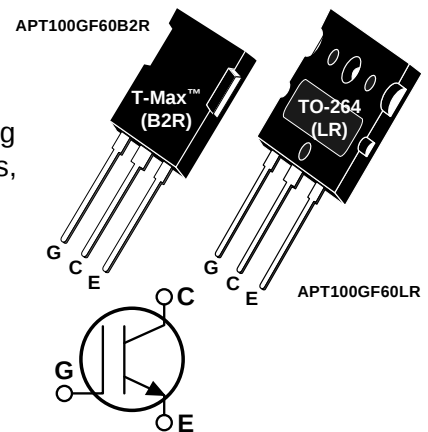


Fast IGBT

The Fast IGBT is a new generation of high voltage power IGBTs. Using Non-Punch Through Technology the Fast IGBT offers superior ruggedness, fast switching speed and low Collector-Emitter On voltage.

- Low Forward Voltage Drop
- Low Tail Current
- Avalanche Rated
- High Freq. Switching to 20KHz
- Ultra Low Leakage Current
- RBSOA and SCSOA Rated



MAXIMUM RATINGS

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

Symbol	Parameter	APT100GF60B2R/LR	UNIT
V_{CES}	Collector-Emitter Voltage	600	Volts
V_{CGR}	Collector-Gate Voltage ($R_{GE} = 20K\Omega$)	600	
V_{GE}	Gate-Emitter Voltage	± 20	
I_{C1}	Continuous Collector Current ⁽⁴⁾ @ $T_C = 25^\circ\text{C}$	100	Amps
I_{C2}	Continuous Collector Current @ $T_C = 60^\circ\text{C}$	100	
I_{CM}	Pulsed Collector Current ⁽¹⁾ @ $T_C = 25^\circ\text{C}$	280	
I_{LM}	RBSOA Clamped Inductive Load Current @ $R_g = 11\Omega$ $T_C = 125^\circ\text{C}$	200	
E_{AS}	Single Pulse Avalanche Energy ⁽²⁾	85	mJ
P_D	Total Power Dissipation	295	Watts
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	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{CES}	Collector-Emitter Breakdown Voltage ($V_{GE} = 0V, I_C = 1.0mA$)	600			Volts
$V_{GE(TH)}$	Gate Threshold Voltage ($V_{CE} = V_{GE}, I_C = 700\mu A, T_J = 25^\circ\text{C}$)	4.5	5.5	6.5	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 50A, T_J = 25^\circ\text{C}$)		1.6	2.7	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 50A, T_J = 125^\circ\text{C}$)		1.7	3.4	
I_{CES}	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 25^\circ\text{C}$)			1.0	mA
	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 125^\circ\text{C}$)			5.0	
I_{GES}	Gate-Emitter Leakage Current ($V_{GE} = \pm 20V, V_{CE} = 0V$)			± 100	nA



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

APT Website - <http://www.advancedpower.com>

DYNAMIC CHARACTERISTICS

APT100GF60B2R/LR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1\text{ MHz}$		4365	5020	pF
C_{oes}	Output Capacitance			490	710	
C_{res}	Reverse Transfer Capacitance			300	520	
Q_g	Total Gate Charge ③	Gate Charge $V_{GE} = 15V$ $V_{CC} = 0.5V_{CES}$ $I_C = I_{C2}$		340	510	nC
Q_{ge}	Gate-Emitter Charge			39	60	
Q_{gc}	Gate-Collector ("Miller") Charge			195	290	
$t_{d(on)}$	Turn-on Delay Time	Resistive Switching (25°C) $V_{GE} = 15V$ $V_{CC} = 0.5V_{CES}$ $I_C = I_{C2}$ $R_G = 10\Omega$		38	80	ns
t_r	Rise Time			162	320	
$t_{d(off)}$	Turn-off Delay Time			230	340	
t_f	Fall Time			165	330	
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +150^\circ C$		44	88	ns
t_r	Rise Time			150	300	
$t_{d(off)}$	Turn-off Delay Time			395	590	
t_f	Fall Time			105	210	
E_{on}	Turn-on Switching Energy	$R_G = 10\Omega$ $T_J = +150^\circ C$		7	14	mJ
E_{off}	Turn-off Switching Energy			6	12	
E_{ts}	Total Switching Losses			13	25	
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +25^\circ C$		47	90	ns
t_r	Rise Time			163	330	
$t_{d(off)}$	Turn-off Delay Time			350	530	
t_f	Fall Time			90	180	
E_{ts}	Total Switching Losses			11	22	mJ
g_{fe}	Forward Transconductance	$V_{CE} = 20V, I_C = I_{C2}$	6			S

