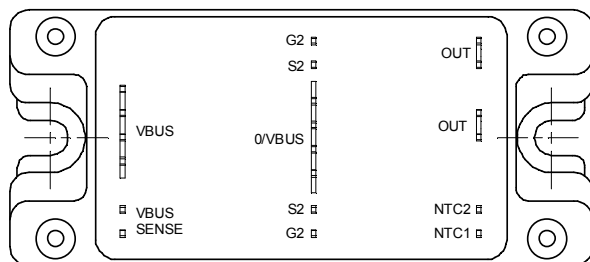
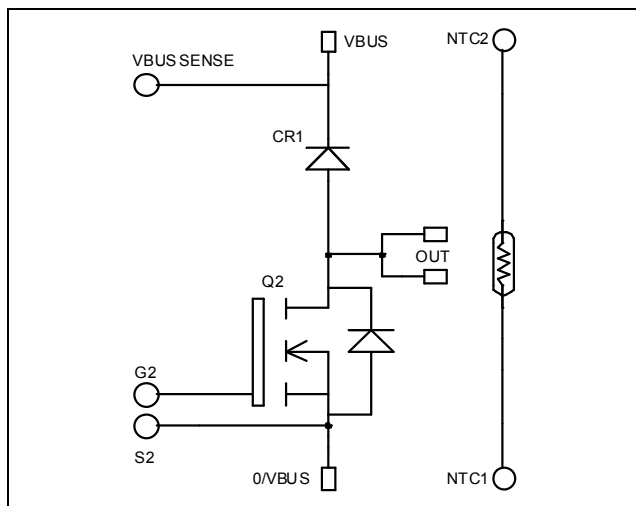


Boost chopper SiC FWD diode MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 38m\Omega$ max @ $T_j = 25^\circ C$

$I_D = 90A$ @ $T_c = 25^\circ C$



Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- **Power MOS 7[®] MOSFETs**
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
- **FWD 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 inductance²
 - 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	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	360	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	38	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	W
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	$V_{GS} = 0V, I_D = 375\mu A$	500			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V, T_j = 25^\circ\text{C}$			150	μA
		$V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$			750	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 45A$			38	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5mA$	3		5	V
I_{GSS}	Gate - Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		11.2		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		2.36		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.18		
Q_g	Total gate Charge	$V_{GS} = 10V$		246		nC
Q_{gs}	Gate - Source Charge	$V_{Bus} = 250V$		66		
Q_{gd}	Gate - Drain Charge	$I_D = 90A$		130		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 90A$ $R_G = 2\Omega$		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 $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 90A, R_G = 2\Omega$		906		μJ
E_{off}	Turn-off Switching Energy ❶			1452		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 90A, R_G = 2\Omega$		1490		μJ
E_{off}	Turn-off Switching Energy ❶			1692		

❶ In accordance with JEDEC standard JESD24-1.

Diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle, $T_c = 125^\circ\text{C}$		60		A
V_F	Diode Forward Voltage	$I_F = 60A$	$T_j = 25^\circ\text{C}$	1.6	1.8	V
			$T_j = 175^\circ\text{C}$	2.0	2.4	
Q_C	Total Capacitive Charge	$I_F = 60A, V_R = 300V$ $di/dt = 1600A/\mu s$		84		nC
Q	Total Capacitance	$f = 1MHz, V_R = 200V$		390		pF
		$f = 1MHz, V_R = 400V$		300		

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
R _{thJC}	Junction to Case	Transistor		0.18	°C/W
		Diode		0.45	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I _{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

