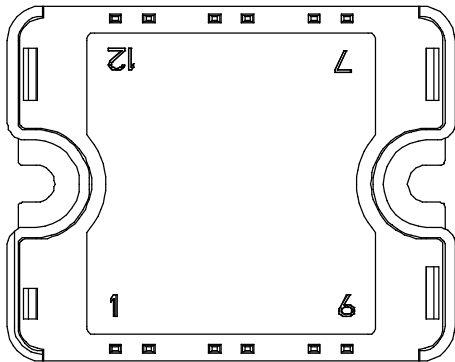
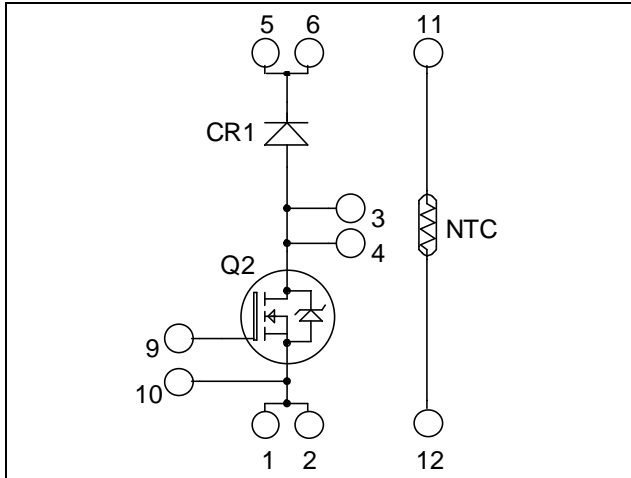


**Boost chopper  
MOSFET + SiC chopper diode  
Power Module**

**$V_{DSS} = 1200V$**   
 **$R_{DSon} = 300m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 31A$  @  $T_c = 25^\circ C$**



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

### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

### Features

- **Power MOS 8<sup>TM</sup> MOSFET**
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- **SiC Schottky Diode**
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- Very low stray inductance
- Internal thermistor for temperature monitoring
- High level of integration

### 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

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	1200	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	31
		$T_c = 80^\circ C$	23
$I_{DM}$	Pulsed Drain current	195	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	360	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	657
$I_{AR}$	Avalanche current (repetitive and non repetitive)	25	A

**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)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 1200\text{V}$ $V_{GS} = 0\text{V}$	$T_j = 25^\circ\text{C}$			100	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 25\text{A}$		300	360	$\text{m}\Omega$	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	3	4	5	V	
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}$			$\pm 100$	nA	

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$		14560		pF
$C_{oss}$	Output Capacitance			1340		
$C_{rss}$	Reverse Transfer Capacitance			172		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 600\text{V}$ $I_D = 25\text{A}$		560		nC
$Q_{gs}$	Gate – Source Charge			90		
$Q_{gd}$	Gate – Drain Charge			265		
$T_{d(on)}$	Turn-on Delay Time	<b>Resistive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 25\text{A}$ $R_G = 2.2\Omega$		100		ns
$T_r$	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			315		
$T_f$	Fall Time			90		

**SiC chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		64	400	$\mu\text{A}$
			$T_j = 175^\circ\text{C}$		112	2000	
$I_F$	DC Forward Current			20		A	
$V_F$	Diode Forward Voltage	$I_F = 20\text{A}$	$T_j = 25^\circ\text{C}$		1.6	1.8	V
			$T_j = 175^\circ\text{C}$		2.3	3	
$Q_C$	Total Capacitive Charge	$I_F = 20\text{A}, V_R = 600\text{V}$ $di/dt = 1000\text{A}/\mu\text{s}$		80		nC	
C	Total Capacitance	$f = 1\text{MHz}, V_R = 200\text{V}$		192		pF	
		$f = 1\text{MHz}, V_R = 400\text{V}$		138			

**Thermal and package characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit	
$R_{thJC}$	Junction to Case Thermal Resistance	Transistor			0.19	$^\circ\text{C}/\text{W}$
		SiC Diode			1	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1\text{min}, I_{isol} < 1\text{mA}, 50/60\text{Hz}$	4000			V	
$T_j$	Operating junction temperature range	-40		150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-40		125		
$T_C$	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight				80	g

