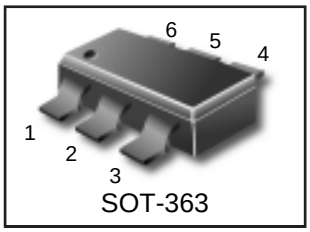
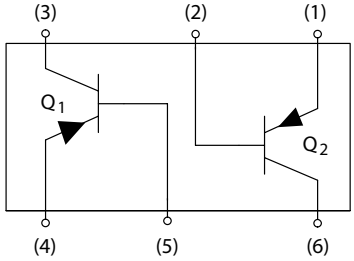
Dual Bias Resistor Transistor

LMBT3906DW1T1G
S-LMBT3906DW1T1G



The LMBT3906DW1T1 device isa spin–off of our popular SOT–23/SOT–323 three–leaded device. It is designed for general purpose amplifier applications and is housed in the SOT–363 six–leaded surface mount package. By putting two discrete devices in one package, this device is ideal for low–power surface mount applications where board space is at a premium.

- h_{FE}, 100–300
- Low $V_{CE(sat)}$, ≤ 0.4 V
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in 8 mm, 7–inch/3,000 Unit Tape and Reel
- Device Marking: LMBT3906DW1T1G = A2



Features

- 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.

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

ORDERING INFORMATION

Device	Marking	Shipping
LMBT3906DW1T1G S-LMBT3906DW1T1G	A2	3000 Units/Reel
LMBT3906DW1T1G S-LMBT3906DW1T1G	A2	10000 Units/Reel

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Package Dissipation(1) T_A = 25°C	P_D	150	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	833	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	–55 to +150	°C

1. Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage(2) (I_C = –1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	–40	–	Vdc
Collector–Base Breakdown Voltage (I_C = –10 μAdc, I_E = 0)	$V_{(BR)CBO}$	–40	–	Vdc
Emitter–Base Breakdown Voltage (I_E = –10 μAdc, I_C = 0)	$V_{(BR)EBO}$	–5.0	–	Vdc
Base Cutoff Current (V_{CE} = –30 Vdc, V_{EB} = –3.0 Vdc)	I_{BL}	–	–50	nAdc
Collector Cutoff Current (V_{CE} = –30 Vdc, V_{EB} = –3.0 Vdc)	I_{CEX}	–	–50	nAdc
ON CHARACTERISTICS (2)				
DC Current Gain (I_C = –0.1 mAdc, V_{CE} = –1.0 Vdc) (I_C = –1.0 mAdc, V_{CE} = –1.0 Vdc) (I_C = –10 mAdc, V_{CE} = –1.0 Vdc) (I_C = –50 mAdc, V_{CE} = –1.0 Vdc) (I_C = –100 mAdc, V_{CE} = –1.0 Vdc)	h_{FE}	 60 80 100 60 30	 – – 300 – –	–
Collector–Emitter Saturation Voltage (I_C = –10 mAdc, I_B = –1.0 mAdc) (I_C = –50 mAdc, I_B = –5.0 mAdc)	$V_{CE(sat)}$	 – –	 –0.25 –0.4	Vdc
Base–Emitter Saturation Voltage (I_C = –10 mAdc, I_B = –1.0 mAdc) (I_C = –50 mAdc, I_B = –5.0 mAdc)	$V_{BE(sat)}$	 –0.65 –	 –0.85 –0.95	Vdc
SMALL–SIGNAL CHARACTERISTICS				
Current–Gain – Bandwidth Product	f_T	250	–	MHz
Output Capacitance	C_{obo}	–	4.5	pF
Input Capacitance	C_{ibo}	–	10	pF
Input Impedance (V_{CE} = –10 Vdc, I_C = –1.0 mAdc, f = 1.0 kHz)	h_{ie}	2.0	12	k Ω
Voltage Feedback Ratio (V_{CE} = –10 Vdc, I_C = –1.0 mAdc, f = 1.0 kHz)	h_{re}	0.1	10	X 10^{-4}
Small–Signal Current Gain (V_{CE} = –10 Vdc, I_C = –1.0 mAdc, f = 1.0 kHz)	h_{fe}	100	400	–
Output Admittance (V_{CE} = –10 Vdc, I_C = –1.0 mAdc, f = 1.0 kHz)	h_{oe}	3.0	60	μmhos
Noise Figure (V_{CE} = –5.0 Vdc, I_C = –100 μAdc, R_S = 1.0 k Ω, f = 1.0 kHz)	NF	–	4.0	dB
SWITCHING CHARACTERISTICS				
Delay Time	(V_{CC} = –3.0 Vdc, V_{BE} = 0.5 Vdc)	t_d	–	35	ns
Rise Time	(I_C = –10 mAdc, I_{B1} = –1.0 mAdc)	t_r	–	35	
Storage Time	(V_{CC} = –3.0 Vdc, I_C = –10 mAdc)	t_s	–	225	ns
Fall Time	(I_{B1} = I_{B2} = –1.0 mAdc)	t_f	–	75	

