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2010 / 10 / 2000

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VARISTORS

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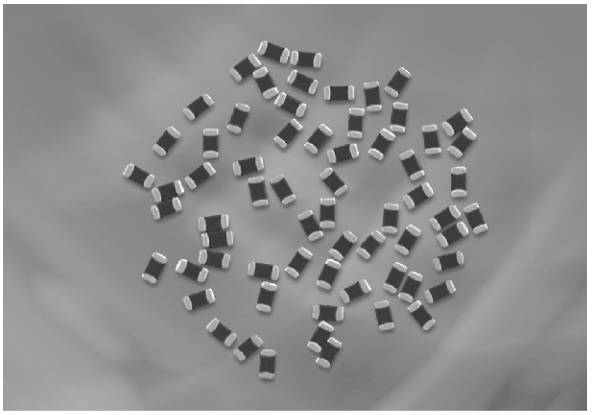
Introduction

Joyin's metal oxide based chip varistors (JMV) are used for transient voltage suppression. JMV has non-linear voltage current behavior which is similar to Zener Diode.

Since each grain in JMV exhibits small p-n-p junction, it has much better electrical reliability than Zener Diode.

Furthermore, JMV also exhibits better electrical properties, such as excellent clamping voltage and low leakage current.

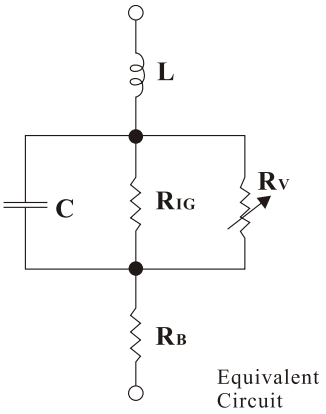


Features

- Small size and SMD capability
- Excellent clamping performance
- High transient current capability
- Fast response time
- Low voltage available
- Comply with RoHS and Halogen-free

Applications

- IC and Transistor Protection
- Power Line and I/O Protection
- Telecommunication Transient Protection
- Automotive Circuit Applications

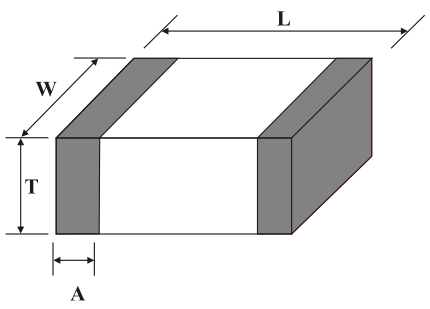


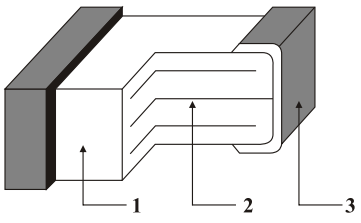
Equivalent Circuit

General Characteristics

- Operating ambient temperature range: -55^{0}C to 85^{0}C
- Storage temperature range: -55^{0}C to 85^{0}C

Introduction





Chip Dimensions

inch (mm)

Chip Size	L	W	T	A
0402 (1005)	0.040±0.004 (1.00±0.10)	0.020±0.004 (0.50±0.10)	0.024 max. (0.6 max.)	0.010± 0.006 (0.25± 0.15)
0603 (1608)	0.063±0.006 (1.60± 0.15)	0.031±0.006 (0.80±0.15)	0.035 max. (0.9 max.)	0.014±0.006 (0.35±0.15)
0805 (2012)	0.079±0.008 (2.01± 0.20)	0.049±0.008 (1.25±0.20)	0.04 max. (1.02 max.)	0.028 max. (0.71 max.)
1206 (3216)	0.126±0.008 (3.20±0.20)	0.063±0.008 (1.60± 0.20)	0.071 max. (1.8 max.)	0.028 max. (0.71 max.)
1210 (3225)	0.126±0.008 (3.20±0.20)	0.098±0.01 (2.50± 0.25)	0.071 max. (1.8 max.)	0.028 max. (0.71 max.)
1812 (4532)	0.177±0.016 (4.5±0.40)	0.126±0.016 (3.2± 0.40)	0.098 max. (2.5 max.)	0.031 max. (0.8 max.)
2220 (5750)	0.224±0.016 (5.7±0.40)	0.197±0.016 (5.0± 0.40)	0.098 max. (2.5 max.)	0.031 max. (0.8 max.)

