

PZT222A

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
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	75	Vdc
Emitter-Base Voltage (Open Collector)	V_{EBO}	6.0	Vdc
Collector Current	I_C	600	mAdc
Total Power Dissipation up to $T_A = 25^\circ\text{C}$ (Note 1)	P_D	1.5	W
Storage Temperature Range	T_{stg}	- 65 to +150	$^\circ\text{C}$
Junction Temperature Range	T_J	- 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.

1. 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 inches².

THERMAL CHARACTERISTICS

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

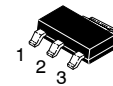
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



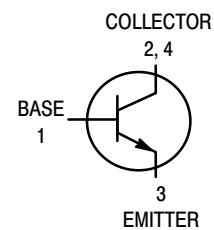
ON Semiconductor®

www.onsemi.com

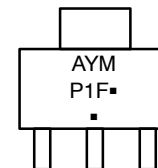
SOT-223 PACKAGE NPN SILICON TRANSISTOR SURFACE MOUNT



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



MARKING DIAGRAM



A = Assembly Location
Y = Year
M = Month Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
PZT222AT1G	SOT-223 (Pb-Free)	1,000 Tape & Reel
SPZT222AT1G	SOT-223 (Pb-Free)	1,000 Tape & Reel
PZT222AT3G	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 Specifications Brochure, BRD8011/D.

PZT2222A

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 10 mAdc, I _B = 0)	V _{(BR)CEO}	40	-	Vdc
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0)	V _{(BR)CBO}	75	-	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	V _{(BR)EBO}	6.0	-	Vdc
Base-Emitter Cutoff Current (V _{CE} = 60 Vdc, V _{BE} = - 3.0 Vdc)	I _{BEX}	-	20	nAdc
Collector-Emitter Cutoff Current (V _{CE} = 60 Vdc, V _{BE} = - 3.0 Vdc)	I _{CEX}	-	10	nAdc
Emitter-Base Cutoff Current (V _{EB} = 3.0 Vdc, I _C = 0)	I _{EBO}	-	100	nAdc
Collector-Base Cutoff Current (V _{CB} = 60 Vdc, I _E = 0) (V _{CB} = 60 Vdc, I _E = 0, T _A = 125°C)	I _{CBO}	- -	10 10	nAdc μAdc

ON CHARACTERISTICS

DC Current Gain (I _C = 0.1 mAdc, V _{CE} = 10 Vdc) (I _C = 1.0 mAdc, V _{CE} = 10 Vdc) (I _C = 10 mAdc, V _{CE} = 10 Vdc) (I _C = 10 mAdc, V _{CE} = 10 Vdc, T _A = - 55°C) (I _C = 150 mAdc, V _{CE} = 10 Vdc) (I _C = 150 mAdc, V _{CE} = 1.0 Vdc) (I _C = 500 mAdc, V _{CE} = 10 Vdc)	h _{FE}	35 50 70 35 100 50 40	- - - - 300 - -	-
Collector-Emitter Saturation Voltages (I _C = 150 mAdc, I _B = 15 mAdc) (I _C = 500 mAdc, I _B = 50 mAdc)	V _{CE(sat)}	- -	0.3 1.0	Vdc
Base-Emitter Saturation Voltages (I _C = 150 mAdc, I _B = 15 mAdc) (I _C = 500 mAdc, I _B = 50 mAdc)	V _{BE(sat)}	0.6 -	1.2 2.0	Vdc
Input Impedance (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 _{ie}	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 _{re}	- -	8.0x10 ⁻⁴ 4.0x10 ⁻⁴	-
Small-Signal Current Gain (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 _{fe}	50 75	300 375	-
Output Admittance (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 _{oe}	5.0 25	35 200	μmhos
Noise Figure (V _{CE} = 10 Vdc, I _C = 100 μAdc, f = 1.0 kHz)	F	-	4.0	dB

