Surge arresters

2-electrode arresters

Type: **EHV6* series**

Version/Date: Issue 08 / 2013-09-19

Product description

The EHV6* series was specially designed to meet the strictest protection requirements. An optimized design features a high level of protection against fast rising transients usually caused by lightning disturbance. For use in high-frequency applications the series offers ultra-low capacitance and shows only marginal signal losses up to high frequencies. The devices are extremely reliable and are able to withstand high surge currents without destruction.
All tubes are produced to ISO TS 16949 standard together with products that have been in use in automotive applications for almost 20 years. The arresters are tested by automotive standards like IEC 60068 and can sustain high humidity environments and heavy vibration while maintaining full operability at all times. They can withstand high AC voltages without ignition. The EPCOS EHV series is fully UL graded and can be delivered for many different voltage levels as well as in different wire configurations.

Features

- Built to automotive standard (ISO TS 16949)
- Small sizes
- Fast response time
- High current handling capability
- Stable performance over service life
- Low capacitance and insertion loss
- High insulation resistance
- RoHS-compliant

Applications

Automotive:

- On-board battery chargers
- Vehicle charging stations

Others:

- LED lighting
- Power supplies
- Photovoltaic
- Antenna protection
- Air-conditioning

Product characteristics

Physical dimensions without lead wires (diameter × length)	Ø 0.24 × 0.28	in
	Ø 6.0 × 7.0	mm
Weight	~ 0.8	g
Operating temperature	-40 ... +125	°C
Recommended storage [1)] - temperature - humidity - period	 +5 … +35 45 … 80 ≤ 2	 °C % year
Climatic category (IEC 60068-1)	40/ 125/ 21	
Moisture sensitivity level [2)]	1	
Marking, blue positive	EPCOS XXXX YY XXXX = Nominal voltage YY = Year of production	
Certifications	UL 1449 (E319264)	

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

Electrical specifications

Type	EHV6*-H25..	EHV6*-H30..	EHV6*-H36..	EHV6*-H40..	EHV6*-H45..	Unit
Nominal DC spark-over voltage [3) 4)]	2500	3000	3600	4000	4500	V
Tolerance	±20					%
Minimum	2000	2400	2880	3200	3600	V
Maximum	3000	3600	4320	4800	5400	V
Impulse spark-over voltage						
@ 100 V/µs						
for 99% of values	< 3300	< 3800	< 4350	< 5000	< 5200	V
typical values	< 3000	< 3400	< 4150	< 4600	< 4800	V
@ 1 kV/µs						
for 99% of values	< 3400	< 4000	< 4500	< 5400	< 5500	V
typical values	< 3100	< 3500	< 4300	< 4800	< 5000	V
@ 5 kV/µs						
for 99% of values	< 3900	< 4500	< 5000	< 5600	< 6000	V
typical values	< 3400	< 4000	< 4500	< 5000	< 5500	V
Service life						
300 operations 8/20 µs	100					A
3 operations 8/20 µs	3					kA
1 operation 8/20 µs	5					kA
Insulation resistance @ 100 V_{DC}	> 1					GΩ
Capacitance	< 1					pF
Arc voltage @ 1 A	~ 45	~ 45	~ 45	~ 50	~ 50	V
Glow to arc transition current	< 0.3	< 0.3	< 0.3	< 0.3	~ 0.3	A
Glow voltage @ 0.1 A	~ 240	~ 240	~ 240	~ 250	~ 250	V
AC withstand voltage (1 min) [5)]	1250	1500	1800	2000	2250	V

