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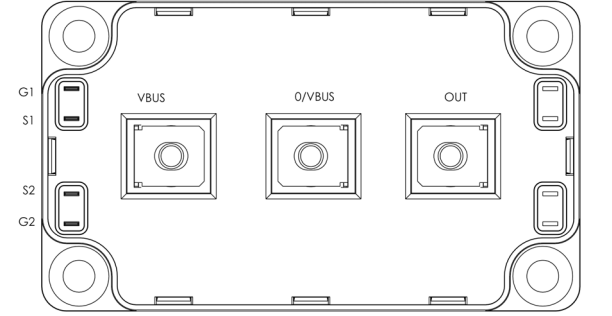
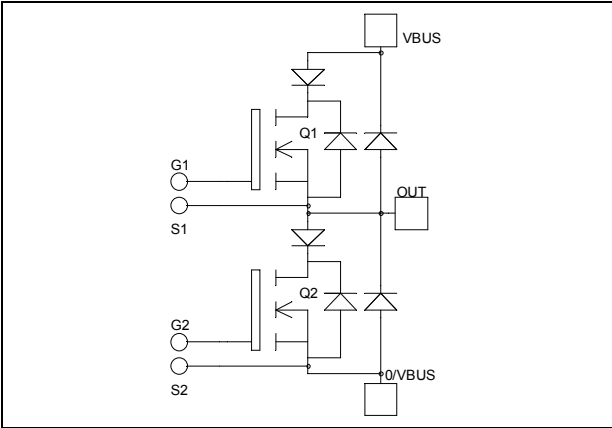
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Phase leg
Series & SiC parallel diodes
MOSFET Power Module

$V_{DSS} = 1000V$
 $R_{DSon} = 130m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 65A$ @ $T_c = 25^\circ C$



Application

- Motor control
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- **Power MOS 7[®] MOSFETs**
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- **Parallel 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
 - Symmetrical design
 - M5 power connectors
- High level of integration

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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	65
		$T_c = 80^\circ C$	49
I_{DM}	Pulsed Drain current	240	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	156	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
I_{AR}	Avalanche current (repetitive and non repetitive)	24	A
E_{AR}	Repetitive Avalanche Energy	30	mJ
E_{AS}	Single Pulse Avalanche Energy	1300	

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

Electrical Characteristics

<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} = 1000V	T _j = 25°C			600	μA
		V _{GS} = 0V, V _{DS} = 800V	T _j = 125°C			2	mA
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 32.5A			130	156	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 6mA		3		5	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V				±450	nA

Dynamic Characteristics

<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		15.2		nF
C _{oss}	Output Capacitance	V _{DS} = 25V		2.6		
C _{rss}	Reverse Transfer Capacitance	f = 1MHz		0.42		
Q _g	Total gate Charge	V _{GS} = 10V		562		nC
Q _{gs}	Gate – Source Charge	V _{Bus} = 500V		75		
Q _{gd}	Gate – Drain Charge	I _D = 65A		363		
T _{d(on)}	Turn-on Delay Time	Inductive switching @125°C		9		ns
T _r	Rise Time	V _{GS} = 15V		9		
T _{d(off)}	Turn-off Delay Time	V _{Bus} = 667V		50		
T _f	Fall Time	I _D = 65A R _G = 0.5Ω		24		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C		1278		μJ
E _{off}	Turn-off Switching Energy	V _{GS} = 15V, V _{Bus} = 667V I _D = 65A, R _G = 0.5Ω		462		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C		2671		μJ
E _{off}	Turn-off Switching Energy	V _{GS} = 15V, V _{Bus} = 667V I _D = 65A, R _G = 0.5Ω		570		
R _{thJC}	Junction to Case Thermal Resistance				0.1	°C/W

Series diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Maximum Repetitive Reverse Voltage		1000			V
I _{RM}	Maximum Reverse Leakage Current	V _R = 1000V			350	μA
I _F	DC Forward Current	T _c = 100°C		120		A
V _F	Diode Forward Voltage	I _F = 120A		1.9	2.5	V
		I _F = 240A		2.2		
		I _F = 120A	T _j = 125°C	1.7		
t _{rr}	Reverse Recovery Time	I _F = 120A V _R = 667V	T _j = 25°C	280		ns
			T _j = 125°C	350		
Q _{rr}	Reverse Recovery Charge	di/dt = 400A/μs	T _j = 25°C	1520		nC
			T _j = 125°C	7200		
R _{thJC}	Junction to Case Thermal Resistance				0.46	°C/W

