



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**

0755-83047638

ysbdt@szyoushang.cn

www.szyoushang.cn



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## Features

- $BV_{CEO} > -12V$
- $I_C = -4A$  Continuous Collector Current
- Low Saturation Voltage  $V_{CE(SAT)} < 75mV @ 1A$
- $R_{CE(SAT)} = 50m\Omega$
- $h_{FE}$  Characterised Up to -6A
- High  $h_{FE}$  Min 400 @ 1A
- 1.5W Power Dissipation
- Complementary NPN Type: NK-ZXTN07012EFF

## Mechanical Data

- Case: SOT23F
- Case 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 
- Weight: 0.012 grams (Approximate)

## Description

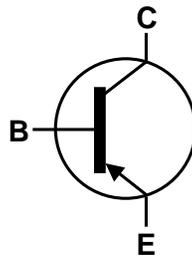
This low voltage PNP transistor has been designed for applications requiring high gain and very low saturation voltage. The SOT23F package is pin compatible with the industry standard SOT23 footprint but offers lower profile and higher dissipation for applications where power density is of utmost importance.

## Applications

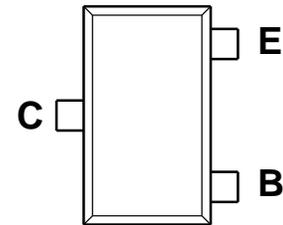
- Boost Converters
- MOSFET and IGBT Gate Drivers
- Lamp and Relay Driver
- Motor Drive
- Siren Driver



Top View



Device Symbol



Top View  
Pin Configuration

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-12	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-12	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-4	A
Peak Pulse Current	I <sub>CM</sub>	-8	A
Base Current	I <sub>B</sub>	-1	A

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

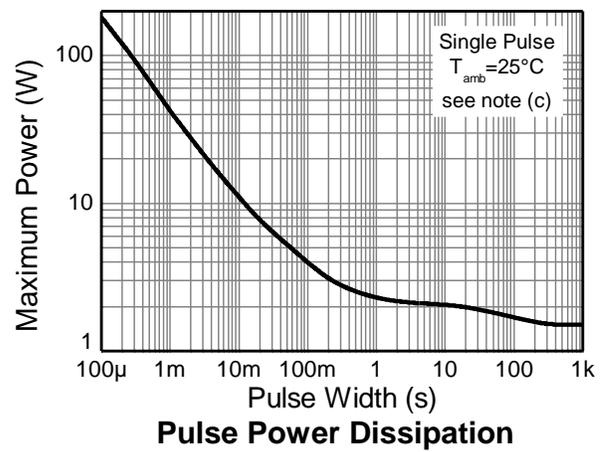
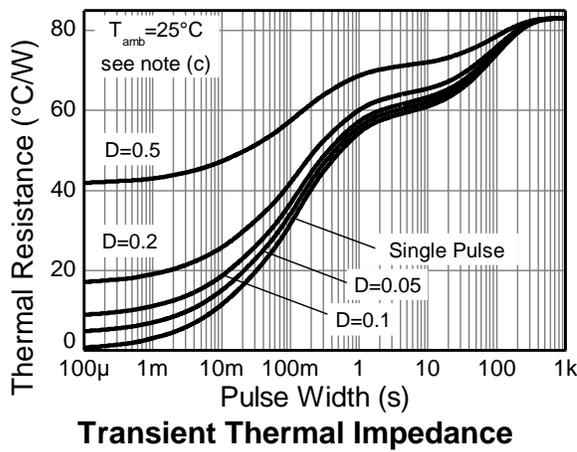
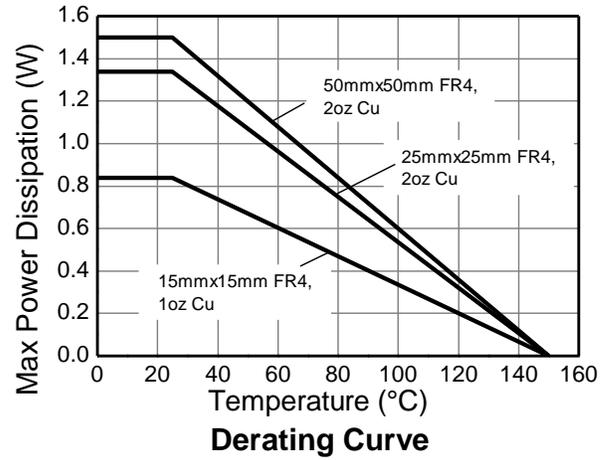
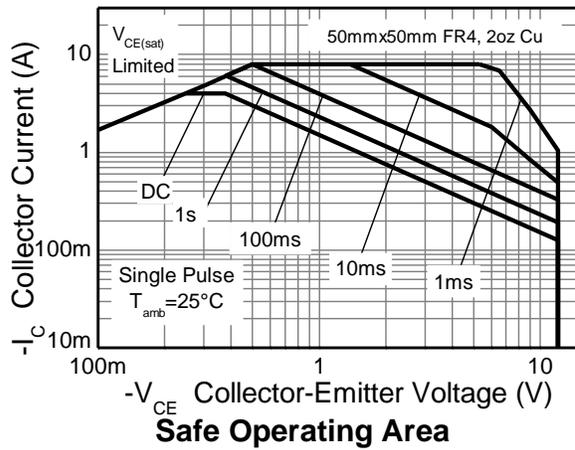
Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	P <sub>D</sub>	0.84	W mW/°C
		6.72	
		1.34	
		10.72	
		1.50	
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	12.0	°C/W
		2.0	
		16.0	
		149	
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	93	°C/W
		83	
		60	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 10)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
- For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
  - Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
  - Same as Note 7, whilst measured at t < 5 seconds.
  - Thermal resistance from junction to solder-point (at the end of the collector lead).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

