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STMicroelectronics
SSRP105B1

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SSRP105B1

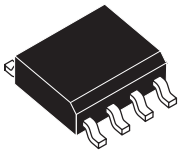
Application Specific Discretes
ASD™

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

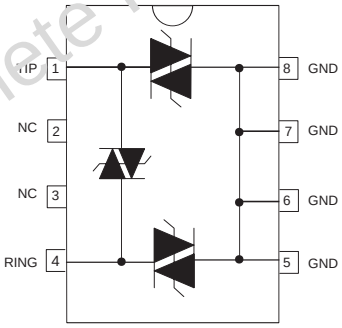


SO-8

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.

FUNCTIONAL DIAGRAM



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 (5/310µs)
- Holding current:
  - I_{H+} = 100mA
  - I_{H-} = 150mA

COMPLY WITH THE FOLLOWING STANDARDS

	Peak Surge Voltage (V)	Voltage Waveform (µs)	Current Waveform (µs)	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

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APPLICATION INFORMATION

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

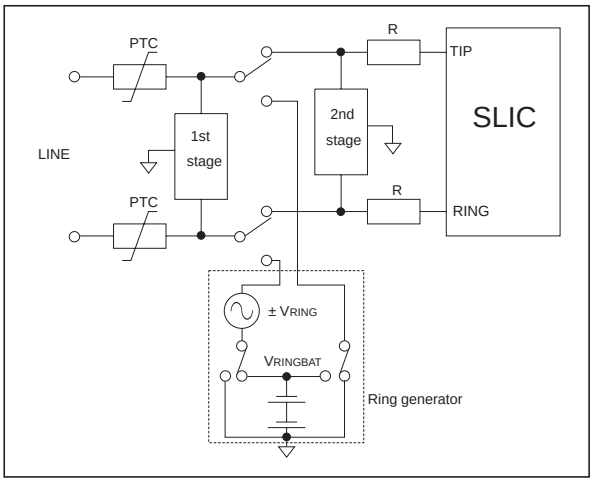
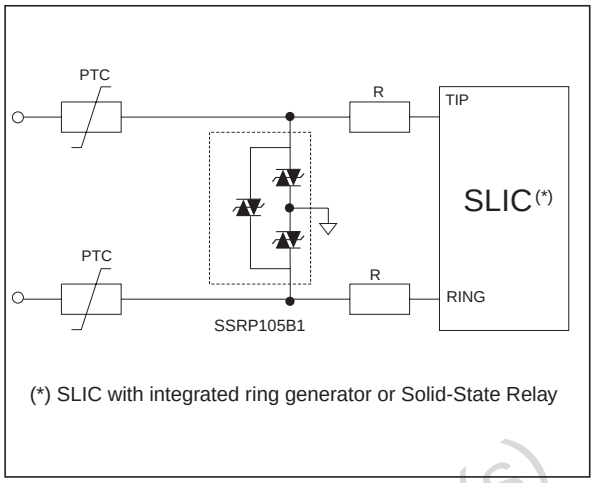


Fig. 2: Classical use of the SSRP105B1.



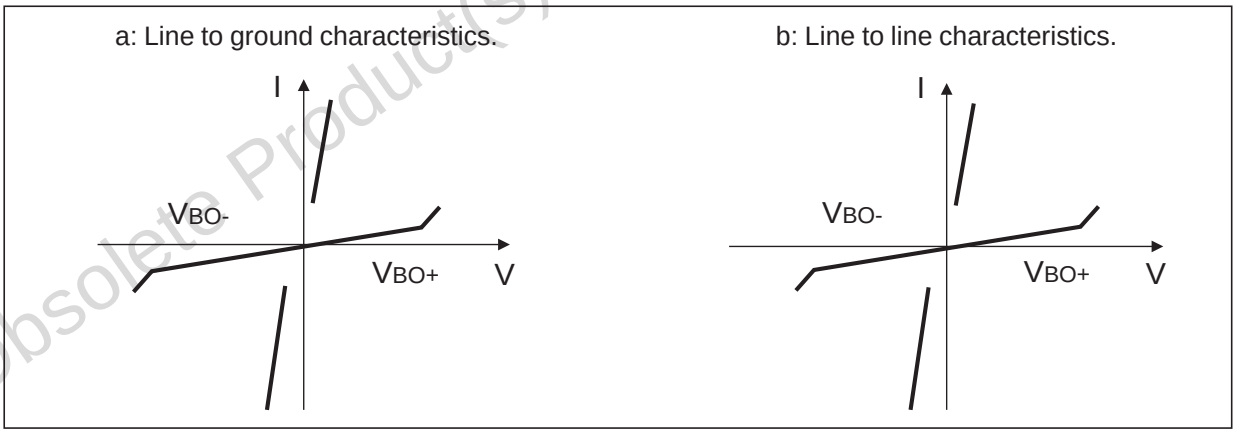
The classical line card requires protection before the ring relay and a second one for the SLIC (*figure 1*).

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.

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.