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.42	°C/W
$R_{\theta JA}$	Junction to Ambient			40	
W_T	Package Weight		0.22		oz
			6.1		gm
Torque	Mounting Torque (using a 6-32 or 3mm Binding Head Machine Screw)			10	lb•in
				1.1	N•m

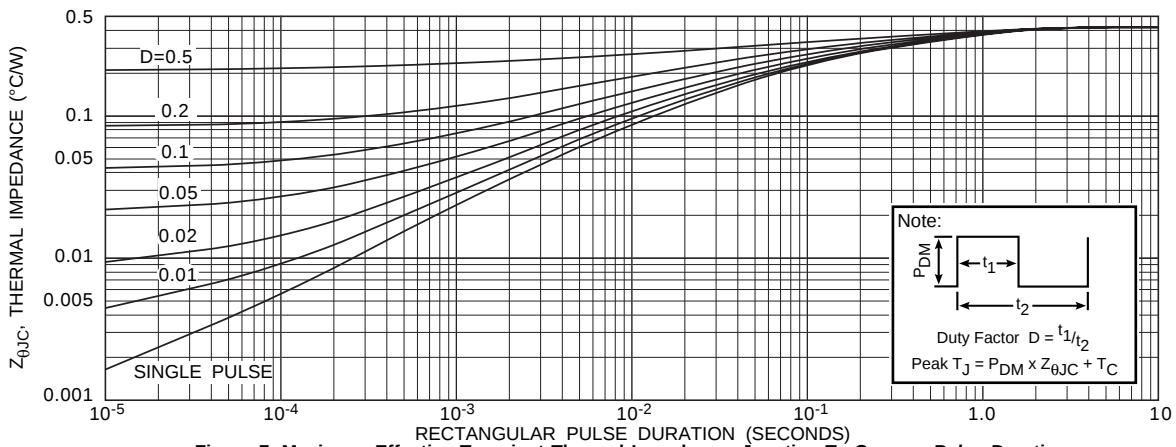
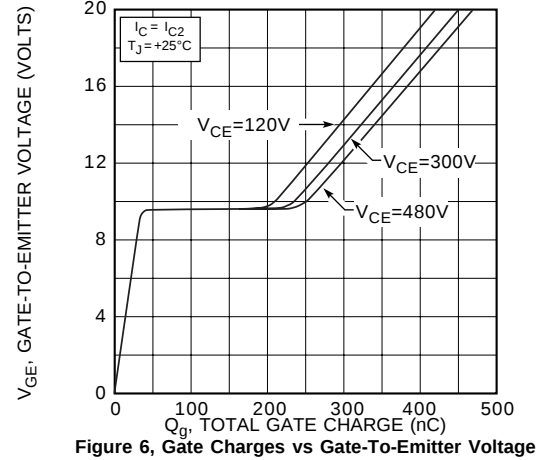
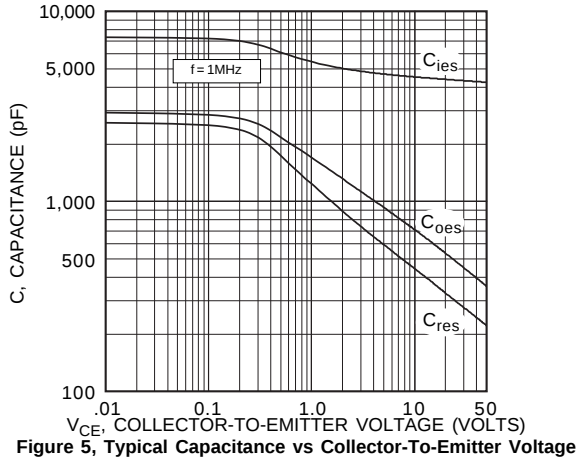
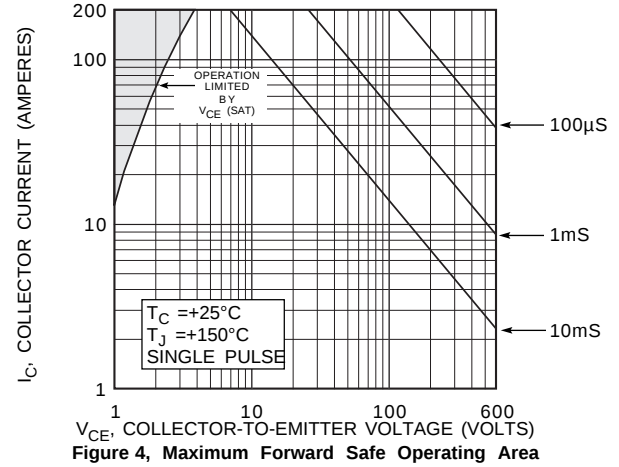
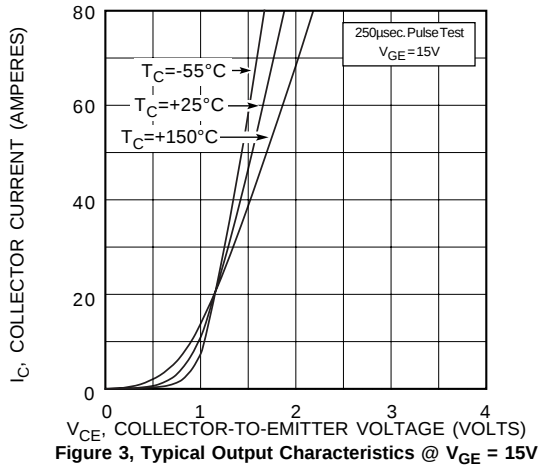
