

**NPN SILICON PLANAR MEDIUM POWER TRANSISTORS IN SOT223**
**Features**

- $I_C = 1A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < 500mV @ 0.5A$
- Gain groups 10 and 16
- Epitaxial Planar Die Construction
- Complementary PNP types: BCP51, 52 and 53
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Devices (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound (Note 2)
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.112 grams (Approximate)

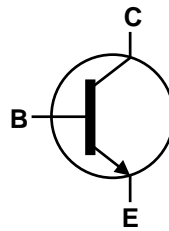
**Applications**

- Medium Power Switching or Amplification Applications
- AF driver and output stages

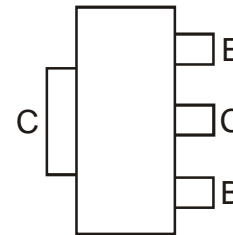
SOT223



Top View



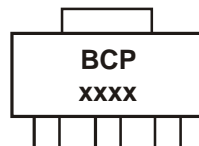
Device Symbol


 Top View  
Pin-Out

**Ordering Information (Note 3)**

| Product   | Marking  | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|----------|--------------------|-----------------|-------------------|
| BCP54TA   | BCP 54   | 7                  | 12              | 1,000             |
| BCP5410TA | BCP 5410 | 7                  | 12              | 1,000             |
| BCP5416TA | BCP 5416 | 7                  | 12              | 1,000             |
| BCP55TA   | BCP 55   | 7                  | 12              | 1,000             |
| BCP5510TA | BCP 5510 | 7                  | 12              | 1,000             |
| BCP5516TA | BCP 5516 | 7                  | 12              | 1,000             |
| BCP56TA   | BCP 56   | 7                  | 12              | 1,000             |
| BCP5610TA | BCP 5610 | 7                  | 12              | 1,000             |
| BCP5616TA | BCP 5616 | 7                  | 12              | 1,000             |
| BCP5616TC | BCP 5616 | 13                 | 12              | 4,000             |

- Notes:
1. No purposefully added lead.
  2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>
  3. For packaging details, go to our website <http://www.diodes.com>

**Marking Information**


BCP = Product Type Marking Code, Line 1.  
 XXXX = Product Type Marking Code, Line 2 as follows:

|                |                |                |
|----------------|----------------|----------------|
| BCP54 = 54     | BCP55 = 55     | BCP56 = 56     |
| BCP5410 = 5410 | BCP5510 = 5510 | BCP5610 = 5610 |
| BCP5416 = 5416 | BCP5516 = 5516 | BCP5616 = 5616 |

**Maximum Ratings** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

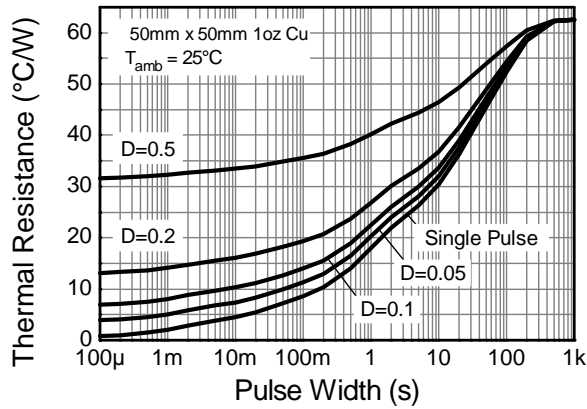
| Characteristic               | Symbol    | BCP54 | BCP55 | BCP56 | Unit |
|------------------------------|-----------|-------|-------|-------|------|
| Collector-Base Voltage       | $V_{CBO}$ | 45    | 60    | 100   | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | 45    | 60    | 80    | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | 5     |       |       | V    |
| Continuous Collector Current | $I_C$     | 1     |       |       | A    |
| Peak Pulse Collector Current | $I_{CM}$  | 2     |       |       |      |
| Continuous Base Current      | $I_B$     | 100   |       |       | mA   |
| Peak Pulse Base Current      | $I_{BM}$  | 200   |       |       |      |

**Thermal Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

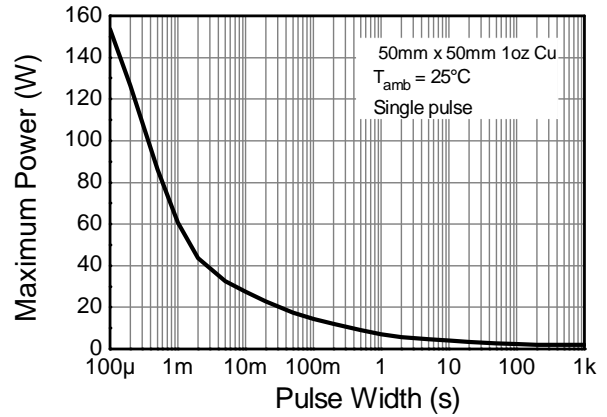
| Characteristic                                   | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 4)                       | $P_D$           | 2           | W                         |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 62          | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note 5)   | $R_{\theta JL}$ | 19.4        | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -65 to +150 | $^\circ\text{C}$          |

- Notes:
4. For a device surface mounted on 50mm X 50mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  5. Thermal resistance from junction to solder-point (at the end of the collector lead).

