



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

- $BV_{CEO} > -60V$
- $I_C = -5.5A$ High Continuous Collector Current
- $I_{CM} = -15A$ Peak Pulse Current
- Low Saturation Voltage $V_{CE(sat)} < -70mV @ -1A$
- $R_{SAT} = 39m\Omega$ for a Low Equivalent On-Resistance
- h_{FE} Specified Up to -10A for a High Gain Hold Up
- Complementary NPN Type: NK-ZX5T851GQ

Mechanical Data

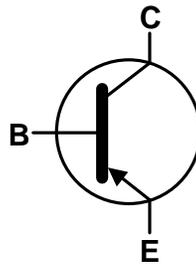
- Case: SOT223
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 ^(E3)
- Weight: 0.112 grams (Approximate)

Applications

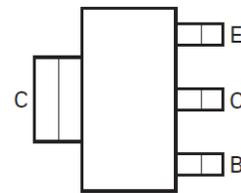
- DC-DC Converters
- MOSFET & IGBT Gate Drivers
- Charging Circuits
- Power Switches
- Motor Control



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} | -100 | V |
| Collector-Emitter Voltage | V_{CEO} | -60 | V |
| Emitter-Base Voltage | V_{EBO} | -7 | V |
| Continuous Collector Current | I_C | -5.5 | A |
| Peak Pulse Current | I_{CM} | -15 | A |

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

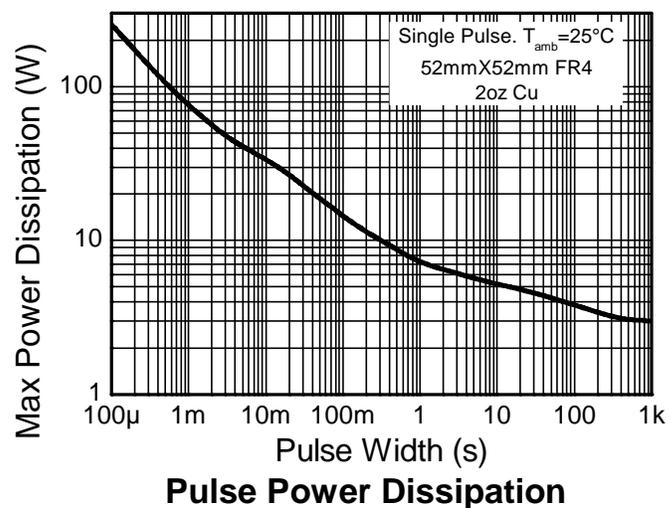
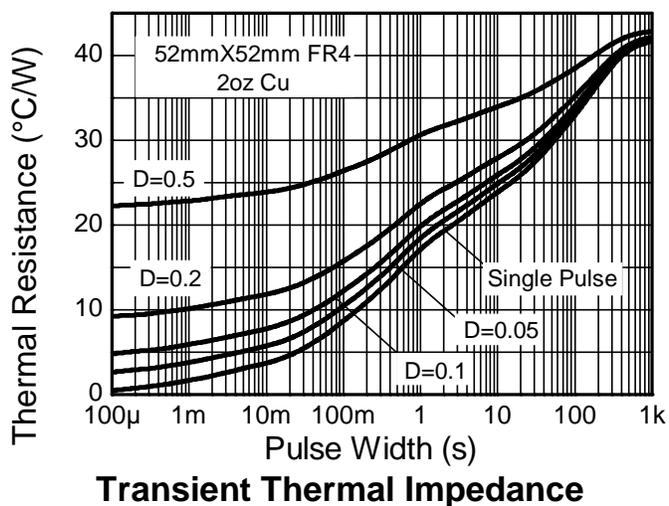
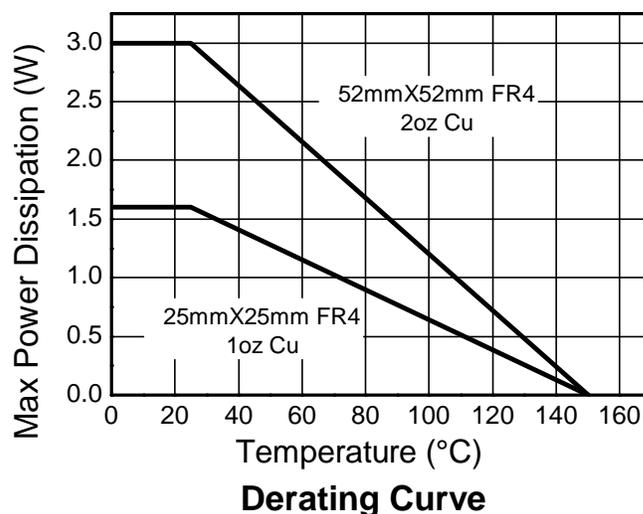
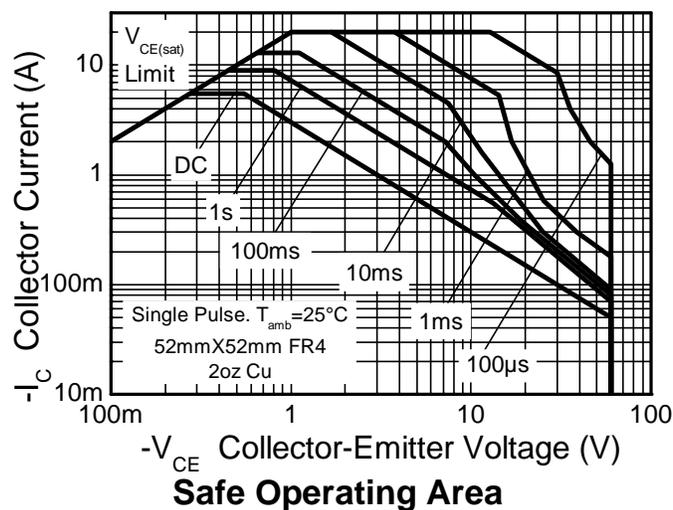
| Characteristic | | Symbol | Value | Unit |
|---|----------|-----------------|-------------|----------------------------|
| Power Dissipation Linear Derating Factor | (Note 5) | P_D | 3.0 | W |
| | (Note 6) | | 24 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 1.6 | $\text{mW}/^\circ\text{C}$ |
| | (Note 6) | | 12.8 | |
| Thermal Resistance Junction to Lead | (Note 5) | $R_{\theta JA}$ | 42 | $^\circ\text{C}/\text{W}$ |
| | (Note 6) | | 78 | |
| Thermal Resistance Junction to Lead | (Note 7) | $R_{\theta JL}$ | 10.48 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

