

# ZXTN2020F

## 100V, SOT23, NPN medium power transistor

### Summary

$V_{(BR)CEV} > 160V, V_{(BR)CEO} > 100V$

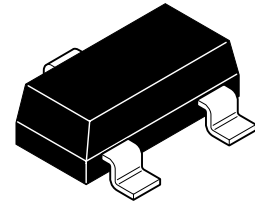
$I_{C(cont)} = 4A$

$R_{CE(sat)} = 30m\Omega$  typical

$V_{CE(sat)} < 50mV @ 1A$

$P_D = 1.2W$

Complementary part number: ZXTP2029F



### Description

Advanced process capability and package design have been used to maximize the power handling and performance of this small outline transistor. The compact size and ratings of this device make it ideally suited to applications where space is at a premium.

### Features

- Higher power dissipation SOT23 package
- High peak current
- Low saturation voltage
- 160V forward blocking voltage

### Applications

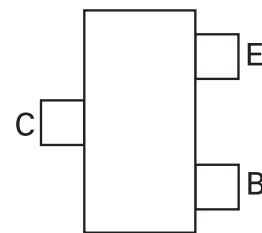
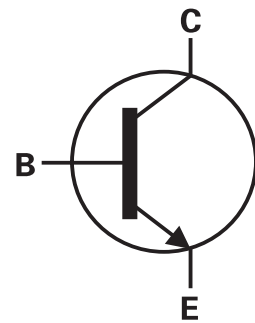
- MOSFET and IGBT gate driving
- Motor drive
- Relay, lamp and solenoid drive

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN2020FTA	7	8	3,000

### Device marking

853



Pinout - top view

# ZXTN2020F

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	160	V
Collector-emitter voltage	$V_{(BR)CEV}$	160	V
Collector-emitter voltage	$V_{CEO}$	100	V
Emitter-base voltage	$V_{EBO}$	7	V
Peak pulse current	$I_{CM}$	12	A
Continuous collector current <sup>(a)</sup>	$I_C$	4	A
Base current	$I_B$	1	A
Power dissipation @ $T_A=25^{\circ}C^{(a)}$ Linear derating factor	$P_D$	1.0 8	W mW/ $^{\circ}C$
Power dissipation @ $T_A=25^{\circ}C^{(b)}$ Linear derating factor	$P_D$	1.2 9.6	W mW/ $^{\circ}C$
Power dissipation @ $T_A=25^{\circ}C^{(c)}$ Linear derating factor	$P_D$	1.56 12.5	W mW/ $^{\circ}C$
Operating and storage temperature	$T_j; T_{stg}$	-55 to +150	$^{\circ}C$

