

# PNP Epitaxial Silicon Transistor

## BSR16

### PNP General Purpose Amplifier

- This Device Designed for Use as General Purpose Amplifier and Switches Requiring Collector Currents to 500 mA
- Sourced from Process 63
- See BCW68G for Characteristics

### ABSOLUTE MAXIMUM RATINGS

(T<sub>A</sub> = 25°C, unless otherwise specified.)

| Symbol                           | Parameter                                        | Value      | Unit |
|----------------------------------|--------------------------------------------------|------------|------|
| V <sub>CEO</sub>                 | Collector-Emitter Voltage                        | -60        | V    |
| V <sub>CBO</sub>                 | Collector-Base Voltage                           | -60        | V    |
| V <sub>EBO</sub>                 | Emitter-Base Voltage                             | -5.0       | V    |
| I <sub>C</sub>                   | Collector Current – Continuous                   | -800       | mA   |
| T <sub>J</sub> , T <sub>ST</sub> | Operating and Storage Junction Temperature Range | -55 ~ +150 | °C   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

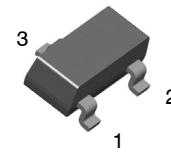
1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### THERMAL CHARACTERISTICS

(T<sub>A</sub> = 25°C, unless otherwise specified)

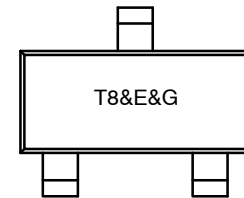
| Symbol           | Parameter                                     | Max.       | Unit        |
|------------------|-----------------------------------------------|------------|-------------|
| P <sub>D</sub>   | Total Device Dissipation<br>Derate above 25°C | 350<br>2.8 | mW<br>mW/°C |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient       | 357        | °C/W        |

3. Device mounted on FR-4 PCB 40 mm × 40 mm × 1.5 mm.



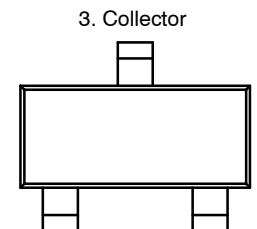
SOT-23  
CASE 318

### MARKING DIAGRAM



T8      Specific Device Code  
&E      Designates Space  
&G      Date Code (Week)

### PIN ASSIGNMENT



### ORDERING INFORMATION

| Device | Package             | Shipping†              |
|--------|---------------------|------------------------|
| BSR16  | SOT-23<br>(Pb-Free) | 3,000 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# BSR16

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                |                                     |                                                                             |      |  |            |                     |
|----------------|-------------------------------------|-----------------------------------------------------------------------------|------|--|------------|---------------------|
| $BV_{(BR)CEO}$ | Collector–Emitter Breakdown Voltage | $I_C = -10\text{ mA}, I_B = 0$                                              | -60  |  |            | V                   |
| $BV_{(BR)CBO}$ | Collector–Base Breakdown Voltage    | $I_C = -100\text{ }\mu\text{A}, I_E = 0$                                    | -60  |  |            | V                   |
| $BV_{(BR)EBO}$ | Emitter–Base Breakdown Voltage      | $I_E = -10\text{ }\mu\text{A}, I_C = 0$                                     | -5.0 |  |            | V                   |
| $I_{CBO}$      | Collector Cut-off Current           | $V_{CB} = -50\text{ V}$<br>$V_{CB} = -50\text{ V}, T_A = 150^\circ\text{C}$ |      |  | -10<br>-10 | nA<br>$\mu\text{A}$ |
| $I_{CEX}$      | Collector Cut-off Current           | $V_{CE} = -30\text{ V}, V_{EB} = -0.5\text{ V}$                             |      |  | -50        | nA                  |
| $I_{BEX}$      | Reverse Base Current                | $V_{CE} = -30\text{ V}, V_{EB} = -3.0\text{ V}$                             |      |  | -50        | nA                  |

### ON CHARACTERISTICS

|               |                                      |                                                                                                                                                                                                                                                  |                               |     |              |   |
|---------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|--------------|---|
| $h_{FE}$      | 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>$I_C = -500\text{ mA}, V_{CE} = -10\text{ V}$ | 75<br>100<br>100<br>100<br>50 | 300 |              |   |
| $V_{CE(sat)}$ | Collector–Emitter Saturation Voltage | $I_C = -150\text{ mA}, I_B = -15\text{ mA}$<br>$I_C = -500\text{ mA}, I_B = -50\text{ mA}$                                                                                                                                                       |                               |     | -0.4<br>-1.6 | V |
| $V_{BE(sat)}$ | Base–Emitter Saturation Voltage      | $I_C = -150\text{ mA}, I_B = -15\text{ mA}$<br>$I_C = -500\text{ mA}, I_B = -50\text{ mA}$                                                                                                                                                       |                               |     | -1.3<br>-2.6 | V |

