Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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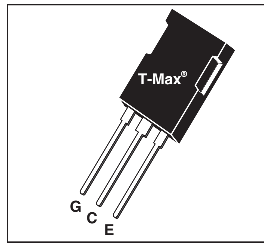
Microsemi.
POWER PRODUCTS GROUP

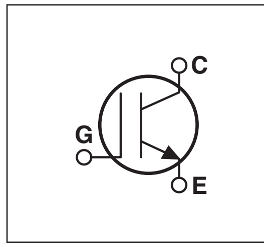
1200V
APT100GN120B2
APT100GN120B2G*

***G Denotes RoHS Compliant, Pb Free Terminal Finish.**

Utilizing the latest Field Stop and Trench Gate technologies, these IGBT's have ultra low $V_{CE(ON)}$ and are ideal for low frequency applications that require absolute minimum conduction loss. Easy paralleling is a result of very tight parameter distribution and a slightly positive $V_{CE(ON)}$ temperature coefficient. A built-in gate resistor ensures extremely reliable operation, even in the event of a short circuit fault. Low gate charge simplifies gate drive design and minimizes losses.



- **1200V Field Stop**
- **Trench Gate: Low $V_{CE(on)}$**
- **Easy Paralleling**
- **Integrated Gate Resistor: Low EMI, High Reliability**



Applications: Welding, Inductive Heating, Solar Inverters, SMPS, Motor drives, UPS

MAXIMUM RATINGS

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

Symbol	Parameter	APT100GN120B2	UNIT
V_{CES}	Collector-Emitter Voltage	1200	Volts
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C ⑧	245	Amps
I_{C2}	Continuous Collector Current @ T_C = 110°C ⑧	100	
I_{CM}	Pulsed Collector Current ①	300	
SSOA	Switching Safe Operating Area @ T_J = 150°C	300A @ 1200V	
P_D	Total Power Dissipation	960	Watts
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	Characteristic / Test Conditions	MIN	TYP	MAX	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 4mA)	1200			Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 4mA, T_j = 25°C)	5.0	5.8	6.5	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 100A, T_j = 25°C)	1.4	1.7	2.1	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 100A, T_j = 125°C)		2.0		
I_{CES}	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 25°C) ②			100	μA
	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 125°C) ②			TBD	
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)			600	nA
$R_{G(int)}$	Integrated Gate Resistor		7.5		Ω

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

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance**		6500		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		365		
C_{res}	Reverse Transfer Capacitance	f = 1 MHz		280		
V_{GEP}	Gate-to-Emitter Plateau Voltage	Gate Charge		9.5		V
Q_g	Total Gate Charge ③	V_{GE} = 15V		540		nC
Q_{ge}	Gate-Emitter Charge	V_{CE} = 600V		50		
Q_{gc}	Gate-Collector ("Miller") Charge	I_C = 100A		295		
SSOA	Switching Safe Operating Area	T_J = 150°C, R_G = 4.3Ω ⑦, V_{GE} = 15V, L = 100µH, V_{CE} = 1200V	300			A
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (25°C)**		50		ns
t_r	Current Rise Time	V_{CC} = 800V		50		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		615		
t_f	Current Fall Time	I_C = 100A		105		
E_{on1}	Turn-on Switching Energy ④	R_G = 1.0Ω ⑦		11		mJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +25°C		15		
E_{off}	Turn-off Switching Energy ⑥			9.5		
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)**		50		ns
t_r	Current Rise Time	V_{CC} = 800V		50		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		725		
t_f	Current Fall Time	I_C = 100A		210		
E_{on1}	Turn-on Switching Energy ④	R_G = 1.0Ω ⑦		12		mJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +125°C		22		
E_{off}	Turn-off Switching Energy ⑥			14		

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case **(IGBT)**			.13	°C/W
$R_{\theta JC}$	Junction to Case **(DIODE)**			N/A	
W_T	Package Weight		6.1		gm

① Repetitive Rating: Pulse width limited by maximum junction temperature.

