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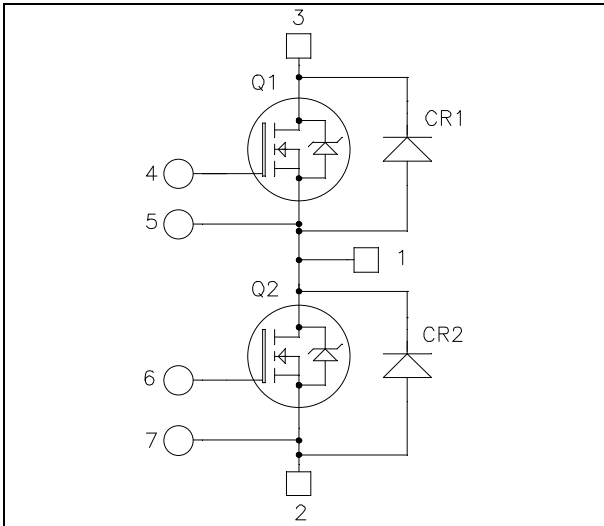
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**Phase leg
SiC MOSFET Power Module**

$V_{DSS} = 1200V$
 $R_{DS(on)} = 16m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 98A$ @ $T_c = 25^\circ C$

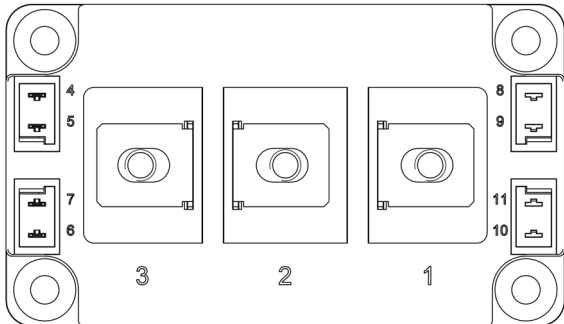


Application

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

Features

- **SiC Power MOSFET**
 - High speed switching
 - Low $R_{DS(on)}$
 - Ultra low loss
- **SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF



- Kelvin emitter for easy drive
- High level of integration
- AlN substrate for improved thermal performance
- M6 power connectors

Benefits

- Stable temperature behavior
- 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)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	131
		$T_c = 80^\circ C$	98
I_{DM}	Pulsed Drain current	262	A
V_{GS}	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	20	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	625
			W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com



Electrical Characteristics (per SiC MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1200V$			500	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 100A$	$T_j = 25^\circ C$	16	20	m Ω
			$T_j = 150^\circ C$	30	42	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}; I_D = 5mA$	1.7	2.2		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V, V_{DS} = 0V$			1.25	μA

Dynamic Characteristics (per SiC MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 1000V$ $f = 1MHz$		4.75		nF
C_{oss}	Output Capacitance			0.4		
C_{rss}	Reverse Transfer Capacitance			0.033		
Q_g	Total gate Charge	$V_{GS} = 0/+20V$ $V_{Bus} = 800V$ $I_D = 100A$		246		nC
Q_{gs}	Gate – Source Charge			54		
Q_{gd}	Gate – Drain Charge			90		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20V$ $V_{Bus} = 800V$ $I_D = 100A; T_j = 150^\circ C$ $R_L = 8\Omega; R_{Gext} = 10\Omega$		20		ns
T_r	Rise Time			20		
$T_{d(off)}$	Turn-off Delay Time			75		
T_f	Fall Time			35		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -5/+20V$ $V_{Bus} = 600V$ $I_D = 100A$ $R_{Gext} = 10\Omega$	$T_j = 150^\circ C$	2.2		mJ
E_{off}	Turn off Energy			$T_j = 150^\circ C$	1.25	
R_{Gint}	Internal gate resistance			1.9		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.20	$^\circ C/W$

Source - Drain diode ratings and characteristics (per SiC MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V, I_{SD} = 50A$		3.3		V
		$V_{GS} = -2V, I_{SD} = 50A$		3.1		
t_{rr}	Reverse Recovery Time	$I_{SD} = 100A; V_{GS} = -5V$ $V_R = 800V; di_F/dt = 1750A/\mu s$		40		ns
Q_{rr}	Reverse Recovery Charge			825		nC
I_{rr}	Reverse Recovery Current				32	



