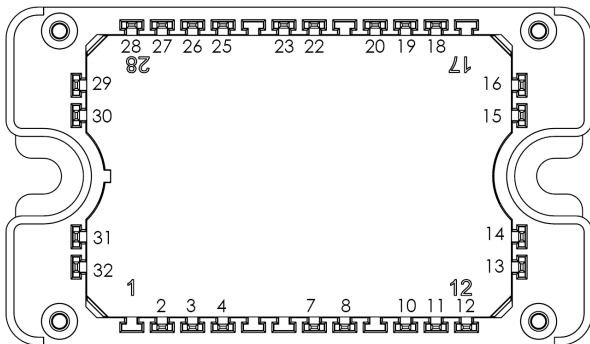
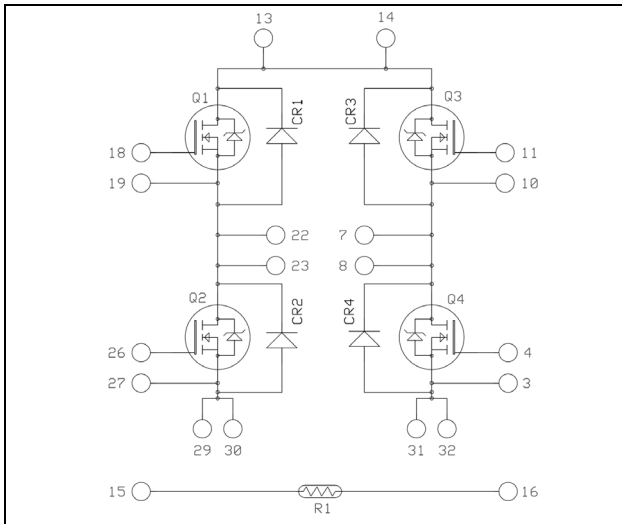


**Full bridge
SiC MOSFET Power Module**

**$V_{DSS} = 1200V$
 $R_{DS(on)} = 17m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 147A \text{ @ } T_c = 25^\circ C$**



All multiple inputs & outputs must be shorted together
 Example: 13/14 ; 29/30 ; 22/23 ...

Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- 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
- Kelvin source for easy drive
- Very low stray inductance
- Internal thermistor for temperature monitoring
- 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
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- 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.

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	147
		T _c = 80°C	116
I _{DM}	Pulsed Drain current	300	A
V _{GS}	Gate - Source Voltage	-10/25V	V
R _{DS(on)}	Drain - Source ON Resistance	17	mΩ
P _D	Maximum Power Dissipation	T _c = 25°C	750

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		20	200	μA
R _{DS(on)}	Drain - Source on Resistance	V _{GS} = 20V I _D = 100A	T _j = 25°C	12.5	17	mΩ
			T _j = 175°C	26		
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 30mA	2	2.6	4	V
I _{GSS}	Gate - Source Leakage Current	V _{GS} = 20 V, V _{DS} = 0V			1.2	μA

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		5576		pF
C _{oss}	Output Capacitance			440		
C _{rss}	Reverse Transfer Capacitance			30		
Q _g	Total gate Charge	V _{GS} = -5/+20V V _{Bus} = 800V I _D = 100A		332		nC
Q _{gs}	Gate - Source Charge			92		
Q _{gd}	Gate - Drain Charge			100		
T _{d(on)}	Turn-on Delay Time	V _{GS} = -2/+20V V _{Bus} = 800V I _D = 100A R _L = 8Ω ; R _G = 10Ω		21		ns
T _r	Rise Time			19		
T _{d(off)}	Turn-off Delay Time			50		
T _f	Fall Time			30		
E _{on}	Turn on Energy	Inductive Switching V _{GS} = -5/+20V V _{Bus} = 600V I _D = 100A R _G = 10Ω	T _j = 150°C		2.2	mJ
E _{off}	Turn off Energy				1.2	
R _{Gint}	Internal gate resistance			3.05		Ω
R _{thJC}	Junction to Case Thermal Resistance				0.2	°C/W