2. Pulse Test: Pulse Width ≤ 300 μs; Duty Cycle ≤2.0%.

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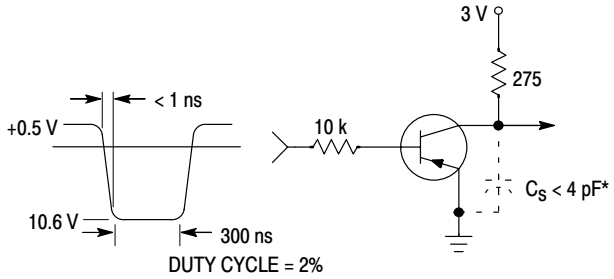


Figure 1. Delay and Rise Time Equivalent Test Circuit

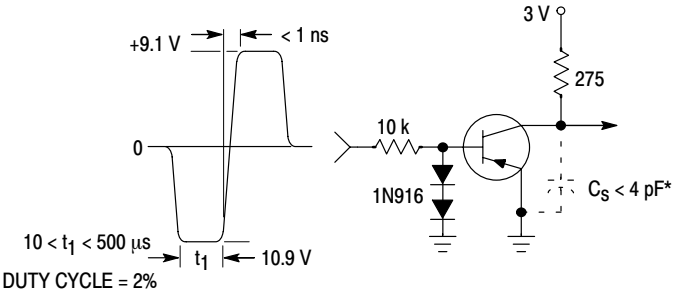


Figure 2. Storage and Fall Time Equivalent Test Circuit

* Total shunt capacitance of test jig and connectors

TYPICAL TRANSIENT CHARACTERISTICS

