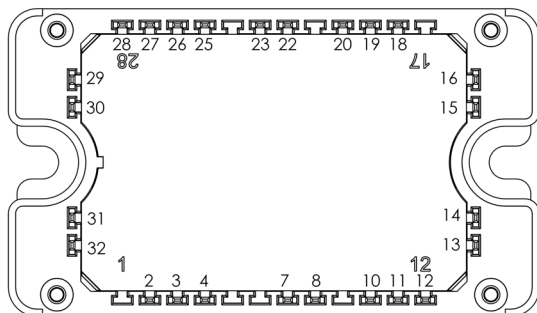
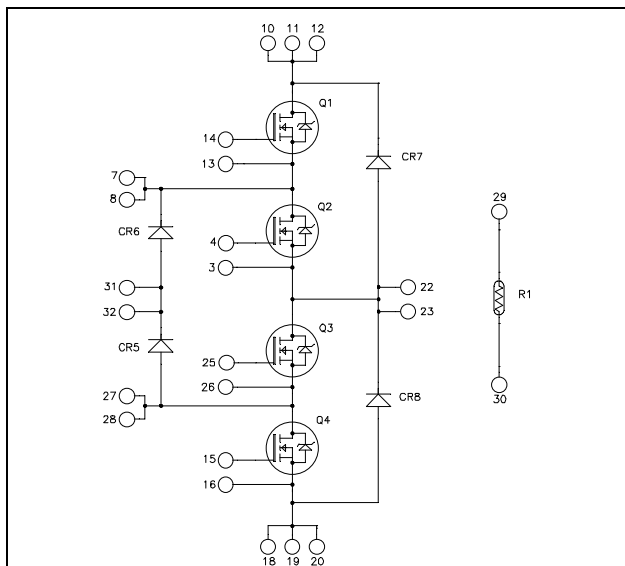


Three level inverter SiC MOSFET Power Module

SiC Power MOSFET :

$V_{DSS} = 1200V$; $R_{DS(on)} = 20m\Omega$ @ $T_j = 25^\circ C$



All multiple inputs and outputs must be shorted together
 10/11/12 ; 7/8 ; 27/28 ; ...

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

Q1 to Q4 Absolute maximum ratings (per SiC MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$ 102 $T_c = 80^\circ C$ 76	A
I_{DM}	Pulsed Drain current	204	
V_{GS}	Gate - Source Voltage	-5/25V	V
$R_{DS(on)}$	Drain - Source ON Resistance	20	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 360	W
I_{AR}	Repetitive avalanche current	TBD	A
E_{AR}	Repetitive Avalanche Energy	TBD	J
E_{AS}	Single Pulse Avalanche Energy	TBD	

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

Q1 to Q4 Electrical Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V$; $V_{DS} = 1200V$		10	200	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 20V$ $I_D = 100A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	12.5 20	20	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 5mA$	1.9	2.3		V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = 20V$, $V_{DS} = 0V$			1	μA

Q1 to Q4 Dynamic Characteristics (per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		5960		nF
C_{oss}	Output Capacitance	$V_{DS} = 800V$		440		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		46		
Q_g	Total gate Charge	$V_{GE} = -2/+20V$		360		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 800V$		64		
Q_{gd}	Gate – Drain Charge	$I_D = 40A$		126		
$T_{d(on)}$	Turn-on Delay Time	$V_{GS} = -2/+20V$		19		ns
T_r	Rise Time	$V_{Bus} = 800V$		19		
$T_{d(off)}$	Turn-off Delay Time	$I_D = 100A$		50		
T_f	Fall Time	$R_G = 1.9\Omega$		30		
E_{on}	Turn on Energy	Inductive Switching $V_{GS} = -2/+20V$; $V_{Bus} = 800V$		2.6		mJ
E_{off}	Turn off Energy	$I_D = 100A$; $R_G = 1.9\Omega$		1.9		mJ
R_{thJC}	Junction to Case Thermal Resistance				0.35	$^\circ C/W$

