

Chip Varistor for ESD – SDV Series



Operating Temp ◆ -55°C ~+125°C

Features ◆ SMD type suitable for high density mounting ◆ Excellent solderability (Ni, Sn plating)
◆ Excellent clamping ratio and quick response time (<0.5ns)

Applications ◆ Transient voltage protection for IC and transistor ◆ MOSFET protection
◆ ESD protection such as USB2.0, MIPI etc. ◆ Portable equipment protection, such as mobile phone, TV, etc.

Product Identification

1 SDV	2 1608	3 A	4 180	5 C121	6 N	7 P	8 T	9 F
----------	-----------	--------	----------	-----------	--------	--------	--------	--------

1	Type
SDV	Chip Varistor for ESD

2	External Dimensions (L×W) (mm)
1005 [0402]	1.0×0.5
1608 [0603]	1.6×0.8
2012 [0805]	2.0×1.25

3	Feature Code
A	For General Use
E	For ESD
H	For High Speed
S	For Special Request

4	Maximum Continuous Working Voltage
Example	Nominal Value
5R5	5.5V
180	18V

5	Capacitance @1MHz
Example	Nominal Value
C121	120pF

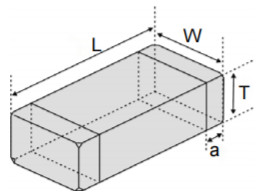
6	Tolerance of Capacitance
N	±30%
Y	-50% ~+100%
G	Maximum

7	Terminal Code
P	Ni, Sn Plating

8	Packing
T	Tape & Reel

9	Hazardous Substance Free Products
F	

Shape and Dimensions



Unit: mm [inch]

Type	L	W	T	a
SDV1005 [0402]	1.0±0.15 [.039±.006]	0.5±0.15 [.020±.006]	0.5±0.15 [.020±.006]	0.25±0.1 [.010±.004]
SDV1608 [0603]	1.6±0.15 [.063±.006]	0.8±0.15 [.031±.006]	0.8±0.15 [.031±.006]	0.3±0.2 [.012±.008]
SDV2012 [0805]	2.0±0.2 [.079±.008]	1.25±0.2 [.049±.008]	0.85±0.2 [.033±.008]	0.5±0.3 [.020±.012]

Specifications

SDV1608A TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WRAC}	V _B	V _C ⁺¹	V _C ⁺²	E _T	I _P	C
SDV1608A090C121 □ PTF	9.0	6.4	11.0-16.0	20	26	0.05	20	120
SDV1608A090C141 □ PTF	9.0	6.4	11.0-16.0	20	26	0.05	20	140
SDV1608A090C201 □ PTF	9.0	6.4	11.0-16.0	20	26	0.1	30	200
SDV1608A090C231 □ PTF	9.0	6.4	11.0-16.0	20	26	0.1	30	230
SDV1608A090C361 □ PTF	9.0	6.4	11.0-16.0	20	26	0.1	30	360
SDV1608A140C121 □ PTF	14.0	10.0	16.0-22.0	30	39	0.05	20	120
SDV1608A140C141 □ PTF	14.0	10.0	16.0-22.0	30	39	0.05	20	140
SDV1608A140C251 □ PTF	14.0	10.0	16.0-22.0	30	39	0.1	30	250
SDV1608A140C361 □ PTF	14.0	10.0	16.0-22.0	30	39	0.1	30	360
SDV1608A180C121 □ PTF	18.0	12.7	22.0-28.0	40	48	0.05	20	120
SDV1608A180C141 □ PTF	18.0	12.7	22.0-28.0	40	48	0.05	20	140
SDV1608A180C231 □ PTF	18.0	12.7	22.0-28.0	40	48	0.1	30	230
SDV1608A180C361 □ PTF	18.0	12.7	22.0-28.0	40	48	0.1	30	360
SDV1608A220C121 □ PTF	22.0	15.6	26.0-34.0	45	54	0.05	20	120
SDV1608A220C141 □ PTF	22.0	15.6	26.0-34.0	45	54	0.05	20	140
SDV1608A220C161 □ PTF	22.0	15.6	26.0-34.0	45	54	0.1	30	160
SDV1608A220C231 □ PTF	22.0	15.6	26.0-34.0	45	54	0.1	30	230
SDV1608A260C121 □ PTF	26.0	18.4	31.0-38.0	58	70	0.1	30	120
SDV1608A260C161 □ PTF	26.0	18.4	31.0-38.0	58	70	0.1	30	160
SDV1608A300C121 □ PTF	30.0	21.3	37.0-46.0	65	78	0.1	30	120
SDV1608A300C141 □ PTF	30.0	21.3	37.0-46.0	65	78	0.1	30	140

