

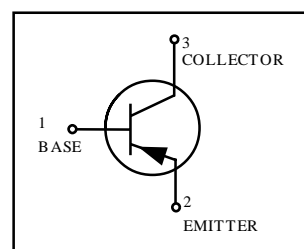
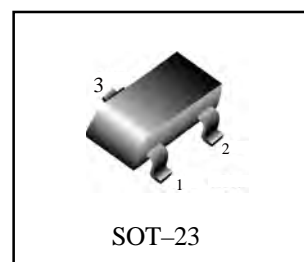
General Purpose Transistors

PNP Silicon

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V
- We declare that the material of product compliance with RoHS requirements.

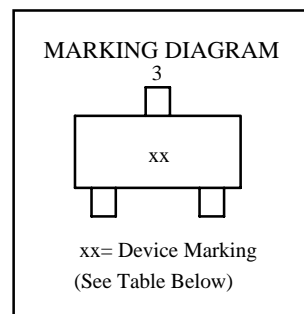
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC856 BC857 BC858, BC859	V_{CEO}	-65 -45 -30	V
Collector-Base Voltage BC856 BC857 BC858, BC859	V_{CBO}	-80 -50 -30	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current – Continuous	I_C	-100	mAdc



THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1.) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (Note 2.) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$



1. FR-5 = 1.0 x 0.75 x 0.062 in
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Package	Shipping
BC856ALT1G	3A	SOT-23	3000/Tape&Reel
BC856ALT3G	3A	SOT-23	10000/Tape&Reel
BC856BLT1G	3B	SOT-23	3000/Tape&Reel
BC856BLT3G	3B	SOT-23	10000/Tape&Reel
BC857ALT1G	3E	SOT-23	3000/Tape&Reel
BC857ALT1G	3E	SOT-23	10000/Tape&Reel
BC857BLT1G	3F	SOT-23	3000/Tape&Reel
BC857BLT3G	3F	SOT-23	10000/Tape&Reel
BC857CLT1G	3G	SOT-23	3000/Tape&Reel
BC857CLT1G	3G	SOT-23	10000/Tape&Reel
BC858ALT1G	3J	SOT-23	3000/Tape&Reel
BC858ALT1G	3J	SOT-23	10000/Tape&Reel
BC858BLT1G	3K	SOT-23	3000/Tape&Reel
BC858BLT3G	3K	SOT-23	10000/Tape&Reel
BC858CLT1G	3L	SOT-23	3000/Tape&Reel
BC858CLT3G	3L	SOT-23	10000/Tape&Reel
BC859BLT1G	4B	SOT-23	3000/Tape&Reel
BC859BLT1G	4B	SOT-23	10000/Tape&Reel
BC859CLT1G	4C	SOT-23	3000/Tape&Reel
BC859CLT3G	4C	SOT-23	10000/Tape&Reel

