# 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
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

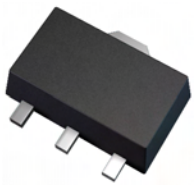
## Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Leads, Solderable per MIL-STD-202 Method 208 e3
- Weight: 0.072 grams (Approximate)

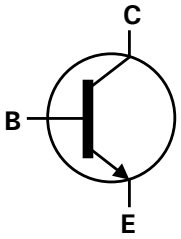
## Applications

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

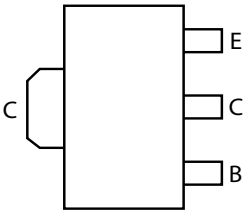
SOT89



Top View




Device Symbol



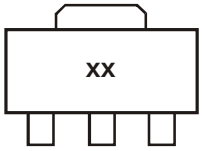

Top View
Pin-Out

## Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|---|
| BCX54TA | AEC-Q101 | BA | 7 | 12 | 1,000 |
| BCX5410TA | AEC-Q101 | BC | 7 | 12 | 1,000 |
| BCX5416TA | AEC-Q101 | BD | 7 | 12 | 1,000 |
| BCX5416-13R | AEC-Q101 | BD | 13 | 12 | 4,000 |
| BCX55TA | AEC-Q101 | BE | 7 | 12 | 1,000 |
| BCX5510TA | AEC-Q101 | BG | 7 | 12 | 1,000 |
| BCX5516TA | AEC-Q101 | BM | 7 | 12 | 1,000 |
| BCX56TA | AEC-Q101 | BH | 7 | 12 | 1,000 |
| BCX5610TA | AEC-Q101 | BK | 7 | 12 | 1,000 |
| BCX5616TA | AEC-Q101 | BL | 7 | 12 | 1,000 |
| BCX5616QTA | Automotive | BL | 7 | 12 | 1,000 |
| BCX5616TC | AEC-Q101 | BL | 13 | 12 | 4,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com for more information about Diodes Incorporated's definitions of Halogen and Antimony free,"Green" and Lead-Free.
3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
5. For packaging details, go to our website at 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°C, unless otherwise specified.)

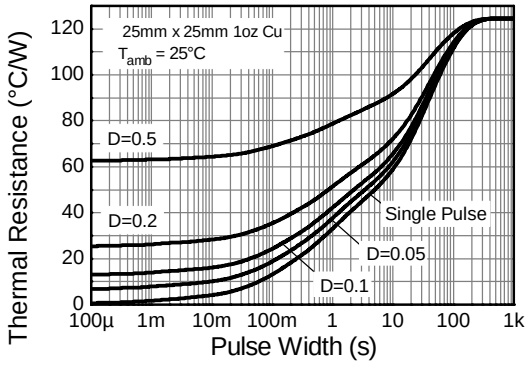
| Characteristic | Symbol | BCX54 | BCX55 | BCX56 | Unit |
|---|---|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 45 | 60 | 100 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 45 | 60 | 80 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 6 | | | V |
| Continuous Collector Current | $I_C$ | 1 | | | 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

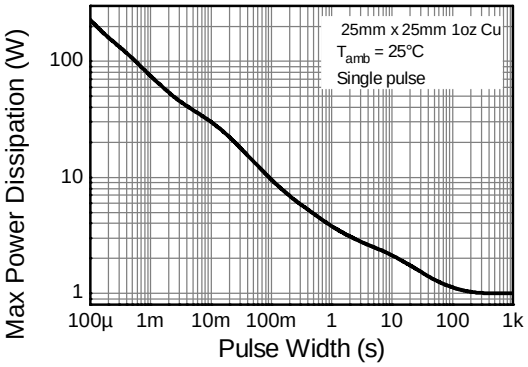
| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 6) | $P_D$ | 1 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 124 | °C/W |
| Thermal Resistance, Junction to Leads (Note 7) | $R_{\theta JL}$ | 10.0 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -65 to +150 | °C |

Notes: 6. 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.
7. Thermal resistance from junction to solder-point (on the exposed collector pad).

