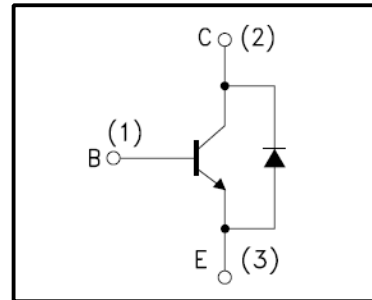


*High Voltage Fast-Switching NPN Power Transistor*

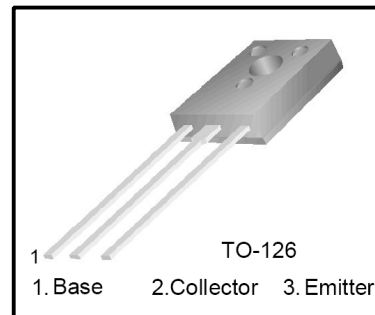
**Features**

- ◆ Very High Switching Speed
- ◆ High Voltage Capability
- ◆ Wide Reverse Bias SOA
- ◆ Built-in freewheeling diode



**General Description**

This Device is designed for high voltage, High speed switching characteristics required such as lighting system, switching mode power supply.



**Absolute Maximum Ratings**

| Symbol           | Parameter                                  | Test Conditions      | Value      | Units |
|------------------|--|----------------------|------------|-------|
| V <sub>CES</sub> | Collector-Emitter Voltage                  | V <sub>BE</sub> = 0  | 700        | V     |
| V <sub>CEO</sub> | Collector-Emitter Voltage                  | I <sub>B</sub> = 0   | 400        | V     |
| V <sub>EBO</sub> | Emitter-Base Voltage                       | I <sub>C</sub> = 0   | 9.0        | V     |
| I <sub>C</sub>   | Collector Current                          |                      | 1.5        | A     |
| I <sub>CP</sub>  | Collector pulse Current                    |                      | 3.0        | A     |
| I <sub>B</sub>   | Base Current                               |                      | 0.75       | A     |
| I <sub>BM</sub>  | Base Peak Current                          | t <sub>P</sub> = 5ms | 1.5        | A     |
| P <sub>C</sub>   | Total Dissipation at T <sub>c</sub> = 25°C |                      | 40         | W     |
|                  | Total Dissipation at T <sub>a</sub> = 25°C |                      | 1.2        |       |
| T <sub>J</sub>   | Operation Junction Temperature             |                      | - 40 ~ 150 | °C    |
| T <sub>STG</sub> | Storage Temperature                        |                      | - 40 ~ 150 | °C    |

**Thermal Characteristics**

| Symbol           | Parameter                              | Value | Units |
|------------------|--|-------|-------|
| R <sub>θJc</sub> | Thermal Resistance Junction to Case    | 3.12  | °C/W  |
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient | 89    | °C/W  |

