

**120V PNP DARLINGTON TRANSISTOR IN SOT223**
**Features**

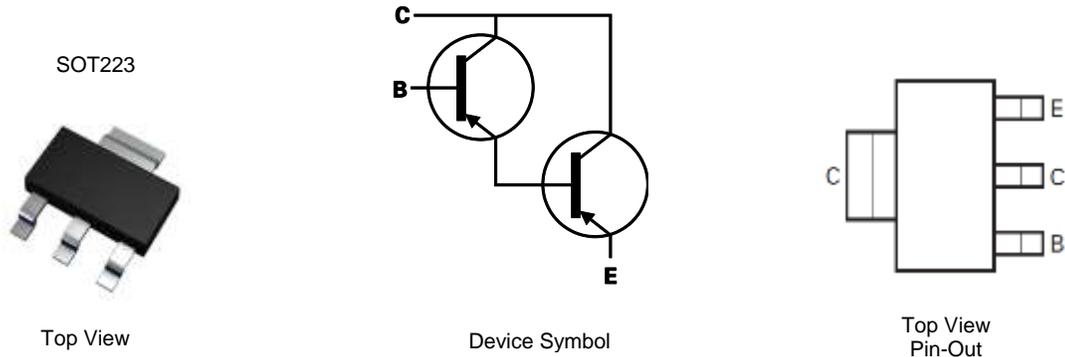
- $BV_{CEO} > -120V$
- $BV_{CBO} > -140V$
- $I_C = 2A$  High Continuous Current
- $h_{FE} > 2k$  for High Gain @ 2A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Data Sheet ([FZT705Q](#))**

**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)

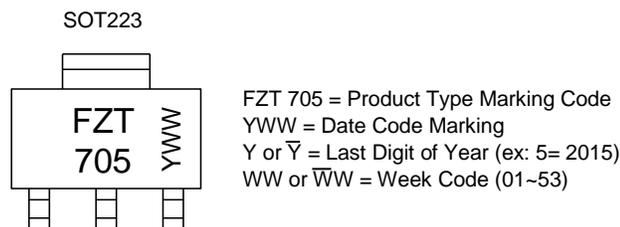
**Applications**

- Lamp
- Relay
- Solenoid Driving


**Ordering Information** (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FZT705TA	FZT705	7	12	1,000
FZT705TC	FZT705	13	12	4,000

- 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-140	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-120	V
Emitter-Base Voltage	V <sub>EBO</sub>	-12	V
Continuous Collector Current	I <sub>C</sub>	-2	A
Peak Pulse Current	I <sub>CM</sub>	-4	A

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

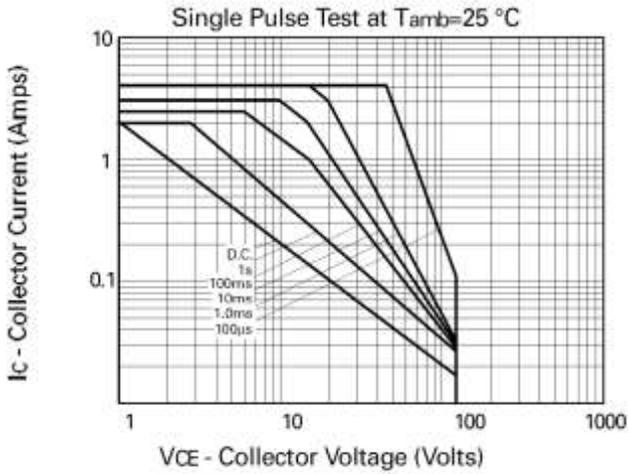
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	3.0
		(Note 6)	2.0
		(Note 7)	1.6
		(Note 8)	1.2
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	41.7
		(Note 6)	62.5
		(Note 7)	78.1
		(Note 8)	104
Thermal Resistance Junction to Lead	R <sub>θJL</sub>	12.9	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 10)

