



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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### Summary

$BV_{CEX} > 70V$

$BV_{CEO} > 20V$

$BV_{ECO} > 5V$

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

$V_{CE(sat)} < 45\text{ mV @ }1A$

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

$P_D = 1.25W$

Complementary part number NK-ZXTP25020CFH

### Description

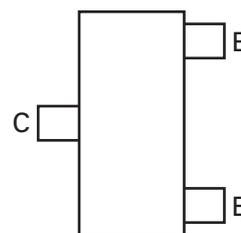
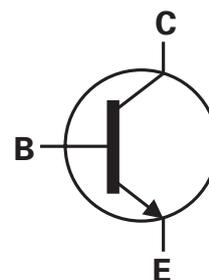
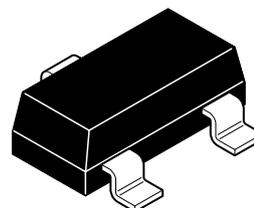
Advanced process capability and package design have been used to maximize the power handling and performance of this small outline transistor. The compact size and ratings of this device make it ideally suited to applications where space is at a premium.

### Features

- High power dissipation SOT23 package
- High peak current
- High gain
- Low saturation voltage
- 70V forward blocking voltage
- 5V reverse blocking voltage

### Applications

- MOSFET gate drivers
- Power switches
- Motor control
- DC fans
- DC-DC converters



Pinout - top view

## 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)	$V_{ECO}$	5	V
Emitter-base voltage	$V_{EBO}$	7	V
Continuous collector current <sup>(c)</sup>	$I_C$	4.5	A
Base current	$I_B$	1	A
Peak pulse current	$I_{CM}$	10	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	$P_D$	0.73	W
Linear derating factor		5.84	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	$P_D$	1.05	W
Linear derating factor		8.4	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(c)}$	$P_D$	1.25	W
Linear derating factor		9.6	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$	$P_D$	1.81	W
Linear derating factor		14.5	mW/ $^{\circ}C$
Operating and storage temperature range	$T_j, T_{stg}$	- 55 to 150	$^{\circ}C$

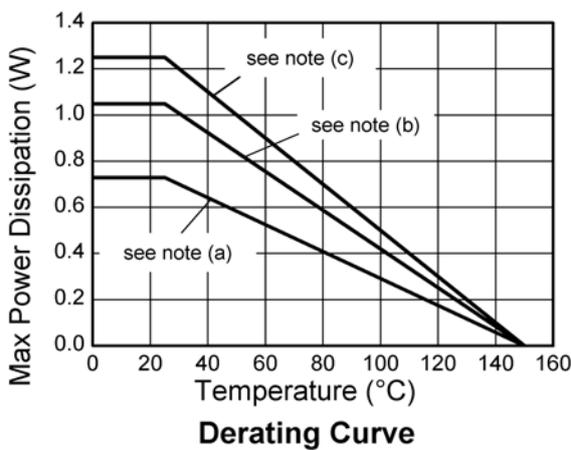
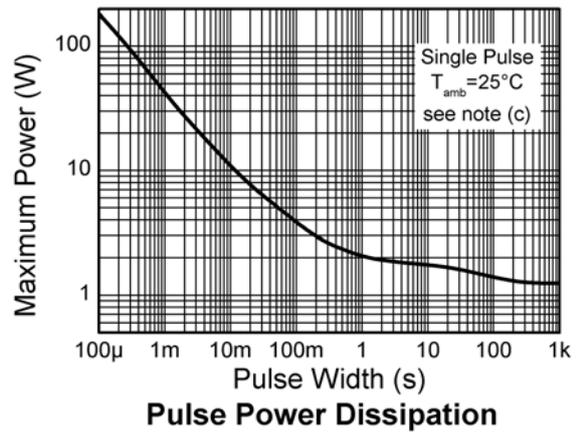
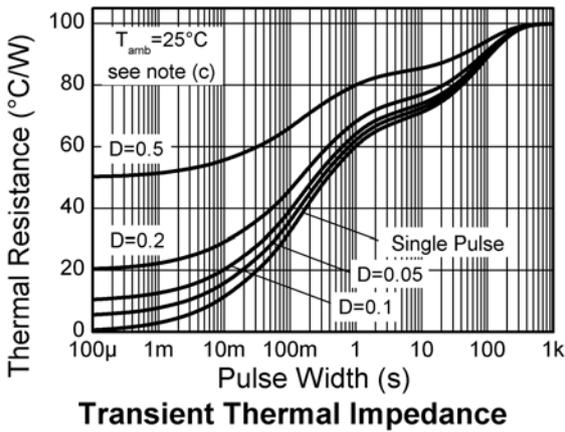
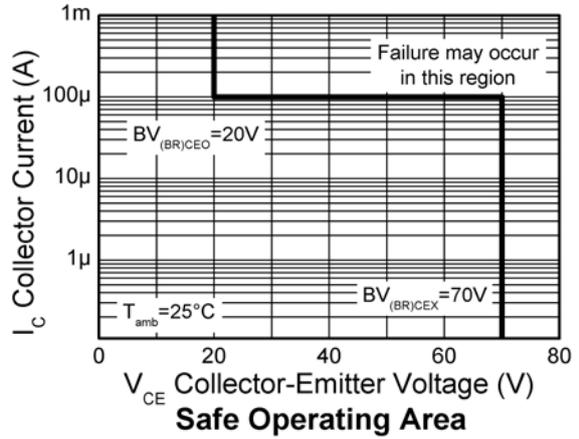
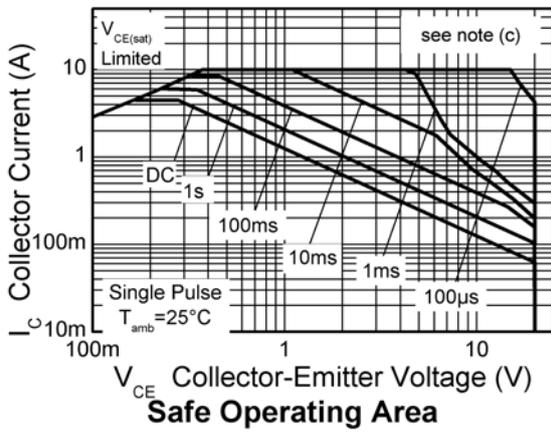
## Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	171	$^{\circ}C/W$
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	119	$^{\circ}C/W$
Junction to ambient <sup>(c)</sup>	$R_{\theta JA}$	100	$^{\circ}C/W$
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	69	$^{\circ}C/W$

