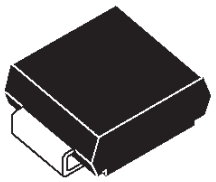
# SMP100-xxx

## COMMUNICATION EQUIPMENT PROTECTION: TRISIL™

### FEATURES

- BIDIRECTIONAL CROWBAR PROTECTION
- VOLTAGE RANGE : FROM 8V to 270V
- REPETITIVE PEAK PULSE CURRENT: $I_{PP}$ = 100 A (10/1000 µs)
- HOLDING CURRENT: $I_H$ = 150mA or 225mA
- LOW LEAKAGE CURRENT: $I_R$ = 2 µA max



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

### DESCRIPTION

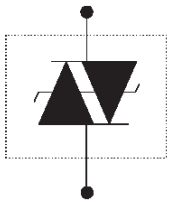
The SMP100 series are transient surge arrestors used for the protection of sensitive telecom equipment.

### MAIN APPLICATIONS

Any sensitive equipment requiring protection against lightning strikes :

- ANALOG AND DIGITAL LINE CARDS
- MAIN DISTRIBUTION FRAMES
- TERMINALS AND TRANSMISSION EQUIPMENT
- GAS-TUBE REPLACEMENT

### SCHEMATIC DIAGRAM



### BENEFITS

- NO AGEING AND NO NOISE
- IF DESTROYED, THE SMP100 FALLS INTO SHORT CIRCUIT, STILL ENSURING PROTECTION
- BOARD SPACE SAVING

| COMPLIES WITH THE FOLLOWING STANDARDS: | Peak Surge Voltage (V) | Voltage Waveform (µs) | Current Waveform (µs) | Admissible Ipp (A) | Necessary Resistor (Ω) |
|---|---|---|---|---|---|
| ITU K20 | 4000 | 10/700 | 5/310 | 100 | - |
| VDE0433 | 4000 | 10/700 | 5/310 | 100 | - |
| VDE0878 | 4000 | 1.2/50 | 1/20 | 100 | - |
| IEC-1000-4-5 | level 4<br>level 4 | 10/700<br>1.2/50 | 5/310<br>8/20 | 100<br>100 | -<br>- |
| FCC Part 68, lightning surge type A | 1500<br>800 | 10/160<br>10/560 | 10/160<br>10/560 | 200<br>100 | -<br>- |
| FCC Part 68, lightning surge type B | 100 | 9/720 | 5/320 | 25 | - |
| BELLCORE TR-NWT-001089 First level | 2500<br>1000 | 2/10<br>10/1000 | 2/10<br>10/1000 | 500<br>100 | -<br>- |
| BELLCORE TR-NWT-001089 Second level | 5000 | 2/10 | 2/10 | 500 | - |
| CNET I31-24 | 4000 | 0.5/700 | 0.8/310 | 100 | - |

## THERMAL RESISTANCES

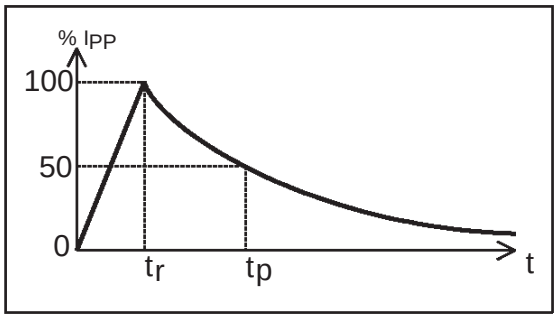
| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th(j-l)}$ | Junction to leads | 20 | °C/W |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit (with standard footprint dimensions) | 100 | °C/W |

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

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $I_{pp}$ | Peak pulse current:<br>10/1000 µs (open circuit voltage waveform 1 kV 10/1000 µs)<br>5/310µs (open circuit voltage waveform 4 kV, 10/700µs)<br>8/20 µs (open circuit voltage waveform 4 kV 1.2/50 µs)<br>2/10 µs (open circuit voltage waveform 2.5kV 2/10 µs) | | <br>100<br>150<br>250<br>500 | <br>A<br>A<br>A<br>A |
| $I_{FS}$ | Fail-safe mode | 8/20 µs | 5 | kA |
| $I_{TSM}$ | Non repetitive surge peak on-state current<br>One cycle | 50Hz<br>60Hz | 55<br>60 | A<br>A |
| | Non repetitive surge peak on-state current<br>F = 50Hz | 0.2s<br>2s | 25<br>12 | A<br>A |
| $T_L$ | 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 |

