

Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive requirements.

Features

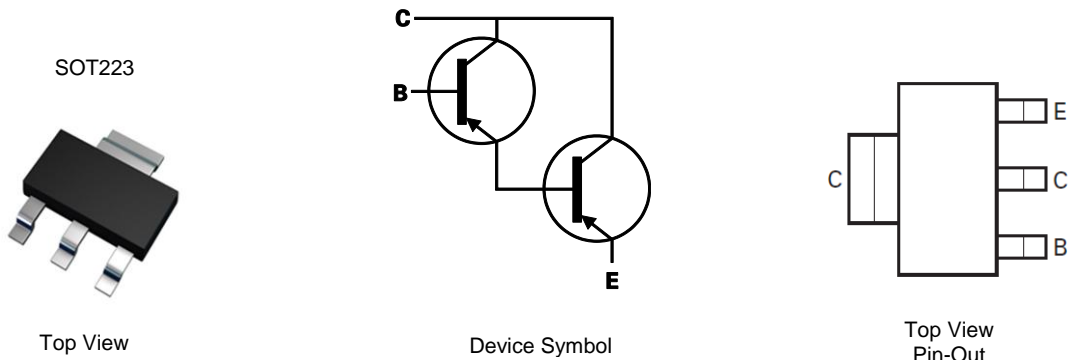
- $BV_{CEO} > -120V$
- $BV_{CBO} > -140V$
- $I_C = -2A$ High Continuous Current
- $h_{FE} > 2k$ for High Gain @ -2A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The FZT705Q is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949: 2016 certified facilities.**

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 **Ⓔ**
- Weight: 0.112 grams (Approximate)

Applications

- Lamp
- Relay
- Solenoid Driving

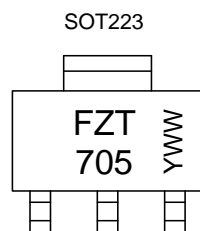


Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|-------------|------------|---------|--------------------|-----------------|-------------------|
| FZT705QTA | Automotive | FZT705 | 7 | 12 | 1,000 |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) 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 705 = Product Type Marking Code
 YWW = Date Code Marking
 Y or \bar{Y} = Last Digit of Year (ex: 9 = 2019)
 WW or $\bar{W}W$ = Week Code (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CB0} | -140 | V |
| Collector-Emitter Voltage | V _{CEO} | -120 | V |
| Emitter-Base Voltage | V _{EBO} | -12 | V |
| Continuous Collector Current | I _C | -2 | A |
| Peak Pulse Current | I _{CM} | -4 | A |

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

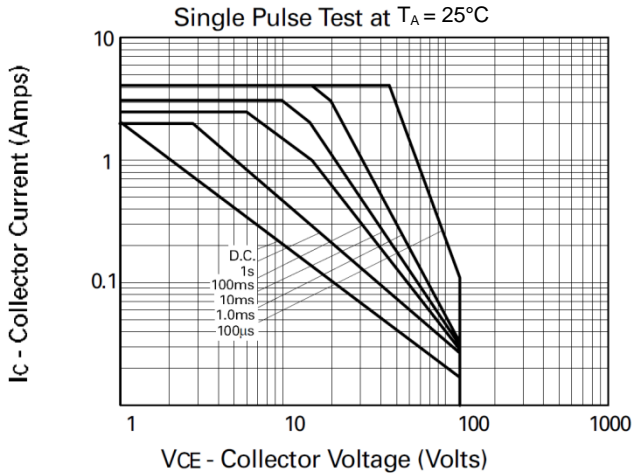
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation | P _D | (Note 5) | 3.0 |
| | | (Note 6) | 2.0 |
| | | (Note 7) | 1.6 |
| | | (Note 8) | 1.2 |
| Thermal Resistance, Junction to Ambient | R _{θJA} | (Note 5) | 41.7 |
| | | (Note 6) | 62.5 |
| | | (Note 7) | 78.1 |
| | | (Note 8) | 104 |
| Thermal Resistance Junction to Lead | R _{θJL} | 12.9 | |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

ESD Ratings (Note 10)

