

# ZXTN2031F

## 50V, SOT23, NPN medium power transistor

### Summary

$V_{(BR)CEV} > 80V$ ,  $V_{(BR)CEO} > 50V$

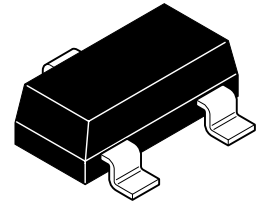
$I_{C(cont)} = 5A$

$R_{CE(sat)} = 24m\Omega$  typical

$V_{CE(sat)} < 40mV @ 1A$

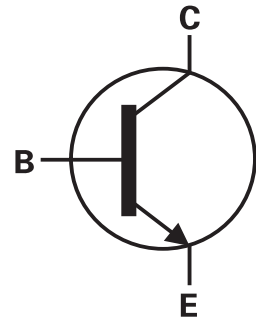
$P_D = 1.2W$

Complementary part number: ZXTP2025F



### 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.

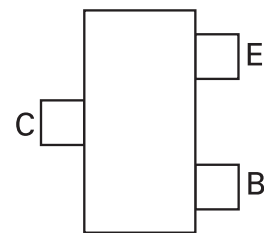


### Feature

- Higher power dissipation SOT23 Package
- High peak current
- Low saturation voltage
- High gain
- 80V forward blocking voltage

### Applications

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



Pinout - top view

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN2031FTA	7	8	3,000

### Device marking

322

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	80	V
Collector-emitter voltage	$V_{(BR)CEV}$	80	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	7.0	V
Peak pulse current	$I_{CM}$	12	A
Continuous collector current <sup>(a)</sup>	$I_C$	5	A
Base current	$I_B$	1.2	A
Power dissipation @ $T_A=25^{\circ}C$ <sup>(a)</sup> Linear derating factor	$P_D$	1.0 8.0	W mW/°C
Power dissipation @ $T_A=25^{\circ}C$ <sup>(b)</sup> Linear derating factor	$P_D$	1.2 9.6	W mW/°C
Power dissipation @ $T_A=25^{\circ}C$ <sup>(c)</sup> Linear derating factor	$P_D$	1.56 12.5	W mW/°C
Operating and storage temperature	$T_j:T_{stg}$	-55 to +150	°C

