

PNP SILICON PLANAR MEDIUM POWER TRANSISTORS IN SOT223

Features

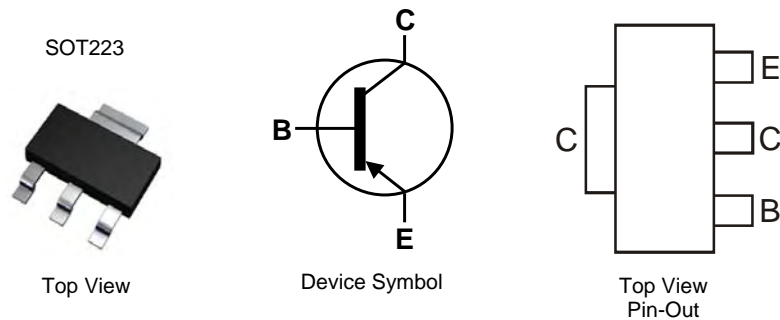
- $I_C = -1A$ Continuous Collector Current
- Low Saturation Voltage $V_{CE(sat)} < -500mV @ -0.5A$
- Gain groups 10 and 16
- Epitaxial Planar Die Construction
- Complementary NPN types: BCP54, 55 and 56
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Devices (Note 2)**
- **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

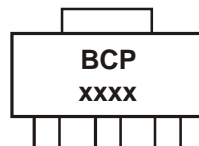


Ordering Information (Note 3)

| 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 | BCP52 = 52 | BCP53 = 53 |
| BCP5110 = 5110 | BCP5210 = 5210 | BCP5310 = 5310 |
| BCP5116 = 5116 | BCP5216 = 5216 | BCP5316 = 5316 |

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

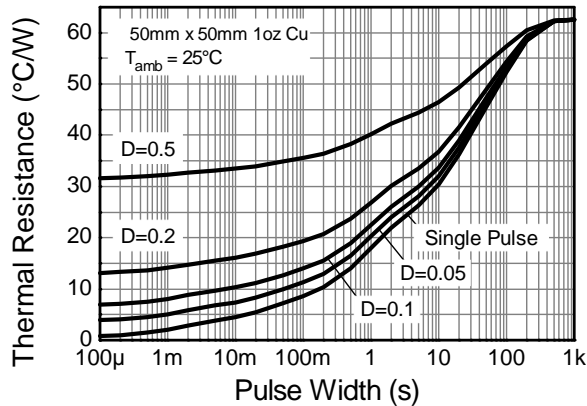
| Characteristic | Symbol | BCP51 | BCP52 | BCP53 | Unit |
|------------------------------|-----------|-------|-------|-------|------|
| Collector-Base Voltage | V_{CBO} | -45 | -60 | -100 | V |
| Collector-Emitter Voltage | V_{CEO} | -45 | -60 | -80 | V |
| Emitter-Base Voltage | V_{EBO} | | -5 | | 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

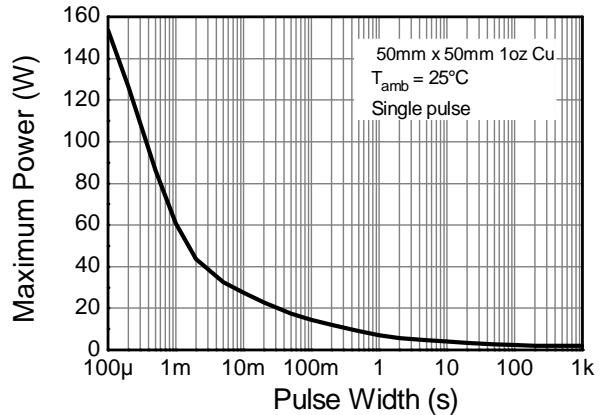
| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 4) | P_D | 2 | W |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 62 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note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

