



SSRP105B1

Application Specific Discretes
ASD™

DUAL ASYMMETRICAL OVERVOLTAGE
PROTECTION FOR TELECOM LINE

MAIN APPLICATIONS

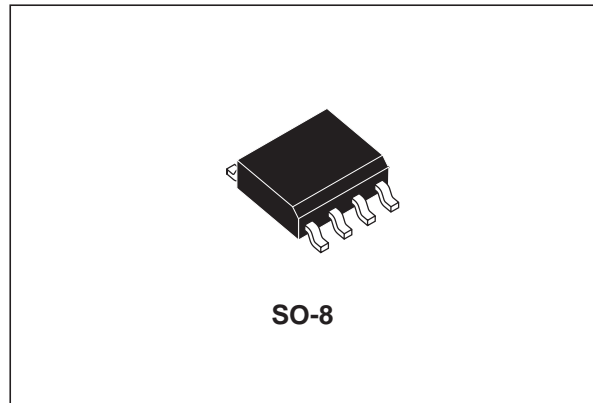
Where asymmetrical protection against lightning strikes and other transient overvoltages is required :

- Solid-State relays
- SLIC with integrated ring generator

DESCRIPTION

The SSRP105B1 is a dual asymmetrical transient voltage suppressor designed to protect a solid-state ring relay or SLICs with integrated ring generator from overvoltages.

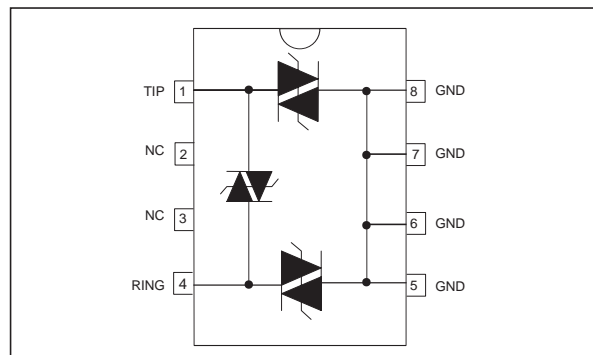
The asymmetrical protection configuration is necessary to allow the use of all different types of ringing schemes.



FEATURES

- Dual bi-directional asymmetrical protection
Stand-off voltages:
 - Between Line and Ground
 - +105V for positive voltages
 - 180V for negative voltages
 - Between Line and Line
 - +180V for positive voltages
 - 180V for negative voltages
- Peak pulse current: $I_{PP} = 50A$ (5/310 μ s)
- Holding current:
 - $I_{H+} = 100mA$
 - $I_{H-} = 150mA$

FUNCTIONAL DIAGRAM



COMPLY WITH THE FOLLOWING STANDARDS

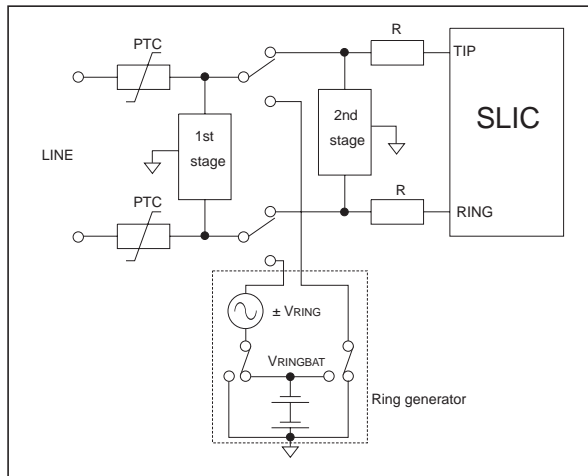
| | Peak Surge Voltage (V) | Voltage Waveform (μ s) | Current Waveform (μ s) | Required Peak current (A) | Min. serial resistor to meet standards (Ω) |
|--------------------------------|------------------------|-----------------------------|-----------------------------|---------------------------|---|
| ITU-T K20 / K21 | 1500 | 10/700 | 5/310 | 38 | - |
| VDE0433 | 2000 | 10/700 | 5/310 | 50 | - |
| IEC61000-4-5 | Level 3 Level 4 | 10/700 1.2/50 | 5/310 8/20 | 50 100 | - - |
| FCC Part 68 | 1500 800 | 10/160 10/560 | 10/160 10/560 | 200 100 | 18 10 |
| BELLCORE GR1089 First level | 2500 1000 | 2/10 10/1000 | 2/10 10/1000 | 500 100 | 10 19 |

TM: ASD is trademarks of STMicroelectronics.

SSRP105B1

APPLICATION INFORMATION

Fig. 1: Topology of the classical line card protection.

