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)

Benefits

- Trisils are not subject to ageing and provide a fail safe mode in short circuit for better protection.
- Helps equipment meet main standards such as UL60950, IEC 950 / CSA C22.2 and UL1459.
- Epoxy meets UL94, V0.
- Package is JEDEC registered (DO-214AA).

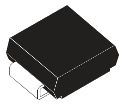
Complies with the following standards

- GR-1089 Core
- ITU-T-K20/K21
- IEC 61000-4-5
- TIA/EIA IS-968
- UL497B recognized, UL file E136224

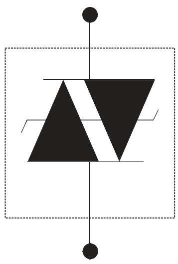
Applications

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

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



SMB
(JEDEC DO-214AA)



Description

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

TM: Trisil is a trademark of STMicroelectronics.

1 Characteristics

Table 1. In compliance 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
IEC61000-4-5	4000 4000	10/700 µs 1.2/50 µs	100 100	5/310 µs 8/20 µs	0 0
TIA/EIA IS-968, lightning surge type A	1500 800	10/160 µs 10/560 µs	200 100	10/160 µs 10/560 µs	2.5 0
TIA/EIA IS-968, 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 2*)	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}	Storage temperature range		-55 to 150	°C
T_j	Operating junction temperature range		-40 to 150	
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

Figure 1. Electrical characteristics - definitions (T_{amb} = 25 °C)

Symbol	Parameter
V_{RM}	Stand-off 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

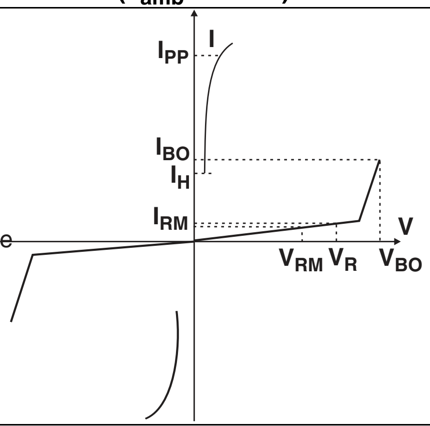


Table 4. Electrical characteristics - values (T_{amb} = 25 °C)

Types	I_{RM} @ V_{RM} max.		I_R @ V_R max.		Dynamic V_{BO}(1) max.	Static V_{BO} @ I_{BO}(2) max.	max.	I_H(3) min.	C(4) typ.	C(5) 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. See *Figure 10: Test circuit 1 for dynamic I_{BO} and V_{BO} parameters*
2. See *Figure 11: Test circuit 2 for I_{BO} and V_{BO} parameters*
3. See *Figure 12: Test circuit 3 for dynamic I_H parameter*
4. V_R = 50 V bias, V_{RMS} = 1 V, F= 1 MHz
5. V_R = 2 V bias, V_{RMS} = 1 V, F = 1 MHz

