



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

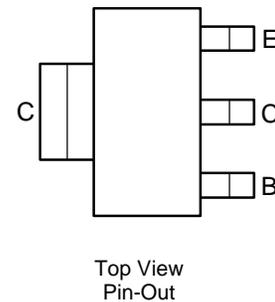
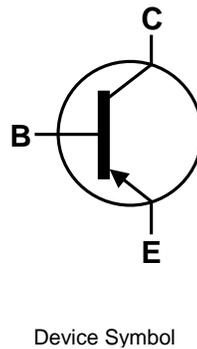
- $BV_{CEO} > -140V$
- $BV_{CBO} > -140V$
- $I_C = -500m$  Continuous Current
- $hFE > 250$  for High Gain @  $-0.2A$
- Very Low  $V_{CEsat}$
- Complementary NPN Type: NK-FZT694B

## 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 ③
- Weight: 0.112 grams (Approximate)

## Applications

- Battery Powered Circuits



**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-140	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-140	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-500	mA
Peak Pulse Current	I <sub>CM</sub>	-1	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

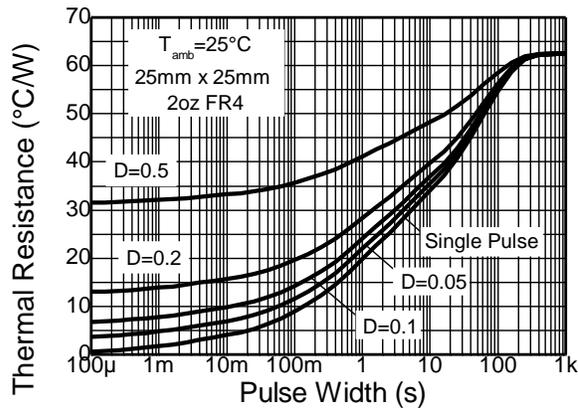
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	2	W
	(Note 7)		3	W
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	62.5	°C/W
	(Note 7)		41.7	°C/W
Thermal Resistance, Junction to Leads	(Note 8)	R <sub>θJL</sub>	12.9	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

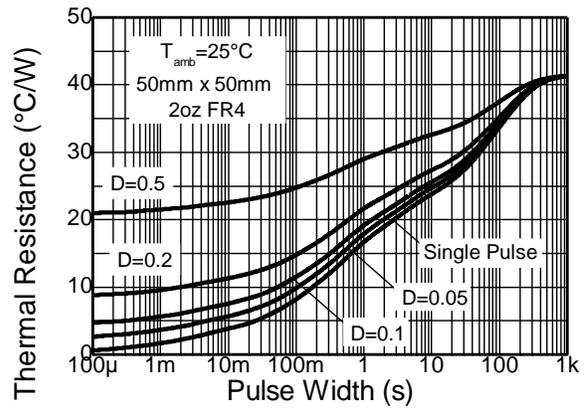
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted with the collector lead on 25mm x 25mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  7. Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
  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.

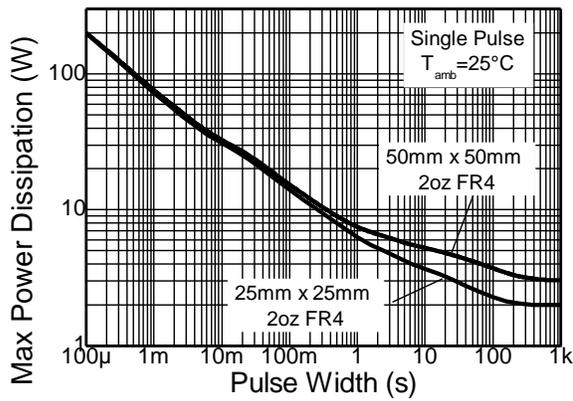
## Thermal Characteristics and Derating Information



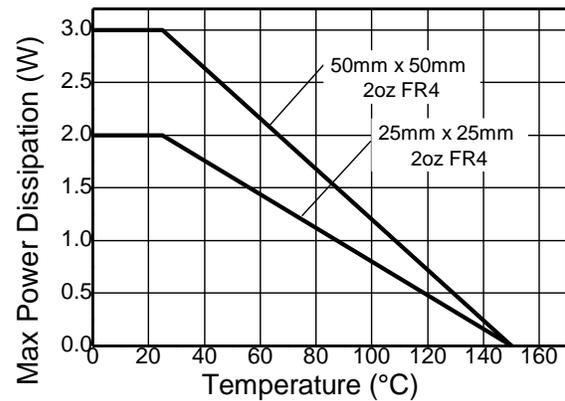
**Transient Thermal Impedance**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



