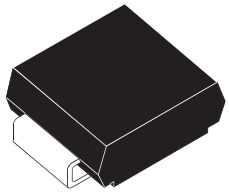
# SMP80MC-270

## TELECOM EQUIPMENT PROTECTION: TRISIL™

### FEATURES

- Bidirectional crowbar protection
- Voltage: 270V
- Low $V_{BO}$ / $V_R$ ratio
- Micro capacitance 15pF typ @ 50V
- Low leakage current : $I_R$ = 2µA max
- Holding current: $I_H$ = 150 mA min
- Repetitive peak pulse current : $I_{PP}$ = 80 A (10/1000µs)



**SMB**
**(JEDEC DO-214AA)**

### MAIN APPLICATIONS

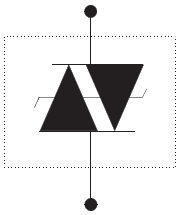
Any sensitive equipment requiring protection against lightning strikes and power crossing:

- Analog and digital line cards (xDSL, T1/ E1, ISDN...)
- Terminals (phone, fax, modem...) and central office equipment

### DESCRIPTION

The SMP80MC-270 is a micro capacitance transient surge arrestor designed for the protection of high debit rate communication equipment. Its micro capacitance avoids any distortion of the signal and is compatible with digital line cards (xDSL, T1/E1, ISDN...).

### SCHEMATIC DIAGRAM



### 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 are UL497B approved (file: E136224) and comply with the following standards GR-1089 Core, ITU-T-K20/K21, VDE0433, VDE0878, IEC61000-4-5 and FCC part 68.

## IN COMPLIANCES WITH THE FOLLOWING STANDARDS

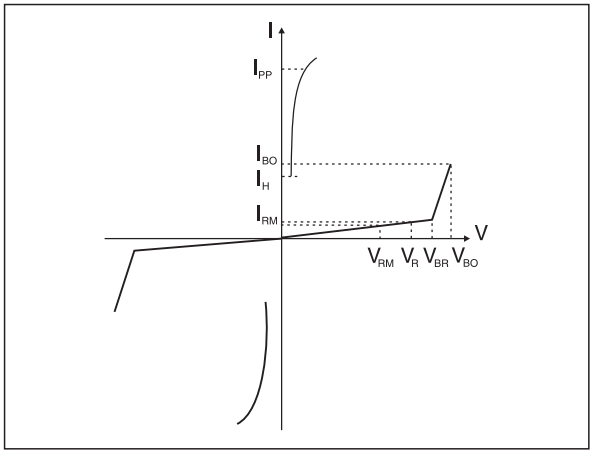
| STANDARD | Peak Surge Voltage (V) | Voltage Waveform | Required peak current (A) | Current waveform | Minimum serial resistor to meet standard (Ω) |
|---|---|---|---|---|---|
| **GR-1089 Core First level** | 2500<br>1000 | 2/10 µs<br>10/1000 µs | 500<br>100 | 2/10 µs<br>10/1000 µs | 5<br>2.5 |
| **GR-1089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

## 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 |

## ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25°C)

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



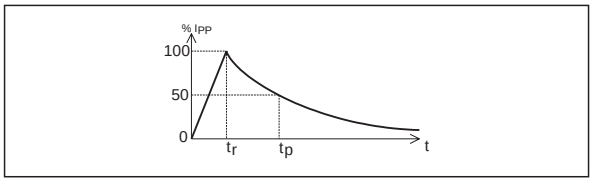
**ABSOLUTE RATINGS** ($T_{amb}$ = 25°C)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $I_{pp}$ | Repetitive peak pulse current:<br>10/1000 µs<br>8/20 µs<br>10/560 µs<br>5/310 µs<br>10/160 µs<br>1/20 µs<br>2/10 µs | | <br>80<br>250<br>100<br>120<br>150<br>250<br>250 | A |
| $I_{FS}$ | Fail-safe mode : maximum current (note 1) | 8/20 µs | 5 | kA |
| $I_{TSM}$ | Non repetitive surge peak on-state current (Sinusoidal) | t = 20ms<br>t = 16.6ms<br>t = 0.2s<br>t = 2s | 28<br>30<br>14<br>7 | A |
| $I^2t$ | $I^2t$ value for fusing | t = 16.6ms<br>t = 20ms | 7.5<br>7.8 | $A^2s$ |
| $T_L$ | Maximum lead temperature for soldering during 10s | | 260 | °C |
| $T_{stg}$<br>Tj | Storage temperature range<br>Maximum junction temperature | | - 55 to + 150<br>150 | °C<br>°C |

