



Silicon Carbide Enhancement Mode MOSFET

Features

Preliminary



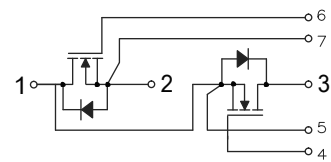
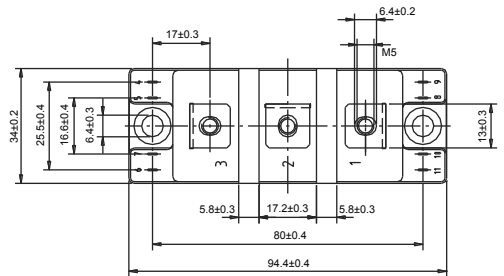
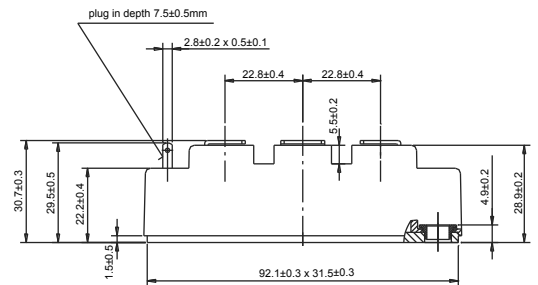
- ◆ $V_{DSS} = 1200V$
- ◆ $R_{DS(ON)} < 15\text{ m}\Omega @ V_{GS} = 20\text{ V}$
- ◆ Fully Avalanche Rated
- ◆ Pb Free & RoHS Compliant
- ◆ Isolation Type Package
- ◆ Electrically Isolation base plate

Applications

- ◆ Solar Inverters
- ◆ Switch Mode Power Supplies
- ◆ Power Converters
- ◆ Battery Chargers
- ◆ Motor Drive

Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	1200	V
Gate-Source Voltage	V_{GS}	-10/+20	V
Drain Current-Continuous @ $T_c = 25^\circ\text{C}$ @ $T_c = 100^\circ\text{C}$	I_D	200 125	A
Drain Current-Pulsed @ $T_c = 25^\circ\text{C}$ ^{Note1}	I_{DM}	500	A
Maximum Power Dissipation	P_D	980	W
Storage Temperature Range	T_{STG}	-50 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-50 to +150	$^\circ\text{C}$
Thermal Resistance, Junction-to-Case	$R_{\theta_{JC}}$	0.13	$^\circ\text{C/W}$
Isolation Voltage (A.C. 1 minute)	V_{iso}	3000	V
Mounting torque (M5 Screw)	M_d	3-5	$\text{N}\cdot\text{m}$
Weight		170	g





Electrical Characteristics @ T_J =25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , I _{DS} =0.3mA	1200	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} =0V , V _{DS} =1200V	-	-	250	uA
Gate-Body Leakage	I _{GSS}	V _{GS} =20V , V _{DS} =0V	-	-	200	nA
ON Characteristics						
Gate Threshold Voltage	V _{TH}	V _{DS} =V _{GS} , I _{DS} =8mA	2.0	2.5	3.5	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =20V , I _{DS} =200A	-	13	15	mΩ
Gate Resistance	R _G		-	1.6	2.9	Ω
Forward Transconductance	g _{fs}	V _{DS} =20V , I _D =100A ^{Note1}	-	55	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =800V V _{GS} =0V	-	7500	-	pF
Output Capacitance	C _{oss}	V _{AC} =25mV	-	460	-	
Reverse Transfer Capacitance	C _{rss}	Freq.=200kHz	-	100	-	
Turn-On Switching Energy	E _{on}	V _{DD} =600V , V _{GS} =-5V/+20V I _D =150A , R _{G(ext)} =2.5Ω	-	1.7	-	mJ
Turn-Off Switching Energy	E _{off}	Load=142μH , T _J =150°C	-	0.4	-	
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{DD} =600V	-	43	-	ns
Rise Time	t _r	V _{GS} =20V	-	32	-	
Turn-Off Delay Time	t _{d(off)}	I _{DS} =150A	-	78	-	
Fall Time	t _f	R _G =2.5Ω	-	32	-	
Total Gate Charge at 10V	Q _g	V _{DS} =800V	-	382	-	nC
Gate to Source Charge	Q _{gs}	V _{GS} =20V	-	100	-	
Gate to Drain Charge	Q _{gd}	I _{DS} =120A	-	116	-	
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V _F	T _J =25°C , I _F =200A	-	-	6.5	V
Diode Continuous Forward Current	I _F		-	-	125	A
Diode Pulsed Current ^{Note1}	I _{F,pulse}		-	-	500	A
Reverse Recovery time	T _{RR}	I _F =0.5V , I _R =1.0A , I _{RR} =0.25A	-	-	220	ns

