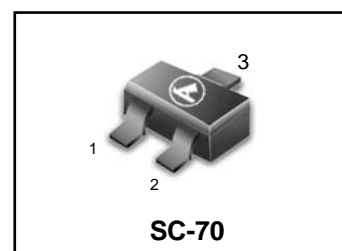


# General Purpose Transistors

## PNP Silicon

- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

**LMBT4403WT1G**  
**S-LMBT4403WT1G**

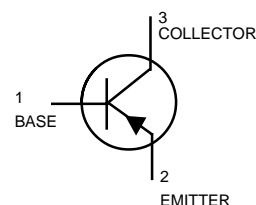


### ORDERING INFORMATION

Device	Marking	Shipping
LMBT4403WT1G S-LMBT4403WT1G	2T	3000/Tape & Reel
LMBT4403WT3G S-LMBT4403WT3G	2T	10000/Tape & Reel

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CE0}$	- 40	Vdc
Collector–Base Voltage	$V_{CBO}$	- 40	Vdc
Emitter–Base Voltage	$V_{EBO}$	- 5.0	Vdc
Collector Current — Continuous	$I_C$	- 600	mAdc



### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### DEVICE MARKING

LMBT4403WT1G = 2T

### 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 (3) ( $I_C = -1.0 \text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	- 40	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = -0.1 \text{ mAdc}, I_E = 0$ )	$V_{(BR)CBO}$	- 40	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = -0.1 \text{ mAdc}, I_C = 0$ )	$V_{(BR)EBO}$	- 5.0	—	Vdc
Base Cutoff Current ( $V_{CE} = -35 \text{ Vdc}, V_{EB} = -0.4 \text{ Vdc}$ )	$I_{BEV}$	—	- 0.1	$\mu\text{Adc}$
Collector Cutoff Current ( $V_{CE} = -35 \text{ Vdc}, V_{EB} = -0.4 \text{ Vdc}$ )	$I_{CEX}$	—	- 0.1	$\mu\text{Adc}$

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.
3. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

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

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = -0.1 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -1.0 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -10 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -150 \text{ mAdc}, V_{CE} = -2.0 \text{ Vdc}$ )(3) ( $I_C = -500 \text{ mAdc}, V_{CE} = -2.0 \text{ Vdc}$ )(3)	$h_{FE}$	30 60 100 100 20	— — — 300 —	—
Collector–Emitter Saturation Voltage(3) ( $I_C = -150\text{mAdc}, I_B = -15 \text{ mAdc}$ ) ( $I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$ )	$V_{CE(sat)}$	— —	- 0.4 - 0.75	Vdc
Base–Emitter Saturation Voltage (3) ( $I_C = -150 \text{ mAdc}, I_B = -15 \text{ mAdc}$ ) ( $I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$ )	$V_{BE(sat)}$	- 0.75 —	- 0.95 - 1.3	Vdc

**SMALL-SIGNAL CHARACTERISTICS**

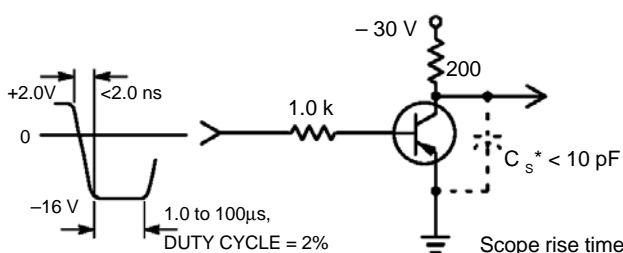
Current–Gain — Bandwidth Product ( $I_C = -20\text{mAdc}, V_{CE} = -10 \text{ Vdc}, f = 100 \text{ MHz}$ )	$f_T$	200	—	MHz
Collector–Base Capacitance ( $V_{CB} = -10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$ )	$C_{cb}$	—	8.5	pF
Emitter–Base Capacitance ( $V_{BE} = -0.5 \text{ Vdc}, I_C = 0, f = 1.0 \text{ MHz}$ )	$C_{eb}$	—	30	pF
Input Impedance ( $V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$ )	$h_{ie}$	1.5	15	$k\Omega$
Voltage Feedback Ratio ( $V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$ )	$h_{re}$	0.1	8.0	$\times 10^{-4}$
Small–Signal Current Gain ( $V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$ )	$h_{fe}$	60	500	—
Output Admittance ( $V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$ )	$h_{oe}$	1.0	100	$\mu\text{mhos}$

