

# General Purpose Transistor

## PNP Silicon

### PZT3906T1G

#### Features

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

#### 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/°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

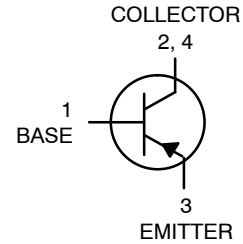
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 with 1 oz and 713 mm<sup>2</sup> of copper area.



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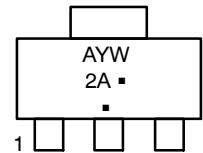
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#### MARKING DIAGRAM



**SOT-223  
CASE 318E**



- 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.

# PZT3906T1G

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b> (Note 2)				
Collector – Emitter Breakdown Voltage (Note 2) (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-40	-	Vdc
Collector – Base Breakdown Voltage (I <sub>C</sub> = -10 μA <sub>dc</sub> , I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	-40	-	
Emitter – Base Breakdown Voltage (I <sub>E</sub> = -10 μA <sub>dc</sub> , I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	-5.0	-	
Base Cutoff Current (V <sub>CE</sub> = -30 Vdc, V <sub>EB</sub> = -3.0 Vdc)	I <sub>BL</sub>	-	-50	nA <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = -30 Vdc, V <sub>EB</sub> = -3.0 Vdc)	I <sub>CEX</sub>	-	-50	

## ON CHARACTERISTICS

 (Note 2)

DC Current Gain (I <sub>C</sub> = -0.1 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -10 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -50 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -100 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 Vdc)	H <sub>FE</sub>	60 80 100 60 30	- - 300 - -	-
Collector – Emitter Saturation Voltage (I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B</sub> = -1.0 mA <sub>dc</sub> ) (I <sub>C</sub> = -50 mA <sub>dc</sub> , I <sub>B</sub> = -5.0 mA <sub>dc</sub> )	V <sub>CE(sat)</sub>	- -	-0.25 -0.4	Vdc
Base – Emitter Saturation Voltage (I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B</sub> = -1.0 mA <sub>dc</sub> ) (I <sub>C</sub> = -50 mA <sub>dc</sub> , I <sub>B</sub> = -5.0 mA <sub>dc</sub> )	V <sub>BE(sat)</sub>	-0.65 -	-0.85 -0.95	

## SMALL-SIGNAL CHARACTERISTICS

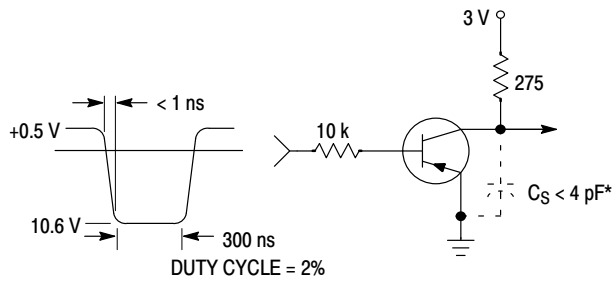
Current – Gain – Bandwidth Product (I <sub>C</sub> = -10 mA <sub>dc</sub> , V <sub>CE</sub> = -20 Vdc, f = 100 MHz)	f <sub>T</sub>	250	-	MHz
Output Capacitance (V <sub>CB</sub> = -5.0 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	-	4.5	pF
Input Capacitance (V <sub>EB</sub> = -0.5 Vdc, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ibo</sub>	-	10	
Input Impedance (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -10 Vdc, f = 1.0 kHz)	h <sub>ie</sub>	2.0	12	kΩ
Voltage Feedback Ratio (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -10 Vdc, f = 1.0 kHz)	h <sub>re</sub>	0.1	10	X 10 <sup>-4</sup>
Small – Signal Current Gain (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -10 Vdc, f = 1.0 kHz)	h <sub>fe</sub>	100	400	-
Output Admittance (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -10 Vdc, f = 1.0 kHz)	h <sub>oe</sub>	3.0	60	μmhos
Noise Figure (I <sub>C</sub> = -100 μA <sub>dc</sub> , V <sub>CE</sub> = -5.0 Vdc, R <sub>S</sub> = 1.0 kΩ, f = 1.0 kHz)	NF	-	4.0	dB

