



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

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (NK-MMBT4401T)
- Ultra-Small Surface-Mount Package

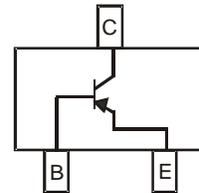
Mechanical Data

- Package: SOT523
- 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 
- Weight: 0.002 grams (Approximate)

SOT523



Top View



Package Pin Out
Configuration

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	-40	V
Collector-Emitter Voltage	V _{CE0}	-40	V
Emitter-Base Voltage	V _{EB0}	-5.0	V
Collector Current – Continuous (Note 5)	I _C	-600	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	150	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	R _{θJA}	833	°C/W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	96	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

- Notes:
- For a device mounted with the exposed collector pad on minimum recommended pad (MRP) layout 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 exposed collector pad is mounted on minimum recommended pad layout 2oz copper that is on a single sided 1.6mm FR4 PCB.

Thermal Characteristics and Derating Information

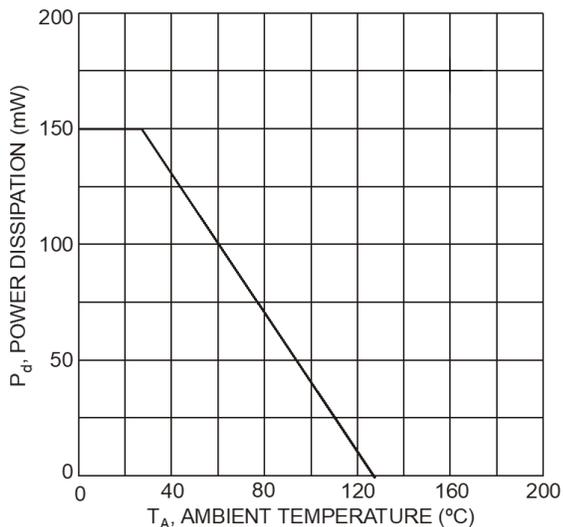


Fig. 1 Power Derating Curve, Total Package

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)						
Collector-Base Breakdown Voltage	BV _{CB0}	-40	—	V	I _C = -100μA	
Collector-Emitter Breakdown Voltage	BV _{CEO}	-40	—	V	I _C = -1.0mA	
Emitter-Base Breakdown Voltage	BV _{EBO}	-5	—	V	I _E = -100μA	
Collector Cutoff Current	I _{CEX}	—	-100	nA	V _{CE} = -35V, V _{EB(off)} = -0.4V	
Base Cutoff Current	I _{BL}	—	-100	nA	V _{CE} = -35V, V _{EB(off)} = -0.4V	
ON CHARACTERISTICS (Note 7)						
DC Current Gain	h _{FE}	30	—	—	I _C = -100μA, V _{CE} = -1V	
		60	—			I _C = -1.0mA, V _{CE} = -1V
		100	—			I _C = -10mA, V _{CE} = -1V
		100	300			I _C = -150mA, V _{CE} = -2V
		20	—			I _C = -500mA, V _{CE} = -2V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	-0.4 -0.75	V	I _C = -150mA, I _B = -15mA I _C = -500mA, I _B = -50mA	
Base-Emitter Saturation Voltage	V _{BE(sat)}	-0.75 —	-0.95 -1.3	V	I _C = -150mA, I _B = -15mA I _C = -500mA, I _B = -50mA	
SMALL-SIGNAL CHARACTERISTICS						
Output Capacitance	C _{obo}	—	8.5	pF	V _{CB} = -10V, f = 1MHz	
Input Capacitance	C _{ibo}	—	30	pF	V _{EB} = -0.5V, f = 1MHz	
Input Impedance	h _{ie}	1.5	15	kΩ	V _{CE} = -10V, I _C = -1mA, f = 1kHz	
Voltage Feedback Ratio	h _{re}	0.1	8	x 10 ⁻⁴		
Small-Signal Current Gain	h _{fe}	60	500	—		
Output Admittance	h _{oe}	1.0	100	μS		
Current Gain-Bandwidth Product	f _T	200	—	MHz	V _{CE} = -10V, I _C = -20mA, f = 100MHz	
SWITCHING CHARACTERISTICS						
Delay Time	t _d	—	15	ns	V _{CC} = -30V, I _C = -150mA, V _{BE(off)} = -2V, I _{B1} = -15mA	
Rise Time	t _r	—	20	ns		
Storage Time	t _s	—	225	ns	V _{CC} = -30V, I _C = -150mA, I _{B1} = I _{B2} = -15mA	
Fall Time	t _f	—	30	ns		

