
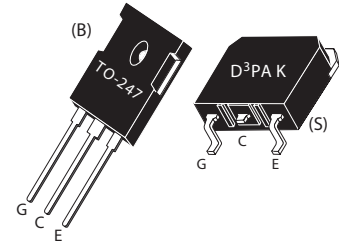


Thunderbolt IGBT®

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

- Low Forward Voltage Drop
- Low Tail Current
- Avalanche Rated
- RoHS Compliant 
- High Freq. Switching to 150KHz
- Ultra Low Leakage Current
- RBSOA and SCSOA Rated



MAXMUM RATINGS

Symbol	Parameter	APT60GT60BR_SRG	Unit
V_{CES}	Collector-Emitter Voltage	600	Volts
V_{GE}	Gate Emitter Voltage	±20	
I_{C1}	Continuous Collector Current @ $T_c = 25^\circ\text{C}$ ^{4±}	100	Amps
I_{C2}	Continuous Collector Current @ $T_c = 105^\circ\text{C}$	60	
I_{CM}	Pulsed Collector Current ¹ @ $T_c = 25^\circ\text{C}$	360	
I_{LM}	RBSOA Clamped Inductive Load Current $R_g = 11\Omega$, $T_c = 25^\circ\text{C}$	360	
E_{AS}	Single Pulse Avalanche Energy ²	65	mJ
P_D	Total Power Dissipation	500	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	UNIT
BV_{CES}	Collector-Emitter Breakdown Voltage ($V_{GE} = 0V, I_C = 0.5mA$)	600			Volts
$V_{GE(TH)}$	Gate Threshold Voltage ($V_{CE} = V_{GE}, I_C = 500\mu A, T_j = 25^\circ\text{C}$)	3	4	5	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = I_{C2}, T_j = 25^\circ\text{C}$)	1.6	2.2	2.5	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = I_{C2}, T_j = 125^\circ\text{C}$)			2.8	
I_{CES}	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 25^\circ\text{C}$)			80	μA
	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 125^\circ\text{C}$)			2000	
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.

DYNAMIC CHARACTERISTICS

APT60GT60BR_SRG

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1\text{ MHz}$		3125	3590	pF
C_{oes}	Output Capacitance			310	450	
C_{res}	Reverse Transfer Capacitance			180	310	
Q_g	Total Gate Charge ³	Gate Charge $V_{GE} = 15V$ $V_{CC} = 0.5V_{CES}$ $I_C = I_{C2}$		275	410	nC
Q_{ge}	Gate-Emitter Charge			19	30	
Q_{gc}	Gate-Collector ("Miller") Charge			120	180	
$t_{d(on)}$	Turn-on Delay Time	Resistive Switching (25°C) $V_{GE} = 15V$ $V_{CC} = 0.5V_{CES}$ $I_C = I_{C2}$ $R_G = 10\Omega$		20	40	ns
t_r	Rise Time			95	190	
$t_{d(off)}$	Turn-off Delay Time			315	470	
t_f	Fall Time			245	490	
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +150^\circ C$		25	50	ns
t_r	Rise Time			59	120	
$t_{d(off)}$	Turn-off Delay Time			430	650	
t_f	Fall Time			65	130	
E_{on}	Turn-on Switching Energy			1.6	3.2	
E_{off}	Turn-off Switching Energy		2.4	4.8	mJ	
E_{ts}	Total Switching Losses		4.0	8.0		
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 5\Omega$ $T_J = +25^\circ C$		26	50	ns
t_r	Rise Time			63	125	
$t_{d(off)}$	Turn-off Delay Time			395	590	
t_f	Fall Time			68	140	
E_{ts}	Total Switching Losses			3.4	7.0	
g_{fe}	Forward Transconductance	$V_{CE} = 20V, I_C = I_{C2}$	4			S

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.25	°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 $I_C = I_{C2}$, $R_{GE} = 25\Omega$, $L = 36\mu H$, $T_J = 25^\circ C$

③ See MIL-STD-750 Method 3471

④ The maximum current is limited by lead temperature.