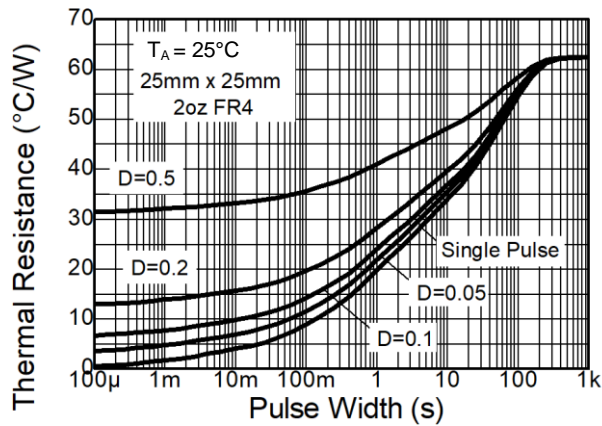
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 2,000 | V | 2 |
| Electrostatic Discharge - Machine Model | ESD MM | ≥ 200 | V | B |

- Notes:
5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
 7. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
 8. Same as Note 5, except the device is mounted on minimum recommended pad layout.
 9. Thermal resistance from junction to solder-point (at the end of the collector lead).
 10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

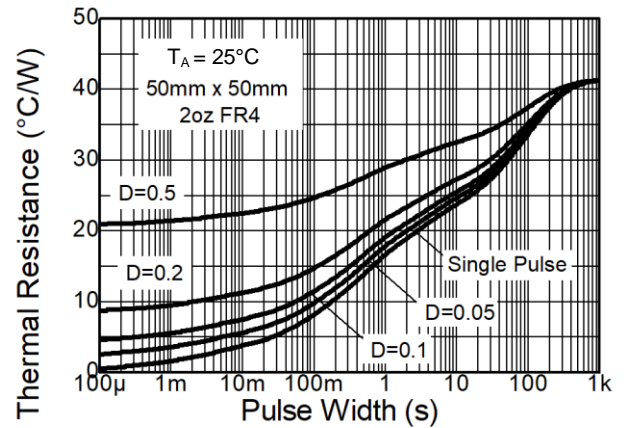
Thermal Characteristics and Derating Information



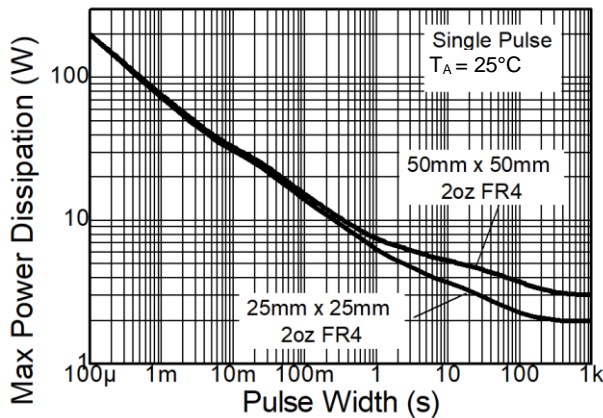
Safe Operating Area



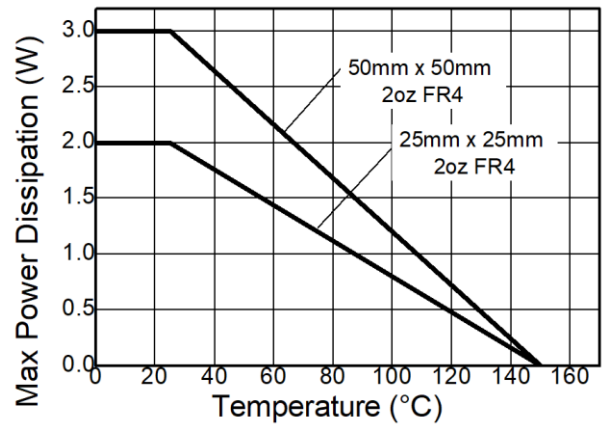
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



