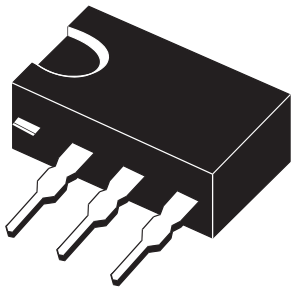
# THBT200S

pplication Specific Discretes
A.S.D.™

TRANSIENT VOLTAGE SUPPRESSOR
FOR SLIC PROTECTION

## FEATURES

- DUAL BIDIRECTIONAL CROWBAR PROTECTION.
- PEAK PULSE CURRENT :
  - $I_{PP}$ = 75 A, 10/1000 µs.
- HOLDING CURRENT = 150 mA min
- BREAKDOWN VOLTAGE = 200 V min.
- BREAKOVER VOLTAGE = 290 V max.
- MONOLITHIC DEVICE.



**SIP3**

## DESCRIPTION

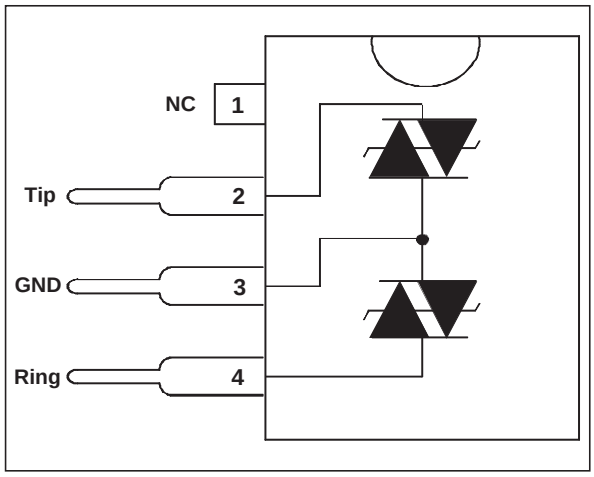
This monolithic protection device has been especially designed to protect subscriber line cards.The THBT200 device is particularly suitable to protect ring generator relay against transient overvoltages.

## COMPLIES WITH THE FOLLOWING STANDARDS :

| | | |
|---|---|---|
| **CCITT K20 :** | 10/700 µs<br>5/310 µs | 1kV<br>25A |
| **VDE 0433 :** | 10/700 µs<br>5/310 µs | 2kV<br>50A |
| **VDE 0878 :** | 1.2/50 µs<br>1/20 µs | 1.5kV<br>40A |
| **FCC part 68 :** | 2/10 µs<br>2/20µs | 2.5kV<br>225A (*) |
| **BELLCORE TR-NWT-001089 :** | 2/10 µs<br>2/10µs<br>10/1000µs<br>10/1000µs | 2.5kV<br>225A (*)<br>1kV<br>75A (*) |

(*) with series resistors or PTC.

## SCHEMATIC DIAGRAM

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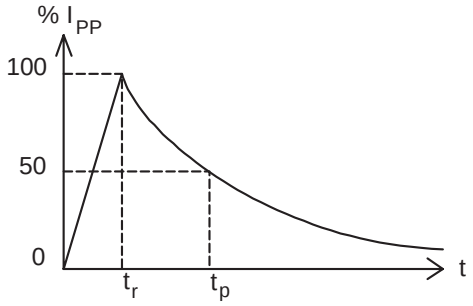
## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $I_{PP}$ | Peak pulse current (see note 1) | 10/1000 µs<br>5/310 µs<br>8/20 µs<br>2/10 µs | 75<br>125<br>150<br>225 | A |
| $I_{TSM}$ | Non repetitive surge peak on-state current (F = 50Hz) | tp = 20ms | 30 | A |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature | | - 40 to + 150<br>150 | °C |
| $T_L$ | Maximum lead temperature for soldering during 10s | | 230 | °C |

**Note 1 :** Pulse waveform :

| | | |
|---|---|---|
| 10/1000µs | $t_r$=10µs | $t_p$=1000µs |
| 5/310µs | $t_r$=5µs | $t_p$=310µs |
| 2/10µs | $t_r$=2µs | $t_p$=10µs |

