



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

- $BV_{CEO} > 30V$
- $I_C = 7A$ Continuous Collector Current
- $I_{CM} = 20A$ Peak Pulse Current
- Low Saturation Voltage $V_{CE(SAT)} < 50mV$ Max @ 1A
- $R_{SAT} = 28m\Omega$ @ 6.5A for Low Equivalent On-Resistance
- h_{FE} Specified up to 20A for High Gain Hold Up

Mechanical Data

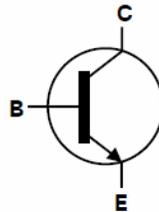
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 
- Weight: 0.112 grams (Approximate)

Applications

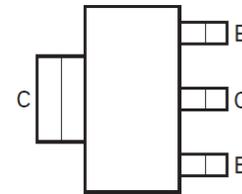
- DC-DC Converters
- MOSFET Gate Drivers
- Charging Circuits
- Power Switches
- Motor Control



Top View



Device Schematic



Pin-Out Top View

Absolute Maximum Ratings

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	80	V
Collector-Emitter Voltage	V _{CEO}	30	V
Emitter-Base Voltage	V _{EBO}	7	V
Continuous Collector Current	I _C	7	A
Peak Pulse Current	I _{CM}	20	A

Thermal Characteristics

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

Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	3.0	W
		24	
Linear Derating Factor		1.6	mW/°C
		12.8	
Thermal Resistance, Junction to Ambient	R _{θJA}	42	°C/W
	R _{θJA}	78	
Thermal Resistance, Junction to Lead	R _{θJL}	8.8	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

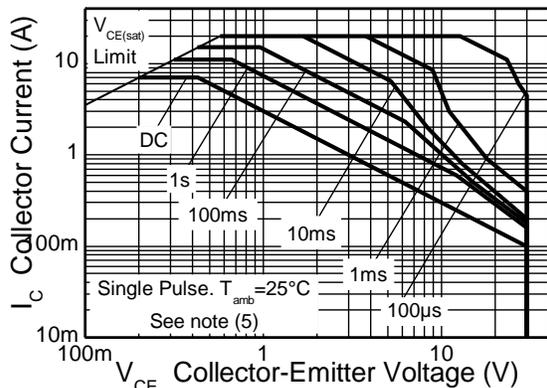
ESD Ratings

 (Note 8)

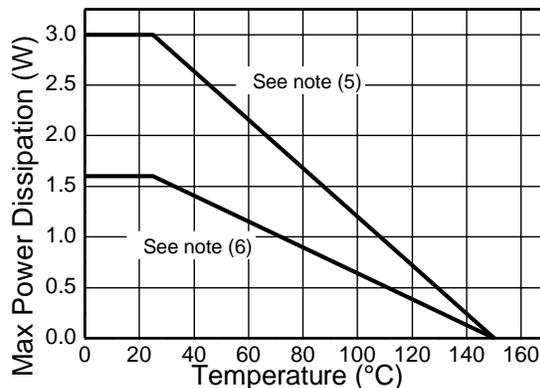
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 52mm x 52mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
 6. Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
 7. Thermal resistance from junction to solder-point (at the end of the collector lead).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

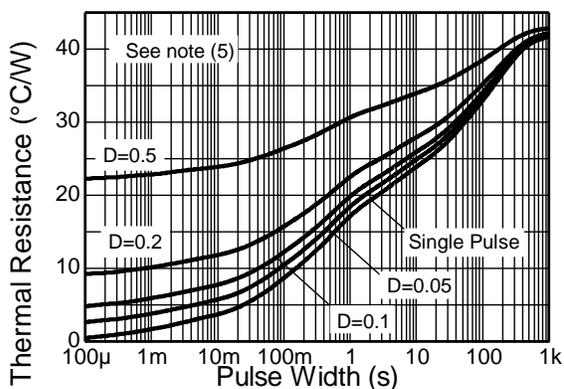
Thermal Characteristics and Derating Information



