



**THE DATASHEET OF  
FZT649TA**



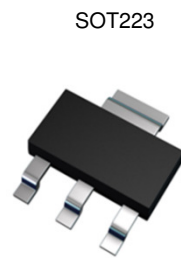
**25V NPN HIGH PERFORMANCE TRANSISTOR IN SOT223**

**Features**

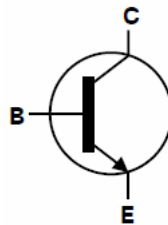
- $BV_{CEO} > 25V$
- $I_C = 3A$  High Continuous Current
- $I_{CM} = 8A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < 300mV @ 1A$
- Complementary PNP Type: FZT749
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

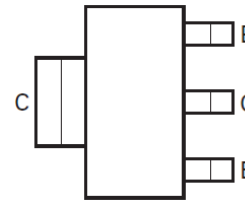
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.112 grams (Approximate)



Top View



Device Symbol



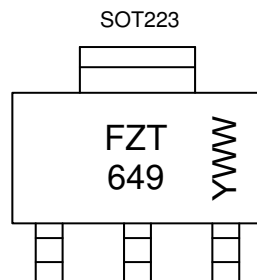
Top View  
Pin-Out

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FZT649TA	AEC-Q101	FZT649	7	12	1,000
FZT649TC	AEC-Q101	FZT649	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**



FZT649 = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{WW}$  = 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>	35	V
Collector-Emitter Voltage	V <sub>CEO</sub>	25	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Peak Pulse Current	I <sub>CM</sub>	8	A

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

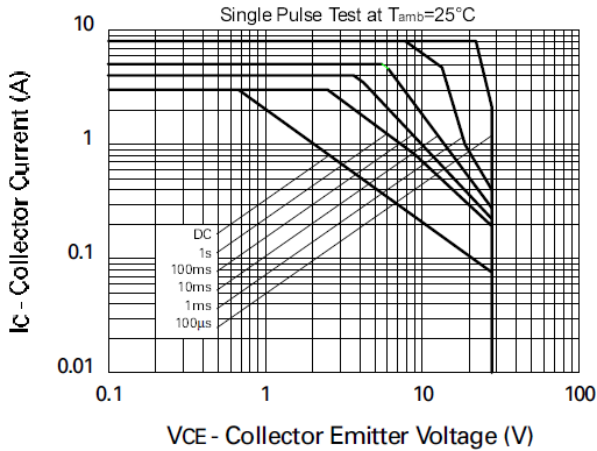
Characteristic	Symbol	Value	Unit	
Power Dissipation	P <sub>D</sub>	(Note 5)	2	W
		(Note 6)	3	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	62.5	°C/W
		(Note 6)	41.7	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	12.9	°C/W	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

**ESD Ratings** (Note 8)

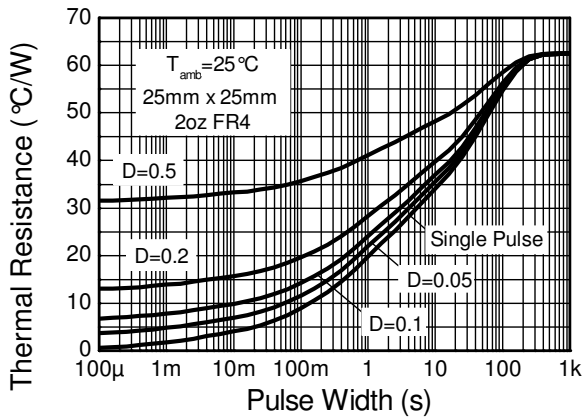
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 25mm x 25mm 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 50mm x 50mm 2oz 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.

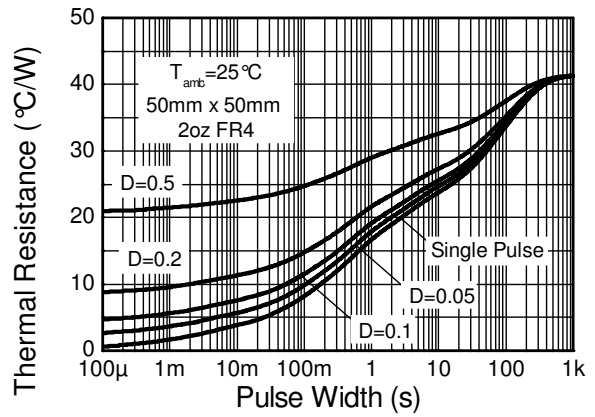
**Thermal Characteristics and Derating Information**



