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# Surge arrester

## 3-electrode arrester

| | |
|---|---|
| **Series/Type:** | **TG30-A90XSMD** |
| **Ordering code:** | **B88069X9991T203** |
| Version/Date: | Issue 04 / 2013-06-05 |



EPCOS AG is a TDK Group Company.

## Description

The TG30-series has been especially designed to meet data line protection requirements. The optimized design features a high level of protection against fast rising transients usually caused by lightning disturbances. For use in high frequency data-lines, the series offers ultra low capacitances and shows only marginally signal losses up to high frequencies. The devices are extremely reliable and are able to withstand high surge currents without destruction.

## Features

- Very small size
- Fast response time
- High current handling capability
- Stable performance over service life
- Ultra low capacitance and insertion loss
- High insulation resistance
- Excellent SMD handling
- RoHS-compliant

## Applications

Telecommunication:

- Ethernet, PoE, xDSL
- Cable modem, splitters, line cards
- Wireless-antenna protection

Others:

- CCTV
- ESD protection

## Product characteristics

| | | |
|---|---|---|
| Physical dimensions (diameter × length) | ∅0.13 × 0.26 | in |
| | ∅3.5 × 6.8 | mm |
| Weight | ~ 0.5 | g |
| Operating temperature | -40 ... +90 | °C |
| Recommended storage [2)]<br>- temperature<br>- humidity<br>- period | <br>+5 … +35<br>45 … 80<br>≤ 2 | <br>°C<br>%<br>years |
| Climatic category (IEC 60068-1) | 40/ 90/ 21 | |
| Moisture sensitivity level [1)] | 1 | |
| Marking | without | |

Notes:
1) Tests according JEDEC J-STD-020
2) Specified in terms of corrosion against Sn-plating

## Electrical specifications and stress test methods

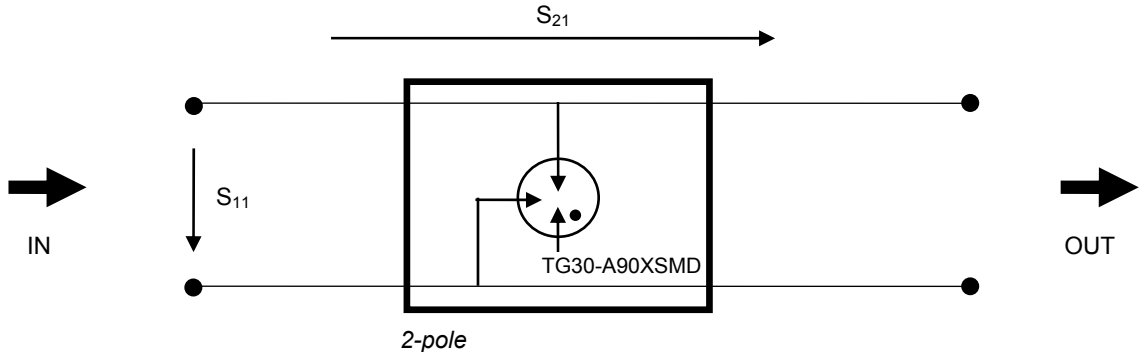
| | | | | |
|---|---|---|---|---|
| Nominal DC spark-over voltage [3) 4) 5)] | | | 90 | V |
| tolerance | | | ±30 | % |
| min. | | | 63 | V |
| max. | | | 117 | V |
| Impulse spark-over voltage [5)] | | | | |
| at 100 V/µs | - for 99% of measured values | | < 450 | V |
| | - typical values of distribution | | < 350 | V |
| at 1 kV/µs | - for 99% of measured values | | < 650 | V |
| | - typical values of distribution | | < 550 | V |
| Service life [10) 11)] | | | | |
| 10 operations | [5× (+) & 5× (–)] | 50 Hz, 1 s [6)] | 2 | A |
| 300 operations | | 8/20 µs [7)] | 100 | A |
| 10 operations | [5× (+) & 5× (–)] | 8/20 µs [6)] | 2 | kA |
| 10 operations | [5× (+) & 5× (–)] | 5/320 µs [8) 9)] | 150 | A |
| 300 operations | [150× (+) & 150× (–)] | 10/1000 µs [6)] | 20 | A |
| Insulation resistance at 50 $V_{DC}$ | | | > 1 | GΩ |
| Capacitance at 1 MHz | | | < 1.2 [5)] | < 0.6 [7)] pF |
| Arc voltage at 1 A | | | ~ 10 | V |
| Glow to arc transition current | | | ~ 0.5 | A |
| Glow voltage | | | ~ 60 | V |

3) At delivery AQL 0.65 level II, DIN ISO 2859
4) In ionized mode
5) Tip or ring electrode to center electrodes
6) Total current through center electrodes, half value through tip respectively ring electrode.
7) Tip to ring electrode
8) Tip to center electrode additional ring to center electrode
9) Test generator 6 kV, 10/700 µs, 40 Ω
10) Electrical specifications may vary after stress tests
11) Tests according to ITU-T Rec. K. 12 and UL 497B

Terms and current waveforms in accordance with ITU-T Rec. K. 12; IEC 61643-21; IEC 61643-311 and IEC 61663-2.

