# FZT458

## 400V NPN SILICON PLANAR MEDIUM POWER TRANSISTOR IN SOT223

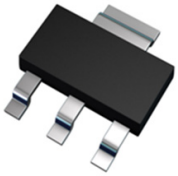
## Features

- $BV_{CEO}$ > 400V
- Max Continuous Current $I_C$ = 300mA
- Low Saturation Voltage
- 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)**

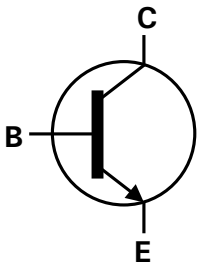
## Mechanical Data

- 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 208 (e3)
- Weight: 0.112 grams (approximate)

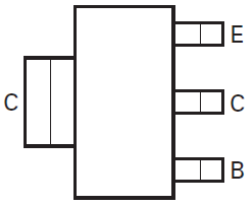
SOT223



Top View




Device Symbol



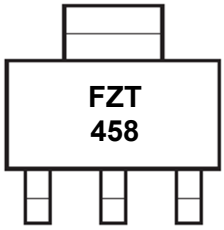

Top View
Pin-Out

## Ordering Information (Note 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 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




FZT458 = Product Type Marking Code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## 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 | $V_{EBO}$ | 7 | V |
| Continuous Collector Current | $I_C$ | 300 | mA |
| Base Current | $I_B$ | 200 | mA |
| Peak Pulse Current | $I_{CM}$ | 1 | A |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 2 | W |
| | (Note 7) | | 3 | W |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 62.5 | °C/W |
| | (Note 7) | | 41.7 | °C/W |
| Thermal Resistance, Junction to Leads (Note 8) | | $R_{\theta JL}$ | 19.41 | °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 | ≥ 8,000 | V | 3B |
| Electrostatic Discharge - Machine Model | ESD MM | ≥ 400 | V | C |

Notes:
6. For a device surface mounted on 25mm X 25mm FR4 PCB with high coverage of single sided 1 oz 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 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.


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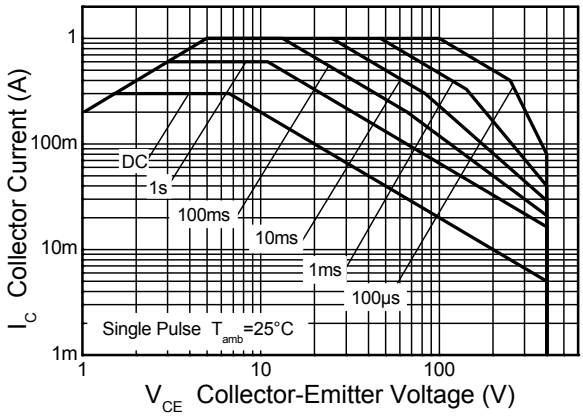
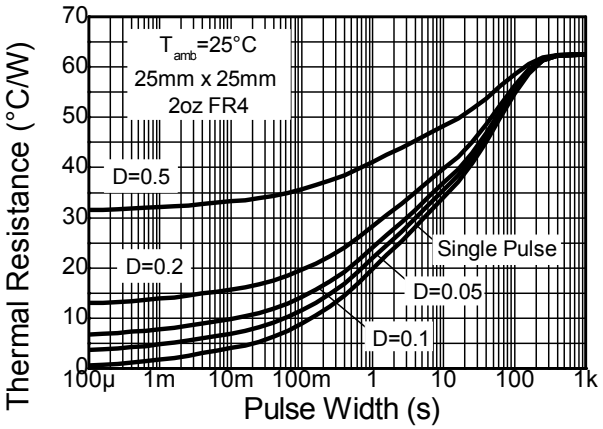
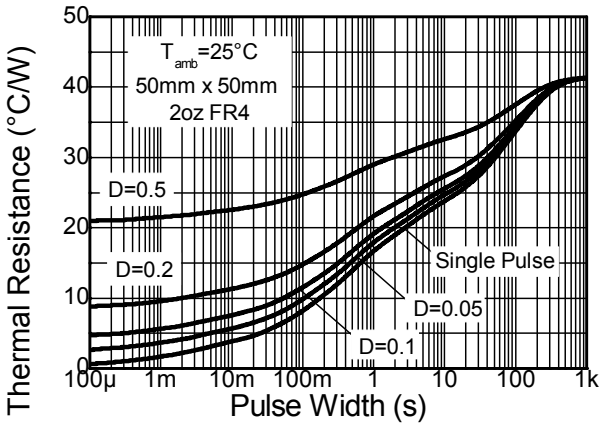
## Thermal Characteristics and Derating Characteristics