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

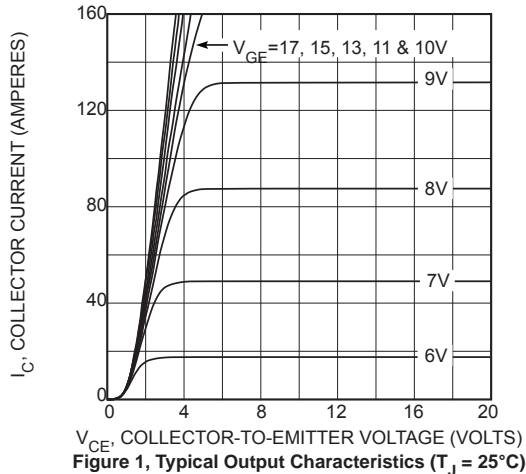


Figure 1, Typical Output Characteristics ($T_J = 25^\circ\text{C}$)

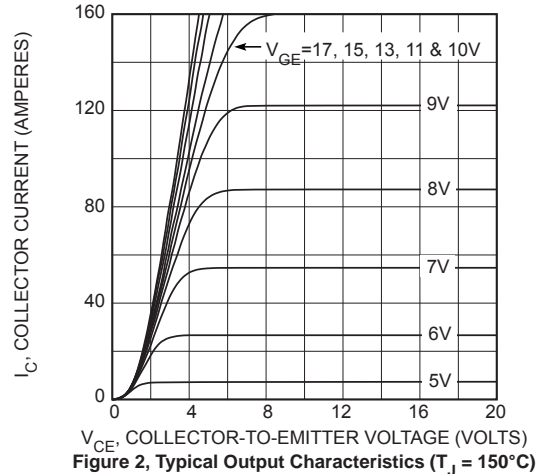


Figure 2, Typical Output Characteristics ($T_J = 150^\circ\text{C}$)