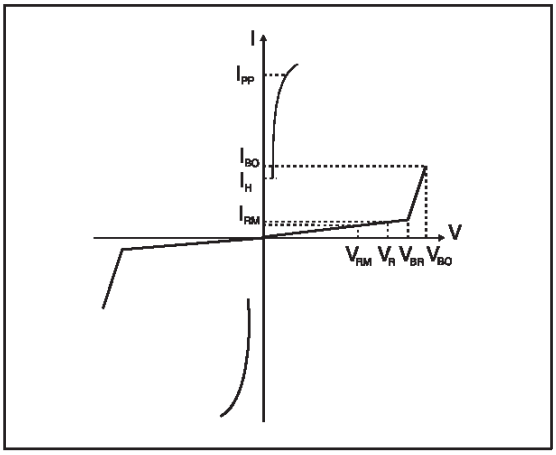
**Note 1:** Pulse waveform

| | | |
|---|---|---|
| 10 / 1000 µs | tr = 10 µs | tp = 1000 µs |
| 8 / 20 µs | tr = 8 µs | tp = 20 µs |
| 5 / 310 µs | tr = 5 µs | tp = 310 µs |
| 1 / 20 µs | tr = 1 µs | tp = 20 µs |
| 2 / 10 µs | tr = 2 µs | tp = 10 µs |



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

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




**STATIC PARAMETERS**

| Type | $I_{RM}$ @ $V_{RM}$ max. | | $I_R$ @ $V_R$ max. note 1 | | $V_{BO}$ @ $I_{BO}$ max. note 2 | | $I_H$ min. note 3 | C typ. note 4 |
|---|---|---|---|---|---|---|---|---|
| | µA | V | µA | V | V | mA | mA | pF |
| SMP100-8 | 2 | 6 | 50 | 8 | 20 | 800 | 50(typ) | 100 |
| SMP100LC-35 | 2 | 32 | 50 | 35 | 55 | 800 | 150 | 90 |
| SMP100-65 | 2 | 55 | 50 | 65 | 80 | 800 | 150 | 160 |
| SMP100-120 | 2 | 110 | 50 | 120 | 160 | 800 | 150 | 140 |
| SMP100-140 | 2 | 120 | 50 | 140 | 200 | 800 | 150 | 140 |
| SMP100-200 | 2 | 170 | 50 | 200 | 265 | 800 | 150 | 130 |
| SMP100-230 | 2 | 200 | 50 | 230 | 300 | 800 | 150 | 120 |
| SMP100-270 | 2 | 230 | 50 | 270 | 350 | 800 | 150 | 120 |
| SMP100-140H225 | 2 | 120 | 50 | 140 | 200 | 800 | 225 | 140 |
| SMP100-200H225 | 2 | 170 | 50 | 200 | 265 | 800 | 225 | 130 |
| SMP100-230H225 | 2 | 200 | 50 | 230 | 300 | 800 | 225 | 130 |
| SMP100-270H225 | 2 | 230 | 50 | 270 | 350 | 800 | 225 | 120 |

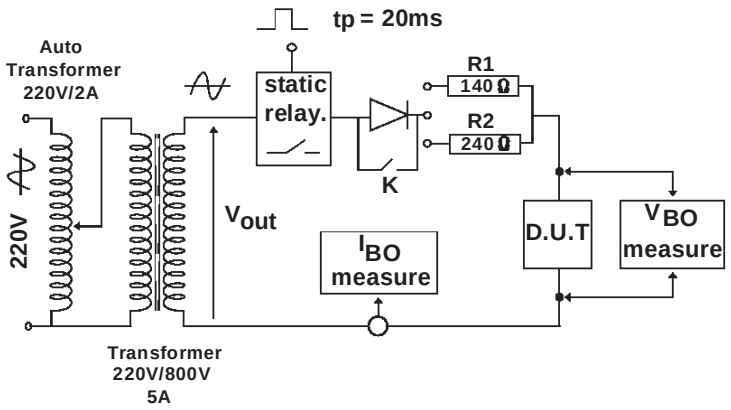
**Note 1 :** $I_R$ measured at $V_R$ guarantees $V_{BR}$>$V_R$
**Note 2 :** Measured at 50Hz, see test circuit 1. In any case $V_{BOmin} \geq V_{BR}$
**Note 3 :** See functional holding current test circuit 2.
**Note 4 :** $V_R$=1V bias, $V_{RMS}$=1V, F=1MHz.

