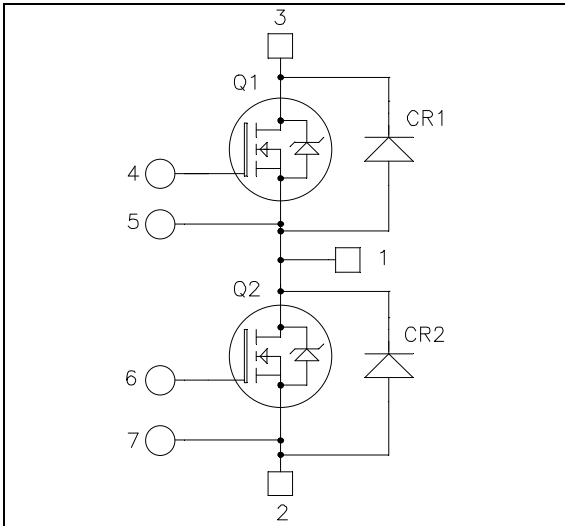


*Phase leg
Full SiC Power Module*

$V_{DSS} = 1200V$
 $R_{DS(on)} = 14m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 180A \text{ @ } T_c = 25^\circ C$

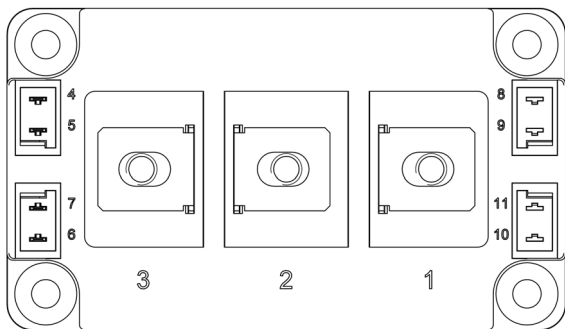


Application

- 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 emitter 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

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	225
		$T_c = 80^\circ C$	180
I_{DM}	Pulsed Drain current	450	A
V_{GS}	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	17	m Ω
P_D	Power Dissipation	$T_c = 25^\circ C$ 1430	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

<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	$V_{GS} = 0V, V_{DS} = 1200V$		60	600	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 120A$	$T_j = 25^\circ C$	14	17	m Ω
			$T_j = 175^\circ C$	23		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}; I_D = 6mA$	1.7	3		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V, V_{DS} = 0V$			600	nA

Dynamic Characteristics

<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	$V_{GS} = 0V$		15.4		nF
C_{oss}	Output Capacitance	$V_{DS} = 1000V$		0.72		
C_{riss}	Reverse Transfer Capacitance	$f = 1MHz$		0.12		
Q_g	Total gate Charge	$V_{GS} = -5/20V$		816		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 600V$		240		
Q_{gd}	Gate – Drain Charge	$I_D = 120A$		240		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching $V_{GS} = -5/20V; V_{Bus} = 800V$ $I_D = 120A; T_j = 150^\circ C$ $R_G = 0.8\Omega$		10		ns
T_r	Rise Time			10		
$T_{d(off)}$	Turn-off Delay Time			45		
T_f	Fall Time			30		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -5/+20V$ $V_{Bus} = 600V$	$T_j = 150^\circ C$	2.6		mJ
E_{off}	Turn off Energy	$I_D = 120A$ $R_G = 0.8\Omega$	$T_j = 150^\circ C$	1.5		
R_{Gint}	Internal gate resistance			0.55		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.105	$^\circ C/W$

Body diode ratings and characteristics

<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	$V_{GS} = 0V, I_{SD} = 120A$		3.9		V
t_{rr}	Reverse Recovery Time	$I_{SD} = 120A; V_{GS} = -2V$ $V_R = 800V; di_F/dt = 600A/\mu s$		140		ns
Q_{rr}	Reverse Recovery Charge			690		nC
I_{rr}	Reverse Recovery Current			12		A



