

PZT3906T1

Preferred Device

General Purpose Transistor PNP Silicon

Features

- Pb-Free Package is Available

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 (Note 1) $T_A = 25^\circ\text{C}$ | P_D | 1.5 12 | W mW/ $^\circ\text{C}$ |
| Thermal Resistance Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 83.3 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance Junction-to-Lead #4 | $R_{\theta JA}$ | 35 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

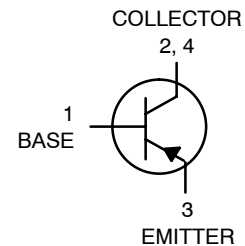
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 with 1 oz and 713 mm² of copper area.

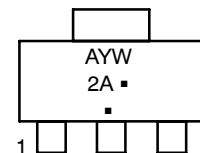


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MARKING DIAGRAM



2A = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping† |
|------------|----------------------|--------------------|
| PZT3906T1 | SOT-223 | 1000 / Tape & Reel |
| PZT3906T1G | SOT-223 (Pb-Free) | 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.

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

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

OFF CHARACTERISTICS (Note 2)

| | | | | |
|---|---------------|------|-----|------|
| Collector - Emitter Breakdown Voltage (Note 2) ($I_C = -1.0 \text{ mAdc}$, $I_B = 0$) | $V_{(BR)CEO}$ | -40 | - | Vdc |
| Collector - Base Breakdown Voltage ($I_C = -10 \mu\text{Adc}$, $I_E = 0$) | $V_{(BR)CBO}$ | -40 | - | |
| Emitter - Base Breakdown Voltage ($I_E = -10 \mu\text{Adc}$, $I_C = 0$) | $V_{(BR)EBO}$ | -5.0 | - | |
| 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 | |

ON CHARACTERISTICS (Note 2)

| | | | | |
|--|---------------|-----------------------------|-------------------------|-----|
| DC Current Gain ($I_C = -0.1 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -10 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -50 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -100 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) | H_{FE} | 60 80 100 60 30 | - - 300 - - | - |
| Collector - Emitter Saturation Voltage ($I_C = -10 \text{ mAdc}$, $I_B = -1.0 \text{ mAdc}$) ($I_C = -50 \text{ mAdc}$, $I_B = -5.0 \text{ mAdc}$) | $V_{CE(sat)}$ | - - | -0.25 -0.4 | Vdc |
| Base - Emitter Saturation Voltage ($I_C = -10 \text{ mAdc}$, $I_B = -1.0 \text{ mAdc}$) ($I_C = -50 \text{ mAdc}$, $I_B = -5.0 \text{ mAdc}$) | $V_{BE(sat)}$ | -0.65 - | -0.85 -0.95 | |

SMALL-SIGNAL CHARACTERISTICS

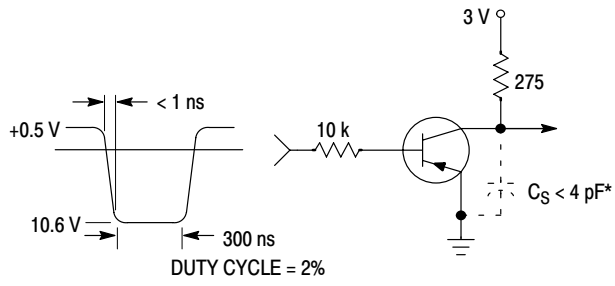
| | | | | |
|--|-----------|-----|-----|------------------|
| Current - Gain - Bandwidth Product ($I_C = -10 \text{ mAdc}$, $V_{CE} = -20 \text{ Vdc}$, $f = 100 \text{ MHz}$) | f_T | 250 | - | MHz |
| Output Capacitance ($V_{CB} = -5.0 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{obo} | - | 4.5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