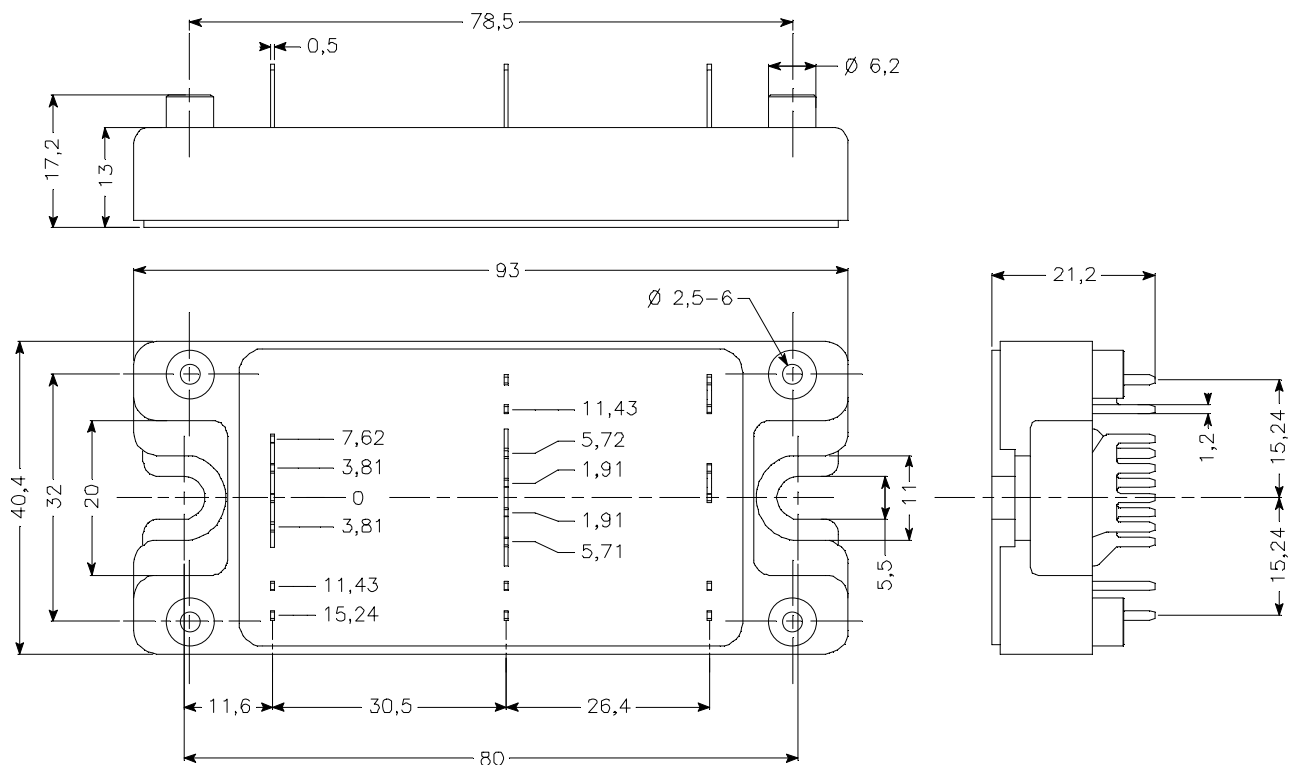
Temperature sensor NTC

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

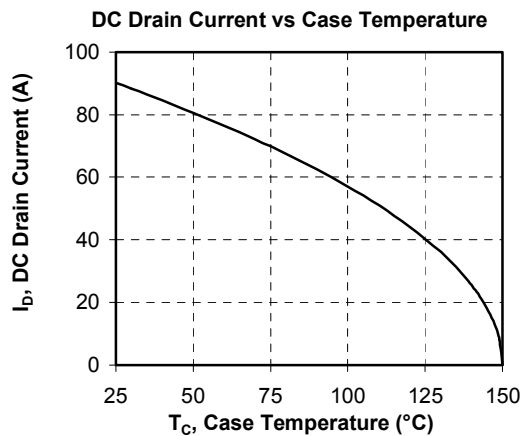
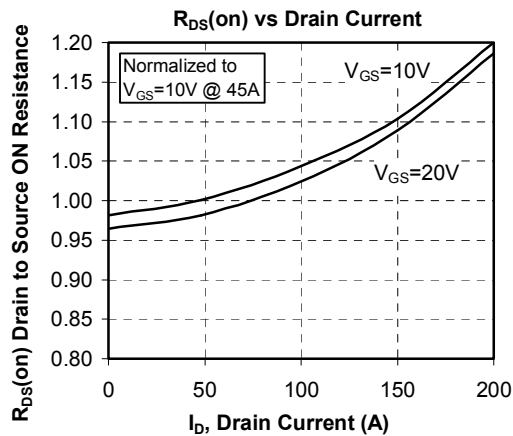
