

# NPN Low Saturation Transistor

## NZT902

These devices are designed with high current gain and low saturation voltage with collector currents up to 3 A continuous.

### Features

- This is a Pb-Free Device

### ABSOLUTE MAXIMUM RATINGS (Notes 1, 2)

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

| Symbol    | Parameter                      | Value              | Unit             |
|-----------|--------------------------------|--------------------|------------------|
| $V_{CEO}$ | Collector-Emitter Voltage      | 90                 | V                |
| $V_{CBO}$ | Collector-Base Voltage         | 120                | V                |
| $V_{EBO}$ | Emitter-Base Voltage           | 5                  | V                |
| $I_C$     | Collector Current – Continuous | 3                  | A                |
| $T_J$     | Junction Temperature           | 150                | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range      | -55 to $\sim +150$ | $^\circ\text{C}$ |

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.

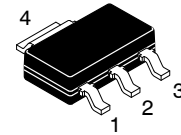
- These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### THERMAL CHARACTERISTICS (Note 3)

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

| Symbol          | Characteristics                         | Value | Unit               |
|-----------------|-----------------------------------------|-------|--------------------|
| $P_D$           | Total Device Dissipation                | 1     | W                  |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 125   | $^\circ\text{C/W}$ |

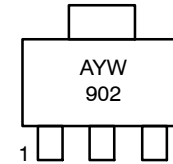
- Device mounted on FR-4 PCB  $36\text{ mm} \times 18\text{ mm} \times 1.5\text{ mm}$ .



1:Base  
2:Collector  
3:Emitter

SOT-223  
CASE 318H

### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
W = Work Week  
902 = Specific Device Code

### ORDERING INFORMATION

| Device | Package           | Shipping <sup>†</sup> |
|--------|-------------------|-----------------------|
| NZT902 | SOT-223 (Pb-Free) | 4000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](http://BRD8011/D).

# NZT902

## ELECTRICAL CHARACTERISTICS (Note 4)

(T<sub>A</sub> = 25°C unless otherwise noted.)

| Symbol               | Parameter                            | Test Condition                                              | Min | Typ | Max  | Unit |
|----------------------|--------------------------------------|-------------------------------------------------------------|-----|-----|------|------|
| BV <sub>CEO</sub>    | Collector–Emitter Breakdown Voltage  | I <sub>C</sub> = 10 mA                                      | 90  |     |      | V    |
| BV <sub>CBO</sub>    | Collector–Base Breakdown Voltage     | I <sub>C</sub> = 100 µA                                     | 120 |     |      | V    |
| BV <sub>EBO</sub>    | Emitter–Base Breakdown Voltage       | I <sub>E</sub> = 100 µA                                     | 5   |     |      | V    |
| I <sub>CBO</sub>     | Collector–Base Cut–Off Current       | V <sub>CB</sub> = 100 V                                     |     |     | 100  | nA   |
|                      |                                      | V <sub>CB</sub> = 100 V, T <sub>A</sub> = 100°C             |     |     | 10   | µA   |
| I <sub>EBO</sub>     | Emitter–Base Cut–Off Current         | V <sub>EB</sub> = 4 V                                       |     |     | 100  | nA   |
| h <sub>FE</sub>      | DC Current Gain                      | I <sub>C</sub> = 0.1 A, V <sub>CE</sub> = 2 V               | 80  |     |      |      |
|                      |                                      | I <sub>C</sub> = 1 A, V <sub>CE</sub> = 2 V                 | 80  |     |      |      |
|                      |                                      | I <sub>C</sub> = 2 A, V <sub>CE</sub> = 2 V                 | 25  |     |      |      |
| V <sub>CE(sat)</sub> | Collector–Emitter Saturation Voltage | I <sub>C</sub> = 0.1 A, I <sub>B</sub> = 5.0 mA             |     |     | 50   | mV   |
|                      |                                      | I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA             |     |     | 250  |      |
|                      |                                      | I <sub>C</sub> = 3.0 A, I <sub>B</sub> = 300 mA             |     |     | 600  |      |
| V <sub>BE(sat)</sub> | Base–Emitter Saturation Voltage      | I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA             |     |     | 1.25 | V    |
| C <sub>obo</sub>     | Output Capacitance                   | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz       |     |     | 35   | pF   |
| f <sub>T</sub>       | Transition Frequency                 | I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5 V, f = 100 MHz | 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.

