

SVC Series Varistors

Introduction

SVC series Varistors are gapless ceramic surge absorbers of a new type made of metal oxide which is designed to protect various kinds of electronic devices and semiconducting elements from surges.

Features

- High discharge current capability up to 4000 Amps.
- Excellent clamping characteristics.
- Fast response time under 50 nanoseconds.
- Improve Product safety
- UL, CSA, VDE recognized

*special specification like a Automobile, Medical, Military, Aviation should be discuss with our sales representatives

How to Order

SVC 471 D-14A FF 7

① ② ③ ④ ⑤ ⑥ ⑦

1 Basic Type

ZnO Varistor

2 Varistor Nominal Voltage

(The first two digit indicate significant digits)
(The 3rd digit indicate the number of zeros following)

4 Chip Element Size(Dia)

05 : Ø5mm, 07 : Ø7mm,
10 : Ø10mm, 14 : Ø14mm,
20 : Ø20mm

5 Classification

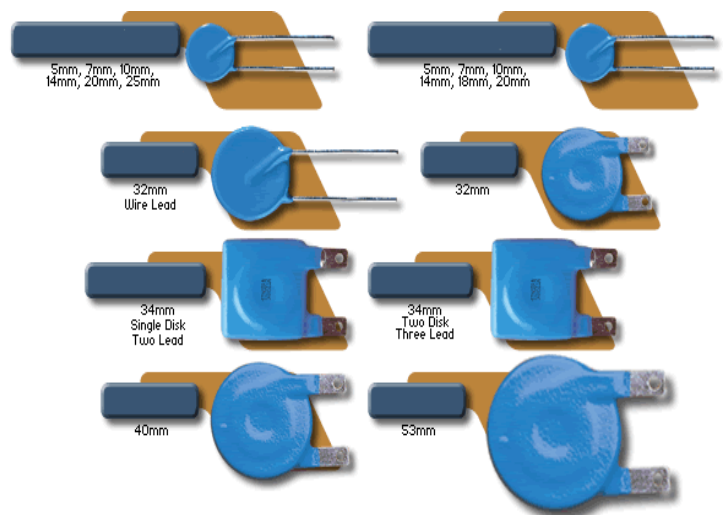
A : High Voltage(82V and above)
B : Low Voltage(less then 68V)

3 Style

D : Disk Type Varistor

6 Packing Style & Lead Variation

7 Lead Spacing & Pitch of Component



Packing Style		Lead Variation		Packing Style		Lead Variation	
F	Taping Type Flat Pack	S	Straight Type	B	Bulk	S	Straight Long Type
		K	In-Kink Type			W	Kink Short Type
		F	Out-Kink Type			K	Kink Long Type
						L	Kink Short Type
						N	Straight Short Type

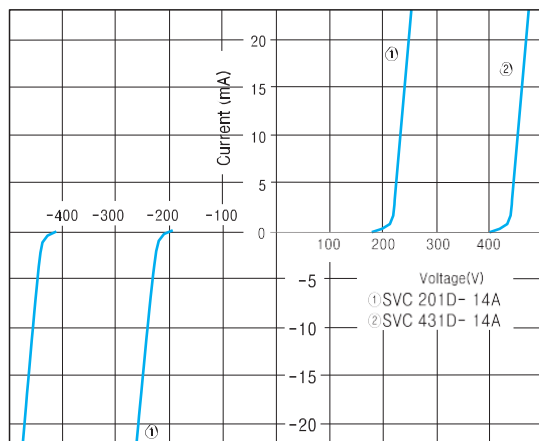
Suffix Code

Taping Type			Bulk Type	
Code	Lead Spacing(mm)	Pitch of Component(mm)	Code	Lead Spacing(mm)
5	5.0	12.7	5	5.0
7	7.5	15.0	7	7.5
8	7.5	30.0	1	10.0
9	7.5	25.4		
1	10.0	30.0		

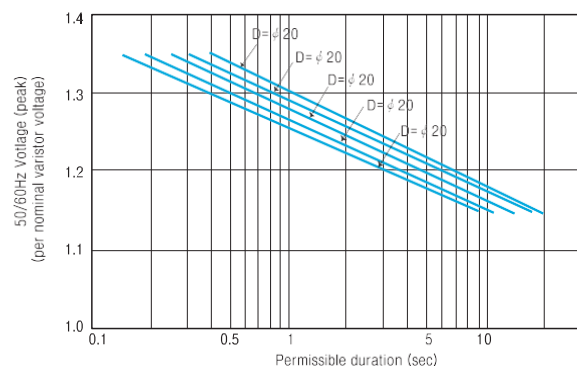
SVC Characteristic Curves

V - I Curve

·Small - current region of V - I curve

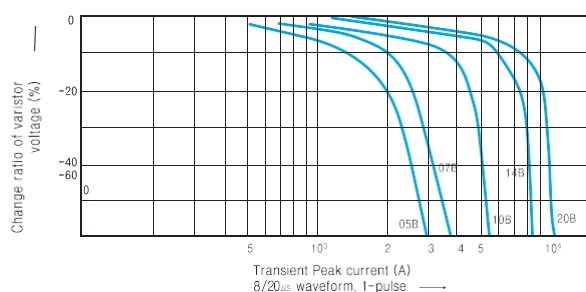


·Temporary power frequency over voltage capability



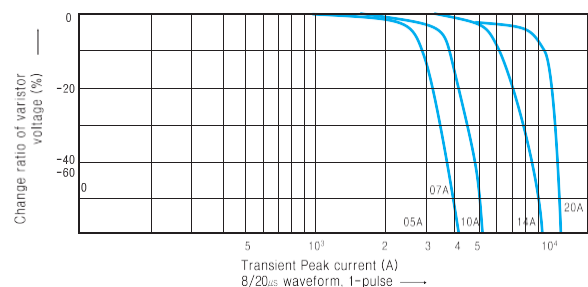
B Type

·Withstand discharge impulse current characteristics(Typical)



A Type

·Withstand discharge impulse current characteristics(Typical)



Device Type	Chip Element Size	Maximum Ratings					Characteristics				
		Applied Voltage		Transient			Nominal Varistor ④ Peak Voltage			Max. Clamping ⑤ Voltage @ Test Current(8/20 μ s)	
		RMS 50/60Hz (25°C)	DC (25°C)	Energy ②	Average Power Dissipation	Peak ③ Current (8/20 μ s)					
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Tolerance		Vc (Volts)	Ip (Amps)
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			10.5	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 680D-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

Device Type	Chip Element Size	Maximum Ratings					Characteristics				
		Applied Voltage		Transient			Nominal Varistor ④ Peak Voltage			Max. Clamping ⑤ Voltage @ Test Current(8/20 μ s)	
		RMS 50/60Hz (25°C)	DC (25°C)	Energy ②	Average Power Dissipation	Peak ③ Current (8/20 μ s)					
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Tolerance		Vc (Volts)	Ip (Amps)
								Min.(Volts)	Max.(Volts)		
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	185	225	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	247	303	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-07A	5			7.5	0.1	400				620	5
SVC 361D-10A	7			15.0	0.25	1200				595	10
SVC 361D-14A	10	230	300	35.0	0.4	2500	360	324	396	595	25
SVC 361D-20A	14			65.0	0.6	4500				595	50
	20			120.0	1.0	6500				595	100
SVC 391D-05A	5			8.0	0.1	400				675	2.55
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				754	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

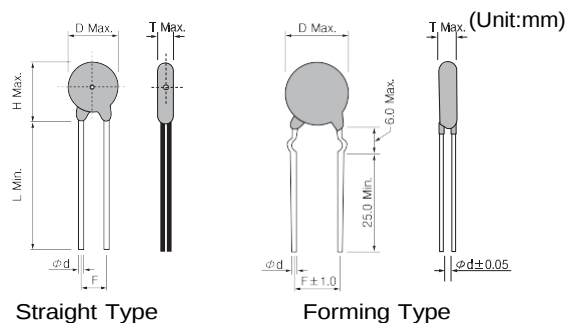
Device Type	Chip Element Size	Maximum Ratings					Characteristics				
		Applied Voltage		Transient			Nominal Varistor ^④ Peak Voltage		Max. Clamping ^⑤ Voltage @ Test Current(8/20 μ s)		
		RMS 50/60Hz (25°C)	DC (25°C)	Energy ^②	Average Power Dissipation	Peak ^③ Current (8/20 μ s)					
	Dia (mm)	Vacm (Volts)	Vdcm (Volts)	Wtm (Joules)	Ptam (Watts)	Itm (Amps)	Vnom (Volts)	Tolerance		Vc (Volts)	Ip (Amps)
								Min.(Volts)	Max.(Volts)		
SVC 561D-10A	10			45.0	0.4	2500				920	25
SVC 561D-14A	14	350	460	85.0	0.6	4500	560	504	616	920	50
SVC 561D-20A	20			150.0	1.0	8000				920	100
SVC 621D-10A	10			45.0	0.4	2500				1025	25
SVC 621D-14A	14	385	550	85.0	0.6	4500	620	558	682	1025	50
SVC 621D-20A	20			150.0	1.0	8000				1025	100
SVC 681D-10A	10			45.0	0.4	2500				1120	25
SVC 681D-14A	14	420	560	90.0	0.6	4500	680	612	748	1120	50
SVC 681D-20A	20			160.0	1.0	8000				1120	100
SVC 751D-10A	10			50.0	0.4	2500				1240	25
SVC 751D-14A	14	460	615	100.0	0.6	4500	750	675	825	1240	50
SVC 751D-20A	20			175.0	1.0	8000				1240	100
SVC 781D-10A	10			50.0	0.4	2500				1290	25
SVC 781D-14A	14	485	640	105.0	0.6	4500	780	702	858	1290	50
SVC 781D-20A	20			180.0	1.0	6500				1290	100
SVC 821D-10A	10			55.0	0.4	2500				1355	25
SVC 821D-14A	14	510	670	110.0	0.6	4500	820	738	902	1355	50
SVC 821D-20A	20			190.0	1.0	6500				1355	100
SVC 911D-10A	10			60.0	0.4	2500				1500	25
SVC 911D-14A	14	550	745	120.0	0.6	4500	910	819	1001	1500	50
SVC 911D-20A	20			215.0	1.0	6500				1500	100
SVC 102D-10A	10			65.0	0.4	2500				1650	25
SVC 102D-14A	14	625	825	130.0	0.6	4500	1000	900	1100	1650	50
SVC 102D-20A	20			230.0	1.0	6500				1650	100
SVC 112D-10A	10			70.0	0.4	2500				1815	25
SVC 112D-14A	14	680	895	140.0	0.6	4500	1100	990	1210	1815	50
SVC 112D-20A	20			250.0	1.0	6500				1815	100
SVC 182D-14A	14	1000	1465	24.0	0.6	4500	1800	1620	1980	2970	50
SVC 182D-20A	20			400.0	1.0	6500				2970	100

