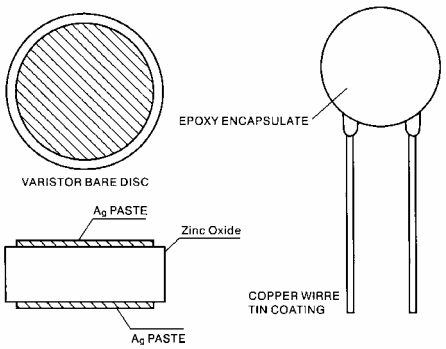
HITANO
ENTERPRISE CORP ®

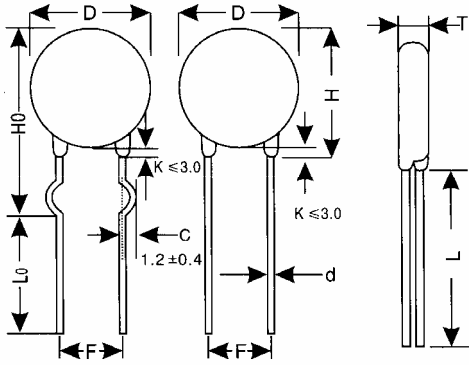
METAL OXIDE VARISTORS

Transient voltage surge suppressors

Materials and Marking



DIMENSION



Dimension table

UNIT :mm

Series	D max	H max	Ho max	d	c±0.4	F
05D	7	10.5	13	0.6	1.2	5±0.8
07D	9	12	13.5	0.6	1.2	5±0.8
10D	13	17	17.5	0.8	1.4	7.5±0.8
14D	17	20	21	0.8	1.4	7.5±0.8
		22	23	0.8		*10±1.0
18D	20	24.5	26	0.8	1.4	*7.5±0.8
				1.0	1.6	10±1.0
20D	24	28	30	0.8	1.4	*7.5±0.8
		30	32	1.0	1.6	10±1.0
25D	30	33	34	1.0	1.6	10±0.8
						*12.5±1.0

*non standard lead space, available upon request.

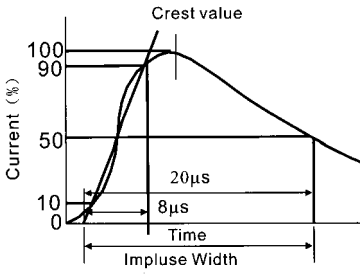
T max. Table

Part No.	05D	07D	10D	14D	18D	20D	25D
180L	4.5	4.5	4.6	4.6	4.8	4.8	4.8
220K	4.6	4.6	4.7	4.7	4.9	5.4	4.9
270K	4.7	4.7	4.8	4.8	5.0	5.5	5.0
330K	4.9	4.9	5.0	5.0	5.2	5.6	5.2
390K	4.8	4.8	4.9	4.9	5.5	5.5	5.5
470K	4.9	4.9	5.0	5.0	5.6	5.6	5.6
560K	5.0	5.0	5.1	5.1	5.7	5.7	5.7
680K	5.2	5.2	5.3	5.3	5.8	5.8	5.8
820K	4.1	4.1	4.5	4.5	4.9	4.9	4.9
101K	4.3	4.3	4.7	4.7	5.1	5.1	5.1
121K	4.5	4.5	4.9	4.9	5.3	5.3	5.3
151K	4.8	4.8	5.2	5.2	5.6	5.6	5.6
181K	4.3	4.3	4.8	4.8	5.0	5.2	5.2
201K	4.4	4.4	4.8	4.8	5.2	5.2	5.4
221K	4.5	4.5	4.9	4.9	5.3	5.3	5.5
241K	4.6	4.6	5.0	5.0	5.4	5.4	5.6
271K	4.9	4.9	5.2	5.2	5.5	5.6	5.8

Part No.	05D	07D	10D	14D	18D	20D	25D
301K	5.0	5.0	5.3	5.3	5.7	5.7	5.9
331K	5.1	5.1	5.6	5.6	6.0	6.0	6.1
361K	5.2	5.2	5.7	5.7	6.2	6.2	6.4
391K	5.4	5.4	5.8	5.8	6.4	6.4	6.6
431K	5.7	5.7	6.2	6.2	6.7	6.7	6.9
471K	6.0	6.0	6.5	6.5	6.9	7.0	7.2
511K	6.2	6.4	6.5	6.5	7.0	7.0	7.2
561K	6.5	6.4	6.5	6.5	7.2	7.0	7.2
621K	-	7.1	7.1	7.1	7.5	7.5	7.7
681K	-	7.3	7.4	7.6	7.8	7.8	8.0
751K	-	-	7.8	7.8	8.2	8.2	8.4
781K	-	-	7.9	7.9	8.3	8.3	8.5
821K	-	-	8.1	8.1	8.5	8.5	8.7
911K	-	-	8.6	8.6	9.0	9.0	9.2
102k	-	-	9.1	9.1	9.5	9.5	9.7
112K	-	-	9.7	9.7	10.1	10.1	10.3
122K				10.4	10.6	10.6	10.8
182K	-	-	-	14.4		13.2	15.2