Notes:

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle > 2%.



Typical Characteristics

Figure 1. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

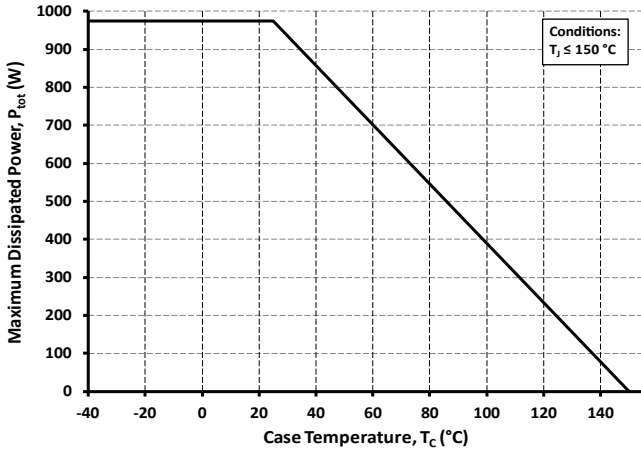


Figure 2. Continuous Drain Current (MOSFET) Derating vs Case Temperature

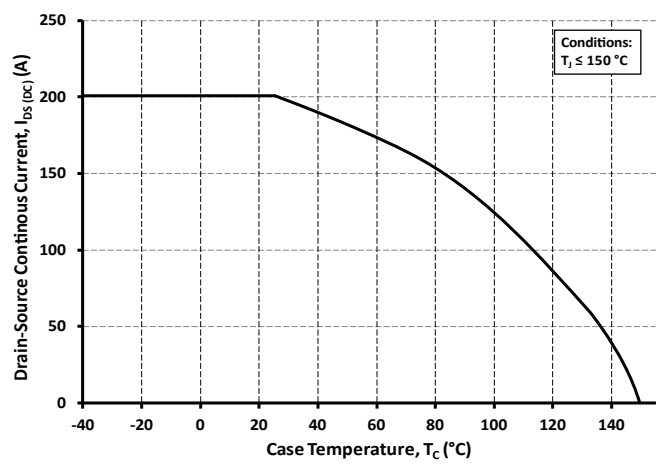


Figure 3. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

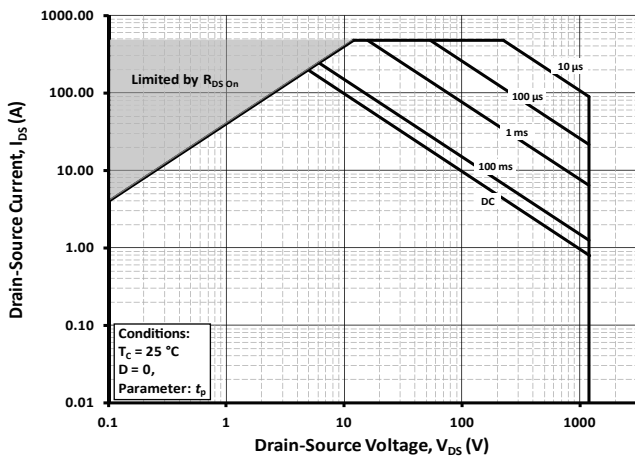


Figure 4. MOSFET Junction to Case Thermal Impedance

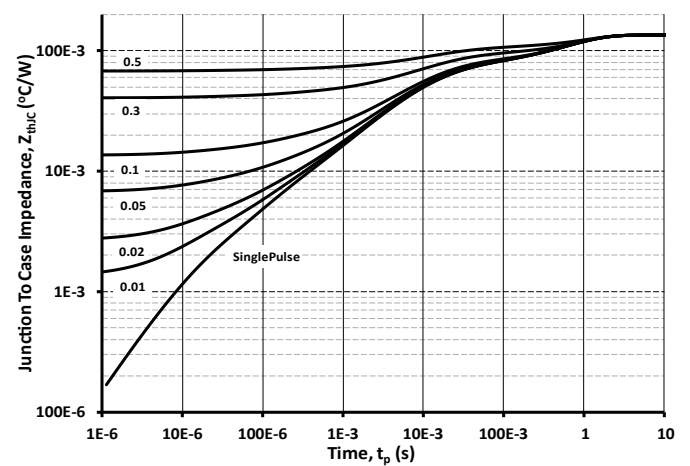


Figure 5. Output Characteristics T_j = 25 °C

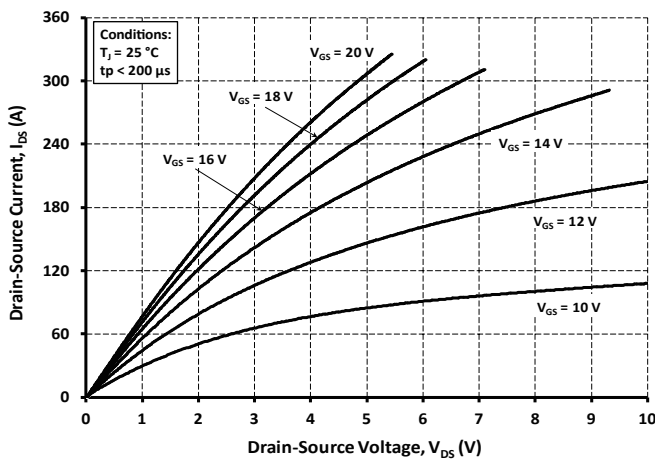
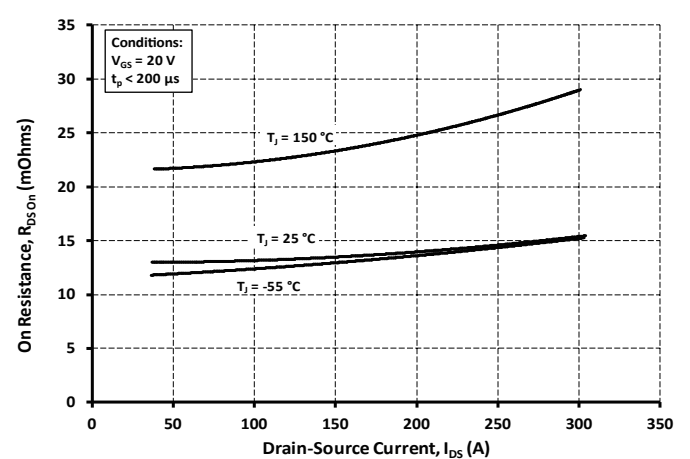


