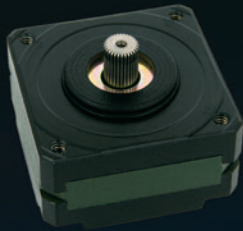




Motor Control Solutions



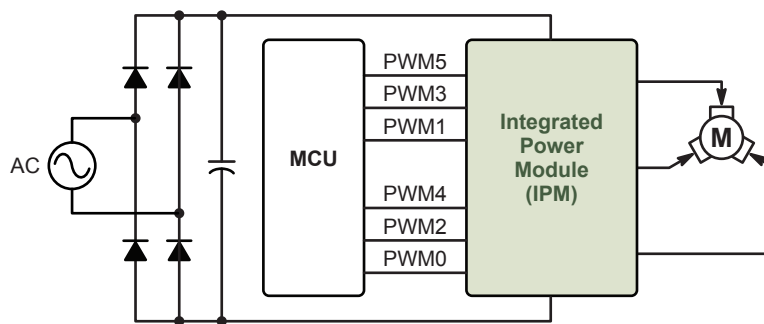
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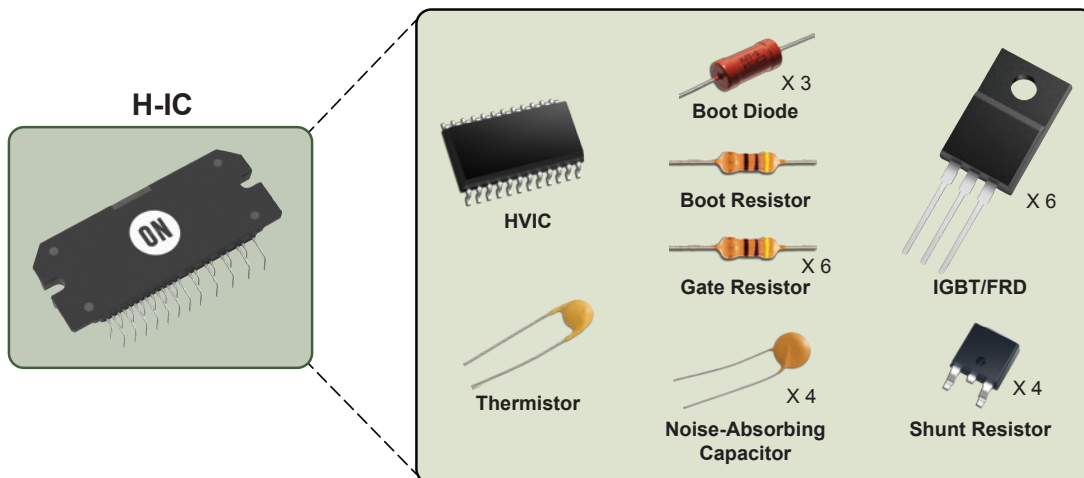
Integrated Motor Control

In keeping with our goal of offering the widest range of energy efficient solutions possible, ON Semiconductor is pleased to introduce our new Intelligent Power Module (IPM) family, an integrated solution for Motor Control in Industrial and Consumer applications. This new family complements our existing broad portfolio of discrete motor control components, comprising Controllers, IGBTs and MOSFETS.

Our new Intelligent Power Modules, capable of driving from 10 A to 50 A of output load current are ideally suited for White Goods and Industrial Motor Control. Manufactured with our revolutionary Insulated Metal Substrate Technology (IMST®), these motor drivers exhibit high thermal performance, low noise and very high reliability, all in a small, space saving footprint. All of the IPMs feature gate drivers, thermal and over current sense, boot diodes, resistors and noise absorbing capacitors. In addition, select products feature an integrated power factor controller (PFC).



Intelligent Power Modules pack several discrete components in one package!



