# 45V PNP SMALL-SIGNAL TRANSISTOR IN X1-DFN1006-3

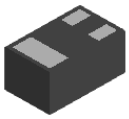
## Features

- $BV_{CEO}$ > -45V
- $I_C$ = -100mA High Collector Current
- $P_D$ = 1000mW Power Dissipation
- 0.60mm$^2$ Package Footprint, 13 Times Smaller Than SOT23
- 0.5mm Height Package Minimizing Off-Board Profile
- Complementary NPN Type: BC847BLP
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

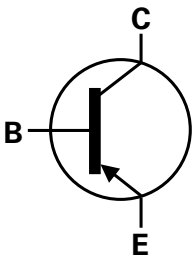
## Mechanical Data

- Package: X1-DFN1006-3
- Package 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: 0.0009 grams (Approximate)

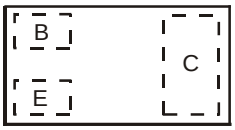
X1-DFN1006-3



Bottom View




Device Symbol



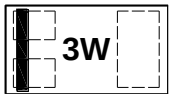
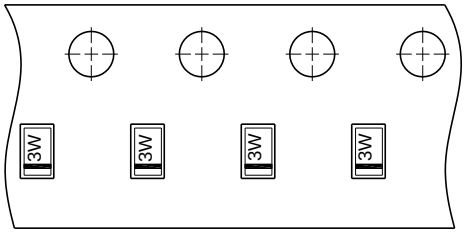
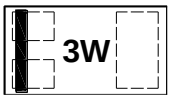
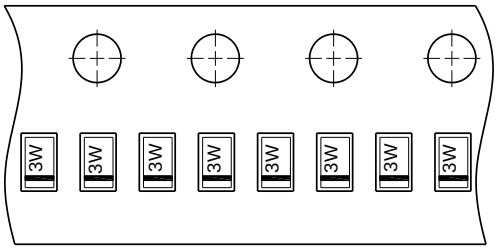

Top View
Pinout

## Ordering Information (Note 4)

| Part Number | Package | Marking | Reel Size (inches) | Tape Width (mm) | Packing | |
|---|---|---|---|---|---|---|
| | | | | | Qty. | Carrier |
| BC857BLP-7 | X1-DFN1006-3 | 3W | 7 | 8 | 3,000 | Reel |
| BC857BLP-7B | X1-DFN1006-3 | 3W | 7 | 8 | 10,000 | Reel |

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

| | |
|---|---|
| **BC857BLP-7** |  Top View<br>Bar Denotes Base and Emitter Side<br>3W = Product Type Marking Code<br>  |
| **BC857BLP-7B** |  Top View<br>Bar Denotes Base and Emitter Side<br>3W = Product Type Marking Code<br>  |

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -50 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -45 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5.0 | V |
| Collector Current | $I_C$ | -100 | mA |
| Peak Pulse Collector Current | $I_{CM}$ | -200 | mA |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 5) | $P_D$ | 400 | mW |
| | (Note 6) | | 1000 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 310 | °C/W |
| | (Note 6) | | 120 | |
| Thermal Resistance, Junction to Lead | (Note 7) | $R_{\theta JL}$ | 120 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

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).

