PZT3904T1

Preferred Device

General Purpose Transistor

NPN Silicon

ON Semiconductor®

http://onsemi.com

MAXIMUM RATINGS

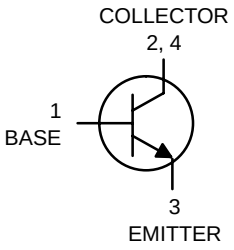
Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	40	Vdc
Collector−Base Voltage	V_{CBO}	60	Vdc
Emitter−Base Voltage	V_{EBO}	6.0	Vdc
Collector Current − Continuous	I_C	200	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) T_A = 25°C	P_D	1.5 12	W mW/°C
Thermal Resistance Junction−to−Ambient (Note 1)	$R_{\theta JA}$	83.3	°C/W
Thermal Resistance Junction−to−Lead #4	$R_{\theta JA}$	35	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

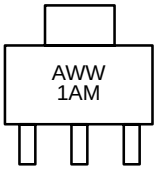
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. FR−4 with 1 oz and 713 mm^2 of copper area.



SOT−223
CASE 318E
Style 1

MARKING DIAGRAM



1AM = Specific Device Code
A = Assembly Location
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
PZT3904T1	SOT−223	1000 / Tape & Reel

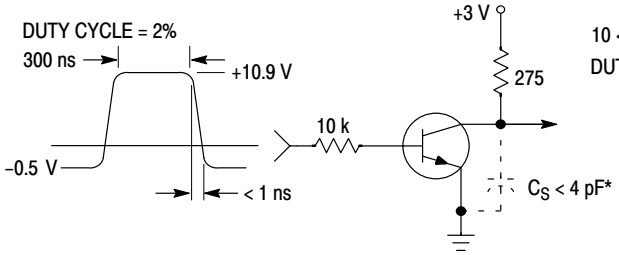
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

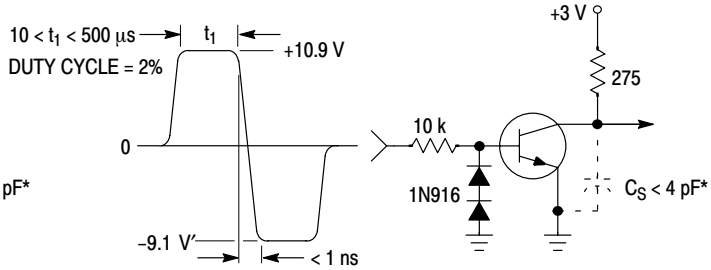
Preferred devices are recommended choices for future use and best overall value.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS (Note 2)				
Collector−Emitter Breakdown Voltage (Note 3) (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	40	−	Vdc
Collector−Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{(BR)CBO}$	60	−	
Emitter−Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	6.0	−	
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	
ON CHARACTERISTICS (Note 3)				
DC Current Gain (Note 2) (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}	 40 70 100 60 30	 − − 300 − −	−
Collector−Emitter Saturation Voltage (Note 3) (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{CE(sat)}$	 − −	 0.2 0.3	Vdc
Base−Emitter Saturation Voltage (Note 3) (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 (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)	f_T	300	−	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	−	5.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	−	8.0	
Input Impedance (V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{ie}	1.0	10	kΩ
Voltage Feedback Ratio (V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{re}	0.5	8.0	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}	1.0	40	μmhos
Noise Figure (V_{CE} = 5.0 Vdc, I_C = 100 μAdc, R_S = 1.0 kΩ, f = 1.0 kHz)	nF	−	5.0	dB
SWITCHING CHARACTERISTICS				
Delay Time	(V_{CC} = 3.0 Vdc, V_{BE} = −0.5 Vdc, I_C = 10 mAdc, I_{B1} = 1.0 mAdc)	t_d	−	35	ns
Rise Time		t_r	−	35	
Storage Time	(V_{CC} = 3.0 Vdc, I_C = 10 mAdc, I_{B1} = I_{B2} = 1.0 mAdc)	t_s	−	200	
Fall Time		t_f	−	50	

