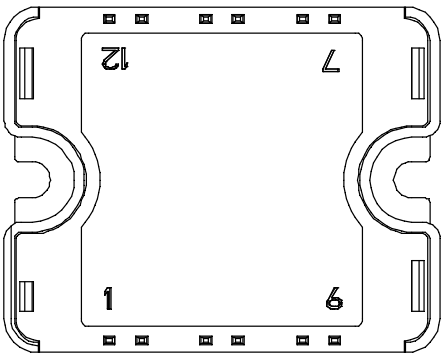
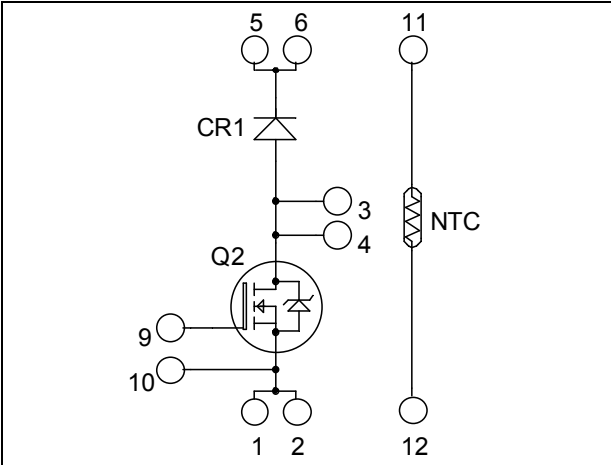


Boost chopper  
MOSFET + SiC chopper diode  
Power Module

**$V_{DSS} = 1200V$**   
 **$R_{DSon} = 300m\Omega$  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™ 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	A
$V_{GS}$	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	$V_{GS} = \pm 30\text{V}$			$\pm 100$	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		14560		$\text{pF}$
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		1340		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		172		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 600\text{V}$ $I_D = 25\text{A}$		560		$\text{nC}$
$Q_{gs}$	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		$\text{ns}$
$T_r$	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	$T_c = 100^\circ\text{C}$		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		$\text{nC}$
C	Total Capacitance	$f = 1\text{MHz}, V_R = 200\text{V}$		192		$\text{pF}$
		$f = 1\text{MHz}, V_R = 400\text{V}$		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 $t = 1\text{min}, 50/60\text{Hz}$	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	3	$\text{N}\cdot\text{m}$
Wt	Package Weight				80	g

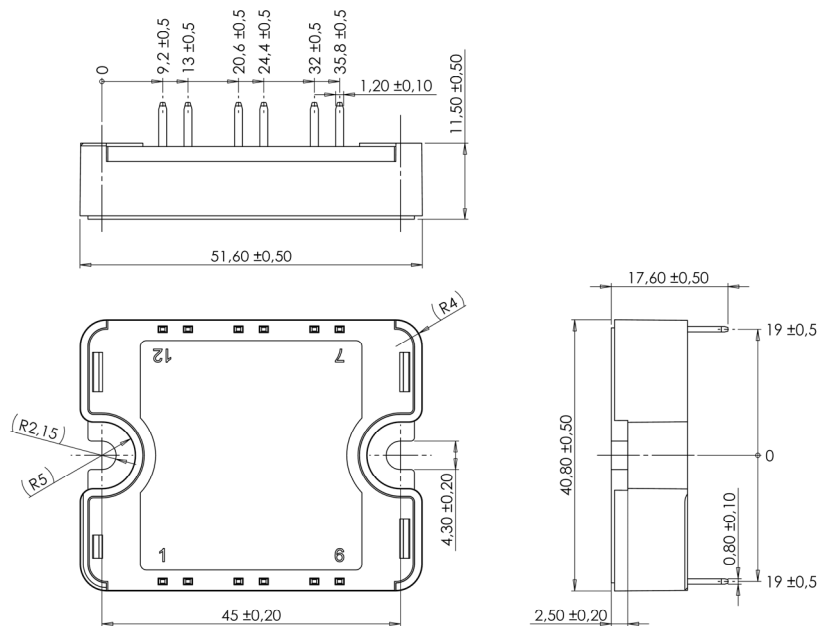
**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

