



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: $I_R = 2\mu\text{A}$ max.
- Holding current: $I_H = 150$ mA min.
- Repetitive peak pulse current:
 $I_{PP} = 50$ A (10/1000 μs)

MAIN APPLICATIONS

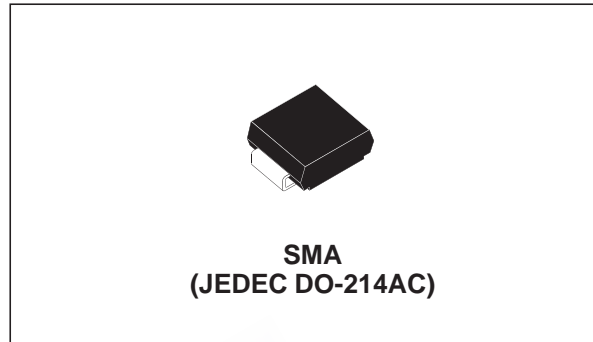
Telecommunication equipment such as

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

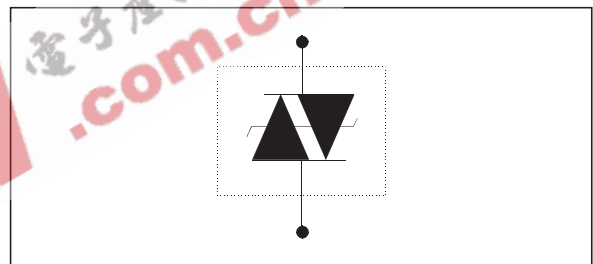
DESCRIPTION

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.



SCHEMATIC DIAGRAM



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 registered. (Trisils are UL 497B approved - file: E136224).

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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 | 2/10 | 500 | 2/10 | 12 |
| | 1000 | 10/1000 | 100 | 10/1000 | 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 | 10/700 | 150 | 5/310 | 53 |
| | 1500 | | 37.5 | | 0 |
| ITU-T-K20 (IEC61000-4-2) | 6000 | 1/60 ns | ESD contact discharge | | 0 |
| | 8000 | | ESD air discharge | | 0 |
| VDE0433 | 4000 | 10/700 | 100 | 5/310 | 21.5 |
| | 2000 | | 50 | | 0 |
| VDE0878 | 4000 | 1.2/50 | 100 | 1/20 | 0 |
| | 2000 | | 50 | | 0 |
| IEC61000-4-5 | 4000 | 10/700 | 100 | 5/310 | 21.5 |
| | 4000 | 1.2/50 | 100 | 8/20 | 0 |
| FCC Part 68, lightning surge type A | 1500 | 10/160 | 200 | 10/160 | 12.5 |
| | 800 | 10/560 | 100 | 10/560 | 6.5 |
| FCC Part 68, lightning surge type B | 1000 | 9/720 | 25 | 5/320 | 0 |

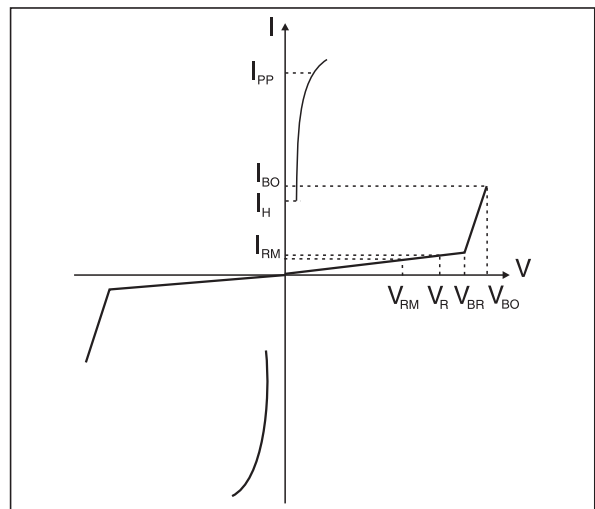
THERMAL RESISTANCES

| 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

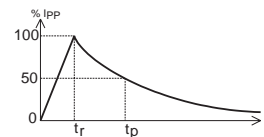
(T_{amb} = 25°C)

| 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 ($T_{amb} = 25^{\circ}\text{C}$)

