



**THE DATASHEET OF  
BC847BT-7-F**



## Features

- $BV_{CEO} > 45V$
- $I_C = 100mA$  Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary PNP Type: MMBT3906T
- **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**

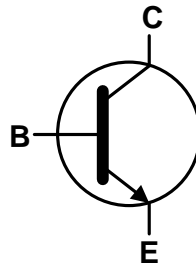
## Mechanical Data

- Case: SOT523
- 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 208③
- Weight: 0.002 grams (Approximate)

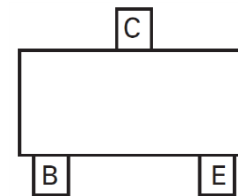
SOT523



Top View



Device Symbol



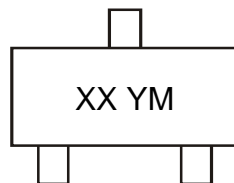
Pin-Out Top View

## Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| BC847AT-7-F | AEC-Q101   | 1E      | 7                  | 8               | 3,000             |
| BC847BT-7-F | AEC-Q101   | 1F      | 7                  | 8               | 3,000             |
| BC847CT-7-F | AEC-Q101   | 1M      | 7                  | 8               | 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



XX = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: D = 2016)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    |

| 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> | 6.0   | V    |
| Collector Current         | I <sub>C</sub>   | 100   | mA   |

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

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 150         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 833         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

### ESD Ratings (Note 6)

| 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 collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

### Thermal Characteristics and Derating Information

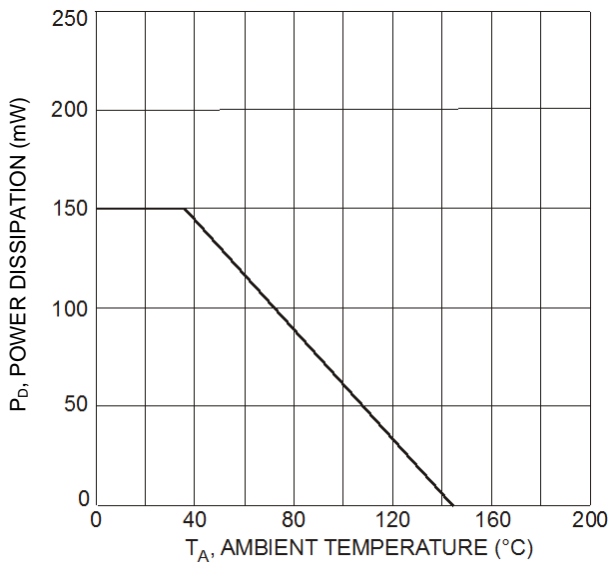


Fig. 1, Power Derating Curve

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

| Characteristic                       | Symbol                   | Min             | Typ        | Max        | Unit     | Test Condition  |   |
|--------------------------------------|--------------------------|-----------------|------------|------------|----------|---|---|
| <b>OFF CHARACTERISTICS (Note 7)</b>  |                          |                 |            |            |          |   |   |
| Collector-Base Breakdown Voltage     | BV <sub>CBO</sub>        | 50              | —          | —          | V        | I <sub>C</sub> = 10μA, I <sub>E</sub> = 0   |   |
| Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>        | 45              | —          | —          | V        | I <sub>C</sub> = 1mA, I <sub>B</sub> = 0  |   |
| Emitter-Base Breakdown Voltage       | BV <sub>EBO</sub>        | 6.0             | —          | —          | V        | I <sub>E</sub> = 10μA, I <sub>C</sub> = 0   |   |
| <b>ON CHARACTERISTICS (Note 7)</b>   |                          |                 |            |            |          |   |   |
| DC Current Gain                      | Current Gain A<br>B<br>C | h <sub>FE</sub> | 110        | —          | 220      | —   | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 2.0mA                      |
|                                      |                          |                 | 200        | 290        | 450      |   |   |
|                                      |                          |                 | 420        | 520        | 800      |   |   |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub>     | —               | —          | 250<br>600 | mV       | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA<br>I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA   |   |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub>     | —               | 700<br>900 | —          | mV       | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA<br>I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA   |   |
| Base-Emitter Voltage                 | V <sub>BE</sub>          | 580<br>—        | 660<br>—   | 700<br>770 | mV       | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 2.0mA<br>V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 10mA |   |
| Collector-Emitter Cutoff Current     | I <sub>CBO</sub>         | —               | —          | 15<br>5.0  | nA<br>μA | V <sub>CB</sub> = 30V<br>V <sub>CB</sub> = 30V, T <sub>A</sub> = +150°C                         |   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |                          |                 |            |            |          |   |   |
| Output Capacitance                   | C <sub>OBO</sub>         | —               | —          | 4.5        | pF       | V <sub>CB</sub> = 10V, f = 1.0MHz   |   |
| Current Gain-Bandwidth Product       | f <sub>T</sub>           | 100             | —          | —          | MHz      | V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA,<br>f = 100MHz                                      |   |
| Noise Figure                         | BC847BT                  | NF              | —          | —          | 1.0      | dB  | V <sub>CE</sub> = 5V, R <sub>S</sub> = 2kΩ,<br>f = 1MHz, BW = 200Hz |
|                                      | BC847CT                  |                 |            |            |          |   |   |

