

**ZXTN2031F**

**50V NPN MEDIUM POWER TRANSISTOR IN SOT23**

**Features**

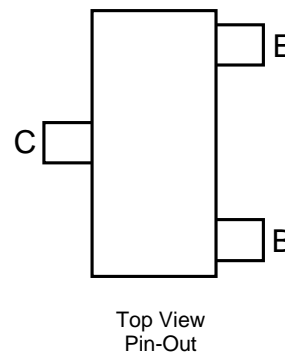
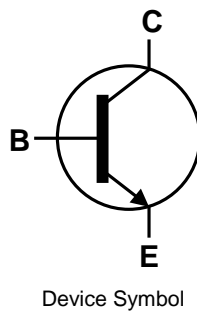
- $BV_{CEO} > 50V$
- $BV_{CEV} > 80V$  Forward Blocking Voltage
- $I_C = 5A$  high Continuous Collector Current
- $I_{CM} = 12A$  Peak Collector Current
- Low Saturation Voltage,  $V_{CE(SAT)} < 40mV @ 1A$
- $R_{CE(SAT)} = 24m\Omega$  for a Low Equivalent On-Resistance
- Complementary PNP Type: ZXTP2025F
- **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: SOT23
- Case 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 208 @3
- Weight 0.008 grams (Approximate)

**Applications**

- MOSFET and IGBT Gate Driving
- Motor Drive
- Relay Lamp and Solenoid Drive
- DC-DC Converters

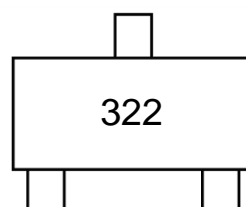


**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN2031FTA	AEC-Q101	322	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**



322 = Product Type Marking Code

**ZXTN2031F**

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	80	V
Collector-Emitter Voltage	V <sub>CEV</sub>	80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	50	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	5	A
Peak Pulse Current	I <sub>CM</sub>	12	A
Base Current	I <sub>B</sub>	1.2	A

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

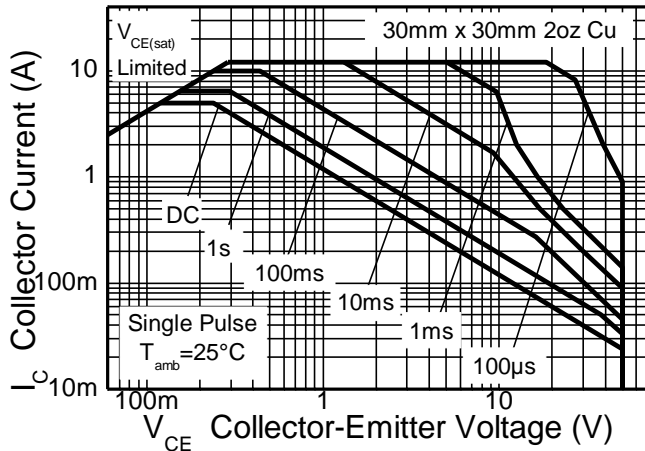
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.0	W
		8.0	
		1.2	
		9.6	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	1.56	°C/W
		12.5	
		125	
		104	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	80	°C/W
		57	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

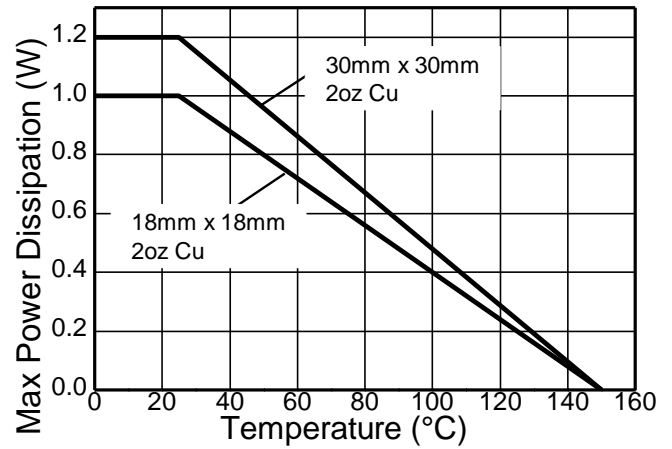
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 18mm x 18mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  6. Same as note (5), except the device is mounted on 30mm x 30mm 2oz copper.
  7. Same as note (6), except measured at t < 5 seconds.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

