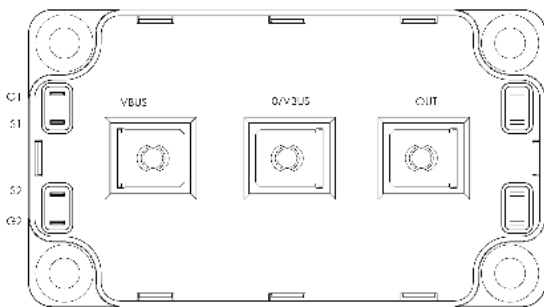
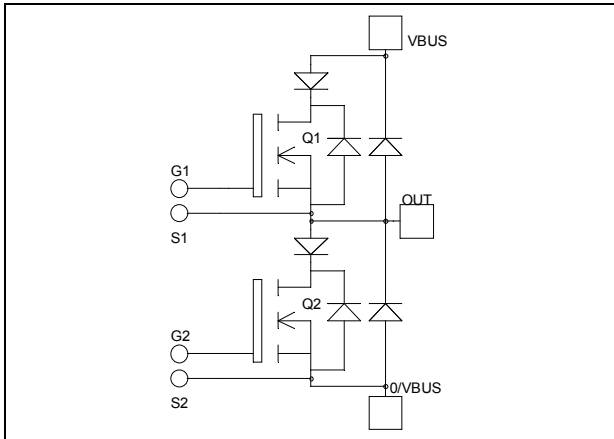


*Phase leg Series & SiC parallel diodes
Super Junction MOSFET Power Module*

$V_{DSS} = 600V$
 $R_{DSon} = 18m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 143A \text{ @ } T_c = 25^\circ C$



Application

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

Features

- **CoolMOS™**
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated
- **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	600	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	143
		$T_c = 80^\circ C$	107
I_{DM}	Pulsed Drain current	572	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	18	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	833
I_{AR}	Avalanche current (repetitive and non repetitive)	20	A
E_{AR}	Repetitive Avalanche Energy	1	mJ
E_{AS}	Single Pulse Avalanche Energy	1800	

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	$V_{GS} = 0V, V_{DS} = 600V$			100	μA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 71.5A$			18	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 4mA$	2.1	3	3.9	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 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	$V_{GS} = 0V$		28		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		10.2		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.85		
Q_g	Total gate Charge	$V_{GS} = 10V$		1036		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 300V$		116		
Q_{gd}	Gate – Drain Charge	$I_D = 143A$		444		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C		21		ns
T_r	Rise Time	$V_{GS} = 15V$		30		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400V$		283		
T_f	Fall Time	$I_D = 143A$ $R_G = 1.2\Omega$		84		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C		1608		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		3920		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C		2630		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		4824		
R_{thJC}	Junction to Case Thermal Resistance				0.15	$^{\circ}C/W$

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 Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$			150	μA
I_F	DC Forward Current			200		A
V_F	Diode Forward Voltage	$I_F = 200A$ $V_{GE} = 0V$	$T_c = 80^{\circ}C$			
			$T_j = 25^{\circ}C$		1.6	2
t_{rr}	Reverse Recovery Time	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 150^{\circ}C$			
			$T_j = 25^{\circ}C$		125	
Q_{rr}	Reverse Recovery Charge	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 150^{\circ}C$			
			$T_j = 25^{\circ}C$		9.4	
E_r	Reverse Recovery Energy	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 150^{\circ}C$			
			$T_j = 25^{\circ}C$		2.2	
$T_j = 150^{\circ}C$		4.8				
R_{thJC}	Junction to Case Thermal Resistance				0.39	$^{\circ}C/W$

