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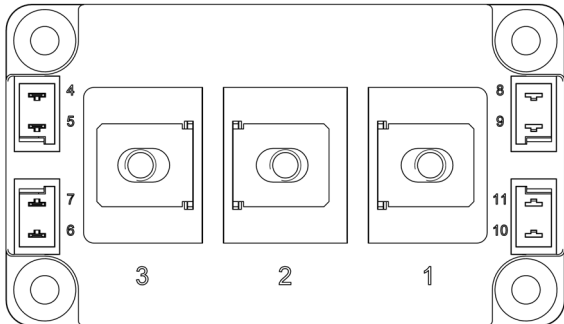
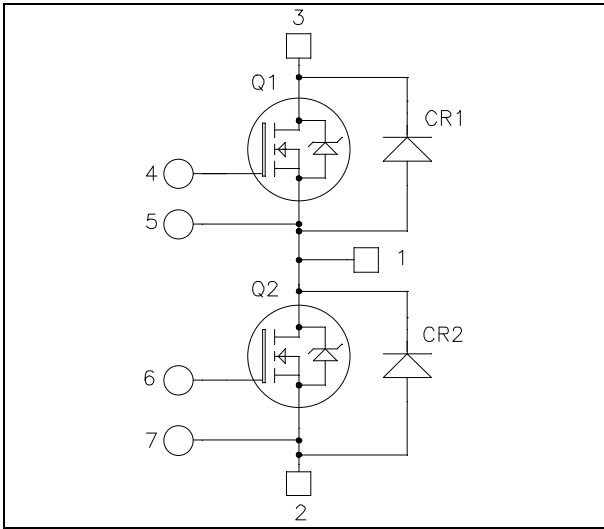
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*Phase leg  
SiC MOSFET Power Module*

$V_{DSS} = 1200V$   
 $R_{DS(on)} = 8m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 250A \text{ @ } T_c = 25^\circ C$



**Application**

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**Features**

- **SiC Power MOSFET**
  - Low  $R_{DS(on)}$
  - High temperature performance
- **SiC Schottky Diode**
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- Kelvin source for easy drive
- High level of integration
- AlN substrate for improved thermal performance
- M6 power connectors

**Benefits**

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- RoHS Compliant

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

**Absolute maximum ratings (per SiC MOSFET)**

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
$V_{DSS}$	Drain - Source Voltage	1200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	250
		$T_c = 80^\circ C$	190
$I_{DM}$	Pulsed Drain current	550	A
$V_{GS}$	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	10	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1100
			W

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)



**Electrical Characteristics** (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1200V		120	1000	μA
R <sub>DS(on)</sub>	Drain – Source on Resistance	V <sub>GS</sub> = 20V I <sub>D</sub> = 200A		8 15	10 21	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> ; I <sub>D</sub> = 10mA	1.7	2.2		V
I <sub>GSS</sub>	Gate – Source Leakage Current	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0V			2.5	μA

**Dynamic Characteristics** (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V		9500		pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 1000V		800		
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		65		
Q <sub>g</sub>	Total gate Charge	V <sub>GS</sub> = 20V		490		nC
Q <sub>gs</sub>	Gate – Source Charge	V <sub>Bus</sub> = 800V		110		
Q <sub>gd</sub>	Gate – Drain Charge	I <sub>D</sub> = 200A		180		
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> = -2/+20V		20		ns
T <sub>r</sub>	Rise Time	V <sub>Bus</sub> = 800V		20		
T <sub>d(off)</sub>	Turn-off Delay Time	I <sub>D</sub> = 200A ; T <sub>J</sub> = 150°C		75		
T <sub>f</sub>	Fall Time	R <sub>L</sub> = 4Ω ; R <sub>G</sub> = 5Ω		35		
E <sub>on</sub>	Turn on Energy	Inductive Switching V <sub>GS</sub> = -5/+20V V <sub>Bus</sub> = 600V		4.3		mJ
E <sub>off</sub>	Turn off Energy	I <sub>D</sub> = 200A R <sub>G</sub> = 5Ω		2.4		
R <sub>Gint</sub>	Internal gate resistance			1		Ω
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.11	°C/W

