



## Surge arrester

2-electrode arrester

**Series/Type:** S30-A90X  
**Ordering code:** B88069X9231T203  
Version/Date: Issue 04 / 2013-09-16

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## Description

The S30-series has been especially designed to meet data transmission 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 (EIA 1812)
- Short response time
- High current handling capability
- Stable performance over service life
- Ultra low capacitance and insertion loss
- High insulation resistance
- Excellent SMD handling
- RoHS-compatible

## Applications

### Telecommunication:

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

### Others:

- CCTV
- Switching power supply

## Product characteristics

Physical dimensions (length x width x height)	0.18 x 0.12 x 0.10	in
	4.5 x 3.2 x 2.7	mm
	EIA 1812 / 4532 metric	
Weight	~ 0.2	g
Operating temperature	-40 ... +90	°C
Recommended storage <sup>1)</sup>		
- temperature	+5 ... +35	°C
- humidity	45 ... 80	%
- period	≤ 2	years
Climatic category (IEC 60068-1)	40/ 90/ 21	
Moisture sensitivity level <sup>2)</sup>	1	
Marking, black positive	<b>▲BY</b> B - Nominal voltage (B $\triangleq$ 90 V) Y - Year of production (last digit)	
Certifications	UL 497B (E163070)	

### Notes:

<sup>1)</sup> Specified in terms of corrosion against Sn-plating

<sup>2)</sup> Tests according to JEDEC J-STD-020

**Electrical specifications and stress test methods**

Nominal DC spark-over voltage <sup>3) 4)</sup>	90	V	
Tolerance	±30	%	
Min.	63	V	
Max.	117	V	
Impulse spark-over voltage			
at 100 V/μs	- for 99% of measured values - typical values of distribution	< 500 < 400	V V
at 1 kV/μs	- for 99% of measured values - typical values of distribution	< 600 < 500	V V
Service life <sup>5) 6)</sup>			
10 operations	50 Hz, 1 s	2	A
1 operation	8/20 μs	3	kA
10 operations [5x (+) & 5x (-)]	8/20 μs	2	kA
10 operations [5x (+) & 5x (-)]	5/320 μs <sup>7)</sup>	150	A
100 operations [50x (+) & 50x (-)]	10/1000 μs	10	A
Insulation resistance at 50 V <sub>DC</sub>	> 1	GΩ	
Capacitance at 1 MHz	< 0.8	pF	
Arc voltage at 1 A	~ 10	V	
Glow to arc transition current	~ 0.4	A	
Glow voltage	~ 55	V	

<sup>3)</sup> At delivery AQL 0.65 level II, DIN ISO 2859

<sup>4)</sup> In ionized mode

<sup>5)</sup> Tests according to ITU-T Rec. K. 12 and UL 497B

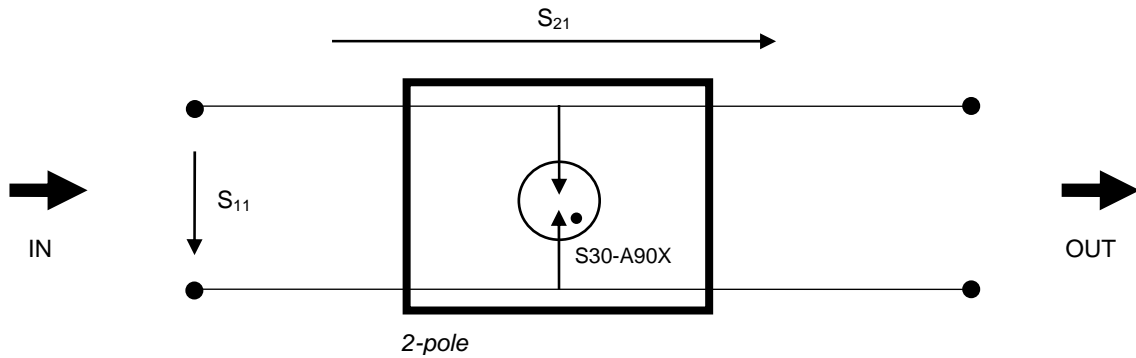
<sup>6)</sup> Electrical specifications may vary after stress tests