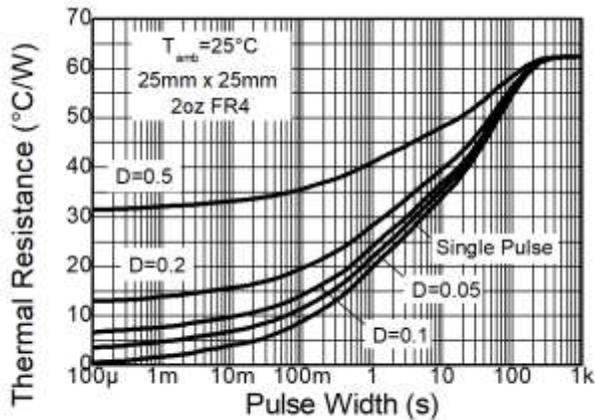
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2
Electrostatic Discharge - Machine Model	ESD MM	≥ 200	V	B

- Notes:
5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 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.

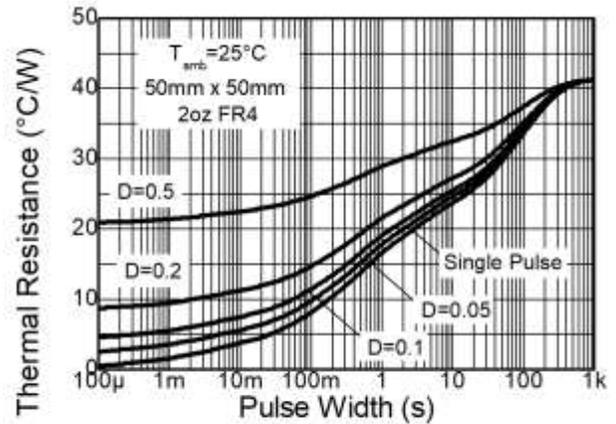
**Thermal Characteristics and Derating Information**



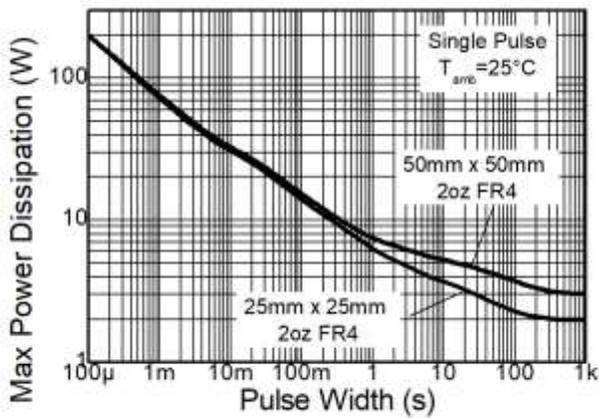
**Safe Operating Area FZT705**



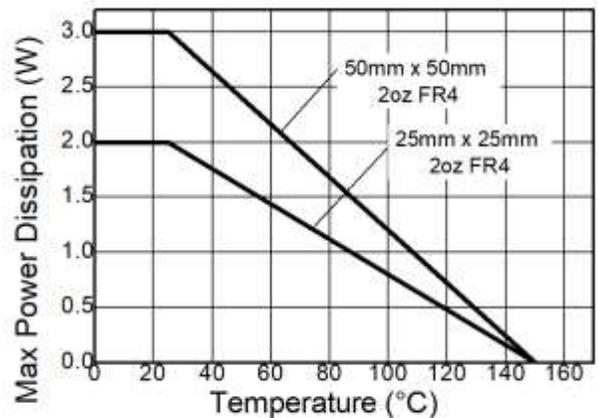
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



