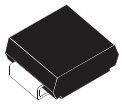
SMP80MC

TRISIL™ for telecom equipment protection

Features

- Bidirectional crowbar protection
- Voltage: range from 120 V to 320 V
- Low V_{BO} / V_R ratio
- Micro capacitance equal to 12 pF @ 50 V
- Low leakage current : I_R = 2 µA max
- Holding current: I_H = 150 mA min
- Repetitive peak pulse current :
- I_{PP} = 80 A (10/1000 µs)

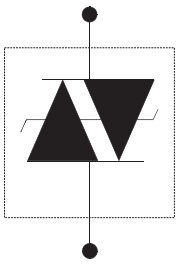


SMB
(JEDEC DO-214AA)

Order codes

Part Number	Marking
SMP80MC-120	TP12
SMP80MC-140	TP14
SMP80MC-160	TP16
SMP80MC-200	TP20
SMP80MC-230	TP23
SMP80MC-270	TP27
SMP80MC-320	TP32

Schematic diagram



Main applications

Any sensitive equipment requiring protection against lightning strikes and power crossing:

- Terminals (phone, fax, modem...) and central office equipment

Description

The SMP80MC is a series of micro capacitance transient surge arrestors designed for the protection of high debit rate communication equipment on CPE side. Its micro capacitance avoids any distortion of the signal and is compatible with digital transmission like ADSL2 and ADSL2+.

Benefits

Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection. They are used to help equipment to meet main standards such as UL1950, IEC950 / CSA C22.2 and UL1459. They have UL94 V0 approved resin. SMB package is JEDEC registered (DO-214AA). Trisils comply with the following standards GR-1089 Core, ITU-T-K20/K21, VDE0433, VDE0878, IEC61000-4-5 and FCC part 68.

TM: TRISIL is a trademark of STMicroelectronics.

1 Characteristics

Table 1. Complies with the following standards

STANDARD	Peak Surge Voltage (V)	Waveform Voltage	Required peak current (A)	Current waveform	Minimum serial resistor to meet standard (Ω)
GR-1089 Core First level	2500 1000	2/10 µs 10/1000 µs	500 100	2/10 µs 10/1000 µs	5 2.5
GR-1089 Core Second level	5000	2/10 µs	500	2/10 µs	10
GR-1089 Core Intra-building	1500	2/10 µs	100	2/10 µs	0
ITU-T-K20/K21	6000 1500	10/700 µs	150 37.5	5/310 µs	10 0
ITU-T-K20 (IEC61000-4-2)	8000 15000	1/60 ns	ESD contact discharge ESD air discharge		0 0
VDE0433	4000 2000	10/700 µs	100 50	5/310 µs	0 0
VDE0878	4000 2000	1.2/50 µs	100 50	1/20 µs	0 0
IEC61000-4-5	4000 4000	10/700 µs 1.2/50 µs	100 100	5/310 µs 8/20 µs	0 0
FCC Part 68, lightning surge type A	1500 800	10/160 µs 10/560 µs	200 100	10/160 µs 10/560 µs	2.5 0
FCC Part 68, lightning surge type B	1000	9/720 µs	25	5/320 µs	0

Table 2. Absolute ratings (T_{amb} = 25° C)

Symbol	Parameter	Conditions	Value	Unit
I_{PP}	Repetitive peak pulse current (see *Figure 1*)	10/1000 µs 8/20 µs 10/560 µs 5/310 µs 10/160 µs 1/20 µs 2/10 µs	80 200 100 120 150 200 250	A
I_{FS}	Fail-safe mode : maximum current (1)	8/20 µs	5	kA
I_{TSM}	Non repetitive surge peak on-state current (sinusoidal)	t = 0.2 s t = 1 s t = 2 s t = 15 mn	14 8 6.5 2	A
I^2t	I^2t value for fusing	t = 16.6 ms t = 20 ms	7.5 7.8	A^2s
T_{stg} T_j	Storage temperature range Maximum junction temperature		-55 to 150 150	° C
T_L	Maximum lead temperature for soldering during 10 s.		260	° C

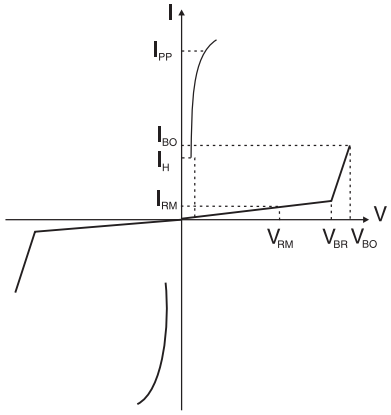
1. in fail safe mode, the device acts as a short circuit

