

## Features

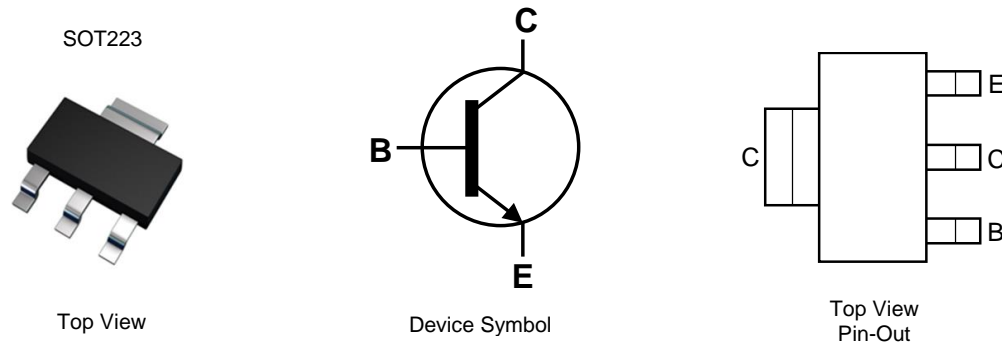
- $BV_{CEX} > 70V$
- $BV_{CEO} > 20V$
- $BV_{ECO} > 4.5V$
- $I_C = 9A$  High Continuous Current
- Low Saturation Voltage  $V_{CE(sat)} < 35mV @ 1A$
- $R_{CE(sat)} = 20m\Omega$
- Complementary PNP Type: ZXTP19020DG
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability 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: 0.112 grams (Approximate)

## Applications

- PSU Start-Up Circuit
- DC-DC Converters
- Motor Drive
- Relay, Lamp and Solenoid Drive

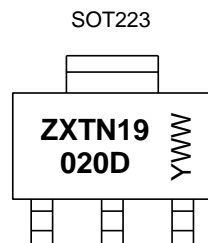


## Ordering Information (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN19020DGTA	AEC-Q101	ZXTN19020D	7	12	1,000

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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



ZXTN19020D = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 5= 2015)  
 WW or  $\bar{W}W$  = Week Code (01~53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	70	V
Collector-Emitter Voltage (forward blocking)	V <sub>CEX</sub>	70	V
Collector-Emitter Voltage	V <sub>CEO</sub>	20	V
Emitter-Collector Voltage (reverse blocking)	V <sub>ECX</sub>	6	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	9	A
Base Current	I <sub>B</sub>	1	A
Peak Pulse Current	I <sub>CM</sub>	20	A

