

MOV Metal Oxide Varistors

Leaded varistors, Multi-Pulse, 10D series

Series/Type: VCRR10D***K****

Ordering code: VCRR10D***K

Date: January 2020

Version: 1

MOV metal oxide varistors

10D***k****

Leaded varistors, Multi-Pulse, 10 series

VCRR10D***K****

Construction

- Round varistor element, leaded
- Coating: epoxy resin, flame-retardant to UL 94 V-0
- Terminals: tinned wire

Features

- High performance with smaller disk diameter
- Wide operating voltage range 10 ... 680V_{RMS}
- High surge current ratings up to 4KV/2KA
- No derating up to 130°C ambient temperature

Approvals

- UL Certificate:E531647
- TUV Certificate:B1199670002
- CQC Certificate :CQC23001396761

Delivery mode

- Bulk (standard), taped versions on reel or in Ammo pack upon request
- For further details refer to chapter "Taping, packaging and lead configuration" for leaded varistors.

General technical data

Climatic category	to IEC 60068-1	40/130/56	
Operating temperature	to IEC 61051	-40 ... +130	°C
Storage temperature		-40 ... +125	°C
Electric strength	to IEC 61051	≥ 2.5	kV _{RMS}
Insulation resistance	to IEC 61051	≥ 100	MΩ

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10D*k******
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VCRR10D*K******
Electrical specifications and ordering codes

Maximum ratings ($T_A = 130\text{ °C}$)

Ordering code	Type	V_{RMS} [V]	V_{DC} [V]	(1.2/50 μs) 40 time [V]*	(1.2/50 μs) 40 times [A]*	W_{max} (10/100 0us) [J]	P_{max} [W]
VCRR10D180KN101	10D180LN	10	14	2000	500	3	0.05
VCRR10D220KN101	10D220KN	14	18	2000	500	5	0.05
VCRR10D270KN101	10D270KN	17	22	2000	500	6.5	0.05
VCRR10D330KN101	10D330KN	20	26	2000	500	8	0.05
VCRR10D390KN101	10D390KN	25	31	2000	500	9.5	0.05
VCRR10D470KN101	10D470KN	30	38	2000	500	11	0.05
VCRR10D560KN101	10D560KN	35	45	2000	500	13	0.05
VCRR10D680KN101	10D680KN	40	56	2000	500	16	0.05
VCRR10D820KN101	10D820KN	50	65	4000	2000	17	0.05
VCRR10D101KN101	10D101KN	60	85	4000	2000	18.5	0.05
VCRR10D121KN101	10D121KN	75	100	4000	2000	21.5	0.05
VCRR10D151KN101	10D151KN	95	125	4000	2000	26	0.05
VCRR10D181KN101	10D181KN	115	150	4000	2000	38	0.4
VCRR10D201KN101	10D201KN	130	170	4000	2000	42.5	0.4
VCRR10D221KN101	10D221KN	140	180	4000	2000	46.5	0.4
VCRR10D241KN101	10D241KN	150	200	4000	2000	51	0.4
VCRR10D271KN101	10D271KN	175	225	4000	2000	58	0.4
VCRR10D301KN101	10D301KN	190	250	4000	2000	63.5	0.4
VCRR10D331KN101	10D331KN	210	270	4000	2000	69	0.4
VCRR10D361KN101	10D361KN	230	300	4000	2000	75	0.4
VCRR10D391KN101	10D391KN	250	320	4000	2000	82	0.4
VCRR10D431KN101	10D431KN	275	350	4000	2000	89	0.4
VCRR10D471KN101	10D471KN	300	385	4000	2000	100	0.4
VCRR10D511KN101	10D511KN	320	420	4000	2000	102	0.4
VCRR10D561KN101	10D561KN	350	460	4000	2000	104	0.4
VCRR10D621KN101	10D621KN	385	505	4000	2000	106	0.4
VCRR10D681KN101	10D681KN	420	560	4000	2000	108	0.4
VCRR10D751KN101	10D751KN	460	615	4000	2000	118	0.4
VCRR10D821KN101	10D821KN	510	670	4000	2000	120	0.4
VCRR10D911KN101	10D911KN	550	745	4000	2000	125	0.4
VCRR10D951KN101	10D951KN	575	765	4000	2000	134	0.4
VCRR10D102KN101	10D102KN	625	825	4000	2000	134	0.4
VCRR10D112KN101	10D112KN	680	895	4000	2000	140	0.4

