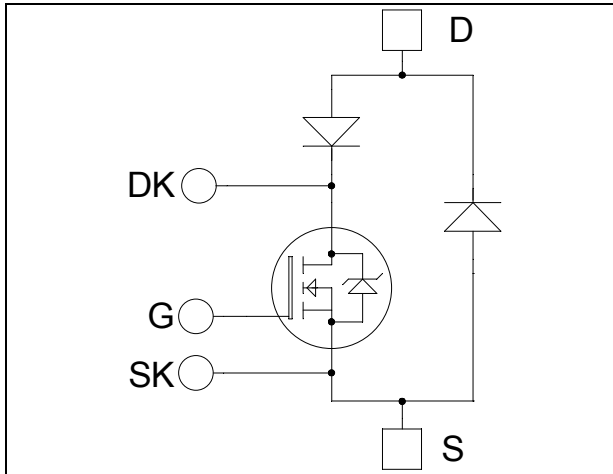


*Single switch
Series & SiC parallel diodes
MOSFET Power Module*

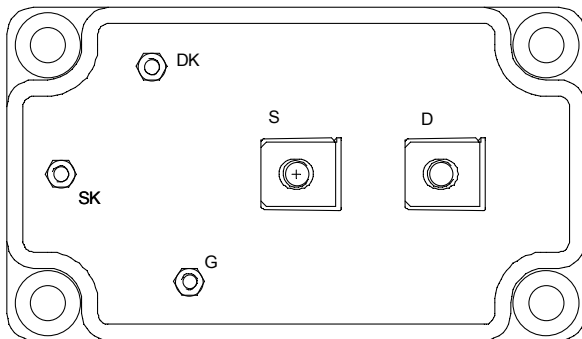
$V_{DSS} = 1000V$

$R_{DSon} = 65m\Omega$ 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 Breakdown 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	Maximum Power Dissipation	T _c = 25°C	3250
I _{AR}	Avalanche current (repetitive and non repetitive)	30	A
E _{AR}	Repetitive Avalanche Energy	50	mJ
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		28.5		nF
C _{oss}	Output Capacitance	V _{DS} = 25V		5.08		
C _{rss}	Reverse Transfer Capacitance	f = 1MHz		0.9		
Q _g	Total gate Charge	V _{GS} = 10V		1068		nC
Q _{gs}	Gate – Source Charge	V _{Bus} = 500V		136		
Q _{gd}	Gate – Drain Charge	I _D = 145A		692		
T _{d(on)}	Turn-on Delay Time	V _{GS} = 15V		18		ns
T _r	Rise Time	V _{Bus} = 670V		14		
T _{d(off)}	Turn-off Delay Time	I _D = 145A		140		
T _f	Fall Time	R _G = 0.75Ω		55		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C		2.9		mJ
E _{off}	Turn-off Switching Energy	V _{GS} = 15V, V _{Bus} = 670V I _D = 145A, R _G = 0.75Ω		2.9		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C		4.8		mJ
E _{off}	Turn-off Switching Energy	V _{GS} = 15V, V _{Bus} = 670V I _D = 145A, R _G = 0.75Ω		3.9		

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			200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R=200V$	$T_j = 25^\circ C$			350	μA
			$T_j = 125^\circ C$			600	
I_F	DC Forward Current	$T_c = 80^\circ C$			120		A
V_F	Diode Forward Voltage	$I_F = 120A$			1.1	1.15	V
		$I_F = 240A$			1.4		
		$I_F = 120A$	$T_j = 125^\circ C$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$		31		ns
			$T_j = 125^\circ C$		60		
Q_{rr}	Reverse Recovery Charge	$I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ C$		120		nC
			$T_j = 125^\circ C$		500		

