



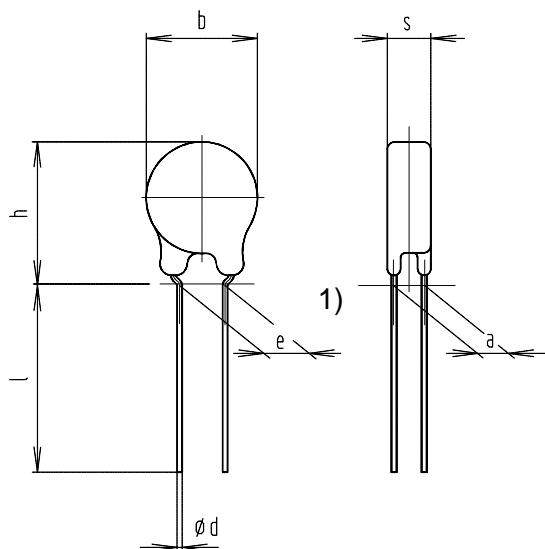
## Leaded Varistors

### Standard Series

**Series/Type:** SIOV-S10K50G3S5  
**Ordering code:** B72210S0500K531  
Date: 2005-09-22  
Version: a

**SIOV nomenclature**

S	=	Disk type
10	=	Rated disk diameter
K	=	Tolerance of varistor voltage at 1mA : $\pm 10\%$
50	=	Max. operating voltage $V_{rms}$
G3	=	Taping based on IEC 60286-2
S5	=	Crimp style S5

**Figure:** Dimensions given in Millimeters (mm)


$b_{max}$	=	12,0
$h_{max}$	=	15,5
$s_{max}$	=	3,9
e	=	$7,5 \pm 0,8$ <sup>2)</sup>
a	=	$1,4 \pm 1,0$
$l_{min}$	=	n.a.
$\varnothing d$	=	$0,8 \pm 0,05$

1) seating plane in accordance with IEC 60717

2) measured above carrier tape

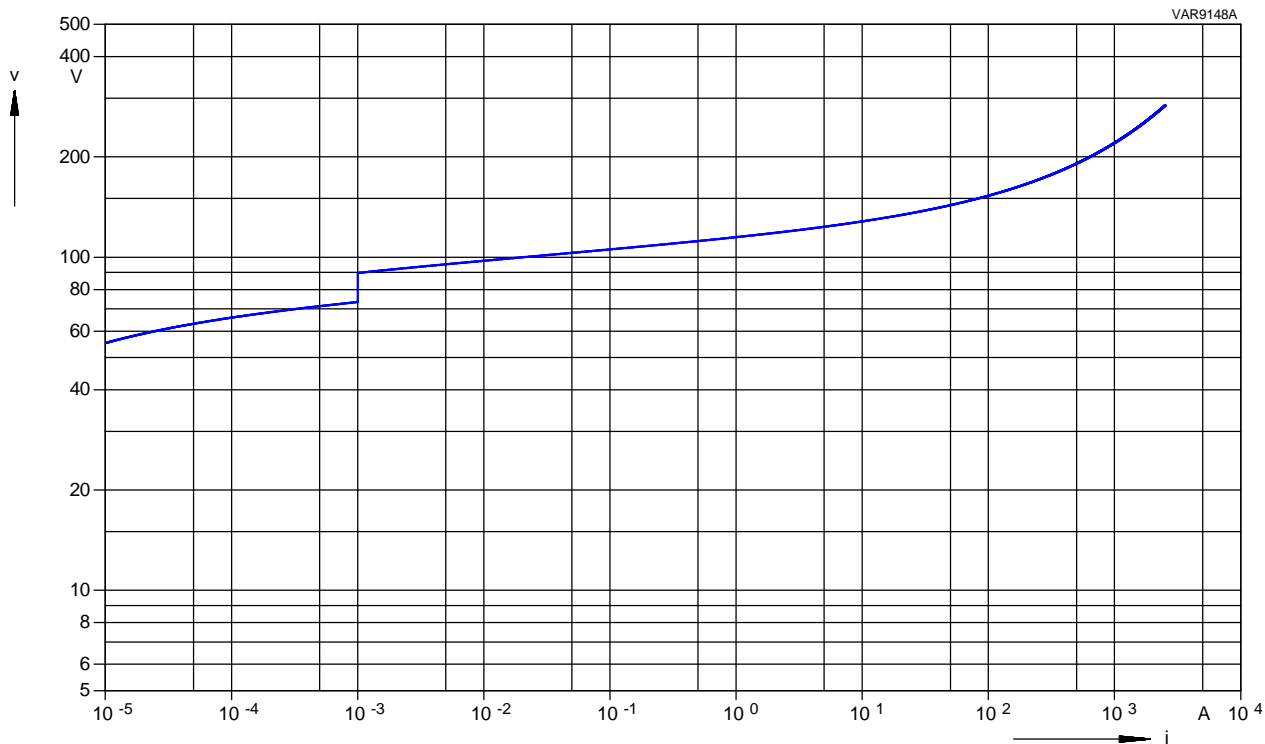
**Electrical data:**
**Maximum Ratings (T=85°C)**