Figure 2. Pulse waveform

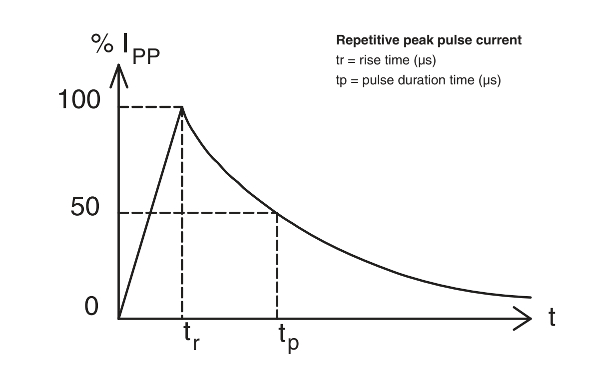


Figure 3. Non repetitive surge peak on-state current versus overload duration

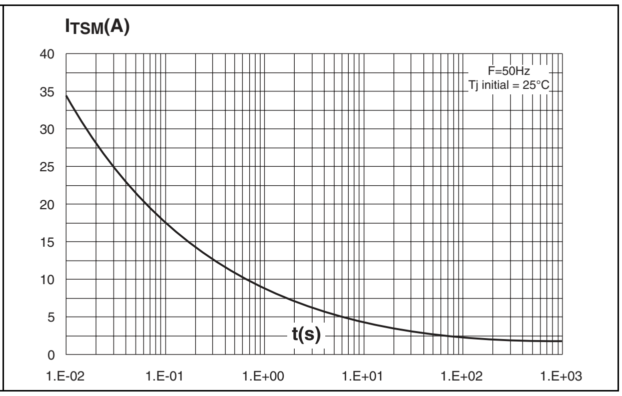


Figure 4. On-state voltage versus on-state current (typical values)

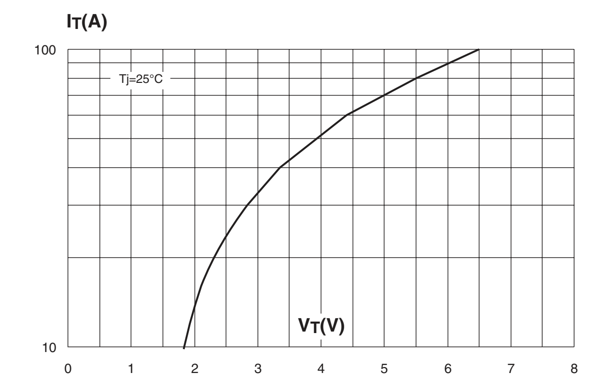


Figure 5. Relative variation of holding current versus junction temperature

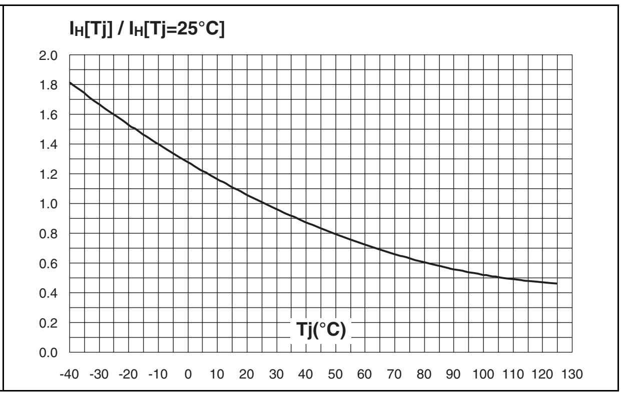


Figure 6. Relative variation of breakover voltage versus junction temperature

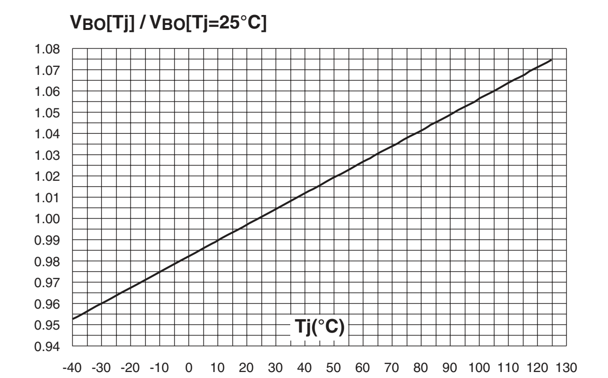


Figure 7. Relative variation of leakage current versus junction temperature (typical values)

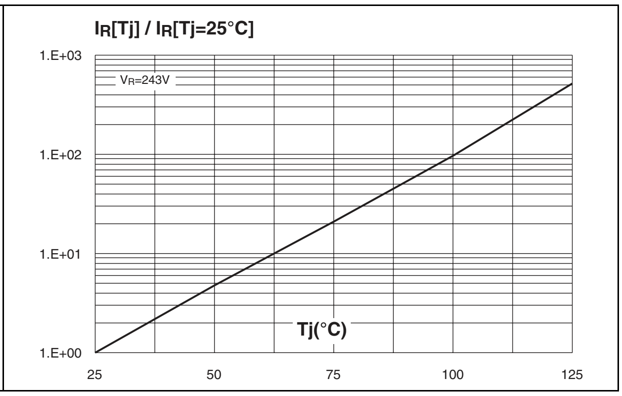


Figure 8. Variation of thermal impedance junction to ambient versus pulse duration

