

Trisil™ for telecom equipment protection

Features

- Bidirectional crowbar protection
- Voltage range from 62 V to 270 V
- Low capacitance from 10 pF to 20 pF typ. @ 50 V
- Low leakage current: $I_R = 2 \mu\text{A}$ max.
- Holding current: $I_H = 150 \text{ mA}$ min.
- Repetitive peak pulse current: $I_{PP} = 30 \text{ A}$ (10/1000 μs)

Benefits

- Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection.
- This device can be used to help equipment meet various standards such as UL1950, IEC950 / CSA C22.2, UL1459 and FCC part 68.
- Trisils have UL94 V0 approved resin.
- SMA package is JEDEC registered (DO-214AC).
- Trisils are UL497B approved (file: E136224).

Applications

Telecommunication equipment such as:

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

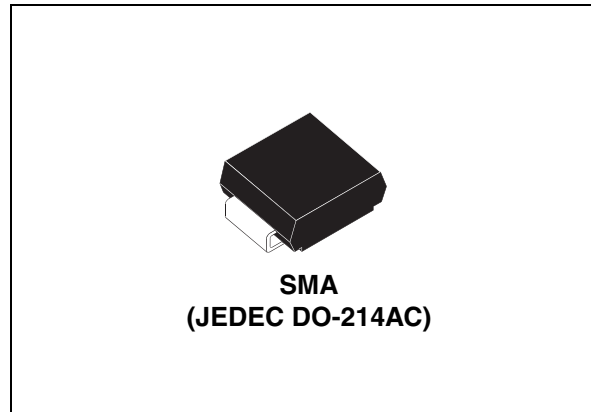
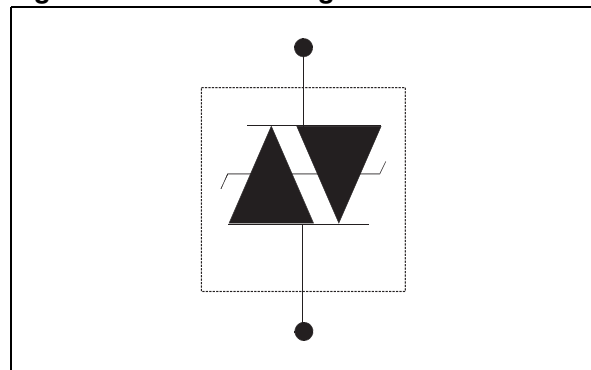


Figure 1. Device configuration



Description

The SMP30 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.

TM: Trisil is a trademark of STMicroelectronics.

1 Characteristics

Table 1. Compliant with the following standards

| STANDARD | Peak surge voltage (V) | Waveform voltage | Required peak current (A) | Current waveform | Minimum serial resistor to meet standard (Ω) |
|--|------------------------|------------------|---------------------------|------------------|---|
| GR-1089 Core First level | 2500 | 2/10 μ s | 500 | 2/10 μ s | 20 |
| | 1000 | 10/1000 μ s | 100 | 10/1000 μ s | 24 |
| GR-1089 Core Second level | 5000 | 2/10 μ s | 500 | 2/10 μ s | 40 |
| GR-1089 Core Intra-building | 1500 | 2/10 μ s | 100 | 2/10 μ s | 0 |
| ITU-T-K20/K21 | 6000 | 10/700 μ s | 150 | 5/310 μ s | 110 |
| | 1500 | | 37.5 | | 0 |
| ITU-T-K20 (IEC61000-4-2) | 8000 | 1/60 ns | ESD contact discharge | | 0 |
| | 15000 | | ESD air discharge | | 0 |
| VDE0433 | 4000 | 10/700 μ s | 100 | 5/310 μ s | 60 |
| | 2000 | | 50 | | 10 |
| VDE0878 | 4000 | 1.2/50 μ s | 100 | 1/20 μ s | 18 |
| | 2000 | | 50 | | 0 |
| IEC61000-4-5 | 4000 | 10/700 μ s | 100 | 5/310 μ s | 60 |
| | 4000 | 1.2/50 μ s | 100 | 8/20 μ s | 18 |
| FCC Part 68, lightning surge type A | 1500 | 10/160 μ s | 200 | 10/160 μ s | 26 |
| | 800 | 10/560 μ s | 100 | 10/560 μ s | 15 |
| FCC Part 68, lightning surge type B | 1000 | 9/720 μ s | 25 | 5/320 μ s | 0 |

