



THE DATASHEET OF BCP5310TA



Features

- $BV_{CE0} > -45V, -60V \text{ \& } -80V$
- $I_C = -1A$ High Continuous Collector Current
- $I_{CM} = -2A$ Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage $V_{CE(sat)} < -500mV @ -0.5A$
- Gain Groups 10 and 16
- Complementary NPN Types: BCP54, 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

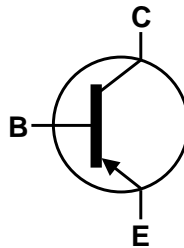
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.112 grams (Approximate)

Applications

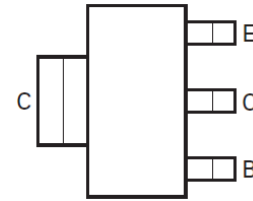
- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages



Top View



Device Symbol

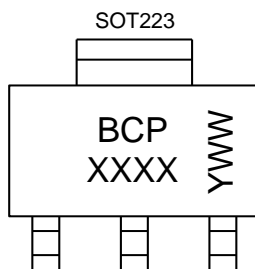

 Top View
Pin-Out

Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|------------|--|--------------------|-----------------|-------------------|
| BCP51TA | AEC-Q101 | BCP 51 | 7 | 12 | 1,000 |
| BCP5110TA | AEC-Q101 | BCP 5110 | 7 | 12 | 1,000 |
| BCP5116TA | AEC-Q101 | BCP 5116 | 7 | 12 | 1,000 |
| BCP5116TC | AEC-Q101 | BCP 5116 | 13 | 12 | 4,000 |
| BCP52TA | AEC-Q101 | BCP 52 | 7 | 12 | 1,000 |
| BCP5210TA | AEC-Q101 | BCP 5210 | 7 | 12 | 1,000 |
| BCP5216TA | AEC-Q101 | BCP 5216 | 7 | 12 | 1,000 |
| BCP53TA | AEC-Q101 | BCP 53 | 7 | 12 | 1,000 |
| BCP53QTA | Automotive | BCP 53 | 7 | 12 | 1,000 |
| BCP5310TA | AEC-Q101 | BCP 5310 | 7 | 12 | 1,000 |
| BCP5316TA | AEC-Q101 | BCP 5316 | 7 | 12 | 1,000 |
| BCP5316QTA | Automotive | Refer to http://diodes.com/datasheets/BCP5316Q.pdf | | | |
| BCP5316TC | AEC-Q101 | BCP 5316 | 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. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



BCP = Product Type Marking Code, Line 1
 XXXX = Product Type Marking Code, Line 2 as follows:

| | | |
|----------------|----------------|----------------|
| BCP51 = 51 | BCP52 = 52 | BCP53 = 53 |
| BCP5110 = 5110 | BCP5210 = 5210 | BCP5310 = 5310 |
| BCP5116 = 5116 | BCP5216 = 5216 | BCP5316 = 5316 |

YWW = Date Code Marking
 Y or \bar{Y} = Last Digit of Year (ex: 5= 2015)
 WW or $\bar{W}W$ = Week Code (01~53)

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

| Characteristic | Symbol | BCP51 | BCP52 | BCP53 | 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} | | -2 | | |
| Continuous Base Current | I _B | | -100 | | mA |
| Peak Pulse Base Current | I _{BM} | | -200 | | |

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

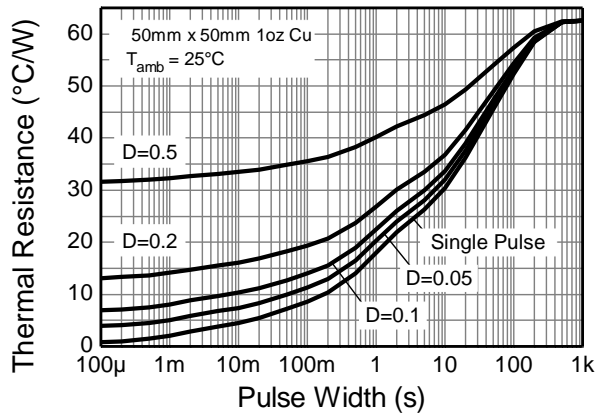
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation | P _D | 2 | W |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 62 | °C/W |
| Thermal Resistance, Junction to Leads | R _{θJL} | 19.4 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -65 to +150 | °C |

ESD Ratings (Note 8)

