

General Purpose Transistors

PNP Silicon

- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish

ORDERING INFORMATION

Device	Package	Shipping
LMBT3906LT1	SOT-23	3000/Tape & Reel
LMBT3906LT1G	SOT-23	3000/Tape & Reel

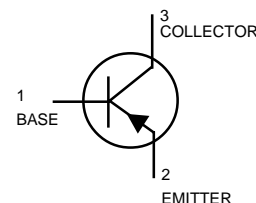
LMBT3906LT1



SOT-23 (TO-236AB)

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-5 Board(1) $T_A = 25^\circ\text{C}$	P_D	225	mW
Derate above 25°C		1.8	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate above 25°C		2.4	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

LMBT3906LT1 = 2A

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

Characteristic	Symbol	Min	Max	Unit
----------------	--------	-----	-----	------

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 ($I_C = -10\ \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	-40	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = -10\ \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	-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

 1. FR-5 = $1.0 \times 0.75 \times 0.062\text{ in.}$

 2. Alumina = $0.4 \times 0.3 \times 0.024\text{ in.}$ 99.5% alumina.

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

LMBT3906LT1

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (2)				
DC Current Gain ($I_C = -0.1 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$) ($I_C = -1.0 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$) ($I_C = -10 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$) ($I_C = -50 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$) ($I_C = -100 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$)	h_{FE}	60 80 100 60 30	— — 300 — —	—
Collector–Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -1.0 \text{ mA}$) ($I_C = -50 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{CE(sat)}$	— —	-0.25 -0.4	Vdc
Base–Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -1.0 \text{ mA}$) ($I_C = -50 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{BE(sat)}$	-0.65 —	-0.85 -0.95	Vdc

