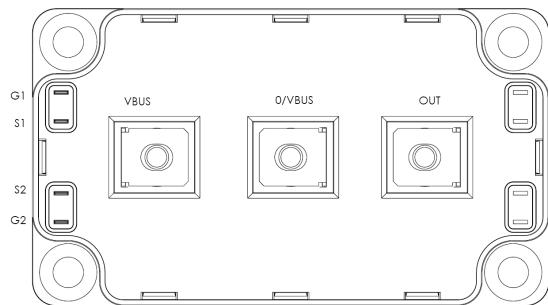
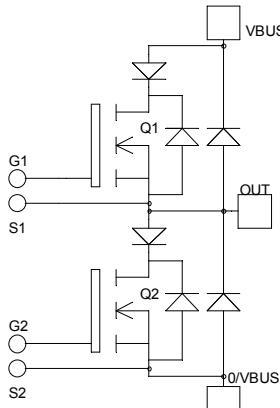


**Phase leg Series & SiC parallel diodes
Super Junction MOSFET Power Module**

V_{DSS} = 600V
R_{DSon} = 18mΩ max @ T_j = 25°C
I_D = 143A @ T_c = 25°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°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°C	A
		T _c = 80°C	
I _{DM}	Pulsed Drain current	572	
V _{GS}	Gate - Source Voltage	±30	V
R _{DSon}	Drain - Source ON Resistance	18	mΩ
P _D	Maximum Power Dissipation	T _c = 25°C	W
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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		28		nF
C_{oss}	Output Capacitance			10.2		
C_{rss}	Reverse Transfer Capacitance			0.85		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 300V$ $I_D = 143A$		1036		nC
Q_{gs}	Gate – Source Charge			116		
Q_{gd}	Gate – Drain Charge			444		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 143A$		21		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			283		
T_f	Fall Time			84		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		1608		μJ
E_{off}	Turn-off Switching Energy			3920		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		2630		μJ
E_{off}	Turn-off Switching Energy			4824		
R_{thJC}	Junction to Case Thermal Resistance				0.15	$^{\circ}C/W$

Series 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	$V_R = 600V$			150	μA
I_F	DC Forward Current			200		A
V_F	Diode Forward Voltage	$I_F = 200A$ $V_{GE} = 0V$	$T_j = 25^{\circ}C$	1.6	2	V
			$T_j = 150^{\circ}C$	1.5		
t_{rr}	Reverse Recovery Time		$T_j = 25^{\circ}C$	125		ns
			$T_j = 150^{\circ}C$	220		
Q_{rr}	Reverse Recovery Charge	$I_F = 200A$ $V_R = 300V$ $di/dt = 2800A/\mu s$	$T_j = 25^{\circ}C$	9.4		μC
			$T_j = 150^{\circ}C$	19.8		
E_r	Reverse Recovery Energy		$T_j = 25^{\circ}C$	2.2		mJ
			$T_j = 150^{\circ}C$	4.8		
R_{thJC}	Junction to Case Thermal Resistance				0.39	$^{\circ}C/W$

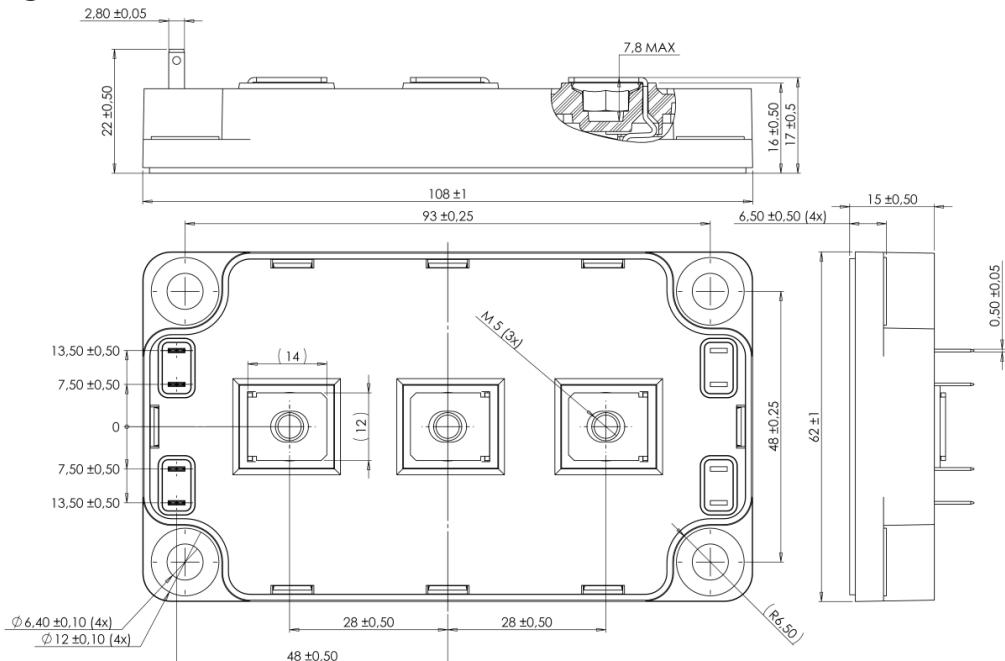
Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ C$		400	1600	μA
			$T_j = 175^\circ C$		800	8000	
I_F	DC Forward Current		$T_c = 125^\circ C$		80		A
V_F	Diode Forward Voltage	$I_F = 80A$	$T_j = 25^\circ C$		1.6	1.8	V
			$T_j = 175^\circ C$		2.0	2.4	
Q_C	Total Capacitive Charge	$I_F = 80A, V_R = 600V$ $di/dt = 2000A/\mu s$			224		nC
Q	Total Capacitance	$f = 1MHz, V_R = 200V$			520		pF
		$f = 1MHz, V_R = 400V$			400		
R_{thJC}	Junction to Case Thermal Resistance					0.35	°C/W

