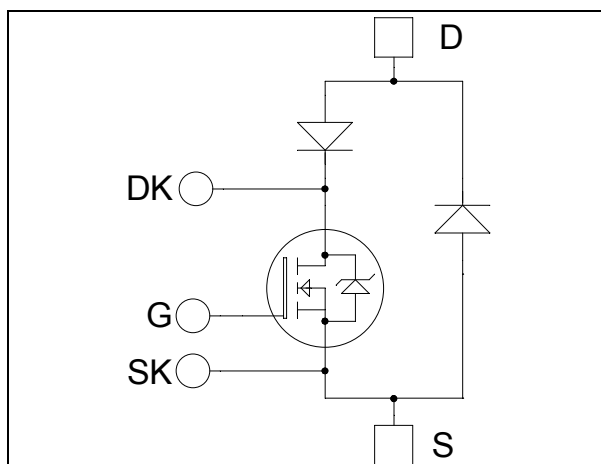


*Single switch
Series & SiC parallel diodes
MOSFET Power Module*

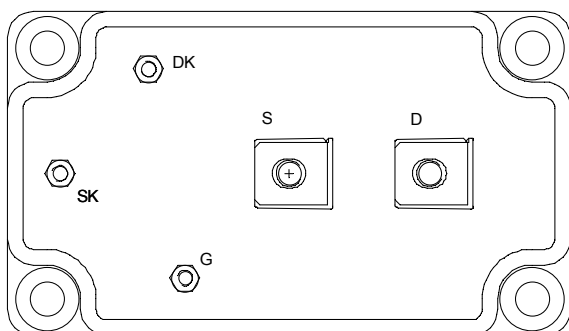
$V_{DSS} = 1000V$

$R_{DS(on)} = 65m\Omega$ 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 $R_{DS(on)}$
 - 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

Symbol	Parameter	Max ratings	Unit
V_{DS}	Drain - Source Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ\text{C}$	A
		$T_c = 80^\circ\text{C}$	
I_{DM}	Pulsed Drain current	580	
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	78	m Ω
P_D	Power Dissipation	$T_c = 25^\circ\text{C}$	W
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

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1000V$ $T_j = 25^\circ\text{C}$			400	μA
		$V_{GS} = 0V, V_{DS} = 800V$ $T_j = 125^\circ\text{C}$			2	mA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 72.5A$		65	78	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 20mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		28.5		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	$V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 145A$ $R_G = 0.75\Omega$		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 $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 145A, R_G = 0.75\Omega$		2.9		mJ
E_{off}	Turn-off Switching Energy			2.9		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 145A, R_G = 0.75\Omega$		4.8		mJ
E_{off}	Turn-off Switching Energy			3.9		
R_{thJC}	Junction to Case Thermal Resistance				0.038	$^\circ\text{C/W}$

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1000	V
I_{RM}	Reverse Leakage Current	$V_R = 1000V$				500	μA
I_F	DC Forward Current		$T_c = 25^\circ C$		240		A
V_F	Diode Forward Voltage	$I_F = 240A$			1.9	2.5	V
		$I_F = 480A$			2.2		
		$I_F = 240A$	$T_j = 125^\circ C$		1.7		
t_{rr}	Reverse Recovery Time	$I_F = 240A$ $V_R = 667V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ C$		280		ns
			$T_j = 125^\circ C$		350		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ C$		3		μC
			$T_j = 125^\circ C$		14.4		
R_{thJC}	Junction to Case Thermal Resistance					0.23	$^\circ C/W$

SiC Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ C$		384	2400	μA
			$T_j = 175^\circ C$		672	12000	
I_F	DC Forward Current		$T_c = 100^\circ C$		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	$I_F = 120A, V_R = 1200V$ $di/dt = 5000A/\mu s$			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	$^\circ C/W$

