

## Features

- $BV_{CEO} > -20V$
- $BV_{ECO} > -7V$
- $I_C = -4A$  Continuous Collector Current
- $V_{CE(sat)} < -55mV @ -1A$
- $R_{CE(sat)} = 32m\Omega$
- Complementary Part Number [ZXTN25020BFH](#)
- **Totally Lead-Free & Fully 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 refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208③
- Weight: 0.008 grams (Approximate)

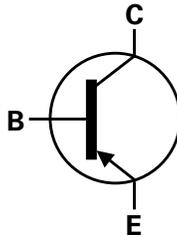
## Applications

- MOSFET and IGBT gate driving
- DC-DC converters
- Motor drivers
- High-side drivers
- Battery charging

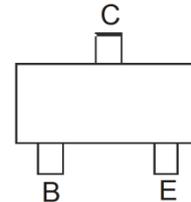
SOT23



Top View



Device Symbol



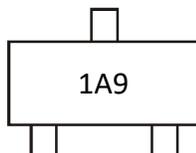
Top View  
Pin-Out

## Ordering Information (Note 4)

Orderable Part Number	Package	Reel Size (inches)	Tape Width (mm)	Packing	
				Qty.	Carrier
ZXTP25020BFHTA	SOT23	7	8	3,000	Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  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



1A9 = Product Type Marking Code

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-40	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEX</sub>	-40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-20	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECO</sub>	-7	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current (Note 5)	I <sub>C</sub>	-4	A
Peak Pulse Current	I <sub>CM</sub>	-10	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit	
Power Dissipation Linear Derating Factor	P <sub>D</sub>	(Note 5)	0.73	W
		(Note 6)	5.84	mW/°C
		(Note 7)	1.05	W
		(Note 8)	8.4	mW/°C
		(Note 5)	1.25	W
		(Note 6)	9.6	mW/°C
		(Note 7)	1.81	W
		(Note 8)	14.5	mW/°C
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	171	°C/W
		(Note 6)	119	
		(Note 7)	100	
		(Note 8)	69	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

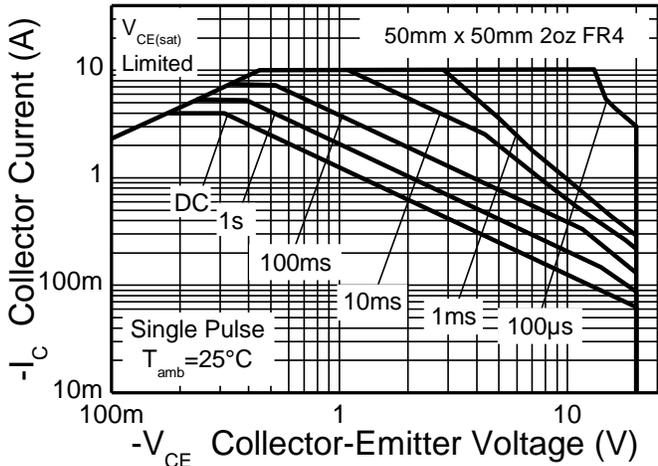
- Notes:
5. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Same as note (5), except the device is surface mounted on 25mm x 25mm with 2 oz copper.
  7. Same as note (5), except the device is surface mounted on 50mm x 50mm with 2 oz copper.
  8. Same as note (7), except the device is measured at t < 5secs.

**ESD Ratings** (Note 9)

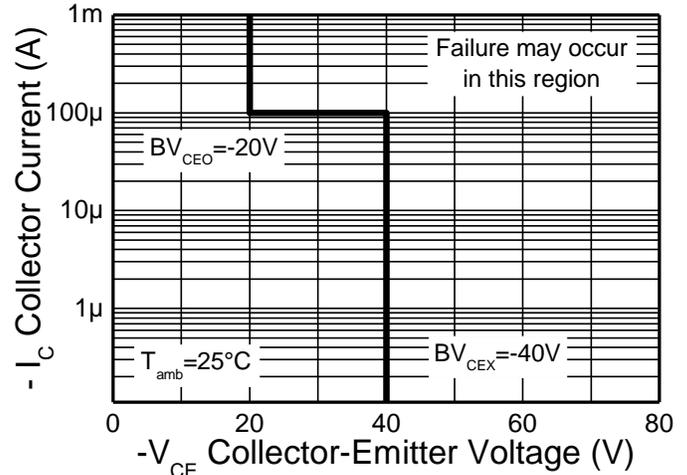
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Note: 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

