# General Purpose Transistor
## PNP Silicon

# PZT3906T1G

**Features**

- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

**ON Semiconductor®**

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### MAXIMUM RATINGS

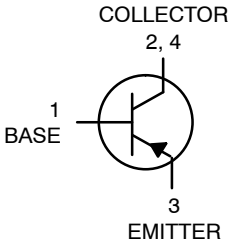
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector − Emitter Voltage | $V_{CEO}$ | −40 | Vdc |
| Collector − Base Voltage | $V_{CBO}$ | −40 | Vdc |
| Emitter − Base Voltage | $V_{EBO}$ | −5.0 | Vdc |
| Collector Current − Continuous | $I_C$ | −200 | mAdc |

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation (Note 1) $T_A$ = 25°C | $P_D$ | 1.5<br>12 | W<br>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 |

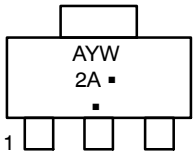
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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




**SOT−223**
**CASE 318E**

**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† |
|---|---|---|
| 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.

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 2) | | | | |
| Collector – Emitter Breakdown Voltage (Note 2)<br>($I_C$ = −1.0 mAdc, $I_B$ = 0) | $V_{(BR)CEO}$ | −40 | – | Vdc |
| Collector – Base Breakdown Voltage<br>($I_C$ = −10 μAdc, $I_E$ = 0) | $V_{(BR)CBO}$ | −40 | – | |
| Emitter – Base Breakdown Voltage<br>($I_E$ = −10 μAdc, $I_C$ = 0) | $V_{(BR)EBO}$ | −5.0 | – | |
| Base Cutoff Current<br>($V_{CE}$ = −30 Vdc, $V_{EB}$ = −3.0 Vdc) | $I_{BL}$ | – | −50 | nAdc |
| Collector Cutoff Current<br>($V_{CE}$ = −30 Vdc, $V_{EB}$ = −3.0 Vdc) | $I_{CEX}$ | – | −50 | |
| **ON CHARACTERISTICS** (Note 2) | | | | |
| DC Current Gain<br>($I_C$ = −0.1 mAdc, $V_{CE}$ = −1.0 Vdc)<br>($I_C$ = −1.0 mAdc, $V_{CE}$ = −1.0 Vdc)<br>($I_C$ = −10 mAdc, $V_{CE}$ = −1.0 Vdc)<br>($I_C$ = −50 mAdc, $V_{CE}$ = −1.0 Vdc)<br>($I_C$ = −100 mAdc, $V_{CE}$ = −1.0 Vdc) | $H_{FE}$ | <br>60<br>80<br>100<br>60<br>30 | <br>–<br>–<br>300<br>–<br>– | – |
| Collector – Emitter Saturation Voltage<br>($I_C$ = −10 mAdc, $I_B$ = −1.0 mAdc)<br>($I_C$ = −50 mAdc, $I_B$ = −5.0 mAdc) | $V_{CE(sat)}$ | <br>–<br>– | <br>−0.25<br>−0.4 | Vdc |
| Base – Emitter Saturation Voltage<br>($I_C$ = −10 mAdc, $I_B$ = −1.0 mAdc)<br>($I_C$ = −50 mAdc, $I_B$ = −5.0 mAdc) | $V_{BE(sat)}$ | <br>−0.65<br>– | <br>−0.85<br>−0.95 | |
| **SMALL– SIGNAL CHARACTERISTICS** | | | | |
| Current – Gain – Bandwidth Product<br>($I_C$ = −10 mAdc, $V_{CE}$ = −20 Vdc, f = 100 MHz) | $f_T$ | 250 | – | MHz |
| Output Capacitance<br>($V_{CB}$ = −5.0 Vdc, $I_E$ = 0, f = 1.0 MHz) | $C_{obo}$ | – | 4.5 | pF |
| Input Capacitance<br>($V_{EB}$ = −0.5 Vdc, $I_C$ = 0, f = 1.0 MHz) | $C_{ibo}$ | – | 10 | |
| Input Impedance<br>($I_C$ = −1.0 mAdc, $V_{CE}$ = −10 Vdc, f = 1.0 kHz) | $h_{ie}$ | 2.0 | 12 | kΩ |
| Voltage Feedback Ratio<br>($I_C$ = −1.0 mAdc, $V_{CE}$ = −10 Vdc, f = 1.0 kHz) | $h_{re}$ | 0.1 | 10 | X $10^{-4}$ |
| Small – Signal Current Gain<br>($I_C$ = −1.0 mAdc, $V_{CE}$ = −10 Vdc, f = 1.0 kHz) | $h_{fe}$ | 100 | 400 | – |
| Output Admittance<br>($I_C$ = −1.0 mAdc, $V_{CE}$ = −10 Vdc, f = 1.0 kHz) | $h_{oe}$ | 3.0 | 60 | μmhos |
| Noise Figure<br>($I_C$ = −100 μAdc, $V_{CE}$ = −5.0 Vdc, $R_S$ = 1.0 kΩ, f = 1.0 kHz) | NF | – | 4.0 | dB |
| **SWITCHING CHARACTERISTICS** | | | | |
| Delay Time<br>($V_{CC}$ = −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<br>($V_{CC}$ = −3.0 Vdc, $I_C$ = −10 mAdc, $I_{B1}$ = $I_{B2}$ = −1.0 mAdc) | $t_s$ | – | 225 | |
| Fall Time | $t_f$ | – | 75 | |

2. Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

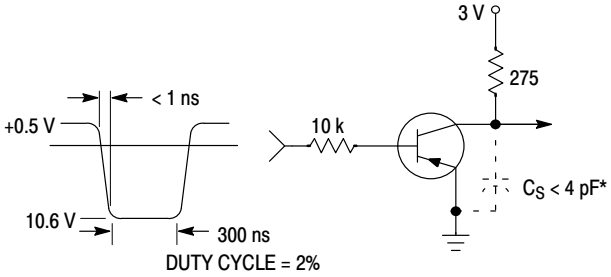



**Figure 1. Delay and Rise Time Equivalent Test Circuit**

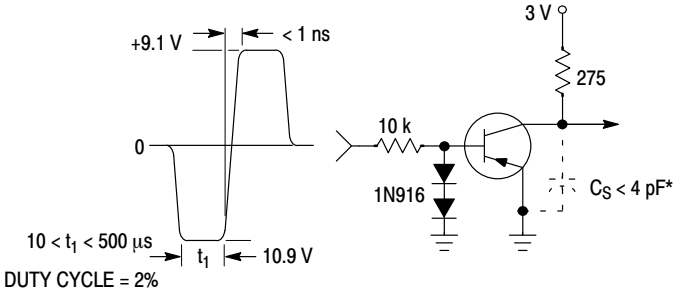



**Figure 2. Storage and Fall Time Equivalent Test Circuit**

* Total shunt capacitance of test jig and connectors