Chip Structure

Symbol	Materials
1	Zinc Oxide Ceramics
2	Metal Inner Electrodes (Ag / Pd)
3	Metal End Termination (Ag / Ni / Sn)

Ordering Code

JMV 0603 S 5R6 T 182

Joyin Multilayer Varistors

Capacitance Value
ex. 3R0=3.0x10^{0}=3pF
331 =33x10^{1} =330pF
182 =18x10^{2} =1800pF

Chip Size
(See Dimension Table)

Packaging
T - Tape on reel
B - Bulk

Working Voltage

Symbol	Voltage	Symbol	Voltage
5R6	5.6 V	090	9.0 V
140	14 V	180	18 V
260	26 V	300	30 V

Performance Designator
S: Surge Protection and/or ESD Protection
E: E Series, for ESD Protection Only
C: C Series, for ESD Protection Only
A: Surge Protection and/or ESD Protection (Sb free)
P: for ESD protection Only (Sb free)

for ESD / Surge protection - S series

Part No.	Working Voltage (Vw)	Breakdown Voltage (Vb)	Clamping Voltage (Vc)	Peak Current (Ip)	Transient Energy (Et)	Typical Capacitance (C)	
	Volt	Volt	Volt	Amp	Joule	pF	
	< 50 μA	1 mA (DC)	1A,8/20 μs	8/20 μS	10/1000 μS	1 KHz	1 MHz
0402							
JMV0402S5R6T301	5.6	7.0~10.0	22.0	20	0.05	—	300
JMV0402S090T201	9.0	10.0~15.0	32.0	20	0.05	—	200
JMV0402S140T850	14.0	16.2~19.8	38.0	20	0.05	—	85
JMV0402S180T550	18.0	21.6~26.0	45.0	20	0.05	—	55
0603							
JMV0603S5R6T102	5.6	7.0~10.0	22.0	30	0.1	1000	—
JMV0603S5R6T351	5.6	7.0~10.0	22.0	30	0.1	350	—
JMV0603S090T651	9.0	10.0~15.0	30.0	30	0.1	650	—
JMV0603S090T331	9.0	10.0~15.0	30.0	30	0.1	330	—
JMV0603S140T451	14.0	16.2~19.8	37.0	30	0.1	450	—
JMV0603S140T181	14.0	16.2~19.8	37.0	30	0.1	180	—
JMV0603S180T281	18.0	21.6~26.0	48.0	30	0.1	280	—
JMV0603S180T111	18.0	21.6~26.0	48.0	30	0.1	110	—
JMV0603S260T151	26.0	31.0~38.0	62.0	30	0.1	150	—
JMV0603S260T800	26.0	31.0~38.0	62.0	30	0.1	80	—
JMV0603S300T101	30.0	37.0~46.0	73.0	30	0.1	100	—
0805							
JMV0805S5R6T132	5.6	7.0~10.0	22.0	80	0.1	1300	—
JMV0805S5R6T451	5.6	7.0~10.0	22.0	40	0.1	450	—
JMV0805S5R6T661	5.6	7.0~10.0	22.0	40	0.1	660	—
JMV0805S090T781	9.0	10.0~15.0	27.0	40	0.1	780	—
JMV0805S090T271	9.0	10.0~15.0	27.0	40	0.1	270	—
JMV0805S120T531	12.0	14.0~18.3	34.0	40	0.1	530	—
JMV0805S120T431	12.0	14.0~18.3	34.0	40	0.1	430	—
JMV0805S120T251	12.0	14.0~18.3	34.0	40	0.1	250	—
JMV0805S140T381	14.0	16.2~19.8	37.0	40	0.1	380	—
JMV0805S140T201	14.0	16.2~19.8	37.0	40	0.1	200	—
JMV0805S180T351	18.0	21.6~26.0	48.0	40	0.1	350	—
JMV0805S180T111	18.0	21.6~26.0	48.0	40	0.1	110	—
JMV0805S260T161	26.0	31.0~38.0	62.0	40	0.1	160	—
JMV0805S260T101	26.0	31.0~38.0	62.0	40	0.1	100	—
JMV0805S300T101	30.0	37.0~46.0	73.0	40	0.1	100	—
JMV0805S300T311	30.0	37.0~46.0	73.0	100	0.3	310	—

V_W - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.
V_b - The voltage acrossed the device measured at 1mA DC current.
V_c - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.
I_p - The max. peak current applied with specified waveform without any possibility of device fail.
E_t - The max. energy which dissipated with the specified waveform without any possibility of device fail.
C - The device capacitance measured with zero volt bias, 1.0 Vrms and 1 KHz / 0.5 Vrms and 1 MHz.

