Metal Oxide Varistors

Arrester Block

Series/Type:	**SIOV- E41VR602**
Ordering code:	**B72241E0602R18**
Date:	2012-04-23
Version:	b

Application

EPCOS metal oxide varistors are intended for use as active element in gapless arrester constructions based on IEC 60099-4.

Suggested usage:

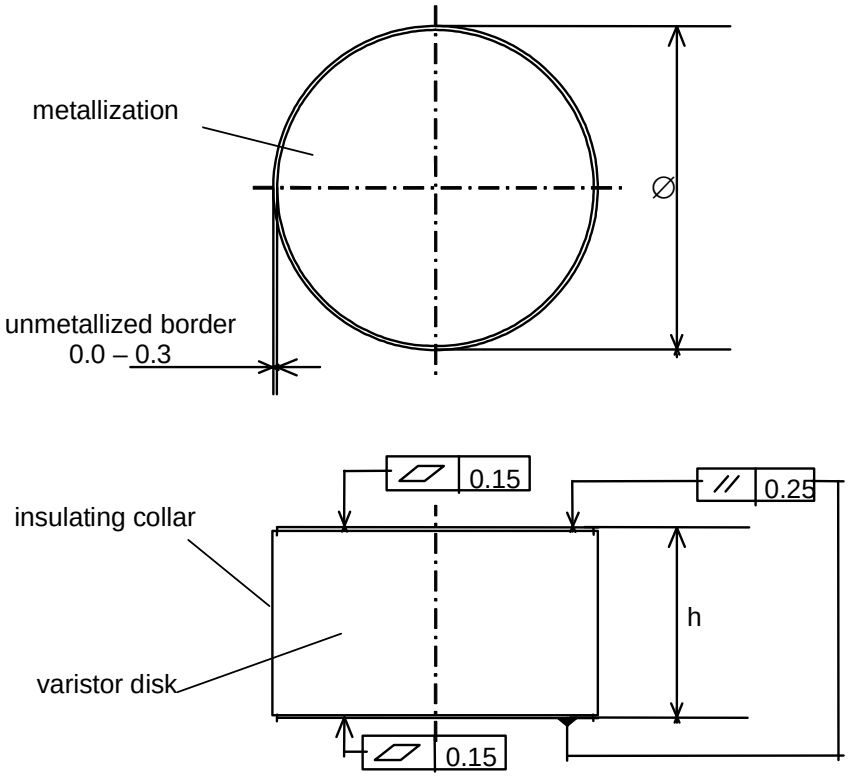
Arrester classification: 10000 A
Line discharge class: 1

Electrical specification

Parameter	Value
Norminal Discharge Current (I_n)	10 kA (8/20 µs)
Residual Voltage at I_n (U_{res})	15.05 –17.05 kV
Max. Continuous Operating Voltage (U_c)	5.1 kV
Resistive Power Dissipation at U_c (P_c)	≤ 0.65 W
Reference Current I_{ref}	2.0 mA
Reference Voltage U_{ref}	≥ 6.0 kV
Suggested Rated Voltage U_r	≤ 6.0 kV
Long Duration Current Impulse	6 x 3 x 325 A, 2 ms
Typical energy absorption at long duration current impulse per pulse	6.0 kJ
Typical specific energy (energy absorption at long duration current withstand test per impulse and per kV rated voltage) 1)	1.00 kJ/kV
Typical specific energy (energy absorption at long duration current withstand test per impulse and per kV continuous operating voltage) 1)	1.2 kJ/kV
High Current Impulse (with secondary insulation)	2 x 100 kA, 4/10 µs

