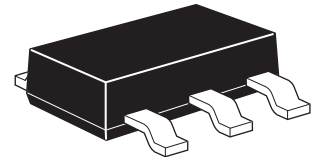


# ZXTN19020DG

## 20V NPN high gain transistor in SOT223

### Summary

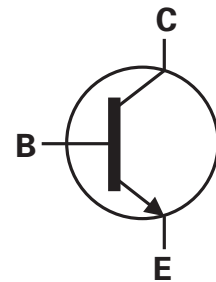
$BV_{CEX} > 70V$   
 $BV_{CEO} > 20V$   
 $BV_{ECO} > 4.5V$   
 $I_{C(cont)} = 9A$   
 $V_{CE(sat)} < 35mV @ 1A$   
 $R_{CE(sat)} = 20m\Omega$   
 $P_D = 3.0W$



Complementary part number ZXTP19020DG

### Description

Packaged in the SOT223 outline this new low saturation NPN transistor offers extremely low on state losses making it ideal for use in DC-DC circuits and various driving and power management functions.



### Features

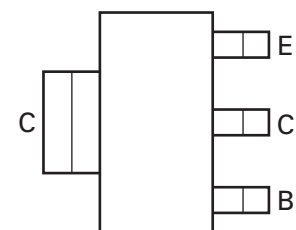
- Higher power dissipation SOT223 package
- High gain
- High peak current
- Low saturation voltage
- 70V forward blocking voltage
- 4.5V reverse blocking voltage

### Applications

- DC - DC converters
- Motor drive
- Relay, lamp and solenoid drive
- Regulator circuits

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN19020DGTA	7	12	1000



Pinout - top view

### Device marking

ZXTN19020D

# ZXTN19020DG

## Absolute maximum ratings

Parameter	Symbol	Limit	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 <sup>(c)</sup>	$I_C$	9	A
Base current	$I_B$	1	A
Peak pulse current	$I_{CM}$	20	A
Power dissipation at $T_A = 25^\circ\text{C}^{(a)}$	$P_D$	1.2	W
Linear derating factor		9.6	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(b)}$	$P_D$	1.6	W
Linear derating factor		12.8	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(c)}$	$P_D$	3.0	W
Linear derating factor		24	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(d)}$	$P_D$	5.3	W
Linear derating factor		42	mW/°C
Power dissipation at $T_C = 25^\circ\text{C}^{(e)}$	$P_D$	9.4	W
Linear derating factor		75	mW/°C
Operating and storage temperature range	$T_j, T_{stg}$	-55 to 150	°C

## Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	104	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	78	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	42	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	23.5	°C/W
Junction to case <sup>(e)</sup>	$R_{\theta JC}$	12.3	°C/W

### NOTES:

(a) For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

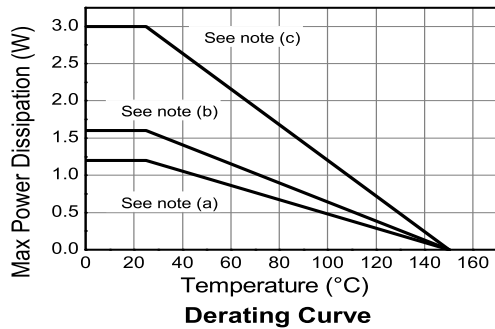
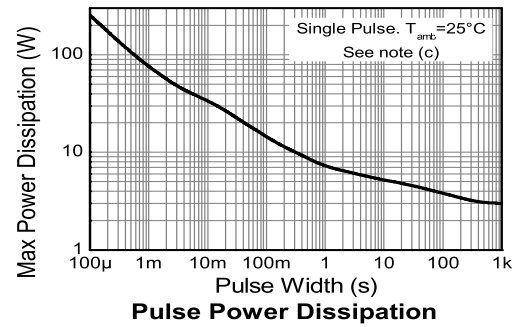
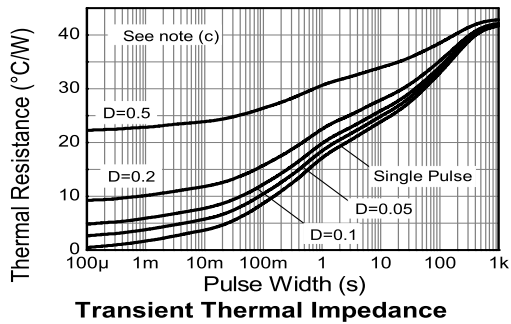
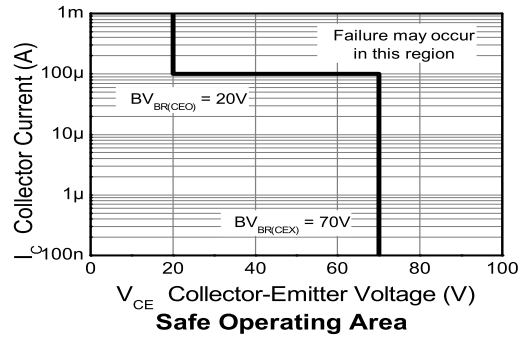
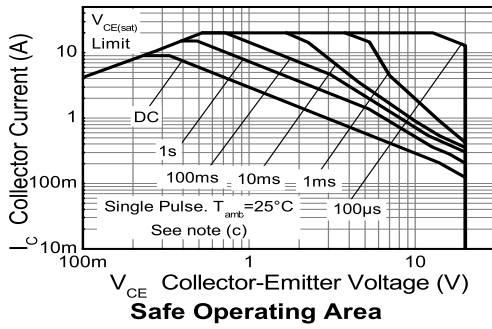
(b) Mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(c) Mounted on 50mm x 50mm x 0.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.

