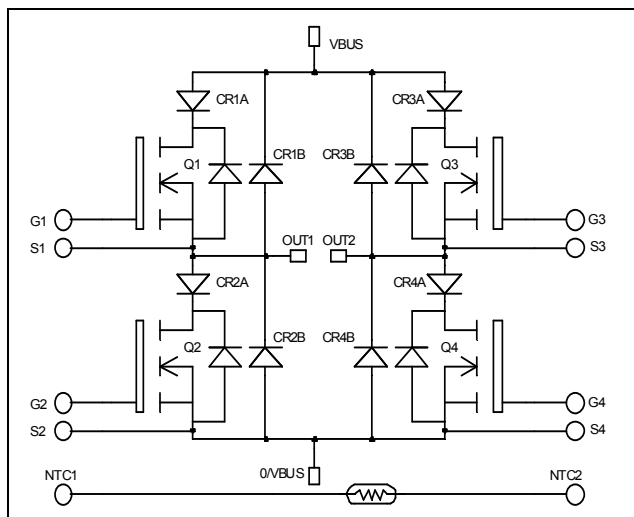


Full bridge Series & SiC parallel diodes MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 75m\Omega$ max @ $T_j = 25^\circ C$

$I_D = 46A$ @ $T_c = 25^\circ C$

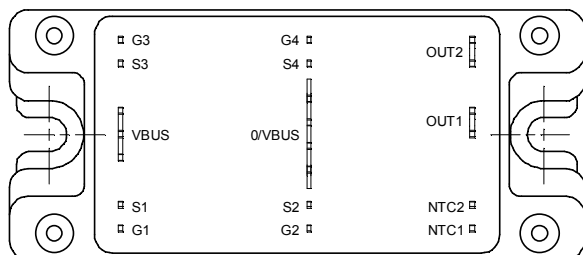


Application

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

Features

- *Power MOS 7[®] MOSFETs*
 - Low R_{DSon}
 - Low input and Miller capacitance
 - 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
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration



Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	46
		$T_c = 80^\circ C$	34
I_{DM}	Pulsed Drain current	184	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	75	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	357
I_{AR}	Avalanche current (repetitive and non repetitive)	46	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	2500	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V, T_j = 25^\circ\text{C}$			100	μA
		$V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$			500	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 23A$			75	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5mA$	3		5	V
I_{GSS}	Gate - Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		5590		pF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		1180		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		85		
Q_g	Total gate Charge	$V_{GS} = 10V$		123		nC
Q_{gs}	Gate - Source Charge	$V_{Bus} = 250V$		33		
Q_{gd}	Gate - Drain Charge	$I_D = 46A$		65		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 46A$ $R_G = 5\Omega$		18		ns
T_r	Rise Time			35		
$T_{d(off)}$	Turn-off Delay Time			87		
T_f	Fall Time			77		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		453		μJ
E_{off}	Turn-off Switching Energy ❶			726		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		745		μJ
E_{off}	Turn-off Switching Energy ❶			846		

❶ In accordance with JEDEC standard JESD24-1.

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle, $T_c = 85^\circ\text{C}$		30		A
V_F	Diode Forward Voltage	$I_F = 30A$		1.1	1.15	V
		$I_F = 60A$		1.4		
		$I_F = 30A, T_j = 125^\circ\text{C}$		0.9		
t_{rr}	Reverse Recovery Time	$I_F = 30A, V_R = 133V, di/dt = 200A/\mu s, T_j = 25^\circ\text{C}$		24		ns
		$T_j = 125^\circ\text{C}$		48		
Q_{rr}	Reverse Recovery Charge	$I_F = 30A, V_R = 133V, di/dt = 200A/\mu s, T_j = 25^\circ\text{C}$		33		nC
		$T_j = 125^\circ\text{C}$		150		

Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I _{F(AV)}	Maximum Average Forward Current	50% duty cycle	T _c = 125°C		20		A
V _F	Diode Forward Voltage	I _F = 20A	T _j = 25°C		1.6	1.8	V
			T _j = 175°C		2.0	2.4	
Q _C	Total Capacitive Charge	I _F = 20A, V _R = 300V di/dt = 800A/μs			28		nC
Q	Total Capacitance	f = 1MHz, V _R = 200V			130		pF
		f = 1MHz, V _R = 400V			100		

