# 400V NPN HIGH VOLTAGE TRANSISTOR IN SOT89

## Features

- $BV_{CEO}$ = 400V
- Low Saturation Voltage $V_{CE(sat)}$ < 200mV @ 100mA
- $I_C$ = 0.5A High Continuous Current
- **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 contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## Mechanical Data

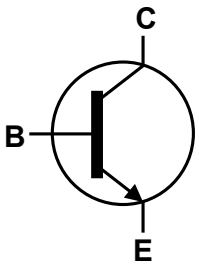
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

## Application

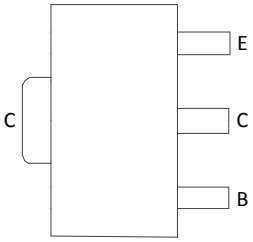
- Telephone dialer circuits
- Hook switches for modems
- Predrivers within HID lamp ballasts
- (SLIC) Subscriber Line Interface Cards

SOT89

Top View




Device Symbol



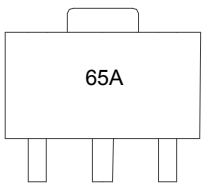

Top View
Pin Out

## Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity Per Reel |
|---|---|---|---|---|---|
| FCX658ATA | Standard | 65A | 7 | 12 | 1,000 |

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




65A = Product Type Marking Code

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 400 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 400 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5 | V |
| Continuous Collector Current | $I_C$ | 500 | mA |
| Peak Pulse Collector Current (single pulse) | $I_{CM}$ | 1 | A |

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 1 | W |
| Power Dissipation (Note 6) | $P_D$ | 5.7 | W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

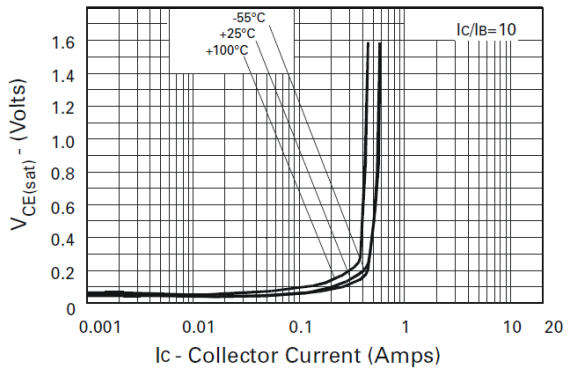
Notes: 5. For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; device measured when operating in steady state condition.
6. Same as note (5), except the device is mounted on 40mm x 40mm x 0.6mm single sided 1oz weight copper.