Figure 6. On-Resistance vs. Drain Current For Various Temperatures





Typical Characteristics

Figure 7. On-Resistance vs. Temperature For Various Gate-Source Voltage

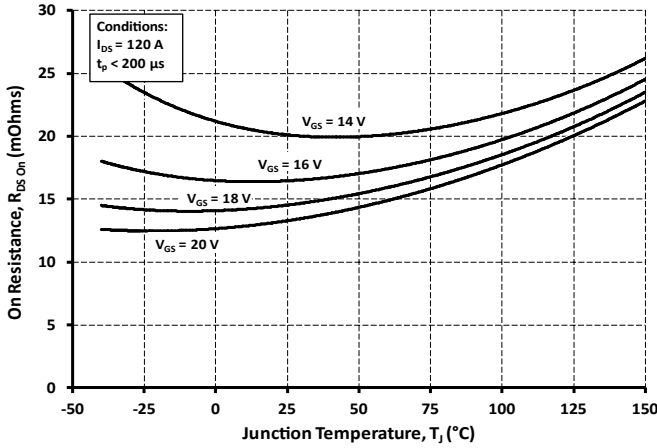


Figure 8. Threshold Voltage vs. Temperature

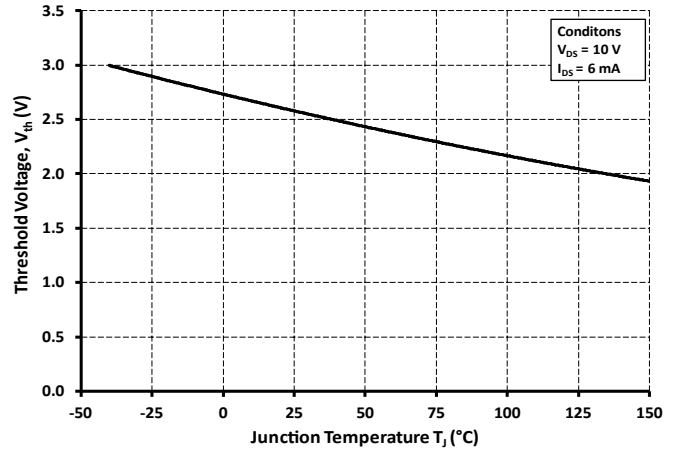


Figure 9. Transfer Characteristic for Various Junction Temperatures

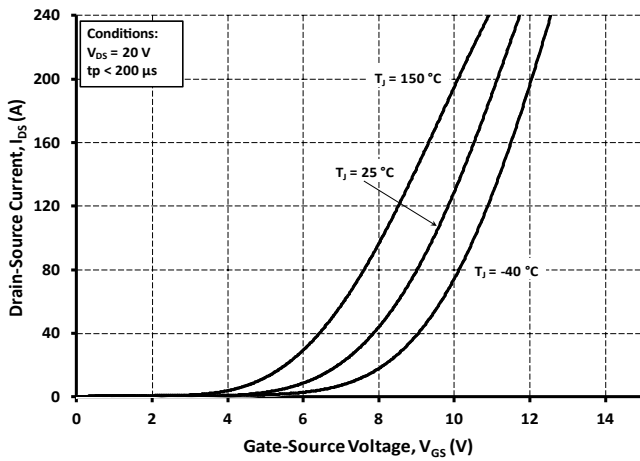


Figure 10. Capacitances vs. Drain-Source Voltage (0 - 1 kV)

