Power Management

Selection Guide 2013

www.infineon.com/powermanagement www.infineon.com/PowerManagementICs

We shape Power Management - We live Energy Efficiency

Infineon, an innovation leader for Power Semiconductor and Energy Efficiency technologies is continually developing and working on the best solutions for your applications and creating new system architectures using state-of-the-art IC and power semiconductors.

Driven by our commitment to our customers, we offer breakthrough innovations such as the highly efficient CoolMOS™ technology or the revolutionary SiC JFET technology together with Digital Power Control Technologies. Each of which addresses fundamental design and product requirements such as ease of use, highest Energy Efficiency and increased power density.

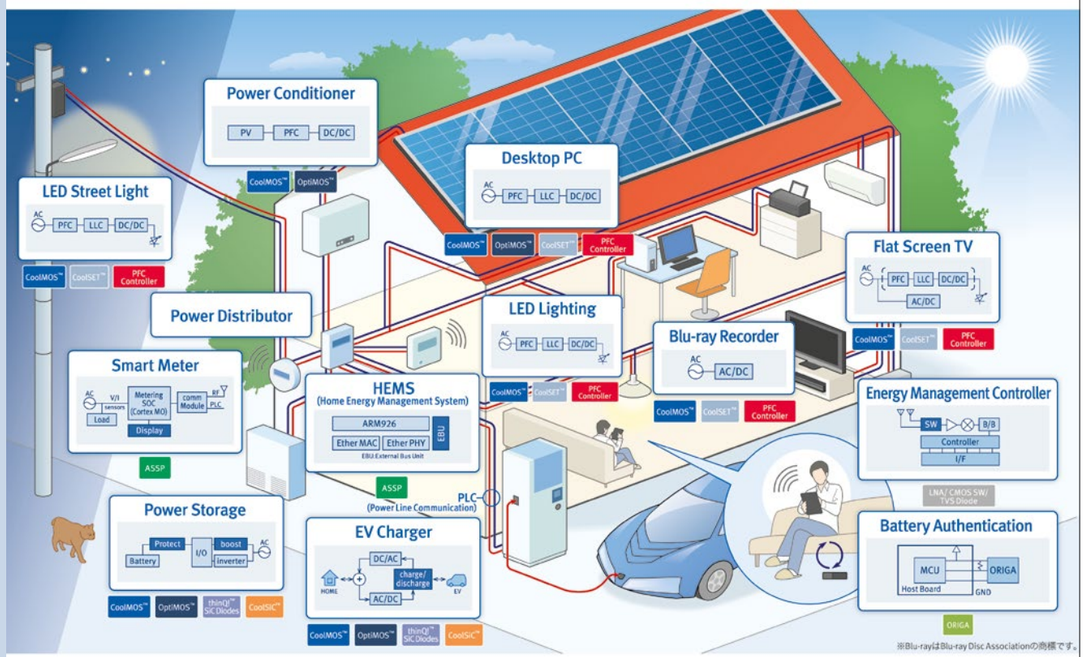
Our innovative approaches, motivated by continuous improvement, make your application more efficient, more cost-effective and thus overall, more successful. We offer you outstanding quality products for Notebook, Notebook Adapter, Server, Desktop and Graphic Cards, Mainboard, PC Silverbox, Server Power Supplies, Telecom Power Supplies, E-Mobility, Solar, Industrial Welding, Induction Heating, Aircon Systems, Lighting and Motor Control.

With dedication and strength we are earnestly working on a better future by providing you more efficient and nature saving products, shaping the world of tomorrow. This commitment serves as our foundation and enabler for reaching international energy standards such as green energy 2020 (in Europe) or NEMS (National Energy Modeling System) in the US.

We would like to invite you to explore our broad offer of leading energy efficient products supporting your application needs!

英飛凌的創新效能理論, 秉持著不斷改進的精神,使你的應用系統不只有高效率, 更有效節省成本,因而於市場上更加成功. 我們提供你卓越高品質產品,在筆記電腦,服務器, 桌上型電腦, 圖型處理器, 主板, 服務器電源, 通信電源, 電動車, 太陽能, 工業焊機, 電磁爐, 空調系統, 照明系統與動力控制系統.有這樣的專注與能力, 我們努力專研於給你更環保的產品以及一個更美好的未來. 這個承諾不只是我們的根基, 更促使我們朝向達到國際能源標準, 像是歐洲的 Green Energy 2020 或美國的 NEMS (National Energy Modeling System) 邁進.

這是我們的榮幸邀請你, 參閱英飛凌廣泛高效能產品目錄, 來找尋最適合你的應用系統需求的產品.



Infineon‘s products are enormously important for future energy supplies in terms of both exploiting renewables and using energy efficiently. Explore our wide offer of high-end products for your application.

Infineon’s Semiconductor Solutions for Energy Efficient Consumption

Highly efficient solutions for Consumer and Computing

- Infineon‘s latest portfolio of SMPS products is consequently optimized along the requirements of the next generation of highest efficient solutions.

SMPS

Best choice for Renewable Energy Applications

- Infineon offers a wide product portfolio with a clear focus on efficiency and reliability in your Solar Application.

Solar

Best solutions for your Lighting Application

- Infineon offers an innovative product portfolio for general Lighting Applications, supporting benchmark efficiency improvements, system miniaturization, reliability and overall cost savings.

Lighting

Full range of highly efficient products for your Computing Application

- Infineon offers superior solutions to fully support the trend towards GreenIT.

DC/DC

New class of ICs dedicated to Smart Metering & Home Energy Control

- Infineon is strongly engaged in the field of Energy Efficiency with a vast portfolio of semiconductor devices targeted to smart grids, cities & homes.

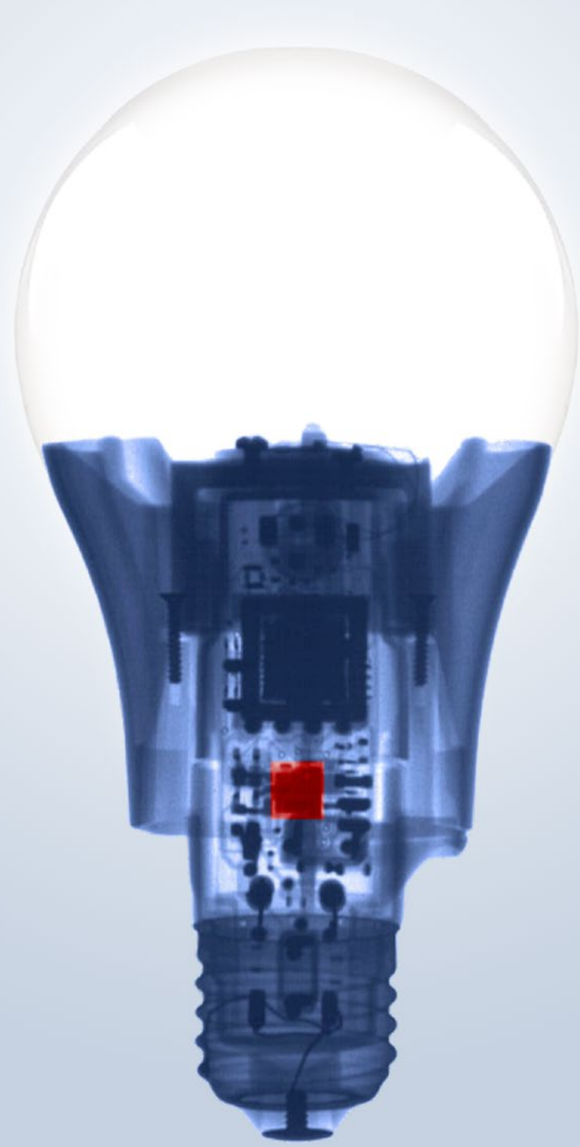
Smart Grid

Infineon products for highest performance and reliability in your Motor Control Application

- With OptiMOS™ 25–250V products we set the benchmark in the industry. With this broad and comprehensive portfolio Infineon supports your applications perfectly and offers you the best solution for Motor Control systems up to 110V DC supply voltage.

Motor Control

Contents

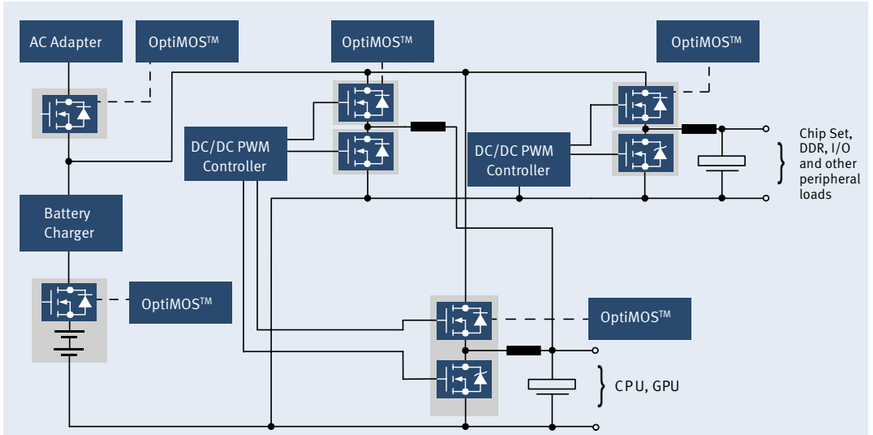


We shape Power Management - We live Energy Efficiency

DC/DC Computing
Notebook

Best Solutions for Small and Cool System Power

Benchmark technologies significantly improve switching losses in power stages and drivers and thus improve battery lifetime and system reliability. Highest efficiency at all load conditions enables system designers to overcome thermal challenges to reach a new level of system miniaturization. Our latest portfolio of notebook products is consequently optimized along the requirements of the next generation notebook platforms and easy to design in.



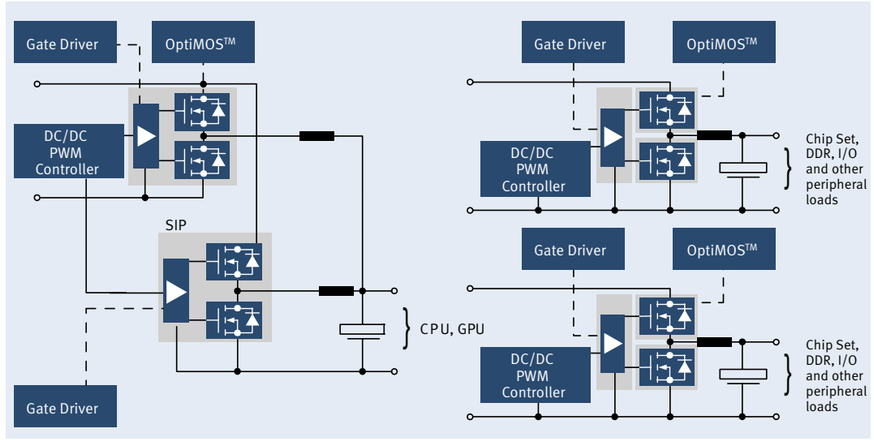
Clamping, Level Shifters & General Purpose

Notebook	Topology	Voltage Class	Technology	Selection
DC/DC	Buck Converter	30V	OptiMOS™	Recommendation

DC/DC Computing
Server, Desktop and Graphic Cards

Highest Power Density for the Next Generation Voltage Regulation Standards

Power management system solutions based on OptiMOS™ technology increase Energy Efficiency in all load conditions, reduce required PCB real estate and are easy to use. Our benchmark solutions demonstrate dramatically increased efficiency even at high currents and high switching frequencies. This supports system designers to achieve their efficiency, power and thermal requirements with a reduced number of phases and thus save overall system cost.



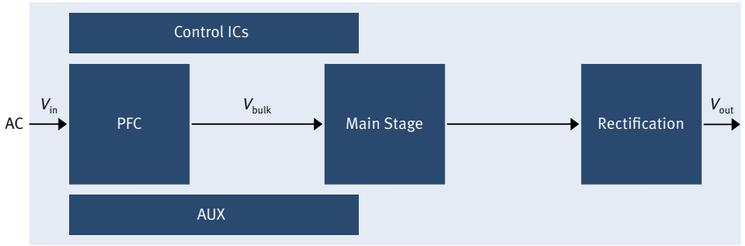
Clamping, Level Shifters & General Purpose

Server, Desktop and Graphic Cards	Topology	Voltage Class	Technology	Selection
DC/DC	Buck Converter	25V	OptiMOS™	Recommendation
	Buck Converter	30V	OptiMOS™	Reference
Driver	Buck Converter	12V	PX 3517	Recommendation
SIP	Buck Converter	16V	TDA21220	Recommendation
Controller	Buck Converter	see page 103 for further information		

SMPS
Consumer SMPS

Cost-effective Products for Consumer SMPS

We offer a wide range of cost-effective products for consumer switch mode power supplies (SMPS). This includes high voltage MOSFETs, Control IC´s for PFC and PWM stages, as well as low voltage MOSFETs for synchronous rectification. With these products Infineon supports the trends towards continuously reducing power consumption. Especially versatile are the new CoolMOS™ C6/E6 and P6 families which combine good efficiency with attractive pricing. For synchronous rectification we recommend our OptiMOS™ series offering extremely low on-state resistance and low capacitances. New control ICs support topologies such as quasi-resonant flyback and LLC. For the PFC stage we introduce our new hyperfast Rapid silicon diode family.

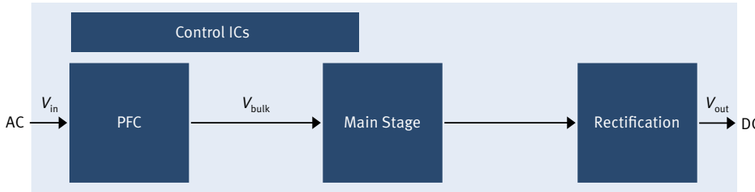


Consumer SMPS	Topology	Voltage Class	Technology	Selection
AC/DC	PFC	600V	CoolMOS™ C6/E6/P6	Ease of Use
	PFC	600V	CoolMOS™ CP	Efficiency
	PFC	600V	CoolMOS™ C6/E6/P6	Recommendation
	PFC	650V	Rapid Diode 2	Ease of Use
DC/DC	2 Switch-Forward DC-DC (TTF)	600V	CoolMOS™ C6/E6	Ease of Use
	2 Switch-Forward DC-DC (TTF)	600V	CoolMOS™ CP	Efficiency
	2 Switch-Forward DC-DC (TTF)	600V	CoolMOS™ C6/E6/P6	Recommendation
	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Ease of Use
	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Efficiency
	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Recommendation
	Single stage	650V	CoolMOS™ C6/E6/P6	Ease of Use
	Single stage	600V	CoolMOS™ CP	Efficiency
	LLC HB DC-DC	650V	CoolMOS™ CFD2	Recommendation
	LLC HB DC-DC	600V	CoolMOS™ C6/E6/P6	Efficiency
	LLC HB DC-DC	650V	CoolMOS™ CFD2	Recommendation
	Quasi-Resonant Flyback DC-DC	900V	CoolMOS™ C3	Ease of Use
	Quasi-Resonant Flyback DC-DC	900V	CoolMOS™ C3	Efficiency
	Quasi-Resonant Flyback DC-DC	900V	CoolMOS™ C3	Recommendation
	Active Clamp Forward	800V	CoolMOS™ C3	Ease of Use
	Active Clamp Forward	800V	CoolMOS™ C3	Efficiency
	Active Clamp Forward	800V	CoolMOS™ C3	Recommendation
	ZVS Asym. Half Bridge DC-DC	650V	CoolMOS™ CFD2	Ease of Use
	ZVS Asym. Half Bridge DC-DC	600V	CoolMOS™ C6/E6	Efficiency
	ZVS Asym. Half Bridge DC-DC	650V	CoolMOS™ CFD2	Recommendation
	ITTF	600V	CoolMOS™ C6/E6	Ease of Use
	ITTF	500V	CoolMOS™ CP	Efficiency
	ITTF	600V	CoolMOS™ C6/E6/P6	Recommendation
Rectification		150-250 V	OptiMOS™	Recommendation
Aux	CoolSET™	650-800V	CoolSET™	Recommendation

SMPS
Notebook Adapter

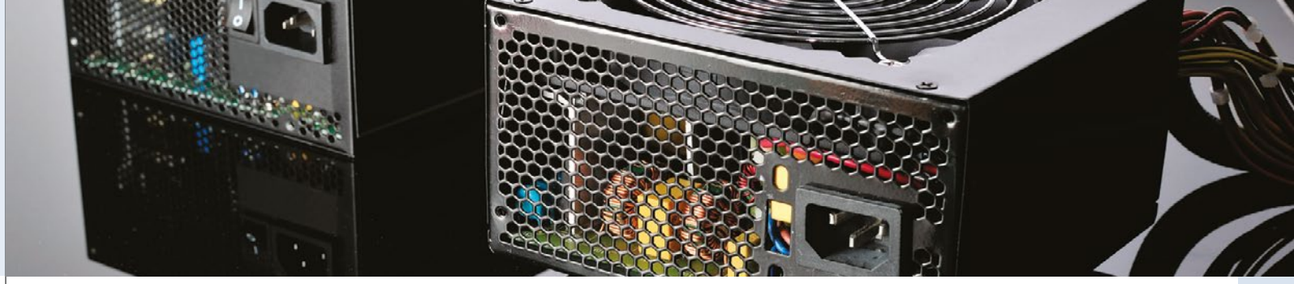
Leading-edge Technologies for Notebook Adapters

We offer a wide range of products for notebook adapters including high voltage MOSFETs and control ICs for both PFC and PWM stage, as well as low voltage MOSFETs for synchronous rectification. With these products Infineon supports the trends towards a significantly higher efficiency level, especially in partial load condition, as well as towards miniaturization of the adapter. Especially versatile are the CoolMOS™ C6/E6 and P6 families which combine good efficieny with ease of use. For synchronous rectification we recommend our OptiMOS™ series, offering extremely low on-state resistance and low capacitances. New control ICs support topologies such as quasi-resonant flyback and LLC, which gain market share within the notebook adapter segment. For the PFC stage we introduce our new hyperfast Rapid silicon diode family.



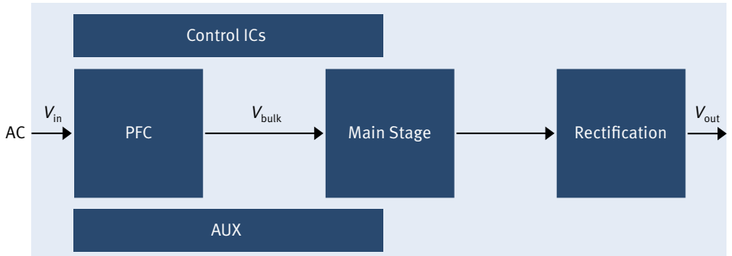
Notebook Adapter	Topology	Voltage Class	Technology	Selection
AC/DC	PFC Boost	600V	CoolMOS™ C6/E6/P6	Ease of Use
	PFC Boost	600V	CoolMOS™ CP	Efficiency
	PFC Boost	600V	CoolMOS™ C6/E6/P6	Recommendation
	PFC Boost	650V	Rapid Diode 1/2	Ease of Use
DC/DC	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Ease of Use
	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Efficiency
	Fixed Frequency Flyback	650V	CoolMOS™ C6/E6/P6	Recommendation
	Single stage	650V	CoolMOS™ C6/E6/P6	Ease of Use
	Single stage	600V	CoolMOS™ CP	Efficiency
	LLC HB	650V	CoolMOS™ CFD2	Ease of Use
	LLC HB	600V	CoolMOS™ C6/E6/P6	Efficiency
	LLC HB	650V	CoolMOS™ CFD2	Recommendation
	Quasi-Resonant Flyback	900V	CoolMOS™ C3	Ease of Use
	Quasi-Resonant Flyback	900V	CoolMOS™ C3	Efficiency
	Quasi-Resonant Flyback	900V	CoolMOS™ C3	Recommendation
	Active Clamp Flyback	800V	CoolMOS™ C3	Ease of Use
	Active Clamp Flyback	800V	CoolMOS™ C3	Efficiency
	Active Clamp Flyback	800V	CoolMOS™ C3	Recommendation
Rectification	Synchronous Rectification	100-120V	OptiMOS™	Recommendation
DC/DC	Fixed Frequency/QR Flyback	650-800V	CoolSET™	Recommendation

SMPS
PC Silverbox



Highest Efficiency with new Topologies for PC Silverbox

The PC Silverbox has seen a tremendous race towards higher efficiency with peak values in the range of 92% and above. Special care is dedicated to the 20% load point. We support these trends with our range of high voltage and low voltage MOSFETs as well as control ICs for power factor correction and PWM. Especially versatile are the CoolMOS™ C6/E6 & P6 families, our latest technologies in the superjunction field, which were pioneered by Infineon Technologies. CoolMOS™ C6/E6 & P6 offer easy paralleling and good efficiency even with less ideal PCB layout. The family is specifically recommended for resonant topologies such as LLC due to its high body diode ruggedness, for hard switching topologies such as TTF we recommend the CoolMOS™ C6/E6 & P6. New control ICs support continous current mode PFC and the LLC topology. For the synchronous rectification and the DC/DC we recommend our OptiMOS™ series, which combine extremely low on-state resistance and low capacitances. For the PFC stage we introduce our new hyperfast Rapid silicon diode family.



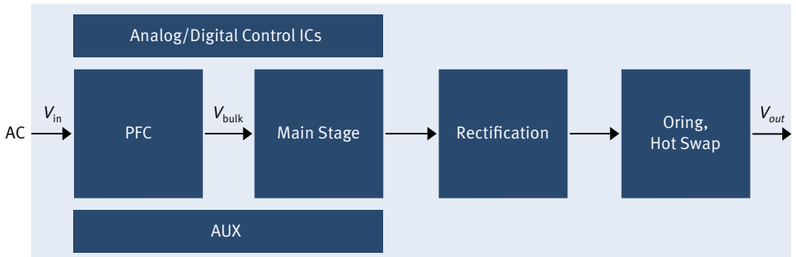
PC Silverbox	Topology	Voltage Class	Technology	Selection
AC/DC	PFC Boost	500V	CoolMOS™ CE	Ease of Use
	PFC Boost	600V	CoolMOS™ C6/E6/P6	Ease of Use
	PFC Boost	600V	CoolMOS™ CP	Efficiency
	PFC Boost	600V	CoolMOS™ C6/E6/P6	Recommendation
	PFC Boost	650V	thinQ!™ Diode Gen 5	Efficiency
	PFC Boost	650V	Rapid Diode 1/2	Ease of Use
DC/DC	2 Switch-Forward (TTF)	500V	CoolMOS™ CE	Ease of Use
	2 Switch-Forward (TTF)	600V	CoolMOS™ C6/E6/P6	Ease of Use
	2 Switch-Forward (TTF)	600V	CoolMOS™ CP	Efficiency
	2 Switch-Forward (TTF)	600V	CoolMOS™ C6/E6/P6	Recommendation
	LLC HB	500V	CoolMOS™ CE	Ease of Use
	LLC HB	650V	CoolMOS™ CFD2	Ease of Use
	LLC HB	600V	CoolMOS™ C6/E6/P6	Efficiency
	LLC HB	650V	CoolMOS™ CFD2	Recommendation
	Active Clamp Forward	800V	CoolMOS™ C3	Ease of Use
	Active Clamp Forward	800V	CoolMOS™ C3	Efficiency
	Active Clamp Forward	800V	CoolMOS™ C3	Recommendation
	ZVS Asym. Half-Bridge	650V	CoolMOS™ CFD2	Ease of Use
	ZVS Asym. Half-Bridge	600V	CoolMOS™ C6/E6	Efficiency
	ZVS Asym. Half-Bridge	650V	CoolMOS™ CFD2	Recommendation
Rectification	Synchronous Rectification	40-80V	OptiMOS™	Recommendation
Aux	Fixed Frequency/QR Flyback	650-800V	CoolSET™	Recommendation

SMPS
Server Power Supply

Technologies for Best Efficiency in Servers

The server market has seen a tremendous shift towards higher efficiency with peak values in the range of 95% and above.

We specifically recommend our CoolMOS™ CP/C7 series for hard switching applications such as continuous current mode PFC and interleaved two transistor forward. For resonant switching applications such as LLC, we offer a wide range of products from the CoolMOS™ P6 series, our latest technology in the superjunction field. For synchronous rectification we offer various voltage classes of the OptiMOS™ such as OptiMOS™ 75V series for 12V output. With ultra-low on-state resistance and very low capacitances the OptiMOS™ series will boost your design to best efficiency. Furthermore, we offer control ICs for the CCM PFC and isolated drivers such as the 1ED and 2ED series. For the PFC stage we introduce our new hyperfast Rapid silicon diode family.

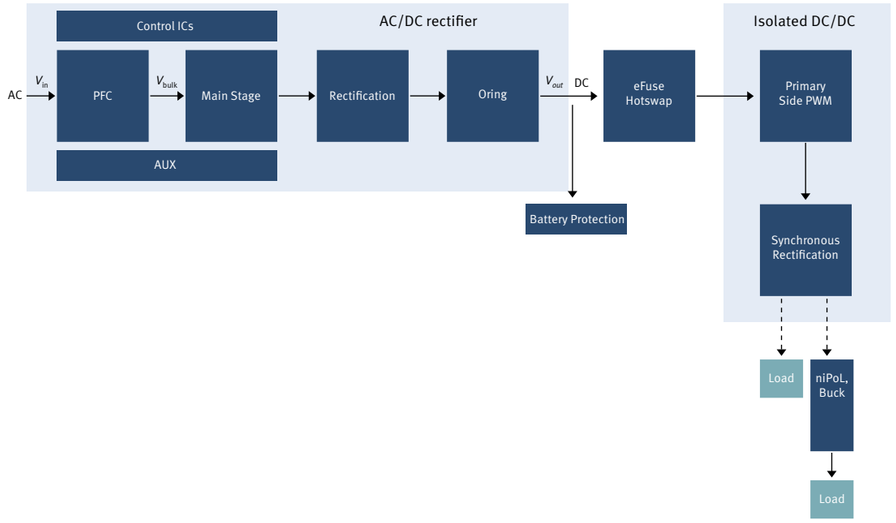


Server Power Supply	Topology	Voltage Class	Technology	Selection
AC/DC	PFC Boost	600V	CoolMOS™ C6/E6/P6	Ease of Use
	PFC Boost	600V	CoolMOS™ CP/C7	Efficiency
	PFC Boost	600V	CoolMOS™ C6/E6/P6	Recommendation
	Bridgless PFC	600V	CoolMOS™ C6/E6/P6	Ease of Use
	Bridgless PFC	600V	CoolMOS™ CP/C7	Efficiency
	Bridgless PFC	600V	CoolMOS™ C6/E6/P6	Recommendation
	PFC Boost	650V	thinQ!™ Diode Gen 5	Efficiency
	PFC Boost	650V	Rapid Diode 2	Ease of Use
DC/DC	LLC HB	650V	CoolMOS™ CFD2	Ease of Use
	LLC HB	600V	CoolMOS™ C6/E6/P6	Efficiency
	LLC HB	650V	CoolMOS™ CFD2	Recommendation
	ZVS Asym. Half-Bridge	650V	CoolMOS™ CFD2	Ease of Use
	ZVS Asym. Half-Bridge	600V	CoolMOS™ C6/E6	Efficiency
	ZVS Asym. Half-Bridge	650V	CoolMOS™ CFD2	Recommendation
	ZVS Full Bridge Phase Shift	650V	CoolMOS™ CFD2	Ease of Use
	ZVS Full Bridge Phase Shift	600V	CoolMOS™ C6/E6	Efficiency
	ZVS Full Bridge Phase Shift	650V	CoolMOS™ CFD2	Recommendation
	ITTF	600V	CoolMOS™ C6/E6/P6	Ease of Use
	ITTF	500V	CoolMOS™ CP/C7	Efficiency
	ITTF	600V	CoolMOS™ C6/E6/P6	Recommendation
Rectification	Synchronous Rectification	40-80V	OptiMOS™	Recommendation
Oring FET	-	30V	OptiMOS™	Recommendation
Aux	Fixed Frequency/QR Flyback	650-800V	CoolSET™	Recommendation

SMPS
Telecom Power Supply

Energy Efficiency for Telecom Power Supply

The Telecom Power Supply market has grown fast within the last years. High efficiency targets are required across the entire load range starting at 20% or even at 10% load. We support these trends with our range of high voltage MOSFETs and SiC Schottky barrier Diodes and Driver ICs as well as our low voltage MOSFET series for synchronous rectification and Oring. For the PFC stage we introduce our new hyperfast Rapid silicon diode family.



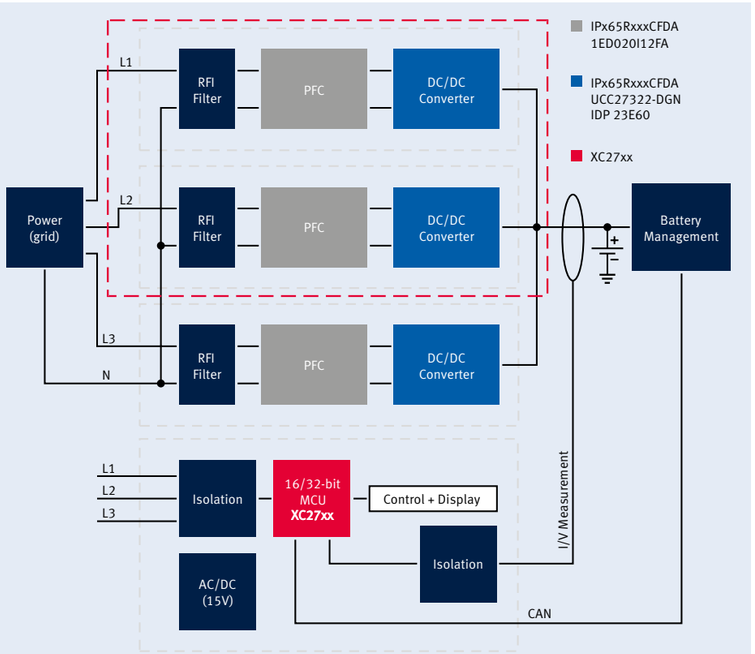
Telecom	Topology	Voltage Class	Technology
AC/DC	PFC	600V	CoolMOS™ C6/E6/P6
	Bridgeless PFC	600V	CoolMOS™ CP/C7
	PFC Boost	650V	ThinQ™ Diode Gen 5
	PFC	650V	Rapid Diode 2
DC/DC	LLC HB DC-DC	600V	CoolMOS™ C6/E6/P6
	LLC HB DC-DC	650V	CoolMOS™ CFD2
	ZVS Full Bridge Phase Shift	600V	CoolMOS™ C6/E6
	ZVS Full Bridge Phase Shift	650V	CoolMOS™ CFD2
	FRC Full Bridge	600V	CoolMOS™ CP/ThinQ!™ Diodes
	ITTF Full Bridge	600V	CoolMOS™ C6/CP/C7
Rectification		80V-200V	OptiMOS™
Oring		60V-100V	OptiMOS™
Battery Protection		60V-150V	OptiMOS™
eFuse, Hotswap		60V-150V	OptiMOS™
Primary Side PWM		75V-200V	OptiMOS™
Synchronous Rectification		30V-100V	OptiMOS™
niPoL, Buck		25V/30V	OptiMOS™

E-Mobility

Best Solutions for Battery Charger

To recharge the battery of an electric car, a charger is needed. In cars with on-board chargers the batteries can be recharged by plugging them into a standard power outlet at home. Battery charging via the power grid requires a flexible switching structure in order to handle the different voltage levels and available power existing in different countries. On-board chargers have to be very efficient so that they are as small and light as possible. A long-term trend is towards bi-directional charger functions for not only drawing current from the grid but feeding excess energy back into it. Infineon's comprehensive portfolio of semiconductors (sensors, microcontrollers, power semiconductors, power modules, etc.) lends itself perfectly to compact charging units. The products also function at high switching frequencies for use in small and light charger designs. Our products in this sector include MOSFETs: CoolMOS™ and the flexible Easy 1B/2B power modules for overnight low-amp charging, HybridPACK™1 for fast charging with high amps and high-performance 16- and 32-bit microcontroller solutions.

AC/DC Battery Charger

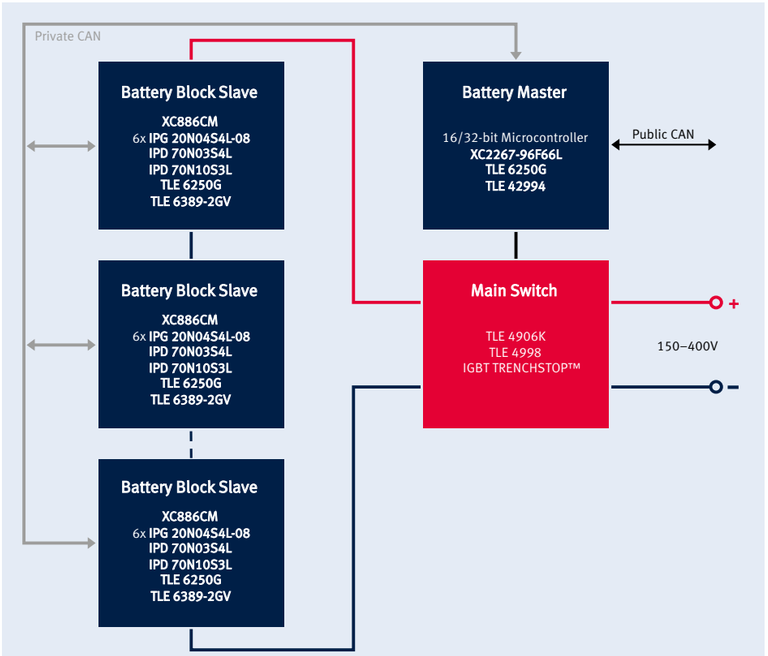


E-car (Battery charger)	Topology	Voltage	Technology	Selection
AC/DC	Bridgeless converter	650V	CoolMOS™ CFDA	Recommendation
	Totem Pole	650V	CoolMOS™ CFDA	Recommendation
DC/DC	ZVS Phase Shifted Full Bridge	650V	CoolMOS™ CFDA	Recommendation
	LLC Converter	650V	CoolMOS™ CFDA	Recommendation
Control Board	-		Microcontroller XC27xx	Recommendation

Best Solution for Battery Management

The Battery Management System (BMS) controls battery charge and discharge. An intelligent battery management system is necessary to lengthen battery life, which reduces the vehicle cost over its entire lifetime. The system constantly controls the functionality and state of charge of the battery cells. As they age, the storage capacity of the individual battery cells may lessen at a different speed for each cell. The challenge is to optimize cell utilization. Circuits to test the cells, and active balancing of the cells during the charging and discharging process enable the battery life and cruising range to be effectively lengthened. Our solution for active cell balancing increases usable battery capacity by over 10 percent. Infineon's microcontrollers and sensors monitor functionality, charge and depth of discharge. These include the 8-bit XC886CM microcontroller family, the 16/32-bit XC22xx microcontroller family, the OptiMOS™ low-voltage MOSFETs, the TLE 6250/51 CAN transceivers as well as the TLE 6389-2GV and TLE 42994GM controllers.

Battery Management



E-car (Battery management)	Topology	Voltage	Technology	Selection
Main Switch	High Power High Current	600V	IGBT TRENCHSTOP™	Recommendation
Battery Block Slave	Step Up Step Down	30V	OptiMOS™	Recommendation
		40V	OptiMOS™	Recommendation
		100V	OptiMOS™	Recommendation

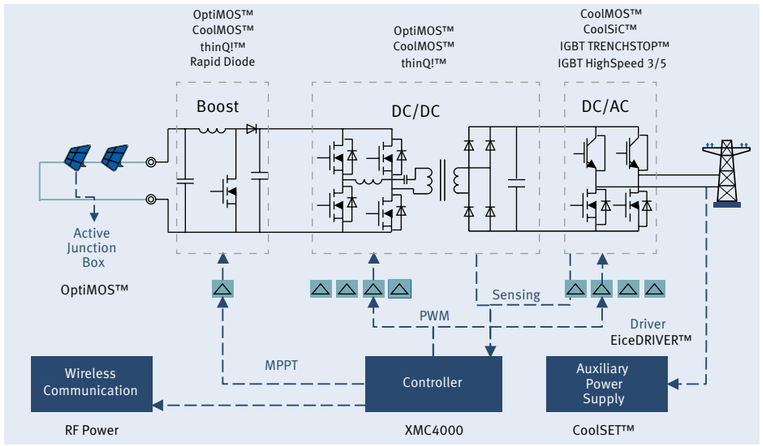
Solar

Infineon Leading Products for Complete Solar Power Solution

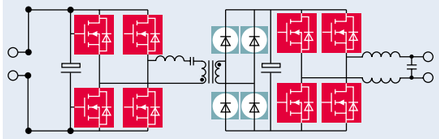
Infineon provides a comprehensive portfolio to deliver the best efficiency and reliability for solar applications. Infineon's leading edge technologies like superjunction MOSFETs, Trench+Fieldstop IGBTs, Coreless transformer drivers, etc, combined with rich experience and highest quality, ensured our No.1 position in solar applications. We are devoted to grow further with the industry to bring efficiency beyond 99% and make solar power applicable wherever the sun is shining.

	Optimizer 250W - 400W	Micro Inverter 215W-500W	String Inverter 1kW-30kW	Central Inverter 30kW-500kW
MOSFET	**Optimizer** 250W-400V	**OptiMOS™** SS08 60V-200V **CoolMOS™** D²PAK/ThinPAK 600V-800V	**CoolMOS™** TO-247 600V/650V 19mΩ-99mΩ	
SiC Diode		**ThinQ™** DPAK 600V/1200V	**ThinQ™** TO220/TO-247 600V/1200V	
SiC JFET			**CoolSiC™** TO-247/bare die 1200V 70mΩ-100mΩ	
IGBT			**TRENCHSTOP™/HighSpeed 3/TRENCHSTOP™5** 600V/650V/1200V TO-247/TO-247 DuoPack	
High Power Silicon Diodes			**Rapid Diodes** 650V TO-247	
Power Module			**Easy PACK**	**Prime PACK**
Driver			**IGBT Driver:** 1ED020I12-F2, 2ED020I12-F2 **JFET Driver:** 1EDI30J12CL/CP	
Schottky Diode RF Power	**Low Noise Amplifier for ZigBee/Wifi**		**Schottky Diode for driver clamping**	
Auxiliary Power Supply		**CoolSET™** 800V		
Current Sensor			**TLI4970-D050T4** 50A Digital current sensor	
Controller	**MCU:** XE162-XMC4100/4200	**QR controller:** ICE2QS02G **MCU:** XE162-XMC4100/4200	**MCU:** XMC4400-XMC4500	**MCU:** XMC4700/TriCore

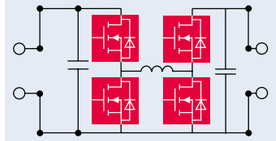
Infineon leading products for Complete Solar System



Micro Inverter



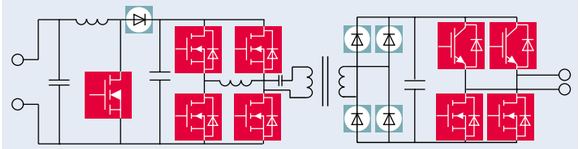
DC/DC Optimizer



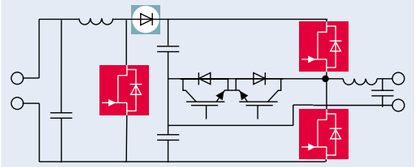
DC /DC	Rectification	DC/AC
OptiMOS™ 60V	SiC Diode	CoolMOS™ P6 600V/650V
BSC028N06NS	IDL04G65C5	IPL60R190P6

DC input
OptiMOS™ 60V-100V
BSC042NE7NS3 G

1-phase String Inverter



3-phase String Inverter



Boost	DC/DC	DC/AC
CoolMOS™ C7 650V	CoolMOS™ CFD 650V	IGBT TRENCHSTOP™ 600V
IPW65R045C7	IPW65R041CFD	IKW50N60T
SiC Diode 600V	SiC Diode 600V	CoolMOS™ CFD 650V
IDW20G65C5	IDW20G65C5	IPW65R041CFD
Rapid Diodes		
IDW40E65D2		

Boost	Inverter
IGBT 1200V	SiC JFET 1200V
IKW40N120H3	IJW120R050T1

Other Products

Product Family	Typical part	Function and Feature
CoolSET™	ICE2A280Z	High Efficiency Auxiliary Power Supply
IGBT TRENCHSTOP™5 650V	IKW50N65H5	>16kHz switching IGBT
EiceDriver™	1ED020I12-F2	High reliability IGBT Driver
Micro Controller	XMC4000	ARM M4 core with high resolution PWM

Key New Products for Solar Application

Product Series	Typical part	Application	Key Value
New OptiMOS™ 60V	BSC028N06NS	Micro Inverter DC/DC	Improved figures of merits
CoolMOS™ P6	IPL60R190P6	Micro Inverter DC/AC	High efficiency especially low R_s
CoolMOS™ C7	IPW65R045C7	String Inverter	High efficiency hard switching
CoolSiC™ JFET	IJW120R100T1	3-phase String Inverter DC/AC	High efficiency & power density in high voltage
SiC Diode Gen 5	IDW20G65C5	Micro Inverter/ String Inverter	High efficiency
IGBT TRENCHSTOP™5	IKW50N65H5	String Inverter	Cost performance
Micro Controller	XMC4000	Controller	ARM M4 core with high resolution PWM

Lighting

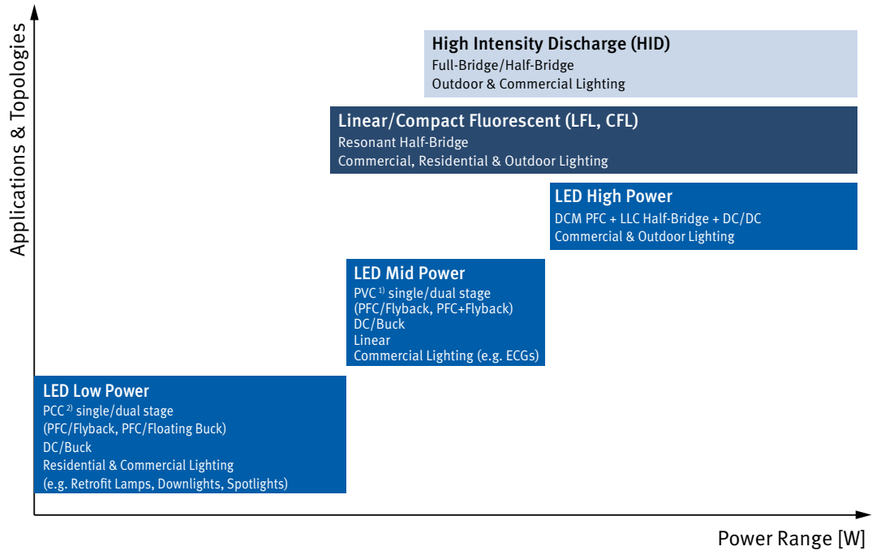
Global concerns over climate changes require using our limited energy resources more efficiently. Approximately 20% of the global electrical energy is consumed by Lighting Applications.

The trend towards energy efficient lighting is apparent and requires both efficient light source technologies and electronics components. Infineon as global number 1 ranking power semiconductor market leader for the last 8 consecutive years, offers an innovative product portfolio for general Lighting Applications, supporting benchmark efficiency improvements, system miniaturization, realiability and overall cost savings.

Infineon delivers innovative, high-performance solutions with best-in-class technologies that can be used in a broad range of applications.

