



# SSRP105B1

Application Specific Discretes  
ASD™

DUAL ASYMMETRICAL OVERVOLTAGE  
PROTECTION FOR TELECOM LINE

## MAIN APPLICATIONS

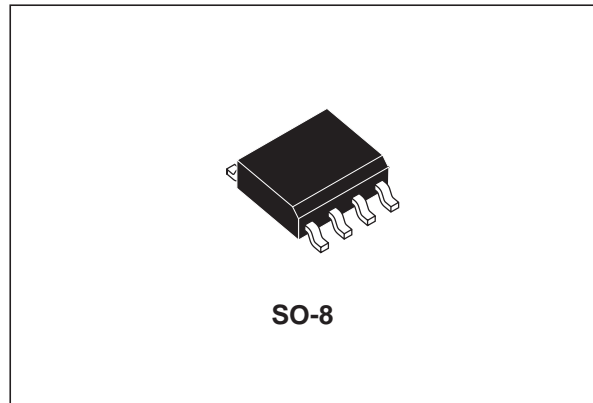
Where asymmetrical protection against lightning strikes and other transient overvoltages is required :

- 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.

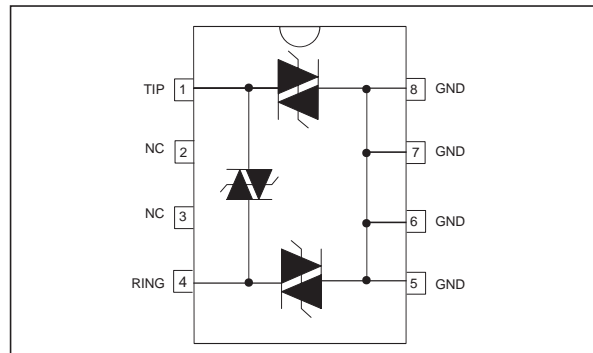
The asymmetrical protection configuration is necessary to allow the use of all different types of ringing schemes.



## 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 $\mu$ s)
- Holding current:
  - $I_{H+} = 100mA$
  - $I_{H-} = 150mA$

## FUNCTIONAL DIAGRAM



## COMPLY WITH THE FOLLOWING STANDARDS

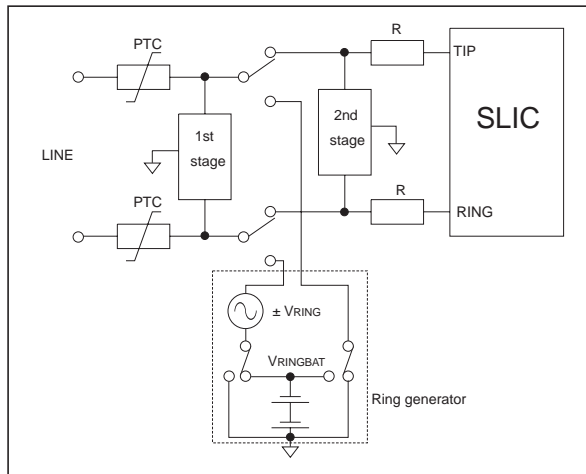
	Peak Surge Voltage (V)	Voltage Waveform ( $\mu$ s)	Current Waveform ( $\mu$ s)	Required Peak current (A)	Min. serial resistor to meet standards ( $\Omega$ )
ITU-T K20 / K21	1500	10/700	5/310	38	-
VDE0433	2000	10/700	5/310	50	-
IEC61000-4-5	Level 3 Level 4	10/700 1.2/50	5/310 8/20	50 100	- -
FCC Part 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

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# SSRP105B1

## APPLICATION INFORMATION

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

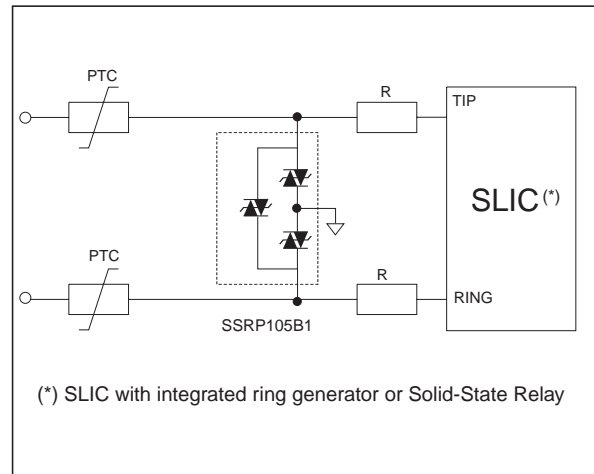


The classical line card requires protection before the ring relay and a second one for the SLIC (*figure 1*).