Performance Characteristic

(A) Electrical

<table>
<tr><th colspan="2">Characteristics</th><th>Test Methods/Description</th><th>Specifications</th></tr>
<tr><td colspan="2">Standard Test Condition</td><td>Environmental conditions under which every measuring is done without doubt on the measuring results. Unless specially specified. Temperature. Relative humidity are 5 to 35˚C 45 to 85%RH.</td><td>—</td></tr>
<tr><td colspan="2">Maximum Allowable Voltage</td><td>The maximum sinusoidal RMS voltage or maximum DC voltage that can be applied continuously in the specified environmental temperature range.</td><td rowspan="4">To meet the specified value</td></tr>
<tr><td colspan="2">Varistor Voltage</td><td>The voltage between two terminals with the specified measuring current Cm A DC applied is called Vc or VcmA, the measurement shall be made as fast as fast as possible to avoid heat affection.</td></tr>
<tr><td colspan="2">Clamping Voltage</td><td>The maximum voltage between two terminals with the specified standard impulse current (8/20μs) illustrated below applied.
 
</td></tr>
<tr><td rowspan="2">Peak Current (Withstanding Surge Current)</td><td>2 times</td><td>The maximum current within the varistor voltage change of ±10% with the standard impulse current (8/20μs) applied two times with an interval of 5 minutes.</td><td rowspan="5"></td></tr>
<tr><td>1 times</td><td>The maximum current within the varistor voltage change of ±10% the standard impulse current (8/20μs) applied one time.</td></tr>
<tr><td colspan="2">Maximum Energy</td><td>The maximum energy within the varistor voltage change of ±10% when one impulse of 2 ms or 10/1000μS is applied.</td></tr>
<tr><td colspan="2">Rated Power</td><td>The power that can be applied in the specified ambient temperature.</td></tr>
<tr><td colspan="2">Capacitance</td><td>Capacitance shall be measured at 1 kHz ±10%, 1Vrms max.(1Mhz below 100pF). 0V bias and 20 ±2˚C</td></tr>
<tr><td colspan="2">Dissipation Factor</td><td>Dissipation Factor shall be measured at 1 KHz±10%, 1 Vrms max.(1Mhz + %10 below 100pF). OV bias and 20 ±2˚C</td><td></td></tr>
<tr><td colspan="2">Temperature Confident of Varistor Voltage</td><td>$\frac{\text{Vc at 85°C - Vc at 105°C}}{\text{Vc at 25°C}} x \frac{1}{60} x100(\%/.°C)$</td><td>±0.05%/˚Cmax</td></tr>
<tr><td colspan="2">Withstanding Voltage (Body Insulation)</td><td>The specified voltage shall be applied both terminals of the specimen connected together and metal foil closely wrapped round its body for 1 minute. Electrical Breakdown shall be examined.
<table>
<tr><th>Classification(Nominal varistor voltage)</th><th>Test Voltage(AC)</th></tr>
<tr><td>VO.1mA. V1mA≦330V</td><td>1000 Vrms</td></tr>
<tr><td>VO.1ma. V1mA > 330V</td><td>1500 Vrms</td></tr>
</table></td><td>No breakdown</td></tr>
</table>