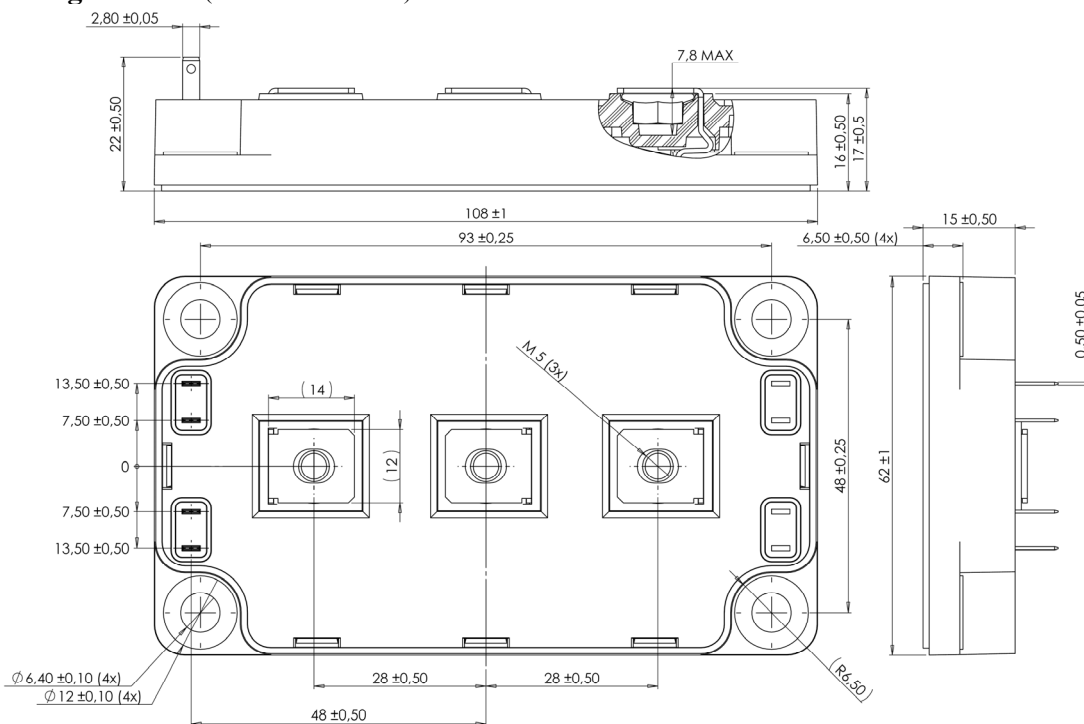
SiC Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200V$		400	1600	μA
		$T_j = 25^\circ C$				
		$T_j = 125^\circ C$		800	8000	
I_F	DC Forward Current			40		A
		$T_c = 125^\circ C$				
V_F	Diode Forward Voltage	$I_F = 40A$		1.6	1.8	V
		$T_j = 25^\circ C$				
		$T_j = 175^\circ C$		2.6	3.0	
Q_C	Total Capacitive Charge	$I_F = 40A, V_R = 600V$ $di/dt = 2000A/\mu s$		112		nC
		$f = 1MHz, V_R = 200V$		360		pF
		$f = 1MHz, V_R = 400V$		264		
R_{thJC}	Junction to Case Thermal Resistance				0.35	$^\circ C/W$

