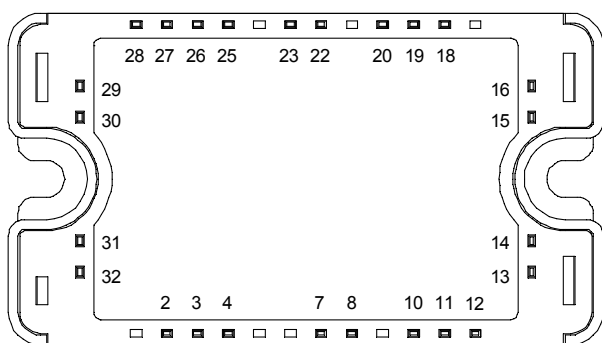
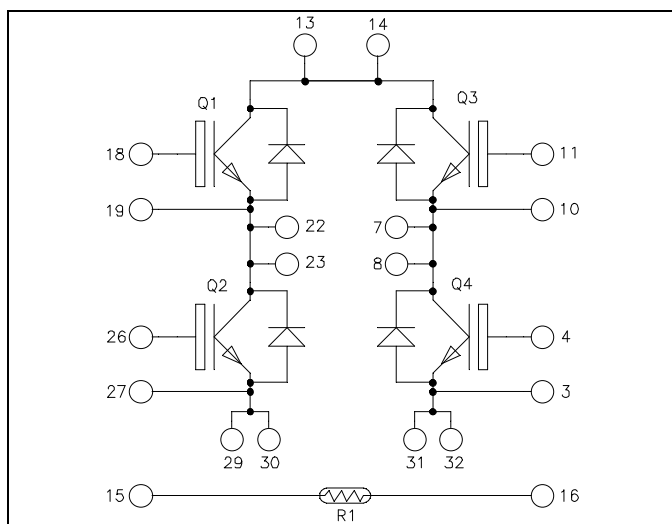


Full - Bridge NPT IGBT Power Module

$V_{CES} = 600V$
 $I_C = 90A @ T_C = 80^\circ C$



All multiple inputs and outputs must be shorted together
 Example: 13/14 ; 29/30 ; 22/23 ...

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
 - Symmetrical design
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

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}
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	A
		$T_C = 80^\circ C$	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	315
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	416
RBSOA	Reverse Bias Safe Operating Area	$T_J = 125^\circ C$	200A@500V

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	
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 100A$	$T_j = 25^\circ\text{C}$	1.7	2.0	V
			$T_j = 125^\circ\text{C}$	2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2mA$	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	$V_{GE} = 0V$		4400		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		645		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		401		
Q_g	Total gate Charge	$V_{GE} = 15V$		331		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 300V$		40		
Q_{gc}	Gate – Collector Charge	$I_C = 100A$		200		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 1.2\Omega$		40		ns
T_r	Rise Time			9		
$T_{d(off)}$	Turn-off Delay Time			120		
T_f	Fall Time			15		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 1.2\Omega$		42		ns
T_r	Rise Time			10		
$T_{d(off)}$	Turn-off Delay Time			130		
T_f	Fall Time			22		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 1.2\Omega$	$T_j = 125^\circ\text{C}$	1		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	2		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 10\mu s ; T_j = 125^\circ\text{C}$		450		A

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		35	μA
			$T_j = 125^\circ\text{C}$		600	
I_F	DC Forward Current		$T_c = 90^\circ\text{C}$	60		A
V_F	Diode Forward Voltage	$I_F = 60A$		1.8	2.2	V
		$I_F = 120A$		2.2		
		$I_F = 60A$ $T_j = 150^\circ\text{C}$		1.5		
t_{rr}	Reverse Recovery Time	$I_F = 60A$ $V_R = 400V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	25		ns
			$T_j = 125^\circ\text{C}$	160		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	70		nC
			$T_j = 125^\circ\text{C}$	960		