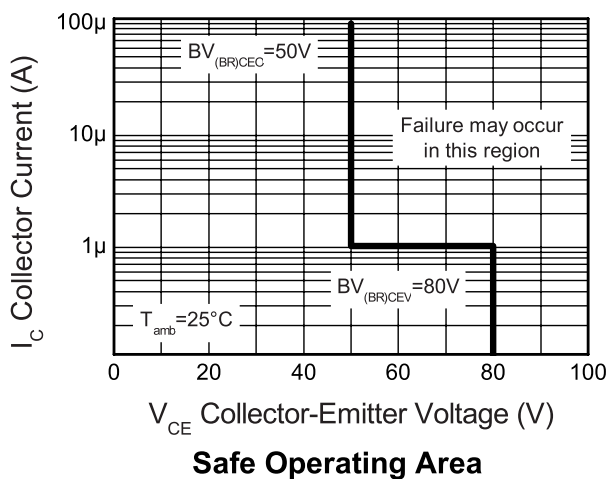
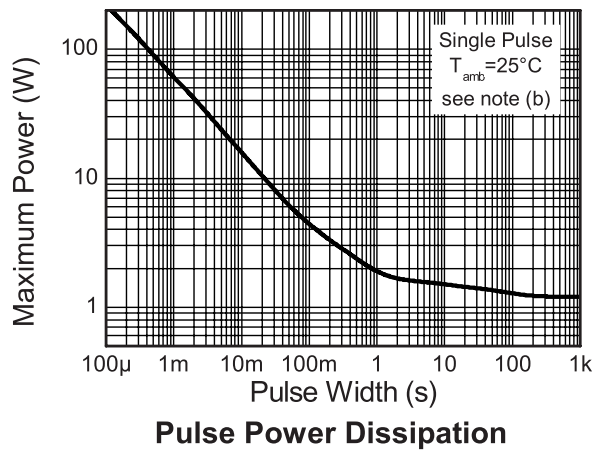
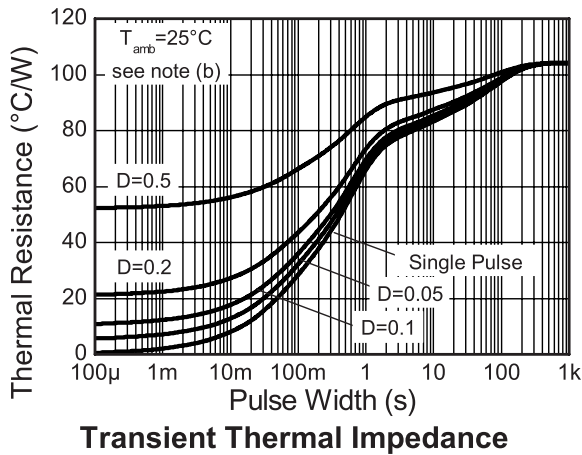
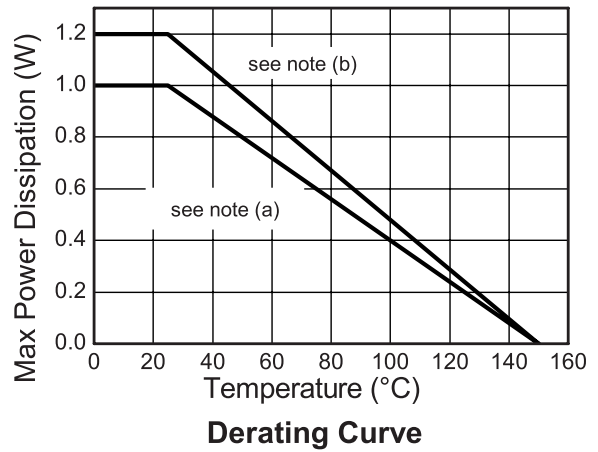
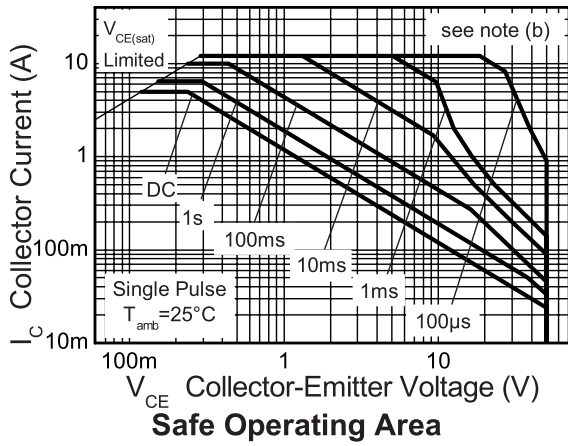
## Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient <sup>(a)</sup>	$R\theta_{JA}$	125	°C/W
Junction to ambient <sup>(b)</sup>	$R\theta_{JA}$	104	°C/W
Junction to ambient <sup>(c)</sup>	$R\theta_{JA}$	80	°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



