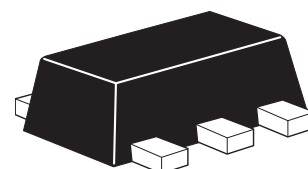


# ZXTN19020DZ

## 20V NPN high gain transistor in SOT89

### Summary

$BV_{CEX} > 70V$   
 $BV_{CEO} > 20V$   
 $BV_{ECO} > 4.5V$   
 $I_{C(cont)} = 7.5A$   
 $V_{CE(sat)} < 35mV @ 1A$   
 $R_{CE(sat)} = 21m\Omega$   
 $P_D = 2.4W$



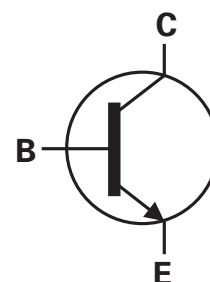
Complementary part number ZXTP19020DZ

### Description

Packaged in the SOT89 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.

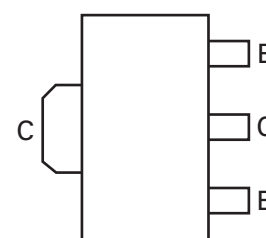
### Features

- 7.5A continuous current
- Up to 20A peak current
- Very low saturation voltage
- 70V forward blocking voltage
- 4.5V reverse blocking voltage



### Applications

- Emergency lighting circuits
- Motor driving
- Camera strobe
- Boost converter
- CCFL backlight inverters
- MOSFET gate drivers
- LED Driving



Pinout - top view

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN19020DZTA	7	12	1000

### Device marking

1L8

**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>	$I_C$	7.5	A
Base current	$I_B$	1	A
Peak pulse current	$I_{CM}$	20	A
Power dissipation at $T_A = 25^\circ\text{C}^{(a)}$	$P_D$	1.1	W
Linear derating factor		8.8	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(b)}$	$P_D$	1.8	W
Linear derating factor		14.4	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(c)}$	$P_D$	2.4	W
Linear derating factor		19.2	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(d)}$	$P_D$	4.46	W
Linear derating factor		35.7	mW/°C
Power dissipation at $T_C = 25^\circ\text{C}^{(e)}$	$P_D$	27.8	W
Linear derating factor		222	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>	$R_{\theta JA}$	117	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	68	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	51	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	28	°C/W
Junction to case <sup>(e)</sup>	$R_{\theta JC}$	4.69	°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.

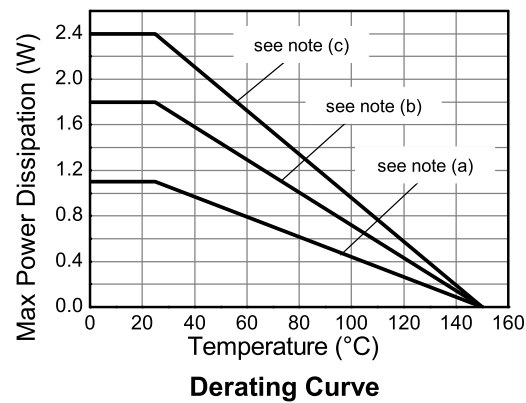
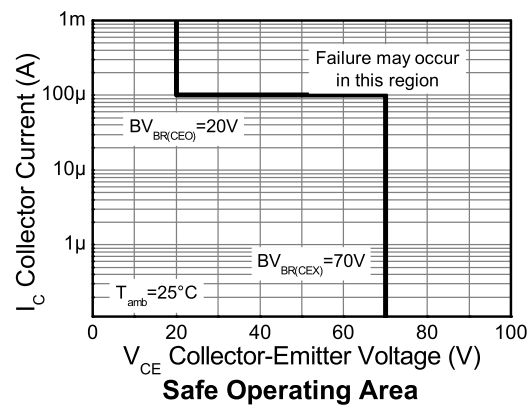
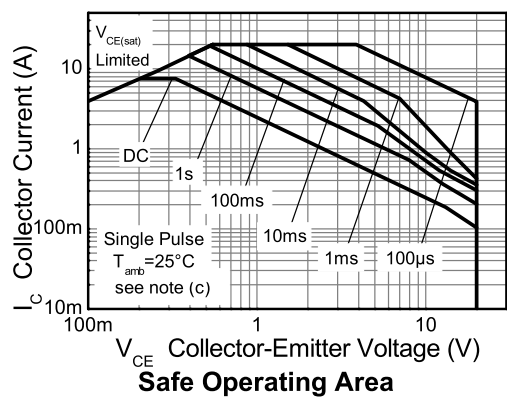
(b) Mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

