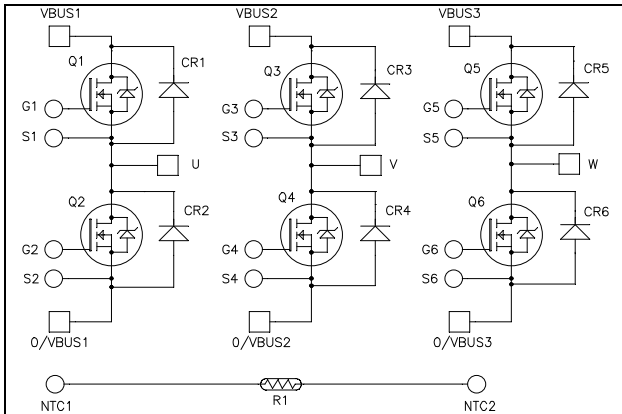


**Triple phase leg
SiC MOSFET Power Module**

$V_{DSS} = 1200V$
 $R_{DS(on)} = 33m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 78A \text{ @ } T_c = 25^\circ C$

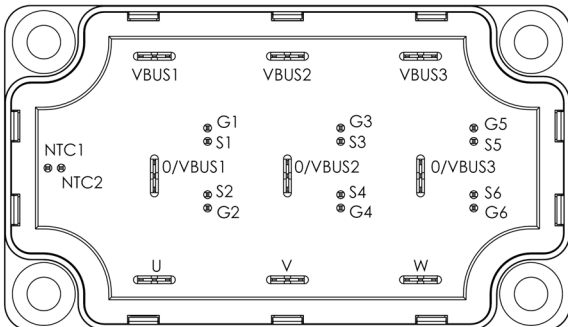


Application

- 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)

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
V _{DSS}	Drain - Source Voltage	1200	V
I _D	Continuous Drain Current	T _c = 25°C	78
		T _c = 80°C	58
I _{DM}	Pulsed Drain current	155	A
V _{GS}	Gate - Source Voltage	-10/25V	V
R _{DS(on)}	Drain - Source ON Resistance	33	mΩ
P _D	Maximum Power Dissipation	T _c = 25°C	370
			W

Electrical Characteristics (per SiC MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} = 0V, V _{DS} = 1200V			300	μA
R _{DS(on)}	Drain - Source on Resistance	V _{GS} = 20V I _D = 60A	T _j = 25°C	27	33	mΩ
			T _j = 150°C	50	70	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} ; I _D = 3mA	1.7	2.2		V
I _{GSS}	Gate - Source Leakage Current	V _{GS} = 20 V, V _{DS} = 0V			750	nA

Dynamic Characteristics (per SiC MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 1000V f = 1MHz		2.85		nF
C _{oss}	Output Capacitance			0.24		
C _{rss}	Reverse Transfer Capacitance			0.02		
Q _g	Total gate Charge	V _{GS} = 0/20V V _{Bus} = 800V I _D = 60A		148		nC
Q _{gs}	Gate - Source Charge			32		
Q _{gd}	Gate - Drain Charge			54		
T _{d(on)}	Turn-on Delay Time	V _{GS} = -5/+20V V _{Bus} = 800V I _D = 60A, T _j = 150°C R _L = 13Ω ; R _{Gext} = 16.7Ω		20		ns
T _r	Rise Time			20		
T _{d(off)}	Turn-off Delay Time			75		
T _f	Fall Time			35		
E _{on}	Turn on Energy	Inductive Switching V _{GS} = -5/+20V V _{Bus} = 600V I _D = 60A R _{Gext} = 16.7Ω	T _j = 150°C	1.3		mJ
E _{off}	Turn off Energy			T _j = 150°C	0.7	
R _{Gint}	Internal gate resistance			3.2		Ω
R _{thJC}	Junction to Case Thermal Resistance				0.34	°C/W

