



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**

0755-83047638  
ysbdt@szyoushang.cn  
www.szyoushang.cn



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## Description

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

## Features

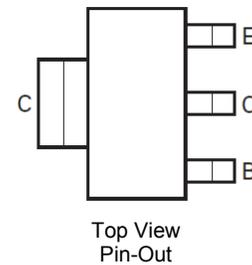
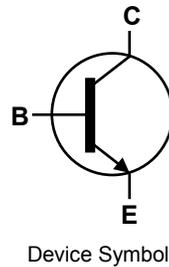
- $BV_{CEO} > 45V$  &  $80V$
- $I_C = 1A$  Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(sat)} < 500mV @ 0.5A$
- Complementary PNP Type: NK-BCP5316Q

## Applications

- Medium Power Switching or Amplification Applications
- AF Drivers and Output Stages

## 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)



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

Characteristic	Symbol	NK-BCP5416	NK-BCP5616	Unit
Collector-Base Voltage	$V_{CB0}$	45	100	V
Collector-Emitter Voltage	$V_{CEO}$	45	80	V
Emitter-Base Voltage	$V_{EBO}$	5		V
Continuous Collector Current	$I_C$	1		A
Peak Pulse Collector Current	$I_{CM}$	2		
Continuous Base Current	$I_B$	100		mA
Peak Pulse Base Current	$I_{BM}$	200		

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

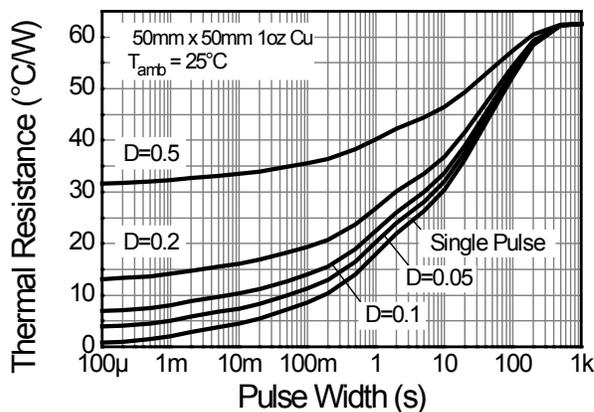
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	$P_D$	2	W
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	19.4	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

### ESD Ratings (Note 7)

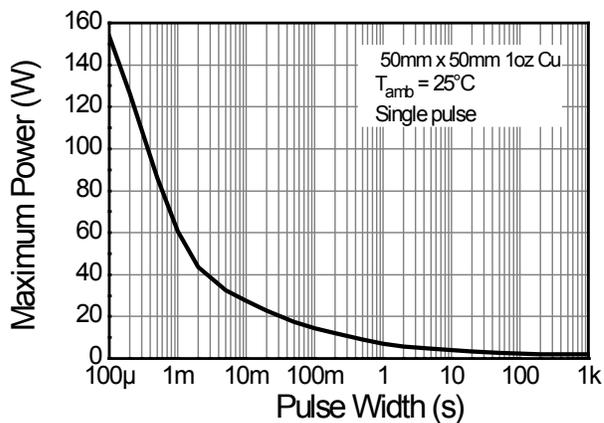
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
- For a device mounted with the collector lead on 50mm x 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  - Thermal resistance from junction to solder-point (at the end of the collector lead).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

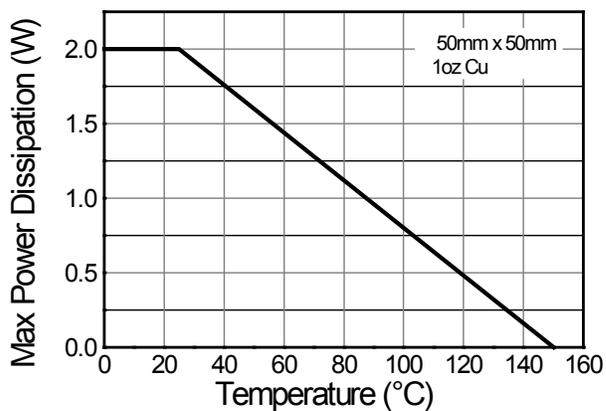
## Thermal Characteristics and Derating Information



