

## Features

- Ideally Suited for Automatic Insertion
- Complementary PNP Types: BC856W – BC858W
- For Switching and AF Amplifier Applications
- **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)**

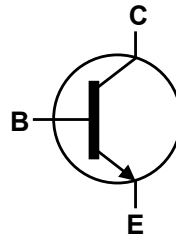
## Mechanical Data

- Case: SOT323
- 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 **(e3)**
- Weight: 0.006 grams (Approximate)

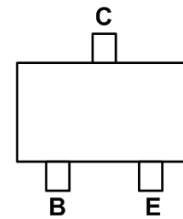
SOT323



Top View



Device Symbol


 Top View  
Pin-Out

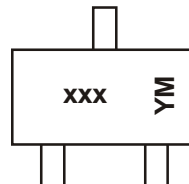
## Ordering Information (Notes 4 & 5)

| Product      | Compliance | Marking | Reel Size (inches) | Quantity per Reel |
|--------------|------------|---------|--------------------|-------------------|
| BC846AW-7-F  | AEC-Q101   | K1Q     | 7                  | 3,000             |
| BC846BW-7-F  | AEC-Q101   | K1R     | 7                  | 3,000             |
| BC846BWQ-7-F | Automotive | K1R     | 7                  | 3,000             |
| BC846BW-13-F | AEC-Q101   | K1R     | 13                 | 10,000            |
| BC847AW-7-F  | AEC-Q101   | K1Q     | 7                  | 3,000             |
| BC847BW-7-F  | AEC-Q101   | K1R     | 7                  | 3,000             |
| BC847BW-13-F | AEC-Q101   | K1R     | 13                 | 10,000            |

| Product       | Compliance | Marking | Reel Size (inches) | Quantity per Reel |
|---------------|------------|---------|--------------------|-------------------|
| BC847BWQ-13-F | Automotive | K1R     | 13                 | 10,000            |
| BC847CW-7-F   | AEC-Q101   | K1M     | 7                  | 3,000             |
| BC847CW-13-F  | AEC-Q101   | K1M     | 13                 | 10,000            |
| BC847CWQ-7-F  | Automotive | K1M     | 7                  | 3,000             |
| BC848AW-7-F   | AEC-Q101   | K1Q     | 7                  | 3,000             |
| BC848BW-7-F   | AEC-Q101   | K1R     | 7                  | 3,000             |
| BC848CW-7-F   | AEC-Q101   | K1M     | 7                  | 3,000             |

- 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](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/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. Tape width is 8mm. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

## Marking Information



xxx = Product Type Marking Code  
(Please see Ordering Information)  
YM = Date Code Marking  
Y or  $\bar{Y}$  = Year (ex: A = 2013)  
M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|------|
| Code | X    | Y    | Z    | A    | B    | C    | D    | E    |

| 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               |              | Symbol           | Value | Unit |
|------------------------------|--------------|------------------|-------|------|
| Collector-Base Voltage       | BC846        | V <sub>CBO</sub> | 80    | V    |
|                              | BC847        |                  | 50    |      |
|                              | BC848        |                  | 30    |      |
| Collector-Emitter Voltage    | BC846        | V <sub>CEO</sub> | 65    | V    |
|                              | BC847        |                  | 45    |      |
|                              | BC848        |                  | 30    |      |
| Emitter-Base Voltage         | BC846, BC847 | V <sub>EBO</sub> | 6     | V    |
|                              | BC848        |                  | 5     |      |
| Continuous Collector Current |              | I <sub>C</sub>   | 100   | mA   |
| Peak Collector Current       |              | I <sub>CM</sub>  | 200   | mA   |
| Peak Base Current            |              | I <sub>BM</sub>  | 200   | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          |          | Symbol                            | Value       | Unit |
|-----------------------------------------|----------|-----------------------------------|-------------|------|
| Power Dissipation                       | (Note 6) | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient | (Note 6) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range |          | T <sub>J</sub> , T <sub>STG</sub> | -65 to +150 | °C   |

