

## **SIOV metal oxide varistors**

Strap varistors, HighE, SuperioR, LS42 series

**Series/Type:** B722\*  
**Date:** April 2011

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**Construction**

- Rectangular varistor element
- Coating: epoxy resin, flame-retardant to UL 94 V-0
- Bolt-holed strap terminals for screw fixing or soldering
- Bent or straight strap terminals

**Features**

- Dimensions equivalent to SIOV-LS40
- High surge current up to 65 kA
- Wide operating voltage range 250 ... 460 V<sub>RMS</sub>
- Designed in accordance with the requirements of IEC 61643-1, class II, for low-voltage surge protection devices

**Approvals**

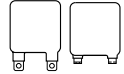
- UL
- CSA

**Delivery mode**

- Vacuum-packed styrofoam box

**General technical data**

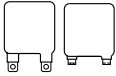
Climatic category	to IEC 60068-1	40/85/56	
Operating temperature	to CECC 42 000	-25 ... + 85	°C
Storage temperature		-25 ... +110	°C
Electric strength	to CECC 42 000	≥ 2.5	kV <sub>RMS</sub>
Insulation resistance	to CECC 42 000	≥ 10	MΩ
Response time		< 25	ns

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**Electrical specifications and ordering codes**
**Maximum ratings ( $T_A = 85\text{ °C}$ )**

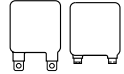
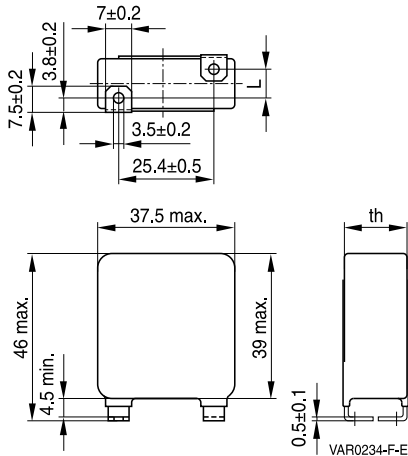
Ordering code	Type	$V_{RMS}$	$V_{DC}$	$i_{max}$ (8/20 $\mu$ s)	$I_{max}^{1)}$ (8/20 $\mu$ s)	$I_{nom}^{2)}$ (8/20 $\mu$ s)	$W_{max}$ (2 ms)	$P_{max}$
	SIOV-	V	V	A	A	A	J	W
<b>Bent strap terminals</b>								
B72242L0251K100	LS42K250QP	250	320	65000	65000	20000	490	1.4
B72242L0271K100	LS42K275QP	275	350	65000	65000	20000	550	1.4
B72242L0321K100	LS42K320QP	320	420	65000	65000	20000	640	1.4
B72242L0381K100	LS42K385QP	385	505	65000	65000	20000	800	1.4
B72242L0421K100	LS42K420QP	420	560	65000	65000	20000	910	1.4
B72242L0441K100	LS42K440QP	440	585	65000	65000	20000	950	1.4
B72242L0461K100	LS42K460QP	460	615	65000	65000	20000	960	1.4
<b>Straight strap terminals</b>								
B72242L0251K102	LS42K250QPK2	250	320	65000	65000	20000	490	1.4
B72242L0271K102	LS42K275QPK2	275	350	65000	65000	20000	550	1.4
B72242L0321K102	LS42K320QPK2	320	420	65000	65000	20000	640	1.4
B72242L0381K102	LS42K385QPK2	385	505	65000	65000	20000	800	1.4
B72242L0421K102	LS42K420QPK2	420	560	65000	65000	20000	910	1.4
B72242L0441K102	LS42K440QPK2	440	585	65000	65000	20000	950	1.4
B72242L0461K102	LS42K460QPK2	460	615	65000	65000	20000	960	1.4

