



A Product Line of Diodes Incorporated

ZXTN2011Z

#### 100V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89

#### Features

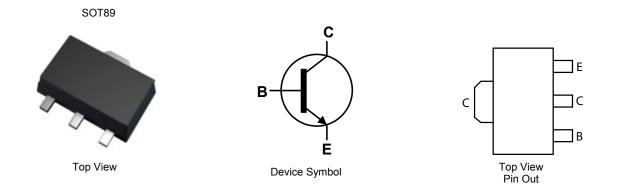
- BV<sub>CEO</sub> > 100V
- I<sub>C</sub> = 4.5A high Continuous Current
- I<sub>CM</sub> = 10A Peak Pulse Current
- $R_{CE(sat)} = 31m\Omega$  for a low equivalent On-Resistance
- Low saturation voltage V<sub>CE(sat)</sub> < 60mV @ I<sub>C</sub> = 1A
- hFE specified up to 10A for high current gain hold up
- Lead-Free Finish; RoHS compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

#### **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 <sup>(23)</sup>
- Weight: 0.05 grams (Approximate)

#### Applications

- Motor driving
- Line switching
- High side switches
- Subscriber line interface cards (SLIC)



#### Ordering Information (Note 4)

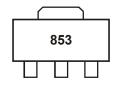
| Product     | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| ZXTN2011ZTA | 853     | 7                  | 12              | 1,000             |

Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.

See http://www.diodes.com for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.</li>

4. For packaging details, go to our website at http://www.diodes.com.

### **Marking Information**



853 = Product Type Marking Code





# Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | 200   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 100   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | Ι <sub>C</sub>   | 4.5   | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | 10    | A    |

## Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   | Symbol                           | Value       | Unit  |  |
|--|----------------------------------|-------------|-------|--|
| Power Dissipation (Note 5)                       | B-                               | 1.5         | W     |  |
| Linear derating factor                           | PD                               | 12          | mW/°C |  |
| Power Dissipation (Note 6)                       | B-                               | 2.1         | W     |  |
| Linear derating factor                           | PD                               | 16.8        | mW/°C |  |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>0JA</sub>                 | 83          | °C/W  |  |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>0JA</sub>                 | 60          | °C/W  |  |
| Thermal Resistance, Junction to Ambient (Note 7) | R <sub>θJL</sub>                 | 3.23        | °C/W  |  |
| Operating and Storage Temperature Range          | T <sub>J,</sub> T <sub>STG</sub> | -55 to +150 | °C    |  |

#### 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  | ≥ 400 | V    | С           |

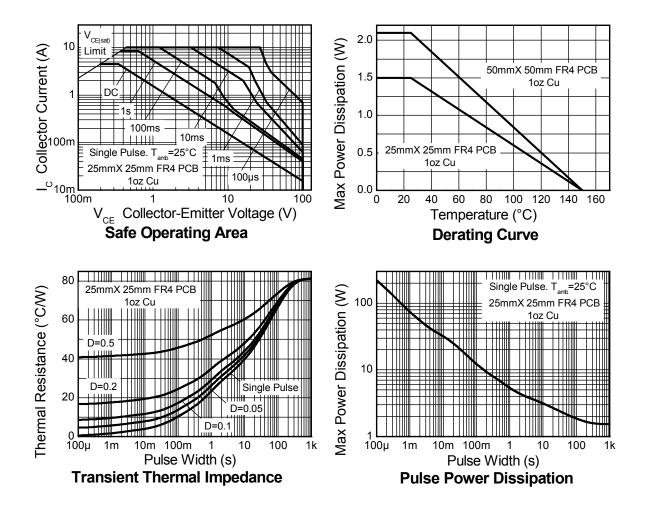
5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; device Notes: measured when operating in steady state condition.

- Same as note (5), except the device is mounted on 50mm X 50mm single sided 1oz weight copper.
  Thermal resistance from junction to solder-point (at the end of the collector lead).
  Refer to JEDEC specification JESD22-A114 and JESD22-A115.





