

Features

- $BV_{CEO} > -45V, -60V \text{ \& } -80V$
- $I_C = -1A$ Continuous Collector Current
- $I_{CM} = -2A$ 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

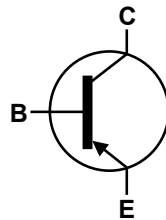
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Leads; Solderable per MIL-STD-202 Method 208 ^(e3)
- Weight: 0.052 grams (Approximate)

Applications

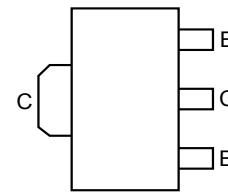
- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages



Top View



Device Symbol



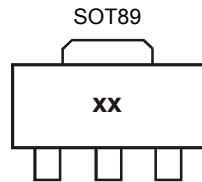
Top View Pin-Out

Ordering Information (Note 4)

| Product | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| BCX51TA | Standard | AA | 7 | 12 | 1,000 |
| BCX51-13R | Standard | AA | 13 | 12 | 4,000 |
| BCX5110TA | Standard | AC | 7 | 12 | 1,000 |
| BCX5116TA | Standard | AD | 7 | 12 | 1,000 |
| BCX5116TC | Standard | AD | 13 | 12 | 4,000 |
| BCX52TA | Standard | AE | 7 | 12 | 1,000 |
| BCX5210TA | Standard | AG | 7 | 12 | 1,000 |
| BCX5216TA | Standard | AM | 7 | 12 | 1,000 |
| BCX53TA | Standard | AH | 7 | 12 | 1,000 |
| BCX5310TA | Standard | AK | 7 | 12 | 1,000 |
| BCX5316TA | Standard | AL | 7 | 12 | 1,000 |
| BCX5316TC | Standard | AL | 13 | 12 | 4,000 |
| BCX5316-13R | Standard | AL | 13 | 12 | 4,000 |
| BCX5110TC | Standard | AC | 13 | 12 | 4,000 |
| BCX51TC | Standard | AA | 13 | 12 | 4,000 |
| BCX5210TC | Standard | AG | 13 | 12 | 4,000 |
| BCX5216TC | Standard | AM | 13 | 12 | 4,000 |
| BCX52TC | Standard | AE | 13 | 12 | 4,000 |
| BCX5310TC | Standard | AK | 13 | 12 | 4,000 |
| BCX53TC | Standard | AH | 13 | 12 | 4,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



xx = Product Type Marking Code, as follows:

| | | |
|--------------|--------------|--------------|
| BCX51 = AA | BCX52 = AE | BCX53 = AH |
| BCX5110 = AC | BCX5210 = AG | BCX5310 = AK |
| BCX5116 = AD | BCX5216 = AM | 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 (Single pulse) | I _{CM} | | -2 | | |
| Continuous Base Current | I _B | | -100 | | mA |
| Peak Pulse Base Current (Single pulse) | I _{BM} | | -200 | | |

Thermal Characteristics (@ T_A = +25°C, unless otherwise specified.)

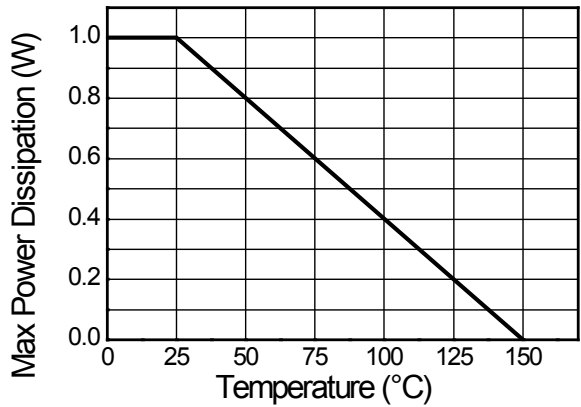
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation | (Note 5) | 1 | W |
| | (Note 6) | 1.5 | |
| | (Note 7) | 2.0 | |
| Thermal Resistance, Junction to Ambient Air | (Note 5) | 125 | °C/W |
| | (Note 6) | 83 | |
| | (Note 7) | 60 | |
| Thermal Resistance, Junction to Lead | (Note 8) R _{θJL} | 13 | °C/W |
| Thermal Resistance, Junction to Case | (Note 9) R _{θJC} | 27 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 10)