**Body diode diode ratings and characteristics** (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = -5V, I <sub>SD</sub> = 100A		3.3		V
		V <sub>GS</sub> = -2V, I <sub>SD</sub> = 100A		3.1		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 200A ; V <sub>GS</sub> = -5V		40		ns
Q <sub>rr</sub>	Reverse Recovery Charge	V <sub>R</sub> = 800V ; di <sub>F</sub> /dt = 3500A/μs		1650		nC
I <sub>rr</sub>	Reverse Recovery Current			64		A



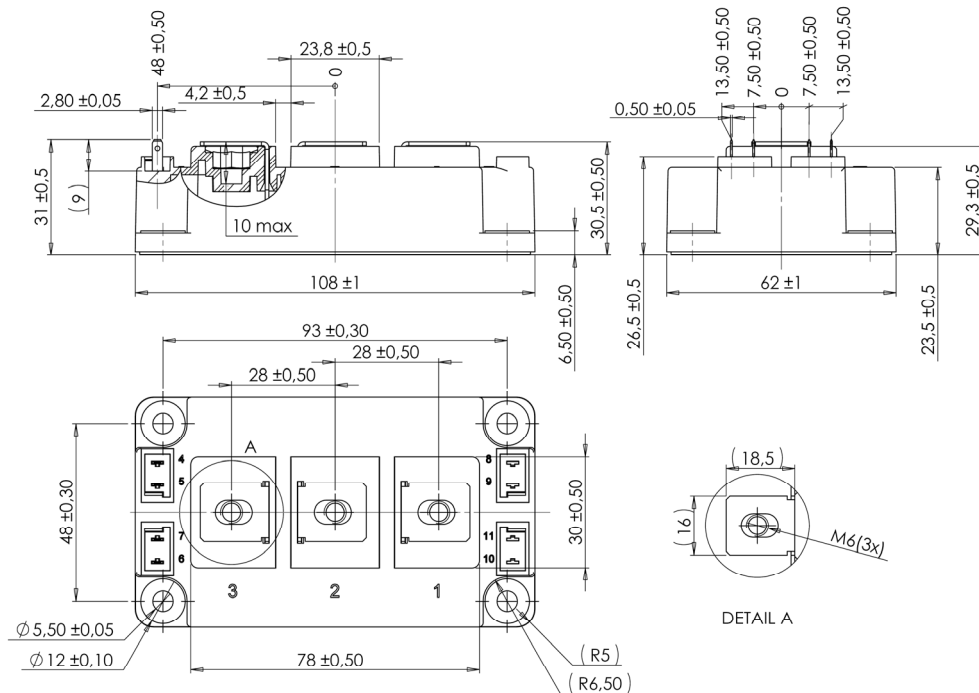
**SiC schottky diode ratings and characteristics (per SiC diode)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				1200	V
I <sub>RRM</sub>	Reverse Leakage Current	V <sub>R</sub> =1200V	T <sub>j</sub> = 25°C	0.38	2.4	mA
			T <sub>j</sub> = 175°C	0.68	12	
I <sub>F</sub>	Forward Current			120		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 120A	T <sub>j</sub> = 25°C	1.6	1.8	V
			T <sub>j</sub> = 175°C	2.3	3	
Q <sub>C</sub>	Total Capacitive Charge	I <sub>F</sub> = 120A, V <sub>R</sub> = 1200V di/dt = 5000A/μs		960		nC
C	Total Capacitance	f = 1MHz, V <sub>R</sub> = 200V		1152		pF
		f = 1MHz, V <sub>R</sub> = 400V		828		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.10	°C/W