② For Combi devices, I_{ces} includes both IGBT and FRED leakages

③ See MIL-STD-750 Method 3471.

④ E_{on1} is the clamped inductive turn-on energy of the IGBT only, without the effect of a commutating diode reverse recovery current adding to the IGBT turn-on loss. Tested in inductive switching test circuit shown in figure 21, but with a Silicon Carbide diode.

⑤ E_{on2} is the clamped inductive turn-on energy that includes a commutating diode reverse recovery current in the IGBT turn-on switching loss. (See Figures 21, 22.)

⑥ E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1. (See Figures 21, 23.)

⑦ R_G is external gate resistance, not including $R_{G(int)}$ nor gate driver impedance. (MIC4452)

⑧ Continuous Current limited by package lead temperature.

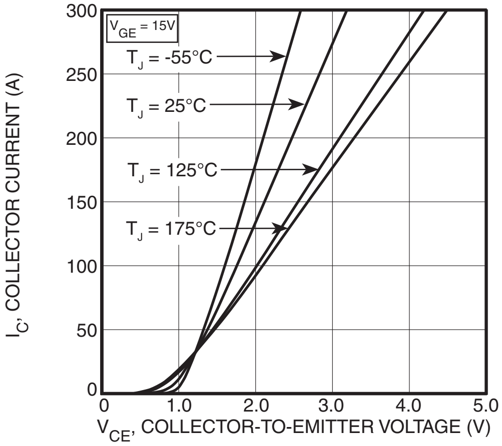


FIGURE 1, Output Characteristics(T_J = 25°C)

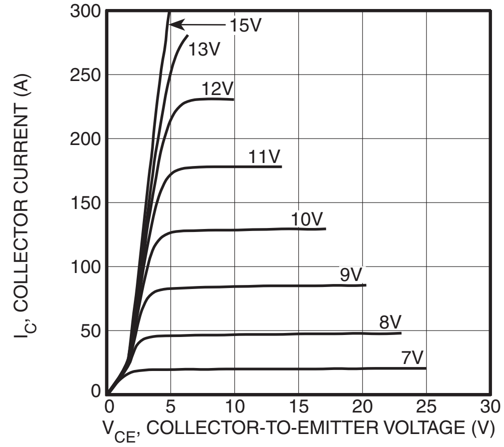


FIGURE 2, Output Characteristics (T_J = 125°C)

