

## 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:  $I_R = 2 \mu\text{A}$  max
- Holding current:  $I_H = 150 \text{ mA}$  min.
- Repetitive peak pulse current:  
 $I_{PP} = 80 \text{ A}$  (10/1000  $\mu\text{s}$ )

### 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).

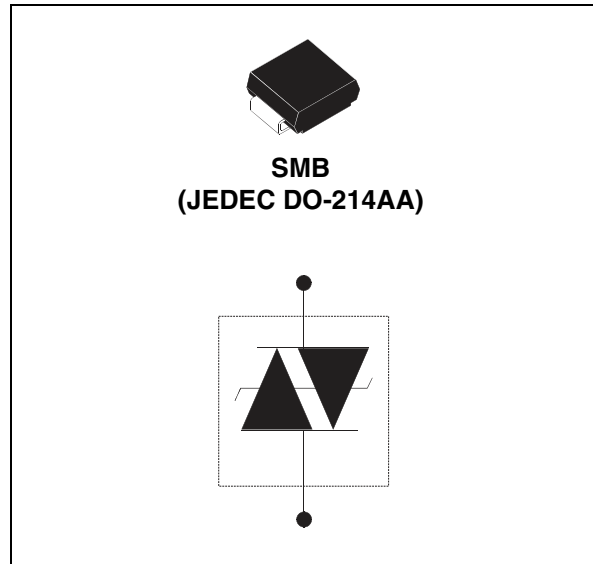
### Complies with the following standards

- 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



### 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+.

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# 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 ( $\Omega$ )
<b>GR-1089 Core First level</b>	2500	2/10 $\mu$ s	500	2/10 $\mu$ s	5
	1000	10/1000 $\mu$ s	100	10/1000 $\mu$ s	2.5
<b>GR-1089 Core Second level</b>	5000	2/10 $\mu$ s	500	2/10 $\mu$ s	10
<b>GR-1089 Core Intra-building</b>	1500	2/10 $\mu$ s	100	2/10 $\mu$ s	0
<b>ITU-T-K20/K21</b>	6000	10/700 $\mu$ s	150	5/310 $\mu$ s	10
	1500		37.5		0
<b>ITU-T-K20 (IEC61000-4-2)</b>	8000	1/60 ns	ESD contact discharge		0
	15000		ESD air discharge		0
<b>IEC61000-4-5</b>	4000	10/700 $\mu$ s	100	5/310 $\mu$ s	0
	4000	1.2/50 $\mu$ s	100	8/20 $\mu$ s	0
<b>TIA/EIA IS-968, lightning surge type A</b>	1500	10/160 $\mu$ s	200	10/160 $\mu$ s	2.5
	800	10/560 $\mu$ s	100	10/560 $\mu$ s	0
<b>TIA/EIA IS-968, lightning surge type B</b>	1000	9/720 $\mu$ s	25	5/320 $\mu$ s	0