2. FR−5 = 1.0 × 0.75 × 0.062 in.
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.





* Total shunt capacitance of test jig and connectors

Figure 1. Delay and Rise Time Equivalent Test Circuit

Figure 2. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

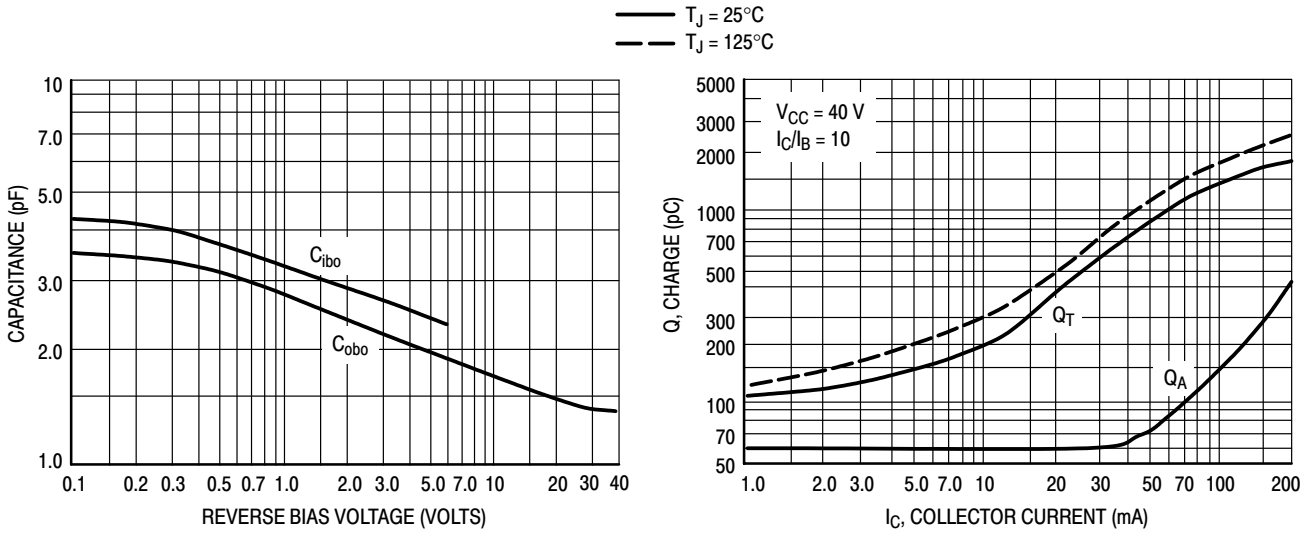


Figure 3. Capacitance

Figure 4. Charge Data

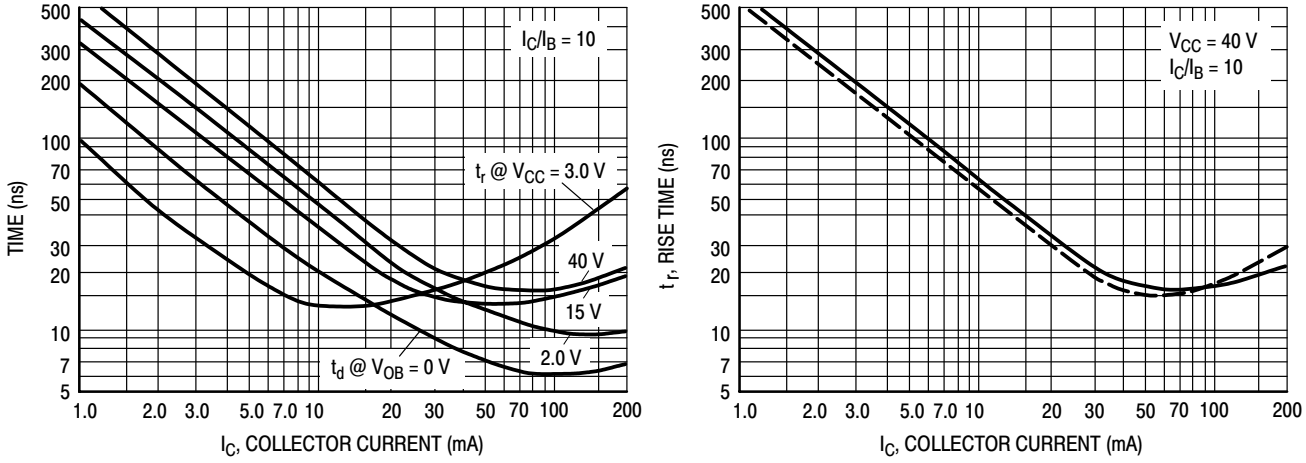


