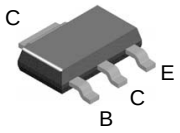
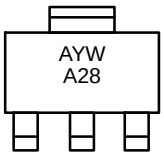
# NPN Darlington Transistor

# PZTA28, MMBTA28

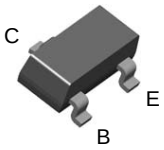



**SOT−223**
**CASE 318H**

**MARKING DIAGRAM**

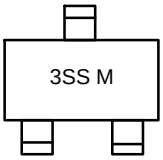



A = Assembly Location
YW = Date Code
A28 = Specific Device Code




**SOT−23/SUPERSOT−23**
**CASE 527AG**

**MARKING DIAGRAM**




3SS = Specific Device Code
M = Date Code

### Description

This device is designed for applications requiring extremely high current gain at collector currents to 500 mA. Sourced from process 03.

### Features

- These are Pb−Free Devices

**ABSOLUTE MAXIMUM RATINGS** ($T_A$ = 25°C unless otherwise noted) (Note 1, Note 2)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CEO}$ | Collector−Emitter Voltage | 80 | V |
| $V_{CBO}$ | Collector−Base Voltage | 80 | V |
| $V_{EBO}$ | Emitter−Base Voltage | 12 | V |
| $I_C$ | Collector Current − Continuous | 800 | mA |
| $T_J$, $T_{STG}$ | 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−state limits. **onsemi** should be consulted on applications involving pulsed or low−duty−cycle operations.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| PZTA28 | SOT−223 | 4000 / Tape & Reel |
| MMBTA28 | SOT−23 | 3000 / 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.

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**THERMAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Symbol | Parameter | Max | | Unit |
|---|---|---|---|---|
| | | **PZTA28** (Note 3) | **MMBTA28** (Note 4) | |
| $P_D$ | Total Device Dissipation | 1000 | 350 | mW |
| | Derate Above 25°C | 8.0 | 2.8 | mW/°C |
| $R_{\theta JA}$ | Thermal Resistance, Junction−to−Ambient | 125 | 357 | °C/W |

3. PCB size: FR−4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.
4. Device mounted on FR−4 PCB 36 mm x 18 mm x 1.5 mm; mounting pad for the collector lead minimum 6cm$^2$.

**ELECTRICAL CHARACTERISTICS** (Note 5) ($T_A$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{(BR)CES}$ | Collector−Emitter Breakdown Voltage | $I_C$ = 100 μA, $V_{BE}$ = 0 | 80 | | V |
| $V_{(BR)CBO}$ | Collector−Base Breakdown Voltage | $I_C$ = 100 μA, $I_E$ = 0 | 80 | | V |
| $V_{(BR)EBO}$ | Emitter−Base Breakdown Voltage | $I_E$ = 10 μA, $I_C$ = 0 | 12 | | V |
| $I_{CBO}$ | Collector Cut−Off Current | $V_{CB}$ = 60 V, $I_E$ = 0 | | 100 | nA |
| $I_{CES}$ | Collector Cut−Off Current | $V_{CE}$ = 60 V, $V_{BE}$ = 0 | | 500 | nA |
| $I_{EBO}$ | Emitter Cut−Off Current | $V_{EB}$ = 10 V, $I_C$ = 0 | | 100 | nA |
| $h_{FE}$ | DC Current Gain | $I_C$ = 10 mA, $V_{CE}$ = 5.0 V | 10000 | | |
| | | $I_C$ = 100 mA, $V_{CE}$ = 5.0 V | 10000 | | |
| $V_{CE}$(sat) | Collector−Emitter Saturation Voltage | $I_C$ = 10 mA, $I_B$ = 0.01 mA | | 1.2 | V |
| | | $I_C$ = 100 mA, $I_B$ = 0.1 mA | | 1.5 | |
| $V_{BE(on)}$ | Base−Emitter On Voltage | $I_C$ = 100 mA, $V_{CE}$ = 5.0 V | | 2.0 | V |
| $f_T$ | Current Gain − Bandwidth Product | $I_C$ = 15 mA, $V_{CE}$ = 5.0 V, f = 100 MHz | 125 | | MHz |
| $C_{obo}$ | Output Capacitance | $V_{CB}$ = 1.0 V, $I_E$ = 0, f = 1.0 MHz | | 8.0 | pF |

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.

