

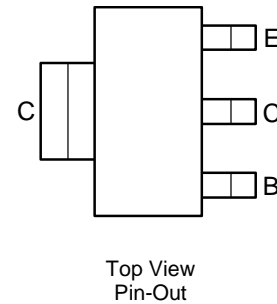
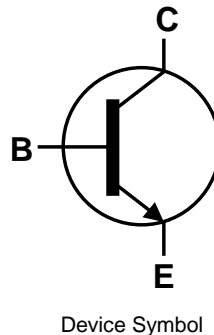
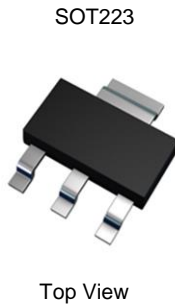
**300V NPN MEDIUM POWER HIGH VOLTAGE TRANSISTOR IN SOT223**

**Features**

- $BV_{CEO} > 300V$
- $BV_{CBO} > 300V$
- $I_C = 0.5A$  High Continuous Current
- $I_{CM} = 1A$  Peak Pulse Current
- Complementary PNP Type: FZT757
- **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 Ⓜ
- Weight: 0.112 grams (Approximate)

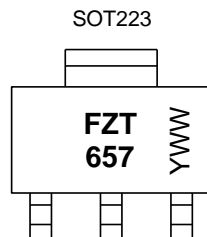


**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FZT657TA	AEC-Q101	FZT657	7	12	1,000
FZT657QTA	Automotive	FZT657	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. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



FZT 657 = 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>CBO</sub>	300	V
Collector-Emitter Voltage	V <sub>CEO</sub>	300	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	0.5	A
Peak Pulse Current	I <sub>CM</sub>	1	A

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

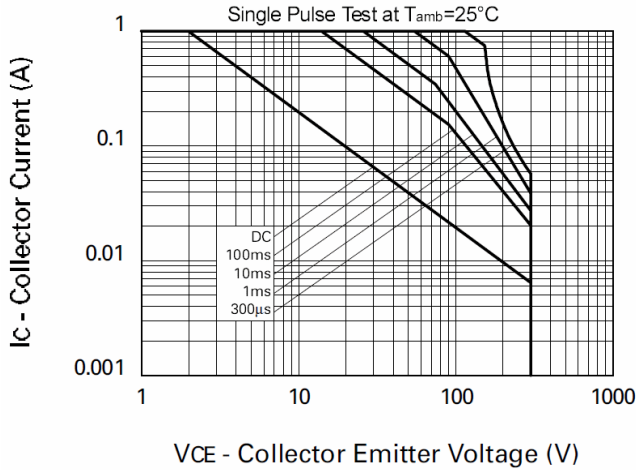
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 6)	3.0
		(Note 7)	2.0
		(Note 8)	1.6
		(Note 9)	1.2
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 6)	41.7
		(Note 7)	62.5
		(Note 8)	78.1
		(Note 9)	104
Thermal Resistance Junction to Lead	R <sub>θJL</sub>	12.9	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 11)

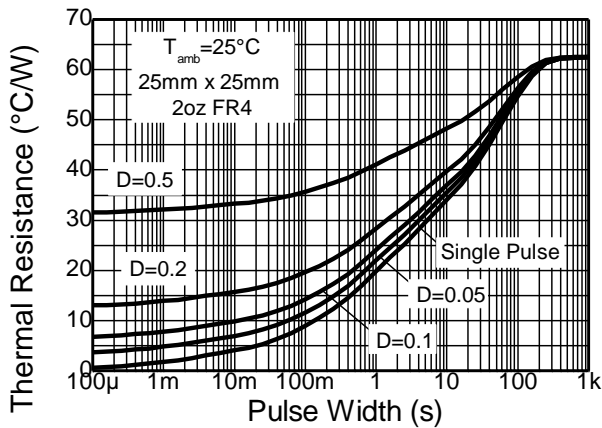
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. 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.
  7. Same as Note 6, except the device is mounted on 25mm x 25mm 2oz copper.
  8. Same as Note 6, except the device is mounted on 25mm x 25mm 1oz copper.
  9. Same as Note 6, except the device is mounted on minimum recommended pad layout.
  10. Thermal resistance from junction to solder-point (at the end of the collector lead).
  11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

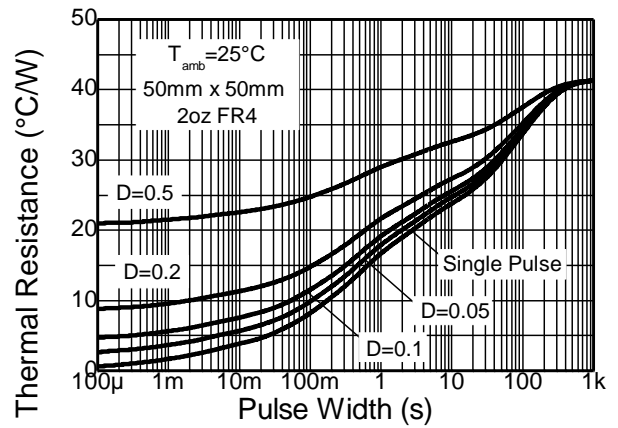
**Thermal Characteristics and Derating Information**