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

TYPICAL PERFORMANCE CHARACTERISTICS

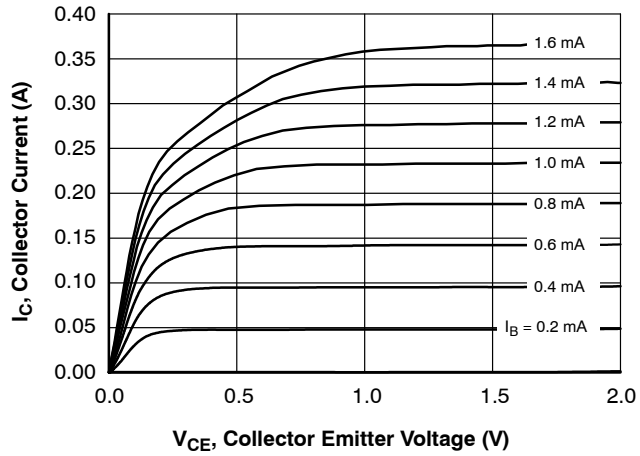


Figure 1. Static Characteristic

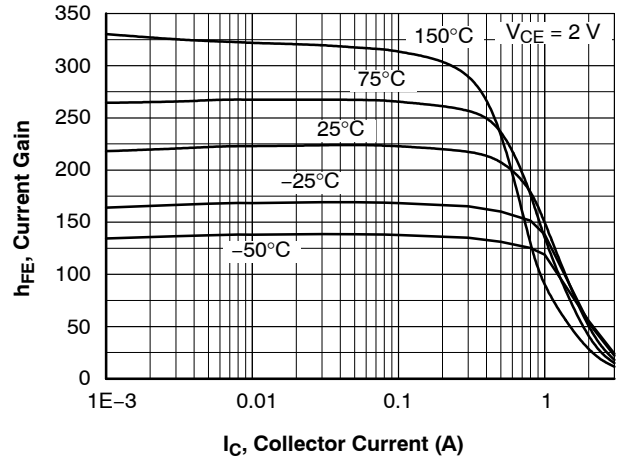


Figure 2. DC Current Gain

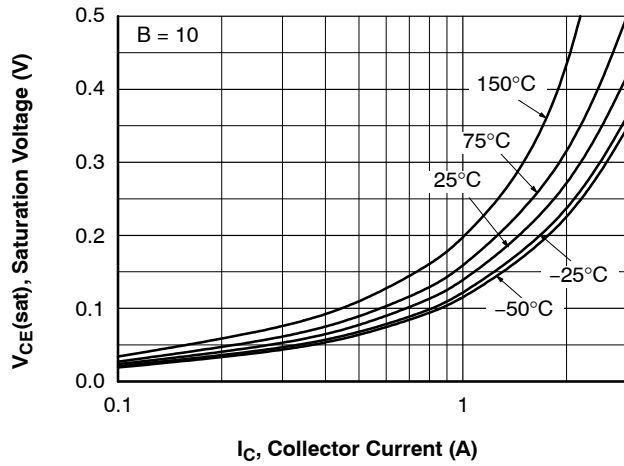


Figure 3. Collector-Emitter Saturation Voltage

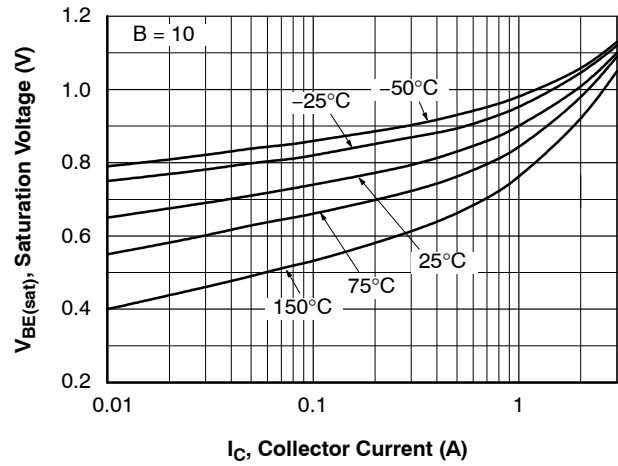