SDV2012A TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage	Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS					
Units	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WRAC}	V _B	V _C ⁺¹	E _T	I _P	C
SDV2012A090C701 □ PTF	9.0	6.4	11.0-16.0	20	0.2	60	700
SDV2012A090C102 □ PTF	9.0	6.4	11.0-16.0	20	0.3	120	1000
SDV2012A140C401 □ PTF	14.0	10.0	16.0-22.0	30	0.2	60	400
SDV2012A140C701 □ PTF	14.0	10.0	16.0-22.0	30	0.3	120	700
SDV2012A140C901 □ PTF	14.0	10.0	16.0-22.0	30	0.4	150	900
SDV2012A180C301 □ PTF	18.0	12.7	22.0-28.0	40	0.2	60	300
SDV2012A180C501 □ PTF	18.0	12.7	22.0-28.0	40	0.3	120	500
SDV2012A180C701 □ PTF	18.0	12.7	22.0-28.0	40	0.4	150	700
SDV2012A220C251 □ PTF	22.0	15.6	26.0-34.0	45	0.2	60	250
SDV2012A220C401 □ PTF	22.0	15.6	26.0-34.0	45	0.3	120	400
SDV2012A220C501 □ PTF	22.0	15.6	26.0-34.0	45	0.3	120	500
SDV2012A260C251 □ PTF	26.0	18.4	31.0-38.0	58	0.2	60	250
SDV2012A260C401 □ PTF	26.0	18.4	31.0-38.0	58	0.3	120	400
SDV2012A300C181 □ PTF	30.0	21.3	37.0-46.0	65	0.2	60	180
SDV2012A300C301 □ PTF	30.0	21.3	37.0-46.0	65	0.3	120	300

Specifications

SDV1005E TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WRMS}	V _B	V _C ⁻¹	V _C ⁻²	E _T	I _P	C
SDV1005E090C180 □ PTF	9.0	6.4	11.0-16.0	20	26	0.005	3	18
SDV1005E090C300 □ PTF	9.0	6.4	11.0-16.0	20	26	0.005	5	30
SDV1005E090C500 □ PTF	9.0	6.4	11.0-16.0	20	26	0.01	10	50
SDV1005E090C800 □ PTF	9.0	6.4	11.0-16.0	20	26	0.02	15	80
SDV1005E140C180 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	3	18
SDV1005E140C300 □ PTF	14.0	10.0	16.0-22.0	30	39	0.01	5	30
SDV1005E140C500 □ PTF	14.0	10.0	16.0-22.0	30	39	0.02	10	50
SDV1005E140C800 □ PTF	14.0	10.0	16.0-22.0	30	39	0.03	15	80
SDV1005E180C150 □ PTF	18.0	12.7	22.0-28.0	40	48	0.005	2	15
SDV1005E180C180 □ PTF	18.0	12.7	22.0-28.0	40	48	0.01	5	18
SDV1005E180C300 □ PTF	18.0	12.7	22.0-28.0	40	48	0.02	10	30
SDV1005E180C500 □ PTF	18.0	12.7	22.0-28.0	40	48	0.02	10	50
SDV1005E220C150 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	2	15
SDV1005E220C180 □ PTF	22.0	15.6	26.0-34.0	45	54	0.01	5	18
SDV1005E220C300 □ PTF	22.0	15.6	26.0-34.0	45	54	0.02	10	30
SDV1005E220C500 □ PTF	22.0	15.6	26.0-34.0	45	54	0.02	10	50

