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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





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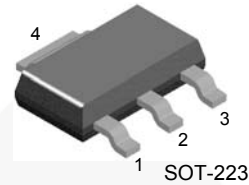
November 2014

# NZT651

## NPN Current Driver Transistor

### Description

This device is designed for power amplifier, regulator and switching circuits where speed is important. Sourced from process 4P.



1. Base 2,4. Collector 3. Emitter

### Ordering Information

| Part Number | Marking | Package    | Packing Method |
|-------------|---------|------------|----------------|
| NZT651      | 651     | SOT-223 4L | Tape and Reel  |

### Absolute Maximum Ratings<sup>(1),(2)</sup>

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol         | Parameter  | Value       | Unit             |
|----------------|--|-------------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 60          | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 80          | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5.0         | V                |
| $I_C$          | Collector Current - Continuous                   | 4.0         | A                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |

#### Notes:

1. These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

### Thermal Characteristics<sup>(3)</sup>

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol          | Parameter                               | Max. | Unit                      |
|-----------------|---|------|---------------------------|
| $P_D$           | Total Power Dissipation                 | 1.2  | W                         |
|                 | Derate Above $25^\circ\text{C}$         | 9.7  | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 103  | $^\circ\text{C}/\text{W}$ |

**Note:**

3. Device is mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead minimum 6 cm<sup>2</sup>.

### Electrical Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol        | Parameter   | Conditions  | Min. | Max. | Unit          |
|---------------|---|---|------|------|---------------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage                 | $I_C = 10\text{ mA}, I_B = 0$                                   | 60   |      | V             |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage                    | $I_C = 100\ \mu\text{A}, I_E = 0$                               | 80   |      | V             |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage                      | $I_E = 100\ \mu\text{A}, I_C = 0$                               | 5.0  |      | V             |
| $I_{CBO}$     | Collector Cut-Off Current                           | $V_{CB} = 80\text{ V}, I_E = 0$                                 |      | 100  | nA            |
| $I_{EBO}$     | Emitter Cut-Off Current                             | $V_{EB} = 4.0\text{ V}, I_C = 0$                                |      | 0.1  | $\mu\text{A}$ |
| $h_{FE}$      | DC Current Gain <sup>(4)</sup>                      | $I_C = 50\text{ mA}, V_{CE} = 2.0\text{ V}$                     | 75   |      |               |
|               |   | $I_C = 500\text{ mA}, V_{CE} = 2.0\text{ V}$                    | 75   |      |               |
|               |   | $I_C = 1.0\text{ A}, V_{CE} = 2.0\text{ V}$                     | 75   |      |               |
|               |   | $I_C = 2.0\text{ A}, V_{CE} = 2.0\text{ V}$                     | 40   |      |               |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage <sup>(4)</sup> | $I_C = 1.0\text{ A}, I_B = 100\text{ mA}$                       |      | 0.3  | V             |
|               |   | $I_C = 2.0\text{ A}, I_B = 200\text{ mA}$                       |      | 0.5  |               |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage <sup>(4)</sup>      | $I_C = 1.0\text{ A}, I_B = 100\text{ mA}$                       |      | 1.2  | V             |
| $V_{BE(on)}$  | Base-Emitter On Voltage <sup>(4)</sup>              | $I_C = 1.0\text{ A}, V_{CE} = 2.0\text{ V}$                     |      | 1.0  | V             |
| $f_T$         | Current Gain - Bandwidth Product                    | $I_C = 50\text{ mA}, V_{CE} = 5.0\text{ V}, f = 100\text{ MHz}$ | 75   |      | MHz           |

