Regulatory requirements at 169 MHz

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With the relatively low operating frequency in the VHF range, and high output power allowance, the 169 MHz band opens up for new opportunities in long range communication for industrial Wireless Sensor Networks (WSN), or what is now called the Industrial Internet of Things (IIoT). Let's take a look at the radio compliance regulations for this band.

The 169 MHz band was originally used for paging services in Europe, but when the cell phones were introduced as a mass market product, and pagers went obsolete, the frequency band was freed up for other services. First it was opened up for meter reading applications. The relatively low frequency (VHF band) combined with high transmission power (up to 500 mW), enables radio communication at long range. In addition, narrow band radio (12.5 or 25 kHz) is used to get the best radio receiver sensitivity. A communication range of 3-4 km in urban environment has been demonstrated using the ultra-narrowband radio modules (see Radiocrafts Application Note AN021).

Radiocrafts has been a pioneer in the standardization and development of radio solutions using the 169 MHz band, and contributed to the inclusion of 169 MHz as mode N in the Wireless M-Bus standard (EN 13757-4) 2013 edition.

Based on the EU decision 2013/752/EU [1], the 169 MHz bands have been dedicated to Assistive Listening Devices (ALD), Metering Devices and Non-specific Short Range Devices (SRDs). The detailed regulatory requirements can be found in the latest CEPT 70-03 [2]. A summary for metering and non-specific SRDs applications is given in the table below.

Frequency band [MHz]	Power e.r.p.	Duty cycle **	Maximum occupied bandwidth	Notes
169.4 – 169.475 (Annex 1 f1 / Annex 2b, 37b/37c)*	500 mW	1 % (10% for metering)	<= 50 kHz	This band can be used for metering devices or SRDs (with lower duty cycle).
169.4-169.4875 (f2, 38)	10 mW	0.1 %	Not specified	
169.4875 – 169.5875 (f3, 39b)	10 mW	0.001 % except 0.1 % from 00:00 – 06:00	Not specified	
169.5875 – 169.8125 (f4, 40)	10 mW	0.1 %	Not specified	

* References to [2] and [1].
** Duty cycle limit unless LBT (Listen Before Talk) and AFA (Adaptive Frequency Agility) is used.

Not all CEPT member countries have implemented the 169 MHz bands for SRDs. Most notably Russia, Ukraine and Belarus do not allow operation in these bands.
Do note that although the same frequency band 169.400 – 169.475 MHz can be used by both metering devices and non-specific SRDs, the duty cycle is limited to 1% for SRDs. However,

this is generally not a real limitation, as sensors and power limited devices (battery operation) need to restrict its use of power anyway.

As the new RED directive now comes into force, the harmonized standards for showing compliance have also undergone a revision. The EN 300 220, used to show compliance with the radio spectrum requirements, has been updated and split into several parts. The general tests are described in part 1 [3], while the actual required tests for non-specific SRDs are given in part 2 [4]. For metering devices in the 169.400 – 169.475 MHz band, the new part 4 [5] shall be used.

The main change from the previous revisions of the EN 300 220 is that now receiver performance tests (sensitivity, selectivity and blocking) have become mandatory for all equipment types. This is in order to meet the RED directive essential requirement for an efficient use of the spectrum. This means, not only should transmitters avoid emitting spurious signals into adjacent bands, but receivers should also be able to withstand some strong interference of services operating in adjacent frequency bands. An example of this is the LTE frequency bands which are quite close to the SRD band at 868 MHz.

References

[1] 2013/752/EU: Commission Implementing Decision of 11 December 2013 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC (notified under document C(2013) 8776) Text with EEA relevance

[2] ERC Recommendation 70-03. Relating to the use of Short Range Devices (SRD). Edition of February 2017.

[3] EN 300 220-1 V3.1.1. Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement.

[4] EN 300 220-2 V3.1.1. Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for non specific radio equipment.

[5] EN 300 220-4 V1.1.1. Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 4: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Metering devices operating in designated band 169,400 MHz to 169,475 MHz.

Document Revision History

Document Revision	Changes
1.0	First release

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