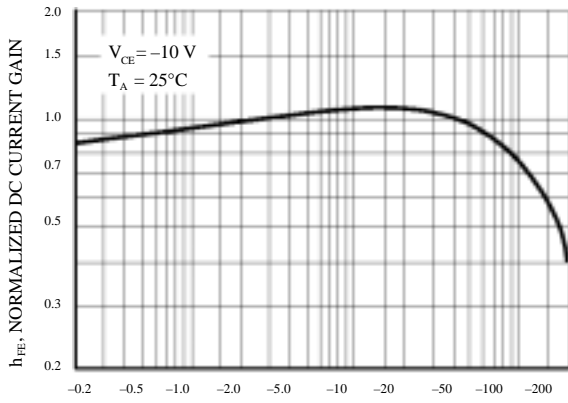


BC856 / 857 / 858 / 859S

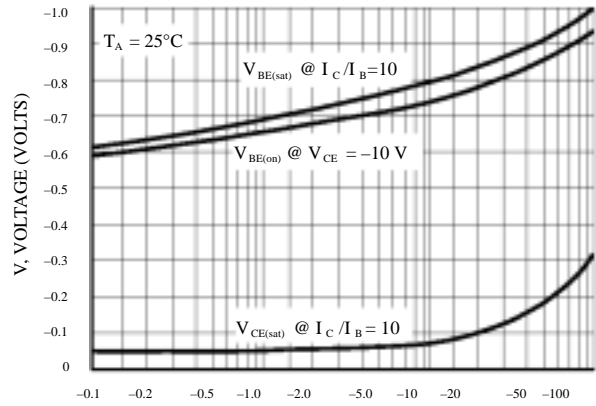
ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage (I _C = –10 mA)	BC856 Series BC857 Series BC858, BC859 Series	V _{(BR)CEO}	–65 –45 –30	– – –	– – –	V
Collector–Emitter Breakdown Voltage (I _C = –10 μA, V _{EB} = 0)	BC856 Series BC857 Series BC858, BC859 Series	V _{(BR)CES}	–80 –50 –30	– – –	– – –	V
Collector–Base Breakdown Voltage (I _C = –10 μA)	BC856 Series BC857 Series BC858, BC859 Series	V _{(BR)CBO}	–80 –50 –30	– – –	– – –	V
Emitter–Base Breakdown Voltage (I _E = –1.0 μA)	BC856 Series BC857 Series BC858, BC859 Series	V _{(BR)EBO}	–5.0 –5.0 –5.0	– – –	– – –	V
Collector Cutoff Current (V _{CB} = –30 V) (V _{CB} = –30 V, T _A = 150 °C)		I _{CBO}	– –	– –	–15 –4.0	nA μA
ON CHARACTERISTICS						
DC Current Gain (I _C = –10 μA, V _{CE} = –5.0 V)	BC856A, BC857A, BC858A BC856B, BC857B, BC858B, BC859B BC857C, BC858C, BC859C	h _{FE}	– – –	90 150 270	– – –	–
(I _C = –2.0 mA, V _{CE} = –5.0 V)	BC856A, BC857A, BC858A BC856B, BC857B, BC858B, BC859B BC857C, BC858C, BC859C		125 220 420	180 290 520	250 475 800	
Collector–Emitter Saturation Voltage (I _C = –10 mA, I _B = –0.5 mA) (I _C = –100 mA, I _B = –5.0 mA)		V _{CE(sat)}	– –	– –	–0.3 –0.65	V
Base–Emitter Saturation Voltage (I _C = –10 mA, I _B = –0.5 mA) (I _C = –100 mA, I _B = –5.0 mA)		V _{BE(sat)}	– –	–0.7 –0.9	– –	V
Base–Emitter On Voltage (I _C = –2.0 mA, V _{CE} = –5.0 V) (I _C = –10 mA, V _{CE} = –5.0 V)		V _{BE(on)}	–0.6 –	– –	–0.75 –0.82	V
SMALL–SIGNAL CHARACTERISTICS						
Current–Gain – Bandwidth Product (I _C = –10 mA, V _{CE} = –5.0 Vdc, f = 100 MHz)		f _T	100	–	–	MHz
Output Capacitance (V _{CB} = –10 V, f = 1.0 MHz)		C _{ob}	–	–	4.5	pF
Noise Figure (I _C = –0.2 mA, V _{CE} = –5.0 Vdc, R _S = 2.0 k Ω, f = 1.0 kHz, BW = 200 Hz)	BC856, BC857, BC858 Series BC859 Series	NF	– –	– –	10 4.0	dB