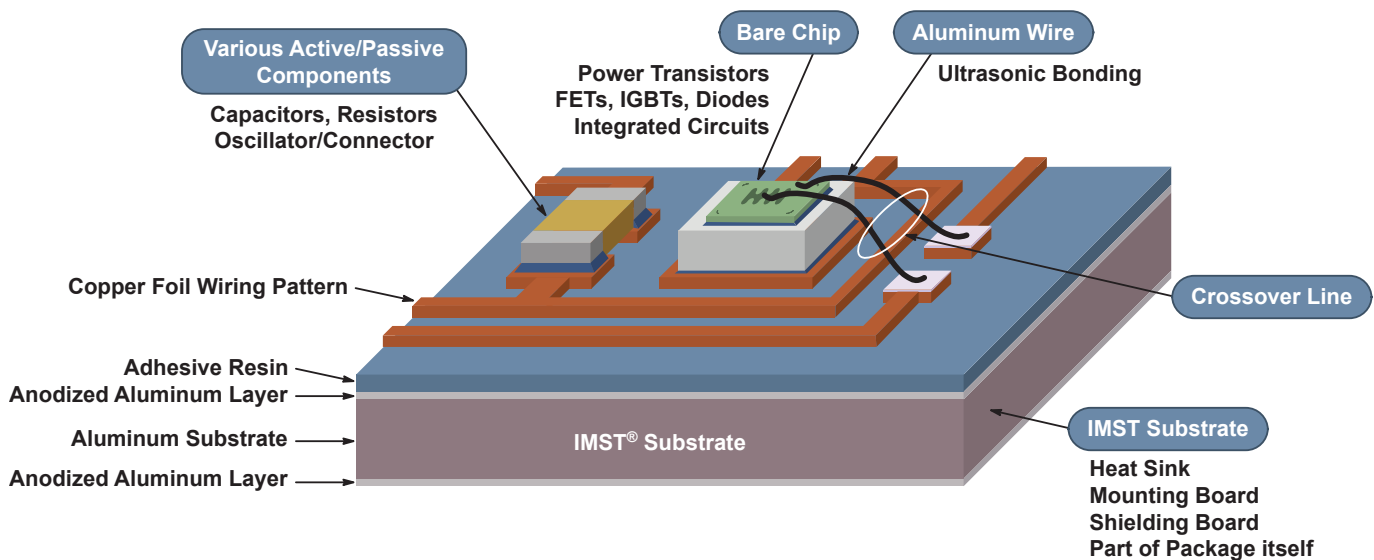
Insulated Metal Substrate Technology

Insulated Metal Substrate Technology (IMST) forms electronic circuits on plates of aluminum (metal substrates). IMST based hybrid devices use the high thermal conductivity plates of aluminum for their base substrates.

Hybrid devices such as the IPMs from ON Semiconductor enable power output circuits, control circuits and peripheral circuits to be mounted on the same substrate. IMST succeeds in turning

bare chip mounting into an element technology and will continue to evolve as an outstanding mounting technology capable of delivering high density, high performance and high reliability.

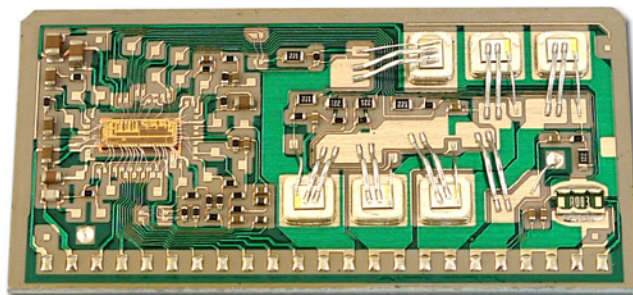
IMST enables assembly of discrete passive components (resistors, capacitors); discrete active components (diodes, transistors); and more complex devices (gate drivers, DSPs, logic) into highly integrated modules.



