

General Purpose Transistors

PNP Silicon

FEATURE

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

ORDERING INFORMATION

Device	Marking	Shipping
LMBT3906TT1G	2A	3000/Tape & Reel
LMBT3906TT3G	2A	10000/Tape & Reel

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	- 40	Vdc
Collector–Base Voltage	V_{CBO}	- 40	Vdc
Emitter–Base Voltage	V_{EBO}	- 5.0	Vdc
Collector Current — Continuous	I_C	- 200	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR– 4 Board(1) $T_A=25\text{ }^\circ\text{C}$	P_D	200	mW
Derate above 25°C		1.6	mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	600	°C/W
Total Device Dissipation FR-4 Board (2), $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate above 25°C		2.4	mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	400	°C/W
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	°C

DEVICE MARKING

LMBT3906TT1G = 2A

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

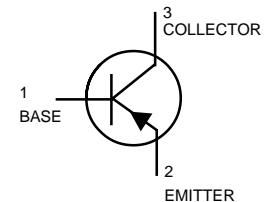
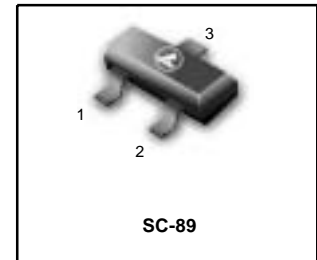
Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (3) ($I_C = -1.0\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	- 40	—	Vdc
Collector–Base Breakdown Voltage ($I_C = -10\text{ }\mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	- 40	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = -10\text{ }\mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	- 5.0	—	Vdc
Base Cutoff Current ($V_{CE} = -30\text{ Vdc}$, $V_{EB} = -3.0\text{ Vdc}$)	I_{BL}	—	- 50	nAdc
Collector Cutoff Current ($V_{CE} = -30\text{ Vdc}$, $V_{EB} = -3.0\text{ Vdc}$)	I_{CEX}	—	- 50	nAdc

- FR-4 Minimum Pad.
- FR-4 1.0 x 1.0 Inch Pad.
- Pulse Width $\leq 300\text{ }\mu\text{s}$; Duty Cycle $\leq 2.0\%$.

LMBT3906TT1G



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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)				
DC Current Gain ($I_C = -0.1 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$)	h_{FE}	60	—	—
($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$)		80	—	—
($I_C = -10 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$)		100	300	—
($I_C = -50 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$)		60	—	—
($I_C = -100 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$)		30	—	—
Collector–Emitter Saturation Voltage ($I_C = -10 \text{ mAdc}$, $I_B = -1.0 \text{ mAdc}$)	$V_{CE(sat)}$	—	-0.25	Vdc
($I_C = -50 \text{ mAdc}$, $I_B = -5.0 \text{ mAdc}$)		—	-0.4	—
Base–Emitter Saturation Voltage ($I_C = -10 \text{ mAdc}$, $I_B = -1.0 \text{ mAdc}$)	$V_{BE(sat)}$	-0.65	-0.85	Vdc
($I_C = -50 \text{ mAdc}$, $I_B = -5.0 \text{ mAdc}$)		—	-0.95	—

SMALL-SIGNAL CHARACTERISTICS

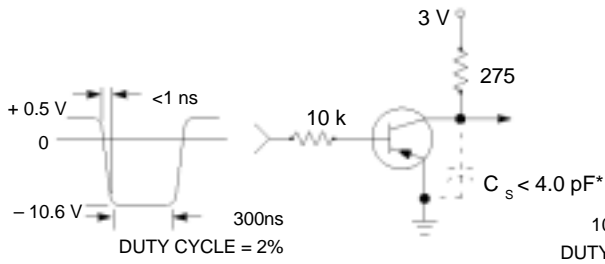
Current–Gain — Bandwidth Product ($I_C = -10 \text{ mAdc}$, $V_{CE} = -20 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	250	—	MHz
Output Capacitance ($V_{CB} = -5.0 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{obo}	—	4.5	pF
Input Capacitance ($V_{EB} = -0.5 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$)	C_{ibo}	—	10	pF
Input Impedance ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{ie}	2.0	12	k Ω
Voltage Feedback Ratio ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{re}	0.1	10	$\times 10^{-4}$
Small–Signal Current Gain ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	100	400	—
Output Admittance ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	* h_{oe}	3.0	60	μmhos
Noise Figure ($V_{CE} = -5.0 \text{ Vdc}$, $I_C = -100 \mu\text{Adc}$, $R_S = 1.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$)	NF	—	4.0	dB

