Microtech (Hong Kong) Limited
Tel: 852 2799 4649 Fax: 852 2121 8310 Email: sales@microtech-hk.com

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

1. Scope

This Specification is applied for Metal Oxide Varistors which provide reliable and economical protection against high voltage transients and surges which may be priduced, for example by lighting, switching or electrical noise on AC or DC power lines.

2. Explanation of Part Numbers(Typical example)

S	V	R	5	6	1	D	2	0	A	-	S	2	5

Common code
Hiel Varistor

Element type
Disk -Type

Series	
U	U-Series
-	S-Series

Lead length	
25	25mm
10	10mm

Varistor Voltage
The first two digits are significant
figures, the third one denotes
the number of Zeros following

Disk dia.	
05	ϕ 05mm
07	ϕ 07mm
10	ϕ 10mm
14	ϕ 14mm
20	ϕ 20mm

Suffix	
A	High Voltage
B	Low Voltage

Formig Type	
S	Straight
O	Out - Kink
I	IN - Kink

3. Operating Temperature Range: -40℃ ~ +85℃

4. Application Notes for UL and CSA Recognized Components

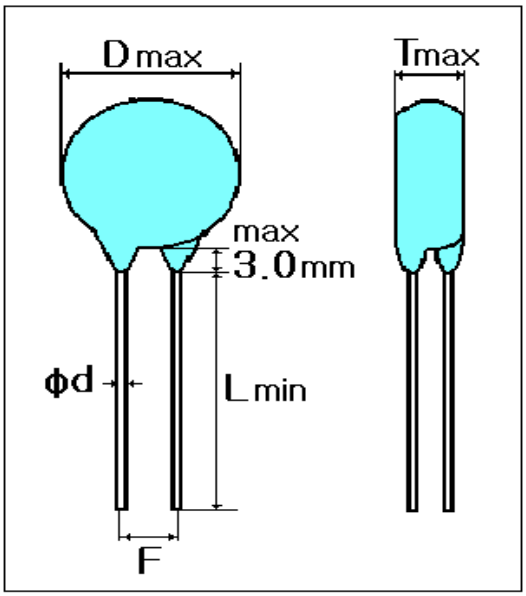
4.1 Related Standards

Standards	File No.	Title
UL1449	E162771	Component - Transient Voltage Surge Suppressors.
UL1414	E188093	Component - Across-the-line capacitors, antenna-coupling and line-by-pass components.
CSA(Class 2221 01)	LR103860-1	Accessories and Patrs for Electronic Products - Metal oxide varistors for across-the-line use on 120Vac norminal systems.

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

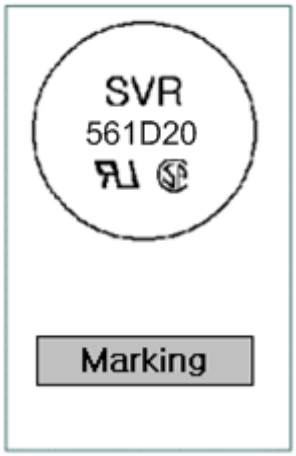
5. Shape and Dimensions

- Bulk Type(Straight)

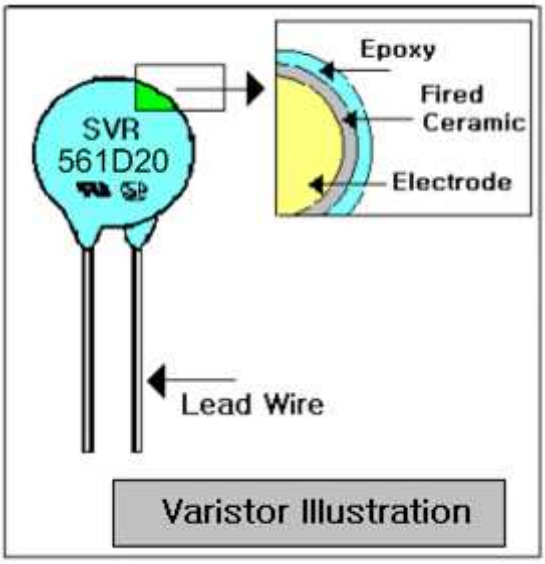


Dimensions	Specifications
D max.	24.0
T max.	10.0
L min.	25.0
F	10.0 ± 1.0
Φd	0.8 ± 0.05

6. Marking and Illustration



SVR	Hiel Varistor
561	$V1_{mA}$ = 560 V
D	Disk – Type
20	Disk size = 20 mm
	UL Mark
	CSA Mark



