



# TPP25011

Application Specific Discretes  
A.S.D.™

OVERVOLTAGE and OVERCURRENT  
PROTECTION for TELECOM LINE

## FEATURES

- UNIDIRECTIONAL FUNCTION
- PROGRAMMABLE BREAKDOWN VOLTAGE UP TO 250 V
- PROGRAMMABLE CURRENT LIMITATION FROM 40 mA TO 500 mA
- SURGE CURRENT CAPABILITY  
 $I_{PP} = 30A \quad 10/1000 \mu s$

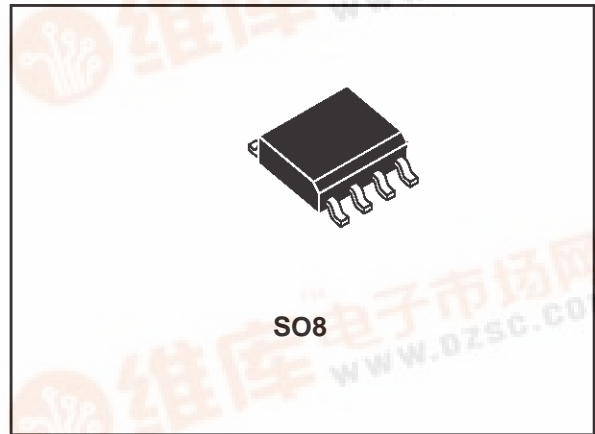
## DESCRIPTION

Dedicated to sensitive telecom equipment protection, this device can provide both voltage and current triggered protection with a very tight tolerance.

The breakdown voltage can be easily programmed by using an external zener diode.

A multiple protection mode can be also performed when using several zener diodes, providing to each line interface an optimized protection level.

The current limiting function is achieved with the use of a resistor between the gate and the cathode. The value of the resistor will determine the level of the desired current.

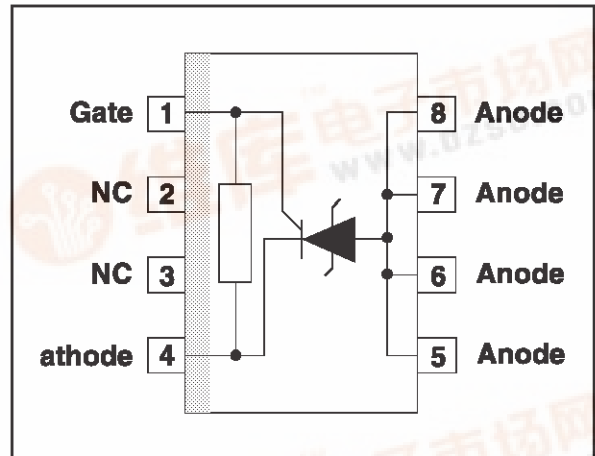


## COMPLIES WITH THE FOLLOWING STANDARDS :

|                                 |                 |          |
|---------------------------------|-----------------|----------|
| <b>CCITT K17 :</b>              | 10/700 $\mu s$  | 1.5 kV   |
|                                 | 5/310 $\mu s$   | 38 A     |
| <b>VDE 0433 :</b>               | 10/700 $\mu s$  | 2k V     |
|                                 | 5/310 $\mu s$   | 40 A (*) |
| <b>CNET :</b>                   | 0.5/700 $\mu s$ | 1.5 kV   |
|                                 | 0.2/310 $\mu s$ | 38 A     |
| <b>FCC part 68 :</b>            | 2/10 $\mu s$    | 2.5 kV   |
|                                 | 2/10 $\mu s$    | 75 A (*) |
| <b>BELLCORE TR-NWT-000974 :</b> | 10/1000 $\mu s$ | 1 kV     |
|                                 | 10/1000 $\mu s$ | 30 A (*) |

(\*) with series resistors or PTC.

## SCHEMATIC DIAGRAM



TM: ASD is trademarks of SGS-THOMSON Microelectronics.