**SWITCHING CHARACTERISTICS**

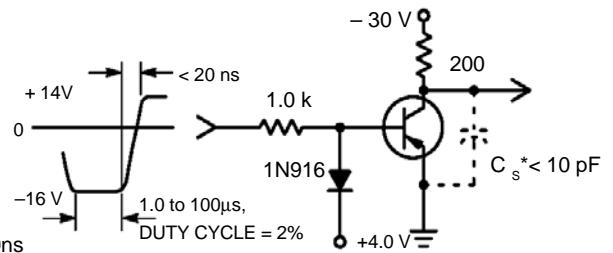
Delay Time	$(V_{CC} = -30 \text{ Vdc}, V_{EB} = -2.0 \text{ Vdc}, I_C = -150\text{mAdc}, I_{B1} = -15 \text{ mAdc})$	$t_d$	—	15	ns
Rise Time		$t_r$	—	20	
Storage Time	$(V_{CC} = -30 \text{ Vdc}, I_C = -150 \text{ mAdc}, I_{B1} = I_{B2} = -15 \text{ mAdc})$	$t_s$	—	225	ns
Fall Time		$t_f$	—	30	

3. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

**SWITCHING TIME EQUIVALENT TEST CIRCUITS**



**Figure 1. Turn–On Time**



**Figure 2. Turn–Off Time**

\*Total shunt capacitance of test jig connectors, and oscilloscope

TYPICAL TRANSIENT CHARACTERISTICS

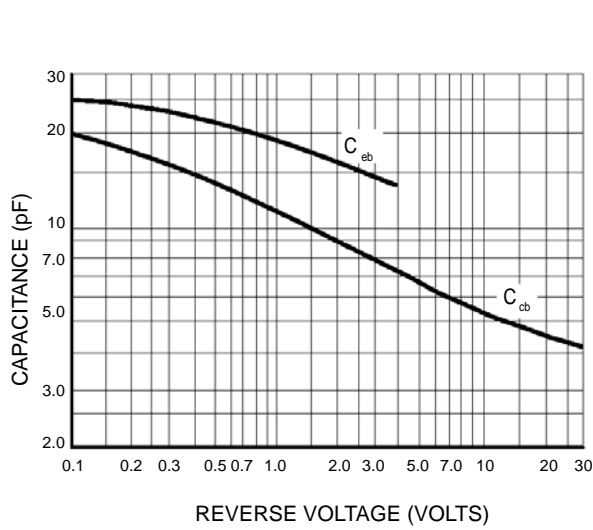


Figure 3. Capacitance

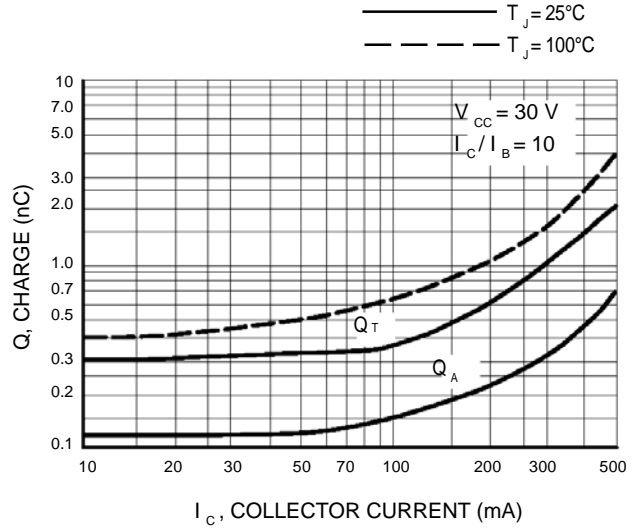


Figure 4. Charge Data

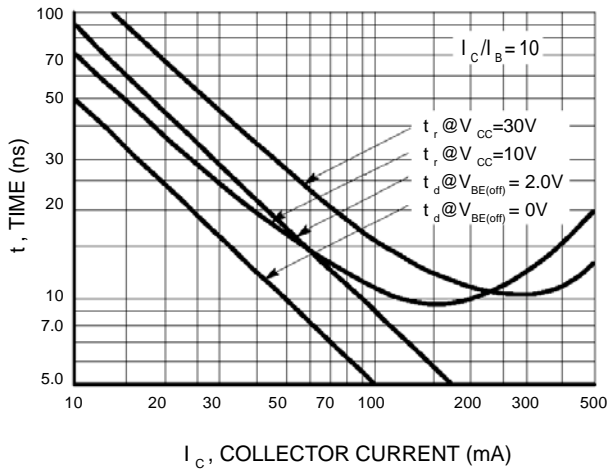


Figure 5. Turn-On Time

