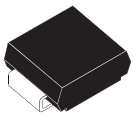
# SMP50-xxx

## TELECOM EQUIPMENT PROTECTION: TRISIL™

### FEATURES

- Bidirectional crowbar protection
- Voltage range from 62V to 270V
- Low capacitance from 15pF to 30pF typ.@ 50V
- Low leakage current: $I_R$ = 2µA max.
- Holding current: $I_H$ = 150 mA min.
- Repetitive peak pulse current: $I_{PP}$ = 50 A (10/1000 µs)



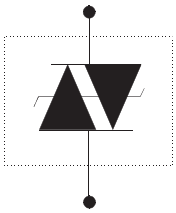
**SMA**
**(JEDEC DO-214AC)**

### MAIN APPLICATIONS

Telecommunication equipment such as

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

### SCHEMATIC DIAGRAM



### DESCRIPTION

The SMP50-xxx series has been designed to protect telecommunication equipment against lightning and transient induced by AC power lines.

The package / die size ratio has been optimized by using the SMA package.

### BENEFITS

Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection. Trisils are used to help equipment to meet various standards such as UL1950, IEC950 / CSA C22.2, UL1459 and FCC part 68. Trisils have UL94 V0 resin approved. SMA package is JEDEC registred. (Trisils are UL 497B approved - file: E136224).

## IN COMPLIANCES WITH THE FOLLOWING STANDARDS

| Standard | Peak Surge Voltage (V) | Voltage Waveform (µs) | Required peak current (A) | Current Waveform (µs) | Minimum serial resistor to meet standard (Ω) |
|---|---|---|---|---|---|
| **GR-1089 Core First level** | 2500<br>1000 | 2/10<br>10/1000 | 500<br>100 | 2/10<br>10/1000 | 12<br>10 |
| **GR-1089 Core Second level** | 5000 | 2/10 | 500 | 2/10 | 24 |
| **GR-1089 Core Intra-building** | 1500 | 2/10 | 100 | 2/10 | 0 |
| **ITU-T-K20 / K21** | 6000<br>1500 | 10/700 | 150<br>37.5 | 5/310 | 53<br>0 |
| **ITU-T-K20 (IEC61000-4-2)** | 6000<br>8000 | 1/60 ns | ESD contact discharge<br>ESD air discharge | | 0<br>0 |
| **VDE0433** | 4000<br>2000 | 10/700 | 100<br>50 | 5/310 | 21.5<br>0 |
| **VDE0878** | 4000<br>2000 | 1.2/50 | 100<br>50 | 1/20 | 0<br>0 |
| **IEC61000-4-5** | 4000<br>4000 | 10/700<br>1.2/50 | 100<br>100 | 5/310<br>8/20 | 21.5<br>0 |
| **FCC Part 68, lightning surge type A** | 1500<br>800 | 10/160<br>10/560 | 200<br>100 | 10/160<br>10/560 | 12.5<br>6.5 |
| **FCC Part 68, lightning surge type B** | 1000 | 9/720 | 25 | 5/320 | 0 |

