



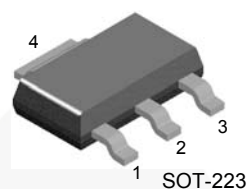
November 2014

# 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  | $^\circ\text{C/W}$   |

**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                    | $I_C = 100\text{ }\mu\text{A}, I_E = 0$                         | 80   |      | V             |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage                      | $I_E = 100\text{ }\mu\text{A}, I_C = 0$                         | 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  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2.0\%$

## Typical Performance Characteristics

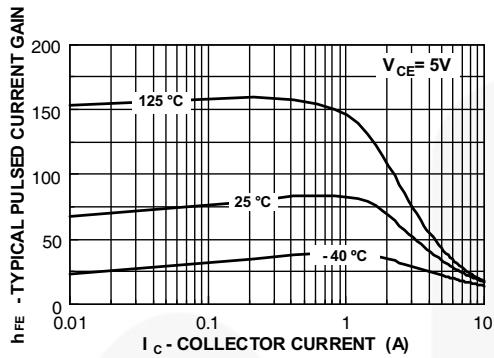


Figure 1. Typical Pulsed Current Gain vs. Collector Current

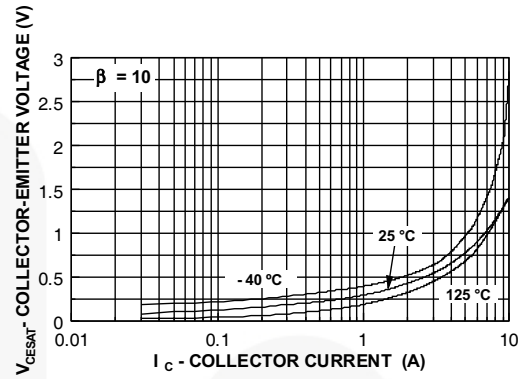


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