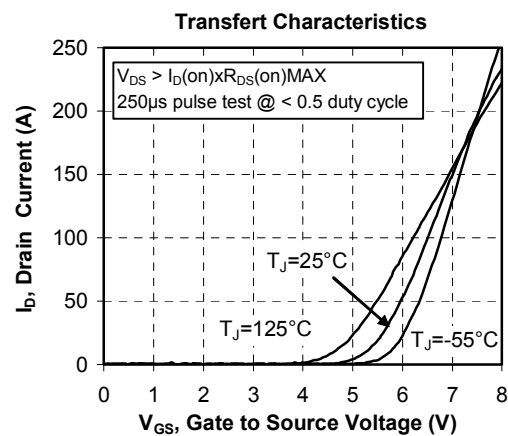
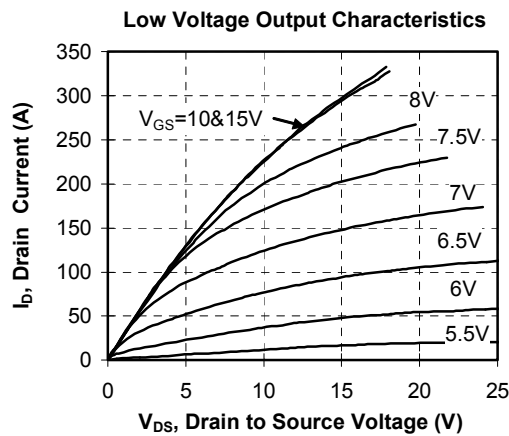
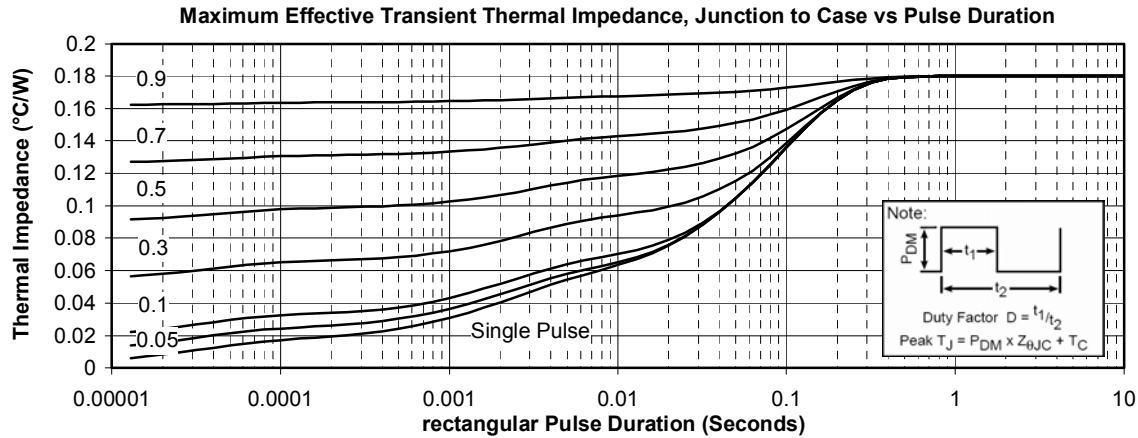
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

