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PN2907A / MMBT2907A / PZT2907A 60 V PNP General-Purpose Transistor

Features

- High DC Current Gain (hFF) Range: 100 ~ 300
- High-Current Gain Bandwidth Product (f_T):
 200 MHz (Minimum)
- Maximum Turn-On Time (ton): 45 ns
- Maximum Turn-Off Time (toff): 100 ns
- Ultra-Small Surface-Mount Package: SOT-223 (PZT2907A)

Description

The PN2907A, MMBT2907A, and PZT2907A are 60 V PNP bipolar transistors designed for use as a general-purpose amplifier or switch in applications that require up to 500 mA. Offered in an ultra-small surface-mount package (SOT-223), the PZT2907A is ideal for space-constrained systems. The NPN complementary types are the PN2222A, MMBT2222A, and PZT2222A; respectively.

Applications

- · General-Purpose Amplifier
- Switch



Ordering Information

Part Number	Top Mark	Package	Packing Method
PN2907ABU	2907A	TO-92 3L	Bulk
PN2907ATF	2907A	TO-92 3L	Tape and Reel
PN2907ATFR	2907A	TO-92 3L	Tape and Reel
PN2907ATA	2907A	TO-92 3L	Ammo
PN2907ATAR	2907A	TO-92 3L	Ammo
MMBT2907A	2F	SOT-23 3L	Tape and Reel
MMBT2907A-D87Z	2F	SOT-23 3L	Tape and Reel
PZT2907A	2907A	SOT-223 4L	Tape and Reel

Absolute Maximum Ratings(1),(2)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^{\circ}C$ unless otherwise noted.

Symbol	Parameter	Value	Unit
V _{CEO}	Collector-Emitter Voltage	-60	V
V _{CBO}	Collector-Base Voltage	-60	V
V _{EBO}	Emitter-Base Voltage	-5.0	V
I _C	Collector Current - Continuous	-800	mA
T _J , T _{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Notes:

- 1. These ratings are based on a maximum junction temperature of 150°C.
- 2. These are steady-state limits. ON Semiconductor should be consulted on applications involving pulsed or lowduty cycle operations.

Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.			
Symbol	raiailletei	PN2907A ⁽⁴⁾	MMBT2907A ⁽³⁾	PZT2907A ⁽⁴⁾ 1000 8.0	Unit
Б	Total Device Dissipation	625	350	1000	mW
P _D	Derate Above 25°C	5.0	2.8	8.0	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3			°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	125	°C/W

Notes:

- 3. Device is mounted on FR-4 PCB 1.6 inch X 1.6 inch X 0.06 inch.
- 4. PCB size: FR-4 76 x 114 x 1.57 mm³ (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

Electrical Characteristics

Values are at $T_A = 25^{\circ}C$ unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit
Off Charac	cteristics			•	
V _{(BR)CEO}	Collector-Emitter Breakdown Voltage ⁽⁵⁾	$I_C = -10 \text{ mA}, I_B = 0$	-60		V
V _{(BR)CBO}	Collector-Base Breakdown Voltage	I _C = -10 μA, I _E = 0	-60		V
V _{(BR)EBO}	Emitter-Base Breakdown Voltage	$I_E = -10 \mu A, I_C = 0$	-5.0		V
I _{BL}	Base Cut-Off Current	V_{CE} = -30 V, V_{EB} = -0.5 V		-50	nA
I _{CEX}	Collector Cut-Off Current	V _{CE} = -30 V, V _{EB} = -0.5 V		-50	nA
I _{CBO}	Collector Cut-Off Current	V _{CB} = -50 V, I _E = 0		-0.02	μΑ
		V _{CB} = -50 V, I _E = 0, T _A = 150°C		-20	
On Charac	teristics				
	DC Current Gain	$I_C = -0.1 \text{ mA}, V_{CE} = -10 \text{ V}$	75		
		I _C = -1.0 mA, V _{CE} = -10 V	100		
h_{FE}		I _C = -10 mA, V _{CE} = -10 V	100		
		$I_C = -150 \text{ mA}, V_{CE} = -10 V^{(5)}$	100	300	
		I _C = -500 mA, V _{CE} = -10 V ⁽⁵⁾	50		
\/ (cot)	Collector-Emitter Saturation Voltage ⁽⁵⁾	I _C = -150 mA, I _B = -15 mA		-0.4	- V
V _{CE} (sat)		I _C = -500 mA, I _B = -50 mA		-1.6	
\	Door Freitter Ceturation Valtage	I _C = -150 mA, I _B = -15 mA ⁽⁵⁾		-1.3	- V
V _{BE} (sat)	Base-Emitter Saturation Voltage	I _C = -500 mA, I _B = -50 mA		-2.6	
Small Sign	nal Characteristics				
f _T	Current Gain - Bandwidth Product	I _C = -50 mA, V _{CE} = -20 V, f = 100 MHz	200		MHz
C _{ob}	Output Capacitance	V _{CB} = -10 V, I _E = 0, f = 100 kHz		8.0	pF
C _{ib}	Input Capacitance	$V_{EB} = -2.0 \text{ V}, I_{C} = 0, f = 100 \text{ kHz}$		30	pF
Switching	Characteristics				
t _{on}	Turn-On Time			45	ns
t _d	Delay Time	$V_{CC} = -30 \text{ V}, I_{C} = -150 \text{ mA},$ $I_{B1} = -15 \text{ mA}$		10	ns
t _r	Rise Time	I IBJ 10 IIW		40	ns
t _{off}	Turn-Off Time			100	ns
t _s	Storage Time	$V_{CC} = -6.0 \text{ V, } I_{C} = -150 \text{ mA,}$ $I_{B1} = I_{B2} = -15\text{mA}$		80	ns
t _f	Fall Time	1.81 1.85 – 1911177		30	ns