Figure 5. Turn−On Time

Figure 6. Rise Time

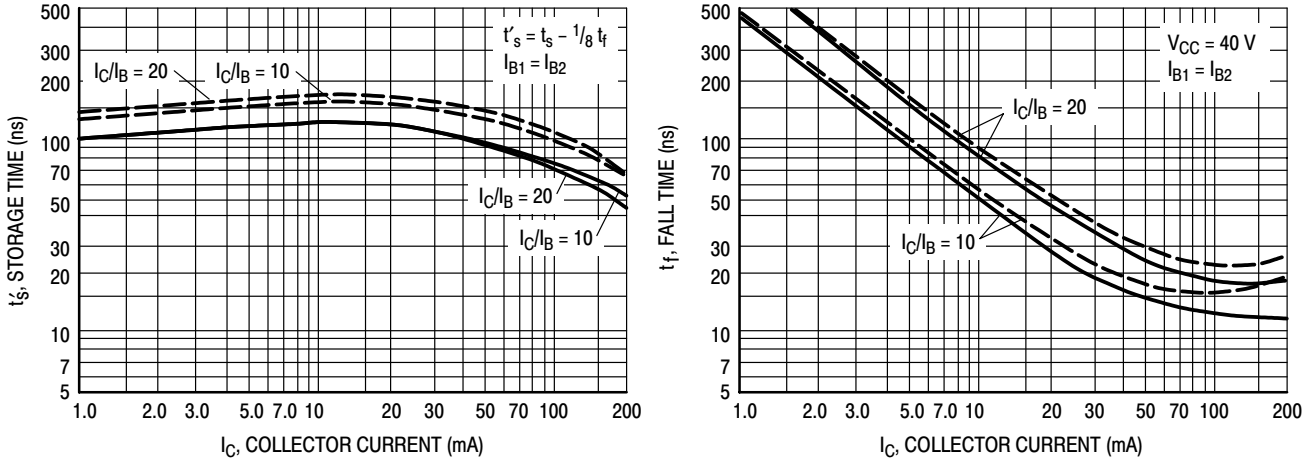


Figure 7. Storage Time

Figure 8. Fall Time

TYPICAL AUDIO SMALL−SIGNAL CHARACTERISTICS
NOISE FIGURE VARIATIONS

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

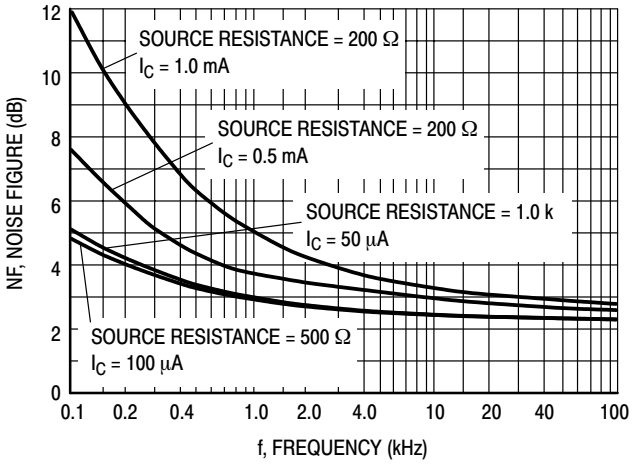


Figure 9.

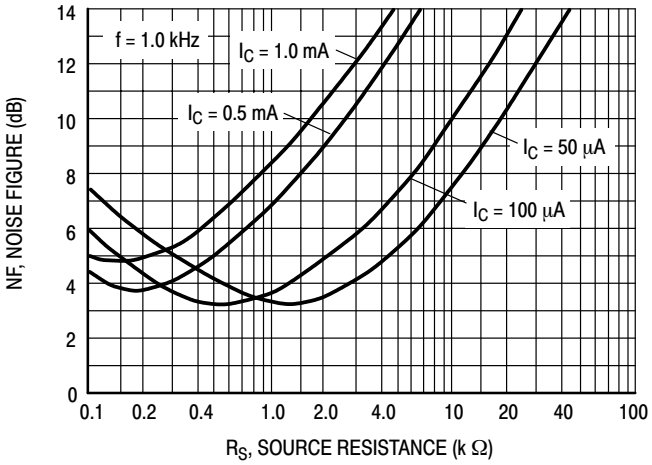


Figure 10.

