



## Metal Oxide Varistor : **VDR** Series Disc Type Varistor for Surge Protection

### 20D 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.

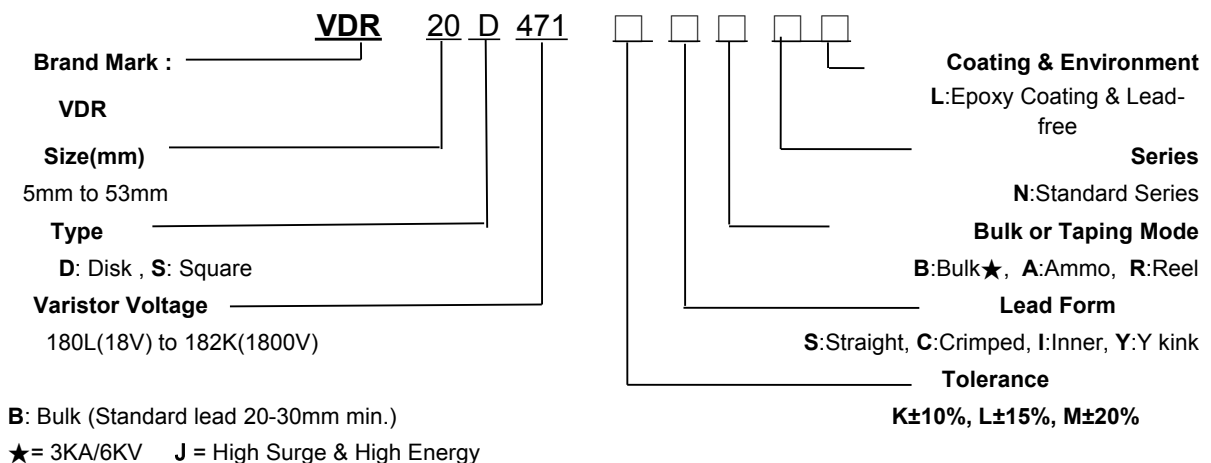
#### General Characteristics Definition

- \*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

#### Material

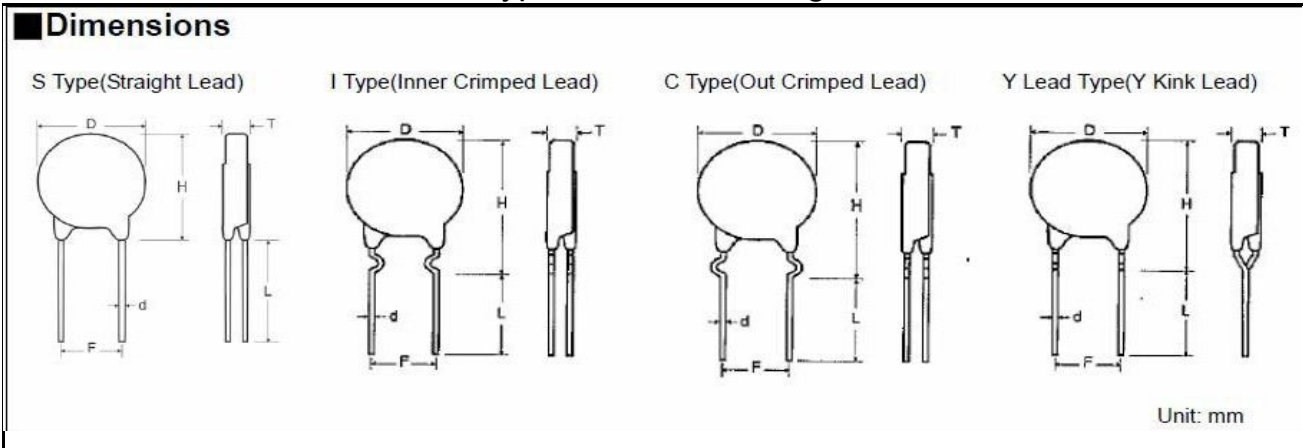
- \*Coating: Epoxy Resin
- \*Lead Wire: The Copper Wire
- \*Electrode: Silver Solder
- \*Disk: Zinc Oxide