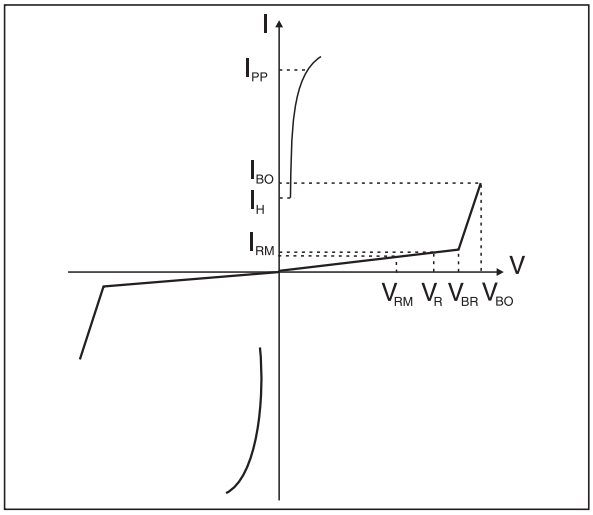
## THERMAL RESISTANCES

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th}$ (j-a) | Junction to ambient with recommended footprint | 120 | °C/W |
| $R_{th}$ (j-l) | Junction to leads | 30 | °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 |
| $V_{BR}$ | 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: | 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 | 50<br>100<br>55<br>65<br>75<br>100<br>150 | A |
| $I_{FS}$ | Fail safe mode: maximum current (note 1) | 8/20 µs | 2.5 | kA |
| $I_{TSM}$ | Non repetitive surge peak on-state current (Sinusoidal) | t = 20ms<br>t = 16.6ms<br>t = 0.2s<br>t = 2s | 25<br>28<br>16<br>8.5 | A |
| $I^2t$ | $I^2t$ value for fusing | t = 16.6ms<br>t = 20ms | 6.5<br>6.3 | $A^2s$ |
| $T_L$ | Maximum lead temperature for soldering during 10 s. | | 260 | °C |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature | | - 55 to + 150<br>150 | °C<br>°C |

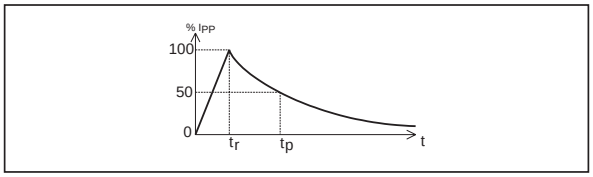
**Repetitive peak pulse current**

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 $V_{BO}$ @ $I_{BO}$ 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 | mA | V | mA | mA | pF | pF |
| SMP50-62 | 2 | 56 | 50 | 62 | 85 | 800 | 82 | 800 | 150 | 30 | 50 |
| SMP50-68 | | 61 | | 68 | 93 | | 90 | | 150 | 30 | 45 |
| SMP50-100 | | 90 | | 100 | 135 | | 133 | | 150 | 20 | 40 |
| SMP50-120 | | 108 | | 120 | 160 | | 160 | | 150 | 20 | 40 |
| SMP50-130 | | 117 | | 130 | 173 | | 173 | | 150 | 20 | 35 |
| SMP50-180 | | 162 | | 180 | 235 | | 240 | | 150 | 15 | 30 |
| SMP50-200 | | 180 | | 200 | 262 | | 267 | | 150 | 15 | 30 |
| SMP50-220 | | 198 | | 220 | 285 | | 293 | | 150 | 15 | 30 |
| SMP50-240 | | 216 | | 240 | 300 | | 320 | | 150 | 15 | 30 |
| SMP50-270 | | 243 | | 270 | 350 | | 360 | | 150 | 15 | 30 |

