Surge arrester

2-electrode arrester

Series/Type:	**S20-A470X**
Ordering code:	**B88069X1193T303**
Version/Date:	Issue 04 / 2013-09-17

EPCOS AG is a TDK Group Company.

Description

The S20-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 1206)
- 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 (width × depth × height)	0.126 × 0.063 × 0.063	in
	3.2 × 1.6 × 1.6	mm
	EIA 1206 / 3216 metric	
Weight	~ 0.05	g
Operating temperature	–40 ... +90	°C
Recommended storage [1)] - temperature - humidity - period	 +5 … +35 45 … 80 ≤ 2	 °C % years
Climatic category (IEC 60068-1)	40/ 90/ 21	
Moisture sensitivity level [2)]	1	
Marking	without	
Certifications	UL 497B (E163070)	

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

Electrical specifications and stress test methods

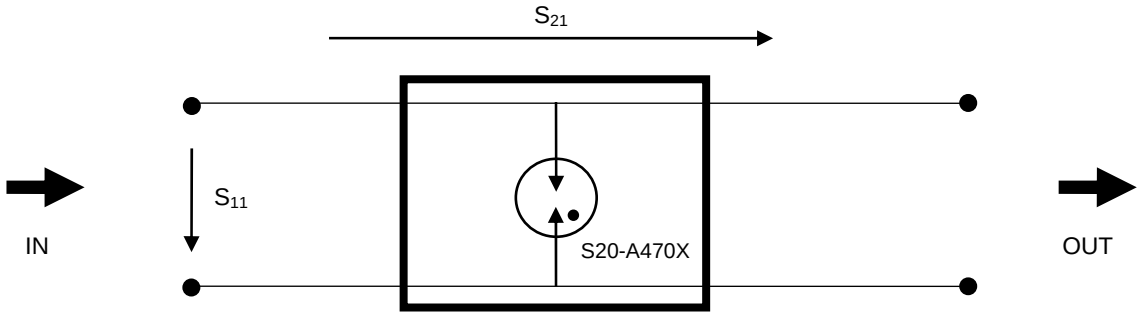
Nominal DC spark-over voltage [3) 4)]		470	V
Tolerance		±30	%
Min.		329	V
Max.		611	V
Impulse spark-over voltage			
at 100 V/µs	- for 99% of measured values	< 1050	V
	- typical values of distribution	< 950	V
at 1 kV/µs	- for 99% of measured values	< 1200	V
	- typical values of distribution	< 1050	V
at 10/700 µs, 6 kV	- for 99% of measured values	< 1200	V
	- typical values of distribution	< 1000	V
Service life [5) 6)]			
10 operations [5× (+) & 5× (–)]	8/20 µs	0.5	kA
10 operations [5× (+) & 5× (–)]	5/320 µs [7)]	150	A
Insulation resistance at 100 V_{DC}		> 1	GΩ
Capacitance at 1 MHz		< 0.3	pF
Arc voltage at 1 A		~ 10	V
Glow to arc transition current		~ 1.0	A
Glow voltage		~ 60	V

[3)] At delivery AQL 0.65 level II, DIN ISO 2859
[4)] In ionized mode
[5)] Tests according to ITU-T Rec. K. 12 and UL 497B
[6)] After service life: DC spark-over voltage 470 V ±40%
[7)] 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

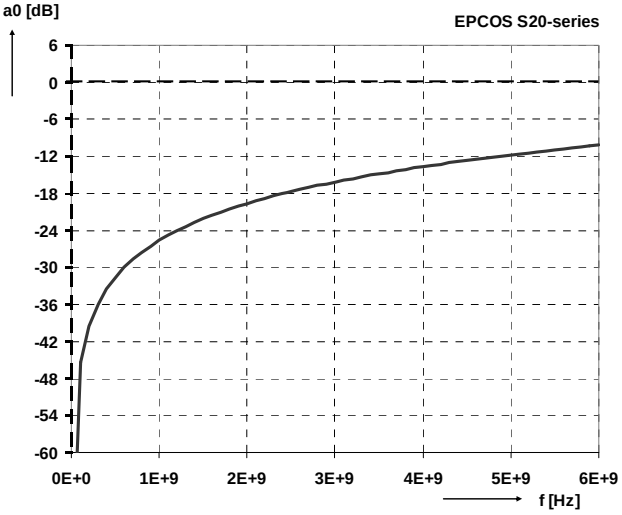
Circuit diagram:



2-pole

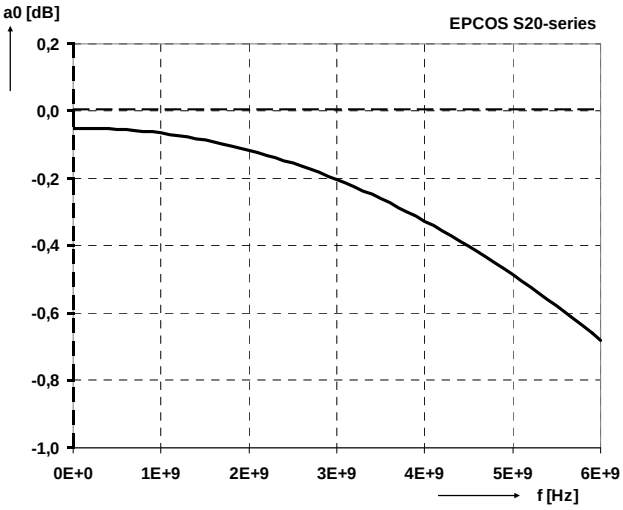
Electrical specifications according circuit diagram:

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



Frequency	S_{11}
1.00 GHz	-25 dB
1.40 GHz	-22 dB
1.80 GHz	-20 dB
2.10 GHz	-19 dB
2.45 GHz	-17 dB
2.80 GHz	-16 dB
3.10 GHz	-15 dB
3.50 GHz	-14 dB
4.00 GHz	-13 dB
5.00 GHz	-11 dB
6.00 GHz	-10 dB

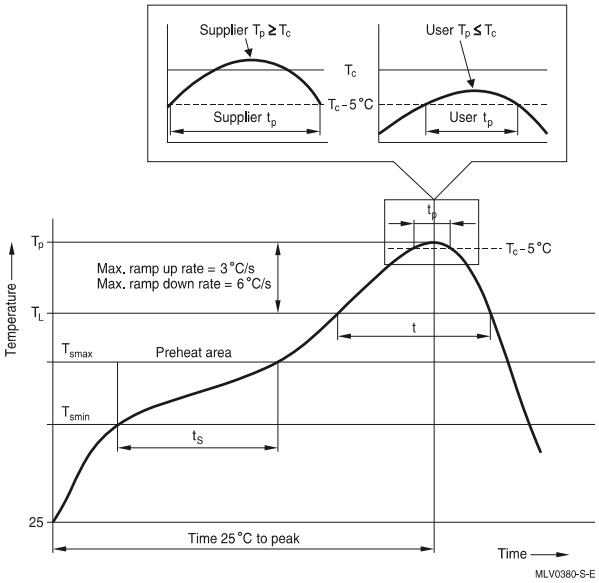
Forward voltage gain S_{21}
(typical values of distribution)



Frequency	S_{21}
1.00 GHz	-0.07 dB
1.40 GHz	-0.08 dB
1.80 GHz	-0.10 dB
2.10 GHz	-0.12 dB
2.45 GHz	-0.15 dB
2.80 GHz	-0.18 dB
3.10 GHz	-0.21 dB
3.50 GHz	-0.26 dB
4.00 GHz	-0.35 dB
5.00 GHz	-0.50 dB
6.00 GHz	-0.70 dB

Soldering parameters

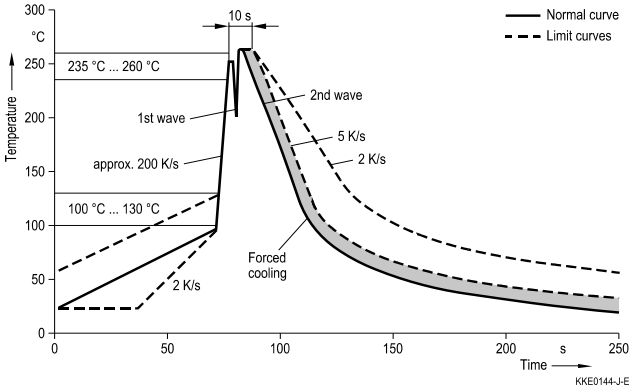
Reflow soldering



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.

