

Cellular · Sub-1 GHz LPWAN & ISM · WiFi/WLAN · 2.4 GHz ISM · GNSS ·  
MIMO · UHF/VHF · Other Antennas · Antenna Mounts



# About Joymax Inc.

Joymax Inc. founded in 1994 manufactures wireless components including antennas, RF connectors and cables assemblies for Internet of Things (IoT) application. Antennas for wireless IoT can be a design challenge. The Joymax team relentlessly focuses on ensuring customer successful product launches by guiding customers through selection and adoption of the best antenna for each individual design. Joymax lives in EnJOY MAX Wireless®. With easy to use products and a focus on customer service, Joymax strives to make every customer engineer success in making wireless design.

For Internet of Things and LPWA applications, Joymax has antenna, connector and cable offerings that support LTE-M (Cat-M1), NB-IoT, LoRaWAN™, as well as, LTE offerings. These include external antennas for permanent or connector attachment, and embedded ceramic and chip antenna offerings. The Joymax antenna portfolio covers single-band solutions for targeted applications, multi-band and wideband antennas to cover wireless mobile network operator and cellular carrier operation, and specialty IoT frequency bands plus GPS/GNSS or 2.4 GHz protocols like WiFi, Bluetooth®, ZigBee® and Thread®.

## Support and Service

In addition to antenna products, Joymax offers design support and services:

- Complimentary design reviews
- Complimentary antenna-matching circuit design
- Full-custom and semi-custom antenna and cable assembly design and documentation

## Brand Promise

If you choose to incorporate our components in your design, we relentlessly focus on ensuring your successful product launches.

## How to Purchase

Joymax sells directly and through a global network of distributors, catalog houses and representatives. See the full list of distributors at the end of this catalog or visit:

<https://www.joymax.com.tw/en/>

## Contact Information

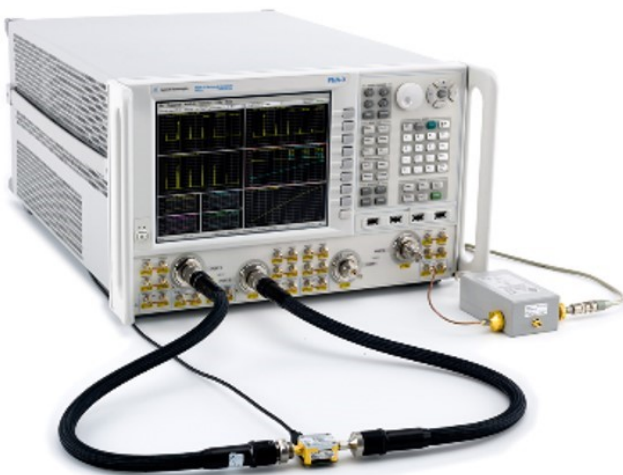
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[www.joymax.com.tw](http://www.joymax.com.tw)

## Headquarters and Factory

Joymax Inc. 5, Dong-Yuan 2<sup>nd</sup> Road, Zhong-Li Dist., Tao-Yuan City 320023 Taiwan (R.O.C.)



## Catalog Organization

Antenna product listings are grouped by application, mounting location and mounting type as defined below. Within each grouping, antennas are listed by part number and series, summary applications and characteristics, and termination type for ease of product selection. An asterisk (\*) may be used in a part number to denote multiple antenna termination options or cable length options.

## Application

### Cellular

Joymax cellular antennas support cellular and cellular IoT/cellular LPWA applications including:

- 5G, 4G, 3G, 2G
- LTE, UMTS, GSM
- LTE-M (Cat-M1)
- NB-IoT
- CBRS

### Sub-1 GHz LPWA & ISM

Joymax sub-1 GHz antennas for LPWA and ISM applications offer single-band options in multiple styles, mounting, and terminations at 433 MHz, 490 MHz, 868 MHz and 915 MHz in support of applications including:

- LoRaWAN®
- Sigfox®
- Weightless-P™
- WiFi HaLow™

### WiFi/WLAN

Joymax Tri-band 2.4 GHz, 5 GHz and 6 GHz antenna solutions target wireless LAN (WiFi/WLAN) applications including:

- WiFi 7/ WiFi 6E
- WiFi 6
- WiFi 5
- WiFi 4
- U-NII 1-4, 5-8
- 802.11b/g/n/ac/ax/be

### 2.4 GHz ISM

Joymax 2.4 GHz single-band antennas provide a broad range of styles, mounting, termination and levels of performance to accommodate ISM applications including:

- Bluetooth®
- ZigBee®
- Thread®
- IEEE 802.11b/g
- IEEE 802.15.4

### GNSS

Joymax offers global navigation satellite system (GNSS) antennas for systems including:

- GPS
- Galileo
- GLONASS
- BeiDou/COMPASS

### Other

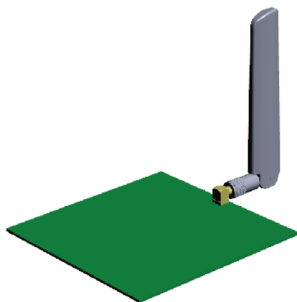
- NFC, UWB
- VHF/UHF
- 403 MHz
- 418 MHz

## Mounting Location

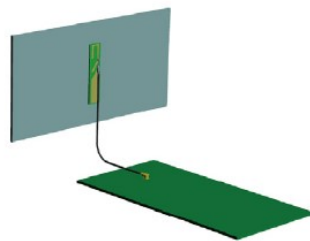
|                          |   |
|--------------------------|---|
| <b>Internal/Embedded</b> | Antenna mounts inside an enclosure  |
| <b>External</b>          | Antenna mounts on the outside of an enclosure                                 |
| <b>Remote</b>            | Antenna mounts away from an enclosure with cabled connection to the enclosure |

## Mounting Type

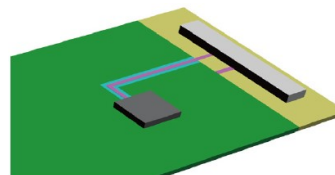
|                      |   |
|----------------------|---|
| <b>Connector</b>     | Connector (e.g. SMA) directly attaches antenna to mounting location                   |
| <b>Adhesive</b>      | Antenna mounts to mounting location using adhesive                                    |
| <b>Surface Mount</b> | Antenna mounts directly to printed circuit board with surface mount solder connection |
| <b>Panel Mount</b>   | Antenna mounts to enclosure panel/surface and signal connects to radio via cable      |
| <b>Bracket</b>       | Antenna mounts to mounting location via bracket                                       |
| <b>Magnetic</b>      | Antenna mounts to mounting location via magnetic base                                 |
| <b>Through Hole</b>  | Antenna mounts to printed circuit board with a through hole solder connection         |



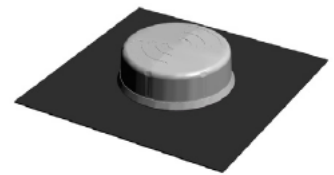
Connector Mount



Adhesive Mount



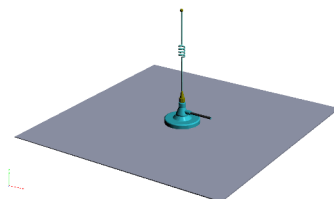
Surface Mount



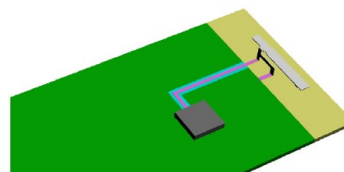
Panel Mount



Bracket Mount



Magnetic Mount



Through Hole Mount

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# Cellular Antennas


Joymax antennas offer a various range of types, mounting and connections, supporting cellular and cellular IoT applications including:

- 5G, 4G, 3G, 2G
- LTE, UMTS, GSM
- LTE-M (Cat-M1)
- NB-IoT
- CBRS

Data is provided by frequency band in MHz. LTE/5G NR band names may be cross-referenced to frequencies using the band table on pages [69](#), [70](#) and [71](#).


## Internal

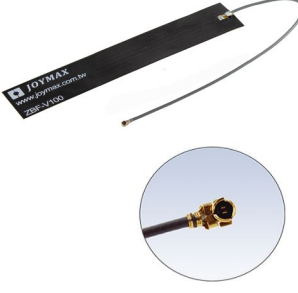
### Surface Mount

| <b>ZRD-C042XX3B</b>  | <b>Overview</b>                          | <b>Electrical Data</b> |            |                  |                      | <b>Mechanical Data</b> |                |
|--|--|------------------------|------------|------------------|----------------------|------------------------|----------------|
|  | 5G Cellular Multi-band Monopole PCB Chip | Frequency (MHz)        | VSWR (Max) | Peak Gain (dBi)  | Efficiency (%)       | Mounting Type          | Surface Mount  |
|  |  | 617-960                | 2.8        | 1.4              | 47                   | Termination            | Solder Pad     |
|  |  | 1710-2690              | 3.0        | 4.8              | 60                   | Dimensions             | 42x7.5x3.2 mm  |
|  |  | 3300-4200              | 2.4        | 3.1              | 52                   | Op. Temp.              | -40°C to +85°C |
|  |  | 4400-5000              | 2.3        | 3.3              | 62                   | Ground Plane           | 140 x 50 mm    |
|  |  | 5150-5850              | 2.8        | 4.8              | 58                   |                        |                |
|  |  | 5925-7125              | 2.5        | 3.7              | 55                   |                        |                |
|  |  | Polarization           |            |                  | Linear               |                        |                |
|  |  | Wavelength             |            |                  | $\frac{1}{4}\lambda$ |                        |                |
|  |  | Electrical Type        |            |                  | Monopole             |                        |                |
|  | Radiation Pattern                        |                        |            | Omni directional |                      |                        |                |
|  | Impedance (Ohms)                         |                        |            | 50               |                      |                        |                |

## Internal

### Adhesive Mount





| <u>ZRF-V092MP3B-*</u>   | Overview  | Electrical Data   |            |                 |                  | Mechanical Data |                           |
|---|---|-------------------|------------|-----------------|------------------|-----------------|---------------------------|
|  | 5G/LTE Cellular Multiband Adhesive Dipole PCB Rigid Flat Patch with Coax Cable<br><br><b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)   | Mounting Type   | Adhesive Mount            |
|   |   | 617-960           | 3.0        | 3.1             | 35               | Termination*    | MHF1 Plug<br>MHF4L Plug   |
|   |   | 1710-2690         | 2.1        | 4.0             | 55               | Dimensions      | 92x18x1.1 mm              |
|   |   | 3300-4200         | 1.9        | 2.6             | 49               | Op. Temp.       | -40°C to +85°C            |
|   |   | 4400-5000         | 1.9        | 4.3             | 53               | Cable Type      | ∅1.13 mm                  |
|   |   | 5150-5850         | 1.8        | 4.0             | 50               | Cable Length*   | 60 mm<br>120 mm<br>180 mm |
|   |   | 5925-7125         | 2.9        | 5.1             | 38               |                 |                           |
|   |   | Polarization      |            |                 | Linear           |                 |                           |
|   |   | Wavelength        |            |                 | ½-λ              |                 |                           |
|   |   | Electrical Type   |            |                 | Dipole           |                 |                           |
|   |   | Radiation Pattern |            |                 | Omni directional |                 |                           |
|   |   | Impedance (Ohms)  |            |                 | 50               |                 |                           |

| <u>ZBF-V100MP3B-*</u>  | Overview   | Electrical Data   |            |                 |                  | Mechanical Data |                           |
|--|--|-------------------|------------|-----------------|------------------|-----------------|---------------------------|
|  | 5G/LTE Cellular Multiband Adhesive Dipole FPC Flexible Flat Patch with Coax Cable<br><br><b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)   | Mounting Type   | Adhesive Mount            |
|  |  | 617-960           | 2.4        | 3.3             | 43               | Termination*    | MHF1 Plug<br>MHF4L Plug   |
|  |  | 1710-2690         | 2.0        | 4.1             | 53               | Dimensions      | 100x18x0.25 mm            |
|  |  | 3300-4200         | 1.7        | 3.1             | 51               | Op. Temp.       | -40°C to +85°C            |
|  |  | 4400-5000         | 2.0        | 4.1             | 57               | Cable Type      | ∅1.13 mm                  |
|  |  | 5150-5850         | 1.8        | 4.8             | 56               | Cable Length*   | 60 mm<br>120 mm<br>180 mm |
|  |  | 5925-7125         | 1.9        | 5.0             | 42               |                 |                           |
|  |  | Polarization      |            |                 | Linear           |                 |                           |
|  |  | Wavelength        |            |                 | ½-λ              |                 |                           |
|  |  | Electrical Type   |            |                 | Dipole           |                 |                           |
|  |  | Radiation Pattern |            |                 | Omni directional |                 |                           |
|  |  | Impedance (Ohms)  |            |                 | 50               |                 |                           |

# Cellular

## External

### Connector Mount

| <u>ZWX-180ASA3B</u>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|---|--|--|------------------------|------------------|-------------------|------------------|---------|----------------------|----------|------------------|-----------|-----|------|----|--|---------------|-----------|--------------|--|---------------|-----------|--------------|-------------------------|--------------|--------------|-----------|----------------|-----|-----|----|--|---------------|-----------|--------------|-------------------------|------------|------------|-----------|----------------|-----------|------|
|    | Outdoor 5G Cellular Multiband Tilt/Swivel Dipole Whip  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>2.5</td> <td>1.5</td> <td>38</td> </tr> <tr> <td>1710-2690</td> <td>3.2</td> <td>2.8</td> <td>44</td> </tr> <tr> <td>3300-4200</td> <td>2.0</td> <td>2.8</td> <td>47</td> </tr> <tr> <td>4400-5000</td> <td>1.7</td> <td>2.4</td> <td>43</td> </tr> <tr> <td>5150-5850</td> <td>2.6</td> <td>2.6</td> <td>48</td> </tr> <tr> <td>5925-7125</td> <td>2.8</td> <td>3.1</td> <td>43</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 617-960 | 2.5                  | 1.5      | 38               | 1710-2690 | 3.2 | 2.8  | 44 | 3300-4200  | 2.0           | 2.8       | 47           | 4400-5000  | 1.7           | 2.4       | 43           | 5150-5850               | 2.6          | 2.6          | 48        | 5925-7125      | 2.8 | 3.1 | 43 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>203xø13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 203xø13 mm | Op. Temp. | -30°C to +70°C | IP Rating | IP67 |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%)   |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 617-960   | 2.5  | 1.5  | 38                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 1710-2690   | 3.2  | 2.8  | 44                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 3300-4200   | 2.0  | 2.8  | 47                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 4400-5000   | 1.7  | 2.4  | 43                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 5150-5850   | 2.6  | 2.6  | 48                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 5925-7125   | 2.8  | 3.1  | 43                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Mounting Type   | Connector  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Termination*  | SMA Plug<br>RP-SMA Plug  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Dimensions  | 203xø13 mm   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| IP Rating   | IP67   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Wavelength             | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole   | Omni directional | 50        |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern      | Impedance (Ohms) |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional       | 50               |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>ZWX-180BSA3B</b>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|   | 5G Cellular Multiband Tilt/Swivel Dipole Whip  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>2.5</td> <td>1.5</td> <td>38</td> </tr> <tr> <td>1710-2690</td> <td>3.2</td> <td>2.8</td> <td>44</td> </tr> <tr> <td>3300-4200</td> <td>2.0</td> <td>2.8</td> <td>47</td> </tr> <tr> <td>4400-5000</td> <td>1.7</td> <td>2.4</td> <td>43</td> </tr> <tr> <td>5150-5850</td> <td>2.6</td> <td>2.6</td> <td>48</td> </tr> <tr> <td>5925-7125</td> <td>2.8</td> <td>3.1</td> <td>43</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 617-960 | 2.5                  | 1.5      | 38               | 1710-2690 | 3.2 | 2.8  | 44 | 3300-4200  | 2.0           | 2.8       | 47           | 4400-5000  | 1.7           | 2.4       | 43           | 5150-5850               | 2.6          | 2.6          | 48        | 5925-7125      | 2.8 | 3.1 | 43 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>203xø13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>   | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 203xø13 mm | Op. Temp. | -30°C to +70°C |           |      |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%)   |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 617-960   | 2.5  | 1.5  | 38                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 1710-2690   | 3.2  | 2.8  | 44                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 3300-4200   | 2.0  | 2.8  | 47                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 4400-5000   | 1.7  | 2.4  | 43                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 5150-5850   | 2.6  | 2.6  | 48                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 5925-7125   | 2.8  | 3.1  | 43                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Mounting Type   | Connector  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Termination*  | SMA Plug<br>RP-SMA Plug  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Dimensions  | 203xø13 mm   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Wavelength             | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole   | Omni directional | 50        |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern      | Impedance (Ohms) |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional       | 50               |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>YWX-100BSA2B</b>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|  | 4G LTE Cellular Multiband Tilt/Swivel Monopole Whip  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>2.4</td> <td>0</td> <td>35</td> </tr> <tr> <td>1710-2170</td> <td>2.2</td> <td>-0.1</td> <td>32</td> </tr> <tr> <td>2300-2700</td> <td>2.7</td> <td>0</td> <td>34</td> </tr> </tbody> </table>  | Frequency (MHz)        | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 617-960 | 2.4                  | 0        | 35               | 1710-2170 | 2.2 | -0.1 | 32 | 2300-2700  | 2.7           | 0         | 34           | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>124xø13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions   | 124xø13 mm   | Op. Temp. | -30°C to +70°C |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%)   |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 617-960   | 2.4  | 0  | 35                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 1710-2170   | 2.2  | -0.1   | 32                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 2300-2700   | 2.7  | 0  | 34                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Mounting Type   | Connector  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Termination*  | SMA Plug<br>RP-SMA Plug  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Dimensions  | 124xø13 mm   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>Applications</b><br>4G LTE, UMTS, LTE-M (Cat-M1), NB-IoT, GSM, LPWA              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Wavelength             | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole   | Omni directional | 50        |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern      | Impedance (Ohms) |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional       | 50               |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>CWX-291XSAXB</b>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|  | Cellular Multiband Tilt/Swivel Monopole Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>860-930</td> <td>2.7</td> <td>1.3</td> <td>50</td> </tr> <tr> <td>1710-2170</td> <td>2.7</td> <td>2.5</td> <td>65</td> </tr> </tbody> </table>   | Frequency (MHz)        | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 860-930 | 2.7                  | 1.3      | 50               | 1710-2170 | 2.7 | 2.5  | 65 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>70xø13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Ground Plane</td> <td>120 x 120 mm</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug  | Dimensions    | 70xø13 mm | Op. Temp.    | -30°C to +70°C          | Ground Plane | 120 x 120 mm |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%)   |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 860-930   | 2.7  | 1.3  | 50                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| 1710-2170   | 2.7  | 2.5  | 65                     |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Mounting Type   | Connector  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Termination*  | SMA Plug<br>RP-SMA Plug  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Dimensions  | 70xø13 mm  |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Ground Plane  | 120 x 120 mm   |  |                        |                  |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| <b>Applications</b><br>LTE-M (Cat-M1), NB-IoT, GSM, LPWA                            | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{4}\lambda</math></td> <td>Monopole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength             | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{4}\lambda$ | Monopole | Omni directional | 50        |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern      | Impedance (Ohms) |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |
| Linear  | $\frac{1}{4}\lambda$   | Monopole   | Omni directional       | 50               |                   |                  |         |                      |          |                  |           |     |      |    |  |               |           |              |  |               |           |              |                         |              |              |           |                |     |     |    |  |               |           |              |                         |            |            |           |                |           |      |

## External

### Connector Mount

#### ZGX-1023NF3W



##### Overview

Outdoor 5G Cellular Multiband  
Dipole Fiberglass Baton/Stick

##### Applications

5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS

##### Electrical Data

| Frequency (MHz)   | VSWR (Max)           | Peak Gain (dBi) | Efficiency (%) |
|-------------------|----------------------|-----------------|----------------|
| 617-960           | 2.2                  | 2.4             | 47             |
| 1710-2690         | 2.7                  | 2.7             | 49             |
| 3300-4200         | 2.3                  | 3.3             | 52             |
| 4400-5000         | 2.8                  | 4.3             | 43             |
| 5150-5850         | 2.4                  | 4.8             | 57             |
| 5925-7125         | 2.5                  | 3.8             | 52             |
| Polarization      | Linear               |                 |                |
| Wavelength        | $\frac{1}{2}\lambda$ |                 |                |
| Electrical Type   | Dipole               |                 |                |
| Radiation Pattern | Omni directional     |                 |                |
| Impedance (Ohms)  | 50                   |                 |                |

##### Mechanical Data

|               |                            |
|---------------|----------------------------|
| Mounting Type | Connector Mount            |
| Termination*  | N-Type Jack<br>N-Type Plug |
| Dimensions    | 145x $\varnothing$ 25 mm   |
| Op. Temp.     | -40°C to +85°C             |
| IP Rating     | IP67                       |

#### ZGX-1123NX3W



##### Overview

Outdoor 5G Cellular Multiband  
Dipole Fiberglass Baton/Stick

##### Applications

5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS

##### Electrical Data

| Frequency (MHz)   | VSWR (Max)           | Peak Gain (dBi) | Efficiency (%) |
|-------------------|----------------------|-----------------|----------------|
| 617-960           | 2.1                  | 2.7             | 55             |
| 1710-2690         | 2.5                  | 3.4             | 65             |
| 3300-4200         | 2.3                  | 2.2             | 68             |
| 4400-5000         | 3.0                  | 3.6             | 56             |
| 5150-5850         | 2.4                  | 4.0             | 58             |
| 5925-7125         | 2.0                  | 4.5             | 55             |
| Polarization      | Linear               |                 |                |
| Wavelength        | $\frac{1}{2}\lambda$ |                 |                |
| Electrical Type   | Dipole               |                 |                |
| Radiation Pattern | Omni directional     |                 |                |
| Impedance (Ohms)  | 50                   |                 |                |

##### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | N-Type Plug              |
| Dimensions    | 152x $\varnothing$ 24 mm |
| Op. Temp.     | -40°C to +85°C           |
| IP Rating     | IP67                     |

# Cellular

## External

### Connector Mount

#### ZHX-150XNX3B



| Overview  | Electrical Data |            |                      |                | Mechanical Data |                 |
|---|-----------------|------------|----------------------|----------------|-----------------|-----------------|
| 5G Cellular Multi-band Straight Dipole Blade                                      | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Connector Mount |
|   | 617-960         | 2.2        | 2.2                  | 51             | Termination     | N-Type Plug     |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS | 1710-2690       | 2.8        | 3.3                  | 53             | Dimensions      | 178xø21 mm      |
|   | 3300-4200       | 2.4        | 2.5                  | 55             | Op. Temp.       | -40°C to +85°C  |
|   | 4400-5000       | 3.1        | 4.3                  | 59             | IP Rating       | IP67            |
|   | 5150-5925       | 2.7        | 4.7                  | 53             |                 |                 |
|   | 5925-7125       | 3.9        | 4.2                  | 46             |                 |                 |
|   | Polarization    |            |                      | Linear         |                 |                 |
| Wavelength  |                 |            | $\frac{1}{2}\lambda$ |                |                 |                 |
| Electrical Type   |                 |            | Dipole               |                |                 |                 |
| Radiation Pattern   |                 |            | Omni directional     |                |                 |                 |
| Impedance (Ohms)  |                 |            | 50                   |                |                 |                 |

#### ZHX-150XNF3B



| Overview  | Electrical Data |            |                      |                | Mechanical Data |                 |
|---|-----------------|------------|----------------------|----------------|-----------------|-----------------|
| 5G Cellular Multi-band Straight Dipole Blade                                      | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Connector Mount |
|   | 617-960         | 2.2        | 2.2                  | 51             | Termination     | N-Type Jack     |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS | 1710-2690       | 2.8        | 3.3                  | 53             | Dimensions      | 183xø21 mm      |
|   | 3300-4200       | 2.4        | 2.5                  | 55             | Op. Temp.       | -40°C to +85°C  |
|   | 4400-5000       | 3.1        | 4.3                  | 59             | IP Rating       | IP67            |
|   | 5150-5850       | 2.7        | 4.7                  | 53             |                 |                 |
|   | 5925-7125       | 3.9        | 4.2                  | 46             |                 |                 |
|   | Polarization    |            |                      | Linear         |                 |                 |
| Wavelength  |                 |            | $\frac{1}{2}\lambda$ |                |                 |                 |
| Electrical Type   |                 |            | Dipole               |                |                 |                 |
| Radiation Pattern   |                 |            | Omni directional     |                |                 |                 |
| Impedance (Ohms)  |                 |            | 50                   |                |                 |                 |




#### ZHX-713ASA4B



| Overview  | Electrical Data |            |                      |                | Mechanical Data |                 |
|---|-----------------|------------|----------------------|----------------|-----------------|-----------------|
| 5G Cellular Multi-band Straight Dipole Blade                                      | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Connector Mount |
|   | 617-960         | 2.4        | 2.1                  | 41             | Termination*    | SMA Plug        |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS | 1710-2690       | 2.0        | 3.7                  | 49             |                 | RP-SMA Plug     |
|   | 3300-4200       | 1.9        | 2.7                  | 52             | Dimensions      | 165x26x13 mm    |
|   | 4400-5000       | 1.9        | 2.8                  | 56             | Op. Temp.       | -30°C to +70°C  |
|   | 5150-5850       | 1.6        | 3.6                  | 55             | IP Rating       | IP67            |
|   | 5925-7125       | 1.7        | 3.9                  | 52             |                 |                 |
|   | Polarization    |            |                      | Linear         |                 |                 |
| Wavelength  |                 |            | $\frac{1}{2}\lambda$ |                |                 |                 |
| Electrical Type   |                 |            | Dipole               |                |                 |                 |
| Radiation Pattern   |                 |            | Omni directional     |                |                 |                 |
| Impedance (Ohms)  |                 |            | 50                   |                |                 |                 |

