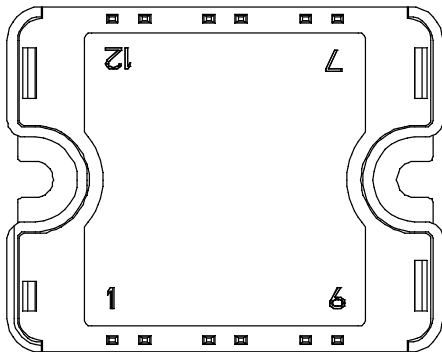
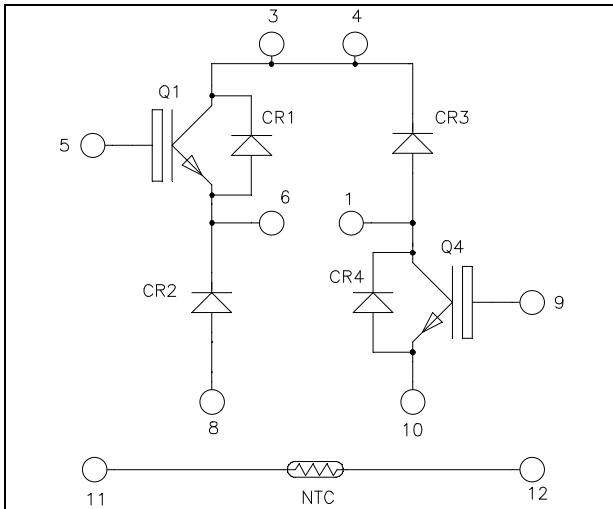


Asymmetrical - Bridge NPT IGBT Power Module

$V_{CES} = 600V$
 $I_C = 50A^* @ T_c = 80^\circ C$



Pins 3/4 must be shorted together

Application

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

Features

- Non Punch Through (NPT) Fast IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 100 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Very low stray inductance
 - Symmetrical design
- 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	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	65*
		$T_C = 80^\circ C$	50*
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	230
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	250
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	100A @ 500V

* Specification of IGBT device but output current must be limited to 40A to not exceed a delta of temperature greater than 35°C for the connectors.

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	$V_{GE} = 0V$ $V_{CE} = 600V$	$T_j = 25^\circ\text{C}$		250	μA	
			$T_j = 125^\circ\text{C}$		500		
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$	1.7	2.0	2.45	V
			$T_j = 125^\circ\text{C}$	2.2			
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1mA$		4	6	V	
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA	

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		2200		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		323		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		200		
Q_g	Total gate Charge	$V_{GE} = 15V$		166		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 300V$		20		
Q_{gc}	Gate – Collector Charge	$I_C = 50A$		100		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		40		ns
T_r	Rise Time	$V_{GE} = 15V$		9		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400V$		120		
T_f	Fall Time	$I_C = 50A$ $R_G = 2.7\Omega$		12		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		42		ns
T_r	Rise Time	$V_{GE} = 15V$		10		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400V$		130		
T_f	Fall Time	$I_C = 50A$ $R_G = 2.7\Omega$		21		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 400V$	$T_j = 125^\circ\text{C}$	0.5		mJ
E_{off}	Turn-off Switching Energy	$I_C = 50A$ $R_G = 2.7\Omega$	$T_j = 125^\circ\text{C}$	1		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 10\mu\text{s} ; T_j = 125^\circ\text{C}$		225		A

Diode ratings and characteristics (CR2 & CR3)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		25	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	30		A
V_F	Diode Forward Voltage	$I_F = 30A$		1.8	2.2	V
		$I_F = 60A$		2.2		
		$I_F = 30A$	$T_j = 125^\circ\text{C}$	1.5		
t_{rr}	Reverse Recovery Time	$I_F = 30A$ $V_R = 400V$	$T_j = 25^\circ\text{C}$	25		ns
			$T_j = 125^\circ\text{C}$	160		
Q_{rr}	Reverse Recovery Charge	$di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	35		nC
			$T_j = 125^\circ\text{C}$	480		

CR1 & CR4 are IGBT protection diodes only

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.5	°C/W	
		Diode		1.2		
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 _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

