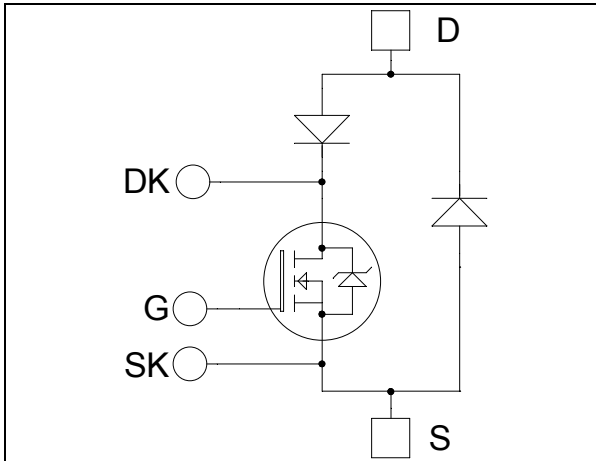
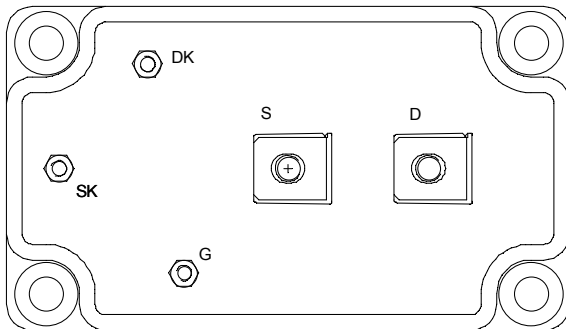


*Single switch
Series & SiC parallel diodes
MOSFET Power Module*

$V_{DSS} = 1000V$
 $R_{DSon} = 65m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 145A$ @ $T_c = 25^\circ C$



G, SK and DK terminals are for control signals only (not for power)



Application

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

Features

- **Power MOS 7[®] MOSFETs**
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- **SiC Parallel Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Kelvin source for easy drive
- Kelvin drain for voltage monitoring
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
 - M3 power connectors
- High level of integration
- AlN substrate for improved MOSFET thermal performance

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

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

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
V _{DSS}	Drain - Source Voltage	1000	V
I _D	Continuous Drain Current	T _c = 25°C	145
		T _c = 80°C	110
I _{DM}	Pulsed Drain current	580	A
V _{GS}	Gate - Source Voltage	±30	V
R _{DS(on)}	Drain - Source ON Resistance	78	mΩ
P _D	Power Dissipation	T _c = 25°C	3250
I _{AR}	Avalanche current (repetitive and non repetitive)		30
E _{AR}	Repetitive Avalanche Energy		50
E _{AS}	Single Pulse Avalanche Energy		3200

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			400	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 = 72.5A		65	78	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 20mA	3		5	V
I _{GSS}	Gate - Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V			±400	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 V _{DS} = 25V f = 1MHz		28.5		nF
C _{oss}	Output Capacitance			5.08		
C _{rss}	Reverse Transfer Capacitance			0.9		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 500V I _D = 145A		1068		nC
Q _{gs}	Gate - Source Charge			136		
Q _{gd}	Gate - Drain Charge			692		
T _{d(on)}	Turn-on Delay Time	V _{GS} = 15V V _{Bus} = 670V I _D = 145A R _G = 0.75Ω		18		ns
T _r	Rise Time			14		
T _{d(off)}	Turn-off Delay Time			140		
T _f	Fall Time			55		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 670V I _D = 145A, R _G = 0.75Ω		2.9		mJ
E _{off}	Turn-off Switching Energy			2.9		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 670V I _D = 145A, R _G = 0.75Ω		4.8		mJ
E _{off}	Turn-off Switching Energy			3.9		
R _{thJC}	Junction to Case Thermal Resistance				0.038	°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}	Peak Repetitive Reverse Voltage					1000	V
I _{RM}	Reverse Leakage Current	V _R =1000V				500	μA
I _F	DC Forward Current		T _c = 25°C		240		A
V _F	Diode Forward Voltage	I _F = 240A			1.9	2.5	V
		I _F = 480A			2.2		
		I _F = 240A	T _j = 125°C		1.7		
t _{rr}	Reverse Recovery Time	I _F = 240A V _R = 667V di/dt = 800A/μs	T _j = 25°C		280		ns
			T _j = 125°C		350		
Q _{rr}	Reverse Recovery Charge	I _F = 240A V _R = 667V di/dt = 800A/μs	T _j = 25°C		3		μC
			T _j = 125°C		14.4		
R _{thJC}	Junction to Case Thermal Resistance					0.23	°C/W