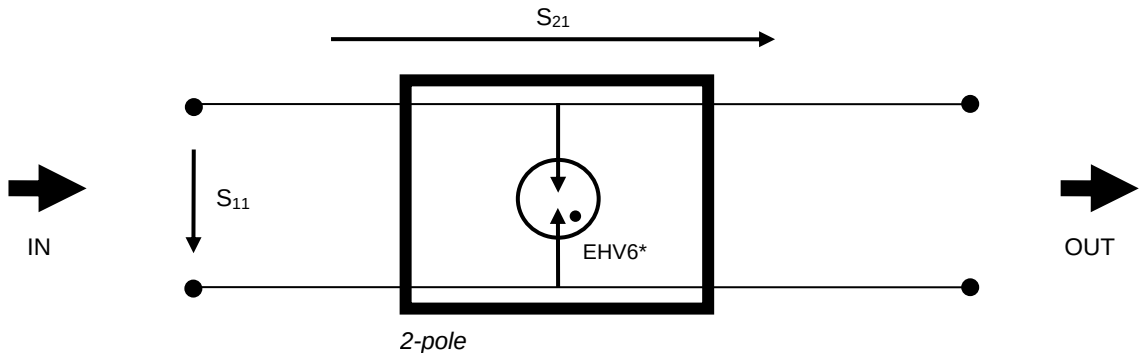
Notes:

3) At delivery AQL 0.65 level II, DIN ISO 2859
4) In ionized mode
5) AC withstand voltage still valid after service life

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

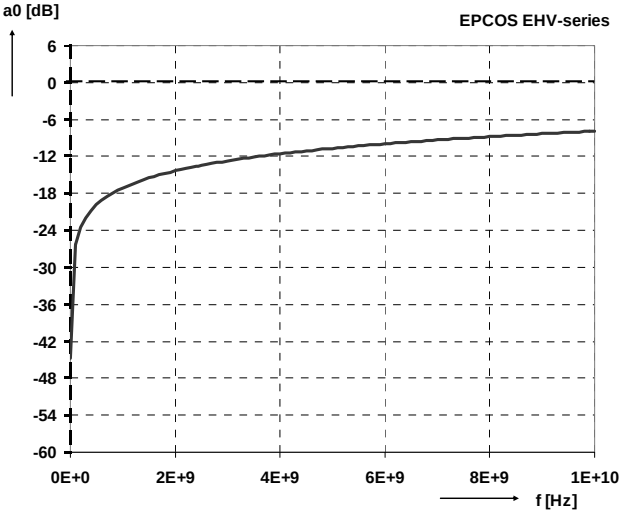
S-parameters

Circuit diagram:



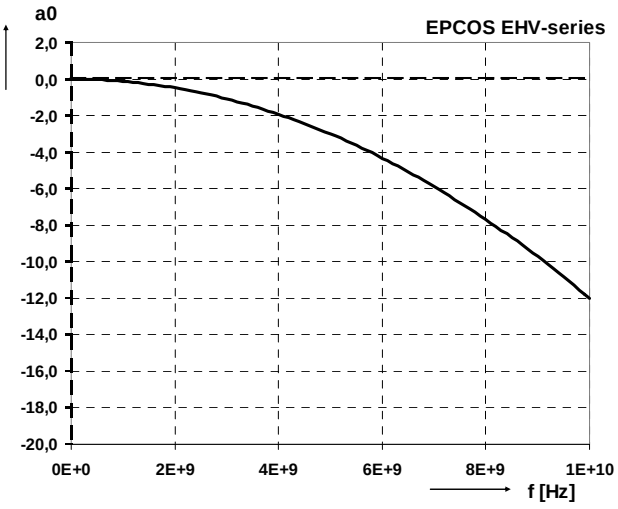
Electrical specifications according circuit diagram:

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



Frequency	S_{11}
1.00 GHz	-17.1 dB
1.40 GHz	-15.8 dB
1.80 GHz	-14.8 dB
2.10 GHz	-14.1 dB
2.45 GHz	-13.5 dB
2.80 GHz	-13.0 dB
3.10 GHz	-12.6 dB
3.50 GHz	-12.1 dB
4.00 GHz	-11.6 dB
6.00 GHz	-9.9 dB
8.00 GHz	-8.8 dB
10.00 GHz	-7.9 dB

