

# PN2907ATFR Datasheet

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|                              |  |
|------------------------------|--|
| DiGi Electronics Part Number | PN2907ATFR-DG  |
| Manufacturer                 | <a href="#">onsemi</a>   |
| Manufacturer Product Number  | PN2907ATFR   |
| Description                  | TRANS PNP 60V 0.8A TO92-3  |
| Detailed Description         | Bipolar (BJT) Transistor PNP 60 V 800 mA 200MHz 6 25 mW Through Hole TO-92-3 |



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## Purchase and inquiry

Manufacturer Product Number:

PN2907ATFR

Series:

-

Transistor Type:

PNP

Voltage - Collector Emitter Breakdown (Max):

60 V

Current - Collector Cutoff (Max):

20nA (ICBO)

Power - Max:

625 mW

Operating Temperature:

-55°C ~ 150°C (TJ)

Package / Case:

TO-226-3, TO-92-3 (TO-226AA) Formed Leads

Base Product Number:

PN2907

Manufacturer:

onsemi

Product Status:

Active

Current - Collector (Ic) (Max):

800 mA

Vce Saturation (Max) @ Ib, Ic:

1.6V @ 50mA, 500mA

DC Current Gain (hFE) (Min) @ Ic, Vce:

100 @ 150mA, 10V

Frequency - Transition:

200MHz

Mounting Type:

Through Hole

Supplier Device Package:

TO-92-3

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0075

Moisture Sensitivity Level (MSL):

Not Applicable

ECCN:

EAR99



# ON Semiconductor

## Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

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

### Features

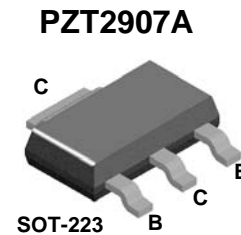
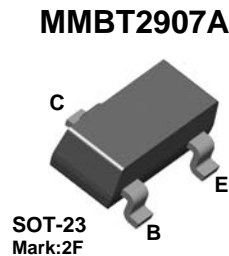
- High DC Current Gain ( $h_{FE}$ ) Range: 100 ~ 300
- High-Current Gain Bandwidth Product ( $f_T$ ): 200 MHz (Minimum)
- Maximum Turn-On Time ( $t_{on}$ ): 45 ns
- Maximum Turn-Off Time ( $t_{off}$ ): 100 ns
- Ultra-Small Surface-Mount Package: SOT-223 (PZT2907A)

### Applications

- General-Purpose Amplifier
- Switch

### 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.



### 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  |

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

## Absolute Maximum Ratings<sup>(1),(2)</sup>

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  $T_A = 25^\circ\text{C}$  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 | $^\circ\text{C}$ |

### Notes:

1. These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
2. These are steady-state limits. ON Semiconductor should be consulted on applications involving pulsed or low-duty cycle operations.

## Thermal Characteristics

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

| Symbol          | Parameter                               | Max.                   |                          |                         | Unit                      |
|-----------------|---|------------------------|--------------------------|-------------------------|---------------------------|
|                 |   | PN2907A <sup>(4)</sup> | MMBT2907A <sup>(3)</sup> | PZT2907A <sup>(4)</sup> |                           |
| $P_D$           | Total Device Dissipation                | 625                    | 350                      | 1000                    | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 5.0                    | 2.8                      | 8.0                     | mW/ $^\circ\text{C}$      |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    | 83.3                   |                          |                         | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 200                    | 357                      | 125                     | $^\circ\text{C}/\text{W}$ |

### 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 mm<sup>3</sup> (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