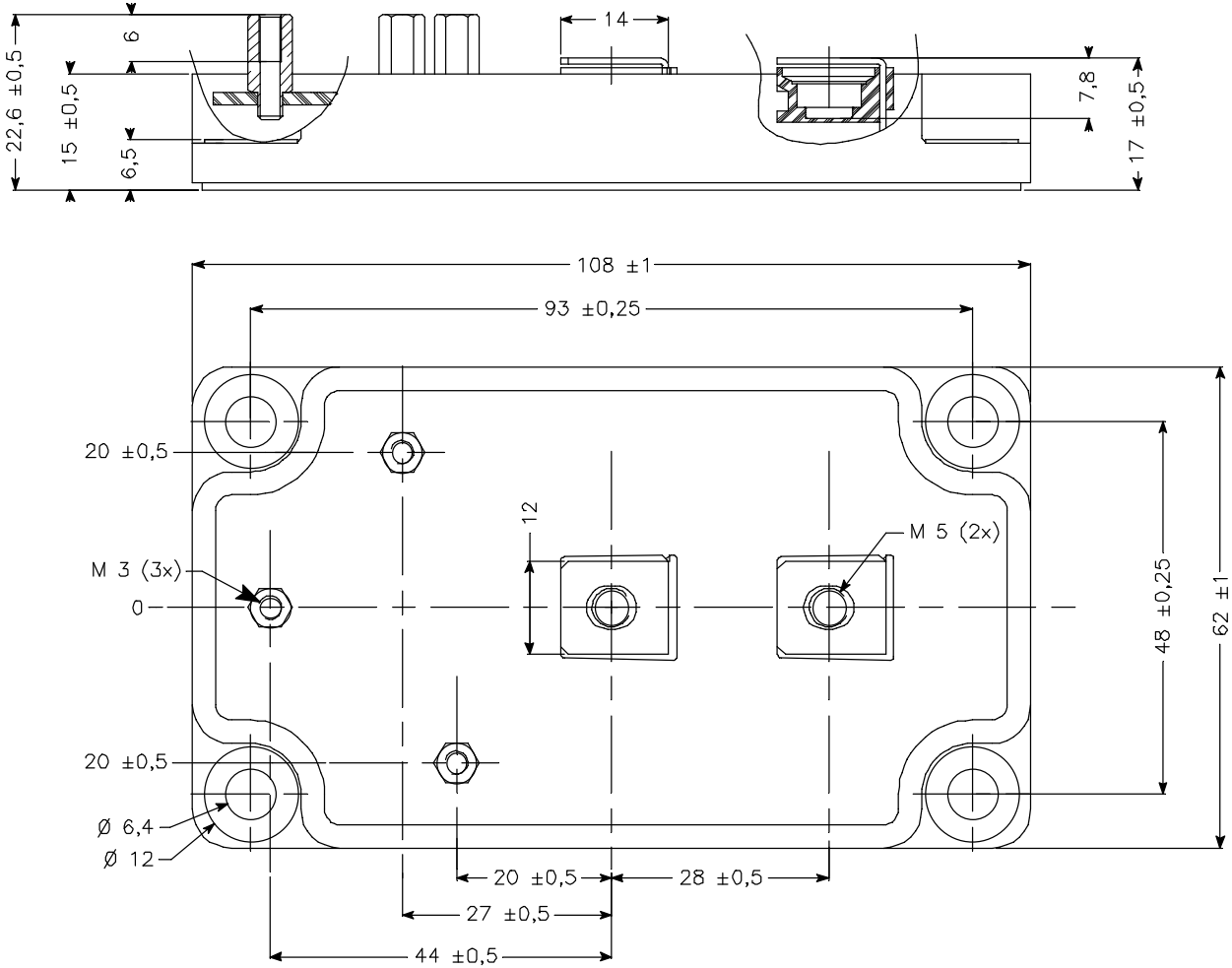
SiC Parallel diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Peak Repetitive Reverse Voltage					1200	V
I _{RM}	Reverse Leakage Current	V _R =1200V	T _j = 25°C		384	2400	μA
			T _j = 175°C		672	12000	
I _F	DC Forward Current		T _c = 100°C		120		A
V _F	Diode Forward Voltage	I _F = 120A	T _j = 25°C		1.6	1.8	V
			T _j = 175°C		2.3	3.0	
Q _C	Total Capacitive Charge	I _F = 120A, V _R = 1200V di/dt = 5000A/μs			960		nC
C	Total Capacitance	f = 1MHz, V _R = 200V			1152		pF
		f = 1MHz, V _R = 400V			828		
R _{thJC}	Junction to Case Thermal Resistance					0.18	°C/W