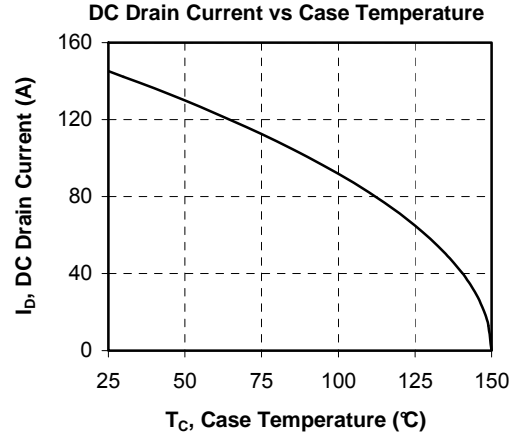
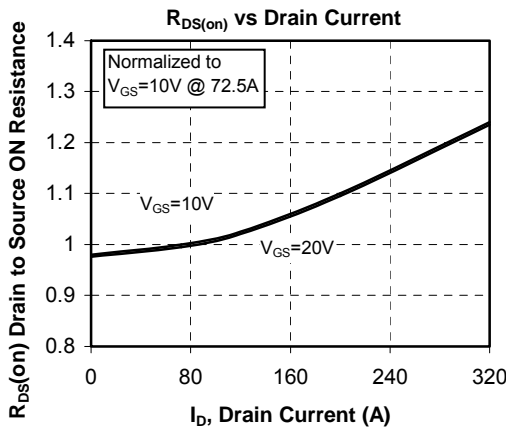
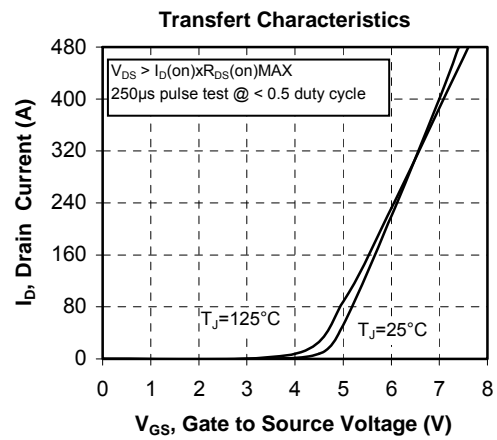
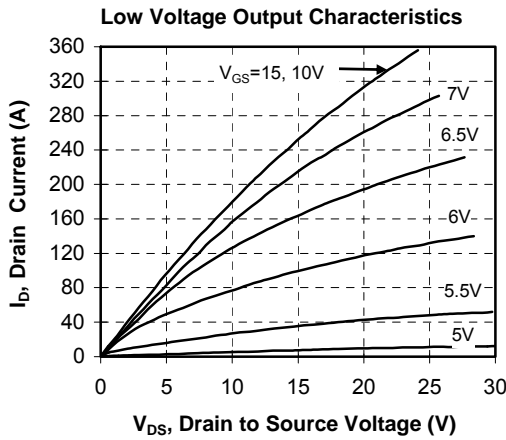
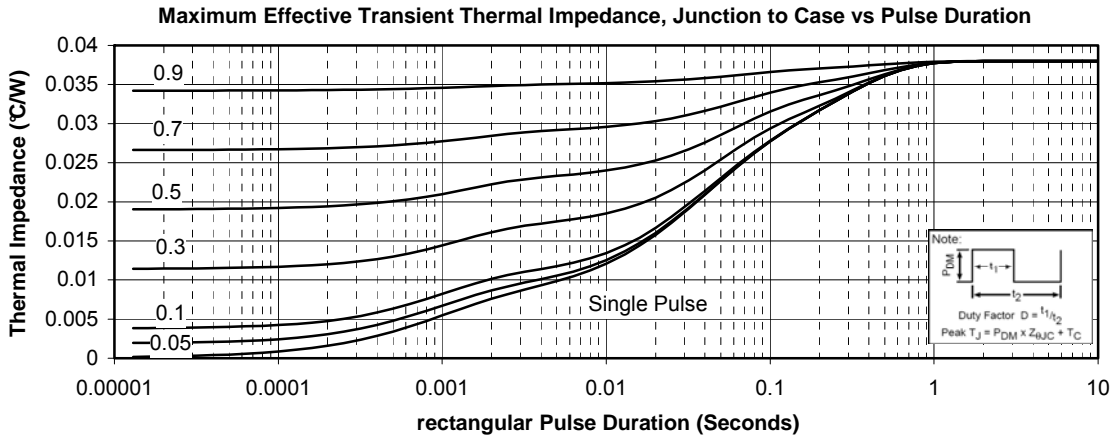
SiC Parallel diode ratings and characteristics