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

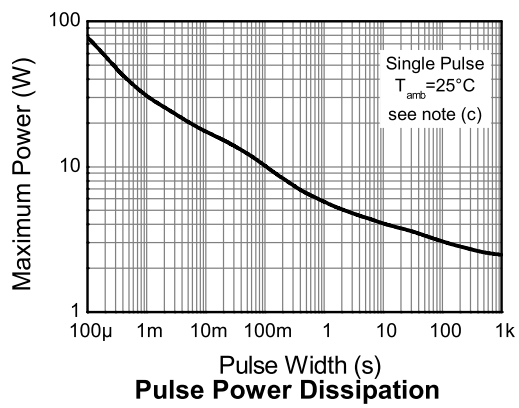
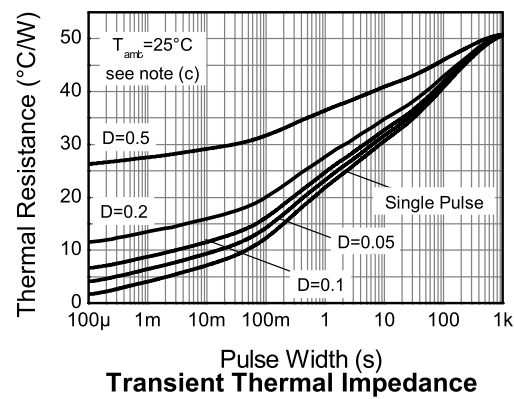
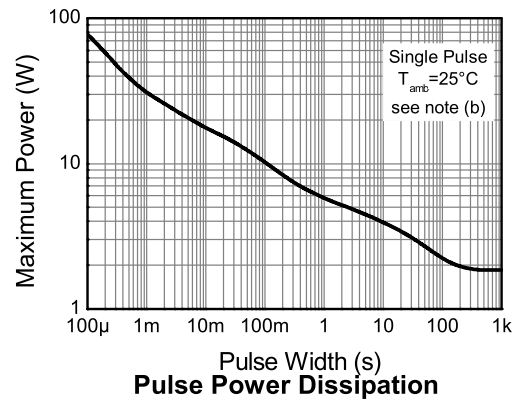
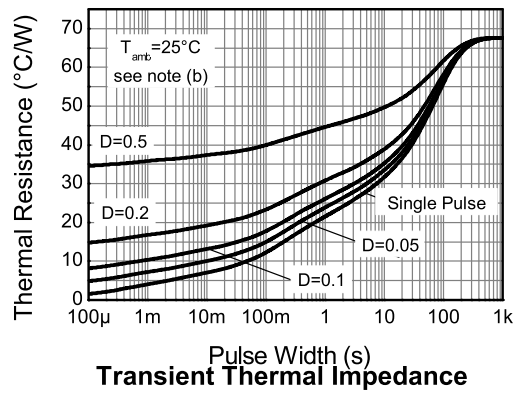
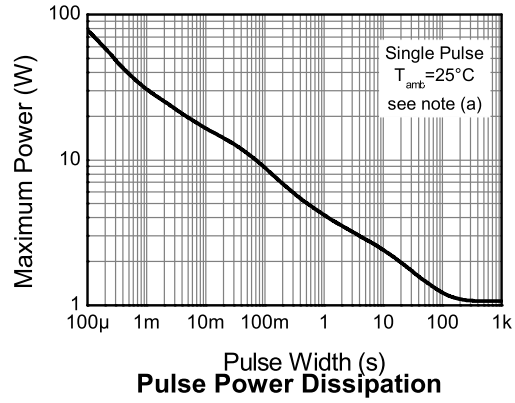
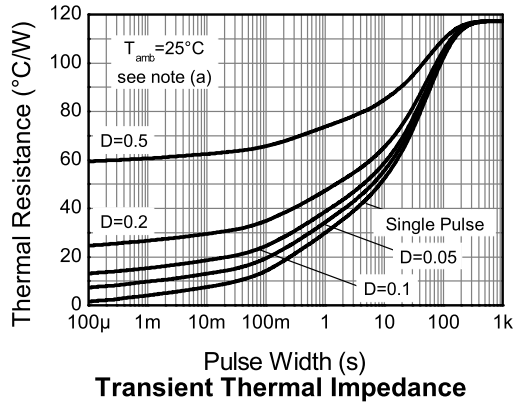
(d) As (c) above measured at  $t < 5$  seconds.

