



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

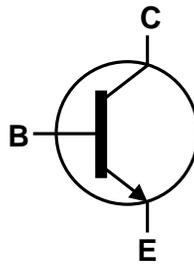
- $BV_{CEO} > 45V$
- $I_C = 100mA$  Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface-Mount Package
- Complementary PNP Type: NK-MMBT3906T

## Mechanical Data

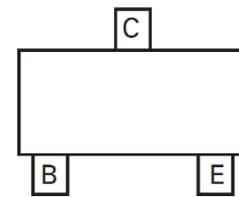
- Package: SOT523
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 
- Weight: 0.002 grams (Approximate)



Top View



Device Symbol



Pin-Out Top View

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	45	V
Emitter-Base Voltage	V <sub>EB0</sub>	6.0	V
Collector Current	I <sub>C</sub>	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	833	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 6)

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:
5. For a device mounted with the collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

### Thermal Characteristics and Derating Information

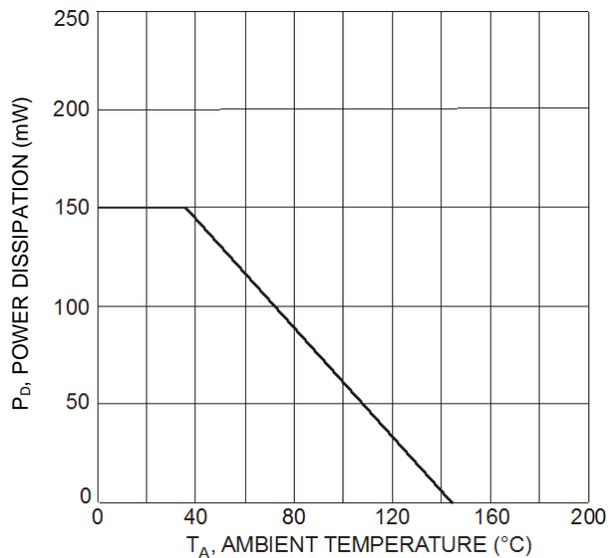


Fig. 1, Power Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	50	—	—	V	I <sub>C</sub> = 10μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	45	—	—	V	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	BV <sub>EB0</sub>	6	—	—	V	I <sub>E</sub> = 10μA, I <sub>C</sub> = 0
<b>ON CHARACTERISTICS (Note 7)</b>						
DC Current Gain	Current Gain A	110	—	220	—	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA
	B	200	290	450		
	C	420	520	800		
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	—	250 600	mV	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	—	700 900	—	mV	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA
Base-Emitter Voltage	V <sub>BE</sub>	580	660	700	mV	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA
		—	—	770		
Collector-Emitter Cutoff Current	I <sub>CB0</sub>	—	—	15	nA	V <sub>CB</sub> = 30V V <sub>CB</sub> = 30V, T <sub>A</sub> = +150°C
				5		
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	C <sub>obo</sub>	—	—	4.5	pF	V <sub>CB</sub> = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	100	—	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA, f = 100MHz
Noise Figure	NK-BC847BT	—	—	1	dB	V <sub>CE</sub> = 5V, R <sub>S</sub> = 2kΩ, f = 1MHz, BW = 200Hz
	NK-BC847CT			4		