- ① The waveform of the maximum DC applied voltage is flat. When a ripple voltage as from a rectifier source is supplied make sure that the peak voltage is kept under the Vdcm. An AC applied voltage(50/60Hz) form a sine wave shape. When the distortion in the waveform is extensive make sure that the peak voltage is less than $\sqrt{2}$ times the Vacm.
- ② Energy : Wtm
Transient energy ratings are given in the Wtm column of the specifications in Joules(watt-second). The rating is the maximum allowable energy for a single impulse of 2ms square-waveform current with continuous voltage applied. Energy ratings are based on a shift of Vnom of less than $\pm 10\%$ of initial value.
- ③ Transient peak current(Itm)
The peak current rating. Itm. of varistor is based on an 8/20 μ s test impulse wave shape. This peak current is the maximum peak current in which the nominal varistor voltage shift does not exceed $\pm 10\%$ when the test impulse

is applied once at 5 minutes intervals.

- ④ Nominal varistor voltage : Vnom
Indicates the varistor terminal voltage measured with a 1mA DC applied. -0.1mA DC in the case of the 0.5A and 05B series.
- ⑤ Maximum clamping voltage : Vc
Indicates the peak terminal voltage measured with an 8/20 μ s impulse current applied.
- Operating ambient temperature : -40°C to +80°C
 - Storage temperature : -40°C to +125°C
 - UL and CSA recognized(UL 1449, UL 497B or UL 1414, CSA)
SVC varistors have been tested by Underwriter's Laboratories, Inc. and Canadian Standards Association
UL File No. E97754, E151195, E154171.
CSA File No. LR78923.

Dimensions



B Type

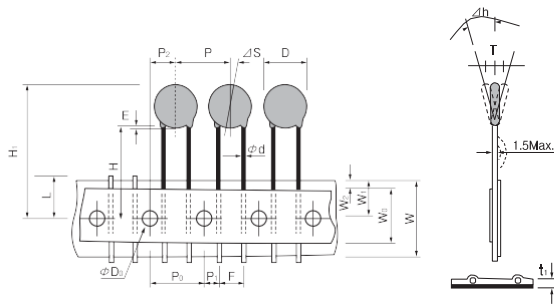
Type	T Max.	D Max.	H Max.	L Min.	F	Ød
SVC 180D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 220D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 270D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 330D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 390D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 470D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 560D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 680D-05B	4.5	7.5	10.0	25	5.0	0.50
SVC 180D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 220D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 270D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 330D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 390D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 470D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 560D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 680D-07D	4.5	9.0	10.0	25	5.0	0.50
SVC 180D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 220D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 270D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 330D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 390D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 470D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 560D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 680D-10B	5.0	13.5	16.5	25	7.5	0.70
SVC 180D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 220D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 270D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 330D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 390D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 470D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 560D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 680D-14B	5.0	17.0	20.0	25	7.5	0.70
SVC 180D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 220D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 270D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 330D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 390D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 470D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 560D-20B	6.0	23.0	27.0	30	10.0	0.80
SVC 680D-20B	6.0	23.0	27.0	30	10.0	0.80

Type	T Max.	D Max.	H Max.	L Min.	F	Ød
SVC 820D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 101D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 121D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 151D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 201D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 221D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 241D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 271D-05A	4.5	7.0	10.0	25	5.0	0.50
SVC 361D-05A	5.0	7.0	10.0	25	5.0	0.50
SVC 391D-05A	5.0	7.0	10.0	25	5.0	0.50
SVC 431D-05A	6.0	7.0	10.0	25	5.0	0.50

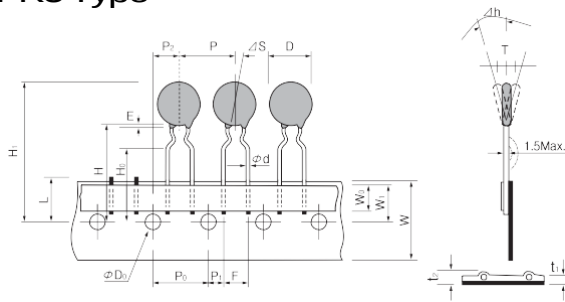
A Type

Type	T Max.	D Max.	H Max.	L Min.	F	Ød
SVC 471D-05A	6.0	7.0	10.0	25	5.0	0.50
SVC 820D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 101D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 121D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 151D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 201D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 221D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 241D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 271D-07A	4.5	9.0	12.0	25	5.0	0.50
SVC 361D-07A	5.0	9.0	12.0	25	5.0	0.50
SVC 391D-07A	5.0	9.0	12.0	25	5.0	0.50
SVC 431D-07A	6.0	9.0	12.0	25	5.0	0.50
SVC 471D-07A	6.0	9.0	12.0	25	5.0	0.50
SVC 820D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 101D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 121D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 151D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 201D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 221D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 241D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 271D-10A	4.5	14.0	17.0	25	7.5	0.70
SVC 361D-10A	5.0	14.0	17.0	25	7.5	0.70
SVC 391D-10A	5.0	14.0	17.0	25	7.5	0.70
SVC 431D-10A	6.0	14.0	17.0	25	7.5	0.70
SVC 561D-10A	7.5	14.0	17.0	25	7.5	0.70
SVC 621D-10A	7.5	14.0	17.0	25	7.5	0.70
SVC 681D-10A	7.5	14.0	17.0	25	7.5	0.70
SVC 751D-10A	8.5	14.0	17.0	25	7.5	0.70
SVC 781D-10A	8.5	14.0	17.0	25	7.5	0.70
SVC 821D-10A	8.5	14.0	17.0	25	7.5	0.70
SVC 911D-10A	10.5	14.0	17.0	25	7.5	0.70
SVC 102D-10A	10.5	14.0	17.0	25	7.5	0.70
SVC 112D-10A	10.5	14.0	17.0	25	7.5	0.70
SVC 820D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 101D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 121D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 151D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 201D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 221D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 241D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 271D-14A	4.5	17.5	21.0	25	7.5	0.70
SVC 361D-14A	5.0	17.5	21.0	25	7.5	0.70
SVC 391D-14A	5.0	17.5	21.0	25	7.5	0.70
SVC 431D-14A	6.0	17.5	21.0	25	7.5	0.70
SVC 471D-14A	6.0	17.5	21.0	25	7.5	0.70
SVC 561D-14A	7.5	17.5	21.0	25	7.5	0.70
SVC 621D-14A	7.5	17.5	21.0	25	7.5	0.70
SVC 681D-14A	7.5	17.5	21.0	25	7.5	0.70
SVC 751D-14A	8.5	17.5	21.0	25	7.5	0.70
SVC 781D-14A	8.5	17.5	21.0	25	7.5	0.70
SVC 821D-14A	8.5	17.5	21.0	25	7.5	0.70
SVC 911D-14A	10.5	17.5	21.0	25	7.5	0.70
SVC 102D-14A	10.5	17.5	21.0	25	7.5	0.70
SVC 112D-14A	10.5	17.5	21.0	25	7.5	0.70
SVC 182D-14A	15.0	17.5	21.0	25	7.5	0.70
SVC 820D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 101D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 121D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 151D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 201D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 221D-20A	4.5	23.0	28.0	30	10.0	0.70
SVC 241D-20A	4.5	24.0	28.0	30	10.0	0.70
SVC 271D-20A	4.5	24.0	28.0	30	10.0	0.70
SVC 361D-20A	5.0	24.0	28.0	30	10.0	0.70
SVC 391D-20A	5.0	24.0	28.0	30	10.0	0.70
SVC 431D-20A	6.0	24.0	28.0	30	10.0	0.70
SVC 471D-20A	6.0	24.0	28.0	30	10.0	0.70
SVC 561D-20A	7.5	24.0	28.0	30	10.0	0.80
SVC 621D-20A	7.5	24.0	28.0	30	10.0	0.80
SVC 681D-20A	7.5	24.0	28.0	30	10.0	0.80
SVC 751D-20A	8.5	24.0	28.0	30	10.0	0.80
SVC 781D-20A	8.5	24.0	28.0	30	10.0	0.80
SVC 821D-20A	8.5	24.0	28.0	30	10.0	0.80
SVC 911D-20A	10.5	24.0	28.0	30	10.0	0.80
SVC 102D-20A	10.5	24.0	28.0	30	10.0	0.80
SVC 112D-20A	10.0	24.0	28.0	30	10.0	0.80
SVC 182D-20A	15.0	24.0	28.0	30	10.0	0.80

