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A Product Line of
Diodes Incorporated



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 $V_{CE(sat)} < 35mV @ 1A$
- $R_{CE(sat)} = 20m\Omega$
- 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

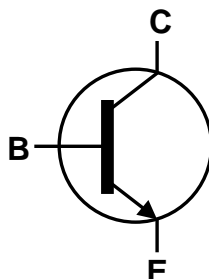
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads; Solderable per MIL-STD-202, Method 208 Ⓜ3
- Weight: 0.112 grams (Approximate)

Applications

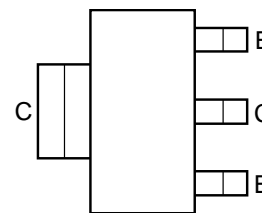
- PSU Start-Up Circuit
- DC-DC Converters
- Motor Drive
- Relay, Lamp and Solenoid Drive



Top View



Device Symbol



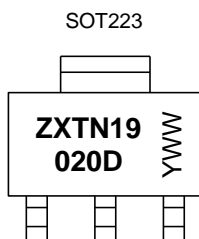
Top View
Pin-Out

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



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_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	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.)

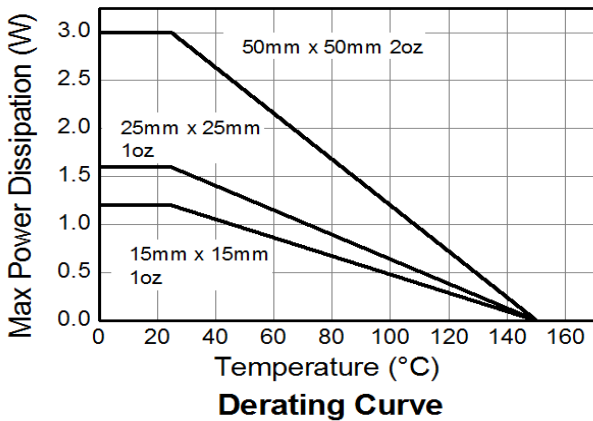
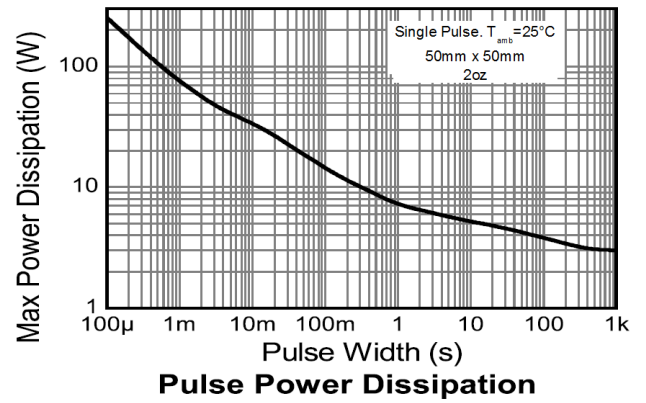
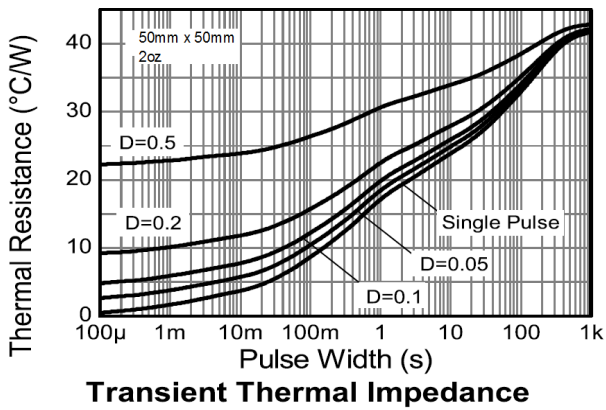
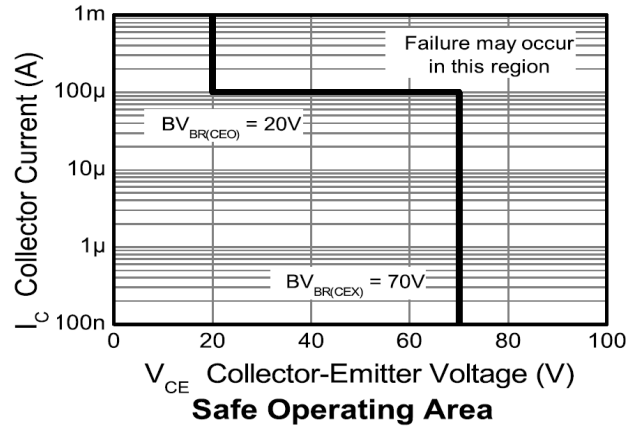
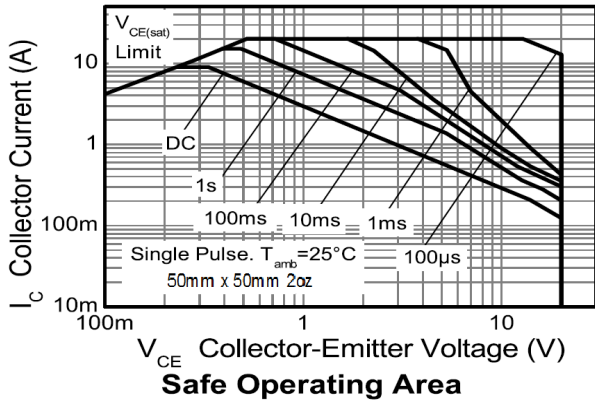
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P _D	1.2	W mW/°C
		9.6	
		1.6	
		12.8	
		3	
Thermal Resistance, Junction to Ambient	R _{θJA}	24	°C/W
		5.3	
		42	
		104	
Thermal Resistance, Junction to Lead	R _{θJL}	78	°C/W
		42	
		23.5	
Operating and Storage Temperature Range	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:
- 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.)

