NPN Silicon Planar Epitaxial Transistor

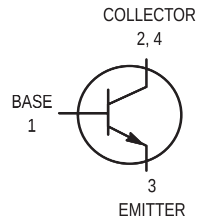
PZT2222AT1

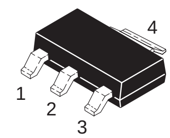
Motorola Preferred Device

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.

- 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
  Use PZT2222AT1 to order the 7 inch/1000 unit reel.
  Use PZT2222AT3 to order the 13 inch/4000 unit reel.

SOT-223 PACKAGE
NPN SILICON
TRANSISTOR
SURFACE MOUNT





CASE 318E-04, STYLE 1
TO-261AA

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°C(1)	P_D	1.5	Watts
Storage Temperature Range	T_{stg}	– 65 to +150	°C
Junction Temperature	T_J	150	°C

THERMAL CHARACTERISTICS

Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	83.3	°C/W
Lead Temperature for Soldering, 0.0625″ from case Time in Solder Bath	T_L	260 10	°C Sec

DEVICE MARKING

P1F

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

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 inches^2.

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

REV 2

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS (continued)				
Collector-Base Cutoff Current	I_{CBO}			
(V_{CB} = 60 Vdc, I_E = 0)		—	10	nAdc
(V_{CB} = 60 Vdc, I_E = 0, T_A = 125°C)		—	10	µAdc
ON CHARACTERISTICS				
DC Current Gain	h_{FE}			—
(I_C = 0.1 mAdc, V_{CE} = 10 Vdc)		35	—	
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)		50	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)		70	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = – 55°C)		35	—	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)		100	300	
(I_C = 150 mAdc, V_{CE} = 1.0 Vdc)		50	—	
(I_C = 500 mAdc, V_{CE} = 10 Vdc)		40	—	
Collector-Emitter Saturation Voltages	$V_{CE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)		—	0.3	
(I_C = 500 mAdc, I_B = 50 mAdc)		—	1.0	
Base-Emitter Saturation Voltages	$V_{BE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)		0.6	1.2	
(I_C = 500 mAdc, I_B = 50 mAdc)		—	2.0	
Input Impedance	h_{ie}			kΩ
(V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)		2.0	8.0	
(V_{CE} = 10 Vdc, I_C = 10 mAdc, f = 1.0 kHz)		0.25	1.25	
Voltage Feedback Ratio	h_{re}			—
(V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)		—	8.0×10^{-4}	
(V_{CE} = 10 Vdc, I_C = 10 mAdc, f = 1.0 kHz)		—	4.0×10^{-4}	
Small-Signal Current Gain	$\lvert h_{fe} \rvert$			—
(V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)		50	300	
(V_{CE} = 10 Vdc, I_C = 10 mAdc, f = 1.0 kHz)		75	375	
Output Admittance	h_{oe}			µmhos
(V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)		5.0	35	
(V_{CE} = 10 Vdc, I_C = 10 mAdc, f = 1.0 kHz)		25	200	
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)

Characteristic	Conditions	Symbol	Min	Max	Unit
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	

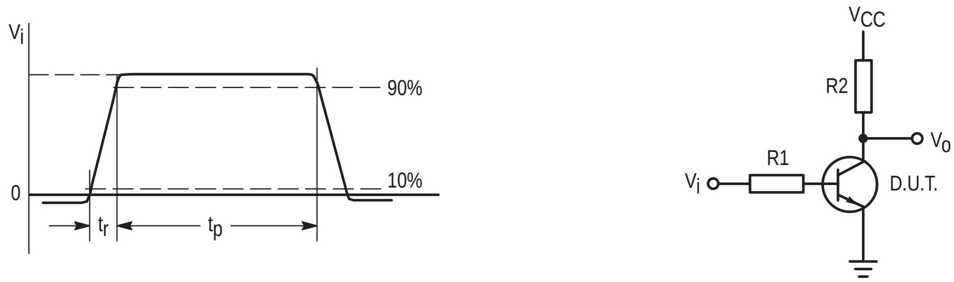


Figure 1. Input Waveform and Test Circuit for Determining Delay Time and Rise Time

V_i = – 0.5 V to +9.9 V, V_{CC} = +30 V, R1 = 619 Ω, R2 = 200 Ω.

PULSE GENERATOR:			
PULSE DURATION	t_p	≤	**200 ns**
RISE TIME	t_r	≤	**2 ns**
DUTY FACTOR	δ	=	**0.02**

OSCILLOSCOPE:			
INPUT IMPEDANCE	Z_i	>	**100 kΩ**
INPUT CAPACITANCE	C_i	<	**12 pF**
RISE TIME	t_r	<	**5 ns**

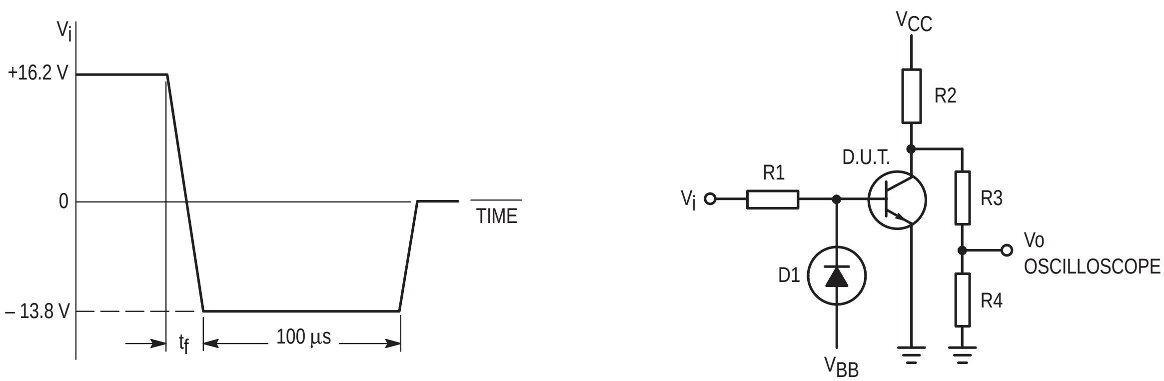


Figure 2. Input Waveform and Test Circuit for Determining Storage Time and Fall Time