## External

### Connector Mount

| <u>ZWX-713ASA4B</u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|---|--|--|-------------------|------------------|-------------------|------------------|---------|----------------------|--------|------------------|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|--|---------------|-----------|--------------|-------------------------|------------|--------------|-----------|----------------|-----------|------|
|    | 450MHz + 5G Cellular Multiband Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>450</td> <td>1.9</td> <td>0.7</td> <td>36</td> </tr> <tr> <td>617-960</td> <td>2.1</td> <td>2.5</td> <td>43</td> </tr> <tr> <td>1710-2690</td> <td>1.8</td> <td>4.0</td> <td>53</td> </tr> <tr> <td>3300-4200</td> <td>1.9</td> <td>3.2</td> <td>63</td> </tr> <tr> <td>4400-5000</td> <td>2.5</td> <td>2.0</td> <td>49</td> </tr> <tr> <td>5150-7125</td> <td>1.7</td> <td>3.8</td> <td>56</td> </tr> </tbody> </table>       | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 450     | 1.9                  | 0.7    | 36               | 617-960   | 2.1 | 2.5 | 43 | 1710-2690 | 1.8 | 4.0 | 53 | 3300-4200 | 1.9 | 3.2 | 63 | 4400-5000 | 2.5 | 2.0 | 49 | 5150-7125 | 1.7 | 3.8 | 56 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>188x27x13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 188x27x13 mm | Op. Temp. | -30°C to +70°C | IP Rating | IP67 |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 450  | 1.9  | 0.7               | 36               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 617-960  | 2.1  | 2.5               | 43               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 1710-2690  | 1.8  | 4.0               | 53               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 3300-4200  | 1.9  | 3.2               | 63               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 4400-5000  | 2.5  | 2.0               | 49               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 5150-7125  | 1.7  | 3.8               | 56               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Dimensions  | 188x27x13 mm   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| IP Rating   | IP67   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| <b>ZWX-715BSA5B</b>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 450MHz + 5G Cellular Multiband Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>450</td> <td>2.2</td> <td>0.5</td> <td>44</td> </tr> <tr> <td>617-960</td> <td>2.1</td> <td>2.3</td> <td>44</td> </tr> <tr> <td>1710-2690</td> <td>1.8</td> <td>4.4</td> <td>61</td> </tr> <tr> <td>3300-4200</td> <td>2.1</td> <td>3.0</td> <td>59</td> </tr> <tr> <td>4400-5000</td> <td>1.8</td> <td>3.1</td> <td>51</td> </tr> <tr> <td>5150-7125</td> <td>1.9</td> <td>4.3</td> <td>62</td> </tr> </tbody> </table>       | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 450     | 2.2                  | 0.5    | 44               | 617-960   | 2.1 | 2.3 | 44 | 1710-2690 | 1.8 | 4.4 | 61 | 3300-4200 | 2.1 | 3.0 | 59 | 4400-5000 | 1.8 | 3.1 | 51 | 5150-7125 | 1.9 | 4.3 | 62 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>183x28x13mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>  | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 183x28x13mm  | Op. Temp. | -30°C to +70°C |           |      |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 450  | 2.2  | 0.5               | 44               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 617-960  | 2.1  | 2.3               | 44               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 1710-2690  | 1.8  | 4.4               | 61               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 3300-4200  | 2.1  | 3.0               | 59               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 4400-5000  | 1.8  | 3.1               | 51               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 5150-7125  | 1.9  | 4.3               | 62               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Dimensions  | 183x28x13mm  |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Op. Temp.   | -30°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| <b>ZWX-720XSA3B</b>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|  | 5G Cellular Multi-band Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>698-960</td> <td>2.2</td> <td>1.0</td> <td>56</td> </tr> <tr> <td>1710-2690</td> <td>2.3</td> <td>2.6</td> <td>64</td> </tr> <tr> <td>3300-4200</td> <td>2.5</td> <td>2.4</td> <td>62</td> </tr> <tr> <td>4400-5000</td> <td>2.3</td> <td>2.6</td> <td>61</td> </tr> <tr> <td>5150-5850</td> <td>2.0</td> <td>2.7</td> <td>61</td> </tr> <tr> <td>5925-7125</td> <td>2.5</td> <td>2.5</td> <td>66</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 698-960 | 2.2                  | 1.0    | 56               | 1710-2690 | 2.3 | 2.6 | 64 | 3300-4200 | 2.5 | 2.4 | 62 | 4400-5000 | 2.3 | 2.6 | 61 | 5150-5850 | 2.0 | 2.7 | 61 | 5925-7125 | 2.5 | 2.5 | 66 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>222x28x14 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-20°C to +70°C</td> </tr> </tbody> </table>   | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 222x28x14 mm | Op. Temp. | -20°C to +70°C |           |      |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 698-960  | 2.2  | 1.0               | 56               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 1710-2690  | 2.3  | 2.6               | 64               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 3300-4200  | 2.5  | 2.4               | 62               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 4400-5000  | 2.3  | 2.6               | 61               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 5150-5850  | 2.0  | 2.7               | 61               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | 5925-7125  | 2.5  | 2.5               | 66               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Dimensions  | 222x28x14 mm   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Op. Temp.   | -20°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |           |      |

# Cellular

## External

### Connector Mount

#### ZWX-711BSA3B



##### Overview

5G Cellular Multi-band Tilt/Swivel Dipole Blade

##### Applications

5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS

##### Electrical Data

| Frequency (MHz)   | VSWR (Max)           | Peak Gain (dBi) | Efficiency (%) |
|-------------------|----------------------|-----------------|----------------|
| 617-960           | 2.5                  | 2.7             | 54             |
| 1710-2690         | 2.1                  | 3.8             | 67             |
| 3300-4200         | 1.6                  | 3.0             | 62             |
| 4400-5000         | 1.8                  | 3.2             | 52             |
| 5150-5850         | 1.9                  | 2.8             | 50             |
| 5925-7125         | 2.0                  | 3.5             | 46             |
| Polarization      | Linear               |                 |                |
| Wavelength        | $\frac{1}{2}\lambda$ |                 |                |
| Electrical Type   | Dipole               |                 |                |
| Radiation Pattern | Omni directional     |                 |                |
| Impedance (Ohms)  | 50                   |                 |                |

##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 136x24x11 mm            |
| Op. Temp.     | -30°C to +70°C          |

#### ZWX-721XSA2B



##### Overview

5G Cellular Multi-band Tilt/Swivel Dipole Blade

##### Applications

5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS

##### Electrical Data




| Frequency (MHz)   | VSWR (Max)           | Peak Gain (dBi) | Efficiency (%) |
|-------------------|----------------------|-----------------|----------------|
| 617-960           | 2.0                  | 2.1             | 51             |
| 1710-2690         | 2.9                  | 4.4             | 65             |
| 3300-4200         | 2.7                  | 2.8             | 68             |
| 4400-5000         | 2.0                  | 3.7             | 54             |
| 5150-5850         | 2.6                  | 4.8             | 52             |
| Polarization      | Linear               |                 |                |
| Wavelength        | $\frac{1}{2}\lambda$ |                 |                |
| Electrical Type   | Dipole               |                 |                |
| Radiation Pattern | Omni directional     |                 |                |
| Impedance (Ohms)  | 50                   |                 |                |

##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 150x22x11 mm            |
| Op. Temp.     | -20°C to +70°C          |

## External

### Connector Mount

| <u>ZWX-6231SA4B</u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|---|--|--|-------------------|------------------|-------------------|------------------|---------|----------------------|--------|------------------|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|--|---------------|-----------|--------------|-------------------------|------------|--------------|-----------|----------------|
|    | 450MHz + 5G Cellular Multiband Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>450</td> <td>1.6</td> <td>1.2</td> <td>45</td> </tr> <tr> <td>617-960</td> <td>2.6</td> <td>2.0</td> <td>51</td> </tr> <tr> <td>1710-2690</td> <td>2.5</td> <td>3.5</td> <td>63</td> </tr> <tr> <td>3300-5000</td> <td>2.0</td> <td>4.0</td> <td>60</td> </tr> <tr> <td>5150-5850</td> <td>1.8</td> <td>4.7</td> <td>65</td> </tr> <tr> <td>5925-7125</td> <td>1.8</td> <td>3.8</td> <td>60</td> </tr> </tbody> </table>       | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 450     | 1.6                  | 1.2    | 45               | 617-960   | 2.6 | 2.0 | 51 | 1710-2690 | 2.5 | 3.5 | 63 | 3300-5000 | 2.0 | 4.0 | 60 | 5150-5850 | 1.8 | 4.7 | 65 | 5925-7125 | 1.8 | 3.8 | 60 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>205x25x13mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>  | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 205x25x13mm  | Op. Temp. | -30°C to +70°C |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 450  | 1.6  | 1.2               | 45               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 617-960  | 2.6  | 2.0               | 51               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 1710-2690  | 2.5  | 3.5               | 63               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 3300-5000  | 2.0  | 4.0               | 60               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5150-5850  | 1.8  | 4.7               | 65               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5925-7125  | 1.8  | 3.8               | 60               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Dimensions  | 205x25x13mm  |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Op. Temp.   | -30°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| <b>ZWX-6141SA3B</b>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5G Cellular Multi-band Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>3.2</td> <td>1.4</td> <td>35</td> </tr> <tr> <td>1710-2690</td> <td>2.1</td> <td>2.8</td> <td>50</td> </tr> <tr> <td>3300-4200</td> <td>1.8</td> <td>1.6</td> <td>51</td> </tr> <tr> <td>4400-5000</td> <td>1.7</td> <td>2.0</td> <td>46</td> </tr> <tr> <td>5150-5850</td> <td>1.9</td> <td>3.4</td> <td>51</td> </tr> <tr> <td>5925-7125</td> <td>2.4</td> <td>3.3</td> <td>48</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 617-960 | 3.2                  | 1.4    | 35               | 1710-2690 | 2.1 | 2.8 | 50 | 3300-4200 | 1.8 | 1.6 | 51 | 4400-5000 | 1.7 | 2.0 | 46 | 5150-5850 | 1.9 | 3.4 | 51 | 5925-7125 | 2.4 | 3.3 | 48 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>160x22x13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 160x22x13 mm | Op. Temp. | -30°C to +70°C |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 617-960  | 3.2  | 1.4               | 35               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 1710-2690  | 2.1  | 2.8               | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 3300-4200  | 1.8  | 1.6               | 51               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 4400-5000  | 1.7  | 2.0               | 46               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5150-5850  | 1.9  | 3.4               | 51               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5925-7125  | 2.4  | 3.3               | 48               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Dimensions  | 160x22x13 mm   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Op. Temp.   | -30°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| <b>ZWX-6221SA4B</b>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|  | 5G Cellular Multi-band Tilt/Swivel Dipole Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>2.6</td> <td>2.5</td> <td>48</td> </tr> <tr> <td>1710-2690</td> <td>2.0</td> <td>4.4</td> <td>63</td> </tr> <tr> <td>3300-4200</td> <td>2.4</td> <td>2.7</td> <td>50</td> </tr> <tr> <td>4400-5000</td> <td>1.8</td> <td>4.9</td> <td>60</td> </tr> <tr> <td>5150-5850</td> <td>1.8</td> <td>5.9</td> <td>63</td> </tr> <tr> <td>5925-7125</td> <td>2.9</td> <td>5.2</td> <td>46</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 617-960 | 2.6                  | 2.5    | 48               | 1710-2690 | 2.0 | 4.4 | 63 | 3300-4200 | 2.4 | 2.7 | 50 | 4400-5000 | 1.8 | 4.9 | 60 | 5150-5850 | 1.8 | 5.9 | 63 | 5925-7125 | 2.9 | 5.2 | 46 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>237x39x13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 237x39x13 mm | Op. Temp. | -30°C to +70°C |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 617-960  | 2.6  | 2.5               | 48               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 1710-2690  | 2.0  | 4.4               | 63               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 3300-4200  | 2.4  | 2.7               | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 4400-5000  | 1.8  | 4.9               | 60               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5150-5850  | 1.8  | 5.9               | 63               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | 5925-7125  | 2.9  | 5.2               | 46               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Mounting Type  | Connector  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
|   | Termination*   | SMA Plug<br>RP-SMA Plug  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Dimensions  | 237x39x13 mm   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Op. Temp.   | -30°C to +70°C   |  |                   |                  |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear  | $\frac{1}{2}\lambda$ | Dipole | Omni directional | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |         |                      |        |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |  |               |           |              |                         |            |              |           |                |

# Cellular

## External

### Panel Mount

#### ZHX-3802NF3B



| Overview   | Electrical Data      |            |                 |                | Mechanical Data |                |
|--|----------------------|------------|-----------------|----------------|-----------------|----------------|
| 5G Cellular Multi-band Dipole<br>Dome/Saltshaker                                     | Frequency (MHz)      | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | Mounting Type   | Panel Mount    |
|  | 617-960              | 3.6        | 4.1             | 78             | Termination     | N-Type Jack    |
| <b>Applications</b><br>5G NR FR1, 4G<br>LTE, UMTS, GSM,<br>LTE-M (Cat-M1),<br>NB-IoT | 1710-2690            | 2.8        | 7.1             | 76             | Dimensions      | 77.7xø38 mm    |
|  | 3300-4200            | 2.3        | 6.8             | 70             | Op. Temp.       | -40°C to +85°C |
|  | 4400-5000            | 2.5        | 6.2             | 76             | IP Rating       | IP67           |
|  | 5150-5850            | 2.0        | 10.0            | 80             | Ground Plane    | 350 x 350 mm   |
|  | 5925-7125            | 2.8        | 8.9             | 75             |                 |                |
| Polarization   | Linear               |            |                 |                |                 |                |
| Wavelength   | $\frac{1}{2}\lambda$ |            |                 |                |                 |                |
| Electrical Type  | Dipole               |            |                 |                |                 |                |
| Radiation Pattern  | Omni directional     |            |                 |                |                 |                |
| Impedance (Ohms)   | 50                   |            |                 |                |                 |                |

#### ZHX-3602NF6B



| Overview   | Electrical Data      |            |                 |                | Mechanical Data |                |
|--|----------------------|------------|-----------------|----------------|-----------------|----------------|
| 5G Cellular Multi-band Dipole<br>Dome/Saltshaker                                     | Frequency (MHz)      | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | Mounting Type   | Panel Mount    |
|  | 698-960              | 3.6        | 2.4             | 63             | Termination     | N-Type Jack    |
| <b>Applications</b><br>5G NR FR1, 4G<br>LTE, UMTS, GSM,<br>LTE-M (Cat-M1),<br>NB-IoT | 1710-2690            | 2.2        | 3.8             | 65             | Dimensions      | 71xø40.2 mm    |
|  | 3300-3800            | 1.8        | 4.5             | 51             | Op. Temp.       | -30°C to +70°C |
|  | 4200-5000            | 3.3        | 3.4             | 55             | IP Rating       | IP65           |
|  | 5150-5850            | 3.2        | 5.1             | 52             | Ground Plane    | 350 x 350 mm   |
|  |                      |            |                 |                |                 |                |
| Polarization   | Linear               |            |                 |                |                 |                |
| Wavelength   | $\frac{1}{2}\lambda$ |            |                 |                |                 |                |
| Electrical Type  | Dipole               |            |                 |                |                 |                |
| Radiation Pattern  | Omni directional     |            |                 |                |                 |                |
| Impedance (Ohms)   | 50                   |            |                 |                |                 |                |

#### ZHX-095ANF3B




New



| Overview   | Electrical Data      |            |                 |                | Mechanical Data |                |
|--|----------------------|------------|-----------------|----------------|-----------------|----------------|
| 5G Cellular Multi-band Monopole<br>Dome  | Frequency (MHz)      | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | Mounting Type   | Panel Mount    |
|  | 617-960              | 2.2        | 3.1             | 36             | Termination     | N-Type Jack    |
| <b>Applications</b><br>5G NR FR1, 4G<br>LTE, UMTS, GSM,<br>LTE-M (Cat-M1),<br>NB-IoT | 1710-2690            | 2.3        | 4.3             | 66             | Dimensions      | 35xø96 mm      |
|  | 3300-4200            | 2.1        | 4.5             | 54             | Op. Temp.       | -40°C to +85°C |
|  | 4400-5000            | 2.5        | 4.3             | 51             | IP Rating       | IP67           |
|  | 5150-5850            | 1.8        | 3.0             | 53             |                 |                |
|  | 5925-7125            | 2.0        | 2.5             | 45             |                 |                |
| Polarization   | Linear               |            |                 |                |                 |                |
| Wavelength   | $\frac{1}{4}\lambda$ |            |                 |                |                 |                |
| Electrical Type  | Monopole             |            |                 |                |                 |                |
| Radiation Pattern  | Omni directional     |            |                 |                |                 |                |
| Impedance (Ohms)   | 50                   |            |                 |                |                 |                |

## External

### Panel Mount

| <u>ZHF-3802SA3B-*</u>  | <b>Overview</b>   | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
|--|---|--|------------------------|----------------|-----------------|-----------------|---------|-------------------|------------------|------------------|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|---|---------------|-------------|-------------|--|---------------|-------------|-------------|----------------|------------|-------------|---------------|--------------------|------------|------|---------------|--------------------|-----------|------|
|   | 5G Cellular Multi-band Dipole<br>Dome /Saltshaker<br>Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>3.3</td> <td>2.8</td> <td>57</td> </tr> <tr> <td>1710-2690</td> <td>2.3</td> <td>3.2</td> <td>55</td> </tr> <tr> <td>3300-4200</td> <td>3.3</td> <td>3.2</td> <td>35</td> </tr> <tr> <td>4400-5000</td> <td>2.4</td> <td>3.6</td> <td>47</td> </tr> <tr> <td>5150-5850</td> <td>2.7</td> <td>5.7</td> <td>44</td> </tr> <tr> <td>5925-7125</td> <td>2.8</td> <td>3.4</td> <td>32</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 617-960 | 3.3               | 2.8              | 57               | 1710-2690 | 2.3 | 3.2 | 55 | 3300-4200 | 3.3 | 3.2 | 35 | 4400-5000 | 2.4 | 3.6 | 47 | 5150-5850 | 2.7 | 5.7 | 44 | 5925-7125   | 2.8           | 3.4         | 32          | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Panel Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>77.7xø38 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>Cable Type</td> <td>RG58</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Panel Mount | Termination | SMA Plug       | Dimensions | 77.7xø38 mm | Op. Temp.     | -40°C to +85°C     | Cable Type | RG58 | Cable Length* | 1000 mm<br>2000 mm | IP Rating | IP67 |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 617-960  | 3.3   | 2.8  | 57                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 1710-2690  | 2.3   | 3.2  | 55                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 3300-4200  | 3.3   | 3.2  | 35                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 4400-5000  | 2.4   | 3.6  | 47                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 5150-5850  | 2.7   | 5.7  | 44                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 5925-7125  | 2.8   | 3.4  | 32                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Mounting Type  | Panel Mount   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Termination  | SMA Plug  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Dimensions   | 77.7xø38 mm   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Type   | RG58  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Length*  | 1000 mm<br>2000 mm  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| IP Rating  | IP67  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT  | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear                 | Wavelength     | ½-λ             | Electrical Type | Dipole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Polarization   | Linear  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Wavelength   | ½-λ   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Electrical Type  | Dipole  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Radiation Pattern  | Omni directional  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Impedance (Ohms)   | 50  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <u>YHF-3602SA3B-*</u>  | <b>Overview</b>   | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
|    | 4G LTE Cellular Multiband Dipole<br>Dome/Saltshaker<br>Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>698-960</td> <td>3.6</td> <td>2.4</td> <td>63</td> </tr> <tr> <td>1710-2690</td> <td>2.2</td> <td>3.8</td> <td>65</td> </tr> <tr> <td>3300-3800</td> <td>1.8</td> <td>4.5</td> <td>51</td> </tr> <tr> <td>4200-5000</td> <td>3.3</td> <td>3.4</td> <td>55</td> </tr> <tr> <td>5150-5850</td> <td>3.2</td> <td>5.1</td> <td>52</td> </tr> </tbody> </table>   | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 698-960 | 3.6               | 2.4              | 63               | 1710-2690 | 2.2 | 3.8 | 65 | 3300-3800 | 1.8 | 4.5 | 51 | 4200-5000 | 3.3 | 3.4 | 55 | 5150-5850 | 3.2 | 5.1 | 52 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Panel Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>71xø40.2 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table> | Mounting Type | Panel Mount | Termination | SMA Plug   | Dimensions    | 71xø40.2 mm | Op. Temp.   | -30°C to +70°C | Cable Type | RG174       | Cable Length* | 1000 mm<br>2000 mm |            |      |               |                    |           |      |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 698-960  | 3.6   | 2.4  | 63                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 1710-2690  | 2.2   | 3.8  | 65                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 3300-3800  | 1.8   | 4.5  | 51                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 4200-5000  | 3.3   | 3.4  | 55                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 5150-5850  | 3.2   | 5.1  | 52                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Mounting Type  | Panel Mount   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Termination  | SMA Plug  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Dimensions   | 71xø40.2 mm   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Op. Temp.  | -30°C to +70°C  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Type   | RG174   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Length*  | 1000 mm<br>2000 mm  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <b>Applications</b><br>4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT   | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear                 | Wavelength     | ½-λ             | Electrical Type | Dipole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Polarization   | Linear  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Wavelength   | ½-λ   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Electrical Type  | Dipole  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Radiation Pattern  | Omni directional  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Impedance (Ohms)   | 50  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <u>ZHF-095ASA3B-*</u>  | <b>Overview</b>   | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <span style="color: red; font-weight: bold;">New</span><br> | 5G Cellular Multi-band Dipole<br>Dome /Saltshaker with coax cable   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>3.3</td> <td>2.8</td> <td>57</td> </tr> <tr> <td>1710-2690</td> <td>2.3</td> <td>3.2</td> <td>55</td> </tr> <tr> <td>3300-4200</td> <td>3.3</td> <td>3.2</td> <td>35</td> </tr> <tr> <td>4400-5000</td> <td>2.4</td> <td>3.6</td> <td>47</td> </tr> <tr> <td>5150-5850</td> <td>2.7</td> <td>5.7</td> <td>44</td> </tr> <tr> <td>5925-7125</td> <td>2.8</td> <td>3.4</td> <td>32</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 617-960 | 3.3               | 2.8              | 57               | 1710-2690 | 2.3 | 3.2 | 55 | 3300-4200 | 3.3 | 3.2 | 35 | 4400-5000 | 2.4 | 3.6 | 47 | 5150-5850 | 2.7 | 5.7 | 44 | 5925-7125   | 2.8           | 3.4         | 32          | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Panel Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>35xø96 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>Cable Type</td> <td>RG58</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table>   | Mounting Type | Panel Mount | Termination | SMA Plug       | Dimensions | 35xø96 mm   | Op. Temp.     | -40°C to +85°C     | Cable Type | RG58 | Cable Length* | 1000 mm<br>2000 mm | IP Rating | IP67 |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 617-960  | 3.3   | 2.8  | 57                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 1710-2690  | 2.3   | 3.2  | 55                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 3300-4200  | 3.3   | 3.2  | 35                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 4400-5000  | 2.4   | 3.6  | 47                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 5150-5850  | 2.7   | 5.7  | 44                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| 5925-7125  | 2.8   | 3.4  | 32                     |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Mounting Type  | Panel Mount   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Termination  | SMA Plug  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Dimensions   | 35xø96 mm   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Type   | RG58  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Cable Length*  | 1000 mm<br>2000 mm  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| IP Rating  | IP67  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT  | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear                 | Wavelength     | ½-λ             | Electrical Type | Dipole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Polarization   | Linear  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Wavelength   | ½-λ   |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Electrical Type  | Dipole  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Radiation Pattern  | Omni directional  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |
| Impedance (Ohms)   | 50  |  |                        |                |                 |                 |         |                   |                  |                  |           |     |     |    |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |  |               |             |             |                |            |             |               |                    |            |      |               |                    |           |      |

# Cellular

## Remote / Rugged

### Panel Mount

#### YHF-HA02SA1W-\*



#### Overview

4G LTE Cellular  
Multiband Rugged  
Dipole Dome Flying Lead

#### Applications

4G LTE, UMTS,  
GSM, LTE-M (Cat-M1), NB-IoT

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 698-960         | 3.5        | 2.6             | 65             |
| 1710-2690       | 2.8        | 3.1             | 72             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Panel Mount              |
| Termination   | SMA Plug                 |
| Dimensions    | 35x $\varnothing$ 169 mm |
| Op. Temp.     | -40°C to +85°C           |
| Cable Type    | RG58                     |
| Cable Length* | 1000mm<br>2000mm         |
| IP Rating     | IP67                     |

#### ZHF-HA04TC2G-\*



#### Overview

5G/LTE Cellular  
Multiband Rugged  
Dipole Dome burial to roadways

#### Applications

5G, 4G LTE, UMTS,  
GSM, LTE-M (Cat-M1), NB-IoT

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 617-960         | 4.0        | 1.9             | 38             |
| 1710-2690       | 3.5        | 4.3             | 41             |
| 3300-4200       | 3.7        | 2.1             | 32             |
| 4400-5000       | 4.9        | 2.0             | 30             |







|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Burial Mount             |
| Termination   | TNC Plug                 |
| Dimensions    | 55x $\varnothing$ 100 mm |
| Op. Temp.     | -40°C to +85°C           |
| Cable Type    | RG58                     |
| Cable Length* | 1000mm<br>2000mm         |
| IP Rating     | IP67                     |

## Remote


### Adhesive Mount

| <u>ZBF-603XSA3B-*</u>   | Overview  | Electrical Data   |            |                      |                | Mechanical Data |                |         |
|---|---|-------------------|------------|----------------------|----------------|-----------------|----------------|---------|
|    | 5G Cellular Multiband Straight Dipole Adhesive Bar/Blade, Flying Lead             | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Adhesive Mount |         |
|   |   | 617-960           | 1.9        | 3.2                  | 46             | Termination     | SMA Plug       |         |
|   | Cellular Multiband Straight Dipole Adhesive Bar/Blade, Flying Lead                | 1710-2690         | 1.6        | 2.5                  | 39             | Dimensions      | 110x20x6 mm    |         |
|   |   | 3300-4200         | 1.6        | 0.3                  | 28             | Op. Temp.       | -40°C to +85°C |         |
|   |   | 4400-5000         | 1.6        | -1.5                 | 17             | Cable Type      | RG174          |         |
|   |   | 5150-5925         | 1.6        | 0.5                  | 19             | Cable Length*   | 1000 mm        |         |
|   |   | 5925-7125         | 1.8        | 0.2                  | 13             |                 | 2000 mm        |         |
|   |   |                   |            |                      |                |                 |                |         |
|   | <b>Applications</b><br>5G NR FR1, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, CBRS |                   |            |                      |                |                 |                |         |
|   |   | Polarization      |            | Linear               |                |                 |                |         |
|   |   | Wavelength        |            | $\frac{1}{2}\lambda$ |                |                 |                |         |
|   |   | Electrical Type   |            | Dipole               |                |                 |                |         |
|   |   | Radiation Pattern |            | Omni directional     |                |                 |                |         |
|   |   | Impedance (Ohms)  |            | 50                   |                |                 |                |         |
| <u>CAF-601XSA1B-*</u>   | Overview  | Electrical Data   |            |                      |                | Mechanical Data |                |         |
|   | Cellular Multiband Straight Dipole Adhesive Bar/Blade, Flying Lead                | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Adhesive Mount |         |
|   |   | 824-960           | 2.0        | 3.9                  | 76             | Termination     | SMA Plug       |         |
|  | Cellular Multiband Dipole Adhesive Puck, Flying Lead                              | 1710-2170         | 3.4        | 4.3                  | 52             | Dimensions      | 146x20x13 mm   |         |
|   |   |                   |            |                      |                | Op. Temp.       | -30°C to +70°C |         |
|   |   |                   |            |                      |                |                 | Cable Type     | RG174   |
|   |   |                   |            |                      |                |                 | Cable Length*  | 1000 mm |
|   |   |                   |            |                      |                |                 |                | 2000 mm |
|   |   |                   |            |                      |                |                 |                |         |
|   | <b>Applications</b><br>LTE-M (Cat-M1), NB-IoT, UMTS, GSM, LPWA                    |                   |            |                      |                |                 |                |         |
|   |   | Polarization      |            | Linear               |                |                 |                |         |
|   |   | Wavelength        |            | $\frac{1}{2}\lambda$ |                |                 |                |         |
|   |   | Electrical Type   |            | Dipole               |                |                 |                |         |
|   |   | Radiation Pattern |            | Omni directional     |                |                 |                |         |
|   |   | Impedance (Ohms)  |            | 50                   |                |                 |                |         |
| <u>CAF-350XSA1B-*</u>   | Overview  | Electrical Data   |            |                      |                | Mechanical Data |                |         |
|  | Cellular Multiband Dipole Adhesive Puck, Flying Lead                              | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi)      | Efficiency (%) | Mounting Type   | Adhesive Mount |         |
|   |   | 880-960           | 2.7        | 1.6                  | 34             | Termination     | SMA Plug       |         |
|  | Cellular Multiband Dipole Adhesive Puck, Flying Lead                              | 1710-1880         | 2.6        | 1.0                  | 28             | Dimensions      | 9.8xø50 mm     |         |
|   |   |                   |            |                      |                | Op. Temp.       | -30°C to +70°C |         |
|   |   |                   |            |                      |                |                 | Cable Type     | RG174   |
|   |   |                   |            |                      |                |                 | Cable Length*  | 1000 mm |
|   |   |                   |            |                      |                |                 |                | 2000 mm |
|   |   |                   |            |                      |                |                 |                |         |
|   | <b>Applications</b><br>LTE-M (Cat-M1), NB-IoT, UMTS, GSM, LPWA                    |                   |            |                      |                |                 |                |         |
|   |   | Polarization      |            | Linear               |                |                 |                |         |
|   |   | Wavelength        |            | $\frac{1}{2}\lambda$ |                |                 |                |         |
|   |   | Electrical Type   |            | Dipole               |                |                 |                |         |
|   |   | Radiation Pattern |            | Omni directional     |                |                 |                |         |
|   |   | Impedance (Ohms)  |            | 50                   |                |                 |                |         |