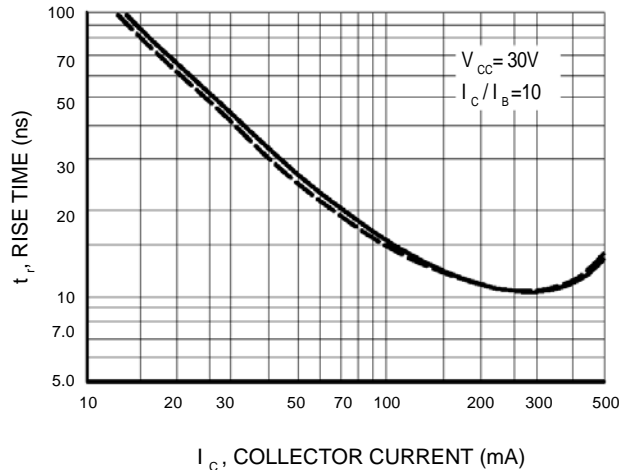


Figure 6. Rise Time

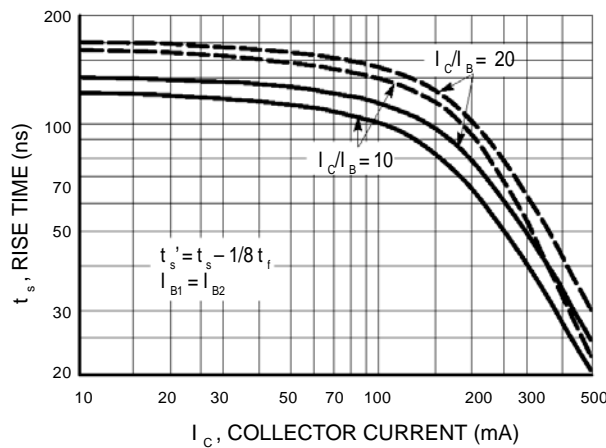


Figure 7. Storage Time

SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

$V_{CE} = -10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

Bandwidth = 1.0 Hz

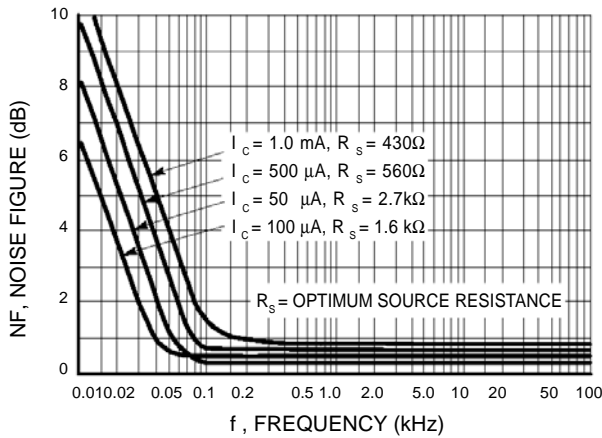


Figure 8. Frequency Effects

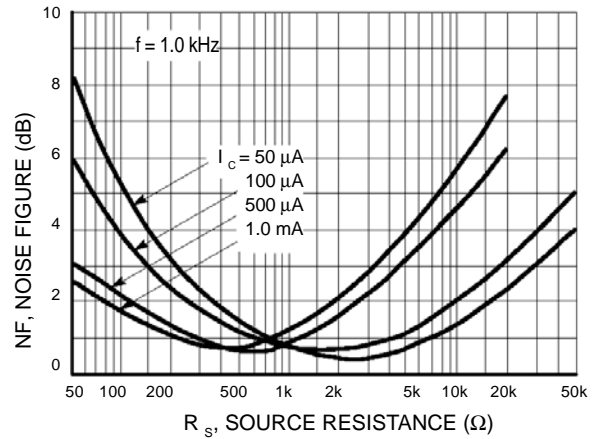


Figure 9. Source Resistance Effects

h PARAMETERS

( $V_{CE} = -10 \text{ Vdc}$ ,  $f = 1.0 \text{ kHz}$ ,  $T_A = 25^\circ\text{C}$ )

This group of graphs illustrates the relationship between  $h_{fe}$  and other "h" parameters for this series of transistors. To obtain these curves, a high-gain and a low-gain unit were selected from the LMBT4403WT1 lines, and the same units were used to develop the correspondingly numbered curves on each graph.