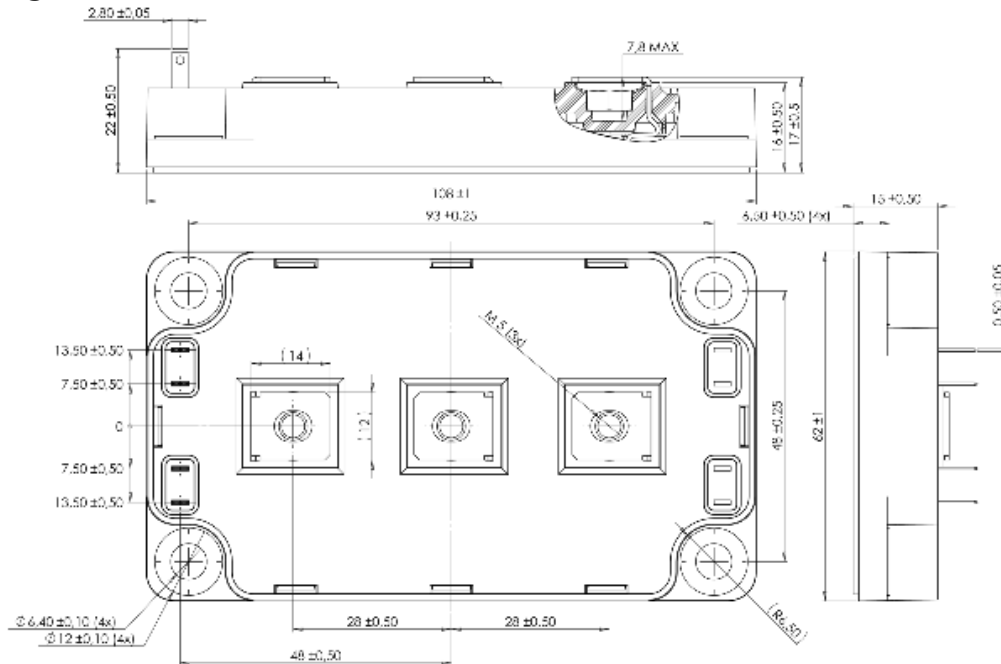
Parallel diode ratings and characteristics

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		400 800	1600 8000	μA
I _F	DC Forward Current			80		A
V _F	Diode Forward Voltage	I _F = 80A		1.6 2.0	1.8 2.4	V
Q _C	Total Capacitive Charge	I _F = 80A, V _R = 600V di/dt = 2000A/μs		224		nC
Q	Total Capacitance	f = 1MHz, V _R = 200V f = 1MHz, V _R = 400V		520 400		pF
R _{thJC}	Junction to Case Thermal Resistance				0.35	°C/W

