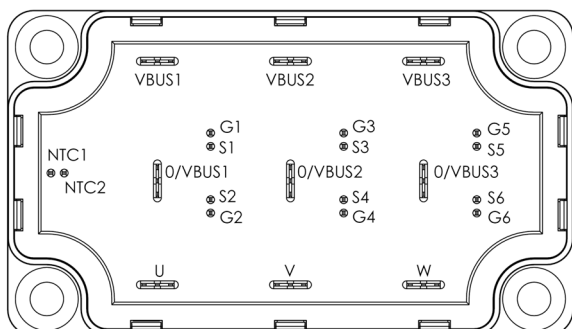
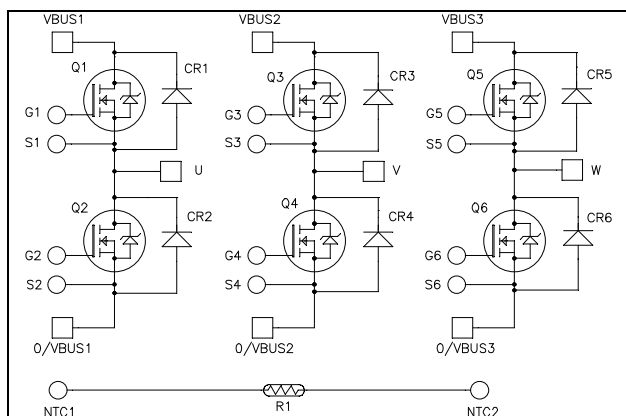


Triple phase leg SiC MOSFET Power Module

$$V_{DSS} = 1200V$$

$$R_{DS(on)} = 33m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 78A \text{ @ } T_c = 25^\circ C$$



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



CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

Absolute maximum ratings (per SiC MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DS}	Drain - Source Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ\text{C}$	A
		$T_c = 80^\circ\text{C}$	
I_{DM}	Pulsed Drain current	155	
V_{GS}	Gate - Source Voltage	-10/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	33	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ\text{C}$	W

Electrical Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{V}$, $V_{DS} = 1200\text{V}$			300	μA
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 20\text{V}$ $I_D = 60\text{A}$		27	33	m Ω
		$T_j = 150^\circ\text{C}$		50	70	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 3\text{mA}$	1.7	2.2		V
I_{GSS}	Gate - Source Leakage Current	$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$			750	nA

Dynamic Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		2.85		nF
C_{oss}	Output Capacitance	$V_{DS} = 1000\text{V}$		0.24		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.02		
Q_g	Total gate Charge	$V_{GS} = 0/20\text{V}$		148		nC
Q_{gs}	Gate - Source Charge	$V_{Bus} = 800\text{V}$		32		
Q_{gd}	Gate - Drain Charge	$I_D = 60\text{A}$		54		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -5/+20\text{V}$		20		ns
T_r	Rise Time	$V_{Bus} = 800\text{V}$		20		
$T_{d(off)}$	Turn-off Delay Time	$I_D = 60\text{A}$, $T_j = 150^\circ\text{C}$		75		
T_f	Fall Time	$R_L = 13\Omega$; $R_{Gext} = 16.7\Omega$		35		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -5/+20\text{V}$ $V_{Bus} = 600\text{V}$		1.3		mJ
E_{off}	Turn off Energy	$I_D = 60\text{A}$ $R_{Gext} = 16.7\Omega$		0.7		
R_{Gint}	Internal gate resistance			3.2		Ω
R_{thJC}	Junction to Case Thermal Resistance				0.34	$^\circ\text{C/W}$

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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	$V_{GS} = -5\text{V}$, $I_{SD} = 30\text{A}$		3.3		V
		$V_{GS} = -2\text{V}$, $I_{SD} = 30\text{A}$		3.1		
t_{rr}	Reverse Recovery Time	$I_{SD} = 60\text{A}$; $V_{GS} = -5\text{V}$		40		ns
Q_{rr}	Reverse Recovery Charge	$V_R = 800\text{V}$; $di_F/dt = 1000\text{A}/\mu\text{s}$		415		nC
I_{rr}	Reverse Recovery Current			20		A