SDV1608E TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WRMS}	V _B	V _C ⁻¹	V _C ⁻²	E _T	I _P	C
SDV1608E090C180 □ PTF	9.0	6.4	11.0-16.0	20	26	0.005	3	18
SDV1608E090C300 □ PTF	9.0	6.4	11.0-16.0	20	26	0.005	5	30
SDV1608E090C500 □ PTF	9.0	6.4	11.0-16.0	20	26	0.01	10	50
SDV1608E090C800 □ PTF	9.0	6.4	11.0-16.0	20	26	0.02	15	80
SDV1608E090C101 □ PTF	9.0	6.4	11.0-16.0	20	26	0.05	20	100
SDV1608E140C180 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	3	18
SDV1608E140C300 □ PTF	14.0	10.0	16.0-22.0	30	39	0.01	5	30
SDV1608E140C500 □ PTF	14.0	10.0	16.0-22.0	30	39	0.02	10	50
SDV1608E140C800 □ PTF	14.0	10.0	16.0-22.0	30	39	0.03	15	80
SDV1608E140C101 □ PTF	14.0	10.0	16.0-22.0	30	39	0.05	20	100
SDV1608E180C180 □ PTF	18.0	12.7	22.0-28.0	40	48	0.005	5	18
SDV1608E180C300 □ PTF	18.0	12.7	22.0-28.0	40	48	0.02	10	30
SDV1608E180C600 □ PTF	18.0	12.7	22.0-28.0	40	48	0.02	10	60
SDV1608E180C800 □ PTF	18.0	12.7	22.0-28.0	40	48	0.03	15	80
SDV1608E180C101 □ PTF	18.0	12.7	22.0-28.0	40	48	0.05	20	100
SDV1608E220C180 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	5	18
SDV1608E220C300 □ PTF	22.0	15.6	26.0-34.0	45	54	0.02	10	30
SDV1608E220C500 □ PTF	22.0	15.6	26.0-34.0	45	54	0.02	10	50
SDV1608E220C800 □ PTF	22.0	15.6	26.0-34.0	45	54	0.03	15	80
SDV1608E220C101 □ PTF	22.0	15.6	26.0-34.0	45	54	0.05	20	100
SDV1608E260C180 □ PTF	26.0	18.4	31.0-38.0	58	70	0.02	5	18
SDV1608E260C300 □ PTF	26.0	18.4	31.0-38.0	58	70	0.03	10	30
SDV1608E260C500 □ PTF	26.0	18.4	31.0-38.0	58	70	0.03	10	50

Specifications

SDV2012E TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WAC}	V _B	V _C ⁻¹	V _C ⁻²	E _T	I _P	C
SDV2012E180C101 □ PTF	18.0	12.7	22.0-28.0	40	48	0.05	20	100
SDV2012E260C800 □ PTF	26.0	18.4	31.0-38.0	58	70	0.05	20	80
SDV2012E220C101 □ PTF	22.0	15.6	26.0-34.0	45	54	0.05	20	100
SDV2012E300C500 □ PTF	30.0	21.3	37.0-46.0	65	78	0.05	15	50

SDV1005H TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WAC}	V _B	V _C ⁻¹	V _C ⁻²	E _T	I _P	C
SDV1005H140C100 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	2	10
SDV1005H140C120 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	2	12
SDV1005H180C050YPTF	18.0	12.7	22.0-28.0	40	48	0.005	2	5
SDV1005H180C100 □ PTF	18.0	12.7	22.0-28.0	40	48	0.005	2	10
SDV1005H220C030YPTF	22.0	15.6	26.0-34.0	45	54	0.003	1	3
SDV1005H220C050YPTF	22.0	15.6	26.0-34.0	45	54	0.005	2	5
SDV1005H220C100 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	2	10
SDV1005H220C120 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	2	12
SDV1005H260C030YPTF	26.0	18.4	31.0-38.0	58	70	0.003	1	3
SDV1005H260C100 □ PTF	26.0	18.4	31.0-38.0	58	70	0.005	2	10
SDV1005H260C120 □ PTF	26.0	18.4	31.0-38.0	58	70	0.005	2	12