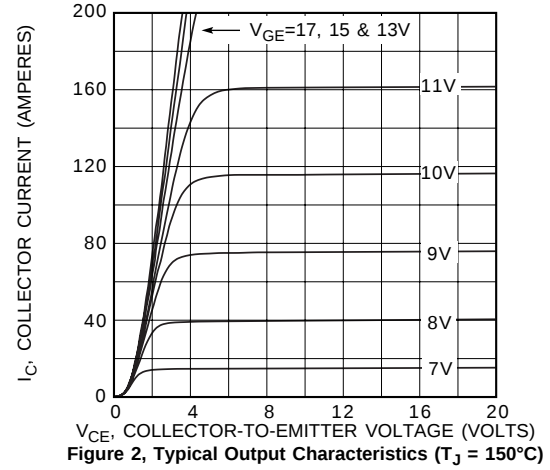
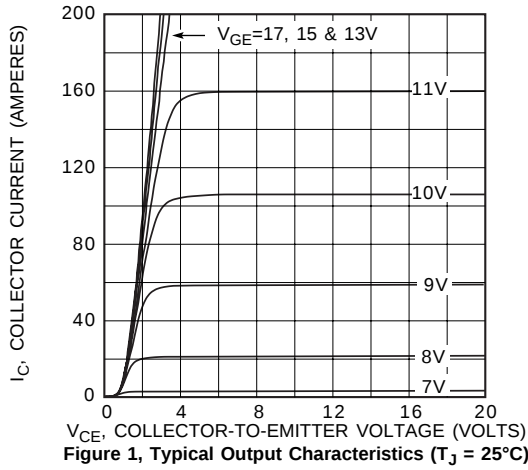
① Repetitive Rating: Pulse width limited by maximum junction temperature.

② $I_C = I_{C2}$, $R_{GE} = 25\Omega$, $L = 17\mu H$, $T_J = 25^\circ C$

③ See MIL-STD-750 Method 3471

④ The maximum current is limited by lead temperature.

APT Reserves the right to change, without notice, the specifications and information contained herein.



