

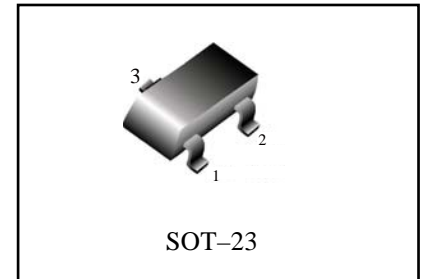
General Purpose Transistors

PNP Silicon

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

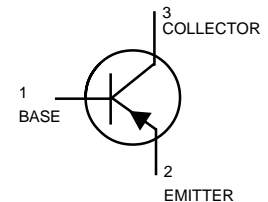
ORDERING INFORMATION

Device	Marking	Shipping
2N3906S	2A	3000/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	– 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/ $^\circ\text{C}$
	θ_{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

2N3906ST1G = 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) ($I_C = -1.0 \text{ mAdc}, I_E = 0$)	$V_{(BR)CEO}$	– 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

- FR–5 = $1.0 \times 0.75 \times 0.062 \text{ in.}$
- Alumina = $0.4 \times 0.3 \times 0.024 \text{ in.}$ 99.5% alumina.
- 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
ON CHARACTERISTICS (2)				
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	

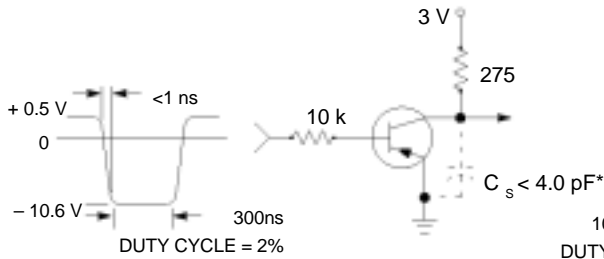
SMALL–SIGNAL CHARACTERISTICS

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	$k\Omega$
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

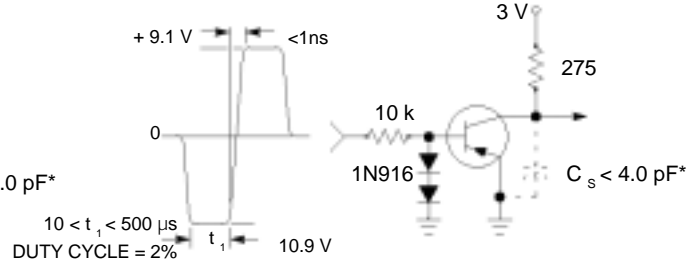
SWITCHING CHARACTERISTICS

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 $\leq 2.0\%$.