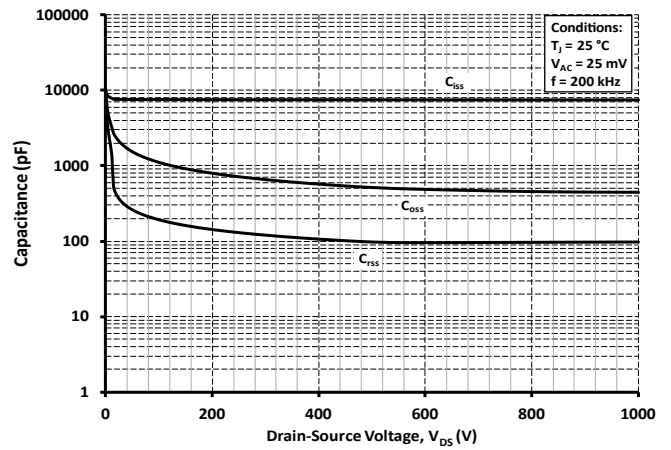


Figure 11. Typical forward characteristics of reverse diode

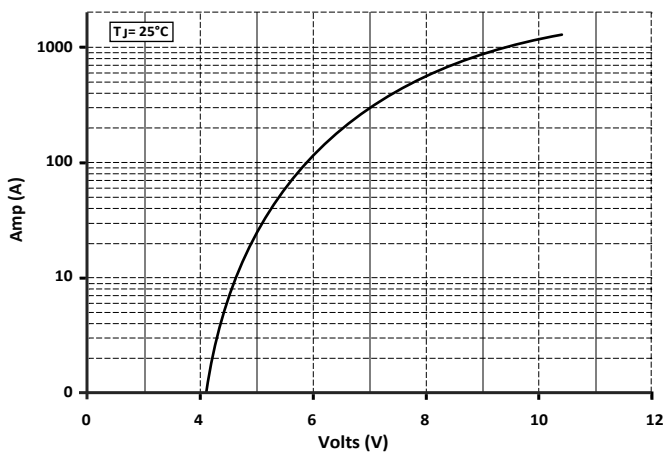
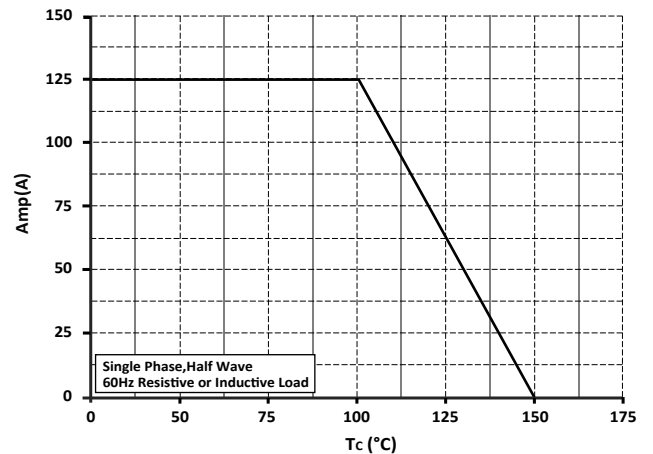