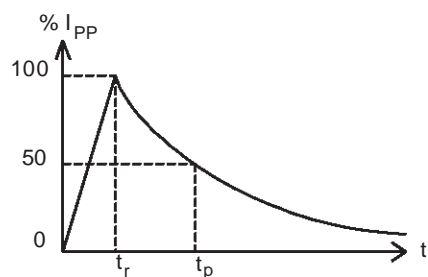
## TPP25011

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

| Symbol             | Parameter   | Value  | Unit               |
|--------------------|---|--|--------------------|
| $I_{PP}$           | Peak pulse current (see note 1)                                     | 10/1000 $\mu\text{s}$<br>5/310 $\mu\text{s}$<br>2/10 $\mu\text{s}$ | A                  |
| $I_{TSM}$          | Non repetitive surge peak on-state current<br>( $F = 50\text{Hz}$ ) | $t_p = 10\text{ms}$<br>$t = 1\text{s}$                             | 5<br>3.5<br>A      |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature           | - 55 to + 150<br>150   | $^{\circ}\text{C}$ |

**Note 1 :** Pulse waveform :

|                       |                       |                         |
|-----------------------|-----------------------|-------------------------|
| 10/1000 $\mu\text{s}$ | $t_r = 10\mu\text{s}$ | $t_p = 1000\mu\text{s}$ |
| 5/310 $\mu\text{s}$   | $t_r = 5\mu\text{s}$  | $t_p = 310\mu\text{s}$  |
| 2/10 $\mu\text{s}$    | $t_r = 2\mu\text{s}$  | $t_p = 10\mu\text{s}$   |

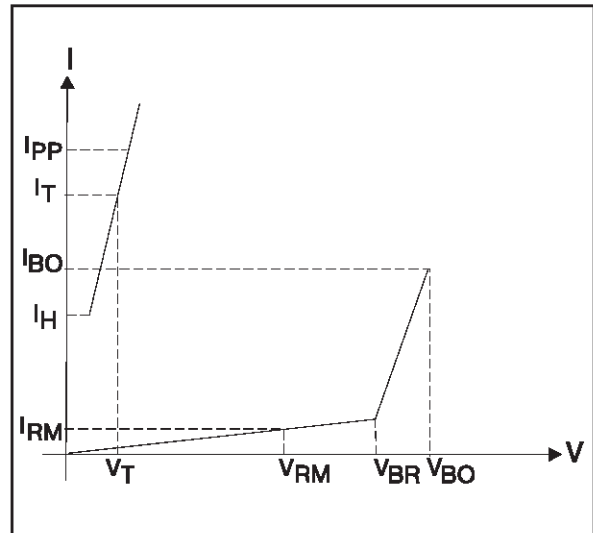


### THERMAL RESISTANCES

| Symbol        | Parameter           | Value | Unit                 |
|---------------|---------------------|-------|----------------------|
| $R_{th(j-a)}$ | Junction to ambient | 170   | $^{\circ}\text{C/W}$ |

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}C$ )

| Symbol   | Parameter                            |
|----------|--------------------------------------|
| $V_{RM}$ | Stand-off voltage                    |
| $I_{RM}$ | Leakage current at stand-off voltage |
| $V_{BR}$ | Breakdown voltage                    |
| $V_{BO}$ | Breakover voltage                    |
| $I_H$    | Holding current                      |
| $I_{BO}$ | Breakover current                    |
| $I_{PP}$ | Peak pulse current                   |
| $V_{GN}$ | Gate voltage                         |
| $I_G$    | Gate triggering current              |
| C        | Capacitance                          |



**1 - OPERATION WITHOUT GATE**

| Type     | $I_{RM} @ V_{RM}$ |    | $V_{BR} @ I_H$ |    | $V_{BO} @ I_{BO}$ |            |      | $I_H$       | C           |
|----------|-------------------|----|----------------|----|-------------------|------------|------|-------------|-------------|
|          | max.              |    | min.           |    | max.              | min. note1 | max. | min. note 2 | max. note 3 |
|          | $\mu A$           | V  | V              | mA | V                 | mA         | mA   | mA          | pF          |
| TPP25011 | 6                 | 60 | 250            | 1  | 340               | 15         | 200  | 180         | 100         |

