



## COMMUNICATION EQUIPMENT PROTECTION: TRISIL™

### FEATURES

- BIDIRECTIONAL CROWBAR PROTECTION
- VOLTAGE RANGE : FROM 8V to 270V
- REPETITIVE PEAK PULSE CURRENT:  
I<sub>PP</sub> = 100 A (10/1000µs)
- HOLDING CURRENT: I<sub>H</sub> = 150mA or 225mA
- LOW LEAKAGE CURRENT: I<sub>R</sub> = 2 µA max

### DESCRIPTION

The SMP100 series are transient surge arrestors used for the protection of sensitive telecom equipment.

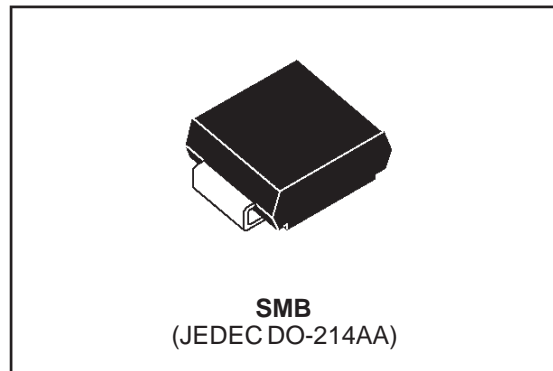
### MAIN APPLICATIONS

Any sensitive equipment requiring protection against lightning strikes :

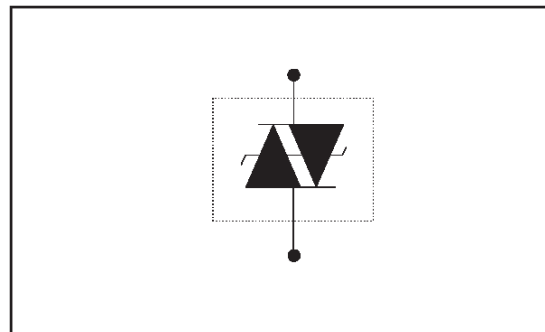
- ANALOG AND DIGITAL LINE CARDS
- MAIN DISTRIBUTION FRAMES
- TERMINALS AND TRANSMISSION EQUIPMENT
- GAS-TUBE REPLACEMENT

### BENEFITS

- NO AGEING AND NO NOISE
- IF DESTROYED, THE SMP100 FALLS INTO SHORT CIRCUIT, STILL ENSURING PROTECTION
- BOARD SPACE SAVING



### SCHEMATIC DIAGRAM



COMPLIES WITH THE FOLLOWING STANDARDS:	Peak Surge Voltage (V)	Voltage Waveform (µs)	Current Waveform (µs)	Admissible I <sub>pp</sub> (A)	Necessary Resistor (Ω)
ITU K20	4000	10/700	5/310	100	-
VDE0433	4000	10/700	5/310	100	-
VDE0878	4000	1.2/50	1/20	100	-
IEC-1000-4-5	level 4	10/700	5/310	100	-
	level 4	1.2/50	8/20	100	-
FCC Part 68, lightning surge type A	1500	10/160	10/160	200	-
	800	10/560	10/560	100	-
FCC Part 68, lightning surge type B	100	9/720	5/320	25	-
BELLCORE TR-NWT-001089 First level	2500	2/10	2/10	500	-
	1000	10/1000	10/1000	100	-
BELLCORE TR-NWT-001089 Second level	5000	2/10	2/10	500	-
CNET I31-24	4000	0.5/700	0.8/310	100	-

## SMP100-xxx

### THERMAL RESISTANCES

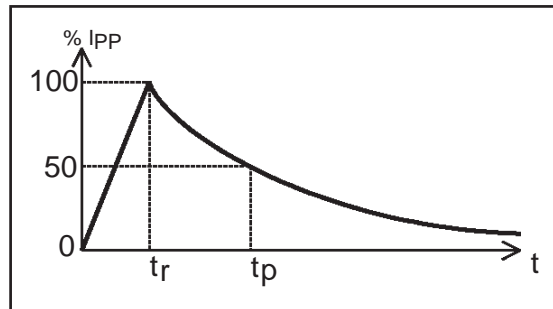
Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	20	°C/W
$R_{th(j-a)}$	Junction to ambient on printed circuit (with standard footprint dimensions)	100	°C/W