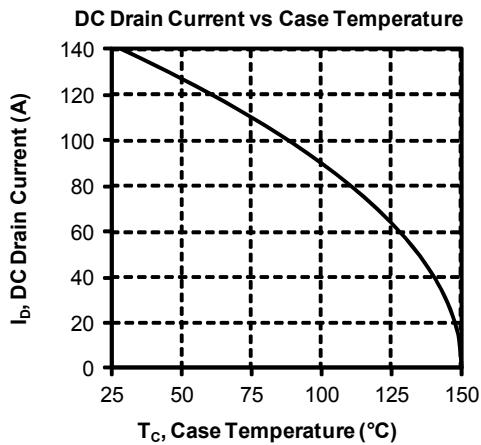
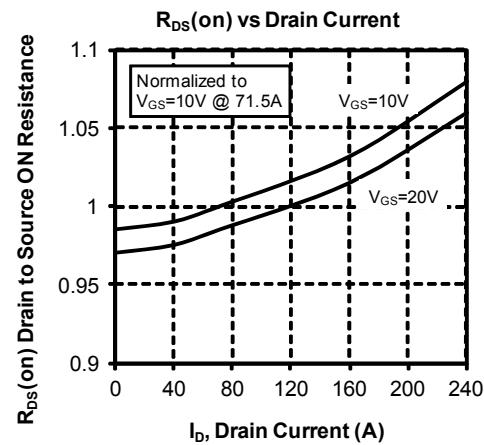
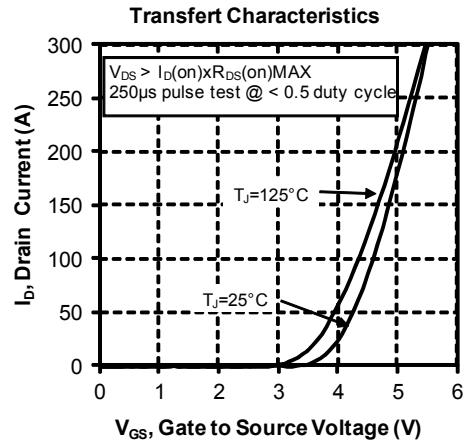
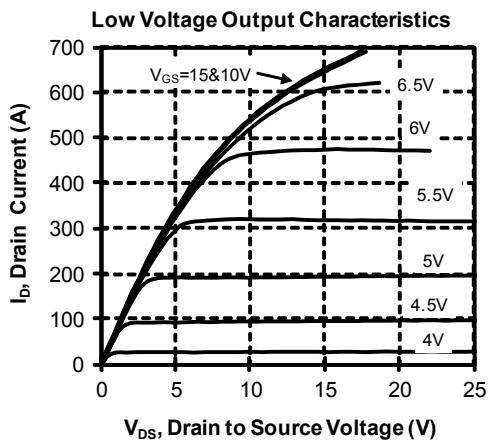
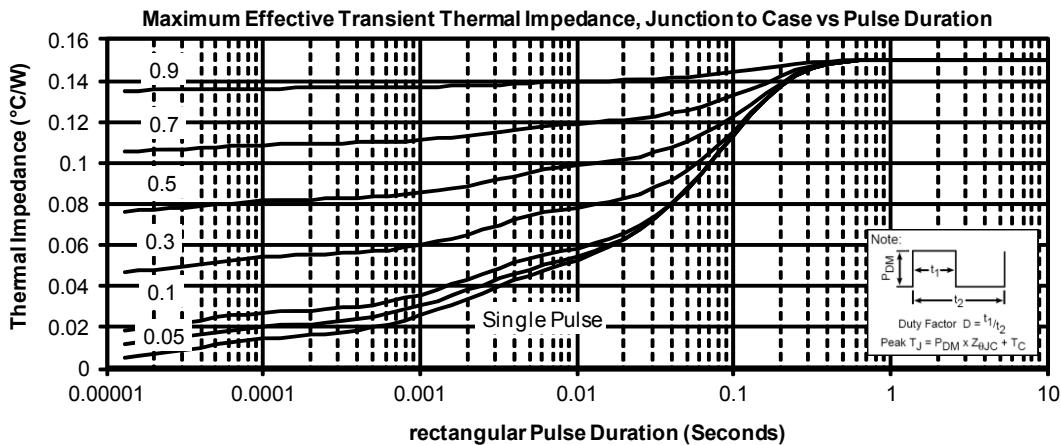
Thermal and package characteristics

