# BCV46

## 60V PNP DARLINGTON TRANSISTOR IN SOT23

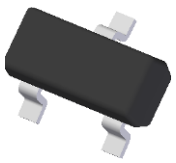
## Features

- $BV_{CEO}$ > -60V
- Darlington Transistor $h_{FE}$ > 10k @ 100mA for high gain
- $I_C$ = -500mA High Continuous Collector Current
- Complementary Darlington PNP Type: BCV47
- **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)**

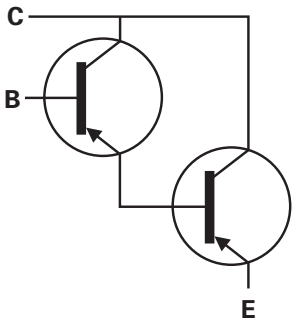
## Mechanical Data

- Case: SOT23
- 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 e3
- Weight 0.008 grams (approximate)

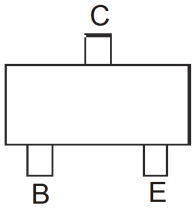
SOT23



Top View




Device Symbol



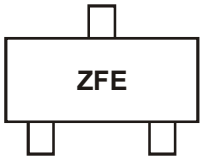

Top View
Pin-Out

## Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|---|
| BCV46TA | AEC-Q101 | ZFE | 7 | 8 | 3,000 |
| BCV46QTA | Automotive | ZFE | 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 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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
5. For packaging details, go to our website at http://www.diodes.com

## Marking Information




ZFE = Product Type Marking Code

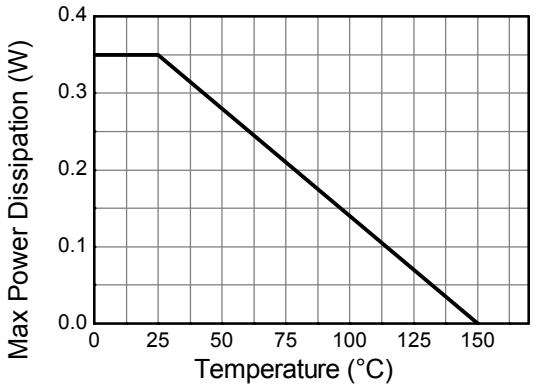
## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -80 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -60 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -10 | V |
| Continuous Collector Current | $I_C$ | -500 | mA |
| Peak Pulse Current | $I_{CM}$ | -800 | mA |
| Base Current | $I_B$ | -100 | mA |

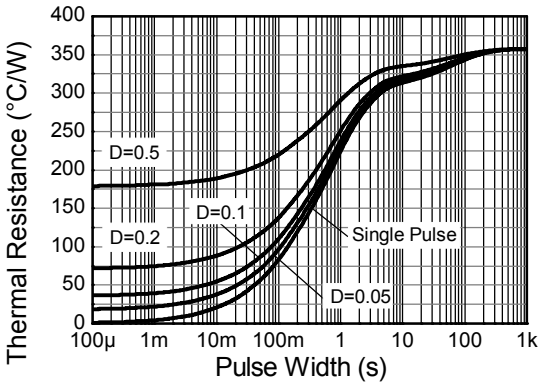
## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 310 | mW |
| | (Note 7) | | 350 | |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 403 | °C/W |
| | (Note 7) | | 357 | |
| Thermal Resistance, Junction to Leads | (Note 8) | $R_{\theta JL}$ | 350 | °C/W |
| Operating and Storage Temperature Range | | $T_J, T_{STG}$ | -55 to +150 | °C |

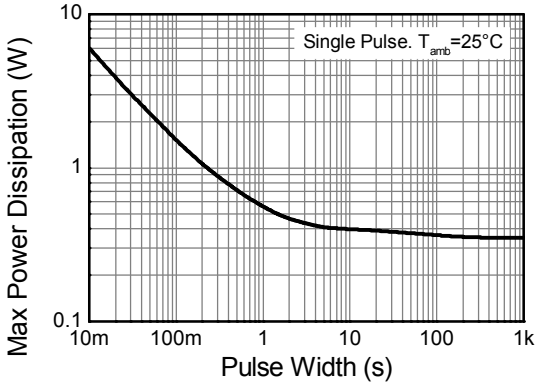
Notes:
6. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper in still air condition; the device is measured when operating in a steady-state condition.
7. Same as note (6), except the device is mounted on 15mm x 15mm FR4 PCB.
8. Thermal resistance from junction to solder-point (at the end of the leads).




