

**60V PNP LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89**

**Features**

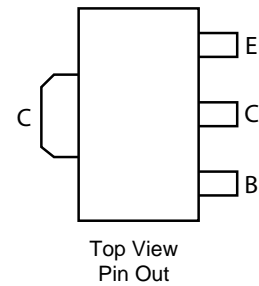
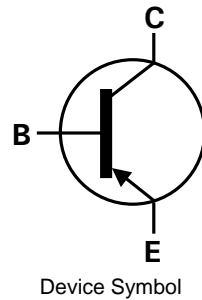
- $BV_{CE0} > -60V$
- $I_C = -4.3A$  high continuous current
- $R_{SAT} = 32m\Omega$  for a low equivalent On-Resistance
- Low saturation voltage  $V_{CE(sat)} < -65mV @ I_C = -1A$
- $h_{FE}$  specified up to -10A for high current gain hold up
- Complementary NPN type: ZXTN2010Z
- **Lead-Free Finish; 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: 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
- Weight: 0.05 grams (Approximate)

**Application**

- Emergency lighting circuits
- Motor driving (including DC fans)
- Backlight inverters
- Power switches
- Gate driving MOSFETs and IGBTs

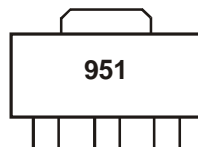


**Ordering Information** (Note 4 & 5)

| Product       | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|------------|---------|--------------------|-----------------|-------------------|