SWITCHING CHARACTERISTICS

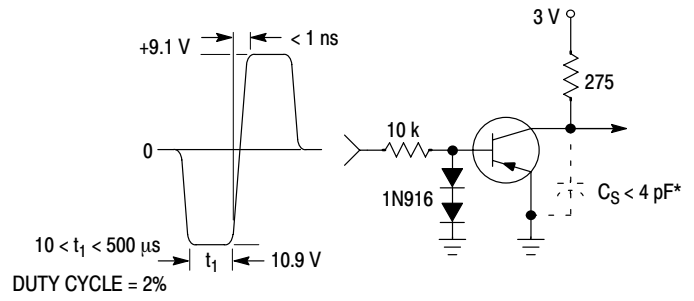
| | | | | | |
|--------------|--|-------|---|-----|----|
| Delay Time | $(V_{CC} = -3.0 \text{ Vdc}$, $V_{BE} = 0.5 \text{ Vdc}$, $I_C = -10 \text{ mAdc}$, $I_{B1} = -1.0 \text{ mAdc}$) | t_d | - | 35 | ns |
| Rise Time | | t_r | - | 35 | |
| Storage Time | $(V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{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

2. 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

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TYPICAL TRANSIENT CHARACTERISTICS

— $T_J = 25^\circ\text{C}$
 - - - $T_J = 125^\circ\text{C}$

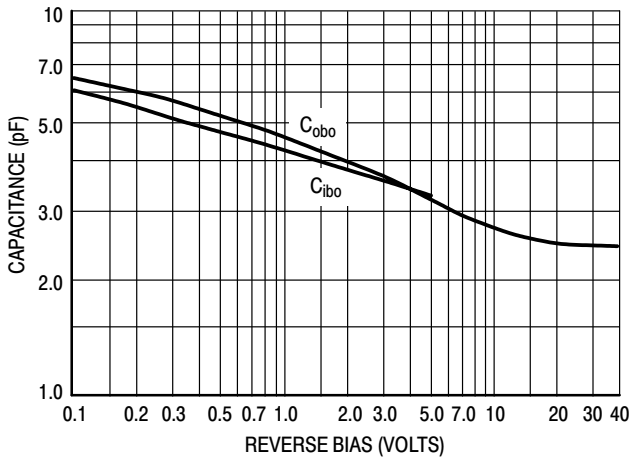


Figure 3. Capacitance

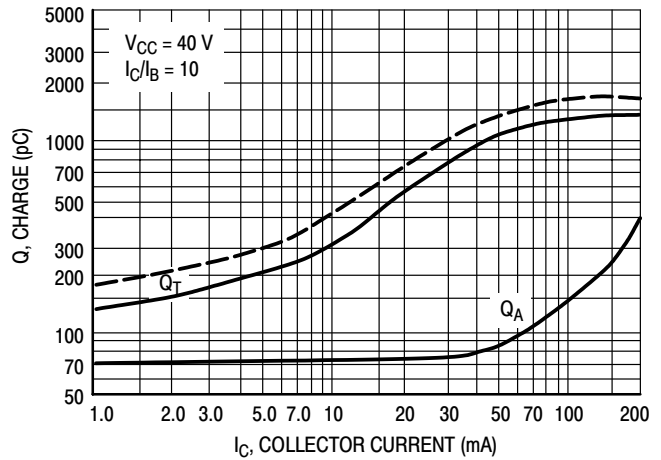


Figure 4. Charge Data

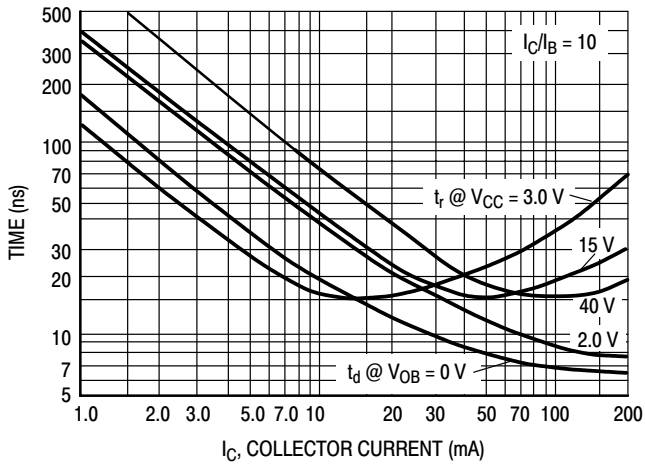


Figure 5. Turn-On Time

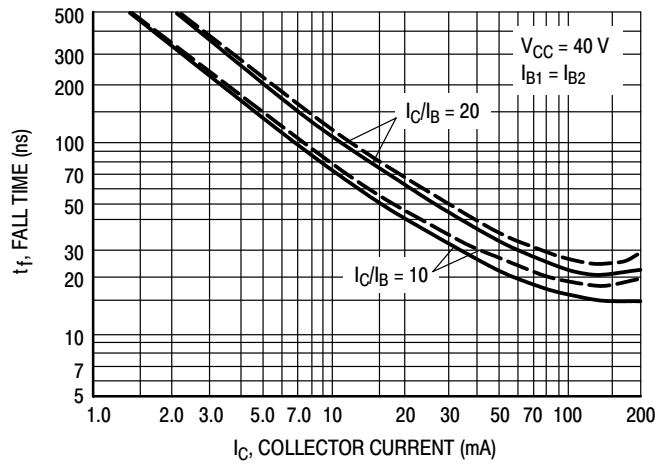


Figure 6. Fall Time

TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE VARIATIONS

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

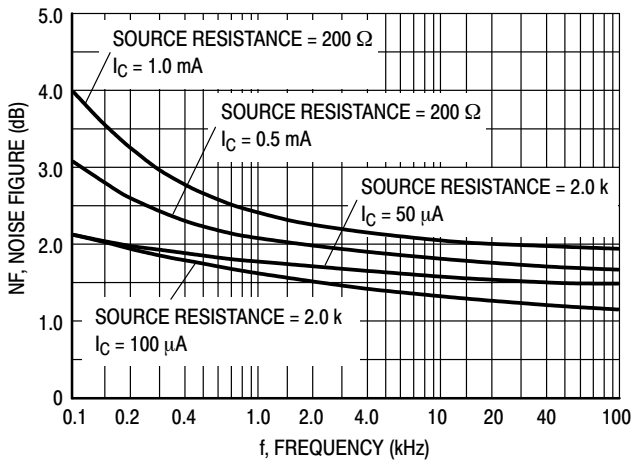


Figure 7.

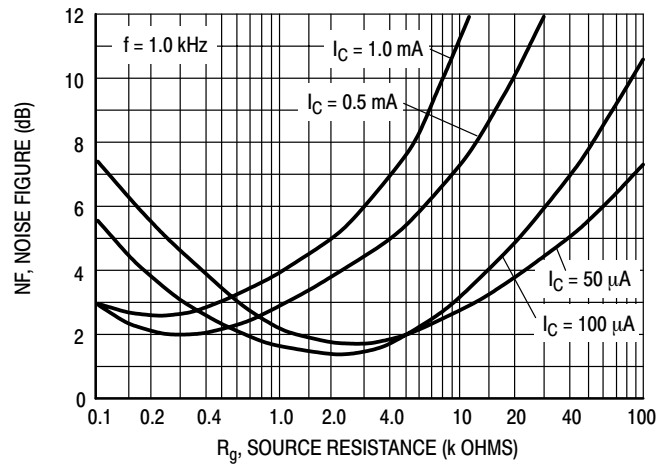


Figure 8.