Insulated Metal Substrate Technology

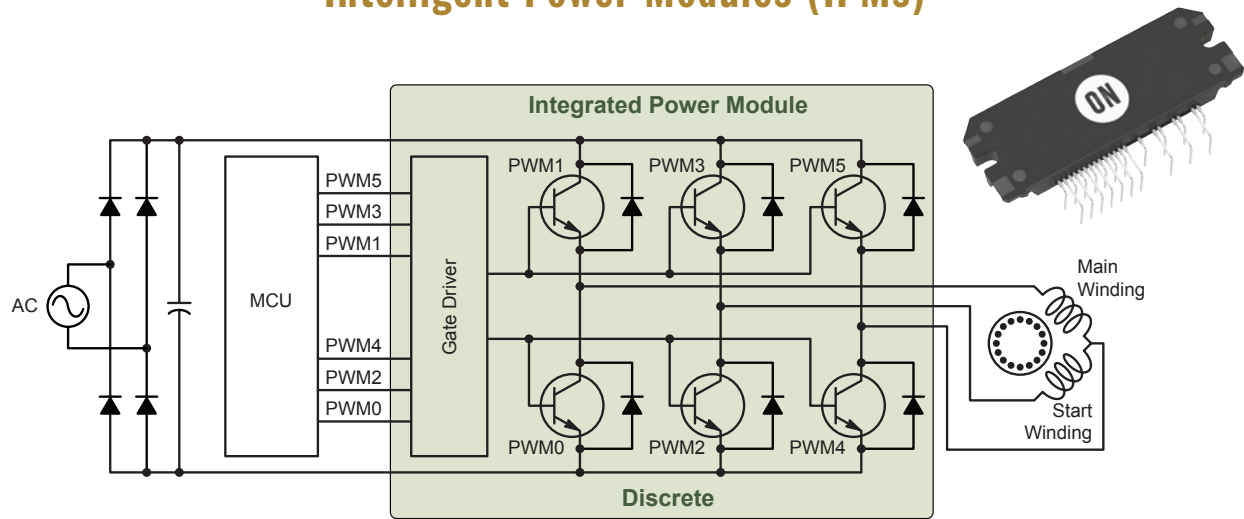
Value Proposition

- Reduced Component Count
- High Thermal Conductivity
- Low Noise
- High Reliability
- Small Design Footprint



Typical Integrated Module

Intelligent Power Modules (IPMs)



Highly Integrated Devices Provide High Thermal Performance and Efficiency While Reducing Component Count and PCB Area

ON Semiconductor has expanded its high voltage IPM portfolio with the STK55xU3xxx-E family. With a power range of 10 A to 50 A in SIP and DIP packaging, the new IPMs integrate a complete 3-phase inverter including the gate drive circuit. The company's newest IGBT and driver technologies are also incorporated in the new family of IPMs, minimizing switching losses of the module.

The modules are based on the proprietary IMST which exhibits many benefits over existing standard frame types including excellent thermal coupling and response, higher reliability, lower power losses, faster temperature monitoring and reduced switching surges.

Features

- 3-phase power MOS/IGBT bridge
- On-board gate drivers
- IC low voltage flag
- Over-current flag
- On-board current sensor
- On-board temperature sensor

Applications

- Motor Control Systems
- Industrial/general control systems
- HVAC
- Clothes washer/dryer
- Dishwasher
- Refrigerator
- Industrial motor
- Fan



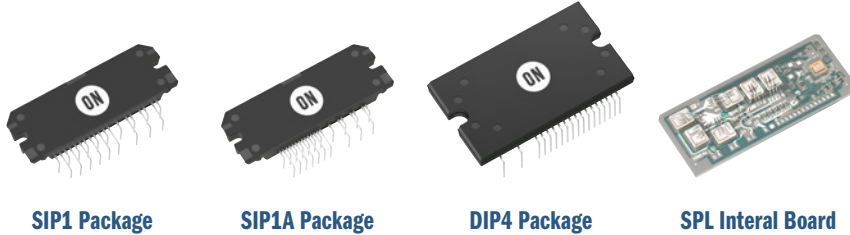
Intelligent Power Modules (IPM) for Inverter Designs

Features and Benefits of IPMs

- Intelligent power module (IPM) is a 3-phase inverter with gate drivers, UVLO, thermal and current sense
- Optimized layout for EMI & thermal performance
- Insulated Metal Substrate Technology (IMST)
- Available with integrated PFC

Applications

- Washing Machines
- Clothes Dryers
- Refrigerators
- Air Conditioning Units
- Variable Speed Drives
- Industrial Motor Control
- Vending Machines
- Slot Machines