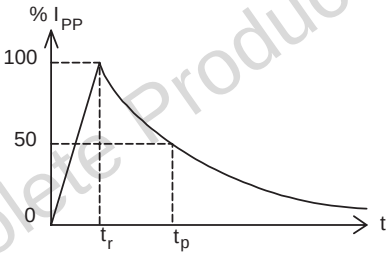
In addition with the 2 crowbar functions which perform the protection of both TIP and RING lines versus ground, a third cell assumes the differential mode protection of the SLIC. The breakover voltage values of this third cell are the same for both positive and negative parts of the characteristics and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

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

Note 1 : Pulse waveform :

10/1000µs	t_r=10µs	t_p=1000µs
10/560µs	t_r=10µs	t_p=560µs
5/310µs	t_r=5µs	t_p=310µs
10/160µs	t_r=10µs	t_p=160µs
8/20µs	t_r=8µs	t_p=20µs
2/10µs	t_r=2µs	t_p=10µs

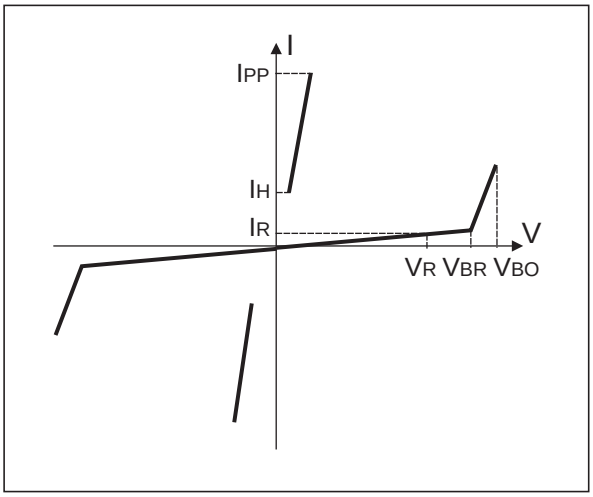


THERMAL RESISTANCE

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

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°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



ELECTRICAL CHARACTERISTICS between TIP and GND, RING and GND (T_{amb}=25°C)

Symbol	Parameter	Test conditions (note 1)	Min.	Typ.	Max.	Unit
V_{BO}	Breakover voltage (note 2)	Positive voltage . 50Hz . 10/700µs Negative voltage . 50Hz . 10/700µs			165 165 225 225	V
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	µA
C	Capacitance	F = 1MHz, V_{RMS} = 1V, $V_{R(T/G)}$ = -5V F = 1MHz, V_{RMS} = 1V, $V_{R(T/G)}$ = -50V		30 16		pF

ELECTRICAL CHARACTERISTICS between TIP and RING (T_{amb}=25°C)

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

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.

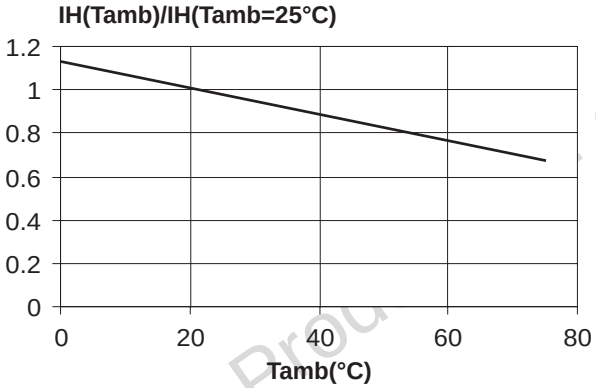


Fig. 5: Non-repetitive peak on-state current versus overload duration (Tj initial = +25°C)..

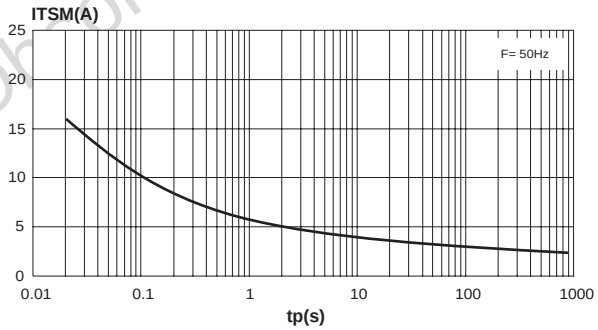
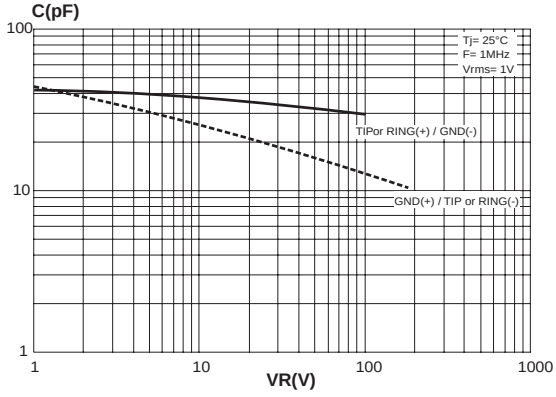
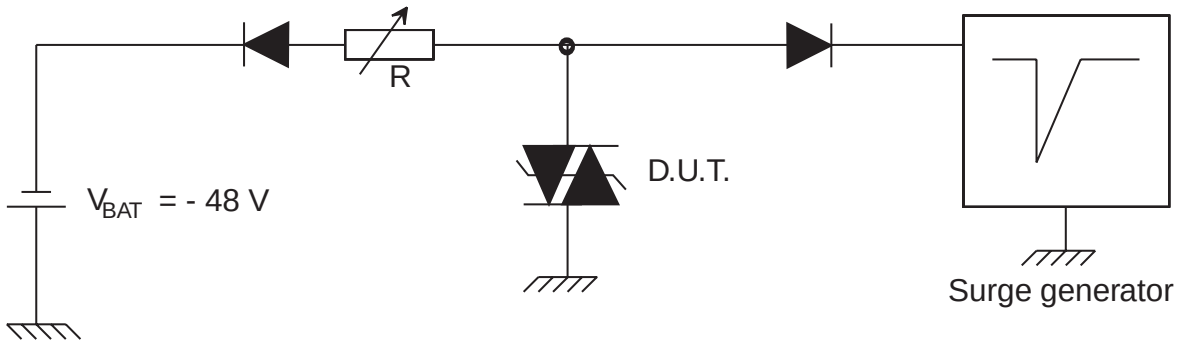