# Thermal Characteristics and Derating Information







| Characteristic                                 | Symbol                    | Min | Тур.    | Max        | Unit     | Test Condition  |
|--|---------------------------|-----|---------|------------|----------|---|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>         | 200 | 235     | -          | V        | I <sub>C</sub> = 100μA  |
| Collector-Emitter Breakdown Voltage (Notes 9)  | BV <sub>CER</sub>         | 200 | 235     | -          | V        | I <sub>C</sub> = 1μA, R <sub>B</sub> ≤ 1kΩ                                |
| Collector-Emitter Breakdown Voltage (Notes 9)  | BV <sub>CEO</sub>         | 100 | 115     | -          | V        | I <sub>C</sub> = 1mA  |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>         | 7   | 8.1     | -          | V        | I <sub>E</sub> = 100μA  |
| Collector Cutoff Current                       | I <sub>CBO</sub>          | -   | <1<br>- | 50<br>500  | nA<br>nA | V <sub>CB</sub> = 150V<br>V <sub>CB</sub> = 150V, T <sub>A</sub> = +100°0 |
| Collector Cutoff Current                       | I <sub>CER</sub><br>R≤1kΩ | -   | <1<br>- | 100<br>500 | nA<br>nA | V <sub>CB</sub> = 150V<br>V <sub>CB</sub> = 150V, T <sub>A</sub> = +100°  |
| Emitter Cutoff Current                         | I <sub>EBO</sub>          | -   | <1      | 10         | nA       | V <sub>EB</sub> = 6V  |
|  |                           | 100 | 230     | -          |          | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V                               |
| DC Current Transfer Statis Datis (Natas O)     | h <sub>FE</sub>           | 100 | 200     | 300        |          | I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V                                 |
| DC Current Transfer Static Ratio (Notes 9)     |                           | 30  | 60      | -          | -        | I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V                                 |
|  |                           | 10  | 20      | -          |          | I <sub>C</sub> = 10A, V <sub>CE</sub> = 2V                                |
|  | V <sub>CE(sat)</sub>      | -   | 20      | 30         |          | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA                              |
| Collector-Emitter Saturation Voltage (Notes 9) |                           | -   | 45      | 60         | mV       | I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA                               |
|  |                           | -   | 85      | 115        | 111V     | I <sub>C</sub> = 2A, I <sub>B</sub> = 100mA                               |
|  |                           | -   | 155     | 195        |          | I <sub>C</sub> = 5A, I <sub>B</sub> = 500mA                               |
| Base-Emitter Saturation Voltage (Notes 9)      | V <sub>BE(sat)</sub>      | -   | 1000    | 1100       | mV       | I <sub>C</sub> = 5A, I <sub>B</sub> = 500mA                               |
| Base-Emitter Turn-on Voltage (Notes 9)         | V <sub>BE(on)</sub>       | -   | 900     | 1000       | mV       | I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V                                 |
| Transitional Frequency                         | f <sub>T</sub>            | -   | 130     | -          | MHz      | I <sub>C</sub> = 100mA, V <sub>CE</sub> = 10V,<br>f = 50MHz               |
| Output Capacitance                             | C <sub>obo</sub>          | -   | 26      | -          | pF       | V <sub>CB</sub> = 10V, f = 1MHz,  |
| Switching Time                                 | t <sub>on</sub>           |     | 41      |            | ns       | $V_{CC}$ = 10V, $I_{C}$ = 1A,   |
|  | t <sub>off</sub>          | -   | 1010    | -          | 115      | I <sub>B1</sub> = I <sub>B2</sub> = 100mA                                 |

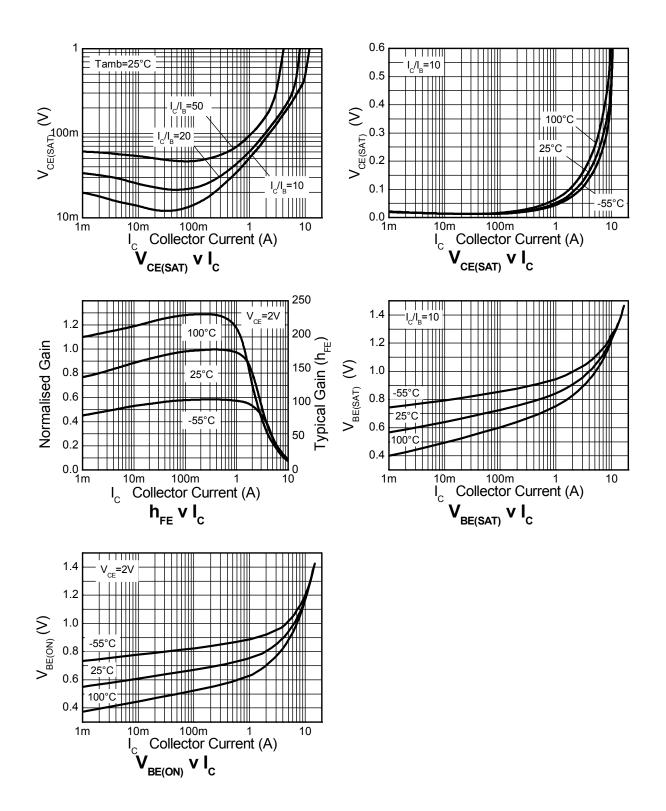
#### **E1** . . . . . . 4 . . . . . . .

8. Measured under pulsed conditions. Pulse width  $\leq$  300µs. Duty cycle  $\leq$  2%. Notes:





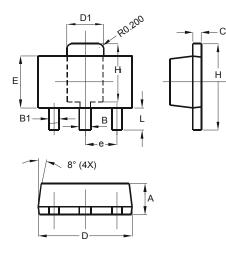
# Typical Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)





## **Package Outline Dimensions**

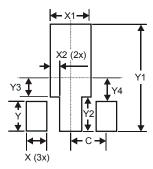
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



| SOT89                |           |      |  |  |  |
|----------------------|-----------|------|--|--|--|
| Dim                  | Min       | Max  |  |  |  |
| Α                    | 1.40      | 1.60 |  |  |  |
| В                    | 0.44      | 0.62 |  |  |  |
| B1                   | 0.35      | 0.54 |  |  |  |
| С                    | 0.35      | 0.44 |  |  |  |
| D                    | 4.40      | 4.60 |  |  |  |
| D1                   | 1.62      | 1.83 |  |  |  |
| E                    | 2.29      | 2.60 |  |  |  |
| е                    | 1.50 Typ  |      |  |  |  |
| Н                    | 3.94      | 4.25 |  |  |  |
| H1                   | 2.63      | 2.93 |  |  |  |
| L                    | 0.89 1.20 |      |  |  |  |
| 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) |
|------------|---------------|
| Х          | 0.900         |
| X1         | 1.733         |
| X2         | 0.416         |
| Y          | 1.300         |
| Y1         | 4.600         |
| Y2         | 1.475         |
| Y3         | 0.950         |
| Y4         | 1.125         |
| С          | 1.500         |





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