Body 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} = 50A	T _j = 25°C	4		V
			T _j = 175°C	3.5		
t _{rr}	Reverse Recovery Time	I _{SD} = 100A ; V _{GS} = -5V V _R = 800V ; di _F /dt = 2000A/μs		45		ns
Q _{rr}	Reverse Recovery Charge			812		nC
I _{rr}	Reverse Recovery Current			27		A



APTMC120HM17CT3AG

Power Matters.™

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	T _j = 25°C	70	400	μA
			T _j = 175°C	130	800	
I _F	DC Forward Current			40		A
V _F	Diode Forward Voltage	I _F = 40A	T _j = 25°C	1.5	1.8	V
			T _j = 175°C	2.2	3	
Q _C	Total Capacitive Charge	I _F = 40A, V _R = 1200V di/dt = 1000A/μs		198		nC
C	Total Capacitance	f = 1MHz, V _R = 400V		186		pF
		f = 1MHz, V _R = 800V		134		
R _{thJC}	Junction to Case Thermal Resistance				0.55	°C/W

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

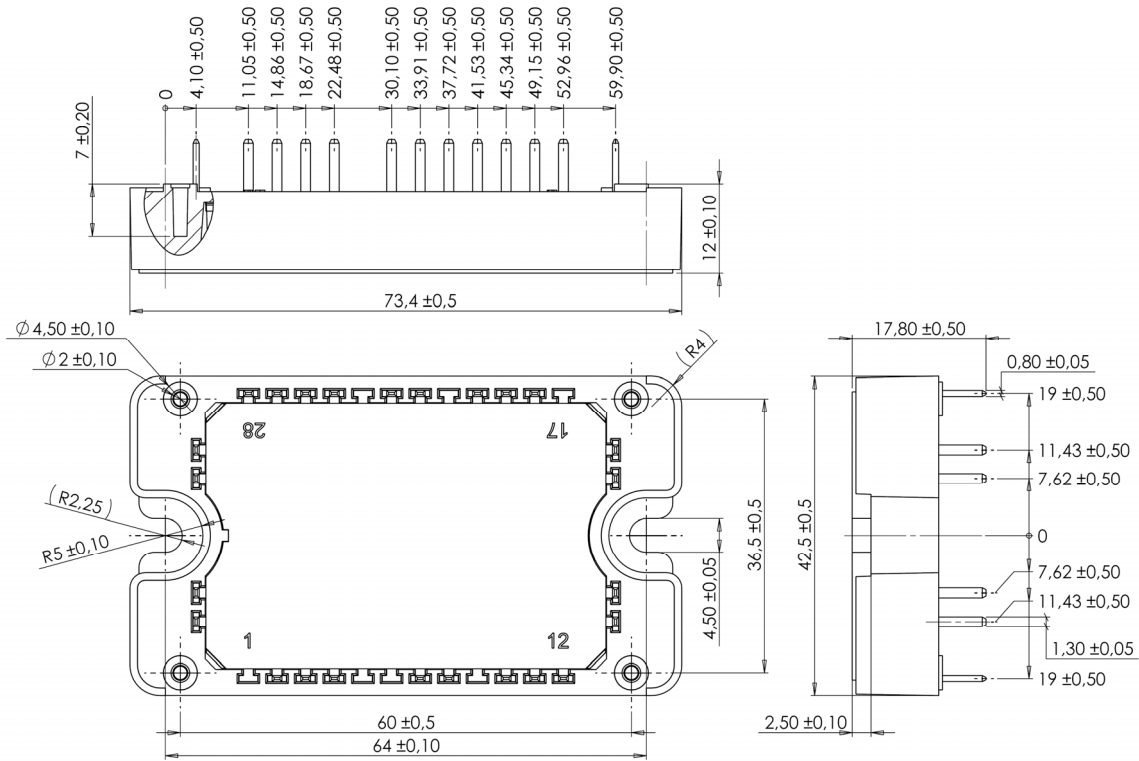
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B		T _C =100°C	4		%