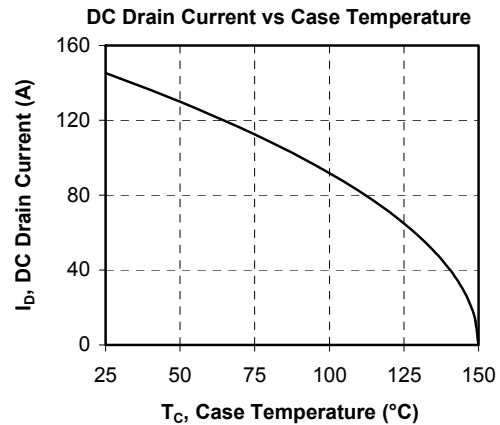
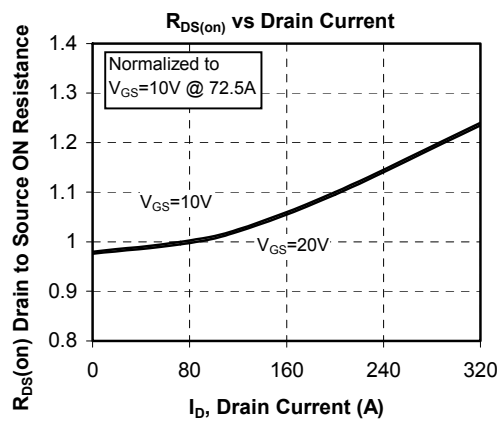
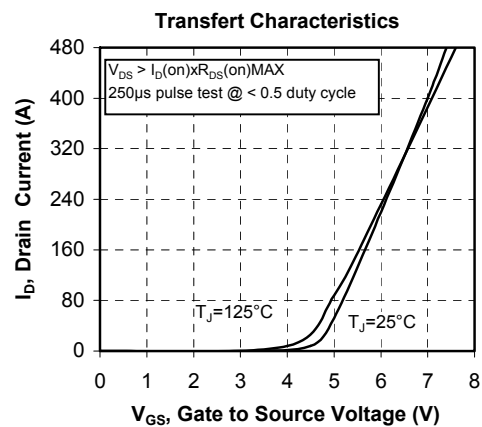
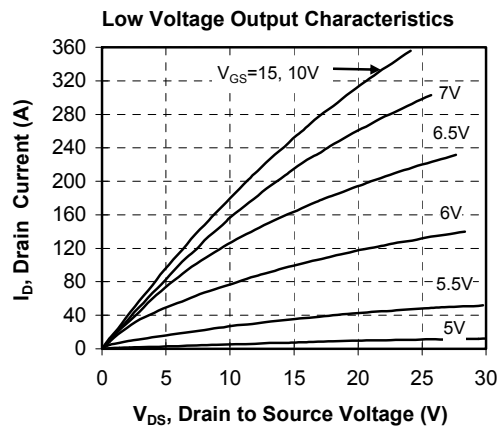
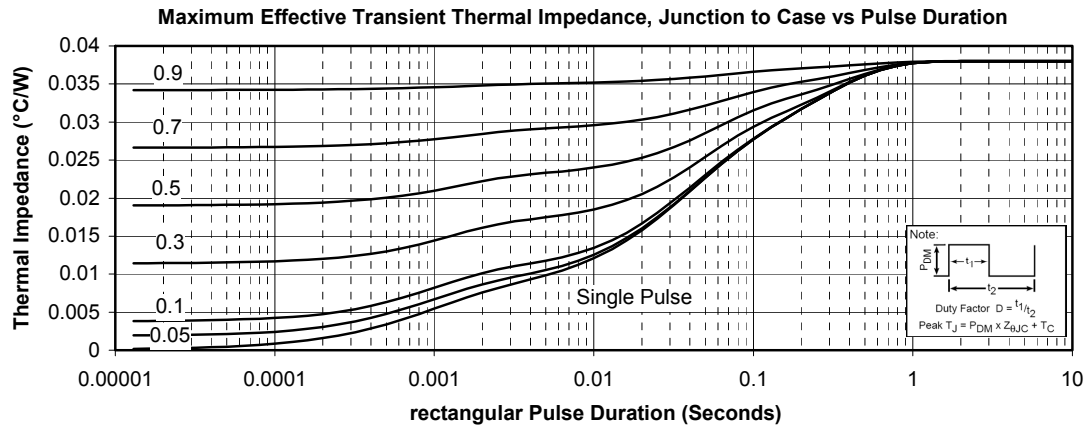
Thermal and package characteristics

