

# ZXTN25020DFH

## 20V SOT23 NPN medium power transistor

### Summary

$BV_{CEX} > 100V$ ;  $BV_{(BR)CEO} > 20V$

$BV_{ECO} > 5V$ ;

$I_{C(Cont)} = 4.5A$

$R_{CE(sat)} = 28\ m\Omega$  typical

$V_{CE(sat)} < 43\ mV$  @ 1A;

$P_D = 1.25W$

Complementary part number ZXTP25020DFH

### 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
- 100V forward blocking voltage
- 5V reverse blocking voltage

### Applications

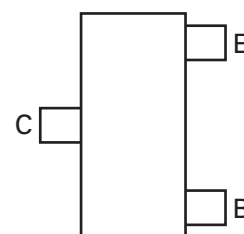
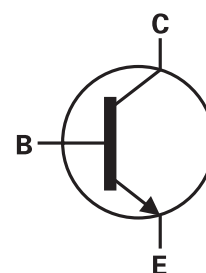
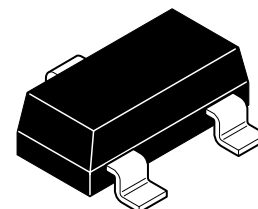
- DC - DC converters
- MOSFET and IGBT gate driving
- LED driver
- Motor drive
- Relay, lamp and solenoid drive

### Ordering information

Device	Reel size (inches)	Tape width	Quantity per reel
ZXTN25020DFHTA	7	8mm	3000

### Device marking

016



Pinout - top view

# ZXTN25020DFH

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	$V_{CBO}$	100	V
Collector-emitter voltage (forward blocking)	$V_{CEX}$	100	V
Collector-emitter voltage	$V_{CEO}$	20	V
Emitter-collector voltage (reverse blocking)	$V_{ECO}$	5	V
Emitter-base voltage	$V_{EBO}$	7	V
Continuous collector current <sup>(c)</sup>	$I_C$	4.5	A
Peak pulse current	$I_{CM}$	15	A
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(a)</sup> Linear Derating Factor	$P_D$	0.73 5.84	W mW/°C
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(b)</sup> Linear derating factor	$P_D$	1.05 8.4	W mW/°C
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(c)</sup> Linear derating factor	$P_D$	1.25 9.6	W mW/°C
Power dissipation at $T_A = 25^\circ\text{C}$ <sup>(d)</sup> Linear derating factor	$P_D$	1.81 14.5	W 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>	$R_{\theta JA}$	171	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	119	°C/W
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	100	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	69	°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.

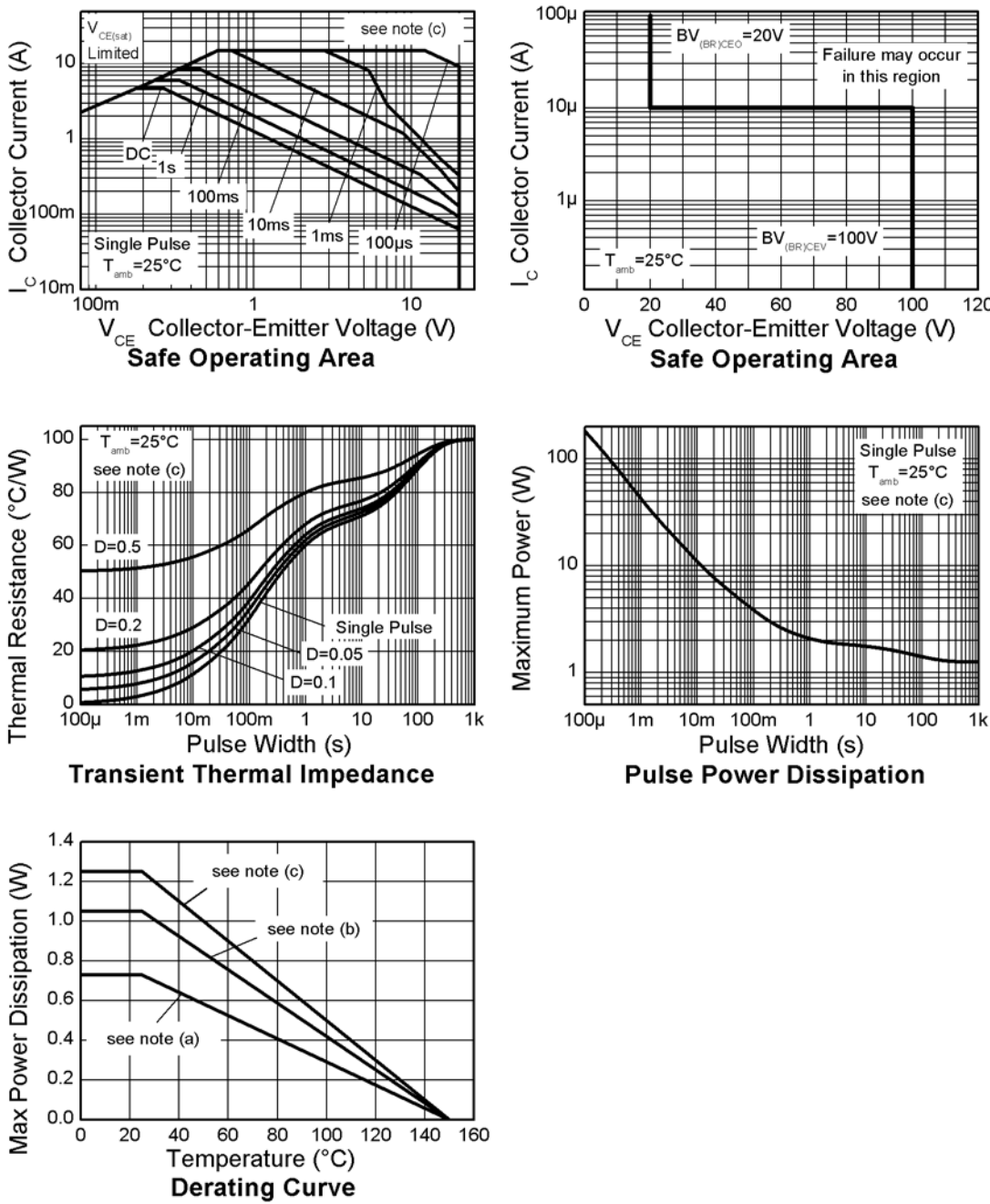
(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(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  $t < 5\text{secs}$ .

