

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

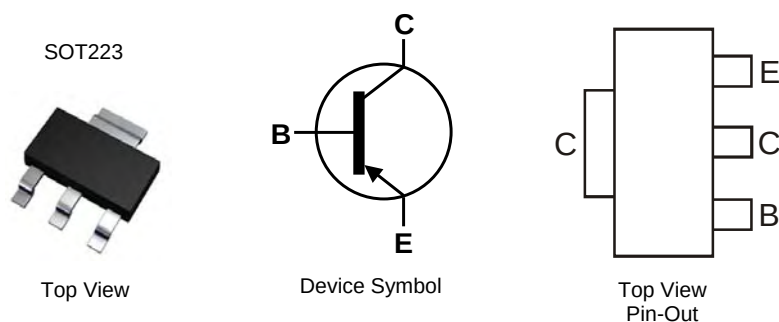
- $I_C = -1A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < -500mV$  @  $-0.5A$
- Gain groups 10 and 16
- Epitaxial Planar Die Construction
- Complementary NPN types: BCP54, 55 and 56
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Devices (Note 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)

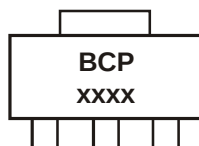
**Applications**

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


**Ordering Information (Note 3)**

| Product   | Marking  | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|----------|--------------------|-----------------|-------------------|
| BCP51TA   | BCP 51   | 7                  | 12              | 1,000             |
| BCP5110TA | BCP 5110 | 7                  | 12              | 1,000             |
| BCP5116TA | BCP 5116 | 7                  | 12              | 1,000             |
| BCP5116TC | BCP 5116 | 13                 | 12              | 4,000             |
| BCP52TA   | BCP 52   | 7                  | 12              | 1,000             |
| BCP5210TA | BCP 5210 | 7                  | 12              | 1,000             |
| BCP5216TA | BCP 5216 | 7                  | 12              | 1,000             |
| BCP53TA   | BCP 53   | 7                  | 12              | 1,000             |
| BCP5310TA | BCP 5310 | 7                  | 12              | 1,000             |
| BCP5316TA | BCP 5316 | 7                  | 12              | 1,000             |
| BCP5316TC | BCP 5316 | 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:

BCP51 = 51  
 BCP5110 = 5110  
 BCP5116 = 5116

BCP52 = 52  
 BCP5210 = 5210  
 BCP5216 = 5216

BCP53 = 53  
 BCP5310 = 5310  
 BCP5316 = 5316

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

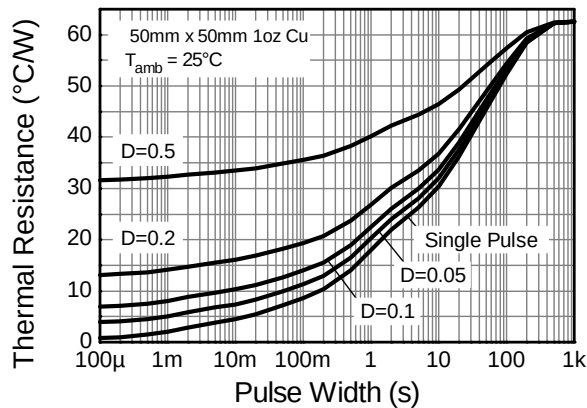
| Characteristic               | Symbol           | BCP51 | BCP52 | BCP53 | Unit |
|------------------------------|------------------|-------|-------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | -45   | -60   | -100  | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -45   | -60   | -80   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -5    |       |       | V    |
| Continuous Collector Current | I <sub>C</sub>   | -1    |       |       | A    |
| Peak Pulse Collector Current | I <sub>CM</sub>  | -2    |       |       |      |
| Continuous Base Current      | I <sub>B</sub>   | -100  |       |       | mA   |
| Peak Pulse Base Current      | I <sub>BM</sub>  | -200  |       |       |      |

