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February 2015

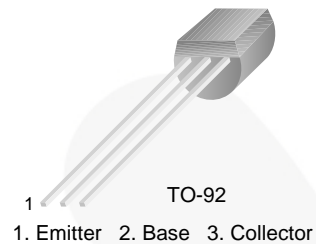
2N5550 — NPN Epitaxial Silicon Transistor

# 2N5550

## NPN Epitaxial Silicon Transistor

### Features

- Amplifier Transistor
- Collector-Emitter Voltage:  $V_{CEO} = 140\text{ V}$



### Ordering Information

| Part Number | Top Mark | Package  | Packing Method |
|-------------|----------|----------|----------------|
| 2N5550BU    | 2N5550   | TO-92 3L | Bulk           |
| 2N5550TA    | 2N5550   | TO-92 3L | Ammo           |
| 2N5550TAR   | 2N5550   | TO-92 3L | Ammo           |
| 2N5550TF    | 2N5550   | TO-92 3L | Tape and Reel  |
| 2N5550TFR   | 2N5550   | TO-92 3L | Tape and Reel  |

### Absolute Maximum Ratings

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             |
|-----------|---------------------------|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | 160        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage | 140        | V                |
| $V_{EBO}$ | Emitter-Base Voltage      | 6          | V                |
| $I_C$     | Collector Current         | 600        | mA               |
| $T_J$     | Junction Temperature      | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature       | -55 to 150 | $^\circ\text{C}$ |

**Thermal Characteristics<sup>(1)</sup>**

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

| Symbol          | Parameter                               | Max. | Unit                      |
|-----------------|---|------|---------------------------|
| $P_D$           | Total Device Dissipation                | 625  | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 5.0  | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 200  | $^\circ\text{C}/\text{W}$ |

**Note:**

1. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (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. | Typ. | Max. | Unit |
|---------------|---|---|------|------|------|------|
| $BV_{CBO}$    | Collector-Base Breakdown Voltage                    | $I_C = 100 \mu\text{A}, I_E = 0$  | 160  |      |      | V    |
| $BV_{CEO}$    | Collector-Emitter Breakdown Voltage <sup>(2)</sup>  | $I_C = 1 \text{ mA}, I_B = 0$   | 140  |      |      | V    |
| $BV_{EBO}$    | Emitter-Base Breakdown Voltage                      | $I_E = 10 \mu\text{A}, I_C = 0$   | 6    |      |      | V    |
| $I_{CBO}$     | Collector Cut-Off Current                           | $V_{CB} = 100 \text{ V}, I_E = 0$   |      |      | 100  | nA   |
| $I_{EBO}$     | Emitter Cut-Off Current                             | $V_{EB} = 4 \text{ V}, I_C = 0$   |      |      | 50   | nA   |
| $h_{FE}$      | DC Current Gain <sup>(2)</sup>                      | $I_C = 1 \text{ mA}, V_{CE} = 5 \text{ V}$  | 60   |      |      |      |
|               |   | $I_C = 10 \text{ mA}, V_{CE} = 5 \text{ V}$   | 60   |      | 250  |      |
|               |   | $I_C = 50 \text{ mA}, V_{CE} = 5 \text{ V}$   | 20   |      |      |      |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage <sup>(2)</sup> | $I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$   |      |      | 0.15 | V    |
|               |   | $I_C = 50 \text{ mA}, I_B = 5 \text{ mA}$   |      |      | 0.25 |      |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage <sup>(2)</sup>      | $I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$   |      |      | 1.0  | V    |
|               |   | $I_C = 50 \text{ mA}, I_B = 5 \text{ mA}$   |      |      | 1.2  |      |
| $f_T$         | Current Gain Bandwidth Product                      | $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$<br>$f = 100 \text{ MHz}$   | 100  |      | 300  | MHz  |
| $C_{ob}$      | Output Capacitance                                  | $V_{CB} = 10 \text{ V}, I_E = 0,$<br>$f = 1 \text{ MHz}$  |      |      | 6    | pF   |
| NF            | Noise Figure  | $I_C = 250 \mu\text{A}, V_{CE} = 5 \text{ V},$<br>$R_S = 1 \text{ k}\Omega, f = 10 \text{ Hz to}$<br>$15.7 \text{ kHz}$ |      |      | 10   | dB   |

