

Features

- $BV_{CEO} > 20V$
- $BV_{CBO} > 20V$
- $I_C = 3.0A$ High Continuous Current
- $h_{FE} > 400 @ 2A$ and Low Saturation Voltage
- $V_{CE(sat)} < 450mV$ at 3A
- Complementary PNP Type: DIODES™ FZT789B
- **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/>**

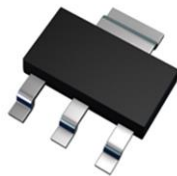
Mechanical Data

- 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 Ⓔ
- Weight: 0.112 grams (Approximate)

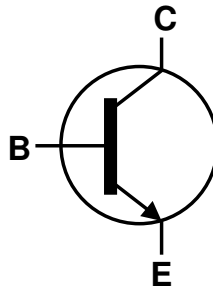
Applications

- Darlington replacements
- Flash gun convertors and battery powered circuits

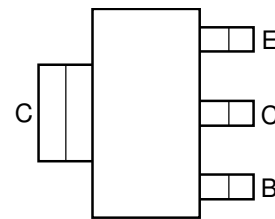
SOT223 (Type DN)



Top View



Device Symbol



Top View
Pin-Out

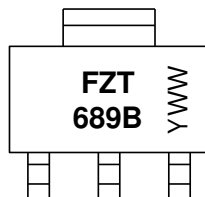
Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
FZT689BTA	SOT223 (Type DN)	FZT689B	7	12	1,000	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)



FZT689B = 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}	20	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Peak Pulse Current	I_{CM}	8	A

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

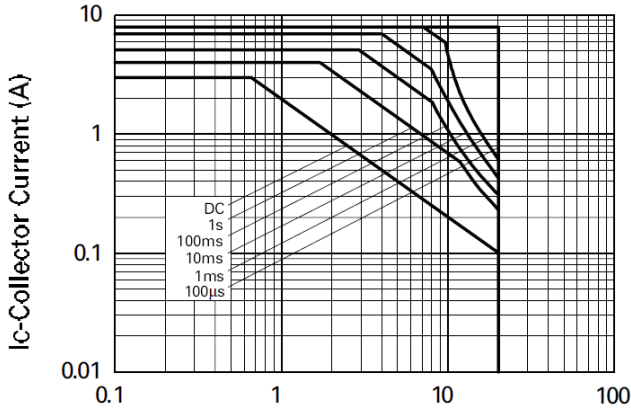
Characteristic	Symbol	Value	Unit	
Power Dissipation	P_D	(Note 5)	3	W
		(Note 6)	2	
		(Note 7)	1.6	
		(Note 8)	1.2	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Note 5)	41.7	$^\circ\text{C/W}$
		(Note 6)	62.5	
		(Note 7)	78.1	
		(Note 8)	104	
Thermal Resistance Junction to Lead	$R_{\theta JL}$	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