***Any special design or request is welcomed. Please contact our e-mail address: sales@joyin.com.tw**

for ESD / Surge protection - S series

Part No.	Working Voltage (Vw)	Breakdown Voltage (Vb)	Clamping Voltage (Vc)	Peak Current (Ip)	Transient Energy (Et)	Typical Capacitance (C)	
	Volt	Volt	Volt	Amp	Joule	pF	
	< 50 μA	1 mA (DC)	1A,8/20 μs	8/20 μS	10/1000 μS	1 KHz	1 MHz
1206							
JMV1206S5R6T152	5.6	7.0~10.0	22.0	150	1.0	1500	—
JMV1206S120T801	12.0	14.0~18.3	34.0	150	0.6	800	—
JMV1206S140T401	14.0	16.2~19.8	37.0	100	0.3	400	—
JMV1206S140T801	14.0	16.2~19.8	37.0	200	0.5	800	—
JMV1206S160T132	16.0	19.8~24.2	40.0	200	1.0	1300	—
JMV1206S180T132	18.0	21.6~26.0	48.0	200	1.0	1300	—
JMV1206S180T901	18.0	21.6~26.0	48.0	100	0.3	900	—
JMV1206S260T901	26.0	31.0~38.0	62.0	200	1.0	900	—
JMV1206S300T201	30.0	37.0~46.0	73.0	100	0.3	200	—
JMV1206S300T401	30.0	37.0~46.0	73.0	100	0.3	400	—
JMV1206S300T551	30.0	37.0~46.0	73.0	200	1.0	550	—
JMV1206S330T551	33.0	39.0~47.0	75.0	180	1.0	550	—
JMV1206S380T501	38.0	42.3~51.7	88.0	200	1.1	500	—
JMV1206S450T551	45.0	50.4~61.6	95.0	180	0.8	550	—
JMV1206S480T251	48.0	55.8~68.2	100.0	100	0.8	250	—
JMV1206S560T101	56.0	61.0~77.0	120.0	100	0.3	100	—
JMV1206S560T381	56.0	61.0~77.0	120.0	180	1.0	380	—
JMV1206S650T241	65.0	73.8~90.2	135.0	100	0.6	240	—
1210							
JMV1210S5R6T502	5.6	7.0~10.0	22@2.5A	250	0.4	5000	—
JMV1210S180T202	18.0	21.6~26.0	48@2.5A	400	1.5	2000	—
JMV1210S220T182	22.0	24.3~29.7	52@2.5A	400	1.7	1800	—
JMV1210S260T112	26.0	31.0~38.0	62@2.5A	250	1.2	1100	—
JMV1210S260T152	26.0	31.0~38.0	62@2.5A	400	1.9	1500	—
JMV1210S300T901	30.0	37.0~46.0	77@2.5A	250	1.7	900	—
JMV1210S300T122	30.0	37.0~46.0	77@2.5A	400	1.9	1200	—
JMV1210S450T951	45.0	50.4~61.6	95@2.5A	250	2.2	950	—
1812							
JMV1812S180T452	18.0	21.6~26.0	48@5A	800	2.3	4500	—
JMV1812S220T352	22.0	24.3~29.7	52@5A	500	2.0	3500	—
JMV1812S220T402	22.0	24.3~29.7	52@5A	800	2.7	4000	—
JMV1812S260T282	26.0	31.0~38.0	65@5A	500	2.5	2800	—
JMV1812S260T302	26.0	31.0~38.0	65@5A	800	3.0	3000	—
JMV1812S300T252	30.0	37.0~46.0	78@5A	800	3.7	2500	—
JMV1812S380T202	38.0	42.3~51.7	88@5A	800	4.2	2000	—
2220							
JMV2220S5R6T203	5.6	7.0~10.0	19@10A	1200	1.4	20000	—
JMV2220S180T153	18.0	22.0~27.0	56@10A	1200	5.8	15000	—
JMV2220S300T502	30.0	37.0~46.0	85@10A	1200	9.6	5000	—
JMV2220S380T402	38.0	42.3~51.7	88@10A	1200	12	4000	—

V_W - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.
V_b - The voltage acrossed the device measured at 1mA DC current.
V_c - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.
I_p - The max. peak current applied with specified waveform without any possibility of device fail.
E_t - The max. energy which dissipated with the specified waveform without any possibility of device fail.
C - The device capacitance measured with zero volt bias, 1.0 Vrms and 1 KHz / 0.5 Vrms and 1 MHz.

