

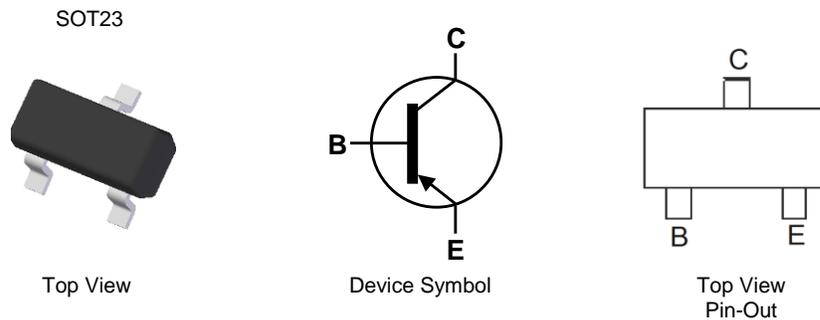
Features

- Ideally Suited for Automatic Insertion
- Complementary NPN Types: BC846 – BC848 Family
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The BC856AQ – BC857BQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (Ⓢ)
- Weight: 0.008 grams (Approximate)

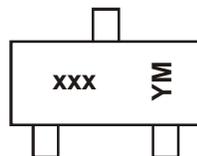


Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| BC856AQ-7-F | Automotive | K3A | 7 | 8 | 3,000 |
| BC856BQ-7-F | Automotive | K3B | 7 | 8 | 3,000 |
| BC856BQ-13-F | Automotive | K3B | 13 | 8 | 10,000 |
| BC857BQ-7-F | Automotive | K3B | 7 | 8 | 3,000 |

- 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



xxx = Product Type Marking Code
(Please see Ordering Information)
YM = Date Code Marking
Y or \bar{Y} = Year (ex: G = 2019)
M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|------|------|------|------|------|------|
| Code | G | H | I | J | K | L | M | N |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

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

| Characteristic | | Symbol | Value | Unit |
|------------------------------|-------|------------------|-------|------|
| Collector-Base Voltage | BC856 | V _{CB0} | -80 | V |
| | BC857 | | -50 | |
| Collector-Emitter Voltage | BC856 | V _{CEO} | -65 | V |
| | BC857 | | -45 | |
| Emitter-Base Voltage | | V _{EB0} | -5.0 | V |
| Continuous Collector Current | | I _C | -100 | mA |
| Peak Collector Current | | I _{CM} | -200 | mA |
| Peak Emitter Current | | I _{EM} | -200 | mA |
| Peak Base Current | | I _{BM} | -200 | mA |

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

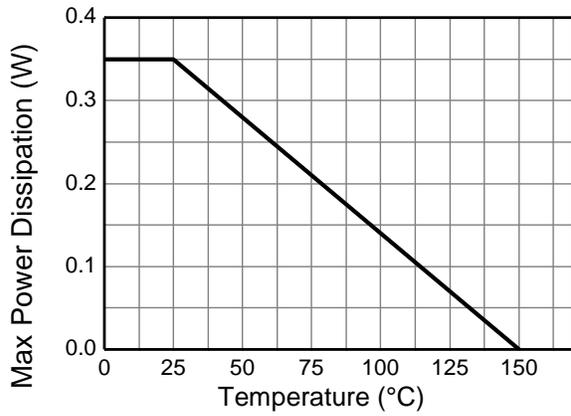
| Characteristic | | Symbol | Value | Unit |
|---|----------|-----------------------------------|-------------|------|
| Power Dissipation | (Note 5) | P _D | 310 | mW |
| | (Note 6) | | 350 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | R _{θJA} | 403 | °C/W |
| | (Note 6) | | 357 | |
| Thermal Resistance, Junction to Leads | (Note 7) | R _{θJL} | 350 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -65 to +150 | °C |

ESD Ratings (Note 8)

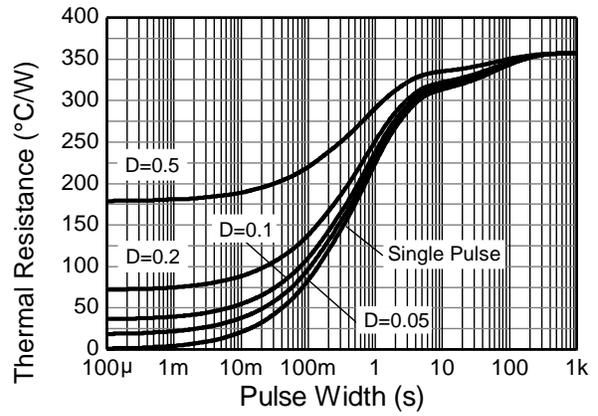
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as note (5), except the device is mounted on 15 mm × 15mm 1oz copper.
 7. Thermal resistance from junction to solder-point (at the end of the leads).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

