优尚

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

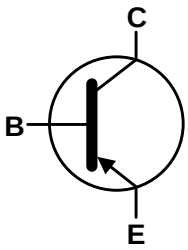
- $BV_{CEO}$ > -500V
- $I_C$ = -150mA High Continuous Current
- $I_{CM}$ = -500mA Peak Pulse Current

## Mechanical Data

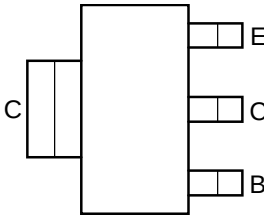
- Case: SOT223
- Case Material: Molded Plastic. “Green” Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

SOT223

Top View




Device Symbol




Top View
Pin-Out

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -500 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -500 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -7 | V |
| Continuous Collector Current | $I_C$ | -150 | mA |
| Peak Pulse Current | $I_{CM}$ | -500 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

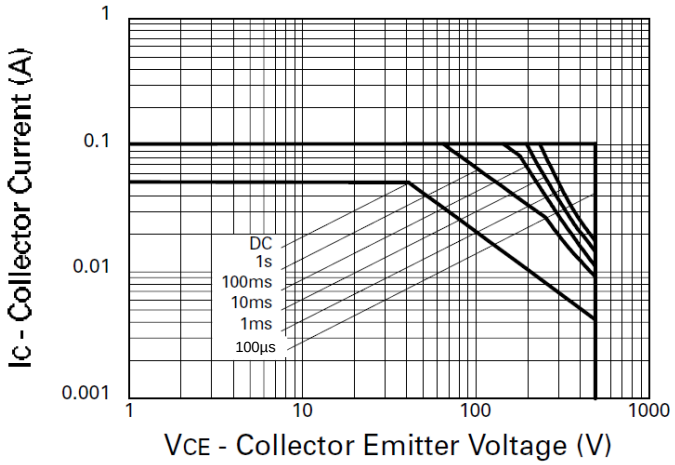
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 2 | W |
| | (Note 7) | | 3 | W |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 62.5 | °C/W |
| | (Note 7) | | 41.7 | °C/W |
| Thermal Resistance, Junction to Leads | (Note 8) | $R_{\theta JL}$ | 14.8 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 9)

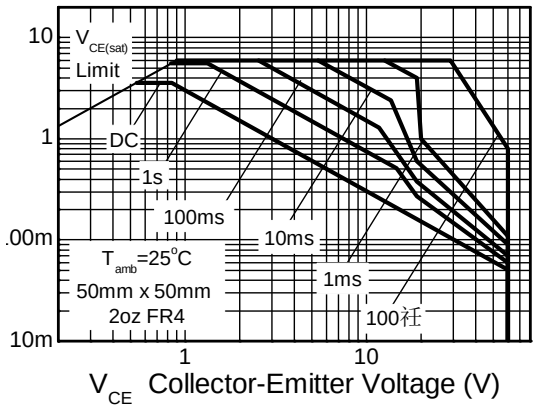
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

Notes:
6. For a device mounted with the collector lead on 25mm x 25mm 2oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in steady-state.
7. Same as note (6), 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.

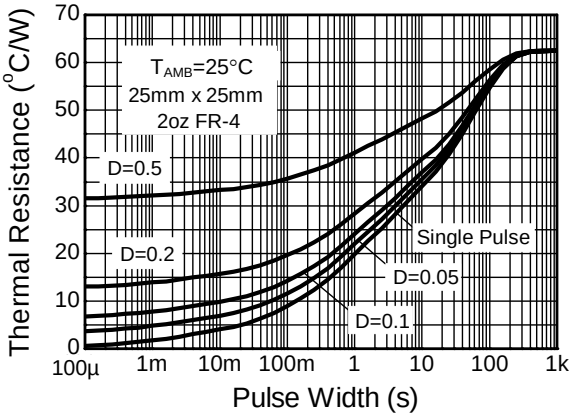
## Thermal Characteristics and Derating Information