## SWITCHING CHARACTERISTICS

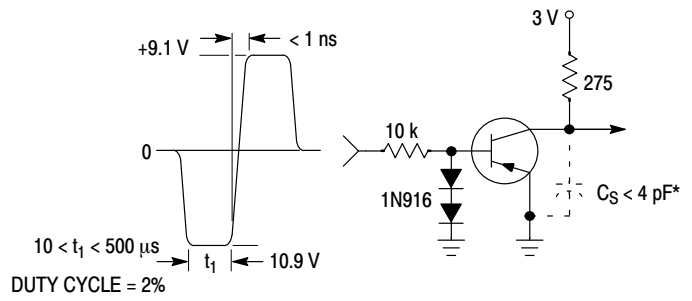
Delay Time	(V <sub>CC</sub> = -3.0 Vdc, V <sub>BE</sub> = 0.5 Vdc, I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B1</sub> = -1.0 mA <sub>dc</sub> )	t <sub>d</sub>	-	35	ns
Rise Time		t <sub>r</sub>	-	35	
Storage Time	(V <sub>CC</sub> = -3.0 Vdc, I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = -1.0 mA <sub>dc</sub> )	t <sub>s</sub>	-	225	
Fall Time		t <sub>f</sub>	-	75	

2. 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

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## TYPICAL TRANSIENT CHARACTERISTICS

