



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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## Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

## Features

- $BV_{CEO} > 300V$
- $I_C = 500mA$  High Collector Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(SAT)} < 500mV @ 20mA$
- Complementary PNP Type: NK-DZTA92

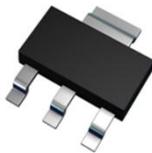
## Mechanical Data

- 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. Solderable per MIL-STD-202, Method 208 
- Weight: 0.112 grams (Approximate)

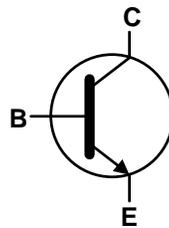
## Applications

- Switch-Mode Power Supplies (SMPS)
- Video Output Stages
- Motor Driver

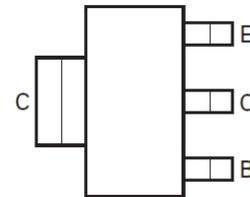
SOT223



Top View



Device Symbol



Top View  
Pin-Out

### Absolute Maximum Ratings

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CB0}$	300	V
Collector-Emitter Voltage	$V_{CEO}$	300	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Collector Current	$I_C$	500	mA
Base Current	$I_B$	100	mA

### Thermal Characteristics

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

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	2	W
		1	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$
		125	
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	19.4	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

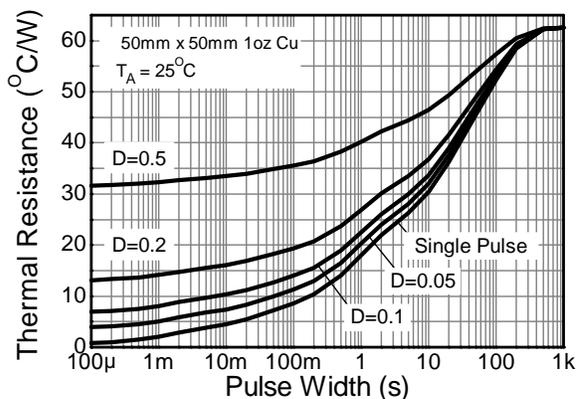
### ESD Ratings

 (Note 9)

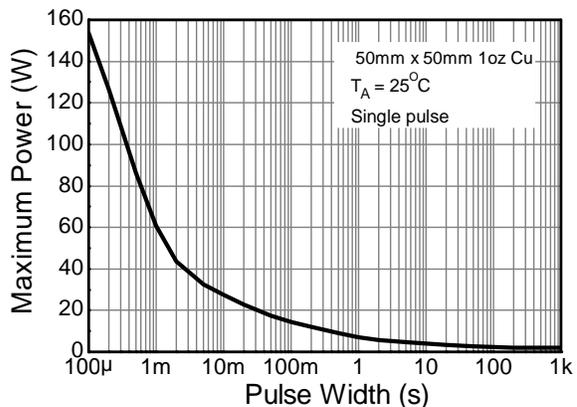
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	$ESD_{HBM}$	4,000	V	3A
Electrostatic Discharge - Machine Model	$ESD_{MM}$	400	V	C

- Notes:
6. For a device mounted with the collector lead on 50mm x 50mm 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.
  7. Same as note (6), except mounted on minimum recommended pad (MRP) layout.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

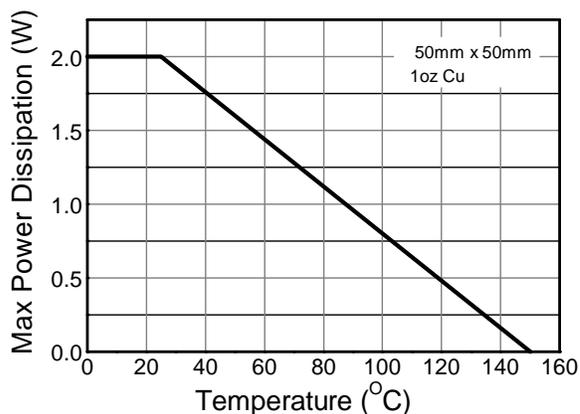
## Thermal Characteristics and Derating Information