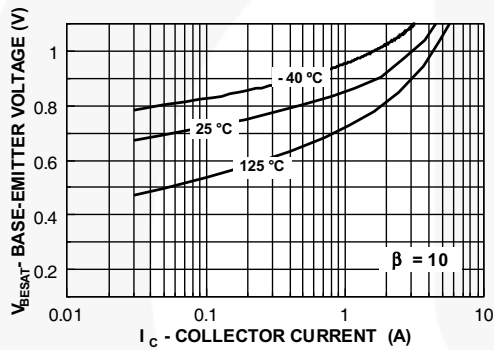


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

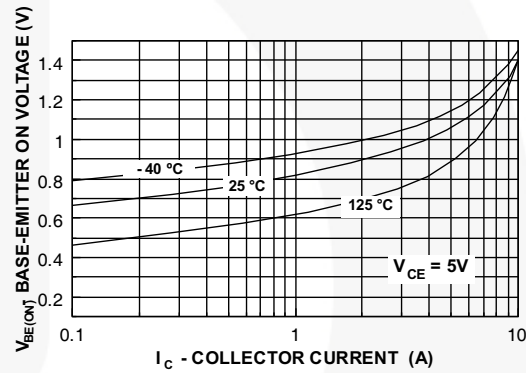


Figure 4. Base-Emitter On Voltage vs. Collector Current

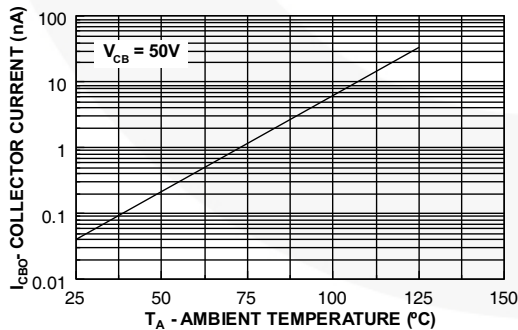


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

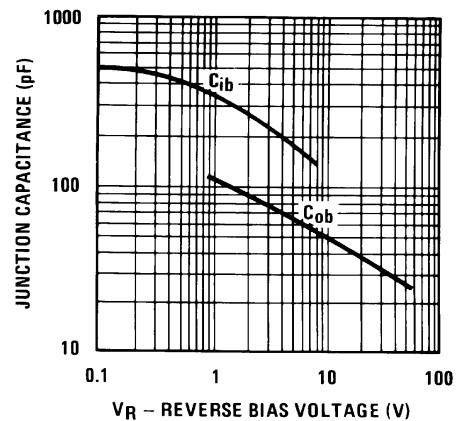


Figure 6. Junction Capacitance vs. Reverse Bias Voltage

## Typical Performance Characteristics (Continued)

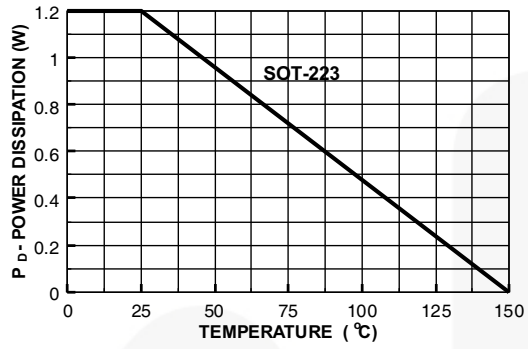
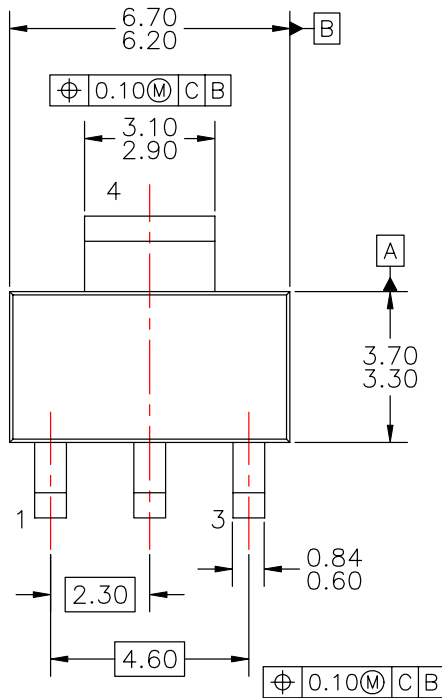


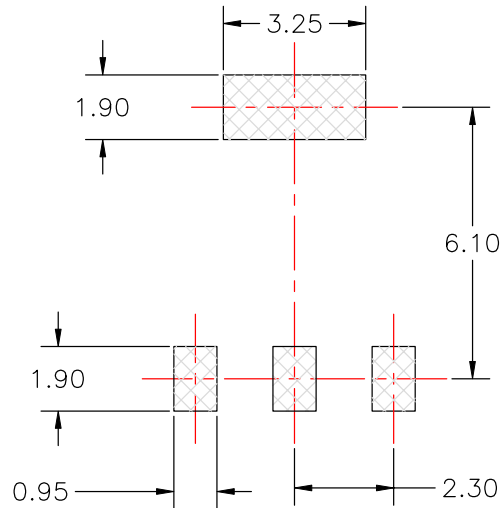
Figure 7. Power Dissipation vs. Ambient Temperature

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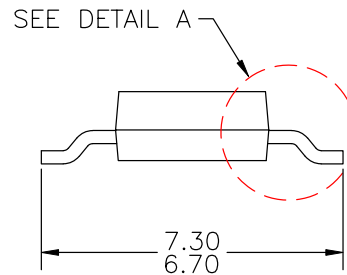
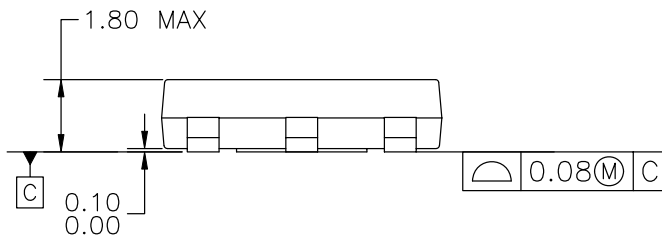
**APPROVED**  
July-14-2008