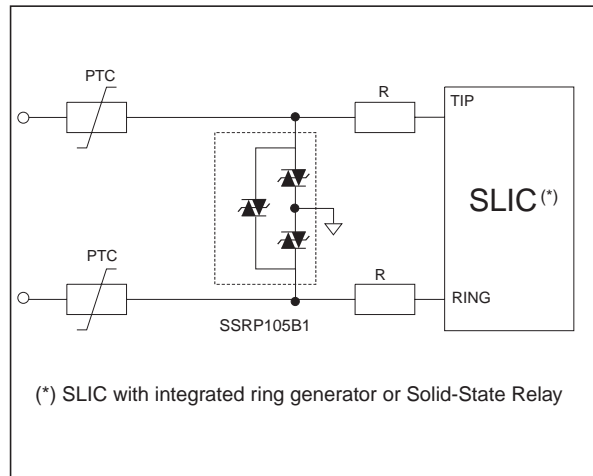


The classical line card requires protection before the ring relay and a second one for the SLIC (*figure 1*).

The use of new SLICs with integrated ring generator or board based on solid-state ring relay suppresses this second protection (*figure 2*). Then, the only remaining stage, located between the line and the ring relay, has to optimize the protection.

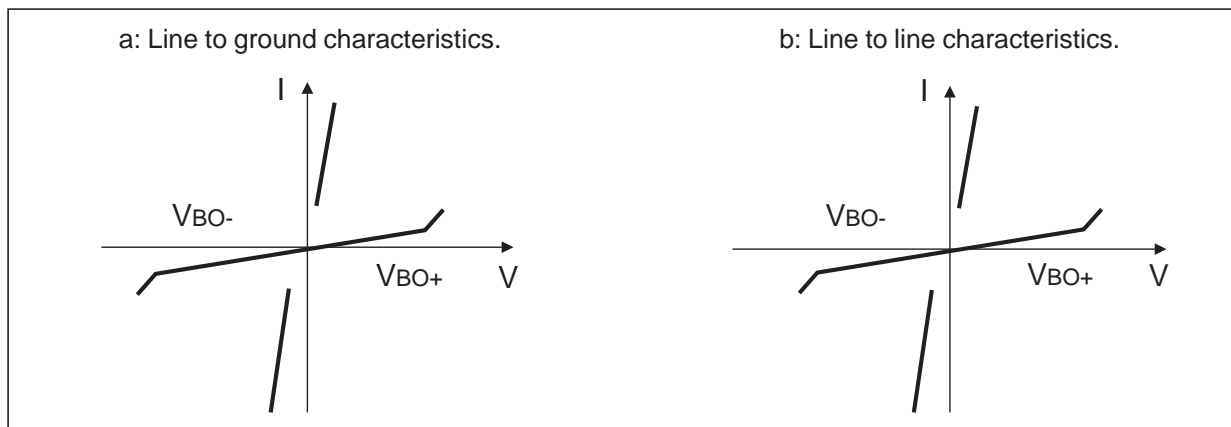
The classical symmetrical first stage protector becomes not sufficient to avoid any circuit destruction during surges.

Fig. 2: Classical use of the SSRP105B1.



The SSRP105B1 device takes into account this fact and is based on asymmetrical voltage characteristics (*figure 3a*). The ring signal being shifted back by the battery voltage, the SSRP105B1 negative breakover value V_{BO-} is greater than the positive one V_{BO+} . This point guarantees a protection operation very close to the peak of the normal operating voltage without any disturbance of the ring signal.

Fig. 3: SSRP105B1 electrical characteristics.



In addition with the 2 crowbar functions which perform the protection of both TIP and RING lines versus ground, a third cell assumes the differential mode protection of the SLIC. The breakover voltage values of this third cell are the same for

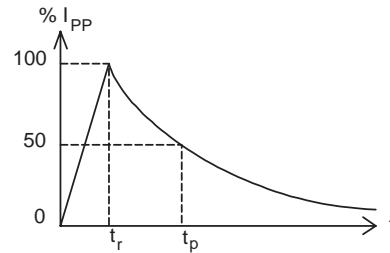
both positive and negative parts of the characteristics and are equivalent to the negative breakover voltage value of the TIP and RING lines versus GND cells (*figure 3b*).