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

Symbol	Parameter	Value	Unit
$I_{pp}$	Peak pulse current: 10/1000 $\mu\text{s}$ (open circuit voltage waveform 1 kV 10/1000 $\mu\text{s}$ )	100	A
	5/310 $\mu\text{s}$ (open circuit voltage waveform 4 kV, 10/700 $\mu\text{s}$ )	150	A
	8/20 $\mu\text{s}$ (open circuit voltage waveform 4 kV 1.2/50 $\mu\text{s}$ )	250	A
	2/10 $\mu\text{s}$ (open circuit voltage waveform 2.5kV 2/10 $\mu\text{s}$ )	500	A
$I_{FS}$	Fail-safe mode 8/20 $\mu\text{s}$	5	kA
$I_{TSM}$	Non repetitive surge peak on-state current One cycle 50Hz	55	A
	60Hz	60	A
$I_{TSM}$	Non repetitive surge peak on-state current F = 50Hz 0.2s	25	A
	2s	12	A
$T_L$	Maximum lead temperature for soldering during 10s	260	°C
$T_{stg}$	Storage temperature range	- 55 to + 150	°C
$T_j$	Maximum junction temperature	150	°C

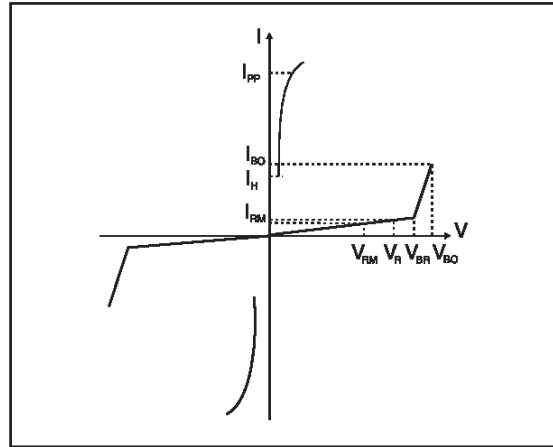
#### Note 1: Pulse waveform

10 / 1000 $\mu\text{s}$	$t_r = 10 \mu\text{s}$	$t_p = 1000 \mu\text{s}$
8 / 20 $\mu\text{s}$	$t_r = 8 \mu\text{s}$	$t_p = 20 \mu\text{s}$
5 / 310 $\mu\text{s}$	$t_r = 5 \mu\text{s}$	$t_p = 310 \mu\text{s}$
1 / 20 $\mu\text{s}$	$t_r = 1 \mu\text{s}$	$t_p = 20 \mu\text{s}$
2 / 10 $\mu\text{s}$	$t_r = 2 \mu\text{s}$	$t_p = 10 \mu\text{s}$



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

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

**STATIC PARAMETERS**

Type	$I_{RM} @ V_{RM}$ max.		$I_R @ V_R$ max. note 1		$V_{BO} @ I_{BO}$ max. note 2		$I_H$ min. note 3	C typ. note 4
	$\mu\text{A}$	V	$\mu\text{A}$	V	V	mA	mA	pF
SMP100-8	2	6	50	8	20	800	50(typ)	100
SMP100LC-35	2	32	50	35	55	800	150	90
SMP100-65	2	55	50	65	80	800	150	160
SMP100-120	2	110	50	120	160	800	150	140
SMP100-140	2	120	50	140	200	800	150	140
SMP100-200	2	170	50	200	265	800	150	130
SMP100-230	2	200	50	230	300	800	150	120
SMP100-270	2	230	50	270	350	800	150	120
SMP100-140H225	2	120	50	140	200	800	225	140
SMP100-200H225	2	170	50	200	265	800	225	130
SMP100-230H225	2	200	50	230	300	800	225	130
SMP100-270H225	2	230	50	270	350	800	225	120