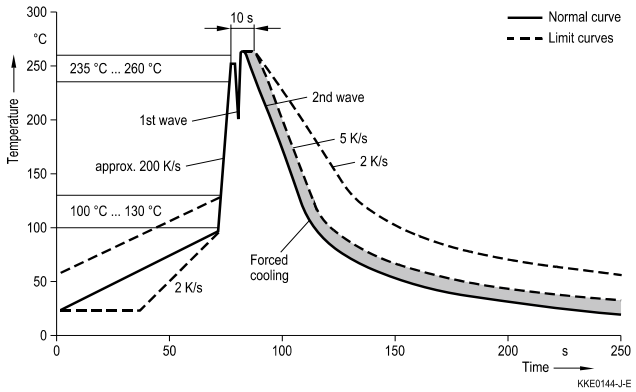
Forward voltage gain S_{21}
(typical values of distribution)



Frequency	S_{21}
1.00 GHz	-0.1 dB
1.40 GHz	-0.3 dB
1.80 GHz	-0.4 dB
2.10 GHz	-0.5 dB
2.45 GHz	-0.7 dB
2.80 GHz	-1.0 dB
3.10 GHz	-1.2 dB
3.50 GHz	-1.5 dB
4.00 GHz	-1.9 dB
6.00 GHz	-4.3 dB
8.00 GHz	-7.7 dB
10.00 GHz	-12.0 dB

Soldering parameter

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.

Explanation of type:

1	2	3	4	5	6	7	8	9	10	11
E	**H**	**V**	**6**	**2**	**-**	**H**	**3**	**6**	**B**	**2**

Product code

High voltage

Ø wire	
1	1.0 mm
2	0.8 mm
3	0.6 mm

DC spark-over voltage
e.g. 36 = 36 × 10² V = 3600 V

Bending style	
blank	straight wires
B…	bended for tray
T…	bended for tape

Explanation of ordering code:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	**8**	**8**	**0**	**6**	**9**	**X**	**1**	**6**	**8**	**3**	**S**	**1**	**0**	**2**

Product group: Surge arresters

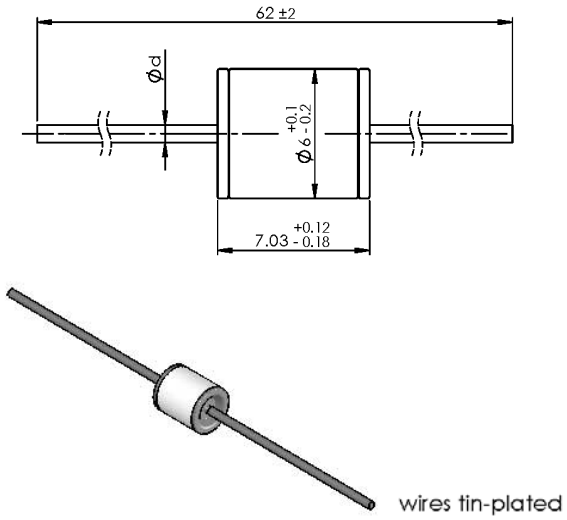
Type code

Packing	
S	Stripes
T	Tape
B	Blister tray
C	Bulk

Packing unit			
Code	**Pieces**	**Code**	**Pieces**
101	10	252	250
102	100	253	2500
103	1000	352	350
202	200	403	4000
203	2000	502	500
251	25	902	900

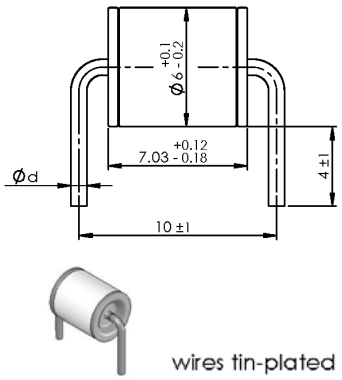
Dimensions in mm and wire configurations

EHV6*-H...



