

## Silicon NPN Power Transistors

## MJE13003

## DESCRIPTION

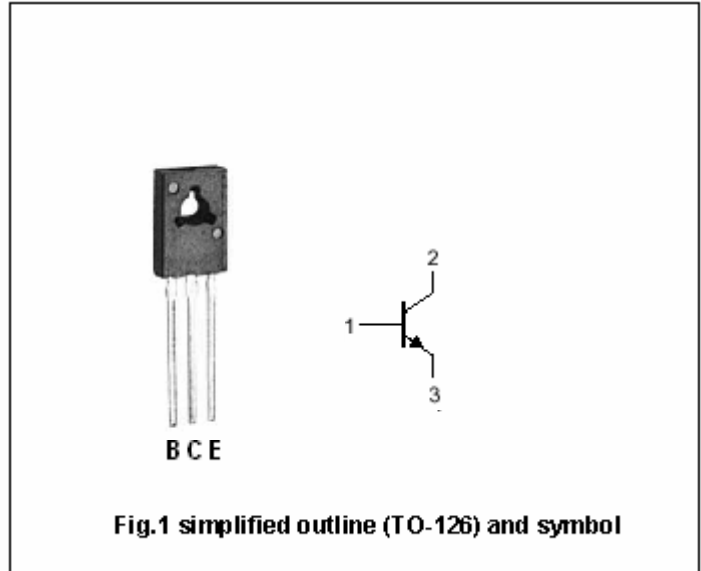
- With TO-126 package
- High voltage ,high speed

## APPLICATIONS

- Particularly suited for 115V and 220V switchmode applications such as switching regulators,inverters ,motor controls,solenoid/ relay drivers and deflection circuits

## PINNING

| PIN | DESCRIPTION                          |
|-----|--------------------------------------|
| 1   | Base                                 |
| 2   | Collector;connected to mounting base |
| 3   | Emitter                              |

ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ )

| SYMBOL    | PARAMETER                 | CONDITIONS             | VALUE   | UNIT             |
|-----------|---------------------------|------------------------|---------|------------------|
| $V_{CBO}$ | Collector-base voltage    | Open emitter           | 700     | V                |
| $V_{CEO}$ | Collector-emitter voltage | Open base              | 400     | V                |
| $V_{EBO}$ | Emitter-base voltage      | Open collector         | 9       | V                |
| $I_C$     | Collector current (DC)    |                        | 1.5     | A                |
| $I_{CM}$  | Collector current-Peak    |                        | 3       | A                |
| $I_B$     | Base current              |                        | 0.75    | A                |
| $I_{BM}$  | Base current-Peak         |                        | 1.5     | A                |
| $I_E$     | Emitter current           |                        | 2.25    | A                |
| $I_{EM}$  | Emitter current-Peak      |                        | 4.5     | A                |
| $P_D$     | Total power dissipation   | $T_a=25^\circ\text{C}$ | 1.4     | W                |
|           |                           | $T_C=25^\circ\text{C}$ | 40      |                  |
| $T_j$     | Junction temperature      |                        | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage temperature       |                        | -65~150 | $^\circ\text{C}$ |

## THERMAL CHARACTERISTICS

| SYMBOL      | PARAMETER                                | MAX  | UNIT                      |
|-------------|--|------|---------------------------|
| $R_{thj-C}$ | Thermal resistance from junction to case | 3.12 | $^\circ\text{C}/\text{W}$ |