	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

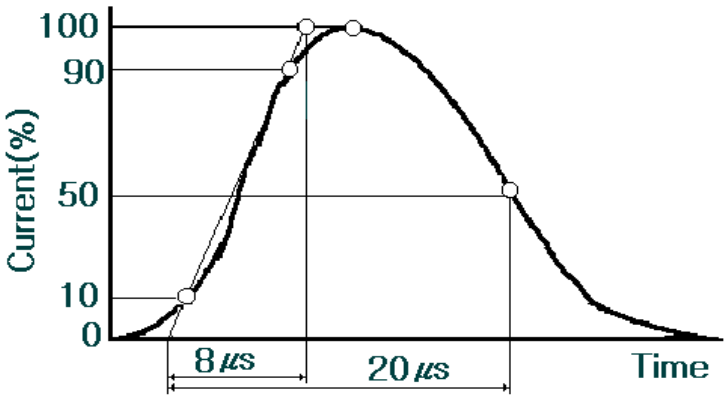
7. Electrical characteristics

Φ20 Series

Model No.	Varistor Voltage 1mA(V)			Max. Continuous Voltage(V)		Max. Clamping Voltage(V)		Power dissipation	Energy (10/1000㎲)	Peak Current (8/20㎲)
	Min	VN(DC)	Max.	Vm(ac)	Vm(dc)	Vc(V)	Ip(A)	Ptam(W)	Wtm(J)	Itm(A)
SVR820D20A	74	82	90	50	65	135	100	1.0	27	6,500
SVR101D20A	90	100	110	60	85	165	100	1.0	30	6,500
SVR121D20A	108	120	132	75	100	200	100	1.0	40	6,500
SVR151D20A	135	150	165	95	125	250	100	1.0	50	6,500
SVR181D20A	162	180	198	115	150	300	100	1.0	60	6,500
SVR201D20A	180	200	220	130	170	340	100	1.0	70	6,500
SVR221D20A	198	220	242	140	180	360	100	1.0	75	6,500
SVR241D20A	216	240	264	150	200	395	100	1.0	80	6,500
SVR271D20A	243	270	297	175	225	455	100	1.0	90	6,500
SVR331D20A	297	330	363	210	275	550	100	1.0	105	6,500
SVR361D20A	324	360	396	230	300	595	100	1.0	120	6,500
SVR391D20A	351	390	429	250	320	650	100	1.0	130	6,500
SVR431D20A	387	430	473	275	350	710	100	1.0	140	6,500
SVR471D20A	423	470	517	300	385	775	100	1.0	150	6,500
SVR561D20A	504	560	616	350	455	925	100	1.0	150	6,500
SVR621D20A	558	620	682	385	505	1025	100	1.0	150	6,500
SVR681D20A	612	680	748	420	560	1120	100	1.0	160	6,500
SVR751D20A	675	750	825	460	615	1240	100	1.0	175	6,500
SVR781D20A	702	780	858	485	640	1290	100	1.0	180	6,500
SVR821D20A	738	820	902	510	670	1355	100	1.0	190	6,500
SVR911D20A	819	910	1001	550	745	1500	100	1.0	215	6,500
SVR102D20A	900	1000	1100	625	825	1650	100	1.0	230	6,500
SVR112D20A	990	1100	1210	680	895	1815	100	1.0	250	6,500
SVR182D20A	###	1800	1980	###	1465	2970	100	1.0	400	6,500

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

8. Perfomance Characteristics

Term	Test method/Discription	Specifications
Standard Test Condition	Environmental conditions under which every measuring is done without doubt on the measuring results. Unless otherwise specified temperature, relative humidity are 5 to 35℃, 45 to 85% RH	-
Varistor Voltage	Voltage across the varistor measured at a specified pulsed dc current, $I_{N(dc)}$	The specified Value
Rated Voltage	The maximum sinusoidal rms voltage or maximum dc voltage which may be applied.	
DC Standby Current	Varistor current measured at rated voltage, Vm(dc)	
Clamping Voltage	Peak voltage across the varistor measured under the conditions of a specified peak pulse current and specified waveform(8/20㎲) illustrated below. 	
Rated Power	Maximum average power which may be dissipated due to a group of the pulses occurring within a specified isolated time period.	
Pluse transient	The maximum energy which may be dissipated for a single impulse of maximum rated current at a specified wave shape(10/1000㎲), within the varistor voltage change of ±10%	
Peak Pulse Current	The maximum current which may be applied for a single 8/20㎲ impulse, within the varistor voltage change of ±10%.	
Temperature Coefficient of Varistor	$\frac{V_{N(dc)} \text{ at } 85℃ - V_{N(dc)} \text{ at } 25℃}{V_{N(dc)} \text{ at } 25℃} \times \frac{1}{60} \times 100(\%/℃)$	-0.05%/℃ ~ 0 max.