| ZXTP2012ZTA   | AEC-Q101   | 951     | 7                  | 12              | 1,000             |
| ZXTP2012Z-13R | AEC-Q101   | 951     | 13                 | 12              | 4,000             |
| ZXTP2012ZQTA  | Automotive | 951     | 7                  | 12              | 1,000             |

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



951 = Product Type Marking Code

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

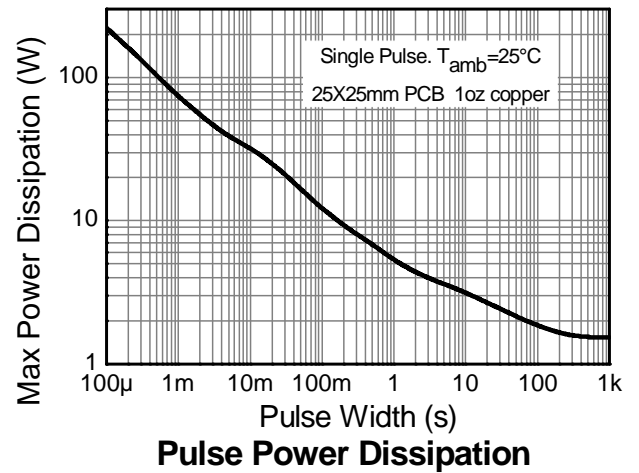
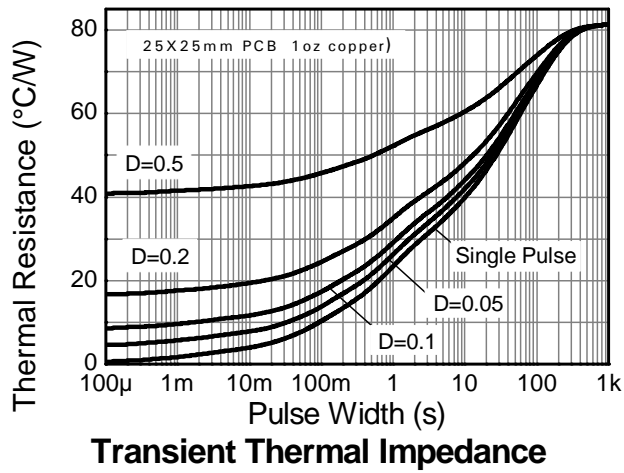
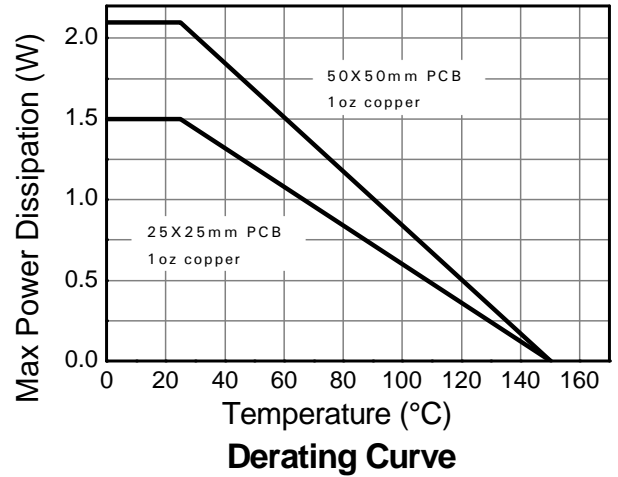
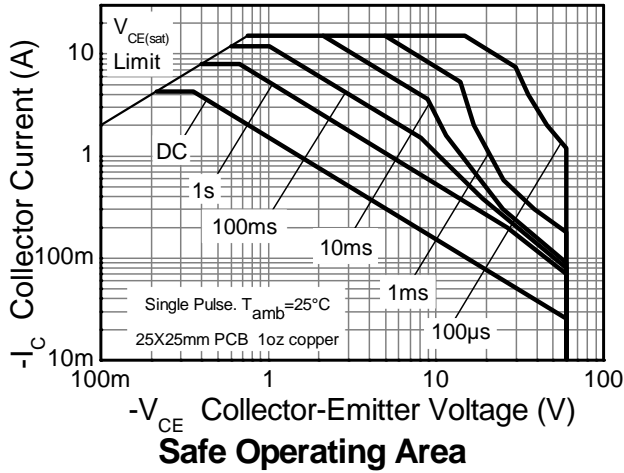
| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CB0</sub> | -100  | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -60   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -7    | V    |
| Continuous Collector Current | I <sub>C</sub>   | -4.3  | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | -15   | A    |