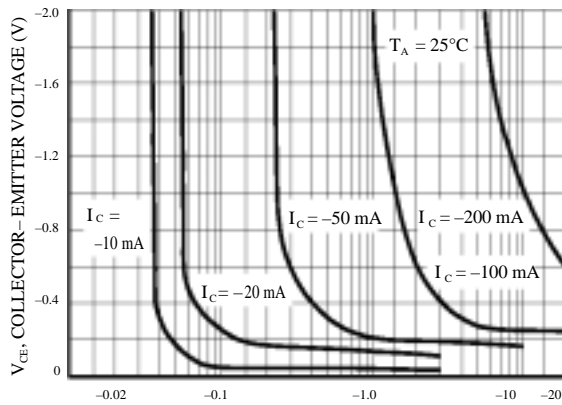
BC857/ BC858



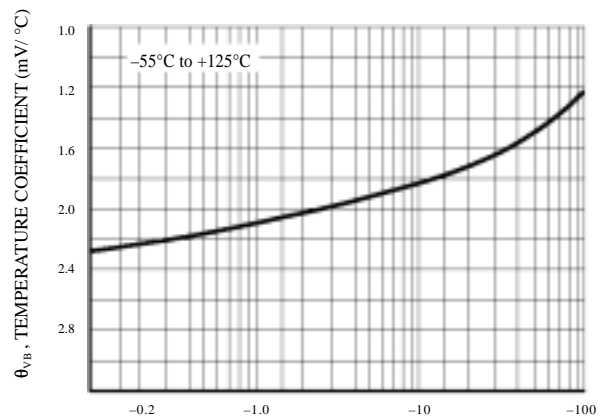
I_C , COLLECTOR CURRENT (mA)
Figure 1 Normalized DC Current Gain



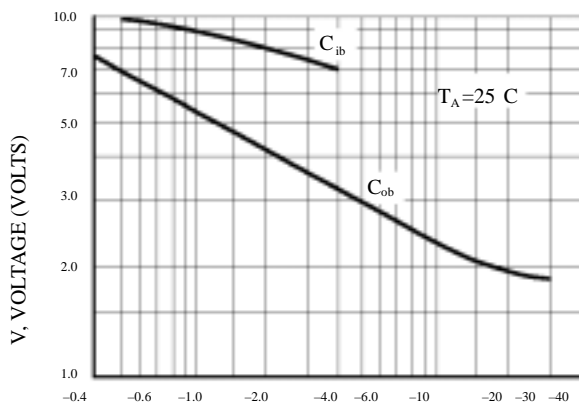
I_C , COLLECTOR CURRENT (mA)
Figure 2 "Saturation" and "On" Voltages



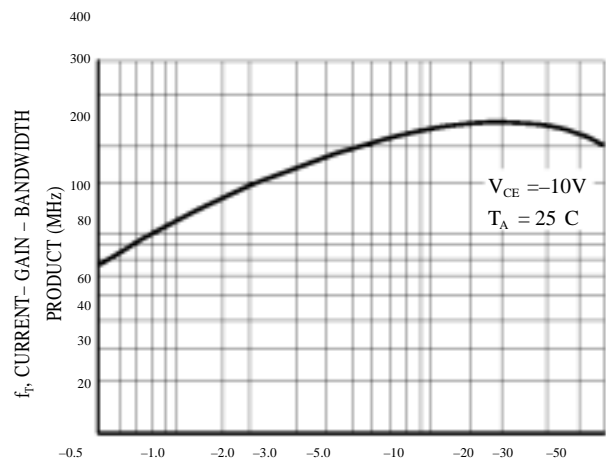
I_B , BASE CURRENT (mA)
Figure 3 Collector Saturation Region



