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# FJY3004R

## NPN Epitaxial Silicon Transistor with Bias Resistor

### Features

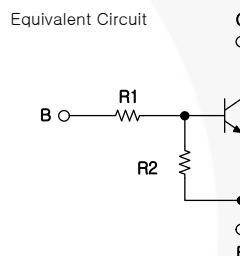
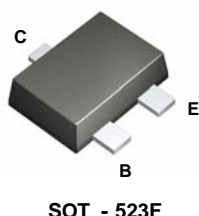
- 100 mA Output Current Capability
- Built-in Bias Resistor ( $R_1 = 47 \text{ k}\Omega$ ,  $R_2 = 47 \text{ k}\Omega$ )

### Application

- Switching, Interface, and Driver Circuits
- Inverters
- Digital Applications in Industrial Segments

### Description

Transistors with built-in resistors can be excellent space- and cost-saving solutions by reducing component count and simplifying circuit design.



### Ordering Information

| Part Number | Top Mark | Package     | Packing Method |
|-------------|----------|-------------|----------------|
| FJY3004R    | S04      | SOT-523F 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    | 50         | V                |
| $V_{CEO}$ | Collector-Emitter Voltage | 50         | V                |
| $V_{EBO}$ | Emitter-Base Voltage      | 10         | V                |
| $I_C$     | Collector Current         | 100        | mA               |
| $T_J$     | Junction Temperature      | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range | -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                               | Value | Unit                 |
|-----------------|---|-------|----------------------|
| $P_D$           | Power Dissipation                       | 200   | mW                   |
|                 | Derate Above $T_A = 25^\circ\text{C}$   | 1.60  | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 625   | $^\circ\text{C/W}$   |

**Note:**

1. PCB size: FR-4 76 x 114 x 0.6T mm<sup>3</sup> (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

**Electrical Characteristics<sup>(2)</sup>**

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

| Symbol        | Parameter                            | Conditions   | Min. | Typ. | Max. | Unit          |
|---------------|--------------------------------------|--|------|------|------|---------------|
| $V_{(BR)CBO}$ | Collector-Emitter Breakdown Voltage  | $I_C = 10\ \mu\text{A}$ , $I_E = 0$                            | 50   |      |      | V             |
| $V_{(BR)CEO}$ | Collector-Base Breakdown Voltage     | $I_C = 100\ \mu\text{A}$ , $I_B = 0$                           | 50   |      |      | V             |
| $I_{CBO}$     | Collector Cut-Off Current            | $V_{CB} = 40\ \text{V}$ , $I_E = 0$                            |      |      | 0.1  | $\mu\text{A}$ |
| $h_{FE}$      | DC Current Gain                      | $V_{CE} = 5\ \text{V}$ , $I_C = 5\ \text{mA}$                  | 56   |      |      |               |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10\ \text{mA}$ , $I_B = 0.5\ \text{mA}$                 |      |      | 0.3  | V             |
| $f_T$         | Current Gain Bandwidth Product       | $V_{CE} = 10\ \text{V}$ , $I_C = 5\ \text{mA}$                 |      | 250  |      | MHz           |
| $C_{cb}$      | Output Capacitance                   | $V_{CB} = 10\ \text{V}$ , $I_E = 0$ ,<br>$f = 1.0\ \text{MHz}$ |      | 3.7  |      | pF            |
| $V_{I(off)}$  | Input-Off Voltage                    | $V_{CE} = 5\ \text{V}$ , $I_C = 100\ \mu\text{A}$              |      |      | 0.5  | V             |
| $V_{I(on)}$   | Input-On Voltage                     | $V_{CE} = 0.3\ \text{V}$ , $I_C = 2\ \text{mA}$                | 3    |      |      | V             |
| $R_1$         | Input Resistor                       |  | 32   | 47   | 62   | k $\Omega$    |
| $R_1/R_2$     | Resistor Ratio                       |  | 0.9  | 1.0  | 1.1  |               |