**Note 1** :  $I_R$  measured at  $V_R$  guarantees  $V_{BR} > V_R$

**Note 2** : Measured at 50Hz, see test circuit 1. In any case  $V_{BOmin} \geq V_{BR}$

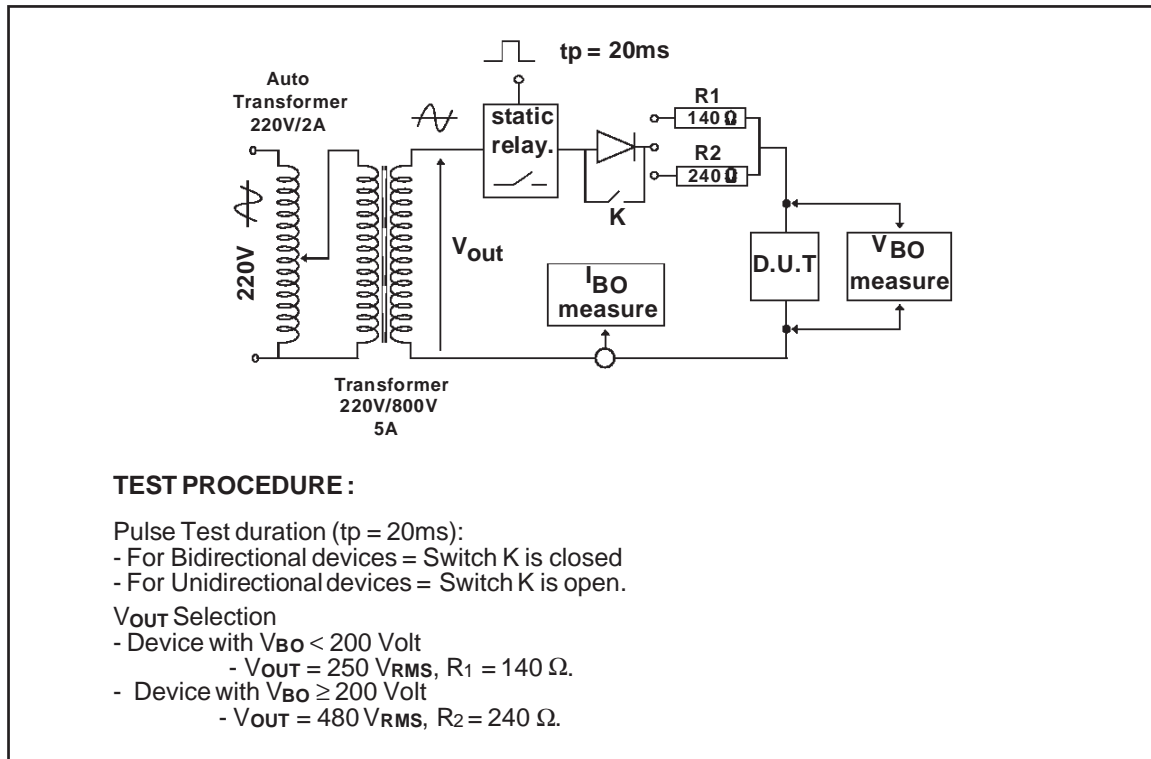
**Note 3** : See functional holding current test circuit 2.