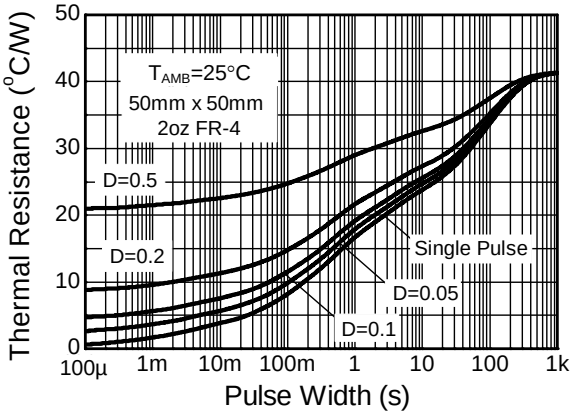

**Safe Operating Area**



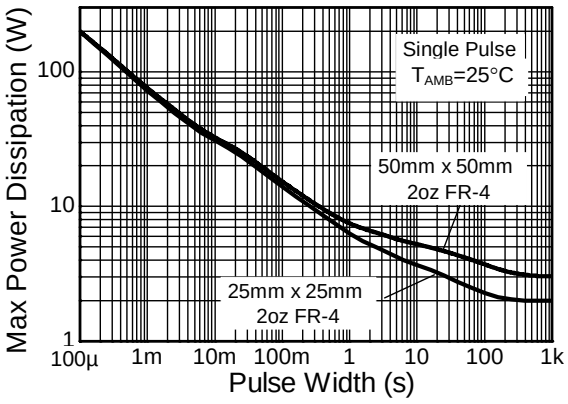

**Safe Operating Area**



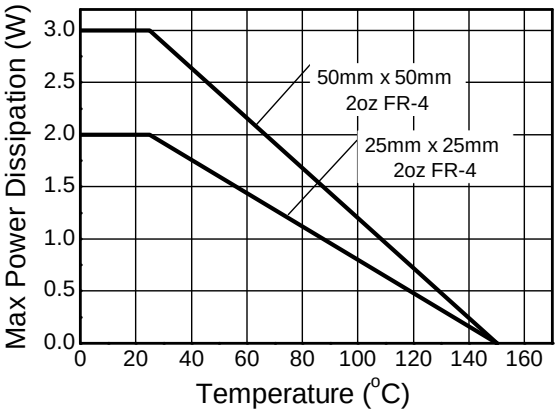

**Transient Thermal Impedance**




**Transient Thermal Impedance**




**Pulse Power Dissipation**



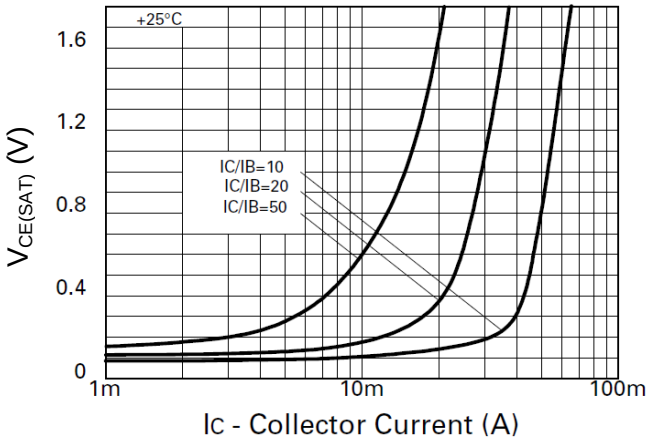

**Derating Curve**

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

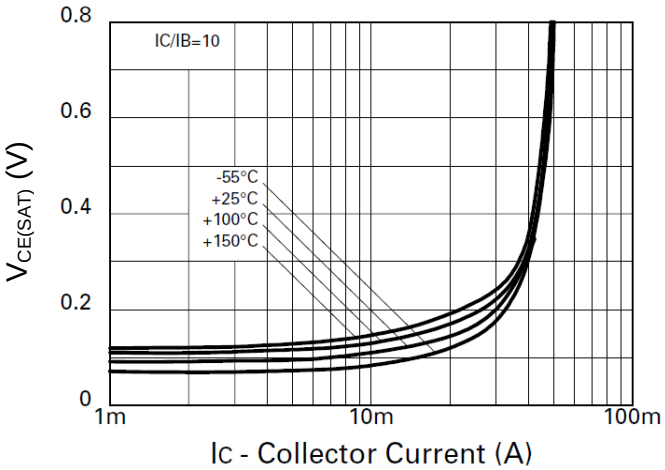
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | -500 | — | — | V | $I_C$ = -100μA |
| Collector-Emitter Breakdown Voltage (Note 10) | $BV_{CEO}$ | -500 | — | — | V | $I_C$ = -1mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | -7 | — | — | V | $I_E$ = -100μA |
| Collector Cut-off Current | $I_{CBO}$ | — | — | -100 | nA | $V_{CB}$ = -500V |
| Collector Cut-off Current | $I_{CES}$ | — | — | -100 | nA | $V_{CE}$ = -500V |
| Emitter Cut-off Current | $I_{EBO}$ | — | — | -100 | nA | $V_{EB}$ = -5.6V |
| Collector-Emitter Saturation Voltage (Note 10) | $V_{CE(SAT)}$ | — | — | -200 | mV | $I_C$ = -20mA, $I_B$ = -2mA |