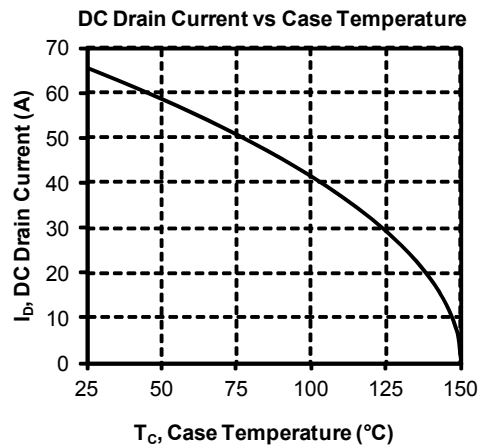
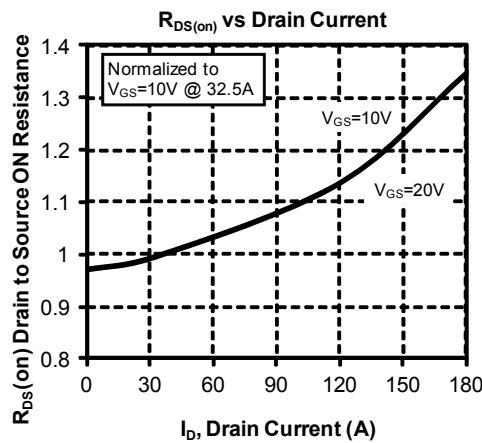
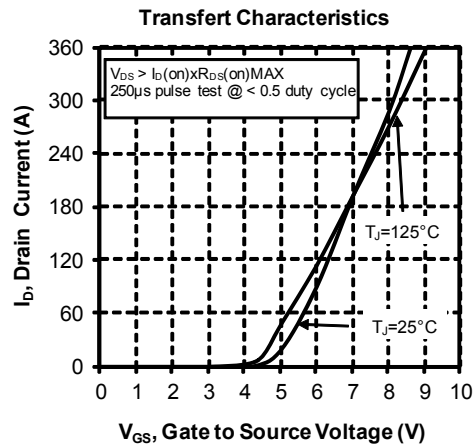
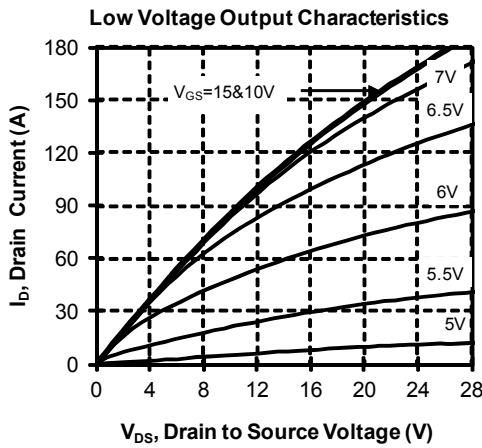
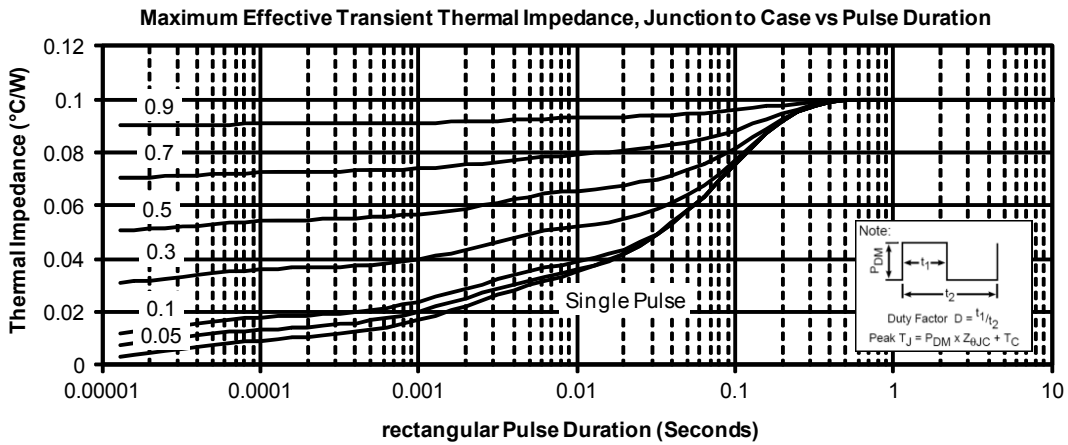
Thermal and package characteristics