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case		Transistor			0.35	°C/W
			Series diode			1.2	
			Parallel diode			1.5	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, Isol<1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To Heatsink	M5			4.7	N.m
Wt	Package Weight					160	g

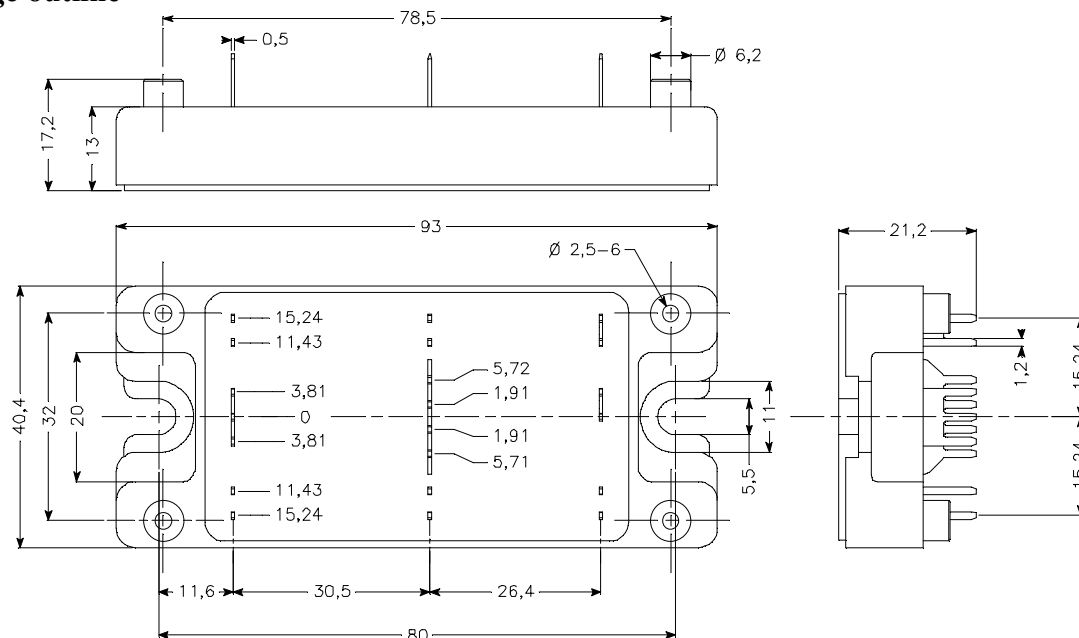
Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		68		kΩ
B _{25/85}	T ₂₅ = 298.16 K		4080		K

