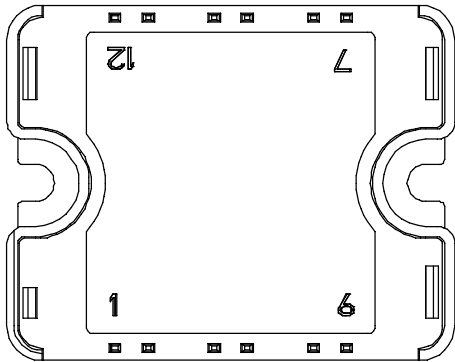
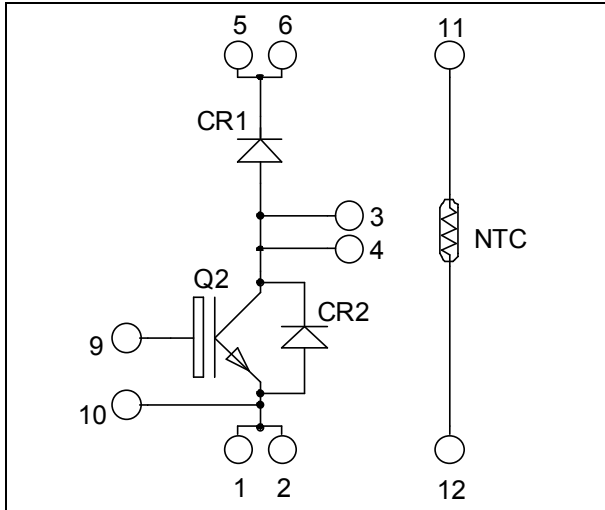


**Boost chopper
NPT IGBT
SiC Chopper diode**

**$V_{CES} = 1200V$
 $I_C = 50A @ T_c = 80^\circ C$**



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Application

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

Features

- **Non Punch Through (NPT) Fast IGBT**
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Low leakage current
 - RBSOA and SCSOA rated
- **Chopper SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Very low stray inductance
- 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
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	75
		$T_c = 80^\circ C$	50
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	150
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	312
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	100A @ 1200V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$			250	μA
		$V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$		500	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$		3.2	3.7	V
		$I_C = 50\text{A}$	$T_j = 125^\circ\text{C}$	4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE2}, I_C = 1\text{mA}$	4.5		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		3450		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		330		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		220		
Q_g	Total gate Charge	$V_{GS} = 15\text{V}$		330		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 600\text{V}$		35		
Q_{gc}	Gate – Collector Charge	$I_C = 50\text{A}$		200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		35		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		65		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		320		
T_f	Fall Time	$I_C = 50\text{A}$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		35		ns
T_r	Rise Time	$V_{GE} = \pm 15\text{V}$		65		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		360		
T_f	Fall Time	$I_C = 50\text{A}$		40		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$	$T_j = 125^\circ\text{C}$	4.2		mJ
E_{off}	Turn-off Switching Energy	$V_{Bus} = 600\text{V}$				
		$I_C = 50\text{A}$	$T_j = 125^\circ\text{C}$	3.05		
		$R_G = 5\ \Omega$				
I_{sc}	Short Circuit data	$V_{GE} \leq 15\text{V}; V_{Bus} = 900\text{V}$		300		A
		$t_p \leq 10\ \mu\text{s}; T_j = 125^\circ\text{C}$				

Chopper SiC diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$	64	400	μA
			$T_j = 175^\circ\text{C}$	112	2000	
I_F	DC Forward Current	$T_c = 100^\circ\text{C}$		20		A
V_F	Diode Forward Voltage	$I_F = 20\text{A}$	$T_j = 25^\circ\text{C}$	1.6	1.8	V
			$T_j = 175^\circ\text{C}$	2.3	3	
Q_C	Total Capacitive Charge	$I_F = 20\text{A}, V_R = 600\text{V}$ $di/dt = 1000\text{A}/\mu\text{s}$		80		nC
C	Total Capacitance	$f = 1\text{MHz}, V_R = 200\text{V}$		192		pF
		$f = 1\text{MHz}, V_R = 400\text{V}$		138		