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

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

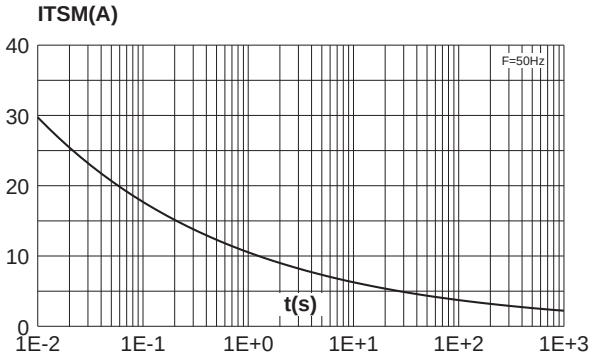



**Fig. 2:** On-state voltage versus on-state current (typical values).

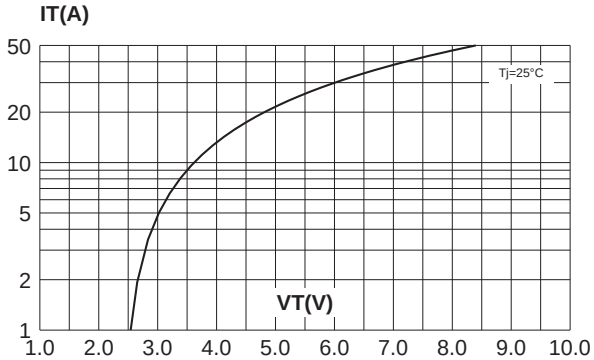


**Fig. 3:** Relative variation of holding current versus junction temperature.

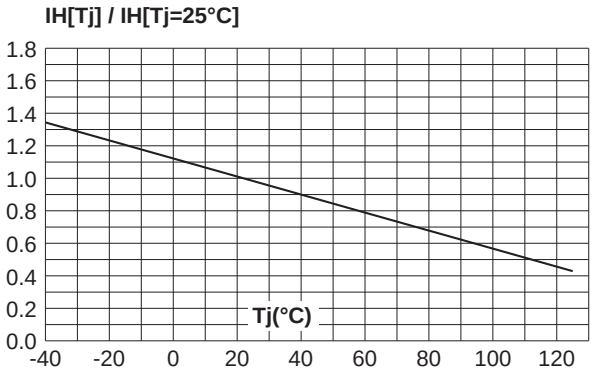



**Fig. 4:** Relative variation of breakover voltage versus junction temperature.

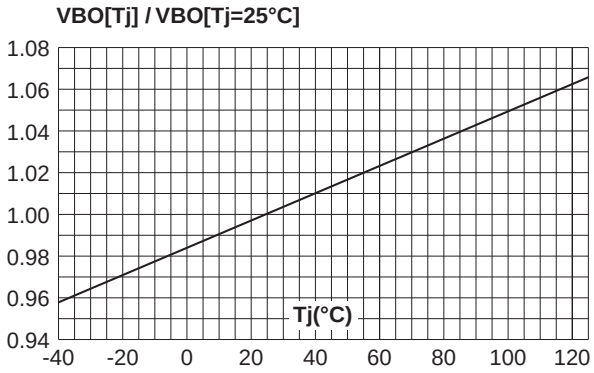



**Fig. 5:** Relative variation of leakage current versus junction temperature (typical values).

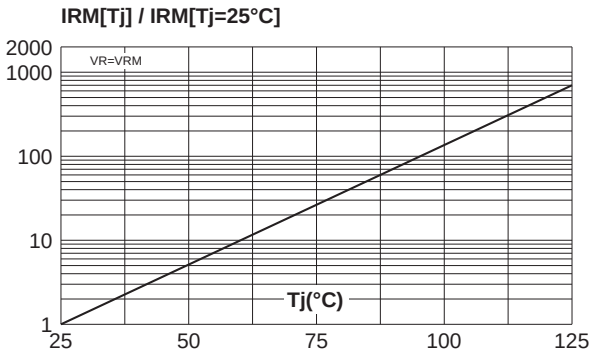



**Fig. 6:** Relative variation of thermal impedance versus pulse duration.

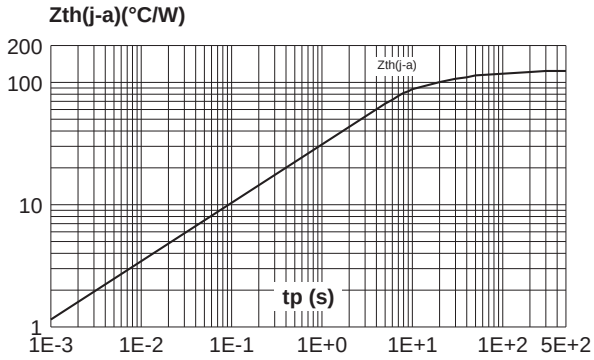
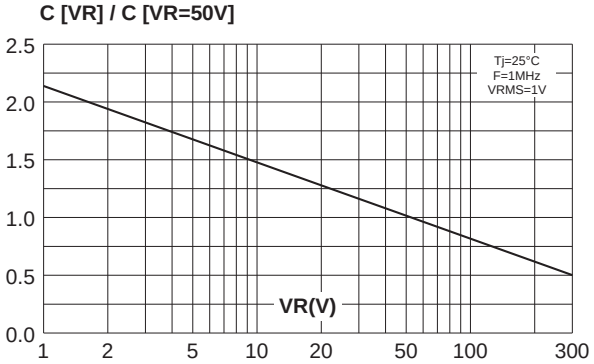
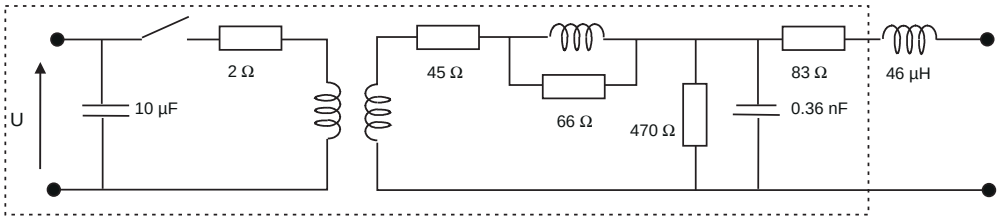