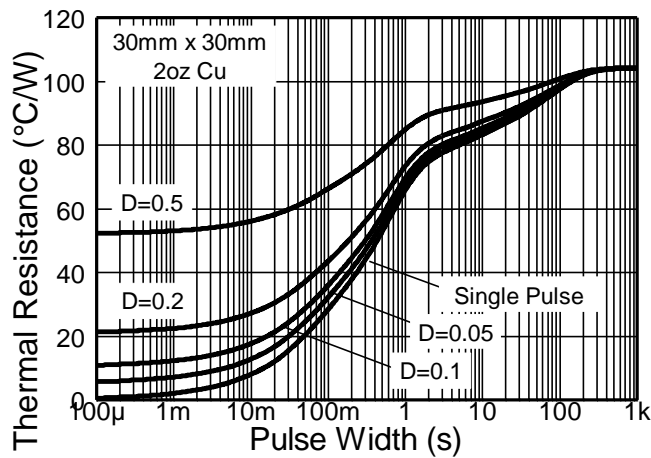
**Thermal Characteristics and Derating information**



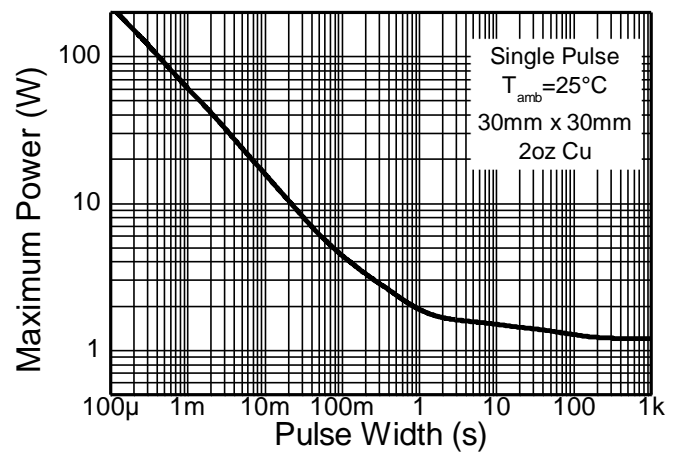
**Safe Operating Area**



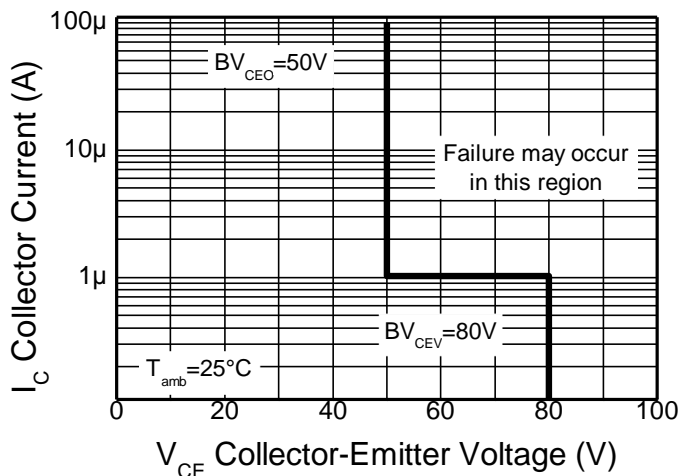
**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