**2 - OPERATION WITH GATE**

| Type     | $V_{GN} @ I_{GN} = 30 \text{ mA}$ |      | $I_G$                     |      |
|----------|-----------------------------------|------|---------------------------|------|
|          | min.                              | max. | min.                      | max. |
|          | note 4                            |      | $V_{A-C} = 100 \text{ V}$ |      |
|          | V                                 | V    | mA                        | mA   |
| TPP25011 | 1.05                              | 1.35 | 5                         | 40   |

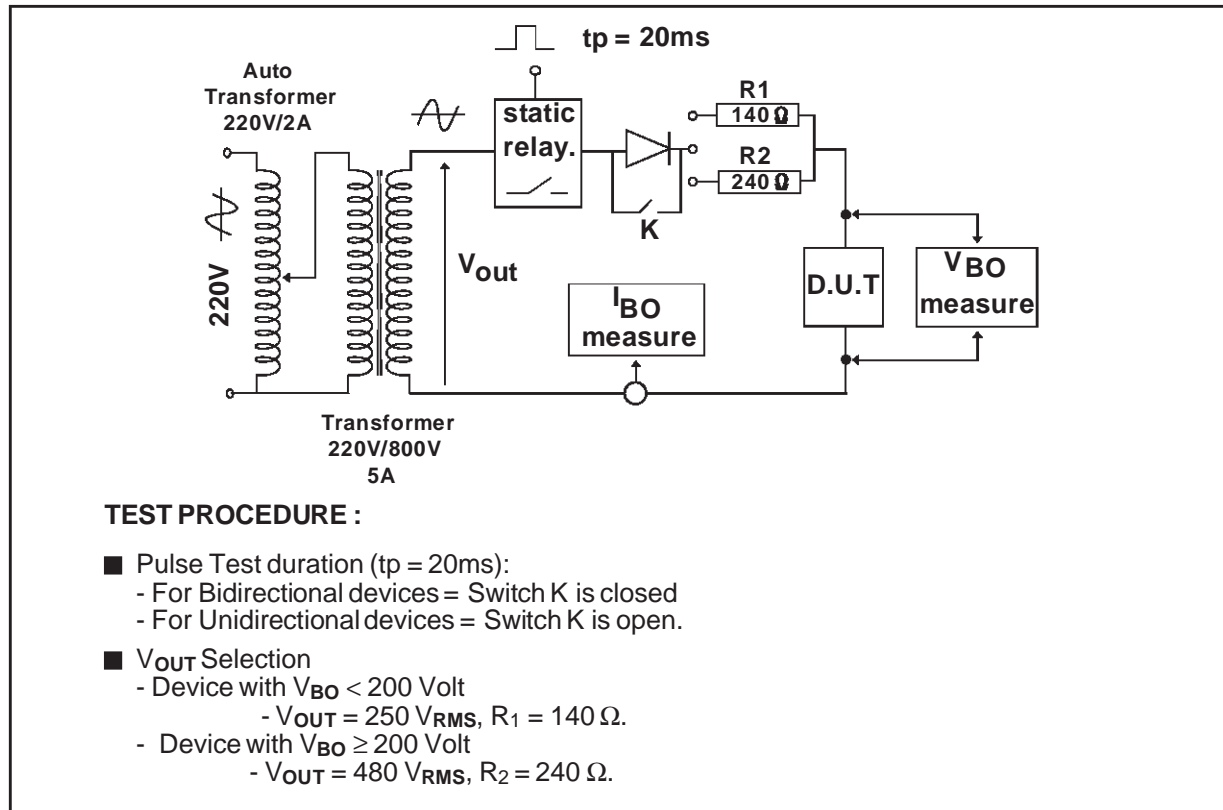
**Note 1:** See the reference test circuit 1.