## DYNAMIC PARAMETERS

| Symbol | Test conditions (see note 5) | Type | Max. | Unit |
|---|---|---|---|---|
| $V_{BO}$ | **Test conditions 1**<br>dV/dt = 100 V/µs, di/dt < 10 A/µs, $I_{PP}$ = 100 A<br>**Test conditions 2**<br>dV/dt = 1 kV/µs, di/dt < 10 A/µs, $I_{PP}$ = 10 A | SMP100-8 | 25 | V |
| | | SMP100LC-35 | 55 | |
| | | SMP100-65 | 95 | |
| | | SMP100-120 | 200 | |
| | | SMP100-140 | 220 | |
| | | SMP100-200 | 285 | |
| | | SMP100-230 | 320 | |
| | | SMP100-270 | 370 | |
| | | SMP100-140H225 | 220 | |
| | | SMP100-200H225 | 285 | |
| | | SMP100-230H225 | 320 | |
| | | SMP100-270H225 | 370 | |

**Note 5 :** $V_{BO}$ parameters are given by a KeyTek 'System 2' generator with PN246I module.
See test circuits 3 for $V_{BO}$ dynamic parameters.

## TEST CIRCUIT 1 FOR $I_{BO}$ and $V_{BO}$ parameters :

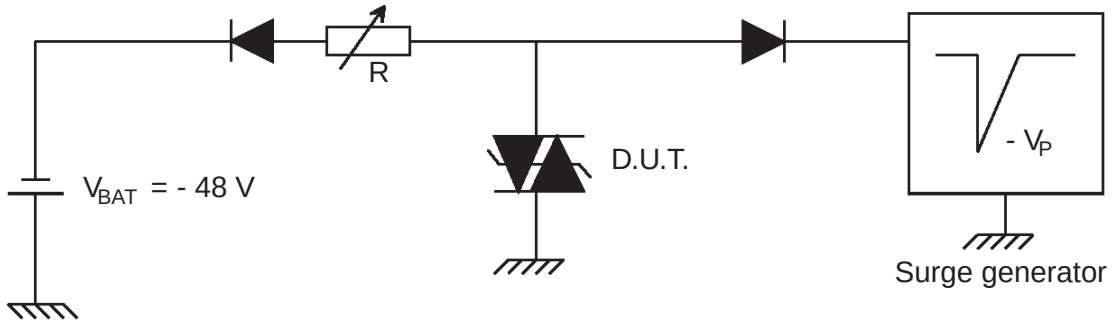



### TEST PROCEDURE :

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 2 for $I_H$ parameter.**



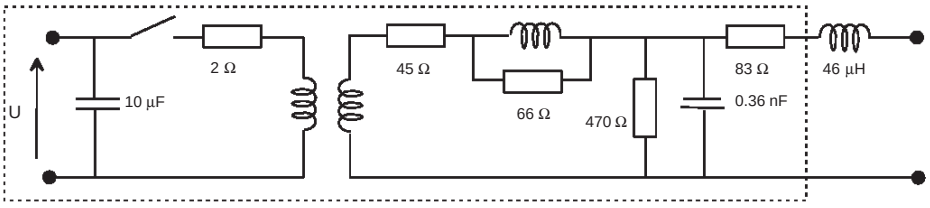

This is a GO-NO GO test which allows to confirm the holding current ($I_H$) level in a functional test circuit.

