

Disc Varistor

FEATURES

- * Wide operating voltages ranging from 5Vrms to 1000Vrms (6Vdc to 1465Vdc).
- * Fast response time of less than 25nS, instantly clamping the transient over voltage.
- * High surge current handling capability.
- * High energy absorption capability.
- * Low clamping voltages, providing better surge protection
- * Low capacitance values, providing digital switching circuitry protection.
- * High insulation resistance, preventing electric arching to the adjacent devices or circuits.

APPLICATIONS

- * Transistor, Diode, IC, Thyristor or Triac semiconductor protection.
- * Surge protection in consumer electronics.
- * Surge protection in industrial electronics.
- * Surge protection in electronic home appliances, gas and petroleum appliances.
- * Relay and electromagnetic valve surge absorption.

General Characteristics Definition

*Operating Temperature:	-40 °C ~ +85 °C
*Storage Temperature:	-40 °C ~ +125 °C
*Working Surface Temperature:	+115 °C
*Insulation Resistance:	> 100M Ω
*Coating (Epoxy Resin):	Flame-Retardant to UL 94 V-0

Standard for Safety

*UL 1449	E171541
*UL 1414	E162455
*CSA	182652(LR107230)
*VDE	127031

Material

*Coating:	Epoxy Resin
*Lead Wire:	Tin Cu. Wire
*Electrode:	Silver
	Solder
*Disk:	Zinc Oxide

Ordering Information

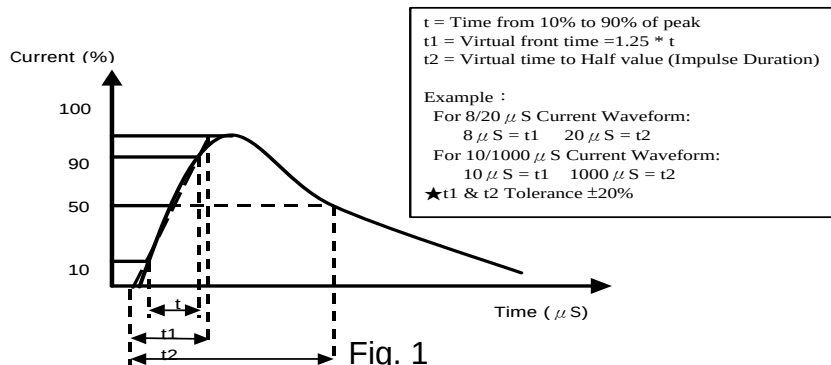
Brand Mark :	MOV	431	K	D	14	S	B	N	L	Coating & Environment
MOV										L: Epoxy Coating & Lead-free
Varistor Voltage										Series
181K(180V) to 471K(470V)										N: Standard Series
Tolerance										Bulk or Taping Mode
K±10%, L±15%, M±20%										B: Bulk★, A: Ammo, R: Reel
Type										Lead Form
D: Disk , S: Square										S: Straight, C: Crimped, I: Inner, Y: Y kink
										Size(mm)
										5mm to 53mm