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

**Repetitive peak pulse current**

tr: rise time (µs)
tp: pulse duration time (µs)
ex: Pulse waveform 10/1000µs
tr = 10µs tp = 1000µs




**ELECTRICAL PARAMETERS** (Tamb = 25°C)

| Type | $I_{RM}$ @ $V_{RM}$ max. | | $I_R$ @ $V_R$ max. Note 1 | | Dynamic $V_{BO}$ max. Note 2 | Static $V_{BO}$ @ $I_{BO}$ max. Note 3 | | $I_H$ min. Note 4 | C typ. Note 5 | C typ. Note 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | µA | V | µA | V | V | V | mA | mA | pF | pF |
| SMP80MC-270 | 2 | 243 | 50 | 270 | 345 | 335 | 800 | 150 | 15 | 30 |

**Note 1:** $I_R$ measured at $V_R$ guarantee $V_{BR\ min} \geq V_R$
**Note 2:** See functional test circuit 1
**Note 3:** See test circuit 2
**Note 4:** See functional holding current test circuit 3
**Note 5:** $V_R$ = 50V bias, $V_{RMS}$=1V, F=1MHz
**Note 6**: $V_R$ = 2V bias, $V_{RMS}$=1V, F=1MHz

**Fig. 1:** Non repetitive surge peak on-state current versus overload duration.

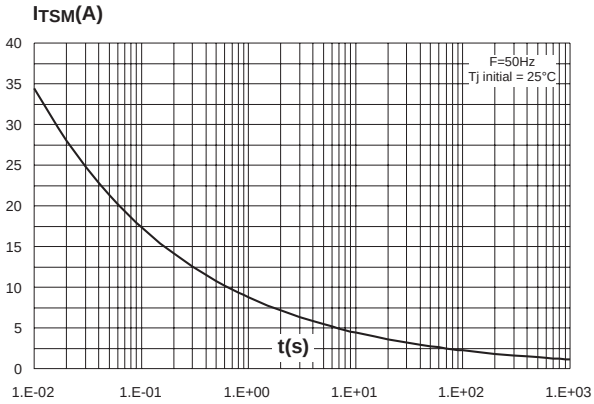