**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.

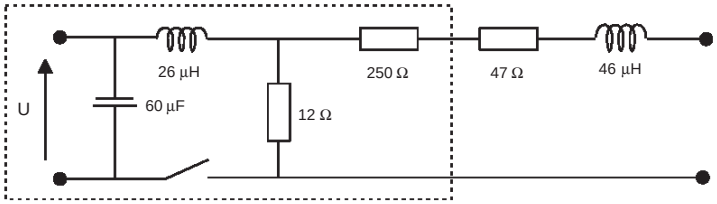
**TEST CIRCUITS 3 FOR $V_{BO}$ DYNAMIC PARAMETERS**

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




KeyTek 'System 2' generator with PN246I module

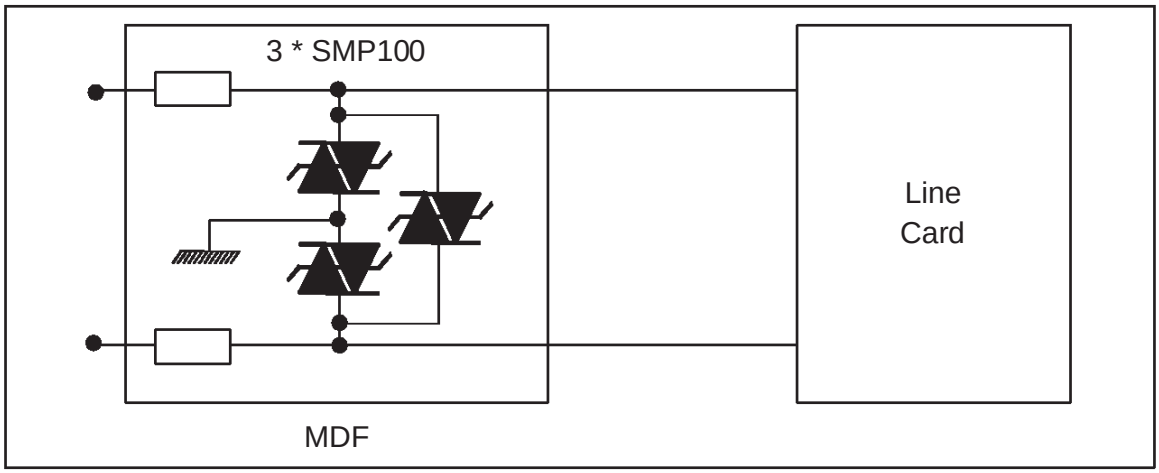
**1 kV / µs, di/dt < 10 A / µs, Ipp = 10 A**