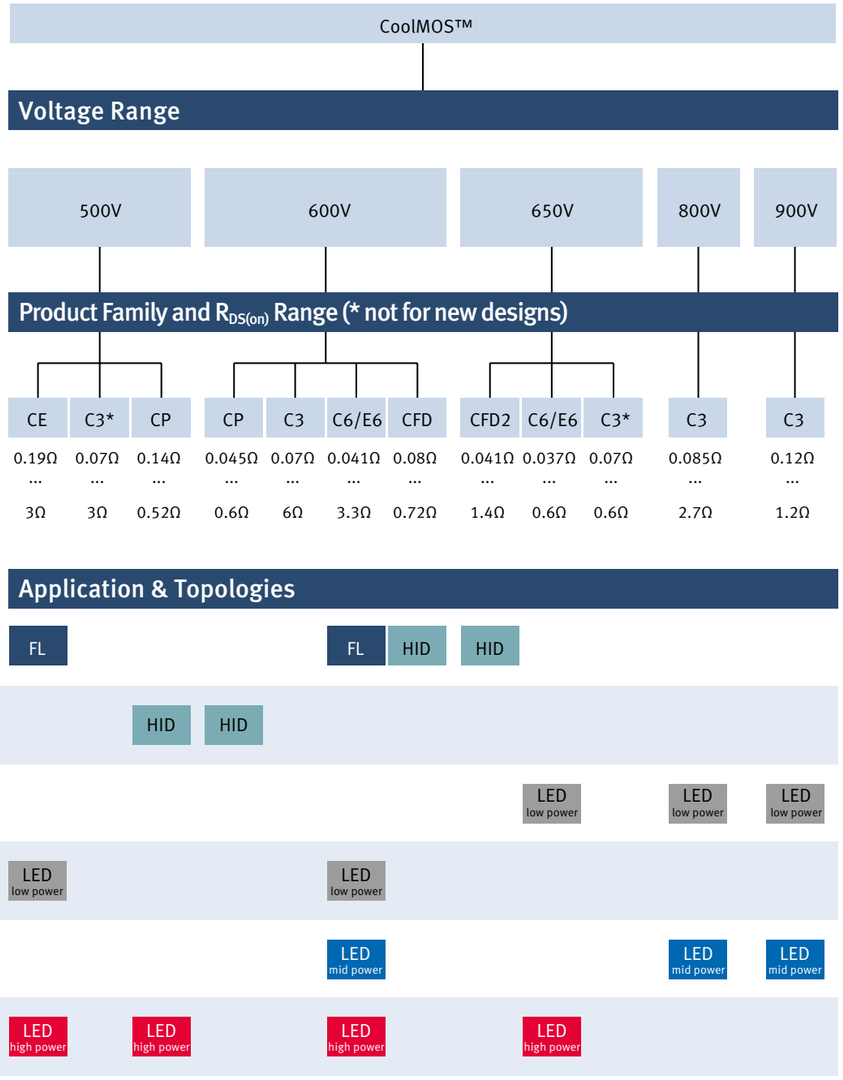
- Fully integrated ballast controllers for fluorescent lamps
- Highly efficient offline LED driver ICs for lamp retrofits and low power LED converters
- DC/DC switched mode and linear LED drivers for single string LED applications
- High performance power management ICs and microcontrollers for intelligent lighting systems
- Extensive portfolio of leading edge CoolMOS™ and OptiMOS™ Power MOSFETs

Lighting Applications vs. power range and topology



1) Primary Side Voltage Control
2) Primary Side Current Control

CoolMOS™ Selection Table



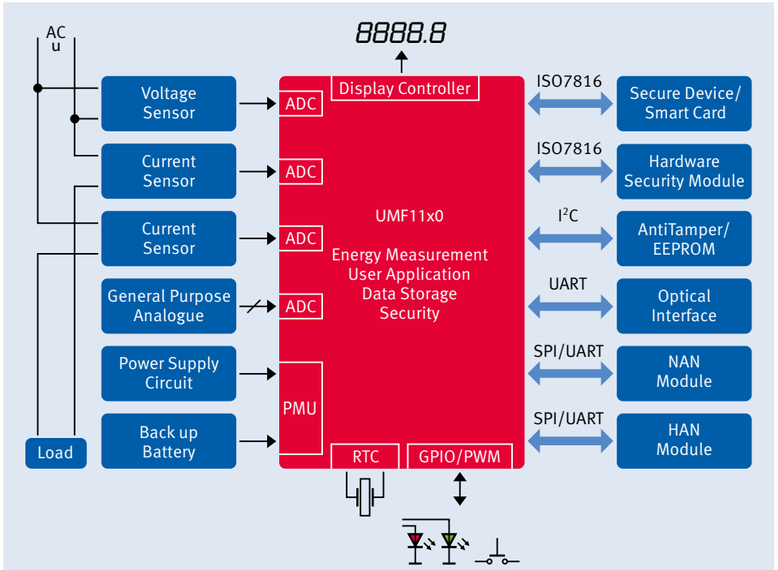
Smart Grid

Electric Metering – Top Metrology, Security and Energy Quality Monitoring at Lowest Power and Cost

We offer a new class of integrated circuits dedicated to smart metering and home energy control, utilizing Infineon's world class reliable technology and designed to meet customer needs now and in the future.

Infineon's metrology controller combines top class features, such as metrology accuracy, temperature compensated RTC and advanced power management with low cost. The UMF11xx family is very flexible thanks to the vast number of peripherals and supports direct access to metrology raw data (with programmable sampling rate up to 16kHz) to run proprietary metrology and power analysis algorithms.

We address proactively Smart Grid security needs with an advanced cryptograhic engine embedded in our Smart Meter controller product families



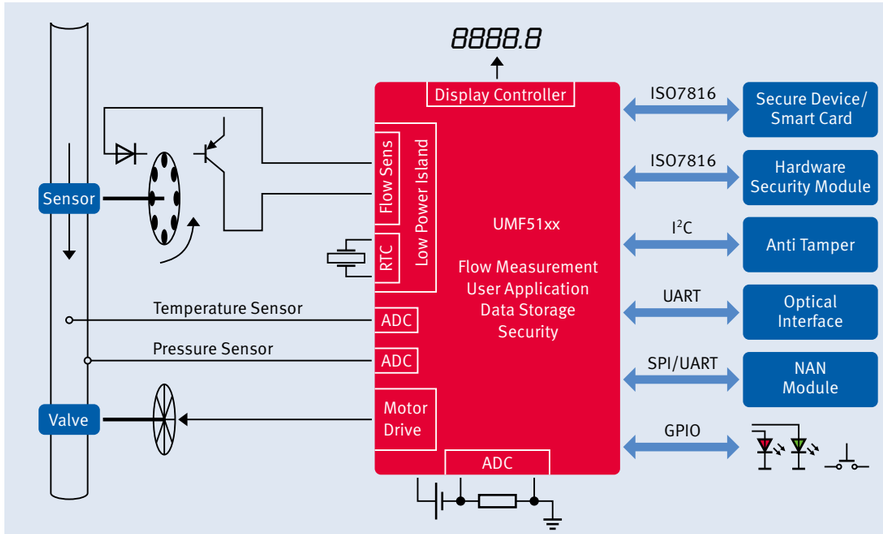
Ordering Information

Product	Phases	Flash	RAM	Supply Voltage	Temperature	Package
UMF1110	2	128KB	16KB	1.8 ... 3.7V	-40°C to +85°C	TQFP-100
UMF1120	2	256KB	16KB	1.8 ... 3.7V	-40°C to +85°C	TQFP-100

Flow Metering – Integration, Security and Dedicated Flow Metrology Peripherals at Lowest Power and Cost

Infineon's flow meter controller is the first IC designed with a specific target to gas, water and heat metering. Beyond a powerful ARM Cortex M0 computing engine, a large embedded flash memory, a versatile LCD display controller and a large set of serial I/O peripherals including a dedicated cryptographic engine. It contains specific hardware peripherals dedicated to flow metering, such as a flow integrator, a valve motor driver and battery monitor. On top, it embeds a dedicated power management unit designed for lowest peak and average energy operation.

To address smart meter requirements for high reliability over extended life time and in a wide temperature range, Infineon's metrology ICs are based on automotive quality IP blocks and manufactured with automotive qualified processes. All of Infineon's embedded Flash memory blocks, for example, are fully qualified for high number of write cycles and for data retention over extended temperature range.



Ordering Information

Product	Flow Peripherals	Flash	RAM	Supply Voltage	Temperature	Package
UMF5110	✓	128KB	16KB	1.8 ... 3.7V	-40°C to +85°C	TQFP-100
UMF5120	✓	256KB	16KB	1.8 ... 3.7V	-40°C to +85°C	TQFP-100

Low Voltage Drives

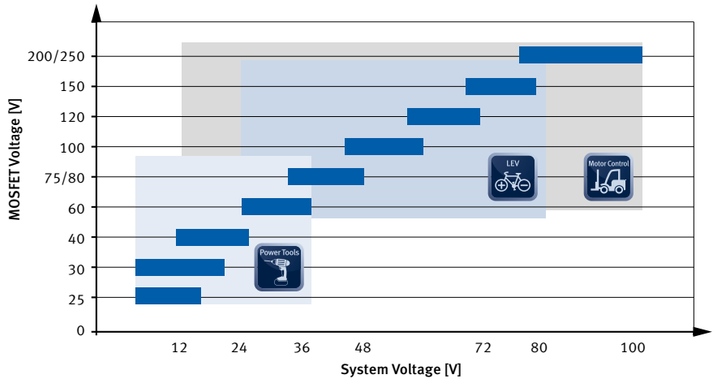
OptiMOS™ for Highest Performance and Reliability in your Drives Application

Motor Control – a high current application with a wide range of system power from 1W to 50.000W requires MOSFETs with:

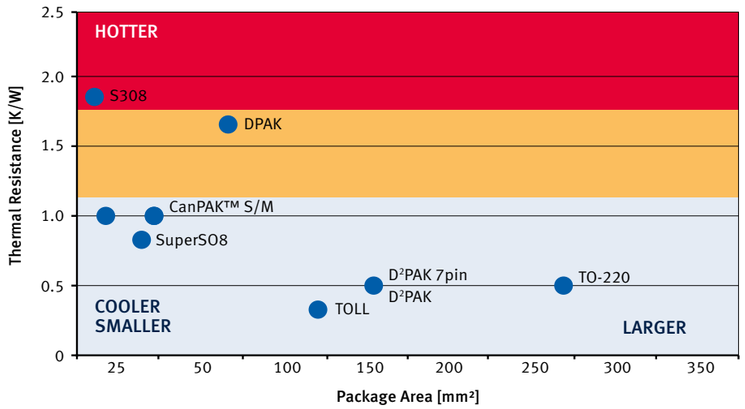
- High current capability
- Lowest on-state resistance ($R_{DS(on)}$)
- Outstanding product performance & quality

With OptiMOS™ 25-250V products we set the benchmark in the industry. With this broad and comprehensive portfolio Infineon supports your application perfectly and offers you the best solution for Motor Control systems up to 110V DC supply voltage.

Infineon offers the right MOSFET for each system



Packages for LV-Drives applications [1)]



[1)] further information on the packages available in chapter “Packages”

Your Application – Our Solution

Application		Nominal Battery Voltage	Voltage Class	Packages
Power and Gardening Tools	Do-it-yourself (DIY)	4.2V-18V	OptiMOS™ 25V, 30V	SuperSO8, D²PAK, TO-220
	Professional	4.2V-36V	OptiMOS™ 25V, 30V, 40V, 60V	CanPAK™ , SuperSO8, D²PAK, D²PAK 7pin, TO-220
Light Electric Vehicles (LEV)	Pedelec	24V-36V	OptiMOS™ 60V, 75V, 80V	SuperSO8, DPAK
	E-Scooter	24V-36V	OptiMOS™ 75V, 80V, 100V	SuperSO8, CanPAK™ M, TO-220, D²PAK 7pin
	Low speed Cars	42V-90V	OptiMOS™ 150V, 200V, 250V	D²PAK 7pin, TO-leadless (TOLL)
RC-toys	Toy-grade	1.2V-24V	OptiMOS™ 25V, 30V, 40V, 60V	S3O8, CanPAK™ S, D-PAK
	Hobby-grade	7.2V-48V	OptiMOS™ 25V, 30V, 40V, 60V, 75V, 80V	SuperSO8 and CanPAK™ S & M
Forklift	Small size	< 24V	OptiMOS™ 40V, 60V, 75V, 80V	TO-220, TO-220 FP D²PAK, D²PAK 7pin TO-leadless (TOLL)
	Medium size	24V-60V	OptiMOS™ 60V, 75V, 80V, 100V	
	Big size	> 60V	OptiMOS™ 120V, 150V, 200V, 250V	
Fans		6V-48V	OptiMOS™ 25V, 30V, 40V, 60V, 75V, 80V, 100V	SuperSO8, CanPAK™, S3O8, D²PAK, DPAK

Features and Benefits of OptiMOS™ 25V-250V for LV-Drives

Features

- High current capability
- Lowest on-state resistance ($R_{DS(on)}$)
- Easy to use
- Outstanding product performance & quality

Benefits

- Enables system cost reduction and overall system minituarization
- Enables optimized thermal management
- Improved battery lifetime
- Reliable operation in harsh environments

Major Home Appliance
Induction Cooking

Highest Performance, Efficiency and Reliability IGBTs for Induction Heating Cooktops

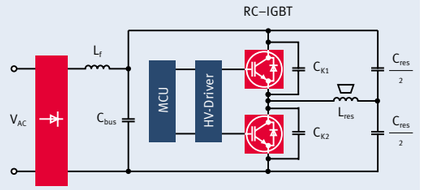
Being the market leader in IGBTs, we offer a comprehensive, high performance portfolio of 600V, 1100V, 1200V, 1350V, 1600V discrete IGBTs for resonant-switching applications like Induction Cooking. The portfolio has been developed to provide benchmark performance in terms of switching and conduction losses, which ensures best-in-class efficiency and fast time to market.

New Edition IHW40N60RF and 600V HighSpeed 3 family have been added to address high speed switching topologies where switching losses have been optimized. These devices provide excellent performance over temperature and ensure up to 20% lower switching losses compared to competitor devices.

The 1350V 3rd Generation Induction Cooking specific IGBT has recently been added to the portfolio. The device has been designed to offer a higher voltage breakthrough headroom to offer customer higher reliability whilst not compromising device performance.

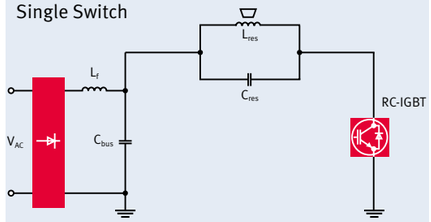
Induction Heating Inverter (Current Resonance)

Half Bridge



Induction Heating Inverter (Voltage Resonance)

Single Switch



Induction Heating	Topology	Voltage Class	Technology	Selection
DC/AC	Series Resonant Half Bridge 20kHz	600V	RC-H	Recommendation
	Series Resonant Half Bridge 40kHz	600V	RC-HF	Recommendation
	Quasi Resonant Single Ended	1100V	RC-H	Recommendation
	Quasi Resonant Single Ended	1200V	RC-H	Recommendation
	Quasi Resonant Single Ended	1350V	RC-H	Recommendation
	Quasi Resonant Single Ended	1600V	RC-H	Recommendation
Aux	Flyback	650V	CoolSET™ QR	Efficiency
	Flyback	800V	CoolSET™ QR	Recommendation
	Boost Converter	800V	CoolSET™ F3	Recommendation

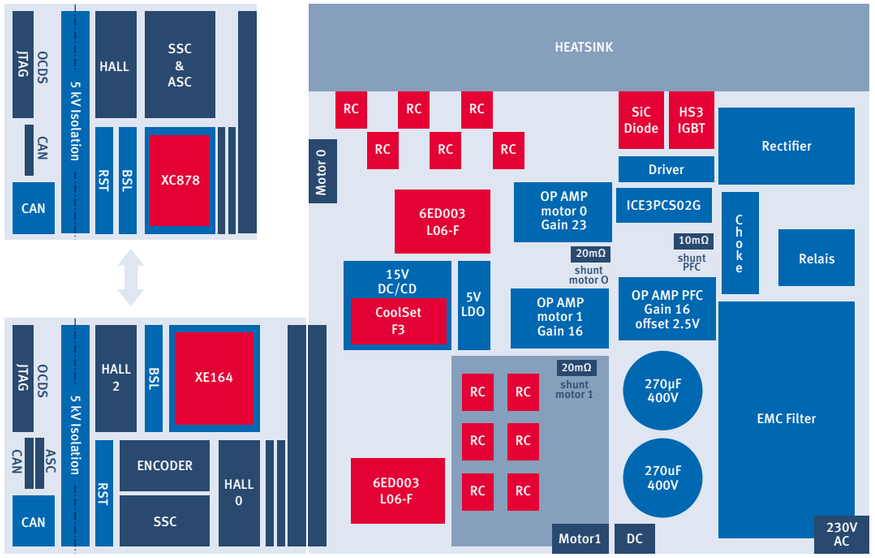
Major Home Appliance
Aircon

Infineon's Innovative Approach for Aircon Reference Board

We offer a wide portfolio of energy saving chips for the whole system chain of power electronic devices for air-conditioning systems. To enable engineers a fast entry in the usage of our devices an aircon reference board has been developed.

Features

- 1kW compressor inverter stage using 15A RC-Drives IGBT in DPAK (TO-252)
- 200W outdoor fan inverter stage using 4A RC-Drives IGBT in DPAK (TO-252)
- 1.5kW CCM-PFC using 20A HighSpeed 3 IGBT
- 10A SiC-Diode



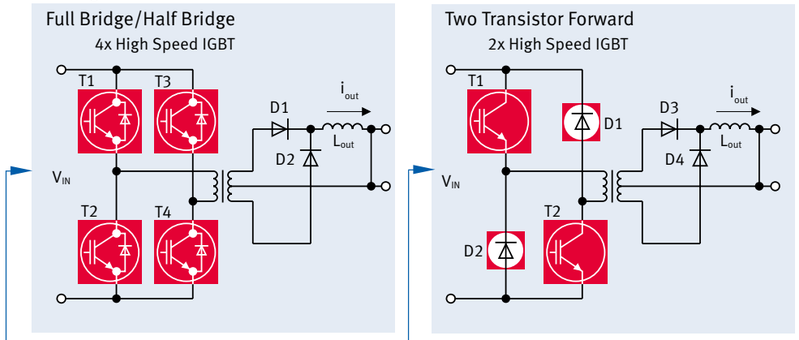
Aircon	Topology	Voltage Class	Technology	Selection
PFC AC/DC	PFC CCM (low frequency)	600V	TRENCHSTOP™	Recommendation
	PFC CCM (high frequency)	600V	HighSpeed 3	Recommendation
	PFC CCM	600V	CoolMOS™ C6	Reference
	PFC CCM	600V	SiC Diode	Recommendation
DC/AC	B6-VSI	600V	RC-Drives IGBT	Recommendation
	B6-VSI	600V	TRENCHSTOP™	Efficiency
IGBT Driver	Driver for B6 Bridge	600V	EiceDRIVER™ (6ED)	Recommendation
Aux	Boost Converter	650V	CoolSET™ F3	Reference

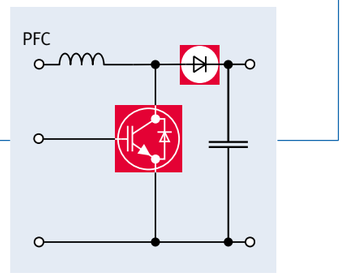
Industrial Welding (MMA < 280A)

Our IGBTs for Welding – the Power is in Your Hands

In the field of industrial welding, discretes are used for home and small inverterised welders. Infineon's high speed IGBTs are used to reduce the size of the active components and transformer (25kHz --› 70kHz). Infineon's IGBTs offer high speed/high performance to get the best out of your system.

Welding Inverter





Industrial Welding	Topology	Voltage Class	Technology	Selection
DC/AC	Full Bridge/Half Bridge	600V	HighSpeed 3	Recommendation
	Full Bridge/Half Bridge	650V	TRENCHSTOP™5	Recommendation
	Full Bridge/Half Bridge	1200V	HighSpeed 3	Recommendation
	Two Transistor Forward	600V	HighSpeed 3	Recommendation
	Two Transistor Forward	650V	Rapid2	Recommendation
	Two Transistor Forward	1200V	HighSpeed 3	Recommendation
PFC AC/DC	Boost Converter/switch	600V	HighSpeed 3	Reference
	Boost Converter/switch	650V	TRENCHSTOP™5	Recommendation
	Boost Converter/switch	1200V	HighSpeed 3	Reference
	Boost Converter/diode	650V	Rapid2	Recommendation
IGBT Driver	Half Bridge Single Channel	600V/1200V	EiceDRIVER™ (1ED)	Efficiency
	Half Bridge Dual Channel	600V/1200V	EiceDRIVER™ (2ED)	Recommendation
Aux	Boost Converter	650V	CoolSET F3	Recommendation

We are the Leader in Energy Efficiency Technologies

Infineon's products are enormously important for future energy supplies in terms of both exploiting renewables and using energy efficiently. Explore our wide offer of high-end products for your application:

CoolSiC™ 1200V SiC JFET & Direct Drive Technology – reaching so far unattainable efficiency levels

- Leading edge technology for utmost effciency
- Best solution combining performance, reliability, safety and ease of use
- Best fit for applications such as Solar, UPS and Industrial Drives

CoolMOS™ 500V CE – best price-performance ratio available on the market

- High body diode ruggedness
- Easy control of switching behavior
- Reduced gate charge (Q_g) and reverse recovery charge (Q_{rr})
- Best fit for applications such as PC Silverbox, Lighting and Consumer

RC-Drives Fast IGBTs – drive high-frequency inverter for comfortable quietness

- Smooth switching performance leading to low EMI levels
- Optimized E_{on}, E_{off} and Q_{rr} for low switching losses
- Best fit for applications in Domestic and Industrial Drives such as compressors, pumps and fans

New OptiMOS™ 40V/60V

- Industry's first 1mΩ 40V product in SuperSO8
- 35% lower $R_{DS(on)}$ than alternative devices
- Highest system efficiency and power density
- Best fit for applications such as Synchronous Rectification, Solar Micro Inverter, isolated DC/DC Converters, Motor Control for 12-48V systems and Oring Switches

For further information please visit our website:
www.infineon.com/power_management_new_products

OptiMOS™

Leading-Edge Solutions for a Better Future

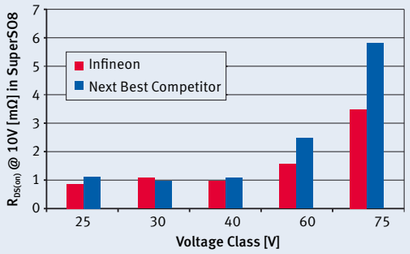
Infineon's innovative products serve the market needs throughout the whole energy supply chain. OptiMOS™ is the market leader in highly efficient solutions for power generation (e.g. solar micro inverter), power supply (e.g. server and telecom) and power consumption (e.g. electric vehicle). In all these areas, our customers face the challenge of growing power demand, higher efficiency and lower cost. At the same time, the available space is constantly shrinking, leading to higher power density requirements.

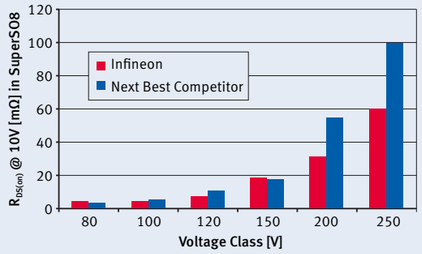
The solution can be found in the low voltage Power MOSFET family, OptiMOS™ 20V up to 250V, which consistently sets the benchmark in key specifications for power system design, including leading on-state resistance and Figure of Merit characteristics which lead to reduced power losses and improved overall efficiency.
Lower power losses enable system cost improvement by reducing the need for device paralleling and allowing smaller heatsinks. OptiMOS™ family also contributes to customers' goals of providing more compact power supply designs.

Available in innovative space saving packages like CanPAK™, SuperSO8 or S3O8, power stage, DrMOS, these products reduce the volume consumption up to more than 90%. In addition, they improve switching noise and EMI for SMPS, as well as other industrial applications.

OptiMOS™ products are suitable for a wide range of applications:

- VR-modules for server
- Synchronous rectification for AC/DC SMPS
- DC/DC converters
- Motor control 12V-110V system
- Solar micro inverter and Maximum Power Point Tracker (MPPT)
- LED lighting
- Notebook and desktop





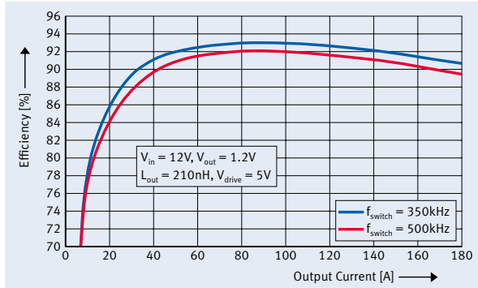
Demonstrating › 93% Efficiency in Voltage Regulation for Power Applications

With the new OptiMOS™ 25V and 30V product family, Infineon sets new standards in power density and Energy Efficiency for discrete power MOSFETs and system in package. Ultra low gate and output charge, together with lowest on-state resistance in small footprint packages, make OptiMOS™ 25V the best choice for the demanding requirements of voltage regulator solutions in servers, datacom and telecom applications. OptiMOS™ 30V products are tailored to the needs of power management in notebook by improved EMI behavior, as well as increased battery life.

With the new OptiMOS™ products, we have the best solution to:

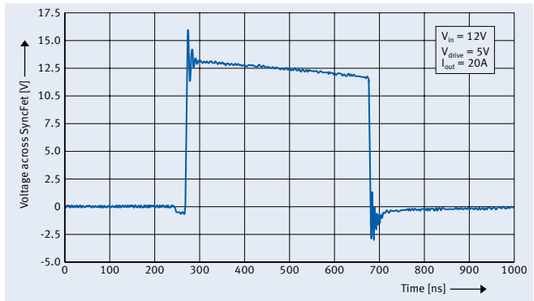
- Save overall system costs by reducing the number of phases in multiphase converters
- Reduce power losses and increase efficiency for all load conditions
- Save space with smallest packages like CanPAK™, S3O8 or system in package solution
- Minimize EMI in the system making external snubber networks obsolete and the products easy to design-in

Efficiency of OptiMOS™ 25V in a six-phase server VRD



Outstanding performance of the new OptiMOS™ 25V and 30V products is exemplified on a six-phase Server V_{core} VRD. 93% peak efficiency and ›90% full load efficiency is demonstrated with the new OptiMOS™ 25V products in SuperSO8 package.
(HighSide: BSC050NE2LS; LowSide: BSC010NE2LS)

Clean waveforms for optimized EMI behaviour make new OptiMOS™ 25V/30V products easy to use



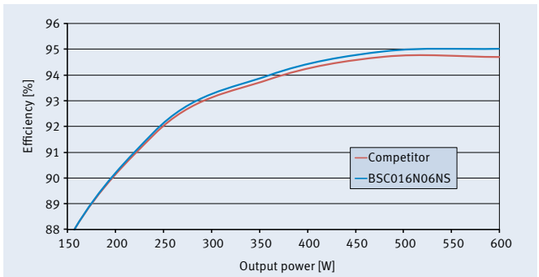
With the new OptiMOS™ 25V/30V products short switching times (rise and fall times ‹5ns) go in hand with excellent EMI behaviour. An integrated damping network guarantees low over- and undershoot and minimizes ringing without sacrifycing efficiency.

Always a Step Ahead with Infineon

With OptiMOS™ 40V-250V products, we set the benchmark in the industry. The leading on-state resistance $R_{DS(on)}$ and switching behaviour reduce power losses and enable overall efficiency of 96%. With these products Infineon supports the market trend towards Energy Efficiency targets such as Energy Star Titanium Level.

OptiMOS™ technology enables for the first time very low $R_{DS(on)}$ values needed for high current applications in space saving packages such as SuperSO8, S3O8 and CanPAK™, which were previously only possible in bulky packages.

Efficiency



Using Infineon products in synchronous rectification of a 600W server power supply with 12V output brings your peak efficiency 0.3% higher.

SuperSO8/S3O8 – the Intelligent Way to Highest Efficiency and Power Density

In applications like synchronous rectification in server and desktop, motor drives and DC/DC converters in telecom, high power density and high efficiency are the major driving factors.The trend set by Infeneon to move from TO-220 to SuperSO8 in Server reduces the volume consumption drastically. With three times lower parasitics compared to TO-220, SuperSO8 offers highest efficiency and lowest design efforts due to reduced spikes.

CanPAK™ – Best Thermal Behaviour in a Tiny Footprint

CanPAK™ portfolio is the best fit for a broad number of industrial applications such as voltage regulator for servers, DC/DC converters in telecom, solar micro inverters and Maximum Power Point Trackers (MPPT), low voltage drives and synchronous rectification in server and desktop. With only 31mm² footprint, CanPAK™ M allows 79% space reduction in power components on the board compared to traditional D²PAK. In addition, the metal 'Can' enables double-sided cooling along with almost no package parasitic inductances, leading to higher systems efficiency.

Power stage 3x3 and power stage 5x6 – Save Space, Minimize Losses, Boost Efficiency

Dual FET power stages in a single leadless SMD package integrate the low side and high side MOSFET of a synchronous DC/DC converter into a 3x3mm² or 5x6mm² package outline. Designers are able to shrink their designs up to 85% by replacing two seperate discrete packages such as SO-8 or SuperSO8 with this new package.
Both, the small outline and the interconnection of the two MOSFETs within the package minimize the loop inductance which boosts efficiency. With the new OptiMOS™ technology power stage 3x3 and power stage 5x6 achieve a peak efficiency of 93,5%. power stage 3x3 can handle an application current up to 12,5A and power stage 5x6 up to 30A.

OptiMOS™ 20V Super Logic Level

$R_{DS(on)}$ @V_{GS}=4.5V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-263 7 Pin	TO-220	TO-220 FullPAK	SuperSO8	SO-8
‹2								BSC019N02KS G $R_{DS(on)}$= 1.9mΩ	
2-4								BSC026N02KS G $R_{DS(on)}$=2.6mΩ	
4-10								BSC046N02KS G $R_{DS(on)}$=4.6mΩ	
30-40									BSO330N02K G $R_{DS(on)}$=33.0mΩ

OptiMOS™ 25V Logic Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-263 7 Pin	TO-220	TO-220 FullPAK	SuperSO8	S308
‹1.0			BSB008NE2LX $R_{DS(on)}$= 0.8mΩ					BSC009NE2LS $R_{DS(on)}$=0.9mΩ	
1-2			BSB012NE2LX $R_{DS(on)}$=1.2mΩ					BSC010NE2LS $R_{DS(on)}$=1.0mΩ	
			BSB013NE2LXI $R_{DS(on)}$=1.3mΩ					BSC010NE2LSI $R_{DS(on)}$=1.05mΩ	
								BSC014NE2LSI $R_{DS(on)}$=1.4mΩ	
								BSC018NE2LS $R_{DS(on)}$=1.8mΩ	BSZ18NE2LS $R_{DS(on)}$=1.8mΩ
								BSC018NE2LSI $R_{DS(on)}$=1.8mΩ	BSZ018NE2LSI $R_{DS(on)}$=1.8mΩ
2-4								BSC024NE2LS $R_{DS(on)}$=2.4mΩ	
								BSC032NE2LS $R_{DS(on)}$=3.2mΩ	
				BSF030NE2LQ $R_{DS(on)}$=3.0mΩ					BSZ036NE2LS $R_{DS(on)}$=3.6mΩ
4-6									
								BSC050NE2LS $R_{DS(on)}$=5.0mΩ	
									BSZ060NE2LS $R_{DS(on)}$=6.0mΩ

OptiMOS™ 25/30V in power stage 3x3 and 5x6

Part Number	Monolithic integrated Schottky like diode	BV_{DSS} (V)	$R_{DS(on)}$ [mΩ] @ V_{GS}=4.5V max		Q_g [nC] @ V_{GS}=4.5V typ.	
			High Side	Low Side	High Side	Low Side
BSC0910NDI	✓	25	5.9	1.6	7.7	25.0
BSC0911ND	–	25	4.8	1.7	7.7	25.0
BSC0921NDI	✓	30	7.0	2.1	5.8	21.0
BSC0923NDI	✓	30	7.0	3.7	5.2	12.2
BSC0924NDI	✓	30	7.0	5.2	5.2	8.6
BSC0925ND	–	30	6.4	6.4	5.2	6.7
BSZ0907ND	–	30	13.0	10.0	4.3	5.3
BSZ0908ND	–	30	25.0	13.0	2.0	4.3

OptiMOS™ 30V Logic Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-263 D²PAK	TO-263 7 Pin	TO-220	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
1-2			BSB012N03LX3 G $R_{DS(on)}$=1.2mΩ			IPB009N03L G $R_{DS(on)}$=0.95mΩ		BSC011N03LS $R_{DS(on)}$=1.1mΩ		IPC218N03L3
								BSC011N03LSI $R_{DS(on)}$=1.1mΩ		
								BSC014N03LS G $R_{DS(on)}$=1.4mΩ		
			BSB017N03LX3 G $R_{DS(on)}$=1.7mΩ					BSC016N03LS G $R_{DS(on)}$=1.6mΩ	BSZ019N03LS $R_{DS(on)}$=1.9mΩ	IPC055N03L3
								BSC0901NS $R_{DS(on)}$=1.9mΩ		
								BSC0901NSI $R_{DS(on)}$=2.0mΩ	BSZ0901NS $R_{DS(on)}$=2.0mΩ	
2-4				BSF024N03LT3 G $R_{DS(on)}$=2.4mΩ				BSC020N03LS G $R_{DS(on)}$=2.0mΩ	BSZ0901NSI $R_{DS(on)}$=2.1mΩ	IPC042N03L3
								BSC0902NS $R_{DS(on)}$=2.6mΩ	BSZ0902NS $R_{DS(on)}$=2.6mΩ	
								BSC025N03LS G $R_{DS(on)}$=2.5mΩ	BSZ0902NSI $R_{DS(on)}$=2.8mΩ	
								BSC0902NSI $R_{DS(on)}$=2.8mΩ		
	IPS031N03L G $R_{DS(on)}$=3.1mΩ	IPD031N03L G $R_{DS(on)}$=3.1mΩ			IPB034N03L G $R_{DS(on)}$=3.4mΩ		IPP034N03L G $R_{DS(on)}$=3.4mΩ	BSC030N03LS G $R_{DS(on)}$=3.0mΩ	BSZ035N03LS G $R_{DS(on)}$=3.5mΩ	
								BSC034N03LS G $R_{DS(on)}$=3.4mΩ	BSZ0904NSI $R_{DS(on)}$=4.0mΩ	
								BSC0904NSI $R_{DS(on)}$=3.7mΩ		
4-6	IPS040N03L G $R_{DS(on)}$=4.0mΩ	IPD040N03L G $R_{DS(on)}$=4.0mΩ		BSF050N03LQ3 G $R_{DS(on)}$=5.0mΩ	IPB042N03L G $R_{DS(on)}$=4.2mΩ		IPP042N03L G $R_{DS(on)}$=4.2mΩ	BSC042N03LS G $R_{DS(on)}$=4.2mΩ	BSZ050N03LS G $R_{DS(on)}$=5.0mΩ	IPC028N03L3 IPC022N03L3
	IPS050N03L G $R_{DS(on)}$=5.0mΩ	IPD050N03L G $R_{DS(on)}$=5.0mΩ			IPB055N03L G $R_{DS(on)}$=5.5mΩ		IPP055N03L G $R_{DS(on)}$=5.5mΩ	BSC0906NS $R_{DS(on)}$=4.5mΩ	BSZ058N03LS G $R_{DS(on)}$=5.8mΩ	
								BSC050N03LS G $R_{DS(on)}$=5.0mΩ		
								BSC052N03LS $R_{DS(on)}$=5.2mΩ		
								BSC057N03LS G $R_{DS(on)}$=5.7mΩ		
6-8	IPS060N03L G $R_{DS(on)}$=6.0mΩ	IPD060N03L G $R_{DS(on)}$=6.0mΩ			IPB065N03L G $R_{DS(on)}$=6.5mΩ		IPP065N03L G $R_{DS(on)}$=6.5mΩ		BSZ065N03LS $R_{DS(on)}$=6.5mΩ	
	IPS075N03L G $R_{DS(on)}$=7.5mΩ	IPD075N03L G $R_{DS(on)}$=7.5mΩ			IPB080N03L G $R_{DS(on)}$=8.0mΩ			BSC0908NS $R_{DS(on)}$=8.0mΩ		

OptiMOS™ 30V Logic Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-263 D²PAK	TO-263 7 Pin	TO-220	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
8-10	IPS090N03L G $R_{DS(on)}$=9.0mΩ	IPD090N03L G $R_{DS(on)}$=9.0mΩ			IPB096N03L G $R_{DS(on)}$=9.6mΩ			BSC080N03LS G $R_{DS(on)}$=8.0mΩ	BSZ088N03LS G $R_{DS(on)}$=8.8mΩ	
								BSC090N03LS G $R_{DS(on)}$=9.0mΩ		
								BSC0909NS $R_{DS(on)}$=9.2mΩ		
10-15	IPS105N03L G $R_{DS(on)}$=10.5mΩ	IPD105N03L G $R_{DS(on)}$=10.5mΩ							BSZ100N03LS G $R_{DS(on)}$=10.0mΩ	IPC014N03L3
								BSC120N03LS G $R_{DS(on)}$=12.0mΩ	BSZ0909NS $R_{DS(on)}$=12.0mΩ	
	IPS135N03L G $R_{DS(on)}$=13.5mΩ	IPD135N03L G $R_{DS(on)}$=13.5mΩ			IPB147N03L G $R_{DS(on)}$=14.7mΩ		IPP147N03L G $R_{DS(on)}$=14.7mΩ		BSZ130N03LS G $R_{DS(on)}$=13.0mΩ	
7 + 9										
9 + 19										
2 x 7.2								BSC072N03LD G $R_{DS(on)}$=7.2mΩ		
2 x 15								BSC150N03LD G $R_{DS(on)}$=15.0mΩ		

OptiMOS™ 30V Logic Level 5V optimized

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	SuperSO8	S308	S08
‹2							BSC014N03MS G $R_{DS(on)}$=1.4mΩ		
							BSC016N03MS G $R_{DS(on)}$=1.6mΩ		
2-6							BSC020N03MS G $R_{DS(on)}$=2.0mΩ	BSZ035N03MS G $R_{DS(on)}$=3.5mΩ	BSO033N03MS G $R_{DS(on)}$=3.3mΩ
							BSC025N03MS G $R_{DS(on)}$=2.5mΩ		BSO040N03MS G $R_{DS(on)}$=4.0mΩ
							BSC030N03MS G $R_{DS(on)}$=3.0mΩ		
							BSC042N03MS G $R_{DS(on)}$=4.2mΩ	BSZ050N03MS G $R_{DS(on)}$=5.0mΩ	
							BSC050N03MS G $R_{DS(on)}$=5.0mΩ	BSZ058N03MS G $R_{DS(on)}$=5.8mΩ	
							BSC057N03MS G $R_{DS(on)}$=5.7mΩ		
6-10									
							BSC080N03MS G $R_{DS(on)}$=8.0mΩ	BSZ088N03MS G $R_{DS(on)}$=8.8mΩ	
							BSC090N03MS G $R_{DS(on)}$=9.0mΩ		
10-20							BSC100N03MS G $R_{DS(on)}$=10.0mΩ	BSZ100N03MS G $R_{DS(on)}$=10.0mΩ	BSO110N03MS G $R_{DS(on)}$=11.0mΩ
							BSC120N03MS G $R_{DS(on)}$=12.0mΩ	BSZ130N03MS G $R_{DS(on)}$=13.0mΩ	
›20									
2 x 15									BSO150N03MD G $R_{DS(on)}$=15.0mΩ
2 x 22									BSO220N03MD G $R_{DS(on)}$=22.0mΩ

[1] in development

OptiMOS™ 40V Logic Level/Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	CanPAK™ M	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
‹2							BSC010N04LS $R_{DS(on)}$=1.0mΩ		
							BSC010N04LSI $R_{DS(on)}$=1.05mΩ		
							BSC014N04LS $R_{DS(on)}$=1.4mΩ		
							BSC014N04LSI $R_{DS(on)}$=1.45mΩ		
		BSB014N04LX3 G $R_{DS(on)}$=1.4mΩ	IPB015N04N G $R_{DS(on)}$=1.5mΩ	IPB011N04L G $R_{DS(on)}$=1.1mΩ	IPP015N04N G $R_{DS(on)}$=1.5mΩ		BSC016N04LS G $R_{DS(on)}$=1.6mΩ		IPC218N04N3 IPC171N04N
		BSB015N04NX3 G $R_{DS(on)}$=1.5mΩ	IPB015N04L G $R_{DS(on)}$=1.5mΩ	IPB011N04N G $R_{DS(on)}$=1.1mΩ			BSC017N04NS G $R_{DS(on)}$=1.7mΩ		
							BSC018N04LS G $R_{DS(on)}$=1.8mΩ		
							BSC019N04NS G $R_{DS(on)}$=1.9mΩ		
							BSC019N04LS[1] $R_{DS(on)}$=1.4mΩ		
2-3				IPB020N04N G $R_{DS(on)}$=2.0mΩ	IPP023N04N G $R_{DS(on)}$=2.3mΩ		BSC022N04LS[1] $R_{DS(on)}$=2.2mΩ	BSZ023N04LS $R_{DS(on)}$=2.3mΩ	
			IPB023N04N G $R_{DS(on)}$=2.3mΩ				BSC026N04LS[1] $R_{DS(on)}$=2.6mΩ	BSZ028N04LS[1] $R_{DS(on)}$=2.8mΩ	
							BSC027N04LS G $R_{DS(on)}$=2.7mΩ		
							BSC030N04NS G $R_{DS(on)}$=3.0mΩ		
3-4	IPD036N04L G $R_{DS(on)}$=3.6mΩ				IPP039N04L G $R_{DS(on)}$=3.9mΩ		BSC032N04LS[1] $R_{DS(on)}$=3.2mΩ	BSZ040N04LS G $R_{DS(on)}$=4.0mΩ	
							BSC035N04LS G $R_{DS(on)}$=3.5mΩ	BSZ034N04LS[1] $R_{DS(on)}$=3.4mΩ	
4-7					IPP041N04N G $R_{DS(on)}$=4.1mΩ		BSC050N04LS G $R_{DS(on)}$=5.0mΩ	BSZ042N04NS G $R_{DS(on)}$=4.2mΩ	
					IPP048N04N G $R_{DS(on)}$=4.8mΩ		BSC054N04NS G $R_{DS(on)}$=5.4mΩ		
					IPP065N04N G $R_{DS(on)}$=6.5mΩ		BSC059N04LS G $R_{DS(on)}$=5.9mΩ		
7-8									
8-10							BSC093N04LS G $R_{DS(on)}$=9.3mΩ	BSZ097N04LS G $R_{DS(on)}$=9.7mΩ	
10-11								BSZ105N04NS G $R_{DS(on)}$=10.5mΩ	
13-17								BSZ165N04NS G $R_{DS(on)}$=16.5mΩ	