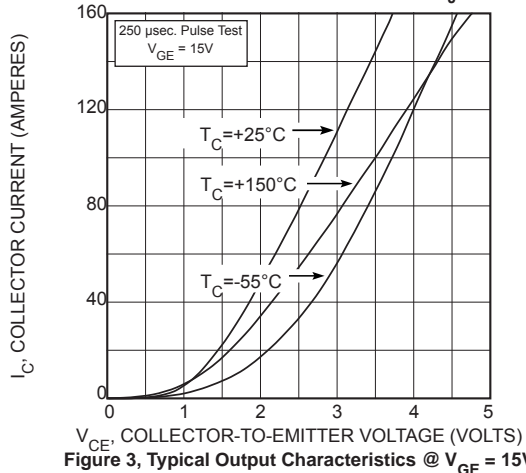


Figure 3, Typical Output Characteristics @ $V_{GE} = 15\text{V}$

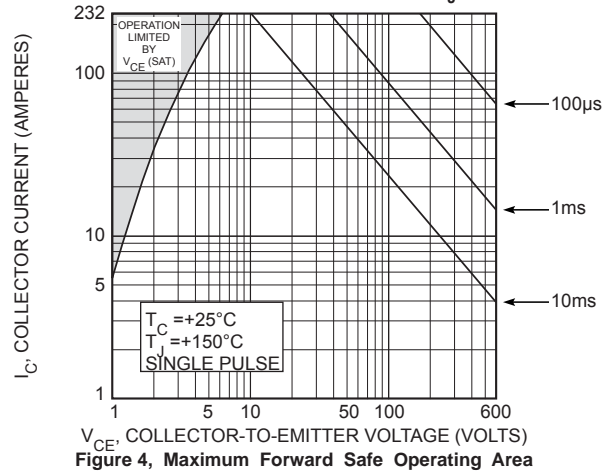


Figure 4, Maximum Forward Safe Operating Area

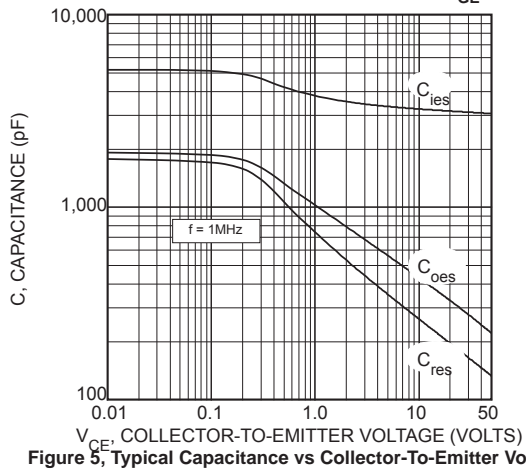


Figure 5, Typical Capacitance vs Collector-To-Emitter Voltage

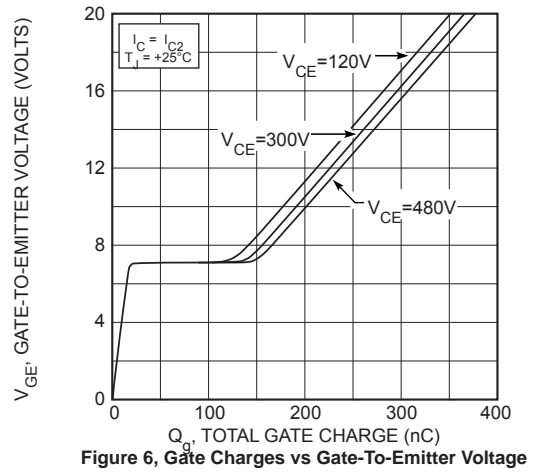


Figure 6, Gate Charges vs Gate-To-Emitter Voltage

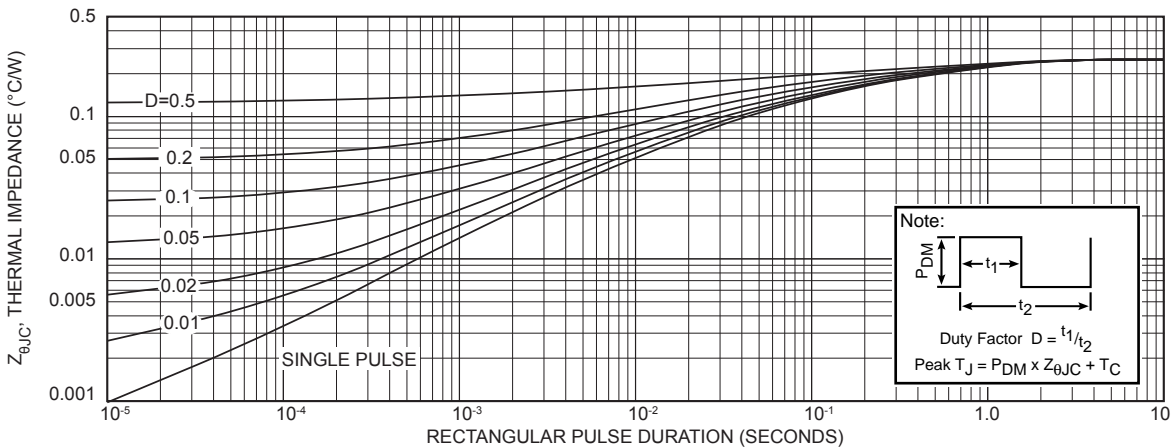