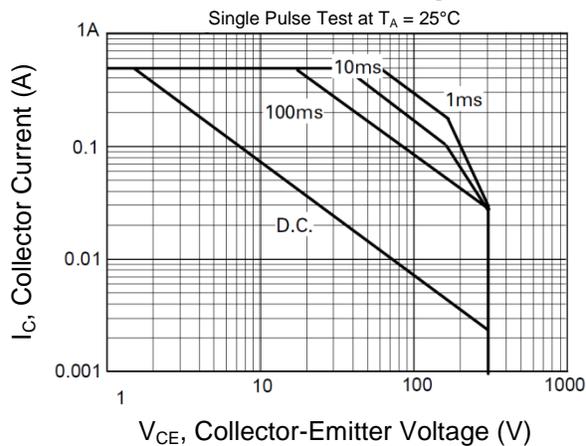
**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**



**Safe Operating Area**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$BV_{CBO}$	300	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	300	—	—	V	$I_C = 1\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	6	—	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cut-off Current	$I_{CBO}$	—	—	0.1	$\mu\text{A}$	$V_{CB} = 200\text{V}$
Emitter-Base Cut-off Current	$I_{EBO}$	—	—	0.1	$\mu\text{A}$	$V_{EB} = 6\text{V}$
<b>ON CHARACTERISTICS (Note 10)</b>						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	0.5	V	$I_C = 20\text{mA}$ , $I_B = 2\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	0.9	V	$I_C = 20\text{mA}$ , $I_B = 2\text{mA}$
Static Forward Current Transfer Ratio	$h_{FE}$	25	—	—	—	$I_C = 1\text{mA}$ , $V_{CE} = 10\text{V}$
		40	—	—		$I_C = 10\text{mA}$ , $V_{CE} = 10\text{V}$
		40	—	—		$I_C = 30\text{mA}$ , $V_{CE} = 10\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	$f_T$	50	—	—	MHz	$I_C = 10\text{mA}$ , $V_{CE} = 20\text{V}$ $f = 100\text{MHz}$
Output Capacitance	$C_{OBO}$	—	—	3	pF	$V_{CB} = 20\text{V}$ , $f = 1\text{MHz}$

Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

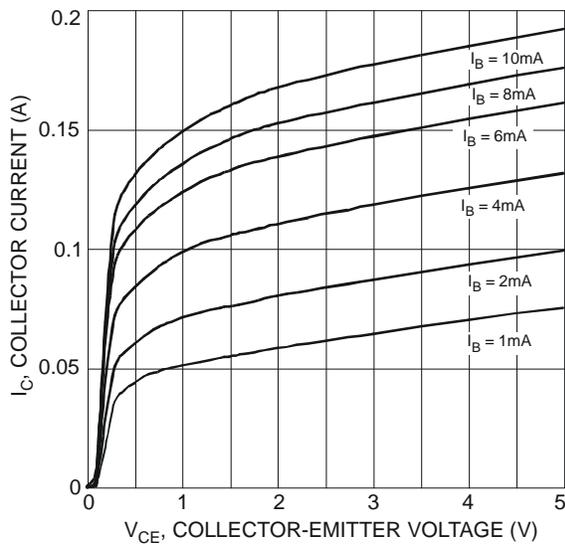
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)


