ZXTN19020DG

20V NPN HIGH GAIN TRANSISTOR IN SOT223

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
- $R_{CE(sat)}$ = 20mΩ
- 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**

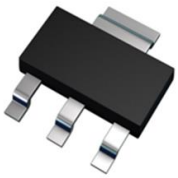
Mechanical Data

- 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 e3
- Weight: 0.112 grams (Approximate)

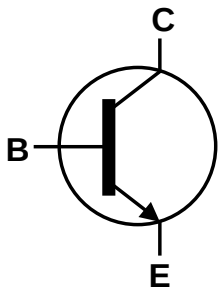
Applications

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

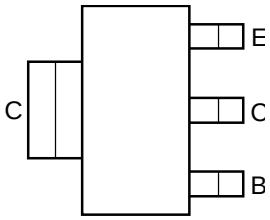
SOT223



Top View



Device Symbol



Top View
Pin-Out

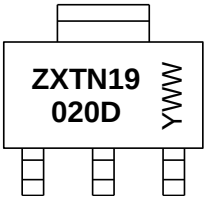
Ordering Information (Note 4)

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 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

SOT223



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

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	70	V
Collector-Emitter Voltage (forward blocking)	V_{CEX}	70	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Collector Voltage (reverse blocking)	V_{ECX}	6	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	9	A
Base Current	I_B	1	A
Peak Pulse Current	I_{CM}	20	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

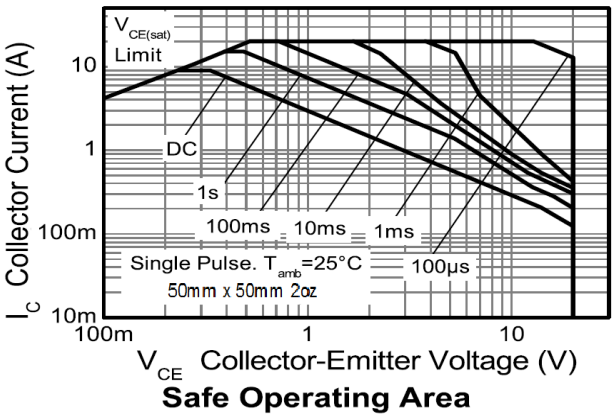
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 5)	P_D	1.2 9.6	W mW/°C
	(Note 6)		1.6 12.8	
	(Note 7)		3 24	
	(Note 8)		5.3 42	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	104	°C/W
	(Note 6)		78	
	(Note 7)		42	
	(Note 8)		23.5	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	16	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 10)

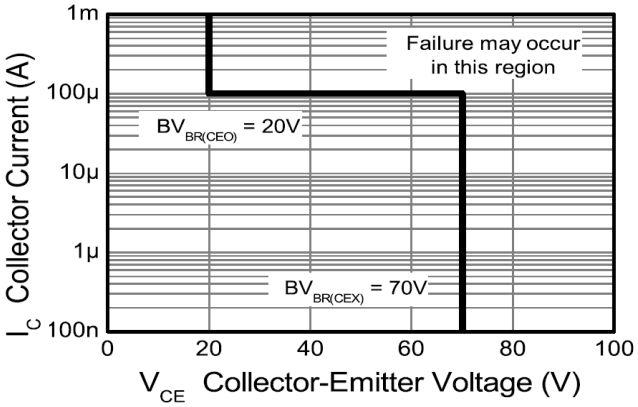
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. 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.
6. Same as Note 6, except the device is mounted on 25mm x 25mm 1oz copper.
7. Same as Note 6, except the device is mounted on 50mm x 50mm 2oz copper.
8. Same as Note 8 measured at t<5 seconds.
9. Thermal resistance from junction to solder-point (at the end of the collector lead).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

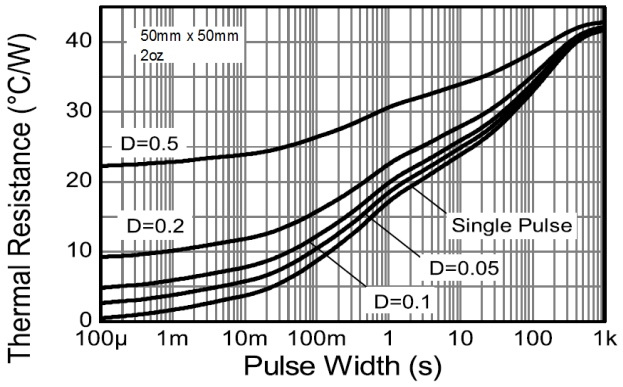
Thermal Characteristics and Derating Information (@T_A = +25°C, unless otherwise specified.)