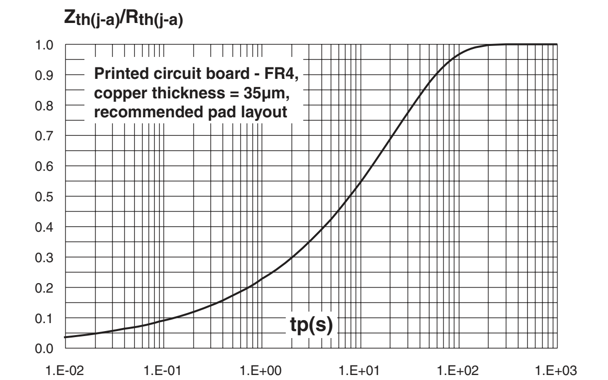


Figure 9. Relative variation of junction capacitance versus reverse voltage applied (typical values)

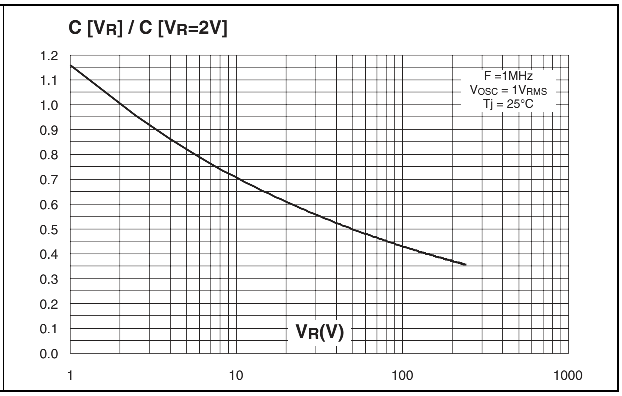


Figure 10. Test circuit 1 for dynamic I_{BO} and V_{BO} parameters

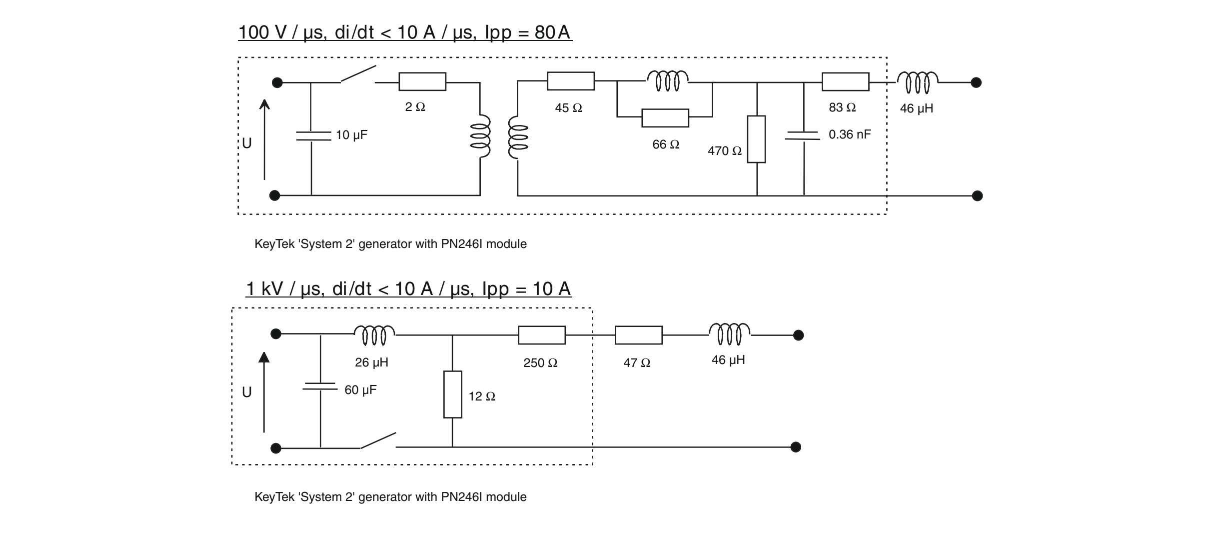
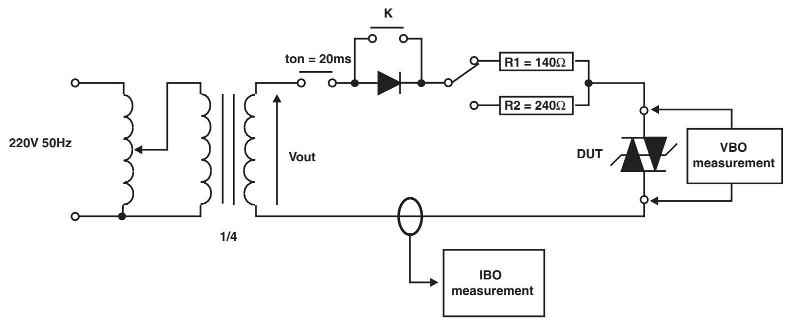


