

NPN SILICON PLANAR MEDIUM POWER TRANSISTORS IN SOT89

Features

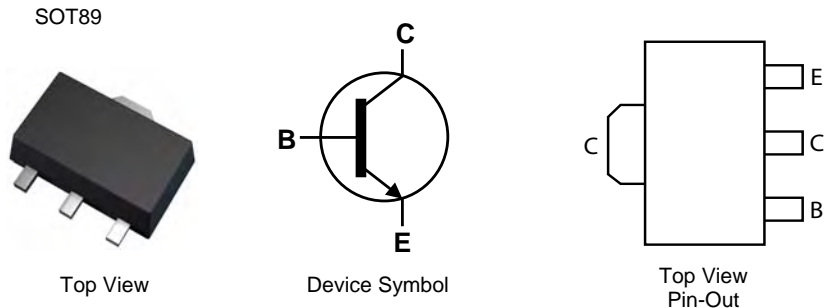
- $I_C = 1A$ Continuous Collector Current
- Low Saturation Voltage $V_{CE(sat)} < 500mV @ 0.5A$
- Gain groups 10 and 16
- Epitaxial Planar Die Construction
- Complementary PNP types: BCX51, 52 and 53
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Devices (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT89
- 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: 0.072 grams (Approximate)

Applications

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

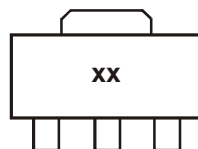


Ordering Information (Note 3)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|---------|--------------------|-----------------|-------------------|
| BCX54TA | BA | 7 | 12 | 1,000 |
| BCX5410TA | BC | 7 | 12 | 1,000 |
| BCX5416TA | BD | 7 | 12 | 1,000 |
| BCX55TA | BE | 7 | 12 | 1,000 |
| BCX5510TA | BG | 7 | 12 | 1,000 |
| BCX5516TA | BM | 7 | 12 | 1,000 |
| BCX56TA | BH | 7 | 12 | 1,000 |
| BCX5610TA | BK | 7 | 12 | 1,000 |
| BCX5616TA | BL | 7 | 12 | 1,000 |
| BCX5316TC | BL | 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



xx = Product Type Marking Code, as follows:

| | | |
|--------------|--------------|--------------|
| BCX54 = BA | BCX55 = BE | BCX56 = BH |
| BCX5410 = BC | BCX5510 = BG | BCX5610 = BK |
| BCX5416 = BD | BCX5516 = BM | BCX5616 = BL |

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

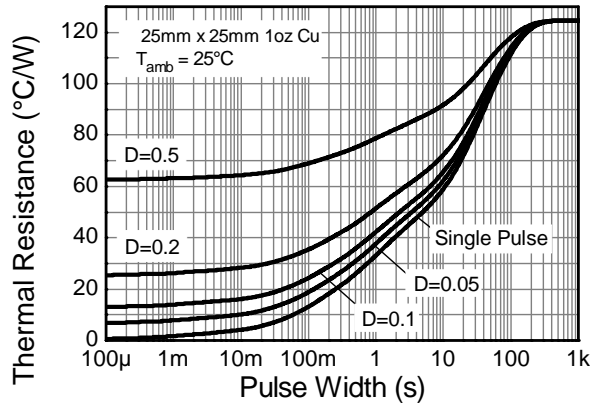
| Characteristic | Symbol | BCX54 | BCX55 | BCX56 | Unit |
|------------------------------|-----------|-------|-------|-------|------|
| Collector-Base Voltage | V_{CBO} | 45 | 60 | 100 | V |
| Collector-Emitter Voltage | V_{CEO} | 45 | 60 | 80 | V |
| Emitter-Base Voltage | V_{EBO} | 5 | | | V |
| Continuous Collector Current | I_C | 1 | | | A |
| Peak Pulse Collector Current | I_{CM} | 1.5 | | | |
| 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

