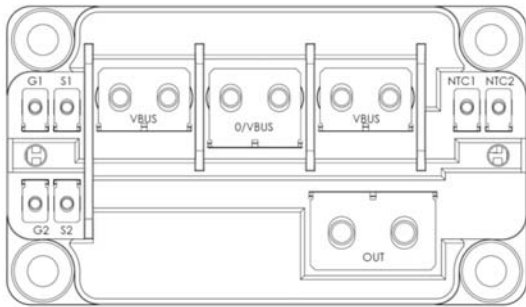
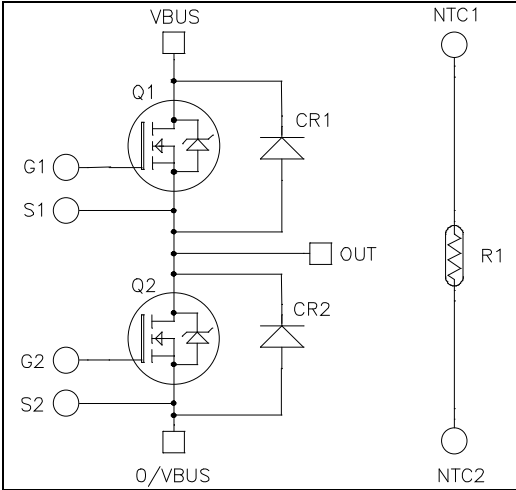


**Very low stray inductance
Phase leg SiC MOSFET Power Module**

$V_{DSS} = 1200V$
 $R_{DS(on)} = 2.6m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 947*A @ T_c = 25^\circ C$



Application

- 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
- Very low stray inductance
- Internal thermistor for temperature monitoring
- M4 & M5 power connectors
- M2.5 signals connectors
- 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
- Low profile
- RoHS Compliant

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

1. SiC MOSFET characteristics (Per MOSFET)

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	947*
		$T_c = 80^\circ C$	754*
I_{DM}	Pulsed Drain current	1400	
V_{GS}	Gate - Source Voltage	-10/+25	V
$R_{DS(on)}$	Drain - Source ON Resistance	2.6	$m\Omega$
P_D	Power Dissipation	$T_c = 25^\circ C$	3750
			W

* Specification of SiC MOSFET device but output current must be limited due to size of power connectors.

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1200V$		200	1200	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS}=20V ; I_D=480A$		2.1	2.6	m Ω
		$T_j = 25^\circ C$		3.4		
		$T_j = 175^\circ C$				
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 12mA$	1.8	2.8		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V, V_{DS} = 0V$			1.2	μA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		36.24		nF
C_{oss}	Output Capacitance	$V_{DS} = 1000V$		3.24		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.3		
Q_g	Total gate Charge	$V_{GS} = -5/+20V$		2784		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 800V$		492		
Q_{gd}	Gate – Drain Charge	$I_D = 480A$		600		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20V ; T_j=150^\circ C$		63		ns
T_r	Rise Time	$V_{Bus} = 600V$		63		
$T_{d(off)}$	Turn-off Delay Time	$I_D = 600A$		150		
T_f	Fall Time	$R_G = 0.25\Omega$		50		
E_{on}	Turn on Energy	Inductive Switching ; $T_j=150^\circ C$		11		mJ
E_{off}	Turn off Energy	$V_{GS} = -5/+20V ; V_{Bus} = 600V$ $I_D = 600A ; R_G = 0.25\Omega$		9.9		
R_{Gint}	Internal gate resistance			0.55		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.04	$^\circ C/W$

Body diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V ; I_{SD} = 480A$		4		V
		$V_{GS} = -5V ; I_{SD} = 480A$		4.2		
t_{rr}	Reverse Recovery Time	$I_{SD} = 480A ; V_{GS} = -5V$		90		ns
Q_{rr}	Reverse Recovery Charge	$V_R = 800V ; di_F/dt = 12000A/\mu s$		6.6		μC
I_{rr}	Reverse Recovery Current			162		A