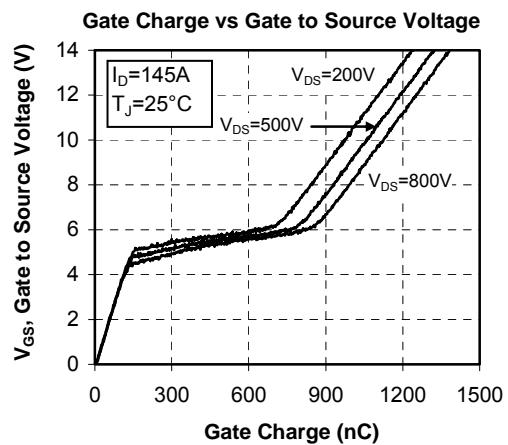
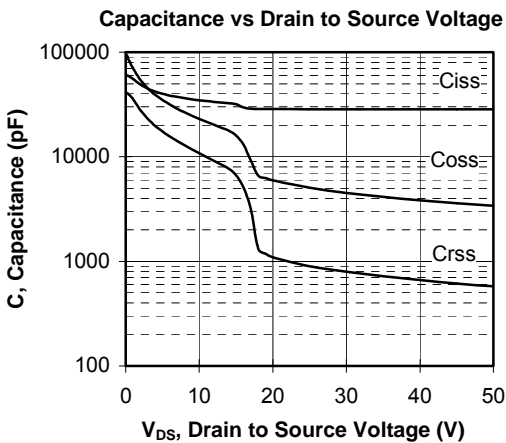
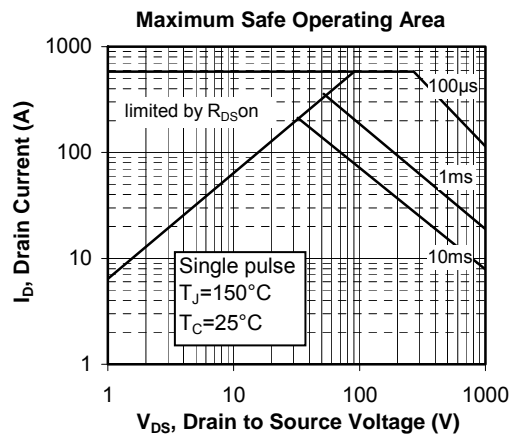
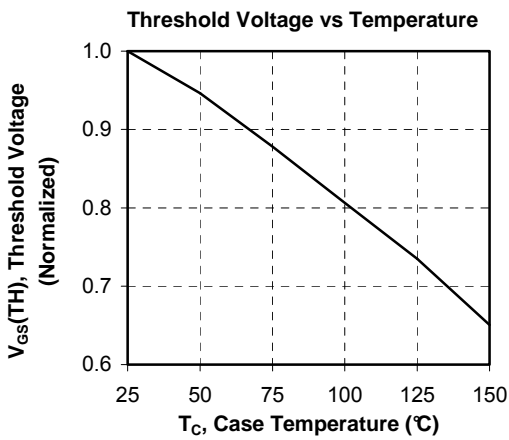
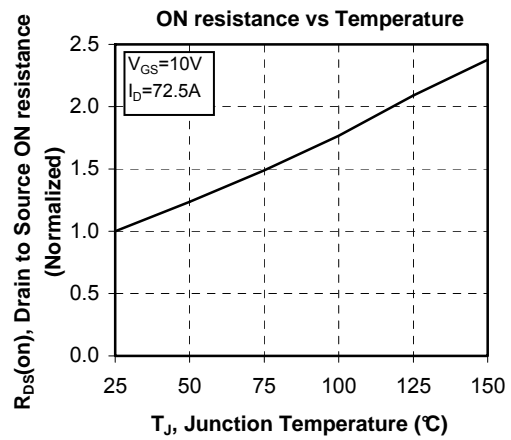
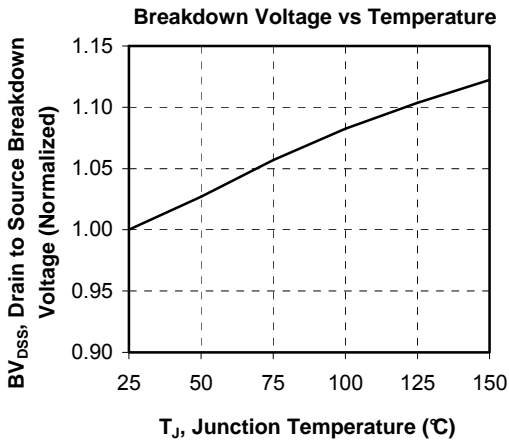
<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R=1200V$	$T_j = 25^\circ C$		384	2400	μA
			$T_j = 125^\circ C$		672	12000	
I_F	DC Forward Current	$T_c = 125^\circ C$			120		A
V_F	Diode Forward Voltage	$I_F = 120A$	$T_j = 25^\circ C$		1.6	1.8	V
			$T_j = 175^\circ C$		2.3	3.0	
Q_C	Total Capacitive Charge	$I_F = 120A, V_R = 600V$ $di/dt = 5000A/\mu s$			480		nC
C	Total Capacitance	$f = 1MHz, V_R = 200V$			1152		pF
		$f = 1MHz, V_R = 400V$			828		