# Cellular

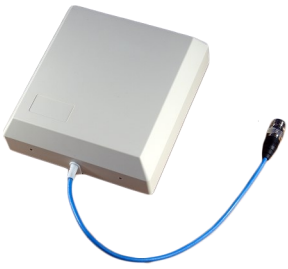



## Remote

### Magnetic Mount

| YAF-129XSA1B-*   | Overview | Electrical Data |            |                 |                | Mechanical Data |                |
|--|----------|-----------------|------------|-----------------|----------------|-----------------|----------------|
|  <p>4G Cellular Multi-band Straight Monopole Magnetic Mount Whip, Flying Lead</p> <p><b>Applications</b><br/>4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT, LPWA</p> |          | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | Mounting Type   | Magnetic Mount |
|  |          | 698-960         | 2.5        | 2.0             | 55             | Termination     | SMA Plug       |
|  |          | 1710-2690       | 2.0        | 3.0             | 63             | Dimensions      | 91xø31 mm      |
|  |          |                 |            |                 |                | Op. Temp.       | -30°C to +70°C |
|  |          |                 |            |                 |                | Cable Type      | RG174          |
|  |          |                 |            |                 |                | Cable Length*   | 1000 mm        |
|  |          |                 |            |                 |                |                 | 2000 mm        |
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## Remote

### Bracket Mount

| <u>SPF-016ANFXW</u>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|---|--|--|------------------------|----------------|----------------------|-----------------|-----------------|-------------------|-------------|------------------|---|---------------|---------------|-------------|-------------|------------|---------------|-----------|----------------|-----------|------|----|-----------|-----|-----|----|-----------|-----|-----|----|--|---------------|---------------|-------------|-------------|------------|---------------|-----------|----------------|------------|-------|--------------|--------|
|    | 5G Cellular Multi-band Directional Patch Panel with RG402 coax cable   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>617-960</td> <td>4.0</td> <td>7.1</td> <td>71</td> </tr> <tr> <td>1710-2690</td> <td>1.5</td> <td>7.6</td> <td>65</td> </tr> <tr> <td>3300-4200</td> <td>1.7</td> <td>6.8</td> <td>54</td> </tr> <tr> <td>4400-5000</td> <td>2.2</td> <td>6.5</td> <td>61</td> </tr> <tr> <td>5150-5850</td> <td>2.9</td> <td>6.5</td> <td>56</td> </tr> <tr> <td>5925-7125</td> <td>3.3</td> <td>4.9</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 617-960         | 4.0               | 7.1         | 71               | 1710-2690   | 1.5           | 7.6           | 65          | 3300-4200   | 1.7        | 6.8           | 54        | 4400-5000      | 2.2       | 6.5  | 61 | 5150-5850 | 2.9 | 6.5 | 56 | 5925-7125 | 3.3 | 4.9 | 50 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Bracket Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-type Jack</td> </tr> <tr> <td>Dimensions</td> <td>165x155x48 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +55°C</td> </tr> <tr> <td>Cable Type</td> <td>RG402</td> </tr> <tr> <td>Cable Length</td> <td>335 mm</td> </tr> </tbody> </table> | Mounting Type | Bracket Mount | Termination | N-type Jack | Dimensions | 165x155x48 mm | Op. Temp. | -40°C to +55°C | Cable Type | RG402 | Cable Length | 335 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 617-960   | 4.0  | 7.1  | 71                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 1710-2690   | 1.5  | 7.6  | 65                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 3300-4200   | 1.7  | 6.8  | 54                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 4400-5000   | 2.2  | 6.5  | 61                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 5150-5850   | 2.9  | 6.5  | 56                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 5925-7125   | 3.3  | 4.9  | 50                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Mounting Type   | Bracket Mount  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Termination   | N-type Jack  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Dimensions  | 165x155x48 mm  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Op. Temp.   | -40°C to +55°C   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Cable Type  | RG402  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Cable Length  | 335 mm   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <b>Applications</b><br>5G, 4G LTE, UMTS, GSM, LTE-M (Cat-M1), NB-IoT                | <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <th>Electrical Type</th> <td>Dipole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table>          | Polarization   | Linear                 | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole          | Radiation Pattern | Directional | Impedance (Ohms) | 50  |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Polarization  | Linear   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Electrical Type   | Dipole   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Radiation Pattern   | Directional  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Impedance (Ohms)  | 50   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <u>SPX-052ANFXW</u>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|   | Cellular 3.5 GHz 4x4 Directional Patch Panel   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>3300-3800</td> <td>2.0</td> <td>12.0</td> <td>77</td> </tr> </tbody> </table>  | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 3300-3800       | 2.0               | 12.0        | 77               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Bracket Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-type Jack</td> </tr> <tr> <td>Dimensions</td> <td>520x300x51 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Bracket Mount | Termination | N-type Jack | Dimensions | 520x300x51 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 3300-3800   | 2.0  | 12.0   | 77                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Mounting Type   | Bracket Mount  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Termination   | N-type Jack  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Dimensions  | 520x300x51 mm  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Op. Temp.   | -40°C to +85°C   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| IP Rating   | IP67   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <b>Applications</b><br>Band n78   | <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <th>Electrical Type</th> <td>Radiating Patch</td> </tr> <tr> <th>Radiation Pattern</th> <td>Directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> | Polarization   | Linear                 | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Radiating Patch | Radiation Pattern | Directional | Impedance (Ohms) | 50  |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Polarization  | Linear   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Electrical Type   | Radiating Patch  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Radiation Pattern   | Directional  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Impedance (Ohms)  | 50   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <u>KPX-032XNFXW</u>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|  | Cellular 4.7 GHz 4x4 Directional Patch Panel   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>4400-5000</td> <td>2.0</td> <td>22.0</td> <td>76</td> </tr> </tbody> </table>  | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 4400-5000       | 2.0               | 22.0        | 76               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Bracket Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-type Jack</td> </tr> <tr> <td>Dimensions</td> <td>320x320x25 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Bracket Mount | Termination | N-type Jack | Dimensions | 320x320x25 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 4400-5000   | 2.0  | 22.0   | 76                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Mounting Type   | Bracket Mount  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Termination   | N-type Jack  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Dimensions  | 320x320x25 mm  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Op. Temp.   | -40°C to +85°C   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| IP Rating   | IP67   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <b>Applications</b><br>Band n79   | <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <th>Electrical Type</th> <td>Radiating Patch</td> </tr> <tr> <th>Radiation Pattern</th> <td>Directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> | Polarization   | Linear                 | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Radiating Patch | Radiation Pattern | Directional | Impedance (Ohms) | 50  |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Polarization  | Linear   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Electrical Type   | Radiating Patch  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Radiation Pattern   | Directional  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Impedance (Ohms)  | 50   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <u>KPX-036XNFXW</u>   | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|  | Cellular 3.8 GHz 4x4 Directional Patch Panel   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>3300-4200</td> <td>2.0</td> <td>10.0</td> <td>73</td> </tr> </tbody> </table>  | Frequency (MHz)        | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 3300-4200       | 2.0               | 10.0        | 73               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Bracket Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-type Jack</td> </tr> <tr> <td>Dimensions</td> <td>360x220x42 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Bracket Mount | Termination | N-type Jack | Dimensions | 360x220x42 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)        | Efficiency (%) |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| 3300-4200   | 2.0  | 10.0   | 73                     |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Mounting Type   | Bracket Mount  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Termination   | N-type Jack  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Dimensions  | 360x220x42 mm  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Op. Temp.   | -40°C to +85°C   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| IP Rating   | IP67   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| <b>Applications</b><br>Band n77, n78  | <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <th>Electrical Type</th> <td>Radiating Patch</td> </tr> <tr> <th>Radiation Pattern</th> <td>Directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> | Polarization   | Linear                 | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Radiating Patch | Radiation Pattern | Directional | Impedance (Ohms) | 50  |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Polarization  | Linear   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Electrical Type   | Radiating Patch  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Radiation Pattern   | Directional  |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |
| Impedance (Ohms)  | 50   |  |                        |                |                      |                 |                 |                   |             |                  |   |               |               |             |             |            |               |           |                |           |      |    |           |     |     |    |           |     |     |    |  |               |               |             |             |            |               |           |                |            |       |              |        |

## Sub-1 GHz LPWA and ISM Antennas

Joymax sub-1 GHz antennas for LPWA (low power wide area) and ISM applications offer single-band options in multiple styles, mounting, and terminations at 433MHz, 490MHz, 868MHz and 915MHz in support of applications including:

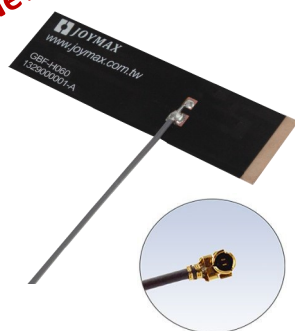
- LoRaWAN®
- Sigfox®
- Weightless-P™
- WiFi HaLow™

### Internal

#### Adhesive Mount

##### **GBF-H060MP3B-\***

New



##### Overview

868 & 915 MHz  
LPWA & ISM Adhesive Dipole FPC Flex Flat Patch with Orthogonal Cable

##### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 2.1        | 1.6             | 49             |
| 915             | 1.6        | 2.0             | 54             |

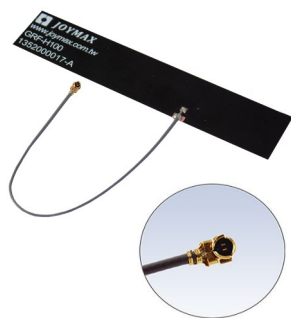
  

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                             |
|---------------|-----------------------------|
| Mounting Type | Adhesive Mount              |
| Termination*  | U.FL/MHF Plug<br>MHF4L Plug |
| Dimensions    | 60x18x0.25 mm               |
| Op. Temp.     | -40°C to +85°C              |
| Cable Type    | $\varnothing$ 1.13 mm       |
| Cable Length* | 60 mm<br>120 mm<br>180 mm   |

##### **GRF-H100MP3B-\***



##### Overview

868 & 915 MHz  
LPWA & ISM Adhesive Dipole PCB Rigid Flat Patch with Orthogonal Cable

##### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 1.6        | 2.0             | 62             |
| 915             | 1.6        | 3.6             | 72             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                             |
|---------------|-----------------------------|
| Mounting Type | Adhesive Mount              |
| Termination*  | U.FL/MHF Plug<br>MHF4L Plug |
| Dimensions    | 100x20x1.1 mm               |
| Op. Temp.     | -40°C to +85°C              |
| Cable Type    | $\varnothing$ 1.13 mm       |
| Cable Length* | 60 mm<br>120 mm<br>180 mm   |

##### **GRF-V090MP3B-\***



##### Overview

868 & 915 MHz  
LPWA & ISM Adhesive Dipole PCB Rigid Flat Patch with Coax Cable

##### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 1.5        | 1.4             | 42             |
| 915             | 1.7        | 2.5             | 53             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                             |
|---------------|-----------------------------|
| Mounting Type | Adhesive Mount              |
| Termination*  | U.FL/MHF Plug<br>MHF4L Plug |
| Dimensions    | 90x18x1.1 mm                |
| Op. Temp.     | -40°C to +85°C              |
| Cable Type    | $\varnothing$ 1.13 mm       |
| Cable Length* | 60 mm<br>120 mm<br>180 mm   |

# Sub-1 GHz LPWA and ISM

External

## Mechanical Mount

### GPF-C035SA2B

New







| Overview   | Electrical Data |            |                 |                   | Mechanical Data      |   |
|--|-----------------|------------|-----------------|-------------------|----------------------|---|
| 915 MHz RFID & ISM Ceramic Patch with PCB and coax cable, SMA plug     | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)    | Mounting Type        | Mechanical Mount                        |
|  | 915             | 1.5        | 1.0             | 41                | Termination          | SMA Plug                                |
| <b>Applications</b><br>RFID, LoRaWAN, Sigfox, Weightless-P, WiFi HaLow |                 |            |                 |                   | Dimensions           | 40x40x6 mm                              |
|  |                 |            |                 |                   | Op. Temp.            | -40°C to +85°C                          |
|  |                 |            |                 |                   | Ground Plane         | 40 x 40 mm                              |
|  |                 |            |                 |                   | Cable Type           | RG174                                   |
|  |                 |            |                 |                   | Cable Length*        | 300mm RG174<br>150mm $\varnothing$ 1.13 |
|  |                 |            |                 |                   | Polarization         | Linear                                  |
|  |                 |            |                 | Wavelength        | $\frac{1}{2}\lambda$ |   |
|  |                 |            |                 | Electrical Type   | Radiating Patch      |   |
|  |                 |            |                 | Radiation Pattern | Directional          |   |
|  |                 |            |                 | Impedance (Ohms)  | 50                   |   |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

| <u><a href="#">GHX-2120SA2W</a></u>   |  | Overview          | Electrical Data |                  |                |               | Mechanical Data         |  |
|---|--|-------------------|-----------------|------------------|----------------|---------------|-------------------------|--|
|    | 915 MHz LPWA & ISM Monopole Straight Whip                        | Frequency (MHz)   | VSWR (Max)      | Peak Gain (dBi)  | Efficiency (%) | Mounting Type | Connector Mount         |  |
|   |  | 915               | 2.5             | 2.0              | 62             | Termination*  | SMA Plug<br>RP-SMA Plug |  |
|   | <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow |                   |                 |                  |                | Dimensions    | 22x9 mm                 |  |
|   |  |                   |                 |                  |                | Op. Temp.     | -30°C to +70°C          |  |
|   |  |                   |                 |                  |                | Ground Plane  | 120 x 120 mm            |  |
|   |  | Polarization      |                 | Linear           |                |               |                         |  |
|   |  | Wavelength        |                 | ¼-λ              |                |               |                         |  |
|   |  | Electrical Type   |                 | Monopole         |                |               |                         |  |
|   |  | Radiation Pattern |                 | Omni directional |                |               |                         |  |
|   |  | Impedance (Ohms)  |                 | 50               |                |               |                         |  |
| <u><a href="#">GHX-2120SA1W</a></u>   |  | Overview          | Electrical Data |                  |                |               | Mechanical Data         |  |
|   | 868 MHz LPWA & ISM Monopole Straight Whip                        | Frequency (MHz)   | VSWR (Max)      | Peak Gain (dBi)  | Efficiency (%) | Mounting Type | Connector Mount         |  |
|   |  | 868               | 2.2             | 1.4              | 53             | Termination*  | SMA Plug<br>RP-SMA Plug |  |
|   | <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow |                   |                 |                  |                | Dimensions    | 22x9 mm                 |  |
|   |  |                   |                 |                  |                | Op. Temp.     | -30°C to +70°C          |  |
|   |  |                   |                 |                  |                | Ground Plane  | 120 x 120 mm            |  |
|   |  | Polarization      |                 | Linear           |                |               |                         |  |
|   |  | Wavelength        |                 | ¼-λ              |                |               |                         |  |
|   |  | Electrical Type   |                 | Monopole         |                |               |                         |  |
|   |  | Radiation Pattern |                 | Omni directional |                |               |                         |  |
|   |  | Impedance (Ohms)  |                 | 50               |                |               |                         |  |
| <u><a href="#">GMX-2120SA2W</a></u>   |  | Overview          | Electrical Data |                  |                |               | Mechanical Data         |  |
|  | 915 MHz LPWA & ISM Monopole Right Angle Whip                     | Frequency (MHz)   | VSWR (Max)      | Peak Gain (dBi)  | Efficiency (%) | Mounting Type | Connector Mount         |  |
|   |  | 915               | 2.5             | 3.0              | 73             | Termination*  | SMA Plug<br>RP-SMA Plug |  |
|   | <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow |                   |                 |                  |                | Dimensions    | 21.6x18x9 mm            |  |
|   |  |                   |                 |                  |                | Op. Temp.     | -30°C to +70°C          |  |
|   |  |                   |                 |                  |                | Ground Plane  | 120 x 120 mm            |  |
|   |  | Polarization      |                 | Linear           |                |               |                         |  |
|   |  | Wavelength        |                 | ¼-λ              |                |               |                         |  |
|   |  | Electrical Type   |                 | Monopole         |                |               |                         |  |
|   |  | Radiation Pattern |                 | Omni directional |                |               |                         |  |
|   |  | Impedance (Ohms)  |                 | 50               |                |               |                         |  |
| <u><a href="#">GMX-2120SA1W</a></u>   |  | Overview          | Electrical Data |                  |                |               | Mechanical Data         |  |
|  | 868 MHz LPWA & ISM Monopole Right Angle Whip                     | Frequency (MHz)   | VSWR (Max)      | Peak Gain (dBi)  | Efficiency (%) | Mounting Type | Connector Mount         |  |
|   |  | 868               | 2.7             | 1.2              | 65             | Termination*  | SMA Plug<br>RP-SMA Plug |  |
|   | <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow |                   |                 |                  |                | Dimensions    | 21.6x18x9 mm            |  |
|   |  |                   |                 |                  |                | Op. Temp.     | -30°C to +70°C          |  |
|   |  |                   |                 |                  |                | Ground Plane  | 120 x 120 mm            |  |
|   |  | Polarization      |                 | Linear           |                |               |                         |  |
|   |  | Wavelength        |                 | ¼-λ              |                |               |                         |  |
|   |  | Electrical Type   |                 | Monopole         |                |               |                         |  |
|   |  | Radiation Pattern |                 | Omni directional |                |               |                         |  |
|   |  | Impedance (Ohms)  |                 | 50               |                |               |                         |  |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

#### [GHX-2120SA2B](#)

New



#### Overview

915 MHz LPWA & ISM Monopole  
Straight Whip

#### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 915             | 2.5        | 2.0             | 62             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 22x $\varnothing$ 9 mm  |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120 mm            |

#### [GHX-2120SA1B](#)

New



#### Overview

868 MHz LPWA & ISM Monopole  
Straight Whip

#### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 2.2        | 1.4             | 53             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 22x $\varnothing$ 9 mm  |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120 mm            |

#### [GMX-2120SA2B](#)

New



#### Overview

915 MHz LPWA & ISM Monopole  
Right Angle Whip

#### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 915             | 2.5        | 3.0             | 73             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 21.6x18x9 mm            |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120 mm            |

#### [GMX-2120SA1B](#)

New



#### Overview

868 MHz LPWA & ISM Monopole  
Right Angle Whip

#### Applications

LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 2.7        | 1.2             | 65             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination*  | SMA Plug<br>RP-SMA Plug |
| Dimensions    | 21.6x18x9 mm            |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120 mm            |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

| <u><a href="#">GHX-463XSA3B</a></u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
|---|--|--|-------------------|------------------|-------------------|------------------|--------|----------------------|----------|------------------|-----|-----|-----|----|---|
|    | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.3</td> <td>1.0</td> <td>60</td> </tr> <tr> <td>915</td> <td>1.7</td> <td>2.4</td> <td>72</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 868    | 1.3                  | 1.0      | 60               | 915 | 1.7 | 2.4 | 72 | Mounting Type Connector Mount<br>Termination* SMA Plug<br>RP-SMA Plug<br>Dimensions 176xø10 mm<br>Op. Temp. -30°C to +70°C  |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 868   | 1.3  | 1.0  | 60                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 915   | 1.7  | 2.4  | 72                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{4}\lambda</math></td> <td>Monopole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear | $\frac{1}{4}\lambda$ | Monopole | Omni directional | 50  |     |     |    |   |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |        |                      |          |                  |     |     |     |    |   |
| Linear  | $\frac{1}{4}\lambda$   | Monopole   | Omni directional  | 50               |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <u><a href="#">GHX-150XNX3B</a></u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
|   | 868 & 915 MHz<br>ISM & LPWA<br>Straight Dipole<br>Blade  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.5</td> <td>1.9</td> <td>56</td> </tr> <tr> <td>915</td> <td>2.0</td> <td>2.5</td> <td>61</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 868    | 2.5                  | 1.9      | 56               | 915 | 2.0 | 2.5 | 61 | Mounting Type Connector Mount<br>Termination* N-Type Plug<br>N-Type Jack<br>Dimensions 178xø21 mm<br>Op. Temp. -40°C to +85°C<br>IP Rating IP67                           |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 868   | 2.5  | 1.9  | 56                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 915   | 2.0  | 2.5  | 61                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear | $\frac{1}{2}\lambda$ | Dipole   | Omni directional | 50  |     |     |    |   |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |        |                      |          |                  |     |     |     |    |   |
| Linear  | $\frac{1}{2}\lambda$   | Dipole   | Omni directional  | 50               |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <u><a href="#">GHX-325ASA3W</a></u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
|  | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.8</td> <td>2.4</td> <td>65</td> </tr> <tr> <td>915</td> <td>1.7</td> <td>4.2</td> <td>71</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 868    | 1.8                  | 2.4      | 65               | 915 | 1.7 | 4.2 | 71 | Mounting Type Connector Mount<br>Termination* SMA Plug<br>RP-SMA Plug<br>Dimensions 111xø11 mm<br>Op. Temp. -30°C to +70°C<br>Ground Plane 120 x 120 mm<br>IP Rating IP65 |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 868   | 1.8  | 2.4  | 65                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 915   | 1.7  | 4.2  | 71                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{4}\lambda</math></td> <td>Monopole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear | $\frac{1}{4}\lambda$ | Monopole | Omni directional | 50  |     |     |    |   |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |        |                      |          |                  |     |     |     |    |   |
| Linear  | $\frac{1}{4}\lambda$   | Monopole   | Omni directional  | 50               |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <u><a href="#">GHX-328XSA3B</a></u>   | Overview   | Electrical Data  | Mechanical Data   |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
|  | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.6</td> <td>2.7</td> <td>78</td> </tr> <tr> <td>915</td> <td>1.7</td> <td>2.7</td> <td>79</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 868    | 1.6                  | 2.7      | 78               | 915 | 1.7 | 2.7 | 79 | Mounting Type Connector Mount<br>Termination* SMA Plug<br>RP-SMA Plug<br>Dimensions 46xø11 mm<br>Op. Temp. -30°C to +70°C<br>Ground Plane 120 x 120mm                     |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 868   | 1.6  | 2.7  | 78                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| 915   | 1.7  | 2.7  | 79                |                  |                   |                  |        |                      |          |                  |     |     |     |    |   |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td>Linear</td> <td><math>\frac{1}{4}\lambda</math></td> <td>Monopole</td> <td>Omni directional</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) | Linear | $\frac{1}{4}\lambda$ | Monopole | Omni directional | 50  |     |     |    |   |
| Polarization  | Wavelength   | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |        |                      |          |                  |     |     |     |    |   |
| Linear  | $\frac{1}{4}\lambda$   | Monopole   | Omni directional  | 50               |                   |                  |        |                      |          |                  |     |     |     |    |   |