5. Pulse test: pulse width \leq 300 μ s, duty cycle \leq 2.0%.

Typical Performance Characteristics

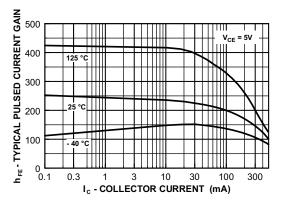


Figure 1. Typical Pulsed Current Gain vs. Collector Current

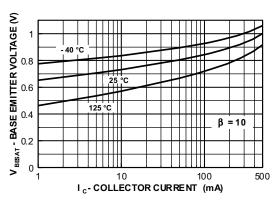


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

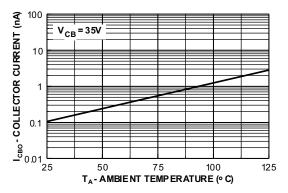


Figure 5. Collector Cut-Off Current vs.
Ambient Temperature

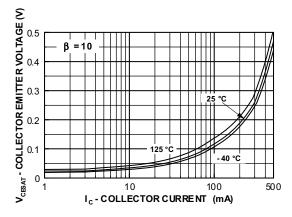


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

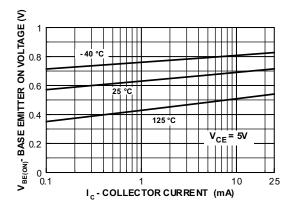


Figure 4. Base-Emitter On Voltage vs. Collector Current

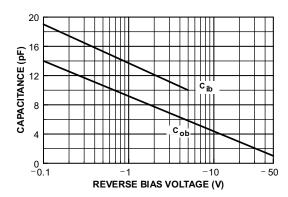


Figure 6. Input and Output Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

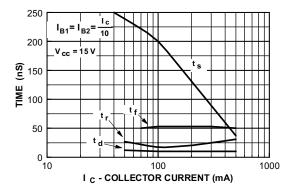


Figure 7. Switching Times vs. Collector Current

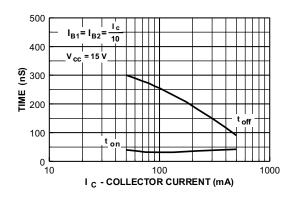


Figure 8. Turn-On and Turn-Off Times vs. Collector Current

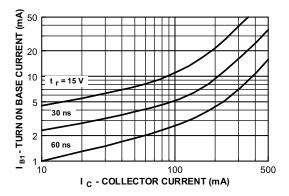


Figure 9. Rise Time vs. Collector and Turn-On Base Currents

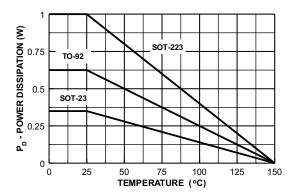


Figure 10. Power Dissipation vs. Ambient Temperature

Typical Performance Characteristics (f = 1.0 kHz)

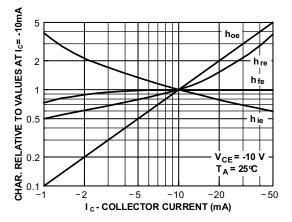


Figure 11. Common Emitter Characteristics

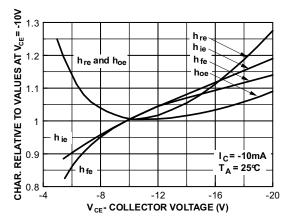


Figure 12. Common Emitter Characteristics

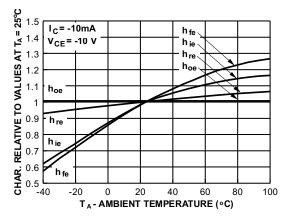


Figure 13. Common Emitter Characteristics

Physical Dimensions

TO-92 (Bulk)