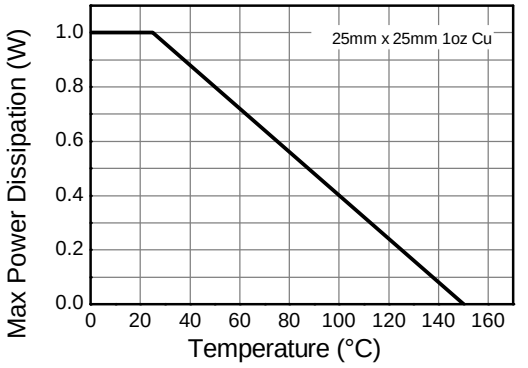
## Thermal Characteristics




**Transient Thermal Impedance**




**Pulse Power Dissipation**




**Derating Curve**

## Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | BCX54 | $BV_{CBO}$ | 45 | — | — | V | $I_C$ = 100µA |
| | BCX55 | | 60 | | | | |
| | BCX56 | | 100 | | | | |
| Collector-Emitter Breakdown Voltage (Note 8) | BCX54 | $BV_{CEO}$ | 45 | — | — | V | $I_C$ = 10mA |
| | BCX55 | | 60 | | | | |
| | BCX56 | | 80 | | | | |
| Emitter-Base Breakdown Voltage | | $BV_{EBO}$ | 6 | — | — | V | $I_E$ = 100µA |
| Collector Cut-off Current | | $I_{CBO}$ | - | — | 0.1<br>20 | µA | $V_{CB}$ = 30V<br>$V_{CB}$ = 30V, $T_A$ = +150°C |
| Emitter Cut-off Current | | $I_{EBO}$ | - | — | 20 | nA | $V_{EB}$ = 5V |
| Static Forward Current Transfer Ratio (Note 6) | All versions | $h_{FE}$ | 25<br>40<br>25 | —<br>—<br>— | -<br>250<br>- | — | $I_C$ = 5mA, $V_{CE}$ = 2V<br>$I_C$ = 150mA, $V_{CE}$ = 2V<br>$I_C$ = 500mA, $V_{CE}$ = 2V |
| | 10 gain grp | | 63 | — | 160 | | $I_C$ = 150mA, $V_{CE}$ = 2V |
| | 16 gain grp | | 100 | — | 250 | | $I_C$ = 150mA, $V_{CE}$ = 2V |
| Collector-Emitter Saturation Voltage (Note 8) | | $V_{CE(sat)}$ | — | — | 0.5 | V | $I_C$ = 500mA, $I_B$ = 50mA |
| Base-Emitter Turn-On Voltage (Note 8) | | $V_{BE(on)}$ | — | — | 1.0 | V | $I_C$ = 500mA, $V_{CE}$ = 2V |
| Transition Frequency | | $f_T$ | 150 | — | - | MHz | $I_C$ = 50mA, $V_{CE}$ = 10V<br>f = 100MHz |
| Output Capacitance | | $C_{obo}$ | — | — | 25 | pF | $V_{CB}$ = 10V, f = 1MHz |