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

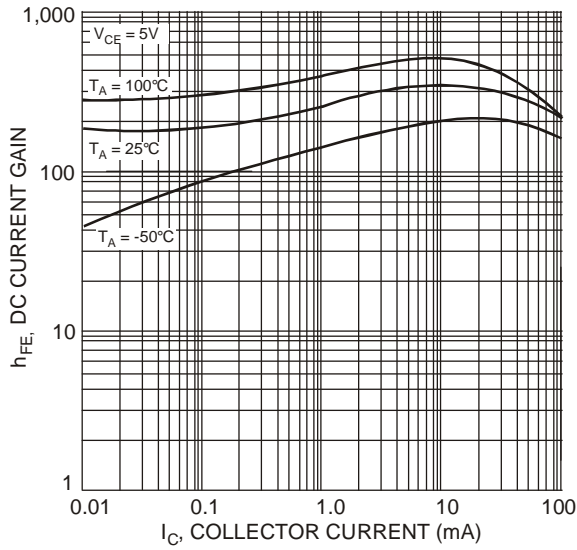


Fig. 2, DC Current Gain vs Collector Current

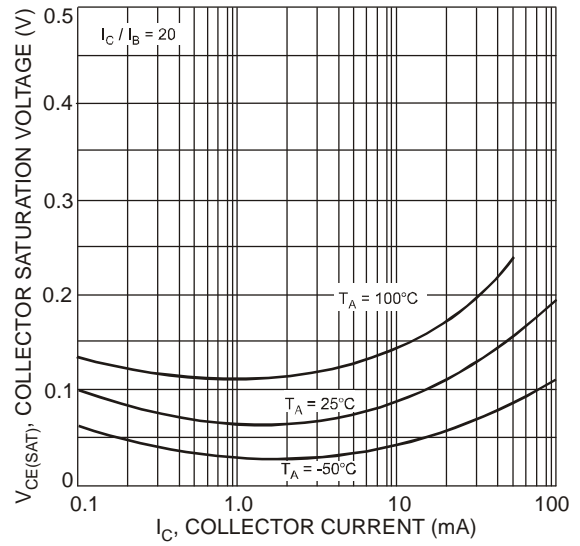


Fig. 3, Collector Saturation Voltage vs Collector Current

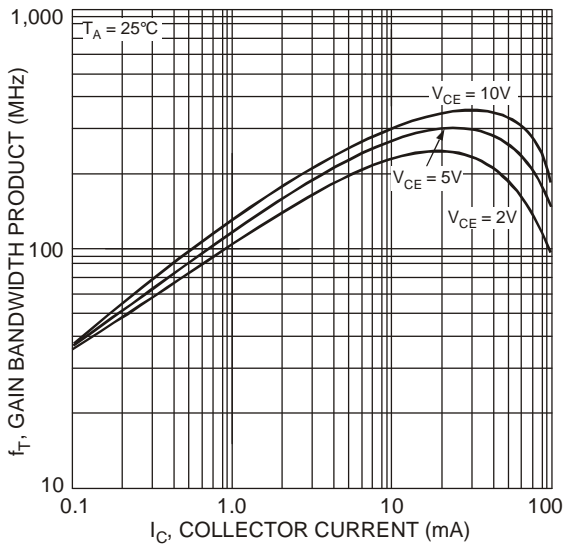
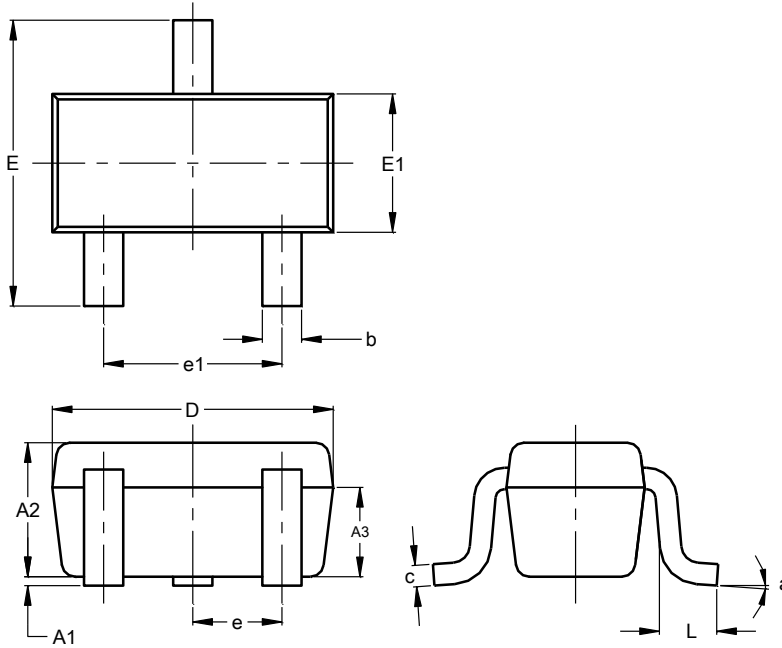


Fig. 4, Gain Bandwidth Product vs Collector Current

**Package Outline Dimensions**

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

**SOT523**

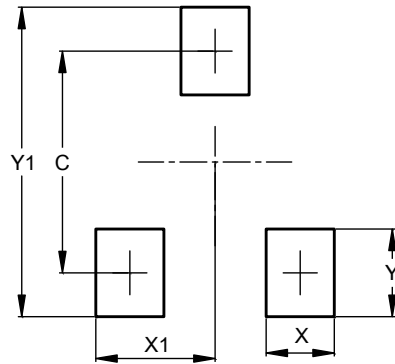


| SOT523               |          |      |      |
|----------------------|----------|------|------|
| Dim                  | Min      | Max  | Typ  |
| A                    | 0.60     | 0.80 | 0.75 |
| A1                   | 0.00     | 0.10 | 0.05 |
| A3                   | 0.45     | 0.65 | 0.50 |
| b                    | 0.15     | 0.30 | 0.22 |
| c                    | 0.10     | 0.20 | 0.12 |
| D                    | 1.50     | 1.70 | 1.60 |
| E                    | 1.45     | 1.75 | 1.60 |
| E1                   | 0.75     | 0.85 | 0.80 |
| e                    | 0.50 BSC |      |      |
| e1                   | 0.90     | 1.10 | 1.00 |
| L                    | 0.20     | 0.40 | 0.33 |
| a                    | 0°       | --   | 8°   |
| All Dimensions in mm |          |      |      |

**Suggested Pad Layout**

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

**SOT523**



| Dimensions | Value |
|------------|-------|
| C          | 1.29  |
| X          | 0.40  |
| X1         | 0.70  |
| Y          | 0.51  |
| Y1         | 1.80  |

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