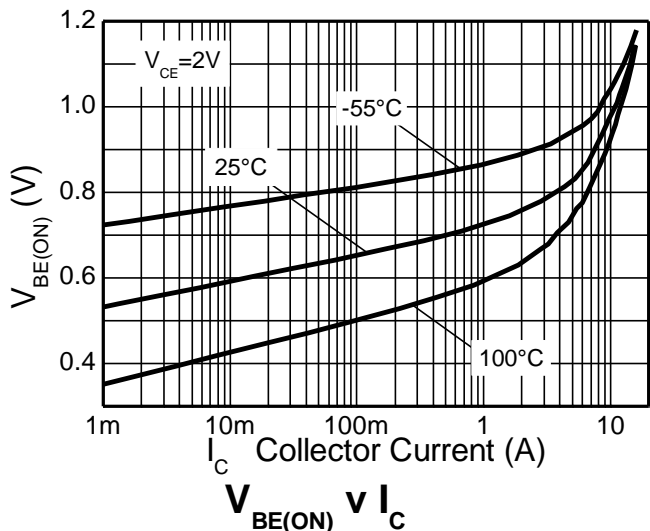
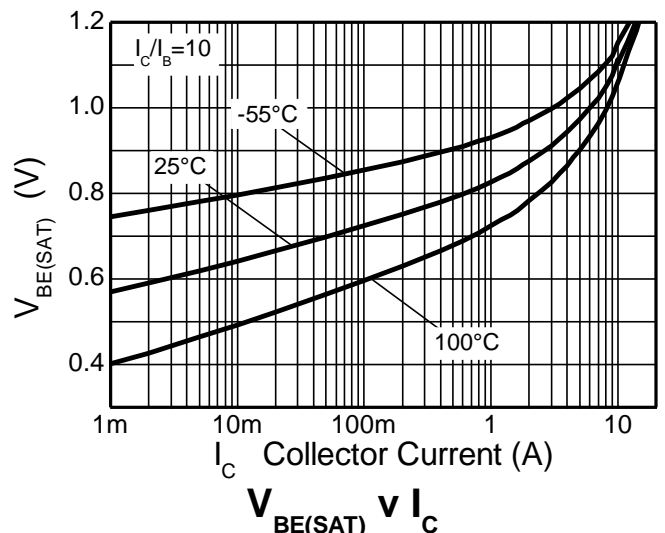
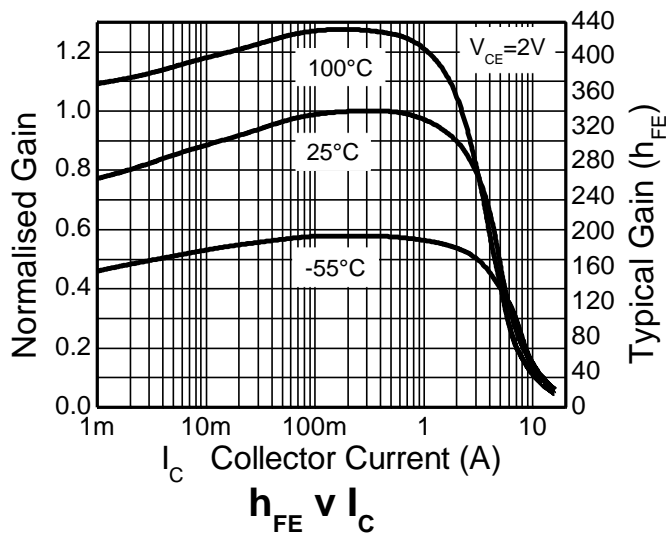
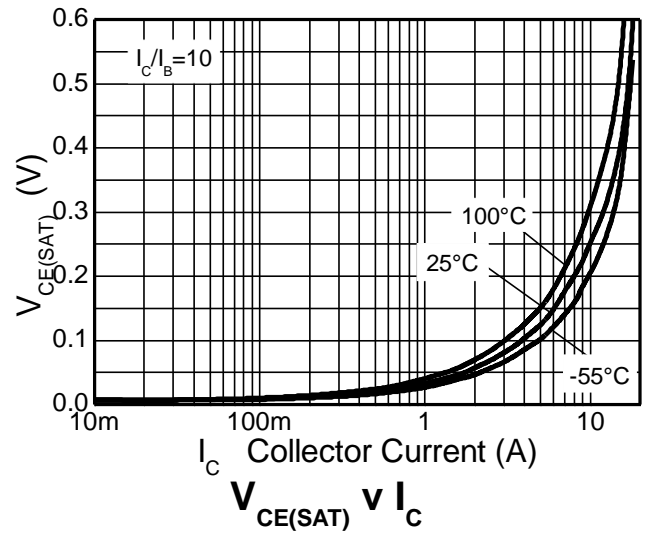
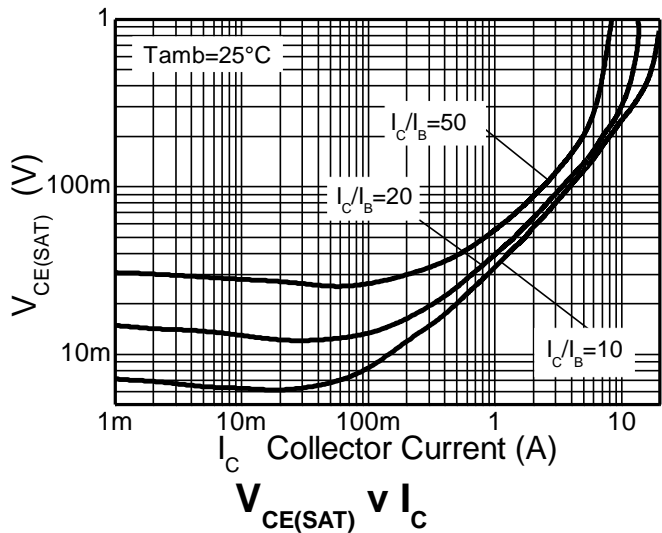
**Safe Operating Area**