5. Pulse test: pulse width ≤ 300 μs, duty cycle ≤ 2.0%.

## TYPICAL PERFORMANCE CHARACTERISTICS

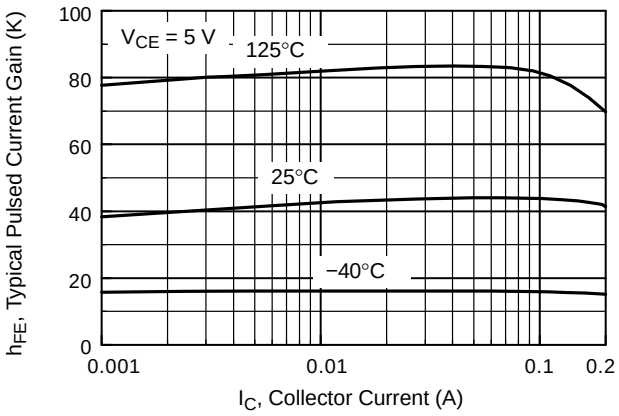



**Figure 1. Typical Pulsed Current Gain vs. Collector Current**

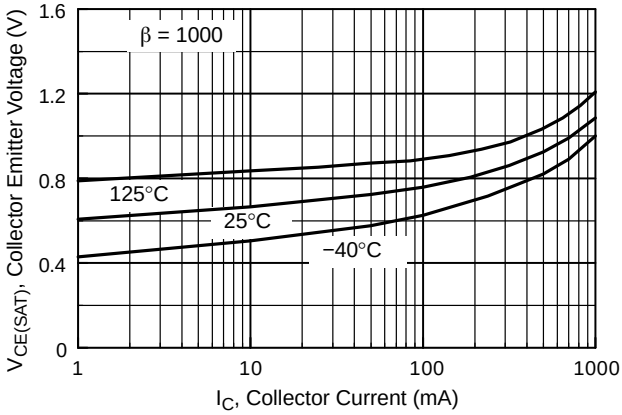



**Figure 2. Collector− Emitter Saturation Voltage vs. Collector Current**

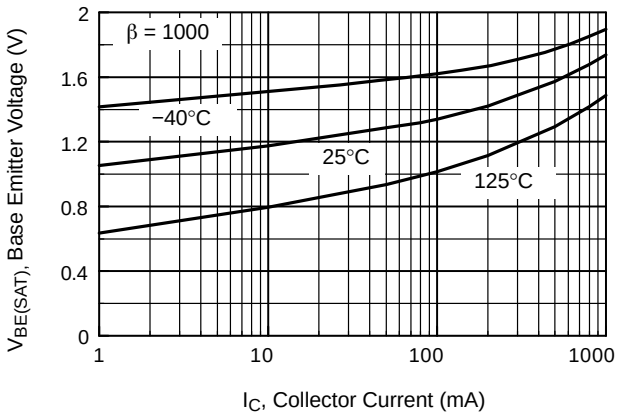



**Figure 3. Base−Emitter Saturation Voltage vs. Collector Current**

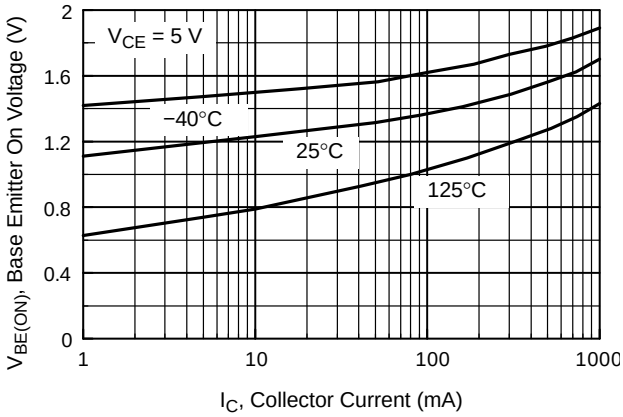



**Figure 4. Base−Emitter On Voltage vs. Collector Current**

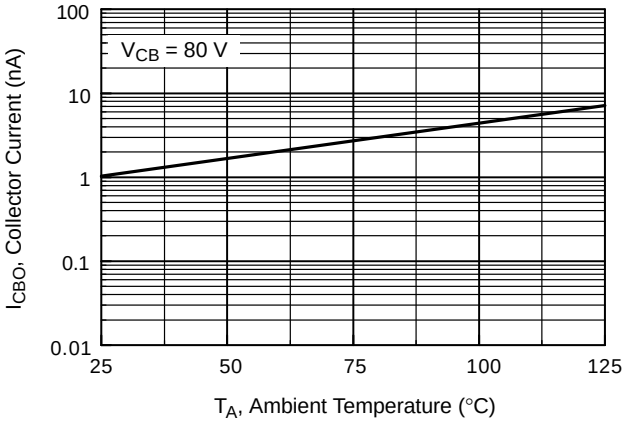



