

# 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<br>@ $T_A = 25^\circ\text{C}$ (Note 1)<br>Derate above $25^\circ\text{C}$ | $P_D$     | 0.8<br>6.4 | W<br>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<br>Time in Solder Bath | $T_L$           | 260<br>10 | $^\circ\text{C}$<br>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.

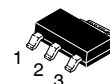
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



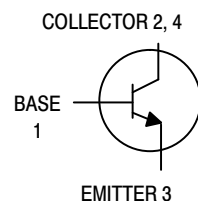
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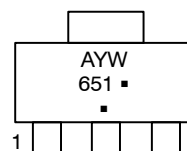
### SOT-223 PACKAGE HIGH CURRENT NPN SILICON TRANSISTOR SURFACE MOUNT



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

| Characteristics  | Symbol        | Min                  | Max              | Unit          |
|--|---------------|----------------------|------------------|---------------|
| <b>OFF CHARACTERISTICS</b>   |               |                      |                  |               |
| Collector–Emitter Breakdown Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 0$ )  | $V_{(BR)CEO}$ | 60                   | –                | Vdc           |
| Collector–Emitter Breakdown Voltage<br>( $I_C = 100\ \mu\text{A}$ , $I_E = 0$ )  | $V_{(BR)CBO}$ | 80                   | –                | Vdc           |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\ \mu\text{A}$ , $I_C = 0$ )  | $V_{(BR)EBO}$ | 5.0                  | –                | Vdc           |
| Base–Emitter Cutoff Current<br>( $V_{EB} = 4.0\text{ Vdc}$ )   | $I_{EBO}$     | –                    | 0.1              | $\mu\text{A}$ |
| Collector–Base Cutoff Current<br>( $V_{CB} = 80\text{ Vdc}$ , $I_E = 0$ )  | $I_{CBO}$     | –                    | 100              | nA            |
| <b>ON CHARACTERISTICS (Note 2)</b>   |               |                      |                  |               |
| DC Current Gain<br>( $I_C = 50\text{ mA}$ , $V_{CE} = 2.0\text{ Vdc}$ )<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ Vdc}$ )<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ Vdc}$ )<br>( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ Vdc}$ ) | $h_{FE}$      | 75<br>75<br>75<br>40 | –<br>–<br>–<br>– | –             |
| Collector–Emitter Saturation Voltages<br>( $I_C = 2.0\text{ A}$ , $I_B = 200\text{ mA}$ )<br>( $I_C = 1.0\text{ A}$ , $I_B = 100\text{ mA}$ )  | $V_{CE(sat)}$ | –<br>–               | 0.5<br>0.3       | Vdc           |
| Base–Emitter Voltages<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ Vdc}$ )  | $V_{BE(on)}$  | –                    | 1.0              | Vdc           |
| Base–Emitter Saturation Voltage<br>( $I_C = 1.0\text{ A}$ , $I_B = 100\text{ mA}$ )  | $V_{BE(sat)}$ | –                    | 1.2              | Vdc           |
| Current–Gain — Bandwidth<br>( $I_C = 50\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )  | $f_T$         | 75                   | –                | MHz           |

2. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle = 2.0%

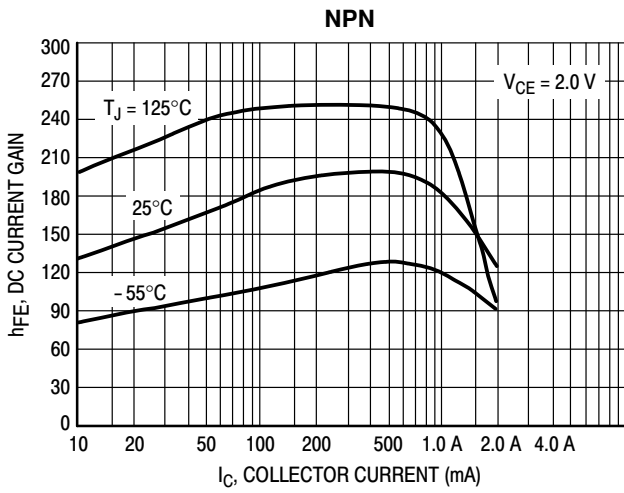


Figure 1. Typical DC Current Gain

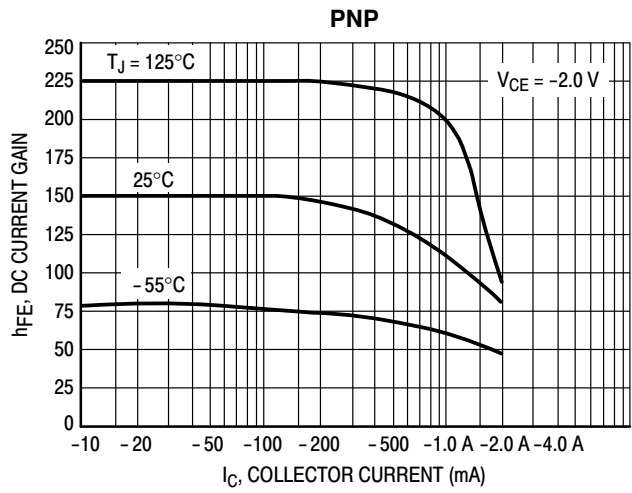


Figure 2. Typical DC Current Gain

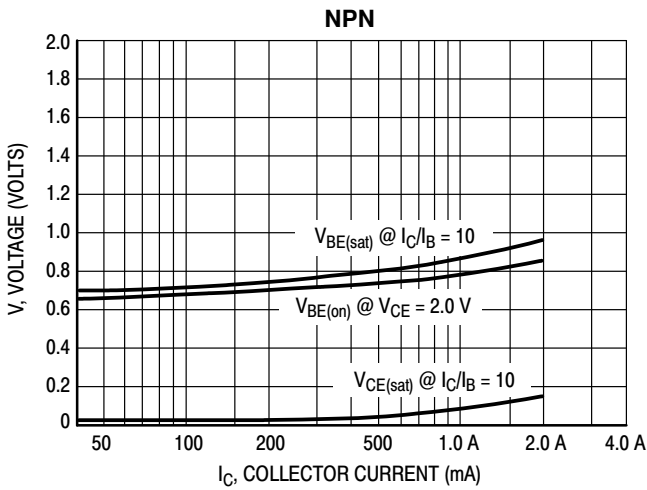


Figure 3. On Voltages

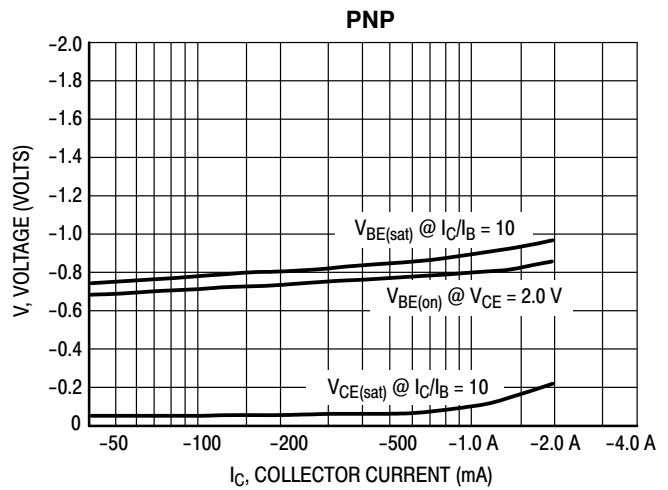


Figure 4. On Voltages

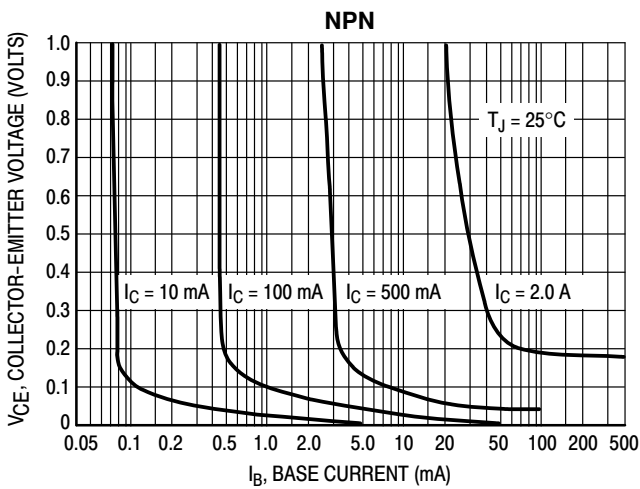


Figure 5. Collector Saturation Region

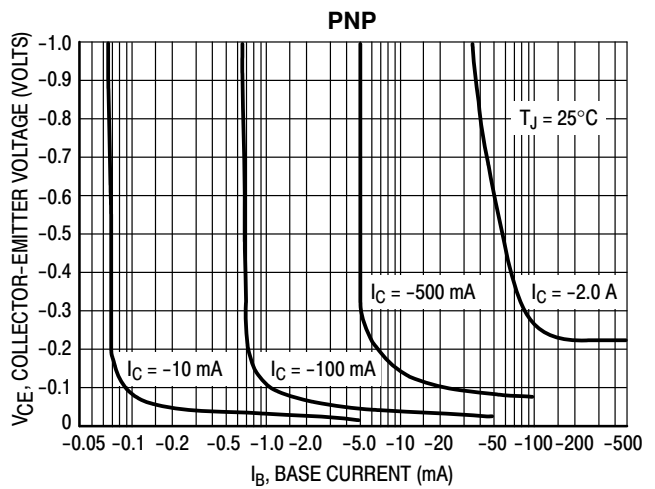
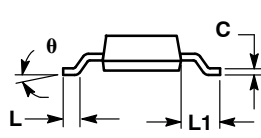
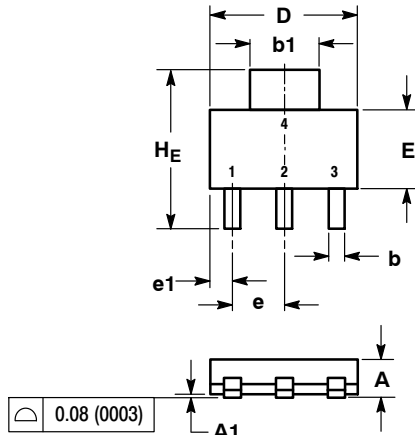


Figure 6. Collector Saturation Region

# PZT651

## PACKAGE DIMENSIONS

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



NOTES:

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

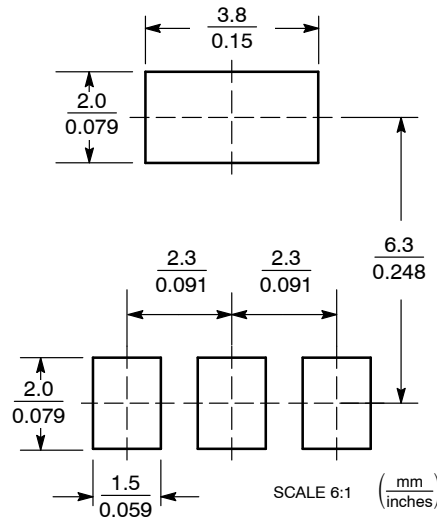
2. CONTROLLING DIMENSION: INCH

| 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 |
| 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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