



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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## Features

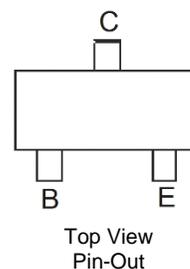
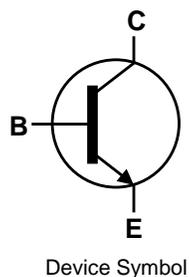
- $BV_{CEO} > 100V$
- $I_C = 2.5A$  Collector Current
- Low Saturation Voltage  $V_{CE(sat)} < 95mV @ 1A$
- Complementary PNP Part: NK-ZXTP25100DFH
- Epitaxial Planar Die Construction
- High Gain
- $R_{CE(sat)} = 80m\Omega$

## Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 (3)
- Weight: 0.008 grams (Approximate)

## Applications

- DC-DC converters
- DC fans
- Motor controls
- Lamps, relays and solenoid driving



**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

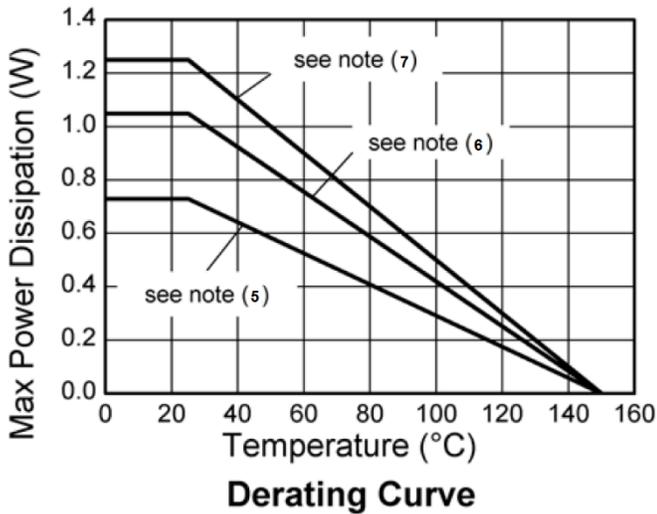
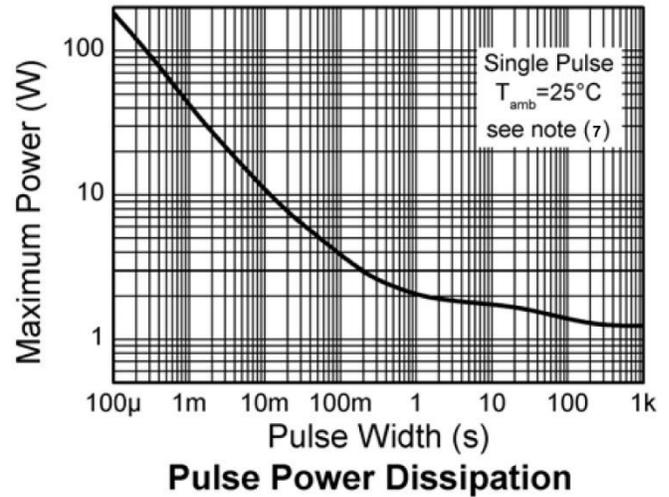
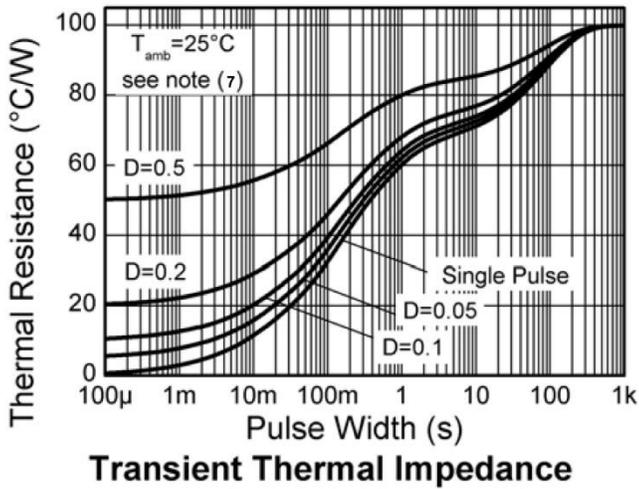
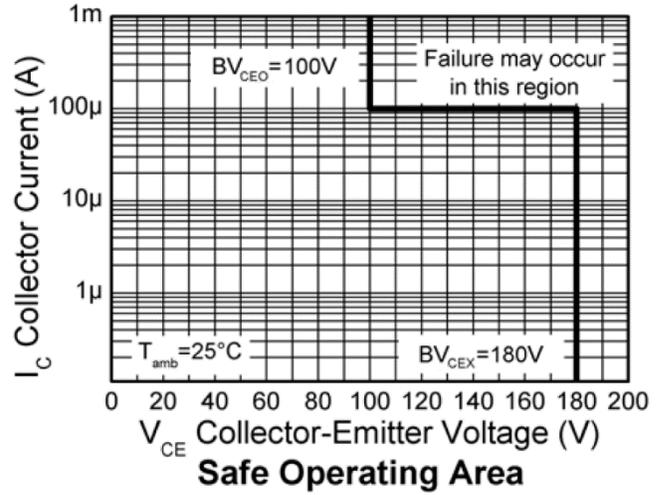
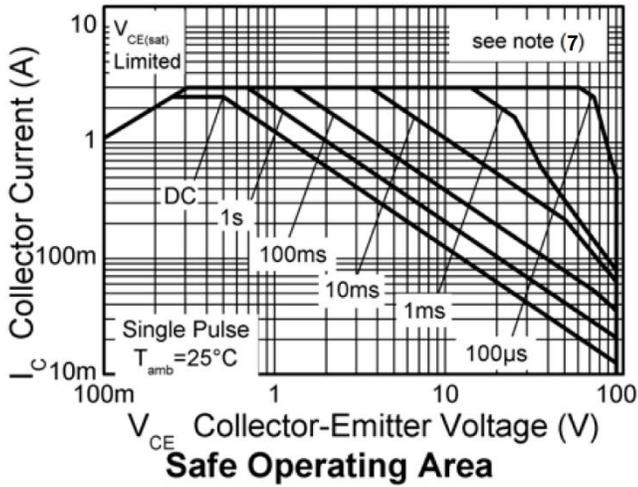
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	180	V
Collector-Emitter Voltage	V <sub>CEO</sub>	100	V
Emitter-Base Voltage	V <sub>EB0</sub>	7	V
Collector-Emitter Voltage (Forward Blocking)	V <sub>CEX</sub>	180	V
Emitter-Collector Voltage (Reverse Blocking)	V <sub>ECO</sub>	6	V
Base Current	I <sub>B</sub>	0.5	A
Continuous Collector Current	I <sub>C</sub>	2.5	A
Peak Collector Current	I <sub>CM</sub>	3	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	0.73	W mW/°C
		5.84	
		1.05	
		8.4	
		1.25	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	9.6	°C/W
		1.81	
		14.5	
		171	
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	119	°C/W
		100	
		69	
		13	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
5. For the device mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  6. For the device mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
  7. For the device mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
  8. Same as Note 7, except measured at t < 5 seconds.
  9. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

