# 32V PNP POWER SWITCHING TRANSISTOR IN SOT89

## Features

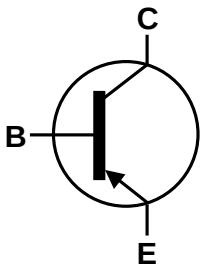
- $BV_{CEO}$ > -32V
- $I_C$ = -1A High Continuous Collector Current
- Complementary NPN Type: 2DD1664
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, 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

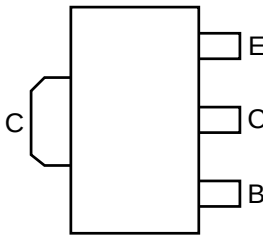
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.055 grams (Approximate)

SOT89

Top View




Device Symbol




Pin Out
Top View

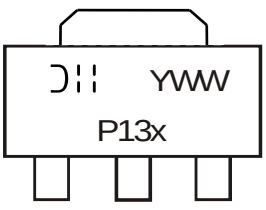
## Ordering Information (Note 4)

| Part Number | Status | Marking Code | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---|---|---|---|---|---|
| 2DB1132P-13 | Obsolete | P13P | 13 | 12 | 2,500 |
| 2DB1132Q-13 | Obsolete | P13Q | 13 | 12 | 2,500 |
| 2DB1132R-13 | Active | P13R | 13 | 12 | 2,500 |
| 2DB1132R-13R | Active | P13R | 13 | 12 | 4,000 |

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

(Top View)




= Manufacturer's Marking
P13x = Product Type Marking Code:
Where P13P = 2DB1132P
P13Q = 2DB1132Q
P13R = 2DB1132R
YWW = Date Code Marking
Y = Last Digit of Year (ex: 1 = 2021)
WW = Week Code (01 to 52)

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -40 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -32 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5 | V |
| Continuous Collector Current | $I_C$ | -1 | A |
| Peak Pulse Current | $I_{CM}$ | -2 | A |

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

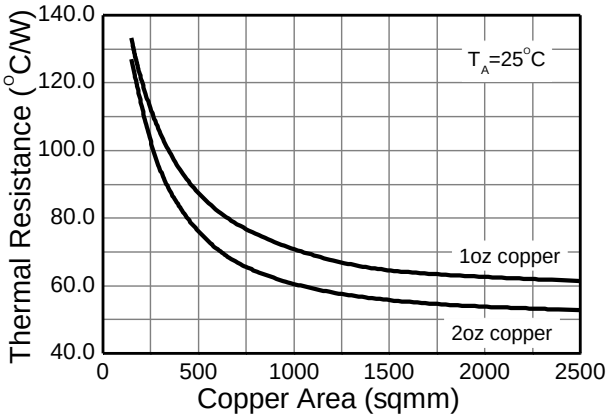
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 5) | $P_D$ | 1 | W |
| | (Note 6) | | 1.5 | |
| | (Note 7) | | 2 | |
| Thermal Resistance, Junction to Ambient Air | (Note 5) | $R_{\theta JA}$ | 125 | °C/W |
| | (Note 6) | | 83 | |
| | (Note 7) | | 60 | |
| Thermal Resistance, Junction to Case | (Note 5) | $R_{\theta JC}$ | 18 | °C/W |
| Thermal Resistance, Junction to Lead | (Note 8) | $R_{\theta JL}$ | 22 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

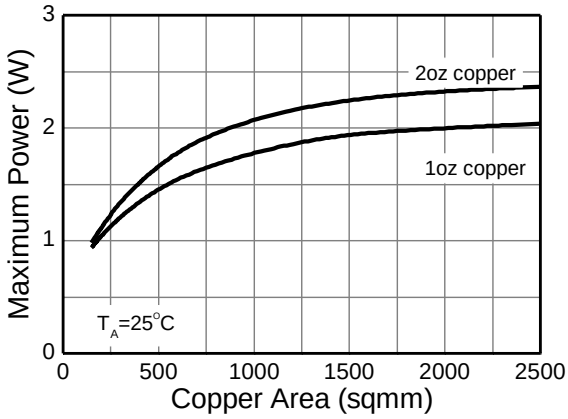
## ESD Ratings (Note 9)