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

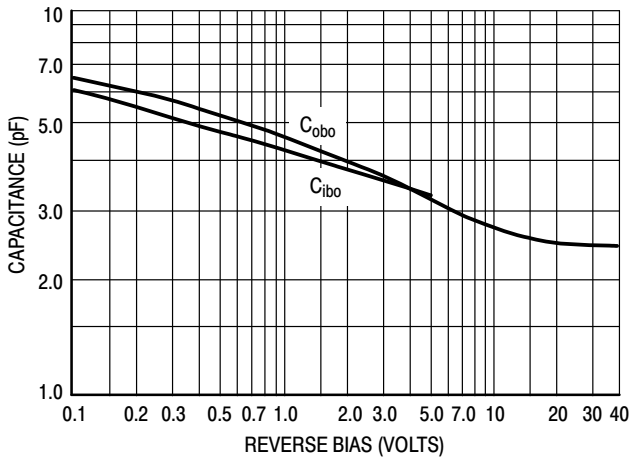


Figure 3. Capacitance

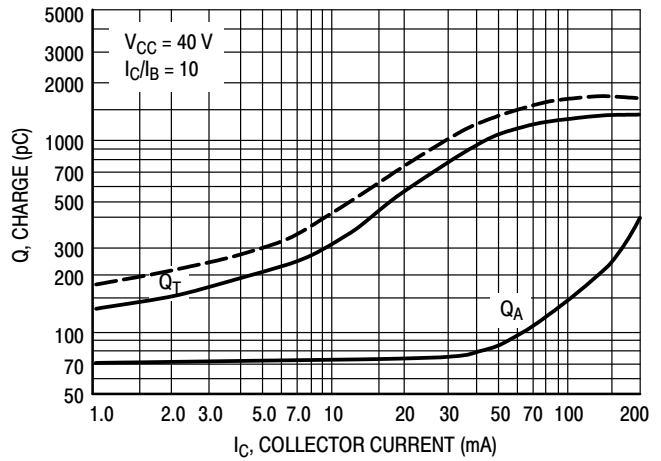


Figure 4. Charge Data

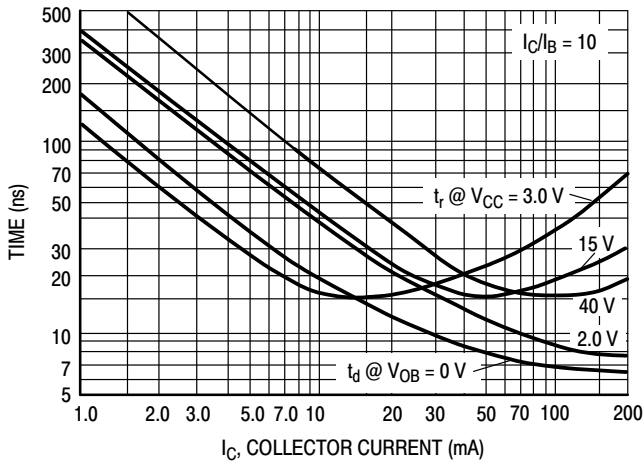


Figure 5. Turn-On Time

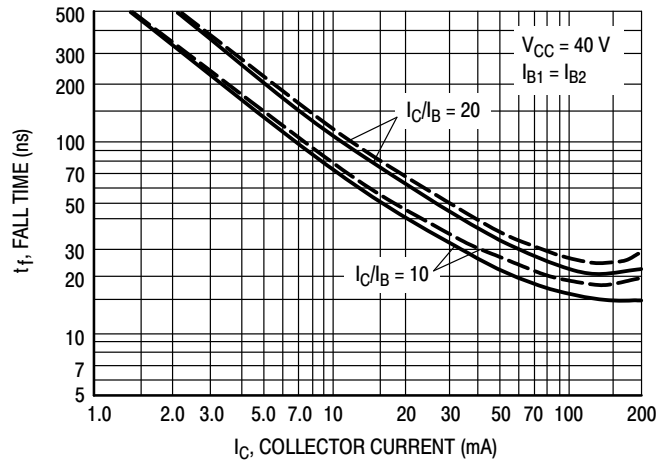


Figure 6. Fall Time

## TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

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

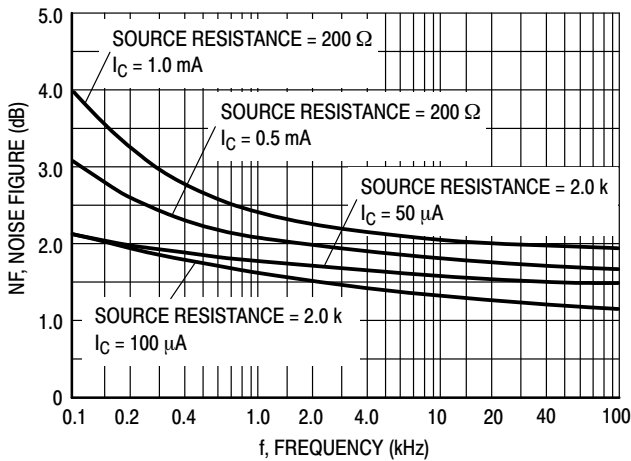


Figure 7.

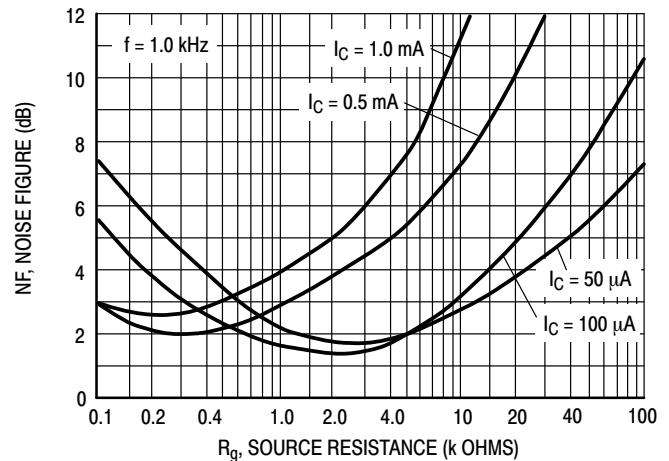


Figure 8.