**Note 2:** See test circuit 2.

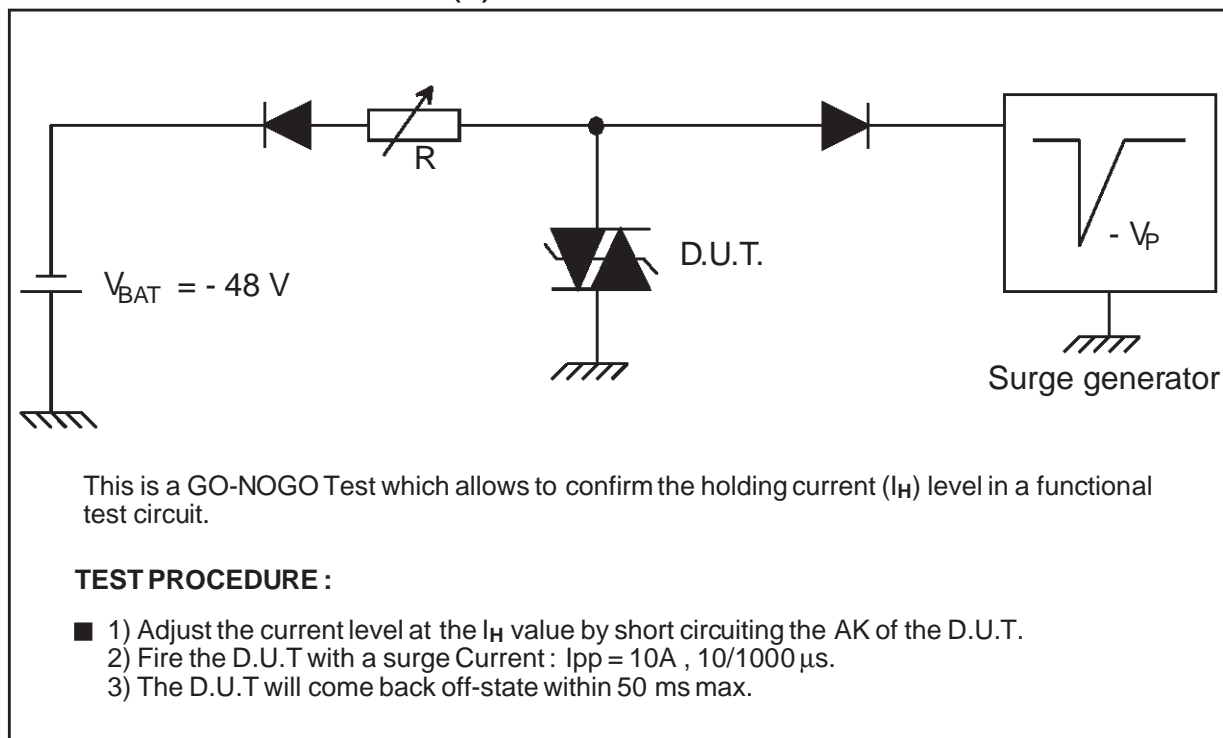
**Note 3:**  $V_R = 5V, F = 1MHz$

## TPP25011

### REFERENCE TEST CIRCUIT 1 :



### FUNCTIONAL HOLDING CURRENT ( $I_H$ ) TEST CIRCUIT 2 = GO - NOGO TEST



**APPLICATION CIRCUIT**  
**Overvoltage protection and current limitation**

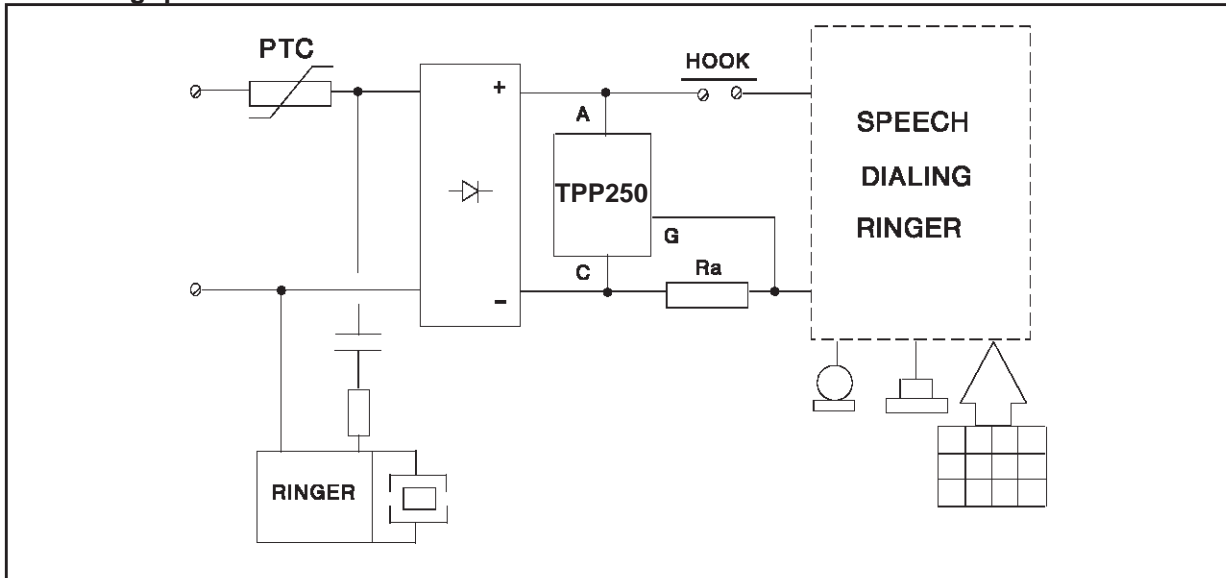
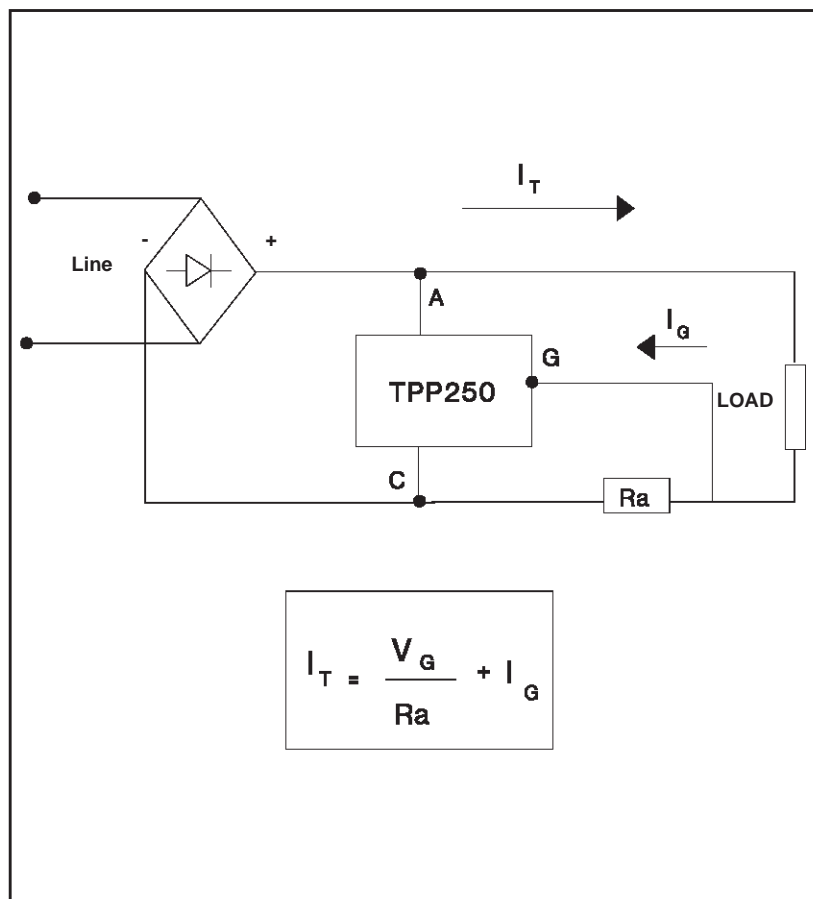