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

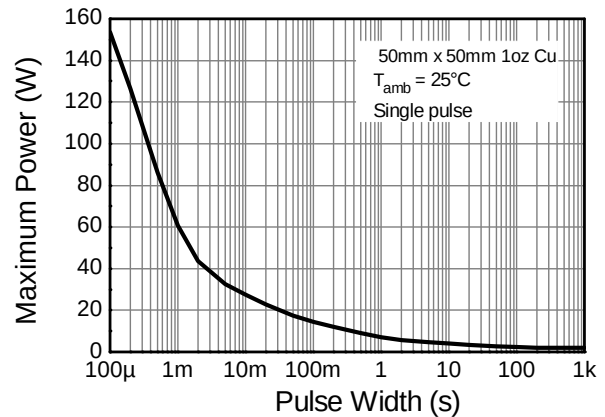
| Characteristic                                   | Symbol          | Value       | Unit               |
|--------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation (Note 4)                       | $P_D$           | 2           | W                  |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 62          | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Leads (Note 5)   | $R_{\theta JL}$ | 19.4        | $^\circ\text{C/W}$ |
| 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).

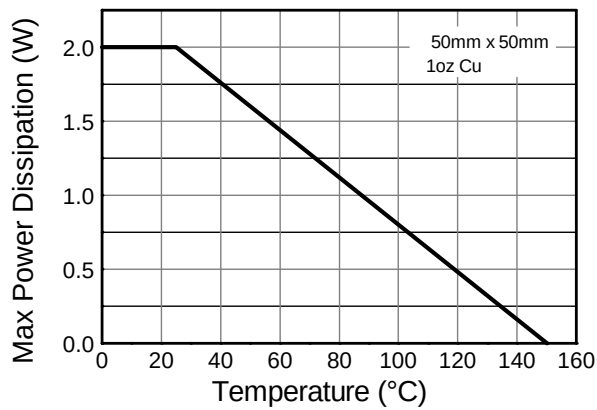
## Thermal Characteristics



**Transient Thermal Impedance**



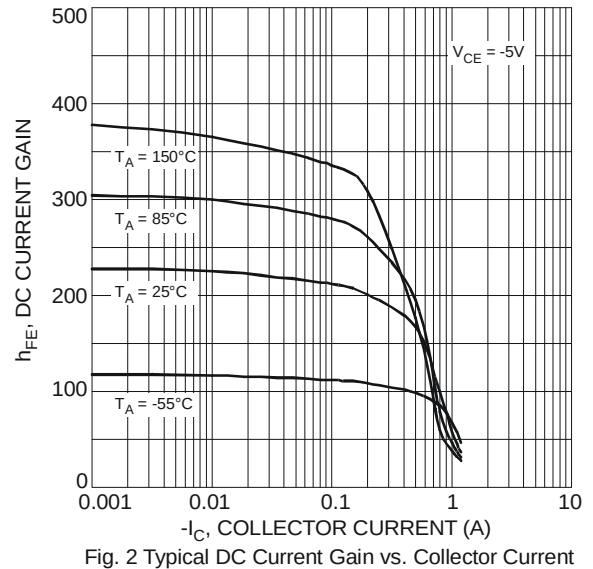
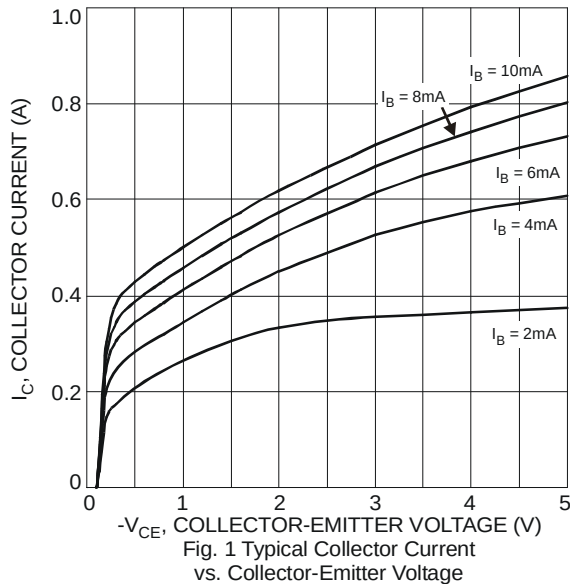
**Pulse Power Dissipation**