SIP1 Package

SIP1A Package

DIP4 Package

SPL Interl Board



Power Modules

Device	Type	V _{DS} Max (V)	I _{op} Peak Current (A)	Package
STK551U362A-E	1 Shunt resistor	600	10	SIP1A
STK554U362A-E	3 Shunt resistor	600	10	SIP1A
STK554U362C-E	3 Shunt resistor	600	10	SIP1A
STK544UC62K-E	3 Shunt resistor	600	10	SIP1
STK551U392A-E	1 Shunt resistor	600	15	SIP1A
STK554U392A-E	3 Shunt resistor	600	15	SIP1A
STK551U3A2A-E	1 Shunt resistor	600	20	SIP1A
STK5F1U3E2D-E	1 Shunt resistor	600	50	DIP4
STK5F4U3E2D-E	3 Shunt resistor	600	50	DIP4

Tools

Evaluation Boards

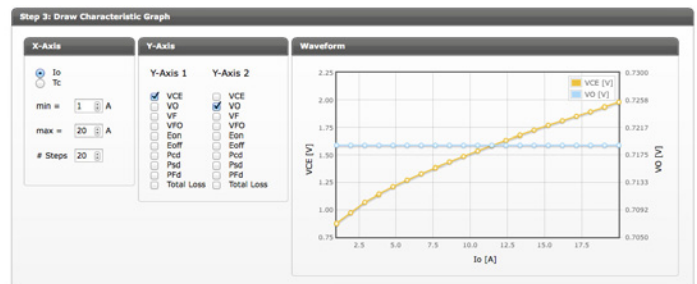
To order, visit www.onsemi.com and search with evaluation board product ID

Eval Board Product ID
STK551U362AGEBV
STK551U392AGEBV
STK551U3A2AGEBV
STK554U362AGEBV
STK554U362CGEBV
STK554U392AGEBV

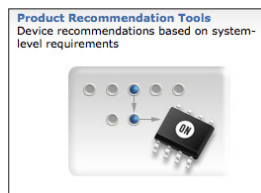


GreenPoint® Power Analyzer – Comprehensive & Powerful

www.onsemi.com > GreenPoint Design Tool > Analysis Tool

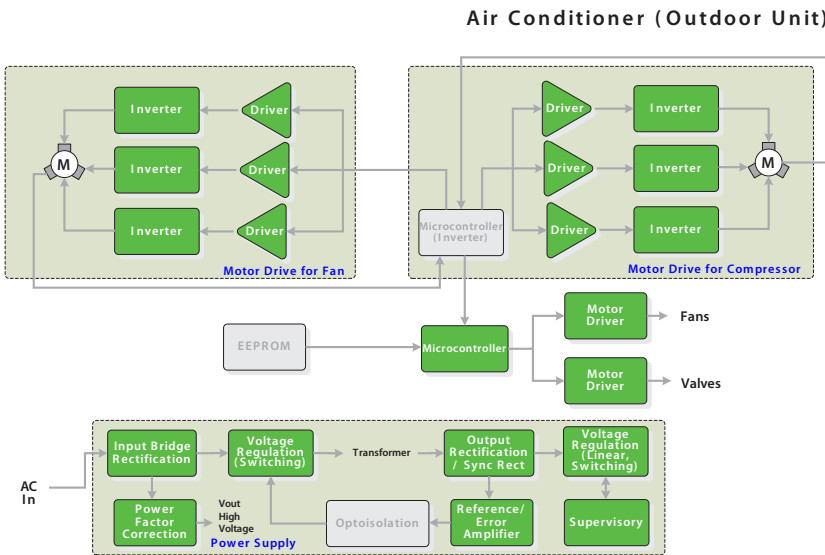


Access the Motor Driver Product Recommendation Tool on www.onsemi.com



For additional Motor Control resources, please visit www.onsemi.com/motorcontrol

Motor Drivers – Consumer Segment



Brushless DC Driver Features

- Soft switching
- Available as Sensorless and with Sensor
- Soft booting
- Lock Protection
- DC / PWM / PAM control
- Current limiter
- Low voltage protection
- Overheat protection

Brushless DC

Device	V _{motor} (V)	I _o Max (A)	Package
LB11868V	18	0.03	SSOP-20J
LB11696V	18	0.03	SSOP-30
LV8136V	18	0.15	SSOP-30
LB11685AV	19	1.20	SSOP-24J
LV8804FV	16	1.20	SSOP-20J
LV8805SV	16	1.20	SSOP-20J
LV8829LFQA	36	1.50	WQFN-24, VQFN-24N