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

Electrical Characteristics(Continued)

<table>
<tr><th>Term</th><th>Test method/Discription</th><th>Specifications</th></tr>
<tr><td>Capacitance</td><td>Capacitance shall be measured at 1 kHz±10%, 1Vrms max. (1MHz±10% below 100pF), 0V bias and 20±2℃.</td><td>The specified Value</td></tr>
<tr><td>Withstanding Voltage
(Body insulation)</td><td>The specified voltage shall be applied between 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</th></tr>
<tr><td>V0.1mA, V1mA ≤330V</td><td>1000 Vrms</td></tr>
<tr><td>V0.1mA, V1mA >330V</td><td>1500 Vrms</td></tr>
</table></td><td>No breakdown</td></tr>
<tr><td>Impulse Life(1)</td><td>The change of VN(dc) shall be measured after the impulse listed below is applied 10,000 times continuously with the interval ten seconds at room temperature.
<table>
<tr><td>20 Series</td><td>SVR820D20A to SVR112D20A</td><td>250A(8/20㎲)</td></tr>
</table></td><td>ΔVN(dc)/VN(dc) ≤±10%</td></tr>
<tr><td>Impulse Life(2)</td><td>The change of VN(dc) shall be measured after the impulse listed below is applied 100,000 times continuously with the interval ten seconds at room temperature.
<table>
<tr><td>20 Series</td><td>SVR820D20A to SVR112D20A</td><td>120A(8/20㎲)</td></tr>
</table></td><td>ΔVN(dc)/VN(dc) ≤±10%</td></tr>
</table>

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

9. Mechanical Characteristics

Term	Test method/Discription	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 damagy. Terminal diameter: Φ0.8 — Force: 9.8N(1.0kgf)	No remarkable mechanical damage
Robustness of Terminations (Bending)	The unit shall be secured with its terminal kept vertical and the force specified below shall be applied in the axial direction. The terminal shall gradually be bent by 90°in the direction, then 90°in the opposite direction, and again back to the position. The damage of the terminal shall be visually examined. Terminal diameter: Φ0.8 — Force: 4.5N(0.5kgf)	
Vibration	After repeatedly applying a single harmonic vibration(amplitude: 0.75mm double amplitude: 1.5mm) with 1 minute vibration frequency cycle(10 Hz to 55 Hz to 10 Hz) to each of three perpendicular directions for 2 hours. Thereafter, the unit shall be visually examined.	
Solderability	After dipping the terminals to a depth of approximately 3mm from the body in the soldering bath of 235±5℃ for 2±0.5 seconds, the terminal shall be visually examined.	Approximately 95% of the termin -als shall be covered uniformly with new solder.
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 from the body of the unit, using shielding board(t=1.5mm), be held there for specified time(5 series:5±1s and others:10±1s), and then be stored at room temperature and norminal humidity for 1 to 2 hours. The change of VN(dc) and mechanical damage are examined.	$\Delta VN_{(dc)}/VN_{(dc)}$ ≤±5%

	SPECIFICATION Metal Oxide Varistors SVR®	REV. DATE	
		REV. NO.	0

10. Environmental Characteristics

Term	Test method/Discription	specifications
Dry Heat/ High Temperature Storage	The specimen shall be subjected to 125±2℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and norminal humidity for one to two hours. Thereafter, the change of $V_{N(dc)}$ shall be measured.	$\Delta V_{N(dc)}/V_{N(dc)}$ ≤±10%
Damp Heat/Humidity (Steady State)	The specimen shall be subjected to 40±2℃, 90 to 95%RH and the max continuous voltage for1000 hours and then stored at room temperature and normal humidity for one to two hours. Thereafter, the change of $V_{N(dc)}$ shall be measured.	
Cold/Low Temperature	The specimen shall be subjected to −40±2℃ without load for 1000 hours and then stored at room temperature and norminal humidity for one to two hours. Thereafter, the change of $V_{N(dc)}$ shall be measured.	No remakable damage $\Delta V_{N(dc)}/V_{N(dc)}$ ≤±5%
Temperature Cycle	The temperature cycles shown below shall be repeated five times and then stored at room temperature normal humidity for one two hours. The change of $V_{N(dc)}$ and mechanical shall be examined.	No remakable damage $\Delta V_{N(dc)}/V_{N(dc)}$ ≤±10%
High temperature load/Dry heat load	After being continuously applied the maximum continuous voltage at 85±5℃ for 1,000 hours, the specimen shall be stored at room tempetature and normal humidity for one two hours. Thereafter, the change of $V_{N(dc)}$ shalled be measured.	$\Delta V_{N(dc)}/V_{N(dc)}$ ≤±10%
Humidity (Steady state)	The specimen shall be subjected to 40±2℃, 90 to 95%RH without load for 1,000 hours and then stored at room temperature and normal humidity for 1 to 2 hours.Thereafter, the change of $V_{N(dc)}$ shall be measured.	$\Delta V_{N(dc)}/V_{N(dc)}$ ≤±5%

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