VCE - Collector Emitter Voltage (V)
Figure 1. Safe Operating Area

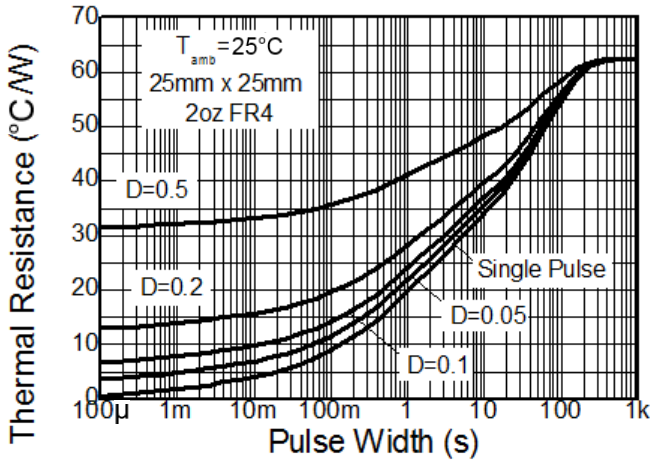


Figure 2. Transient Thermal Impedance

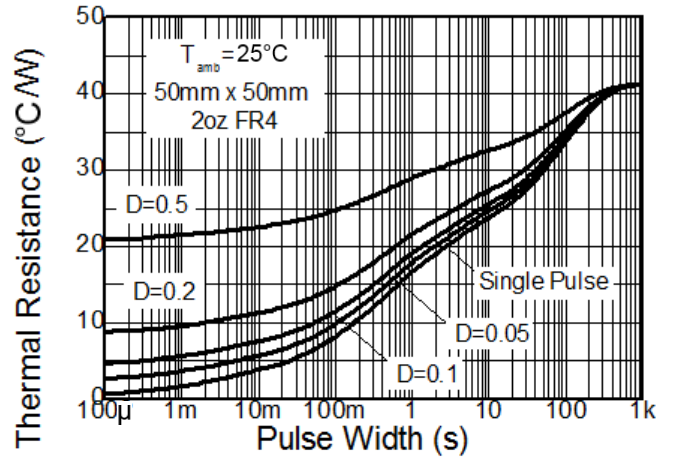


Figure 3. Transient Thermal Impedance

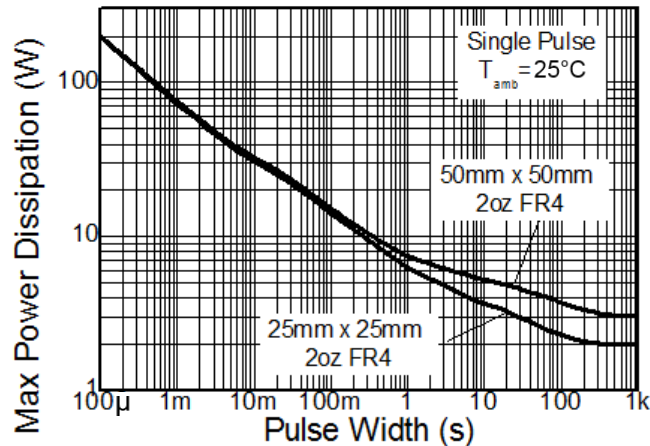


Figure 4. Pulse Power Dissipation

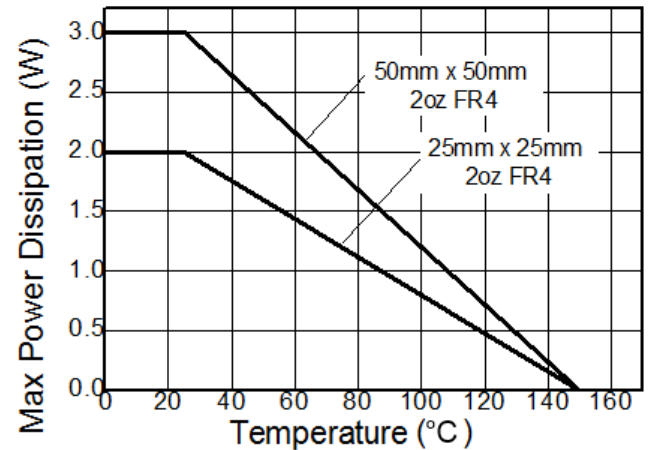


Figure 5. Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	20	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 11)	BV _{CEO}	20	—	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	BV _{EBO}	7	—	—	V	I _E = 100μA
Collector-Base Cut-Off Current	I _{CBO}	—	—	50	nA	V _{CB} = 16V
Emitter Cut-Off Current	I _{EBO}	—	—	50	nA	V _{EB} = 6V
DC Current Gain (Note 11)	h _{FE}	500	—	—	—	I _C = 0.1A, V _{CE} = 2V
		400	—	—		I _C = 2A, V _{CE} = 2V
		150	—	—		I _C = 6A, V _{CE} = 2V
Collector-Emitter Saturation Voltage (Note 11)	V _{CE(sat)}	—	—	100	mV	I _C = 0.1A, I _B = 0.5mA
		—	—	500		I _C = 2A, I _B = 10mA
		—	—	450		I _C = 3A, I _B = 20mA
Base-Emitter Saturation Voltage (Note 11)	V _{BE(sat)}	—	—	0.9	V	I _C = 1A, I _B = 10mA
Base-Emitter Turn-On Voltage (Note 11)	V _{BE(on)}	—	—	0.9	V	I _C = 1A, V _{CE} = 2V
Input Capacitance	C _{ibo}	—	200	—	pF	V _{EB} = 0.5V, f = 1MHz
Output Capacitance	C _{obo}	—	16	—	pF	V _{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f _T	150	—	—	MHz	V _{CE} = 5V, I _C = 50mA, f = 50MHz
Turn-On Time	t _{on}	—	30	—	ns	V _{CC} = 10V, I _C = 500mA,
Turn-Off Time	t _{off}	—	800	—	ns	I _{B1} = -I _{B2} = 50mA