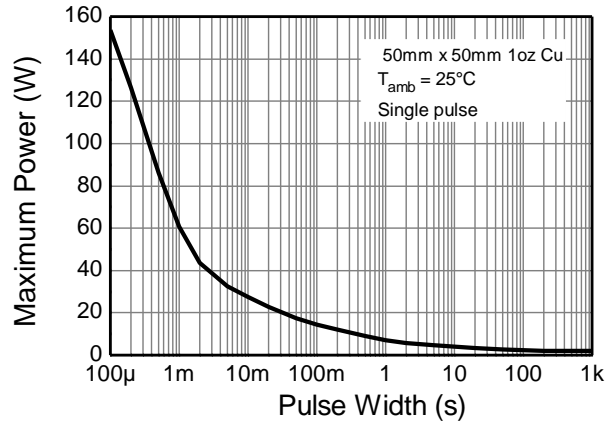
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
6. For a device mounted with the collector lead on 50mm x 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
 7. Thermal resistance from junction to solder-point (at the end of the collector lead).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

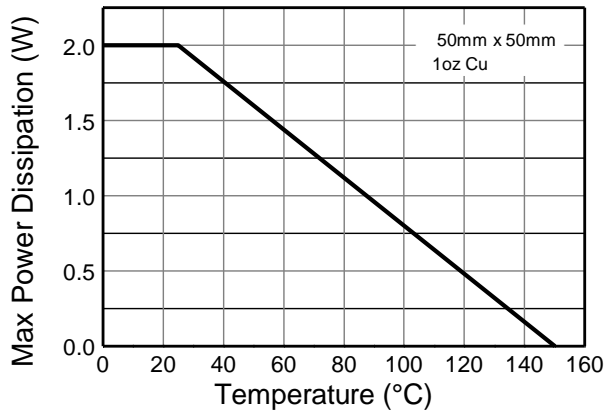
Thermal Characteristics and Derating Information



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 | BCP51 | BV _{CBO} | -45 | — | — | V | I _C = -100μA |
| | BCP52 | | -60 | | | | |
| | BCP53 | | -100 | | | | |
| Collector-Emitter Breakdown Voltage (Note 9) | BCP51 | BV _{CEO} | -45 | — | — | V | I _C = -10mA |
| | BCP52 | | -60 | | | | |
| | BCP53 | | -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 _A = +150°C |
| Emitter Cut-Off Current | | I _{EBO} | — | — | -20 | nA | V _{EB} = -4V |
| Static Forward Current Transfer Ratio (Note 9) | All Versions | h _{FE} | 25 | — | — | — | I _C = -5mA, V _{CE} = -2V I _C = -150mA, V _{CE} = -2V I _C = -500mA, V _{CE} = -2V |
| | | | 40 | — | 250 | | |
| | | | 25 | — | — | | |
| | 10 gain grp | | 63 | — | 160 | | |
| | 16 gain grp | 100 | — | 250 | | I _C = -150mA, V _{CE} = -2V | |
| Collector-Emitter Saturation Voltage (Note 9) | | V _{CE(sat)} | — | — | -0.5 | V | I _C = -500mA, I _B = -50mA |
| Base-Emitter Turn-On Voltage (Note 9) | | 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: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

