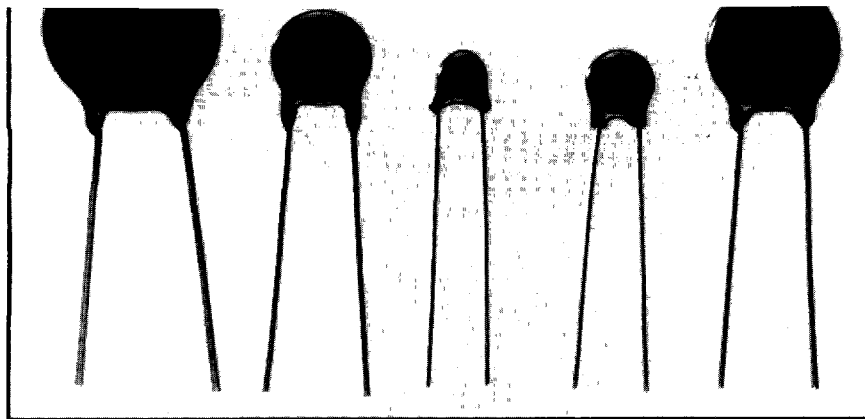




METAL
OXIDE
VARISTORS
VSA
9-800

TYPE VSA VARISTORS TRANSIENT / SURGE ABSORBER

APPLICATIONS

Transistor, diode, IC, thyristor and triac semiconductor protection.

Surge protection in consumer electronics.

Surge protection in industrial electronics.

Surge protection in communication, measuring and controller electronics.

Surge protection in electronic home appliances and gas and petroleum appliances.

Electrostatic discharge and noise spike suppression.

Relay and electromagnetic valve surge absorption.

FEATURES

Fast response to the rapidly rising surge voltage.

High performance clamping voltage characteristics.

Broad products range.

Varistor voltage: 18v to 1.2 kv.

Withstanding surge current: 50A to 6,500A

(8 x 20 μ sec., 1 time).

Mallory VSAs are zinc oxide nonlinear resistors whose resistance changes as a function of the applied voltage. The VSA has a bilateral and symmetrical V-I characteristic curve and can therefore be used in circuits in place of back-to-back zener diodes. This gives your circuit clamping protection in either direction. The VSA thus provides a highly reliable and economical way to protect against repeated high voltage transients and surges such as those produced by lightning, switching surges and noise spikes.

The VSA utilizes a ceramic element composed of zinc oxide and several kinds of metal oxide additives that have been sintered at relatively high temperatures. Ohmic electrodes are connected to each end of the element by firing. The specific characteristics of each VSA are determined by the properties of the ceramics used.

MALLORY
EMHART MALLORY

ORDERING INFORMATION

V	S	A	C																																
Common Code				Element Dia.		Type		Tolerance		Varistor Voltage		Suffix																							
				<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">05</td> <td style="width: 33%;">φ 5mm (.197")</td> <td style="width: 33%;"> </td> </tr> <tr> <td>07</td> <td>φ 7mm (.276")</td> <td> </td> </tr> <tr> <td>10</td> <td>φ 10mm (.394")</td> <td> </td> </tr> <tr> <td>14</td> <td>φ 14mm (.551")</td> <td> </td> </tr> <tr> <td>20</td> <td>φ 20mm (.787")</td> <td> </td> </tr> </table>		05	φ 5mm (.197")		07	φ 7mm (.276")		10	φ 10mm (.394")		14	φ 14mm (.551")		20	φ 20mm (.787")		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">D</td> <td style="width: 50%;">Type D</td> </tr> </table>		D	Type D	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">J</td> <td style="width: 50%;">± 5%</td> </tr> <tr> <td>K</td> <td>± 10%</td> </tr> <tr> <td>S</td> <td>Special</td> </tr> </table>		J	± 5%	K	± 10%	S	Special	The first two digits are significant figures and the third one denotes the number of zeros following. Decimal point is expressed by R.		
05	φ 5mm (.197")																																		
07	φ 7mm (.276")																																		
10	φ 10mm (.394")																																		
14	φ 14mm (.551")																																		
20	φ 20mm (.787")																																		
D	Type D																																		
J	± 5%																																		
K	± 10%																																		
S	Special																																		