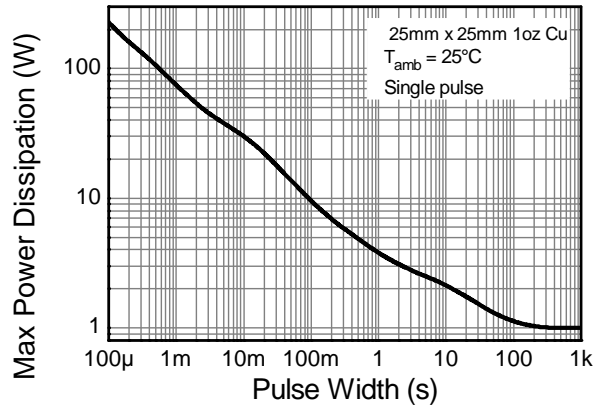
| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 4) | P_D | 1 | W |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 124 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Leads (Note 5) | $R_{\theta JL}$ | 10.0 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -65 to +150 | $^\circ\text{C}$ |

- Notes:
4. For a device surface mounted on 25mm X 25mm 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 (on the exposed collector pad).

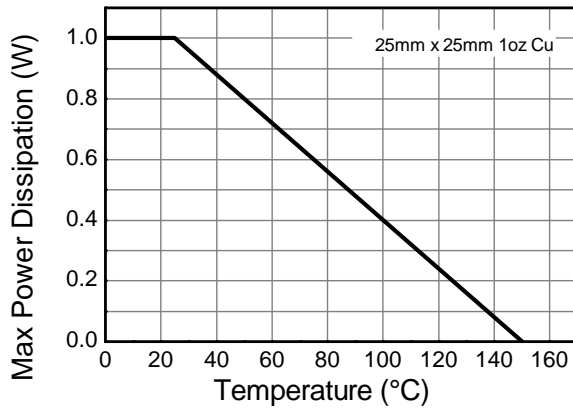
Thermal Characteristics



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 | BV_{CBO} | 45 | - | - | V | $I_C = 100\mu\text{A}$ |
| | | 60 | | | | |
| | | 100 | | | | |
| Collector-Emitter Breakdown Voltage (Note 6) | BV_{CEO} | 45 | - | - | V | $I_C = 10\text{mA}$ |
| | | 60 | | | | |
| | | 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) | 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 | - | - | | |
| | 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 | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$ |
| 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 $\leq 2\%$.