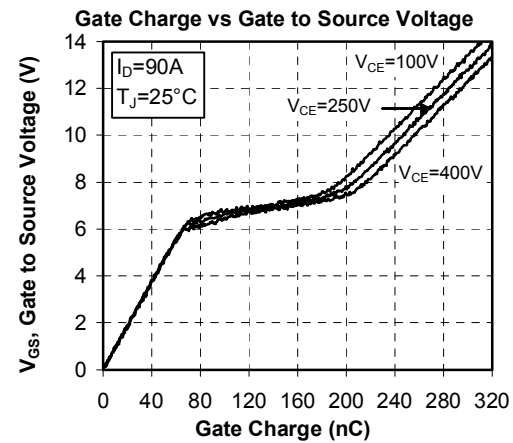
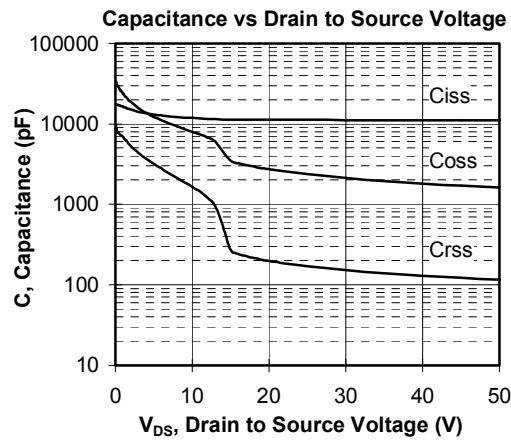
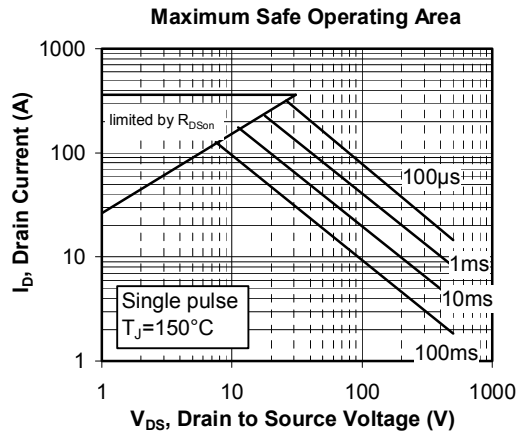
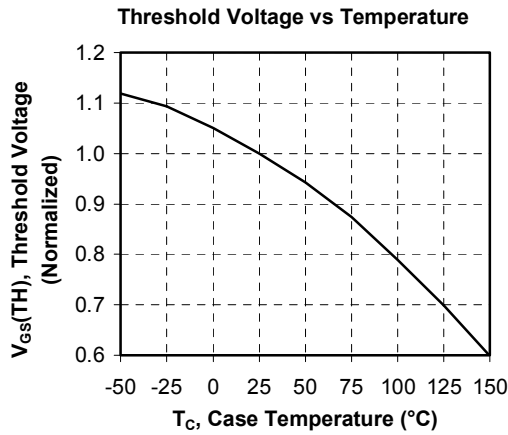
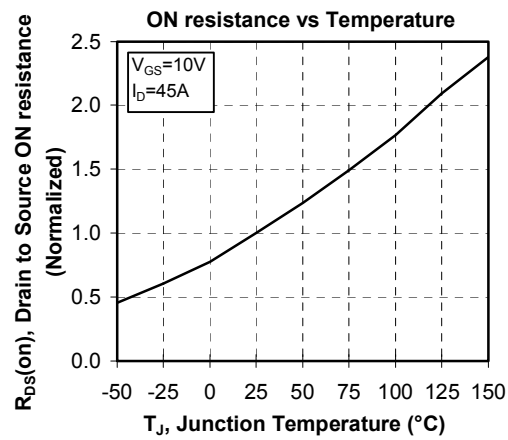
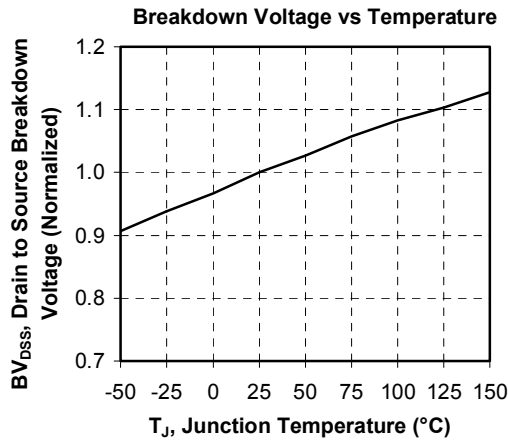
T: Thermistor temperature
R_T: Thermistor value at T