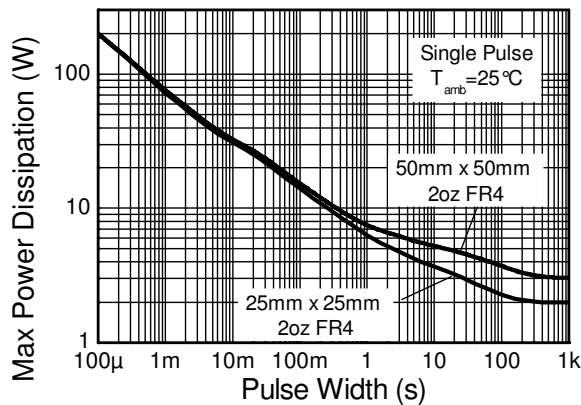
**Safe Operating Area**



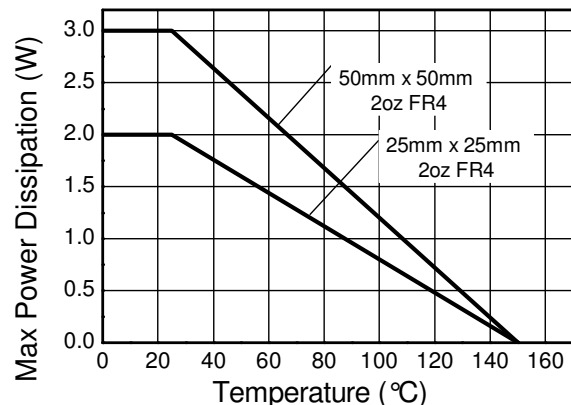
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



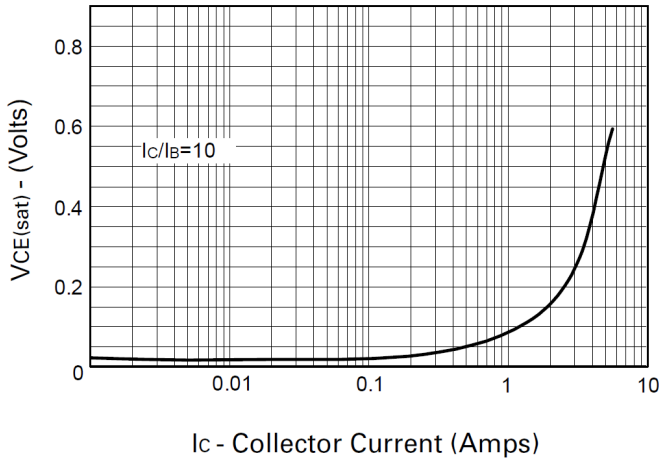
**Derating Curve**

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

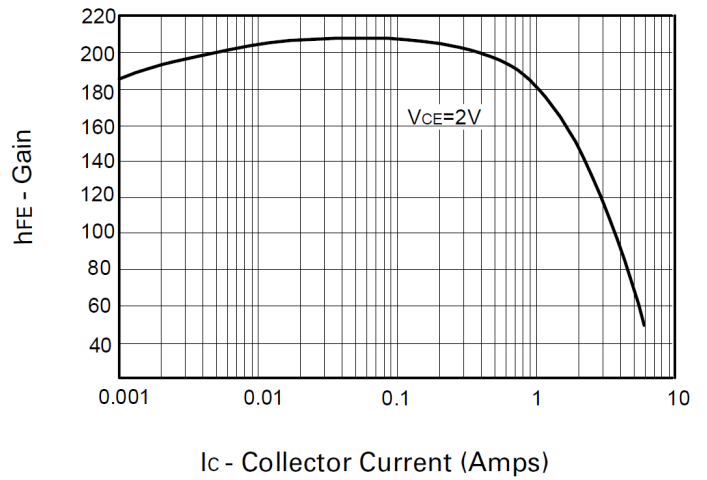
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	35	–	–	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	25	–	–	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	–	–	V	I <sub>E</sub> = 100μA
Collector Cut-Off Current	I <sub>CBO</sub>	–	–	0.1	μA	V <sub>CB</sub> = 30V
		–	–	10		V <sub>CB</sub> = 30V, T <sub>A</sub> = +100°C
Emitter Cut-Off Current	I <sub>EBO</sub>	–	–	100	nA	V <sub>EB</sub> = 4V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	–	0.12	0.3	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		–	0.40	0.6		I <sub>C</sub> = 3A, I <sub>B</sub> = 300mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	–	0.9	1.25	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	–	0.8	1.0	V	I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
DC Current Gain (Note 9)	h <sub>FE</sub>	70	200	–	–	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 2V
		100	200	300		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		75	150	–		I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
		15	50	–		I <sub>C</sub> = 6A, V <sub>CE</sub> = 2V
Current Gain-Bandwidth Product	f <sub>T</sub>	150	240	–	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100mA, f = 100MHz
Switching Times	t <sub>on</sub>	–	55	–	ns	I <sub>C</sub> = 500mA, V <sub>CC</sub> = 10V, I <sub>B1</sub> = -I <sub>B2</sub> = 50mA
	t <sub>off</sub>	–	300	–		
Output Capacitance	C <sub>obo</sub>	–	25	50	pF	V <sub>CB</sub> = 10V, f = 1MHz

