Safety

SPECIFICATION

SAMWHA CAPACITOR CO.,LTD

PT SAMCON

JL. RAYA SUBANG CIKUMPAY

CAMPAKA-PURWAKARTA

JAWA BARAT - INDONESIA

To. TME **No. SWC-20251016-08**

SPECIFICATION

ITEM : VARISTOR
(CERAMIC SURGE ABSORBER)

PT.SAMCON		
Written	Checked	Approved
		
Irman Sudirman	Apang Djafar S.	Kim Jae Min
TME		

SAMWHA CAPACITOR Co., Ltd
(Manufacturer : PT. SAMCON)
Jln Raya Subang Cikumpay – campaka
Purwakarta – West Java Indonesia

P/N	SAMWHA SPEC	P/N	SAMWHA SPEC
-	SVC221D-05AFF5	-	SVC221D-05ABW5
-	SVC241D-05AFF5	-	SVC241D-05ABW5
-	SVC271D-05AFF5	-	SVC271D-05ABW5
-	SVC361D-05AFF5	-	SVC361D-05ABW5
-	SVC431D-05AFF5	-	SVC431D-05ABW5
-	SVC471D-05AFF5	-	SVC471D-05ABW5
-	SVC221D-07AFF5	-	SVC221D-07ABW5
-	SVC271D-07AFF5	-	SVC271D-07ABW5
-	SVC361D-07AFF5	-	SVC361D-07ABW5
-	SVC431D-07AFF5	-	SVC431D-07ABW5
-	SVC471D-07AFF5	-	SVC471D-07ABW5
-	SVC511D-07AFF5	-	SVC511D-07ABW5
-	SVC561D-07AFF5	-	SVC561D-07ABW5
-	SVC621D-07AFF5	-	SVC621D-07ABW5
-	SVC681D-07AFF5	-	SVC681D-07ABW5
-	SVC221D-10AFF7	-	SVC221D-10ABW7
-	SVC271D-10AFF7	-	SVC271D-10ABW7
-	SVC361D-10AFF7	-	SVC361D-10ABW7
-	SVC431D-10AFF7	-	SVC431D-10ABW7
-	SVC471D-10AFF7	-	SVC471D-10ABW7
-	SVC511D-10AFF7	-	SVC511D-10ABW7
-	SVC561D-10AFF7	-	SVC561D-10ABW7
-	SVC621D-10AFF7	-	SVC621D-10ABW7
-	SVC681D-10AFF7	-	SVC681D-10ABW7
-	SVC821D-10AFF7	-	SVC821D-10ABW7
-	SVC911D-10AFF7	-	SVC911D-10ABW7
-	SVC102D-10AFF7	-	SVC102D-10ABW7
-	SVC112D-10AFF7	-	SVC112D-10ABW7
-	SVC221D-14AFF8	-	SVC221D-14ABW7
-	SVC271D-14AFF8	-	SVC271D-14ABW7
-	SVC361D-14AFF8	-	SVC361D-14ABW7
-	SVC431D-14AFF8	-	SVC431D-14ABW7
-	SVC471D-14AFF8	-	SVC471D-14ABW7
-	SVC511D-14AFF8	-	SVC511D-14ABW7
-	SVC561D-14AFF8	-	SVC561D-14ABW7
-	SVC621D-14AFF8	-	SVC621D-14ABW7
-	SVC681D-14AFF8	-	SVC681D-14ABW7
-	SVC821D-14AFF8	-	SVC821D-14ABW7
-	SVC911D-14AFF8	-	SVC911D-14ABW7
-	SVC102D-14AFF8	-	SVC102D-14ABW7
-	SVC112D-14AFF8	-	SVC112D-14ABW7
-	SVC182D-14AFF8	-	SVC182D-14ABW7

Record of Revision

No	Reason	Contents	Date of approval	Checked	Remark
1	RoHS Free	1) P.12/23 6-3. Solder Heat Resistance 2) P.14/23 6-9. The regulation of environmental pollution materials	05.11.10		
2	Material Change	Material wire from Cu wire (Sn-Cu) to Cp wire (Sn-Cu-Fe)	07.06.15		
3	Characteristics data & Reliability test Added	1) P.6/23 5-2. Maximum allowable voltage (Withstanding voltage) 2) P.6/23 5-3. Varistor Nominal Voltage (V_{1mA}) & Tolerance 3) P.7/23 5-4. L/C Characteristics 4) P.13/23 6-4. Body Insulation 5) P.15/23 6-8. Low Temperature	11.09.01		
4	Drawing & Dimension of Taping Style	Hold Down Tape Width (Wo)	12.05.01		
5	Marking	Marking Change	21.01.26		

1. SCOPE

This specification relates zinc oxide varistor or ceramic surge absorbers are designed to protect low voltage electronic devices such as semiconductors from the effects of surge voltage transient.

2. GENERAL DESCRIPTION

SVC Series varistors are used in application where protection from lightning and switching surges is required and are widely used in T/V set broadcasting and communication equipment and similar situation where there is danger of over voltages or lightning damage and other devices.

SVC Series are gapless ceramic surge absorbers of a new type made of metal oxide.

They have excellent non-linear characteristics and their use gives a high degree of reliability to voltage sensitive circuit components. They have excellent clamping characteristics and when subjected to high emerge transient currents their impedance rapidly changes from a high standby value to a low conducting value which keeps voltages within safe limits.

Discharge transient peak current ratings are available up to a maximum of 4000A between 50 ~1000 volts RMS AC or 65 ~1465 volts DC. They are easily installed, take up little space, and are attractively priced.

3. APPLICATION, APPLICATION EXAMPLES AND FEATURES

3-1. Applications.

- Protection of semiconductor element such as diodes, thyristors,transistors, IC and relays against transient voltages.

- Similar protection of many types of measuring instruments, control machinery and equipment, communication and broadcasting equipment against inductive lightning and switching surges.

- Protection of general purpose electrical equipment, communication equipment, T/V set, radio and similar products against lightning and switching surges.

3-2. Application Examples.

- Fire-alarming equipment of systems, signal equipment for rail and road traffic, disaster prevention shutters and pressure sensors.
- Valve controllers, semiconductor power conversion systems, motor controllers, relay control equipment.
- Centralized meter reading equipment, cable and community T/V systems and broadcast relay equipment.
- Industrial gasoline heaters, automatic vending machines, air conditioning equipment, boilers, refrigerators.
- Medical equipment's, air-operated break switches, ELCB's, clutches and magnetic breaks.
- Temperature relays, proximity switches measuring instrument protection and noise filers.
- T/V set, VTR, Telephone, PBX, car, microwave oven, washing machine and others.

3-3. Features.

- Excellent clamping characteristics.
- High discharge current capability-up to 4000 Amps.
- Fast response time-under 50 nanoseconds.
- Wide operating temperature range.
- Eliminate follow-on current .
- Improve product safety.
- Remarkably symmetrical V-I characteristics.
- Protect circuit insulation and improve system reliability.
- Low installation cost.

4. SPECIFICATION.

- See Specification Table (page 20/23~22/23)

5. CHARACTERISTIC

5-1. V-I Characteristics.

The most distinguishing feature of zinc oxide varistor is their highly exponential variation of current over a narrow range of applied voltage.

Within the useful varistor voltage range, the voltage current relationship is empirically approximated by the expression :

$I = K V^{\alpha}$ Where, I = Current in amperes.

V = Voltage.

K = a material constant.

α= an exponent defining the degree of non-linearity.

it is convenient to use a log-log plot of the above equation where is the slope of the V-I curve.

$$\alpha = \frac{\log (i'/I)}{\log (v'/V)}$$

where, I = 1㎃

i‘ = 10㎂

V = V1㎃ = Voltage at 1㎃

v'= V10㎂ = Voltage at 10㎂

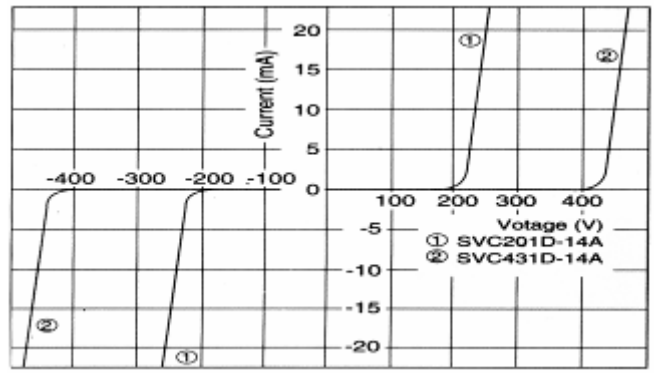


Fig 5-1) Small-current region of V-I curve

Typically, the varistor voltage range may be defined qualitively as that portion of V-I curve Which falls between two regions of transition resistivity :

(1) at lower voltage-a linear/non-linear transition from a high resistance ohmic mode (10^8 ~10^9 ohms), and

(2) at higher voltage a non-linear transition back to an ohmic with resistance of only a few ohms.