**Note 4** :  $V_R = 1\text{V}$  bias,  $V_{RMS} = 1\text{V}$ ,  $F = 1\text{MHz}$ .

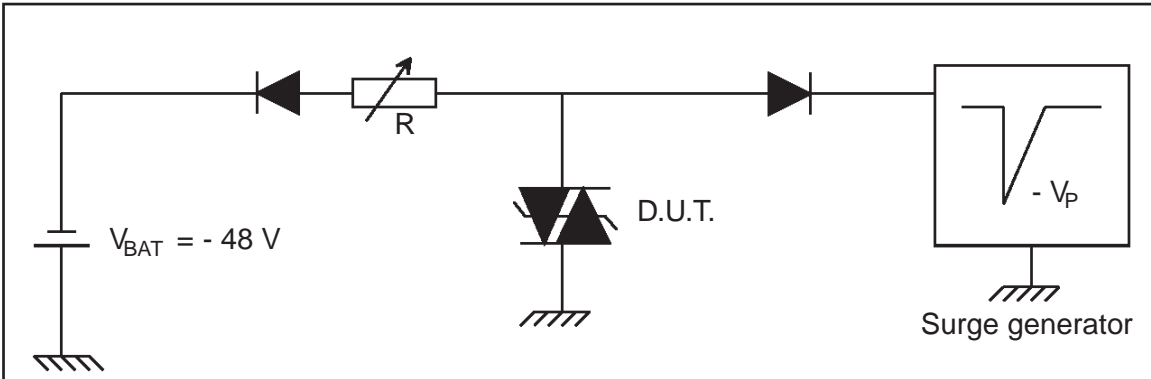
## DYNAMIC PARAMETERS

Symbol	Test conditions (see note 5)	Type	Max.	Unit
$V_{BO}$	<p><b>Test conditions 1</b>  <math>dV/dt = 100 \text{ V}/\mu\text{s}</math>, <math>di/dt &lt; 10 \text{ A}/\mu\text{s}</math>, <math>I_{PP} = 100 \text{ A}</math></p> <p><b>Test conditions 2</b>  <math>dV/dt = 1 \text{ kV}/\mu\text{s}</math>, <math>di/dt &lt; 10 \text{ A}/\mu\text{s}</math>, <math>I_{PP} = 10 \text{ A}</math></p>	SMP100-8	25	V
		SMP100LC-35	55	
		SMP100-65	95	
		SMP100-120	200	
		SMP100-140	220	
		SMP100-200	285	
		SMP100-230	320	
		SMP100-270	370	
		SMP100-140H225	220	
		SMP100-200H225	285	
		SMP100-230H225	320	
		SMP100-270H225	370	

**Note 5 :**  $V_{BO}$  parameters are given by a KeyTek 'System 2' generator with PN2461 module.  
 See test circuits 3 for  $V_{BO}$  dynamic parameters.

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

**TEST CIRCUIT 2 for  $I_H$  parameter.**

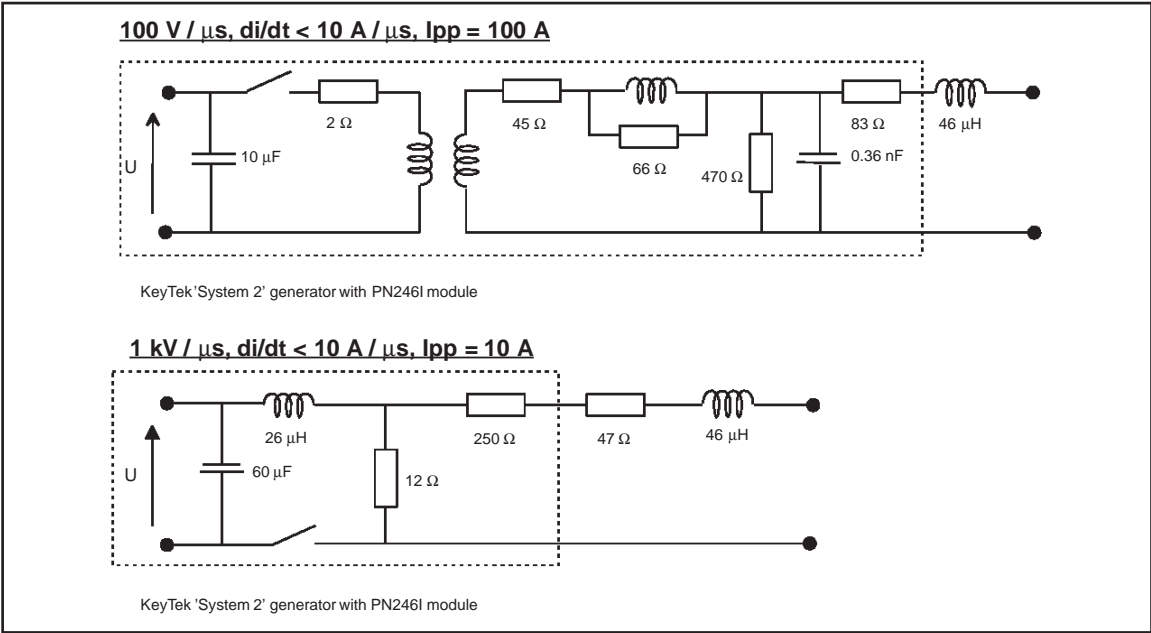


This is a GO-NO GO test which allows to confirm the holding current ( $I_H$ ) level in a functional test circuit.