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

| Characteristic                                   | Symbol                            | Value       | Unit  |
|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 1.5         | W     |
| Linear derating factor                           |                                   | 12          | mW/°C |
| Power Dissipation (Note 7)                       | P <sub>D</sub>                    | 2.1         | W     |
| Linear derating factor                           |                                   | 16.8        | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 83          | °C/W  |
| Thermal Resistance, Junction to Ambient (Note 7) | R <sub>θJA</sub>                  | 60          | °C/W  |
| Thermal Resistance, Junction to Leads (Note 8)   | 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    |

- Notes:
6. 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 measured when operating in steady state condition.
  7. Same as note (6), except the device is mounted on 50mm X 50mm single sided 1oz weight copper.
  8. Thermal resistance from junction to solder-point (on the exposed collector pad).

**Thermal Characteristics and Derating Information**

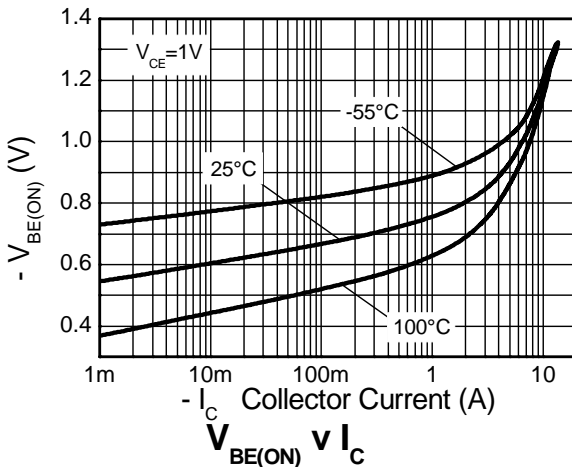
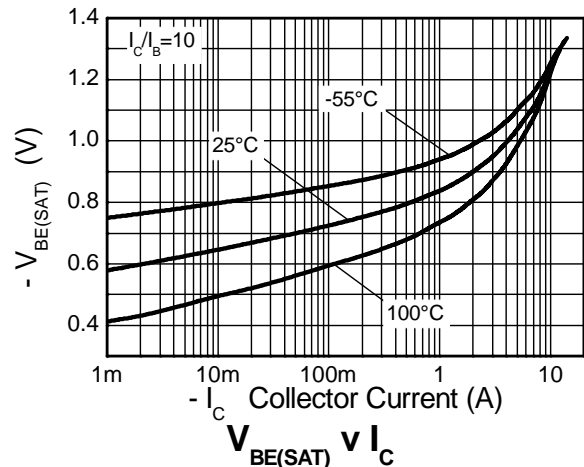
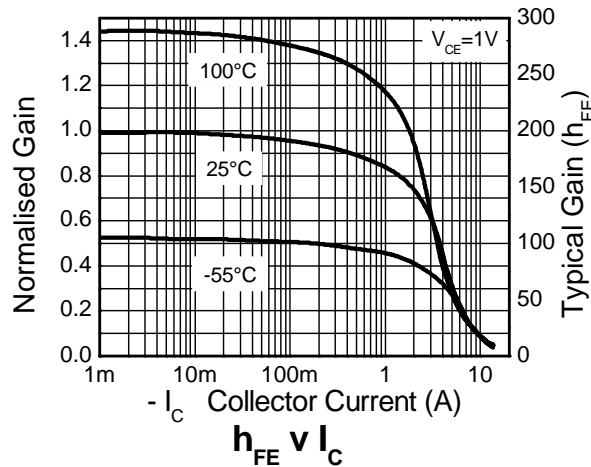
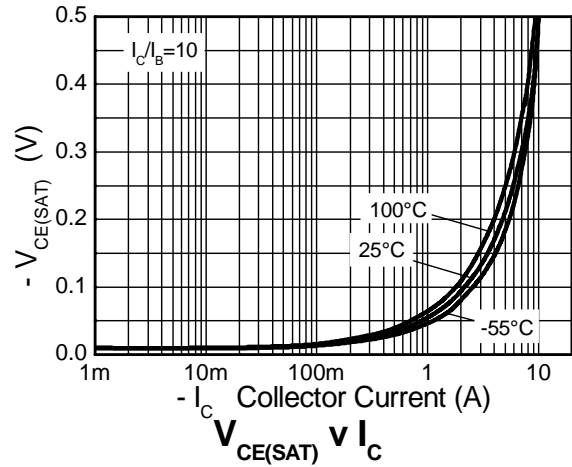
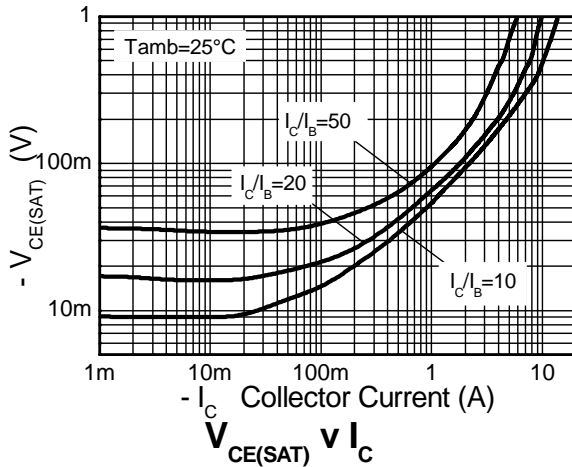