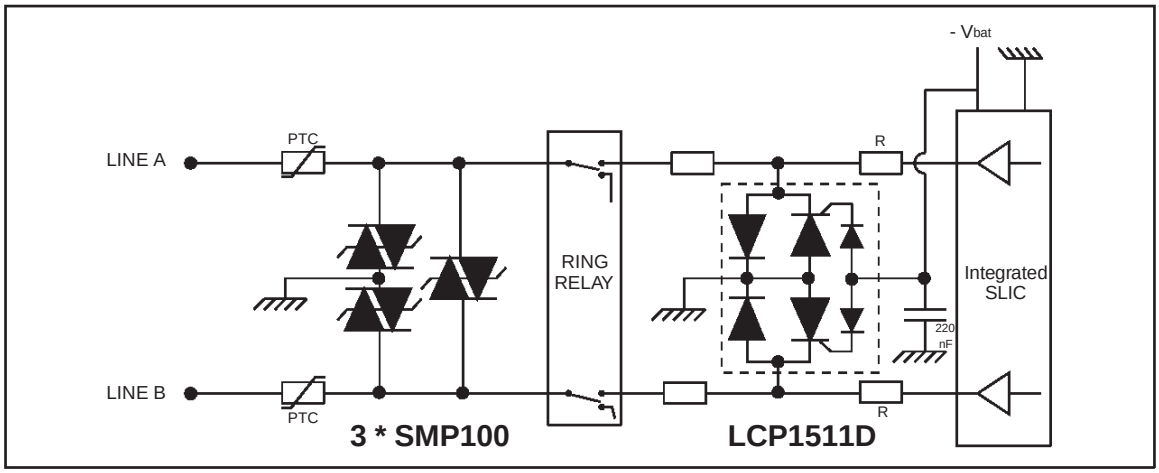

KeyTek 'System 2' generator with PN246I module

## TYPICAL APPLICATIONS

### 1 - Primary protection module




### 2 - Line card protection




### 3 - ISDN: U interface protection

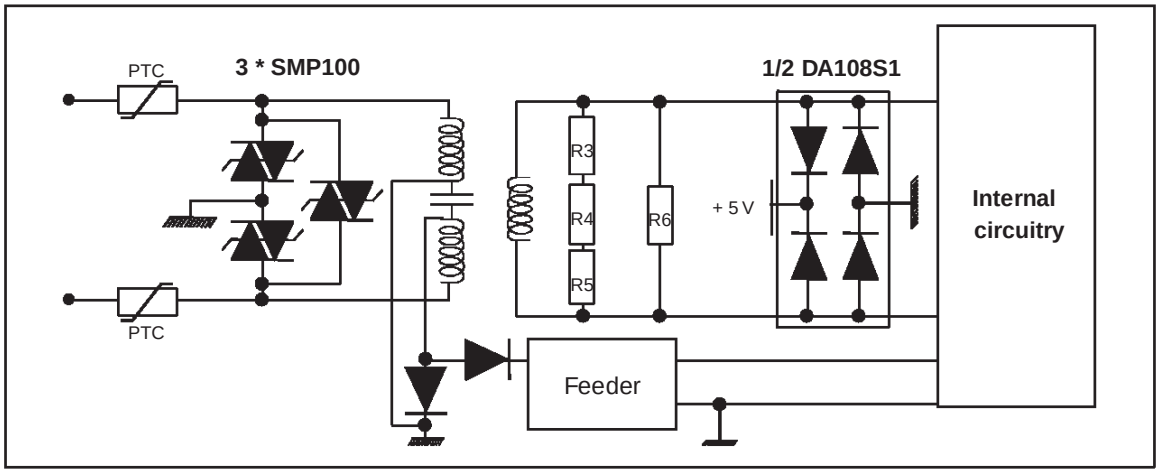


**Fig 1 :** Non repetitive surge peak on-state current versus overload duration ($T_j$ initial = 25 °C).

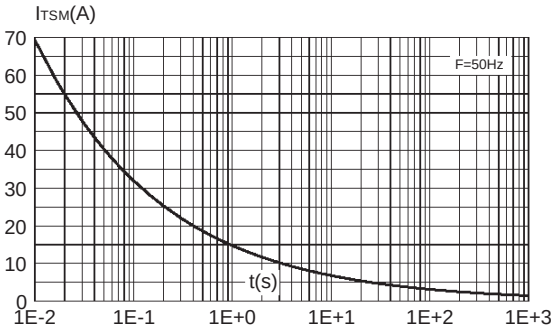



**Fig 2 :** On-state voltage versus on-state current (typical values).

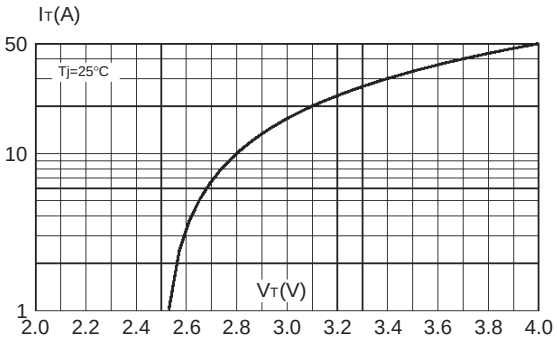



**Fig 3 :** Relative variation of holding current versus junction temperature.

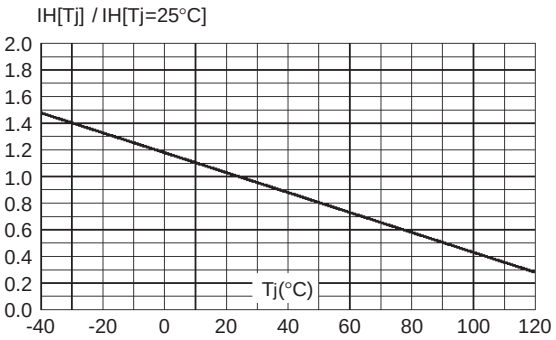



**Fig 4 :** Variation of thermal impedance junction to ambient versus pulse duration.

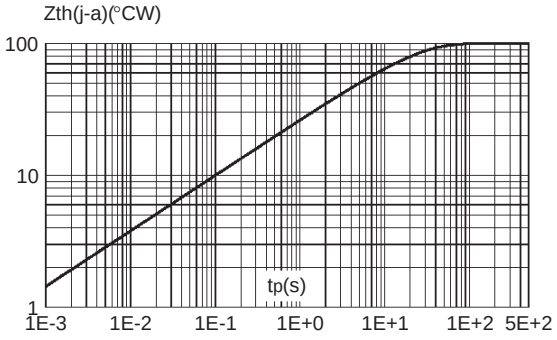
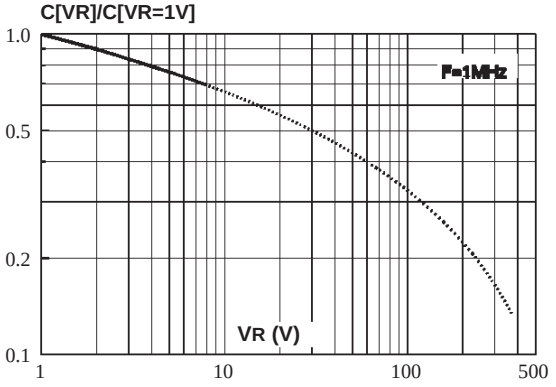



**Fig 5 :** Relative variation of junction capacitance versus reverse voltage applied (typical values).

**Note** : For other types than SMP100-8, the curve can be extrapolated (dotted line)

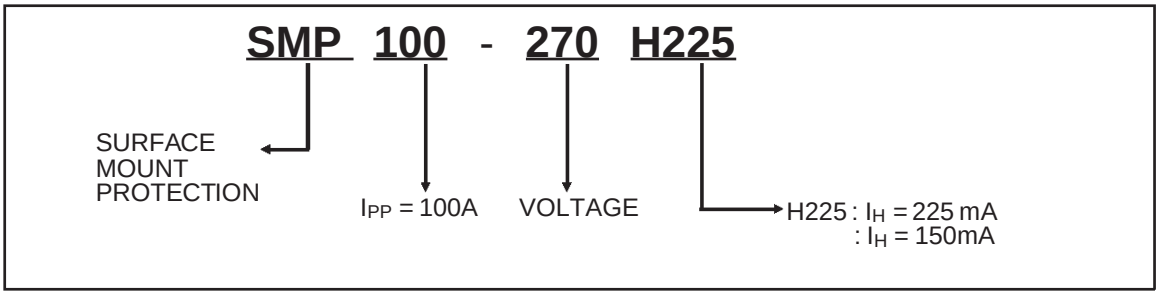


