

**PNP SILICON PLANAR MEDIUM POWER TRANSISTORS IN SOT89**

**Features**

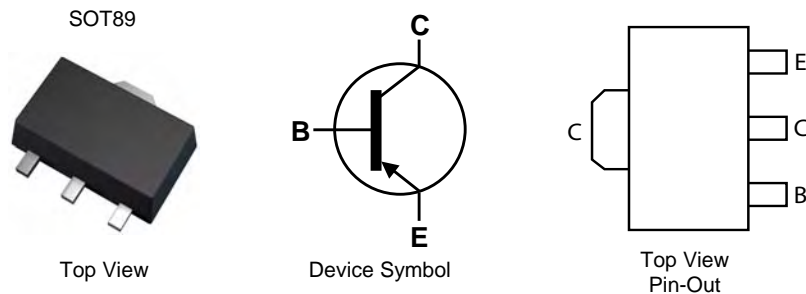
- $I_C = -1A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < -500mV @ -0.5A$
- Gain groups 10 and 16
- Epitaxial Planar Die Construction
- Complementary NPN types: BCX54, 55, and 56
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Devices (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: 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

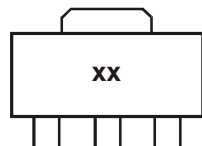


**Ordering Information (Note 3)**

| Product     | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| BCX51TA     | AA      | 7                  | 12              | 1,000             |
| BCX5110TA   | AC      | 7                  | 12              | 1,000             |
| BCX5116TA   | AD      | 7                  | 12              | 1,000             |
| BCX52TA     | AE      | 7                  | 12              | 1,000             |
| BCX5210TA   | AG      | 7                  | 12              | 1,000             |
| BCX5216TA   | AM      | 7                  | 12              | 1,000             |
| BCX53TA     | AH      | 7                  | 12              | 1,000             |
| BCX5310TA   | AK      | 7                  | 12              | 1,000             |
| BCX5316TA   | AL      | 7                  | 12              | 1,000             |
| BCX5316TC   | AL      | 13                 | 12              | 4,000             |
| BCX5316-13R | AL      | 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:

- |              |              |              |
|--------------|--------------|--------------|
| BCX51 = AA   | BCX52 = AE   | BCX53 = AH   |
| BCX5110 = AC | BCX5210 = AG | BCX5310 = AK |
| BCX5116 = AD | BCX5316 = AM | BCX5316 = AL |

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

| Characteristic               | Symbol    | BCX51 | BCX52 | BCX53 | 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         | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Leads (Note 5)   | $R_{\theta JL}$ | 10.0        | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -65 to +150 | $^\circ\text{C}$          |

- Notes:
4. For a device surface mounted on 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).

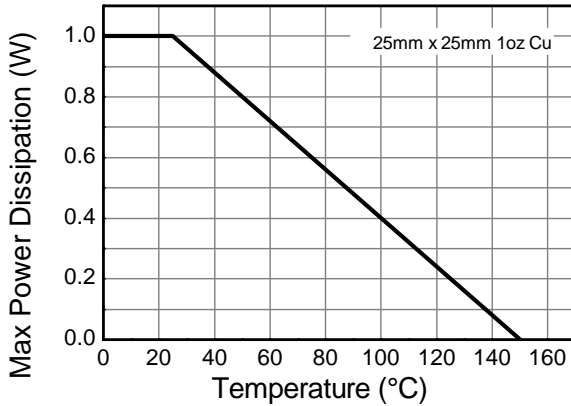
**Thermal Characteristics**



**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               | BCX51        | $BV_{CBO}$    | -45  | -   | -           | V  | $I_C = -100\mu\text{A}$  |
|  | BCX52        |               | -60  |     |             |  |  |
|  | BCX53        |               | -100 |     |             |  |  |
| Collector-Emitter Breakdown Voltage (Note 6)   | BCX51        | $BV_{CEO}$    | -45  | -   | -           | V  | $I_C = -10\text{mA}$   |
|  | BCX52        |               | -60  |     |             |  |  |
|  | BCX53        |               | -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 |             | $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ |  |
| 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  | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$<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  $\leq 2\%$ .

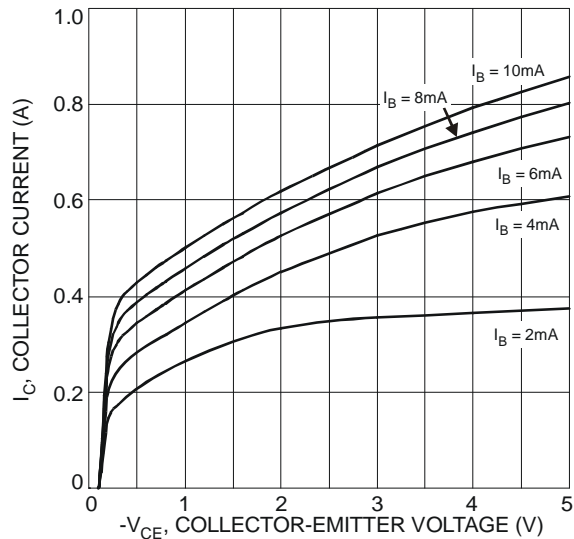


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

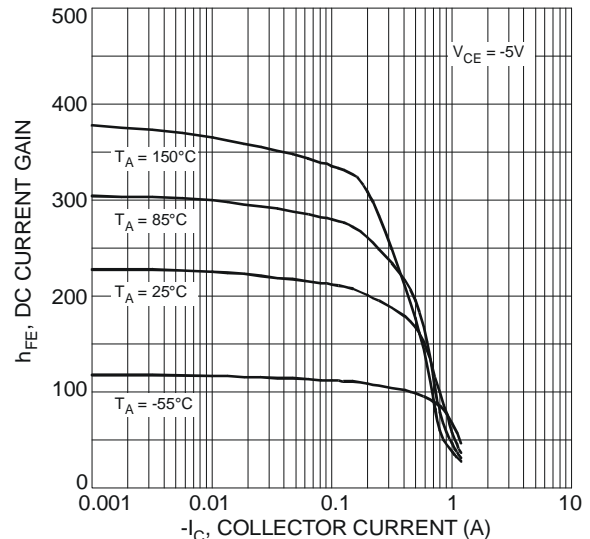


Fig. 2 Typical DC Current Gain vs. Collector Current



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

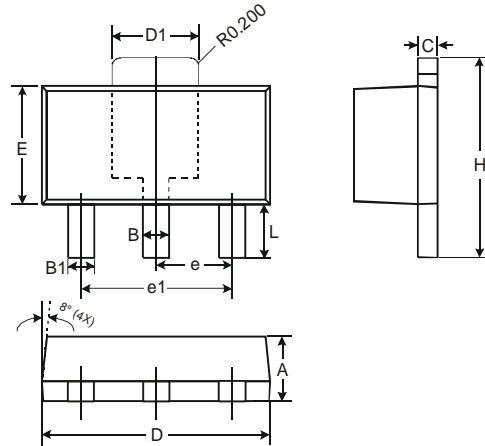


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current



Fig. 7 Typical Capacitance Characteristics

**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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