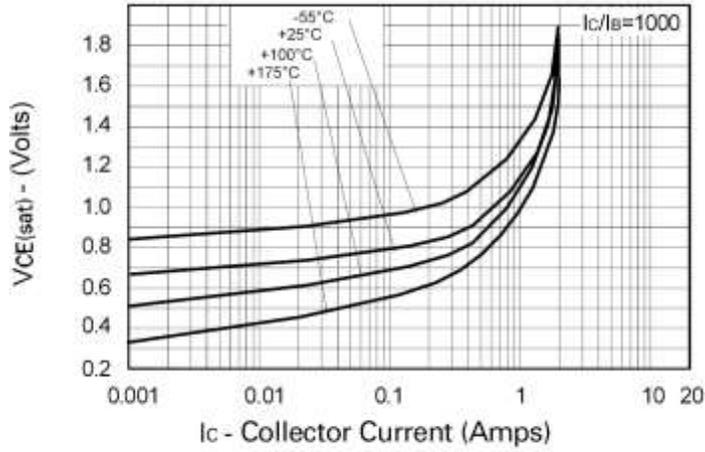
**Derating Curve**

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

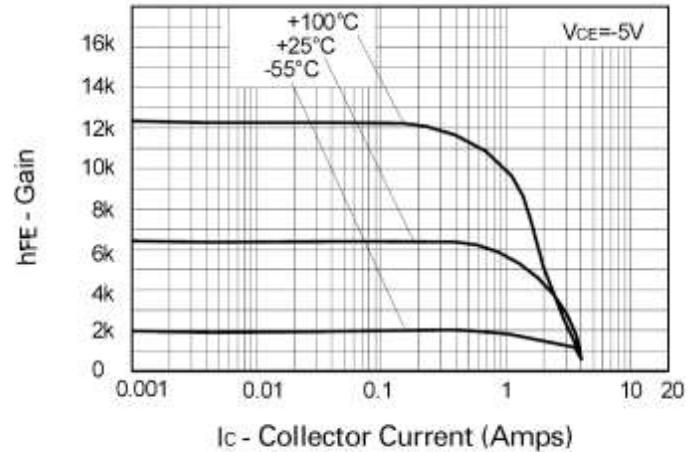
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	-140	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV <sub>CEO</sub>	-120	—	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-12	—	—	V	I <sub>E</sub> = -100μA
Collector-Base Cut-Off Current	I <sub>CB0</sub>	—	—	-100 -10	nA μA	V <sub>CB</sub> = -120V V <sub>CB</sub> = -120V, T <sub>A</sub> = +100°C
Collector-Emitter Cut-Off Current	I <sub>CES</sub>	—	—	-10	μA	V <sub>CE</sub> = -80V
Emitter Cut-Off Current	I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -8V
DC Current Gain (Note 9)	h <sub>FE</sub>	3,000 3,000 3,000 2,000	—	— — 30,000 —	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5V I <sub>C</sub> = -100mA, V <sub>CE</sub> = -5V I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V I <sub>C</sub> = -2A, V <sub>CE</sub> = -5V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	— —	— —	-1.3 -2.5	V	I <sub>C</sub> = -1A, I <sub>B</sub> = -1mA I <sub>C</sub> = -2A, I <sub>B</sub> = -2mA
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	—	—	-1.8	V	I <sub>C</sub> = -1A, I <sub>B</sub> = -10mA
Base-Emitter Turn-On Voltage (Note 11)	V <sub>BE(on)</sub>	—	—	-1.7	V	I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V
Output Capacitance (Note 9)	C <sub>obo</sub>	—	15	—	pF	V <sub>EB</sub> = -10V, f = 1MHz
Current Gain-Bandwidth Product (Note 11)	f <sub>T</sub>	—	160	—	MHz	V <sub>CE</sub> = -10V, I <sub>C</sub> = -100mA, f=20MHz
Turn-On Time	t <sub>on</sub>	—	0.6	—	μs	V <sub>CC</sub> = -10V, I <sub>C</sub> = -500mA
Turn-Off Time	t <sub>off</sub>	—	0.8	—	μs	I <sub>B1</sub> = -I <sub>B2</sub> = 0.5mA