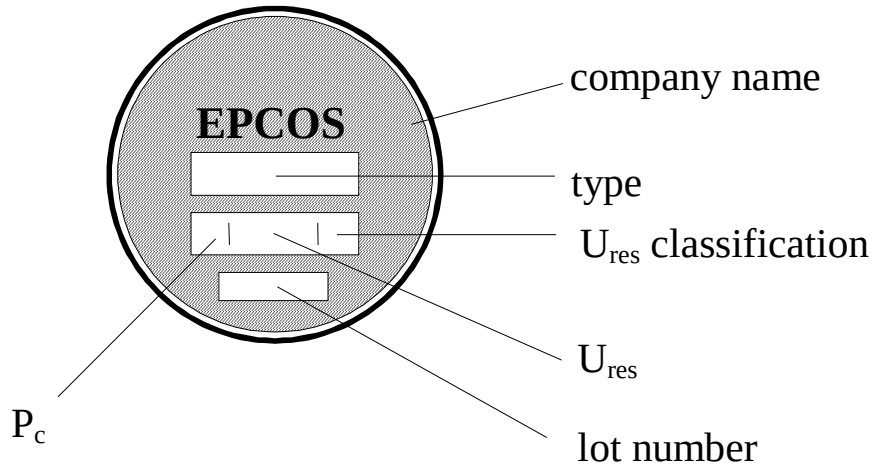
1) calculated value based on 2ms withstand test.

Dimensions (in mm)



Metallization	Al - electrodes
Diameter ϕ	(41.7 ± 0.8) mm
Thickness h	(41.0 ± 0.6) mm

Marking



R Remarks:

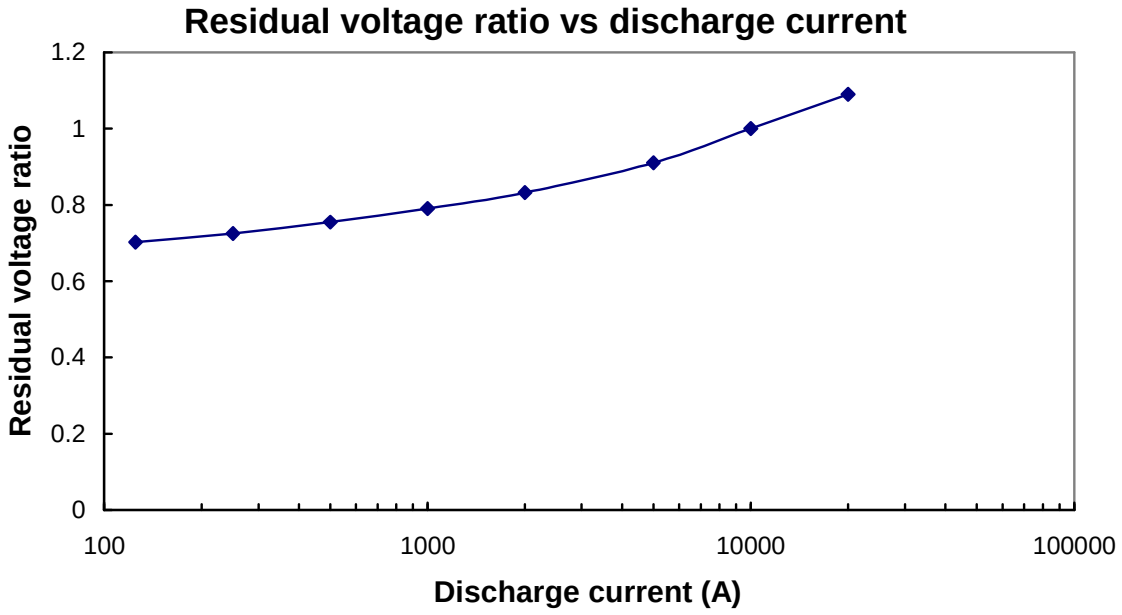
P_c	Resistive power dissipation at max. continuous operating voltage and 25℃ in 10^{-2} W e.g. P 30 ..... $P_c = 30 * 10^{-2}$ W = 0.30 W
U_{res}	Residual voltage at nominal discharge current I_n = 10 kA in kV e.g. 16.00 = 16.00kV
U_{res} classification	Residual voltage is classified in 100 V steps and identified by a letter

U_{res}		class letter	U_{res}		class letter
lower value	upper value		lower value	upper value	
15.05	15.149	A	16.05	16.149	K
15.15	15.249	B	16.15	16.249	L
15.25	15.349	C	16.25	16.349	M
15.35	15.449	D	16.35	16.449	N
15.45	15.549	E	16.45	16.549	$
15.55	15.649	F	16.55	16.649	P
15.65	15.749	G	16.65	16.749	Q
15.75	15.849	H	16.75	16.849	R
15.85	15.949	I	16.85	16.949	S
15.95	16.049	J	16.95	17.049	T