## Electrical Characteristics

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

| Symbol                              | Parameter   | Conditions   | Min. | Max.  | Unit          |
|-------------------------------------|---|--|------|-------|---------------|
| <b>Off Characteristics</b>          |   |  |      |       |               |
| $V_{(BR)CEO}$                       | Collector-Emitter Breakdown Voltage <sup>(5)</sup>  | $I_C = -10\text{ mA}, I_B = 0$   | -60  |       | V             |
| $V_{(BR)CBO}$                       | Collector-Base Breakdown Voltage                    | $I_C = -10\text{ }\mu\text{A}, I_E = 0$  | -60  |       | V             |
| $V_{(BR)EBO}$                       | Emitter-Base Breakdown Voltage                      | $I_E = -10\text{ }\mu\text{A}, I_C = 0$  | -5.0 |       | V             |
| $I_{BL}$                            | Base Cut-Off Current                                | $V_{CE} = -30\text{ V}, V_{EB} = -0.5\text{ V}$                                      |      | -50   | nA            |
| $I_{CEX}$                           | Collector Cut-Off Current                           | $V_{CE} = -30\text{ V}, V_{EB} = -0.5\text{ V}$                                      |      | -50   | nA            |
| $I_{CBO}$                           | Collector Cut-Off Current                           | $V_{CB} = -50\text{ V}, I_E = 0$   |      | -0.02 | $\mu\text{A}$ |
|                                     |   | $V_{CB} = -50\text{ V}, I_E = 0, T_A = 150^\circ\text{C}$                            |      | -20   |               |
| <b>On Characteristics</b>           |   |  |      |       |               |
| $h_{FE}$                            | DC Current Gain                                     | $I_C = -0.1\text{ mA}, V_{CE} = -10\text{ V}$  | 75   |       |               |
|                                     |   | $I_C = -1.0\text{ mA}, V_{CE} = -10\text{ V}$  | 100  |       |               |
|                                     |   | $I_C = -10\text{ mA}, V_{CE} = -10\text{ V}$   | 100  |       |               |
|                                     |   | $I_C = -150\text{ mA}, V_{CE} = -10\text{ V}^{(5)}$                                  | 100  | 300   |               |
|                                     |   | $I_C = -500\text{ mA}, V_{CE} = -10\text{ V}^{(5)}$                                  | 50   |       |               |
| $V_{CE(sat)}$                       | Collector-Emitter Saturation Voltage <sup>(5)</sup> | $I_C = -150\text{ mA}, I_B = -15\text{ mA}$  |      | -0.4  | V             |
|                                     |   | $I_C = -500\text{ mA}, I_B = -50\text{ mA}$  |      | -1.6  |               |
| $V_{BE(sat)}$                       | Base-Emitter Saturation Voltage                     | $I_C = -150\text{ mA}, I_B = -15\text{ mA}^{(5)}$                                    |      | -1.3  | V             |
|                                     |   | $I_C = -500\text{ mA}, I_B = -50\text{ mA}$  |      | -2.6  |               |
| <b>Small Signal Characteristics</b> |   |  |      |       |               |
| $f_T$                               | Current Gain - Bandwidth Product                    | $I_C = -50\text{ mA}, V_{CE} = -20\text{ V},$<br>$f = 100\text{ MHz}$                | 200  |       | MHz           |
| $C_{ob}$                            | Output Capacitance                                  | $V_{CB} = -10\text{ V}, I_E = 0,$<br>$f = 100\text{ kHz}$                            |      | 8.0   | pF            |
| $C_{ib}$                            | Input Capacitance                                   | $V_{EB} = -2.0\text{ V}, I_C = 0, f = 100\text{ kHz}$                                |      | 30    | pF            |
| <b>Switching Characteristics</b>    |   |  |      |       |               |
| $t_{on}$                            | Turn-On Time  | $V_{CC} = -30\text{ V}, I_C = -150\text{ mA},$<br>$I_{B1} = -15\text{ mA}$           |      | 45    | ns            |
| $t_d$                               | Delay Time  |  |      | 10    | ns            |
| $t_r$                               | Rise Time   |  |      | 40    | ns            |
| $t_{off}$                           | Turn-Off Time                                       | $V_{CC} = -6.0\text{ V}, I_C = -150\text{ mA},$<br>$I_{B1} = I_{B2} = -15\text{ mA}$ |      | 100   | ns            |
| $t_s$                               | Storage Time  |  |      | 80    | ns            |
| $t_f$                               | Fall Time   |  |      | 30    | ns            |

