

# NPN Darlington Transistor

## NZT605

This device designed for applications requiring extremely high gain at collector currents to 1.0 A and high breakdown voltage. Sourced from process 06.

### ABSOLUTE MAXIMUM RATINGS

( $T_C = 25^\circ\text{C}$  unless otherwise noted.) (Notes 1, 2)

| Symbol         | Parameter                                        | Value       | Unit             |
|----------------|--------------------------------------------------|-------------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 110         | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 140         | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 10          | V                |
| $I_C$          | Collector Current – Continuous                   | 1.5         | A                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +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 limits. The factory should be consulted on application involving pulsed or low duty cycle operations.

### THERMAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted.) (Note 3)

| Symbol          | Parameter                                                   | Max        | Unit                            |
|-----------------|-------------------------------------------------------------|------------|---------------------------------|
| $P_D$           | Total Device Dissipation<br>Derate above $25^\circ\text{C}$ | 1.0<br>8.0 | W<br>$\text{mW}/^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance,<br>Junction to Ambient                  | 125        | $^\circ\text{C}/\text{W}$       |

- Device mounted on FR-4PCB 36 mm x 18 mm x 1.5 mm; mounting pad for the collector lead min.  $6\text{ cm}^2$ .

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.) (Note 4)

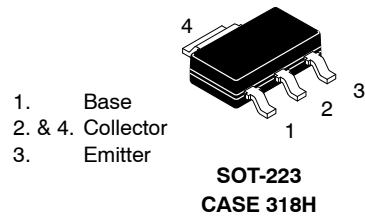
| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|--------|-----------|-----------------|-----|-----|------|
|--------|-----------|-----------------|-----|-----|------|

#### OFF CHARACTERISTICS

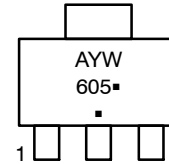
|               |                                              |                                         |     |     |    |
|---------------|----------------------------------------------|-----------------------------------------|-----|-----|----|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage (Note 4) | $I_C = 10\text{ mA}, I_B = 0$           | 110 | –   | V  |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage             | $I_C = 100\text{ }\mu\text{A}, I_E = 0$ | 140 | –   | V  |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage               | $I_E = 100\text{ }\mu\text{A}, I_C = 0$ | 10  | –   | V  |
| $I_{CBO}$     | Collector Cut-off Current                    | $V_{CB} = 120\text{ V}, I_E = 0$        | –   | 10  | nA |
| $I_{CES}$     | Collector Cut-off Current                    | $V_{CE} = 120\text{ V}, I_E = 0$        | –   | 10  | nA |
| $I_{EBO}$     | Emitter Cut-off Current                      | $V_{EB} = 8.0\text{ V}, I_C = 0$        | –   | 100 | nA |

#### ON CHARACTERISTICS (Note 4)

|               |                                      |                                                                                                                                                                                                                                          |                                       |                          |   |
|---------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------|---|
| $h_{FE}$      | DC Current Gain                      | $V_{CE} = 5.0\text{ V}, I_C = 50\text{ mA}$<br>$V_{CE} = 5.0\text{ V}, I_C = 500\text{ mA}$<br>$V_{CE} = 5.0\text{ V}, I_C = 1.0\text{ A}$<br>$V_{CE} = 5.0\text{ V}, I_C = 1.5\text{ A}$<br>$V_{CE} = 5.0\text{ V}, I_C = 2.0\text{ A}$ | 2,000<br>5,000<br>2,000<br>300<br>200 | –<br>–<br>100K<br>–<br>– |   |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 250\text{ mA}, I_B = 0.25\text{ mA}$<br>$I_C = 1.0\text{ A}, I_B = 1.0\text{ mA}$                                                                                                                                                 | –<br>–                                | 1<br>1.5                 | V |



### MARKING DIAGRAM



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

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device | Package              | Shipping            |
|--------|----------------------|---------------------|
| NZT605 | SOT-223<br>(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](http://BRD8011/D).

# NZT605

## ELECTRICAL CHARACTERISTICS ( $T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.) (Note 4) (continued)

| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|--------|-----------|-----------------|-----|-----|------|
|--------|-----------|-----------------|-----|-----|------|

### ON CHARACTERISTICS (Note 4)

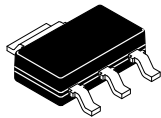
|               |                                 |                                                |   |     |   |
|---------------|---------------------------------|------------------------------------------------|---|-----|---|
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C = 1.0\text{ A}$ , $I_B = 1.0\text{ mA}$   | – | 1.8 | V |
| $V_{BE(on)}$  | Base-Emitter On Voltage         | $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ | – | 1.7 | V |

### SMALL SIGNAL CHARACTERISTICS

|       |                      |                                                                      |     |   |     |
|-------|----------------------|----------------------------------------------------------------------|-----|---|-----|
| $f_T$ | Transition Frequency | $I_C = 100\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 20\text{ MHz}$ | 150 | – | 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. Device mounted on FR-4PCB 36 mm x 18 mm x 1.5 mm; mounting pad for the collector lead min. 6 cm<sup>2</sup>.