Table 3. Thermal resistances

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

Table 4. Electrical characteristics (T_{amb} = 25° C)

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



Types	I_{RM} @ V_{RM} max.		I_R @ V_R(1) max.		Dynamic V_{BO}(2) max.	Static V_{BO} @ I_{BO}(3) max.		I_H(4) min.	C(5) typ.	C(6) typ.
	µA	V	µA	V	V	V	mA	mA	pF	pF
SMP80MC-120	2	108	5	120	155	155	800	150	12	25
SMP80MC-140		126		140	180	180				
SMP80MC-160		144		160	205	205				
SMP80MC-200		180		200	255	255				
SMP80MC-230		207		230	295	295				
SMP80MC-270		243		270	345	345				
SMP80MC-320		290		320	400	400				

1. I_R measured at V_R guarantee V_{BR} min ≥ VR
2. See *Figure 9* functional test circuit 1
3. See *Figure 10* test circuit 2
4. See *Figure 11* functional holding current test circuit 3
5. V_R = 50 V bias, V_{RMS} = 1 V, F= 1 MHz
6. V_R = 2 V bias, V_{RMS} = 1 V, F = 1 MHz

Figure 1. Pulse waveform

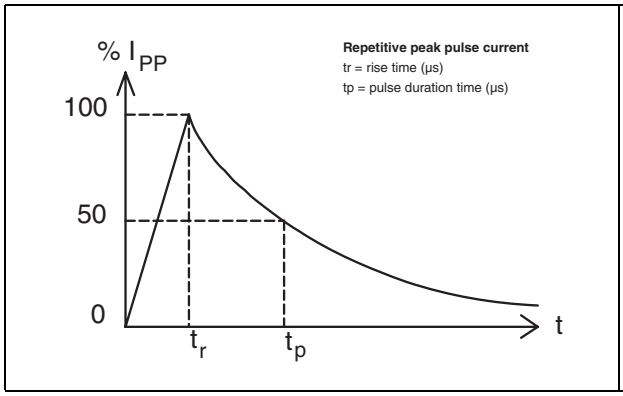


Figure 2. Non repetitive surge peak on-state current versus overload duration

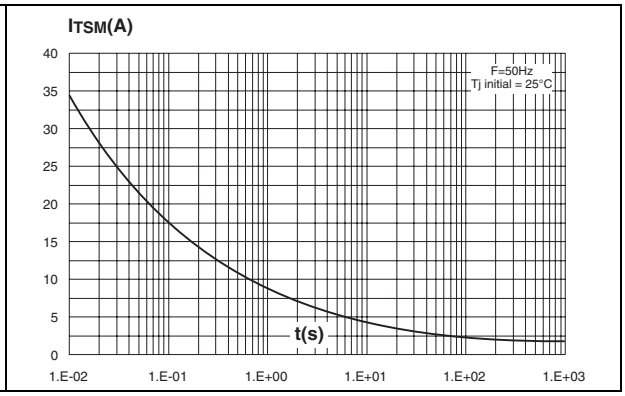


Figure 3. On-state voltage versus on-state current (typical values)

