

**20V PNP MEDIUM POWER TRANSISTOR IN SOT223**
**Features**

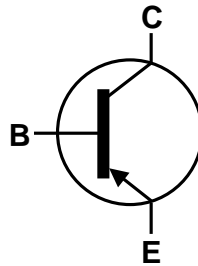
- $BV_{CEO} > -20V$
- $I_C = -6A$  High Continuous Collector Current
- $I_{CM} = -20A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(SAT)}$
- $h_{FE}$  Specified up to  $-20A$  for a High Gain Hold-up
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

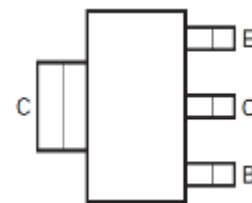
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.112 grams (Approximate)



Top View



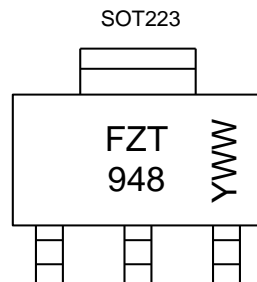
Device Symbol


 Top View  
Pin-Out

**Ordering Information** (Note 4)

| Product  | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|----------|------------|---------|--------------------|-----------------|-------------------|
| FZT948TA | AEC-Q101   | FZT948  | 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 <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**


FZT 948 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 7 = 2017)  
 WW or  $\bar{W}W$  = Week Code (01 to 53)

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

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CB0</sub> | -40   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | -20   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | -7    | V    |
| Continuous Collector Current | I <sub>C</sub>   | -6    | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | -20   | A    |

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

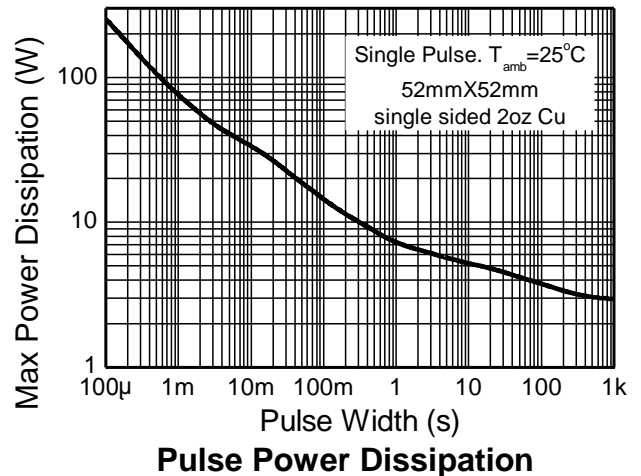
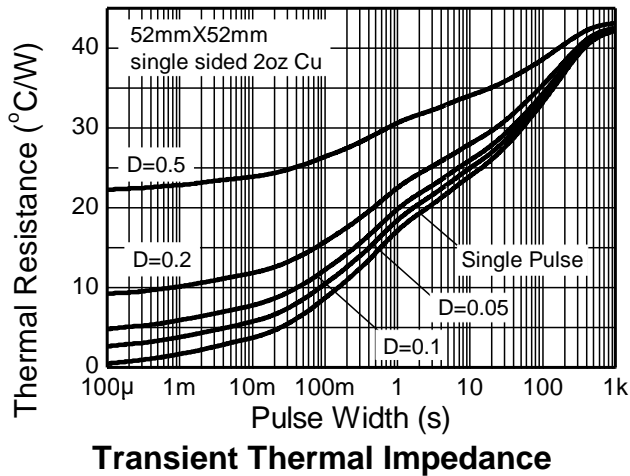
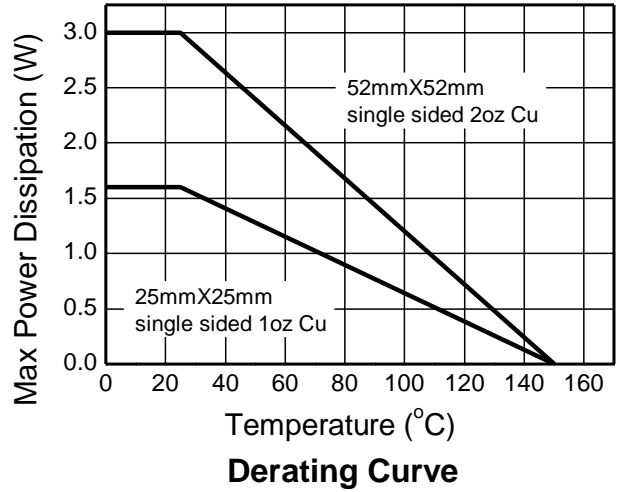
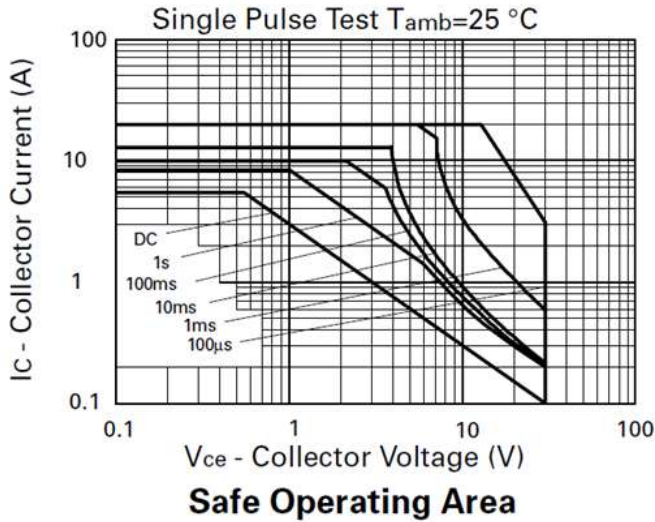
| Characteristic                              | Symbol                            | Value       | Unit   |
|---|-----------------------------------|-------------|--------|
| Power Dissipation<br>Linear Derating Factor | P <sub>D</sub>                    | 3.0         | W      |
|   |                                   | 24          |        |
| Thermal Resistance, Junction to Ambient     | R <sub>θJA</sub>                  | 1.6         | mW /°C |
|   |                                   | 12.8        |        |
| Thermal Resistance Junction to Lead         | R <sub>θJL</sub>                  | 42          | °C/W   |
|   |                                   | 78          |        |
| 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    | 3B          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
5. For a device mounted with the collector lead on 52mm x 52mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
  7. Thermal resistance from junction to solder-point (at the end of the collector lead).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

