

# BCP68T1

Preferred Device

## 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
- Pb-Free Packages are Available

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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

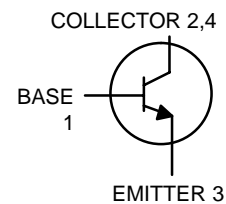
1. Device mounted on a glass epoxy printed circuit board 1.575 in. x 1.575 in. x 0.059 in.; mounting pad for the collector lead min. 0.93 sq. in.



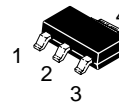
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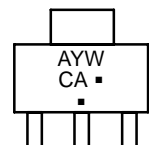
## MEDIUM POWER NPN SILICON HIGH CURRENT TRANSISTOR SURFACE MOUNT



### MARKING DIAGRAM



SOT-223  
CASE 318E  
STYLE 1



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†        |
|----------|----------------------|------------------|
| BCP68T1  | SOT-223              | 1000/Tape & Reel |
| BCP68T1G | SOT-223<br>(Pb-Free) | 1000/Tape & Reel |
| BCP68T3  | SOT-223              | 4000/Tape & Reel |
| BCP68T3G | SOT-223<br>(Pb-Free) | 4000/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.

Preferred devices are recommended choices for future use and best overall value.

# BCP68T1

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

| Characteristics  | Symbol        | Min            | Typ         | Max           | Unit            |
|--|---------------|----------------|-------------|---------------|-----------------|
| <b>OFF CHARACTERISTICS</b>   |               |                |             |               |                 |
| Collector-Emitter Breakdown Voltage ( $I_C = 100\ \mu\text{Adc}$ , $I_E = 0$ )   | $V_{(BR)CES}$ | 25             | -           | -             | Vdc             |
| Collector-Emitter Breakdown Voltage ( $I_C = 1.0\ \text{mAdc}$ , $I_B = 0$ )   | $V_{(BR)CEO}$ | 20             | -           | -             | Vdc             |
| Emitter-Base Breakdown Voltage ( $I_E = 10\ \mu\text{Adc}$ , $I_C = 0$ )   | $V_{(BR)EBO}$ | 5.0            | -           | -             | Vdc             |
| Collector-Base Cutoff Current ( $V_{CB} = 25\ \text{Vdc}$ , $I_E = 0$ )  | $I_{CBO}$     | -              | -           | 10            | $\mu\text{Adc}$ |
| Emitter-Base Cutoff Current ( $V_{EB} = 5.0\ \text{Vdc}$ , $I_C = 0$ )   | $I_{EBO}$     | -              | -           | 10            | $\mu\text{Adc}$ |
| <b>ON CHARACTERISTICS</b>  |               |                |             |               |                 |
| DC Current Gain<br>( $I_C = 5.0\ \text{mAdc}$ , $V_{CE} = 10\ \text{Vdc}$ )<br>( $I_C = 500\ \text{mAdc}$ , $V_{CE} = 1.0\ \text{Vdc}$ )<br>( $I_C = 1.0\ \text{Adc}$ , $V_{CE} = 1.0\ \text{Vdc}$ ) | $h_{FE}$      | 50<br>85<br>60 | -<br>-<br>- | -<br>375<br>- | -               |
| Collector-Emitter Saturation Voltage ( $I_C = 1.0\ \text{Adc}$ , $I_B = 100\ \text{mAdc}$ )  | $V_{CE(sat)}$ | -              | -           | 0.5           | Vdc             |
| Base-Emitter On Voltage ( $I_C = 1.0\ \text{Adc}$ , $V_{CE} = 1.0\ \text{Vdc}$ )   | $V_{BE(on)}$  | -              | -           | 1.0           | Vdc             |
| <b>DYNAMIC CHARACTERISTICS</b>   |               |                |             |               |                 |
| Current-Gain - Bandwidth Product<br>( $I_C = 10\ \text{mAdc}$ , $V_{CE} = 5.0\ \text{Vdc}$ )   | $f_T$         | -              | 60          | -             | MHz             |