Max. operating AC voltage		$V_{RMS}$	=	50 V
Max. operating DC voltage		$V_{DC}$	=	65 V
Surge current (8/20µs)	1 time	$I_{max}$	=	2500 A
Energy absorption (2ms)	1 time	$W_{max}$	=	8,4 J
Average power dissipation		$P_{max}$	=	0,40 W

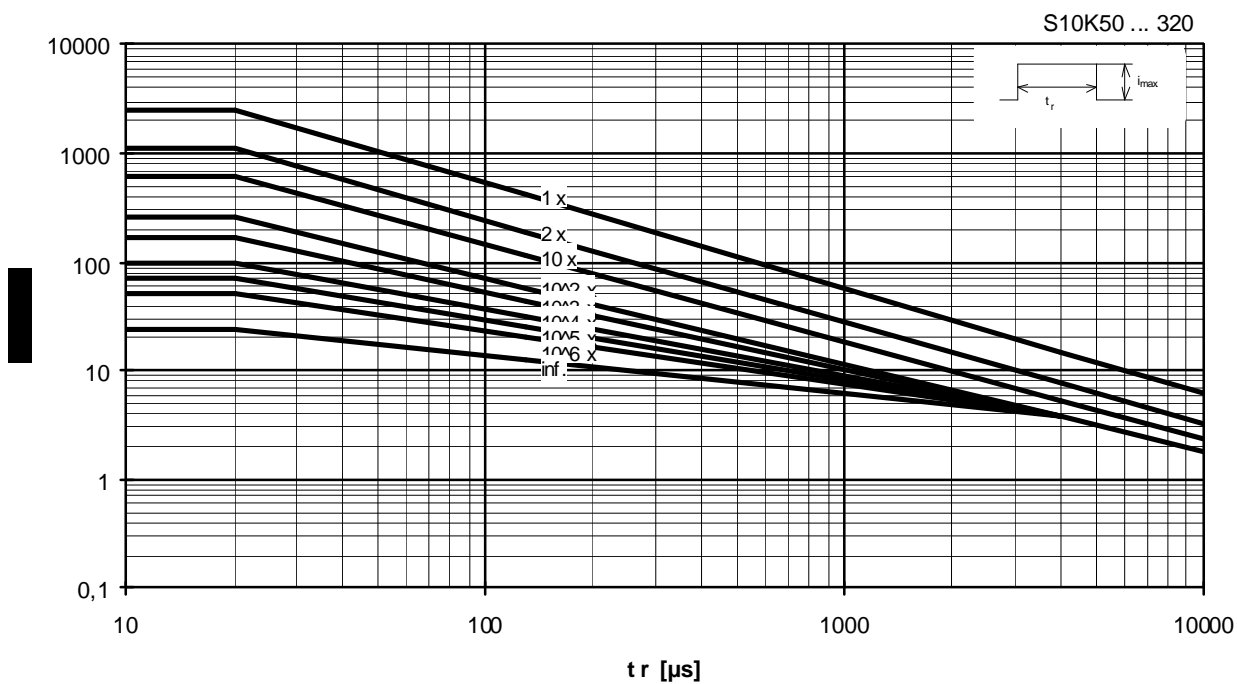
**Characteristics (T=25°C)**

Varistor voltage at 1mA		$V_V$	=	$82 V \pm 10\%$
Clamping voltage at 25 A (8/20µs)		$V_{C,max}$	=	135 V
Typ. capacitance at 1 kHz		C	=	950 pF

V/I Characteristic:

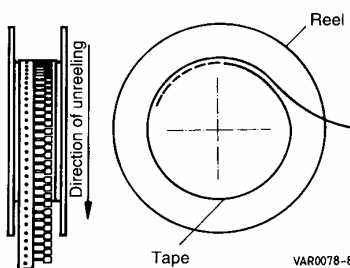
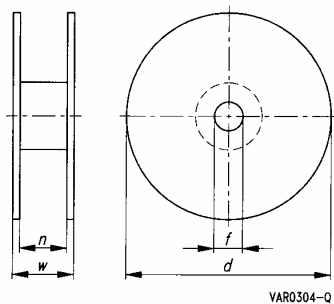


Derating:



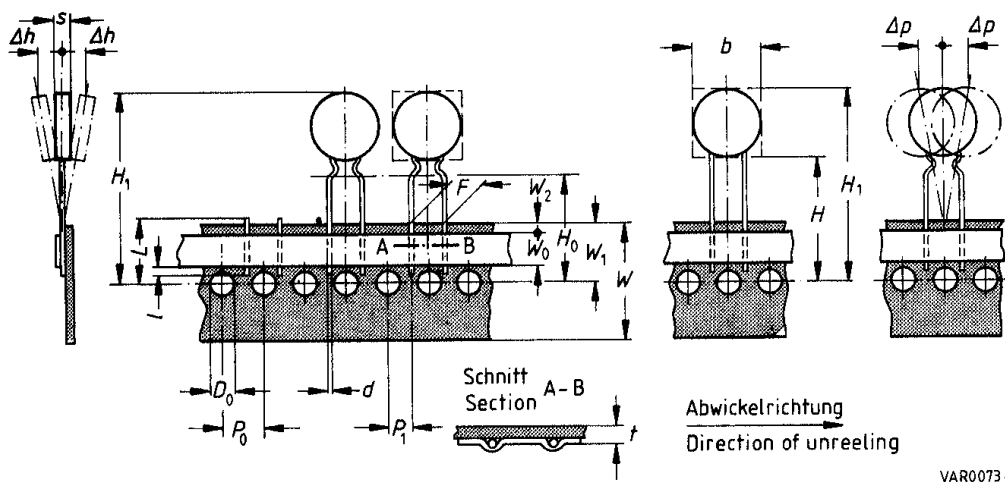
Taping:

Package Unit: 750 pcs./reel



- $d_{max}$  = 360 mm
- $w_{max}$  = 64 mm
- $f$  =  $31 \pm 1,0$ mm
- $n$  = 55 mm (typ.)

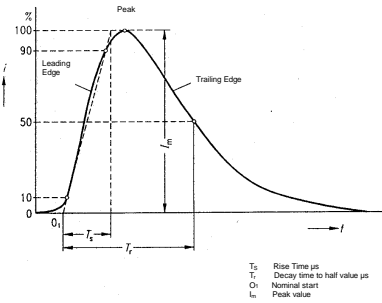
Lead spacing 7,5 mm



**Tape dimensions, in Millimeters (mm):**

Definition	Symbol	Dimension	Tolerance	Remarks
Body diameter	b	12,0	max	
Body thickness	s	3,9	max	
Lead diameter	d	0,8	$\pm 0,05$	
Sprocket hole pitch	$P_0$	12,7	$\pm 0,3$	$\pm 1\text{mm}/20$ sprocket holes
Distance hole center to lead center	$P_1$	8,95	$\pm 0,8$	
Lead spacing	F	7,5	$\pm 0,8$	measured above carrier tape
Component deviation	$\Delta h$			depends on s
Component deviation	$\Delta p$	0	$\pm 2,0$	measured at top of component body
Carrier tape width	W	18,0	$\pm 0,5$	
Adhesive tape width	$W_0$	11,0	min	Peel-off force $\geq 5\text{N}$
Sprocket hole position	$W_1$	9,0	$+0,75/-0,5$	
Adhesive tape position	$W_2$	3,0	max	
Distance hole center to the top of the component	$H_1$	45,0	max	
Seating plane height	$H_0$	16,0	$\pm 0,5$	
Hole diameter	$D_0$	4,0	$\pm 0,2$	
Total tape thickness	t	0,9	max	
Cutting level	L	11,0	max	

Reliability Data:

	Characteristics	Test Methods/Description	Specifications
E L E C T R I C A L	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 (8/20µs) illustrated below applied.  	To meet the specified value.
	Surge current derating, 8/20 µs	100 surge currents (8/20 µs), unipolar, interval 30 s, amplitude corresponding to derating curve for 20 µs	$ \Delta V/V (1 \text{ mA})  \leq 10 \%$ (measured in direction of surge current) No visible damage
L	Surge current derating, 2 ms	100 surge currents (2ms), unipolar, interval 120s, amplitude corresponding to derating curve for 2ms	$ \Delta V/V (1 \text{ mA})  \leq 10 \%$ (measured in direction of surge current) No visible damage

