



SIOV metal oxide varistors

Taping, packaging and lead configuration
(for leaded varistors)

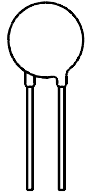
Date: December 2007

Taping, packaging and lead configuration

For leaded varistors

1 EPCOS ordering code system

B722	10	S	2	271	K	1	0	1
Digit 1 2 3 4	...	...	...	...	12	13	14	15
Monolithic varistor								
	Nominal disc diameter							
		Design: S = Leaded varistor T = ThermoFuse F = Fail-safe varistor Q = EnergetiQ						
			Series: 0 = StandarD 1 = Automotive 2 = AdvanceD 3 = SuperioR 4 = SuperioR					
				Max. AC operating voltage: $271 = 27 \cdot 10^1 = 275 \text{ VAC}$ $140 = 14 \cdot 10^0 = 14 \text{ VAC}$ $141 = 14 \cdot 10^1 = 140 \text{ VAC}$				
					Tolerance of varistor voltage: K = $\pm 10\%$ J = $\pm 5\%$ S = Special tolerance			
						Lead configuration: 1 = Straight leads, 2 thru 5 = Kinked form		
							Packaging: 0 = Bulk, 1 thru 6 = Taping style	
								Internal coding: 1 = Standard



Taping, packaging and lead configuration

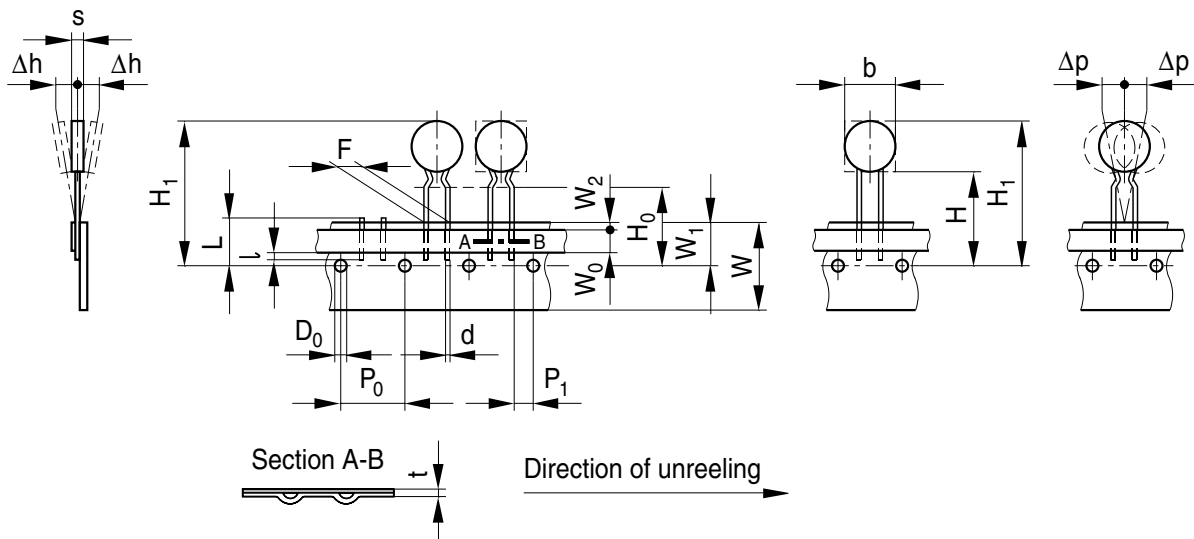
For leaded varistors

2 Taping and packaging of leaded varistors

Tape packaging for lead spacing $\boxed{e} = 5$ fully conforms to IEC 60286-2, while for lead spacings $\boxed{e} = 7.5$ and 10 the taping mode is based on this standard.

The overview of delivery mode on pages 11 ff lists disk types available on tape in detail, i.e. with complete ordering code and type designation. Taping mode and, if relevant, crimp style and lead spacing are coded in the type designation. For types not listed please contact EPCOS. Upon request parts with lead spacing $\boxed{e} = 5$ mm are also available in Ammo pack too.