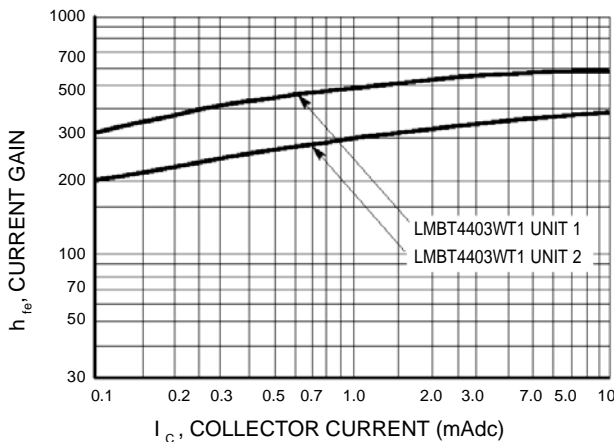


Figure 10. Current Gain

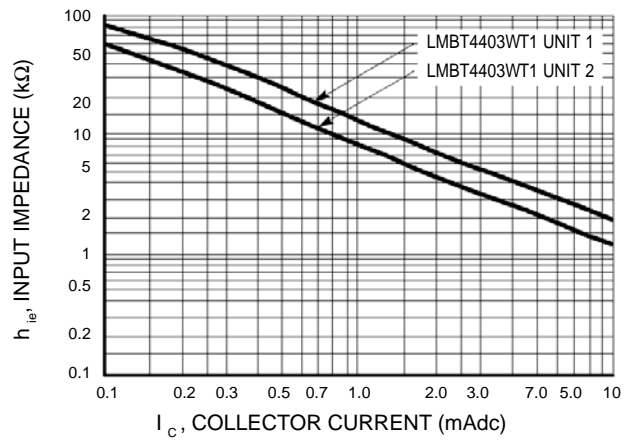


Figure 11. Input Impedance

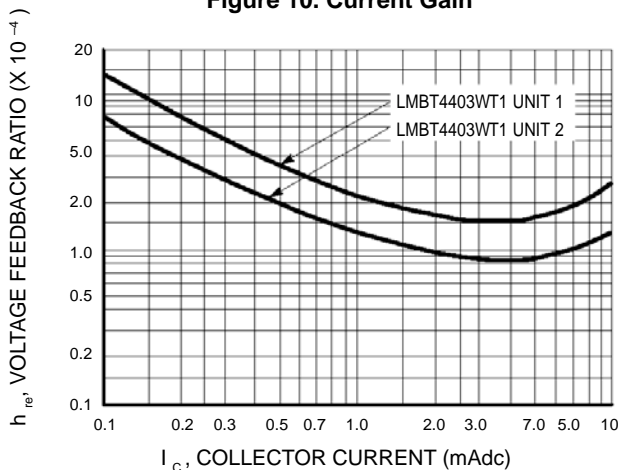


Figure 12. Voltage Feedback Ratio

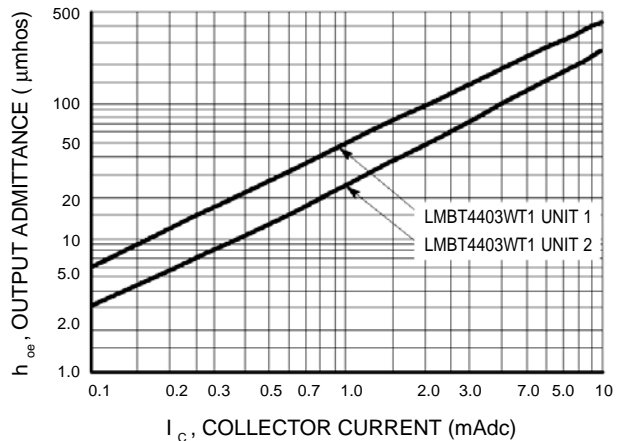


Figure 13. Output Admittance

STATIC CHARACTERISTICS

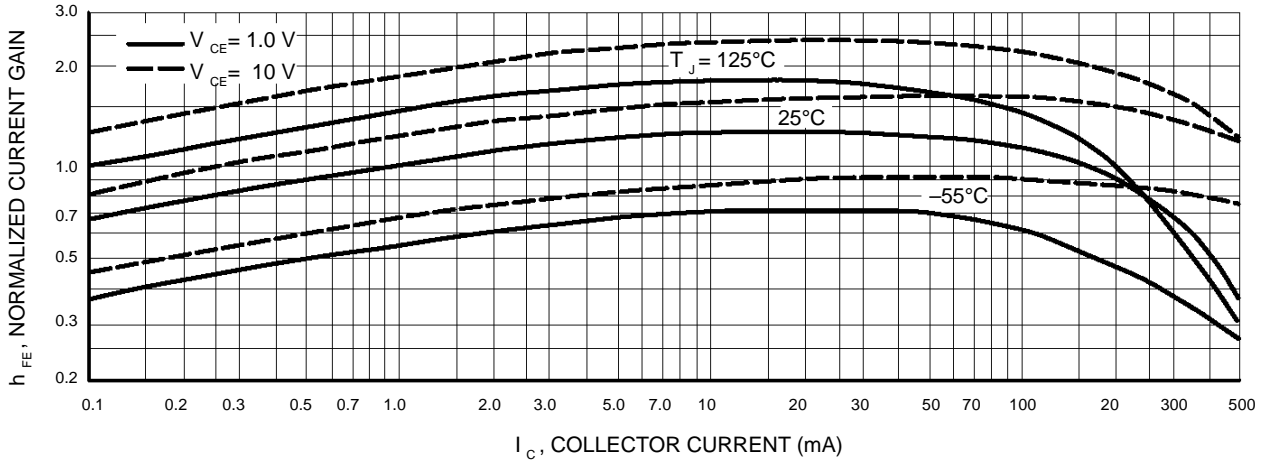


Figure 14. DC Current Gain