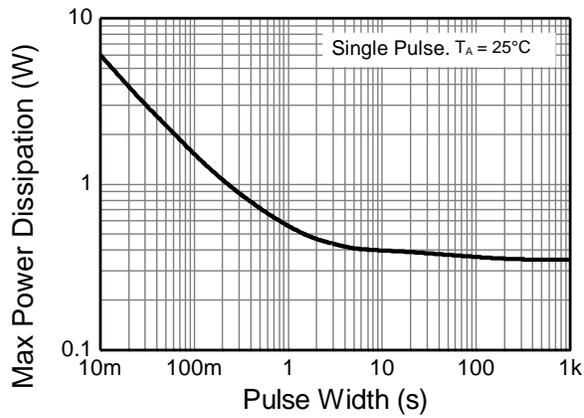
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition | |
|---|-----------------|----------------------|-----|----------------------|-------|------|--|--|
| Collector-Base Breakdown Voltage | BC856 | BV _{CB0} | -80 | — | — | V | I _C = -10μA | |
| | BC857 | | -50 | — | — | | | |
| Collector-Emitter Breakdown Voltage (Note 9) | BC856 | BV _{CEO} | -65 | — | — | V | I _C = -10mA | |
| | BC857 | | -45 | — | — | | | |
| Emitter-Base Breakdown Voltage | | BV _{EBO} | -5 | — | — | V | I _E = -1μA | |
| Collector Cutoff Current | | I _{CBO} | — | — | -15 | nA | V _{CB} = -30V | |
| | | | | | -4 | μA | V _{CB} = -30V, T _J = +150°C | |
| Collector Emitter Cutoff Current | BC856 | I _{CES} | — | — | -15 | nA | V _{CE} = -80V | |
| | BC857 | | | | -15 | | V _{CE} = -50V | |
| Emitter-Base Cutoff Current | | I _{EBO} | — | — | -100 | nA | V _{EB} = -5V | |
| Small Signal Current Gain | BC856A | h _{fe} | — | 200 | — | — | I _C = -2.0mA, V _{CE} = -5V f = 1.0kHz | |
| | BC856B / BC857B | | | 330 | | | | |
| Input Impedance | BC856A | h _{ie} | — | 2.7 | — | kΩ | | |
| | BC856B / BC857B | | | 4.5 | | | | |
| Output Admittance | BC856A | h _{oe} | — | 18 | — | μS | | |
| | BC856B / BC857B | | | 30 | | | | |
| Reverse Voltage Transfer Ratio | BC856A | h _{re} | — | 1.5x10 ⁻⁴ | — | — | | |
| | BC856B / BC857B | | | 2x10 ⁻⁴ | | | | |
| DC Current Gain (Note 9) | BC856A | h _{FE} | 125 | 180 | 250 | — | | I _C = -2.0mA, V _{CE} = -5V |
| | BC856B / BC857B | | 220 | 290 | 475 | | | |
| Collector-Emitter Saturation Voltage (Note 9) | | V _{CE(sat)} | — | -75 | -300 | mV | I _C = -10mA, I _B = -0.5mA | |
| | | | | -250 | -650 | | I _C = -100mA, I _B = -5.0mA | |
| Base-Emitter Turn-On Voltage (Note 9) | | V _{BE(on)} | — | -600 | -650 | mV | I _C = -2mA, V _{CE} = -5V | |
| | | | | — | -820 | | I _C = -10mA, V _{CE} = -5V | |
| Base-Emitter Saturation Voltage (Note 9) | | V _{BE(sat)} | — | -700 | — | mV | I _C = -10mA, I _B = -0.5mA | |
| | | | | -850 | -1100 | | I _C = -100mA, I _B = -5mA | |
| Output Capacitance | | C _{obo} | — | 3 | — | pF | V _{CB} = -10V, f = 1.0MHz | |
| Transition Frequency | | f _T | 100 | 200 | — | MHz | V _{CE} = -5V, I _C = -10mA, f = 100MHz | |
| Noise Figure | | NF | — | 2 | 10 | dB | V _{CE} = -5V, I _C = -200μA R _S = 2kΩ, f = 1kHz Δf = 200Hz | |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