## 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 |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -50 | — | — | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 9) | $BV_{CEO}$ | -45 | — | — | V | $I_C$ = 10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -5 | — | — | V | $I_E$ = 100µA |
| DC Current Gain | $h_{FE}$ | 220 | 260 | 475 | — | $V_{CE}$ = -5.0V, $I_C$ = -2.0mA |
| Collector-Emitter Saturation Voltage (Note 9) | $V_{CE(sat)}$ | — | -90<br>-250 | -300<br>-650 | mV | $I_C$ = -10mA, $I_B$ = -0.5mA<br>$I_C$ = -100mA, $I_B$ = -5.0mA |
| Base-Emitter Saturation Voltage (Note 9) | $V_{BE(sat)}$ | —<br>— | -700<br>-850 | —<br>— | mV | $I_C$ = -10mA, $I_B$ = -0.5mA<br>$I_C$ = -100mA, $I_B$ = -5.0mA |
| Base-Emitter Voltage (Note 9) | $V_{BE(on)}$ | -600<br>— | -670<br>-710 | -750<br>-820 | mV | $V_{CE}$ = -5.0V, $I_C$ = -2.0mA<br>$V_{CE}$ = -5.0V, $I_C$ = -10mA |
| Collector-Cutoff Current | $I_{CBO}$ | —<br>— | —<br>— | -15<br>-4.0 | nA<br>µA | $V_{CB}$ = -30V<br>$V_{CB}$ = -30V, $T_A$ = +150°C |
| Gain Bandwidth Product | $f_T$ | 100 | — | — | MHz | $V_{CE}$ = -5.0V, $I_C$ = -10mA, f = 100MHz |
| Collector-Base Capacitance | $C_{CBO}$ | — | 3.0 | — | pF | $V_{CB}$ = -10V, f = 1.0MHz |

Notes: 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.
9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