Residual voltage

Ratio of residual voltage vs discharge current

	Steep current	Switching impulse residual voltage ratio					Lightning impulse residual voltage ratio		
	10 kA	125 A	250 A	500 A	1 kA	2 kA	5 kA	**10 kA**	20 kA
typ	-	0.702	0.725	0.755	0.790	0.832	0.91	**1**	1.09
max	1.15	-	-	-	-	-	0.94	**-**	1.15
min	-	0.66	-	0.71	-	-	-	**-**	-



Accelerated ageing

When this procedure is performed in accordance with IEC 60099-4, the resistive power loss P_{2ct} is equal or less than P_{1ct} .

Conditions:

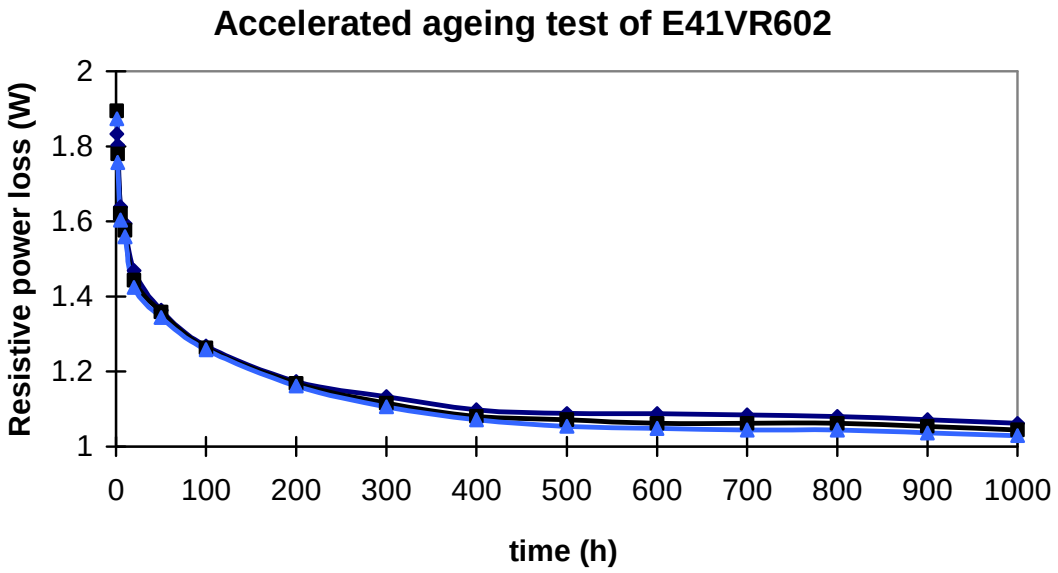
temperature:	115 ± 4 ℃
surrounding medium:	N_2
test voltage:	U_c
frequency:	50 Hz
time:	≥1000 h

P_{1ct} : resistive power loss measured at 1 to 2 hours after voltage application

P_{2ct} : resistive power loss measured after 1000 h (0 + 100 h)

number of samples: ≥ 3 for type release

Typical accelerated ageing curve tested on E41VR602 as below:



Visual inspection

Following discs are not allowed to be delivered:

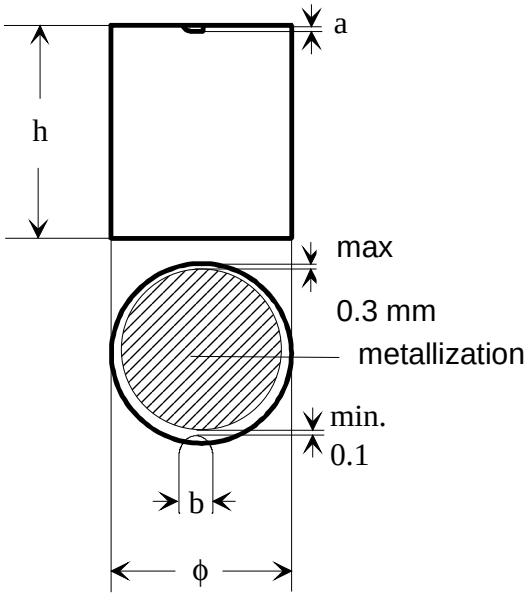
a) cracked discs

b) discs with edge chippings, with dimensions larger as tolerated (see schematic drawing and table below). Smaller edge chippings are to be covered with varnish.

