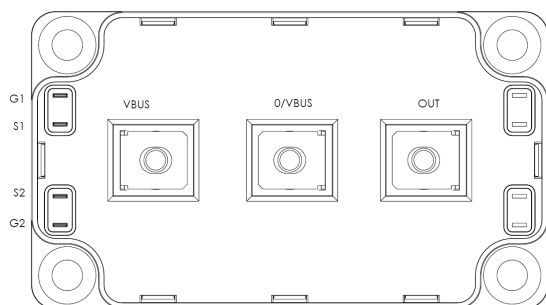
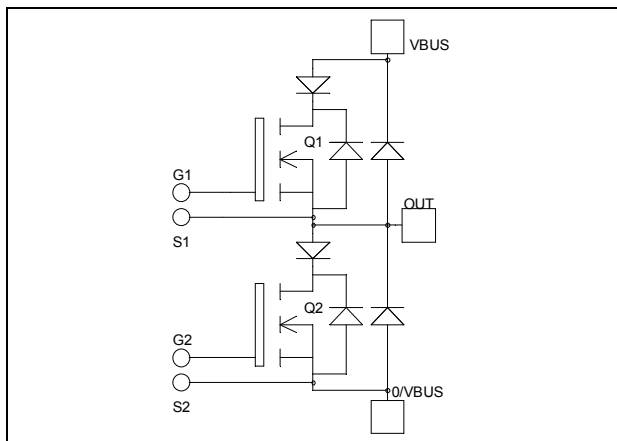


*Phase leg Series & SiC parallel diodes
Super Junction MOSFET Power Module*



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

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	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	572	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	18	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	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 Ω
$V_{GS(th)}$	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	$V_{GS} = 0V$		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 $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 143A$ $R_G = 1.2\Omega$		21		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			283		
T_f	Fall Time			84		
Eon	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		1608		μJ
Eoff	Turn-off Switching Energy			3920		
Eon	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 143A, R_G = 1.2\Omega$		2630		μJ
Eoff	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		T _c = 80°C		200		A
V _F	Diode Forward Voltage	I _F = 200A V _{GE} = 0V	T _i = 25°C		1.6	2	V
			T _j = 150°C		1.5		
t _{rr}	Reverse Recovery Time	I _F = 200A V _R = 300V di/dt = 2800A/μs	T _j = 25°C		125		ns
			T _j = 150°C		220		
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		9.4	μC	
			T _j = 150°C		19.8		
E _r	Reverse Recovery Energy		T _j = 25°C		2.2	mJ	
			T _j = 150°C		4.8		
R _{thJC}	Junction to Case Thermal Resistance					0.39	°C/W

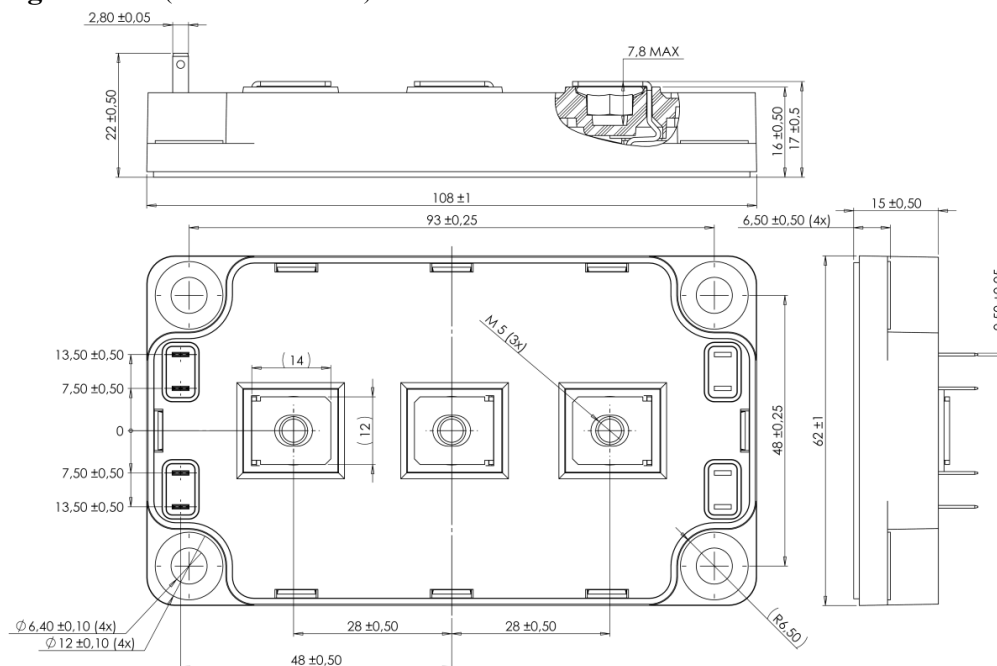
Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R=600V$				μA
		$T_j = 25^\circ C$		400	1600	
		$T_j = 175^\circ C$		800	8000	
I_F	DC Forward Current			80		A
V_F	Diode Forward Voltage	$I_F = 80A$				V
		$T_c = 125^\circ C$		1.6	1.8	
		$T_j = 175^\circ C$		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	$^\circ C/W$