#### Ordering Information





## Metal Oxide Varistor : VDR Series Disc Type Varistor for Surge Protection



Part No.	D Max.	H Max.		L min.	F ±0.8	d ± 0.05	T Max.
		SB	CB / IB / YB				
20D182K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	12.5
20D152K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	11.0
20D112K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	8.5
20D102K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	7.8
20D911K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	7.6
20D821K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	7.2
20D781K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	6.8
20D751K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	6.5
20D681K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	6.4
20D621K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	6.4
20D561K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	6.2
20D511K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	5.8
20D471K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	5.6
20D431K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	5.3
20D391K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	5.1
20D361K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	5.0
20D331K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.8
20D301K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.7
20D271K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.5
20D241K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.3
20D221K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.2
20D201K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.1
20D181K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.1
20D151K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.8
20D121K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.5
20D101K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.3
20D820K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.1
20D680K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.1
20D560K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.1
20D470K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.5
20D390K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.5
20D330K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.2
20D270K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.0
20D220K	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.0
20D180L	22.5	26.0	21.0	20.0	7.5/10.0	0.8/1.0	4.0



**Metal Oxide Varistor : VDR Series**  
**Disc Type Varistor for Surge Protection**





**20D Standard & High Surge**

Part No.	Maximum Allowable Voltage		Energy 10/1000 $\mu$ S		Withstanding Surge Current $\mu$ S 8/20				Rated Power (W)	Varistor Voltage (V)	Max Clamping Voltage (V)	Capacitance (pF)
	ACrms (V)	DC (V)	Standard (J)	High Surge (J)	Standard (A)		High Surge(A)					
					1 TIME	2 TIME	1 TIME	2 TIME				
20D180L	10	14	6.1	13.0	2000	1000	3000	1000	0.2	18(15-21)	38	19000
20D220K	14	18	7.4	16.0	2000	1000	3000	1000	0.2	22(20-24)	43	15000
20D270K	17	22	9.1	19.0	2000	1000	3000	1000	0.2	27(24-30)	53	12000
20D330K	20	26	11.2	24.0	2000	1000	3000	1000	0.2	33(30-36)	65	10000
20D390K	25	31	13.2	28.0	2000	1000	3000	1000	0.2	39(35-43)	77	8500
20D470K	30	38	16.8	34.0	2000	1000	3000	1000	0.2	47(42-52)	93	7400
20D560K	35	45	19.6	41.0	2000	1000	3000	1000	0.2	56(50-62)	110	6500
20D680K	40	56	23.8	49.0	2000	1000	3000	1000	0.2	68(61-75)	135	5800
Part No.	Maximum Allowable Voltage		Energy 10/1000 $\mu$ S		Withstanding Surge Current $\mu$ S 8/20				Rated Power (W)	Varistor Voltage (V)	Max Clamping Voltage (V)	Capacitance (pF)
	ACrms (V)	DC (V)	Standard (J)	High Surge (J)	Standard (A)		High Surge(A)					
					1 TIME	2 TIME	1 TIME	2 TIME				
20D820K	50	65	37.8	56.0	6500	4000	10000	7000	1.0	82(74-90)	135	4900
20D101K	60	85	42.0	70.0	6500	4000	10000	7000	1.0	100(90-110)	165	4000
20D121K	75	100	56.0	85.0	6500	4000	10000	7000	1.0	120(108-132)	200	3300
20D151K	95	125	70.0	106	6500	4000	10000	7000	1.0	150(135-165)	250	2700
20D181K	115	150	84.0	130	6500	4000	10000	7000	1.0	180(162-198)	300	2200
20D201K	130	170	98.0	140	6500	4000	10000	7000	1.0	200(185-225)	330	2000
20D221K	140	180	105	155	6500	4000	10000	7000	1.0	220(198-242)	360	1800
20D241K	150	200	112	168	6500	4000	10000	7000	1.0	240(216-264)	395	1650
20D271K	175	225	126	190	6500	4000	10000	7000	1.0	270(243-297)	455	1500
20D301K	190	250	133	210	6500	4000	10000	7000	1.0	300(270-330)	505	1300
20D331K	210	275	140	228	6500	4000	10000	7000	1.0	330(297-363)	550	1200
20D361K	230	300	168	255	6500	4000	10000	7000	1.0	360(324-396)	595	1100
20D391K	250	320	182	275	6500	4000	10000	7000	1.0	390(351-429)	650	1000
20D431K	275	350	196	305	6500	4000	10000	7000	1.0	430(387-473)	710	930
20D471K	300	385	202	350	6500	4000	10000	7000	1.0	470(423-517)	775	850
20D511K	320	415	207	360	6500	4000	10000	7000	1.0	510(459-561)	845	780
20D561K	350	460	210	366	6500	4000	10000	7000	1.0	560(504-616)	920	715
20D621K	385	505	224	372	6500	4000	10000	7000	1.0	620(558-682)	1025	650
20D681K	420	560	224	382	6500	4000	10000	7000	1.0	680(612-748)	1120	600
20D751K	460	615	230	410	6500	4000	10000	7000	1.0	750(675-825)	1240	530
20D781K	485	640	240	421	6500	4000	10000	7000	1.0	780(702-858)	1290	510
20D821K	510	670	250	460	6500	4000	10000	7000	1.0	820(738-902)	1355	500
20D911K	550	745	260	510	6500	4000	10000	7000	1.0	910(819-1001)	1500	440
20D102K	625	825	270	560	6500	4000	10000	7000	1.0	1000(900-1100)	1650	400
20D112K	680	895	280	620	6500	4000	10000	7000	1.0	1100(990-1210)	1815	360
20D152K	900	1200	420	780	6500	4000	10000	7000	1.0	1500(1350-1650)	2475	260
20D182K	1000	1465	560	860	6500	4000	10000	7000	1.0	1800(1620-1980)	2970	220