**Figure 5. Collector Cut−Off Current vs. Ambient Temperature**

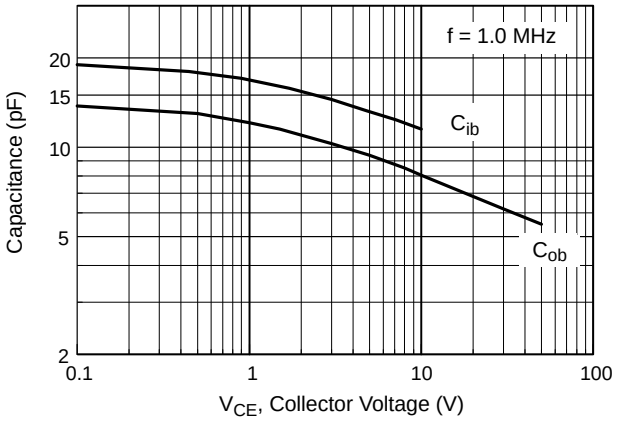



**Figure 6. Input and Output Capacitance vs. Reverse Voltage**

## TYPICAL PERFORMANCE CHARACTERISTICS (continued)

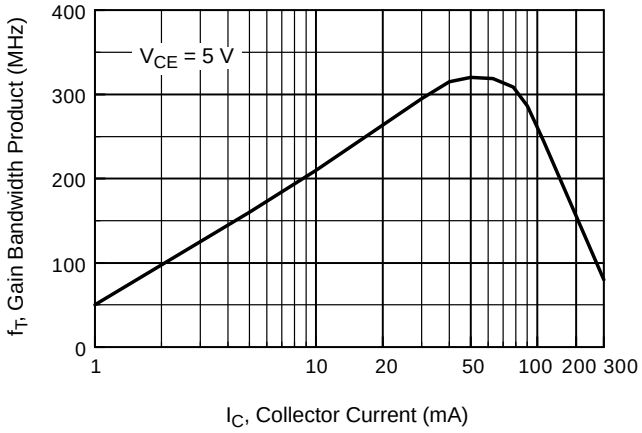



**Figure 7. Gain Bandwidth Product vs. Collector Current**

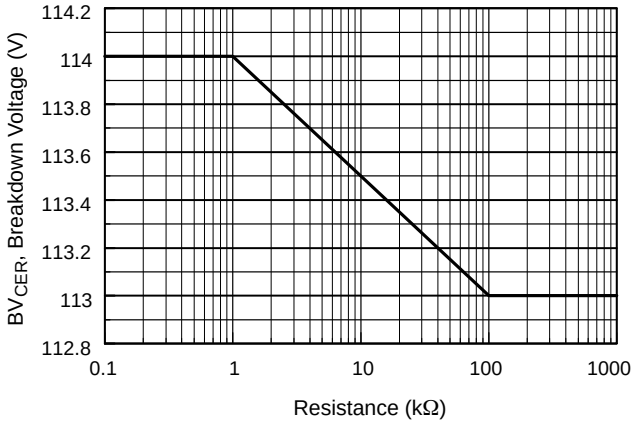



**Figure 8. Collector−Emitter Breakdown Voltage with Resistance Between Emitter−Base**

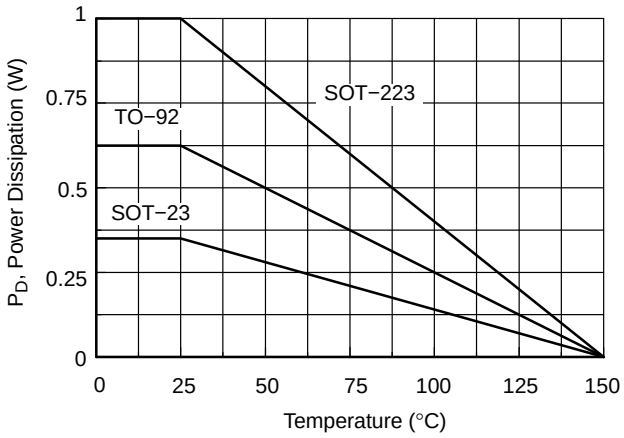


