

## Features

- $BV_{CEO} > 50V$
- $I_C = 4A$  Continuous Collector Current
- Low Saturation Voltage (100mV Max @1A)
- $R_{SAT} = 68m\Omega$  for a Low Equivalent On-Resistance
- $h_{FE}$  Specified up to 6A for High Current Gain Hold Up
- Low Profile 0.6mm High Package for Thin Applications
- $R_{\theta JA}$  Efficient, 60% Lower than SOT23
- 4mm<sup>2</sup> Footprint, 50% Smaller than SOT23
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([ZXTN619MAQ](#))**

## Mechanical Data

- Case: U-DFN2020-3
- Nominal Package Height: 0.6mm
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu, Solderable per MIL-STD-202, Method 208 <sup>e4</sup>
- Weight: 0.01 grams (Approximate)

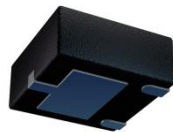
## Applications

- MOSFET Gate Driving
- DC-DC Converters
- Charging Circuits
- Motor Control
- Power Switches

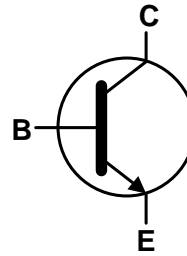
U-DFN2020-3 (Type B)



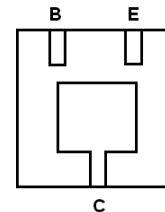
Top View



Bottom View



Device Symbol



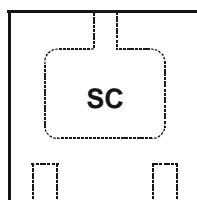
Bottom View Pin-Out

## Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ZXTN619MATA	SC	7	8	3,000

- 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



Top View

SC = Product Type Marking code

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

Parameter	Symbol	Limit	Unit	
Collector-Base Voltage	V <sub>CBO</sub>	100	V	
Collector-Emitter Voltage	V <sub>CEO</sub>	50		
Emitter-Base Voltage	V <sub>EBO</sub>	7		
Peak Pulse Current	I <sub>CM</sub>	6	A	
Continuous Collector Current	I <sub>C</sub>	(Note 5)		4
		(Note 6)		4.3
Base Current	I <sub>B</sub>	1		

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

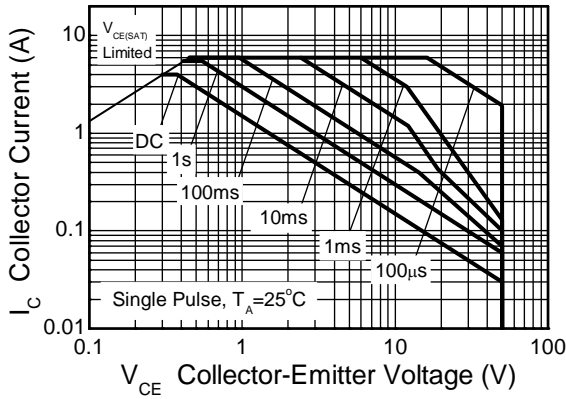
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	(Note 5)	1.5
		(Note 6)	12
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	2.45
		(Note 6)	19.6
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	(Note 5)	83
		(Note 6)	51
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 8)

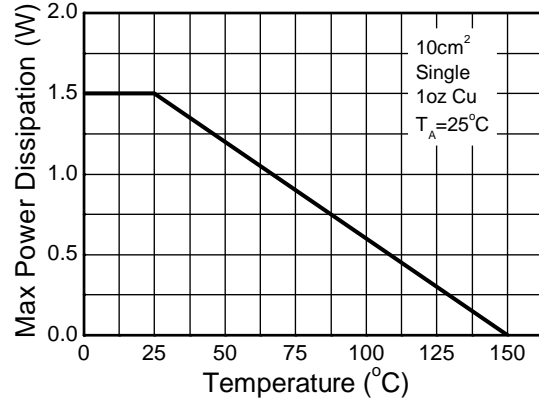
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the exposed collector pad on 31mm x 31mm (10cm<sup>2</sup>) 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. The entire exposed collector pad is attached to the heatsink.
  6. Same as Note 5, except the device is measured at t ≤ 5s.
  7. Thermal resistance from junction to solder-point (on the exposed collector pad).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