CR5 & CR6 SiC diode ratings and characteristics (Per SiC diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ C$ $T_j = 175^\circ C$	80 160	480 2400	μA
I_F	DC Forward Current		$T_c = 125^\circ C$	80		A
V_F	Diode Forward Voltage	$I_F = 80A$	$T_j = 25^\circ C$ $T_j = 175^\circ C$	1.6 2	1.8 2.4	V
Q_C	Total Capacitive Charge	$I_F = 80A$, $V_R = 600V$ $di/dt = 2000A/\mu s$		224		nC
C	Total Capacitance	$f = 1MHz$, $V_R = 200V$ $f = 1MHz$, $V_R = 400V$		520 400		pF
R_{thJC}	Junction to Case Thermal Resistance				0.25	$^\circ C/W$

CR7 & CR8 diode ratings and characteristics (Per SiC diode)

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 =1200V				μA
		T _j = 25°C		140	800	
		T _j = 175°C		260	1600	
I _F	DC Forward Current			80		A
		T _c = 125°C				
V _F	Diode Forward Voltage	I _F = 80A				V
		T _j = 25°C		1.5	1.8	
		T _j = 175°C		2.2	3	
Q _C	Total Capacitive Charge	I _F = 80A, V _R = 1200V di/dt = 2000A/μs		520		nC
C	Total Capacitance	f = 1MHz, V _R = 400V		372		pF
		f = 1MHz, V _R = 800V		268		
R _{thJC}	Junction to Case Thermal Resistance				0.35	°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

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

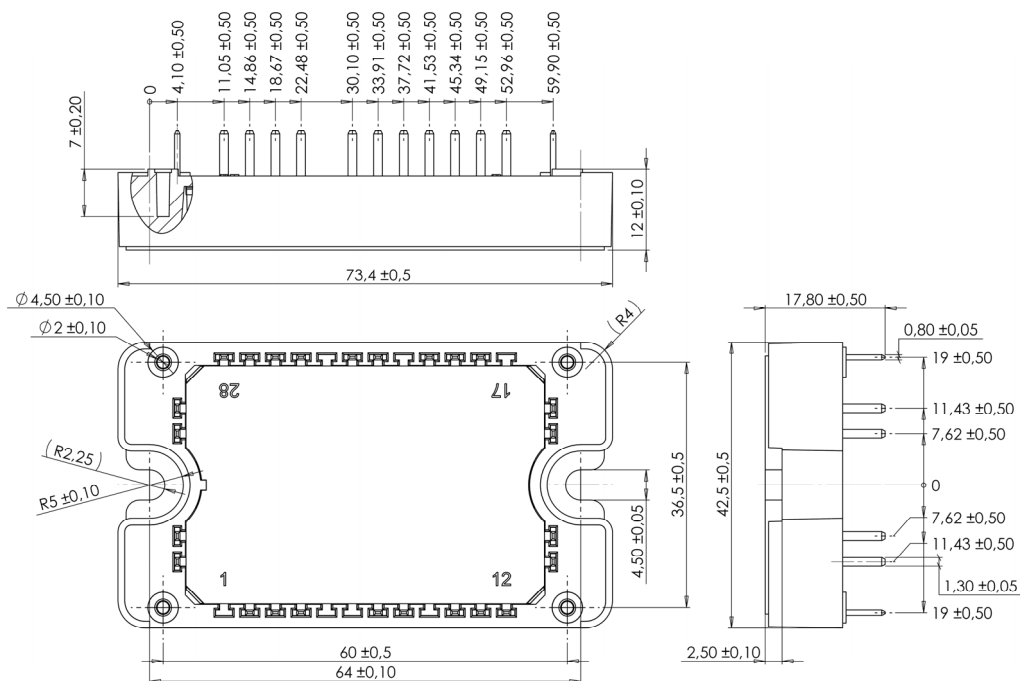
T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	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 _{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

