

## Features

- $BV_{CEO} > -45V$
- $I_C = -100mA$  High Collector Current
- $P_D = 925mW$  Power Dissipation
- $0.36mm^2$  Package Footprint, 40% Smaller than DFN1006
- 0.4mm Height Package Minimizing Off-Board Profile
- Complementary NPN Type BC847BFZ
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

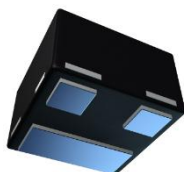
## Mechanical Data

- Case: X2-DFN0606-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu, Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.0008 grams (Approximate)

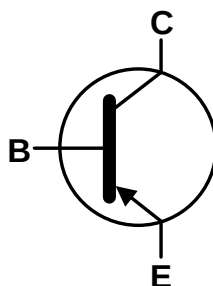
X2-DFN0606-3



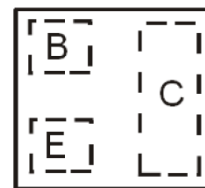
Top View



Bottom View



Device Symbol

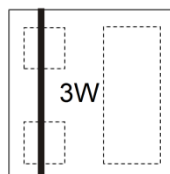

 Top View  
 Device Schematic

## Ordering Information (Note 4)

| Product     | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| BC857BFZ-7B | 3W      | 7                  | 8               | 10,000            |

- 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


 Top View  
 Bar Denotes Base  
 and Emitter Side

3W = Product Type Marking Code

## 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    |
| Continuous Collector Current | I <sub>C</sub>   | -100  | mA   |
| Peak Pulse Collector Current | I <sub>CM</sub>  | -200  | mA   |

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

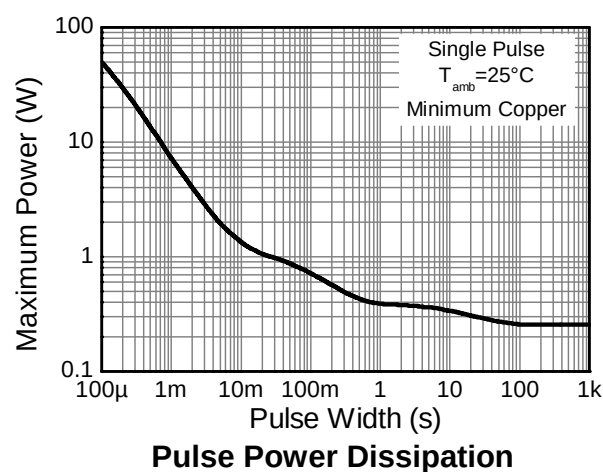
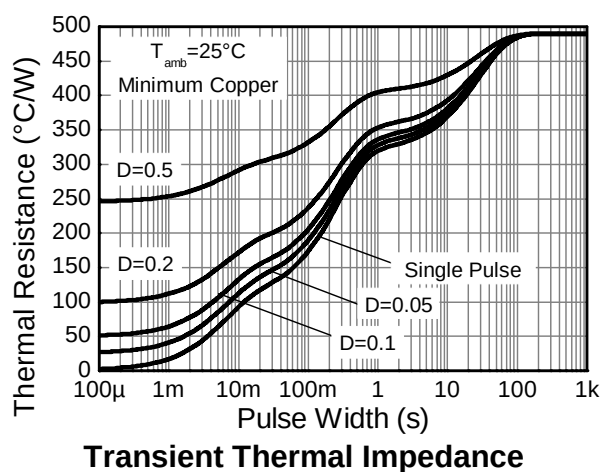
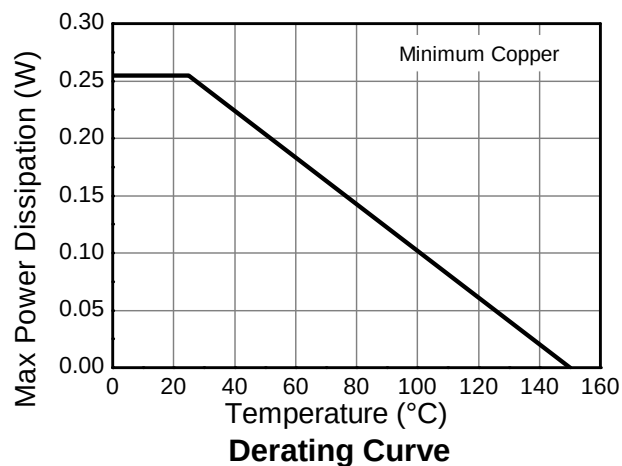
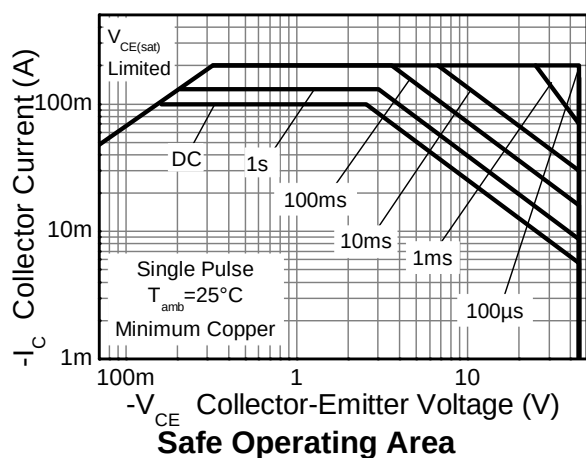
| Characteristic                              | Symbol                            | Value       | Unit |
|---------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation                           | P <sub>D</sub>                    | 270         | mW   |
|                                             |                                   | 925         |      |
| Thermal Resistance, Junction to Ambient     | R <sub>θJA</sub>                  | 465         | °C/W |
|                                             |                                   | 135         |      |
| Thermal Resistance, Junction to Lead        | R <sub>θJL</sub>                  | 135         | °C/W |
| Operating and Storage and Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 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  | 200   | V    | B           |

