

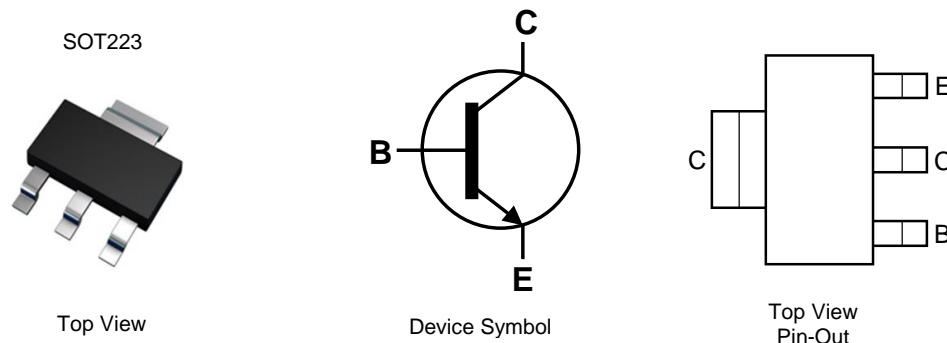
100V NPN HIGH PERFORMANCE TRANSISTOR IN SOT223

Features

- $BV_{CEO} > 100V$
- $I_C = 3A$ High Continuous Current
- $I_{CM} = 6A$ Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)} < 300mV @ 1A$
- Complementary PNP Type: FZT753
- **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 (E3)
- Weight: 0.112 grams (Approximate)

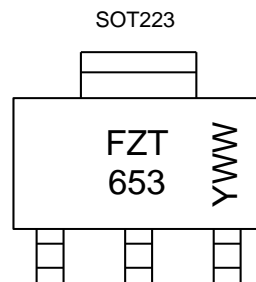


Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FZT653TA	AEC-Q101	FZT653	7	12	1,000
FZT653QTA	Automotive	FZT653	7	12	1,000
FZT653TC	AEC-Q101	FZT653	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 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/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



FZT 653 = 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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	120	V
Collector-Emitter Voltage	V _{CEO}	100	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	2	A
Peak Pulse Current	I _{CM}	6	A

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

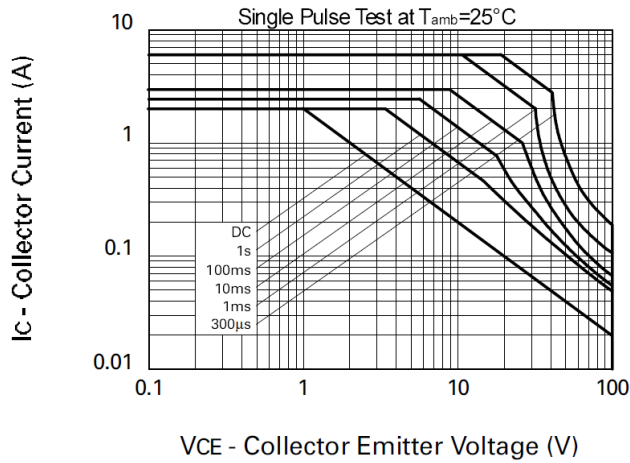
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 6)	3.0
		(Note 7)	2.0
		(Note 8)	1.6
		(Note 9)	1.2
Thermal Resistance, Junction to Ambient	R _{θJA}	(Note 6)	41.7
		(Note 7)	62.5
		(Note 8)	78.1
		(Note 9)	104
Thermal Resistance Junction to Lead	R _{θJL}	12.9	
Operating and Storage Temperature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

ESD Ratings (Note 11)

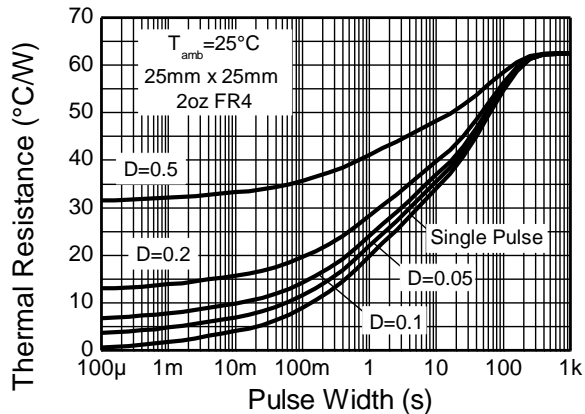
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