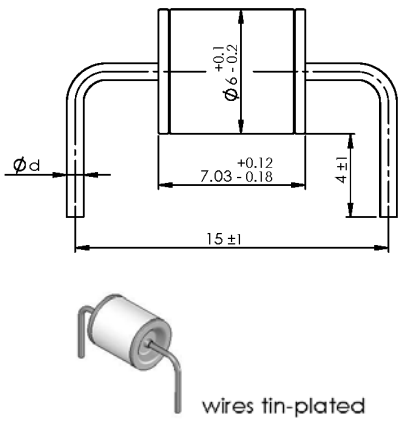
Type	Ordering code
EHV62-H25	B88069X1893S102 / B88069X1893T502
EHV63-H25	B88069X2733S102 / B88069X2733T502
EHV63-H30	B88069X2553S102 / B88069X2553T502
EHV62-H36	B88069X1683S102 / B88069X1683T502
EHV62-H40	B88069X2103S102 / B88069X2103T502
EHV63-H40	B88069X2563S102 / B88069X2563T502
EHV62-H45	B88069X1793S102 / B88069X1793T502
EHV63-H45	B88069X2573S102 / B88069X2573T502

EHV6*-H...B1



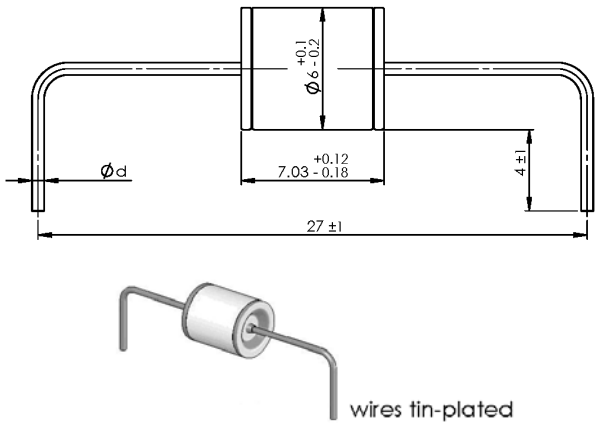
Type	Ordering code
EHV62-H36B1	B88069X2213B502

EHV6*-H...B2



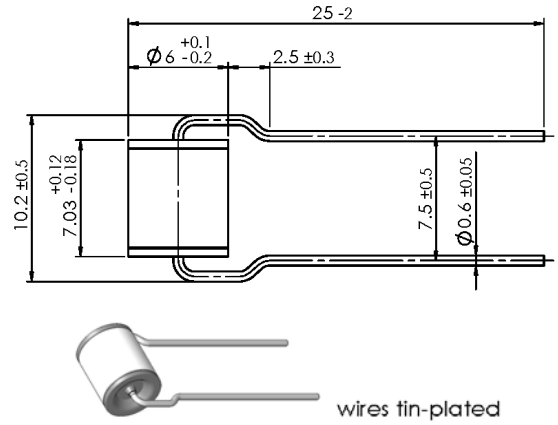
Type	Ordering code
EHV63-H25B2	B88069X2023B502
EHV63-H30B2	B88069X2043B502
EHV62-H36B2	B88069X1693B502
EHV63-H36B2	B88069X2073B502
EHV63-H40B2	B88069X2633B502
EHV63-H45B2	B88069X2643B502