★B: Bulk (Standard lead 20mm)
Digital (Special lead) ex.3:3±0.8mm

Disc Varistor

Terminology Definitions

Technical Term	Descriptions		
Varistor Voltage (Vb)	Voltage across the varistor measured at a specified current (1mA or 0.1mA)		
Maximum Clamping Voltage	Peak voltage across the varistor with a specified peak impulse current (8x20 msec). Waveform see fig. 1		
Maximum Allowable/ Rated Voltage	Maximum sine wave voltage (rms) or the maximum dc voltage which may be applied continuously		
Non-linear Exponent (α)	A measure of varistor voltage-current nonlinearity between two given operating currents, I1 and I2, as described by I=KV α , where K is a device constant, and α = log (I1/I2) / log (V1/V2)		
Leakage Current	Maximum current with rated voltage (80% varistor voltage) applied. 200 μ A maximum.		
Single Pulse Transient Energy	Energy which may be dissipated for a single 10/1000 μ S pulse of a maximum rated current, with AC/DC voltage applied, without causing device failure. Energy=K*Vc*Ip*T Where Ip(Ipeak) is the peak current applied, Vc(Vclamp) is the clamp voltage which results, T is the impulse duration and K is a constant (1.4 for 10/1000 μ S waveform). Waveform see fig. 1		
Withstanding Surge Current	The maximum peak current that can be applied to the varistor for a single 8/20 μ S current waveform, with line voltage applied, without causing device failure. Waveform see fig. 1		
Energy	The maximum energy within the varistor voltage change of $\pm 10\%$ when one impulse is applied. Energy=K*Vc*Ip*T Where Ip(Ipeak) is the peak current Applied, Vc(Vclamp) is the clamp voltage which results, T is the impulse duration and K is a constant.		
Rated Wattage	The maximum average power that can be dissipated at the specified ambient temperature resulting from a group of pulses occurring within a specified isolated time period, without causing device failure.		
Varistor Voltage Temperature Coefficient	$\frac{V_b \text{ at } 25^\circ\text{C} - V_b \text{ at } 85^\circ\text{C}}{V_b \text{ at } 25^\circ\text{C}} \quad * \quad \frac{1}{60} \quad * 100\% \quad (+0.05\%/^\circ\text{C max.})$		
Surge Life Time Rating	The change of Vb that measured after 10,000 times pulses applied continuously with the interval of ten seconds at room temperature. Waveform see fig. 1		
	5D Series	8R0MD05 to 680KD05	5A (8/20 μ S)
		820KD05 to 751KD05	20A (8/20 μ S)
	7D Series	8R0MD07 to 680KD07	20A (8/20 μ S)
		820KD07 to 821KD07	50A (8/20 μ S)
	10D Series	120MD10 to 680KD10	50A (8/20 μ S)
		820KD10 to 112KD10	100A (8/20 μ S)
	14D Series	120MD14 to 680KD14	75A (8/20 μ S)
		820KD14 to 182KD14	150A (8/20 μ S)
20D Series	180LD20 to 680KD20	125A (8/20 μ S)	
	820KD20 to 182KD20	200A (8/20 μ S)	



Disc Varistor

Reliability Test

Mechanical Ratings

Test Parameter	Test Condition / Description			Performance Requirements
Terminal Pull Strength	After gradually applying the load specified below and keeping the unit fixed for ten seconds, the terminal shall be visually examined for any damage.	Diameter	Loading	No visible damage
		0.6mm	1.0 Kg	
		0.8mm	1.0 Kg	
		1.0mm	2.0 Kg	
Terminal Bending Strength	The unit shall be secured with its terminal kept vertical and the weight specified below be applied in the axial direction. The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction, and again back to the original position. The damage of the terminal shall be visually examined.	Diameter	Loading	No visible damage
		0.6mm	0.5 Kg	
		0.8mm	0.5 Kg	
		1.0mm	1.0 Kg	
Vibration	The Specimen shall be vibrated by its lead wires with a total amplitude of 1.5 mm and a varying frequency of 10~55~10HZ(each minutes) for a period of 2 hours respectively in each X,Y and Z directions.			No visible damage $\Delta VB/VB\% \leq \pm 5\%$
Soldering-solderability	After dipping the terminal to depth of approximately 3 mm from the specimen in a soldering bath of 260℃ for 10±1(D5: 5±1) seconds. Thereafter the terminal shall be visually examined.			Terminations shall be uniformly tinned
Soldering-Resistance to Solder Heat	After preheating the specimen, the specimen shall be completely immersed into a soldering bath having a temperature of 260±5℃ for 10±1 (D5: 5±1) seconds or iron of 400±5℃ for 3±0.5 seconds. There after the change of Vb and mechanical damage shall be examined.			No visible damage $\Delta VB/VB\% \leq \pm 5\%$

ENVIRONMENTAL RATINGS

Dry Heat Loading	The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of Vb and mechanical damage shall be examined. Ambient temp : 125±2℃ ; Period : 1000±24hours.			$\Delta VB/VB\% \leq \pm 10\%$
High Temperature Storage	In a drying oven without load. Ambient temp : 125±2℃ ; period : 1000±24hours			$\Delta VB/VB\% \leq \pm 5\%$
Damp Heat Loading	The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of Vb and mechanical damage shall be examined. Ambient condition : 40±2℃ , 90 to 95%R.H. ; period : 1000±24 hours			$\Delta VB/VB\% \leq \pm 10\%$
Temperature Cycle	Condition the specimen to each temperature form step 1 to step 4 in this order for the period shown in the table of specifications. The change of Vb and mechanical damage shall be examined after 2 hours.	Step	Temp°C	Period
		1	-40±3℃	30 min.
		2	Room Temp	15 min.
		3	85±2℃	30 min.
Surge Lifetime Rating	The change of Vb shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.	4	Room Temp	15 min.
Voltage Proof	Voltage : 2500VAC Leakage Current ≤ 0.5mA Time : 60 Seconds			No Breakdown