2. SiC diode characteristics (Per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1200	V
I _{RM}	Reverse Leakage Current	V _R =1200V	T _j = 25°C	0.1	1.2	mA
			T _j = 175°C	1.5		
I _F	DC Forward Current		T _c = 95°C	300		A
V _F	Diode Forward Voltage	I _F = 300A	T _j = 25°C	1.5	1.8	V
			T _j = 175°C	2.1		
Q _C	Total Capacitive Charge	V _R = 800V		1344		nC
C	Total Capacitance	f = 1MHz, V _R = 400V		1476		pF
		f = 1MHz, V _R = 800V		1092		
R _{thJC}	Junction to Case Thermal Resistance				0.109	°C/W

3. Thermal and package characteristics

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	M2.5	0.4	0.6	N.m
			M4	2	3	
			M5	2	3.5	
		To heatsink	M6	3	5	
L _{DC}	Module stray inductance between VBUS & 0/VBUS		3	nH		
Wt	Package Weight		320	g		

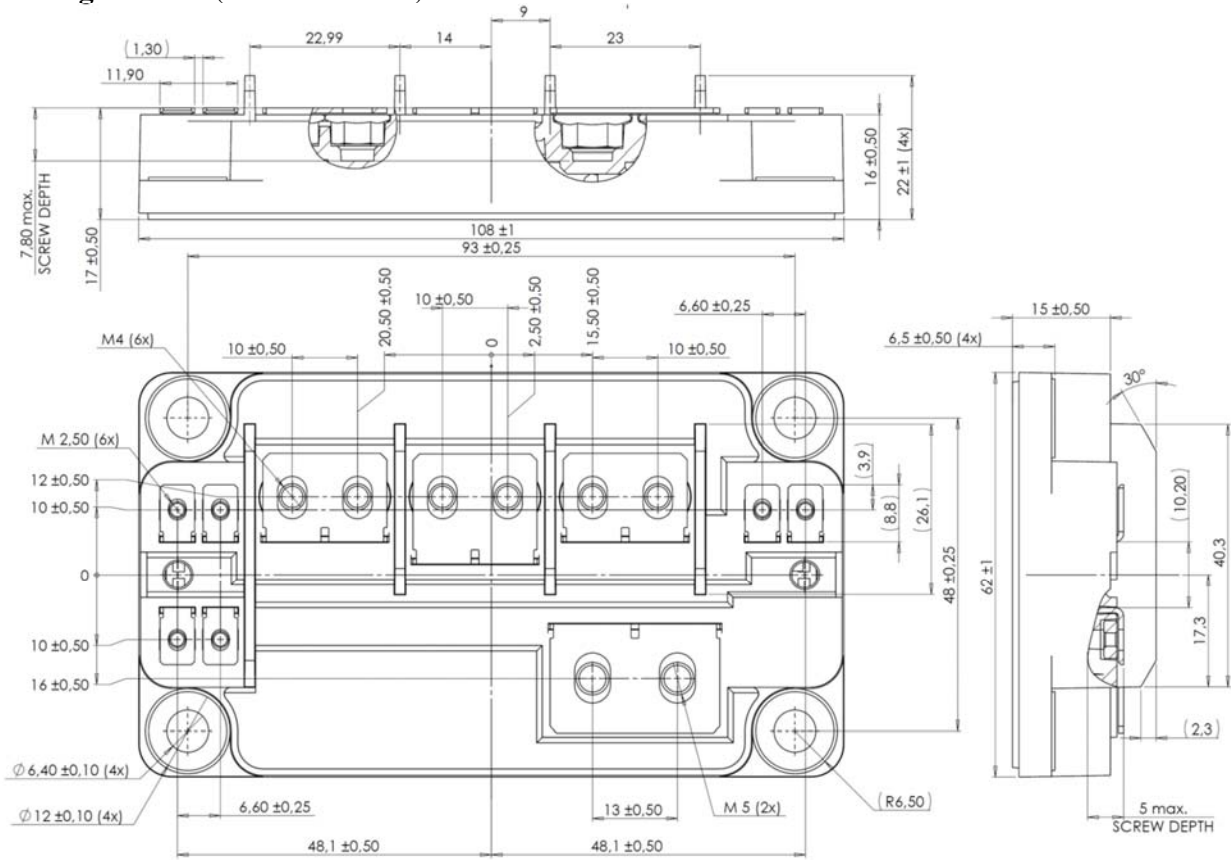
Temperature sensor NTC (see application note APT0406 on www.microsemi.com).