**Derating Curve**




**Transient Thermal Impedance**




**Pulse Power Dissipation**

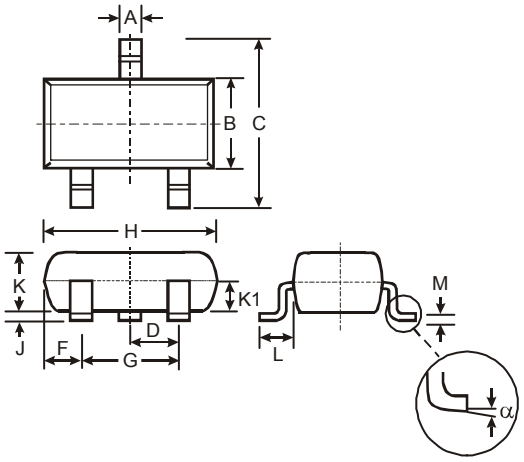
## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -80 | - | - | V | $I_C$ = -100µA |
| Collector-Emitter Breakdown Voltage (Note 9) | $BV_{CEO}$ | -60 | - | - | V | $I_C$ = -10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -10 | - | - | V | $I_E$ = -10µA |
| Collector Cutoff Current | $I_{CBO}$ | -<br>- | <1<br>- | -100<br>-10 | nA<br>µA | $V_{CB}$ = -60V<br>$V_{CB}$ = -60V, $T_A$ = +150°C |
| Emitter Cutoff Current | $I_{EBO}$ | - | <1 | -100 | nA | $V_{EB}$ = -4V |
| **ON CHARACTERISTICS (Note 9)** | | | | | | |
| Static Forward Current Transfer Ratio | $h_{FE}$ | 2,000<br>4,000<br>10,000<br>2,000 | -<br>-<br>-<br>- | -<br>-<br>-<br>- | - | $I_C$ = -100µA, $V_{CE}$ = -1V<br>$I_C$ = -10mA, $V_{CE}$ = -5V<br>$I_C$ = -100mA, $V_{CE}$ = -5V<br>$I_C$ = -500mA, $V_{CE}$ = -5V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | - | - | -1.0 | V | $I_C$ = - 100mA, $I_B$ = -0.1mA |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | - | - | -1.5 | V | $I_C$ = -100mA, $I_B$ = -0.1mA |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | | |
| Transition Frequency | $f_T$ | - | 200 | - | MHz | $V_{CE}$ = -5V, $I_C$ = -50mA,<br>f = 20MHz |
| Output Capacitance | $C_{obo}$ | - | 4.5 | - | pF | $V_{CB}$ = -10V, f = 1MHz |

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

## Package Outline Dimensions

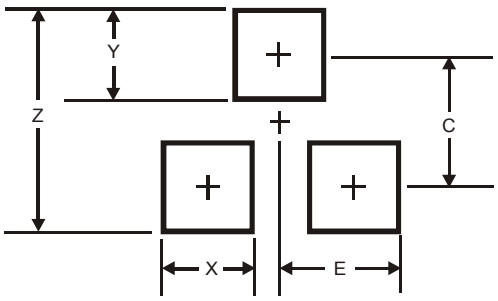
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.903 | 1.10 | 1.00 |
| **K1** | - | - | 0.400 |
| **L** | 0.45 | 0.61 | 0.55 |
| **M** | 0.085 | 0.18 | 0.11 |
| **α** | 0° | 8° | - |
| **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) |
|---|---|
| **Z** | 2.9 |
| **X** | 0.8 |
| **Y** | 0.9 |
| **C** | 2.0 |
| **E** | 1.35 |

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