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for ESD protection - C series

Part Number	Working Voltage (Vw)	Clamping Voltage (Vc)	ESD Withstanding	Capacitance (C)		Capacitance Tolerance
	Volt	Volt	Time	pF		%
	< 15 μA	1A,8/20 μs	8KV *	1 KHz	1 MHz	
0402						
JMV0402C050T4R7	5.0	50.0	> 1000	—	4.7	-20% ~ +80%
JMV0402C050T100	5.0	50.0	> 1000	—	10	±20%
JMV0402C050T120	5.0	50.0	> 1000	—	12	±20%
JMV0402C050T150	5.0	50.0	> 1000	—	15	±20%
JMV0402C050T180	5.0	50.0	> 1000	—	18	±20%
JMV0402C050T220	5.0	50.0	> 1000	—	22	±20%
JMV0402C050T270	5.0	50.0	> 1000	—	27	±20%
JMV0402C050T330	5.0	50.0	> 1000	—	33	±20%
JMV0402C050T390	5.0	50.0	> 1000	—	39	±20%
JMV0402C050T470	5.0	50.0	> 1000	—	47	±20%
JMV0402C050T560	5.0	50.0	> 1000	—	56	±20%
JMV0402C050T680	5.0	50.0	> 1000	—	68	±20%
JMV0402C050T820	5.0	50.0	> 1000	—	82	±20%
JMV0402C050T101	5.0	30.0	> 1000	100	—	±20%
JMV0402C050T121	5.0	30.0	> 1000	120	—	±20%
JMV0402C050T151	5.0	29.0	> 1000	150	—	±20%
JMV0402C050T181	5.0	29.0	> 1000	180	—	±20%
JMV0402C050T221	5.0	27.0	> 1000	220	—	±20%
JMV0402C050T271	5.0	27.0	> 1000	270	—	±20%
JMV0402C050T331	5.0	26.0	> 1000	330	—	±20%
JMV0402C120T4R7	12.0	80.0	> 1000	—	4.7	-20% ~ +80%
JMV0402C120T100	12.0	60.0	> 1000	—	10	±20%
JMV0402C120T220	12.0	50.0	> 1000	—	22	±20%
JMV0402C120T330	12.0	50.0	> 1000	—	33	±20%
JMV0402C120T560	12.0	50.0	> 1000	—	56	±20%
JMV0402C120T820	12.0	50.0	> 1000	—	82	±20%
JMV0402C120T101	12.0	50.0	> 1000	100	—	±20%
JMV0402C240T3R3	24.0	200.0	> 1000	—	3.3	-20% ~ +80%
JMV0402C240T4R7	24.0	130.0	> 1000	—	4.7	-20%~+80%

* - In system ESD withstanding pulse per IEC 61000-4-2,8KV, contact discharge method.
Vw- The max. steady state DC operating voltage of which varistor could maintain also not exceeding 15 μA leakage current.
Vc - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.
C - The device capacitance measured with 1.0Vrms, 1KHz / 0.5rms, 1 MHz.

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for ESD protection - C series