Thermal and package characteristics

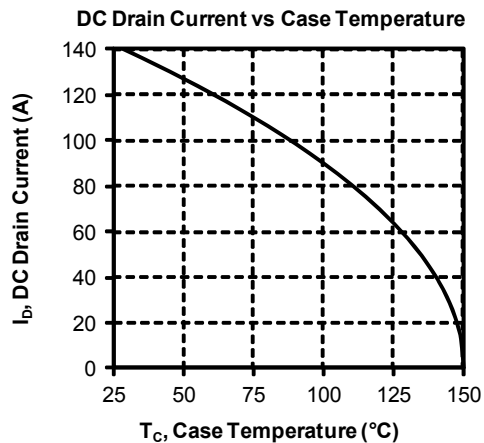
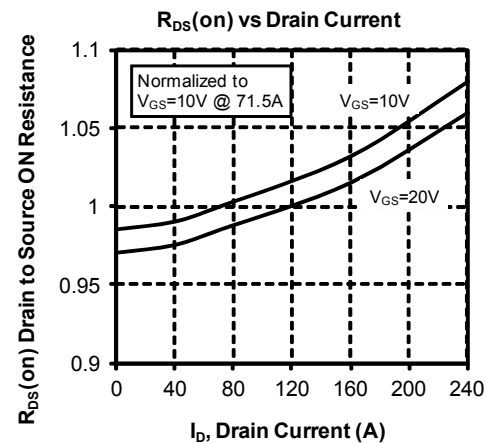
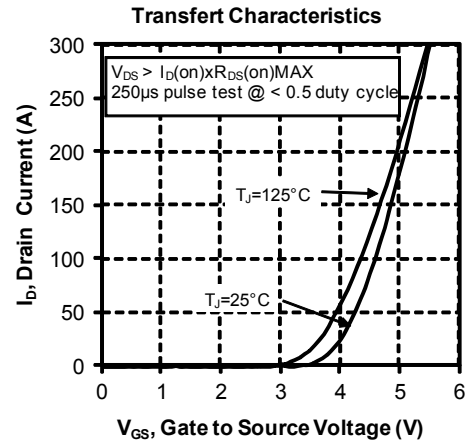
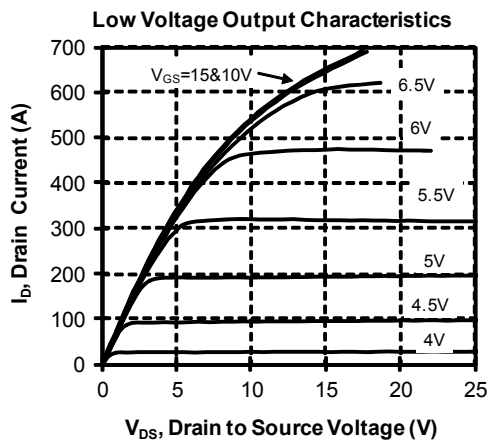
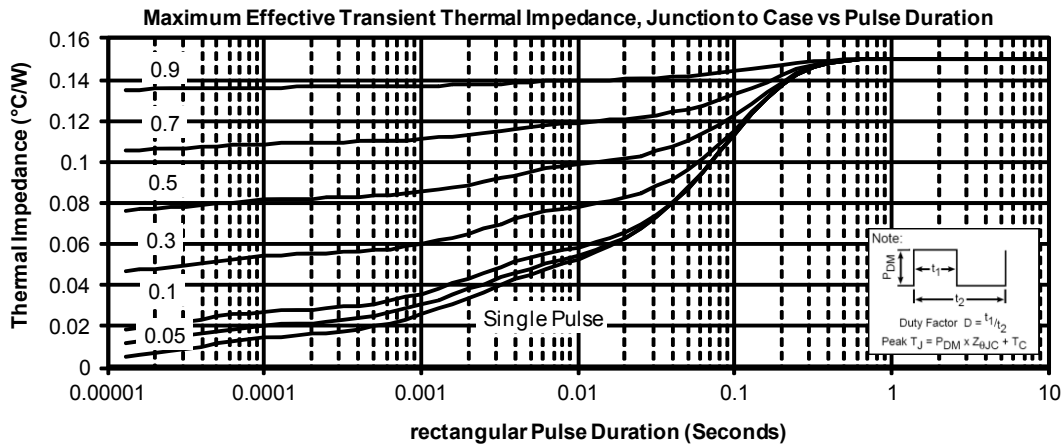
Symbol	Characteristic	Min	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, 50/60Hz	4000		V
T_J	Operating junction temperature range			$^\circ C$
	Parallel diode	-40	175	
	Series diode & CoolMOST™	-40	150	
T_{JOP}	Recommended junction temperature under switching conditions	-40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