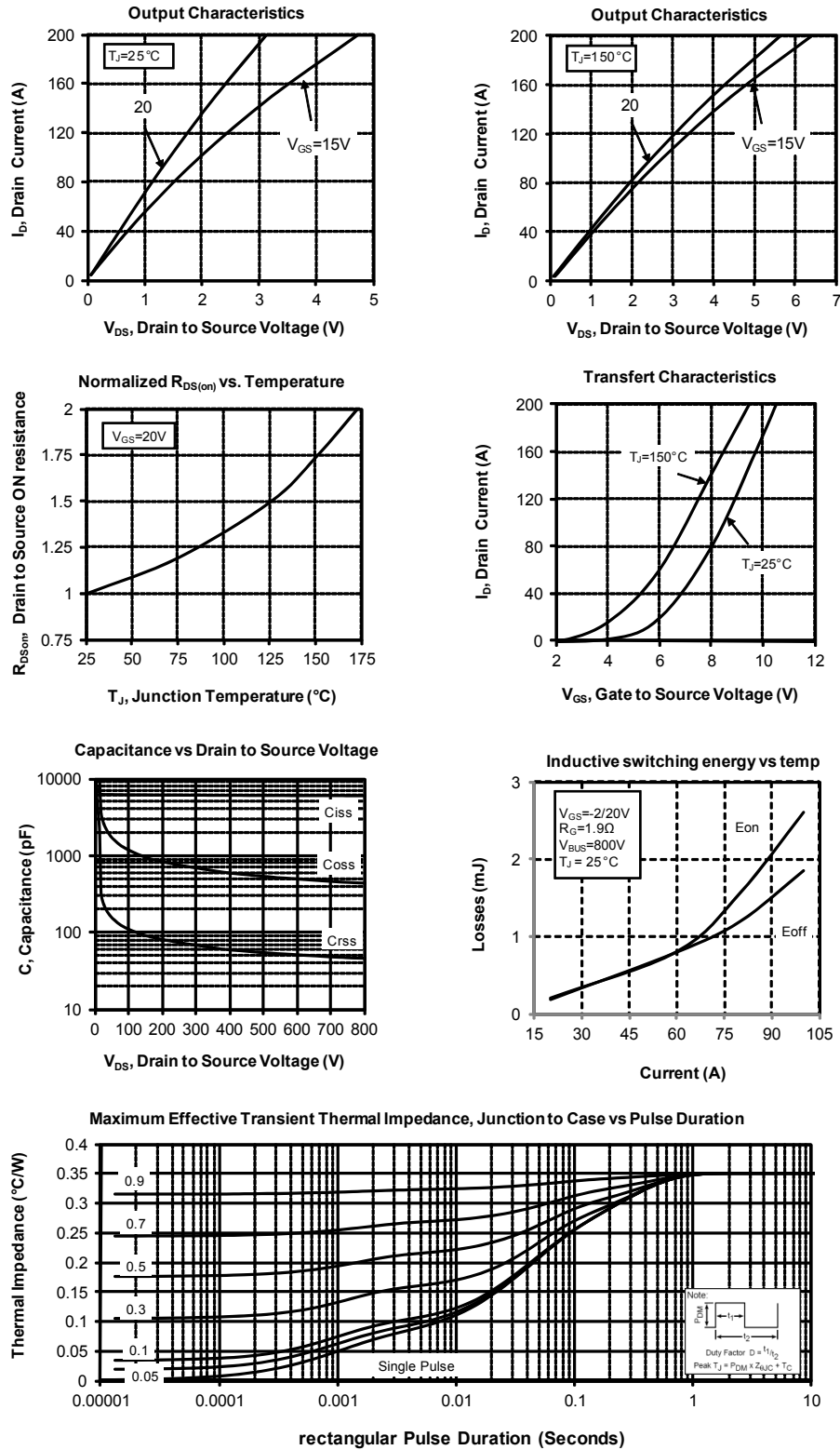
*T_{Jmax}=150°C for SiC MOSFET

SP3 Package outline (dimensions in mm)

