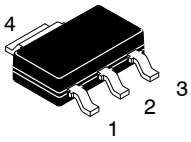
# PNP Low-Saturation Transistor

# NZT660, NZT660A




1. Base
2. & 4. Collector
3. Emitter

**SOT−223**
**CASE 318H**

### Description

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

### ABSOLUTE MAXIMUM RATINGS

($T_A$ = 25°C unless otherwise noted.) (Notes 1, 2)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CEO}$ | Collector−Emitter Voltage | −60 | V |
| $V_{CBO}$ | Collector−Base Voltage<br>NZT660<br>NZT660A | <br>−80<br>−60 | V |
| $V_{EBO}$ | Emitter−Base Voltage | −5 | V |
| $I_C$ | Collector Current − Continuous | −3 | A |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | −55 to +150 | °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.

1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady limits. **onsemi** should be consulted on application involving pulsed or low−duty−cycle operations.

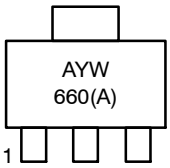
### THERMAL CHARACTERISTICS

($T_A$ = 25°C unless otherwise noted.) (Note 3)

| Symbol | Parameter | Max | Unit |
|---|---|---|---|
| $P_D$ | Total Device Dissipation | 2 | W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 62.5 | °C/W |

3. PCB size: FR−4, 76 mm × 114 mm × 1.57 mm (3.0 inch × 4.5 inch × 0.062 inch) with minimum land pattern size.

### MARKING DIAGRAM




A = Assembly Location
Y = Year
W = Work Week
660(A) = Specific Device Code

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NZT660 | SOT−223 (Pb−Free) | 4,000 / Tape & Reel |
| NZT660A | SOT−223 (Pb−Free) | 4,000 / Tape & Reel |

†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.

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted.)

| Symbol | Parameter | Test Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $BV_{CEO}$ | Collector−Emitter Breakdown Voltage | $I_C$ = −10 mA | | −60 | – | V |
| $BV_{CBO}$ | Collector−Base Breakdown Voltage | $I_C$ = −100 μA | NZT660 | −80 | – | V |
| | | | NZT660A | −60 | – | |
| $BV_{EBO}$ | Emitter−Base Breakdown Voltage | $I_E$ = −100 μA | | −5 | – | V |
| $I_{CBO}$ | Collector−Base Cut−Off Current | $V_{CB}$ = −30 V | | – | −100 | nA |
| | | $V_{CB}$ = −30 V, $T_A$ = 100°C | | – | −10 | μA |
| $I_{EBO}$ | Emitter−Base Cut−Off Current | $V_{EB}$ = −4 V | | – | −100 | nA |
| $h_{FE}$ | DC Current Gain (Note 4) | $I_C$ = −100 mA, $V_{CE}$ = −2 V | | 70 | – | |
| | | $I_C$ = −500 mA, $V_{CE}$ = −2 V | NZT660 | 100 | 300 | |
| | | | NZT660A | 250 | 550 | |
| | | $I_C$ = −1 A, $V_{CE}$ = −2 V | | 80 | – | |
| | | $I_C$ = −3 A, $V_{CE}$ = −2 V | | 25 | – | |
| $V_{CE}$(sat) | Collector−Emitter Saturation Voltage (Note 4) | $I_C$ = −1 A, $I_B$ = −100 mV | | – | −300 | mV |
| | | $I_C$ = −3 A, $I_B$ = −300 mV | NZT660 | – | −550 | |
| | | | NZT660A | – | −500 | |
| $V_{BE}$(sat) | Base−Emitter Saturation Voltage (Note 4) | $I_C$ = −1 A, $I_B$ = −100 mV | | – | −1.25 | V |
| $V_{BE}$(on) | Base−Emitter On Voltage (Note 4) | $I_C$ = −1 A, $V_{CE}$ = −2 V | | – | −1 | V |
| $C_{ob}$ | Output Capacitance | $V_{CB}$ = −10 V, $I_E$ = 0, f = 1 MHz | | – | 45 | pF |
| $f_T$ | Transition Frequency | $I_C$ = −100 mA, $V_{CE}$ = −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

