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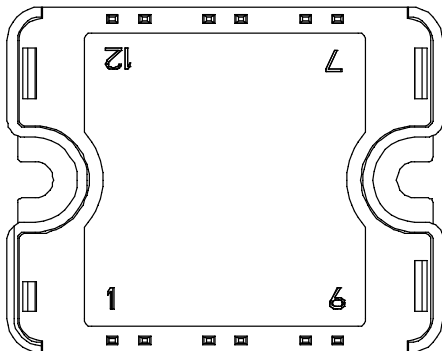
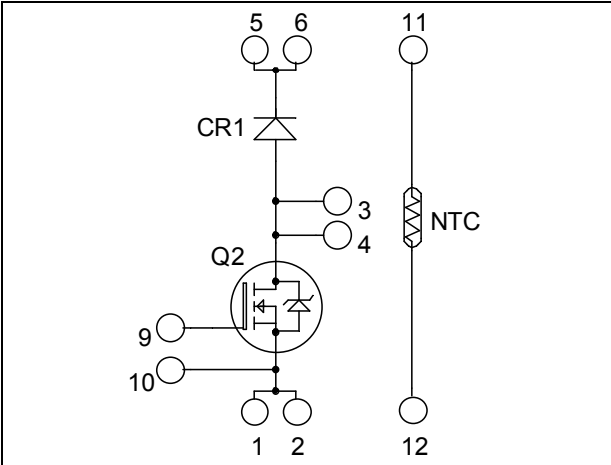
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*Boost chopper
 MOSFET + SiC chopper diode
 Power Module*

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



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	± 30	V
R_{DSon}	Drain - Source ON Resistance	360	m Ω
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

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	μA
			$T_j = 125^\circ\text{C}$		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	$V_{GS} = \pm 30\text{V}$			± 100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		14560		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		nC
Q_{gs}	Gate – Source Charge			90		
Q_{gd}	Gate – Drain Charge			265		
$T_{d(on)}$	Turn-on Delay Time	Resistive switching @ 25°C $V_{GS} = 15\text{V}$ $V_{Bus} = 800\text{V}$ $I_D = 25\text{A}$ $R_G = 2.2\Omega$		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	μA
			$T_j = 175^\circ\text{C}$	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 $t = 1\text{ min}, 50/60\text{Hz}$	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

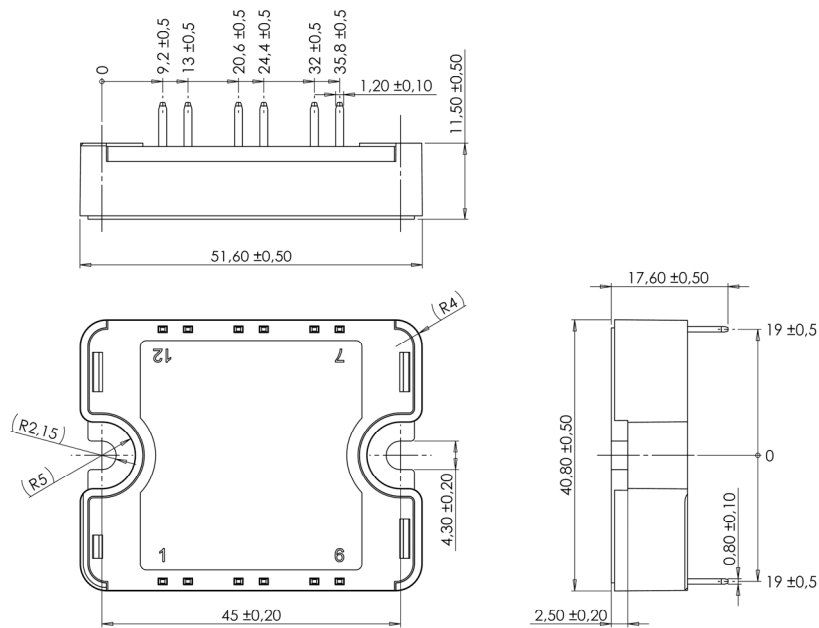
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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		%