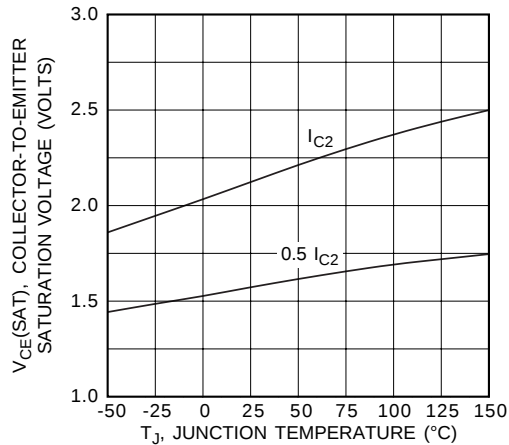


Figure 8, Typical $V_{CE(SAT)}$ Voltage vs Junction Temperature

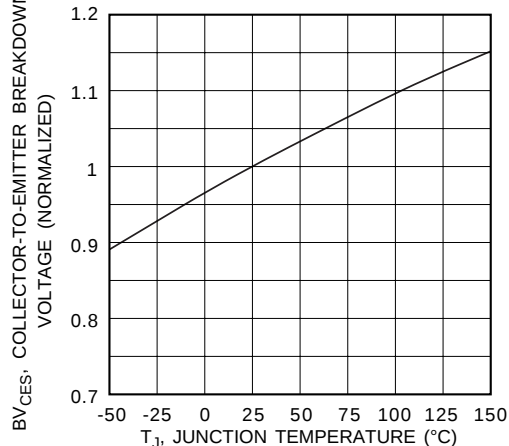


Figure 10, Breakdown Voltage vs Junction Temperature

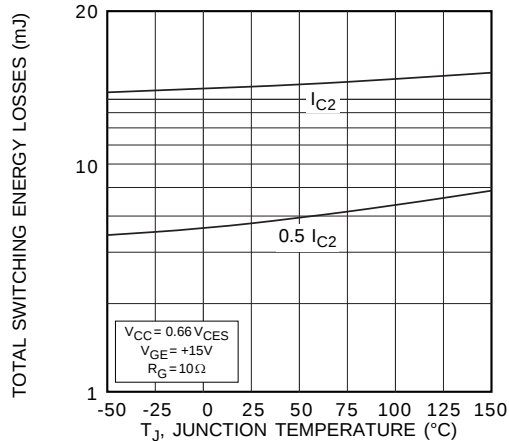


Figure 12, Typical Switching Energy Losses vs. Junction Temperature

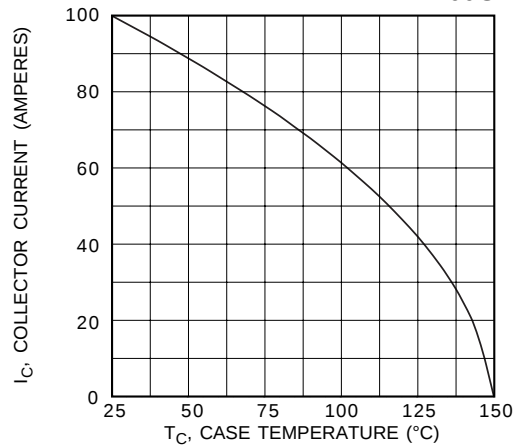


Figure 9, Maximum Collector Current vs Case Temperature