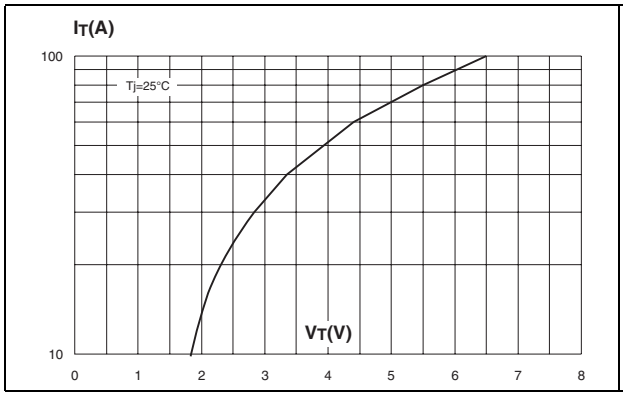


Figure 4. Relative variation of holding current versus junction temperature

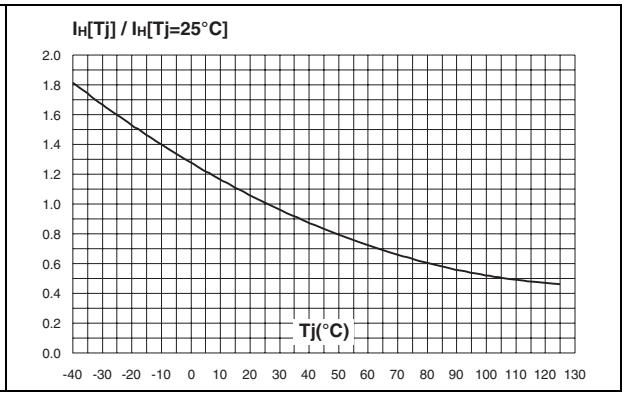


Figure 5. Relative variation of breakover voltage versus junction temperature

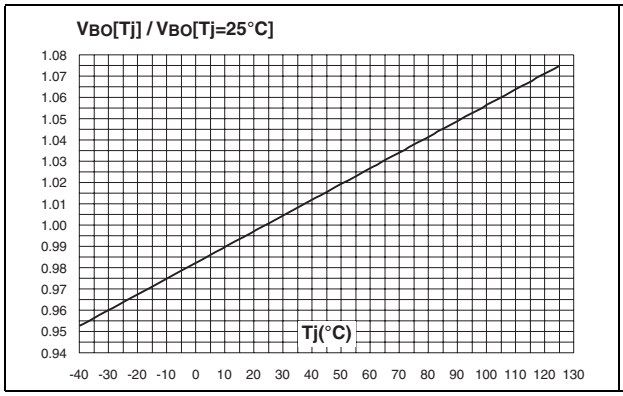


Figure 6. Relative variation of leakage current versus junction temperature (typical values)

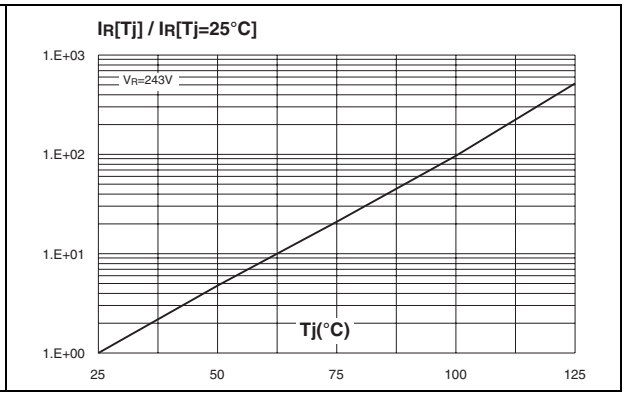


Figure 7. Variation of thermal impedance junction to ambient versus pulse duration (Printed circuit board FR4, SCu=35µm, recommended pad layout)

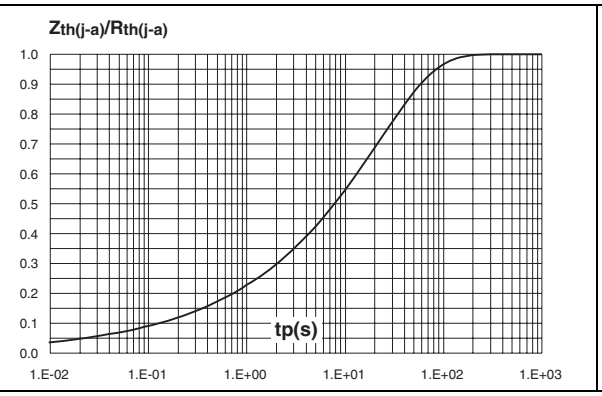


Figure 8. Relative variation of junction capacitance versus reverse voltage applied (typical values)