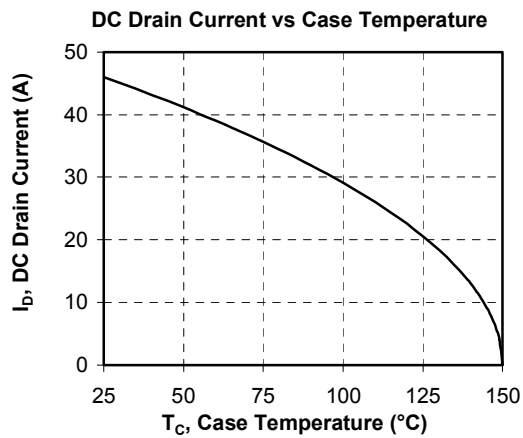
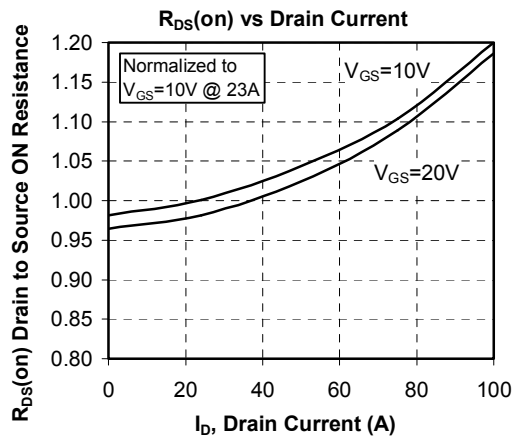
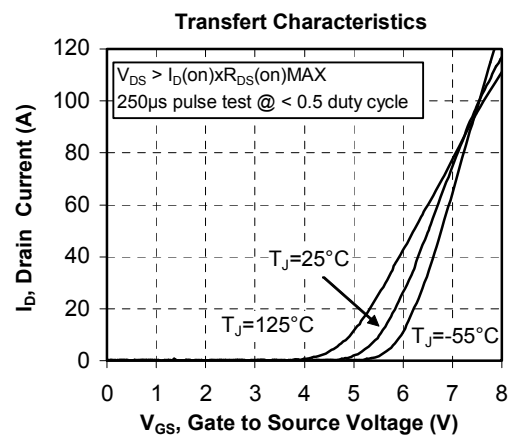
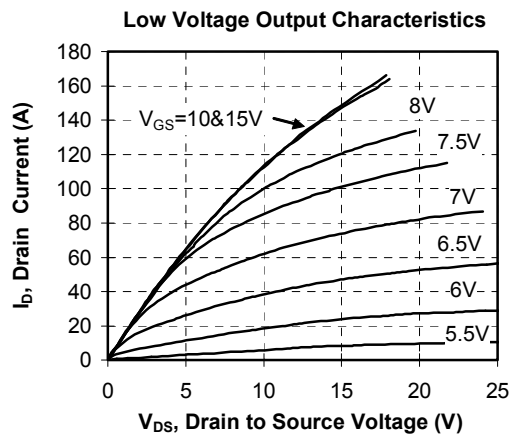
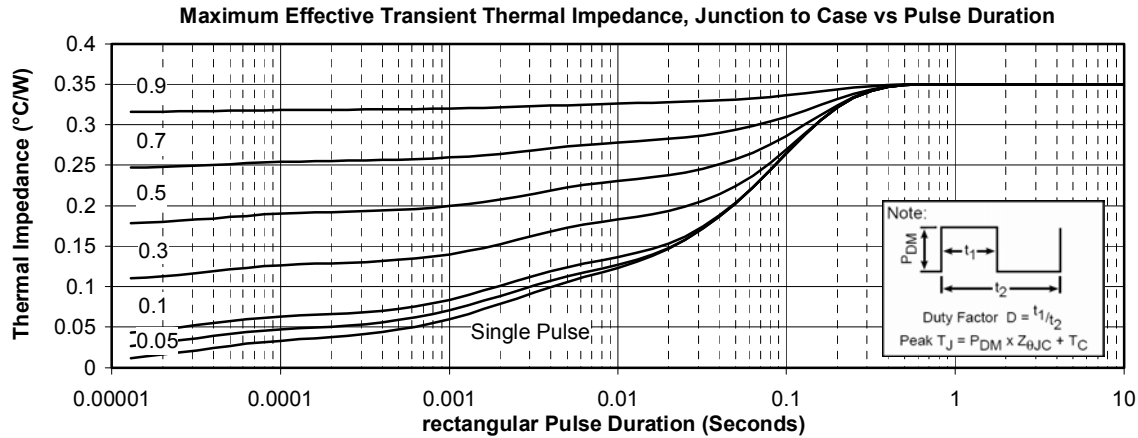
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