OptiMOS™ 60V Logic Level/Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	CanPAK™ M	CanPAK™ S	TO-262 I^2PAK	TO-263 D^2PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
‹3	IPD025N06N $R_{DS(on)}$=2.5mΩ	BSB028N06NN3 G $R_{DS(on)}$=2.8mΩ		IPI020N06N [2] $R_{DS(on)}$=2.0mΩ	IPB019N06L3 G $R_{DS(on)}$=1.9mΩ	IPB010N06N [2] $R_{DS(on)}$=1.0mΩ	IPP020N06N [2] $R_{DS(on)}$=2.0mΩ		BSC014N06NS [2] $R_{DS(on)}$=1.4mΩ		
				IPI024N06N3 G $R_{DS(on)}$=2.4mΩ		IPB014N06N [2] $R_{DS(on)}$=1.4mΩ	IPP024N06N3 G $R_{DS(on)}$=2.4mΩ		BSC016N06NS [2] $R_{DS(on)}$=1.6mΩ		IPC218N06L3
				IPI029N06N [2] $R_{DS(on)}$=2.9mΩ	IPB026N06N [2] $R_{DS(on)}$=2.6mΩ	IPB016N06L3 G $R_{DS(on)}$=1.6mΩ	IPP029N06N [2] $R_{DS(on)}$=2.9mΩ		BSC028N06NS [2] $R_{DS(on)}$=2.8mΩ		IPC218N06N3
					IPB029N06N3 G $R_{DS(on)}$=2.9mΩ	IPB017N06N3 G $R_{DS(on)}$=1.7mΩ			BSC028N06LS3 G $R_{DS(on)}$=2.8mΩ		
3-5	IPD031N06L3 G $R_{DS(on)}$=3.1mΩ			IPI032N06N3 G $R_{DS(on)}$=3.2mΩ	IPB034N06L3 G $R_{DS(on)}$=3.4mΩ		IPP032N06N3 G $R_{DS(on)}$=3.2mΩ	IPA032N06N3 G $R_{DS(on)}$=3.2mΩ	BSC031N06NS3 G $R_{DS(on)}$=3.1mΩ	BSZ042N06NS [2] $R_{DS(on)}$=4.2mΩ	
	IPD034N06N3 G $R_{DS(on)}$=3.4mΩ			IPI037N06L3 G $R_{DS(on)}$=3.7mΩ	IPB037N06N3 G $R_{DS(on)}$=3.7mΩ		IPP037N06L3 G $R_{DS(on)}$=3.7mΩ		BSC034N06NS [1] [2] $R_{DS(on)}$=3.4mΩ		
	IPD035N06L3 G $R_{DS(on)}$=3.5mΩ			IPI040N06N3 G $R_{DS(on)}$=4.0mΩ			IPP040N06N [2] $R_{DS(on)}$=4.0mΩ		BSC039N06NS [2] $R_{DS(on)}$=3.9mΩ		
	IPD038N06N3 G $R_{DS(on)}$=3.8mΩ						IPP040N06N3 G $R_{DS(on)}$=4.0mΩ				
	IPD048N06L3 G $R_{DS(on)}$=4.8mΩ										
5-7	IPD053N06N $R_{DS(on)}$=5.3mΩ				IPB054N06N3 G $R_{DS(on)}$=5.4mΩ		IPP052N06L3 G $R_{DS(on)}$=5.2mΩ	IPA057N06N3 G $R_{DS(on)}$=5.7mΩ	BSC066N06NS [1] [2] $R_{DS(on)}$=6.6mΩ		
					IPB057N06N [2] $R_{DS(on)}$=5.7mΩ		IPP057N06N3 G $R_{DS(on)}$=5.7mΩ		BSC067N06LS3 G $R_{DS(on)}$=6.7mΩ	BSZ067N06LS3 G $R_{DS(on)}$=6.7mΩ	
							IPP060N06N [2] $R_{DS(on)}$=6.0mΩ			BSZ068N06NS [1] [2] $R_{DS(on)}$=6.8mΩ	
7-10	IPD079N06L3 G $R_{DS(on)}$=7.9mΩ		BSF077N06NT3 G $R_{DS(on)}$=7.7mΩ	IPI084N06L3 G $R_{DS(on)}$=8.4mΩ	IPB081N06L3 G $R_{DS(on)}$=8.1mΩ		IPP084N06L3 G $R_{DS(on)}$=8.4mΩ	IPA093N06N3 G $R_{DS(on)}$=9.3mΩ	BSC076N06NS3 G $R_{DS(on)}$=7.6mΩ	BSZ076N06NS3 G $R_{DS(on)}$=7.6mΩ	
	IPD088N06N3 G $R_{DS(on)}$=8.8mΩ				IPB090N06N3 G $R_{DS(on)}$=9.0mΩ		IPP093N06N3 G $R_{DS(on)}$=9.3mΩ		BSC097N06NS [1] [2] $R_{DS(on)}$=9.7mΩ	BSZ100N06LS3 G $R_{DS(on)}$=10.0mΩ	
									BSC100N06LS3 G $R_{DS(on)}$=10.0mΩ	BSZ100N06NS [1] [2] $R_{DS(on)}$=10.0mΩ	
11-30	IPD220N06L3 G $R_{DS(on)}$=22.0mΩ		BSF110N06NT3 G $R_{DS(on)}$=11.0mΩ				IPP230N06L3 G $R_{DS(on)}$=23.0mΩ		BSC110N06NS3 G $R_{DS(on)}$=11.0mΩ	BSZ110N06NS3 G $R_{DS(on)}$=11.0mΩ	
30-50	IPD350N06L G $R_{DS(on)}$=35.0mΩ										
	IPD400N06N G $R_{DS(on)}$=40.0mΩ										
	IPD640N06L G $R_{DS(ON}$ = 64.0mΩ										
50-80	IPD800N06N G $R_{DS(on)}$ = 80.0mΩ										

OptiMOS™ 75V Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	CanPAK™ S-Can	TO-262 I^2PAK	TO-263 D^2PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
2-4			IPI023NE7N3 G $R_{DS(on)}$=2.3mΩ	IPB020NE7N3 G $R_{DS(on)}$=2.0mΩ		IPP023NE7N3 G $R_{DS(on)}$=2.3mΩ		BSC036NE7NS3 G $R_{DS(on)}$=3.6mΩ		IPC302NE7N3
			IPI034NE7N3 G $R_{DS(on)}$=3.4mΩ	IPB031NE7N3 G $R_{DS(on)}$=3.1mΩ		IPP034NE7N3 G $R_{DS(on)}$=3.4mΩ				
4-6			IPI052NE7N3 G $R_{DS(on)}$=5.2mΩ	IPB049NE7N3 G $R_{DS(on)}$=4.9mΩ		IPP052NE7N3 G $R_{DS(on)}$=5.2mΩ		BSC042NE7NS3 G $R_{DS(on)}$=4.2mΩ		
6-12						IPP062NE7N3 G $R_{DS(on)}$=6.2mΩ				
12-45		BSF450NE7NH3 $R_{DS(on)}$=45.0mΩ								

OptiMOS™ 80V Normal Level [2]

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	TO-262 I^2PAK	TO-263 D^2PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
1-3						IPB019N08N3 G $R_{DS(on)}$=1.9mΩ					IPC302N08N3
					IPB025N08N3 G $R_{DS(on)}$=2.5mΩ		IPP028N08N3 G $R_{DS(on)}$=2.8mΩ	IPA028N08N3 G $R_{DS(on)}$=2.8mΩ			
3-4				IPI037N08N3 G $R_{DS(on)}$=3.7mΩ	IPB035N08N3 G $R_{DS(on)}$=3.5mΩ	IPB030N08N3 G $R_{DS(on)}$=3.0mΩ	IPP037N08N3 G $R_{DS(on)}$=3.7mΩ	IPA037N08N3 G $R_{DS(on)}$=3.7mΩ			
4-6		IPD053N08N3 G $R_{DS(on)}$=5.3mΩ	BSB044N08NN3 G $R_{DS(on)}$=4.4mΩ		IPB054N08N3 G $R_{DS(on)}$=5.4mΩ		IPP057N08N3 G $R_{DS(on)}$=5.7mΩ	IPA057N08N3 G $R_{DS(on)}$=5.7mΩ	BSC047N08NS3 G $R_{DS(on)}$=4.7mΩ		
									BSC057N08NS3 G $R_{DS(on)}$=5.7mΩ		
6-7					IPB067N08N3 G $R_{DS(on)}$=6.7mΩ		IPP070N08N3 G $R_{DS(on)}$=7.0mΩ				
7-11		IPD096N08N3 G $R_{DS(on)}$=9.6mΩ			IPB097N08N3 G $R_{DS(on)}$=9.7mΩ		IPP100N08N3 G $R_{DS(on)}$=9.7mΩ	IPA100N08N3 G $R_{DS(on)}$=10.0mΩ			
11-20	IPU135N08N3 G $R_{DS(on)}$=13.5mΩ	IPD135N08N3 G $R_{DS(on)}$=13.5mΩ			IPB136N08N3 G $R_{DS(on)}$=13.6mΩ		IPP139N08N3 G $R_{DS(on)}$=13.9mΩ		BSC123N08NS3 G $R_{DS(on)}$=12.3mΩ	BSZ123N08NS3 G $R_{DS(on)}$=12.3mΩ	
30-40									BSC340N08NS3 G $R_{DS(on)}$=34.0mΩ	BSZ340N08NS3 G $R_{DS(on)}$=34.0mΩ	

Low Voltage

[1] in development
[2] 6V rated ($R_{DS(on)}$ also specified @ VGS=6V)

OptiMOS™ 100V Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
<3					IPI030N10N3 G $R_{DS(on)}$=3.0mΩ	IPB027N10N3 G $R_{DS(on)}$=2.7mΩ	IPB025N10N3 G $R_{DS(on)}$=2.5mΩ	IPP030N10N3 G $R_{DS(on)}$=3.0mΩ	IPA030N10N3 G $R_{DS(on)}$=3.0mΩ			IPC302N10N3 IPC26N10NR
3-4							IPB039N10N3 G $R_{DS(on)}$=3.9mΩ					
4-6			BSB056N10NN3 G $R_{DS(on)}$=5.6mΩ		IPI045N10N3 G $R_{DS(on)}$=4.5mΩ	IPB042N10N3 G $R_{DS(on)}$=4.2mΩ		IPP045N10N3 G $R_{DS(on)}$=4.5mΩ	IPA045N10N3 G $R_{DS(on)}$=4.5mΩ	BSC046N10NS3 G $R_{DS(on)}$=4.6mΩ		
6-8		IPD068N10N3 G $R_{DS(on)}$=6.8mΩ			IPI072N10N3 G $R_{DS(on)}$=7.2mΩ					BSC060N10NS3 G $R_{DS(on)}$=6.0mΩ		
								IPP072N10N3 G $R_{DS(on)}$=7.2mΩ		BSC070N10NS3 G $R_{DS(on)}$=7.0mΩ		
8-12	IPS118N10N G $R_{DS(on)}$=11.8mΩ	IPD082N10N3 G $R_{DS(on)}$=8.2mΩ			IPI086N10N3 G $R_{DS(on)}$=8.6mΩ	IPB083N10N3 G $R_{DS(on)}$=8.3mΩ			IPA086N10N3 G $R_{DS(on)}$=8.6mΩ			
								IPP086N10N3 G $R_{DS(on)}$=8.6mΩ		BSC109N10NS3 G $R_{DS(on)}$=10.9mΩ		
										BSC118N10NS G $R_{DS(on)}$=11.8mΩ		
12-18		IPD122N10N3 G $R_{DS(on)}$=12.2mΩ		BSF134N10NJ3 G $R_{DS(on)}$=13.4mΩ	IPI126N10N3 G $R_{DS(on)}$=12.6mΩ	IPB123N10N3 G $R_{DS(on)}$=12.3mΩ		IPP126N10N3 G $R_{DS(on)}$=12.6mΩ	IPA126N10N3 G $R_{DS(on)}$=12.6mΩ		BSZ160N10NS3 G $R_{DS(on)}$=16.0mΩ	
										BSC160N10NS3 G $R_{DS(on)}$=16.0mΩ		
18-20		IPD180N10N3 G $R_{DS(on)}$=18.0mΩ			IPI180N10N3 G $R_{DS(on)}$=18.0mΩ			IPP180N10N3 G $R_{DS(on)}$=18.0mΩ	IPA180N10N3 G $R_{DS(on)}$=18.0mΩ	BSC196N10NS G $R_{DS(on)}$=19.6mΩ		
20-40		IPD25CN10N G [1] $R_{DS(on)}$=25.0mΩ										
		IPD33CN10N G [1] $R_{DS(on)}$=33.0mΩ										
40-80										BSC440N10NS3 G $R_{DS(on)}$=44.0mΩ	BSZ440N10NS3 G $R_{DS(on)}$=44.0mΩ	
		IPD78CN10N G [1] $R_{DS(on)}$=78.0mΩ										
2 x 75										BSC750N10ND G $R_{DS(on)}$=75.0mΩ		

[1] not 6V rated

OptiMOS™ 100V Logic Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	CanPAK™ M-Can	CanPAK™ S-Can	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
4-6												
6-8												
8-12										BSC082N10LS G $R_{DS(on)}$=8.2mΩ		
										BSC105N10LSF G $R_{DS(on)}$=10.5mΩ		
								IPP12CN10L G $R_{DS(on)}$=12.0mΩ				
12-18										BSC123N10LS G $R_{DS(on)}$=12.3mΩ	BSZ150N10LS3 $R_{DS(on)}$=15.0mΩ	
										BSC159N10LSF G $R_{DS(on)}$=15.9mΩ		
20-40										BSC205N10LS $R_{DS(on)}$=20.5mΩ		
										BSC265N10LSF G $R_{DS(on)}$=26.5mΩ		

Low Voltage

OptiMOS™ 120V Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-251 / TO-251 SL	TO-252 DPAK	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
‹4				IPB038N12N3 G $R_{DS(on)}$=3.8mΩ	IPB036N12N3 G $R_{DS(on)}$=3.6mΩ				IPC302N12N3 IPC26N12N
4-5			IPI041N12N3 G $R_{DS(on)}$=4.1mΩ			IPP041N12N3 G $R_{DS(on)}$=4.1mΩ			IPC300N20N3
						IPP048N12N3 G $R_{DS(on)}$=4.8mΩ			
7-8			IPI076N12N3 G $R_{DS(on)}$=7.6mΩ			IPP076N12N3 G $R_{DS(on)}$=7.6mΩ	BSC077N12NS3 G $R_{DS(on)}$=7.7mΩ		
10-13	IPS110N12N3 G $R_{DS(on)}$=11.0mΩ	IPD110N12N3 G $R_{DS(on)}$=11.0mΩ				IPP114N12N3 G $R_{DS(on)}$=11.4mΩ			
13-20			IPI147N12N3 G $R_{DS(on)}$=14.7mΩ	IPB144N12N3 G $R_{DS(on)}$=14.4mΩ		IPP147N12N3 G $R_{DS(on)}$=14.7mΩ	BSC190N12NS3 G $R_{DS(on)}$=19.0mΩ		
20-25							BSC240N12NS3 G $R_{DS(on)}$=24.0mΩ	BSZ240N12NS3 G $R_{DS(on)}$=24.0mΩ	

OptiMOS™ 150V Normal Level [3]

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	CanPAK™ M-Can	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
4-7					IPB065N15N3 G $R_{DS(on)}$=6.5mΩ					IPC302N15N3
7-12			IPI075N15N3 G $R_{DS(on)}$=7.5mΩ	IPB072N15N3 G $R_{DS(on)}$=7.2mΩ		IPP075N15N3 G $R_{DS(on)}$=7.5mΩ	IPA075N15N3 G $R_{DS(on)}$=6.5mΩ			
			IPI111N15N3 G $R_{DS(on)}$=11.1mΩ	IPB108N15N3 G $R_{DS(on)}$=10.8mΩ		IPP111N15N3 G $R_{DS(on)}$=11.1mΩ	IPA105N15N3 G $R_{DS(on)}$=10.5mΩ			
16-30	IPD200N15N3 G $R_{DS(on)}$=20.0mΩ	BSB165N15NZ3 G $R_{DS(on)}$=16.5mΩ	IPI200N15N3 G $R_{DS(on)}$=20.0mΩ	IPB200N15N3 G $R_{DS(on)}$=20.0mΩ		IPP200N15N3 G $R_{DS(on)}$=20.0mΩ		BSC190N15NS3 G $R_{DS(on)}$=19.0mΩ		
		BSB280N15NZ3 G $R_{DS(on)}$=28.0mΩ								
30-60								BSC360N15NS3 G $R_{DS(on)}$=36.0mΩ		
	IPD530N15N3 G $R_{DS(on)}$=53.0mΩ		IPI530N15N3 G $R_{DS(on)}$=53.0mΩ	IPB530N15N3 G $R_{DS(on)}$=53.0mΩ		IPP530N15N3 G $R_{DS(on)}$=53.0mΩ		BSC520N15NS3 G $R_{DS(on)}$=52.0mΩ	BSZ520N15NS3 G $R_{DS(on)}$=52.0mΩ	
80-90									BSZ900N15NS3 G $R_{DS(on)}$=90.0mΩ	

[1] in development
[2] part qualified for Automotive
[3] 8V rated ($R_{DS(on)}$ also specified @ VGS=8V)

OptiMOS™ 200V Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
10-20									IPC300N20N3
		IPI110N20N3 G $R_{DS(on)}$=11.0mΩ	IPB107N20N3 G $R_{DS(on)}$=10.7mΩ		IPP110N20N3 G $R_{DS(on)}$=11.0mΩ				IPC302N20N3
			IPB107N20NA [2] $R_{DS(on)}$=10.7mΩ		IPP110N20NA [2] $R_{DS(on)}$=11.0mΩ				
30-40	IPD320N20N3 G $R_{DS(on)}$=32.0mΩ	IPI320N20N3 G $R_{DS(on)}$=32.0mΩ	IPB320N20N3 G $R_{DS(on)}$=32.0mΩ		IPP320N20N3 G $R_{DS(on)}$=32.0mΩ		BSC320N20NS3 G $R_{DS(on)}$=32.0mΩ		
40-50							BSC500N20NS3G [1] $R_{DS(on)}$=50.0mΩ		
80-100							BSC900N20NS3 G $R_{DS(on)}$=90.0mΩ	BSZ900N20NS3 G $R_{DS(on)}$=90.0mΩ	
100-200							BSC12DN20NS3 G $R_{DS(on)}$=125.0mΩ	BSZ12DN20NS3 G $R_{DS(on)}$=125.0mΩ	
200-300							BSC22DN20NS3 G $R_{DS(on)}$=225.0mΩ	BSZ22DN20NS3 G $R_{DS(on)}$=225.0mΩ	

OptiMOS™ 250V Normal Level

$R_{DS(on)}$ @V_{GS}=10V [mΩ]	TO-252 DPAK	TO-262 I²PAK	TO-263 D²PAK	TO-263 7 Pin	TO-220	TO-220 FullPAK	Super SO8	S308	Bare Die ($R_{DS(on)}$ typ.)
10-20									IPC302N25N3A [2]
20-30		IPI200N25N3 G $R_{DS(on)}$=20.0mΩ	IPB200N25N3 G $R_{DS(on)}$=20.0mΩ		IPP200N25N3 G $R_{DS(on)}$=20.0mΩ				
60-70	IPD600N25N3 G $R_{DS(on)}$=60.0mΩ	IPI600N25N3 G $R_{DS(on)}$=60.0mΩ	IPB600N25N3 G $R_{DS(on)}$=60.0mΩ		IPP600N25N3 G $R_{DS(on)}$=60.0mΩ		BSC600N25NS3 G $R_{DS(on)}$=60.0mΩ		
100-200							BSC16DN25NS3 G $R_{DS(on)}$=165.0mΩ	BSZ16DN25NS3 G $R_{DS(on)}$=165.0mΩ	
400-500								BSZ42DN25NS3 G $R_{DS(on)}$=425.0mΩ	

Small Signal

	Voltage	SOT-223	TSOP6	SOT-89	SC-59	SOT-23	SOT-323	SOT-363
P-Channel MOSFETs	- 250	BSP317P 4.0Ω, -0.43A, LL						
		BSP92P 12.0Ω, -0.26A, LL		BSS192P 12.0Ω, -0.19A, LL	BSR92P 11.0Ω, -0.14A, LL			
	- 100	BSP321P 900.0mΩ, -0.98A, NL						
		BSP322P 800.0mΩ, -1.0A, LL						
		BSP316P 1.8Ω, -0.68A, LL			BSR316P 1.8Ω, -0.36A, LL			
	- 60	BSP613P 130.0mΩ, 2.9A, NL				BSS83P 2.0Ω, -0.33A, LL		
		BSP170P 300.0mΩ, -1.9A, NL				BSS84P 8.0Ω, -0.17A, LL	BSS84PW 8.0Ω, -0.15, LL	
		BSP171P 300.0mΩ, -1.9A, LL						
		BSP315P 800.0mΩ, -1.17A, LL			BSR315P 800.0mΩ, -0.62A, LL			
	- 30		BSL303SPE[1] ~30.0mΩ, ~-6.6A, LL		BSR303PE[1] ~30.0mΩ, ~-3.3A, LL			
		BSP304PE[1] ~40.0mΩ, ~-5.5A, LL	BSL305SPE[1] ~50.0mΩ, ~-5.3A, LL		BSR305PE[1] ~50.0mΩ, ~-2.7A, LL			
		BSP306PE[1] ~60.0mΩ, ~-4.5A, LL	BSL307SP 43.0mΩ, -5.5A, LL			BSS308PE 80.0mΩ, -2.1A, LL, ESD		
			BSL308PE 80.0mΩ, -2.1A, LL, dual, ESD			BSS314PE 140.0mΩ, -1.5A, LL, ESD		
			BSL314PE 140.0mΩ, -1.5A, LL, dual, ESD			BSS315P 150.0mΩ, -1.5A, LL		BSD314SPE 140.0mΩ, -1.5A, LL, ESD
							BSS356PWE[1] ~560.0mΩ, ~0.73A, LL	BSD356PE[1] ~560.0mΩ, ~0.73A, LL
	- 20		BSL207SP 41.0mΩ, -6A, SLL				BSS209PW 550.0mΩ, -0.58A, SLL	BSV236SP 175.0mΩ, -1.5A, SLL
			BSL211SP 67.0mΩ, -4.7A, SLL				BSS223PW 1.2Ω, -0.39A, SLL	BSD223P 1.2Ω, -0.39A, SLL, dual
						BSS215P 150.0mΩ, -1.5A, SLL		

[1] in development

Small Signal

	Voltage	SOT-223	TSOP6	SOT-89	SC-59	SOT-23	SOT-323	SOT-363
Complementary	-20/20		BSL215C N: 140.0mΩ, 1.5A, SLL P: 150.0mΩ, -1.5A, SLL					BSD235C N: 350mΩ, 0.95A, SLL P: 1.2Ω, -0.53A, SLL
	-30/30		BSL316C N: 160.0mΩ, 1.4A, LL P: 150.0mΩ, -1.5A, LL					
			BSL308C N:57.0mΩ, A, LL P:80.0mΩ, A, LL,					BSD356PC[1] N:350.0mΩ, 0.95A, LL P:~560.0mΩ, ~0.73A, LL
	-60/60							

Low Voltage

Small Signal

	Voltage	SOT-223	TSOP6	SOT-89	SC-59	SOT-23	SOT-323	SOT-363
N-Channel MOSFETs	20		BSL802SN 22.0mΩ, 7.5A, ULL		BSR802N 23.0mΩ, 3.7A, ULL			
			BSL202SN 22.0mΩ, 7.5A, SLL		BSR202N 21.0mΩ, 3.8A, SLL	BSS806NE 57.0mΩ, 2.3A,ULL,ESD		
			BSL806N 57.0mΩ, 2.3A, ULL, dual			BSS806N 57.0mΩ, 2.3A, ULL		BSD816SN 160.0mΩ, 1.4A, ULL
			BSL205N 50.0mΩ, 2.5A, SLL, dual			BSS205N 50.0mΩ, 2.5A, SLL		BSD214SN 140.0mΩ, 1.5A, SLL
			BSL207N 70.0mΩ, 2.1A, SLL, dual				BSS816NW 160.0mΩ, 1.4A, ULL	BSD840N 400.0mΩ, 0.88A, ULL, dual
			BSL214N 140.0mΩ, 1.5A, SLL, dual			BSS214N 140.0mΩ, 1.5A, SLL	BSS214NW 140.0mΩ, 1.5A, SLL	BSD235N 350.0mΩ, 0.95A, SLL, dual
	30		BSL302SN 25.0mΩ, 7.1A, LL		BSR302N 23.0mΩ, 3.7A, LL	BSS306N 57.0mΩ, 2.3A, LL		
			BSL306N 57.0mΩ, 2.3A, LL, dual			BSS316N 160.0mΩ, 1.4A, LL		BSD316SN 160.0mΩ, 1.4A, LL
	55					BSS670S2L 650.0mΩ, 0.54A, LL		
	60	BSP318S 90.0mΩ, 2.6A, LL	BSL606SN 60.0mΩ, 4.5A, LL	BSS606N [1] 60.0mΩ, 2.3A, LL	BSR606N [1] 60.0mΩ, 2.3A, LL	2N7002 3.0Ω, 0.3A, LL	BSS138W 3.5Ω, 0.28A, LL	
		BSP320S 120.0mΩ, 2.9A, NL				BSS138N 3.5Ω, 0.23A, LL		
		BSP295 300.0mΩ, 1.8A, LL				BSS7728N 5.0Ω, 0.2A, LL	SN7002W 5.0Ω, 0.23A, LL	
						SN7002N 5.0Ω, 0.2A, LL		2N7002DW 3.0Ω, 0.3A, LL, dual
						BSS159N 8.0Ω, 0.13A, depl.		
	75	BSP716N [1] ~160.0mΩ, 2.3A, LL	BSL716N [1] 150.0mΩ, 2.5A, LL					

[1] in developement

Small Signal

	Voltage	SOT-223	TSOP6	SOT-89	SC-59	SOT-23	SOT-323
N-Channel MOSFETs	100	BSP373 300.0mΩ, 1.7A, NL	BSL373SN [1] 230.0mΩ, 2.0A, NL			BSS169 12.0Ω, 0.09A, depl.	
		BSP373N [1] 230.0mΩ, 2.0A, NL	BSL372SN [1] 220.0mΩ, 2.0A, LL				
		BSP372 310.0mΩ, 1.7A, LL	BSL296SN [1] 460.0mΩ, 1.4A, LL				
		BSP372N [1] 230mΩ, 1.8A, LL				BSS119N 6.0Ω, 0.19A, LL	
		BSP296 700.0mΩ, 1.1A, LL					
		BSP296N [1] 600.0Ω, 1.2A, LL					
		BSP123 6.0Ω, 0.37A, LL					
						BSS123N 6.0Ω, 0.19A, LL	
	200	BSP297 1.8Ω, 0.66A, LL					
		BSP149 3.5Ω,0.14 A, depl.					
	240	BSP88 6.0Ω, 0.35A, 2.8V rated		BSS87 6.0Ω, 0.26A, LL		BSS131 14.0Ω, 0.1A, LL	
		BSP89 6.0Ω, 0.35A, LL					
		BSP129 6.0Ω, 0.05A, depl.					
	250					BSS139 30.0Ω, 0.03A, depl.	
	400	BSP298 3.0Ω, 0.5A, NL					
		BSP324 25.0Ω, 0.17A, LL					
	500	BSP299 4.0Ω, 0.4A, NL					
	600	BSP125 45.0Ω, 0.12A, LL		BSS225 45.0Ω, 0.09A, LL		BSS127 500.0Ω, 0.023A, LL	
		BSP135 60.0Ω, 0.02A, depl.				BSS126 700.0mΩ, 0.007A, depl.	
	800	BSP300 20.0Ω, 0.19A, NL					

	to be used from V_{GS}
NL = Normal Level	10V
LL = Logic Level	4.5V
SLL = Super Logic Level	2.5V
ULL = Ultra Logic Level	1.8V

P-Channel MOSFETs

		$R_{DS(on)}$ @ V_{GS}=10V [mΩ]	TO-220	TO-252 (DPAK)	TO-263 (D^2PAK)	SO8	SuperSO8	S3O8	CanPAK
P-Channel MOSFETs	- 20V	7				BSO201SP H			
		21				BSO203SP H BSO203P H (dual)			
		30							
		45				BSO207P H (dual)			
		67				BSO211P H (dual)			
	- 30V	3					BSC030P03NS3 G		
		4,2		IPD042P03L3 G					
		5-7		SPD50P03L G [2] IPD068P03L3 G			BSC060P03NS3E G		
		~8				BSO080P03NS3 G BSO080P03NS3E G BSO080P03S H BSO301SP H	BSC080P03LS G BSC084P03NS3 G BSC084P03NS3E G	BSZ086P03NS3 G BSZ086P03NS3E G	
		12						BSZ120P03NS3 G BSZ120P03NS3E G	
		13				BSO130P03S H	BSC130P03LS G		
		18						BSZ180P03NS3 G BSZ180P03NS3E G	
		20				BSO200P03S H BSO303SP H			
		21				BSO303P H (dual)			
		1,2 Ω							
	- 60V	23	SPP80P06P H		SPB80P06P G				
		75		SPD30P06P G					
		130	SPP18P06P H	SPD18P06P G	SPB18P06P G	BSO613SPV G			
		250		SPD09P06PL G					
		300	SPP08P06P H	SPD08P06P G	SPB08P06P G				
	- 100V	210	SPP15P10PL H	SPD15P10PL G					
		240	SPP15P10P H	SPD15P10P G					
		850		SPD04P10PL G					
		1 Ω		SPD04P10P G					
Complem.	-60/ 60V	11-30				BSO612CV G			
						BSO615C G			

[2] 5-leg

Naming System

OptiMOS™

BSC 014 N 03 L [S] [X] [E] [G]

Package Type
BSB = CanPAK™ (M Can)
BSC = SuperSO8
BSF = CanPAK™ (S Can)
BSO = SO-8
BSZ = S3O8
IPA = FullPAK
IPB = D^2PAK
IPC = Chip Product
IPD = DPAK
IPI = I^2PAK
IPP = TO-220
IPS = IPAK Short Leads

$R_{DS(on)}$ [mΩ]
Divide by 10 to get $R_{DS(on)}$ value e.g. 014 = 1.4 mOhm
For chip products chip area in mm^2 multiplied by 10

N = N-Channel
P = P-Channel
C = Complementary

Breakdown Voltage [V]
multiply by 10 to get voltage class e.g. 03 = 30V
E = Extended, +5V, e.g. E2 = 25V

Level

		to be used from V_{GS}
N = Normal Level	(NL)	10.0
M = Logic Level 5V opt.	(LL)	4.5
L = Logic Level	(ELL)	4.5
K = Super Logic Level	(SLL)	2.5
J = Ultra Logic Level	(ULL)	1.8

3 = Technology Generation
I = Monolithically integrated Schottky like diode

Package Options SO-8/SuperSO8/S3O8
S = Single Chip
D = Dual Chip

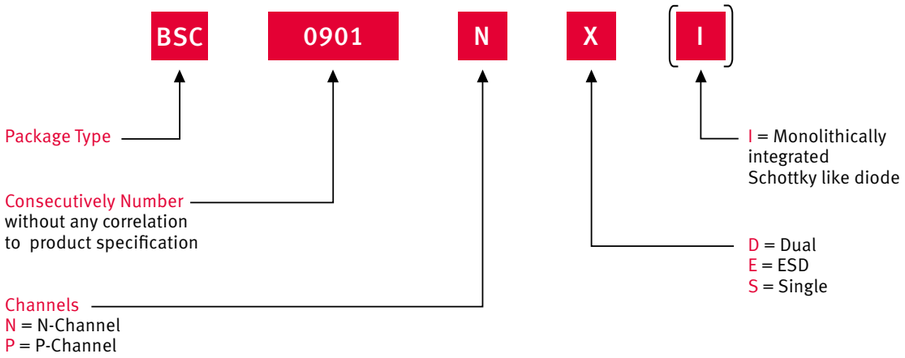
CanPAK™
Q = SQ or MQ footprint
X = SX or MX footprint
T = ST or MT footprint
P = MP footprint
N = MN footprint
H = SH footprint

D^2PAK
X = Extra drain lead

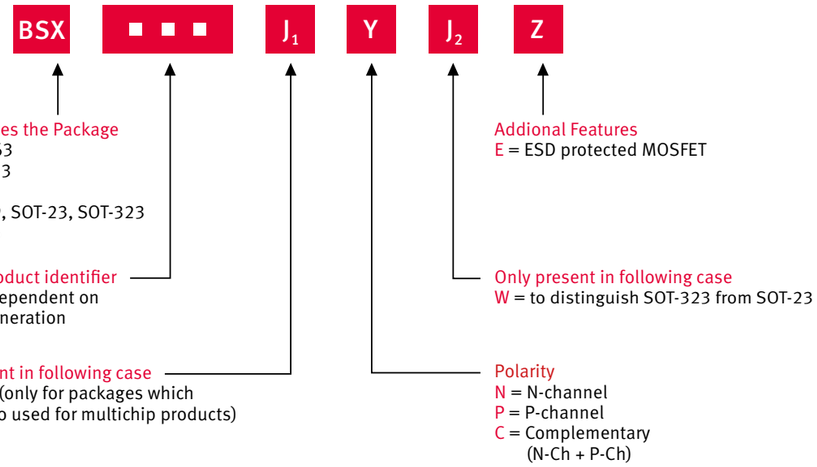
Features
F = fast switching
R = integrated gate resistor
E = ESD protection

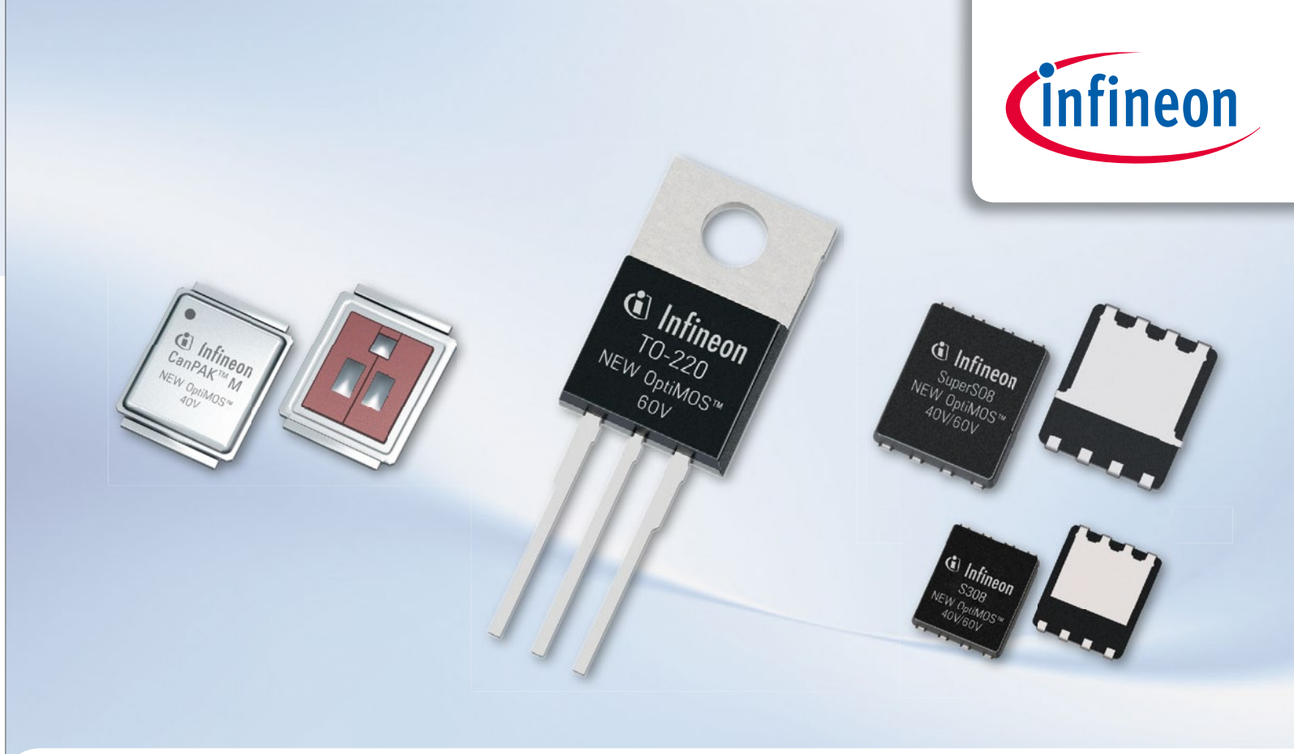
RoHS compliant

New OptiMOS™ 30V



Small Signal





New OptiMOS™ 40V and 60V

Enables 96% Efficiency Level in Server Power Supply

Infineon's new OptiMOS™ 40V and 60V family is optimized for synchronous rectification in Switched Mode Power Supplies (SMPS) such as in servers and desktop PCs. These devices set highest standards in power density and efficiency and reduce system costs at the same time.

They are also a perfect choice for a broad range of industrial applications like motor control, solar micro inverter and fast switching DC/DC converter.

Key features and benefits of new OptiMOS™ 40V/60V

- Industry's first 1mΩ 40V and 1.6mΩ 60V product in SuperSO8
- 35% lower $R_{DS(on)}$ and 45% lower FOM than alternative devices
- Highest system efficiency and power density
- Monolithically integrated Schottky like diode for highest efficiency

For further information please visit our website:

www.infineon.com/newoptimos

CoolMOS™

The revolutionary CoolMOS™ power family sets new standards in the field of Energy Efficiency. As technology leader in high voltage MOSFETs, CoolMOS™ offers a significant reduction of conduction and switching losses and enables high power density and efficiency for superior power conversion systems. Especially the latest, state-of-the-art generation of high voltage power MOSFETs makes it possible that AC/DC power supplies are more efficient, more compact, lighter and cooler than ever before. This success was achieved by offering the lowest on-state resistance per package outline, the fastest switching speed and the lowest gate driver requirements of high voltage MOSFETs commercially available.

Features
- Offers a significant reduction of conduction and switching losses
- Enables high power density and efficiency for superior power conversion systems
- Best-in-Class price/performance ratio

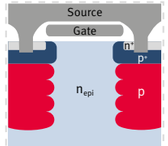
Benefits
- Improved efficiency
- More efficient, more compact, lighter and cooler
- Outstanding reliability with proven CoolMOS™ quality combined with high body diode ruggedness

CoolMOS™ Technology

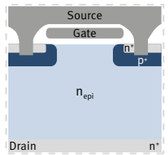
On-state: Reduction of resistance of epitaxial layer by high doped n-columns
- Higher doping level in n-type drift region results in lower $R_{DS(on)}$

Blocking state: Compensation of additional charge by adjacent p-columns
- Half of active chip area is covered by p-columns
- During blocking state the p-column compensates the charge of the adjacent n-column resulting in high breakdown voltage at an area specific on-resistance below the silicon limit

CoolMOS™



Standard MOSFET



Main Applications

- Adapter
- PC Silverbox
- Server
- Telecom
- Solar
- UPS
- HID Lighting
- Automotive

CoolMOS™ – a History

Since the development of the innovative CoolMOS™ technology we support applications to meet the standby power and Energy Efficiency regulations. CoolMOS™ is used for example in lighting applications where Energy Efficiency is more than ever a pre-condition as well as in solar inverters of market leaders.

S5 series:
- First series of CoolMOS™, market entry in 1998
- Slow switching, close to converter MOSFET, V_{th} 4.5 V, g_{fs} low, R_g high
- Design-in in high power SMPS only

C3 series:
- Third series of CoolMOS™, market entry in 2001
- The "working horse" of the portfolio, fast switching, symmetrical rise/fall time @10 V V_{gs}, V_{th} 3 V, g_{fs} high, R_g very low
- Design-in into all CoolMOS™ segments

CFD series:
- Fourth series of CoolMOS™, market entry in 2004
- Fast Body Diode, Q_{rr} 1/10th of C3 series, V_{th} 4 V, g_{fs} high, R_g low
- Specific for phase-shift ZVS and DC/AC power applications

CE series:
- Cost optimized platform for price sensitive applications such as PC Silverbox, Consumer and Lighting
- Applicable in PFC, in LLC topologies in resonant switching and in TTF topologies in Hard Switching in PWM stage

CP series:
- Fifth series of CoolMOS™, market entry in 2005
- Ultra low $R_{DS(on)}$, ultra low gate charge, very fast switching
- V_{th} 3 V, g_{fs} very high, internal R_g very low

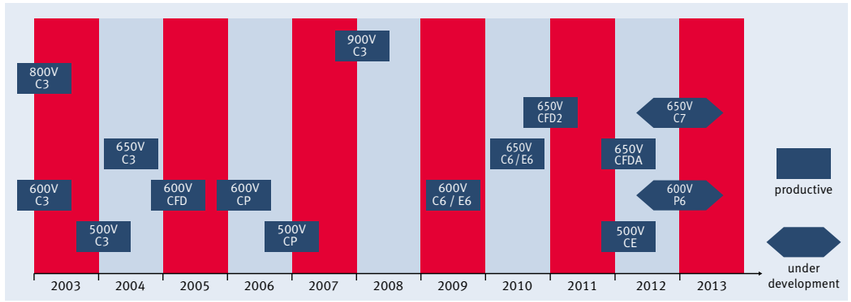
C6 / E6 series:
- Sixth series of CoolMOS™, market entry 2009
- Is the successor of C3

CFD2 series:
- Seventh series of CoolMOS™, market entry 2011
- First 650V superjunction device, with Fast Body Diode
- Is the successor of CFD, suitable for resonant topologies

CFDA series:
- First automotive qualified CoolMOS™ technology with integrated Fast Body Diode
- Optimized for resonant topologies in the automotive field used e.g. for battery charging and DC/DC converters

P6 series:
- New price/performance family suitable for both PFC and PWM topologies

C7 series:
- New Best-in-Class efficiency in hard switching applications such as Power Factor Correction



600V CoolMOS™ P6 Power MOSFET

Optimized Power MOSFETs merging high Energy Efficiency with Easiness to use
CoolMOS™ P6 is Infineon's seventh generation of high voltage power MOSFETs designed according to the revolutionary superjunction (SJ) principle. The new CoolMOS™ P6 series combines our experience as the leading SJ MOSFET supplier with innovation focusing on high efficiency solutions. The resulting P6 technology is tailored to provide high performance in hard & soft switching topologies (e.g. PFC, LLC) while not sacrificing the ease of use.

P6 achieves extremely low conduction and switching losses especially in light load condition enabling switching applications to work more efficient and be designed more compact, lighter and cooler.

Moreover, with its granular portfolio, P6 can address the specific needs of applications such as server, PC power, telecom rectifiers and consumer applications, while additionally offering the best price/performance ratio on the market today.

Features
- Reduced gate charge (Q_g)
- Optimized V_{th} for soft switching
- Good body diode ruggedness
- Optimized integrated R_g
- Improved dv/dt

Benefits
- Improved efficiency especially in light load condition
- Better efficiency in soft switching applications due to earlier turn-off
- Suitable for hard- & soft-switching topologies
- Optimized balance of efficiency and ease of use and good controllability of switching behavior
- High robustness and better efficiency
- Outstanding quality & reliability
- CoolMOS™ quality with over 12 years manufacturing experience in superjunction technology

Applications
- PFC stages for Server, Telecom Rectifier, PC Silverbox, Gaming Consoles
- PWM stages (TTF, LLC) for Server,Telecom Rectifier, PC Silverbox, Gaming Consoles

New 650V CoolMOS™ C7 Series

Introduction of new market leading Best-in-Class on-resistance per package
With the new 650V CoolMOS™ C7 series Infineon brings a new level of performance in hard switching applications such as Power Factor Correction (PFC). It is the successor to the CP series and provides efficiency benefits across the whole load range through balancing a number of key parameters.

The Best in Class $R_{DS(on)}$ leads to increased full load efficiency and improves on our already BiC CoolMOS™ C6 parts in TO-220 and establishes clear leadership in TO-247. E_{oss} reduction brings efficiency benefits at light load and the low Q_g correlates to faster switching and lower E_{on} and E_{off} which gives efficiency benefits across the whole load range.

As well as balancing the various parameters to give the Best-in-Class performance, measures were taken to even improve implementation/ease of use behavior compared to the CoolMOS™ CP series.

650V was chosen to give extra safety margin for designers and make it suitable for both SMPS and Solar inverters. Finally the new CoolMOS™ C7 series benefits from the 12 years manufacturing experience and continues to offer Infineon's outstanding quality.