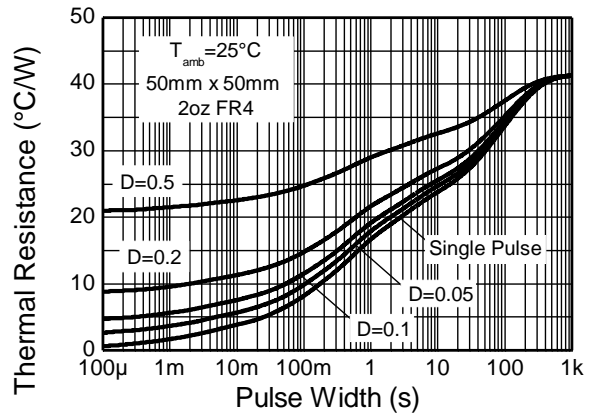
Thermal Characteristics and Derating Information



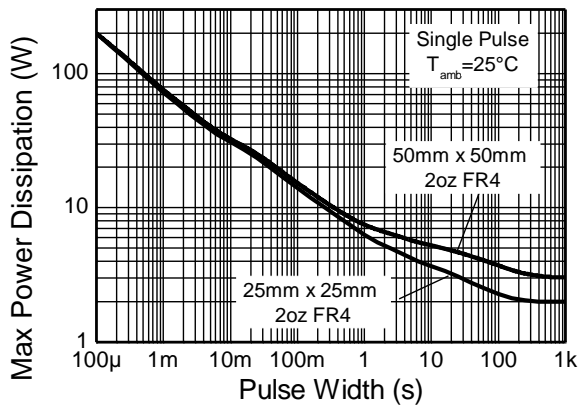
Safe Operating Area



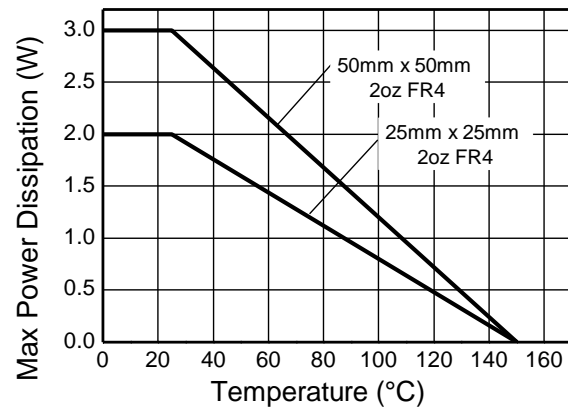
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



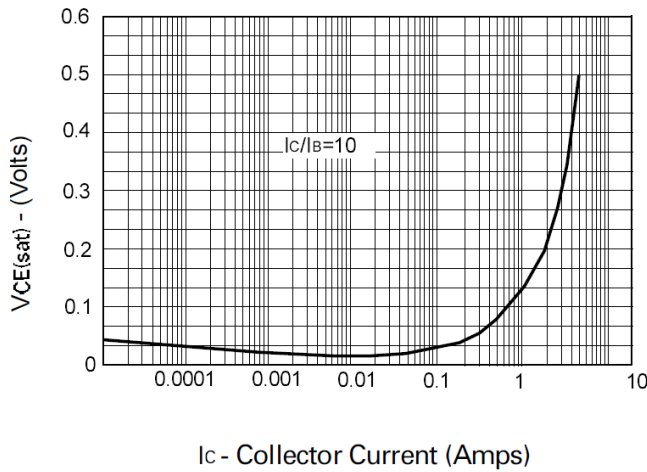
Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	120	–	–	V	$I_C = 100\mu A$
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	100	–	–	V	$I_C = 10mA$
Emitter-Base Breakdown Voltage	BV_{EBO}	7	–	–	V	$I_E = 100\mu A$
Collector Cut-Off Current	I_{CBO}	–	< 1	100	nA	$V_{CB} = 100V$
		–	–	10	μA	$V_{CB} = 100V, T_A = +125^\circ C$
Emitter Cut-Off Current	I_{EBO}	–	< 1	100	nA	$V_{EB} = 5.6V$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	–	0.13	0.3	V	$I_C = 1A, I_B = 100mA$
		–	0.23	0.5		$I_C = 2A, I_B = 200mA$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	–	0.9	1.25	V	$I_C = 1A, I_B = 100mA$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	–	0.8	1.0	V	$I_C = 1A, V_{CE} = 2V$
DC Current Gain (Note 11)	h_{FE}	70	200	–	–	$I_C = 50mA, V_{CE} = 2V$
		100	200	300		$I_C = 500mA, V_{CE} = 2V$
		55	110	–		$I_C = 1A, V_{CE} = 2V$
		25	55	–		$I_C = 2A, V_{CE} = 2V$
Current Gain-Bandwidth Product	f_T	140	175	–	MHz	$V_{CE} = 5V, I_C = 100mA, f = 100MHz$
Switching Times	t_{on}	–	80	–	ns	$I_C = 500mA, V_{CC} = 10V, I_{B1} = -I_{B2} = 50mA$
	t_{off}	–	1200	–		
Output Capacitance	C_{obo}	–	–	30	pF	$V_{CB} = 10V, f = 1MHz$