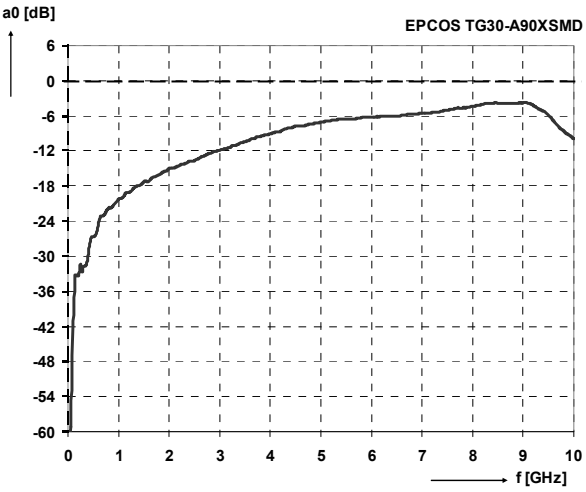
## S-parameters

Circuit diagram:



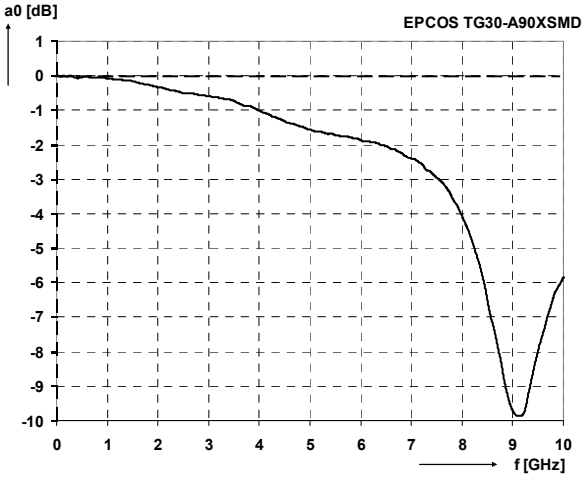

Electrical specifications according circuit diagram:

***Input port voltage reflection coefficient $S_{11}$***
*(typical values of distribution)*



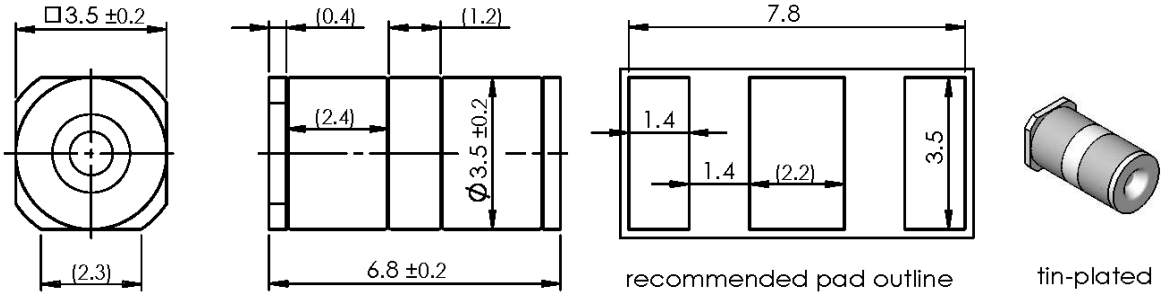

| Frequency | $S_{11}$ |
|---|---|
| 1.00 GHz | -21.0 dB |
| 1.40 Ghz | -17.8 dB |
| 1.80 GHz | -15.4 dB |
| 2.10 GHz | -13.9 dB |
| 2.45 GHz | -12.6 dB |
| 2.80 GHz | -11.5 dB |
| 3.10 GHz | -10.8 dB |
| 3.50 GHz | -10.0 dB |
| 4.00 GHz | -9.1 dB |
| 6.00 GHz | -6.3 dB |
| 8.00 GHz | -4.0 dB |
| 10.00 GHz | -9.5 dB |

***Forward voltage gain $S_{21}$***
*(typical values of distribution)*



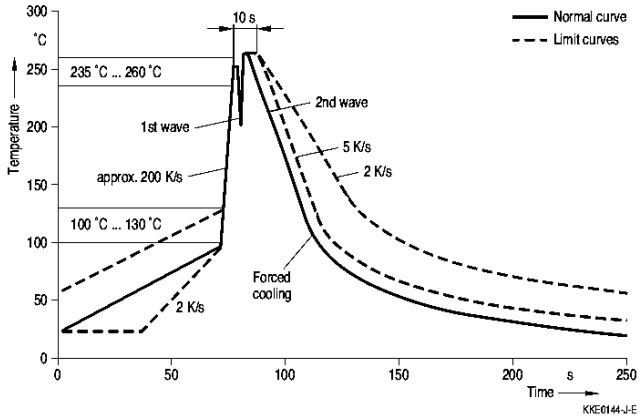

| Frequency | $S_{21}$ |
|---|---|
| 1.00 GHz | -0.08 dB |
| 1.40 Ghz | -0.14 dB |
| 1.80 GHz | -0.26 dB |
| 2.10 GHz | -0.36 dB |
| 2.45 GHz | -0.48 dB |
| 2.80 GHz | -0.56 dB |
| 3.10 GHz | -0.62 dB |
| 3.50 GHz | -0.73 dB |
| 4.00 GHz | -1.02 dB |
| 6.00 GHz | -1.87 dB |
| 8.00 GHz | -4.08 dB |
| 10.00 GHz | -5.96 dB |

