

**ZXTN619MA**

**50V NPN LOW SATURATION TRANSISTOR**

**Features**

- $BV_{CEO} > 50V$
- $I_C = 4A$  Continuous Collector Current
- Low Saturation Voltage (100mV max @1A)
- $R_{SAT} = 68\ m\Omega$  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**

**Mechanical Data**

- Case: U-DFN2020-3 Type B
- 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@4
- Weight: 0.01 grams (Approximate)

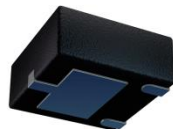
**Applications**

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

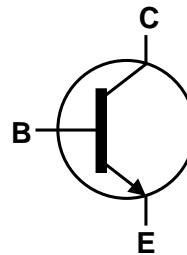
U-DFN2020-3 Type B



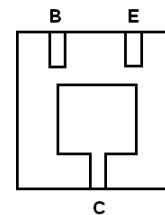
Top View



Bottom View



Device Symbol



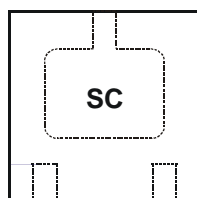
Bottom View  
Pin-Out

**Ordering Information** (Note 4)

Product	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) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**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.)

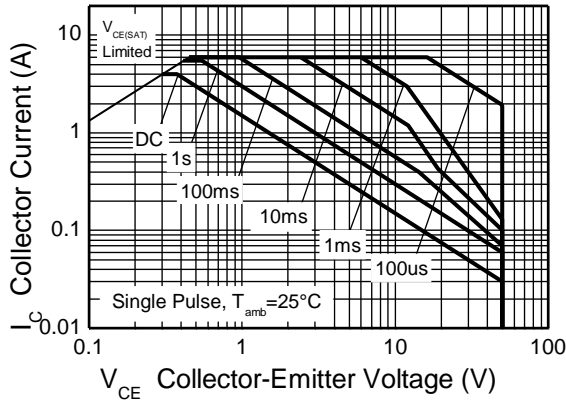
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	(Note 5) 1.5	W mW/°C
		(Note 6) 2.45	
		19.6	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5) 83	°C/W
		(Note 6) 51	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	(Note 7) 16.8	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 8)

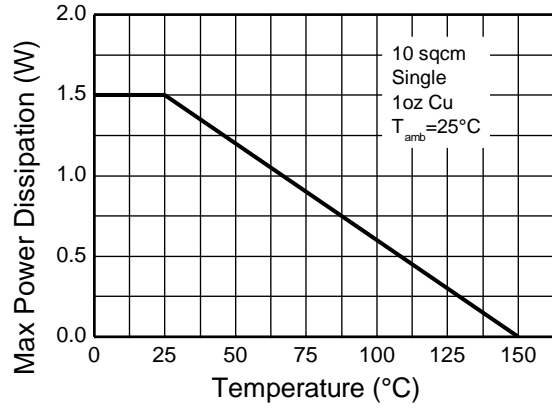
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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 FR4 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 ≤ 5 sec.
  7. Thermal resistance from junction to solder-point (on the exposed collector pad).
  8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

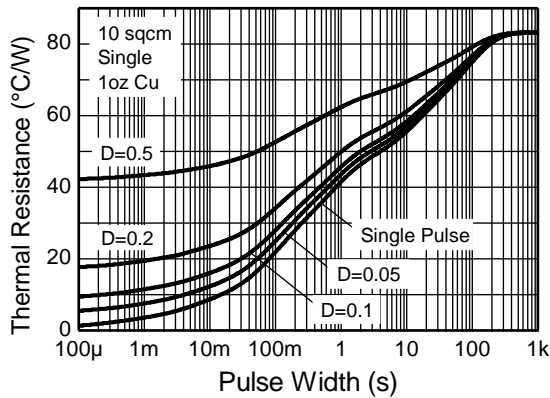
**Thermal Characteristics and Derating Information**