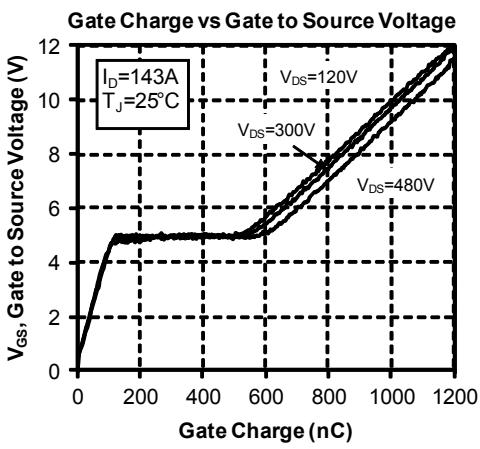
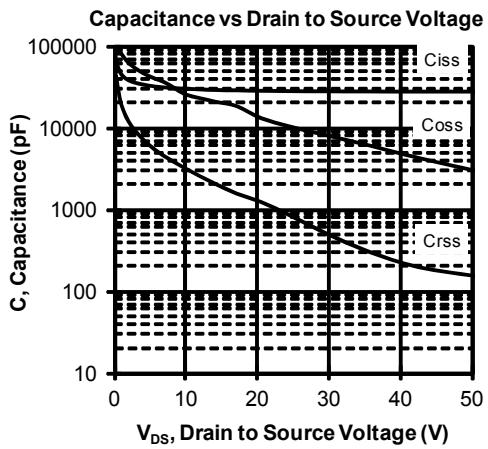
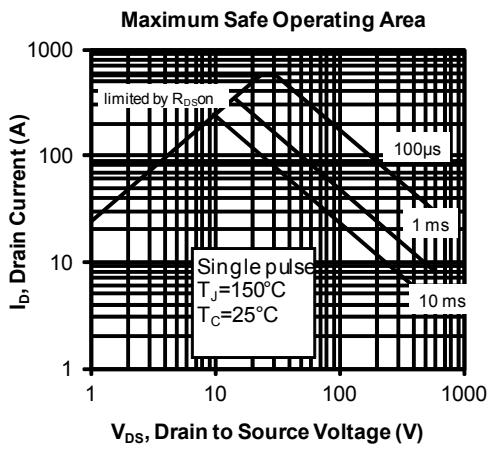
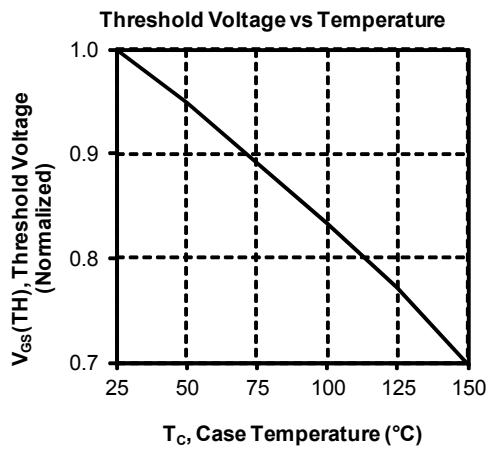
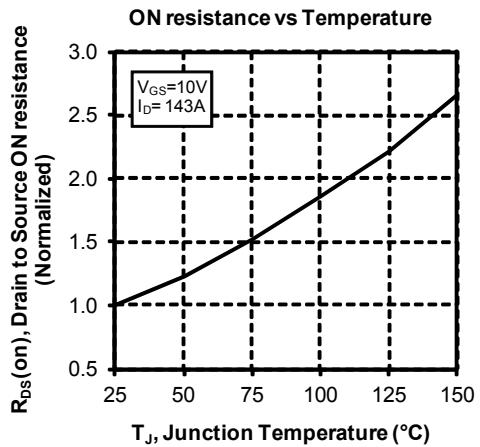
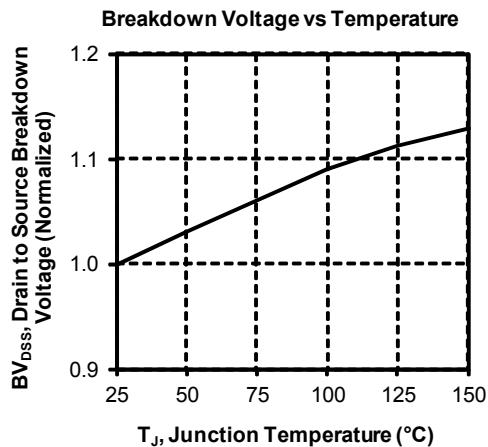
Symbol	Characteristic		Min	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		4000		V
T_J	Operating junction temperature range	Parallel diode	-40	175	°C
		Series diode & CoolMOS™	-40	150	
T_{JOP}	Recommended junction temperature under switching conditions		-40	T_J max -25	
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
Wt	Package Weight			300	g