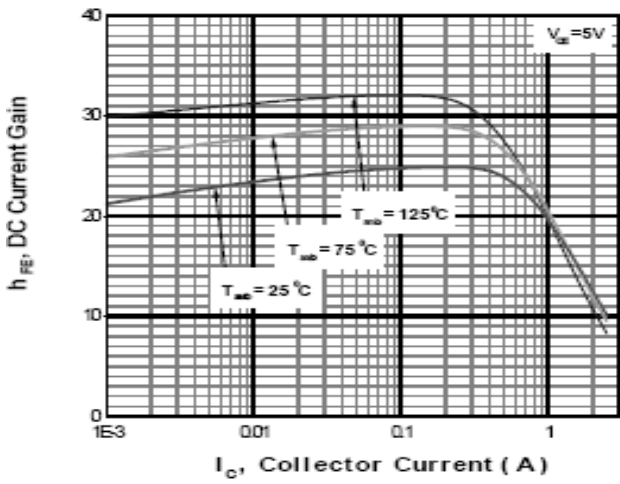
# SBR13003D

## Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

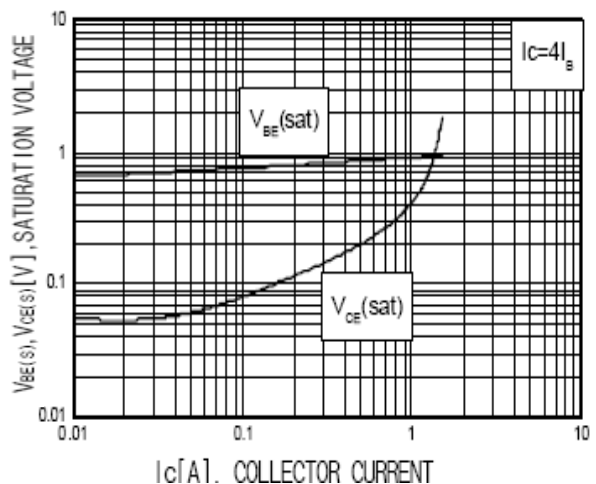
| Symbol               | Parameter                            | Test Conditions  | Value   |        |         | Units |
|----------------------|--------------------------------------|--|---------|--------|---------|-------|
|                      |                                      |  | Min     | Typ    | Max     |       |
| BV <sub>CB0</sub>    | Collector-Base Breakdown Voltage     | I <sub>c</sub> =0.5mA, I <sub>e</sub> =0   | 700     |        |         | V     |
| BV <sub>CEO</sub>    | Collector-Emitter Breakdown Voltage  | I <sub>c</sub> =10mA, I <sub>b</sub> =0  | 400     | -      | -       | V     |
| V <sub>CE(sat)</sub> | Collector-Emitter Saturation Voltage | I <sub>c</sub> =200mA, I <sub>b</sub> =100mA   | -       | -      | 1.6     | V     |
| V <sub>BE(sat)</sub> | Base-Emitter Saturation Voltage      | I <sub>c</sub> =200mA, I <sub>b</sub> =100mA   | -       | -      | 1.2     | V     |
| I <sub>CB0</sub>     | Collector-Base Cutoff Current        | V <sub>cb</sub> =550V, I <sub>e</sub> =0mA   | -       | -      | 10      | μA    |
| I <sub>CEO</sub>     | Collector-Emitter Cutoff Current     | V <sub>ce</sub> =400V, I <sub>b</sub> =0mA   | -       | -      | 20      | μA    |
| I <sub>EBO</sub>     | Emitter- Base Cutoff Current         | V <sub>eb</sub> =9V, I <sub>c</sub> =0mA   | -       | -      | 20      | μA    |
| h <sub>FE</sub>      | DC Current Gain                      | V <sub>ce</sub> =20V, I <sub>c</sub> =20mA<br>V <sub>ce</sub> =5V, I <sub>c</sub> =1mA | 10<br>9 | -<br>- | 40<br>- |       |
| t <sub>s</sub>       | Storage Time                         | V <sub>CC</sub> =250V  | -       | -      | 3       | μs    |
| t <sub>f</sub>       | Fall Time                            | I <sub>c</sub> =5 I <sub>B</sub><br>I <sub>B1</sub> =- I <sub>B2</sub> =0.04A          | -       | -      | 0.8     |       |

**Note:**

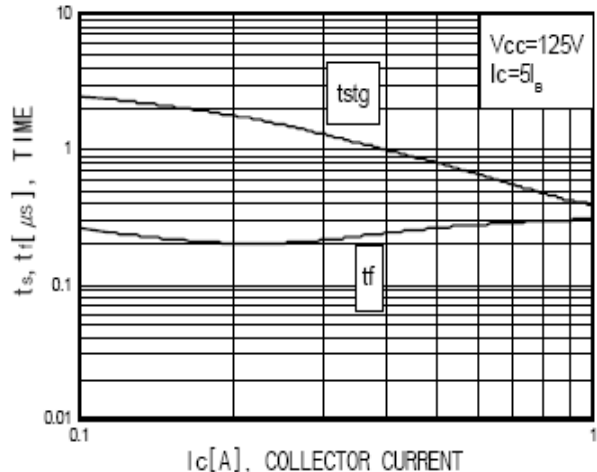
Pulse Test : Pulse width 300, Duty cycle 2%



