

# NPN Darlington Transistor

## PZTA28, MMBTA28

### Description

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

### Features

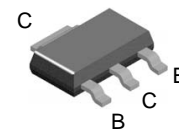
- These are Pb-Free Devices

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted) (Note 1, Note 2)

Symbol	Parameter	Value	Unit
V <sub>CEO</sub>	Collector–Emitter Voltage	80	V
V <sub>CBO</sub>	Collector–Base Voltage	80	V
V <sub>EBO</sub>	Emitter–Base Voltage	12	V
I <sub>C</sub>	Collector Current – Continuous	800	mA
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	–55 to + 150	°C

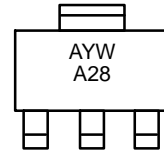
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.

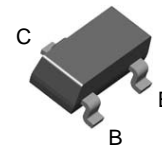


SOT-223  
 CASE 318H

### MARKING DIAGRAM

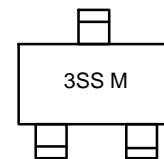


- A = Assembly Location
- YW = Date Code
- A28 = Specific Device Code



SOT-23/SUPERSOT-23  
 CASE 527AG

### MARKING DIAGRAM



- 3SS = Specific Device Code
- M = Date Code

### 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.

## PZTA28, MMBTA28

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

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

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  $6\text{cm}^2$ .

### Electrical Characteristics (Note 5) ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

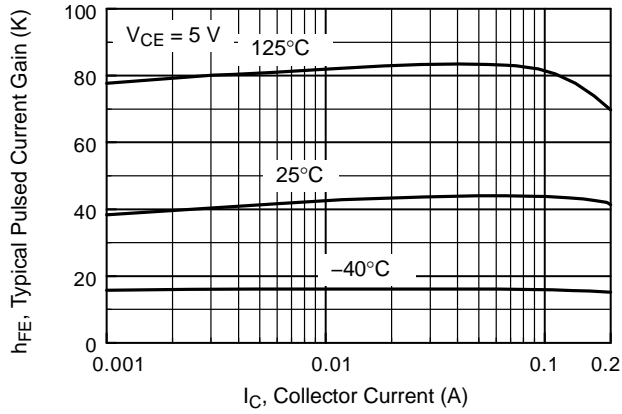
Symbol	Parameter	Test Conditions	Min	Max	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = 100\ \mu\text{A}$ , $V_{BE} = 0$	80		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\ \mu\text{A}$ , $I_E = 0$	80		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\ \mu\text{A}$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

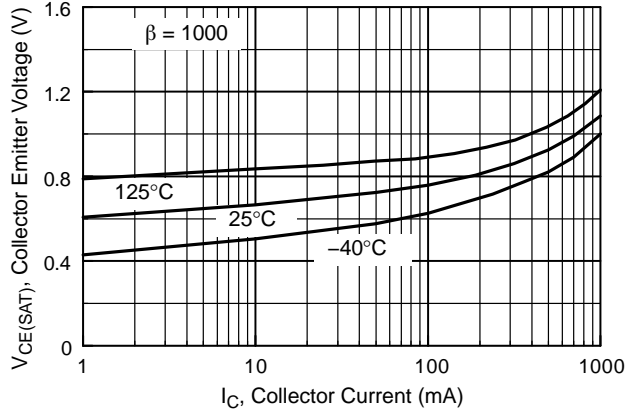
5. Pulse test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

# PZTA28, MMBTA28

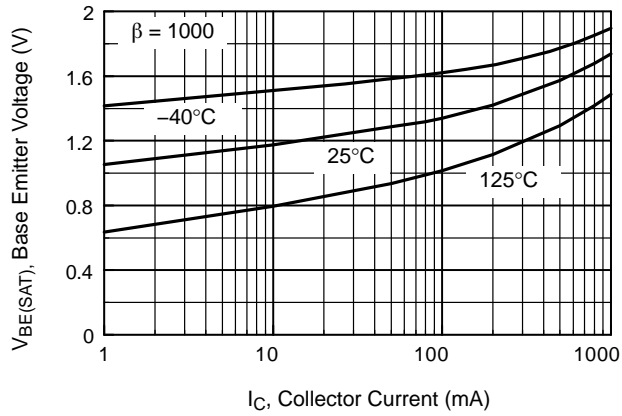
## TYPICAL PERFORMANCE CHARACTERISTICS



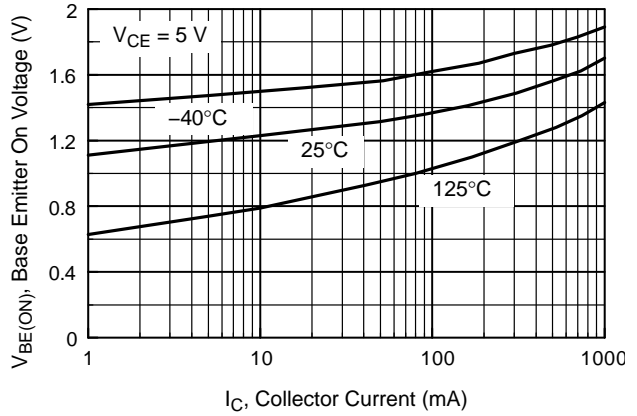
**Figure 1. Typical Pulsed Current Gain vs. Collector Current**