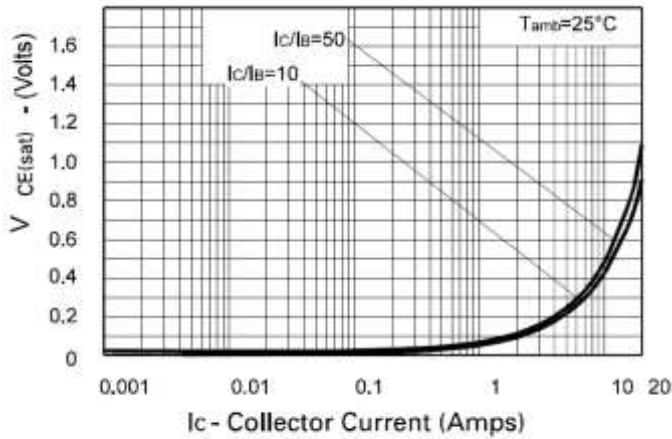


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

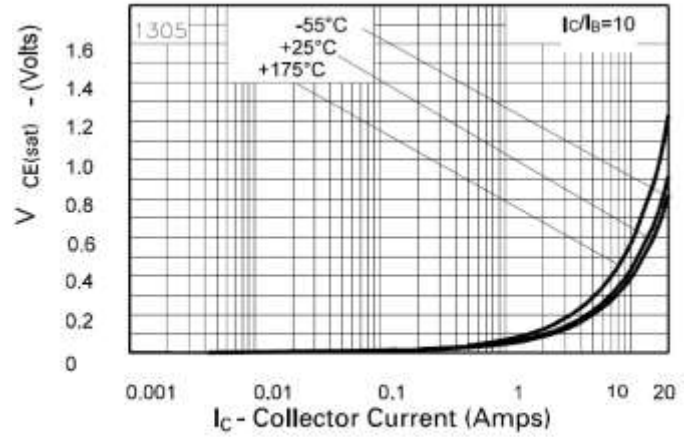
| Characteristic                                | Symbol               | Min | Typ    | Max       | Unit     | Test Condition   |
|---|----------------------|-----|--------|-----------|----------|--|
| Collector-Base Breakdown Voltage              | BV <sub>CBO</sub>    | -40 | -55    | —         | V        | I <sub>C</sub> = -100μA  |
| Collector-Emitter Breakdown Voltage (Note 9)  | BV <sub>CER</sub>    | -40 | -55    | —         | V        | I <sub>C</sub> = -1μA, R <sub>B</sub> ≤ 1kΩ  |
| Collector-Emitter Breakdown Voltage (Note 9)  | BV <sub>CEO</sub>    | -20 | -30    | —         | V        | I <sub>C</sub> = -10mA   |
| Emitter-Base Breakdown Voltage                | BV <sub>EBO</sub>    | -7  | -8     | —         | V        | I <sub>E</sub> = -100μA  |
| Collector Cut-Off Current                     | I <sub>CBO</sub>     | —   | —      | -50<br>-1 | nA<br>μA | V <sub>CB</sub> = -30V<br>V <sub>CB</sub> = -30V, T <sub>A</sub> = +100°C                    |
| Collector Cut-Off Current                     | I <sub>CER</sub>     | —   | —      | -50<br>-1 | nA<br>μA | V <sub>CE</sub> = -30V, R ≤ 1kΩ<br>V <sub>CE</sub> = -30V, T <sub>A</sub> = +100°C           |
| Emitter Cut-Off Current                       | I <sub>EBO</sub>     | —   | —      | -10       | nA       | V <sub>EB</sub> = -6V  |
| DC Current Transfer Static Ratio (Note 9)     | h <sub>FE</sub>      | 100 | 200    | —         | —        | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1V  |
|   |                      | 100 | 200    | 300       |          | I <sub>C</sub> = -1A, V <sub>CE</sub> = -1V  |
|   |                      | 75  | 160    | —         |          | I <sub>C</sub> = -5A, V <sub>CE</sub> = -1V  |