SMALL–SIGNAL CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

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

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

LMBT3906LT1

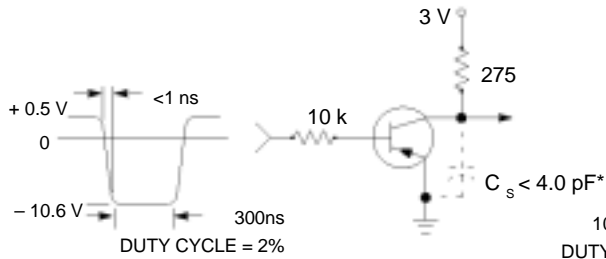


Figure 1. Delay and Rise Time Equivalent Test Circuit

*Total shunt capacitance of test jig and connectors

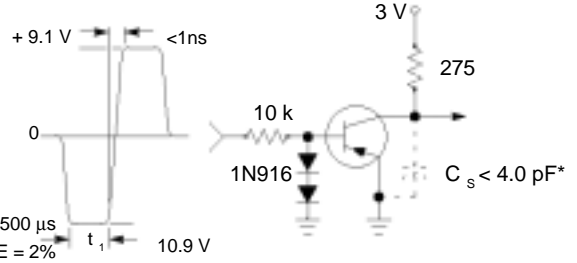


Figure 2. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

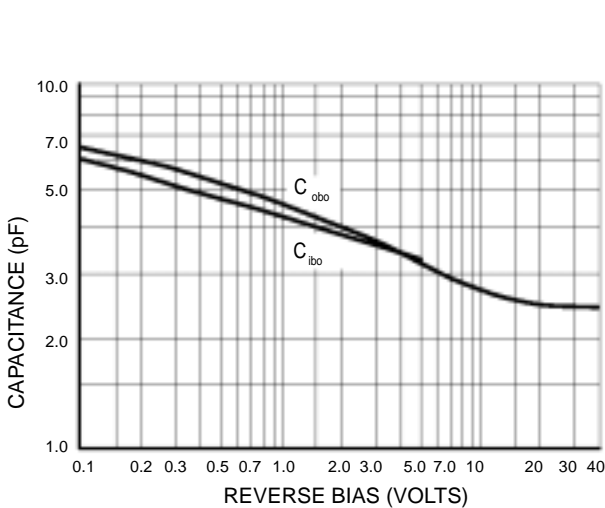


Figure 3. Capacitance

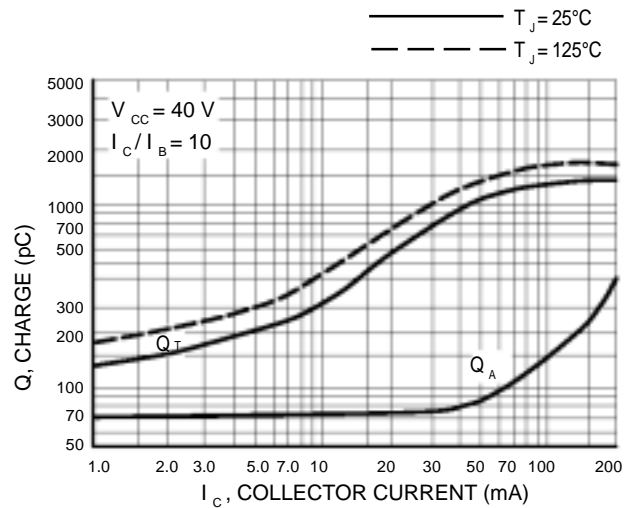


Figure 4. Charge Data

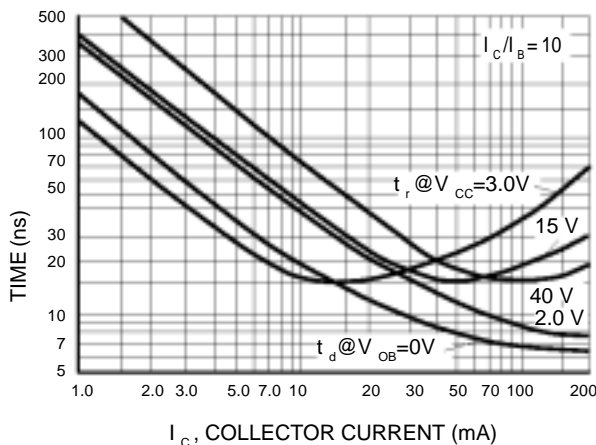


Figure 5. Turn-On Time

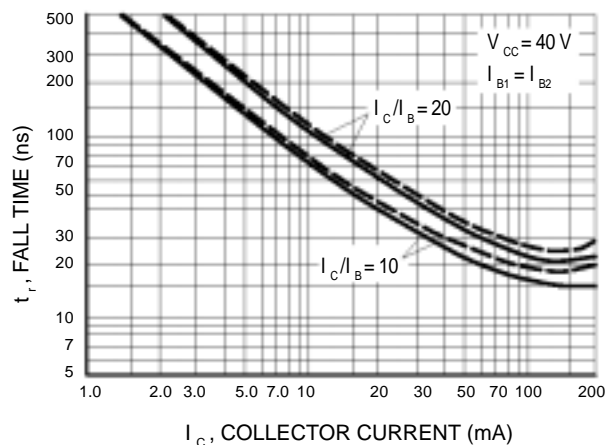
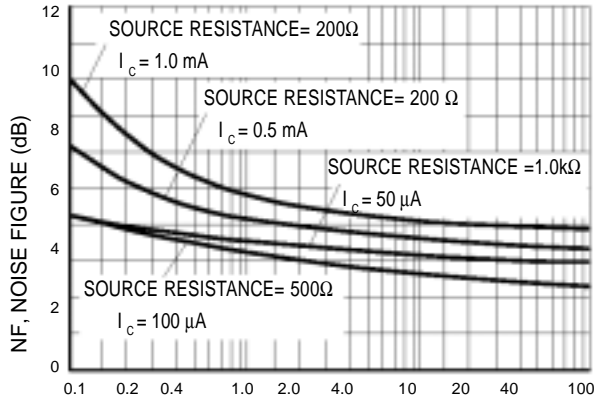