## Dimensional drawing in mm



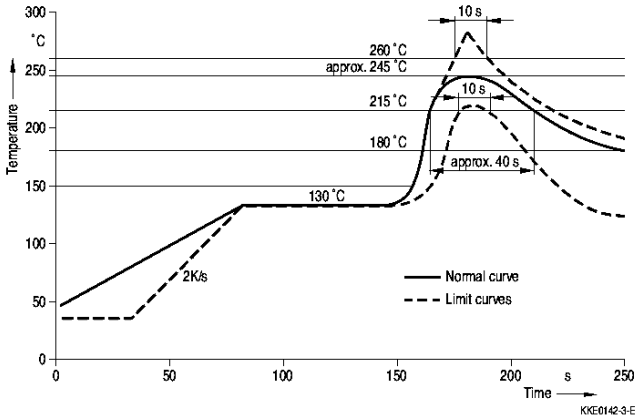

## Soldering parameters

Wave soldering




Soldering profile applied to a single soldering process.

Reflow soldering

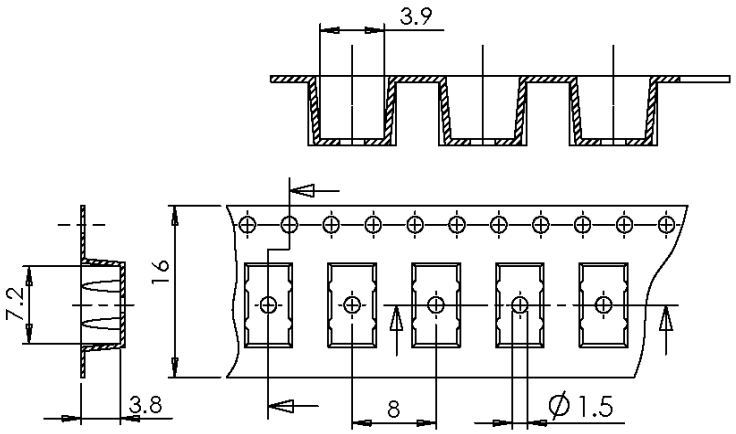


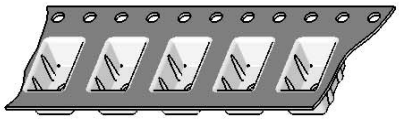

Temperature rise rate: 3 °C/s

| Solder | Solder bath temperature | Dwell time |
|---|---|---|
| Sn 95.5/ Ag 3.8/ Cu 0.7 | 263 (±3) °C | < 3 s |

## Ordering code and packing advice

*B88069X9991**T203** = SMD-tape with 2000 pcs.*



SMD-tape according to IEC 60286-3

## Reliability inspections

| Test | Parameter |
|---|---|
| Outer dimensions | Arrester (acc. data sheet) |
| Environmental testing – test B: dry heat<br>DIN IEC 60068 part 2-2 test Bd | T = max. operating temperature<br>period: 16 h |
| Environmental testing – test A: cold<br>DIN IEC 60068 part 2-1 test Ab | T = min. operating temperature<br>period = 16 h |
| Environmental testing – test N: change of temperature<br>DIN IEC 60068 part 2-14 test Na | TA = min. operating temperature;<br>TB = max. operating temperature<br>t1 = each 30 min.; cycles = 5 |
| Environmental testing – test Cab: damp heat, steady state<br>DIN IEC 60068 part 2-78 test Cab | T = 40 °C; relative humidity = 93%<br>test period = 21 days |
| Environmental testing – test N: bump<br>DIN IEC 60068 part 2-29 test Eb | a = 400 m/s²; shock period = 6 ms;<br>shock number = 4000 |
| Environmental testing – test Fc: vibration<br>DIN IEC 60068 part 2-6 test Fc | f = 10 ... 500 Hz; A = 0.75 mm;<br>a = 100 m/s²; cycles = 10; directions = 2 |
| Environmental testing – test T: soldering<br>DIN IEC 60068 part 2-20 test Ta method 3 | Enclosing time in delivery status<br>≤2 s; after aging ≤4 s |
| Environmental testing – test Td: solderability (SMD)<br>DIN IEC 60068 part 2-58 test Td | Solder temperature = 260 °C<br>pre heating = 150 °C / 120 s<br>cooling <50 s; dipping time = 3 × 10 s |

## Cautions and warnings

- Surge arresters must not be operated directly in power supply networks.
- Surge arresters may become hot in the event of longer periods of current stress (danger of burning). In the event of thermal overload, the connectors may fail or the component may be destroyed.
- Damaged surge arresters must not be re-used.

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