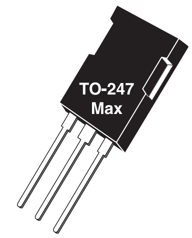
Ultra Fast NPT - IGBT®

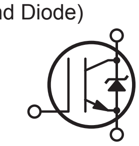
The Ultra Fast NPT - IGBT® is a new generation of high voltage power IGBTs. Using Non-Punch-Through Technology, the Ultra Fast NPT-IGBT® offers superior ruggedness and ultrafast switching speed.



Features

- Low Saturation Voltage
- Low Tail Current
- RoHS Compliant
- Short Circuit Withstand Rated
- High Frequency Switching
- Ultra Low Leakage Current

Combi (IGBT and Diode)



Unless stated otherwise, Microsemi discrete IGBTs contain a single IGBT die. This device is recommended for applications such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	Ratings	Unit
V_{ces}	Collector Emitter Voltage	1200	V
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	88	A
I_{C2}	Continuous Collector Current @ T_C = 110°C	40	
I_{CM}	Pulsed Collector Current ①	160	
SCWT	Short Circuit Withstand Time: V_{CE} = 600V, V_{GE} = 15V, T_C=125°C	10	μs
P_D	Total Power Dissipation @ T_C = 25°C	500	W
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.	300	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 1.0mA)	1200			Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 2.0mA, T_j = 25°C)	3	5.0	6.0	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 40A, T_j = 25°C)		2.5	3.2	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 40A, T_j = 125°C)		3.5		
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 88A, T_j = 25°C)		3.5		
I_{CES}	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 25°C) ②			1200	μA
	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 125°C) ②		300		
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)			±250	nA

CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance V_{GE} = 0V, V_{CE} = 25V f = 1MHz		3980		pF
C_{oes}	Output Capacitance			510		
C_{res}	Reverse Transfer Capacitance			80		
V_{GEP}	Gate to Emitter Plateau Voltage	Gate Charge V_{GE} = 15V V_{CE}= 600V I_C = 40A		7		V
Q_g (3)	Total Gate Charge			210		nC
Q_{ge}	Gate-Emitter Charge			25		
Q_{gc}	Gate- Collector Charge			90		
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C) V_{CC} = 600V V_{GE} = 15V I_C = 40A R_G = 4.3 Ω (4) T_J = +25°C		20		ns
t_r	Current Rise Time			21		
$t_{d(off)}$	Turn-Off Delay Time			166		
t_f	Current Fall Time			42		
E_{on} (5)	Turn-On Switching Energy			929	1800	μJ
E_{off} (6)	Turn-Off Switching Energy			1070	1650	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C) V_{CC} = 600V V_{GE} = 15V I_C = 40A R_G = 4.3 Ω (4) T_J = +125°C		20		ns
t_r	Current Rise Time			20		
$t_{d(off)}$	Turn-Off Delay Time			187		
t_f	Current Fall Time			48		
E_{on} (5)	Turn-On Switching Energy			971	2000	μJ
E_{off} (6)	Turn-Off Switching Energy			1042	2500	

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance (IGBT)			.25	°C/W
	Junction to Case Thermal Resistance (Diode)			1.00	
$R_{\theta JA}$	Junction to Ambient Thermal Resistance			40	
W_T	Package Weight		.22		oz
			6.2		g

1 Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.
2 Pulse test: Pulse Width < 380μs, duty cycle < 2%.
3 See Mil-Std-750 Method 3471.
4 R_G is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)
5 E_{on} is the clamped inductive turn on energy that includes a commutating diode reverse transient current in the IGBT turn on energy loss. A combi device is used for the clamping diode.
6 E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