| REVISIONS |  |             |           |
|-----------|--|-------------|-----------|
| LTR       | DESCRIPTION  | DATE        | NAME/SITE |
| A         | RELEASE TO DOCUMENT CONTROL  | JAN.25.1996 | TL/FSCP   |
| 2         | CHG DWG TEMPLATE FR NATIONAL TO FAIRCHILD; CHG DIM STYLE FR DUAL INCH[MM] TO SINGLE, MM; CHG LD WID FR 0.74 <sup>0.08</sup> TO 0.60-0.84; REMOVE PKG THICK DIM (1.6); CHG TOTAL PKG HT FR 1.80 TO 1.80 MAX; CHG FOOT LANDING DIM FR 0.91 MIN TO 0.60 MIN; CHG LD THICKNESS FR 0.35 <sup>0.08</sup> TO 0.20-0.35; ADD DRAFT ANGLE OF MOLDED BODY TOP & BOT; CHG LD LGTH TO PKG EDGE DIM TO BASIC; CHG LD PITCH FR 2.29 BS TO 2.30 BS; CHG BODY WID FR 3.56 <sup>0.38</sup> TO 3.30; CHG BODY LN FR 6.53 <sup>0.38</sup> TO 6.30; CHG TOTAL PKG WID FR 6.94 <sup>0.38</sup> TO 7.30; CHG PAD SIZE FR 0.99 MAX TO 0.95; CHG PAD PITCH FR 2.286 TO 2.30; CHG THERMAL TAB SIZE FR 3.28 MAX TO 3.25; CHG PAD SIZE FR 1.5 TO 1.90; CHG PAD SPACE FR 6.3 TO 6.10; CHG NOTE '2' TO 'A' W/O DATE; DEL NOTE ON LD FINISH; ADD NOTES B, C, D, E & F. | 12FEB08     | LZSC/FSCP |

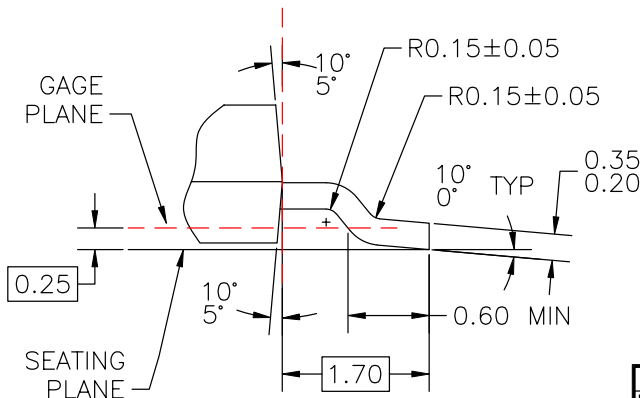


LAND PATTERN RECOMMENDATION



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- C) ALL DIMENSIONS ARE IN MILLIMETERS.
- D) DRAWING CONFORMS TO ASME Y14.5M-1994.
- E) LANDPATTERN NAME: SOT230P700X180-4BN
- F) DRAWING FILENAME: MKT-MA04AREV2



**DETAIL A**  
SCALE: 2:1

| APPROVALS                      |  | DATE           |   |                             |
|--------------------------------|--|----------------|---|-----------------------------|
| DRAWN:<br>J.U. COMPARATIVO JR. |  | 26FEB2008      |   |                             |
| CHECKED:<br>L.Z. STA CRUZ      |  |                | <b>MOLDED PACKAGE<br/>SOT-223, 4 LEAD</b> |                             |
| APPROVED:<br>M.R. GESTOLE      |  |                |   |                             |
| G.S. BAJE                      |  |                |   |                             |
|                                |  | SCALE<br>1:1   | SIZE<br>A3                                | DRAWING NUMBER<br>MKT-MA04A |
|                                |  | FORMERLY: N/A  |   | REV<br>2                    |
|                                |  | SHEET : 1 OF 1 |   |                             |



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