**TEST PROCEDURE :**

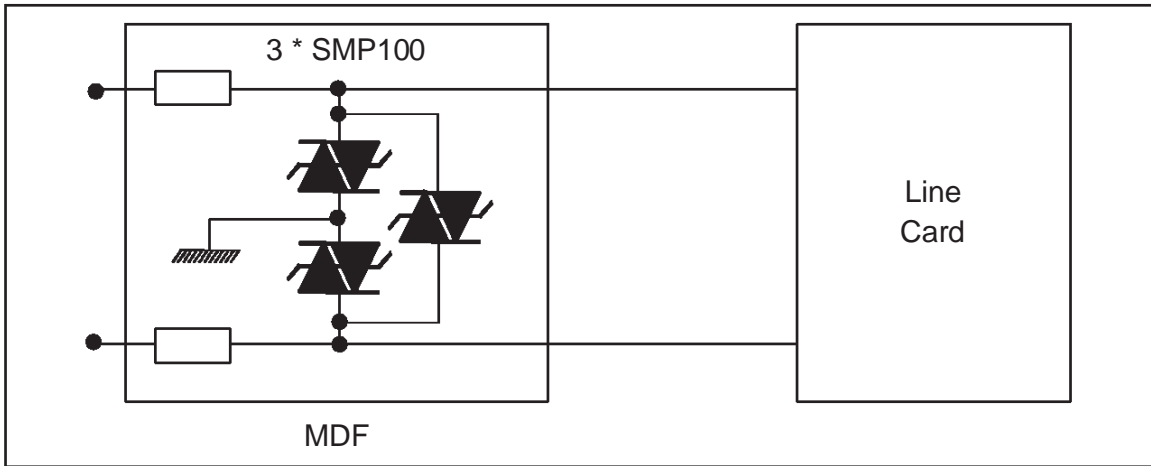
- Adjust the current level at the  $I_H$  value by short circuiting the D.U.T.
- Fire the D.U.T. with a surge current :  $I_{pp} = 10A, 10/1000 \mu s$ .
- The D.U.T. will come back to the off-state within 50 ms max.