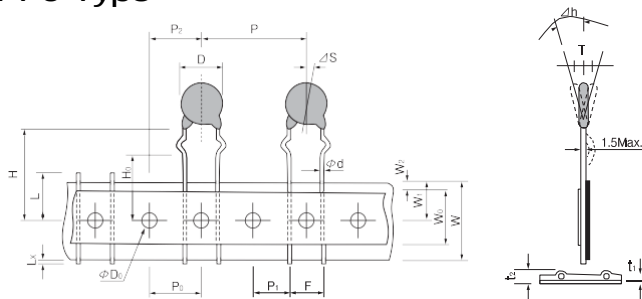
FS5 Type



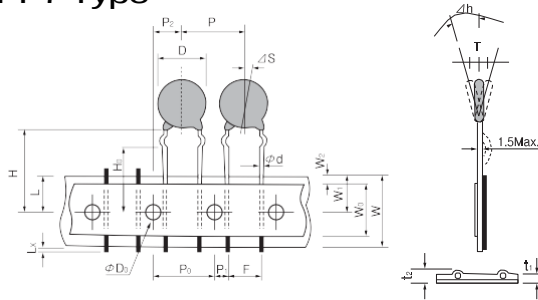
FK5 Type



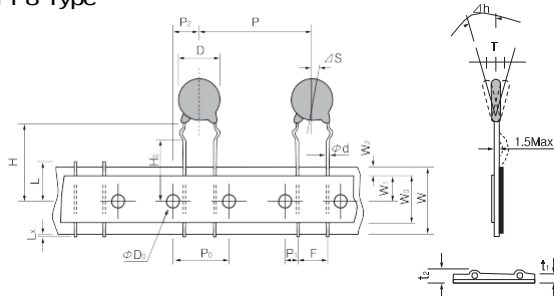
FF9 Type



FF7 Type



FF8 Type



Item	Code	Dimensions (mm)	
		FS5 or FK5	FF9
Body Diameter	D	See page 121	
Body Thickness	T	See page 121	
Lead Diameter	ϕd	$0.5/0.50 \pm 0.05$	$0.6-0.8 \pm 0.05$
Pitch of sprocket Hole	P0	12.7 ± 0.3	
Pitch of Component	P	6.35 ± 1.3	25.4 ± 1.0
Lead Length from Hole Center Lead	P1	3.85 ± 0.7	8.95 ± 1.0
Lead Length from Hole Center to Component Center	P2	6.35 ± 1.3	12.7 ± 1.5
Lead Spacing	F	$5.0^{+0.81}_{-0.20}$	7.5 ± 1.0
Deviation Along Tape. Left or Right	ΔS	0 ± 1.0	
Deviation Across Tape	Δh	0 ± 2.0	
Carrier Tape Width	W	$18^{+0.1}_{-0.5}$	
Hold Down Tape Width	W0	5.0Min.	9.0Min.
Position of Sprocket Hole	W1	9.0 ± 0.5	
Hole Down Tape Position	W2	3.0Max.	
Lead-Wire Clinch Height	H0	16.0 ± 0.5	
Height of Component Hole	H	$20.0^{+1.5}_{-1.0}$	
Component Height	H1	32.25Max.	
Diameter of Sprocket Hole	ϕD_0	4.0 ± 0.2	
Length of Snipped Lead	L	11.0Max.	
Total Tape Thickness	t_1	0.7 ± 0.2	
Total Thickness Tape and Lead Wire	t_2	1.5Max.	1.7Max.
Length of Snipped Lead	Lx	1.0Max.	

Item	Code	Dimensions (mm)	
		FF7	FF8
Body Diameter	D	See page 121	
Body Thickness	T	See page 121	
Lead Diameter	ϕd	$0.6-0.8 \pm 0.05$	
Pitch of sprocket Hole	P0	15.0 ± 0.3	
Pitch of Component	P	15.0 ± 0.3	30.0 ± 1.0
Lead Length from Hole Center Lead	P1	3.75 ± 1.0	
Lead Length from Hole Center to Component Center	P2	7.50 ± 1.5	
Lead Spacing	F	7.5 ± 1.0	
Deviation Along Tape. Left or Right	ΔS	0 ± 1.0	
Deviation Across Tape	Δh	0 ± 2.0	
Carrier Tape Width	W	$18.0^{+0.1}_{-0.5}$	
Hold Down Tape Width	W0	5.0Min.	
Position of Sprocket Hole	W1	9.0 ± 0.5	
Hole Down Tape Position	W2	3.0Max.	
Lead-Wire Clinch Height	H0	16.0 ± 0.5	
Height of Component Hole	H	$20.0^{+1.5}_{-1.0}$	
Component Height	H1	40.00Max.	
Diameter of Sprocket Hole	ϕD_0	4.0 ± 0.2	
Length of Snipped Lead	L	11.0Max.	
Total Taps Thickness	t_1	0.7 ± 0.2	
Total Thickness Tape and Lead Wire	t_2	1.7Max.	
Length of Snipped Lead	Lx	1.0Max.	

Char, Curves and Lifetime

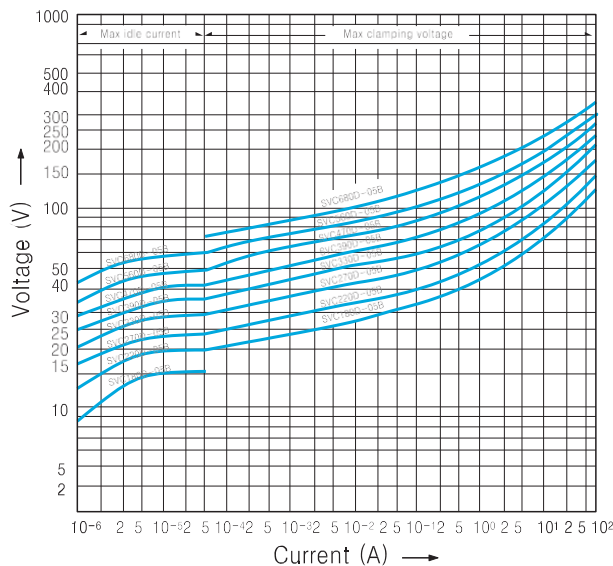
Transient V-I Charactic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : 8/20 μ s

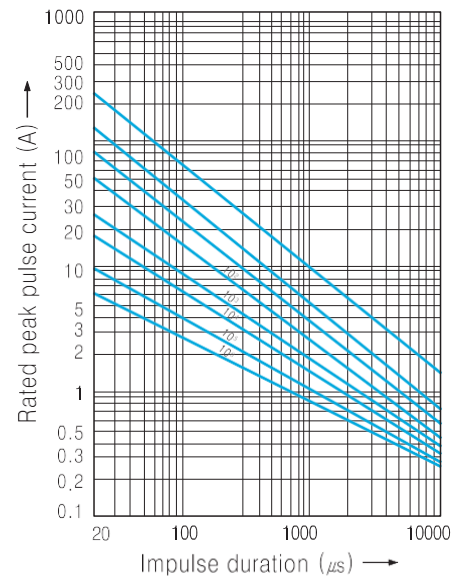
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval
3 to 10-pulse : 2-minute interval
Up to 10^6 - pulse : 10-second interval

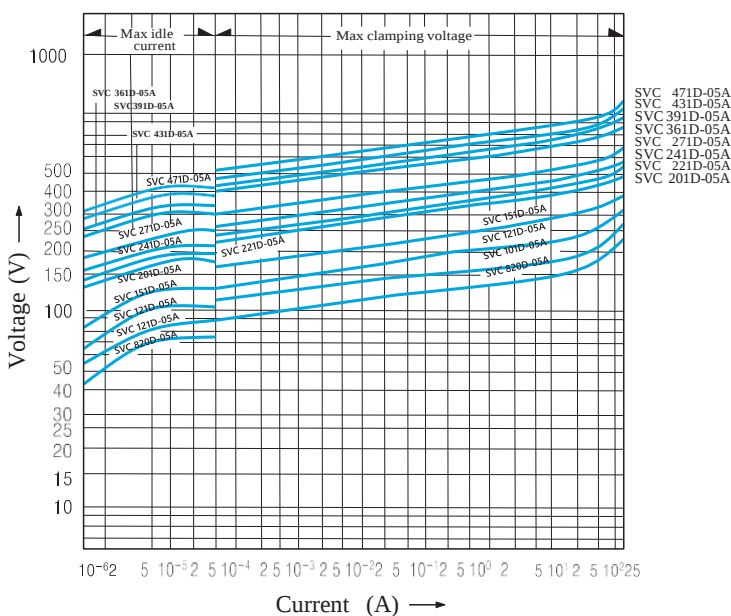
05B(SVC 180D-05B to SVC 680D-05B)