### Notes:

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

### Typical Performance Characteristics

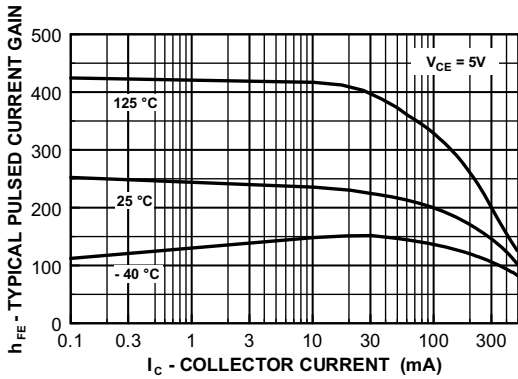


Figure 1. Typical Pulsed Current Gain vs. Collector Current

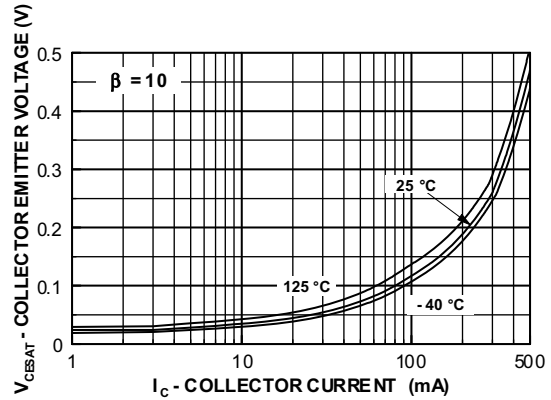


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

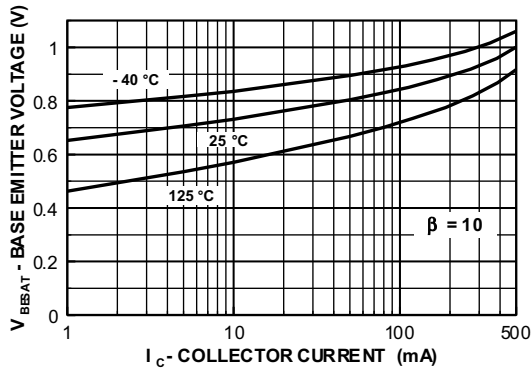


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

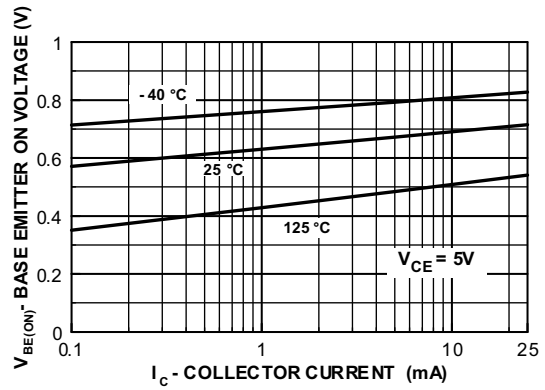


Figure 4. Base-Emitter On Voltage vs. Collector Current

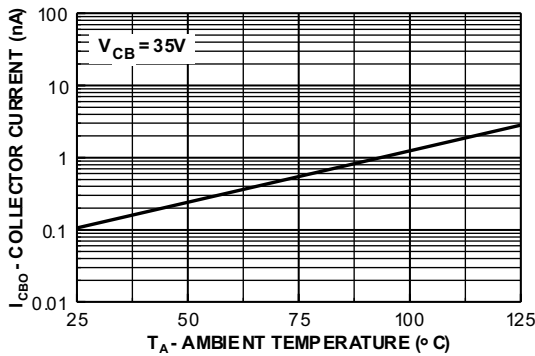


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