### Thermal Characteristics and Derating Information

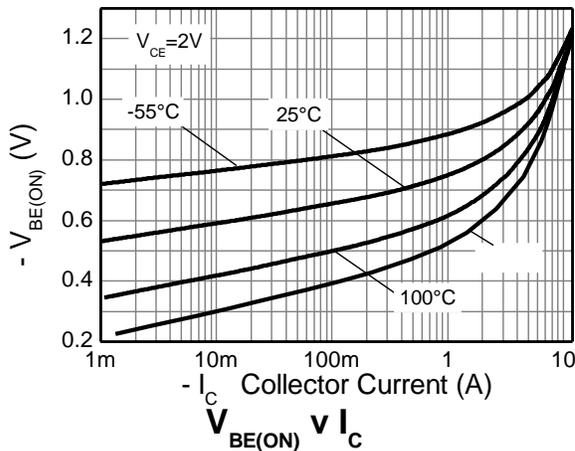
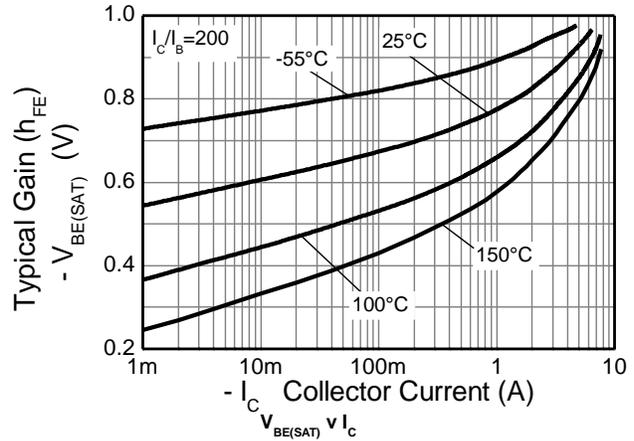
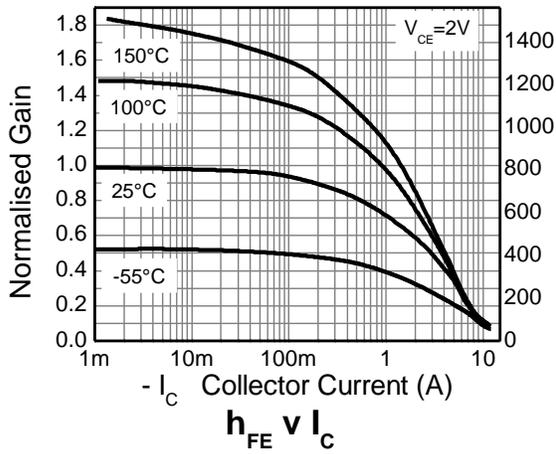
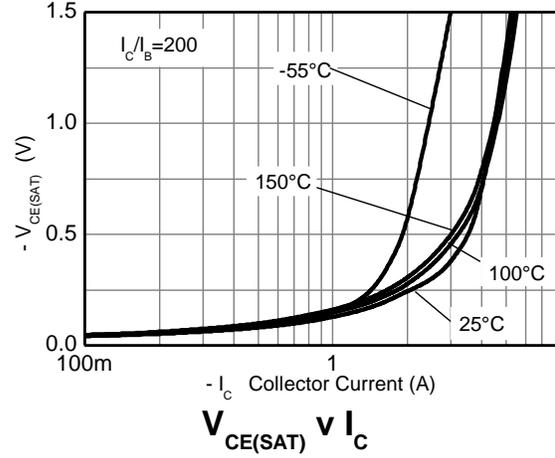
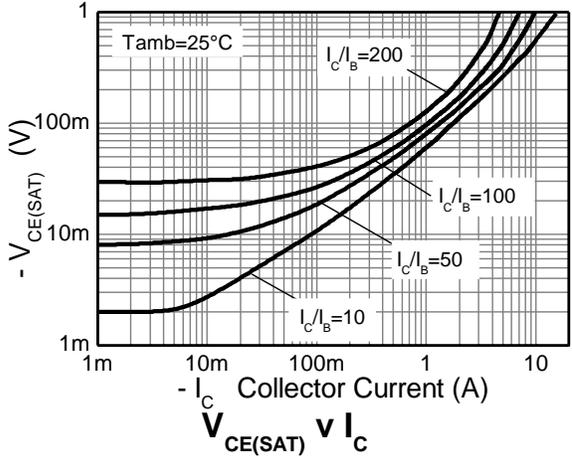