## MARKING

| Type | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| SMP100-8 | PL8 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100LC-35 | L35 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-65 | P06 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-120 | P12 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-140 | P14 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-200 | P20 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-230 | P23 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-270 | P27 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-140H125 | P16 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-200H225 | P22 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-230H225 | P24 | SMB | 0.107g | 2500 | Tape & Reel |
| SMP100-270H225 | P29 | SMB | 0.107g | 2500 | Tape & Reel |

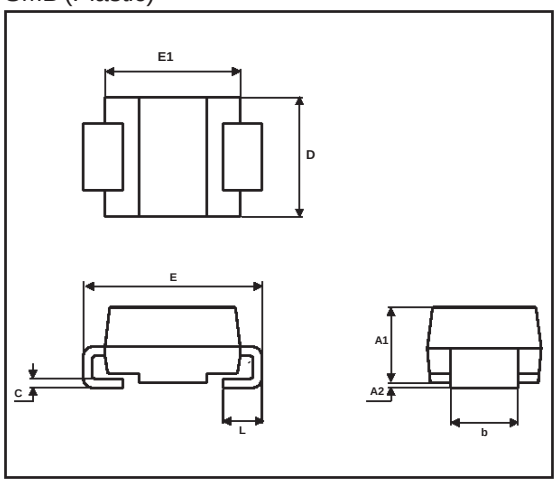
■ Epoxy meets UL94, V0

## ORDER CODE



## 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)