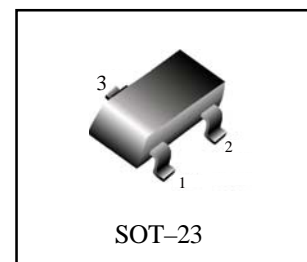


Darlington Amplifier Transistors

- We declare that the material of product compliance with RoHS requirements.

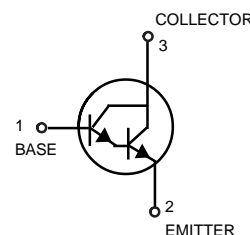
ORDERING INFORMATION

Device	Marking	Shipping
MMBTA13	1M	3000/Tape & Reel
MMBTA14	1N	3000/Tape & Reel



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	30	Vdc
Collector-Base Voltage	V_{CBO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	10	Vdc
Collector Current — Continuous	I_C	300	mAdc



THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (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	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (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	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBTA13 = 1M, MMBTA14 = 1N

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 100 \mu\text{Adc}, V_{BE} = 0$)	$V_{(BR)CEO}$	30	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{Vdc}, I_E = 0$)	I_{CBO}	—	100	nAdc
Emitter Cutoff Current ($V_{EB} = 10\text{Vdc}, I_C = 0$)	I_{EBO}	—	100	nAdc

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.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
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ON CHARACTERISTICS (3)

DC Current Gain ($I_C = 10\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	MMBTA13 MMBTA14	h_{FE}	5,000	—	—
($I_C = 100\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)			10,000	—	—
Collector–Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 0.1\text{ mAdc}$)	MMBTA13 MMBTA14	$V_{CE(sat)}$	—	1.5	Vdc
Base–Emitter On Voltage ($I_C = 100\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)		V_{BE}	—	2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current – Gain–Bandwidth Product(4) ($V_{CE} = 5.0\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $f = 100\text{ MHz}$)	f_T	125	—	MHz
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3. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

4. $f_T = |h_{fe}| * f_{test}$.