**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               | BCP51        | $BV_{CBO}$    | -45  | -   | -           | V             | $I_C = -100\mu\text{A}$                                                   |
|                                                | BCP52        |               | -60  |     |             |               |                                                                           |
|                                                | BCP53        |               | -100 |     |             |               |                                                                           |
| Collector-Emitter Breakdown Voltage (Note 6)   | BCP51        | $BV_{CEO}$    | -45  | -   | -           | V             | $I_C = -10\text{mA}$                                                      |
|                                                | BCP52        |               | -60  |     |             |               |                                                                           |
|                                                | BCP53        |               | -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   | -   | -           | -             | $I_C = -5\text{mA}, V_{CE} = -2\text{V}$                                  |
|                                                |              |               | 40   | -   | 250         |               | $I_C = -150\text{mA}, V_{CE} = -2\text{V}$                                |
|                                                |              |               | 25   | -   | -           |               | $I_C = -500\text{mA}, V_{CE} = -2\text{V}$                                |
|                                                |              |               |      | -   |             |               |                                                                           |
|                                                | 10 gain grp  |               | 63   | -   | 160         |               | $I_C = -150\text{mA}, V_{CE} = -2\text{V}$                                |
|                                                | 16 gain grp  |               | 100  | -   | 250         |               | $I_C = -150\text{mA}, V_{CE} = -2\text{V}$                                |
| 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  $\leq 2\%$ .