I_C , COLLECTOR CURRENT (mA)
Figure 4 Base-Emitter Temperature Coefficient

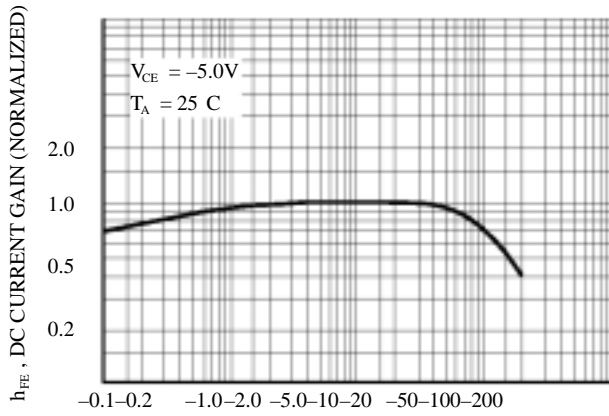


V_R , REVERSE VOLTAGE (VOLTS)
Figure 5. Capacitances

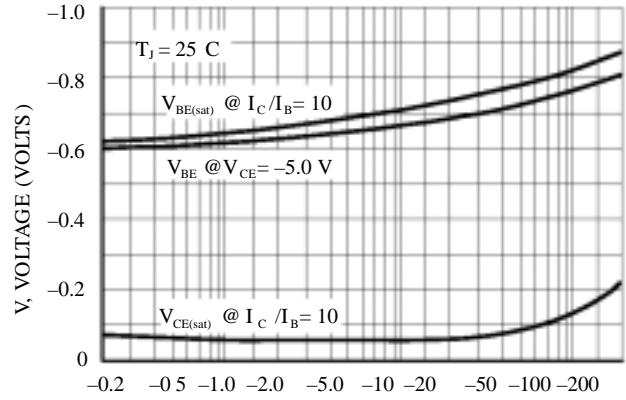


I_C , COLLECTOR CURRENT (mA)
Figure 6. Current-Gain - Bandwidth Product

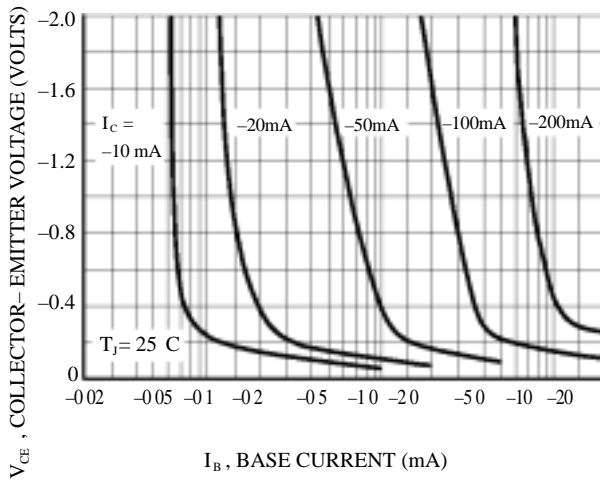
BC856



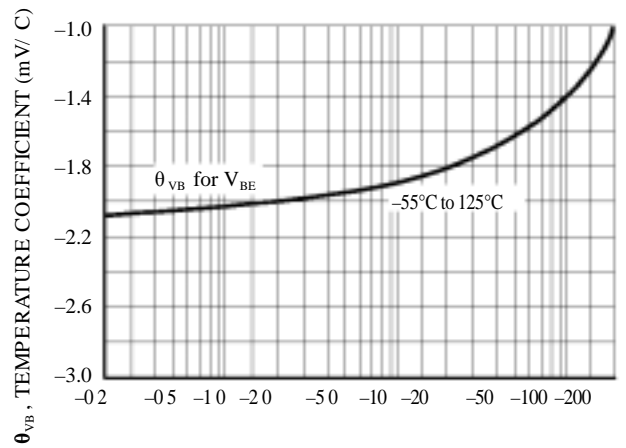
I_C , COLLECTOR CURRENT (mA)
Figure 7. DC Current Gain



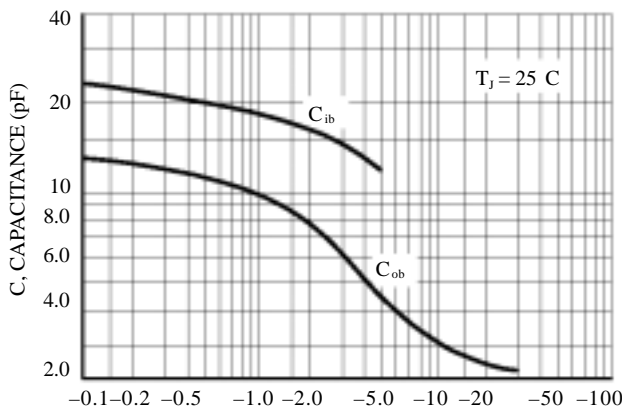
I_C , COLLECTOR CURRENT (mA)
Figure 8. "On" Voltage