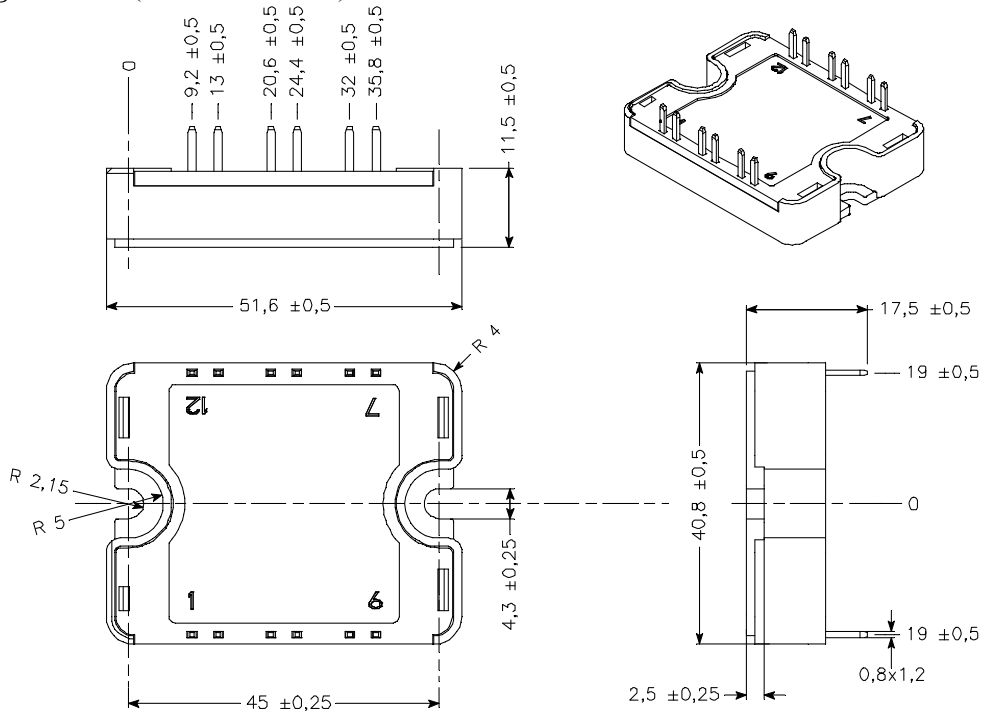
**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

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

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

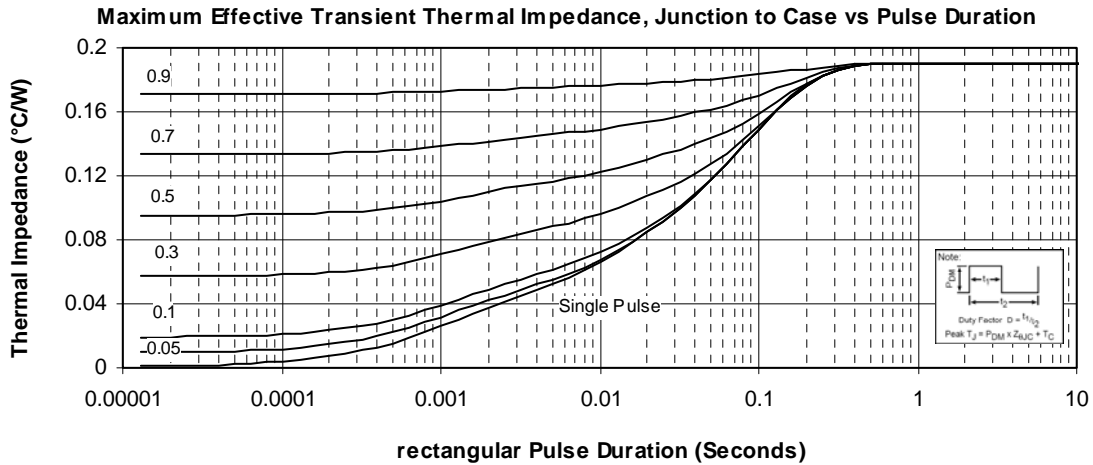
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