h PARAMETERS

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

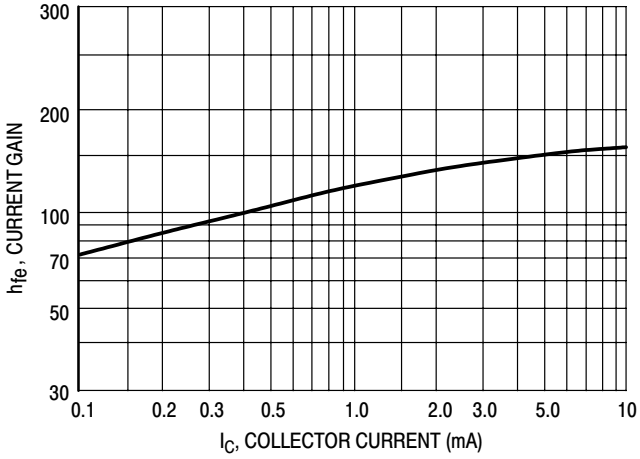


Figure 11. Current Gain

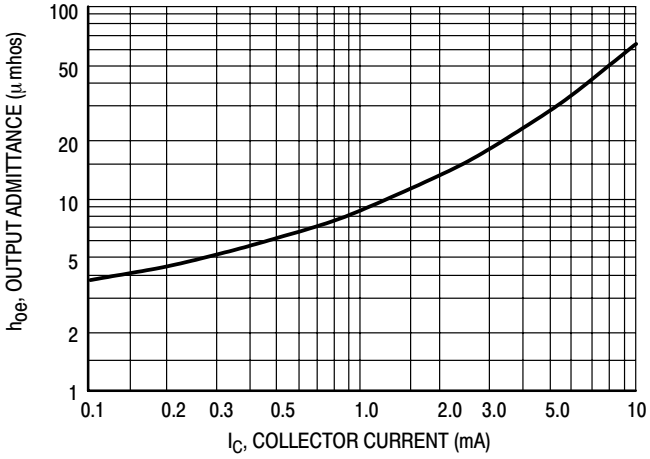


Figure 12. Output Admittance

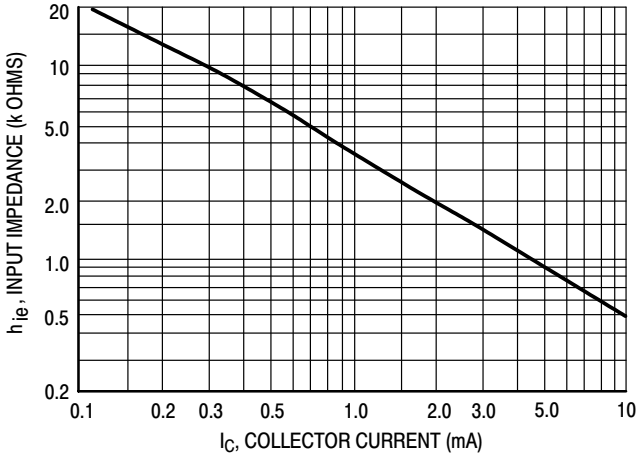


Figure 13. Input Impedance

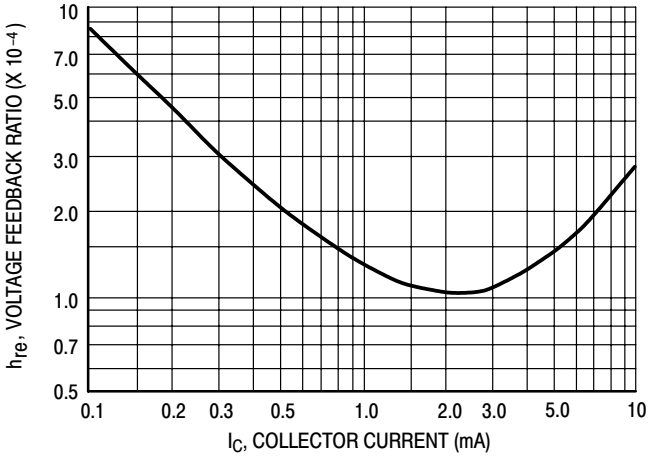


Figure 14. Voltage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

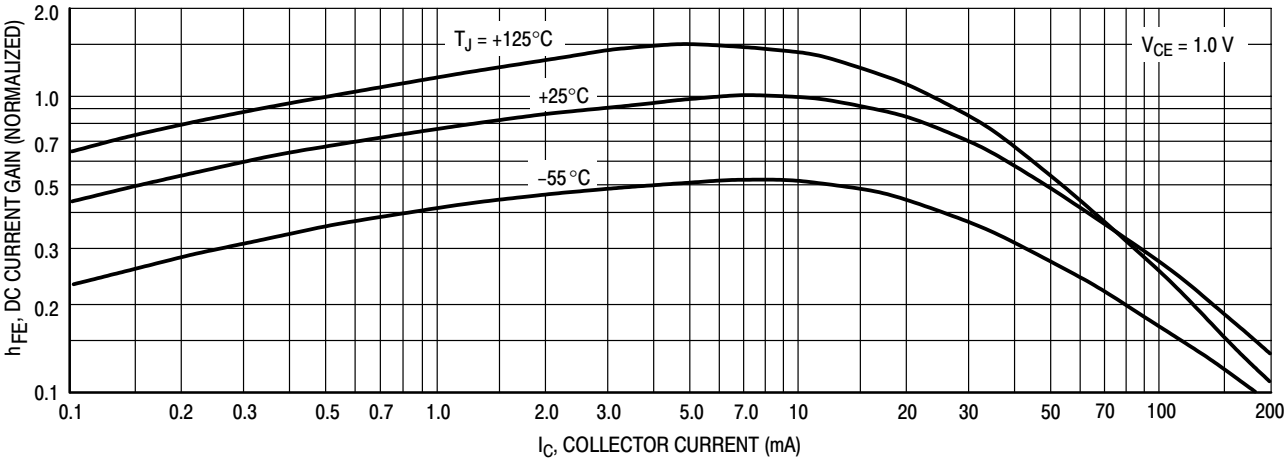


Figure 15. DC Current Gain