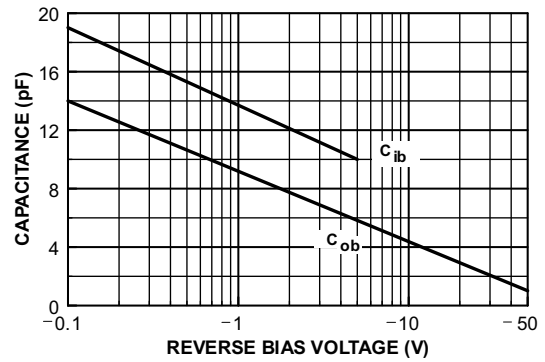


Figure 6. Input and Output Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

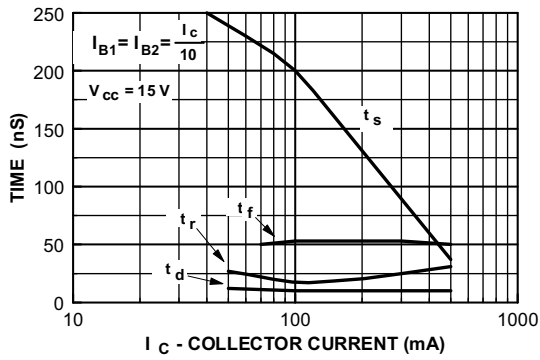


Figure 7. Switching Times vs. Collector Current

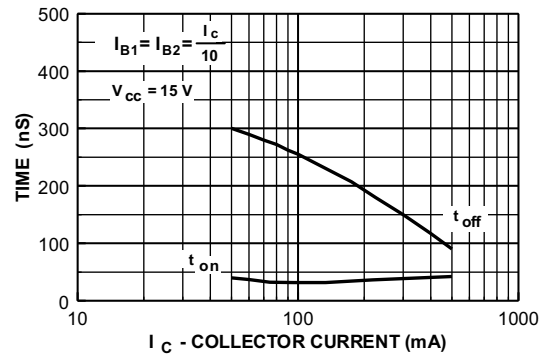


Figure 8. Turn-On and Turn-Off Times vs. Collector Current

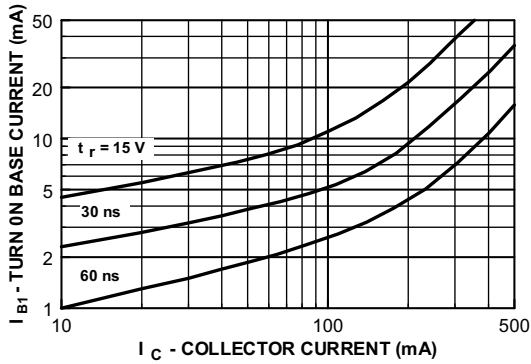


Figure 9. Rise Time vs. Collector and Turn-On Base Currents

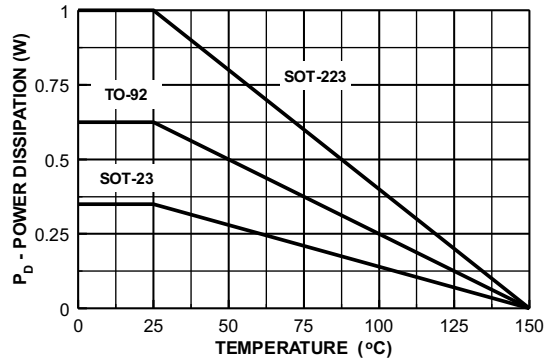


Figure 10. Power Dissipation vs. Ambient Temperature



Typical Performance Characteristics (f = 1.0 kHz)