**Note:**

2. Pulse test: pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$

## Typical Performance Characteristics

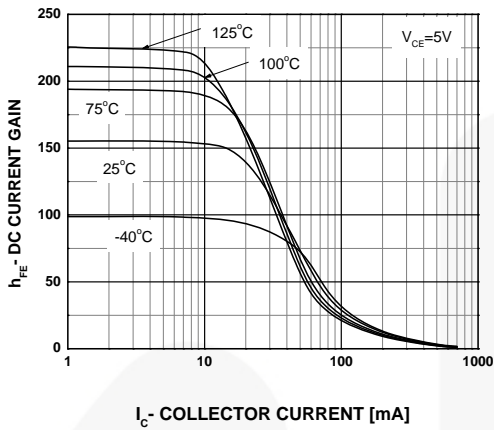


Figure 1. Typical Pulsed Current Gain vs. Collector Current

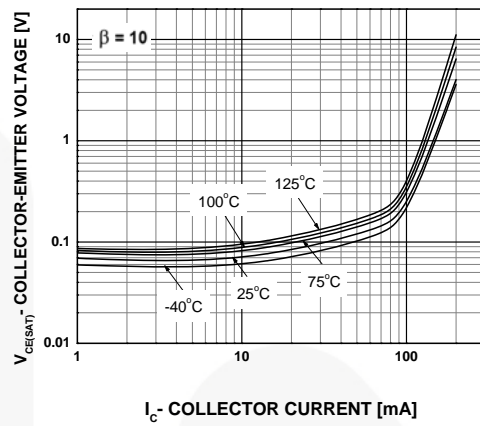


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

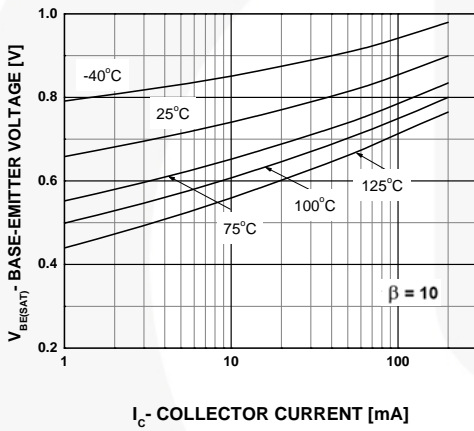


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

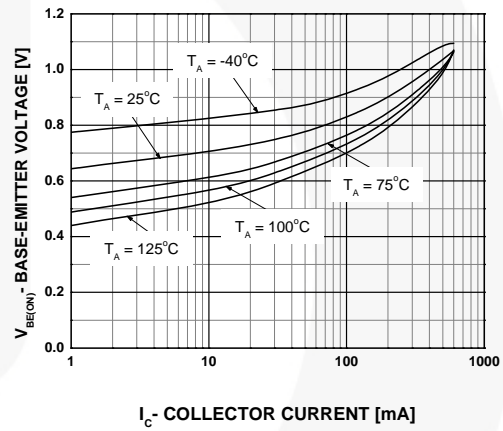


Figure 4. Base-Emitter On Voltage vs. Collector Current

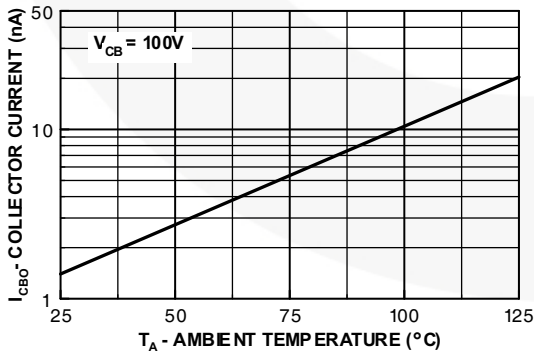


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

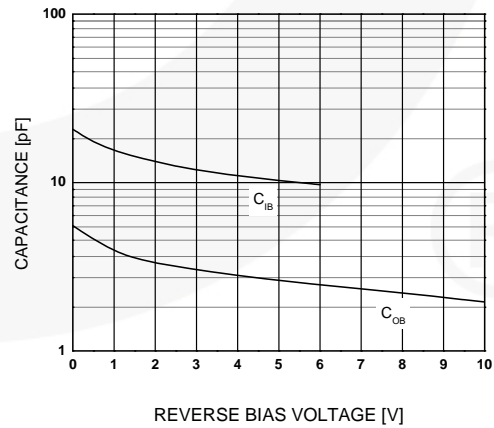


Figure 6. Input and Output Capacitance vs. Reverse Voltage

Typical Performance Characteristics (Continued)

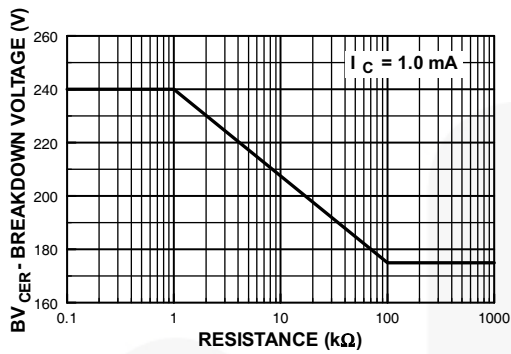


Figure 7. Collector- Emitter Breakdown Voltage with Resistance between Emitter-Base