Table 2. Absolute ratings (T_{amb} = 25 °C)

| Symbol | Parameter | Value | Unit | |
|------------------|---|--------------|------|------------------|
| I _{PP} | Repetitive peak pulse current | 10/1000 μs | 30 | |
| | | 8/20 μs | 70 | |
| | | 10/560 μs | 35 | |
| | | 5/310 μs | 40 | |
| | | 10/160 μs | 45 | |
| | | 1/20 μs | 70 | |
| | | 2/10 μs | 100 | |
| I _{FS} | Fail-safe mode : maximum current ⁽¹⁾ | 8/20 μs | 2.5 | kA |
| I _{TSM} | Non repetitive surge peak on-state current (sinusoidal) | t = 0.2 s | 14 | A |
| | | t = 1 s | 10.5 | |
| | | t = 2 s | 9 | |
| | | t = 15 mn | 3 | |
| I ² t | I ² t value for using | t = 16.6 ms | 5.7 | A ² s |
| | | t = 20 ms | 4.9 | |
| T _{stg} | Storage temperature range | -55 to + 150 | °C | |
| T _j | Maximum junction temperature | 150 | °C | |
| T _L | Maximum lead temperature for soldering during 10 s. | 260 | °C | |

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) | 120 | °C/W |
| R _{th(j-l)} | Junction to leads | 30 | °C/W |

Table 4. Electrical characteristics - definitions (T_{amb} = 25 °C)

| Symbol | Parameter |
|-----------------|-----------------------------------|
| V _{RM} | Stand-off voltage |
| V _{BR} | Breakdown voltage |
| V _{BO} | Breakover voltage |
| I _{RM} | Leakage current |
| I _{PP} | Peak pulse current |
| I _{BO} | Breakover current |
| I _H | Holding current |
| V _R | Continuous reverse voltage |
| I _R | Leakage current at V _R |
| C | Capacitance |

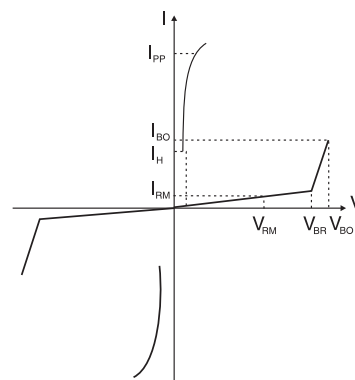


Table 5. Electrical characteristics - values ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

| Types | $I_{RM} @ V_{RM}$ | | $I_R^{(1)} @ V_R$ | | Dynamic V_{BO} | Static $V_{BO} @ I_{BO}$ | | I_H | $C^{(2)}$ | $C^{(3)}$ |
|-----------|-------------------|-----|-------------------|-----|------------------|--------------------------|------|-------|-----------|-----------|
| | max. | | max. | | max. | max. | max. | min. | typ. | typ. |
| | μA | V | μA | V | V | V | mA | mA | pF | pF |
| SMP30-62 | 2 | 56 | 5 | 62 | 85 | 82 | 800 | 150 | 20 | 40 |
| SMP30-68 | | 61 | | 68 | 93 | 90 | | | 20 | 40 |
| SMP30-100 | | 90 | | 100 | 135 | 133 | | | 16 | 35 |
| SMP30-120 | | 108 | | 120 | 160 | 160 | | | 16 | 30 |
| SMP30-130 | | 117 | | 130 | 173 | 173 | | | 14 | 30 |
| SMP30-180 | | 162 | | 180 | 235 | 240 | | | 12 | 25 |
| SMP30-200 | | 180 | | 200 | 262 | 267 | | | 12 | 25 |
| SMP30-220 | | 198 | | 220 | 285 | 293 | | | 10 | 20 |
| SMP30-240 | | 216 | | 240 | 300 | 320 | | | 10 | 20 |
| SMP30-270 | | 243 | | 270 | 350 | 360 | | | 10 | 20 |