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

T: Thermistor temperature
R_T: Thermistor value at T

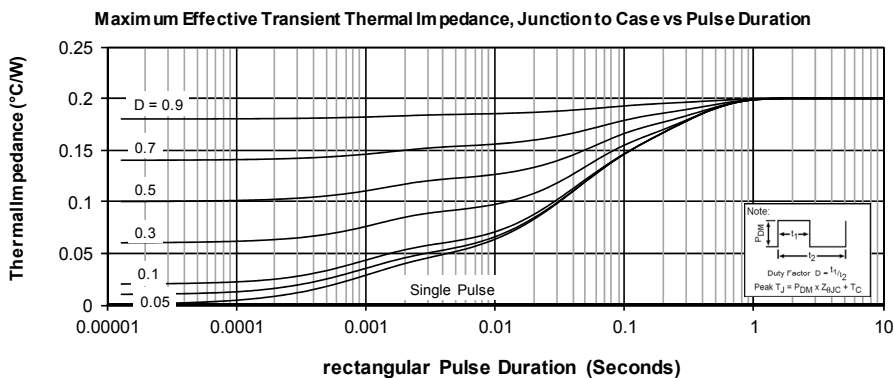
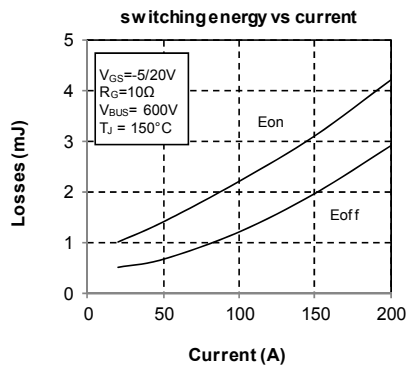
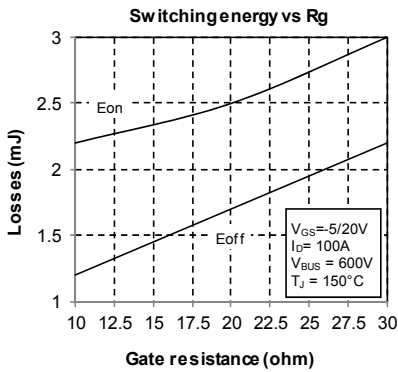
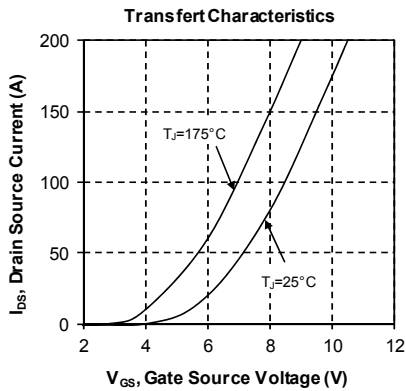
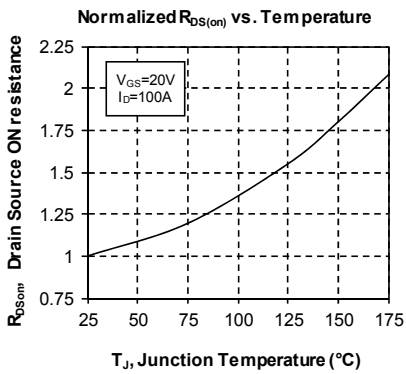
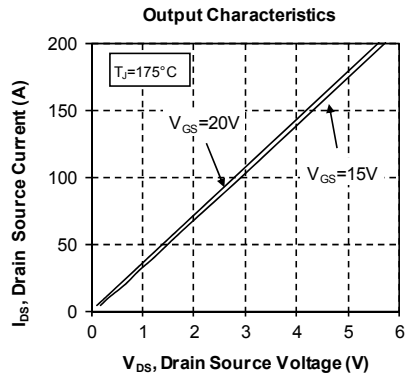
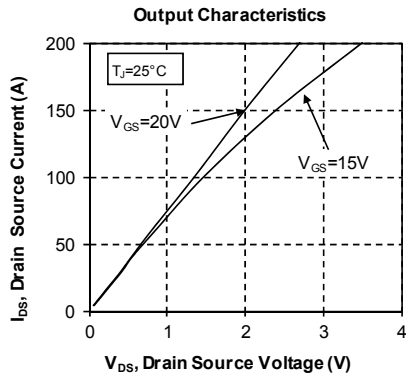
Thermal and package characteristics