TYPE VSA STANDARD RATINGS

Part No.	Maximum Allowable Voltage		Varistor* Voltage (V)	Max. Clamping Voltage @ Test Current (8 x 20 μsec.)		Energy (2ms.) (J)	Withstanding Surge Current (8 x 20 μsec. 1 time) (A)	Typical Capacitance @ 1kHz(pF)
	ACrms(V)	DC(V)		Vc(V)	Ip(A)			
VSAC05DK180 VSAC07DK180 VSAC10DK180 VSAC14DK180 VSAC20DK180	11	14	18 (16 ~ 20)	40	1	0.3	100	1600
				36	2.5	0.8	250	3500
				36	5	1.5	500	7500
				36	10	3.5	1000	18000
				36	20	10	2000	37000
VSAC05DK220 VSAC07DK220 VSAC10DK220 VSAC14DK220 VSAC20DK220	14	18	22 (20 ~ 24)	48	1	0.4	100	1300
				43	2.5	0.9	250	2800
				43	5	2.0	500	6000
				43	10	4.0	1000	15000
				43	20	13	2000	30000
VSAC05DK270 VSAC07DK270 VSAC10DK270 VSAC14DK270 VSAC20DK270	17	22	27 (24 ~ 30)	60	1	0.5	100	1050
				53	2.5	1.0	250	2000
				53	5	2.5	500	4000
				53	10	5.0	1000	10000
				53	20	15	2000	22000
VSAC05DK330 VSAC07DK330 VSAC10DK330 VSAC14DK330 VSAC20DK330	20	26	33 (30 ~ 36)	73	1	0.6	100	900
				65	2.5	1.2	250	1500
				65	5	3.0	500	3000
				65	10	6.0	1000	7500
				65	20	20	2000	17000
VSAC05DK390 VSAC07DK390 VSAC10DK390 VSAC14DK390 VSAC20DK390	25	31	39 (35 ~ 43)	86	1	0.8	100	500
				77	2.5	1.5	250	1350
				77	5	3.5	500	2600
				77	10	7.0	1000	6500
				77	20	24	2000	15000
VSAC05DK470 VSAC07DK470 VSAC10DK470 VSAC14DK470 VSAC20DK470	30	38	47 (42 ~ 52)	104	1	1.0	100	450
				93	2.5	1.8	250	1150
				93	5	4.5	500	2200
				93	10	8.5	1000	5500
				93	20	30	2000	13000
VSAC05DK560 VSAC07DK560 VSAC10DK560 VSAC14DK560 VSAC20DK560	35	45	56 (50 ~ 62)	123	1	1.0	100	400
				110	2.5	2.2	250	950
				110	5	5.5	500	1800
				110	10	10.0	1000	4500
				110	20	35	2000	11000
VSAC05DK680 VSAC07DK680 VSAC10DK680 VSAC14DK680 VSAC20DK680	40	56	68 (61 ~ 75)	150	1	1.2	100	350
				135	2.5	2.5	250	700
				135	5	6.5	500	1300
				135	10	12.0	1000	3300
				135	20	40	2000	7000

(continued)