SWITCHING CHARACTERISTICS

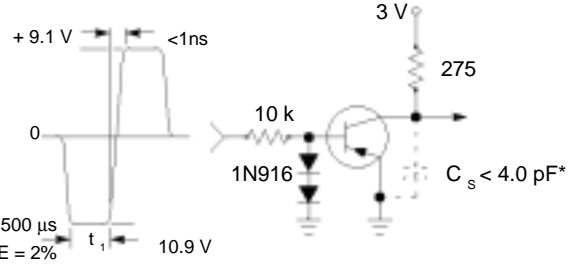
Delay Time	($V_{CC} = -3.0 \text{ Vdc}$, $V_{BE} = 0.5 \text{ Vdc}$, $I_C = -10 \text{ mAdc}$, $I_{B1} = -1.0 \text{ mAdc}$)	t_d	—	35	ns
Rise Time		t_d	—	35	
Storage Time	($V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{ mAdc}$, $I_{B1} = I_{B2} = -1.0 \text{ mAdc}$)	t_s	—	225	ns
Fall Time		t_f	—	75	

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

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**Figure 1. Delay and Rise Time
Equivalent Test Circuit**



**Figure 2. Storage and Fall Time
Equivalent Test Circuit**

*Total shunt capacitance of test jig and connectors

TYPICAL TRANSIENT CHARACTERISTICS

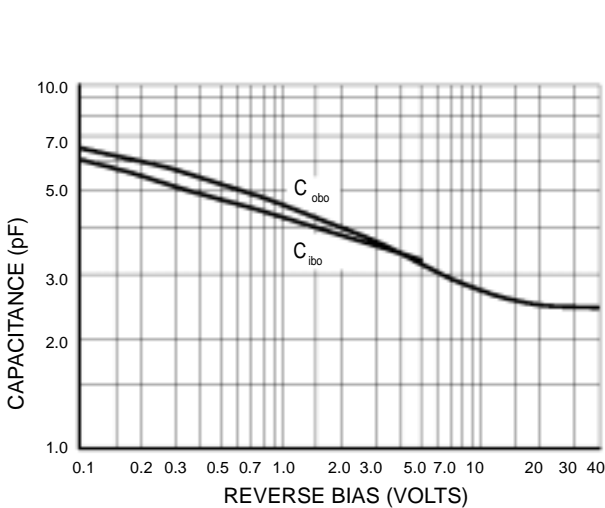


Figure 3. Capacitance

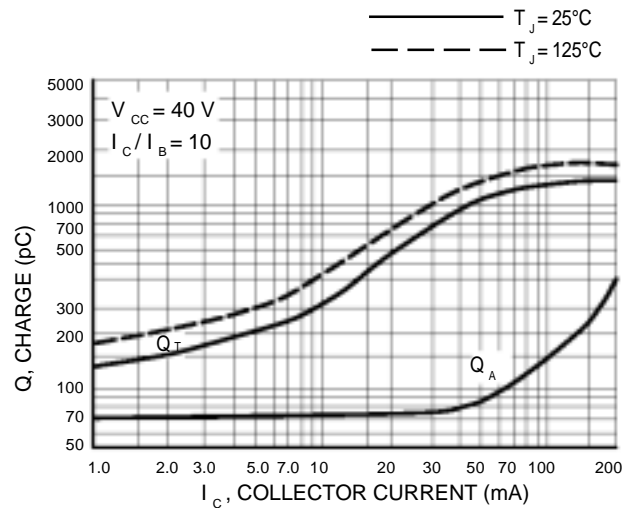


Figure 4. Charge Data

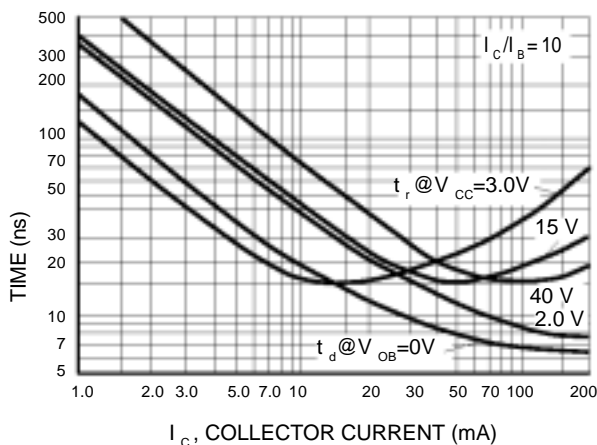


Figure 5. Turn-On Time

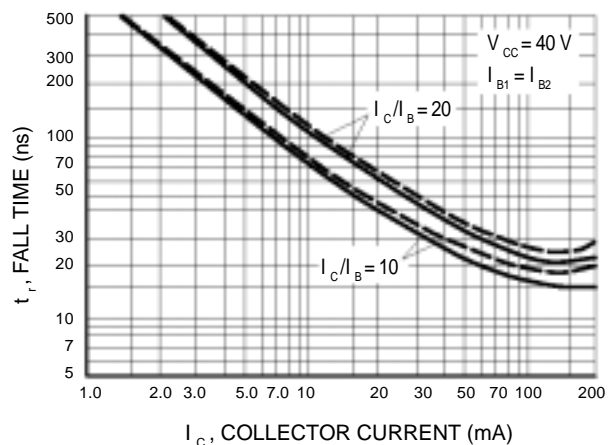


Figure 6. Fall Time

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**TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS
NOISE FIGURE VARIATIONS**

($V_{CE} = -5.0$ Vdc, $T_A = 25^\circ\text{C}$, Bandwidth = 1.0 Hz)