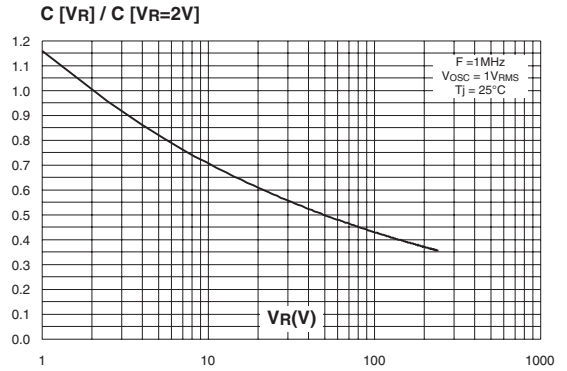


Figure 9. Test circuit 1 for dynamic IBO and VBO parameters

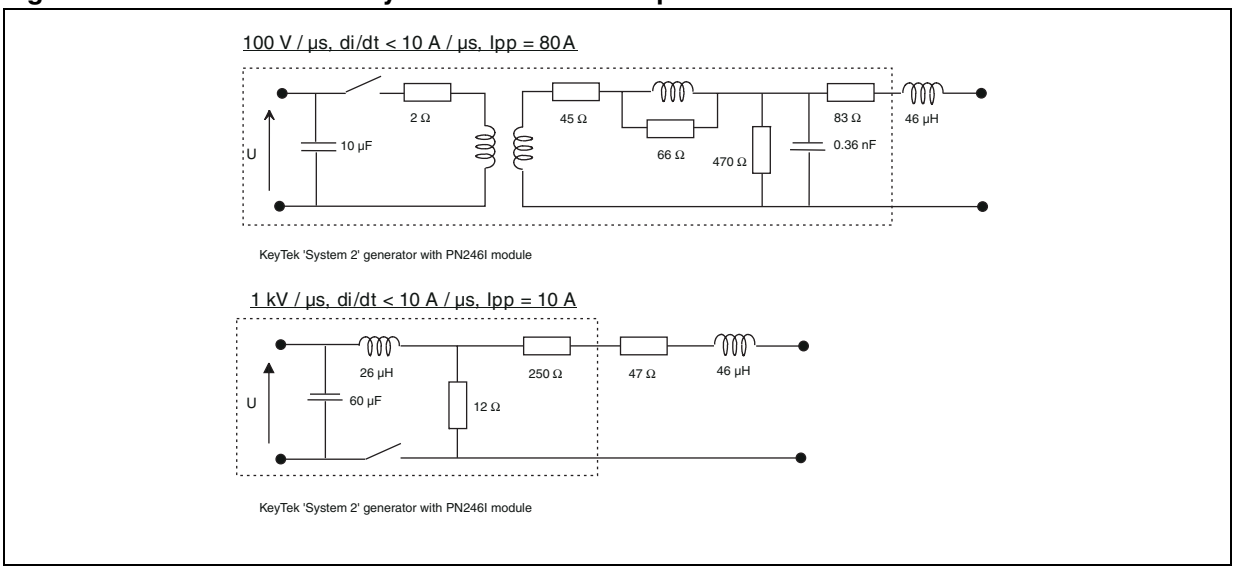
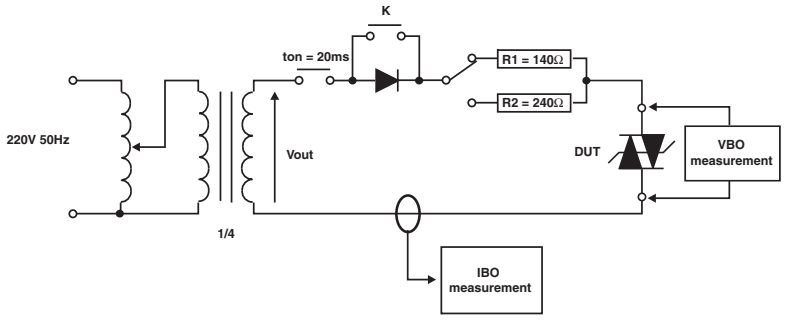


Figure 10. Test circuit 2 for IBO and VBO parameters



TEST PROCEDURE

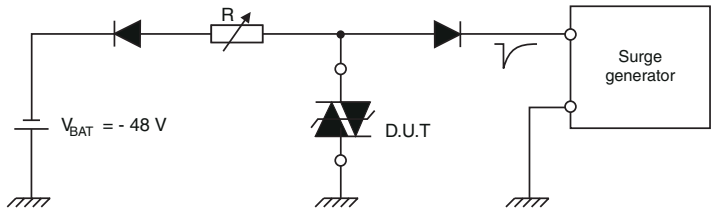
Pulse test duration (tp = 20ms):

- for Bidirectional devices = Switch K is closed
- for Unidirectional devices = Switch K is open

V_{OUT} selection:

- Device with V_{BO} < 200V → V_{OUT} = 250 V_{RMS}, R1 = 140Ω
- Device with V_{BO} ≥ 200V → V_{OUT} = 480 V_{RMS}, R2 = 240Ω