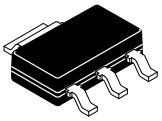

**Figure 9. Power Dissipation vs. Ambient Temperature**

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

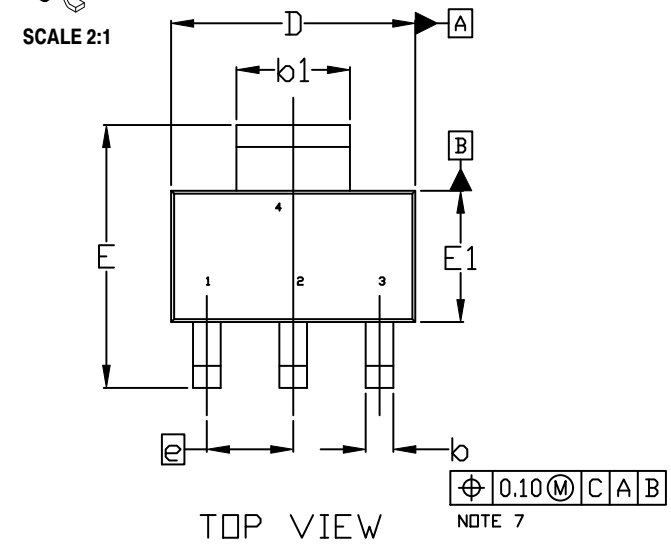
ON Semiconductor®

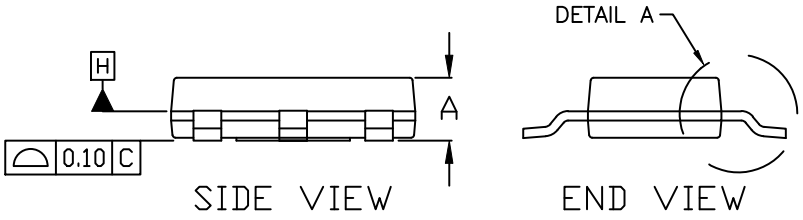
**SOT−223**
CASE 318H
ISSUE B

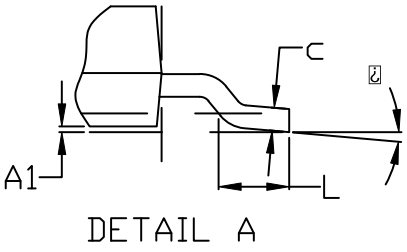
DATE 13 MAY 2020



SCALE 2:1

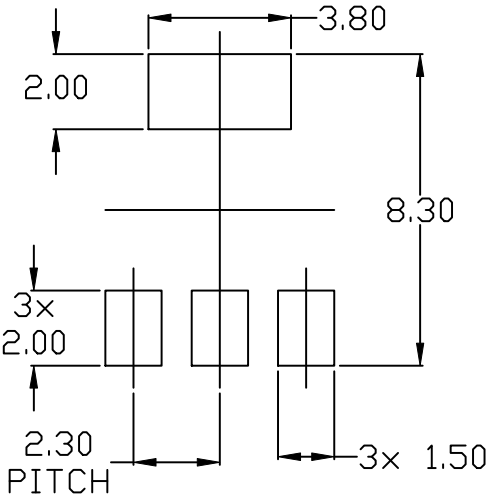



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
4. LEAD DIMENSIONS b AND b1 DO NOT INCLUDE DAMBAR PROTRUSION.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