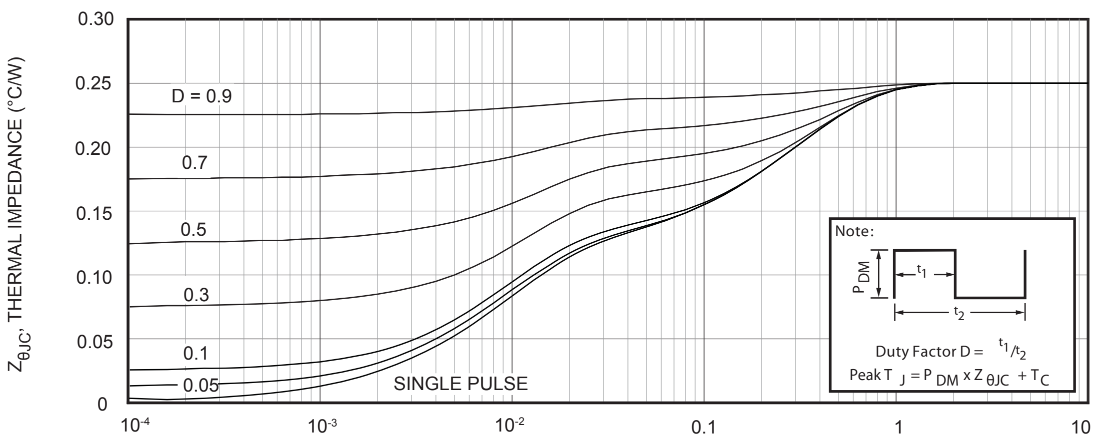


Figure 1, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

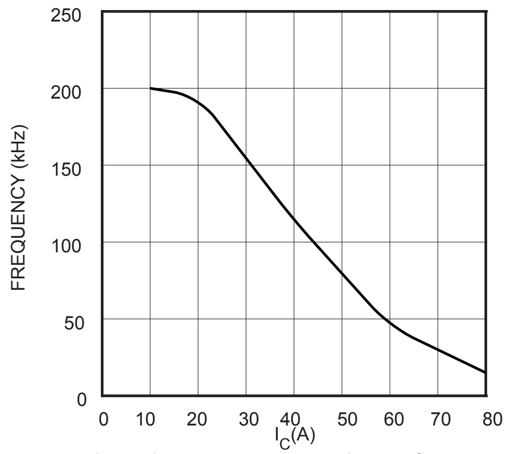


FIGURE 2, Max Frequency vs Current (T_{case} = 75°C)

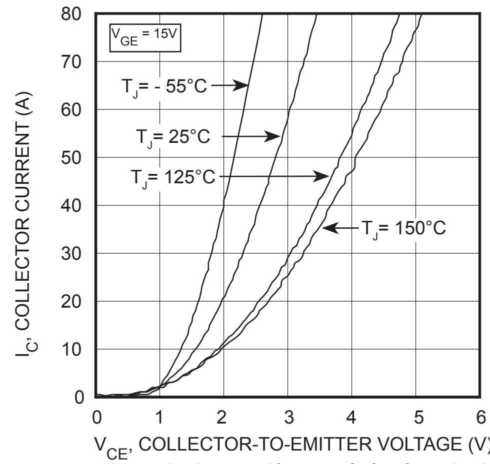


FIGURE 3, Output Characteristics (T_J = 25°C)

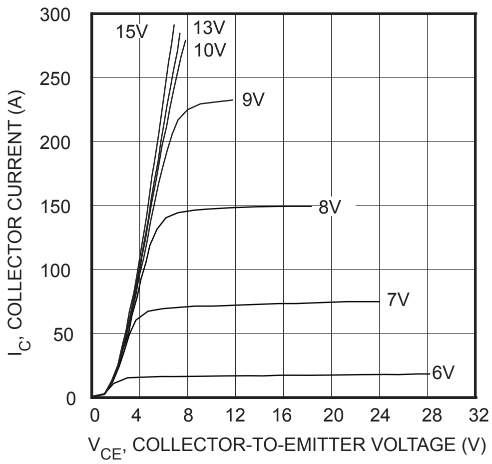


FIGURE 4, Output Characteristics (T_J = 25°C)