Note : Since the V-I curve is symmetrical SVC are capable of absorbing surge having both positive negative polarities with a similar suppression performance.

5-2. Maximum Allowable Voltage (Withstanding Voltage)

The maximum sinusoidal RMS voltage or maximum DC Voltage that can be applied continuously in the specified environmental temperature range for 60 second.

For example: Spec SVC681D-14A

- Vac (RMS 50/60Hz) = 420 volt
- Vdc = 560 volt

5-3. Varistor Nominal Voltage (V_{1mA}) & Tolerance (±10 %)

The voltage across the varistor measured at specified current Ic (1㎃) of specified duration (when applied voltage ex. 681D-14, Vdc 560 V)

For Varistor Nominal Voltage tolerance :

Example : SVC681D-14A; 681D= ± 10%; Max = 748 volt; min = 612 volt

(Refer to Specification table; page 20/23~22/23)

5-4. L/C Characteristics

The voltage across the varistor measured at specified current Ic (1mA) of specified duration (when applied voltage ex. 681D-14, Vdc 560 V)

For Varistor Nominal Voltage tolerance :

Example : SVC681D-14A; 681D= ± 10%; Max = 748 volt; min = 612 volt

Leakage Current (L/C) characteristics of varistor finish goods must be not over than 200μA.

For example: Spec SVC681D-14A

Check L/C Applied Voltage (Vdc) = 560V

Applied voltage : 560 Vdc (Refer to Specification table; page 20/23~22/23)

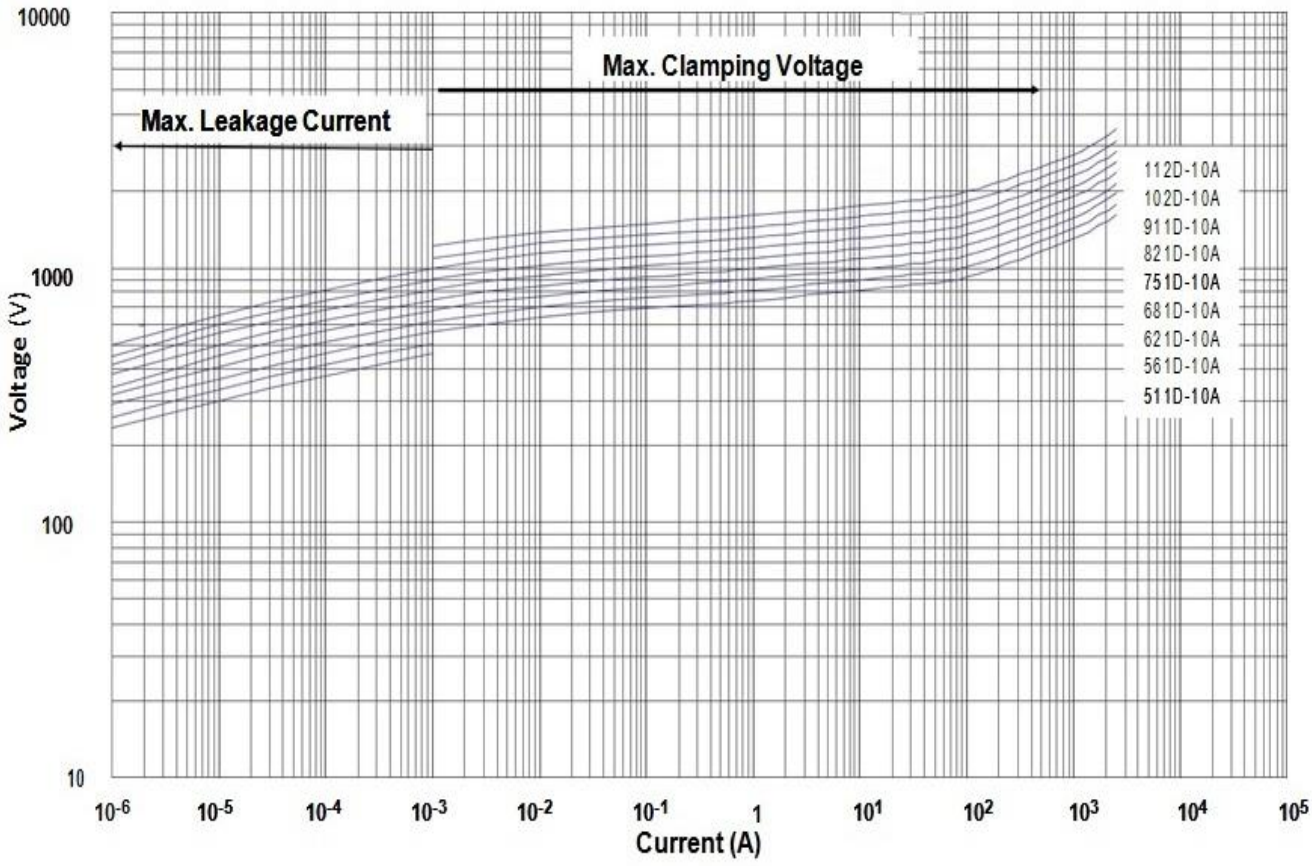


Fig 5-2) Example of transient V-I characteristic curves. ∅10

5-3. SVC Series characteristic curves.

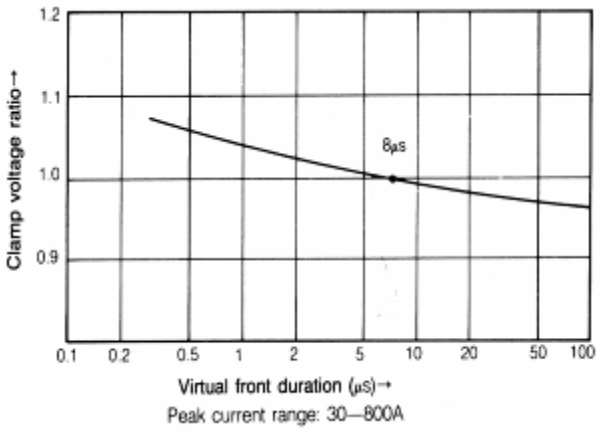


Fig 5-3) Front duration vs. clamp voltage (Typical)

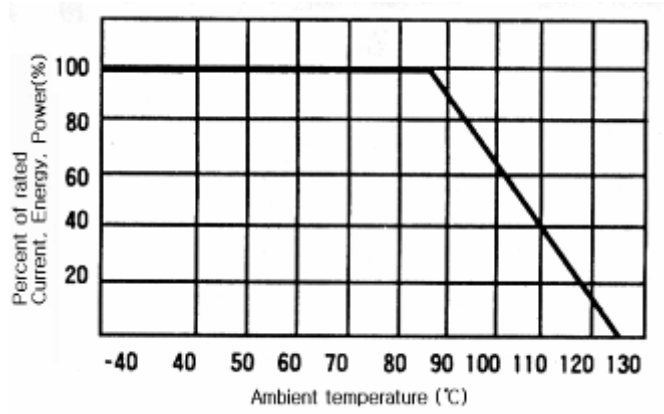


Fig 5-4) Current, Power and energy rating vs. temperature

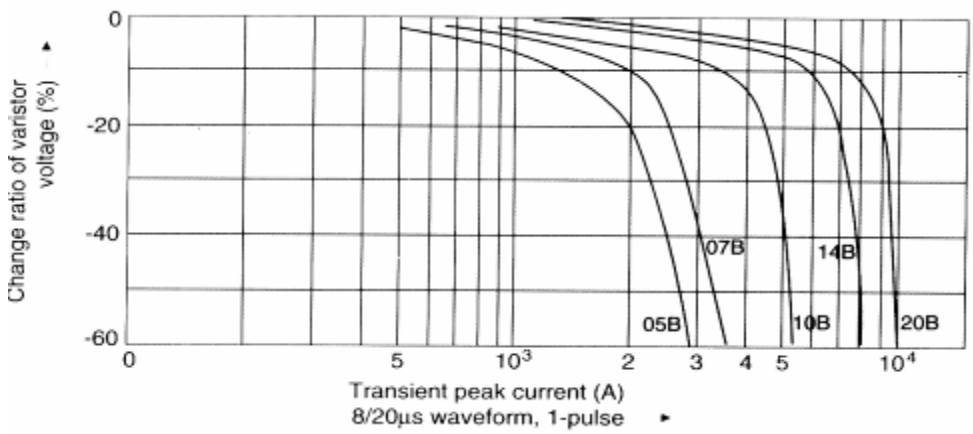


Fig 5-5) Withstand discharge impulse current characteristics - B Series.