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## Characteristics



# ZXTN25020DFH

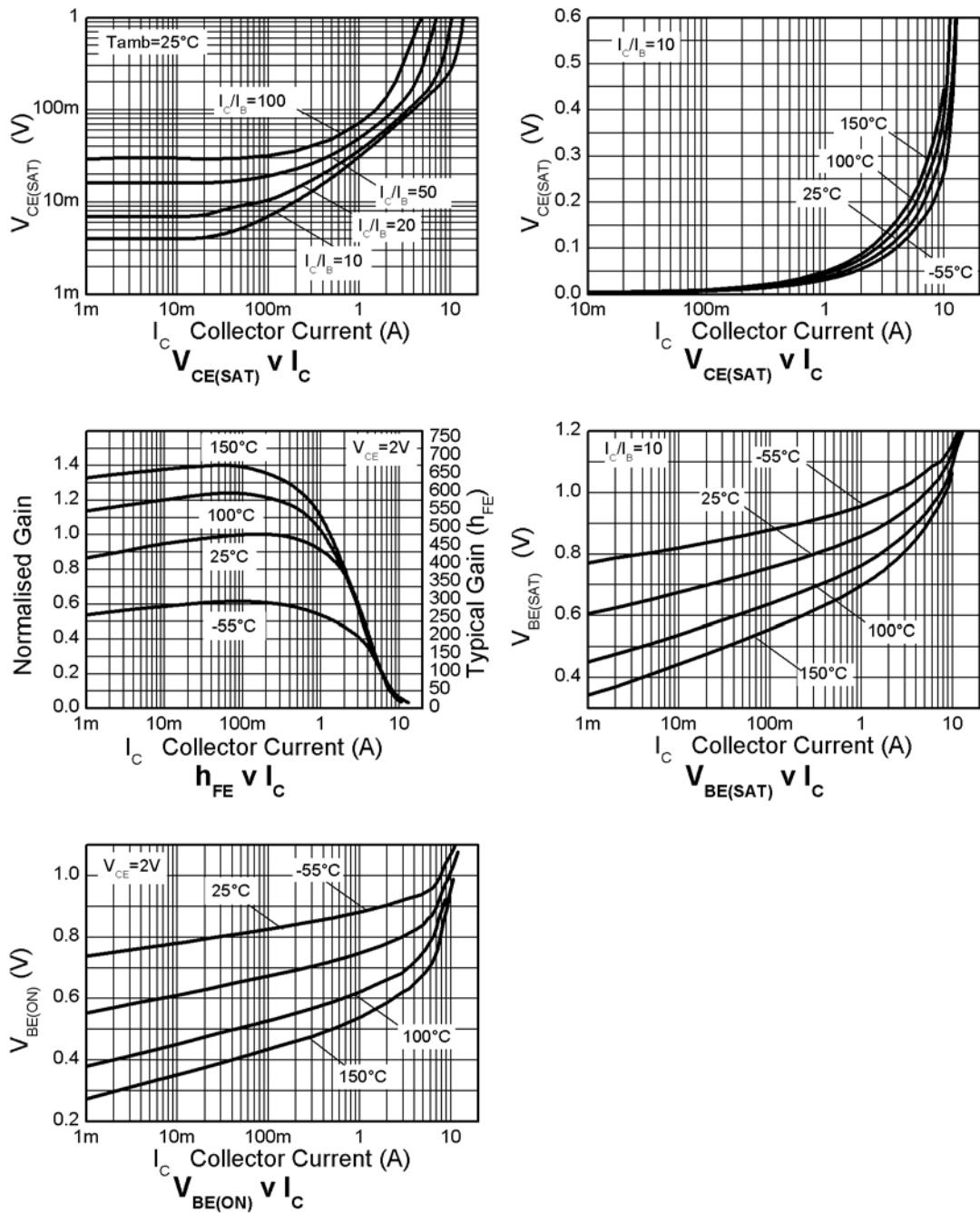
## Electrical characteristics (at $T_{AMB} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector base breakdown voltage	$BV_{CBO}$	100	125		V	$I_C = 100\mu\text{A}$
Collector emitter breakdown voltage (forward blocking)	$BV_{CEX}$	100	120			$I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Collector emitter breakdown voltage (base open)	$BV_{CEO}$	20	35		V	$I_C = 10\text{mA}^{(*)}$
Emitter-collector breakdown voltage (reverse blocking)	$BV_{ECX}$	6	8		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)	$BV_{ECO}$	5	6		V	$I_E = 100\text{mA}$ ,
Emitter base breakdown voltage	$BV_{EBO}$	7	8.3		V	$I_E = 100\text{mA}$
Collector cut-off current	$I_{CBO}$		<1	50 20	nA $\mu\text{A}$	$V_{CB} = 80\text{V}$ $V_{CB} = 80\text{V}$ , $T_{AMB} = 100^{\circ}\text{C}$
Collector emitter cut-off current	$I_{CEX}$		-	100	nA	$V_{CE} = 80\text{V}$ ; $R_{BE} \leq 1\text{k}\Omega$ 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	$V_{CE(sat)}$		35	43	mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$
			55	70	mV	$I_C = 1\text{A}$ , $I_B = 20\text{mA}^{(*)}$
			90	110	mV	$I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$