ESD Ratings (Note 8)

| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |

- Notes:
5. For a device surface mounted on 52mm x 52mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 6. Same as Note 5 except the device is surface mounted on 25mm x 25mm with 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

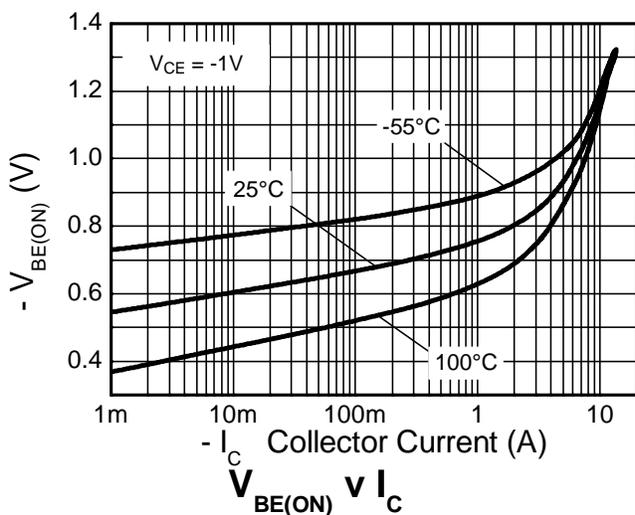
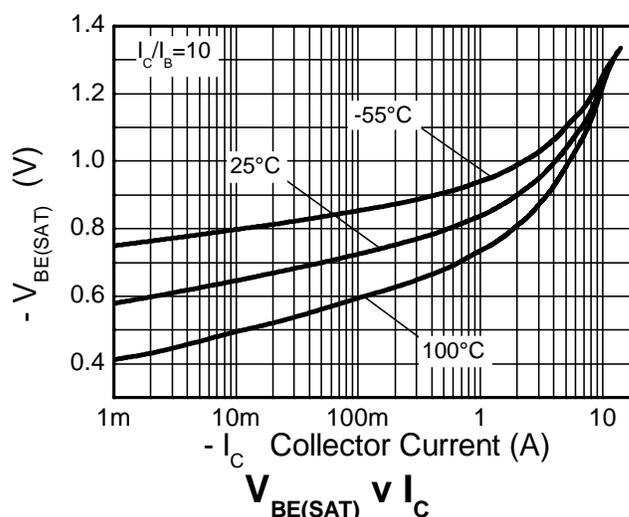
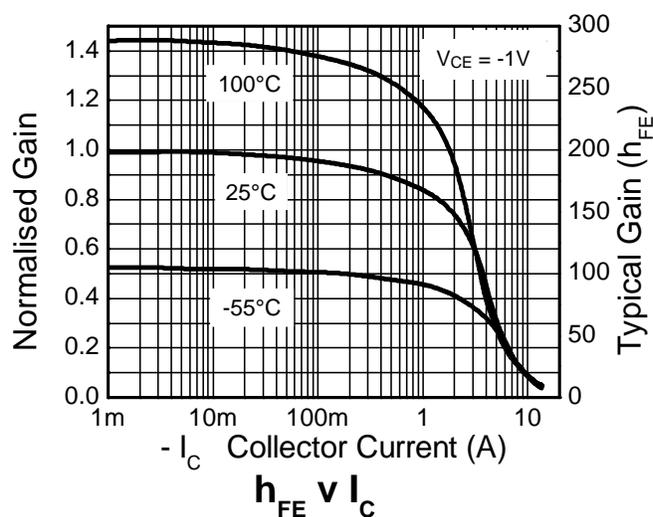
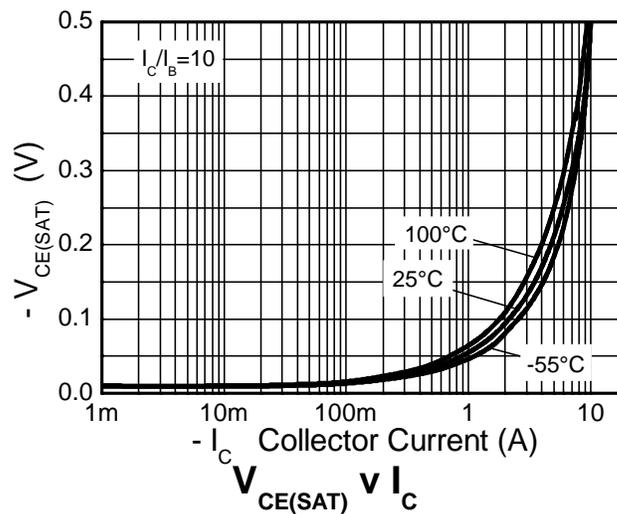
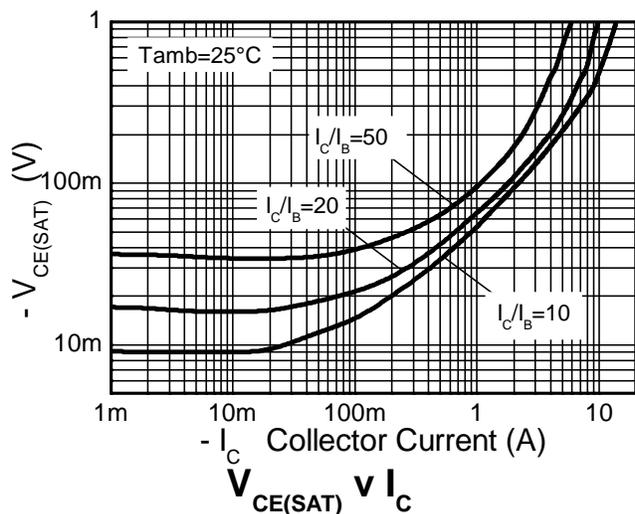


Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

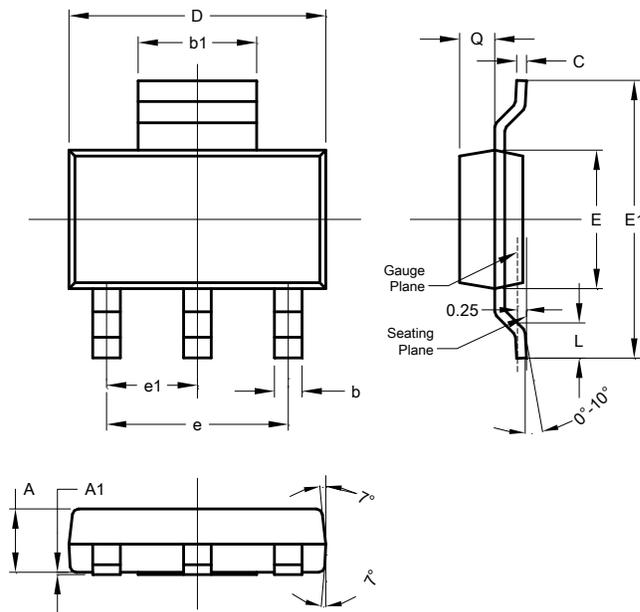
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|------|-------|-------|------|--|
| Collector-Base Breakdown Voltage | BV _{CBO} | -100 | -120 | — | V | I _C = -100μA |
| Collector-Emitter Breakdown Voltage | BV _{CER} | -100 | -120 | — | V | I _C = -1μA, R _B ≤ 1kΩ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV _{CEO} | -60 | -80 | — | V | I _C = -10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -7 | -8.1 | — | V | I _E = -100μA |
| Collector-Base Cutoff Current | I _{CBO} | — | <-1 | -20 | nA | V _{CB} = -80V |
| | | | — | -0.5 | μA | V _{CB} = -80V, T _A = +100°C |
| Collector-Emitter Cutoff Current | I _{CER} | — | <-1 | -20 | nA | V _{CB} = -80V |
| | R ≤ 1kΩ | | — | -0.5 | μA | V _{CB} = -80V, T _A = +100°C |
| Emitter Cutoff Current | I _{EBO} | — | <-1 | -10 | nA | V _{EB} = -6V |
| Static Forward Current Transfer Ratio (Note 9) | h _{FE} | 100 | 250 | — | — | I _C = -10mA, V _{CE} = -1V |
| | | 100 | 200 | 300 | | I _C = -2A, V _{CE} = -1V |
| | | 45 | 90 | — | | I _C = -5A, V _{CE} = -1V |
| | | 10 | 25 | — | | I _C = -10A, V _{CE} = -1V |
| Collector-Emitter Saturation Voltage (Note 9) | V _{CE(sat)} | — | -15 | -25 | mV | I _C = -100mA, I _B = -10mA |
| | | — | -55 | -70 | | I _C = -1A, I _B = -100mA |
| | | — | -90 | -120 | | I _C = -2A, I _B = -200mA |
| | | — | -195 | -250 | | I _C = -5A, I _B = -500mA |
| Base-Emitter Saturation Voltage (Note 9) | V _{BE(sat)} | — | -1030 | -1150 | mV | I _C = -5A, I _B = -500mA |
| Base-Emitter Turn-On Voltage (Note 9) | V _{BE(on)} | — | -920 | -1020 | mV | I _C = -5A, V _{CE} = -1V |
| Output Capacitance (Note 9) | C _{obo} | — | 48 | — | pF | V _{CB} = -10V, f = 1MHz |
| Transition Frequency | f _T | — | 120 | — | MHz | V _{CE} = -10V, I _C = -100mA f = 50MHz |
| Switching Time | t _{on} | — | 39 | — | ns | V _{CC} = -10V, I _C = -1A |
| | t _{off} | — | 370 | — | | I _{B1} = -I _{B2} = -100mA |

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

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

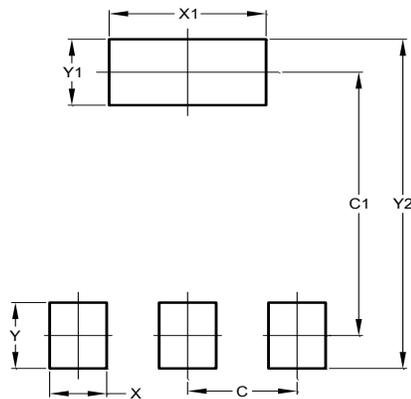


Package Outline Dimensions



| SOT223 | | | |
|----------------------|-------|------|------|
| 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 |