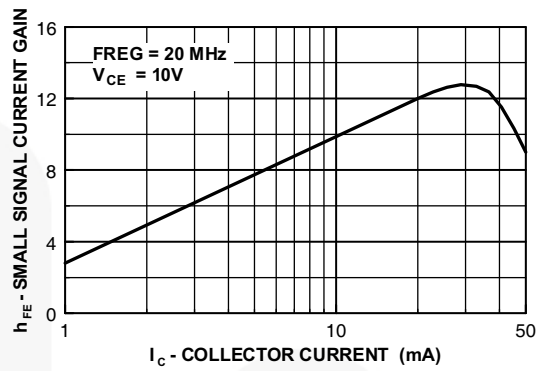


Figure 8. Small Signal Current Gain vs. Collector Current

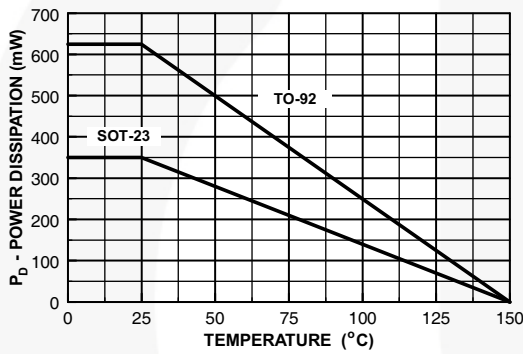


Figure 9. Power Dissipation vs. Ambient Temperature

### Physical Dimensions



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 |

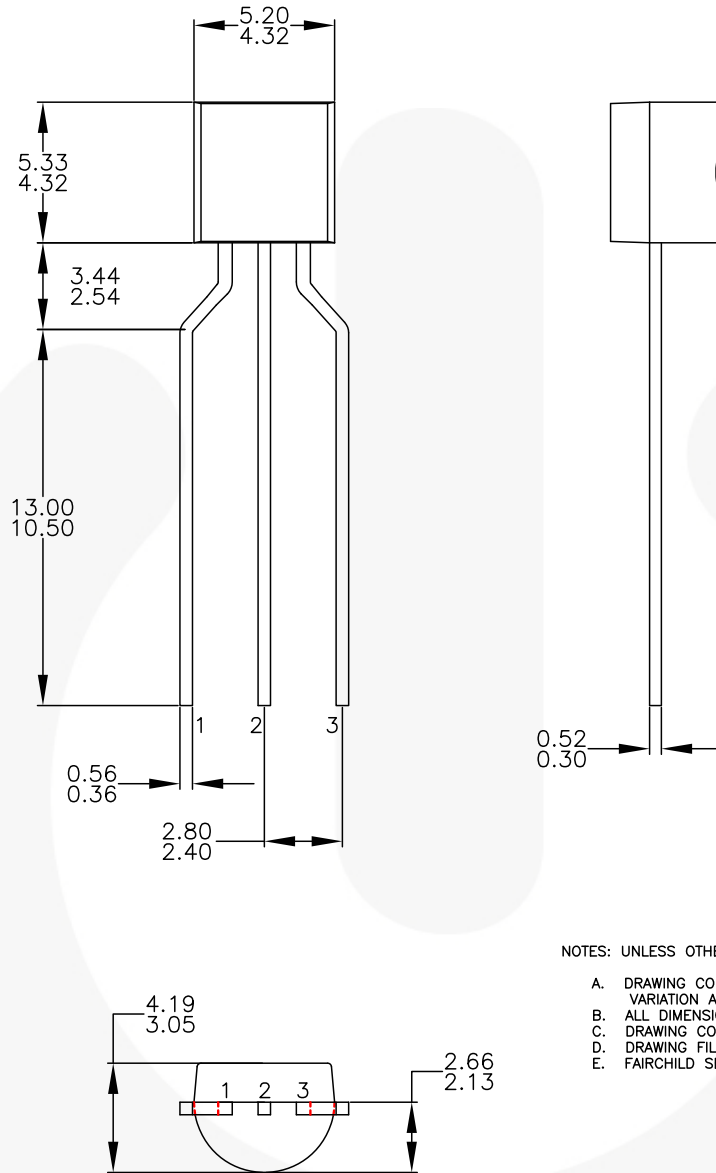
LEGEND:

P - BIPOLAR      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 10. 3-Lead, TO-92, JEDEC TO-92 Compliant Straight Lead Configuration, Bulk Type**

Physical Dimensions (Continued)



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. FAIRCHILD SEMICONDUCTOR.

Figure 11. 3-Lead, TO-92, Molded, 0.2 In Line Spacing Lead Form, Ammo, Tape and Reel Type





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