**Table 2. Absolute ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

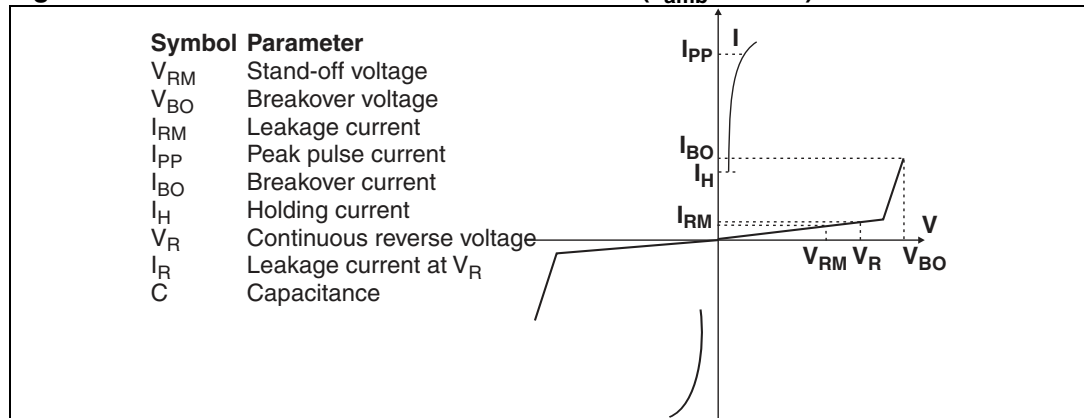
Symbol	Parameter	Conditions	Value	Unit
$I_{PP}$	Repetitive peak pulse current (see <a href="#">Figure 2</a> )	10/1000 $\mu\text{s}$	80	A
		8/20 $\mu\text{s}$	200	
		10/560 $\mu\text{s}$	100	
		5/310 $\mu\text{s}$	120	
		10/160 $\mu\text{s}$	150	
		1/20 $\mu\text{s}$	200	
		2/10 $\mu\text{s}$	250	
$I_{FS}$	Fail-safe mode: maximum current <sup>(1)</sup>	8/20 $\mu\text{s}$	5	kA
$I_{TSM}$	Non repetitive surge peak on-state current (sinusoidal)	t = 0.2 s	14	A
		t = 1 s	8	
		t = 2 s	6.5	
		t = 15 mn	2	
$I^2t$	$I^2t$ value for fusing	t = 16.6 ms	7.5	$\text{A}^2\text{s}$
		t = 20 ms	7.8	
$T_{stg}$	Storage temperature range		-55 to 150	$^{\circ}\text{C}$
$T_j$	Operating junction temperature range		-40 to 150	
$T_L$	Maximum lead temperature for soldering during 10 s.		260	

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	$^{\circ}\text{C}/\text{W}$
$R_{th(j-l)}$	Junction to leads	20	$^{\circ}\text{C}/\text{W}$

**Figure 1. Electrical characteristics - definitions ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**



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

Types	$I_{RM} @ V_{RM}$		$I_R @ V_R$		Dynamic $V_{BO}^{(1)}$	Static $V_{BO} @ I_{BO}^{(2)}$		$I_H^{(3)}$	$C^{(4)}$	$C^{(5)}$
	max.		max.		max.	max.	max.	min.	typ.	typ.
	$\mu A$	V	$\mu A$	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.  $V_R = 50\text{ V}$  bias,  $V_{RMS} = 1\text{ V}$ ,  $F = 1\text{ MHz}$
5.  $V_R = 2\text{ V}$  bias,  $V_{RMS} = 1\text{ V}$ ,  $F = 1\text{ MHz}$

Figure 2. Pulse waveform

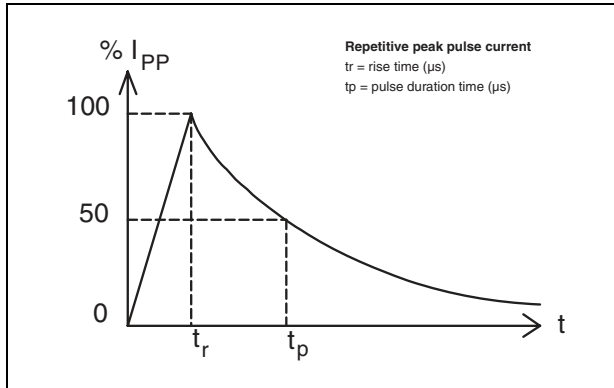


Figure 3. Non repetitive surge peak on-state current versus overload duration

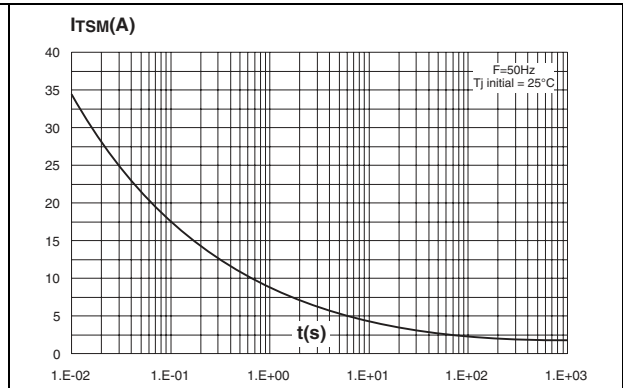


Figure 4. On-state voltage versus on-state current (typical values)