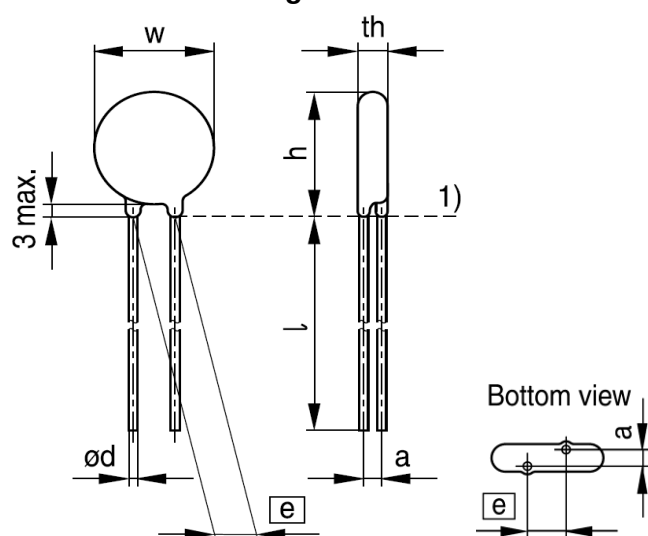
¹⁾ **Note:** Nominal discharge current is the specification defined in UL1449 4th edition and tested with 8/20 μs current waveform

MOV metal oxide varistors
10D*k******
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VCRR10D*K******
Characteristics (T_A=25 °C):

Ordering code	Type	V _V (1 mA) [V]	ΔV _V (1 mA) [%]	Max clamping voltage		C _{typ} (1 kHz) [pF]
				V _c [V]	I _c [A]	
VCRR10D180KN101	10D180LN	18	5	38	5	5600
VCRR10D220KN101	10D220KN	22	±10	43	5	4500
VCRR10D270KN101	10D270KN	27	±10	53	5	3700
VCRR10D330KN101	10D330KN	33	±10	65	5	3000
VCRR10D390KN101	10D390KN	390	±10	77	5	2600
VCRR10D470KN101	10D470KN	47	±10	93	5	2100
VCRR10D560KN101	10D560KN	56	±10	110	5	1800
VCRR10D680KN101	10D680KN	68	±10	135	5	1500
VCRR10D820KN101	10D820KN	82	±10	135	25	1200
VCRR10D101KN101	10D101KN	100	±10	165	25	1000
VCRR10D121KN101	10D121KN	120	±10	200	25	830
VCRR10D151KN101	10D151KN	150	±10	250	25	670
VCRR10D181KN101	10D181KN	180	±10	300	25	560
VCRR10D201KN101	10D201KN	200	±10	340	25	500
VCRR10D221KN101	10D221KN	220	±10	360	25	450
VCRR10D241KN101	10D241KN	240	±10	395	25	420
VCRR10D271KN101	10D271KN	270	±10	455	25	370
VCRR10D301KN101	10D301KN	300	±10	500	25	330
VCRR10D331KN101	10D331KN	330	±10	550	25	300
VCRR10D361KN101	10D361KN	360	±10	595	25	280
VCRR10D391KN101	10D391KN	390	±10	650	25	260
VCRR10D431KN101	10D431KN	430	±10	710	25	230
VCRR10D471KN101	10D471KN	470	±10	775	25	210
VCRR10D511KN101	10D511KN	510	±10	840	25	200
VCRR10D561KN101	10D561KN	560	±10	910	25	180
VCRR10D621KN101	10D621KN	620	±10	1025	25	160
VCRR10D681KN101	10D681KN	680	±10	1120	25	150
VCRR10D751KN101	10D751KN	750	±10	1240	25	140
VCRR10D821KN101	10D821KN	820	±10	1355	25	120
VCRR10D911KN101	10D911KN	910	±10	1500	25	110
VCRR10D951KN101	10D951KN	950	±10	1570	25	100
VCRR10D102KN101	10D102KN	1000	±10	1650	25	90
VCRR10D112KN101	10D112KN	1100	±10	1815	25	90

2) *Please refer to the suffix code

Dimensional drawings



Weight

Nominal diameter mm	V _{RMS} V	Weight g
10	130...680	0.9...2.9

Different voltage levels result in differences in weight.