| | | — | — | -500 | | $I_C$ = -50mA, $I_B$ = -10mA |
| Base-Emitter Saturation Voltage (Note 10) | $V_{BE(SAT)}$ | — | — | -900 | mV | $I_C$ = -50mA, $I_B$ = -10mA |
| Base-Emitter Turn-On Voltage (Note 10) | $V_{BE(ON)}$ | — | — | -900 | mV | $I_C$ = -50mA, $V_{CE}$ = -10V |
| DC Current Gain (Note 10) | $h_{FE}$ | 100 | — | 300 | — | $I_C$ = -1mA, $V_{CE}$ = -10V |
| | | 80 | — | 300 | | $I_C$ = -50mA, $V_{CE}$ = -10V |
| | | — | 15 | — | | $I_C$ = -100mA, $V_{CE}$ = -10V |
| Current Gain-Bandwidth Product | $f_T$ | 60 | — | — | MHz | $V_{CE}$ = -20V, $I_C$ = -10mA f = 50MHz |
| Turn-On Time | $t_{ON}$ | — | 110 | — | ns | $V_{CC}$ = -100V, $I_C$ = -50mA |
| Turn-Off Time | $t_{OFF}$ | — | 1.5 | — | μs | $I_{B1}$ = -5mA, $I_{B2}$ = 10mA |
| Output Capacitance | $C_{OBO}$ | — | — | 8 | pF | $V_{CB}$ = -20V, f = 1MHz |

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

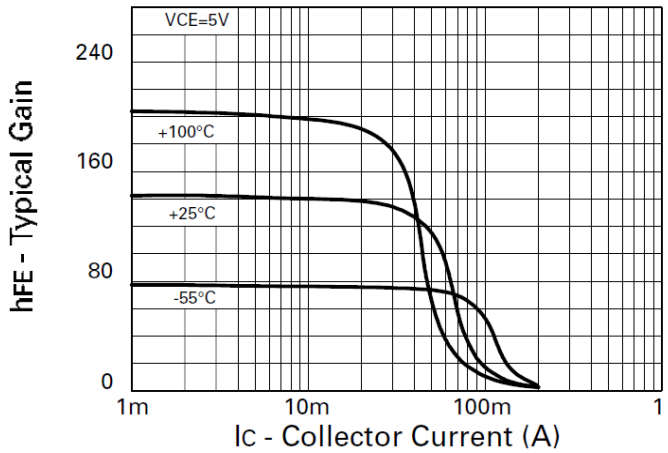
## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