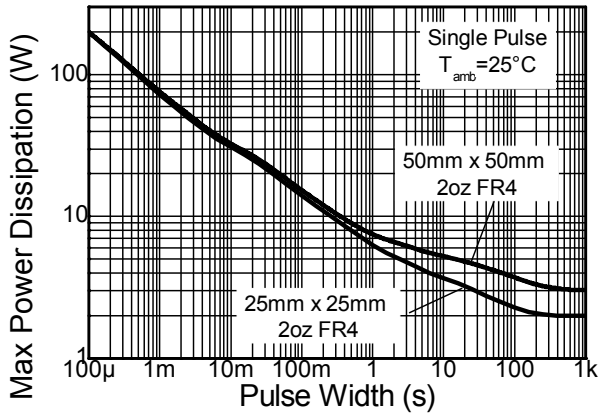

**Safe Operating Area**



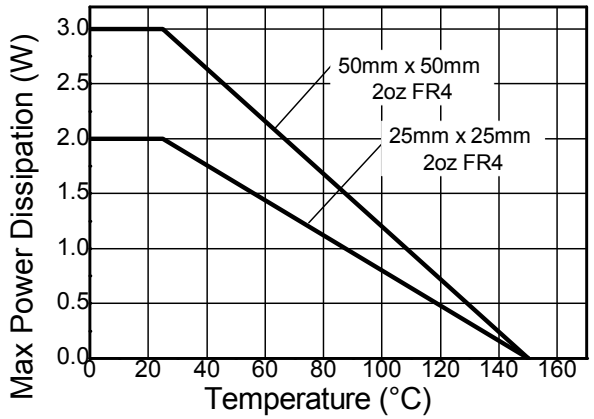

**Transient Thermal Impedance**




**Transient Thermal Impedance**




**Pulse Power Dissipation**




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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | 400 | – | – | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 10) | $BV_{CEO}$ | 400 | – | – | V | $I_C$ = 10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | 7 | – | – | V | $I_E$ = 100µA |
| Collector Cut-off Current | $I_{CBO}$ | – | – | 100 | nA | $V_{CB}$ = 320V |
| Collector Cut-off Current | $I_{CES}$ | – | – | 100 | nA | $V_{CE}$ = 320V |
| Emitter Cut-off Current | $I_{EBO}$ | – | – | 100 | nA | $V_{EB}$ = 4V |
| Collector-Emitter Saturation Voltage (Note 10) | $V_{CE(sat)}$ | –<br>– | –<br>– | 0.2<br>0.5 | V | $I_C$ = 20mA, $I_B$ = 2mA<br>$I_C$ = 50mA, $I_B$ = 6mA |
| Base-Emitter Saturation Voltage (Note 10) | $V_{BE(sat)}$ | – | – | 0.9 | V | $I_C$ = 50mA, $I_B$ = 5mA |
| Base-Emitter Turn-On Voltage (Note 10) | $V_{BE(on)}$ | – | – | 0.9 | V | $I_C$ = 50mA, $V_{CE}$ = 10V |
| DC Current Gain (Note 10) | $h_{FE}$ | 100<br>100<br>15 | –<br>–<br>– | –<br>300<br>– | | $I_C$ = 1mA, $V_{CE}$ = 10V<br>$I_C$ = 50mA, $V_{CE}$ = 10V<br>$I_C$ = 100mA, $V_{CE}$ = 10V |
| Current Gain-Bandwidth Product (Note 10) | $f_T$ | 50 | – | – | MHz | $V_{CE}$ = 20V, $I_C$ = 10mA<br>f = 20MHz |
| Output Capacitance (Note 10) | $C_{obo}$ | – | – | 5 | pF | $V_{CB}$ = 20V. f = 1MHz |
| Switching Times | $t_{on}$ | – | 135 | – | ns | $I_C$ = 50mA, $V_{CC}$ = 100V<br>$I_{B1}$ = 5mA, $I_{B2}$ = -10mA |
| | $t_{off}$ | | 2260 | | | |