Dimensions

Ordering code ²⁾	[e] ±1 mm	W _{max} mm	h _{max} mm	th _{max} mm	a _{typ} mm	l _{min} mm	Ød±0.05 mm
VCRR10D180KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D220KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D270KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D330KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D390KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D470KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D560KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D680KN101	7.5	11.5	14	3.6	1.2	25.0	0.8
VCRR10D820KN101	7.5	11.5	14	3.6	1.3	25.0	0.8
VCRR10D101KN101	7.5	11.5	14	3.6	1.3	25.0	0.8
VCRR10D121KN101	7.5	11.5	14	3.6	1.3	25.0	0.8
VCRR10D151KN101	7.5	11.5	14	3.6	1.3	25.0	0.8
VCRR10D181KN101	7.5	11.5	14	3.6	1.5	25.0	0.8
VCRR10D201KN101	7.5	11.5	14	4.2	1.5	25.0	0.8
VCRR10D221KN101	7.5	11.5	14	4.3	1.5	25.0	0.8
VCRR10D241KN101	7.5	11.5	14	4.4	1.5	25.0	0.8
VCRR10D271KN101	7.5	11.5	14	4.6	1.5	25.0	0.8
VCRR10D301KN101	7.5	11.5	14	4.7	1.5	25.0	0.8
VCRR10D331KN101	7.5	11.5	14	4.8	1.5	25.0	0.8
VCRR10D361KN101	7.5	11.5	14	5.0	1.6	25.0	0.8
VCRR10D391KN101	7.5	11.5	14	5.1	1.8	25.0	0.8
VCRR10D431KN101	7.5	11.5	14	5.4	2.0	25.0	0.8
VCRR10D471KN101	7.5	11.5	14	5.6	2.1	25.0	0.8
VCRR10D511KN101	7.5	11.5	14	5.8	2.3	25.0	0.8
VCRR10D561KN101	7.5	11.5	14	6.1	2.3	25.0	0.8

MOV metal oxide varistors							10D***k****
Leaded varistors, Multi-Pulse, 10 series							VCRR10D***K****
Ordering code ²⁾	[e] ±1 mm	W _{max} mm	h _{max} mm	th _{max} mm	a _{typ} mm	l _{min} mm	Ød±0.05 mm
VCRR10D621KN101	7.5	11.5	14	6.2	2.8	25.0	0.8
VCRR10D681KN101	7.5	11.5	14	6.3	2.4	25.0	0.8
VCRR10D751KN101	7.5	11.5	14	6.7	3.1	25.0	0.8
VCRR10D821KN101	7.5	11.5	14	7.1	3.4	25.0	0.8
VCRR10D911KN101	7.5	11.5	14	7.5	3.7	25.0	0.8
VCRR10D951KN101	7.5	11.5	14	7.9	3.9	25.0	0.8
VCRR10D102KN101	7.5	11.5	14	7.9	4.1	25.0	0.8
VCRR10D112KN101	7.5	11.5	14	8.0	4.4	25.0	0.8

2) *Please refer to the suffix code.

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 _{DC} @ 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 µs) applied.	To meet the specified value
Endurance at upper category temperature	1000 h at UCT After having continuously applied the maximum allowable AC voltage at UCT ±2 °C for 1000 h, 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.	$ \Delta V/V (1 \text{ mA}) \leq 10\%$
Surge current derating, 8/20 µs	10 surge currents (8/20 µs), unipolar, interval 30 s, amplitude corresponding to derating curve for 10 impulses at 20 µs	$ \Delta V/V (1 \text{ mA}) \leq 10\%$ (measured in direction of surge current) No visible damage
Surge current derating, 2 ms	10 surge currents (2 ms), unipolar, interval 120 s, amplitude corresponding to derating curve for 10 impulses at 2 ms	$ \Delta V/V (1 \text{ mA}) \leq 10\%$ (measured in direction of surge current) No visible damage
Electric strength	IEC 61051-1, test 4.9.2 Metal balls method, 2500 VRMS, 60 s The varistor is placed in a container holding 1.6 ±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

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10D*k******
Leaded varistors, Multi-Pulse, 10 series
VCRR10D*K******

Test	Test methods/conditions	Requirement
Climatic sequence	The specimen shall be subjected to: a) dry heat at UCT, 16 h, IEC 60068-2-2, test Ba b) damp heat, 1st cycle: 55 °C, 93% r. H., 24 h, IEC 60068-2-30, test Db c) cold, LCT, 2 h, IEC 60068-2-1, test Aa d) damp heat, additional 5 cycles: 55 °C/25 °C, 93% r. H., 24 h/cycle, IEC 60068-2-30, test Db. 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. Thereafter, insulation resistance R_{ins} shall be measured at $V = 500$ V.	$ \Delta V/V (1 \text{ mA}) \leq 10\%$ $R_{ins} \geq 100 \text{ M}\Omega$
Rapid change of temperature	IEC 60068-2-14, test Na, LCT/UCT, dwell time 30 min, 5 cycles	$ \Delta V/V (1 \text{ mA}) \leq 5\%$ No visible damage
Damp heat, steady state	IEC 60068-2-78, test Ca The specimen shall be subjected to 40 ± 2 °C, 90 to 95% r. H. for 56 days without load / 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. Thereafter, insulation resistance R_{ins} shall be measured at $V = 500$ V (insulated varistors only).	$ \Delta V/V (1 \text{ mA}) \leq 10\%$ $R_{ins} \geq 100 \text{ M}\Omega$