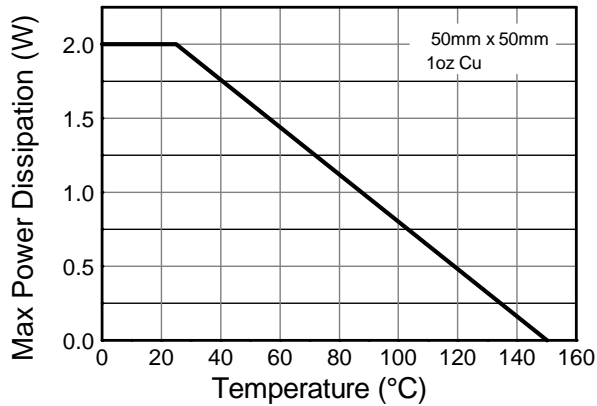
**Thermal Characteristics**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                 |              | Symbol        | Min | Typ | Max       | Unit   | Test Condition   |
|--|--------------|---------------|-----|-----|-----------|--|--|
| Collector-Base Breakdown Voltage               | BCP54        | $BV_{CBO}$    | 45  | -   | -         | V  | $I_C = 100\mu\text{A}$   |
|  | BCP55        |               | 60  |     |           |  |  |
|  | BCP56        |               | 100 |     |           |  |  |
| Collector-Emitter Breakdown Voltage (Note 6)   | BCP54        | $BV_{CEO}$    | 45  | -   | -         | V  | $I_C = 10\text{mA}$  |
|  | BCP55        |               | 60  |     |           |  |  |
|  | BCP56        |               | 80  |     |           |  |  |
| Emitter-Base Breakdown Voltage                 |              | $BV_{EBO}$    | 5   | -   | -         | V  | $I_E = 10\mu\text{A}$  |
| Collector Cut-off Current                      |              | $I_{CBO}$     | -   | -   | 0.1<br>20 | $\mu\text{A}$  | $V_{CB} = 30\text{V}$<br>$V_{CB} = 30\text{V}, T_A = 150^\circ\text{C}$  |
| Emitter Cut-off Current                        |              | $I_{EBO}$     | -   | -   | 20        | nA   | $V_{EB} = 4\text{V}$   |
| Static Forward Current Transfer Ratio (Note 6) | All versions | $h_{FE}$      | 25  | -   | -         |  | $I_C = 5\text{mA}, V_{CE} = 2\text{V}$<br>$I_C = 150\text{mA}, V_{CE} = 2\text{V}$<br>$I_C = 500\text{mA}, V_{CE} = 2\text{V}$ |
|  |              |               | 40  | -   | 250       |  |  |
|  |              |               | 25  | -   | -         |  |  |
|  | 10 gain grp  |               | 63  | -   | 160       |  |  |
|  | 16 gain grp  |               | 100 | -   | 250       | $I_C = 150\text{mA}, V_{CE} = 2\text{V}$<br>$I_C = 150\text{mA}, V_{CE} = 2\text{V}$ |  |
| Collector-Emitter Saturation Voltage (Note 6)  |              | $V_{CE(sat)}$ | -   | -   | 0.5       | V  | $I_C = 500\text{mA}, I_B = 50\text{mA}$  |
| Base-Emitter Turn-On Voltage (Note 6)          |              | $V_{BE(on)}$  | -   | -   | 1.0       | V  | $I_C = 500\text{mA}, V_{CE} = 2\text{V}$   |
| Transition Frequency                           |              | $f_T$         | 150 | -   | -         | MHz  | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$<br>$f = 100\text{MHz}$  |
| Output Capacitance                             |              | $C_{obo}$     | -   | -   | 25        | pF   | $V_{CB} = 10\text{V}, f = 1\text{MHz}$   |