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.4	°C/W	
		SiC Chopper Diode		1		
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	°C	
T _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight				80	g

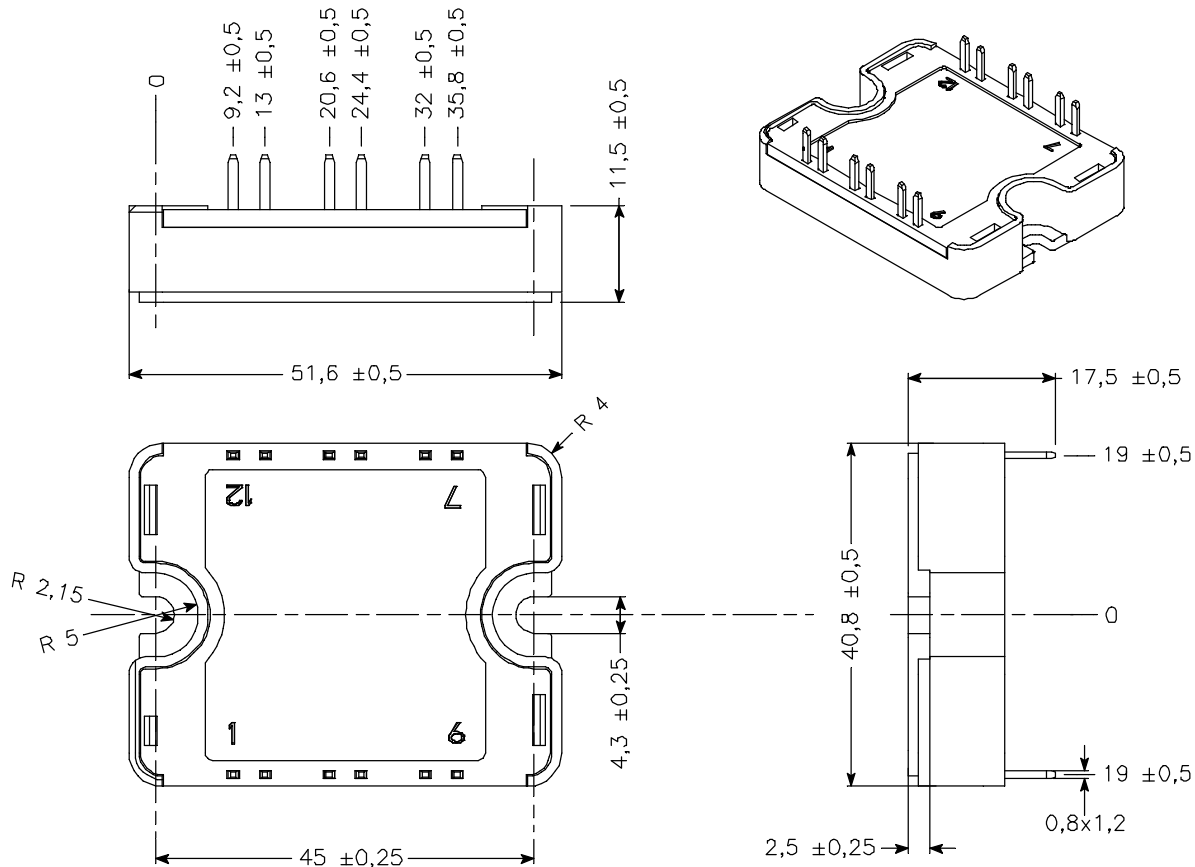
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