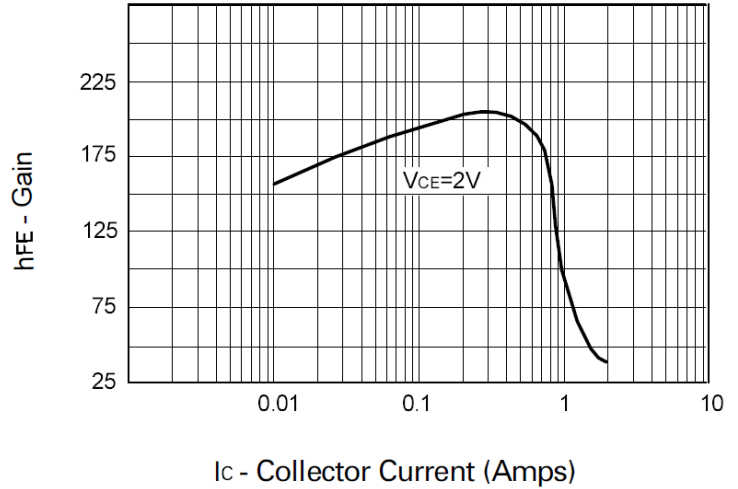
Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu s$. Duty cycle $\leq 2\%$.

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



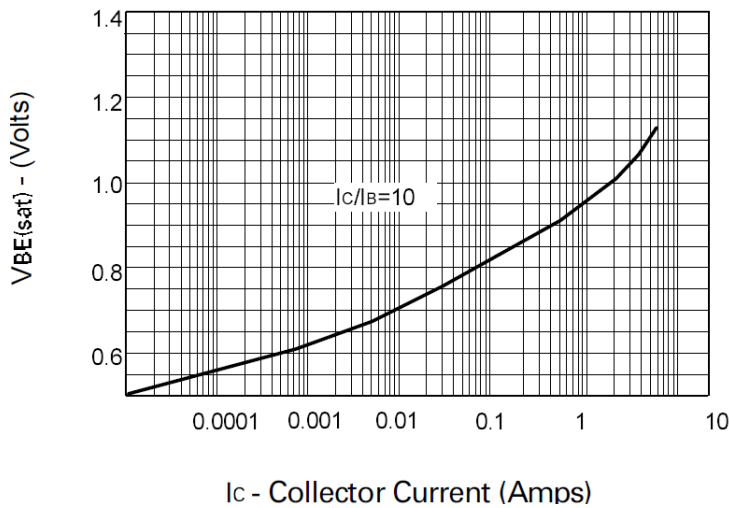
I_C - Collector Current (Amps)