TYPE VSA STANDARD RATINGS

Part No.	Maximum Allowable Voltage		Varistor* Voltage (V)	Max. Clamping Voltage @ Test Current (8 x 20 μ sec.)		Energy (2ms.) (J)	Withstanding Surge Current (8 x 20 μ sec. 1 time) (A)	Typical Capacitance @ 1kHz(pF)
	ACrms(V)	DC(V)		Vc(V)	Ip(A)			
VSAC05DK820 VSAC07DK820 VSAC10DK820 VSAC14DK820 VSAC20DK820	50	65	82 (74 ~ 90)	145	5	1.7	400	250
				135	10	3.5	1200	550
				135	25	8	2500	1800
				135	50	14	4500	2900
				135	100	27	6500	5500
VSAC05DK101 VSAC07DK101 VSAC10DK101 VSAC14DK101 VSAC20DK101	60	85	100 (90 ~ 110)	175	5	2.0	400	200
				165	10	4	1200	500
				165	25	10	2500	1400
				165	50	18	4500	2400
				165	100	30	6500	4800
VSAC05DK121 VSAC07DK121 VSAC10DK121 VSAC14DK121 VSAC20DK121	75	100	120 (108 ~ 132)	210	5	2.5	400	170
				200	10	5	1200	450
				200	25	12	2500	1100
				200	50	20	4500	1900
				200	100	40	6500	3800
VSAC05DK151 VSAC07DK151 VSAC10DK151 VSAC14DK151 VSAC20DK151	95	125	150 (135 ~ 165)	260	5	3.0	400	140
				250	10	6	1200	350
				250	25	16	2500	900
				250	50	25	4500	1500
				250	100	50	6500	3000
†VSAC05DK201 †VSAC07DK201 †VSAC10DK201 †VSAC14DK201 †VSAC20DK201	130	170	200 (185 ~ 225)	355	5	4.0	400	80
				340	10	10	1200	250
				340	25	20	2500	500
				340	50	35	4500	1000
				340	100	70	6500	2000
†VSAC05DK221 †VSAC07DK221 †VSAC10DK221 †VSAC14DK221 †VSAC20DK221	140	180	220 (198 ~ 242)	380	5	4.5	400	70
				360	10	10	1200	250
				360	25	23	2500	450
				360	50	40	4500	1000
				360	100	75	6500	2000
†VSAC05DK241 †VSAC07DK241 †VSAC10DK241 †VSAC14DK241 †VSAC20DK241	150	200	240 (216 ~ 264)	415	5	5.0	400	70
				395	10	10	1200	200
				395	25	25	2500	400
				395	50	40	4500	900
				395	100	80	6500	1800
†VSAC05DK271 †VSAC07DK271 †VSAC10DK271 †VSAC14DK271 †VSAC20DK271	175	225	270 (247 ~ 303)	475	5	6.0	400	65
				455	10	12	1200	170
				455	25	30	2500	350
				455	50	50	4500	750
				455	100	90	6500	1600
†VSAC05DK361 †VSAC07DK361 †VSAC10DK361 †VSAC14DK361 †VSAC20DK361	230	300	360 (324 ~ 396)	620	5	7.5	400	50
				595	10	15	1200	130
				595	25	35	2500	300
				595	50	65	4500	550
				595	100	120	6500	1200
†VSAC05DK391 †VSAC07DK391 †VSAC10DK391 †VSAC14DK391 †VSAC20DK391	250	320	390 (351 ~ 429)	675	5	8.0	400	50
				650	10	17	1200	130
				650	25	40	2500	270
				650	50	70	4500	500
				650	100	130	6500	1000
†VSAC05DK431 †VSAC07DK431 †VSAC10DK431 †VSAC14DK431 †VSAC20DK431	275	350	430 (387 ~ 473)	745	5	9.0	400	45
				710	10	20	1200	110
				710	25	45	2500	250
				710	50	75	4500	450
				710	100	140	6500	900
†VSAC05DK471 †VSAC07DK471 †VSAC10DK471 †VSAC14DK471 †VSAC20DK471	300	385	470 (423 ~ 517)	810	5	10.0	400	40
				775	10	20	1200	100
				775	25	45	2500	230
				775	50	80	4500	400
				775	100	150	6500	900
†VSAC10DK621 †VSAC14DK621 †VSAC20DK621	385	505	620 (558 ~ 682)	1025	25	45	2500	130
				1025	50	85	4500	250
				1025	100	150	6500	500
†VSAC10DK681 †VSAC14DK681 †VSAC20DK681	420	560	680 (612 ~ 748)	1120	25	45	2500	130
				1120	50	90	4500	250
				1120	100	160	6500	460
†VSAC10DK751 †VSAC14DK751 †VSAC20DK751	460	615	750 (675 ~ 825)	1240	25	50	2500	120
				1240	50	100	4500	230
				1240	100	175	6500	420

(continued)

†: UL approved model available with your indication of suffix "U".