MOV metal oxide varistors

10D***k****

Leaded varistors, Multi-Pulse, 10 series

VCRR10D***K****

Test	Test methods/conditions	Requirement
Solderability	IEC 60068-2-20, test Ta, method 1 with modified conditions for lead-free solder alloys: 245 °C, 3 s: After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 245 °C for 3 s, 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 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.
Resistance to soldering heat	IEC 60068-2-20, test Tb, method 1A, 260 °C, 10 s: Each lead shall be dipped into a solder bath having a temperature of 260 ±5 °C to a point 2.0 to 2.5 mm from the body of the specimen, be held there for 10 ±1 s and then be stored at room temperature and normal humidity for 1 to 2 h. The change of VV shall be measured and the specimen shall be visually examined.	$ \Delta V/V (1 \text{ mA}) \leq 5\%$ No visible damage
Tensile strength	IEC 60068-2-21, test Ua1 After gradually applying the force specified below and keeping the unit fixed for 10 s, the terminal shall be visually examined for any damage. Force for wire diameter: 0.6 mm = 10 N 0.8 mm = 10 N 1.0 mm = 20 N	$ \Delta V/V (1 \text{ mA}) \leq 5\%$ No break of solder joint, no wire break

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10D*k******
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VCRR10D*K******

Test	Test methods/conditions	Requirement
Vibration	IEC 60068-2-6, test Fc, method B4 Frequency range: 10 ... 55 Hz Amplitude: 0.75 mm or 98 m/s ² Duration: 6 h (3 · 2 h) Pulse: sine wave After repeatedly applying a single harmonic vibration according to the table above. The change of V _V shall be measured and the specimen shall be visually examined.	ΔV/V (1 mA) ≤5% No visible damage
Bump	IEC 60068-2-29, test Eb Pulse duration: 6 ms Max. acceleration: 400 m/s ² Number of bumps: 4000 Pulse: half sine	ΔV/V (1 mA) ≤5% No visible damage
Fire hazard	IEC 60695-11-5 (needle flame test) Severity: vertical 10 s	5 s max.

Note:

UCT = Upper category temperature

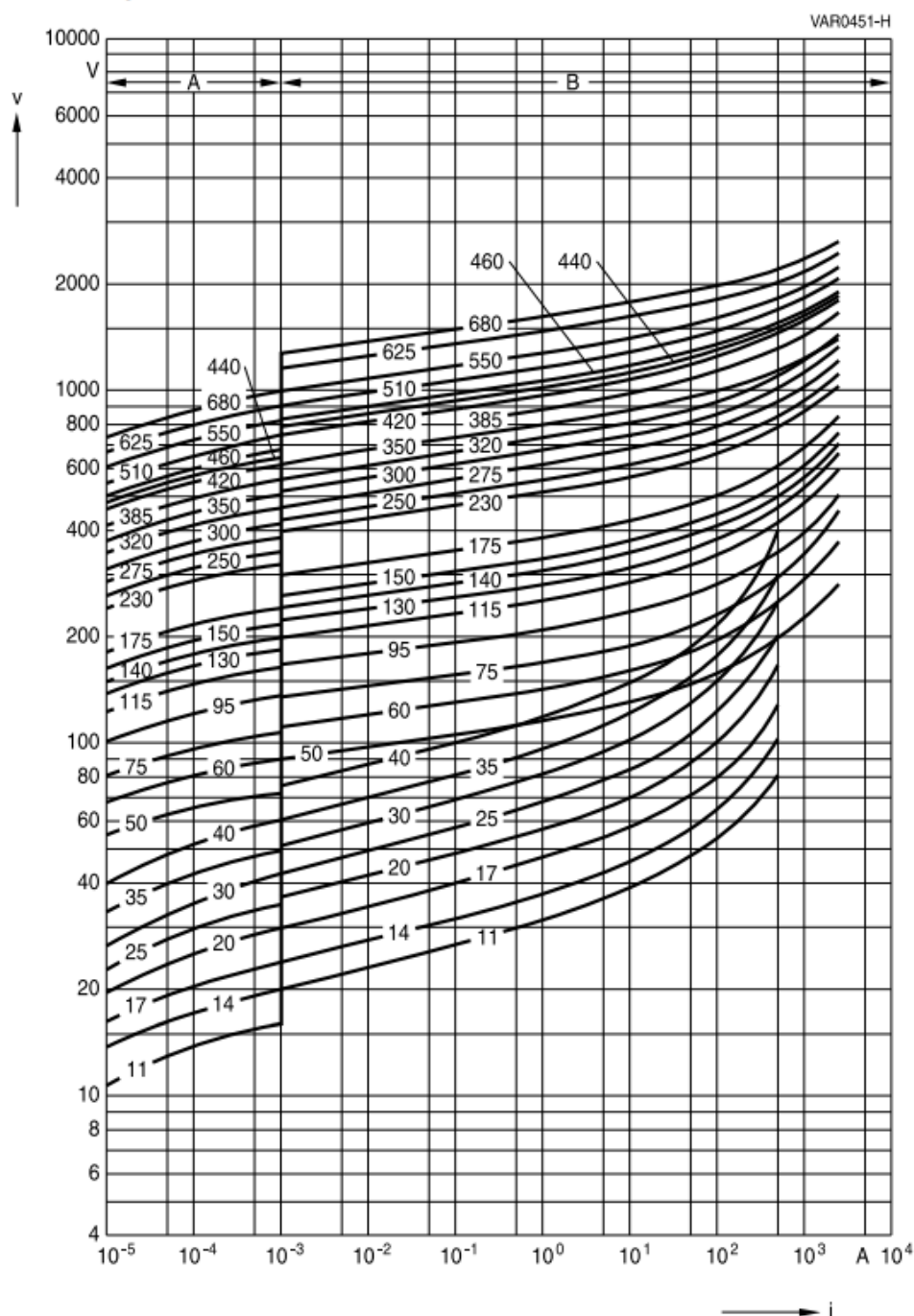
LCT = Lower category temperature

R_{ins} = Insulation resistance

v/i characteristics

$v = f(i)$ - for explanation of the characteristics refer to "General technical information",

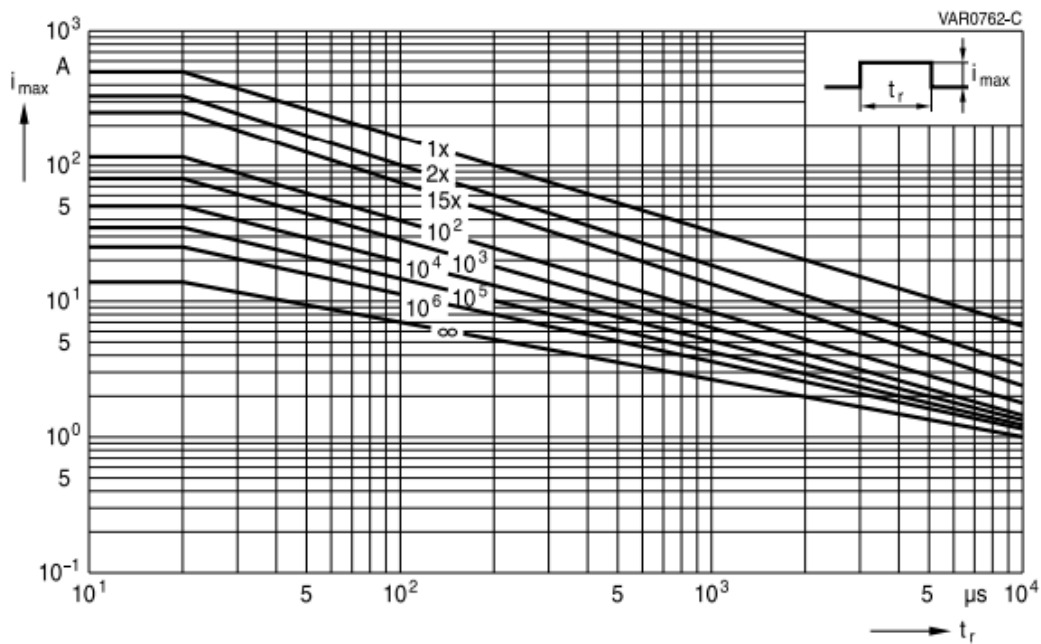
A = Leakage current, B = Protection level } for worst-case varistor tolerances



Derating curves

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

For explanation of the derating curves refer to "General technical information".