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## CHARACTERISTICS

T<sub>j</sub>=25°C unless otherwise specified

| SYMBOL                 | PARAMETER                            | CONDITIONS  | MIN | TYP. | MAX        | UNIT |
|------------------------|--------------------------------------|---|-----|------|------------|------|
| V <sub>CEQ(SUS)</sub>  | Collector-emitter sustaining voltage | I <sub>C</sub> =10mA ; I <sub>B</sub> =0  | 400 |      |            | V    |
| V <sub>CE(sat)-1</sub> | Collector-emitter saturation voltage | I <sub>C</sub> =0.5A; I <sub>B</sub> =0.1A  |     |      | 0.5        | V    |
| V <sub>CE(sat)-2</sub> | Collector-emitter saturation voltage | I <sub>C</sub> =1A; I <sub>B</sub> =0.25A<br>T <sub>C</sub> =100°C                  |     |      | 1.0<br>1.0 | V    |
| V <sub>CE(sat)-3</sub> | Collector-emitter saturation voltage | I <sub>C</sub> =1.5A; I <sub>B</sub> =0.5A  |     |      | 3.0        | V    |
| V <sub>BE(sat)-1</sub> | Base-emitter saturation voltage      | I <sub>C</sub> =0.5A; I <sub>B</sub> =0.1A  |     |      | 1.0        | V    |
| V <sub>BE(sat)-2</sub> | Base-emitter saturation voltage      | I <sub>C</sub> =1A; I <sub>B</sub> =0.25A<br>T <sub>C</sub> =100°C                  |     |      | 1.2<br>1.1 | V    |
| I <sub>CEV</sub>       | Collector cut-off current            | V <sub>CEV</sub> =Rated value; V <sub>BE (off)</sub> =1.5V<br>T <sub>C</sub> =100°C |     |      | 1.0<br>5.0 | mA   |
| I <sub>EBO</sub>       | Emitter cut-off current              | V <sub>EB</sub> =9V; I <sub>C</sub> =0  |     |      | 1.0        | mA   |
| h <sub>FE-1</sub>      | DC current gain                      | I <sub>C</sub> =0.5A ; V <sub>CE</sub> =2V  | 8   |      | 40         |      |
| h <sub>FE-2</sub>      | DC current gain                      | I <sub>C</sub> =1A ; V <sub>CE</sub> =2V  | 5   |      | 25         |      |
| f <sub>T</sub>         | Transition frequency                 | I <sub>C</sub> =0.1A ; V <sub>CE</sub> =10V; f=1MHz                                 | 4   |      |            | MHz  |
| C <sub>OB</sub>        | Collector outoput capacitance        | I <sub>E</sub> =0; f=0.1MHz ; V <sub>CB</sub> =10V                                  |     | 21   |            | pF   |

Switching times resistive load

|                |              |  |  |      |     |    |
|----------------|--------------|--|--|------|-----|----|
| t <sub>d</sub> | Delay time   | V <sub>CC</sub> =125V , I <sub>C</sub> =1A<br>I <sub>B1</sub> =-I <sub>B2</sub> =0.2A<br>t <sub>p</sub> =25μs<br>duty cycle≤1% |  | 0.05 | 0.1 | μs |
| t <sub>r</sub> | Rise time    |  |  | 0.5  | 1.0 | μs |
| t <sub>s</sub> | Storage time |  |  | 2.0  | 4.0 | μs |
| t <sub>f</sub> | Fall time    |  |  | 0.4  | 0.7 | μs |