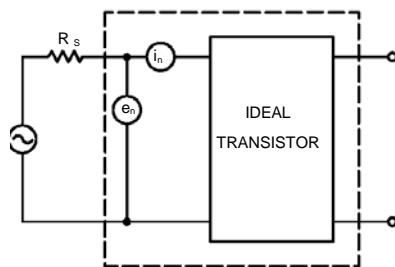


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

($V_{CE} = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

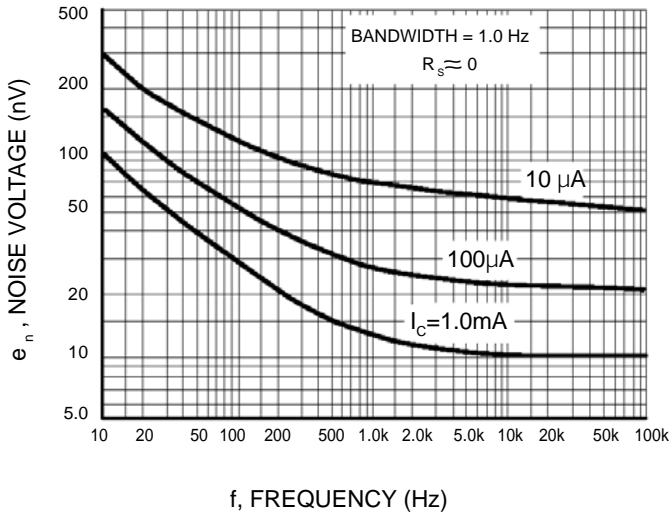


Figure 2. Noise Voltage

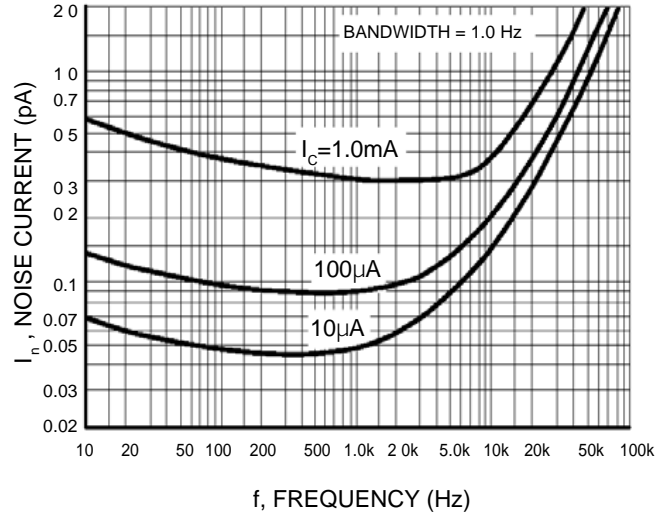


Figure 3. Noise Current

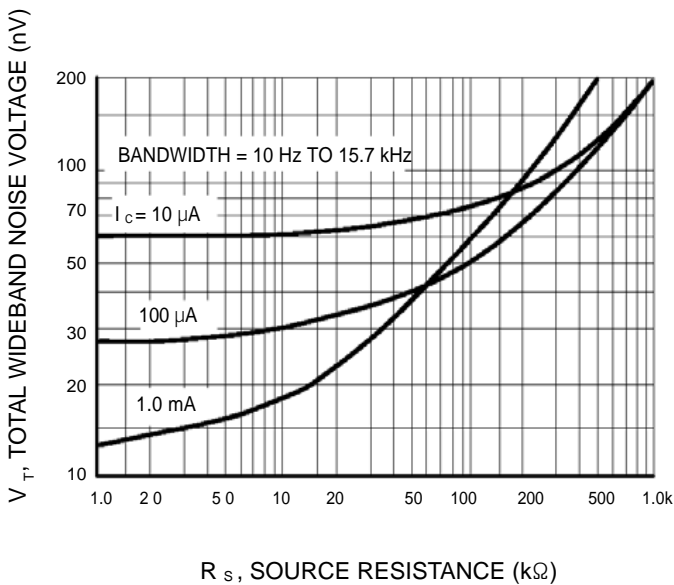


