



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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企业微信二维码



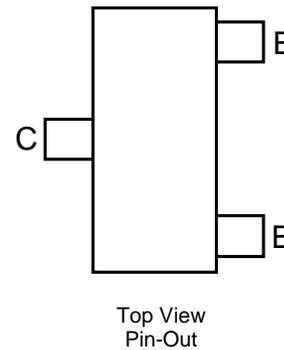
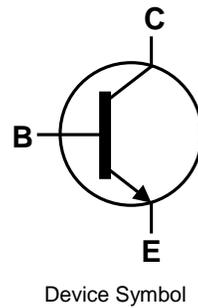
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## Features

- $BV_{CEO} > 400V$
- $I_C = 225mA$  High Continuous Collector Current
- $I_{CM} = 1A$  Peak Pulse Current
- 500mW Power Dissipation
- Excellent  $h_{FE}$  Characteristics Up To 100mA
- Complementary PNP Type: NK-FMMT558Q

## Mechanical Data

- Package: SOT23
- Package 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: 0.008 grams (Approximate)



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

| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CB0</sub> | 400   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 400   | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 225   | mA   |
| Peak Pulse Current           | I <sub>CM</sub>  | 1     | A    |
| Base Current                 | I <sub>B</sub>   | 200   | mA   |

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

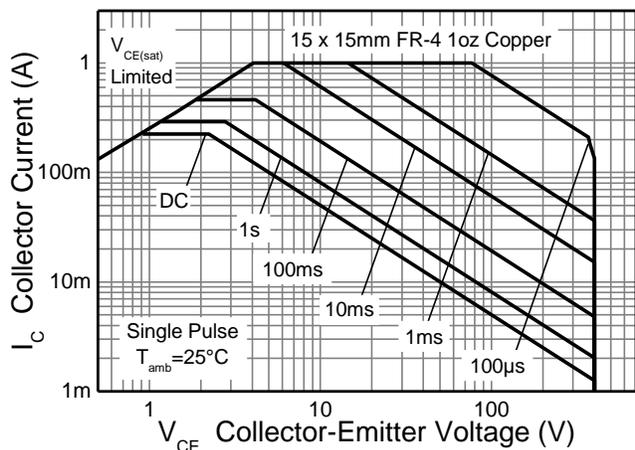
| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 500         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 250         | °C/W |
| Thermal Resistance, Junction to Lead (Note 6)    | R <sub>θJL</sub>                  | 197         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 7)

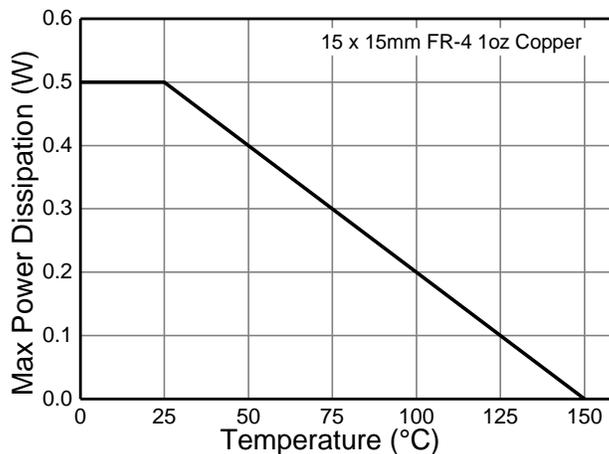
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | ≥ 400 | V    | C           |

- Notes:
- 5. For a device surface mounted on 15mm X 15mm X 1.6mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  - 6. Thermal resistance from junction to solder-point (at the end of the collector lead).
  - 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