	Characteristics	Test Methods/Description	Specifications										
M	Tensile strength	After gradually applying the force specified below and keeping the unit fixed for 10 seconds, the terminal shall be visually examined for any damage.	$ \Delta V/V (1 \text{ mA})  \leq 5 \%$ No break of solder joint, no wire break										
		<table border="1"> <thead> <tr> <th>Terminal diameter</th> <th>Force</th> </tr> </thead> <tbody> <tr> <td>0.5 mm</td> <td>5 N</td> </tr> <tr> <td>0.6 mm</td> <td>10 N</td> </tr> <tr> <td>0.8 mm</td> <td>10 N</td> </tr> <tr> <td>1.0 mm</td> <td>20 N</td> </tr> </tbody> </table>		Terminal diameter	Force	0.5 mm	5 N	0.6 mm	10 N	0.8 mm	10 N	1.0 mm	20 N
		Terminal diameter		Force									
		0.5 mm		5 N									
0.6 mm	10 N												
0.8 mm	10 N												
1.0 mm	20 N												
E	Vibration	After repeatedly applying a single harmonic vibration according to the table below. Thereafter, the unit shall be visually examined.	$ \Delta V/V (1 \text{ mA})  \leq 5 \%$ No visible damage										
C	frequency range: 10 .... 55 Hz	amplitude: 0.75 mm or 98 m/s <sup>2</sup> duration: 6 h (3 x 2 h) pulse: sine wave											
H													
A N I C A L	Solderability	After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 235°C for 5 seconds, the terminals shall be visually examined.	The inspection shall be carried out under adequate light with normal eyesight or with the assistance of a magnifier capable of giving a magnification of 4 times to 10 times. The dipped surface shall be covered with a smooth and bright solder coating with no more than small amounts of scattered imperfections such as pinholes or un-wetted or de-wetted areas. These imperfections shall not be concentrated in one area.										

	Characteristics	Test Methods/Description	Specifications
M E C H A	Resistance to soldering heat	Each lead shall be dipped into a solder bath having a temperature of $260 \pm 5^\circ\text{C}$ to a point 2.0 to 2.5 mm from the body of the unit, be held there for $10 \pm 1$ s and then be stored at room temperature and normal humidity for 1 to 2 hours. The change of $V_v$ and mechanical damages shall be examined.	$ \Delta V/V (1 \text{ mA})  \leq 5 \%$ No visible damage
N I C A L	Electric strength	2500 $V_{\text{RMS}}$ , 10 s The varistor is placed in a container holding $1.6 \pm 0.2$ mm diameter metal balls such that only the terminations of the varistor are protruding. The specified voltage shall be applied between both terminals of the specimen connected together and the electrode inserted between the metal balls.	No breakdown



	Characteristics	Test Methods/Description	Specifications												
E N	Max. AC operating voltage	After being continuously applied the maximum allowable voltage at $85 \pm 2^\circ\text{C}$ for 1000 hours, the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of $V_v$ shall be measured.	$ \Delta V/V (1 \text{ mA})  \leq 10 \%$												
	V I	Damp heat, steady state	The specimen shall be subjected to $40 \pm 2^\circ\text{C}$ , 90 to 95 % r.H. for 56 days without load and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of $V_v$ shall be measured.	$ \Delta V/V (1 \text{ mA})  \leq 10 \%$											
R O N M	Climatic sequence	The specimen shall be subjected to: a) dry heat at $+85^\circ\text{C}$ , 16 h b) damp heat, 1st cycle: $55^\circ\text{C}$ , 93 % r.H., 24 h c) cold, $-40^\circ\text{C}$ , 2 h d) damp heat, additional 5 cycles: $55^\circ\text{C}$ , 93 % r.H., 24 h/cycle Then the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of $V_v$ shall be measured.	$ \Delta V/V (1 \text{ mA})  \leq 10 \%$												
E N T A L	Fast temperature cycling	The temperature cycle shown below shall be repeated 5 times. Then the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. The change of $V_v$ and mechanical damage shall be examined.  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (<math>^\circ\text{C}</math>)</th> <th>Period (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-40 \pm 3</math></td> <td><math>30 \pm 3</math></td> </tr> <tr> <td>2</td> <td>transition time</td> <td>&lt; 10 s</td> </tr> <tr> <td>3</td> <td><math>85 \pm 2</math></td> <td><math>30 \pm 3</math></td> </tr> </tbody> </table>	Step	Temperature ( $^\circ\text{C}$ )	Period (min.)	1	$-40 \pm 3$	$30 \pm 3$	2	transition time	< 10 s	3	$85 \pm 2$	$30 \pm 3$	$ \Delta V/V (1 \text{ mA})  \leq 5 \%$ No visible damage
Step	Temperature ( $^\circ\text{C}$ )	Period (min.)													
1	$-40 \pm 3$	$30 \pm 3$													
2	transition time	< 10 s													
3	$85 \pm 2$	$30 \pm 3$													

**Note:** More details can be found in the data book 'SIOV Metal Oxide Varistors', Ordering No. EPC: 62002-7600

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