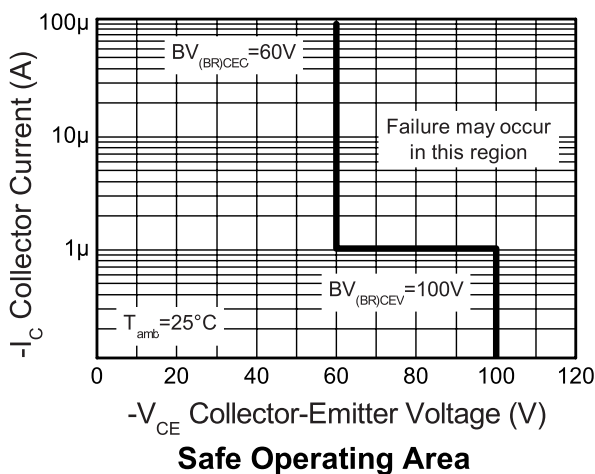
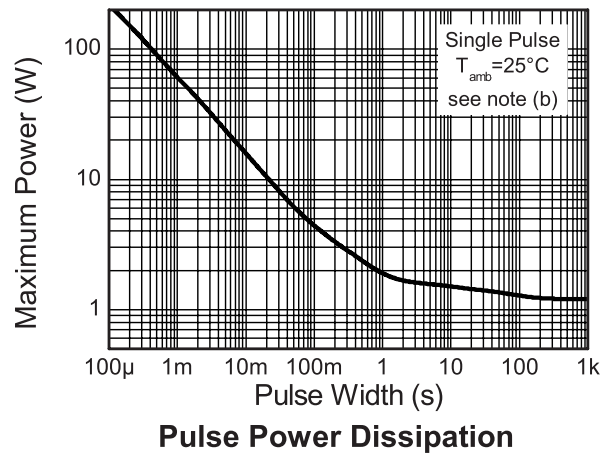
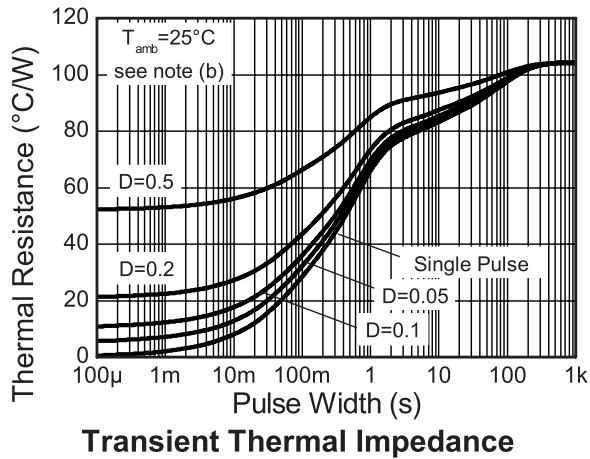
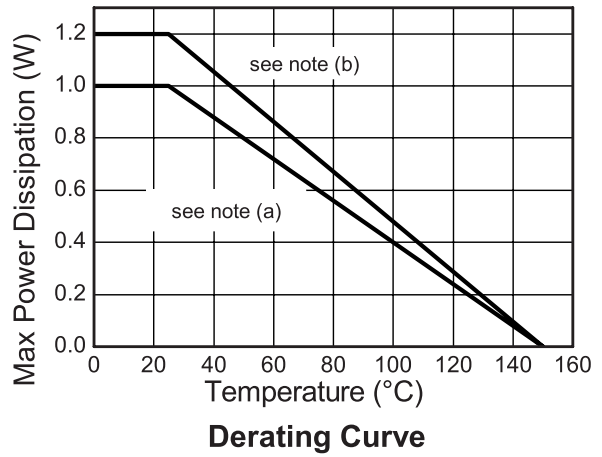
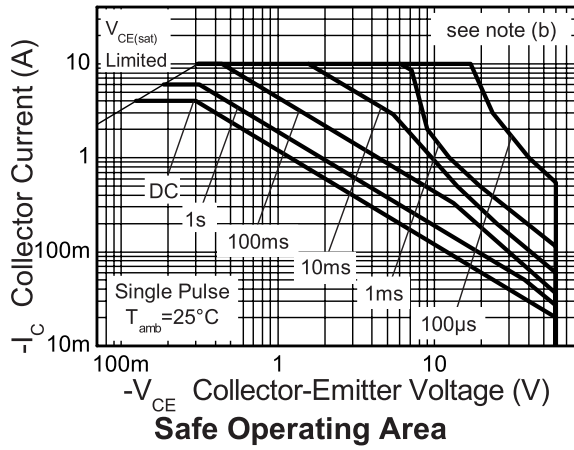
## Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	125	$^{\circ}C/W$
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	104	$^{\circ}C/W$
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	80	$^{\circ}C/W$

### NOTES:

- (a) Mounted on 18mm x 18mm x 1.6mm FR4 PCB with a very high coverage of 2 oz weight copper in still air conditions.  
(b) Mounted on 30mm x 30mm x 1.6mm FR4 PCB with a very high coverage of 2 oz weight copper in still air conditions.  
(c) as (b) above measured at  $t < 5$ secs.