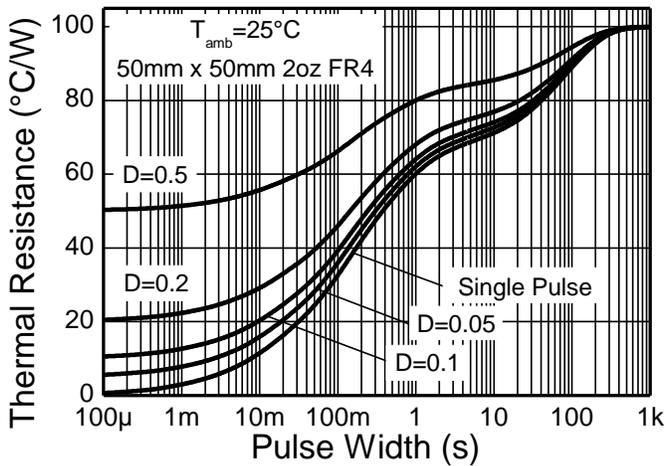
**Thermal Characteristics and Derating Information**



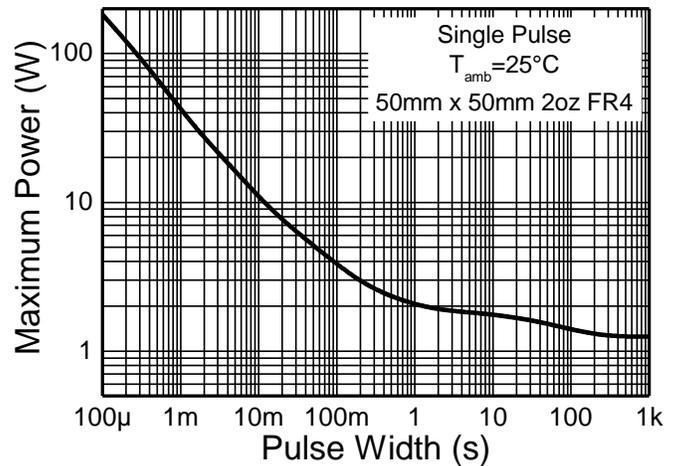
**Fig 1. Safe Operating Area**



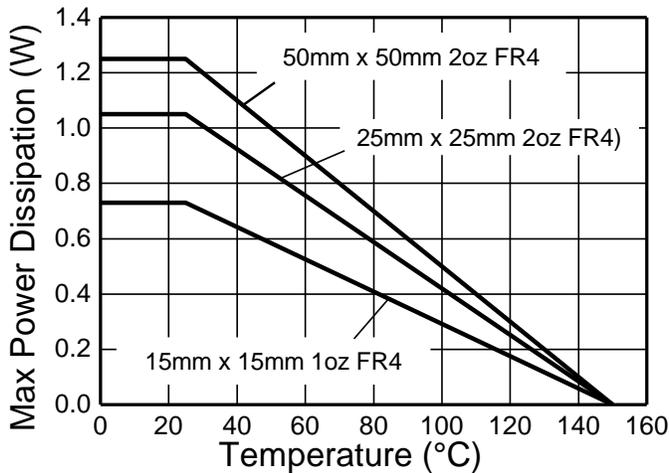
**Fig 2. Safe Operating Area**



**Fig 3. Transient Thermal Impedance**



**Fig 4. Pulse Power Dissipation**



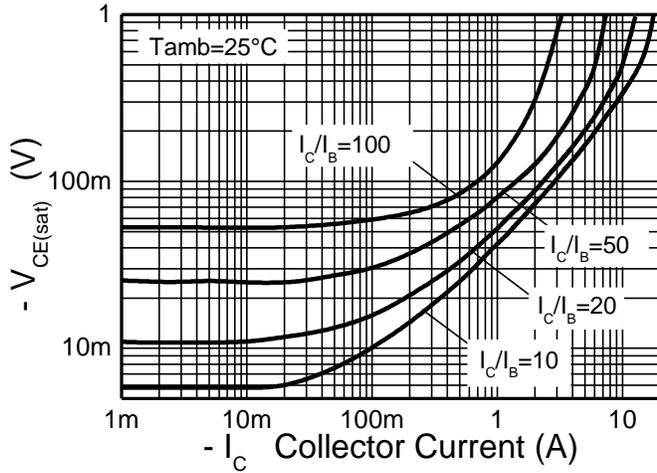
**Fig 5. Derating Curve**

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

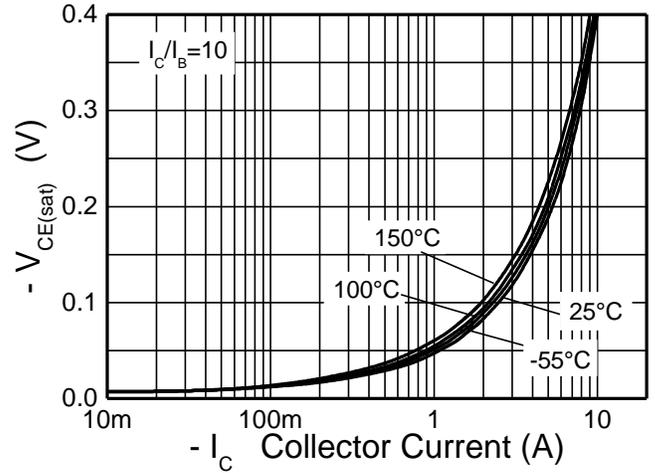
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-40	-60	—	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Forward Blocking)	$BV_{CEX}$	-40	-60	—	V	$I_E = -100\mu\text{A}$ (*) $R_{BE} < 1\text{k}\Omega$ or $1\text{V} < V_{BE} < -0.25\text{V}$
Collector-Emitter Breakdown Voltage (Base Open) (Note 10)	$BV_{CEO}$	-20	-35	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	-8.2	—	V	$I_E = -100\mu\text{A}$
Emitter-Collector Breakdown Voltage (Reverse Blocking)	$BV_{ECX}$	-6	-8	—	V	$I_E = -100\mu\text{A}$ (*) $R_{BC} < 10\text{k}\Omega$ or $0.25 < V_{BC} < -0.25\text{V}$
Emitter-Base Breakdown Voltage (Base Open)	$BV_{ECO}$	-7	-8.6	—	V	$I_E = -100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	< -1	-50	nA	$V_{CB} = -32\text{V}$
		—	—	-20	$\mu\text{A}$	$V_{CB} = -32\text{V}$ , $T_{amb} = +100^\circ\text{C}$
Collector-Emitter Cut-Off Current	$I_{CEX}$	—	—	100	nA	$V_{CE} = -32\text{V}$ , $R_{BE} < 1\text{k}\Omega$