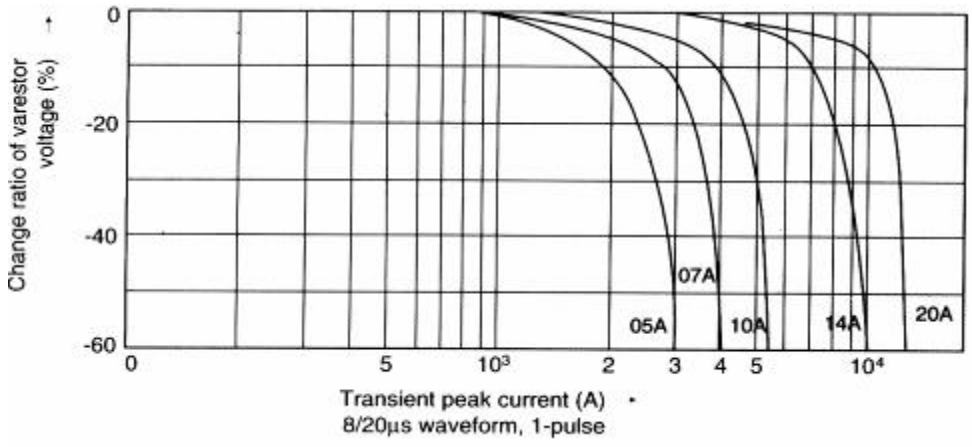


Fig 5-6) Withstand discharge impulse current characteristics - A Series.

▣ Test current waveform.

Characteristics tests for SAMWHA SVC are carried out by using 8 × 20 ㎲ test impulses. Data such as the maximum clamping voltage (Vc) and the transient peak current (I_{tm}) are obtained by using this impulse current.

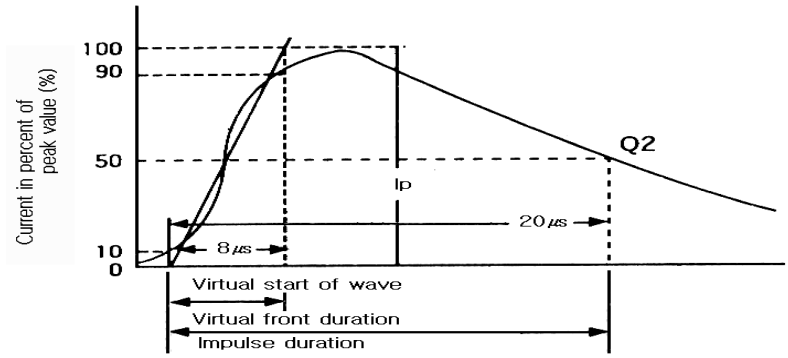


Fig 5-7) Test current waveform 8 × 20 ㎲ Current wave.

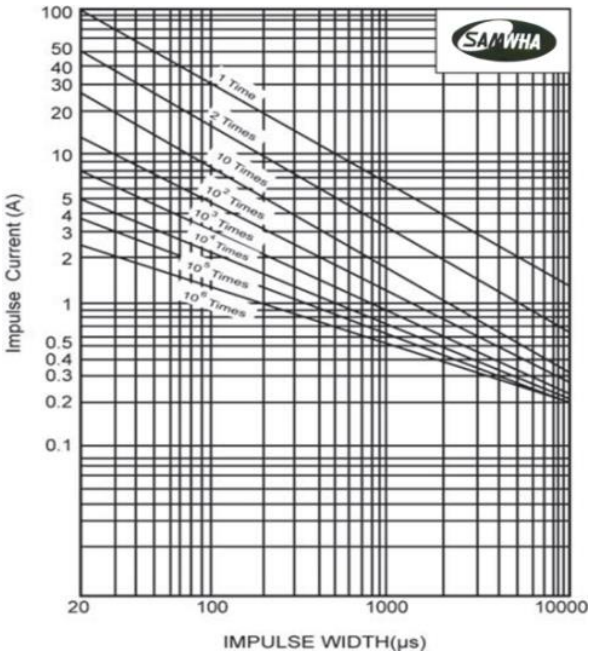
▣ Pulse lifetime ratings

Notes : 2-pulse : 5-minute interval

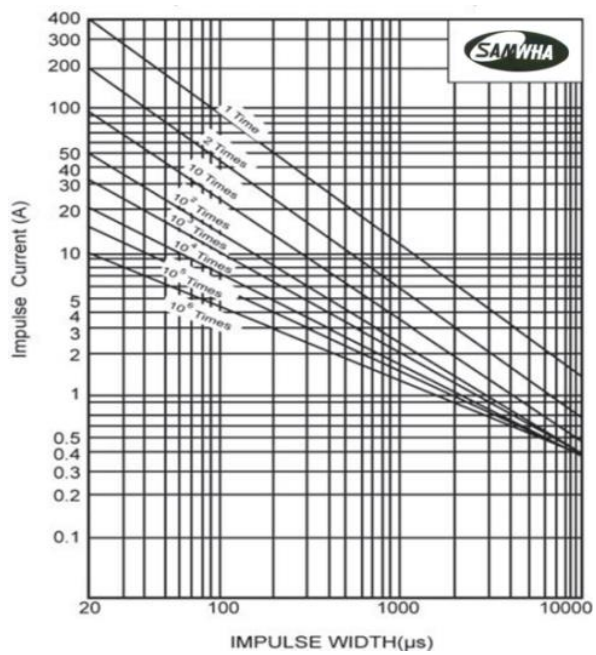
3 to 10-pulse : 2-minute interval

Up to 10^6-pulse : 10-second interval

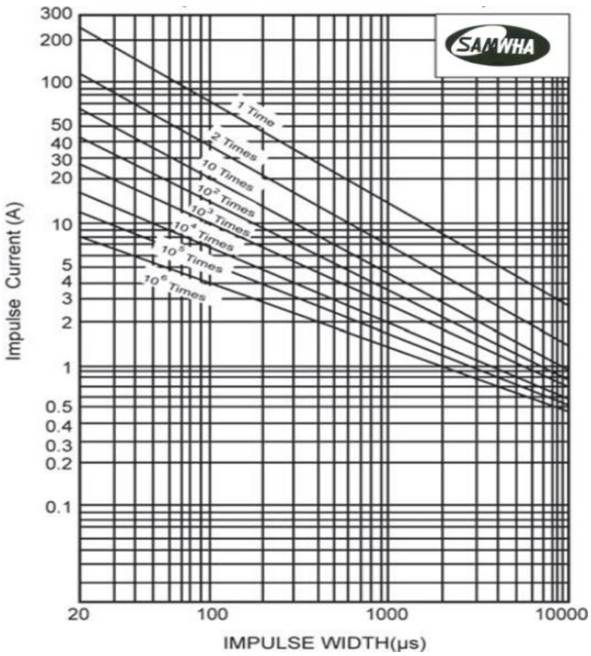
●05B(SVC180D-05B to SVC680D-05B)



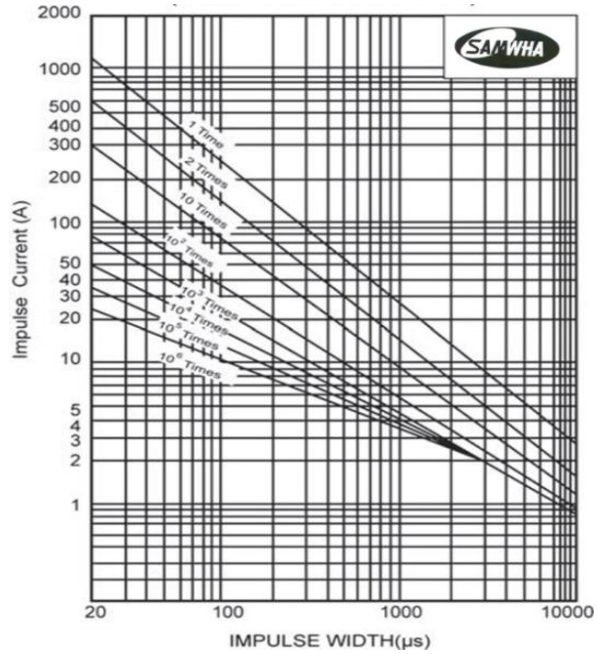
●05A(SVC820D-05A to SVC471D-05A)



●07B(SVC180D-07B to SVC680D-07B)



●07A(SVC820D-07A to SVC471D-07A)