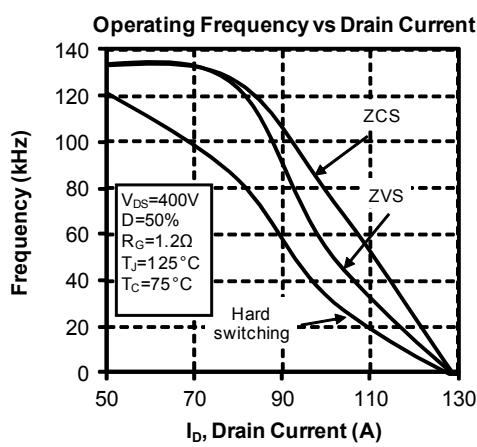
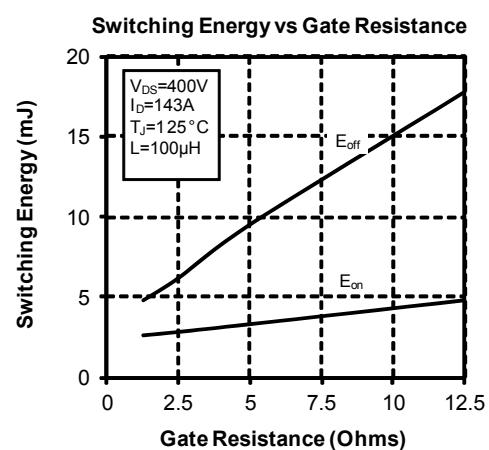
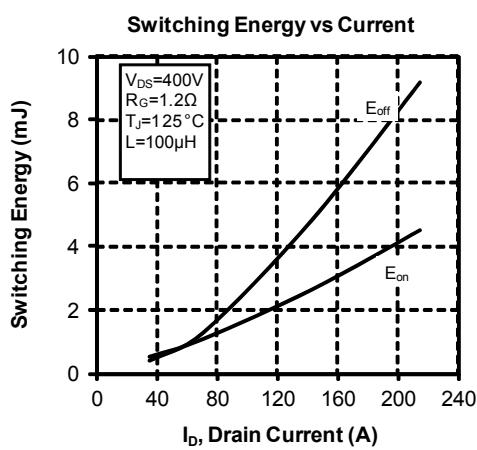
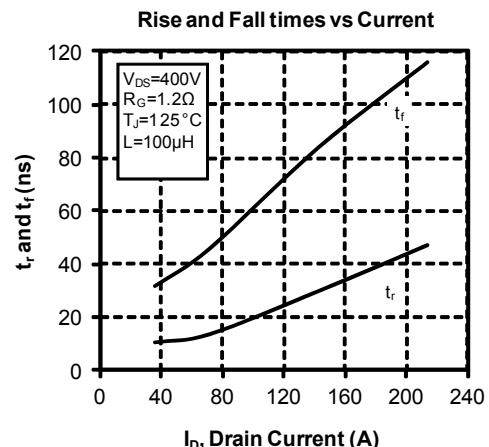
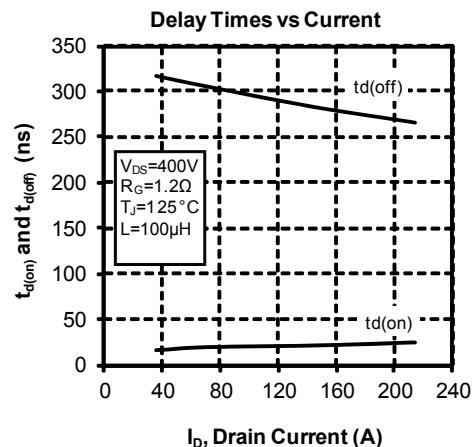
SP6 Package outline (dimensions in mm)