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

| Symbol | Parameter | Value | Unit | |
|--------------------|---|--|------------------------------------|--|
| I_{PP} | Peak pulse current (see note 1) | 10 / 1000 μs 10 / 560 μs 5 / 310 μs 10 / 160 μs 8 / 20 μs 2 / 10 μs | 35 45 50 60 120 175 | A |
| I_{TSM} | Non repetitive surge peak on-state current (F=50Hz) | $t_p = 0.2 \text{ s}$ $t_p = 5 \text{ s}$ $t_p = 15 \text{ min.}$ | 8.5 4.5 2.5 | A |
| T_{op} | Operating temperature range | | 0 to + 70 | $^{\circ}\text{C}$ |
| T_{stg} T_j | Storage temperature range Maximum operating junction temperature | | - 55 to + 150 + 150 | $^{\circ}\text{C}$ $^{\circ}\text{C}$ |
| T_L | Maximum lead temperature for soldering during 10s | | 260 | $^{\circ}\text{C}$ |

Note 1 : Pulse waveform :

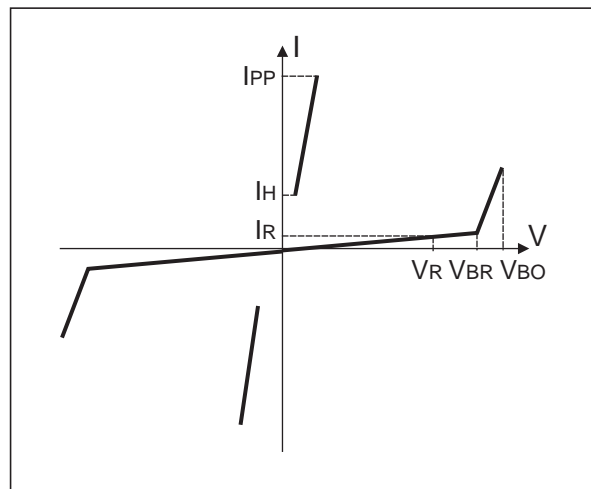
| | | |
|-----------------------|----------------------|------------------------|
| 10/1000 μs | $t_r=10 \mu\text{s}$ | $t_p=1000 \mu\text{s}$ |
| 10/560 μs | $t_r=10 \mu\text{s}$ | $t_p=560 \mu\text{s}$ |
| 5/310 μs | $t_r=5 \mu\text{s}$ | $t_p=310 \mu\text{s}$ |
| 10/160 μs | $t_r=10 \mu\text{s}$ | $t_p=160 \mu\text{s}$ |
| 8/20 μs | $t_r=8 \mu\text{s}$ | $t_p=20 \mu\text{s}$ |
| 2/10 μs | $t_r=2 \mu\text{s}$ | $t_p=10 \mu\text{s}$ |

**THERMAL RESISTANCE**

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

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

| Symbol | Parameter |
|----------|--------------------------------------|
| V_R | Stand-off voltage |
| I_R | 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 |
| C | Capacitance |



SSRP105B1

ELECTRICAL CHARACTERISTICS between TIP and GND, RING and GND ($T_{amb}=25^{\circ}C$)

| Symbol | Parameter | Test conditions (note 1) | Min. | Typ. | Max. | Unit |
|----------|----------------------------|--|------------|------|------------|---------|
| V_{BO} | Breakover voltage (note 2) | Positive voltage . 50Hz . 10/700 μ s | | | 165 165 | V |
| | | Negative voltage . 50Hz . 10/700 μ s | | | 225 225 | |
| I_H | Holding current | Positive polarity Negative polarity | 100 150 | | | mA |
| I_R | Leakage current (note 3) | $V_R = +105 V$ $V_R = -180 V$ | | | 10 10 | μ A |
| C | Capacitance | $F = 1MHz, V_{RMS} = 1V, V_{R(T/G)} = -5V$ | | 30 | | pF |
| | | $F = 1MHz, V_{RMS} = 1V, V_{R(T/G)} = -50V$ | | 16 | | |

ELECTRICAL CHARACTERISTICS between TIP and RING ($T_{amb}=25^{\circ}C$)

| Symbol | Parameter | Test conditions | Min | Max | Unit |
|--------|--------------------------|----------------------------------|-----|----------|---------|
| I_R | Leakage current (note 3) | $V_R = +180 V$ $V_R = -180 V$ | | 10 10 | μ A |

- Note 1: Positive voltage means between T and G, or between R and G.
Negative voltage means between G and T, or between G and R.
Note 2: See test circuit for V_{BO} parameters
Note 3: I_R measured at V_R guarantees $V_{BR} > V_R$

Fig. 4: Relative variation of holding current versus junction temperature.