Thermal and package characteristics

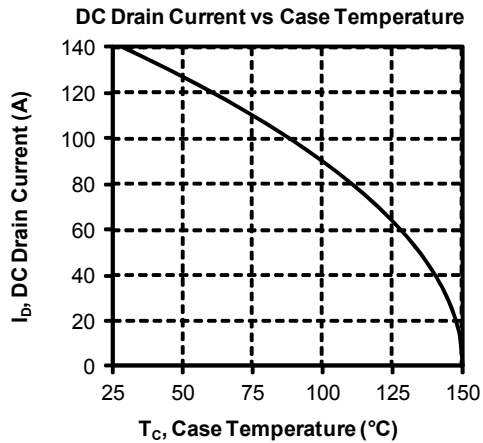
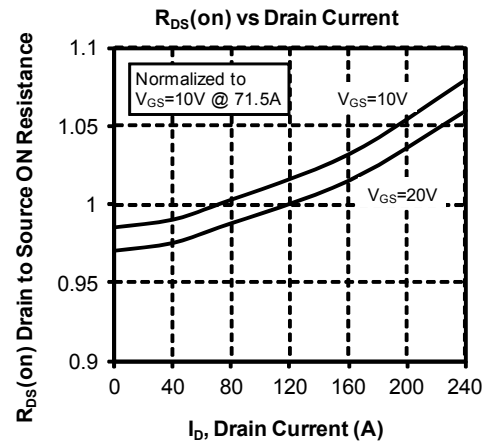
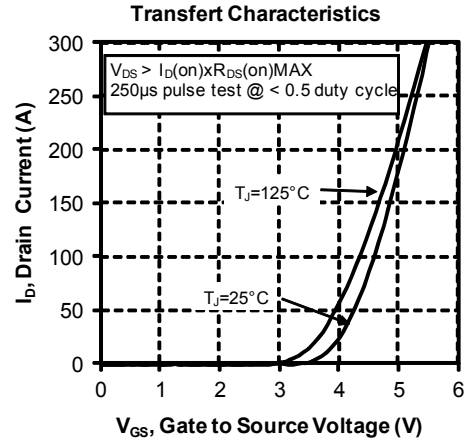
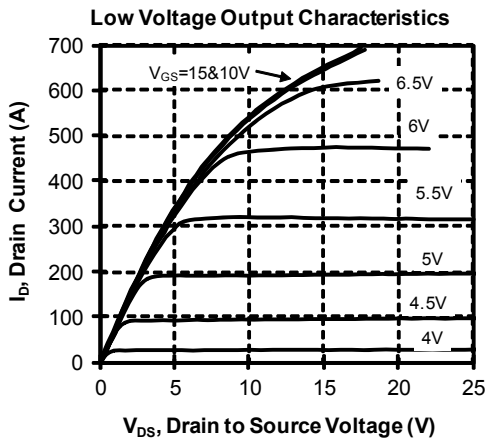
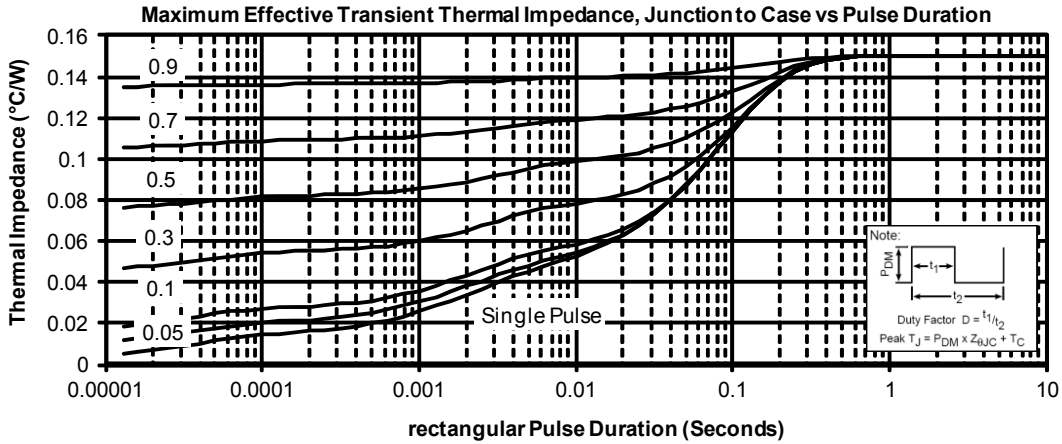
Symbol	Characteristic	Min	Max	Unit		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T _J	Operating junction temperature range	-40	175	°C		
	Parallel diode	-40	150			
	Series diode & CoolMOST™	-40	150			
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25			
T _{STG}	Storage Temperature Range	-40	125			
T _C	Operating Case Temperature	-40	100			
Torque	Mounting torque	To heatsink For terminals	M6 M5	3 2	5 3.5	N.m
Wt	Package Weight				300	g

