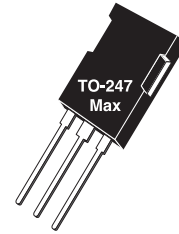


Ultra Fast NPT - IGBT®

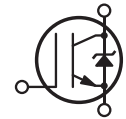
The Ultra Fast NPT - IGBT® is a new generation of high voltage power IGBTs. Using Non-Punch-Through Technology, the Ultra Fast NPT-IGBT® offers superior ruggedness and ultrafast switching speed.



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: $T_C = 25^\circ\text{C}$ 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 @ $T_C = 25^\circ\text{C}$	88	A
I_{C2}	Continuous Collector Current @ $T_C = 110^\circ\text{C}$	40	
I_{CM}	Pulsed Collector Current ^①	160	
SCWT	Short Circuit Withstand Time: $V_{CE} = 600V, V_{GE} = 15V, T_C = 125^\circ\text{C}$	10	μs
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	500	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
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 ($V_{CE} = V_{GE}, I_C = 2.0mA, T_J = 25^\circ\text{C}$)	3	5.0	6.0	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 40A, T_J = 25^\circ\text{C}$)		2.5	3.2	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 40A, T_J = 125^\circ\text{C}$)		3.5		
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 88A, T_J = 25^\circ\text{C}$)		3.5		
I_{CES}	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 25^\circ\text{C}$) ^②			1200	μA
	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 125^\circ\text{C}$) ^②		300		
I_{GES}	Gate-Emitter Leakage Current ($V_{GE} = \pm 20V$)			± 250	nA


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

DYNAMIC CHARACTERISTICS

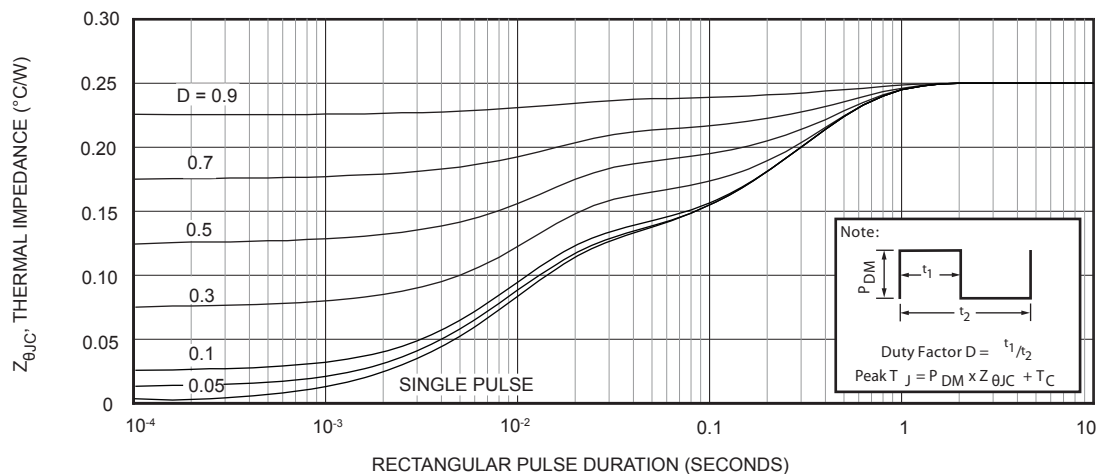
APT40GR120B2SCD10

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) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 40A$ $R_G = 4.3 \Omega^{(4)}$ $T_J = +25^\circ C$		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	$R_G = 4.3 \Omega^{(4)}$ $T_J = +25^\circ C$		929	1800	μJ
$E_{off}^{(6)}$	Turn-Off Switching Energy			1070	1650	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 40A$ $R_G = 4.3 \Omega^{(4)}$ $T_J = +125^\circ C$		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	$R_G = 4.3 \Omega^{(4)}$ $T_J = +125^\circ C$		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	$^\circ C/W$
	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 < 380 μs , 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.