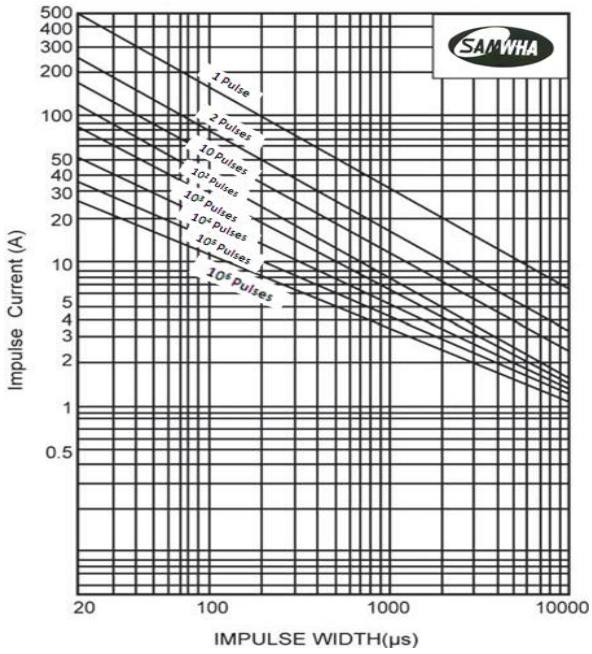
▣ Pulse lifetime ratings

Notes : 2-pulse : 5-minute interval

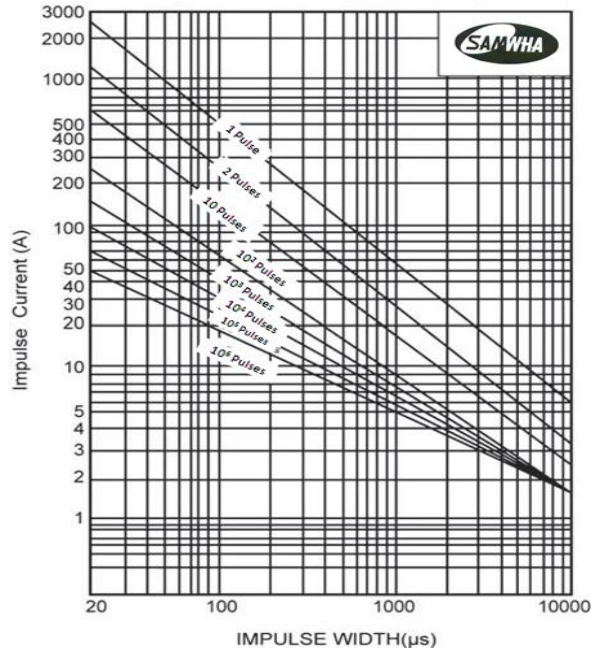
3 to 10-pulse : 2-minute interval

Up to 10^6-pulse : 10-second interval

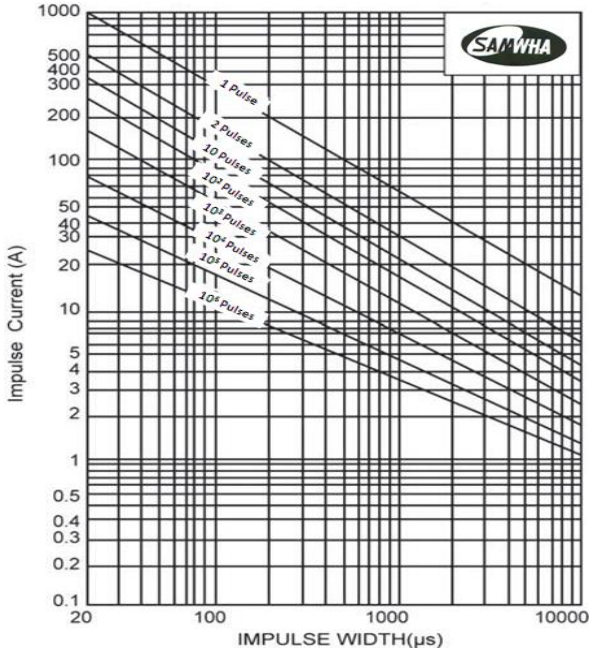
●10B(SVC180D-10B to SVC680D-10B)



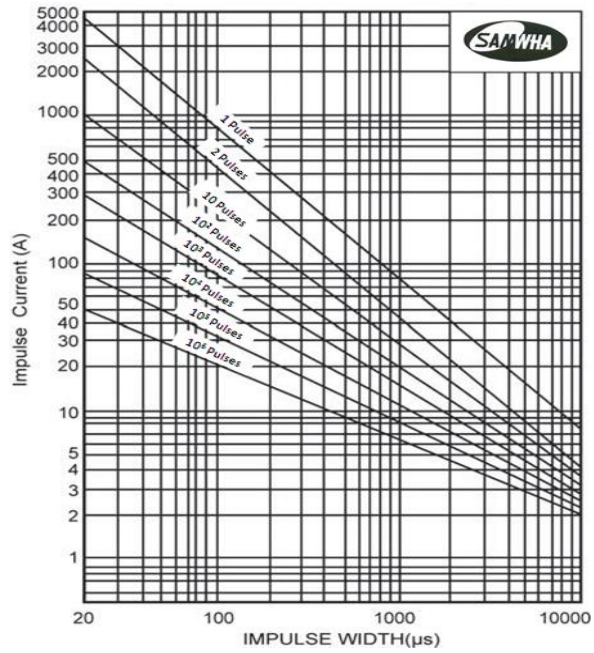
●10A(SVC820D-10A to SVC112D-10A)



●14B(SVC180D-10B to SVC680D-10B)



●14A(SVC820D-14A to SVC182D-14A)



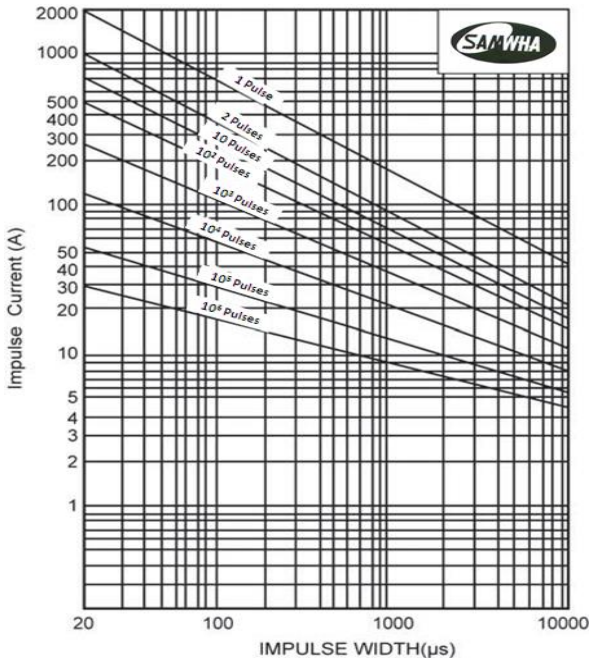
▣ Pulse lifetime ratings

Notes : 2-pulse : 5-minute interval

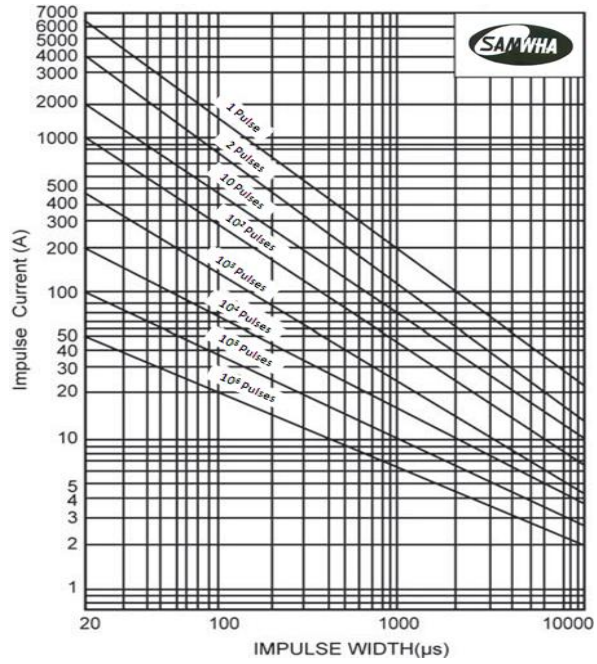
3 to 10-pulse : 2-minute interval

Up to 10^6-pulse : 10-second interval

●20B(SVC180D-20B to SVC680D-20B)



●20A(SVC820D-20A to SVC182D-20A)



5-5. Varistor voltage temperature coefficient.

Standard :

$$\frac{V_{1mA} \text{ at } 85℃ - V_{1mA} \text{ at } 25℃}{V_{1mA} \text{ at } 25℃} \times \frac{1}{60} \times 100 \ (\%/℃)$$

$$\frac{V_{1mA} \text{ at } -40℃ - V_{1mA} \text{ at } 25℃}{V_{1mA} \text{ at } 25℃} \times \frac{1}{65} \times 100 \ (\%/℃)$$

Specification : $-0.05 \leqq TC \leqq 0.05 (\%/^{O}C)$

6. ELECTRICAL AND MECHANICAL REQUIREMENTS

6-1. Terminal Pull Strength.

