

## Features

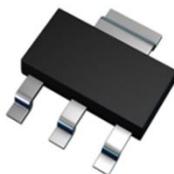
- $BV_{CEO} > -30V$
- $I_C = -5.5A$  High Continuous Collector Current
- $I_C = -20A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < -140mV @ -1A$
- $h_{FE}$  Specified up to -20A for a High Gain Hold-up
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ FZT949Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

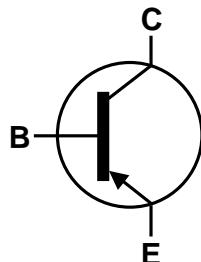
## Mechanical Data

- 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 (E3)
- Weight: 0.112 grams (Approximate)

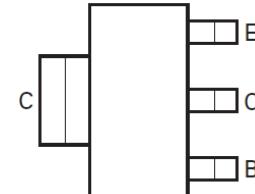
SOT223 (Type ZN)



Top View



Device Symbol



Top View  
Pin-Out

## Ordering Information (Note 4)

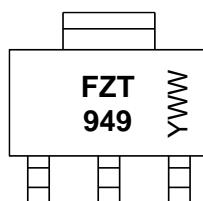
Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
FZT949QTA	SOT223 (Type ZN)	FZT949	7	12	1,000	Reel

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 ZN)



FZT 949 = Product Type Marking Code

YWW = Date Code Marking

Y or  $\bar{Y}$  = Last Digit of Year (ex: 3 = 2023)

WW or  $\bar{WW}$  = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-50	V
Collector-Emitter Voltage	$V_{CEO}$	-30	V
Emitter-Base Voltage	$V_{EBO}$	-7	V
Continuous Collector Current	$I_C$	-5.5	A
Peak Pulse Current	$I_{CM}$	-20	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	$P_D$	3.0	W mW/ $^\circ\text{C}$
		24	
Linear Derating Factor (Note 6)		1.6	$^\circ\text{C/W}$
		12.8	
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	42	$^\circ\text{C/W}$
		78	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	8.8	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

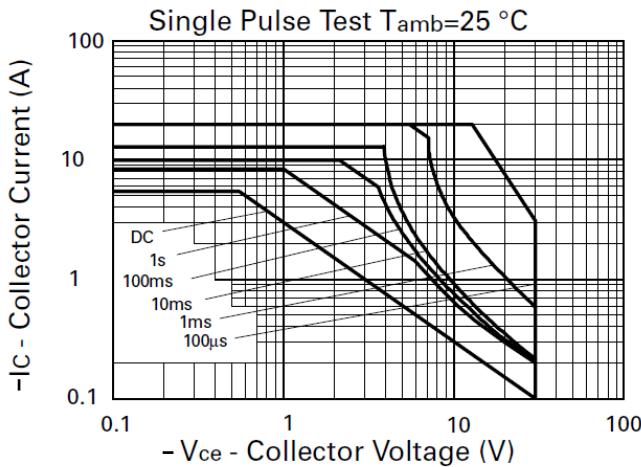
**ESD Ratings** (Note 8)

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

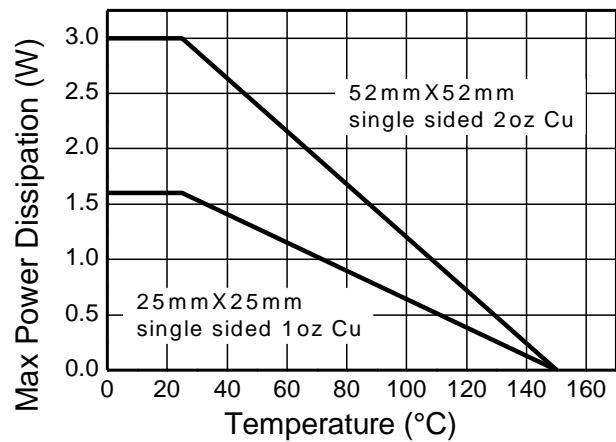
Notes:

5. For a device mounted with the collector lead on 52mm x 52mm 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 mounted on 25mm x 25mm 1oz 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.