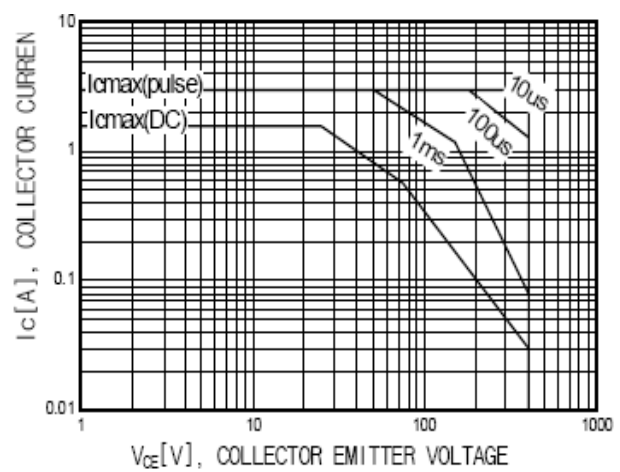
**Fig. 1 DC Current Gain**



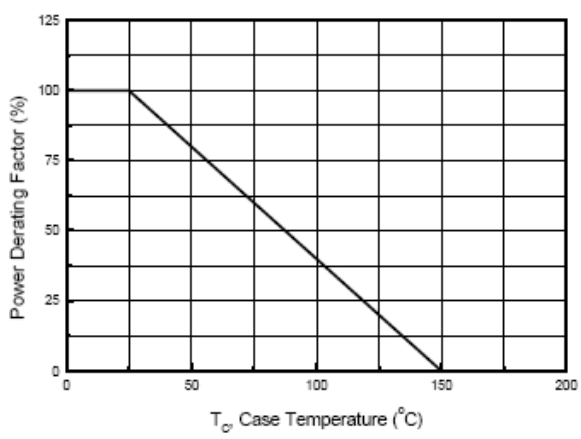
**Fig. 2 Saturation Voltage**



**Fig. 3 Switching Time**



**Fig. 4 Safe Operation Area**

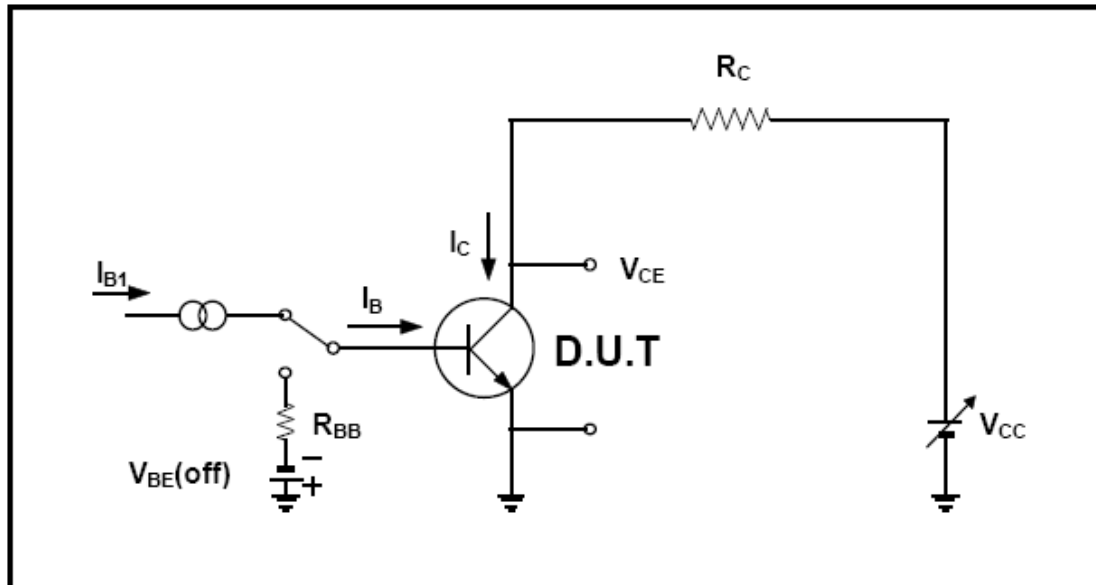


**Fig. 5 Power Derating**

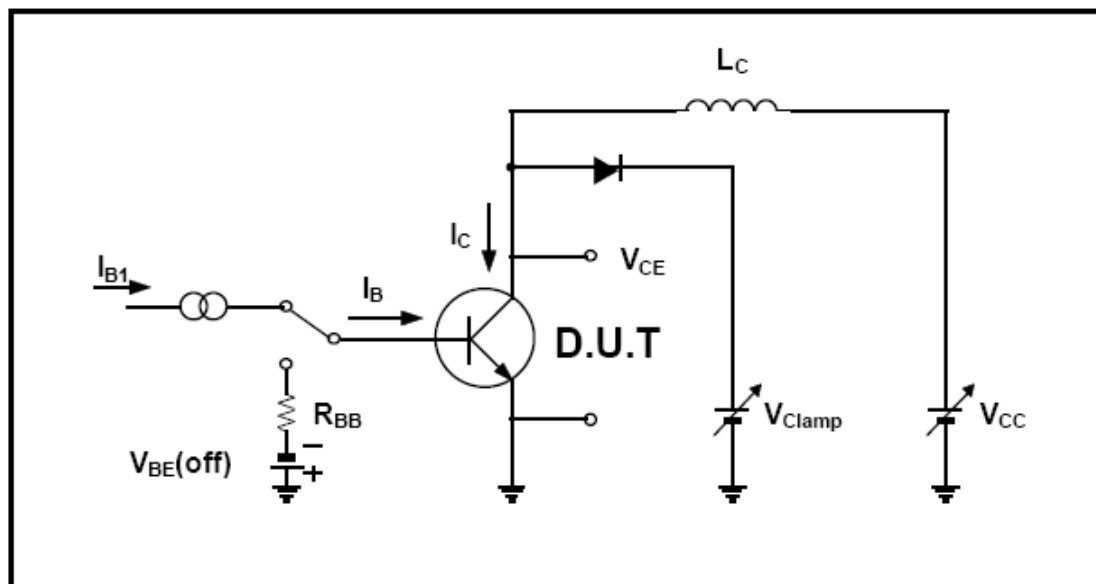


# SBR13003D

## Resistive Load Switching Test Circuit



## Inductive Load Switching & RBSOA Test Circuit



## TO-126 Package Dimension

| Dim.   | mm   |      |      | Inch  |       |       |
|--------|------|------|------|-------|-------|-------|
|        | Min. | Typ. | Max. | Min.  | Typ.  | Max.  |
| A      | 7.5  |      | 7.9  | 0.295 |       | 0.311 |
| B      | 10.8 |      | 11.2 | 0.425 |       | 0.441 |
| C      | 14.2 |      | 14.7 | 0.559 |       | 0.579 |
| D      | 2.7  |      | 2.9  | 0.106 |       | 0.114 |
| E      |      | 3.8  |      |       | 0.150 |       |
| F      |      | 2.5  |      |       | 0.098 |       |
| G      | 1.2  |      | 1.5  | 0.047 |       | 0.059 |
| H      |      | 2.3  |      |       | 0.091 |       |
| I      |      | 4.6  |      |       | 0.181 |       |
| J      | 0.48 |      | 0.62 | 0.019 |       | 0.024 |
| K      | 0.7  |      | 0.86 | 0.028 |       | 0.034 |
| L      |      | 1.4  |      |       | 0.055 |       |
| $\phi$ |      | 3.2  |      |       | 0.126 |       |

