

## Description

AC847BWQ and AC847CWQ Bipolar Junction Transistors (BJT) are designed to meet the stringent requirements of Automotive Applications.

## Features

- Ideally Suited for Automatic Insertion
- Complementary PNP Types: AC857BWQ – AC857CWQ
- 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)**

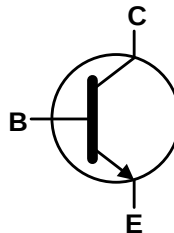
## Mechanical Data

- 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 
- Weight: 0.006 grams (Approximate)

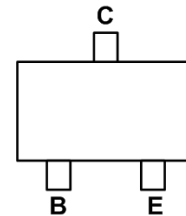
SOT323



Top View



Device Symbol



Top View  
Pin-Out

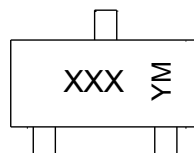
## Ordering Information (Notes 4 & 5)

| Part Number | Compliance | Marking | Reel Size (inches) | Quantity Per Reel |
|-------------|------------|---------|--------------------|-------------------|
| AC847BWQ-7  | Automotive | 2D6     | 7                  | 3,000             |
| AC847BWQ-13 | Automotive | 2D6     | 13                 | 10,000            |
| AC847CWQ-7  | Automotive | 2D3     | 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. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT323



XXX = Product Type Marking Code  
(Please see Ordering Information)  
YM = Date Code Marking  
Y or  $\overline{Y}$  = Year (ex: E = 2017)  
M or  $\overline{M}$  = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|------|------|------|------|------|------|------|------|------|
| Code | E    | F    | G    | H    | I    | J    | K    | L    |

| 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       | V <sub>CBO</sub> | 50    | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 45    | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 6     | V    |
| 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 FR-4 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              |                    |   | BV <sub>CBO</sub>    | 50  | —   | —   | V    | I <sub>C</sub> = 100μA                                                                       |
| Collector-Emitter Breakdown Voltage (Note 8)  |                    |   | BV <sub>CEO</sub>    | 45  | —   | —   | V    | I <sub>C</sub> = 10mA                                                                        |
| Emitter-Base Breakdown Voltage                |                    |   | BV <sub>EBO</sub>    | 6   | —   | —   | V    | I <sub>E</sub> = 100μA                                                                       |
| DC Current Gain (Note 8)                      | Current Gain Group | B | h <sub>FE</sub>      | 200 | 290 | 450 | —    | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 2.0mA                                               |
|                                               |                    | 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 |

