

# BCP68T1G, SBCP68T1G

## NPN Silicon Epitaxial Transistor

This NPN Silicon Epitaxial Transistor is designed for use in low voltage, high current applications. The device is housed in the SOT-223 package, which is designed for medium power surface mount applications.

### Features

- High Current:  $I_C = 1.0\text{ A}$
- The SOT-223 Package Can Be Soldered Using Wave or Reflow
- SOT-223 package ensures level mounting, resulting in improved thermal conduction, and allows visual inspection of soldered joints. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- The PNP Complement is BCP69T1
- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

### MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Rating                                                                                            | Symbol         | Value      | Unit                      |
|---------------------------------------------------------------------------------------------------|----------------|------------|---------------------------|
| Collector-Emitter Voltage                                                                         | $V_{CEO}$      | 20         | Vdc                       |
| Collector-Base Voltage                                                                            | $V_{CBO}$      | 25         | Vdc                       |
| Emitter-Base Voltage                                                                              | $V_{EBO}$      | 5.0        | Vdc                       |
| Collector Current                                                                                 | $I_C$          | 1.0        | Adc                       |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$<br>(Note 1)<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12  | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range                                                           | $T_J, T_{stg}$ | -65 to 150 | $^\circ\text{C}$          |

### THERMAL CHARACTERISTICS

| Characteristic                                                                | Symbol          | Max       | Unit                    |
|-------------------------------------------------------------------------------|-----------------|-----------|-------------------------|
| Thermal Resistance,<br>Junction-to-Ambient (Surface Mounted)                  | $R_{\theta JA}$ | 83.3      | $^\circ\text{C/W}$      |
| Lead Temperature for Soldering,<br>0.0625 in from case<br>Time in Solder Bath | $T_L$           | 260<br>10 | $^\circ\text{C}$<br>Sec |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Device mounted on a glass epoxy printed circuit board 1.575 in. x 1.575 in. x 0.059 in.; mounting pad for the collector lead min. 0.93 sq. in.

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



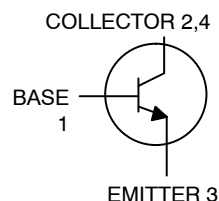
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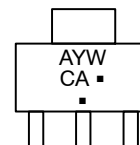
## MEDIUM POWER NPN SILICON HIGH CURRENT TRANSISTOR SURFACE MOUNT



SOT-223  
CASE 318E  
STYLE 1



### MARKING DIAGRAM



CA = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device    | Package              | Shipping†         |
|-----------|----------------------|-------------------|
| BCP68T1G  | SOT-223<br>(Pb-Free) | 1,000/Tape & Reel |
| SBCP68T1G | SOT-223<br>(Pb-Free) | 1,000/Tape & Reel |
| BCP68T3G  | SOT-223<br>(Pb-Free) | 4,000/Tape & Reel |