Figure 4. Total Wideband Noise Voltage

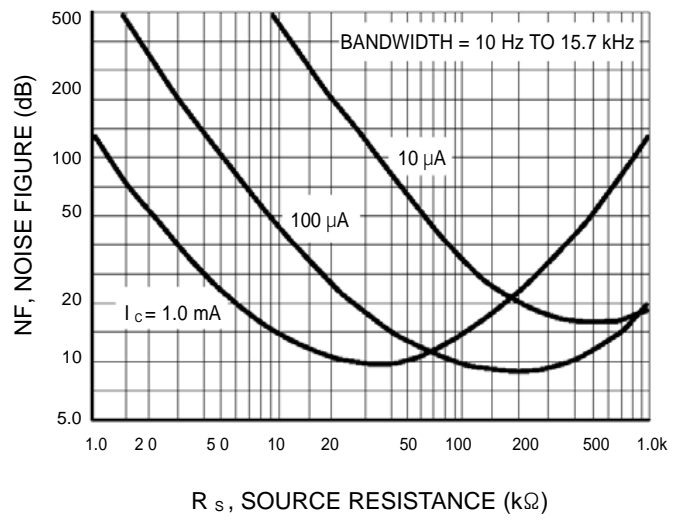


Figure 5. Wideband Noise Figure



MMBTA14

SMALL-SIGNAL CHARACTERISTICS

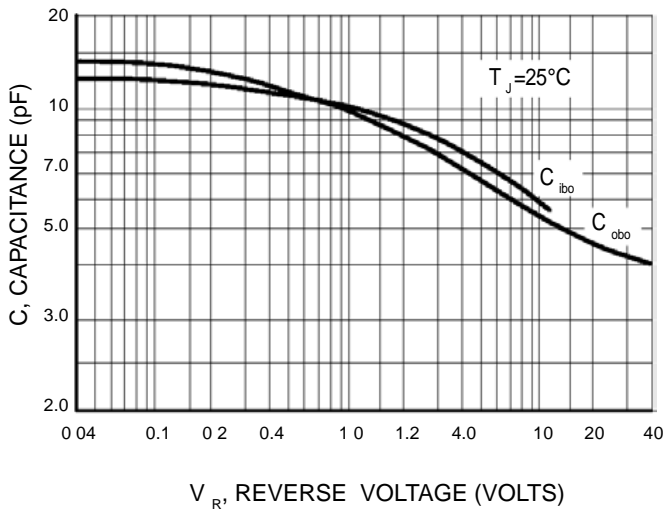


Figure 6. Capacitance

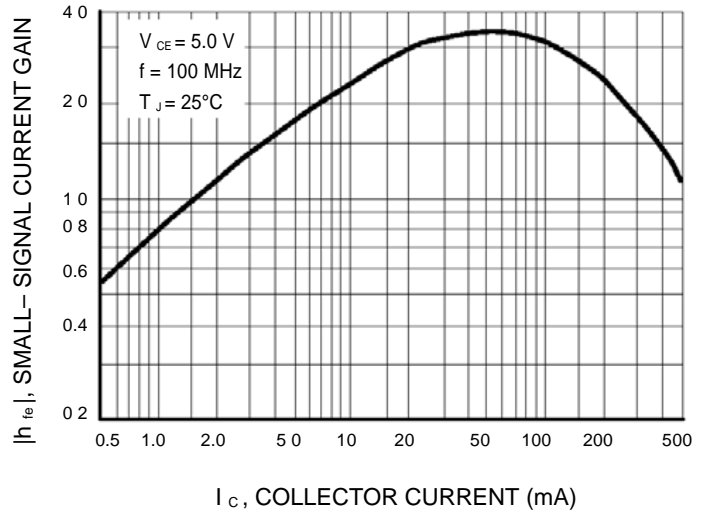


Figure 7. High Frequency Current Gain