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

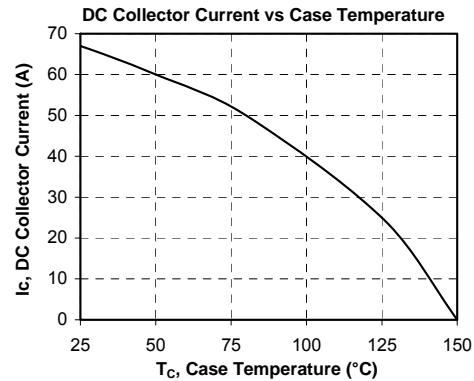
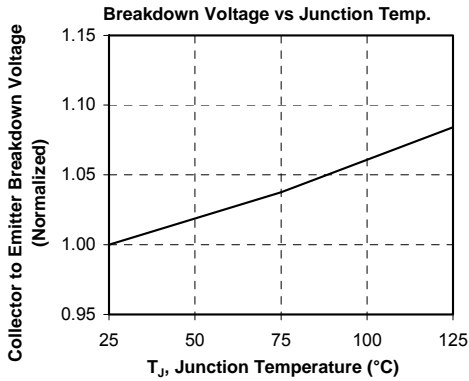
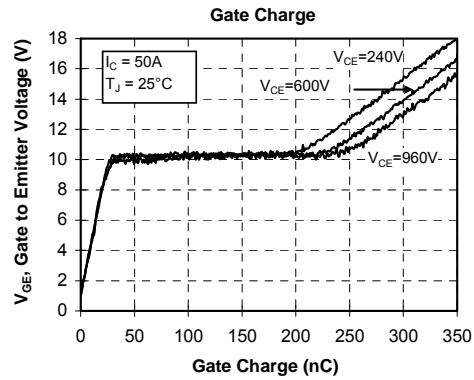
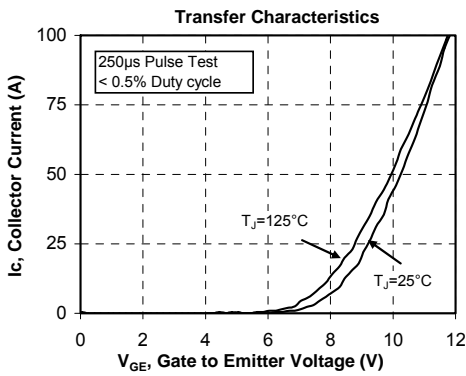
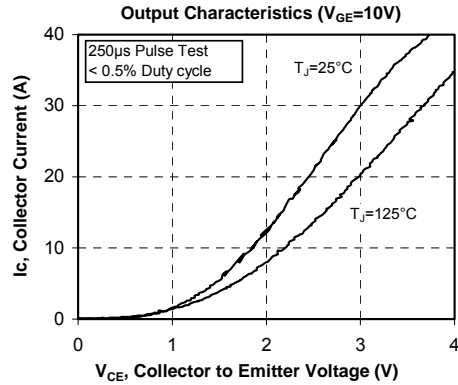
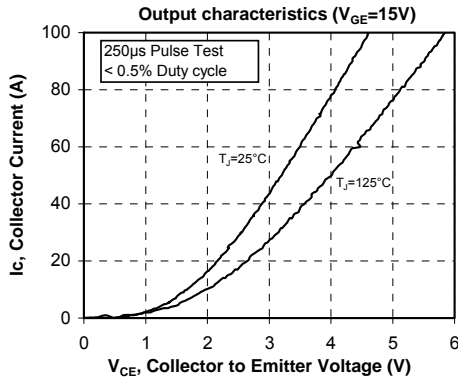
T: Thermistor temperature
 R_T: Thermistor value at T