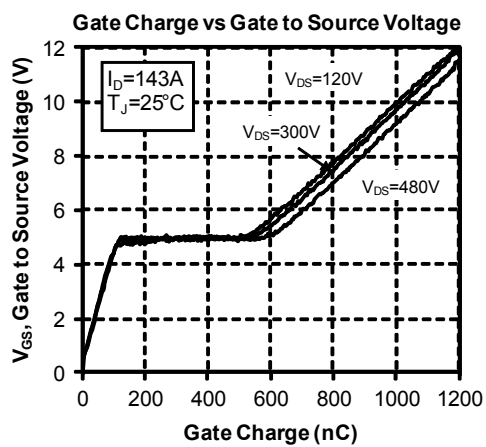
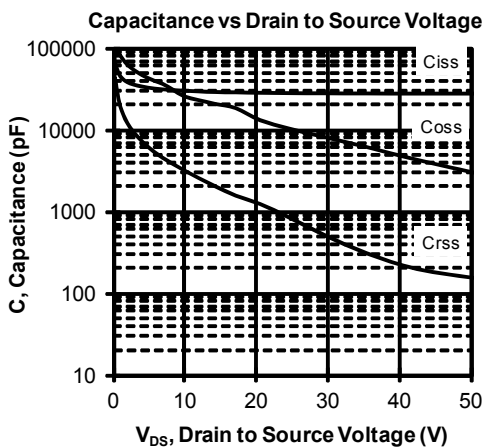
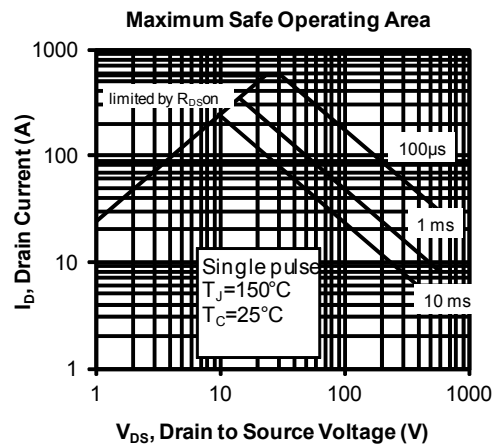
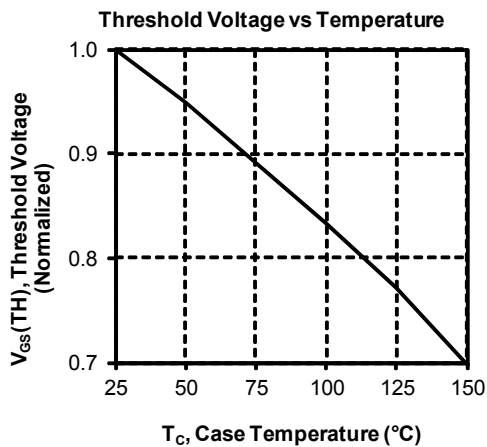
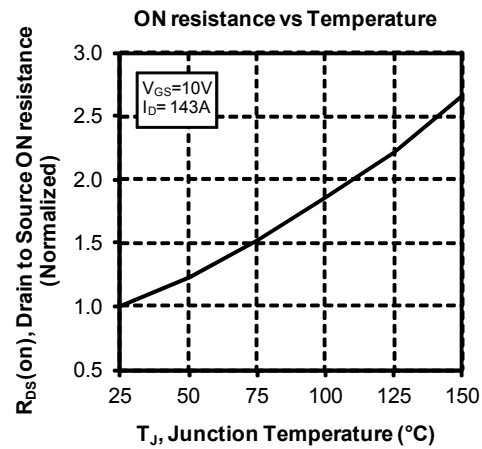
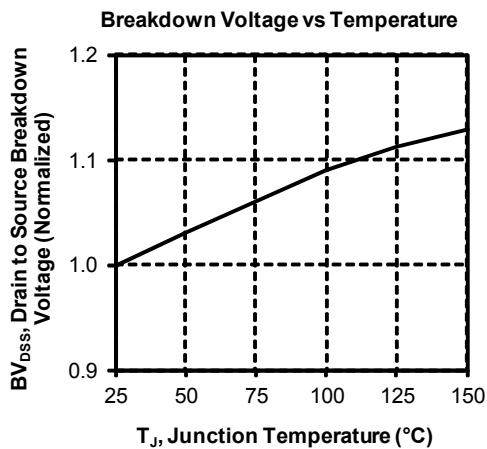
SP6 Package outline (dimensions in mm)