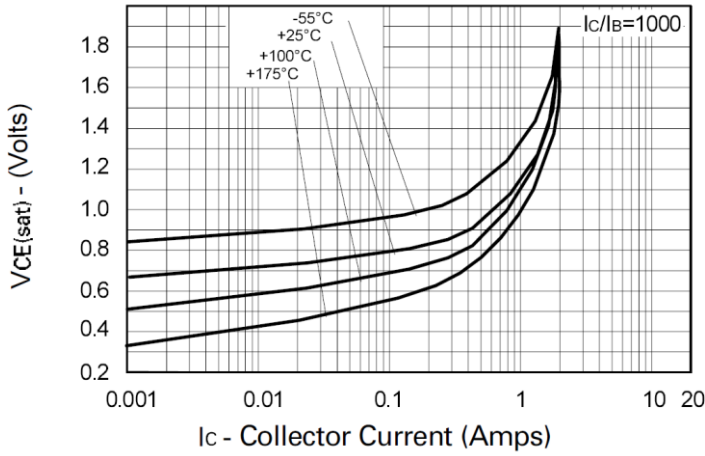
Derating Curve

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

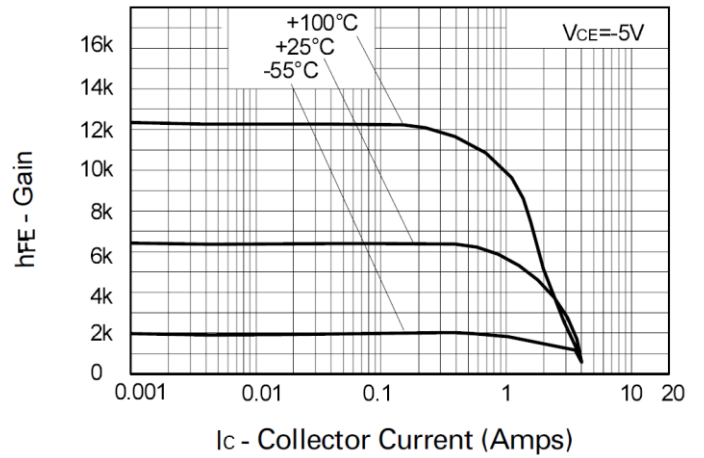
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|-------|-----|--------|------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | -140 | — | — | V | I _C = -100μA |
| Collector-Emitter Breakdown Voltage (Note 11) | BV _{CEO} | -120 | — | — | V | I _C = -10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -12 | — | — | V | I _E = -100μA |
| Collector-Base Cut-Off Current | I _{CBO} | — | — | -100 | nA | V _{CB} = -120V |
| | | | | -10 | μA | V _{CB} = -120V, T _A = +100°C |
| Collector-Emitter Cut-Off Current | I _{CES} | — | — | -10 | μA | V _{CE} = -80V |
| Emitter Cut-Off Current | I _{EBO} | — | — | -100 | nA | V _{EB} = -8V |
| DC Current Gain (Note 11) | h _{FE} | 3,000 | — | — | — | I _C = -10mA, V _{CE} = -5V |
| | | 3,000 | — | — | | I _C = -100mA, V _{CE} = -5V |
| | | 3,000 | — | 30,000 | | I _C = -1A, V _{CE} = -5V |
| | | 2,000 | — | — | | I _C = -2A, V _{CE} = -5V |
| Collector-Emitter Saturation Voltage (Note 11) | V _{CE(sat)} | — | — | -1.3 | V | I _C = -1A, I _B = -1mA |
| | | — | — | -2.5 | | I _C = -2A, I _B = -2mA |
| Base-Emitter Saturation Voltage (Note 11) | V _{BE(sat)} | — | — | -1.8 | V | I _C = -1A, I _B = -10mA |
| Base-Emitter Turn-On Voltage (Note 11) | V _{BE(on)} | — | — | -1.7 | V | I _C = -1A, V _{CE} = -5V |
| Output Capacitance | C _{obo} | — | 15 | — | pF | V _{EB} = -10V, f = 1MHz |
| Current Gain-Bandwidth Product | f _T | — | 160 | — | MHz | V _{CE} = -10V, I _C = -100mA, f = 20MHz |
| Turn-On Time | t _{ON} | — | 0.6 | — | μs | V _{CC} = -10V, I _C = -500mA |
| Turn-Off Time | t _{OFF} | — | 0.8 | — | μs | I _{B1} = -I _{B2} = -0.5mA |

Note: 11. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%.