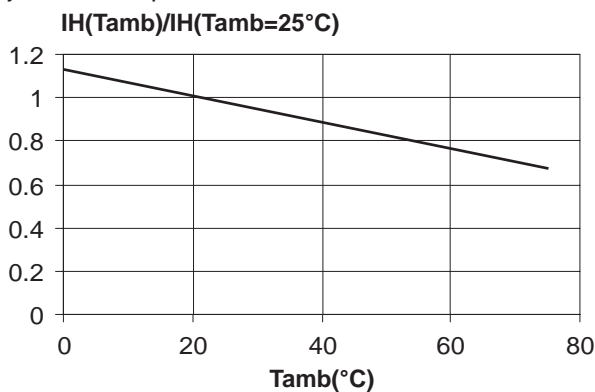


Fig. 5: Non-repetitive peak on-state current versus overload duration (T_j initial = $+25^{\circ}C$)..

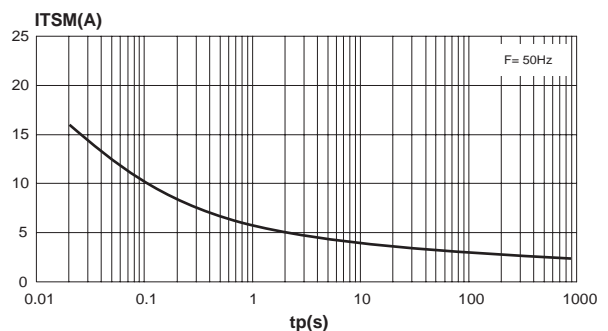
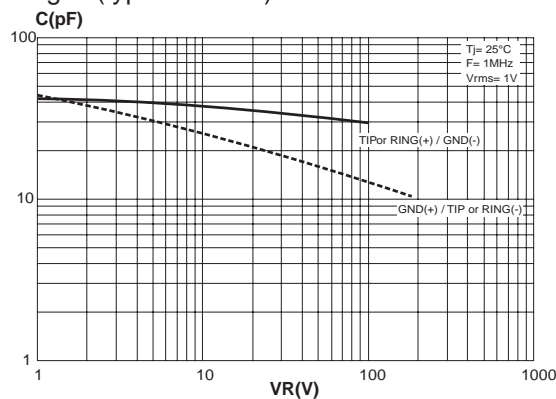


Fig. 6: Capacitance versus applied reverse voltages (typical values).



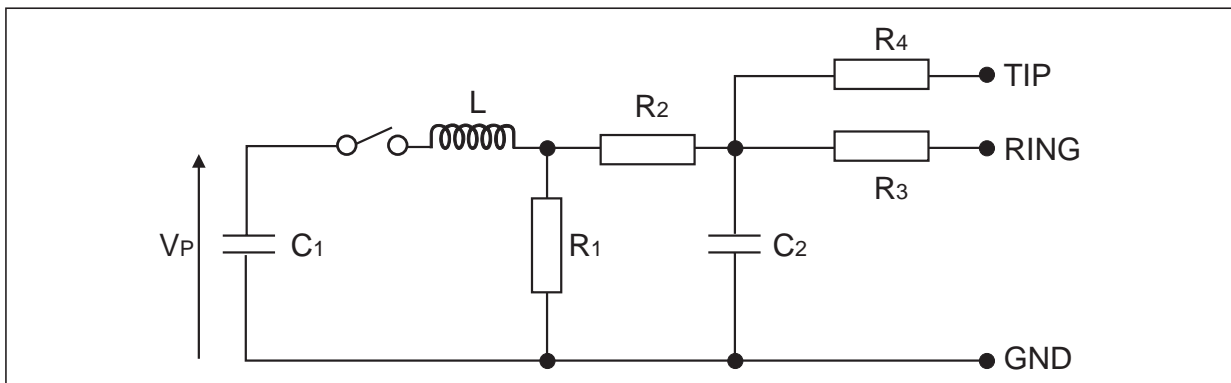
FUNCTION HOLDING CURRENT (I_H) TEST CIRCUIT (GO-NO GO TEST)

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

TEST PROCEDURE :

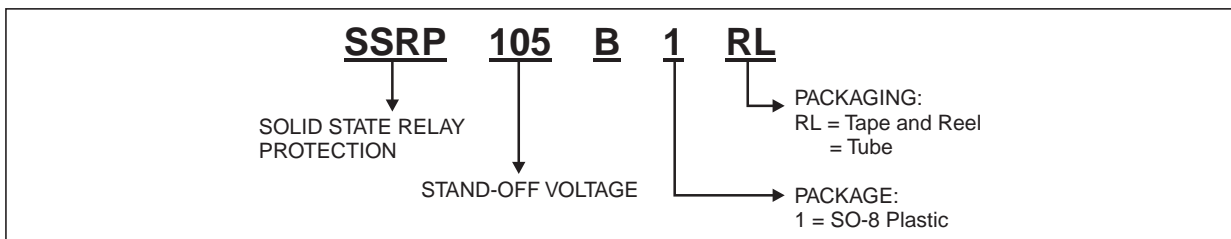
- 1) Adjust the current level at the I_H value by short circuiting the D.U.T.
- 2) Fire the D.U.T with a surge Current : I_{pp} = 10A , 10/1000μs.
- 3) The D.U.T will come back off-state within 50 ms max.

