

## Features

- $BV_{CEO} > 180V$
- $I_C = 0.5A$  Continuous Current
- $h_{FE} > 500$  for High Gain @ 0.1A
- Very Low Saturation Voltage
- Complementary PNP Type: DIODES™ FZT795A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Mechanical Data

- Package: SOT223
- Package 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 (3)
- Weight: 0.112 grams (Approximate)

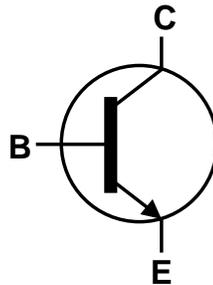
## Applications

- Darlington replacements
- Relay and solenoid drivers

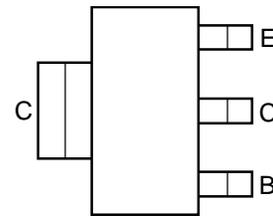
SOT223 (Type DN)



Top View



Device Symbol



Top View  
Pin-Out

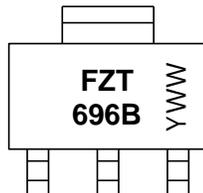
## Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
FZT696BTA	SOT223 (Type DN)	FZT696B	7	12	1,000	Reel
FZT696BTC	SOT223 (Type DN)	FZT696B	13	12	4,000	Reel

- 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

SOT223 (Type DN)



FZT696B = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 3 = 2023)  
 WW or  $\bar{W}W$  = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CB0}$	180	V
Collector-Emitter Voltage	$V_{CEO}$	180	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	0.5	A
Peak Pulse Current	$I_{CM}$	1	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	(Note 5)	3
		(Note 6)	2
		(Note 7)	1.6
		(Note 8)	1.2
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Note 5)	41.7
		(Note 6)	62.5
		(Note 7)	78.1
		(Note 8)	104
Thermal Resistance Junction to Lead	$R_{\theta JL}$	12.9	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**ESD Ratings** (Note 10)

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 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**