Figure 12. Forward derating curve of reverse diode





Typical Characteristics

Figure 13. Peak forward surge current of reverse diode

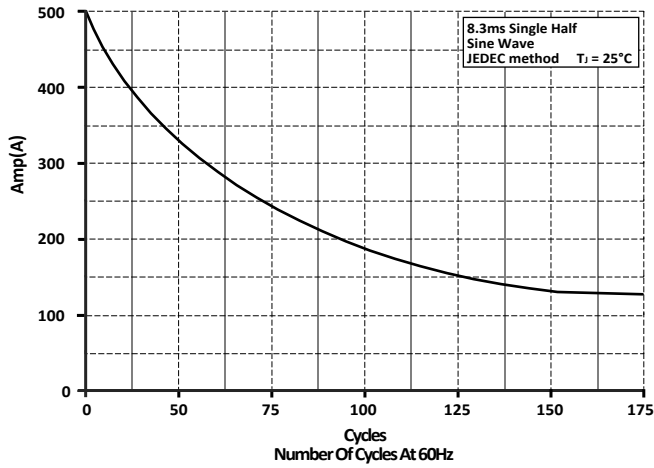


Figure 14. Typical reverse diode characteristics

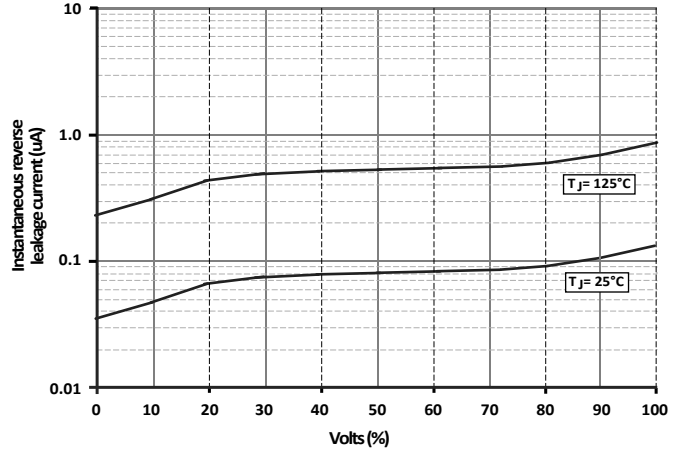


Figure 15. Gate Charge Characteristics

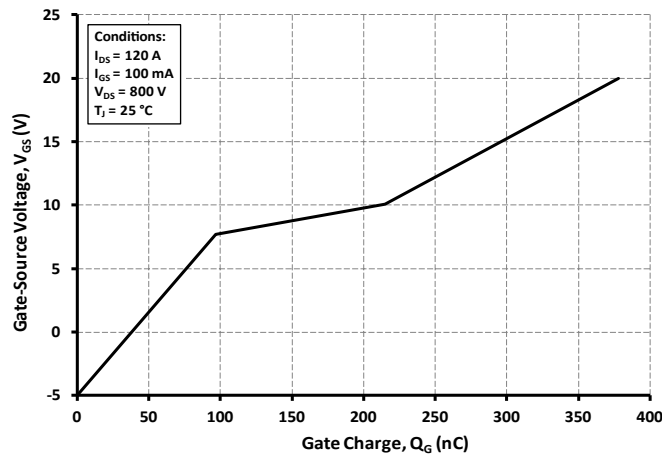