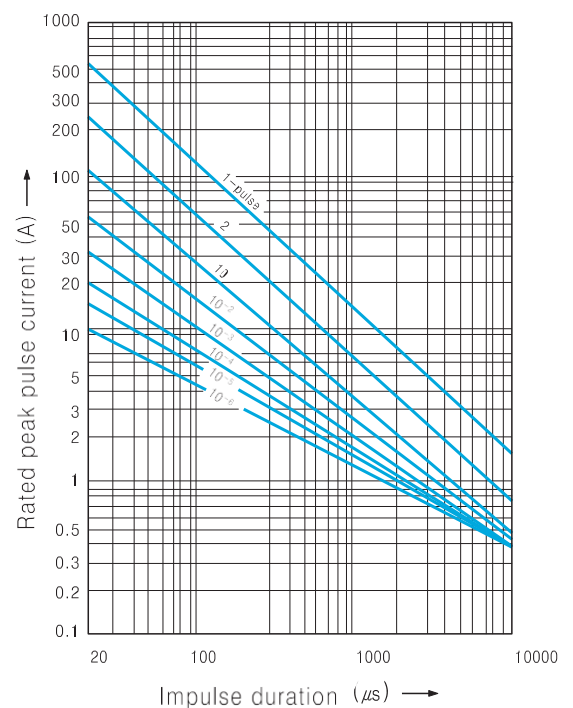
05B(SVC 180D-05B to SVC 680D-05B)



05A(SVC 820D-05A to SVC 471D-05A)



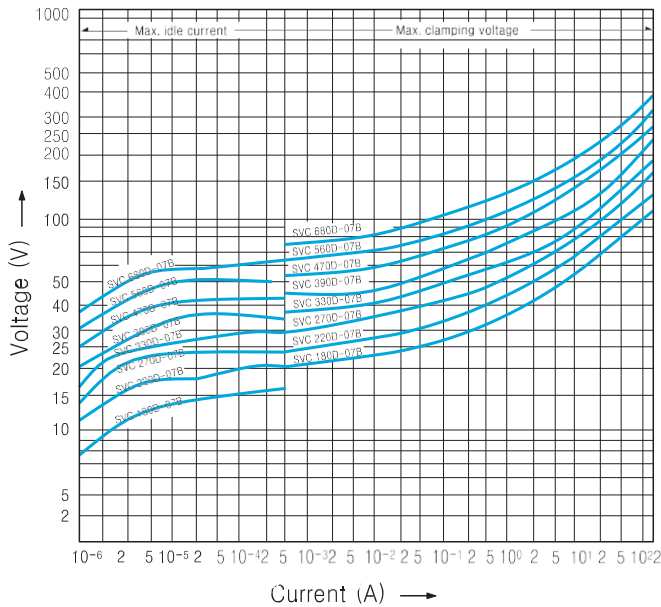
05A(SVC 820D-05A to SVC 471D-05A)



Transient V-I Characteristic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : 8/20 μ s

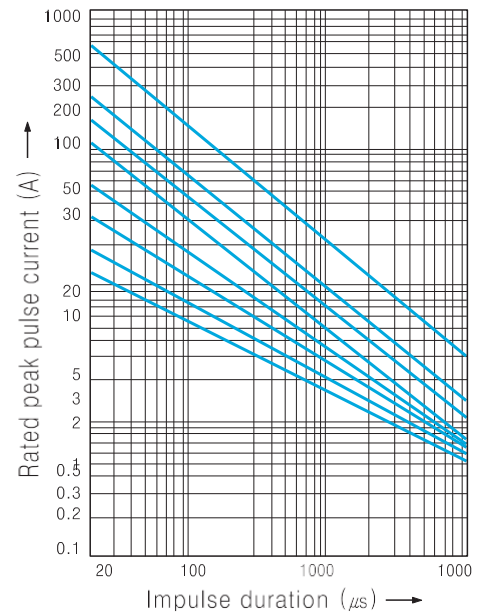
07B(SVC 180D-07B to SVC 680D-07B)



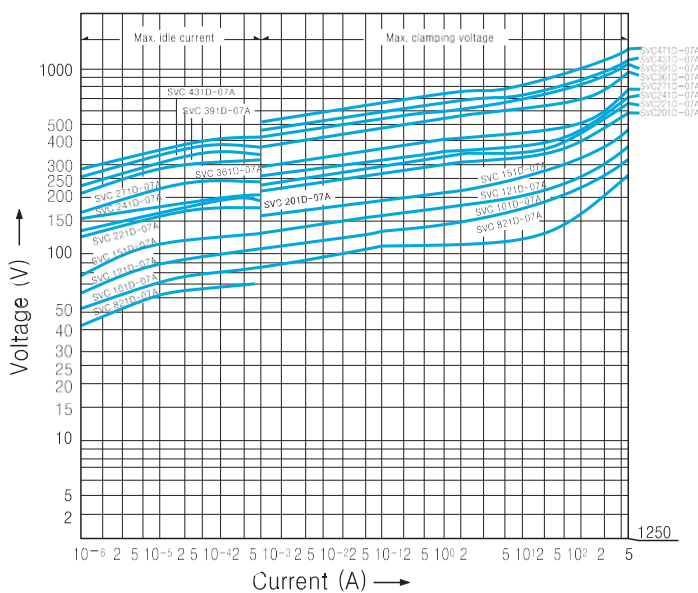
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval
3 to 10-pulse : 2-minute interval
Up to 10^6 -pulse : 10-second interval

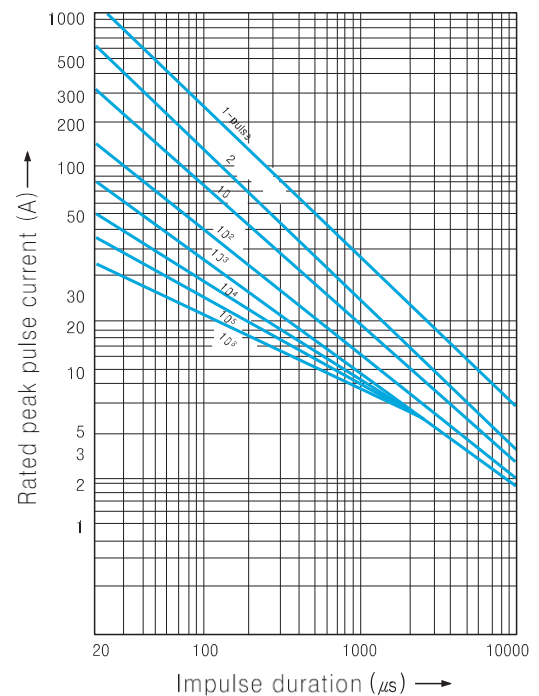
07B(SVC 180D-07B to SVC 680D-07B)



07A(SVC 820D-07A to SVC 471D-07A)



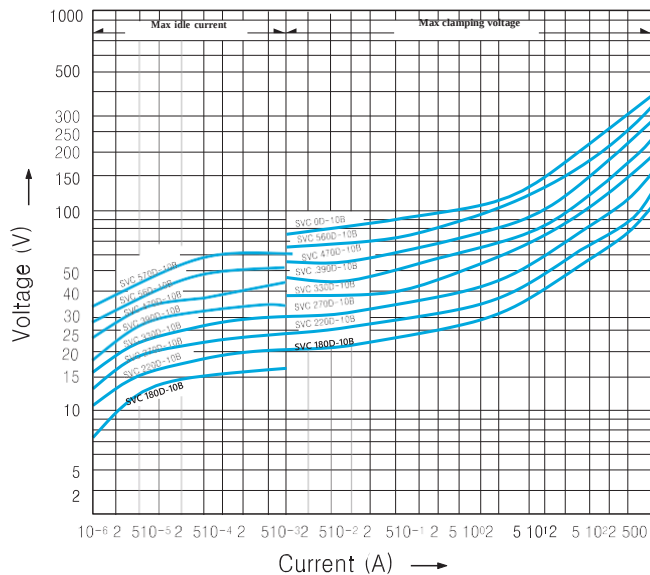
07A(SVC 820D-07A to SVC 471D-07A)



Transient V-I Characteristic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : 8/20 μ s

10B(SVC 180D-10B to SVC 680D-10B)



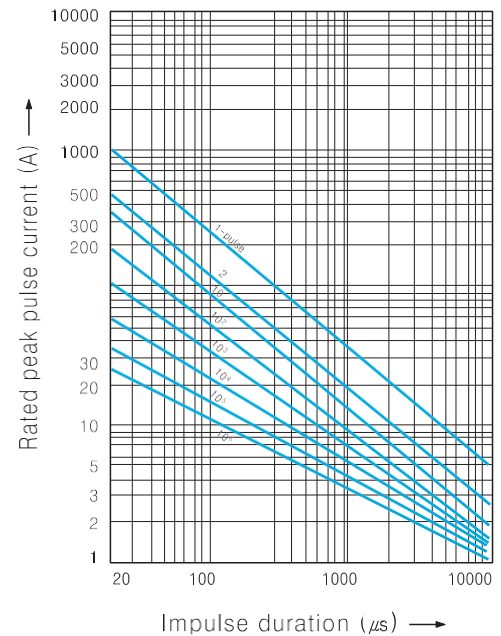
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval

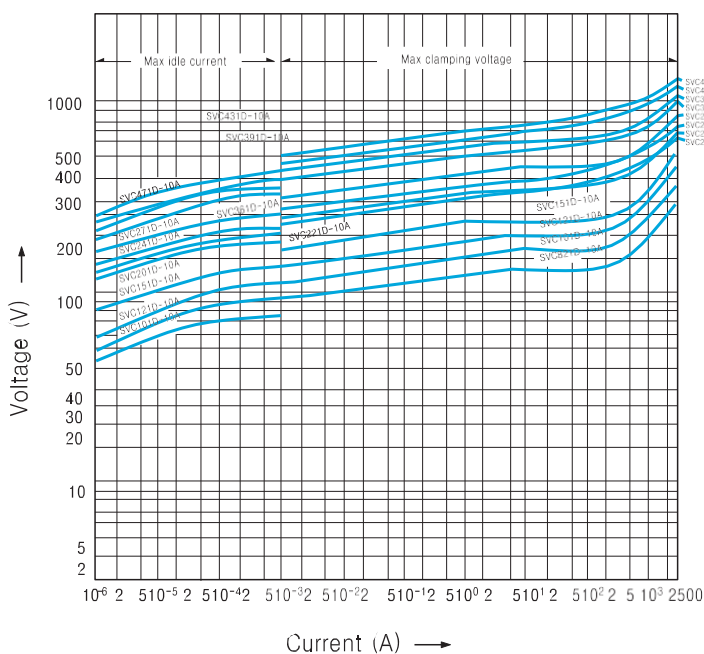
3 to 10-pulse : 2-minute interval

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

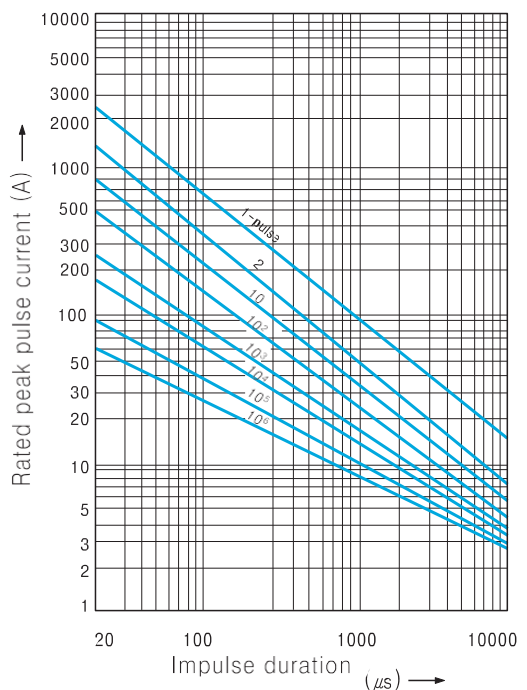
10B(SVC 180D-10B to SVC 680D-10B)



10A(SVC 820D-10A to SVC 471D-10A)



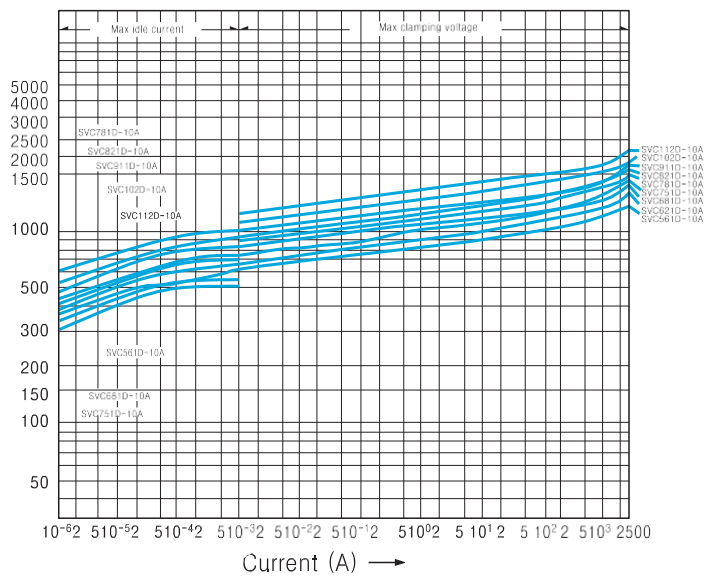
10A(SVC 820D-10A to SVC 471D-10A)



Transient V-I Characteristic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : $8/20 \mu\text{s}$

10A(SVC 561D-10A to SVC 112D-10A)



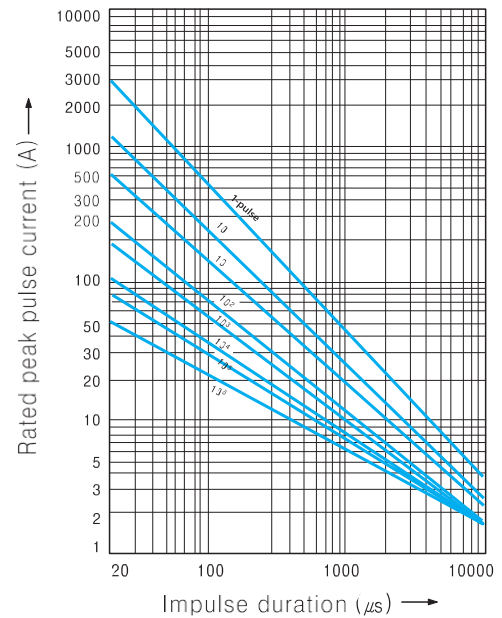
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval

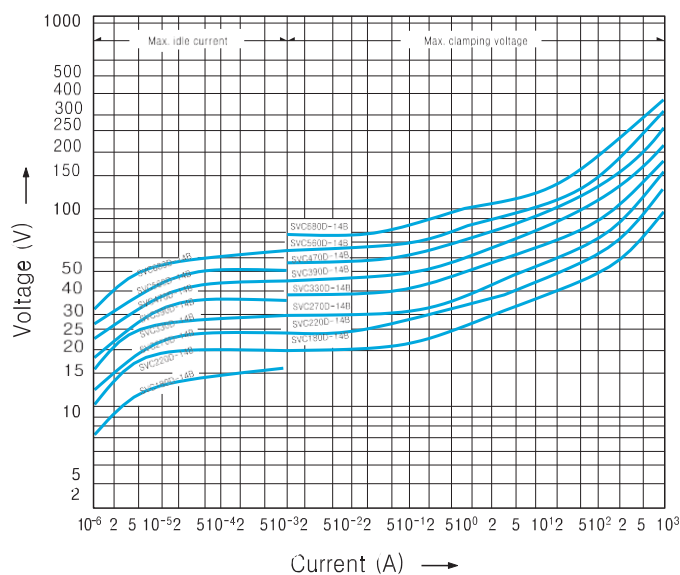
3 to 10-pulse : 2-minute interval

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

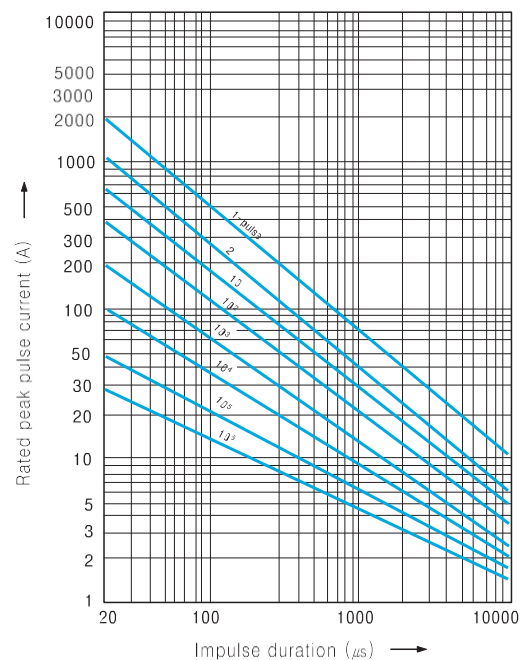
10A(SVC 561D-10A to SVC 112D-10A)



14B(SVC 180D-14B to ENC 680D-14B)



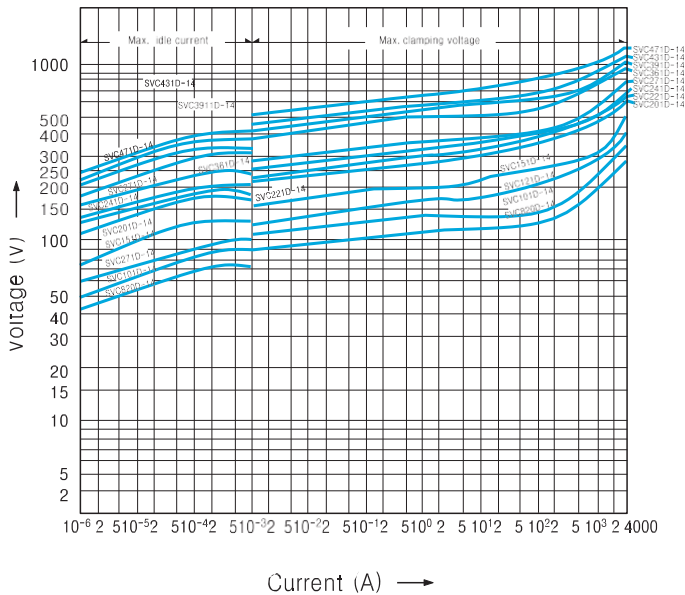
14B(SVC 180D-14B to SVC 680D-14B)