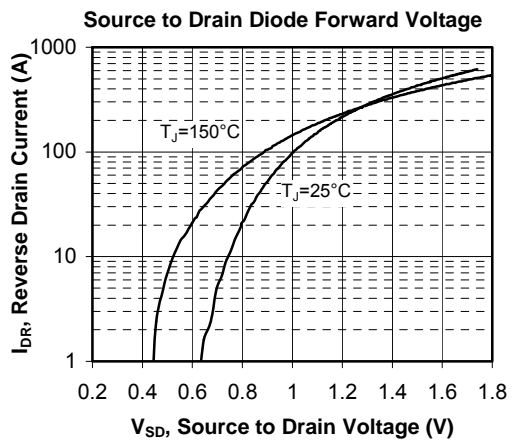
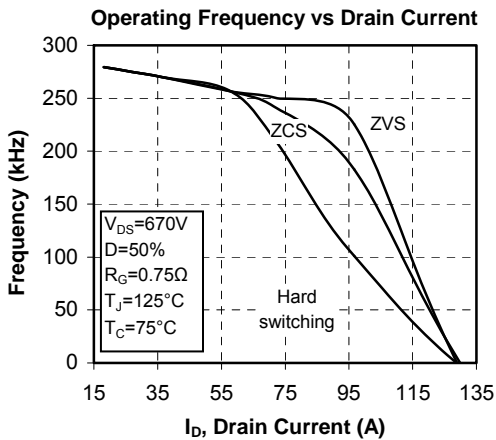
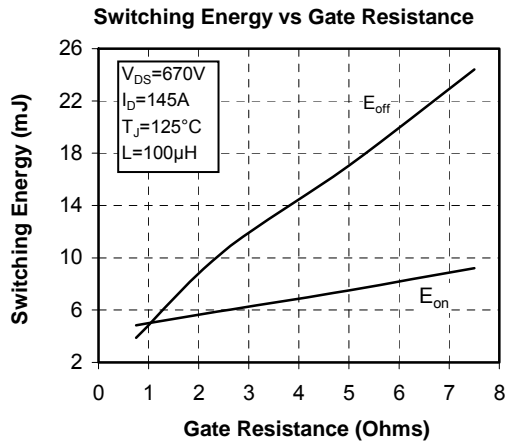
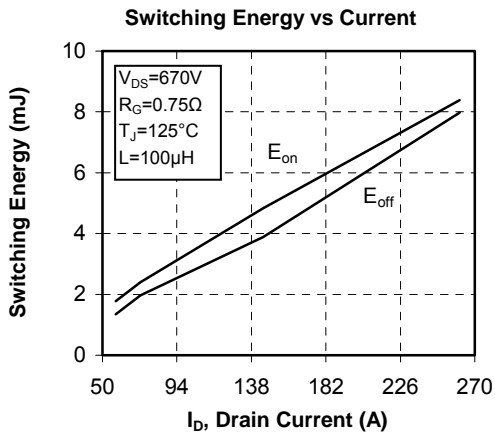
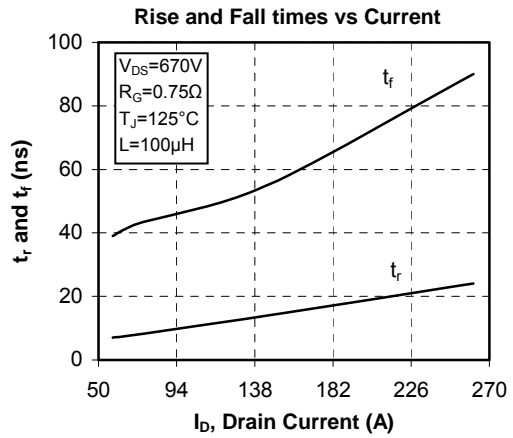
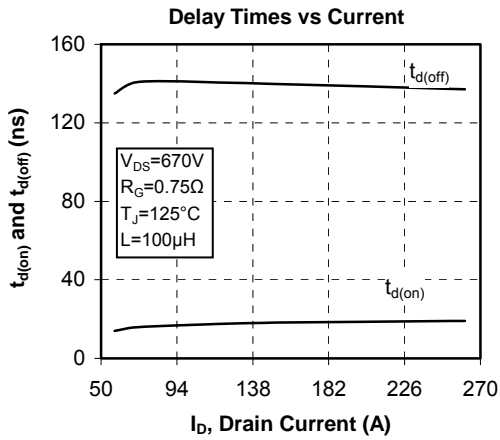
Thermal and package characteristics