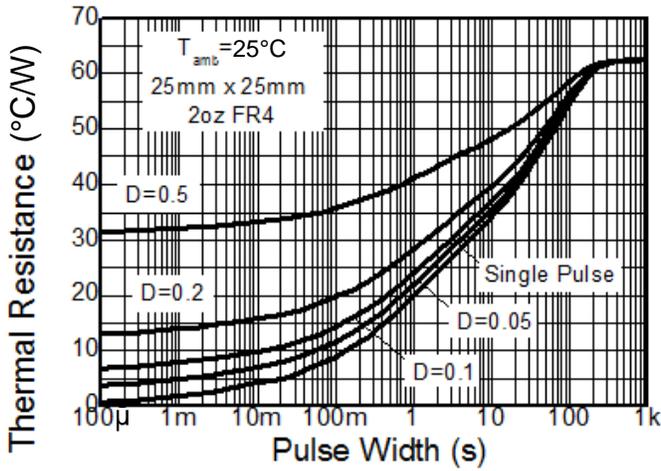


Figure 1. Transient Thermal Impedance

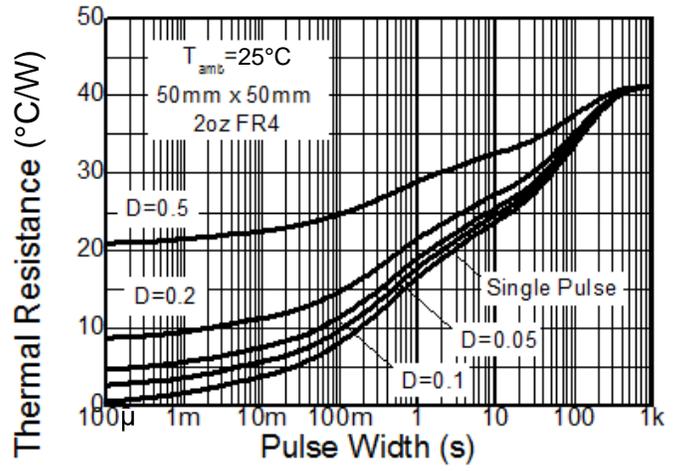


Figure 2. Transient Thermal Impedance

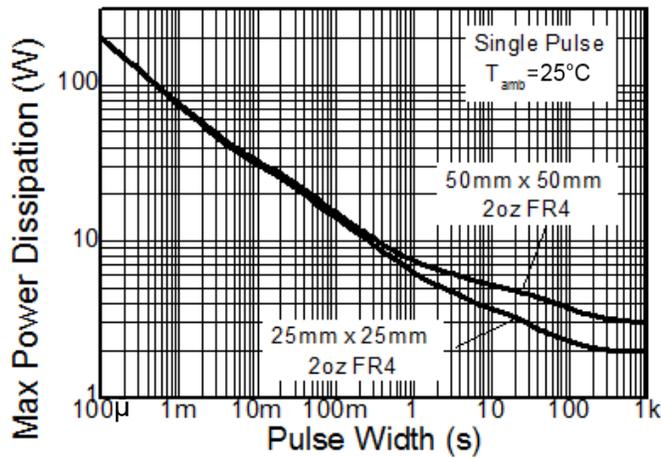


Figure 3. Pulse Power Dissipation

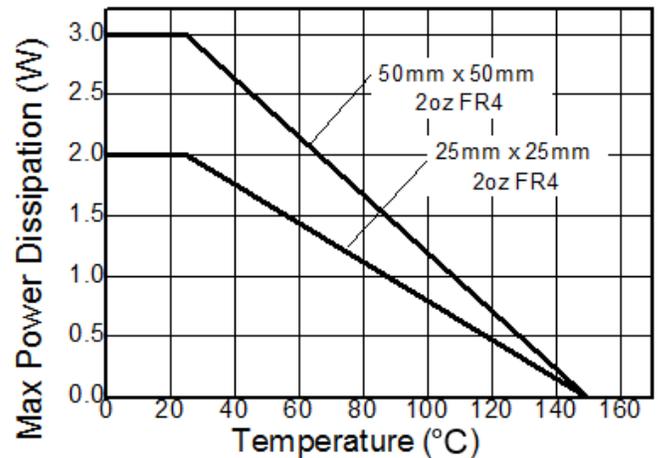


Figure 4. Derating Curve

**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>	180	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV <sub>CEO</sub>	180	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EB0</sub>	7	—	—	V	I <sub>E</sub> = 100μA
Collector-Base Cut-Off Current	I <sub>CB0</sub>	—	—	100	nA	V <sub>CB</sub> = 140V
Emitter Cut-Off Current	I <sub>EB0</sub>	—	—	50	nA	V <sub>EB</sub> = 6V
DC Current Gain (Note 11)	h <sub>FE</sub>	500 150	— —	— —	— —	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5V I <sub>C</sub> = 200mA, V <sub>CE</sub> = 5V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	— — —	— — —	200 200 250	mV	I <sub>C</sub> = 50mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 2mA I <sub>C</sub> = 200mA, I <sub>B</sub> = 5mA
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	—	—	0.9	V	I <sub>C</sub> = 200mA, I <sub>B</sub> = 50mA
Base-Emitter Turn-On Voltage (Note 11)	V <sub>BE(on)</sub>	—	—	0.9	V	I <sub>C</sub> = 200mA, V <sub>CE</sub> = 5V
Input Capacitance	C <sub>ibo</sub>	—	200	—	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
Output Capacitance	C <sub>obo</sub>	—	6	—	pF	V <sub>CB</sub> = 10V, f = 1MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	130	—	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 50mA, f = 50MHz
Turn-On Time	t <sub>on</sub>	—	80	—	ns	V <sub>CC</sub> = 50V, I <sub>C</sub> = 100mA,
Turn-Off Time	t <sub>off</sub>	—	4400	—	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 10mA