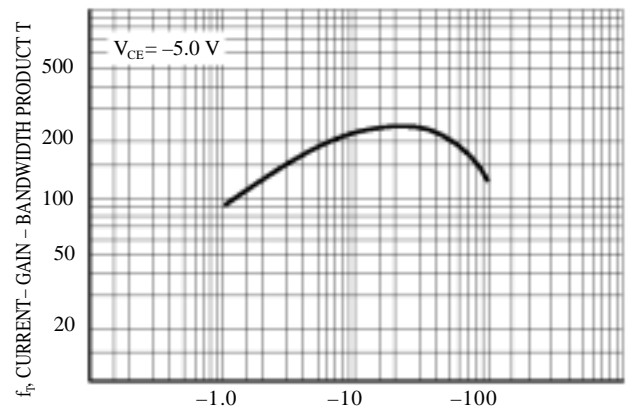
I_B , BASE CURRENT (mA)
Figure 9. Collector Saturation Region



I_C , COLLECTOR CURRENT (mA)
Figure 10. Base-Emitter Temperature Coefficient



V_R , REVERSE VOLTAGE (VOLTS)
Figure 11. Capacitance



I_C , COLLECTOR CURRENT (mA)
Figure 12. Current-Gain - Bandwidth Product

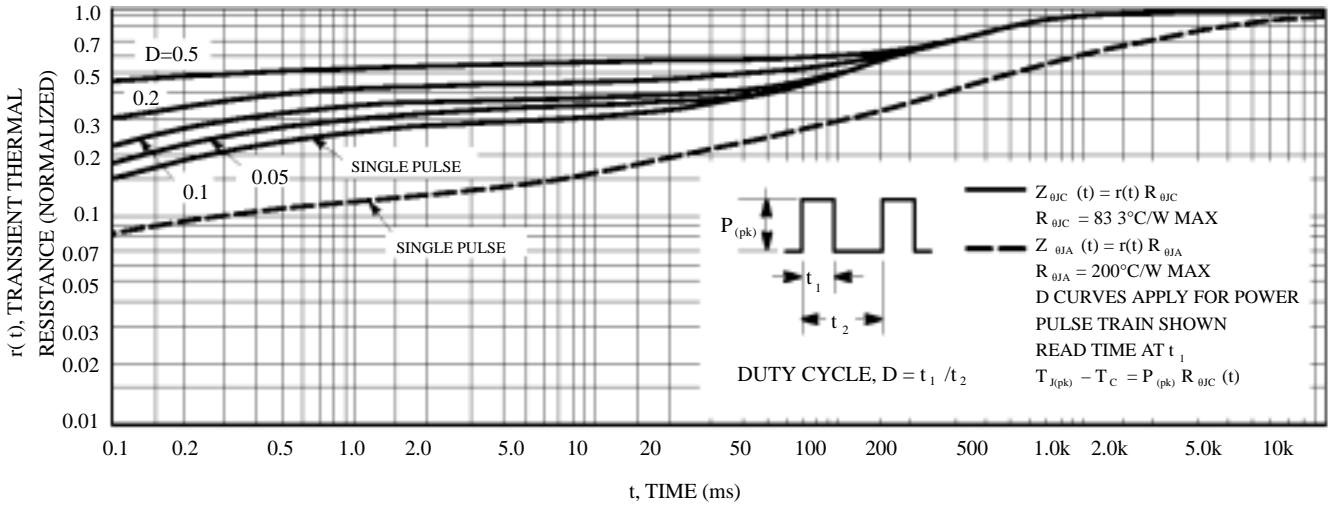


Figure 13. Thermal Response

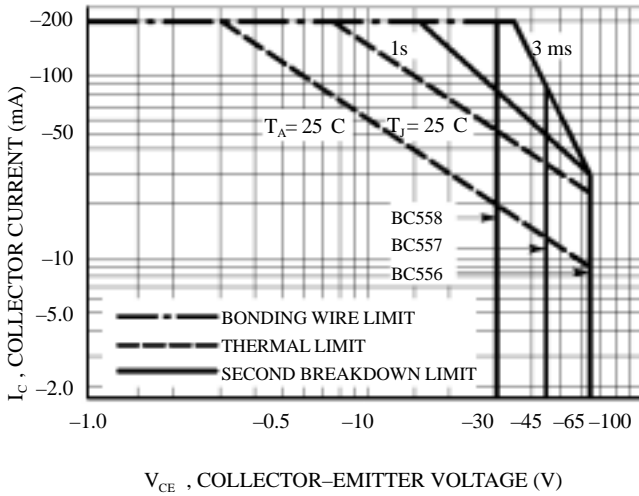
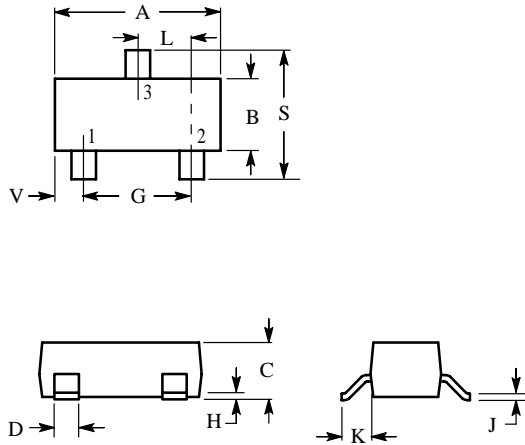