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PACKAGE OUTLINE

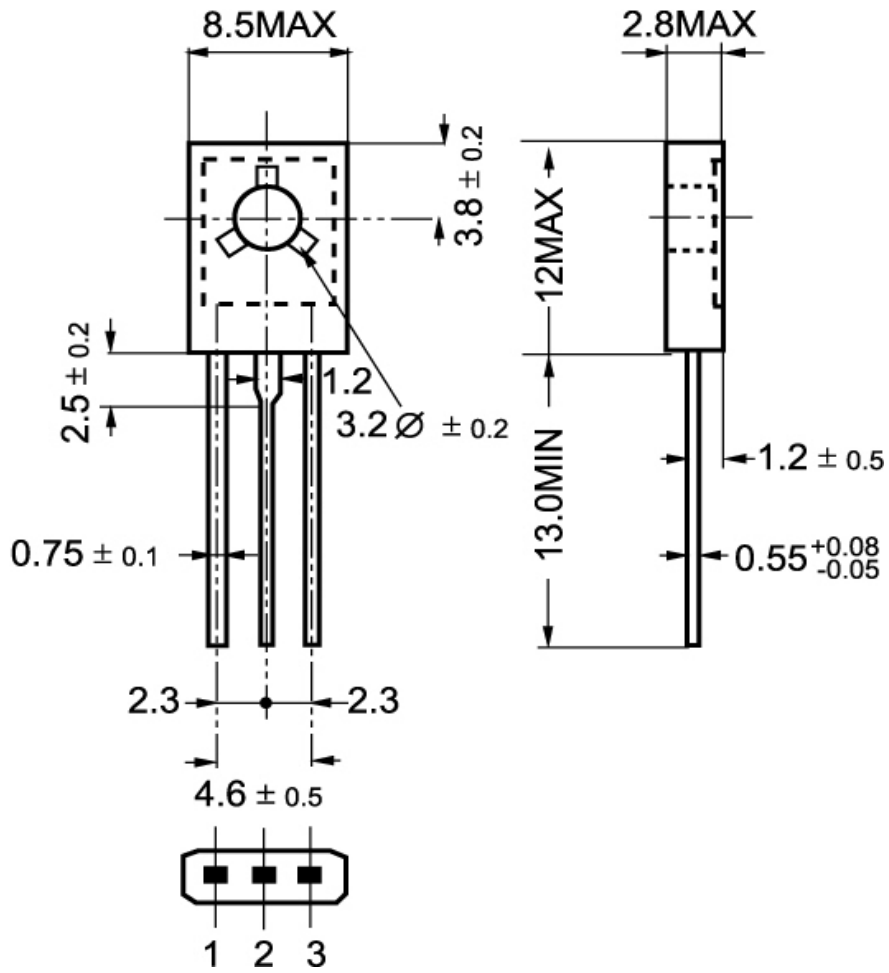


Fig.2 Outline dimensions

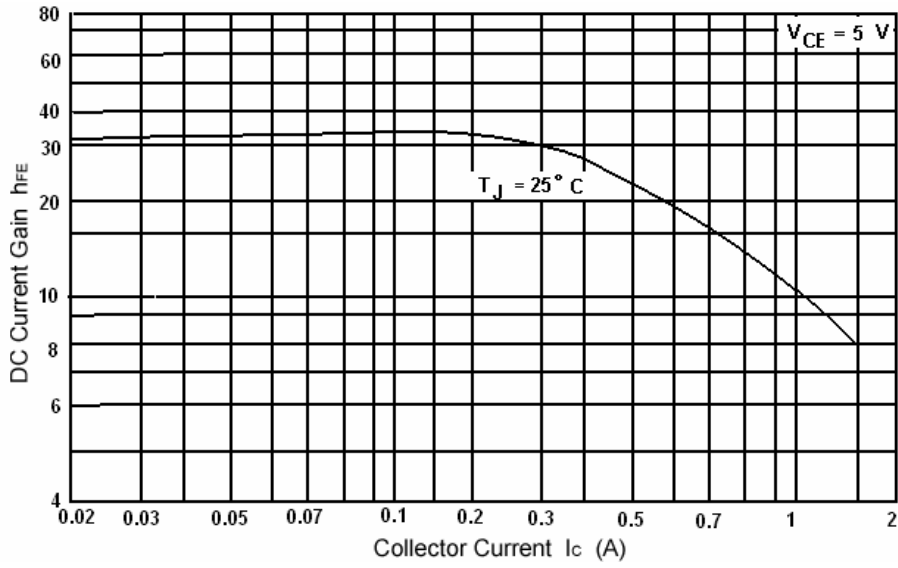


Fig.3 DC current Gain

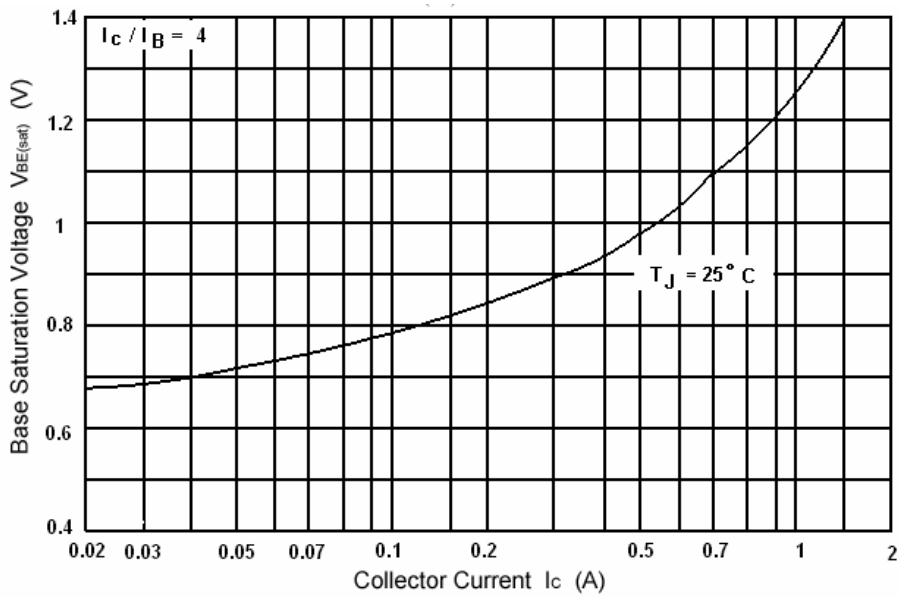