<sup>7)</sup> Test generator 6 kV, 10/700 μs, 40 Ω

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

**S-parameters**

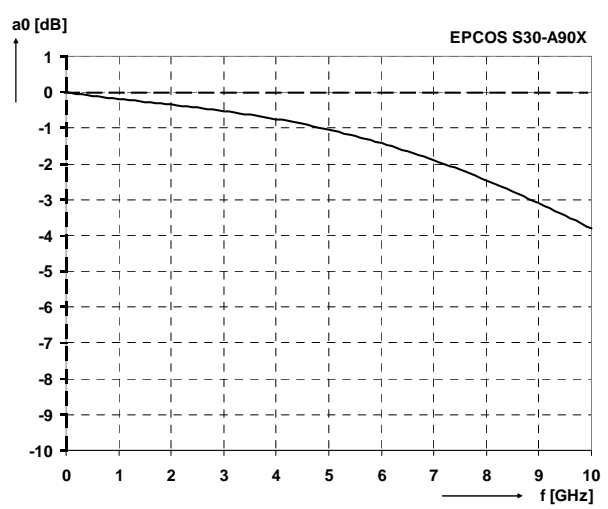
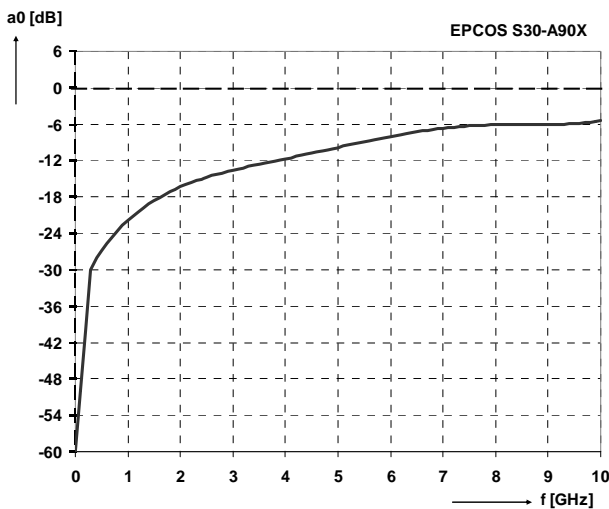
Circuit diagram:



Electrical specifications according circuit diagram:

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

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

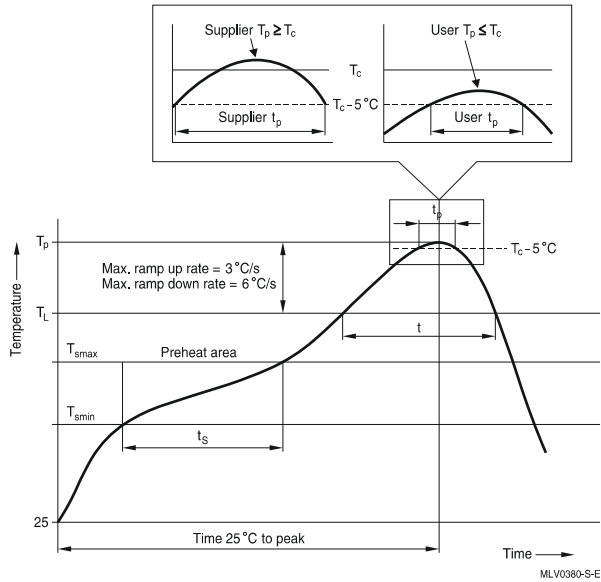


Frequency	$S_{11}$
1.00 GHz	-21.9 dB
1.40 GHz	-19.1 dB
1.80 GHz	-17.1 dB
2.10 GHz	-16.0 dB
2.45 GHz	-14.9 dB
2.80 GHz	-14.0 dB
3.10 GHz	-13.4 dB
3.50 GHz	-12.6 dB
4.00 GHz	-11.7 dB
6.00 GHz	-8.0 dB
8.00 GHz	-6.1 dB
10.00 GHz	-5.4 dB