### SMALL SIGNAL CHARACTERISTICS

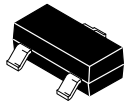
|          |                                |                                                                                               |     |  |     |     |
|----------|--------------------------------|-----------------------------------------------------------------------------------------------|-----|--|-----|-----|
| $f_T$    | Current Gain Bandwidth Product | $I_C = -50\text{ mA}, V_{CE} = -20\text{ V},$<br>$f = 100\text{ MHz}, T_A = 25^\circ\text{C}$ | 200 |  |     | MHz |
| $C_{cb}$ | Output Capacitance             | $V_{CB} = -10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$                                          |     |  | 8.0 | pF  |
| $C_{eb}$ | Emitter–Base Capacitance       | $V_{CB} = -2.0\text{ V}, I_E = 0, f = 1.0\text{ MHz}$                                         |     |  | 30  | pF  |

### SWITCHING CHARACTERISTICS

|           |               |                                                                                    |  |  |     |    |
|-----------|---------------|------------------------------------------------------------------------------------|--|--|-----|----|
| $t_{on}$  | 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 | $V_{CC} = -6\text{ V}, I_C = -150\text{ mA},$<br>$I_{B1} = I_{B2} = -15\text{ mA}$ |  |  | 100 | ns |
| $t_s$     | Storage Time  |                                                                                    |  |  | 80  | ns |
| $t_f$     | Fall Time     |                                                                                    |  |  | 30  | ns |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

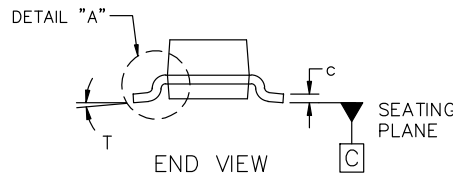
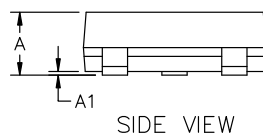
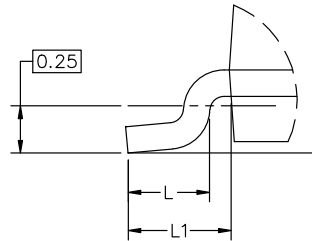
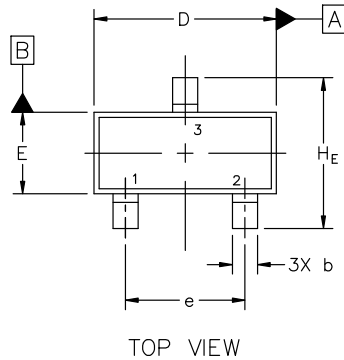




SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P  
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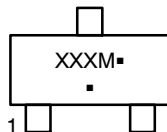


| MILLIMETERS |      |      |      |
|-------------|------|------|------|
| DIM         | MIN  | NOM  | MAX  |
| A           | 0.89 | 1.00 | 1.11 |
| A1          | 0.01 | 0.06 | 0.10 |
| b           | 0.37 | 0.44 | 0.50 |
| c           | 0.08 | 0.14 | 0.20 |
| D           | 2.80 | 2.90 | 3.04 |
| E           | 1.20 | 1.30 | 1.40 |
| e           | 1.78 | 1.90 | 2.04 |
| L           | 0.30 | 0.43 | 0.55 |
| L1          | 0.35 | 0.54 | 0.69 |
| HE          | 2.10 | 2.40 | 2.64 |
| T           | 0°   | ---  | 10°  |

NOTES:

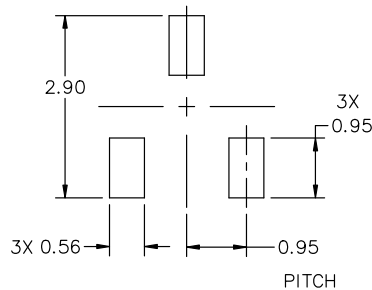
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC  
MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED  
MOUNTING FOOTPRINT

\* For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

STYLES ON PAGE 2

|                  |                                      |                                                                                                                                                                                     |
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**CASE 318**  
**ISSUE AU**

DATE 14 AUG 2024

|                                                         |                                                       |                                                             |                                                             |                                                             |                                                             |
|---------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
| STYLE 1 THRU 5:<br>CANCELLED                            | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE  |                                                             |                                                             |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE      | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE     | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          |
| STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE      | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE | STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE          |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN       | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT   | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE           | STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION |
| STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE     |                                                             |                                                             |                                                             |                                                             |

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