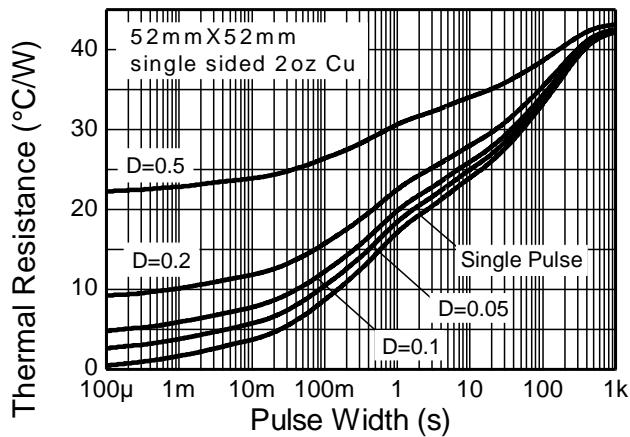
## Thermal Characteristics and Derating Information



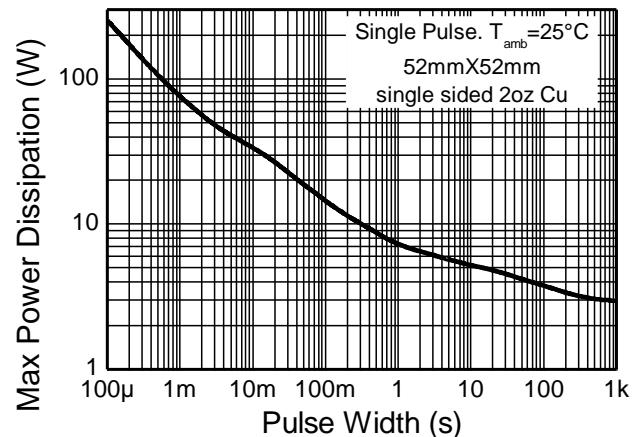
**Figure 1. Safe Operating Area**



**Figure 2. Derating Curve**



**Figure 3. Transient Thermal Impedance**



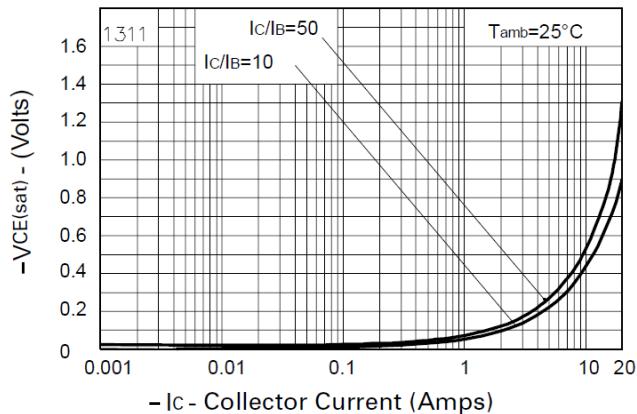
**Figure 4. Pulse Power Dissipation**

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

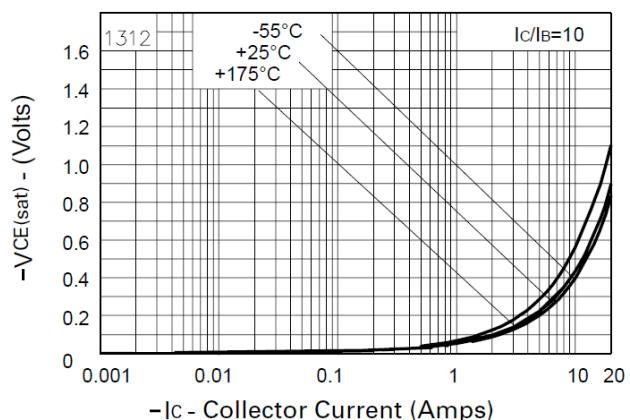
Characteristic	Symbol	Min	Typ.	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	-50	-80	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$\text{BV}_{\text{CER}}$	-50	-80	—	V	$I_C = -1\mu\text{A}, R_B \leq 1\text{k}\Omega$
Collector-Emitter Breakdown Voltage (Note 9)	$\text{BV}_{\text{CEO}}$	-30	-45	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	-7	-8	—	V	$I_E = -100\mu\text{A}$
Collector Cut-Off Current	$I_{\text{CBO}}$	—	—	-50	nA	$V_{\text{CB}} = -40\text{V}$
		—	—	-1	$\mu\text{A}$	$V_{\text{CB}} = -40\text{V}, T_A = +100^\circ\text{C}$
Collector Cut-Off Current	$I_{\text{CER}}$	—	—	-50	nA	$V_{\text{CE}} = -40\text{V}, R \leq 1\text{k}\Omega$
		—	—	-1	$\mu\text{A}$	$V_{\text{CE}} = -40\text{V}, T_A = +100^\circ\text{C}$
Emitter Cut-Off Current	$I_{\text{EBO}}$	—	—	-10	nA	$V_{\text{EB}} = -6\text{V}$
DC Current Transfer Static Ratio (Note 9)	$\text{h}_{\text{FE}}$	100	200	—	—	$I_C = -10\text{mA}, V_{\text{CE}} = -1\text{V}$