Hybrid IC Features

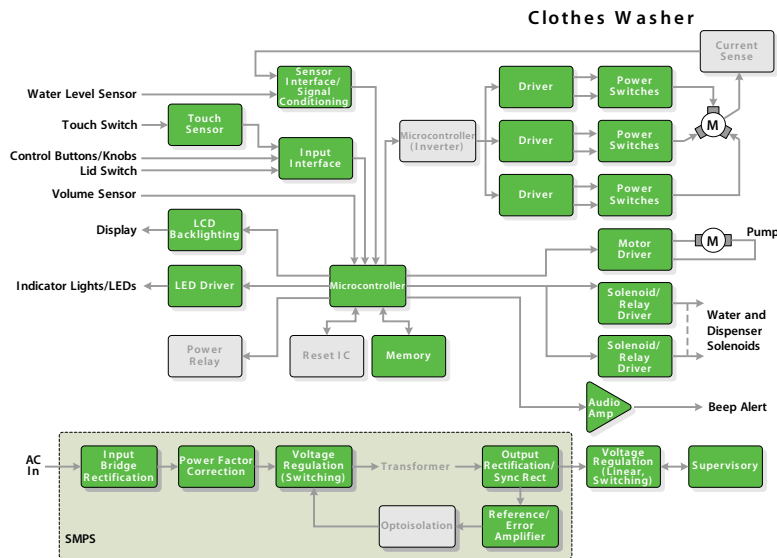
- Built-in microstepping controller
- Built-in current detection resistors
- Hollow packaging – contains fire and smoke
- Easy switching between full and fractional steps without jumping phase

Hybrid

Device	V _{motor} (V)	I _o Max (A)	Package
STK672-060-E	45	1.60	SIP-16
STK672-040-E	45	2.20	SIP-16
STK672-050-E	45	4.00	SIP-22



Motor Drivers – Consumer Segment



Features

- Microstepping
- Small footprint and reduced BOM
- Dynamic control of speed, torque and position
- Full set of protection & diagnostics
 - Short Circuit
 - Over & Under Voltage
 - Over & Under Temperature
- Stall detection – Speed and Load Angle output

Applications

- Washing Machines
- Clothes Dryers
- Refrigerators
- Air Conditioning Units
- Vending Machines
- Slot Machines
- Blood Analyzer

Stepper

Device	V _{motor} (V)	I _o Max (A)	Package
LB1909MC	20	0.80	SOIC-10
AMIS-30512	40	0.80	SOIC-24
AMIS-30622	40	0.80	NQFP-32, SOIC-20W
AMIS-30624	40	0.80	NQFP-32, SOIC-20W
AMIS-30521	40	1.60	NQFP-32
AMIS-30522	40	1.60	NQFP-32
LV8772	36	3.00	PDIP-30
AMIS-30532	40	3.20	NQFP-32



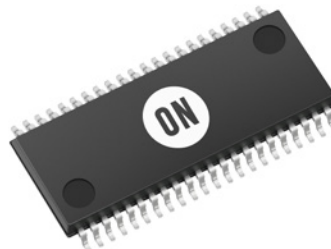
Stepper/Dual Brush DC

Device	V _{motor} (V)	I _o Max (A)	Package
LB1948MC	20	0.80	SOIC-10 W, MFP-10SK
LV8548MC	20	1.00	SOIC-10
LV8549MC	20	1.00	SOIC-10

Motor Drivers – Industrial Segment

Features

- Microstepping
- Small footprint and reduced BOM
- Dynamic control of speed, torque and position
- Full set of protection & diagnostics
 - Short Circuit
 - Over & Under Voltage
 - Over & Under Temperature
- Stall detection – Speed and Load Angle output