After gradually applying the load specified below and keeping the unit fixed for 10±1 seconds, the terminal shall be visually examined for any damage.

Terminal Dia.(㎜)	Load (㎏f)	Remarks
0.5<d≦0.8	1.0	
0.8<d≦1.25	2.0	
1.25<d	4.0	

Specification : a. No visbile damage

b. $|\Delta V/V1mA| \leqq 5\%$

6-2. Terminal Bending Strength.

The unit shall be secured with its terminal kept vertical the weight specified below be applied in the axial direction. The terminal shall gradually be bent by 90°in one direction, then 90°in opposite direction, than 90°in the opposite direction, and again back to the original position. The damage of the terminal shall be visually examined.

Terminal Dia.(㎜)	Load (㎏f)	Remarks
0.5<d≦0.8	0.5	
0.8<d≦1.25	1.0	
1.25<d	2.0	

Specification : a. No visbile damage

b. $|\Delta V/V1mA| \leqq 5\%$

6-3. Resistance to Solder Heat

After dipping the terminal to a depth of approximately 3mm from the body in a soldering bath of 260℃(-0,+5) for 10 seconds, the terminal shall be visually examined.

Requirement = $\frac{\Delta V1_{mA}}{V1_{mA}} \times 100(\%) \leq \pm 10\%$

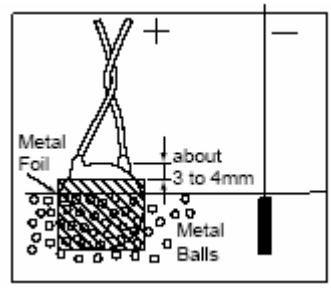
$V1_{mA}$: Voltage at $V1_{mA}$

$\Delta V1_{mA}$: Change of $V1_{mA}$

6-4. Body Insulation

Metal ball method, as table below.

Classification (Nominal Voltage Varistor)	Test Voltage (AC)
$V_{0.1mA}$, $V_{1mA} \leqq 330V$	1000 Vrms
$V_{0.1mA}$, $V_{1mA} > 330V$	1500 Vrms



6-5. Humidity (Moisture Resistance)

Varistor shall be subjected to 40℃, 95% R.H for 500 hours without load and then stored at room temperature and humidity for one to two hours.

There after, the change of $V1_{mA}$ shall be measured.

$$\text{Requirement} = \frac{\Delta V1_{mA}}{V1_{mA}} \times 100(\%) \leq \pm 10\%$$

$V1_{mA}$: Voltage at 1_{mA}

$\Delta V1_{mA}$: Change of $V1_{mA}$

6-6. Temperature Cycle.

Varistor shall be subjected to the following 5 cycles : at -40℃ for 30 minutes at 85℃ for 30 minutes.

After the cycles, the varistor shall be returned to and stabilized at room ambient conditions for 1 hour.

$$\text{Requirement} = \frac{\Delta V1_{mA}}{V1_{mA}} \times 100(\%) \leq \pm 10\%$$

$V1_{mA}$: Voltage at 1_{mA}

$\Delta V1_{mA}$: Change of $V1_{mA}$

Test condition :

Step	Condition	Remarks
1	Room Temp.	Temp : ± 3 ℃
2	- 40℃ × 30 min	Time : ± 5 min
3	Room Temp. × (5 min max)	
4	+ 85℃ × 30 min	
5	Room Temp. × (5 min max)	

6-7. High Temperature Load Test

Varistors are to placed in a circulating air oven for 1000±12hours the air oven is to be maintained at a temperature of 85 ± 3℃ throughout the test, each varistor is to be subjected to a Applied voltage.

After placing in room condition for 1 to 4 hours.

$$\text{Requirement} = \frac{\Delta V1_{mA}}{V1_{mA}} \times 100(\%) \leq \pm 10\%$$

$V1_{mA}$: Voltage at 1_{mA}

$\Delta V1_{mA}$: Change of $V1_{mA}$

6-8. Low Temperature

The specimen shall be subjected to -40 ± 2°C without load for 1000 hours and then stored at room temperature and nominal humidity for one to two hours.

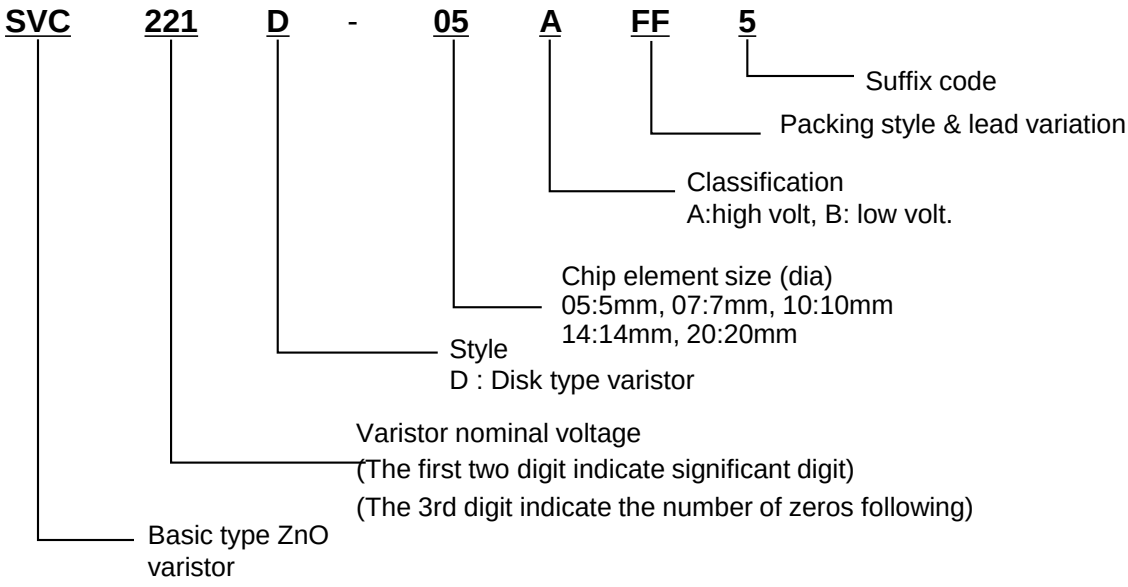
Specification : a. ΔV1mA/V1mA ≦ 5%

b. No visible damage

6-9. The Regulation of Environmental Pollution Materials.

* Never use materials mentioned below based on International RoHS Standard.
* Pb, Hg, Cr^{+6}, PBB, PBDE, Cd, Phthalate (DEHP, DBP, BBP & DIBP).

7. TYPE DESIGNATION. (HOW TO ORDER)



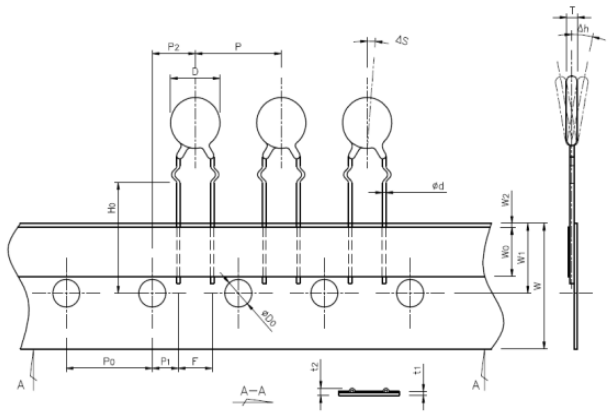
8. MARKING

Dia.(Φ)	Marking		Remarks
05 07 10 14	S V C □□□-■■ VDE	S V C □□□-■■ VDE	□ Varistor nominal volt ■ Chip element size
	SVC180~SVC181	SVC201~SVC182	
20	S V C □□□-■■	S V C □□□-■■	
	SVC180~SVC181	SVC201~SVC182	

9. PACKING STYLE

TAPING

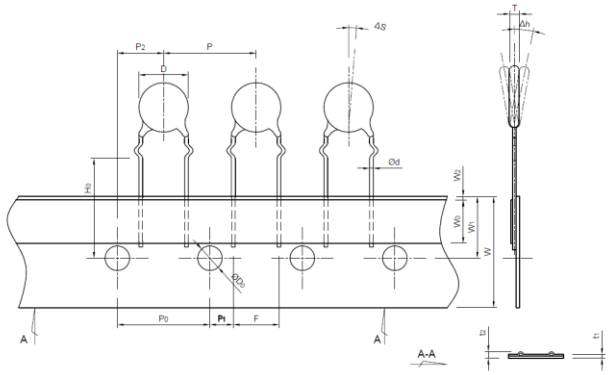
FF5



[Unit : mm]