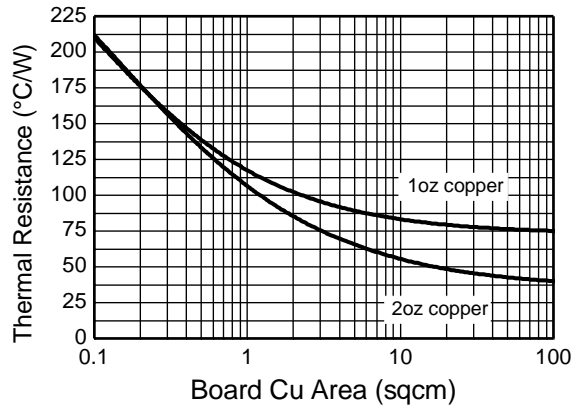
**Safe Operating Area**



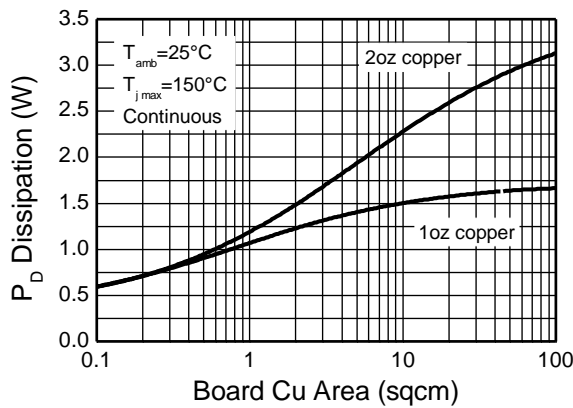
**Derating Curve**



**Transient Thermal Impedance**



**Thermal Resistance v Board Area**



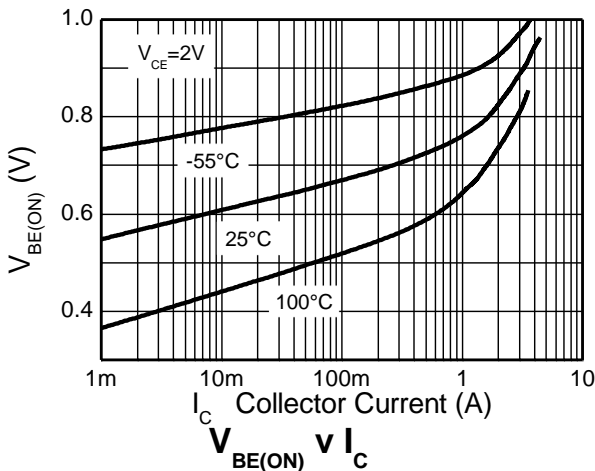
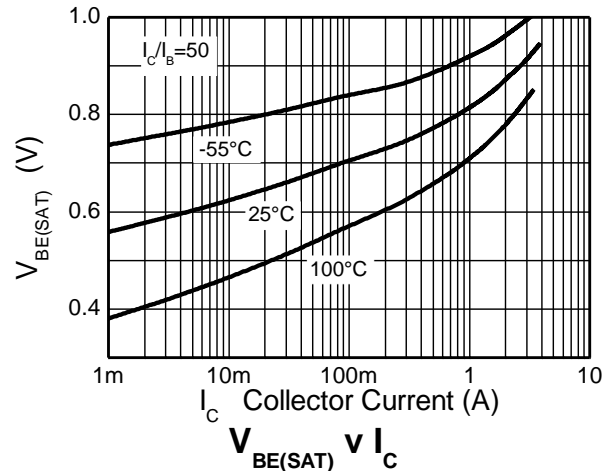
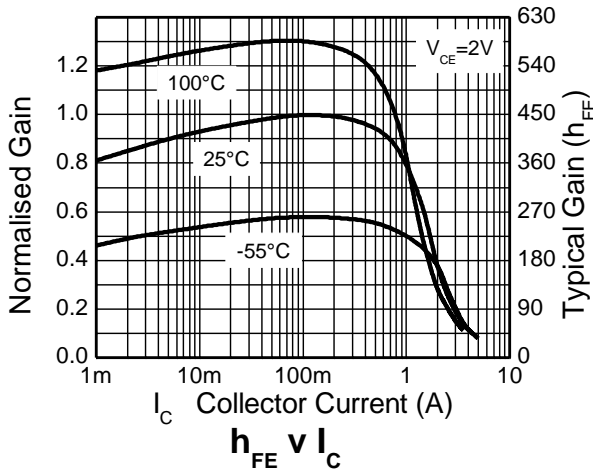
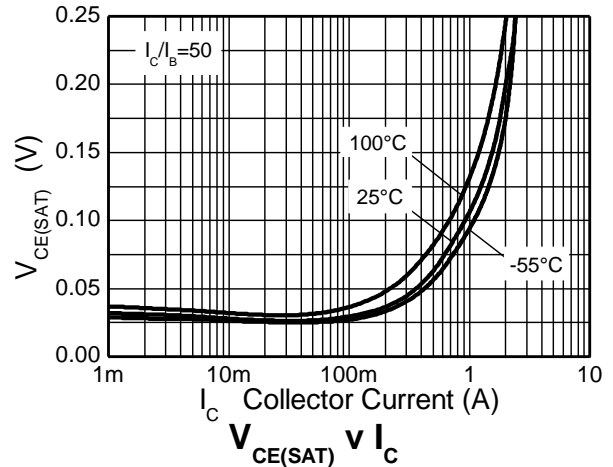
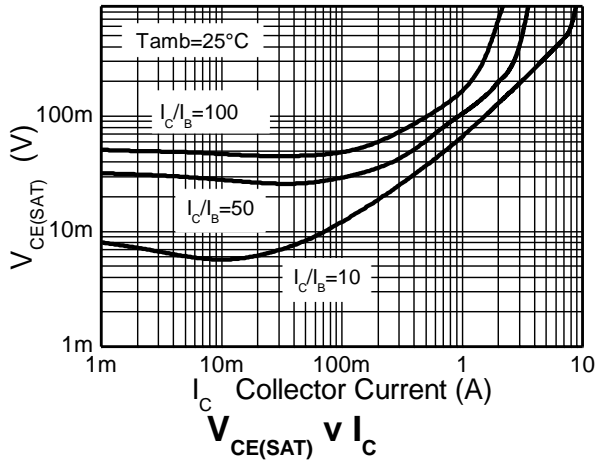
**Power Dissipation v Board Area**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	100	190	-	V	I <sub>C</sub> = 100 μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	50	65	-	V	I <sub>C</sub> = 10 mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.2	-	V	I <sub>E</sub> = 100 μA
Collector Cutoff Current	I <sub>CBO</sub>	-	-	100	nA	V <sub>CB</sub> = 80V
Emitter Cutoff Current	I <sub>EBO</sub>	-	-	100	nA	V <sub>EB</sub> = 6V
Collector Emitter Cutoff Current	I <sub>CES</sub>	-	-	100	nA	V <sub>CES</sub> = 40V
Static Forward Current Transfer Ratio (Note 9)	h <sub>FE</sub>	200 300 200 100 -	400 450 400 225 40	- - - - -	-	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 200mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V I <sub>C</sub> = 6A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	- - - - -	10 70 145 115 225 270	20 100 200 220 300 320	mV	I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA I <sub>C</sub> = 3A, I <sub>B</sub> = 100mA I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	-	0.94	1.00	V	I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	-	1.00	1.07	V	I <sub>C</sub> = 4A, I <sub>B</sub> = 200mA
Output Capacitance	C <sub>obo</sub>	-	12	20	pF	V <sub>CB</sub> = 10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	100	165	-	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 100MHz
Turn-On Time	t <sub>on</sub>	-	170	-	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A
Turn-Off Time	t <sub>off</sub>	-	750	-	ns	I <sub>B1</sub> = I <sub>B2</sub> = 10mA