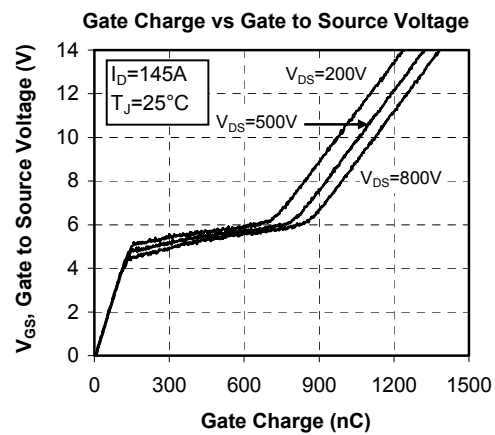
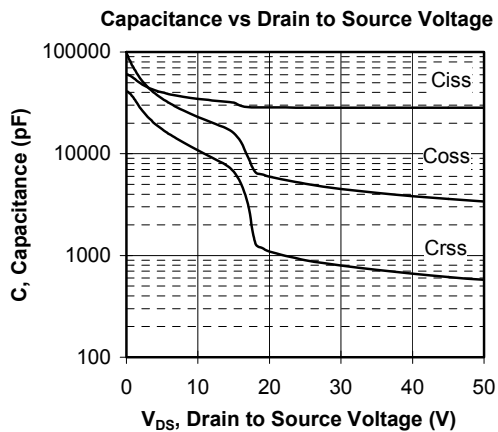
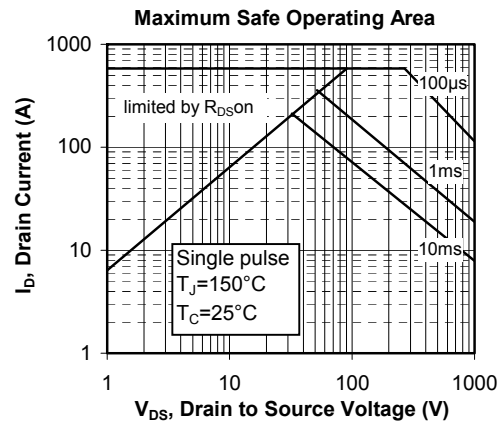
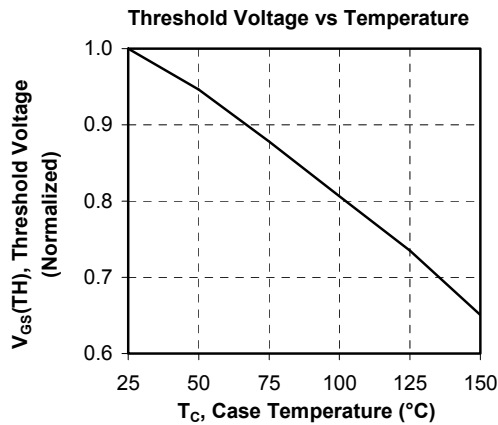
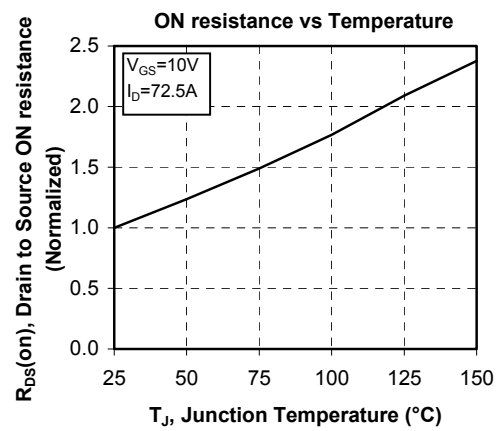
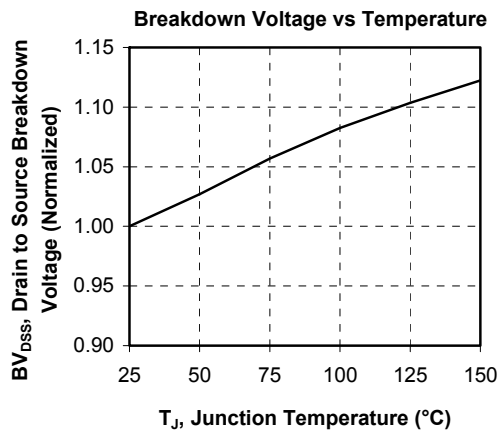
Symbol	Characteristic			Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T _J	Operating junction temperature range			-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions			-40	T _J max -25	
T _{STG}	Storage Temperature Range			-40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

