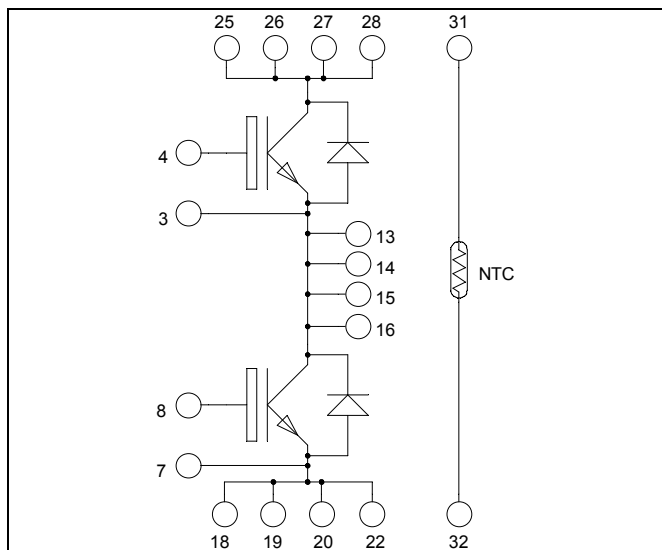


Phase leg NPT IGBT Power Module

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

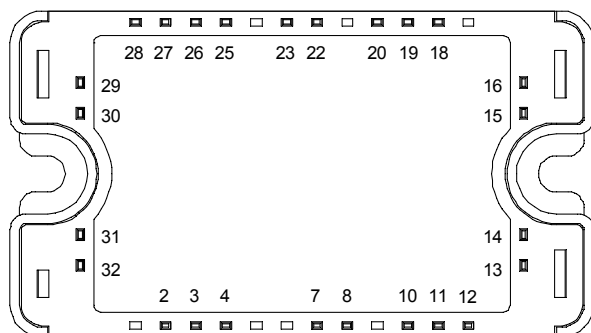


Application

- Welding converters

Features

- Non Punch Through (NPT) Fast IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
 - Symmetrical design
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring



Pins 25/26/27/28 must be shorted together
 Pins 13/14/15/16 must be shorted together
 Pins 18/19/20/22 must be shorted together

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
- Easy paralleling due to positive T_c of V_{CEsat}
- RoHS compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
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	$V_{GE} = 0V$ $V_{CE} = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		250 500	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	3.2 4.0	3.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE2}$, $I_C = 1\text{ mA}$	4.5		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{ V}$, $V_{CE} = 0V$			100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		3450		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		330		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		220		
Q_g	Total gate Charge	$V_{GS} = 15V$		330		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 600V$		35		
Q_{gc}	Gate – Collector Charge	$I_C = 50A$		200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		35		ns
T_r	Rise Time	$V_{GE} = 15V$		65		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		320		
T_f	Fall Time	$I_C = 50A$ $R_G = 5\ \Omega$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		35		ns
T_r	Rise Time	$V_{GE} = \pm 15V$		65		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$		360		
T_f	Fall Time	$I_C = 50A$ $R_G = 5\ \Omega$		40		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$	$T_j = 125^\circ\text{C}$	6.9		mJ
E_{off}	Turn-off Switching Energy	$I_C = 50A$ $R_G = 5\ \Omega$	$T_j = 125^\circ\text{C}$	3.05		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V$; $V_{Bus} = 900V$ $t_p \leq 10\mu\text{s}$; $T_j = 125^\circ\text{C}$		300		A

Reverse 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	$V_R = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		100 500	μA
I_F	DC Forward Current	$T_c = 80^\circ\text{C}$		30		A
V_F	Diode Forward Voltage	$I_F = 30A$		2.6	3.1	V
		$I_F = 60A$		3.2		
		$I_F = 30A$, $T_j = 125^\circ\text{C}$		1.8		
t_{rr}	Reverse Recovery Time	$I_F = 30A$ $V_R = 800V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	300 380		ns
Q_{rr}	Reverse Recovery Charge	$di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	360 1700		

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance			IGBT		0.4	°C/W
				Diode		1.2	
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	M4	2.5		4.7	N.m
Wt	Package Weight					110	g