			125	170	mV	$I_C = 2\text{A}$ , $I_B = 20\text{mA}^{(*)}$
			125	150	mV	$I_C = 4.5\text{A}$ , $I_B = 450\text{mA}^{(*)}$
			205	265	mV	$I_C = 4.5\text{A}$ , $I_B = 90\text{mA}^{(*)}$
Base emitter saturation voltage	$V_{BE(sat)}$		900	1000	mV	$I_C = 4.5\text{A}$ , $I_B = 90\text{mA}^{(*)}$
Base emitter turn-on voltage	$V_{BE(on)}$		820	900	mV	$I_C = 4.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	300	450	900		$I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$
		250	380			$I_C = 2\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		120	170			$I_C = 4.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
			15			$I_C = 15\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	$f_T$		215		MHz	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output capacitance	$C_{OBO}$		16.5		pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}^{(*)}$
Turn-on time	$t_{(on)}$		140		ns	$V_{CC} = 10\text{V}$ . $I_C = 1\text{A}$ , $I_{B1} = I_{B2} = 10\text{mA}$ .
Turn-off time	$t_{(off)}$		425		ns	

### NOTES:

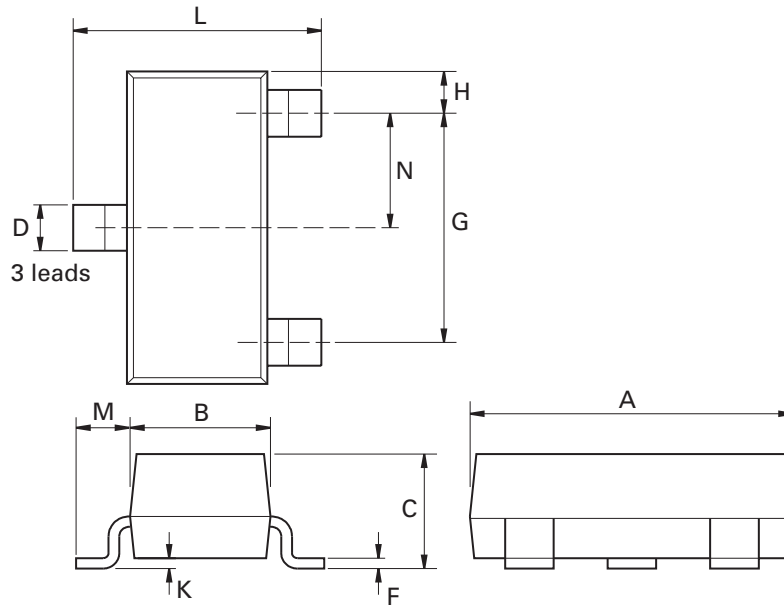
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

Characteristics



# ZXTN25020DFH

## Package outline - 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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