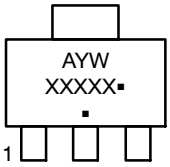
| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | --- | --- | 1.80 |
| A1 | 0.02 | 0.06 | 0.11 |
| b | 0.60 | 0.74 | 0.88 |
| b1 | 2.90 | 3.00 | 3.10 |
| c | 0.24 | --- | 0.35 |
| D | 6.30 | 6.50 | 6.70 |
| E | 6.70 | 7.00 | 7.30 |
| E1 | 3.30 | 3.50 | 3.70 |
| e | 2.30 BSC |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

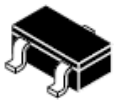
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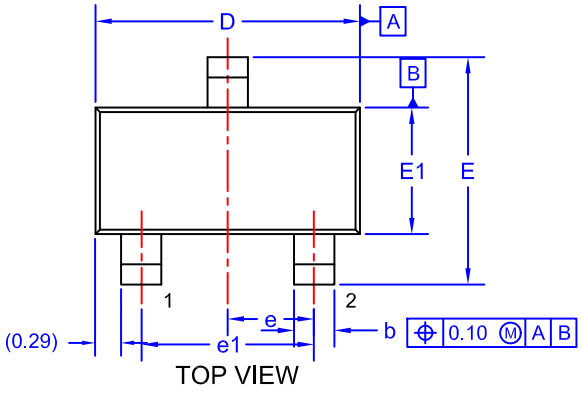
# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

ON Semiconductor®



**SOT−23/SUPERSOT™ −23, 3 LEAD, 1.4x2.9**
CASE 527AG
ISSUE A

DATE 09 DEC 2019

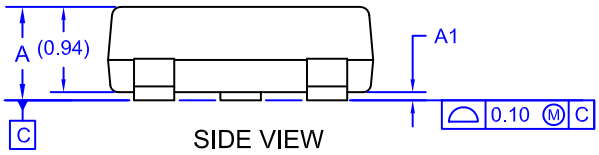


TOP VIEW

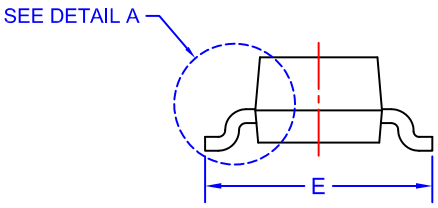
NOTES: UNLESS OTHERWISE SPECIFIED

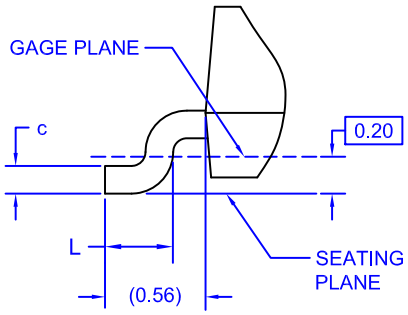
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

| DIM | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 0.85 | 0.95 | 1.12 |
| A1 | 0.00 | 0.05 | 0.10 |
| b | 0.370 | 0.435 | 0.508 |
| c | 0.085 | 0.150 | 0.180 |
| D | 2.80 | 2.92 | 3.04 |
| E | 2.31 | 2.51 | 2.71 |
| E1 | 1.20 | 1.40 | 1.52 |
| e | | 0.95 BSC | |
| e1 | | 1.90 BSC | |
| L | 0.33 | 0.38 | 0.43 |

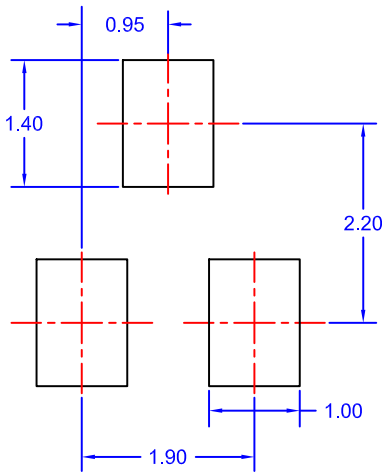


SIDE VIEW



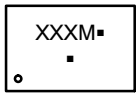
DETAIL A



LAND PATTERN RECOMMENDATION*

*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***




XXX = Specific Device Code
M = Month 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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