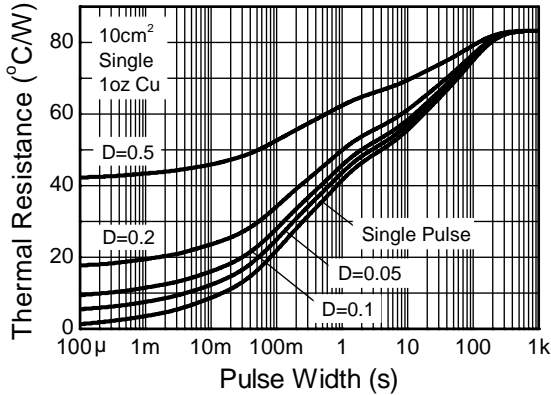
**Thermal Characteristics and Derating Information**



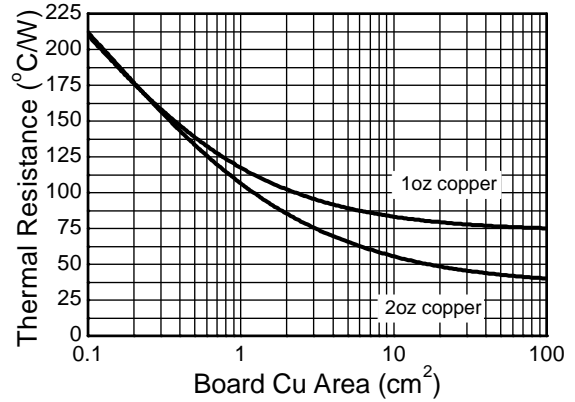
**Safe Operating Area**



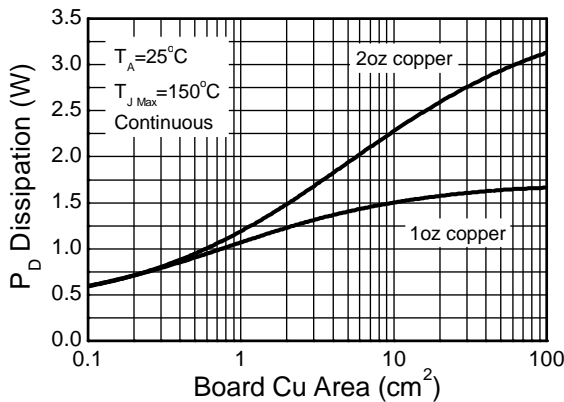
**Derating Curve**



**Transient Thermal Impedance**



**Thermal Resistance v Board Area**



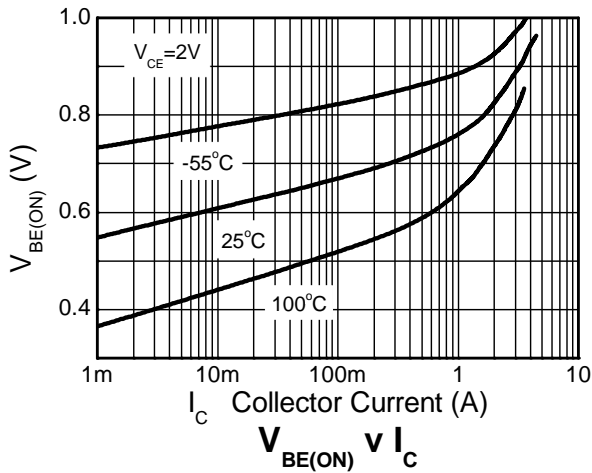
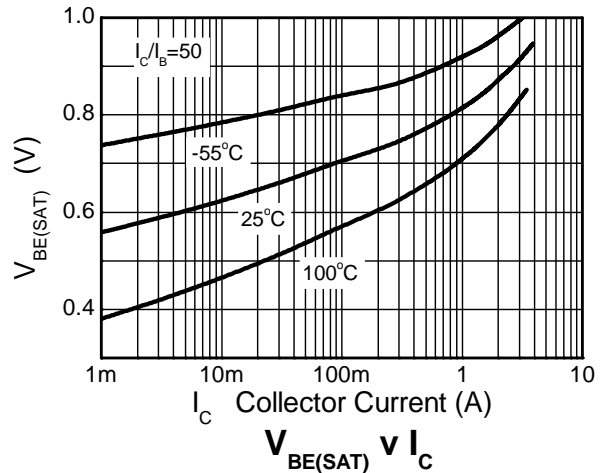
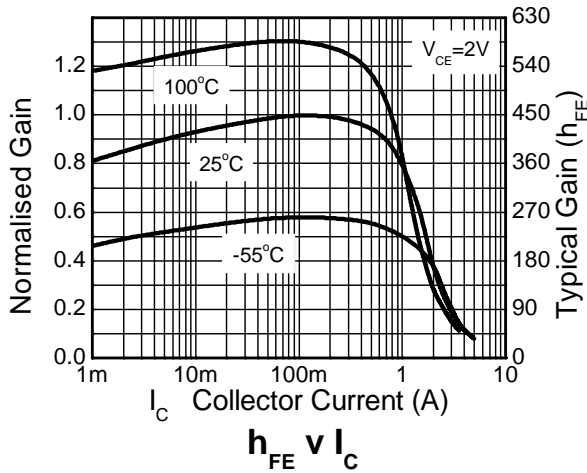
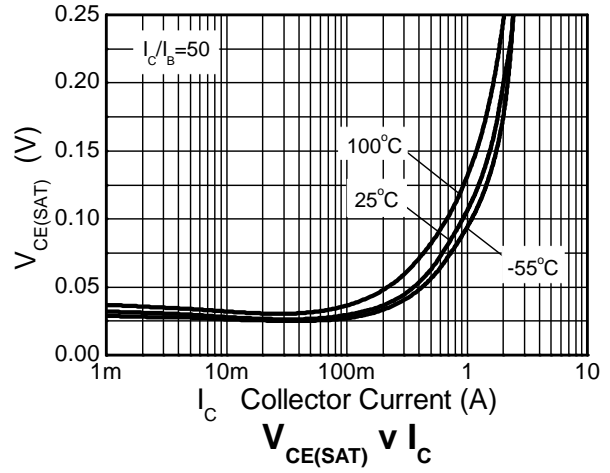
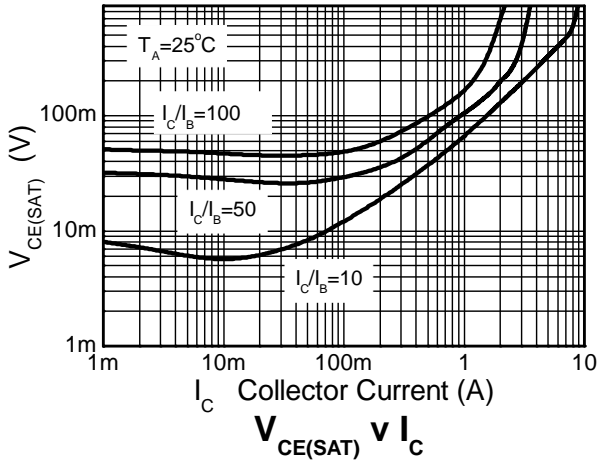
**Power Dissipation v Board Area**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	100	190	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 9)	$BV_{CEO}$	50	65	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.2	—	V	$I_E = 100\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	—	—	100	nA	$V_{CB} = 80\text{V}$
Emitter Cutoff Current	$I_{EBO}$	—	—	20	nA	$V_{EB} = 6\text{V}$
Collector Emitter Cutoff Current	$I_{CES}$	—	—	100	nA	$V_{CES} = 40\text{V}$