1)  $I_{max}$  = Maximum discharge current to IEC 61643-1, class II

2)  $I_{nom}$  = Nominal discharge current to IEC 61643-1, class II

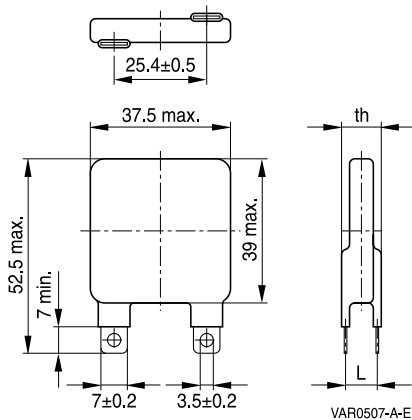

**Strap varistors**
**B722\***
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**Characteristics (T<sub>A</sub> = 25 °C)**

Ordering code	Type	V <sub>v</sub> (1 mA)	ΔV <sub>v</sub> (1 mA)	V <sub>c,max</sub> (i <sub>c</sub> )	i <sub>c</sub>	C <sub>typ</sub> (1 kHz)
	SIOV-	V	%	V	A	pF
<b>Bent strap terminals</b>						
B72242L0251K100	LS42K250QP	390	±10	650	300	2900
B72242L0271K100	LS42K275QP	430	±10	710	300	2700
B72242L0321K100	LS42K320QP	510	±10	840	300	2300
B72242L0381K100	LS42K385QP	620	±10	1025	300	1900
B72242L0421K100	LS42K420QP	680	±10	1120	300	1800
B72242L0441K100	LS42K440QP	715	±10	1180	300	1700
B72242L0461K100	LS42K460QP	750	±10	1240	300	1600
<b>Straight strap terminals</b>						
B72242L0251K102	LS42K250QPK2	390	±10	650	300	2900
B72242L0271K102	LS42K275QPK2	430	±10	710	300	2700
B72242L0321K102	LS42K320QPK2	510	±10	840	300	2300
B72242L0381K102	LS42K385QPK2	620	±10	1025	300	1900
B72242L0421K102	LS42K420QPK2	680	±10	1120	300	1800
B72242L0441K102	LS42K440QPK2	715	±10	1180	300	1700
B72242L0461K102	LS42K460QPK2	750	±10	1240	300	1600


**Dimensional drawings**
**Bent strap terminals**


SIOV-LS42K ... QP

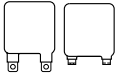
Weight: 25 ... 40 g

**Straight strap terminals**


SIOV-LS42K ... QPK2

Weight: 25 ... 40 g

Ordering code	th <sub>max</sub> mm	L ±1.0 mm
<b>Bent strap terminals</b>		
B72242L0251K100	9.2	-2.1
B72242L0271K100	9.4	-1.9
B72242L0321K100	9.9	-1.5
B72242L0381K100	10.6	-0.8
B72242L0421K100	10.9	-0.5
B72242L0441K100	11.1	-0.4
B72242L0461K100	11.4	-0.2
<b>Straight strap terminals</b>		
B72242L0251K102	9.2	5.3
B72242L0271K102	9.4	5.5
B72242L0321K102	9.9	5.9
B72242L0381K102	10.6	6.5
B72242L0421K102	10.9	6.8
B72242L0441K102	11.1	7.0
B72242L0461K102	11.4	7.2

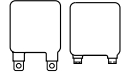

**Strap varistors**
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**HighE, SuperioR, LS42 series**
**Reliability data**