Stepper

Device	V _{motor} (V)	I _{OP Peak} (A)	Package
LB1939T	10.5	0.40	TSSOP-20
AMIS-30512	40	0.80	SOIC-24
AMIS-30622	40	0.80	NQFP-32, SOIC-20W
AMIS-30623	40	0.80	NQFP-32, SOIC-20W
AMIS-30624	40	0.80	NQFP-32, SOIC-20W
LB1846MC	8	0.80	SOIC-10 W, MFP-10SK
LB1848MC	8	0.80	SOIC-10 NB
LB1909MC	20	0.80	SOIC-10 NB
LB1838M	10.5	1.00	SOIC-14W, MFP-14S
LB1973JA	8	1.00	SSOP-16
LV8548MC	20	1.00	SOIC-10 NB
LV8549MC	20	1.00	SOIC-10 NB
AMIS-30521	40	1.60	NQFP-32
AMIS-30522	40	1.60	NQFP-32
AMIS-30523	40	1.60	QFN-52
LV8771VH	36	1.75	HSOP-28
LV8729V	36	1.80	SSOP-44K EP
LV8773	36	2.50	PDIP-28
AMIS-30543	40	3.00	QFN-32
LV8702V	36	3.00	SSOP-44J EP
LV8772	36	3.00	PDIP-30
AMIS-30532	40	3.20	NQFP-32
LV8727	50	4.60	HSOP-36B
AMIS-30421	40	10.00	QFN-44

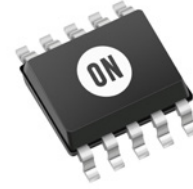
Stepper/Brush DC

Device	V _{motor} (V)	I _{OP Peak} (A)	Package
LV8411GR	6	0.60	VCT-24
LV8413GP	6	0.60	VCT-16
LB1836M	10.5	1.00	SOIC-14W, MFP-14S
LV8711T	18	1.00	TSSOP-24
LV8712T	18	1.00	TSSOP-24
LV8713T	18	1.00	TSSOP-24
LV8746V	38	1.20	SSOP-44K EP
LV8735V	36	1.50	SSOP-44K EP
LV8736V	36	1.50	SSOP-44K EP
LV8734V	36	1.75	SSOP-44K EP
LV8741V	38	1.75	SSOP-36J EP, SSOP-44K EP
LV8731V	36	2.50	SSOP-44K EP
LV8732V	36	2.50	SSOP-44K EP
LV8740V	38	3.00	SSOP-44J EP

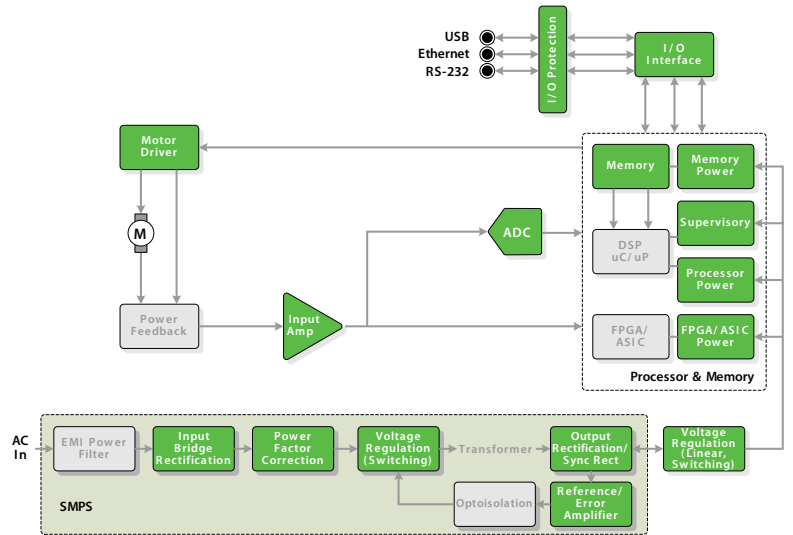
Motor Drivers – Industrial Segment

Applications

- Industrial Variable Speed Drives
- Surveillance Cameras
- Point of Sale Terminals
- Smart Motors
- Robotics
- Textile Machines
- Dose Pumps
- Vending Machines
- Stage Lighting



Motor Control System



Hybrid

Device	V _{motor} (V)	I _{OP} Peak (A)	Package
STK672-060-E	45	1.60	SIP-16
STK672-040-E	45	2.20	SIP-16
STK672-050-E	45	4.00	SIP-22
STK673-010-E	36	4.00	SIP-25
STK673-011-E	36	4.00	SIP-25
STK681-300	52	5.00	SIP-19
STK681-310	52	8.00	SIP-19
STK681-320	52	8.00	SIP-19
STK681-332-E	52	12.00	SIP-19
STK681-352-E	38	12.00	SIP-19
STK984-091A-E	18	180.00	SIP-23