**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

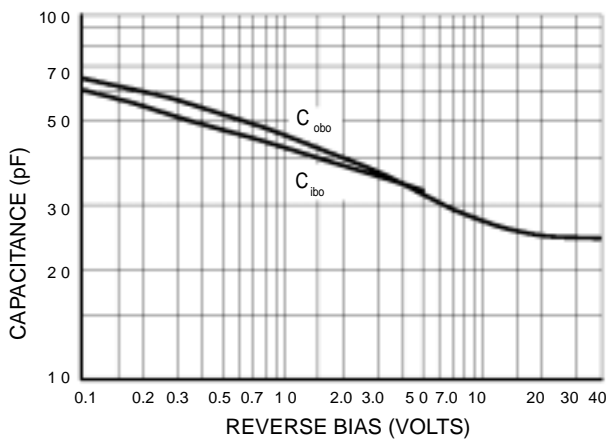


Figure 3. Capacitance

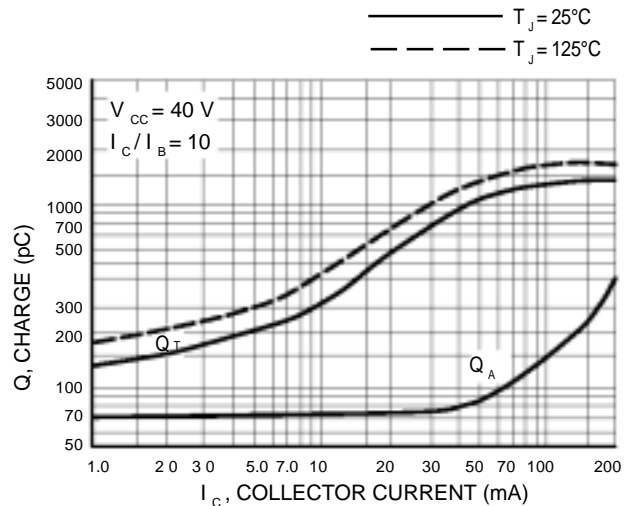


Figure 4. Charge Data

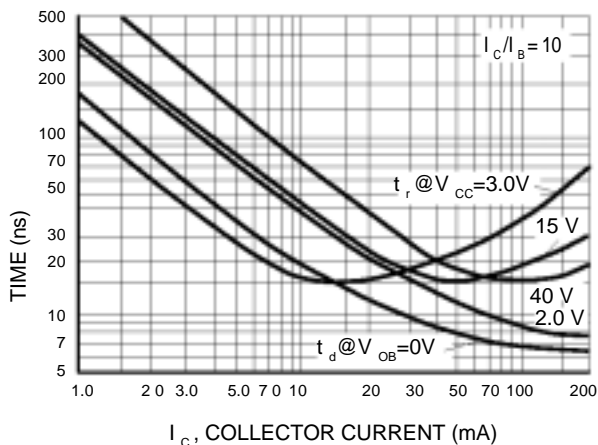


Figure 5. Turn-On Time

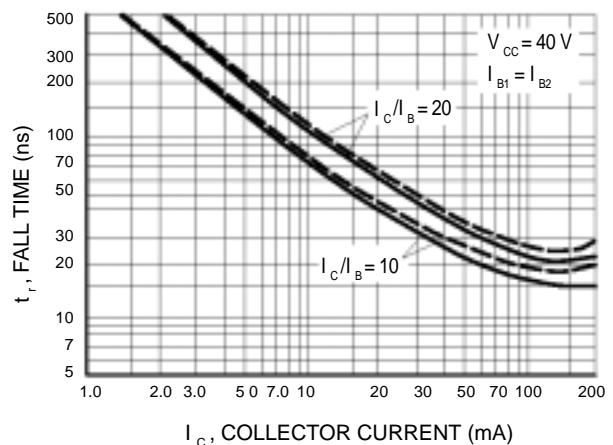
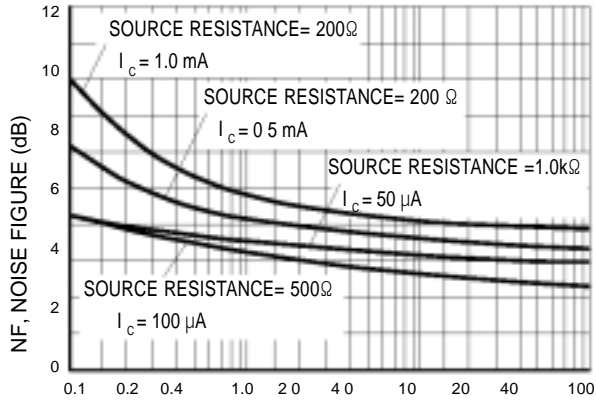