TYPICAL PERFORMANCE CURVES

APT40GR120B2SCD10

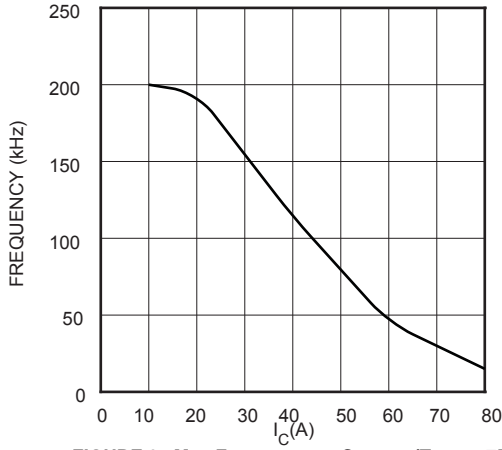


FIGURE 2, Max Frequency vs Current ($T_{case} = 75^{\circ}C$)

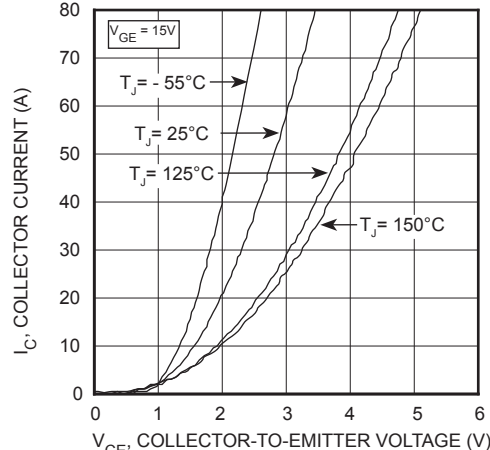


FIGURE 3, Output Characteristics ($T_J = 25^{\circ}C$)

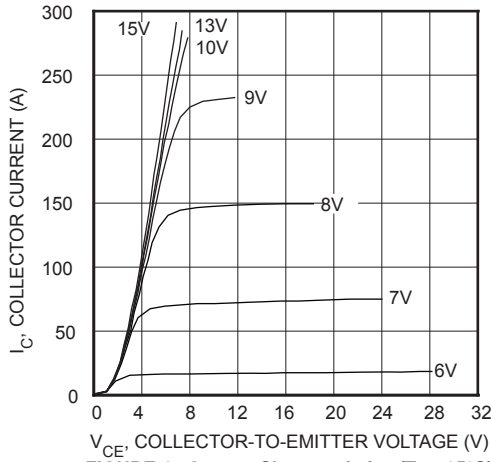


FIGURE 4, Output Characteristics ($T_J = 25^{\circ}C$)

