

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)

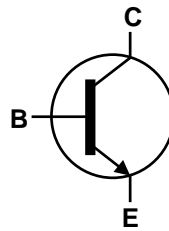
Applications

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

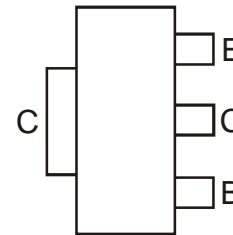
SOT223



Top View



Device Symbol



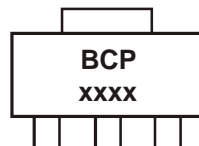
Top View
Pin-Out

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

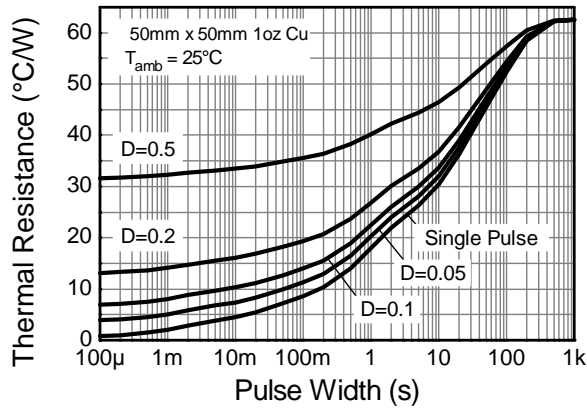
| Characteristic | Symbol | BCP54 | BCP55 | BCP56 | Unit |
|------------------------------|-----------|-------|-------|-------|------|
| Collector-Base Voltage | V_{CBO} | 45 | 60 | 100 | V |
| Collector-Emitter Voltage | V_{CEO} | 45 | 60 | 80 | V |
| Emitter-Base Voltage | V_{EBO} | 5 | | | V |
| Continuous 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

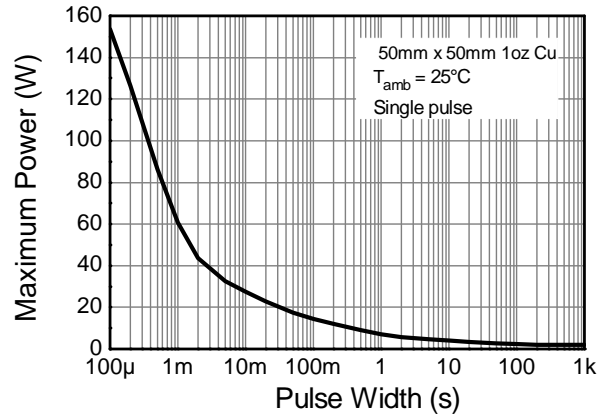
| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 4) | P_D | 2 | W |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 62 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note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

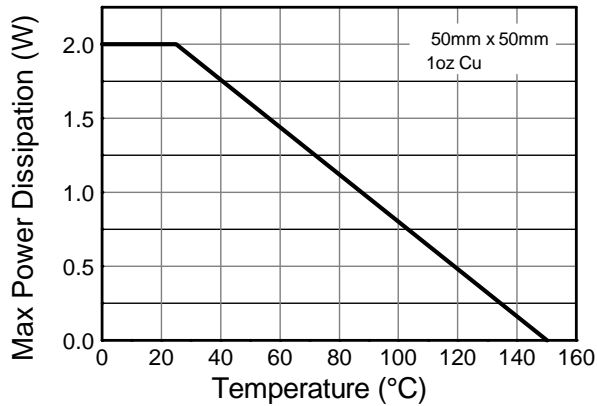
Thermal Characteristics



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 20 | μA | $V_{CB} = 30\text{V}$ $V_{CB} = 30\text{V}, T_A = 150^\circ\text{C}$ |
| 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 | - | - | | $I_C = 5\text{mA}, V_{CE} = 2\text{V}$ $I_C = 150\text{mA}, V_{CE} = 2\text{V}$ $I_C = 500\text{mA}, V_{CE} = 2\text{V}$ |
| | | | 40 | - | 250 | | |
| | | | 25 | - | - | | |
| | | | 63 | - | 160 | | |
| | | | 100 | - | 250 | | $I_C = 150\text{mA}, V_{CE} = 2\text{V}$ $I_C = 150\text{mA}, V_{CE} = 2\text{V}$ |
| 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 | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$ |
| 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 $\leq 2\%$.