Figure 6. Fall Time

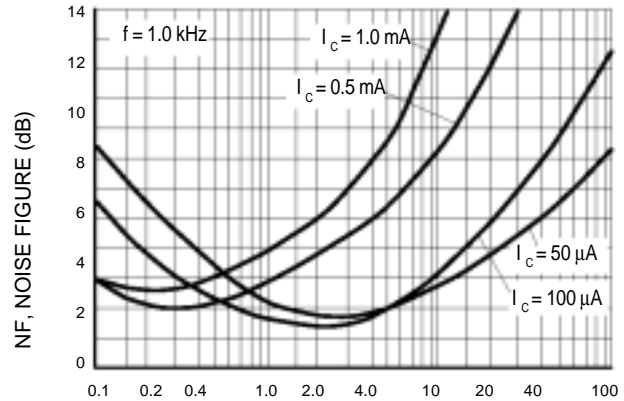
LMBT3906LT1

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

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



f, FREQUENCY (kHz)
Figure 7. Noise Figure



R_g , SOURCE RESISTANCE (k Ω)
Figure 8. Noise Figure

h PARAMETERS

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

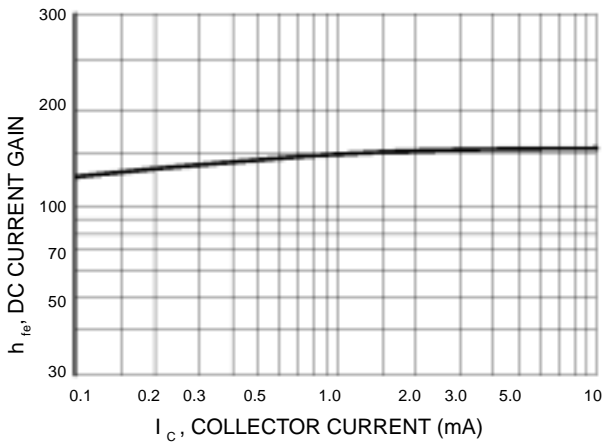