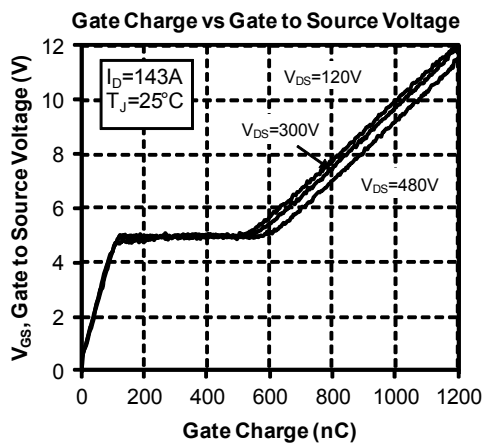
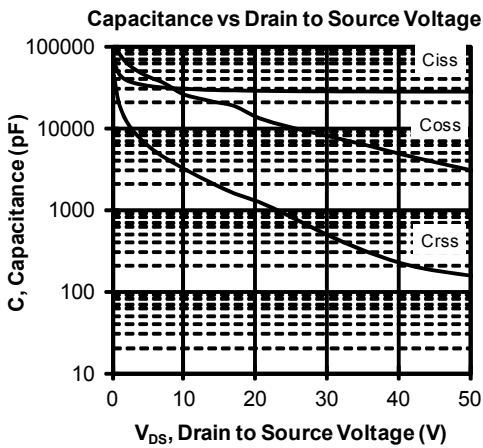
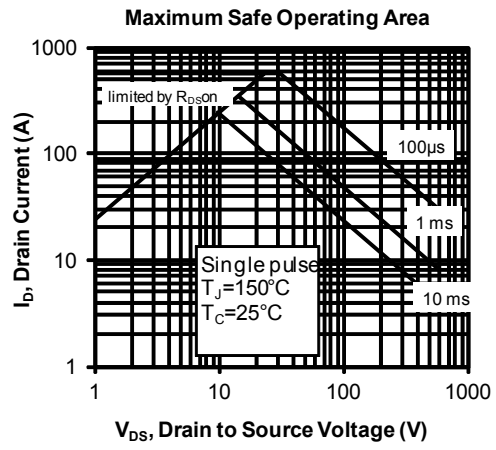
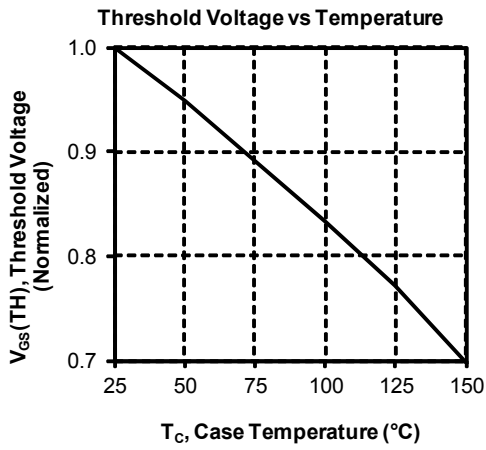
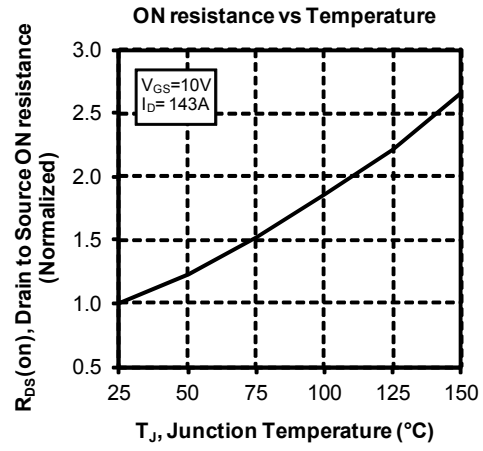
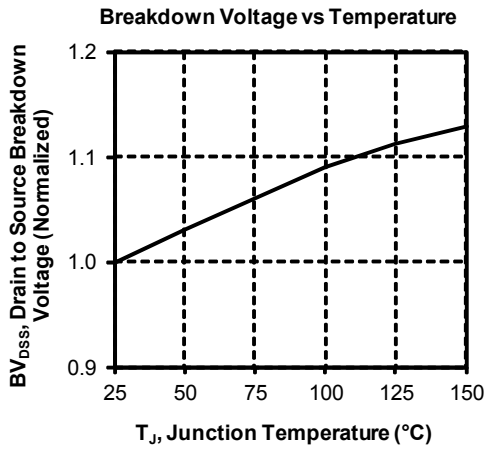
SP6 Package outline (dimensions in mm)

