

## Features

- $BV_{CEO} > 17.5V$
- $BV_{CES} > 50V$
- $I_C = 5A$  High Continuous Collector Current
- $I_{CM} = 20A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(sat)} < 45mV$  @ 500mA
- $R_{SAT} = 50m\Omega$  @ 5A for a Low Equivalent On-Resistance
- $h_{FE}$  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)
- 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/quality/product-definitions/) or your local Diodes representative.

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

## Mechanical Data

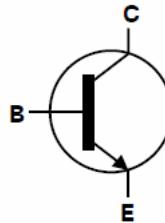
- Package: SOT223
- Package Material: Molded Plastic. "Green" Molding Compound
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads.
- Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.112 grams (Approximate)

## Applications

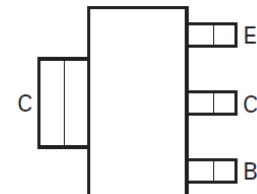
- Solenoids, relays, and actuator drivers
- DC modules
- Motor controls



Top View



Device Symbol



Top View  
Pin-Out

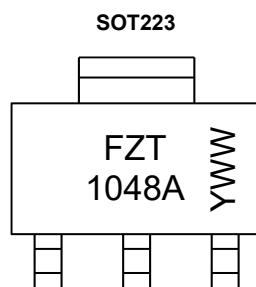
## Ordering Information (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
FZT1048ATA	FZT1048A	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



FZT1048A = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 2 = 2022)  
 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	$V_{CEO}$	17.5	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	5	A
Peak Pulse Current	$I_{CM}$	20	A
Base Current	$I_B$	500	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	3.0	W
		2.0	
		1.6	
		1.2	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	41.7	°C/W
		62.5	
		78.1	
		104	
Thermal Resistance Junction to Lead	$R_{\theta JL}$	10.9	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

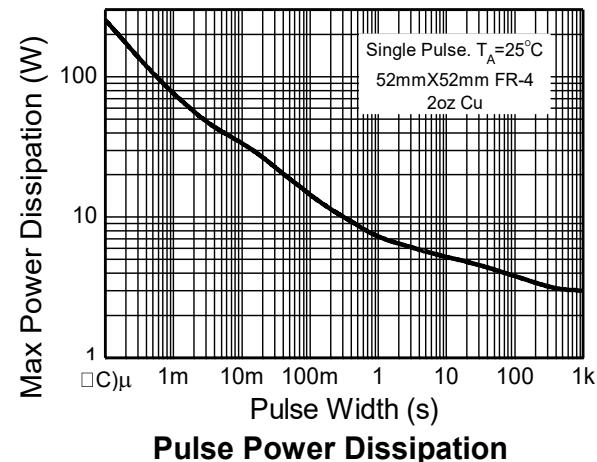
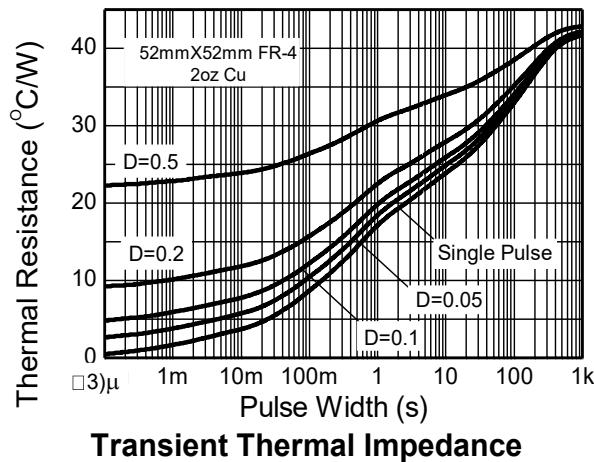
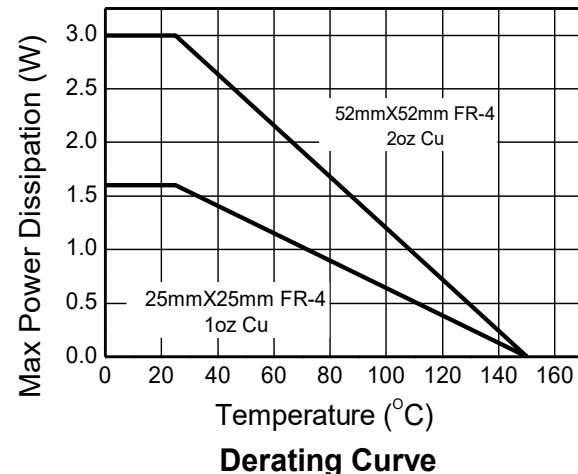
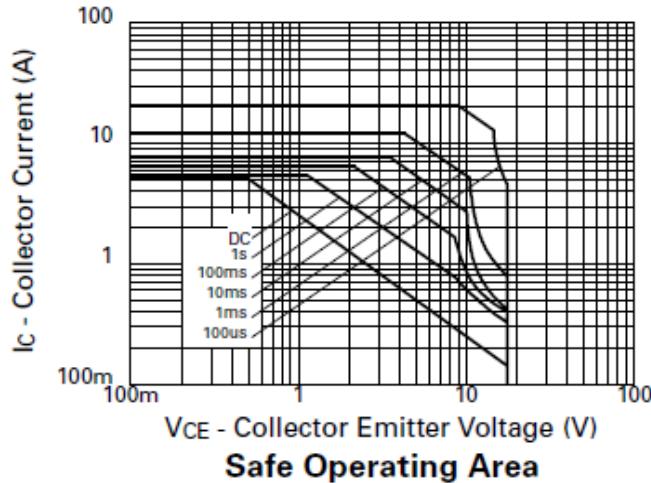
**ESD Ratings** (Note 10)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	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 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