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

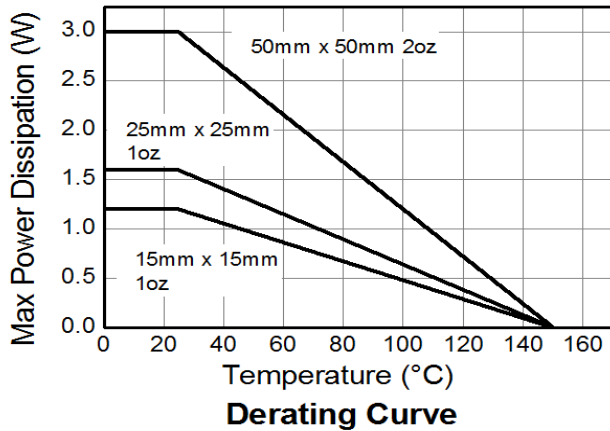
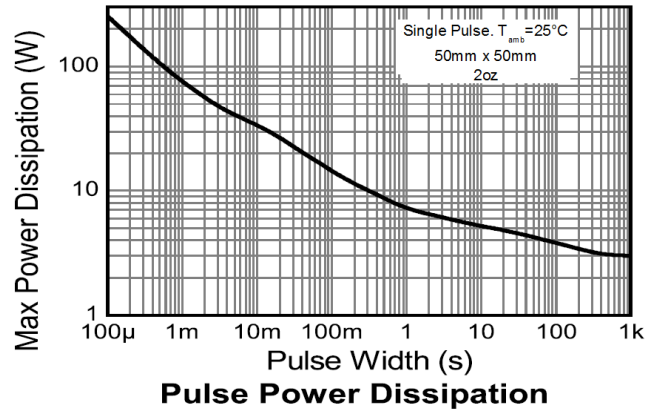
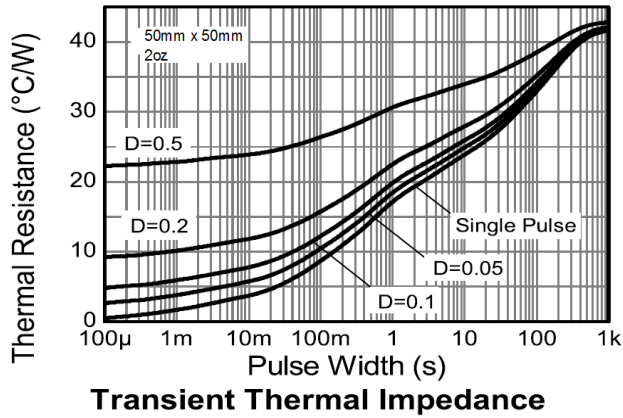
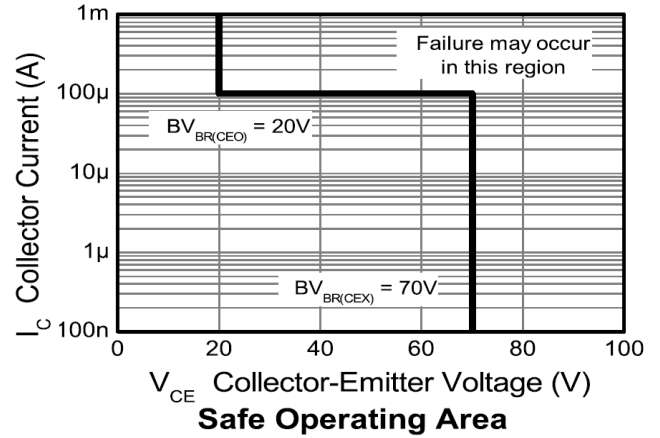
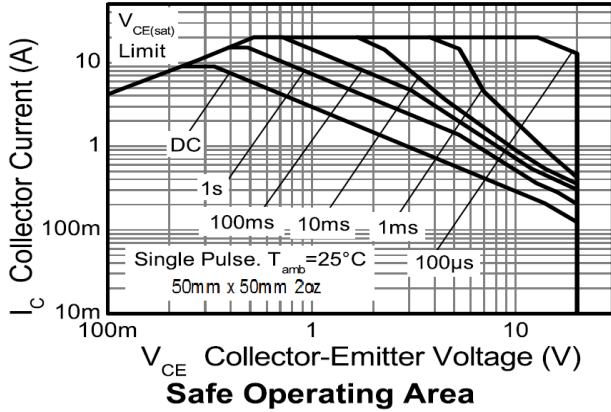
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	1.2	W mW/°C
		9.6	
		1.6	
		12.8	
		3	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	24	°C/W
		5.3	
		42	
		104	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	78	°C/W
		42	
		23.5	
Thermal Resistance, Junction to Solder Point	R <sub>θJS</sub>	16	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 10)

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:
- For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  - Same as Note 6, except the device is mounted on 25mm x 25mm 1oz copper.
  - Same as Note 6, except the device is mounted on 50mm x 50mm 2oz copper.
  - Same as Note 8 measured at t<5 seconds.
  - Thermal resistance from junction to solder-point (at the end of the collector lead).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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

