

## Features and Benefits

- $BV_{CEO} > 40V$
- $I_C = 4A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < 55mV @ 1A$
- $R_{CE(sat)} = 35m\Omega$
- High  $h_{FE} \text{ min } 300 @ 1A$
- 1.25W Power Dissipation
- Complementary Part Number: [ZXTP25040DFH](#)
- **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/>

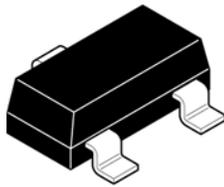
## Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208 (B3)
- Weight: 0.008 grams (Approximate)

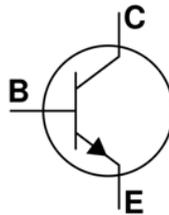
## Applications

- MOSFET gate drivers
- Power switches
- Motor control
- DC fans
- DC-DC converters

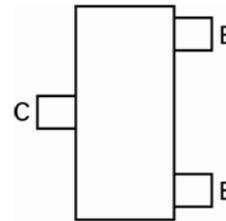
SOT23



Top View



Device Symbol



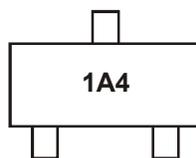
Top View  
Pin Configuration

## Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZXTN25040DFHTA	SOT23	1A4	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



1A4 = 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>CBO</sub>	130	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEX</sub>	130	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECO</sub>	6	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
Base Current	I <sub>B</sub>	1	A

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

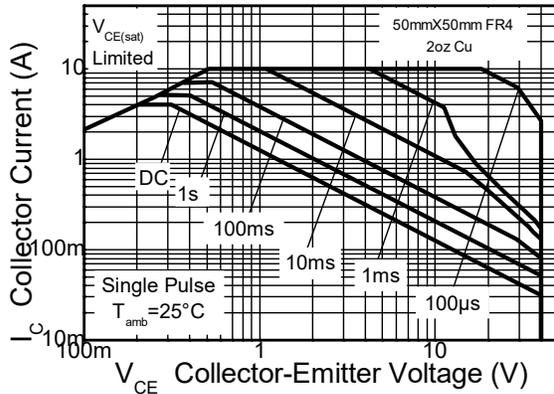
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub> —	0.73	W mW/°C
		5.84	
		1.05	
		8.4	
		1.25	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	9.6	°C/W
		1.81	
		14.5	
		171	
Thermal Resistance, Junction to Lead (Note 9)	R <sub>θJL</sub>	119	°C/W
Thermal Resistance, Junction to Case (Notes 5 & 10)	R <sub>θJC</sub>	100	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	69	°C
		74.95	°C/W
		40	°C/W
		-55 to +150	°C

**ESD Ratings** (Note 11)

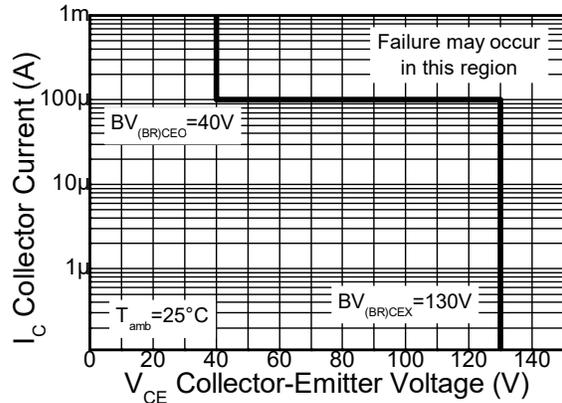
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	IV

- Notes:
- For a device mounted with the collector lead on 15mm x 15mm 1oz 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
  - Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper
  - Same as Note 6, except the device is mounted on 50mm x 50mm 2oz copper
  - Same as Note 7, except measured at t < 5 seconds
  - Thermal resistance from junction to solder-point
  - Thermal resistance from junction to the top of the case
  - Refer to JEDEC specifications JESD22-A114, JESD22-A115 & JESD22-C101