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.

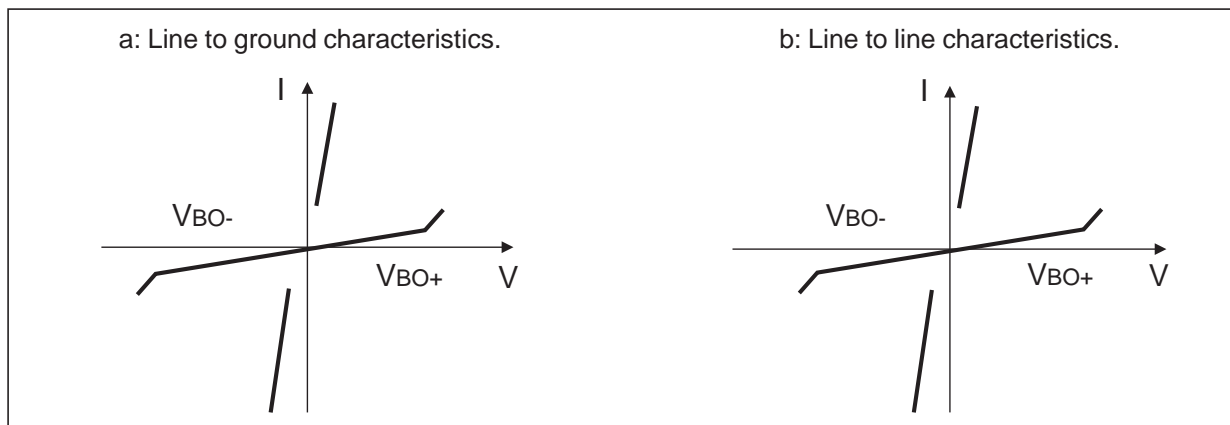
The classical symmetrical first stage protector becomes not sufficient to avoid any circuit destruction during surges.

**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

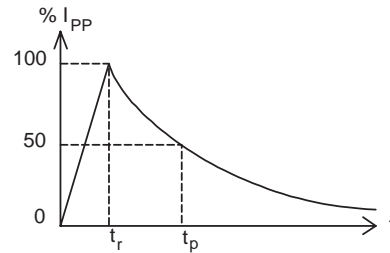
both positive and negative parts of the characteristics and are equivalent to the negative breakover voltage value of the TIP and RING lines versus GND cells (*figure 3b*).

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

Symbol	Parameter	Value	Unit	
$I_{PP}$	Peak pulse current (see note 1)	10 / 1000 $\mu\text{s}$ 10 / 560 $\mu\text{s}$ 5 / 310 $\mu\text{s}$ 10 / 160 $\mu\text{s}$ 8 / 20 $\mu\text{s}$ 2 / 10 $\mu\text{s}$	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 :

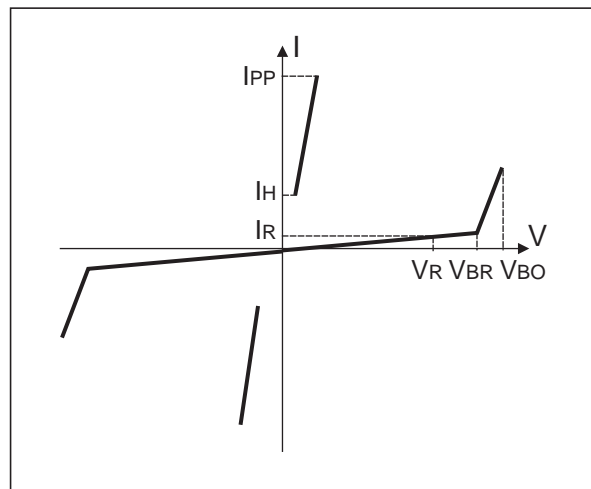
10/1000 $\mu\text{s}$	$t_r=10\mu\text{s}$	$t_p=1000\mu\text{s}$
10/560 $\mu\text{s}$	$t_r=10\mu\text{s}$	$t_p=560\mu\text{s}$
5/310 $\mu\text{s}$	$t_r=5\mu\text{s}$	$t_p=310\mu\text{s}$
10/160 $\mu\text{s}$	$t_r=10\mu\text{s}$	$t_p=160\mu\text{s}$
8/20 $\mu\text{s}$	$t_r=8\mu\text{s}$	$t_p=20\mu\text{s}$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