Figure 4. Base-Emitter Saturation Voltage

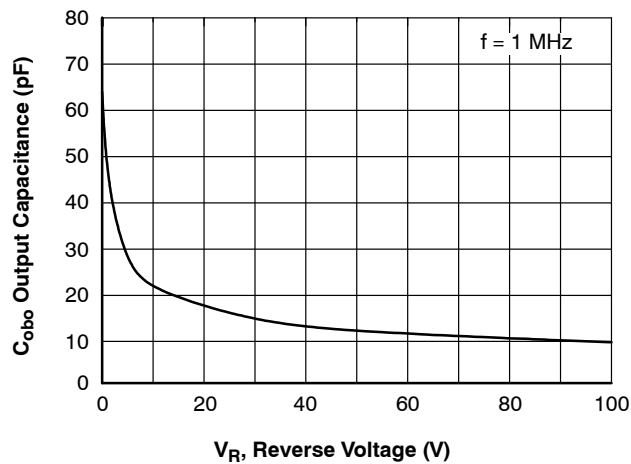


Figure 5. Output Capacitance

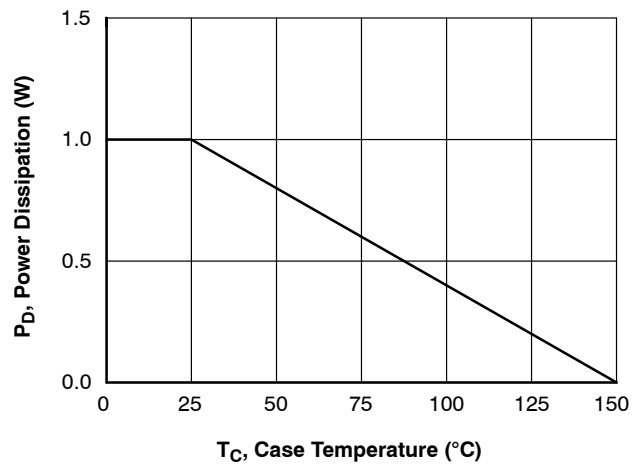


Figure 6. Power Dissipation vs. Ambient Temperature

TYPICAL PERFORMANCE CHARACTERISTICS

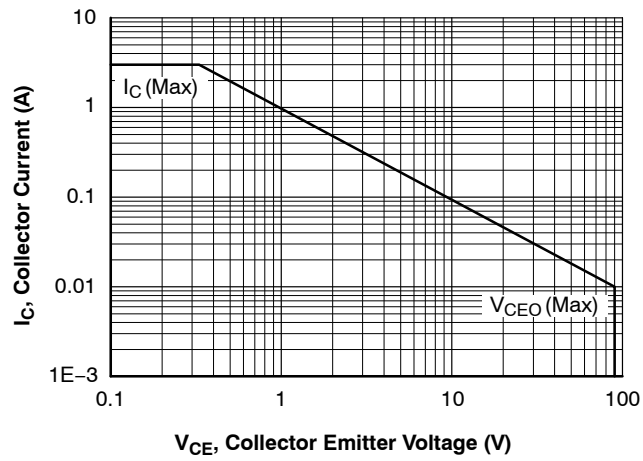
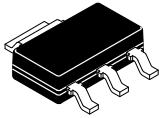