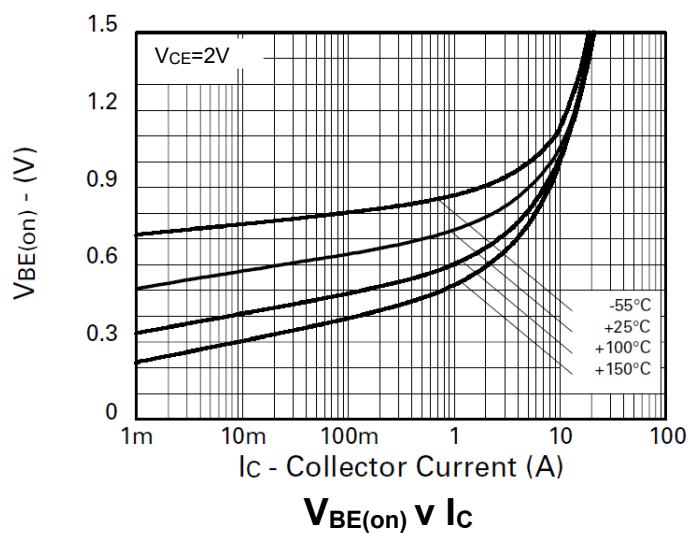
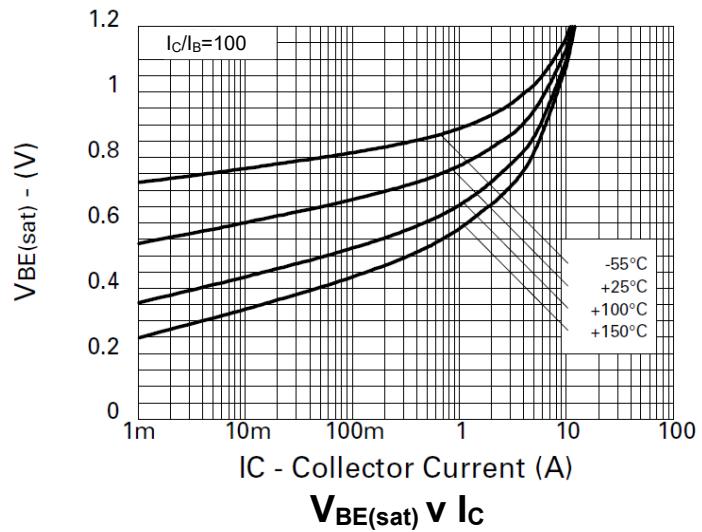
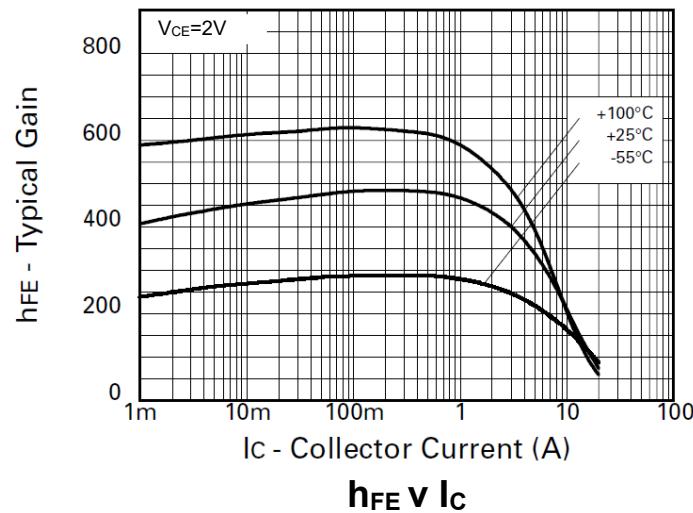
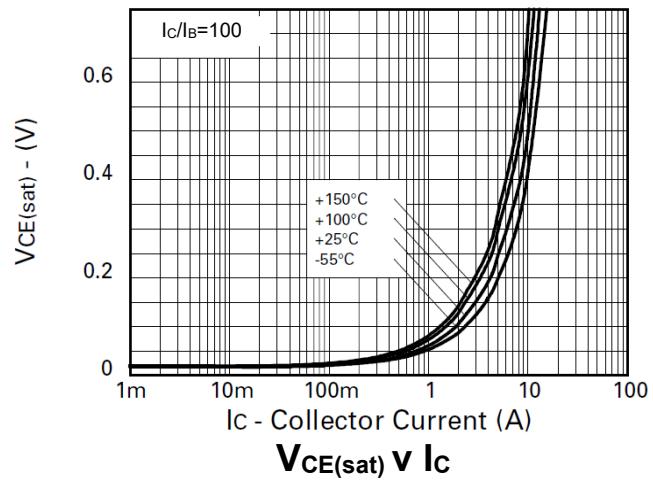
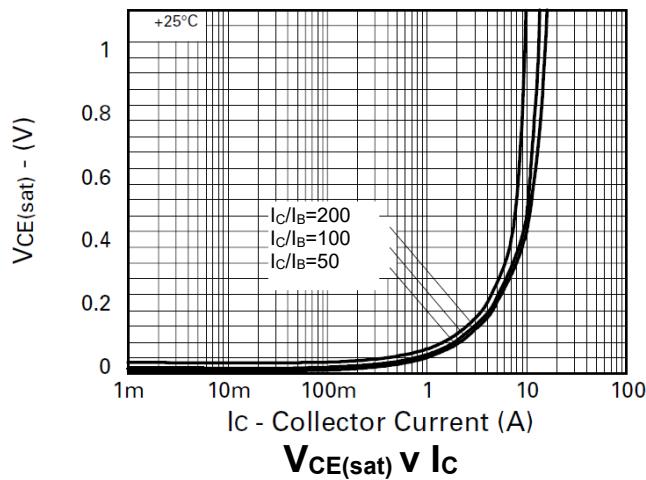


