

# PZT651

## NPN Silicon Planar Epitaxial Transistor

This NPN Silicon Epitaxial transistor is designed for use in industrial and consumer applications. The device is housed in the SOT-223 package which is designed for medium power surface mount applications.

SOT-223 package ensures level mounting, resulting in improved thermal conduction, and allows visual inspection of soldered joints. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die.

### Features

- High Current
- The SOT-223 Package can be Soldered Using Wave or Reflow
- Available in 12 mm Tape and Reel
  - ♦ Use PZT651T1 to Order the 7 inch/1000 Unit Reel
  - ♦ Use PZT651T3 to Order the 13 inch/4000 Unit Reel
- PNP Complement is PZT751T1
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

### MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	60	Vdc
Collector-Base Voltage	$V_{CBO}$	80	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Collector Current	$I_C$	2.0	Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) Derate above $25^\circ\text{C}$	$P_D$	0.8 6.4	W mW/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to 150	$^\circ\text{C}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance from Junction-to-Ambient in Free Air	$R_{\theta JA}$	156	$^\circ\text{C}/\text{W}$
Maximum Temperature for Soldering Purposes Time in Solder Bath	$T_L$	260 10	$^\circ\text{C}$ Sec

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. Device mounted on a FR-4 glass epoxy printed circuit board using minimum recommended footprint.

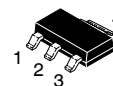
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



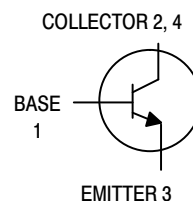
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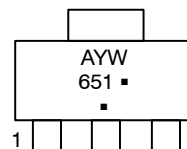
### SOT-223 PACKAGE HIGH CURRENT NPN SILICON TRANSISTOR SURFACE MOUNT



SOT-223  
CASE 318E-04  
STYLE 1



### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
PZT651T1G	SOT-223 (Pb-Free)	1,000 / Tape & Reel
SPZT651T1G	SOT-223 (Pb-Free)	1,000 / 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.

# PZT651

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

Characteristics	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	60	–	Vdc
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 100 µAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	80	–	Vdc
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 10 µAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	5.0	–	Vdc
Base–Emitter Cutoff Current (V <sub>EB</sub> = 4.0 Vdc)	I <sub>EBO</sub>	–	0.1	µAdc
Collector–Base Cutoff Current (V <sub>CB</sub> = 80 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	–	100	nAdc

### ON CHARACTERISTICS (Note 2)

DC Current Gain (I <sub>C</sub> = 50 mAdc, V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 2.0 Vdc) (I <sub>C</sub> = 2.0 Adc, V <sub>CE</sub> = 2.0 Vdc)	h <sub>FE</sub>	75 75 75 40	– – – –	–
Collector–Emitter Saturation Voltages (I <sub>C</sub> = 2.0 Adc, I <sub>B</sub> = 200 mAdc) (I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 100 mAdc)	V <sub>CE(sat)</sub>	– –	0.5 0.3	Vdc
Base–Emitter Voltages (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 2.0 Vdc)	V <sub>BE(on)</sub>	–	1.0	Vdc
Base–Emitter Saturation Voltage (I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 100 mAdc)	V <sub>BE(sat)</sub>	–	1.2	Vdc
Current–Gain — Bandwidth (I <sub>C</sub> = 50 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)	f <sub>T</sub>	75	–	MHz