- Notes:
5. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady state condition. The entire exposed collector pad is attached to the heatsink.
  6. Same as Note 5, except the exposed collector pad is mounted on 25mm x 25mm 2oz copper.
  7. Thermal resistance from junction to solder-point (on the exposed collector pad).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information



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

| Characteristic                               | Symbol               | Min       | Typical      | Max              | Unit | Test Condition                                                                                      |
|----------------------------------------------|----------------------|-----------|--------------|------------------|------|-----------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b>                   |                      |           |              |                  |      |                                                                                                     |
| Collector-Base Breakdown Voltage             | BV <sub>CBO</sub>    | -50       | -100         | —                | V    | I <sub>C</sub> = -50μA, I <sub>B</sub> = 0                                                          |
| Collector-Emitter Breakdown Voltage          | BV <sub>CES</sub>    | -50       | -90          | —                | V    | I <sub>C</sub> = -50μA, I <sub>B</sub> = 0                                                          |
| Collector-Emitter Breakdown Voltage (Note 9) | BV <sub>CEO</sub>    | -45       | -65          | —                | V    | I <sub>C</sub> = -1mA, I <sub>B</sub> = 0                                                           |
| Collector-Base Breakdown Voltage             | BV <sub>EBO</sub>    | -6.0      | -8.5         | —                | V    | I <sub>E</sub> = -50μA, I <sub>C</sub> = 0                                                          |
| Collector-Base Cutoff Current                | I <sub>CBO</sub>     | —         | —            | -15              | nA   | V <sub>CB</sub> = -40V                                                                              |
| Collector-Emitter Cutoff Current             | I <sub>CES</sub>     | —         | —            | -15              | nA   | V <sub>CE</sub> = -40V                                                                              |
| <b>ON CHARACTERISTICS (Note 9)</b>           |                      |           |              |                  |      |                                                                                                     |
| DC Current Gain                              | h <sub>FE</sub>      | —<br>200  | 340<br>330   | —<br>470         | —    | I <sub>C</sub> = -10μA, V <sub>CE</sub> = -5.0V<br>I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5.0V |
| Collector-Emitter Saturation Voltage         | V <sub>CE(sat)</sub> | —         | -70<br>-300  | -175<br>-500     | mV   | I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA<br>I <sub>C</sub> = -100mA, I <sub>B</sub> = -5.0mA |
| Base-Emitter Saturation Voltage              | V <sub>BE(sat)</sub> | —         | -760<br>-885 | -1,000<br>-1,100 | mV   | I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA<br>I <sub>C</sub> = -100mA, I <sub>B</sub> = -5.0mA |
| Base-Emitter Voltage                         | V <sub>BE(on)</sub>  | -600<br>— | -670<br>-715 | -780<br>-850     | mV   | I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5V<br>I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5V     |
| <b>SMALL SIGNAL CHARACTERISTICS</b>          |                      |           |              |                  |      |                                                                                                     |
| Output Capacitance                           | C <sub>obo</sub>     | —         | 2.0          | —                | pF   | V <sub>CB</sub> = -10.0V, f = 1.0MHz, I <sub>E</sub> = 0                                            |
| Current Gain-Bandwidth Product               | f <sub>T</sub>       | 100       | 270          | —                | MHz  | V <sub>CE</sub> = -5V, I <sub>C</sub> = -10mA,<br>f = 100MHz                                        |