# Sub-1 GHz LPWA and ISM

## External


### Connector Mount

| <u>GWX-180ASA2B</u>  | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
|--|--|--|------------------------|-----------------|-----------------|-----------------|----------|-------------------|------------------|------------------|---|---------------|-----------------|--------------|--|---------------|-----------------|--------------|-------------------------|------------|------------|-----------|----------------|--------------|--------------|-----------|------|
|   | 915 MHz LPWA & ISM Tilt/Swivel Dipole Whip<br><br><b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow         | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>915</td> <td>1.6</td> <td>2.8</td> <td>74</td> </tr> </tbody> </table>   | Frequency (MHz)        | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  | 915      | 1.6               | 2.8              | 74               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination*</th> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>203xø13 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>IP Rating</th> <td>IP67</td> </tr> </thead> </table> | Mounting Type | Connector Mount | Termination* | SMA Plug<br>RP-SMA Plug  | Dimensions    | 203xø13 mm      | Op. Temp.    | -30°C to +70°C          | IP Rating  | IP67       |           |                |              |              |           |      |
|  |  | Frequency (MHz)  | VSWR (Max)             | Peak Gain (dBi) | Efficiency (%)  |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 915  | 1.6  | 2.8  | 74                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Mounting Type  | Connector Mount  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Termination*   | SMA Plug<br>RP-SMA Plug  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Dimensions   | 203xø13 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Op. Temp.  | -30°C to +70°C   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| IP Rating  | IP67   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>½-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Dipole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table>   |  | Polarization   | Linear                 | Wavelength      | ½-λ             | Electrical Type | Dipole   | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Polarization   | Linear   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Wavelength   | ½-λ  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Electrical Type  | Dipole   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Radiation Pattern  | Omni directional   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Impedance (Ohms)   | 50   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <u>GWX-180ASA1B</u>  | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
|    | 868 MHz LPWA & ISM Tilt/Swivel Dipole Whip<br><br><b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow         | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.5</td> <td>2.0</td> <td>73</td> </tr> </tbody> </table>   | Frequency (MHz)        | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  | 868      | 1.5               | 2.0              | 73               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination*</th> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>203xø13 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>IP Rating</th> <td>IP67</td> </tr> </thead> </table> | Mounting Type | Connector Mount | Termination* | SMA Plug<br>RP-SMA Plug  | Dimensions    | 203xø13 mm      | Op. Temp.    | -30°C to +70°C          | IP Rating  | IP67       |           |                |              |              |           |      |
|  |  | Frequency (MHz)  | VSWR (Max)             | Peak Gain (dBi) | Efficiency (%)  |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 868  | 1.5  | 2.0  | 73                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Mounting Type  | Connector Mount  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Termination*   | SMA Plug<br>RP-SMA Plug  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Dimensions   | 203xø13 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Op. Temp.  | -30°C to +70°C   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| IP Rating  | IP67   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>½-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Dipole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table>   |  | Polarization   | Linear                 | Wavelength      | ½-λ             | Electrical Type | Dipole   | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Polarization   | Linear   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Wavelength   | ½-λ  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Electrical Type  | Dipole   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Radiation Pattern  | Omni directional   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Impedance (Ohms)   | 50   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <u>GWX-100ASA3B</u>  | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
|   | 868 & 915 MHz ISM & LPWA Tilt/Swivel Monopole Whip<br><br><b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.8</td> <td>2.3</td> <td>72</td> </tr> <tr> <td>915</td> <td>1.9</td> <td>2.2</td> <td>73</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  | 868      | 1.8               | 2.3              | 72               | 915   | 1.9           | 2.2             | 73           | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination*</th> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>124xø13 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> <tr> <th>IP Rating</th> <td>IP67</td> </tr> </thead> </table> | Mounting Type | Connector Mount | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 124xø13 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm | IP Rating | IP67 |
|  |  | Frequency (MHz)  | VSWR (Max)             | Peak Gain (dBi) | Efficiency (%)  |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 868  | 1.8  | 2.3  | 72                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 915  | 1.9  | 2.2  | 73                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Mounting Type  | Connector Mount  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Termination*   | SMA Plug<br>RP-SMA Plug  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Dimensions   | 124xø13 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Op. Temp.  | -30°C to +70°C   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Ground Plane   | 120 x 120 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| IP Rating  | IP67   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> |  | Polarization   | Linear                 | Wavelength      | ¼-λ             | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Polarization   | Linear   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Wavelength   | ¼-λ  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Electrical Type  | Monopole   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Radiation Pattern  | Omni directional   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Impedance (Ohms)   | 50   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <u>GWX-241BSA3B</u>  | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
|   | 868 & 915 MHz ISM & LPWA Tilt/Swivel Monopole Whip<br><br><b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.6</td> <td>2.3</td> <td>78</td> </tr> <tr> <td>915</td> <td>1.7</td> <td>2.3</td> <td>78</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  | 868      | 1.6               | 2.3              | 78               | 915   | 1.7           | 2.3             | 78           | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination*</th> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>108xø10 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> </thead> </table>   | Mounting Type | Connector Mount | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 108xø10 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm |           |      |
|  |  | Frequency (MHz)  | VSWR (Max)             | Peak Gain (dBi) | Efficiency (%)  |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 868  | 1.6  | 2.3  | 78                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| 915  | 1.7  | 2.3  | 78                     |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Mounting Type  | Connector Mount  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Termination*   | SMA Plug<br>RP-SMA Plug  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Dimensions   | 108xø10 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Op. Temp.  | -30°C to +70°C   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Ground Plane   | 120 x 120 mm   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> |  | Polarization   | Linear                 | Wavelength      | ¼-λ             | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Polarization   | Linear   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Wavelength   | ¼-λ  |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Electrical Type  | Monopole   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Radiation Pattern  | Omni directional   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |
| Impedance (Ohms)   | 50   |  |                        |                 |                 |                 |          |                   |                  |                  |   |               |                 |              |  |               |                 |              |                         |            |            |           |                |              |              |           |      |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

| <a href="#">GMX-221ASA3B</a>  | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
|---|---|--|-----------------|----------------|----------------------|-----------------|----------|-------------------|------------------|------------------|-----|-----|-----|----|--|---------------|-----------|--------------|-------------------------|------------|--------------|-----------|----------------|--------------|-------------|
|    | 868 & 915 MHz<br>ISM & LPWA Right<br>Angle Monopole<br>Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.4</td> <td>1.1</td> <td>55</td> </tr> <tr> <td>915</td> <td>2.0</td> <td>1.8</td> <td>66</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868      | 2.4               | 1.1              | 55               | 915 | 2.0 | 1.8 | 66 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>SMA Plug<br/>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>47xø8 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Ground Plane</td> <td>120 x 120mm</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination* | SMA Plug<br>RP-SMA Plug | Dimensions | 47xø8 mm     | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120mm |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 868   | 2.4   | 1.1  | 55              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 915   | 2.0   | 1.8  | 66              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Mounting Type   | Connector   |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Termination*  | SMA Plug<br>RP-SMA Plug   |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Dimensions  | 47xø8 mm  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Ground Plane  | 120 x 120mm   |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{4}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{4}\lambda$ | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Polarization  | Linear  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Wavelength  | $\frac{1}{4}\lambda$  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Electrical Type   | Monopole  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| <a href="#">GWX-711BSA3B</a>  | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
|   | 868 & 915 MHz<br>ISM & LPWA Tilt/<br>Swivel Dipole<br>Blade   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.5</td> <td>2.0</td> <td>61</td> </tr> <tr> <td>915</td> <td>1.3</td> <td>2.1</td> <td>60</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868      | 1.5               | 2.0              | 61               | 915 | 1.3 | 2.1 | 60 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>136x24x11 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>  | Mounting Type | Connector | Termination  | SMA Plug                | Dimensions | 136x24x11 mm | Op. Temp. | -30°C to +70°C |              |             |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 868   | 1.5   | 2.0  | 61              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 915   | 1.3   | 2.1  | 60              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Mounting Type   | Connector   |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Termination   | SMA Plug  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Dimensions  | 136x24x11 mm  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole   | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Polarization  | Linear  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Wavelength  | $\frac{1}{2}\lambda$  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Electrical Type   | Dipole  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| <a href="#">GWX-6141SA3B</a>  | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
|  | 868 & 915 MHz<br>ISM & LPWA Tilt/<br>Swivel Dipole<br>Blade   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.5</td> <td>0.8</td> <td>41</td> </tr> <tr> <td>915</td> <td>1.9</td> <td>1.7</td> <td>40</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868      | 1.5               | 0.8              | 41               | 915 | 1.9 | 1.7 | 40 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>160x22x13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>  | Mounting Type | Connector | Termination  | SMA Plug                | Dimensions | 160x22x13 mm | Op. Temp. | -30°C to +70°C |              |             |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 868   | 1.5   | 0.8  | 41              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| 915   | 1.9   | 1.7  | 40              |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Mounting Type   | Connector   |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Termination   | SMA Plug  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Dimensions  | 160x22x13 mm  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table>   | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole   | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Polarization  | Linear  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Wavelength  | $\frac{1}{2}\lambda$  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Electrical Type   | Dipole  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |          |                   |                  |                  |     |     |     |    |  |               |           |              |                         |            |              |           |                |              |             |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

#### GHX-221ASA3B

New



#### Overview

868 & 915 MHz  
Monopole Straight  
Whip

#### Applications

LoRaWAN, Sigfox,  
Weightless-P, WiFi  
HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 1.7        | 1.7             | 65             |
| 915             | 2.1        | 2.9             | 73             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                        |
|---------------|------------------------|
| Mounting Type | Connector Mount        |
| Termination   | SMA Plug               |
| Dimensions    | 50x $\varnothing$ 8 mm |
| Op. Temp.     | -30°C to +70°C         |
| Ground Plane  | 120 x 120mm            |
| IP Rating     | IP65                   |

#### UHX-325ASAXB



#### Overview

410 MHz & 433  
MHz Monopole  
Straight Whip

#### Applications

LTE Band 87, Band  
88, LoRaWAN, ISM

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 410-427         | 4.0        | -0.6            | 51             |
| 433-435         | 1.7        | -1.0            | 51             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | SMA Plug                 |
| Dimensions    | 111x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C           |
| Ground Plane  | 120 x 120mm              |
| IP Rating     | IP65                     |

#### UHX-328ASAXB

New



#### Overview

433 MHz Mono-  
pole Straight Whip

#### Applications

LTE Band 87, Band  
88, LoRaWAN, ISM

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 433             | 1.8        | 1.6             | 51             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | SMA Plug                |
| Dimensions    | 46x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120mm             |
| IP Rating     | IP65                    |

#### UHX-328ASA2B

New



#### Overview

315 MHz Mono-  
pole Straight Whip

#### Applications

Remote Control,  
Unlicensed band,  
Short-range data  
transmission

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 315             | 2.0        | 0.6             | 47             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | SMA Plug                |
| Dimensions    | 46x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C          |
| Ground Plane  | 120 x 120mm             |
| IP Rating     | IP65                    |

# Sub-1 GHz LPWA and ISM

## External

### Connector Mount

#### GGX-1023NF3W



#### Overview

868 & 915MHz  
ISM & LPWA Out-  
door Fiberglass  
Dipole Baton/Stick

#### Applications

LoRaWAN, Sigfox,  
Weightless-P, WiFi  
HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 1.6        | 0.3             | 48             |
| 915             | 1.3        | 1.5             | 57             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                            |
|---------------|----------------------------|
| Mounting Type | Connector Mount            |
| Termination*  | N-Type Jack<br>N-Type Plug |
| Dimensions    | 145x $\varnothing$ 25 mm   |
| Op. Temp.     | -40°C to +85°C             |
| IP Rating     | IP67                       |

#### GGX-1123NX3W



#### Overview

868 & 915 MHz  
ISM & LPWA Out-  
door Fiberglass  
Dipole Baton/Stick

#### Applications

LoRaWAN, Sigfox,  
Weightless-P, WiFi  
HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 1.8        | 1.6             | 49             |
| 915             | 1.5        | 1.2             | 56             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |




#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | N-Type Plug              |
| Dimensions    | 152x $\varnothing$ 24 mm |
| Op. Temp.     | -40°C to +85°C           |
| IP Rating     | IP67                     |

## Sub-1 GHz LPWA and ISM

## External

## Connector Mount

| <u><a href="#">GHX-1017NX2W</a></u>   | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
|---|---|--|-----------------|----------------|----------------------|-----------------|--------|-------------------|------------------|------------------|--|---------------|-----------------|-------------|-------------|------------|------------|-----------|----------------|-----------|------|
|    | 915 MHz ISM & LPWA Outdoor Fiberglass Dipole Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>915</td> <td>1.3</td> <td>4.5</td> <td>76</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 915    | 1.3               | 4.5              | 76               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Plug</td> </tr> <tr> <td>Dimensions</td> <td>528xø20 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector Mount | Termination | N-Type Plug | Dimensions | 528xø20 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| 915   | 1.3   | 4.5  | 76              |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Mounting Type   | Connector Mount   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Termination   | N-Type Plug   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Dimensions  | 528xø20 mm  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Op. Temp.   | -40°C to +85°C  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| IP Rating   | IP67  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow                    | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                 |             |             |            |            |           |                |           |      |
| Polarization  | Linear  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Wavelength  | $\frac{1}{2}\lambda$  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Electrical Type   | Dipole  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| <u><a href="#">GGX-1017NX1W</a></u>   | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
|   | 868 MHz ISM & LPWA Outdoor Fiberglass Dipole Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.7</td> <td>4.4</td> <td>71</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868    | 1.7               | 4.4              | 71               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Plug</td> </tr> <tr> <td>Dimensions</td> <td>528xø20 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector Mount | Termination | N-Type Plug | Dimensions | 528xø20 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| 868   | 1.7   | 4.4  | 71              |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Mounting Type   | Connector Mount   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Termination   | N-Type Plug   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Dimensions  | 528xø20 mm  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Op. Temp.   | -40°C to +85°C  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| IP Rating   | IP67  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow                    | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                 |             |             |            |            |           |                |           |      |
| Polarization  | Linear  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Wavelength  | $\frac{1}{2}\lambda$  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Electrical Type   | Dipole  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| <u><a href="#">GGX-103XNF2W</a></u>   | Overview  | Electrical Data  | Mechanical Data |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
|  | 915 MHz ISM & LPWA Outdoor Fiberglass Dipole Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>915</td> <td>1.5</td> <td>7.0</td> <td>83</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 915    | 1.5               | 7.0              | 83               | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Jack</td> </tr> <tr> <td>Dimensions</td> <td>621xø22 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP65</td> </tr> </tbody> </table> | Mounting Type | Connector Mount | Termination | N-Type Jack | Dimensions | 621xø22 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP65 |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| 915   | 1.5   | 7.0  | 83              |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Mounting Type   | Connector Mount   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Termination   | N-Type Jack   |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Dimensions  | 621xø22 mm  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Op. Temp.   | -40°C to +85°C  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| IP Rating   | IP65  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| <b>Applications</b><br>LoRaWAN, Sigfox, Weightless-P, WiFi HaLow                    | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                 |             |             |            |            |           |                |           |      |
| Polarization  | Linear  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Wavelength  | $\frac{1}{2}\lambda$  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Electrical Type   | Dipole  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Radiation Pattern   | Omni directional  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |
| Impedance (Ohms)  | 50  |  |                 |                |                      |                 |        |                   |                  |                  |  |               |                 |             |             |            |            |           |                |           |      |

# Sub-1 GHz LPWA and ISM

## External

### Panel Mount

#### [GHX-3802NF3B](#)



#### Overview

868 & 915 MHz  
ISM & LPWA Di-  
pole Dome/  
Saltshaker

#### Applications

LoRaWAN, Sigfox,  
Weightless-P, WiFi  
HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 3.0        | 2.3             | 61             |
| 915             | 3.0        | 2.5             | 63             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                           |
|---------------|---------------------------|
| Mounting Type | Panel Mount               |
| Termination   | N-Type Jack               |
| Dimensions    | 77.7x $\varnothing$ 38 mm |
| Op. Temp.     | -40°C to +85°C            |
| IP Rating     | IP67                      |

#### [GHX-3602NF3B](#)



#### Overview

868 & 915 MHz  
ISM & LPWA Di-  
pole Dome/  
Saltshaker

#### Applications

LoRaWAN, Sigfox,  
Weightless-P, WiFi  
HaLow

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 868             | 3.0        | 1.9             | 58             |
| 915             | 3.0        | 2.2             | 60             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |



#### Mechanical Data

|               |                           |
|---------------|---------------------------|
| Mounting Type | Panel Mount               |
| Termination   | N-Type Jack               |
| Dimensions    | 71x $\varnothing$ 40.2 mm |
| Op. Temp.     | -30°C to +70°C            |
| IP Rating     | IP65                      |

# Sub-1 GHz LPWA and ISM

## External





### Panel Mount

| <u><a href="#">GHF-3802SA3B-*</a></u>  | Overview  | Electrical Data  | Mechanical Data |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
|--|---|--|-----------------|-----------------|-----------------|----------------------|-----------------|--------|-------------------|------------------|------------------|-----|-----|----|--|---------------|-------------|-------------|----------|------------|-------------|-----------|----------------|------------|-------|---------------|--------------------|-----------|------|
|   | 868MHz 915MHz<br>ISM & LPWA Di-<br>pole Dome/<br>Saltshaker, Flying<br>Lead<br><br><b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>3.0</td> <td>2.3</td> <td>61</td> </tr> <tr> <td>915</td> <td>3.0</td> <td>2.5</td> <td>63</td> </tr> </tbody> </table>   | Frequency (MHz) | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)       | 868             | 3.0    | 2.3               | 61               | 915              | 3.0 | 2.5 | 63 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Panel Mount</td> </tr> <tr> <th>Termination</th> <td>SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>78xø40 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-40°C to +85°C</td> </tr> <tr> <th>Cable Type</th> <td>RG174</td> </tr> <tr> <th>Cable Length*</th> <td>1000 mm<br/>2000 mm</td> </tr> <tr> <th>IP Rating</th> <td>IP65</td> </tr> </thead> </table> | Mounting Type | Panel Mount | Termination | SMA Plug | Dimensions | 78xø40 mm   | Op. Temp. | -40°C to +85°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm | IP Rating | IP65 |
|  |   | Frequency (MHz)  | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| 868  | 3.0   | 2.3  | 61              |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| 915  | 3.0   | 2.5  | 63              |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Mounting Type  | Panel Mount   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Termination  | SMA Plug  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Dimensions   | 78xø40 mm   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Cable Type   | RG174   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Cable Length*  | 1000 mm<br>2000 mm  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| IP Rating  | IP65  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
|  |   | <table border="1"> <thead> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <th>Electrical Type</th> <td>Dipole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </thead> </table> | Polarization    | Linear          | Wavelength      | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Polarization   | Linear  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Wavelength   | $\frac{1}{2}\lambda$  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Electrical Type  | Dipole  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Impedance (Ohms)   | 50  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| <u><a href="#">GHF-3602SA3B-*</a></u>  | Overview  | Electrical Data  | Mechanical Data |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
|  | 868MHz 915MHz<br>ISM & LPWA Di-<br>pole Dome/<br>Saltshaker, Flying<br>Lead<br><br><b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>3.0</td> <td>1.9</td> <td>58</td> </tr> <tr> <td>915</td> <td>3.0</td> <td>2.2</td> <td>60</td> </tr> </tbody> </table>   | Frequency (MHz) | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)       | 868             | 3.0    | 1.9               | 58               | 915              | 3.0 | 2.2 | 60 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Panel Mount</td> </tr> <tr> <th>Termination</th> <td>SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>71xø40.2 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>RG174</td> </tr> <tr> <th>Cable Length*</th> <td>1000 mm<br/>2000 mm</td> </tr> </thead> </table>   | Mounting Type | Panel Mount | Termination | SMA Plug | Dimensions | 71xø40.2 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |           |      |
|  |   | Frequency (MHz)  | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| 868  | 3.0   | 1.9  | 58              |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| 915  | 3.0   | 2.2  | 60              |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Mounting Type  | Panel Mount   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Termination  | SMA Plug  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Dimensions   | 71xø40.2 mm   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Op. Temp.  | -30°C to +70°C  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Cable Type   | RG174   |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Cable Length*  | 1000 mm<br>2000 mm  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
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| Polarization   | Linear  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Wavelength   | $\frac{1}{2}\lambda$  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Electrical Type  | Dipole  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |
| Impedance (Ohms)   | 50  |  |                 |                 |                 |                      |                 |        |                   |                  |                  |     |     |    |  |               |             |             |          |            |             |           |                |            |       |               |                    |           |      |

# Sub-1 GHz LPWA and ISM

## Remote

### Adhesive Mount




| <u>GBF-603XSA3B-*</u>   | Overview   | Electrical Data  | Mechanical Data |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
|---|--|--|-----------------|----------------|----------------------|-----------------|---------------|-------------------|------------------|------------------|--|---------------|----------------|-------------|--|---------------|----------------|-------------|----------------|------------|--------------|---------------|-------------------|------------|-------|---------------|--------------------|
|    | 868 & 915 MHz<br>ISM & LPWA<br>Straight Dipole<br>Adhesive Bar/<br>Blade, Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.0</td> <td>2.0</td> <td>47</td> </tr> <tr> <td>915</td> <td>1.8</td> <td>2.3</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868           | 2.0               | 2.0              | 47               | 915  | 1.8           | 2.3            | 50          | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>110x20x6 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table>  | Mounting Type | Adhesive Mount | Termination | SMA Plug       | Dimensions | 110x20x6 mm  | Op. Temp.     | -30°C to +70°C    | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 868   | 2.0  | 2.0  | 47              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 915   | 1.8  | 2.3  | 50              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Mounting Type   | Adhesive Mount   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Dimensions  | 110x20x6 mm  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole        | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Polarization  | Linear   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Electrical Type   | Dipole   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
|   | 868 & 915 MHz<br>ISM & LPWA<br>Straight Dipole<br>Adhesive Bar/<br>Blade, Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>1.2</td> <td>3.2</td> <td>80</td> </tr> <tr> <td>915</td> <td>1.7</td> <td>3.6</td> <td>73</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868           | 1.2               | 3.2              | 80               | 915  | 1.7           | 3.6            | 73          | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>146x20x13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table> | Mounting Type | Adhesive Mount | Termination | SMA Plug       | Dimensions | 146x20x13 mm | Op. Temp.     | -30°C to +70°C    | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 868   | 1.2  | 3.2  | 80              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 915   | 1.7  | 3.6  | 73              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Mounting Type   | Adhesive Mount   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Dimensions  | 146x20x13 mm   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole        | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Polarization  | Linear   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Electrical Type   | Dipole   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
|  | 868 & 915 MHz<br>ISM & LPWA Di-<br>pole Adhesive<br>Puck, Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.6</td> <td>1.5</td> <td>34</td> </tr> <tr> <td>915</td> <td>2.5</td> <td>1.8</td> <td>36</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 868           | 2.6               | 1.5              | 34               | 915  | 2.5           | 1.8            | 36          | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>9.8x50 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table>    | Mounting Type | Adhesive Mount | Termination | SMA Plug       | Dimensions | 9.8x50 mm    | Op. Temp.     | -30°C to +70°C    | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 868   | 2.6  | 1.5  | 34              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 915   | 2.5  | 1.8  | 36              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Mounting Type   | Adhesive Mount   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Dimensions  | 9.8x50 mm  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Dipole        | Radiation Pattern | Omni directional | Impedance (Ohms) | 50   |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Polarization  | Linear   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Electrical Type   | Dipole   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
|  | 915 MHz RFID &<br>ISM Directional<br>Ceramic Puck with<br>coaxial cable  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>915</td> <td>1.4</td> <td>1.7</td> <td>48</td> </tr> </tbody> </table>   | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi)      | Efficiency (%)  | 915           | 1.4               | 1.7              | 48               | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>55x50x18 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>300 mm<br/>1000 mm</td> </tr> </tbody> </table> | Mounting Type | Adhesive Mount | Termination | SMA Plug   | Dimensions    | 55x50x18 mm    | Op. Temp.   | -30°C to +70°C | Cable Type | RG174        | Cable Length* | 300 mm<br>1000 mm |            |       |               |                    |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| 915   | 1.4  | 1.7  | 48              |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Mounting Type   | Adhesive Mount   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Dimensions  | 55x50x18 mm  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Cable Length*   | 300 mm<br>1000 mm  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| <b>Applications</b><br>RFID, ISM, LPWA  | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>RHCP</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Ceramic Patch</td> </tr> <tr> <td>Radiation Pattern</td> <td>Directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | RHCP            | Wavelength     | $\frac{1}{2}\lambda$ | Electrical Type | Ceramic Patch | Radiation Pattern | Directional      | Impedance (Ohms) | 50   |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Polarization  | RHCP   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Electrical Type   | Ceramic Patch  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Radiation Pattern   | Directional  |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                      |                 |               |                   |                  |                  |  |               |                |             |  |               |                |             |                |            |              |               |                   |            |       |               |                    |

New

# Sub-1 GHz LPWA and ISM

## Remote

### Magnetic Mount

| GAF-129XSA3B-*  | Overview   | Electrical Data  | Mechanical Data |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|---|--|--|-----------------|----------------|-----------------|-----------------|----------|-------------------|------------------|------------------|-----|-----|-----|----|--|---------------|----------------|-------------|----------|------------|------------|-----------|----------------|------------|-------|---------------|--------------------|
|     | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Magnetic Mount<br>Whip, Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.5</td> <td>1.8</td> <td>55</td> </tr> <tr> <td>915</td> <td>2.2</td> <td>2.0</td> <td>58</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 868      | 2.5               | 1.8              | 55               | 915 | 2.2 | 2.0 | 58 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Magnetic Mount</td> </tr> <tr> <th>Termination</th> <td>SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>91xø31 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>RG174</td> </tr> <tr> <th>Cable Length*</th> <td>1000 mm<br/>2000 mm</td> </tr> </thead> </table>  | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 91xø31 mm  | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 868  | 2.5  | 1.8             | 55             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 915  | 2.2  | 2.0             | 58             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Dimensions  | 91xø31 mm  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td>¼-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Polarization  | Linear   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Wavelength  | ¼-λ  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| GAF-126XSA3B-*  | Overview   | Electrical Data  | Mechanical Data |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|    | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Magnetic Mount<br>Whip, Flying Lead  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.4</td> <td>1.9</td> <td>57</td> </tr> <tr> <td>915</td> <td>2.0</td> <td>2.2</td> <td>59</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 868      | 2.4               | 1.9              | 57               | 915 | 2.0 | 2.2 | 59 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Magnetic Mount</td> </tr> <tr> <th>Termination</th> <td>SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>120xø27 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>RG174</td> </tr> <tr> <th>Cable Length*</th> <td>1000 mm<br/>2000 mm</td> </tr> </thead> </table> | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 120xø27 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 868  | 2.4  | 1.9             | 57             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 915  | 2.0  | 2.2             | 59             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Dimensions  | 120xø27 mm   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
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| Polarization  | Linear   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Wavelength  | ¼-λ  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| GAF-121XSA3B-*  | Overview   | Electrical Data  | Mechanical Data |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|  | 868 & 915 MHz<br>ISM & LPWA<br>Straight Monopole<br>Magnetic Mount<br>Whip   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>868</td> <td>2.5</td> <td>1.8</td> <td>55</td> </tr> <tr> <td>915</td> <td>2.2</td> <td>2.0</td> <td>58</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 868      | 2.5               | 1.8              | 55               | 915 | 2.2 | 2.0 | 58 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Magnetic Mount</td> </tr> <tr> <th>Termination</th> <td>SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>178xø27 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>RG174</td> </tr> <tr> <th>Cable Length*</th> <td>1000 mm<br/>2000 mm</td> </tr> </thead> </table> | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 178xø27 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
|   | Frequency (MHz)  | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 868  | 2.5  | 1.8             | 55             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   | 915  | 2.2  | 2.0             | 58             |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Dimensions  | 178xø27 mm   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| <b>Applications</b><br>LoRaWAN, Sigfox,<br>Weightless-P, WiFi<br>HaLow              | <table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td>¼-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Polarization  | Linear   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Wavelength  | ¼-λ  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |
|   |  |  |                 |                |                 |                 |          |                   |                  |                  |     |     |     |    |  |               |                |             |          |            |            |           |                |            |       |               |                    |

# Sub-1 GHz LPWA and ISM

## Remote

### Bracket Mount

#### GPX-026XNF2W



##### Overview

915 MHz Outdoor Directional Patch Flat Panel

##### Applications

RFID, LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz)                  | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|----------------------------------|------------|-----------------|----------------|
| 915                              | 1.1        | 8.1             | 79             |
| Polarization: RHCP               |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$ |            |                 |                |
| Electrical Type: Radiating Patch |            |                 |                |
| Radiation Pattern: Directional   |            |                 |                |
| Impedance (Ohms): 50             |            |                 |                |

##### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Bracket Mount  |
| Termination   | N-Type Jack    |
| Dimensions    | 260x260x44 mm  |
| Op. Temp.     | -40°C to +85°C |
| IP Rating     | IP65           |

#### GPX-036XNF2W



##### Overview

915 MHz Outdoor Directional Patch Flat Panel

##### Applications

RFID, LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz)                  | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|----------------------------------|------------|-----------------|----------------|
| 915                              | 1.2        | 8.9             | 83             |
| Polarization: RHCP               |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$ |            |                 |                |
| Electrical Type: Radiating Patch |            |                 |                |
| Radiation Pattern: Directional   |            |                 |                |
| Impedance (Ohms): 50             |            |                 |                |

##### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Bracket Mount  |
| Termination   | N-Type Jack    |
| Dimensions    | 360x220x42 mm  |
| Op. Temp.     | -40°C to +85°C |
| IP Rating     | IP65           |

#### GPX-052ANF2W



##### Overview

915 MHz Outdoor Directional Patch Flat Panel

##### Applications

RFID LoRaWAN, Sigfox, Weightless-P, WiFi HaLow

##### Electrical Data

| Frequency (MHz)                  | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|----------------------------------|------------|-----------------|----------------|
| 915                              | 1.2        | 9.5             | 84             |
| Polarization: RHCP               |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$ |            |                 |                |
| Electrical Type: Radiating Patch |            |                 |                |
| Radiation Pattern: Directional   |            |                 |                |
| Impedance (Ohms): 50             |            |                 |                |

##### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Bracket Mount  |
| Termination   | N-Type Jack    |
| Dimensions    | 521x301x48 mm  |
| Op. Temp.     | -40°C to +85°C |
| IP Rating     | IP65           |

## WiFi / WLAN

Joymax multi-band 2.4 GHz, 5 GHz and 6 GHz antenna solutions target wireless LAN (WiFi/WLAN) applications including:

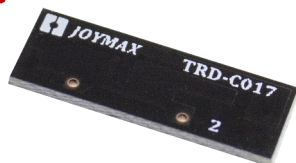
- WiFi 7 (Tri-band: 2.4 GHz + 5 GHz + 6 GHz)
- WiFi 6E (Tri-band: 2.4 GHz + 5 GHz + 6 GHz)
- WiFi 6 (Dual-band: 2.4 GHz + 5 GHz)
- WiFi 5 (5 GHz)
- WiFi 4 (2.4 GHz)
- U-NII 1-8
- 802.11b/g/n/ac/ax/be

### Internal

#### Surface Mount

##### TRD-C017SMDB

New



#### Overview

WLAN/WiFi Triband Monopole PCB chip SMD type

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.4             | 70             |
| 5150-5850       | 2.1        | 5.8             | 65             |
| 5925-7125       | 1.9        | 5.0             | 67             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Surface Mount  |
| Termination   | Solder Pad     |
| Dimensions    | 17x6x0.8 mm    |
| Op. Temp.     | -40°C to +85°C |
| Ground Plane  | 47 x 30 mm     |

# WiFi / WLAN

## Internal

### Adhesive Mount

#### TBF-H030MP3B-\*



#### Overview

WLAN/WiFi Trib-and Adhesive FPC  
Dipole Flexible Flat Patch Orthogonal Cable

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 2.0        | 2.3             | 63             |
| 5150-5850       | 1.5        | 4.6             | 70             |
| 5925-7125       | 1.5        | 6.3             | 64             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                                      |
|---------------|--------------------------------------|
| Mounting Type | Adhesive Mount                       |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4 Plug |
| Dimensions    | 30x10x0.2 mm                         |
| Op. Temp.     | -40°C to +85°C                       |
| Cable Type    | $\varnothing$ 1.13mm                 |
| Cable Length* | 60 mm<br>120 mm<br>180 mm            |

#### TBF-H035MP3B-\*



#### Overview

WLAN/WiFi Trib-and Adhesive FPC  
Dipole Flexible Flat Patch Orthogonal Cable

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 2.2        | 2.4             | 60             |
| 5150-5850       | 2.1        | 4.4             | 71             |
| 5925-7125       | 2.7        | 7.1             | 62             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                                      |
|---------------|--------------------------------------|
| Mounting Type | Adhesive Mount                       |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4 Plug |
| Dimensions    | 35x20x0.2 mm                         |
| Op. Temp.     | -40°C to +85°C                       |
| Cable Type    | $\varnothing$ 1.13mm                 |
| Cable Length* | 60 mm<br>120 mm<br>180 mm            |

#### TBF-V035MP3B-\*



#### Overview

WLAN/WiFi Trib-and Adhesive FPC  
Dipole Flexible Flat Patch Coax Cable

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.8        | 2.3             | 64             |
| 5150-5850       | 1.7        | 4.6             | 71             |
| 5925-7125       | 2.5        | 7.3             | 65             |

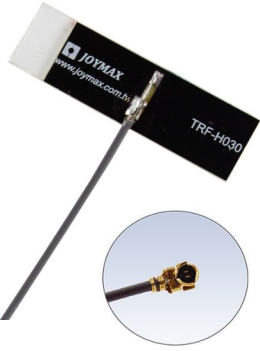

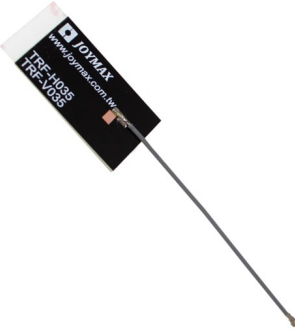
|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                                      |
|---------------|--------------------------------------|
| Mounting Type | Adhesive Mount                       |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4 Plug |
| Dimensions    | 35x20x0.2 mm                         |
| Op. Temp.     | -40°C to +85°C                       |
| Cable Type    | $\varnothing$ 1.13mm                 |
| Cable Length* | 60 mm<br>120 mm<br>180 mm            |

## Internal

### Adhesive Mount

| TRF-H030MP3B-*   | Overview  | Electrical Data  | Mechanical Data   |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|--|---|--|-------------------|------------------|-------------------|------------------|-----------|-----|--------|----|-----------|-----|----------------------|--------|------------------|-----|-----|----|---|
|                 | WLAN/WiFi Trib-and Adhesive PCB<br>Dipole Rigid Flat<br>Patch Orthogonal<br>Cable   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.7</td> <td>2.5</td> <td>60</td> </tr> <tr> <td>5150-5850</td> <td>1.3</td> <td>4.7</td> <td>64</td> </tr> <tr> <td>5925-7125</td> <td>2.3</td> <td>4.8</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 2400-2500 | 1.7 | 2.5    | 60 | 5150-5850 | 1.3 | 4.7                  | 64     | 5925-7125        | 2.3 | 4.8 | 50 | Mounting Type Adhesive Mount<br>Termination* U.FL-type Plug /MHF1 Plug /MHF4L Plug<br>Dimensions 30x10x1.1 mm<br>Op. Temp. -40°C to +85°C<br>Cable Type $\varnothing$ 1.13mm<br>Cable Length* 60 mm, 120 mm, 180 mm |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 2400-2500  | 1.7   | 2.5  | 60                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5150-5850  | 1.3   | 4.7  | 64                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5925-7125  | 2.3   | 4.8  | 50                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Linear</td> <td></td> <td>50</td> </tr> <tr> <td></td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td></td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) |           |     | Linear |    | 50        |     | $\frac{1}{2}\lambda$ | Dipole | Omni directional |     |     |    |   |
| Polarization   | Wavelength  | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  |   | Linear   |                   | 50               |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  | $\frac{1}{2}\lambda$  | Dipole   | Omni directional  |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|                | WLAN/WiFi Trib-and Adhesive PCB<br>Dipole Rigid Flat<br>Patch Orthogonal<br>Cable   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.5</td> <td>3.0</td> <td>59</td> </tr> <tr> <td>5150-5850</td> <td>1.7</td> <td>3.9</td> <td>65</td> </tr> <tr> <td>5925-7125</td> <td>2.0</td> <td>4.7</td> <td>46</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 2400-2500 | 1.5 | 3.0    | 59 | 5150-5850 | 1.7 | 3.9                  | 65     | 5925-7125        | 2.0 | 4.7 | 46 | Mounting Type Adhesive Mount<br>Termination* U.FL-type Plug /MHF1 Plug /MHF4L Plug<br>Dimensions 35x20x1.1 mm<br>Op. Temp. -40°C to +85°C<br>Cable Type $\varnothing$ 1.13mm<br>Cable Length* 60 mm, 120 mm, 180 mm |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 2400-2500  | 1.5   | 3.0  | 59                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5150-5850  | 1.7   | 3.9  | 65                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5925-7125  | 2.0   | 4.7  | 46                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Linear</td> <td></td> <td>50</td> </tr> <tr> <td></td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td></td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) |           |     | Linear |    | 50        |     | $\frac{1}{2}\lambda$ | Dipole | Omni directional |     |     |    |   |
| Polarization   | Wavelength  | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  |   | Linear   |                   | 50               |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  | $\frac{1}{2}\lambda$  | Dipole   | Omni directional  |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|               | WLAN/WiFi Trib-and Adhesive PCB<br>Dipole Rigid Flat<br>Patch Coax Cable  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.8</td> <td>2.2</td> <td>65</td> </tr> <tr> <td>5150-5850</td> <td>1.8</td> <td>4.9</td> <td>63</td> </tr> <tr> <td>5925-7125</td> <td>3.2</td> <td>4.6</td> <td>47</td> </tr> </tbody> </table> | Frequency (MHz)   | VSWR (Max)       | Peak Gain (dBi)   | Efficiency (%)   | 2400-2500 | 1.8 | 2.2    | 65 | 5150-5850 | 1.8 | 4.9                  | 63     | 5925-7125        | 3.2 | 4.6 | 47 | Mounting Type Adhesive Mount<br>Termination* U.FL-type Plug /MHF1 Plug /MHF4L Plug<br>Dimensions 35x20x1.1 mm<br>Op. Temp. -40°C to +85°C<br>Cable Type $\varnothing$ 1.13mm<br>Cable Length* 60 mm, 120 mm, 180 mm |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)   | Efficiency (%)   |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 2400-2500  | 1.8   | 2.2  | 65                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5150-5850  | 1.8   | 4.9  | 63                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| 5925-7125  | 3.2   | 4.6  | 47                |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Wavelength</th> <th>Electrical Type</th> <th>Radiation Pattern</th> <th>Impedance (Ohms)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Linear</td> <td></td> <td>50</td> </tr> <tr> <td></td> <td><math>\frac{1}{2}\lambda</math></td> <td>Dipole</td> <td>Omni directional</td> <td></td> </tr> </tbody> </table> | Polarization   | Wavelength        | Electrical Type  | Radiation Pattern | Impedance (Ohms) |           |     | Linear |    | 50        |     | $\frac{1}{2}\lambda$ | Dipole | Omni directional |     |     |    |   |
| Polarization   | Wavelength  | Electrical Type  | Radiation Pattern | Impedance (Ohms) |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  |   | Linear   |                   | 50               |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |
|  | $\frac{1}{2}\lambda$  | Dipole   | Omni directional  |                  |                   |                  |           |     |        |    |           |     |                      |        |                  |     |     |    |   |

# WiFi / WLAN

## External

### Connector Mount

#### TWX-100ARS3B



#### Overview

Outdoor WLAN/  
WiFi Triband Tilt/  
Swivel Dipole  
Whip

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.6        | 2.6             | 71             |
| 5150-5850       | 1.5        | 4.3             | 57             |
| 5925-7125       | 3.0        | 4.6             | 58             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 124xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |
| IP Rating     | IP67            |

#### TWX-180ARS3B



#### Overview

Outdoor WLAN/  
WiFi Triband Tilt/  
Swivel Dipole  
Whip

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.9        | 3.7             | 53             |
| 5150-5850       | 1.6        | 5.5             | 69             |
| 5925-7125       | 2.0        | 4.9             | 66             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 203xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |
| IP Rating     | IP67            |

#### TWX-100BRS3B



#### Overview

WLAN/WiFi Trib-  
and Tilt/Swivel  
Dipole Whip

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.6        | 2.6             | 71             |
| 5150-5850       | 1.5        | 4.3             | 57             |
| 5925-7125       | 3.0        | 4.4             | 58             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 124xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |

#### TWX-180BRS3B



#### Overview

WLAN/WiFi Trib-  
and Tilt/Swivel  
Dipole Whip

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.9        | 3.7             | 53             |
| 5150-5850       | 1.6        | 5.5             | 69             |
| 5925-7125       | 2.0        | 4.9             | 66             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 203xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |

## External

### Connector Mount

#### TMX-221ARS3B



#### Overview

WLAN/WiFi Trib- and Right-Angle Monopole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.5        | 1.1             | 49             |
| 5150-5850       | 2.5        | 3.0             | 62             |
| 5925-7125       | 3.0        | 3.5             | 61             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 47xø8 mm        |
| Op. Temp.     | -30°C to +70°C  |

#### TWX-144XRS3B



#### Overview

WLAN/WiFi Trib- and Tilt/Swivel Dipole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.3        | 2.5             | 70             |
| 5150-5850       | 1.6        | 4.2             | 56             |
| 5925-7125       | 2.1        | 4.4             | 57             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 138xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |

#### KWX-100ARS2B



#### Overview

WLAN/WiFi Trib- and Tilt/Swivel Dipole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 5150-5850       | 1.3        | 4.5             | 85             |
| 5925-7125       | 2.0        | 4.1             | 58             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 124xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |
| IP Rating     | IP67            |

# WiFi / WLAN

## External

### Connector Mount

#### TWX-282BRS3B



#### Overview

WLAN/WiFi Tri-band Tilt/Swivel Dipole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.4        | 2.0             | 67             |
| 5150-5850       | 1.5        | 3.0             | 73             |
| 5925-7125       | 2.7        | 3.3             | 70             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | RP-SMA Plug             |
| Dimensions    | 86x $\varnothing$ 10 mm |
| Op. Temp.     | -30°C to +70°C          |

#### TWX-241BRS3B



#### Overview

WLAN/WiFi Tri-band Tilt/Swivel Dipole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.3        | 2.1             | 65             |
| 5150-5850       | 1.4        | 3.1             | 69             |
| 5925-7125       | 2.1        | 3.3             | 72             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 108x $\varnothing$ 10 mm |
| Op. Temp.     | -30°C to +70°C           |

#### KWX-100BRS2B



#### Overview

WLAN/WiFi Triband Tilt/Swivel Dipole Whip

#### Applications

WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 5150-5850       | 1.7        | 3.5             | 83             |
| 5925-7125       | 1.6        | 4.9             | 66             |


|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |


#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 124x $\varnothing$ 13 mm |
| Op. Temp.     | -30°C to +70°C           |

## External

### Panel Mount

| TWF-282BMP3B-*  | Overview   | Electrical Data  | Mechanical Data |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
|---|--|--|-----------------|-----------------|-----------------|----------------|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|---|---------------|-------------|-------------|-----------|------------|-----------|-----------|----------------|------------|---------|---------------|-------|
|  | WLAN/WiFi Tri-band Tilt/Swivel Dipole Whip, Flying Lead<br><br><b>Applications</b><br>WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.4</td> <td>2.0</td> <td>67</td> </tr> <tr> <td>5150-5850</td> <td>1.5</td> <td>3.0</td> <td>73</td> </tr> <tr> <td>5925-7125</td> <td>2.7</td> <td>3.3</td> <td>70</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.4 | 2.0 | 67 | 5150-5850 | 1.5 | 3.0 | 73 | 5925-7125 | 2.7 | 3.3 | 70 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Panel Mount</td> </tr> <tr> <th>Termination</th> <td>MHF1 Plug</td> </tr> <tr> <th>Dimensions</th> <td>82xø10 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>ø1.37mm</td> </tr> <tr> <th>Cable Length*</th> <td>150mm</td> </tr> </thead> </table> | Mounting Type | Panel Mount | Termination | MHF1 Plug | Dimensions | 82xø10 mm | Op. Temp. | -30°C to +70°C | Cable Type | ø1.37mm | Cable Length* | 150mm |
|   |  | Frequency (MHz)  | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| 2400-2500   | 1.4  | 2.0  | 67              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| 5150-5850   | 1.5  | 3.0  | 73              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| 5925-7125   | 2.7  | 3.3  | 70              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Mounting Type   | Panel Mount  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Termination   | MHF1 Plug  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Dimensions  | 82xø10 mm  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Op. Temp.   | -30°C to +70°C   |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Cable Type  | ø1.37mm  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
| Cable Length*   | 150mm  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |
|   |  | Polarization: Linear<br>Wavelength: ½-λ<br>Electrical Type: Dipole<br>Radiation Pattern: Omni directional<br>Impedance (Ohms): 50  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |   |               |             |             |           |            |           |           |                |            |         |               |       |

| TWF-241BMP3B-*   | Overview   | Electrical Data  | Mechanical Data |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
|--|--|--|-----------------|-----------------|-----------------|----------------|-----------|-----|-----|----|-----------|-----|-----|----|-----------|-----|-----|----|--|---------------|-------------|-------------|-----------|------------|------------|-----------|----------------|------------|---------|---------------|-------|
|  | WLAN/WiFi Tri-band Tilt/Swivel Dipole Whip, Flying Lead<br><br><b>Applications</b><br>WiFi 7, WiFi 6E, WiFi 6, WiFi 5, WiFi 4, U-NII, 802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.3</td> <td>2.1</td> <td>65</td> </tr> <tr> <td>5150-5850</td> <td>1.4</td> <td>3.1</td> <td>69</td> </tr> <tr> <td>5925-7125</td> <td>2.1</td> <td>3.3</td> <td>72</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.3 | 2.1 | 65 | 5150-5850 | 1.4 | 3.1 | 69 | 5925-7125 | 2.1 | 3.3 | 72 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <td>Panel Mount</td> </tr> <tr> <th>Termination</th> <td>MHF1 Plug</td> </tr> <tr> <th>Dimensions</th> <td>105xø10 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Cable Type</th> <td>ø1.37mm</td> </tr> <tr> <th>Cable Length*</th> <td>150mm</td> </tr> </thead> </table> | Mounting Type | Panel Mount | Termination | MHF1 Plug | Dimensions | 105xø10 mm | Op. Temp. | -30°C to +70°C | Cable Type | ø1.37mm | Cable Length* | 150mm |
|  |  | Frequency (MHz)  | VSWR (Max)      | Peak Gain (dBi) | Efficiency (%)  |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| 2400-2500  | 1.3  | 2.1  | 65              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| 5150-5850  | 1.4  | 3.1  | 69              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| 5925-7125  | 2.1  | 3.3  | 72              |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Mounting Type  | Panel Mount  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Termination  | MHF1 Plug  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Dimensions   | 105xø10 mm   |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Op. Temp.  | -30°C to +70°C   |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Cable Type   | ø1.37mm  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
| Cable Length*  | 150mm  |  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |
|  |  | Polarization: Linear<br>Wavelength: ½-λ<br>Electrical Type: Dipole<br>Radiation Pattern: Omni directional<br>Impedance (Ohms): 50  |                 |                 |                 |                |           |     |     |    |           |     |     |    |           |     |     |    |  |               |             |             |           |            |            |           |                |            |         |               |       |

# WiFi / WLAN

## External

### Connector Mount

#### THX-150XNX3B



##### Overview

WLAN/WiFi Trib-  
and Dipole  
Straight Blade

##### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 2.0        | 4.0             | 70             |
| 5150-5850       | 2.0        | 5.5             | 77             |
| 5925-7125       | 2.0        | 4.8             | 68             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 178x $\varnothing$ 21 mm |
| Op. Temp.     | -40°C to +85°C           |
| IP Rating     | IP67                     |

#### THX-325ARS3B



##### Overview

WLAN/WiFi Trib-  
and Dipole  
Straight Whip

##### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.8             | 54             |
| 5150-5850       | 1.5        | 3.6             | 64             |
| 5925-7125       | 2.8        | 3.4             | 51             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 111x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C           |
| IP Rating     | IP65                     |

#### THX-328ARS3B



##### Overview

WLAN/WiFi Trib-  
and Dipole  
Straight Whip

##### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.3             | 49             |
| 5150-5850       | 1.8        | 3.5             | 67             |
| 5925-7125       | 1.9        | 3.3             | 50             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | RP-SMA Plug             |
| Dimensions    | 46x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C          |
| IP Rating     | IP65                    |

#### THX-221ARS3B

New



##### Overview

WLAN/WiFi Trib-  
and Dipole  
Straight Whip

##### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.3             | 49             |
| 5150-5850       | 1.8        | 3.5             | 67             |
| 5925-7125       | 1.9        | 3.3             | 50             |





|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | RP-SMA Plug             |
| Dimensions    | 46x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C          |
| IP Rating     | IP65                    |

## External

### Connector Mount

| <u>TGX-1023NF3W</u>  | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
|--|---|--|-----------------|----------------|-----------------|-----------------|-----------|-------------------|------------------|------------------|-----------|-----|-----|----|--|---------------|-----------|-------------|---|---------------|------------|--------------|----------------------------|------------|------------|-----------|----------------|-----------|------|
|                 | Outdoor WLAN/<br>WiFi tri-band Fi-<br>berglass Dipole<br>Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.5</td> <td>2.7</td> <td>77</td> </tr> <tr> <td>5150-5850</td> <td>1.8</td> <td>6.3</td> <td>63</td> </tr> <tr> <td>5925-7125</td> <td>2.4</td> <td>6.8</td> <td>43</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 1.5               | 2.7              | 77               | 5150-5850 | 1.8 | 6.3 | 63 | 5925-7125  | 2.4           | 6.8       | 43          | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination*</td> <td>N-Type Jack<br/>N-Type Plug</td> </tr> <tr> <td>Dimensions</td> <td>145xø25 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector  | Termination* | N-Type Jack<br>N-Type Plug | Dimensions | 145xø25 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 2400-2500  | 1.5   | 2.7  | 77              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5150-5850  | 1.8   | 6.3  | 63              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5925-7125  | 2.4   | 6.8  | 43              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Mounting Type  | Connector   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Termination*   | N-Type Jack<br>N-Type Plug  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Dimensions   | 145xø25 mm  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| IP Rating  | IP67  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ½-λ             | Electrical Type | Dipole    | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Polarization   | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Wavelength   | ½-λ   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Electrical Type  | Dipole  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Impedance (Ohms)   | 50  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <u>TGX-1123NX3W</u>  | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
|                | Outdoor WLAN/<br>WiFi Tri-band<br>Fiberglass Dipole<br>Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.4</td> <td>2.9</td> <td>73</td> </tr> <tr> <td>5150-5850</td> <td>1.7</td> <td>5.0</td> <td>60</td> </tr> <tr> <td>5925-7125</td> <td>1.8</td> <td>5.5</td> <td>40</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 1.4               | 2.9              | 73               | 5150-5850 | 1.7 | 5.0 | 60 | 5925-7125  | 1.8           | 5.5       | 40          | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Plug</td> </tr> <tr> <td>Dimensions</td> <td>152xø24 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table>                  | Mounting Type | Connector  | Termination  | N-Type Plug                | Dimensions | 152xø24 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 2400-2500  | 1.4   | 2.9  | 73              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5150-5850  | 1.7   | 5.0  | 60              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5925-7125  | 1.8   | 5.5  | 40              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Mounting Type  | Connector   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Termination  | N-Type Plug   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Dimensions   | 152xø24 mm  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| IP Rating  | IP67  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ½-λ             | Electrical Type | Dipole    | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Polarization   | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Wavelength   | ½-λ   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Electrical Type  | Dipole  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Impedance (Ohms)   | 50  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <u>TGX-1017NX3W</u>  | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
|               | Outdoor WLAN/<br>WiFi Tri-band<br>Fiberglass Dipole<br>Baton/Stick  | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.8</td> <td>7.2</td> <td>77</td> </tr> <tr> <td>5150-5850</td> <td>2.3</td> <td>7.5</td> <td>68</td> </tr> <tr> <td>5925-7125</td> <td>3.6</td> <td>7.9</td> <td>70</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 1.8               | 7.2              | 77               | 5150-5850 | 2.3 | 7.5 | 68 | 5925-7125  | 3.6           | 7.9       | 70          | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Jack</td> </tr> <tr> <td>Dimensions</td> <td>528xø20 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table>                  | Mounting Type | Connector  | Termination  | N-Type Jack                | Dimensions | 528xø20 mm | Op. Temp. | -40°C to +85°C | IP Rating | IP67 |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 2400-2500  | 1.8   | 7.2  | 77              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5150-5850  | 2.3   | 7.5  | 68              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5925-7125  | 3.6   | 7.9  | 70              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Mounting Type  | Connector   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Termination  | N-Type Jack   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Dimensions   | 528xø20 mm  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Op. Temp.  | -40°C to +85°C  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| IP Rating  | IP67  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ½-λ             | Electrical Type | Dipole    | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Polarization   | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Wavelength   | ½-λ   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Electrical Type  | Dipole  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Impedance (Ohms)   | 50  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <u>TGX-103XNF1W</u>  | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
|               | Outdoor WLAN/<br>WiFi Dual-band<br>Fiberglass Dipole<br>Baton/Stick   | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>2.5</td> <td>7.0</td> <td>68</td> </tr> <tr> <td>5150-5850</td> <td>3.0</td> <td>9.0</td> <td>75</td> </tr> </tbody> </table>   | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 2.5               | 7.0              | 68               | 5150-5850 | 3.0 | 9.0 | 75 | <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>N-Type Jack</td> </tr> <tr> <td>Dimensions</td> <td>621xø22 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>IP Rating</td> <td>IP65</td> </tr> </tbody> </table> | Mounting Type | Connector | Termination | N-Type Jack   | Dimensions    | 621xø22 mm | Op. Temp.    | -30°C to +70°C             | IP Rating  | IP65       |           |                |           |      |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 2400-2500  | 2.5   | 7.0  | 68              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| 5150-5850  | 3.0   | 9.0  | 75              |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Mounting Type  | Connector   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Termination  | N-Type Jack   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Dimensions   | 621xø22 mm  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Op. Temp.  | -30°C to +70°C  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| IP Rating  | IP65  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| <b>Applications</b><br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4                     | <table border="1"> <thead> <tr> <th>Polarization</th> <th>Linear</th> </tr> </thead> <tbody> <tr> <td>Wavelength</td> <td>½-λ</td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Polarization   | Linear          | Wavelength     | ½-λ             | Electrical Type | Dipole    | Radiation Pattern | Omni directional | Impedance (Ohms) | 50        |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Polarization   | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Wavelength   | ½-λ   |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Electrical Type  | Dipole  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Radiation Pattern  | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |
| Impedance (Ohms)   | 50  |  |                 |                |                 |                 |           |                   |                  |                  |           |     |     |    |  |               |           |             |   |               |            |              |                            |            |            |           |                |           |      |

# WiFi / WLAN

## External

### Connector Mount

#### TWX-711BRS3B



#### Overview

WLAN/WiFi Trib-  
and Tilt/Swivel  
Dipole Blade

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 3.0             | 72             |
| 5150-5850       | 1.8        | 5.3             | 62             |
| 5925-7125       | 2.0        | 6.2             | 64             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 136x24x11 mm    |
| Op. Temp.     | -30°C to +70°C  |