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		%

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

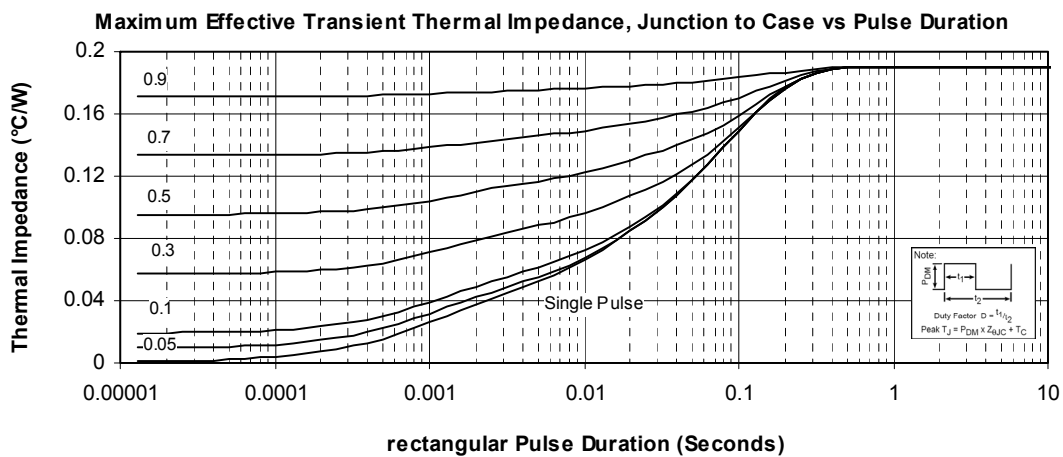
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

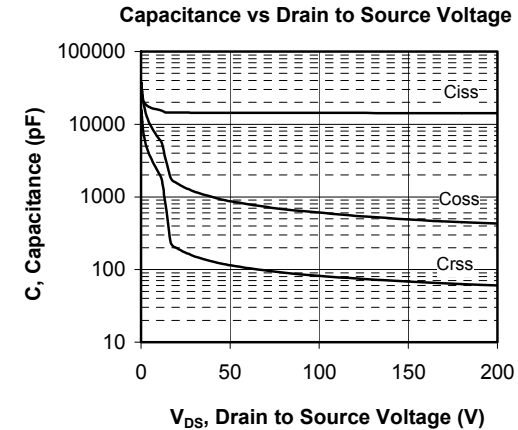
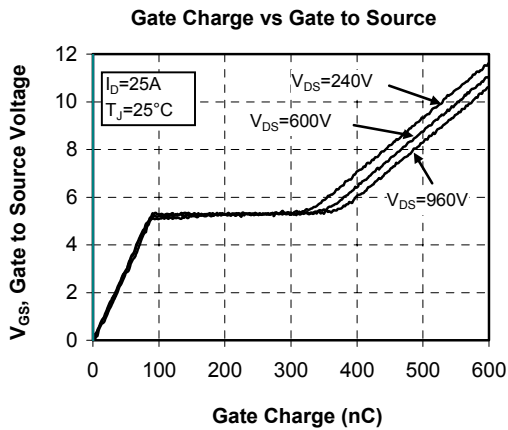
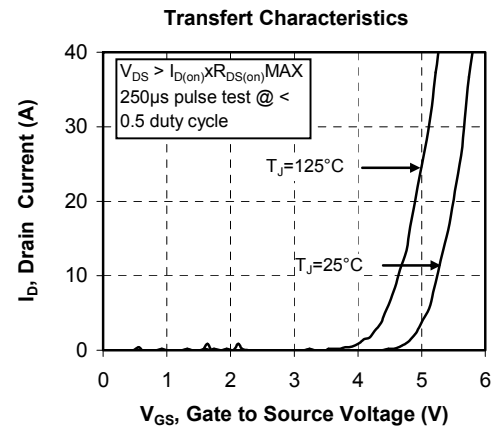
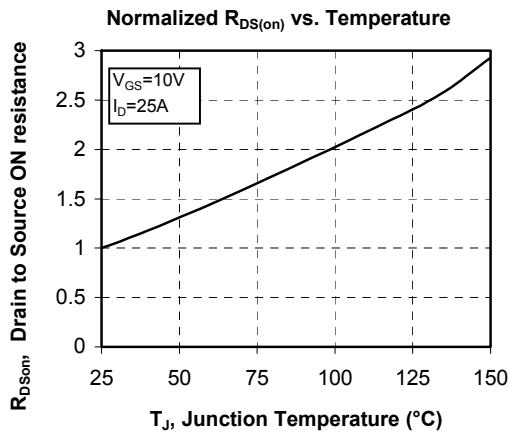
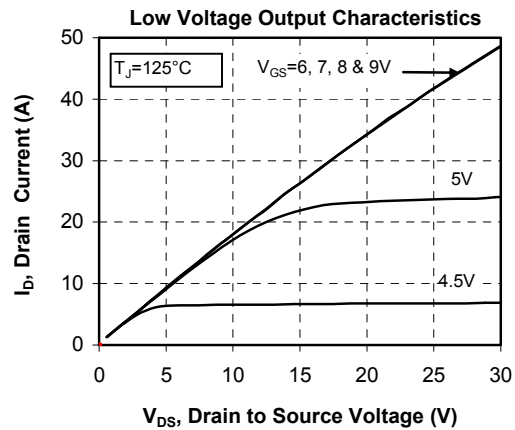
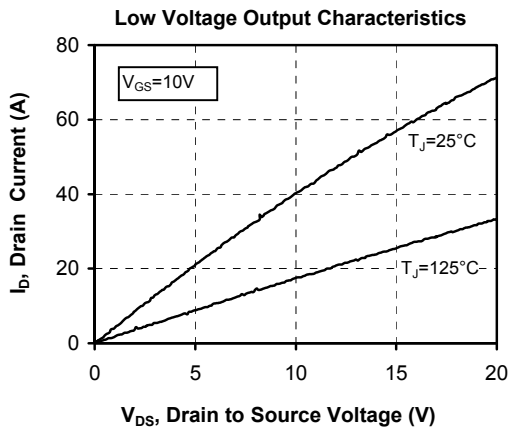
### SP1 Package outline (dimensions in mm)