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

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

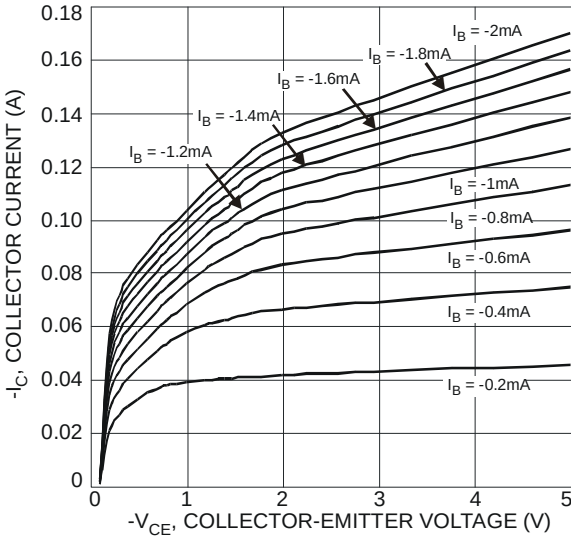


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

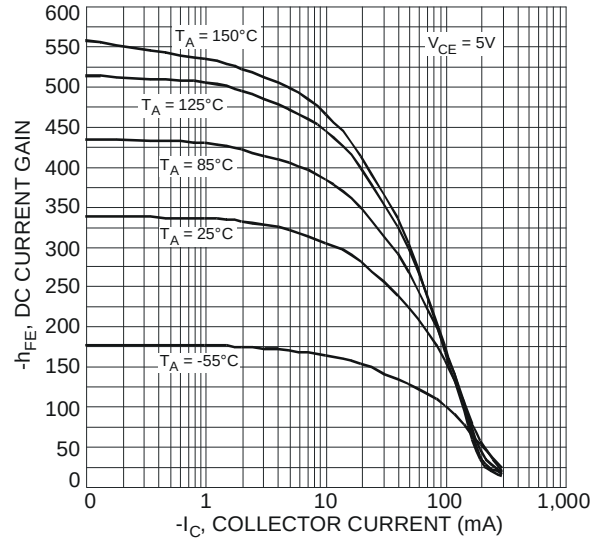


Fig. 5 Typical DC Current Gain vs. Collector Current

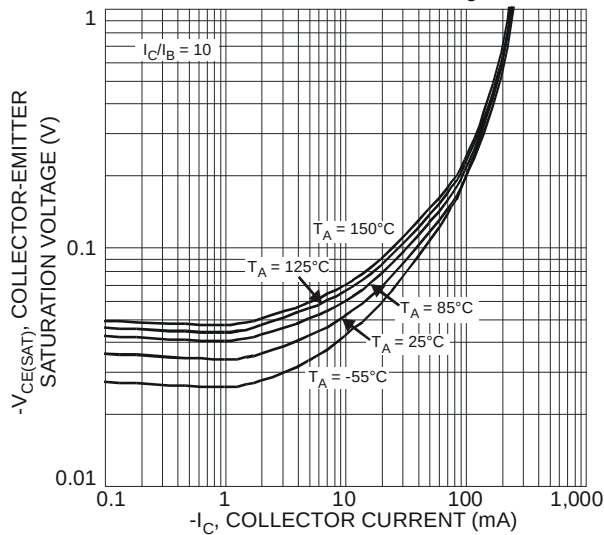


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

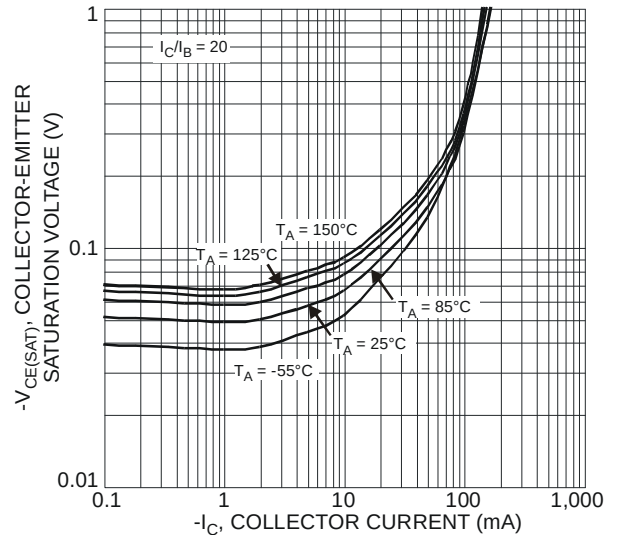


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Collector Current

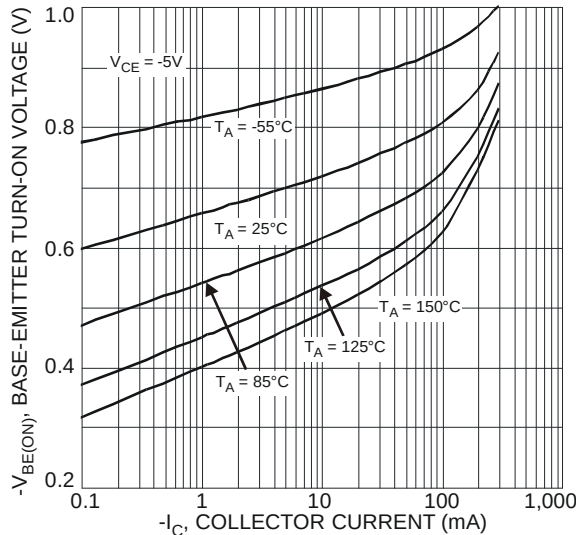


Fig. 8 Typical Base-Emitter Turn-On Voltage vs. Collector Current

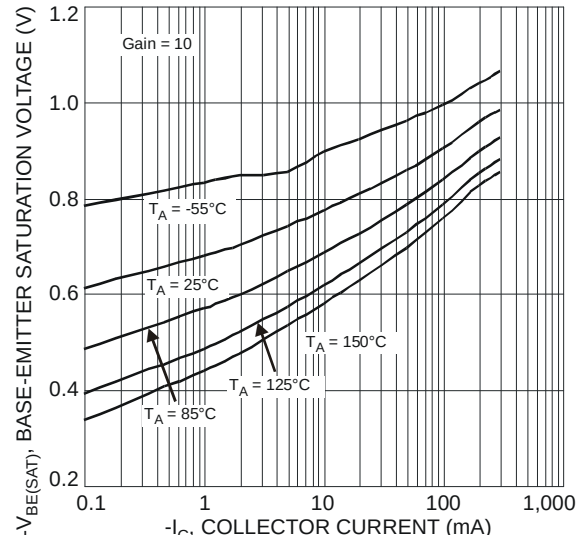
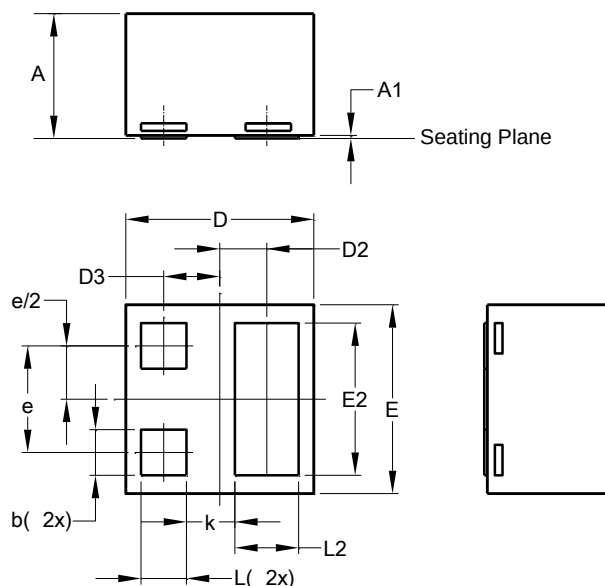


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

## Package Outline Dimensions

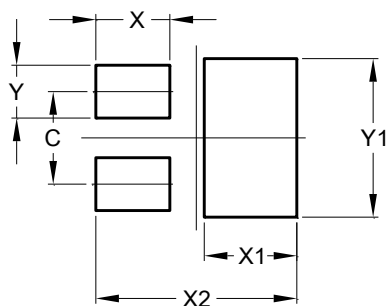
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| X2-DFN0606-3         |           |      |      |
|----------------------|-----------|------|------|
| Dim                  | Min       | Max  | Typ  |
| A                    | 0.36      | 0.42 | 0.39 |
| A1                   | 0         | 0.05 | 0.02 |
| b                    | 0.10      | 0.20 | 0.15 |
| D                    | 0.57      | 0.67 | 0.62 |
| D2                   | 0.155 BSC |      |      |
| D3                   | 0.185 BSC |      |      |
| E                    | 0.57      | 0.67 | 0.62 |
| E2                   | 0.40      | 0.60 | 0.50 |
| e                    | 0.35 BSC  |      |      |
| k                    | 0.16 REF  |      |      |
| L                    | 0.09      | 0.21 | 0.15 |
| L2                   | 0.11      | 0.31 | 0.21 |
| 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          | 0.350         |
| X          | 0.280         |
| X1         | 0.350         |
| X2         | 0.760         |
| Y          | 0.200         |
| Y1         | 0.600         |

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