



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

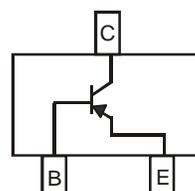
- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Voltage, $V_{CE(SAT)}$
- Complementary NPN Type Available (NK-DSS4160U)
- Ultra-Small Surface Mount Package

Mechanical Data

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper Plated Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



Top View



Device Schematic

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-80	V
Collector-Emitter Voltage	V_{CEO}	-60	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current - Continuous	I_C	-1	A
Peak Pulse Collector Current	I_{CM}	-2	A
Base Current (DC)	I_B	-300	mA
Peak Base Current	I_{BM}	-1	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$	P_D	400	mW
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	313	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 1. No purposefully added lead.

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-80	—	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 4)	$V_{(BR)CEO}$	-60	—	—	V	$I_C = -10\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5	—	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cutoff Current	I_{CBO}	—	—	-100	nA	$V_{CB} = -60\text{V}, I_E = 0$
Collector Cutoff Current	I_{CES}	—	—	-100	nA	$V_{CE} = -60\text{V}, V_{BE} = 0$
Emitter Cutoff Current	I_{EBO}	—	—	-100	nA	$V_{EB} = -5\text{V}, I_C = 0$
ON CHARACTERISTICS (Note 4)						
DC Current Gain	h_{FE}	200 150 100	— — —	— — —	—	$V_{CE} = -5\text{V}, I_C = -1\text{mA}$ $V_{CE} = -5\text{V}, I_C = -500\text{mA}$ $V_{CE} = -5\text{V}, I_C = 1\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	— — —	— — —	-175 -180 -340	mV	$I_C = -100\text{mA}, I_B = -1\text{mA}$ $I_C = -500\text{mA}, I_B = -50\text{mA}$ $I_C = -1\text{A}, I_B = -100\text{mA}$
Collector-Emitter Saturation Resistance	$R_{CE(SAT)}$	—	—	340	m Ω	$I_C = -1\text{A}, I_B = -100\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	-1.1	V	$I_C = -1\text{A}, I_B = -50\text{mA}$
Base-Emitter Turn On Voltage	$V_{BE(ON)}$	—	—	-0.9	V	$V_{CE} = 5\text{V}, I_C = 1\text{A}$
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	—	15	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	150	—	—	MHz	$V_{CE} = -10\text{V}, I_C = -50\text{mA}, f = 100\text{MHz}$
SWITCHING CHARACTERISTICS						
Turn-On Time	t_{on}	—	75	—	ns	$V_{CC} = -10\text{V}$ $I_C = -0.5\text{A}, I_{B1} = I_{B2} = -25\text{mA}$
Delay Time	t_d	—	35	—	ns	
Rise Time	t_r	—	40	—	ns	
Turn-Off Time	t_{off}	—	265	—	ns	
Storage Time	t_s	—	230	—	ns	
Fall Time	t_f	—	35	—	ns	

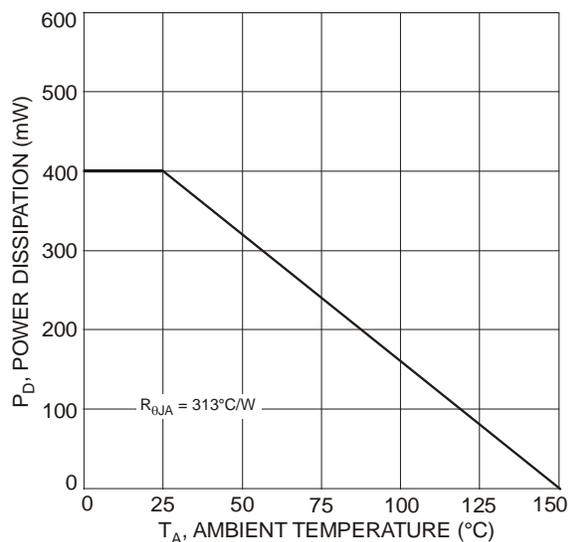
 Notes: 4. Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

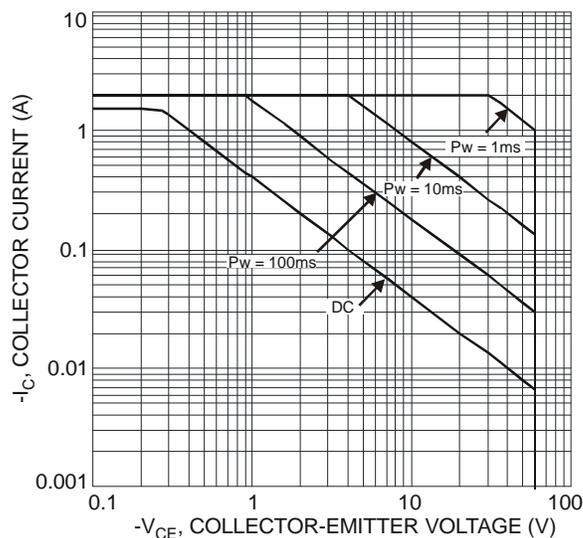


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage (Note 3)