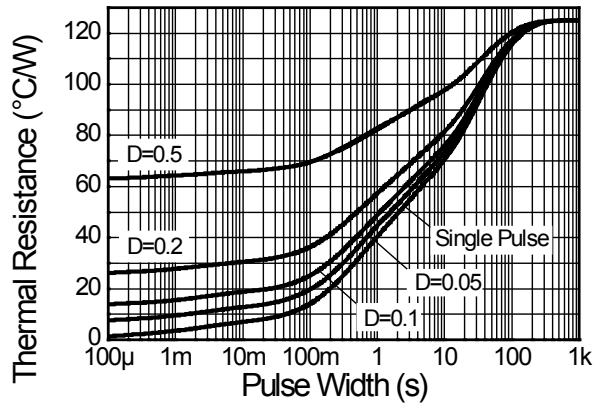
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
- 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.
 - Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
 - Same as Note 5, except the device is mounted on 50mm x 50mm 1oz copper.
 - Thermal resistance from junction to solder-point (on the exposed collector pad).
 - Thermal resistance from junction to the top of the case.
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

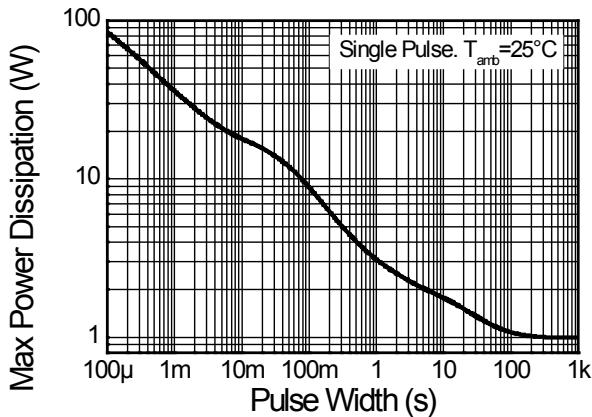
Thermal Characteristics and Derating Information



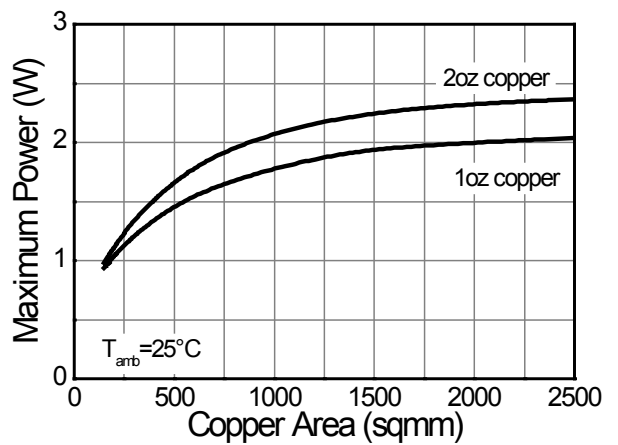
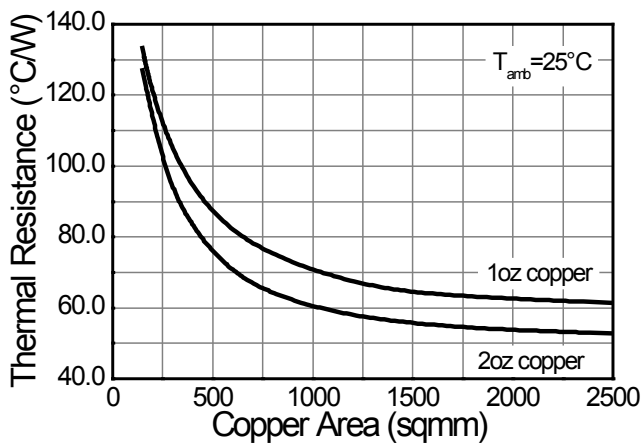
Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