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		%

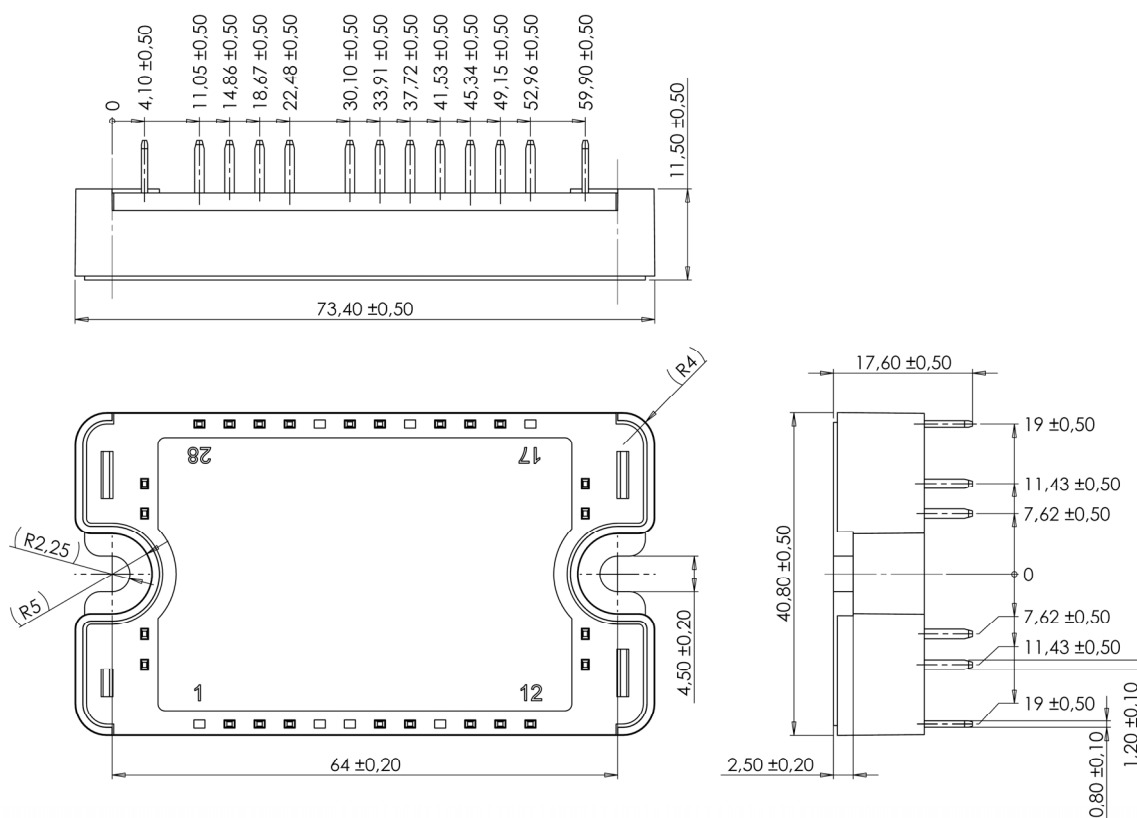
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