#### TWX-614XRS3B



#### Overview

WLAN/WiFi Dual-  
band Tilt/Swivel  
Dipole Blade

#### Applications

WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.8        | 3.2             | 59             |
| 5150-5850       | 1.6        | 6.2             | 71             |
| 5925-7125       | 3.0        | 5.4             | 59             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 160x22x13 mm    |
| Op. Temp.     | -30°C to +70°C  |

#### TWX-721XRS3B



#### Overview

WLAN/WiFi Trib-  
and Tilt/Swivel  
Dipole Blade

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.4        | 2.4             | 57             |
| 5150-5850       | 1.9        | 3.8             | 63             |
| 5925-7125       | 1.6        | 5.0             | 69             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | RP-SMA Plug     |
| Dimensions    | 150x22x11 mm    |
| Op. Temp.     | -20°C to +70°C  |

## External

### Panel Mount

#### THX-3802NF3B



| Overview   | Electrical Data   |            |                 |                  | Mechanical Data |                |
|--|-------------------|------------|-----------------|------------------|-----------------|----------------|
| WLAN/WiFi Tri-band Dipole Dome/Saltshaker  | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)   | Mounting Type   | Panel Mount    |
|  | 2400-2500         | 1.8        | 1.4             | 43               | Termination     | N-Type Jack    |
|  | 5150-5850         | 1.7        | 5.0             | 64               | Dimensions      | 77.7xø38 mm    |
|  | 5925-7125         | 2.4        | 4.0             | 45               | Op. Temp.       | -40°C to +85°C |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 |                   |            |                 |                  | IP Rating       | IP67           |
|  | Polarization      |            |                 | Linear           |                 |                |
|  | Wavelength        |            |                 | ½-λ              |                 |                |
|  | Electrical Type   |            |                 | Dipole           |                 |                |
|  | Radiation Pattern |            |                 | Omni directional |                 |                |
|  | Impedance (Ohms)  |            |                 | 50               |                 |                |

#### THX-3602NF3B



| Overview   | Electrical Data   |            |                 |                  | Mechanical Data |                |
|--|-------------------|------------|-----------------|------------------|-----------------|----------------|
| WLAN/WiFi Tri-band Dipole Dome/Saltshaker  | Frequency (MHz)   | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)   | Mounting Type   | Panel Mount    |
|  | 2400-2500         | 2.0        | 2.0             | 45               | Termination     | N-Type Jack    |
|  | 5150-5850         | 2.0        | 2.0             | 60               | Dimensions      | 71xø40.2 mm    |
|  | 5925-7125         | 3.0        | 2.0             | 63               | Op. Temp.       | -30°C to +70°C |
| <b>Applications</b><br>WiFi 7, WiFi 6E,<br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 |                   |            |                 |                  | IP Rating       | IP65           |
|  | Polarization      |            |                 | Linear           |                 |                |
|  | Wavelength        |            |                 | ½-λ              |                 |                |
|  | Electrical Type   |            |                 | Dipole           |                 |                |
|  | Radiation Pattern |            |                 | Omni directional |                 |                |
|  | Impedance (Ohms)  |            |                 | 50               |                 |                |

# WiFi / WLAN

## External

### Panel Mount

#### THF-3802RS3B-\*



#### Overview

WLAN/WiFi Tri-band Dipole  
Dome/Saltshaker,  
Flying Lead

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.6        | 2.4             | 55             |
| 5150-5850       | 2.1        | 5.6             | 54             |
| 5925-7125       | 2.4        | 4.0             | 36             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                           |
|---------------|---------------------------|
| Mounting Type | Panel Mount               |
| Termination   | RP-SMA Plug               |
| Dimensions    | 77.7x $\varnothing$ 38 mm |
| Op. Temp.     | -40°C to +85°C            |
| Cable Type    | RG174                     |
| Cable Length* | 1000 mm<br>2000 mm        |
| IP Rating     | IP67                      |

#### THF-3602RS3B-\*



#### Overview

WLAN/WiFi Tri-band Dipole  
Dome/Saltshaker,  
Flying Lead

#### Applications

WiFi 7, WiFi 6E,  
WiFi 6, WiFi 5,  
WiFi 4, U-NII,  
802.11, 802.15.4

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 2.0        | 2.0             | 45             |
| 5150-5850       | 2.0        | 2.0             | 60             |
| 5925-7125       | 3.0        | 2.0             | 63             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                           |
|---------------|---------------------------|
| Mounting Type | Panel Mount               |
| Termination   | RP-SMA Plug               |
| Dimensions    | 71x $\varnothing$ 40.2 mm |
| Op. Temp.     | -30°C to +70°C            |
| Cable Type    | RG174                     |
| Cable Length* | 1000 mm<br>2000 mm        |
| IP Rating     | IP65                      |



## 2.4 GHz ISM Antennas

Joymax 2.4 GHz single-band antennas provide a broad band range of styles, mounting, termination and level of performance to accommodate ISM applications including:

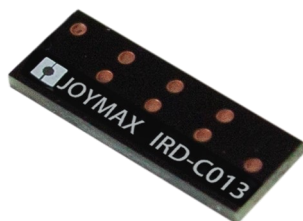
- BlueTooth®
- ZigBee®
- Thread®
- IEEE 802.11b/g
- IEEE 802.15.4

### Internal

#### Surface Mount

##### IRD-C013SMDB

New



##### Overview

2.4 GHz ISM band  
Monopole PCB  
Chip SMD Type

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.6        | 2.0             | 68             |

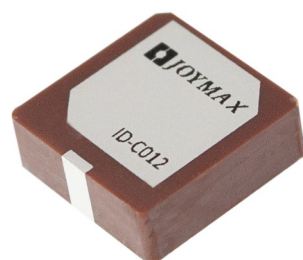
|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Surface Mount  |
| Termination   | Solder Pad     |
| Dimensions    | 13x4.5x0.8 mm  |
| Op. Temp.     | -40°C to +85°C |
| Ground Plane  | 45 x 20 mm     |

##### IPD-C012SMDB

New



##### Overview

2.4 GHz ISM band  
Directional Ceramic  
Patch SMD Type

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 3.1        | 5.6             | 62             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | RHCP                 |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Radiating Patch      |
| Radiation Pattern | Directional          |
| Impedance (Ohms)  | 50                   |

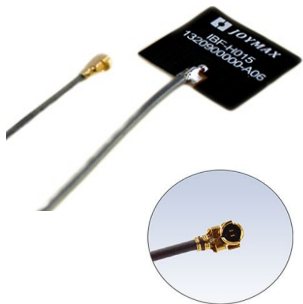

##### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Surface Mount   |
| Termination   | Solder Pad      |
| Dimensions    | 12x12x4 mm      |
| Op. Temp.     | -40°C to +105°C |
| Ground Plane  | 60 x 60 mm      |

## 2.4 GHz ISM

### Internal

#### Adhesive Mount

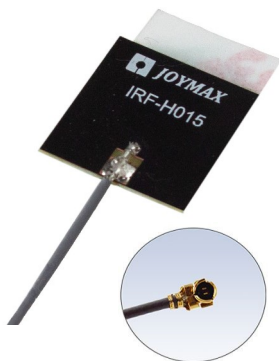
| <b><u>IBF-H015MPXB-*</u></b>  | <b>Overview</b>  | <b>Electrical Data</b>   | <b>Mechanical Data</b> |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
|---|--|--|------------------------|------------|-----------------|----------------|-----------|-----|-----|----|--------------|--------|------------|----------------------|-----------------|--------|-------------------|------------------|------------------|----|--|---------------|----------------|--------------|---------------------------------------|------------|--------------|-----------|----------------|------------|---------|---------------|---------------------------|
|   | <p>2.4 GHz ISM Adhesive FPC Dipole Flexible Flat Patch with Orthogonal Cable</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p> | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>2.2</td> <td>2.0</td> <td>53</td> </tr> </tbody> </table><br><table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 2.2 | 2.0 | 53 | Polarization | Linear | Wavelength | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50 | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination*</td> <td>U.FL-type Plug /MHF1 Plug /MHF4L Plug</td> </tr> <tr> <td>Dimensions</td> <td>15x15x0.2 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>Cable Type</td> <td>Ø1.13mm</td> </tr> <tr> <td>Cable Length*</td> <td>60 mm<br/>120 mm<br/>180 mm</td> </tr> </tbody> </table> | Mounting Type | Adhesive Mount | Termination* | U.FL-type Plug /MHF1 Plug /MHF4L Plug | Dimensions | 15x15x0.2 mm | Op. Temp. | -40°C to +85°C | Cable Type | Ø1.13mm | Cable Length* | 60 mm<br>120 mm<br>180 mm |
| Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)  | Efficiency (%)         |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| 2400-2500   | 2.2  | 2.0  | 53                     |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Polarization  | Linear   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Electrical Type   | Dipole   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Radiation Pattern   | Omni directional   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Impedance (Ohms)  | 50   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Mounting Type   | Adhesive Mount   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4L Plug  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Dimensions  | 15x15x0.2 mm   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Op. Temp.   | -40°C to +85°C   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Cable Type  | Ø1.13mm  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Cable Length*   | 60 mm<br>120 mm<br>180 mm  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
|  | <p>2.4 GHz ISM Adhesive FPC Dipole Flexible Flat Patch with Orthogonal Cable</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p> | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.3</td> <td>3.1</td> <td>57</td> </tr> </tbody> </table><br><table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{2}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Dipole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz)        | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.3 | 3.1 | 57 | Polarization | Linear | Wavelength | $\frac{1}{2}\lambda$ | Electrical Type | Dipole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50 | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Adhesive Mount</td> </tr> <tr> <td>Termination*</td> <td>U.FL-type Plug /MHF1 Plug /MHF4L Plug</td> </tr> <tr> <td>Dimensions</td> <td>40x7x0.2 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-40°C to +85°C</td> </tr> <tr> <td>Cable Type</td> <td>Ø1.13mm</td> </tr> <tr> <td>Cable Length*</td> <td>60 mm<br/>120 mm<br/>180 mm</td> </tr> </tbody> </table>  | Mounting Type | Adhesive Mount | Termination* | U.FL-type Plug /MHF1 Plug /MHF4L Plug | Dimensions | 40x7x0.2 mm  | Op. Temp. | -40°C to +85°C | Cable Type | Ø1.13mm | Cable Length* | 60 mm<br>120 mm<br>180 mm |
| Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)  | Efficiency (%)         |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| 2400-2500   | 1.3  | 3.1  | 57                     |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Polarization  | Linear   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Wavelength  | $\frac{1}{2}\lambda$   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Electrical Type   | Dipole   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Radiation Pattern   | Omni directional   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Impedance (Ohms)  | 50   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Mounting Type   | Adhesive Mount   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4L Plug  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Dimensions  | 40x7x0.2 mm  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Op. Temp.   | -40°C to +85°C   |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Cable Type  | Ø1.13mm  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |
| Cable Length*   | 60 mm<br>120 mm<br>180 mm  |  |                        |            |                 |                |           |     |     |    |              |        |            |                      |                 |        |                   |                  |                  |    |  |               |                |              |                                       |            |              |           |                |            |         |               |                           |

## 2.4 GHz ISM

### Internal

#### Adhesive Mount

##### IRF-H015MPXB-\*



##### Overview

2.4 GHz ISM Adhesive PCB Dipole Rigid Flat Patch with Orthogonal Cable

##### Applications

Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g

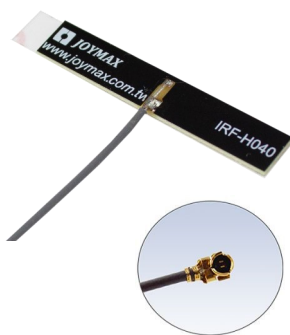
##### Electrical Data

| Frequency (MHz)                     | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-------------------------------------|------------|-----------------|----------------|
| 2400-2500                           | 2.1        | 3.1             | 57             |
| Polarization: Linear                |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$    |            |                 |                |
| Electrical Type: Dipole             |            |                 |                |
| Radiation Pattern: Omni directional |            |                 |                |
| Impedance (Ohms): 50                |            |                 |                |

##### Mechanical Data

|               |                                       |
|---------------|---------------------------------------|
| Mounting Type | Adhesive Mount                        |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4L Plug |
| Dimensions    | 15x15x1.1 mm                          |
| Op. Temp.     | -40°C to +85°C                        |
| Cable Type    | Ø1.13mm                               |
| Cable Length* | 60 mm<br>120 mm<br>180 mm             |

##### IRF-H040MPXB-\*



##### Overview

2.4 GHz ISM Adhesive PCB Dipole Rigid Flat Patch with Orthogonal Cable

##### Applications

Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g

##### Electrical Data

| Frequency (MHz)                     | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-------------------------------------|------------|-----------------|----------------|
| 2400-2500                           | 1.3        | 3.5             | 61             |
| Polarization: Linear                |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$    |            |                 |                |
| Electrical Type: Dipole             |            |                 |                |
| Radiation Pattern: Omni directional |            |                 |                |
| Impedance (Ohms): 50                |            |                 |                |


##### Mechanical Data


|               |                                       |
|---------------|---------------------------------------|
| Mounting Type | Adhesive Mount                        |
| Termination*  | U.FL-type Plug /MHF1 Plug /MHF4L Plug |
| Dimensions    | 40x7x1.1 mm                           |
| Op. Temp.     | -40°C to +85°C                        |
| Cable Type    | Ø1.13mm                               |
| Cable Length* | 60 mm<br>120 mm<br>180 mm             |


## 2.4 GHz ISM


### External

#### Connector Mount

| <u>IHX-2120RSXW</u>   | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
|---|---|--|-----------------|----------------|-----------------|-----------------|-----------|-------------------|------------------|------------------|---|---------------|-----------------|-------------|-------------|------------|----------|-----------|----------------|--------------|--------------|
|  | 2.4 GHz ISM<br>Straight Monopole<br>Whip  | <table border="1"> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> <tr> <td>2400-2500</td> <td>1.6</td> <td>3.7</td> <td>71</td> </tr> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 1.6               | 3.7              | 71               | <table border="1"> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination</th> <td>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>22xø9 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 22xø9 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| 2400-2500   | 1.6   | 3.7  | 71              |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Mounting Type   | Connector Mount   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Termination   | RP-SMA Plug   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Dimensions  | 22xø9 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Ground Plane  | 120 x 120 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| <b>Applications</b><br>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g             | <table border="1"> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |             |             |            |          |           |                |              |              |
| Polarization  | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Wavelength  | ¼-λ   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Electrical Type   | Monopole  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Radiation Pattern   | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Impedance (Ohms)  | 50  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |

| <u>IHX-2120RSXW</u>  | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
|--|---|--|-----------------|----------------|-----------------|-----------------|-----------|-------------------|------------------|------------------|---|---------------|-----------------|-------------|-------------|------------|----------|-----------|----------------|--------------|--------------|
| <span style="color: red; font-weight: bold;">New</span>  | 2.4 GHz ISM<br>Straight Monopole<br>Whip  | <table border="1"> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> <tr> <td>2400-2500</td> <td>1.6</td> <td>3.7</td> <td>71</td> </tr> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 1.6               | 3.7              | 71               | <table border="1"> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination</th> <td>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>22xø9 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 22xø9 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm |
|  | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| 2400-2500  | 1.6   | 3.7  | 71              |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Mounting Type  | Connector Mount   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Termination  | RP-SMA Plug   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Dimensions   | 22xø9 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Op. Temp.  | -30°C to +70°C  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Ground Plane   | 120 x 120 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| <b>Applications</b><br>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g  | <table border="1"> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |             |             |            |          |           |                |              |              |
| Polarization   | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Wavelength   | ¼-λ   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Electrical Type  | Monopole  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Radiation Pattern  | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |
| Impedance (Ohms)   | 50  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |          |           |                |              |              |

| <u>IMX-2120RSXW</u>   | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
|---|---|--|-----------------|----------------|-----------------|-----------------|-----------|-------------------|------------------|------------------|---|---------------|-----------------|-------------|-------------|------------|--------------|-----------|----------------|--------------|--------------|
| <span style="color: red; font-weight: bold;">New</span>  | 2.4 GHz ISM Monopole Right Angle Whip   | <table border="1"> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> <tr> <td>2400-2500</td> <td>2.3</td> <td>3.2</td> <td>72</td> </tr> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 2.3               | 3.2              | 72               | <table border="1"> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination</th> <td>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>21.6x18x9 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 21.6x18x9 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| 2400-2500   | 2.3   | 3.2  | 72              |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Mounting Type   | Connector Mount   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Termination   | RP-SMA Plug   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Dimensions  | 21.6x18x9 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Ground Plane  | 120 x 120 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| <b>Applications</b><br>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g   | <table border="1"> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |             |             |            |              |           |                |              |              |
| Polarization  | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Wavelength  | ¼-λ   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Electrical Type   | Monopole  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Radiation Pattern   | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Impedance (Ohms)  | 50  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |

| <u>IMX-2120RSXW</u>   | Overview  | Electrical Data  | Mechanical Data |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
|---|---|--|-----------------|----------------|-----------------|-----------------|-----------|-------------------|------------------|------------------|---|---------------|-----------------|-------------|-------------|------------|--------------|-----------|----------------|--------------|--------------|
| <span style="color: red; font-weight: bold;">New</span>  | 2.4 GHz ISM Monopole Right Angle Whip   | <table border="1"> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> <tr> <td>2400-2500</td> <td>2.3</td> <td>3.2</td> <td>72</td> </tr> </table> | Frequency (MHz) | VSWR (Max)     | Peak Gain (dBi) | Efficiency (%)  | 2400-2500 | 2.3               | 3.2              | 72               | <table border="1"> <tr> <th>Mounting Type</th> <td>Connector Mount</td> </tr> <tr> <th>Termination</th> <td>RP-SMA Plug</td> </tr> <tr> <th>Dimensions</th> <td>21.6x18x9 mm</td> </tr> <tr> <th>Op. Temp.</th> <td>-30°C to +70°C</td> </tr> <tr> <th>Ground Plane</th> <td>120 x 120 mm</td> </tr> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 21.6x18x9 mm | Op. Temp. | -30°C to +70°C | Ground Plane | 120 x 120 mm |
|   | Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi) | Efficiency (%) |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| 2400-2500   | 2.3   | 3.2  | 72              |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Mounting Type   | Connector Mount   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Termination   | RP-SMA Plug   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Dimensions  | 21.6x18x9 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Op. Temp.   | -30°C to +70°C  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Ground Plane  | 120 x 120 mm  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| <b>Applications</b><br>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g   | <table border="1"> <tr> <th>Polarization</th> <td>Linear</td> </tr> <tr> <th>Wavelength</th> <td>¼-λ</td> </tr> <tr> <th>Electrical Type</th> <td>Monopole</td> </tr> <tr> <th>Radiation Pattern</th> <td>Omni directional</td> </tr> <tr> <th>Impedance (Ohms)</th> <td>50</td> </tr> </table> | Polarization   | Linear          | Wavelength     | ¼-λ             | Electrical Type | Monopole  | Radiation Pattern | Omni directional | Impedance (Ohms) | 50  |               |                 |             |             |            |              |           |                |              |              |
| Polarization  | Linear  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Wavelength  | ¼-λ   |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Electrical Type   | Monopole  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Radiation Pattern   | Omni directional  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |
| Impedance (Ohms)  | 50  |  |                 |                |                 |                 |           |                   |                  |                  |   |               |                 |             |             |            |              |           |                |              |              |

## 2.4 GHz ISM

### External

#### Connector Mount

##### IHX-325ARSXB



##### Overview

2.4 GHz ISM  
Straight Dipole  
Whip

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.7             | 68             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 111x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C           |
| IP Rating     | IP65                     |

##### IHX-328ARSXB



##### Overview

2.4 GHz ISM  
Straight Dipole  
Whip

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.7        | 2.3             | 49             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | RP-SMA Plug             |
| Dimensions    | 46x $\varnothing$ 11 mm |
| Op. Temp.     | -30°C to +70°C          |
| IP Rating     | IP65                    |

##### IWX-241BRSXB



##### Overview

2.4 GHz ISM Tilt/  
Swivel Dipole  
Whip

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.5        | 2.5             | 67             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

##### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | RP-SMA Plug              |
| Dimensions    | 108x $\varnothing$ 10 mm |
| Op. Temp.     | -30°C to +70°C           |

##### IWX-282BRSXB



##### Overview

2.4 GHz ISM Tilt/  
Swivel Dipole  
Whip

##### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

##### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.6        | 2.4             | 72             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |




##### Mechanical Data

|               |                         |
|---------------|-------------------------|
| Mounting Type | Connector Mount         |
| Termination   | RP-SMA Plug             |
| Dimensions    | 86x $\varnothing$ 10 mm |
| Op. Temp.     | -30°C to +70°C          |

## 2.4 GHz ISM

### External

#### Panel Mount

| <u>IHF-2120MPXB-*</u>   | Overview   | Electrical Data    |               |  |                   | Mechanical Data                        |  |
|---|--|--------------------|---------------|--|-------------------|--|--|
|    | 2.4 GHz ISM<br>Straight Monopole<br>Whip, Flying Lead                                  | Frequency<br>(MHz) | VSWR<br>(Max) | Peak Gain<br>(dBi)   | Efficiency<br>(%) | Mounting Type                          | Panel Mount                              |
|   | <b>Applications</b><br>Bluetooth, Zigbee,<br>Thread, 802.15.4,<br>802.11b/g            | 2400-2500          | 1.2           | 2.7  | 63                | Termination<br>Dimensions<br>Op. Temp. | MHF1 Plug<br>14x9 mm<br>-30°C to +70°C   |
|   | Polarization<br>Wavelength<br>Electrical Type<br>Radiation Pattern<br>Impedance (Ohms) |                    |               | Linear<br>$\frac{1}{4}\lambda$<br>Monopole<br>Omni directional<br>50 |                   | Cable Type<br>Cable Length*            | $\varnothing$ 1.13mm<br>100 mm<br>150 mm |
| <u>IWF-282BMPXB-*</u>   | Overview   | Electrical Data    |               |  |                   | Mechanical Data                        |  |
|   | 2.4 GHz ISM Tilt/<br>Swivel Dipole<br>Whip, Flying Lead                                | Frequency<br>(MHz) | VSWR<br>(Max) | Peak Gain<br>(dBi)   | Efficiency<br>(%) | Mounting Type                          | Panel Mount                              |
|   | <b>Applications</b><br>Bluetooth, Zigbee,<br>Thread, 802.15.4,<br>802.11b/g            | 2400-2500          | 1.6           | 2.4  | 72                | Termination<br>Dimensions<br>Op. Temp. | MHF1 Plug<br>82x10 mm<br>-30°C to +70°C  |
|   | Polarization<br>Wavelength<br>Electrical Type<br>Radiation Pattern<br>Impedance (Ohms) |                    |               | Linear<br>$\frac{1}{2}\lambda$<br>Dipole<br>Omni directional<br>50   |                   | Cable Type<br>Cable Length*            | $\varnothing$ 1.37mm<br>150mm            |
| <u>IWF-241BMPXB-*</u>   | Overview   | Electrical Data    |               |  |                   | Mechanical Data                        |  |
|  | 2.4 GHz ISM Tilt/<br>Swivel Dipole<br>Whip, Flying Lead                                | Frequency<br>(MHz) | VSWR<br>(Max) | Peak Gain<br>(dBi)   | Efficiency<br>(%) | Mounting Type                          | Panel Mount                              |
|   | <b>Applications</b><br>Bluetooth, Zigbee,<br>Thread, 802.15.4,<br>802.11b/g            | 2400-2500          | 1.5           | 2.5  | 67                | Termination<br>Dimensions<br>Op. Temp. | MHF1 Plug<br>105x10 mm<br>-30°C to +70°C |
|   | Polarization<br>Wavelength<br>Electrical Type<br>Radiation Pattern<br>Impedance (Ohms) |                    |               | Linear<br>$\frac{1}{2}\lambda$<br>Dipole<br>Omni directional<br>50   |                   | Cable Type<br>Cable Length*            | $\varnothing$ 1.37mm<br>150mm            |

## 2.4 GHz ISM

### External

#### Connector Mount

| <p><b><u>IWX-180ARSXB</u></b></p>    | <p><b>Overview</b></p> <p>Outdoor 2.4 GHz ISM Tilt/Swivel Dipole Whip</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p> | <p><b>Electrical Data</b></p> <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.9</td> <td>4.5</td> <td>77</td> </tr> </tbody> </table> <p>Polarization: Linear<br/>Wavelength: <math>\frac{1}{2}\lambda</math><br/>Electrical Type: Dipole<br/>Radiation Pattern: Omni directional<br/>Impedance (Ohms): 50</p> | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.9 | 4.5 | 77 | <p><b>Mechanical Data</b></p> <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>203x<math>\varnothing</math>13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 203x $\varnothing$ 13 mm | Op. Temp. | -30°C to +70°C | IP Rating | IP67 |
|---|---|---|-----------------|------------|-----------------|----------------|-----------|-----|-----|----|---|---------------|-----------------|-------------|-------------|------------|--------------------------|-----------|----------------|-----------|------|
| Frequency (MHz)   | VSWR (Max)  | Peak Gain (dBi)   | Efficiency (%)  |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| 2400-2500   | 1.9   | 4.5   | 77              |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Mounting Type   | Connector Mount   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Termination   | RP-SMA Plug   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Dimensions  | 203x $\varnothing$ 13 mm  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Op. Temp.   | -30°C to +70°C  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| IP Rating   | IP67  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| <p><b><u>IWX-100ARSXB</u></b></p>   | <p><b>Overview</b></p> <p>Outdoor 2.4 GHz ISM Tilt/Swivel Dipole Whip</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p> | <p><b>Electrical Data</b></p> <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.7</td> <td>3.0</td> <td>65</td> </tr> </tbody> </table> <p>Polarization: Linear<br/>Wavelength: <math>\frac{1}{2}\lambda</math><br/>Electrical Type: Dipole<br/>Radiation Pattern: Omni directional<br/>Impedance (Ohms): 50</p> | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.7 | 3.0 | 65 | <p><b>Mechanical Data</b></p> <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>124x<math>\varnothing</math>13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>IP Rating</td> <td>IP67</td> </tr> </tbody> </table> | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 124x $\varnothing$ 13 mm | Op. Temp. | -30°C to +70°C | IP Rating | IP67 |
| Frequency (MHz)   | VSWR (Max)  | Peak Gain (dBi)   | Efficiency (%)  |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| 2400-2500   | 1.7   | 3.0   | 65              |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Mounting Type   | Connector Mount   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Termination   | RP-SMA Plug   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Dimensions  | 124x $\varnothing$ 13 mm  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Op. Temp.   | -30°C to +70°C  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| IP Rating   | IP67  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| <p><b><u>IWX-180BRSXB</u></b></p>  | <p><b>Overview</b></p> <p>2.4 GHz ISM Tilt/Swivel Dipole Whip</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p>         | <p><b>Electrical Data</b></p> <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.9</td> <td>4.5</td> <td>77</td> </tr> </tbody> </table> <p>Polarization: Linear<br/>Wavelength: <math>\frac{1}{2}\lambda</math><br/>Electrical Type: Dipole<br/>Radiation Pattern: Omni directional<br/>Impedance (Ohms): 50</p> | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.9 | 4.5 | 77 | <p><b>Mechanical Data</b></p> <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>203x<math>\varnothing</math>13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>   | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 203x $\varnothing$ 13 mm | Op. Temp. | -30°C to +70°C |           |      |
| Frequency (MHz)   | VSWR (Max)  | Peak Gain (dBi)   | Efficiency (%)  |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| 2400-2500   | 1.9   | 4.5   | 77              |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Mounting Type   | Connector Mount   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Termination   | RP-SMA Plug   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Dimensions  | 203x $\varnothing$ 13 mm  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Op. Temp.   | -30°C to +70°C  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| <p><b><u>IWX-100BRSXB</u></b></p>  | <p><b>Overview</b></p> <p>2.4 GHz ISM Tilt/Swivel Dipole Whip</p> <p><b>Applications</b><br/>Bluetooth, Zigbee, Thread, 802.15.4, 802.11b/g</p>         | <p><b>Electrical Data</b></p> <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>2400-2500</td> <td>1.7</td> <td>3.0</td> <td>65</td> </tr> </tbody> </table> <p>Polarization: Linear<br/>Wavelength: <math>\frac{1}{2}\lambda</math><br/>Electrical Type: Dipole<br/>Radiation Pattern: Omni directional<br/>Impedance (Ohms): 50</p> | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 2400-2500 | 1.7 | 3.0 | 65 | <p><b>Mechanical Data</b></p> <table border="1"> <thead> <tr> <th>Mounting Type</th> <th>Connector Mount</th> </tr> </thead> <tbody> <tr> <td>Termination</td> <td>RP-SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>124x<math>\varnothing</math>13 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> </tbody> </table>   | Mounting Type | Connector Mount | Termination | RP-SMA Plug | Dimensions | 124x $\varnothing$ 13 mm | Op. Temp. | -30°C to +70°C |           |      |
| Frequency (MHz)   | VSWR (Max)  | Peak Gain (dBi)   | Efficiency (%)  |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| 2400-2500   | 1.7   | 3.0   | 65              |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Mounting Type   | Connector Mount   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Termination   | RP-SMA Plug   |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Dimensions  | 124x $\varnothing$ 13 mm  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |
| Op. Temp.   | -30°C to +70°C  |   |                 |            |                 |                |           |     |     |    |   |               |                 |             |             |            |                          |           |                |           |      |