TO BE CONTINUED

<table>
<tr><th>Characteristics</th><th>Test Methods/Description</th><th>Specifications</th></tr>
<tr><td>Impulse Life (I)</td><td>The change of Vc shall be measured after the impulse listed below is applied 10000 times continuously with the interval of the seconds at room temperature.
<table>
<tr><td rowspan="2">05D Series</td><td>VCR-05D180L to VCR-05D680K</td><td>0.5A (2ms)</td></tr>
<tr><td>VCR-05D820K to VCR-05D681K</td><td>20A (8/20μs)</td></tr>
<tr><td rowspan="2">07D Series</td><td>VCR-07D180K to VCR-07D680K</td><td>18A (8/20μs)</td></tr>
<tr><td>VCR-07D820K to VCR-07D471K</td><td>50A (8/20μs)</td></tr>
<tr><td rowspan="2">10D Series</td><td>VCR-10D180K to VCR-10D680K</td><td>50A (8/20μs)</td></tr>
<tr><td>VCR-10D820K to VCR-10D112K</td><td>100A (8/20μs)</td></tr>
<tr><td rowspan="2">14D Series</td><td>VCR-14D180K to VCR-14D680K</td><td>75A (8/20μs)</td></tr>
<tr><td>VCR-14D820K to VCR-14D112K</td><td>150A (8/20μs)</td></tr>
<tr><td rowspan="2">20D Series</td><td>VCR-20D180K to VCR-20D680K</td><td>120A (8/20μs)</td></tr>
<tr><td>VCR-20D820K to VCR-20D182K</td><td>200A (8/20μs)</td></tr>
</table></td><td>ΔVcmA/VcmA
≦ ±10%</td></tr>
<tr><td>Impulse Life (II)</td><td>The change of Vc shall be measured after the impulse listed below is applied 10000 times continuously with the interval of the seconds at room temperature.
<table>
<tr><td rowspan="2">05D Series</td><td>VCR-05D180L to VCR-05D680K</td><td>0.45A (2ms)</td></tr>
<tr><td>VCR-05D820K to VCR-05D681K</td><td>14A (8/20μs)</td></tr>
<tr><td rowspan="2">07D Series</td><td>VCR-07D180K to VCR-07D680K</td><td>12A (8/20μs)</td></tr>
<tr><td>VCR-07D820K to VCR-07D471K</td><td>35A (8/20μs)</td></tr>
<tr><td rowspan="2">10D Series</td><td>VCR-10D180K to VCR-10D680K</td><td>35A (8/20μs)</td></tr>
<tr><td>VCR-10D820K to VCR-10D112K</td><td>70A (8/20μs)</td></tr>
<tr><td rowspan="2">14D Series</td><td>VCR-14D180K to VCR-14D680K</td><td>45A (8/20μs)</td></tr>
<tr><td>VCR-14D820K to VCR-14D112K</td><td>90A (8/20μs)</td></tr>
<tr><td rowspan="2">20D Series</td><td>VCR-20D180K to VCR-20D680K</td><td>55A (8/20μs)</td></tr>
<tr><td>VCR-20D820K to VCR-20D182K</td><td>100A (8/20μs)</td></tr>
</table></td><td>ΔVcmA/VcmA
≦ ±10%</td></tr>
<tr><td>Impulse Response Time</td><td>Time lag Between Application of surge and varistor's "turn-on" conduction action.</td><td><50 nanoseconds</td></tr>
<tr><td>DC Leakage Current</td><td>Maximum current with rated DC voltage applied</td><td>200 μA max.</td></tr>
<tr><td>Current/Energy Detecting</td><td>Detecting of Maximum Values when operated above 85˚C</td><td>-2.5%/˚C</td></tr>
</table>

(B) Mechanical

Characteristics	Test Methods/Description	Specifications
Robustness of Terminations (Tensile)	After gradually applying the force specified below and keeping the unit fixed for ten seconds. The terminal shall be visually examined for any damage. Terminal diameter — Force Ø0.6mm — 9.8N(1.0Kgf) Ø 0.8mm — 9.8N(1.0Kgf) Ø 1.0mm — 19.6N(2.0Kgf)	No outstanding damage
Robustness of Terminations (Bending)	The unit shall be secured with its terminal vertical and the force 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. Terminal diameter — Force Ø 0.6 mm — 9.8N(1.0Kgf) Ø 0.8 mm — 9.8N(1.0Kgf) Ø 1.0mm — 19.6N(2.0Kgf)	
Vibration	After repeating apply a single harmonic vibration (amplitude:0.75mm)double amplitude: 1.5mm with 1 minute vibration frequency cycles(10 Hz to 55 Hz to 10Hz) to each of three perpendicular directions for 2 hours. Thereafter. The unit shall be visually examined.	
Solder ability	After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 235±℃for 2±0.5 seconds. The terminal shall be visually examined.	Approximately 95%of the terminals shall be covered with solder uniformly.
Resistance to Soldering Heat	After each lead shall be dipped into a solder bath having a temperature 260±5℃ To a point 2.0 to 2.5mm form the body of the unit. Using shielding board (t=1.5mm). be held there for specified time(5 series:5±1us and others: 10±1us). And then be stored at room temperature and humidity for 1 to 2 hours. The change of Vc and mechanical damages are examined.	△VcmA/VcmA≦±5% NO outstanding damage

(C) Environmental

Characteristics	Test Methods/Description	Specifications
High Temperature Storage/Dry Heat.	The specimen shall be subjected to 125±℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. Thereafter. The change of Vc shall be measured.	△VcmA/VcmA≦±5%
Damp Heat/Humidity (Steady State)	The specimen shall be subjected to 40±2℃.90 to 95%RH for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter. the Change of Vc shall be measured.	
Temperature Cycle	The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours' .The change of Vc and mechanical damage shall be examined.	

Step.	Temperature(℃)	Period(minutes)
1	-40±3	30±3
2	Room Temperature	15±3
3	125±2	30±3
4	Room Temperature	15±3

High Temperature Load/Dry heat load	After being continuously applied the Maximum Allowable Voltage at 85±2℃ for 1000 hours. The specimen shall be stored at room temperature and humidity for one to two hours. Thereafter. The change of Vc shall be measured.	△VcmA/VcmA≦±10%
Damp Heat Load/ Humidity Load	The specimen shall be subjected to 40±2℃. 90 to 95% RH and the Maximum Allowable Voltage for 1000 hours and then stored at room temperature and humidity for one to two hours. Thereafter. the change of Vc shall be measured.	△VcmA/VcmA≦±10%
Low Temperature Storage/Cold	The specimen shall be subjected to –40±2℃without load for 1000 hours and then stored at room temperature for one to two hours. Thereafter. the change of Vc shall be measured.	△VcmA/VcmA≦±5%