c) discs with deviation at dimensions of unmetallized border

d) discs with metal splasher on collar surface

Max. dimension a (mm)	Max. dimension b (mm)	Max. added dimensions b (mm)
2	3	6



Routine tests performed on each disk

Residual voltage at discharge current I = 10 kA

Resistive power dissipation at continuous operating voltage at 25 ℃

Sample tests performed on each lot

Reference voltage U_{ref}: sample size: 6

Long duration current impulse: sample size: 6
six groups of three impulses, 325 A, 50 – 60 s between pulses, 30 min or cooling down to room temperature.
requirement: no flashover, no puncture, no visible damage

Accelerated ageing: sample size: 2
conditions: temperature 115 ℃
voltage U_c
frequency 50 Hz
medium N_2
time 200 h
requirement: decreasing power dissipation

High current impulse test: sample size: 2
a secondary insulation (3M Scotch insulation tape 69) is used to prevent flashover
axial force: ≥ 2000 N
diameter of steel electrodes: 40.0 ±1.0 mm
height of steel electrodes: 40.0 ± 1.0 mm
two impulses with 100 kA - 4/10 us, cool down to ambient temperature between impulses
requirement: no flashover, no puncture , no visible damage

Dimensions: sample size: 10

Pull-off strength of metallization: sample size: 8
requirement: ≥3 N/mm²

Cautions and warnings

General

1. EPCOS metal oxide varistors (SIOVs) are designed for specific applications and should not be used for purposes not identified in our specifications, application notes and data books unless otherwise agreed with EPCOS during the design-in-phase.
2. Ensure suitability of SIOVs through reliability testing during the design-in phase. The SIOVs should be evaluated taking into consideration worst-case conditions.
3. For applications of SIOVs in line-to ground circuits based on various international and local standards there are restrictions existing or additional safety measures required.

Storage

1. Store SIOVs only in original packaging. Do not open the package before storage.

2. Storage conditions in original packaging:
   Storage temperature: -25 ℃ … +45 ℃
   Relative humidity: <75% annual average,
   <95% on maximum 30 days a year.
   Dew precipitation: Is to be avoided.

3. Avoid contamination of SIOVs surface during storage, handling and processing.

4. Avoid storage of SIOVs in harmful environments which can affect the function during long-term operation (examples given under operation precautions).

5. The SIOV type series should be soldered within the time specified.
   SIOV-S, -Q, -LS 24 month
   ETFV and SFS types 12 month.

Handling

1. SIOVs must not be dropped.

2. Components must not be touched with bare hands. Gloves are recommended.

3. Avoid contamination of the surface of SIOV electrodes during handling, be careful of the sharp edge of SIOV electrodes.

Soldering (where applicable)

1. Use rosin-type flux or non-activated flux.

2. Insufficient preheating may cause ceramic cracks.

3. Rapid cooling by dipping in solvent is not recommended.

4. Complete removal of flux is recommended.

Mounting

1. Potting, sealing or adhesive compounds can produce chemical reactions in the SIOV ceramic that will degrade the component's electrical characteristics.

2. Overloading SIOVs may result in ruptured packages and expulsion of hot materials. For this reason the SIOVs should be physically shielded from adjacent components.

Operation

1. Use SIOVs only within the specified temperature operating range

2. Use SIOVs only within the specified voltage and current ranges.

3. Environmental conditions must not harm the SIOVs. Use SIOVs only in normal atmospheric con-
ditions. Avoid use in the presence of deoxidizing gases (chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, etc), corrosive agents, humid or salty conditions, Avoid contact with any liquids and solvents.

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