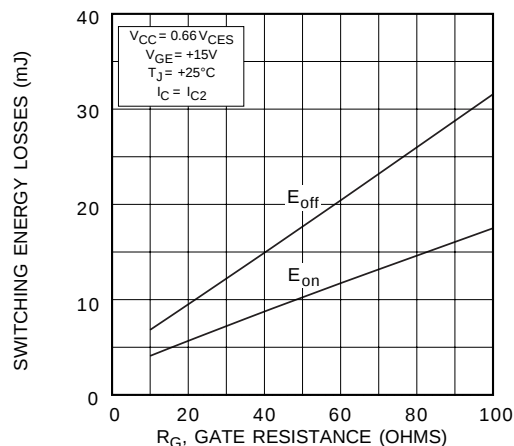


Figure 11, Typical Switching Energy Losses vs Gate Resistance

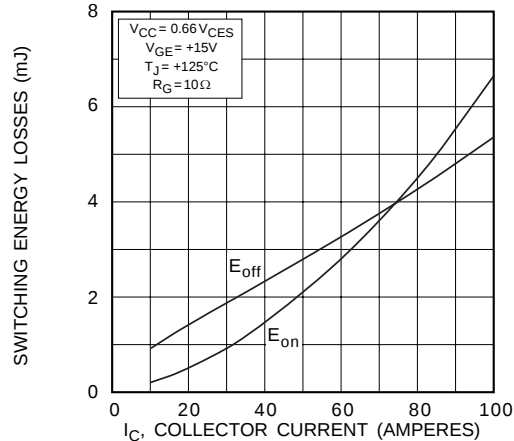


Figure 13, Typical Switching Energy Losses vs Collector Current

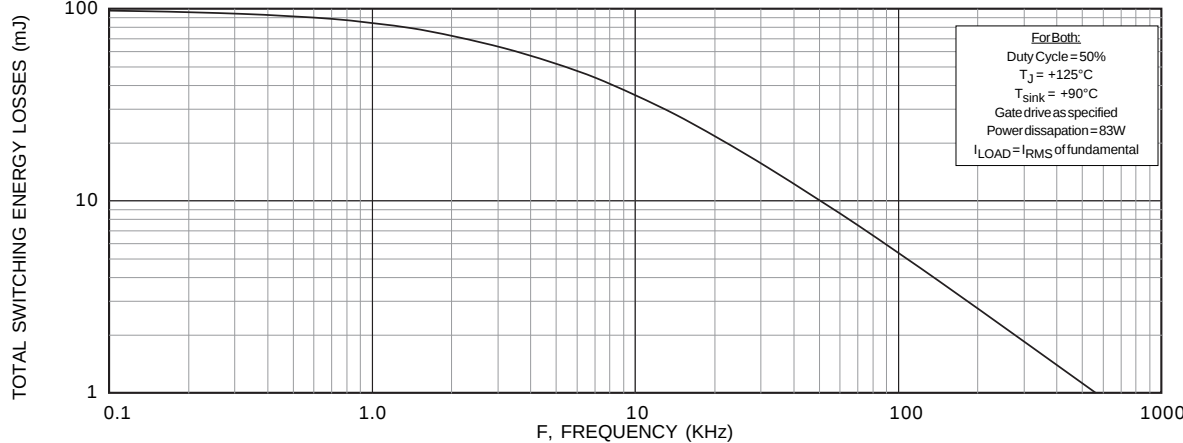


Figure 14, Typical Load Current vs Frequency

APT100GF60B2R/LR

*DRIVER SAME TYPE AS D.U.T.
 $V_{CC} = 0.66 V_{CES}$
 $E_{ts} = E_{on} + E_{off}$