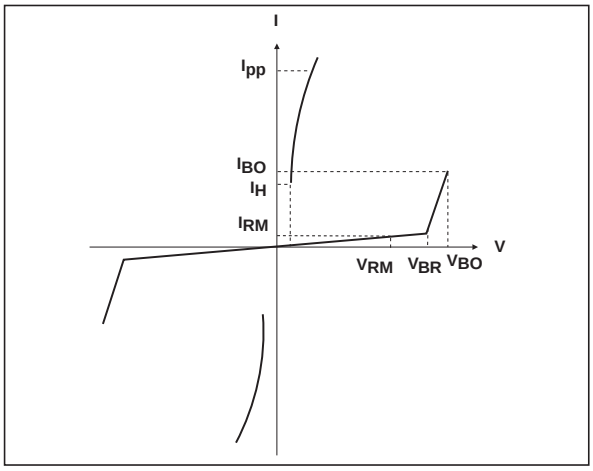



## THERMAL RESISTANCE

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th\ (j-a)}$ | Junction to ambient | 80 | °C/W |

**ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25°C).

| Symbol | Parameter |
|---|---|
| $V_{RM}$ | Stand-off voltage |
| $I_{RM}$ | Leakage current at $V_{RM}$ |
| $V_{BR}$ | Continuous reverse voltage |
| $V_{BO}$ | Breakover voltage |
| $I_H$ | Holding current |
| $I_{BO}$ | Breakover current |
| $I_{PP}$ | Peak pulse current |
| C | Capacitance |

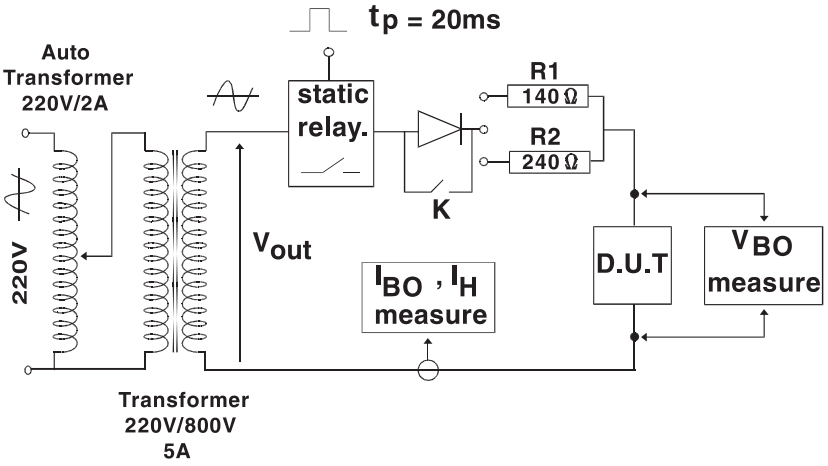



**PARAMETERS RELATED TO ONE TRISIL (Between TIP and GND or RING and GND)**

| $I_{RM}$ @ $V_{RM}$ | | $V_{BR}$ @ $I_R$ | | $V_{BO}$ @ $I_{BO}$ | | | $I_H$ | C |
|---|---|---|---|---|---|---|---|---|
| max. | | min. | | max. | min. | max. | min. | max. |
| | | | | | note 1 | | note 2 | note 3 |
| µA | V | V | mA | V | mA | mA | mA | pF |
| 10 | 180 | 200 | 1 | 290 | 150 | 800 | 150 | 200 |

**Note 1 :** See reference test circuit 1 for $I_{BO}$ and $V_{BO}$ parameters.
**Note 2 :** See test circuit 2.
**Note 3** : $V_R$ = 1V, F = 1MHz.