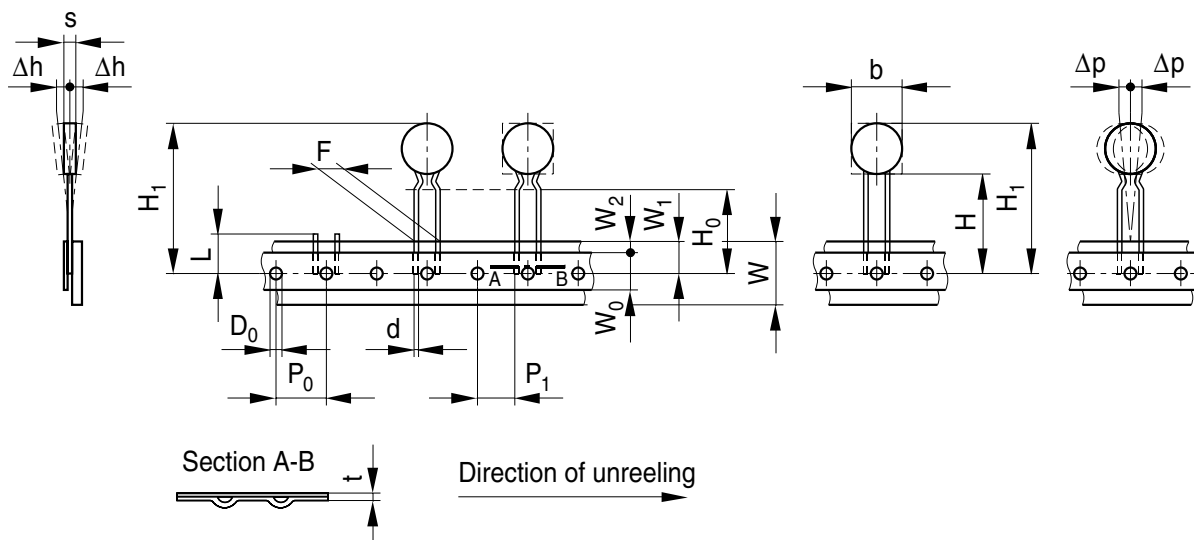
2.1 Taping in accordance with IEC 60286-2 for lead spacing 5.0 mm



$F \triangleq \boxed{e} = 5.0$ mm (except S ... R5)

VAR0410-X

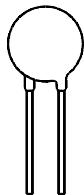
2.2 Taping based on IEC 60286-2 for lead spacing 7.5 and 10 mm



$F \triangleq \boxed{e} = 7.5$ mm (including S ... R5)

$F \triangleq \boxed{e} = 10$ mm (including S ... R5)

VAR0395-J



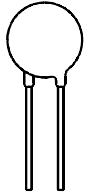
Taping, packaging and lead configuration

For leaded varistors

2.3 Tape dimensions (in mm)

Sym- bol	$e = 5.0$	Tolerance	$e = 7.5$	Tolerance	$e = 10.0$	Tolerance	Remarks
b s d	0.6	max. max. ± 0.05	0.8	max. max. ± 0.05	1.0	max. max. ± 0.05	see tables on pages 110 ff
P_0	12.7	± 0.3	12.7 ¹⁾	± 0.3	12.7	± 0.3	± 1 mm/20 sprocket holes
P_1	3.85	± 0.7	8.95	± 0.8	7.7	± 0.8	
F	5.0	$+0.6/-0.1$	7.5	± 0.8	10.0	± 0.8	measured at top of compo- nent body
Δh	0	± 2.0	depends on s		depends on s		
Δp	0	± 1.3	0	± 2.0	0	± 2.0	
W	18.0	± 0.5	18.0	± 0.5	18.0	± 0.5	Peel-off force ≥ 5 N
W_0	5.5	min.	11.0	min.	11.0	min.	
W_1	9.0	± 0.5	9.0	$+0.75/-0.5$	9.0	$+0.75/-0.5$	
W_2	3.0	max.	3.0	max.	3.0	max.	
H	18.0	$+2.0/-0$	18.0	$+2.0/-0$	18.0	$+2.0/-0$	²⁾ ³⁾
H_0	16.0 (18.0)	± 0.5	16.0 (18.0)	± 0.5	16.0	± 0.5	
H_1	32.2	max.	45.0	max.	45.0	max.	
D_0	4.0	± 0.2	4.0	± 0.2	4.0	± 0.2	without lead
t	0.9	max.	0.9	max.	0.9	max.	
L	11.0	max.	11.0	max.	11.0	max.	
l	4.0	max.					