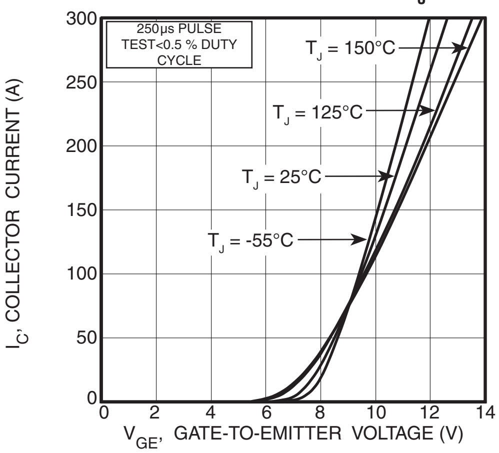


FIGURE 3, Transfer Characteristics

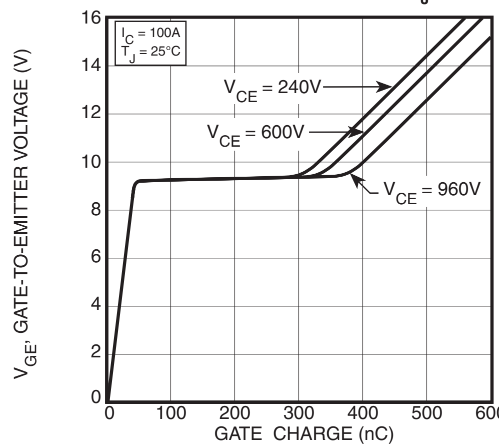


FIGURE 4, Gate Charge

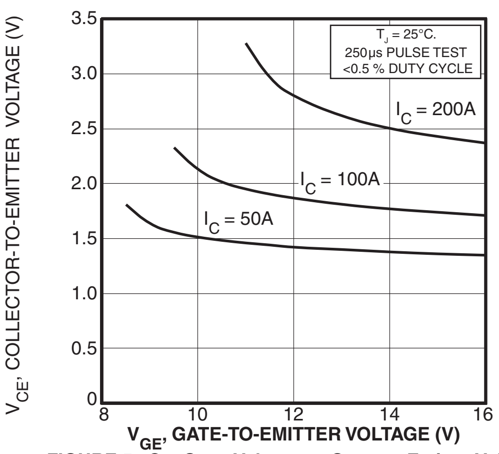


FIGURE 5, On State Voltage vs Gate-to- Emitter Voltage

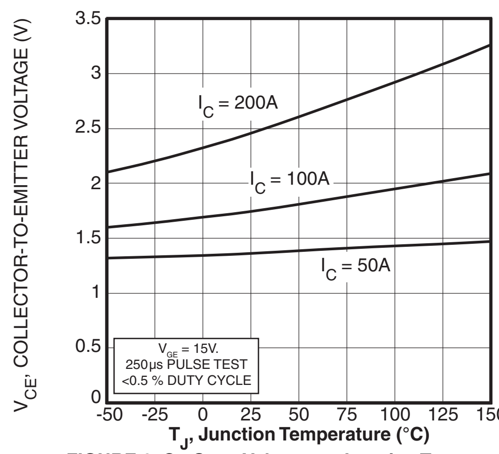


FIGURE 6, On State Voltage vs Junction Temperature

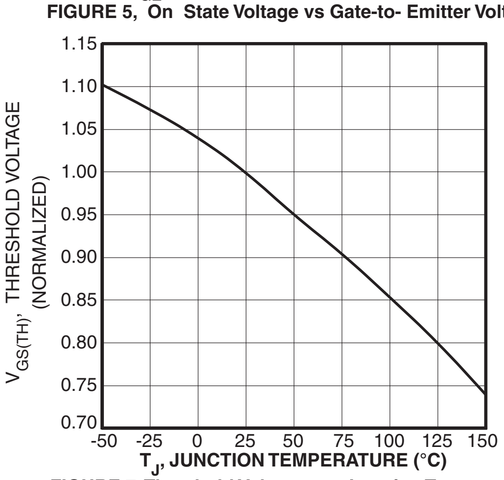


FIGURE 7, Threshold Voltage vs. Junction Temperature