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

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

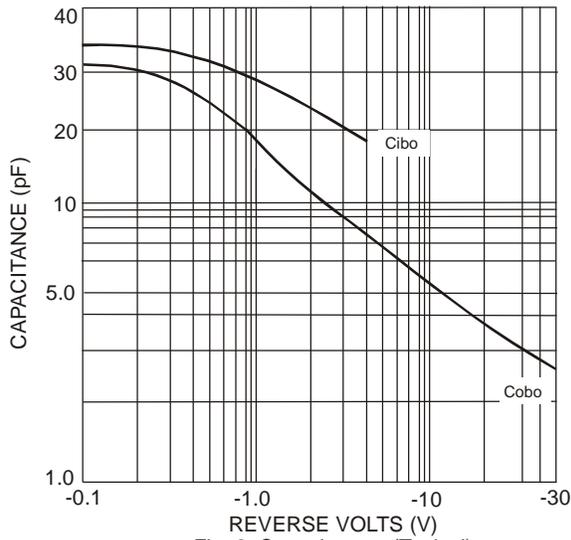


Fig. 2 Capacitances (Typical)

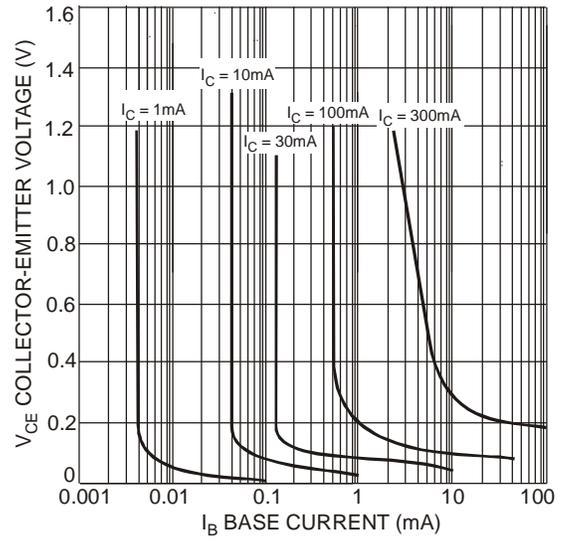


Fig. 3 Typical Collector Saturation Region

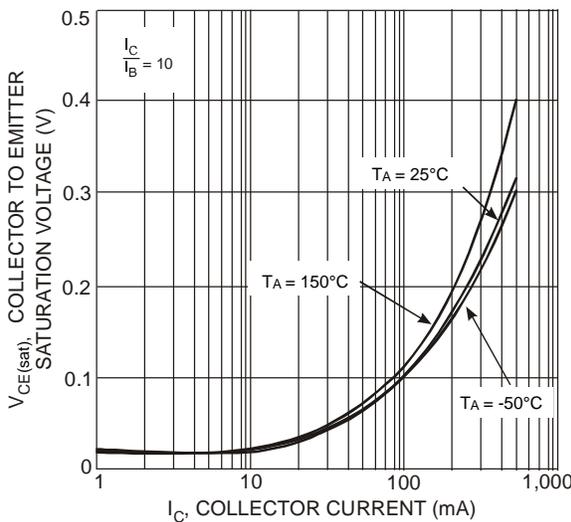


Fig. 4 Collector Emitter Saturation Voltage vs. Collector Current

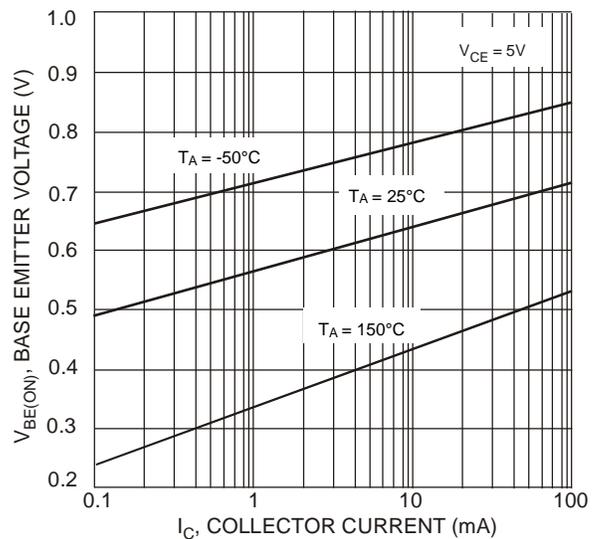