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

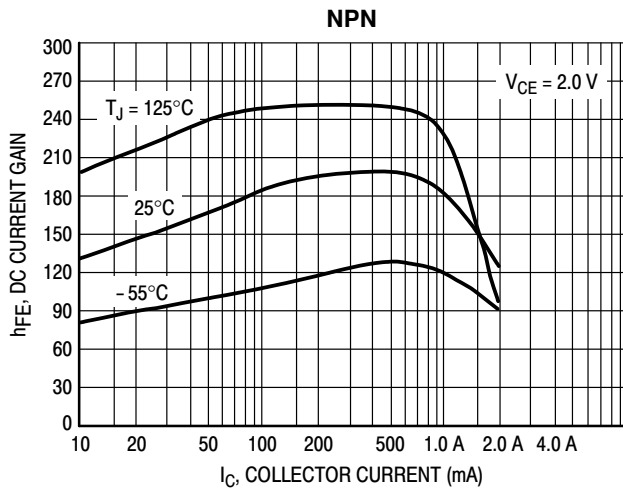


Figure 1. Typical DC Current Gain

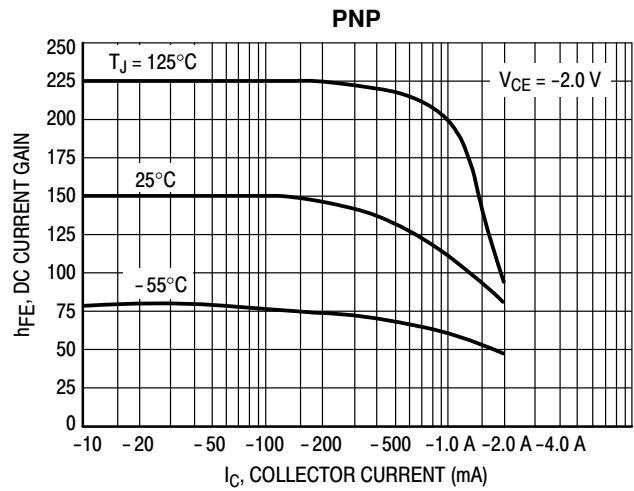


Figure 2. Typical DC Current Gain

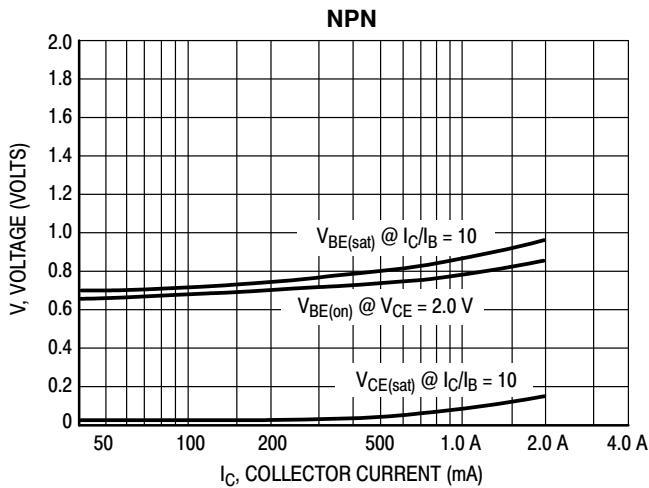


Figure 3. On Voltages

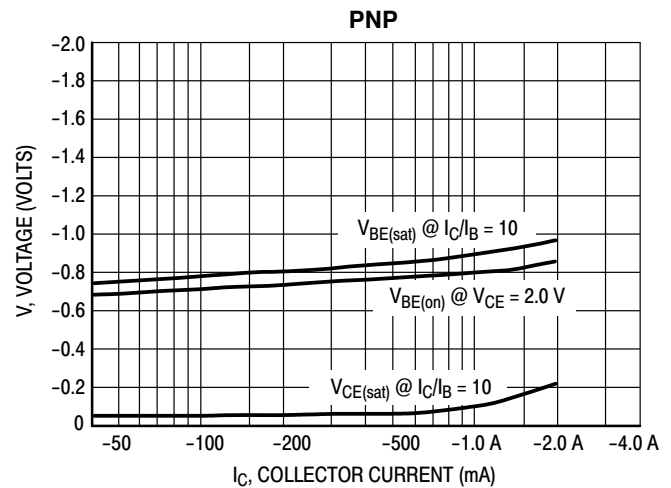


Figure 4. On Voltages

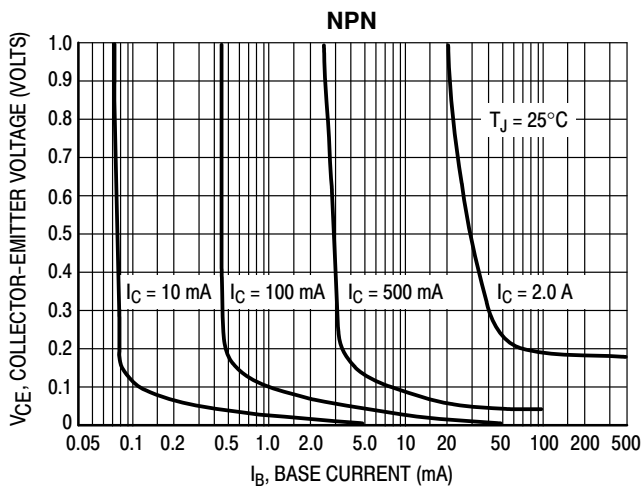


Figure 5. Collector Saturation Region

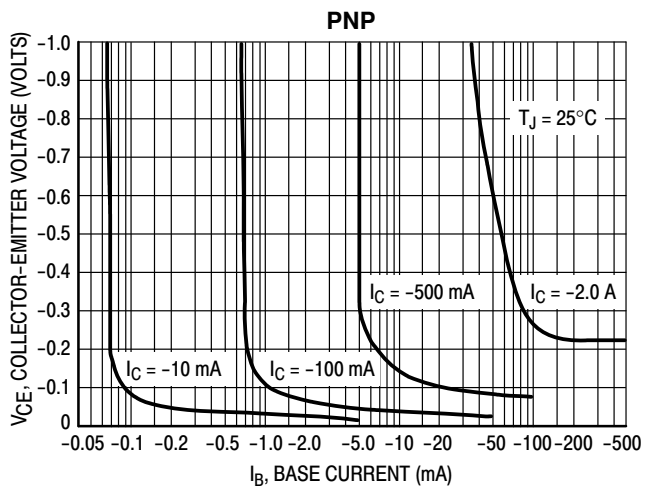
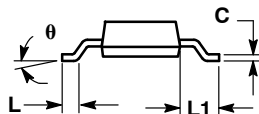