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

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristics                                                                                                                                                                             | Symbol               | Min            | Typ         | Max           | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|-------------|---------------|------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                                  |                      |                |             |               |      |
| Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 100 µAdc, I <sub>E</sub> = 0)                                                                                                         | V <sub>(BR)CES</sub> | 25             | –           | –             | Vdc  |
| Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 1.0 mAdc, I <sub>B</sub> = 0)                                                                                                         | V <sub>(BR)CEO</sub> | 20             | –           | –             | Vdc  |
| Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 µAdc, I <sub>C</sub> = 0)                                                                                                               | V <sub>(BR)EBO</sub> | 5.0            | –           | –             | Vdc  |
| Collector-Base Cutoff Current (V <sub>CB</sub> = 25 Vdc, I <sub>E</sub> = 0)                                                                                                                | I <sub>CBO</sub>     | –              | –           | 10            | µAdc |
| Emitter-Base Cutoff Current (V <sub>EB</sub> = 5.0 Vdc, I <sub>C</sub> = 0)                                                                                                                 | I <sub>EBO</sub>     | –              | –           | 10            | µAdc |
| <b>ON CHARACTERISTICS</b>                                                                                                                                                                   |                      |                |             |               |      |
| DC Current Gain<br>(I <sub>C</sub> = 5.0 mAdc, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = 1.0 Vdc)<br>(I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 1.0 Vdc) | h <sub>FE</sub>      | 50<br>85<br>60 | –<br>–<br>– | –<br>375<br>– | –    |
| Collector-Emitter Saturation Voltage (I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 100 mAdc)                                                                                                  | V <sub>CE(sat)</sub> | –              | –           | 0.5           | Vdc  |
| Base-Emitter On Voltage (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 1.0 Vdc)                                                                                                               | V <sub>BE(on)</sub>  | –              | –           | 1.0           | Vdc  |
| <b>DYNAMIC CHARACTERISTICS</b>                                                                                                                                                              |                      |                |             |               |      |
| Current-Gain – Bandwidth Product (I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 5.0 Vdc)                                                                                                      | f <sub>T</sub>       | –              | 60          | –             | MHz  |

## TYPICAL ELECTRICAL CHARACTERISTICS

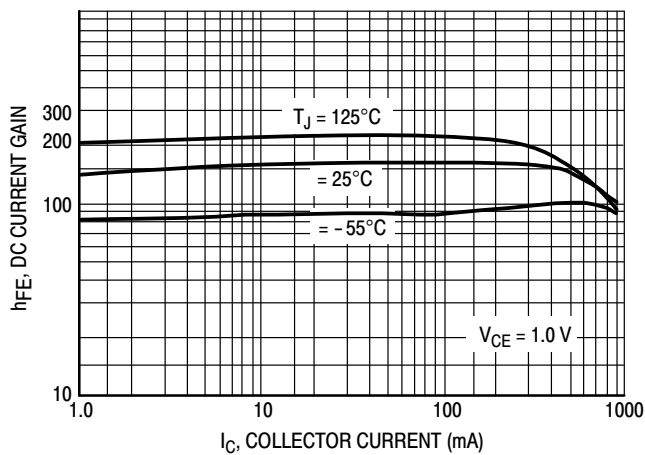


Figure 1. DC Current Gain

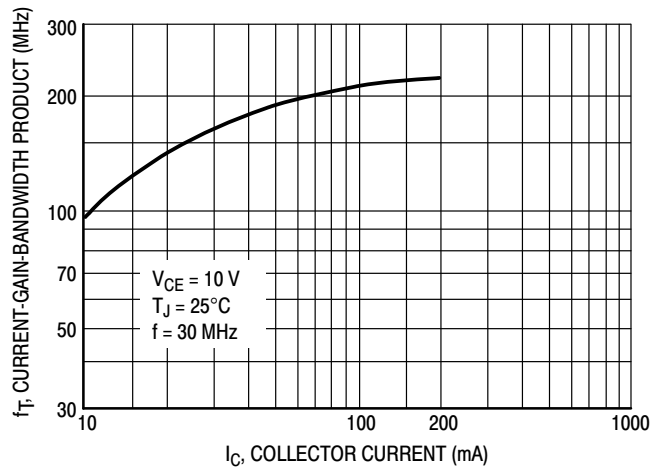


Figure 2. Current-Gain-Bandwidth Product

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## TYPICAL ELECTRICAL CHARACTERISTICS

