

# ZXTN19020DFF

## 20V, SOT23F, NPN high gain power transistor

### Summary

$BV_{CEX} > 70V$

$BV_{CEO} > 20V$

$BV_{ECO} > 4.5V$

$I_{C(cont)} = 6.5A$

$V_{CE(sat)} = < 30mV @ 1A$

$R_{CE(sat)} = 18m\Omega$

$P_D = 1.5W$

Complementary part number ZXTP19020DFF

### Description

Advanced process capability has been used to maximize the performance of this transistor. The SOT23F package is compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

### Features

- Very low saturation voltage
- High gain
- High forward blocking voltage
- Low profile high dissipation package

### Applications

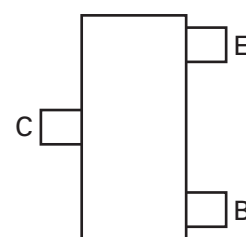
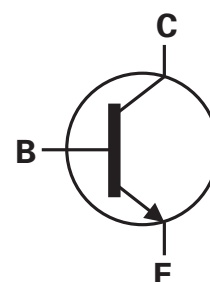
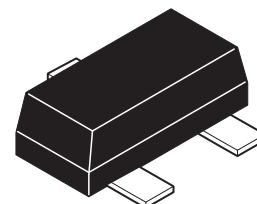
- MOSFET and IGBT gate driving
- LED driving
- Strobe flash
- Motor drive
- Micro buffers

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN19020DFFTA	7	8	3000

### Device marking

1E3



Pinout - top view

# ZXTN19020DFF

## 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 (base open)	$V_{CEO}$	20	V
Emitter-collector voltage (reverse blocking)	$V_{ECO}$	4.5	V
Emitter-base voltage	$V_{EBO}$	7	V
Continuous collector current <sup>(c)</sup>	$I_C$	6.5	A
Base current	$I_B$	1	A
Peak pulse current	$I_{CM}$	15	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	$P_D$	0.84	W
Linear derating factor		6.72	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	$P_D$	1.34	W
Linear derating factor		10.72	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(c)}$	$P_D$	1.5	W
Linear derating factor		12.0	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$	$P_D$	2.0	W
Linear derating factor		16.0	mW/°C
Operating and storage temperature range	$T_j, T_{stg}$	- 55 to 150	°C

## Thermal resistance

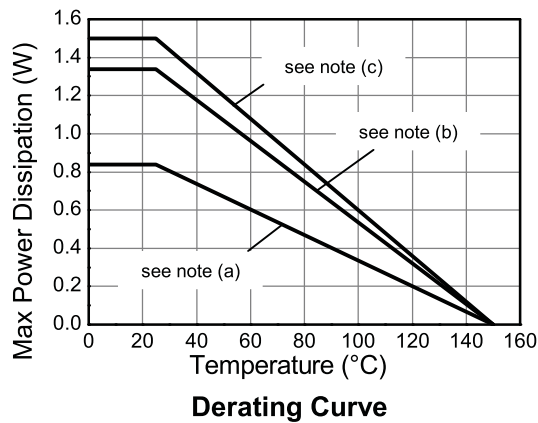
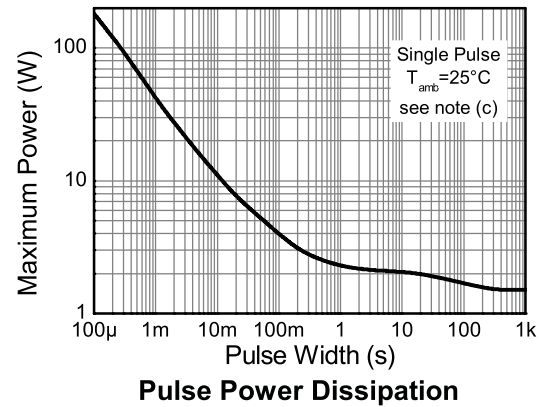
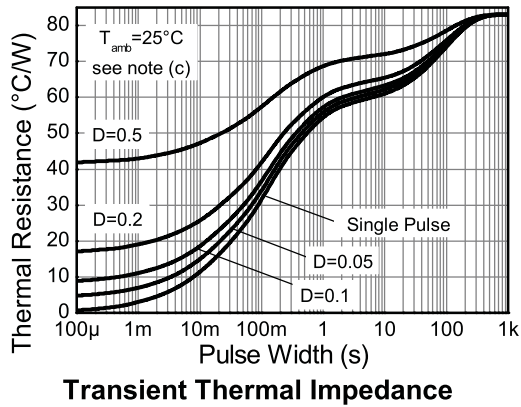
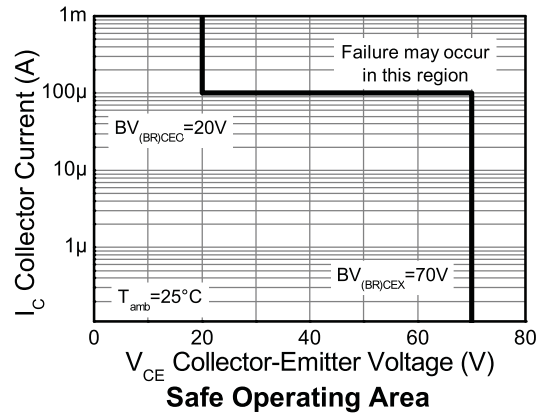
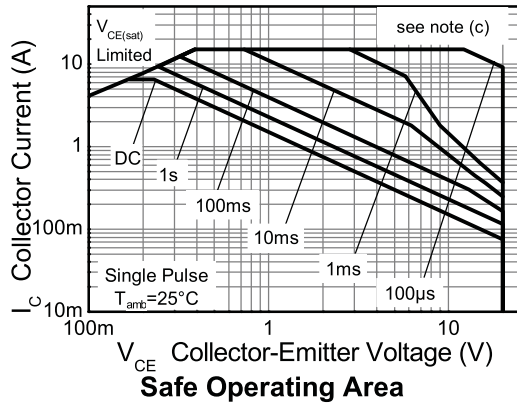
Parameter	Symbol	Value	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	149.3	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	93.4	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	83.3	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	60	°C/W