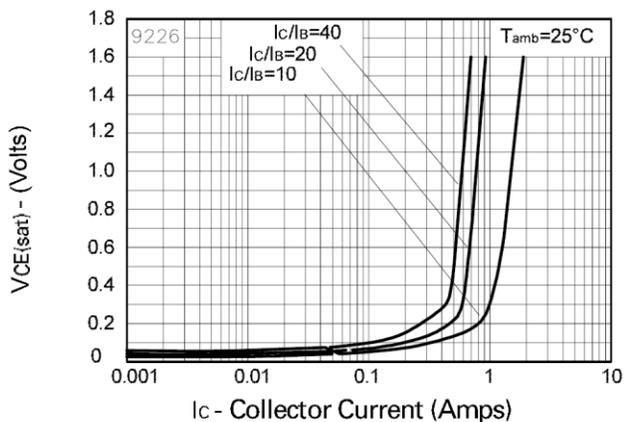
**Derating Curve**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

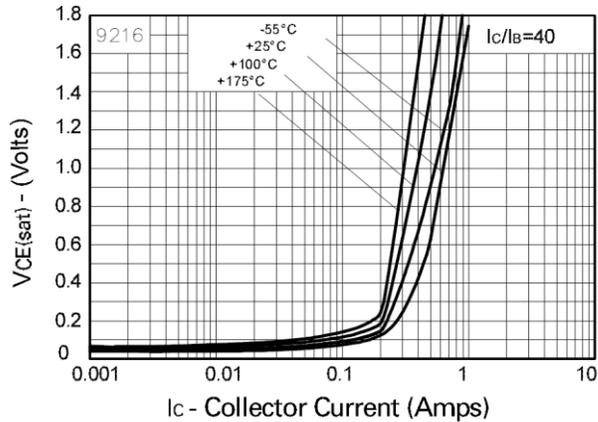
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	-140	—	—	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	-140	—	—	V	I <sub>C</sub> = -10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	—	—	V	I <sub>E</sub> = -100μA
Collector-Base Cut-Off Current	I <sub>CB0</sub>	—	—	-100	nA	V <sub>CB</sub> = -100V
Collector-Emitter Cut-Off Current	I <sub>CES</sub>	—	—	-100	nA	V <sub>CE</sub> = -100V
Emitter Cut-Off Current	I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -6V
DC Current Gain (Note 10)	h <sub>FE</sub>	300 250 100	— — —	800 — —	—	I <sub>C</sub> = -10mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -200mA, V <sub>CE</sub> = -2V I <sub>C</sub> = -300mA, V <sub>CE</sub> = -2V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(sat)</sub>	— — —	— — —	-300 -300 -250	mV	I <sub>C</sub> = -100mA, I <sub>B</sub> = -1mA I <sub>C</sub> = -200mA, I <sub>B</sub> = -5mA I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	—	—	-0.95	V	I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA
Base-Emitter Turn-On Voltage (Note 10)	V <sub>BE(on)</sub>	—	-0.75	—	V	I <sub>C</sub> = -500mA, V <sub>CE</sub> = -2V
Input Capacitance	C <sub>ibo</sub>	—	225	—	pF	V <sub>EB</sub> = -0.5V, f = 1MHz
Output Capacitance	C <sub>obo</sub>	—	15	—	pF	V <sub>CB</sub> = -10V, f = 1MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	100	—	—	MHz	V <sub>CE</sub> = -5V, I <sub>C</sub> = -50mA, f=50MHz
Turn-On Time	t <sub>on</sub>	—	100	—	ns	V <sub>CC</sub> = -50V, I <sub>C</sub> = -100mA
Turn-Off Time	t <sub>off</sub>	—	1900	—	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 10mA

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300 μs. Duty cycle ≤ 2%.

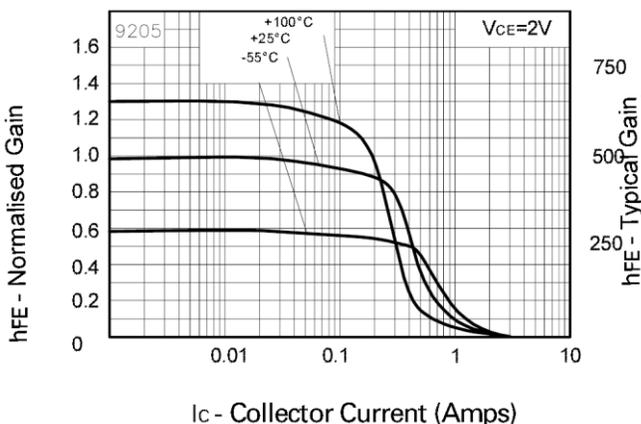
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



