


Features

- $BV_{CEO} > -45V, -60V \text{ \& } -80V$
- $I_C = -1A$ Continuous Collector Current
- $I_{CM} = -1.5A$ Peak Pulse Current
- Low Saturation Voltage $V_{CE(SAT)} < -500mV @ -0.5A$
- Gain groups 10 and 16
- Complementary NPN types: BCX54, 55, and 56
- **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 
- Weight: 0.052 grams (Approximate)

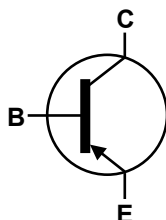
Applications

- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages

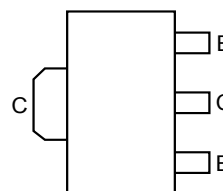
SOT89



Top View



Device Symbol

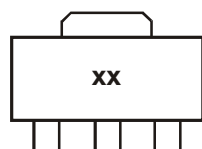

 Top View
Pin-Out

Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| BCX51TA | AEC-Q101 | AA | 7 | 12 | 1,000 |
| BCX51-13R | AEC-Q101 | AA | 13 | 12 | 4,000 |
| BCX5110TA | AEC-Q101 | AC | 7 | 12 | 1,000 |
| BCX5116TA | AEC-Q101 | AD | 7 | 12 | 1,000 |
| BCX5116TC | AEC-Q101 | AD | 13 | 12 | 4,000 |
| BCX52TA | AEC-Q101 | AE | 7 | 12 | 1,000 |
| BCX5210TA | AEC-Q101 | AG | 7 | 12 | 1,000 |
| BCX5216TA | AEC-Q101 | AM | 7 | 12 | 1,000 |
| BCX5216QTA | Automotive | AM | 7 | 12 | 1,000 |
| BCX53TA | AEC-Q101 | AH | 7 | 12 | 1,000 |
| BCX5310TA | AEC-Q101 | AK | 7 | 12 | 1,000 |
| BCX5316TA | AEC-Q101 | AL | 7 | 12 | 1,000 |
| BCX5316TC | AEC-Q101 | AL | 13 | 12 | 4,000 |
| BCX5316-13R | AEC-Q101 | AL | 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/quality/lead_free.html 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/products/packages.html>.

Marking Information



xx = Product Type Marking Code, as follows:

BCX51 = AA
 BCX5110 = AC
 BCX5116 = AD

BCX52 = AE
 BCX5210 = AG
 BCX5216 = AM

BCX53 = AH
 BCX5310 = AK
 BCX5316 = AL

Absolute Maximum Ratings (@T_A = +25°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°C, unless otherwise specified.)

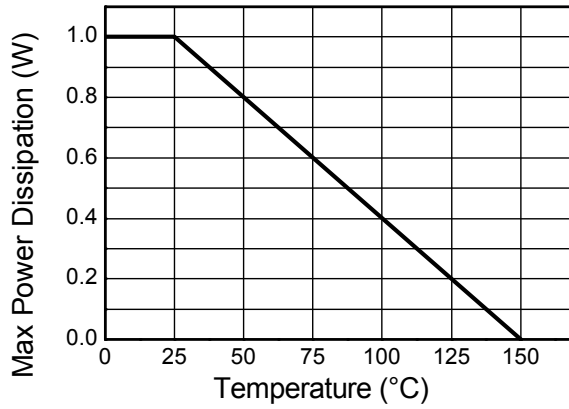
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation | P _D | 1 | W |
| | | 1.5 | |
| | | 2.0 | |
| Thermal Resistance, Junction to Ambient Air | R _{θJA} | 125 | °C/W |
| | | 83 | |
| | | 60 | |
| Thermal Resistance, Junction to Lead | R _{θJL} | 13 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -65 to +150 | °C |

ESD Ratings (Note 10)

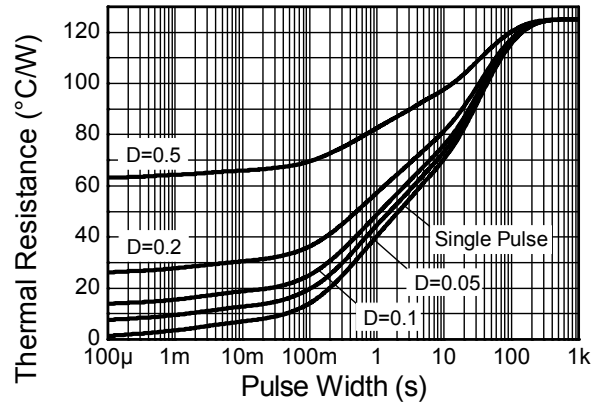
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
6. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 7. Same as note (6), except the device is mounted on 25mm x 25mm 1oz copper.
 8. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
 9. Thermal resistance from junction to solder-point (on the exposed collector pad).
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