## Characteristics



# ZXTN2020F

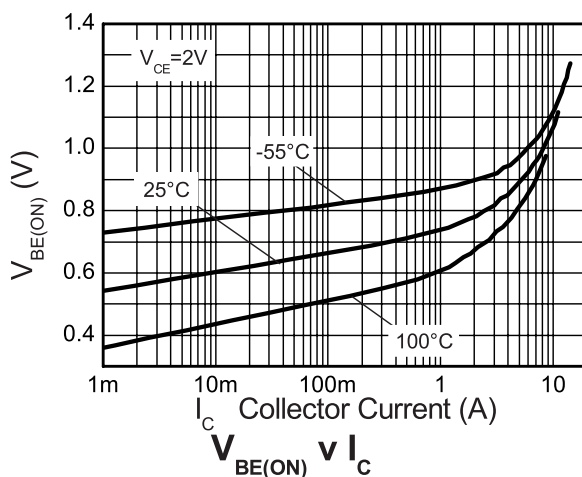
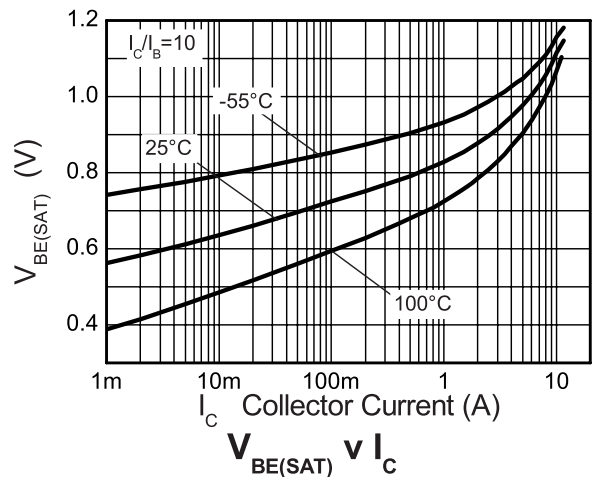
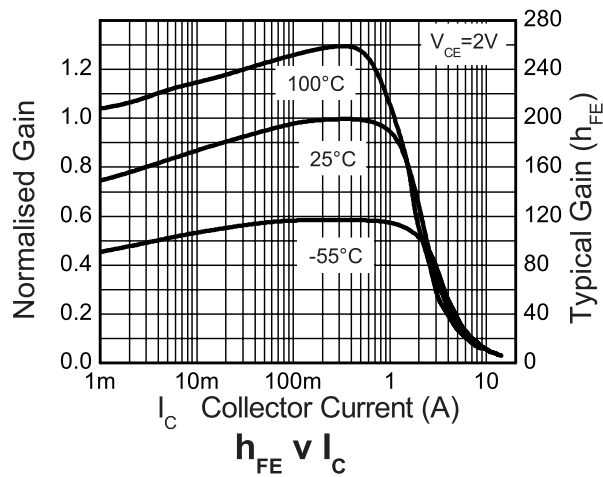
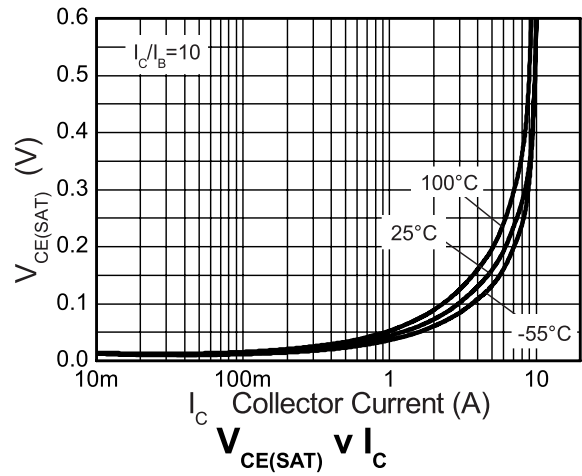
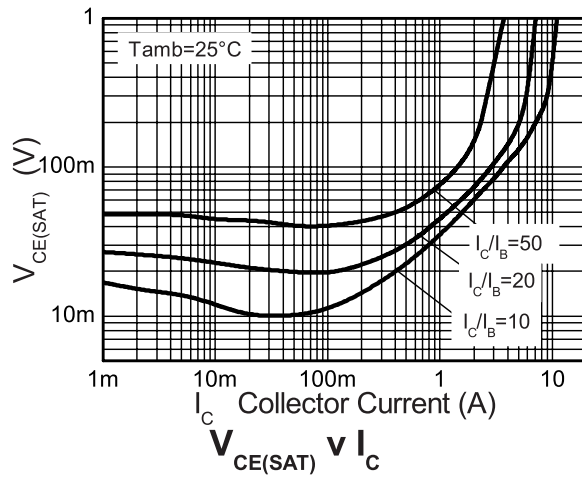
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$V_{(BR)CBO}$	160	200		V	$I_C=100\mu\text{A}$
Collector-emitter breakdown voltage	$V_{(BR)CEV}$	160	200		V	$I_C=1\mu\text{A}$ , $-1\text{V} < V_{BE} < +0.3\text{V}$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	100	115		V	$I_C=10\text{mA}$ <sup>(a)</sup>
Emitter-base breakdown voltage	$V_{(BR)EBO}$	7	8		V	$I_E=100\mu\text{A}$
Collector-emitter cut-off current	$I_{CEV}$		<1	20	nA	$V_{CES}=128\text{V}$ , $V_{BE} = -1\text{V}$
Collector-base cut-off current	$I_{CBO}$		<1	20	nA	$V_{CB}=128\text{V}$
Emitter-base cut-off current	$I_{EBO}$		<1	10	nA	$V_{EB}=6\text{V}$
Static forward current transfer ratio	$H_{FE}$	100 100 35	220 200 60 13	300		$I_C=10\text{mA}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=1\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=4\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=10\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup>