- 1) Taping with $P_0 = 15.0$ mm upon request
2) Applies only to uncrimped types
3) Applies only to crimped types ($H_0 = 18$ upon request)



Taping, packaging and lead configuration

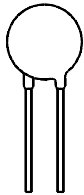
For leaded varistors

2.4 Taping mode

Example: B72210S0271K1 5 1

Digit 14

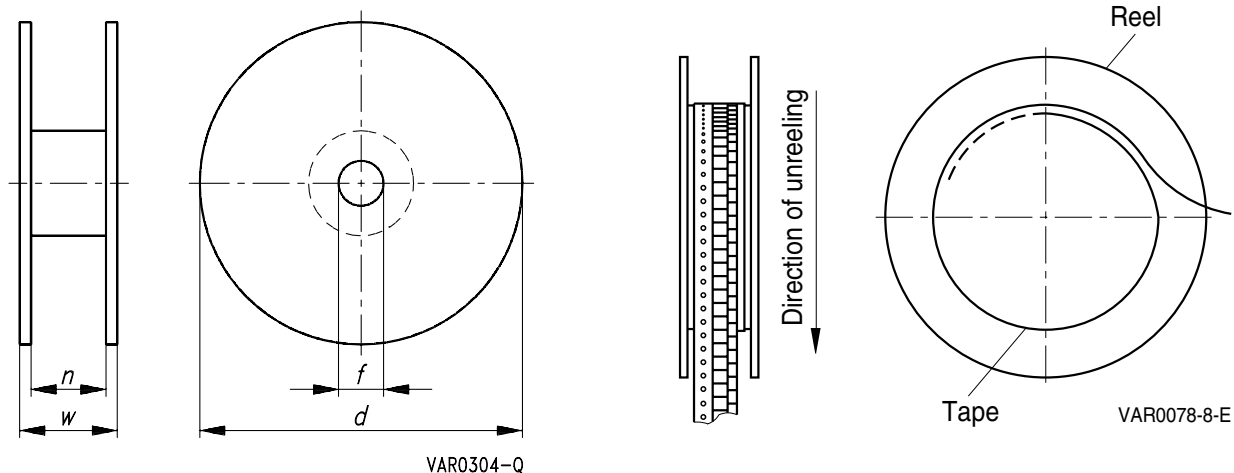
Digit 14	Taping mode	Reel type	Seating plane height H_0 for crimped types mm	Seating plane height H for uncrimped types mm	Pitch distance P_0 mm
1	G	I	16	18	12.7
2	G2	I	18	—	12.7
3	G3	II	16	18	12.7
4	G4	II	18	—	12.7
5	G5	III	16	18	12.7
6	GA	Ammo pack	16	18	12.7
7	G2A	Ammo pack	18	—	12.7
Internal coding for special taping					
	G6	III	18	—	12.7
	G10	II	16	18	15.0
	G11	II	18	—	15.0
	G10A	Ammo pack	16	18	15.0
	G11A	Ammo pack	18	—	15.0