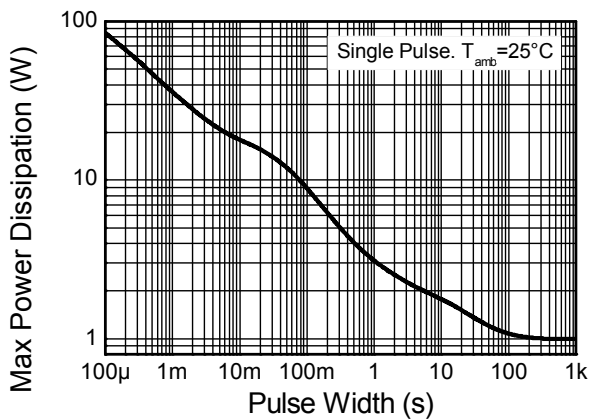
Thermal Characteristics and Derating Information



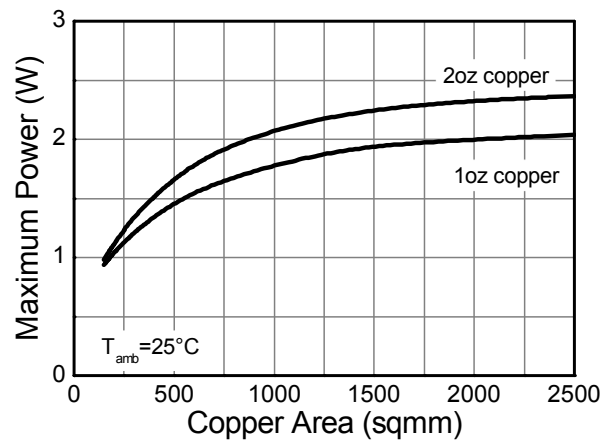
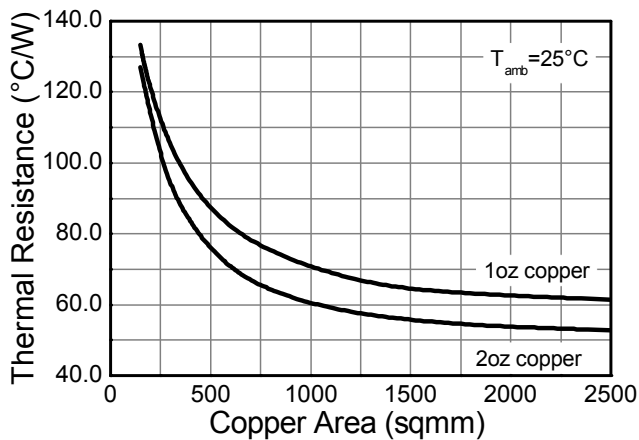
Derating Curve



Transient Thermal Impedance



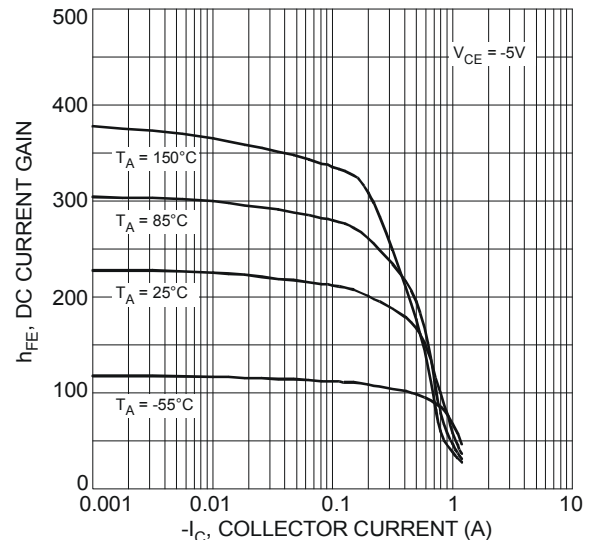
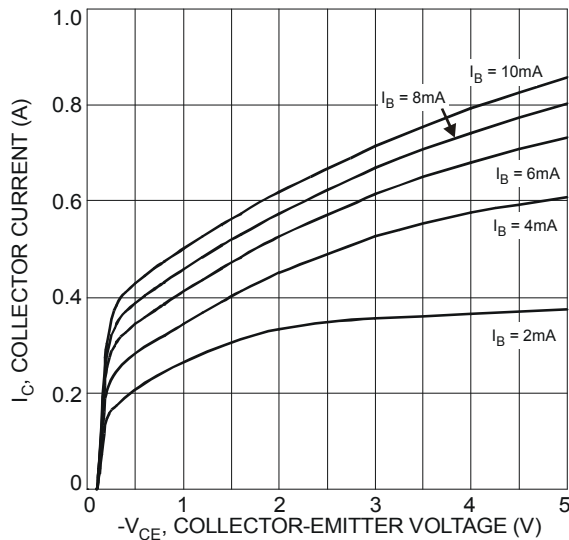
Pulse Power Dissipation