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%.

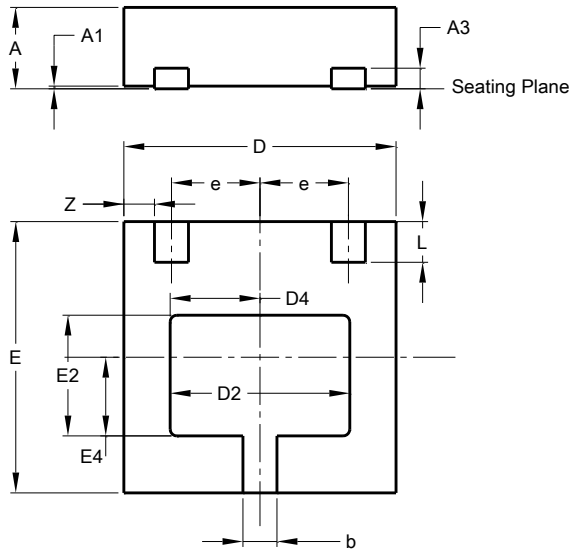
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

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

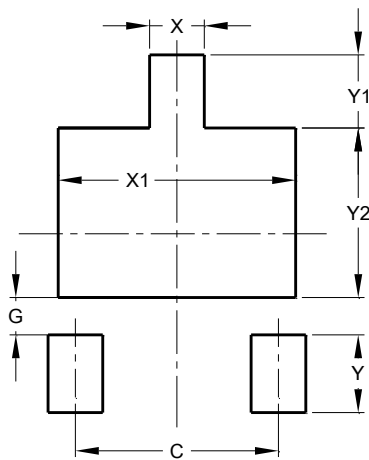


U-DFN2020-3 (Type B)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.02
A3	—	—	0.152
b	0.20	0.30	0.25
D	1.950	2.075	2.00
D2	1.22	1.42	1.32
D4	0.56	0.76	0.66
E	1.950	2.075	2.00
E2	0.79	0.99	0.89
E4	0.48	0.68	0.58
e	—	—	0.65
L	0.25	0.35	0.30
Z	—	—	0.225
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> 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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