# 2.4 GHz ISM

## External

### Connector Mount

#### IGX-1023NFXG



#### Overview

Outdoor 2.4 GHz  
ISM Fiberglass  
Dipole Baton/Stick

#### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

#### Electrical Data

| Frequency (MHz)                     | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-------------------------------------|------------|-----------------|----------------|
| 2400-2500                           | 1.4        | 2.5             | 76             |
| Polarization: Linear                |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$    |            |                 |                |
| Electrical Type: Dipole             |            |                 |                |
| Radiation Pattern: Omni directional |            |                 |                |
| Impedance (Ohms): 50                |            |                 |                |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | N-Type Jack              |
| Dimensions    | 174x $\varnothing$ 25 mm |
| Op. Temp.     | -40°C to +85°C           |
| IP Rating     | IP67                     |

#### IGX-1123NXXW



#### Overview

Outdoor 2.4 GHz  
ISM Fiberglass  
Dipole Baton/Stick

#### Applications

Bluetooth, Zigbee,  
Thread, 802.15.4,  
802.11b/g

#### Electrical Data

| Frequency (MHz)                     | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-------------------------------------|------------|-----------------|----------------|
| 2400-2500                           | 2.0        | 3.5             | 76             |
| Polarization: Linear                |            |                 |                |
| Wavelength: $\frac{1}{2}\lambda$    |            |                 |                |
| Electrical Type: Dipole             |            |                 |                |
| Radiation Pattern: Omni directional |            |                 |                |
| Impedance (Ohms): 50                |            |                 |                |

#### Mechanical Data

|               |                          |
|---------------|--------------------------|
| Mounting Type | Connector Mount          |
| Termination   | N-Type Plug              |
| Dimensions    | 152x $\varnothing$ 24 mm |
| Op. Temp.     | -40°C to +85°C           |
| IP Rating     | IP67                     |

# GNSS Antennas


Joymax offers internal and external Global Navigation Satellite System (GNSS) antennas for systems including:

- GPS (L1 band central frequency at: 1575.42MHz)
- Galileo (E1 band central frequency at: 1575.42MHz)
- Glonass (G1 band central frequency at: 1602MHz)
- BeiDou/ COMPASS (B1 band central frequency at: 1561MHz)


Data is provided by frequency band in MHz. GNSS frequency band names may be cross-referenced to frequencies using the band table on pages [72](#).

## Internal

### Surface Mount

| <b>PPD-C018GL1B</b>  |  | <b>Overview</b>   | <b>Electrical Data</b> |                      |                |               | <b>Mechanical Data</b> |  |
|--|--|-------------------|------------------------|----------------------|----------------|---------------|------------------------|--|
|  | L1, E1, G1, B1C<br>RHCP Ceramic<br>Patch SMD Type<br><br><b>Applications</b><br>GNSS, Navigation,<br>Location, Timing,<br>GZSS | Frequency (MHz)   | VSWR (Max)             | Peak Gain (dBi)      | Efficiency (%) | Mounting Type | Surface Mount          |  |
|  |  | 1575.46           | 1.7                    | 3.6                  | 65             | Termination   | Solder Pad             |  |
|  |  | 1602              | 1.8                    | 3.9                  | 64             | Dimensions    | 18x18x4 mm             |  |
|  |  |                   |                        |                      |                | Op. Temp.     | -40°C to +105°C        |  |
|  |  |                   |                        |                      |                | Ground Plane  | 60 x 60 mm             |  |
|  |  | Polarization      |                        | RHCP                 |                |               |                        |  |
|  |  | Wavelength        |                        | $\frac{1}{2}\lambda$ |                |               |                        |  |
|  |  | Electrical Type   |                        | Radiating Patch      |                |               |                        |  |
|  |  | Radiation Pattern |                        | Directional          |                |               |                        |  |
|  |  | Impedance (Ohms)  |                        | 50                   |                |               |                        |  |

| <b>PCD-C020GL1W</b>   |   | <b>Overview</b>   | <b>Electrical Data</b> |                      |                |               | <b>Mechanical Data</b> |  |
|---|---|-------------------|------------------------|----------------------|----------------|---------------|------------------------|--|
|  | L1, E1, G1, B1, B1C<br>Monopole Ceramic<br>Chip SMD Type<br><br><b>Applications</b><br>GNSS, Navigation,<br>Location, Timing,<br>GZSS | Frequency (MHz)   | VSWR (Max)             | Peak Gain (dBi)      | Efficiency (%) | Mounting Type | Surface Mount          |  |
|   |   | 1561              | 1.6                    | 1.1                  | 57             | Termination   | Solder Pad             |  |
|   |   | 1575.42           | 1.6                    | 1.1                  | 57             | Dimensions    | 20x3.5x2 mm            |  |
|   |   | 1602              | 1.9                    | 1.2                  | 53             | Op. Temp.     | -40°C to +105°C        |  |
|   |   |                   |                        |                      |                | Ground Plane  | 60 x 60 mm             |  |
|   |   | Polarization      |                        | Linear               |                |               |                        |  |
|   |   | Wavelength        |                        | $\frac{1}{4}\lambda$ |                |               |                        |  |
|   |   | Electrical Type   |                        | Monopole             |                |               |                        |  |
|   |   | Radiation Pattern |                        | Omni directional     |                |               |                        |  |
|   |   | Impedance (Ohms)  |                        | 50                   |                |               |                        |  |

## Internal

### Adhesive plus Through-hole Solder Mount

#### PPX-C025GL1W



#### Overview

L1, E1, G1, B1, B1C  
RHCP Ceramic  
Patch Through-hole Pin Type

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 1561            | 2.4        | 4.0             | 70             |
| 1575.42         | 2.2        | 3.2             | 63             |
| 1602            | 1.4        | 5.2             | 77             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | RHCP                 |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Radiating Patch      |
| Radiation Pattern | Directional          |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                            |
|---------------|----------------------------|
| Mounting Type | Adhesive + TH Solder Mount |
| Termination   | Solder Pad                 |
| Dimensions    | 25x25x4 mm                 |
| Op. Temp.     | -40°C to +105°C            |
| Ground Plane  | 60 x 60 mm                 |

#### PPX-C025L25B

New



#### Overview

L1, L2, L5 RHCP  
Stacked Ceramic  
Patch Through-hole Pin Type

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 1176.45         | 1.3        | 1.7             | 39             |
| 1227.6          | 1.5        | 0.9             | 38             |
| 1561            | 2.8        | 1.2             | 40             |
| 1575.42         | 3.4        | 0.6             | 35             |
| 1602            | 1.6        | 2.3             | 52             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | RHCP                 |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Radiating Patch      |
| Radiation Pattern | Directional          |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                            |
|---------------|----------------------------|
| Mounting Type | Adhesive + TH Solder Mount |
| Termination   | Solder Pad                 |
| Dimensions    | 25x25x8 mm                 |
| Op. Temp.     | -40°C to +105°C            |
| Ground Plane  | 60 x 60 mm                 |

# GNSS

## Internal

### Mechanical Mount

#### PLF-C025MP4B

New



| Overview   | Electrical Data    |                       |                    |                      | Mechanical Data |                     |
|--|--------------------|-----------------------|--------------------|----------------------|-----------------|---------------------|
| L1, L2, L5 RHCP<br>Stacked Ceramic<br>Patch Active an-<br>tenna with 1.13<br>coax cable and<br>MHF plug con-<br>nector | Frequency<br>(MHz) | VSWR<br>(Max)         | Peak Gain<br>(dBi) | Axial Ratio<br>(dB)  | Mounting Type   | Mechanical<br>Mount |
|  | 1176.45            | 1.5                   | 28                 | 15                   | Termination     | MHF1 Plug           |
|  | 1227.6             | 1.8                   | 27                 | 33                   | Dimensions      | 25x25x13 mm         |
|  | 1561               | 5.0                   | 26                 | 33                   | Op. Temp.       | -40°C to +85°C      |
|  | 1575.42            | 2.8                   | 28                 | 20                   | Ground Plane    | 25 x 25 mm          |
|  | 1602               | 2.2                   | 29                 | 37                   | Cable Type      | ∅1.13 mm            |
|  |                    |                       |                    |                      | Cable Length*   | 60 mm<br>120 mm     |
| <b>Applications</b><br>GNSS, Navigation,<br>Location, Timing,<br>GZSS  | Polarization       | Wavelength            |                    | RHCP                 |                 |                     |
|  | Electrical Type    | Radiation Pattern     |                    | $\frac{1}{2}\lambda$ |                 |                     |
|  | Impedance (Ohms)   | Radiating Patch + LNA |                    | Directional          |                 |                     |
|  |                    |                       |                    | 50                   |                 |                     |

## External

### Connector Mount

#### PWX-711BSAXB



#### Overview

L1, E1, G1, B1, B1C  
Tilt/Swivel Dipole  
Blade

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 1561            | 1.3        | 1.1             | 67             |
| 1575.42         | 1.2        | 1.5             | 71             |
| 1602            | 1.2        | 1.6             | 68             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{2}\lambda$ |
| Electrical Type   | Dipole               |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | SMA Plug        |
| Dimensions    | 136x24x11 mm    |
| Op. Temp.     | -40°C to +85°C  |

### Panel Mount

#### PPX-6030NFXB



#### Overview

L1, E1, G1 RHCP  
Active Dome with  
integrated 2-stage  
LNA

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1561            | 1.2        | 28              | 13.9             |
| 1575.42         | 2.0        | 29              | 5.0              |
| 1602            | 1.9        | 29              | 5.7              |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | N-Type Jack    |
| Dimensions    | 30xø60 mm      |
| Op. Temp.     | -30°C to +70°C |
| IP Rating     | IP65           |

#### PPF-6030SA4B-\*

New



#### Overview

L1, L2, L5 RHCP  
Active Dome with  
integrated 2-stage  
LNA, Coax Cable

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1176.45         | 1.5        | 33              | 24               |
| 1227.6          | 1.4        | 32              | 19               |
| 1561            | 1.2        | 29              | 12               |
| 1575.42         | 1.1        | 30              | 12               |
| 1602            | 1.5        | 32              | 22               |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                    |
|---------------|--------------------|
| Mounting Type | Panel Mount        |
| Termination   | SMA Plug           |
| Dimensions    | 30xø60 mm          |
| Op. Temp.     | -30°C to +70°C     |
| Cable Type    | RG 174             |
| Cable Length* | 2000 mm<br>3000 mm |
| IP Rating     | IP65               |

#### PPX-6030NF4B

New



#### Overview

L1, L2, L5 RHCP  
Active Dome with  
integrated 2-stage  
LNA, N Jack

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 1176.45         | 1.6        | 30              | 40             |
| 1227.6          | 1.2        | 31              | 45             |
| 1561            | 1.4        | 29              | 27             |
| 1575.42         | 1.5        | 29              | 41             |
| 1602            | 1.6        | 29              | 60             |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 30xø60 mm      |
| Op. Temp.     | -30°C to +70°C |
| IP Rating     | IP65           |

#### PPX-095ANF4W

New



#### Overview

L1, L2, L5 RHCP  
Active Dome with  
integrated 2-stage  
LNA, N Jack

#### Applications

GNSS, Navigation,  
Location, Timing,  
GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1176.45         | 2.0        | 33              | 3.3              |
| 1227.6          | 1.4        | 33              | 2.4              |
| 1561            | 1.4        | 32              | 2.2              |
| 1575.42         | 1.4        | 35              | 2.2              |
| 1602            | 2.1        | 33              | 4.0              |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 35xø96 mm      |
| Op. Temp.     | -40°C to +85°C |
| IP Rating     | IP67           |

## Remote

### Magnetic Mount

#### PPF-GP07SAXB-\*



#### Overview

L1, E1, G1, B1, B1C RHCP Active Puck with integrated 2-stage LNA, Coax Cable

#### Applications

GNSS, Navigation, Location, Timing, GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1561            | 1.8        | 30              | 5.2              |
| 1575.42         | 2.0        | 29              | 1.7              |
| 1602            | 1.7        | 29              | 4.2              |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                    |
|---------------|--------------------|
| Mounting Type | Magnetic Mount     |
| Termination   | SMA Plug           |
| Dimensions    | 49x38x17 mm        |
| Op. Temp.     | -30°C to +70°C     |
| Cable Type    | RG 174             |
| Cable Length* | 2000 mm<br>3000 mm |
| IP Rating     | IP65               |

#### PPF-GP04SA4B-\*

New



#### Overview

L1, L2, L5 RHCP Active Puck with integrated 2-stage LNA, Coax Cable

#### Applications

GNSS, Navigation, Location, Timing, GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1176.45         | 1.6        | 33              | 14               |
| 1227.6          | 1.4        | 33              | 23               |
| 1561            | 1.2        | 30              | 18               |
| 1575.42         | 1.2        | 32              | 15               |
| 1602            | 1.3        | 32              | 20               |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                    |
|---------------|--------------------|
| Mounting Type | Magnetic Mount     |
| Termination   | SMA Plug           |
| Dimensions    | 41x38x17 mm        |
| Op. Temp.     | -40°C to +85°C     |
| Cable Type    | RG 174             |
| Cable Length* | 2000 mm<br>3000 mm |
| IP Rating     | IP67               |

#### PPF-GP09SA4B-\*

New



#### Overview

L1, L2, L5 RHCP Active Puck with integrated 2-stage LNA, Coax Cable

#### Applications

GNSS, Navigation, Location, Timing, GZSS

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Axial Ratio (dB) |
|-----------------|------------|-----------------|------------------|
| 1176.45         | 2.5        | 33              | 3.5              |
| 1227.6          | 2.5        | 34              | 3.4              |
| 1561            | 1.9        | 33              | 0.6              |
| 1575.42         | 1.3        | 32              | 0.7              |
| 1602            | 1.4        | 31              | 2.4              |

|                   |                       |
|-------------------|-----------------------|
| Polarization      | RHCP                  |
| Wavelength        | $\frac{1}{2}\lambda$  |
| Electrical Type   | Radiating Patch + LNA |
| Radiation Pattern | Directional           |
| Impedance (Ohms)  | 50                    |

#### Mechanical Data

|               |                    |
|---------------|--------------------|
| Mounting Type | Adhesive Mount     |
| Termination   | SMA Plug           |
| Dimensions    | 66x66x26 mm        |
| Op. Temp.     | -40°C to +85°C     |
| Cable Type    | RG 174             |
| Cable Length* | 2000 mm<br>3000 mm |
| IP Rating     | IP65               |

# Combo (MIMO) Antennas

Joymax offers external Multi Input and Multi Output (MIMO) combo all-in-1 antennas for fleet management, public transportation, industrial and other applications combining:

- LTE / Cellular 5G, 4G, 3G, 2G
- WiFi / WLAN
- GNSS
- 2.4 GHz
- UHF / VHF
- ISM / LPWA

## External

### Panel Mount

#### PHF-095A3SQW-\*

New



#### Overview

3x3 MIMO Dome  
WiFi x2, GNSS L1  
L2 L5 x1 with Coax  
cable

#### Applications

Fleet Management, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz)   | VSWR (Max)                | Peak Gain (dBi) | Efficiency (%) |
|-------------------|---------------------------|-----------------|----------------|
| 2400-2500         | 4.7                       | 3.8             | 48             |
| 5150-5850         | 2.1                       | 4.9             | 51             |
| 5925-7125         | 2.0                       | 3.3             | 35             |
| 1176              | 1.6                       | 31              |                |
| 1227              | 1.5                       | 32              |                |
| 1575.42           | 1.8                       | 29              |                |
| Polarization      | Linear/RHCP (GNSS)        |                 |                |
| Wavelength        | $\frac{1}{4}$ - $\lambda$ |                 |                |
| Electrical Type   | Monopole                  |                 |                |
| Radiation Pattern | Omni directional          |                 |                |
| Impedance (Ohms)  | 50                        |                 |                |

#### Mechanical Data

| Mounting Type | Panel Mount             |
|---------------|-------------------------|
| Termination   | SMA Plug                |
| Dimensions    | 35x $\varnothing$ 96 mm |
| Op. Temp.     | -40°C to +85°C          |
| Cable Type    | RG58/RG174              |
| Cable Length* | 2000 mm                 |
|               | 1000 mm                 |
| IP Rating     | IP67                    |
| Antenna Color | White                   |

#### PHF-165A5SQB-\*



#### Overview

5x5 MIMO Dome  
5G/LTE x2, WiFi  
x2, GNSS L1 L2 L5  
x1

#### Applications

Fleet Management, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz)   | VSWR (Max)                | Peak Gain (dBi) | Efficiency (%) |
|-------------------|---------------------------|-----------------|----------------|
| 617-960           | 4.7                       | 3.8             | 48             |
| 1710-2690         | 2.1                       | 4.9             | 51             |
| 3300-4200         | 2.0                       | 3.3             | 35             |
| 4400-5000         | 1.6                       | 3.7             | 38             |
| 5150-5850         | 1.7                       | 2.9             | 32             |
| 1575.42           | 1.3                       | 31              |                |
| Polarization      | Linear/RHCP (GNSS)        |                 |                |
| Wavelength        | $\frac{1}{4}$ - $\lambda$ |                 |                |
| Electrical Type   | Monopole                  |                 |                |
| Radiation Pattern | Omni directional          |                 |                |
| Impedance (Ohms)  | 50                        |                 |                |

#### Mechanical Data

| Mounting Type | Panel Mount                |
|---------------|----------------------------|
| Termination   | SMA Plug                   |
| Dimensions    | 50x $\varnothing$ 141.3 mm |
| Op. Temp.     | -40°C to +85°C             |
| Cable Type    | RG58/RG174                 |
| Cable Length* | 2000 mm                    |
|               | 1000 mm                    |
| IP Rating     | IP67                       |

#### PHF-168A9SQB-\*



#### Overview

9x9 MIMO Dome  
5G/LTE x4, WiFi  
x4, GNSS L1 L2 L5  
x1

#### Applications

Fleet Management, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz)   | VSWR (Max)                | Peak Gain (dBi) | Efficiency (%) |
|-------------------|---------------------------|-----------------|----------------|
| 617-960           | 2.5                       | 3.8             | 66             |
| 1710-2690         | 2.0                       | 4.0             | 69             |
| 3300-4200         | 2.0                       | 4.7             | 62             |
| 4400-5000         | 2.2                       | 4.6             | 68             |
| 5150-5925         | 2.1                       | 5.5             | 73             |
| 1575.42           | 2.3                       | 30.0            |                |
| Polarization      | Linear/RHCP (GNSS)        |                 |                |
| Wavelength        | $\frac{1}{4}$ - $\lambda$ |                 |                |
| Electrical Type   | Monopole                  |                 |                |
| Radiation Pattern | Omni directional          |                 |                |
| Impedance (Ohms)  | 50                        |                 |                |

#### Mechanical Data

| Mounting Type | Panel Mount              |
|---------------|--------------------------|
| Termination   | SMA Plug                 |
| Dimensions    | 85x $\varnothing$ 142 mm |
| Op. Temp.     | -40°C to +85°C           |
| Cable Type    | RG174/RG58               |
| Cable Length* | 2000 mm                  |
|               | 1000 mm                  |
| IP Rating     | IP67                     |

# Combo / MIMO

## External

### Panel Mount

#### YHF-095A2S2B-\*

New



#### Overview

MIMO 2x2 Dome  
4G/LTE x 2, with  
Coax Cable

#### Applications

Fleet Manage-  
ment, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 617-960         | 3.0        | 1.7             | 24             |
| 1710-2170       | 2.9        | 3.9             | 42             |
| 2170-2690       | 2.7        | 3.7             | 40             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 35xø96 mm      |
| Op. Temp.     | -40°C to +85°C |
| Cable Type    | RG174          |
| Cable Length* | 2000 mm        |
|               | 500 mm         |
| IP Rating     | IP67           |
| Antenna Color | Black          |

#### PHF-095A3SNB-\*

New



#### Overview

3x3 MIMO Dome  
WiFi x2, GNSS x1  
with Coax Cable

#### Applications

Fleet Manage-  
ment, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 2400-2500       | 1.4        | 3.1             | 72             |
| 5150-5850       | 3.1        | 3.5             | 48             |
| 5925-7125       | 3.0        | 3.3             | 44             |

|                   |                      |     |    |
|-------------------|----------------------|-----|----|
|                   | 1561                 | 1.4 | 35 |
|                   | 1575.42              | 1.7 | 34 |
|                   | 1602                 | 1.3 | 30 |
| Polarization      | Linear/RHCP (GNSS)   |     |    |
| Wavelength        | $\frac{1}{4}\lambda$ |     |    |
| Electrical Type   | Monopole             |     |    |
| Radiation Pattern | Omni directional     |     |    |
| Impedance (Ohms)  | 50                   |     |    |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 35xø96 mm      |
| Op. Temp.     | -40°C to +85°C |
| Cable Type    | RG58/RG174     |
| Cable Length* | 2000 mm        |
|               | 1000 mm        |
| IP Rating     | IP67           |
| Antenna Color | Black          |

#### PPF-165A5SNB-\*



#### Overview

Outdoor MIMO  
5x5 Dome 5G/LTE  
x2, WiFi x2, GNSS  
x1

#### Applications

Fleet Manage-  
ment, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 617-960         | 4.7        | 3.8             | 48             |
| 1710-2690       | 2.1        | 4.9             | 51             |
| 3300-4200       | 2.0        | 3.3             | 35             |
| 4400-5000       | 1.6        | 3.7             | 38             |
| 5150-5850       | 1.7        | 2.9             | 32             |

|                   |                      |     |      |
|-------------------|----------------------|-----|------|
|                   | 1575.42              | 1.7 | 30.0 |
| Polarization      | Linear/RHCP (GNSS)   |     |      |
| Wavelength        | $\frac{1}{4}\lambda$ |     |      |
| Electrical Type   | Monopole             |     |      |
| Radiation Pattern | Omni directional     |     |      |
| Impedance (Ohms)  | 50                   |     |      |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 50xø141.3 mm   |
| Op. Temp.     | -40°C to +85°C |
| Cable Type    | RG58/RG174     |
| Cable Length* | 2000 mm        |
|               | 1000 mm        |
| IP Rating     | IP67           |

#### PHF-168A9SNB-\*



#### Overview

9x9 MIMO Dome  
5G/LTE x4, WiFi  
x4, GNSS x1

#### Applications

Fleet Manage-  
ment, Public  
Transportation,  
Industrial

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 617-960         | 2.5        | 3.8             | 66             |
| 1710-2690       | 2.0        | 4.0             | 69             |
| 3300-4200       | 2.0        | 4.7             | 62             |
| 4400-5000       | 2.2        | 4.6             | 68             |
| 5150-5925       | 2.1        | 5.5             | 73             |

|                   |                      |     |      |
|-------------------|----------------------|-----|------|
|                   | 1575.42              | 2.3 | 30.0 |
| Polarization      | Linear/RHCP (GNSS)   |     |      |
| Wavelength        | $\frac{1}{4}\lambda$ |     |      |
| Electrical Type   | Monopole             |     |      |
| Radiation Pattern | Omni directional     |     |      |
| Impedance (Ohms)  | 50                   |     |      |

#### Mechanical Data

|               |                |
|---------------|----------------|
| Mounting Type | Panel Mount    |
| Termination   | SMA Plug       |
| Dimensions    | 85xø142 mm     |
| Op. Temp.     | -40°C to +85°C |
| Cable Type    | RG174/RG58     |
| Cable Length* | 2000 mm        |
|               | 1000 mm        |
| IP Rating     | IP67           |

# Combo / MIMO

## External

### Panel Mount

#### PHF-1003S4NW-\*



| Overview   | Electrical Data      |               |                    |                   | Mechanical Data |                    |
|--|----------------------|---------------|--------------------|-------------------|-----------------|--------------------|
| MIMO 5x5 Dome<br>4G/LTE x2, WiFi x2,<br>GNSS x1                                  | Frequency<br>(MHz)   | VSWR<br>(Max) | Peak Gain<br>(dBi) | Efficiency<br>(%) | Mounting Type   | Panel Mount        |
| <b>Applications</b><br>Fleet Management, Public<br>Transportation,<br>Industrial | 698-960              | 2.8           | 3.5                | 42                | Termination     | SMA Plug           |
|  | 1710-2690            | 2.5           | 4.0                | 68                | Dimensions      | 75xø107 mm         |
|  | 2400-2500            | 2.8           | 3.4                | 64                | Op. Temp.       | -30°C to +70°C     |
|  | 5150-5850            | 2.5           | 5.7                | 61                | Cable Type      | RG174/RG58         |
|  | 1575.42              | 2.0           | 30.0               |                   | Cable Length*   | 2000 mm<br>1000 mm |
| Polarization   | Linear/RHCP (GNSS)   |               |                    | IP Rating         | IP65            |                    |
| Wavelength   | $\frac{1}{2}\lambda$ |               |                    |                   |                 |                    |
| Electrical Type  | Dipole               |               |                    |                   |                 |                    |
| Radiation Pattern  | Omni directional     |               |                    |                   |                 |                    |
| Impedance (Ohms)   | 50                   |               |                    |                   |                 |                    |