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 11) | 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 -20 | μA | $V_{CB} = -30\text{V}$ $V_{CB} = -30\text{V}, T_J = +150^\circ\text{C}$ |
| Emitter Cut-off Current | | I_{EBO} | — | — | -20 | nA | $V_{EB} = -5\text{V}$ |
| Static Forward Current Transfer Ratio (Note 11) | All versions | h_{FE} | 25 | — | — | — | $I_C = -5\text{mA}, V_{CE} = -2\text{V}$ |
| | | | 40 | — | 250 | | $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ |
| | | | 25 | — | — | | $I_C = -500\text{mA}, V_{CE} = -2\text{V}$ |
| | 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 11) | | $V_{CE(sat)}$ | — | — | -0.5 | V | $I_C = -500\text{mA}, I_B = -50\text{mA}$ |
| Base-Emitter Turn-On Voltage (Note 11) | | $V_{BE(on)}$ | — | — | -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 | $V_{CB} = -10\text{V}, f = 1\text{MHz}$ |

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.



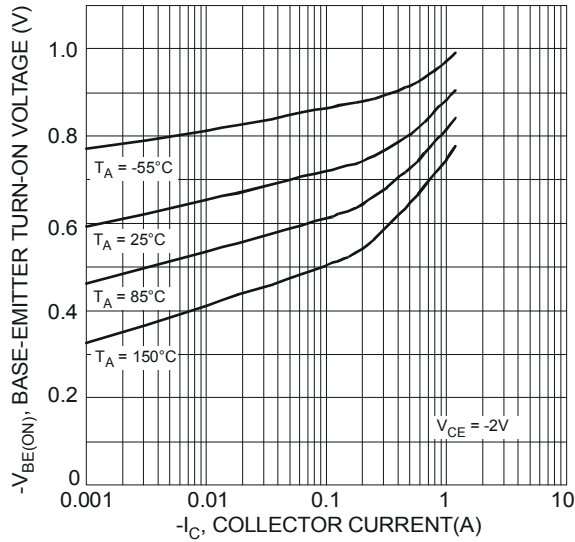


Fig 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

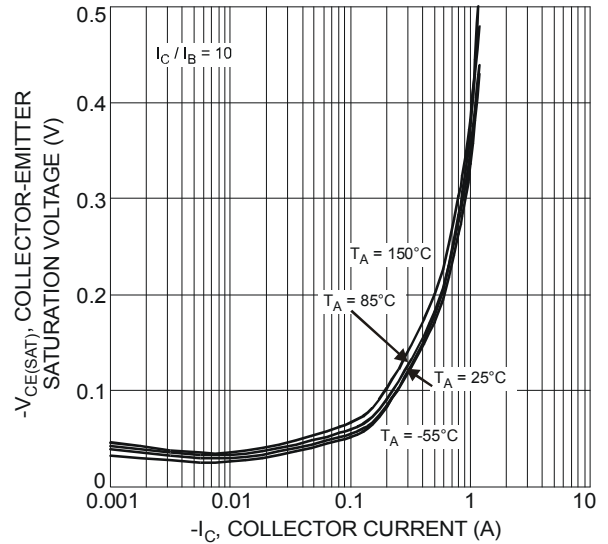


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

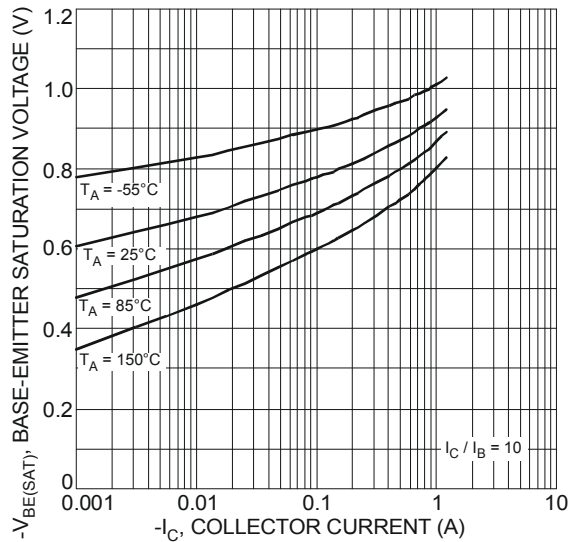


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

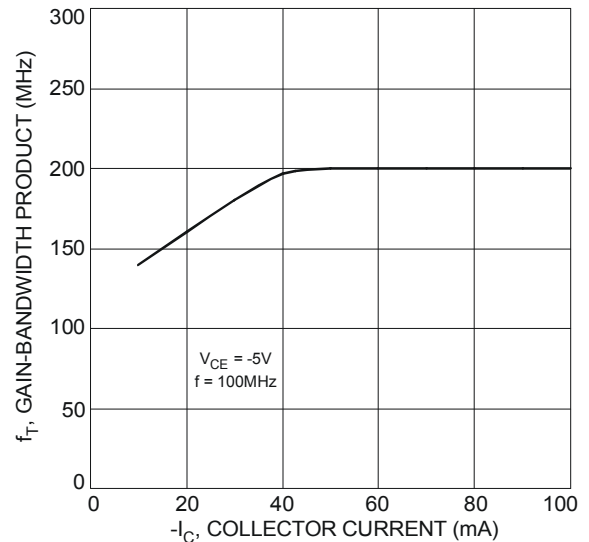


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current

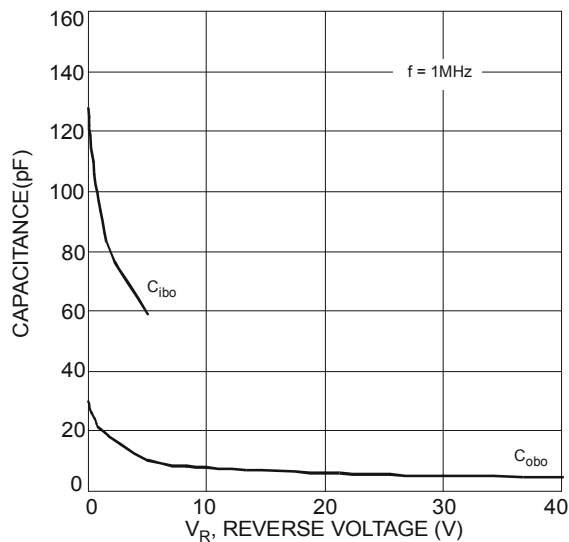
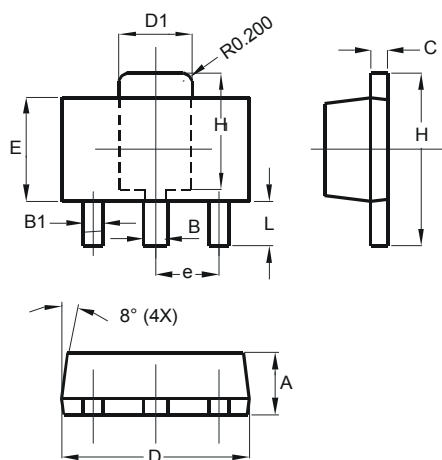


Fig. 7 Typical Capacitance Characteristics

Package Outline Dimensions

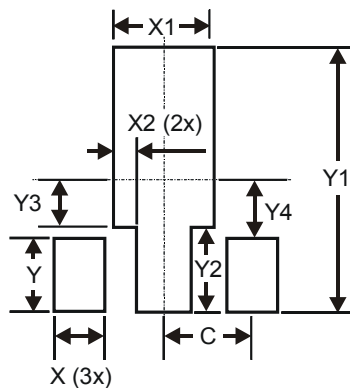
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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