Transient V-I Characteristic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : 8/20 μ s

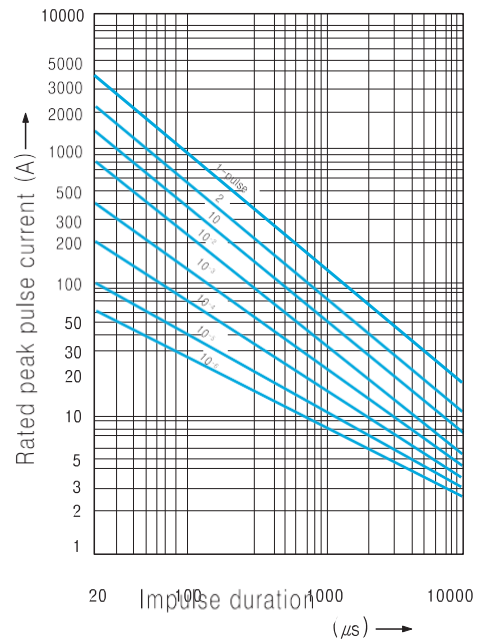
14A(SVC 820D-14A to SVC 471D-14A)



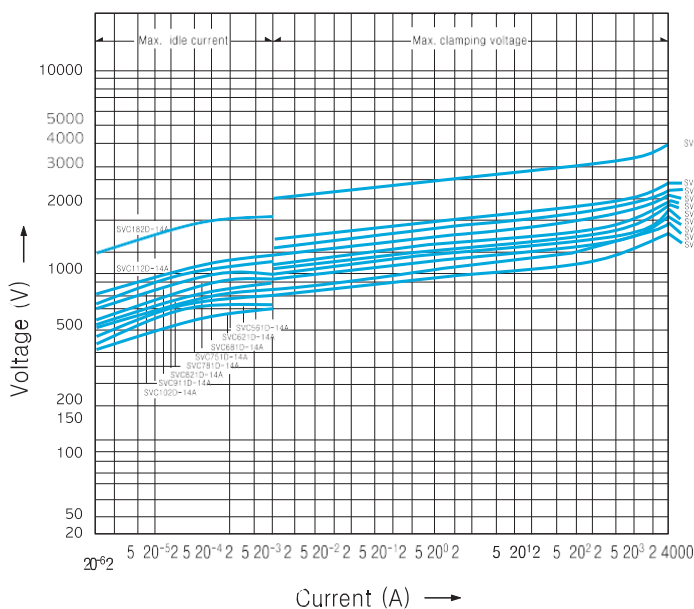
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval
3 to 10-pulse : 2-minute interval
Up to 10^6 -pulse : 10-second interval

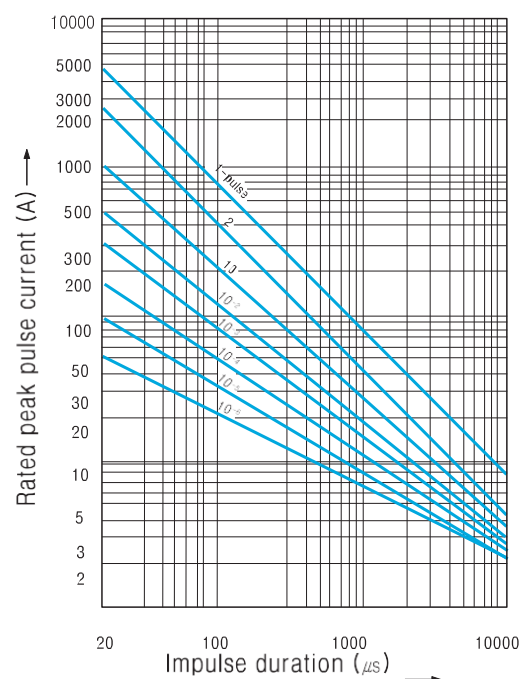
14A(SVC 820D-14A to SVC 471D-14A)



14A(SVC 561D-14A to SVC 182D-14A)



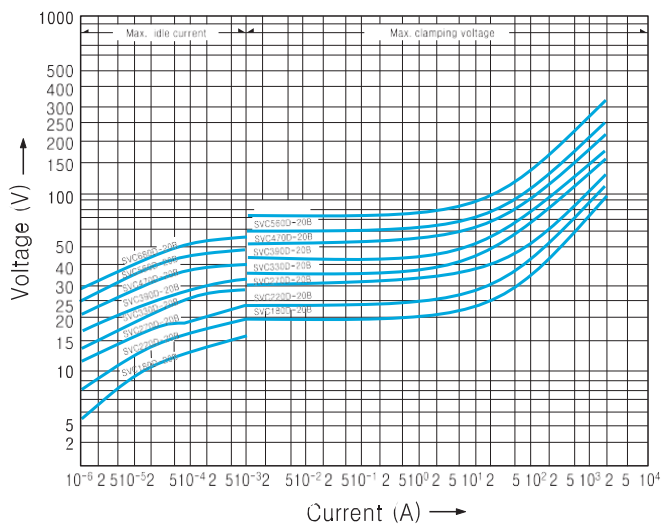
14A(SVC 561D-14A to SVC 182D-14A)



Transient V-I Characteristic Curves

Current waveform under 10^{-2} A : DC
over 10^{-1} A : 8/20 μ s

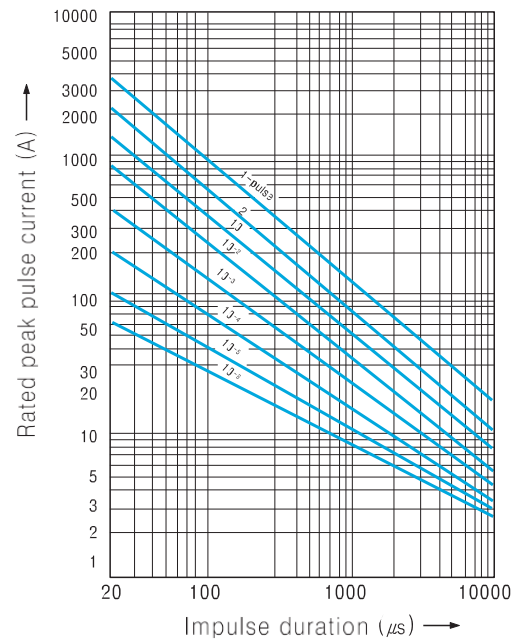
20B(SVC 180D-20B to SVC 680D-20B)



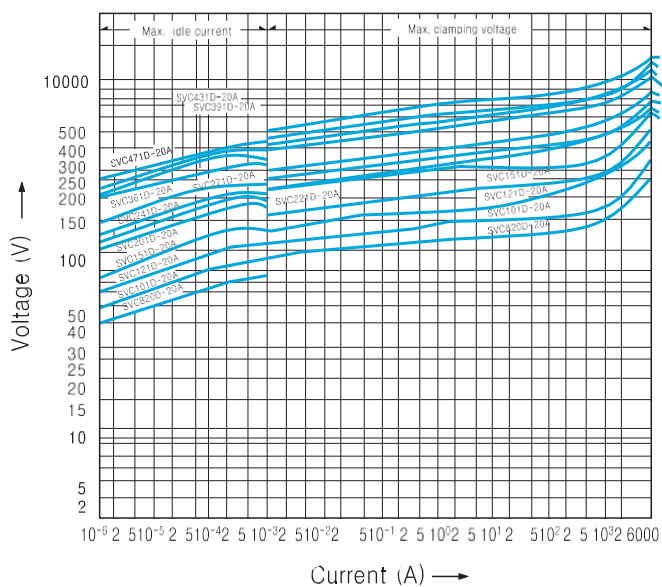
Pulse Lifetime Ratings

Notes : 2-pulse : 5-minute interval
3 to 10-pulse : 2-minute interval
Up to 10^6 -pulse : 10-second interval

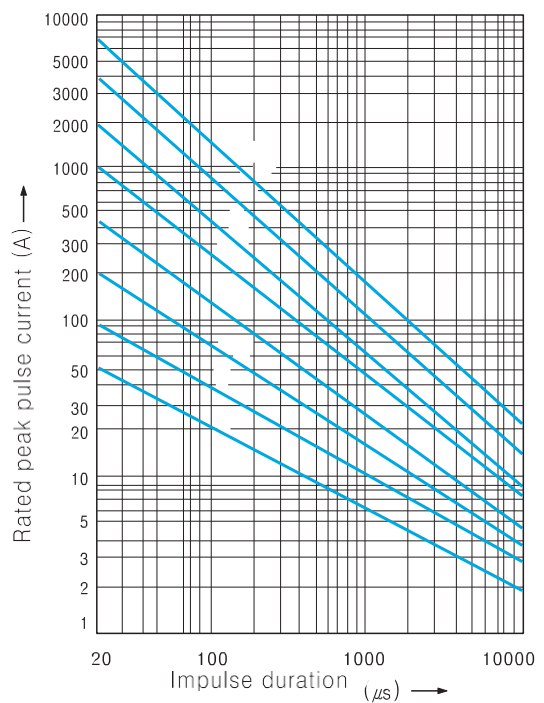
20B(SVC 180D-20B to SVC 680D-20B)