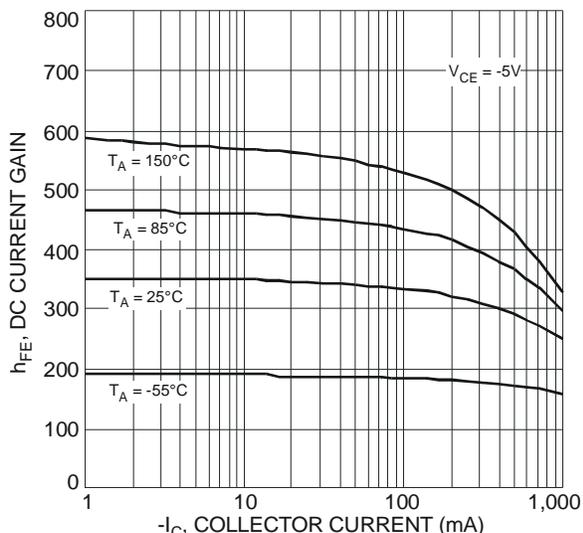


Fig. 3 Typical DC Current Gain vs. Collector Current

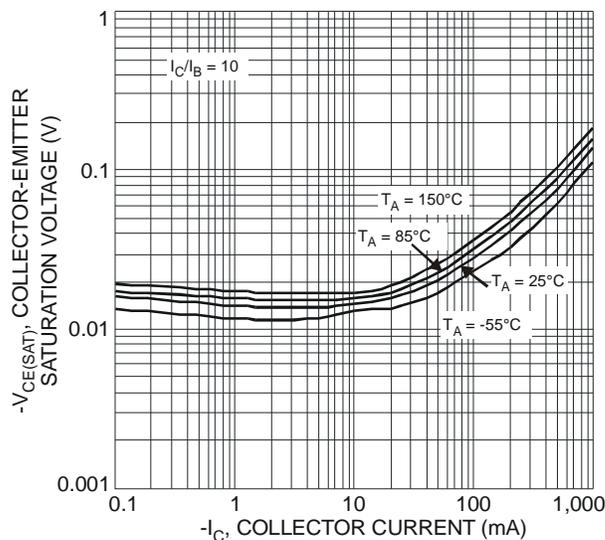


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

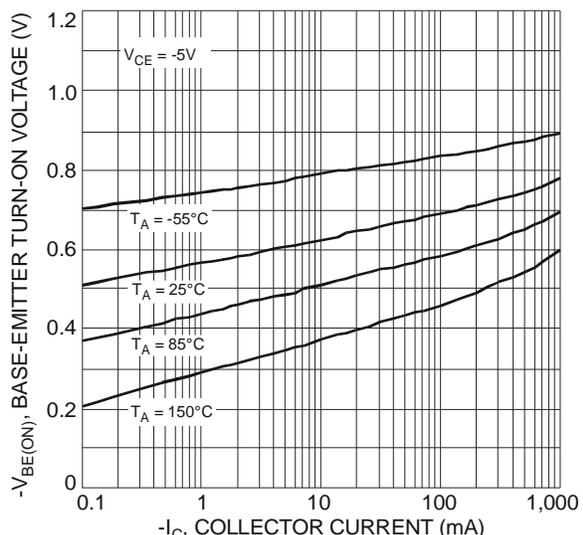


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

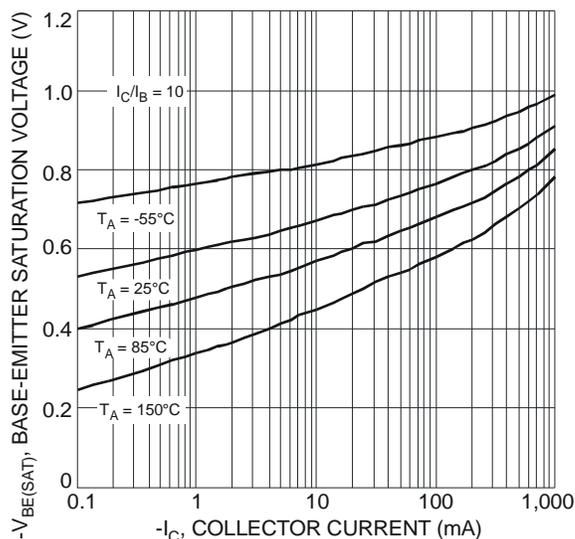


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

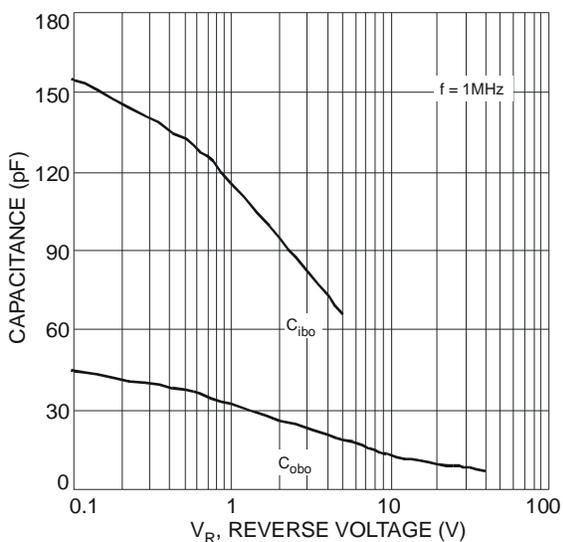