TYPE VSA STANDARD RATINGS

Part No.	Maximum Allowable Voltage		Varistor* Voltage	Max. Clamping Voltage @ Test Current (8 x 20 μ sec.)		Energy (2ms.)	Withstanding Surge Current (8 x 20 μ sec. 1 time)	Typical Capacitance @ 1kHz(pF)
	ACrms(V)	DC(V)		Vc(V)	Ip(A)			
†VSAC10DK781	485	640	780 (702 ~ 858)	1290	25	50	2500	120
†VSAC14DK781				1290	50	105	4500	230
†VSAC20DK781				1290	100	180	6500	420
†VSAC10DK821	510	670	820 (738 ~ 902)	1355	25	55	2500	110
†VSAC14DK821				1355	50	110	4500	200
†VSAC20DK821				1355	100	190	6500	400
†VSAC10DK911	550	745	910 (819 ~ 1001)	1500	25	60	2500	100
†VSAC14DK911				1500	50	120	4500	180
†VSAC20DK911				1500	100	215	6500	350
†VSAC10DK102	625	825	1000 (900 ~ 1100)	1650	25	65	2500	90
†VSAC14DK102				1650	50	130	4500	150
†VSAC20DK102				1650	100	230	6500	320
†VSAC10DK112	680	895	1100 (990 ~ 1210)	1815	25	70	2500	80
†VSAC14DK112				1815	50	140	4500	150
†VSAC20DK112				1815	100	250	6500	300

Notes: 1. *Varistor Voltage: 5 Series — V0.1mA
7, 10, 14, 20 Series — V1mA

2. Rated Wattage:

Part No.	Rated Wattage (W)	Part No.	Rated Wattage (W)
VSAC05DK180 ~ 680	0.01	VSAC05DK820 ~ 471	0.1
VSAC07DK180 ~ 680	0.02	VSAC07DK820 ~ 471	0.25
VSAC10DK180 ~ 680	0.05	VSAC10DK820 ~ 112	0.4
VSAC14DK180 ~ 680	0.1	VSAC14DK820 ~ 182	0.6
VSAC20DK180 ~ 680	0.2	VSAC20DK820 ~ 182	1.0

3. Operating temperature range: -40 to 85°C (-40 to 185°F)

4. Storage temperature range: -40 to 125°C (-40 to 257°F)

5. Maximum clamping voltage as a function of surge current is obtainable from the respective V-I characteristic curves.

6. Maximum leakage current: refer to the V-I curves.

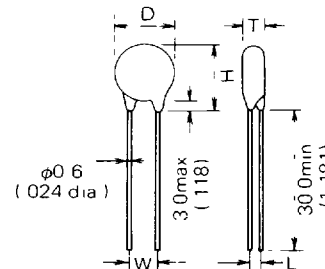
7. †: UL approved model available with your indication of suffix "U". File No. E6274 Across the line varistor.

File No. F86821 Transient Voltage surge suppressor.

OUTLINE DIMENSIONS

5 Series

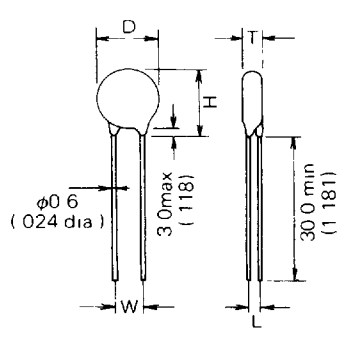
Part No.	Dmax.	T ± 1.0(.039)	W ± 1.0(.039)	Hmax.	L ± 1.0(.039)	Dimensions mm(in.)
VSAC 05DK180	7.5 (.295)	3.5(.138)	5.0 (.197)	10.0 (.394)	1.5(.059)	
VSAC 05DK220						
VSAC 05DK270						
VSAC 05DK330						
VSAC 05DK390						
VSAC 05DK470						
VSAC 05DK560						
VSAC 05DK680						
VSAC 05DK820						
VSAC 05DK101	7.0 (.276)	3.7(.146)	5.0 (.197)	10.0 (.394)	1.6(.063)	
VSAC 05DK121		3.8(.150)			1.8(.071)	
VSAC 05DK151		4.0(.157)			2.0(.079)	
†VSAC 05DK201		4.2(.165)			2.0(.079)	
†VSAC 05DK221		4.3(.169)			2.1(.083)	
†VSAC 05DK241		4.4(.173)			2.2(.087)	
†VSAC 05DK271		4.6(.181)			2.4(.094)	
†VSAC 05DK361		5.2(.205)			3.0(.118)	
†VSAC 05DK391		5.4(.215)			3.2(.126)	
†VSAC 05DK431		5.7(.224)			3.5(.138)	
†VSAC 05DK471		6.0(.236)			3.8(.150)	