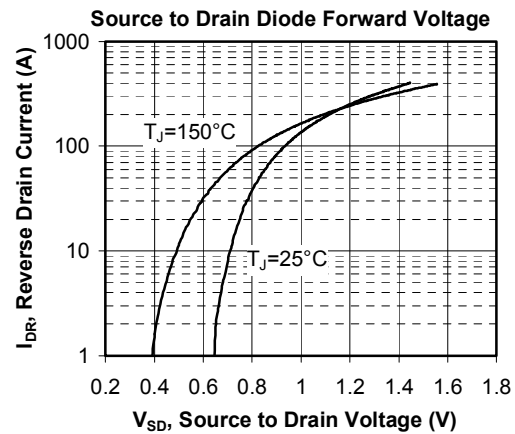
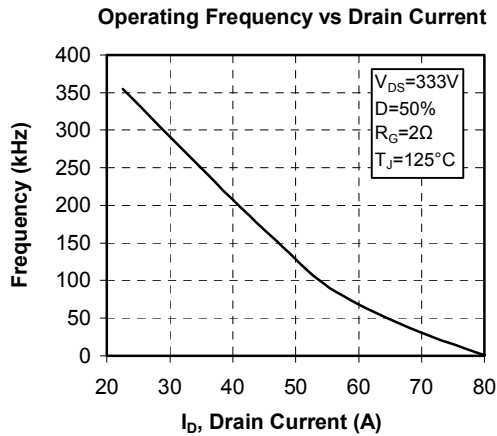
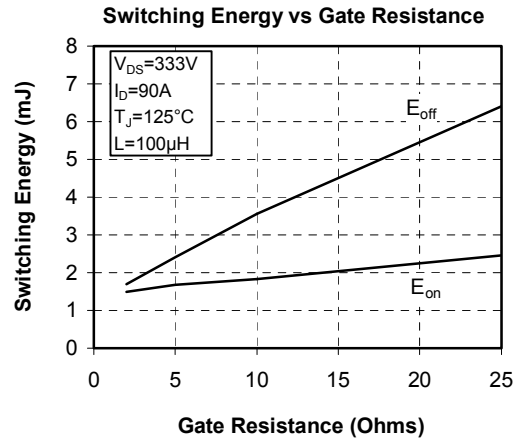
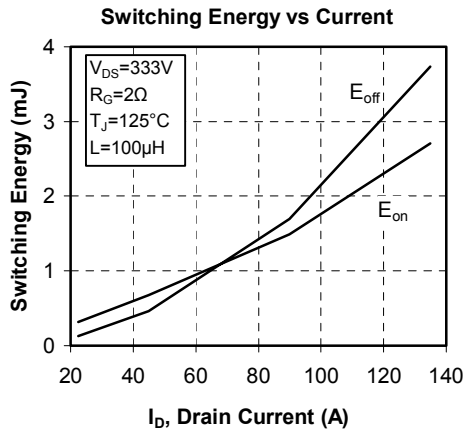
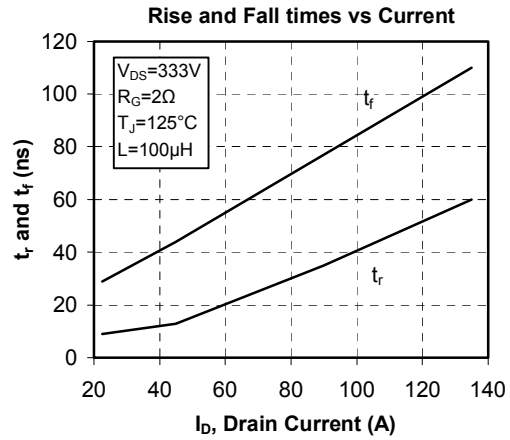
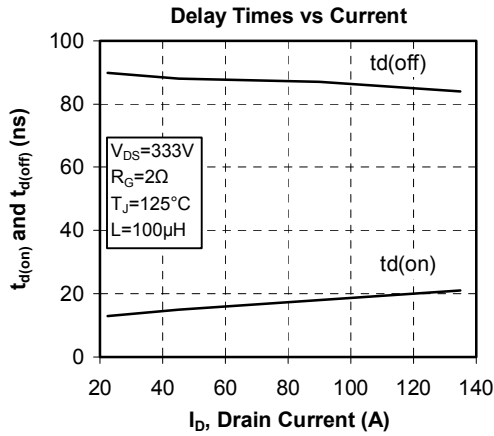
Package outline