1. I_R measured at V_R guarantee $V_{BR\ min} \geq V_R$
2. $V_R = 50\text{ V}$ bias, $V_{RMS} = 1\text{ V}$, $F = 1\text{ MHz}$
3. $V_R = 2\text{ V}$ bias, $V_{RMS} = 1\text{ V}$, $F = 1\text{ MHz}$

Figure 2. Pulse waveform

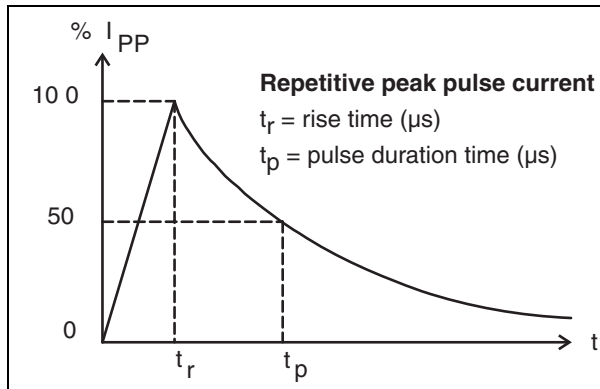


Figure 3. Non repetitive surge peak on-state current versus overload duration

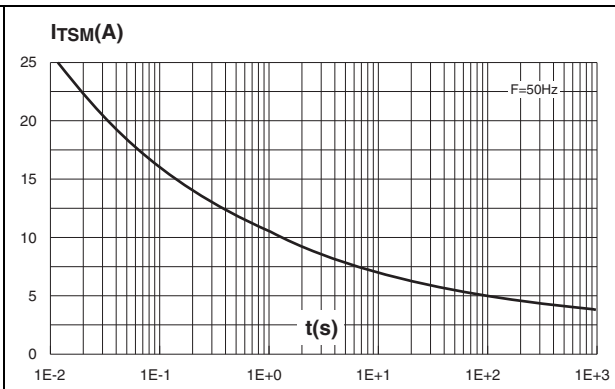


Figure 4. On-state voltage versus on-state current (typical values)