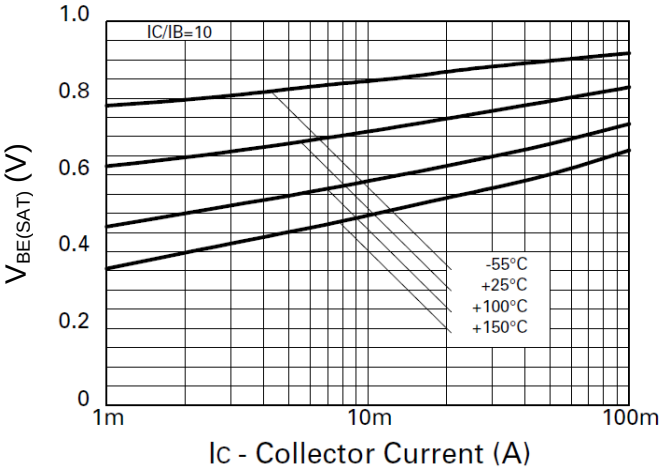

**$V_{CE(SAT)}$ v $I_C$**



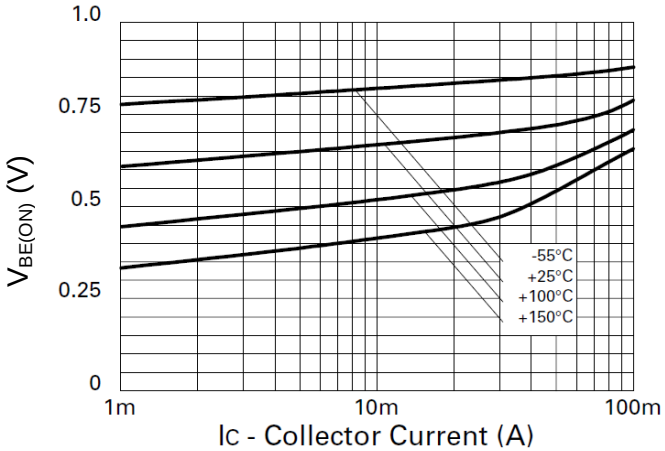

**$V_{CE(SAT)}$ v $I_C$**




**hFE v IC**



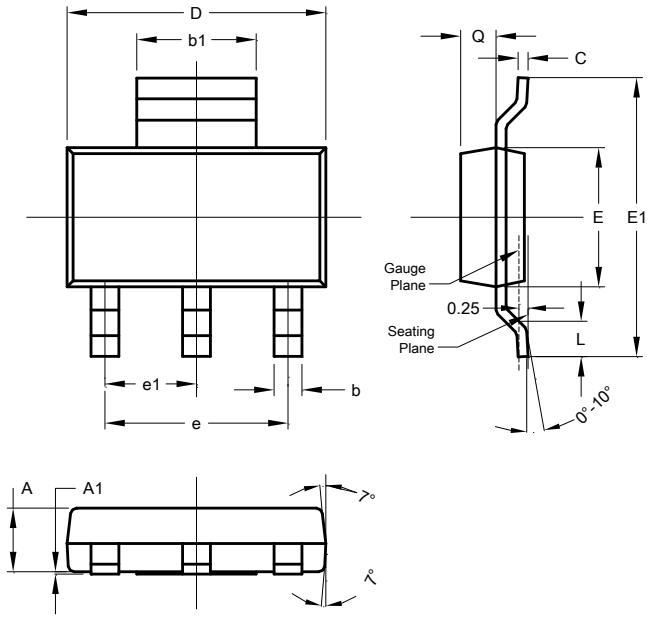

**$V_{BE(SAT)}$ v $I_C$**




**$V_{BE(ON)}$ v $I_C$**

## Package Outline Dimensions

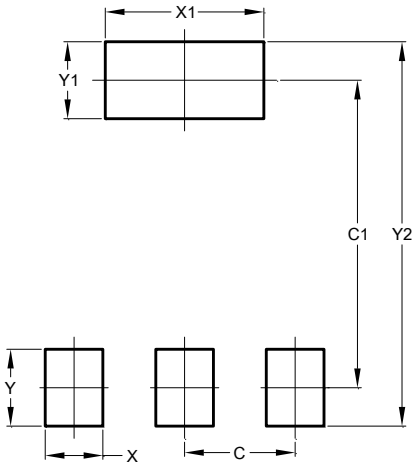
**SOT223**




| 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.