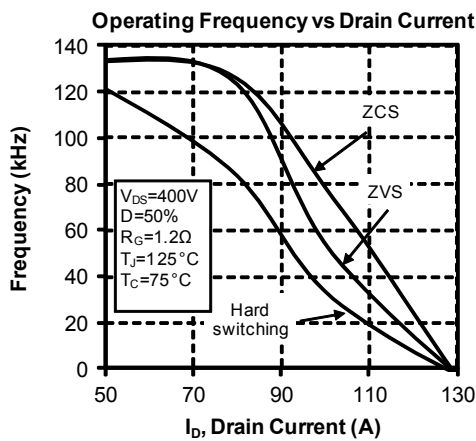
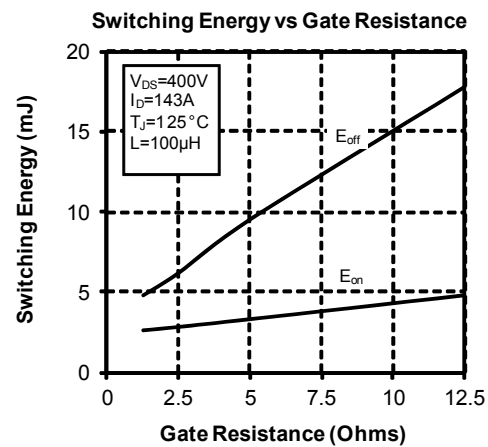
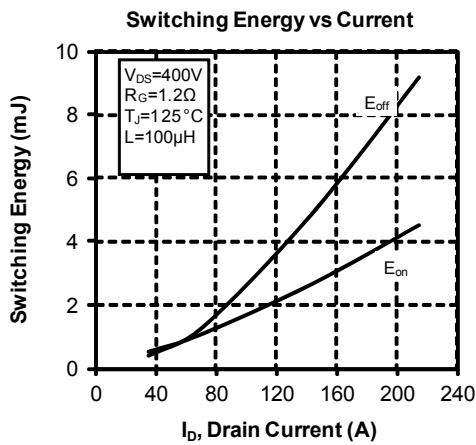
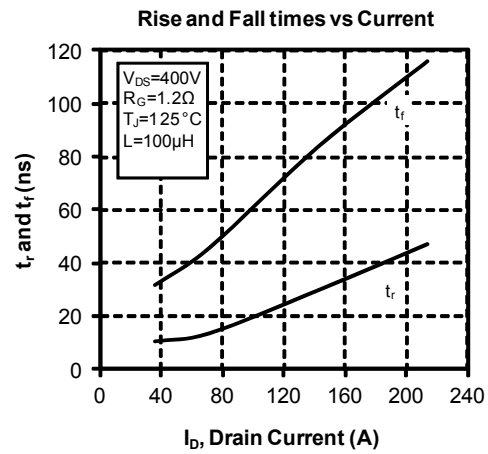
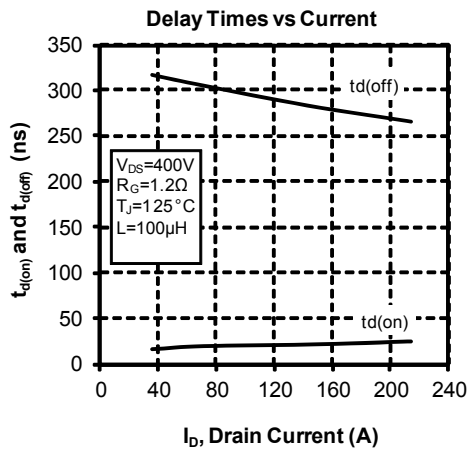