**Metal Oxide Varistor : VDR Series**  
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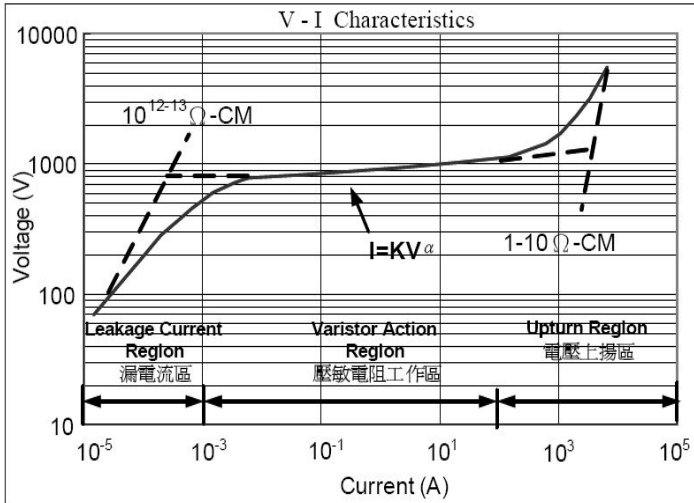
**Approval Standard And File Number**

Certified Model No.	 UL1449 3rd & cUL <b>E317616</b>		 IEC-60950-1 & Annex Q <b>40028836</b>		 GB/T10193/10194-1997 GB4943.1/GB8898-2011 <b>12001076476</b>		 CSA & cUL <b>E317616</b>	
20D180L	YES				YES		YES	
20D220K	YES				YES		YES	
20D270K	YES				YES		YES	
20D330K	YES		YES		YES		YES	
20D390K	YES		YES		YES		YES	
20D470K	YES		YES		YES		YES	
20D560K	YES		YES		YES		YES	
20D680K	YES		YES		YES		YES	
20D820K	YES	3ka/6kv	YES		YES		YES	
20D101K	YES	3ka/6kv	YES		YES		YES	
20D121K	YES	3ka/6kv	YES		YES		YES	
20D151K	YES	3ka/6kv	YES		YES		YES	
20D181K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D201K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D221K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D241K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D271K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D301K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D331K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D361K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D391K	YES	3ka/6kv	YES	3ka/6kv	YES		YES	
20D431K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D471K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D511K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D561K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D621K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D681K	YES	3ka/6kv	YES	3ka/6kv	YES	3ka/6kv	YES	
20D751K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D821K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D911K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D102K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D112K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D152K	YES	3ka/6kv			YES	3ka/6kv	YES	
20D182K	YES	3ka/6kv			YES	3ka/6kv	YES	