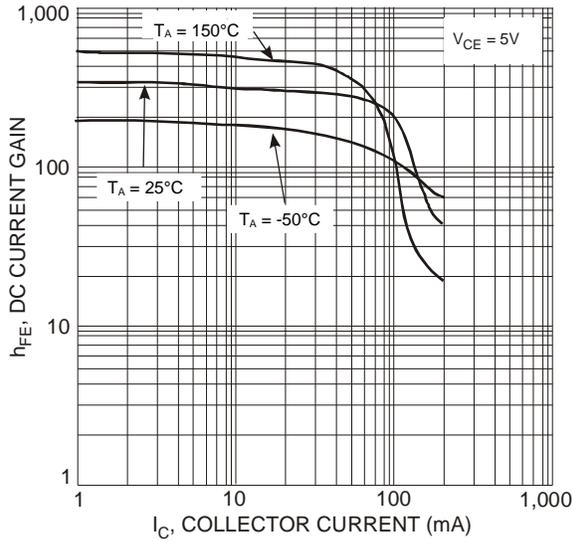


Figure 1 Typical DC Current Gain vs. Collector Current

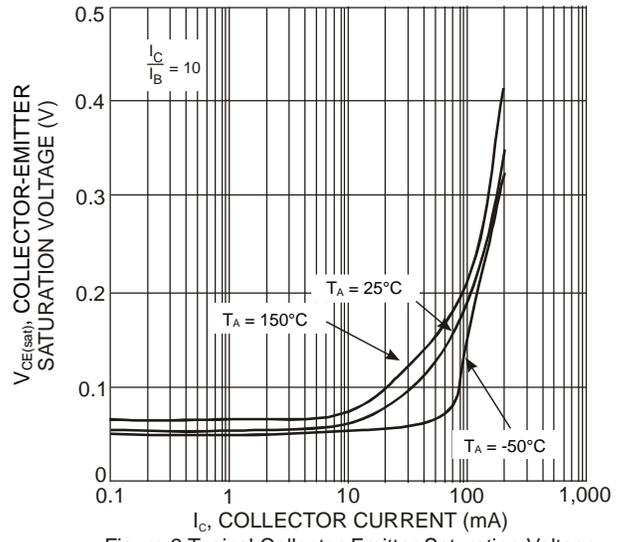


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

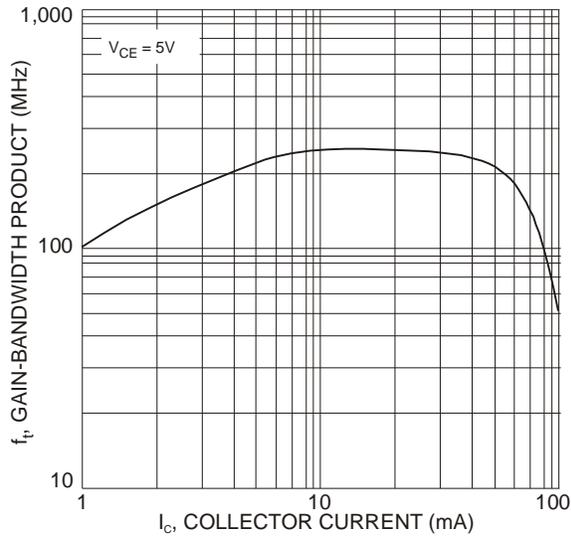
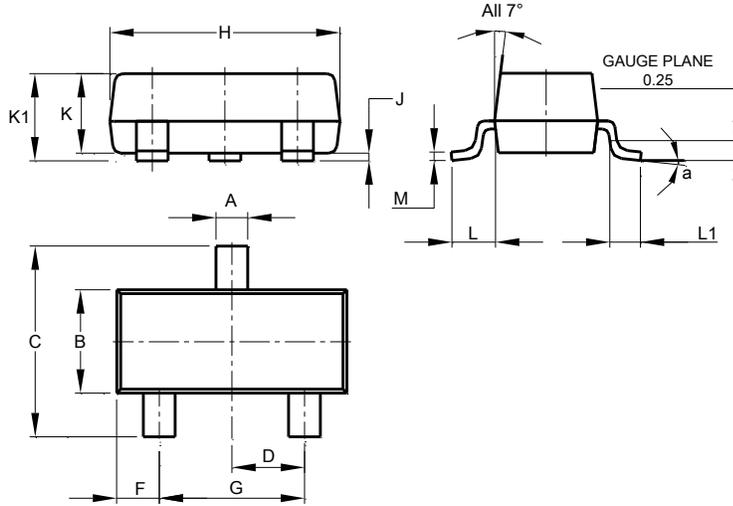


Figure 3 Gain-Bandwidth Product vs Collector Current

Package Outline Dimensions

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

SOT23

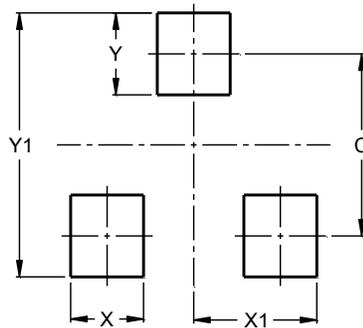


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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