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-12	-23	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Base Open) (Note 11)	BV <sub>CEO</sub>	-12	-16	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-8.4	—	V	I <sub>E</sub> = -100μA
Collector-Base Cutoff Current	I <sub>CBO</sub>	—	<1	-50	nA	V <sub>CB</sub> = -10V
Emitter-Base Cutoff Current	I <sub>EBO</sub>	—	<1	-50	nA	V <sub>CB</sub> = -10V, T <sub>A</sub> = +100°C
<b>ON CHARACTERISTICS (Note 11)</b>						
Static Forward Current Transfer Ratio	h <sub>FE</sub>	500 400 230 150	750 570 320 210	1500 — — —	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -1A, V <sub>CE</sub> = -2V I <sub>C</sub> = -4A, V <sub>CE</sub> = -2V I <sub>C</sub> = -6A, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	-80 -60 -130 -250 -260	-100 -75 -165 -350 -340	mV	I <sub>C</sub> = -0.5A, I <sub>B</sub> = -2.5mA I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA I <sub>C</sub> = -1A, I <sub>B</sub> = -5mA I <sub>C</sub> = -2A, I <sub>B</sub> = -10mA I <sub>C</sub> = -4A, I <sub>B</sub> = -80mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	-945	-1050	mV	I <sub>C</sub> = -4A, I <sub>B</sub> = -80mA
Base-Emitter On Voltage	V <sub>BE(ON)</sub>	—	-850	-950	mV	I <sub>C</sub> = -4A, V <sub>CE</sub> = -2V
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>T</sub>	100	250	—	MHz	I <sub>C</sub> = -50mA, V <sub>CE</sub> = -5V, f = 50MHz
Input Capacitance	C <sub>I(BO)</sub>	—	223	—	pF	V <sub>EB</sub> = -0.5V, f = 1MHz
Output Capacitance	C <sub>O(BO)</sub>	—	49	60	pF	V <sub>CB</sub> = -8V, f = 1MHz
Delay Time	t <sub>D</sub>	—	12.8	—	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>	—	15.6	—	ns	
Storage Time	t <sub>S</sub>	—	240	—	ns	
Fall Time	t <sub>F</sub>	—	92.8	—	ns	

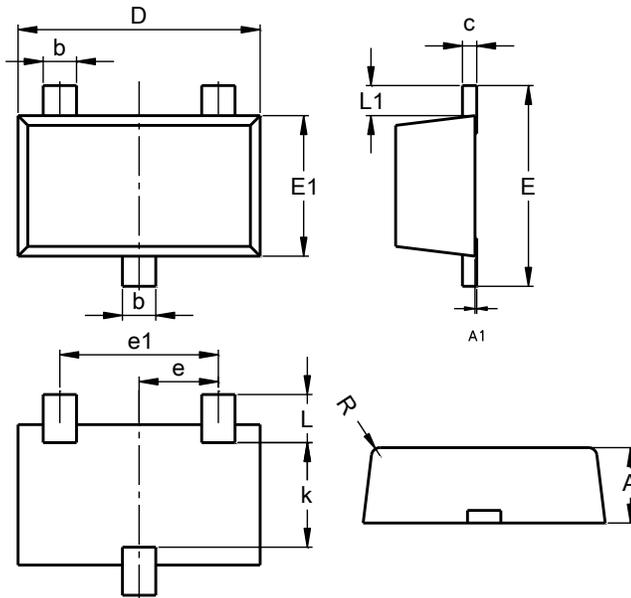
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



**Package Outline Dimensions**

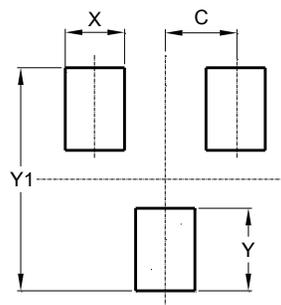
SOT23F



SOT23F			
Dim	Min	Max	Typ
A	0.80	1.00	0.90
b	0.35	0.50	0.44
c	0.10	0.20	0.16
D	2.80	3.00	2.90
e	0.95 REF		
e1	0.190 REF		
E	2.30	2.50	2.40
E1	1.50	1.70	1.65
k	1.20	-	-
L	0.30	0.65	0.50
L1	0.30	0.50	0.40
R	0.05	0.15	-
All Dimensions in mm			

**Suggested Pad Layout**

SOT23F



Dimensions	Value (in mm)
C	0.95
X	0.80
Y	1.110
Y1	3.000