Brushed/Brushless DC

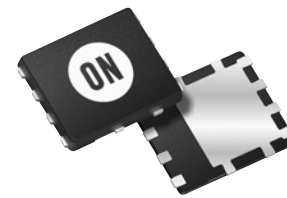
Device	V _{motor} (V)	I _{OP} Peak (A)	Package
NCV7720	40	0.55	SSOP-24 NB EP
LB1843V	10.5	0.80	SSOP-20
LV8762T	36	1.50	TSSOP-24
NCV7708B	40	2.00	SOIC-28W
LV8400V	16	3.80	SSOP-16
LV8760T	38	4.00	TSSOP-20 / TSSOP-20J
LV8761V	38	4.00	SSOP-36J EP
NCV7703B	40	5.00	SOIC-14
LV8860V*	34	0.70	SSOP-16

* Brushless DC Motor Driver

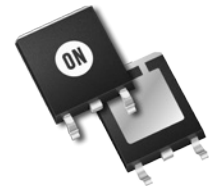
MOSFETs for Motor Control

Features

- Low $R_{DS(on)}$ to minimize conduction losses
- Low capacitance to minimize driver losses
- Low gate charge to minimize switching losses
- High avalanche resistance
- High current capability



SO-8 Flat Lead Package

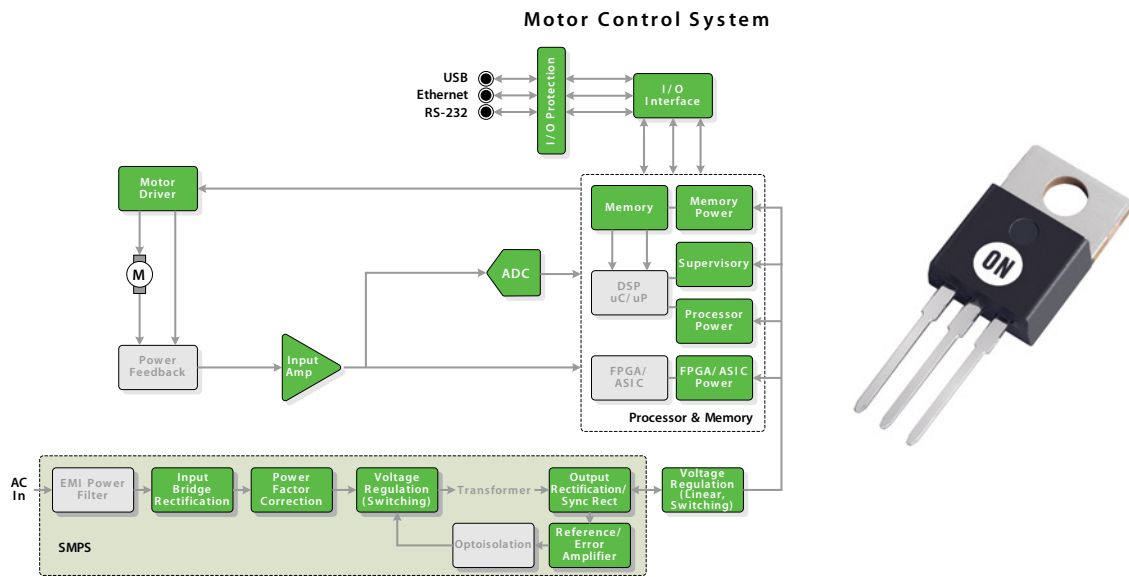


ATPAK

Power MOSFETs

Device	Channel	V_{DS} (V)	I_D (A)	$R_{DS(on)}$ ($m\Omega$)	$Q_G(TOT)$ (nC)	Package
BMS3004	P	-75	-68	8.5	300	TO-220F-3SG (SC-67)
2SJ652	P	-60	-28	38	80	TO-220F-3SG (SC-67)
NTTFS5116PL	P	-60	-20	52	25	u8FL
BXL4004	N	40	100	3.9	140	TO-220-3L (SC-46)
NTD5802N	N	40	101	4.4	75	DPAK, IPAK
NTD5803N	N	40	75	7.2	51	DPAK, IPAK
NTD5805N	N	40	51	9.5	33	DPAK, IPAK
NTD5807N	N	40	23	31	12.6	DPAK, IPAK
NTP5404N	N	40	167	4.5	125	D2PAK, TO-220
NTMFS5830NL	N	40	172	2.3	113	SO-8FL (DFN-5)
NTMFS5832NL	N	40	111	4.2	51	SO-8FL (DFN-5)
NTMFS5834NL	N	40	74	9.3	24	SO-8FL (DFN-5)
NTTFS5811NL	N	40	53	6.7	31	u8FL
2SK3703	N	60	30	26	40	TO-220F-3SG (SC-67)
2SK3816	N	60	40	26	40	TO-262-3L (I2PAK)
2SK4066	N	60	100	4.7	220	TO-262-3L (I2PAK)
2SK4094	N	60	100	5.0	220	TO-220-3L (SC-46)
ATP401	N	60	100	3.7	300	ATPAK