Test	Test methods/conditions	Requirement
Varistor voltage	The voltage between two terminals with the specified measuring current applied is called $V_V$ (1 mA <sub>DC</sub> @ 0.2 ... 2 s).	To meet the specified value
Clamping voltage	The maximum voltage between two terminals with the specified standard impulse current (8/20 $\mu$ s) applied.	To meet the specified value
Max. DC operating voltage	The maximum allowable DC operating voltage $V_{DC}$ at UCT +5/-0 °C is applied for 1000 $\pm$ 48 h. The leakage current $I_{leak}(t)$ during test is recorded. Then the specimen shall be stored at room temperature and normal humidity for 1 to 2 h. Thereafter, the change of $V_V$ shall be measured.	$I_{leak}(t = 1000 \text{ h}) \leq I_{leak}(t = 0 \text{ h})$ $ \Delta V/V (1 \text{ mA})  \leq 10\%$
Surge current derating, 8/20 $\mu$ s	10 surge currents (8/20 $\mu$ s), unipolar, interval $\geq$ 60 s, amplitude corresponding to derating curve for 10 impulses at 20 $\mu$ s	$ \Delta V/V (1 \text{ mA})  \leq 10\%$ (measured in direction of surge current) No visible damage
Fast temperature cycling	IEC 60068-2-14, test Na, LCT/UCT, dwell time 30 min, 5 cycles	$ \Delta V/V (1 \text{ mA})  \leq 10\%$ No visible damage
Damp heat, steady state	IEC 60068-2-78 The specimen shall be subjected to 40 $\pm$ 2 °C, 90 to 95% r. H. for 56 $\pm$ 2 days with 10% of the maximum continuous DC operating voltage $V_{DC}$ . Then stored at room temperature and normal humidity for 1 to 2 h. Thereafter, the change of $V_V$ shall be measured.	$ \Delta V/V (1 \text{ mA})  \leq 10\%$

**Note:**

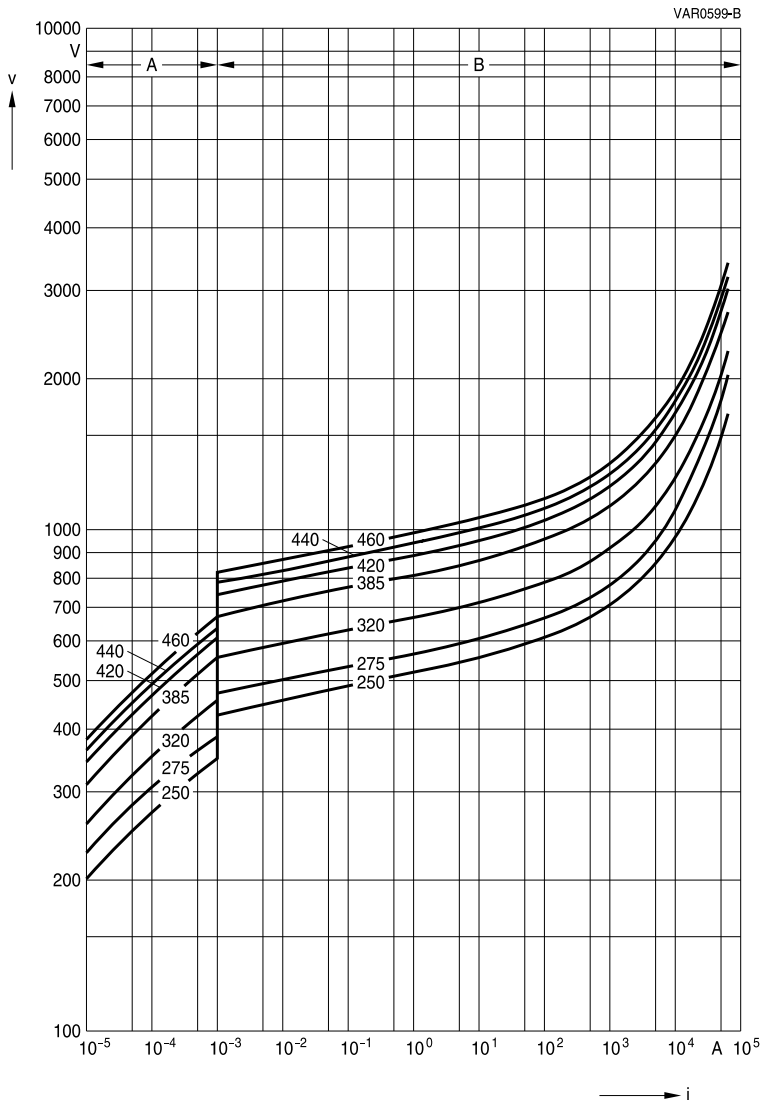
UCT = Upper category temperature

LCT = Lower category temperature

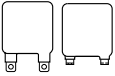


**v/i characteristics**

$v = f(i)$  for explanation of the characteristics refer to "General technical information", chapter 1.6.3  
 A = Leakage current, B = Protection level } for worst-case varistor tolerances