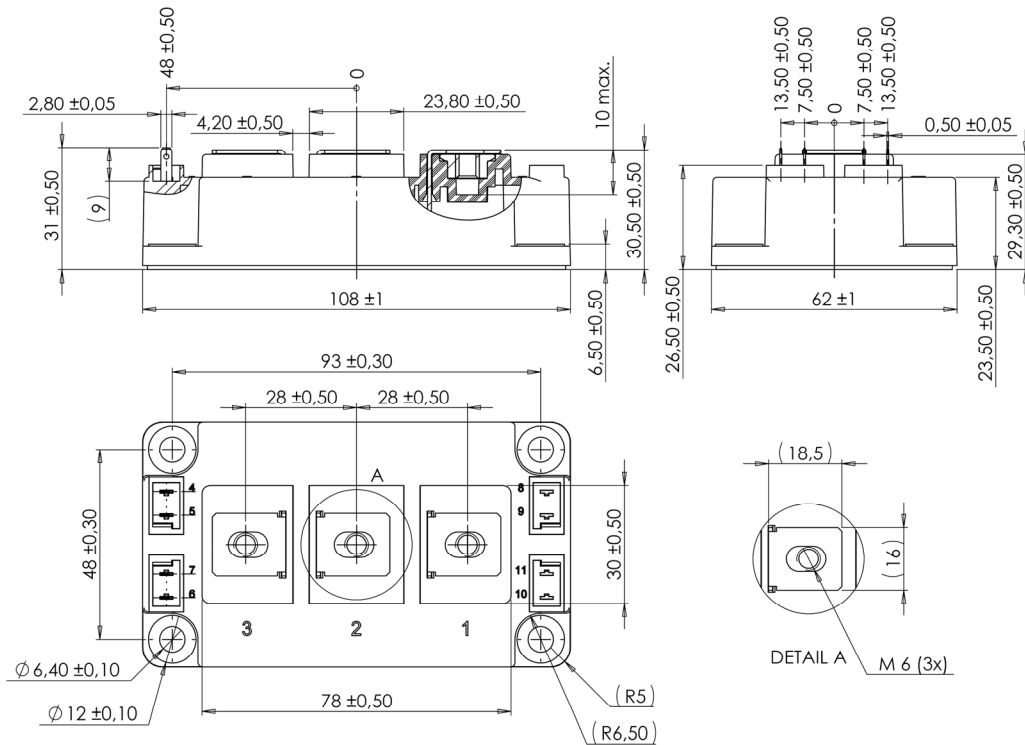
SiC schottky diode ratings and characteristics

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	60	1200	μA
			T _j = 175°C	3000		
I _F	Forward Current			60		A
V _F	Diode Forward Voltage	I _F = 60A	T _j = 25°C	1.5	1.8	V
			T _j = 175°C	2.3		
Q _C	Total Capacitive Charge	I _F = 60A, V _R = 600V di/dt = 3000A/μs		720		nC
C	Total Capacitance	f = 1MHz, V _R = 200V		690		pF
		f = 1MHz, V _R = 400V		510		
R _{thJC}	Junction to Case Thermal Resistance				0.19	°C/W

Thermal and package characteristics

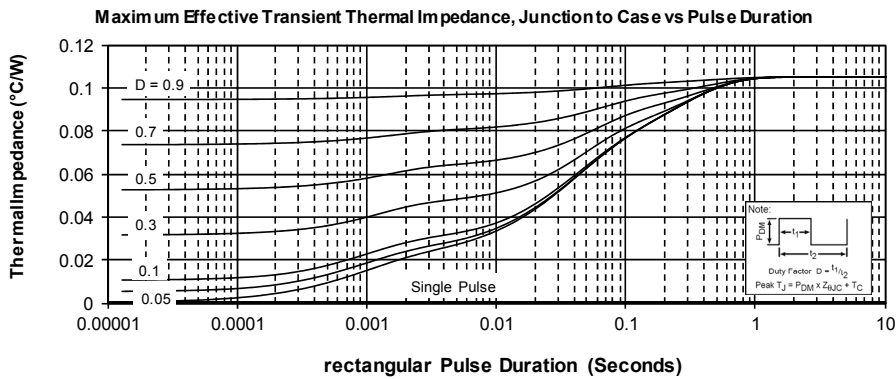
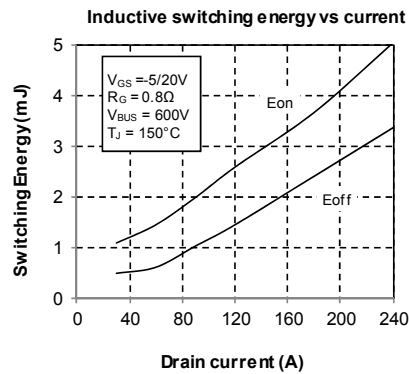
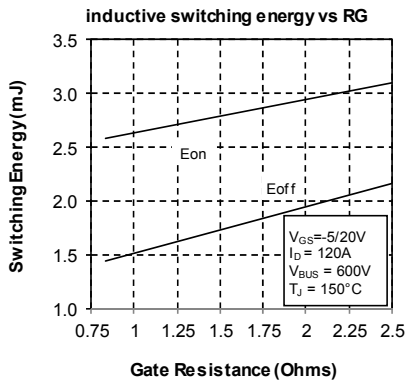
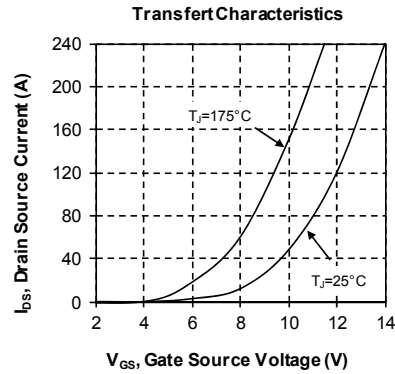
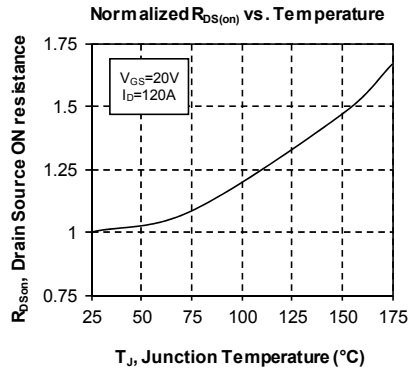
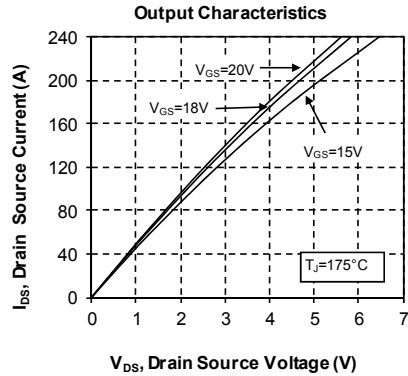
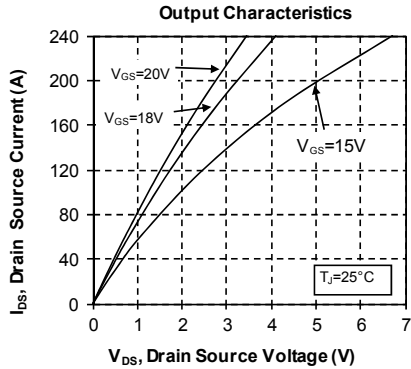
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40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