		—	—	—	—	or $1\text{V} < V_{BE} < -0.25\text{V}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	< -1	-50	nA	$V_{EB} = -5.6\text{V}$
Static Forward Current Transfer Ratio (Note 10)	$h_{FE}$	100	200	300	—	$I_C = -10\text{mA}$ , $V_{CE} = -2\text{V}$
		80	160	—		$I_C = -1\text{A}$ , $V_{CE} = -2\text{V}$
		50	100	—		$I_C = -4\text{A}$ , $V_{CE} = -2\text{V}$
		—	45	—		$I_C = -10\text{A}$ , $V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	-44	-60	mV	$I_C = -1\text{A}$ , $I_B = -100\text{mA}$
		—	-80	-110		$I_C = -1\text{A}$ , $I_B = -20\text{mA}$
		—	-125	-190		$I_C = -2\text{A}$ , $I_B = -40\text{mA}$
		—	-160	-210		$I_C = -4\text{A}$ , $I_B = -200\text{mA}$
		—	-160	-210		$I_C = -5\text{A}$ , $I_B = -500\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	-930	-1000	mV	$I_C = -4\text{A}$ , $I_B = -200\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(on)}$	—	-820	-900	mV	$I_C = -4\text{A}$ , $V_{CE} = -2\text{V}$
Output Capacitance	$C_{obo}$	—	32.5	40	pF	$V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$
Transition Frequency	$f_T$	—	250	—	MHz	$V_{CE} = -10\text{V}$ , $I_C = -50\text{mA}$ , $f = 100\text{MHz}$
Delay Time	$t_{(d)}$	—	53	—	ns	$V_{CC} = -15\text{V}$ , $I_C = -750\text{mA}$ , $I_{B1} = -I_{B2} = -15\text{mA}$
Rise Time	$t_{(r)}$	—	63	—	ns	
Storage Time	$t_{(s)}$	—	128	—	ns	
Fall Time	$t_{(f)}$	—	50	—	ns	

Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

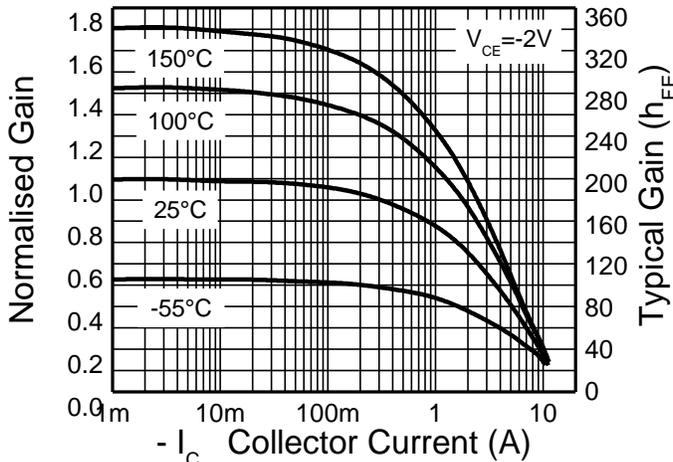
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



