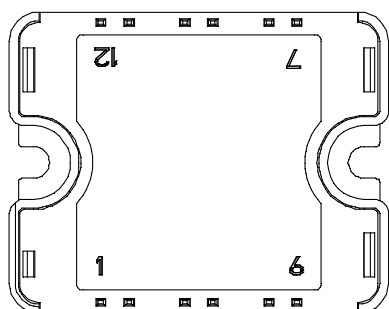
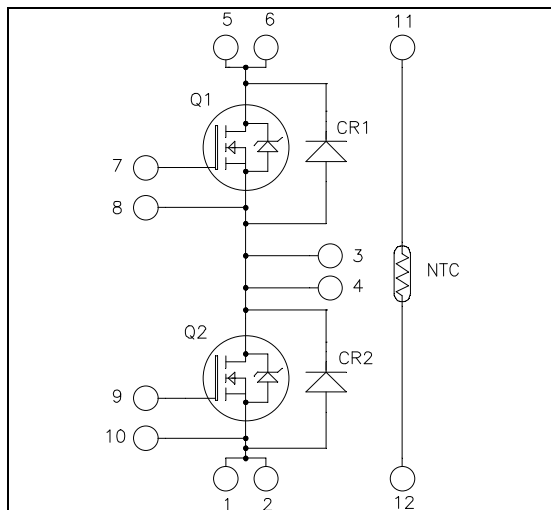


Phase leg SiC MOSFET Power Module

$$V_{DSS} = 1700V$$

$$R_{DS(on)} = 60m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 53A \text{ @ } T_c = 25^\circ C$$



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

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
- Very low stray inductance
- Kelvin source for easy drive
- Internal thermistor for temperature monitoring
- High level of integration
- AlN substrate for improved thermal performance

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- 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	1700	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	110	
V_{GS}	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	60	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	350
			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)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V$, $V_{DS} = 1700V$			100	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 50A$		40	60	$m\Omega$
		$T_j = 25^\circ C$ $T_j = 150^\circ C$		80		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 2.5mA$	1.9	2.3		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V$, $V_{DS} = 0V$			500	nA

Dynamic Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 1000V$ $f = 1MHz$		3080		pF
C_{oss}	Output Capacitance			165		
C_{rss}	Reverse Transfer Capacitance			16		
Q_g	Total gate Charge	$V_{GS} = -5/+20V$ $V_{Bus} = 1000V$ $I_D = 20A$		190		nC
Q_{gs}	Gate – Source Charge			37		
Q_{gd}	Gate – Drain Charge			70		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20V$ $V_{Bus} = 1000V$ $I_D = 50A$; $T_j = 150^\circ C$ $R_L = 20\Omega$; $R_{Gext} = 20\Omega$		35		ns
T_r	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			150		
T_f	Fall Time			70		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -5/+20V$ $V_{Bus} = 1000V$ $I_D = 50A$ $R_{Gext} = 20\Omega$	$T_j = 150^\circ C$	1.9		mJ
E_{off}	Turn off Energy			1.2		
R_{Gint}	Internal gate resistance			1.5		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.36	$^\circ C/W$

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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V$, $I_{SD} = 25A$		3.5		V
		$V_{GS} = -2V$, $I_{SD} = 25A$		3.1		
t_{rr}	Reverse Recovery Time	$I_{SD} = 25A$; $V_{GS} = -5V$ $V_R = 1000V$; $di_F/dt = 100A/\mu s$		TBD		ns
Q_{rr}	Reverse Recovery Charge			TBD		μC
I_{rr}	Reverse Recovery Current			TBD		A

SiC schottky diode ratings and characteristics (per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1700	V
I _{RRM}	Reverse Leakage Current	V _R =1700V				μA
		T _j = 25°C		20	100	
		T _j = 175°C		100	400	
I _F	DC Forward Current	T _C = 125°C		25		A
V _F	Diode Forward Voltage	I _F = 25A				V
		T _j = 25°C		1.8	2	
		T _j = 175°C		3.2	4	
Q _C	Total Capacitive Charge	I _F = 25A, V _R = 1700V di/dt = 400A/μs		170		nC
C	Total Capacitance	f = 1MHz, V _R = 200V		200		pF
		f = 1MHz, V _R = 400V		140		
R _{thJC}	Junction to Case Thermal Resistance				0.48	°C/W