**Transient Thermal Impedance**



**Pulse Power Dissipation**



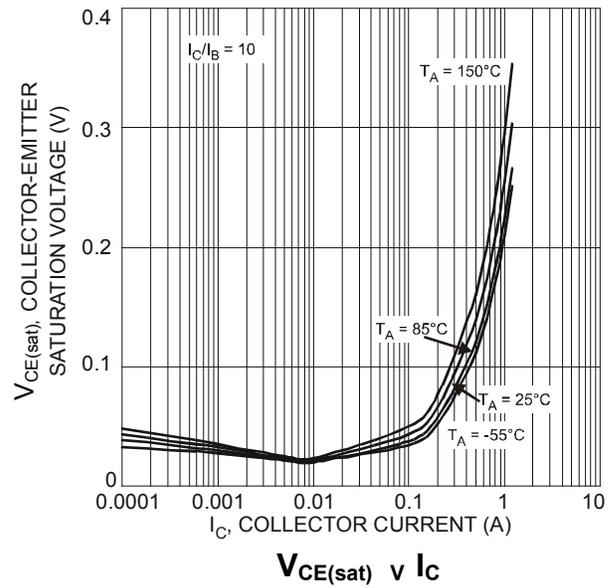
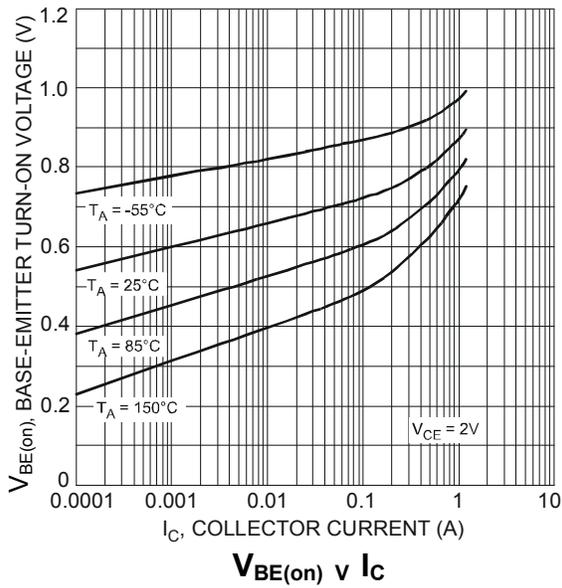
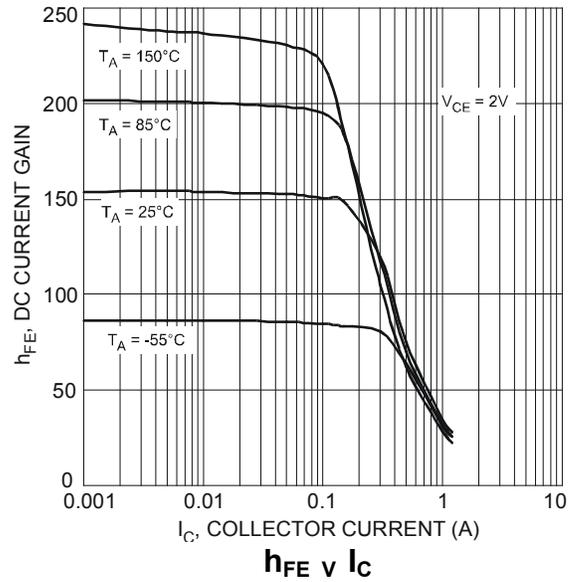
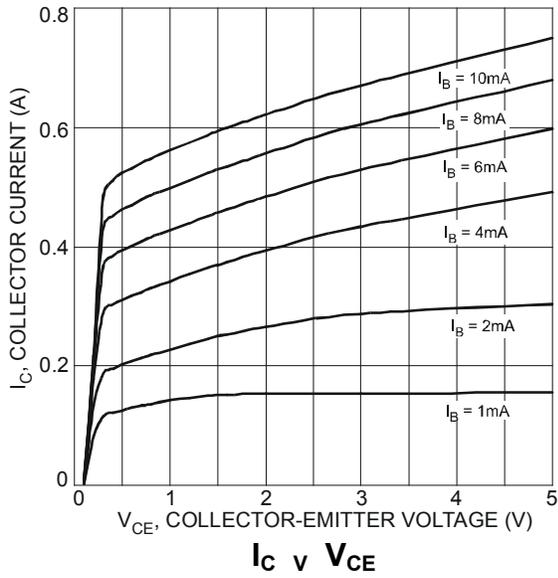
**Derating Curve**