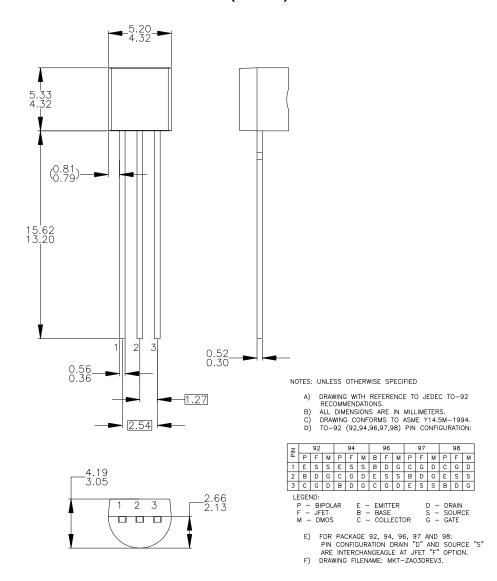
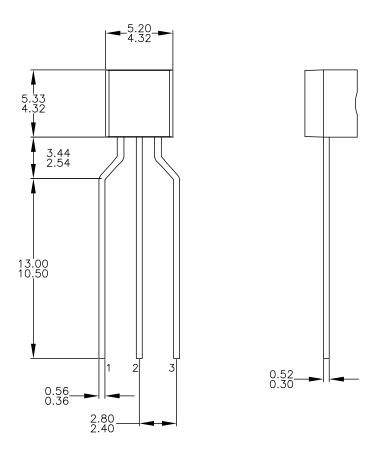


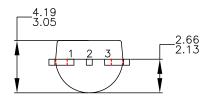
Figure 14. 3-LEAD, TO92, JEDEC TO-92 COMPLIANT STRAIGHT LEAD CONFIGURATION (OLD TO92AM3) (ACTIVE)

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Physical Dimensions (Continued)

TO-92 (Tape and Reel, Ammo)





NOTES: UNLESS OTHERWISE SPECIFIED

- DRAWING CONFORMS TO JEDEC MS-013, VARIATION AC.
 ALL DIMENSIONS ARE IN MILLIMETERS.
 DRAWING CONFORMS TO ASME Y14.5M-2009.
 DRAWING FILENAME: MKT-ZAO3FREV3.

Figure 15. 3-LEAD, TO92, MOLDED 0.200 IN LINE SPACING LEAD FORM (J61Z OPTION) (ACTIVE)

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Physical Dimensions (Continued)

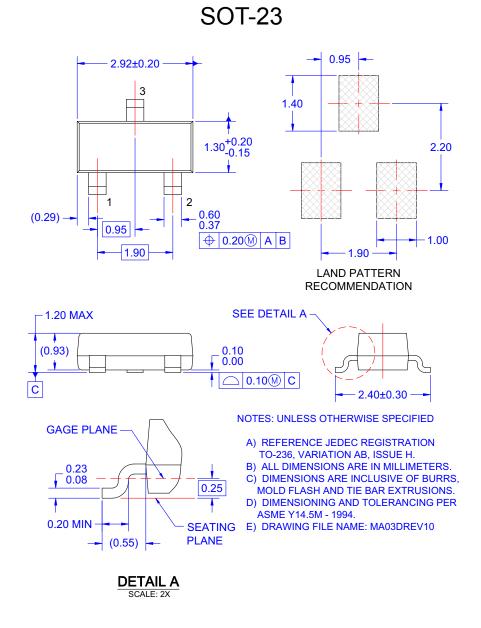


Figure 16. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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Physical Dimensions (Continued)

SOT-223

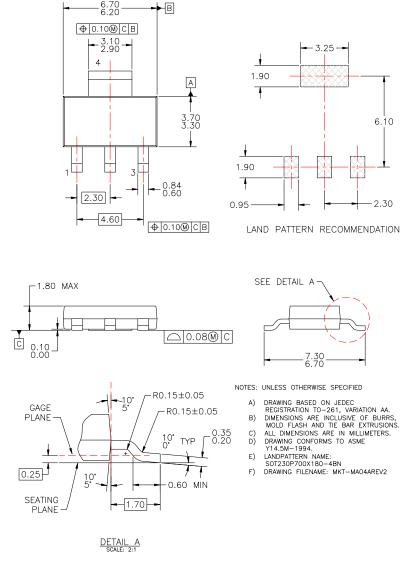


Figure 17. MOLDED PACKAGING, SOT-223, 4-LEAD (ACTIVE)

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