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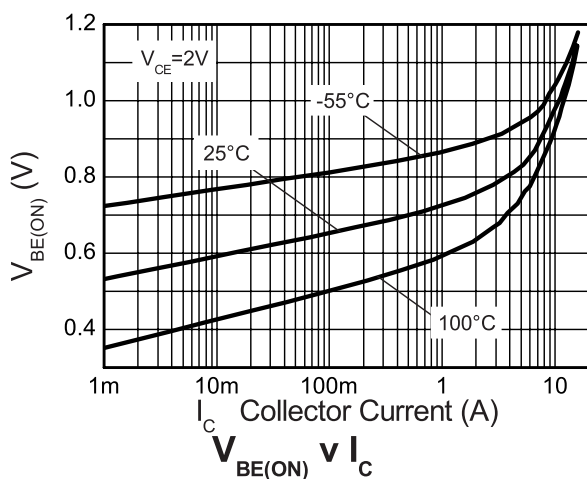
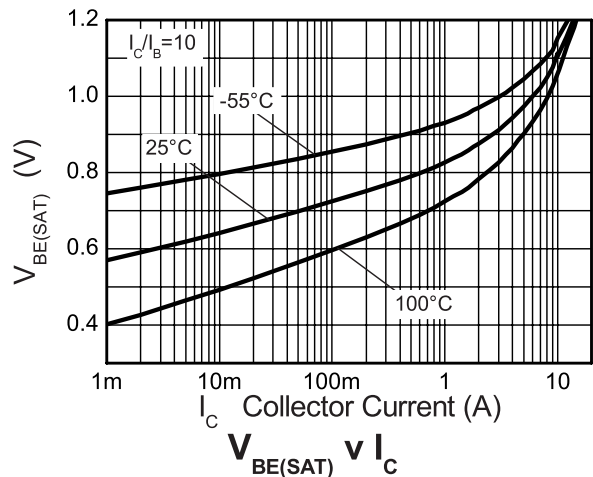
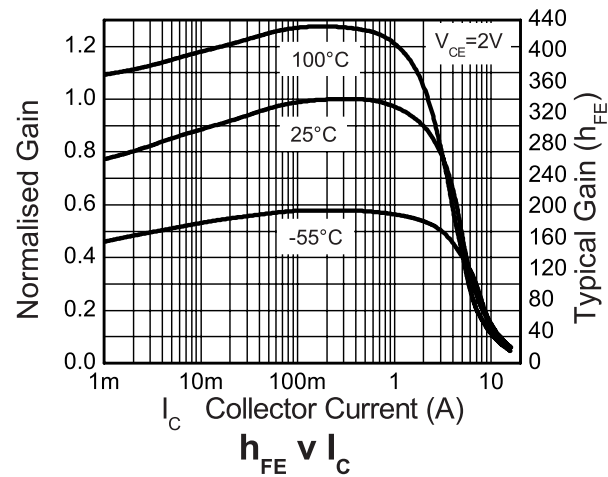
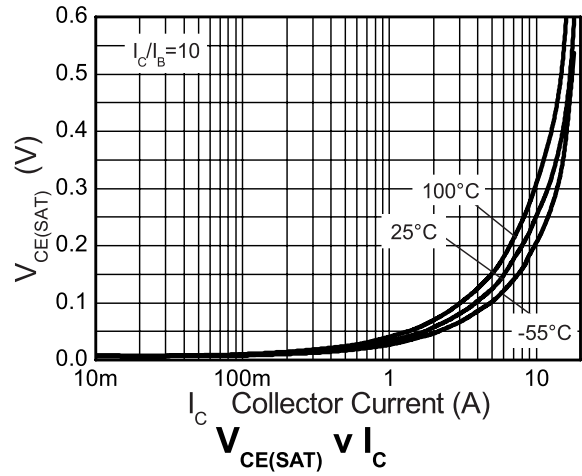
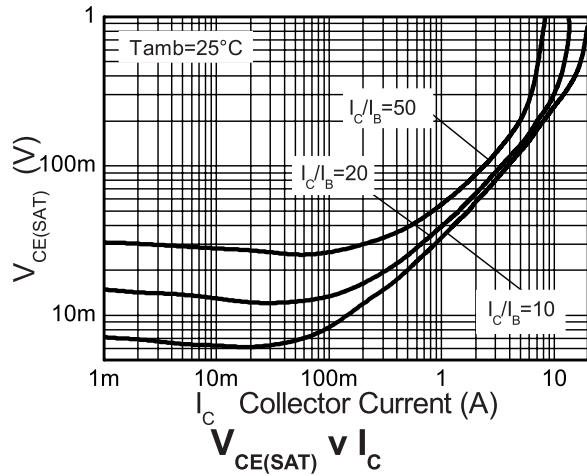
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$V_{(BR)CBO}$	80	175		V	$I_C=100\mu\text{A}$
Collector-emitter breakdown voltage	$V_{(BR)CEV}$	80	175		V	$I_C=1\mu\text{A}$ , $-1\text{V} < V_{BE} < +0.3\text{V}$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	50	75		V	$I_C=10\text{mA}$ <sup>(a)</sup>
Emitter-base breakdown voltage	$V_{(BR)EBO}$	7.0	8.3		V	$I_E=100\mu\text{A}$
Collector-emitter cut-off current	$I_{CEV}$		<1	20	nA	$V_{CE}=60\text{V}$ , $V_{BE} = -1\text{V}$
Collector-base cut-off current	$I_{CBO}$		<1	20	nA	$V_{CB}=60\text{V}$
Emitter-base cut-off current	$I_{EBO}$		<1	10	nA	$V_{EB}=6\text{V}$
Static forward current transfer ratio	$H_{FE}$	190 200 200 80	300 350 340 125	560		$I_C=10\text{mA}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=500\text{mA}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=2\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup> $I_C=5\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup>
Collector-emitter saturation voltage	$V_{CE(sat)}$		13 30 80 135	18 40 110 170	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> $I_C=2\text{A}$ , $I_B=40\text{mA}$ <sup>(a)</sup> $I_C=5\text{A}$ , $I_B=250\text{mA}$ <sup>(a)</sup>
Base-emitter saturation voltage	$V_{BE(sat)}$		0.80 0.92	0.90 1.00	V	$I_C=2\text{A}$ , $I_B=40\text{mA}$ <sup>(a)</sup> $I_C=5\text{A}$ , $I_B=250\text{mA}$ <sup>(a)</sup>
Base-emitter turn-on voltage	$V_{BE(on)}$		0.83	0.93	V	$I_C=5\text{A}$ , $V_{CE}=2\text{V}$ <sup>(a)</sup>
Transition frequency	$f_T$		125		MHz	$I_C=500\text{mA}$ , $V_{CE}=10\text{V}$ , $f=50\text{MHz}$
Output capacitance	$C_{obo}$		29		pF	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$
Delay time	$t_{(d)}$		16		ns	$V_{CC}=12\text{V}$ , $I_C=2.5\text{A}$ , $I_{B1}=I_{B2}=125\text{mA}$
Rise time	$t_{(r)}$		27		ns	
Storage time	$t_{(stg)}$		468		ns	
Fall time	$t_{(f)}$		44		ns	