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


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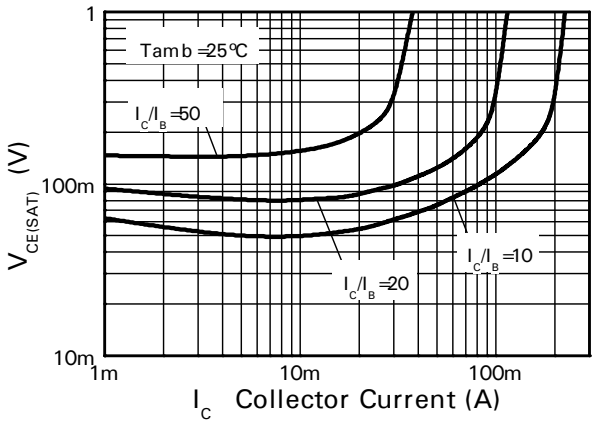
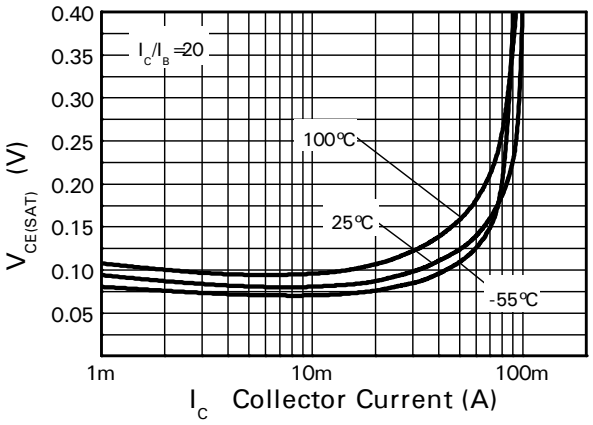
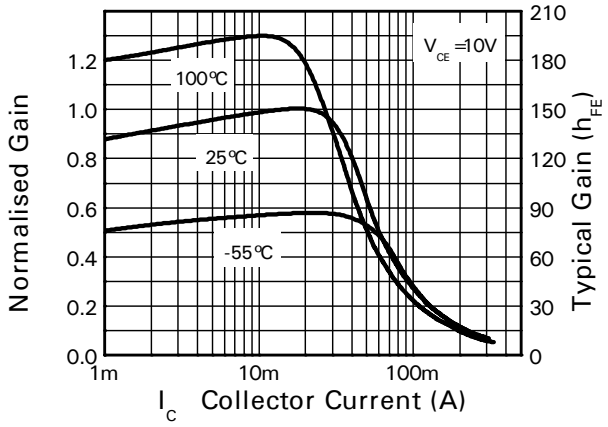
## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



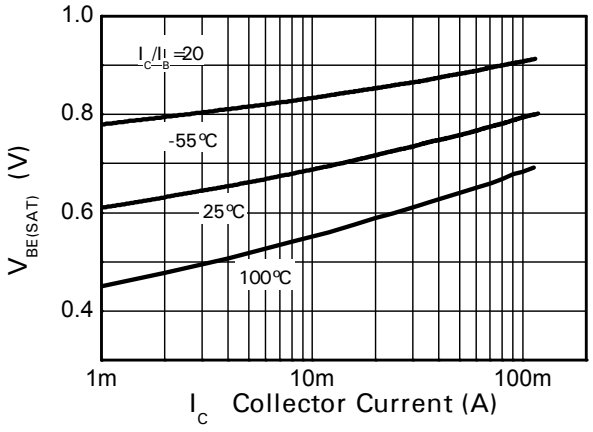

**$V_{CE(SAT)}$ v $I_C$**



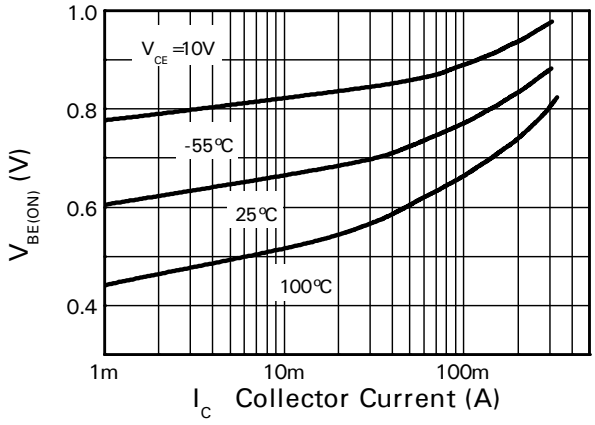

**$V_{CE(SAT)}$ v $I_C$**




**$h_{FE}$ v $I_C$**




**$V_{BE(SAT)}$ v $I_C$**




**$V_{BE(ON)}$ v $I_C$**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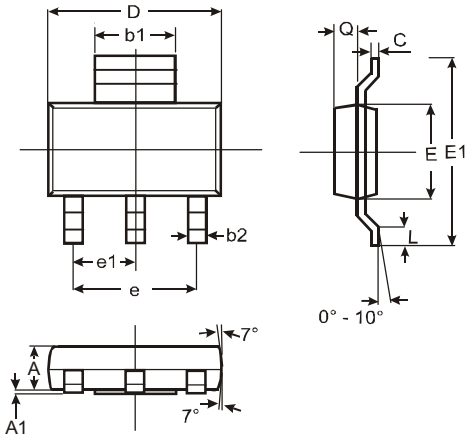
## Package Outline Dimensions

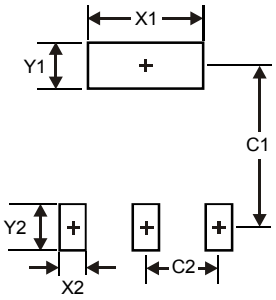
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT223 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.55 | 1.65 | 1.60 |
| **A1** | 0.010 | 0.15 | 0.05 |
| **b1** | 2.90 | 3.10 | 3.00 |
| **b2** | 0.60 | 0.80 | 0.70 |
| **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) |
|---|---|
| **X1** | 3.3 |
| **X2** | 1.2 |
| **Y1** | 1.6 |
| **Y2** | 1.6 |
| **C1** | 6.4 |
| **C2** | 2.3 |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