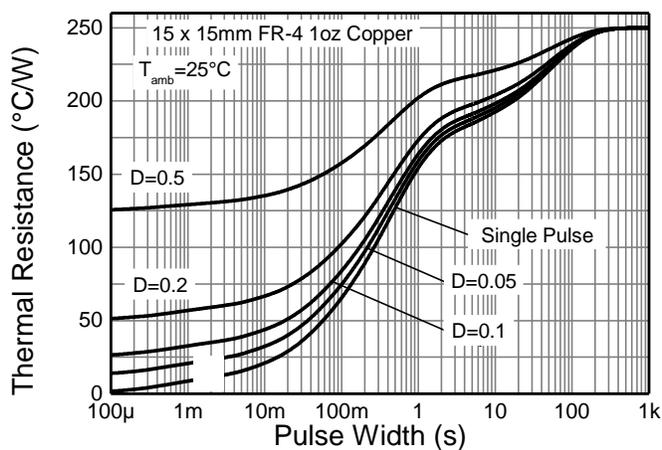
**Thermal Characteristics and Derating Information**



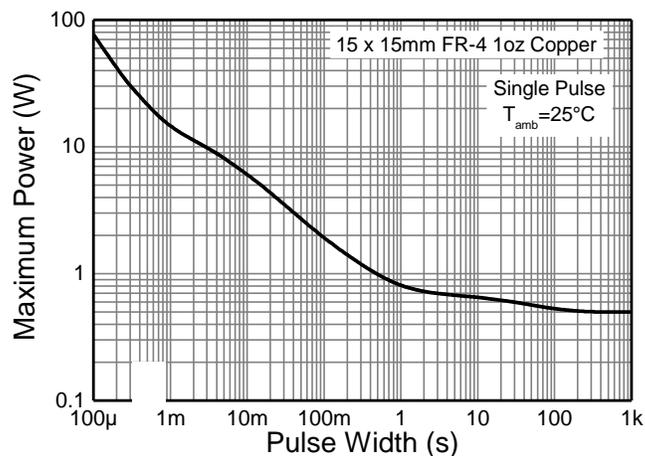
**Figure 1. Safe Operating Area**



**Figure 2. Derating Curve**



**Figure 3. Transient Thermal Impedance**



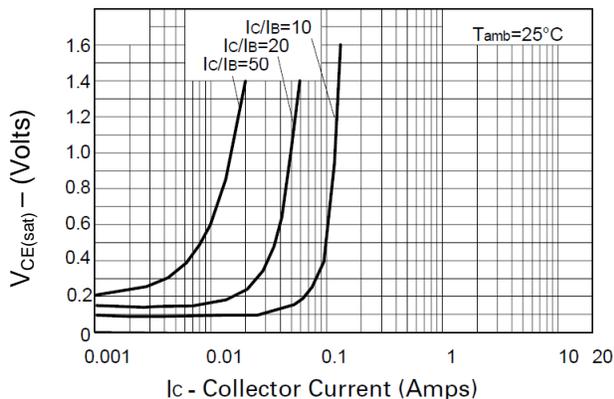
**Figure 4. Pulse Power Dissipation**

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

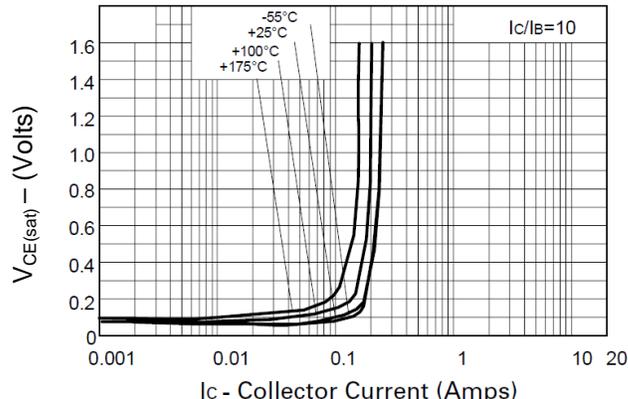
| Characteristic                                 | Symbol        | Min              | Typ  | Max        | Unit     | Test Condition   |
|--|---------------|------------------|------|------------|----------|--|
| Collector-Base Breakdown Voltage               | $BV_{CBO}$    | 400              | —    | —          | V        | $I_C = 100\mu\text{A}$   |
| Collector-Emitter Breakdown Voltage (Note 8)   | $BV_{CEO}$    | 400              | —    | —          | V        | $I_C = 10\text{mA}$  |
| Emitter-Base Breakdown Voltage                 | $BV_{EBO}$    | 7                | —    | —          | V        | $I_E = 100\mu\text{A}$   |
| Collector Cutoff Current                       | $I_{CBO}$     | —                | —    | 100        | nA       | $V_{CB} = 320\text{V}$   |
| Emitter Cutoff Current                         | $I_{EBO}$     | —                | —    | 100        | nA       | $V_{EB} = 5.6\text{V}$   |
| Collector Emitter Cutoff Current               | $I_{CES}$     | —                | —    | 100        | nA       | $V_{CE} = 320\text{V}$   |