| Symbol | Parameter | Value | Unit | |
|--------------------|---|-----------------------|--------------------|----------------------|
| I_{PP} | Repetitive peak pulse current: | 10/1000 μs | 50 | A |
| | | 8/20 μs | 100 | |
| | | 10/560 μs | 55 | |
| | | 5/310 μs | 65 | |
| | | 10/160 μs | 75 | |
| | | 1/20 μs | 100 | |
| | | 2/10 μs | 150 | |
| 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 | 25 | A |
| | | t = 16.6ms | 28 | |
| | | t = 0.2s | 16 | |
| | | t = 2s | 8.5 | |
| I^2t | I^2t value for fusing | t = 16.6ms | 6.5 | A^2s |
| | | t = 20ms | 6.3 | |
| T_L | Maximum lead temperature for soldering during 10 s. | 260 | $^{\circ}\text{C}$ | |
| T_{stg} T_j | Storage temperature range | - 55 to + 150 | $^{\circ}\text{C}$ | |
| | Maximum junction temperature | 150 | $^{\circ}\text{C}$ | |

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

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ELECTRICAL PARAMETERS (Tamb = 25°C)

| Type | IRM @ VRM max | | IR @ VR MAX | | DYNAMIC VBO @ IBO max | | STATIC VBO @ IBO max | | IH min | C typ. | C typ. |
|-----------|---------------|-----|-------------|-----|-----------------------|-----|----------------------|-----|--------|--------|--------|
| | 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: IR measured at VR guarantee VBRmin ≥ VR

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: VR = 50V bias, VRMS = 1V, F = 1MHz.

Note 6: VR = 2V bias, VRMS = 1V, F = 1MHz

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

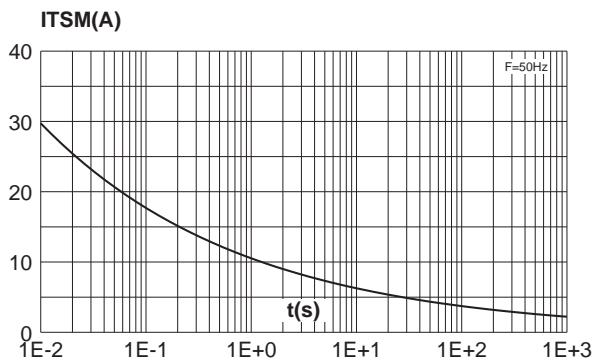


Fig. 2: On-state voltage versus on-state current (typical values).

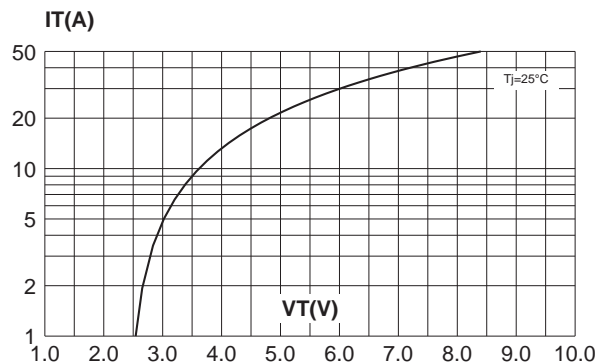


Fig. 3: Relative variation of holding current versus junction temperature.

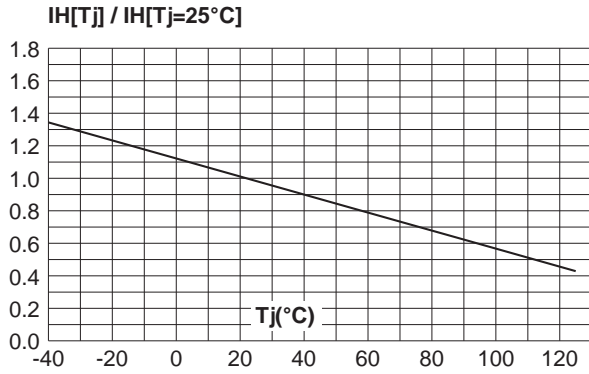


Fig. 4: Relative variation of breakover voltage versus junction temperature.