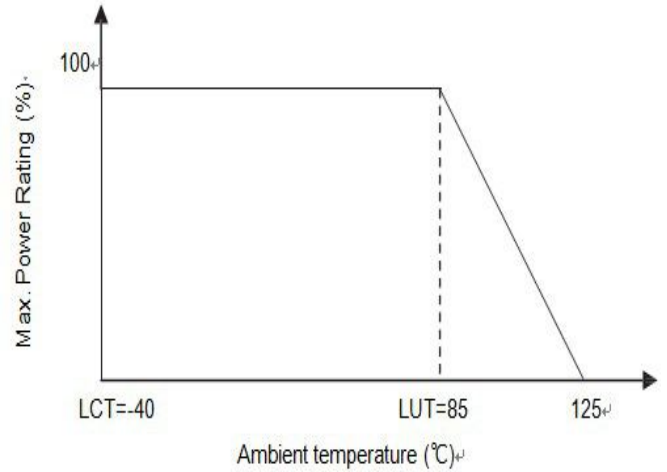


# Metal Oxide Varistor : VDR Series Disc Type Varistor for Surge Protection

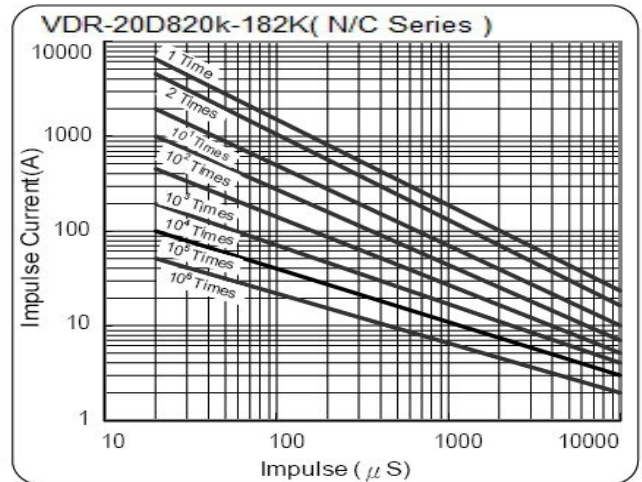
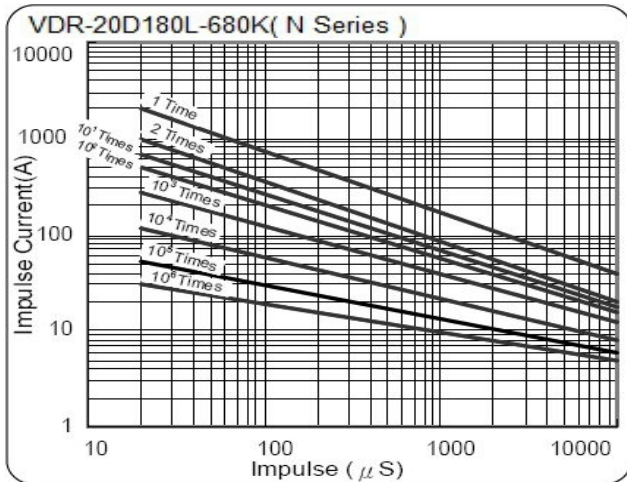
## VARISTOR V - I CHARACTERISTICS