SDV1608H TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WAC}	V _B	V _C ⁻¹	V _C ⁻²	E _T	I _P	C
SDV1608H140C100 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	2	10
SDV1608H140C120 □ PTF	14.0	10.0	16.0-22.0	30	39	0.005	2	12
SDV1608H180C050YPTF	18.0	12.7	22.0-28.0	40	48	0.003	1	5
SDV1608H180C100 □ PTF	18.0	12.7	22.0-28.0	40	48	0.005	2	10
SDV1608H180C120 □ PTF	18.0	12.7	22.0-28.0	40	48	0.005	2	12
SDV1608H220C030YPTF	22.0	15.6	26.0-34.0	45	54	0.003	1	3
SDV1608H220C050YPTF	22.0	15.6	26.0-34.0	45	54	0.003	1	5
SDV1608H220C100 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	2	10
SDV1608H220C120 □ PTF	22.0	15.6	26.0-34.0	45	54	0.005	2	12
SDV1608H260C030YPTF	26.0	18.4	31.0-38.0	58	70	0.003	1	3
SDV1608H260C100 □ PTF	26.0	18.4	31.0-38.0	58	70	0.005	2	10
SDV1608H260C120 □ PTF	26.0	18.4	31.0-38.0	58	70	0.005	2	12
SDV1608H300C100 □ PTF	30.0	21.3	37.0-46.0	65	78	0.005	2	10

Specifications

SDV1005S TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WAC}	V _B	V _C ^{*1}	V _C ^{*2}	E _T	I _P	C
SDV1005S5R5C030YPTF	5.5	4.0	31.0-38.0	58	70	0.003	1	3
SDV1005S5R5C050YPTF	5.5	4.0	22.0-28.0	40	48	0.003	1	5
SDV1005S5R5C100 □ PTF	5.5	4.0	22.0-28.0	40	48	0.005	2	10
SDV1005S5R5C120 □ PTF	5.5	4.0	22.0-28.0	40	48	0.005	2	12
SDV1005S090C030YPTF	9.0	6.4	31.0-38.0	58	70	0.003	1	3
SDV1005S090C050YPTF	9.0	6.4	22.0-28.0	40	48	0.003	1	5
SDV1005S090C100 □ PTF	9.0	6.4	22.0-28.0	40	48	0.005	2	10
SDV1005S090C120 □ PTF	9.0	6.4	22.0-28.0	40	48	0.005	2	12
SDV1005S140C030YPTF	14.0	10.0	31.0-38.0	58	70	0.003	1	3
SDV1005S140C050YPTF	14.0	10.0	22.0-28.0	40	48	0.003	1	5
SDV1005S180C030YPTF	18.0	12.7	31.0-38.0	58	70	0.003	1	3
SDV1005S360C050YPTF	36.0	25.4	46.0-60.0	130	155	0.003	1	5
SDV1005S420C050YPTF	42.0	29.7	51.0-81.0	135	160	0.005	2	5

SDV1608S TYPE

Part Number	Max. Working Voltage		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
Test Condition	<20 μ A		@1mA DC	8/20 μ s	ESD	Energy 10/1000 μ s	Peak Current 8/20 μ s	@0.5Vrms, 1MHz
	DC	AC RMS						
Units	Volts	Volts	Volts	Volts	Volts	Joules	Amps	pF
Symbol	V _{WDC}	V _{WAC}	V _B	V _C ^{*1}	V _C ^{*2}	E _T	I _P	C
SDV1608S5R5C030YPTF	5.5	4.0	31.0-38.0	58	70	0.003	1	3
SDV1608S5R5C050YPTF	5.5	4.0	22.0-28.0	40	48	0.003	1	5
SDV1608S5R5C100 □ PTF	5.5	4.0	22.0-28.0	40	48	0.005	2	10
SDV1608S5R5C120 □ PTF	5.5	4.0	22.0-28.0	40	48	0.005	2	12
SDV1608S090C030YPTF	9.0	6.4	31.0-38.0	58	70	0.003	1	3
SDV1608S090C050YPTF	9.0	6.4	22.0-28.0	40	48	0.003	1	5
SDV1608S090C100 □ PTF	9.0	6.4	22.0-28.0	40	48	0.005	2	10
SDV1608S090C120 □ PTF	9.0	6.4	22.0-28.0	40	48	0.005	2	12
SDV1608S140C030YPTF	14.0	10.0	31.0-38.0	58	70	0.003	1	3
SDV1608S140C050YPTF	14.0	10.0	22.0-28.0	40	48	0.003	1	5
SDV1608S180C030YPTF	18.0	12.7	31.0-38.0	58	70	0.003	1	3

※V_{DC} : Max DC working voltage of varistor must exceed or equal to 1.5 times that of the application circuit voltage, V_{DC}≥1.5V_n.