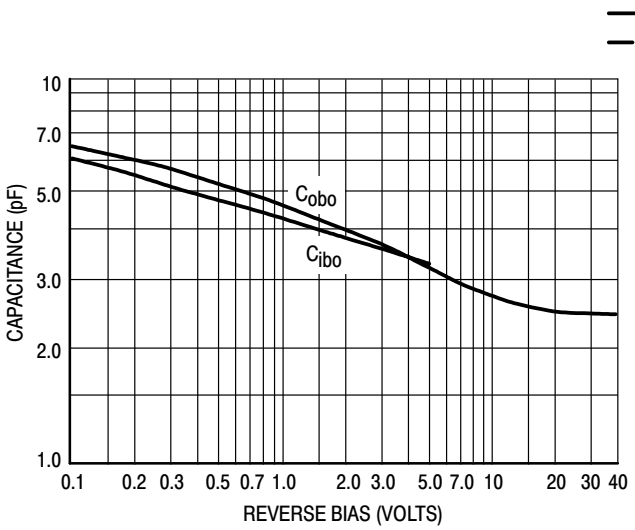


Figure 3. Capacitance

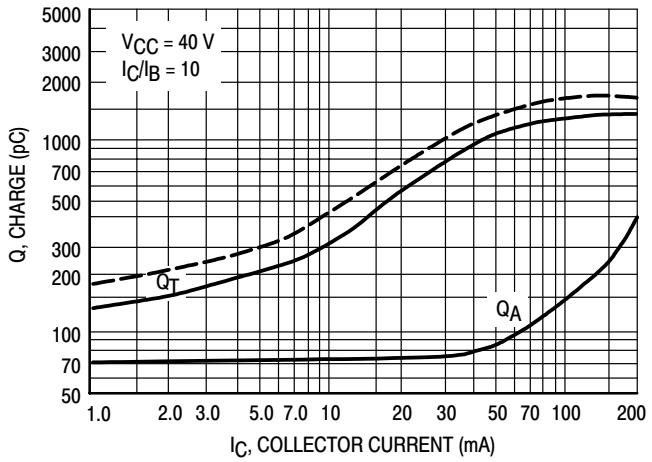


Figure 4. Charge Data

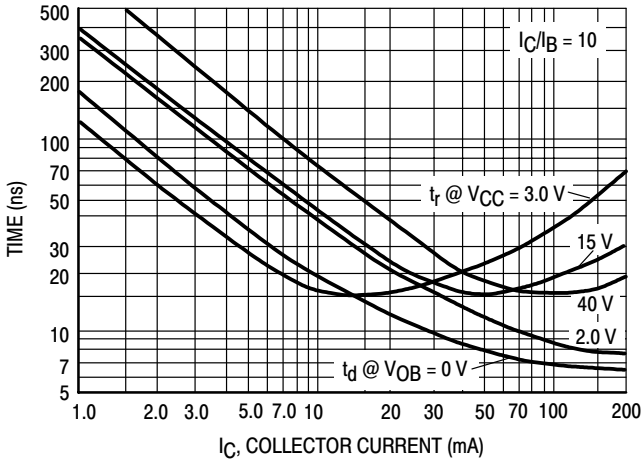


Figure 5. Turn–On Time

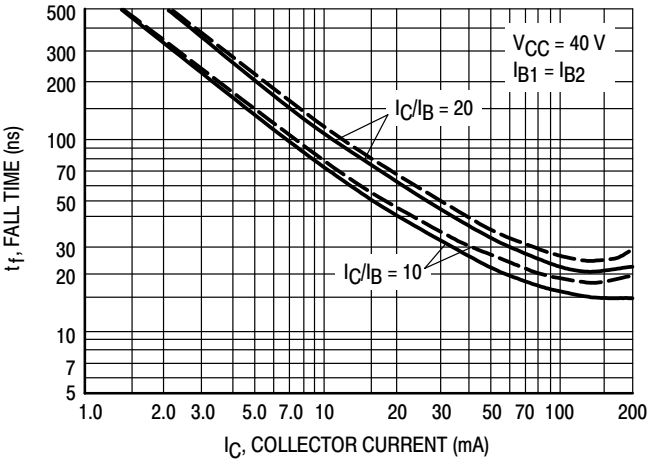


Figure 6. Fall Time

TYPICAL AUDIO SMALL–SIGNAL CHARACTERISTICS
NOISE FIGURE VARIATIONS

(V_{CE} = –5.0 Vdc, T_A = 25°C, Bandwidth = 1.0 Hz)

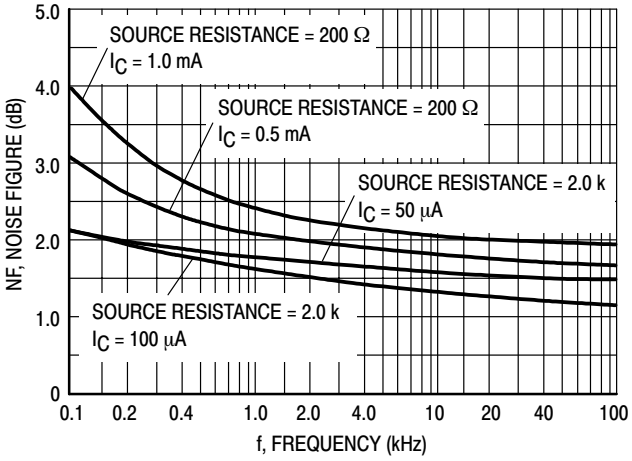


Figure 7.