Static Forward Current Transfer Ratio (Note 9)	$h_{FE}$	200 300 200 100 —	400 450 400 225 40	— — — — —	—	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 200\text{mA}, V_{CE} = 2\text{V}$ $I_C = 1\text{A}, V_{CE} = 2\text{V}$ $I_C = 2\text{A}, V_{CE} = 2\text{V}$ $I_C = 6\text{A}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(SAT)}$	— — — — —	10 70 145 150 225 270	20 100 200 220 300 320	mV	$I_C = 0.1\text{A}, I_B = 10\text{mA}$ $I_C = 1\text{A}, I_B = 50\text{mA}$ $I_C = 1\text{A}, I_B = 10\text{mA}$ $I_C = 2\text{A}, I_B = 50\text{mA}$ $I_C = 3\text{A}, I_B = 100\text{mA}$ $I_C = 4\text{A}, I_B = 200\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(ON)}$	—	0.94	1.00	V	$I_C = 4\text{A}, V_{CE} = 2\text{V}$
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(SAT)}$	—	1.00	1.07	V	$I_C = 4\text{A}, I_B = 200\text{mA}$
Output Capacitance	$C_{OBO}$	—	12	20	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Transition Frequency	$f_T$	100	165	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-On Time	$t_{ON}$	—	170	—	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-Off Time	$t_{OFF}$	—	750	—	ns	$I_{B1} = -I_{B2} = 10\text{mA}$