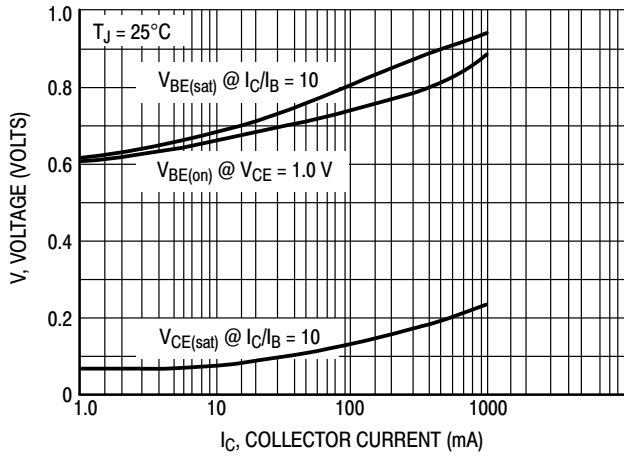


Figure 3. "On" Voltage

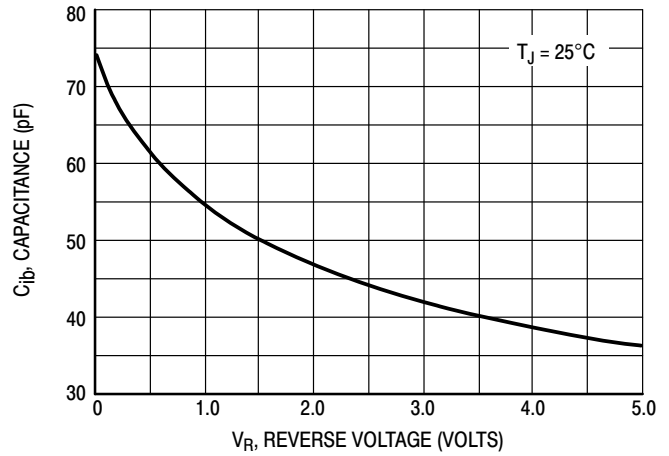


Figure 4. Capacitance

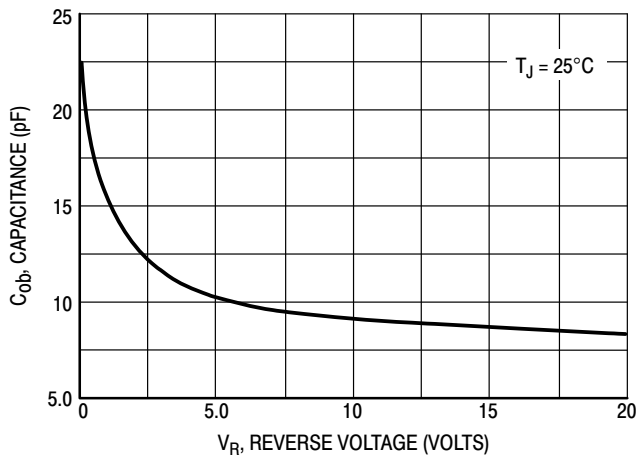


Figure 5. Capacitance

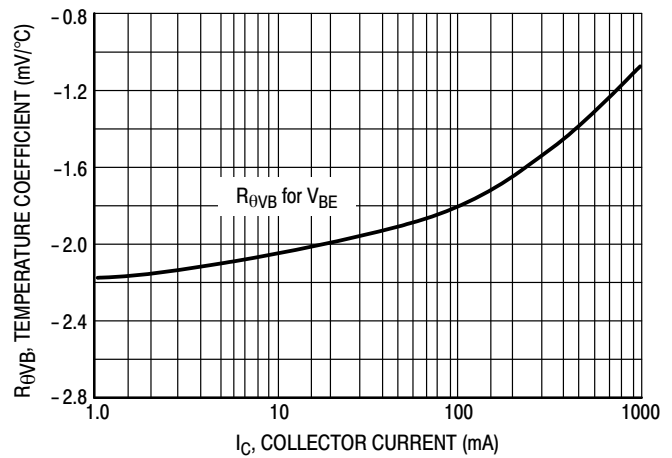


Figure 6. Base-Emitter Temperature Coefficient

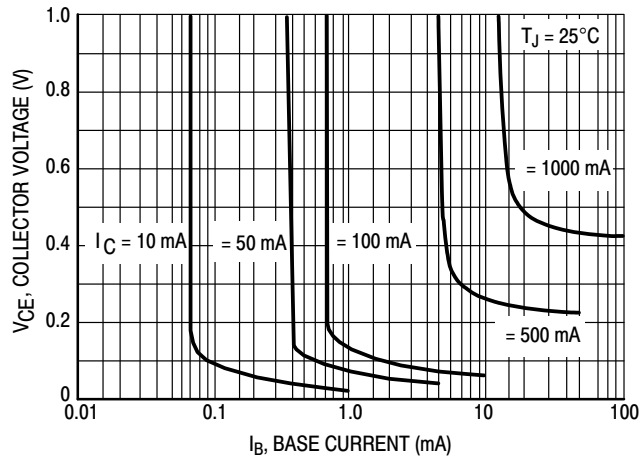
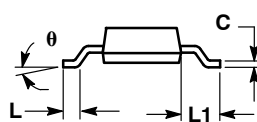
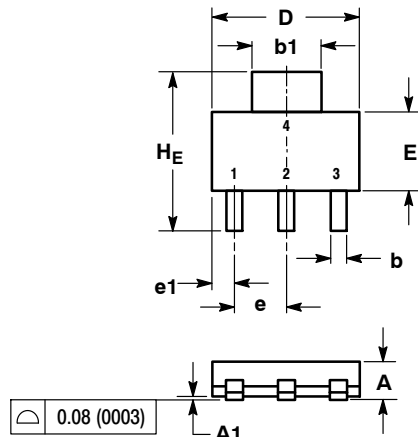


Figure 7. Saturation Region

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## PACKAGE DIMENSIONS

SOT-223 (TO-261)  
CASE 318E-04  
ISSUE N

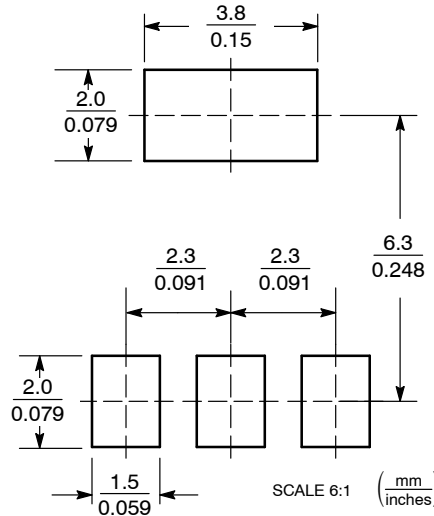


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.  
2. CONTROLLING DIMENSION: INCH.

| DIM   | MILLIMETERS |      |      | INCHES |       |       |
|-------|-------------|------|------|--------|-------|-------|
|       | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A     | 1.50        | 1.63 | 1.75 | 0.060  | 0.064 | 0.068 |
| A1    | 0.02        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b     | 0.60        | 0.75 | 0.89 | 0.024  | 0.030 | 0.035 |
| b1    | 2.90        | 3.06 | 3.20 | 0.115  | 0.121 | 0.126 |
| c     | 0.24        | 0.29 | 0.35 | 0.009  | 0.012 | 0.014 |
| D     | 6.30        | 6.50 | 6.70 | 0.249  | 0.256 | 0.263 |
| E     | 3.30        | 3.50 | 3.70 | 0.130  | 0.138 | 0.145 |
| e     | 2.20        | 2.30 | 2.40 | 0.087  | 0.091 | 0.094 |
| e1    | 0.85        | 0.94 | 1.05 | 0.033  | 0.037 | 0.041 |
| L     | 0.20        | ---  | ---  | 0.008  | ---   | ---   |
| L1    | 1.50        | 1.75 | 2.00 | 0.060  | 0.069 | 0.078 |
| H_E   | 6.70        | 7.00 | 7.30 | 0.264  | 0.276 | 0.287 |
| theta | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

- STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

### SOLDERING FOOTPRINT\*



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

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