## TYPICAL ELECTRICAL CHARACTERISTICS

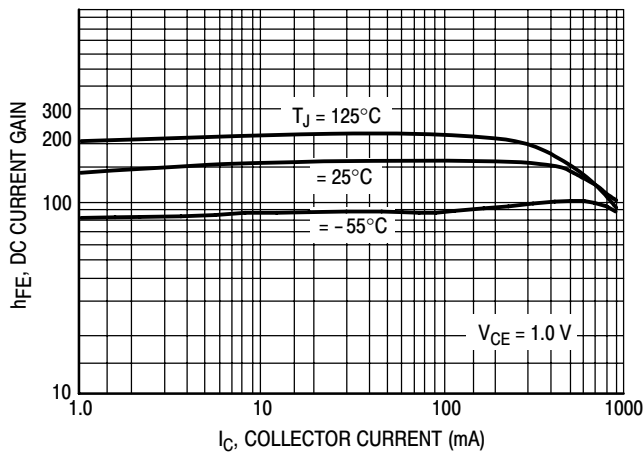


Figure 1. DC Current Gain

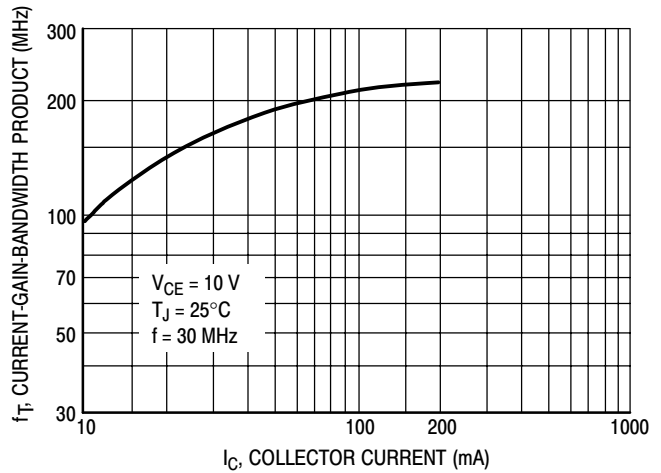


Figure 2. Current-Gain-Bandwidth Product

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## TYPICAL ELECTRICAL CHARACTERISTICS