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

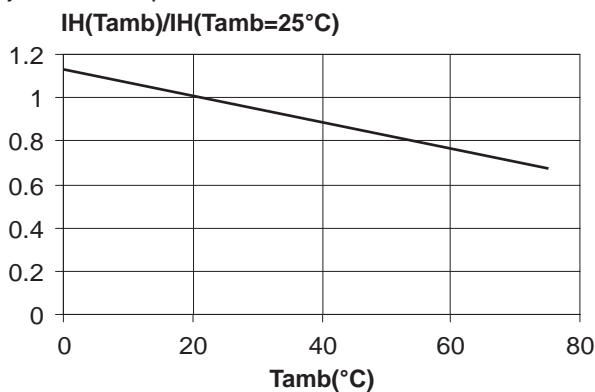
Symbol	Parameter	Test conditions (note 1)	Min.	Typ.	Max.	Unit
$V_{BO}$	Breakover voltage (note 2)	Positive voltage . 50Hz . 10/700 $\mu$ s			165 165	V
		Negative voltage . 50Hz . 10/700 $\mu$ s			225 225	
$I_H$	Holding current	Positive polarity Negative polarity	100 150			mA
$I_R$	Leakage current (note 3)	$V_R = +105 V$ $V_R = -180 V$			10 10	$\mu A$
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 ( $T_{amb}=25^{\circ}C$ )

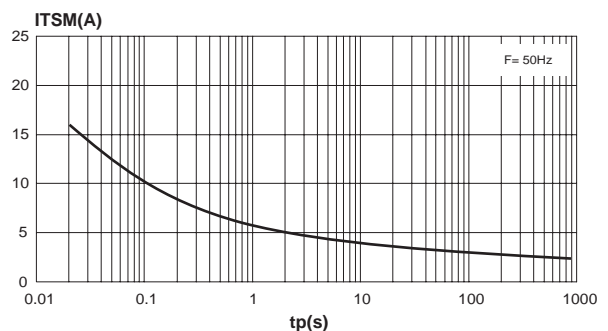
Symbol	Parameter	Test conditions	Min	Max	Unit
$I_R$	Leakage current (note 3)	$V_R = +180 V$ $V_R = -180 V$		10 10	$\mu A$

- 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  $V_{BR} > V_R$

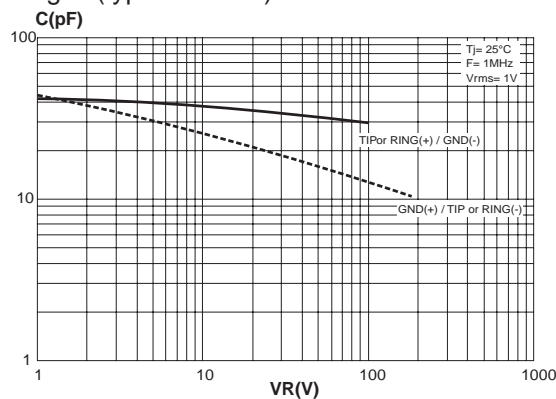
**Fig. 4:** Relative variation of holding current versus junction temperature.



**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).



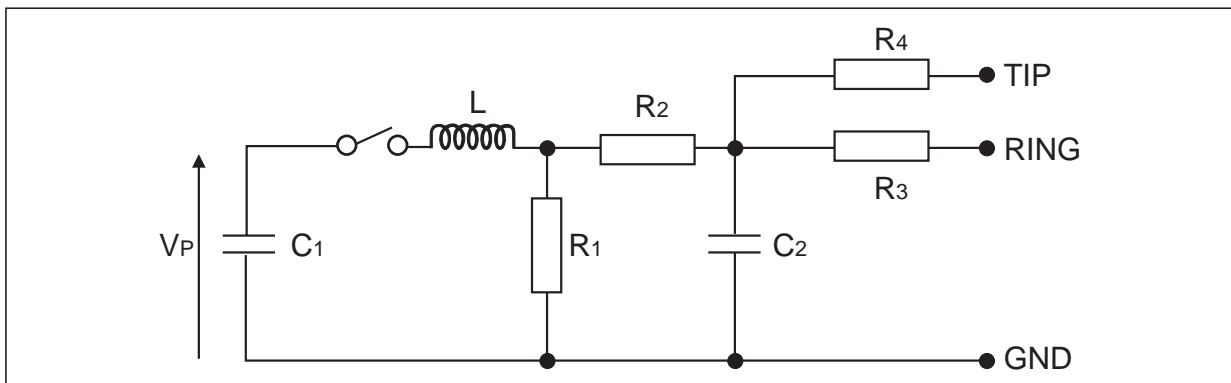
**FUNCTION HOLDING CURRENT (I<sub>H</sub>) TEST CIRCUIT (GO-NO GO TEST)**