Figure 7, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

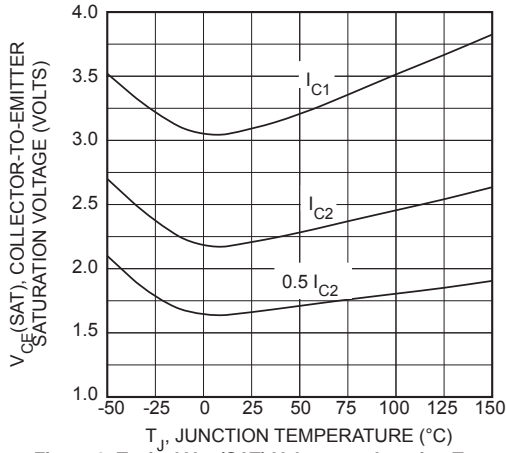


Figure 8, Typical $V_{CE(SAT)}$ Voltage vs Junction Temperature

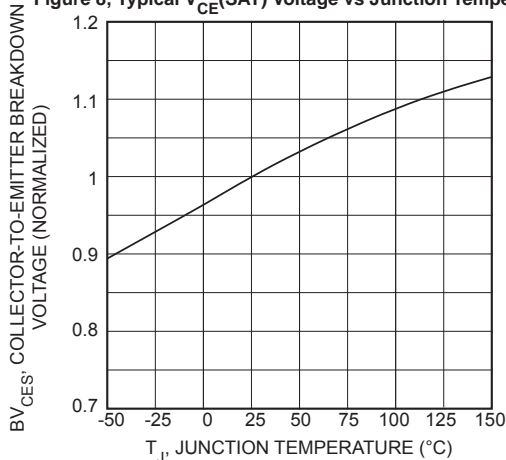


Figure 10, Breakdown Voltage vs Junction Temperature

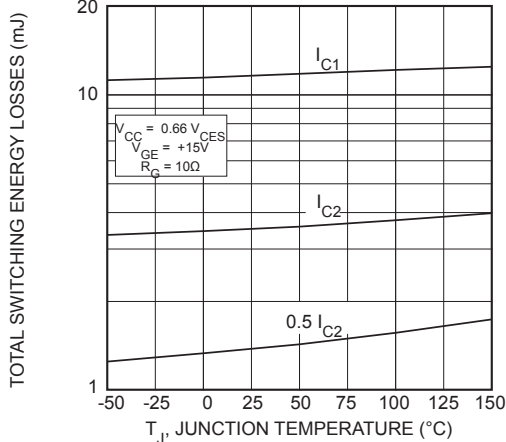


Figure 12, Typical Switching Energy Losses vs. Junction Temperature

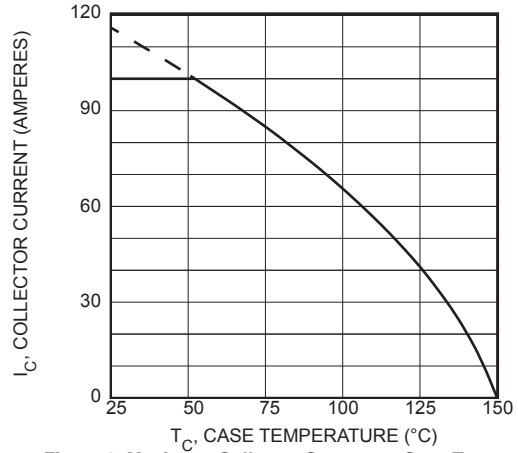