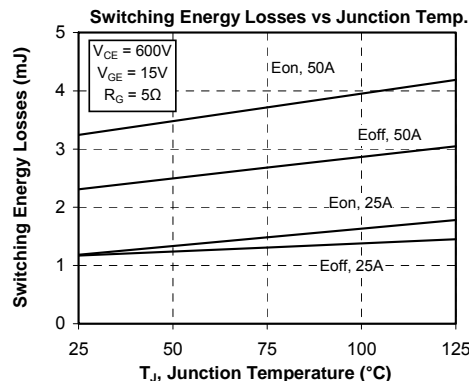
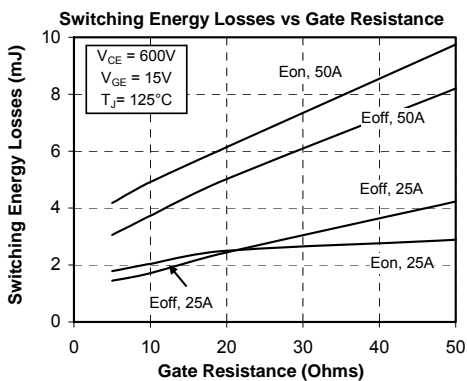
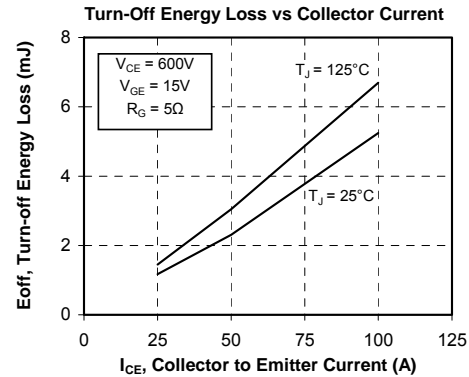
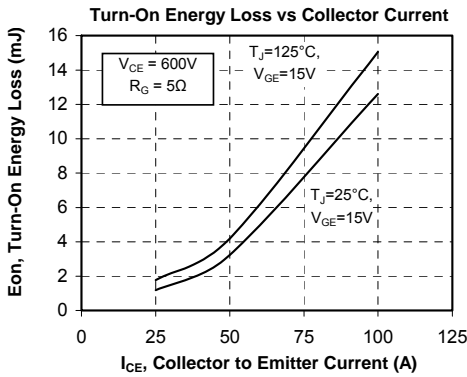
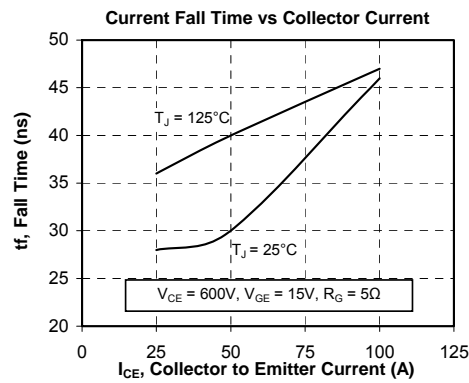
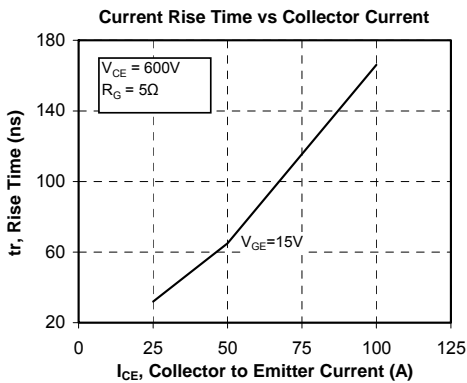
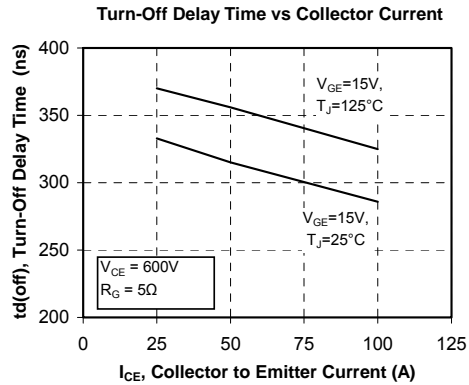
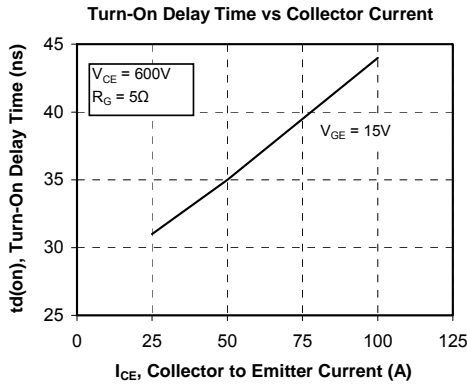
SP1 Package outline (dimensions in mm)