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

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

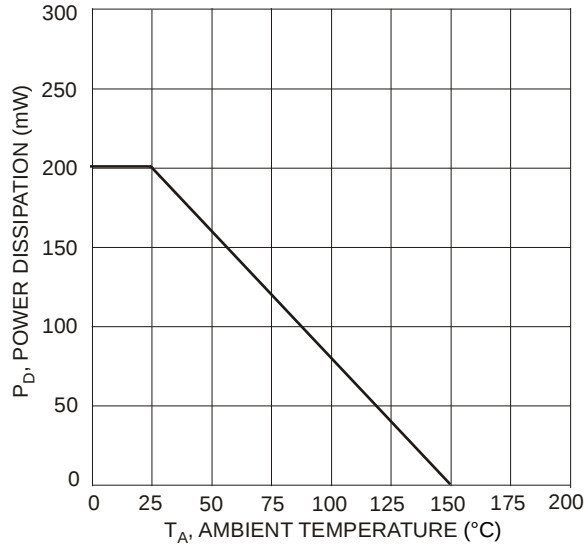


Figure 1 Power Dissipation vs. Ambient Temperature

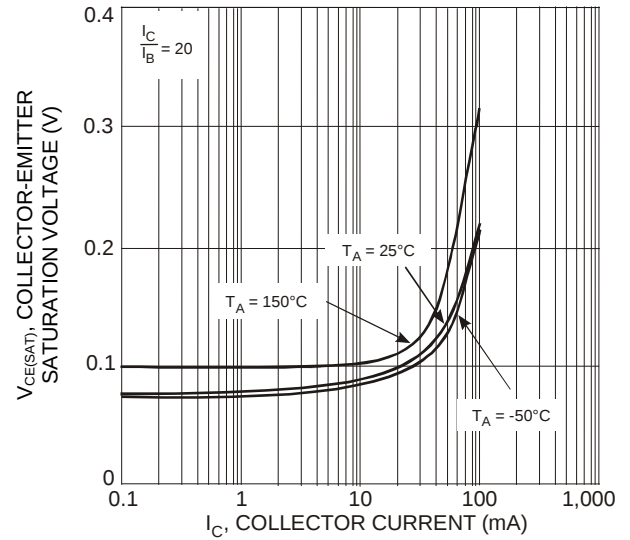


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

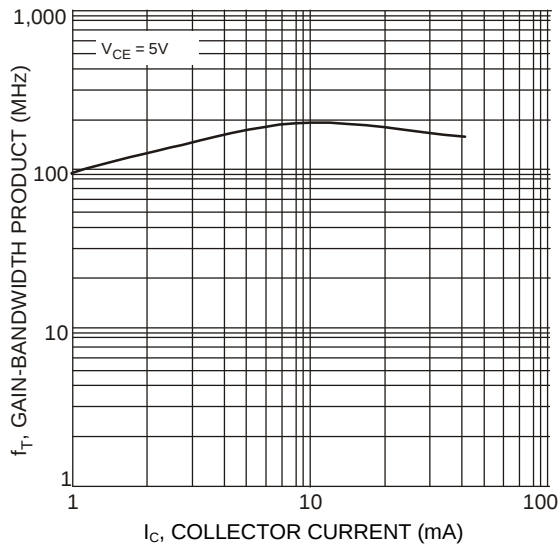


Figure 3 Typical Gain-Bandwidth Product vs. Collector Current

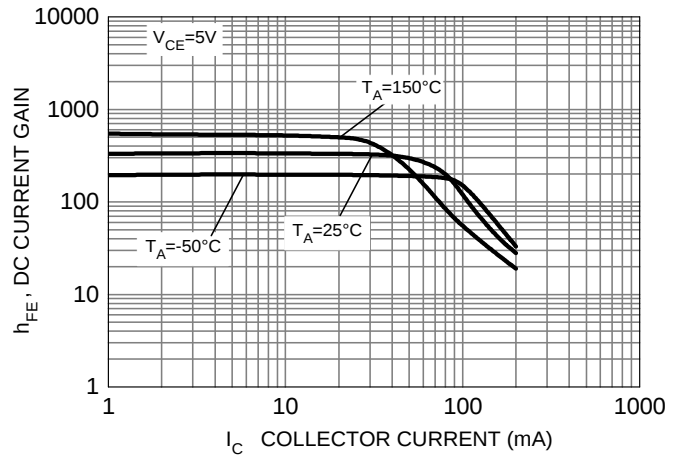


Figure 4 Typical DC Current Gain vs. Collector Current (Band B Group Gain)

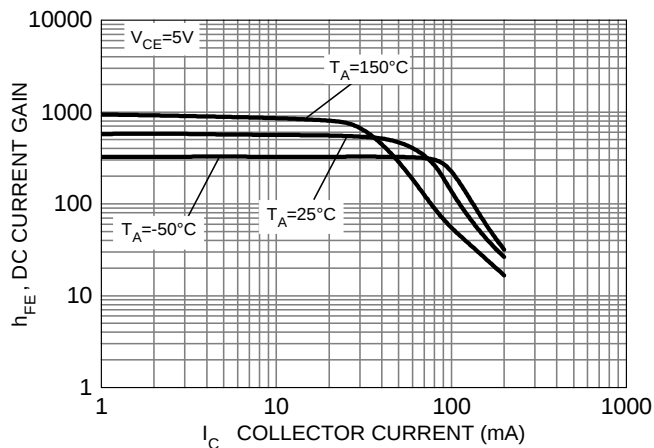
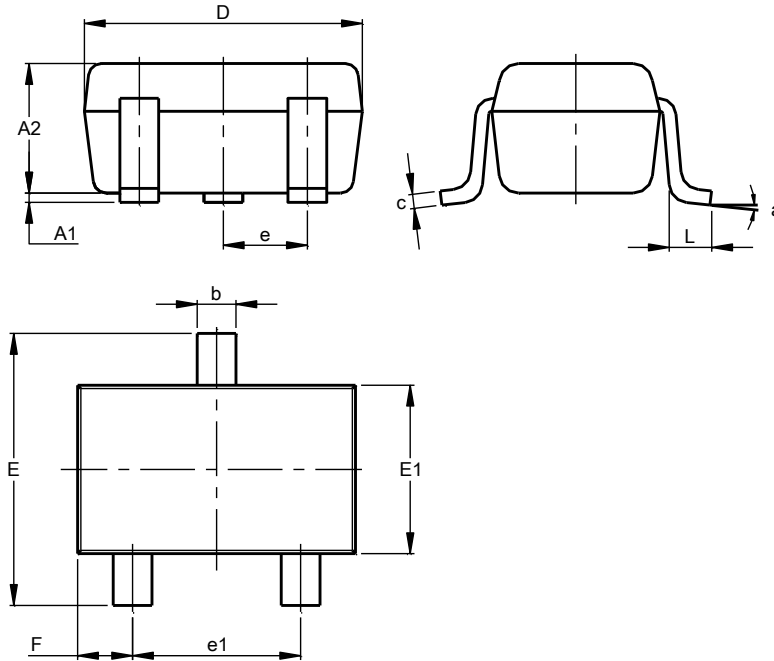


Figure 5 Typical DC Current Gain vs. Collector Current (Band C Group Gain)

## Package Outline Dimensions

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

SOT323

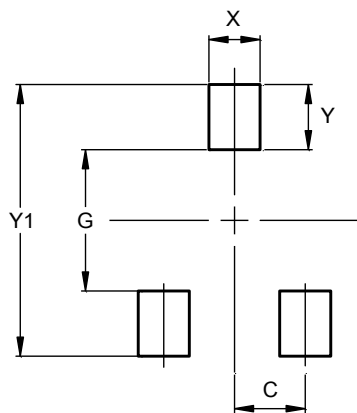


| SOT323               |           |       |       |
|----------------------|-----------|-------|-------|
| Dim                  | Min       | Max   | Typ   |
| A1                   | 0.00      | 0.10  | 0.05  |
| A2                   | 0.90      | 1.00  | 0.95  |
| b                    | 0.25      | 0.40  | 0.30  |
| c                    | 0.10      | 0.18  | 0.11  |
| D                    | 1.80      | 2.20  | 2.15  |
| E                    | 2.00      | 2.20  | 2.10  |
| E1                   | 1.15      | 1.35  | 1.30  |
| e                    | 0.650 BSC |       |       |
| e1                   | 1.20      | 1.40  | 1.30  |
| F                    | 0.375     | 0.475 | 0.425 |
| L                    | 0.25      | 0.40  | 0.30  |
| a                    | 0°        | 8°    | --    |
| All Dimensions in mm |           |       |       |

## Suggested Pad Layout

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

SOT323



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.470         |
| Y          | 0.600         |
| Y1         | 2.500         |

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