Taping, packaging and lead configuration

For leaded varistors

2.5 Reel dimensions

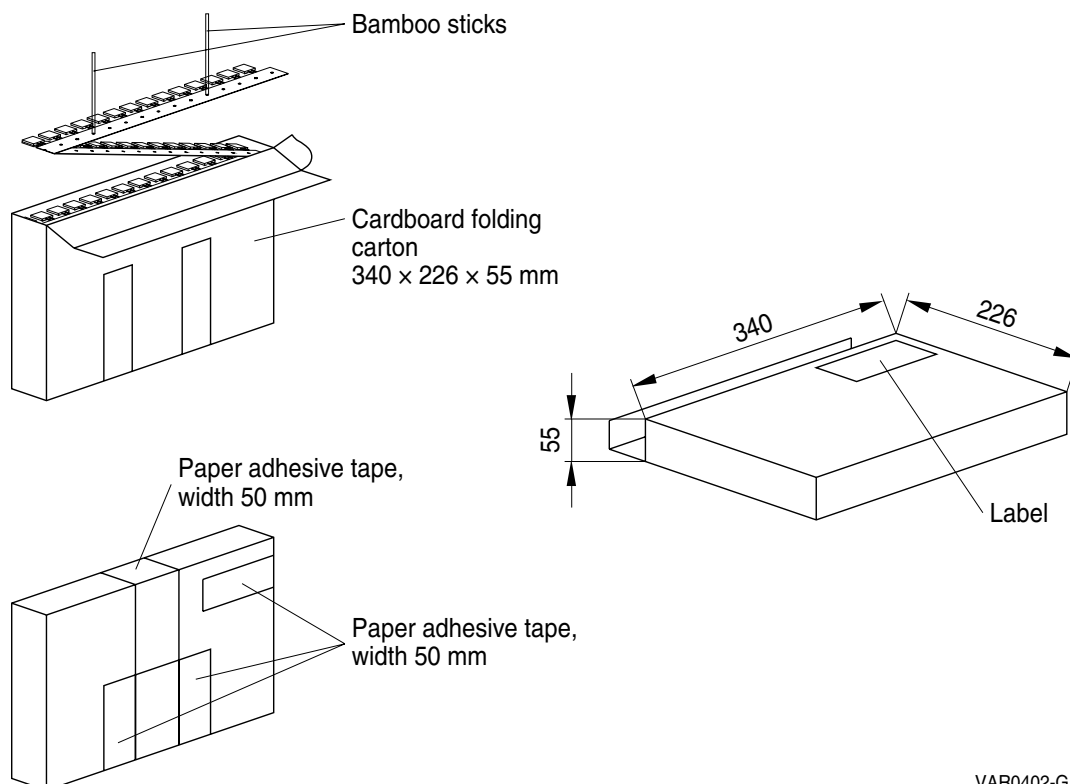


Dimensions (in mm)

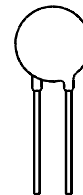
Reel type	d	f	n	w
I	360 max.	31 ± 1	approx. 45	54 max.
II	360 max.	31 ± 1	approx. 55	64 max.
III	500 max.	23 ± 1	approx. 59	72 max.

If reel type III is not compatible with insertion equipment because of its large diameter, nominal disk diameter 10 mm and 14 mm can be supplied on reel II upon request (taping mode G3).

2.6 Ammo pack dimensions



VAR0402-G



Taping, packaging and lead configuration

For leaded varistors

3 Lead configuration

Both crimped and straight leads are standard for taped disk varistors. The leads are differently crimped for technical reasons; the individual crimp styles are denoted by consecutive numbers (S, S2 through S5) as shown in the dimensional drawings on page 7.

The crimp styles of the individual types can be seen from the type designation in the ordering tables.

3.1 Crimp style mode

Example: B72210S0271K **5** 01

Digit 13

Digit 13 of ordering code	Crimp style	Figure
1	Standard, straight leads	1
2	S2	2
3	S3	3
4	S4	4
5	S5	5
Available upon request		
Internal coding	S9	6
Internal coding	S11	7
Internal coding	—	8

3.2 Standard crimp styles

Standard, straight leads

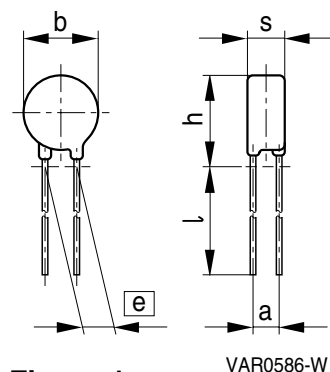


Figure 1

Crimp style S2

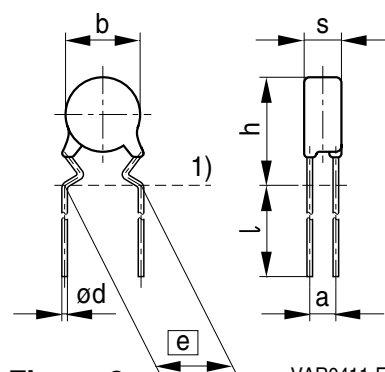


Figure 2

Crimp style S3

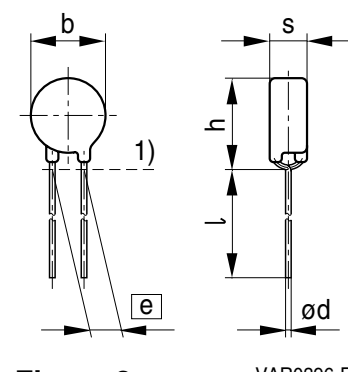


Figure 3

Crimp style S4

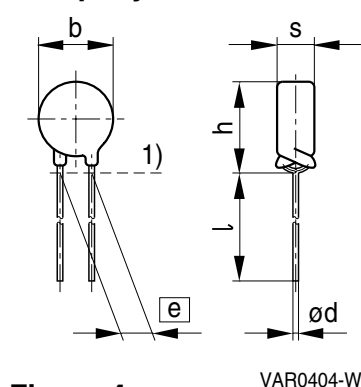


Figure 4

Crimp style S5

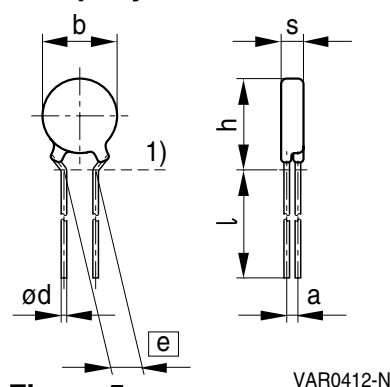
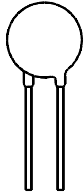