Collector-emitter saturation voltage	$V_{CE(sat)}$		20 40 85 120	30 50 105 150	mV	$I_C=0.1\text{A}$ , $I_B=5\text{mA}$ <sup>(a)</sup> $I_C=1\text{A}$ , $I_B=100\text{mA}$ <sup>(a)</sup> $I_C=2\text{A}$ , $I_B=100\text{mA}$ <sup>(a)</sup> $I_C=4\text{A}$ , $I_B=400\text{mA}$ <sup>(a)</sup>
Base-emitter saturation voltage	$V_{BE(sat)}$		0.94	1.05	V	$I_C=4\text{A}$ , $I_B=400\text{mA}$ <sup>(a)</sup>
Base-emitter turn-on voltage	$V_{BE(on)}$		0.84	0.94	V	$I_C=4\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup>
Transition frequency	$f_T$		130		MHz	$I_C=100\text{mA}$ , $V_{CE}=10\text{V}$ , $f=50\text{MHz}$
Output capacitance	$C_{obo}$		22		pF	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$
Turn-on time	$t_{(on)}$		37		ns	$V_{CC}=10\text{V}$ , $I_C=1\text{A}$ ,
Turn-off time	$t_{(off)}$		910		ns	$I_{B1}=I_{B2}=100\text{mA}$

### NOTES:

(a) Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN2020F

## Packaging details - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	2.67	3.05	0.105	0.120	H	0.33	0.51	0.013	0.020
B	1.20	1.40	0.047	0.055	K	0.01	0.10	0.0004	0.004
C	-	1.10	-	0.043	L	2.10	2.50	0.083	0.0985
D	0.37	0.53	0.015	0.021	M	0.45	0.64	0.018	0.025
F	0.085	0.15	0.0034	0.0059	N	0.95 NOM		0.0375 NOM	
G	1.90 NOM		0.075 NOM		-	-	-	-	-

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

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