## Power Derating Curve



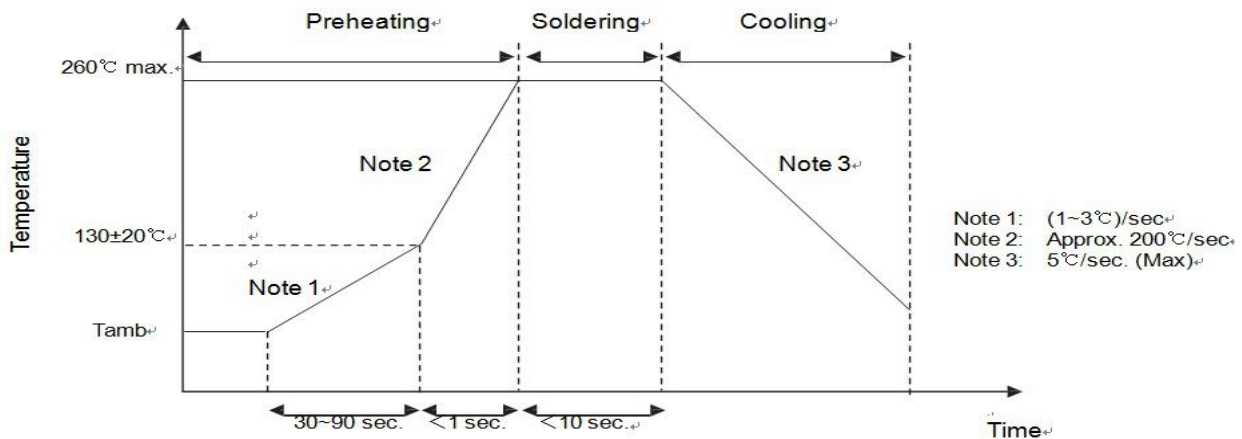
## Surge Life Time Ratings N (Standard) / K (Low Capacitance) Series



Current (A)