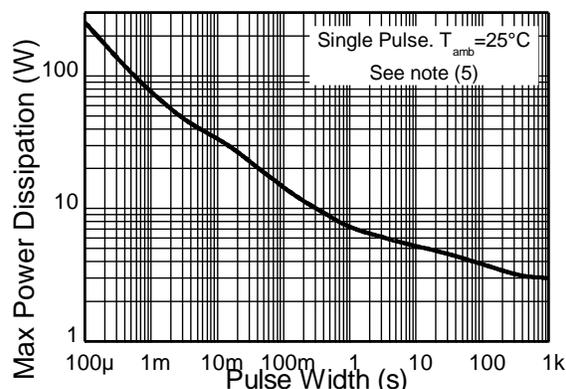
Safe Operating Area



Derating Curve



Transient Thermal Impedance



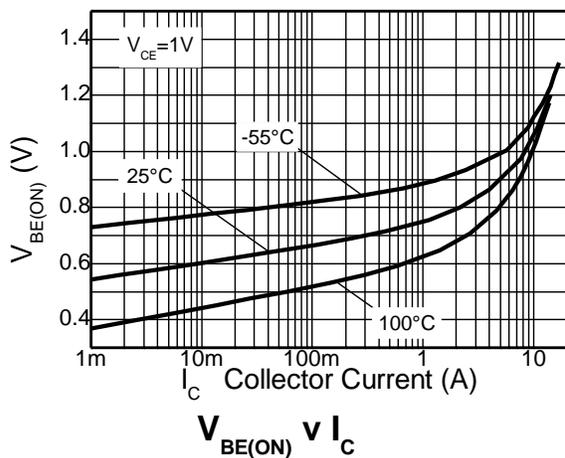
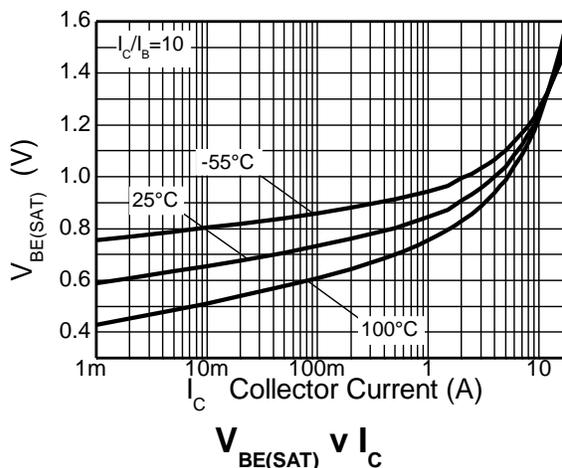
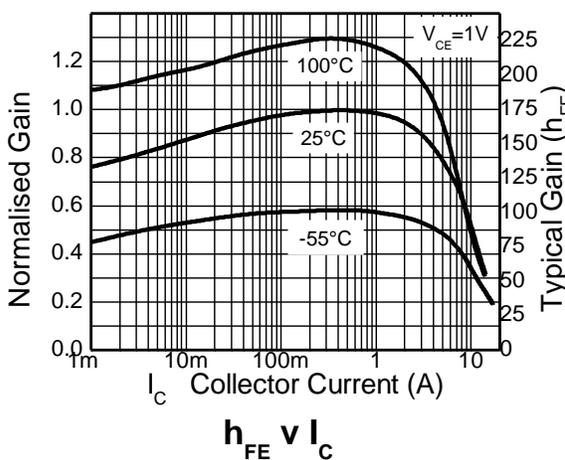
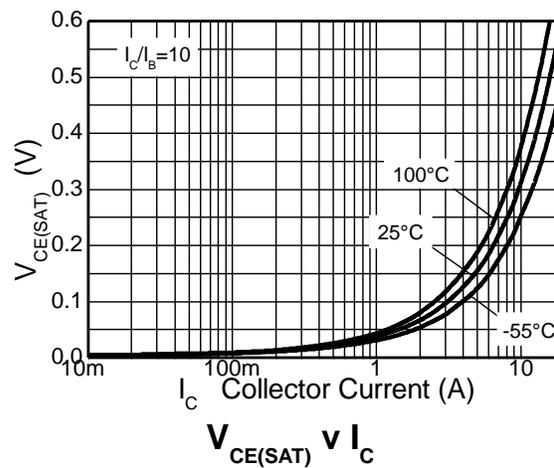
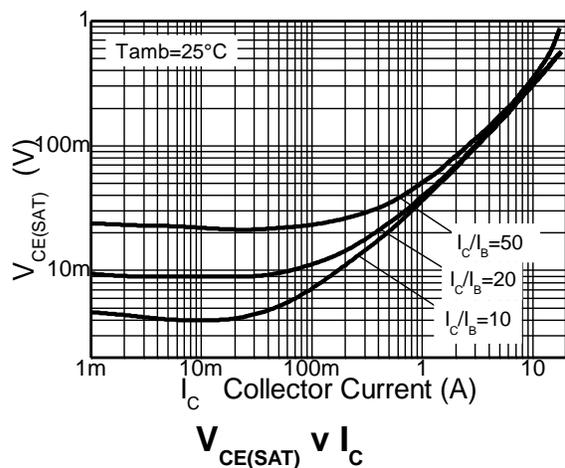
Pulse Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV _{CBO}	80	125	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage	BV _{CER}	80	125	—	V	I _C = 1μA, R _B ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 9)	BV _{CEO}	30	40	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	BV _{EBO}	7	8.1	—	V	I _E = 100μA
Collector Cutoff Current	I _{CBO}	—	< 1	50	nA	V _{CB} = 70V
		—	—	0.5	μA	V _{CB} = 70V, T _A = +100°C
Collector Cutoff Current	I _{CER}	—	< 1	100	nA	V _{CB} = 70V
	R _S ≤ 1kΩ	—	—	0.5	μA	V _{CB} = 70V, T _A = +100°C
Emitter Cutoff Current	I _{EBO}	—	< 1	10	nA	V _{EB} = 6V
Collector-Emitter Saturation Voltage (Note 9)	V _{CE(SAT)}	—	25 35 50 100 185	35 50 65 125 220	mV	I _C = 500mA, I _B = 20mA I _C = 1A, I _B = 100mA I _C = 1A, I _B = 20mA I _C = 2A, I _B = 20mA I _C = 6.5A, I _B = 300mA
Base-Emitter Saturation Voltage (Note 9)	V _{BE(SAT)}	—	1.03	1.13	V	I _C = 6.5A, I _B = 150mA
Base-Emitter Turn-On Voltage (Note 9)	V _{BE(ON)}	—	0.92	1	V	I _C = 6.5A, V _{CE} = 1V
DC Current Gain (Note 9)	h _{FE}	100 100 100 20	175 200 150 30	300	—	I _C = 10mA, V _{CE} = 1V I _C = 1A, V _{CE} = 1V I _C = 7A, V _{CE} = 1V I _C = 20A, V _{CE} = 1V
Transition Frequency	f _T	—	140	—	MHz	V _{CE} = 10V, I _C = 100mA, f = 50MHz
Output Capacitance (Note 9)	C _{OBO}	—	48	—	pF	V _{CB} = 10V, f = 1MHz
Switching Times	t _{ON}	—	37	—	ns	V _{CC} = 10V, I _C = 1A, I _{B1} = -I _{B2} = 100mA
	t _{OFF}	—	425	—		