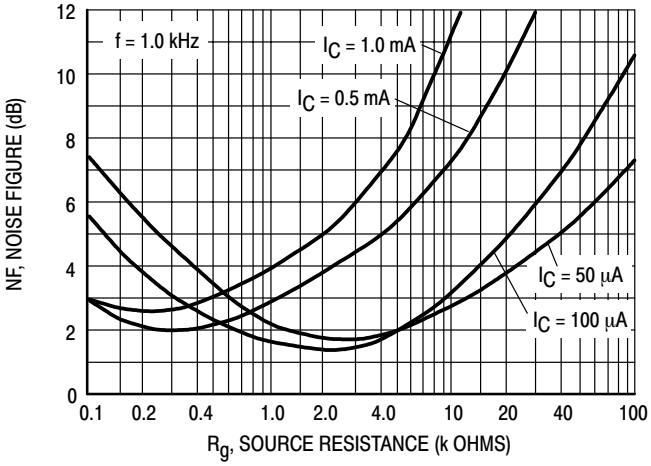


Figure 8.

h PARAMETERS

(V_{CE} = –10 Vdc, f = 1.0 kHz, T_A = 25°C)

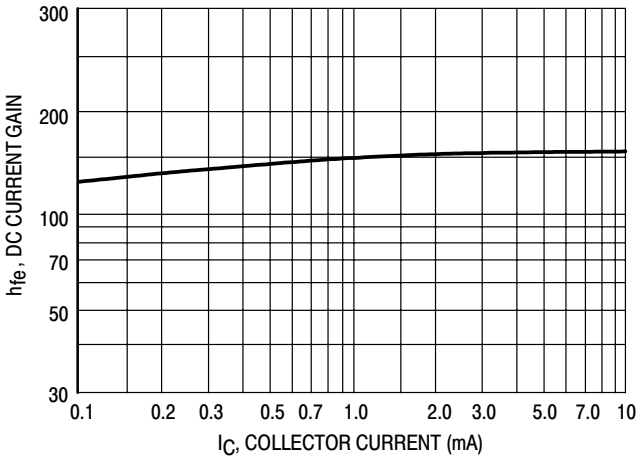


Figure 9. Current Gain

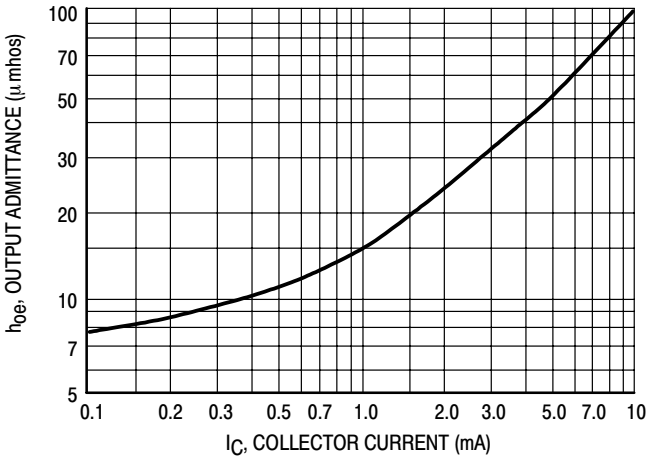


Figure 10. Output Admittance

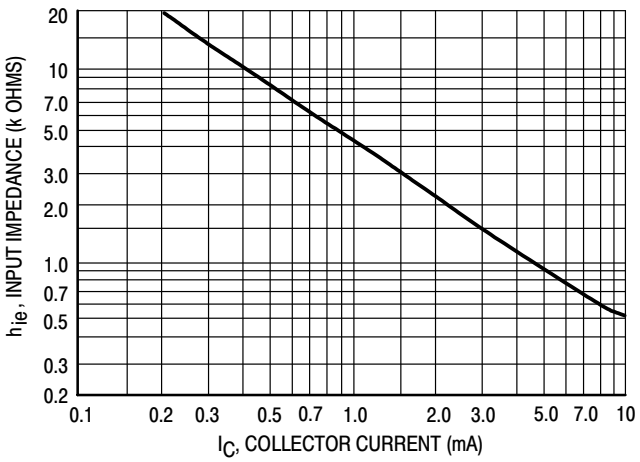