Thermal and package characteristics

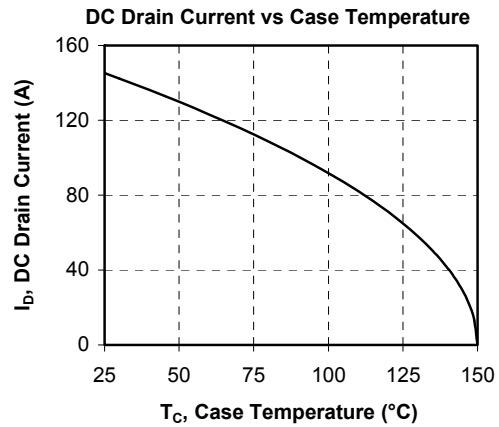
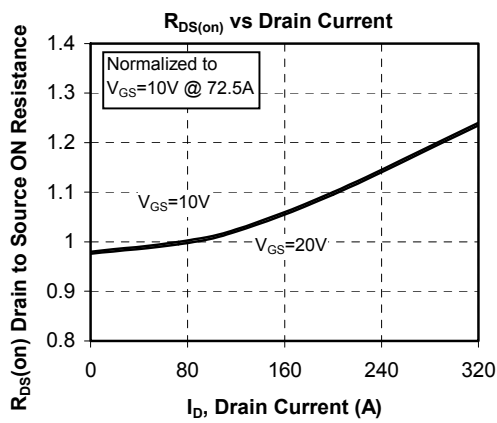
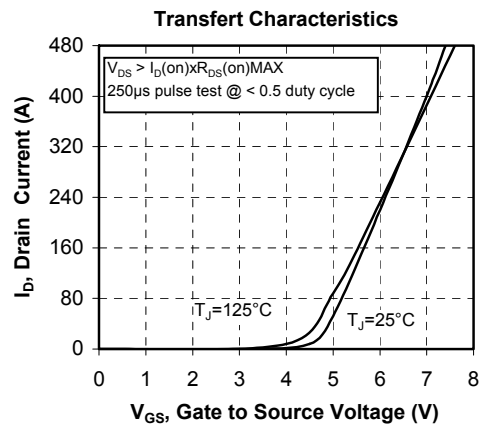
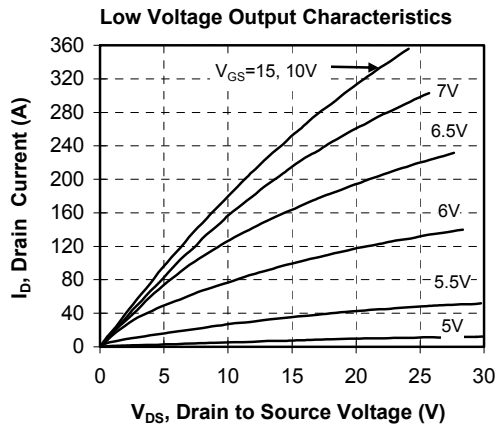
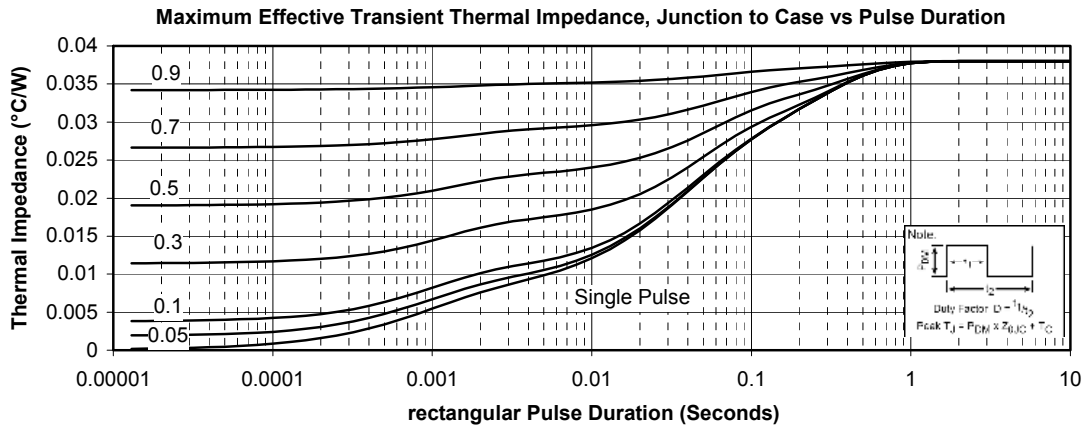
<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Max</i>	<i>Unit</i>
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz			4000		V
T _J	Operating junction temperature range			-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions			-40	T _{Jmax} -25	
T _{STG}	Storage Temperature Range			-40	125	
T _C	Operating Case Temperature			-40	100	
Torque	Mounting torque	To heatsink	M6	3	5	
		For terminals	M5	2	3.5	
			M3	1	1.5	
Wt	Package Weight				300	g