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h PARAMETERS

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

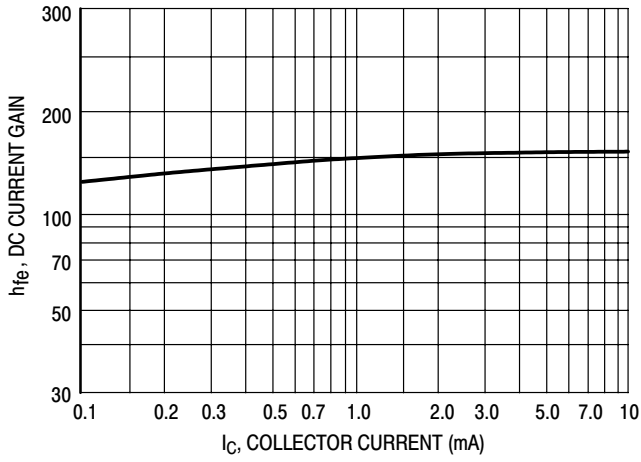


Figure 9. Current Gain

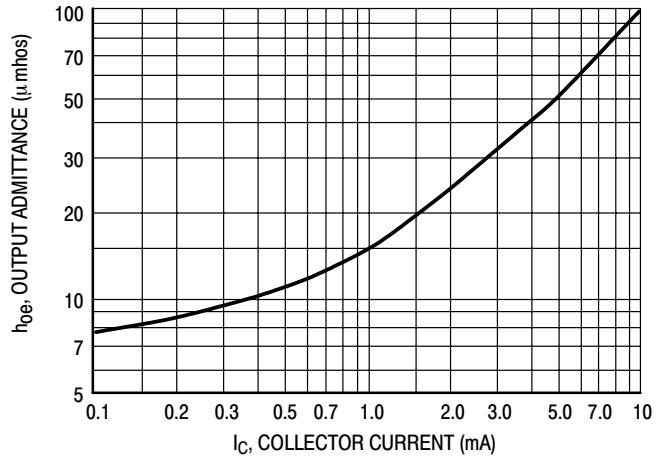


Figure 10. Output Admittance

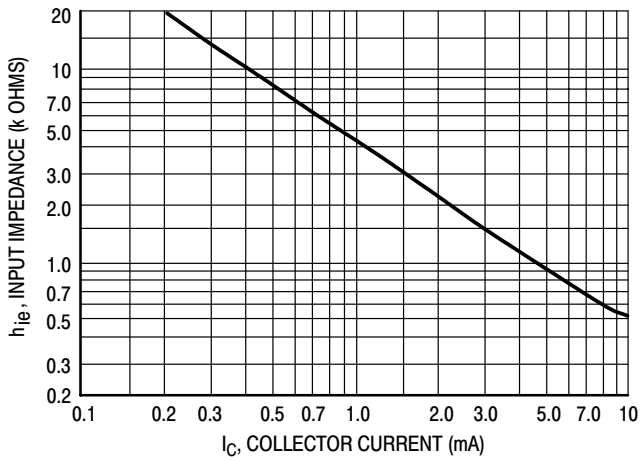


Figure 11. Input Impedance

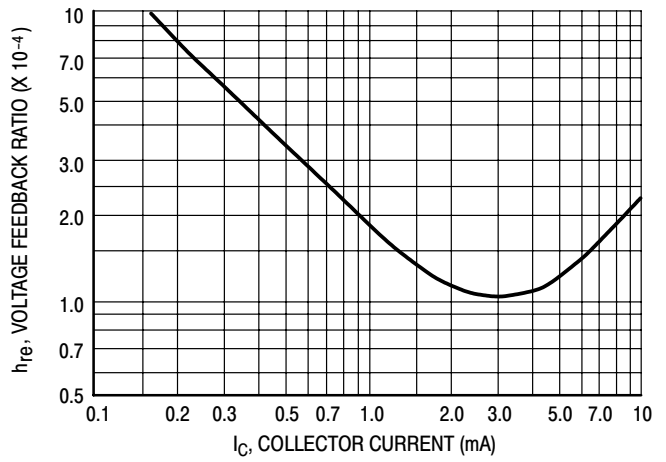


Figure 12. Voltage Feedback Ratio

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TYPICAL STATIC CHARACTERISTICS