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

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{SD}	Diode Forward Voltage	V _{GS} = -5V, I _{SD} = 30A		3.3		V
		V _{GS} = -2V, I _{SD} = 30A		3.1		
t _{rr}	Reverse Recovery Time	I _{SD} = 60A ; V _{GS} = -5V V _R = 800V ; di _F /dt = 1000A/μs		40		ns
Q _{rr}	Reverse Recovery Charge			415		nC
I _{rr}	Reverse Recovery Current			20		A

SiC schottky diode ratings and characteristics (per SiC diode)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Peak Repetitive Reverse Voltage					1200	V
I _{RRM}	Reverse Leakage Current	V _R =1200V	T _j = 25°C		100	600	μA
			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	T _j = 25°C		1.6	1.8	V
			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).

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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		%

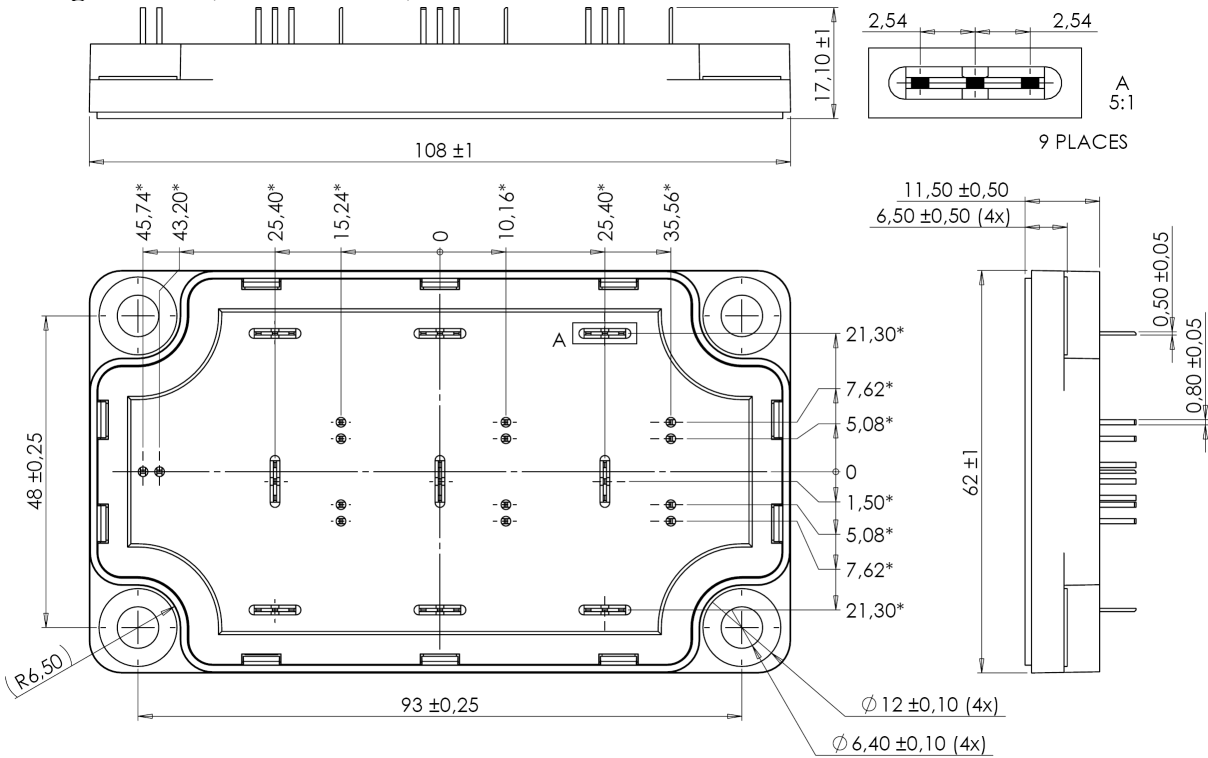
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>		
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