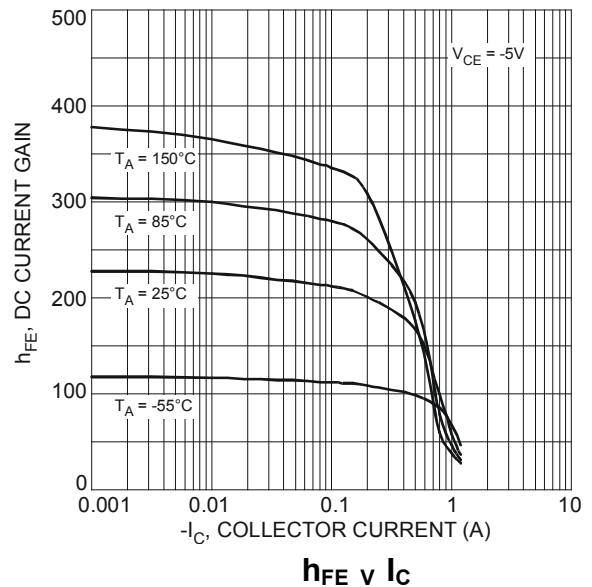
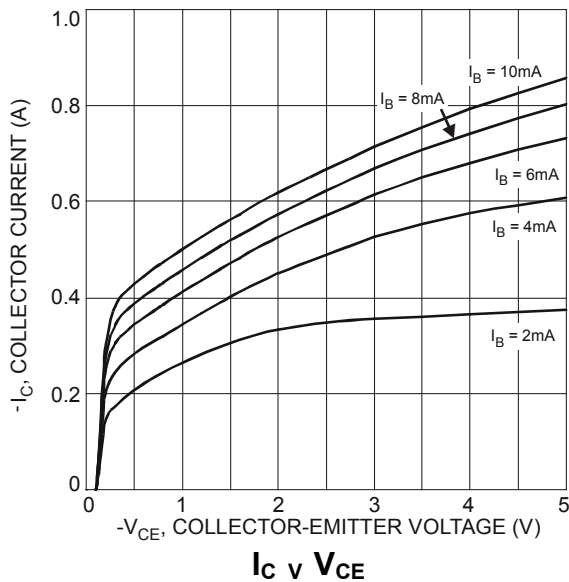