Taping, packaging and lead configuration

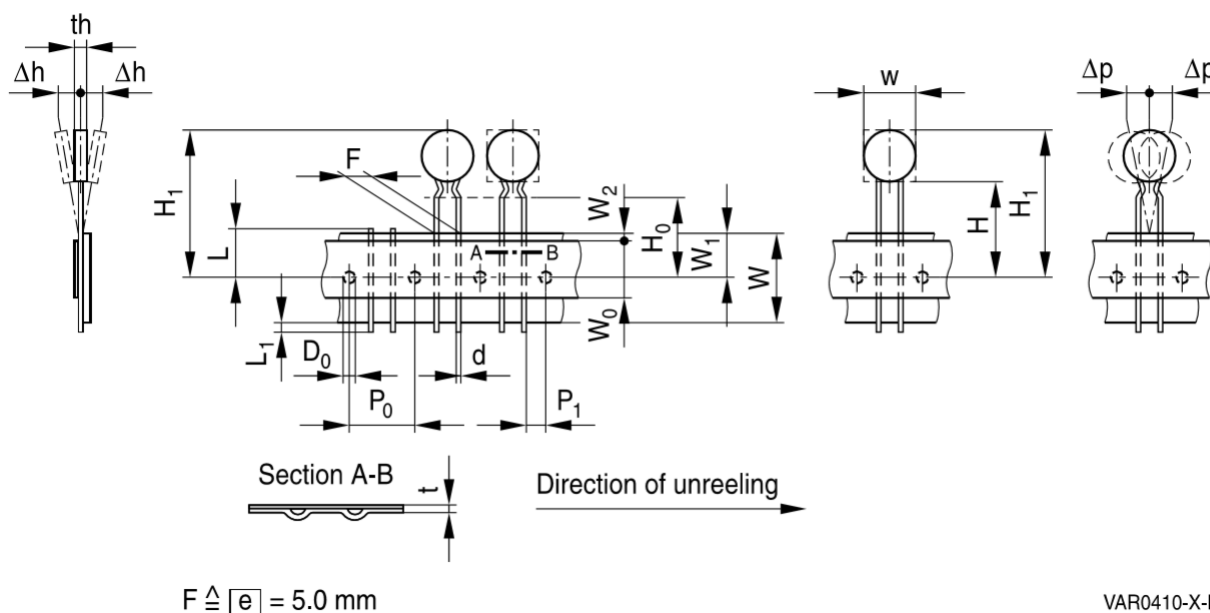
1 JORDUN Electronics ordering code system for leaded varistors

VCRR	10	D	471	K	N	1	0	1	1
logo									
Disc Diameter									
Disc Shape: D:Round Shape S:Square									
			Varistor Voltage: 471:470V 561:560V 470:47V 102:1000V						
			Tolerance of Varistor Voltage: K=±10% J=±5% S=Special tolerance						
			Design: 0=Standard J=High Joule N=High Energy T=Automotive Remark: The standard printing is 07D471K, and the high joule printing is 10D471KN						
			Lead Configuration: 1=Straight Leads 2=Inner Pin 3=Forward and Backward Pin 4=Outer K Pin Plase refer to” Standard leads and non- standard crimp styles”						
			Packaging: 0=Bulk 1=Taping Style for further information please refer to chapter “Taping, packaging and lead configuration”						
				Bulk Pin Length: 1=3.5±0.5mm 2=3.0±0.5mm 3=4.0±0.5mm 4=25±0.5mm 5=Special					
								Internal Coding: ABCDEF	

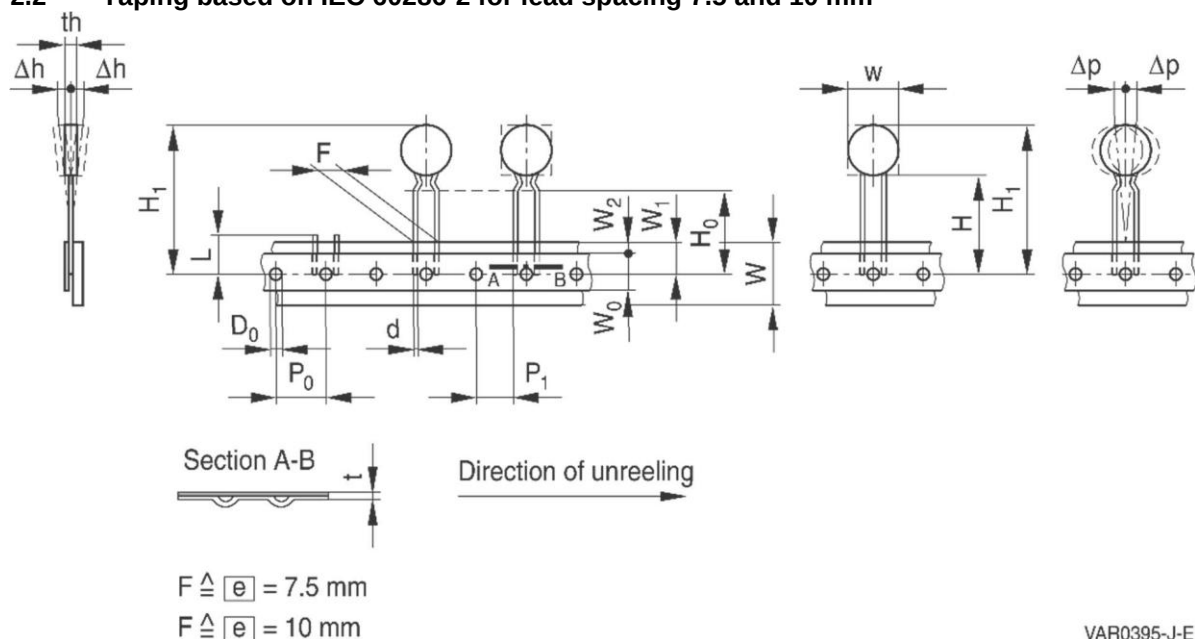
2 Taping and packaging of leaded varistors

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.