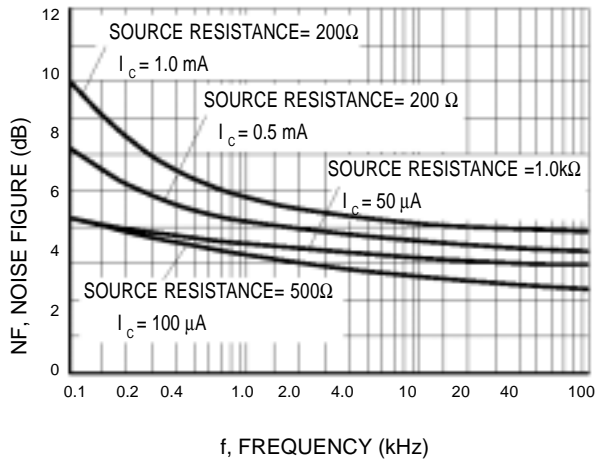


Figure 7. Noise Figure

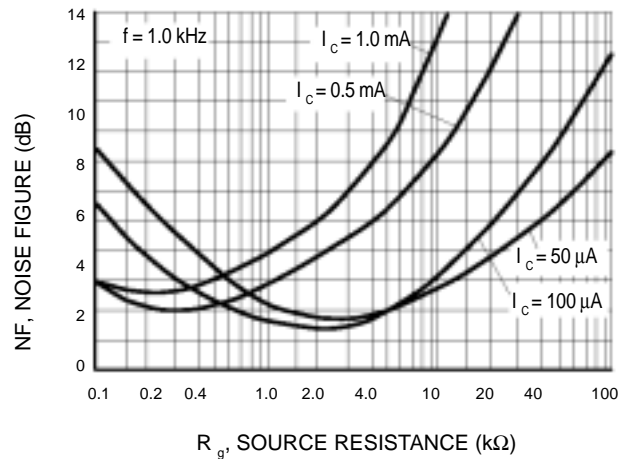


Figure 8. Noise Figure

h PARAMETERS

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

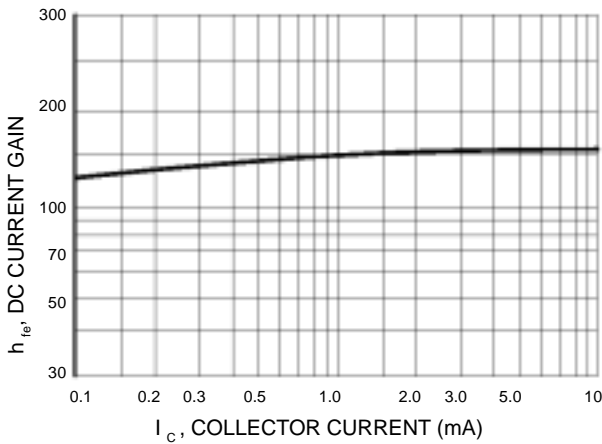


Figure 9. Current Gain