Figure 7. Safe Operating Area



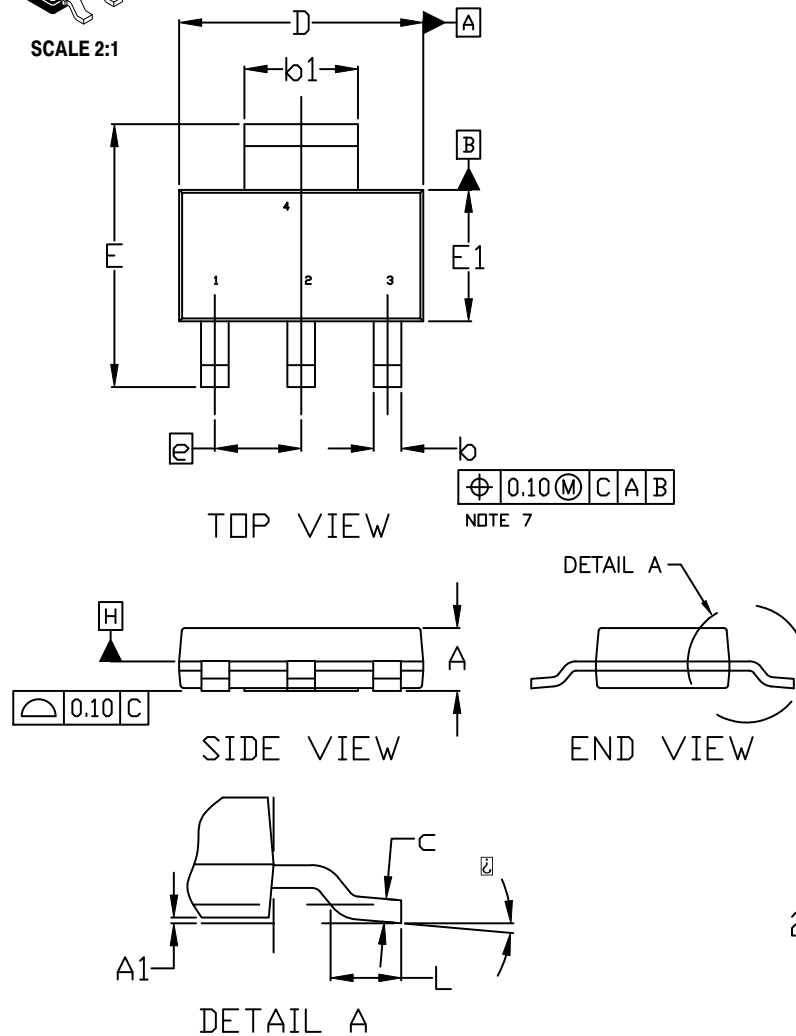
SCALE 2:1

**SOT-223**  
**CASE 318H**  
**ISSUE B**

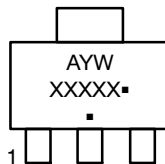
DATE 13 MAY 2020

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
4. LEAD DIMENSIONS b AND b1 DO NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION IS 0.08mm PER SIDE.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
7. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.



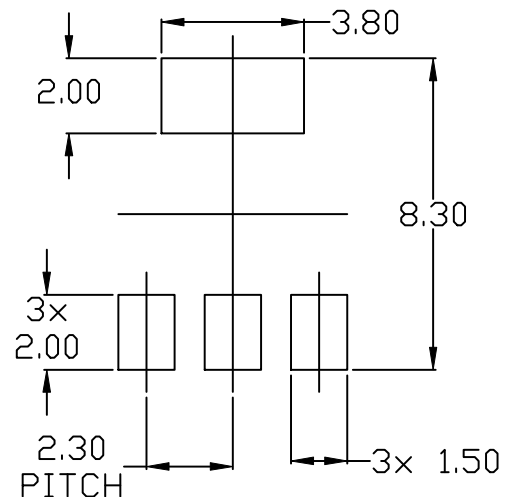
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | ---         | ---  | 1.80 |
| A1  | 0.02        | 0.06 | 0.11 |
| b   | 0.60        | 0.74 | 0.88 |
| b1  | 2.90        | 3.00 | 3.10 |
| c   | 0.24        | ---  | 0.35 |
| D   | 6.30        | 6.50 | 6.70 |
| E   | 6.70        | 7.00 | 7.30 |
| E1  | 3.30        | 3.50 | 3.70 |
| e   | 2.30 BSC    |      |      |
| L   | 0.25        | ---  | ---  |
| ⌀   | 0°          | ---  | 10°  |

**GENERIC MARKING DIAGRAM\***


A = Assembly Location  
Y = Year  
W = Work Week  
XXXXX = Specific Device Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.


**RECOMMENDED MOUNTING FOOTPRINT**

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

|                         |                    |                                                                                                                                                                                  |
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