### 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.

**Characteristics**



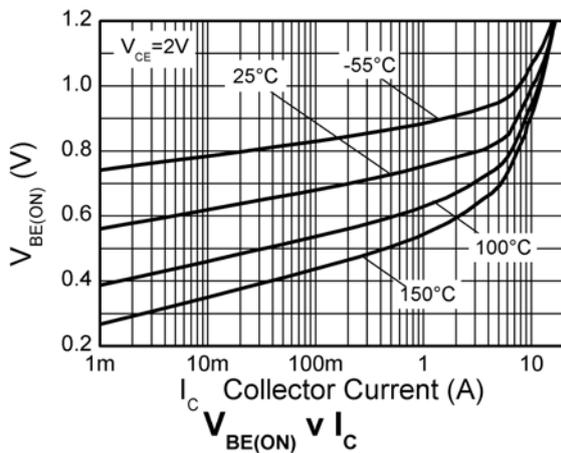
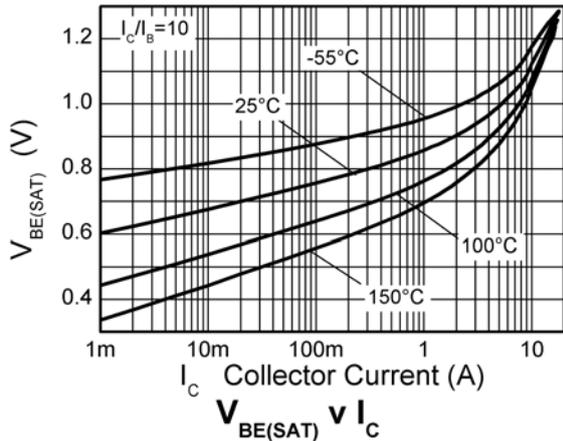
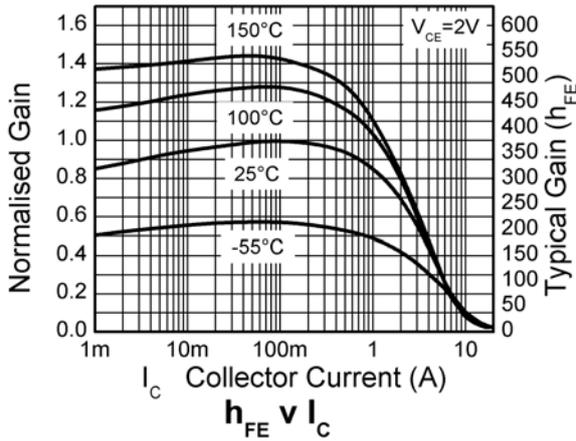
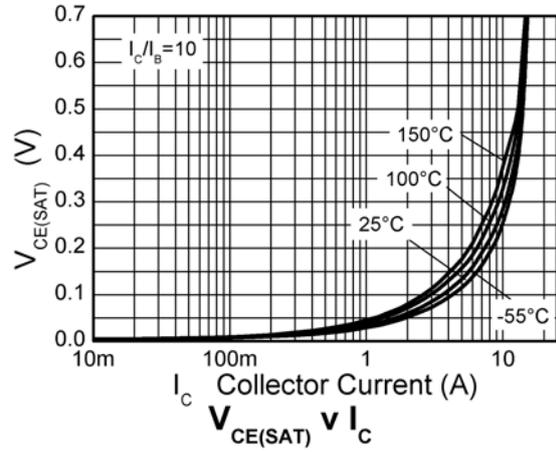
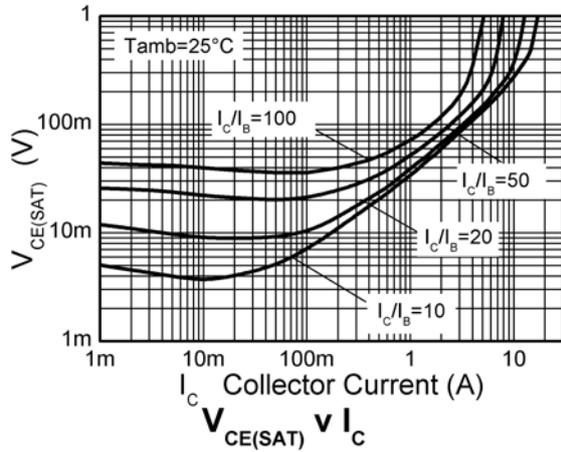
**Electrical characteristics (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)**