Figure 9. Current Gain

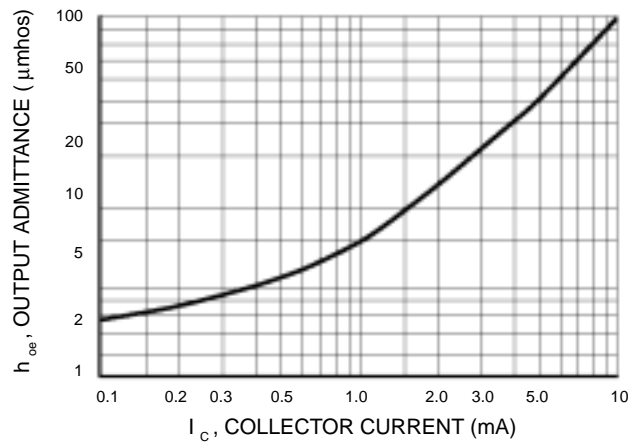


Figure 10. Output Admittance

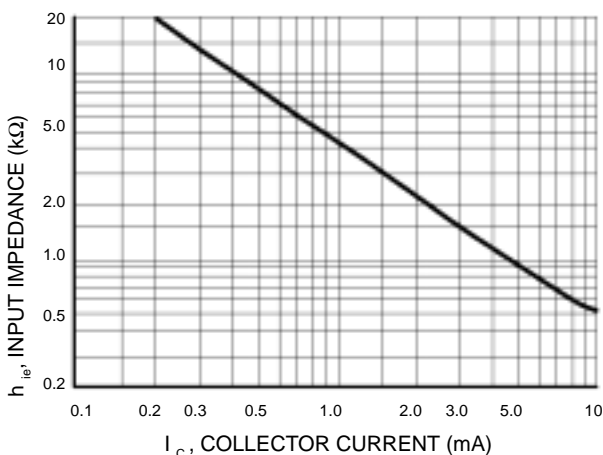


Figure 11. Input Impedance

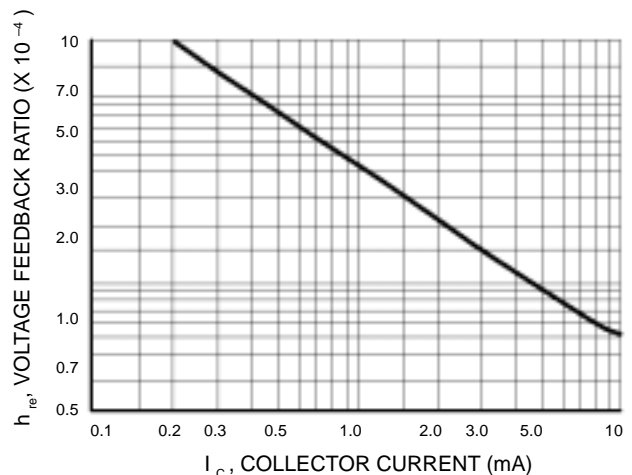


Figure 12. Voltage Feedback Ratio

LMBT3906LT1

TYPICAL STATIC CHARACTERISTICS

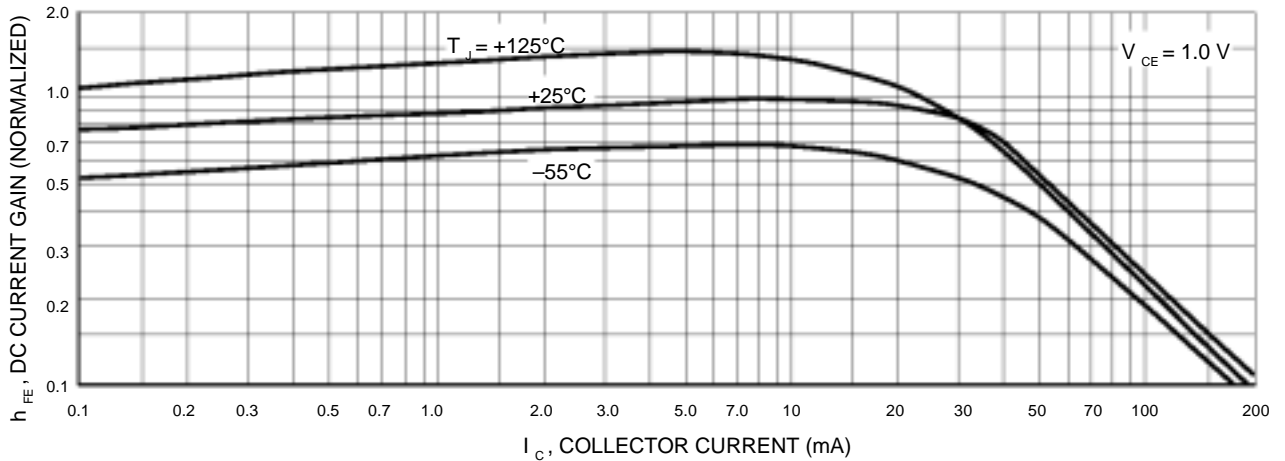


Figure 13. DC Current Gain