<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R_{thJC}	Junction to Case Thermal Resistance	Transistor				0.038	$^\circ C/W$
		Series diode				0.46	
		SiC Parallel diode				0.18	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1mA, 50/60Hz$			4000			V
T_J	Operating junction temperature range			-40		150	$^\circ C$
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
		For terminals	M5	2		3.5	
			M3	1		1.5	
Wt	Package Weight					280	g

Typical MOSFET Performance Curve

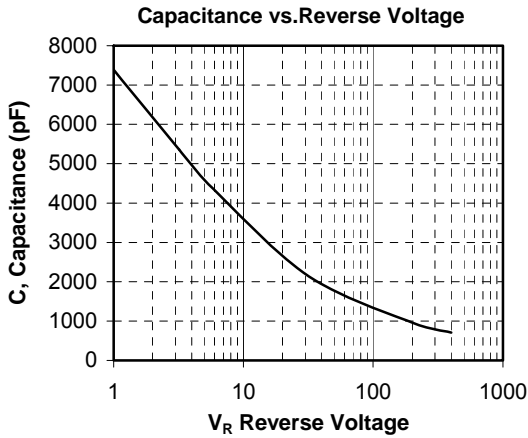
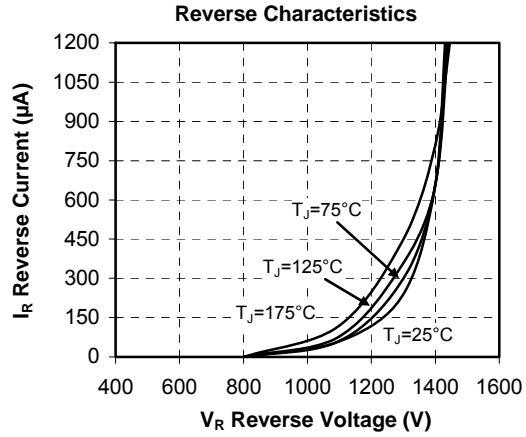
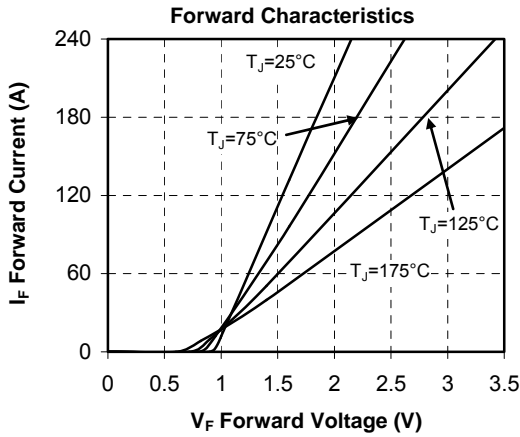
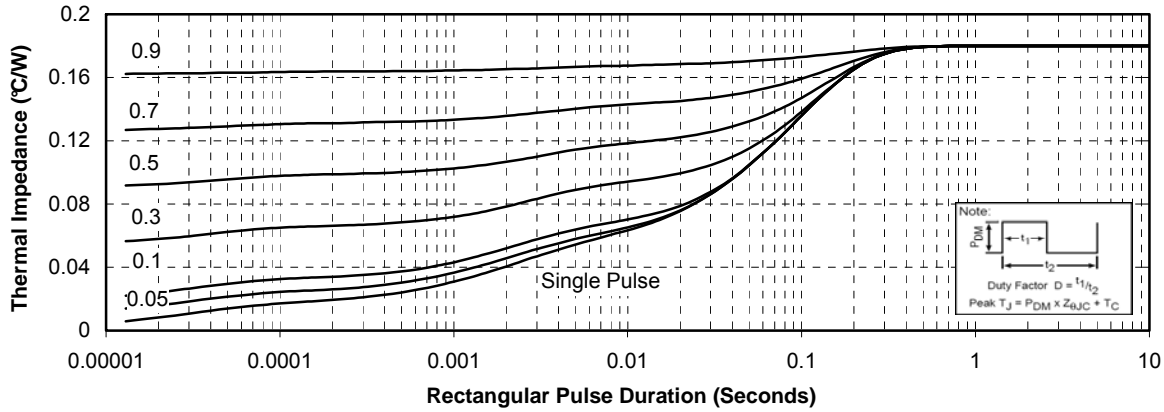






Typical SiC Diode Performance Curve

Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



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