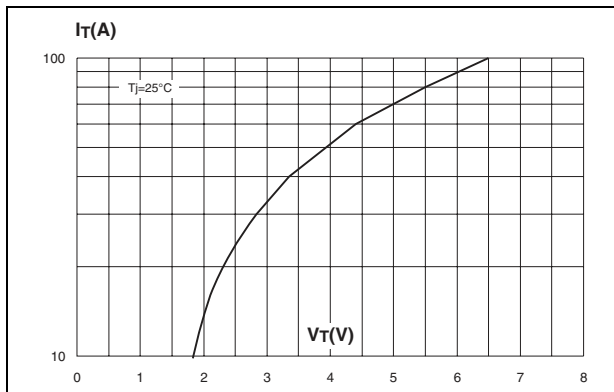


Figure 5. Relative variation of holding current versus junction temperature

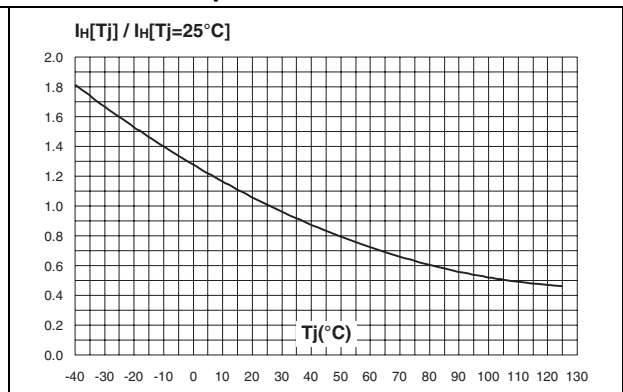


Figure 6. Relative variation of breakover voltage versus junction temperature

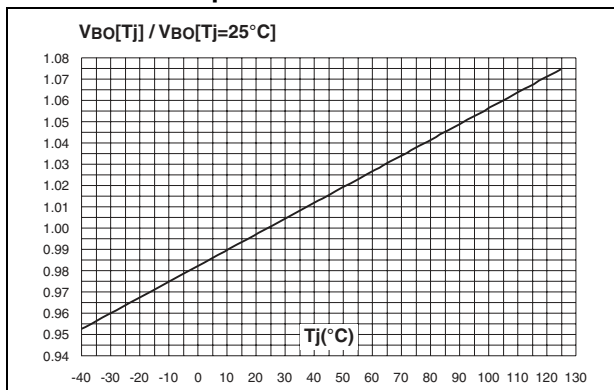
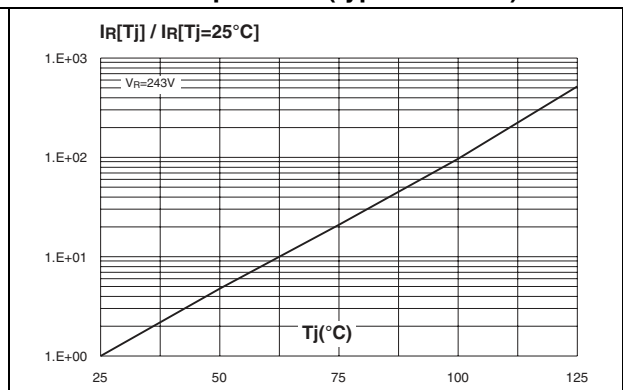
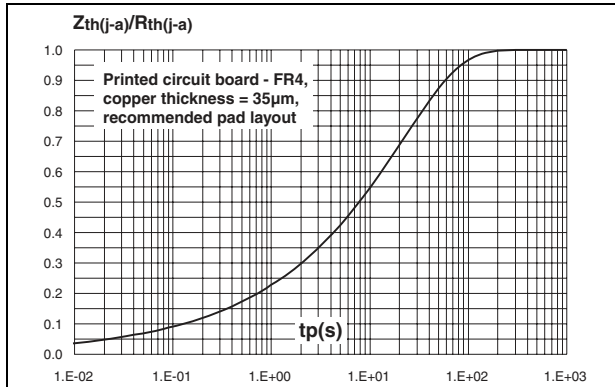