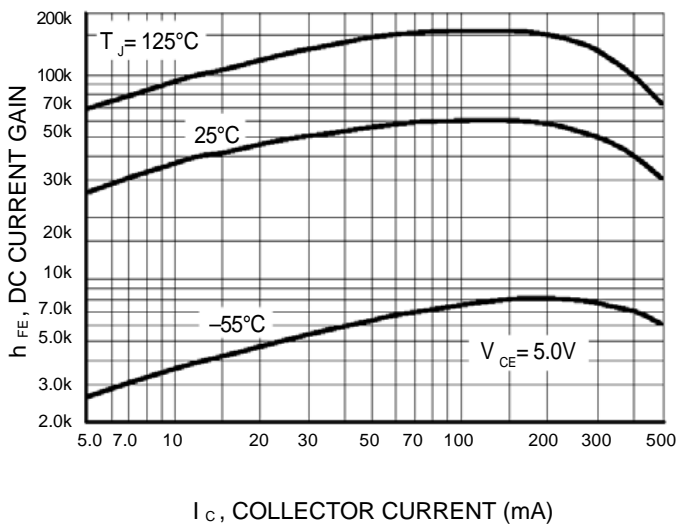


Figure 8. DC Current Gain

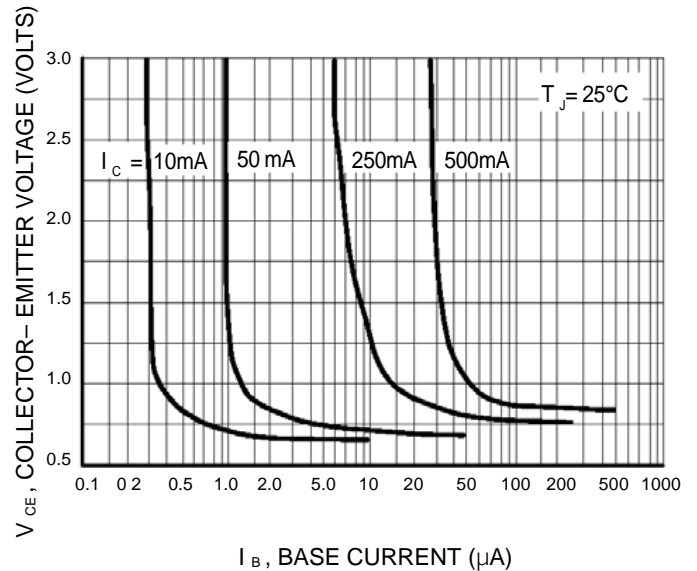


Figure 9. Collector Saturation Region

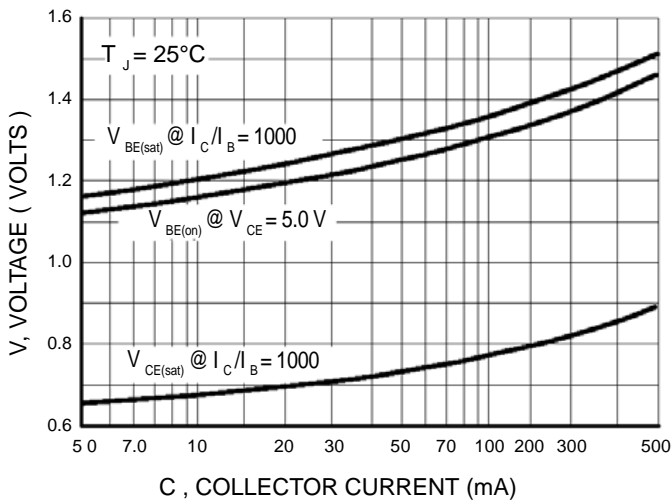


Figure 17. "ON" Voltages

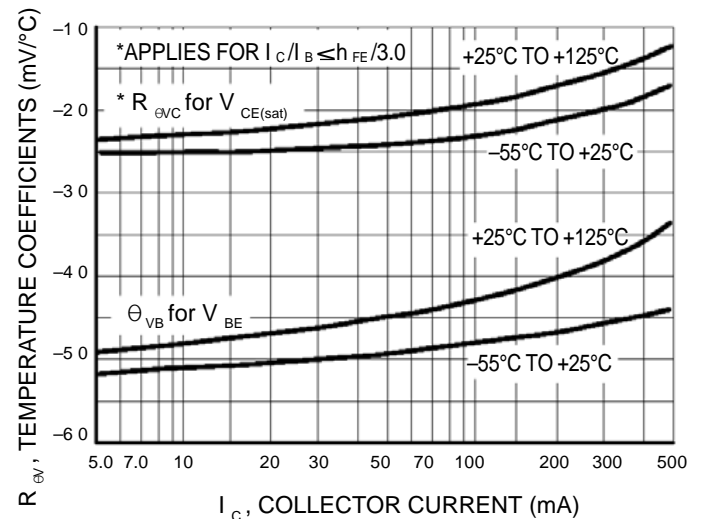


Figure 18. Temperature Coefficients

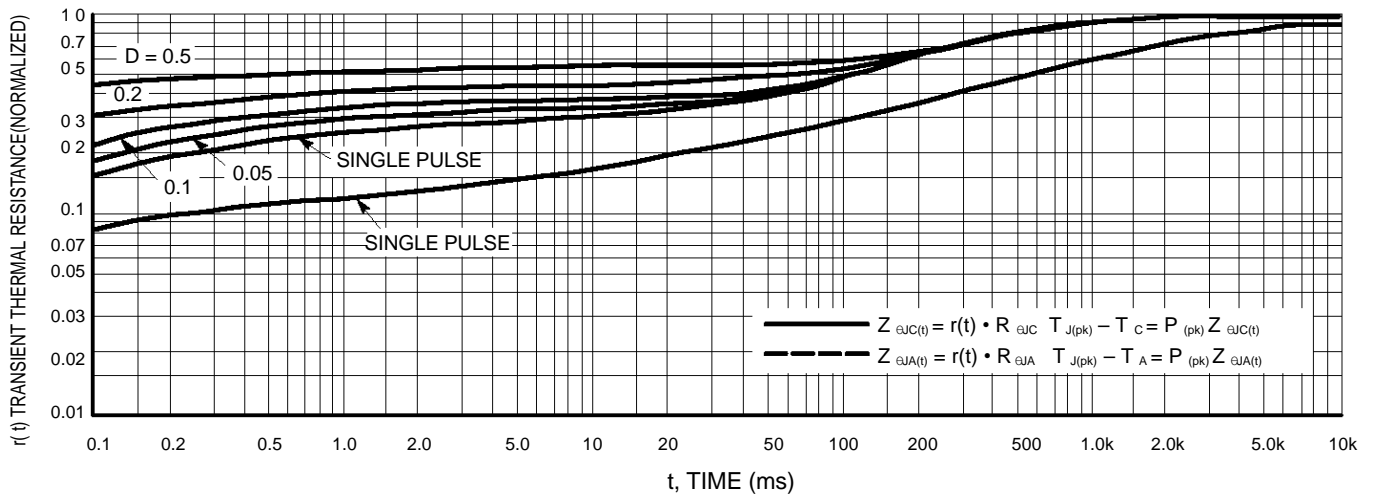