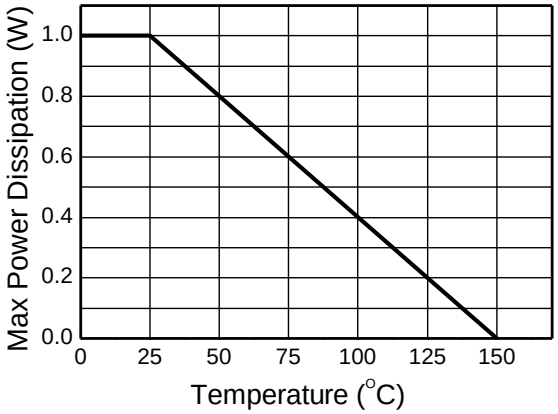
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Notes:
5. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper.
7. Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
8. Thermal resistance from junction to solder-point (on the exposed collector pad).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

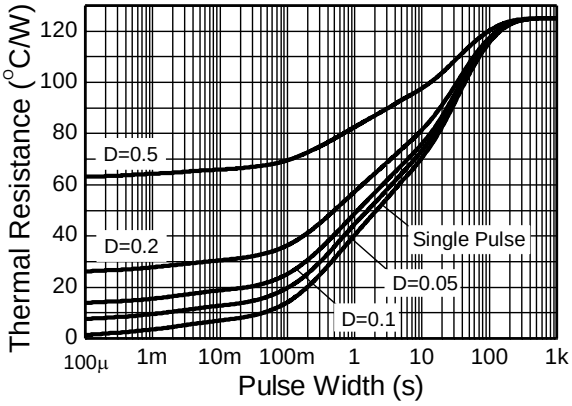
## Thermal Characteristics and Derating Information



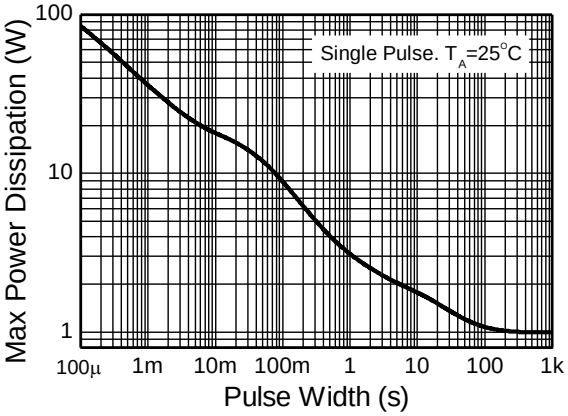




**Derating Curve**




**Transient Thermal Impedance**




**Pulse Power Dissipation**

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

| Characteristic | | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | | $BV_{CBO}$ | -40 | — | — | V | $I_C$ = -50μA |
| Collector-Emitter Breakdown Voltage (Note 10) | | $BV_{CEO}$ | -32 | — | — | V | $I_C$ = -1mA |
| Emitter-Base Breakdown Voltage | | $BV_{EBO}$ | -5 | — | — | V | $I_E$ = -50μA |
| Collector Cut-Off Current | | $I_{CBO}$ | — | — | -0.5 | μA | $V_{CB}$ = -20V |
| Emitter Cut-Off Current | | $I_{EBO}$ | — | — | -0.5 | μA | $V_{EB}$ = -4V |
| Static Forward Current Transfer Ratio (Note 10) | 2DB1132P | $h_{FE}$ | 82 | — | 180 | — | $I_C$ = -100mA, $V_{CE}$ = -3V |
| | 2DB1132Q | | 120 | | 270 | | |
| | 2DB1132R | | 180 | | 390 | | |
| Collector-Emitter Saturation Voltage (Note 10) | | $V_{CE(sat)}$ | — | -125 | -500 | mV | $I_C$ =-500mA, $I_B$ = -50mA |
| Transition Frequency | | $f_T$ | — | 190 | — | MHz | $I_E$ = -50mA, $V_{CE}$ = -5V, f = 30MHz |
| Output Capacitance | | $C_{obo}$ | — | 12 | 30 | pF | $I_E$ = 0A, $V_{CB}$ = -10V, f = 1MHz |