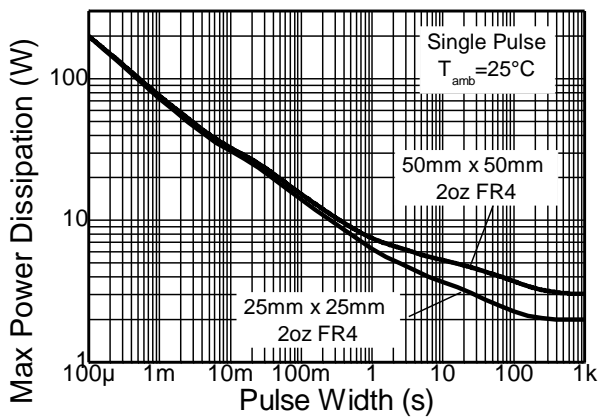
**Safe Operating Area**



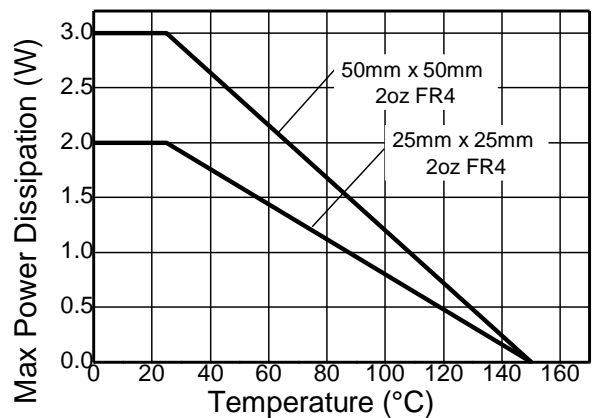
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



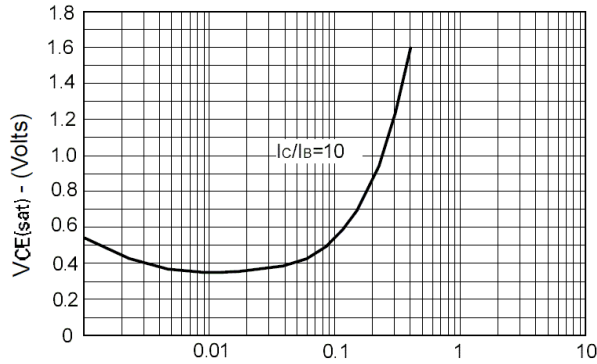
**Derating Curve**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	300	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 12)	$BV_{CEO}$	300	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cut-Off Current	$I_{CBO}$	—	—	100	nA	$V_{CB} = 200\text{V}$
Emitter Cut-Off Current	$I_{EBO}$	—	—	100	nA	$V_{EB} = 5.6\text{V}$
DC Current Gain (Note 12)	$h_{FE}$	40 50	— —	— —	—	$I_C = 10\text{mA}, V_{CE} = 5\text{V}$ $I_C = 100\text{mA}, V_{CE} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 12)	$V_{CE(sat)}$	—	—	0.5	V	$I_C = 100\text{mA}, I_B = 10\text{mA}$
Base-Emitter Saturation Voltage (Note 12)	$V_{BE(sat)}$	—	—	1.0	V	$I_C = 100\text{mA}, I_B = 10\text{mA}$
Base-Emitter Turn-On Voltage (Note 12)	$V_{BE(on)}$	—	—	1.0	V	$I_C = 100\text{mA}, V_{CE} = 5\text{V}$
Output Capacitance	$C_{obo}$	—	—	20	pF	$V_{CB} = 20\text{V}, f = 1\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	30	—	—	MHz	$V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 20\text{MHz}$

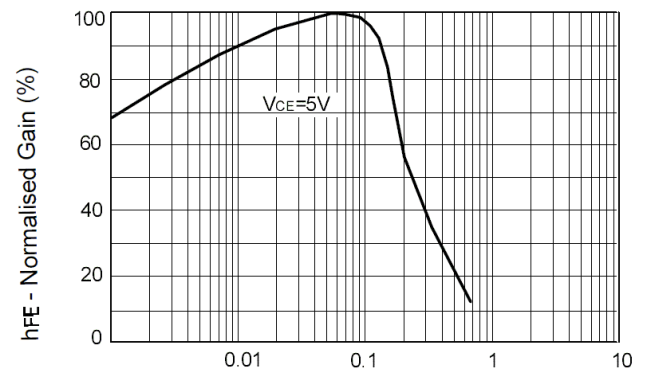
Note: 12. Measured under pulsed conditions. Pulse width  $\leq 300 \mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