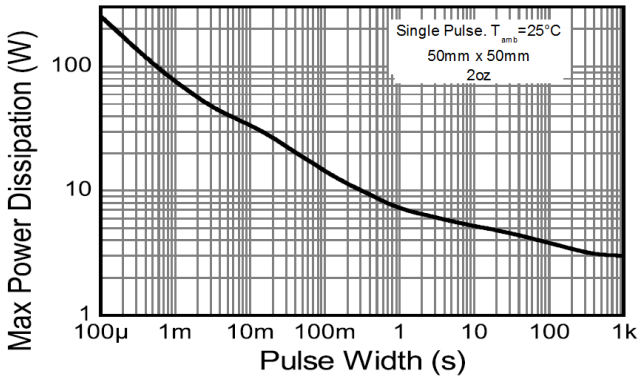
Safe Operating Area



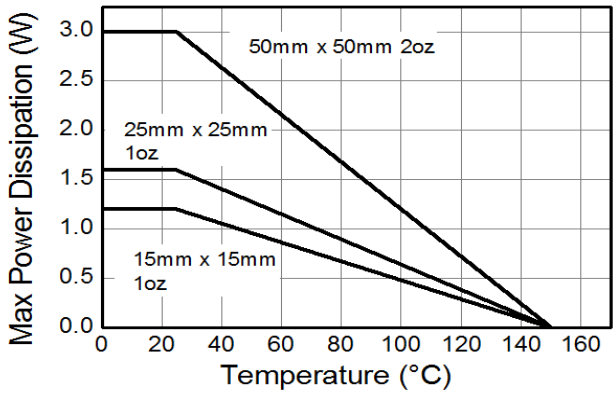
Safe Operating Area



Transient Thermal Impedance



Pulse Power Dissipation



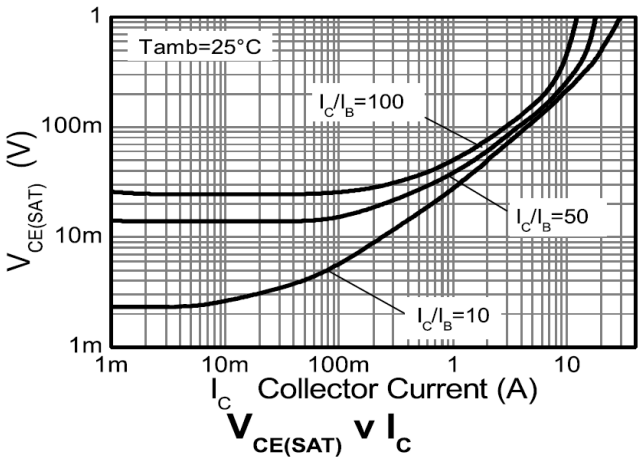
Derating Curve

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

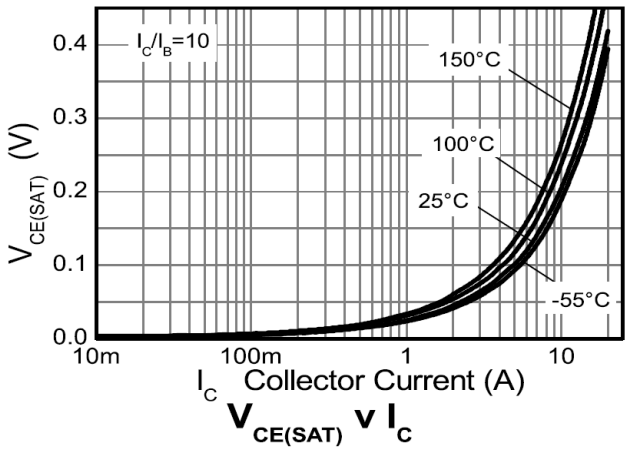
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	70	100	–	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (forward blocking)	BV_{CEX}	70	100	–	V	I_C = 100µA, R_{BE} <1kΩ or -1V< V_{BE} > 0.25V
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	20	30	–	V	I_C = 10mA
Emitter-Collector Breakdown Voltage (reverse blocking)	BV_{ECX}	6	8.4	–	V	I_C = 100µA, R_{BC} <1kΩor 0.25V< V_{BC} > -0.25V
Emitter-Collector Breakdown Voltage (reverse blocking)	BV_{ECO}	4.5	5.7	–	V	I_E = 100µA
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.4	–	V	I_E = 100µA
Collector Cut-Off Current	I_{CBO}	–	< 1	50	nA	V_{CB} = 70V
		–	–	0.5	µA	V_{CB} = 70V, T_A = +100°C
Collector-Emitter Cut-Off Current	I_{CEX}	–	–	100	nA	V_{CE} = 70V, R_{BE} <1kΩ or -1V < V_{BE} > 0.25V
Emitter Cut-Off Current	I_{EBO}	–	< 1	50	nA	V_{EB} = 5.6V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	–	27	35	mV	I_C = 1A, I_B = 100mA