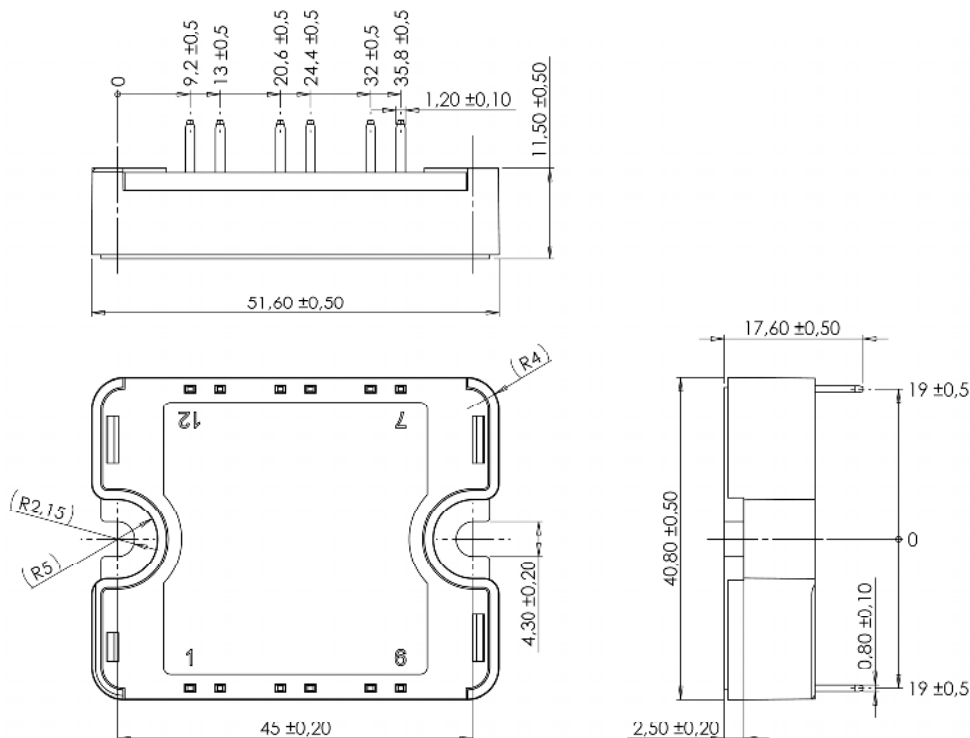
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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		%

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

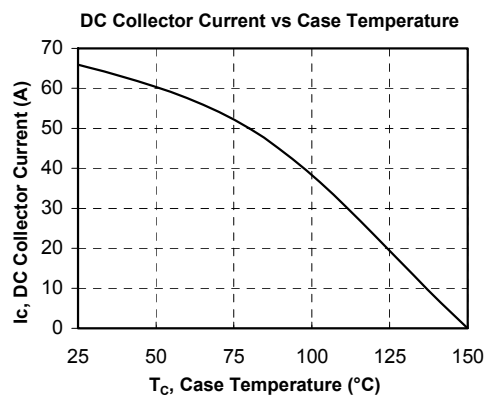
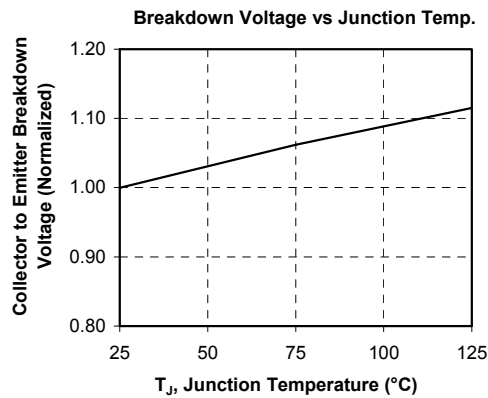
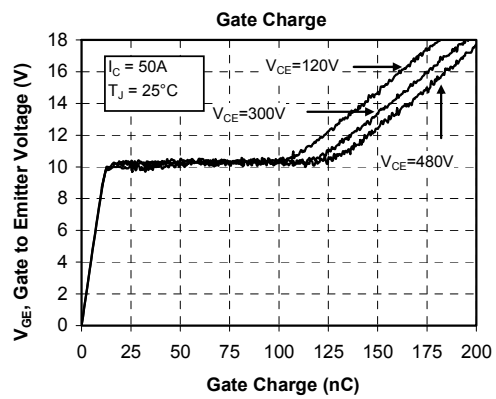
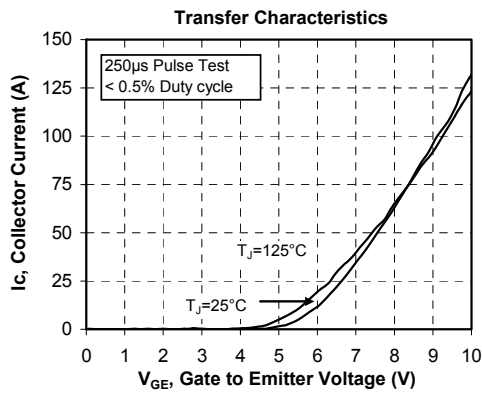
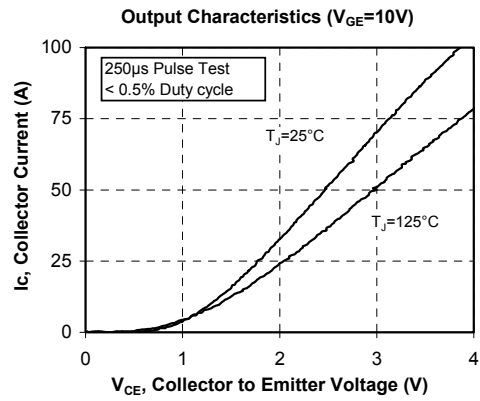
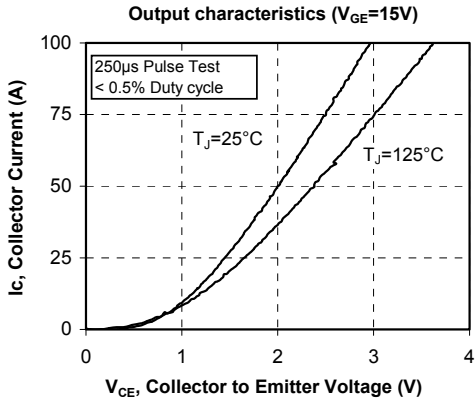
T: Thermistor temperature
 R_T: Thermistor value at T