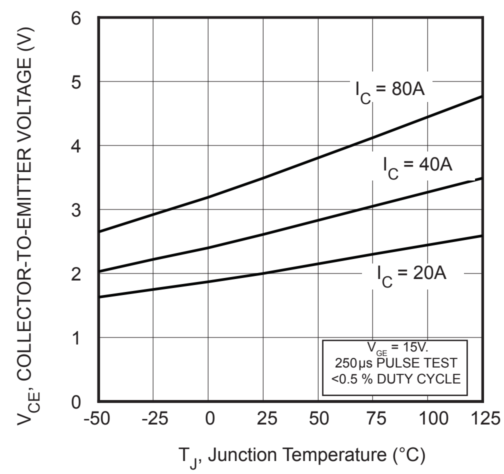


FIGURE 5, On State Voltage vs Junction Temperature

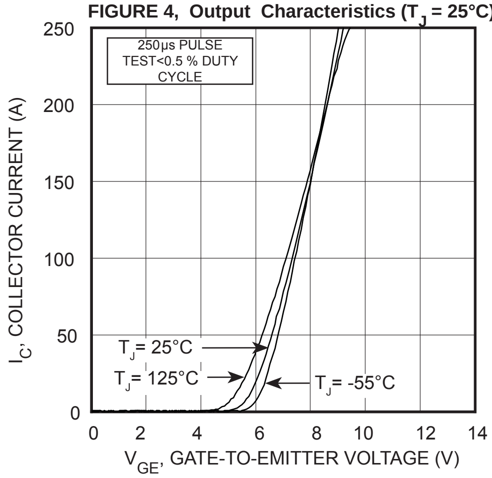


FIGURE 6, Transfer Characteristics

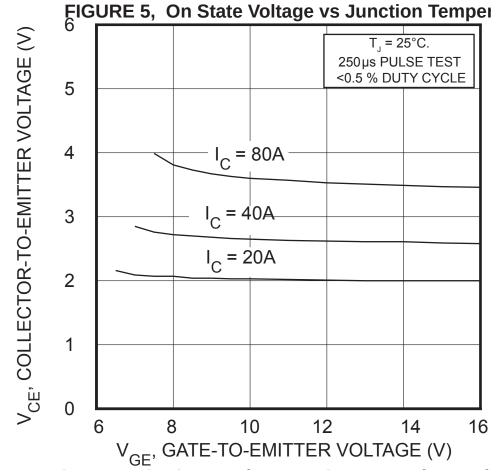


FIGURE 7, On State Voltage vs Gate-to-Emitter Voltage

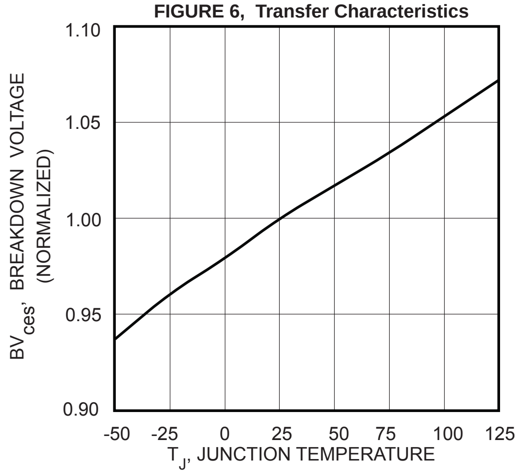


FIGURE 8, Breakdown Voltage vs Junction Temperature

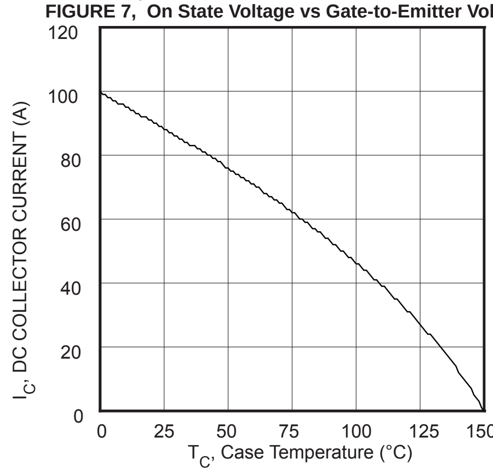


FIGURE 9, DC Collector Current vs Case Temperature

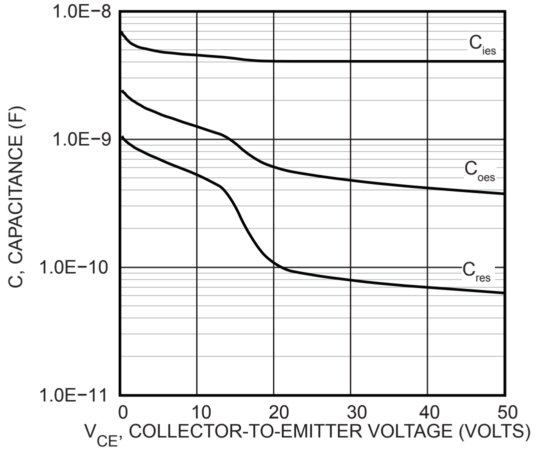


FIGURE 10, Capacitance vs Collector-To-Emitter Voltage

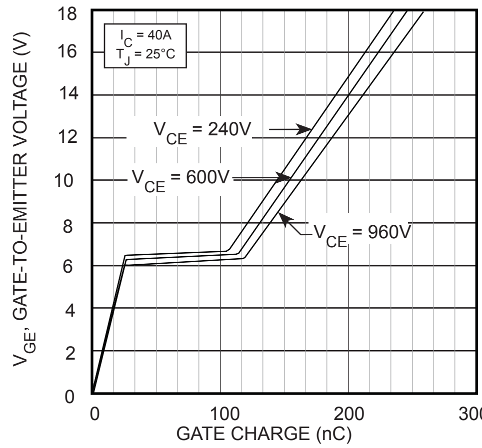


FIGURE 11, Gate charge vs. Gate-to-Emitter Voltage