**TEST CIRCUITS 3 FOR  $V_{BO}$  DYNAMIC PARAMETERS**

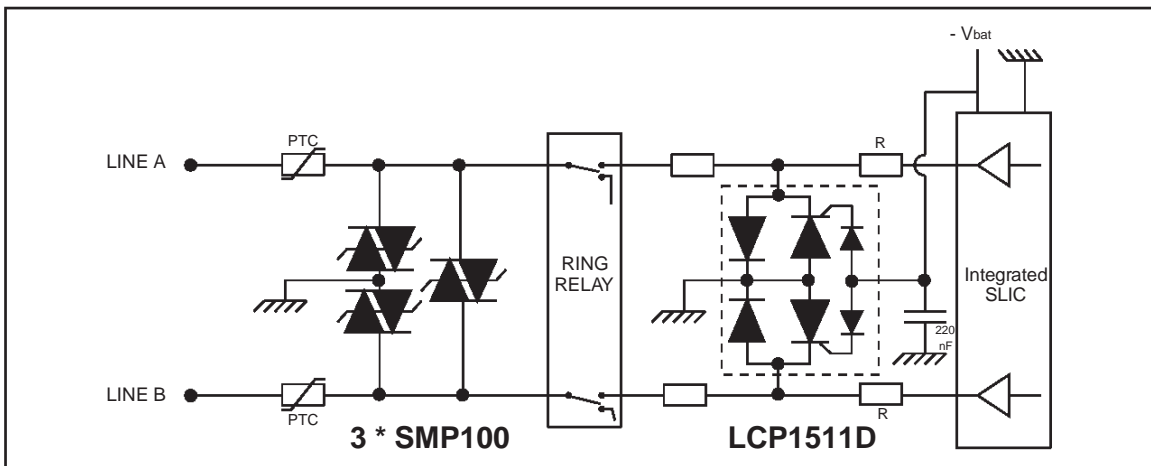


TYPICAL APPLICATIONS

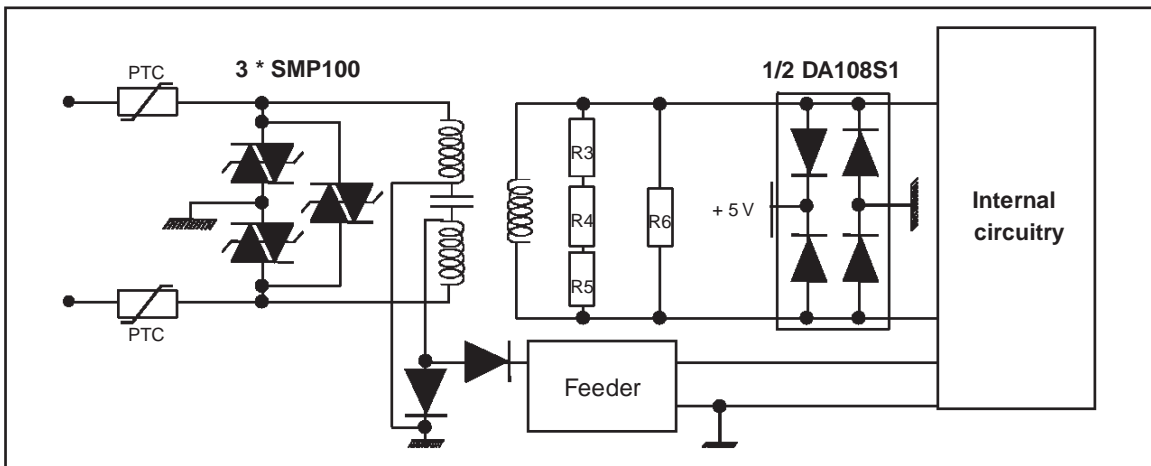
1 - Primary protection module



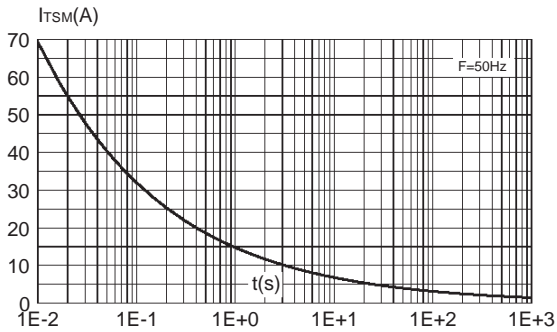
2 - Line card protection



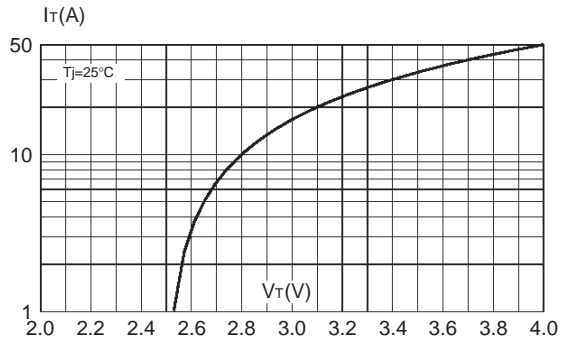
3 - ISDN: U interface protection



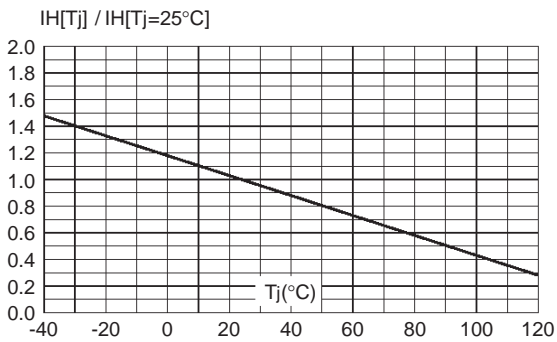
**Fig 1 :** Non repetitive surge peak on-state current versus overload duration ( $T_j$  initial = 25 °C).



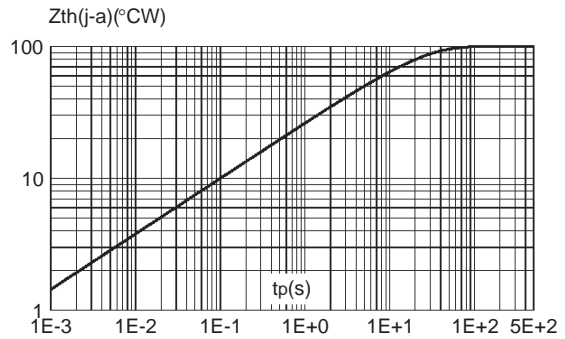
**Fig 2 :** On-state voltage versus on-state current (typical values).