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

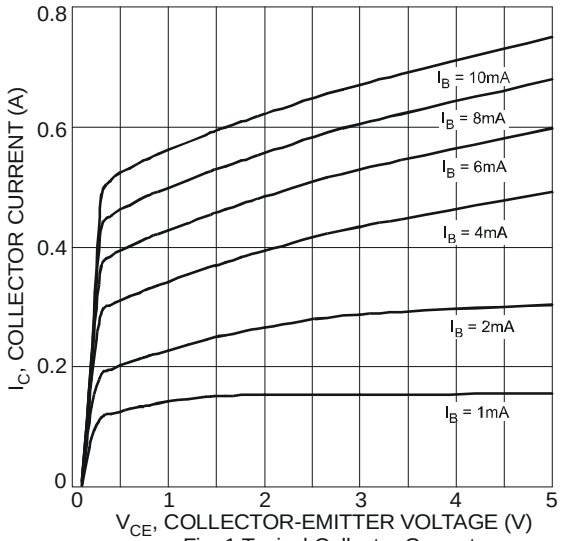



Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

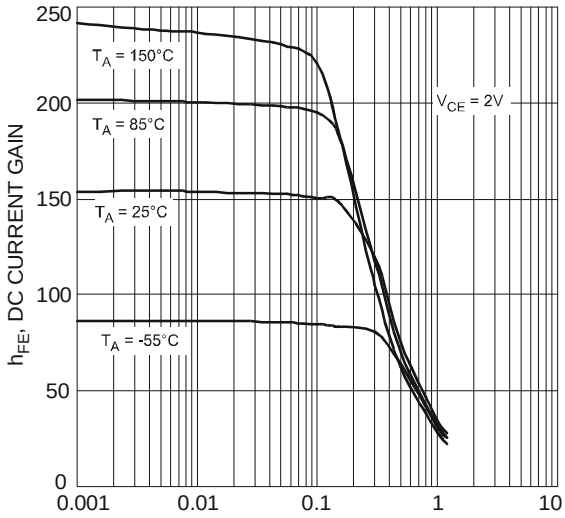



Fig. 2 Typical DC Current Gain vs. Collector Current

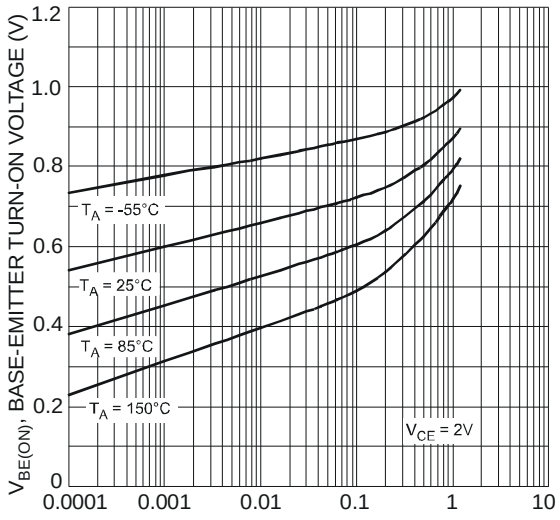



Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

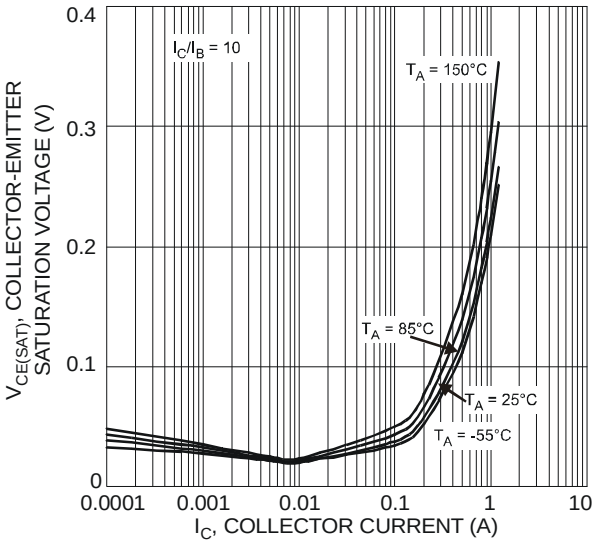



Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

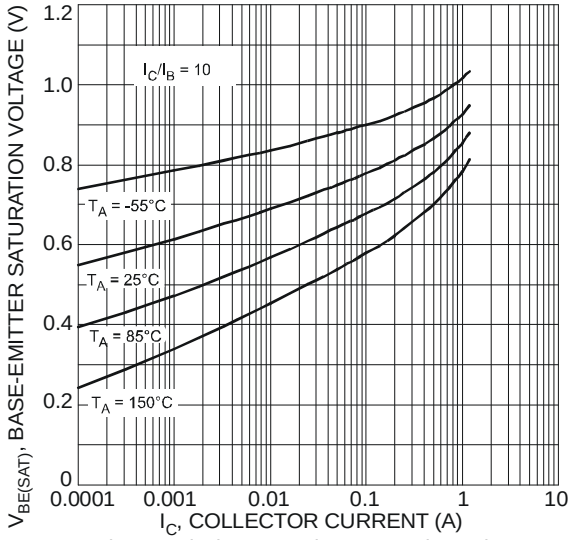



Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

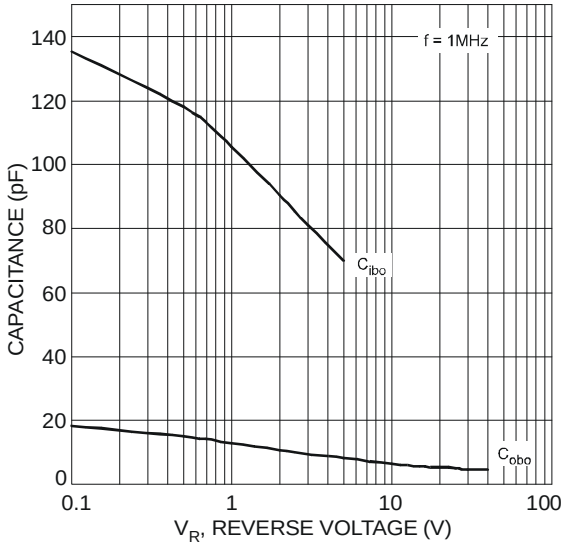



Fig. 6 Typical Capacitance Characteristics

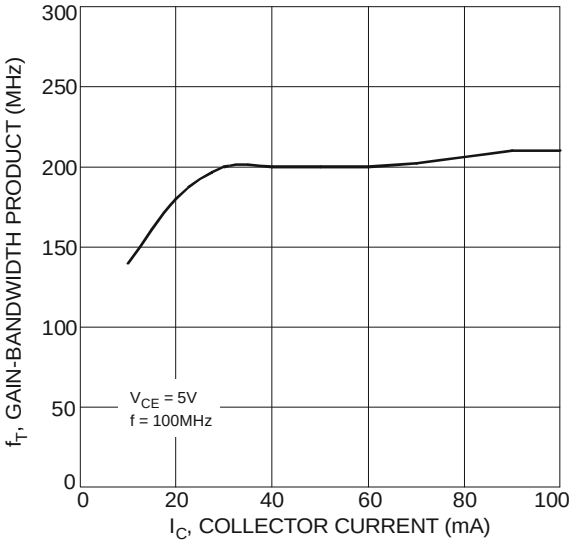