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## h PARAMETERS

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

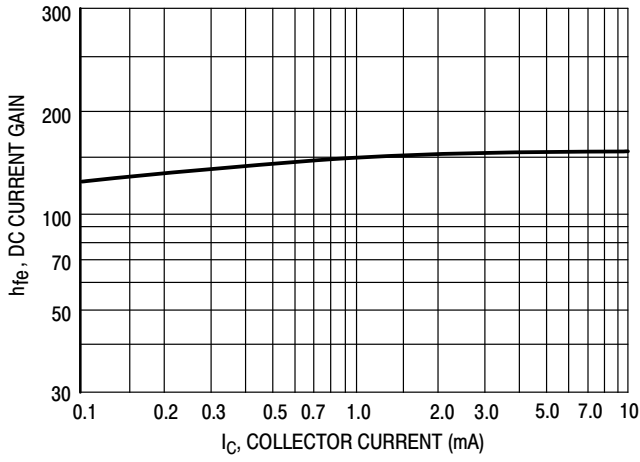


Figure 9. Current Gain

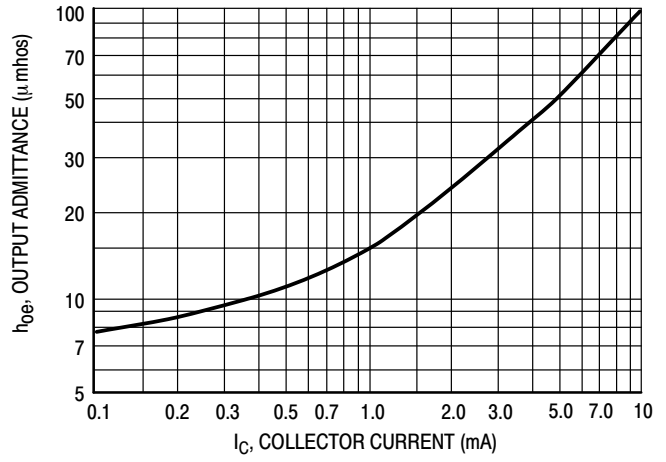


Figure 10. Output Admittance

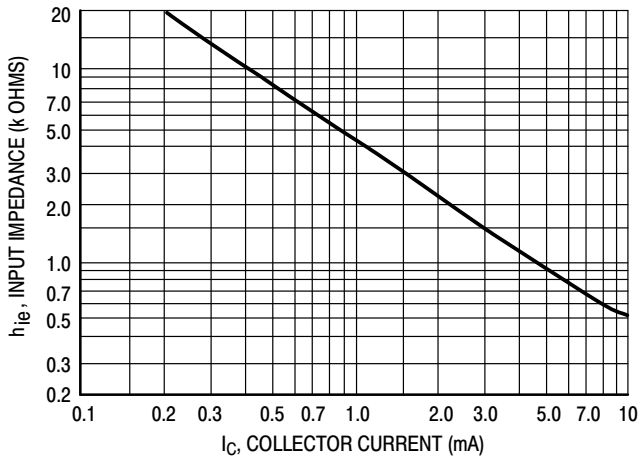


Figure 11. Input Impedance

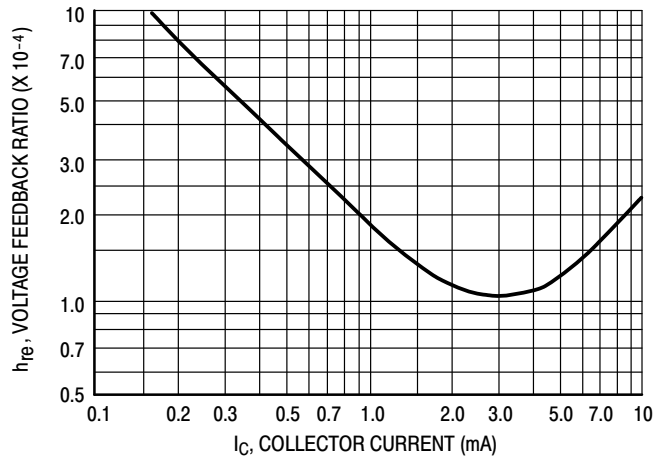


Figure 12. Voltage Feedback Ratio

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## TYPICAL STATIC CHARACTERISTICS