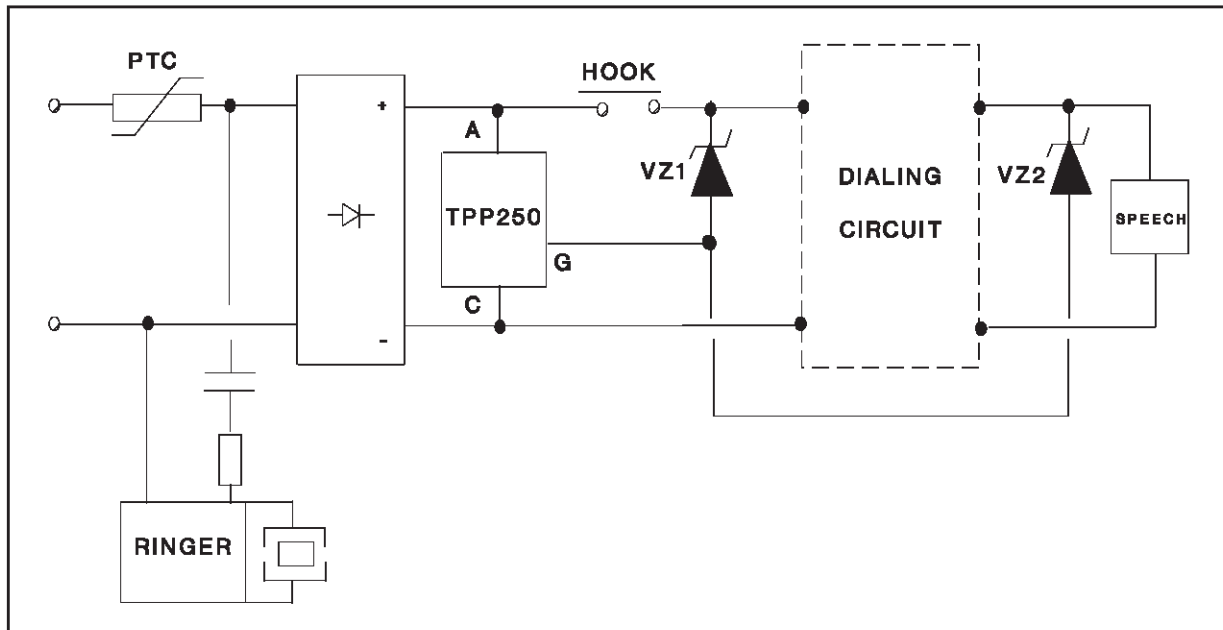
Table below gives the tolerance of the limited current  $I_T$  for each standardized resistor value.

| CURRENT TOLERANCE |                    |                    |
|-------------------|--------------------|--------------------|
| R<br>Ω<br>( ± 5%) | $I_T$<br>mA<br>min | $I_T$<br>mA<br>max |
| 3.00              | 338                | 514                |
| 3.30              | 308                | 471                |
| 3.60              | 283                | 435                |
| 3.90              | 261                | 404                |
| 4.30              | 238                | 370                |
| 4.70              | 218                | 342                |
| 5.10              | 201                | 319                |
| 5.60              | 184                | 294                |
| 6.20              | 166                | 269                |
| 6.80              | 152                | 249                |
| 7.50              | 138                | 229                |
| 8.20              | 127                | 213                |
| 9.10              | 115                | 196                |
| 10.10             | 104                | 181                |
| 11.00             | 96                 | 169                |
| 12.00             | 88                 | 158                |
| 13.00             | 82                 | 149                |
| 15.00             | 72                 | 135                |
| 16.00             | 68                 | 129                |
| 18.00             | 61                 | 119                |
| 20.00             | 55                 | 111                |
| 22.00             | 50                 | 105                |
| 24.00             | 47                 | 99                 |
| 27.00             | 42                 | 93                 |
| 30.00             | 38                 | 87                 |