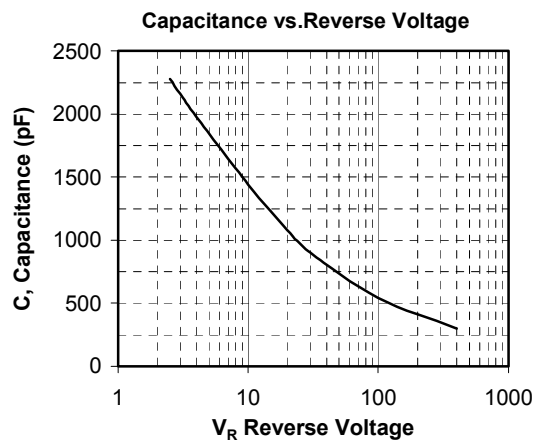
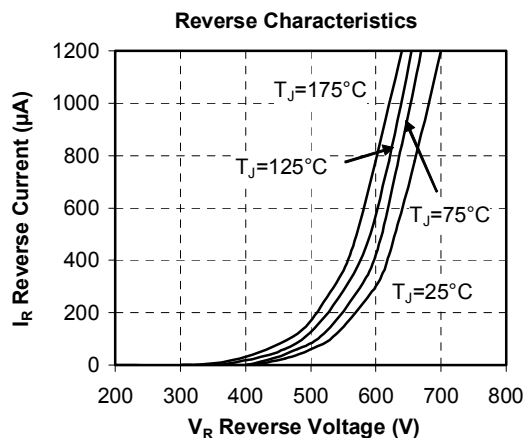
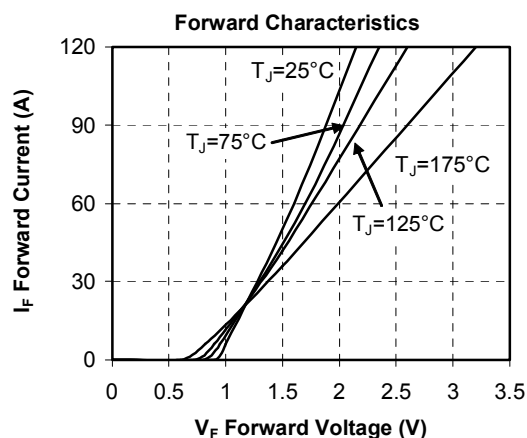
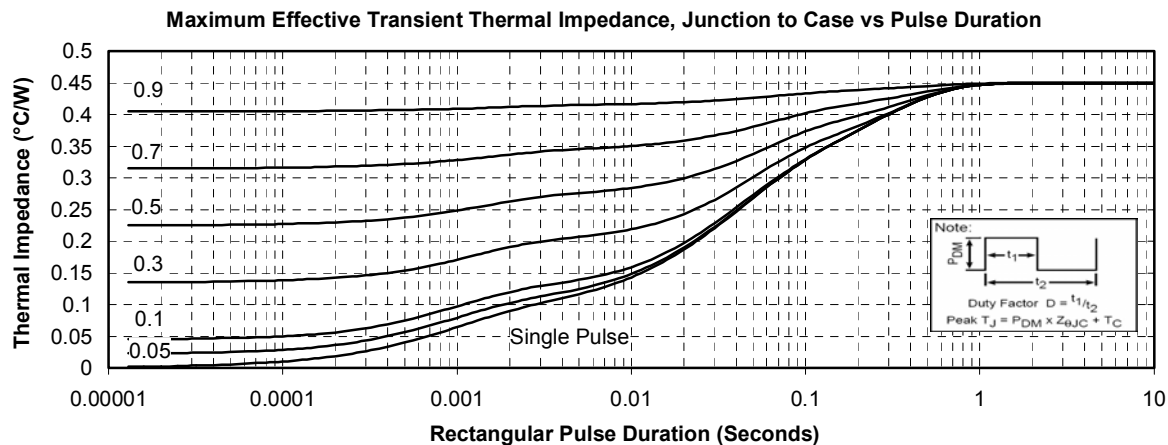
Typical MOSFET Performance Curve







Typical SiC Diode Performance Curve



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