Figure 11. Input Impedance

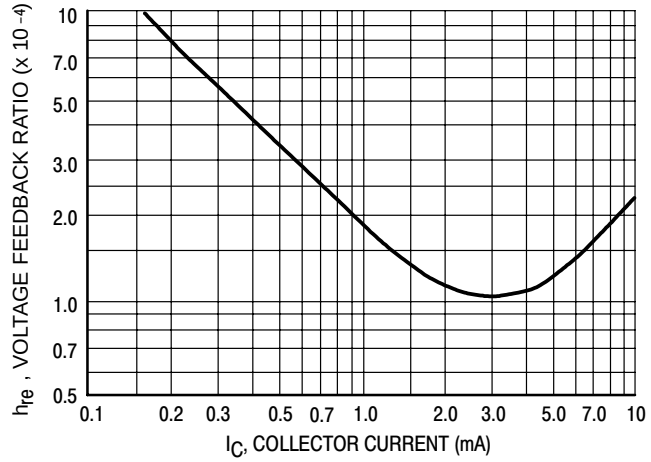


Figure 12. Voltage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

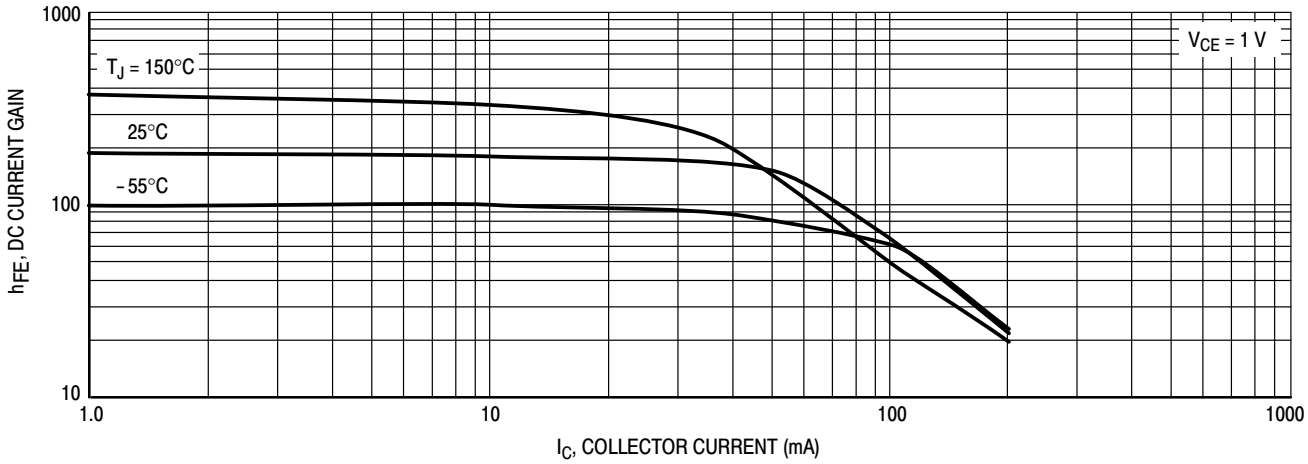


Figure 13. DC Current Gain

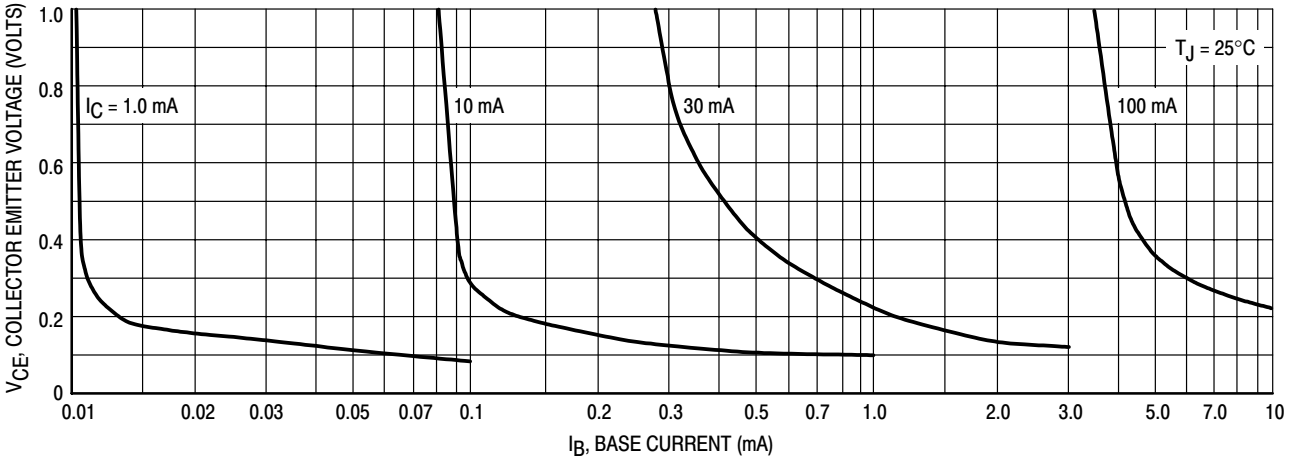


Figure 14. Collector Saturation Region