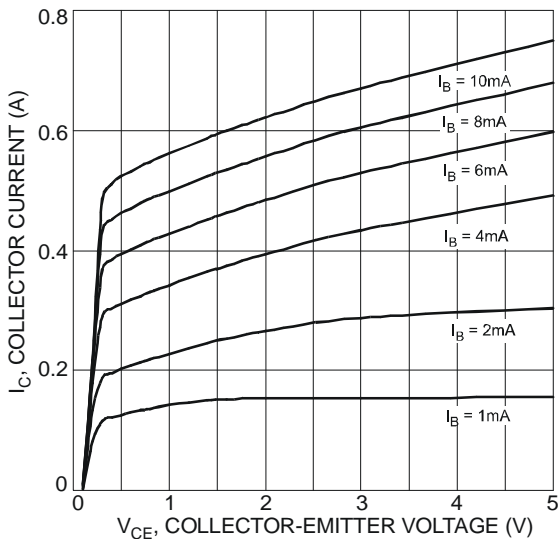


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

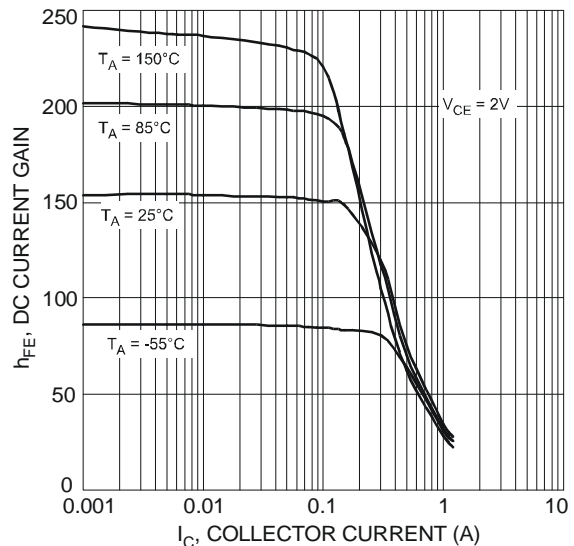


Fig. 2 Typical DC Current Gain vs. Collector Current

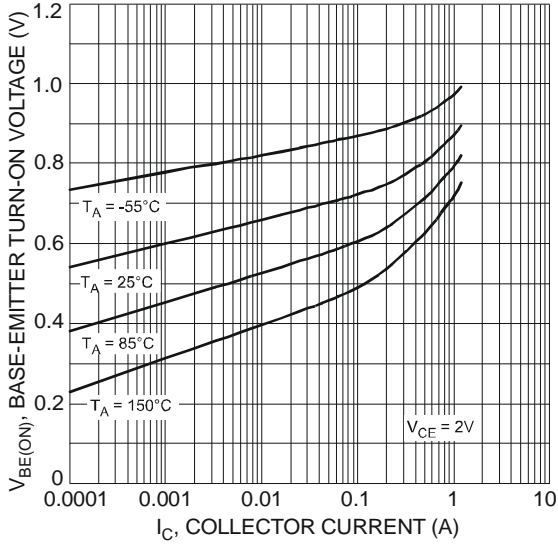


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

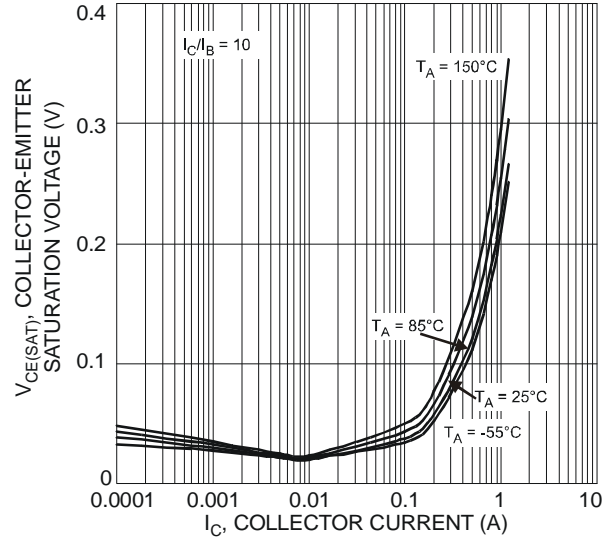


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

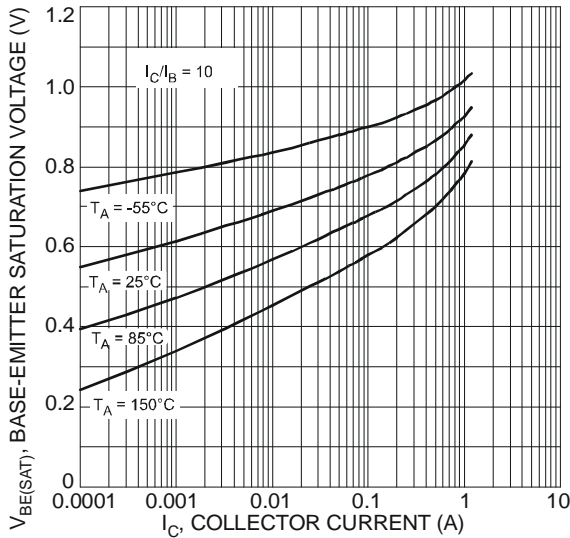