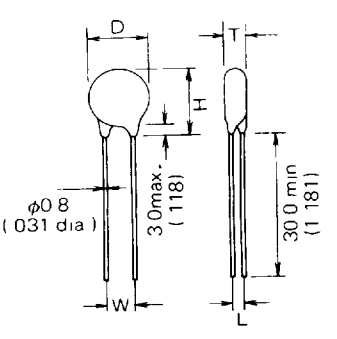
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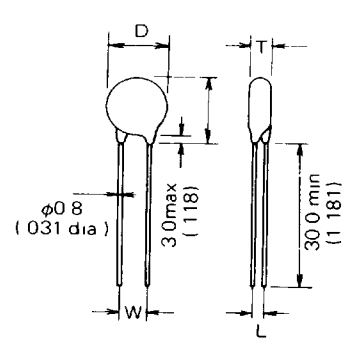
OUTLINE DIMENSIONS

7 Series

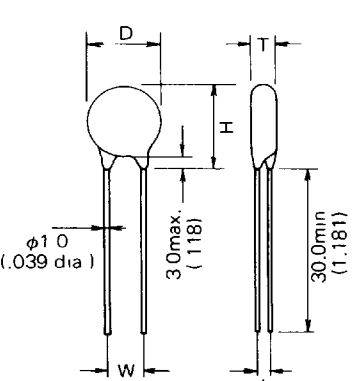
Part No.	Dmax.	T ± 1.0(.039)	W ± 1.0(.039)	Hmax.	L ± 1.0(.039)	Dimensions mm(in.)
VSAC 07DK180	9.0 (.354)	3.5(.138)	5.0 (.197)	12.0 (.472)	1.3(.051)	
VSAC 07DK220		3.6(.142)			1.4(.055)	
VSAC 07DK270		3.7(.146)			1.5(.059)	
VSAC 07DK330		3.9(.154)			1.7(.067)	
VSAC 07DK390		3.8(.150)			1.7(.067)	
VSAC 07DK470		3.9(.154)			1.8(.071)	
VSAC 07DK560		4.0(.157)			1.9(.075)	
VSAC 07DK680		4.2(.165)			2.1(.083)	
VSAC 07DK820		3.6(.142)			1.6(.063)	
VSAC 07DK101		3.7(.146)			1.6(.063)	
VSAC 07DK121		3.8(.150)			1.8(.071)	
VSAC 07DK151		4.0(.157)			2.0(.079)	
†VSAC 07DK201		4.2(.165)			2.0(.079)	
†VSAC 07DK221		4.3(.169)			2.1(.083)	
†VSAC 07DK241		4.4(.173)			2.2(.087)	
†VSAC 07DK271		4.6(.181)			2.4(.094)	
†VSAC 07DK361		5.2(.205)			3.0(.118)	
†VSAC 07DK391		5.4(.213)			3.2(.126)	
†VSAC 07DK431		5.7(.224)			3.5(.138)	
†VSAC 07DK471		6.0(.236)			3.8(.150)	

10 Series

Part No.	Dmax.	T ± 1.0(.039)	W ± 1.0(.039)	Hmax.	L ± 1.0(.039)	Dimensions mm(in.)
VSAC 10DK180	13.5 (.531)	3.6(.142)	7.5 (.295)	16.5 (.650)	1.3(.051)	
VSAC 10DK220		3.7(.146)			1.4(.055)	
VSAC 10DK270		3.8(.150)			1.5(.059)	
VSAC 10DK330		4.0(.157)			1.7(.067)	
VSAC 10DK390		4.1(.161)			1.8(.071)	
VSAC 10DK470		4.0(.157)			1.7(.067)	
VSAC 10DK560		4.1(.161)			1.9(.075)	
VSAC 10DK680		4.3(.169)			2.2(.087)	
VSAC 10DK820		4.0(.157)			1.6(.063)	
VSAC 10DK101		4.1(.161)			1.8(.071)	
VSAC 10DK121		4.2(.165)			2.0(.079)	
VSAC 10DK151		4.5(.177)			2.2(.087)	
†VSAC 10DK201		4.6(.181)			2.2(.087)	
†VSAC 10DK221		4.7(.185)			2.3(.091)	
†VSAC 10DK241		4.8(.181)			2.4(.094)	
†VSAC 10DK271		5.1(.201)			2.6(.102)	
†VSAC 10DK361	14.0 (.551)	5.7(.224)		17.0 (.669)	3.2(.126)	
†VSAC 10DK391		5.8(.228)			3.4(.134)	
†VSAC 10DK431		6.2(.244)			3.7(.146)	
†VSAC 10DK471		6.5(.256)			4.0(.157)	
†VSAC 10DK621		6.2(.244)			3.8(.150)	
†VSAC 10DK681		6.5(.256)			4.1(.161)	
†VSAC 10DK751		6.8(.268)			4.4(.173)	
†VSAC 10DK781		6.9(.272)			4.5(.177)	
†VSAC 10DK821		7.1(.280)			4.7(.185)	
†VSAC 10DK911		7.6(.299)			5.2(.205)	
†VSAC 10DK102		8.0(.315)			5.6(.220)	
†VSAC 10DK112		8.5(.335)			6.1(.240)	