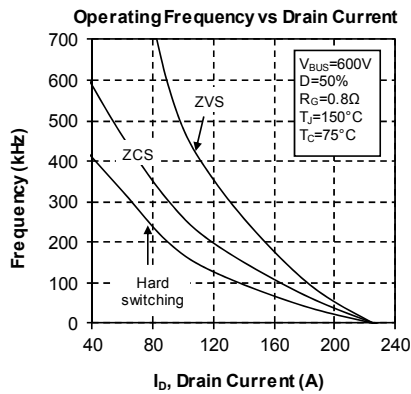
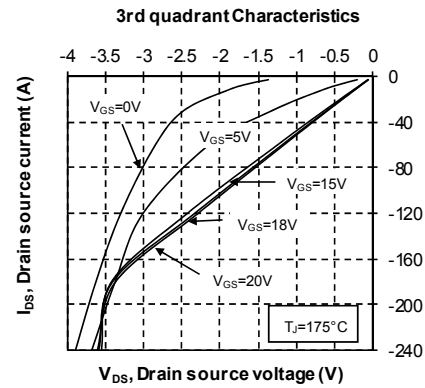
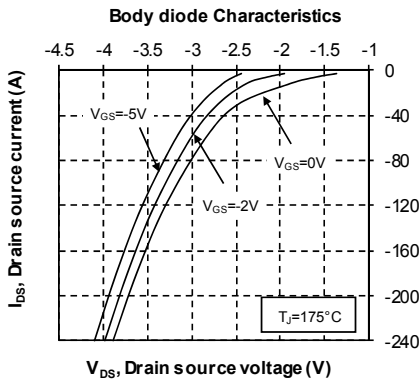
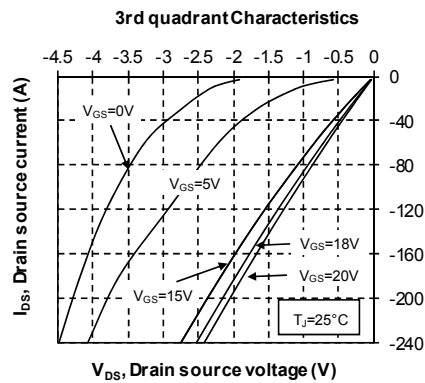
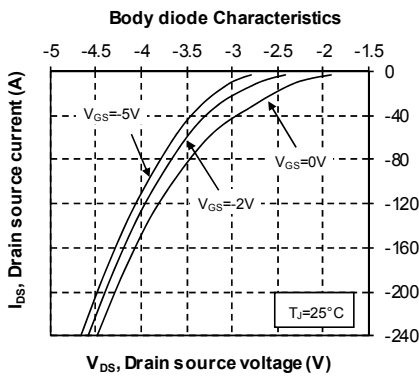
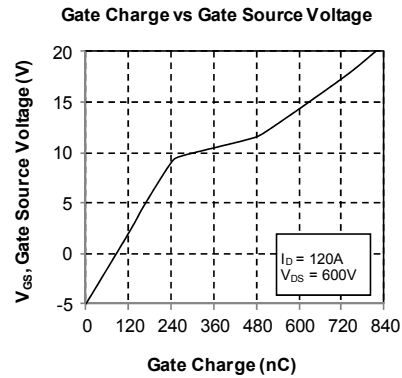
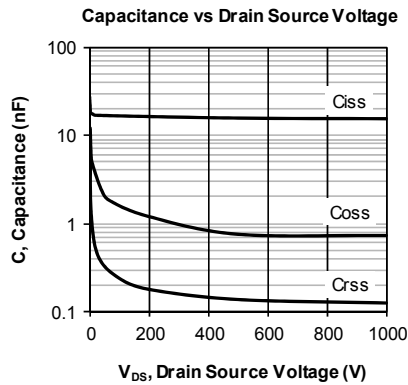
Package outline (dimensions in mm)