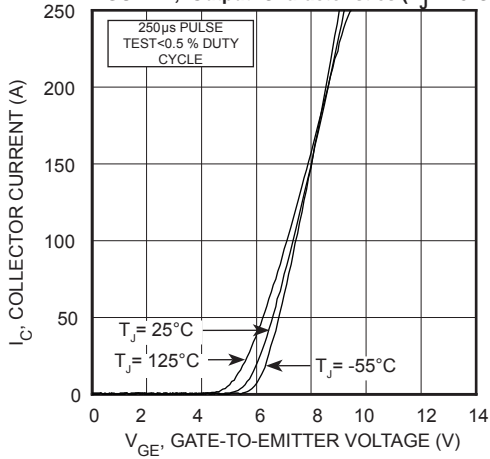


FIGURE 6, Transfer Characteristics

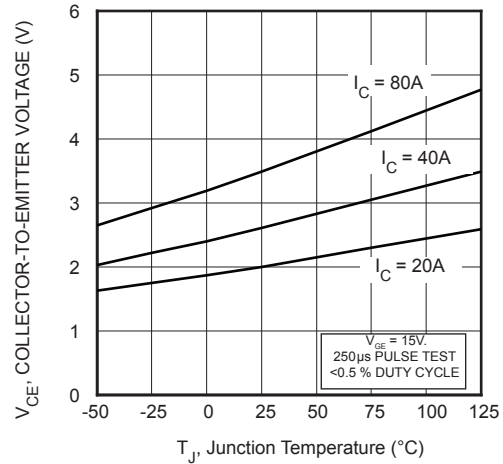


FIGURE 5, On State Voltage vs Junction Temperature

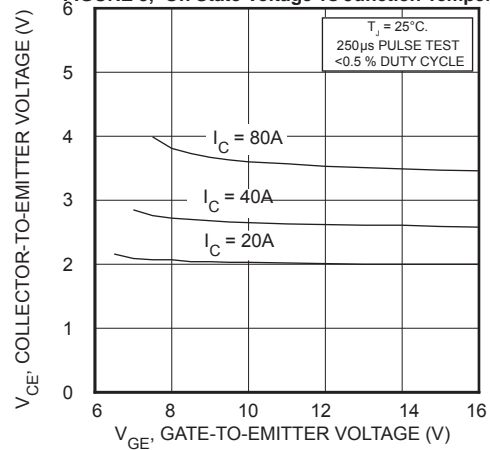


FIGURE 7, On State Voltage vs Gate-to-Emitter Voltage

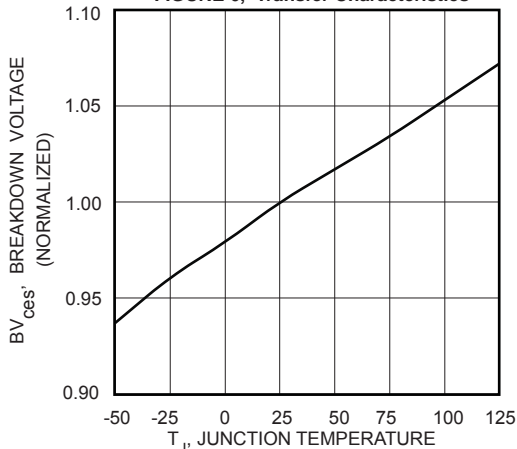


FIGURE 8, Breakdown Voltage vs Junction Temperature

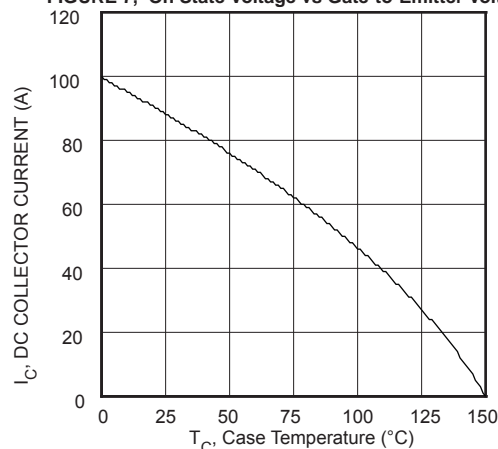


FIGURE 9, DC Collector Current vs Case Temperature

TYPICAL PERFORMANCE CURVES

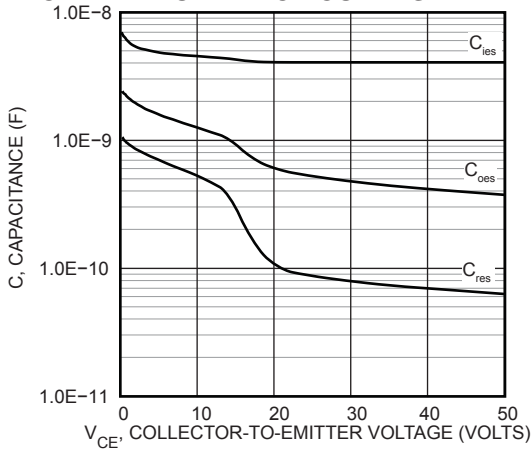


FIGURE 10, Capacitance vs Collector-To-Emitter Voltage

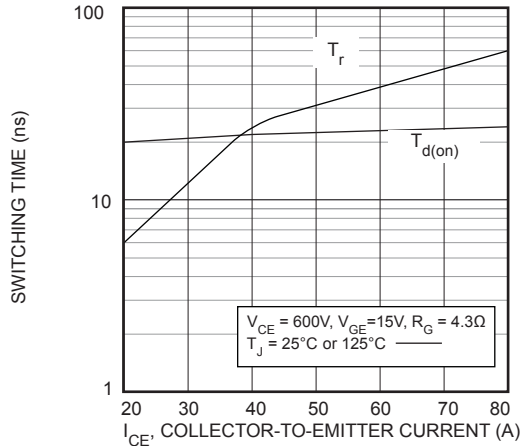


FIGURE 12, Turn-On Time vs Collector Current