Part No.	Dmax.	T ± 1.0(.039)	W ± 1.0(.039)	Hmax.	L ± 1.0(.039)	Dimensions mm(in.)
VSAC 14DK180	17.0 (.669)	3.6(.142)	7.5 (.295)	20.0 (.787)	1.3(.051)	
VSAC 14DK220		3.7(.146)			1.4(.055)	
VSAC 14DK270		3.8(.150)			1.5(.059)	
VSAC 14DK330		4.0(.157)			1.7(.067)	
VSAC 14DK390		4.1(.161)			1.8(.071)	
VSAC 14DK470		4.0(.157)			1.7(.067)	
VSAC 14DK560		4.1(.161)			1.9(.075)	
VSAC 14DK680		4.3(.169)			2.2(.087)	
VSAC 14DK820		4.0(.157)			1.6(.063)	
VSAC 14DK101		4.1(.161)			1.8(.071)	
VSAC 14DK121		4.2(.165)			2.0(.079)	
VSAC 14DK151		4.5(.177)			2.2(.087)	
†VSAC 14DK201		4.6(.181)			2.2(.087)	
†VSAC 14DK221		4.7(.185)			2.3(.091)	
†VSAC 14DK241		4.8(.189)			2.4(.094)	
†VSAC 14DK271		5.1(.201)			2.6(.102)	
†VSAC 14DK361	17.5 (.689)	5.7(.224)	7.5 (.295)	20.5 (.807)	3.2(.126)	
†VSAC 14DK391		5.8(.228)			3.4(.134)	
†VSAC 14DK431		6.2(.244)			3.7(.146)	
†VSAC 14DK471		6.5(.256)			4.0(.157)	
†VSAC 14DK621		6.2(.244)			3.8(.150)	
†VSAC 14DK681		6.5(.256)			4.1(.161)	
†VSAC 14DK751		6.8(.268)			4.4(.173)	
†VSAC 14DK781		6.9(.272)			4.5(.177)	
†VSAC 14DK821		7.1(.280)			4.7(.185)	
†VSAC 14DK911		7.6(.299)			5.2(.205)	
†VSAC 14DK102		8.0(.315)			5.6(.220)	
†VSAC 14DK112		8.5(.335)			6.1(.240)	