Figure 1 Typical Collector Current vs. Collector-Emitter Voltage

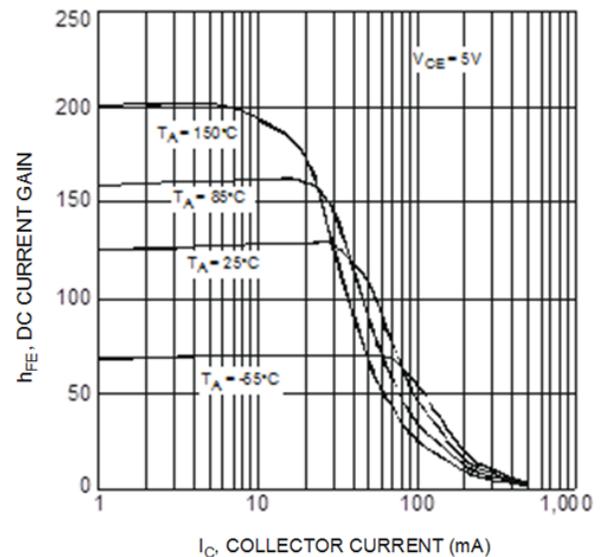


Figure 2 Typical DC Current Gain vs. Collector Current

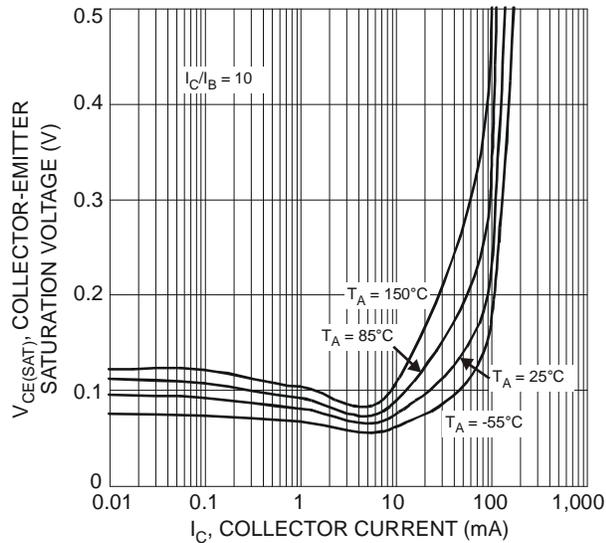


Figure 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

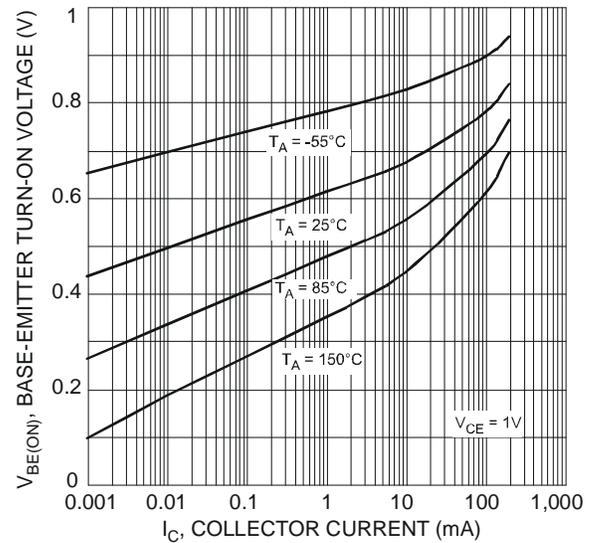


Figure 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

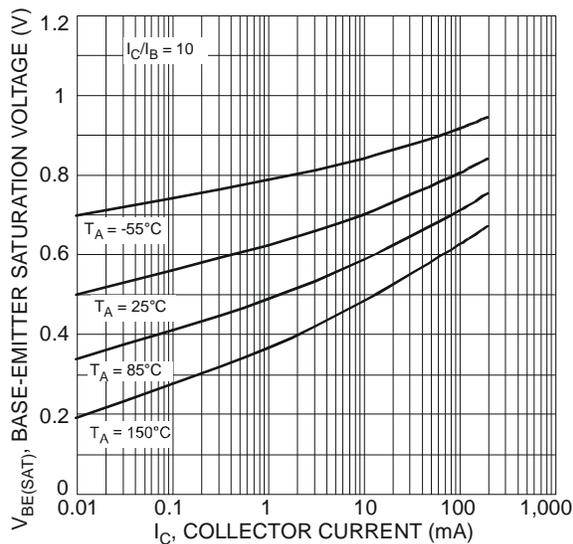


Figure 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