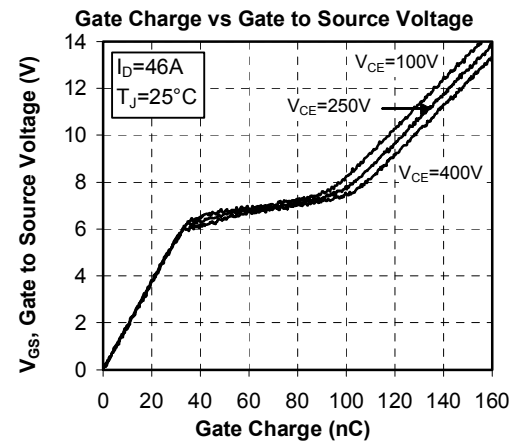
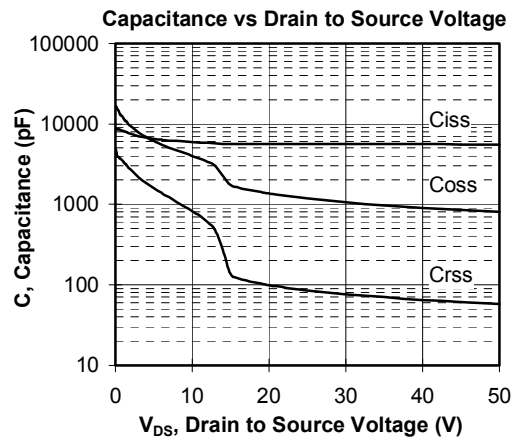
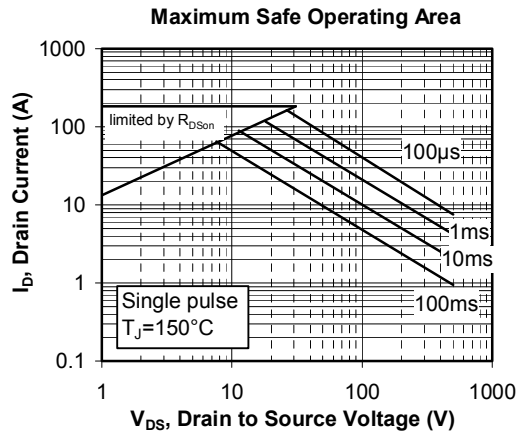
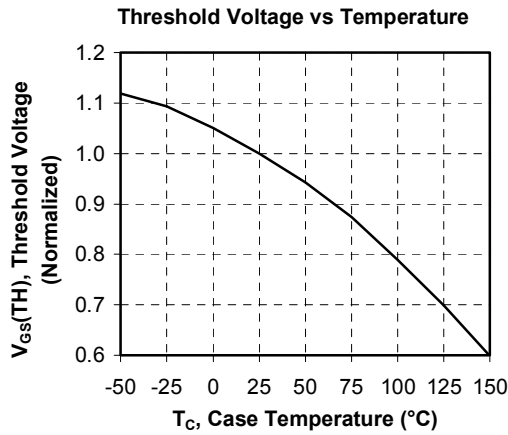
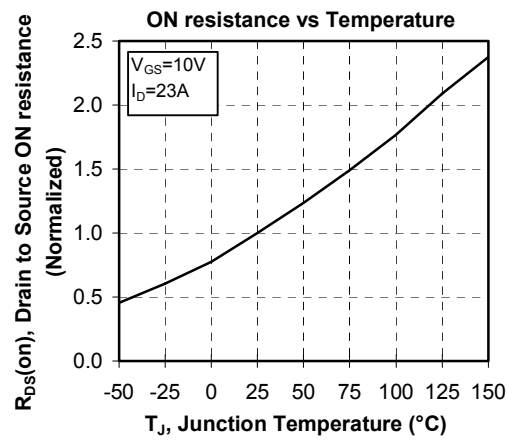
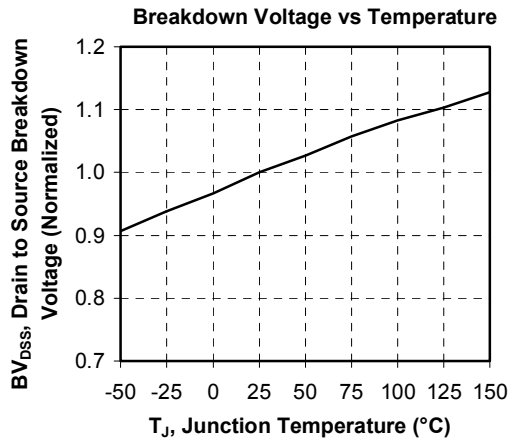
T: Thermistor temperature
R_T: Thermistor value at T