**Thermal and package characteristics**

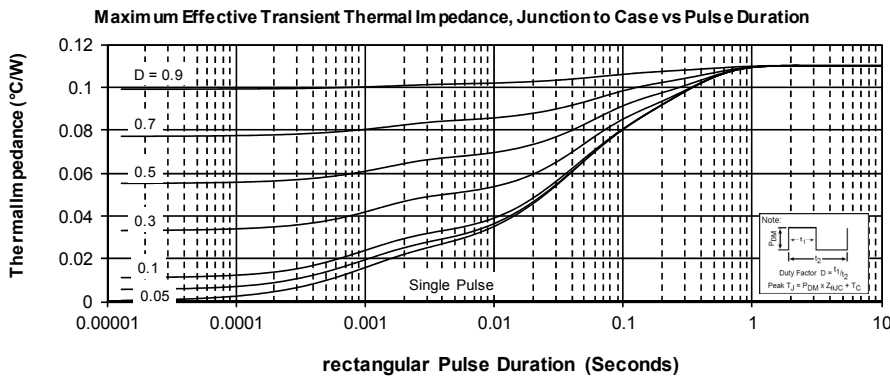
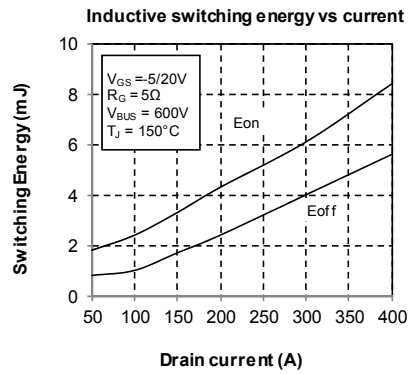
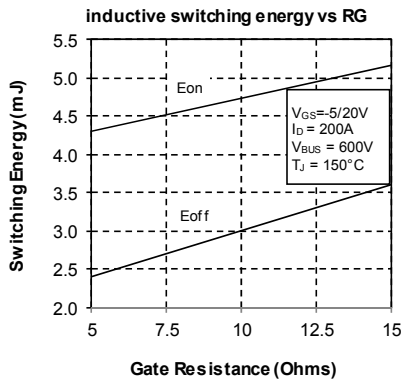
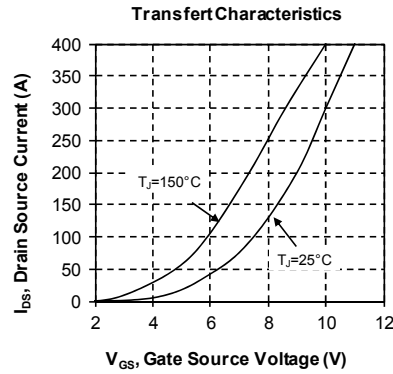
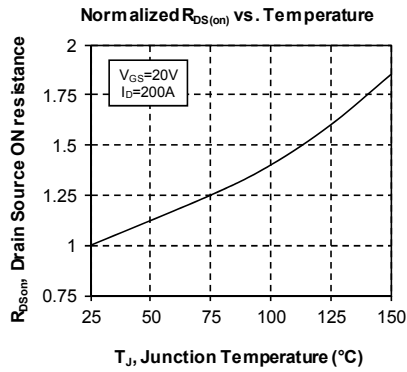
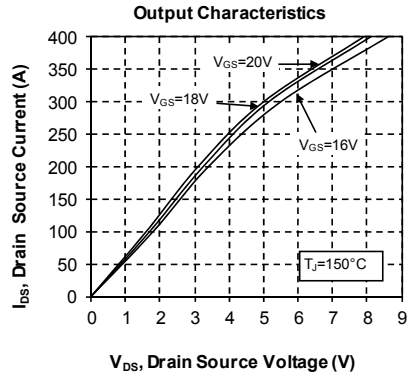
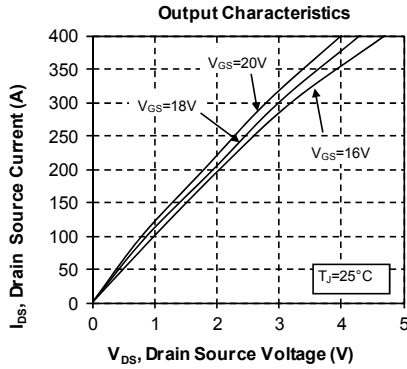
Symbol	Characteristic	Min	Max	Unit	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V	
T <sub>J</sub>	Operating junction temperature range	SiC MOSFET	-40	150	°C
		SiC diode	-40	175	
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>jmax</sub> -25		
T <sub>STG</sub>	Storage Temperature Range	-40	125		
T <sub>C</sub>	Operating Case Temperature	-40	100		
Torque	Mounting torque	For terminals	M6	3	N.m
		To Heatsink	M6	3	
Wt	Package Weight			350	g