20A(SVC 820D-20A to SVC 471D-20A)



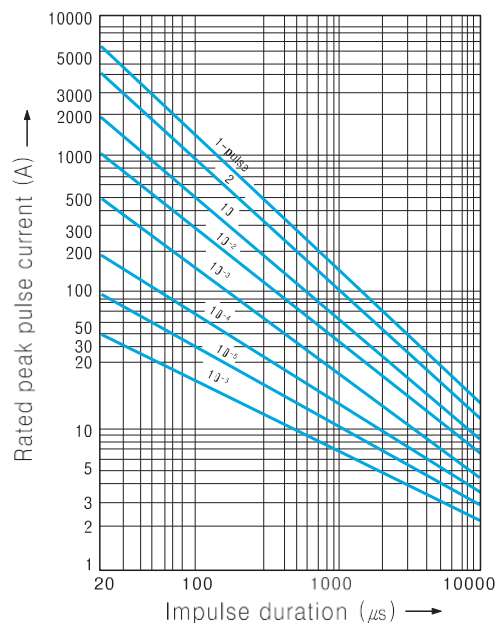
20A(SVC 820D-20A to SVC 471D-20A)



Current waveform under 10^{-2} A : DC
over 10^{-1} A : $8/20 \mu\text{s}$

Notes : 2-pulse : 5-minute interval
3 to 10-pulse : 2- minute interval
Up to 10^6 -pulse : 10-second interval

20A(SVC 561D-20A to SVC 182D-20A)



Applications

- The Protection of semiconducting elements such as diodes, thyristors, transistors, IC and relays against transient Voltages.
- Similar protection of many types of measuring instruments, control machinery and communication equipment and broadcasting equipment against inductive lightning and switching surges.
- Protection of general purpose electrical equipment, domestic machinery and appliances. TV and radios and similar consumer products against lightning and switching surges.

Power Supply Circuit Protection

Line circuit

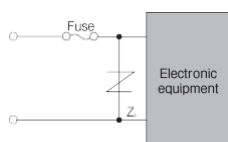
Varistor voltage selection table (Z_L)

Power Supply Voltage	Type
100VAC	SVC201D -□□A
	SVC221D -□□A
	SVC241D -□□A
	SVC271D -□□A*
200V AC	SVC391D -□□A
	SVC431D -□□A
	SVC471D -□□A*
12V DC	SVC220D -□□B
24V DC	SVC390D -□□B

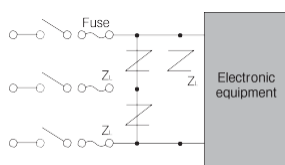
Notes :

- ① The power supply voltage must not exceed the maximum allowable circuit voltage.
- ② Since independent wiring loads and capacitive loads cause the voltage build-up at the time of opening or closing the load, use SVC having a varistor voltage as high as possible. (*mark)
- ③ The bold faced portions of the type letters vary.

single-phase circuit



AC three-phase circuit



Line and ground circuit

Varistor voltage selection table (Z_E)

Power Supply Voltage	Type
100VAC	SVC431D -□□A SVC471D -□□A
200V AC	SVC751D -□□A to SVC112D -□□A* SVC182D -□□A**

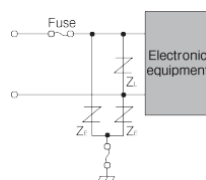
Notes :

- ① When subjected to megger testing (500V DC), the insulation resistance value can decrease due to the leakage current of the SVC. To avoid this remove the varistor or use* marked SVC.
- ② When subjected to dielectric strength test (1000V AC), remove the SVC or use** marked SVC.

Select varistors taking a note of operating conditions peculiar to the equipment.

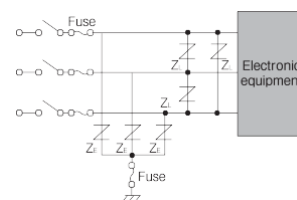
AC/DC

single-phase circuit

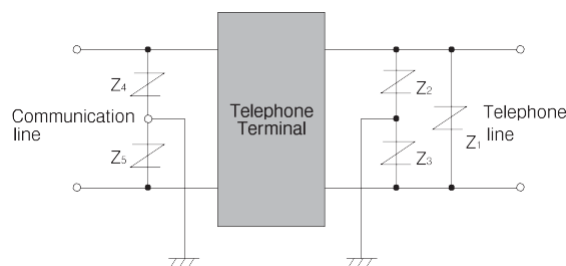


AC

three-phase circuit



Telecommunication Circuit Protection



Varistor voltage selection guided

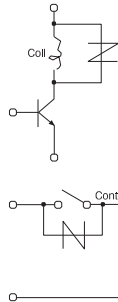
Power Supply Voltage	Type
12V DC	SVC180D -□□B
	SVC220D -□□B
	SVC820D -□□A
24V AC	SVC390D -□□B
	SVC820D -□□A

Notes :

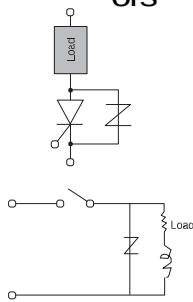
The varistor SVC has a capacitance value. Take not of this when applying them to high-frequency signal circuits.

Switching Circuit Protection

Protection of relay (Contact coil)



Protection of semiconductor



Varistor voltage selection guide

Power Supply Voltage	Type
12V DC	SVC220D -□□B
24V DC	SVC390D -□□B
100V DC	SVC151D -□□A
100VAC	SVC201D -□□A
	SVC221D -□□A
	SVC241D -□□A
	SVC271D -□□A

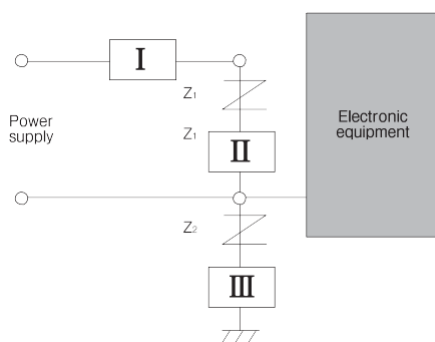
Notes :

- ① The power supply voltage must not exceed the maximum allowable circuit voltage of the SVC
- ② Pay due attention to the surge energy generated by the load.
- ③ Select SVC referring to the pulse lifetime rating.
- ④ To further reduce the tendency of sparking across the contacts connect a capacitors parallel with the SVC. This will also protect the equipment from electromagnetic wave jamming.

Application Notes

Overcurrent protection

When surges exceed the rating for the SVC, short-circuits or damages can be expected. Take following precautions.



- ① Connect the SVC at a position nearer to the equipment than the overcurrent protection device (fuse, MCCB) as is shown in the diagram.

When the SVC is shorted, the overcurrent protection device "I" operates (trips or blow off the fuse).

- ② If the overcurrent protection device "I" can not be installed in "I" position, connect a fuse at "II" position. Select fuse rated current for the SVC referring to the following table.

SVC	05A	07A	10A	14A	20A
	05B	07B	10B	14B	20B
Applicable fuse rated current(A)	1 to 2	2 to 3	3 to 5	3 to 10	5 to 15

- ③ When "Z" SVC is connected between the equipment and ground install an ELCB (Earth Leakage Circuit Breaker). If not possible, connect a fuse or thermal fuse at "III" position.

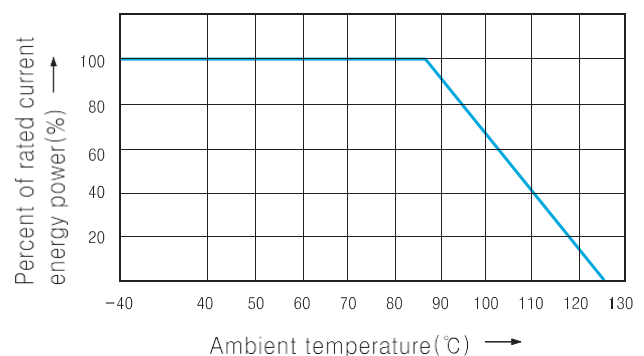
Installation

- ① When operated at location near heating element or exposed to direct sun light, confirm that the ambient temperature range.
- ② When operated in dusty or dirty locations, or exposed to corrosive atmospheres, or where metallic powders or salt can be expected, be sure to mount within a protective enclosure.