**Fig. 7:** Relative variation of junction capacitance versus reverse voltage applied (typical values).



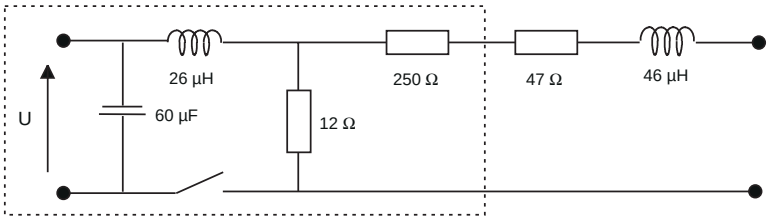
## TEST CIRCUIT 1 FOR DYNAMIC $I_{BO}$ and $V_{BO}$ PARAMETERS

**100 V / µs, di/dt < 10 A / µs, Ipp = 50A**



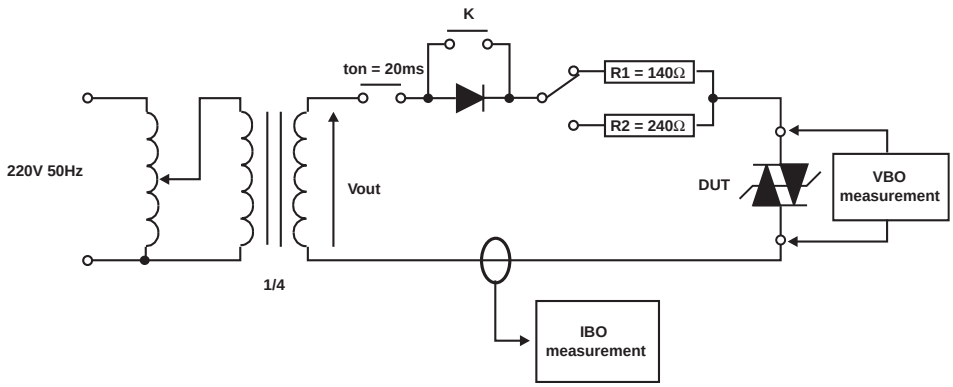

Key Tek 'System 2' generator with PN246I module

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




Key Tek 'System 2' generator with PN246I module

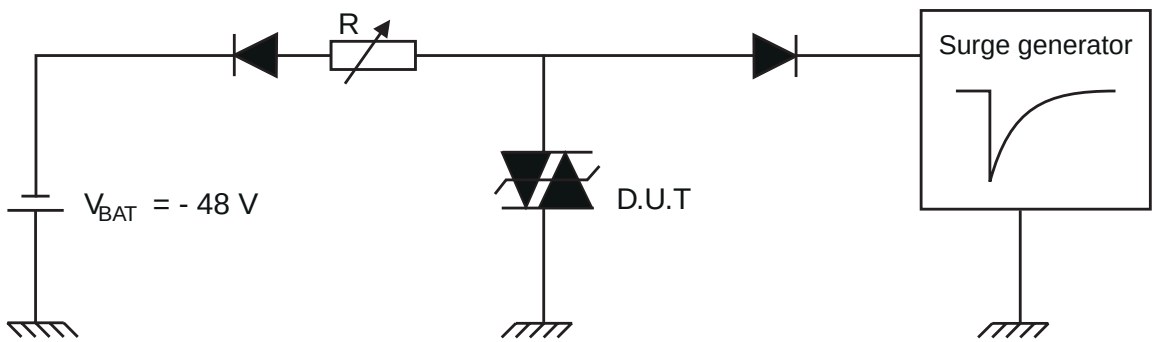
## TEST CIRCUIT 2 for $I_{BO}$ AND $V_{BO}$ PARAMETERS.




### 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 Ω.
  - Device with $V_{BO}$ ≥ 200 Volt
    - $V_{OUT}$ = 480 $V_{RMS}$, $R_2$ = 240 Ω.