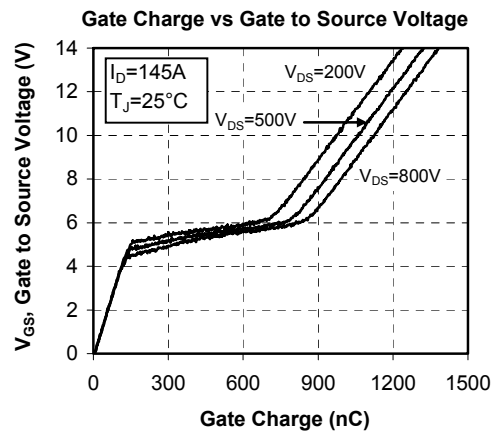
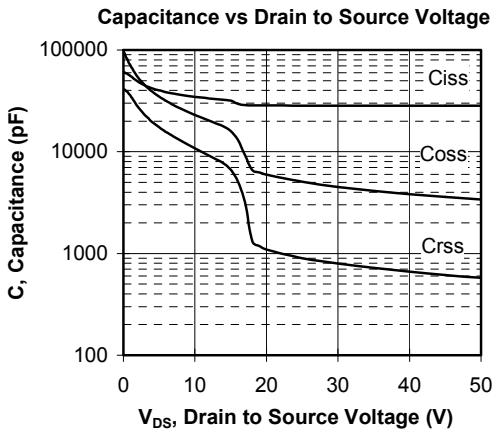
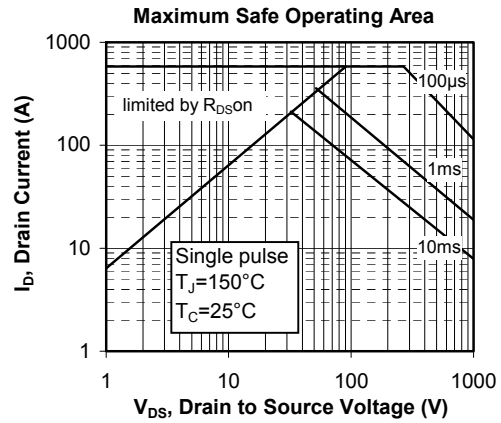
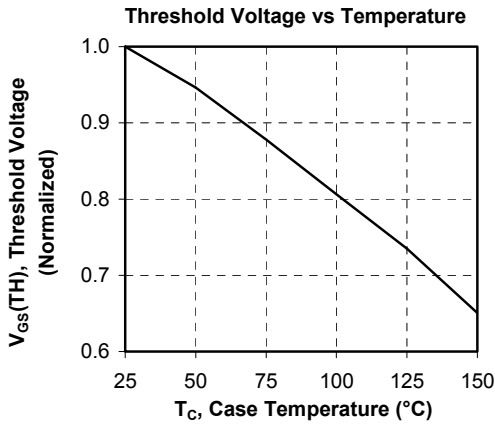
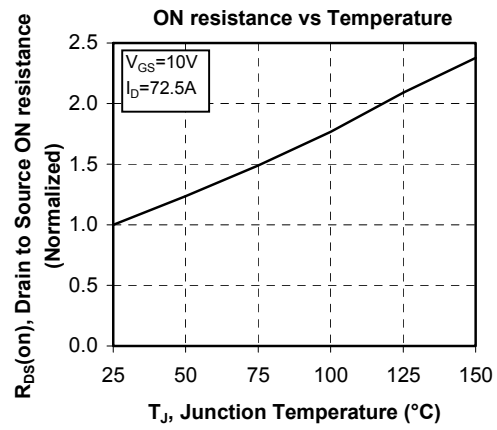
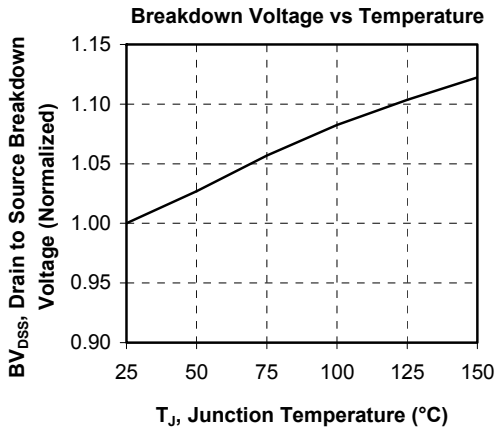
SP6 Package outline (dimensions in mm)