		–	50	70	mV	I_C = 1A, I_B = 10mA
		–	80	100	mV	I_C = 2A, I_B = 20mA
		–	63	80	mV	I_C = 2A, I_B = 40mA
		–	85	110	mV	I_C = 4A, I_B = 400mA
		–	200	250	mV	I_C = 9A, I_B = 450mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	–	1040	1150	mV	I_C = 9A, I_B = 450mA
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	–	910	1050	mV	I_C = 9A, V_{CE} = 2V
DC Current Gain (Note 11)	h_{FE}	300	450	900	–	I_C = 100mA, V_{CE} = 2V
		260	390	–	–	I_C = 2A, V_{CE} = 2V
		130	175	–	–	I_C = 9A, V_{CE} = 2V
		50	75	–	–	I_C = 15A, V_{CE} = 2V
		–	30	–	–	I_C = 20A, V_{CE} = 2V
Current Gain-Bandwidth Product (Note 11)	f_T	–	160	–	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz
Input Capacitance (Note 11)	C_{ibo}	–	297	400	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance (Note 11)	C_{obo}	–	32.6	40	pF	V_{CB} = 10V, f = 1MHz
Delay Time	t_d	–	129	–	ns	I_C = 1A, V_{CC} = 10V, I_{B1} = -I_{B2} = 10mA
Rise Time	t_r	–	96	–	ns	
Storage Time	t_s	–	398	–	ns	
Fall Time	t_f	–	90	–	ns	

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

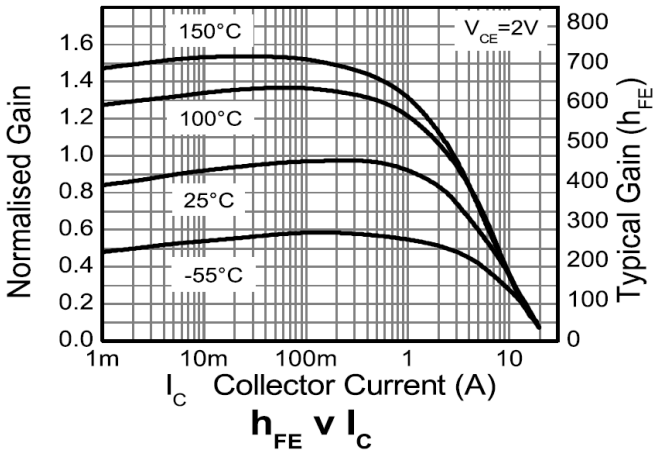
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