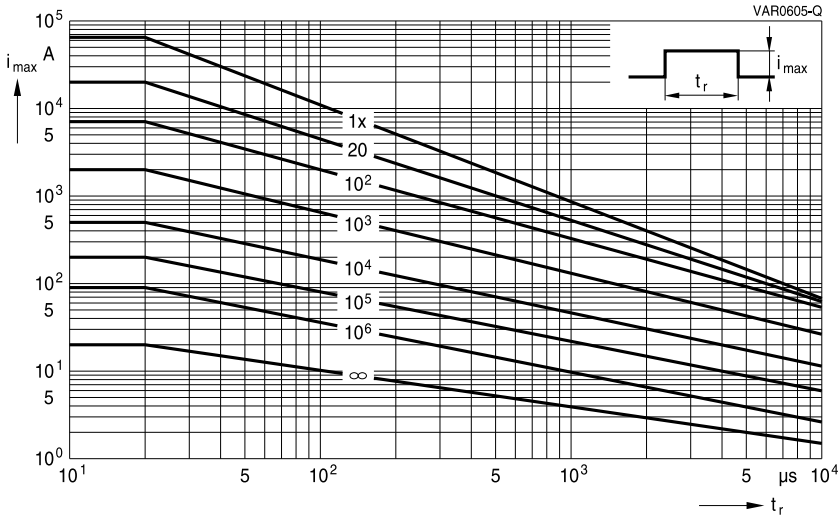
**SIOV-LS42K250QP(K2) ... K460QP(K2)**



### Derating curves

Maximum surge current  $i_{max} = f(t_r, \text{pulse train})$

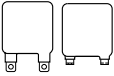
For explanation of the derating curves refer to "General technical information", section 1.8.1



**SIOV-LS42K250QP(K2) ... K460QP(K2)**





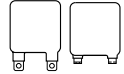


### Mounting

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 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 SIOVs. Use SIOVs only in normal atmospheric conditions. Avoid use in deoxidizing gases (chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas etc), corrosive agents, humid or salty conditions. Contact with any liquids and solvents should be prevented.


**Symbols and terms**

Symbol	Term
C	Capacitance
$C_{typ}$	Typical capacitance
i	Current
$i_c$	Current at which $V_{c, max}$ is measured
$I_{leak}$	Leakage current
$i_{max}$	Maximum surge current (also termed peak current)
$I_{max}$	Maximum discharge current to IEC 61643-1
$I_{nom}$	Nominal discharge current to IEC 61643-1
LCT	Lower category temperature
$L_{typ}$	Typical inductance
$P_{max}$	Maximum average power dissipation
$R_{ins}$	Insulation resistance
$R_{min}$	Minimum resistance
$T_A$	Ambient temperature
$t_r$	Duration of equivalent rectangular wave
UCT	Upper category temperature
v	Voltage
$V_{clamp}$	Clamping voltage
$V_{c, max}$	Maximum clamping voltage at specified current $i_c$
$V_{DC}$	DC operating voltage
$V_{jump}$	Maximum jump start voltage
$V_{max}$	Maximum voltage
$V_{op}$	Operating voltage
$V_{RMS}$	AC operating voltage, root-mean-square value
$V_{RMS, op, max}$	Root-mean-square value of max. DC operating voltage incl. ripple current
$V_{surge}$	Super imposed surge voltage
$V_V$	Varistor voltage
$\Delta V_V$	Tolerance of varistor voltage
$W_{LD}$	Maximum load dump
$W_{max}$	Maximum energy absorption
$e$	Lead spacing

All dimensions are given in mm.

The commas used in numerical values denote decimal points.

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