Figure 5

1) Seating plane to IEC 60717



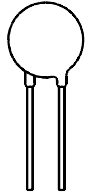
Taping, packaging and lead configuration

For leaded varistors

3.3 Component height ($h_{\max}$) for crimped versions

Due to technical reasons the component height ($h_{\max}$) increases if a crimp is added. The maximum height of the crimped component can be found in the table below.

Nominal diameter mm	V_{RMS} V	Crimp style	e mm	$h_{\max}$ mm
5	11 ... 175	S2	5.0	10.0
5	210 ... 460	S3	5.0	10.0
7	11 ... 175	S2	5.0	12.0
7	210 ... 460	S3	5.0	12.0
10	11 ... 300	S5	7.5	15.5
10	320 ... 460	S3/S5	7.5	16.5
10	510	S3/S5	7.5	17.5
10	Automotive	S5	7.5	17.0
10	Automotive (D1 types)	S5	7.5	16.0
10	11 ... 175	S4	5.0	16.5
10	210 ... 460	S3	5.0	16.5
14	11 ... 300	S5	7.5	20.0
14	320 ... 460	S3/S5	7.5	20.0
14	510	S3/S5	7.5	21.5
14	Automotive	S5	7.5	21.0
14	Automotive (D1 types)	S5	7.5	20.0
20	11 ... 320	S5	10.0	27.0
20	385 ... 510	S5	10.0	27.5



Taping, packaging and lead configuration

For leaded varistors

3.4 Crimp style S9, lock-in crimps (for lead spacing $e = 5$ mm)

These crimp styles provide automatic lock-in function on the printed circuit board for simplified assembly.

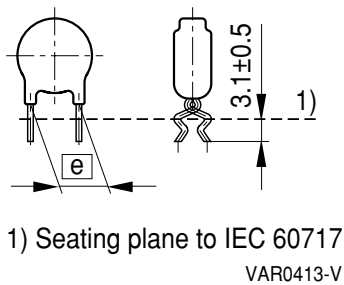
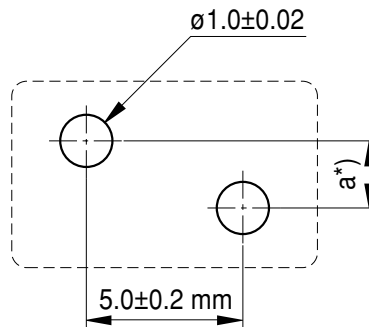


Figure 6

Layout recommendation



*) Set-off "a" depending on voltage ratings

VAR0421-M-E

Recommended PCB thickness: 1.5 ± 0.2 mm

Example: SIOV-S07K275S9

3.5 Crimp style S11, lock-in crimps (for lead spacing $e = 7.5$ mm)

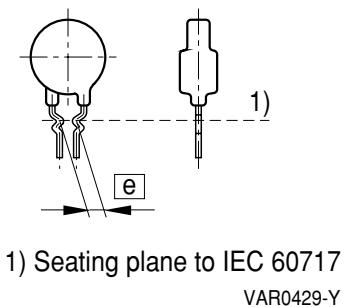
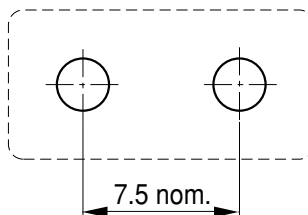


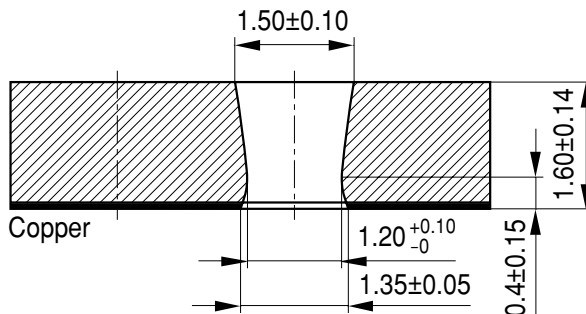
Figure 7

Layout recommendation



VAR0414-D

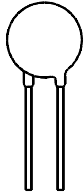
Recommended PCB thickness: 1.6 ± 0.14 mm



VAR0549-S

Recommended hole pattern

Example: SIOV-S14K275S11

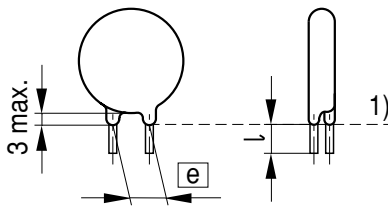


3.6 Trimmed leads

Varistors with cut leads available upon request.