Molding

When shielding the SVC in a resin molding, take a note of the materials used and temperature, since they influence the reliability. For further information please contact SAMWHA

Current, power and energy rating vs, temperature



Electrical Characteristics

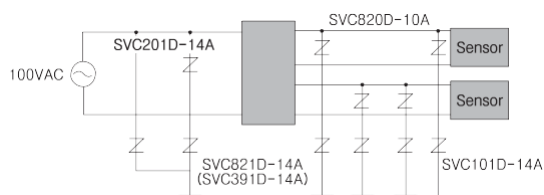
Operating ambient temperature	-40°C to +85°C
Storage temperature	-40°C to +125°C
Voltage temperature coefficient	-0.05% / °C
Insulation resistance(at500V)	Over 1000MΩ

Recognized standards

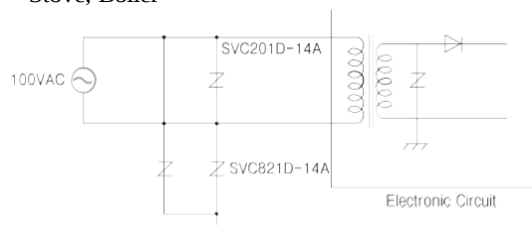
Standard	Content	Applicable SVC series		File No.
UL	UL 1449 3rd edition	Surge-protective Devices - Component	Other SPD Applications : 05/07/10 Series, 14B/20B Series	Type 3 SPD Applications : 14A/20A Series E332621
	UL 497B	Component-Isolated Loop Circuit Protectors	SVC 180D - □ ~ SVC821D - □ E154171	
VDE	IEC61051-1:2007-04 IEC61051-2:1991-01 IEC61051-2-2:1991-01	Varistor	05/07/10/14 Series 116012	
CAS	CLASS 2221 01	AUDIO AND VIDEO EQUIPMENT - Accessories and Parts for Electronic Equipment	SVC201D - □ ~ SVC182D - □ 1577876	

Application Example

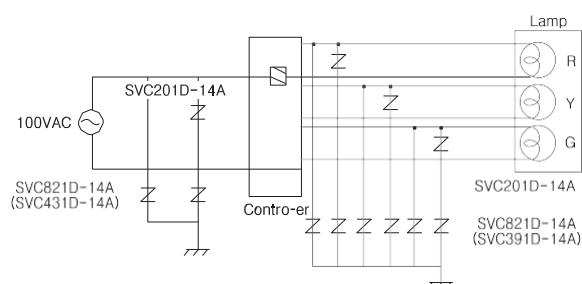
Fire Alarm System



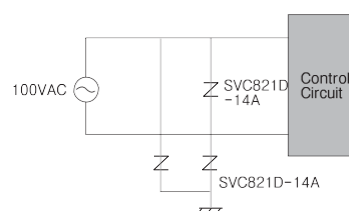
Stove, Boiler



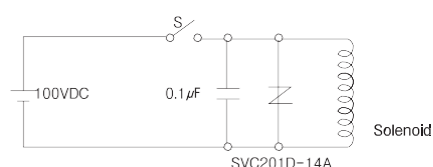
Traffic Signal Control



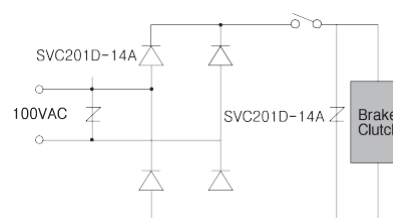
Vending Machine



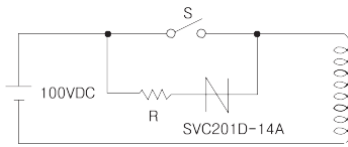
Solenoid



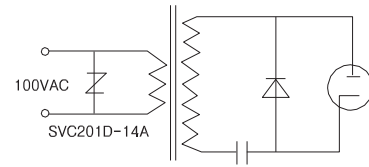
Brake, Clutch



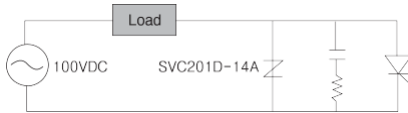
Contact Protection



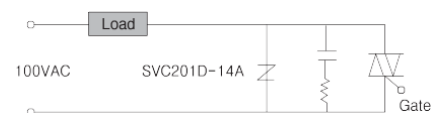
Microwave Oven



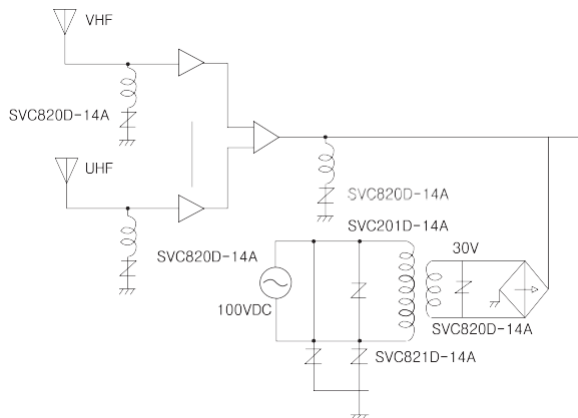
Thyristor Protection



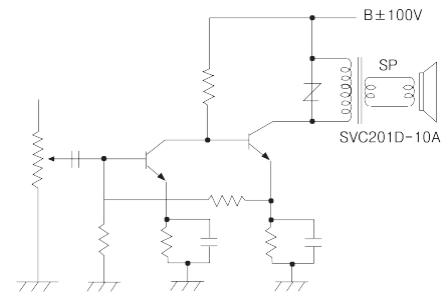
Triac Protection



TV Booster



Sound Output Circuit

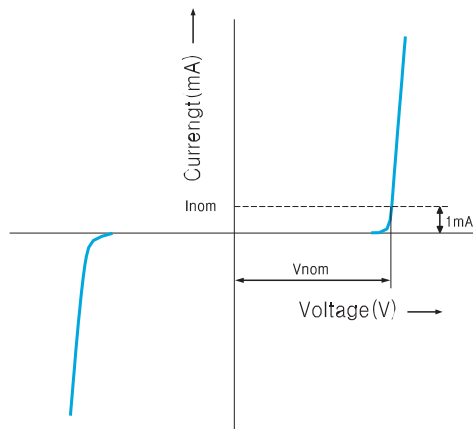


Varistor Terminology

Varistor Voltage : V_{nom}

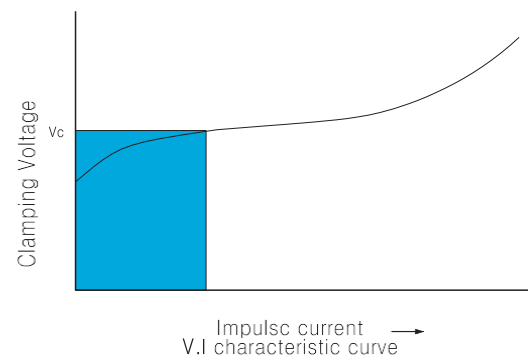
Varistor peak terminal voltage measured with a specified current applied. The DC current applied is 1mA normally.

Typical values measured at a test frequency of 1kHz



Clamping Voltage : V_c

Maximum terminal voltage (peak voltage across the varistor) measured with an applied $8/20 \mu s$ impulse of a given peak current.



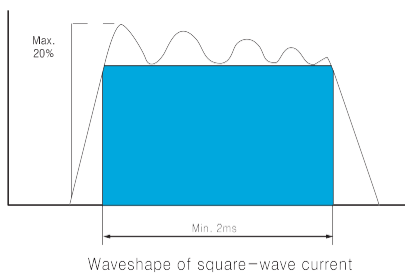
Rated peak transient current : I_{tm}

Maximum peak current through the varistor with line voltage applied.

The maximum peak current with in the varistor voltage change ratio of $\pm 10\%$ with the standard $8/20 \mu s$ impulse current applied two times at 5 minute interval.

Rated transient energy : W_{tm}

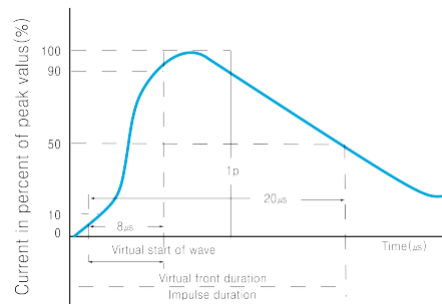
Maximum allowable energy for a single impulse of 2ms square-wave current waveform with rated continuous voltage applied. Maximum energy rating base on a shift of V_{nom} of less than $\pm 10\%$ of initial value.



Test current waveform

Characteristics tests for Varistors are carried out by using $8/20 \mu s$ test impulses. Data such as the maximum clamping voltage (V_c) and the transient peak current (I_{tm}) are obtained by using this impulse current.

However, for the V_c characteristics of the Axial Package type a 10mA DC squarewave current is used to carry out the test.



Rated RMS Voltage : V_{acm}

Maximum continuous sinusoidal RMS voltage at 50/60Hz which may be applied.

Rated DC Voltage : V_{dcm}

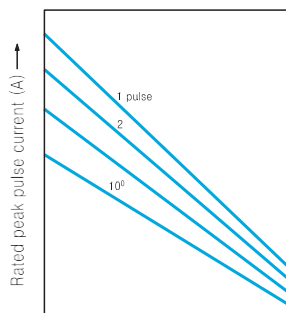
Maximum continuous DC voltage which may be applied.

Pulse lifetime rating

This is expressed as the maximum allowable number of impulse currents applied.

$8/20 \mu s$ impulse current (or 2ms square wave) is applied at prescribed interval.

This curve also provides for derating current as required with repetitive pulsing.



Rated average power dissipation : P_{tam}

Maximum average power that can be applied within the specified ambient temperature.