### NOTES:

- (a) For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.
- (c) Mounted on 50mm x 50mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.
- (d) As (c) above measured at  $t < 5$ secs.

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## Characteristics



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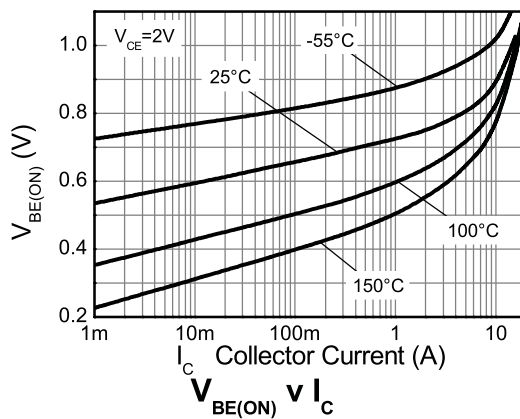
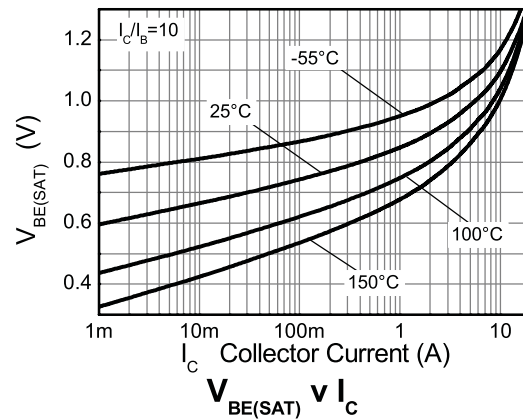
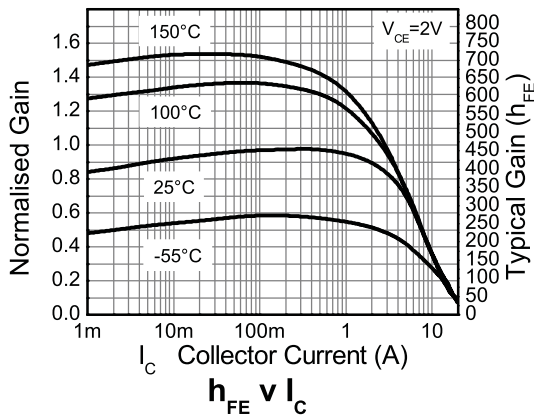
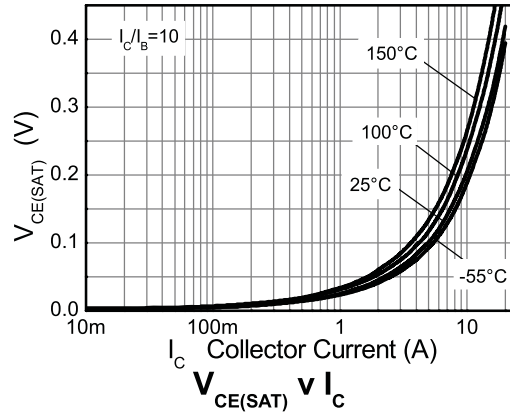
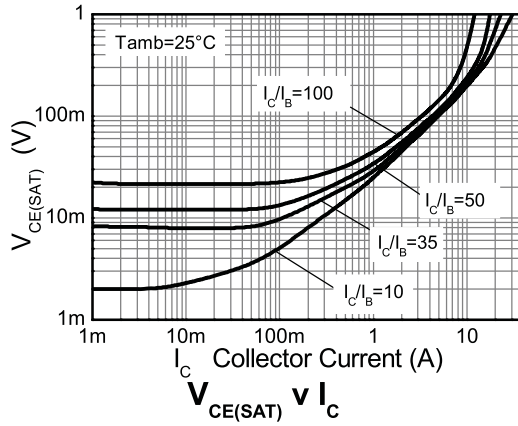
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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 (base open)	$BV_{CEO}$	20	30		V	$I_C = 10\text{mA}^{(*)}$
Emitter-base breakdown voltage	$BV_{EBO}$	7	8.4		V	$I_E = 100\mu\text{A}$
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 (base open)	$BV_{ECO}$	4.5	5.7		V	$I_E = 100\mu\text{A}$ ,
Collector-base cut-off current	$I_{CBO}$		<1	50 20	nA $\mu\text{A}$	$V_{CB} = 56\text{V}$ $V_{CB} = 56\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$
Collector-emitter cut-off current	$I_{CEX}$		-	100	nA	$V_{CE} = 56\text{V}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Emitter-base cut-off current	$I_{EBO}$		<1	50	nA	$V_{EB} = 5.6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$		25	30	mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$
			45	65	mV	$I_C = 1\text{A}$ , $I_B = 10\text{mA}^{(*)}$
			70	95	mV	$I_C = 2\text{A}$ , $I_B = 20\text{mA}^{(*)}$
			55	75	mV	$I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$
			140	190	mV	$I_C = 6.5\text{A}$ , $I_B = 180\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		940	1050	mV	$I_C = 6.5\text{A}$ , $I_B = 180\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		830	950	mV	$I_C = 6.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	300	450	900		$I_C = 0.1\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		260	420			$I_C = 2\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		160	270			$I_C = 6.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		50	80			$I_C = 15\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	$f_T$		160		MHz	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 50\text{MHz}$
Input capacitance	$C_{ibo}$		297		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	$V_{CC} = 10\text{V}$ . $I_C = 1\text{A}$ , $I_{B1} = I_{B2} = 10\text{mA}$ .
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  $\leq 2\%$ .