**ESD Ratings** (Note 7)

| 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 on minimum recommended pad layout 1oz weight copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                |                    |              | Symbol               | Min | Typ | Max | Unit | Test Condition                                                                               |
|-----------------------------------------------|--------------------|--------------|----------------------|-----|-----|-----|------|----------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage              |                    | BC846        | BV <sub>CBO</sub>    | 80  | —   | —   | V    | I <sub>C</sub> = 100μA                                                                       |
|                                               |                    | BC847        |                      | 50  |     |     |      |                                                                                              |
|                                               |                    | BC848        |                      | 30  |     |     |      |                                                                                              |
| Collector-Emitter Breakdown Voltage (Note 8)  |                    | BC846        | BV <sub>CEO</sub>    | 65  | —   | —   | V    | I <sub>C</sub> = 10mA                                                                        |
|                                               |                    | BC847        |                      | 45  |     |     |      |                                                                                              |
|                                               |                    | BC848        |                      | 30  |     |     |      |                                                                                              |
| Emitter-Base Breakdown Voltage                |                    | BC846, BC847 | BV <sub>EBO</sub>    | 6   | —   | —   | V    | I <sub>E</sub> = 100μA                                                                       |
|                                               |                    | BC848        |                      | 5   |     |     |      |                                                                                              |
| DC Current Gain (Note 8)                      | Current Gain Group | A            | h <sub>FE</sub>      | 110 | 180 | 220 | —    | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 2.0mA                                               |
|                                               |                    | B            |                      | 200 | 290 | 450 |      |                                                                                              |
|                                               |                    | C            |                      | 420 | 520 | 800 |      |                                                                                              |
| Collector Cutoff Current                      |                    |              | I <sub>CBO</sub>     | —   | —   | 20  | nA   | V <sub>CB</sub> = 30V                                                                        |
|                                               |                    |              |                      |     |     | 5   | μA   | V <sub>CB</sub> = 30V, T <sub>A</sub> = +150°C                                               |
| Collector-Emitter Saturation Voltage (Note 8) |                    |              | V <sub>CE(sat)</sub> | —   | 90  | 250 | mV   | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA                                                |
|                                               |                    |              |                      |     | 200 | 600 |      | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5.0mA                                               |
| Base-Emitter Turn-On Voltage (Note 8)         |                    |              | V <sub>BE(on)</sub>  | 580 | 660 | 700 | mV   | I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V                                                   |
|                                               |                    |              |                      | —   | —   | 770 |      | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 5V                                                  |
| Base-Emitter Saturation Voltage (Note 8)      |                    |              | V <sub>BE(sat)</sub> | —   | 700 | —   | mV   | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA                                                |
|                                               |                    |              |                      |     | 900 |     |      | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA                                                 |
| Output Capacitance                            |                    |              | C <sub>obo</sub>     | —   | 3   | 4.5 | pF   | V <sub>CB</sub> = 10V, f = 1.0MHz                                                            |
| Transition Frequency                          |                    |              | f <sub>T</sub>       | 100 | 300 | —   | MHz  | V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA, f = 100MHz                                      |
| Noise Figure                                  |                    |              | NF                   | —   | —   | 10  | dB   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 200μA<br>R <sub>S</sub> = 2kΩ, f = 1kHz<br>Δf = 200Hz |