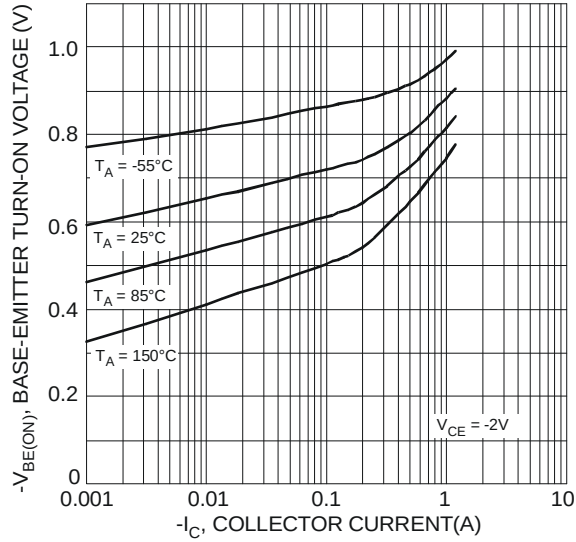


Fig 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

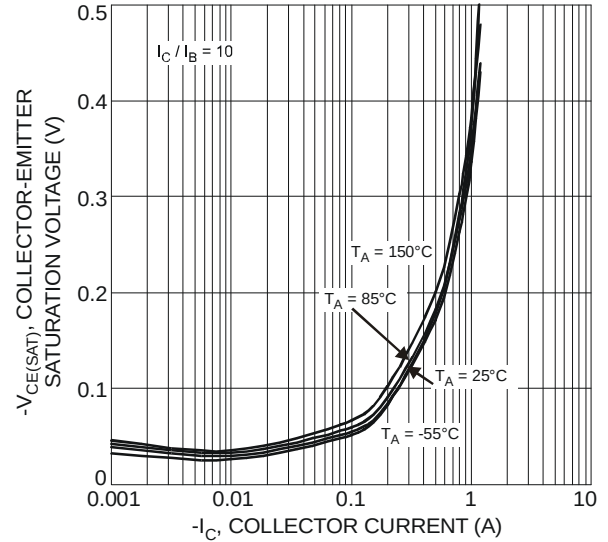


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

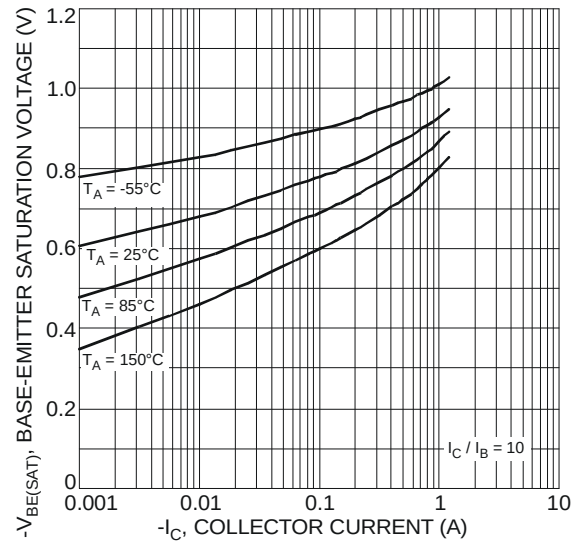


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

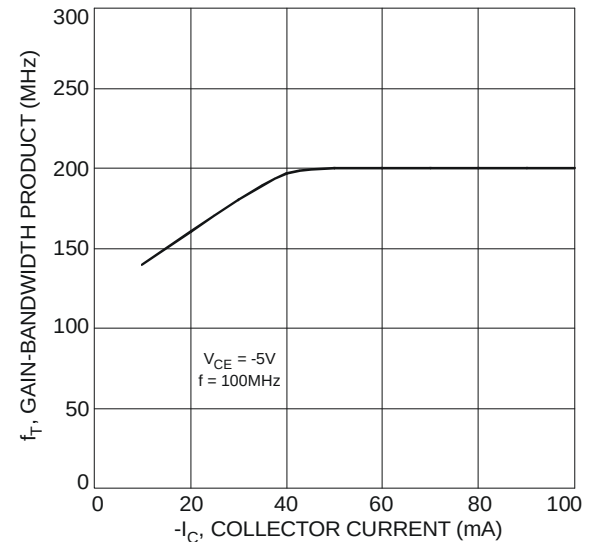


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current

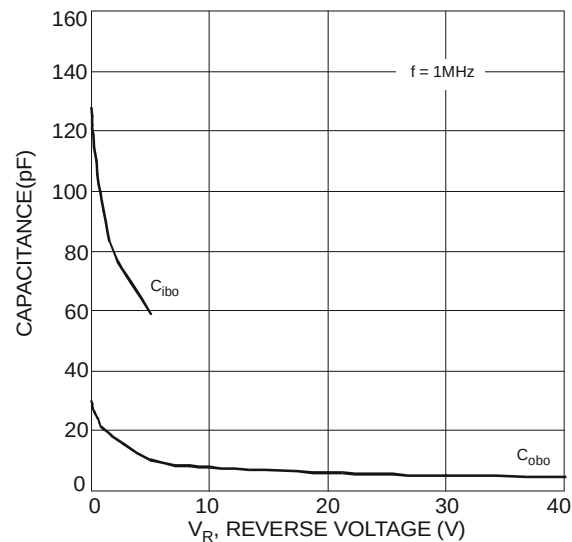
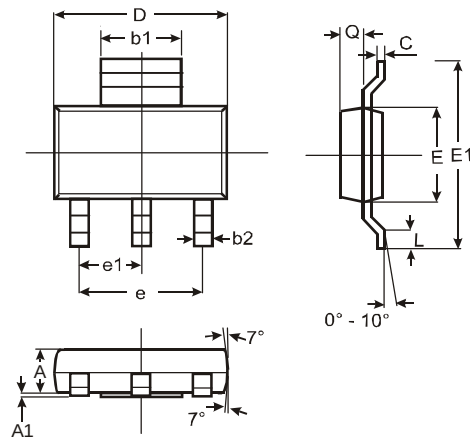


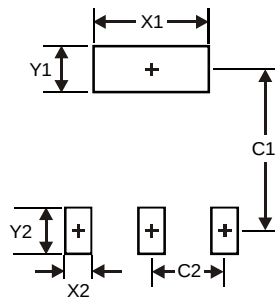
Fig. 7 Typical Capacitance Characteristics

## 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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