ATP404	N	60	95	7.2	120	ATPAK
NTD5862N	N	60	90	5.7	82	DPAK, IPAK
NTD5865N	N	60	38	18	23	DPAK, IPAK
NTD5867NL	N	60	20	39	15	DPAK, IPAK
NTMFS5844NL	N	60	60	12	30	SO-8FL (DFN-5)
NTP5863N	N	60	97	7.8	55	TO-220
NTP5864N	N	60	63	12.4	31	TO-220
NTTFS5820NL	N	60	37	11.5	28	u8FL
NTTFS5826NL	N	60	20	24	8.4	u8FL
BMS4007	N	75	60	7.8	160	TO-220F-3SG (SC-67)
2SK3707	N	100	20	60	44	TO-220F-3SG (SC-67)
ATP405	N	100	40	33	68	ATPAK
NTD6414AN	N	100	32	37	40	DPAK, IPAK
NTD6416ANL	N	100	19	80	25	DPAK, IPAK
ATP613	N	500	5.5	2.0	14	ATPAK
WPB4001	N	500	26	0.26	87	TO-3P-3L (SC-65)
BFL4007	N	600	14	0.68	46	TO-220F-3FS (SC-67)
WPB4002	N	600	23	0.36	84	TO-3P-3L (SC-65)

IGBTs for Motor Control



Features

- Low saturation voltage using trench technology
- Low switching loss
- Positive temperature coefficient for effective paralleling
- Low gate charge
- Very low off-state leakage current
- Short Circuit (5 μ s)

Applications

- Motor Control Inverters
- Variable Speed Drives
- PFC

Device	V(BR)CES Typ (V)	Ic Max (A)	Package
NGTB15N60EG	600	15	TO-220-3
NGTB15N60S1	600	15	TO-220-3
NGTG15N60S1	600	15	TO-220-3
NGTB30N60FWG	600	30	TO-247-3
NGTB50N60FWG	600	50	TO-247-3
NGTB15N120L	1200	15	TO-247-3
NGTB20N120L	1200	20	TO-247-3
NGTB30N120FL2	1200	30	TO-247-3
NGTB30N120L	1200	30	TO-247-3
NGTB30N120L2	1200	30	TO-247-3
NGTB40N120FL2	1200	40	TO-247-3
NGTB40N120L	1200	40	TO-247-3
NGTB50N120FL2	1200	50	TO-247-3

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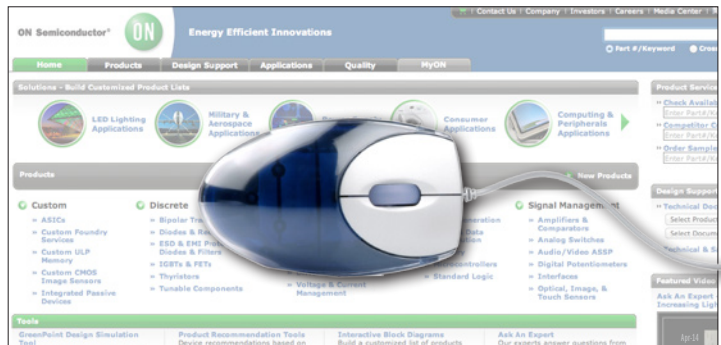
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