## TYPICAL TRANSIENT CHARACTERISTICS

$T_J = 25°C$
$T_J = 125°C$

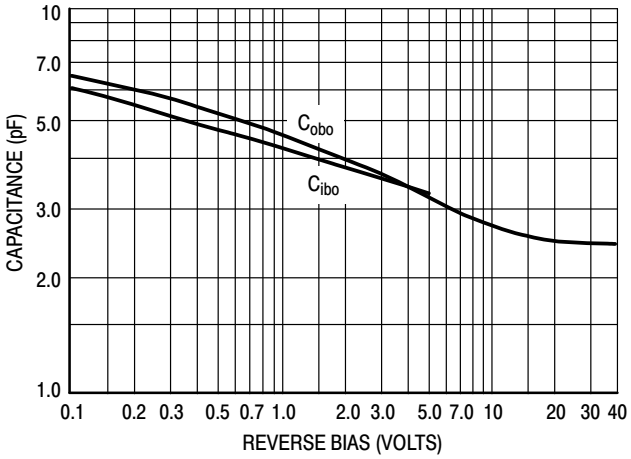



**Figure 3. Capacitance**

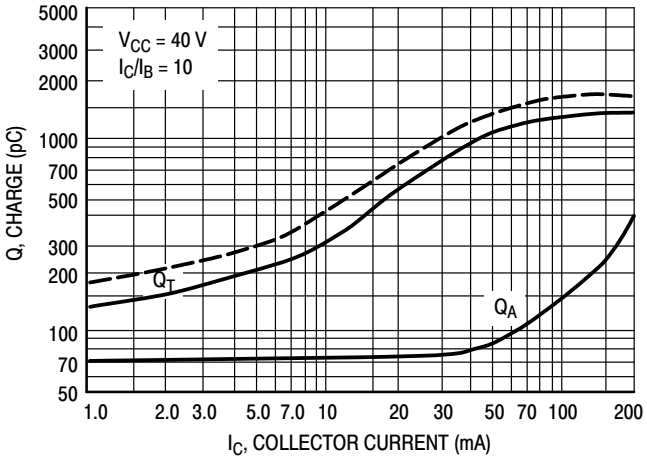



**Figure 4. Charge Data**

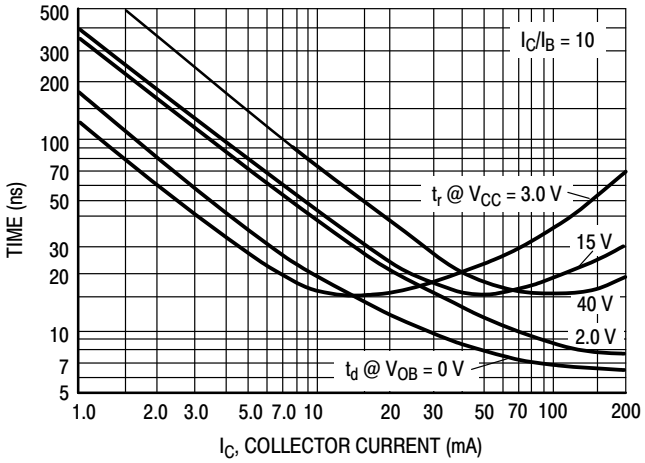



**Figure 5. Turn−On Time**

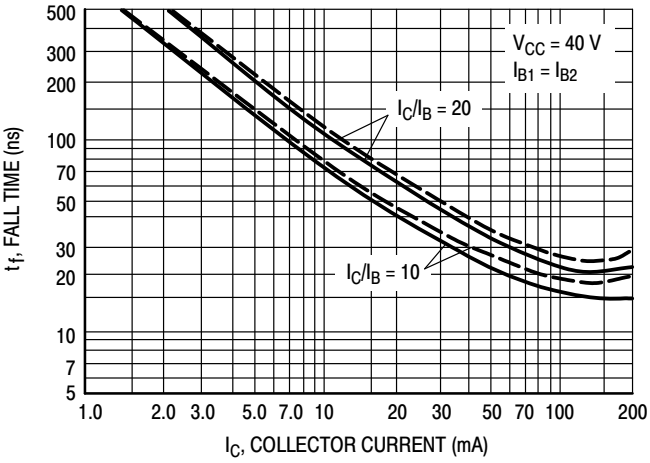