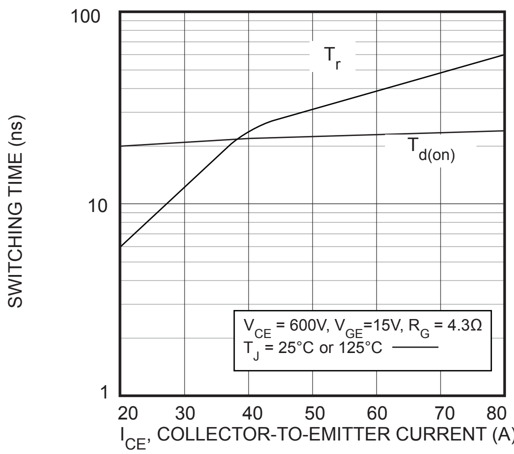


FIGURE 12, Turn-On Time vs Collector Current

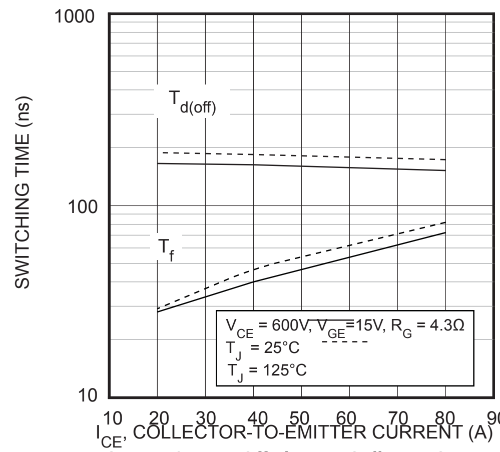


FIGURE 13, Turn-Off Time vs Collector Current

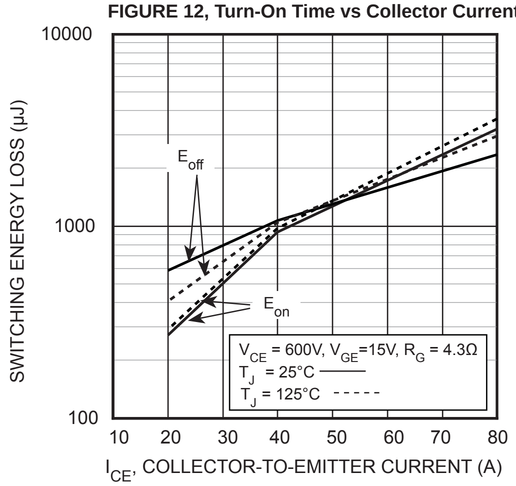


FIGURE 14, Energy Loss vs Collector Current

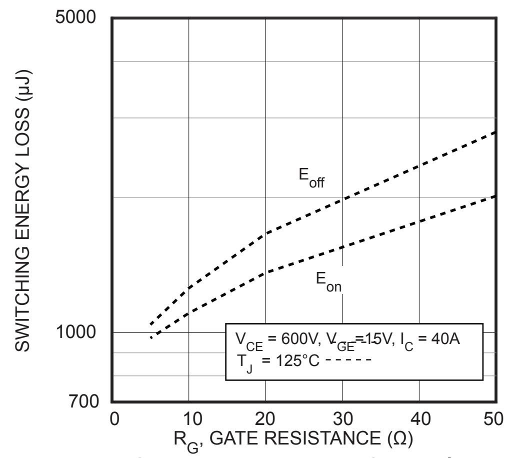


FIGURE 15, Energy Loss vs Gate Resistance

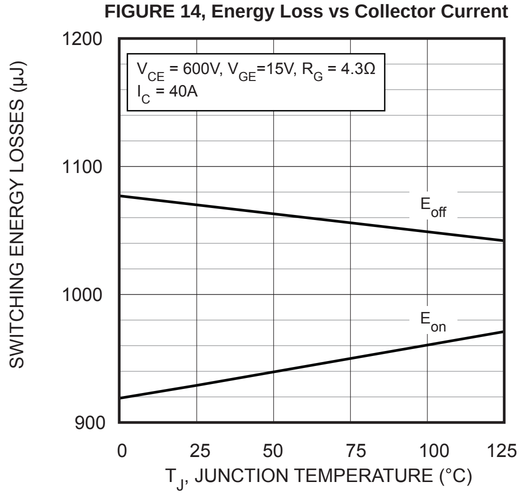


FIGURE 16, Energy Losses vs Junction Temperature

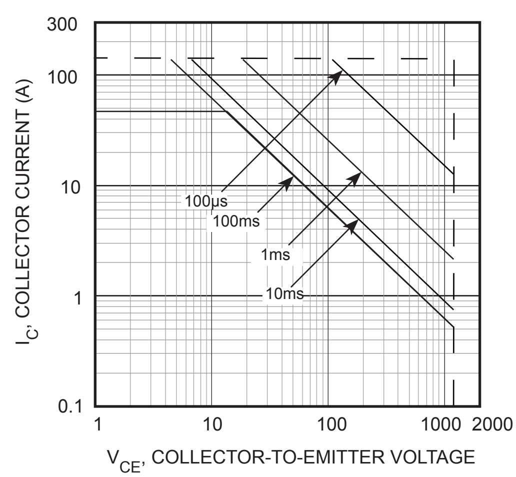


FIGURE 17, Minimum Switching Safe Operating Area

ZERO RECOVERY LOW LEAKAGE SIC ANTI-PARALLEL DIODE

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Characteristic / Test Conditions		Ratings	Unit
I_F	Maximum D.C. Forward Current	T_C = 25°C	36	Amps
		T_C = 135°C	10	
I_{FRM}	Repetitive Peak Forward Surge Current (T_J = 45°C, t_p = 10ms, Half Sine Wave)		50	
I_{FSM}	Non-Repetitive Forward Surge Current (T_J = 25°C, t_p = 10ms, Half Sine)		110	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions		Min	Typ	Max	Unit
V_F	Forward Voltage	I_F = 10A T_J = 25°C		1.5		Volts
		I_F = 10A, T_J = 150°C		2.1		
Q_c	Total Capactive Charge V_R = 800V, I_F = 10A, di/dt = -100A/µs, T_J = 25°C			30		nC
C_T	Junction Capacitance V_R = 0V, T_J = 25°C, f = 1MHz			600		pF
	Junction Capacitance V_R = 200V, T_J = 25°C, f = 1MHz			71		
	Junction Capacitance V_R = 400V, T_J = 25°C, f = 1MHz			52		