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

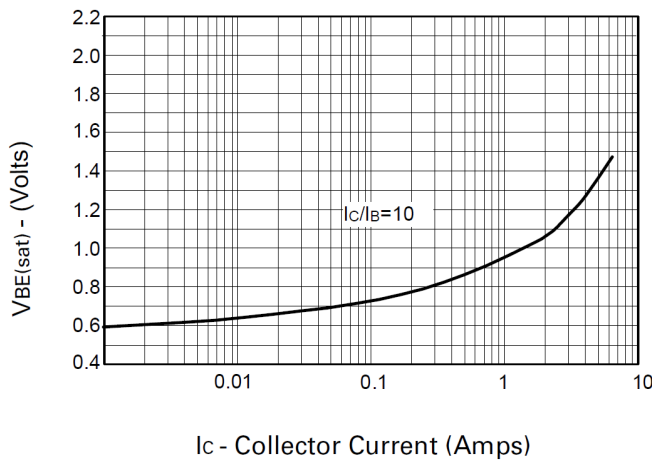
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



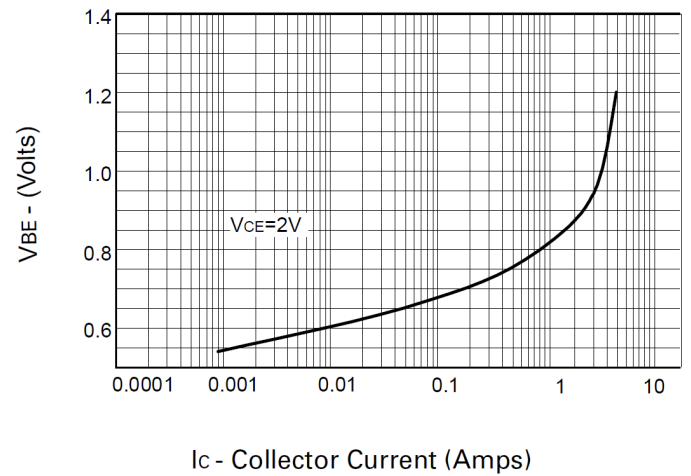
**VCE(sat) v IC**



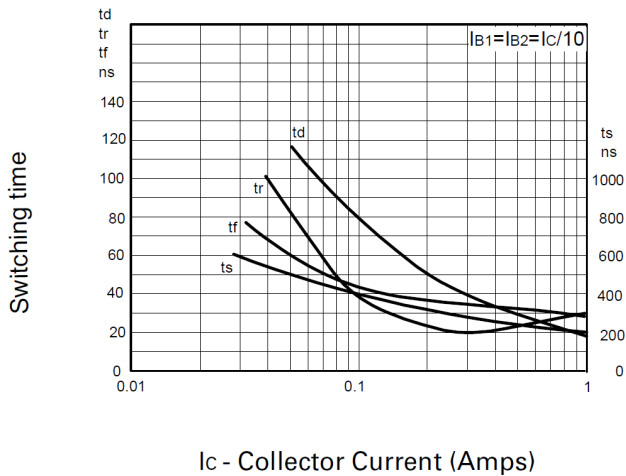
**hFE v IC**



**VBE(sat) v IC**



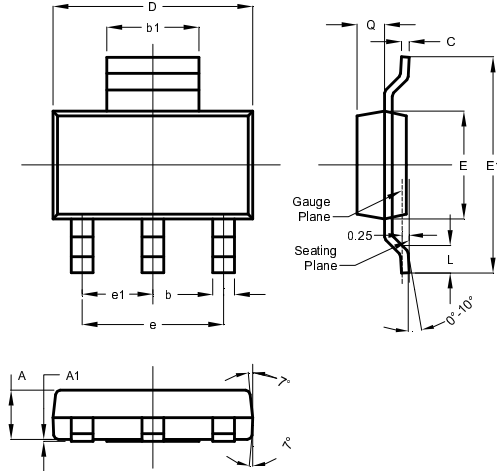
**VBE(on) v IC**



**Switching Speeds**

### Package Outline Dimensions

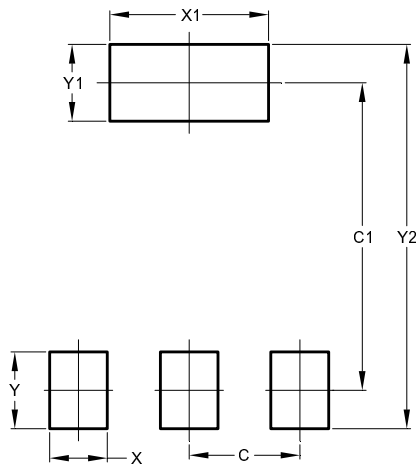
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
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)
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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