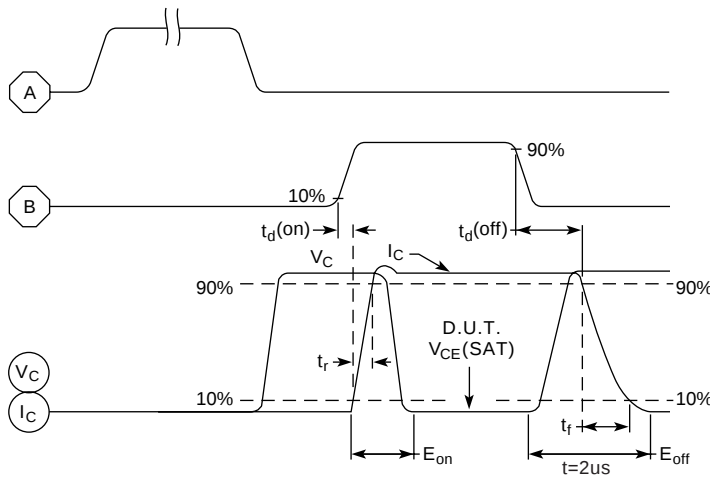


Figure 15, Switching Loss Test Circuit and Waveforms

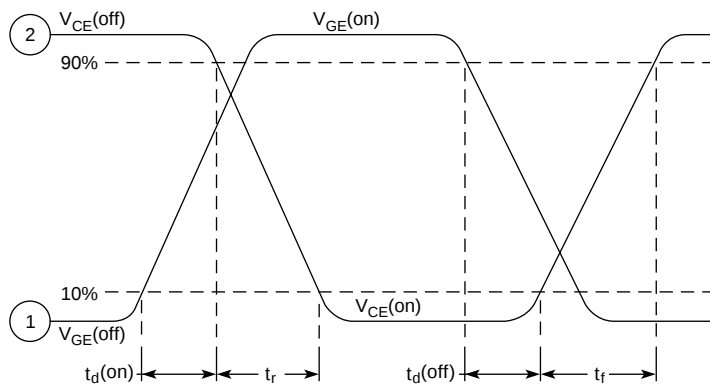
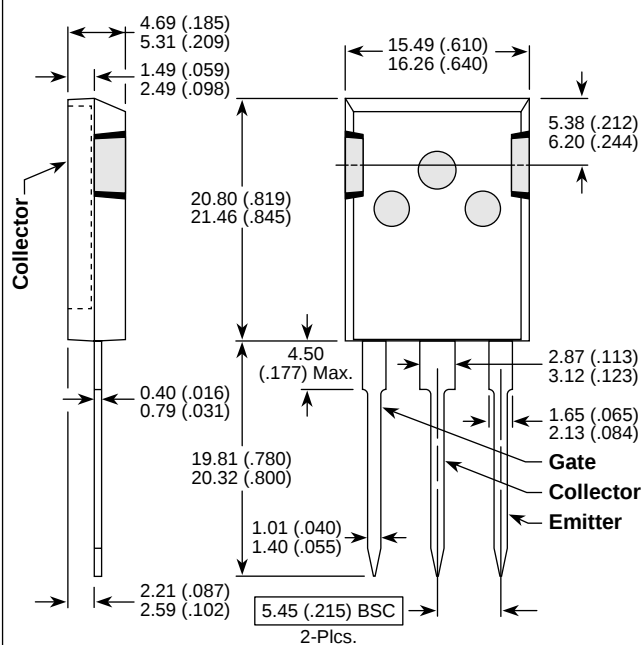


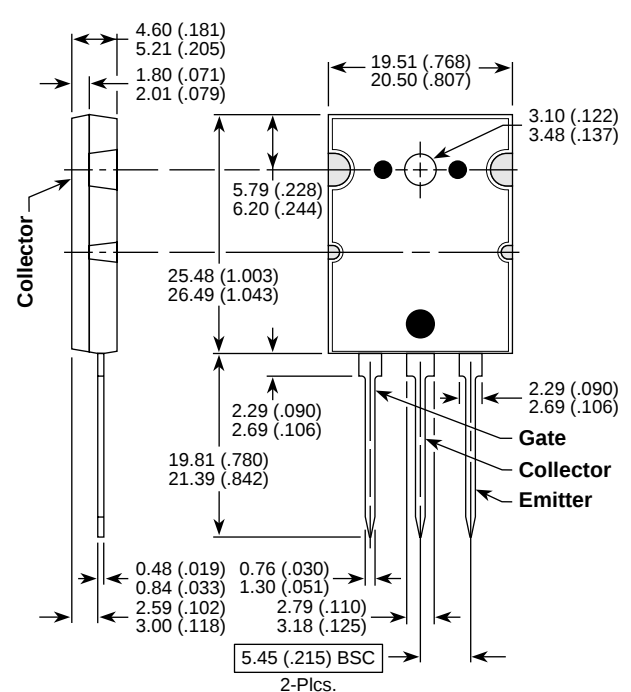
Figure 16, Resistive Switching Time Test Circuit and Waveforms

T-MAX™ Package Outline



Dimensions in Millimeters and (Inches)

TO-264 Package Outline



Dimensions in Millimeters and (Inches)