Figure 12. Thermal Response

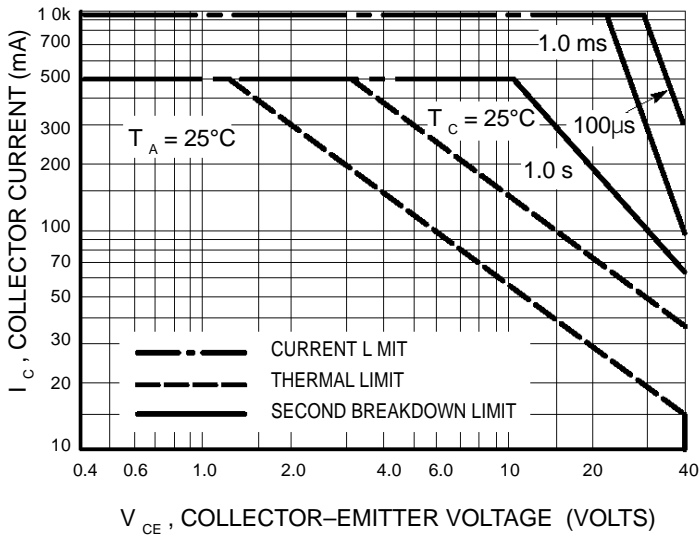
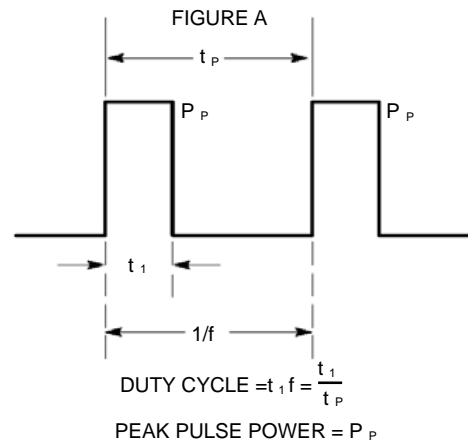
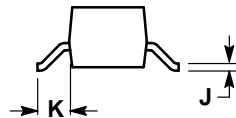
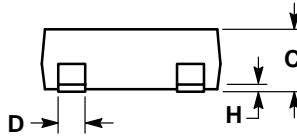
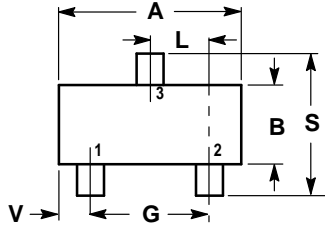


Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

SOT-23 (TO-236AB)