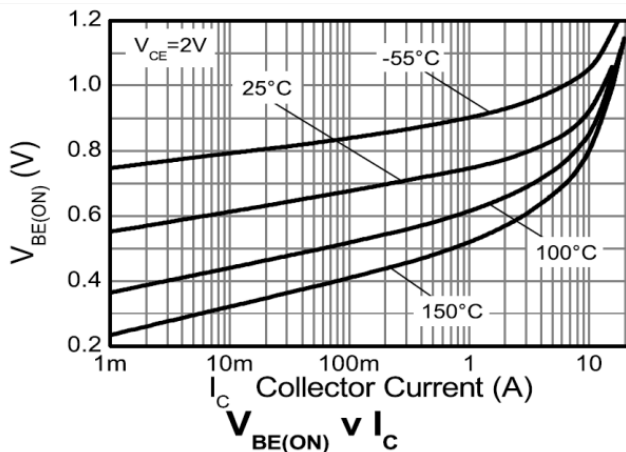
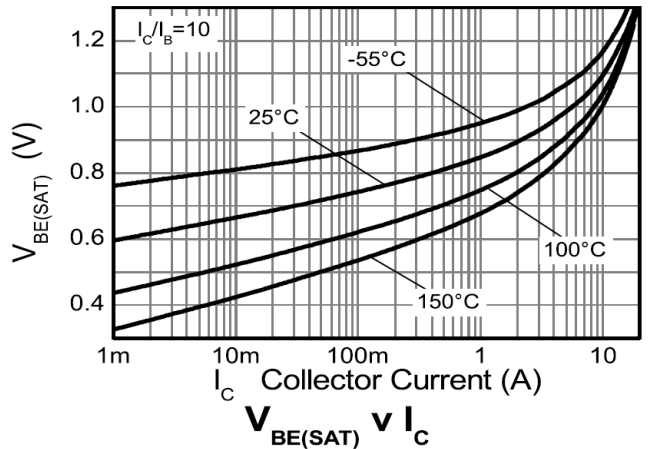
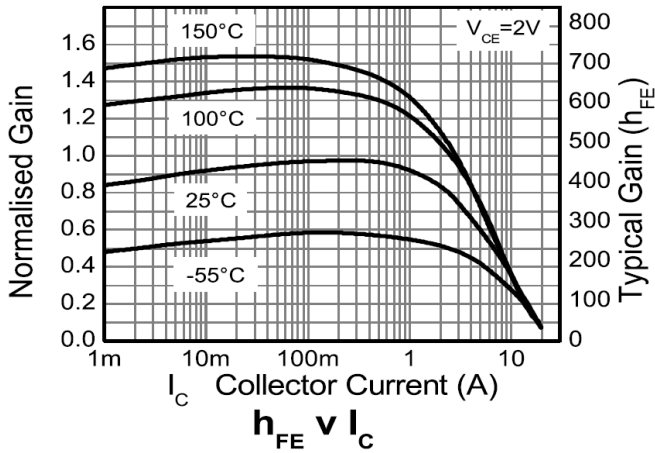
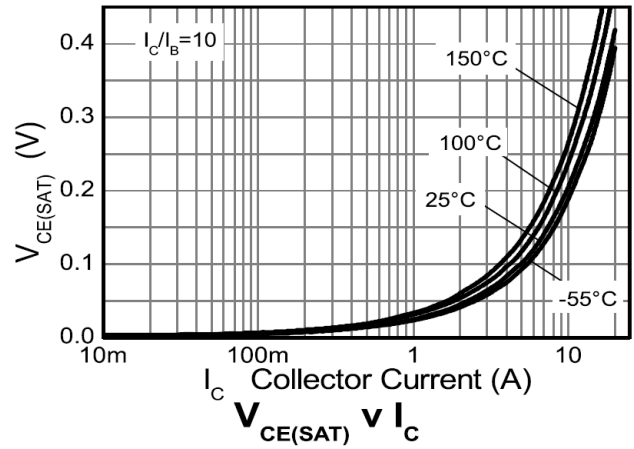
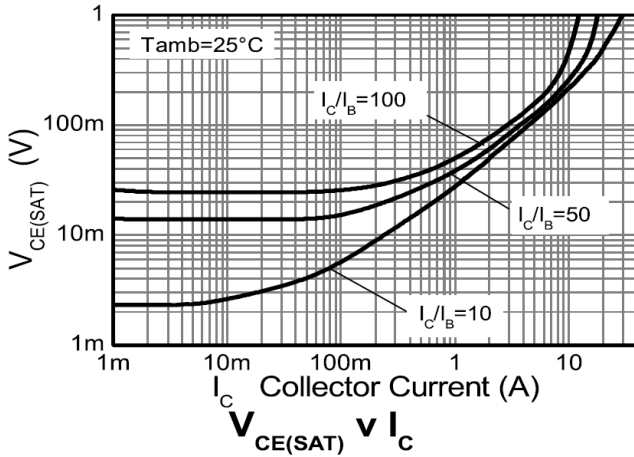