Figure 14. Active Region Safe Operating Area

The safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon $T_{J(pk)} = 150\text{ }^\circ\text{C}$; T_C or T_E is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150\text{ }^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

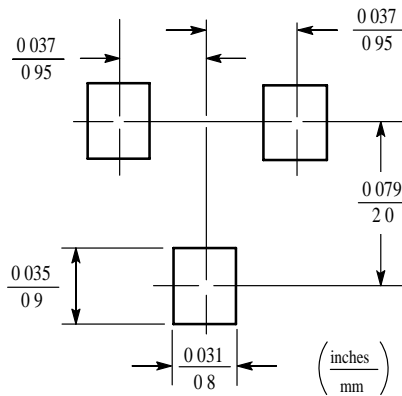
SOT-23



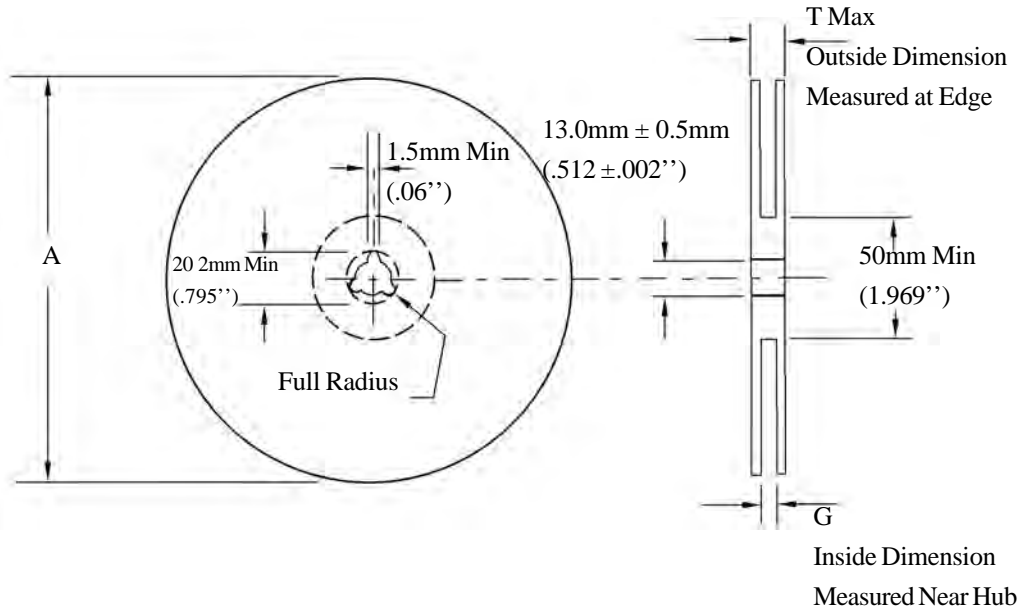
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60



EMBOSSED TAPE AND REEL DATA FOR DISCRETES



Size	A Max	G	T Max
8 mm	330mm (12.992'')	8.4mm+1.5mm, -0.0 (.33'+.059'', -0.00)	14.4mm (.56'')

Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

Storage Conditions

Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)

Humidity: 30 to 80 RH (40 to 60 is preferred)

Recommended Period: One year after manufacturing

(This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)