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

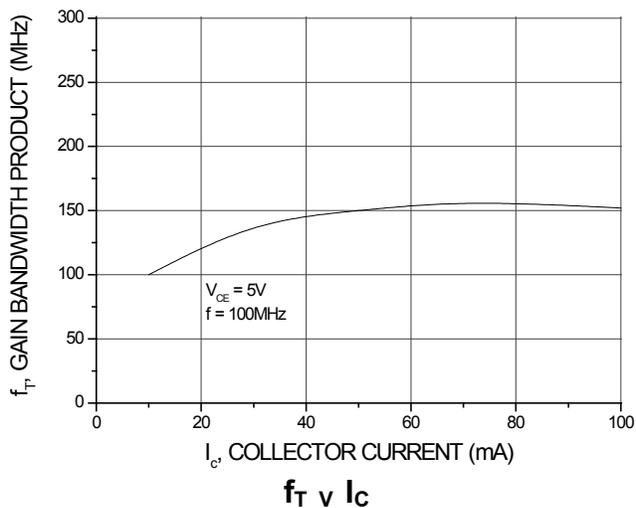
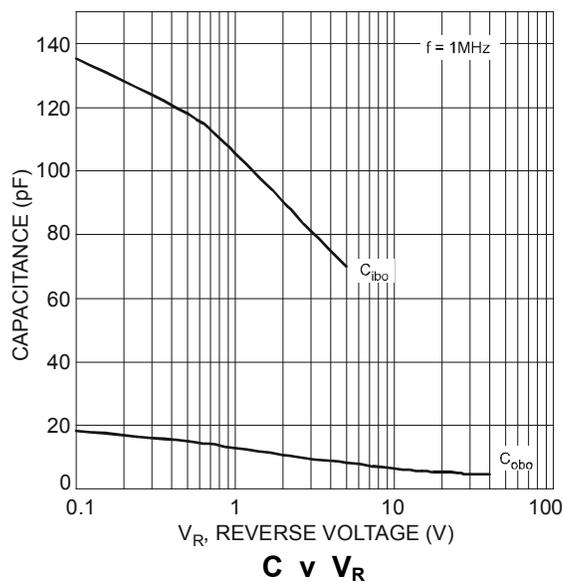
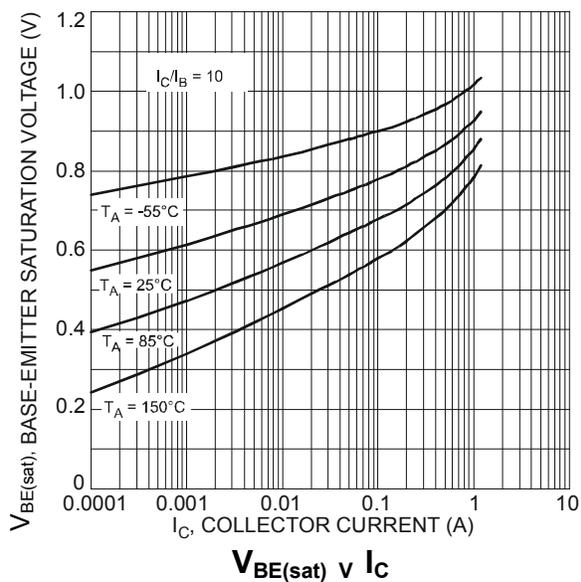
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	NK-BCP5416	$BV_{CBO}$	45	—	—	V	$I_C = 100\mu\text{A}$
	NK-BCP5616		100				
Collector-Emitter Breakdown Voltage (Note 8)	NK-BCP5416	$BV_{CEO}$	45	—	—	V	$I_C = 10\text{mA}$
	NK-BCP5616		80				
Emitter-Base Breakdown Voltage		$BV_{EBO}$	5	—	—	V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current		$I_{CBO}$	—	—	0.1 20	$\mu\text{A}$	$V_{CB} = 30\text{V}$ $V_{CB} = 30\text{V}, T_A = +150^\circ\text{C}$
Emitter Cut-Off Current		$I_{EBO}$	—	—	20	nA	$V_{EB} = 4\text{V}$
DC Current Gain (Note 8)		$h_{FE}$	25	—	—	—	$I_C = 5\text{mA}, V_{CE} = 2\text{V}$
			100		250		$I_C = 150\text{mA}, V_{CE} = 2\text{V}$
			25		—		$I_C = 500\text{mA}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 8)		$V_{CE(sat)}$	—	—	0.5	V	$I_C = 500\text{mA}, I_B = 50\text{mA}$
Base-Emitter Turn-On Voltage (Note 8)		$V_{BE(on)}$	—	—	1.0	V	$I_C = 500\text{mA}, V_{CE} = 2\text{V}$
Transition frequency		$f_T$	100	150	—	MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance		$C_{obo}$	—	—	25	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$