**REFERENCE TEST CIRCUIT 1 FOR $I_{BO}$ and $V_{BO}$ parameters :**

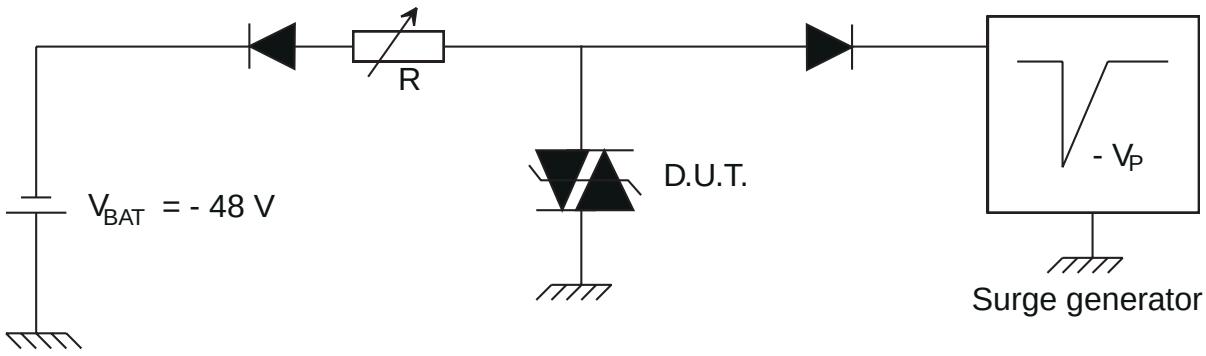



**TEST PROCEDURE :**

Pulse Test duration (tp = 20ms):
- For Bidirectional devices = Switch K is closed
- For Unidirectional devices = Switch K is open.

$V_{OUT}$ Selection
- Device with $V_{BO}$ < 200 Volt
  - $V_{OUT}$ = 250 $V_{RMS}$, $R_1$ = 140 Ω.
- Device with $V_{BO}$ ⎪ 200 Volt
  - $V_{OUT}$ = 480 $V_{RMS}$, $R_2$ = 240 Ω.