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

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

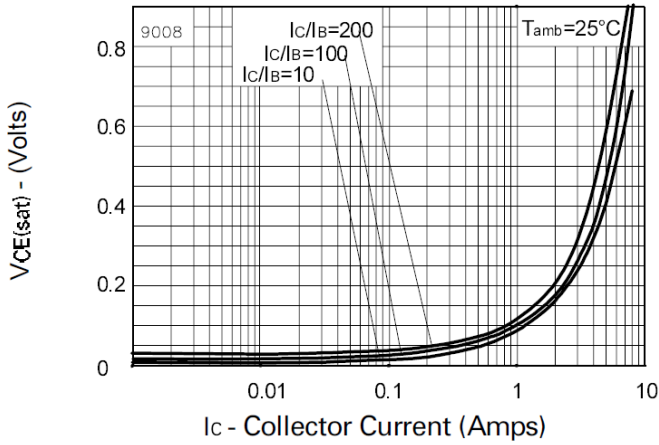


Figure 6. $V_{CE(sat)}$ vs. I_C

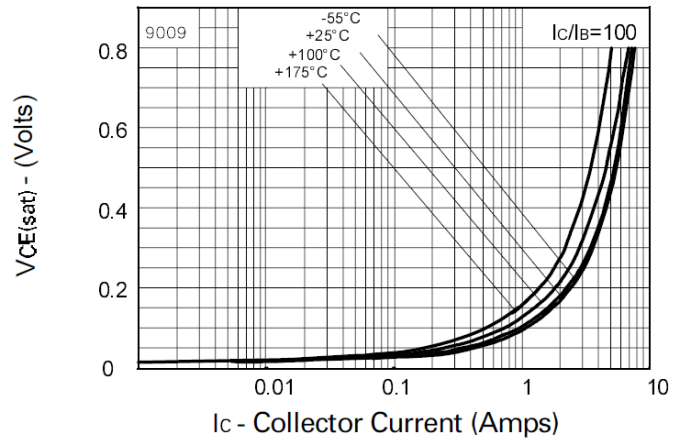


Figure 7. $V_{CE(sat)}$ vs. I_C

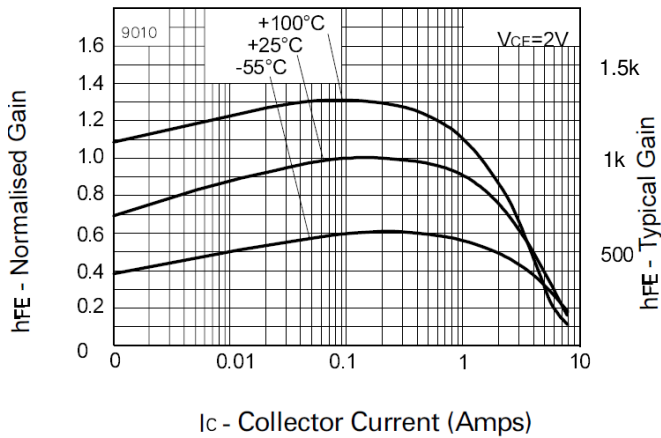


Figure 8. h_{FE} vs. I_C

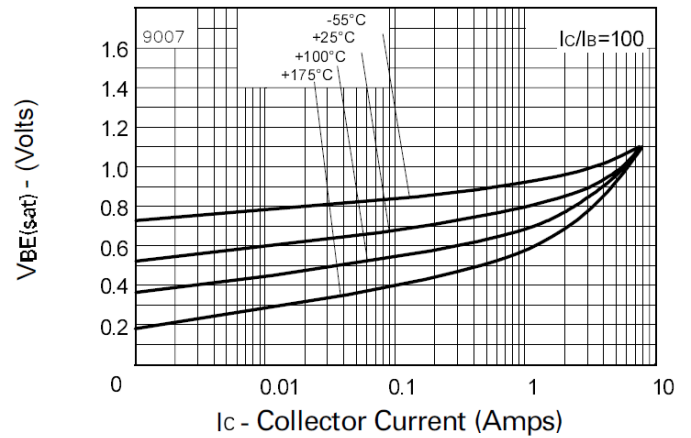


Figure 9. $V_{BE(sat)}$ vs. I_C