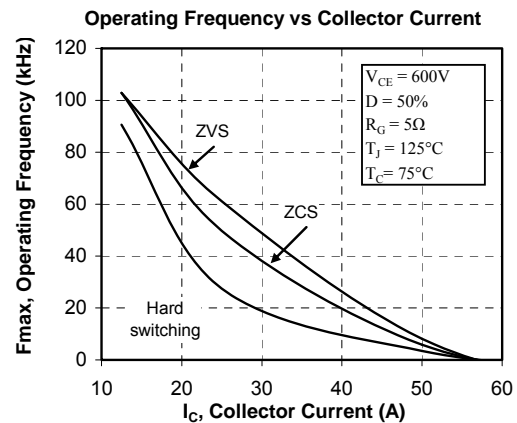
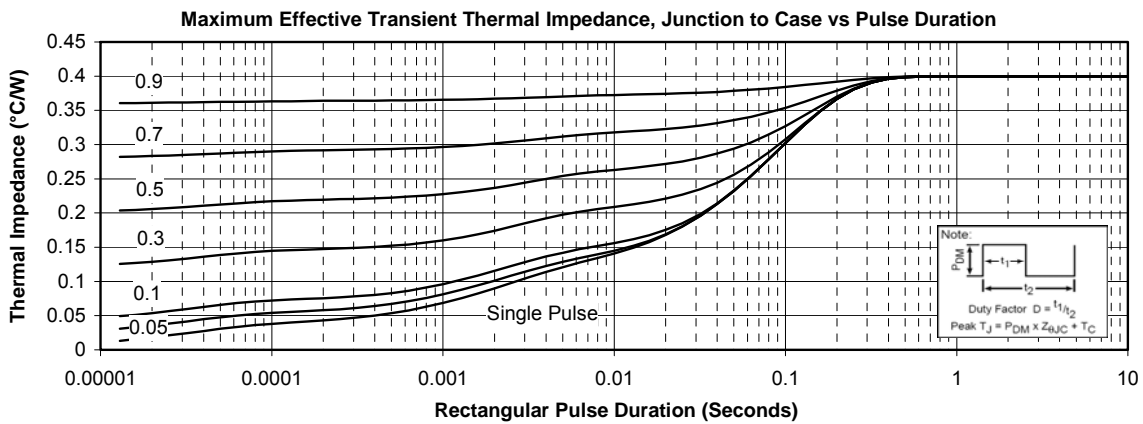
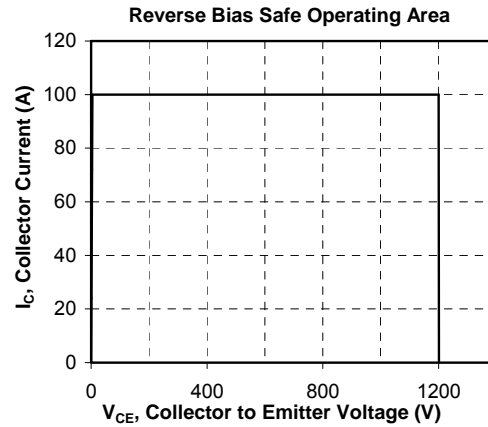
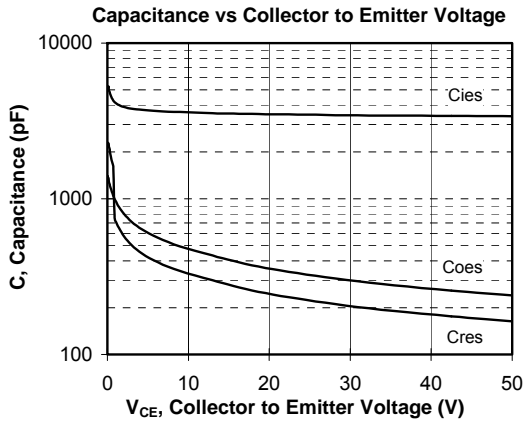