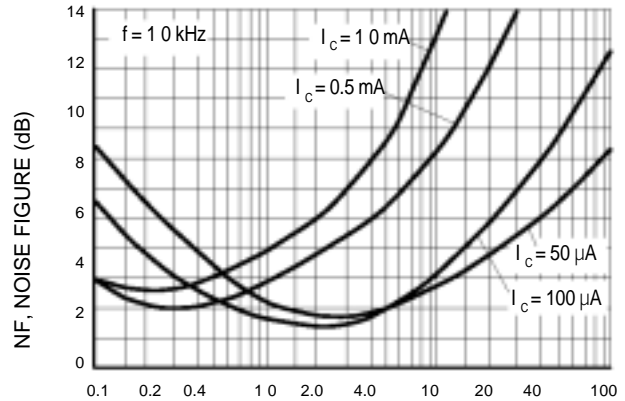
Figure 6. Fall Time

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

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



f, FREQUENCY (kHz)
Figure 7. Noise Figure



R_g , SOURCE RESISTANCE (kΩ)
Figure 8. Noise Figure

h PARAMETERS

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

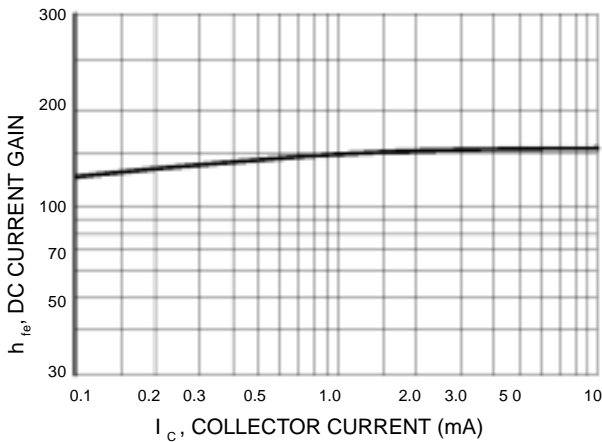


Figure 9. Current Gain

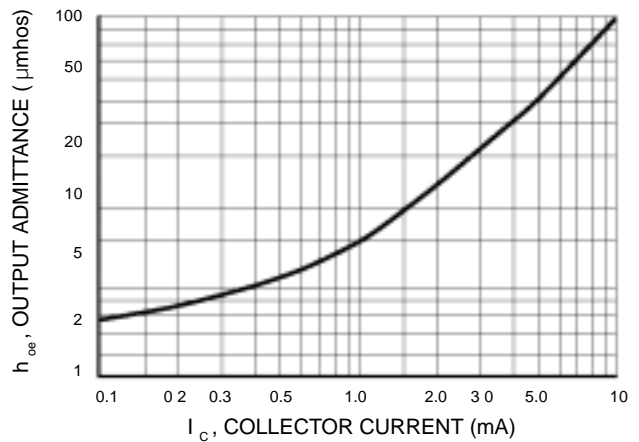


Figure 10. Output Admittance

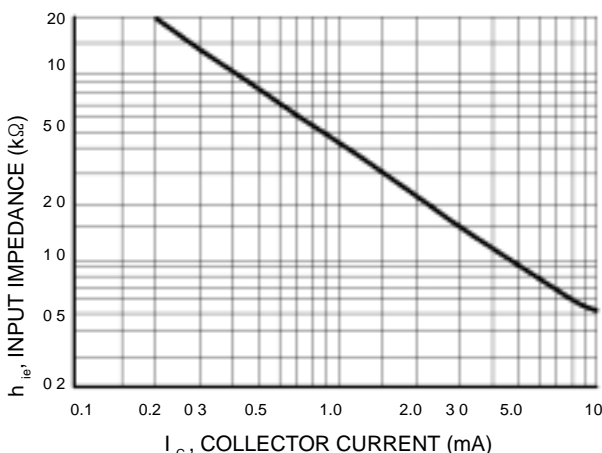


Figure 11. Input Impedance

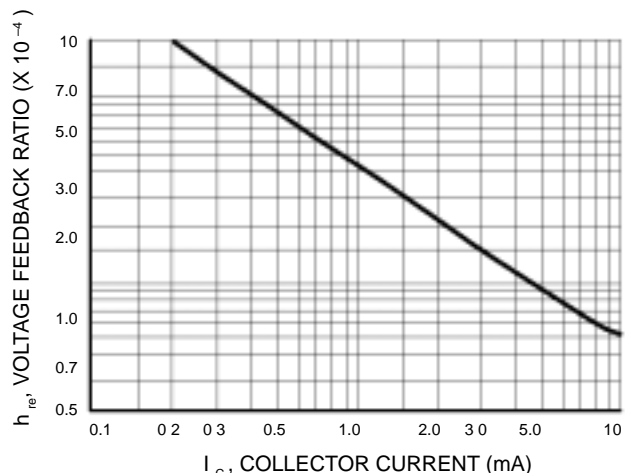


Figure 12. Voltage Feedback Ratio



TYPICAL STATIC CHARACTERISTICS

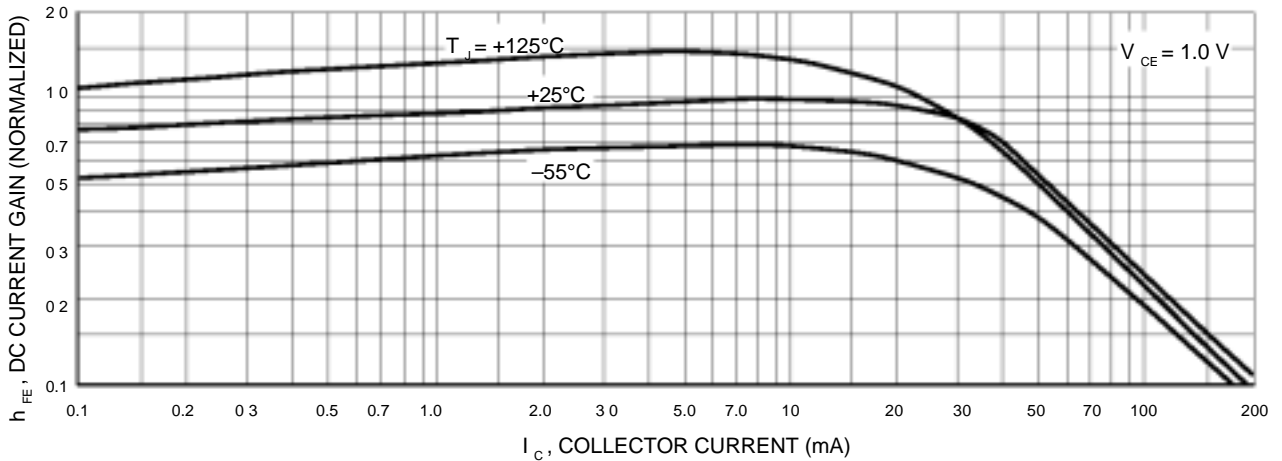