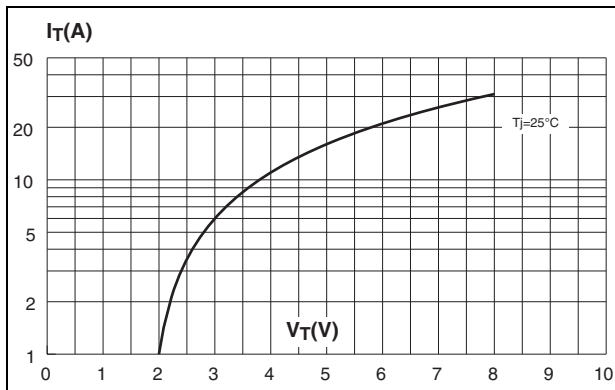


Figure 5. Relative variation of holding current versus junction temperature

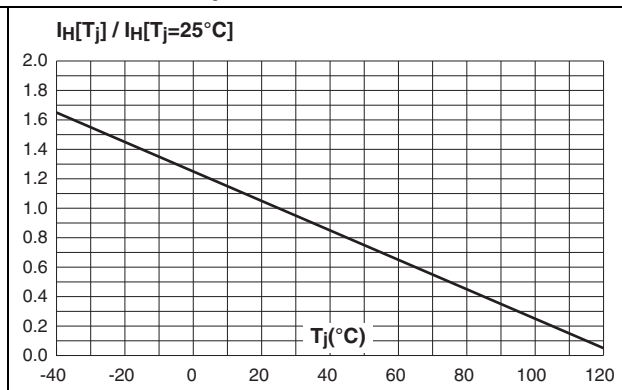


Figure 6. Relative variation of breakover voltage versus junction temperature

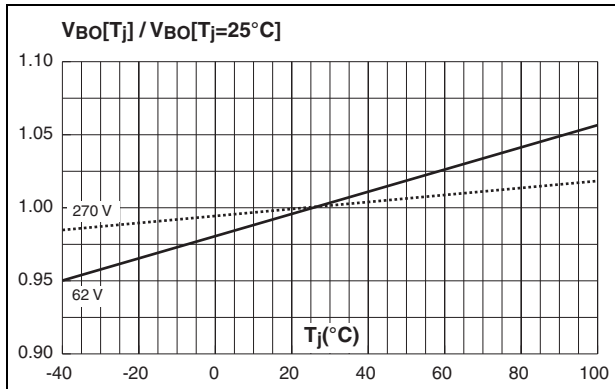


Figure 7. Relative variation of leakage current versus reverse voltage applied (typical values)

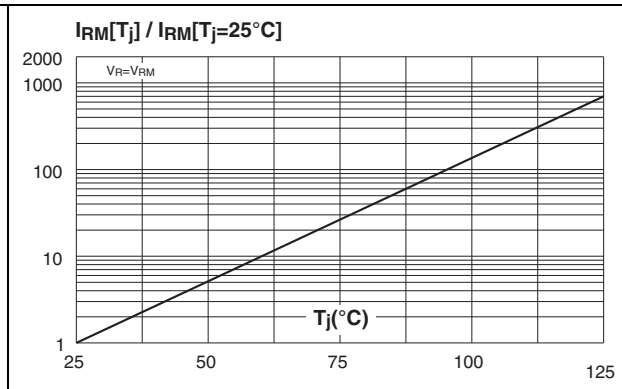


Figure 8. Variation of thermal impedance junction to ambient versus pulse duration

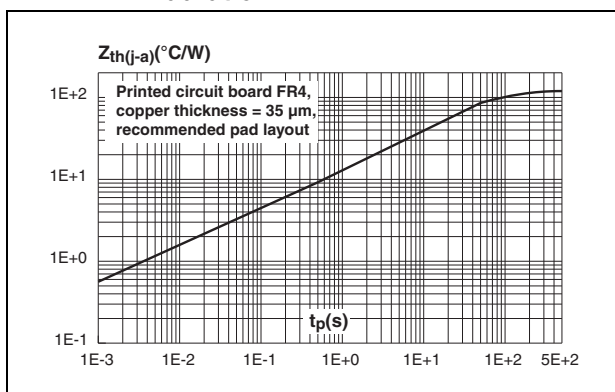
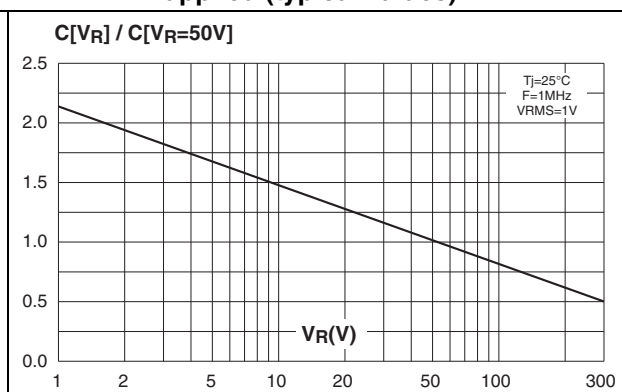
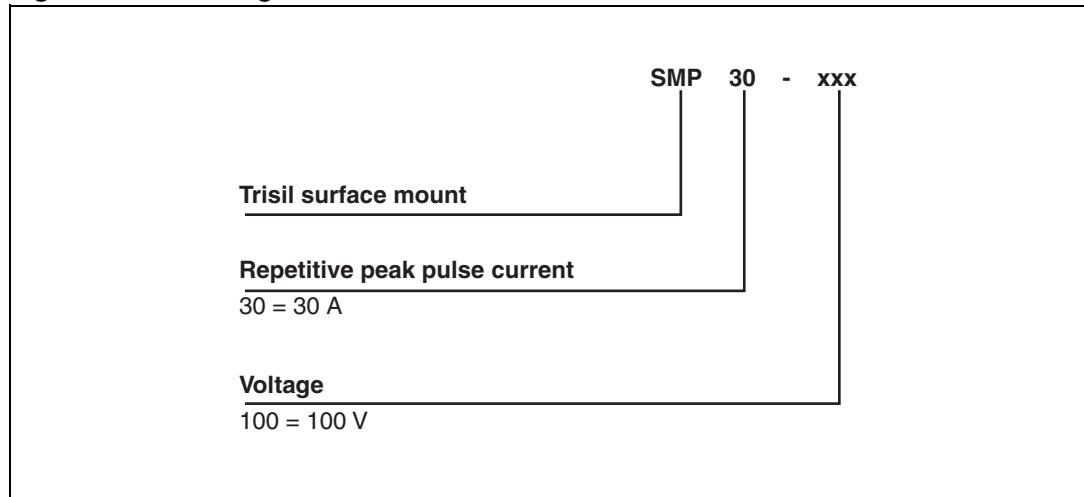