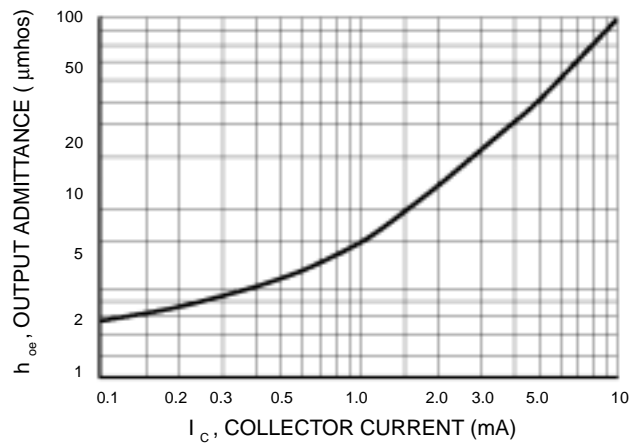


Figure 10. Output Admittance

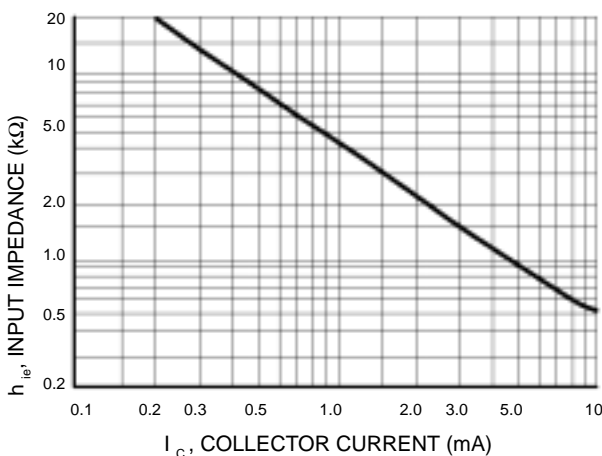


Figure 11. Input Impedance

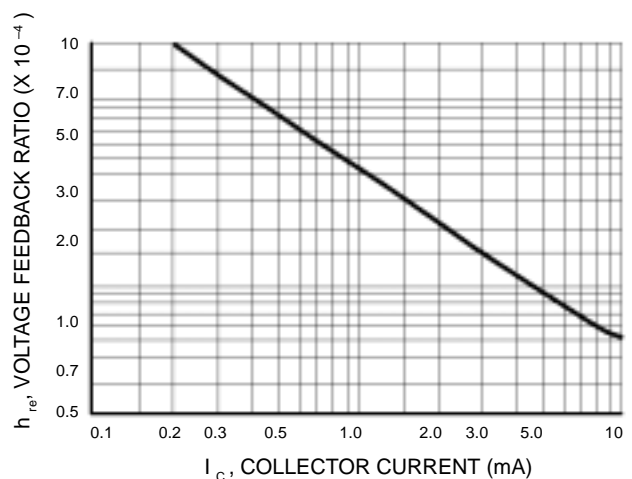


Figure 12. Voltage Feedback Ratio

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TYPICAL STATIC CHARACTERISTICS