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	70	100	–	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (forward blocking)	BV <sub>CEX</sub>	70	100	–	V	I <sub>C</sub> = 100μA, R <sub>BE</sub> < 1kΩ or -1V < V <sub>BE</sub> > 0.25V
Collector-Emitter Breakdown Voltage (Note 11)	BV <sub>CEO</sub>	20	30	–	V	I <sub>C</sub> = 10mA
Emitter-Collector Breakdown Voltage (reverse blocking)	BV <sub>ECX</sub>	6	8.4	–	V	I <sub>C</sub> = 100μA, R <sub>BC</sub> < 1kΩ or 0.25V < V <sub>BC</sub> > -0.25V
Emitter-Collector Breakdown Voltage (reverse blocking)	BV <sub>ECO</sub>	4.5	5.7	–	V	I <sub>E</sub> = 100μA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.4	–	V	I <sub>E</sub> = 100μA
Collector Cut-Off Current	I <sub>CBO</sub>	–	< 1	50	nA	V <sub>CB</sub> = 70V
		–	–	0.5	μA	V <sub>CB</sub> = 70V, T <sub>A</sub> = +100°C
Collector-Emitter Cut-Off Current	I <sub>CEX</sub>	–	–	100	nA	V <sub>CE</sub> = 70V, R <sub>BE</sub> < 1kΩ or -1V < V <sub>BE</sub> > 0.25V
Emitter Cut-Off Current	I <sub>EBO</sub>	–	< 1	50	nA	V <sub>EB</sub> = 5.6V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	–	27	35	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		–	50	70	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA
		–	80	100	mV	I <sub>C</sub> = 2A, I <sub>B</sub> = 20mA
		–	63	80	mV	I <sub>C</sub> = 2A, I <sub>B</sub> = 40mA
		–	85	110	mV	I <sub>C</sub> = 4A, I <sub>B</sub> = 400mA
		–	200	250	mV	I <sub>C</sub> = 9A, I <sub>B</sub> = 450mA
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	–	1040	1150	mV	I <sub>C</sub> = 9A, I <sub>B</sub> = 450mA
Base-Emitter Turn-On Voltage (Note 11)	V <sub>BE(on)</sub>	–	910	1050	mV	I <sub>C</sub> = 9A, V <sub>CE</sub> = 2V
DC Current Gain (Note 11)	h <sub>FE</sub>	300	450	900	–	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 2V
		260	390	–	–	I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
		130	175	–	–	I <sub>C</sub> = 9A, V <sub>CE</sub> = 2V
		50	75	–	–	I <sub>C</sub> = 15A, V <sub>CE</sub> = 2V
		–	30	–	–	I <sub>C</sub> = 20A, V <sub>CE</sub> = 2V
Current Gain-Bandwidth Product (Note 11)	f <sub>T</sub>	–	160	–	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 50mA, f = 100MHz
Input Capacitance (Note 11)	C <sub>ibo</sub>	–	297	400	pF	V <sub>EB</sub> = 0.5V, f = 1MHz
Output Capacitance (Note 11)	C <sub>obo</sub>	–	32.6	40	pF	V <sub>CB</sub> = 10V, f = 1MHz
Delay Time	t <sub>d</sub>	–	129	–	ns	I <sub>C</sub> = 1A, V <sub>CC</sub> = 10V, I <sub>B1</sub> = -I <sub>B2</sub> = 10mA
Rise Time	t <sub>r</sub>	–	96	–	ns	
Storage Time	t <sub>s</sub>	–	398	–	ns	
Fall Time	t <sub>f</sub>	–	90	–	ns	

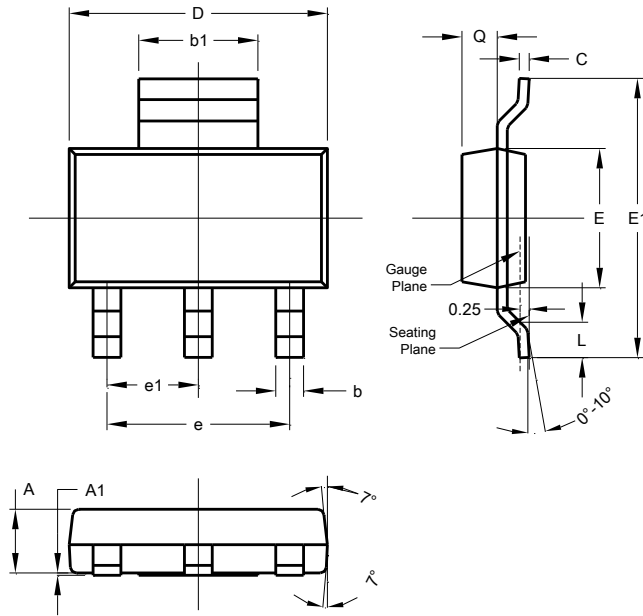
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



## Package Outline Dimensions

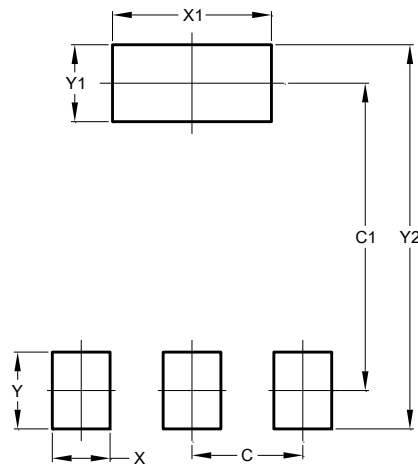
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
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)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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