Features
- 650V voltage
- Revolutionary BiC $R_{DS(on)}$ /package
- Reduced energy stored in output capacitance (E_{oss})
- Lower gate charge Q_g
- Space saving through use of smaller packages or reduction of parts
- 12 years manufacturing experience in superjunction Technology

Benefits
- Improved safety margin and suitable for both SMPS and Solar Inverter applications
- Lowest conduction losses/package
- Low switching losses
- Better light load efficiency
- Increasing power density
- Outstanding CoolMOS™ quality

Topologies
- Power Factor Correction
- Solar Boost

Applications
- Telecom
- Server
- Solar
- UPS

CoolMOS™ C3 500V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
1.8	3000	9			SPD02N50C3					
3.2	1400	15			SPD03N50C3					
4.5	950	22			SPD04N50C3		SPB04N50C3	SPP04N50C3	SPA04N50C3	
7.6	600	32			SPD08N50C3	SPI08N50C3		SPP08N50C3	SPA08N50C3	
11.6	380	49				SPI12N50C3	SPB12N50C3	SPP12N50C3	SPA12N50C3	SPW12N50C3
16	280	66				SPI16N50C3	SPB16N50C3	SPP16N50C3	SPA16N50C3	SPW16N50C3
21	190	95				SPI21N50C3	SPB21N50C3	SPP21N50C3	SPA21N50C3	SPW21N50C3
32	110	170								SPW32N50C3
52	70	290								SPW52N50C3

CoolMOS™ C3 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
0.8	6000	3.9	SPU01N60C3	SPS01N60C3	SPD01N60C3					
1.8	3000	9.5	SPU02N60C3	SPS02N60C3	SPD02N60C3		SPB02N60C3	SPP02N60C3		
3.2	1400	13	SPU03N60C3	SPS03N60C3	SPD03N60C3		SPB03N60C3	SPP03N60C3	SPA03N60C3	
4.5	950	19	SPU04N60C3	SPS04N60C3	SPD04N60C3		SPB04N60C3	SPP04N60C3	SPA04N60C3	
6.2	750	24			SPD06N60C3			SPP06N60C3	SPA06N60C3	
7.3	600	21	SPU07N60C3		SPD07N60C3	SPI07N60C3	SPB07N60C3	SPP07N60C3	SPA07N60C3	
11	380	45				SPI11N60C3	SPB11N60C3	SPP11N60C3	SPA11N60C3	SPW11N60C3
15	280	63				SPI15N60C3		SPP15N60C3	SPA15N60C3	SPW15N60C3
20.7	190	87				SPI20N60C3	SPB20N60C3	SPP20N60C3	SPA20N60C3	SPW20N60C3
24.3	160	104.9						SPP24N60C3		SPW24N60C3
34.6	100	150								SPW35N60C3
47	70	252								SPW47N60C3

[1] close automotive variant available, see you local sales contact for details

CoolMOS™ C3 650V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
7.3	600	21				SPI07N65C3		SPP07N65C3	SPA07N65C3	
11	380	45				SPI11N65C3		SPP11N65C3	SPA11N65C3	
15	280	63				SPI15N65C3		SPP15N65C3	SPA15N65C3	
20.7	190	87				SPI20N65C3		SPP20N65C3	SPA20N65C3	
47	70	255								SPW47N65C3

CoolMOS™ C3 800V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
2	2700	9			SPD02N80C3 [1]			SPP02N80C3	SPA02N80C3	
4	1380	20			SPD04N80C3 [1]			SPP04N80C3	SPA04N80C3	
6	950	27			SPD06N80C3 [1]			SPP06N80C3	SPA06N80C3	
8	650	40				SPI08N80C3		SPP08N80C3	SPA08N80C3	
11	450	50					SPB11N80C3 [1]	SPP11N80C3 [1]	SPA11N80C3	SPW11N80C3 [1]
17	290	91					SPB17N80C3 [1]	SPP17N80C3	SPA17N80C3	SPW17N80C3 [1]
55	85	288								SPW55N80C3 [1]

CoolMOS™ C3 900V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
5.1	1200	29			IPD90R1K2C3	IPI90R1K2C3		IPP90R1K2C3	IPA90R1K2C3	IPW90R1K2C3
5.7	1000	34				IPI90R1K0C3		IPP90R1K0C3	IPA90R1K0C3	IPW90R1K0C3
6.9	800	42				IPI90R800C3		IPP90R800C3	IPA90R800C3	IPW90R800C3
11	500	68				IPI90R500C3		IPP90R500C3	IPA90R500C3	IPW90R500C3
15	340	93				IPI90R340C3	IPB90R340C3	IPP90R340C3	IPA90R340C3	IPW90R340C3
36	120	260								IPW90R120C3

CoolMOS™ CP 500V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
7.1	520	13		IPS50R520CP	IPD50R520CP			IPP50R520CP	IPA50R520CP	
9	399	17			IPD50R399CP	IPI50R399CP		IPP50R399CP	IPA50R399CP	IPW50R399CP
10	350	19				IPI50R350CP		IPP50R350CP	IPA50R350CP	IPW50R350CP
12	299	23				IPI50R299CP	IPB50R299CP	IPP50R299CP	IPA50R299CP	IPW50R299CP
13	250	27				IPI50R250CP	IPB50R250CP	IPP50R250CP	IPA50R250CP	IPW50R250CP
17	199	34				IPI50R199CP	IPB50R199CP	IPP50R199CP	IPA50R199CP	IPW50R199CP
23	140	48				IPI50R140CP	IPB50R140CP	IPP50R140CP	IPA50R140CP	IPW50R140CP

CoolMOS™ CE 500V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
1.7	3000	4.3		IPU50R3k0CE		IPD50R3k0CE					
2.4	2000	6		IPU50R2k0CE		IPD50R2k0CE					
3.1	1400	8.2		IPU50R1k4CE		IPD50R1k4CE					
4.3	950	10.5		IPU50R950CE		IPD50R950CE				IPA50R950CE	
5	800	12.4				IPD50R800CE				IPA50R800CE	
6.1	650	15				IPD50R650CE				IPA50R650CE	
7.6	500	18.7				IPD50R500CE			IPP50R500CE	IPA50R500CE	
9.9	380	24.8				IPD50R380CE			IPP50R380CE	IPA50R380CE	
13	280	32.6				IPD50R280CE			IPP50R280CE	IPA50R280CE	IPW50R280CE
18.5	190	47.2							IPP50R190CE	IPA50R190CE	IPW50R190CE

CoolMOS™ CP 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
6.1	600	21				IPD60R600CP	IPI60R600CP	IPB60R600CP	IPP60R600CP	IPA60R600CP	
6.8	520	24				IPD60R520CP	IPI60R520CP	IPB60R520CP	IPP60R520CP	IPA60R520CP	
9	385	17	IPL60R385CP			IPD60R385CP	IPI60R385CP	IPB60R385CP	IPP60R385CP	IPA60R385CP	
11	299	22	IPL60R299CP				IPI60R299CP	IPB60R299CP	IPP60R299CP	IPA60R299CP	IPW60R299CP
12	250	26					IPI60R250CP	IPB60R250CP	IPP60R250CP	IPA60R250CP	IPW60R250CP
16	199	32	IPL60R199CP				IPI60R199CP	IPB60R199CP	IPP60R199CP	IPA60R199CP	IPW60R199CP
21	165	39					IPI60R165CP	IPB60R165CP	IPP60R165CP	IPA60R165CP	IPW60R165CP
25	125	53					IPI60R125CP	IPB60R125CP	IPP60R125CP	IPA60R125CP	IPW60R125CP
31	99	60					IPI60R099CP	IPB60R099CP	IPP60R099CP		IPW60R099CP
39	75	86									IPW60R075CP
60	45	150									IPW60R045CP

[1] Wave 1: Engineering Samples available Q4 2012
[2] Wave 2: Engineering Samples available Q4 2012
[3] Wave 3: Engineering Samples coming soon

CoolMOS™ C6 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
1.7	3300	4.7			IPD60R3K3C6					
2.4	2000	6.7	IPU60R2K0C6		IPD60R2K0C6					
3.2	1400	9.4	IPU60R1K4C6		IPD60R1K4C6			IPP60R1K4C6		
4.4	950	13	IPU60R950C6		IPD60R950C6		IPB60R950C6	IPP60R950C6	IPA60R950C6	
7.3	600	20.5	IPU60R660C6		IPD60R600C6		IPB60R600C6	IPP60R600C6	IPA60R600C6	
8.1	520	23.4			IPD60R520C6			IPP60R520C6	IPA60R520C6	
10.6	380	32			IPD60R380C6	IPI60R380C6	IPB60R380C6	IPP60R380C6	IPA60R380C6	
13.8	280	43				IPI60R280C6	IPB60R280C6	IPP60R280C6	IPA60R280C6	IPW60R280C6
20.2	190	58				IPI60R190C6	IPB60R190C6	IPP60R190C6	IPA60R190C6	IPW60R190C6
23.8	160	75					IPB60R160C6	IPP60R160C6	IPA60R160C6	IPW60R160C6
30	125	96					IPB60R125C6	IPP60R125C6	IPA60R125C6	IPW60R125C6
38	99	119					IPB60R099C6	IPP60R099C6	IPA60R099C6	IPW60R099C6
57.7	74	131						IPP60R074C6		
53.5	70	170								IPW60R070C6
77.5	41	290								IPW60R041C6

CoolMOS™ E6 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
5.7	750	17.2			IPD60R750E6			IPP60R750E6	IPA60R750E6	
7.3	600	20.5			IPD60R600E6			IPP60R600E6	IPA60R600E6	
8.1	520	23.5						IPP60R520E6	IPA60R520E6	
9.2	450	28			IPD60R450E6			IPP60R450E6	IPA60R450E6	
10.6	380	32						IPP60R380E6	IPA60R380E6	
13.8	280	43						IPP60R280E6	IPA60R280E6	IPW60R280E6
20.2	190	63						IPP60R190E6	IPA60R190E6	IPW60R190E6

CoolMOS™ P6 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
tbd	600	tbd				IPD60R600P6 [1]			IPP60R600P6 [1]	IPA60R600P6 [1]	
tbd	380	tbd				IPD60R380P6 [2]			IPP60R380P6 [2]	IPA60R380P6 [2]	
tbd	280	tbd							IPP60R280P6 [2]	IPA60R280P6 [2]	IPW60R280P6 [2]
tbd	230/255	tbd	IPL60R255P6 [2]						IPP60R230P6 [2]	IPA60R230P6 [2]	IPW60R230P6 [2]
tbd	190/210	tbd	IPL60R210P6 [1]						IPP60R190P6 [1]	IPA60R190P6 [1]	IPW60R190P6 [1]
tbd	160/180	tbd	IPL60R180P6 [2]						IPP60R160P6 [2]	IPA60R160P6 [2]	IPW60R160P6 [2]
tbd	125	tbd							IPP60R125P6 [3]	IPA60R125P6 [3]	IPW60R125P6 [3]
tbd	99	tbd							IPP60R099P6 [3]	IPA60R099P6 [3]	IPW60R099P6 [3]
tbd	70	tbd									IPW60R070P6 [3]
tbd	41	tbd									IPW60R041P6 [3]

CoolMOS™ C6 650V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
	1400			IPS65R1k4C6						
	950			IPS65R950C6						
7.3	600	23			IPD65R600C6	IPI65R600C6	IPB65R600C6	IPP65R600C6	IPA65R600C6	
10.6	380	39			IPD65R380C6	IPI65R380C6	IPB65R380C6	IPP65R380C6	IPA65R380C6	
13.8	280	45				IPI65R280C6	IPB65R280C6	IPP65R280C6	IPA65R280C6	IPW65R280C6
16.1	250	44			IPD650R250C6					
20.7	190	87				IPI65R190C6	IPB65R190C6	IPP65R190C6	IPA65R190C6	IPW65R190C6
38	99	127				IPI65R099C6		IPP65R099C6	IPA65R099C6	IPW65R099C6
57.7	74	138						IPP65R074C6		
47	70	255								IPW65R070C6
83.2	37	330								IPW65R037C6

CoolMOS™ E6 650V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
7.3	600/660	23	IPL65R660E6 [1]			IPD65R600E6			IPP65R600E6	IPA65R600E6	
10.6	380/420	39	IPL65R420E6 [1]			IPD65R380E6			IPP65R380E6	IPA65R380E6	
13.8	280/310	45	IPL65R310E6 [1]						IPP65R280E6	IPA65R280E6	IPW65R280E6
16.1	250	44				IPD65R250E6					
20.2	190/210	73	IPL65R210E6 [1]						IPP65R190E6	IPA65R190E6	IPW65R190E6

CoolMOS™ C7 650V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247	TO-247-4
11	225/230	20	IPL65R230C7[3]			IPD65R225C7[3]		IPB65R225C7[2]	IPP65R225C7[2]			
tbd	190/195	tbd	IPL65R195C7[4]			**IPD65R190C7**[4]		IPB65R190C7[4]	IPP65R190C7[4]		IPW65R190C7[4]	
18.4	125/130	35	IPL65R130C7[3]					IPB65R125C7[3]	IPP65R125C7[3]		IPW65R125C7[3]	
tbd	95/99	tbd	IPL65R099C7[4]					IPB65R095C7[4]	IPP65R095C7[4]		IPW65R095C7[4]	IPZ65R095C7[4]
tbd	65/70	tbd	IPL65R070C7[4]					IPB65R065C7[4]	IPP65R065C7[4]		IPW65R065C7[4]	IPZ65R065C7[4]
46.9	45	93						**IPB65R045C7**[2]	**IPP65R045C7**[2]		IPW65R045C7[2]	IPZ65R045C7[3]
57.9	19	214									**IPW65R019C7**[2]	**IPZ65R019C7**[3]

[1] in development, see your local sales contact for details
[2] Samples available by Q1 / 2013
[3] Samples available by Q2 / 2013
[4] Samples available by Q3 / 2013

CoolMOS™ CFD 600V

I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
6.6	700	35						SPP07N60CFD	SPA07N60CFD	SPW07N60CFD
11	440	48				SPI11N60CFD		SPP11N60CFD	SPA11N60CFD	SPW11N60CFD
13.4	330	63				SPI15N60CFD		SPP15N60CFD	SPA15N60CFD	SPW15N60CFD
20.7	220	95				SPI20N60CFD		SPP20N60CFD	SPA20N60CFD	SPW20N60CFD
21.7	185	110						SPP24N60CFD		SPW24N60CFD
34.1	115	163								SPW35N60CFD
46	80	248								SPW47N60CFD

CoolMOS™ CFD2 650V

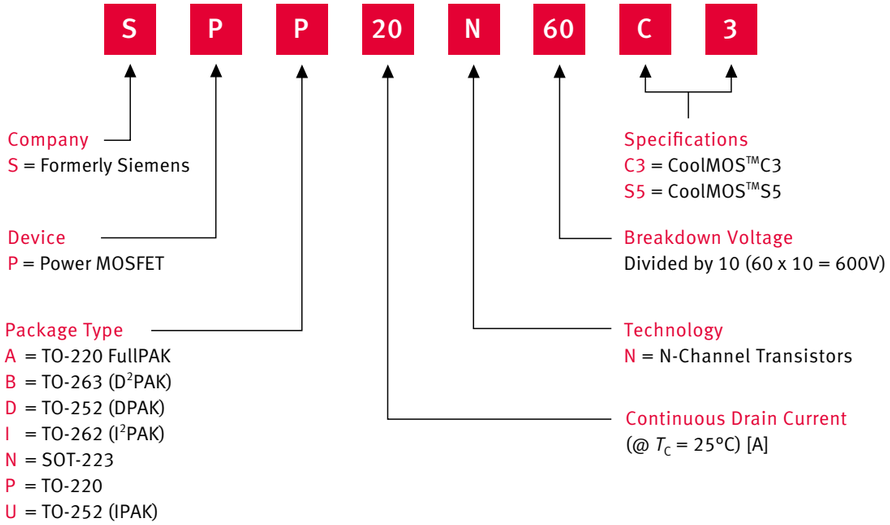
I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	ThinPAK 8 x 8 Halogen-Free	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
tbd	1400	tbd				IPD65R1K4CFD					
tbd	950	tbd				IPD65R950CFD					
6.0	660/725	20	IPL65R725CFD[2]			IPD65R660CFD	IPI65R660CFD	IPB65R660CFD	IPP65R660CFD	IPA65R660CFD	IPW65R660CFD
8.7	420/460	32	IPL65R460CFD[2]			IPD65R420CFD	IPI65R420CFD	IPB65R420CFD	IPP65R420CFD	IPA65R420CFD	IPW65R420CFD
11.4	310/340	41	IPL65R340CFD[2]				IPI65R310CFD	IPB65R310CFD	IPP65R310CFD	IPA65R310CFD	IPW65R310CFD
17.5	190/210	68	IPL65R210CFD[3]				IPI65R190CFD	IPB65R190CFD	IPP65R190CFD	IPA65R190CFD	IPW65R190CFD
tbd	150/165	tbd	IPL65R165CFD[3]				IPI65R150CFD	IPB65R150CFD	IPP65R150CFD	IPA65R150CFD	IPW65R150CFD
31.2	110	118					IPI65R110CFD	IPB65R110CFD	IPP65R110CFD	IPA65R110CFD	IPW65R110CFD
43.3	80	162									IPW65R080CFD
68	41	300									IPW65R041CFD

CoolMOS™ CFDA 650V

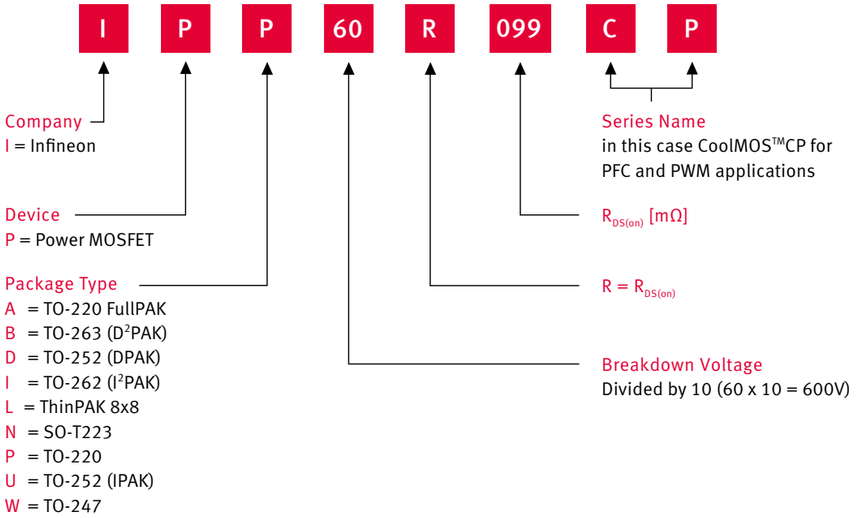
I_D [A]	$R_{DS(on)}$ [mΩ]	Q_g [nC]	TO-251 IPAK	TO-251 IPAK SL short leads	TO-252 DPAK	TO-262 I²PAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
6	660	20			IPD65R660CFDA[2]		IPB65R660CFDA	IPP65R660CFDA		
tbd	420	tbd			IPD65R420CFDA[2]					
11.4	310	41					IPB65R310CFDA	IPP65R310CFDA		
17.5	190	68					IPB65R190CFDA	IPP65R190CFDA		IPW65R190CFDA
22.4	150	86					IPB65R150CFDA	IPP65R150CFDA		IPW65R150CFDA
31.2	110	118					IPB65R110CFDA	IPP65R110CFDA		IPW65R110CFDA
43.3	80	161								IPW65R080CFDA
63.3	48	270								IPW65R048CFDA

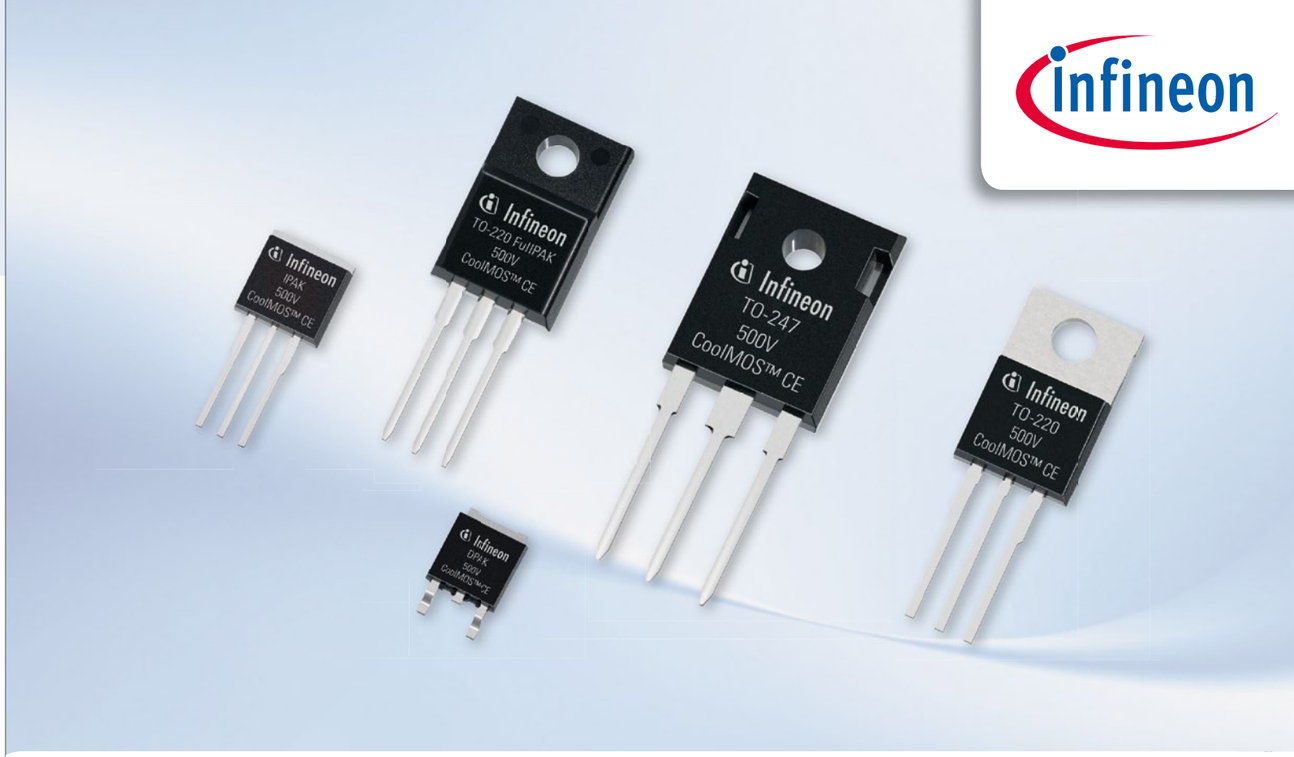
Naming System

Power MOSFETs (naming system until 2005)



Power MOSFETs (naming system from 2005 onwards)





500V CoolMOS™ CE

The new Market Leading Generation of Superjunction MOSFETs

As technology leader in high voltage MOSFETs, Infineon now launches a new generation of high voltage MOSFETs, reaching price driven markets such as PC Silverbox, Consumer and Lighting.

500V CoolMOS™ CE is a price-performance optimized platform enabling to target cost sensitive applications in Consumer and Lighting markets by still meeting highest efficiency standards. The new series provides all benefits of a fast switching superjunction MOSFET while not sacrificing ease of use and offering the best cost down performance ratio available on the market.

Key features and benefits of 500V CoolMOS™ CE

- Easy control of switching behaviour
- High body diode ruggedness
- Improved light load efficiency
- Outstanding reliability with proven CoolMOS™ quality
- Reduced reverse recovery charge (Q_{rr}) and gate charge (Q_g)
- Price-Performance optimized 500V design

For further information please visit our website:
www.infineon.com/ce

Silicon Carbide

Silicon Carbide (SiC) devices belong to the so-called wide band gap semiconductor group, which offers a number of attractive characteristics for high voltage power semiconductors when compared to commonly used silicon (Si). In particular, the much higher breakdown field strength and thermal conductivity of SiC allow creating devices which outperform by far the corresponding Si ones, and enable reaching otherwise unattainable efficiency levels.

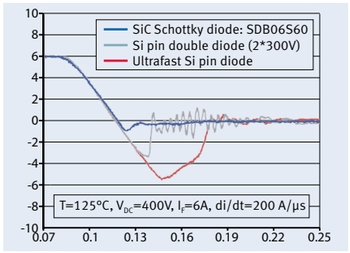
Silicon Carbide Schottky Diodes

The differences in material properties between SiC and silicon limit the fabrication of practical silicon unipolar diodes (Schottky diodes) to a range up to 100V – 150V, with relatively high on-state resistance and leakage current. On the other hand, SiC Schottky barrier diodes (SBD) can reach a much higher breakdown voltage; Infineon offers products up to 1200V as discrete and up to 1700V in modules.

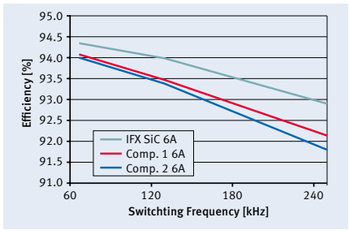
Features
- Benchmark switching behavior
- No reverse recovery charge
- Temperature independent switching behavior
- High operating temperature (T_j max 175°C)

Applications
- Server
- Telecom
- Solar
- UPS
- PC Silverbox
- Motor Drives
- Lighting

Benefits
- System efficiency improvement compared to Si diodes
- Reduced cooling requirements
- Enabling higher frequency/increased power density
- Higher system reliability due to lower operating temperature
- Reduced EMI



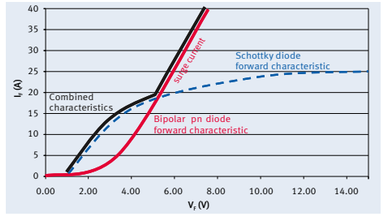
Reverse recovery charge of SiC versus Silicon devices
The majority carrier characteristics of the device imply no reverse recovery charge and the only contribution to the switching losses comes from the tiny displacement charge of capacitive nature. In the same voltage range, Silicon devices show a bipolar component resulting in much higher switching losses. Here the comparison for 600V devices.



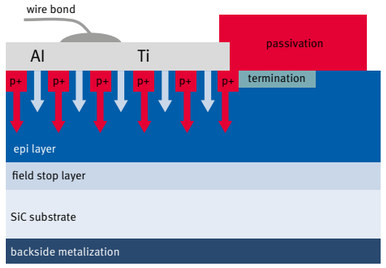
Improved system efficiency (PFC in CCM Mode operation, full load, low line)
The fast switching characteristics of the SiC diodes provide clear efficiency improvements at system level. The performance gap between SiC and high-end silicon devices increases with the operating frequency.

thinQ!™ Generation 2 600V

The second generation of Infineon SiC Schottky diodes has emerged over the years as the industry standard. The low V_f values characterizing this family of products, make it particularly suitable for applications requiring high load efficiency. With the Generation 2 Infineon introduced a new design concept consisting in regularly distributed p-doped areas, in conjunction with the pure Schottky ones: the so-called “merged pn-structure” (MPS).



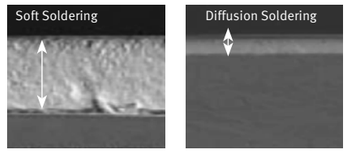
Merged pn-structure and improved surge capability
In standard operation the device behaves like a pure SBD, but at high current levels a bipolar component is activated: the much lower voltage drop dramatically reduces the power dissipation at high current peaks and accordingly the risks for thermal runaway.



thinQ!™ Generation 3 600V

The third generation of Infineon SiC Schottky diodes features the industry’s lowest device capacitance for any given current rating, which further enhances overall system efficiency, especially at higher switching frequencies and under low load conditions. The Generation 3 is based on the same technology platform as Generation 2 with the introduction, at package level, of the so called diffusion soldering.

Diffusion soldering and improved thermal performance
Diffusion soldering is a proprietary Infineon process reducing dramatically the thickness of the solder between chip and lead frame with respect to standard soft soldering. It results into ~40% lower R_{thjc} per same unit Area.



thinQ!™ 1200V

The 1200V is the highest voltage family of Infineon SiC Schottky discrete diodes and is now being extended with the TO-247 package. The very good thermal characteristics of the TO-247 in combination with the low V_f of the 1200V diodes make it particularly suitable in power applications where relatively high currents are demanded and utmost efficiency is required. With the introduction of this package, Infineon now offers a current capability of up to 30A in the 1200V range.

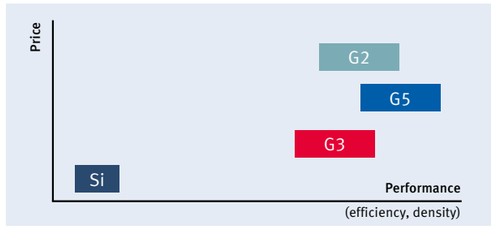
Generation 5 650V: Compact Design and Wafer Thinning Technology for Best Price/Performance Level

Performance comparison

thinQ!™ Generation 5 represents Infineon's leading edge technology for SiC Schottky Barrier diodes. The Infineon proprietary diffusion soldering process, already introduced with Gen3, is now combined with a new, more compact MPS design and thin wafer technology. The result is a new family of products showing improved efficiency over all load conditions, coming from both the improved thermal characteristics and a lower figure of Merit (Q_c x V_f). The new thinQ!™ Generation 5 has been designed to complement our 650V CoolMOS™ offer: This ensures meeting the most stringent application requirements in this voltage range.

Generation 5 main product characteristics

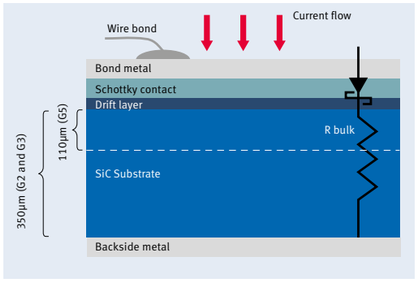
- Improved efficiency with respect to all previous generations
- Surge current capability at Gen2 level
- Increased V_{br} to 650V
- Extension of portfolio up to 40A
- New packages
- Pricing below Gen2

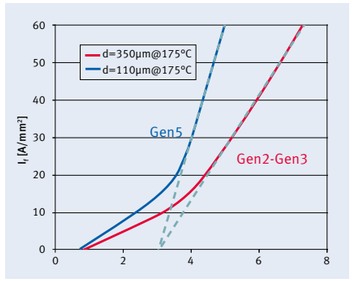


Wafer Thinning

Higher surge current capability

By reducing the wafer thickness to almost 1/3, the resistive contribution of the substrate is considerably reduced and one of its most striking benefits is a consistent improvement of the surge current robustness, now at comparable level or even higher (for I_f <10A) than for Gen2, in spite of a smaller chip size.

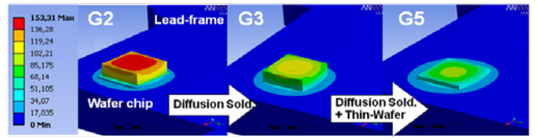




Lower thermal resistance

In combination with our proprietary diffusion soldering, the reduced thickness further contributes to decrease the overall thermal resistance in the package. The picture on the right shows the temperature increase at the junction under given forward current conditions for the same device area:

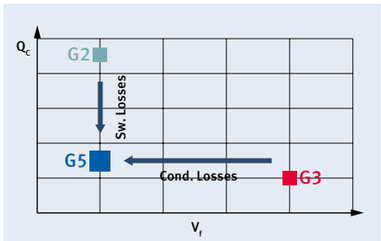
Left: 350µm chip with 60µm soft solder;
middle: 350µm chip with diff. solder;
right: 110µm chip with diff. solder



Generation 5 650V: Best Performance over all Load Conditions

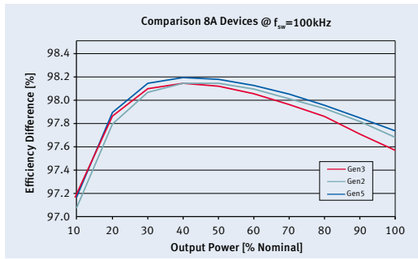
Lower Figure of Merit V_f x Q_c

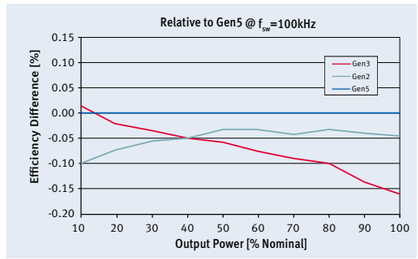
- Gen2 diodes have been optimized with low forward voltage (V_f)
- Gen3 is optimized with low capacitive charge (Q_c)
- Thanks to the technology advance, Gen5 can be optimized to have V_f at Gen2 level and Q_c comparable with Gen3
- On the right picture: device tailoring in Gen5, comparison with Gen2 and Gen3 regarding of Q_c and V_f. Arrows represent the benefit in terms of device lower losses



Performance comparison

Thanks to the similar Q_c values, Gen5 efficiency is comparable to Gen3 at light load, and outperforms it at high load, because of the lower V_f. Gen2 has been optimized for high load performance, and also with respect to this family Gen5 shows clear improvements, mainly at light load; the benefits of Gen5 over Gen2 become even more evident with increasing operating frequency, because of the much lower Q_c values.





CoolSiC™ 1200V SiC JFET & Direct Drive JFET Topology

The new CoolSiC™ 1200V SiC JFET family, in combination with the proposed Direct Drive JFET Topology, represents Infineon's leading edge solution to bring actual designs towards new and so far unattainable efficiency borders. In fact the SiC JFET consistently reduces the switching losses with respect to the available IGBT based Silicon devices and even the conduction losses when its ohmic characteristics are fully exploited. Utmost efficiency at highest power density levels can be reached also thanks to Infineon CoolSiC™ monolithically integrated body diode, showing a switching performance comparable with that of an external SiC Schottky barrier diode. The Infineon SiC JFET, with its ultrafast body diode and dedicated driver, represents the best solution in solar, UPS and industrial drives applications by combining best performance, reliability, safety and ease of use.

Features

- Extremely low and temperature independent switching losses
- Reduced conduction losses at light load with respect to IGBT technologies
- Monolithically integrated body diode
- Dedicated driver for direct JFET control
- High reliability due to missing gate oxide
- Structural elements similar to SiC diodes, with 10 year IFX proved experience in manufacturing

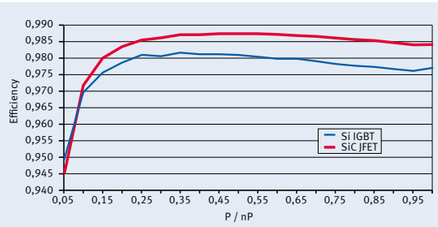
Benefits

- Reduced cooling effort due to reduced losses
- Increase of the operating frequency with consequent shrink of passive components and savings at system level
- Increased power density
- Increase of output power and reduction of specific system cost

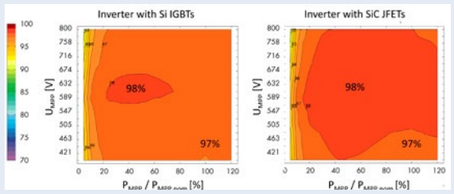
Applications

- Solar
- UPS
- Industrial Drives

Direct measurements in a 3-phase string inverter (Sunny Tripower by SMA) P_{out} max 17kW fsw=16kHz [1)]



Measured system efficiencies at optimum operation point



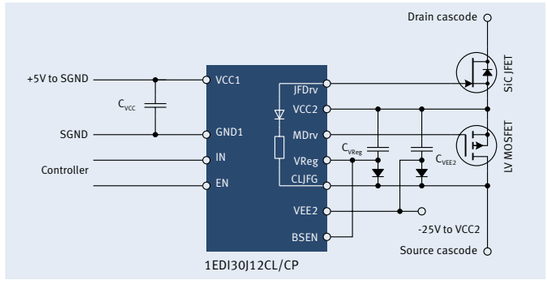
Measured system efficiencies at several DC link voltages (400V up to 800V)

[1)] G. Deboy, H. Ludwig, R. Mallwitz, R. Rupp, „New SiC JFET with Integrated Body Diode Boosts Performance of Photovoltaic Systems" Proc. PCIM, May 2011

Infineon Direct Drive Technology

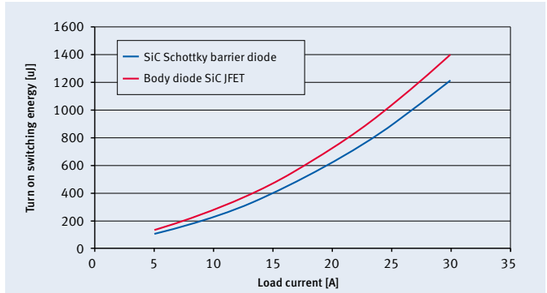
The Infineon approach to SiC switches consists of a simple and safe driver circuit design based on a dedicated driver IC that directly drives both the CoolSiC™ JFET and the LV p-channel MOSFET, as indicated in the picture on the right. The main features of the unique SiC direct drive approach are:

- A low-voltage Si MOSFET is used to insure safe off-state during start up or system failure. During normal operation, the LV MOSFET is turned-on and acts like a small resistance
- A dedicated driver IC operating both normally-on JFET and p-MOS --› enabling a normally-off behavior and best controllability of the JFET



CoolSiC™ JFET Monolithically Integrated Body Diode and Synchronous Rectification

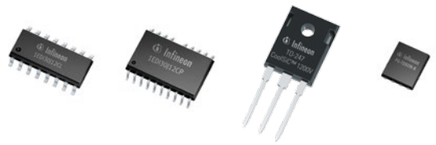
The monolithically integrated body diode has been explicitly optimized to provide a benchmarking switching performance. This decision accounts for the possibility of exploiting the ohmic characteristics of the SiC JFET also in reverse operation with the adoption of a synchronous rectification driving scheme: the relatively high voltage drop of the body diode can be in fact significantly reduced by turning-on the JFET channel in parallel. With such a driving scheme the conduction losses of the diode are negligible, as they play a role only within a very short dead time between turn-off of the channel and commutation of the body diode.



CoolSiC™ 1200V JFET portfolio and recommended driver/LV MOS for Direct Drive JFET Topology

Voltage	$R_{DS(on)}$	Sales name	JFET Package	Driver	Driver Package	LV MOS	LV MOS Package
1200	70	IJW120R070T1	TO247	1EDI30J12CL/CP	DSO-16-20/19-4	BSC030P03NS3 G	SuperSO8
	100	IJW120R100T1	TO247	1EDI30J12CL/CP	DSO-16-20/19-4	BSC030P03NS3 G	SuperSO8
1200	70	IJC120R070T1	Bare die	1EDI30J12CL/CP	DSO-16-20/19-4	IPC099P03N	Bare die
	100	IJC120R100T1	Bare die	1EDI30J12CL/CP	DSO-16-20/19-4	IPC099P03N	Bare die

Further information on the JFET driver available on page 113



600V Silicon Carbide High Voltage Schottky Diodes thinQ!™ G2

I_F [A]	TO-252 DPAK	TO-263 D²PAK	TO-220 real2pin	TO-220 FullPAK
2				IDV02S60C [1]
3				IDV03S60C [1]
4	IDD04S60C		IDH04S60C	IDV04S60C [1]
5			IDH05S60C	IDV05S60C [1]
6		IDB06S60C [1]	IDH06S60C	IDV06S60C [1]
8			IDH08S60C	
10		IDB10S60C [1]	IDH10S60C	
12			IDH12S60C	
16			IDH16S60C	

600V Silicon Carbide High Voltage Schottky Diodes thinQ!™ G3

I_F [A]	TO-252 DPAK	TO-263 D²PAK	TO-220 real2pin	TO-220 FullPAK
3	IDD03SG60C		IDH03SG60C	
4	IDD04SG60C		IDH04SG60C	
5	IDD05SG60C		IDH05SG60C	
6	IDD06SG60C		IDH06SG60C	
8	IDD08SG60C		IDH08SG60C	
9	IDD09SG60C		IDH09SG60C	
10	IDD10SG60C		IDH10SG60C	
12	IDD12SG60C		IDH12SG60C	

650V Silicon Carbide High Voltage Schottky Diodes thinQ!™ G5

I_F [A]	TO-220 R2L	TO-247	D²PAK R2L	ThinPAK 8x8
2	IDH02G65C5		IDK02G65C5	IDL02G65C5
3	IDH03G65C5		IDK03G65C5	
4	IDH04G65C5		IDK04G65C5	IDL04G65C5
5	IDH05G65C5		IDK05G65C5	
6	IDH06G65C5		IDK06G65C5	IDL06G65C5
8	IDH08G65C5		IDK08G65C5	IDL08G65C5
9	IDH09G65C5		IDK09G65C5	
10	IDH10G65C5	IDW10G65C5	IDK10G65C5	IDL10G65C5
12	IDH12G65C5	IDW12G65C5	IDK12G65C5	IDL12G65C5
16	IDH16G65C5	IDW16G65C5		
20	IDH20G65C5	IDW20G65C5		
30		IDW30G65C5		
40		IDW40G65C5		

[1] not recommended for new designs

1200V Silicon Carbide High Voltage Schottky Diodes thinQ!™

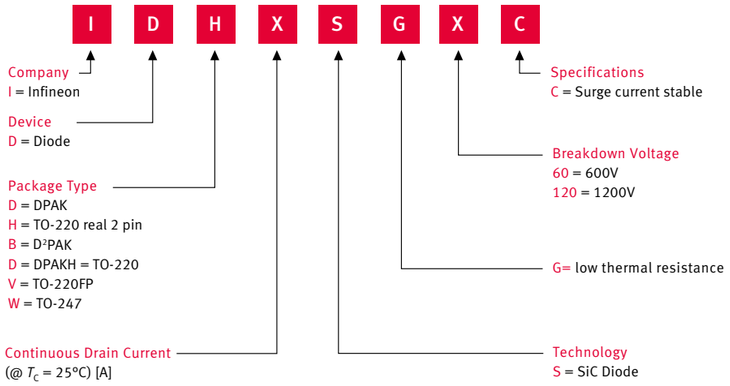
I_F [A]	TO-252 DPAK	TO-263 D²PAK	TO-220 real2pin	TO-247
2			IDH02SG120	
5			IDH05S120	
8			IDH08S120	
10			IDH10S120	IDW10S120
15			IDH15S120	IDW15S120
20				IDW20S120
30				IDW30S120

1200V CoolSiC™ JFET

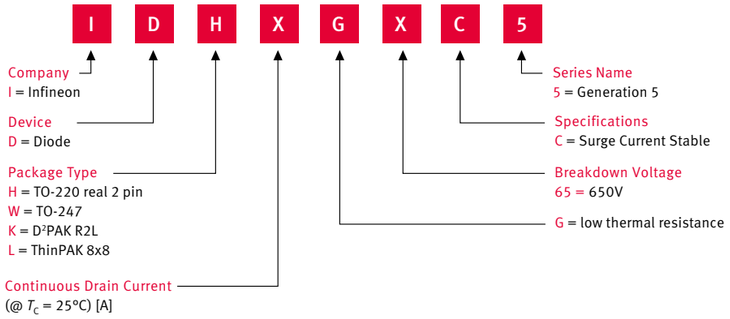
$R_{DS(on)}$	TO-252 DPAK	TO-263 D²PAK	TO-220 real2pin	TO-247
70				IJW120R070T1
100				IJW120R100T1

Naming System

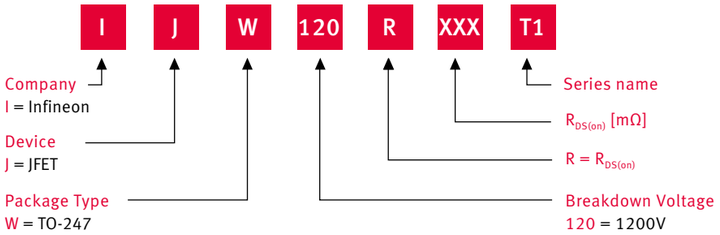
thinQ!™ Silicon Carbide Schottky Diodes Generation 2 and 3

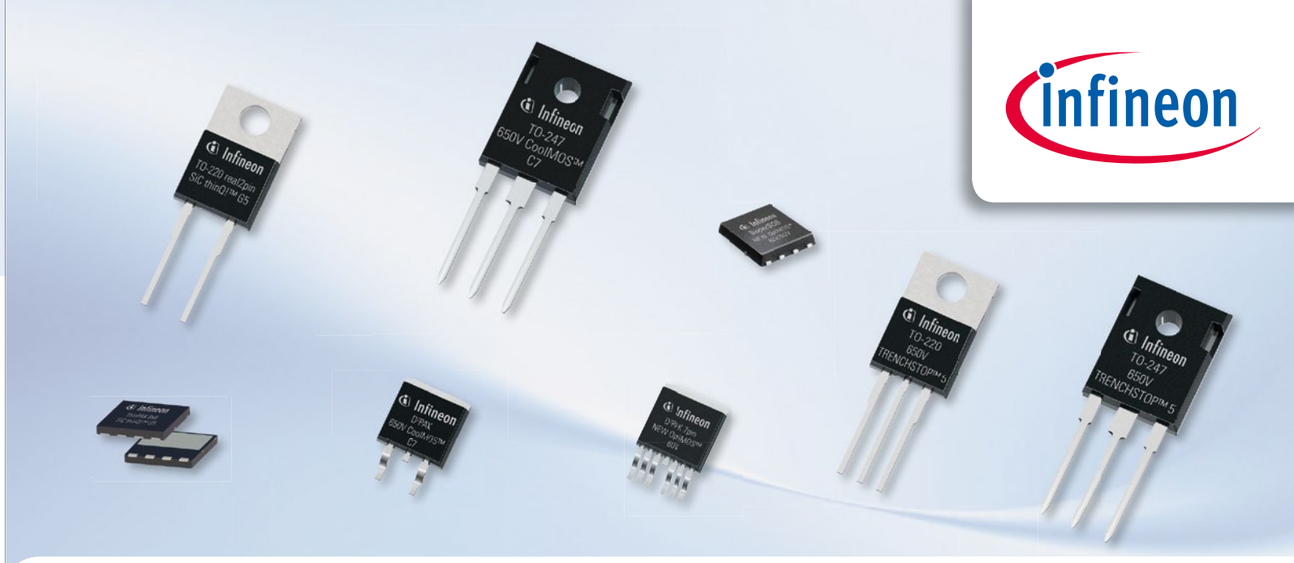


thinQ!™ Silicon Carbide Schottky Diodes Generation 5



CoolSiC™ Silicon Carbide JFET





We are the Leader in Energy Efficiency Technologies

Infineon's products are enormously important for future energy supplies in terms of both exploiting renewables and using energy efficiently. Explore our wide offer of high-end products for your application:

650V CoolMOS™ C7 – in touch with world leading performance

- Revolutionary Best-in-Class $R_{DS(on)}$/package
- Reduced Q_g and E_{OSS} values enabling improved light load efficiency
- Best-in-Class Figure of Merit ($R_{DS(on)}$ * Q_g)
- 650V suitable for both SMPS and Solar applications

New OptiMOS™ 40V/60V – shrink your design and boost efficiency

- Industry's first 1mΩ 40V product in SuperSO8
- 35% lower $R_{DS(on)}$ than alternative devices
- Highest system efficiency and power density
- Best fit for applications such as Synchronous Rectification, Solar Micro Inverter, isolated DC/DC Converters, Motor Control for 12-36V systems and Oring Switches

650V thinQ!™ SiC Diodes Gen 5 – improve efficiency and solution costs

- V_{br} increased from 600V to 650V
- Improved efficiency over all load conditions
- Best fit for applications such as Server, Telecom, PC Silverbox, Solar, UPS and Lighting

650V TRENCHSTOP™ 5 – redefining the „Best-in-Class" IGBT

- More than 1% PFC efficiency improvement at 70kHz
- Q_g reduced by a factor of 2.5
- Total losses reduced by a factor of 2
- Best fit for PV Inverters, UPS, Welders and all hard switching applications in PFC and PWM topologies

For further information please visit our website:
www.infineon.com/power_management_new_products

IGBT

We are famous for IGBT technology leadership and offer a comprehensive portfolio for the general purpose inverters, solar inverters, UPS, Induction heating, Microwave Oven, Rice cookers, Welding and SMPS segments.