**D3 Package outline (dimensions in mm)**



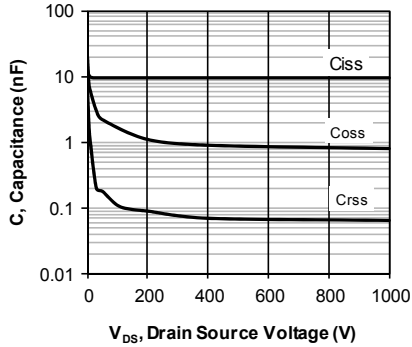


**Typical SiC MOSFET Performance Curve**

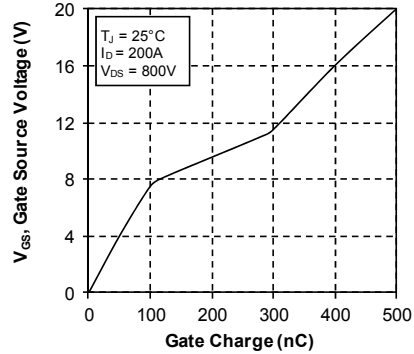




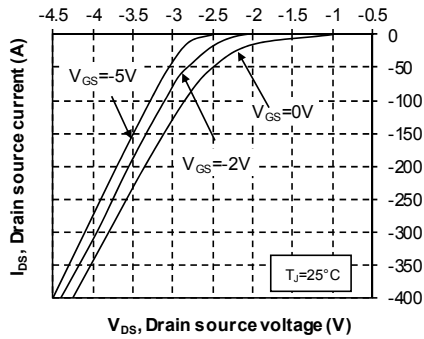
Capacitance vs Drain Source Voltage



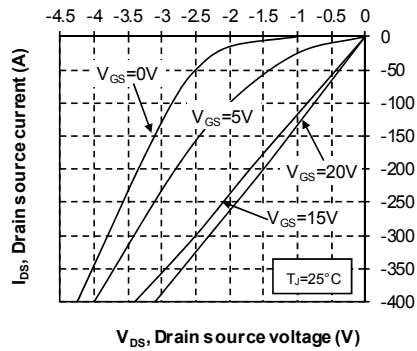
Gate Charge vs Gate Source Voltage



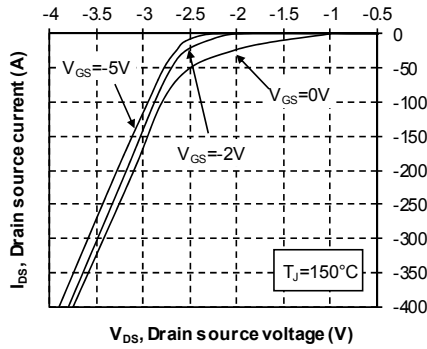
Body diode Characteristics



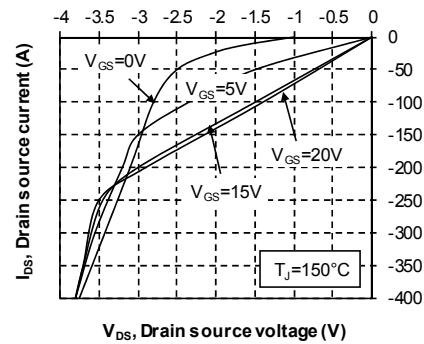
Output Characteristics



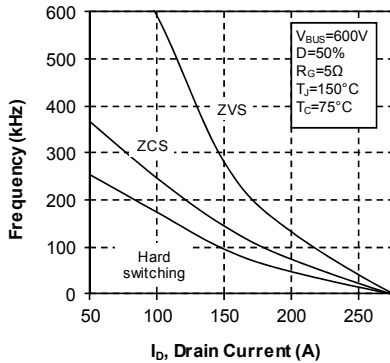