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			$I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ 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-base breakdown voltage	$BV_{EBO}$	7	8.3		V	$I_E = 100\mu\text{A}$
Emitter-collector breakdown voltage (reverse blocking)	$BV_{ECX}$	6	8.0		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	6.6		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	$V_{CE(sat)}$		35	45	mV	$I_C = 1\text{A}$ , $I_B = 100\text{mA}^{(*)}$
			53	65	mV	$I_C = 1\text{A}$ , $I_B = 20\text{mA}^{(*)}$
			85	100	mV	$I_C = 2\text{A}$ , $I_B = 40\text{mA}^{(*)}$
			175	220	mV	$I_C = 4.5\text{A}$ , $I_B = 90\text{mA}^{(*)}$
			125	140	mV	$I_C = 4.5\text{A}$ , $I_B = 450\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		905	1000	mV	$I_C = 4.5\text{A}$ , $I_B = 90\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		815	900	mV	$I_C = 4.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	$h_{FE}$	200	350	500		$I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}^{(*)}$
		180	320			$I_C = 1\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		90	145			$I_C = 4.5\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
		25	40			$I_C = 10\text{A}$ , $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	$f_T$		185		MHz	$I_C = 50\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output capacitance	$C_{OBO}$		16.8	25	pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}^{(*)}$
Delay time	$t_d$		70.5		ns	$V_{CC} = 10\text{V}$ .
Rise time	$t_r$		88		ns	$I_C = 1\text{A}$ ,
Storage time	$t_s$		266		ns	$I_{B1} = I_{B2} = 10\text{mA}$ .
Fall time	$t_f$		65		ns	

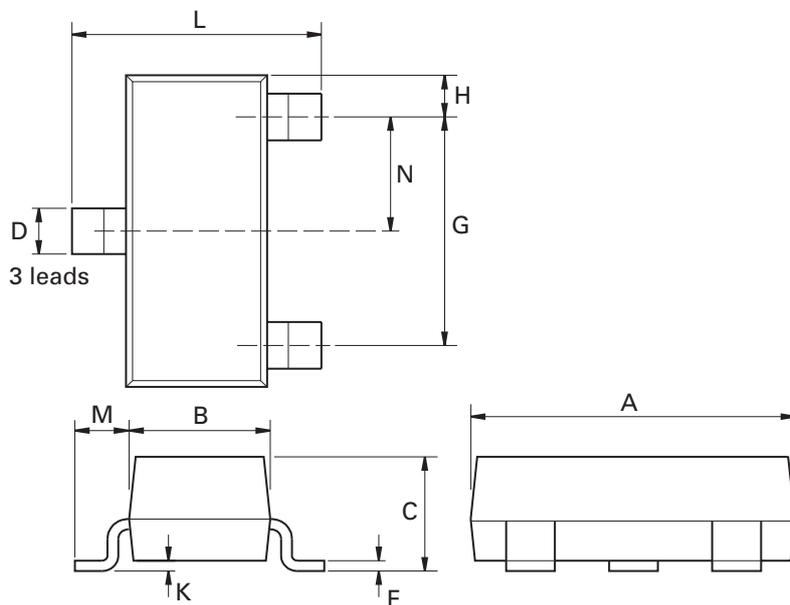
**NOTES:**

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

Typical characteristics



**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