ITEM	SYMBOL	TAPING SPECIFICATION	NOTE
		FF5	
Body Diameter	D	12.5 Max	
Body Thickness	T	7.5 Max	
Lead Diameter	Φ d	0.50 ± 0.05	
Pitch of Sprocket Hole	Po	12.7 ± 0.3	Accumulative.pitch error : ± 1mm/20pitch
Pitch of Component	P	12.7 ± 1.0	
Lead Length from Hole Center to Lead	P1	3.85 ± 0.7	
Lead Length from Hole Center to Component Center	P2	6.35 ± 1.3	
Lead Spacing	F	5.0 + 0.8 - 0.2	
Deviation Along Tape	△S	0 ± 1.0	
Deviation Across Tape	△h	0 ± 2.0	
Carrier Tape Width	W	18.0 + 1.0 - 0.5	
Hold Down Tape Width	Wo	6.0 Min	
Position of Sprocket Hole	W1	9.0 ± 0.5	
Hold Down Tape Position	W2	3.0 Max	
Diameter of Sprocket Hole	Φ Do	4.0 ± 0.2	
Lead-Wire Clinch Height	Ho	16.0 ± 0.5	
Total Tape Thickness	t_1	0.7 ± 0.2	
Total Thickness, Tape and Lead Wire	t_2	1.5 Max	

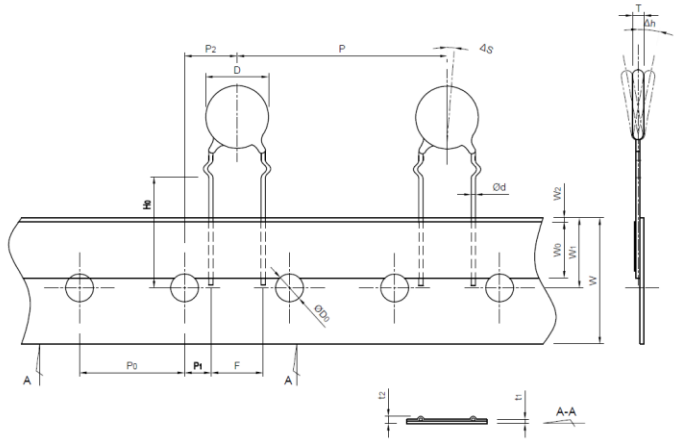
FF7



[Unit : mm]

ITEM	SYMBOL	TAPING SPECIFICATION	NOTE
		FF7	
Body Diameter	D	14.0 Max	
Body Thickness	T	10.5 Max	
Lead Diameter	Φ d	0.70 ± 0.05	
Pitch of Sprocket Hole	Po	15.0 ± 0.3	
Pitch of Component	P	15.0 ± 1.0	
Lead Length from Hole Center to Lead	P1	3.75 ± 1.0	
Lead Length from Hole Center to Component Center	P2	7.5 ± 1.5	
Lead Spacing	F	7.5 ± 1.0	
Deviation Along Tape.Left or Right	△S	0 ± 1.0	
Deviation Across Tape	△h	0 ± 2.0	
Carrier Tape Width	W	18.0 + 1.0 - 0.5	
Hold Down Tape Width/Masking Tape Width	Wo	8.0 Min	
Position of Sprocket Hole	W1	9.0 ± 0.5	
Hold Down Tape Position	W2	3.0 Max	
Lead-Wire Clinch Height	Ho	16.0 ± 0.5	
Height of Component Hole	H	20.0 + 1.5 - 1.0	
Diameter of Sprocket Hole	Φ Do	4.0 ± 0.2	
Length of Snipped Lead	L	11.0 Max	
Total Tape Thickness	t_1	0.7 ± 0.2	
Total Thickness, Tape and Lead Wire	t_2	1.7 Max	

FF8

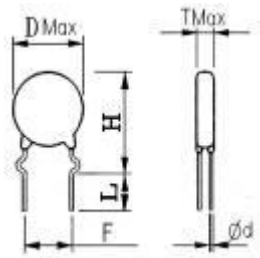


[Unit : mm]

ITEM	SYMBOL	TAPING SPECIFICATION	NOTE
		FF8	
Body Diameter	D	17.5 Max	
Body Thickness	T	15.0 Max	
Lead Diameter	Φ d	0.70 ± 0.05	
Pitch of Sprocket Hole	Po	15.0 ± 0.3	
Pitch of Component	P	30.0 ± 1.0	
Lead Length from Hole Center to Lead	P1	3.75 ± 1.0	
Lead Length from Hole Center to Component Center	P2	7.5 ± 1.5	
Lead Spacing	F	7.5 ± 1.0	
Deviation Along Tape.Left or Right	△S	0 ± 1.0	
Deviation Across Tape	△h	0 ± 2.0	
Carrier Tape Width	W	18.0 + 1.0 - 0.5	
Hold Down Tape Width/Masking Tape Width	Wo	8.0 Min	
Position of Sprocket Hole	W1	9.0 ± 0.5	
Hold Down Tape Position	W2	3.0 Max	
Lead-Wire Clinch Height	Ho	16.0 ± 1.0	
Height of Component Hole	H	20.0 + 1.5 - 1.0	
Diameter of Sprocket Hole	Φ Do	4.0 ± 0.2	
Length of Snipped Lead	L	11.0 Max	
Total Tape Thickness	t_1	0.7 ± 0.2	
Total Thickness, Tape and Lead Wire	t_2	1.7 Max	

BW Type

(Unit:mm)



B(Low voltage) TYPE

TYPE	Dmax	Tmax	Hmax	L (±0.4)	F	Φd (±0.05)
SVC 180D-05B SVC 220D-05B SVC 270D-05B SVC 330D-05B SVC 390D-05B SVC 470D-05B SVC 560D-05B SVC 680D-05B	7.5	4.5	16.0	3.5	5.0 (-0.2, +0.8)	0.50
SVC 180D-07B SVC 220D-07B SVC 270D-07B SVC 330D-07B SVC 390D-07B SVC 470D-07B SVC 560D-07B SVC 680D-07B	9.0	4.5	16.0	3.5	5.0 (-0.2, +0.8)	0.50
SVC 180D-10B SVC 220D-10B SVC 270D-10B SVC 330D-10B SVC 390D-10B SVC 470D-10B SVC 560D-10B SVC 680D-10B	13.5	5.0	22.5	3.5	7.5±1	0.70
SVC 180D-14B SVC 220D-14B SVC 270D-14B SVC 330D-14B SVC 390D-14B SVC 470D-14B SVC 560D-14B SVC 680D-14B	17.0	5.0	26.0	3.5	7.5±1	0.70
SVC 180D-20B SVC 220D-20B SVC 270D-20B SVC 330D-20B SVC 390D-20B SVC 470D-20B SVC 560D-20B SVC 680D-20B	23.0	6.0	33.0	3.5	10.0±1	0.70

A(High voltage) TYPE

TYPE	Dmax	Tmax	Hmax	L (±0.4)	F	Φd (±0.05)
SVC 820D-05A SVC 101D-05A SVC 121D-05A SVC 151D-05A SVC 201D-05A SVC 221D-05A SVC 241D-05A SVC 271D-05A SVC 361D-05A SVC 391D-05A SVC 431D-05A SVC 471D-05A SVC 561D-05A SVC 511D-05A	7.5	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 5.0 5.0 6.0 6.0 6.0 7.5	16.0	3.5	5.0 (-0.2, +0.8)	0.50

TYPE	Dmax	Tmax	Hmax	L (±0.4)	F	Φd (±0.05)
SVC 820D-07A SVC 101D-07A SVC 121D-07A SVC 151D-07A SVC 201D-07A SVC 221D-07A SVC 241D-07A SVC 271D-07A SVC 361D-07A SVC 391D-07A SVC 431D-07A SVC 471D-07A SVC 511D-07A SVC 561D-07A SVC 621D-07A SVC 681D-07A	9.0	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 5.0 5.0 6.0 6.0 6.0 7.5 7.5 7.5	18.0	3.5	5.0 (-0.2, +0.8); 7.5± 1	0.50; 0.7
SVC 820D-10A SVC 101D-10A SVC 121D-10A SVC 151D-10A SVC 201D-10A SVC 221D-10A SVC 241D-10A SVC 271D-10A SVC 361D-10A SVC 391D-10A SVC 431D-10A SVC 471D-10A SVC 511D-10A SVC 561D-10A SVC 621D-10A SVC 681D-10A SVC 751D-10A SVC 781D-10A SVC 821D-10A SVC 911D-10A SVC 102D-10A SVC 112D-10A	14.0	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 5.0 5.0 6.0 6.0 6.0 7.5 7.5 7.5 8.5 8.5 8.5 10.5 10.5 10.5	23.0	3.5	7.5± 1	0.70
SVC 820D-14A SVC 101D-14A SVC 121D-14A SVC 151D-14A SVC 201D-14A SVC 221D-14A SVC 241D-14A SVC 271D-14A SVC 361D-14A SVC 391D-14A SVC 431D-14A SVC 471D-14A SVC 511D-14A SVC 561D-14A SVC 621D-14A SVC 681D-14A SVC 751D-14A SVC 781D-14A SVC 821D-14A SVC 911D-14A SVC 102D-14A SVC 112D-14A SVC 182D-14A	17.5	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 5.0 5.0 6.0 6.0 6.0 7.5 7.5 7.5 8.5 8.5 8.5 10.5 10.5 10.5 15.0	27.0	3.5	7.5± 1	0.70
SVC 820D-20A SVC 101D-20A SVC 121D-20A SVC 151D-20A SVC 201D-20A SVC 221D-20A SVC 241D-20A SVC 271D-20A SVC 361D-20A SVC 391D-20A SVC 431D-20A SVC 471D-20A SVC 511D-20A SVC 561D-20A SVC 621D-20A SVC 681D-20A SVC 751D-20A SVC 781D-20A SVC 821D-20A SVC 911D-20A SVC 102D-20A SVC 112D-20A SVC 182D-20A	24.0	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 5.0 5.0 6.0 6.0 6.0 7.5 7.5 7.5 8.5 8.5 8.5 10.5 10.5 10.5 15.0	34.0	3.5	10 ±1	0.80