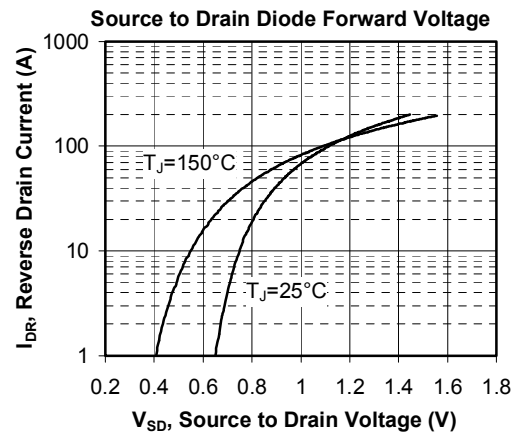
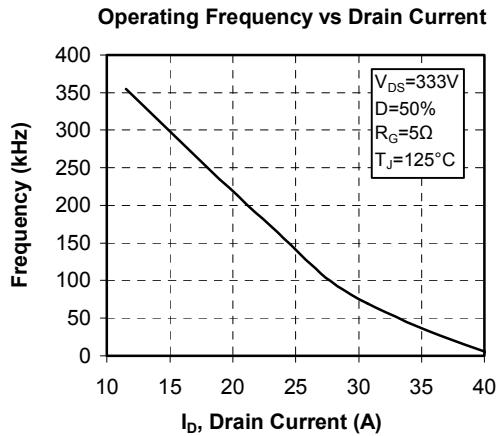
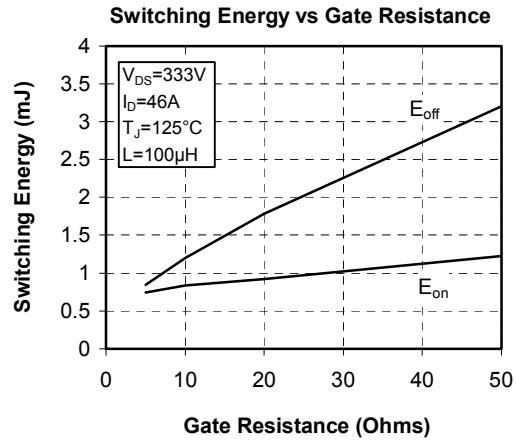
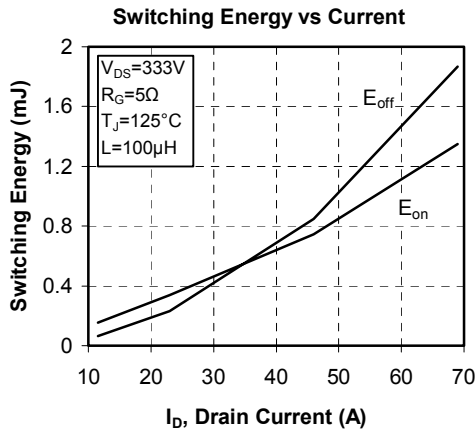
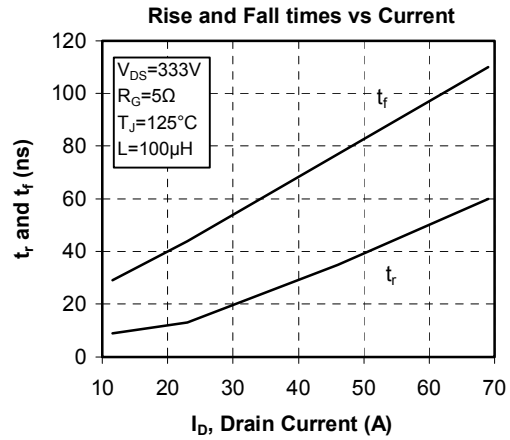
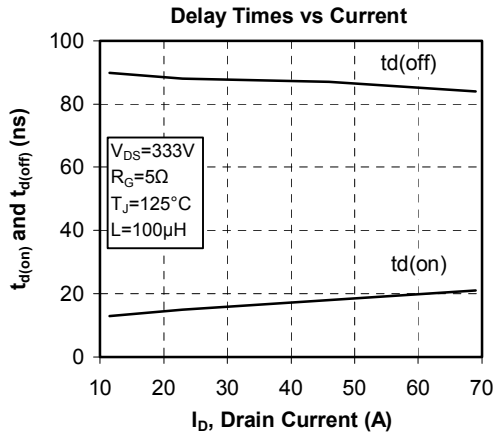
Package outline