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

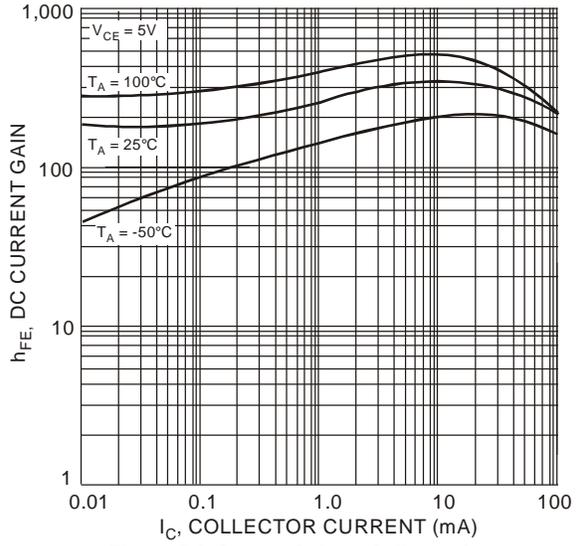


Fig. 2, DC Current Gain vs Collector Current

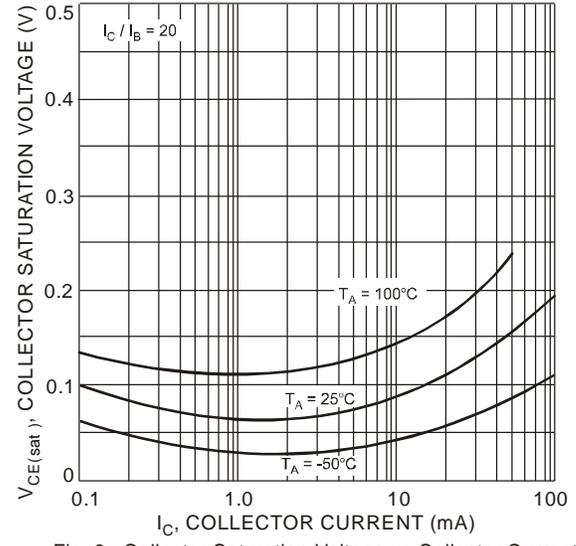


Fig. 3, Collector Saturation Voltage vs Collector Current

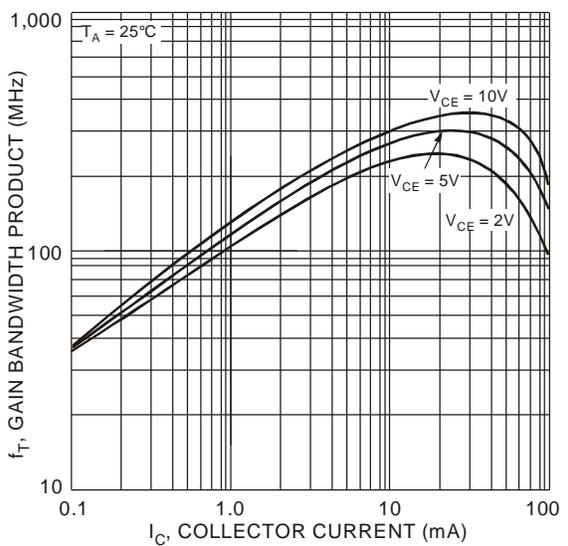
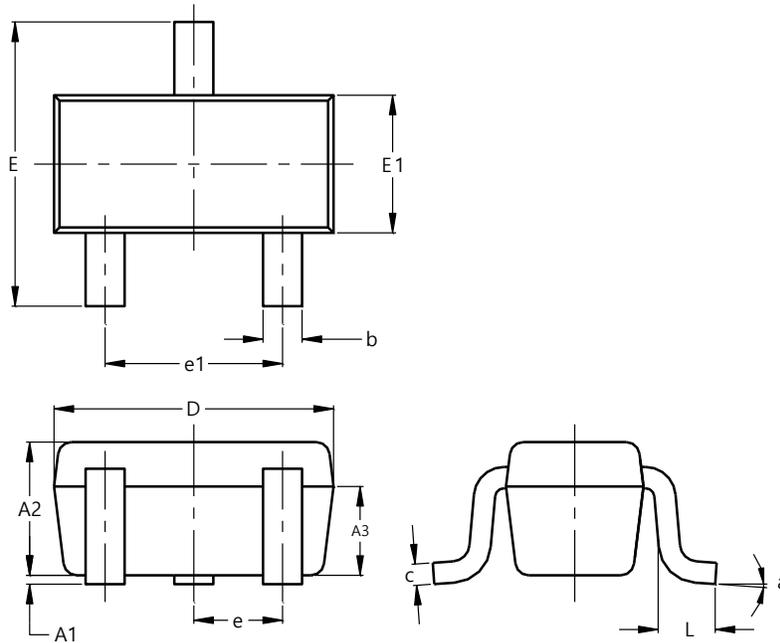


Fig. 4, Gain Bandwidth Product vs Collector Current

## Package Outline Dimensions

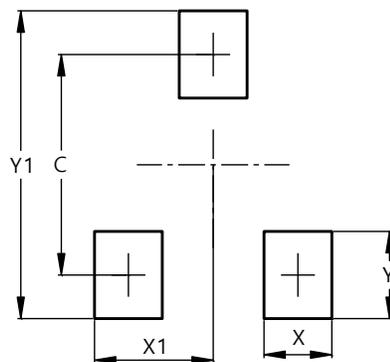
SOT523



SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

## Suggested Pad Layout

SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80