# PZT2222AT1

**Preferred Device** 

# NPN Silicon Planar Epitaxial Transistor

This NPN Silicon Epitaxial transistor is designed for use in linear and switching applications. The device is housed in the SOT-223 package which is designed for medium power surface mount applications.

### Features

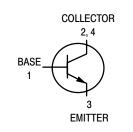
- PNP Complement is PZT2907AT1
- The SOT-223 package can be soldered using wave or reflow
- SOT-223 package ensures level mounting, resulting in improved thermal conduction, and allows visual inspection of soldered joints
- The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- Available in 12 mm tape and reel
- Pb–Free Packages are Available



## **ON Semiconductor<sup>®</sup>**

http://onsemi.com

## SOT-223 PACKAGE NPN SILICON TRANSISTOR SURFACE MOUNT



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	40	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	75	Vdc
Emitter-Base Voltage (Open Collector)	V <sub>EBO</sub>	6.0	Vdc
Collector Current	Ι <sub>C</sub>	600	mAdc
Total Power Dissipation up to T <sub>A</sub> = 25°C (Note 1)	PD	1.5	W
Storage Temperature Range	T <sub>stg</sub>	– 65 to +150	°C
Junction Temperature	TJ	150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Device mounted on an epoxy printed circuit board 1.575 inches x 1.575 inches x 0.059 inches; mounting pad for the collector lead min. 0.93 inches<sup>2</sup>.

### THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	83.3	°C/W
Lead Temperature for Soldering, 0.0625" from case Time in Solder Bath	ΤL	260 10	°C Sec



SOT-223 (TO-261) CASE 318E-04 STYLE 1

## MARKING DIAGRAM



A = Assembly Location WW = Work Week

### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
PZT2222AT1	SOT-223	3000 Tape & Reel
PZT2222AT1G	SOT-223 (Pb-Free)	3000 Tape & Reel
PZT2222AT3	SOT-223	10,000 Tape & Reel
PZT2222AT3G	SOT-223 (Pb-Free)	10,000 Tape & Reel

+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**Preferred** devices are recommended choices for future use and best overall value.

# PZT2222AT1

## **ELECTRICAL CHARACTERISTICS** ( $T_A = 25^{\circ}C$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ( $I_C = 10 \text{ mAdc}, I_B = 0$ )	V <sub>(BR)CEO</sub>	40	-	Vdc
Collector-Base Breakdown Voltage ( $I_C = 10 \ \mu Adc$ , $I_E = 0$ )	V <sub>(BR)CBO</sub>	75	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \ \mu Adc$ , $I_C = 0$ )	V <sub>(BR)EBO</sub>	6.0	-	Vdc
Base-Emitter Cutoff Current ( $V_{CE}$ = 60 Vdc, $V_{BE}$ = – 3.0 Vdc)	I <sub>BEX</sub>	-	20	nAdc
Collector-Emitter Cutoff Current ( $V_{CE}$ = 60 Vdc, $V_{BE}$ = - 3.0 Vdc)	I <sub>CEX</sub>	-	10	nAdc
Emitter-Base Cutoff Current ( $V_{EB}$ = 3.0 Vdc, $I_{C}$ = 0)	I <sub>EBO</sub>	-	100	nAdc
Collector-Base Cutoff Current $(V_{CB} = 60 \text{ Vdc}, I_E = 0)$ $(V_{CB} = 60 \text{ Vdc}, I_E = 0, T_A = 125^{\circ}\text{C})$	Ісво		10 10	nAdc μAdc
ON CHARACTERISTICS				
DC Current Gain ( $I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, T_A = -55^{\circ}\text{C}$ ) ( $I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ )	h <sub>FE</sub>	35 50 70 35 100 50 40	- - - 300 -	-
Collector-Emitter Saturation Voltages ( $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ ) ( $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ )	V <sub>CE(sat)</sub>		0.3 1.0	Vdc
Base-Emitter Saturation Voltages ( $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ ) ( $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ )	V <sub>BE(sat)</sub>	0.6 -	1.2 2.0	Vdc
Input Impedance ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 1.0 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ ) ( $V_{CE} = 10 \text{ Vdc}$ , $I_C = 10 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	h <sub>ie</sub>	2.0 0.25	8.0 1.25	kΩ
Voltage Feedback Ratio ( $V_{CE} = 10$ Vdc, $I_C = 1.0$ mAdc, $f = 1.0$ kHz) ( $V_{CE} = 10$ Vdc, $I_C = 10$ mAdc, $f = 1.0$ kHz)	h <sub>re</sub>		8.0x10 <sup>-4</sup> 4.0x10 <sup>-4</sup>	-
Small-Signal Current Gain ( $V_{CE} = 10 \text{ Vdc}, I_C = 1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$ ) ( $V_{CE} = 10 \text{ Vdc}, I_C = 10 \text{ mAdc}, f = 1.0 \text{ kHz}$ )	h <sub>fe</sub>	50 75	300 375	_
Output Admittance (V <sub>CE</sub> = 10 Vdc, I <sub>C</sub> = 1.0 mAdc, f = 1.0 kHz) (V <sub>CE</sub> = 10 Vdc, I <sub>C</sub> = 10 mAdc, f = 1.0 kHz)	h <sub>oe</sub>	5.0 25	35 200	μmhos
Noise Figure (V <sub>CE</sub> = 10 Vdc, I <sub>C</sub> = 100 $\mu$ Adc, f = 1.0 kHz)	F	-	4.0	dB
DYNAMIC CHARACTERISTICS				
Current-Gain – Bandwidth Product (I <sub>C</sub> = 20 mAdc, V <sub>CE</sub> = 20 Vdc, f = 100 MHz)	f <sub>T</sub>	300	-	MHz
Output Capacitance ( $V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 1.0 MHz)	C <sub>c</sub>	-	8.0	pF
Input Capacitance ( $V_{EB}$ = 0.5 Vdc, $I_C$ = 0, f = 1.0 MHz)	C <sub>e</sub>	-	25	pF
SWITCHING TIMES $(T_A = 25^{\circ}C)$				
Delay Time $(V_{CC} = 30 \text{ Vdc}, I_C = 150 \text{ mAdc},$	t <sub>d</sub>	-	10	ns
Rise Time I <sub>B(on)</sub> = 15 mAdc, V <sub>EB(off)</sub> = 0.5 Vdc) Figure 1	t <sub>r</sub>	_	25	
		1	-	
Storage Time $(V_{CC} = 30 \text{ Vdc}, I_C = 150 \text{ mAdc},$	ts	-	225	ns