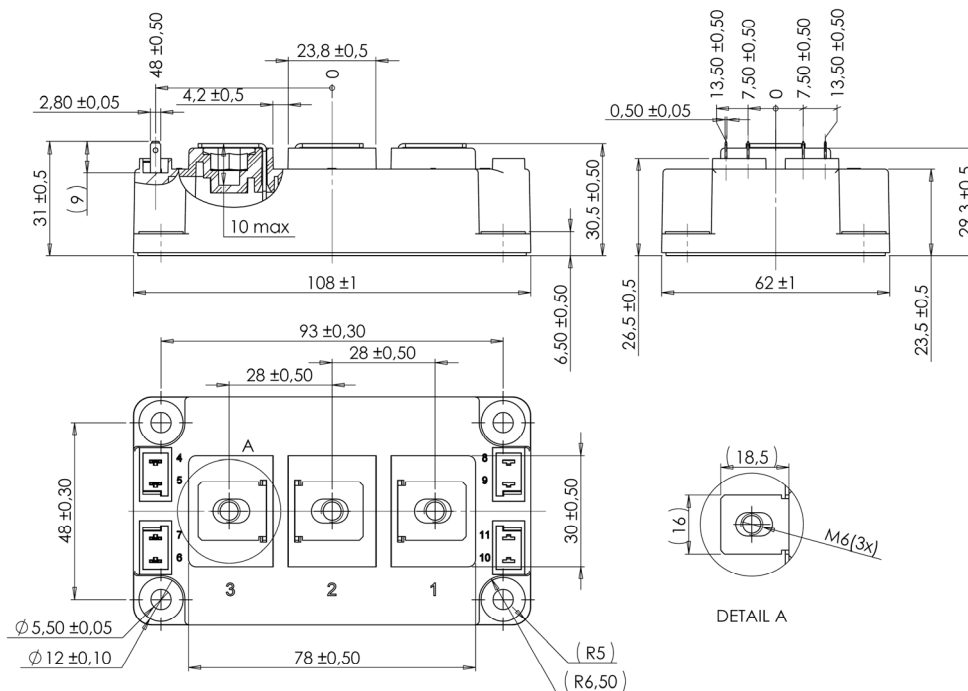
SiC schottky diode ratings and characteristics (per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1200	V
I _{RRM}	Reverse Leakage Current	V _R =1200V	T _j = 25°C	192	1200	μA
			T _j = 175°C	336	6000	
I _F	DC Forward Current			60		A
V _F	Diode Forward Voltage	I _F = 60A	T _j = 25°C	1.6	1.8	V
			T _j = 175°C	2.3	3	
Q _C	Total Capacitive Charge	I _F = 60A, V _R = 1200V di/dt = 2400A/μs		480		nC
C	Total Capacitance	f = 1MHz, V _R = 200V		576		pF
		f = 1MHz, V _R = 800V		414		
R _{thJC}	Junction to Case Thermal Resistance				0.19	°C/W

Thermal and package characteristics

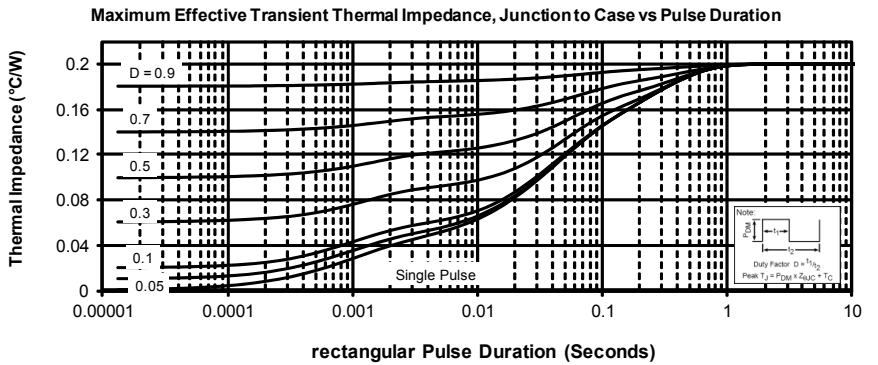
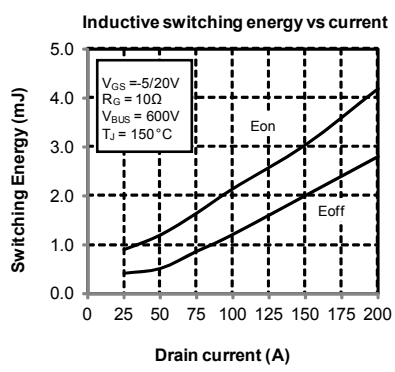
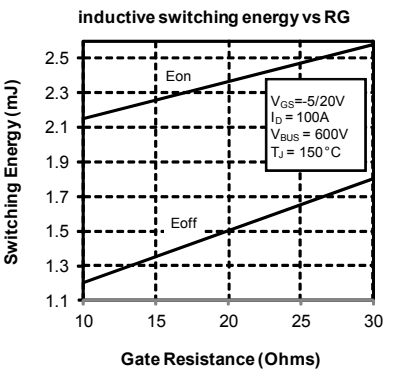
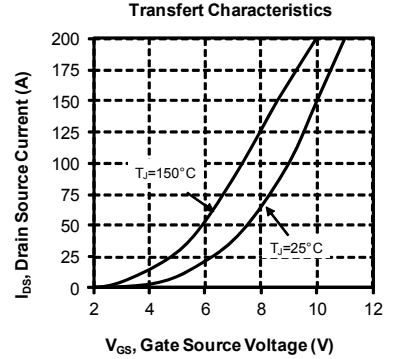
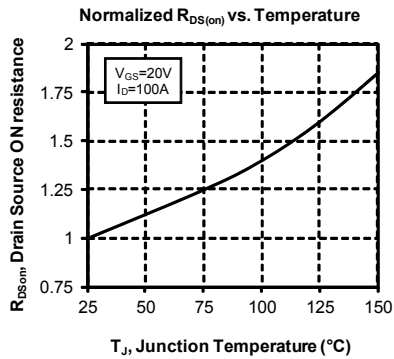
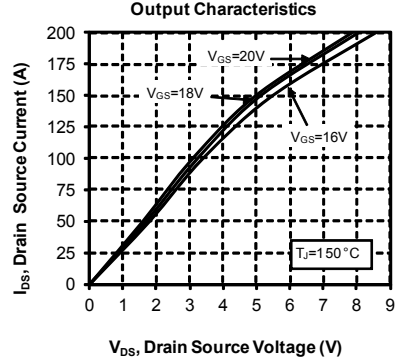
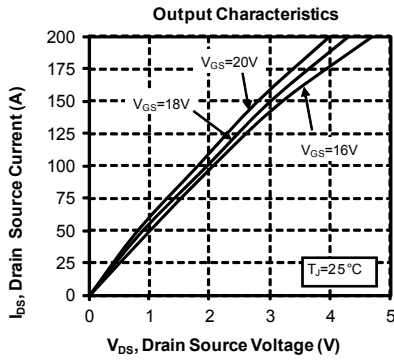
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	SiC MOSFET	-40	150	°C	
		SiC diode	-40	175		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25	°C		
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	100			
Torque	Mounting torque	For terminals	M6	3	5	N.m
		To Heatsink	M6	3	5	
Wt	Package Weight			350	g	