## Soldering Recommendation

### Wave Soldering Profile



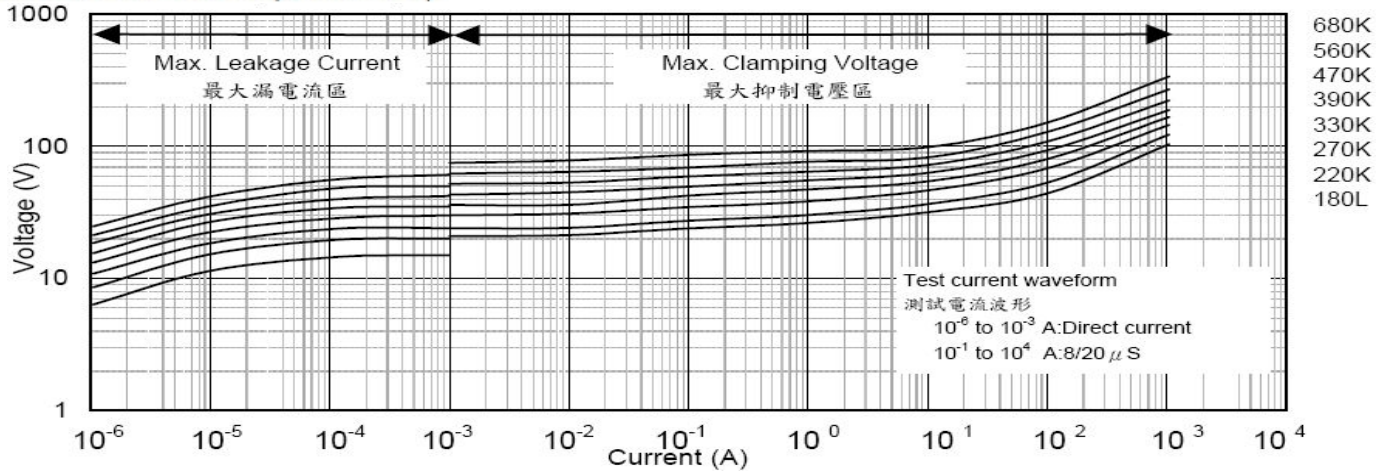


# Metal Oxide Varistor : VDR Series

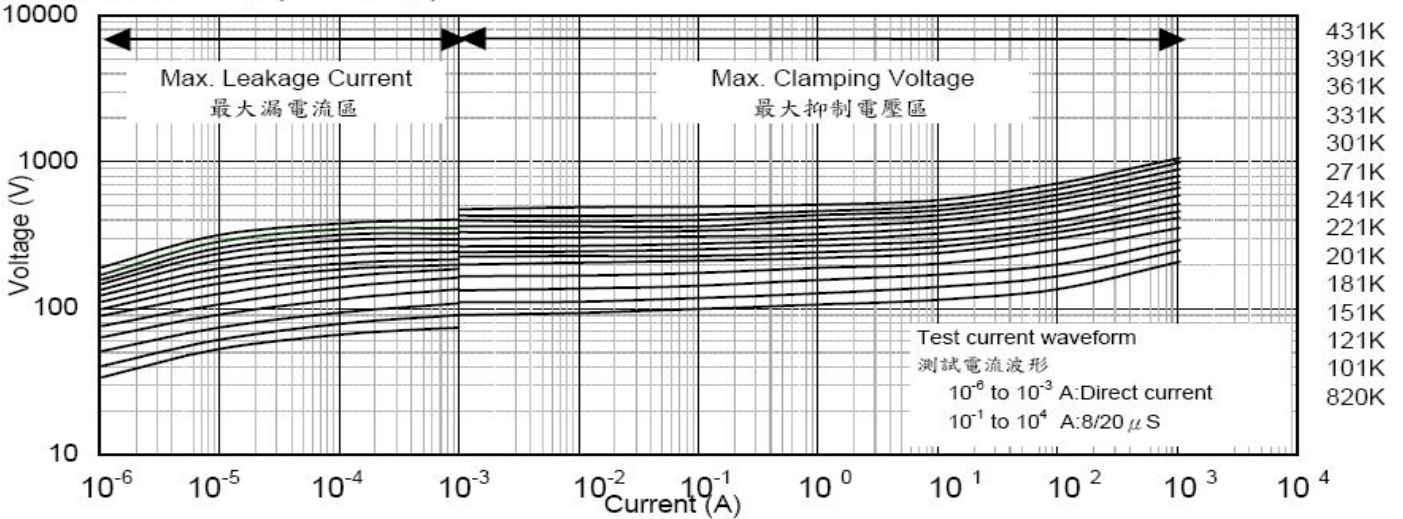
## Disc Type Varistor for Surge Protection

### V-I CURVE

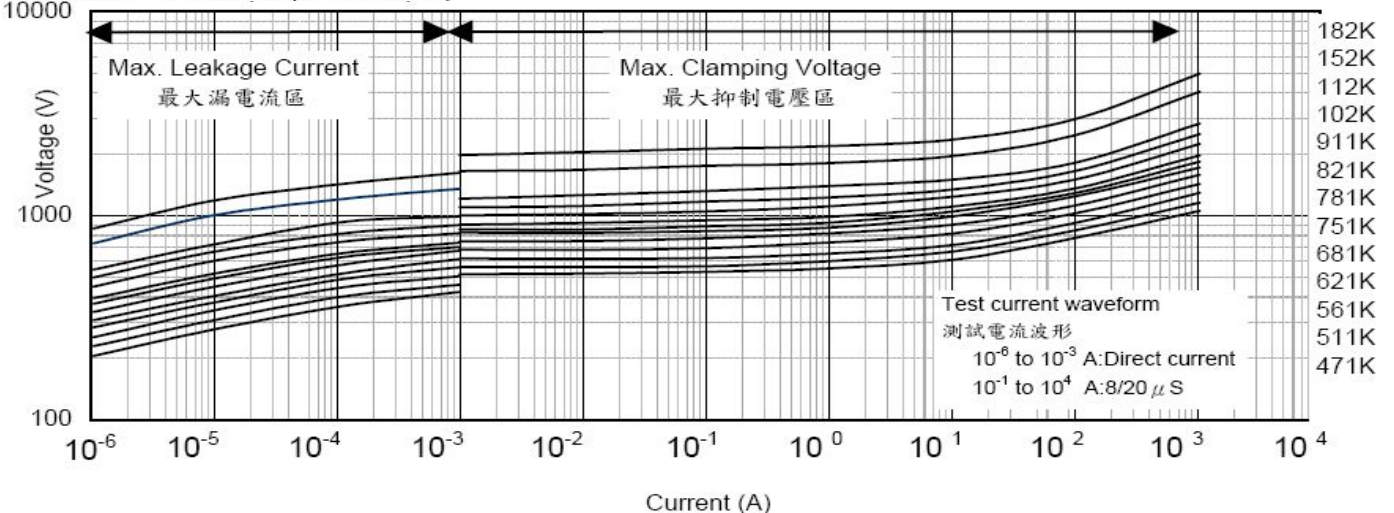
VDR-20D180L~20D680K( N/J/S Series)



VDR-20D820K~20D431K( N/J/S Series)



VDR-20D471K~20D182K( N/J/S Series)