## PZT2222AT1

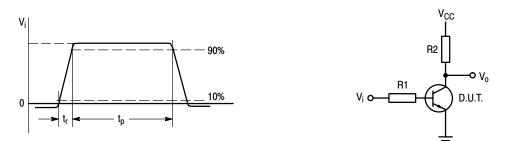


Figure 1. Input Waveform and Test Circuit for Determining Delay Time and Rise Time

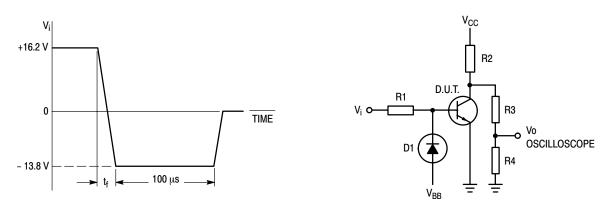
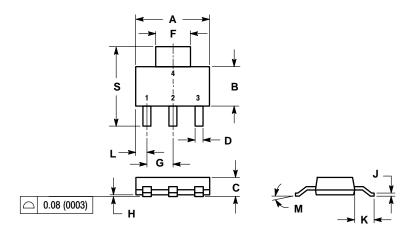


Figure 2. Input Waveform and Test Circuit for Determining Storage Time and Fall Time

#### PACKAGE DIMENSIONS

SOT-223 (TO-261) CASE 318E-04 ISSUE K



Y14.5M, 1982. CONTROLLING DIMENSION: INCH.					
	INCHES		MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
Α	0.249	0.263	6.30	6.70	
В	0.130	0.145	3.30	3.70	
C	0.060	0.068	1.50	1.75	
D	0.024	0.035	0.60	0.89	
F	0.115	0.126	2.90	3.20	
G	0.087	0.094	2.20	2.40	
н	0.0008	0.0040	0.020	0.100	
J	0.009	0.014	0.24	0.35	
K	0.060	0.078	1.50	2.00	
L	0.033	0.041	0.85	1.05	
М	0°	10 °	0 °	10 °	
S	0.264	0.287	6.70	7.30	

DIMENSIONING AND TOLERANCING PER ANSI

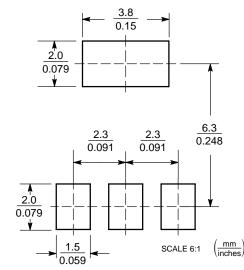
STYLE 1: PIN 1. BASE

NOTES:

1.

2. COLLECTOR 3. EMITTER 4. COLLECTOR

#### SOLDERING 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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor P.O. Box 61312, Phoenix, Arizona 85082–1312 USA Phone: 480–829–7710 or 800–344–3860 Toll Free USA/Canada Fax: 480–829–7709 or 800–344–3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800–282–9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center 2–9–1 Kamimeguro, Meguro–ku, Tokyo, Japan 153–0051 Phone: 81–3–5773–3850 ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.