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		%

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

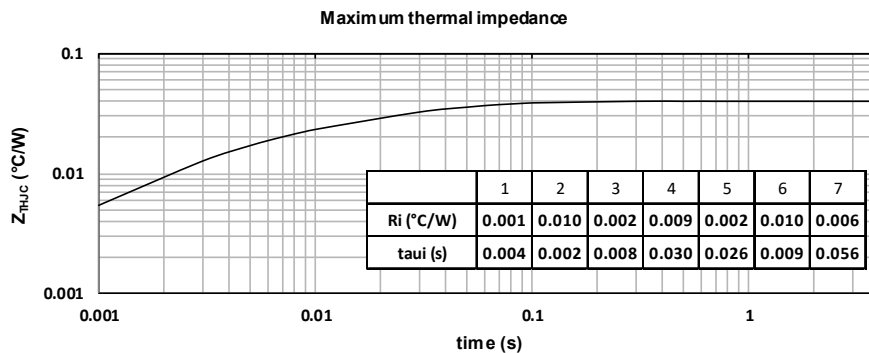
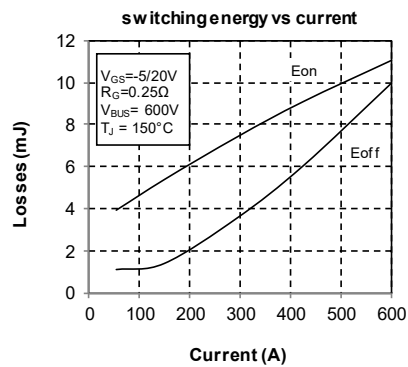
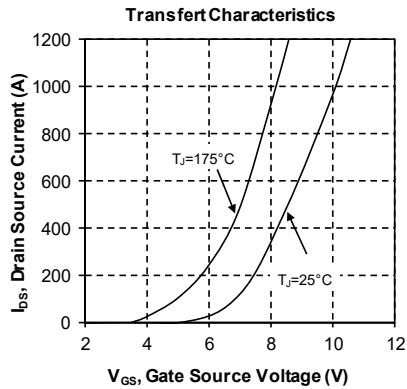
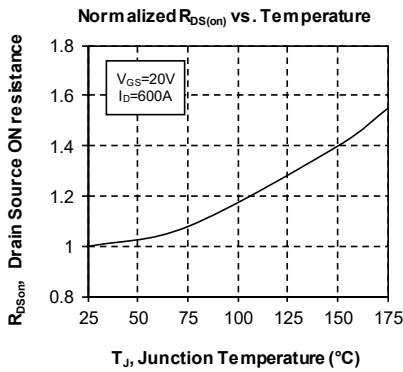
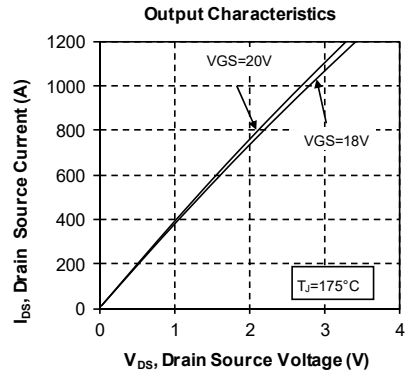
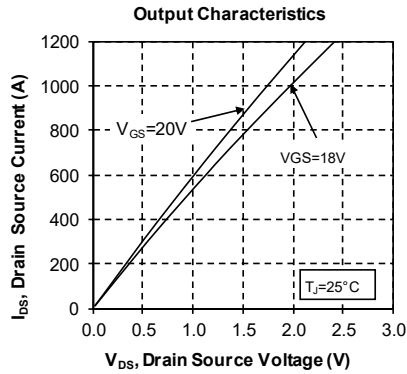
T: Thermistor temperature
R_T: Thermistor value at T