EHV6*-H.. B7



Type	Ordering code
EHV63-H30B7	B88069X2053B252
EHV63-H36B7	B88069X2083B252

EHV6*-H.. T7

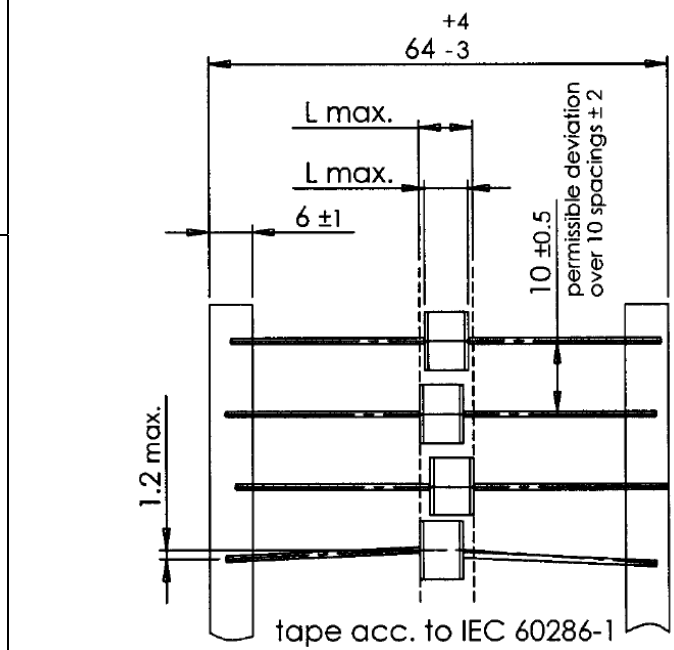


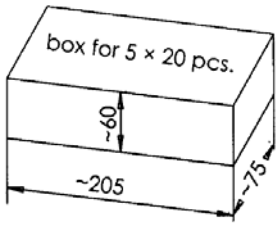
Type	Ordering code
EHV63-H25T7	B88069X2033A802 / B88069X2033A103
EHV63-H30T7	B88069X2063A802 / B88069X2063A103
EHV63-H36T7	B88069X2093A802 / B88069X2093A103

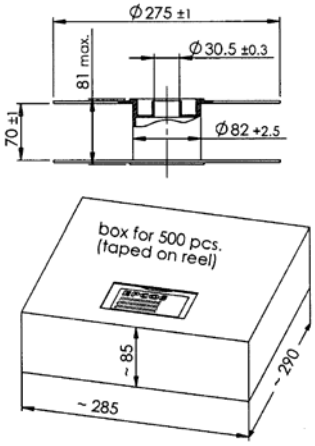
Packing advices

*B88069X….**S102** = 100 pcs. on 5 taped stripes*

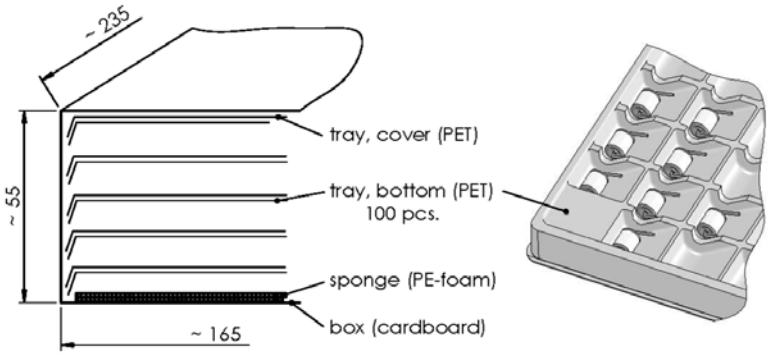
*B88069X….**T502** = 500 pcs. on tape and reel*