#### TDF-1204RS3W-\*



| Overview   | Electrical Data      |               |                    |                   | Mechanical Data |                    |
|--|----------------------|---------------|--------------------|-------------------|-----------------|--------------------|
| MIMO 4x4 Dome<br>WiFi x 4 Ceiling<br>Mount DAS                               | Frequency<br>(MHz)   | VSWR<br>(Max) | Peak Gain<br>(dBi) | Efficiency<br>(%) | Mounting Type   | Panel Mount        |
| <b>Applications</b><br>WiFi 6, WiFi 5,<br>WiFi 4, U-NII,<br>802.11, 802.15.4 | 2400-2500            | 2.5           | 2.5                | 65                | Termination     | SMA Plug           |
|  | 5150-5850            | 2.5           | 4.3                | 72                | Dimensions      | 45xø130 mm         |
|  |                      |               |                    |                   | Op. Temp.       | -30°C to +70°C     |
|  |                      |               |                    |                   | Cable Type      | RG174              |
|  |                      |               |                    |                   | Cable Length*   | 2000 mm<br>1000 mm |
| Polarization   | Linear               |               |                    |                   |                 |                    |
| Wavelength   | $\frac{1}{4}\lambda$ |               |                    |                   |                 |                    |
| Electrical Type  | Monopole             |               |                    |                   |                 |                    |
| Radiation Pattern  | Directional          |               |                    |                   |                 |                    |
| Impedance (Ohms)   | 50                   |               |                    |                   |                 |                    |



# Other

## External

### Connector Mount

#### VHX-362BSAXB

New



#### Overview

138 MHz Straight Monopole Whip

#### Applications

CATV, Unlicensed Band, Smart IoT Sensors, Gateways

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 138             | 1.5        | -0.7            | 44             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | SMA Plug        |
| Dimensions    | 154xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |

#### VHX-362BSA1B

New



#### Overview

169 MHz Straight Monopole Whip

#### Applications

Unlicensed Band, Smart Meters, Smart Sensors, IoT Gateways

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 169             | 1.5        | 0.6             | 49             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | SMA Plug        |
| Dimensions    | 154xø13 mm      |
| Op. Temp.     | -30°C to +70°C  |

#### UHX-462CSAXB



#### Overview

UHF 400-420MHz Straight Monopole Whip

#### Applications

LMR for Public Safety

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 400-420         | 2.0        | 2.0             | 60             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | SMA Plug        |
| Dimensions    | 170xø14.8 mm    |
| Op. Temp.     | -30°C to +70°C  |

#### UHX-465XSAXB



#### Overview

UHF 430 MHz Straight Monopole Whip

#### Applications

LMR for Public Safety

#### Electrical Data

| Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) |
|-----------------|------------|-----------------|----------------|
| 430             | 2.0        | 2.0             | 50             |

|                   |                      |
|-------------------|----------------------|
| Polarization      | Linear               |
| Wavelength        | $\frac{1}{4}\lambda$ |
| Electrical Type   | Monopole             |
| Radiation Pattern | Omni directional     |
| Impedance (Ohms)  | 50                   |

#### Mechanical Data

|               |                 |
|---------------|-----------------|
| Mounting Type | Connector Mount |
| Termination   | SMA Plug        |
| Dimensions    | 193xø14 mm      |
| Op. Temp.     | -30°C to +70°C  |

## Remote

### Adhesive Mount

#### VAF-603XSA1B-\*

New






| Overview   | Electrical Data |            |                 |                   | Mechanical Data |                |
|--|-----------------|------------|-----------------|-------------------|-----------------|----------------|
| 169 MHz Straight Monopole Blade with Orthogonal Cable                          | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%)    | Mounting Type   | Magnetic Mount |
|  | 169             | 3.1        | -0.2            | 59                | Termination     | SMA Plug       |
| <b>Applications</b><br>Unlicensed Band, Smart Meter, Smart Sensor, IoT Gateway |                 |            |                 |                   | Dimensions      | 110x20x5.4mm   |
|  |                 |            |                 |                   | Op. Temp.       | -30°C to +70°C |
|  |                 |            |                 | Polarization      | Cable Type      | RG174          |
|  |                 |            |                 | Wavelength        | Cable Length*   | 1000 mm        |
|  |                 |            |                 | Electrical Type   |                 | 2000 mm        |
|  |                 |            |                 | Radiation Pattern |                 |                |
|  |                 |            |                 | Impedance (Ohms)  |                 |                |

# Other

## Remote

### Magnetic Mount

| <u>UAF-121XSAXB-*</u>   | Overview   | Electrical Data  | Mechanical Data |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
|---|--|--|-----------------|------------|-----------------|----------------|---------|-----|-----|----|--------------|--------|------------|----------------------|-----------------|----------|-------------------|------------------|------------------|----|---|---------------|----------------|-------------|----------|------------|--------------------------|-----------|----------------|------------|-------|---------------|--------------------|
|    | UHF 430 MHz<br>Straight Monopole<br>Magnetic Mount<br>Whip, Flying Lead<br><br><b>Applications</b><br>LMR for Public Safety    | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>430</td> <td>2.0</td> <td>2.0</td> <td>60</td> </tr> </tbody> </table><br><table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{4}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table>     | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 430     | 2.0 | 2.0 | 60 | Polarization | Linear | Wavelength | $\frac{1}{4}\lambda$ | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50 | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Magnetic Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>178x<math>\varnothing</math>27 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table> | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 178x $\varnothing$ 27 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
| Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)  | Efficiency (%)  |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| 430   | 2.0  | 2.0  | 60              |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Polarization  | Linear   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Wavelength  | $\frac{1}{4}\lambda$   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Dimensions  | 178x $\varnothing$ 27 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
|   | UHF 470-490MHz<br>Straight Monopole<br>Magnetic Mount<br>Whip, Flying Lead<br><br><b>Applications</b><br>LMR for Public Safety | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>470-490</td> <td>2.5</td> <td>2.0</td> <td>60</td> </tr> </tbody> </table><br><table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{4}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table> | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 470-490 | 2.5 | 2.0 | 60 | Polarization | Linear | Wavelength | $\frac{1}{4}\lambda$ | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50 | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Magnetic Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>120x<math>\varnothing</math>27 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table> | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 120x $\varnothing$ 27 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
| Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)  | Efficiency (%)  |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| 470-490   | 2.5  | 2.0  | 60              |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Polarization  | Linear   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Wavelength  | $\frac{1}{4}\lambda$   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Dimensions  | 120x $\varnothing$ 27 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
|  | UHF 430MHz<br>Straight Monopole<br>Magnetic Mount<br>Whip, Flying Lead<br><br><b>Applications</b><br>LMR for Public Safety     | <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>VSWR (Max)</th> <th>Peak Gain (dBi)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>430</td> <td>2.0</td> <td>0.3</td> <td>47</td> </tr> </tbody> </table><br><table border="1"> <tbody> <tr> <td>Polarization</td> <td>Linear</td> </tr> <tr> <td>Wavelength</td> <td><math>\frac{1}{4}\lambda</math></td> </tr> <tr> <td>Electrical Type</td> <td>Monopole</td> </tr> <tr> <td>Radiation Pattern</td> <td>Omni directional</td> </tr> <tr> <td>Impedance (Ohms)</td> <td>50</td> </tr> </tbody> </table>     | Frequency (MHz) | VSWR (Max) | Peak Gain (dBi) | Efficiency (%) | 430     | 2.0 | 0.3 | 47 | Polarization | Linear | Wavelength | $\frac{1}{4}\lambda$ | Electrical Type | Monopole | Radiation Pattern | Omni directional | Impedance (Ohms) | 50 | <table border="1"> <tbody> <tr> <td>Mounting Type</td> <td>Magnetic Mount</td> </tr> <tr> <td>Termination</td> <td>SMA Plug</td> </tr> <tr> <td>Dimensions</td> <td>120x<math>\varnothing</math>27 mm</td> </tr> <tr> <td>Op. Temp.</td> <td>-30°C to +70°C</td> </tr> <tr> <td>Cable Type</td> <td>RG174</td> </tr> <tr> <td>Cable Length*</td> <td>1000 mm<br/>2000 mm</td> </tr> </tbody> </table> | Mounting Type | Magnetic Mount | Termination | SMA Plug | Dimensions | 120x $\varnothing$ 27 mm | Op. Temp. | -30°C to +70°C | Cable Type | RG174 | Cable Length* | 1000 mm<br>2000 mm |
| Frequency (MHz)   | VSWR (Max)   | Peak Gain (dBi)  | Efficiency (%)  |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| 430   | 2.0  | 0.3  | 47              |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Polarization  | Linear   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Wavelength  | $\frac{1}{4}\lambda$   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Electrical Type   | Monopole   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Radiation Pattern   | Omni directional   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Impedance (Ohms)  | 50   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Mounting Type   | Magnetic Mount   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Termination   | SMA Plug   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Dimensions  | 120x $\varnothing$ 27 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Op. Temp.   | -30°C to +70°C   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Type  | RG174  |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |
| Cable Length*   | 1000 mm<br>2000 mm   |  |                 |            |                 |                |         |     |     |    |              |        |            |                      |                 |          |                   |                  |                  |    |   |               |                |             |          |            |                          |           |                |            |       |               |                    |

# Cellular LTE / 5G NR Frequency Band Guide

| Band # | Uplink Band (MHz) | Downlink Band (MHz) | Overall Band (MHz) | Total Bandwidth | LTE-M | LTE NB-IoT | 5G NB-IoT |
|--------|-------------------|---------------------|--------------------|-----------------|-------|------------|-----------|
| (n)1   | 1920 — 1980       | 2110 — 2170         | 1920 — 2170        | 250             | X     | X          | X         |
| (n)2   | 1850 — 1910       | 1930 — 1990         | 1850 — 1990        | 140             | X     | X          | X         |
| (n)3   | 1710 — 1785       | 1805 — 1880         | 1710 — 1880        | 170             | X     | X          | X         |
| 4      | 1710 — 1755       | 2110 — 2155         | 1710 — 2155        | 445             | X     | X          |           |
| (n)5   | 824 — 849         | 869 — 894           | 824 — 894          | 70              | X     | X          | X         |
| 6      | 830 — 840         | 875 — 885           | 830 — 885          | 55              |       |            |           |
| (n)7   | 2500 — 2570       | 2620 — 2690         | 2500 — 2690        | 190             | X     | X          | X         |
| (n)8   | 880 — 915         | 925 — 960           | 880 — 960          | 80              | X     | X          | X         |
| 9      | 1749.9 — 1784.9   | 1844.9 — 1879.9     | 1749.9 — 1879.9    | 130             |       |            |           |
| 10     | 1710 — 1770       | 2110 — 2170         | 1710 — 2170        | 460             |       |            |           |
| 11     | 1427.9 — 1447.9   | 1475.9 — 1495.9     | 1427.9 — 1495.9    | 68              | X     | X          |           |
| (n)12  | 699 — 716         | 729 — 746           | 699 — 746          | 47              | X     | X          | X         |
| (n)13  | 777 — 787         | 746 — 756           | 746 — 787          | 41              | X     | X          |           |
| (n)14  | 788 — 798         | 758 — 768           | 758 — 798          | 40              | X     | X          | X         |
| 17     | 704 — 716         | 734 — 746           | 704 — 746          | 42              |       | X          |           |
| (n)18  | 815 — 830         | 860 — 875           | 815 — 875          | 60              | X     | X          | X         |
| 19     | 830 — 845         | 875 — 890           | 830 — 890          | 60              | X     | X          |           |
| (n)20  | 832 — 862         | 791 — 821           | 791 — 862          | 71              | X     | X          | X         |
| 21     | 1447.9 — 1462.9   | 1495.9 — 1510.9     | 1447.9 — 1510.9    | 63              | X     | X          |           |
| 22     | 3410 — 3490       | 3510 — 3590         | 3410 — 3590        | 180             |       |            |           |
| 23     | 2000 — 2020       | 2180 — 2200         | 2000 — 2200        | 200             |       |            |           |
| (n)24  | 1626.5 — 1660.5   | 1525 — 1559         | 1525 — 1660.5      | 135.5           | X     | X          | X         |
| (n)25  | 1850 — 1915       | 1930 — 1995         | 1850 — 1995        | 145             | X     | X          | X         |
| (n)26  | 814 — 849         | 859 — 894           | 814 — 894          | 80              | X     | X          | X         |
| 27     | 807 — 824         | 852 — 869           | 807 — 869          | 62              | X     |            |           |
| (n)28  | 703 — 748         | 758 — 803           | 703 — 803          | 100             | X     | X          | X         |
| (n)29  | N/A               | 717 — 728           | 717 — 728          | 11              |       |            |           |
| (n)30  | 2305 — 2315       | 2350 — 2360         | 2305 — 2360        | 55              |       |            |           |
| (n)31  | 452.5 — 457.5     | 462.5 — 467.5       | 452.5 — 467.5      | 15              | X     | X          | X         |
| 32     | N/A               | 1452 — 1496         | 1452 — 1496        | 44              |       |            |           |
| 33     | 1900 — 1920       | 1900 — 1920         | 1900 — 1920        | 20              |       |            |           |
| (n)34  | 2010 — 2025       | 2010 — 2025         | 2010 — 2025        | 15              |       |            |           |
| 35     | 1850 — 1910       | 1850 — 1910         | 1850 — 1910        | 60              |       |            |           |
| 36     | 1930 — 1990       | 1930 — 1990         | 1930 — 1990        | 60              |       |            |           |
| 37     | 1910 — 1930       | 1910 — 1930         | 1910 — 1930        | 20              |       |            |           |
| (n)38  | 2570 — 2620       | 2570 — 2620         | 2570 — 2620        | 50              |       |            |           |
| (n)39  | 1880 — 1920       | 1880 — 1920         | 1880 — 1920        | 40              |       |            |           |
| (n)40  | 2300 — 2400       | 2300 — 2400         | 2300 — 2400        | 100             |       |            |           |
| (n)41  | 2496 — 2690       | 2496 — 2690         | 2496 — 2690        | 194             |       | X          | X         |
| 42     | 3400 — 3600       | 3400 — 3600         | 3400 — 3600        | 200             |       | X          |           |
| 43     | 3600 — 3800       | 3600 — 3800         | 3600 — 3800        | 200             |       | X          |           |
| 44     | 703 — 803         | 703 — 803           | 703 — 803          | 100             |       |            |           |
| 45     | 1447 — 1467       | 1447 — 1467         | 1447 — 1467        | 20              |       |            |           |
| (n)46  | 5150 — 5925       | 5150 — 5925         | 5150 — 5925        | 775             |       |            |           |
| 47     | 5855 — 5925       | 5855 — 5925         | 5855 — 5925        | 70              |       |            |           |

LTE: 3GPP TS 36.101 V18.6.0 (2024-06), 5G NR: 3GPP TS 38.104 V18.6.0 (2024-06)

# Cellular LTE / 5G NR Frequency Band Guide

| Band # | Uplink Band (MHz) | Downlink Band (MHz) | Overall Band (MHz) | Total Bandwidth | LTE-M | LTE NB-IoT | 5G NB-IoT |
|--------|-------------------|---------------------|--------------------|-----------------|-------|------------|-----------|
| (n)48  | 3550 — 3700       | 3550 — 3700         | 3550 — 3700        | 150             |       | X          |           |
| 49     | 3550 — 3700       | 3550 — 3700         | 3550 — 3700        | 150             |       |            |           |
| (n)50  | 1432 — 1517       | 1432 — 1517         | 1432 — 1517        | 85              |       |            |           |
| (n)51  | 1427 — 1432       | 1427 — 1432         | 1427 — 1432        | 5               |       |            |           |
| 52     | 3300 — 3400       | 3300 — 3400         | 3300 — 3400        | 100             |       |            |           |
| (n)53  | 2483.5 — 2495     | 2483.5 — 2495       | 2483.5 — 2495      | 11.5            |       |            |           |
| (n)54  | 1670 — 1675       | 1670 — 1675         | 1670 — 1675        | 5               | X     | X          | X         |
| (n)65  | 1920 — 2010       | 2110 — 2200         | 1920 — 2200        | 280             |       | X          | X         |
| (n)66  | 1710 — 1780       | 2110 — 2200         | 1710 — 2200        | 490             | X     | X          | X         |
| (n)67  | N/A               | 738 — 758           | 738 — 758          | 20              |       |            |           |
| 68     | 698 — 728         | 753 — 783           | 698 — 783          | 85              |       |            |           |
| 69     | N/A               | 2570 — 2620         | 2570 — 2620        | 50              |       |            |           |
| (n)70  | 1695 — 1710       | 1995 — 2020         | 1695 — 2020        | 325             |       | X          | X         |
| (n)71  | 663 — 698         | 617 — 652           | 617 — 698          | 81              | X     | X          | X         |
| (n)72  | 451 — 456         | 461 — 466           | 451 — 466          | 15              | X     | X          | X         |
| 73     | 450 — 455         | 460 — 465           | 450 — 465          | 15              | X     | X          |           |
| (n)74  | 1427 — 1470       | 1475 — 1518         | 1427 — 1518        | 91              | X     | X          | X         |
| (n)75  | N/A               | 1432 — 1517         | 1432 — 1517        | 85              |       |            |           |
| (n)76  | N/A               | 1427 — 1432         | 1427 — 1432        | 5               |       |            |           |
| n77    | 3300 — 4200       | 3300 — 4200         | 3300 — 4200        | 900             |       |            |           |
| n78    | 3300 — 3800       | 3300 — 3800         | 3300 — 3800        | 500             |       |            |           |
| n79    | 4400 — 5000       | 4400 — 5000         | 4400 — 5000        | 600             |       |            |           |
| n80    | 1710 — 1785       | N/A                 | 1710 — 1785        | 75              |       |            |           |
| n81    | 880 — 915         | N/A                 | 880 — 915          | 35              |       |            |           |
| n82    | 832 — 862         | N/A                 | 832 — 862          | 30              |       |            |           |
| n83    | 703 — 748         | N/A                 | 703 — 748          | 45              |       |            |           |
| n84    | 1920 — 1980       | N/A                 | 1920 — 1980        | 60              |       |            |           |
| (n)85  | 698 — 716         | 728 — 746           | 698 — 746          | 48              | X     | X          |           |
| n86    | 1710 — 1780       | N/A                 | 1710 — 1780        | 70              |       |            |           |
| 87     | 410 — 415         | 420 — 425           | 410 — 425          | 15              | X     | X          |           |
| 88     | 412 — 417         | 422 — 427           | 412 — 427          | 15              | X     | X          |           |
| n89    | 824 — 849         | N/A                 | 824 — 849          | 25              |       |            |           |
| n90    | 2496 — 2690       | 2496 — 2690         | 2496 — 2690        | 194             |       |            | X         |
| n91    | 832 — 862         | 1427 — 1432         | 832 — 1432         | 600             |       |            |           |
| n92    | 832 — 862         | 1432 — 1517         | 832 — 1517         | 685             |       |            |           |
| n93    | 880 — 915         | 1427 — 1432         | 880 — 1432         | 552             |       |            |           |
| n94    | 880 — 915         | 1432 — 1517         | 880 — 1517         | 637             |       |            |           |
| n95    | 2010 — 2025       | N/A                 | 2010 — 2025        | 15              |       |            |           |
| n96    | 5925 — 7125       | 5925 — 7125         | 5925 — 7125        | 1200            |       |            |           |
| n97    | 2300 — 2400       | N/A                 | 2300 — 2400        | 100             |       |            |           |
| n98    | 1880 — 1920       | N/A                 | 1880 — 1920        | 40              |       |            |           |
| n99    | 1626.5 — 1660.5   | N/A                 | 1626.5 — 1660.5    | 34              |       |            |           |
| n100   | 874.4 — 880       | 919.4 — 925         | 874.4 — 925        | 50.6            |       |            |           |
| n101   | 1900 — 1910       | 1900 — 1910         | 1900 — 1910        | 10              |       |            |           |
| n102   | 5925 — 6425       | 5925 — 6425         | 5925 — 6425        | 500             |       |            |           |

LTE: 3GPP TS 36.101 V18.6.0 (2024-06), 5G NR: 3GPP TS 38.104 V18.6.0 (2024-06)



# Cellular LTE / 5G NR Frequency Band Guide

| Band # | Uplink Band (MHz) | Downlink Band (MHz) | Overall Band (MHz) | Total Bandwidth | LTE-M | LTE NB-IoT | 5G NB-IoT |
|--------|-------------------|---------------------|--------------------|-----------------|-------|------------|-----------|
| 103    | 787 – 788         | 757 – 758           | 757 – 788          | 31              |       | X          |           |
| n104   | 6425 – 7125       | 6425 – 7125         | 6425 – 7125        | 700             |       |            |           |
| n105   | 663 – 703         | 612 – 652           | 612 – 703          | 91              |       |            |           |
| (n)106 | 896 – 901         | 935 – 940           | 896 – 940          | 44              | X     | X          |           |
| n109   | 703 – 733         | 1432 – 1517         | 703 – 1517         | 814             |       |            |           |

## LTE-only Bands

## 5G NR-only Bands

## Both LTE and 5G NR Bands

LTE: 3GPP TS 36.101 V18.6.0 (2024-06), 5G NR: 3GPP TS 38.104 V18.6.0 (2024-06)

# GNSS Frequency Band Guide

## GNSS Constellations and Frequency Bands

As of 2025, there are 4 Global Navigation Satellite System (GNSS) in operation as shown in **Figure 1**. United States' GPS (Global Positioning System), European Union's Galileo system, Russia's Glonass and China's BeiDou/Compass system. Satellite-Based Augmentation System (SBAS) are designed to enhance the accuracy of GPS, including Japan's QZSS (Quasi-Zenith Satellite System), India's GAGAN and European EGNOS. IRNSS (Indian Regional Navigation Satellite System) operationally also known as NavIC is a stand alone Regional Navigation Satellite System (RNSS).

| GNSS Frequency Bands |                  |                   |             |             |             |
|----------------------|------------------|-------------------|-------------|-------------|-------------|
| GPS                  | <b>L1</b>        | <b>L2</b>         | <b>L5</b>   |             |             |
|                      | 1575.42 MHz      | 1227.6 MHz        | 1176.45 MHz |             |             |
| Galileo              | <b>E1</b>        | <b>E5a</b>        | <b>E5b</b>  | <b>E6</b>   |             |
|                      | 1575.42 MHz      | 1176.45 MHz       | 1207.14 MHz | 1278.75 MHz |             |
| Glonass              | <b>G1</b>        | <b>G2</b>         | <b>G3</b>   |             |             |
|                      | 1602 MHz         | 1246 MHz          | 1202 MHz    |             |             |
| BeiDou (Compass)     | <b>B1</b>        | <b>B1C</b>        | <b>B2a</b>  | <b>B2b</b>  | <b>B3</b>   |
|                      | 1561 MHz         | 1575.42 MHz       | 1176.45 MHz | 1207.14 MHz | 1268.52 MHz |
| QZSS                 | <b>L1</b>        | <b>L2</b>         | <b>L5</b>   | <b>L6</b>   |             |
|                      | 1575.42 MHz      | 1227.6 MHz        | 1176.45 MHz | 1278.75 MHz |             |
| SBAS                 | <b>L1/E1/B1C</b> | <b>L5/E5a/B2a</b> | <b>G1</b>   | <b>G2</b>   | <b>G3</b>   |
|                      | 1575.42 MHz      | 1176.45 MHz       | 1602 MHz    | 1246 MHz    | 1202 MHz    |
| IRNSS (NavIC)        | <b>L5</b>        |                   |             |             |             |
|                      | 1176.45 MHz      |                   |             |             |             |

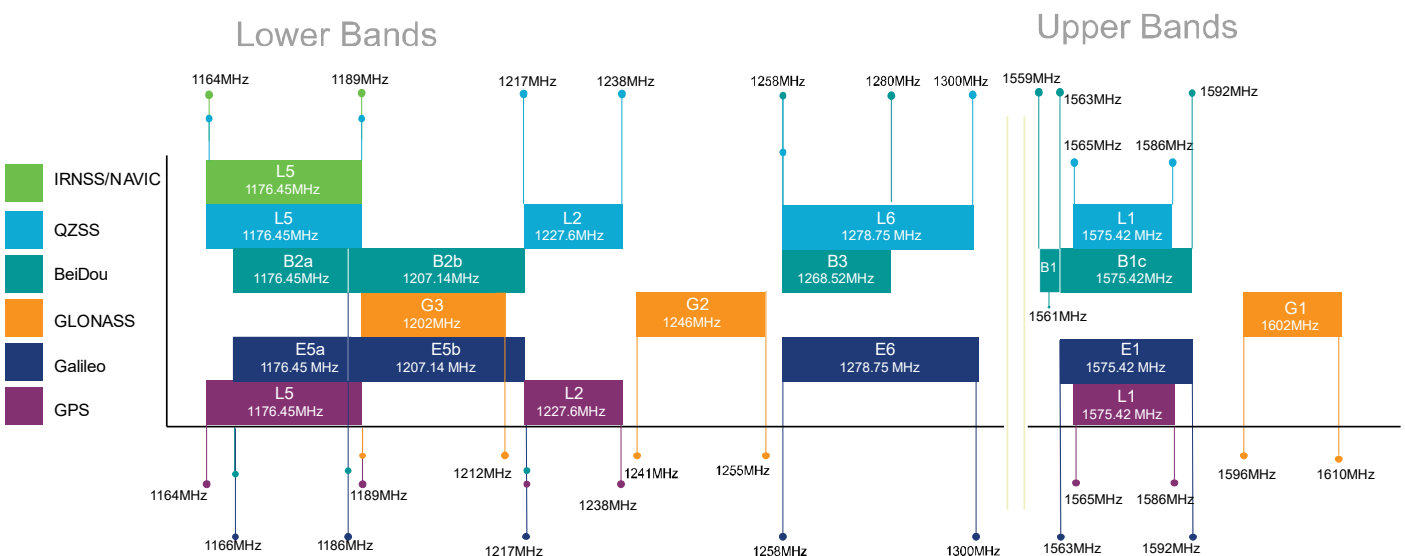


Figure 1. GNSS Frequency Bands

# Joymax Inc. Distribution Channel

## Worldwide

### Digikey Corporation

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