120V PNP DARLINGTON TRANSISTOR IN SOT223

Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive requirements.

Features

- BV_{CEO} > -120V
- BV_{CBO} > -140V
- I_C = -2A High Continuous Current
- h_{FE} > 2k for High Gain @ -2A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The FZT705Q is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949: 2016 certified facilities.**

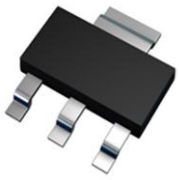
Mechanical Data

- 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)

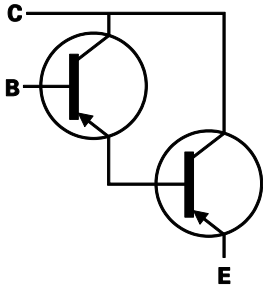
Applications

- Lamp
- Relay
- Solenoid Driving

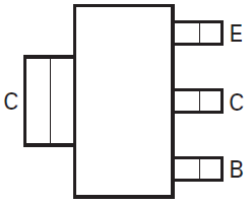
SOT223



Top View



Device Symbol



Top View
Pin-Out

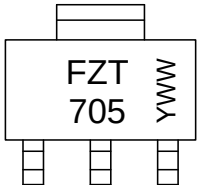
Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FZT705QTA	Automotive	FZT705	7	12	1,000

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



FZT 705 = Product Type Marking Code
YWW = Date Code Marking
Y or $\overline{Y}$ = Last Digit of Year (ex: 9 = 2019)
WW or $\overline{W}W$ = Week Code (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-140	V
Collector-Emitter Voltage	V_{CEO}	-120	V
Emitter-Base Voltage	V_{EBO}	-12	V
Continuous Collector Current	I_C	-2	A
Peak Pulse Current	I_{CM}	-4	A

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

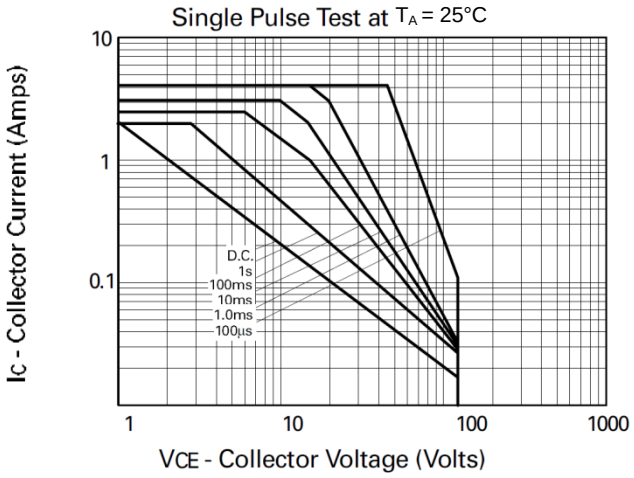
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	3.0	W
	(Note 6)		2.0	
	(Note 7)		1.6	
	(Note 8)		1.2	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	41.7	°C/W
	(Note 6)		62.5	
	(Note 7)		78.1	
	(Note 8)		104	
Thermal Resistance Junction to Lead	(Note 9)	$R_{\theta JL}$	12.9	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

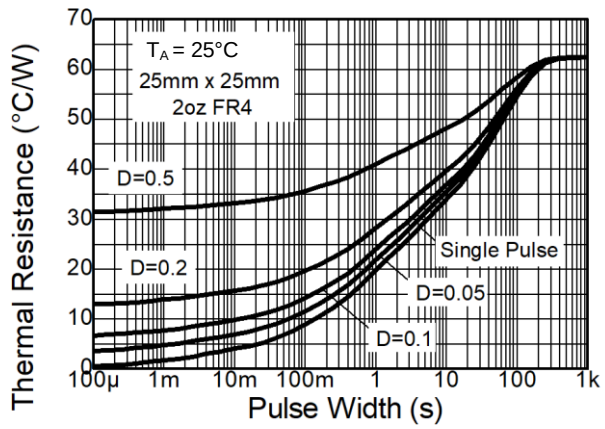
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2
Electrostatic Discharge - Machine Model	ESD MM	≥ 200	V	B

Notes:
5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR-4 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.

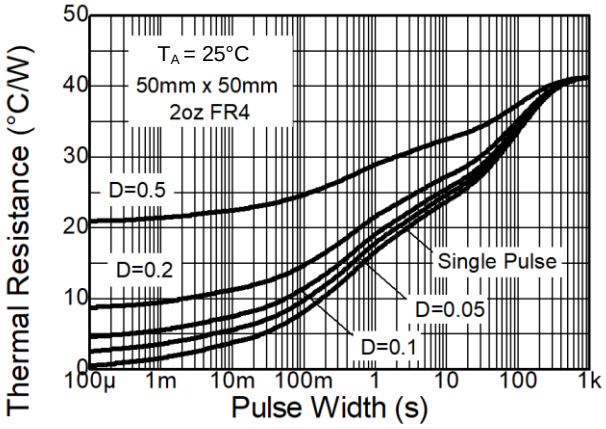
Thermal Characteristics and Derating Information