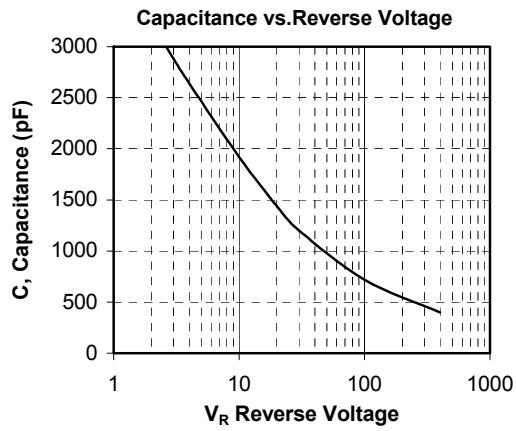
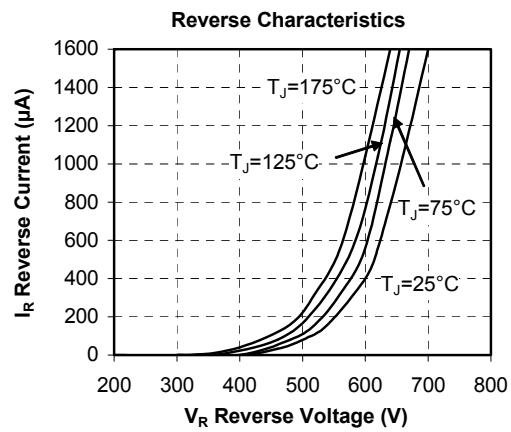
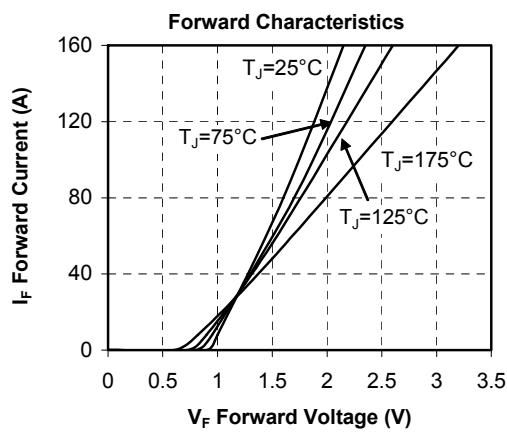
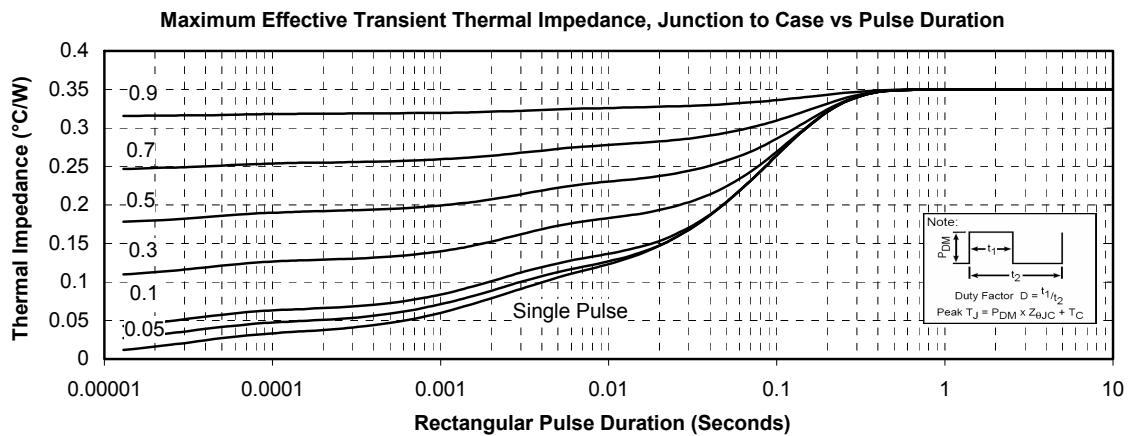


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical CoolMOS Performance Curve






Typical SiC Diode Performance Curve


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