※□ : Please specify the capacitance tolerance code (N=±30%, Y=-50%~+100%, G=Maximum).

※*1: V_C, Maximum peak voltage across the varistor measured at a specified pulse current and waveform.

Energy Rating Pulse & Waveform

0.00-0.05 Joule 1A, 8/20 μ s

0.10 Joule 2A, 8/20 μ s

0.20-0.50 Joule 5A, 8/20 μ s

※*2: V_C, Maximum peak voltage across the varistor measured at 30ns after initiation of pulse on IEC61000-4-2 30A/8kV.

Specifications

Ultra low capacitance type (C=0.5pF, 1pF or 2pF)

Part Number	Max. Working Voltage		Varistor Voltage	Typical Capacitance	Min. Cut-off Frequency
Test Condition	<20 μ A		@1mA DC	@0.5Vrms, 1MHz	@-3dB
	DC	AC RMS			
Units	Volts	Volts	Volts	pF	MHz
Symbol	V _{WDC}	V _{WRMS}	V _B	C	f ₀
SDV1005S5R5C0R5YPTF	5.5	4.0	100-160	0.5	2000
SDV1005S5R5C010YPTF	5.5	4.0	100-160	1	1250
SDV1005S5R5C020YPTF	5.5	4.0	60-80	2	600
SDV1005S090C0R5YPTF	9.0	6.4	100-160	0.5	2000
SDV1005S090C010YPTF	9.0	6.4	100-160	1	1250
SDV1005S090C020YPTF	9.0	6.4	60-80	2	600
SDV1005S140C0R5YPTF	14.0	10.0	100-160	0.5	2000
SDV1005S140C010YPTF	14.0	10.0	100-160	1	1250
SDV1005S140C020YPTF	14.0	10.0	60-80	2	600
SDV1005S180C0R5YPTF	18.0	12.7	100-160	0.5	2000
SDV1005S180C010YPTF	18.0	12.7	100-160	1	1250
SDV1005S180C020YPTF	18.0	12.7	60-80	2	600
SDV1005H260C0R5YPTF	26.0	18.4	100-160	0.5	2000
SDV1005H260C010YPTF	26.0	18.4	100-160	1	1250
SDV1005H260C020YPTF	26.0	18.4	60-80	2	600

Ultra low capacitance type (C=0.5pF, 1pF or 2pF)

Part Number	Max. Working Voltage		Varistor Voltage	Typical Capacitance	Min. Cut-off Frequency
Test Condition	<20 μ A		@1mA DC	@0.5Vrms, 1MHz	@-3dB
	DC	AC RMS			
Units	Volts	Volts	Volts	pF	MHz
Symbol	V _{WDC}	V _{WRMS}	V _B	C	f ₀
SDV1608S5R5C0R5YPTF	5.5	4.0	100-160	0.5	2000
SDV1608S5R5C010YPTF	5.5	4.0	100-160	1	1250
SDV1608S5R5C020YPTF	5.5	4.0	60-80	2	600
SDV1608S090C0R5YPTF	9.0	6.4	100-160	0.5	2000
SDV1608S090C010YPTF	9.0	6.4	100-160	1	1250
SDV1608S090C020YPTF	9.0	6.4	60-80	2	600
SDV1608S140C0R5YPTF	14.0	10.0	100-160	0.5	2000
SDV1608S140C010YPTF	14.0	10.0	100-160	1	1250
SDV1608S140C020YPTF	14.0	10.0	60-80	2	600
SDV1608S180C0R5YPTF	18.0	12.7	100-160	0.5	2000
SDV1608S180C010YPTF	18.0	12.7	100-160	1	1250
SDV1608S180C020YPTF	18.0	12.7	60-80	2	600
SDV1608H260C0R5YPTF	26.0	18.4	100-160	0.5	2000
SDV1608H260C010YPTF	26.0	18.4	100-160	1	1250
SDV1608H260C020YPTF	26.0	18.4	60-80	2	600

※ □ :V_{DC} : Max DC working voltage of varistor must exceed or equal to 1.5 times that of the application circuit voltage,V_{DC}≥1.5V_n .

※ Products with other Electrical Characteristics can be provided upon customer's request. Please contact your local sales.