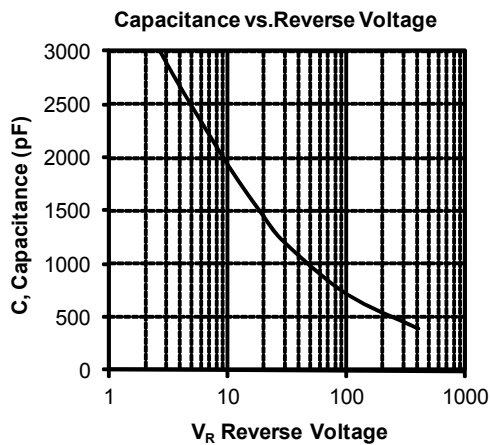
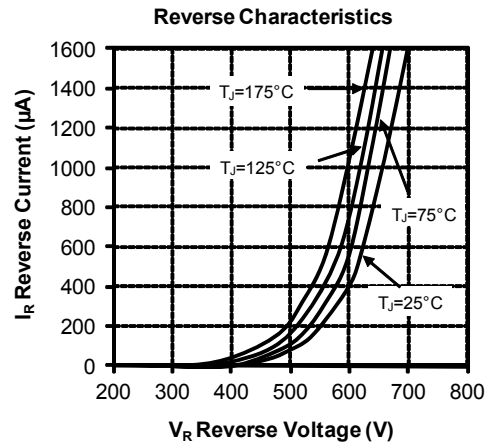
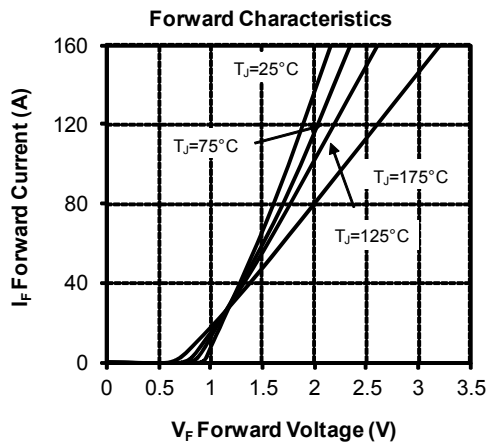
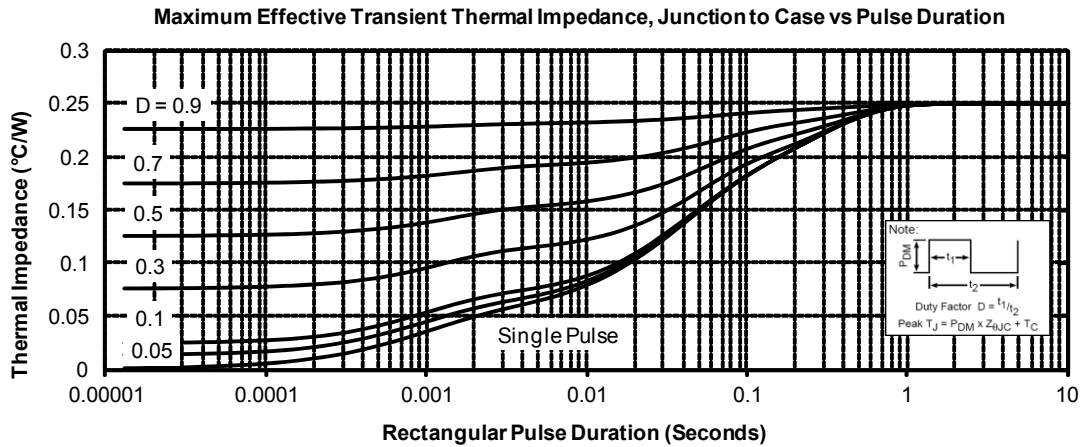