Typical SiC MOSFET Performance Curve

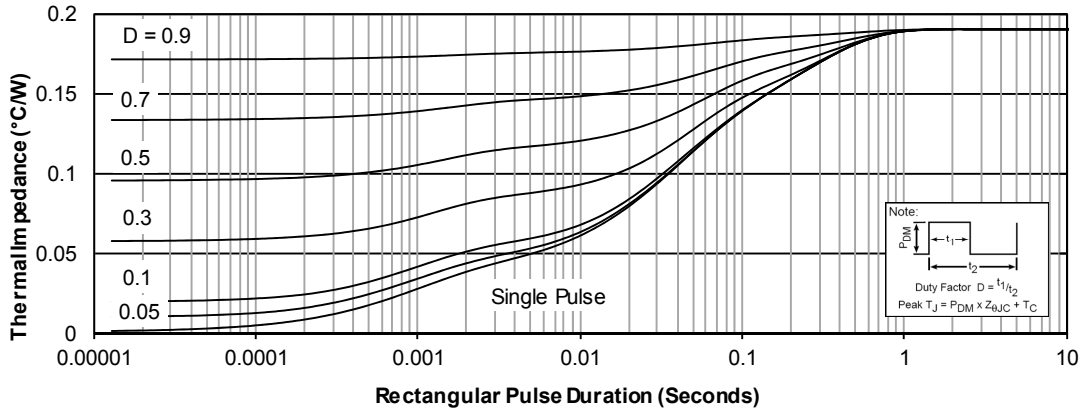




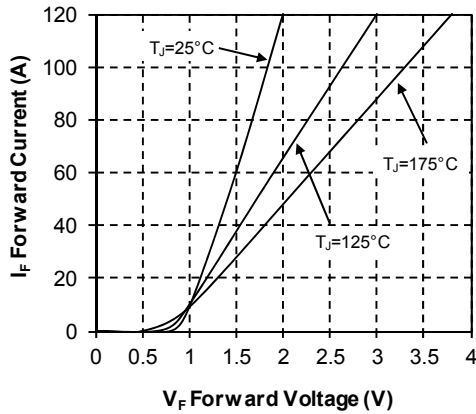


Typical SiC diode Performance Curve

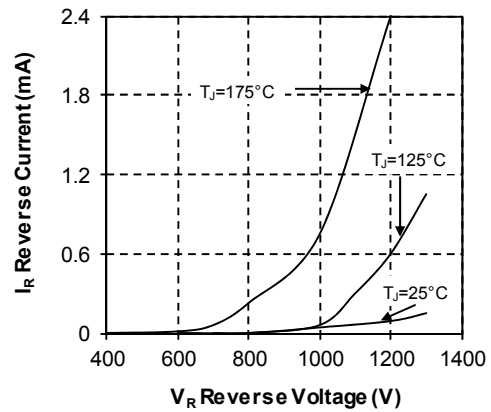
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



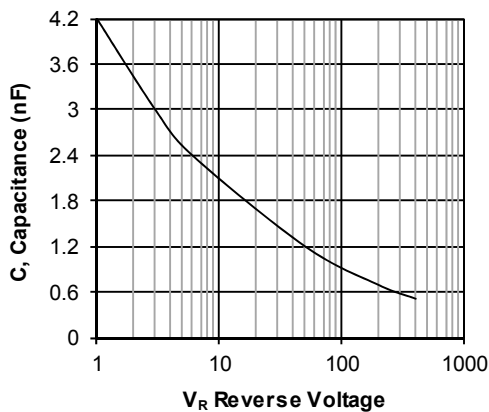
Forward Characteristics



Reverse Characteristics



Capacitance vs. Reverse Voltage





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