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                 | Symbol                      | Min                    | Typ                       | Max                        | Unit     | Test Condition   |
|--|-----------------------------|------------------------|---------------------------|----------------------------|----------|--|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>           | -100                   | -120                      | -                          | V        | I <sub>C</sub> = -100μA  |
| Collector-Emitter Breakdown Voltage (Notes 9)  | BV <sub>CER</sub>           | -100                   | -120                      | -                          | V        | I <sub>C</sub> = -1μA, R <sub>B</sub> ≤ 1kΩ  |
| Collector-Emitter Breakdown Voltage (Notes 9)  | BV <sub>CEO</sub>           | -60                    | -80                       | -                          | V        | I <sub>C</sub> = -10mA   |
| 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                      | -20<br>-500                | nA<br>nA | V <sub>CB</sub> = -80V<br>V <sub>CB</sub> = -80V, T <sub>A</sub> = +100°C  |
| Collector Cutoff Current                       | I <sub>CER</sub><br>R ≤ 1kΩ | -                      | < -1                      | -20<br>-500                | nA<br>nA | V <sub>CB</sub> = -80V<br>V <sub>CB</sub> = -80V, T <sub>A</sub> = +100°C  |
| Emitter Cutoff Current                         | I <sub>EBO</sub>            | -                      | < -1                      | -10                        | nA       | V <sub>EB</sub> = -6V  |
| DC current transfer Static ratio (Notes 9)     | h <sub>FE</sub>             | 100<br>100<br>45<br>10 | 250<br>200<br>90<br>25    | 300                        |          | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1V<br>I <sub>C</sub> = -2A, V <sub>CE</sub> = -1V<br>I <sub>C</sub> = -5A, V <sub>CE</sub> = -1V<br>I <sub>C</sub> = -10A, V <sub>CE</sub> = -1V        |
| Collector-Emitter Saturation Voltage (Notes 9) | V <sub>CE(sat)</sub>        | -                      | -14<br>-50<br>-75<br>-160 | -20<br>-65<br>-110<br>-215 | mV       | I <sub>C</sub> = -100mA, I <sub>B</sub> = -10mA<br>I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA<br>I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA<br>I <sub>C</sub> = -5A, I <sub>B</sub> = -500mA |
| Base-Emitter Saturation Voltage (Notes 9)      | V <sub>BE(sat)</sub>        | -                      | -950                      | -1050                      | mV       | I <sub>C</sub> = -5A, I <sub>B</sub> = -500mA  |
| Base-Emitter Turn-on Voltage (Notes 9)         | V <sub>BE(on)</sub>         | -                      | -840                      | -950                       | mV       | I <sub>C</sub> = -5A, V <sub>CE</sub> = -1V  |
| Transitional Frequency (Notes 9)               | f <sub>T</sub>              | -                      | 120                       | -                          | MHz      | I <sub>C</sub> = -100mA, V <sub>CE</sub> = -10V,<br>f = 50MHz  |
| Output capacitance                             | C <sub>obo</sub>            | -                      | 48                        | -                          | pF       | V <sub>CB</sub> = -10V, f = 1MHz,  |
| Switching Time                                 | t <sub>ON</sub>             | -                      | 39                        | -                          | ns       | V <sub>CC</sub> = -10V, I <sub>C</sub> = -1A,<br>I <sub>B1</sub> = I <sub>B2</sub> = -100mA  |
|  | t <sub>OFF</sub>            | -                      | 370                       | -                          |          |  |

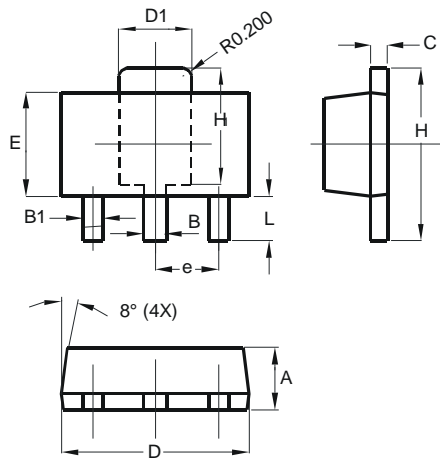
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



## Package Outline Dimensions

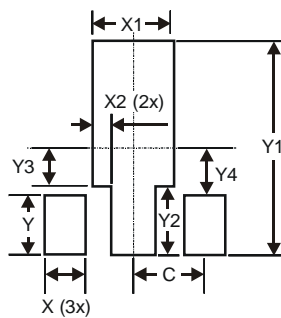
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT89                |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | 1.40     | 1.60 |
| B                    | 0.44     | 0.62 |
| B1                   | 0.35     | 0.54 |
| C                    | 0.35     | 0.44 |
| D                    | 4.40     | 4.60 |
| D1                   | 1.62     | 1.83 |
| E                    | 2.29     | 2.60 |
| e                    | 1.50 Typ |      |
| H                    | 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) |
|------------|---------------|
| X          | 0.900         |
| X1         | 1.733         |
| X2         | 0.416         |
| Y          | 1.300         |
| Y1         | 4.600         |
| Y2         | 1.475         |
| Y3         | 0.950         |
| Y4         | 1.125         |
| C          | 1.500         |

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