

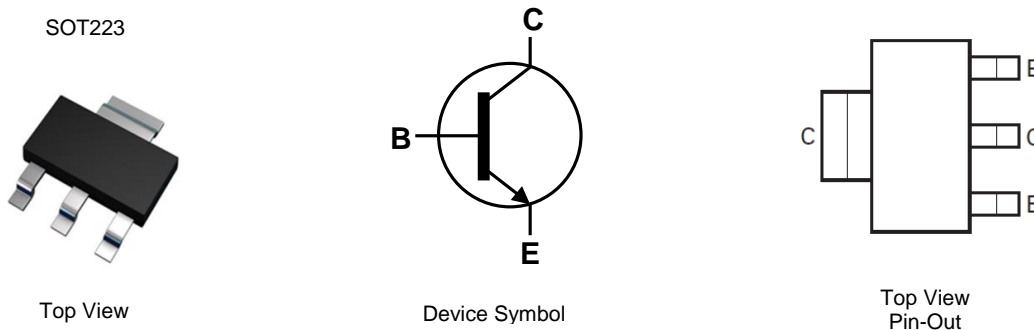
**400V NPN MEDIUM POWER TRANSISTOR IN SOT223**

**Features**

- $BV_{CEO} > 400V$
- $I_C = 300mA$  High Continuous Current
- Excellent  $h_{FE}$  Characteristics up to 100mA
- Low Saturation Voltage  $V_{CE(sat)} < 200mV @ 20mA$
- Complementary PNP Type: FZT558
- **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: SOT223
- 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 208③
- Weight: 0.112 grams (Approximate)

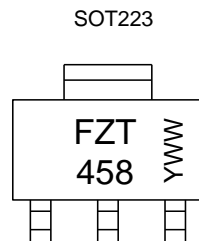


**Ordering Information** (Notes 4 & 5)

| Product   | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|------------|---------|--------------------|-----------------|-------------------|
| FZT458TA  | AEC-Q101   | FZT458  | 7                  | 12              | 1,000             |
| FZT458QTA | Automotive | FZT458  | 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/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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/products/packages.html>.

**Marking Information**



FZT 458 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CB0</sub> | 400   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 400   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 300   | mA   |
| Base Current                 | I <sub>B</sub>   | 200   | mA   |
| Peak Pulse Current           | I <sub>CM</sub>  | 1     | A    |

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

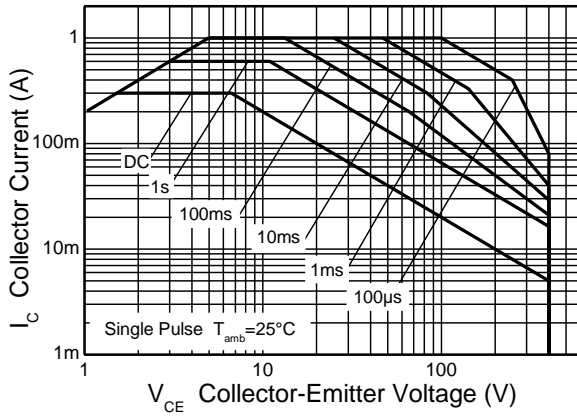
| Characteristic                                 | Symbol                            | Value            | Unit |
|--|-----------------------------------|------------------|------|
| Power Dissipation                              | P <sub>D</sub>                    | (Note 6)<br>2    | W    |
|  |                                   | (Note 7)<br>3    | W    |
| Thermal Resistance, Junction to Ambient        | R <sub>θJA</sub>                  | (Note 6)<br>62.5 | °C/W |
|  |                                   | (Note 7)<br>41.7 | °C/W |
| Thermal Resistance, Junction to Leads (Note 8) | R <sub>θJL</sub>                  | 19.41            | °C/W |
| Operating and Storage Temperature Range        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150      | °C   |

### ESD Ratings (Note 9)

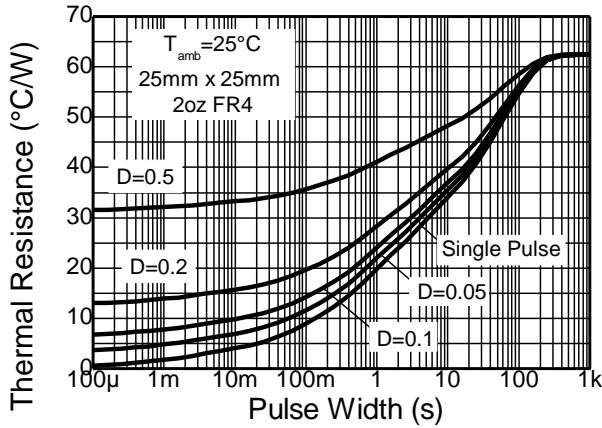
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 8,000 | V    | 3B          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
6. For a device mounted with the collector lead on 25mm x 25mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as Note 6, except the device is mounted on 50mm x 50mm single sided 2oz weight copper.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