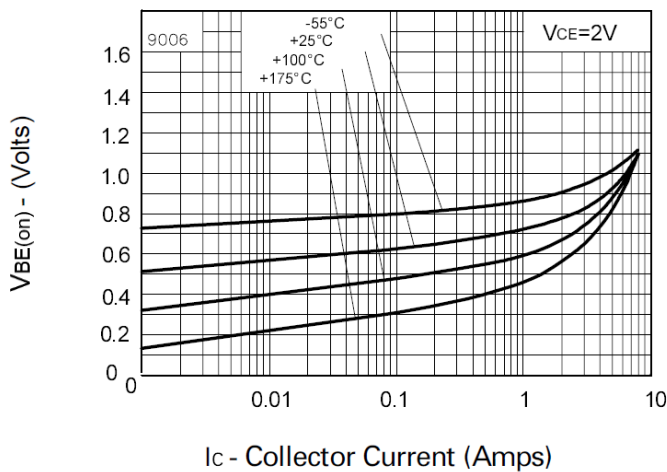
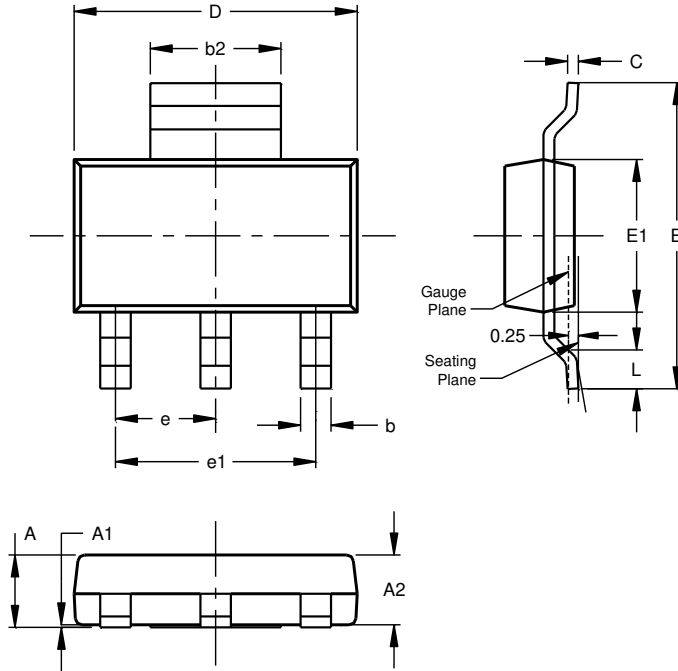


Figure 10. $V_{BE(on)}$ vs. I_C

Package Outline Dimensions

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

SOT223 (Type DN)

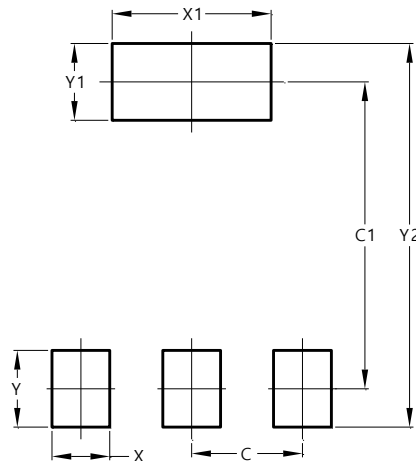


SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

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

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