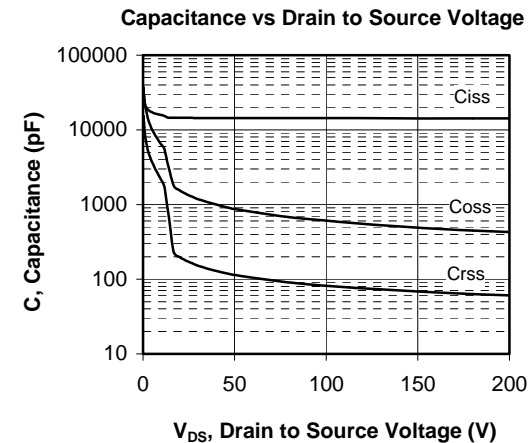
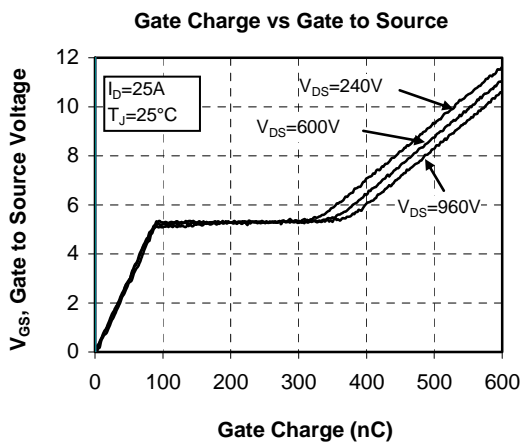
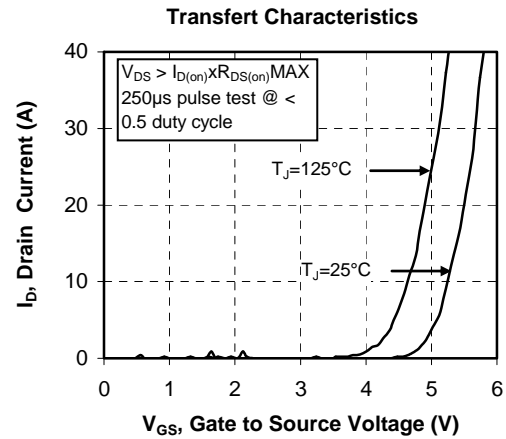
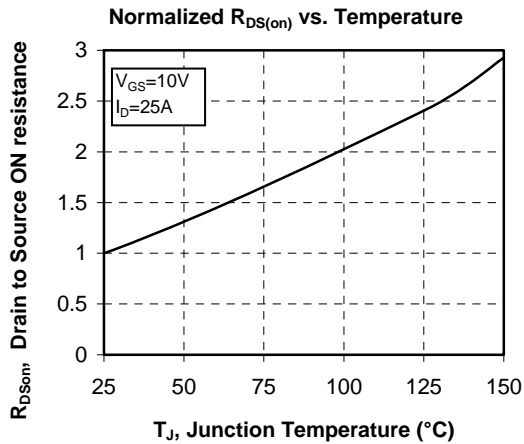
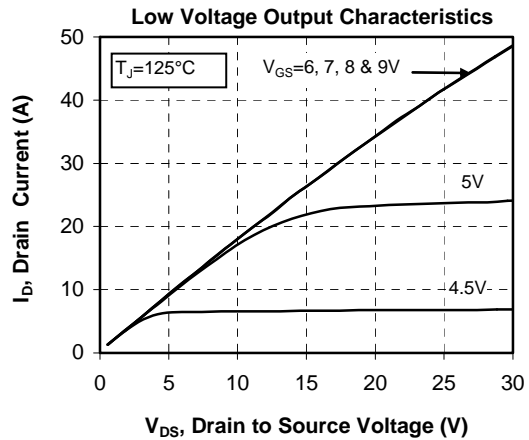
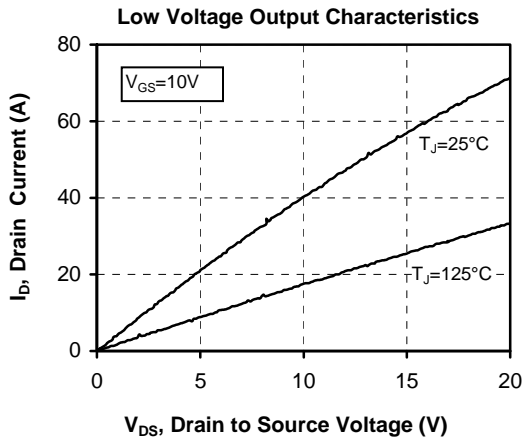
### SP1 Package outline (dimensions in mm)