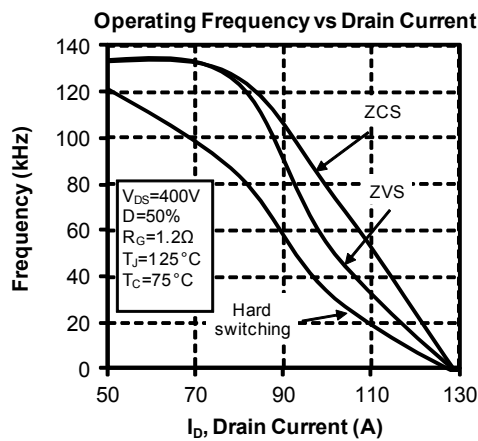
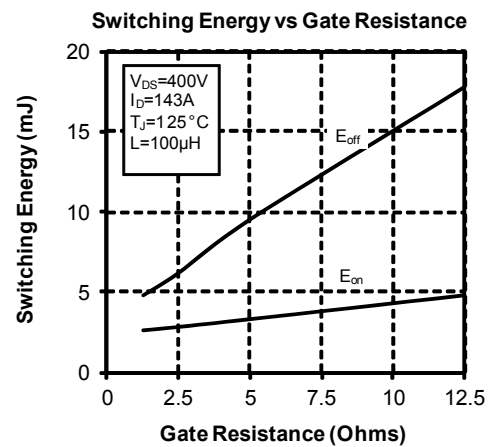
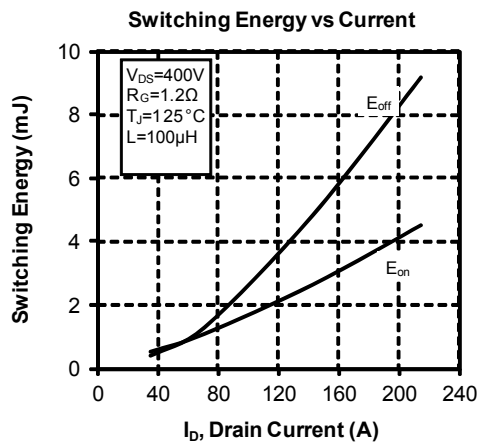
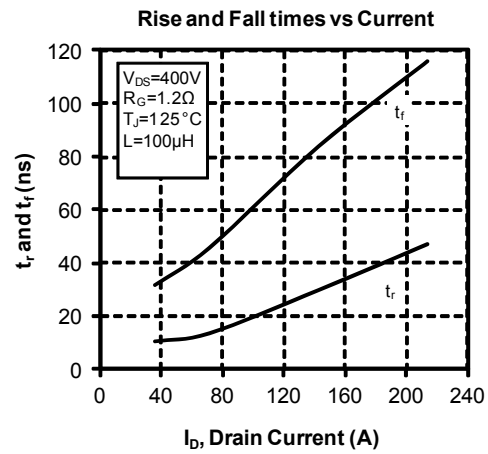
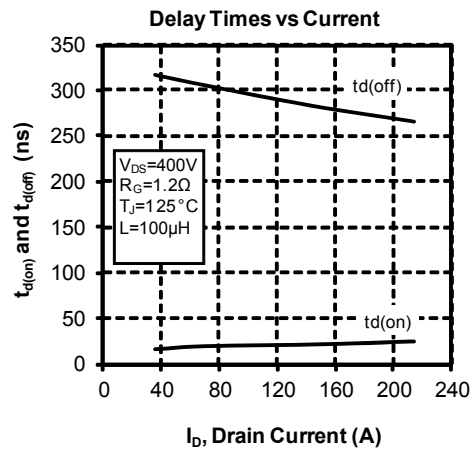