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	50	85	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CES}}$	50	85	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CEV}}$	50	85	—	V	$I_C = 100\mu\text{A}, V_{EB} = 1\text{V}$
Collector-Emitter Breakdown Voltage (Note 11)	$\text{BV}_{\text{CEO}}$	17.5	24	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	7	8.7	—	V	$I_E = 100\mu\text{A}$
Collector Cut-off Current	$I_{\text{CBO}}$	—	0.3	10	nA	$V_{CB} = 35\text{V}$
Collector Cut-off Current	$I_{\text{CES}}$	—	0.3	10	nA	$V_{CB} = 35\text{V}$
Emitter Cut-off Current	$I_{\text{EBO}}$	—	0.3	10	nA	$V_{EB} = 4\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{\text{CE}}(\text{sat})$	—	27	45	mV	$I_C = 500\text{mA}, I_B = 10\text{mA}$
		—	55	75		$I_C = 1\text{A}, I_B = 10\text{mA}$
		—	155	210		$I_C = 3\text{A}, I_B = 15\text{mA}$
		—	250	350		$I_C = 5\text{A}, I_B = 25\text{mA}$
Base-Emitter Saturation Voltage (Note 11)	$V_{\text{BE}}(\text{sat})$	—	920	1,000	mV	$I_C = 5\text{A}, I_B = 25\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{\text{BE}}(\text{on})$	—	880	970	mV	$I_C = 5\text{A}, V_{CE} = 2\text{V}$
DC Current Gain (Note 11)	$h_{\text{FE}}$	280	440	—	—	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$
		300	450	—		$I_C = 0.5\text{A}, V_{CE} = 2\text{V}$
		300	450	1,200		$I_C = 1\text{A}, V_{CE} = 2\text{V}$
		180	300	—		$I_C = 5\text{A}, V_{CE} = 2\text{V}$
		50	80	—		$I_C = 20\text{A}, V_{CE} = 2\text{V}$
Output Capacitance	$C_{\text{obo}}$	—	60	80	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	—	150	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 50\text{MHz}$
Switching Times	$t_{\text{on}}$	—	120	—	ns	$I_C = 4\text{A}, V_{CC} = 10\text{V}, I_{B1} = -I_{B2} = 40\text{mA}$
	$t_{\text{off}}$	—	310	—		