DYNAMIC CHARACTERISTICS

Current-Gain – Bandwidth Product (I _C = 20 mAdc, V _{CE} = 20 Vdc, f = 100 MHz)	f _T	300	-	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 1.0 MHz)	C _c	-	8.0	pF
Input Capacitance (V _{EB} = 0.5 Vdc, I _C = 0, f = 1.0 MHz)	C _e	-	25	pF

SWITCHING TIMES (T_A = 25°C)

Delay Time	(V _{CC} = 30 Vdc, I _C = 150 mAdc, I _{B(on)} = 15 mAdc, V _{EB(off)} = 0.5 Vdc) Figure 1	t _d	-	10	ns
Rise Time		t _r	-	25	
Storage Time	(V _{CC} = 30 Vdc, I _C = 150 mAdc, I _{B(on)} = I _{B(off)} = 15 mAdc) Figure 2	t _s	-	225	ns
Fall Time		t _f	-	60	

PZT2222A

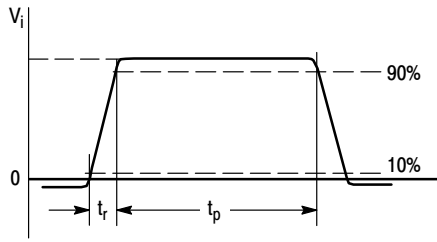


Figure 1. Input Waveform and Test Circuit for Determining Delay Time and Rise Time

$V_i = -0.5 \text{ V to } +9.9 \text{ V}$, $V_{CC} = +30 \text{ V}$, $R_1 = 619 \Omega$, $R_2 = 200 \Omega$.

PULSE GENERATOR:

PULSE DURATION t_p 3 200 ns
RISE TIME t_r 3 2 ns
DUTY FACTOR δ = 0.02

OSCILLOSCOPE:

INPUT IMPEDANCE $Z_i > 100 \text{ k}\Omega$
INPUT CAPACITANCE $C_i < 12 \text{ pF}$
RISE TIME $t_r < 5 \text{ ns}$

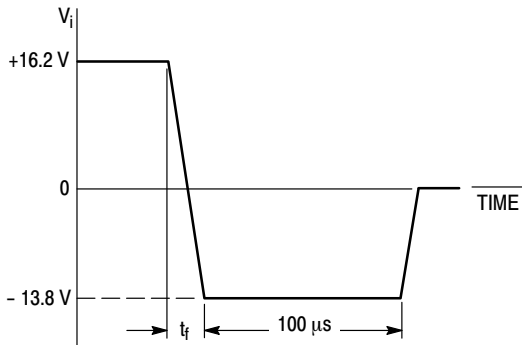


Figure 2. Input Waveform and Test Circuit for Determining Storage Time and Fall Time