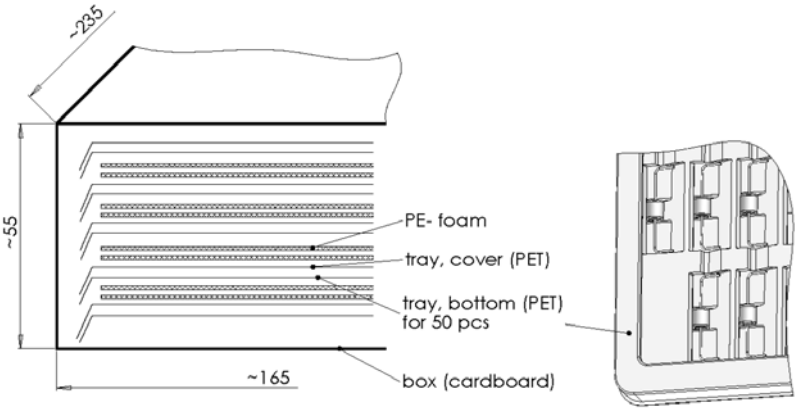


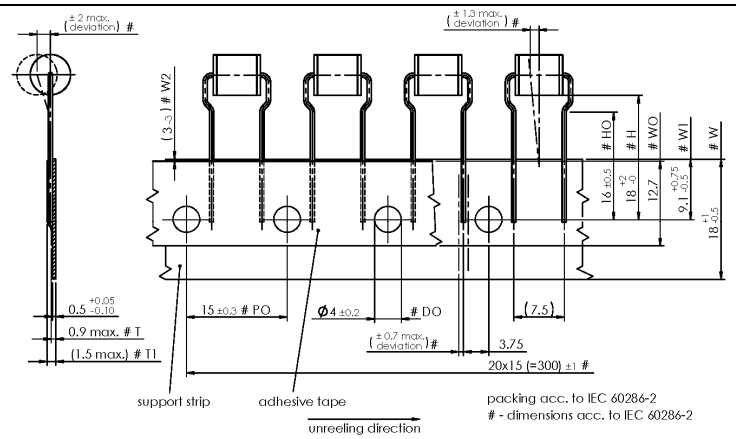
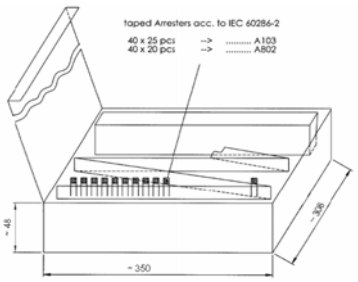
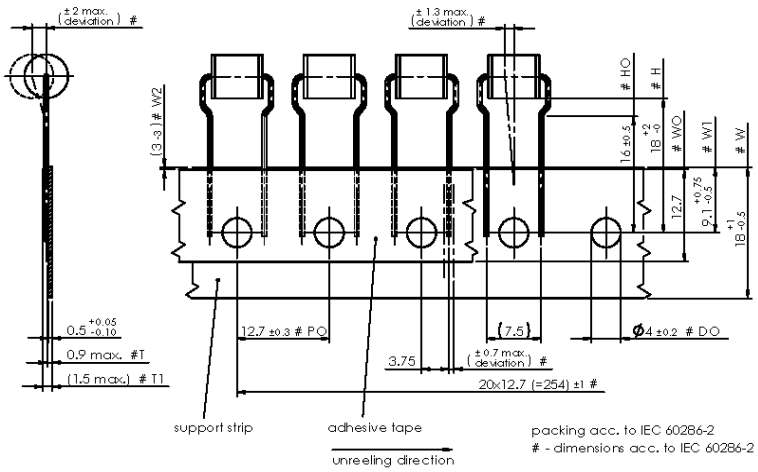


*B88069X….**B502** = 500 pcs. on trays*



*B88069X….**B252** = 250 pcs. on trays*



*B88069X….**A802** = 800 pcs. in ammo pack*		
*B88069X….**A103** = 1000 pcs. in ammo pack*		

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 Ea: shock DIN IEC 60068 part 2-29 test Ea	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
Environmental testing – test Td: stability during soldering 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).
- Electromagnetic fields and ionizing radiation may affect the electrical characteristics of the arresters. The impact of this kind of disturbances (inductive and capacitive comply, field distortion by nearby conductors) has to be avoided by circuit design.
- Surge arresters may be used only within their specified values. In the event of overload, the lead contacts 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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