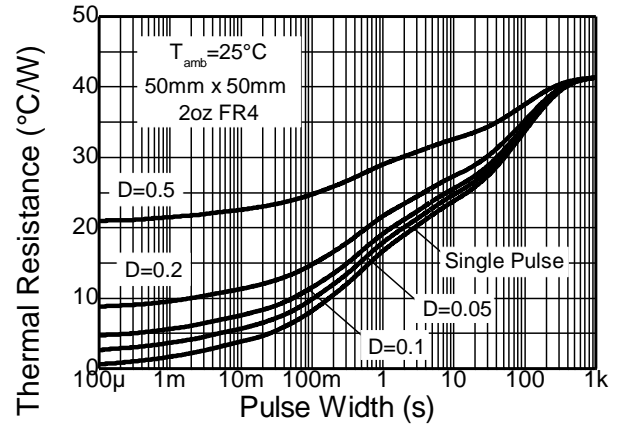
**Thermal Characteristics and Derating Characteristics**



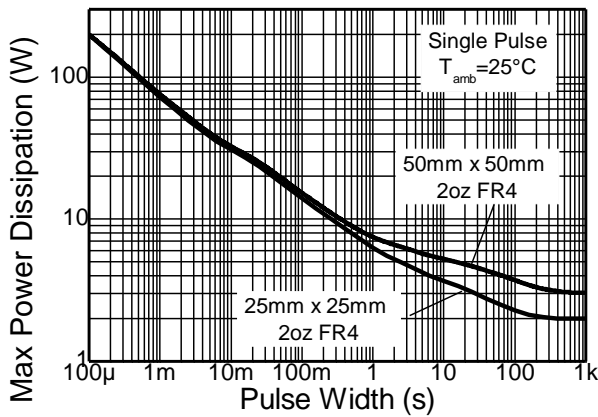
**Safe Operating Area**



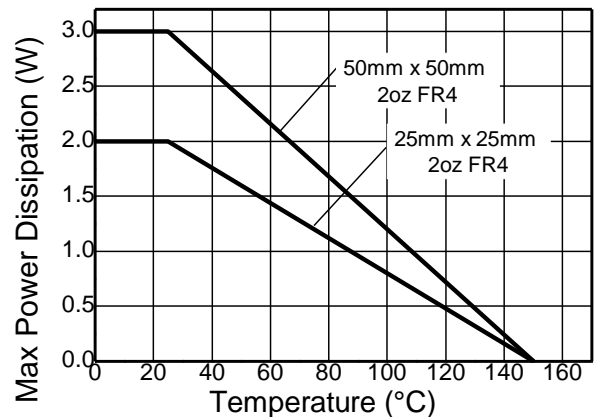
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