**Note:**

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

## Typical Performance Characteristics

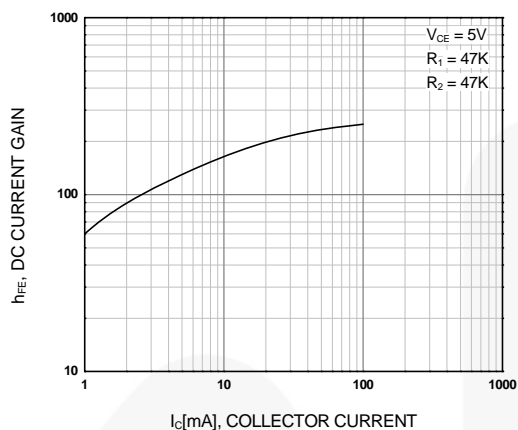


Figure 1. DC Current Gain

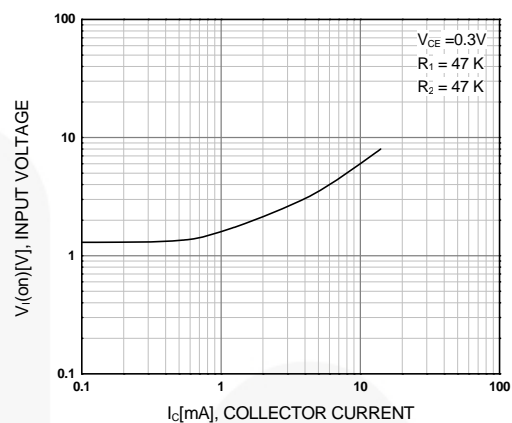


Figure 2. Input-On Voltage

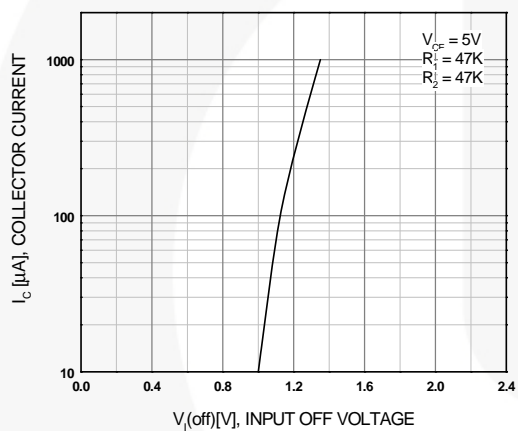


Figure 3. Input-Off Voltage

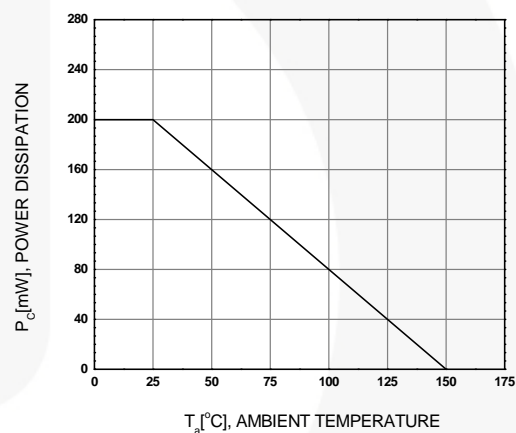
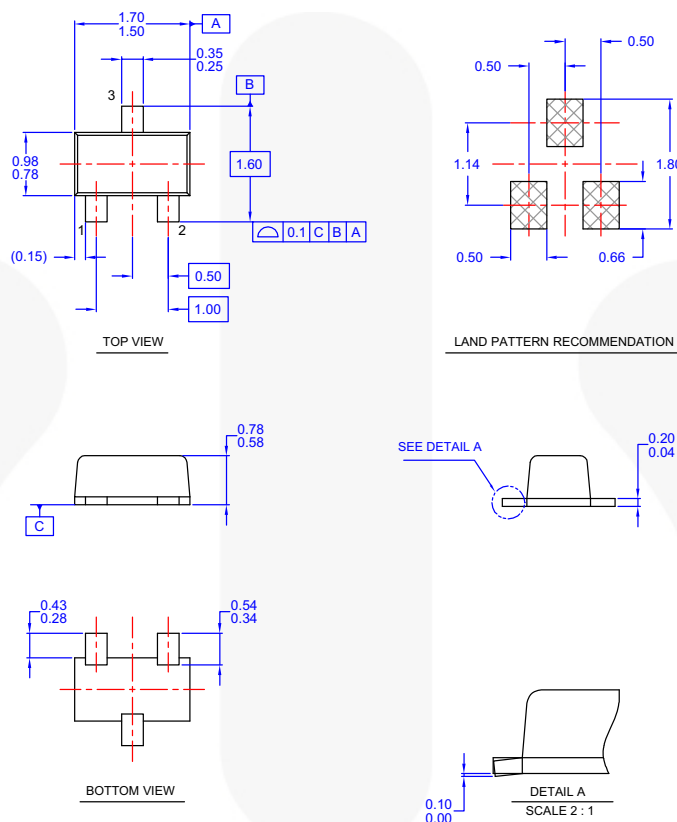


Figure 4. Power Derating

## Physical Dimensions

## SOT-523F



- NOTES:
- A) THIS PACKAGE CONFORMS TO EIAJ SC89 PACKAGING STANDARD.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DRAWING CONFORMS TO ASME Y14.5M-1994
  - D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

MAD03ArevA

**Figure 5. 3-LEAD, SC89, EIAJ-SC89, 0.88 MM WIDE, SOT523F (ACTIVE)**

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