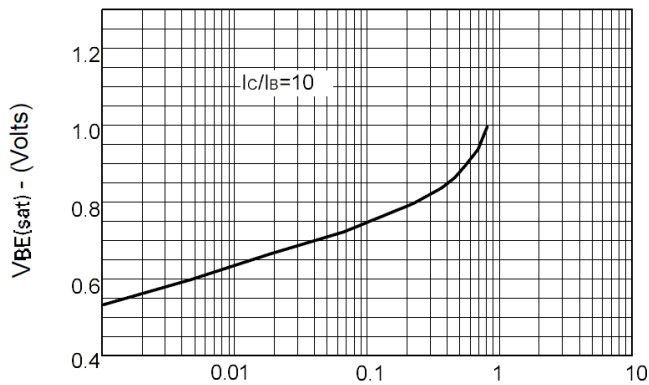
IC - Collector Current (Amps)

**VCE(sat) v IC**



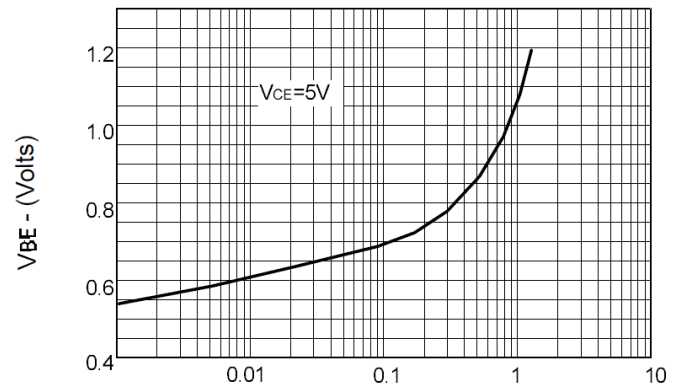
IC - Collector Current (Amps)

**hFE v IC**



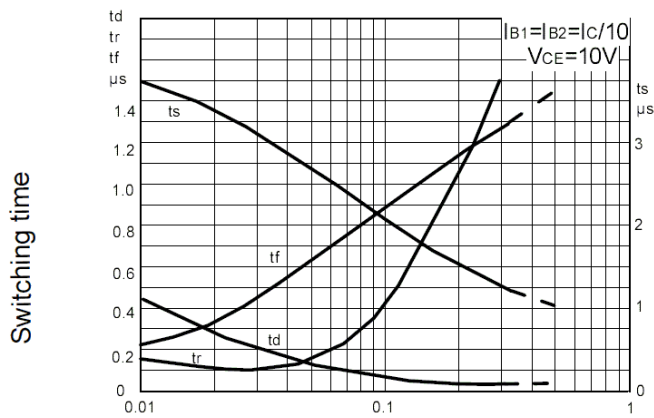
IC - Collector Current (Amps)

**VBE(sat) v IC**



IC - Collector Current (Amps)

**VBE(on) v IC**

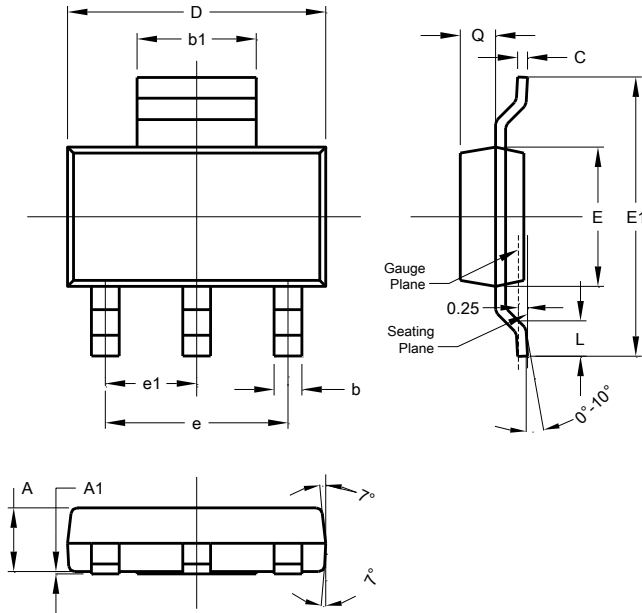


IC - Collector Current (Amps)

**Switching Speeds**

## Package Outline Dimensions

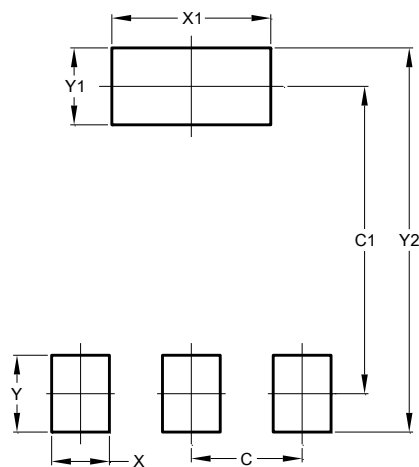
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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