Disc Varistor

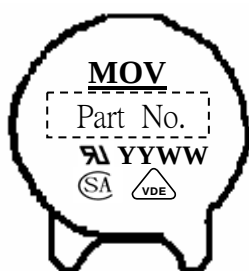
Electrical Characteristic

Part No.	Max. Allowable Voltage (V)		Varistor Voltage (V)		Max. Surge Current (A)		Max. Energy (J)	Max. Clamping Voltage (V)		Rated Wattage
	V _{RMS}	V _{DC}	V	Tolerance(%)	1 Time	2 Times	10/1000 μ S	I _p	V _c	W
471KD14SBNL	300	385	470	$\pm 10\%$	4500	2500	149.8	50	775	0.6
431KD14SBNL	275	350	430	$\pm 10\%$	4500	2500	145.6	50	710	0.6
391KD14SBNL	250	320	390	$\pm 10\%$	4500	2500	134.4	50	650	0.6
361KD14SBNL	230	300	360	$\pm 10\%$	4500	2500	123.2	50	595	0.6
331KD14SBNL	210	275	330	$\pm 10\%$	4500	2500	112.0	50	550	0.6
301KD14SBNL	190	250	300	$\pm 10\%$	4500	2500	103.2	50	505	0.6
271KD14SBNL	175	225	270	$\pm 10\%$	4500	2500	93.8	50	455	0.6
251KD14SBNL	160	205	250	$\pm 10\%$	4500	2500	84.0	50	415	0.6
241KD14SBNL	150	200	240	$\pm 10\%$	4500	2500	82.6	50	395	0.6
221KD14SBNL	140	180	220	$\pm 10\%$	4500	2500	79.8	50	360	0.6
201KD14SBNL	130	170	200	$\pm 10\%$	4500	2500	79.8	50	340	0.6
181KD14SBNL	115	150	180	$\pm 10\%$	4500	2500	58.8	50	300	0.6

Standard for Safety

Standard No.	File No.	Dimension	Part No.
UL 1449	E171541	D14	181K to 471K
UL 1414	E162455	D14	201K to 471K
CSA	182652 (LR107230)	D14	181K to 471K
VDE	127031	D14	181K to 471K

Marking



Trademark : MOV
Part No. : 181KD14 to 471KD14
Standard for Safety: UL / CSA / VDE
Date Code:

YY : Year

Y	2004	2005	2006	2007	2008
Code	04	05	06	07	08
Y	2009	2010	2011	2012	2013
Code	09	10	11	12	13

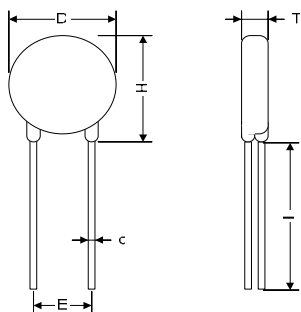
WW : Week

W	1	2	3		52
Code	01	02	03		52

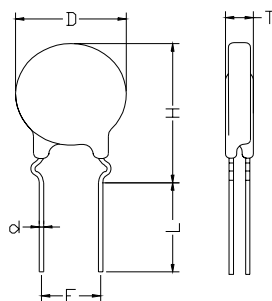
Disc Varistor

Dimension - SB / CB / IB / YB Lead forming Series

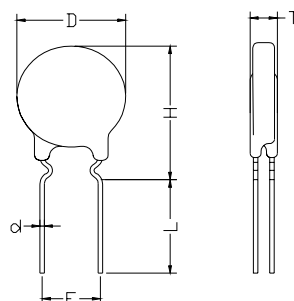
SB Series



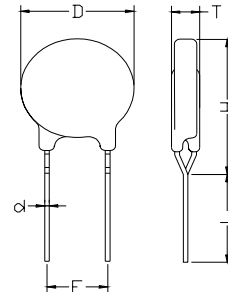
CB Series



IB Series



YB Series

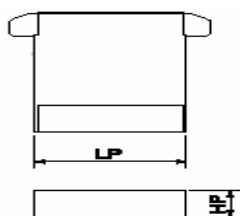


Unit : mm

Part No.	D Max.	H Max.		L ± 0.8	E ± 0.8	d ± 0.05	T Max.
		SB	CB / IB / YB				
471KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	6.1
431KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.9
391KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.7
361KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.5
331KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.3
301KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.1
271KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	5.0
251KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	4.9
241KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	4.8
221KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	4.7
201KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	4.5
181KD14SBNL	17.0	20.0	23.0	20.0	7.5	0.8	4.5