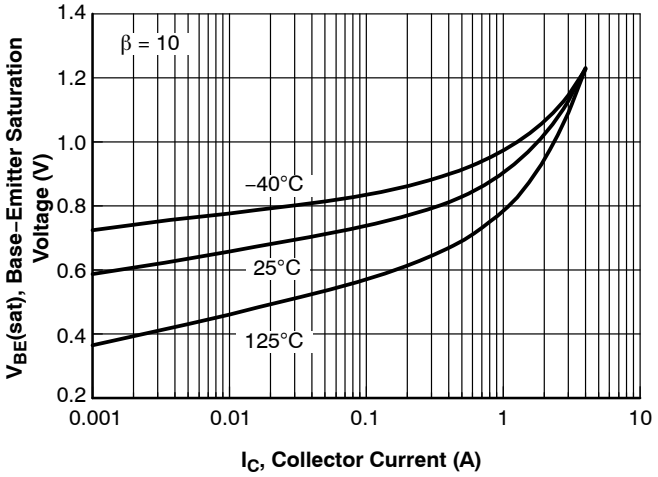



**Figure 1. Base−Emitter Saturation Voltage vs. Collector Current**

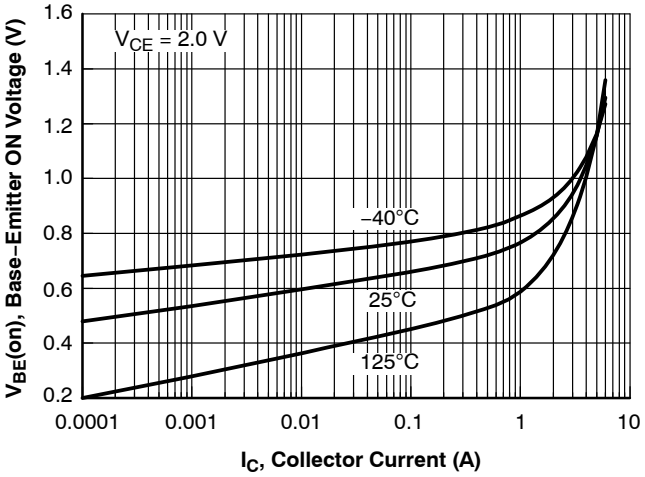



**Figure 2. Base−Emitter On Voltage vs. Collector Current**

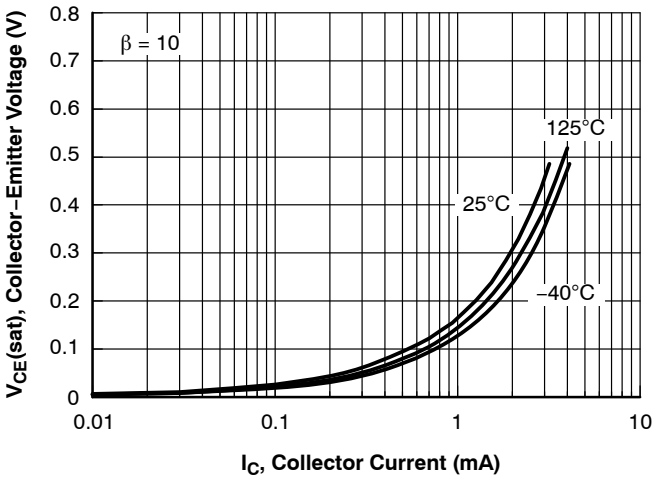



**Figure 3. Collector−Emitter Saturation Voltage vs. Collector Current**

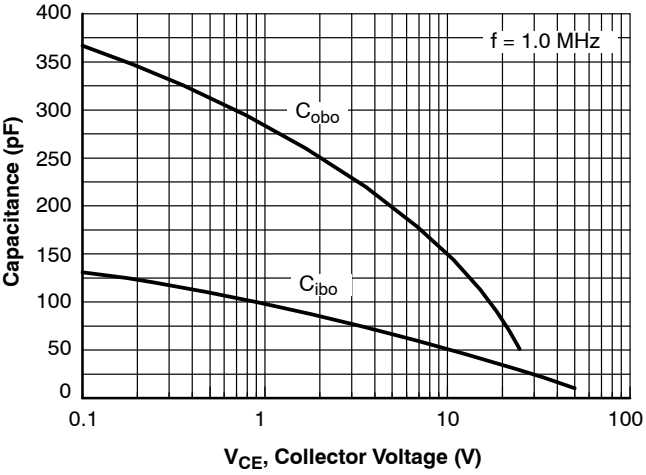



**Figure 4. Input/Output Capacitance vs. Reverse Bias Voltage**

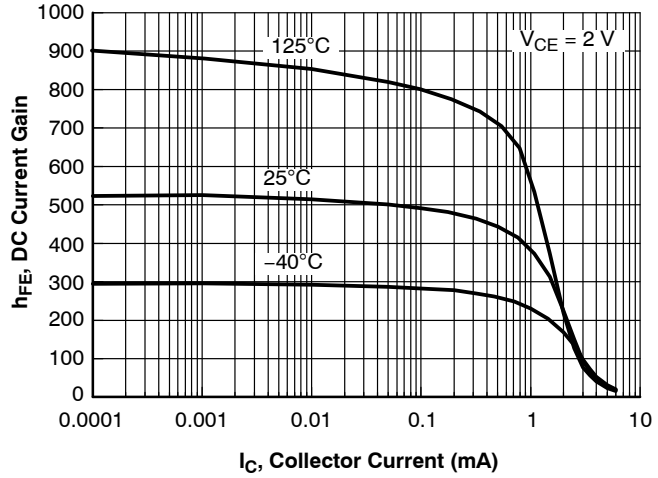


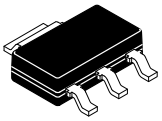

**Figure 5. Current Gain vs. Collector Current**

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

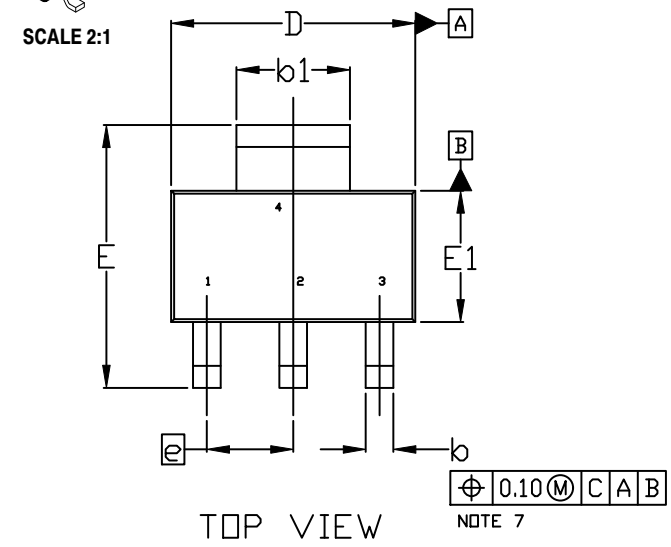
ON Semiconductor®

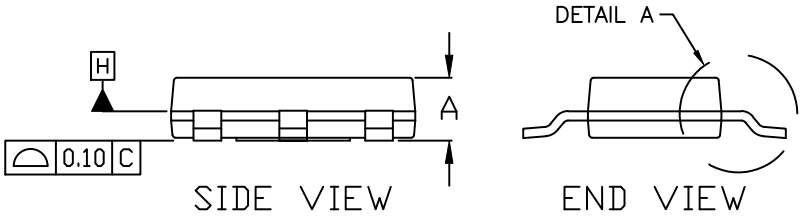
**SOT−223**
CASE 318H
ISSUE B

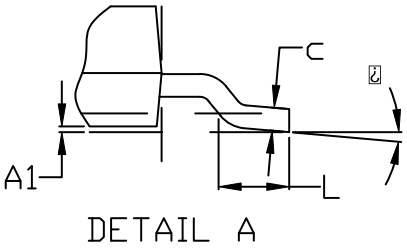
DATE 13 MAY 2020



SCALE 2:1

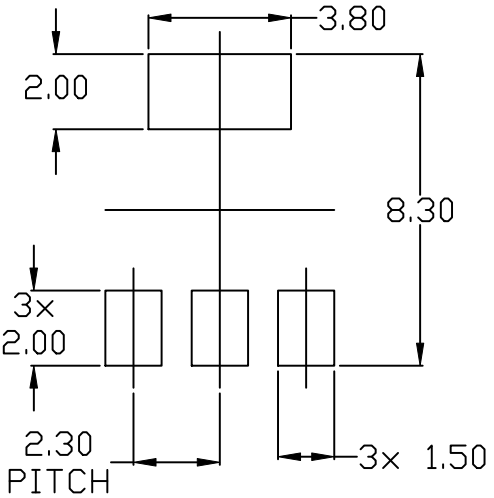



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
4. LEAD DIMENSIONS b AND b1 DO NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBBAR 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.

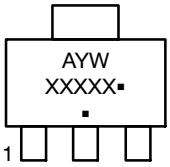
| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | --- | --- | 1.80 |
| A1 | 0.02 | 0.06 | 0.11 |
| b | 0.60 | 0.74 | 0.88 |
| b1 | 2.90 | 3.00 | 3.10 |
| c | 0.24 | --- | 0.35 |
| D | 6.30 | 6.50 | 6.70 |
| E | 6.70 | 7.00 | 7.30 |
| E1 | 3.30 | 3.50 | 3.70 |
| e | 2.30 BSC |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




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, SOLDERRM/D.

**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.

| | | |
|---|---|---|
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| **DESCRIPTION:** | **SOT−223** | **PAGE 1 OF 1** |

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