



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

$BV_{CEX} > 30V$

$BV_{CEO} > 15V$

$BV_{ECO} > 4.5V$

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

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

$R_{CE(sat)} = 25\text{ m}\Omega$

$P_D = 1.25W$

Complementary part number NK-ZXTP25015DFH

Description

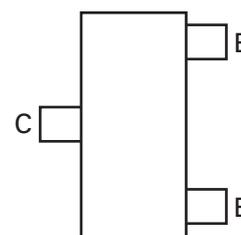
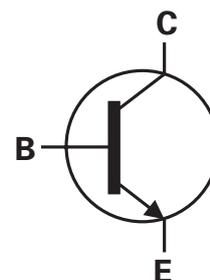
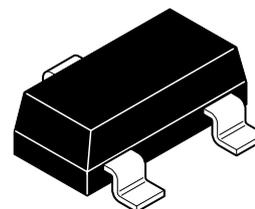
Advanced process capability and package design have been used to maximize the power handling and performance of this small outline transistor. The compact size and ratings of this device make it ideally suited to applications where space is at a premium.

Features

- High power dissipation SOT23 package
- High gain
- Low saturation voltage

Applications

- LED driving
- DC-DC converters
- MOSFET and IGBT gate driving
- Motor drive



Pinout - top view

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Collector-base voltage	V_{CBO}	40	V
Collector-emitter voltage (forward blocking)	V_{CEX}	30	V
Collector-emitter voltage	V_{CEO}	15	V
Emitter-collector voltage (reverse blocking)	V_{ECO}	4.5	V
Emitter-base voltage	V_{EBO}	7	V
Continuous collector current ^(c)	I_C	5	A
Peak pulse current	I_{CM}	15	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	P_D	0.73	W
Linear derating factor		5.84	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	P_D	1.05	W
Linear derating factor		8.4	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(c)}$	P_D	1.25	W
Linear derating factor		9.6	mW/°C
Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$	P_D	1.81	W
Linear derating factor		14.5	mW/°C
Operating and storage temperature range	T_j, T_{stg}	- 55 to 150	°C

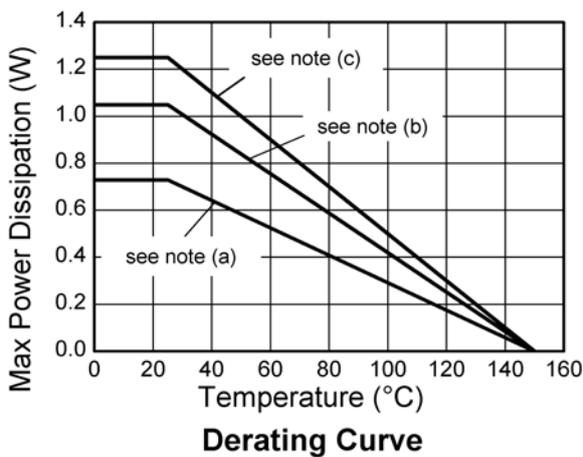
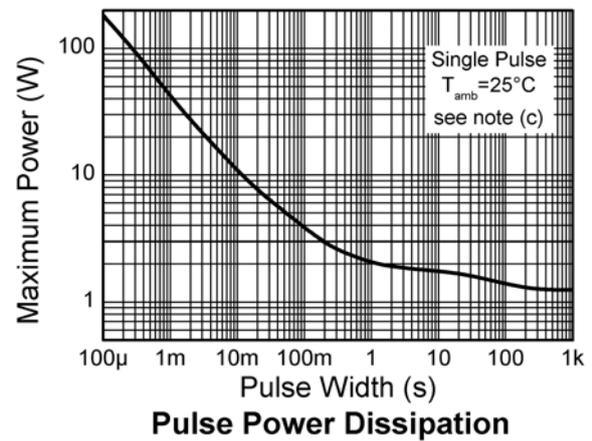
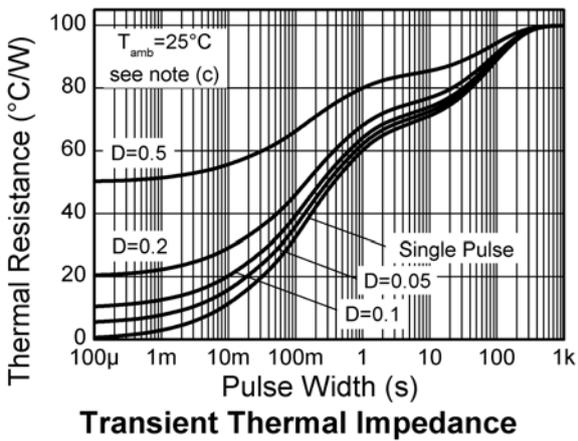
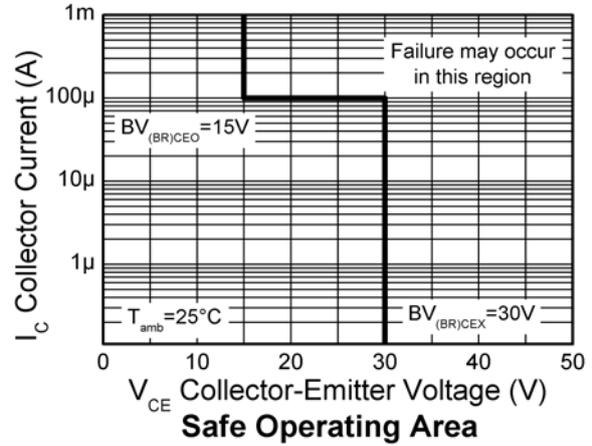
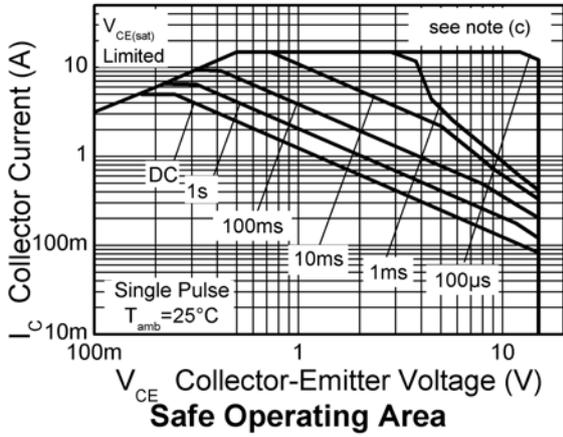
Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	171	°C/W
Junction to ambient ^(b)	$R_{\theta JA}$	119	°C/W
Junction to ambient ^(c)	$R_{\theta JA}$	100	°C/W
Junction to ambient ^(d)	$R_{\theta JA}$	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 $t < 5$ secs.