TYPICAL CHARACTERISTICS

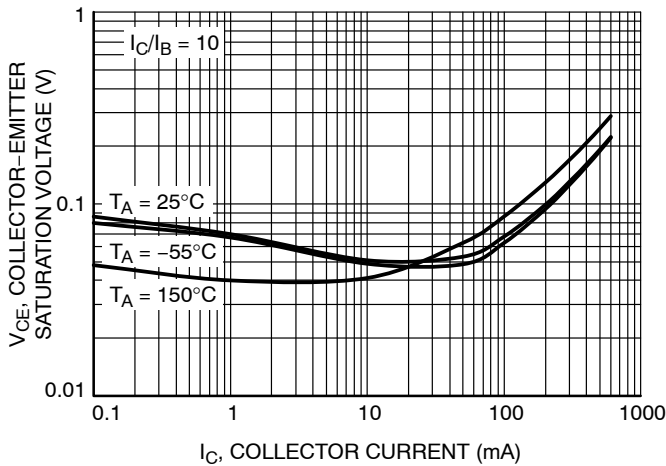


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

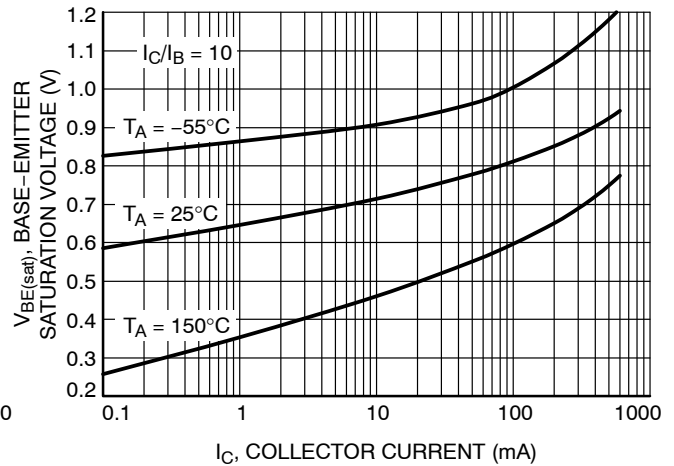


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

TYPICAL CHARACTERISTICS

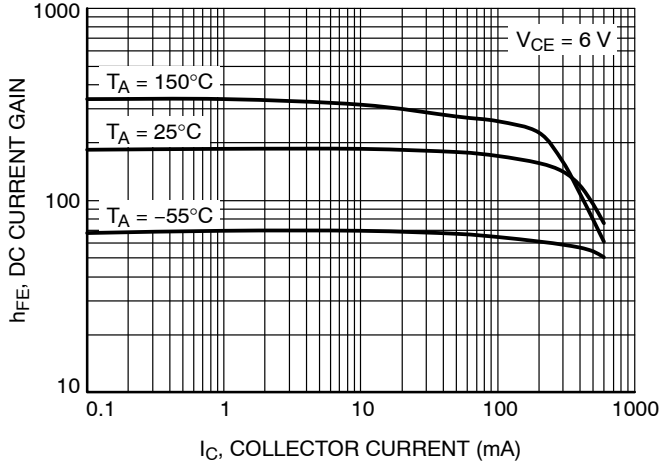


Figure 5. DC Current Gain vs. Collector Current

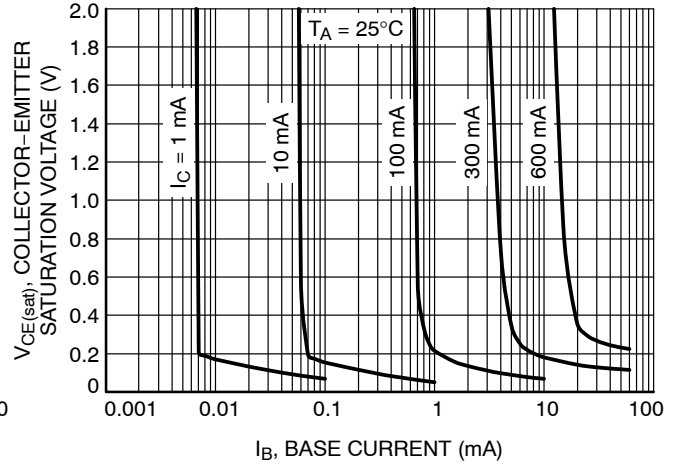


Figure 6. Saturation Region

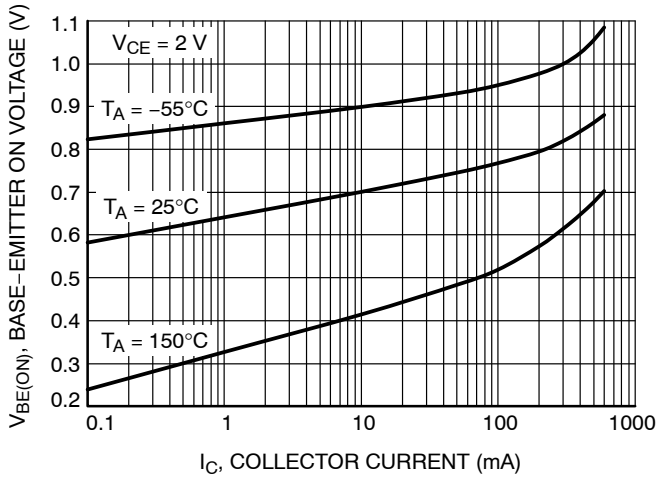


Figure 7. Base-Emitter Turn-On Voltage vs. Collector Current

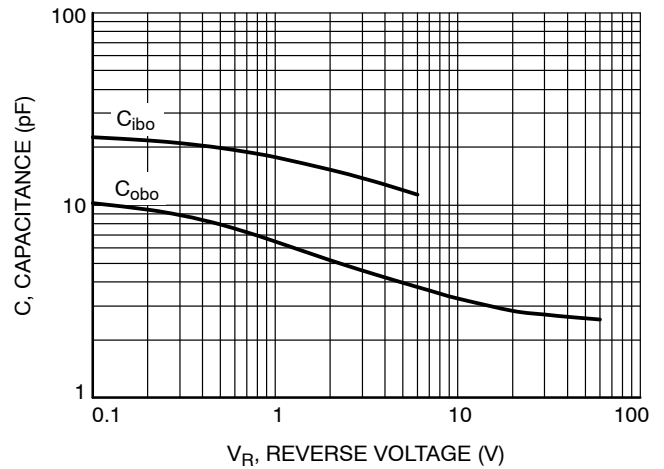


Figure 8. Capacitance

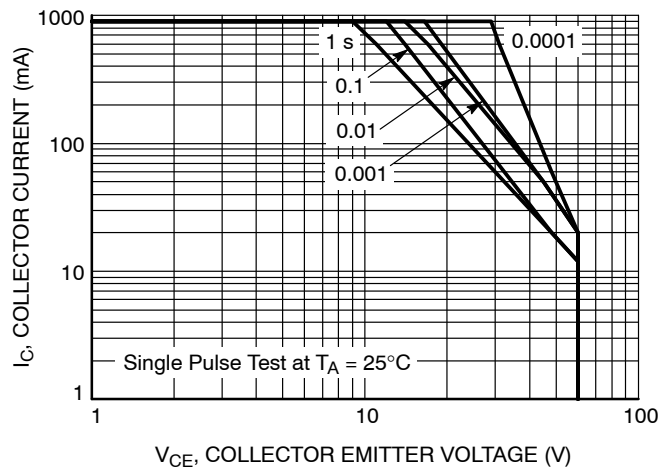


Figure 9. Safe Operating Area

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1

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

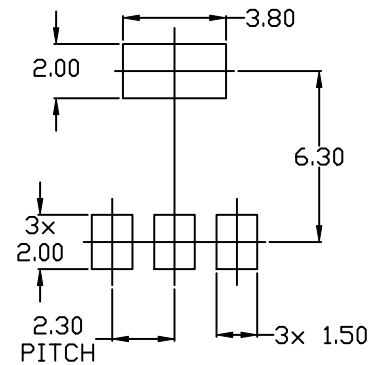
DATE 02 OCT 2018



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
θ	0°	---	10°



DOCUMENT NUMBER:	98ASB42680B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-223 (TO-261)	PAGE 1 OF 2

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

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

DATE 02 OCT 2018

- | | | | | |
|--|---|---|---|---|
| STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 2:
PIN 1. ANODE
2. CATHODE
3. NC
4. CATHODE | STYLE 3:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN | STYLE 4:
PIN 1. SOURCE
2. DRAIN
3. GATE
4. DRAIN | STYLE 5:
PIN 1. DRAIN
2. GATE
3. SOURCE
4. GATE |
| STYLE 6:
PIN 1. RETURN
2. INPUT
3. OUTPUT
4. INPUT | STYLE 7:
PIN 1. ANODE 1
2. CATHODE
3. ANODE 2
4. CATHODE | STYLE 8:
CANCELLED | STYLE 9:
PIN 1. INPUT
2. GROUND
3. LOGIC
4. GROUND | STYLE 10:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE |
| STYLE 11:
PIN 1. MT 1
2. MT 2
3. GATE
4. MT 2 | STYLE 12:
PIN 1. INPUT
2. OUTPUT
3. NC
4. OUTPUT | STYLE 13:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | | |

**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.

DOCUMENT NUMBER:	98ASB42680B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-223 (TO-261)	PAGE 2 OF 2

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[SPZT2222AT1G](#)