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

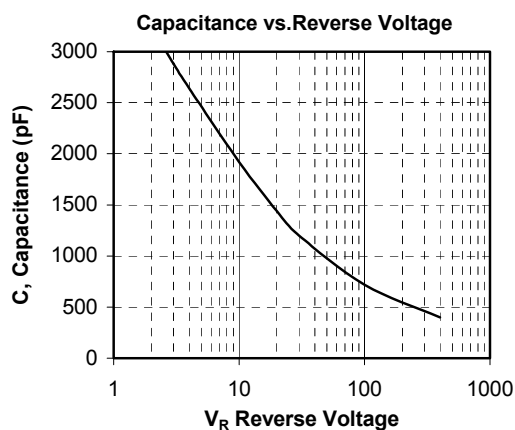
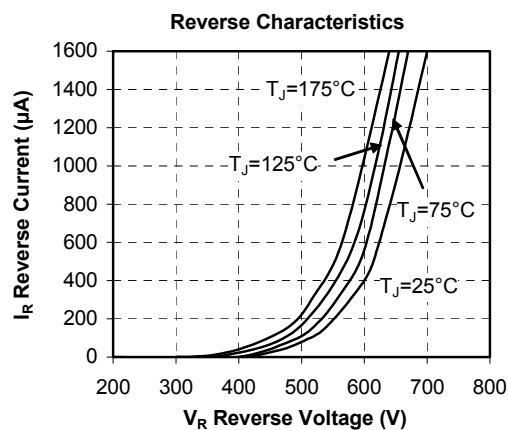
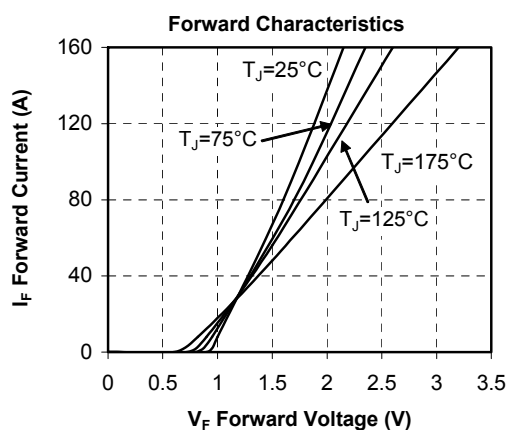
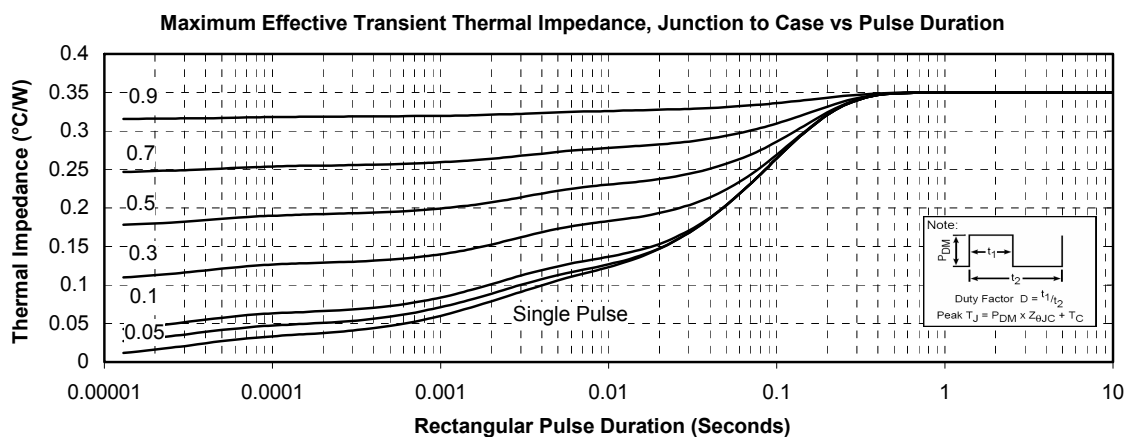
Typical CoolMOS Performance Curve







Typical SiC Diode Performance Curve



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