Frequency	$S_{21}$
1.00 GHz	-0.19 dB
1.40 GHz	-0.26 dB
1.80 GHz	-0.32 dB
2.10 GHz	-0.37 dB
2.45 GHz	-0.42 dB
2.80 GHz	-0.49 dB
3.10 GHz	-0.55 dB
3.50 GHz	-0.64 dB
4.00 GHz	-0.75 dB
6.00 GHz	-1.43 dB
8.00 GHz	-2.46 dB
10.00 GHz	-3.81 dB

Soldering parameters

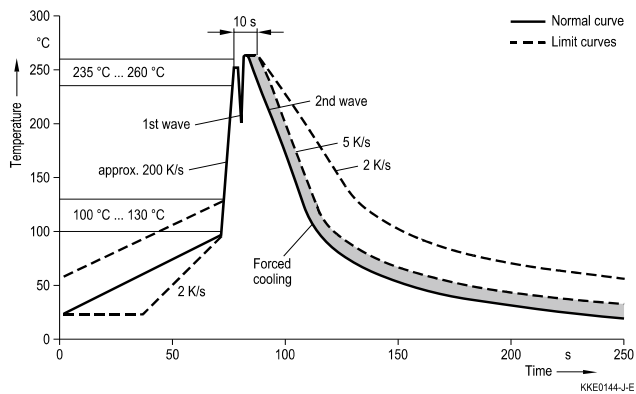
Reflow soldering



Reflow profile feature		Sn- Pb eutectic assembly	Pb-free assembly
Preheat and soak - Temperature min - Temperature max - Time	$T_{smin}$ $T_{smax}$ $t_{smin}$ to $t_{smax}$	100 °C 150 °C 60 ... 120 s	150 °C 200 °C 60 ... 180 s
Average ramp-up rate	$T_{smax}$ to $T_p$	max. 3 °C/ s	max. 3 °C/ s
Liquidous temperature Time at liquidous	$T_L$ $t_L$	183 °C 60 ... 150 s	217 °C 60 ... 150 s
Peak package body temperature *	$T_p$	220 ... 235 °C **	245 ... 260 °C **
Time ( $t_p$ ) ** within 5 °C of the specified classification temperature ( $T_c$ )		20 s ***	30 s ***
Average ramp-down rate	$T_p$ to $T_{smax}$	max. 6 °C/ s	max. 6 °C/ s
Time 25 °C to peak temperature		max. 6 min	max. 8 min

\* = Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.  
 \*\* = For details please refer to JEDEC J-STD-020D.  
 \*\*\* = Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

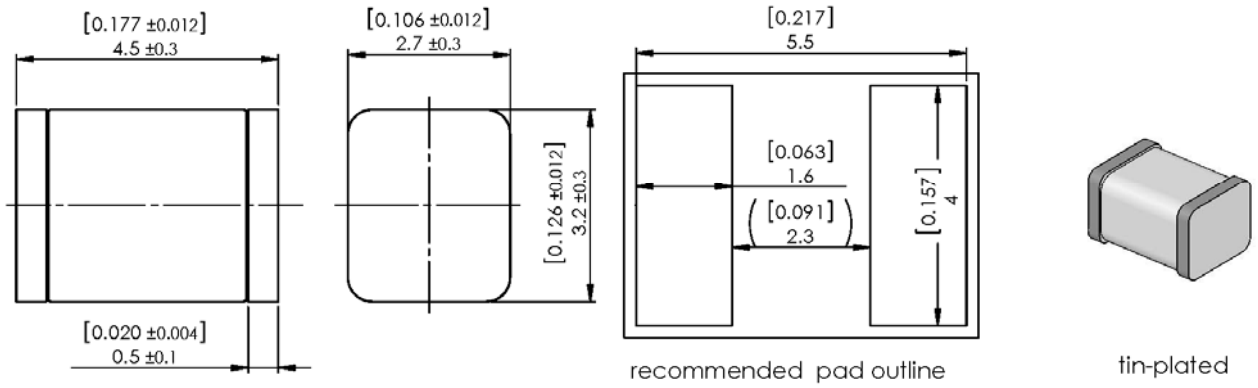
Wave soldering



Wave profile feature	Pb-free assembly
Solder	Sn 95.5 / Ag 3.8 / Cu 0.7
Solder bath temperature	263 (±3) °C
Dwell time	< 3 s