**TEST CIRCUIT 3 for $I_H$ PARAMETERS.**



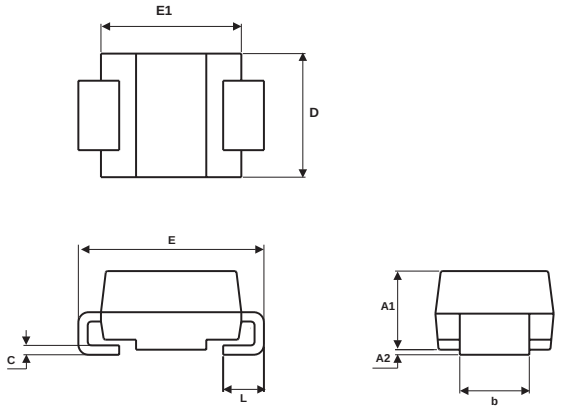

This is a GO-NO GO test which allows to confirm the holding current ($I_H$) level in a functional test circuit.

**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.

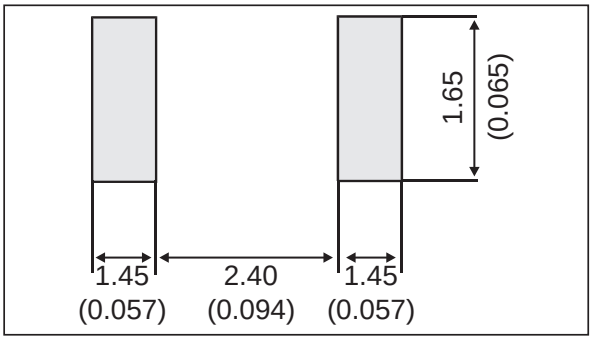
**PACKAGE MECHANICAL DATA**

SMA (JEDEC DO-214AC)

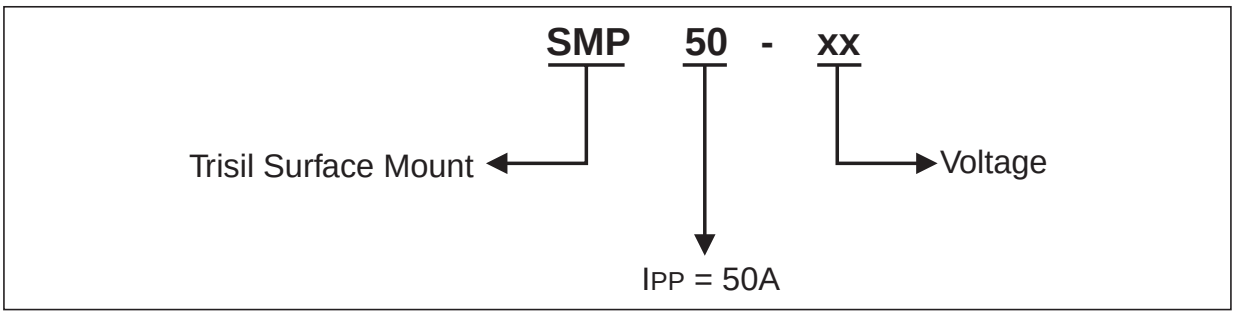



| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.70 | 0.075 | 0.106 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.25 | 1.65 | 0.049 | 0.065 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 4.80 | 5.60 | 0.189 | 0.220 |
| E1 | 3.95 | 4.60 | 0.156 | 0.181 |
| D | 2.25 | 2.95 | 0.089 | 0.116 |
| L | 0.75 | 1.60 | 0.030 | 0.063 |

**FOOT PRINT** in millimeters (in inches)



## ORDER CODE




## ORDERING INFORMATION

| Part number | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| SMP50-62 | V06 | SMA | 0.068 g | 5000 | Tape & reel |
| SMP50-68 | V07 | | | | |
| SMP50-100 | V10 | | | | |
| SMP50-120 | V12 | | | | |
| SMP50-130 | V13 | | | | |
| SMP50-180 | V18 | | | | |
| SMP50-200 | V20 | | | | |
| SMP50-220 | V22 | | | | |
| SMP50-240 | V24 | | | | |
| SMP50-270 | V27 | | | | |