Specification Table

Device type	Chip Element size	MAXIMUM RATINGS					CHARACTERISTICS					SAFETY APPROVAL		
		Applied voltage		Transient			Nominal varistor peak voltage			Max. clamping voltage @ test current (8/23/μs)				
		RMS 50/60Hz (25℃)	DC (25℃)	Energy	Average power dissipation	Peak current (8/23μs)		Tolerance (± 10%)						
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Min (Volts)	Max (Volts)	Vc (Volts)	Ip (Amps)	UL	CSA	VDE
SVC 180D-05B	5	11	14	0.3	0.01	125	18	16	20	40	1	●		●
SVC 180D-07B	7			0.8	0.02	250				36	2.5	●		●
SVC 180D-10B	10			1.5	0.05	500				36	5	●		●
SVC 180D-14B	14			3.5	0.1	1000				36	10	●		●
SVC 180D-20B	20			10.0	0.2	2000				36	20	●		
SVC 220D-05B	5	14	18	0.4	0.01	125	22	20	24	48	1	●		●
SVC 220D-07B	7			0.9	0.02	250				43	2.5	●		●
SVC 220D-10B	10			2.0	0.05	500				43	5	●		●
SVC 220D-14B	14			4.0	0.1	1000				43	10	●		●
SVC 220D-20B	20			13.0	0.2	2000				43	20	●		
SVC 270D-05B	5	17	22	0.5	0.01	125	27	24	30	60	1	●		●
SVC 270D-07B	7			1.0	0.02	250				53	2.5	●		●
SVC 270D-10B	10			2.5	0.05	500				53	5	●		●
SVC 270D-14B	14			5.0	0.1	1000				54	10	●		●
SVC 270D-20B	20			15.0	0.2	2000				53	20	●		
SVC 330D-05B	5	20	26	0.6	0.01	125	33	30	36	73	1	●		●
SVC 330D-07B	7			1.2	0.02	250				65	2.5	●		●
SVC 330D-10B	10			3.0	0.05	500				65	5	●		●
SVC 330D-14B	14			6.0	0.1	1000				65	10	●		●
SVC 330D-20B	20			20.0	0.2	2000				65	20	●		
SVC 390D-05B	5	25	31	0.8	0.01	125	39	35	43	86	1	●		●
SVC 390D-07B	7			1.5	0.02	250				77	2.5	●		●
SVC 390D-10B	10			3.5	0.05	500				77	5	●		●
SVC 390D-14B	14			7.0	0.1	1000				77	10	●		●
SVC 390D-20B	20			24.0	0.2	2000				77	20	●		
SVC 470D-05B	5	30	38	1.0	0.01	125	47	42	52	104	1	●		●
SVC 470D-07B	7			1.8	0.02	250				93	2.5	●		●
SVC 470D-10B	10			4.5	0.05	500				93	5	●		●
SVC 470D-14B	14			8.5	0.1	1000				93	10	●		●
SVC 470D-20B	20			30.0	0.2	2000				93	20	●		
SVC 560D-05B	5	35	45	1.0	0.01	125	56	50	62	123	1	●		●
SVC 560D-07B	7			2.2	0.02	250				110	2.5	●		●
SVC 560D-10B	10			5.5	0.05	500				110	5	●		●
SVC 560D-14B	14			10.0	0.1	1000				110	10	●		●
SVC 560D-20B	20			35.0	0.2	2000				110	20	●		
SVC 680D-05B	5	40	56	1.2	0.01	125	68	61	75	150	1	●		●
SVC 680D-07B	7			2.5	0.02	250				135	2.5	●		●
SVC 630D-10B	10			6.5	0.05	500				135	5	●		●
SVC 680D-14B	14			12.0	0.1	1000				135	10	●		●
SVC 680D-20B	20			40.0	0.2	2000				135	20	●		
SVC 820D-05A	5	50	65	1.7	0.1	400	82	74	90	145	5	●		●
SVC 820D-07A	7			3.5	0.25	1200				135	10	●		●
SVC 820D-10A	10			8.0	0.4	2500				135	25	●		●
SVC 820D-14A	14			14.0	0.6	4500				135	50	●		●
SVC 820D-20A	20			27.0	1.0	6500				135	100	●		
SVC 101D-05A	5	60	85	2.0	0.1	400	100	90	110	175	5	●		●
SVC 101D-07A	7			4.0	0.25	1200				165	10	●		●
SVC 101D-10A	10			10.0	0.4	2500				165	25	●		●
SVC 101D-14A	14			18.0	0.6	4500				165	50	●		●
SVC 101D-20A	20			30.0	1.0	6500				165	100	●		

Specification Table

Device type	Chip Element size	MAXIMUM RATINGS					CHARACTERISTICS					SAFETY APPROVAL		
		Applied voltage		Transient			Nominal varistor peak voltage			Max. clamping voltage @ test current (8/23/µs)				
		RMS 50/60Hz (25℃)	DC (25℃)	Energy	Average power dissipation	Peak current (8/23µs)		Tolerance (± 10%)						
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Min (Volts)	Max (Volts)	Vc (Volts)	Ip (Amps)	UL	CSA	VDE
SVC 121D-05A	5			2.5	0.1	400				210	5	●		●
SVC 121D-07A	7			5.0	0.25	1200				200	10	●		●
SVC 121D-10A	10	75	100	12.0	0.4	2500	120	108	132	200	25	●		●
SVC 121D-14A	14			20.0	0.6	4500				200	50	●		●
SVC 121D-20A	20			40.0	1.0	6500				200	100	●		
SVC 151D-05A	5			3.0	0.1	400				260	5	●		●
SVC 151D-07A	7			6.0	0.25	1200				250	10	●		●
SVC 151D-10A	10	95	125	16.0	0.4	2500	150	135	165	250	25	●		●
SVC 151D-14A	14			25.0	0.6	4500				250	50	●		●
SVC 151D-20A	20			50.0	1.0	6500				250	100	●		
SVC 201D-05A	5			4.0	0.1	400				355	5	●	●	●
SVC 201D-07A	7			10.0	0.25	1200				340	10	●	●	●
SVC 201D-10A	10	130	170	20.0	0.4	2500	200	180	220	340	25	●	●	●
SVC 201D-14A	14			35.0	0.6	4500				340	50	●	●	●
SVC 201D-20A	20			70.0	1.0	6500				340	100	●	●	
SVC 221D-05A	5			4.5	0.1	400				380	5	●	●	●
SVC 221D-07A	7			10.0	0.25	1200				360	10	●	●	●
SVC 221D-10A	10	140	180	23.0	0.4	2500	220	198	242	360	25	●	●	●
SVC 221D-14A	14			40.0	0.6	4500				360	50	●	●	●
SVC 221D-20A	20			75.0	1.0	6500				360	100	●	●	
SVC 241D-05A	5			5.0	0.1	400				415	5	●	●	●
SVC 241D-07A	7			10.0	0.25	1200				395	10	●	●	●
SVC 241D-10A	10	150	200	25.0	0.4	2500	240	216	264	395	25	●	●	●
SVC 241D-14A	14			40.0	0.6	4500				395	50	●	●	●
SVC 241D-20A	20			80.0	1.0	6500				395	100	●	●	
SVC 271D-05A	5			6.0	0.1	400				475	5	●	●	●
SVC 271D-07A	7			12.0	0.25	1200				455	10	●	●	●
SVC 271D-10A	10	175	225	30.0	0.4	2500	270	243	297	455	25	●	●	●
SVC 271D-14A	14			50.0	0.6	4500				455	50	●	●	●
SVC 271D-20A	20			90.0	1.0	6500				455	100	●	●	
SVC 361D-05A	5			7.5	0.1	400				620	5	●	●	●
SVC 361D-07A	7			15.0	0.25	1200				595	10	●	●	●
SVC 361D-10A	10	230	300	35.0	0.4	2500	360	324	396	595	25	●	●	●
SVC 361D-14A	14			65.0	0.6	4500				595	50	●	●	●
SVC 361D-20A	20			120.0	1.0	6500				595	100	●	●	
SVC 391D-05A	5			8.0	0.1	400				675	5	●	●	●
SVC 391D-07A	7			17.0	0.25	1200				650	10	●	●	●
SVC 391D-10A	10	250	320	40.0	0.4	2500	390	351	429	650	25	●	●	●
SVC 391D-14A	14			70.0	0.6	4500				650	50	●	●	●
SVC 391D-20A	20			130.0	1.0	6500				650	100	●	●	
SVC 431D-05A	5			9.0	0.1	400				745	5	●	●	●
SVC 431D-07A	7			20.0	0.25	1200				710	10	●	●	●
SVC 431D-10A	10	275	350	45.0	0.4	2500	430	387	473	710	25	●	●	●
SVC 431D-14A	14			75.0	0.6	4500				710	50	●	●	●
SVC 431D-20A	20			140.0	1.0	6500				710	100	●	●	●
SVC 471D-05A	5			10.0	0.1	400				810	5	●	●	●
SVC 471D-07A	7			20.0	0.25	1200				775	10	●	●	●
SVC 471D-10A	10	300	385	45.0	0.4	2500	470	423	517	775	25	●	●	●
SVC 471D-14A	14			80.0	0.6	4500				775	50	●	●	●
SVC 471D-20A	20			150.0	1.0	6500				775	100	●	●	●