**Figure 6. Fall Time**

## TYPICAL AUDIO SMALL−SIGNAL CHARACTERISTICS
## NOISE FIGURE VARIATIONS

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

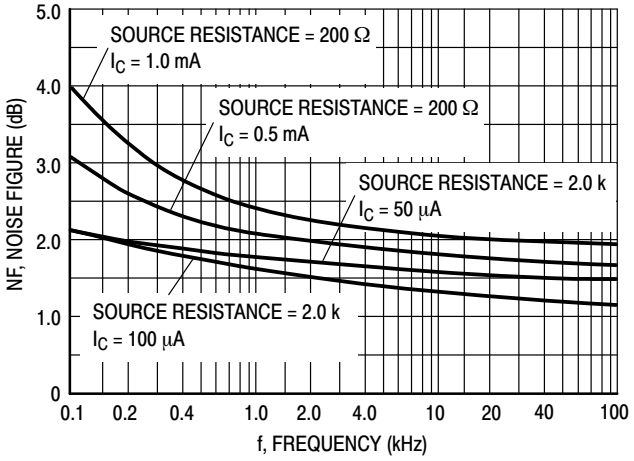



**Figure 7.**

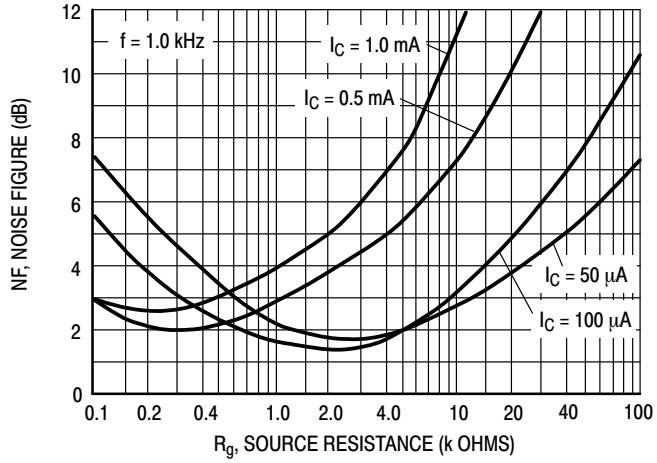



**Figure 8.**

## h PARAMETERS

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

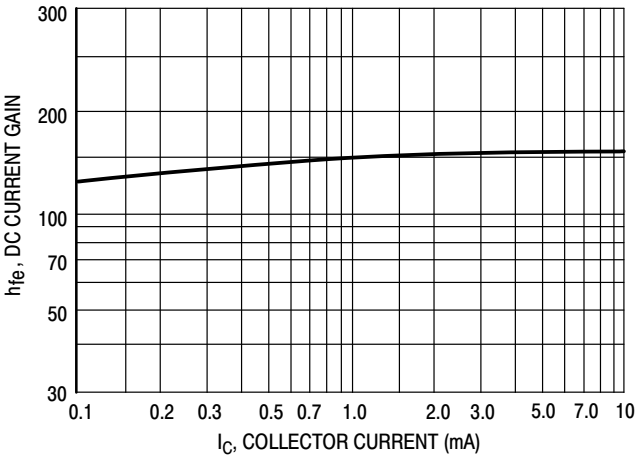