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

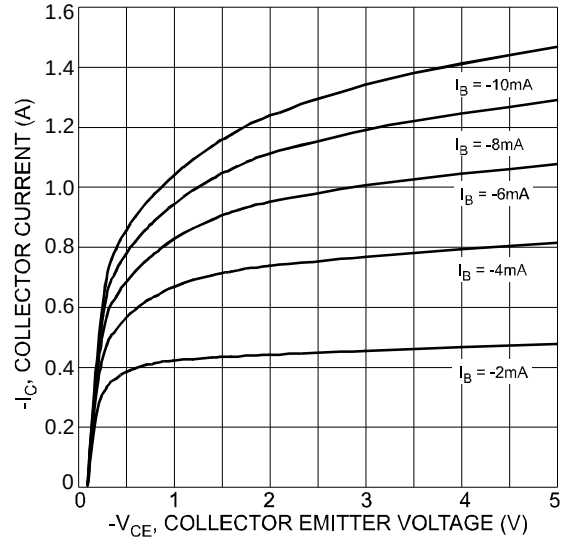



Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

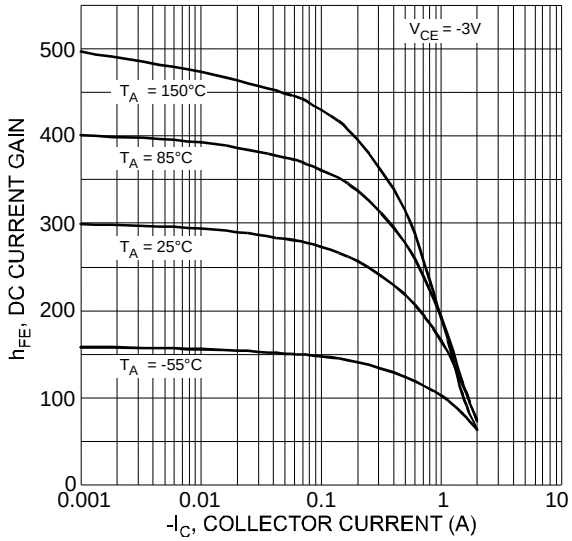



Fig. 2 Typical DC Current Gain vs. Collector Current (2DB1132R)