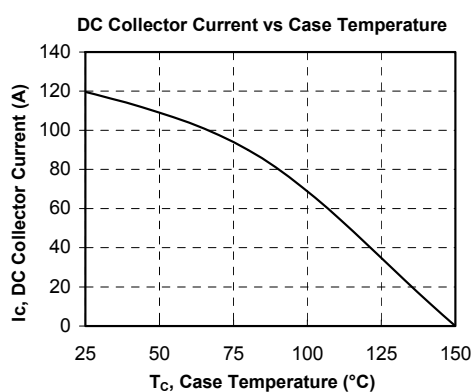
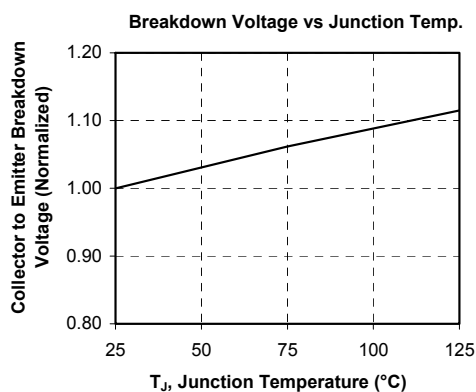
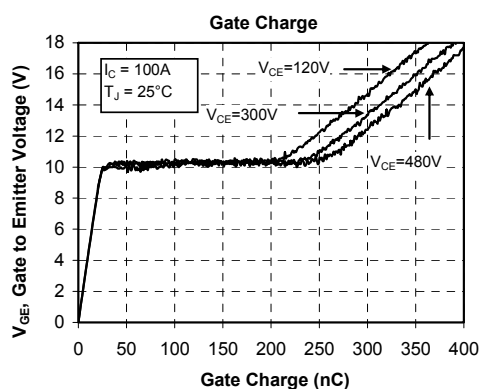
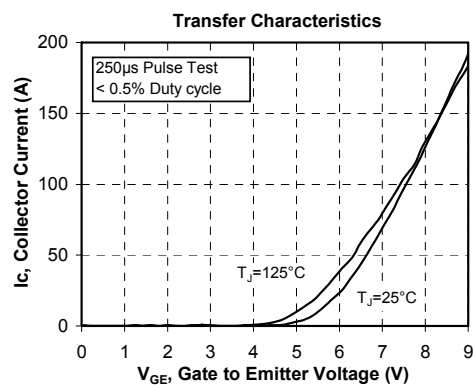
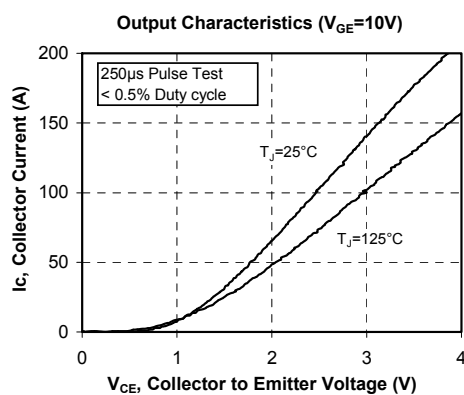
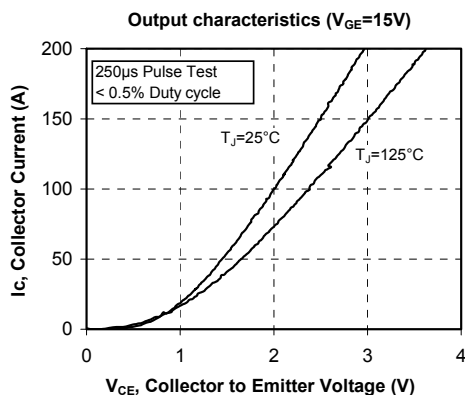
Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance		IGBT			0.3	°C/W
			Diode			0.65	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight					110	g