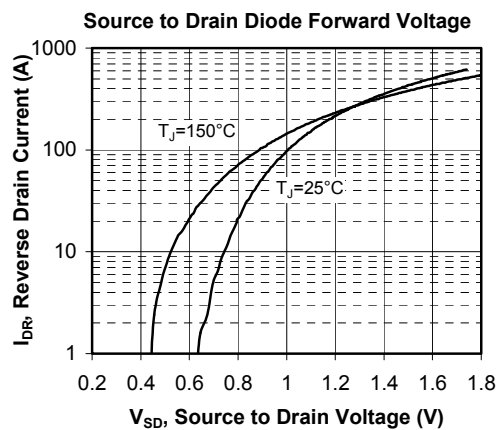
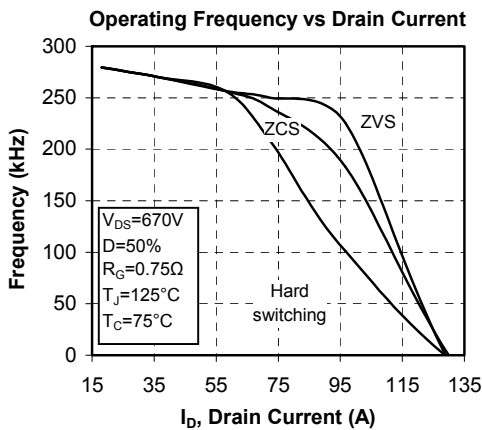
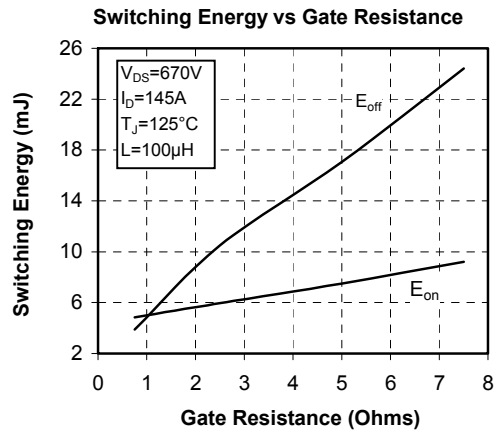
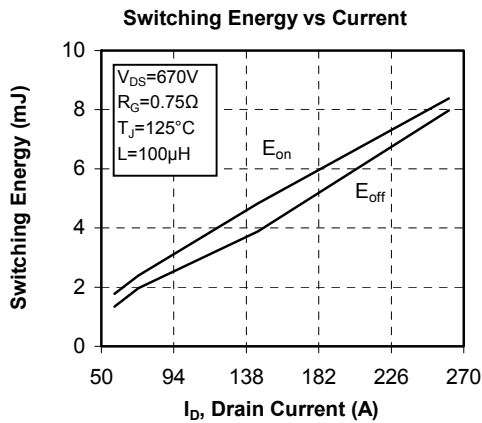
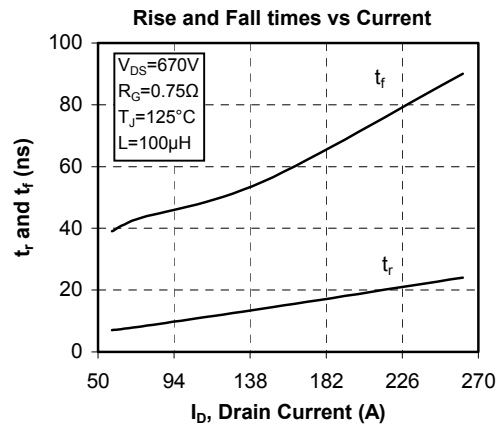
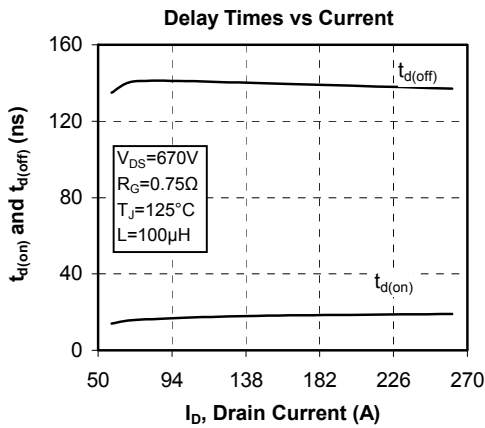
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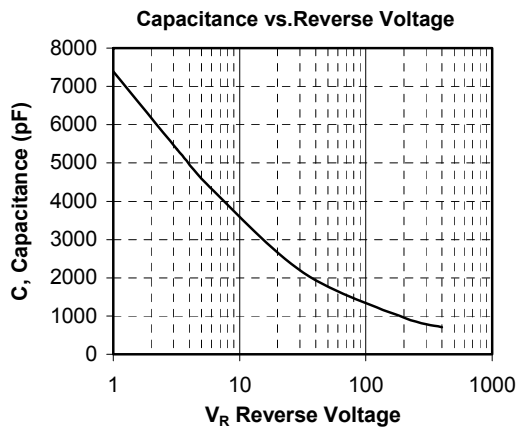