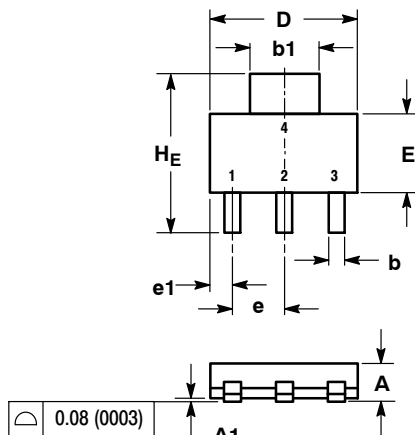


Figure 6. Collector Saturation Region

# PZT651

## PACKAGE DIMENSIONS

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



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

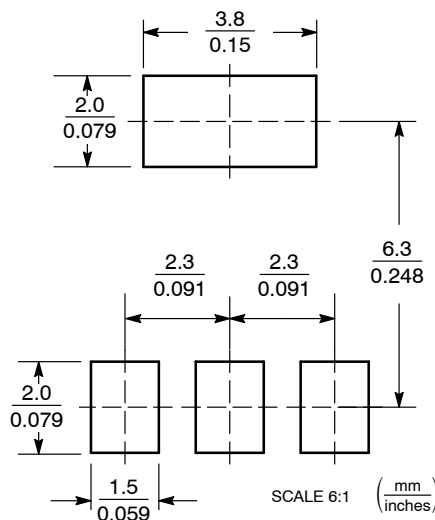
2. CONTROLLING DIMENSION: INCH

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
L	0.20	---	---	0.008	---	---
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
theta	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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