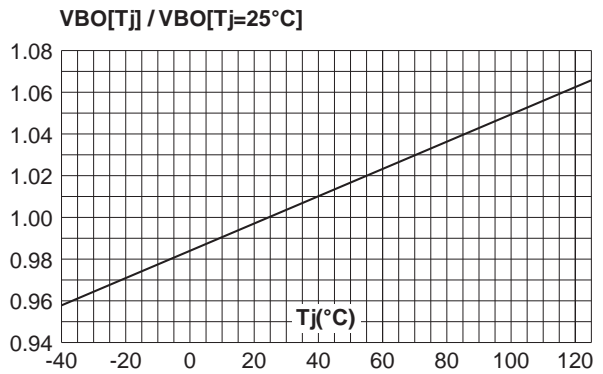


Fig. 5: Relative variation of leakage current versus junction temperature (typical values).

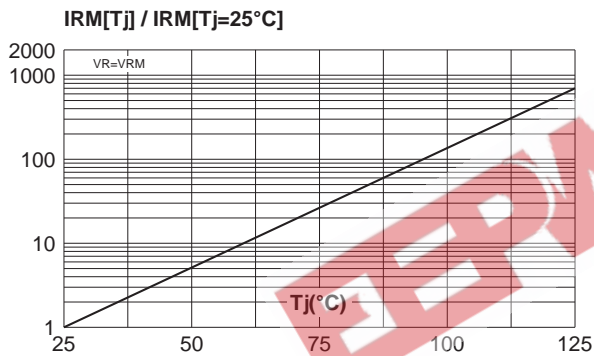


Fig. 6: Relative variation of thermal impedance versus pulse duration.

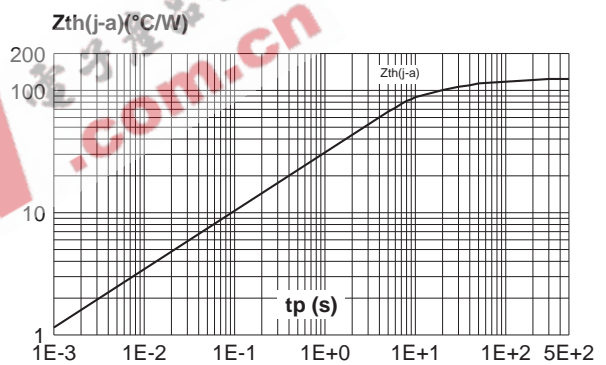
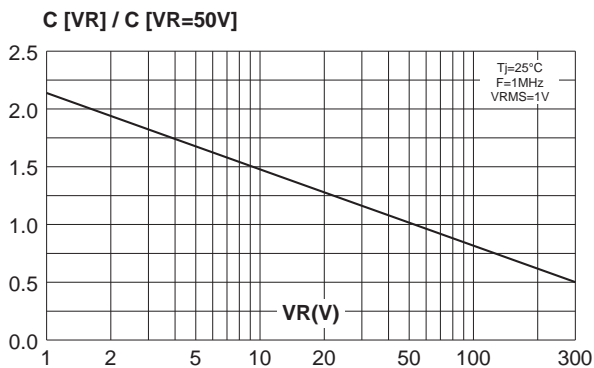
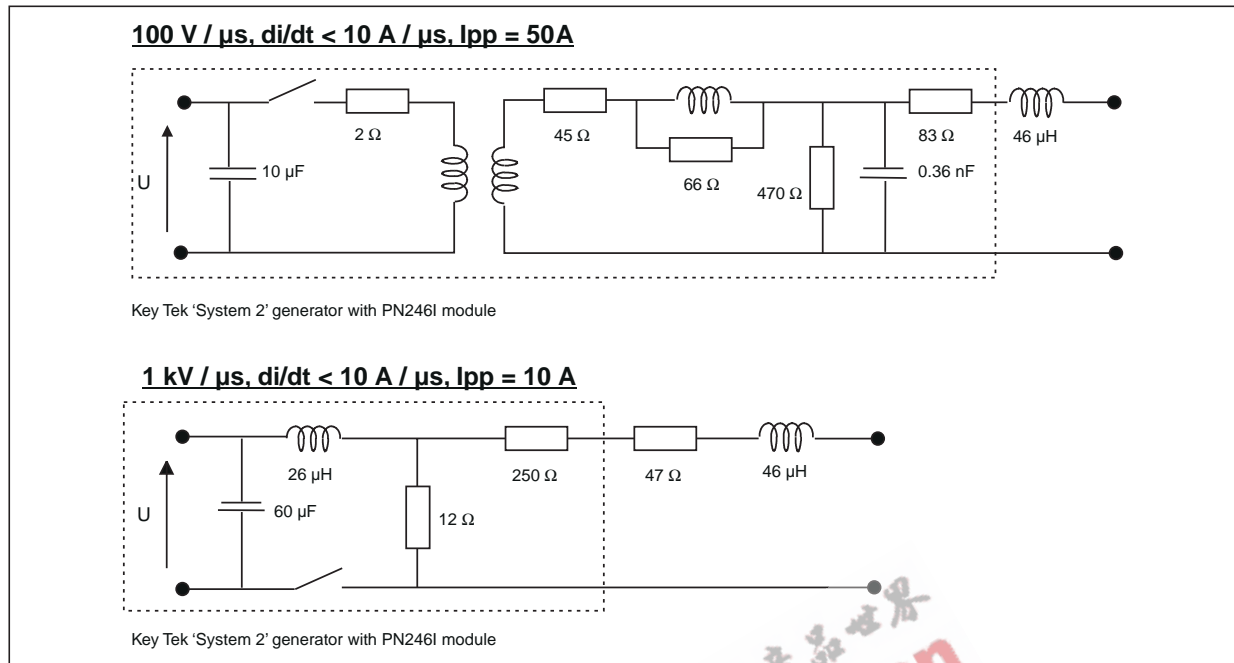