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

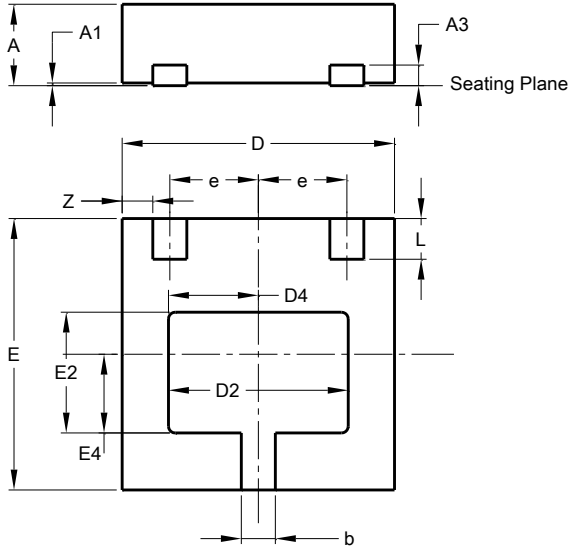
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**Package Outline Dimensions**

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

**U-DFN2020-3 (Type B)**



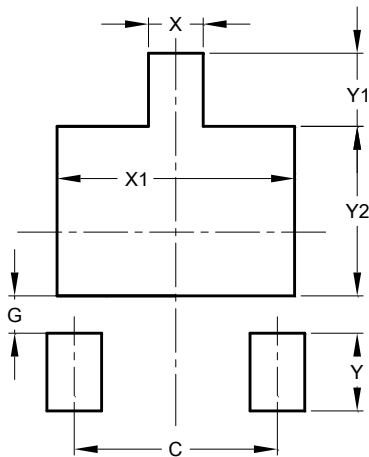
U-DFN2020-3 (Type B)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.02
A3	—	—	0.152
b	0.20	0.30	0.25
D	1.950	2.075	2.00
D2	1.22	1.42	1.32
D4	0.56	0.76	0.66
E	1.950	2.075	2.00
E2	0.79	0.99	0.89
E4	0.48	0.68	0.58
e	—	—	0.65
L	0.25	0.35	0.30
Z	—	—	0.225

All Dimensions in mm

**Suggested Pad Layout**

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

**U-DFN2020-3 (Type B)**



Dimensions	Value (in mm)
C	1.300
G	0.240
X	0.350
X1	1.520
Y	0.500
Y1	0.470
Y2	1.090

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