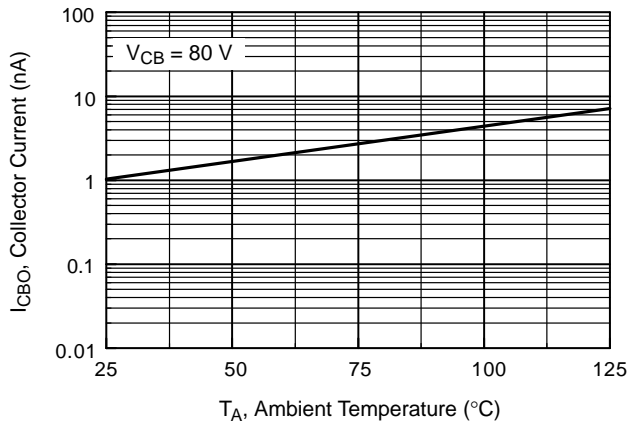
**Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current**



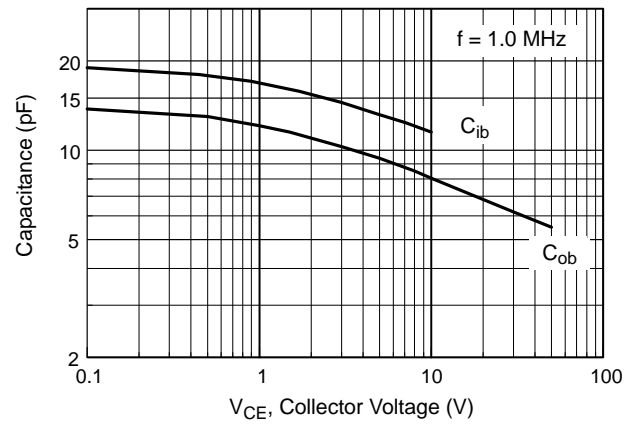
**Figure 3. Base-Emitter Saturation Voltage vs. Collector Current**



**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**

# PZTA28, MMBTA28

## TYPICAL PERFORMANCE CHARACTERISTICS (continued)

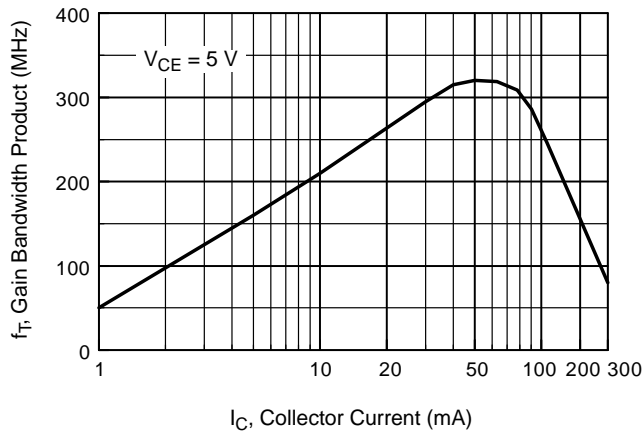


Figure 7. Gain Bandwidth Product vs. Collector Current

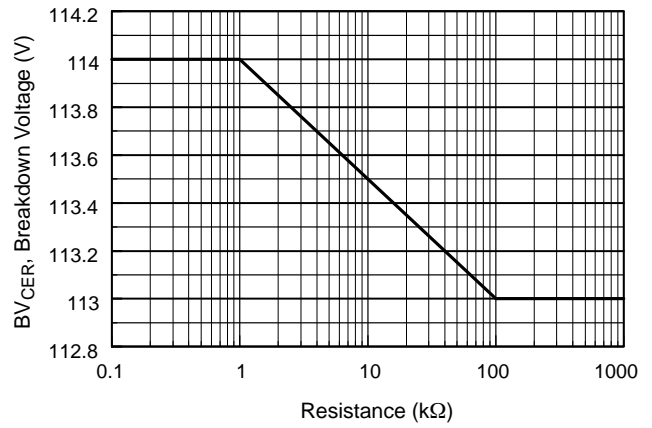


Figure 8. Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

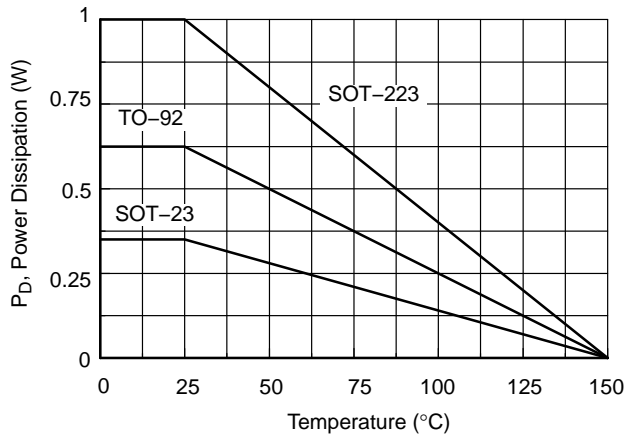
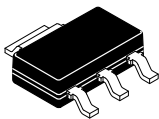