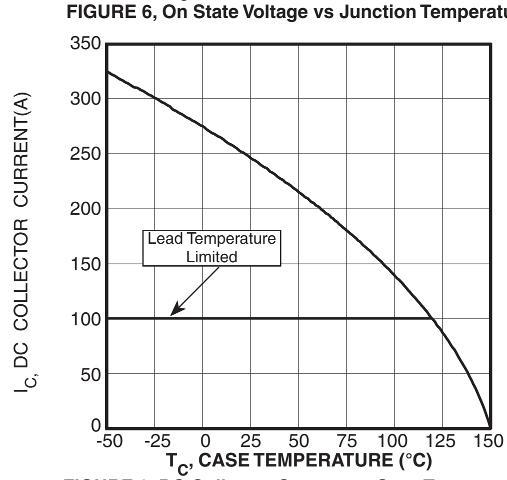


FIGURE 8, DC Collector Current vs Case Temperature

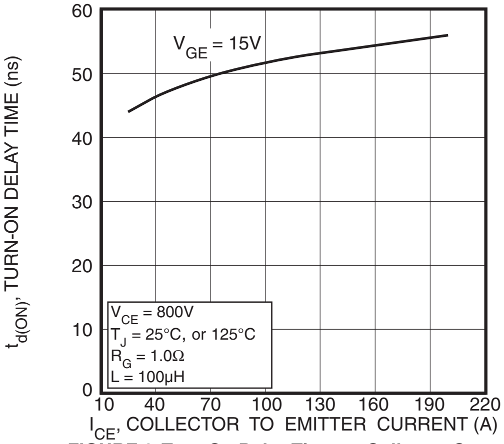


FIGURE 9, Turn-On Delay Time vs Collector Current

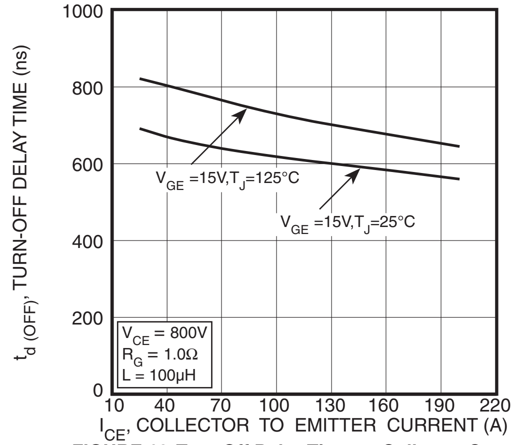


FIGURE 10, Turn-Off Delay Time vs Collector Current

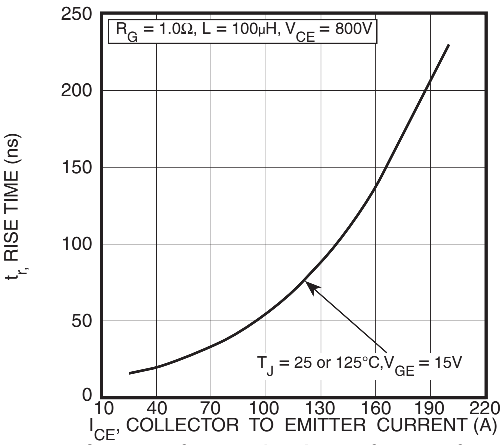


FIGURE 11, Current Rise Time vs Collector Current

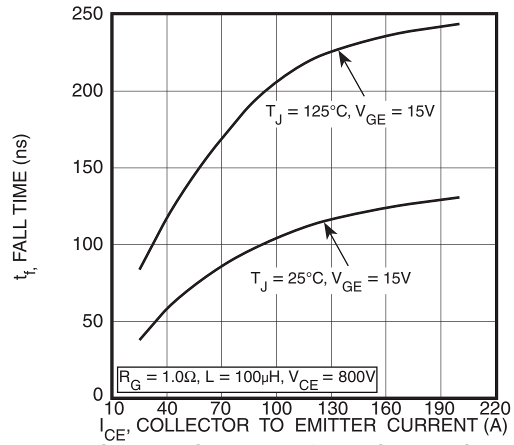