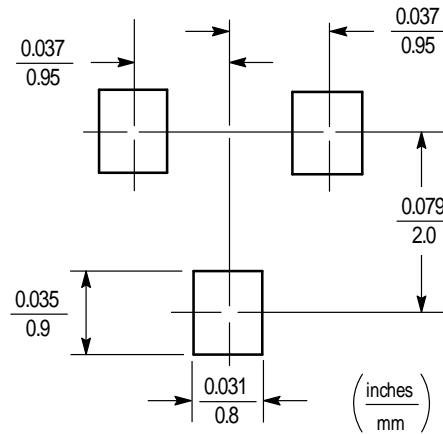


NOTES:

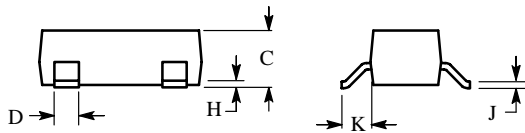
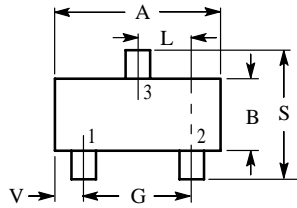
1. CONTROLLING DIMENSION: MILLIMETERS
2. LEAD THICKNESS SPECIFIED PER L / F DRAWING WITH SOLDER PLATING.

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	0.0180	0.0236	0.45	0.60
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

- STYLE1 1:
 PIN 1. ANODE
 2. NO CONNECTION
 3. CATHODE



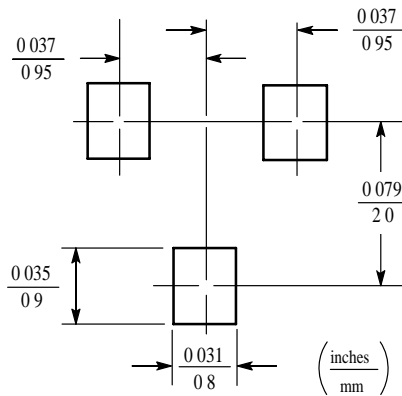
SOT-23



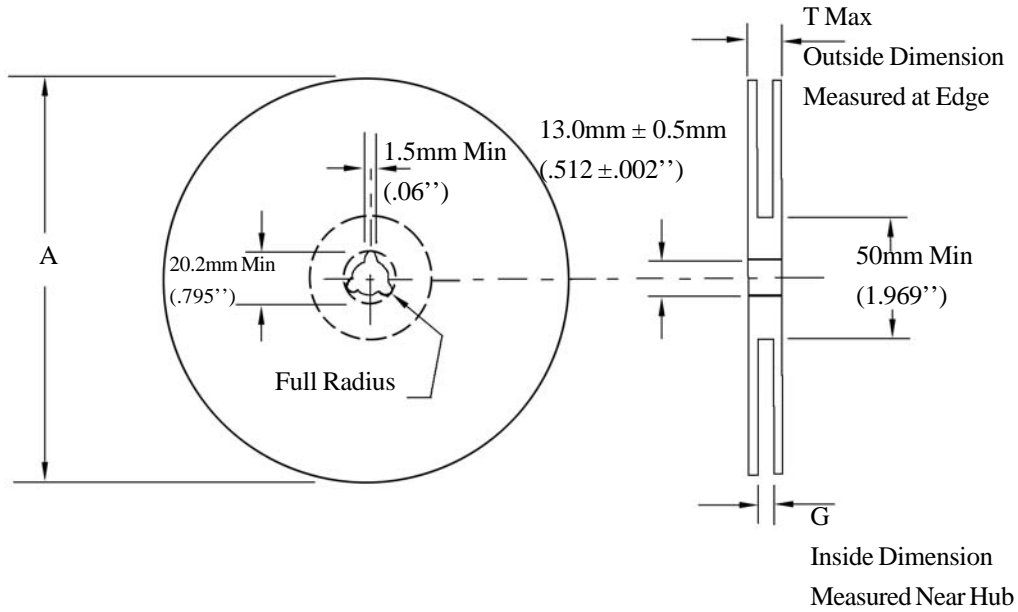
NOTES:

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)