Packing Specifications

Bulk Packing Dimension



Symbol	Dimension
LP :	250 mm
WP :	165 mm
HP :	60 mm
Bag. :	210 mm * 225 mm
Carton :	350 mm * 250 mm * 200 mm

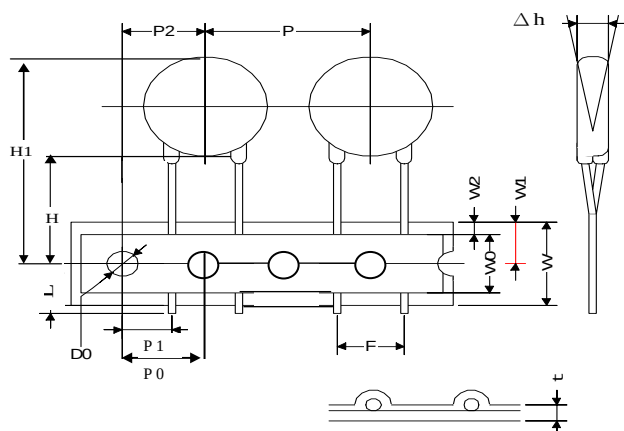
Quantity per Packing Method

Dimension	Part No.	Bag	Box	Unit : Pcs
				Carton
D14	181K to 471K	500	1,000	6,000

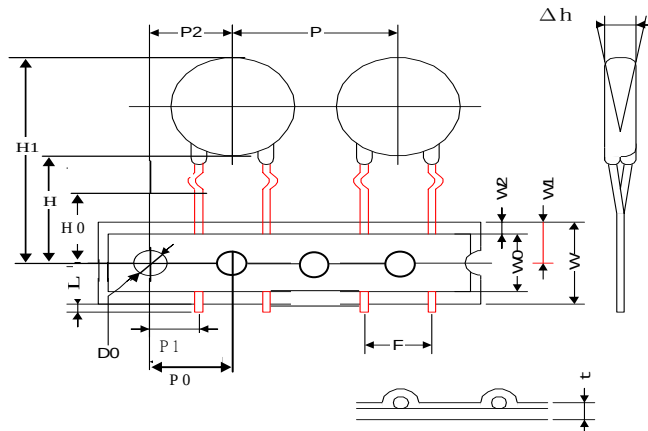
Disc Varistor

Dimension - SA / SR / CA / CR Ammo & Reel Series

SA / SR



CA / CR Series



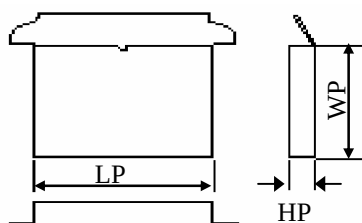
Unit: mm

Symbol	P	P0	P1	P2	F	W	W0	W1
D14	25.4±1.0	12.7±1.0	8.95±0.7	12.7±1.3	7.5±0.5	18.0±1.0	12.5max.	9.0±0.5
Symbol	W2	H	H0	H1	Δh	L	D0	t
D14	3.0max.	20.0±2.0	16.0±1.0	40.0max.	0±2	1.0max.	4.0±0.2	0.6±0.3

Packing Specifications

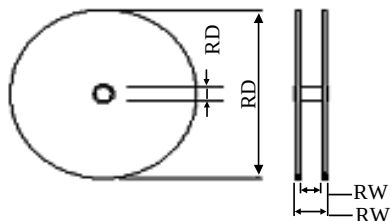
Ammo & Reel Packing Dimension

Ammo & Reel Box



Symbol	Ammo
LP :	335 mm
WP :	243 mm
HP :	50 mm
Carton :	355 mm * 260 mm * 537 mm

Reel



Symbol	Reel
LP :	345mm
WP :	345mm
HP :	65mm
RD :	340 mm
RD1 :	30 ± 0.5 mm
RW :	51mm
RW1 :	56mm
Carton :	360 mm * 360 mm * 480 mm

Quantity per Packing Method

Unit : Pcs

Dimension	Part No.	Box		Carton	
		Ammo	Reel	Ammo	Reel
D14	181K to 471K	500	500	5,000	3,500