(d) As (c) above measured at  $t < 5$  seconds.

(e) Junction to case (collector tab). Typical

## Thermal characteristics



# ZXTN19020DG

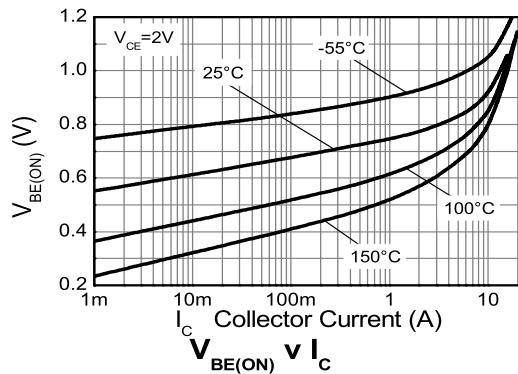
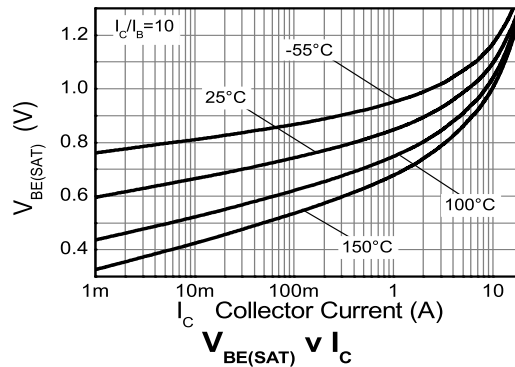
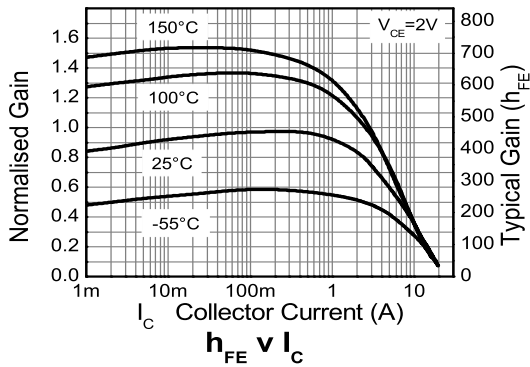
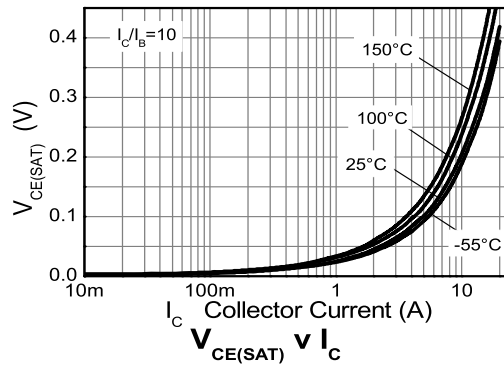
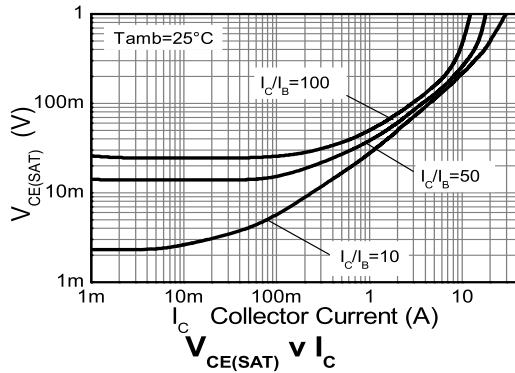
Electrical characteristics (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated).

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
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	$BV_{CEO}$	20	30		V	$I_C = 10\text{mA}^{(*)}$
Emitter-Collector breakdown voltage (reverse blocking)	$BV_{ECX}$	6	8.4		V	$I_E = 100\mu\text{A}$ , $R_{BC} < 1\text{k}\Omega$ 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-Base cut-off current	$I_{CBO}$		<1	50 0.5	nA $\mu\text{A}$	$V_{CB} = 70\text{V}$ $V_{CB} = 70\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$
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	$V_{CE(sat)}$		27 50 80 63 85 200	35 70 100 80 110 250	mV mV mV mV mV mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$ $I_C = 2\text{A}$ , $I_B = 20\text{mA}^{(*)}$ $I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$ $I_C = 4\text{A}$ , $I_B = 400\text{mA}^{(*)}$ $I_C = 9\text{A}$ , $I_B = 450\text{mA}^{(*)}$
Base-Emitter saturation voltage	$V_{BE(sat)}$		1040	1150	mV	$I_C = 9\text{A}$ , $I_B = 450\text{mA}^{(*)}$
Base-Emitter turn-on voltage	$V_{BE(on)}$		910	1050	mV	$I_C = 9\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	300 260 130 50	450 390 175 75 30	900		$I_C = 100\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 2\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 9\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 15\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$ $I_C = 20\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	$f_T$		160		MHz	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Input capacitance	$C_{ibo}$		297	400	pF	$V_{EB} = 0.5\text{V}$ , $f = 1\text{MHz}^{(*)}$
Output capacitance	$C_{obo}$		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	

**NOTES:**

(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN19020DG

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# ZXTN19020DG

## Package outline - SOT223



Conforms to JEDEC TO-261 AA Issue B

Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.80	-	0.071	D	6.30	6.70	0.248	0.264
A1	0.02	0.10	0.0008	0.004	e	2.30 BSC		0.0905 BSC	
A2	1.55	1.65	0.0610	0.0649	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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