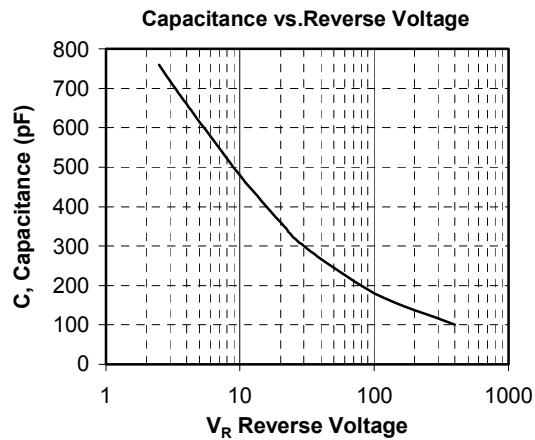
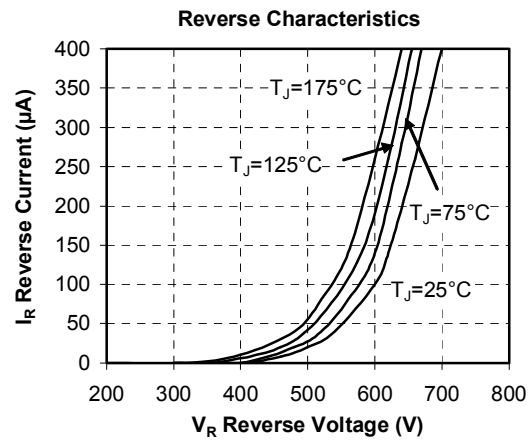
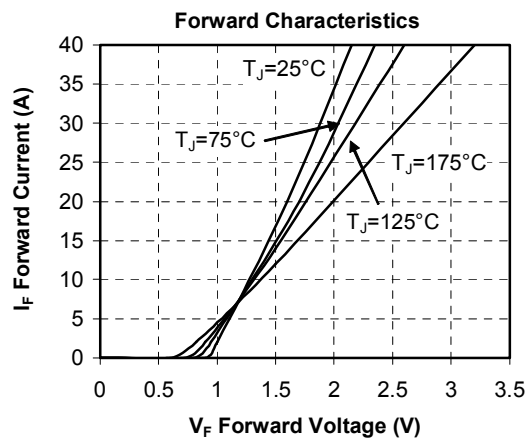
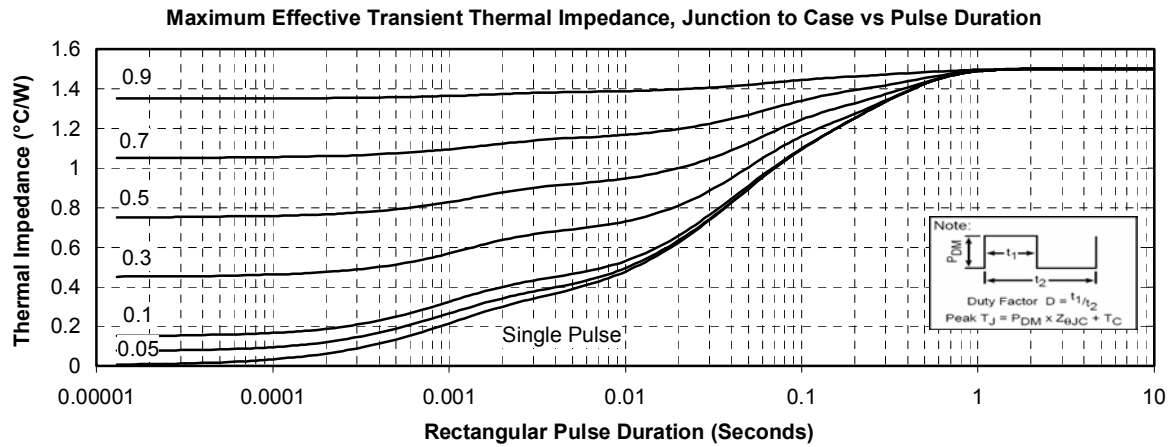
Typical MOSFET Performance Curve







Typical SiC Diode Performance Curve



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