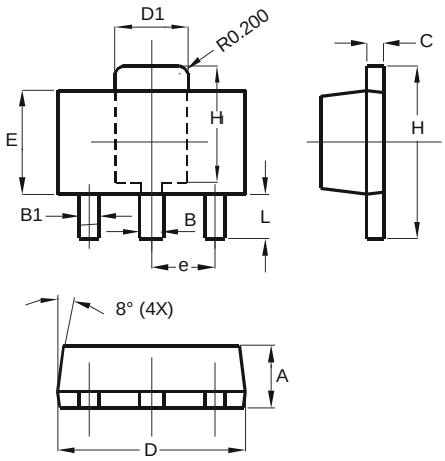



Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

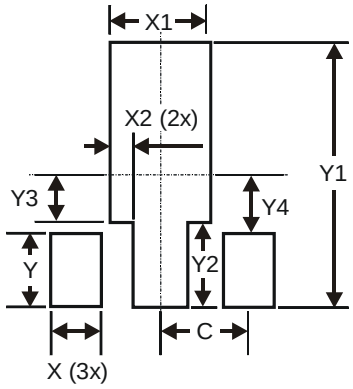
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT89 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 1.40 | 1.60 |
| **B** | 0.44 | 0.62 |
| **B1** | 0.35 | 0.54 |
| **C** | 0.35 | 0.44 |
| **D** | 4.40 | 4.60 |
| **D1** | 1.62 | 1.83 |
| **E** | 2.29 | 2.60 |
| **e** | 1.50 Typ | |
| **H** | 3.94 | 4.25 |
| **H1** | 2.63 | 2.93 |
| **L** | 0.89 | 1.20 |
| **All Dimensions in mm** | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| 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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