Notes: 6. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

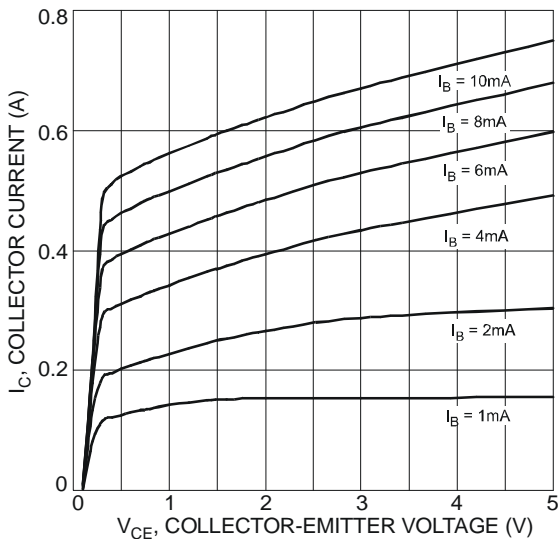


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

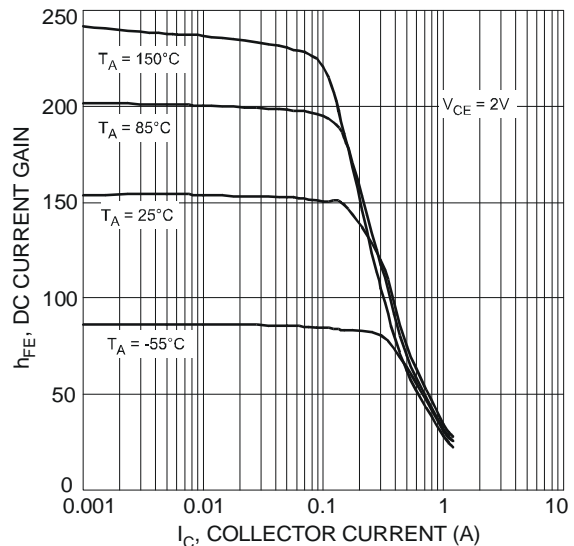


Fig. 2 Typical DC Current Gain vs. Collector Current

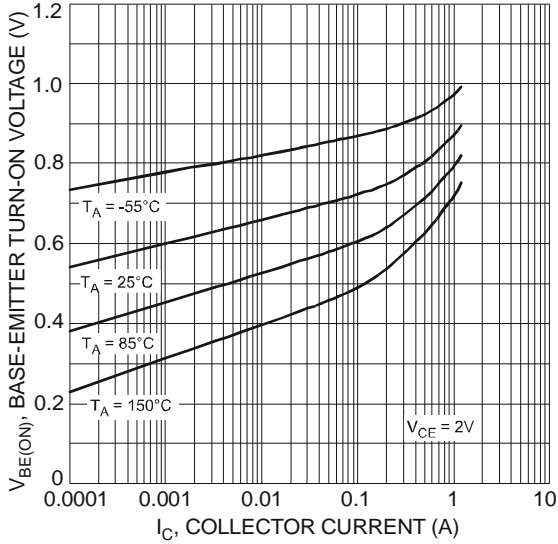


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

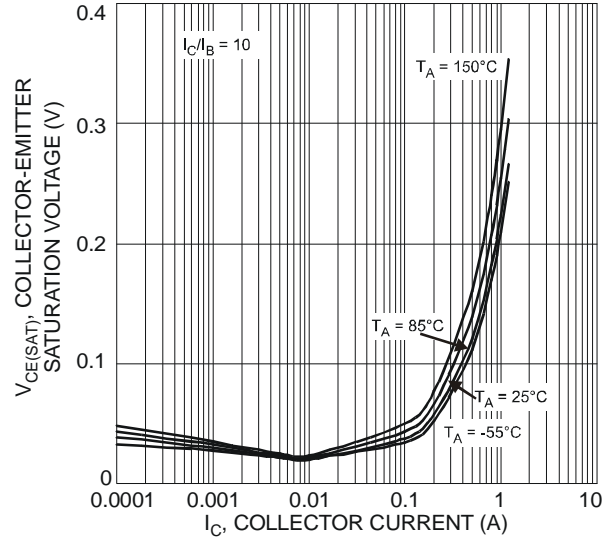


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

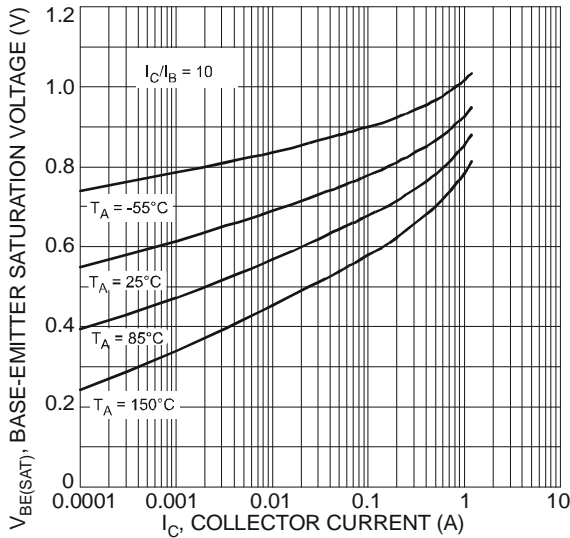


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

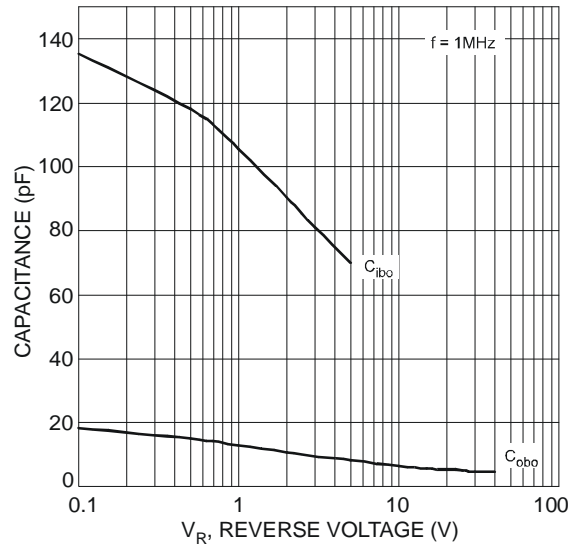


Fig. 6 Typical Capacitance Characteristics

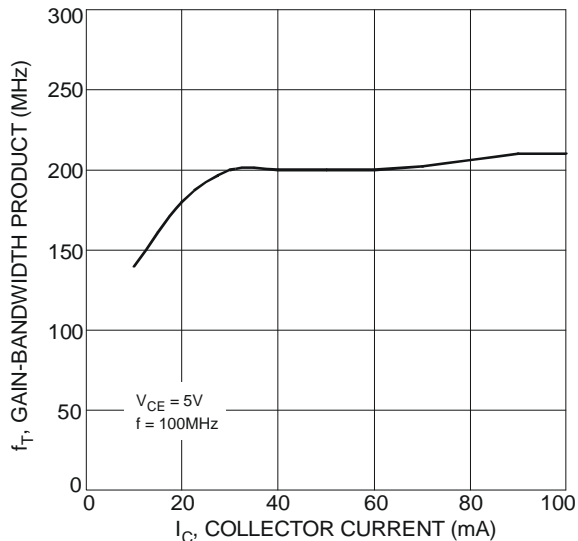
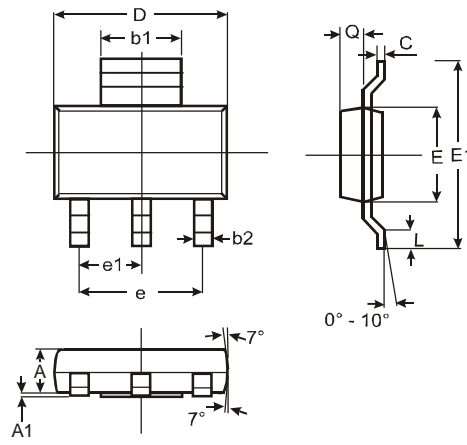


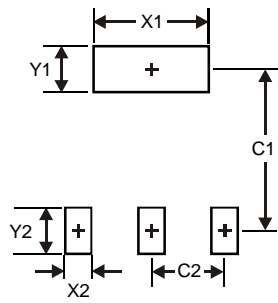
Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

**Package Outline Dimensions**



| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b1                   | 2.90  | 3.10 | 3.00 |
| b2                   | 0.60  | 0.80 | 0.70 |
| C                    | 0.20  | 0.30 | 0.25 |
| D                    | 6.45  | 6.55 | 6.50 |
| E                    | 3.45  | 3.55 | 3.50 |
| E1                   | 6.90  | 7.10 | 7.00 |
| e                    | —     | —    | 4.60 |
| e1                   | —     | —    | 2.30 |
| L                    | 0.85  | 1.05 | 0.95 |
| Q                    | 0.84  | 0.94 | 0.89 |
| All Dimensions in mm |       |      |      |

**Suggested Pad Layout**



| Dimensions | Value (in mm) |
|------------|---------------|
| X1         | 3.3           |
| X2         | 1.2           |
| Y1         | 1.6           |
| Y2         | 1.6           |
| C1         | 6.4           |
| C2         | 2.3           |

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