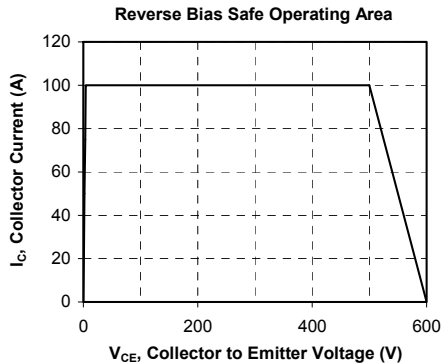
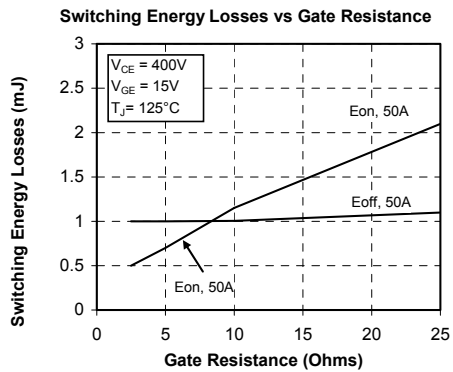
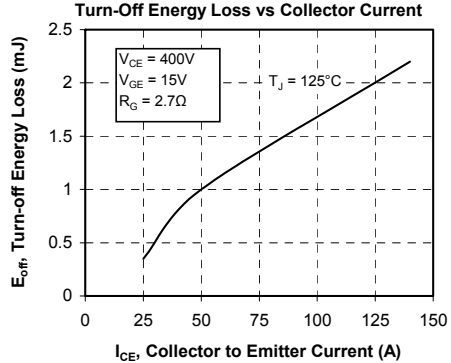
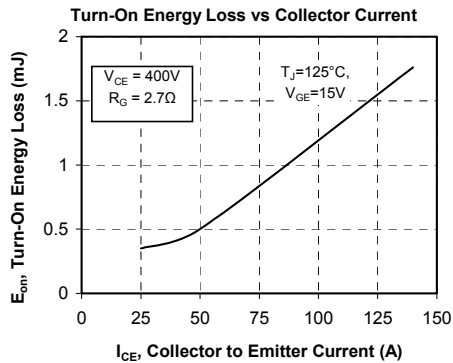
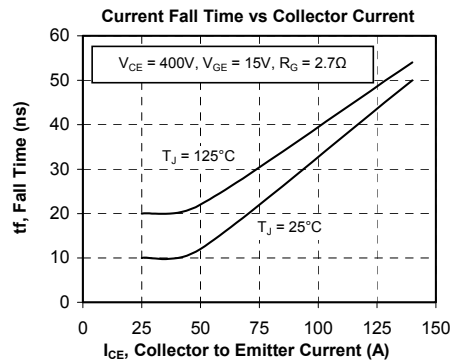
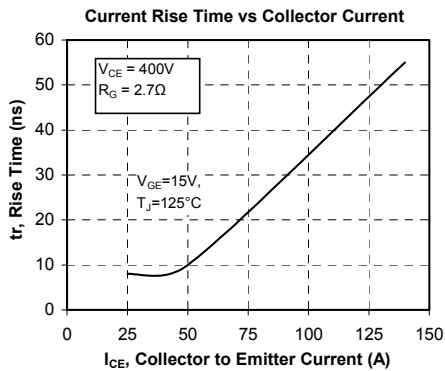
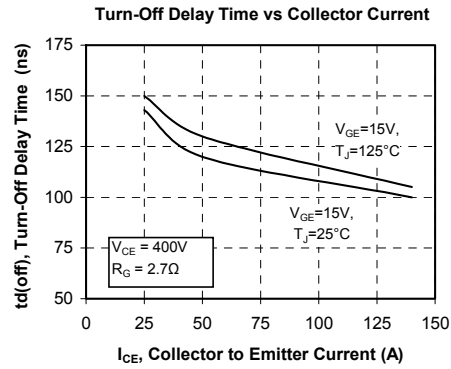
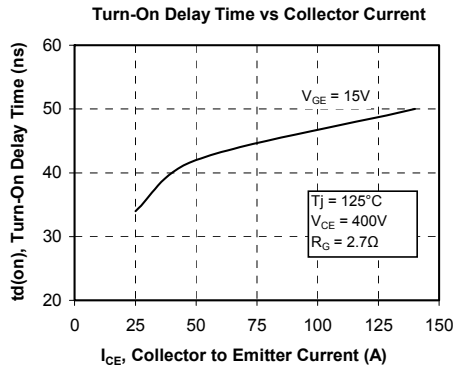
SP1 Package outline (dimensions in mm)