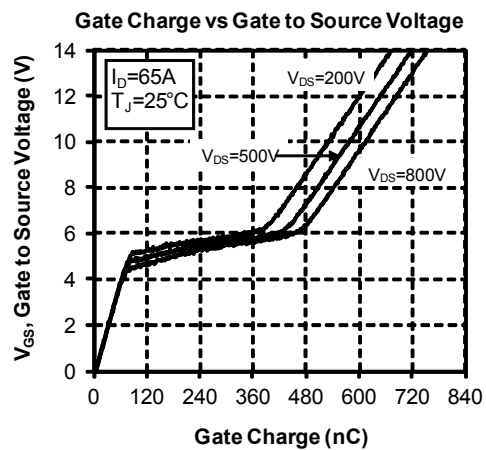
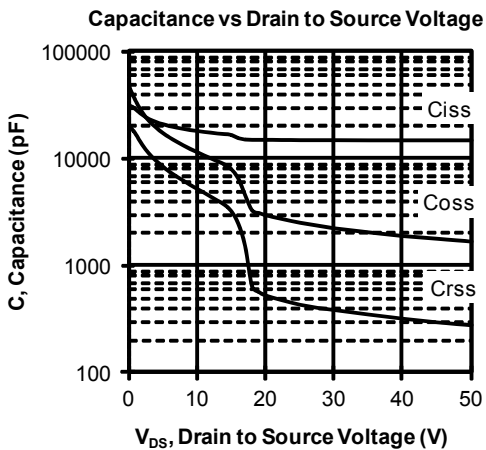
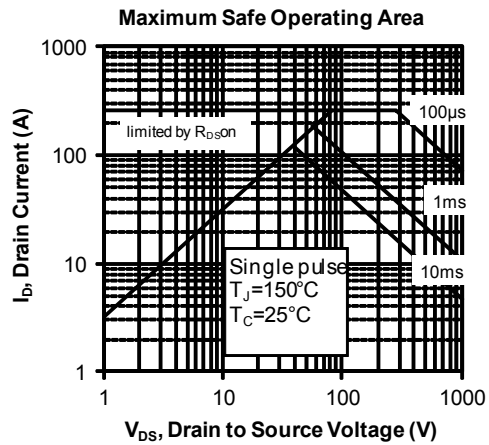
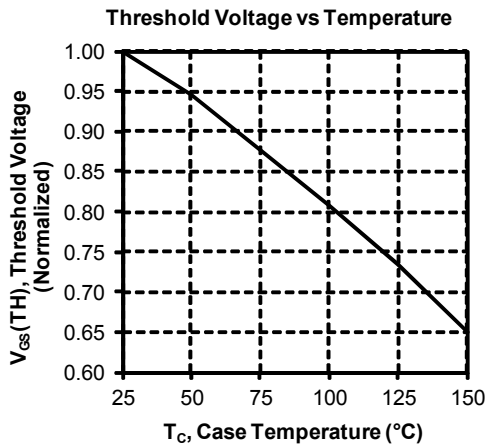
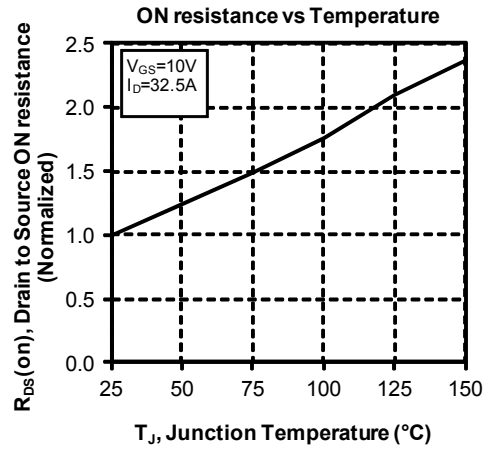
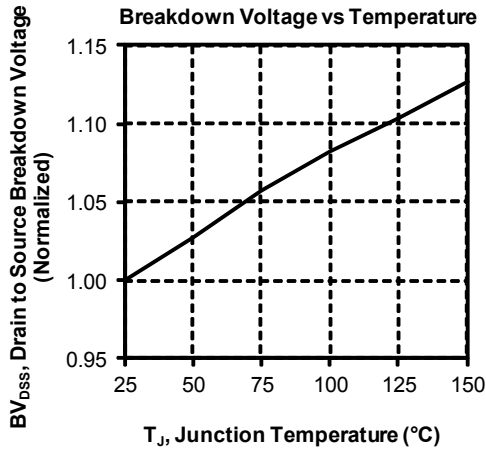
Symbol	Characteristic	Min	Typ	Max	Unit	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			V	
T_J	Operating junction temperature range	-40		150	$^\circ C$	
T_{STG}	Storage Temperature Range	-40		125	$^\circ C$	
T_C	Operating Case Temperature	-40		100	$^\circ C$	
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			300	g	