Fig. 7 Typical Capacitance Characteristics

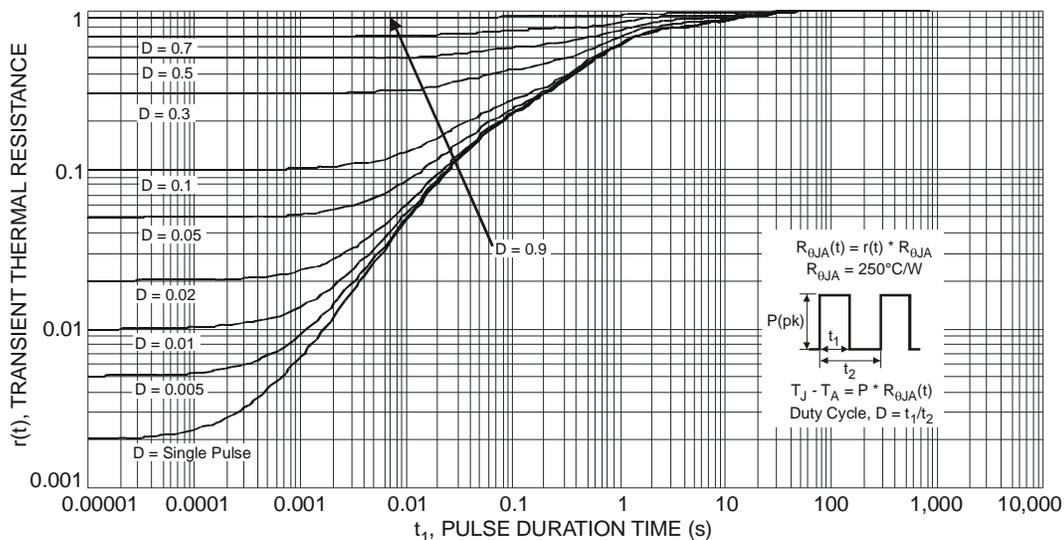
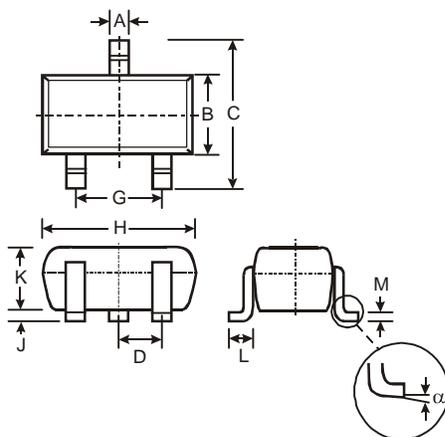


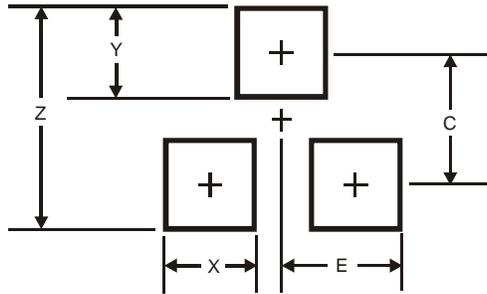
Fig. 8 Transient Thermal Response (Note 3)

Package Outline Dimensions



SOT-323			
Dim	Min	Max	Typ
A	0.25	0.40	0.30
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	-	-	0.65
G	1.20	1.40	1.30
H	1.80	2.20	2.15
J	0.0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.8
X	0.7
Y	0.9
C	1.9
E	1.0