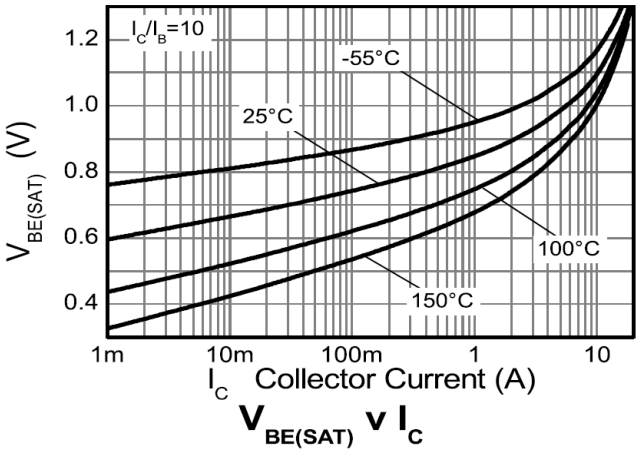
$V_{CE(SAT)}$ v I_C



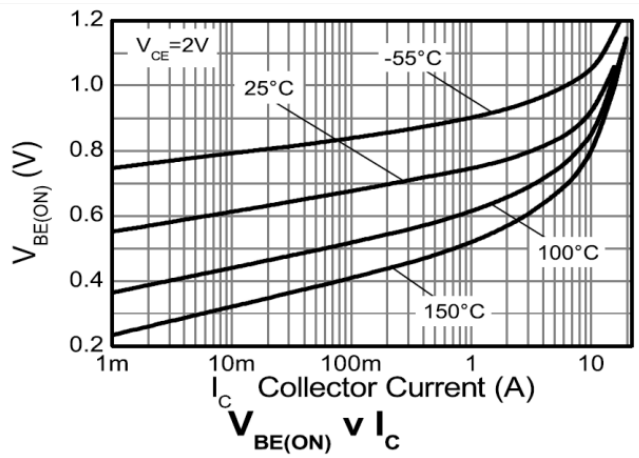
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



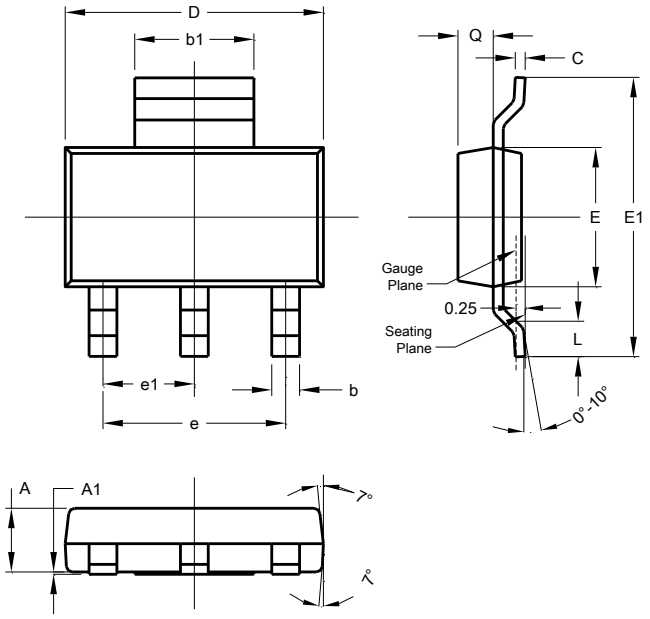
$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package Outline Dimensions

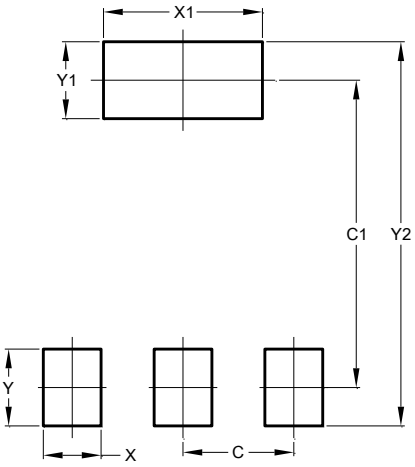
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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