FIGURE 12, Current Fall Time vs Collector Current

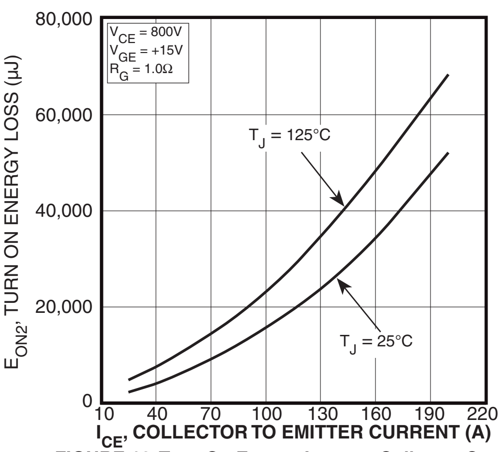


FIGURE 13, Turn-On Energy Loss vs Collector Current

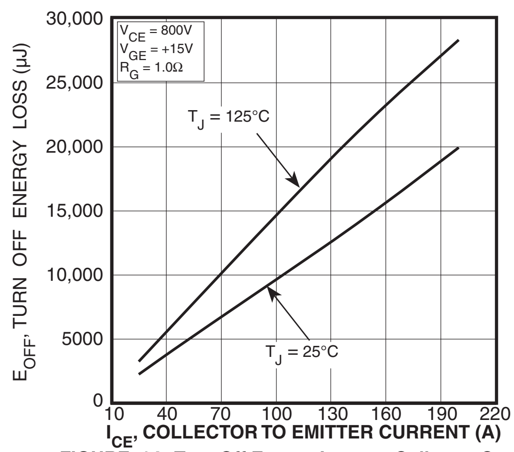


FIGURE 14, Turn Off Energy Loss vs Collector Current

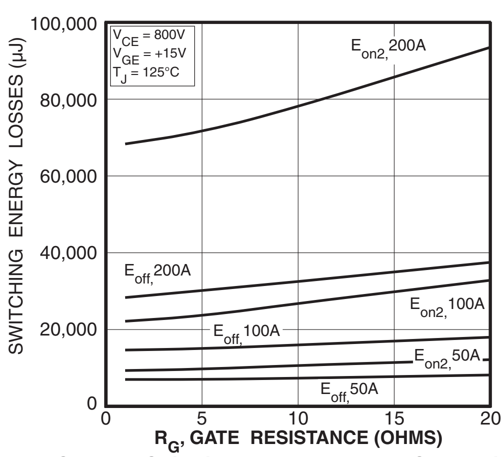


FIGURE 15, Switching Energy Losses vs. Gate Resistance

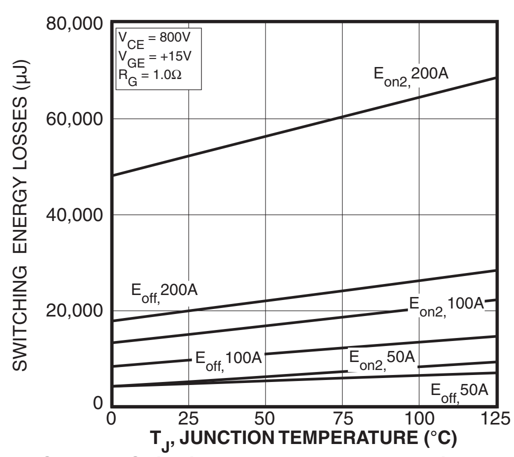