Figure 13. DC Current Gain

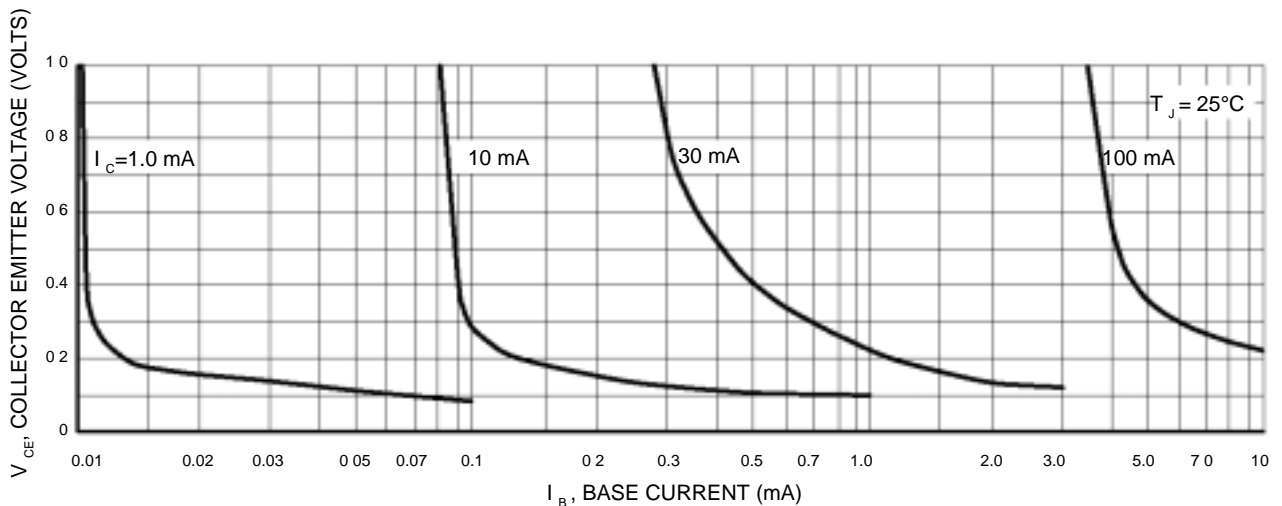


Figure 14. Collector Saturation Region

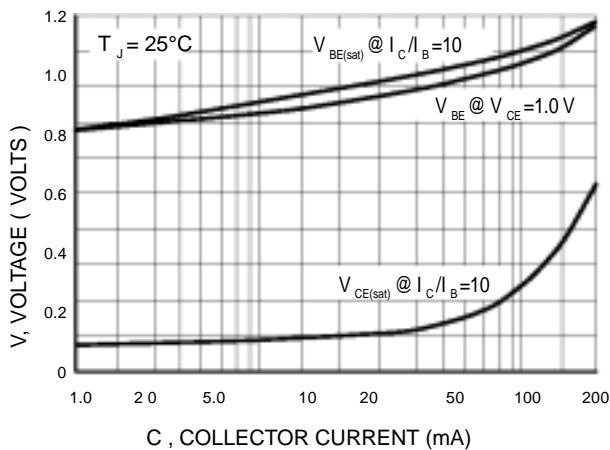


Figure 15. "ON" Voltages

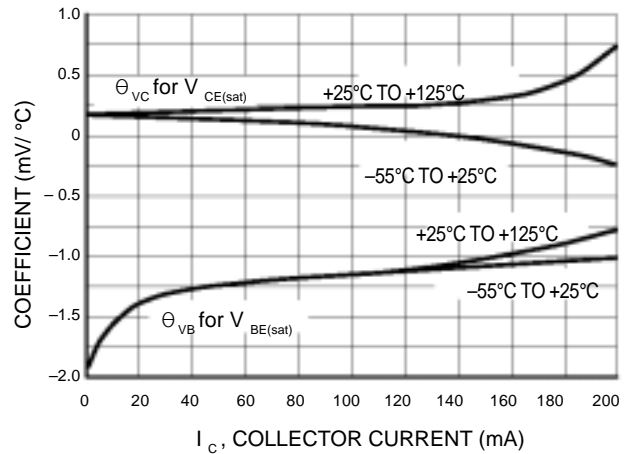
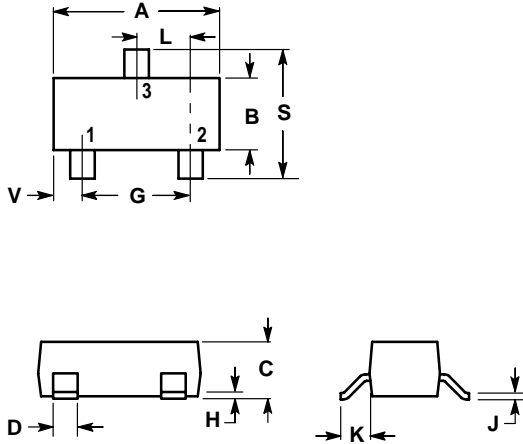


Figure 16. Temperature Coefficients

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