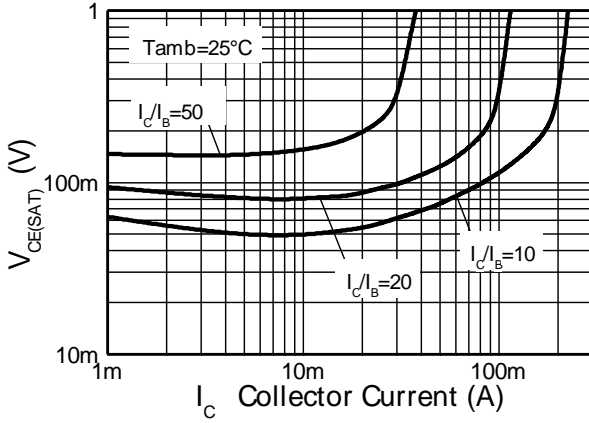
**Derating Curve**

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

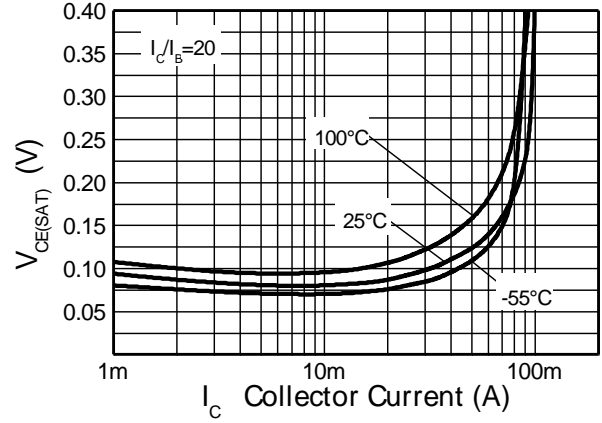
| Characteristic                                 | Symbol               | Min              | Typ         | Max           | Unit | Test Condition   |
|--|----------------------|------------------|-------------|---------------|------|--|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>    | 400              | –           | –             | V    | I <sub>C</sub> = 100μA   |
| Collector-Emitter Breakdown Voltage (Note 10)  | BV <sub>CEO</sub>    | 400              | –           | –             | V    | I <sub>C</sub> = 10mA  |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>    | 7                | –           | –             | V    | I <sub>E</sub> = 100μA   |
| Collector Cut-Off Current                      | I <sub>CBO</sub>     | –                | –           | 100           | nA   | V <sub>CB</sub> = 320V   |
| Collector Cut-Off Current                      | I <sub>CES</sub>     | –                | –           | 100           | nA   | V <sub>CE</sub> = 320V   |
| Emitter Cut-Off Current                        | I <sub>EBO</sub>     | –                | –           | 100           | nA   | V <sub>EB</sub> = 4V   |
| Collector-Emitter Saturation Voltage (Note 10) | V <sub>CE(sat)</sub> | –                | –           | 0.2<br>0.5    | V    | I <sub>C</sub> = 20mA, I <sub>B</sub> = 2mA<br>I <sub>C</sub> = 50mA, I <sub>B</sub> = 6mA   |
| Base-Emitter Saturation Voltage (Note 10)      | V <sub>BE(sat)</sub> | –                | –           | 0.9           | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA  |
| Base-Emitter Turn-On Voltage (Note 10)         | V <sub>BE(on)</sub>  | –                | –           | 0.9           | V    | I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V   |
| DC Current Gain (Note 10)                      | h <sub>FE</sub>      | 100<br>100<br>15 | –<br>–<br>– | –<br>300<br>– |      | I <sub>C</sub> = 1mA, V <sub>CE</sub> = 10V<br>I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V<br>I <sub>C</sub> = 100mA, V <sub>CE</sub> = 10V |
| Current Gain-Bandwidth Product (Note 10)       | f <sub>T</sub>       | 50               | –           | –             | MHz  | V <sub>CE</sub> = 20V, I <sub>C</sub> = 10mA<br>f = 20MHz  |
| Output Capacitance (Note 10)                   | C <sub>obo</sub>     | –                | –           | 5             | pF   | V <sub>CB</sub> = 20V, f = 1MHz  |
| Switching Times                                | t <sub>on</sub>      | –                | 135         | –             | ns   | I <sub>C</sub> = 50mA, V <sub>CC</sub> = 100V<br>I <sub>B1</sub> = 5mA, I <sub>B2</sub> = -10mA  |
|  | t <sub>off</sub>     | –                | 2260        | –             |      |  |

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

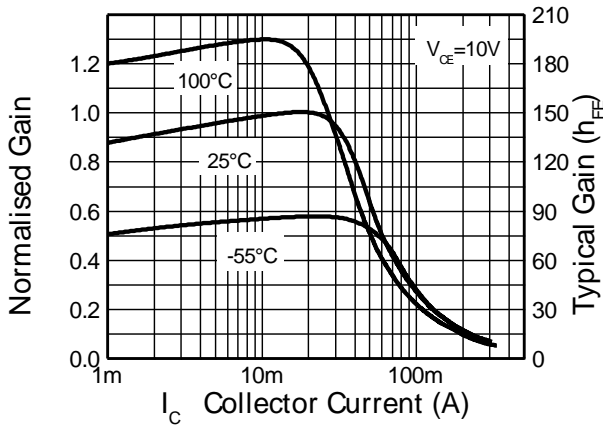
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