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

Thermal characteristics



## Thermal characteristics



# ZXTN19020DZ

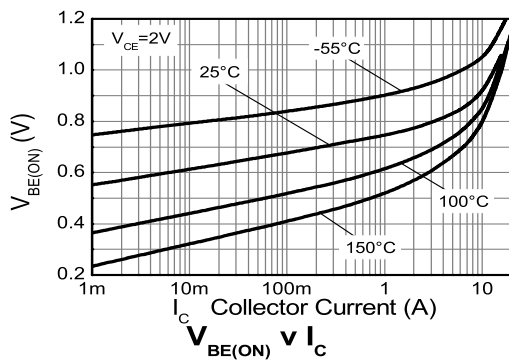
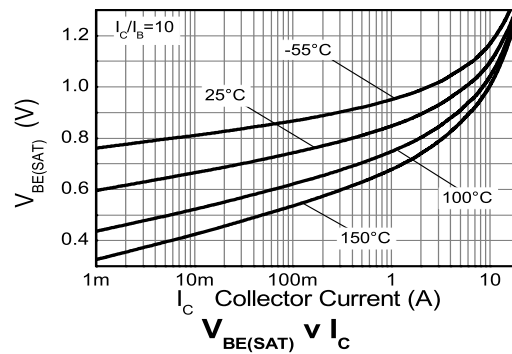
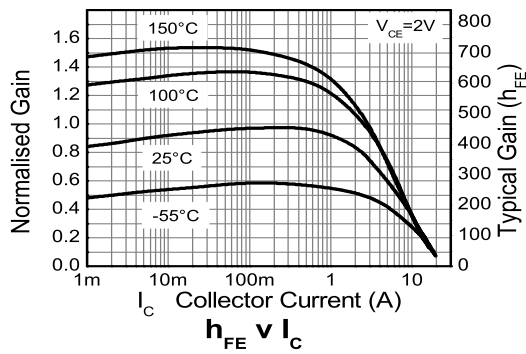
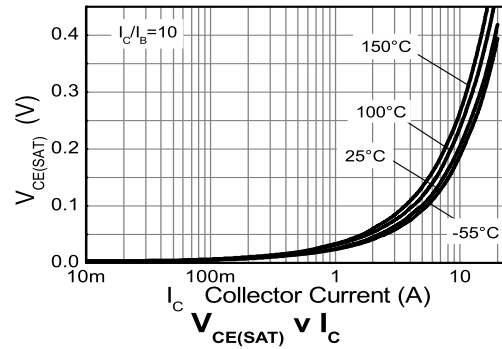
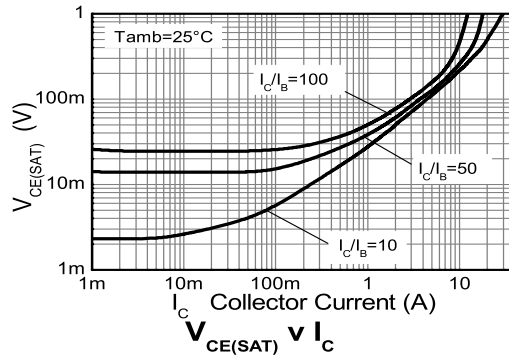
**Electrical characteristics (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated).**