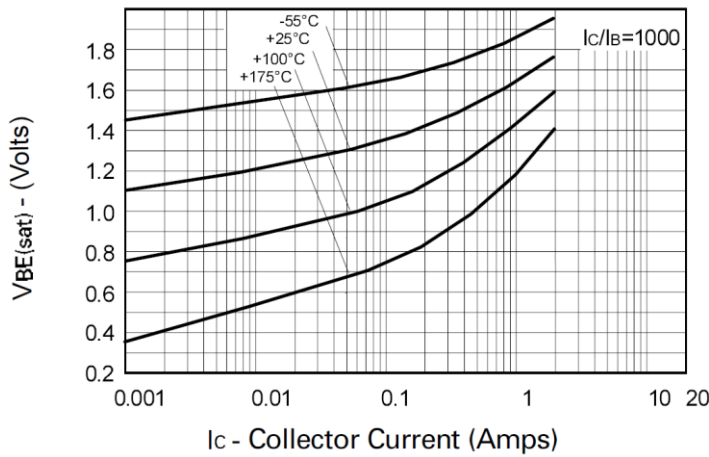
Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



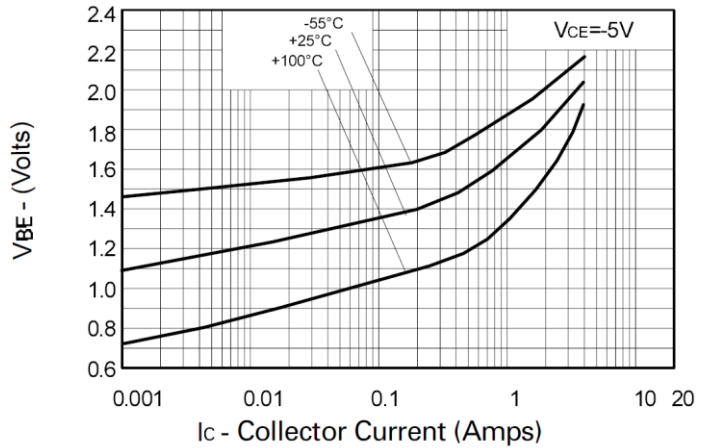
$V_{CE(sat)}$ v I_C



h_{FE} v I_C



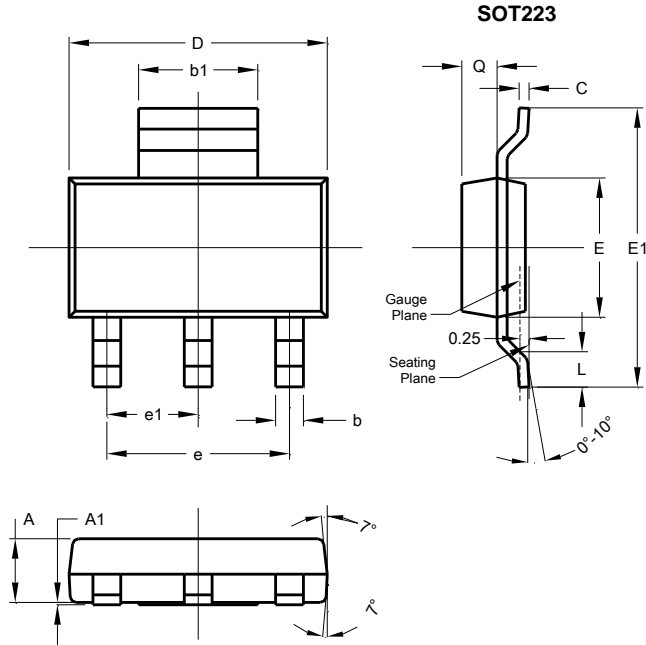
$V_{BE(sat)}$ v I_C



$V_{BE(on)}$ v I_C

Package Outline Dimensions

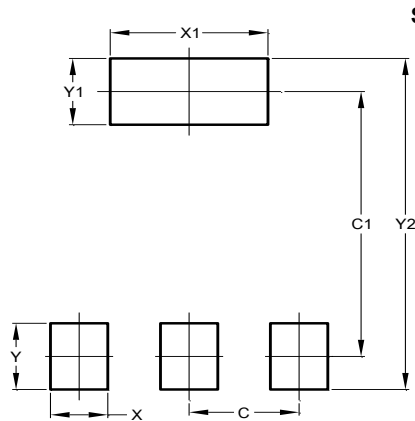
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT223 | | | |
|----------------------|-------|------|------|
| 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.



| 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 |

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.