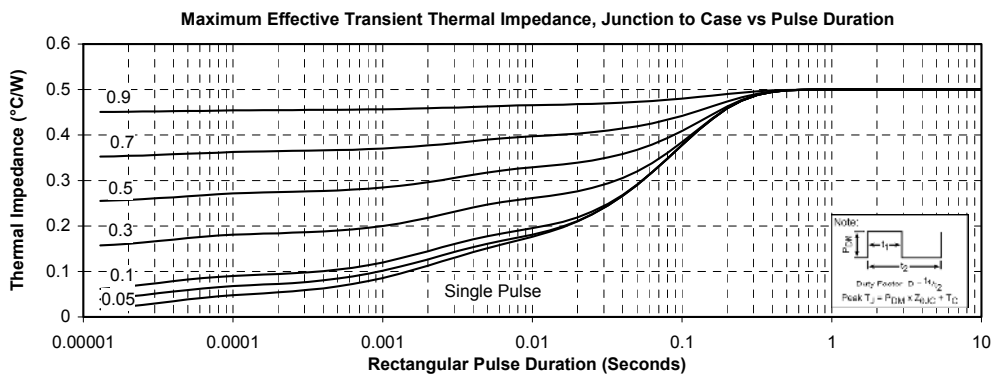
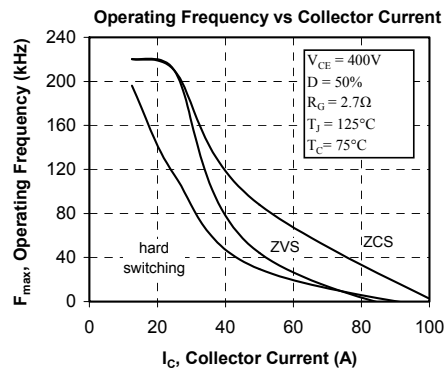
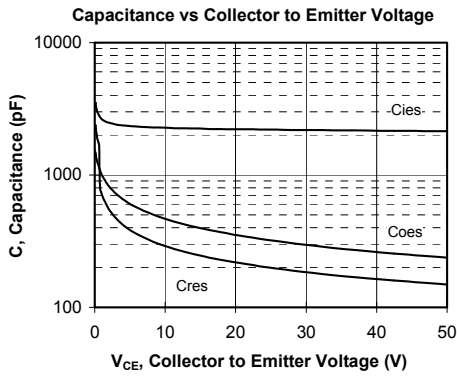