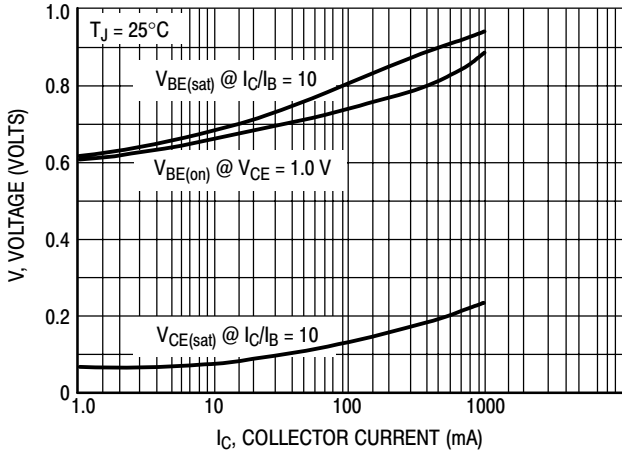


Figure 3. "On" Voltage

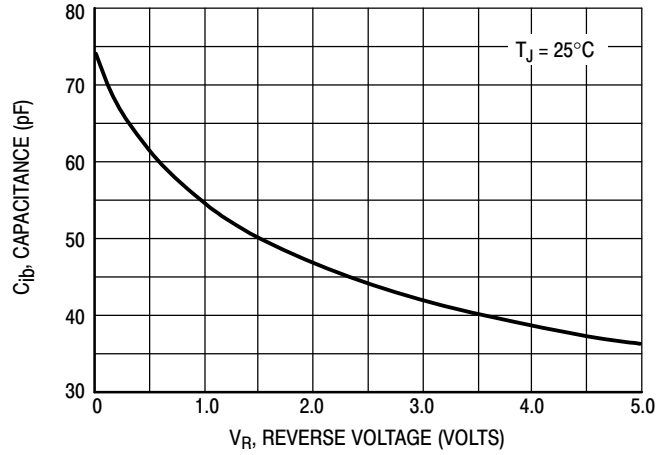


Figure 4. Capacitance

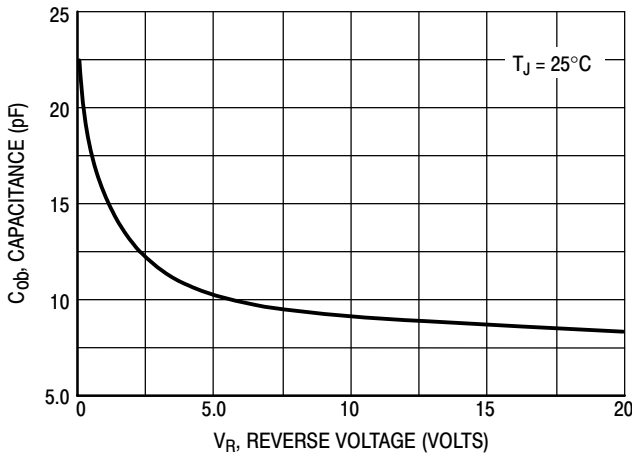


Figure 5. Capacitance

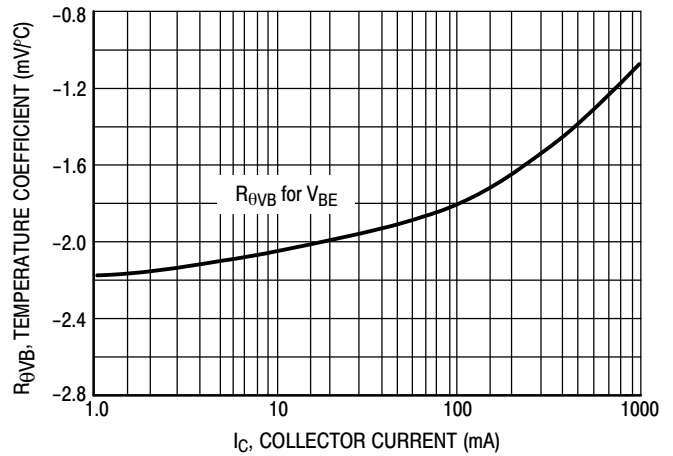


Figure 6. Base-Emitter Temperature Coefficient

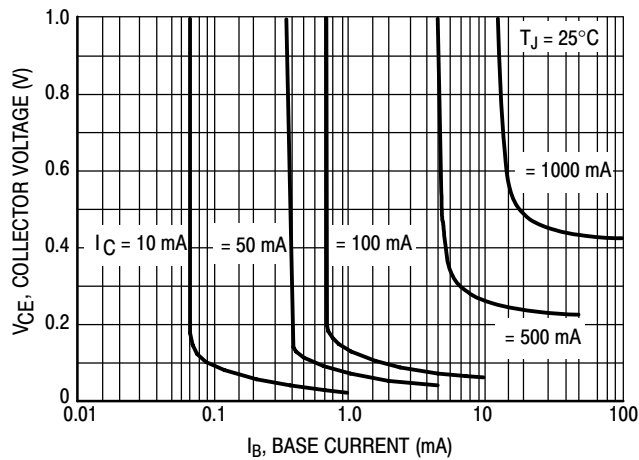
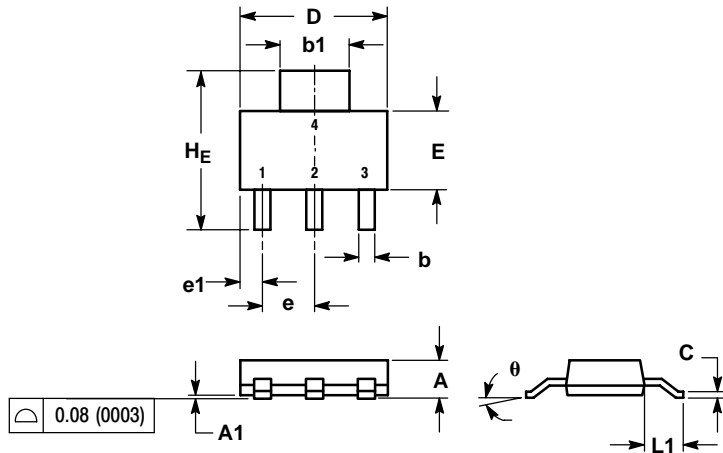


Figure 7. Saturation Region

# BCP68T1

## PACKAGE DIMENSIONS

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

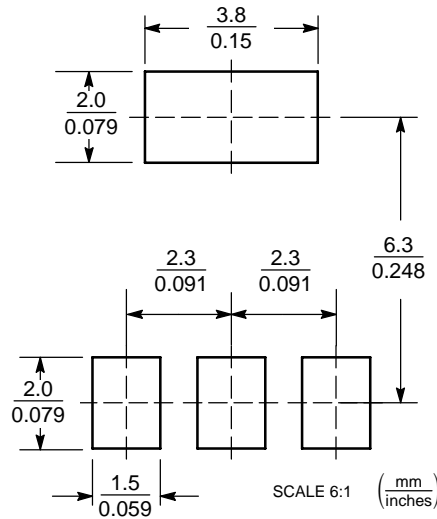


- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: INCH.

| 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 |
| L1  | 1.50        | 1.75 | 2.00 | 0.060  | 0.069 | 0.078 |
| HE  | 6.70        | 7.00 | 7.30 | 0.264  | 0.276 | 0.287 |
| θ   | 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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