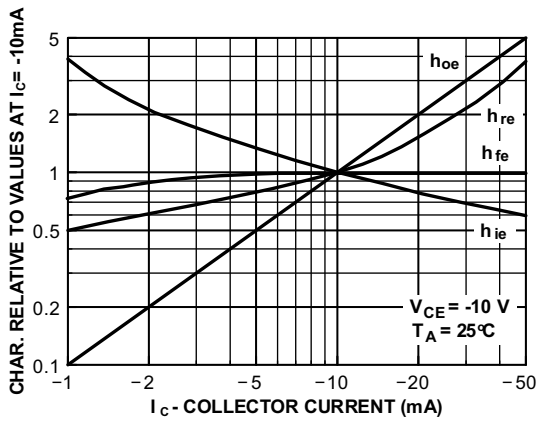


Figure 11. Common Emitter Characteristics

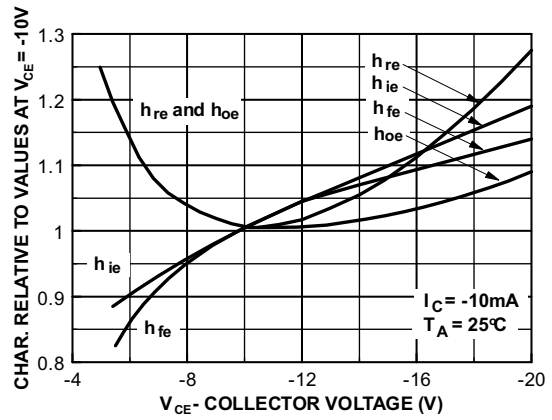


Figure 12. Common Emitter Characteristics

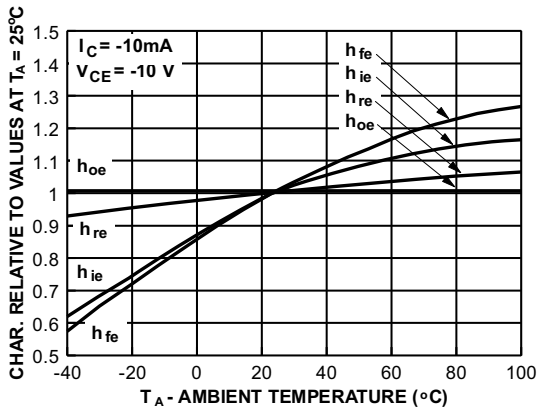
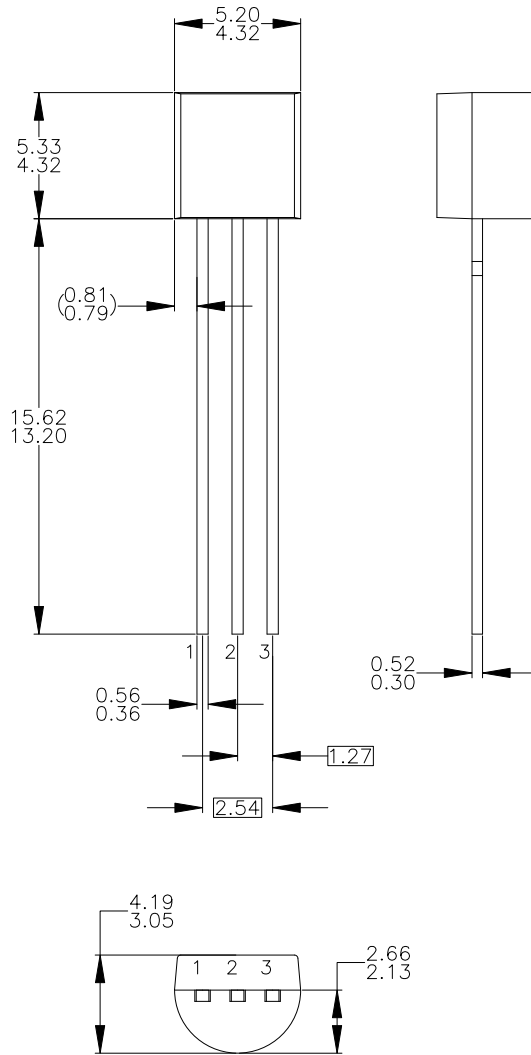


Figure 13. Common Emitter Characteristics

Physical Dimensions

TO-92 (Bulk)



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

| PIN | 92 |   |   | 94 |   |   | 96 |   |   | 97 |   |   | 98 |   |   |
|-----|----|---|---|----|---|---|----|---|---|----|---|---|----|---|---|
|     | P  | F | M | P  | F | M | B  | F | M | P  | F | M | P  | F | M |
| 1   | E  | S | S | E  | S | S | B  | D | G | C  | G | D | C  | G | D |
| 2   | B  | D | G | C  | G | D | E  | S | S | B  | D | G | E  | S | S |
| 3   | C  | G | D | B  | D | G | C  | G | D | E  | S | S | B  | D | G |

LEGEND:

- P - BIPOLAR
- F - JFET
- M - DMOS
- E - EMITTER
- B - BASE
- C - COLLECTOR
- D - DRAIN
- S - SOURCE
- G - GATE

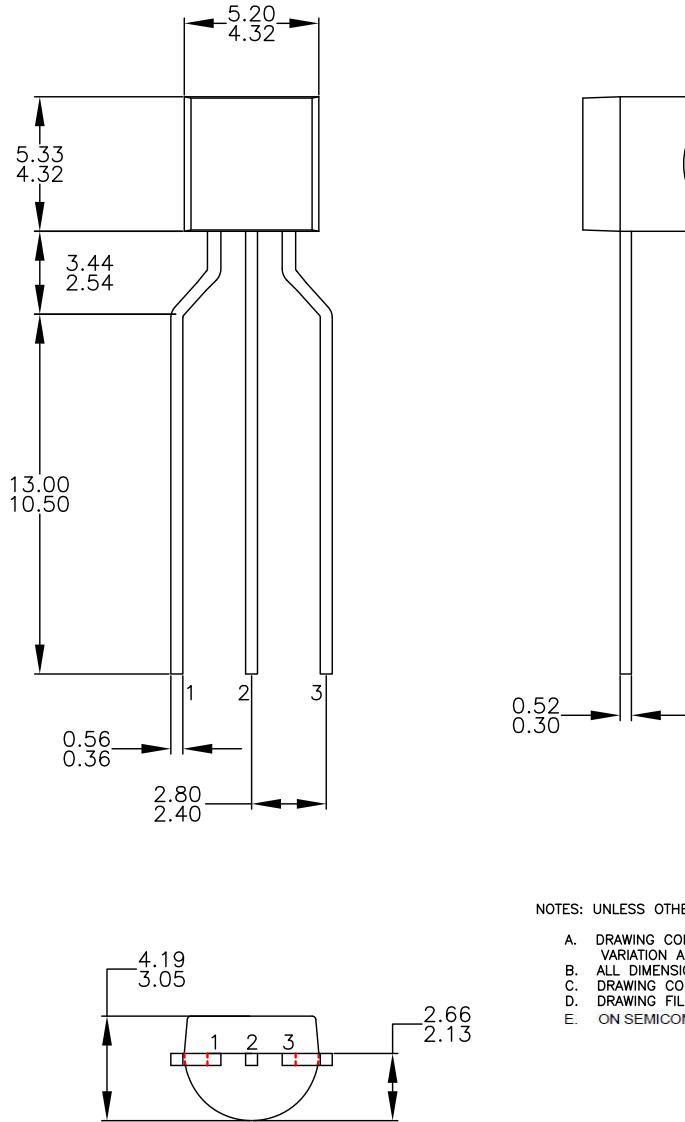
- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03DREV3.

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

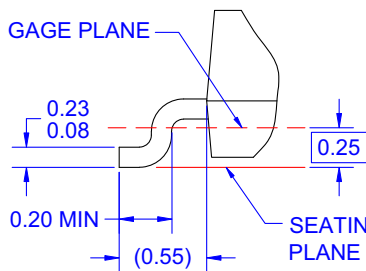
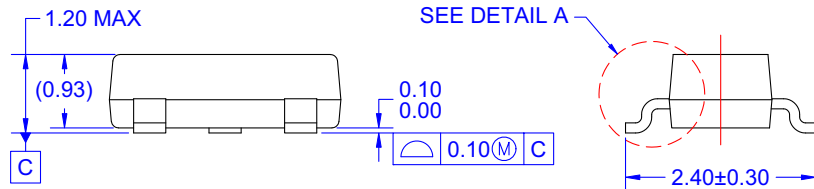
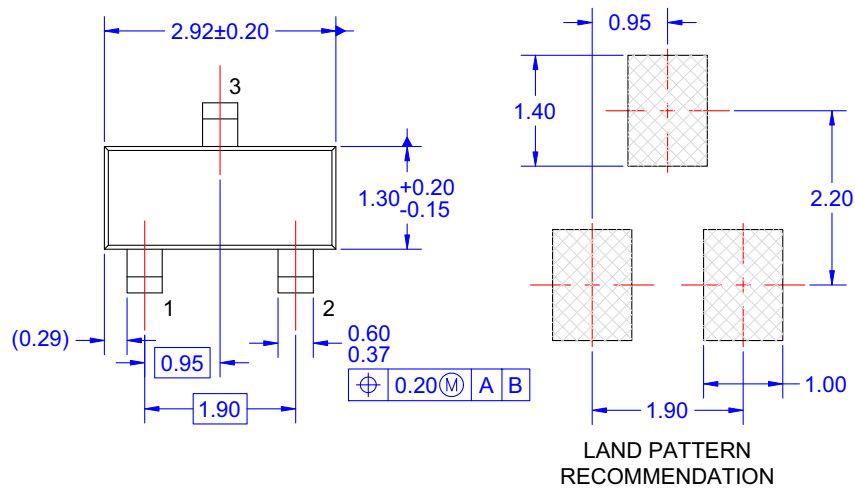
- A. DRAWING CONFORMS TO JEDEC MS-013, VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5M-2009.
- D. DRAWING FILENAME: MKT-ZA03FREV3.
- E. ON SEMICONDUCTOR