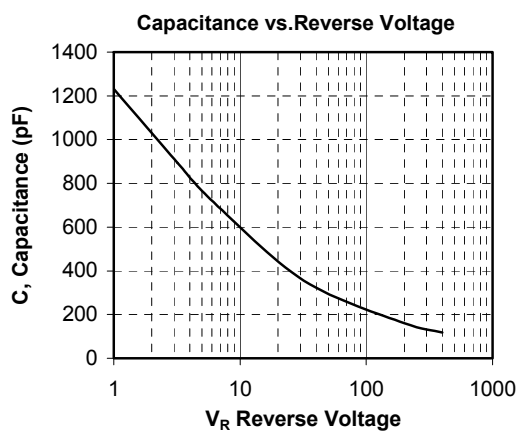
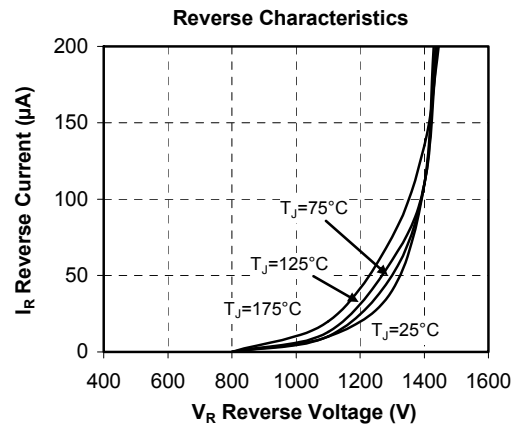
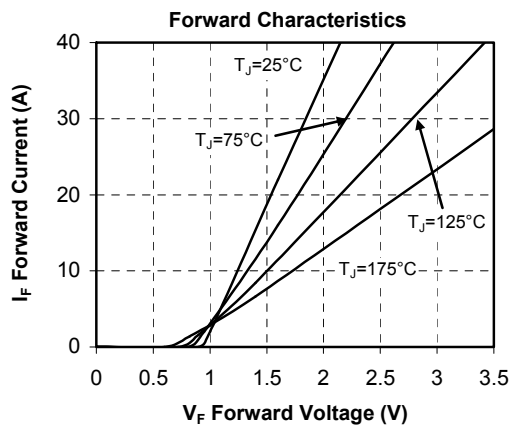
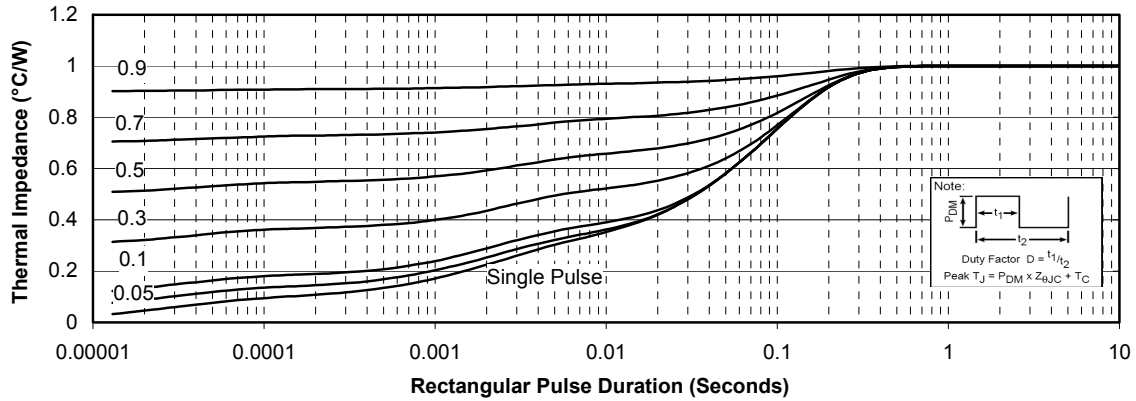


See application note 1904 - Mounting Instructions for SP1 Power Modules on [www.microsemi.com](http://www.microsemi.com)

### Typical Mosfet Performance Curve





**Typical SiC Diode Performance Curve**
**Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration**


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