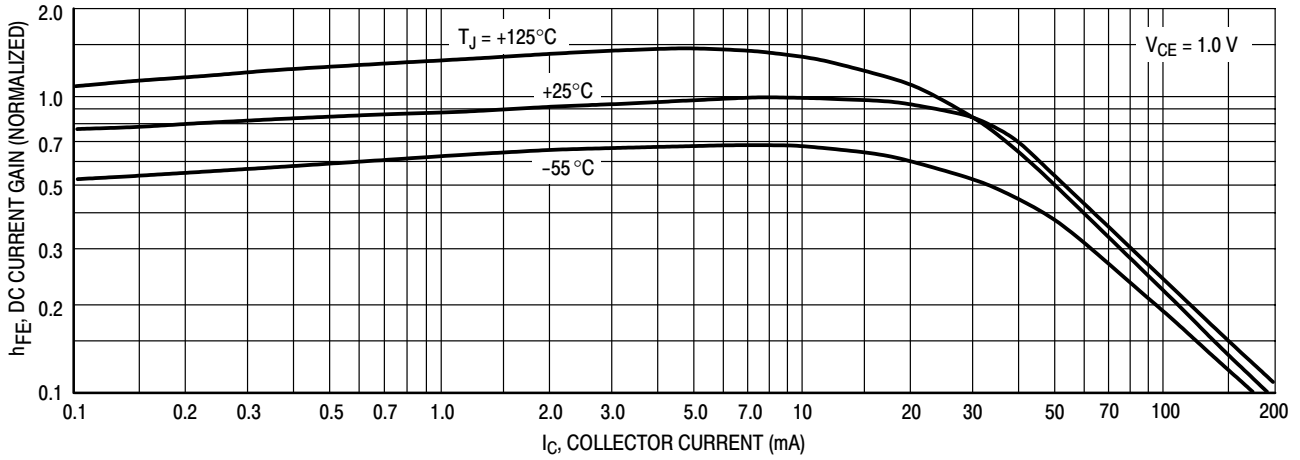


Figure 13. DC Current Gain

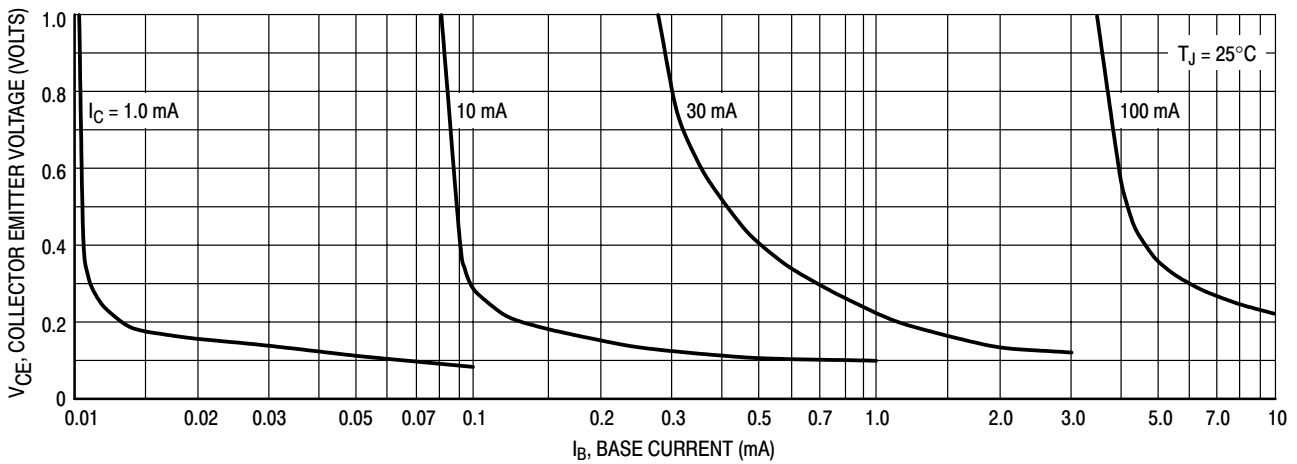


Figure 14. Collector Saturation Region

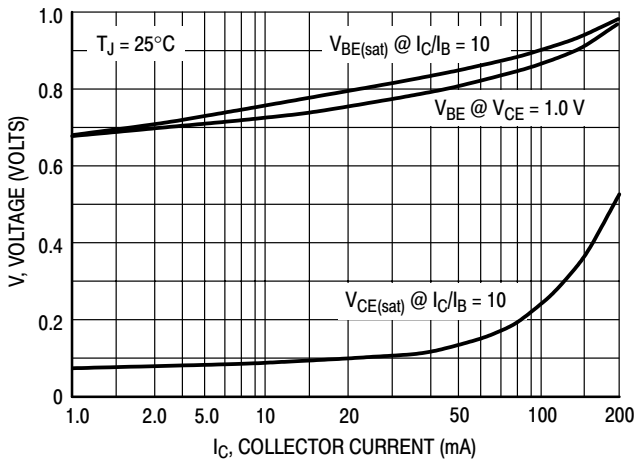


Figure 15. "ON" Voltages

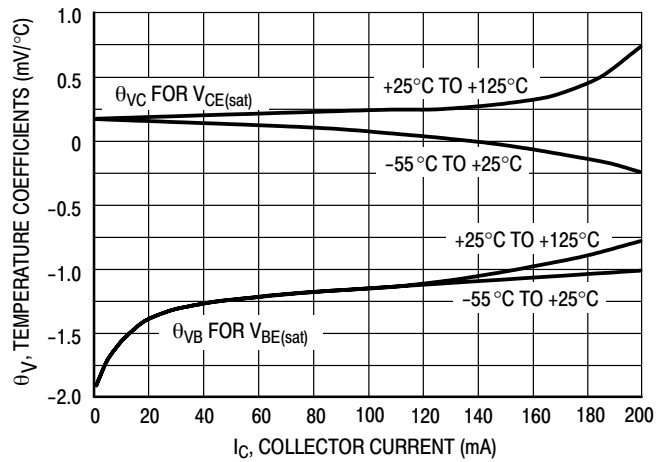
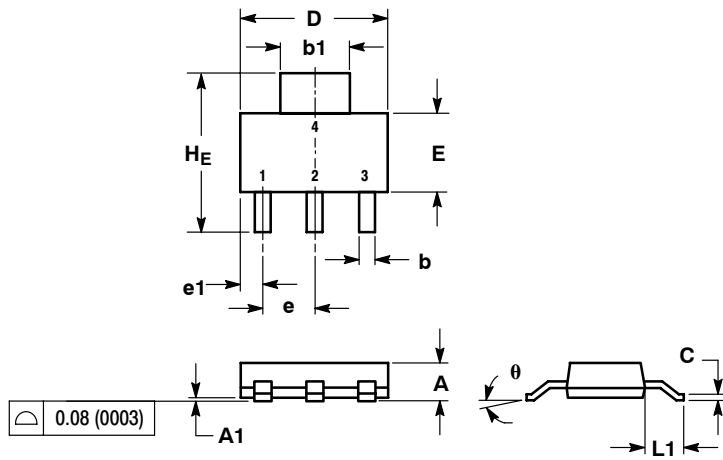


Figure 16. Temperature Coefficients

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PACKAGE DIMENSIONS

SOT-223 (TO-261)
CASE 318E-04
ISSUE L

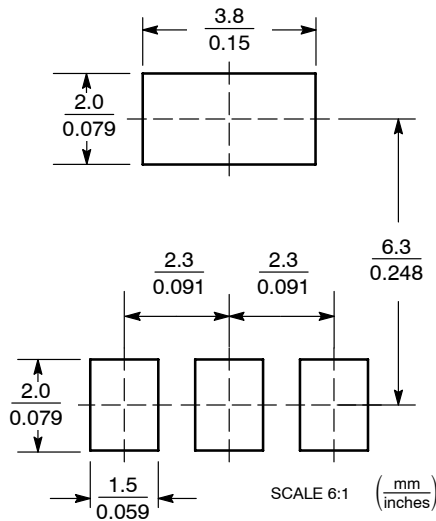


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1.50 | 1.63 | 1.75 | 0.060 | 0.064 | 0.068 |
| A1 | 0.02 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.60 | 0.75 | 0.89 | 0.024 | 0.030 | 0.035 |
| b1 | 2.90 | 3.06 | 3.20 | 0.115 | 0.121 | 0.126 |
| c | 0.24 | 0.29 | 0.35 | 0.009 | 0.012 | 0.014 |
| D | 6.30 | 6.50 | 6.70 | 0.249 | 0.256 | 0.263 |
| E | 3.30 | 3.50 | 3.70 | 0.130 | 0.138 | 0.145 |
| e | 2.20 | 2.30 | 2.40 | 0.087 | 0.091 | 0.094 |
| e1 | 0.85 | 0.94 | 1.05 | 0.033 | 0.037 | 0.041 |
| L1 | 1.50 | 1.75 | 2.00 | 0.060 | 0.069 | 0.078 |
| HE | 6.70 | 7.00 | 7.30 | 0.264 | 0.276 | 0.287 |
| θ | 0° | - | 10° | 0° | - | 10° |

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

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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