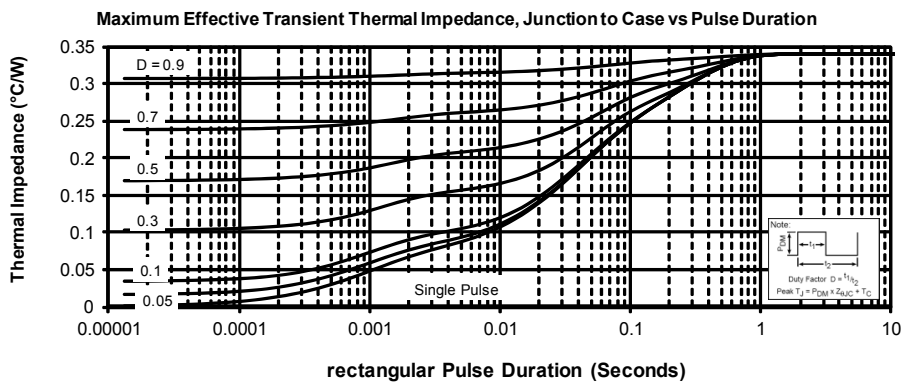
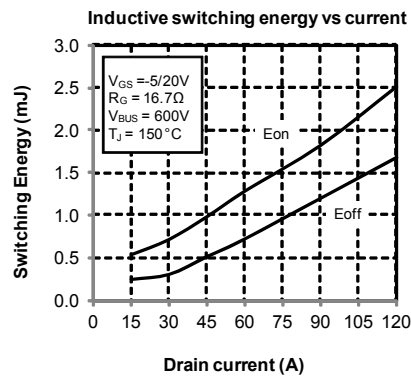
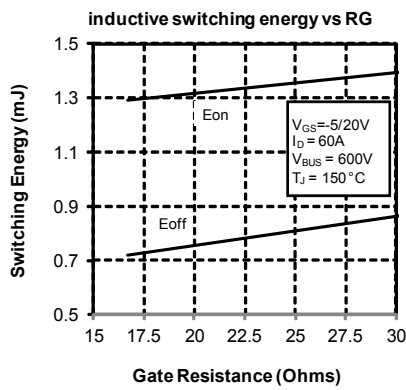
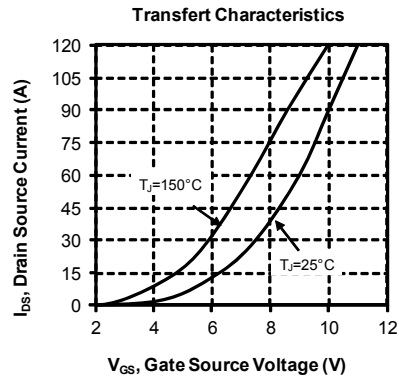
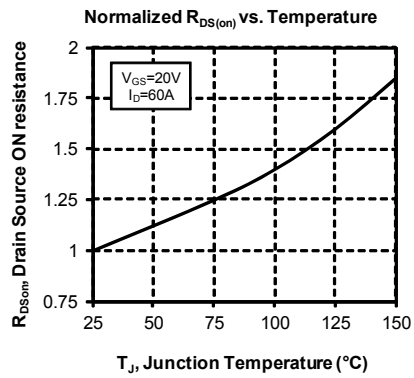
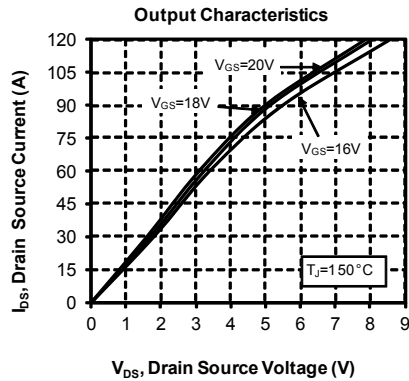
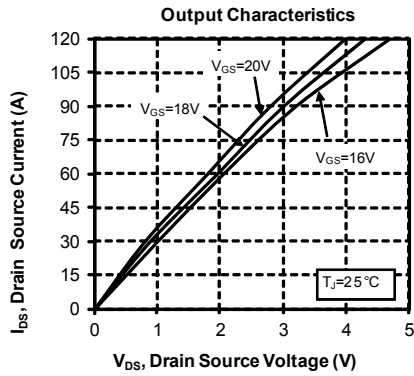
Package outline (dimensions in mm)