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

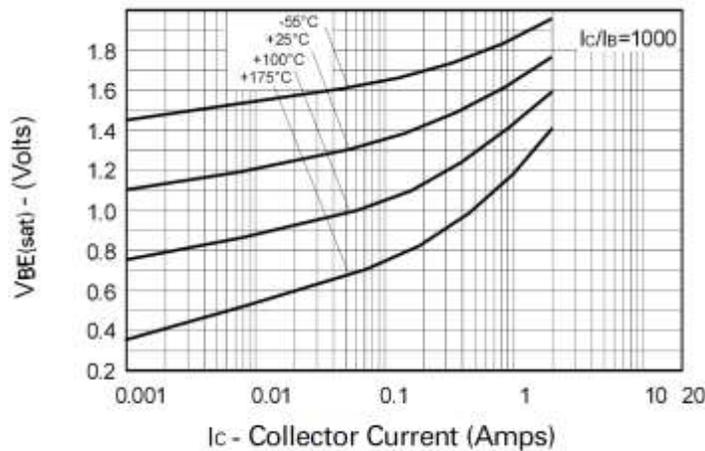
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



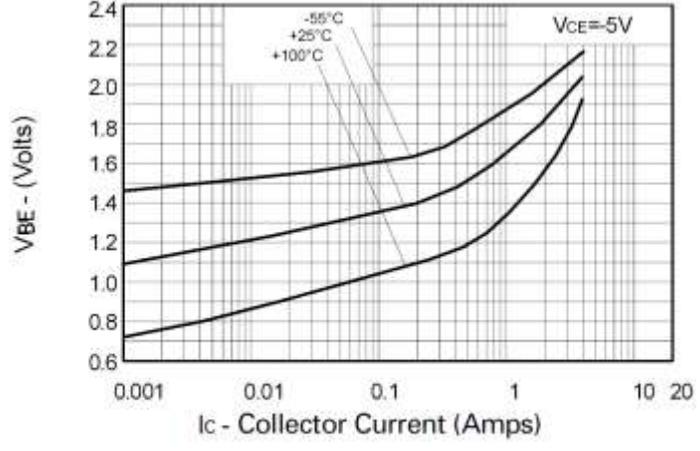
**VCE(sat) v IC**



**hFE v IC**



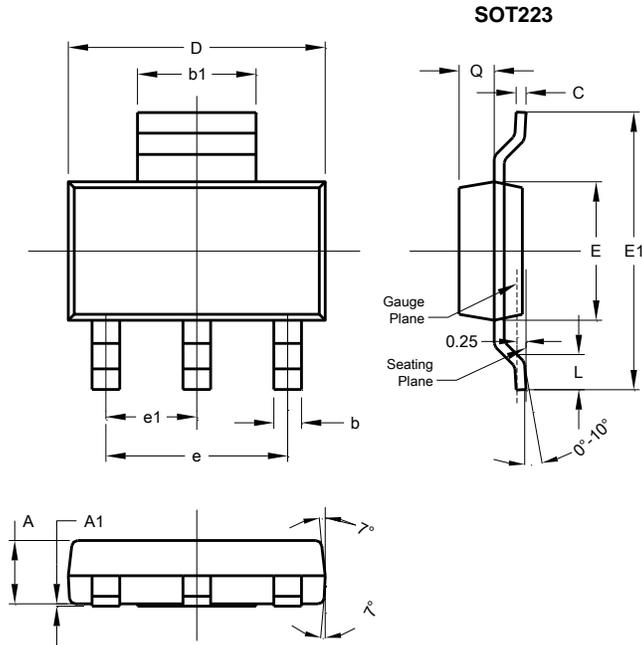
**VBE(sat) v IC**



**VBE(on) v IC**

**Package Outline Dimensions**

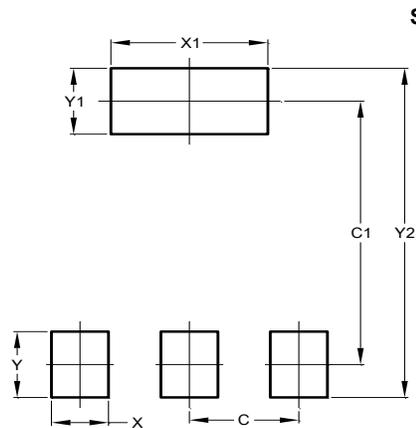
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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
<b>All Dimensions in mm</b>			

**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.

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