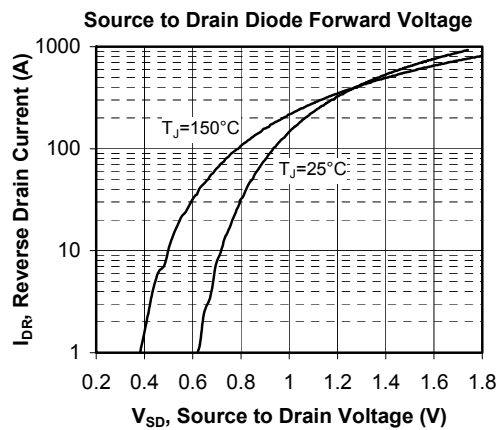
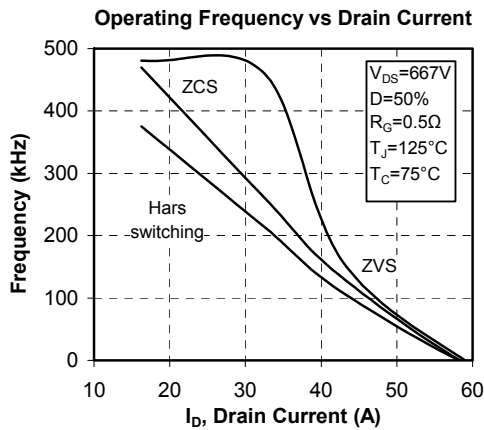
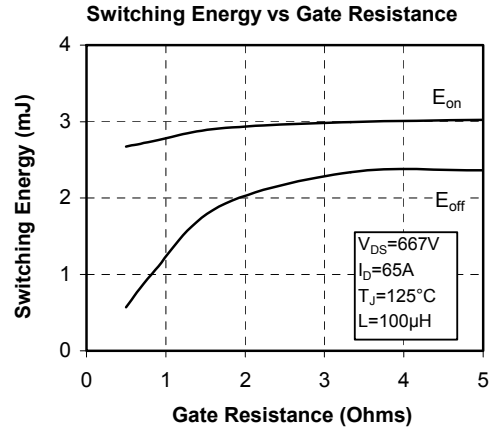
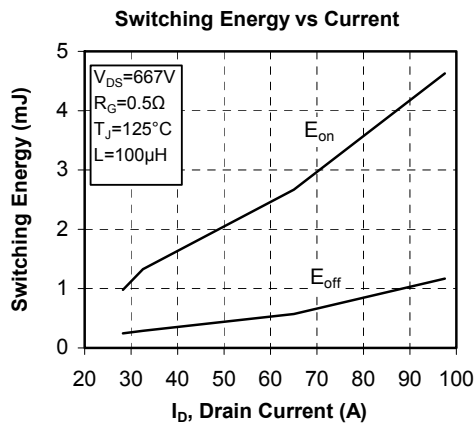
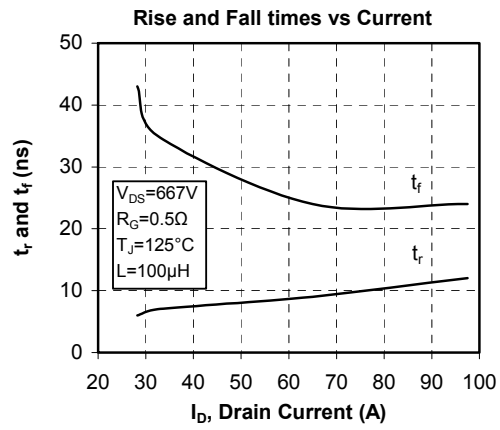
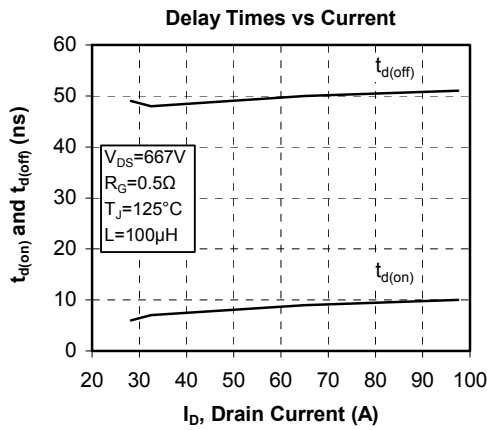
SP6 Package outline (dimensions in mm)