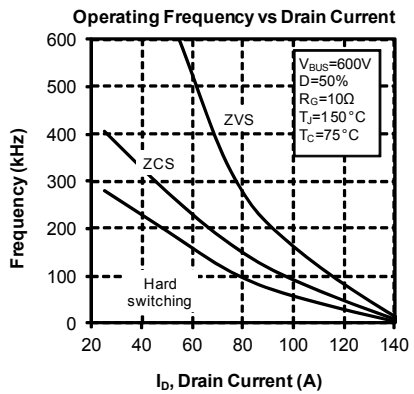
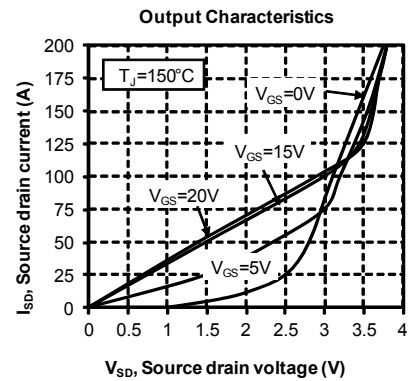
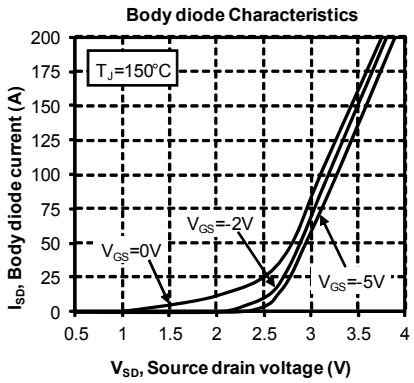
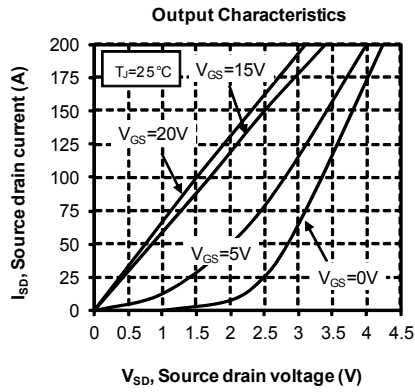
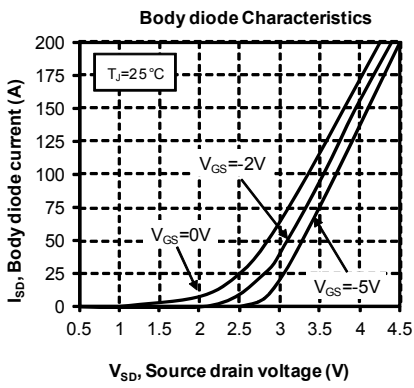
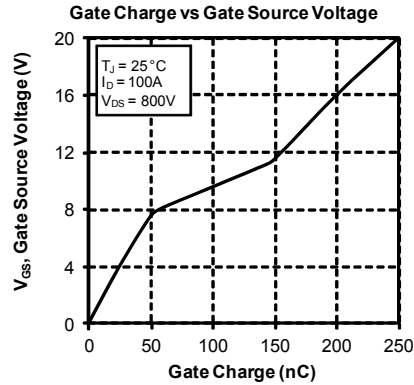
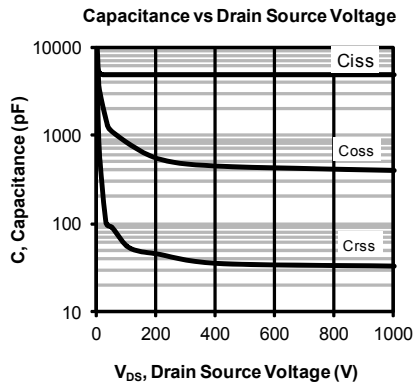
D3 Package outline (dimensions in mm)