**FUNCTIONAL HOLDING CURRENT ($I_H$) TEST CIRCUIT 2.**



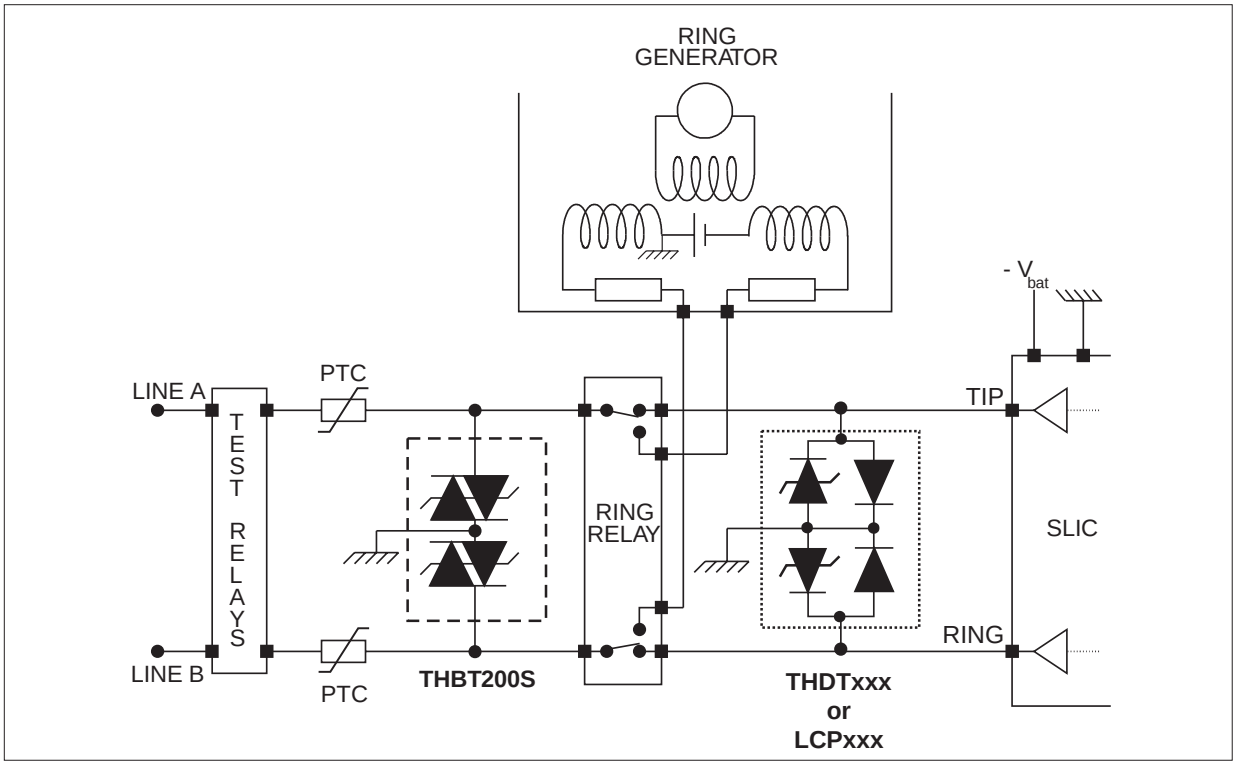

This is a GO-NOGO Test which allows to confirm the holding current ($I_H$) level in a functional test circuit.

**TEST PROCEDURE :**

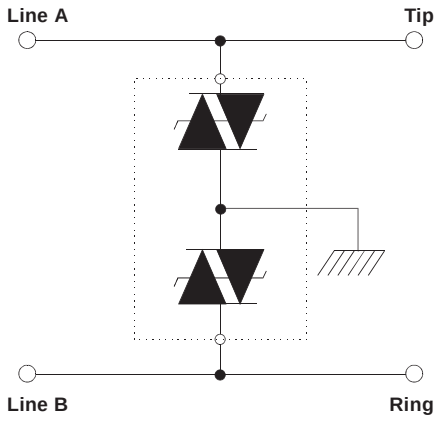
1) Adjust the current level at the $I_H$ value by short circuiting the AK of the D.U.T.
2) Fire the D.U.T with a surge Current : Ipp = 10A , 10/1000 µs.
3) The D.U.T will come back off-state within 50 ms max.

## APPLICATION CIRCUIT

### Typical line card protection concept




## FUNCTIONAL DESCRIPTION




**LINE A AND LINE B PROTECTION.**

Each line (TIP and RING) is protected by a bidirectional Trisil, which triggers at a maximum voltage equal to the $V_{BO}$.