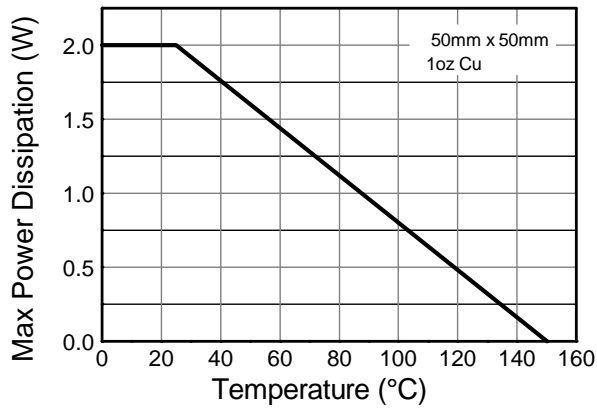
Thermal Characteristics



Transient Thermal Impedance



Pulse Power Dissipation

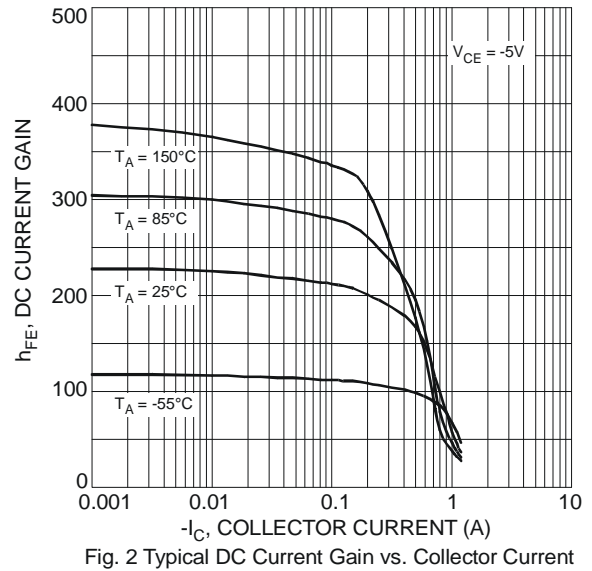
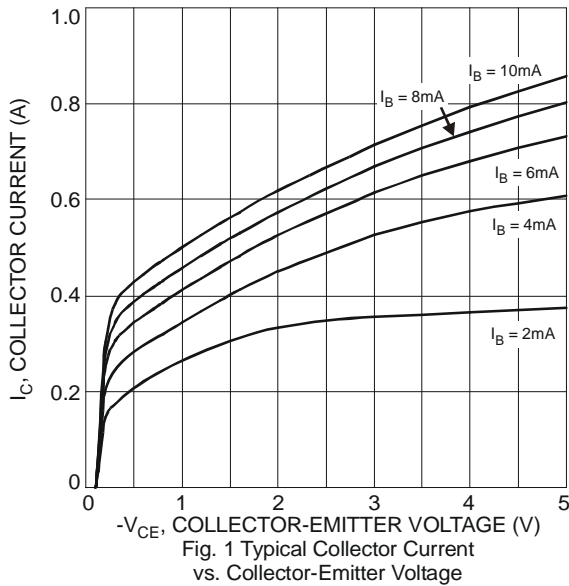


Derating Curve

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|--|---------------|----------|-------------|-------------|---------------|---|--|
| Collector-Base Breakdown Voltage | BCP51 | -45 | - | - | V | $I_C = -100\mu\text{A}$ | |
| | BCP52 | -60 | | | | | |
| | BCP53 | -100 | | | | | |
| Collector-Emitter Breakdown Voltage (Note 6) | BCP51 | -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 -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 | - | - | - | $I_C = -5\text{mA}, V_{CE} = -2\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ $I_C = -500\text{mA}, V_{CE} = -2\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ |
| | | | 40 | - | 250 | | |
| | | | 25 | - | - | | |
| | | | 10 gain grp | 63 | - | | |
| 16 gain grp | 100 | - | 250 | | | | |
| 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_r | 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 $\leq 2\%$.