Typical SiC MOSFET Performance Curve

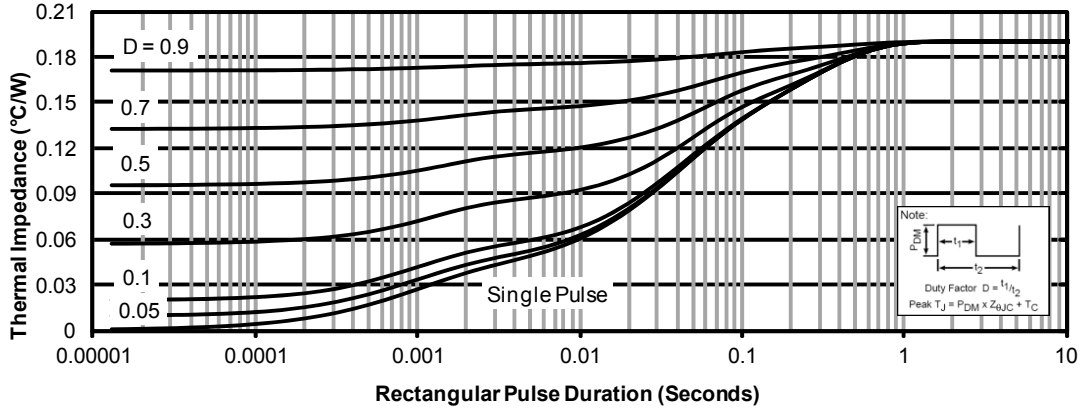




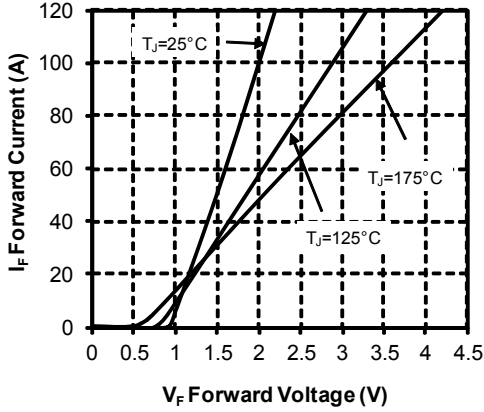


Typical SiC diode Performance Curve

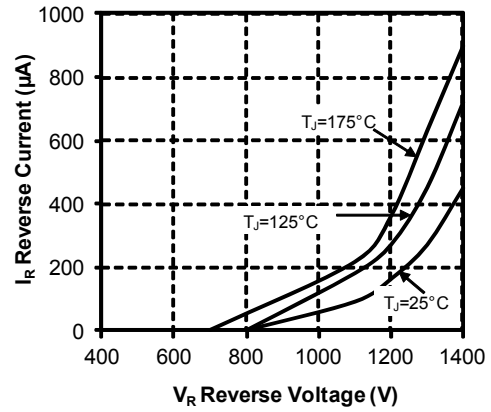
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



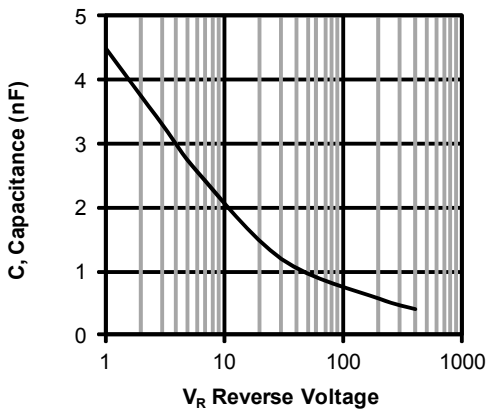
Forward Characteristics



Reverse Characteristics



Capacitance vs. Reverse Voltage





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