**Fig. 2:** On-state voltage versus on-state current (typical values)

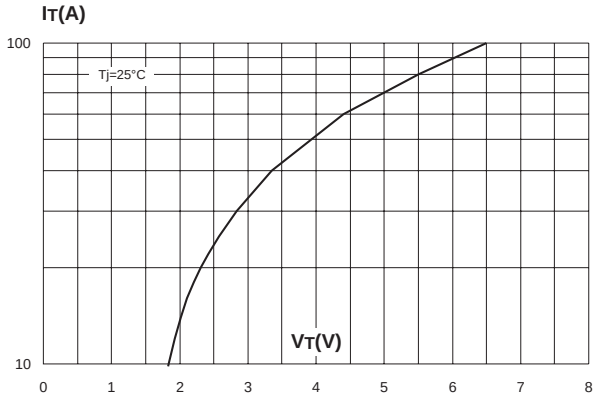



**Fig. 3:** Relative variation of holding current versus junction temperature .

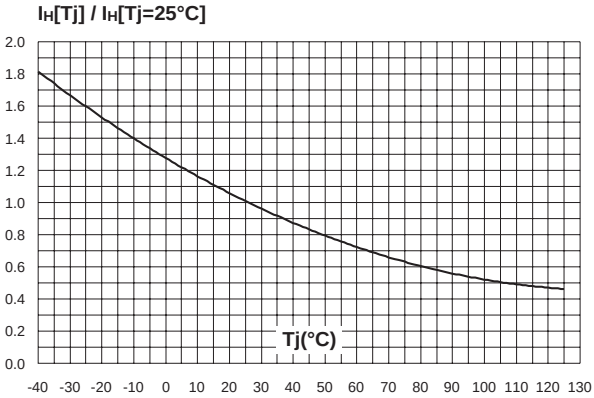



**Fig. 4:** Relative variation of breakover voltage versus junction temperature.

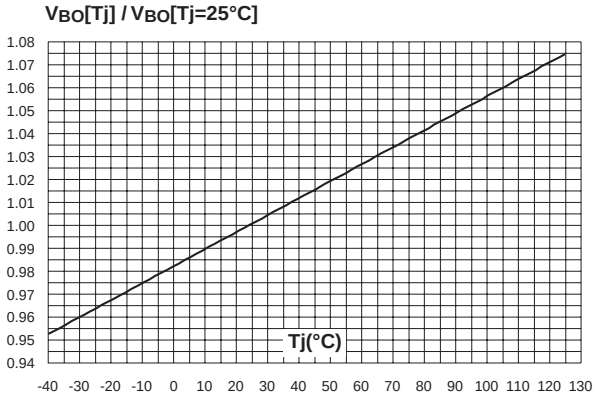



**Fig. 5:** Relative variation of leakage current versus reverse voltage applied (typical values).

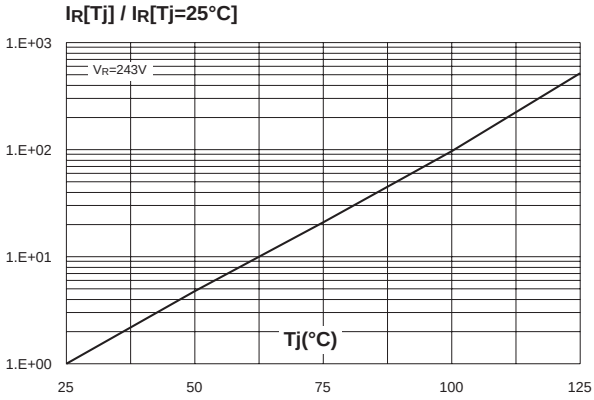



**Fig. 6:** Variation of thermal impedance junction to ambient versus pulse duration (Printed circuit board FR4, SCu=35µm, recommended pad layout).

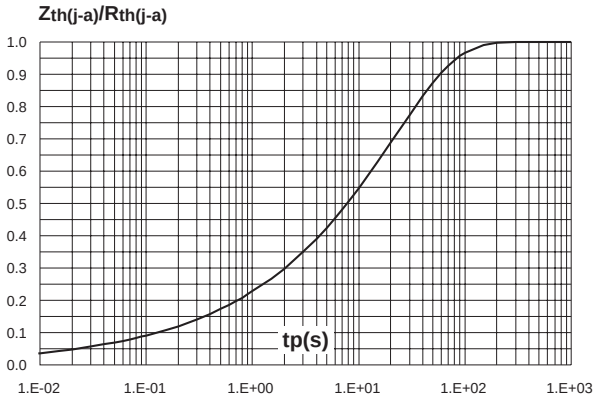
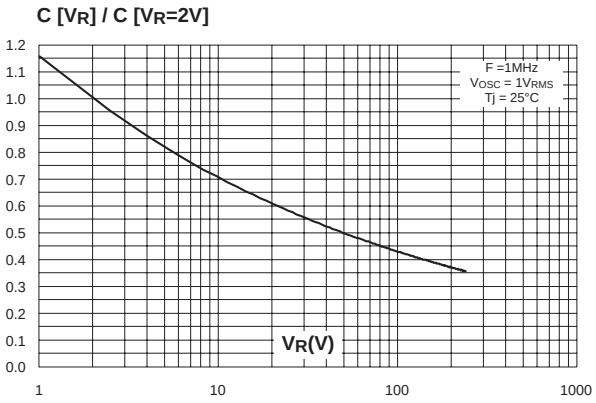
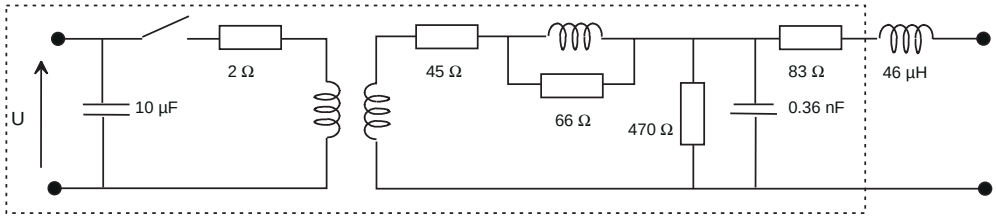