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

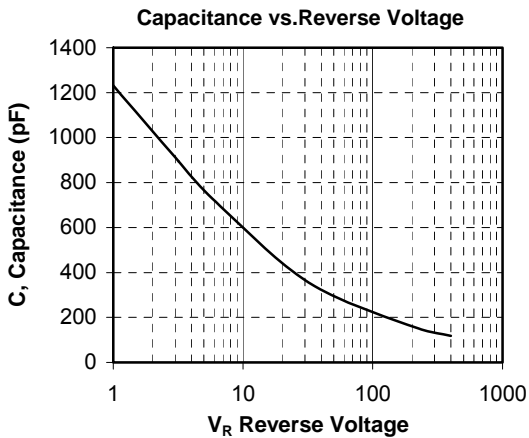
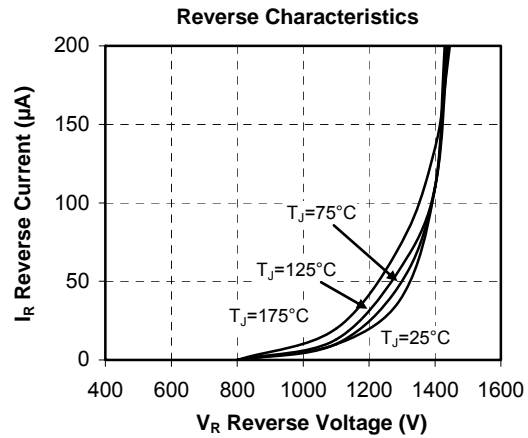
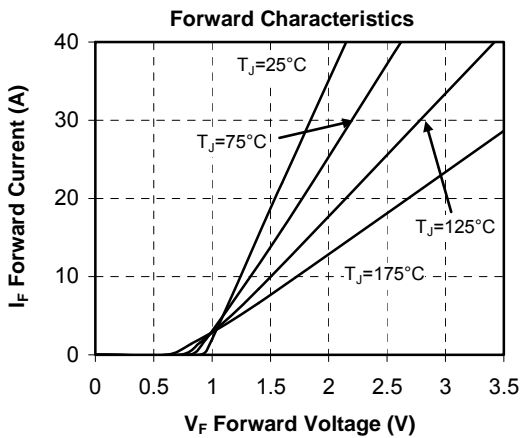
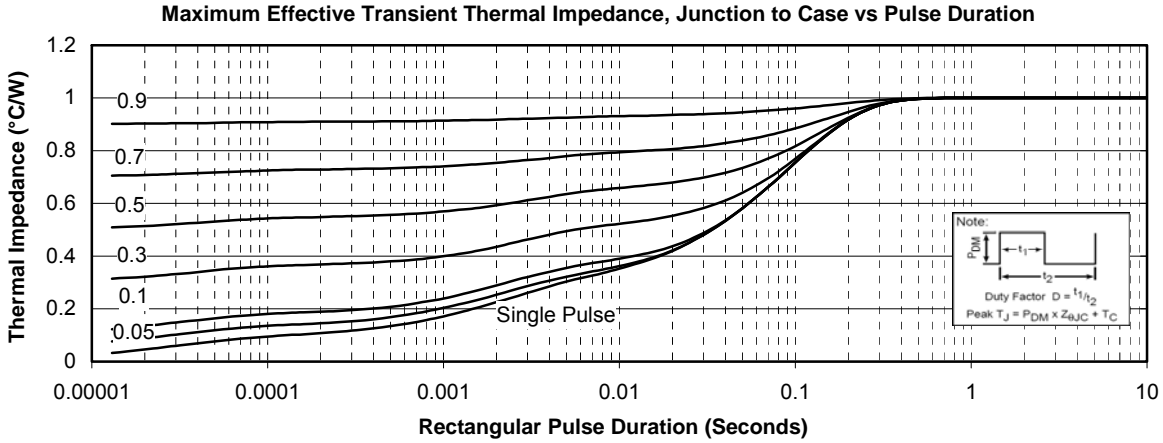
Typical IGBT Performance Curve







Typical SiC chopper diode Performance Curve



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