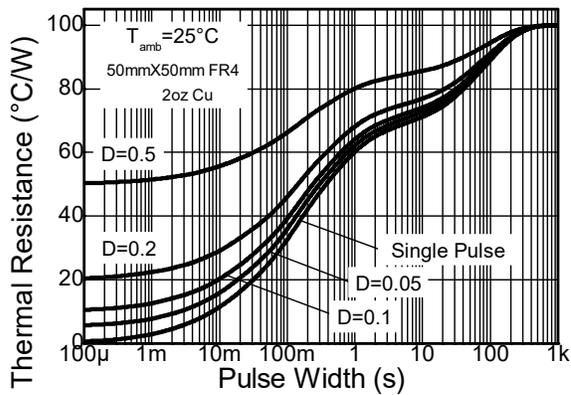
**Typical Thermal Characteristics**



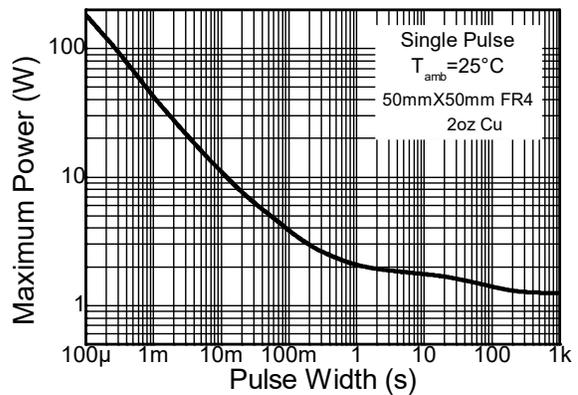
**Figure 1. Safe Operating Area**



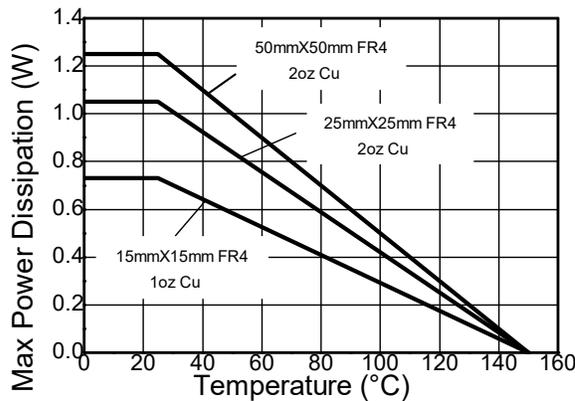
**Figure 2. Safe Operating Area**



**Figure 3. Transient Thermal Impedance**



**Figure 4. Pulse Power Dissipation**



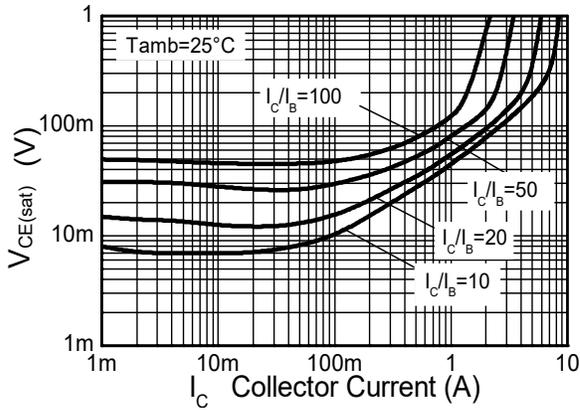
**Figure 5. Derating Curve**

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

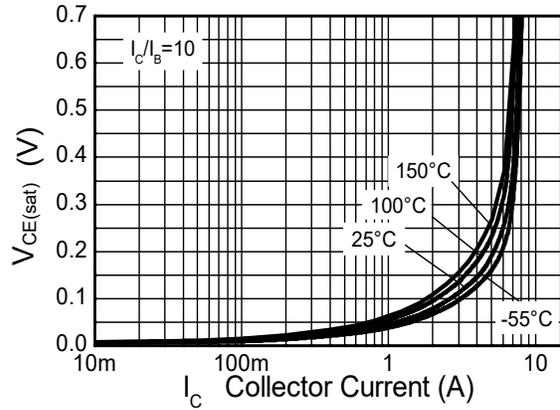
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	130	170	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Forward Blocking)	BV <sub>CEX</sub>	130	170	—	V	I <sub>C</sub> = 100μA, R <sub>BE</sub> < 1kΩ or -1V < V <sub>BE</sub> < 0.25V
Collector-Emitter Breakdown Voltage (Base Open) (Note 12)	BV <sub>CEO</sub>	40	63	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.3	—	V	I <sub>E</sub> = 100μA
Emitter-Collector Breakdown Voltage (Reverse Blocking)	BV <sub>ECX</sub>	6	7.4	—	V	I <sub>E</sub> = 100μA, R <sub>BC</sub> < 1kΩ or -0.25V < V <sub>BC</sub> < 0.25V
Emitter-Collector Breakdown Voltage (Base Open)	BV <sub>ECO</sub>	6	7.4	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current	I <sub>CB0</sub>	—	1	50	nA μA	V <sub>CB</sub> = 100V V <sub>CB</sub> = 100V, T <sub>A</sub> = +100°C
Collector-Emitter Cutoff Current	I <sub>CEX</sub>	—	—	100	nA	V <sub>CE</sub> = 100V, R <sub>BE</sub> < 1kΩ or -1V < V <sub>BE</sub> < 0.25V
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	1	50	nA	V <sub>EB</sub> = 5.6V
<b>ON CHARACTERISTICS (Note 12)</b>						
Static Forward Current Transfer Ratio	h <sub>FE</sub>	300 300 30 —	450 450 60 10	900 — — —	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V I <sub>C</sub> = 10A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	— — — —	45 120 135 140	55 210 210 190	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA I <sub>C</sub> = 4A, I <sub>B</sub> = 400mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	—	960	1050	mV	I <sub>C</sub> = 4A, I <sub>B</sub> = 400mA
Base-Emitter On Voltage	V <sub>BE(on)</sub>	—	840	950	mV	I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
<b>SMALL-SIGNAL CHARACTERISTICS (Note 12)</b>						
Transition Frequency	f <sub>T</sub>	—	190	—	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V f = 100MHz
Collector Output Capacitance	C <sub>obo</sub>	—	11.7	20	pF	V <sub>CB</sub> = 10V, f = 1MHz
Delay Time	t <sub>d</sub>	—	64	—	ns	V <sub>CC</sub> = 10V I <sub>C</sub> = 1A I <sub>B1</sub> = -I <sub>B2</sub> = 10mA
Rise Time	t <sub>r</sub>	—	108	—	ns	
Storage Time	t <sub>s</sub>	—	428	—	ns	
Fall Time	t <sub>f</sub>	—	130	—	ns	