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	$I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ 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	$I_E = 100\mu\text{A}$ , $R_{BC} \leq 1\text{k}\Omega$ 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	$BV_{EBO}$	7.0	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	$V_{CE} = 70\text{V}$ , $R_{BE} \leq 1\text{k}\Omega$ 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	$V_{CE(sat)}$		26	32	mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$
			50	70	mV	$I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$
			75	100	mV	$I_C = 2\text{A}$ , $I_B = 20\text{mA}^{(*)}$
			60	80	mV	$I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$
			83	105	mV	$I_C = 4\text{A}$ , $I_B = 400\text{mA}^{(*)}$
			155	200	mV	$I_C = 7.5\text{A}$ , $I_B = 375\text{mA}^{(*)}$
Base-Emitter saturation voltage	$V_{BE(sat)}$		1000	1100	mV	$I_C = 7.5\text{A}$ , $I_B = 375\text{mA}^{(*)}$
Base-Emitter turn-on voltage	$V_{BE(on)}$		870	1000	mV	$I_C = 7.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	300	450	900		$I_C = 100\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$
		260	390			$I_C = 2\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		150	210			$I_C = 7.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		50	75			$I_C = 15\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
			35			$I_C = 20\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
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:

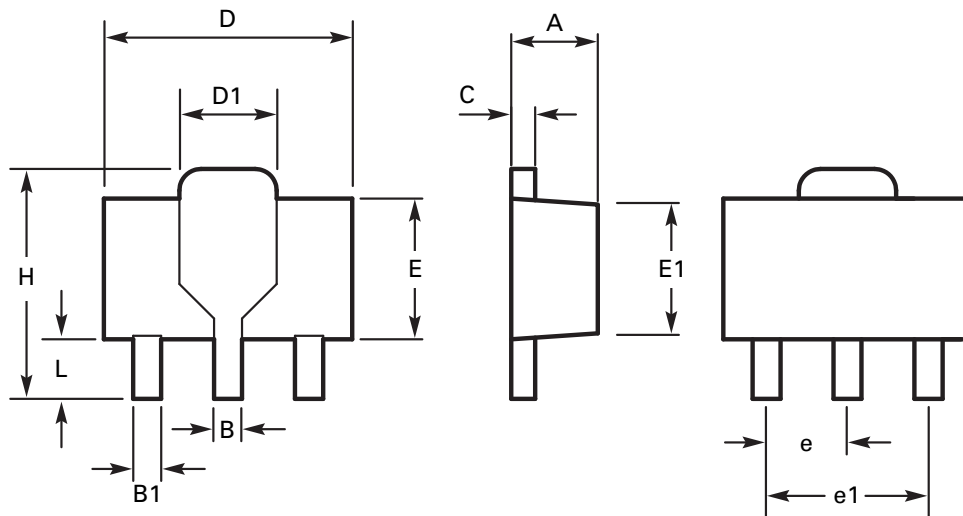
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN19020DZ

## Package outline - SOT89



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
B	0.44	0.56	0.017	0.022	E1	2.13	2.29	0.084	0.090
B1	0.36	0.48	0.014	0.019	e	1.50 BSC		0.059 BSC	
C	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	H	3.94	4.25	0.155	0.167
D1	1.52	1.83	0.064	0.072	L	0.89	1.20	0.035	0.047

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

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