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



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



2.3 Tape dimensions (in mm)

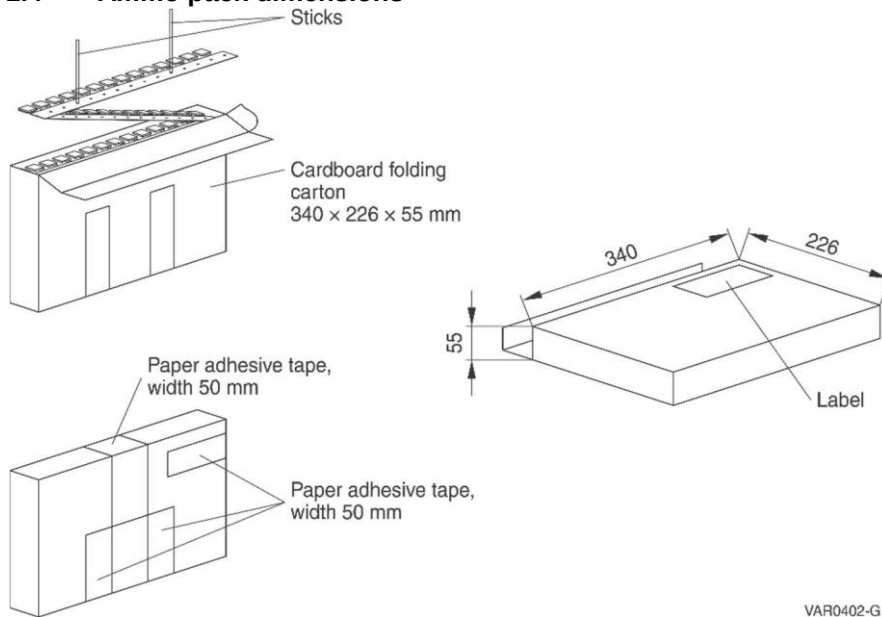
Symbol	$e = 5.0$	Tolerance	$e = 7.5$	Tolerance	$e = 10.0$	Tolerance	Remarks
w th d	0.6	max. max. ± 0.05	0.8	max. max. ± 0.05	1.0	max. max. ± 0.05	see tables in each series under "Dimensions "
P ₀	12.7	± 0.3	12.7 ¹⁾	± 0.3	12.7	± 0.3	± 1 mm/20 sprocket holes
P ₁	3.85	± 0.7	8.95	± 0.8	7.7	± 0.8	
F	5.0	± 10	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	± 0.5	16.0	± 0.5	16.0	± 0.5	
	(18.0)		(18.0)				
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 ₁	0.5	max.					

1) Taping with P₀ = 15.0 mm upon request

2) Applies only to uncrimped types

3) Applies only to crimped types (H₀ = 18 upon request)

2.4 Ammo pack dimensions



2.5 Quantities Per Packaging

Part No	Voltage	Bulk		Ammo Packing(Taping)	
		Bag	Carton	Box	Carton
7D	181-821	1000	12000	1000	10000
10D	180-182	500	6000	1000	10000
14D	180-182	500	6000	800	8000
20D	180-182	250	3000	----	----
25D	180-182	200	2400	----	----

3 Lead configuration

Straight leads are standard for disk varistors. Other lead configurations as crimp style or customerspecific lead wire length according to 3.1, 3.2, 3.3 and 3.4 are optional. Crimped leads (non-standard) are differently crimped for technical reasons; the individual crimp styles are denot-ed by consecutive numbers (S, S2 through S5) as shown in the dimensional drawings below.

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

3.1 Standard leads and non-standard crimp styles

The basic dimensions in figure 1 to 5 are valid for types with either round or square (EnergetiQ series) component head