Lead length tolerances:

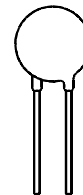
Straight leads	$\pm 1.0 \text{ mm}$
Crimped leads	$\pm 0.8 \text{ mm}$
Minimum lead length	3.5 mm



1) Seating plane to IEC 60717

VAR0642-U-E

Figure 8



Taping, packaging and lead configuration

For leaded varistors

Overview of standard varistors

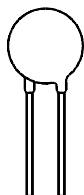
Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel I
---------------	---------------	-------------	-------------	---------------

Nominal disk diameter 5 mm, straight leads, $e = 5$ mm

B72205S0110K111	S05K11G	—	G	1500
B72205S0140K111	S05K14G	—	G	1500
B72205S0170K111	S05K17G	—	G	1500
B72205S0200K111	S05K20G	—	G	1500
B72205S0250K111	S05K25G	—	G	1500
B72205S0300K111	S05K30G	—	G	1500
B72205S0350K111	S05K35G	—	G	1500
B72205S0400K111	S05K40G	—	G	1500
B72205S0500K111	S05K50G	—	G	1500
B72205S0600K111	S05K60G	—	G	1500
B72205S0750K111	S05K75G	—	G	1500
B72205S0950K111	S05K95G	—	G	1500
B72205S0111K111	S05K115G	—	G	1500
B72205S0131K111	S05K130G	—	G	1500
B72205S0141K111	S05K140G	—	G	1500
B72205S0151K111	S05K150G	—	G	1500
B72205S0171K111	S05K175G	—	G	1500
B72205S0231K111	S05K230G	—	G	1500
B72205S0251K111	S05K250G	—	G	1500
B72205S0271K111	S05K275G	—	G	1500
B72205S0301K111	S05K300G	—	G	1000

Nominal disk diameter 5 mm, crimped leads, $e = 5$ mm

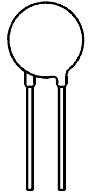
B72205S0110K211	S05K11GS2	S2	G	1500
B72205S0140K211	S05K14GS2	S2	G	1500
B72205S0170K211	S05K17GS2	S2	G	1500
B72205S0200K211	S05K20GS2	S2	G	1500
B72205S0250K211	S05K25GS2	S2	G	1500
B72205S0300K211	S05K30GS2	S2	G	1500
B72205S0350K211	S05K35GS2	S2	G	1500
B72205S0400K211	S05K40GS2	S2	G	1500
B72205S0500K211	S05K50GS2	S2	G	1500
B72205S0600K211	S05K60GS2	S2	G	1500
B72205S0750K211	S05K75GS2	S2	G	1500
B72205S0950K211	S05K95GS2	S2	G	1500



Taping, packaging and lead configuration

For leaded varistors

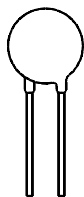
Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel I
Nominal disk diameter 5 mm, crimped leads, $\boxed{e}$ = 5 mm (continued)				
B72205S0111K211	S05K115GS2	S2	G	1500
B72205S0131K211	S05K130GS2	S2	G	1500
B72205S0141K211	S05K140GS2	S2	G	1500
B72205S0151K211	S05K150GS2	S2	G	1500
B72205S0171K211	S05K175GS2	S2	G	1500
B72205S0231K311	S05K230GS3	S3	G	1500
B72205S0251K311	S05K250GS3	S3	G	1500
B72205S0271K311	S05K275GS3	S3	G	1500
B72205S0301K311	S05K300GS3	S3	G	1000
B72205S0381K311	S05K385GS3	S3	G	1000
B72205S0421K311	S05K420GS3	S3	G	1000
B72205S0441K311	S05K440GS3	S3	G	1000
B72205S0461K311	S05K460GS3	S3	G	1000
Nominal disk diameter 7 mm, straight leads, $\boxed{e}$ = 5 mm				
B72207S0110K111	S07K11G	—	G	1500
B72207S0140K111	S07K14G	—	G	1500
B72207S0170K111	S07K17G	—	G	1500
B72207S0200K111	S07K20G	—	G	1500
B72207S0250K111	S07K25G	—	G	1500
B72207S0300K111	S07K30G	—	G	1500
B72207S0350K111	S07K35G	—	G	1500
B72207S0400K111	S07K40G	—	G	1500
B72207S0500K111	S07K50G	—	G	1500
B72207S0600K111	S07K60G	—	G	1500
B72207S0750K111	S07K75G	—	G	1500
B72207S0950K111	S07K95G	—	G	1500
B72207S0111K111	S07K115G	—	G	1500
B72207S0131K111	S07K130G	—	G	1500
B72207S0141K111	S07K140G	—	G	1500
B72207S0151K111	S07K150G	—	G	1500
B72207S0171K111	S07K175G	—	G	1500
B72207S0231K111	S07K230G	—	G	1500
B72207S0251K111	S07K250G	—	G	1500
B72207S0271K111	S07K275G	—	G	1000
B72207S0301K111	S07K300G	—	G	1000