Benefits
- IGBTs offer much higher current density than MOSFET power switches due to bipolar action
- Insulated gate allows bipolar performance with MOSFET gate drive performance
- High efficiency = smaller heat sink which leads to lower overall system cost
- 175°C $T_{j(max)}$ leading to higher reliability

Soft Switching/Resonant and Hard Switching Topologies are Comprehensively Supported

Infineon has a huge portfolio addressing the following two switching techniques:

Soft Switching/resonant
- The world famous IHW series IGBTs – #1 best selling family worldwide
- Available in 600V, 1100V, 1200V, 1350V and 1600V voltage classes
- Best-in-Class efficiency and robustness

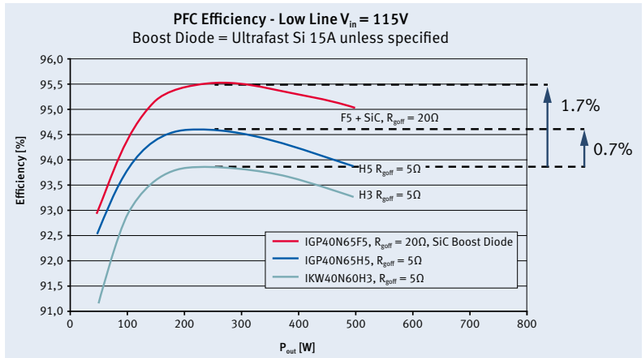
Hard Switching
- 600V RC-D IGBTs
- 600V RC-Drives Fast
- 600V TRENCHSTOP™ DuoPack IGBTs
- 600V/1200V HighSpeed 3
- 1200V TRENCHSTOP™2
- 650V TRENCHSTOP™5

Preview

- Low $V_{CE(sat)}$ 650V: Low $V_{CE(sat)}$ optimized IGBT based on TRENCHSTOP™5 platform for mix frequency topologies e.g. 3 level NPC and asymmetrical H4. Meanwhile, characteristics of low switching losses maintained to address requirement of reactive power.
- RC-H5 650V/1200V/1350V: The upcoming RC-H5 devices for 650V will be based on the TRENCHSTOP™5 technology and offers an increase in breakdown voltage improving the reliability of the system. There will be two versions available: for lower conduction losses for switching frequencies around 20kHz and a fast version for lowers switching losses for frequencies above 40kHz. All versions of the new 1200V/1350V RC-H5 IGBT will also have a reduced E_{off} (turn-off energy) to lower the device losses or allow designers to increase the switching frequency for higher system efficiency and a better system cost/performance trade-off.

TRENCHSTOP™5

In terms of switching and conduction losses, there is no other IGBT on the market that can match the performance of the TRENCHSTOP™5. TRENCHSTOP™5 is the next generation of thin wafer technology for applications switching ›10kHz. Wafer thickness has been reduced by ›25%, which enables a dramatic improvement in both switching and conduction losses, whilst providing a breakthrough voltage of 650V. Translating this Best-in-Class efficiency application tests show ›25% reduction in package temperature when performing a plug and play approach with Infineon's previous Best-in-Class IGBT, the "HighSpeed 3". Even more revolutionary, when replacing a TO-247 HighSpeed 3 IGBT with the TRENCHSTOP™5 in a TO-220, case temperatures are ›10% lower for the TRENCHSTOP™5. The quantum leap of efficiency improvement provided by the TRENCHSTOP™5 opens up new opportunities for designers to explore



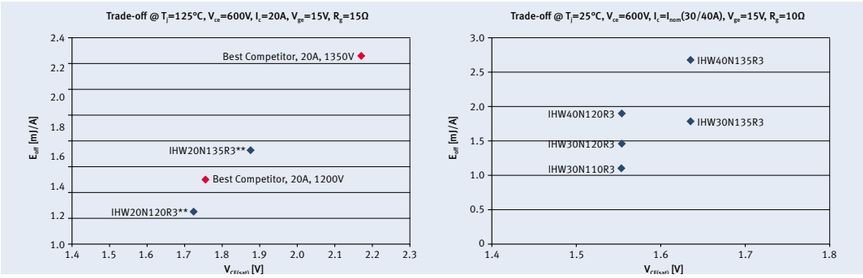
Features:
- 650V breakthrough voltage
- Compared to Infineon's Best-in-Class "HighSpeed 3" family
  - Factor 2.5 lower Q_g
  - Factor 2 reduction in switching losses
  - 200mV reduction in $V_{CE(sat)}$
- Co-packed with Infineon's new "Rapid" Si-diode technology
- Low C_{oss}/E_{oss}
- Mild positive temperature coefficient $V_{CE(sat)}$
- Temperature stability of V_f

Benefits
- Best-in-Class efficiency, resulting in lower junction and case temperature leading to higher device reliability
- 50V increase in the bus voltage possible without compromising reliability
- Higher power density designs

See page 82 for TRENCHSTOP™5 Selection Tree.

3rd Generation Reverse Conducting IGBT

The 3rd generation of reverse conducting IGBTs has been optimized for lower switching and conduction losses. Reduced power dissipation together with soft switching behavior allows better thermal performance and EMI behavior resulting in lower system costs. Excellent performance can be achieved at lower costs. Infineon RC-H technology has set the benchmark of $T_{j(max)}$ of 175°C to offer higher lifetime reliability. Recent portfolio extension to 30A and 40A at 1200V and 1350V defines the new trend for higher power density and better reliability devices. 40A 1350V device is capable for switching up to 50kHz with $V_{CE(sat)}$ value of 1.65V at 25°C – a staggering 5% lower loss than the next best competitor.



** 5% lower conduction losses than the best competitor in 1200V and 1350V

Features:

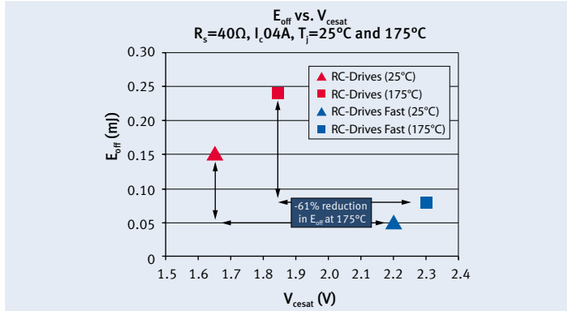
- Best-in-Class conduction properties in $V_{CE(sat)}$ and V_f
- Lowest switching losses, highest efficiency
- $T_{j(max)}$ = 175°C
- Soft current turn-off waveforms for low EMI
- Higher breakthrough voltage $V_{BR(min)}$ = 1350V

Benefits

- Lowest power dissipation
- Better thermal management
- Surge current capability
- Lower EMI filtering requirements
- Reduced system costs
- Excellent quality
- Highest reliability against peak currents

RC-Drives and RC-Drives Fast

The RC-Drives IGBT technology is a cost optimized solution for the price-sensitive consumer drives market that provides outstanding performance for permanent magnet synchronous and brushless DC motor drives. The new family of reverse conducting RC-Drives Fast was developed to meet rising demand for the low power motor drives in consumer market. IGBT and diode losses were reoptimized to reduce losses at frequencies of 4 ~ 30kHz. RC-Drives Fast enables high efficiency designs for inverters above 16kHz to reduce the audible noise to absolutely silent level. Furthermore highly precise vector control techniques can be used to provide more torque in operation at low speed and high performance dynamics in the control at high speed. The small size of the components allows high power density designs with less system costs



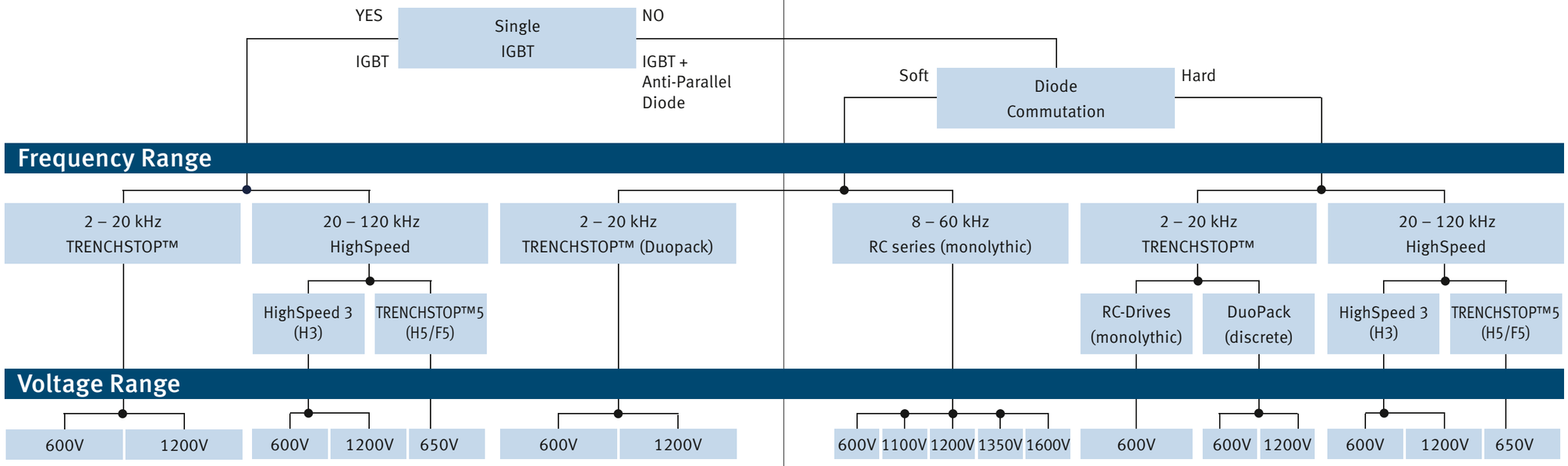
Features

- Optimized E_{on}, E_{off} and Q_{rr} for up to 20% lower switching losses
- Operating range of DC to 30kHz
- Max junction temperature 175°C
- Short circuit capability of 5µs
- Very tight parameter distribution
- Best-in-Class current versus package size performance
- Smooth switching performance leading to low EMI levels
- Complete product portfolio and PSpice Models on the internet

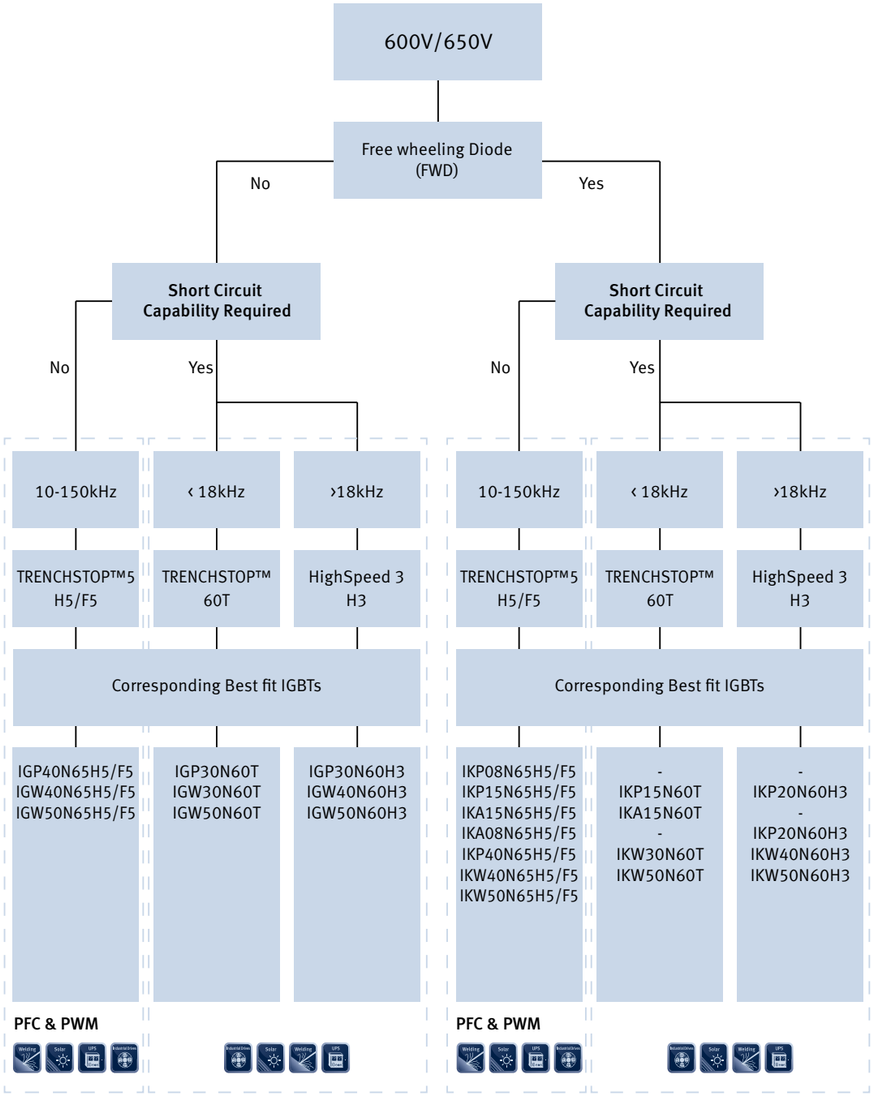
Benefits

- Excellent cost/performance for hard switching applications
- Outstanding temperature stability
- Very good EMI behavior
- Up to 60% space saving on the PCB
- Higher reliability due to monolithically integrated IGBT & diode due to less thermal cycling during switching

IGBT Selection Tree



TRENCHSTOP™5 Selection Tree



TRENCHSTOP™ and RC-Drives IGBT

600V Product Family

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
Single IGBT	6		IGD06N60T		IGP06N60T			
	10			IGB10N60T	IGP10N60T			
	15			IGB15N60T	IGP15N60T			
	30			IGB30N60T				IGW30N60T
	50			IGB50N60T	IGP50N60T			IGW50N60T
	75							IGW75N60T
IGBT and Diode	3		IKD03N60RF					
	4		IKD04N60RF IKD04N60R		IKP04N60T	IKI04N60T		
	6		IKD06N60RF IKD06N60R	IKB06N60T	IKP06N60T		IKA06N60T	
	10		IKD10N60RF IKD10N60R	IKB10N60T	IKP10N60T		IKA10N60T	
	15		IKD15N60RF IKD15N60R	IKB15N60T	IKP15N60T		IKA15N60T	
	20			IKB20N60T	IKP20N60T			IKW20N60T
	30							IKW30N60T
	50							IKW50N60T
	75							IKW75N60T

TRENCHSTOP™ IGBT and DuoPack

1200V Product Family

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247	
								TRENCHSTOP™	TRENCHSTOP™ 2
Single IGBT	8							IGW08T120	
	15							IGW15T120	
	25							IGW25T120	
	40							IGW40T120	
	60							IGW60T120	
DuoPack	8							IKW08T120	
	15							IKW15T120	IKW15N120T2
	25							IKW25T120	IKW25N120T2
	40							IKW40T120	IKW40N120T2

Induction Cooking Series Portfolio

Portfolio for 600V, 1100V, 1200V, 1350V & 1600V

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-247				
							600V	1100V	1200V	1350V	1600V
IGBT & Diode	15										
									IHW15N120R3		
	20						IKW20N60H3		IHW20N120R3	IHW20N135R3	
	25								IHW25N120R2		
	30						IHW30N60T	IHW30N110R3	IHW30N120R3	IHW30N135R3	IHW30N160R2
							IKW30N60H3		IHW30N120R2		
	40						IHW40T60		IHW40N120R3	IHW40N135R3	
							IHW40N60R		IHW40T120		
							IHW40N60RF				
	50						IKW50N60H3				
	60						IKW60N60H3				
	75						IKW75N60H3				

HighSpeed 2 IGBT and DuoPack

1200V Product Family

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
IGBT	1		IGD01N120H2	IGB01N120H2	IGP01N120H2			
	3			IGB03N120H2	IGP03N120H2		IGA03N120H2	IGW03N120H2
DuoPack	3			IKB03N120H2	IKP03N120H2		IKA03N120H2	IKW03N120H2

HighSpeed 3 IGBT and DuoPack

600V Product Family

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
IGBT	20			IGB20N60H3	IGP20N60H3			IGW20N60H3
	30			IGB30N60H3	IGP30N60H3		IGA30N60H3	IGW30N60H3
	40							IGW40N60H3
	50							IGW50N60H3
	60							IGW60N60H3
	75							IGW75N60H3
	100							IGW100N60H3
DuoPack	20			IKB20N60H3	IKP20N60H3			IKW20N60H3
	30							IKW30N60H3
	40							IKW40N60H3
	50							IKW50N60H3
	60							IKW60N60H3
	75							IKW75N60H3

HighSpeed 3 IGBT and DuoPack

1200V Product Family

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
IGBT	15							IGW15N120H3
	25							IGW25N120H3
	40							IGW40N120H3
DuoPack	15							IKW15N120H3
	25							IKW25N120H3
	40							IKW40N120H3

TRENCHSTOP™5 Product Spectrum

Continuous collector current a T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247
IGBT	40				IGP40N65F5/H5			IGW40N65F5/5
	50							IGW50N65F5/5
DuoPack	8				IKP08N65F5/H5		IKA08N65F5/H5	
	15				IKP15N65F5/H5		IKA15N65F5/H5	
	40				IKP40N65F5/H5			IKW40N65F5/H5
	50							IKW50N65F5/H5

Naming System

Discretes IGBT and High Power Silicon Diodes

I	K	W	40	N	120	H	3

Company
I = Infineon
S = Formerly Siemens

Device
K = IGBT + Diode (normal drives)
H = optimised for soft switching applications (e.g. induction heating)
G = Single IGBT
D = Diode

Package Type
A = TO-220 FullPAK
B = TO-263 (D^2PAK)
D = TO-252 (DPAK)
P = TO-220
U = TO-251 (IPAK)
W = TO-247
I = I^2PAK
V = Real 2pin TO-220 FP } diodes only
P = Real 2Pin TO-220 }

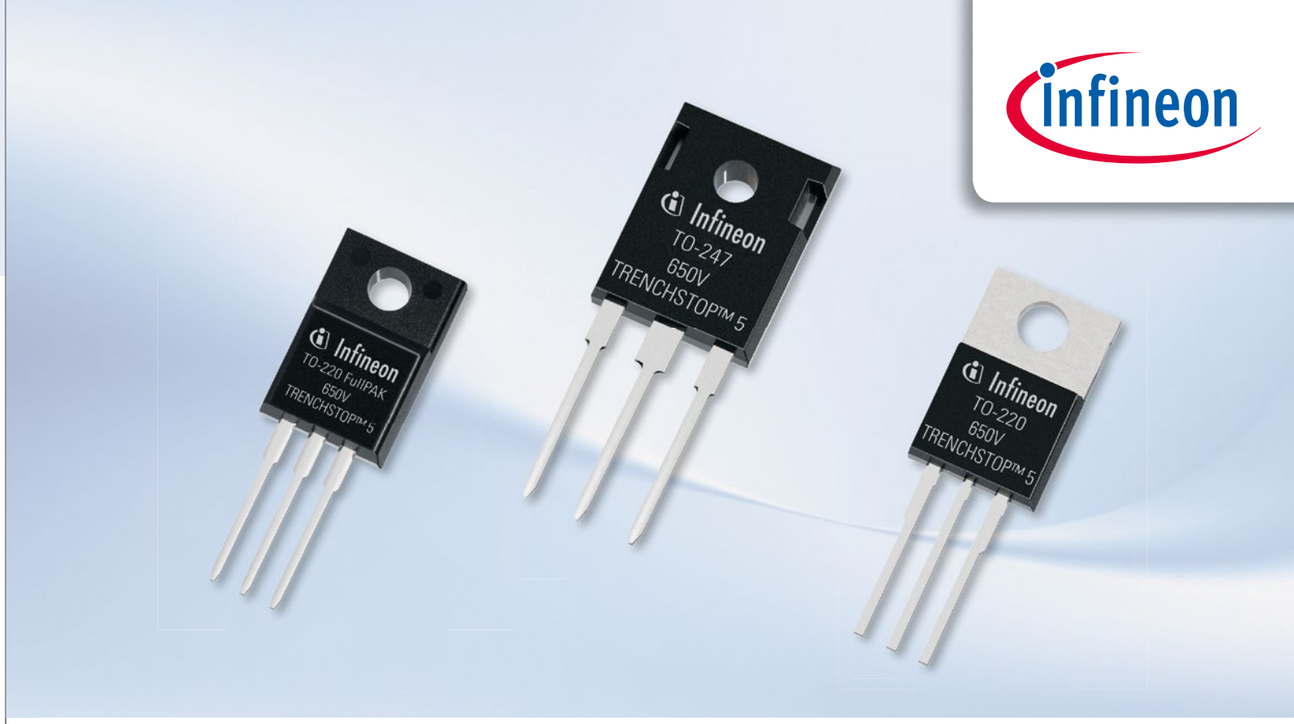
Nominal Current
(@ 100°C) [A]

Technology
N = N-Channel
T = TRENCHSTOP™
E = Emitter Controlled Diodes (for diode only)

Nominal Voltage
Divided by 10 (1200V/10 = 120)

– = Fast IGBT (~20kHz)
HX = HighSpeed Generation (600 - 1200V)
TX = TRENCHSTOP™ Generation (600V IGBT3) (1200V IGBT4)
RX = Reverse Conducting
RF = Reverse Conducting Fast
F = HighSpeed FAST 5
RX = Rapid Diode Generation

Generation



650V TRENCHSTOP™5

Introducing a Technology to Match Tomorrow's High Efficiency Demands

The new TRENCHSTOP™5 IGBT technology from Infineon redefines the "Best-in-Class IGBT" by providing unmatched performance in terms of efficiency. When high efficiency, lower system costs and increased reliability are demanded, TRENCHSTOP™5 is the only option. The new TRENCHSTOP™5 IGBTs deliver a dramatic reduction in switching and conduction losses – for example in application measurement 1.7% efficiency improvement – whilst also offering a 650V breakthrough voltage. Can you afford to wait for the competition to catch up?

Key features and benefits of the brand new 650V TRENCHSTOP™5 IGBT technology

- New benchmark in terms of Best-in-Class efficiency
- Lowest ever switching losses
- $V_{CE(sat)}$ more than 10% lower than previous generation
- 650V breakthrough voltage
- Temperature stable V_f value of Infineon's free-wheeling Rapid diode
- 2.5 factor lower Q_g compared to HighSpeed 3

For further information please visit our website:
www.infineon.com/trenchstop5

High Power Silicon Diodes

Infineon's New Rapid Diode Family

Infineon brings thin wafer technology expertise to offer two brand new 650V hyperfast diode families that offer outstanding efficiency and EMI behaviour.

Rapid 1 is forward voltage drop (V_F) optimized to address low switching frequency applications
Optimized for applications switching up to 40kHz, for example air conditioner and welder PFC stages and the boost stages of photovoltaic inverters.

Features

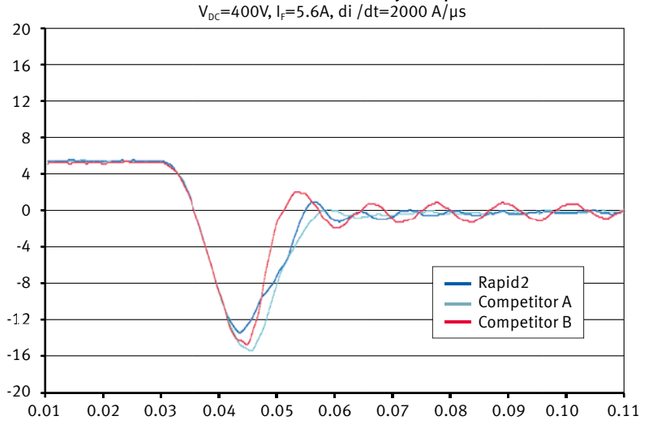
- Temperature stable forward voltage (V_F) of 1.35V
- 650V breakthrough voltage
- Low reverse recovery current (I_{rrm})
- Soft reverse recovery for outstanding EMI behaviour
- t_{rr} < 50ns

Rapid 2 is Q_{rr}/t_{rr} optimized hyperfast diode to address high speed switching applications
Optimized for applications switching between 40kHz and 100kHz typically found in PFCs in high efficiency switch mode power supplies (SMPS) and welding machines.

Features

- Temperature stable forward voltage (V_F) of 1.6V
- t_{rr} < 20ns
- Soft reverse recovery for outstanding EMI behaviour
- Excellent cost optimized alternative to silicon carbide (SiC) diodes

Boost diode reverse recovery comparison
V_{DC}=400V, I_F=5.6A, di /dt=2000 A/µs



Rapid2 combines low I_{RRM} and high softness ratio to achieve a low Q_{rr} and an outstanding EMI behavior. Low Q_{rr} will minimize the power losses of the power switch in a PFC. Here the comparison for 600V/8A devices for an 800W PFC.

Rapid Diode Families 1st Wave Release

650V Product Family

PC Power · Welding · Solar · SMPS · Server · Telecom

Continous Current I_c T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 real 2-leg Halogen-Free	TO-262 Halogen-Free	TO-220 FullPAK real 2-leg Halogen-Free	TO-247
Rapid1	8				IDP08E65D1			
	15				IDP15E65D1			
	30							IDW30E65D1
	40							IDW40E65D1
Rapid2	8				IDP08E65D2		IDV08E65D2	
	15				IDP15E65D2		IDV15E65D2	IDW15E65D2
	40				IDP40E65D2			IDW40E65D2

Discrete Emitter Controlled Diodes

600V and 1200V

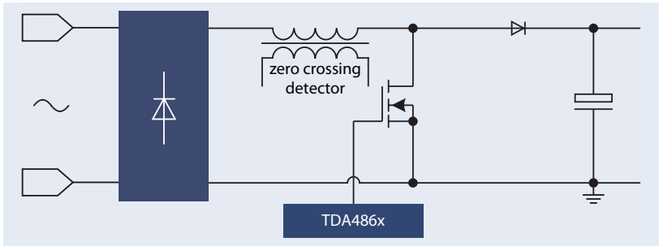
AC/DC

Continous Current I_c T_c=100°C		TO-251	TO-252 DPAK Halogen-Free	TO-263 D²PAK Halogen-Free	TO-220 Real 2pin Halogen-Free	TO-220 FullPAK Real 2pin Halogen-Free 600V	TO-247
600V	3		IDD03E60				
	6		IDD06E60	IDB06E60	IDP06E60		
	9		IDD09E60	IDB09E60	IDP09E60		
	15		IDD15E60	IDB15E60	IDP15E60		
	23			IDB23E60	IDP23E60		
	30			IDB30E60	IDP30E60	IDV30E60C	IDW30E60
	45			IDB45E60	IDP45E60		
	50						IDW50E60
	75						IDW75E60
	100						IDW100E60
1200V	4				IDP04E120		
	9				IDP09E120		
	12			IDB12E120	IDP12E120		
	18			IDB18E120	IDP18E120		
	30			IDB30E120	IDP30E120		

See page 86 for naming system.

Power Factor Correction and Combo Controller

Discontinuous Conduction Mode PFC ICs



TDA4862

Power Factor Controller (PFC) IC for high-power factor and active harmonic filter

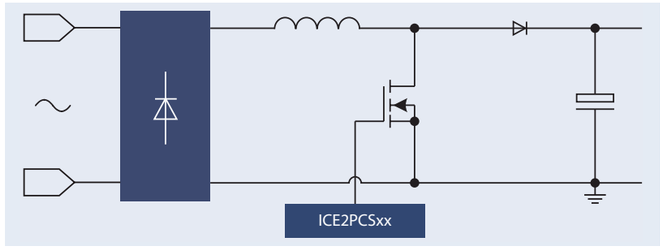
- IC for sinusoidal line-current consumption
- Power factor approaching 1
- Controls boost converter as an active harmonics filter
- Internal start-up with low current consumption
- Zero current detector for discontinuous operation mode
- High current totem pole gate driver
- Trimmed ±1.4% internal reference
- Undervoltage lock out with hysteresis
- Very low start-up current consumption
- Pin compatible with world standard
- Output overvoltage protection
- Current sense input with internal low pass filter
- Totem pole output with active shutdown during UVLO
- Junction temperature range -40°C to +150°C
- Available in DIP-8 and SO-8 packages

TDA4863 / TDA4863-2

Power Factor Controller IC for high-power factor and low THD additional features to TDA4862

- Reduced tolerance of signal levels
- Improved light load behavior
- Open loop protection
- Current sense input with leading edge blanking LEB
- Undervoltage protection

Continuous Conduction Mode PFC ICs



2nd Generation Continuous Conduction Mode (CCM) Power Factor Correction IC Features

- Fulfills Class D Requirements of IEC 61000-3-2
- Lowest count of external components
- Adjustable and fixed sw frequencies
- Frequency range from 20kHz to 285kHZ
- Versions with brown-out protection available
- Wide input range supported
- Enhanced dynamic response during load jumps
- Cycle by Cycle Peak Current Limiting
- Integrated protections OVP, OCP
- DIP8 and DSO8
- Leadfree, RoHS compliant

2nd Generation Continuous Conduction Mode (CCM) Power Factor Correction IC Product Portfolio

Product	$Frequency_{(SW)}$	Current Drives	Package
ICE2PCS01	50kHz-285kHz	2.0A	DIP-8
ICE2PCS02	65kHz	2.0A	
ICE2PCS03	100kHz	2.0A	
ICE2PCS04	133kHz	2.0A	
ICE2PCS05	20kHz-250kHz	2.0A	
ICE2PCS01G	50kHz-250kHz	2.0A	DSO-8
ICE2PCS02G	65kHz	2.0A	
ICE2PCS03G	100kHz	2.0A	
ICE2PCS04G	133kHz	2.0A	
ICE2PCS05G	20kHz-250kHz	2.0A	

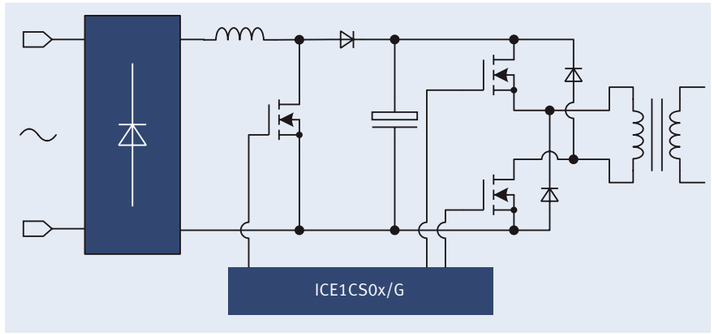
3rd Generation Continuous Conduction Mode (CCM) Power Factor Correction IC Features

- Fulfills Class D Requirements of IEC 61000-3-2
- Integrated digital voltage loop compensation
- Boost follower function
- Bulk voltage monitoring signals, brown-out
- Multi protections such as Double OVP
- Fast output dynamic response during load jump
- External synchronization
- Extra low peak current limitation threshold
- SO8 and SO14
- Leadfree, RoHS compliant

Fixed Frequency PWM IC and CoolSET™ Product Portfolio

Product	$Frequency_{(SW)}$	Current Drives	Features	Package
ICE3PCS01G	Adjustable	0.75A	OVP+Brown-out	DSO-14
ICE3PCS02G		0.75A	OVP	DSO-8
ICE3PCS03G		0.75A	Brown-out	DSO-8

Combination of Continuous Conduction Mode PFC with Two-Transistor Forward PWM IC



- Pre-short protection
- Trimmed reference voltage ±2.5% (±2% at 25°C)
- BiCMOS technology for wider V_{CC} range

Power Factor Correction Block

- Fulfills Class D Requirements of IEC 61000-3-2
- Fixed switching frequency (sync to half PWM freq.)
- AC brown-out protection
- Average current control
- Max duty cycle of 95%
- Enhanced dynamic response for fast load response
- Unique soft-start to limit start up current
- Over-voltage protection

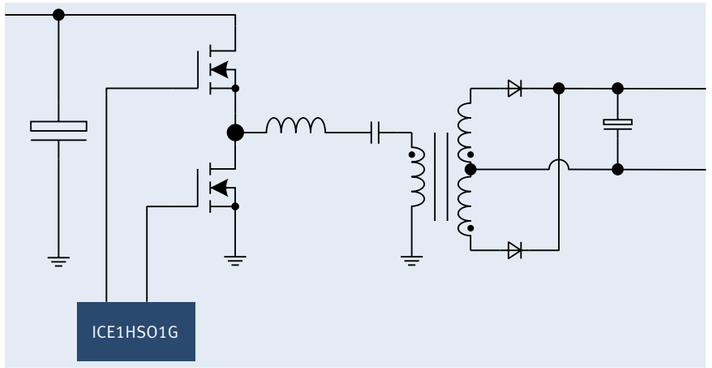
Pulse-Width-Modulation Block

- Fixed switching frequency
- Option for external control synchronization
- Built in soft start for higher reliability
- Max duty cycle 47% or 60%
- Overall tolerance of current limiting <±5%
- Internal leading edge blanking
- Slope compensation
- Fast, soft switching totem pole gate drive (2A)
- SO16 and DIP16
- Pb-free lead plating and RoHS compilant
- All protection features available

Product	$Frequency_{(SW)}$	Current Drives	Package
ICE1CS02	PFC=65kHz PWM=130kHz	2.0A	DIP-16
ICE1CS02G		2.0A	DSO-16

Resonant LLC Half-Bridge Controller IC

LLC Resonant (No SR)

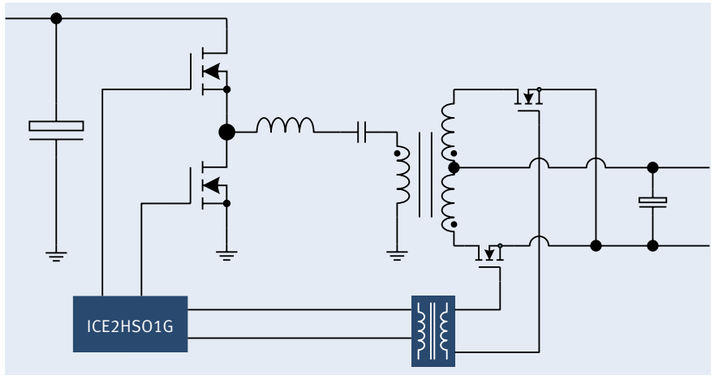


- Novel and simple design (12 components + HB driver)
- Minimum operating frequency is adjustable externally
- Burst mode operation for output voltage regulation during no load and/or bus over-voltage
- Multiple protections in case fault
- Input voltage sense for brown-out protection
- Open loop/over load fault detection by FB pin with auto-restart and adjustable blanking/restart time
- Frequency shift for over-current protection
- Lead Free, RoHS compliant package
- DSO-8 package

Product	Frequency$_{(SW)}$	Dead Time(ns)	Current Drives	Package
ICE1HS01G	30kHZ~600kHz	380	1.5A	DSO-8

Resonant LLC Half-Bridge Controller IC with Integrated Sychronised Rectifier Control

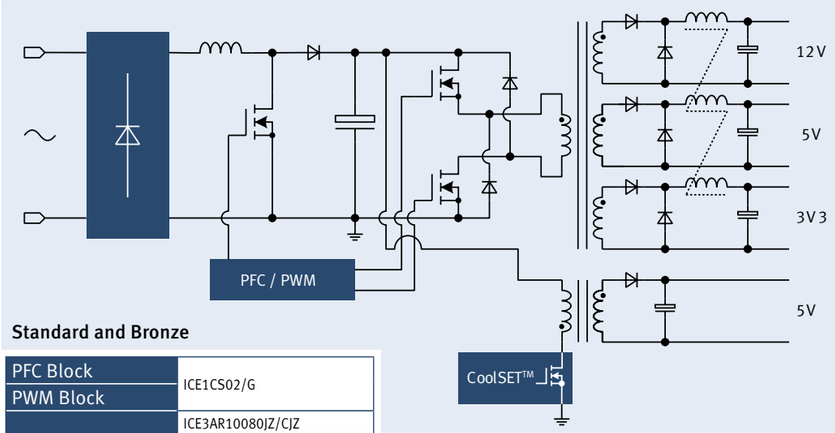
LLC Resonant + SR



- Novel LLC/SR operation mode and controlled by primary side controller
- Multiple protections for SR operation
- Tight tolerance control
- Accurate setting of switching frequency and dead time
- Simple system design
- Optimized system efficiency
- Multiple converter protections: OTP, OLP, OCP, latch-off enable
- External disable for either SR switching or HB switching
- Lead free, RoHS compliant package
- DSO-20 package

Product	Frequency$_{(SW)}$	Dead Time(ns)	Current Drives	Package
ICE2HS01G	30kHz~1MHz	125ns~2us	0.3A	DSO-20

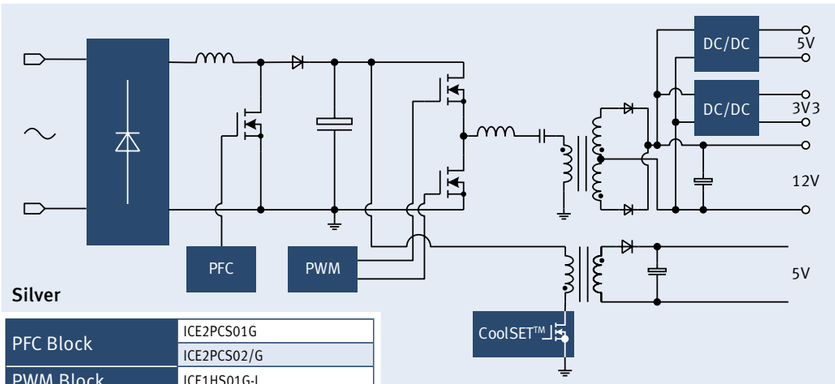
Climate Saver Standard and Bronze



Standard and Bronze

PFC Block	ICE1CS02/G
PWM Block	
Standby Block CoolSET™	ICE3AR10080JZ/CJZ
	ICE3AR4780JZ
	ICE3AR2280JZ/CJZ
	ICE3AR0680JZ

Climate Saver Silver



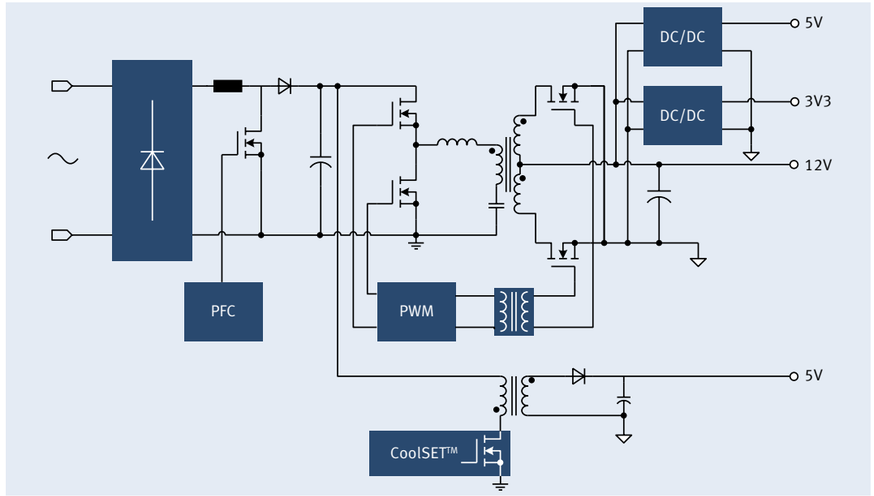
Silver

PFC Block	ICE2PCS01G
	ICE2PCS02/G
PWM Block	ICE1HS01G-I
Standby Block CoolSET™	ICE3AR10080JZ/CJZ
	ICE3AR4780JZ
	ICE3AR2280JZ/CJZ
	ICE3AR0680JZ
	ICE2QR4765
	ICE2QR1765
	ICE2QR0665

Climate Saver Gold

Climate Saver 80 PLUS® Platinum

Certification for Infineon's Silverbox reference design



Gold

PFC Block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM Block	ICE2HS01G
Standby Block CoolSET™	ICE3AR10080JZ/CJZ
	ICE3AR4780JZ
	ICE3AR2280JZ/CJZ
	ICE3AR0680JZ
	ICE3BR2280JZ
	ICE3BR0680JZ

80 PLUS® Platinum

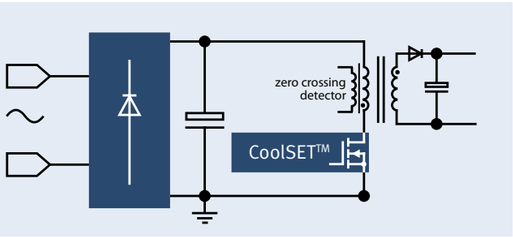
Certification for Infineon's Silverbox reference design

PFC Block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM Block	ICE2HS01G
Standby Block CoolSET™	ICE2QR4780Z
	ICE2QR2280Z
	ICE2QR0680Z
	ICE2QR2280G

For further information visit www.infineon.com/silverbox

Isolated AC/DC

Quasi-resonant PWM IC and CoolSET™ Features



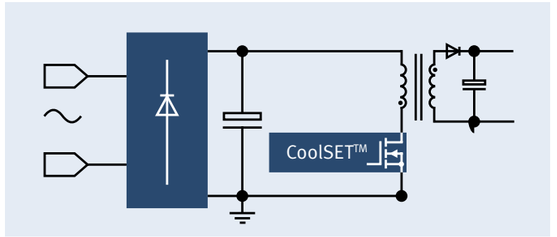
- Integrated 650V CoolMOS™ or HV start-up cell for IC self-power supply
- Quasi-resonant operation with Digital Frequency Reduction
- High average efficiency over wide load range
- Stable operation without jittering/audible noise problem
- Active burst mode operation for very low stby losses (to achieve standby power <100mW)
- Auto restart mode for V_{CC} under-voltage/over-voltage protection
- Auto restart mode for open-loop and output overload protection
- Auto restart mode for over-temperature protection
- Latch-off mode for output over-voltage, short-winding
- BiCMOS technology (controller) for wide V_{cc} operation and low IC power consumption
- Peak power limitation with input voltage compensation
- Minimum switching frequency limitation (no audible noise on power units on/off)
- DIP & DSO package (for controllers and CoolSET™)
- PB-free plating and RoHS compliance