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

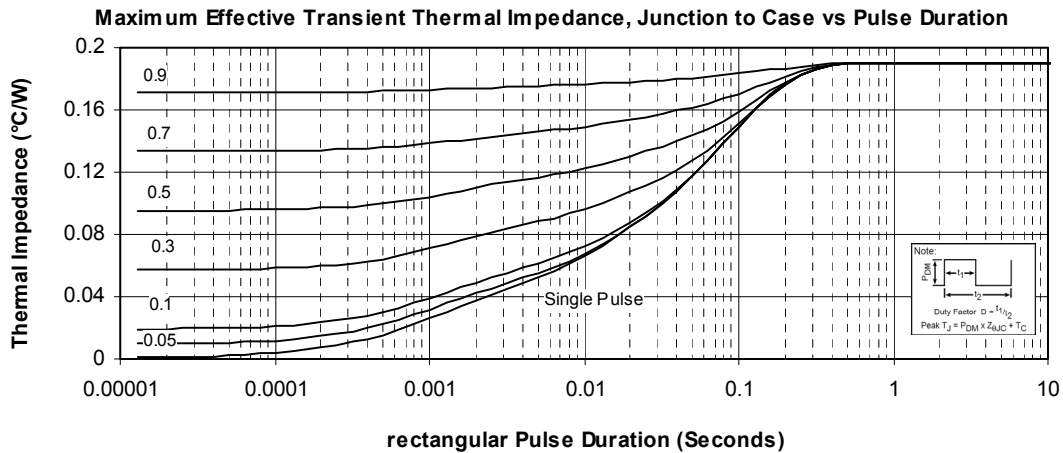
T: Thermistor temperature
 R_T: Thermistor value at T

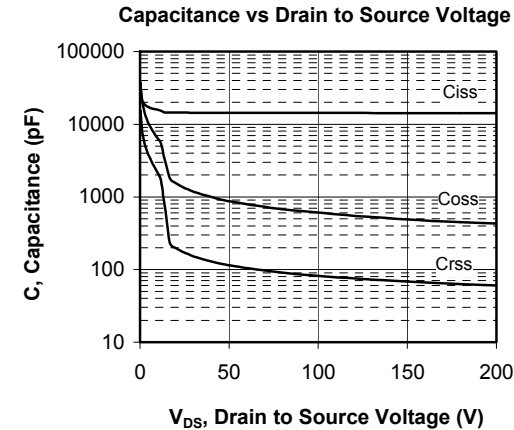
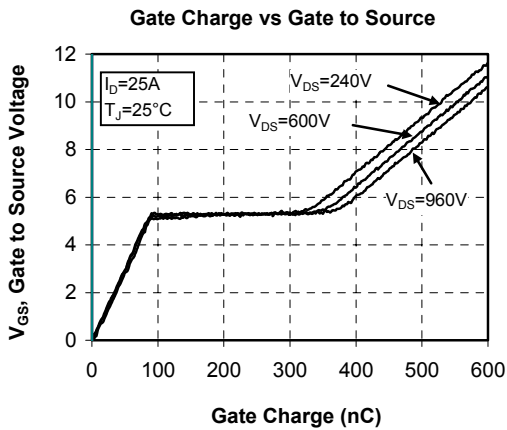
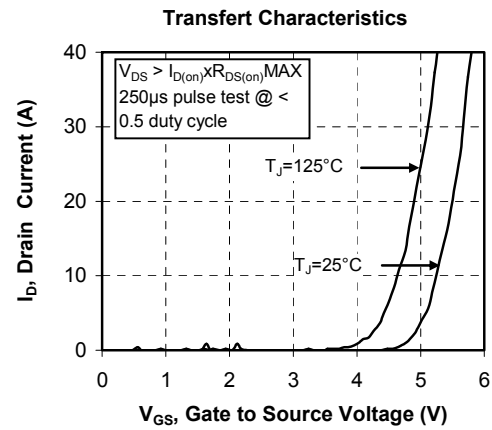
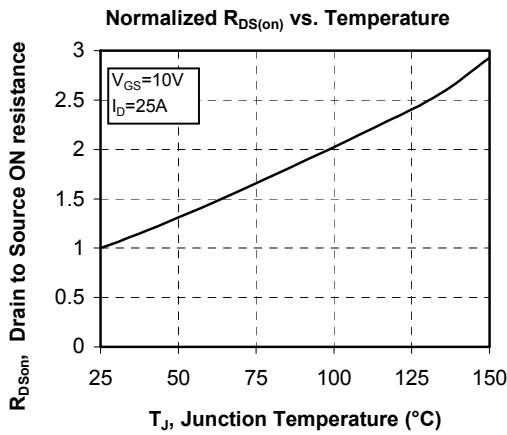
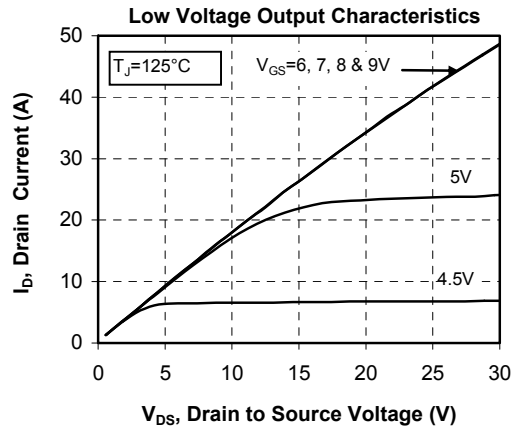
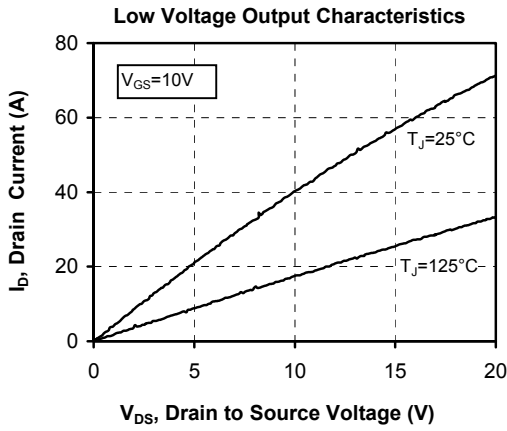
SP1 Package outline (dimensions in mm)