$V_{CE(sat)}$ v I_C

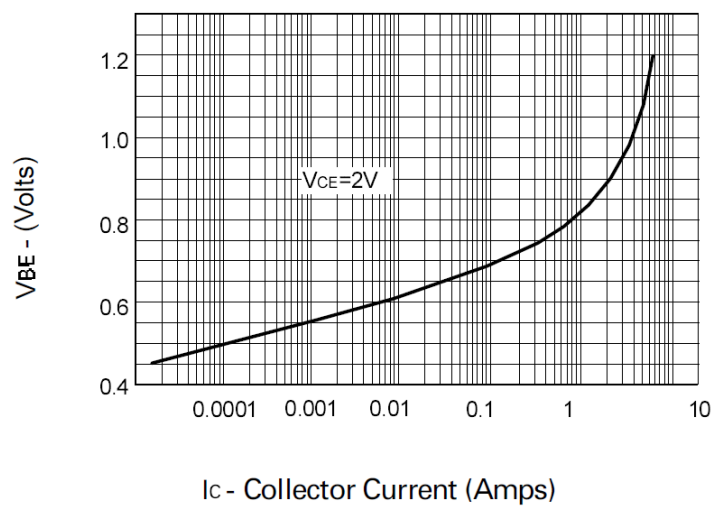


I_C - Collector Current (Amps)

h_{FE} v I_C

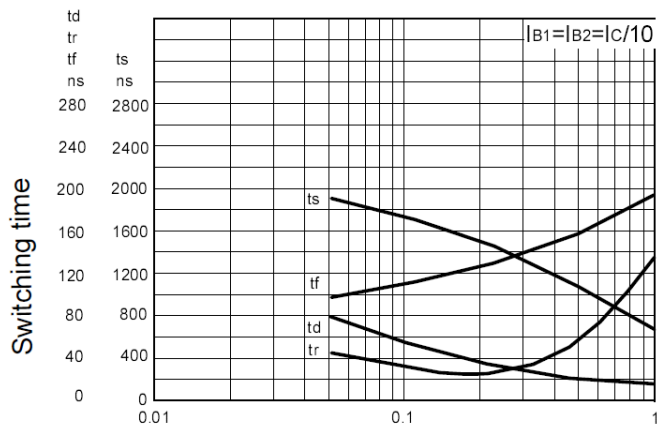


I_C - Collector Current (Amps)



I_C - Collector Current (Amps)

$V_{BE(on)}$ v I_C

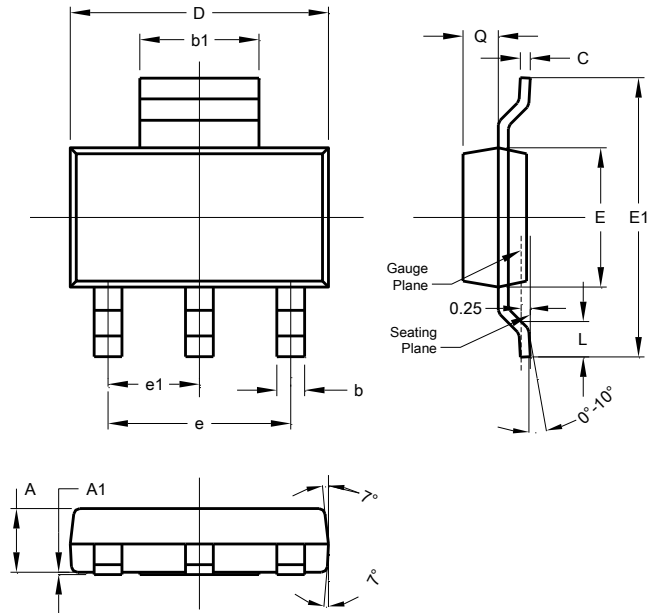


I_C - Collector Current (Amps)

Switching Speeds

Package Outline Dimensions

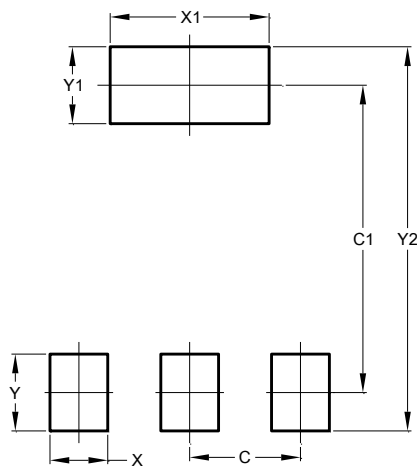
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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 voltage spacing between terminals.

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