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

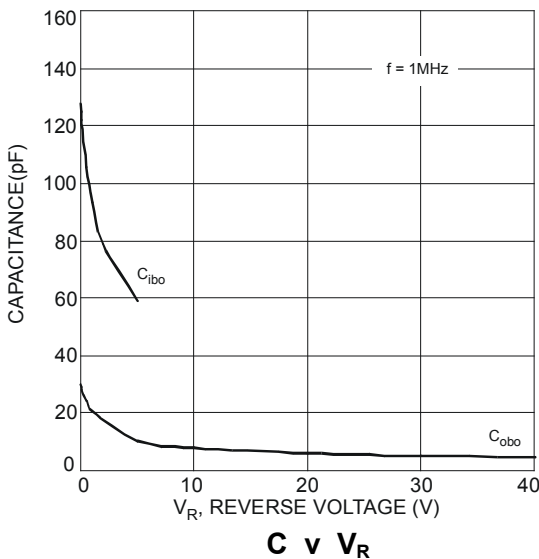
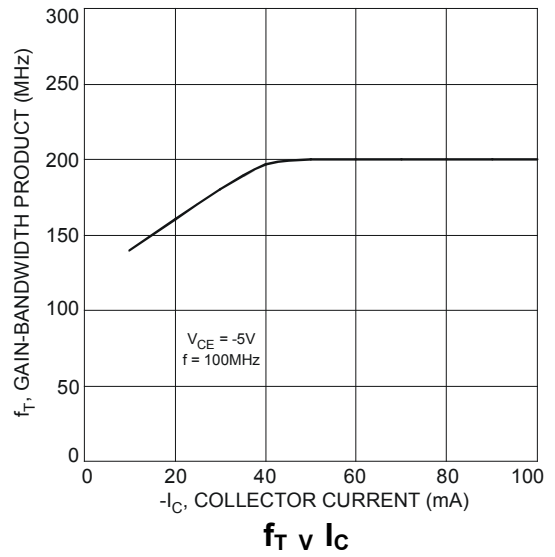
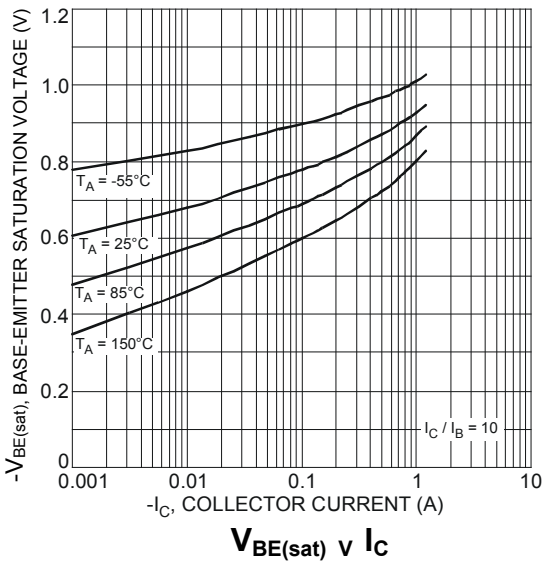
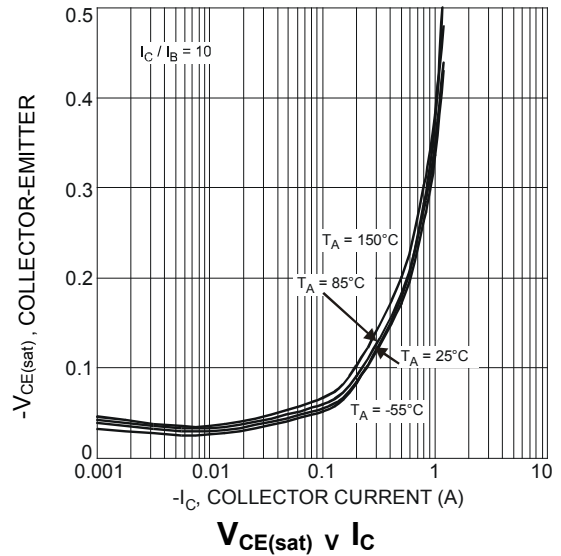
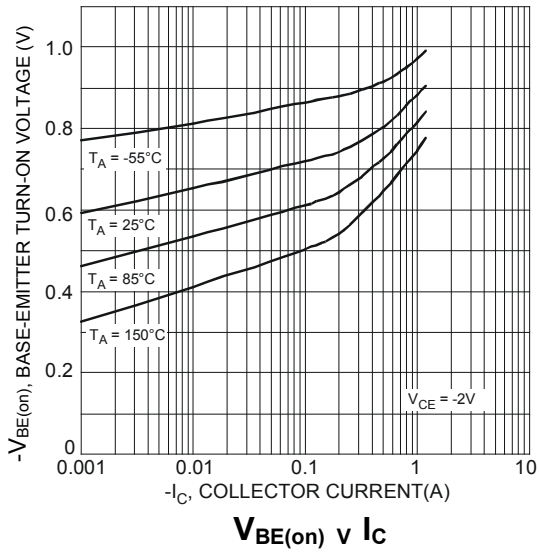
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|------|-----|-------------|------|--|
| Collector-Base Breakdown Voltage | BV _{CB0} | -45 | — | — | V | I _C = -100μA |
| | | -60 | | | | |
| | | -100 | | | | |
| Collector-Emitter Breakdown Voltage (Note 11) | BV _{CEO} | -45 | — | — | V | I _C = -10mA |
| | | -60 | | | | |
| | | -80 | | | | |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -5 | — | — | V | I _E = -10μA |
| Collector Cut-Off Current | I _{CBO} | — | — | -0.1 -20 | μA | V _{CB} = -30V V _{CB} = -30V, T _J = +150°C |
| Emitter Cut-Off Current | I _{EBO} | — | — | -20 | nA | V _{EB} = -5V |
| DC Current Gain (Note 11) | h _{FE} | 25 | — | — | — | I _C = -5mA, V _{CE} = -2V I _C = -150mA, V _{CE} = -2V I _C = -500mA, V _{CE} = -2V |
| | | 40 | | | | |
| | | 25 | | | | |
| | | 63 | | | | |
| | 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 11) | V _{CE(sat)} | — | — | -0.5 | V | I _C = -500mA, I _B = -50mA |
| Base-Emitter Turn-On Voltage (Note 11) | V _{BE(on)} | — | — | -1.0 | V | I _C = -500mA, V _{CE} = -2V |
| Transition frequency | f _T | 150 | — | — | MHz | I _C = -50mA, V _{CE} = -10V f = 100MHz |
| Output Capacitance | C _{obo} | — | — | 25 | pF | V _{CB} = -10V, f = 1MHz |