Figure 9, Maximum Collector Current vs Case Temperature

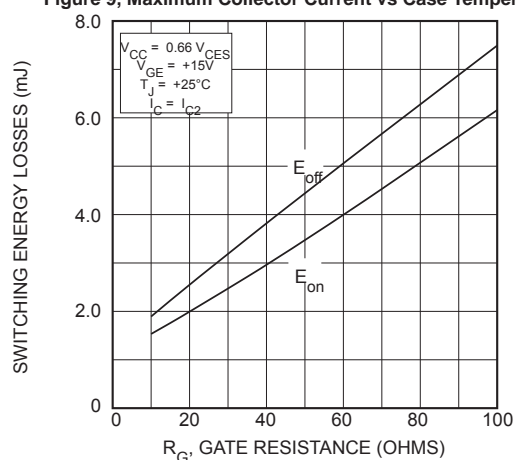


Figure 11, Typical Switching Energy Losses vs Gate Resistance

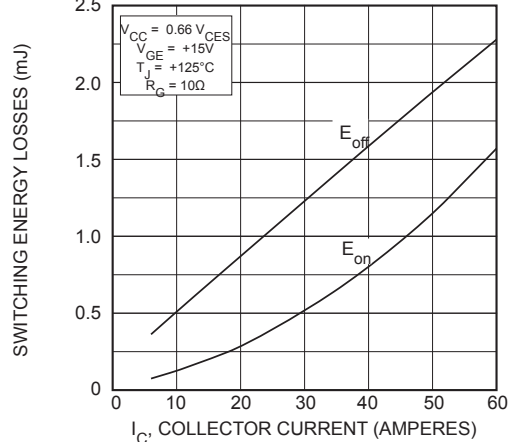


Figure 13, Typical Switching Energy Losses vs Collector Current

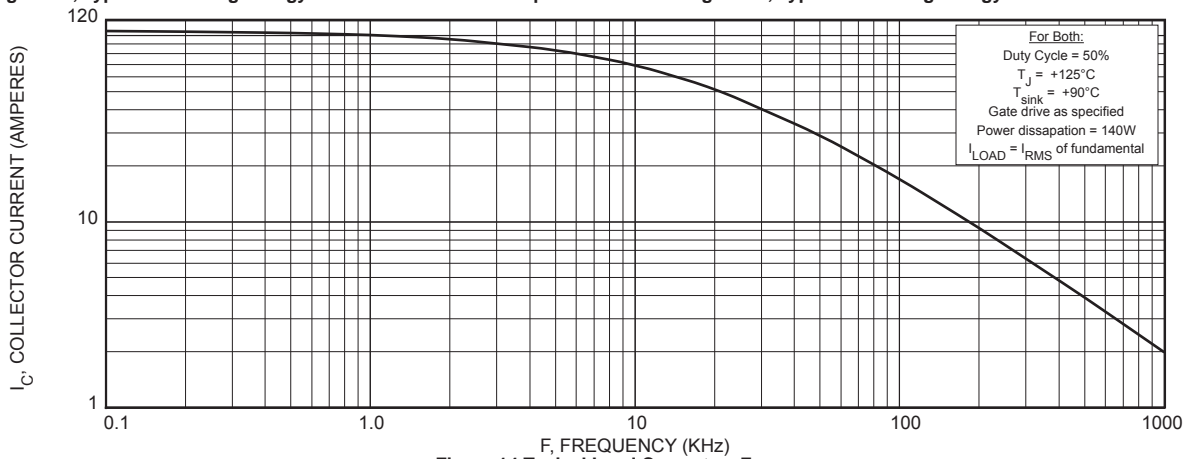


Figure 14, Typical Load Current vs Frequency

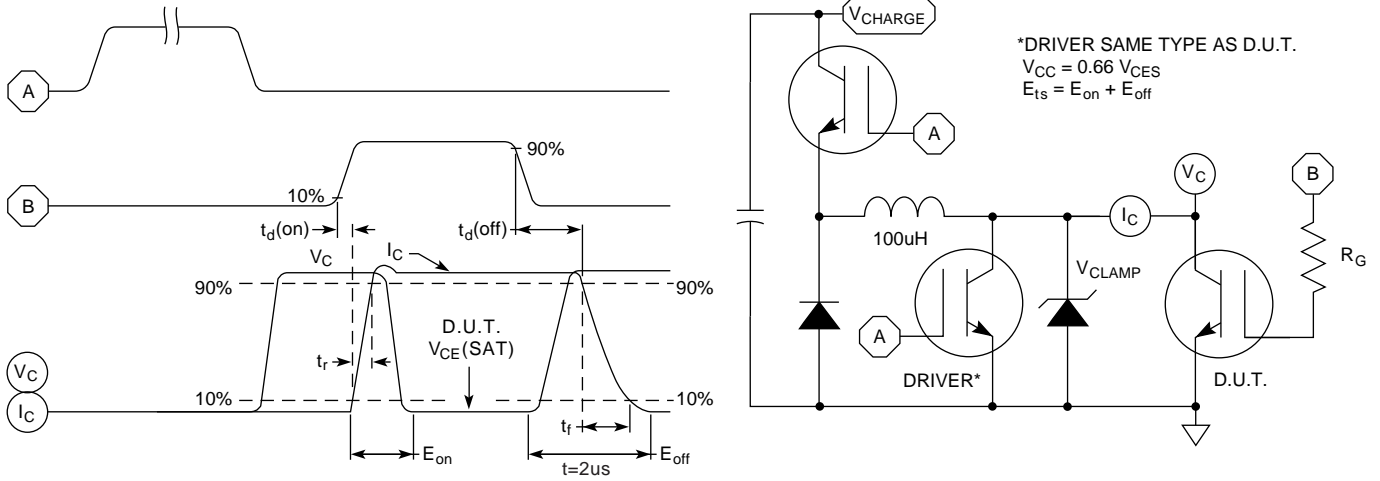


Figure 15, Switching Loss Test Circuit and Waveforms