Figure 16. Inductive Switching Energy vs. Temperature

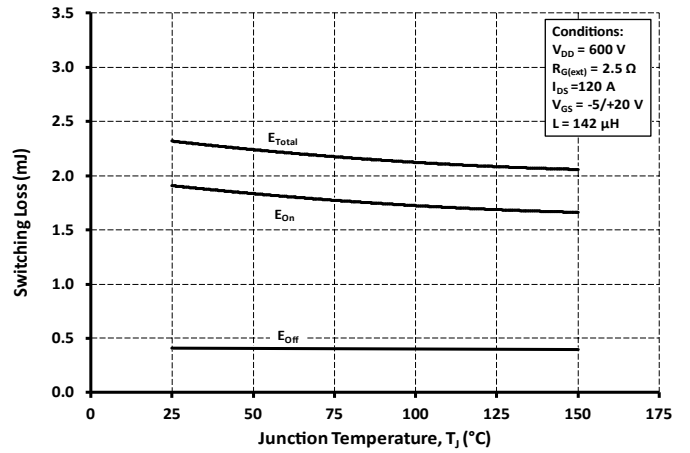


Figure 17. Timing vs. $R_{G(ext)}$

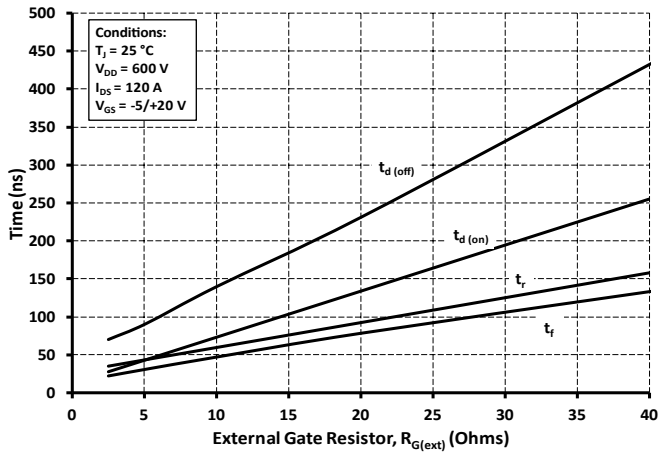
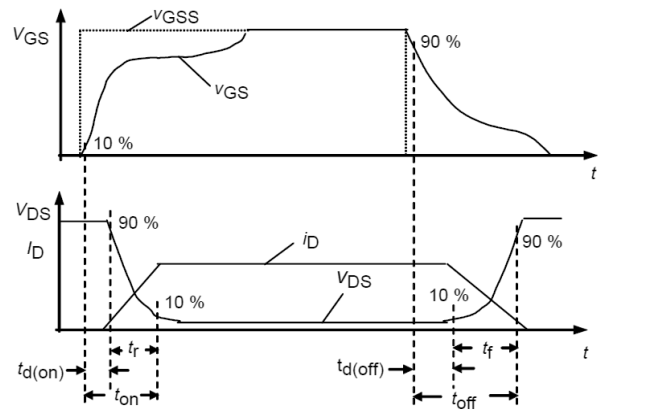


Figure 18. Resistive Switching Time Description



IEC 1161/04



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