SiC schottky diode ratings and characteristics (per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1200	V
I _{RRM}	Reverse Leakage Current	V _R =1200V		100	600	μA
		T _j = 25°C				
		T _j = 175°C		170	3000	
I _F	DC Forward Current	T _C = 125°C		30		A
V _F	Diode Forward Voltage	I _F = 30A		1.6	1.8	V
		T _j = 25°C				
		T _j = 175°C		2.3	3	
Q _C	Total Capacitive Charge	I _F = 30A, V _R = 1200V di/dt = 1200A/μs		240		nC
C	Total Capacitance	f = 1MHz, V _R = 200V		288		pF
		f = 1MHz, V _R = 400V		207		
R _{thJC}	Junction to Case Thermal Resistance				0.37	°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			4		%
					T _C =100°C

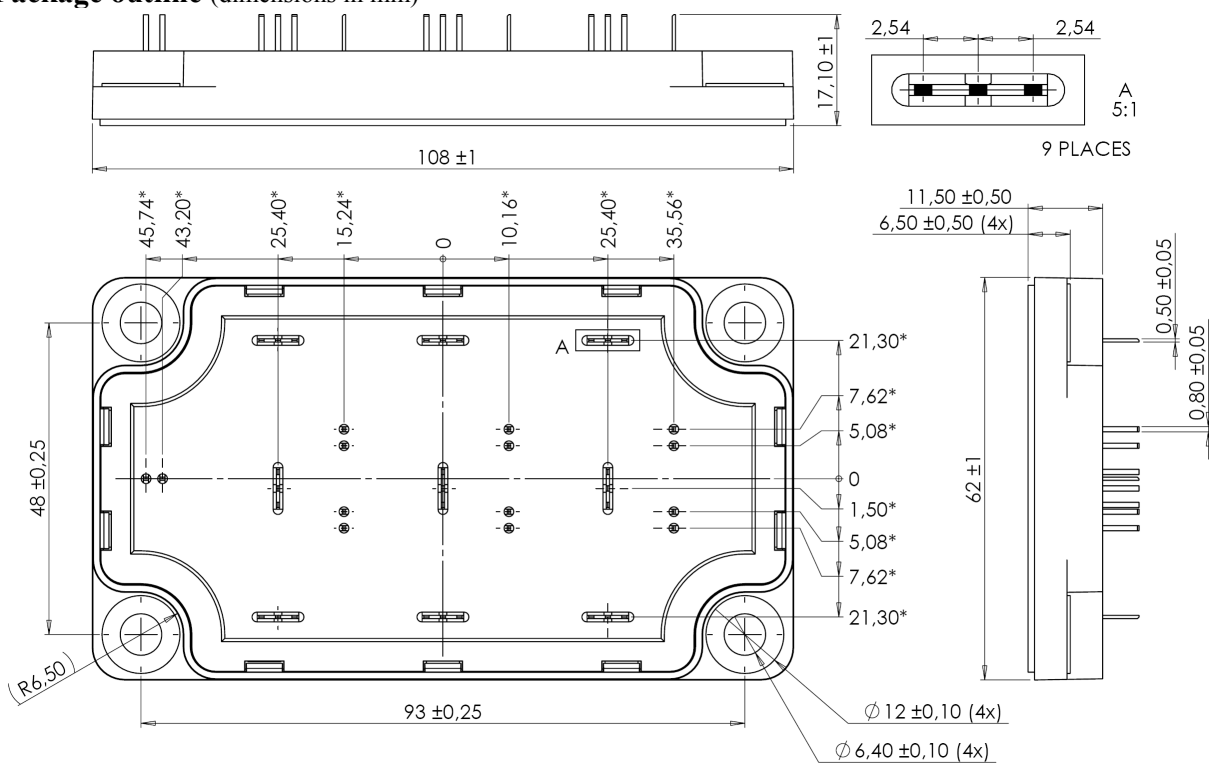
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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	°C
			SiC diode	-40	175	
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	100	
Torque	Mounting torque	To heatsink	M6	3	5	N.m
Wt	Package Weight				250	g