Quasi-resonant PWM IC and CoolSET™ Product Portfolio

Product	V_{DS} (breakdown)	$R_{(DS)on}$	Power (Universal)	Package
ICE2QS02G				DSO-8
ICE2QS03				DIP-8
ICE2QS03G				DSO-8
ICE2QR4765Z	650V	4.7Ω	18W	DIP-7
ICE2QR4765	650V	4.7Ω	19W	DIP-8
ICE2QR4765G	650V	4.7Ω	17W	DSO-12
ICE2QR1765Z	650V	1.7Ω	30.6W	DIP-7
ICE2QR1765	650V	1.7Ω	33W	DIP-8
ICE2QR1765G	650V	1.7Ω	28W	DSO-12
ICE2QR0665/Z/G	650V	0.6Ω	50W/45W	DIP-8/DIP-7/DSO-12
ICE2QR1065Z	650V	1.0Ω	41W	DIP-7
ICE2QR4780Z	800V	4.7Ω	22W	DIP-7
ICE2QR2280Z	800V	2.2Ω	30W	DIP-7
ICE2QR2280Z/G-1[1]	800V	2.2Ω	30W	DIP-7/DSO-12
ICE2QR2280G	800V	2.2Ω	30W	DSO-12
ICE2QR0680Z	800V	0.6Ω	57W	DIP-7

[1] Low V_{ccoff}
[2] CJZ can operate at CCM mode

Fixed Frequency PWM IC and CoolSET™ Features



- Active Burst Mode to achieve the lowest standby power requirements < 50 mW
- Optional latched off mode (L) to increase robustness and safety of the system
- Adjustable blanking window for high load jumps to increase reliability
- Startup cell switched off after start up
- 65kHz/100kHz/130kHz internally fixed switching frequency
- Over-temperature, over-voltage, short-winding, overload and open-loop, V_{CC} under-voltage, (Brown-out) protections
- Fixed softstart time
- Overall tolerance of current limiting < ±5%
- Internal leading edge blanking time
- Max duty cycle 72%
- PB-free plating and RoHS compliance
- DIP, DSO and FullPAK packages

Fixed Frequency PWM IC and CoolSET™ Product Portfolio

Product	Frequency$_{(SW)}$	V_{DS} (breakdown)	$R_{(DS)on}$	Power (Universal)	Package
ICE3AS03LJG	100kHz				DSO-8
ICE3BS03LJG	65kHz				DSO-8
ICE3GS03LJG	130kHz				DSO-8
ICE3BR4765J	65kHz	650V	4.7Ω	18W	DIP-8
ICE3BR1765J	65kHz	650V	1.7Ω	31W	DIP-8
ICE3BR1065J	65kHz	650V	1.0Ω	41W	DIP-8
ICE3BR0665J	65kHz	650V	0.6Ω	49W	DIP-8
ICE3BR4765JZ	65kHz	650V	4.7Ω	18W	DIP-7
ICE3BR1765JZ	65kHz	650V	1.7Ω	30W	DIP-7
ICE3BR0665JZ	65kHz	650V	0.6Ω	47W	DIP-7
ICE3BR4765JG	65kHz	650V	4.7Ω	17W	DSO-12
ICE3A1065ELJ	100kHz	650V	3.0Ω	23W	DIP-8
ICE3A2065ELJ	100kHz	650V	1.0Ω	41W	DIP-8
ICE3AR10080JZ	100kHz	800V	10.0Ω	15W	DIP-7
ICE3AR10080CJZ[2]	100kHz	800V	10.0Ω	15W	DIP-7
ICE3AR4780JZ	100kHz	800V	4.7Ω	20W	DIP-7
ICE3AR2280JZ	100kHz	800V	2.2Ω	28W	DIP-7
ICE3AR2280CJZ[2]	100kHz	800V	2.2Ω	28W	DIP-7
ICE3AR0680JZ	100kHz	800V	0.6Ω	52W	DIP-7
ICE3BR2280JZ	65kHz	800V	2.2Ω	28W	DIP-7
ICE3BR0680JZ	65kHz	800V	0.6Ω	52W	DIP-7
ICE3BR2565JF	67kHz	650V	2.6Ω	81W	TO-220 FP
ICE3BR1465JF	67kHz	650V	1.4Ω	104W	TO-220 FP
ICE3BR1065JF	67kHz	650V	1.0Ω	120W	TO-220 FP
ICE3BR0665JF	67kHz	650V	0.6Ω	173W	TO-220 FP

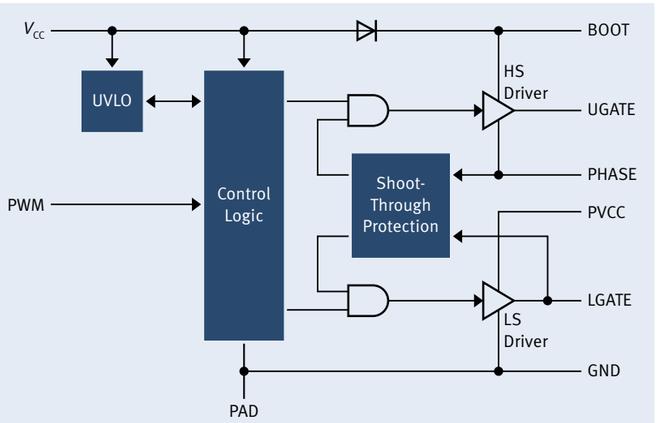
MOSFET Gate Driver IC

PX3516

Features

- Gate driver for MOSFET Half-Bridge
- Adjustable high-side and low-side MOSFET gate drive voltages for optimal efficiency
- Integrated bootstrap diode for reduced part count
- Adaptive gate drive control prevents cross-conduction
- Fast rise and fall times supports switching rates of up to 2MHz
- 4A sinking capability for LS-MOSFET
- Three-state PWM input for output stage shutdown
- V_{cc} under-voltage protection
- Lead-free (RoHS compliant) SOIC and DFN packages

Gate Driver	PX3516
Package	TDSON10
RoHS-compliant	Y
Number of channels	1
Maximum junction temperature	0°C to 125°C
Supply voltage, V_{cc}	+4.5V to 6,5V
BOOT to GND	30
PWM Inputs	1.15, 2.10
Quiescent current Iq	410uA



6 x 6 IQFN High-Performance DrMOS (Driver+MOS)

TDA21220

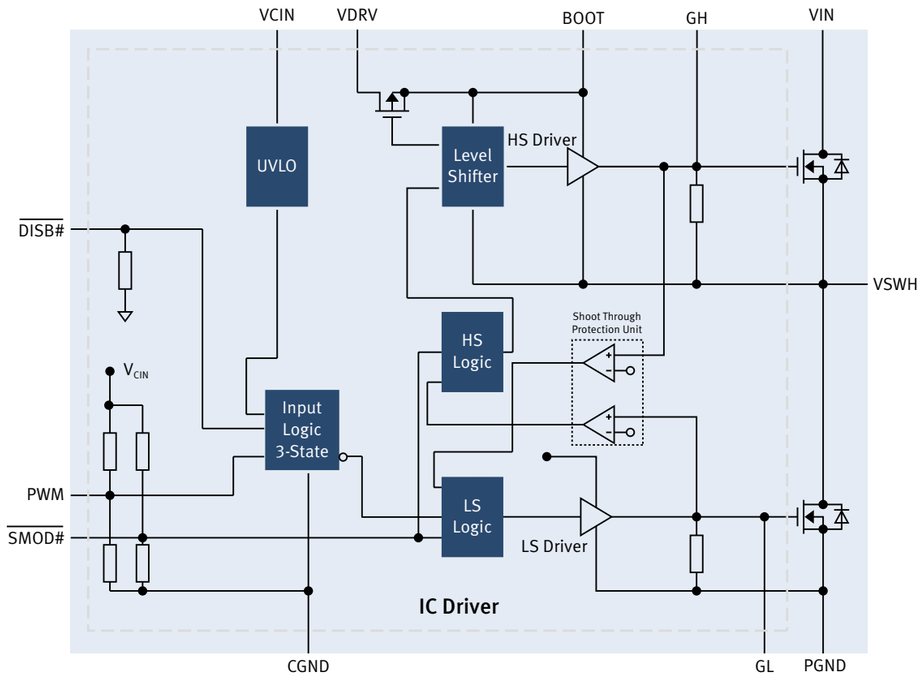
Features

- Intel compliant DrMOS, Power MOSFET and Driver in one package
- For Synchronous Buck - step down voltage applications
- Wide input voltage range 5V ... 16V
- High efficiency
- Extremely fast switching technology for improved performance at high switching frequencies
- Remote driver disable function
- SMOD–switching modulation of low side MOS
- Extremely robust switch node -10 ... 25V for added reliability in noisy applications
- Includes active PMOS structure as integrated bootstrap circuit for reduced part count
- Adaptive Gate Drive for shoot through protection
- 5V high and low side driving voltage
- Compatible to standard PWM controller ICs with 3.3V and 5V logic
- Three-State functionality
- Small package: IQFN-40 (6 x 6 x 0.8 mm^3)
- RoHS compliant (Pb Free)

For further information visit www.infineon.com/drmos

	TDA21220
Input Voltage	16V
SMOD function	Low Side
Thermal warning/shutdown	–
Max average load current	50A
MOSFET Voltage	25V
Schottky Diode	Included
PWM levels	compatible +3.3V / +5V (tolerant)
Shoot through protection	Included

DrMOS application diagram



Digital Controllers for Core and Memory Power

As microprocessors and ASICs have grown in power and complexity, their voltage regulation requirements have become increasingly demanding. This growing complexity has led to the introduction of Primarion Digital Power Management (DPM) solutions with increased accuracy, real-time monitoring and control capabilities via digital communications bus. The simplified system design the DPM solution provides leads to lower cost and higher performance implementations.

Primarion's Core Power ICs are designed into voltage regulator modules (VRMs) and motherboards for leading server original equipment manufacturers (OEMs) and are currently shipping into major server OEM systems to power CPU and GPU.

Primarion's digital power system-level solutions enable improved digital control features: better accuracy and use of lower cost passive components through adaptive digital calibration, improved ability to respond to fast changes in power requirements (transients) using fewer external capacitors with proprietary Active Transient Response (ATR), and easier design-in with a graphical user interface. Primarion's overall solution requires substantially fewer components and associated costs as compared to current analog power solutions.

Infineon/Primarion PowerCode™ is a software tool which greatly simplifies the configuration and performance optimization of Infineon digital controllers. It provides an intuitive Graphical User Interface (GUI) that runs on Microsoft Windows. The program comes with an automated design wizard that guides design engineers through the process of configuring single or multi-chip systems. Factory default configurations are supplied which can be easily modified through a variety of dialogs. Range checking and error detection ensure proper configuration.

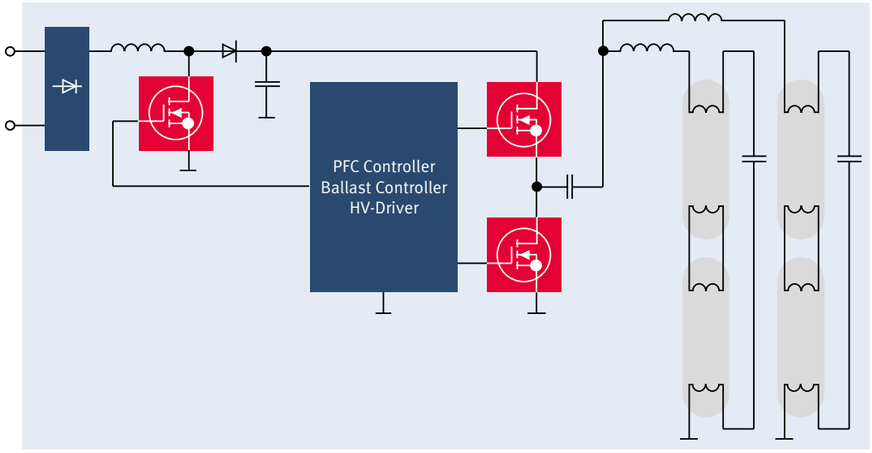
Additional features included are:

- Chip detection
- Real-time telemetry and temperature information
- Fault detection and clearing
- System file editing
- Bode plots and load models
- Current sense network design
- Phase and frequency adjustment
- Input and output settings
- Access to PMBus programming

Smart FL Ballast Controller

Smart Ballast Control ICs from Infineon integrate all functions required to operate FL lamps such as preheat-, ignition- and run- mode and protection features. Digital mixed-signal power control is employed enabling speedy, cost effective and stable ballast designs with a minimum number of external components. Reliable and robust high voltage isolation is achieved using Infineon's proprietary Coreless Transformer Technology (CLT).

- Integrated high performance PFC Stage
- Intelligent digital/mixed signal power control
- Integrated high voltage half bridge driver
- All parameters set using only resistors
- Highly accurate timing and frequency control over a wide temperature range



ICB2FL01 G

Infineon's 2nd Generation Smart Ballast Controller ICB2FL01 G is designed to control a fluorescent lamp ballast including

- Power Factor Correction (PFC)
- Lamp Inverter Control and
- High voltage level-shift half bridge driver with Coreless Transformer Technology

Short Form Data	min.	typ.	max.
Package		SO-19	
Operating voltage range	10V	–	17.5V
Turn-on threshold	–	14V	
Supply current during UVLO and fault mode	–	110µA	170µA
Operating frequency of inverter during RUN mode	20kHz	–	120kHz
Operating frequency of inverter during preheating mode	F_{RFRUN}	–	150kHz
Preheating time	0ms	–	2500ms
Adjustable self-adapting dead time max between LS and HS gate drive	2.25µs	2.50µs	2.75µs
Adjustable self-adapting dead time min between LS and HS gate drive	1.00µs	1.25µs	1.50µs
Operating voltage range of floating HS gate drive	-900V	–	+900V
LS Current limitation threshold: Ignition/start up/soft start/pre run	1.5V	1.6V	1.7V
LS Current protection threshold during RUN mode and preheating	0.75V	0.80V	0.85V
End-of-life detection threshold	-40µA	–	+40µA
Detection of non-ZVS operation CapMode 1 & 2	–	–	–
PFC preconverter control with critical and discontinuous CM	–	–	–
Maximum controlled on-time	18µs	22.7µs	26µs
Hysteresis of zero current detector	–	1.0V	–
PFC Current limitation threshold	–	1.0V	–
Reference voltage for control of bus voltage	2.47V	2.5V	2.53V
Overvoltage detection threshold	2.68V	2.73V	2.78V
Undervoltage detection threshold	1.835V	1.88V	1.915V
Open loop detection	0.237V	0.31V	0.387V
Junction operating temperature range	-25°C	–	+125°C
Pb-free lead plating RoHS compliant	–	–	–

Smart Ballast Controller

ICB2FL01 G

Features

- Able to handle lamp chokes with higher saturation behavior
- Special in-circuit test mode for faster test time
- Excellent dynamic PFC performance enables very low THD across wide load ranges
- Separate adjustable levels of lamp overload and rectifier effect detection
- Adjustment of the preheat time
- No high voltage capacitor required for detection of lamp removal (capacitive mode operation)
- Automatically restarts by surge and inverter overcurrent events
- Skipped preheating when line interruption ‹ 500ms
- Self adapting dead time adjustment of the half bridge driver
- One single restart at fault mode

Benefits

- Optimized lamp choke size and reduced BOM costs
- Dramatically reduced time for key tests such as end of life detection, preheat/ignition timeout and pre run operation modes
- Suitable for dimming and multi-power ballasts
- Enables ballast compatibility with a wider range of lamp types
- Flexible support of both current and voltage mode preheating
- Reduced BOM costs
- Intelligent discrimination between surge & half bridge overcurrent events
- Meets standards for emergency lighting (according to DIN VDE 0108)
- Eases design of multi-power ballasts and reduces EMI
- Enhanced reliability of ballasts

ICB2FL02 G

The ICB2FL02 G is functionality identical to the ICB2FL01 G with adjustments to certain timings and parameters to further optimize performance in dimming ballasts.

Function	ICB2FL02 G	ICB2FL01 G
Cap load 1 protection	Deactivated	Activated
Suitable for dimming	Optimized	yes
Max adjustable run frequency	max. 140kHz	max. 120kHz
Adjustable dead time	1.05µs	1.05µs to 2.5µs
Dead time detector level	-50mV	-100mV
Capacitive mode 2 detector level 3	-50mV	-100mV

ICB2FL03 G

Infineons's latest Smart Ballast Controller ICB2FL03 G in SO-16 offers very similar performance and feature set compared to the well established SO-19 product ICB2FL01 G

	ICB2FL03 G	ICB1FL01 G
Package	SO-16 small body	SO-19 wide body
Driver capability	650V	900V
Lamp connection	single and series	single, series and parallel

LED Driver for General Lighting

LED based lighting sources are the best suited candidates to replace inefficient lighting solutions such as incandescent or halogen lamps that are still widely used today. Current LED driver design and system cost are still a challenge to gain major consumer acceptance. Infineon offers benchmark solutions and represent an outstanding choice to overcome this hurdle.

ICL8001G / ICL8002G

are designed for off-line LED lighting applications with high efficiency requirements such as replacement lamps (40/60/100W), LED tubes, luminaires and downlights. Infineon provides a single stage flyback solution with PFC functionality. Innovative primary control techniques combined with accurate PWM generation for phase cut dimming enable solutions with significant reduced component count on a single sided driver PCB for smallest form factor.

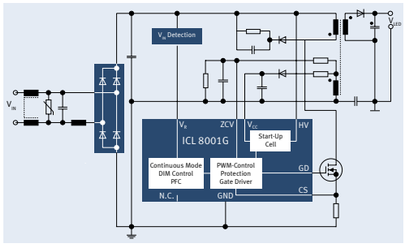
Benefits

- ICL8001G simplifies LED driver implementation
- ICL8002G is optimized for best dimming performance

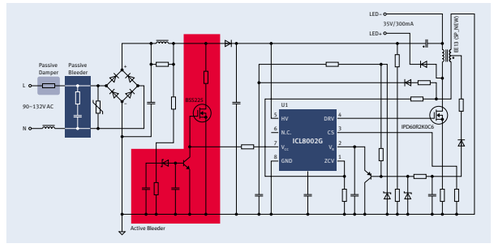
Features

- Primary side flyback or buck control with integrated PFC and phase angle dimming
- Optimized for trailing- and leading-edge dimmers
- Integrated HV startup cell for short time to light
- Best in class BOM for dimmable LED bulbs
- High and stable efficiency over wide dimming range
  - Good line regulation capabilities based on digital foldback correction
  - Low external part count for simplified designs and short-time to market
  - Cycle-by-cycle peak current limitation
- Built-in digital soft-start
- Auto restart mode for short circuit protection
- Adjustable latch-off mode for output overvoltage protection

ICL8001G



ICL8002G



Linear Current Regulators

BCR401W / BCR402W / BCR401U / BCR402U / BCR405U

The BCR40x family is the smallest size and lowest cost series of LED drivers. These products are perfectly suited for driving low power LEDs in general lighting applications. Thanks to AEC-Q101 qualification, it may also be used in automotive applications such as brake lights or interior.

The advantage versus resistor biasing is:

- Long lifetime of LEDs due to constant current in each LED string
- Homogenous LED light output independent of LED forward voltage binning, temperature increase and supply voltage variations
- See Application Note AN182 for details on replacing resistors

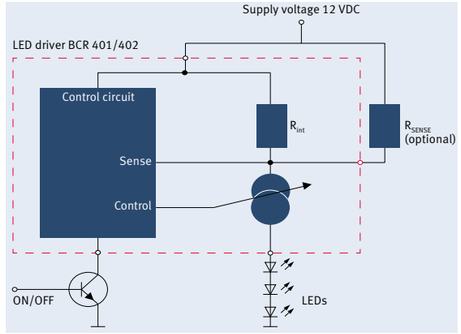
The advantage versus discrete semiconductors is:

- Reduced part count and assembly effort
- Pretested output current
- Defined negative temperature co-efficient protection

Features and benefits

- Output current from 10mA to 65mA (adjustable by external resistor)
- Supply voltage up to 24V (BCR401W, BCR402W) and up to 40V (BCR401U, BCR402U, BCR405U)
- Reduction of output current at high temperature, contributing to long lifetime LED systems
- Easy to use
- Very small form factor packages with up to 750mW max. power handling capability

	V_s (min)	V_s (max)	I_{out} (typ)	I_{out} (max)	Package	P_{tot} (max)	$\Delta(I_{out})/ I_{out}$
BCR 401U	$1.4V+U^{fLED}$	40V	10mA	65mA	SC74	750mW	1.0%/V
BCR 401W	$1.2V+U^{fLED}$	18V	10mA	60mA	SOT343	500mW	2.0%/V
BCR 402U	$1.4V+U^{fLED}$	40V	20mA	60mA	SC74	750mW	1.0%/V
BCR 402W	$1.4V+U^{fLED}$	18V	20mA	65mA	SC343	500mW	2.0%/V
BCR 405U	$1.4V+U^{fLED}$	18V	50mA	65mA	SC343	750mW	1.0%/V



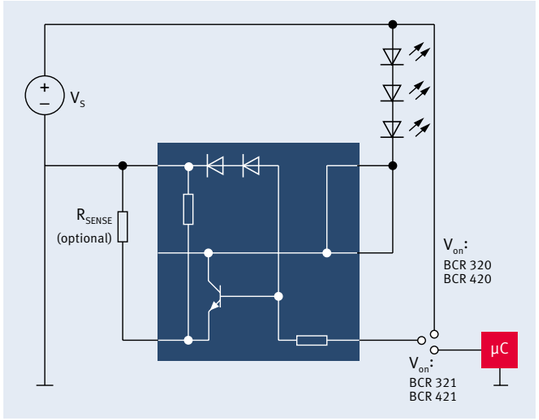
BCR420U / BCR321U / BCR420U / BCR421U

The BCR32x and BCR42x LED drivers are dedicated linear regulators for 0.5W LEDs with a maximum output current of 250mA. They are optimized in terms of cost, size and feature set for medium power LEDs in General Lighting applications. Thanks to AEC-Q101 qualification, it may also be used in automotive applications such as brake lights or interior.

Features and benefits

- Output current from 10mA up to 300mA for BCR32x (200mA for BCR42xU), adjustable by external resistor
- Supply voltage up to 40V for BCR42x (24V for BCR32x)
- Direct microcontroller interface for PWM dimming with BCR321U/BCR421U
- Reduction of output current at high temperature, contributing to long lifetime LED systems
- Easy to use
- Very small form factor packages with up to 1.000mW max. power handling capability

	V_s (min)	V_s (max)	I_{out} (typ)	I_{out} (max)	Package	P_{tot} (max)	$\Delta(I_{out})/ I_{out}$
BCR 320U	1.4V+U^{fLED}	24V+U^{fLED}	250mA	300mA	SC74	1.000mW	1.0%/V
BCR 321U	1.4V+U^{fLED}	24V+U^{fLED}	250mA	300mA	SC74	1.000mW	1.0%/V
BCR 420U	1.4V+U^{fLED}	40V+U^{fLED}	150mA	200mA	SC74	1.000mW	1.0%/V
BCR 421U	1.4V+U^{fLED}	40V+U^{fLED}	150mA	200mA	SC74	1.000mW	1.0%/V



DC/DC Switch Mode LED Drivers

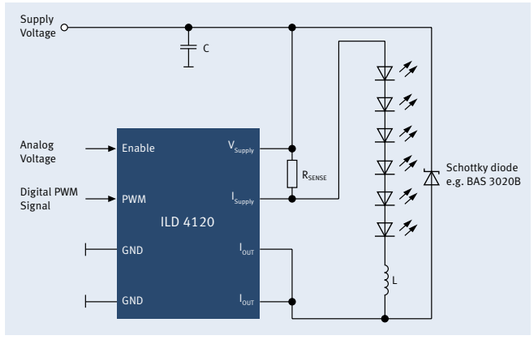
ILD1151 / ILD2035 / ILD4001 / ILD4035 / ILD4120 / ILD4180

The ILD series are switch-mode LED drivers for high power LEDs. They combine protection features that contribute to the lifetime of LEDs with the flexibility in output current range from 150mA up to multiple amperes. The new ILD series include LED driver ICs with integrated power stage as well as with external MOSFET achieving up to 98% driver efficiency across a wide range of general lighting applications. ILD2035, ILD4035, ILD4120 and ILD4180 are buck LED regulators. ILD4001 is a buck LED controller and ILD1151 is a multi-topology LED controller.

Features and benefits

- Wide input voltage range
- Scalability in output current from 150mA up to multiple amperes
- Alternative dimming concepts: Digital or analog
- Over voltage and over current protection
- Smart thermal protection for ILD2035, ILD4035 and ILD4120 contributing to longer LED lifetime
- ILD1151 supports boost, buck-boost and SEPIC topologies

	V_s (min)	V_s (max)	I_{out} (typ)	I_{out} (max)	Package	Dimming	Topology	f_{sw}	Features
ILD 1151	4.5V	45V	90.0mA	3.000mA	SSOP-14	analog/ digital	boost, buckboost SEPIC	adjustable 100-500kHz	multi topology controller, constant current or constant voltage mode, over voltage, over current, short on GND protection
ILD 4001	4.5V	42V	10.0mA	3.000mA	DSO-8-27	analog/ digital	hysteretic buck	‹ 500kHz	thermal protection
ILD 2035	8.0V	22V	350mA	400mA	SC74	-	hysteretic buck	‹ 500kHz	smart thermal protection
ILD 4035	4.5V	40V	350mA	400mA	SC74	analog/ digital	hysteretic buck	‹ 500kHz	smart thermal protection, over voltage, over current protection
ILD 4120	4.5V	40V	1.200mA	1.200mA	DSO-8-27	analog/ digital	hysteretic buck	‹ 500kHz	smart thermal protection, over voltage, over current protection
ILD 4180	4.75V	45V	1.800mA	1.800mA	DSO-8-27	digital	fixed frequency buck	370kHz	over voltage, over current protection, constant current or constant voltage mode



Driver ICs

1ED020I12-B2

Single channel isolated gate driver
- Basic isolation according to EN60747-5-2, recognized under UL1577
- Fully functional at transient +/- 1420V and static voltages of +/-1200V
- High voltage side status feedback
- 2A sink and source rail-to-rail output
- Max. T_j = 150°C
- Package SO16 300mil
- Protection functions:
  - Enchanced desaturation detection
  - Active Miller clamp
  - Under voltage lockout
  - Shut down
  - Watchdog timer

1ED020I12-F2

Single channel isolated gate driver
- Same functions and features as 1ED020I12-B2
- Functional isolation of 1200V

1ED020I12-BT

Single channel isolated gate driver
- Same functions and features as 1ED020I12-B2
- Basic isolation according to EN60747-5-2, recognized under UL1577
- Adjustable two level turn-off function
- Desaturation detection with 500µA

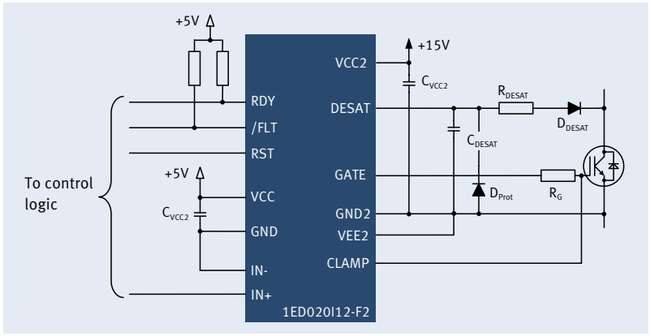
1ED020I12-FT

Single channel isolated gate driver
- Same functions and features as 1ED020I12-BT
- Functional isolation of 1200V

2ED020I12-F2

Dual channel isolated gate driver
- Same functions and features as two times 1ED020I12-F2
- Package SO36 300mil

Typical application 1ED020I12-F2

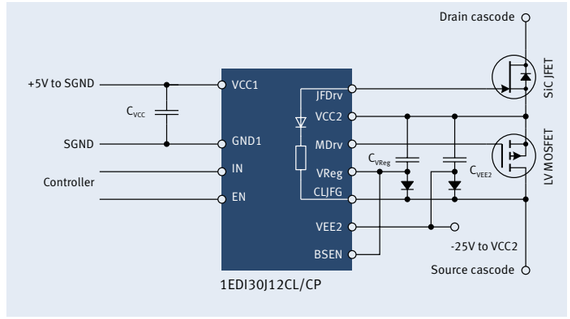


1EDI30J12CL and 1EDI30J12CP

Infineon has developed the Direct Drive JFET Topology to enable normally-on SiC JFETs to be driven at best possible efficiency and as safe as normally-off switches. This isolated EiceDRIVER™ dedicated for normally-on SiC JFETs comes with special features and benefits:

- Single channel driver IC with Coreless Transformer (CT) technology
- Galvanic isolation, ±1200V
- UVLO 16-17V, optimized for Infineon's SiC JFET discretes and power modules
- Bootstrap mode (UVLO 8-9V, logic, MOS driver capability, indicator output)
- Safe turn off during start up and power supply failures
- Minimum 3A rail-to-rail output
- Extremely low propagation delay of typ. 80ns
- Green Packages DSO-16-20 (150mil) and DSO-19-4 (300mil)

Typical application 1EDI30J12CL/CP



CoolSiC™ 1200V JFET portfolio and recommended driver / LV MOS for Direct Drive Topology

Voltage	$R_{DS(on)}$	Sales name	JFET Package	Driver	Driver Package	LV MOS	LV MOS Package
1200	70	IJW120R070T1	TO247	1EDI30J12CL/CP	DSO-16-20/19-4	BSC030P03NS3 G	SuperSO8
	100	IJW120R100T1	TO247	1EDI30J12CL/CP	DSO-16-20/19-4	BSC030P03NS3 G	SuperSO8
1200	70	IJC120R070T1	Bare die	1EDI30J12CL/CP	DSO-16-20/19-4	IPC099P03N	Bare die
	100	IJC120R100T1	Bare die	1EDI30J12CL/CP	DSO-16-20/19-4	IPC099P03N	Bare die

2ED020I12-FI

1200V Isolated high side half bridge gate driver

- Galvanic isolation of high side driver
- 2A sink current, 1 A source current
- Fully functional at transient and static voltages of +/-1200V
- Integrated operational amplifier and comparator
- Matched delay times of high side and low side
- Max. T_j = 150°C
- Package SO18 300mil
- Protection function:
  - Hardware input interlocking
  - Under voltage lockout
  - Shut down function

2ED020I06-FI

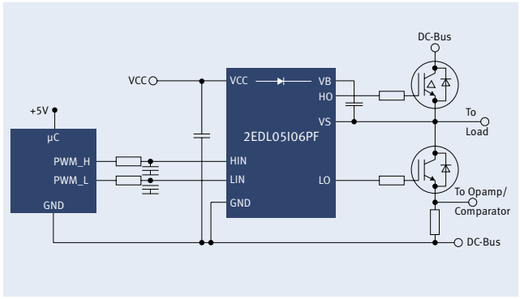
650V isolated high side half bridge gate driver

- Galvanic isolation of high side driver
- 2A sink current, 1 A source current
- Fully functional at transient and static voltages of +/-650V
- Matched delay times of high side and low side
- Max. T_j = 150°C
- Package SO18 300mil
- Protection function:
  - Hardware input interlocking
  - Under voltage lockout

2EDL - Family

- Ultra fast integrated bootstrap diode
- SO8 and SO14 package
- Enable function (2EDL23x only)
- Fault indication (2EDL23x only)
- Versions with and without Interlock
- Protection functions:
  - Asymmetric undervoltage lockout
  - Active shut down
  - Undervoltage lockout levels for MOSFET and IGBT
  - Over current protection (2EDL23x only)
  - Fixed HW dead time optional

Typical application 2EDL05I06PF



HV Gate Driver ICs Product Type

Products		Packages	Topology	$Io_{+/-}$	Turn On Propagation Delay (max)	T_j (max)	Safety Isolation Typ [2]	UVLO_ON_max	Fault Reporting	Shutdown / Enable	Input Logic Type	Interlock	Two Level Turn Off
1200 V	1ED020I12-F2	PG-DSO-16	Single	2.0 - 2.0 A	195.0 ns	150.0 degC	-	12.6 V	DESAT	/RST	pos/neg	–	–
	1ED020I12-B2	PG-DSO-16	Single	2.0 - 2.0 A	195.0 ns	150.0 degC	Basic	12.6 V	DESAT	/RST	pos/neg	–	–
	1ED020I12-FT	PG-DSO-16	Single	2.0 - 2.0 A	2,000.0 ns	150.0 degC	-	12.6 V	DESAT	/RST	pos/neg	–	✓
	1ED020I12-BT	PG-DSO-16	Single	2.0 - 2.0 A	2,000.0 ns	150.0 degC	Basic	12.6 V	DESAT	/RST	pos/neg	–	✓
	2ED020I12-F2	PG-DSO-36	Dual	2.0 - 2.0 A	195.0 ns	150.0 degC	-	12.6 V	DESAT	/RST	pos/neg	–	–
	2ED020I12-FI	PG-DSO-18	Half Bridge	1.0 - 2.0 A	105.0 ns	150.0 degC	-	13.5 V	OCP	/SD	pos	✓	–
600 V	2ED020I06-FI	PG-DSO-18	Half Bridge	1.0 - 2.0 A	105.0 ns	150.0 degC	-	13.5 V	-	/SD	pos	✓	–
	6ED003L06-F2	PG-DSO-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	12.5 V	ITRIP	EN	neg	✓	–
	6EDL04I06NT	PG-DSO-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	12.5 V	ITRIP	EN	neg	✓	–
	6EDL04I06PT	PG-DSO-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	12.5 V	ITRIP	EN	pos	✓	–
	6EDL04N06PT	PG-DSO-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	9.8 V	ITRIP	EN	pos	✓	–
	2EDL05I06PF [1]	PG-DSO-8	Half Bridge	0.25 - 0.5 A	600.0 ns	125.0 degC	-	13.2 V	-	-	pos	✓	–
	2EDL05I06BF [1]	PG-DSO-8	Half Bridge	0.25 - 0.5 A	600.0 ns	125.0 degC	-	13.2 V	-	-	pos	-	–
	2EDL05N06PF [1]	PG-DSO-8	Half Bridge	0.25 - 0.5 A	450.0 ns	125.0 degC	-	9.8 V	-	-	pos	✓	–
	2EDL05I06PJ [1]	PG-DSO-14	Half Bridge	0.25 - 0.5 A	600.0 ns	125.0 degC	-	13.2 V	-	-	pos	✓	–
	2EDL23I06PJ [1]	PG-DSO-14	Half Bridge	1.5 - 2.3 A	600.0 ns	125.0 degC	-	13.2 V	OCP	EN	pos	✓	–
	2EDL23N06PJ [1]	PG-DSO-14	Half Bridge	1.5 - 2.3 A	450.0 ns	125.0 degC	-	9.8 V	OCP	EN	pos	✓	–
200 V	6ED003L02-F2	PG-TSSOP-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	12.5 V	ITRIP	EN	neg	✓	–
	6EDL04N02PR	PG-TSSOP-28	3-Phase	180 - 380 mA	800.0 ns	125.0 degC	-	9.8 V	ITRIP	EN	pos	✓	–

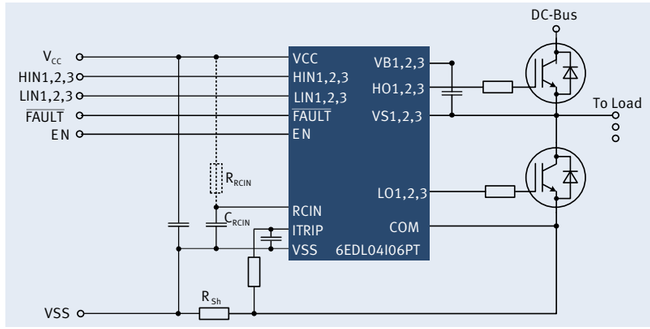
[1] Mass Production August 2013
[2] Certified according to DIN EN 60747-5-2

6ED family – 2nd Generation

200V and 600V 3-phase gate driver

- Ultra fast integrated bootstrap diode
- Fully functional at neg. transient voltages down to -50V (500ns)
- Programmable restart after over current protection
- Shut down of all outputs in case of UVLO, OCP
- Package SO28 300mil (600V) and
- package TSSOP28 (200V)
- Protection functions:
  - Over current protection (OCP)
  - Hard ware input interlocking
  - Under voltage lockout (UVLO)
  - Fixed hard ware dead time of high side and low side
  - Enable function
  - Pin compatible variants of first generation available

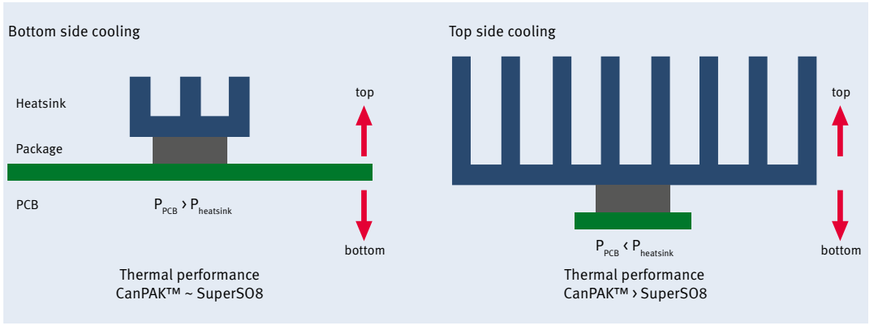
Typical application 6EDL04I06PT



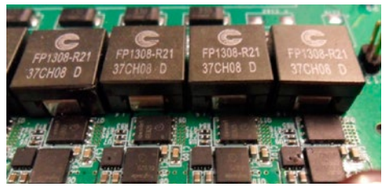
Packages

Top and bottom side cooling of SMD devices

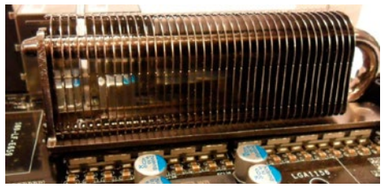
For LV MOSFETs different SMD packages like SuperSO8 and CanPAK™ are available. If the cooling system is designed for main heatflow to the PCB both packages will show similar thermal performance. If the main heat flow is to the top side the CanPAK™ is the better choice since the thermal resistance to the top side is lower ($R_{th\_top\_CanPAK}$ ~ 1 K/W, $R_{th\_top\_SuperSO8}$ ~ 20 K/W).



Example: High performance Server
(PCB: 8 layer, 70 µm)



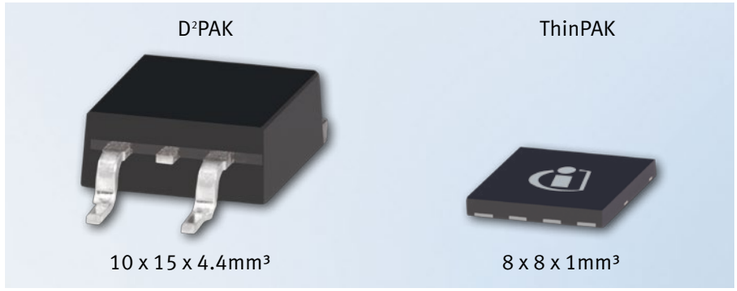
Example: Motherboard (PCB 4 layer, 35 µm)
with high performance heatsink



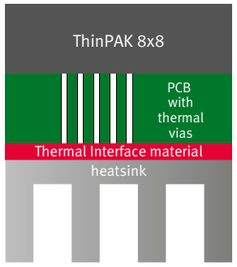
ThinPAK new leadless SMD package for high voltage MOSFETs

- The new package features a very small footprint of only 64 mm² (vs. 150 mm² for the D²PAK) and a very low profile with only 1 mm height (vs. 4.4 mm for the D²PAK). This significantly smaller package size with ist benchmark low parasitic inductances can be used as a new and effective way to decrease system solution size in power-density driven systems.
- A well designed thermal system is required to achieve high power handling capability.
  The recommended design is a thin PCB with may vias and a heatsink attached to the backside of the PCB. A high number of thermal vias is needed to reduce the thermal conduction resistance through the board.

60% footprint reduction – 80% height reduction



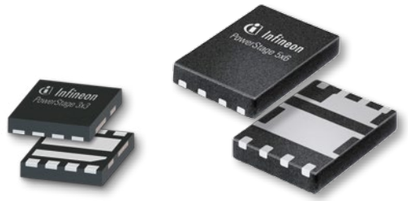
Thermal cooling system for ThinPAK 8x8



Power stage 3x3 and power stage 5x6

Save space, minimize losses, boost efficiency
Dual FET power stages in a single leadless SMD package integrate the low side and high side MOSFET of a synchronous DC/DC converter into a 3x3mm² or 5x6mm² package outline. Designers are able to shrink their designs up to 85% by replacing two separate discrete packages such as SO-8 or SuperSO8 with this new package.

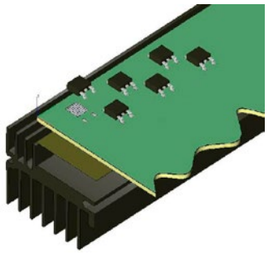
Both, the small outline and the interconnection of the two MOSFETs within the package minimize the loop inductance which boosts efficiency. With the new OptiMOS™ technology power stage 3x3 and power stage 5x6 achieve a peak efficiency of 93.5%. Power stage 3x3 can handle an application current up to 12.5A and power stage 5x6 up to 30A.



New IGBT technology RCD allows Highest Power Density with Small SMD Packages

The new IGBT RCD technology in combination with an efficient cooling system allows to use small SMD packages which enable to build compact systems with increased power density.

In order to improve the heat dissipation, thermal vias are integrated in the PCB under the device case which results in a low thermal resistance to the opposite side of the PCB. A heatsink complements the cooling system. Isolation to the heatsink is realized with a thermal foil. With this cooling system power dissipation up to 7 to 10 W / IGBT is achievable which corresponds to ~ 2 kW application systems.



You CanPAK™ More Performance in Your Design! OptiMOS™ Medium Voltage Classes in CanPAK™

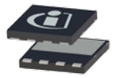
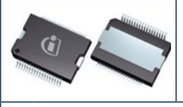
Infineon expands its OptiMOS™ power MOSFET portfolio, introducing 60V to 150V products in CanPAK™. This product family is the best fit for a broad number of industrial applications like DC-DC converters for telecom, solar micro inverters and synchronous rectification.

Key features and benefits
- Lowest package parasitics
- Ultra thin package (<0.7mm)
- Best thermal behavior
- Highest efficiency and power density
- Lowest board space consumption
- Environmentally friendly

For further information please visit our website:
www.infineon.com/canpak

Packages

SMD Technology

DPAK (TO-252)		Reverse DPAK (Rev. TO-252)		DPAK 5pin (TO-252 5pin)		D²PAK (TO-263)		D²PAK 2pin (TO-263-2)		D²PAK 7pin (TO-263 7pin)	
3	9.9 x 6.5 x 2.3	3	9.7 x 6.6 x 2.34	5	9.9 x 6.5 x 2.3	3	15.0 x 10.0 x 4.4	2	15.0 x 10.0 x 4.4	7	15.0 x 10.0 x 4.4
											
SO-8/SO-8 dual		**SO-16/12**		**SO-14**		**SO-16**		**SO-18**		**SO-19**	
8	5.0 x 6.0 x 1.75	12	10.0 x 6.0 x 1.75	14	8.75 x 6.0 x 1.75	16	10.0 x 6.0 x 1.75	18	12.8 x 10.3 x 2.65	19	12.8 x 10.3 x 2.65
											
SO-20		**SC59**		**SOT-23**		**SOT-89**		**SOT-223**		**SOT-323**	
20	12.8 x 10.3 x 2.65	3	3.0 x 2.8 x 1.1	3	2.9 x 2.4 x 1.0	3	4.5 x 4.0 x 1.5	4	6.5 x 7.0 x 1.6	3	2.0 x 2.1 x 0.9
											
SOT-363		**TSOP-6**		**S3O8**		**TISON (power stage 5x6)**		**WISON (power stage 3x3)**		**SuperSO8**	
6	2.0 x 2.1 x 0.9	6	2.9 x 2.5 x 1.1	8	3.3 x 3.3 x 1.0	8	5.0 x 6.0 x 1.0	8	3.0 x 3.0 x 0.8	8	5.15 x 6.15 x 1.0
											
SuperSO8 dual		**SuperSO8 fused leads**		**VSON (ThinPAK)**		**CanPAK™ S-Size**		**CanPAK™ M-Size**		**TDSON-10**	
8	5.15 x 6.15 x 1.0	8	5.15 x 6.15 x 1.0	4	8.0 x 8.0 x 1.0	6	4.8 x 3.8 x 0.65	7	6.3 x 4.9 x 0.65	10	3.0 x 3.0 x 0.9
											
TO-leadless (TOLL)		**TSSOP-48**		**DSO-36**		**IQFN-40**		**TSSOP-28**		**DSO-28**	
8	11.68 x 9.9 x 2.3	48	12.5 x 6.1 x 1.1	36	15.9 x 11.0 x 3.5	40	6.0 x 6.0 x 0.8	28	9.7 x 6.4 x 1.2	28	18.1 x 10.3 x 2.65
											
VQFN-68		**Package (JEITA-code)**									
68	10.0 x 10.0 x 0.9	X	L x W x H								
		PIN-Count All Dimensions in mm									

All products are available in green (RoHS compliant).