Figure 9. Relative variation of junction capacitance versus reverse voltage applied (typical values)



2 Ordering information scheme

Figure 10. Ordering information scheme



3 Package mechanical data

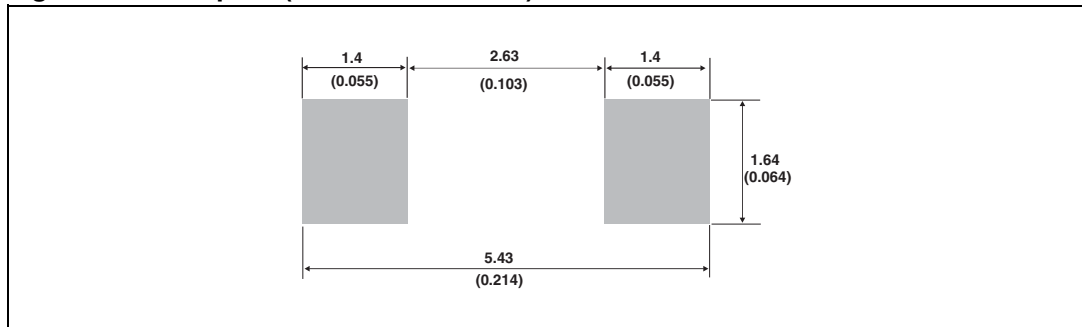
- Epoxy meets UL94, V0
- Lead-free package

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. ECOPACK® is an ST trademark.

Table 6. SMA dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.094 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.25 | 1.65 | 0.049 | 0.065 |
| c | 0.15 | 0.40 | 0.006 | 0.016 |
| D | 2.25 | 2.90 | 0.089 | 0.114 |
| E | 4.80 | 5.35 | 0.189 | 0.211 |
| E1 | 3.95 | 4.60 | 0.156 | 0.181 |
| L | 0.75 | 1.50 | 0.030 | 0.059 |

Figure 11. Footprint (dimensions in mm)



4 Ordering information

Table 7. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|------------|---------|---------|--------|----------|---------------|
| SMP30-62 | QAA | SMA | 0.06 g | 5000 | Tape and reel |
| SMP30-68 | QAB | | | | |
| SMP30-100 | QAC | | | | |
| SMP30-120 | QAD | | | | |
| SMP30-130 | QAE | | | | |
| SMP30-180 | QAF | | | | |
| SMP30-200 | QAG | | | | |
| SMP30-220 | QAH | | | | |
| SMP30-240 | QAI | | | | |
| SMP30-270 | QAJ | | | | |

5 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|---------------|----------|---|
| November-2002 | 4B | Last update. |
| 10-Nov-2004 | 5 | SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106 inch) to 2.03mm (0.080 inch). |
| 13-Dec-2004 | 6 | Figure 7 text legend corrected from "... reverse voltage applied" to "... junction capacitance". |
| 01-Jul-2010 | 7 | Added ECOPACK statement. Updated trademark statement. Removed section on test circuits. |

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