20 Series

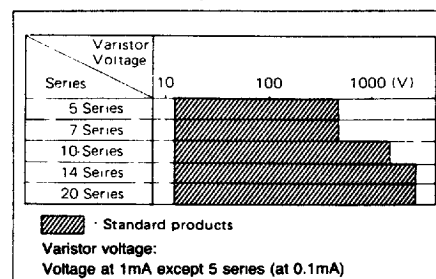
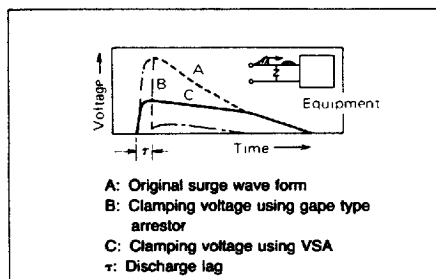
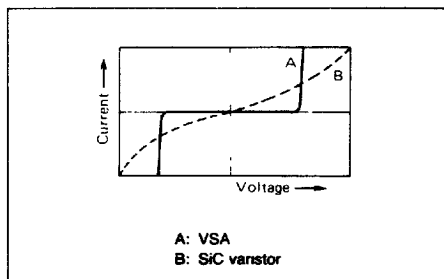
Part No.	Dmax.	T ± 1.0(.039)	W ± 1.0(.039)	Hmax.	L ± 1.0(.039)	Dimensions mm(in.)
VSAC 20DK180	23.0 (.906)	4.1(.161)	10.0 (.394)	27.0 (1.063)	1.5(.059)	
VSAC 20DK220		4.2(.165)			1.6(.063)	
VSAC 20DK270		4.3(.169)			1.7(.067)	
VSAC 20DK330		4.5(.177)			1.9(.075)	
VSAC 20DK390		4.5(.177)			1.9(.075)	
VSAC 20DK470		4.6(.181)			1.9(.075)	
VSAC 20DK560		4.7(.185)			2.1(.083)	
VSAC 20DK680		4.8(.189)			2.4(.094)	
VSAC 20DK820		4.5(.177)			1.8(.071)	
VSAC 20DK101		4.6(.181)			2.0(.079)	
VSAC 20DK121		4.7(.185)			2.2(.087)	
VSAC 20DK151		4.9(.193)			2.4(.094)	
†VSAC 20DK201		5.0(.197)			2.4(.094)	
†VSAC 20DK221		5.2(.205)			2.6(.102)	
†VSAC 20DK241		5.3(.209)			2.7(.106)	
†VSAC 20DK271		5.5(.217)			2.9(.114)	
†VSAC 20DK361	24.0 (.945)	6.2(.244)	10.0 (.394)	28.0 (1.102)	3.5(.138)	
†VSAC 20DK391		6.4(.252)			3.7(.146)	
†VSAC 20DK431		6.7(.264)			4.0(.157)	
†VSAC 20DK471		7.0(.276)			4.3(.169)	
†VSAC 20DK621		6.6(.260)			4.1(.161)	
†VSAC 20DK681		6.9(.272)			4.4(.173)	
†VSAC 20DK751		7.3(.287)			4.8(.189)	
†VSAC 20DK781		7.4(.291)			4.9(.193)	
†VSAC 20DK821		7.6(.299)			5.1(.201)	
†VSAC 20DK911		8.1(.319)			5.6(.220)	
†VSAC 20DK102		8.5(.335)			6.0(.236)	
†VSAC 20DK112		9.0(.354)			6.5(.256)	

FEATURES

Excellent clamping voltage characteristic and fast response time (< 50nsec.) when subjected to impulse surges. Eliminates the discharge lag that is indicative of gap-type arrestors.

Bilateral and symmetrical V-I characteristic curve. The VSA can, therefore, be used both in AC and DC circuits, for protection of either positive or negative transients.

■ Broad varistor voltage from 18 to 1800V.



ELECTRICAL RATINGS

Item	Test Condition/Description	Requirement
Varistor Voltage	The voltage between two terminals with the specified measuring current C_m A DC applied is called V_c . The measurement shall be made as fast as possible to avoid heat affection.	To meet the specified value.
Maximum Allowable voltage	The recommended maximum sine wave voltage (rms) or the maximum DC voltage that can be applied continuously.	
Maximum Clamping voltage	The maximum voltage between two terminals with the specified standard impulse current ($8 \times 20 \mu\text{sec.}$) illustrated below applied.	
Rated Wattage	The maximum power that can be applied within the specified ambient temperature.	
Energy	The maximum energy within the varistor voltage change of $\pm 10\%$ when one impulse of 2msec. is applied. The maximum energy which is figured out as follows. $E = V_m \cdot I_m \cdot T$ E: Energy I_m: Maximum allowable single surge current of 2ms. (rectangular wave form) V_m: Maximum clamping voltage at I_m T: Duration of surge current (2ms.)	
Withstanding Surge Current	The maximum current within the varistor voltage change of $\pm 10\%$ with the standard impulse current ($8 \times 20 \mu\text{sec.}$) applied one time.	
Varistor voltage Temperature Coefficient	$\frac{V_c \text{ at } 20^\circ\text{C}(68^\circ\text{F}) - V_c \text{ at } 70^\circ\text{C}(158^\circ\text{F})}{V_c \text{ at } 20^\circ\text{C}(68^\circ\text{F})} \times \frac{1}{50} \times 100(\% / ^\circ\text{C})$	$-0.05 / ^\circ\text{C max.}$