		100	200	300		$I_C = -1\text{A}, V_{\text{CE}} = -1\text{V}$
		75	140	—		$I_C = -5\text{A}, V_{\text{CE}} = -1\text{V}$
		—	35	—		$I_C = -20\text{A}, V_{\text{CE}} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{\text{CE}(\text{sat})}$	—	-50	-75	mV	$I_C = -500\text{mA}, I_B = -20\text{mA}$
		—	-85	-140		$I_C = -1\text{A}, I_B = -20\text{mA}$
		—	-190	-270		$I_C = -2\text{A}, I_B = -200\text{mA}$
		—	-350	-440		$I_C = -5.5\text{A}, I_B = -500\text{mA}$
Base-Emitter Saturation Voltage (Note 9)	$V_{\text{BE}(\text{sat})}$	—	-1,100	-1,250	mV	$I_C = -5.5\text{A}, I_B = -500\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{\text{BE}(\text{on})}$	—	-900	-1,060	mV	$I_C = -5.5\text{A}, V_{\text{CE}} = -1\text{V}$
Transitional Frequency (Note 9)	$f_T$	—	100	—	MHz	$I_C = -100\text{mA}, V_{\text{CE}} = -10\text{V}$ $f = 50\text{MHz}$
Output Capacitance	$C_{\text{obo}}$	—	122	—	pF	$V_{\text{CB}} = -10\text{V}, f = 1\text{MHz}$
Switching Time	$t_{\text{on}}$	—	120	—	ns	$V_{\text{CC}} = -10\text{V}, I_C = -4\text{A}$
	$t_{\text{off}}$	—	130	—		$I_{B1} = -I_{B2} = -400\text{mA}$

Note: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

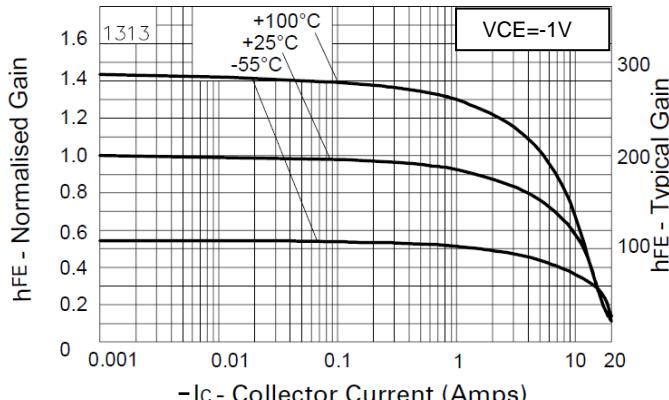
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



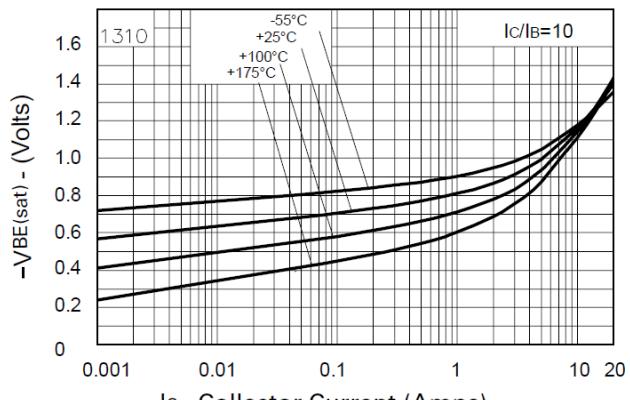
**Figure 5.  $V_{CE(\text{sat})} \text{ v } I_c$**