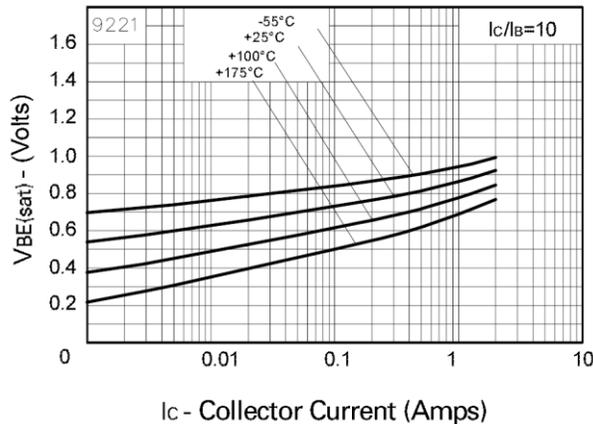
**VCE(sat) v IC**



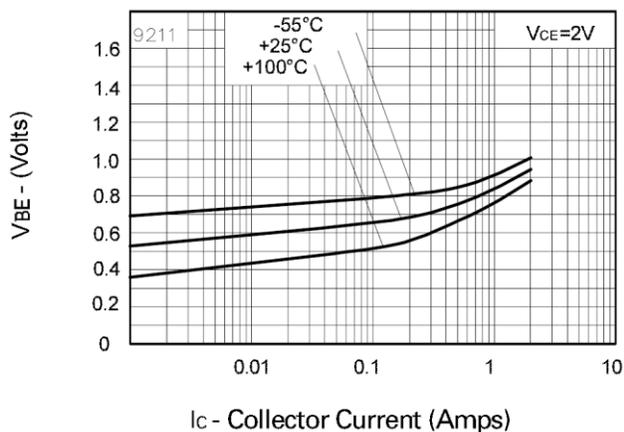
**VCE(sat) v IC**



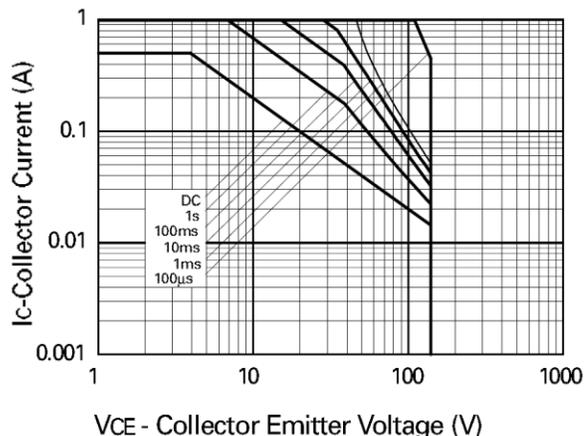
**hFE v IC**



**VBE(sat) v IC**

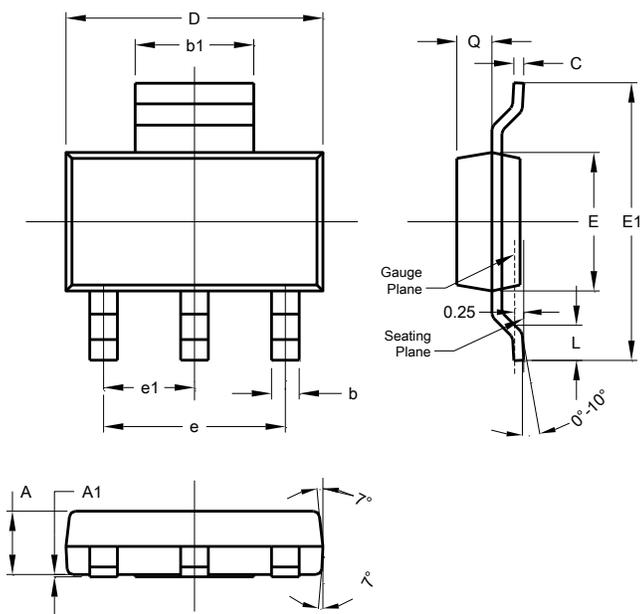


**VBE(on) v IC**



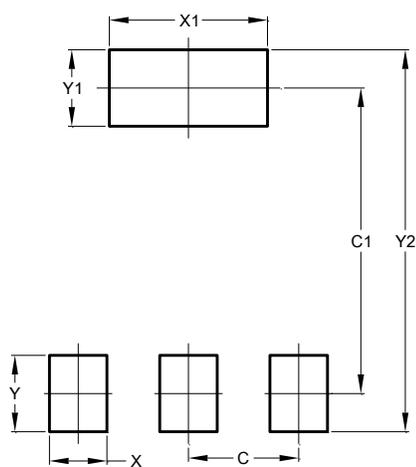
**Safe Operating Area**

### 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