

# 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
- PNP Complement is PZT751T1G
- 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/°C
Storage Temperature Range	$T_{stg}$	-65 to 150	°C
Junction Temperature	$T_J$	150	°C

### THERMAL CHARACTERISTICS

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

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.

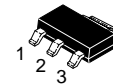
1. Device mounted on a FR-4 glass epoxy printed circuit board using minimum recommended footprint.



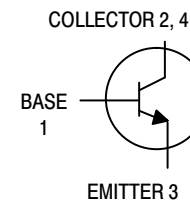
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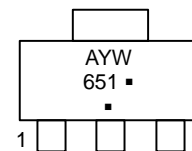
### SOT-223 PACKAGE HIGH CURRENT NPN SILICON TRANSISTOR SURFACE MOUNT



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.

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

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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

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## TYPICAL CHARACTERISTICS

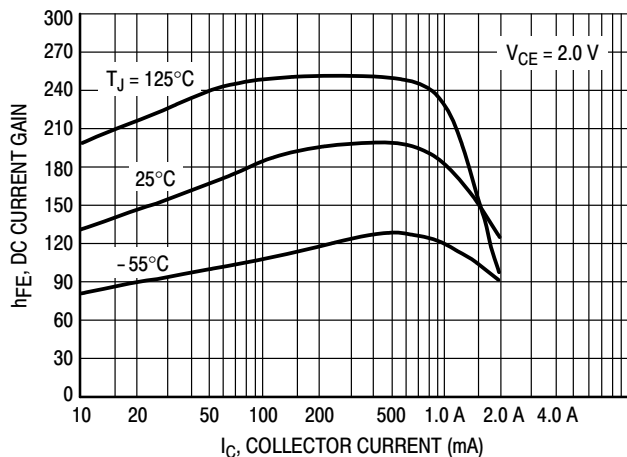


Figure 1. Typical DC Current Gain

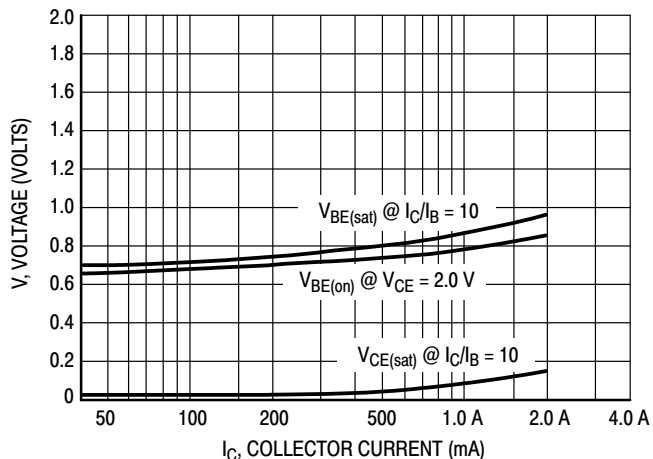


Figure 2. On Voltages

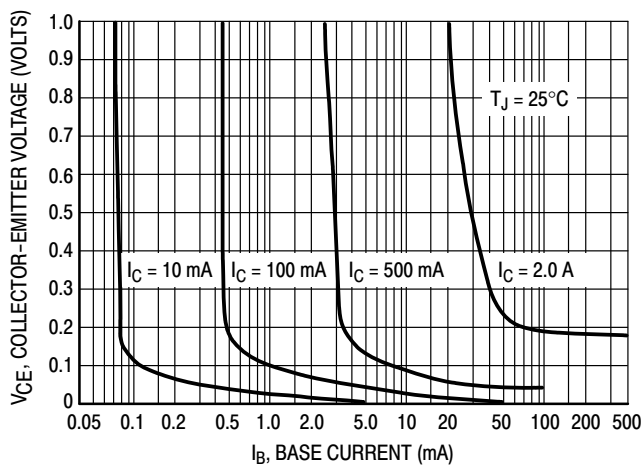
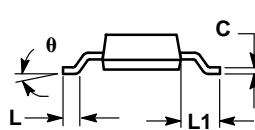
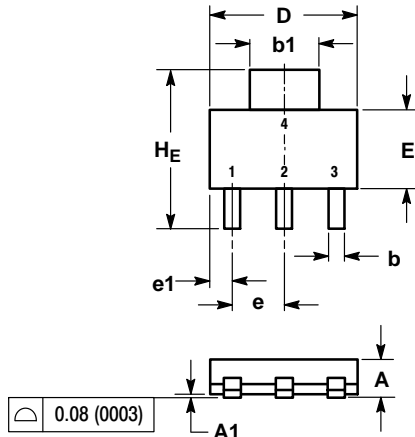


Figure 3. Collector Saturation Region

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## PACKAGE DIMENSIONS

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



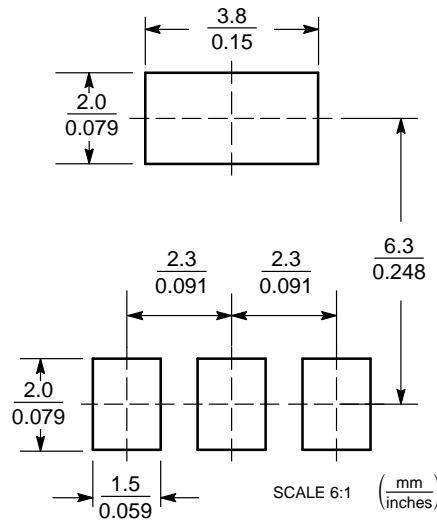
- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.  
2. CONTROLLING DIMENSION: INCH

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	---	---	---	---	---	---

STYLE 1:

- PIN 1: BASE 10°  
 PIN 2: COLLECTOR 0°  
 PIN 3: EMITTER  
 PIN 4: COLLECTOR 10°

### 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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