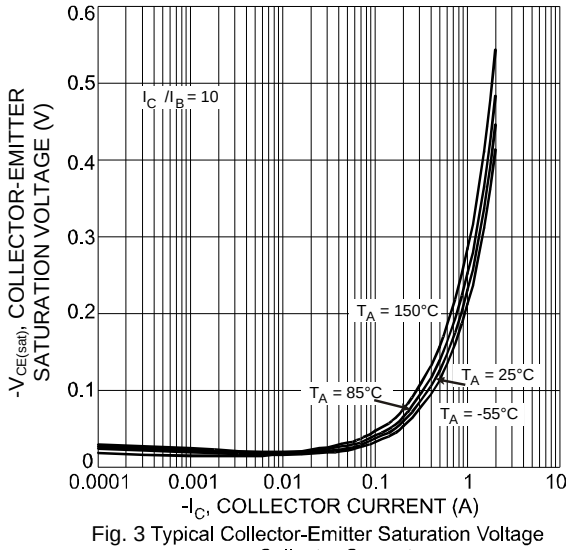



Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

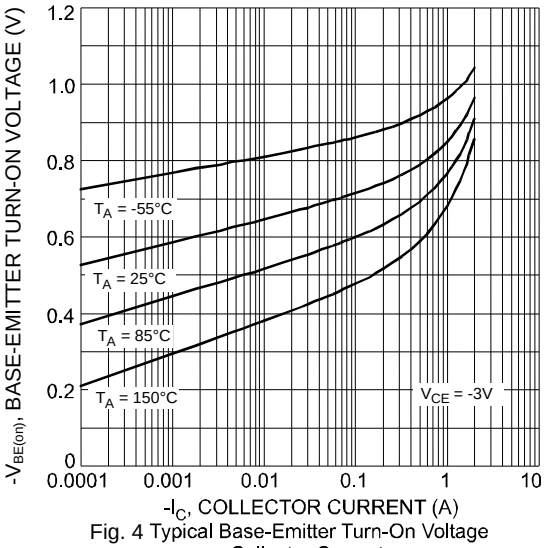



Fig. 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

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

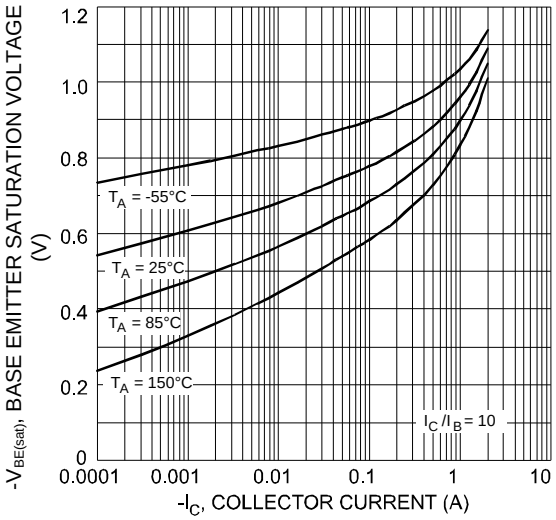



Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

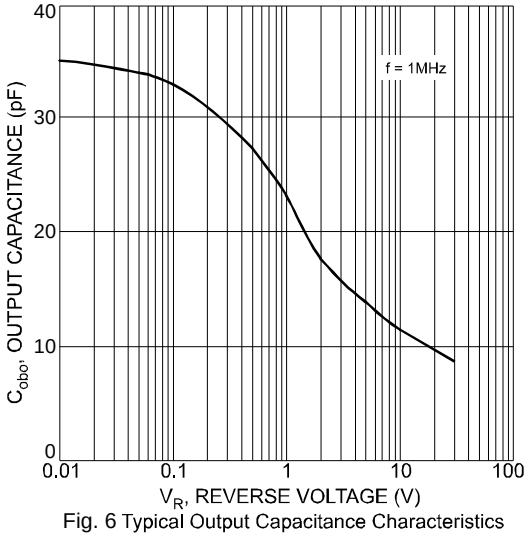



Fig. 6 Typical Output Capacitance Characteristics

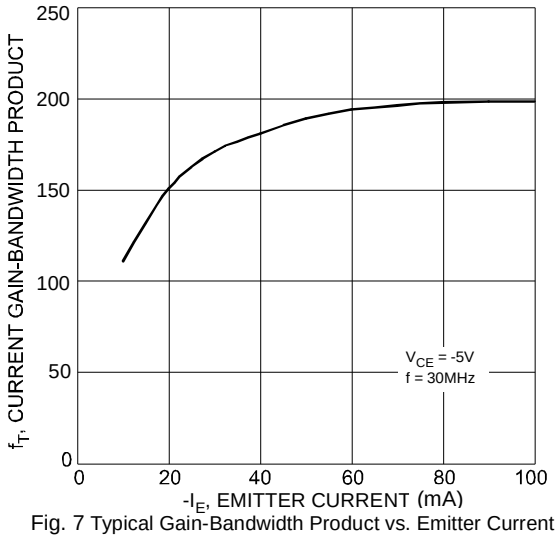
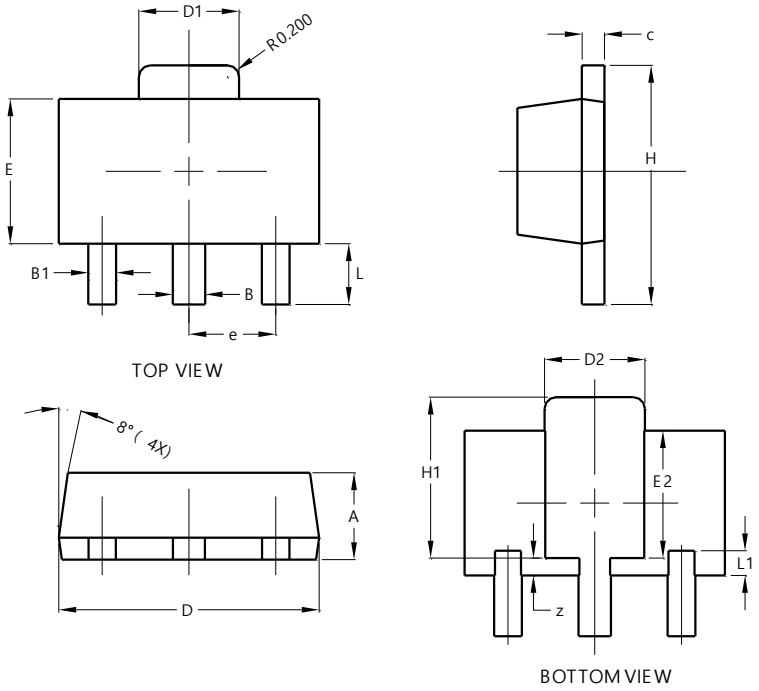



Fig. 7 Typical Gain-Bandwidth Product vs. Emitter Current

## Package Outline Dimensions

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

**SOT89**

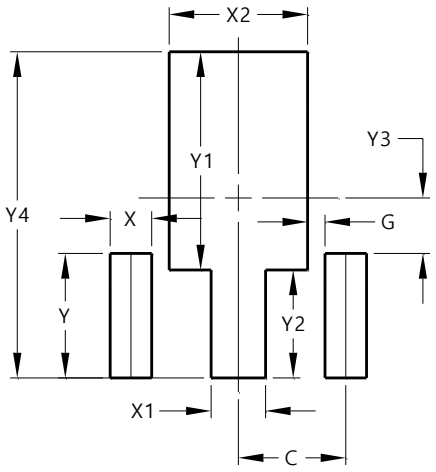



| SOT89 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.40 | 1.60 | 1.50 |
| **B** | 0.50 | 0.62 | 0.56 |
| **B1** | 0.42 | 0.54 | 0.48 |
| **c** | 0.35 | 0.43 | 0.38 |
| **D** | 4.40 | 4.60 | 4.50 |
| **D1** | 1.62 | 1.83 | 1.733 |
| **D2** | 1.61 | 1.81 | 1.71 |
| **E** | 2.40 | 2.60 | 2.50 |
| **E2** | 2.05 | 2.35 | 2.20 |
| **e** | - | - | 1.50 |
| **H** | 3.95 | 4.25 | 4.10 |
| **H1** | 2.63 | 2.93 | 2.78 |
| **L** | 0.90 | 1.20 | 1.05 |
| **L1** | 0.327 | 0.527 | 0.427 |
| **z** | 0.20 | 0.40 | 0.30 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT89**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.500 |
| **G** | 0.244 |
| **X** | 0.580 |
| **X1** | 0.760 |
| **X2** | 1.933 |
| **Y** | 1.730 |
| **Y1** | 3.030 |
| **Y2** | 1.500 |
| **Y3** | 0.770 |
| **Y4** | 4.530 |

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