Figure 9. Power Dissipation vs. Ambient Temperature

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

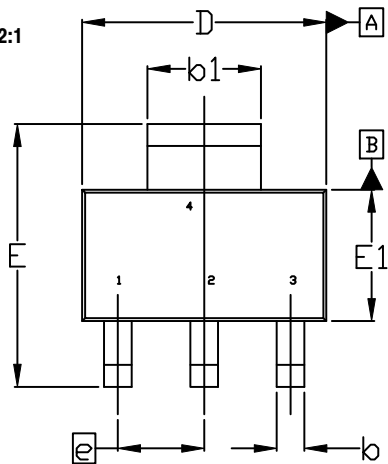
ON Semiconductor®



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

DATE 13 MAY 2020

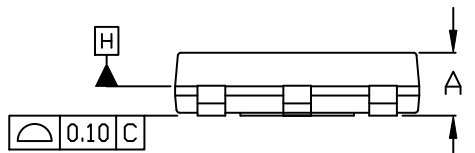
SCALE 2:1



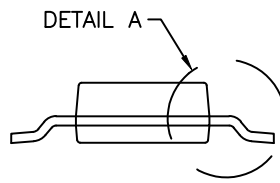
TOP VIEW

$\Phi 0.10 \text{ (M)}$  C A B

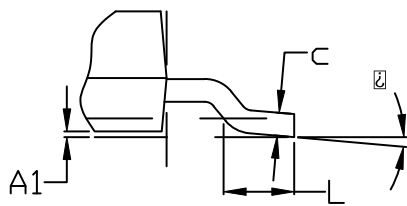
NOTE 7



SIDE VIEW



END VIEW

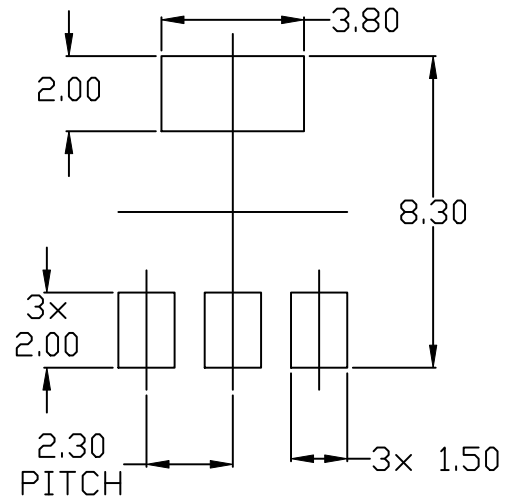


DETAIL A

**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.

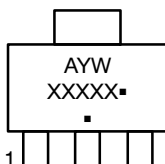
DIM	MILLIMETERS		
	MIN.	NDM.	MAX.
A	---	---	1.80
A1	0.02	0.06	0.11
b	0.60	0.74	0.88
b1	2.90	3.00	3.10
c	0.24	---	0.35
D	6.30	6.50	6.70
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.30 BSC		
L	0.25	---	---
$\square$	0°	---	10°



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, SOLDERM/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

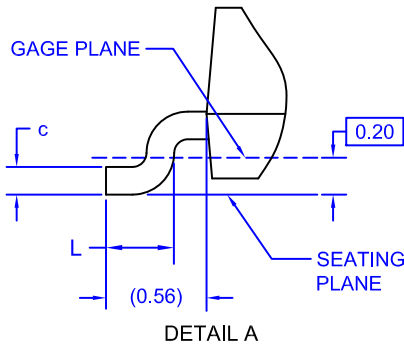
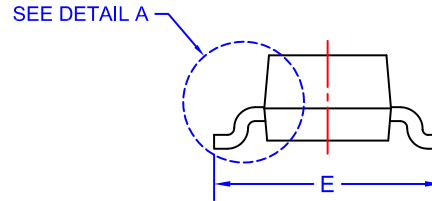
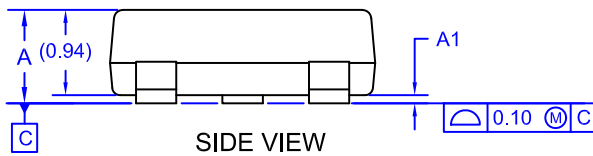
DATE 09 DEC 2019



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.

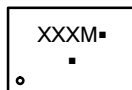
DIM	MIN.	NOM.	MAX.
A	0.85	0.95	1.12
A1	0.00	0.05	0.10
b	0.370	0.435	0.508
c	0.085	0.150	0.180
D	2.80	2.92	3.04
E	2.31	2.51	2.71
E1	1.20	1.40	1.52
e	0.95 BSC		
e1	1.90 BSC		
L	0.33	0.38	0.43



**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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