TEST CIRCUIT FOR V_{BO} PARAMETERS:



| Pulse (μs) | | V _p (V) | C ₁ (μF) | C ₂ (nF) | L (μH) | R ₁ (Ω) | R ₂ (Ω) | R ₃ (Ω) | R ₄ (Ω) | I _{PP} (A) | R _p (Ω) |
|----------------|----------------|-----------------------|------------------------|------------------------|-----------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| t _r | t _p | | | | | | | | | | |
| 10 | 700 | 1000 | 20 | 200 | 0 | 50 | 15 | 25 | 25 | 38 | 0 |
| 1.2 | 50 | 1500 | 1 | 33 | 0 | 76 | 13 | 25 | 25 | 30 | 10 |
| 2 | 10 | 2500 | 10 | 0 | 1.1 | 1.3 | 0 | 3 | 3 | 38 | 62 |

ORDER CODE



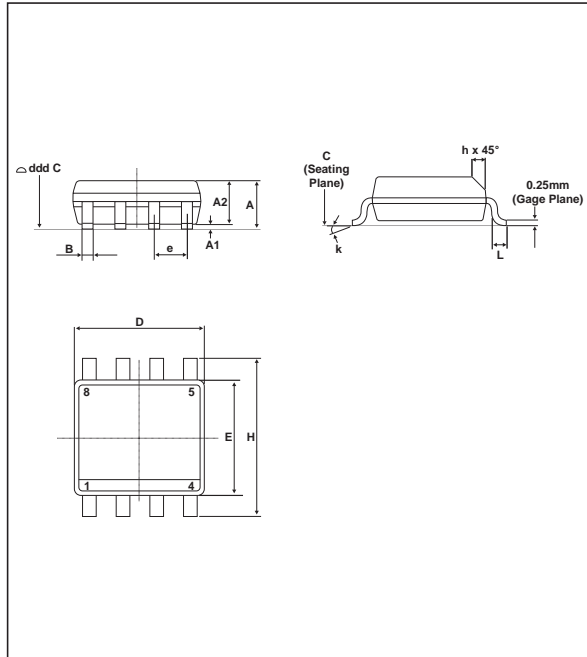
SSRP105B1

OTHER INFORMATION

| Ordering type | Marking | Package | Weight | Base Qty (pcs) | Delivery mode |
|--------------------------|---------|---------|---------|----------------|---------------------|
| SSRP105B1 SSRP105B1RL | SSR105 | SO-8 | 0.08 g. | 100 2500 | Tube Tape & Reel |

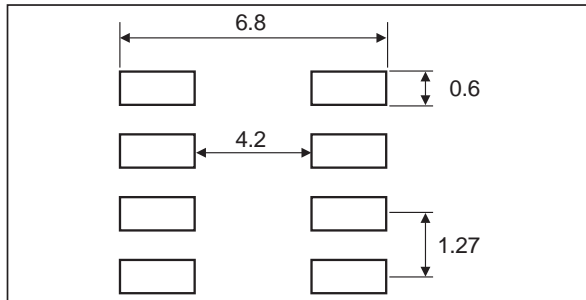
PACKAGE MECHANICAL DATA

SO-8 (Plastic)



| REF. | DIMENSIONS | | | |
|------|-------------|------|-----------|-------|
| | Millimetres | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A1 | 0.1 | 0.25 | 0.004 | 0.010 |
| A2 | 1.10 | 1.65 | 0.043 | 0.065 |
| B | 0.33 | 0.51 | 0.013 | 0.020 |
| C | 0.19 | 0.25 | 0.007 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 Typ. | | 0.05 Typ. | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.019 |
| L | 0.40 | 1.27 | 0.016 | 0.050 |
| k | 8° (max) | | | |
| ddd | 0.100 | | 0.004 | |

FOOT-PRINT DIMENSIONS (in millimeters)



Information furnished is believed to be accurate and reliable. However, STMicroelectronics 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 STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics
 © 2002 STMicroelectronics - Printed in Italy - All rights reserved.
 STMicroelectronics GROUP OF COMPANIES
 Australia - Brazil - Canada - China - Finland - France - Germany
 Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore
 Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>