Figure 11. Test circuit 3 for dynamic IH parameter



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

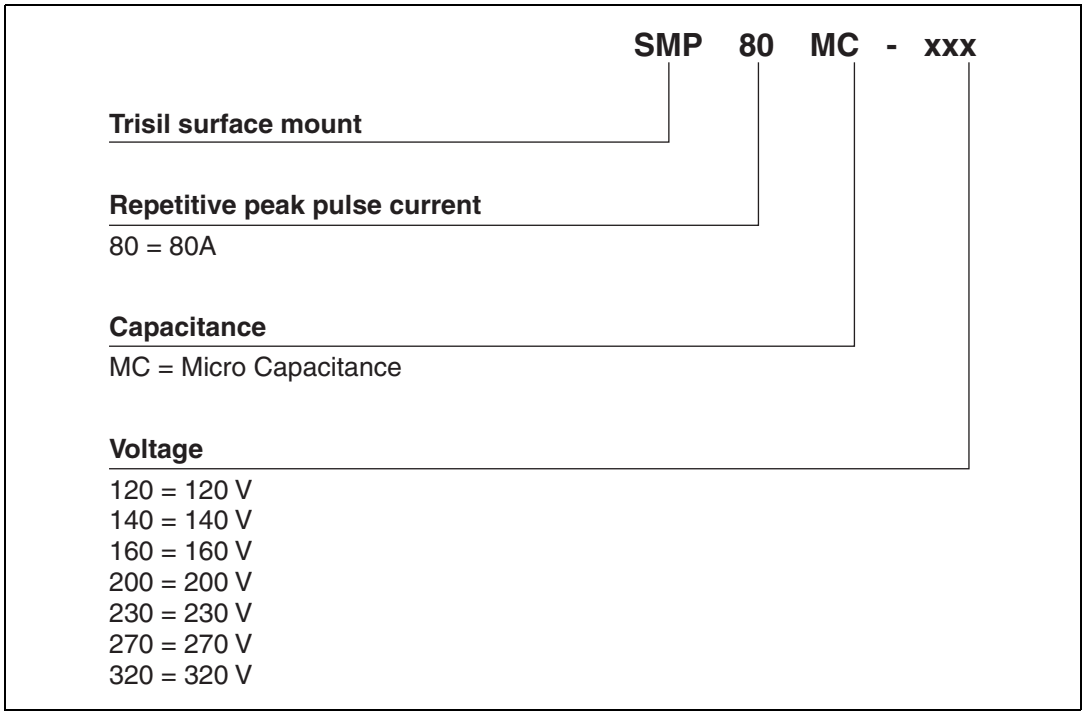
TEST PROCEDURE

1/ Adjust the current level at the I_H value by short circuiting the AK of 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 50ms maximum.

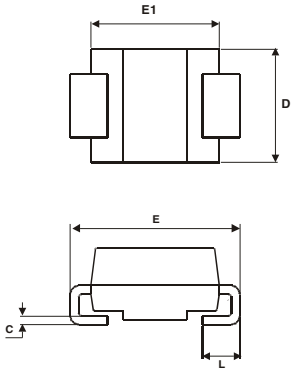
2 Ordering Information Scheme



3 Package information

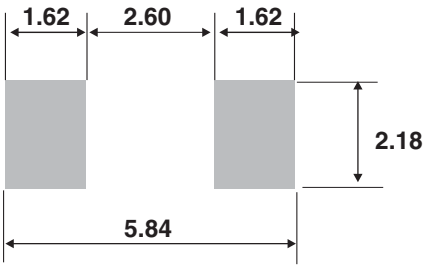
- Epoxy meets UL94, V0

Table 5. SMB dimensions



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	0.40	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	1.50	0.030	0.059

Figure 12. Footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
SMP80MC-120	TP12	SMB	0.11 g	2500	Tape and reel
SMP80MC-140	TP14				
SMP80MC-160	TP16				
SMP80MC-200	TP20				
SMP80MC-230	TP23				
SMP80MC-270	TP27				
SMP80MC-320	TP32				

5 Revision history

Date	Revision	Description of Changes
September-2001	1	First issue.
11-May-2005	2	New types introduction.
20-Jun-2005	3	Qualification of new types
18-Jan-2007	4	Reformatted to current standards. Added product SMP80MC-320

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