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

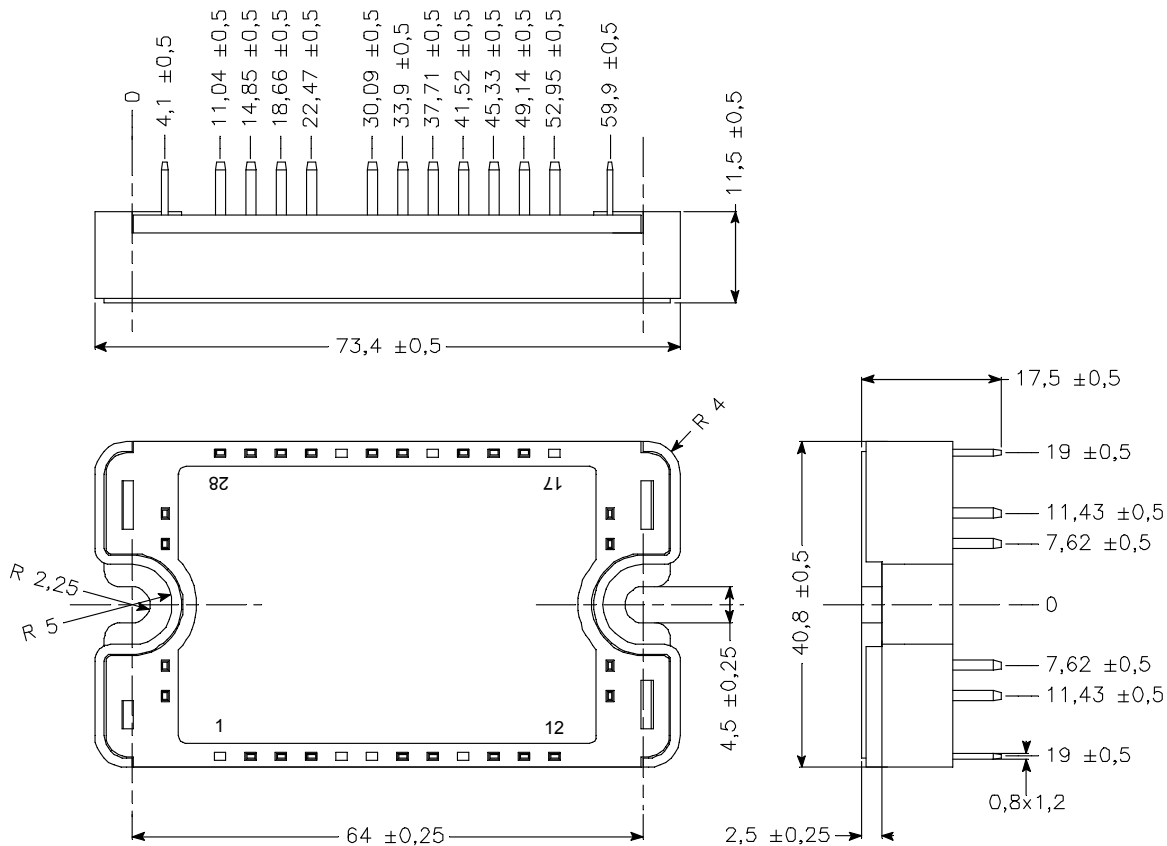
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