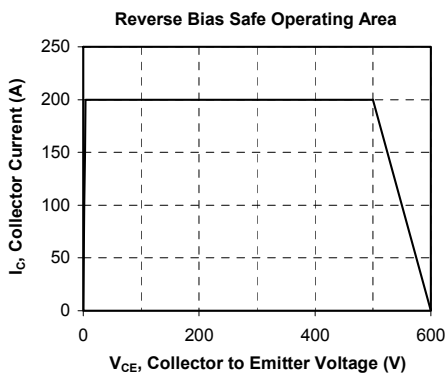
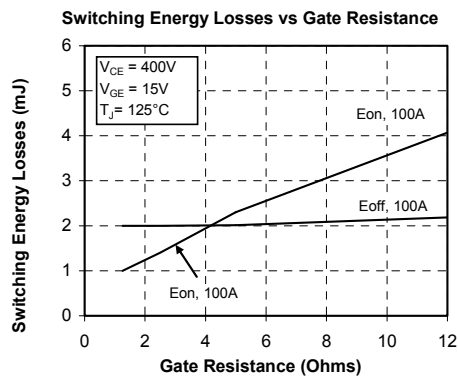
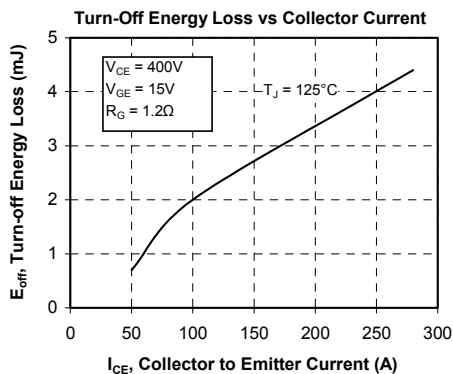
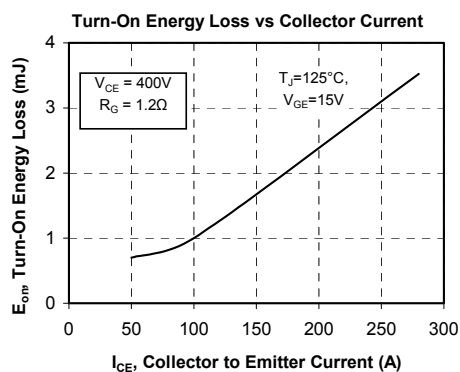
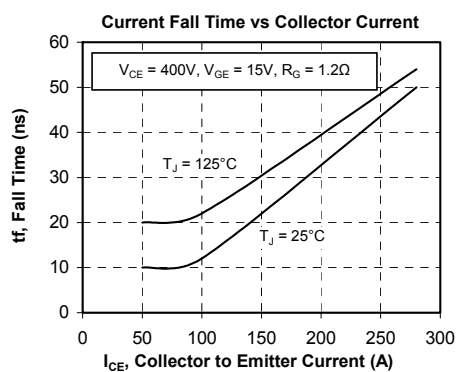
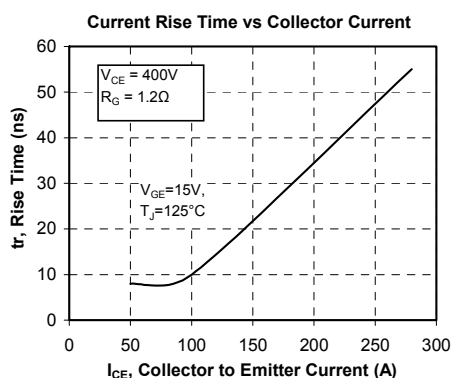
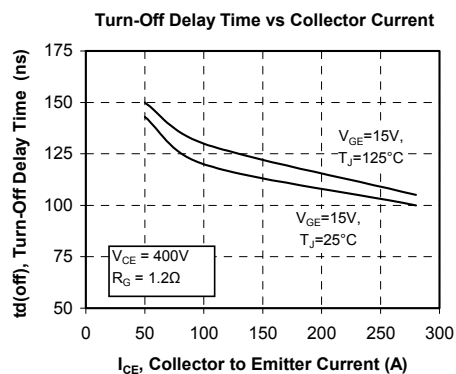
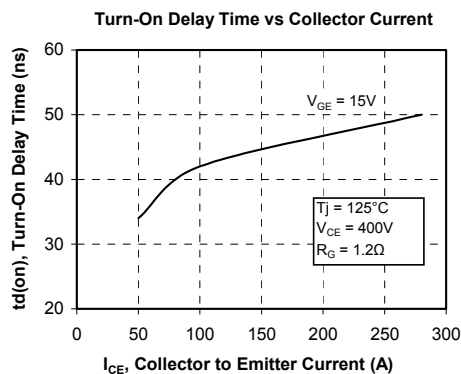
SP3 Package outline (dimensions in mm)