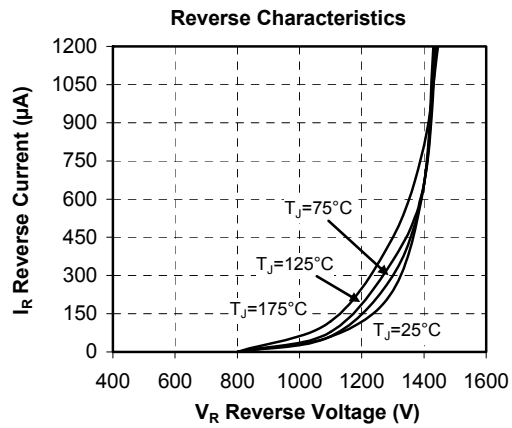
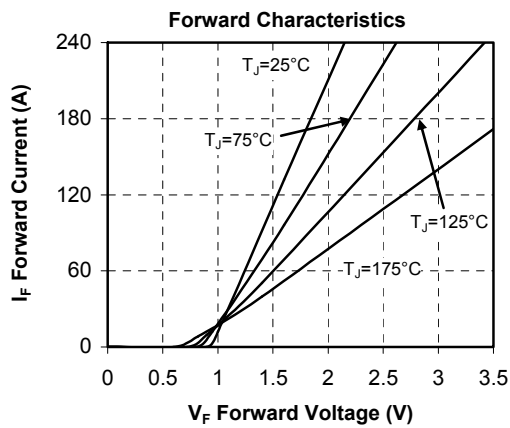
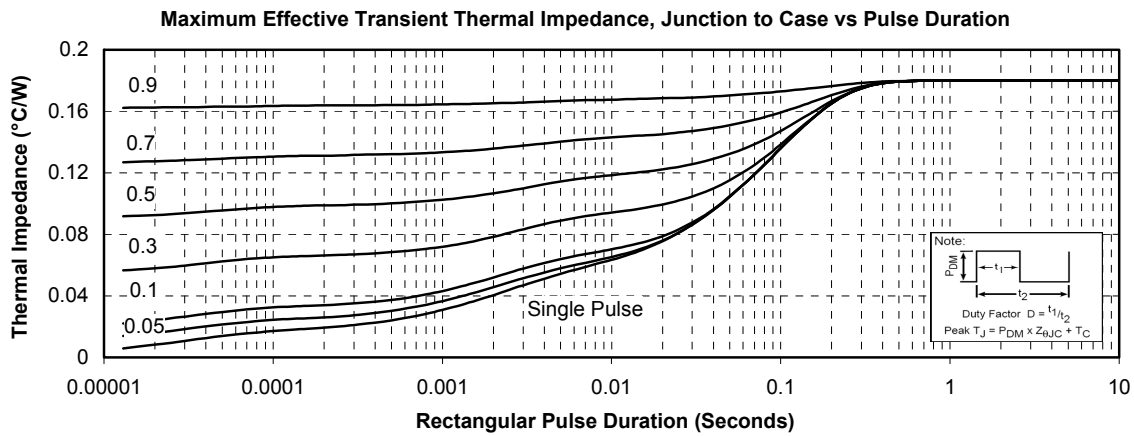
Typical MOSFET Performance Curve







Typical SiC Diode Performance Curve



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