| Static Forward Current Transfer Ratio (Note 8) | $h_{FE}$      | 100<br>100<br>15 | —    | 300        | —        | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 50\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 100\text{mA}, V_{CE} = 10\text{V}$ |
| Collector-Emitter Saturation Voltage (Note 8)  | $V_{CE(sat)}$ | —                | —    | 200<br>500 | mV<br>mV | $I_C = 20\text{mA}, I_B = 2\text{mA}$<br>$I_C = 50\text{mA}, I_B = 6\text{mA}$   |
| Base-Emitter Turn-On Voltage (Note 8)          | $V_{BE(on)}$  | —                | —    | 0.9        | V        | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$   |
| Base-Emitter Saturation Voltage (Note 8)       | $V_{BE(sat)}$ | —                | —    | 0.9        | V        | $I_C = 50\text{mA}, I_B = 5\text{mA}$  |
| Output Capacitance                             | $C_{obo}$     | —                | —    | 5          | pF       | $V_{CB} = 20\text{V}, f = 1\text{MHz}$   |
| Transition Frequency                           | $f_T$         | 50               | —    | —          | MHz      | $V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 20\text{MHz}$   |
| Turn-On Time                                   | $t_{on}$      | —                | 135  | —          | ns       | $V_{CE} = 100\text{V}, I_C = 50\text{mA}$  |
| Turn-Off Time                                  | $t_{off}$     | —                | 2260 | —          | ns       | $I_{B1} = 5\text{mA}, I_{B2} = -10\text{mA}$   |

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

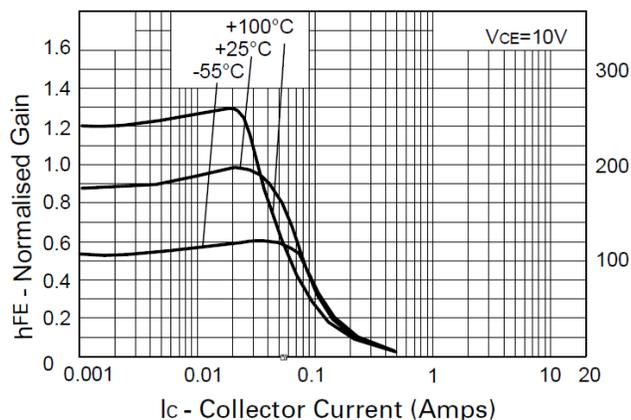
**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



