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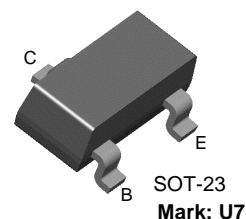
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## BSR13

### NPN General Purpose Amplifier

- Sourced from process 10.



### Absolute Maximum Ratings\* $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter  | Ratings   | Units            |
|----------------|--|-----------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 30        | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 60        | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5.0       | V                |
| $I_C$          | Collector Current - Continuous                   | 0.5       | A                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 ~ 150 | $^\circ\text{C}$ |

\* This ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- These rating are based on a maximum junction temperature of 150 degrees C.
- These are steady limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol                              | Parameter                              | Test Condition   | Min.                              | Max.       | Units               |
|-------------------------------------|--|--|-----------------------------------|------------|---------------------|
| <b>Off Characteristics</b>          |  |  |                                   |            |                     |
| $V_{(BR)CEO}$                       | Collector-Emitter Breakdown Voltage *  | $I_C = 10\text{mA}, I_B = 0$   | 30                                |            | V                   |
| $V_{(BR)CBO}$                       | Collector-Base Breakdown Voltage       | $I_C = 10\mu\text{A}, I_E = 0$   | 60                                |            | V                   |
| $V_{(BR)EBO}$                       | Emitter-Base Breakdown Voltage         | $I_E = 10\mu\text{A}, I_C = 0$   | 5.0                               |            | V                   |
| $I_{CBO}$                           | Collector Cutoff Current               | $V_{CB} = 50\text{V}, I_E = 0$<br>$V_{CB} = 50\text{V}, I_E = 0, T_a = 150^\circ\text{C}$  |                                   | 30<br>10   | nA<br>$\mu\text{A}$ |
| $I_{EBO}$                           | Emitter Cutoff Current                 | $V_{EB} = 3.0\text{V}, I_C = 0$  |                                   | 15         | nA                  |
| <b>On Characteristics</b>           |  |  |                                   |            |                     |
| $h_{FE}$                            | DC Current Gain                        | $I_C = 0.1\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 1.0\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 10\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 150\text{mA}, V_{CE} = 10\text{V} *$<br>$I_C = 150\text{mA}, V_{CE} = 1.0\text{V} *$<br>$I_C = 500\text{mA}, V_{CE} = 10\text{V} *$ | 35<br>50<br>75<br>100<br>50<br>30 | 300        |                     |
| $V_{CE(sat)}$                       | Collector-Emitter Saturation Voltage * | $I_C = 150\text{mA}, I_B = 15\text{V}$<br>$I_C = 500\text{mA}, I_B = 50\text{V}$   |                                   | 0.4<br>1.6 | V                   |
| $V_{BE(sat)}$                       | Base-Emitter Saturation Voltage        | $I_C = 150\text{mA}, I_B = 15\text{V}$<br>$I_C = 500\text{mA}, I_B = 50\text{V}$   |                                   | 1.3<br>2.6 | V                   |
| <b>Small Signal Characteristics</b> |  |  |                                   |            |                     |
| $f_T$                               | Curent Gain Bandwidth Product          | $I_C = 20\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$  | 250                               |            |                     |

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

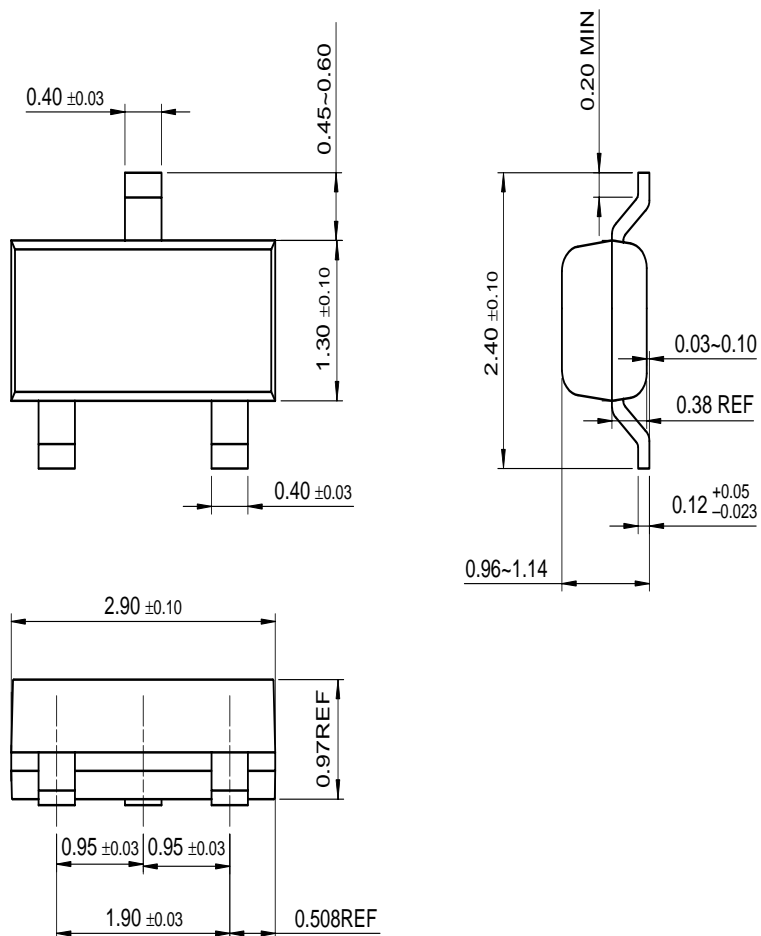
**Thermal Characteristics**  $T_a=25^{\circ}\text{C}$  unless otherwise noted

| Symbol          | Parameter                               | Max. | Units                  |
|-----------------|---|------|------------------------|
| $P_D$           | Total Device Dissipation                | 350  | mW                     |
|                 | Derate above $25^{\circ}\text{C}$       | 2.8  | mW/ $^{\circ}\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 357  | $^{\circ}\text{C/W}$   |

\* Device mounted on FR-4PCB  $1.6'' \times 1.6'' \times 0.06''$ .

## Package Dimensions

### SOT-23



Dimensions in Millimeters

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|--------------------------|------------------------|---|
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