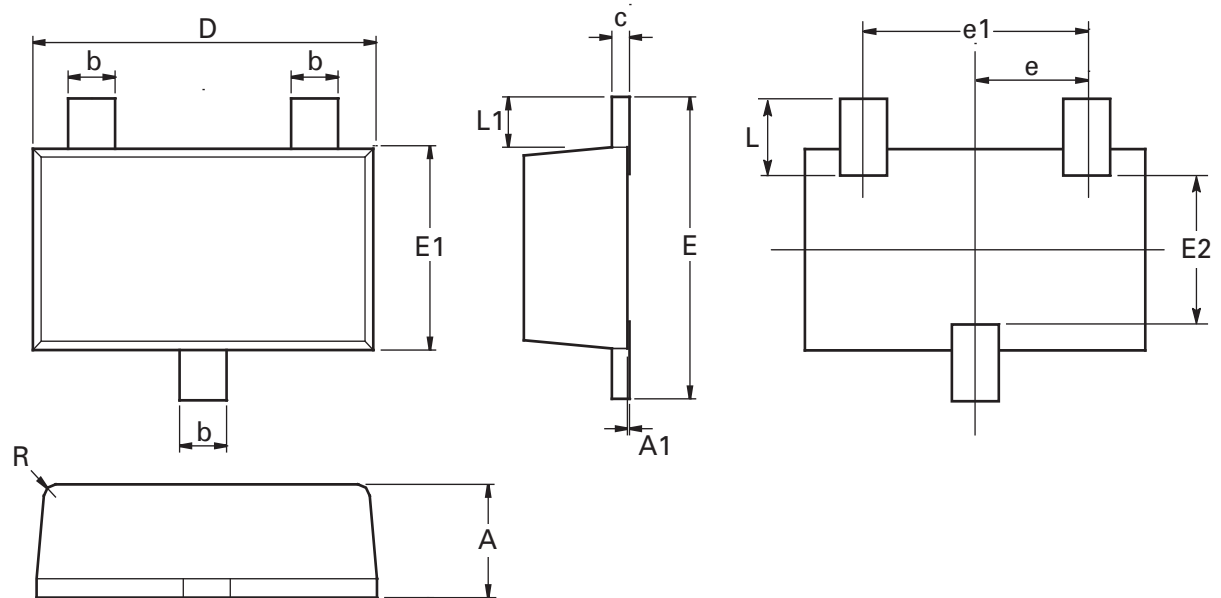
## Typical characteristics



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# ZXTN19020DFF

## Package outline - SOT23F



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	0.80	1.00	0.0315	0.0394	E	2.30	2.50	0.0906	0.0984
A1	0.00	0.10	0.00	0.0043	E1	1.50	1.70	0.0590	0.0669
b	0.35	0.45	0.0153	0.0161	E2	1.10	1.26	0.0433	0.0496
c	0.10	0.20	0.0043	0.0079	L	0.48	0.68	0.0189	0.0268
D	2.80	3.00	0.1102	0.1181	L1	0.30	0.50	0.0153	0.0161
e	0.95 ref		0.0374 ref		R	0.05	0.15	0.0019	0.0059
e1	1.80	2.00	0.0709	0.0787	O	0°	12°	0°	12°

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

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