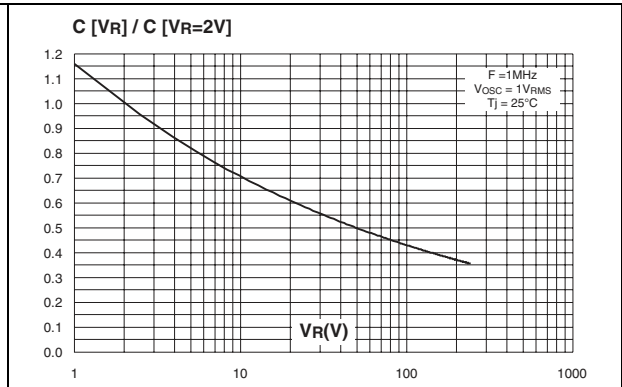
Figure 7. Relative variation of leakage current versus junction temperature (typical values)



**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**

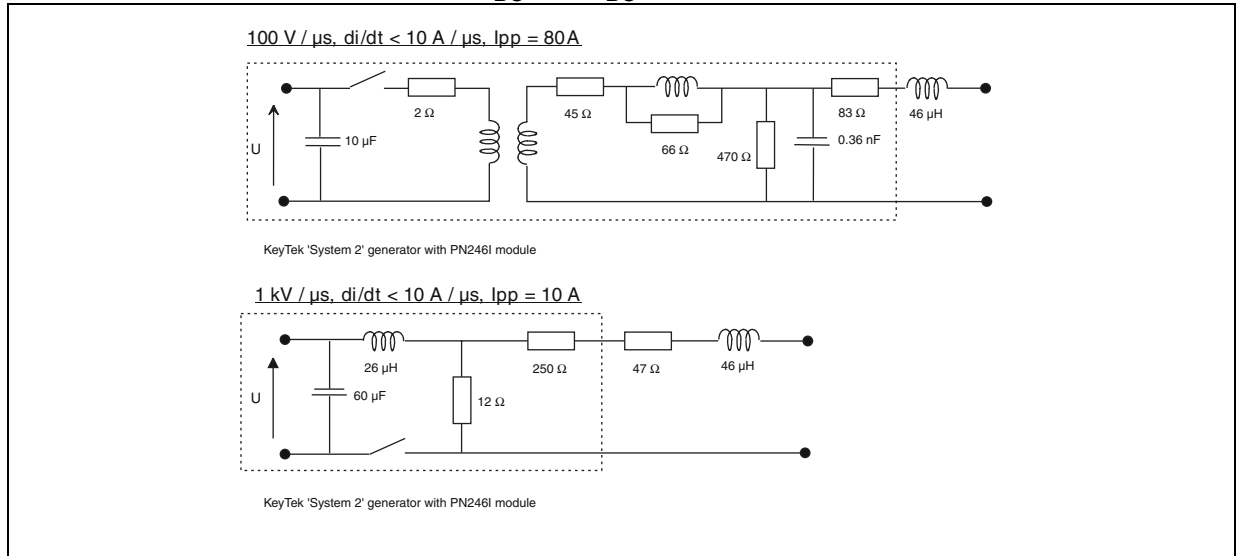


