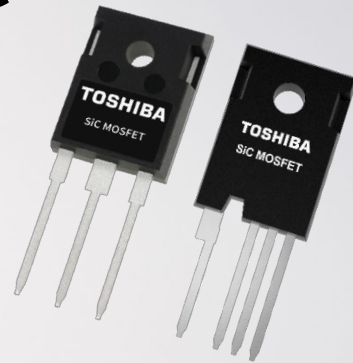


Silicon Carbide MOSFETs



650V and 1200V 3rd Generation SiC MOSFETs

Toshiba's latest Silicon Carbide (SiC) MOSFETs provide a selection of both 650V and 1200V voltage products. The 3rd generation SiC MOSFETs include a built-in Schottky Barrier Diode (SBD) with a low forward voltage V_F of -1.35V (typ.) placed in parallel with the junction PN diode of the SiC MOSFET to suppress fluctuation in $R_{DS(on)}$. Furthermore, Toshiba's advanced SiC process has greatly improved the on-resistance per unit area $R_{DS(on)} * A$ and the performance index $R_{DS(on)} * Q_{gd}$, which indicates switching characteristics, compared to 2nd generation products.

Applications

- Power supplies & DC/DC converters for
 - Server
 - Telecom
 - Industrial equipment
- UPS
- Energy storage system
- EV- quick charger (off board)
- Solar-Inverter
- Industrial motor drive

Features

- Low $R_{DS(on)} * Q_{gd}$ index
- Built-in SiC SBD structure with low V_F 1.35V
- 40% reduction of $R_{DS(on)} * A$ versus 2nd Gen SiC-MOSFET
- TO-247 3-Pin standard and 4-Pin package with Kelvin source
- Wide V_{GSS} range -10V to +25V; high V_{th} of 3V (min.) to 5V (max.)

Advantages

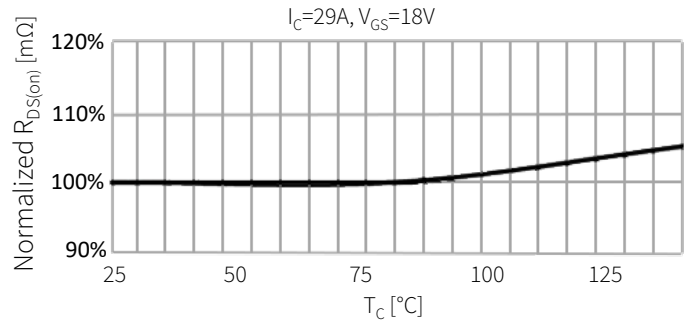
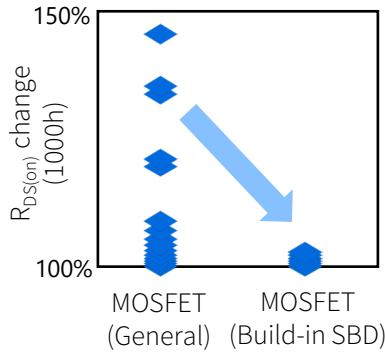
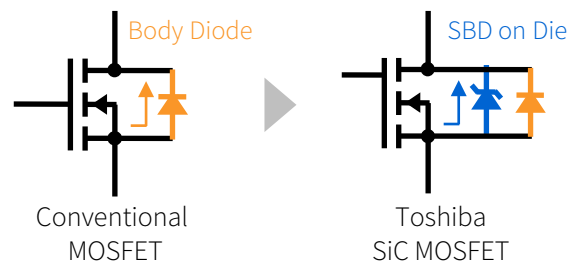
- 80% reduced $R_{DS(on)} * Q_{gd}$ compared to 2nd generation products for better switching performance
- Suppressing $R_{DS(on)}$ fluctuation
- Reduction of chip size combined with improved performance
- Kelvin source offers reduced switching loss, E_{ON} & E_{OFF} compared to 3 pin solution
- Facilitating the gate drive circuit design and prevent malfunction due to switching noise

Benefits

- Lower power consumption, less heat system costs
- Increased reliability
- SiC allows reduced bill of materials (BOM) costs by needing smaller passive components
- Further increased efficiency, allows higher power density
- Simplified design-in for faster time to market and product launch

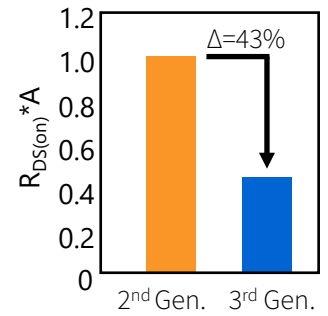
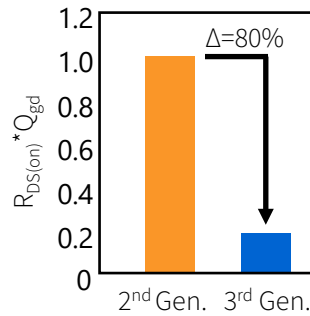
Built-in Schottky barrier diode

Low V_F Schottky diode integrated; V_F : 1.35V (typ.).
 Integrated SBD improves reliability as it suppresses $R_{DS(on)}$ fluctuation over time and temperature.



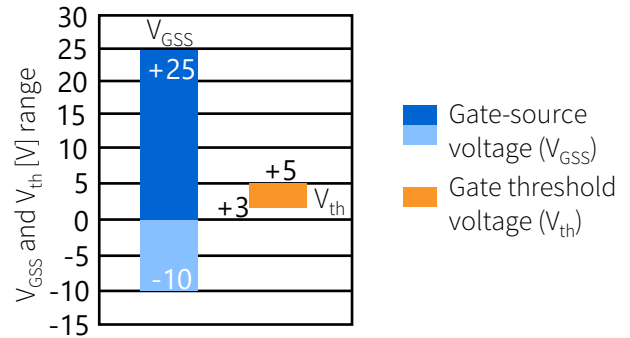
Low $R_{DS(on)} * Q_{gd}$ index

Greatly improved $R_{DS(on)} * Q_{gd}$ performance index can enable lower switching losses depending on the circuit design.
 Reduced $R_{DS(on)} * A$ compared to previous generation.



High noise immunity, easy to use

Wide V_{GSS} range from -10V ~ 25V (recommended: 18V) enabling simplified gate driving.
 High V_{th} from 3V (min.) to 5V (max.) to prevent malfunction due to switching noise.
 A wide V_{GSS} range and a high V_{th} allows an easy gate circuit design.



SiC MOSFET 3rd generation line-up

$V_{DSS} : 650V$			$V_{DSS} : 1200V$		
$R_{DS(on)}$ (typ)	TO-247	TO-247-4L	$R_{DS(on)}$ (typ)	TO-247	TO-247-4L
15mΩ	TW015N65C	TW015Z65C	15mΩ	TW015N120C	TW015Z120C
27mΩ	TW027N65C	TW027Z65C	30mΩ	TW030N120C	TW030Z120C
48mΩ	TW048N65C	TW048Z65C	45mΩ	TW045N120C	TW045Z120C
83mΩ	TW083N65C	TW083Z65C	60mΩ	TW060N120C	TW060Z120C
107mΩ	TW107N65C	TW107Z65C	140mΩ	TW140N120C	TW140Z120C