**Fig. 1** : Relative variation of holding current versus junction temperature.

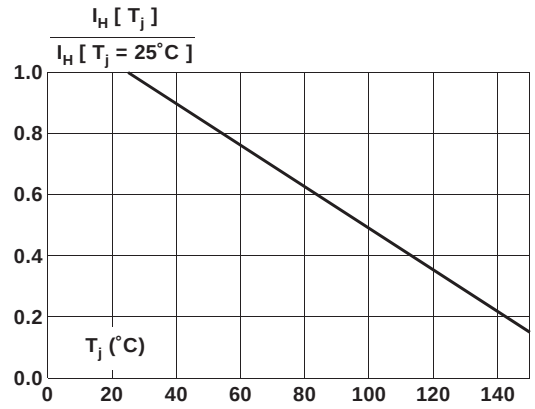



**Fig. 2** : Surge peak current versus overload duration.

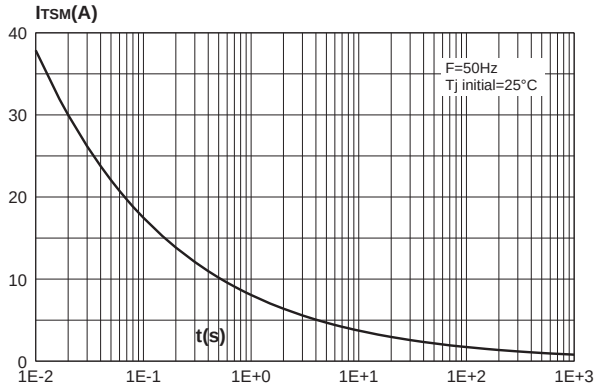



**Fig. 3** : Peak on state voltage versus peak on state current (typical values).

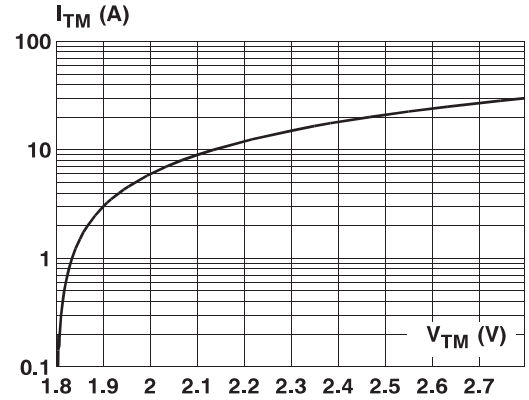
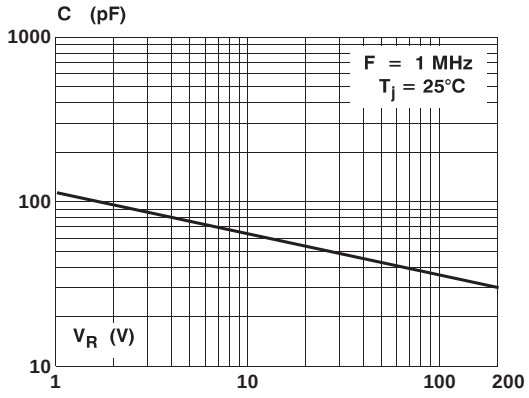
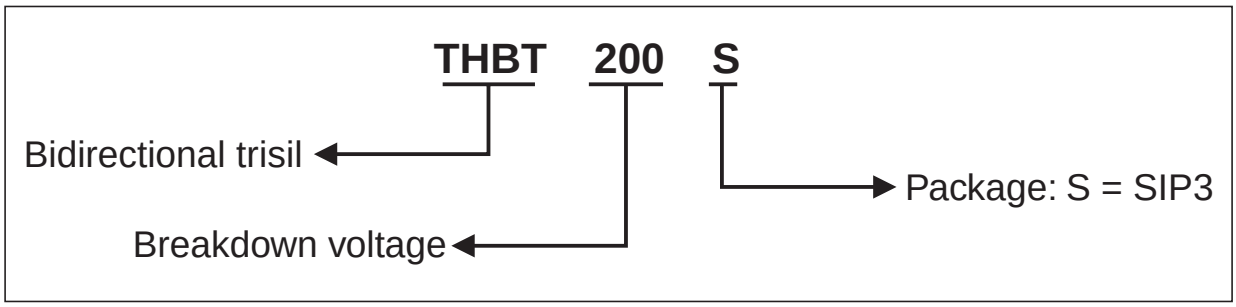



**Fig. 4** : Capacitance versus reverse applied voltage (typical values).



**ORDER CODE**

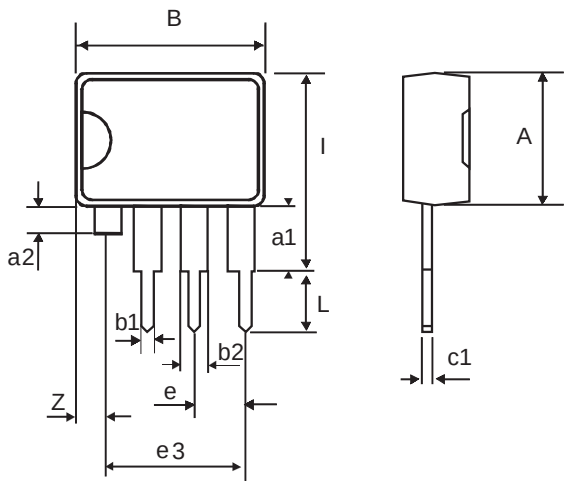



**MARKING :**

| Package | Types | Marking |
|---|---|---|
| SIP3 | THBT200S | THBT200S |

**Packaging:** Products supplied in antistatic tubes.
**Weight:** 0.55g

**PACKAGE MECHANICAL DATA**
SIP3 Plastic




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimetres | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 7.10 | | | 0.280 |
| a1 | 2.80 | | | 0.110 | | |
| a2 | 1.50 | | 1.90 | 0.059 | | 0.075 |
| B | | | 10.15 | | | 0.400 |
| b1 | | 0.50 | | | 0.020 | |
| b2 | 1.35 | | 1.75 | 0.053 | | 0.069 |
| c1 | 0.38 | | 0.50 | 0.015 | | 0.020 |
| e | | 2.54 | | | 0.100 | |
| e3 | | 7.62 | | | 0.200 | |
| I | | | 10.50 | | | 0.413 |
| L | | 3.30 | | | 0.130 | |
| Z | | | 1.50 | | | 0.059 |