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

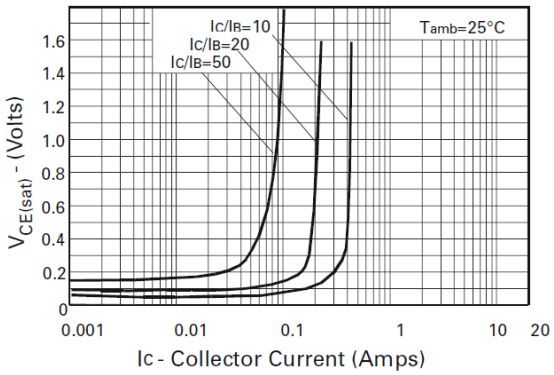
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | 400 | 480 | — | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 7) | $BV_{CEO}$ | 400 | 465 | — | V | $I_C$ = 10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | 5 | 7.8 | — | V | $I_E$ = 100µA |
| Collector Cut-Off Current | $I_{CBO}$ | — | — | 0.1 | µA | $V_{CB}$ = 320V |
| Collector Emitter Cut-Off Current | $I_{CES}$ | — | — | 0.1 | µA | $V_{CE}$ = 320V |
| Emitter Cut-Off Current | $I_{EBO}$ | — | — | 0.1 | µA | $V_{EB}$ = 4V |
| Collector-Emitter Saturation Voltage (Note 7) | $V_{CE(sat)}$ | — | — | 165<br>125<br>200 | mV | $I_C$ = 20mA, $I_B$ = 1mA<br>$I_C$ = 50mA, $I_B$ = 0.5mA<br>$I_C$ = 100mA, $I_B$ = 10mA |
| Base-Emitter Saturation Voltage (Note 7) | $V_{BE(sat)}$ | — | 750 | 850 | mV | $I_C$ = 100mA, $I_B$ = 10mA |
| Base-Emitter Turn-On Voltage (Note 7) | $V_{BE(on)}$ | — | 700 | 850 | mV | $I_C$ = 100mA, $V_{CE}$ = 5V |
| DC Current Gain (Note 7) | $h_{FE}$ | 85<br>100<br>55<br>35 | 150<br>170<br>130<br>90 | — | — | $I_C$ = 1mA, $V_{CE}$ = 5V<br>$I_C$ = 10mA, $V_{CE}$ = 10V<br>$I_C$ = 100mA, $V_{CE}$ = 5V<br>$I_C$ = 200mA, $V_{CE}$ = 10V |
| Transitional frequency | $f_T$ | 50 | — | — | MHz | $I_C$ = 20mA, $V_{CE}$ = 20V<br>f = 20MHz |
| Output Capacitance | $C_{obo}$ | — | — | 10 | pF | $V_{CB}$ = 20V, f = 1MHz |
| Switching Time | $t_{on}$ | — | 130 | — | ns | $I_C$ = 100mA, $V_{CC}$ = 100V, |
| | $t_{off}$ | | 3300 | | | $I_{B1}$ = 10mA, $I_{B2}$ = -20mA |

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

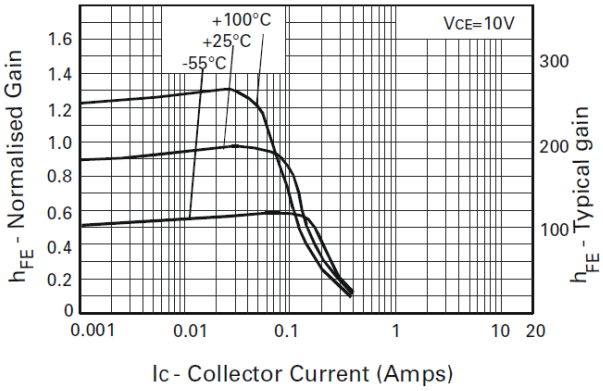
## Typical Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)