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

T: Thermistor temperature
 R_T : Thermistor value at T

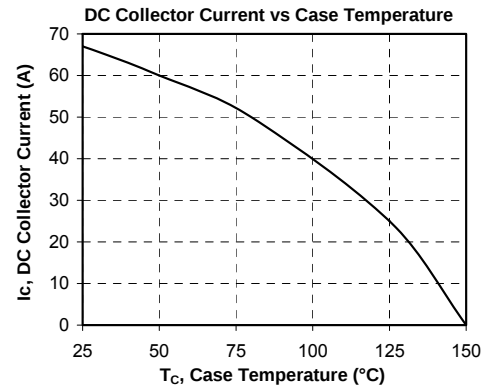
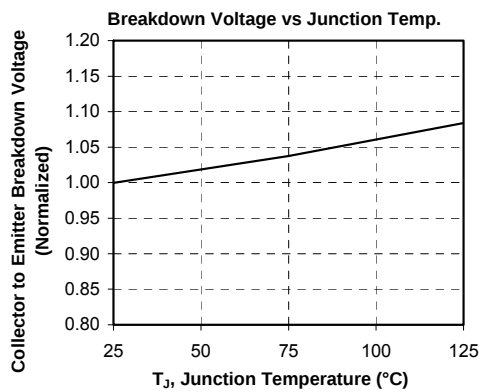
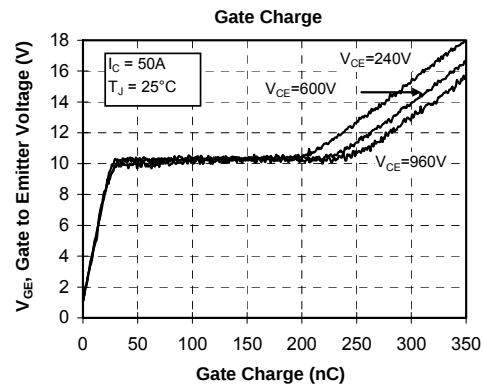
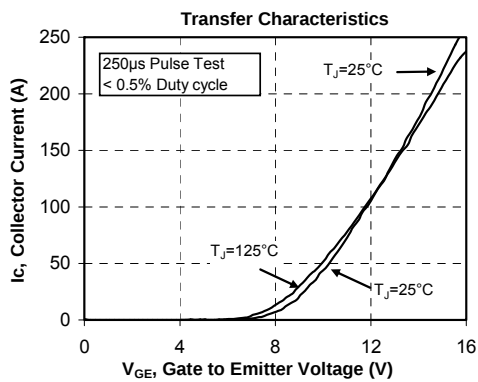
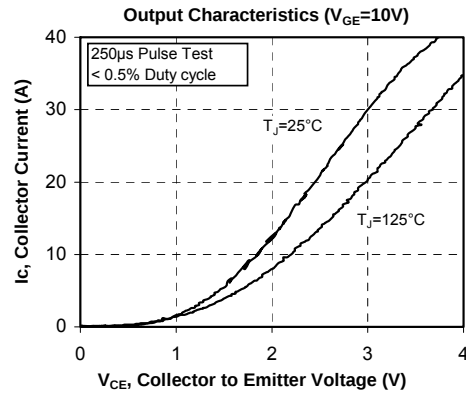
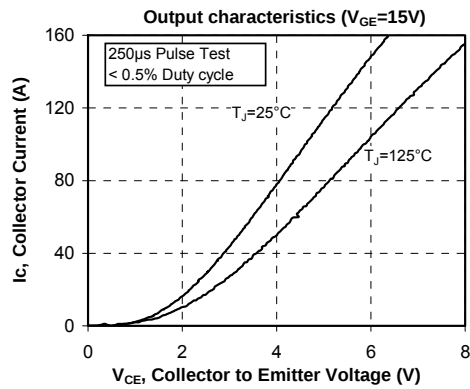
T: Thermistor temperature
R_T: Thermistor value at T

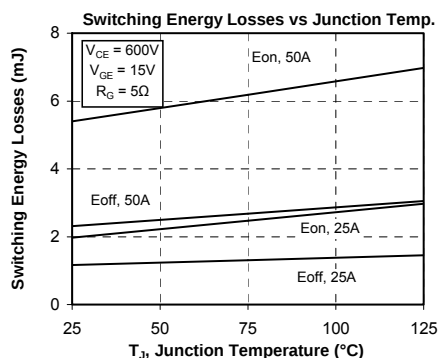
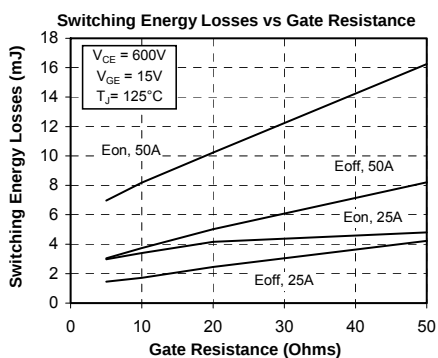
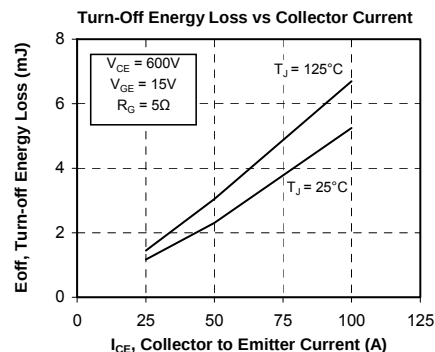
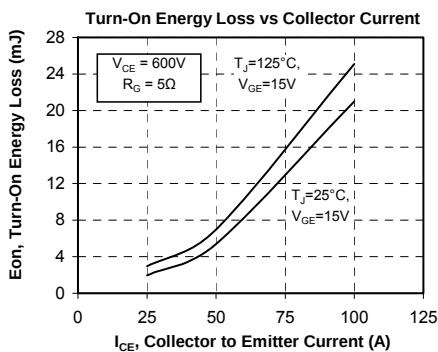
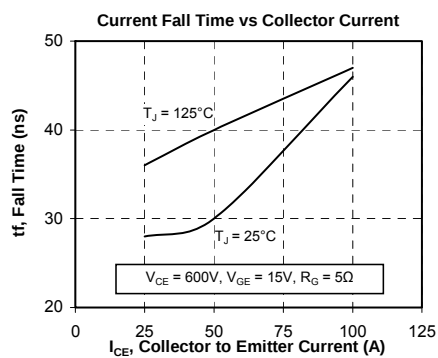
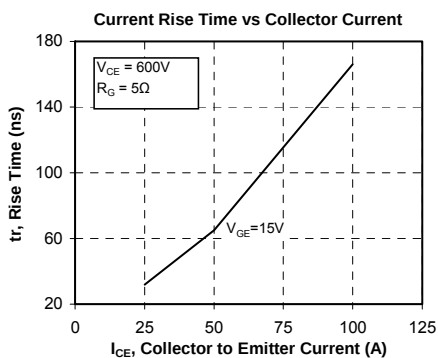
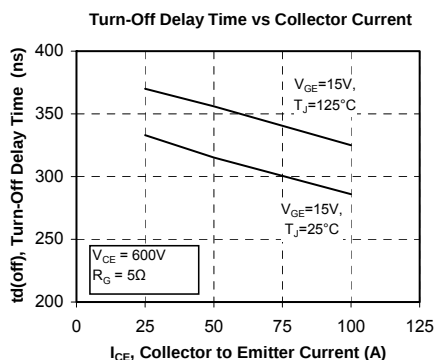
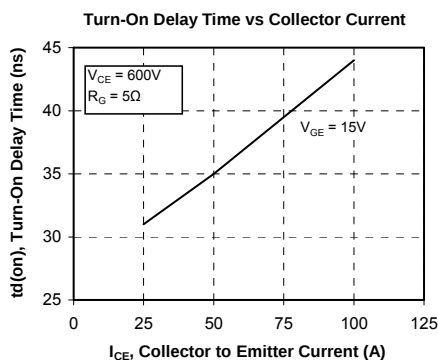
SP3 Package outline (dimensions in mm)