|   |                      | 60  | 130    | —         |          | I <sub>C</sub> = -10A, V <sub>CE</sub> = -1V   |
|   |                      | 15  | 40     | —         |          | I <sub>C</sub> = -20A, V <sub>CE</sub> = -2V   |
| Collector-Emitter Saturation Voltage (Note 9) | V <sub>CE(SAT)</sub> | —   | -60    | -130      | mV       | I <sub>C</sub> = -0.5A, I <sub>B</sub> = -10mA   |
|   |                      | —   | -110   | -180      |          | I <sub>C</sub> = -2A, I <sub>B</sub> = -200mA  |
|   |                      | —   | -200   | -280      |          | I <sub>C</sub> = -4A, I <sub>B</sub> = -400mA  |
|   |                      | —   | -360   | -450      |          | I <sub>C</sub> = -6A, I <sub>B</sub> = -250mA  |
| Base-Emitter Saturation Voltage (Note 9)      | V <sub>BE(SAT)</sub> | —   | -1,050 | -1,200    | mV       | I <sub>C</sub> = -5A, I <sub>B</sub> = -300mA  |
| Base-Emitter Turn-On Voltage (Note 9)         | V <sub>BE(ON)</sub>  | —   | -870   | -1,050    | mV       | I <sub>C</sub> = -6A, V <sub>CE</sub> = -1V  |
| Transitional Frequency (Note 9)               | f <sub>T</sub>       | —   | 80     | —         | MHz      | I <sub>C</sub> = -100mA, V <sub>CE</sub> = -10V,<br>f = 50MHz                                |
| Output Capacitance                            | C <sub>OBO</sub>     | —   | 163    | —         | pF       | V <sub>CB</sub> = -10V, f = 1MHz   |
| Switching Time                                | t <sub>ON</sub>      | —   | 120    | —         | ns       | V <sub>CC</sub> = -10V, I <sub>C</sub> = -4A,<br>-I <sub>B1</sub> = I <sub>B2</sub> = -400mA |
|   | t <sub>OFF</sub>     | —   | 126    | —         |          |  |

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

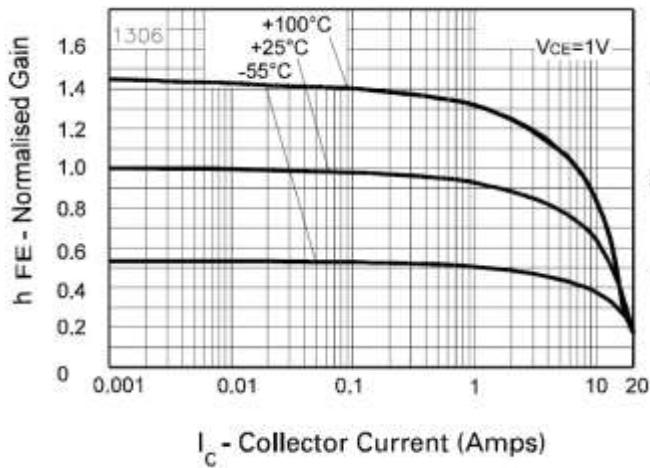
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