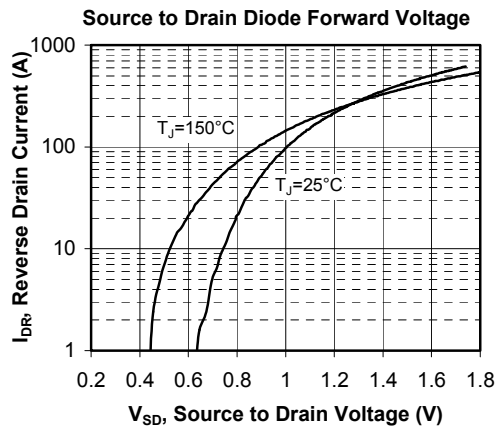
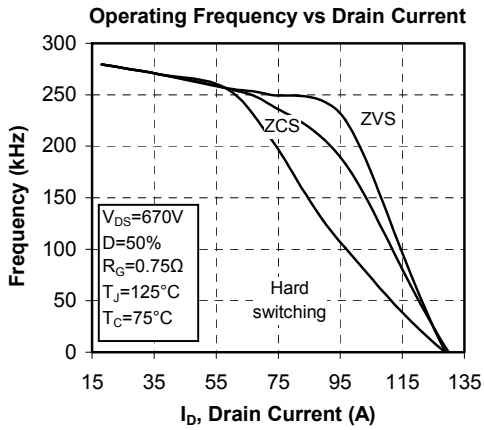
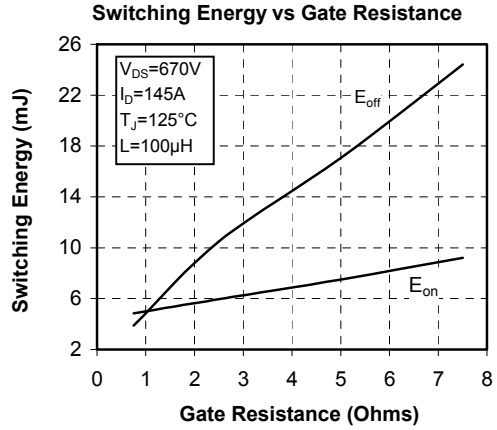
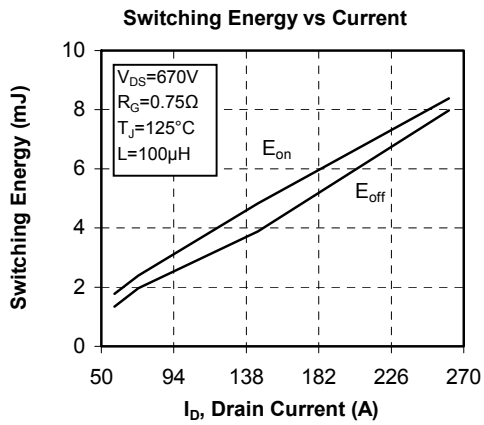
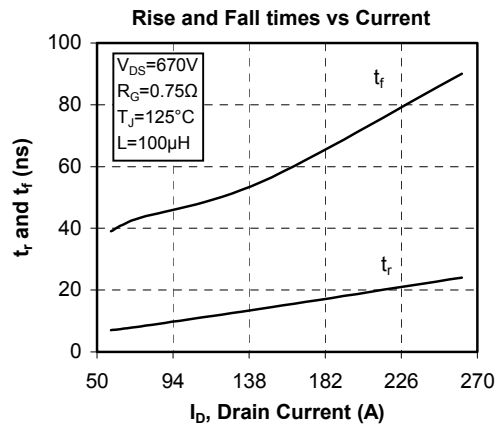
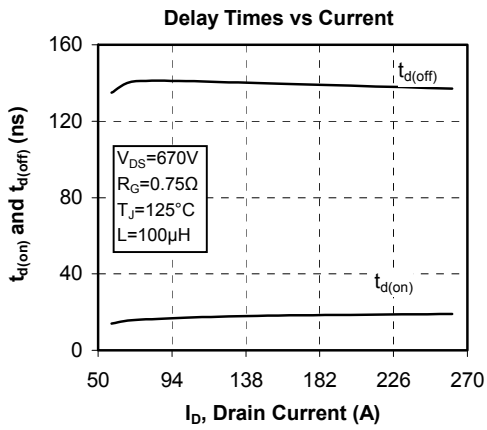