FIGURE 16, Switching Energy Losses vs Junction Temperature

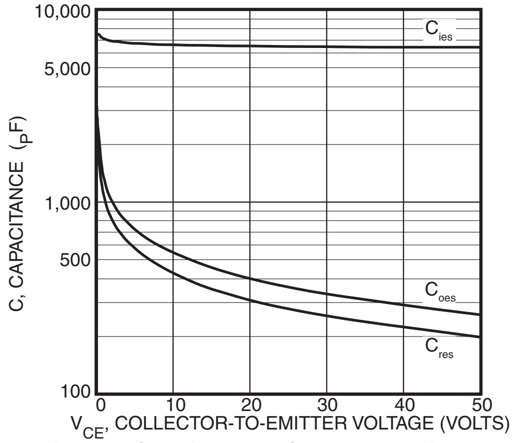


Figure 17, Capacitance vs Collector-To-Emitter Voltage

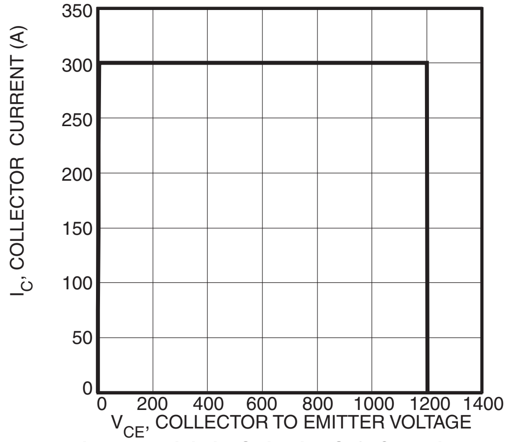


Figure 18,Minimim Switching Safe Operating Area

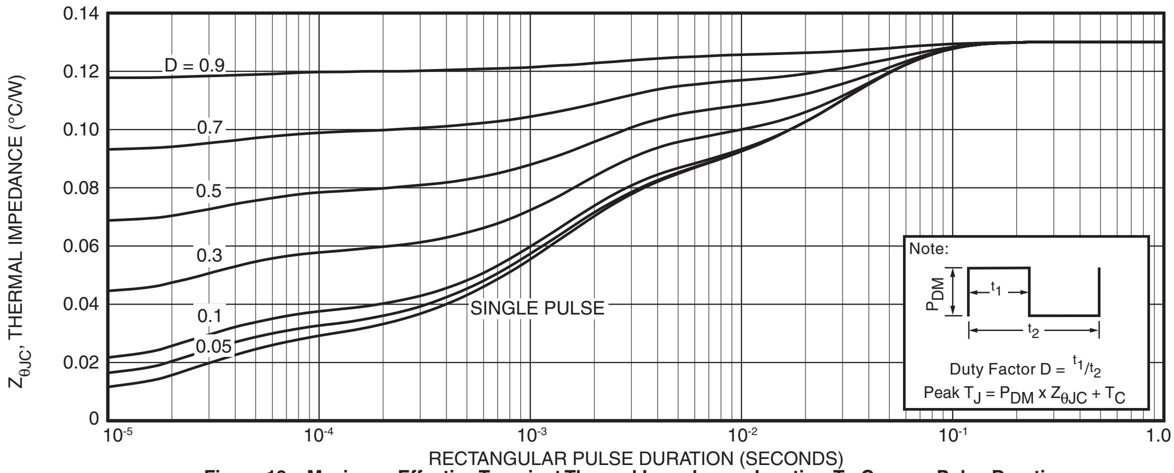


Figure 19a, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

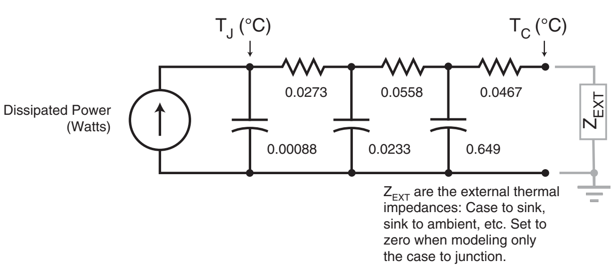
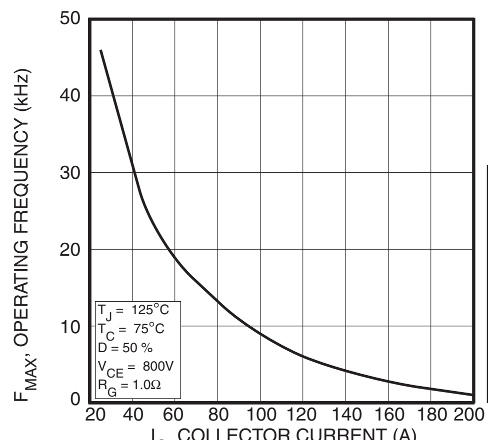