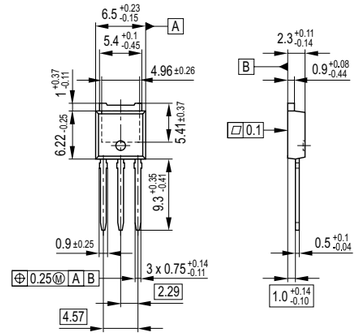
THD Technology

IPAK (TO-251)		IPAK SL (TO-251 SL)		I²PAK (TO-262)		TO-220 real 2pin		TO-220 2pin		TO-220 3pin	
3	15.5 x 6.5 x 2.3	3	10.7 x 6.5 x 2.3	3	25.1 x 10 x 4.4	2	29.15 x 10.0 x 4.4	2	29.1 x 9.9 x 4.4	3	29.15 x 10.0 x 4.4
											
TO-220 FullPAK		**TO-220-6-46**		**TO-220-6-47**		**TO-247**		**TO-247 4pin**		**DIP-7**	
3	29.6 x 10.5 x 4.7	6	21.7 x 9.9 x 4.4	6	26.1 x 9.9 x 4.4	3	40.15 x 15.9 x 5.0	3	40.15 x 15.9 x 5.0	7	9.52 x 8.9 x 4.37
DIP-8		**DIP-14**		**DIP-20**		**Package (JEITA-code)**					
8	9.52 x 8.9 x 4.37	14	19.5 x 8.9 x 4.37	20	24.6 x 9.9 x 4.2	X	L x W x H				
						PIN-Count All Dimensions in mm					

All products are available in green (RoHS compliant).

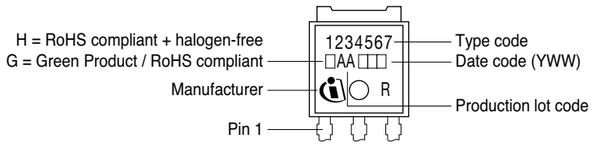
TO-251

Package Outline



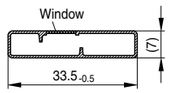
All metal surfaces tin plated, except area of cut.

Marking Layout



Packing

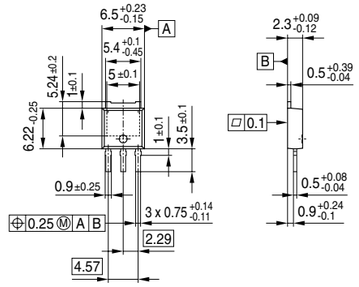
Pieces/Tube: 75



All dimensions in mm

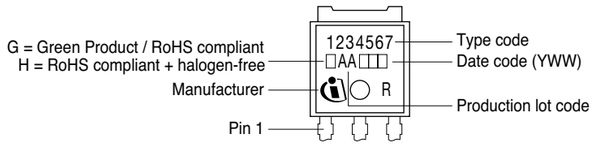
TO-251-3

Package Outline



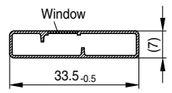
All metal surfaces tin plated, except area of cut.

Marking Layout



Packing

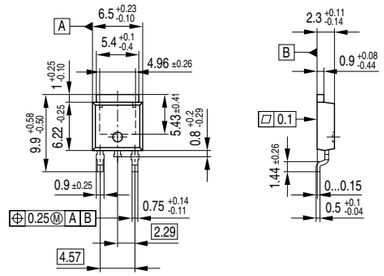
Pieces/Tube: 75



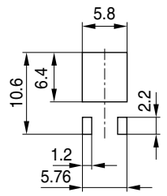
All dimensions in mm

DPAK

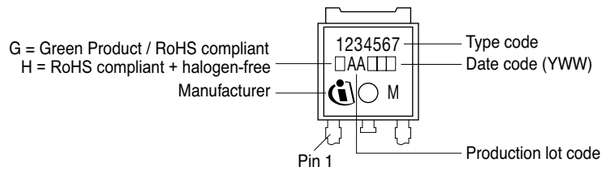
Package Outline



Foot Print

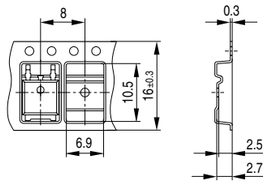


Marking Layout



Packing

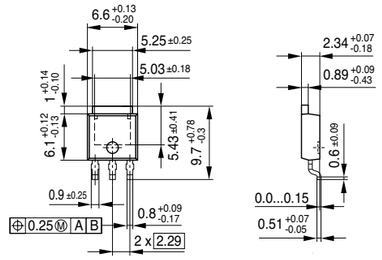
Reel ø330mm = 2.500 Pieces/Reel



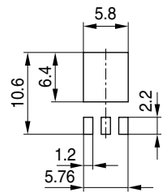
All dimensions in mm

Reverse DPAK

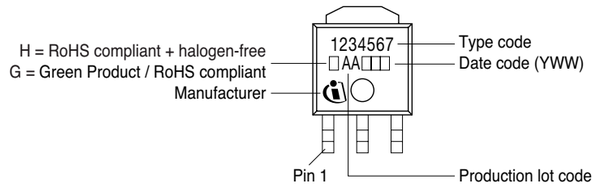
Package Outline



Foot Print

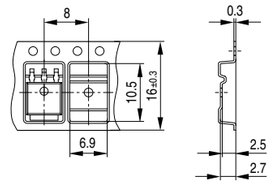


Marking Layout



Packing

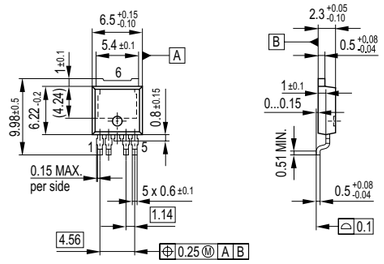
Reel ø330mm = 2.500 Pieces/Reel



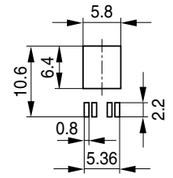
All dimensions in mm

DPAK 5pin

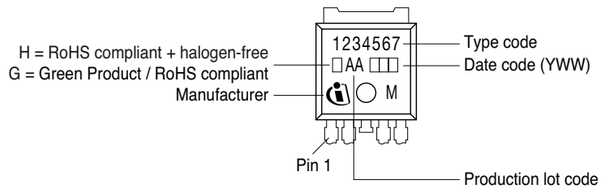
Package Outline



Foot Print

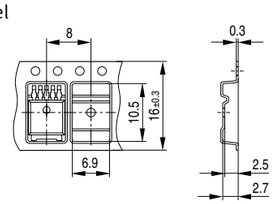


Marking Layout



Packing

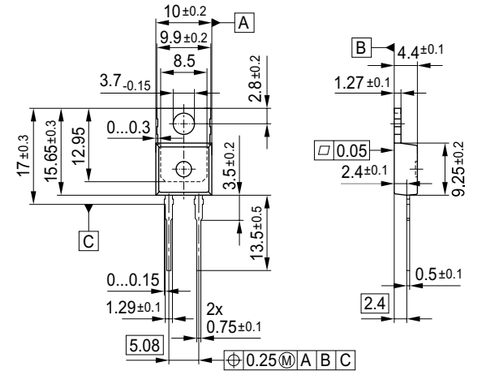
Reel ø330mm = 2.500 Pieces/Reel



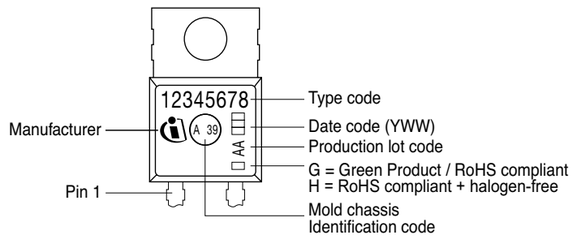
All dimensions in mm

TO-220 2pin

Package Outline

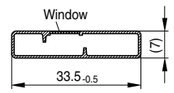


Marking Layout



Packing

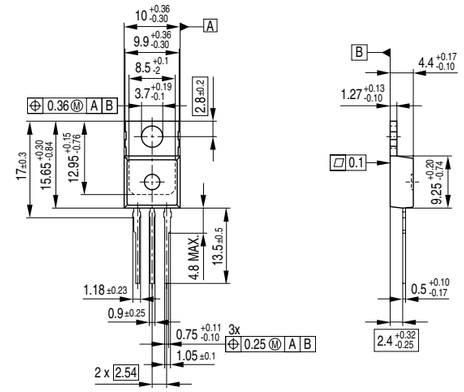
Pieces/Tube: 50



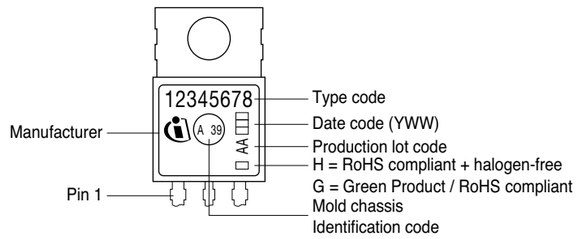
All dimensions in mm

TO-220 3pin

Package Outline

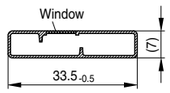


Marking Layout



Packing

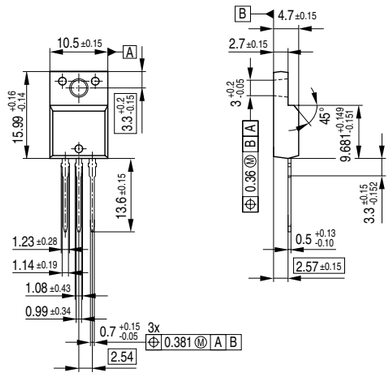
Pieces/Tube: 50



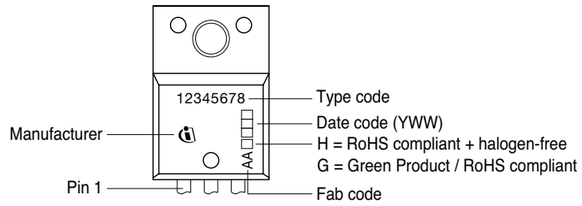
All dimensions in mm

TO-220 FullPAK

Package Outline

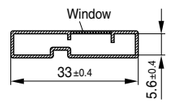


Marking Layout



Packing

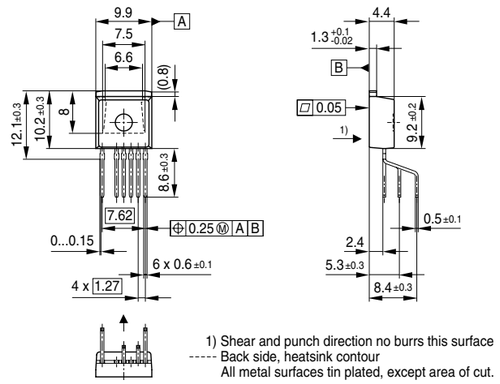
Pieces/Tube: 25



All dimensions in mm

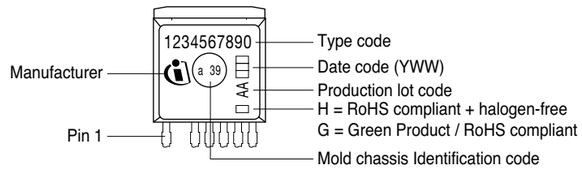
TO-220-6-46

Package Outline



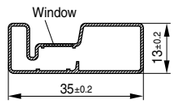
1) Shear and punch direction no burrs this surface
----- Back side, heatsink contour
All metal surfaces tin plated, except area of cut.

Marking Layout



Packing

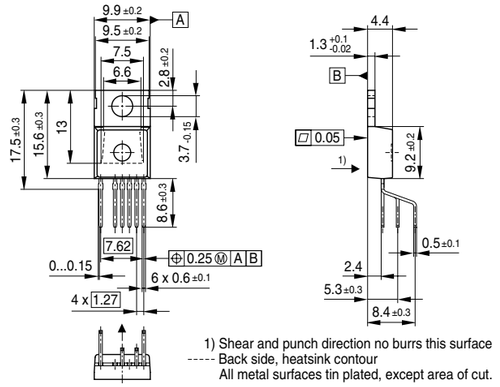
Pieces/Tube: 50



All dimensions in mm

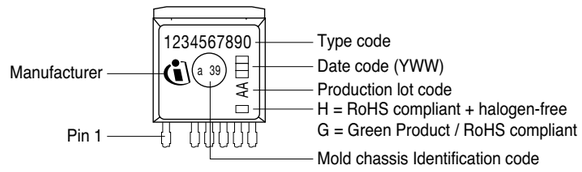
TO-220-6-47

Package Outline



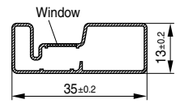
1) Shear and punch direction no burrs this surface
----- Back side, heatsink contour
All metal surfaces tin plated, except area of cut.

Marking Layout



Packing

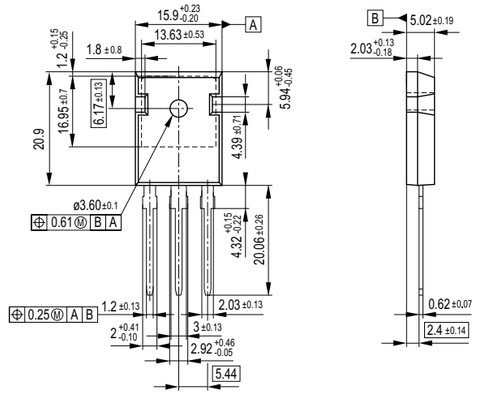
Pieces/Tube: 50



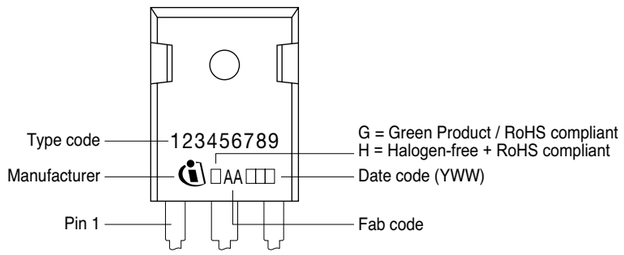
All dimensions in mm

TO-247

Package Outline

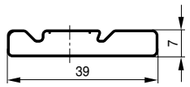


Marking Layout



Packing

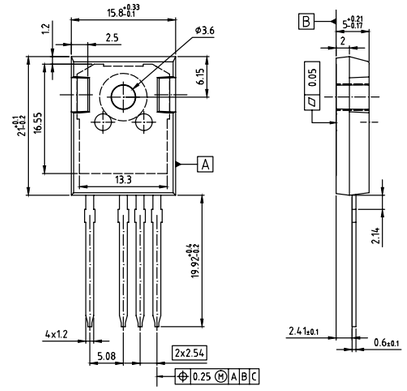
Pieces/Tube: 30



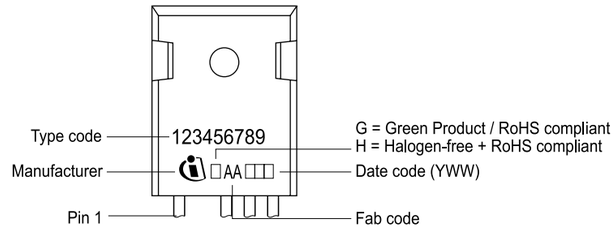
All dimensions in mm

TO-247 4pin

Package Outline

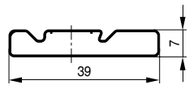


Marking Layout



Packing

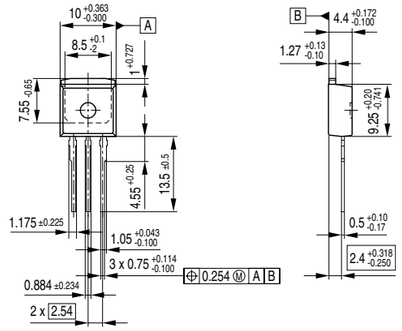
Pieces/Tube: 30



All dimensions in mm

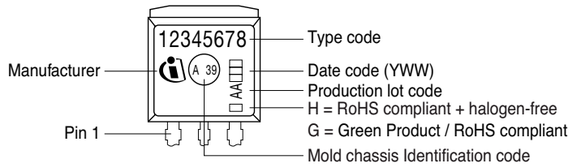
I²PAK

Package Outline



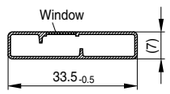
All metal surfaces tin plated, except area of cut.

Marking Layout



Packing

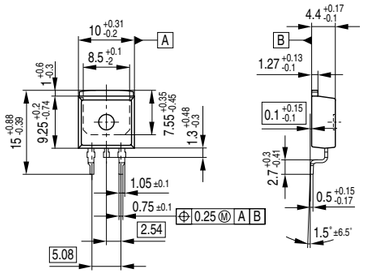
Pieces/Tube: 50



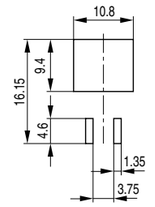
All dimensions in mm

D²PAK

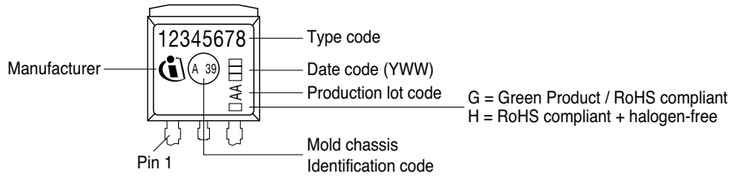
Package Outline



Foot Print

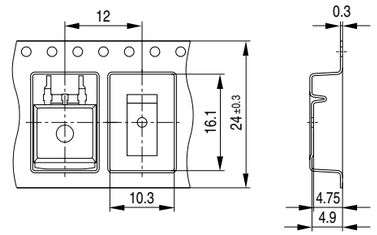


Marking Layout



Packing

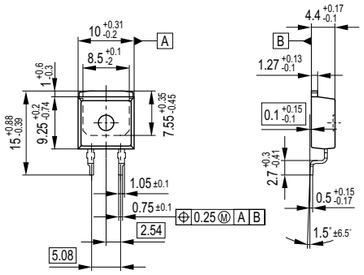
Reel ø330mm = 1.000 Pieces/Reel



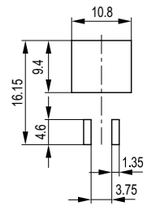
All dimensions in mm

D²PAK 2pin

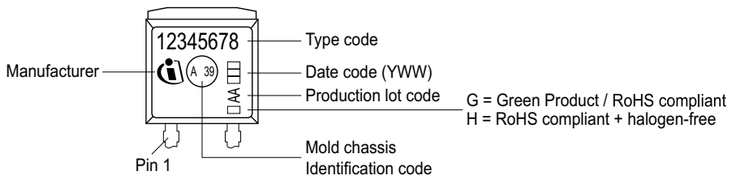
Package Outline



Foot Print

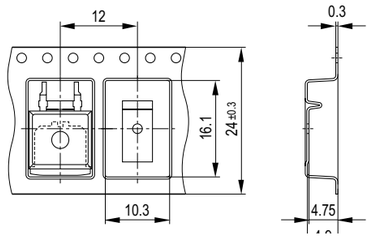


Marking Layout



Packing

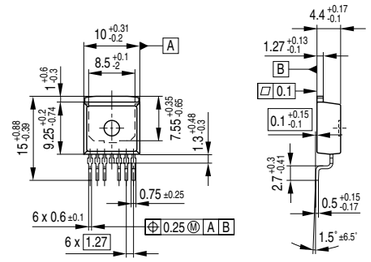
Reel ø330mm = 1.000 Pieces/Reel



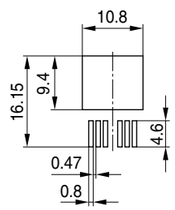
All dimensions in mm

D²PAK 7pin

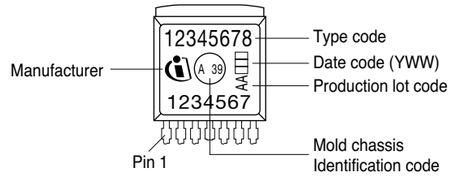
Package Outline



Foot Print

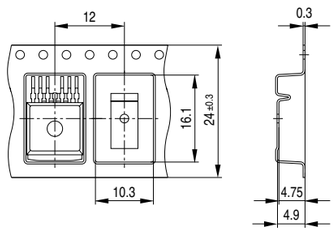


Marking Layout



Packing

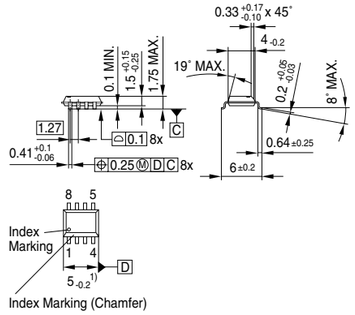
Reel ø330mm = 1.000 Pieces/Reel



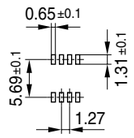
All dimensions in mm

SO-8

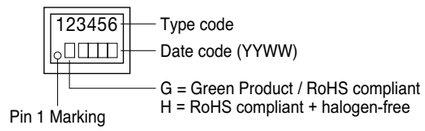
Package Outline



Foot Print



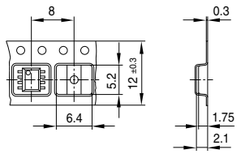
Marking Layout

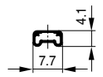


Packing

Reel ø330mm = 2.500 Pieces/Reel

Pieces/Tube: 100

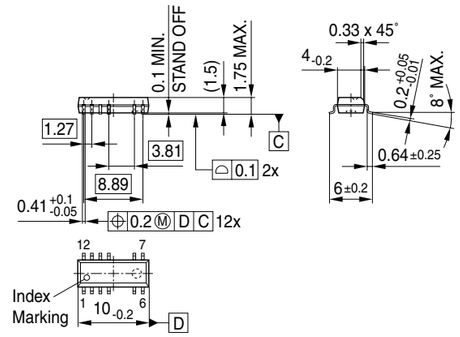




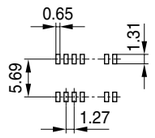
All dimensions in mm

SO-16/12

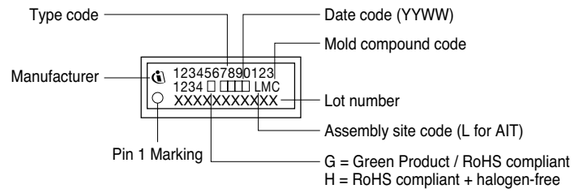
Package Outline



Foot Print



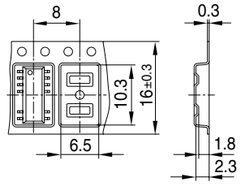
Marking Layout

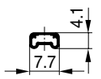


Packing

Reel ø330mm = 2.500 Pieces/Reel

Pieces/Tube: 50

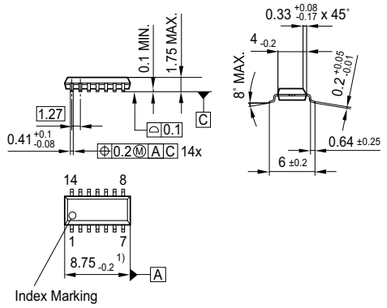




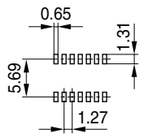
All dimensions in mm

SO-14

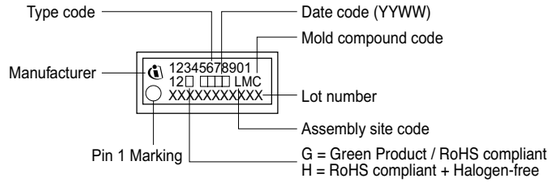
Package Outline



Foot Print



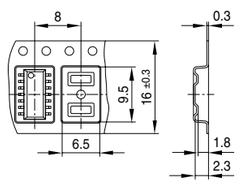
Marking Layout

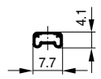


Packing

Reel ø330mm = 2.500 Pieces/Reel

Pieces/Tube: 50

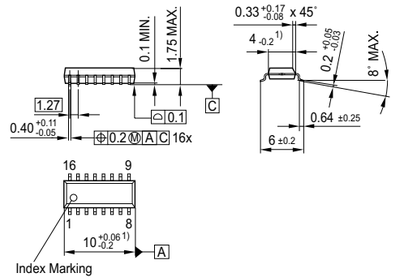




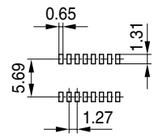
All dimensions in mm

SO-16

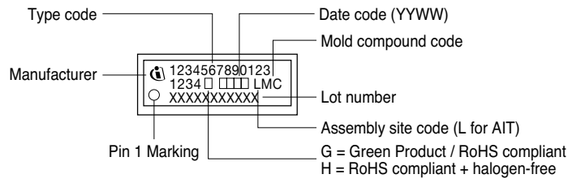
Package Outline



Foot Print



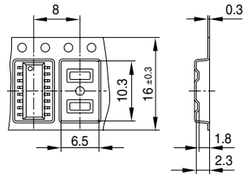
Marking Layout

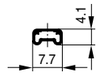


Packing

Reel ø330mm = 2.500 Pieces/Reel

Pieces/Tube: 50

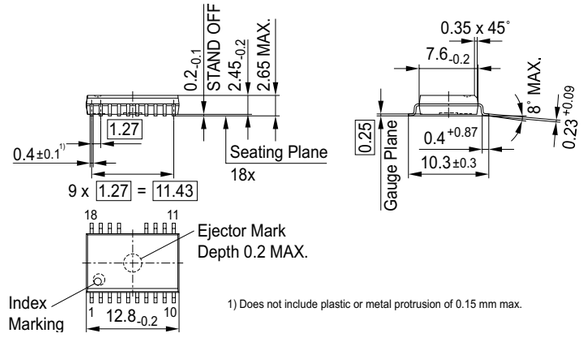




All dimensions in mm

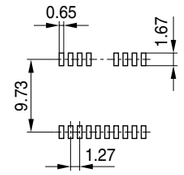
SO-18

Package Outline

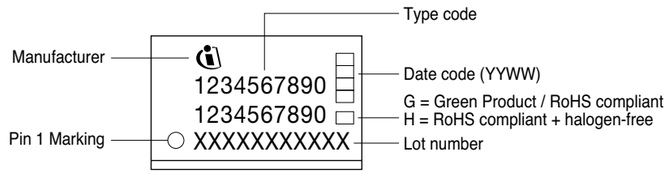


1) Does not include plastic or metal protrusion of 0.15 mm max.

Foot Print

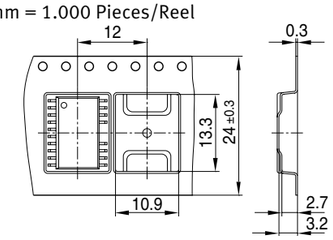


Marking Layout

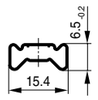


Packing

Reel ø330mm = 1.000 Pieces/Reel



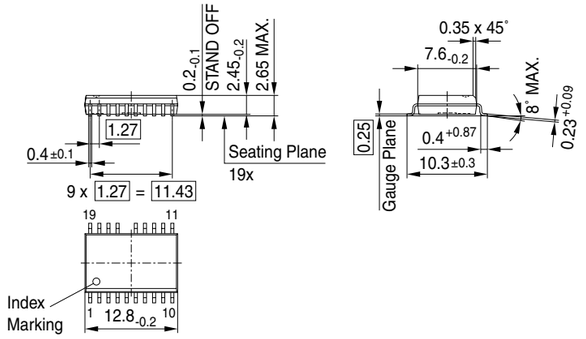
Pieces/Tube: 39



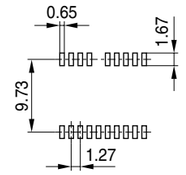
All dimensions in mm

SO-19

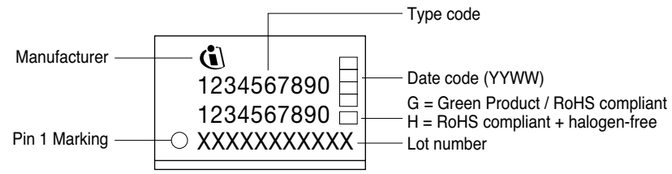
Package Outline



Foot Print

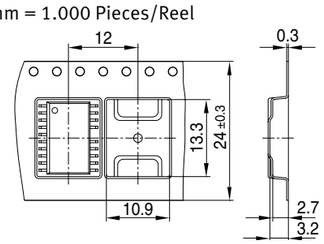


Marking Layout

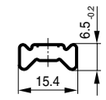


Packing

Reel ø330mm = 1.000 Pieces/Reel



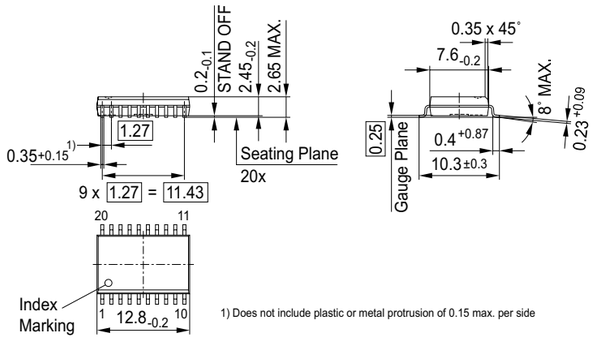
Pieces/Tube: 39



All dimensions in mm

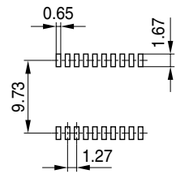
SO-20

Package Outline

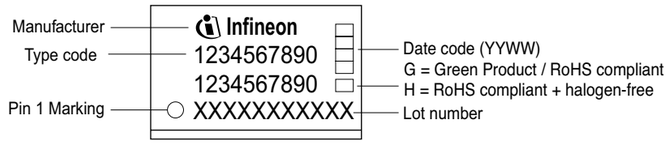


1) Does not include plastic or metal protrusion of 0.15 max. per side

Foot Print

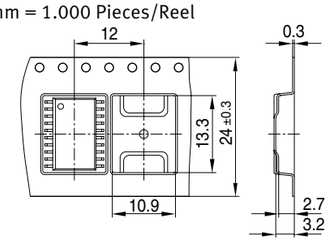


Marking Layout



Packing

Reel ø330mm = 1.000 Pieces/Reel

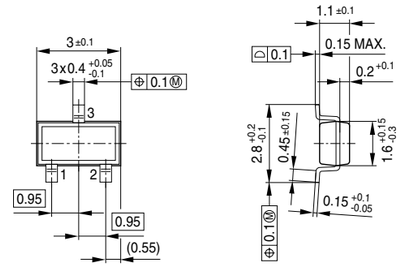


Pieces/Tube: 39

All dimensions in mm

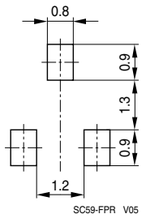
SC59

Package Outline



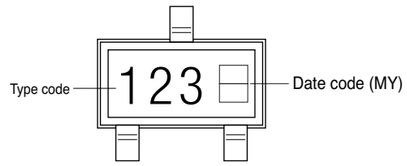
SC59-PO V05

Foot Print



SC59-FPR V05

Marking Layout

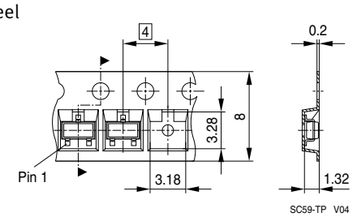


SC59-MK V01

Packing

Reel ø180mm = 3.000 Pieces/Reel

Reel ø330mm = 10.000 Pieces/Reel

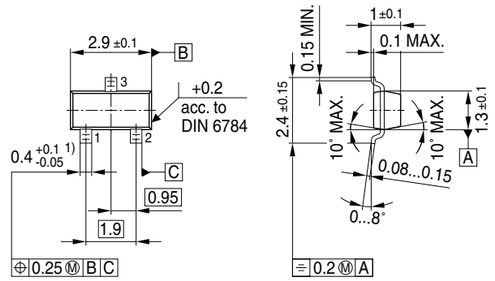


SC59-TP V04

All dimensions in mm

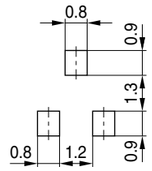
SOT-23

Package Outline

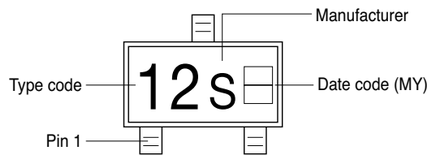


1) Lead width can be 0.6 max. in dambar area

Foot Print



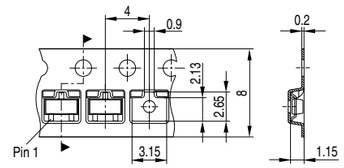
Marking Layout



Packing

Reel ø180mm = 3.000 Pieces/Reel

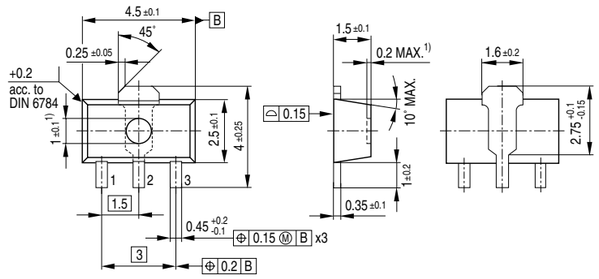
Reel ø330mm = 10.000 Pieces/Reel



All dimensions in mm

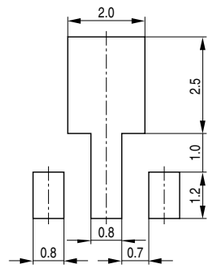
SOT-89

Package Outline

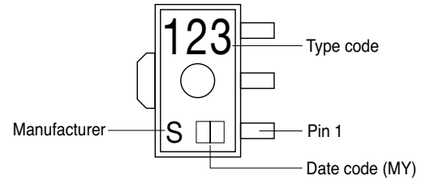


1) Ejector pin markings possible

Foot Print



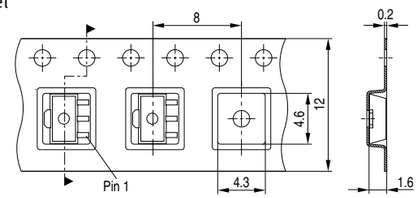
Marking Layout



Packing

Reel ø180mm = 1.000 Pieces/Reel

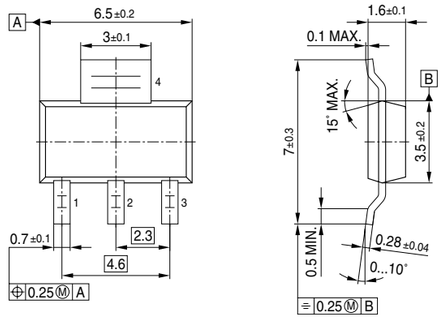
Reel ø330mm = 4.000 Pieces/Reel



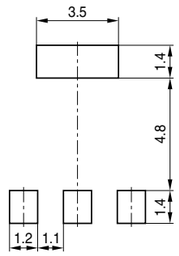
All dimensions in mm

SOT-223

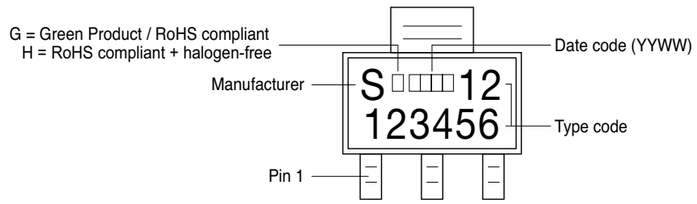
Package Outline



Foot Print



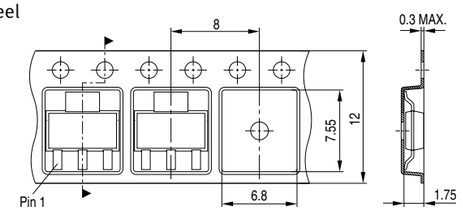
Marking Layout



Packing

Reel ø180mm = 1.000 Pieces/Reel

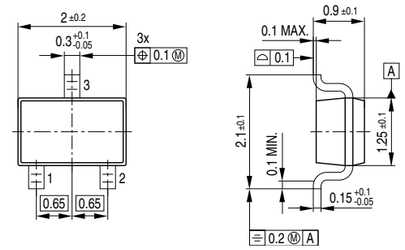
Reel ø330mm = 4.000 Pieces/Reel



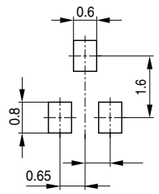
All dimensions in mm

SOT-323

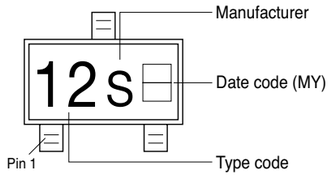
Package Outline



Foot Print



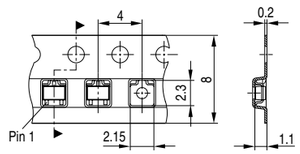
Marking Layout



Packing

Reel ø180mm = 3.000 Pieces/Reel

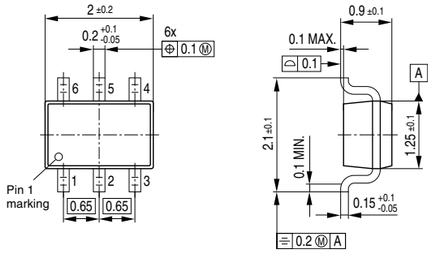
Reel ø330mm = 10.000 Pieces/Reel



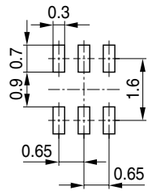
All dimensions in mm

SOT-363

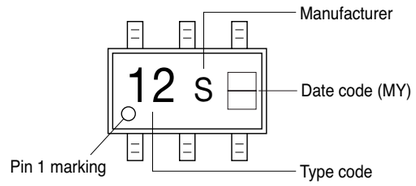
Package Outline



Foot Print

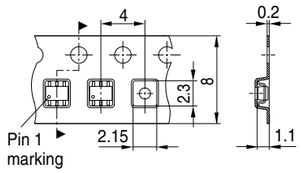


Marking Layout



Packing

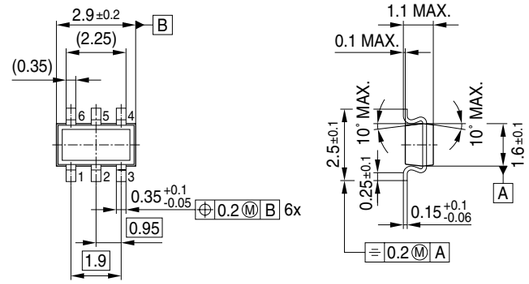
Reel ø180mm = 3.000 Pieces/Reel
Reel ø330mm = 10.000 Pieces/Reel



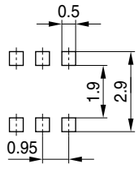
All dimensions in mm

TSOP-6

Package Outline

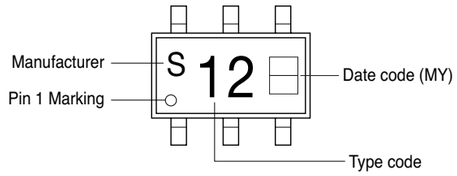


Foot Print



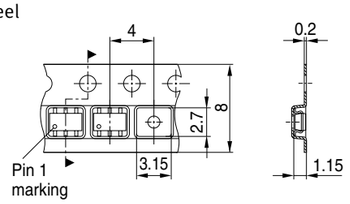
Remark: Wave soldering possible dep.
on customers process conditions

Marking Layout



Packing

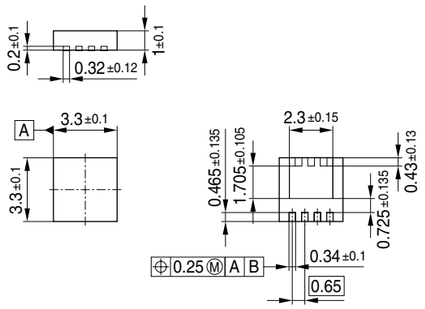
Reel ø180mm = 3.000 Pieces/Reel
Reel ø330mm = 10.000 Pieces/Reel