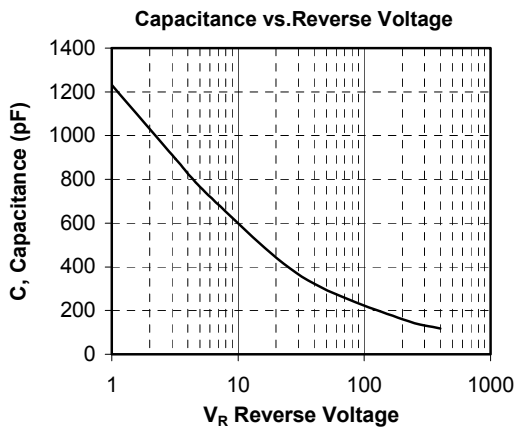
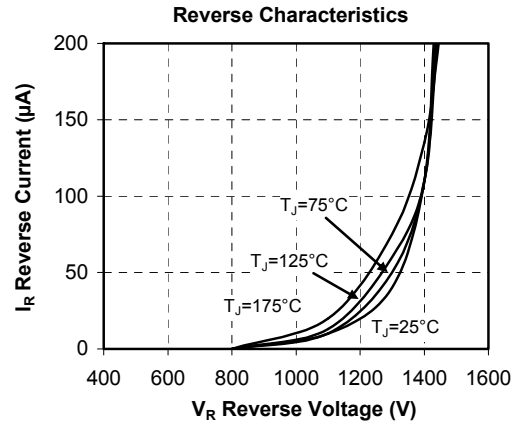
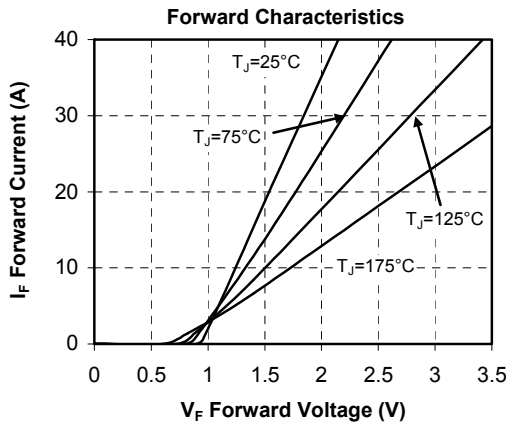
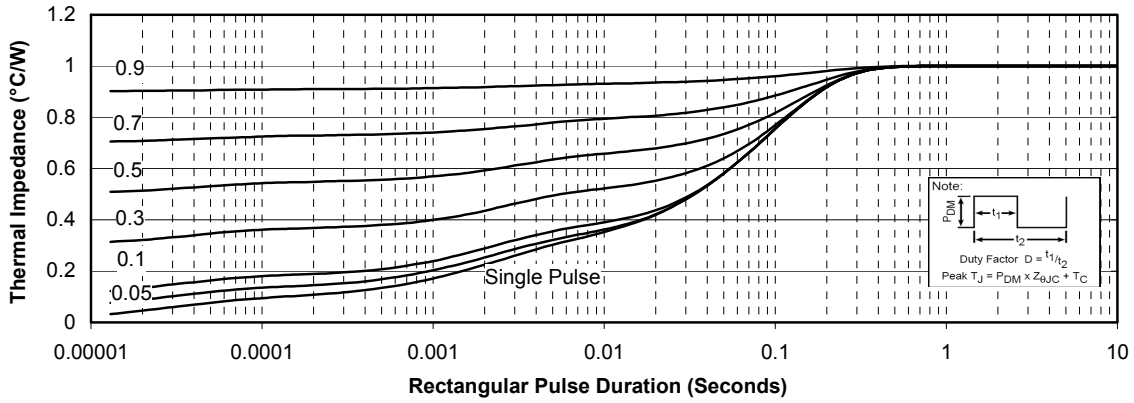


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical Mosfet Performance Curve





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


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