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

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

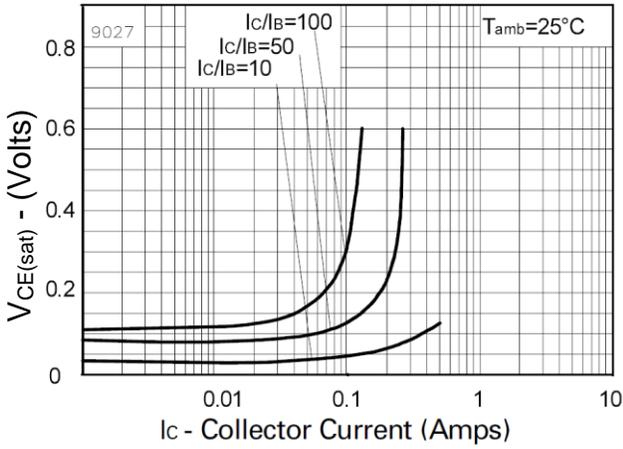


Figure 5. V<sub>CE(sat)</sub> vs. I<sub>c</sub>

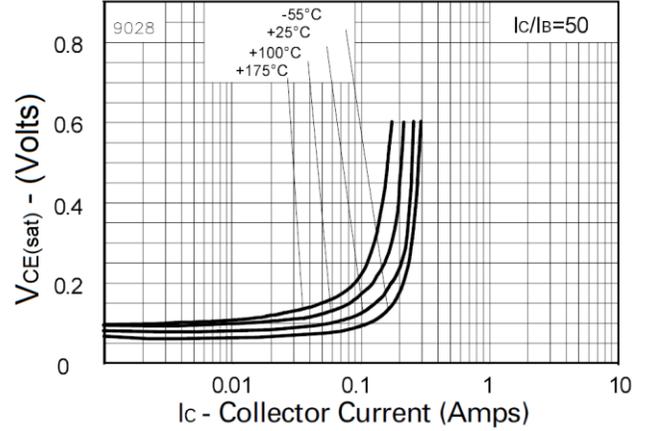


Figure 6. V<sub>CE(sat)</sub> vs. I<sub>c</sub>

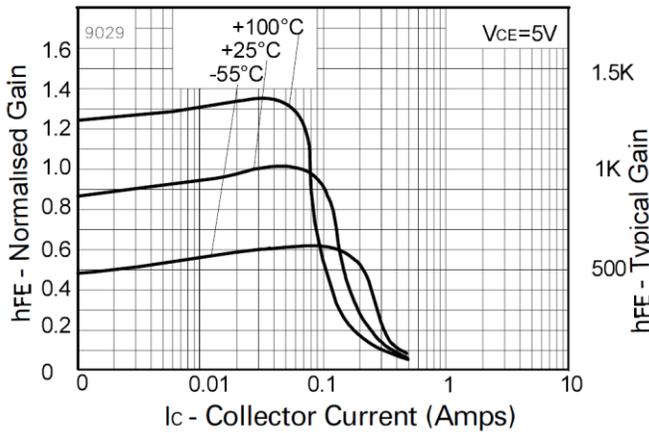


Figure 7. h<sub>FE</sub> vs. I<sub>c</sub>

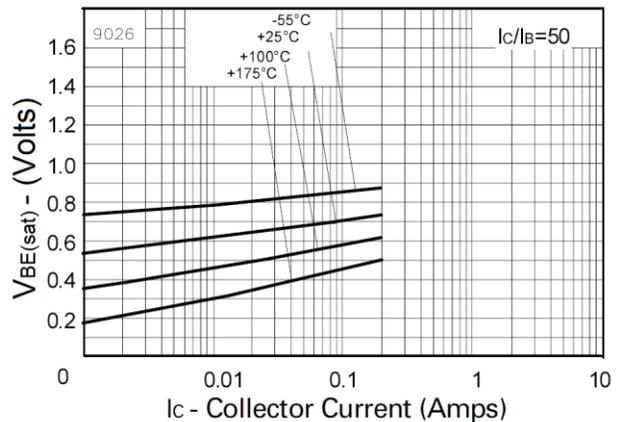


Figure 8. V<sub>BE(sat)</sub> vs. I<sub>c</sub>

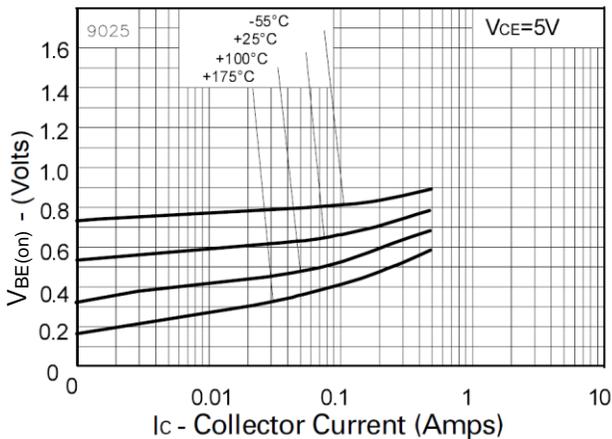
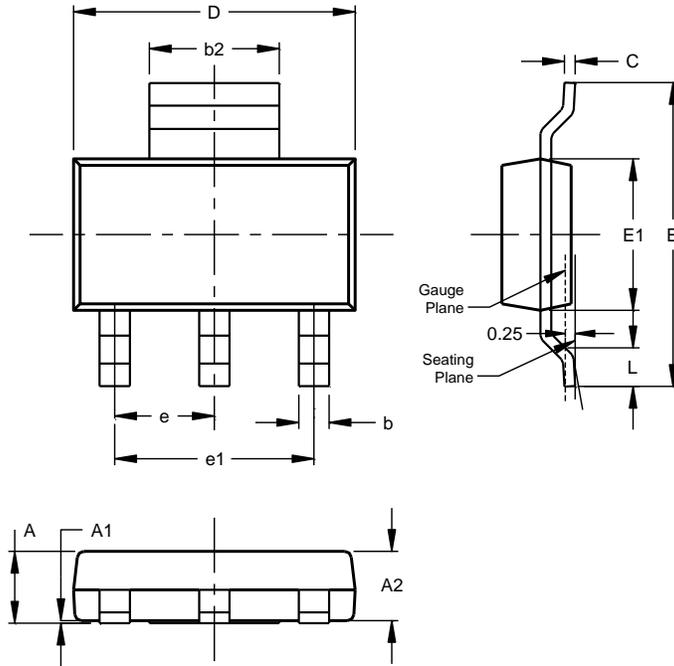


Figure 9. V<sub>BE(on)</sub> vs. I<sub>c</sub>

## Package Outline Dimensions

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

SOT223 (Type DN)

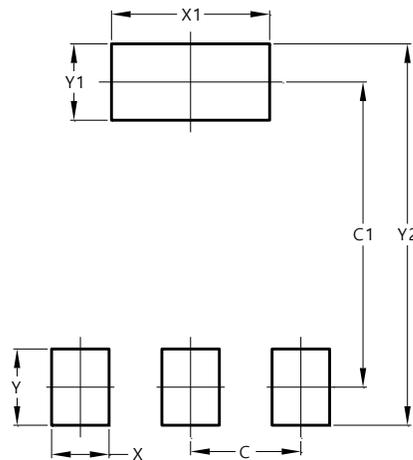


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

## Suggested Pad Layout

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

SOT223 (Type DN)



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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