Temperature sensor NTC (see application note APT0406 on www.microsemi.com).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

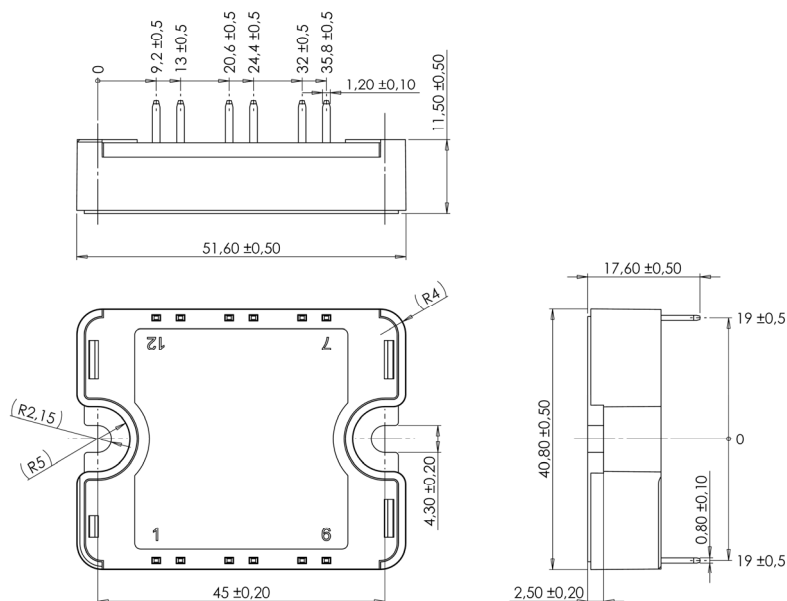
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

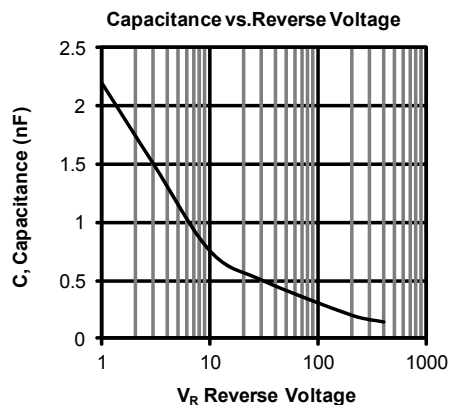
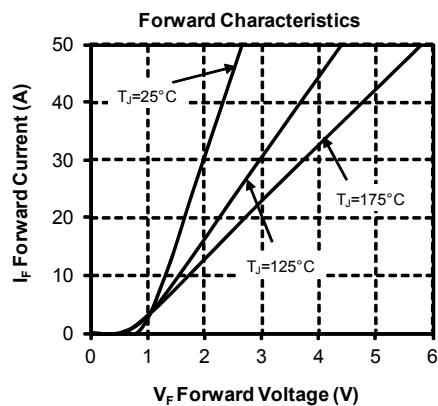
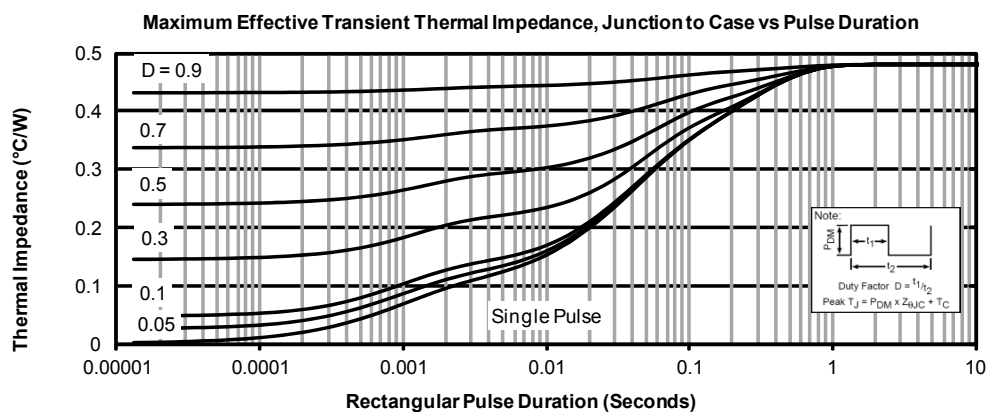
Symbol	Characteristic	Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V
T _J	Operating junction temperature range			
	SiC MOSFET	-40	150	
	SiC diode	-40	175	
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25	°C
T _{STG}	Storage Temperature Range	-40	125	
T _C	Operating Case Temperature	-40	100	
Torque	Mounting torque	To heatsink	M4	N.m
Wt	Package Weight		80	g