Characteristics



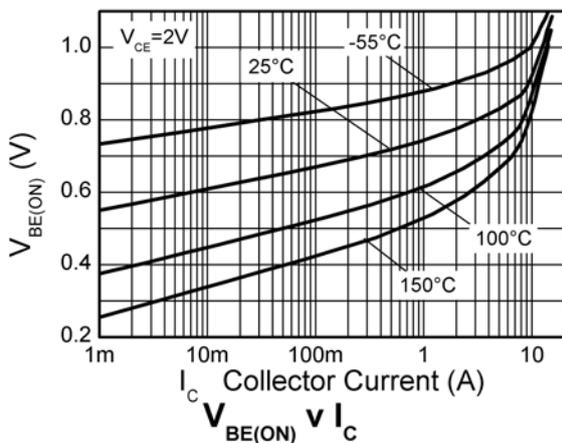
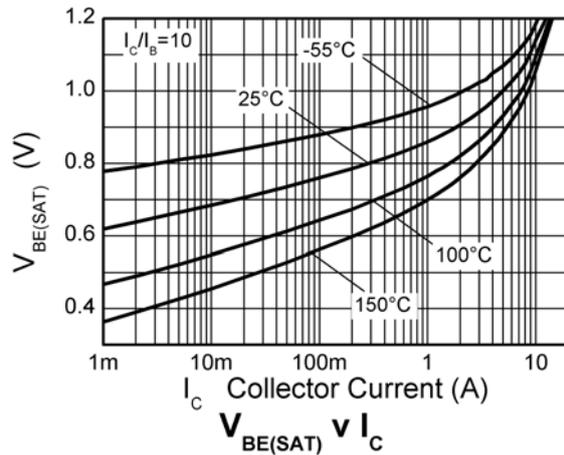
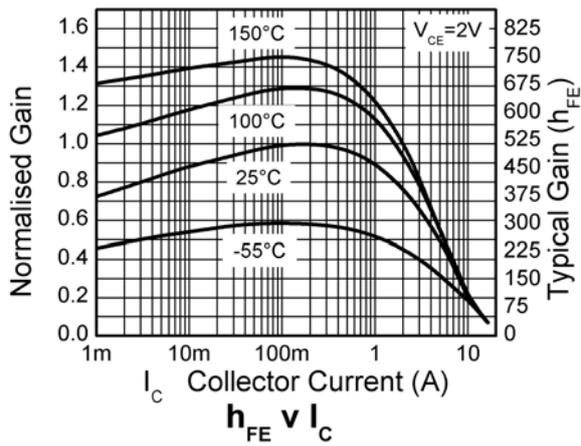
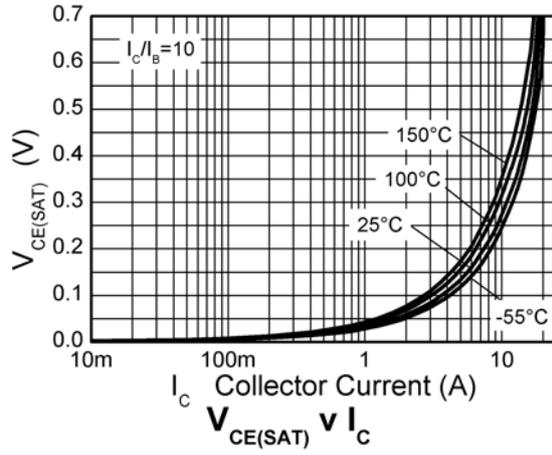
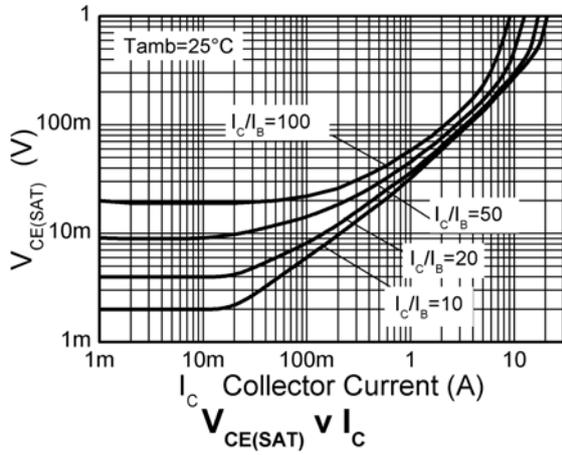
Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Collector-emitter breakdown voltage	BV_{CEO}	15	22		V	$I_C = 10\text{mA}^{(*)}$
Collector-emitter breakdown voltage (reverse blocking)	BV_{ECX}	6	8		V	$I_E = 100\mu\text{A}$, $R_{BC} < 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$
Collector-emitter breakdown voltage (reverse blocking)	BV_{ECO}	4.5	5.3		V	$I_E = 100\mu\text{A}$,
Emitter-base breakdown voltage	BV_{EBO}	7	8.2		V	$I_E = 100\mu\text{A}$
Collector cut-off current	I_{CBO}		<1	50 20	nA μA	$V_{CB} = 40\text{V}$ $V_{CB} = 40\text{V}$, $T_{amb} = 100^{\circ}\text{C}$
Collector-emitter cut-off current	I_{CEX}		-	100	nA	$V_{CE} = 30\text{V}$; $R_{BE} < 1\text{k}\Omega$ 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	$V_{CE(sat)}$		30 60 90 125 160	40 80 125 155 215	mV mV mV mV mV	$I_C = 1\text{A}$, $I_B = 100\text{mA}^{(*)}$ $I_C = 1\text{A}$, $I_B = 10\text{mA}^{(*)}$ $I_C = 2\text{A}$, $I_B = 20\text{mA}^{(*)}$ $I_C = 5\text{A}$, $I_B = 500\text{mA}^{(*)}$ $I_C = 5\text{A}$, $I_B = 100\text{mA}^{(*)}$
Base-emitter saturation voltage	$V_{BE(sat)}$		990	1090	mV	$I_C = 5\text{A}$, $I_B = 500\text{mA}^{(*)}$
Base-emitter turn-on voltage	$V_{BE(on)}$		805	900	mV	$I_C = 5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Static forward current transfer ratio	h_{FE}	300 300 150 25	450 400 275 40	900		$I_C = 10\text{mA}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 2\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 5\text{A}$, $V_{CE} = 2\text{V}^{(*)}$ $I_C = 15\text{A}$, $V_{CE} = 2\text{V}^{(*)}$
Transition frequency	f_T	150	240		MHz	$I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 50\text{MHz}$
Output capacitance	C_{OBO}		22.7	30	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}^{(*)}$
Delay time	$t_{(d)}$		16		ns	$V_{CC} = 10\text{V}$. $I_C = 3\text{A}$, $I_{B1} = I_{B2} = 50\text{mA}$.
Rise time	$t_{(r)}$		41		ns	
Storage time	$t_{(s)}$		148		ns	
Fall time	$t_{(f)}$		23		ns	