**Fig. 7:** Relative variation of junction capacitance versus reverse voltage applied (typical values).



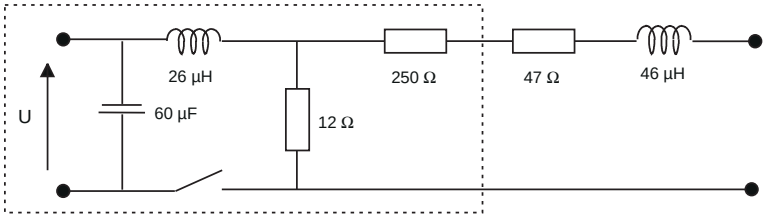

## TEST CIRCUIT 1 FOR DYNAMIC $I_{BO}$ AND $V_{BO}$ PARAMETERS

**100 V / µs, di/dt < 10 A / µs, Ipp = 80 A**



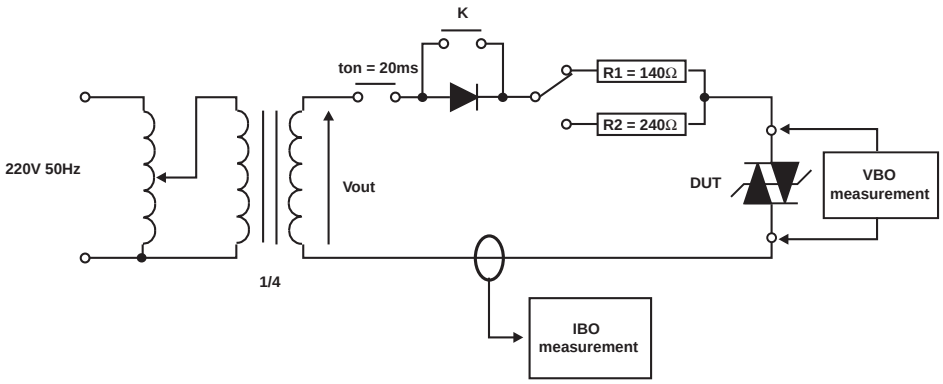

KeyTek 'System 2' generator with PN246I module

**1 kV / µs, di/dt < 10 A / µs, Ipp = 10 A**




KeyTek 'System 2' generator with PN246I module

## TEST CIRCUIT 2 FOR $I_{BO}$ and $V_{BO}$ parameters :

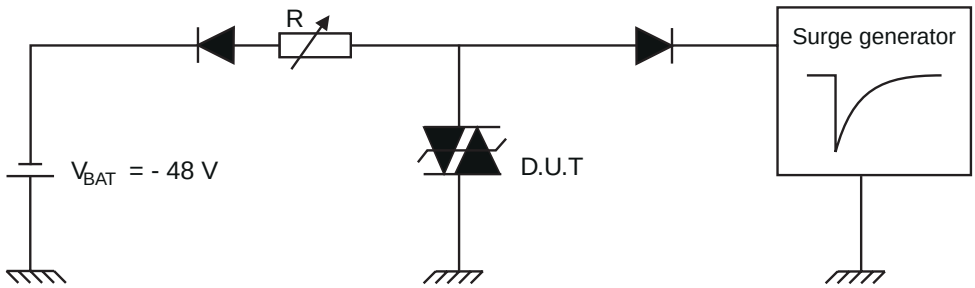



### TEST PROCEDURE :

Pulse test duration (tp = 20ms):
- For Bidirectional devices = Switch K is closed
- For Unidirectional devices = Switch K is open.