Figure 11. Test circuit 2 for  $I_{BO}$  and  $V_{BO}$  parameters

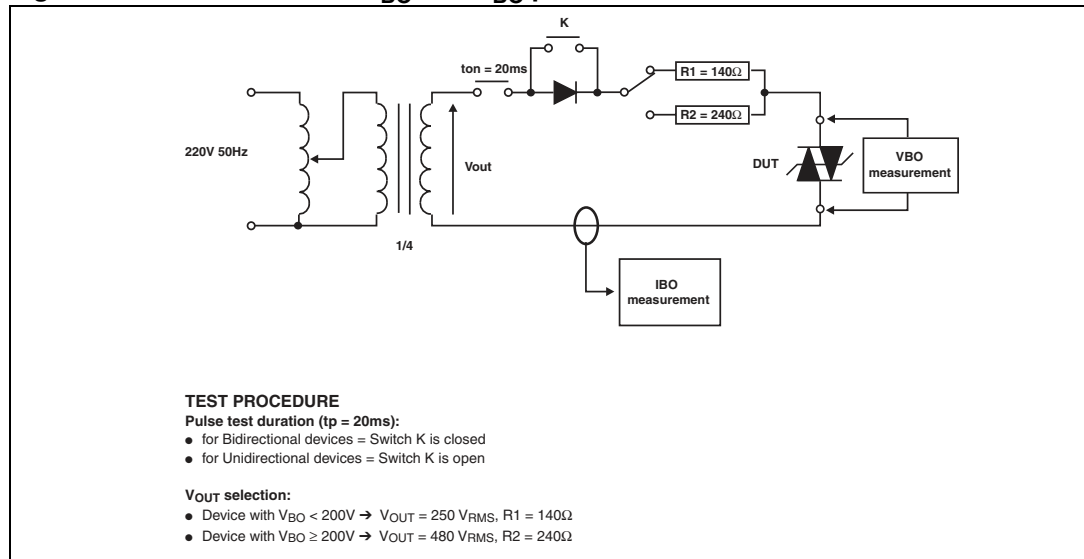
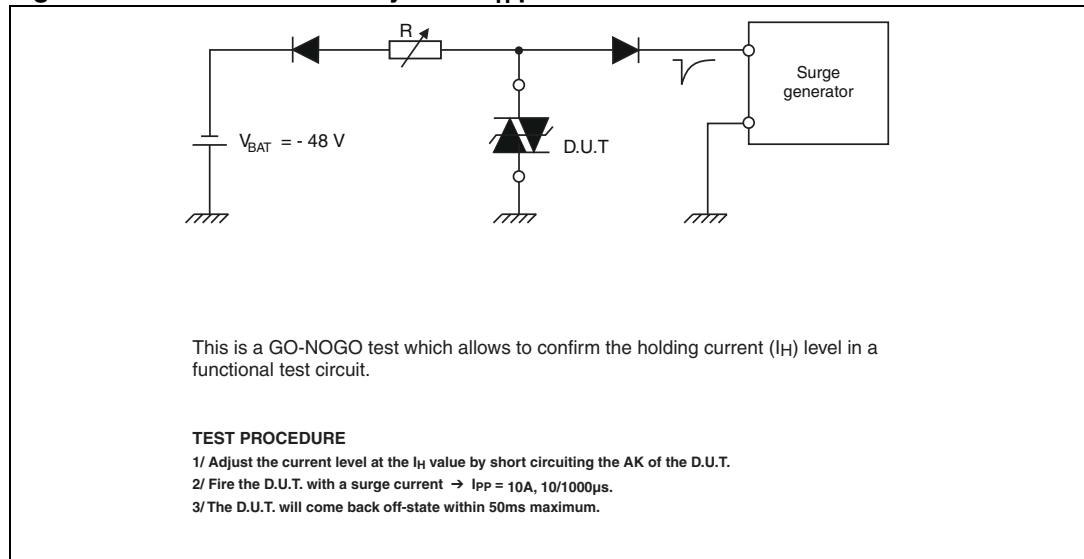
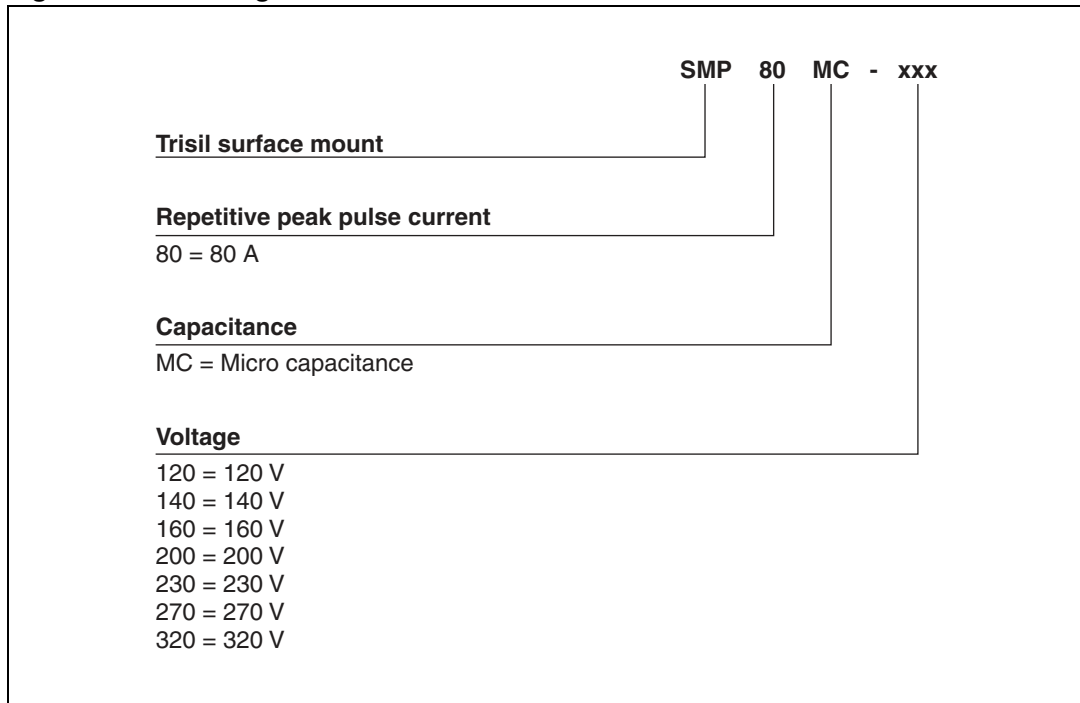