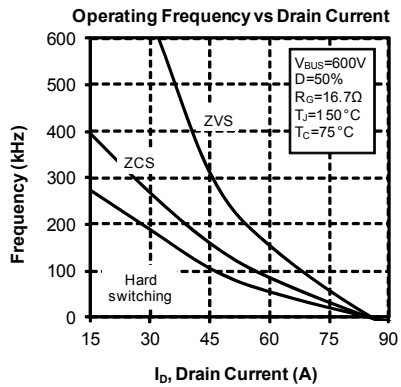
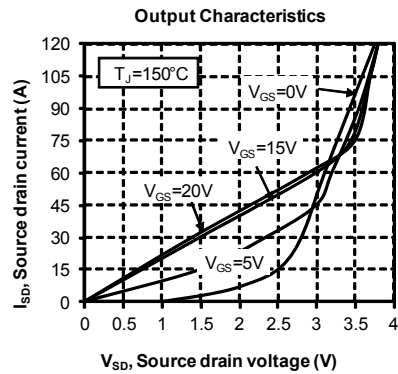
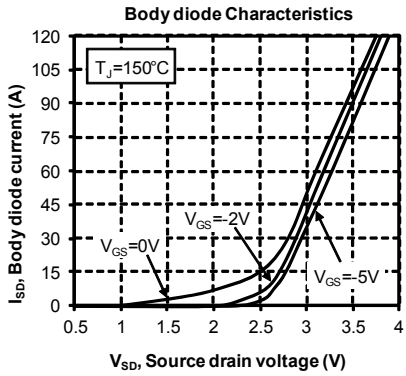
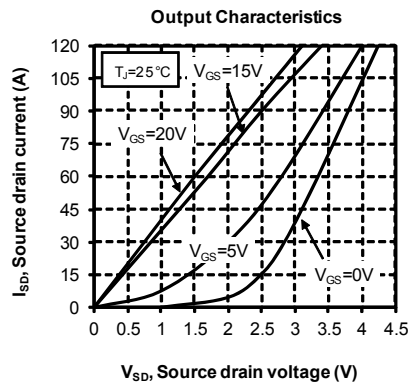
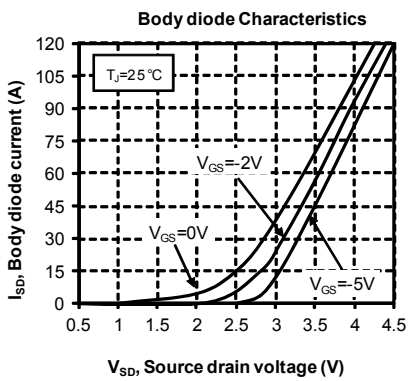
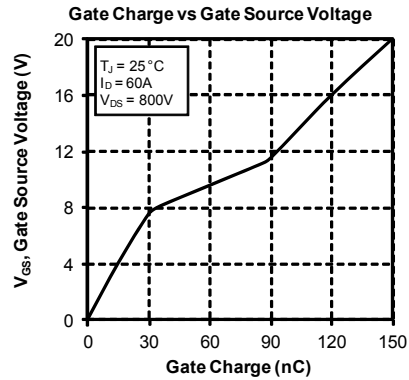
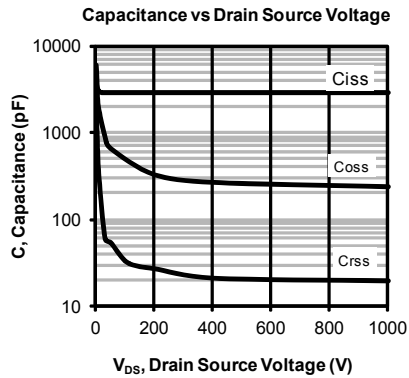