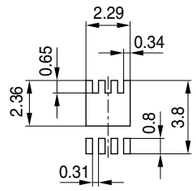
All dimensions in mm

S308

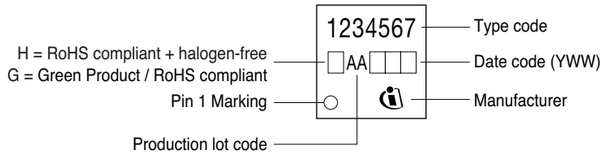
Package Outline



Foot Print

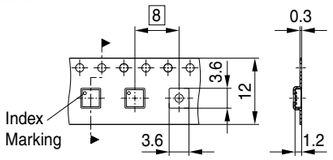


Marking Layout



Packing

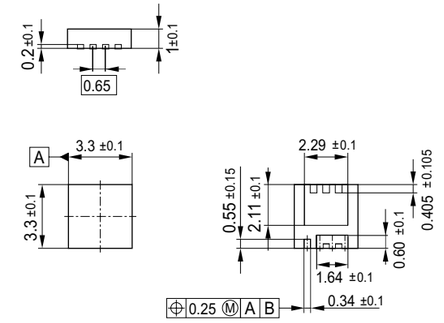
Reel ø330mm = 5.000 Pieces/Reel



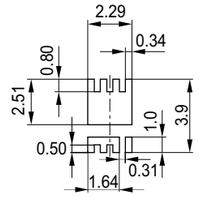
All dimensions in mm

S308 fused leads

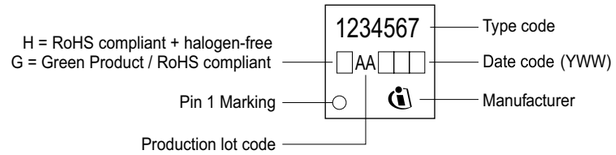
Package Outline



Foot Print

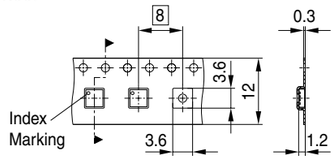


Marking Layout



Packing

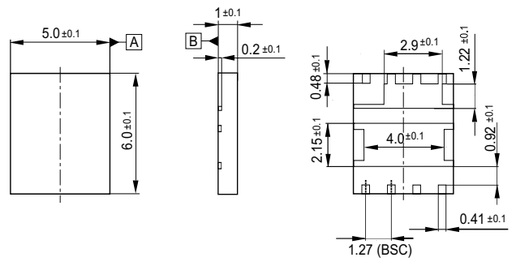
Reel ø330mm = 5.000 Pieces/Reel



All dimensions in mm

Power stage 5x6

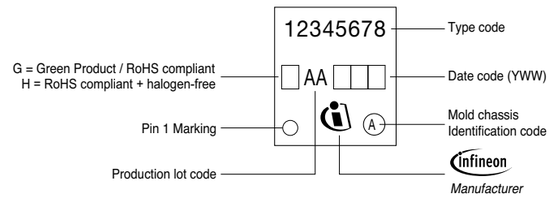
Package Outline



Foot Print

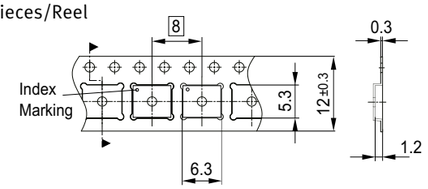
Drawing available on request

Marking Layout



Packing

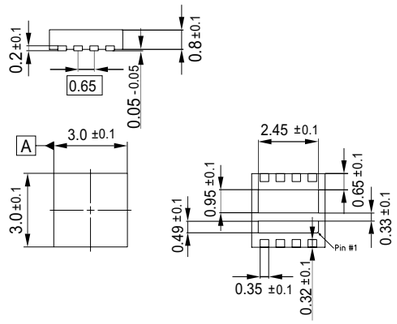
Reel ø330mm = 5.000 Pieces/Reel



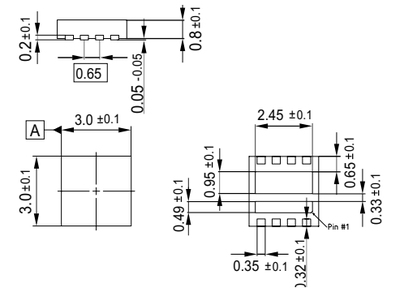
All dimensions in mm

Power stage 3x3

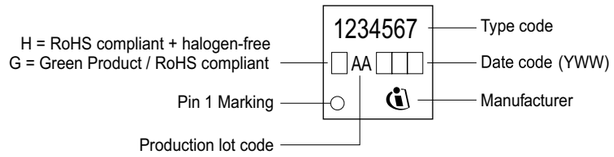
Package Outline



Foot Print

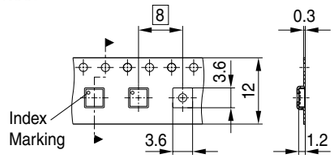


Marking Layout



Packing

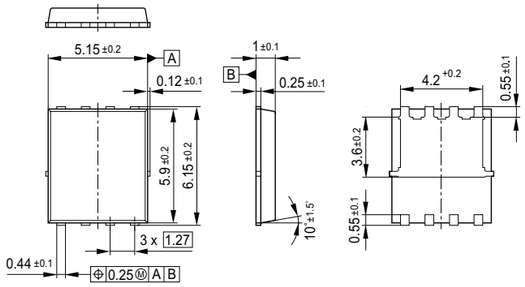
Reel ø330mm = 5.000 Pieces/Reel



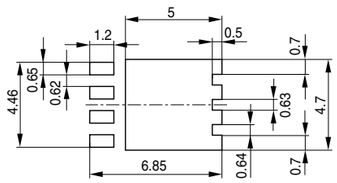
All dimensions in mm

SuperSO8

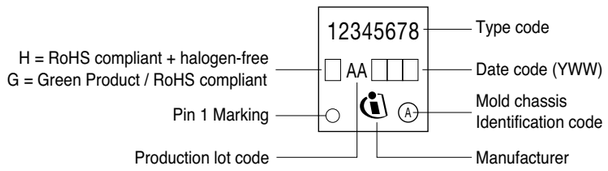
Package Outline



Foot Print

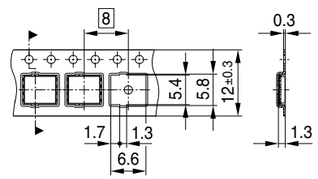


Marking Layout



Packing

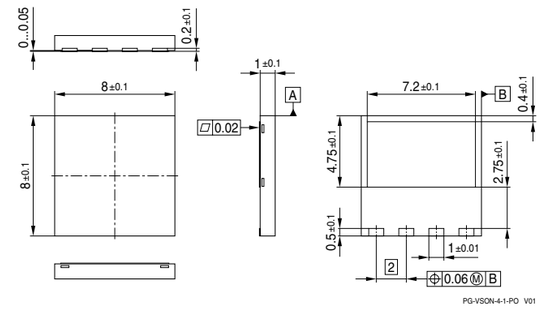
Reel ø330mm = 5.000 Pieces/Reel



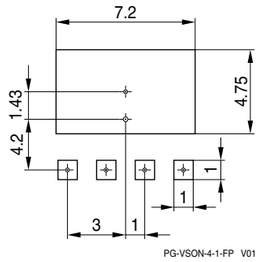
All dimensions in mm

VSON

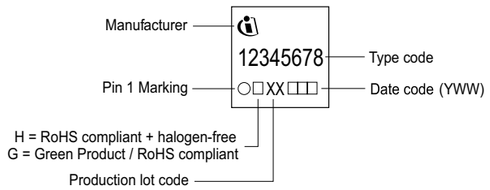
Package Outline



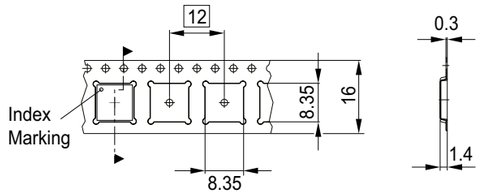
Foot Print



Marking Layout



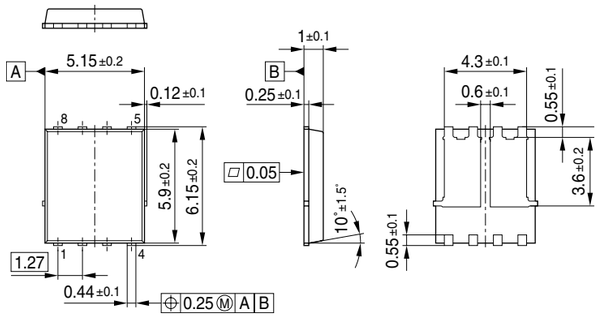
Packing



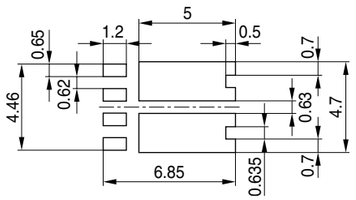
All dimensions in mm

SuperSO8 dual

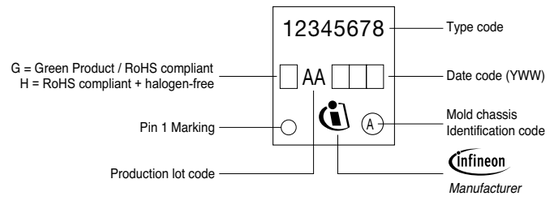
Package Outline



Foot Print

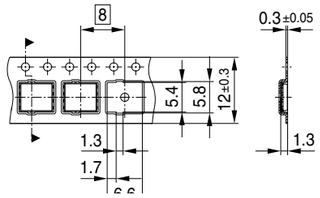


Marking Layout



Packing

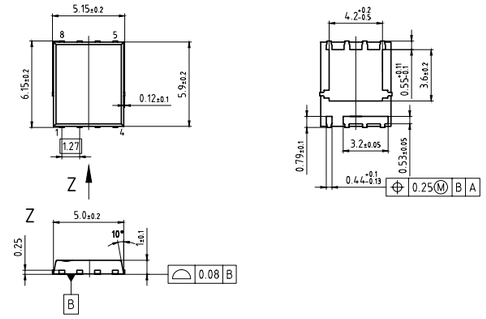
Reel ø330mm = 5.000 Pieces/Reel



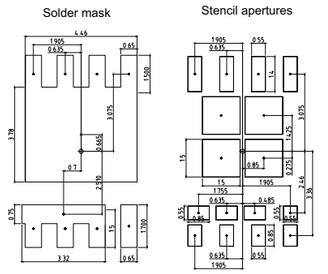
All dimensions in mm

SuperSO8 fused leads

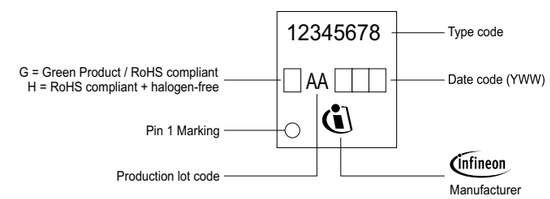
Package Outline



Foot Print

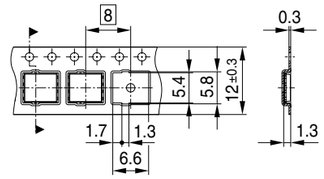


Marking Layout



Packing

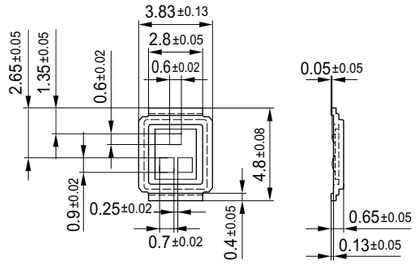
Reel ø330mm = 5.000 Pieces/Reel



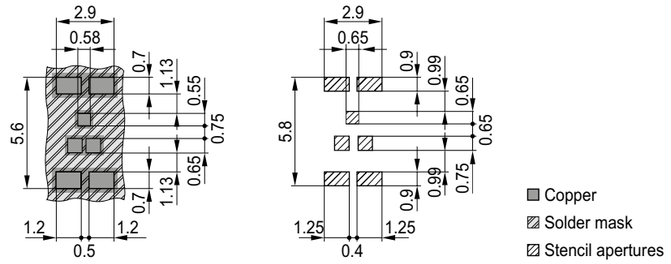
All dimensions in mm

CanPAK™ SJ

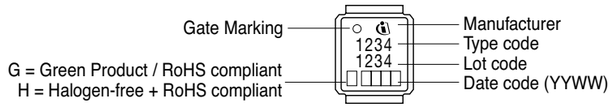
Package Outline



Foot Print

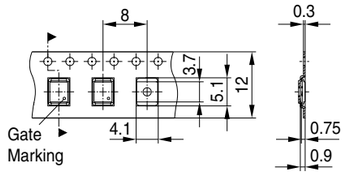


Marking Layout



Packing

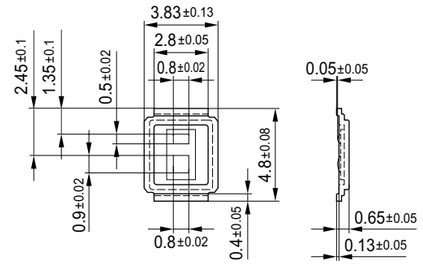
Reel ø177mm = 1.000 Pieces/Reel



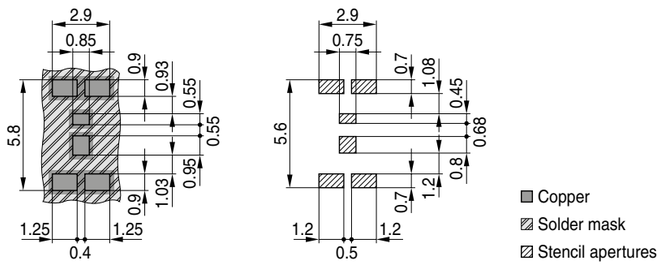
All dimensions in mm

CanPAK™ SQ

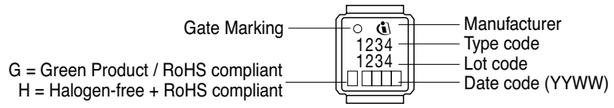
Package Outline



Foot Print

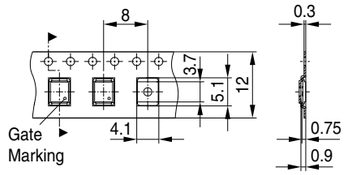


Marking Layout



Packing

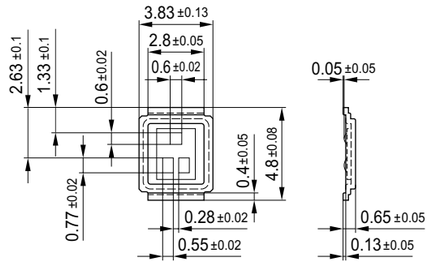
Reel ø177mm = 1.000 Pieces/Reel



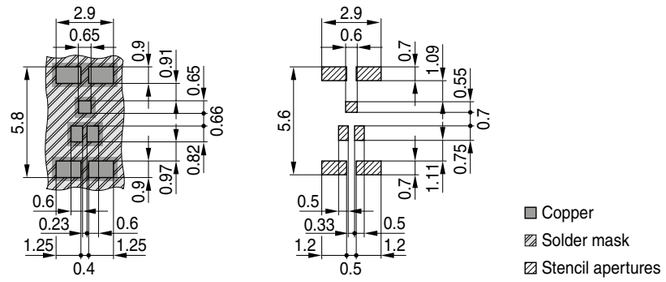
All dimensions in mm

CanPAK™ ST

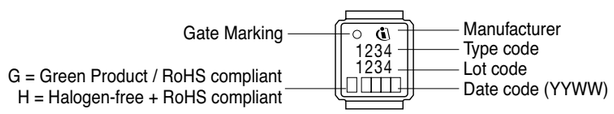
Package Outline



Foot Print

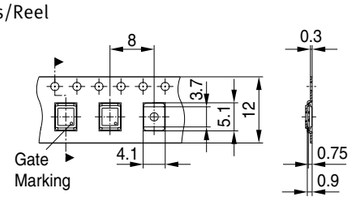


Marking Layout



Packing

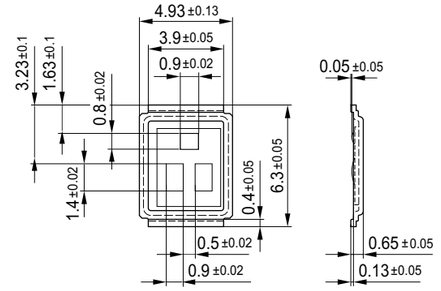
Reel ø177mm = 1.000 Pieces/Reel



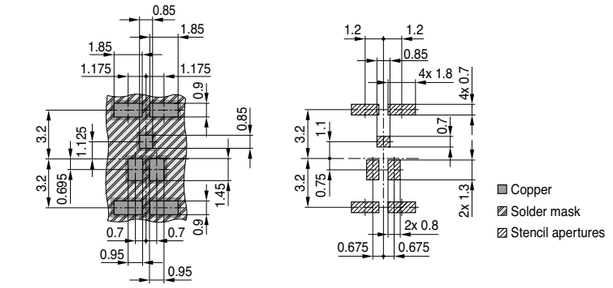
All dimensions in mm

CanPAK™ MN

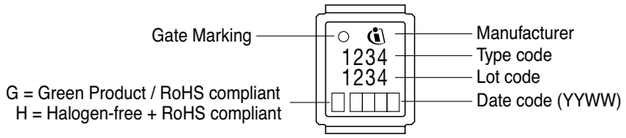
Package Outline



Foot Print

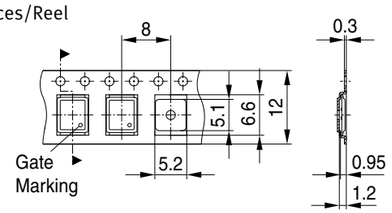


Marking Layout



Packing

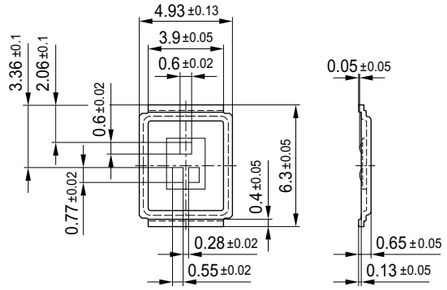
Reel ø177mm = 1.000 Pieces/Reel



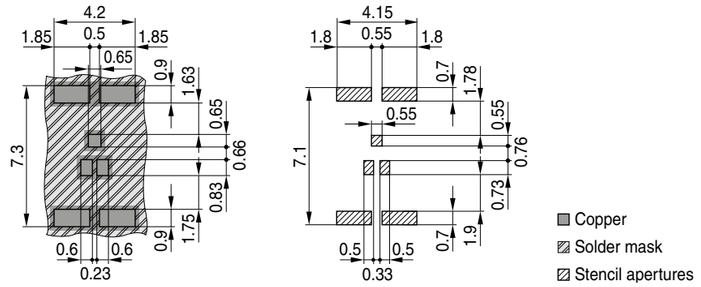
All dimensions in mm

CanPAK™ MP

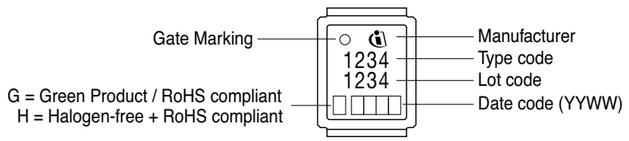
Package Outline



Foot Print

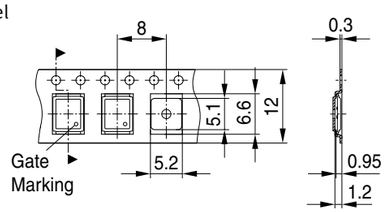


Marking Layout



Packing

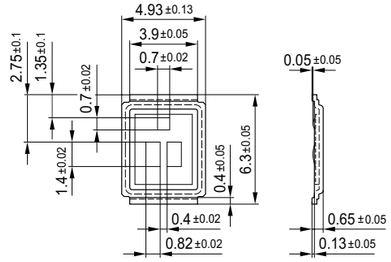
Reel ø177mm = 1.000 Pieces/Reel



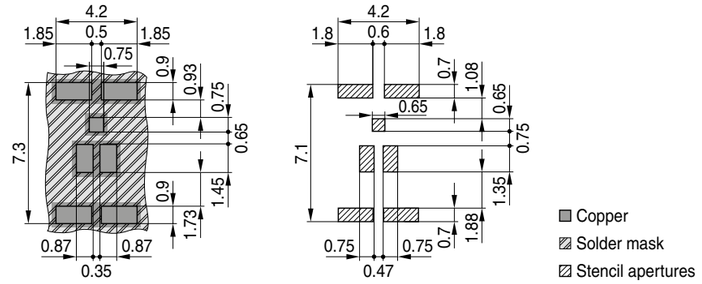
All dimensions in mm

CanPAK™ MX

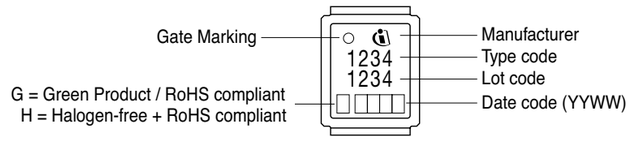
Package Outline



Foot Print

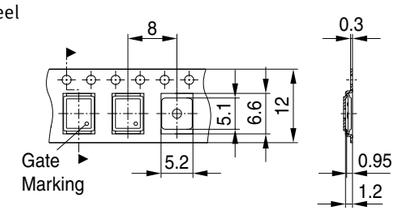


Marking Layout



Packing

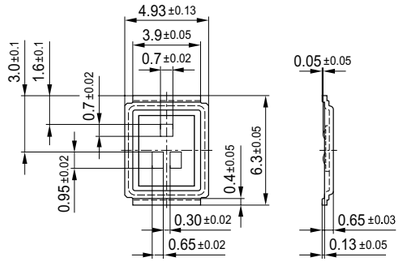
Reel ø177mm = 1.000 Pieces/Reel



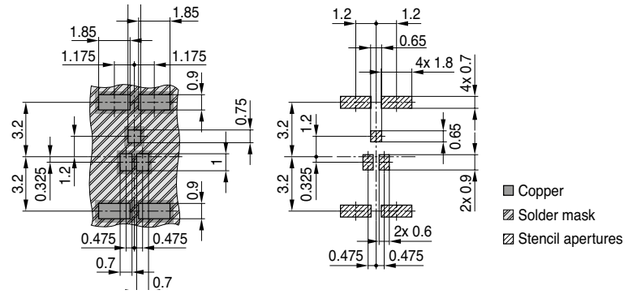
All dimensions in mm

CanPAK™ MZ

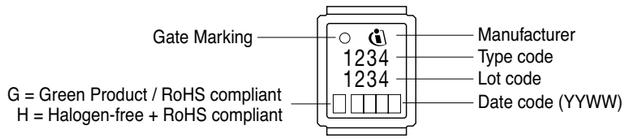
Package Outline



Foot Print

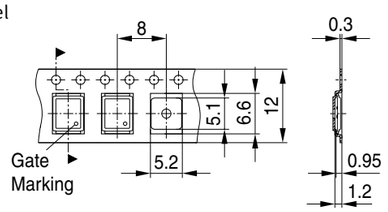


Marking Layout



Packing

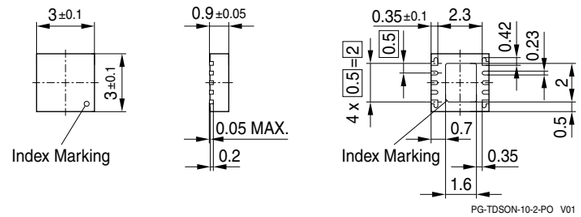
Reel ø177mm = 1.000 Pieces/Reel



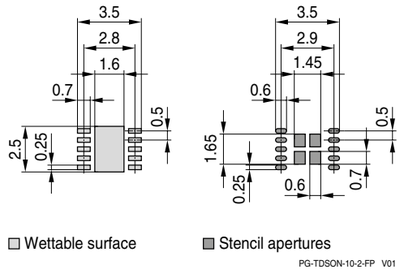
All dimensions in mm

TDSON-10

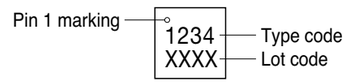
Package Outline



Foot Print



Marking Layout



Packing

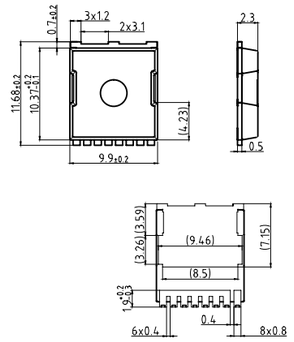
Reel ø330mm = 5.000 Pieces/Reel

Drawing available on request

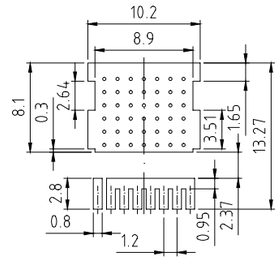
All dimensions in mm

TO-leadless (TOLL)

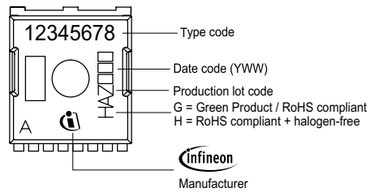
Package Outline



Foot Print

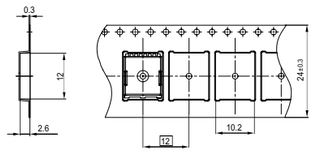


Marking Layout



Packing

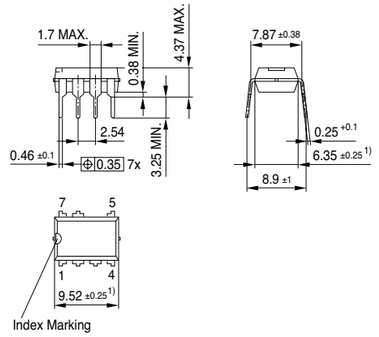
Reel ø330mm = 5.000 Pieces/Reel



All dimensions in mm

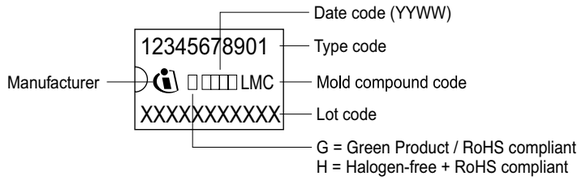
DIP-7

Package Outline



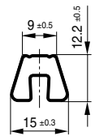
1) Does not include plastic or metal protrusion of 0.25 max. per side

Marking Layout



Packing

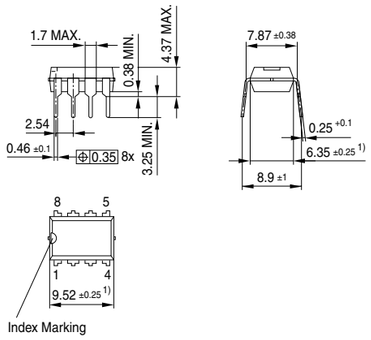
Pieces/Tube: 20



All dimensions in mm

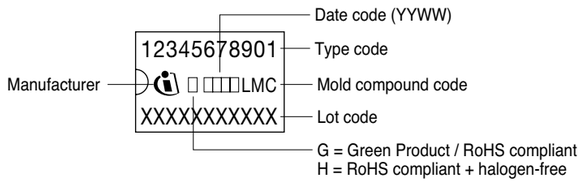
DIP-8

Package Outline



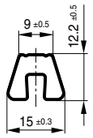
1) Does not include plastic or metal protrusion of 0.25 max. per side

Marking Layout



Packing

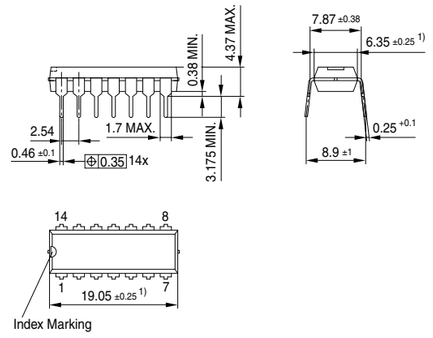
Pieces/Tube: 20



All dimensions in mm

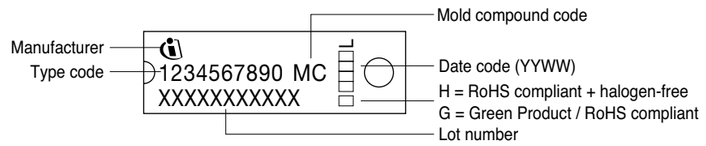
DIP-14

Package Outline



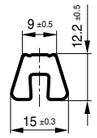
1) Does not include plastic or metal protrusion of 0.25 max. per side

Marking Layout



Packing

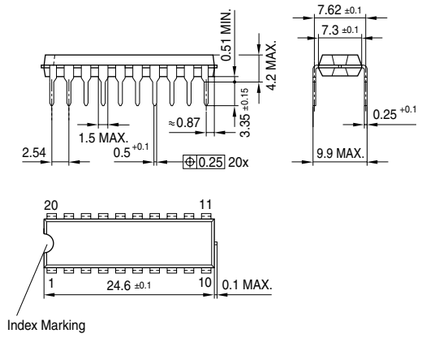
Pieces/Tube: 20



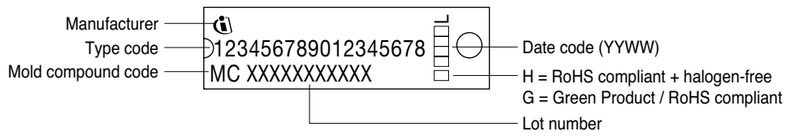
All dimensions in mm

DIP-20

Package Outline

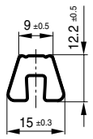


Marking Layout



Packing

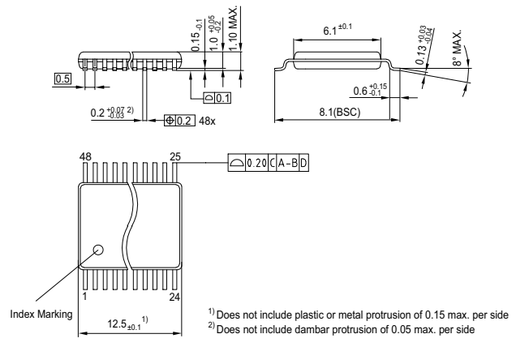
Pieces/Tube: 20



All dimensions in mm

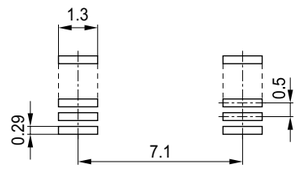
TSSOP-48

Package Outline

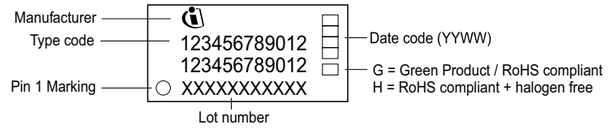


1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Does not include dambar protrusion of 0.05 max. per side

Foot Print



Marking Layout



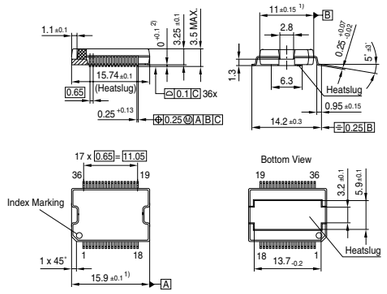
Packing

Drawing available on request

All dimensions in mm

DSO-36 (430 mil)

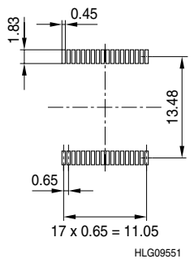
Package Outline



1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Stand off

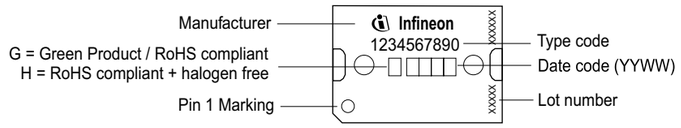
PG-DSO-36-10 -12 -15 -16 -21 -23 -26 -27 V01

Foot Print

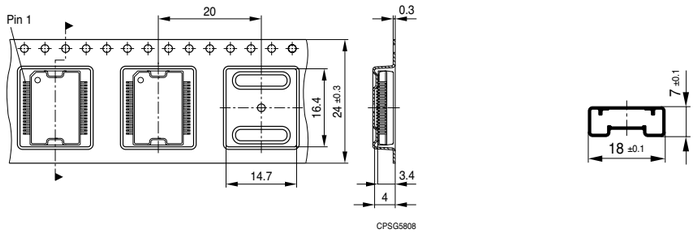


HLG09551

Marking Layout



Packing

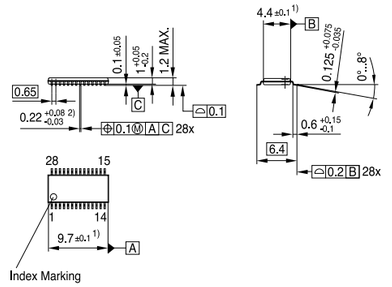


CPSG5808

All dimensions in mm

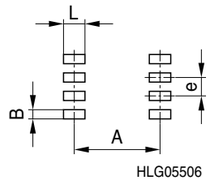
TSSOP-28

Package Outline



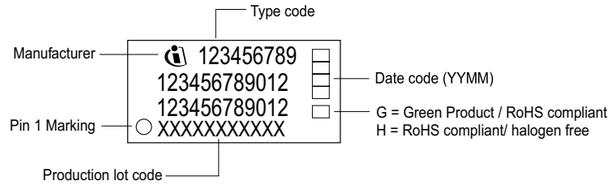
1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Does not include dambar protrusion

Foot Print

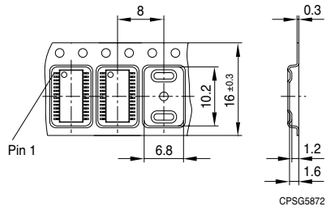


HLG05506

Marking Layout



Packing

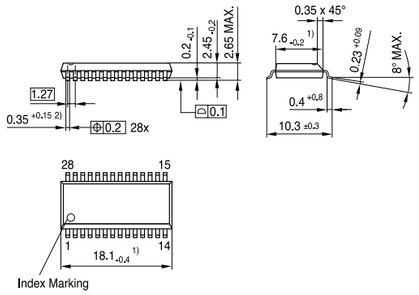


CPSG5872

All dimensions in mm

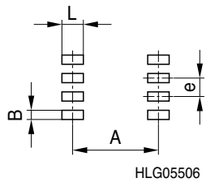
DSO-28

Package Outline

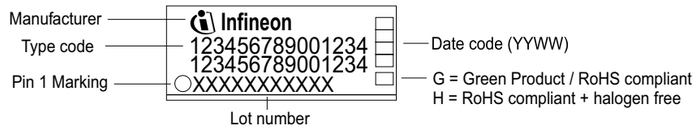


1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Does not include dambar protrusion of 0.05 max. per side

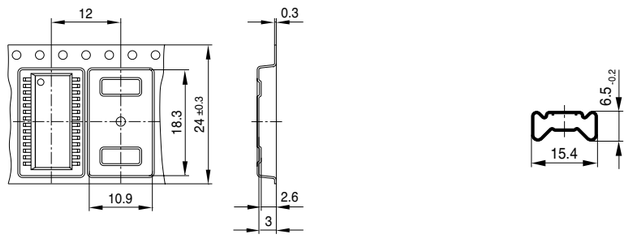
Foot Print



Marking Layout



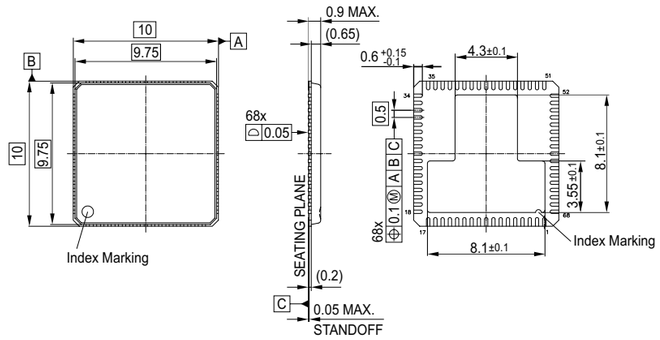
Packing



All dimensions in mm

VQFN-68

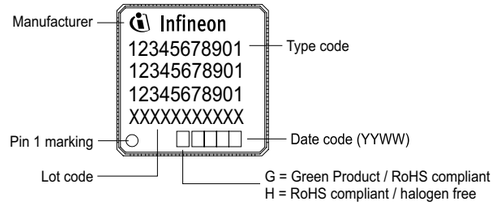
Package Outline



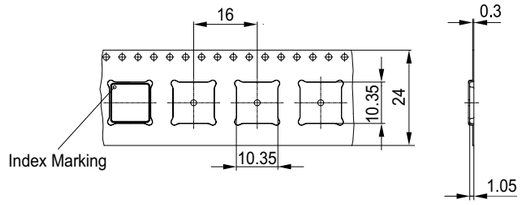
Foot Print

Drawing available on request

Marking Layout



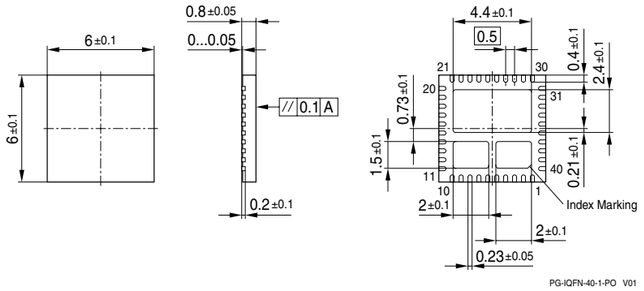
Packing



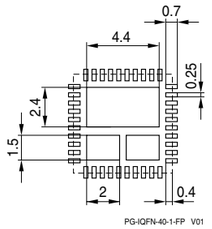
All dimensions in mm

IQFN-40 (DrMOS)

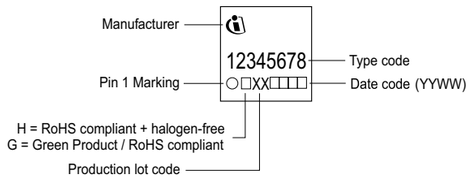
Package Outline



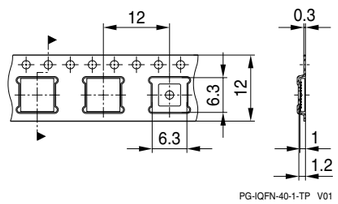
Foot Print



Marking Layout



Packing



All dimensions in mm

Packaging Information

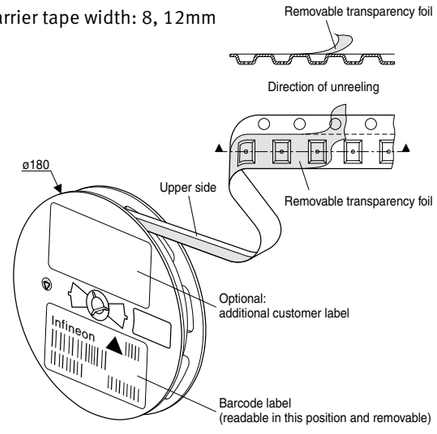
Tape and Reel

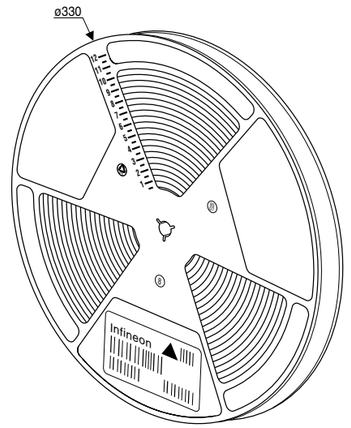
(DIN IEC 60 286-3)

Please consult your nearest Infineon sales offices (www.infineon.com/sales) if you have any queries relating to additional dimensions, dimensional tolerances or variations.

Tape and Reel made of Plastic

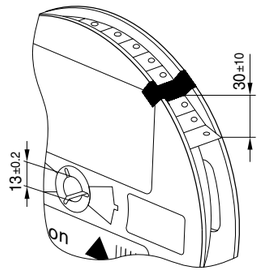
ø Reel 180mm and 330mm
Carrier tape width: 8, 12mm



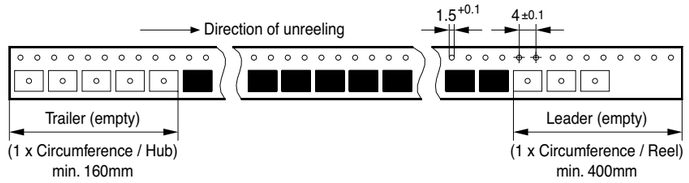


Fixing on the Tape

Carrier tape width: ≤ 12mm



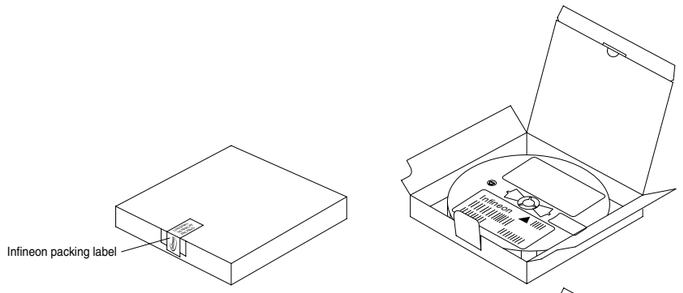
Direction of Unreeling



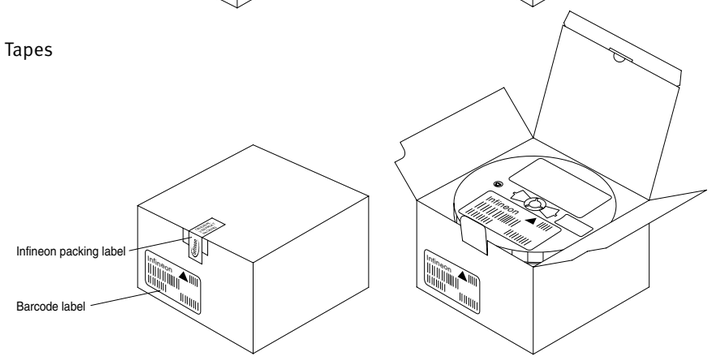
There shall be a leader of 400mm minimum of cover tape, which includes at least 100mm of carrier tape with empty compartments. All the leader may consist of the carrier tape with empty compartments, sealed by cover tape.

Labels and Boxes

For 1 Tape (resembling a pizza box)



Up to 10 Tapes

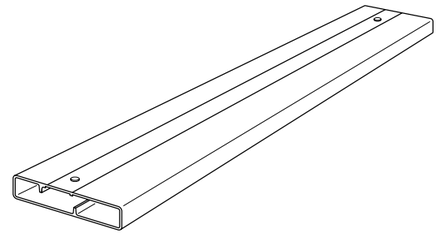


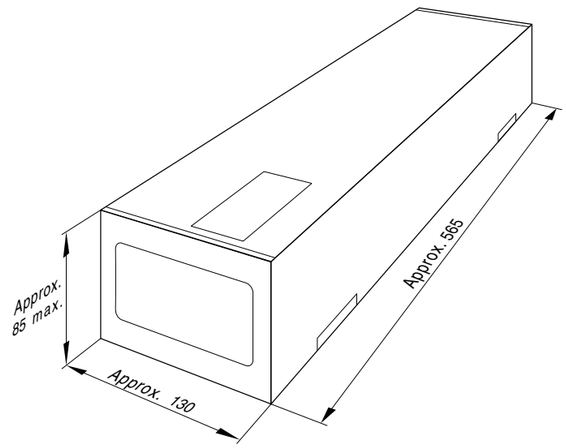
Tube (DIN IEC60 286-4)

(DIN IEC60 286-4)
Please consult your nearest Infineon sales offices (www.infineon.com/sales) if you have any queries relating to additional dimensions, dimensional tolerances or variations.

Tube and Packing

Standard Length: 528_{-2}mm;
coated (unless stated to the contrary)



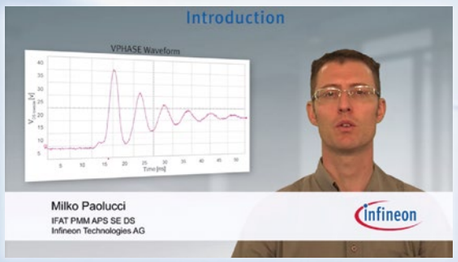


600V CoolMOS™ P6
www.infineon.com/p6

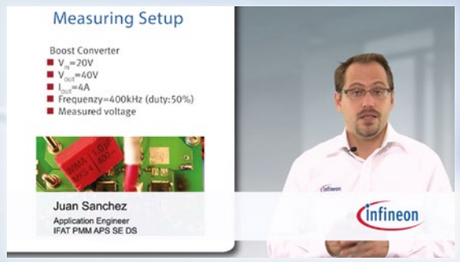
500V CoolMOS™ CE
www.infineon.com/ce

IGBT TRENCHSTOP™5
www.infineon.com/trenchstop5

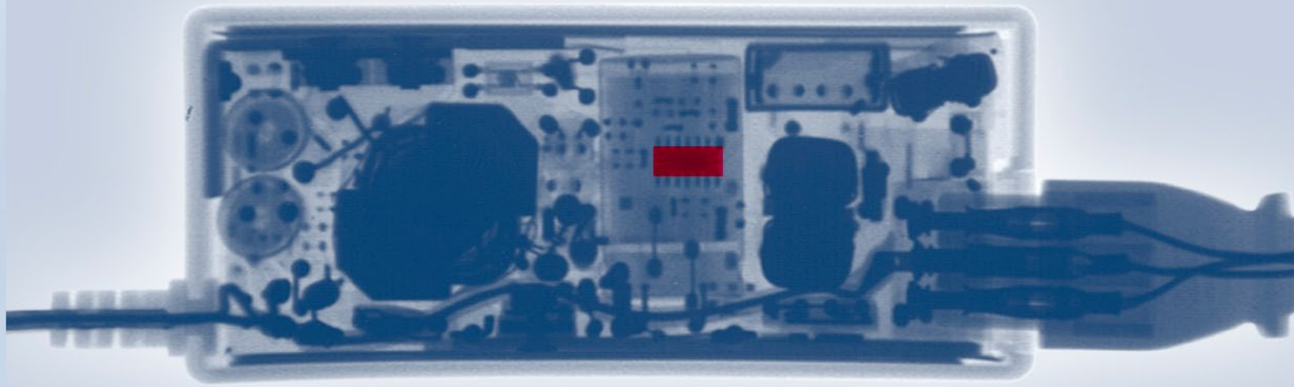
IGBT Induction Heating Gen 3
www.infineon.com/igbt



Overshoot & EMI issues in Buck Converters
www.infineon.com/powermosfets



Measurement techniques on waveforms
www.infineon.com/powermosfets



Power Management Expert Videos

Worldwide Access to Expert Knowledge

- Infineon experts giving digital lectures
- Updates on new technologies and products
- Knowledge and expertise sharing

www.infineon.com/powermanagement
www.youtube.com/InfineonTechnologies

We shape Power Management - We live Energy Efficiency

Ask Infineon. Get connected with the answers.
Where you need it. When you need it.

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

Our global connection service goes way beyond standard switchboard services by offering qualified support on the phone. Call us!

- Germany ..... 0800 951 951 951 (German/English)
- China, mainland ..... 4001 200 951 (Mandarin/English)
- India ..... 000 800 4402 951 (English)
- USA ..... 1-866 951 9519 (English/German)
- Other countries ..... 00* 800 951 951 951 (English/German)
- Direct access ..... +49 89 234-0 (interconnection fee, German/English)

* Please note: Some countries may require you to dial a code other than "00" to access this international number, please visit www.infineon.com/service for your country!

Where to Buy
Infineon Distribution Partners and Sales Offices

Please use our location finder to get in contact with your nearest Infineon distributor or sales office.

www.infineon.com/WhereToBuy

Infineon Technologies – innovative semiconductor solutions for Energy Efficiency, mobility and security.

Published by
Infineon Technologies Austria AG
9500 Villach, Austria

Visit us:
www.infineon.com

Order Number: B152-H9571-G3-X-7600
Date: 02 / 2013

ATTENTION PLEASE!
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

INFORMATION
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

WARNINGS
Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office. Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.