**Note:**

4. Pulse test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2.0\%$

## Typical Performance Characteristics

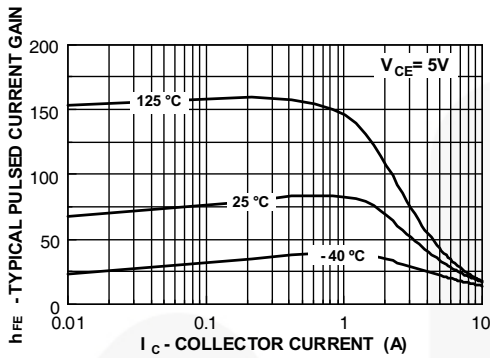


Figure 1. Typical Pulsed Current Gain vs. Collector Current

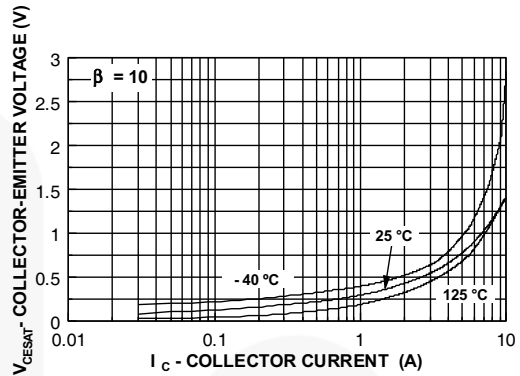


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

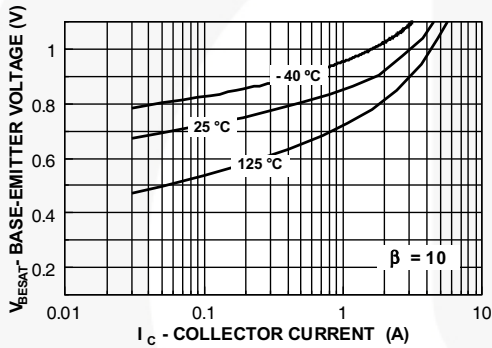


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

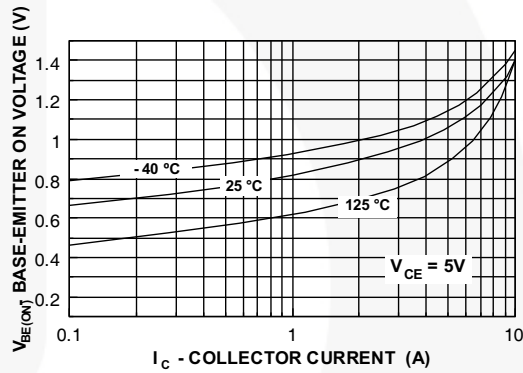


Figure 4. Base-Emitter On Voltage vs. Collector Current

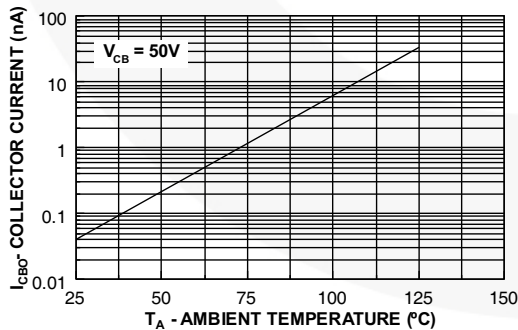


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

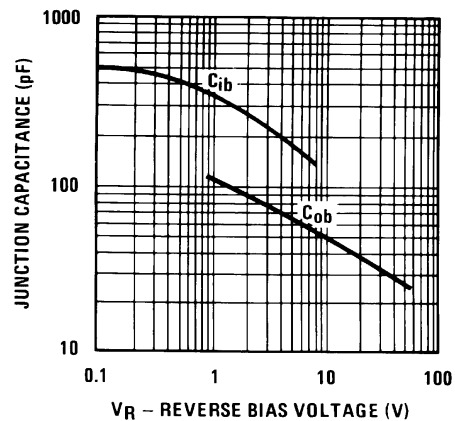


Figure 6. Junction Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