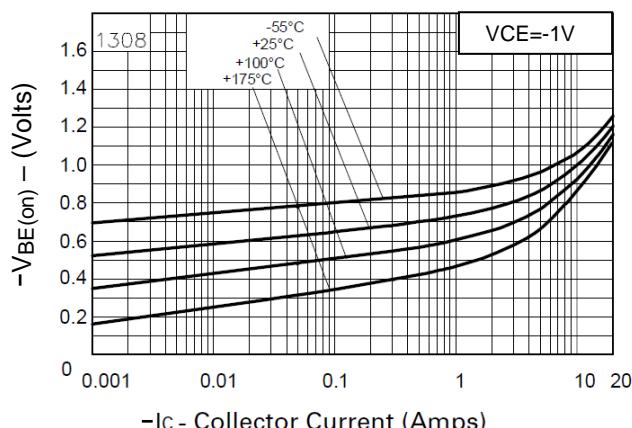
**Figure 6.  $V_{CE(\text{sat})} \text{ v } I_c$**



**Figure 7.  $h_{FE} \text{ v } I_c$**



**Figure 8.  $V_{BE(\text{sat})} \text{ v } I_c$**

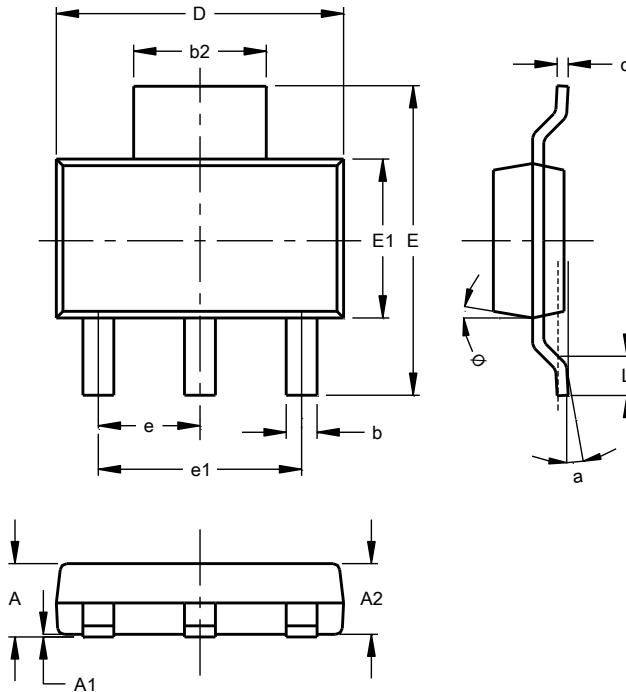


**Figure 9.  $V_{BE(\text{on})} \text{ v } I_c$**

## Package Outline Dimensions

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

SOT223 (Type ZN)



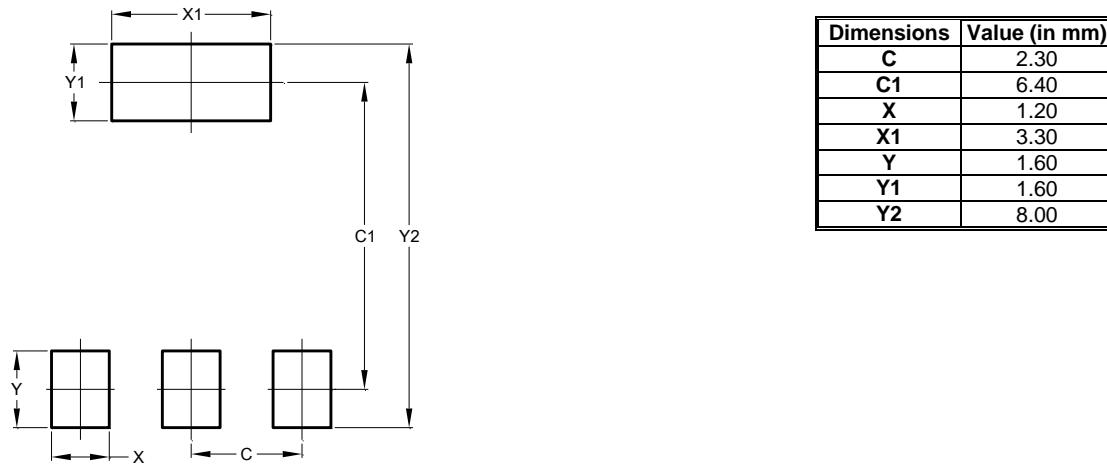
SOT223 (Type ZN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.02	0.10	--
A2	1.50	1.68	1.60
b	0.60	0.80	--
b2	2.90	3.10	--
c	0.24	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	2.30 NOM		
e1	4.60 NOM		
L	0.90	--	--
a	--	--	10°
Θ	--	15°	--

All Dimensions in mm

## Suggested Pad Layout

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

SOT223 (Type ZN)



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