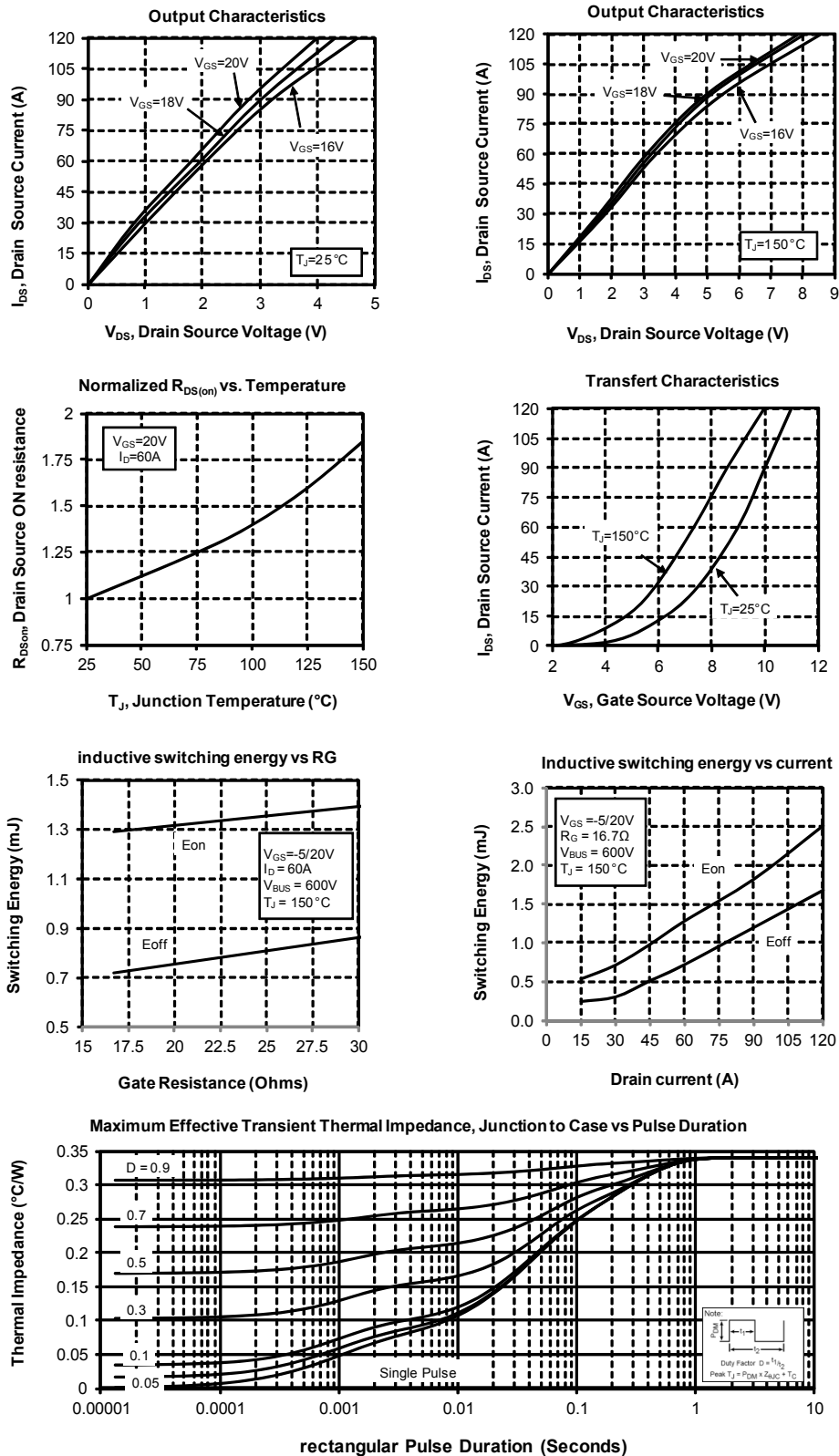
Package outline (dimensions in mm)