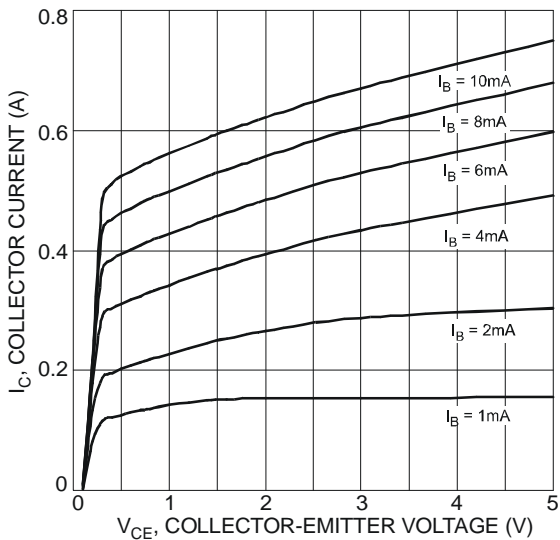


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

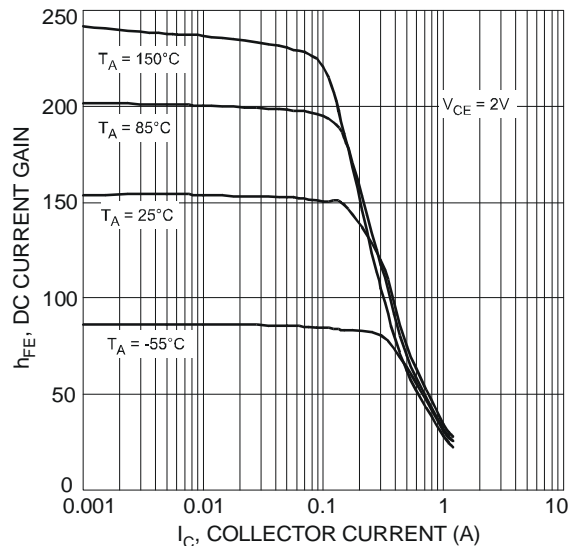


Fig. 2 Typical DC Current Gain vs. Collector Current

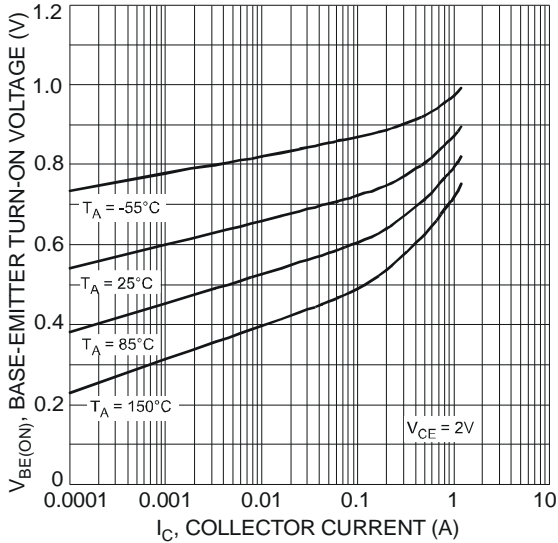


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

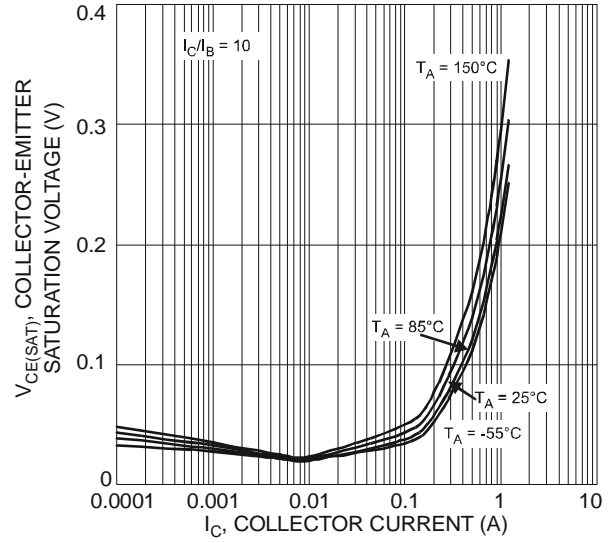


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

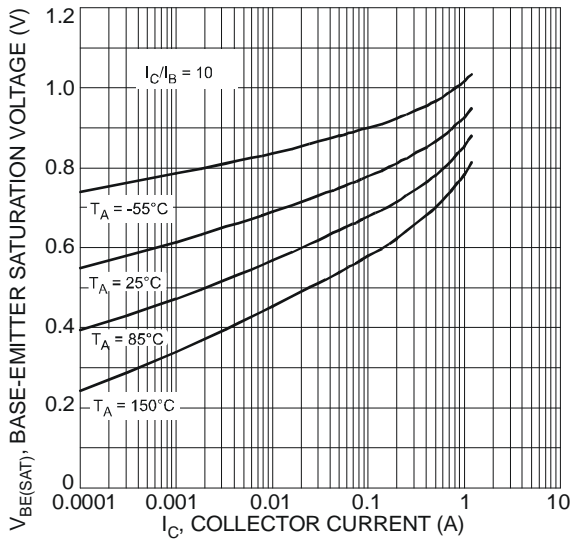


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

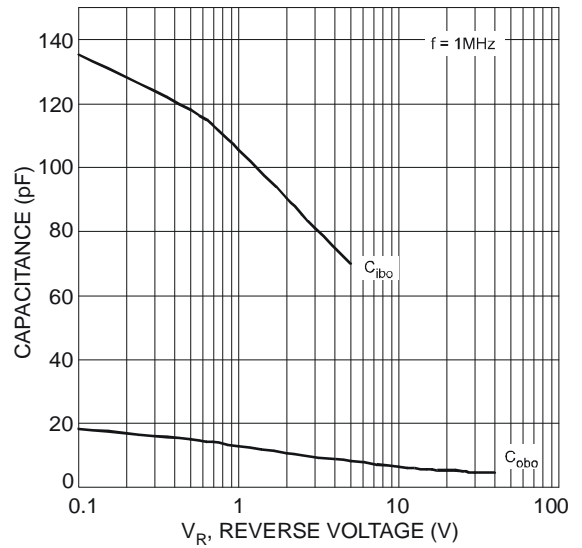


Fig. 6 Typical Capacitance Characteristics

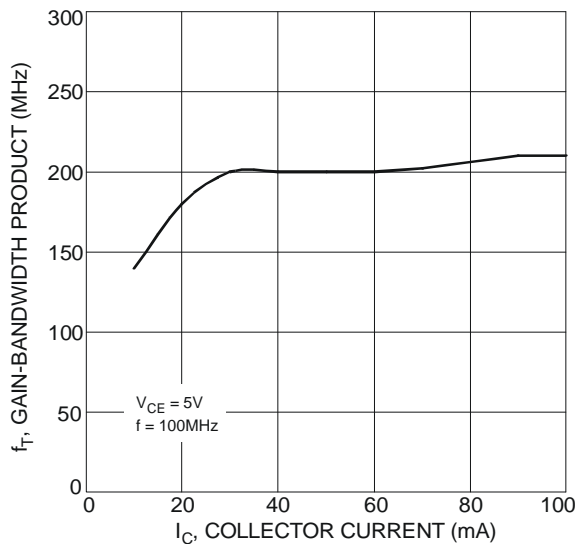
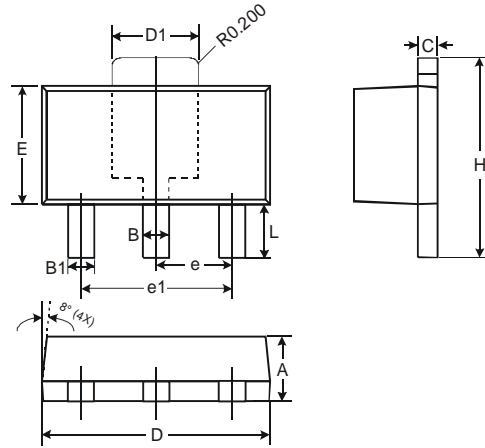


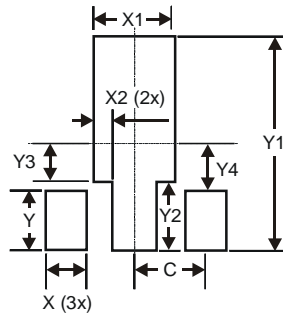
Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

Package Outline Dimensions



| SOT89 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 1.40 | 1.60 |
| B | 0.44 | 0.62 |
| B1 | 0.35 | 0.54 |
| C | 0.35 | 0.43 |
| D | 4.40 | 4.60 |
| D1 | 1.52 | 1.83 |
| E | 2.29 | 2.60 |
| E | 1.50 Typ | |
| e1 | 3.00 Typ | |
| H | 3.94 | 4.25 |
| L | 0.89 | 1.20 |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| X | 0.900 |
| X1 | 1.733 |
| X2 | 0.416 |
| Y | 1.300 |
| Y1 | 4.600 |
| Y2 | 1.475 |
| Y3 | 0.950 |
| Y4 | 1.125 |
| C | 1.500 |

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