**Standard,
straight leads**

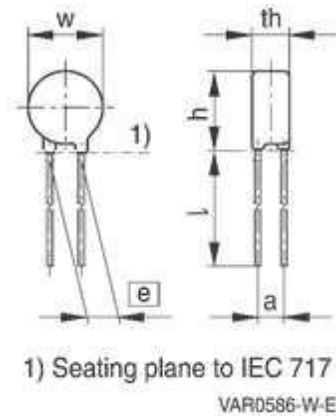


Figure 1

**Non-standard,
crimp style S2**

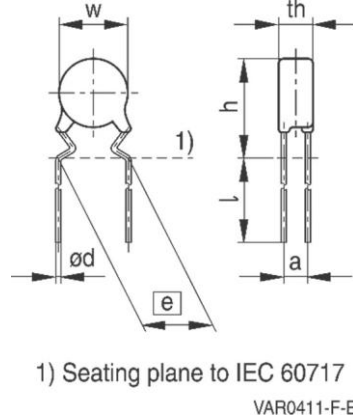


Figure 2

**Non-standard,
crimp style S3**

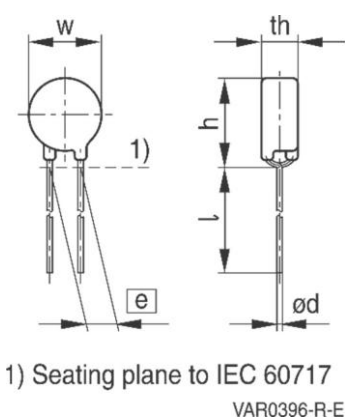
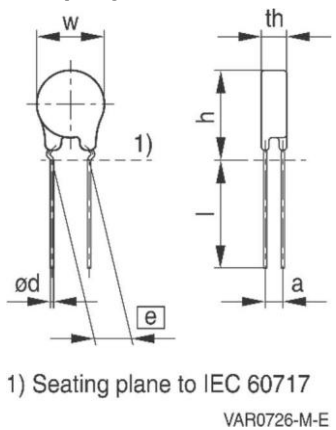


Figure 3

**Non-standard,
crimp style S5**



Figure

3.2 Trimmed leads (non-standard)

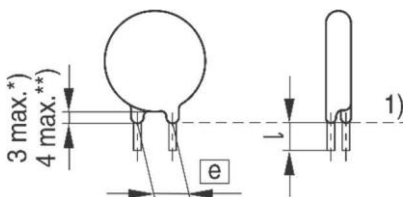
Varistors with cut leads available upon request.

Lead length tolerances:

Straight leads ± 0.8 mm

Crimped leads ± 0.5 mm

Minimum lead length 3.0 mm



1) Seating plane to IEC 60717

*) For round component head

**) For EnergetiQ series, square component head

VAR0642-U-E

Cautions and warnings

General

1. JORDUN Electronics metal oxide varistors (MOV) 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 JORDUN Electronics during the design-in-phase.
2. Ensure suitability of MOV through reliability testing during the design-in phase. The MOV should be evaluated taking into consideration worst-case conditions.
3. For applications of MOV in line-to ground circuits based on various international and local standards there are restrictions existing or additional safety measures required.

Storage

1. Store MOV only in original packaging. Do not open the package prior to processing.
2. Recommended storage conditions in original packaging:

Storage temperature:	-25 °C ... +45 °C
Relative humidity:	<75% annual average, <95% on maximum 30 days a year.
Dew precipitation:	Is to be avoided.
3. Avoid contamination of an MOV's during storage, handling and processing.
4. Avoid storage of MOVs in harmful environments that can affect the function during long-term operation (examples given under operation precautions).
5. The MOV type series should be soldered after shipment from JORDUN ELECTRONIC within the time specified.

MOV-J,N,T	24 months
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Handling

1. MOVs must not be dropped.
2. Components must not be touched with bare hands. Gloves are recommended.
3. Avoid contamination of the surface of MOV electrodes during handling, be careful of the sharp edge of MOV 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.
5. Temperatures of all preheat stages and the solder bath must be strictly controlled especially for T series (T14 and T20).

Mounting

1. Potting, sealing or adhesive compounds can produce chemical reactions in the MOV ceramic that will degrade the component's electrical characteristics.
2. Overloading MOVs may result in ruptured packages and expulsion of hot materials. For this reason the MOVs should be physically shielded from adjacent components.

Operation

1. Use MOVs only within the specified temperature operating range
2. Use MOVs only within the specified voltage and current ranges.
3. Environmental conditions must not harm the MOVs. Use MOVs only in normal atmospheric conditions. 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.

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
I_n	Nominal discharge current to UL 1449
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 DC operating voltage
V_{DC}	Maximum jump start voltage
V_{jump}	Maximum voltage
V_{max}	Operating voltage
V_{op}	AC operating voltage, root-mean-square value
V_{RMS}	Root-mean-square value of max. DC operating voltage incl. ripple current
$V_{RMS, op, max}$	Super imposed surge voltage
V_{surge}	Varistor voltage
V_V	Tolerance of varistor voltage
ΔV_V	Maximum load dump
W_{LD}	Maximum energy absorption
W_{max}	Maximum energy absorption
	Lead spacing

All dimensions are given in mm.

The commas used in numerical values denote decimal points.

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