See application note 1904 - Mounting Instructions for SP1 Power Modules on [www.microsemi.com](http://www.microsemi.com)

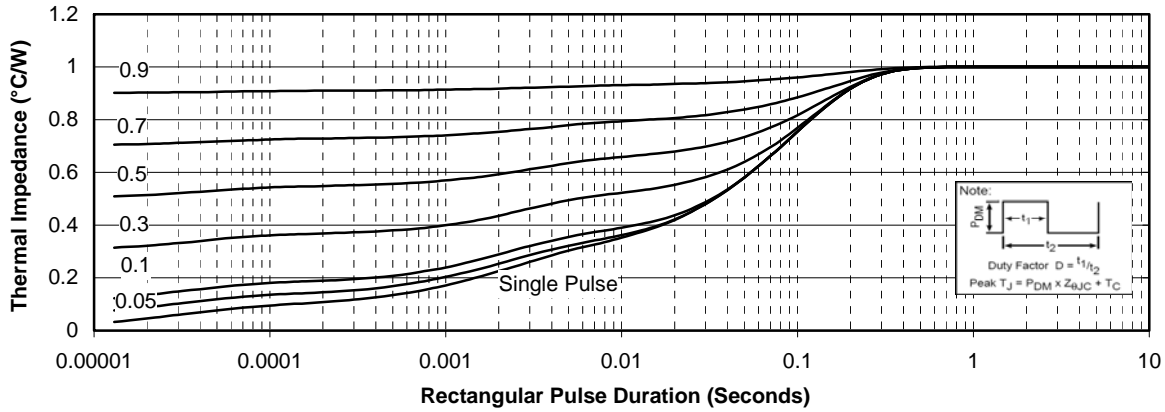
### Typical Mosfet Performance Curve



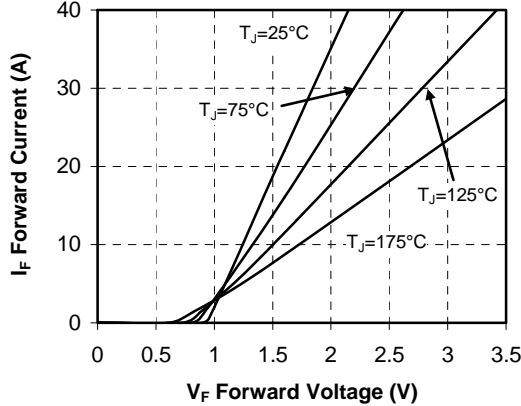


## Typical SiC Diode Performance Curve

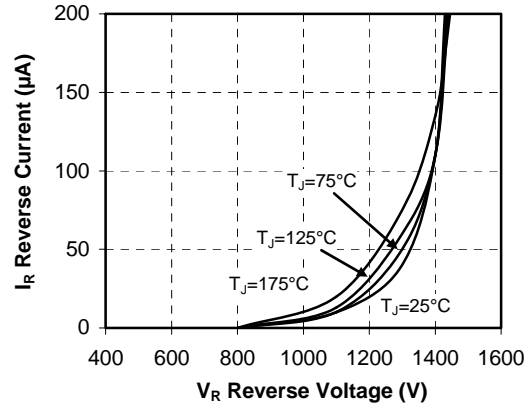
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



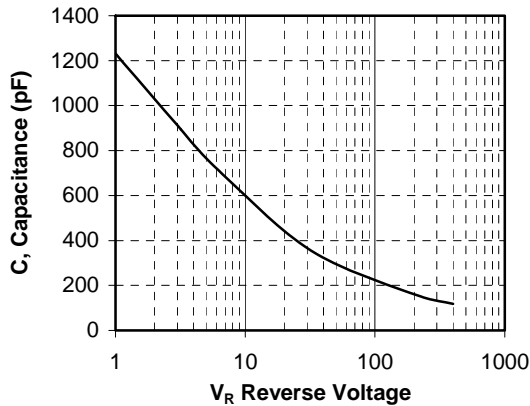
Forward Characteristics



Reverse Characteristics



Capacitance vs. Reverse Voltage



Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.