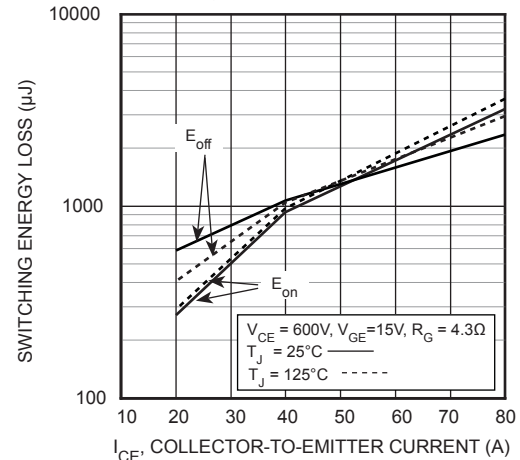


FIGURE 14, Energy Loss vs Collector Current

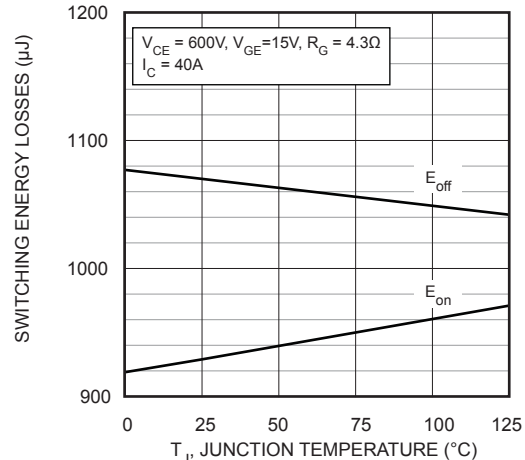


FIGURE 16, Energy Losses vs Junction Temperature

APT40GR120B2SCD10

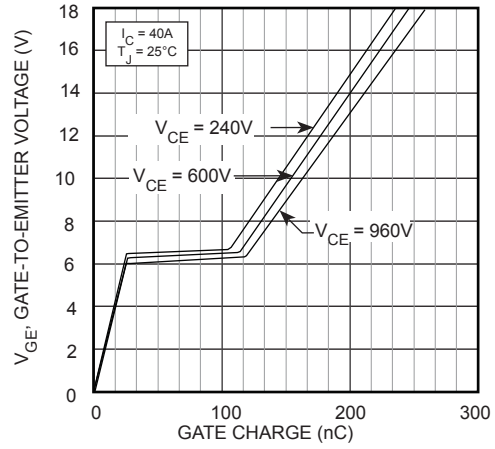


FIGURE 11, Gate charge vs. Gate-to-Emitter Voltage

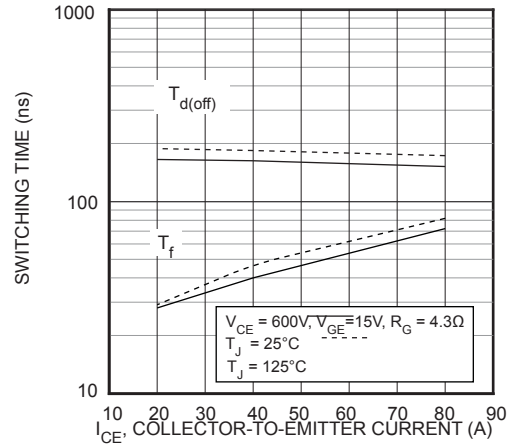


FIGURE 13, Turn-Off Time vs Collector Current

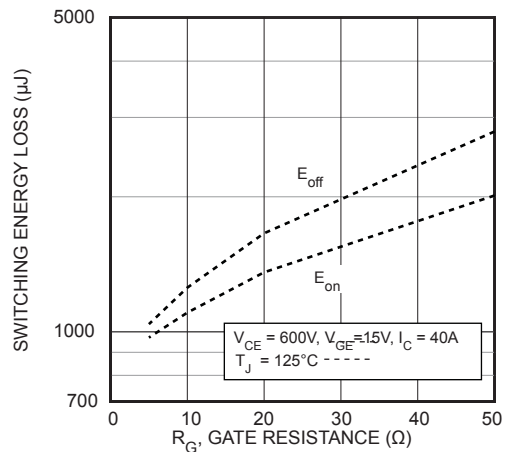


FIGURE 15, Energy Loss vs Gate Resistance

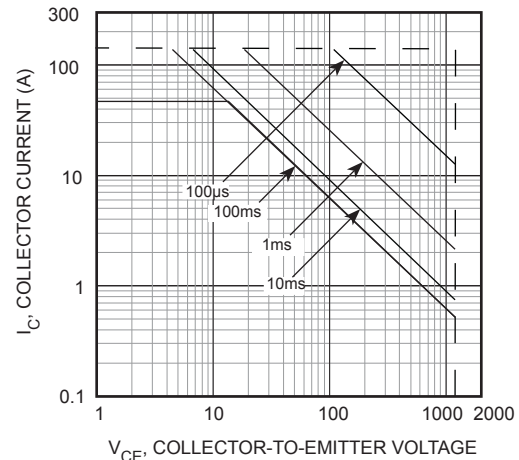


FIGURE 17, Minimum Switching Safe Operating Area

ZERO RECOVERY LOW LEAKAGE SIC ANTI-PARALLEL DIODE

MAXIMUM RATINGS

All Ratings: $T_C = 25^\circ\text{C}$ unless otherwise specified.

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

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	Min	Typ	Max	Unit
V_F	Forward Voltage		$I_F = 10\text{A}$, $T_J = 25^\circ\text{C}$	1.5	Volts
			$I_F = 10\text{A}$, $T_J = 150^\circ\text{C}$	2.1	
Q_c	Total Capacitive Charge $V_R = 800\text{V}$, $I_F = 10\text{A}$, $di/dt = -100\text{A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$		30		nC
C_T	Junction Capacitance $V_R = 0\text{V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$		600		pF
	Junction Capacitance $V_R = 200\text{V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$		71		
	Junction Capacitance $V_R = 400\text{V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$		52		