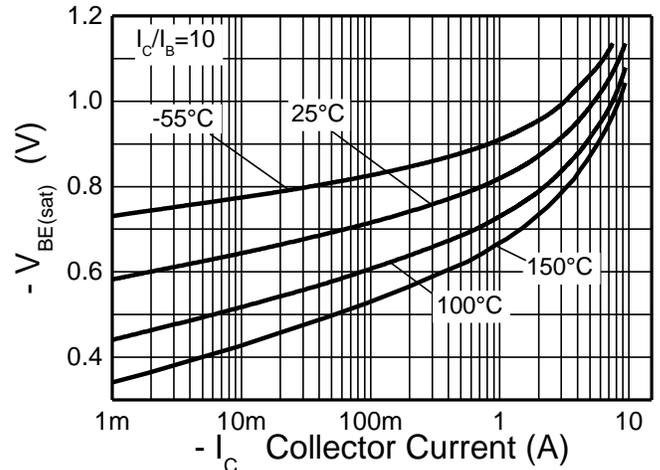
**Fig 6.  $V_{CE(sat)}$  v  $I_C$**



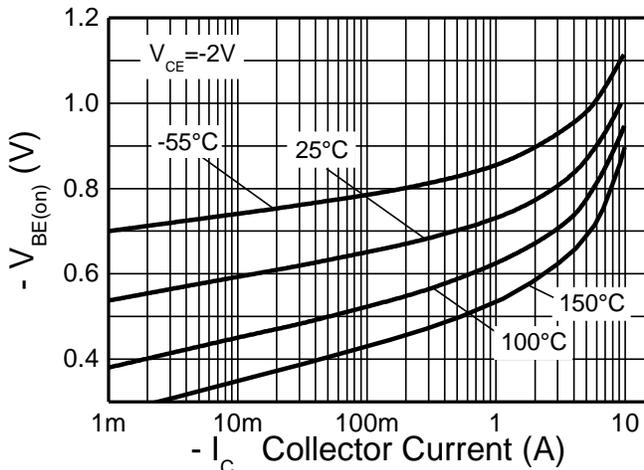
**Fig 7.  $V_{CE(sat)}$  v  $I_C$**



**Fig 8.  $h_{FE}$  v  $I_C$**



**Fig 9.  $V_{BE(sat)}$  v  $I_C$**

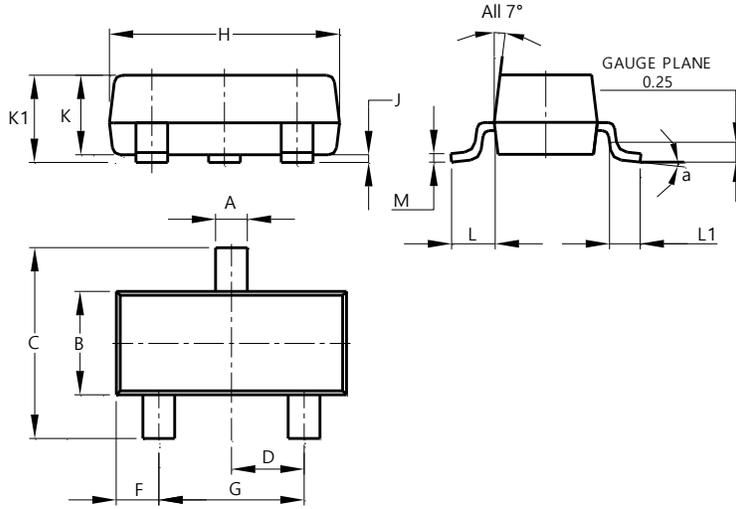


**Fig 10.  $V_{BE(on)}$  v  $I_C$**

**Package Outline Dimensions**

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

**SOT23**

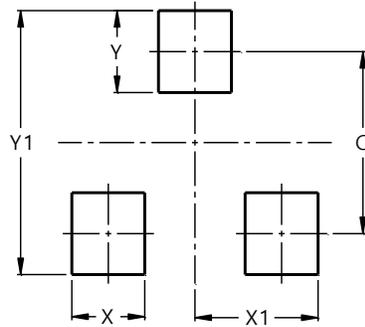


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

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

**SOT23**



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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