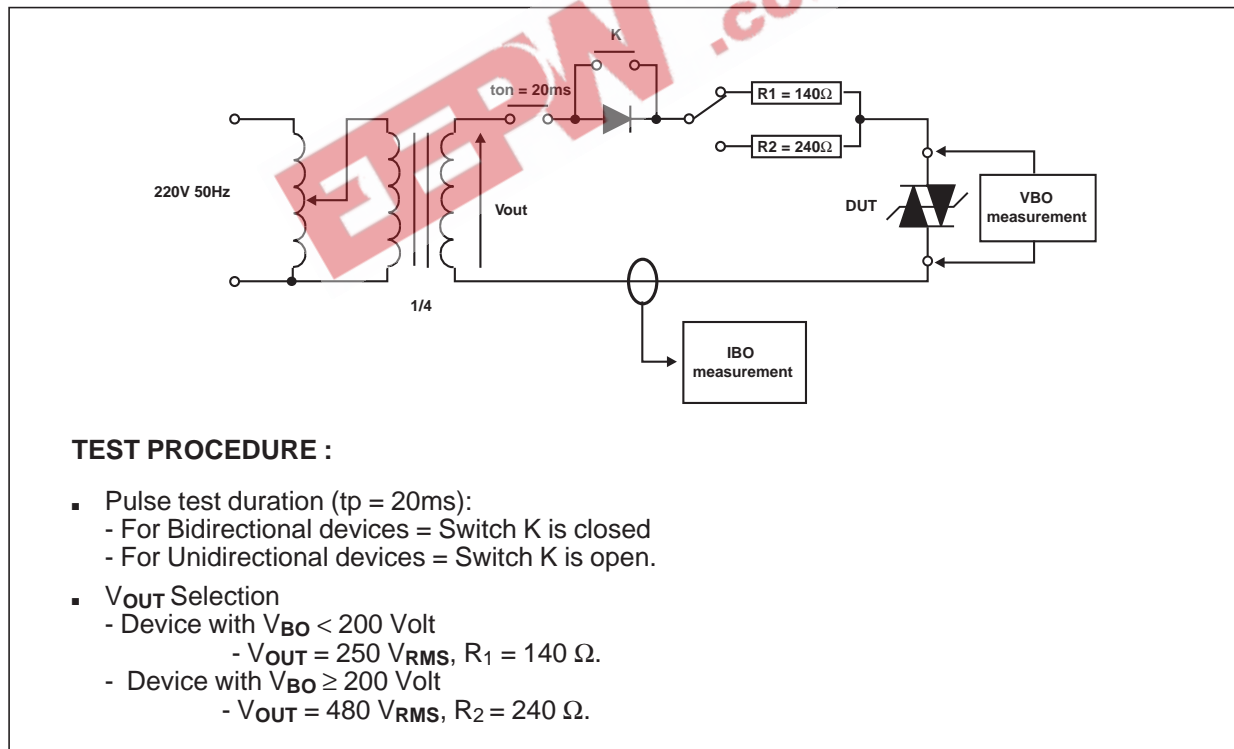
Fig. 7: Relative variation of junction capacitance versus reverse voltage applied (typical values).