**Fig 3 :** Relative variation of holding current versus junction temperature.

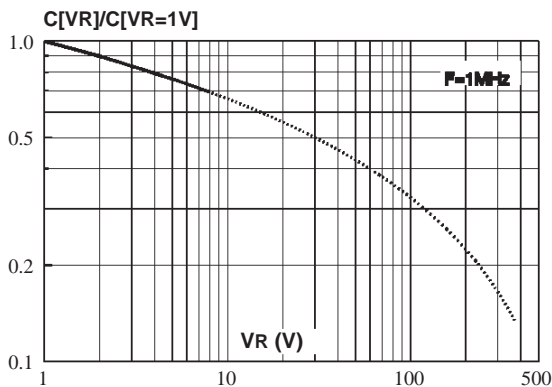


**Fig 4 :** Variation of thermal impedance junction to ambient versus pulse duration.



**Fig 5 :** Relative variation of junction capacitance versus reverse voltage applied (typical values).

**Note :** For other types than SMP100-8, the curve can be extrapolated (dotted line)



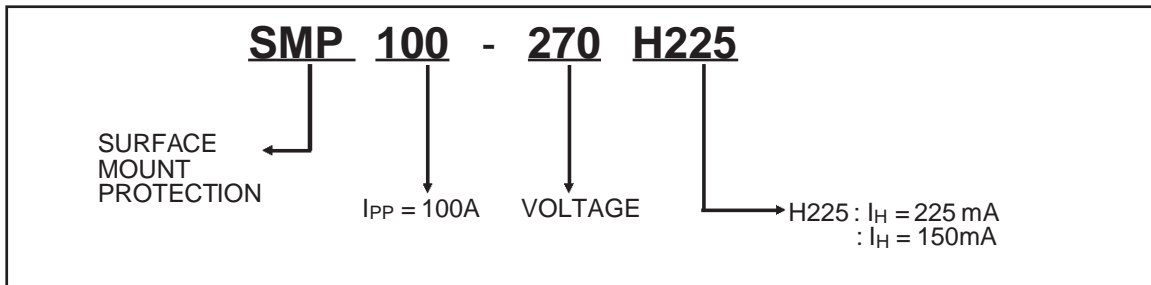
## SMP100-xxx

### MARKING

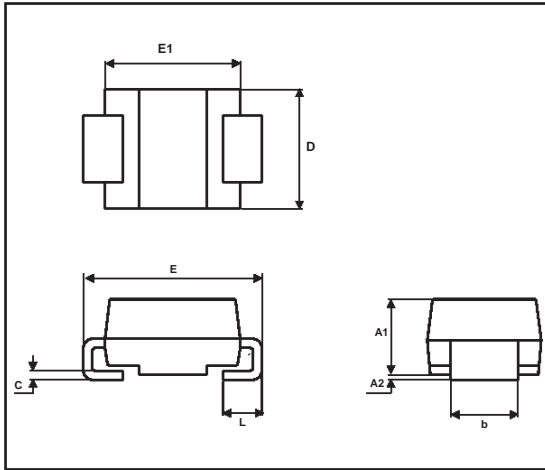
Type	Marking	Package	Weight	Base qty	Delivery mode
SMP100-8	PL8	SMB	0.107g	2500	Tape & Reel
SMP100LC-35	L35	SMB	0.107g	2500	Tape & Reel
SMP100-65	P06	SMB	0.107g	2500	Tape & Reel
SMP100-120	P12	SMB	0.107g	2500	Tape & Reel
SMP100-140	P14	SMB	0.107g	2500	Tape & Reel
SMP100-200	P20	SMB	0.107g	2500	Tape & Reel
SMP100-230	P23	SMB	0.107g	2500	Tape & Reel
SMP100-270	P27	SMB	0.107g	2500	Tape & Reel
SMP100-140H125	P16	SMB	0.107g	2500	Tape & Reel
SMP100-200H225	P22	SMB	0.107g	2500	Tape & Reel
SMP100-230H225	P24	SMB	0.107g	2500	Tape & Reel
SMP100-270H225	P29	SMB	0.107g	2500	Tape & Reel

- Epoxy meets UL94, V0

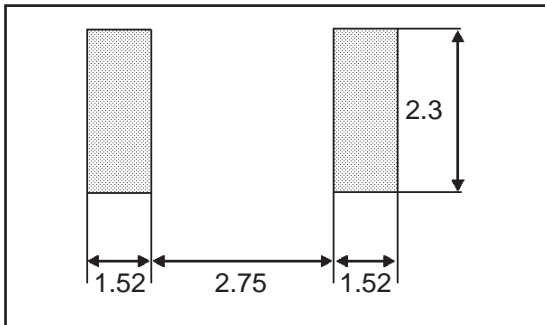
### ORDER CODE





**PACKAGE MECHANICAL DATA**  
 SMB (Plastic)


REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.41	0.006	0.016
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
D	3.30	3.95	0.130	0.156
L	0.75	1.60	0.030	0.063

**FOOT PRINT (in millimeters)**


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