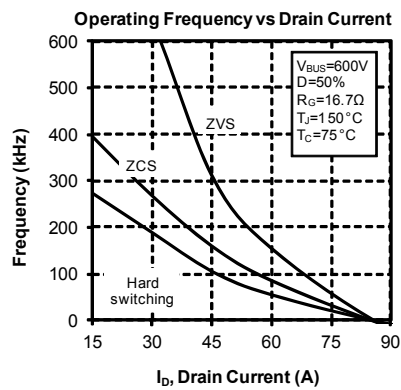
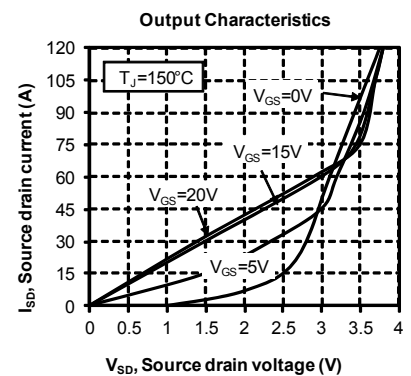
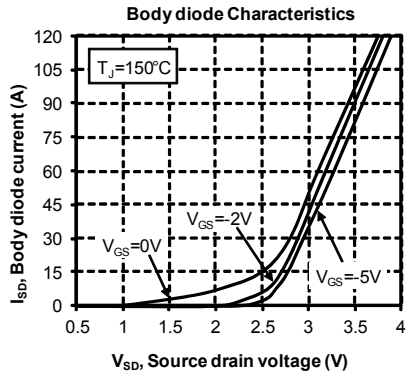
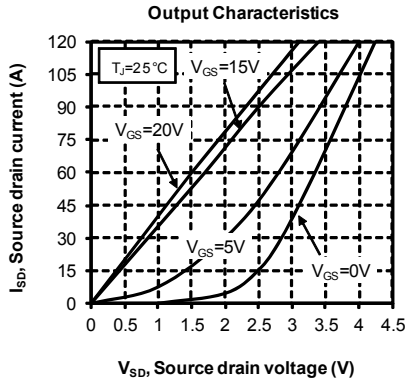
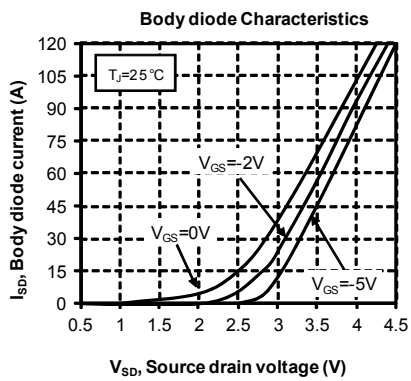
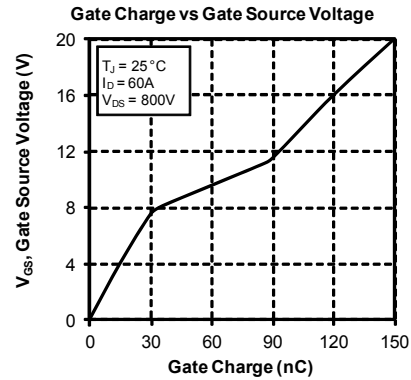
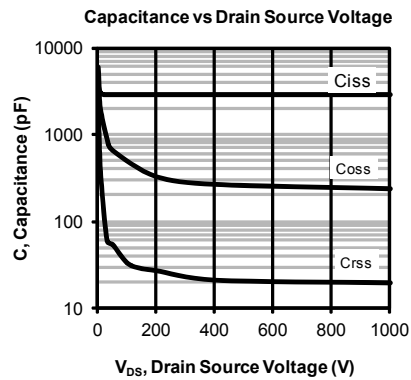