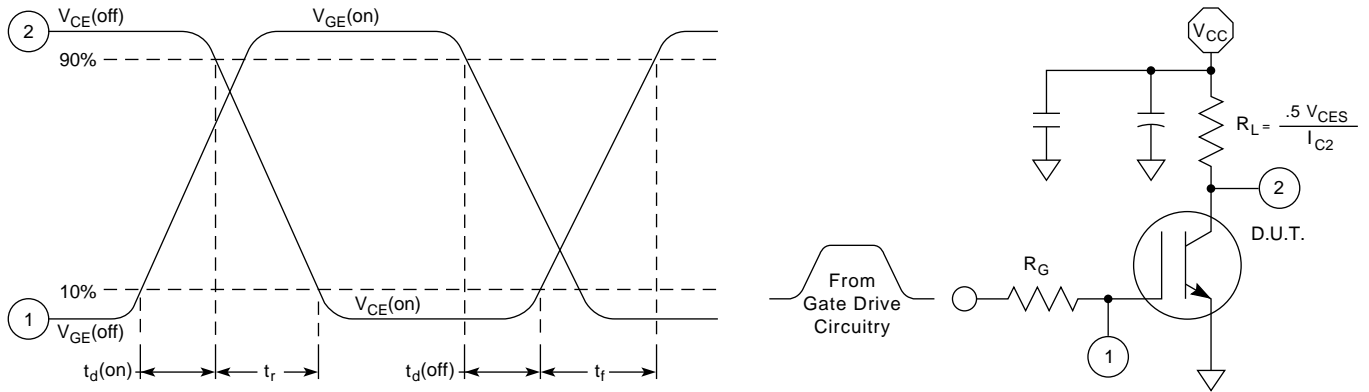
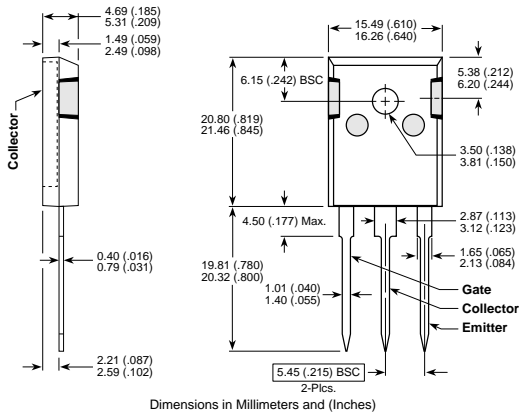


Figure 16, Resistive Switching Time Test Circuit and Waveforms

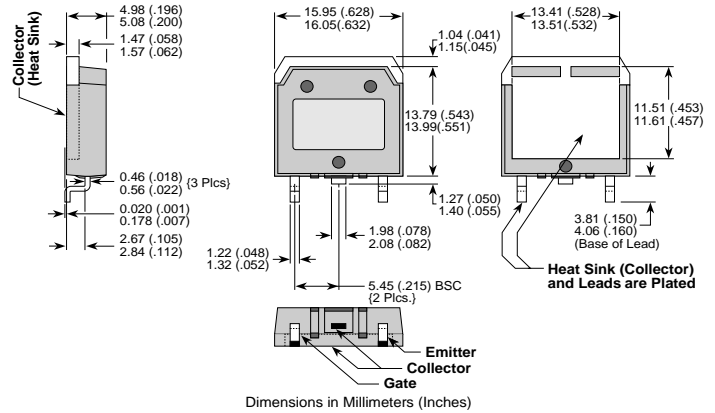
TO-247 Package Outline

e1 SAC: Tin, Silver, Copper



D³PAK Package Outline

e3 SAC: Tin, Silver, Copper





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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