Figure 11. Test circuit 2 for I_{BO} and V_{BO} parameters



TEST PROCEDURE

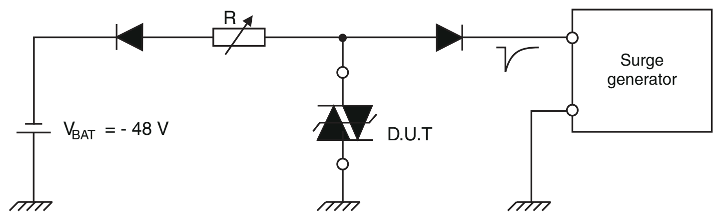
Pulse test duration (tp = 20ms):

- 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 12. Test circuit 3 for dynamic I_H 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

Figure 13. Ordering information scheme

SMP 80 MC - xxx

Trisil surface mount

Repetitive peak pulse current
80 = 80 A

Capacitance
MC = Micro capacitance

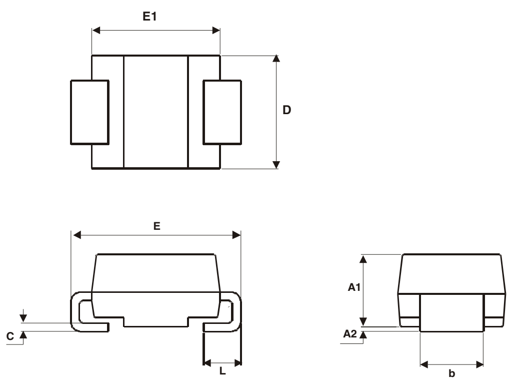
Voltage
120 = 120 V
140 = 140 V
160 = 160 V
200 = 200 V
230 = 230 V
270 = 270 V
320 = 320 V

3 Package information

- Epoxy meets UL94, V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

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 14. Footprint dimensions in mm (inches)

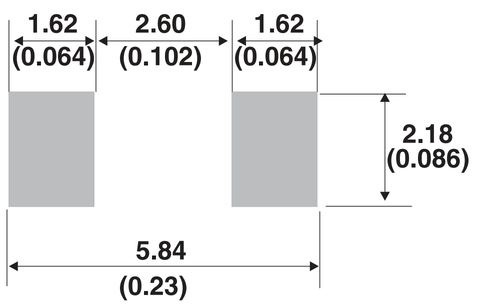
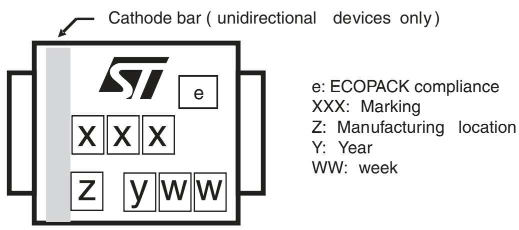


Figure 15. Marking layout(1)



1. Marking layout can vary according to assembly location.

4 Ordering information

Table 6. Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
SMP80MC-120	TP12	SMB	98 mg	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

Table 7. Document revision history

Date	Revision	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	Added product SMP80MC-320
09-Feb-2012	5	Added UL statement in *Complies with the following standards*