**Figure 9. Current Gain**

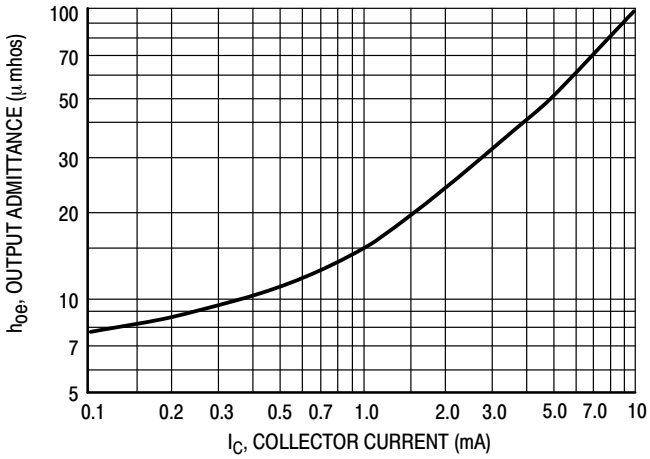



**Figure 10. Output Admittance**

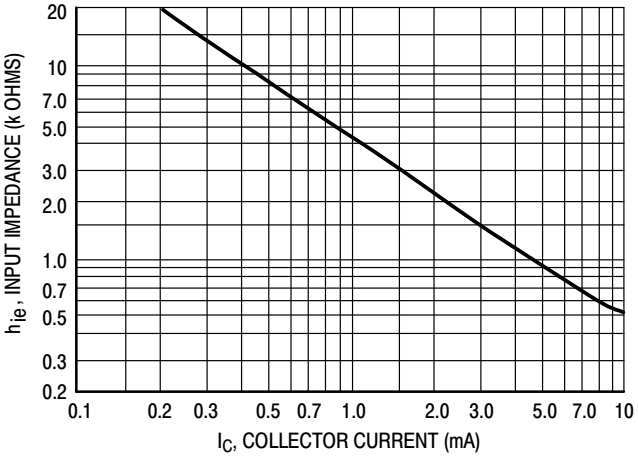



**Figure 11. Input Impedance**

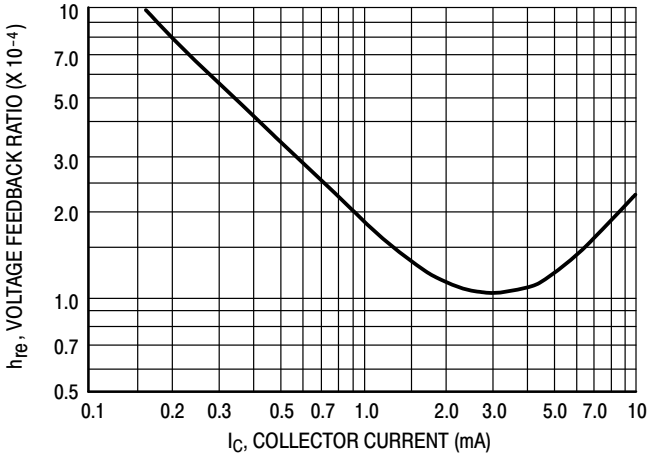



**Figure 12. Voltage Feedback Ratio**

## TYPICAL STATIC CHARACTERISTICS

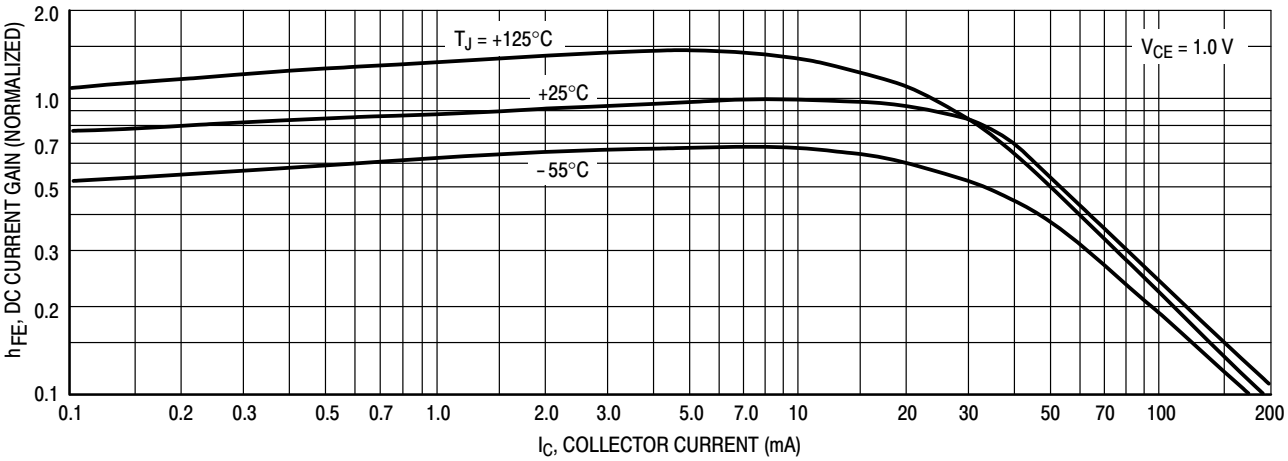