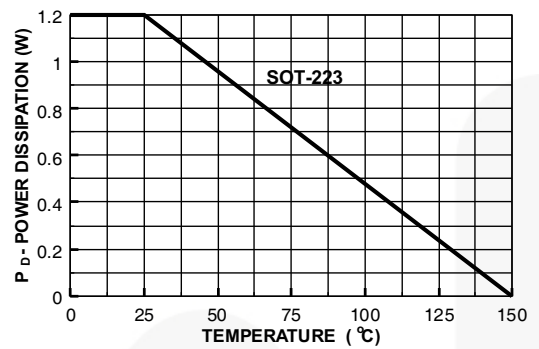
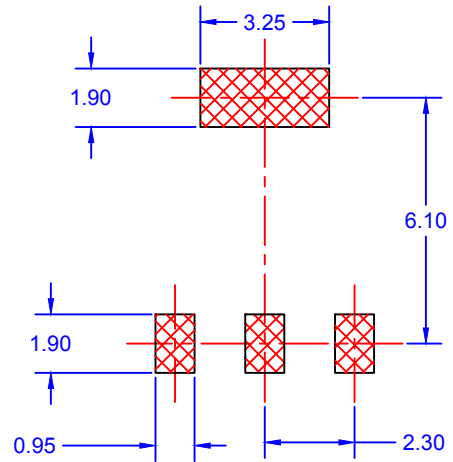
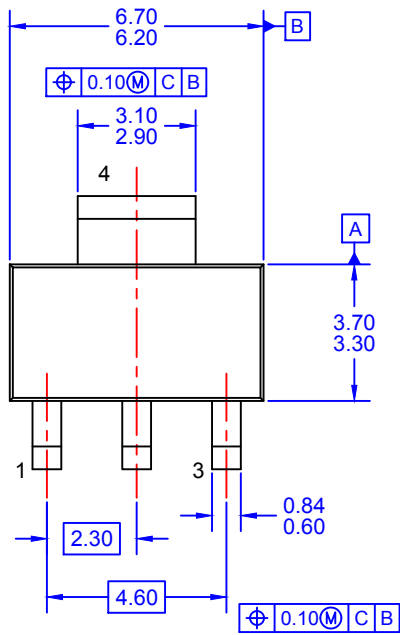
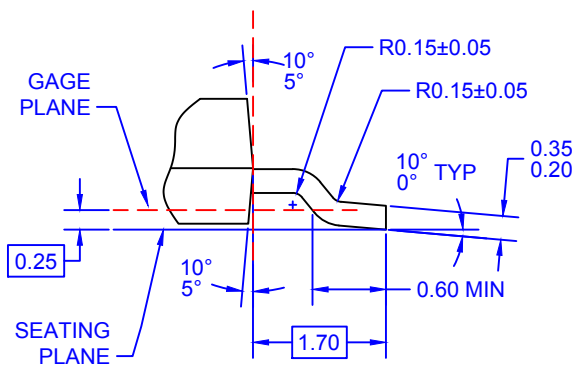
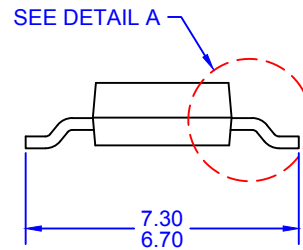
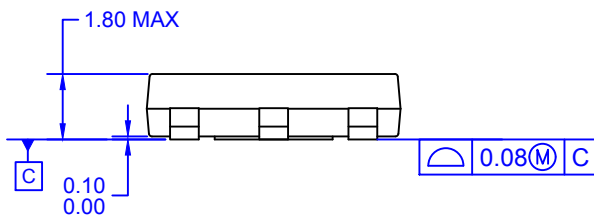


Figure 7. Power Dissipation vs. Ambient Temperature





LAND PATTERN RECOMMENDATION



DETAIL A  
SCALE: 2:1

- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) DRAWING BASED ON JEDEC REGISTRATION TO-261C, VARIATION AA.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.  
 D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.  
 E) LANDPATTERN NAME: SOT230P700X180-4BN  
 F) DRAWING FILENAME: MKT-MA04AREV3



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