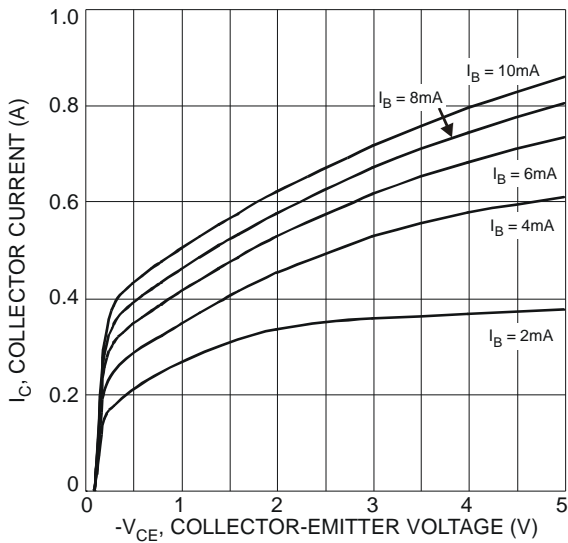


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

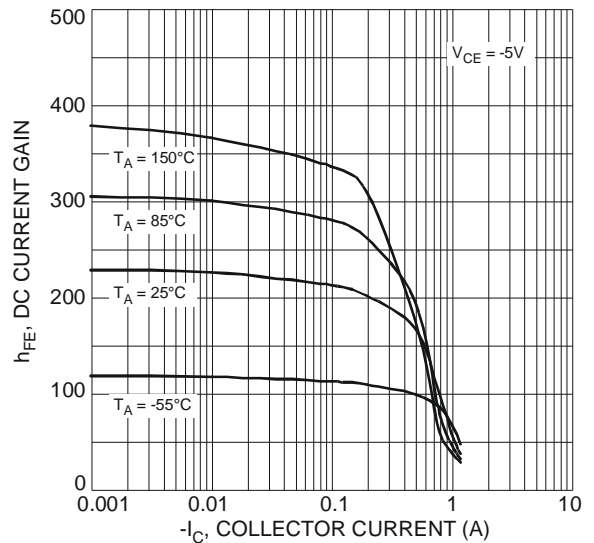


Fig. 2 Typical DC Current Gain vs. Collector Current

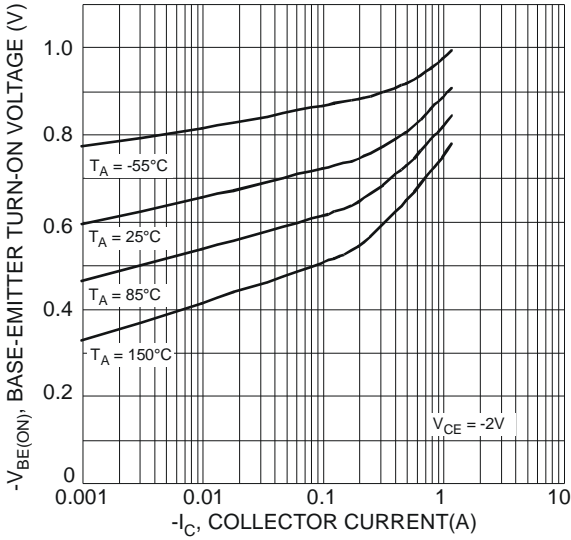


Fig 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

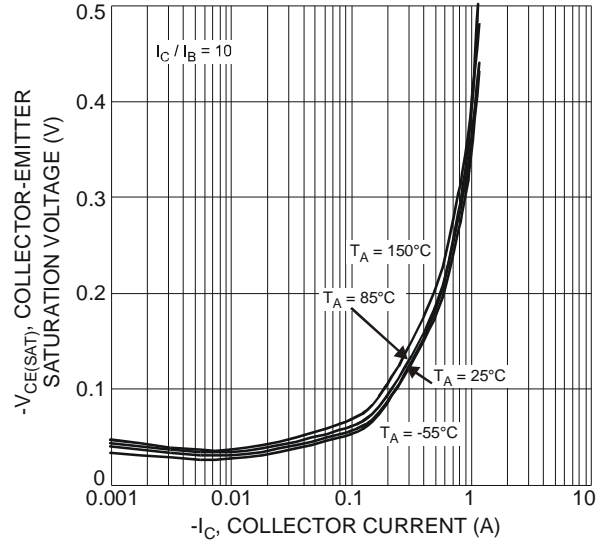


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

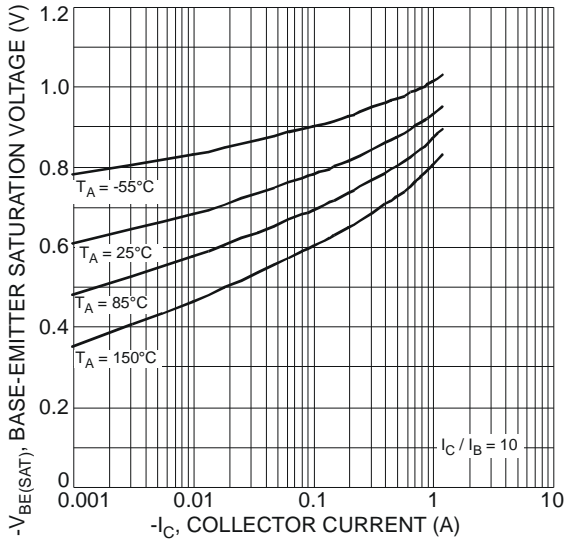


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

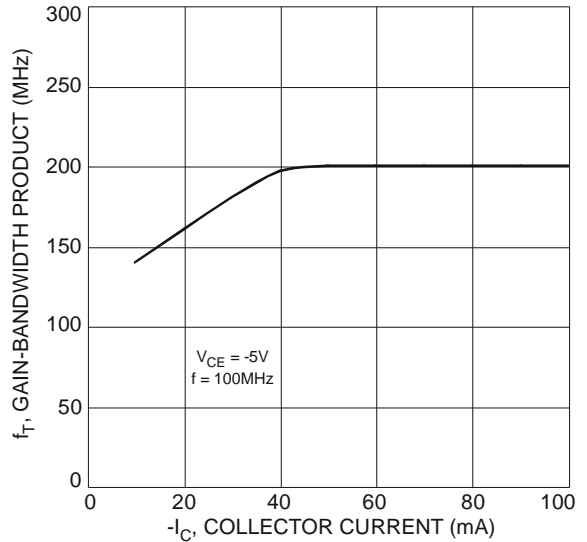


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current

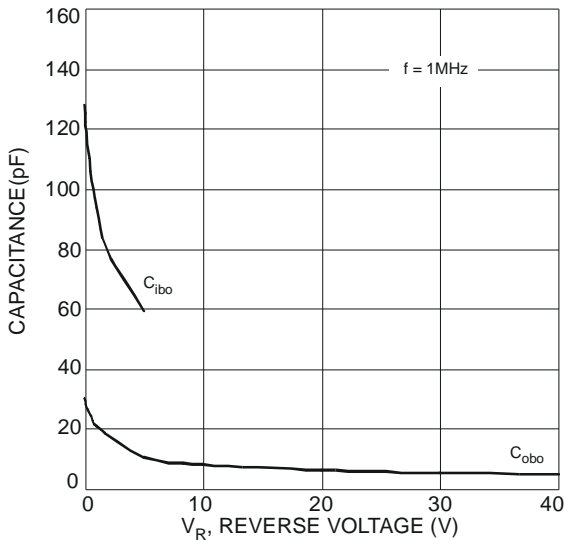
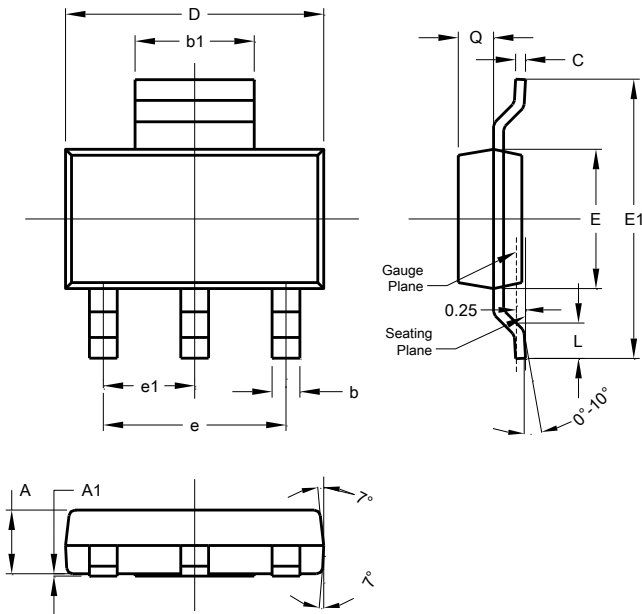


Fig. 7 Typical Capacitance Characteristics

Package Outline Dimensions