Package outline (dimensions in mm)

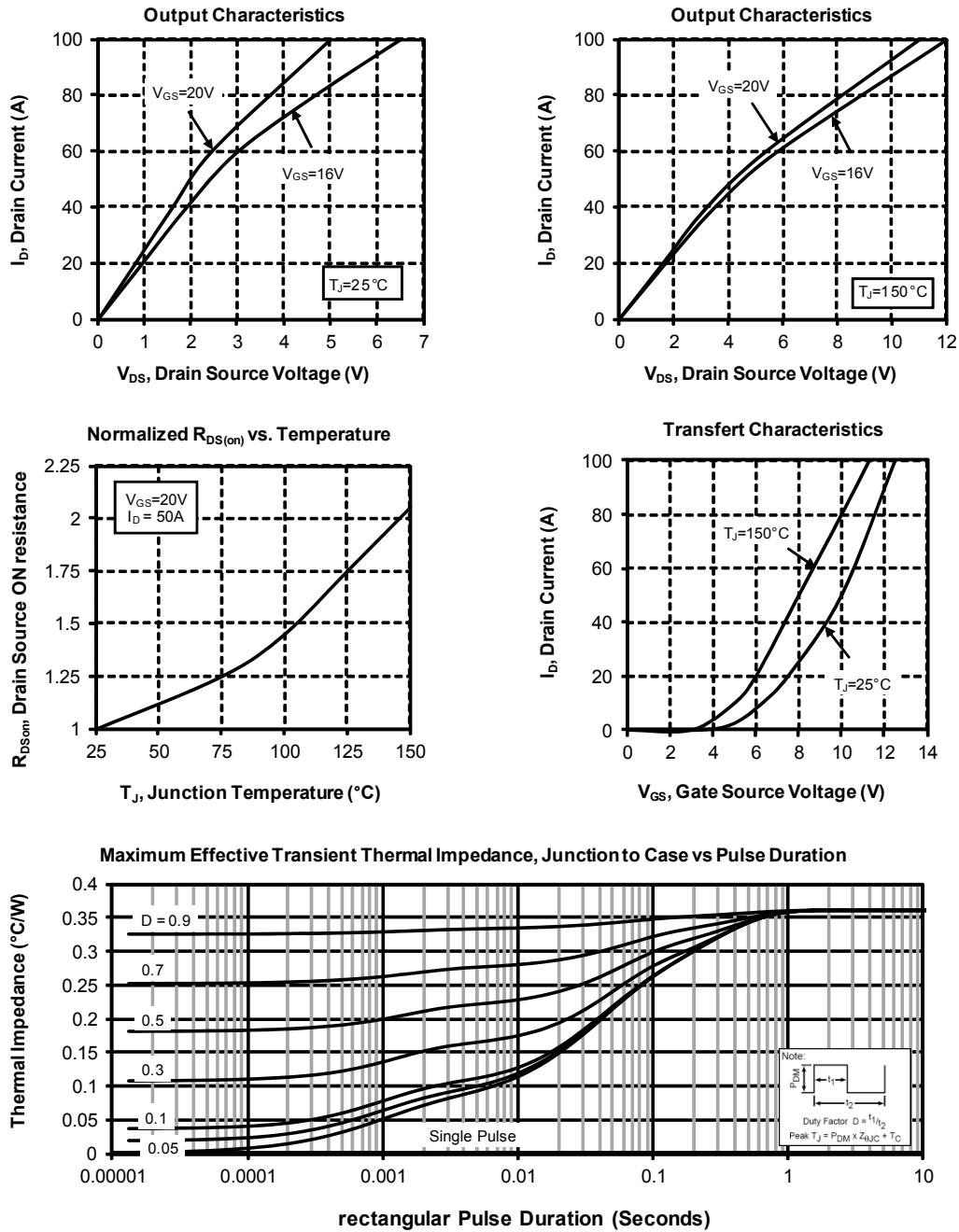


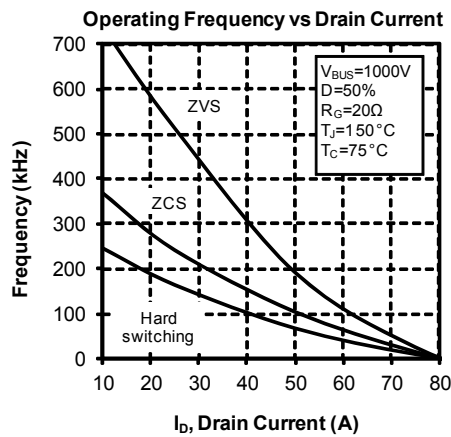
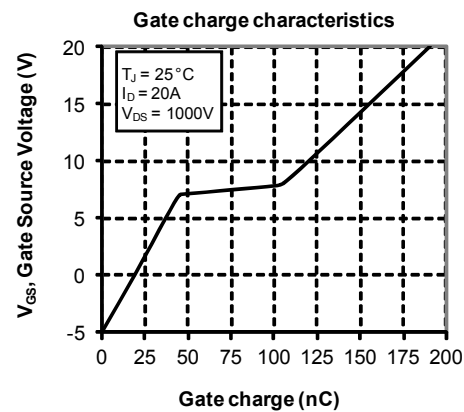
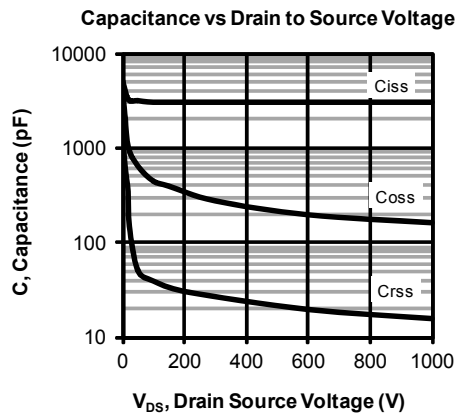
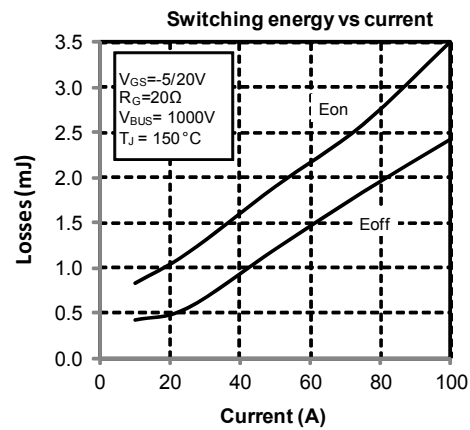
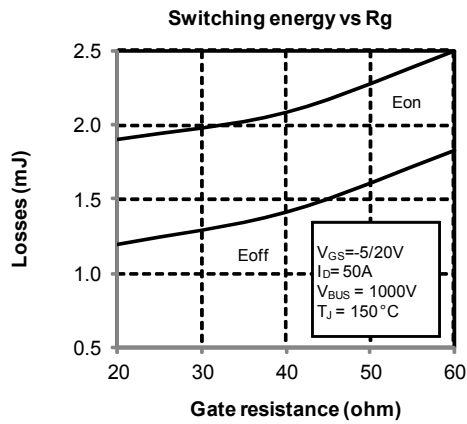
See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical SiC diode Performance Curve



Typical SiC MOSFET Performance Curve





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