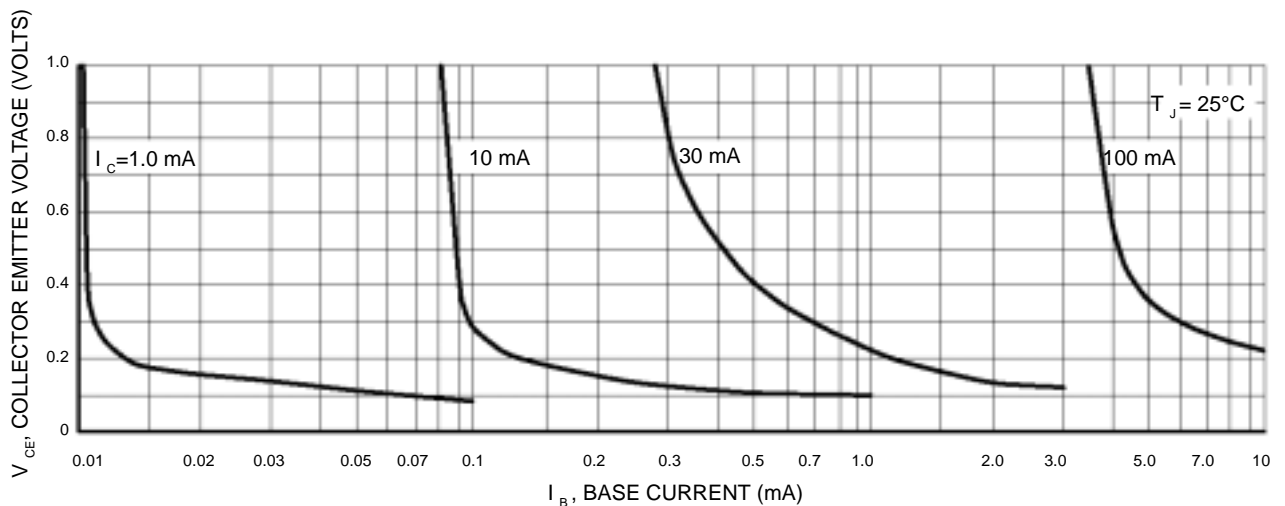


Figure 14. Collector Saturation Region

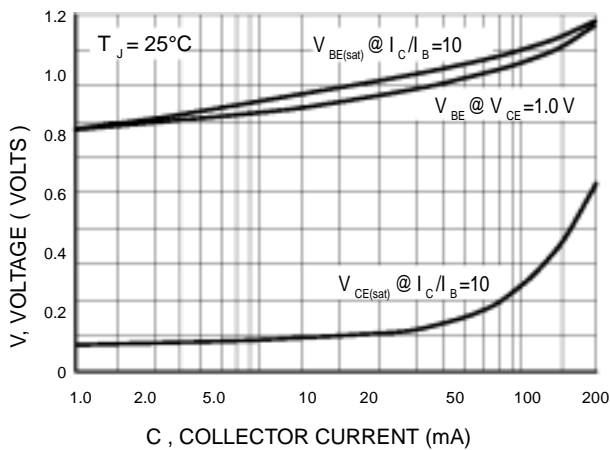


Figure 15. "ON" Voltages

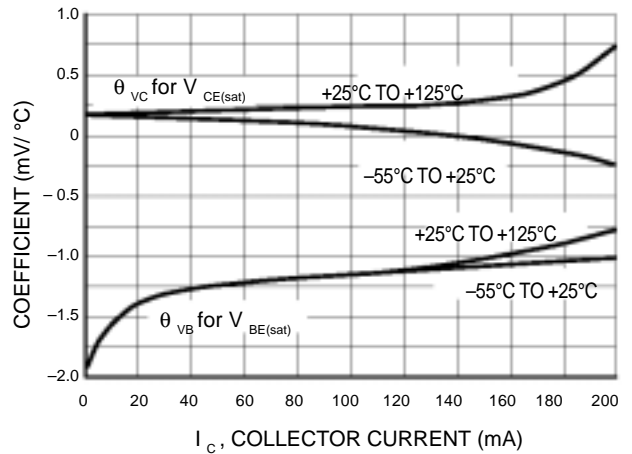
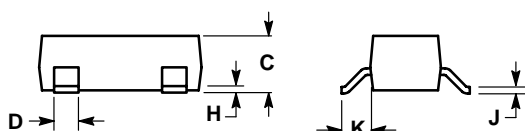
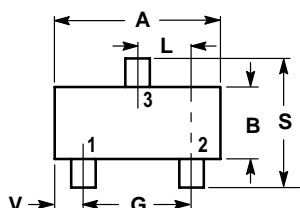


Figure 16. Temperature Coefficients

LMBT3906LT1

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