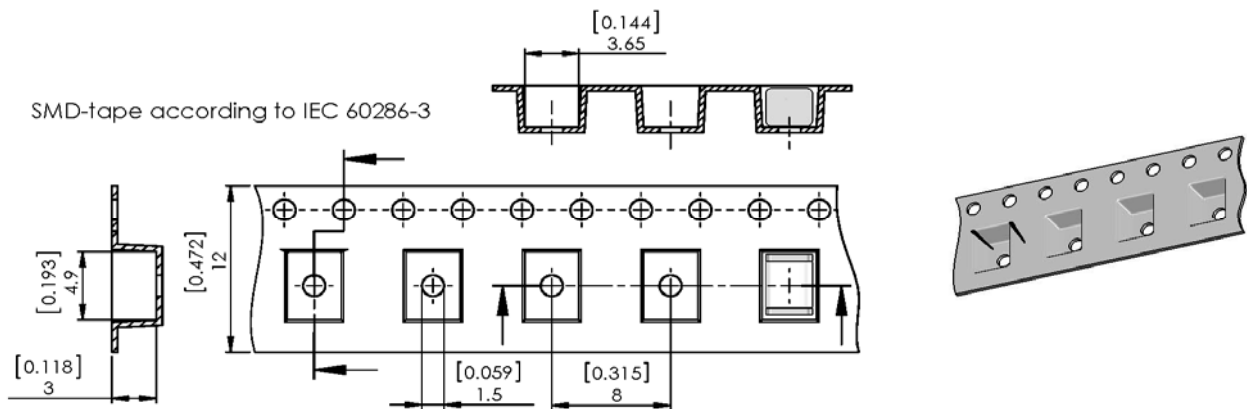
Soldering profile applied to a single soldering process.

Dimensions in mm and inch [...]



Ordering code and packing advice

B88069X9231T203 = 2000 pcs. on SMD-tape



### Reliability inspections

Test	Parameter
Outer dimensions	Arrester (acc. data sheet)
Environmental testing – test B: dry heat DIN IEC 60068 part 2-2 test Bd	T = max. operating temperature period: 16 h
Environmental testing – test A: cold DIN IEC 60068 part 2-1 test Ab	T = min. operating temperature period = 16 h
Environmental testing – test N: change of temperature DIN IEC 60068 part 2-14 test Na	TA = min. operating temperature; TB = max. operating temperature t1 = each 30 min.; cycles = 5
Environmental testing – test Cab: damp heat, steady state DIN IEC 60068 part 2-78 test Cab	T = 40 °C; relative humidity = 93% test period = 21 days
Environmental testing – test N: bump DIN IEC 60068 part 2-29 test Eb	a = 400 m/s <sup>2</sup> ; shock period = 6 ms; shock number = 4000
Environmental testing – test Fc: vibration DIN IEC 60068 part 2-6 test Fc	f = 10 ... 500 Hz; A = 0.75 mm; a = 100 m/s <sup>2</sup> ; cycles = 10; directions = 2
Environmental testing – test T: soldering DIN IEC 60068 part 2-20 test Ta method 3	Enclosing time in delivery status ≤2 s; after aging ≤4 s
Environmental testing – test Td: solderability (SMD) DIN IEC 60068 part 2-58 test Td	Solder temperature = 260 °C pre heating = 150 °C / 120 s 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.
- Surge arresters must be handled with care and must not be dropped.
- Damaged surge arresters must not be re-used.

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