Body diode Characteristics



Output Characteristics



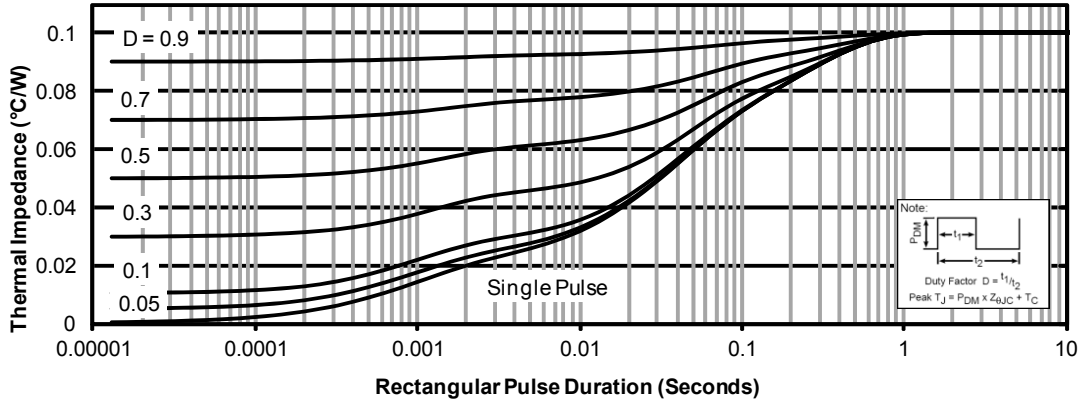
Operating Frequency vs Drain Current



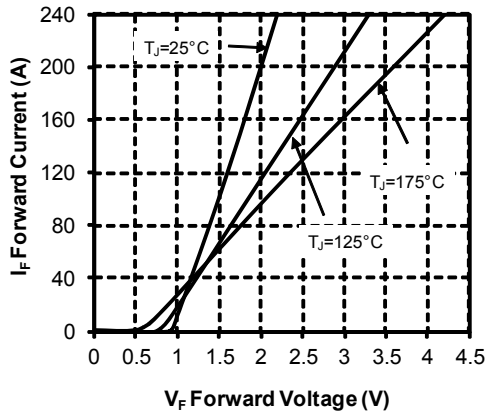


## Typical SiC diode Performance Curve

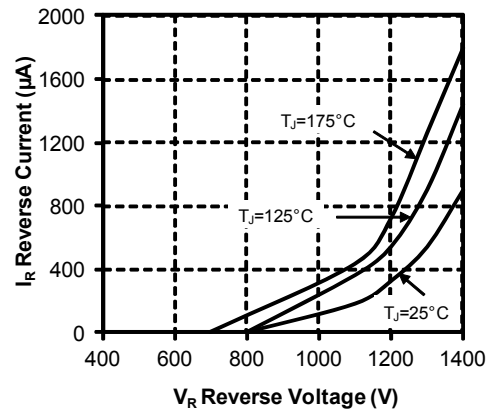
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



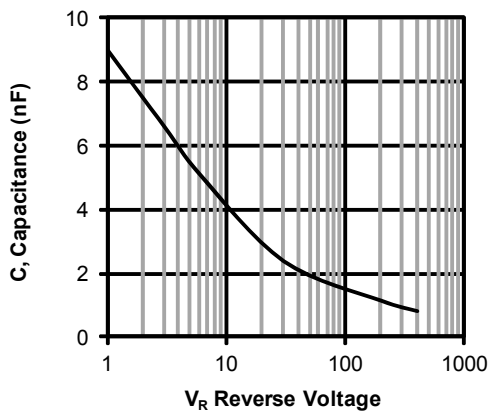
Forward Characteristics



Reverse Characteristics



Capacitance vs. Reverse Voltage





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