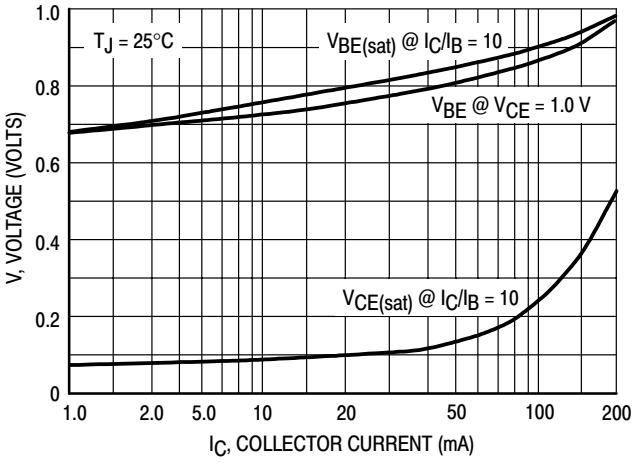


Figure 15. “ON” Voltages

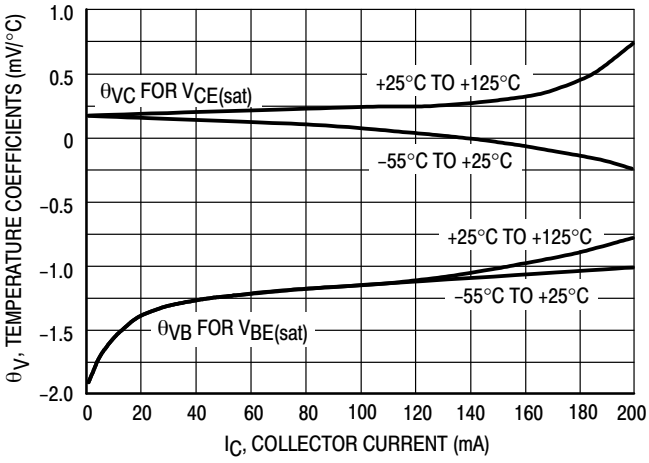
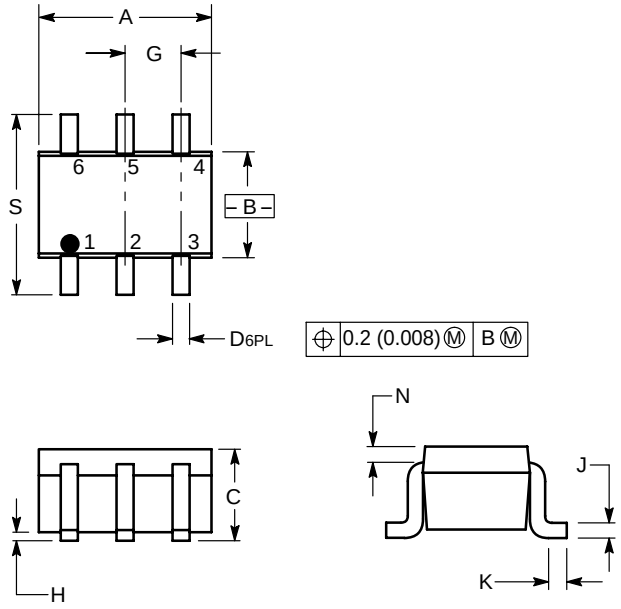


Figure 16. Temperature Coefficients

SC−88/SOT−363



NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4.EMITTER 1
5. BASE 1
6.COLLECTOR 2