Figure 12. Test circuit 3 for dynamic  $I_H$  parameter



## 2 Ordering Information Scheme

Figure 13. Ordering information scheme





### 3 Package information

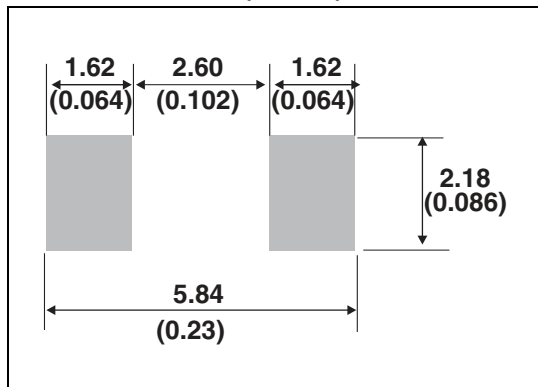
- Epoxy meets UL94, V0
- Lead-free package

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](http://www.st.com). ECOPACK® is an ST trademark.

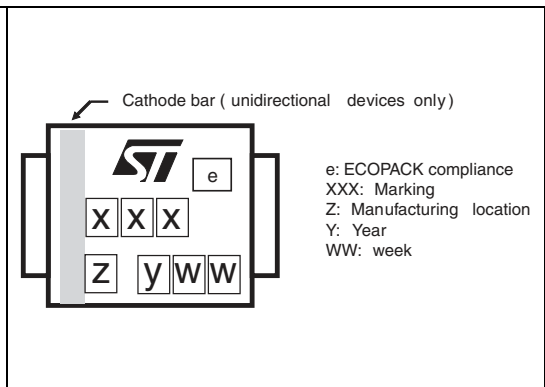
**Table 5. SMB dimensions**

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<sup>(1)</sup>**



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 <i>Complies with the following standards</i>

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