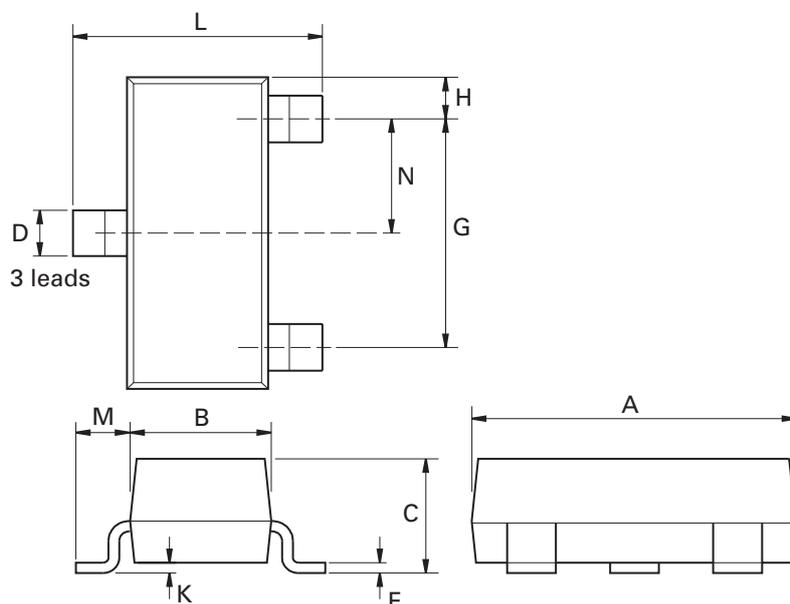
NOTES:

 (*) 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