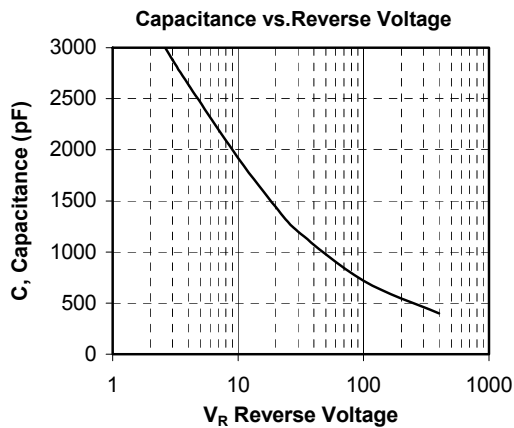
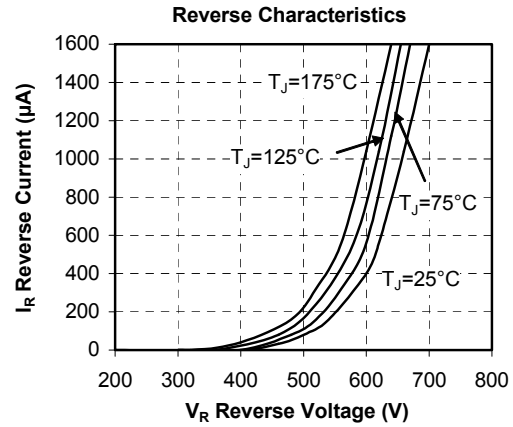
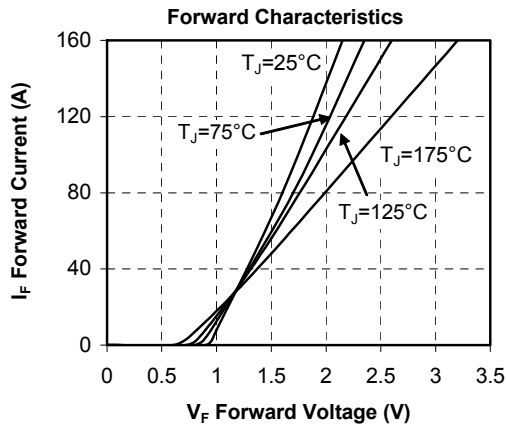
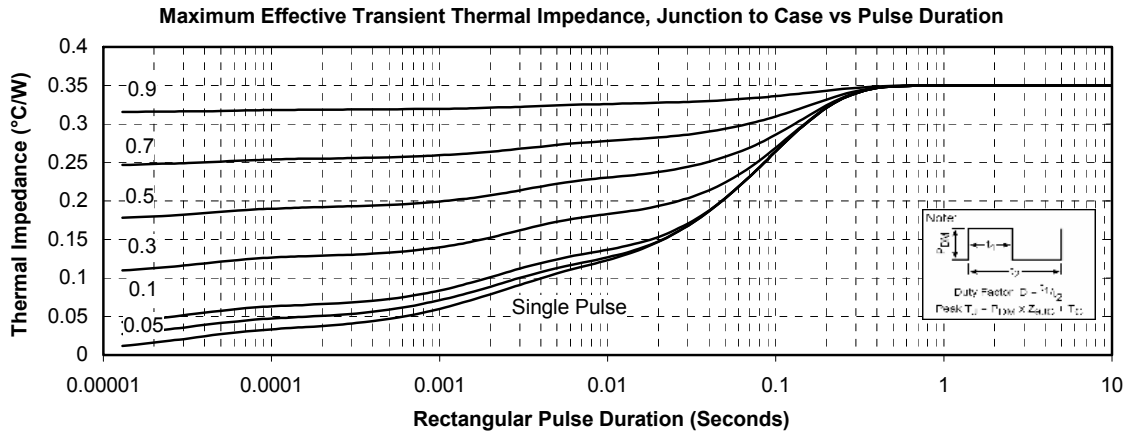
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical CoolMOS Performance Curve







Typical SiC Diode Performance Curve


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