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

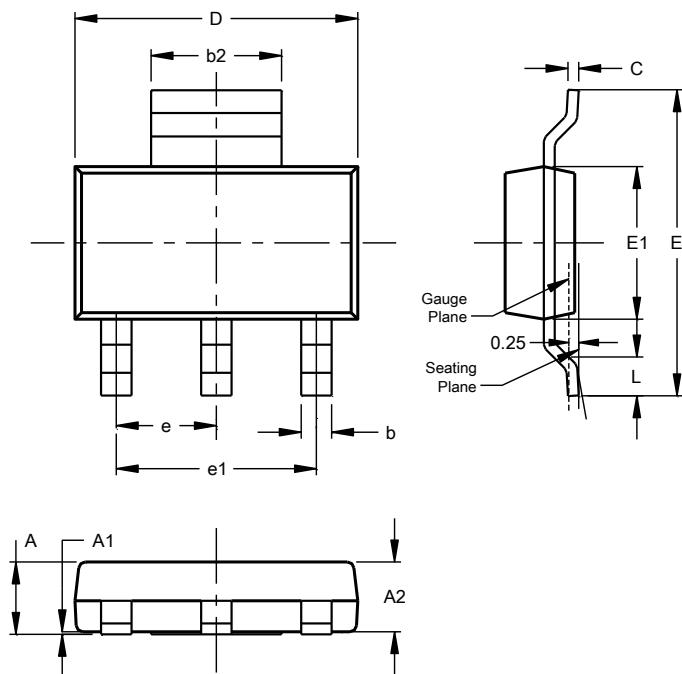
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



## Package Outline Dimensions

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

SOT223 (Type DN)



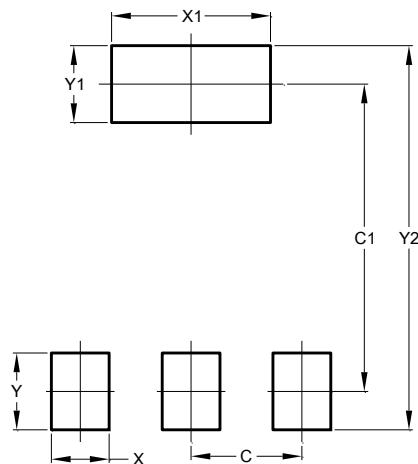
SOT223 (Type DN)			
Dim	Min	Max	Typ
<b>A</b>	--	1.70	--
<b>A1</b>	0.01	0.15	--
<b>A2</b>	1.50	1.68	1.60
<b>b</b>	0.60	0.80	0.70
<b>b2</b>	2.90	3.10	--
<b>c</b>	0.20	0.32	--
<b>D</b>	6.30	6.70	--
<b>E</b>	6.70	7.30	--
<b>E1</b>	3.30	3.70	--
<b>e</b>	--	--	2.30
<b>e1</b>	--	--	4.60
<b>L</b>	0.85	--	--

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)
<b>C</b>	2.30
<b>C1</b>	6.40
<b>X</b>	1.20
<b>X1</b>	3.30
<b>Y</b>	1.60
<b>Y1</b>	1.60
<b>Y2</b>	8.00

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