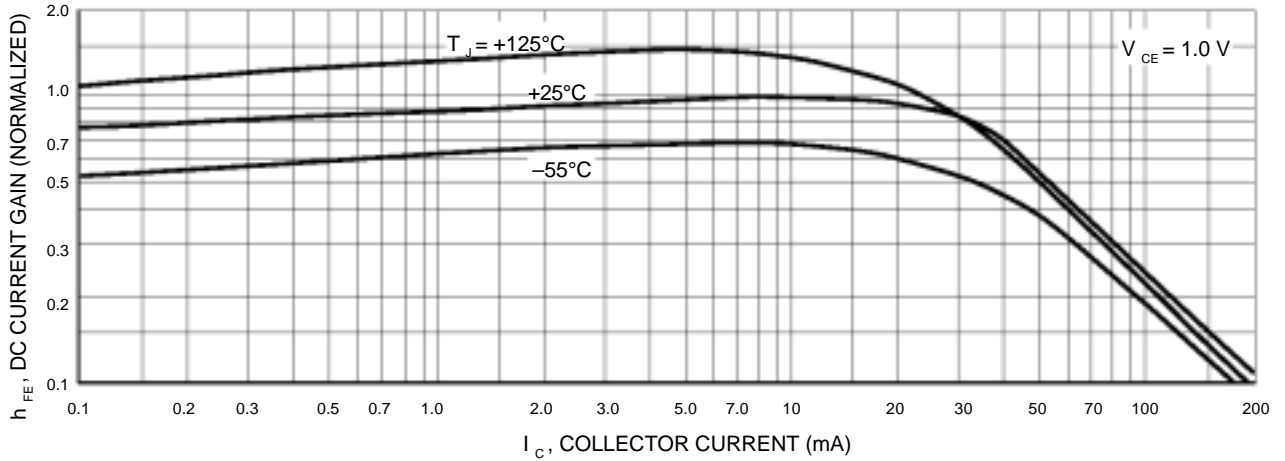


Figure 13. DC Current Gain

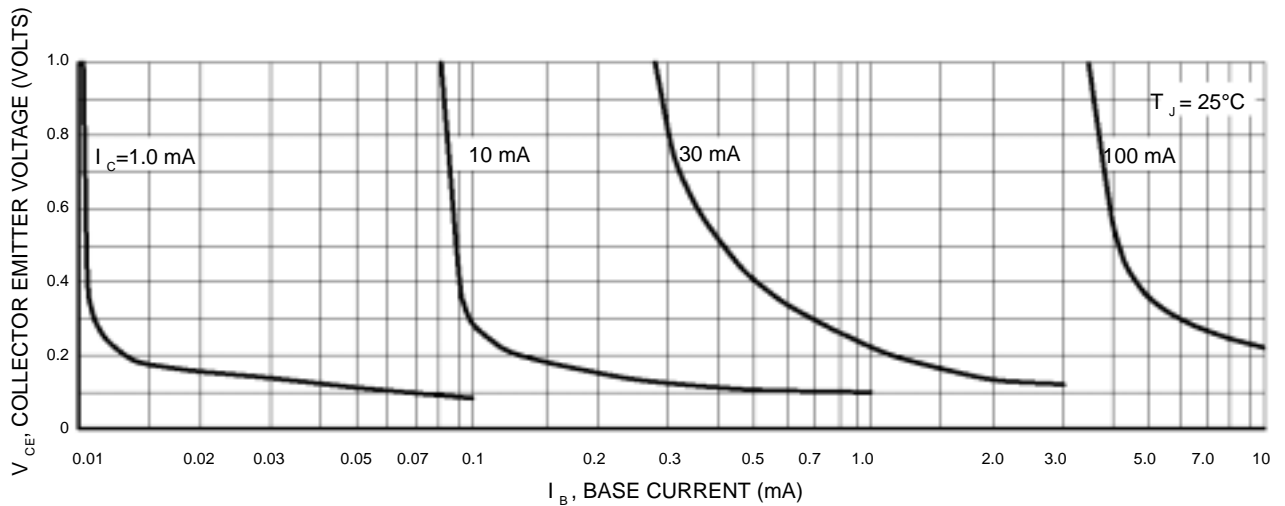


Figure 14. Collector Saturation Region

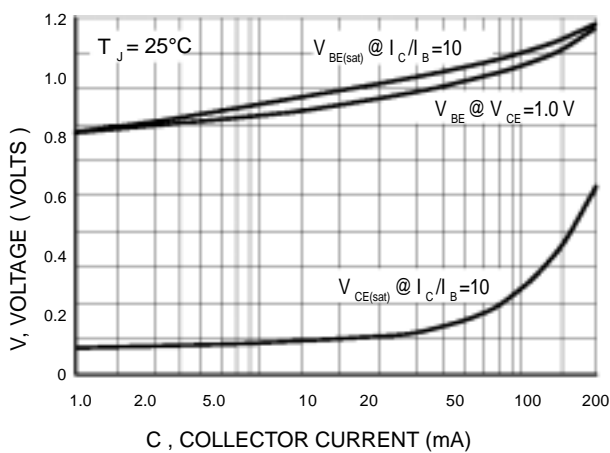


Figure 15. "ON" Voltages

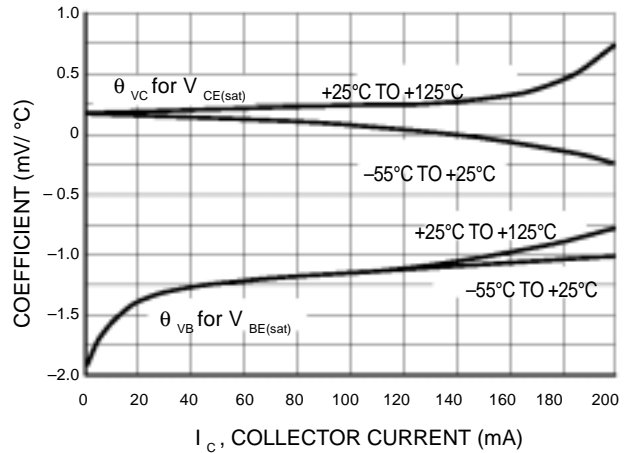
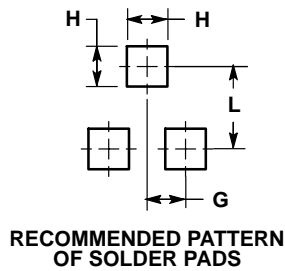
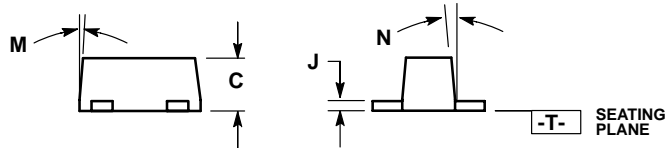
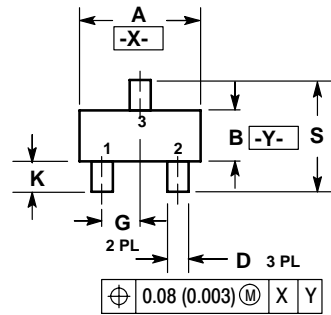


Figure 16. Temperature Coefficients

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SC-89



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067