# TPP25011

## Telephone set protection

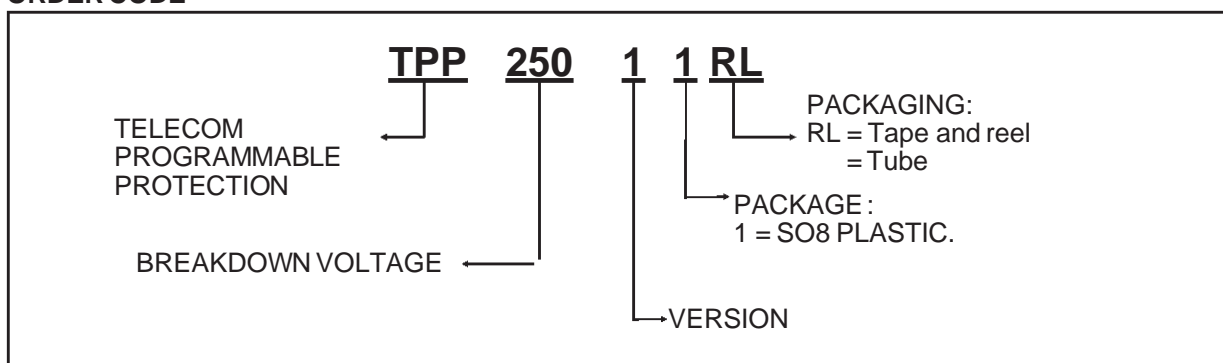


### PROTECTION MODES :

**OFF HOOK** = Ringer circuit protection is insured with intrinsic breakdown voltage at 250 V

**ON HOOK** = In dialing mode and in conversation mode, the breakdown voltage of TPP250 can be adapted at different levels with zener diodes.

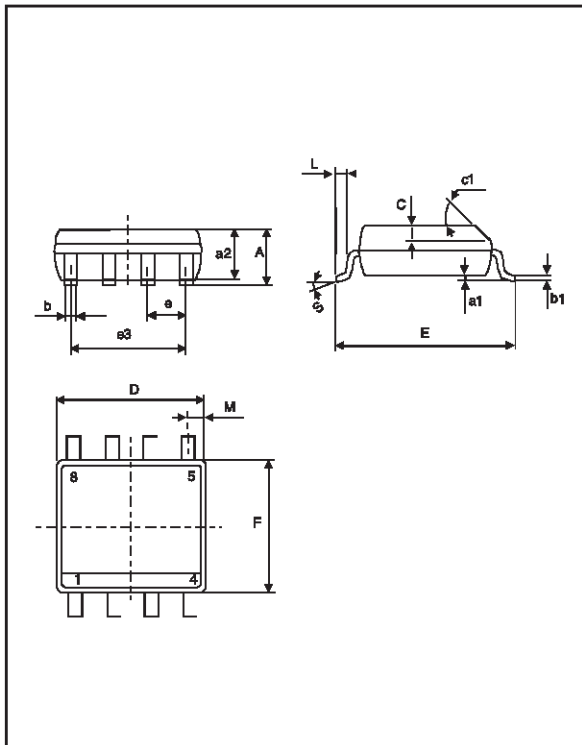
### ORDER CODE



**MARKING**

| Package | Type     | Marking |
|---------|----------|---------|
| SO8     | TPP25011 | TPP250  |

**PACKAGE MECHANICAL DATA**  
SO8 Plastic



| REF. | DIMENSIONS  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimetres |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             |      | 1.75 |        |       | 0.069 |
| a1   | 0.1         |      | 0.25 | 0.004  |       | 0.010 |
| a2   |             |      | 1.65 |        |       | 0.065 |
| b    | 0.35        |      | 0.48 | 0.014  |       | 0.019 |
| b1   | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C    |             | 0.50 |      |        | 0.020 |       |
| c1   | 45° (typ)   |      |      |        |       |       |
| D    | 4.8         |      | 5.0  | 0.189  |       | 0.197 |
| E    | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e    |             | 1.27 |      |        | 0.050 |       |
| e3   |             | 3.81 |      |        | 0.150 |       |
| F    | 3.8         |      | 4.0  | 0.15   |       | 0.157 |
| L    | 0.4         |      | 1.27 | 0.016  |       | 0.050 |
| M    |             |      | 0.6  |        |       | 0.024 |
| S    | 8° (max)    |      |      |        |       |       |

**Packaging :** Products supplied antistatic tubes or tape and reel.

**Weight :** 0.08g

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1998 SGS-THOMSON Microelectronics - Printed in Italy - All rights reserved.

SGS-THOMSON Microelectronics GROUP OF COMPANIES  
Australia - Brazil - Canada - China - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Morocco  
The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.