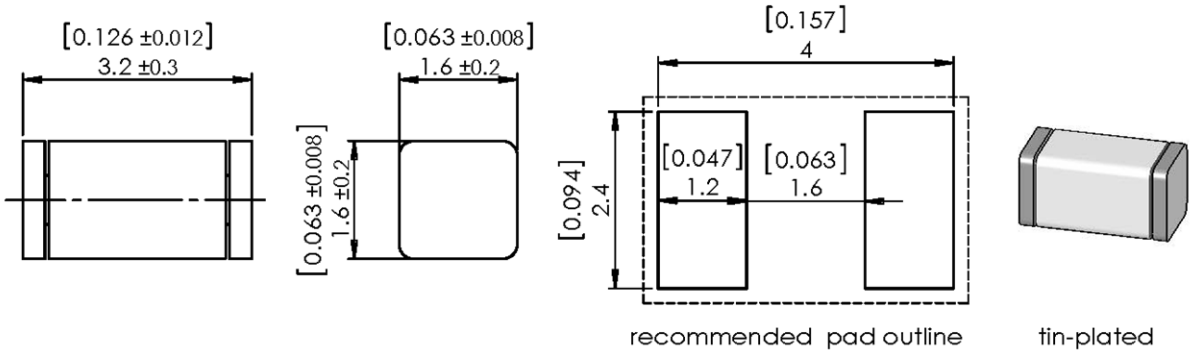
Wave soldering



Soldering profile applied to a single soldering process.

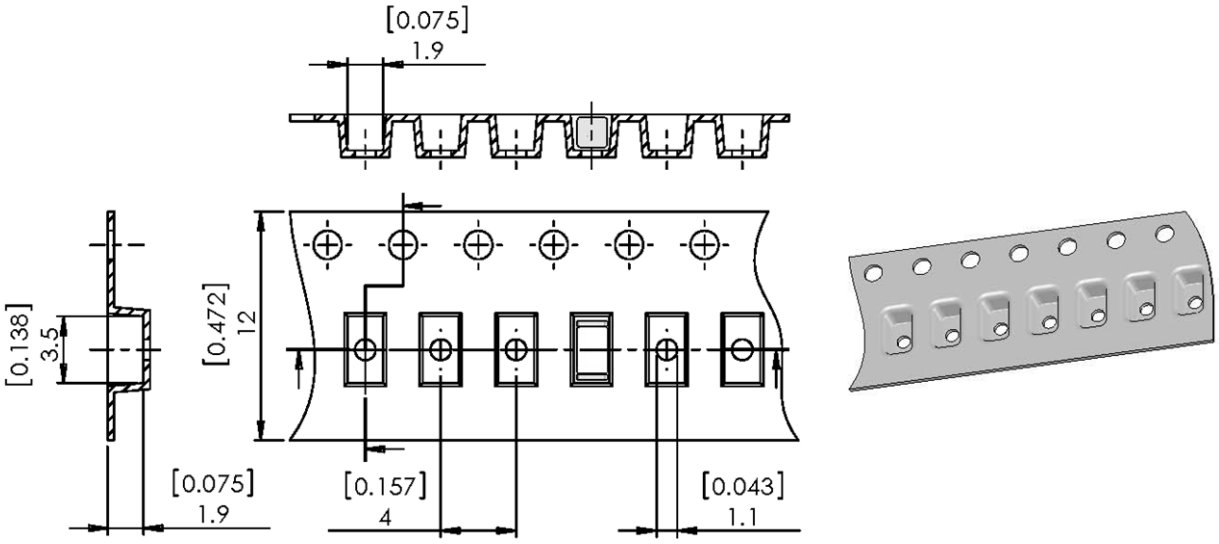
Wave profile feature	Pb-free assembly
Solder	Sn 95.5 / Ag 3.8 / Cu 0.7
Solder bath temperature	263 (±3) °C
Dwell time	< 3 s

Dimensions in mm and inch [...]



Ordering code and packing advice

*B88069X1193**T303** = 3000 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/s²; 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/s²; 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 regular QCC-control
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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