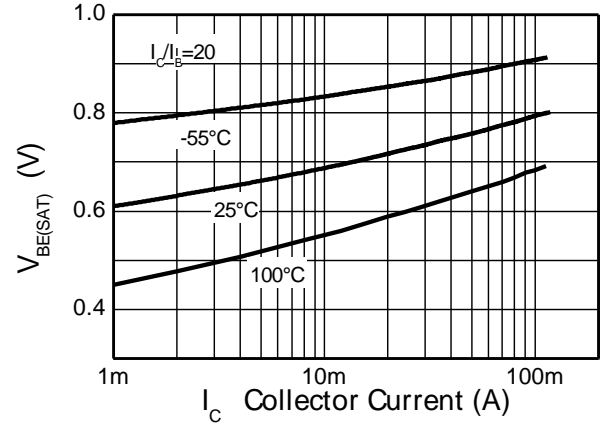
$V_{CE(SAT)} \text{ v } I_C$



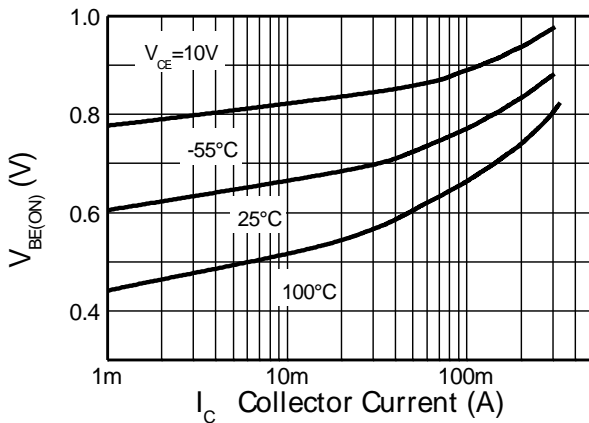
$V_{CE(SAT)} \text{ v } I_C$



$h_{FE} \text{ v } I_C$



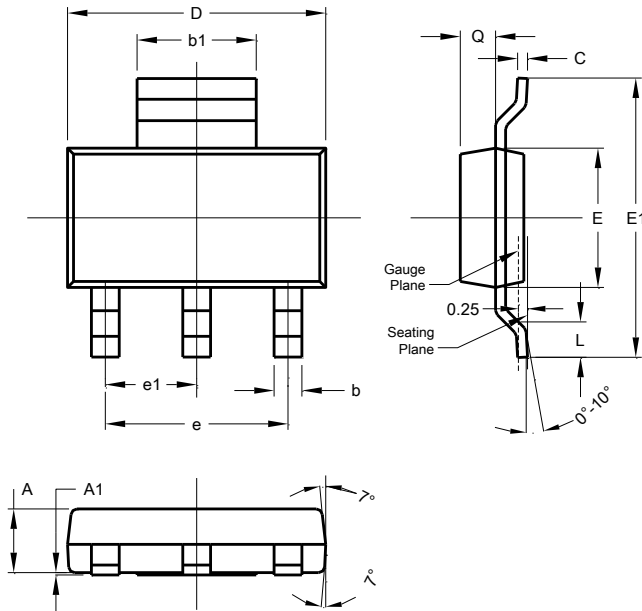
$V_{BE(SAT)} \text{ v } I_C$



$V_{BE(ON)} \text{ v } I_C$

## Package Outline Dimensions

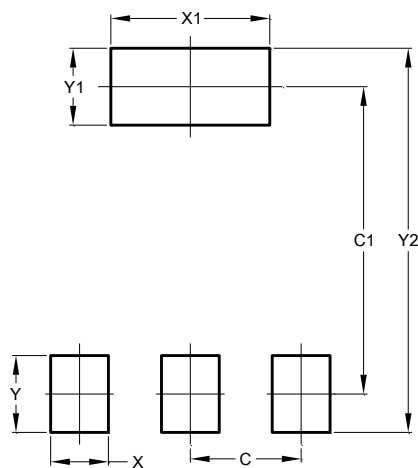
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b                    | 0.60  | 0.80 | 0.70 |
| b1                   | 2.90  | 3.10 | 3.00 |
| C                    | 0.20  | 0.30 | 0.25 |
| D                    | 6.45  | 6.55 | 6.50 |
| E                    | 3.45  | 3.55 | 3.50 |
| E1                   | 6.90  | 7.10 | 7.00 |
| e                    | -     | -    | 4.60 |
| e1                   | -     | -    | 2.30 |
| L                    | 0.85  | 1.05 | 0.95 |
| Q                    | 0.84  | 0.94 | 0.89 |
| 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) |
|------------|---------------|
| C          | 2.30          |
| C1         | 6.40          |
| X          | 1.20          |
| X1         | 3.30          |
| Y          | 1.60          |
| Y1         | 1.60          |
| Y2         | 8.00          |

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.

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