**Figure 13. DC Current Gain**

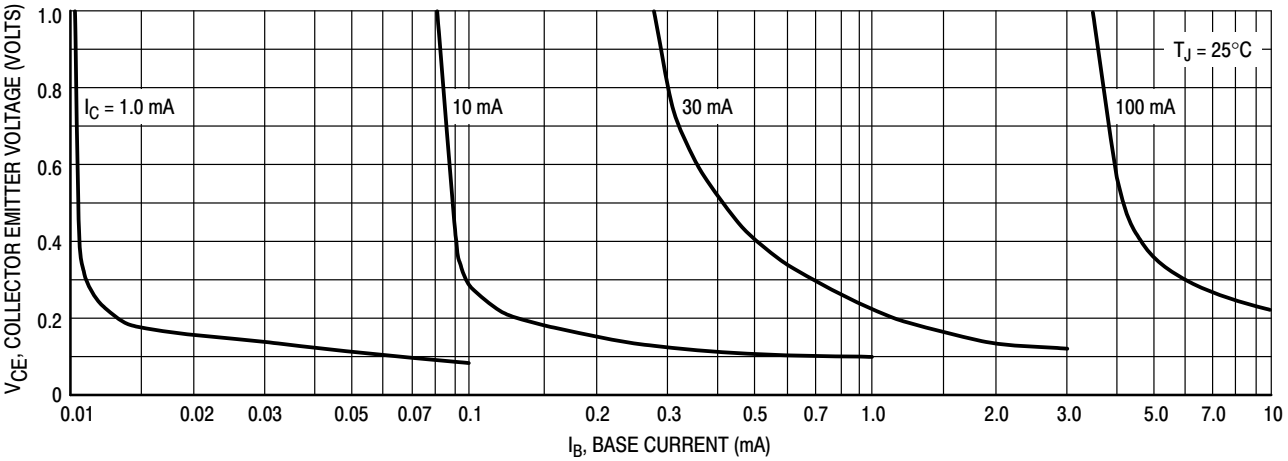



**Figure 14. Collector Saturation Region**

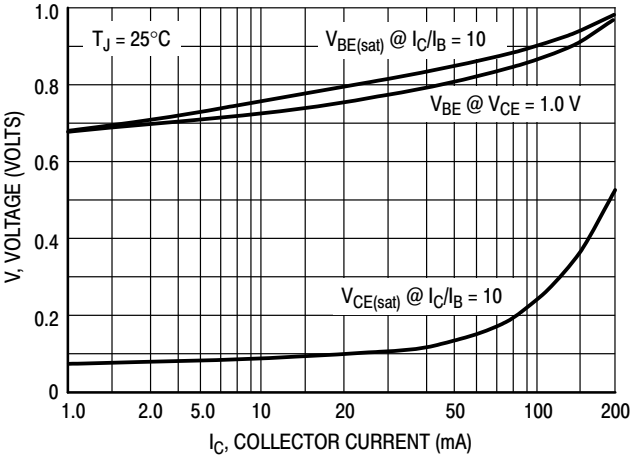



**Figure 15. “ON” Voltages**

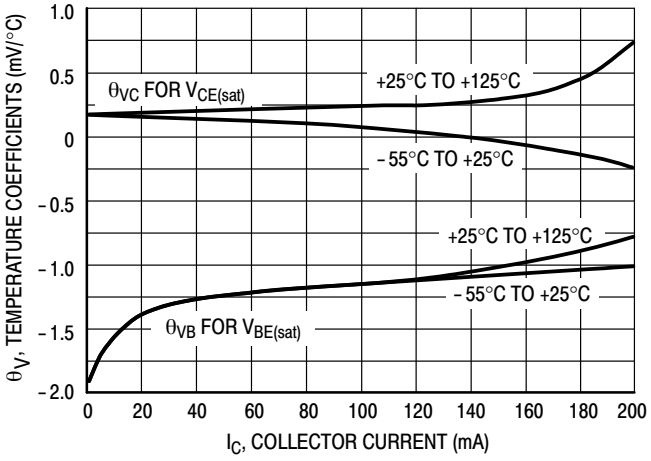



**Figure 16. Temperature Coefficients**

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