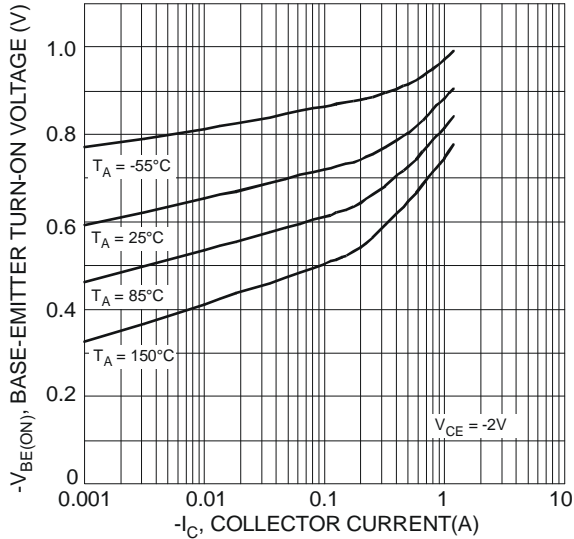


Fig 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

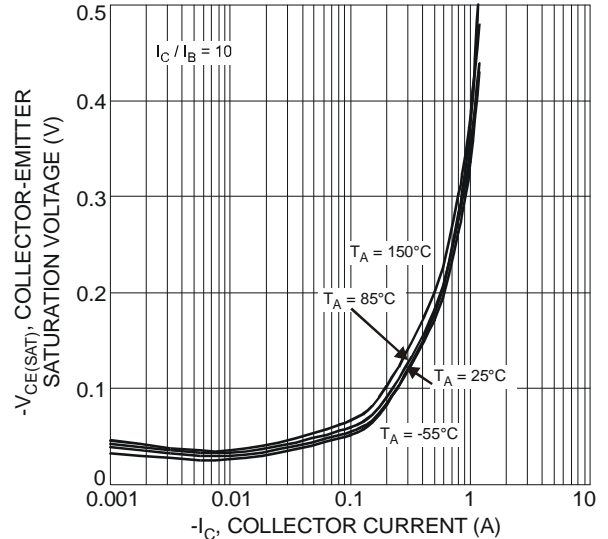


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

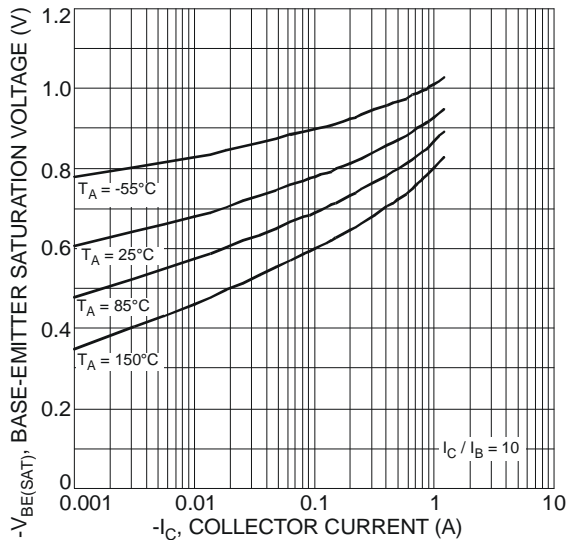


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

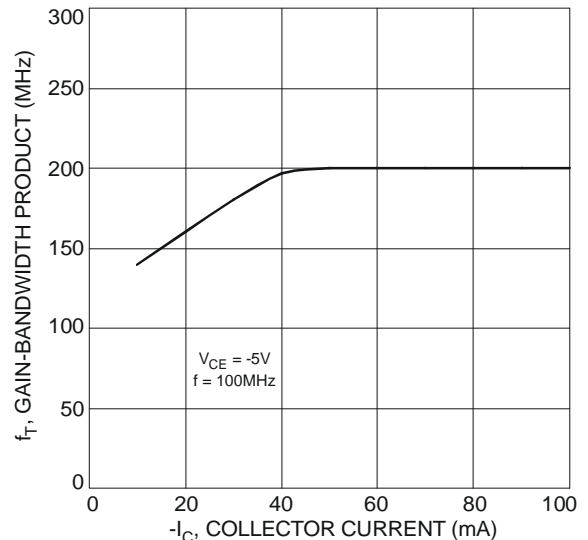


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current

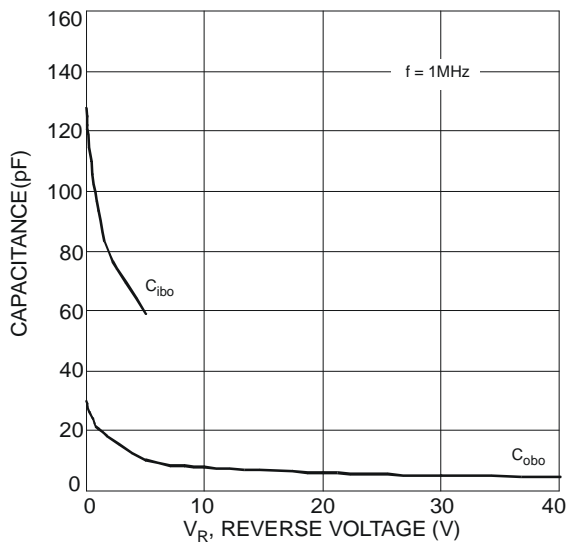
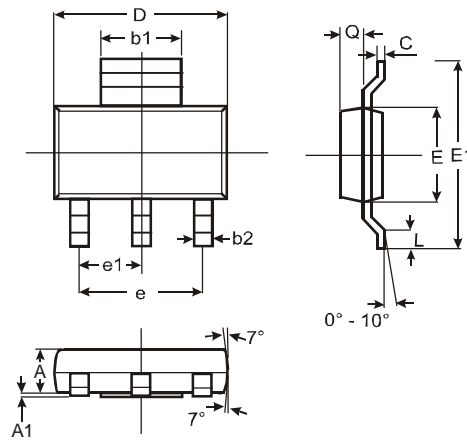


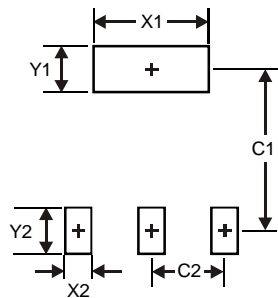
Fig. 7 Typical Capacitance Characteristics

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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