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

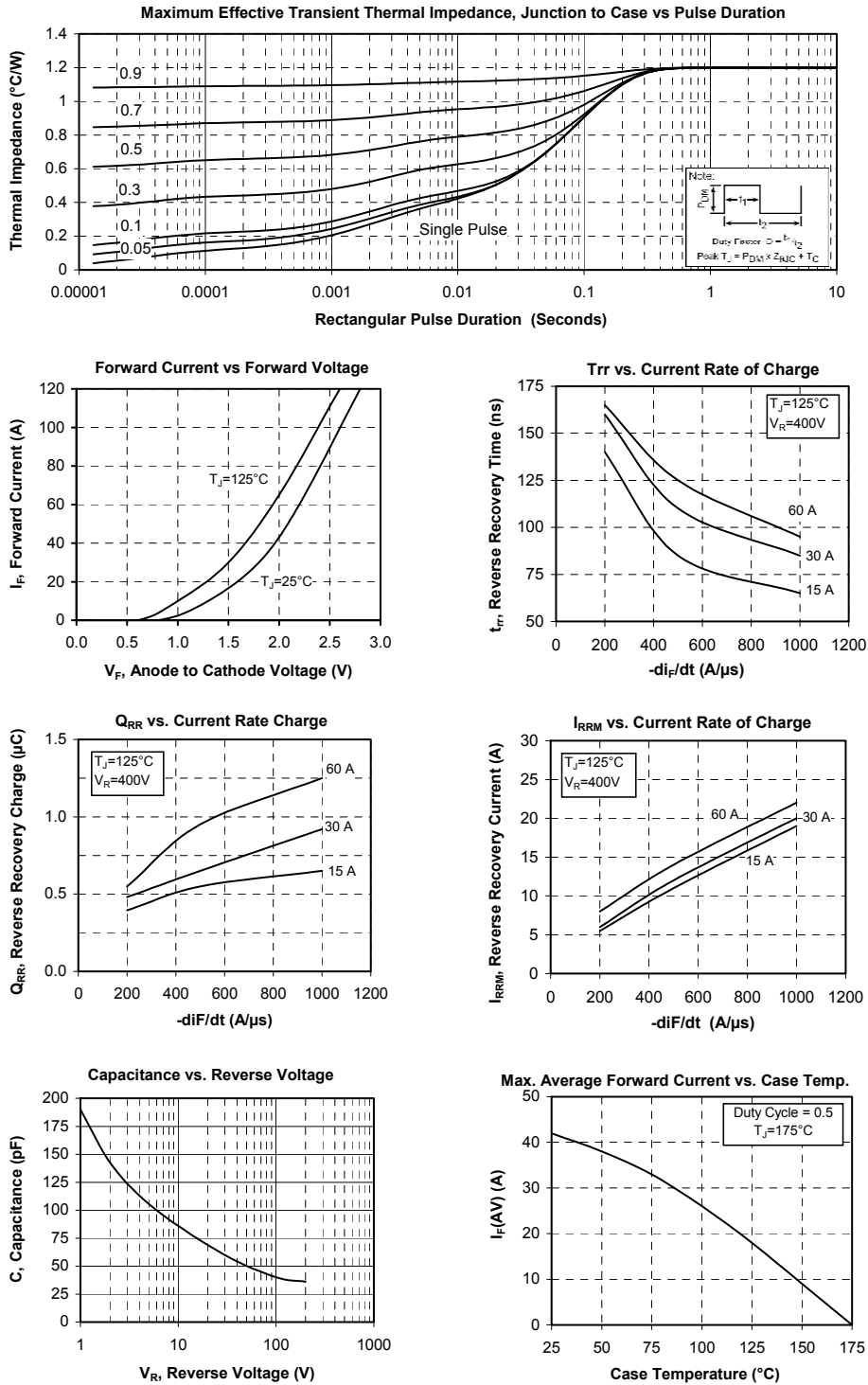
Typical IGBT Performance Curve







Typical diode Performance Curve



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