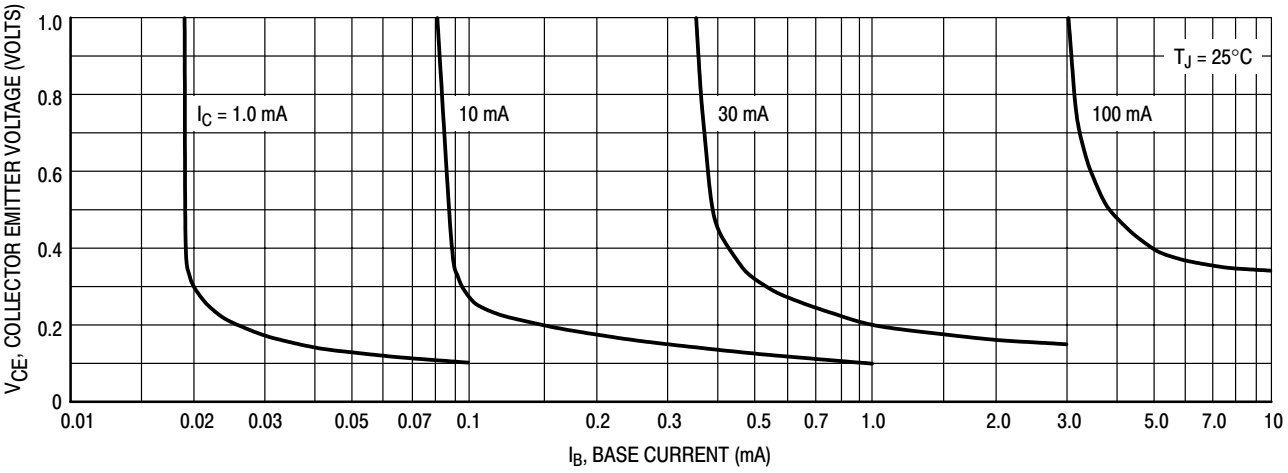


Figure 16. Collector Saturation Region

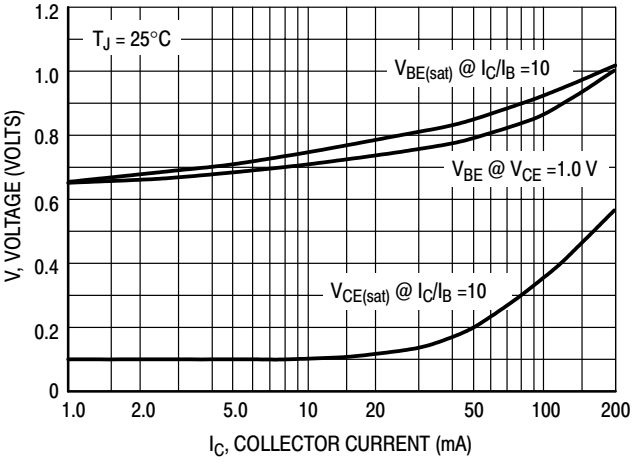


Figure 17. “ON” Voltages

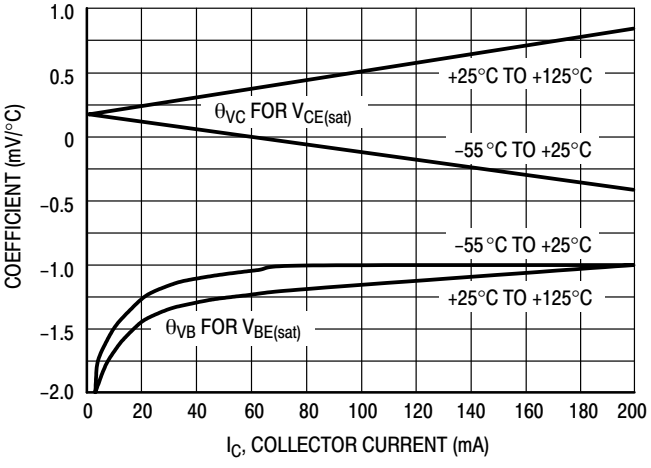
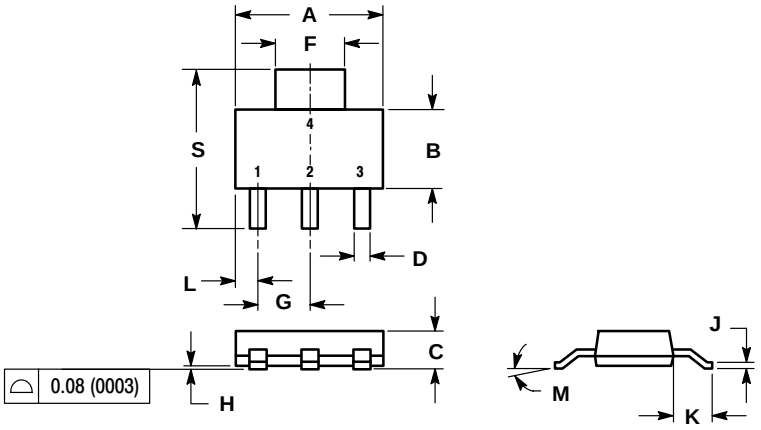


Figure 18. Temperature Coefficients

PACKAGE DIMENSIONS

SOT−223 (TO−261)
CASE 318E−04
ISSUE K

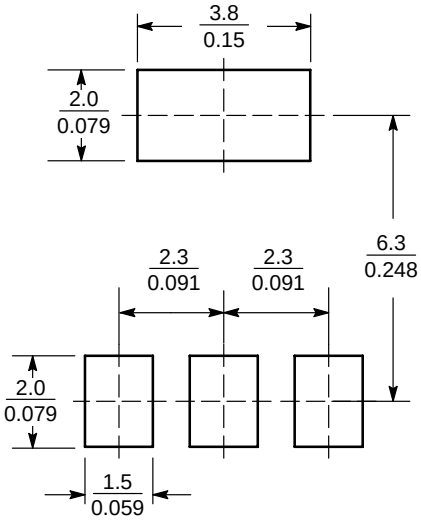


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.249	0.263	6.30	6.70
B	0.130	0.145	3.30	3.70
C	0.060	0.068	1.50	1.75
D	0.024	0.035	0.60	0.89
F	0.115	0.126	2.90	3.20
G	0.087	0.094	2.20	2.40
H	0.0008	0.0040	0.020	0.100
J	0.009	0.014	0.24	0.35
K	0.060	0.078	1.50	2.00
L	0.033	0.041	0.85	1.05
M	0 °	10 °	0 °	10 °
S	0.264	0.287	6.70	7.30

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

SOLDERING FOOTPRINT



PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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