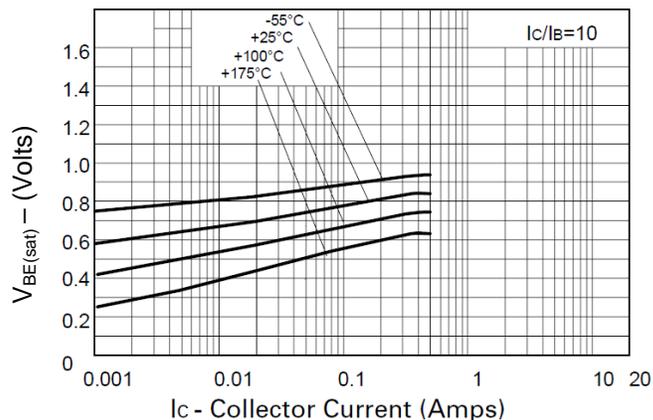
**Figure 5.  $V_{CE(sat)}$  v  $I_C$**



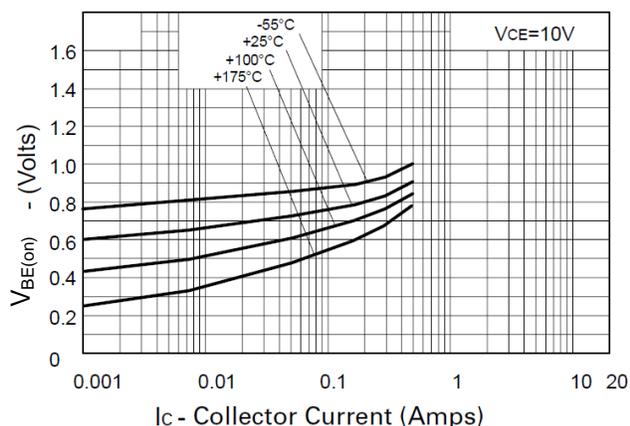
**Figure 6.  $V_{CE(sat)}$  v  $I_C$**



**Figure 7.  $h_{FE}$  v  $I_C$**



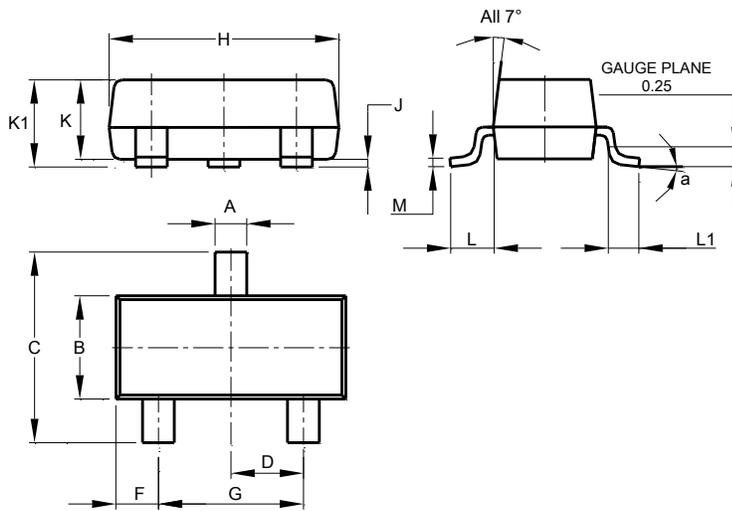
**Figure 8.  $V_{BE(sat)}$  v  $I_C$**



**Figure 9.  $V_{BE(on)}$  v  $I_C$**

### Package Outline Dimensions

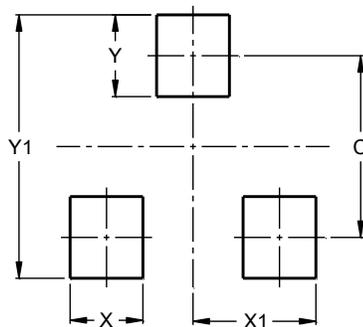
SOT23



| SOT23                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.37  | 0.51  | 0.40  |
| B                    | 1.20  | 1.40  | 1.30  |
| C                    | 2.30  | 2.50  | 2.40  |
| D                    | 0.89  | 1.03  | 0.915 |
| F                    | 0.45  | 0.60  | 0.535 |
| G                    | 1.78  | 2.05  | 1.83  |
| H                    | 2.80  | 3.00  | 2.90  |
| J                    | 0.013 | 0.10  | 0.05  |
| K                    | 0.890 | 1.00  | 0.975 |
| K1                   | 0.903 | 1.10  | 1.025 |
| L                    | 0.45  | 0.61  | 0.55  |
| L1                   | 0.25  | 0.55  | 0.40  |
| M                    | 0.085 | 0.150 | 0.110 |
| a                    | 0°    | 8°    | --    |
| All Dimensions in mm |       |       |       |

### Suggested Pad Layout

SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.0           |
| X          | 0.8           |
| X1         | 1.35          |
| Y          | 0.9           |
| Y1         | 2.9           |