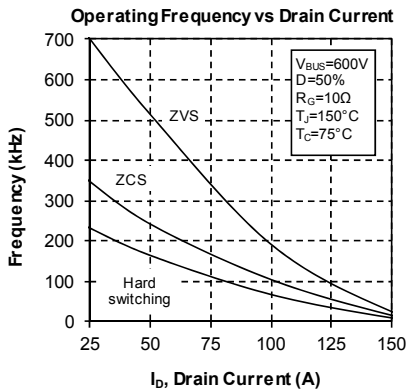
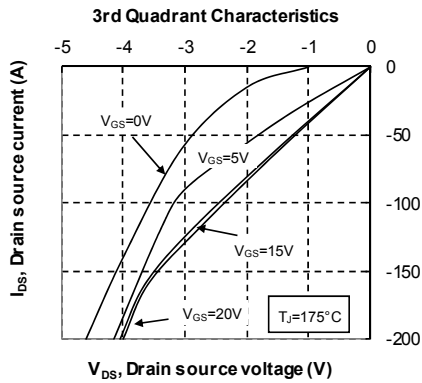
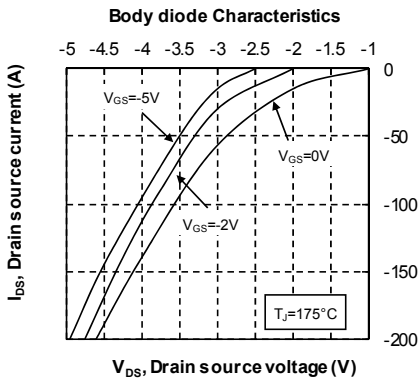
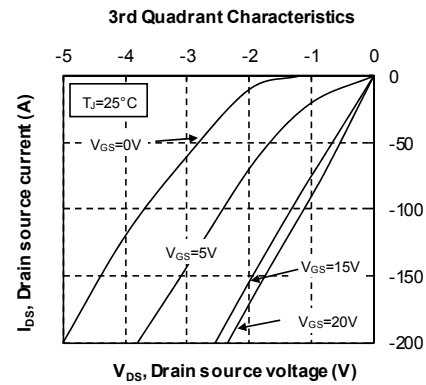
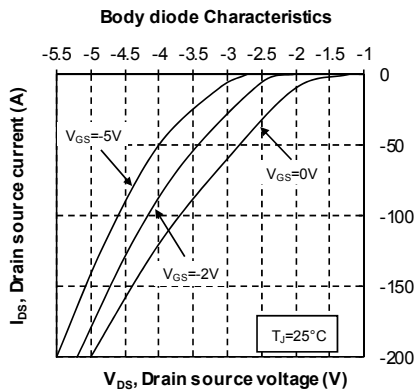
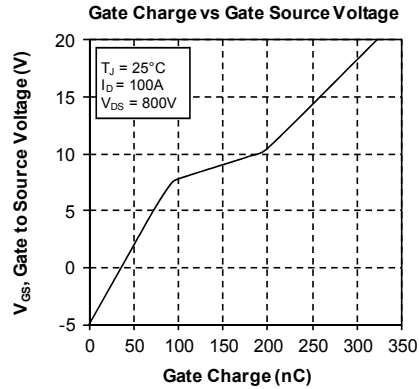
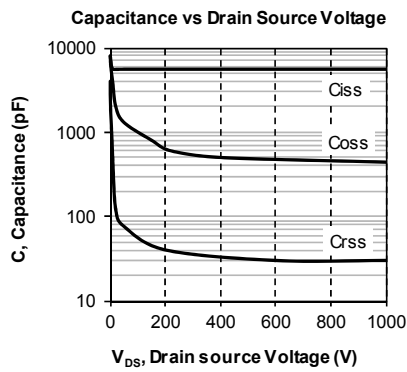
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} - 25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