See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

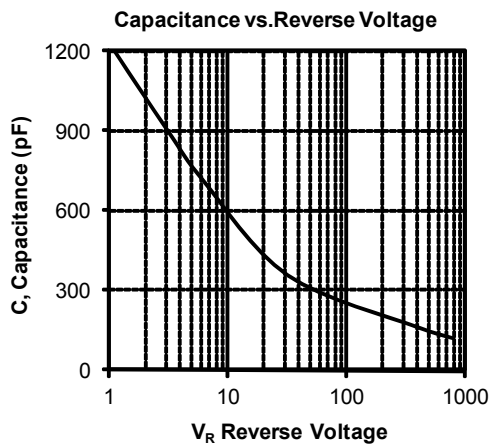
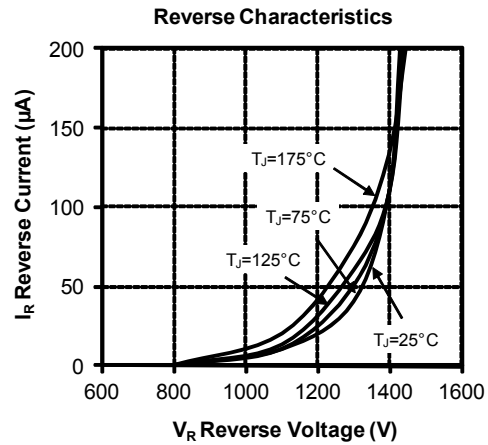
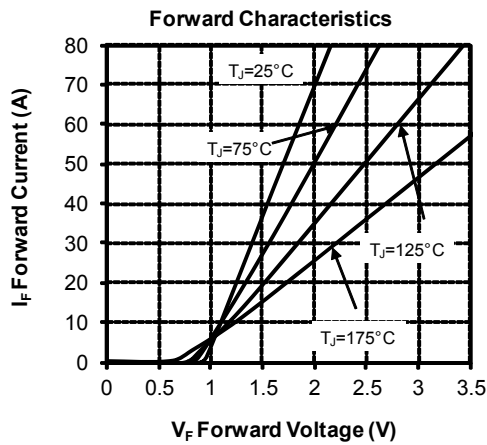
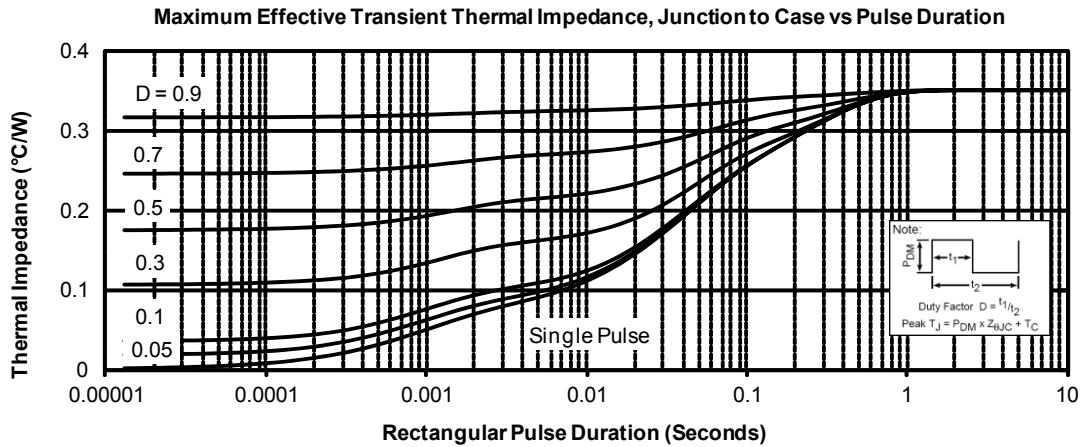
Q1 to Q4 Typical performance curve



CR5 & CR6 Typical performance curve



CR7 & CR8 Typical performance curve



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