FIGURE 19b, TRANSIENT THERMAL IMPEDANCE MODEL



$$F_{max} = \min(f_{max}, f_{max2})$$

$$f_{max1} = \frac{0.05}{t_{d(on)} + t_r + t_{d(off)} + t_f}$$

$$f_{max2} = \frac{P_{diss} - P_{cond}}{E_{on2} + E_{off}}$$

$$P_{diss} = \frac{T_J - T_C}{R_{\theta JC}}$$

Figure 20, Operating Frequency vs Collector Current

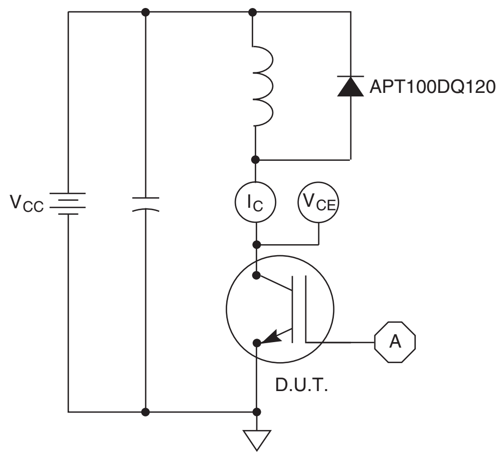


Figure 21, Inductive Switching Test Circuit

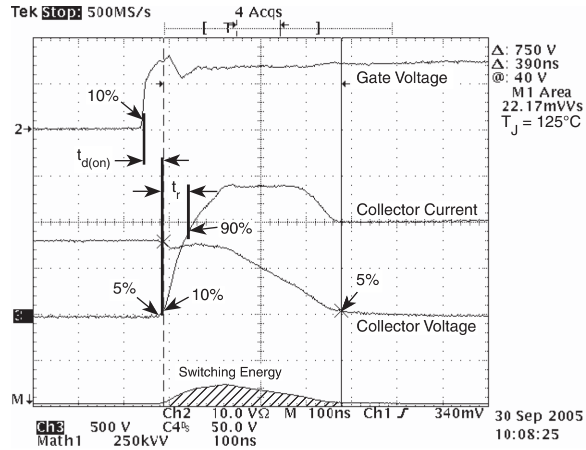


Figure 22, Turn-on Switching Waveforms and Definitions

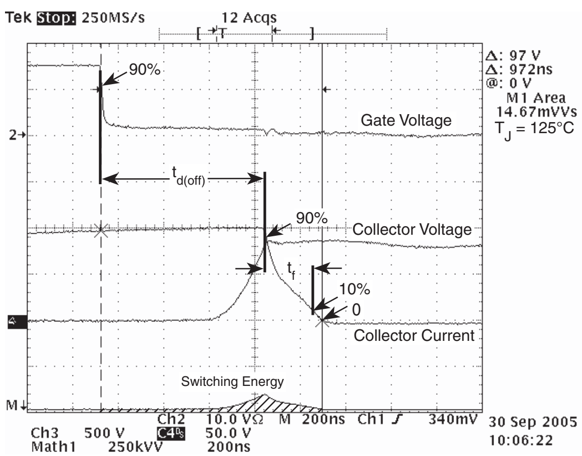
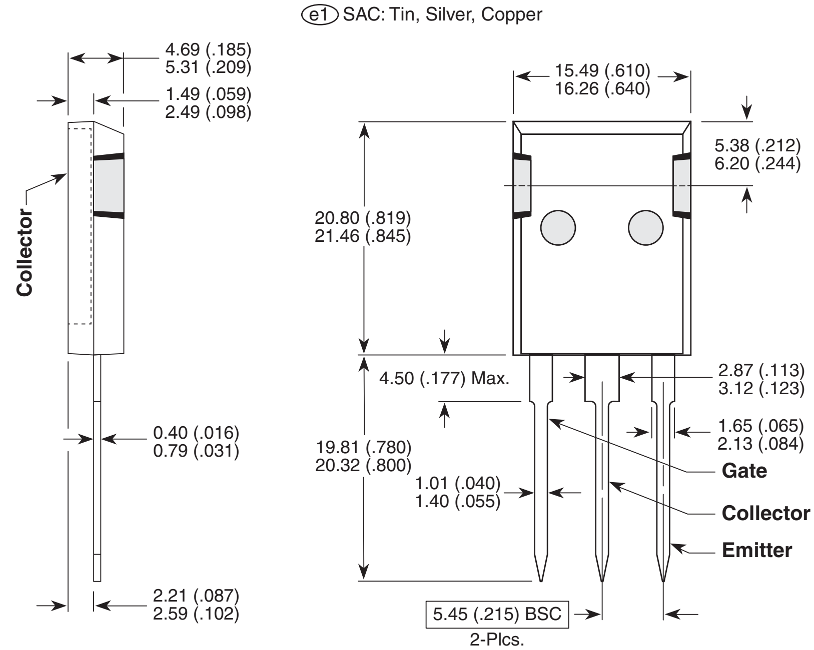


Figure 23, Turn-off Switching Waveforms and Definitions

T-MAX® (B2) Package Outline

(e1) SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)