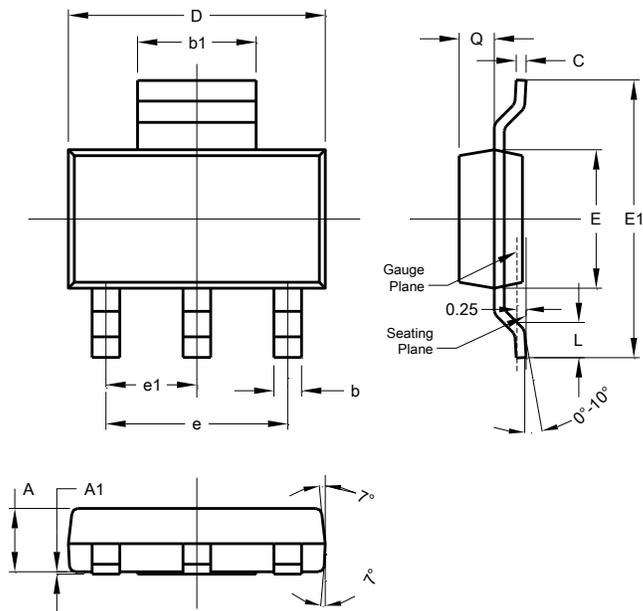
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



Package Outline Dimensions

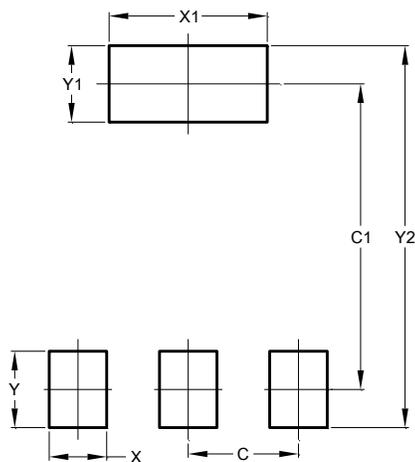
SOT223



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

SOT223



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
C2	8.00