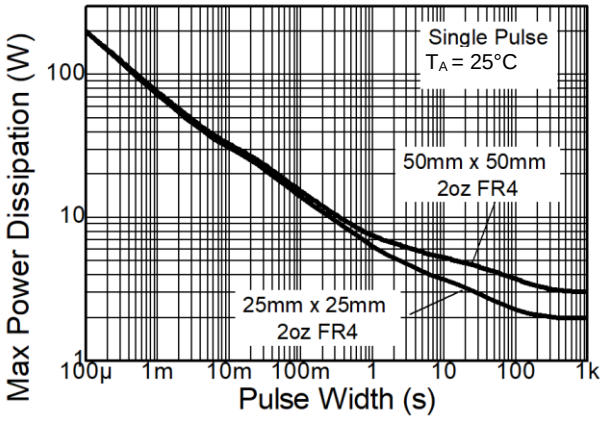
Safe Operating Area



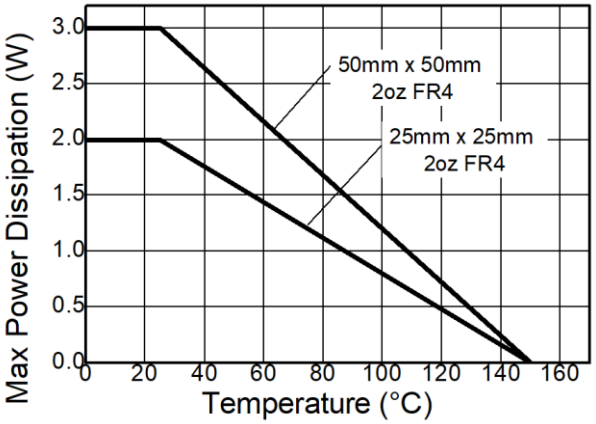
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



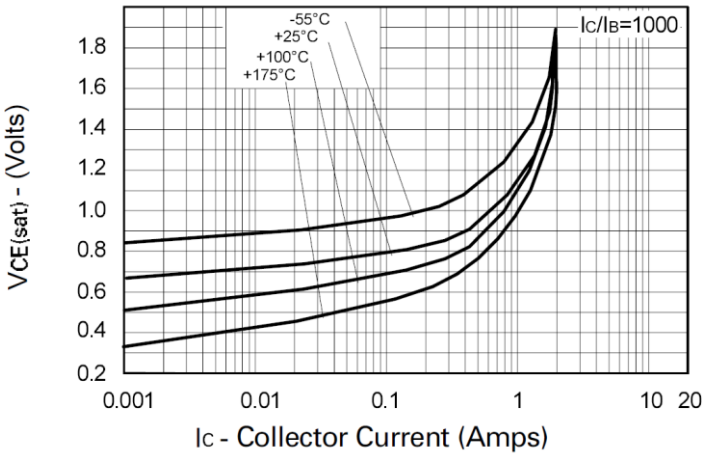
Derating Curve

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

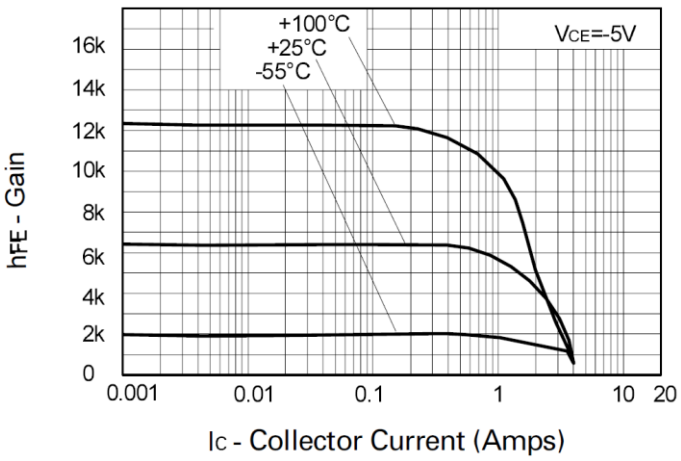
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-140	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	-120	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-12	—	—	V	I_E = -100µA
Collector-Base Cut-Off Current	I_{CBO}	—	—	-100	nA	V_{CB} = -120V
				-10	µA	V_{CB} = -120V, T_A = +100°C
Collector-Emitter Cut-Off Current	I_{CES}	—	—	-10	µA	V_{CE} = -80V
Emitter Cut-Off Current	I_{EBO}	—	—	-100	nA	V_{EB} = -8V
DC Current Gain (Note 11)	h_{FE}	3,000	—	—	—	I_C = -10mA, V_{CE} = -5V
		3,000	—	—		I_C = -100mA, V_{CE} = -5V
		3,000	—	30,000		I_C = -1A, V_{CE} = -5V
		2,000	—	—		I_C = -2A, V_{CE} = -5V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	—	—	-1.3	V	I_C = -1A, I_B = -1mA
		—	—	-2.5		I_C = -2A, I_B = -2mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	—	—	-1.8	V	I_C = -1A, I_B = -10mA
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	—	-1.7	V	I_C = -1A, V_{CE} = -5V
Output Capacitance	C_{obo}	—	15	—	pF	V_{EB} = -10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	—	160	—	MHz	V_{CE} = -10V, I_C = -100mA, f = 20MHz
Turn-On Time	t_{ON}	—	0.6	—	µs	V_{CC} = -10V, I_C = -500mA
Turn-Off Time	t_{OFF}	—	0.8	—	µs	I_{B1} = -I_{B2} = -0.5mA