Taping, packaging and lead configuration

For leaded varistors

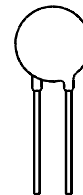
Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel I
Nominal disk diameter 7 mm, crimped leads, $e = 5$ mm				
B72207S0110K211	S07K11GS2	S2	G	1500
B72207S0140K211	S07K14GS2	S2	G	1500
B72207S0170K211	S07K17GS2	S2	G	1500
B72207S0200K211	S07K20GS2	S2	G	1500
B72207S0250K211	S07K25GS2	S2	G	1500
B72207S0300K211	S07K30GS2	S2	G	1500
B72207S0350K211	S07K35GS2	S2	G	1500
B72207S0400K211	S07K40GS2	S2	G	1500
B72207S0500K211	S07K50GS2	S2	G	1500
B72207S0600K211	S07K60GS2	S2	G	1500
B72207S0600S212	S07S60AGS2	S2	G	1500
B72207S0750K211	S07K75GS2	S2	G	1500
B72207S0950K211	S07K95GS2	S2	G	1500
B72207S0950S212	S07S95AGS2	S2	G	1500
B72207S0111K211	S07K115GS2	S2	G	1500
B72207S0131K211	S07K130GS2	S2	G	1500
B72207S0141K211	S07K140GS2	S2	G	1500
B72207S0151K211	S07K150GS2	S2	G	1500
B72207S0171K211	S07K175GS2	S2	G	1500
B72207S0231K311	S07K230GS3	S3	G	1000
B72207S0251K311	S07K250GS3	S3	G	1000
B72207S0271K311	S07K275GS3	S3	G	1000
B72207S0301K311	S07K300GS3	S3	G	1000
B72207S0381K311	S07K385GS3	S3	G	1000
B72207S0421K311	S07K420GS3	S3	G	1000
B72207S0441K311	S07K440GS3	S3	G	1000
B72207S0461K311	S07K460GS3	S3	G	1000



Taping, packaging and lead configuration

For leaded varistors

Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel III
Nominal disk diameter 10 mm, straight leads, $\varnothing = 7.5$ mm				
B72210S0110K151	S10K11G5	—	G5	1500
B72210S0140K151	S10K14G5	—	G5	1500
B72210S0170K151	S10K17G5	—	G5	1500
B72210S0200K151	S10K20G5	—	G5	1500
B72210S0250K151	S10K25G5	—	G5	1500
B72210S0300K151	S10K30G5	—	G5	1500
B72210S0350K151	S10K35G5	—	G5	1500
B72210S0400K151	S10K40G5	—	G5	1500
B72210S0500K151	S10K50G5	—	G5	1500
B72210S0600K151	S10K60G5	—	G5	1500
B72210S0750K151	S10K75G5	—	G5	1500
B72210S0950K151	S10K95G5	—	G5	1500
B72210S0111K151	S10K115G5	—	G5	1500
B72210S0131K151	S10K130G5	—	G5	1500
B72210S0141K151	S10K140G5	—	G5	1500
B72210S0151K151	S10K150G5	—	G5	1500
B72210S0171K151	S10K175G5	—	G5	1500
B72210S0231K151	S10K230G5	—	G5	1000
B72210S0251K151	S10K250G5	—	G5	1000
B72210S0271K151	S10K275G5	—	G5	1000
B72210S0301K151	S10K300G5	—	G5	1000
Nominal disk diameter 10 mm, crimped leads, $\varnothing = 7.5$ mm				
B72210S0110K551	S10K11G5S5	S5	G5	1500
B72210S0140K551	S10K14G5S5	S5	G5	1500
B72210S0170K551	S10K17G5S5	S5	G5	1500
B72210S0200K551	S10K20G5S5	S5	G5	1500
B72210S0250K551	S10K25G5S5	S5	G5	1500
B72210S0300K551	S10K30G5S5	S5	G5	1500
B72210S0350K551	S10K35G5S5	S5	G5	1500
B72210S0400K551	S10K40G5S5	S5	G5	1500
B72210S0500K551	S10K50G5S5	S5	G5	1500
B72210S0600K551	S10K60G5S5	S5	G5	1500
B72210S0750K551	S10K75G5S5	S5	G5	1500
B72210S0950K551	S10K95G5S5	S5	G5	1500
B72210S0111K551	S10K115G5S5	S5	G5	1500
B72210S0131K551	S10K130G5S5	S5	G5	1500
B72210S0141K551	S10K140G5S5	S5	G5	1500