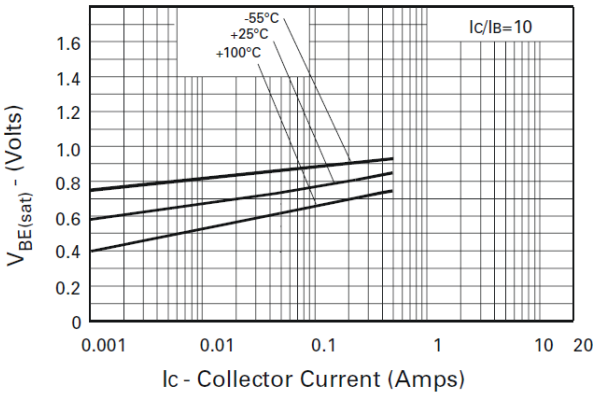

**VCE(sat) v IC**



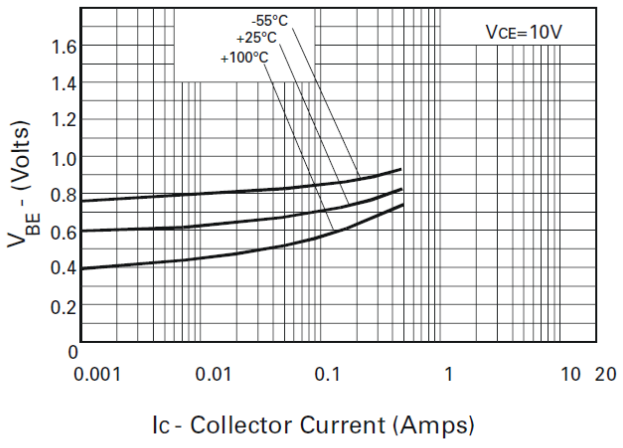

**VCE(sat) v IC**



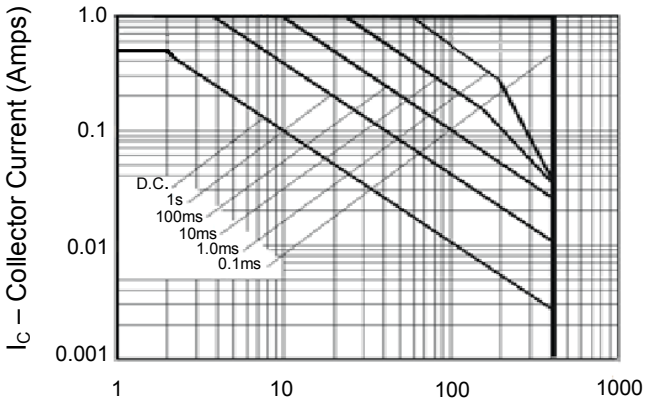

**hFE v IC**




**VBE(sat) v IC**




**VBE(on) v IC**

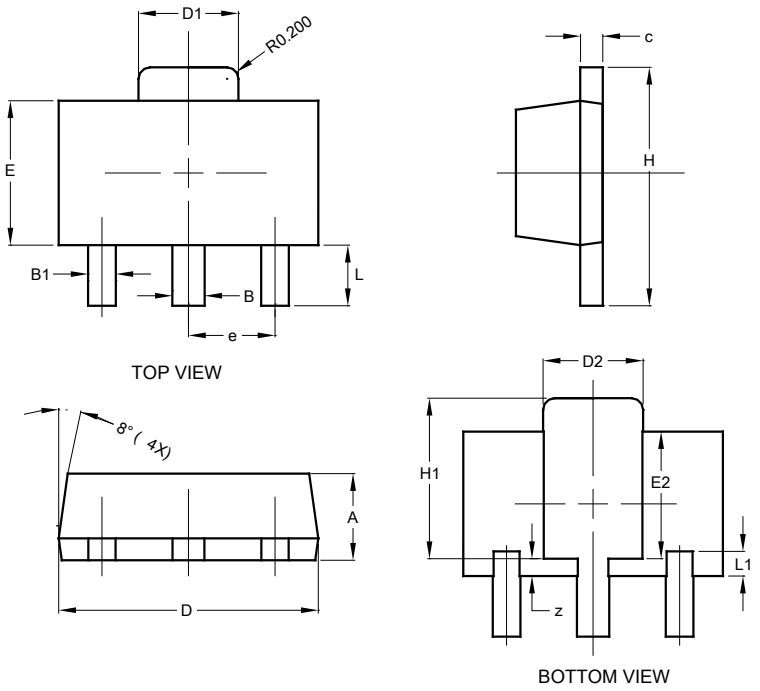



**Safe Operating Area**

## Package Outline Dimensions

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

**SOT89**

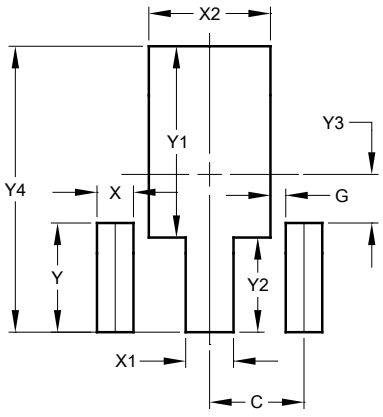



| SOT89 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.40 | 1.60 | 1.50 |
| **B** | 0.50 | 0.62 | 0.56 |
| **B1** | 0.42 | 0.54 | 0.48 |
| **c** | 0.35 | 0.43 | 0.38 |
| **D** | 4.40 | 4.60 | 4.50 |
| **D1** | 1.62 | 1.83 | 1.733 |
| **D2** | 1.61 | 1.81 | 1.71 |
| **E** | 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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