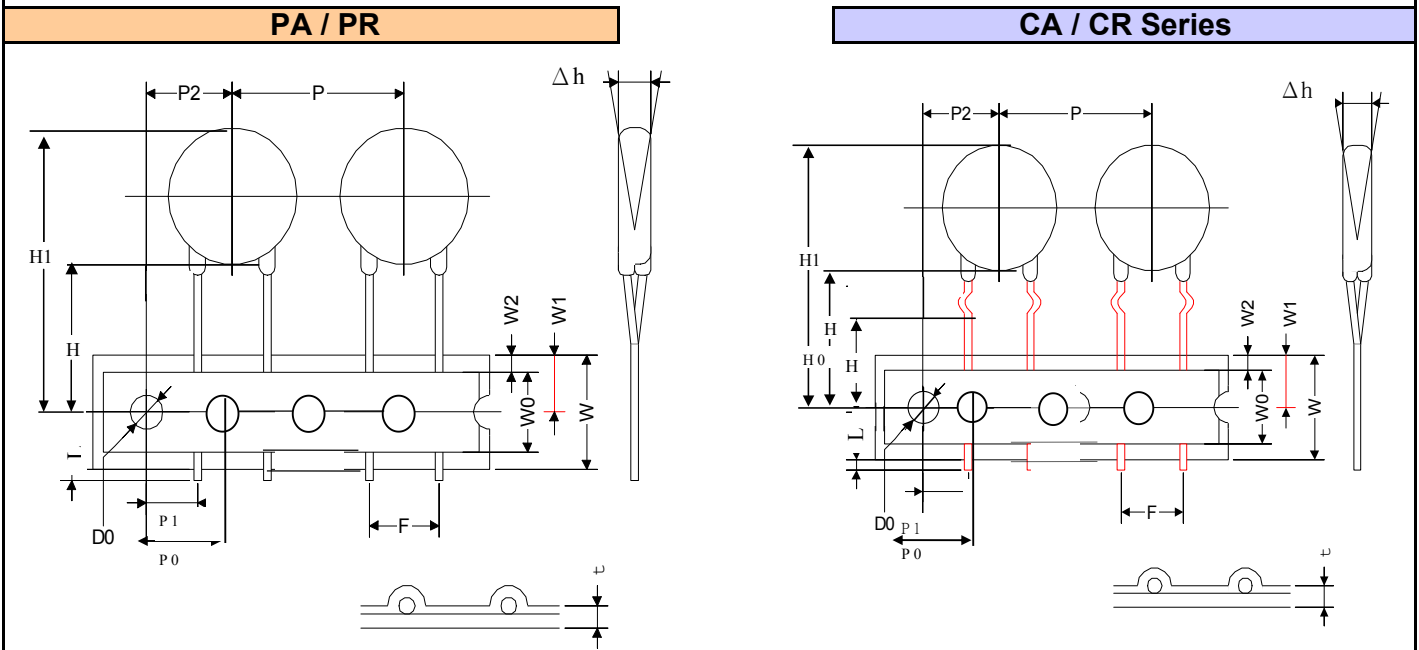




# Metal Oxide Varistor : VDR Series

## Disc Type Varistor for Surge Protection

### Dimension - PA / PR / CA / CR Ammo & Reel Series

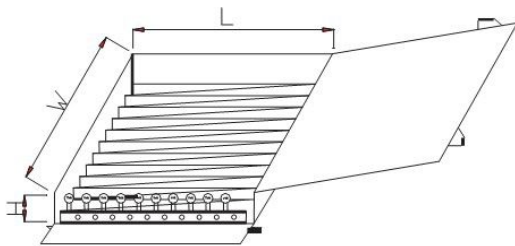


Unit: mm

Symbol	P	P0	P1	P2	F	W	W0	W1
20D	25.4±1.0	12.7±1.0	8.95/7.7±0.7	12.7±1.3	7.5/10.0±0.8	18.0±1.0	12.5max.	9.0±0.5
Symbol	W2	H	H0	H1	△h	L	D0	t
20D	3.0max.	20.0±2.0	16.0±1.0	46.5max.	0±0.2	1.0max.	4.0±0.2	0.6±0.3