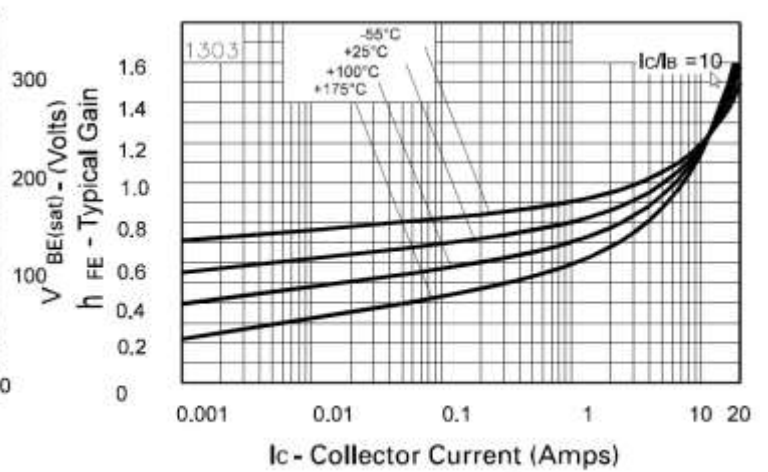
**$V_{CE(sat)}$  v  $I_C$**



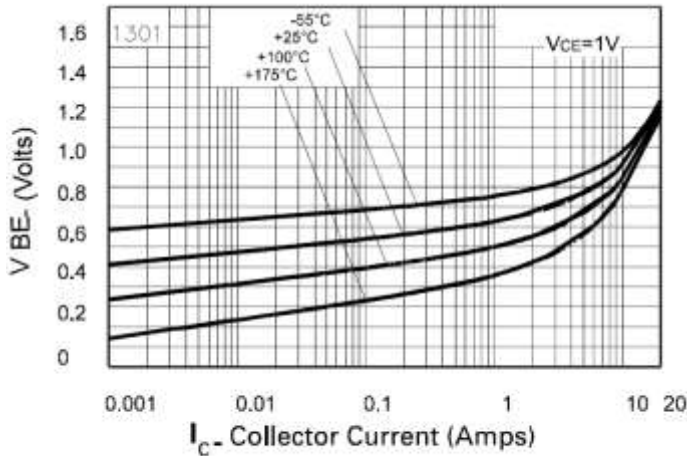
**$V_{CE(sat)}$  v  $I_C$**



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



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

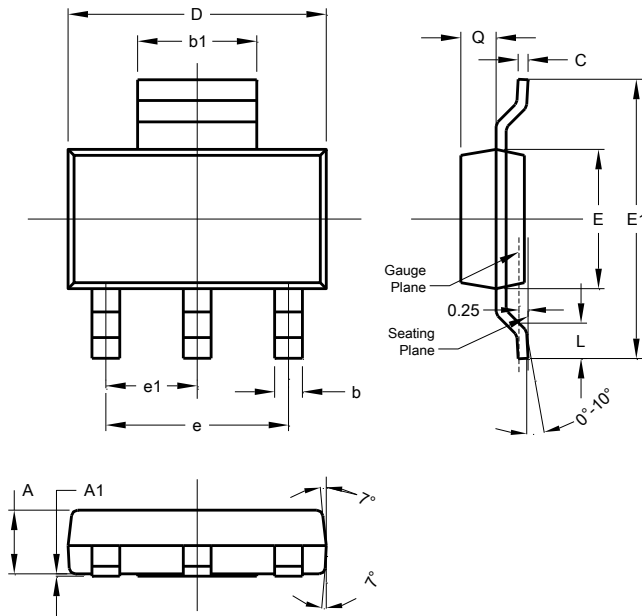


**$V_{BE(on)}$  v  $I_C$**

## Package Outline Dimensions

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

### SOT223

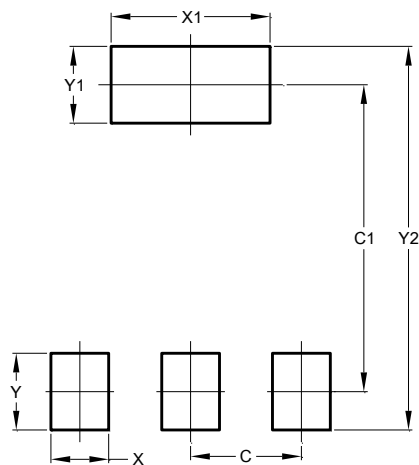


| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b                    | 0.60  | 0.80 | 0.70 |
| b1                   | 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 <http://www.diodes.com/package-outlines.html> for the latest version.

### SOT223



| 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          |

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