Fig. 5 Base-Emitter Voltage vs. Collector Current

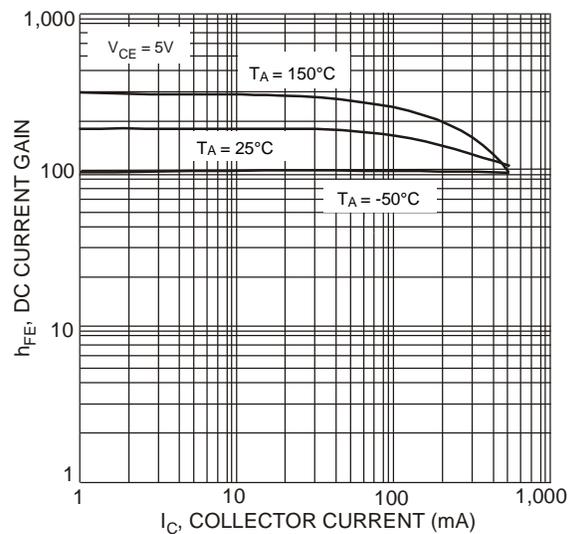


Fig. 6 DC Current Gain vs. Collector Current

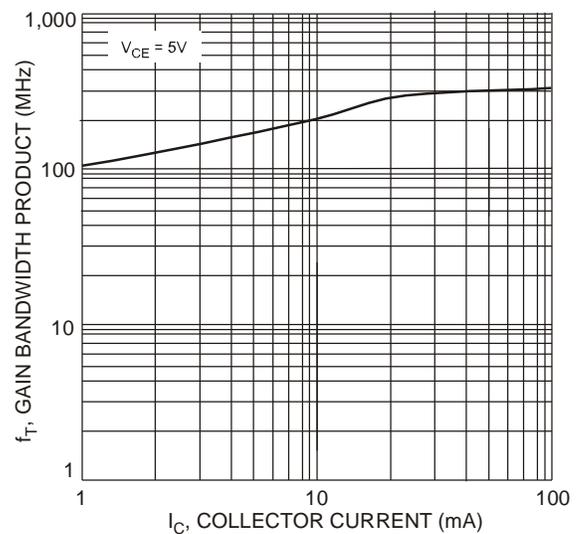
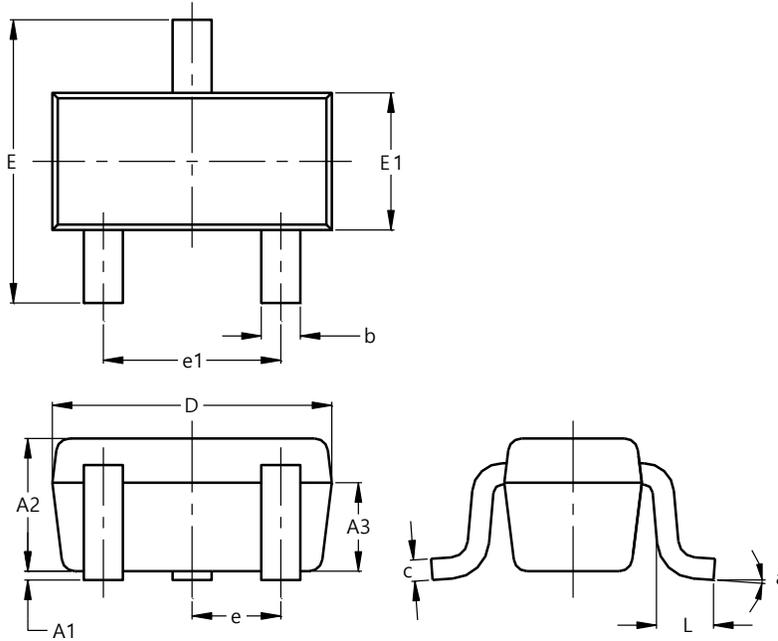


Fig. 7 Gain Bandwidth Product vs. Collector Current

Package Outline Dimensions

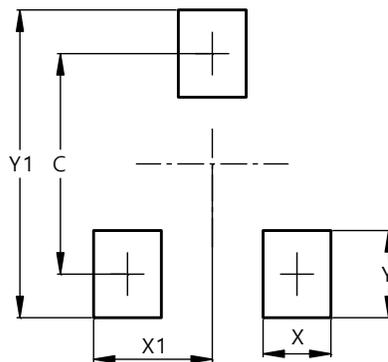
SOT523



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