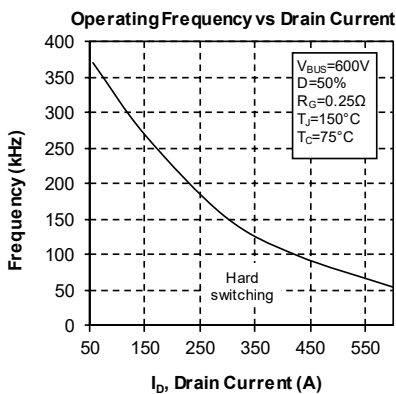
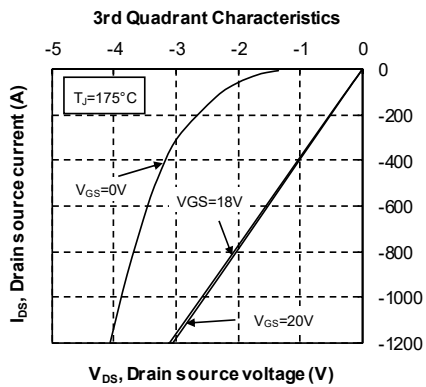
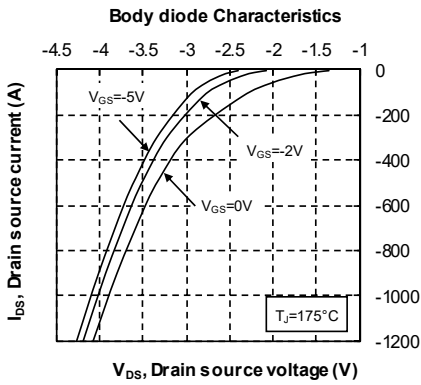
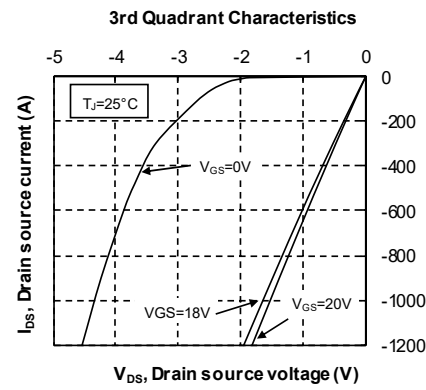
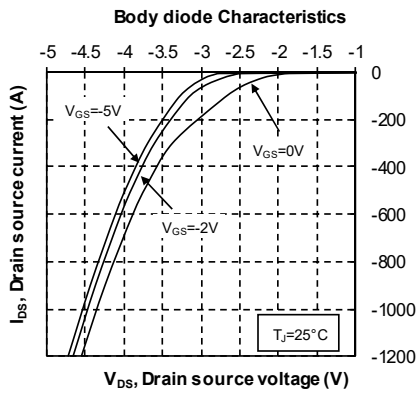
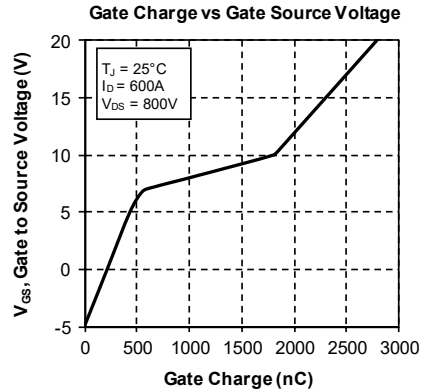
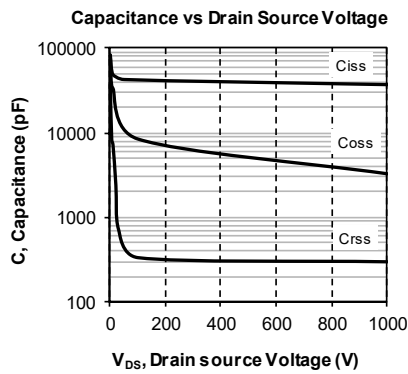
Package outline (dimensions in mm)



See application note AN1911 - Mounting instructions for SP6 Low inductance Power Module on www.microsemi.com

Typical Performance Curve





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