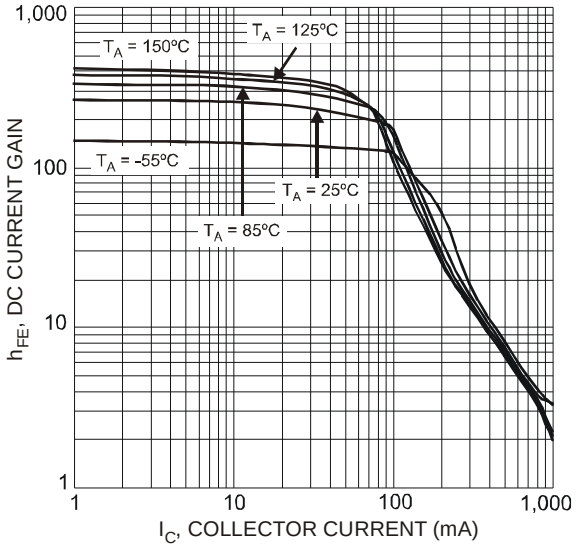



Fig. 1 Typical DC Current Gain vs. Collector Current

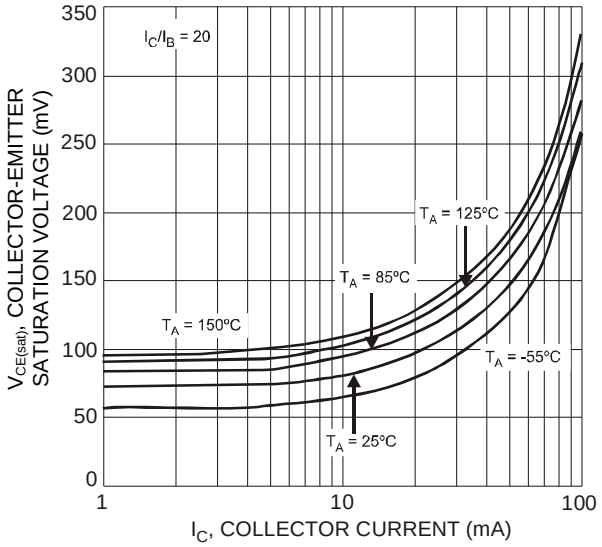



Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

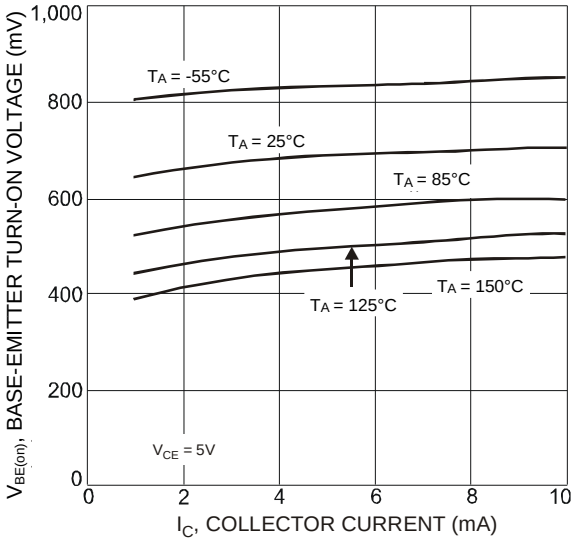



Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

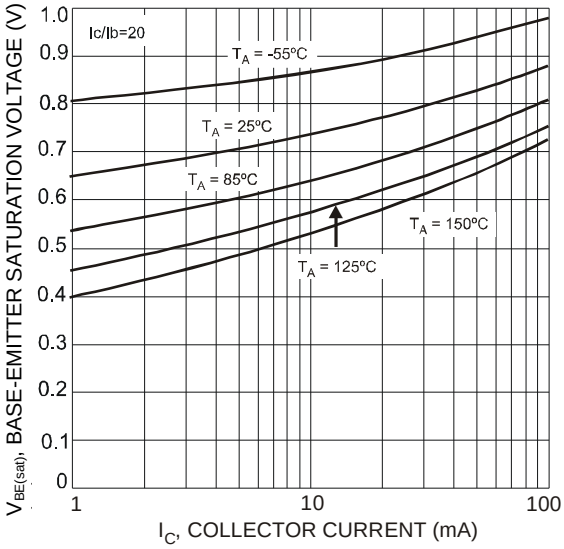
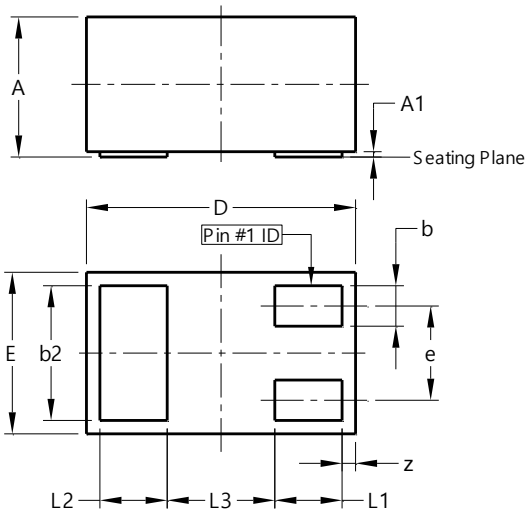



Fig. 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

## Package Outline Dimensions

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

**X1-DFN1006-3**

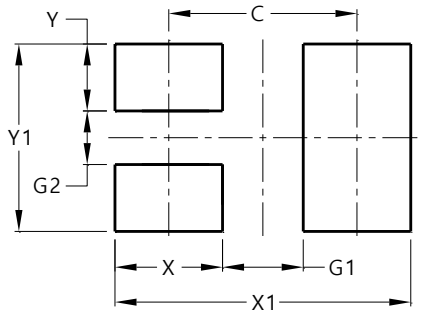



| X1-DFN1006-3 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.47 | 0.53 | 0.50 |
| **A1** | 0.00 | 0.05 | 0.03 |
| **b** | 0.10 | 0.20 | 0.15 |
| **b2** | 0.45 | 0.55 | 0.50 |
| **D** | 0.95 | 1.075 | 1.00 |
| **E** | 0.55 | 0.675 | 0.60 |
| **e** | - | - | 0.35 |
| **L1** | 0.20 | 0.30 | 0.25 |
| **L2** | 0.20 | 0.30 | 0.25 |
| **L3** | - | - | 0.40 |
| **z** | 0.02 | 0.08 | 0.05 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**X1-DFN1006-3**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.70 |
| **G1** | 0.30 |
| **G2** | 0.20 |
| **X** | 0.40 |
| **X1** | 1.10 |
| **Y** | 0.25 |
| **Y1** | 0.70 |

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