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

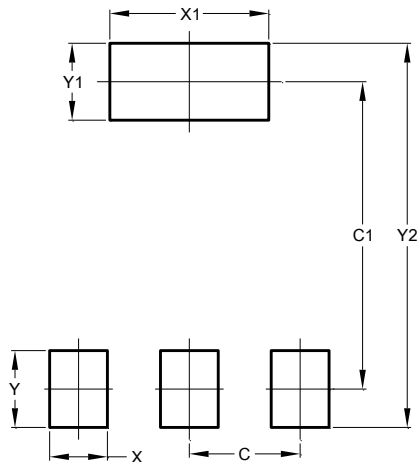


| SOT223 | | | |
|--------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 1.55 | 1.65 | 1.60 |
| A1 | 0.010 | 0.15 | 0.05 |
| b | 0.60 | 0.80 | 0.70 |
| b1 | 2.90 | 3.10 | 3.00 |
| C | 0.20 | 0.30 | 0.25 |
| D | 6.45 | 6.55 | 6.50 |
| E | 3.45 | 3.55 | 3.50 |
| E1 | 6.90 | 7.10 | 7.00 |
| e | - | - | 4.60 |
| e1 | - | - | 2.30 |
| L | 0.85 | 1.05 | 0.95 |
| Q | 0.84 | 0.94 | 0.89 |

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) |
|------------|---------------|
| C | 2.30 |
| C1 | 6.40 |
| X | 1.20 |
| X1 | 3.30 |
| Y | 1.60 |
| Y1 | 1.60 |
| Y2 | 8.00 |

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