Specification Table

Device type	Chip Element size	MAXIMUM RATINGS					CHARACTERISTICS					SAFETY APPROVAL		
		Applied voltage		Transient			Nominal varistor peak voltage			Max. clamping voltage @ test current (8/23μs)				
		RMS 50/60Hz (25℃)	DC (25℃)	Energy	Average power dissipation	Peak current (8/23μs)		Tolerance (± 10%)						
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Min (Volts)	Max (Volts)	Vc (Volts)	Ip (Amps	U L	C S A	V D E
SVC 511D-07A SVC 511D-10A SVC 511D-14A	7 10 14	320	410	20.0 45.0 85.0	0.25 0.4 0.6	1200 2500 4500	510	459	561	840 840 840	10 25 50	● ● ●	● ● ●	● ● ●
SVC 561D-07A SVC 561D-10A SVC 561D-14A SVC 561D-20A	7 10 14 20	350	460	20.0 45.0 85.0 150.0	0.25 0.4 0.6 1.0	1200 2500 4500 6500	560	504	616	920 920 920 920	10 25 50 100	80 160 260 480	● ● ● ●	● ● ● ●
SVC 621D-07A SVC 621D-10A SVC 621D-14A SVC 621D-20A	07 10 14 20	385	550	20.0 45.0 85.0 150.0	0.25 0.4 0.6 1.0	1200 2500 4500 6500	620	558	682	1025 1025 1025 1025	10 25 50 100	55 150 240 450	● ● ● ●	● ● ● ●
SVC 681D-07A SVC 681D-10A SVC 681D-14A SVC 681D-20A	07 10 14 20	420	560	20.0 45.0 90.0 160.0	0.25 0.4 0.6 1.0	1200 2500 4500 6500	680	612	748	1120 1120 1120 1120	10 25 50 100	50 135 220 420	● ● ● ●	● ● ● ●
SVC 751D-10A SVC 751D-14A SVC 751D-20A	10 14 20	460	615	50.0 100.0 175.0	0.4 0.6 1.0	2500 4500 6500	750	675	825	1240 1240 1240	25 50 100	● ● ●	● ● ●	● ● ●
SVC 781D-10A SVC 781D-14A SVC 781D-20A	10 14 20	485	640	50.0 105.0 180.0	0.4 0.6 1.0	2500 4500 6500	780	702	858	1290 1290 1290	25 50 100	● ● ●	● ● ●	● ● ●
SVC 821D-10A SVC 821D-14A SVC 821D-20A	10 14 20	510	670	55.0 110.0 190.0	0.4 0.6 1.0	2500 4500 6500	820	738	902	1355 1355 1355	25 50 100	● ● ●	● ● ●	● ● ●
SVC 911D-10A SVC 911D-14A SVC 911D-20A	10 14 20	550	745	60.0 120.0 215.0	0.4 0.6 1.0	2500 4500 6500	910	819	1001	1500 1500 1500	25 50 100	● ● ●	● ● ●	● ● ●
SVC 102D-10A SVC 102D-14A SVC 102D-20A	10 14 20	625	825	65.0 130.0 230.0	0.4 0.6 1.0	2500 4500 6500	1000	900	1100	1650 1650 1650	25 50 100	● ● ●	● ● ●	● ● ●
SVC 112D-10A SVC 112D-14A SVC 112D-20A	10 14 20	680	895	70.0 140.0 250.0	0.4 0.6 1.0	2500 4500 6500	1100	990	1210	1815 1815 1815	25 50 100	● ● ●	● ● ●	● ● ●
SVC 182D-14A SVC 182D-20A	14 20	1000	1465	240.0 400.0	0.6 1.0	4500 6500	1800	1620	1980	2970 2970	50 100	● ●	● ●	● ●

VARISTOR PACKING SPECIFICATION

1. PACKING QUANTITY

1-1. BULK

DIA [∅]	PACKING Q'TY [pcs]			
	L/W Length	VINYL	In Box	Out Box
05, 07	Long, Short	500 +2, -0	7,500	15,000
	Long : 391-07, 471-07	500 +2, -0	5,000	10,000
10, 14	Short	400 +1, -0	4,000	8,000
	Long	400 +1, -0	2,000	4,000
	911-14	200 +1, -0	1,000	2,000
	182-14	150 +1, -0	750	1,500
	621-14BW7	200 +1, -0	2,000	4,000
	621-14TW7	200 +1, -0	2,000	4,000
	621-14TM7, 621-14BM7	200 +1, -0	1,600	3,200
	621-14CM7	200 +1, -0	1,000	2,000
20	Long, Short, TW1, TM1	200 +1, -0	1,000	2,000

1-2. TAPING

CATEGORY	F [mm]	P [mm]	DIA [∅]	IBR [mm]	PACKING Q'TY [pcs]		REMARK
					Flat Box	Out Box	
Varistor	5.0	12.7	5.0 ~ 7.0	52	1000 +5,-0	5,000	
	7.5	15.0	Above 10.0		1000 +5,-0	5,000	
		30.0			500 +5,-0	2,500	
		25.4			500 +5,-0	2,500	

2. PACKING BOX DIMENSIONS

PACKING STYLE		CATEGORY	L × W × H [mm]
BULK	IBB (Inner Box Bulk)	IBB 140	250 × 235 × 130
	OBB (Out Box Bulk)	OBB 150 (IBB 140 × 2)	485 × 265 × 145
TAPING	INNER BOX	IBR 52	325 × 280 × 55
	OUT BOX	OBR 52 (IBR 52 × 5)	340 × 310 × 290

3) STACKING BOX (Maximum)

PACKING STYLE	INBOX	OUTBOX
BULK	6	6
TAPING	10	6

▣ MATERIAL LIST

No	Material Name	Substance	Hazardous Substance Existences						Remarks
			Pb	Hg	Cr	Cr^{+6}	PBB	PBDE	
1	Varistor Powder	ZnO	X	X	X	X	X	X	
2	Ag Paste	Ag	X	X	X	X	X	X	
3	Solder	Sn, Ag, Cu	X	X	X	X	X	X	
4	Epoxy Resin	Epoxy	X	X	X	X	X	X	
5	Lead Wire	Cu, Sn, Fe	X	X	X	X	X	X	Plating thickness: min 3μm. (material : tin)

※ SAFETY APPROVAL FILE NO

- UL FILE No : E332621 (Surge Protective Device)

- UL FILE No : E154171(Circuit Component Isolated Loop Circuit Protectors)

- CSA C221331 Certificate No : 1513084 (Surge Protective Device)

- VDE IEC 61051-2:1991/AMD1:2009 Certificate No : 116012

※ Operating ambient temperature : -40^{O}C to +85^{O}C

※ Storage temperature : -40^{O}C to +125^{O}C

▣ Varistor Label Type

▣ Varistor Label – Bulk Style

BULK TYPE		
PLASTIC	**INBOX**	**OUTBOX**
		
Varistor Bulk Plastic Style	**Varistor Bulk Inbox Style**	**Varistor Bulk Outbox Style**

▣ Varistor Label – Taping Style

TAPING TYPE		
PLASTIC	**INBOX**	**OUTBOX**
		
	Varistor Taping Inbox Style	**Varistor Taping Outbox Style**