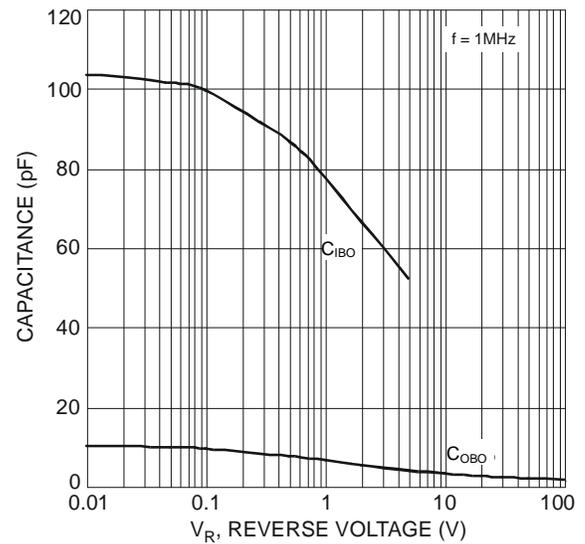


Figure 6 Typical Capacitance Characteristics

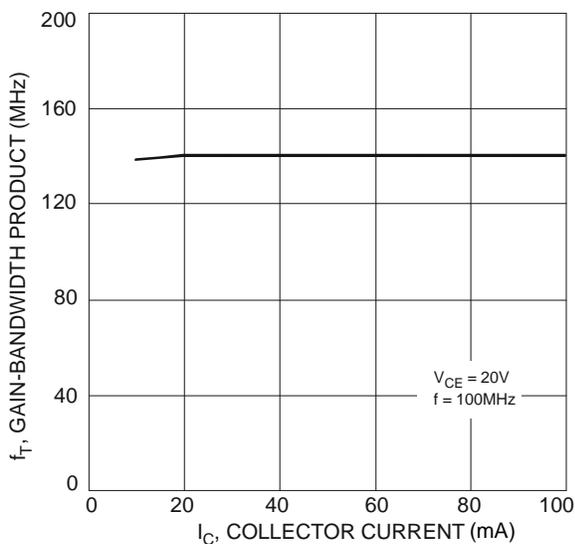
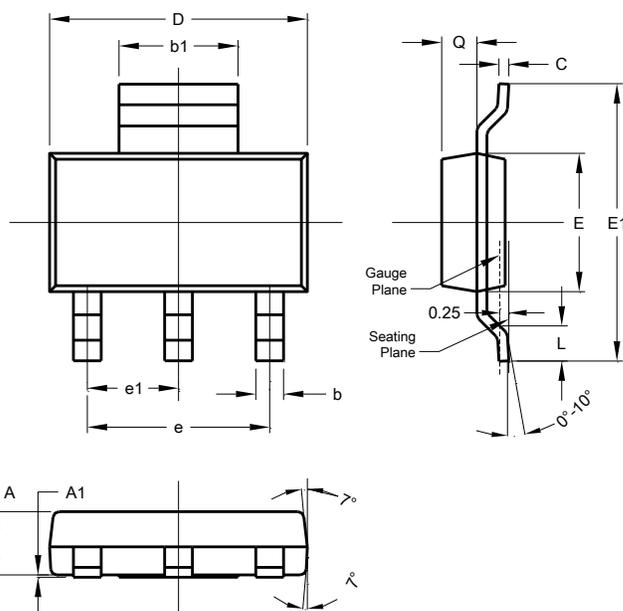


Figure 7 Typical Gain-Bandwidth Product vs. Collector Current

### Package Outline Dimensions

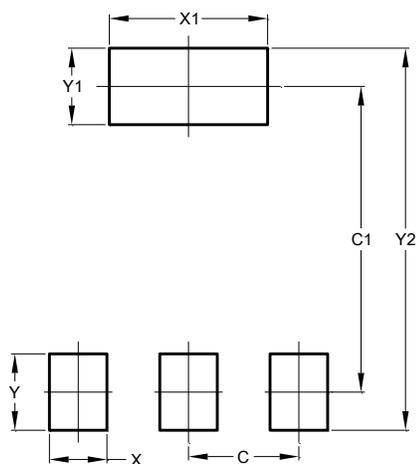
SOT223



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
Y2	8.00

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.