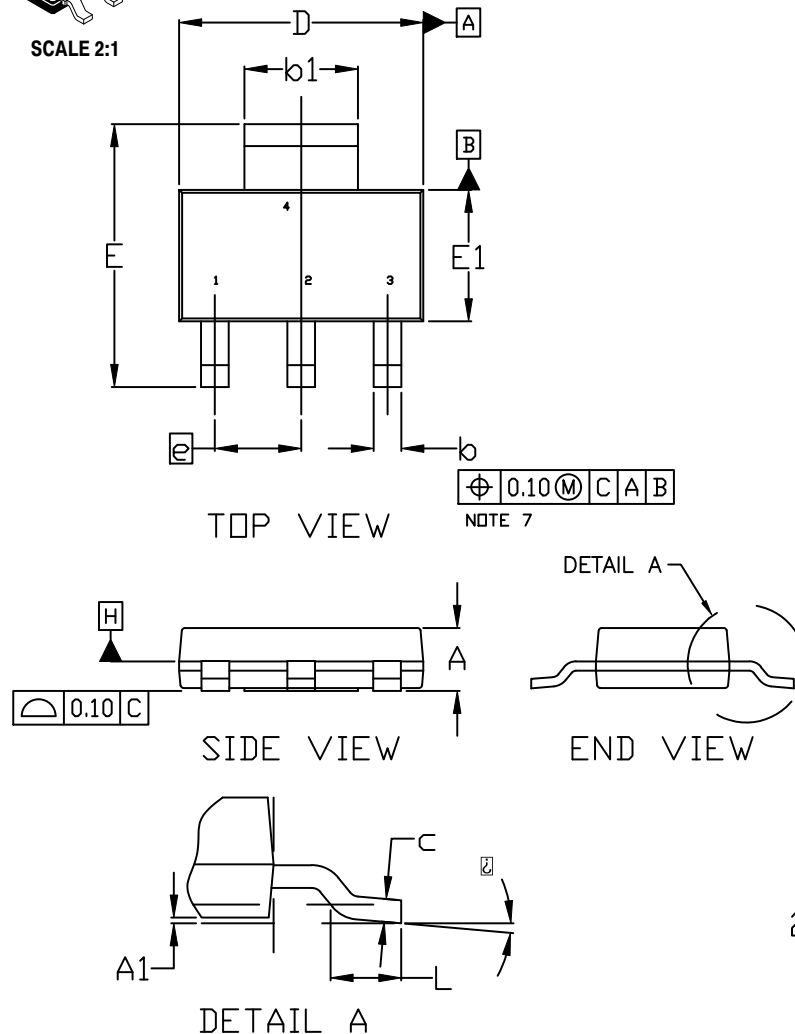
SCALE 2:1

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

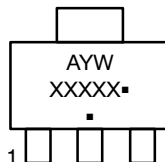
DATE 13 MAY 2020

## 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.



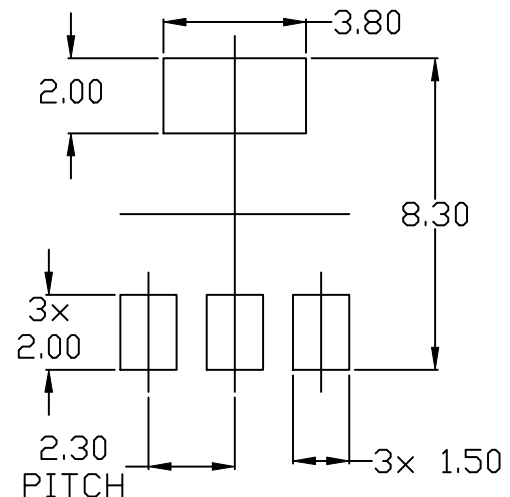
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | ---         | ---  | 1.80 |
| A1  | 0.02        | 0.06 | 0.11 |
| b   | 0.60        | 0.74 | 0.88 |
| b1  | 2.90        | 3.00 | 3.10 |
| c   | 0.24        | ---  | 0.35 |
| D   | 6.30        | 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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