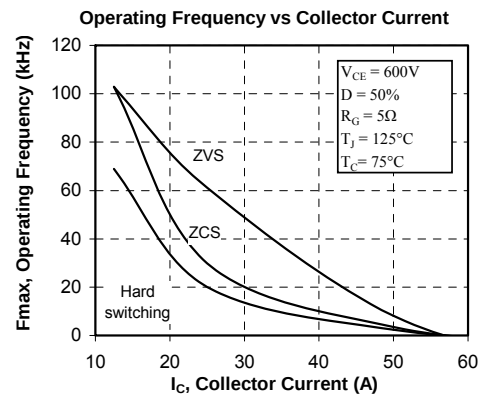
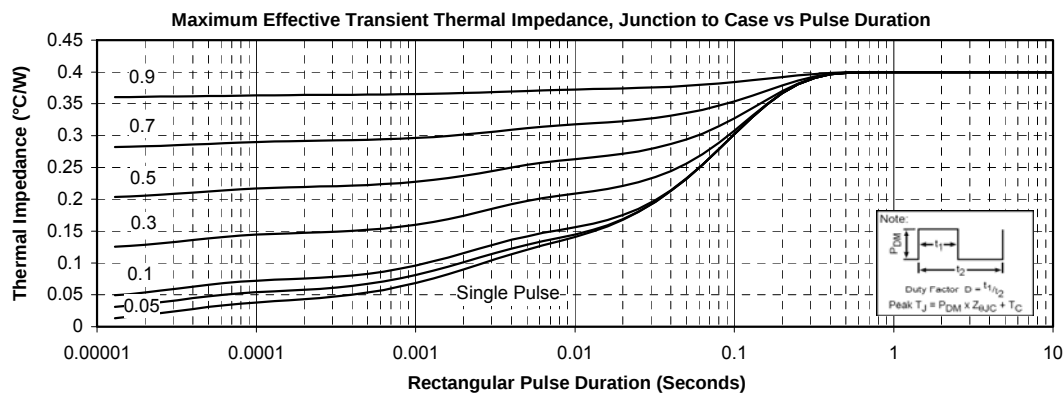
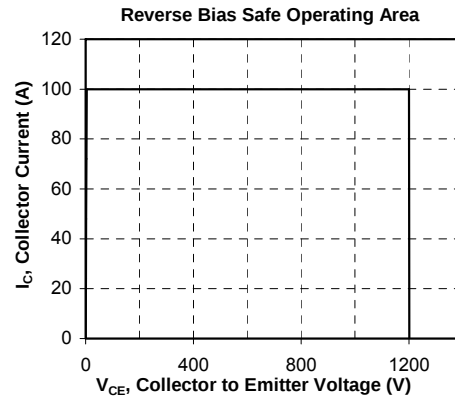
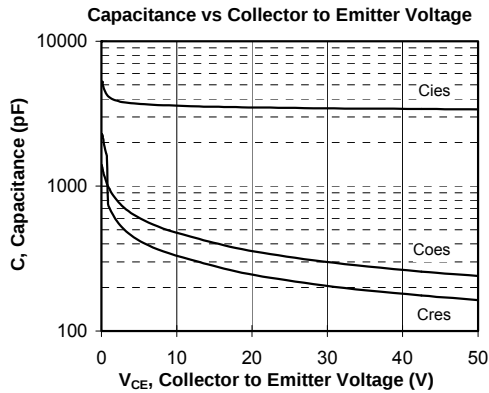