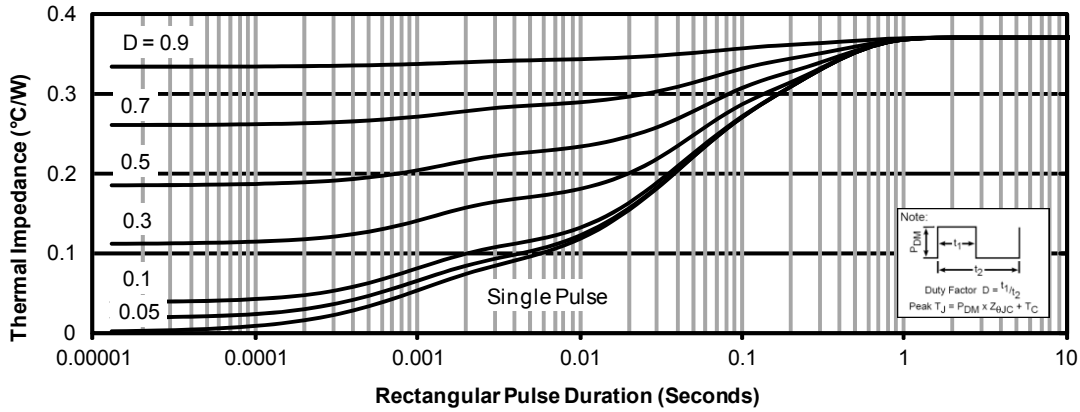
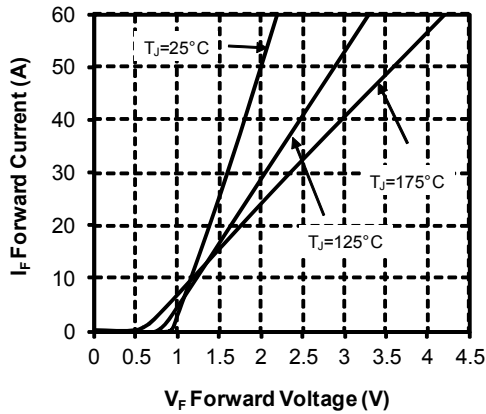
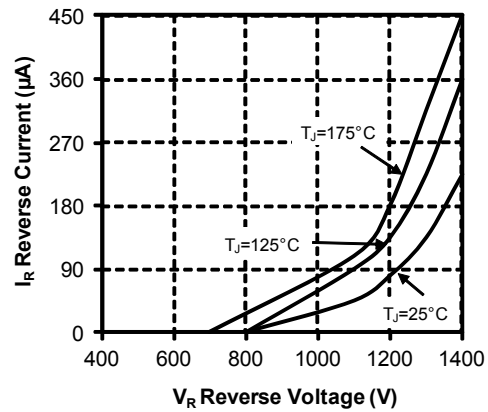
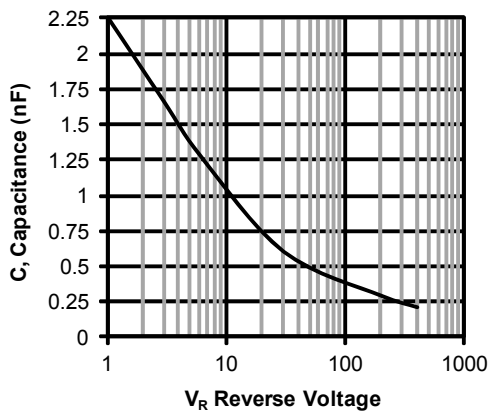
ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS : $\begin{matrix} \oplus \\ \ominus \end{matrix} \varnothing 1$

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

Forward Characteristics

Reverse Characteristics

Capacitance vs. Reverse Voltage


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