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS : $\pm 0,1$

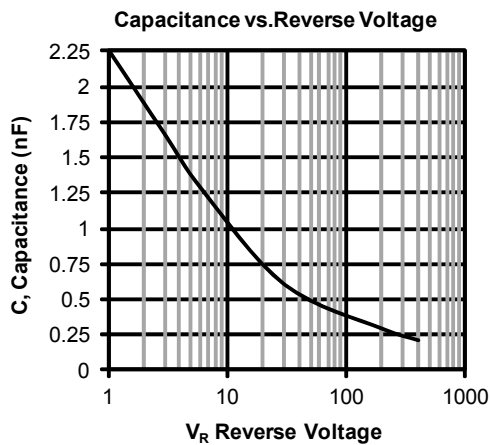
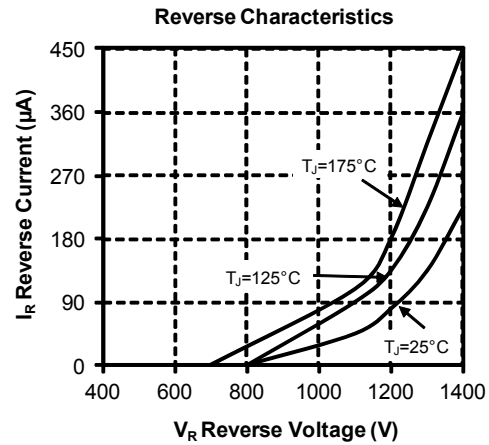
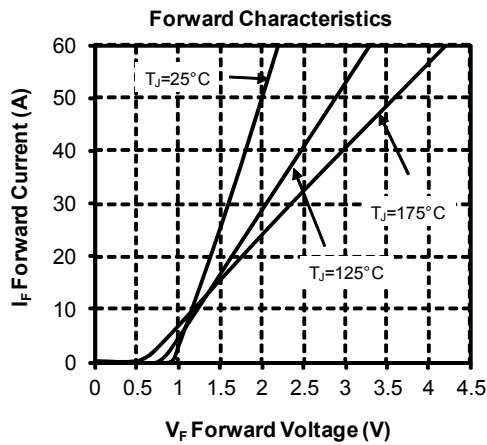
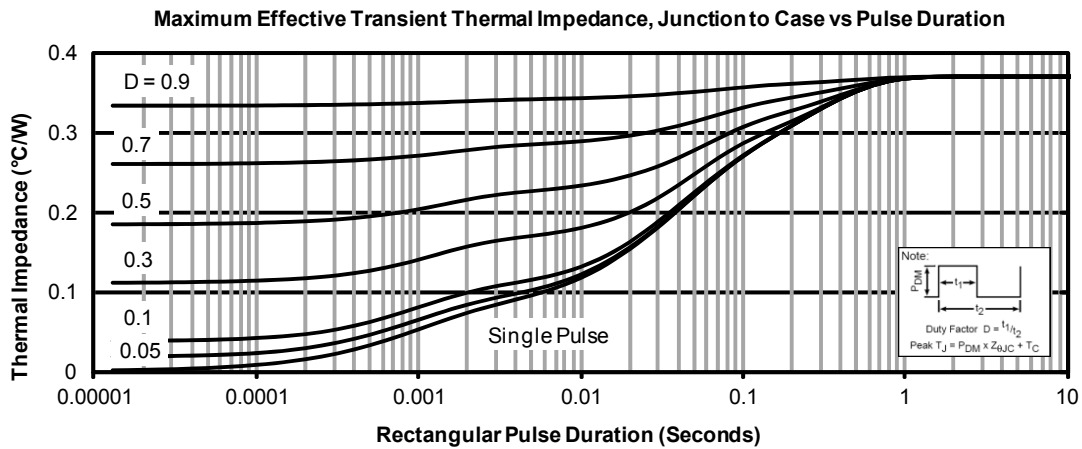
See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

Typical SiC MOSFET Performance Curve





Typical SiC diode Performance Curve



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