Fig. 6: Capacitance versus applied reverse voltages (typical values).



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

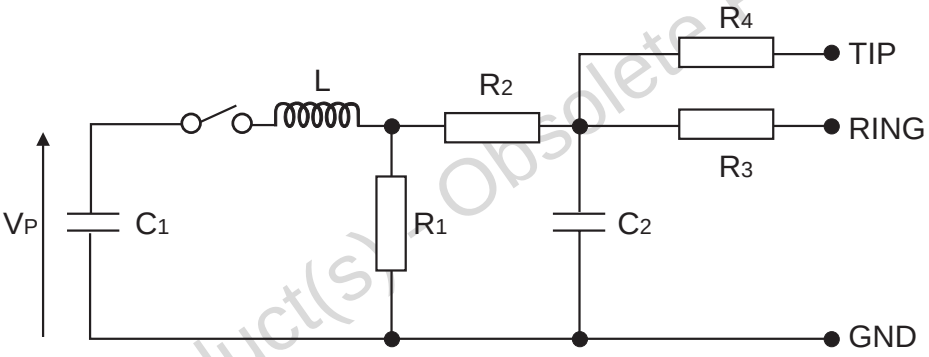


This is a GO-NOGO test which allows to confirm the holding current (I_H) level in a functional test circuit.

TEST PROCEDURE :

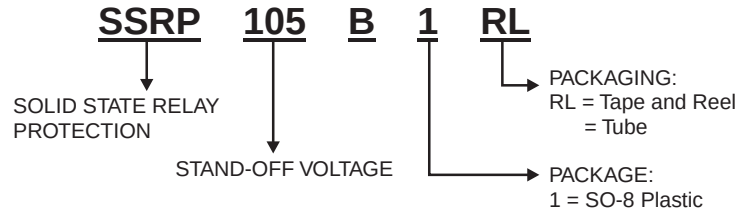
1) Adjust the current level at the I_H value by short circuiting the D.U.T.
2) Fire the D.U.T with a surge Current : Ipp = 10A , 10/1000µs.
3) The D.U.T will come back off-state within 50 ms max.

TEST CIRCUIT FOR V_{BO} PARAMETERS:



Pulse (µs)		V_p	C_1	C_2	L	R_1	R_2	R_3	R_4	I_{PP}	R_p
t_r	t_p	(V)	(µF)	(nF)	(µH)	(Ω)	(Ω)	(Ω)	(Ω)	(A)	(Ω)
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



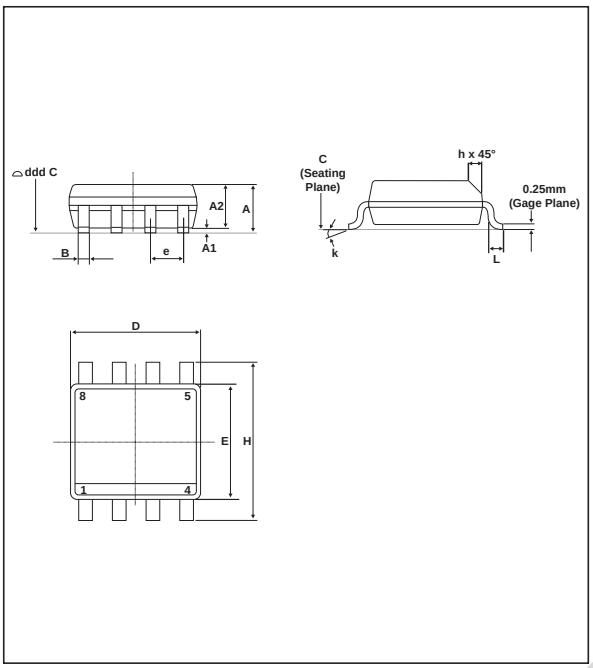
SSRP105B1

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)