# 45V PNP SMALL SIGNAL TRANSISTOR IN DFN1006-3/SWP

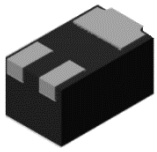
## Features

- $BV_{CEO}$ > -45V
- $I_C$ = -100mA High Collector Current
- $P_D$ = 1W Power Dissipation
- 0.6mm$^2$ Package Footprint, 13 Times Smaller than SOT23
- 0.4mm-High Package Minimizing Off-Board Profile
- Sidewall Tin Plating for Wettable Flanks in AOI
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The BC857BLP4Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  **https://www.diodes.com/quality/product-definitions/**

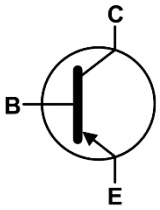
## Mechanical Data

- Package: U-DFN1006-3/SWP (Type UX)
- Package 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: 0.0008 grams (Approximate)

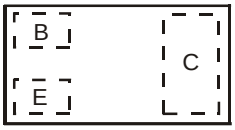
U-DFN1006-3/SWP
(Type UX)



Bottom View




Device Symbol




Top View
Device Schematic

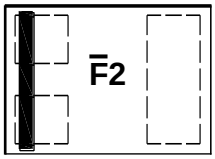
## Ordering Information (Note 4)

| Orderable Part Number | Package | Marking | Reel Size (inches) | Tape Width (mm) | Packing | |
|---|---|---|---|---|---|---|
| | | | | | Qty. | Carrier |
| BC857BLP4Q-7 | U-DFN1006-3/SWP (Type UX) | F2 | 7 | 8 | 3,000 | Reel |
| BC857BLP4Q-7B | U-DFN1006-3/SWP (Type UX) | F2 | 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

U-DFN1006-3/SWP
(Type UX)




$\bar{F}2$ = Product Type Marking Code

## 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 | $V_{EBO}$ | -6 | 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) | $P_D$ | 0.255 | W |
| | (Note 6) | | 0.890 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 490 | °C/W |
| | (Note 6) | | 140 | |
| Thermal Resistance, Junction to Lead | (Note 7) | $R_{\theta JL}$ | 42 | °C/W |
| Operating and Storage and Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 8)

| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge – Human Body Model | ESD HBM | 4000 | V | 3A |

Notes:
5. For a device mounted on the minimum recommended pad layout of 2oz copper on a single-sided 1.6mm FR4 PCB; device is measured under still-air conditions whilst operating in steady-state condition.
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 JS-001.