**Thermal Characteristics**

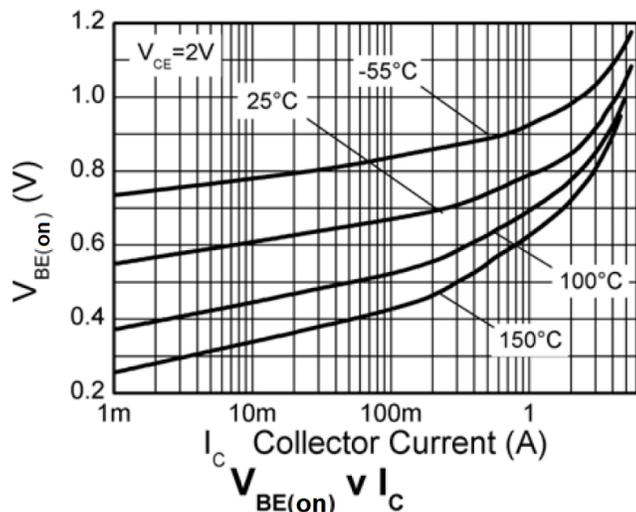
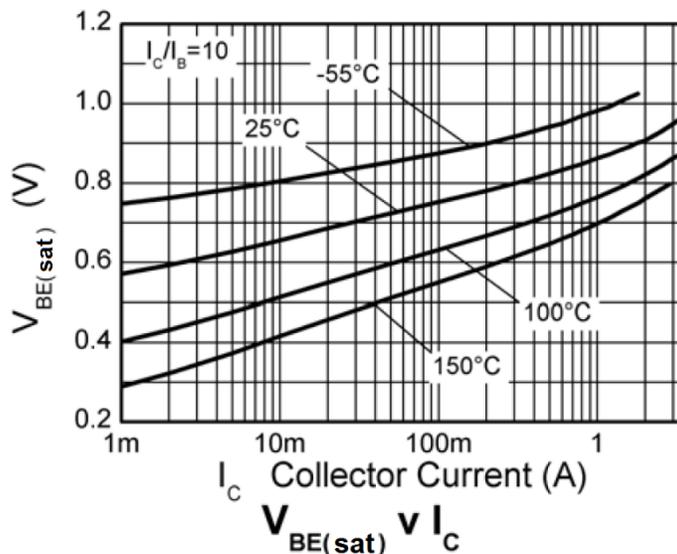
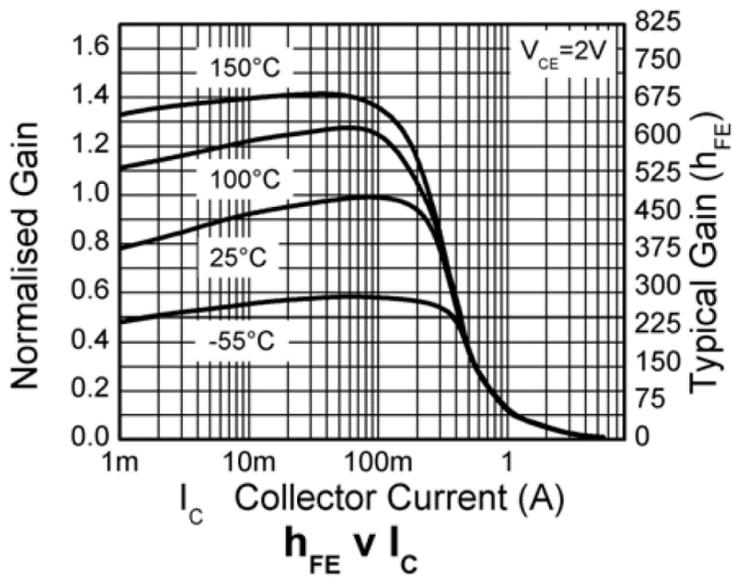
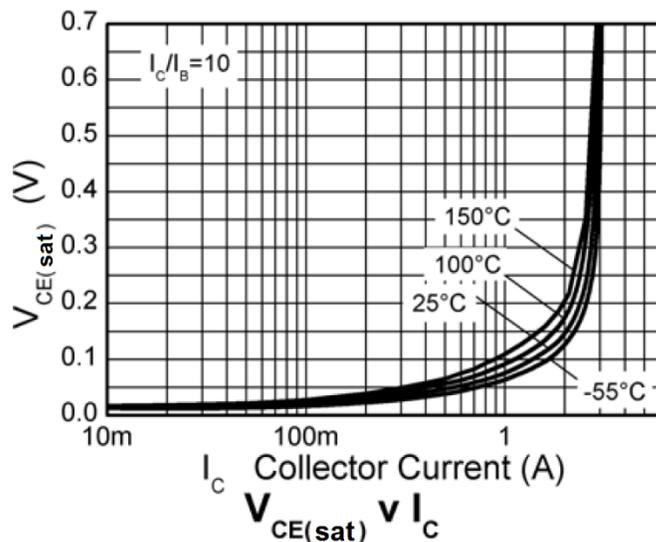
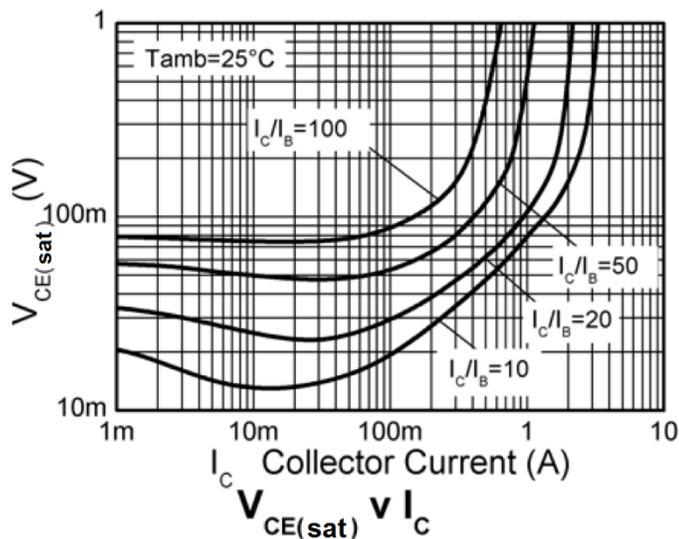