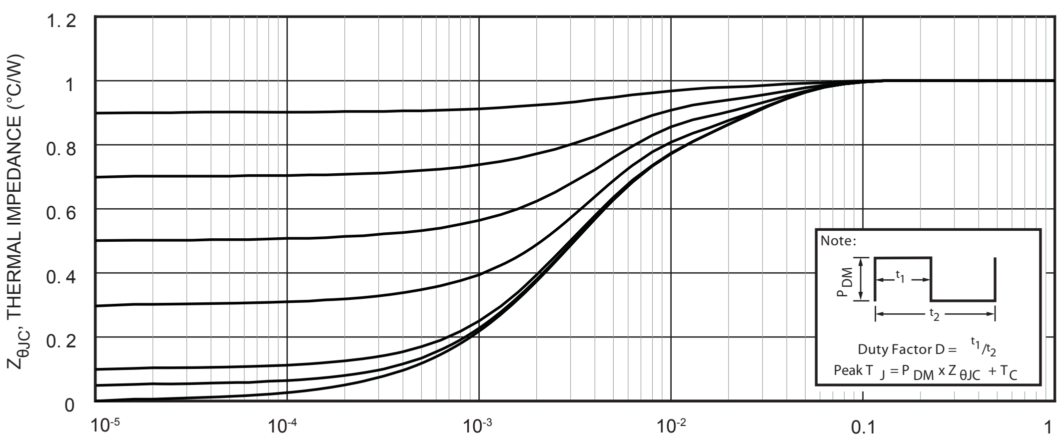


FIGURE 18. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

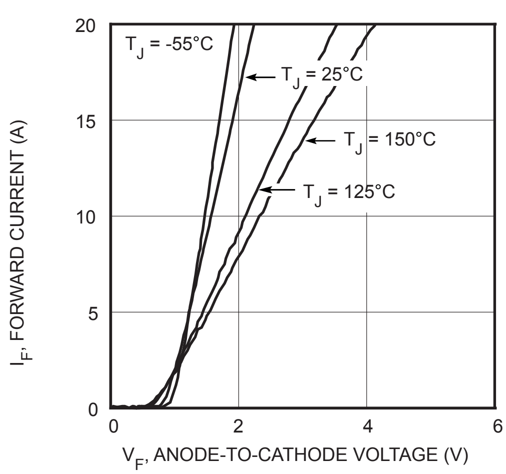


FIGURE 19, Forward Current vs. Forward Voltage

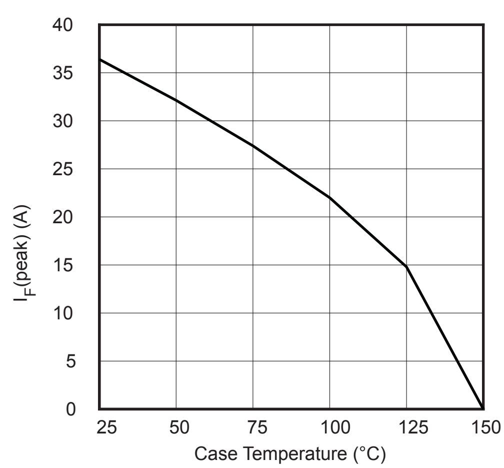


FIGURE 20, Maximum Forward Current vs. Case Temperature

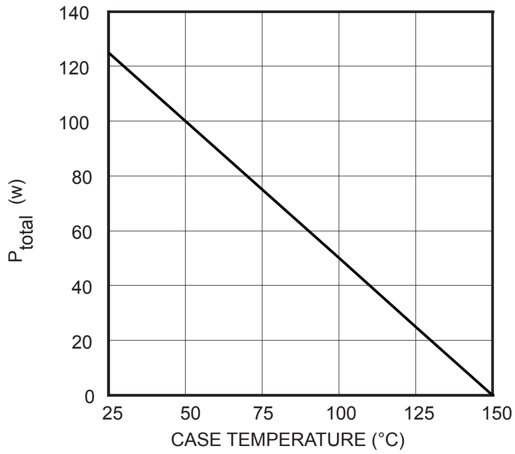


Figure 21. Maximum Power Dissipation *vs.* Case Temperature

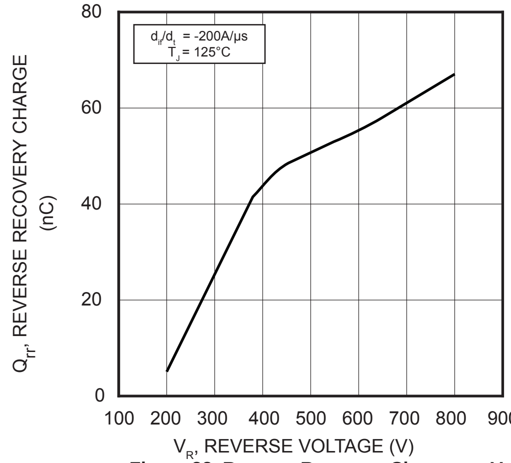


