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# PN2907 / MMBT2907

## PNP General-Purpose Transistor

### Description

This device is designed for use with general-purpose amplifiers and switches requiring collector currents to 500 mA. Sourced from process 63.



### Ordering Information

| Part Number   | Top Mark | Package   | Packing Method |
|---------------|----------|-----------|----------------|
| PN2907BU      | PN2907   | TO-92 3L  | Bulk           |
| MMBT2907_D87Z | 2B       | SOT-23 3L | Tape and Reel  |

## 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                        | -40         | 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:

- These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
- These are steady-state limits. Fairchild 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                      |
|-----------------|---|-----------------------|-------------------------|---------------------------|
|                 |   | PN2907 <sup>(3)</sup> | MMBT2907 <sup>(4)</sup> |                           |
| $P_D$           | Total Device Dissipation                | 625                   | 350                     | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 5.0                   | 2.8                     | 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                     | $^\circ\text{C}/\text{W}$ |

### Notes:

- 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.
- Device mounted on FR-4 PCB 1.6 inch x 1.6 inch x 0.06 inch.

## Electrical Characteristics

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

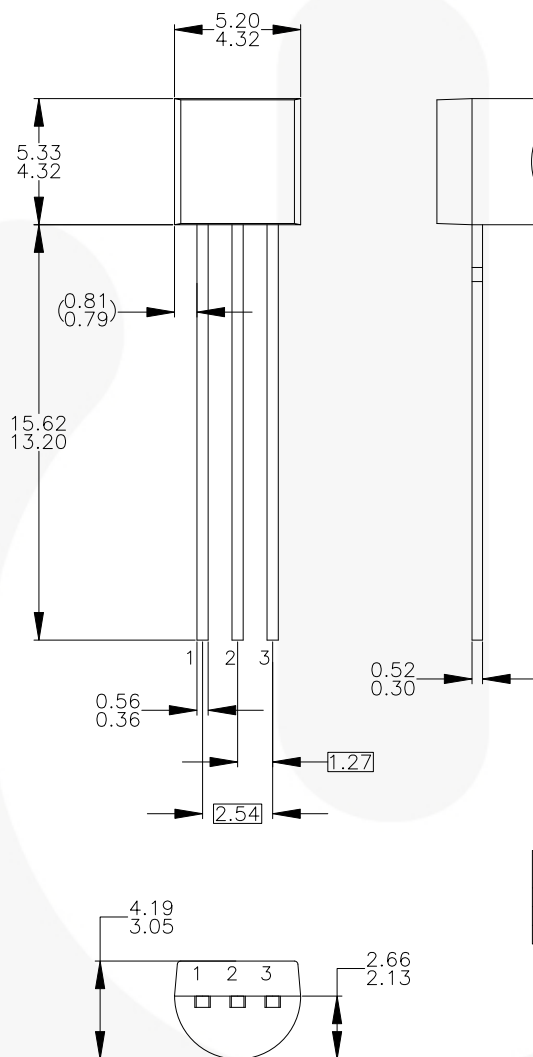
| Symbol                            | Parameter  | Conditions   | Min. | Max. | Unit          |
|-----------------------------------|--|--|------|------|---------------|
| Off Characteristics               |  |  |      |      |               |
| $V_{(BR)CEO}$                     | Collector-Emitter Breakdown Voltage <sup>(5)</sup> | $I_C = -10\text{ mA}, I_B = 0$   | -40  |      | 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             |
| $I_{CEX}$                         | Collector Cut-Off Current                          | $V_{CE} = -30\text{ V}, V_{EB} = -0.5\text{ V}$                                |      | -50  | nA            |
| $I_{BL}$                          | Base Cut-Off Current                               | $V_{CE} = -30\text{ V}, V_{EB} = -0.5\text{ V}$                                |      | -50  | nA            |
| $I_{CBO}$                         | Collector Cut-Off Current                          | $V_{CB} = -50\text{ V}, I_E = 0$   |      | -20  | nA            |
|                                   |  | $V_{CB} = -50\text{ V}, I_E = 0, T_A = 150^\circ\text{C}$                      |      | -20  | $\mu\text{A}$ |
| On Characteristics <sup>(5)</sup> |  |  |      |      |               |
| $h_{FE}$                          | DC Current Gain                                    | $V_{CE} = -10\text{ V}, I_C = -0.1\text{ mA}$                                  | 35   |      |               |
|                                   |  | $V_{CE} = -10\text{ V}, I_C = -1.0\text{ mA}$                                  | 50   |      |               |
|                                   |  | $V_{CE} = -10\text{ V}, I_C = -10\text{ mA}$                                   | 70   |      |               |
|                                   |  | $V_{CE} = -10\text{ V}, I_C = -150\text{ mA}$                                  | 100  | 300  |               |
|                                   |  | $V_{CE} = -10\text{ V}, I_C = -500\text{ mA}$                                  | 30   |      |               |
| $V_{CE(sat)}$                     | Collector-Emitter Saturation Voltage               | $I_C = -150\text{ mA}, I_B = -15\text{ mA}$                                    |      | -0.4 | V             |
|                                   |  | $I_C = -500\text{ mA}, I_B = -50\text{ mA}$                                    |      | -1.6 |               |
| $V_{BE(sat)}$                     | Base-Emitter Saturation Voltage                    | $I_C = -150\text{ mA}, I_B = -15\text{ mA}$                                    |      | -1.3 | V             |
|                                   |  | $I_C = -500\text{ mA}, I_B = -50\text{ mA}$                                    |      | -2.6 |               |
| Small Signal Characteristics      |  |  |      |      |               |
| $C_{ob}$                          | Output Capacitance                                 | $V_{CB} = -10\text{ V}, f = 1.0\text{ MHz}$                                    |      | 8    | pF            |
| $C_{ib}$                          | Input Capacitance                                  | $V_{EB} = -2.0\text{ V}, f = 1.0\text{ MHz}$                                   |      | 30   | pF            |
| $h_{fe}$                          | Small-Signal Current Gain                          | $I_C = -50\text{ mA}, V_{CE} = -20\text{ V}, f = 100\text{ MHz}$               | 2    |      |               |
| Switching Characteristics         |  |  |      |      |               |
| $t_{on}$                          | Turn-On Time                                       | $V_{CC} = -30\text{ V}, I_C = -150\text{ mA}, I_{B1} = -15\text{ mA}$          |      | 45   | ns            |
| $t_d$                             | Delay Time   |  |      | 10   | ns            |
| $t_r$                             | Rise Time  |  |      | 40   | ns            |
| $t_{off}$                         | Turn-Off Time                                      | $V_{CC} = -6.0\text{ V}, I_C = -150\text{ mA}, I_{B1} = I_{B2} = -15\text{mA}$ |      | 100  | ns            |
| $t_s$                             | Storage Time                                       |  |      | 80   | ns            |
| $t_f$                             | Fall Time  |  |      | 30   | ns            |