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

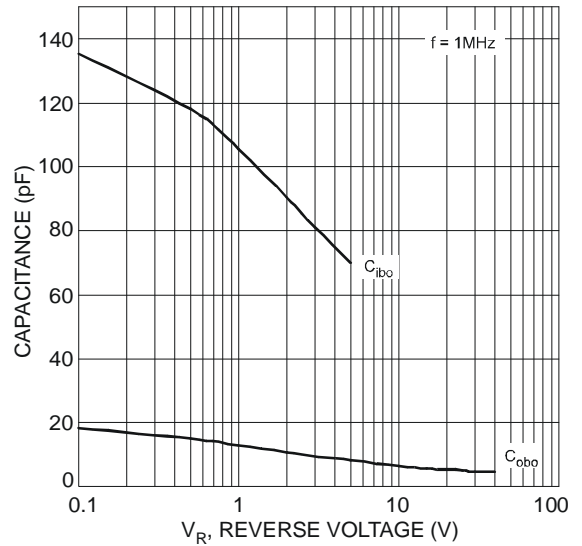


Fig. 6 Typical Capacitance Characteristics

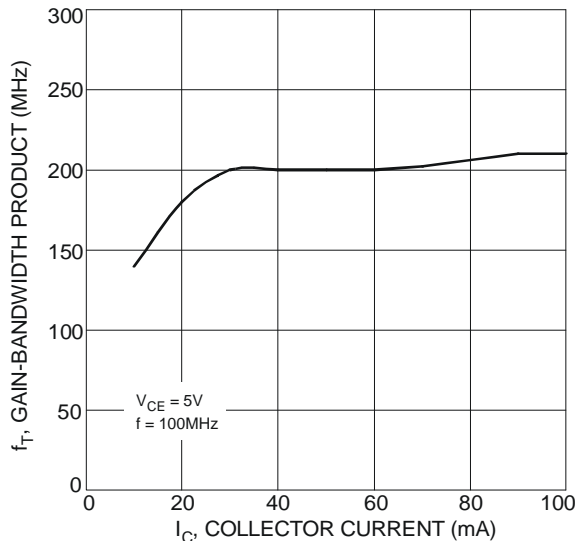
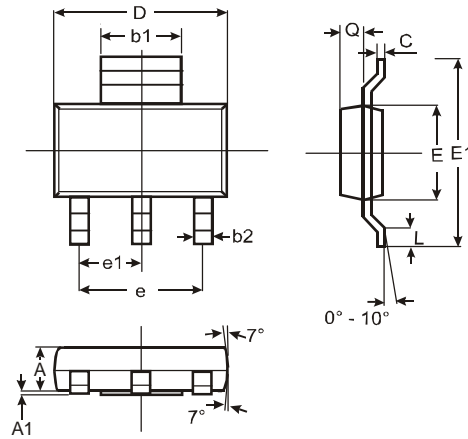


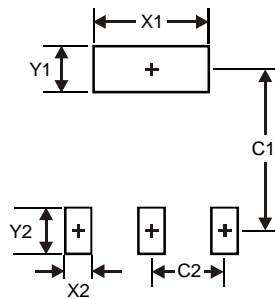
Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

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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