### NOTES:

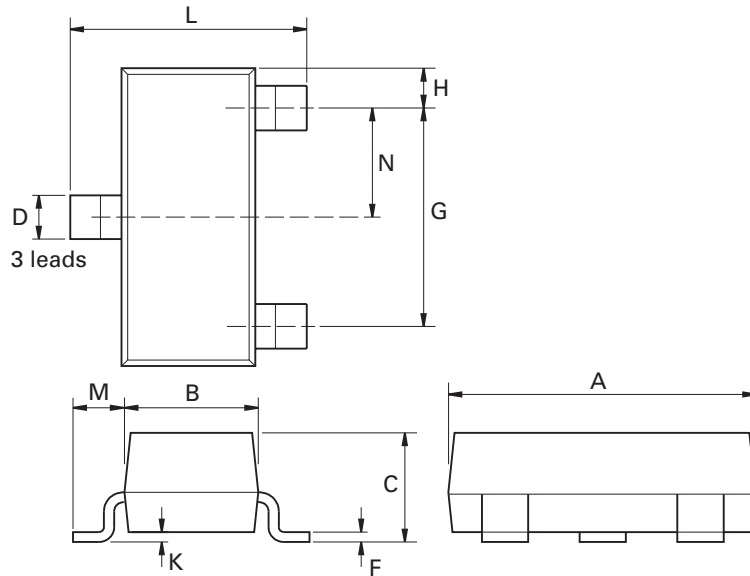
(a) Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

## Typical characteristics



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## 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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