### Note:

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

## 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 | P  | 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      E — EMITTER      D — DRAIN  
 F — JFET          B — BASE          S — SOURCE  
 M — DMOS          C — COLLECTOR      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 1. 3-LEAD, TO92, JEDEC TO-92 COMPLIANT STRAIGHT LEAD CONFIGURATION (OLD TO92AM3)**

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## Physical Dimensions (Continued)

## SOT-23

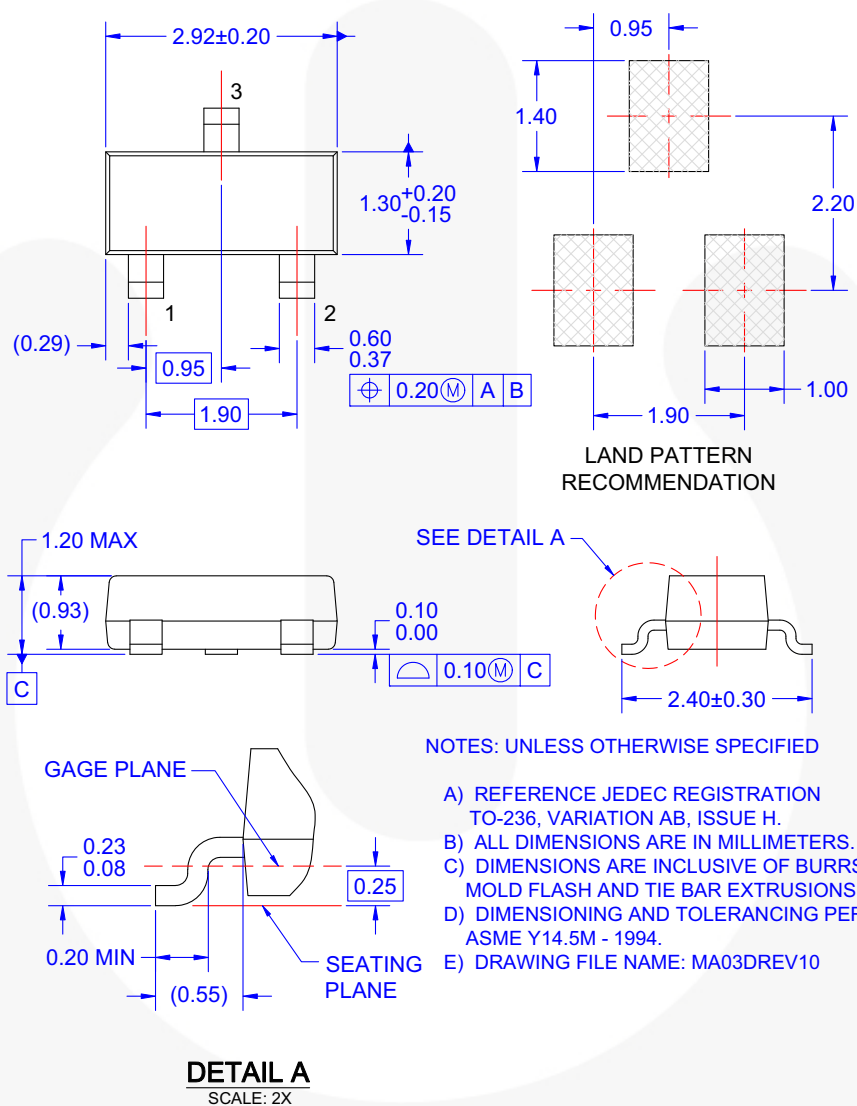


Figure 2. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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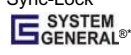



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