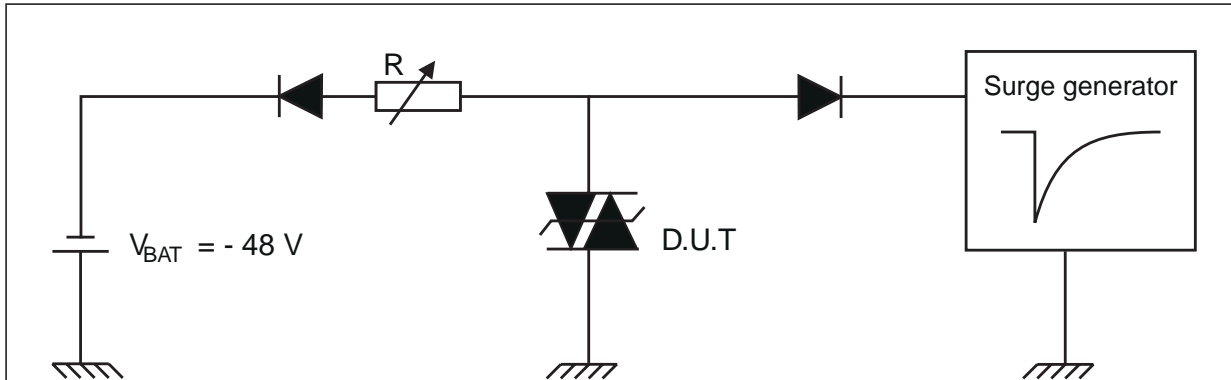
TEST CIRCUIT 1 FOR DYNAMIC I_{BO} and V_{BO} PARAMETERS



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



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.

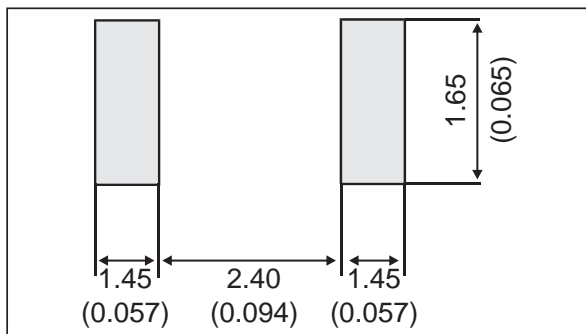
TEST PROCEDURE :

- 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 : $I_{pp} = 10A, 10/1000 \mu s$.
- The D.U.T. will come back to the off-state within 50 ms max.

PACKAGE MECHANICAL DATA
SMA (JEDEC DO-214AC)

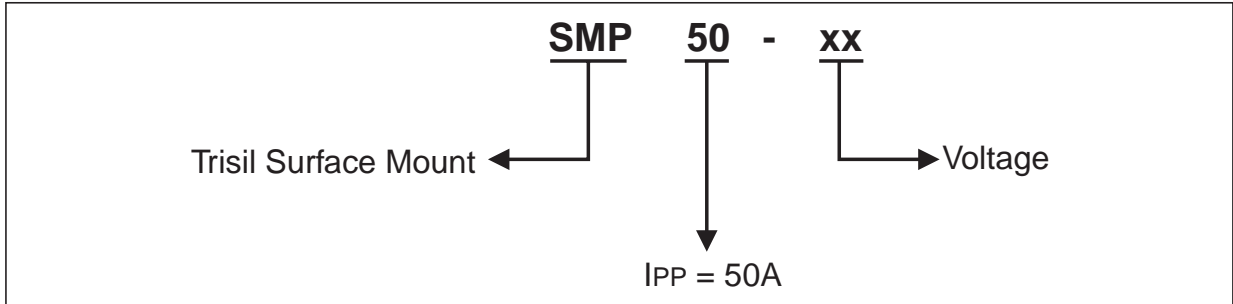
| REF. | DIMENSIONS | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.70 | 0.075 | 0.106 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.25 | 1.65 | 0.049 | 0.065 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 4.80 | 5.60 | 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)



SMP50-xxx

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 | | | | |

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