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

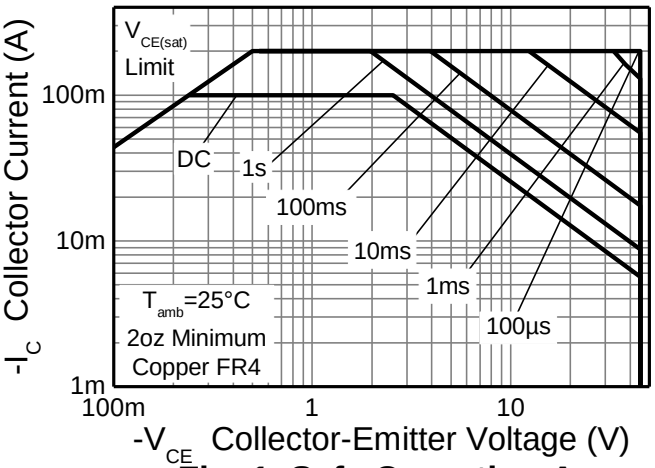



**Fig. 1 Safe Operating Area**

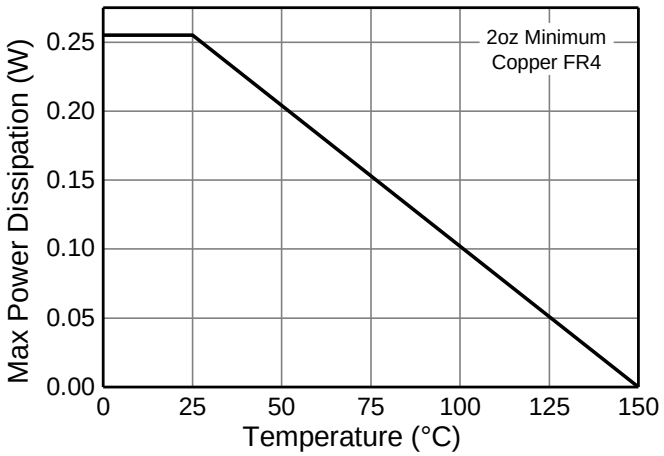



**Fig.2 Derating Curve**

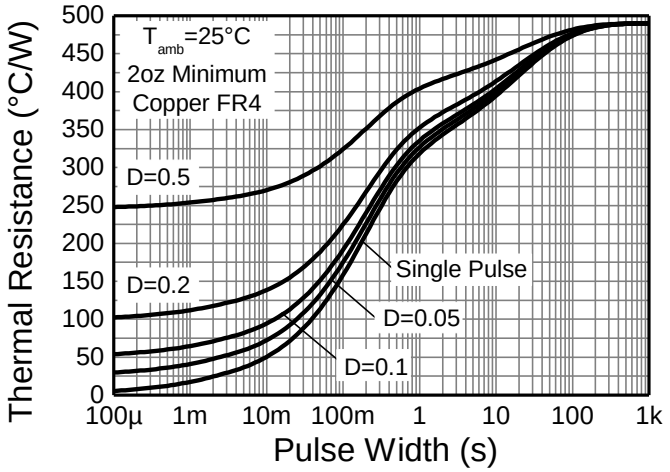



**Fig.3 Transient Thermal Impedance**

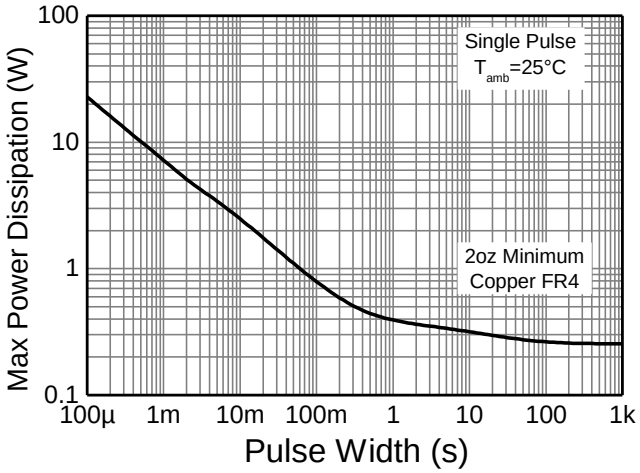



**Fig.4 Pulse Power Dissipation**

## 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 | 300 | 475 | — | $V_{CE}$ = -5V, $I_C$ = -2mA |
| Collector-Emitter Saturation Voltage (Note 9) | $V_{CE(sat)}$ | —<br>— | -90<br>-250 | -300<br>-650 | mV | $I_C$ = -10mA, $I_B$ = -0.5mA<br>$I_C$ = -100mA, $I_B$ = -5mA |
| 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, $I_B$ = -5mA |
| Base-Emitter Voltage (Note 9) | $V_{BE(on)}$ | -600<br>— | -670<br>-710 | -750<br>-820 | mV | $V_{CE}$ = -5V, $I_C$ = -2mA<br>$V_{CE}$ = -5V, $I_C$ = -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 | $V_{CE}$ = -5V, $I_C$ = -10mA<br>f = 100MHz |
| Collector-Base Capacitance | $C_{CBO}$ | — | 3.0 | — | pF | $V_{CB}$ = -10V, f = 1MHz |