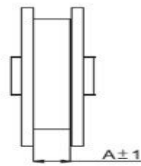
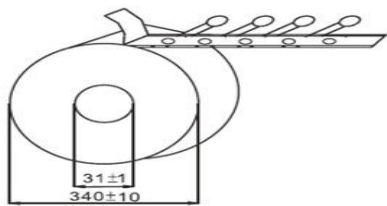
### Packing Specifications Ammo & Reel Packing Dimension

#### Ammo & Reel Box



#### Symbol Ammo

Series <sup>⊕</sup>	W±5 <sup>⊕</sup>	L±5 <sup>⊕</sup>	H±5 <sup>⊕</sup>
VDR05D <sup>⊕</sup>	348 <sup>⊕</sup>	185 <sup>⊕</sup>	60 <sup>⊕</sup>
~ VDR20D <sup>⊕</sup>	348 <sup>⊕</sup>	275 <sup>⊕</sup>	60 <sup>⊕</sup>



#### Symbol Reel

	05D	07D	10D	14D	20D
A	46	46	46	46	55

(Unit: mm)<sup>⊕</sup>

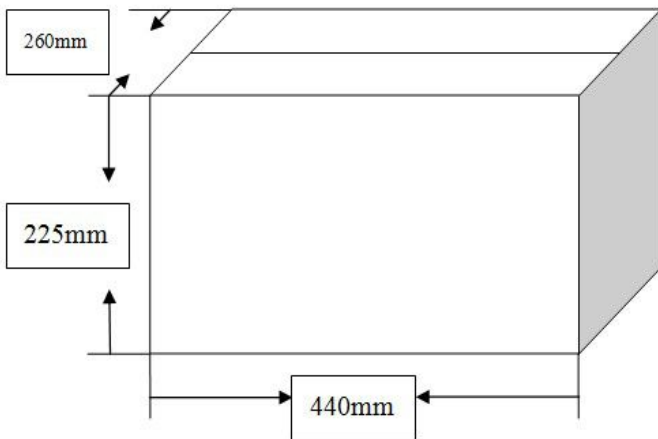


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Unit:Pcs

Dimension	Part No.	Ammo	
		Box	Carton
20D	180L to 471K	500	5,000
20D	511k to 821K	300	3,000

**Packing Specifications /Bulk Packing Dimension /Quantity per Packing Method**



Unit:Pcs

Dimension	Part No.	Bag	Small Carton	Carton
20D	180L to 681K	250	1,500	3,000
<b>20D (Short leg)</b>	180L to 681K	250	2,000	4,000
20D	751K to 182K	250	1,000	4,000
<b>20D (Short leg)</b>	751K to 182K	250	1,500	3,000

**Marking & DIMENSIONS**



**Trademark :** VDR

**Part No. :** 20D180L-182K  
180L-270K No VDE  
751K-182K No VDE

**Standard for Safety:** CUL / VDE

**Date Code:** Y : Year M : Month





## Metal Oxide Varistor : VDR Series Disc Type Varistor for Surge Protection

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			
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 <sub>mm</sub> and a varying frequency of 10~55~10HZ(each minutes) for a period of 2 hours respectively in each X,Yand Z directions.			No visible damage VB/VB% ≤ ±5%	△	
Soldering-solderability	After dipping the terminal to depth of approximately 3 <sub>mm</sub> from the specimen in a soldering bath of 260°C 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°C for 10±1 (D5: 5±1) seconds or iron of 400±5°C for 3±0.5 seconds. There after the change of Vb and mechanical damage shall be examined.			No visible damage VB/VB% ≤ ±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°C ; Period : 1000±24hours.			△VB/VB% ≤ ±10%		
High Temperature Storage	In a drying oven without load. Ambient temp : 125±2°C ; period : 1000±24hours			△VB/VB% ≤ ±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°C , 90 to 95%R.H. ; period : 1000±24 hours			△VB/VB% ≤ ±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	No visible damage ±10% △VB/VB% ≤	
		1	-40±3°C	30 min.		
		2	Room Temp	15 min.		
		3	85±2°C	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.	No visible damage ±10% △VB/VB% ≤	
Voltage Proof	Voltage : 2500VAC Leakage Current ≤ 0.5mA Time : 60 Seconds			No Breakdown		