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

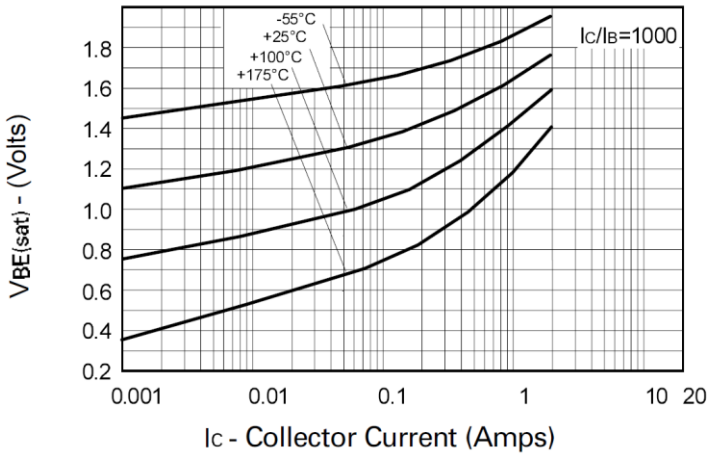
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



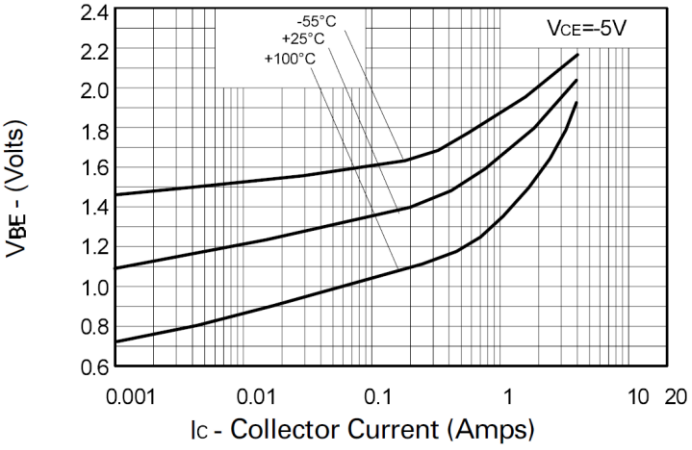
VCE(sat) v IC



hFE v IC



VBE(sat) v IC



VBE(on) v IC

Package Outline Dimensions

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

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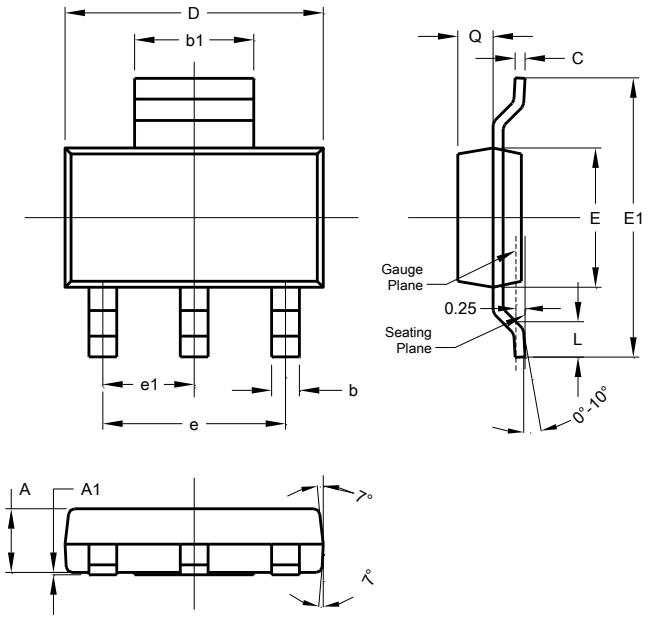
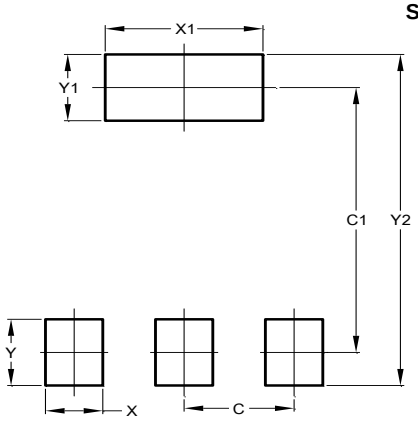


SOT223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	—	—	4.60
e1	—	—	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

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

SOT223



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

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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