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

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

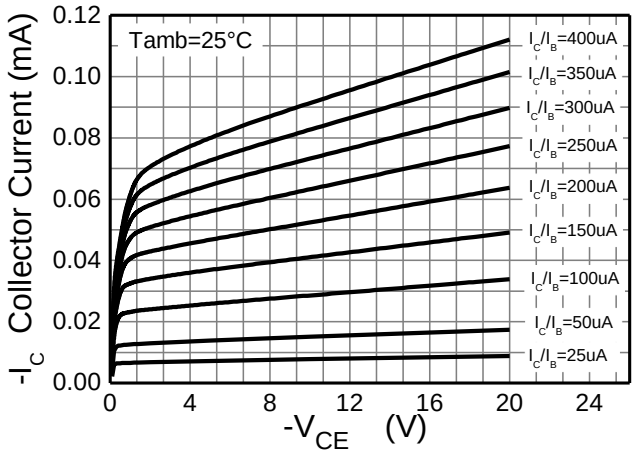



**Fig.5 $I_C$ v $V_{CE}$**

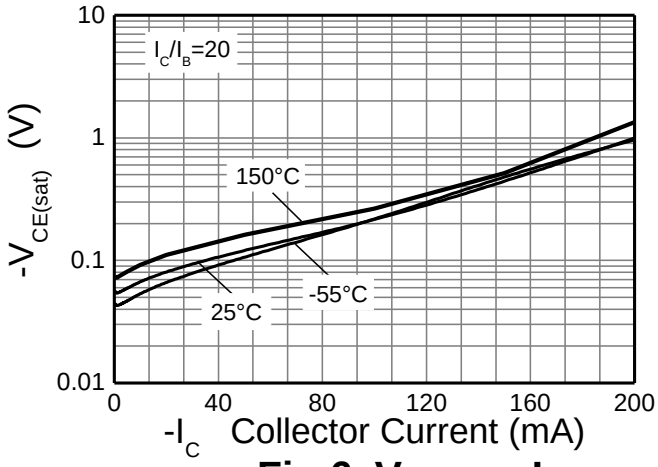



**Fig.6 $V_{CE(sat)}$ v $I_C$**

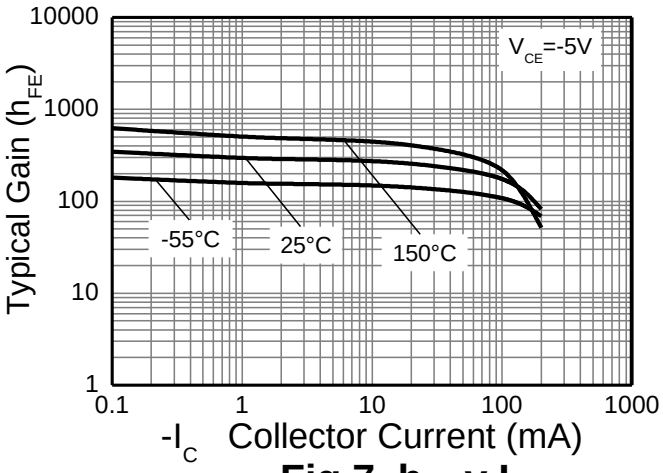



**Fig.7 $h_{FE}$ v $I_C$**

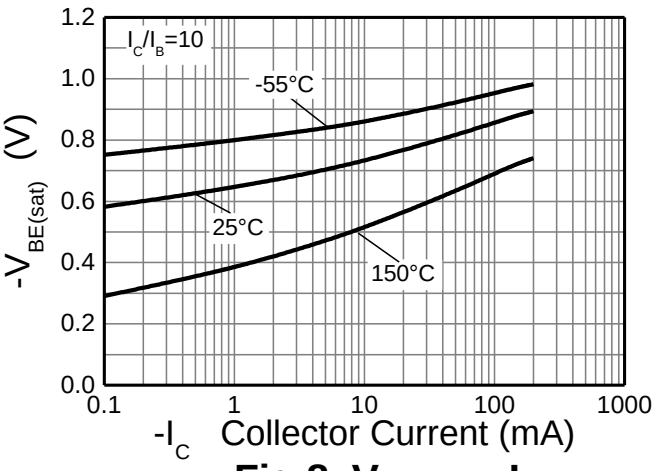



**Fig.8 $V_{BE(sat)}$ v $I_C$**

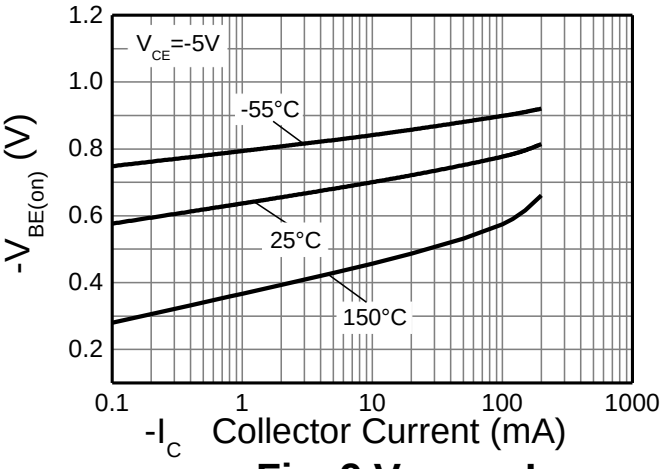
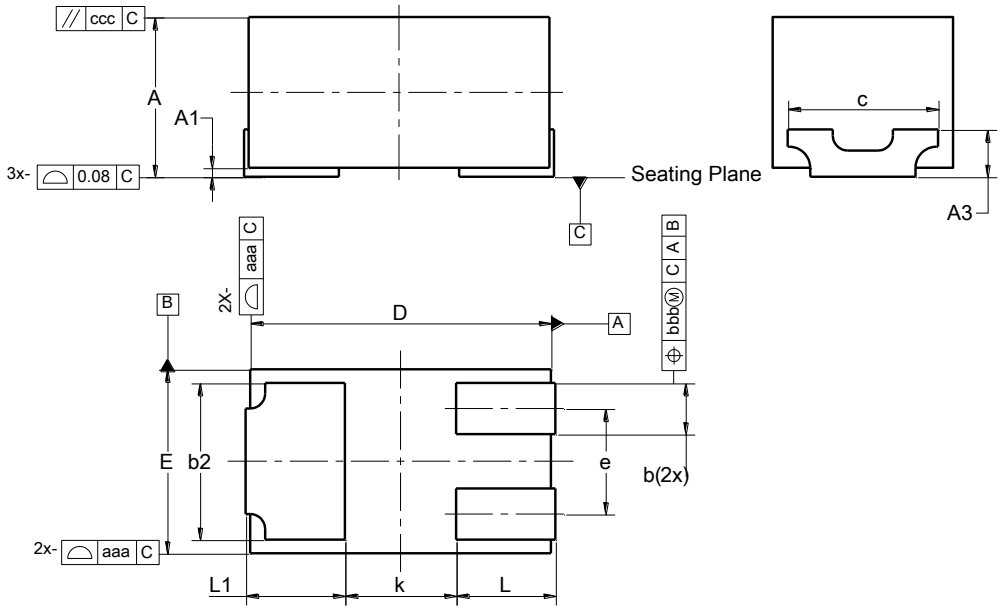



**Fig. 9 $V_{BE(on)}$ v $I_C$**

## Package Outline Dimensions

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

**U-DFN1006-3/SWP (Type UX)**



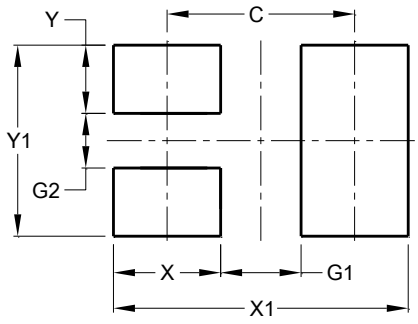

| U-DFN1006-3/SWP (Type UX) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.47 | 0.53 | 0.50 |
| **A1** | 0.00 | 0.05 | 0.03 |
| **A3** | 0.17 REF | | |
| **b** | 0.12 | 0.22 | 0.17 |
| **b2** | 0.47 | 0.57 | 0.52 |
| **D** | 0.95 | 1.05 | 1.00 |
| **E** | 0.55 | 0.65 | 0.60 |
| **e** | -- | -- | 0.35 |
| **k** | 0.37 REF | | |
| **L** | 0.28 | 0.38 | 0.33 |
| **L1** | 0.28 | 0.38 | 0.33 |
| **c** | 0.50 REF | | |
| **aaa** | 0.15 | | |
| **bbb** | 0.05 | | |
| **ccc** | 0.05 | | |
| All Dimensions in mm | | | |

Note: 10. Sidewall tin-plated package for wettable flanks in AOI.

## Suggested Pad Layout

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

**U-DFN1006-3/SWP (Type UX)**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.700 |
| **G1** | 0.300 |
| **G2** | 0.200 |
| **X** | 0.400 |
| **X1** | 1.100 |
| **Y** | 0.250 |
| **Y1** | 0.700 |

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