**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>	80	175	-	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage	BV <sub>CEV</sub>	80	175	-	V	I <sub>C</sub> = 1μA, -1V < V <sub>BE</sub> < +0.3V
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	50	75	-	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.3	-	V	I <sub>E</sub> = 100μA
Collector – Emitter Cut-Off Current	I <sub>CEV</sub>	-	<1	20	nA	V <sub>CE</sub> = 60V, V <sub>BE</sub> = -1V
Collector - Base Cut-Off Current	I <sub>CBO</sub>	-	<1	20	nA	V <sub>CB</sub> = 60V
Emitter Cut-off Current	I <sub>EBO</sub>	-	<1	10	nA	V <sub>EB</sub> = 6V
Static Forward Current Transfer Ratio (Note 10)	h <sub>FE</sub>	190 200 200 80	300 350 340 125	- 560 - -	-	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(sat)</sub>	- - - -	13 30 80 135	18 40 110 170	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA I <sub>C</sub> = 5A, I <sub>B</sub> = 250mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	- -	800 920	900 1000	mV	I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA I <sub>C</sub> = 5A, I <sub>B</sub> = 250mA
Base-Emitter Turn-On Voltage (Note 10)	V <sub>BE(on)</sub>	-	830	930	mV	I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V
Transition Frequency	F <sub>T</sub>	-	125	-	MHz	I <sub>C</sub> = 500mA, V <sub>CE</sub> = 10V, f = 50MHz
Output Capacitance	C <sub>obo</sub>	-	29	-	pF	V <sub>CB</sub> = 10V, f = 1MHz
Delay Time	t <sub>(d)</sub>	-	16	-	ns	V <sub>CC</sub> = 12V, I <sub>C</sub> = 2.5A, I <sub>B1</sub> = - I <sub>B1</sub> = 125mA
Rise Time	t <sub>(r)</sub>	-	27	-	ns	
Storage Time	t <sub>(stg)</sub>	-	468	-	ns	
Fall Time	t <sub>(f)</sub>	-	44	-	ns	

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

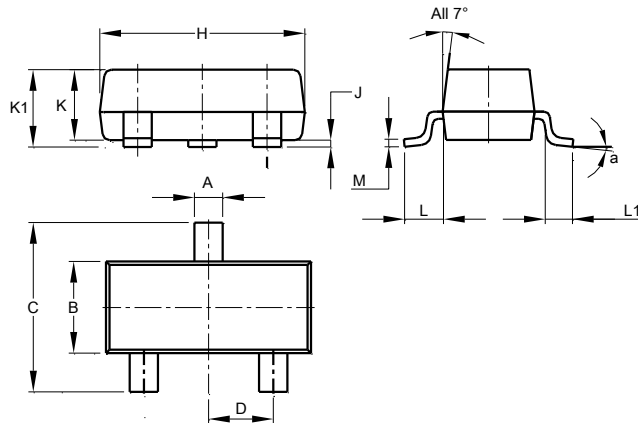
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



**ZXTN2031F**

**Package Outline Dimensions**

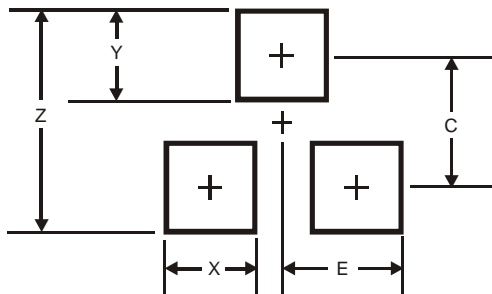
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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	8°		
All Dimensions in mm			

**Suggested Pad Layout**

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



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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