$V_{OUT}$ Selection
- Device with $V_{BO} < 200$ Volt
  - $V_{OUT} = 250\ V_{RMS}$, $R_1 = 140\ \Omega$.
- Device with $V_{BO} \geq 200$ Volt
  - $V_{OUT} = 480\ V_{RMS}$, $R_2 = 240\ \Omega$.

## TEST CIRCUIT 3 FOR $I_H$ PARAMETER

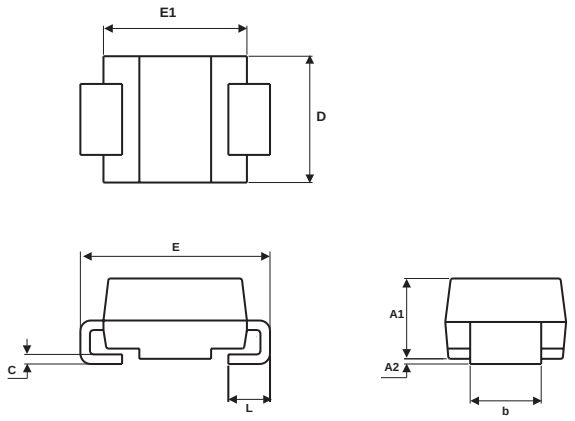



This is a GO-NO GO test which allows to confirm the holding current ($I_H$) level in a functional test circuit.

### TEST PROCEDURE :

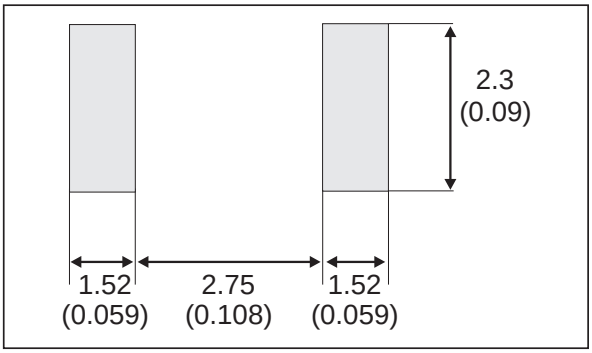
- Adjust the current level at the $I_H$ value by short circuiting the D.U.T.
- Fire the D.U.T. with a surge current : $I_{pp}$ = 10A, 10/1000 µs.
- The D.U.T. will come back to the off-state within 50 ms max.

**PACKAGE MECHANICAL DATA**
SMB (Plastic)

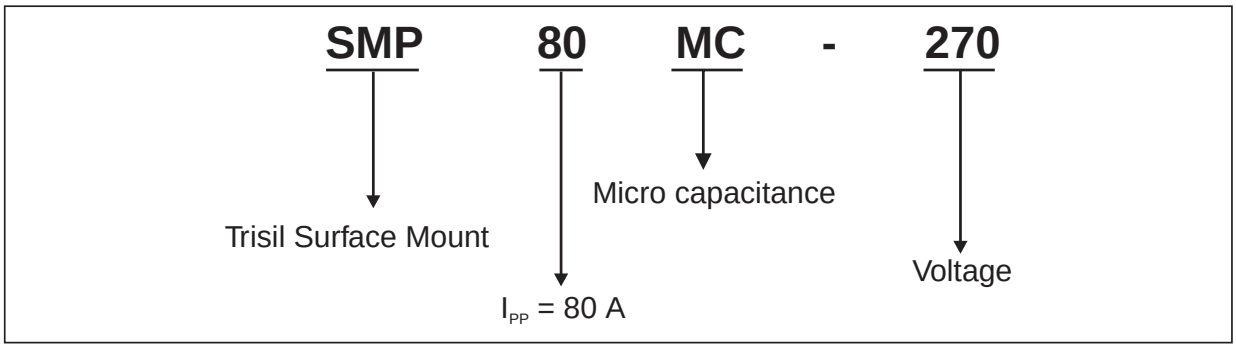



| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.096 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.95 | 2.20 | 0.077 | 0.087 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 5.10 | 5.60 | 0.201 | 0.220 |
| E1 | 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 (inches)



## ORDER CODE




| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| SMP80MC-270 | TP27 | SMB | 0.11g | 2500 | Tape & Reel |