Note: 12. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

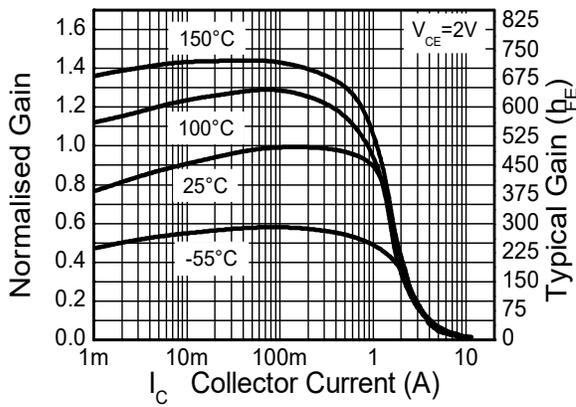
**Typical Electrical Characteristics**



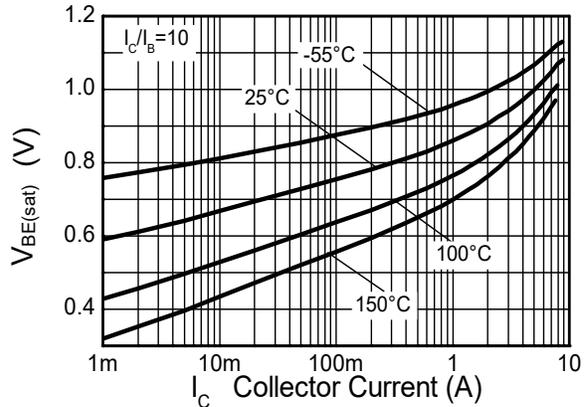
**Figure 6.  $V_{CE(sat)}$  vs.  $I_c$**



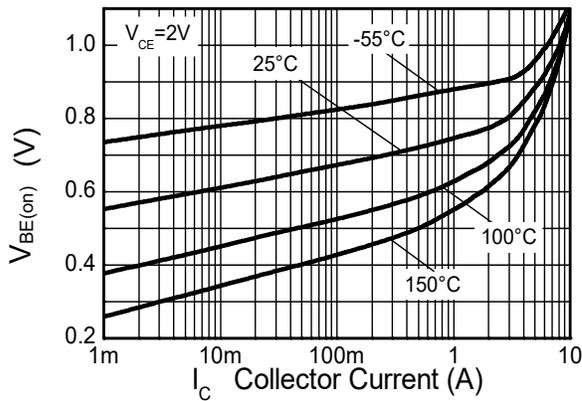
**Figure 7.  $V_{CE(sat)}$  vs.  $I_c$**



**Figure 8.  $h_{FE}$  vs.  $I_c$**



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

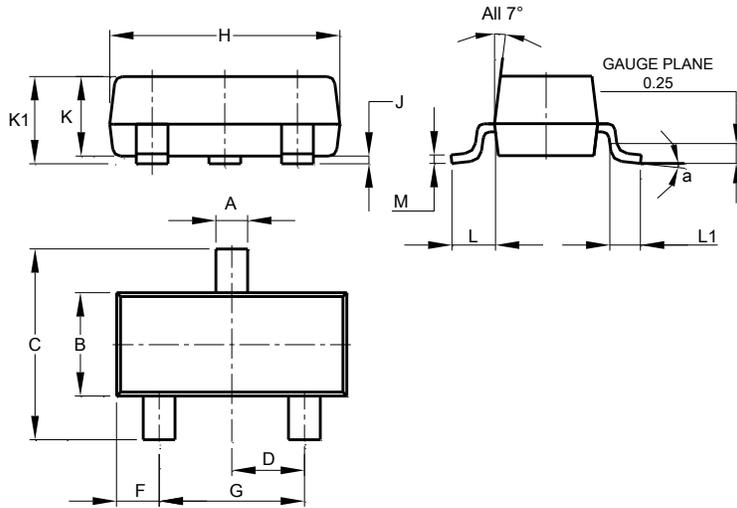


**Figure 10.  $V_{BE(on)}$  vs.  $I_c$**

**Package Outline Dimensions**

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

**SOT23**

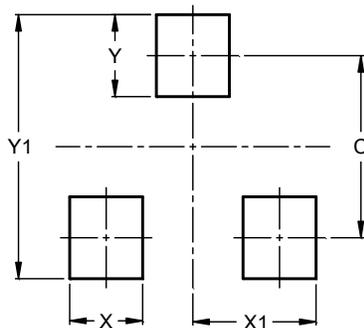


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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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