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	180	220	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	100	130	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7.0	8.3	—	V	I <sub>E</sub> = 100μA
Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	6.0	8.7	—	V	I <sub>E</sub> = 100μA
Emitter-Collector Breakdown Voltage	BV <sub>ECX</sub>	6.0	8.2	—	V	I <sub>E</sub> = 100μA, R <sub>BC</sub> ≤ 1kΩ or -0.25V < V <sub>BC</sub> < 0.25V
Collector-Emitter Breakdown Voltage	BV <sub>CEX</sub>	180	220	—	V	I <sub>C</sub> = 100μA, R <sub>BE</sub> ≤ 1kΩ or -1V < V <sub>BE</sub> < 0.25V
Collector Cutoff Current	I <sub>CB0</sub>	—	1	50	nA	V <sub>CB</sub> = 180V
		—	—	0.5	μA	V <sub>CB</sub> = 180V, T <sub>amb</sub> = +100°C
Emitter Cutoff Current	I <sub>EBO</sub>	—	1	50	nA	V <sub>EB</sub> = 5.6V
Collector-Emitter Cutoff Current	I <sub>CEx</sub>	—	—	100	nA	V <sub>CE</sub> = 144V, R <sub>BE</sub> ≤ 1kΩ or -1V < V <sub>BE</sub> < 0.25V
<b>ON CHARACTERISTICS (Note 10)</b>						
DC Current Gain	h <sub>FE</sub>	300	450	900	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V
		120	170	—		I <sub>C</sub> = 0.5A, V <sub>CE</sub> = 2V
		40	60	—		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		—	20	—		I <sub>C</sub> = 2.5A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	120	170	mV	I <sub>C</sub> = 0.5A, I <sub>B</sub> = 10mA
		—	80	95		I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		—	215	330		I <sub>C</sub> = 2.5A, I <sub>B</sub> = 250mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	—	910	1000	mV	I <sub>C</sub> = 2.5A, I <sub>B</sub> = 250mA
Base-Emitter Turn-On Voltage	V <sub>BE(on)</sub>	—	860	950	mV	I <sub>C</sub> = 2.5A, V <sub>CE</sub> = 2V
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance (Note 10)	C <sub>obo</sub>	—	8.7	15	pF	V <sub>CB</sub> = 10V, f = 1MHz
Transition Frequency	f <sub>T</sub>	—	175	—	MHz	V <sub>CE</sub> = 10V, I <sub>C</sub> = 100mA f = 100MHz
<b>SWITCHING CHARACTERISTICS</b>						
Delay Time	t <sub>d</sub>	—	16.4	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 500mA I <sub>B1</sub> = -I <sub>B2</sub> = 50mA
Rise Time	t <sub>r</sub>	—	115	—	ns	
Storage Time	t <sub>s</sub>	—	763	—	ns	
Fall Time	t <sub>f</sub>	—	158	—	ns	

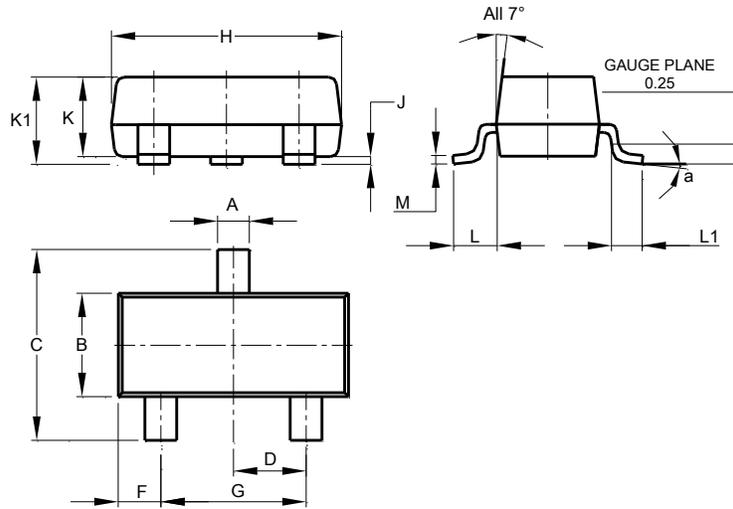
Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



### Package Outline Dimensions

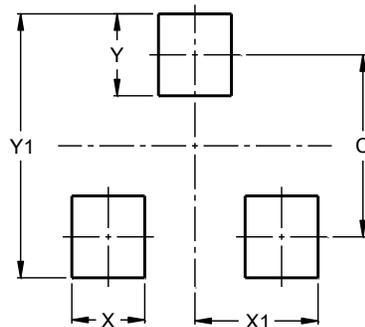
SOT23



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

### Suggested Pad Layout

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9