 Note: 8. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

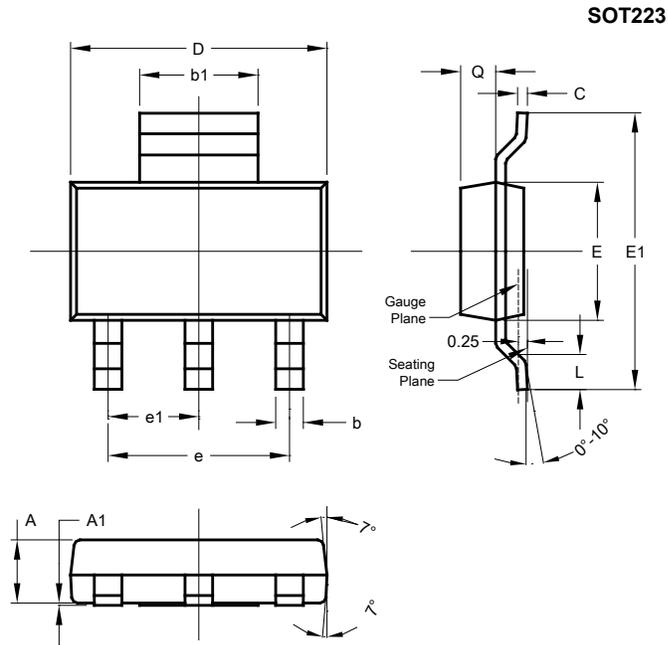
**Typical Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



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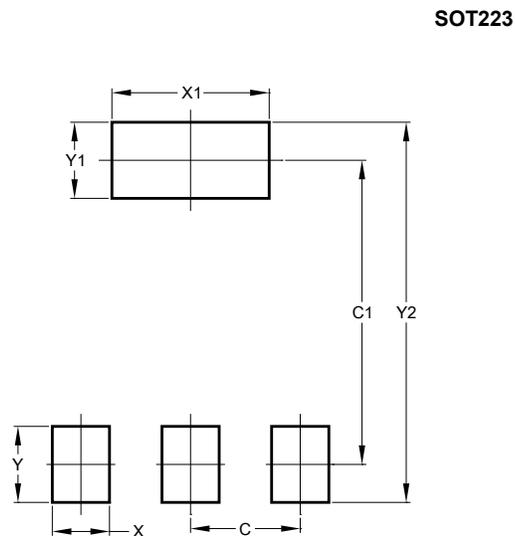


### Package Outline Dimensions



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



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