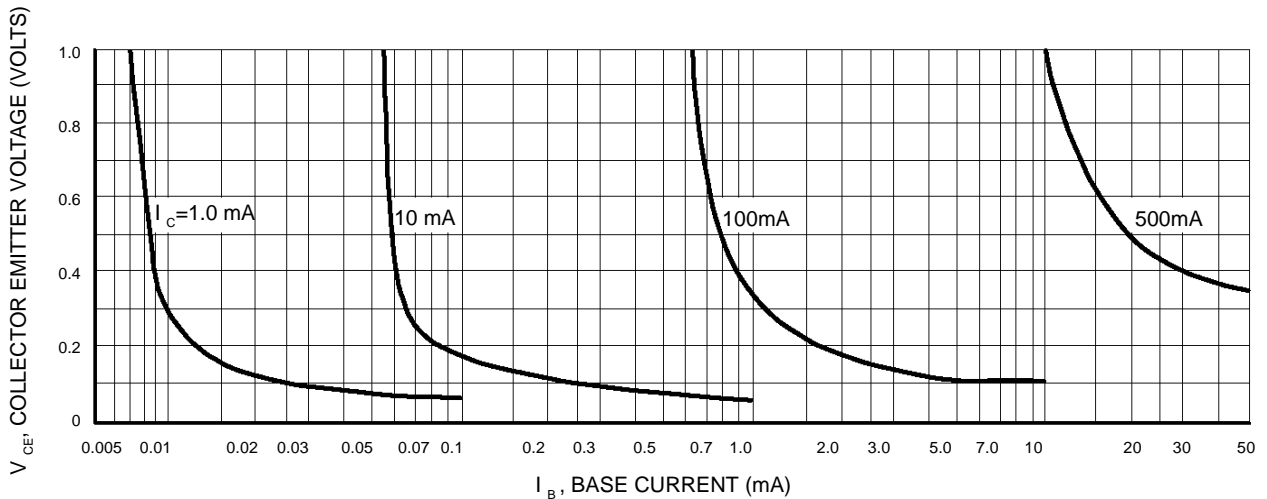


Figure 15. Collector Saturation Region

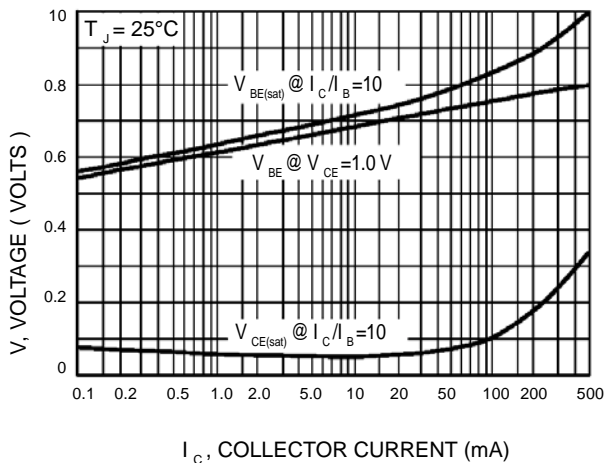


Figure 16. "On" Voltages

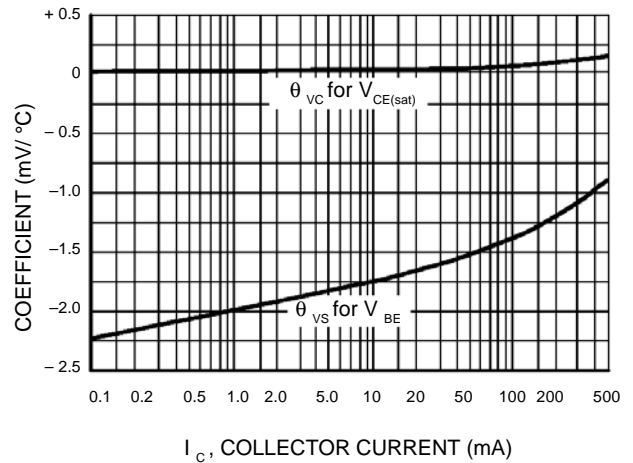
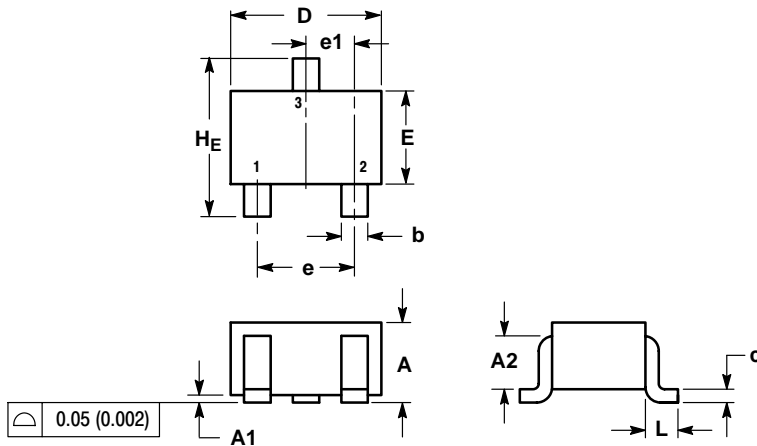
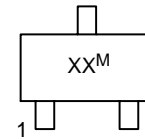


Figure 17. Temperature Coefficients

**SC-70 (SOT-323)**

**NOTES:**

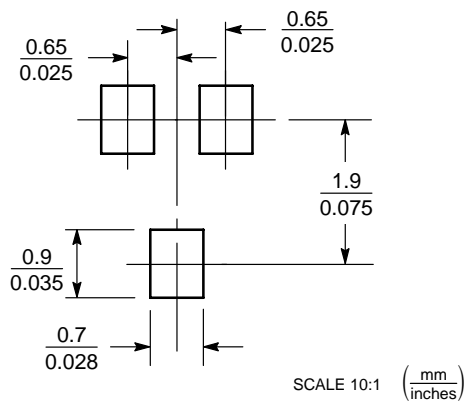
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.7 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.425 REF			0.017 REF		
H <sub>E</sub>	2.00	2.10	2.40	0.079	0.083	0.095

**GENERIC MARKING DIAGRAM**


- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

**SOLDERING FOOTPRINT\***


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