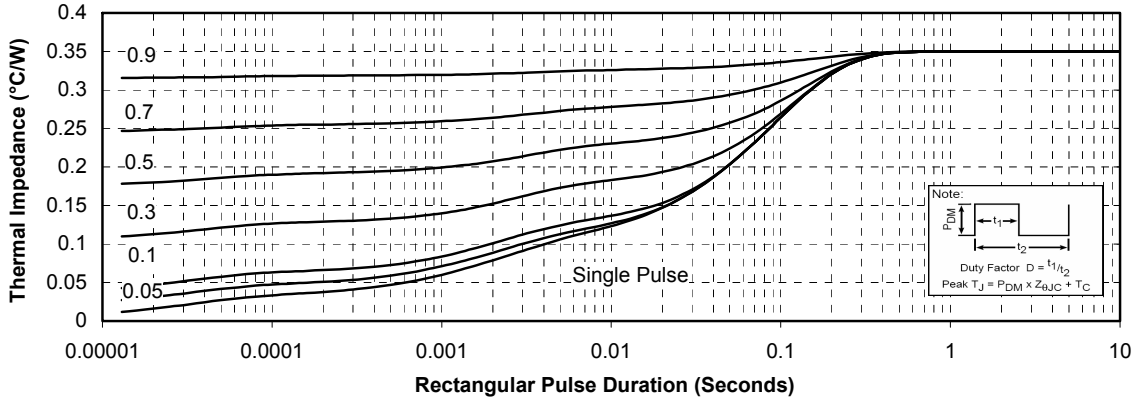
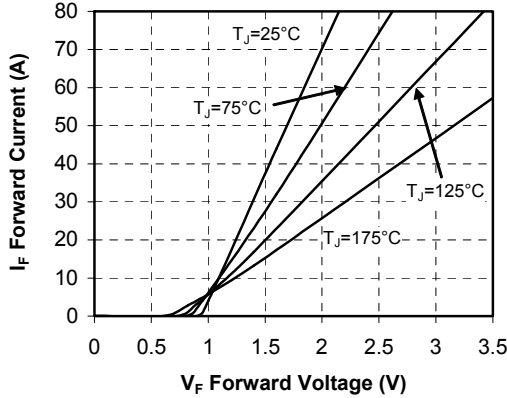
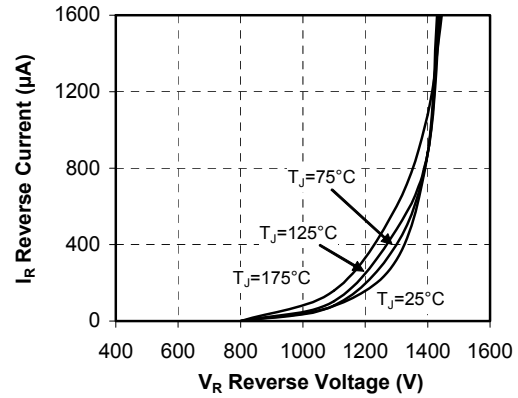
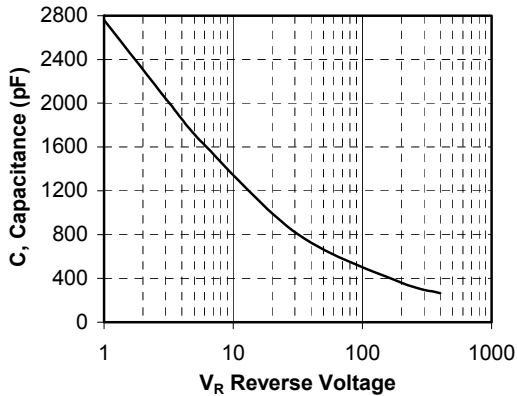


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical 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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