Figure 22. Reverse Recovery Charge *vs.* V_R

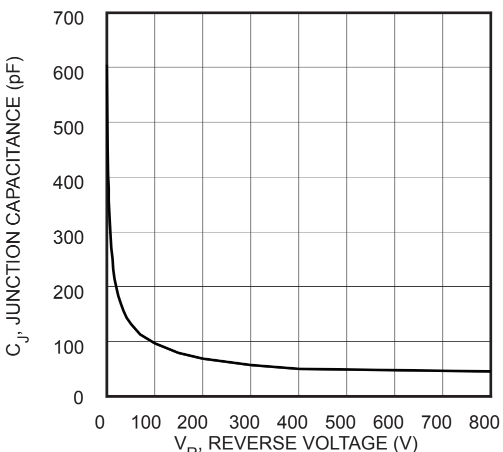
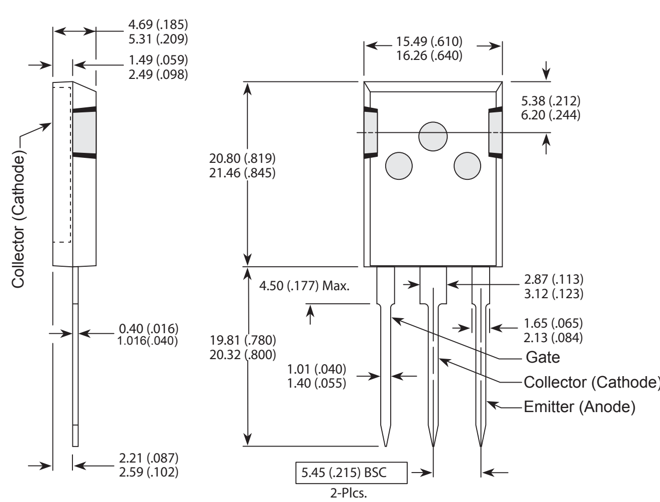


Figure 23. Junction Capacitance *vs.* Reverse Voltage

T-MAX® (B2) Package Outline



These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

Disclaimer:

052-6406 Rev A 12-2012

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(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

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