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

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

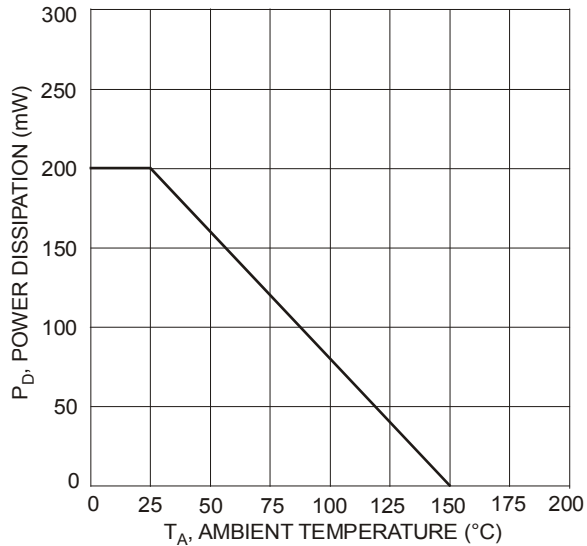


Figure 1 Power Dissipation vs. Ambient Temperature

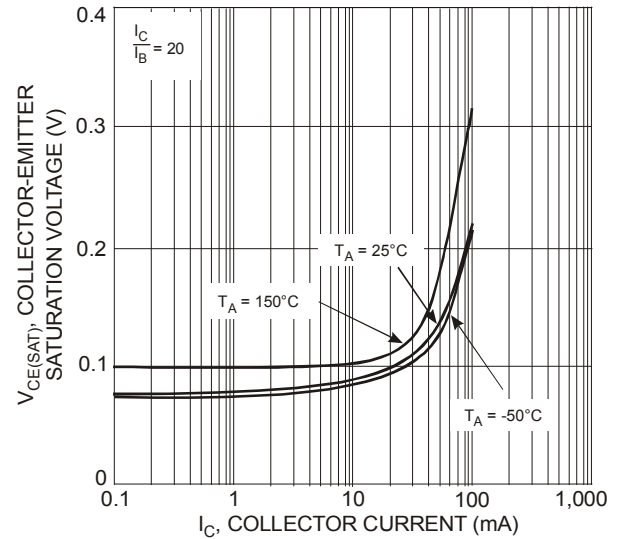


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

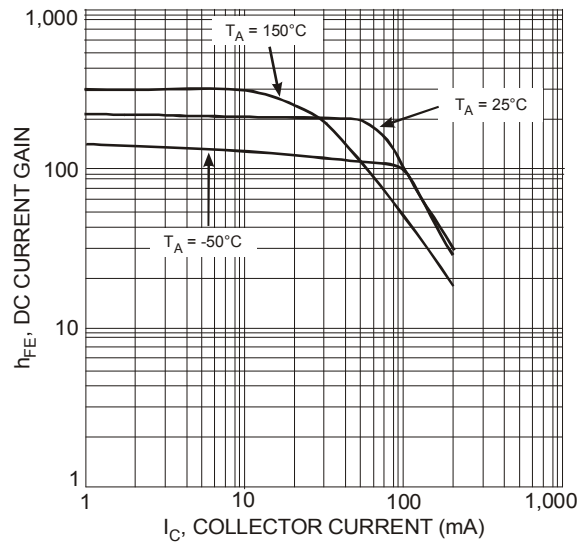


Figure 3 Typical DC Current Gain vs. Collector Current

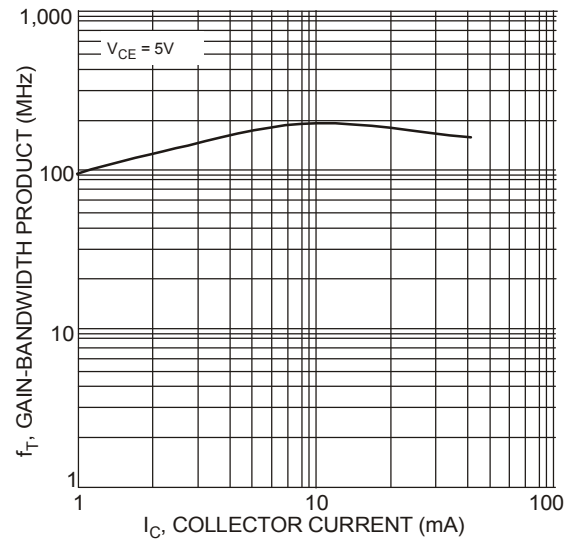
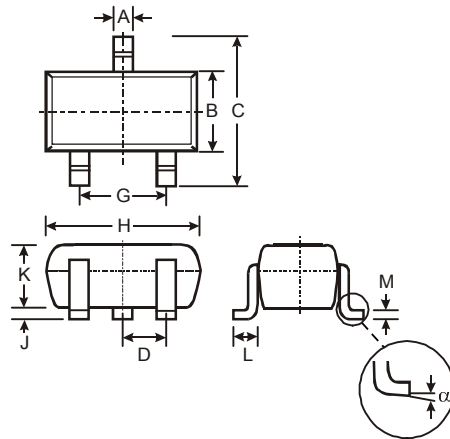


Figure 4 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

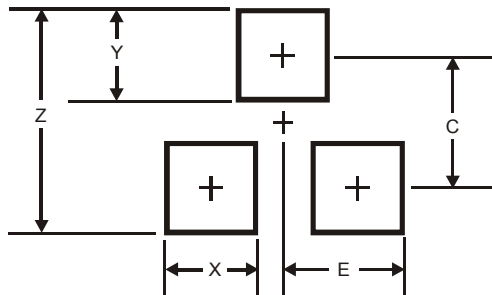
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT323               |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.25 | 0.40 | 0.30 |
| B                    | 1.15 | 1.35 | 1.30 |
| C                    | 2.00 | 2.20 | 2.10 |
| D                    | —    | —    | 0.65 |
| G                    | 1.20 | 1.40 | 1.30 |
| H                    | 1.80 | 2.20 | 2.15 |
| J                    | 0.0  | 0.10 | 0.05 |
| K                    | 0.90 | 1.00 | 1.00 |
| L                    | 0.25 | 0.40 | 0.30 |
| M                    | 0.10 | 0.18 | 0.11 |
| $\alpha$             | 0°   | 8°   | —    |
| 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) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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