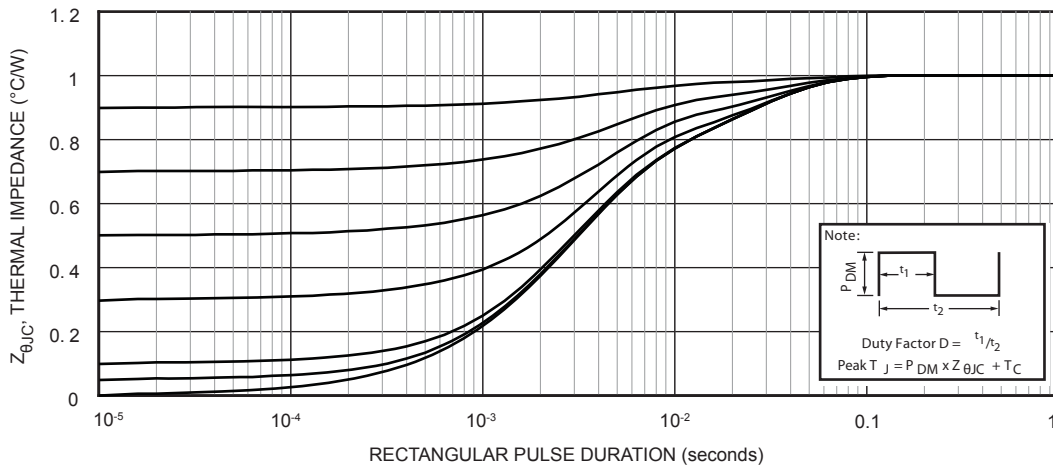


FIGURE 18. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

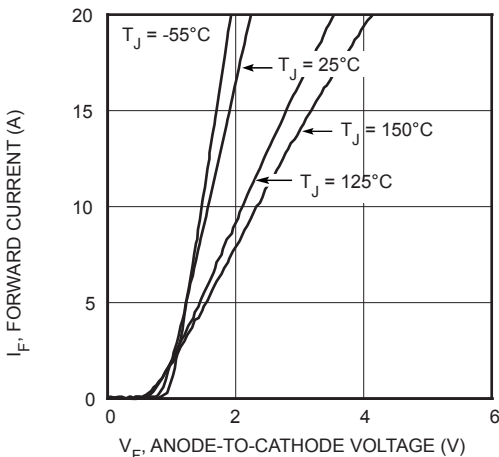


FIGURE 19. Forward Current vs. Forward Voltage

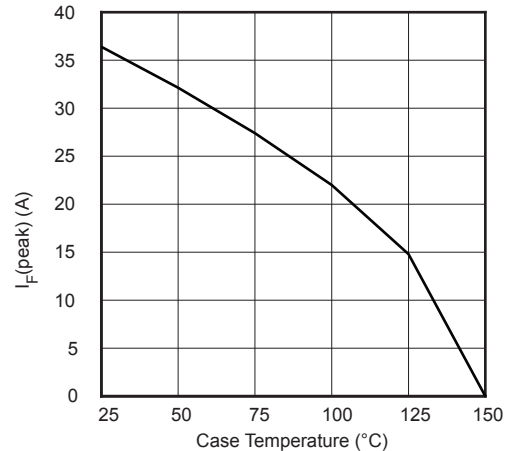


FIGURE 20. Maximum Forward Current vs. Case Temperature

TYPICAL PERFORMANCE CURVES

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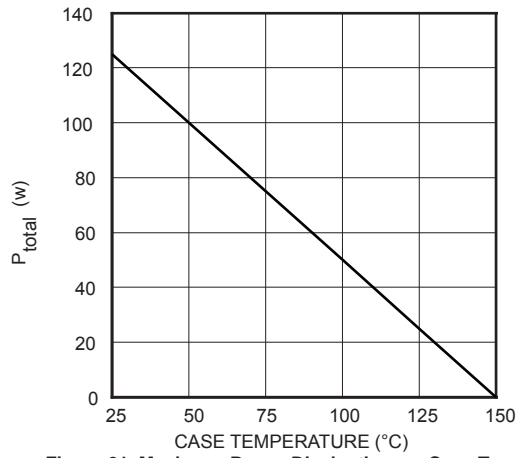


Figure 21. Maximum Power Dissipation vs. Case Temperature

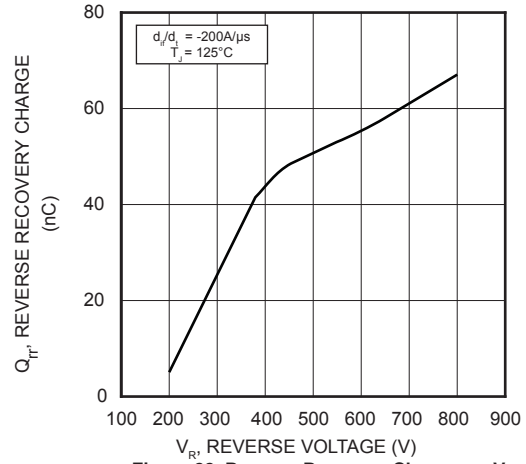


Figure 22. Reverse Recovery Charge vs. V_R

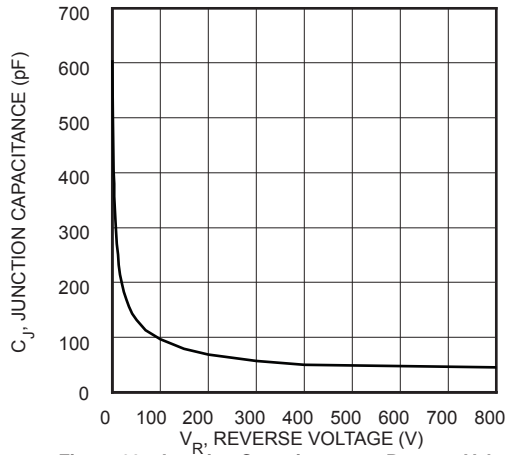
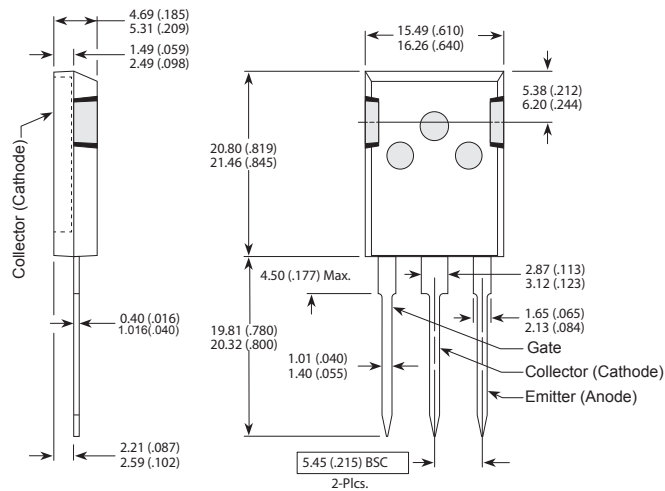


Figure 23. Junction Capacitance vs. Reverse Voltage

T-MAX® (B2) Package Outline



These dimensions are equal to the TO-247 without the mounting hole.
Dimensions in Millimeters and (Inches)

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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