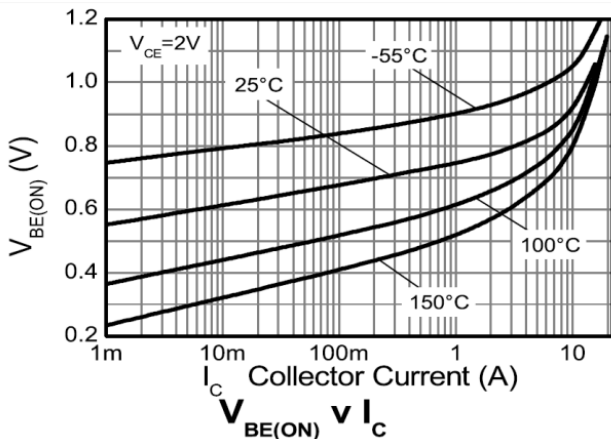
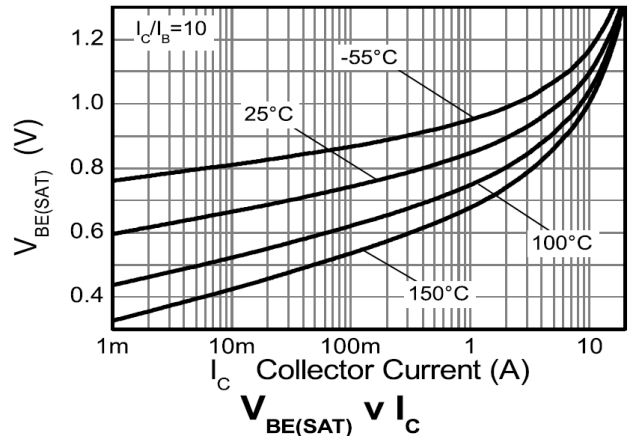
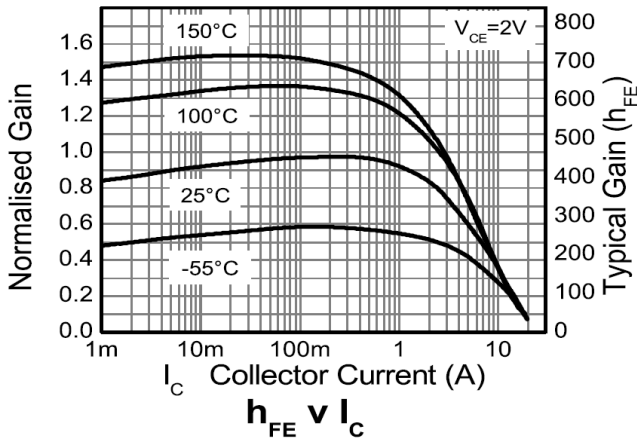
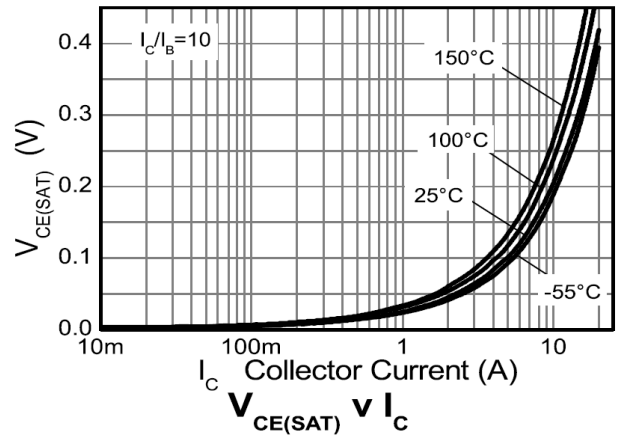
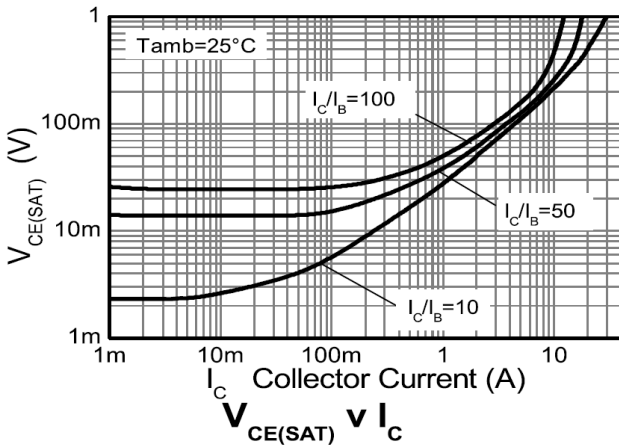


Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

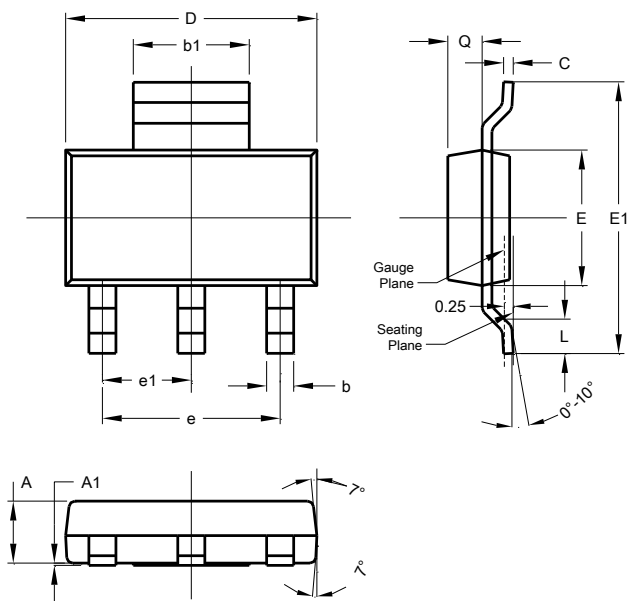
 Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

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



Package Outline Dimensions

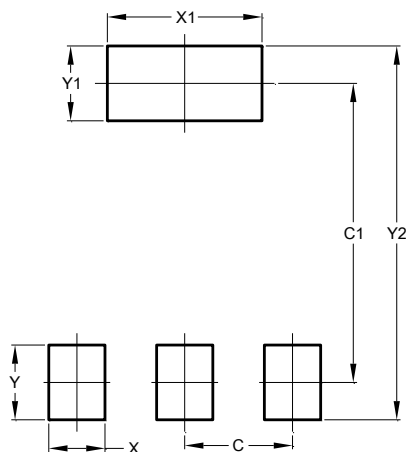
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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