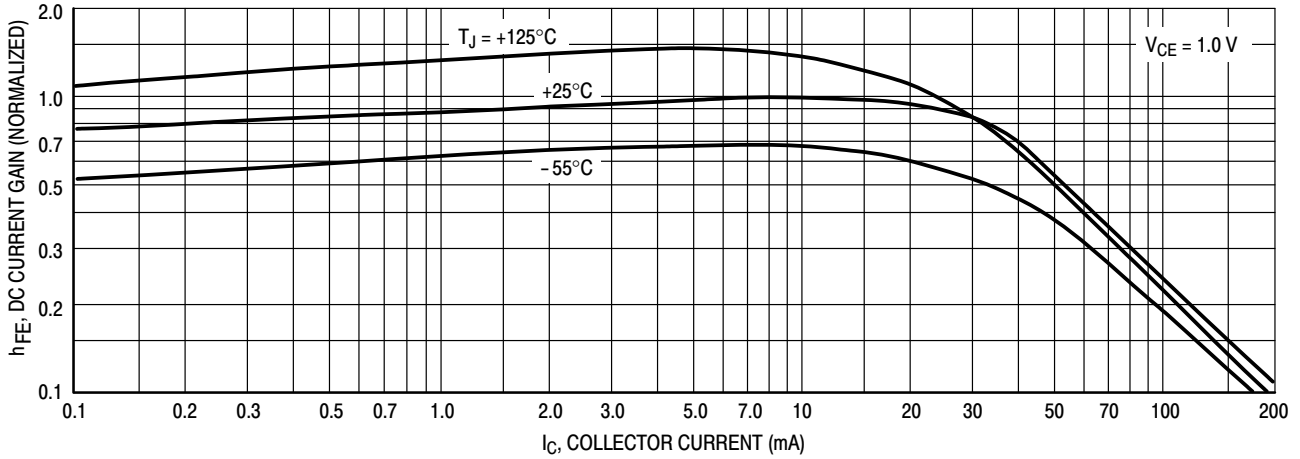


Figure 13. DC Current Gain

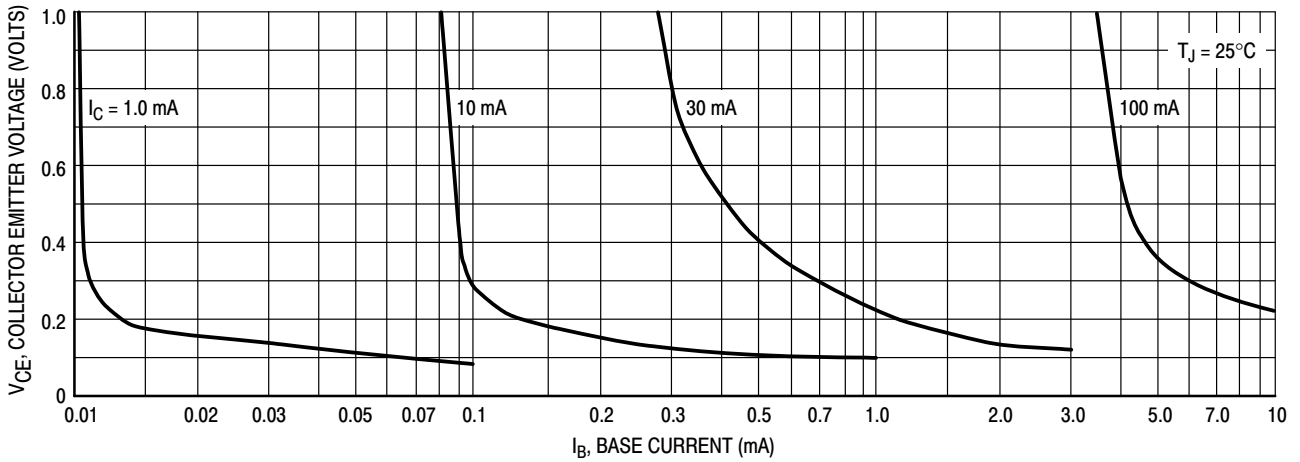


Figure 14. Collector Saturation Region

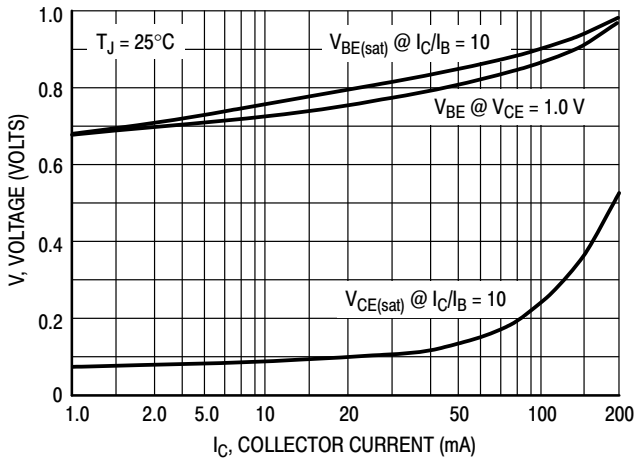


Figure 15. "ON" Voltages

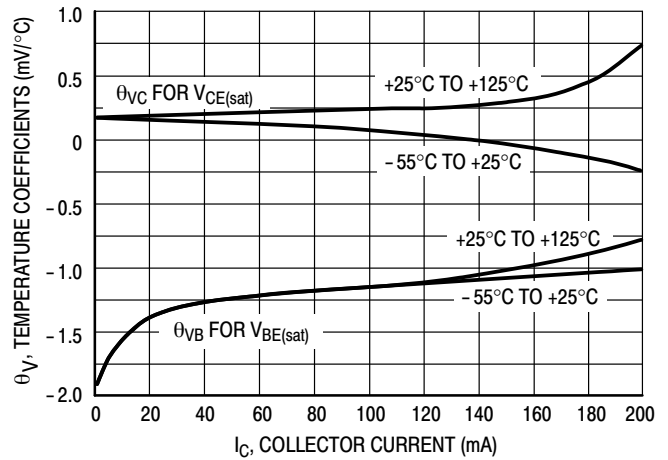


Figure 16. Temperature Coefficients

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