This is a GO-NOGO test which allows to confirm the holding current (I<sub>H</sub>) level in a functional test circuit.

**TEST PROCEDURE :**

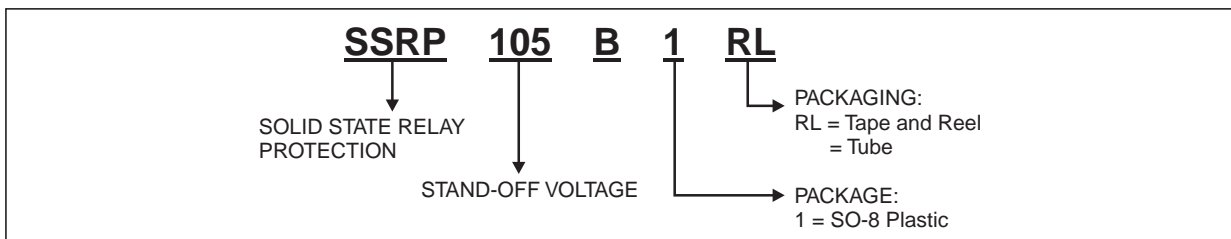
- 1) Adjust the current level at the I<sub>H</sub> value by short circuiting the D.U.T.
- 2) Fire the D.U.T with a surge Current : I<sub>pp</sub> = 10A , 10/1000μs.
- 3) The D.U.T will come back off-state within 50 ms max.

**TEST CIRCUIT FOR V<sub>BO</sub> PARAMETERS:**



Pulse (μs)		V <sub>p</sub> (V)	C <sub>1</sub> (μF)	C <sub>2</sub> (nF)	L (μH)	R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	R <sub>3</sub> (Ω)	R <sub>4</sub> (Ω)	I <sub>PP</sub> (A)	R <sub>p</sub> (Ω)
t <sub>r</sub>	t <sub>p</sub>										
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**



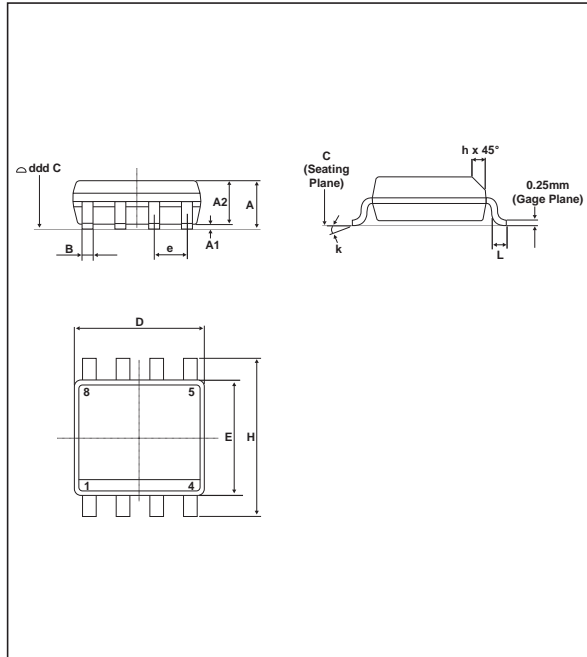
# SSRP105B1

## 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

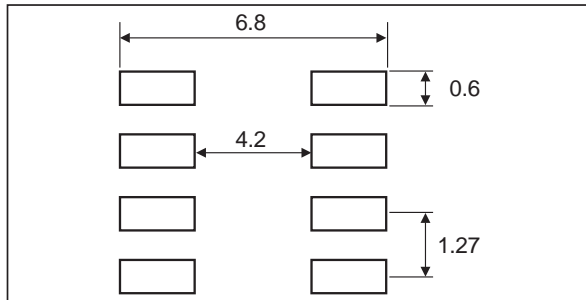
## PACKAGE MECHANICAL DATA

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)



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