See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

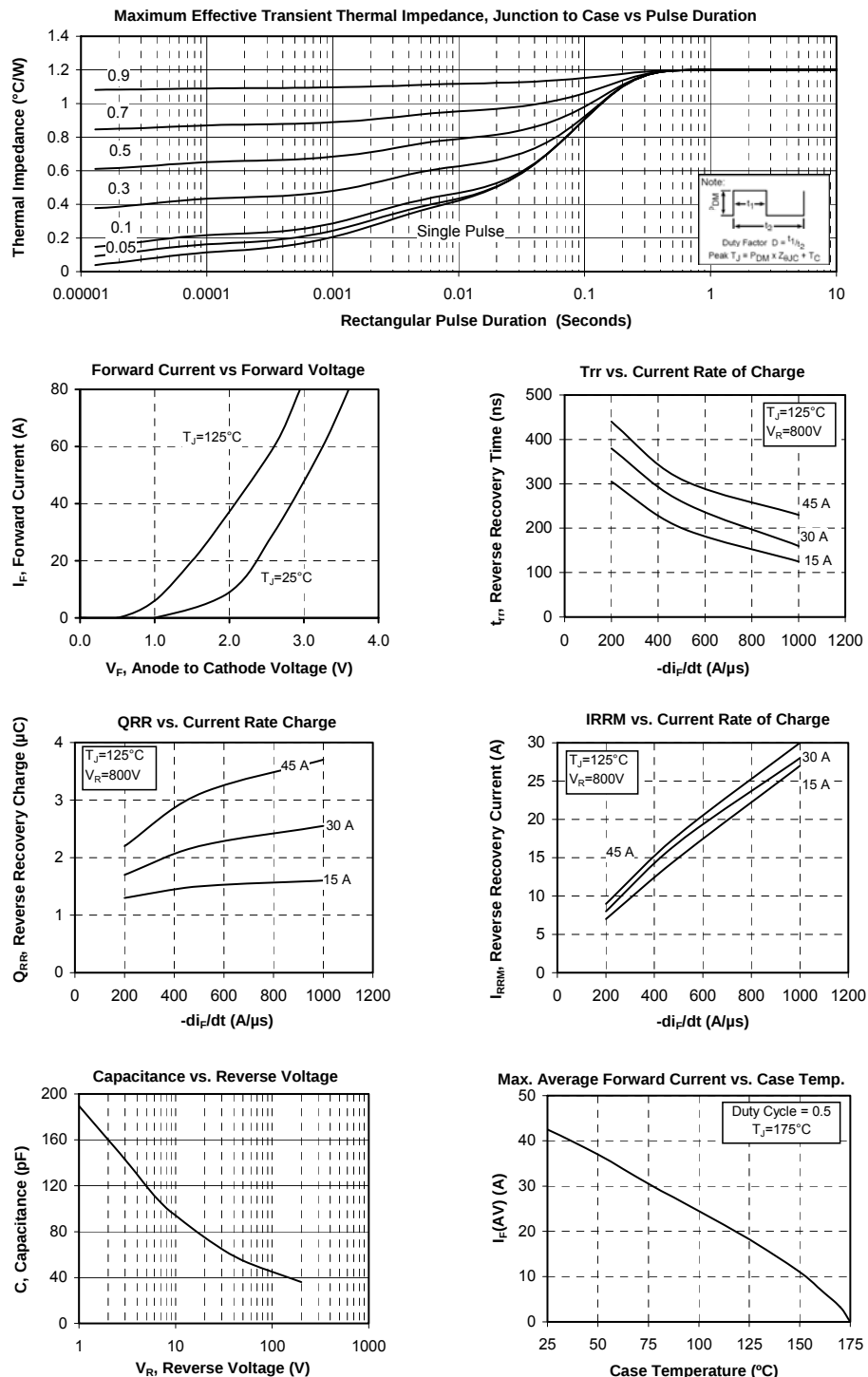
Typical IGBT Performance Curve







Typical diode Performance Curve



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