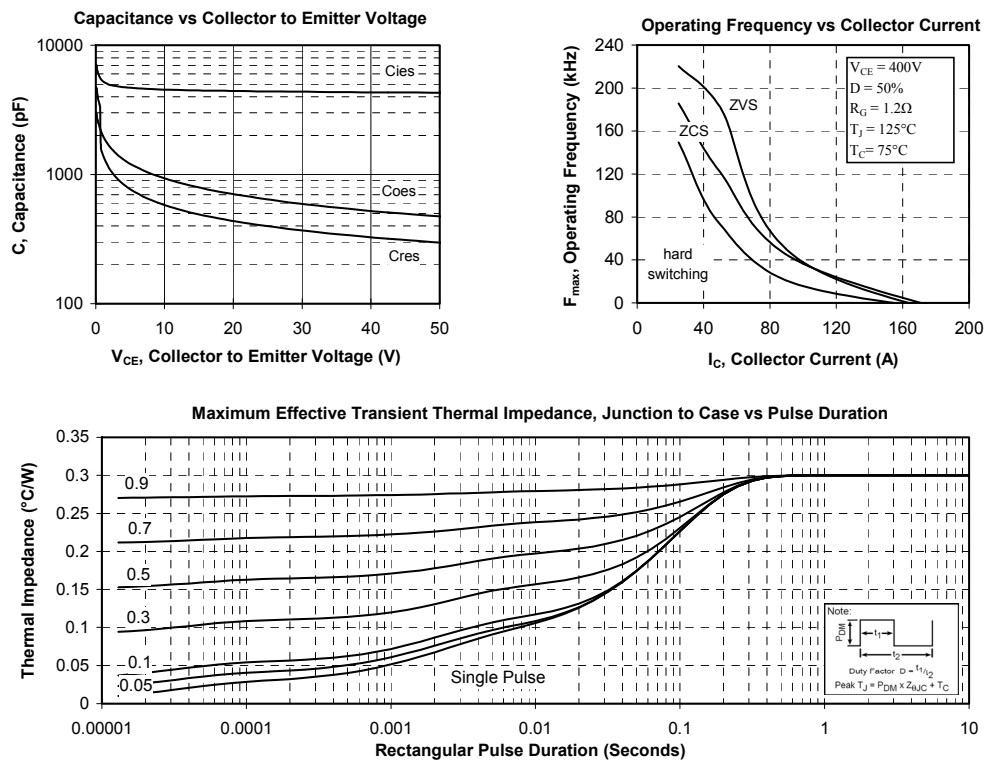


See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

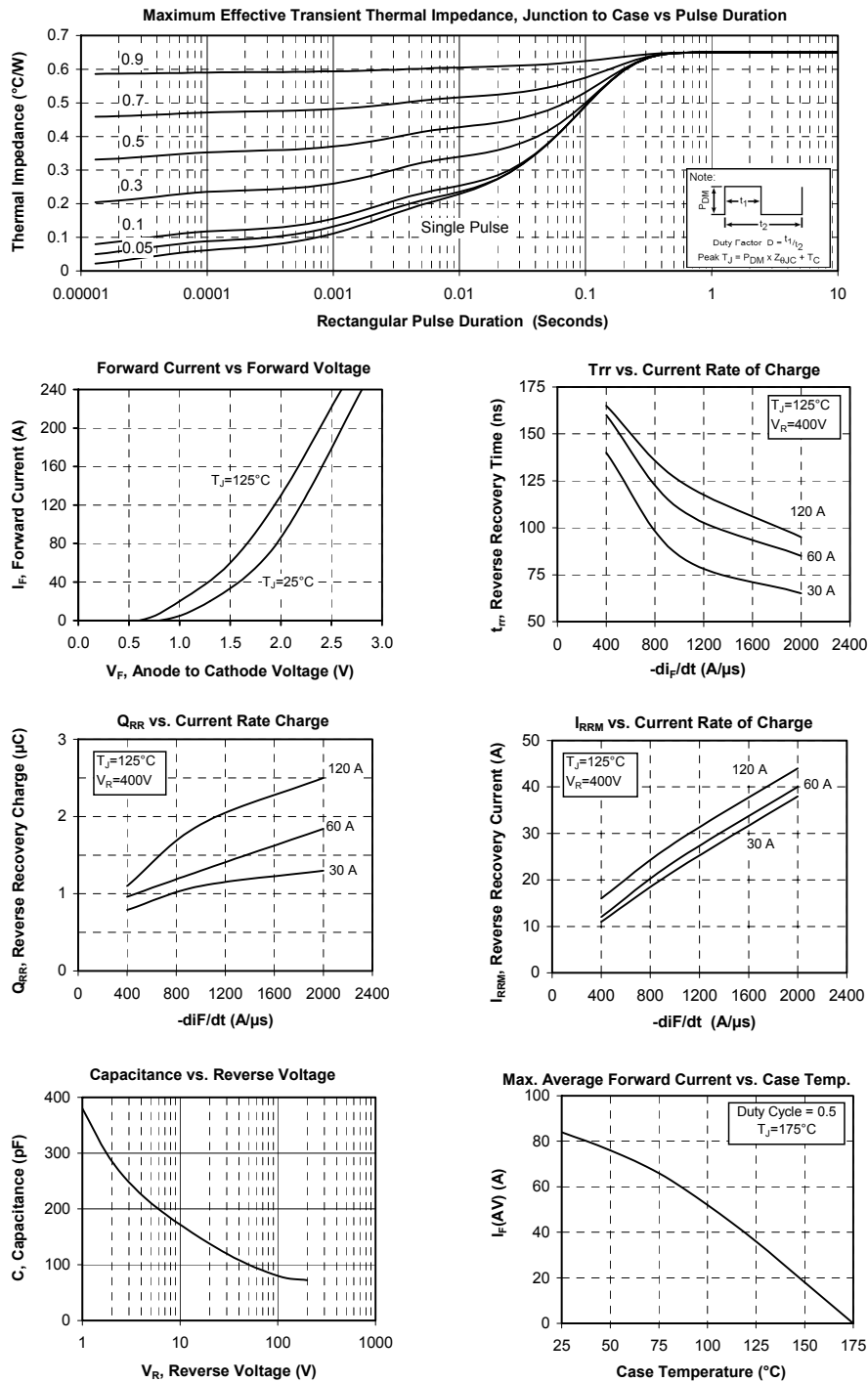
Typical IGBT Performance Curve







Typical diode Performance Curve



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