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

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Physical Dimensions (Continued)

SOT-23



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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 1994.
- E) DRAWING FILE NAME: MA03DREV10

**DETAIL A**  
SCALE: 2X

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

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Physical Dimensions (Continued)

SOT-223

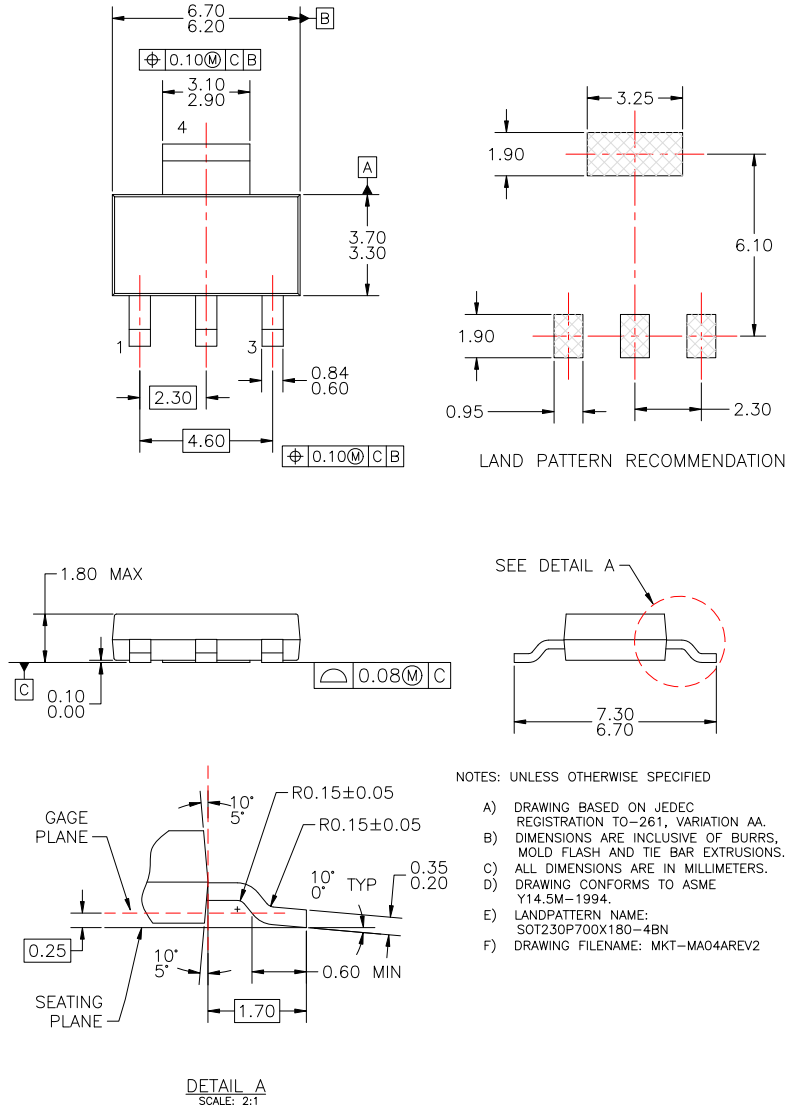



Figure 17. MOLDED PACKAGING, SOT-223, 4-LEAD (ACTIVE)

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