Fig.4 Base-Emitter Saturation Voltage

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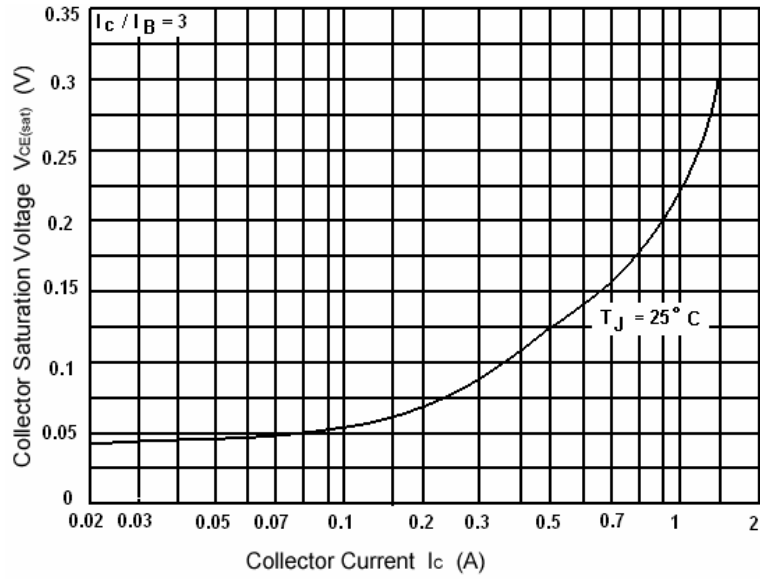


Fig.5 Collector-Emitter Saturation Voltage

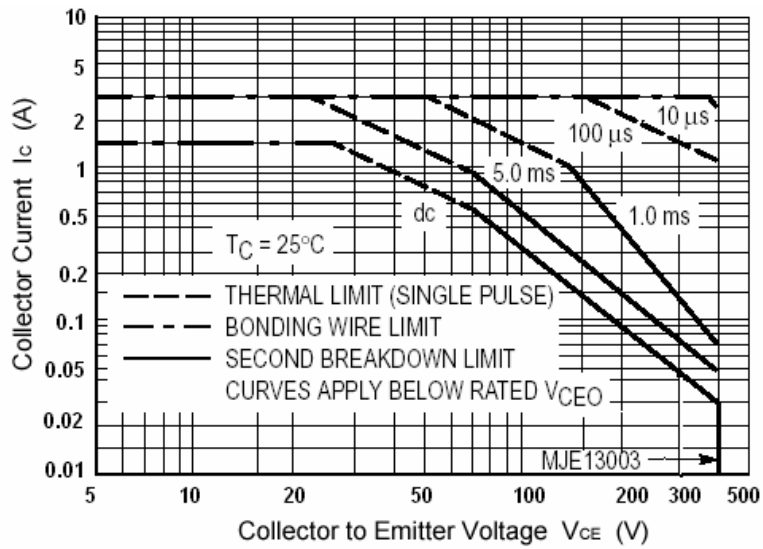


Fig.6 Safe Operating Area