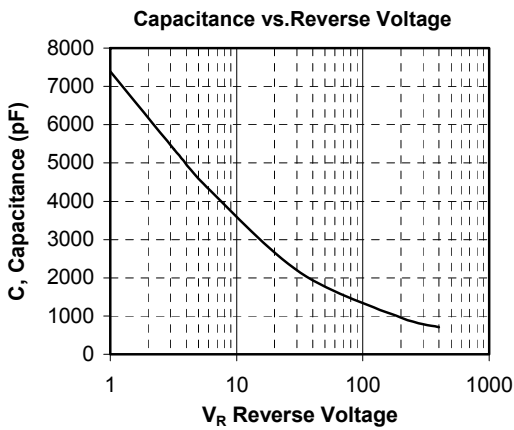
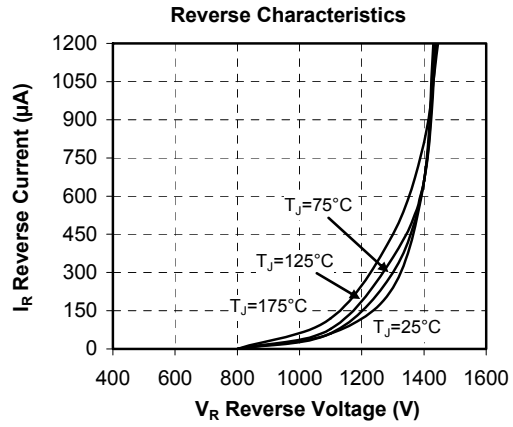
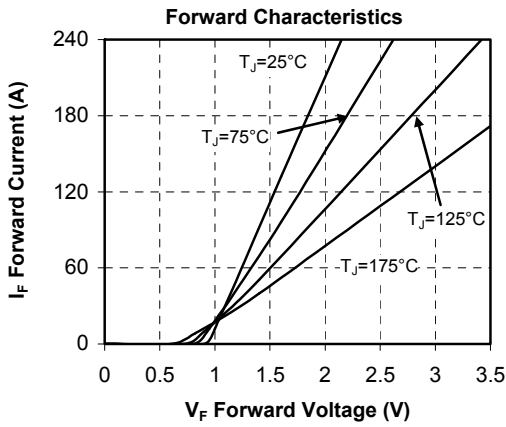
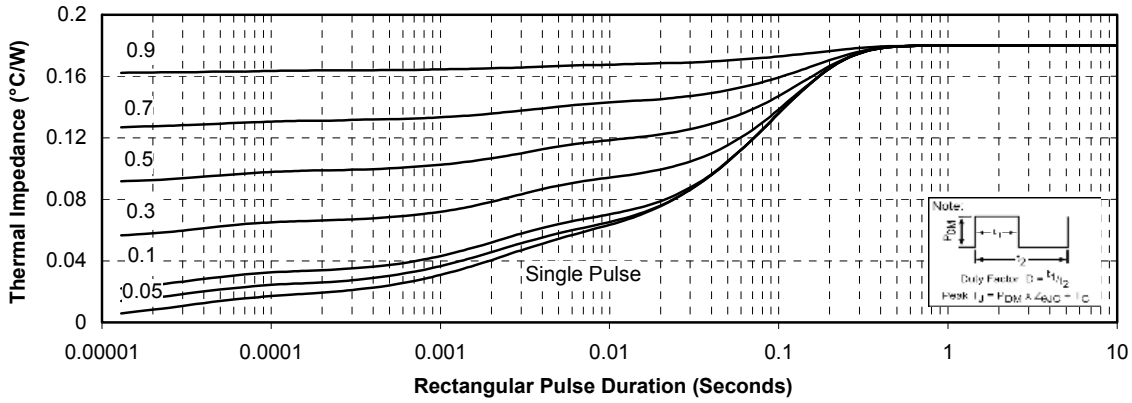
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical MOSFET Performance Curve







Typical SiC Diode Performance Curve
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration


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