Taping, packaging and lead configuration

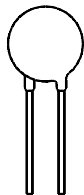
For leaded varistors

Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel III
Nominal disk diameter 10 mm, crimped leads, $e = 7.5$ mm (continued)				
B72210S0151K551	S10K150G5S5	S5	G5	1500
B72210S0171K551	S10K175G5S5	S5	G5	1500
B72210S0231K551	S10K230G5S5	S5	G5	1000
B72210S0251K551	S10K250G5S5	S5	G5	1000
B72210S0271K551	S10K275G5S5	S5	G5	1000
B72210S0301K551	S10K300G5S5	S5	G5	1000

S10K320 ... 460G.S. upon request

Nominal disk diameter 14 mm, straight leads, $e = 7.5$ mm

B72214S0110K151	S14K11G5	—	G5	1500
B72214S0140K151	S14K14G5	—	G5	1500
B72214S0170K151	S14K17G5	—	G5	1500
B72214S0200K151	S14K20G5	—	G5	1500
B72214S0250K151	S14K25G5	—	G5	1500
B72214S0300K151	S14K30G5	—	G5	1500
B72214S0350K151	S14K35G5	—	G5	1500
B72214S0400K151	S14K40G5	—	G5	1500
B72214S0500K151	S14K50G5	—	G5	1500
B72214S0600K151	S14K60G5	—	G5	1500
B72214S0750K151	S14K75G5	—	G5	1500
B72214S0950K151	S14K95G5	—	G5	1500
B72214S0111K151	S14K115G5	—	G5	1500
B72214S0131K151	S14K130G5	—	G5	1500
B72214S0141K151	S14K140G5	—	G5	1500
B72214S0151K151	S14K150G5	—	G5	1500
B72214S0171K151	S14K175G5	—	G5	1500
B72214S0231K151	S14K230G5	—	G5	1000
B72214S0251K151	S14K250G5	—	G5	1000
B72214S0271K151	S14K275G5	—	G5	1000
B72214S0301K151	S14K300G5	—	G5	1000



Taping, packaging and lead configuration

For leaded varistors

Ordering code	Type SIOV-	Crimp style	Taping mode	Pieces/reel III
Nominal disk diameter 14 mm, crimped leads, $e = 7.5$ mm				
B72214S0110K551	S14K11G5S5	S5	G5	1500
B72214S0140K551	S14K14G5S5	S5	G5	1500
B72214S0170K551	S14K17G5S5	S5	G5	1500
B72214S0200K551	S14K20G5S5	S5	G5	1500
B72214S0250K551	S14K25G5S5	S5	G5	1500
B72214S0300K551	S14K30G5S5	S5	G5	1500
B72214S0350K551	S14K35G5S5	S5	G5	1500
B72214S0400K551	S14K40G5S5	S5	G5	1500
B72214S0500K551	S14K50G5S5	S5	G5	1500
B72214S0600K551	S14K60G5S5	S5	G5	1500
B72214S0750K551	S14K75G5S5	S5	G5	1500
B72214S0950K551	S14K95G5S5	S5	G5	1500
B72214S0111K551	S14K115G5S5	S5	G5	1500
B72214S0131K551	S14K130G5S5	S5	G5	1500
B72214S0141K551	S14K140G5S5	S5	G5	1500
B72214S0151K551	S14K150G5S5	S5	G5	1500
B72214S0171K551	S14K175G5S5	S5	G5	1500
B72214S0231K551	S14K230G5S5	S5	G5	1000
B72214S0251K551	S14K250G5S5	S5	G5	1000
B72214S0271K551	S14K275G5S5	S5	G5	1000
B72214S0301K551	S14K300G5S5	S5	G5	1000