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



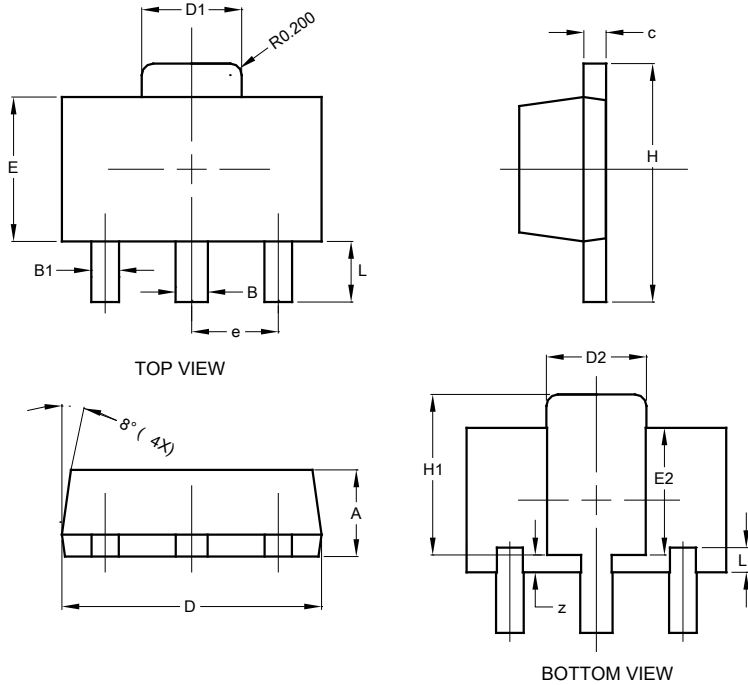
Typical Electrical Characteristics (continued.)



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT89

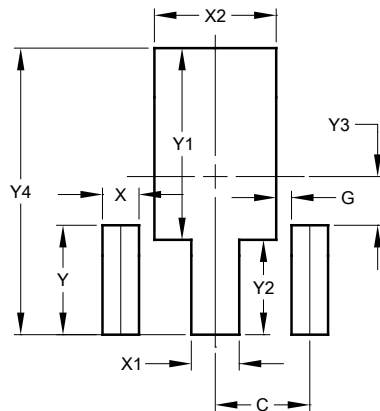


| SOT89 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 1.40 | 1.60 | 1.50 |
| B | 0.50 | 0.62 | 0.56 |
| B1 | 0.42 | 0.54 | 0.48 |
| c | 0.35 | 0.43 | 0.38 |
| D | 4.40 | 4.60 | 4.50 |
| D1 | 1.62 | 1.83 | 1.733 |
| D2 | 1.61 | 1.81 | 1.71 |
| E | 2.40 | 2.60 | 2.50 |
| E2 | 2.05 | 2.35 | 2.20 |
| e | - | - | 1.50 |
| H | 3.95 | 4.25 | 4.10 |
| H1 | 2.63 | 2.93 | 2.78 |
| L | 0.90 | 1.20 | 1.05 |
| L1 | 0.327 | 0.527 | 0.427 |
| z | 0.20 | 0.40 | 0.30 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT89



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.500 |
| G | 0.244 |
| X | 0.580 |
| X1 | 0.760 |
| X2 | 1.933 |
| Y | 1.730 |
| Y1 | 3.030 |
| Y2 | 1.500 |
| Y3 | 0.770 |
| Y4 | 4.530 |

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