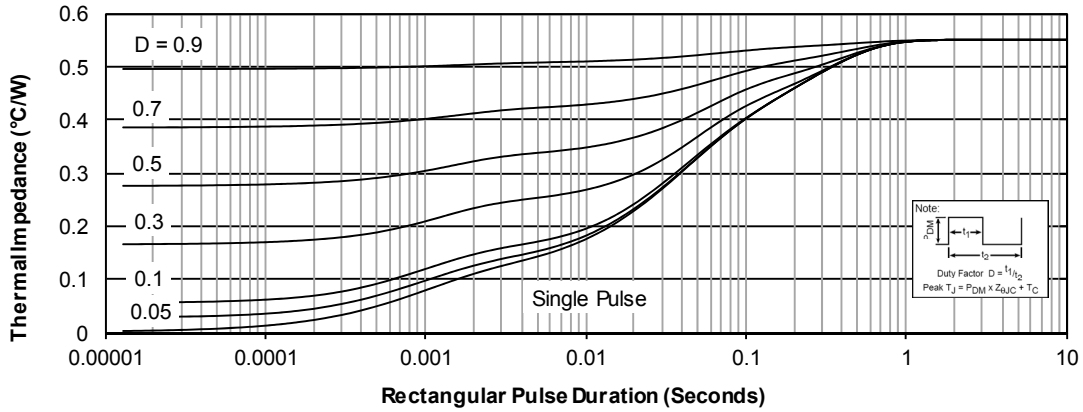
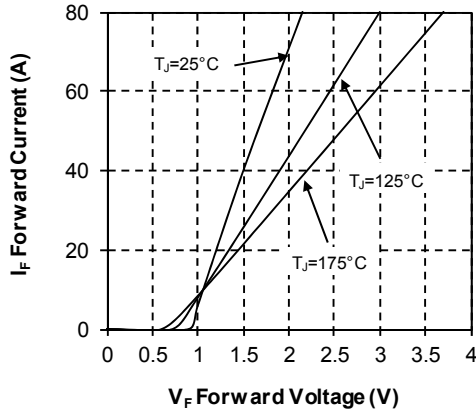
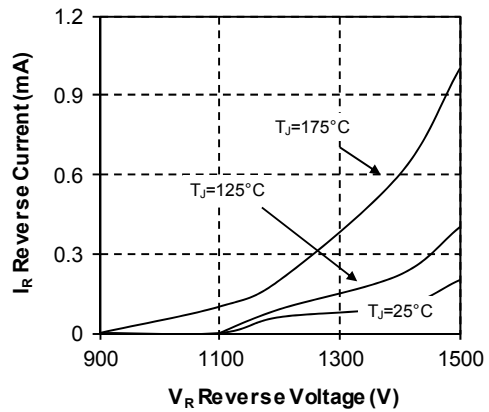
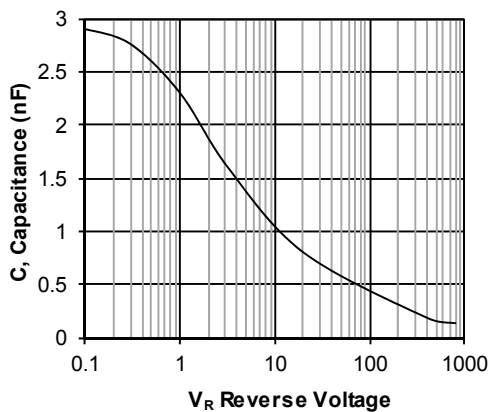
Package outline (dimensions in mm)


See application note 1906 - Mounting Instructions for SP3F 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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