Part Number	Working Voltage (Vw)	Clamping Voltage (Vc)	ESD Withstanding	Capacitance (C)		Capacitance Tolerance
	Volt	Volt	Time	pF		%
	< 15 μA	1A,8/20 μs	8KV *	1 KHz	1 MHz	
0603						
JMV0603C050T4R7	5.0	50.0	> 1000	—	4.7	-20% ~ +80%
JMV0603C050T100	5.0	50.0	> 1000	—	10	±20%
JMV0603C050T120	5.0	50.0	> 1000	—	12	±20%
JMV0603C050T150	5.0	50.0	> 1000	—	15	±20%
JMV0603C050T180	5.0	50.0	> 1000	—	18	±20%
JMV0603C050T220	5.0	50.0	> 1000	—	22	±20%
JMV0603C050T270	5.0	50.0	> 1000	—	27	±20%
JMV0603C050T330	5.0	50.0	> 1000	—	33	±20%
JMV0603C050T390	5.0	50.0	> 1000	—	39	±20%
JMV0603C050T470	5.0	50.0	> 1000	—	47	±20%
JMV0603C050T560	5.0	50.0	> 1000	—	56	±20%
JMV0603C050T680	5.0	50.0	> 1000	—	68	±20%
JMV0603C050T820	5.0	50.0	> 1000	—	82	±20%
JMV0603C050T101	5.0	30.0	> 1000	100	—	±20%
JMV0603C050T151	5.0	29.0	> 1000	150	—	±20%
JMV0603C050T181	5.0	29.0	> 1000	180	—	±20%
JMV0603C050T221	5.0	27.0	> 1000	220	—	±20%
JMV0603C050T271	5.0	27.0	> 1000	270	—	±20%
JMV0603C050T331	5.0	26.0	> 1000	330	—	±20%
JMV0603C050T391	5.0	26.0	> 1000	390	—	±20%
JMV0603C050T471	5.0	26.0	> 1000	470	—	±20%
JMV0603C050T102	5.0	23.0	> 1000	1000	—	±20%
JMV0603C120T4R7	12.0	80.0	> 1000	—	4.7	-20% ~ +80%
JMV0603C120T100	12.0	60.0	> 1000	—	10	±20%
JMV0603C120T220	12.0	50.0	> 1000	—	22	±20%
JMV0603C120T330	12.0	50.0	> 1000	—	33	±20%
JMV0603C120T390	12.0	50.0	> 1000	—	39	±20%
JMV0603C120T470	12.0	50.0	> 1000	—	47	±20%
JMV0603C120T560	12.0	50.0	> 1000	—	56	±20%
JMV0603C120T820	12.0	50.0	> 1000	—	82	±20%
JMV0603C120T101	12.0	50.0	> 1000	100	—	±20%
JMV0603C120T151	12.0	50.0	> 1000	150	—	±20%
JMV0603C120T181	12.0	47.0	> 1000	180	—	±20%
JMV0603C120T331	12.0	46.0	> 1000	330	—	±20%
JMV0603C240T3R3	24.0	200.0	> 1000	—	3.3	-20% ~ +80%

* - In system ESD withstanding pulse per IEC 61000-4-2,8KV, contact discharge method.
V_W - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 15μA leakage current.
V_C - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.
C -The device capacitance measured with 1.0Vrms, 1KHz / 0.5rms, 1 MHz.

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for ESD protection - Low capacitance Series

Part No.	Size (mm)	V w	Insulation Resistance	Trigger Voltage* (Vt)	Clamping Voltage* (Vc)	ESD		ESD Pulse Withstand* min.	Cp (1MHz, 1Vrms)
						Contact	Air		
0402 / 0603									
JJESD0402C120T0R2	1005	12	≧ 15MΩ	350	30	8KV	15KV	100	0.15pF
JJESD0603C120T0R2	1608	12		350	30	8KV	15KV	100	0.15pF

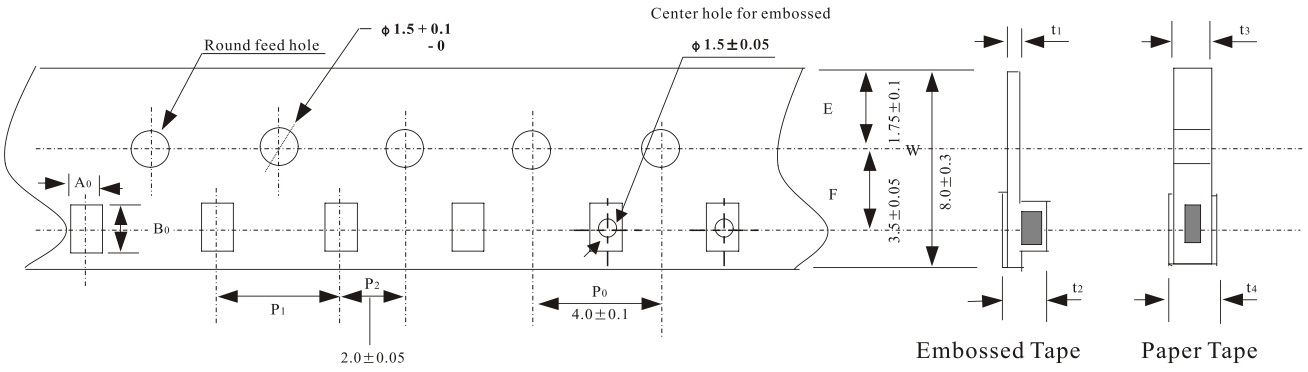
*: Per IEC 61000-4-2, 8KV, Clamp measurement made 30nS after initiation of pulse, all test in contact discharge mode.
Note: Operating temperature : -55℃ ~ 85℃

for ESD protection - E series

Part No.	Working Voltage (V_W)	Breakdown Voltage (Vb)	Clamping Voltage (Vc)	Peak Current (Ip)	Transient Energy (Et)	Typical Capacitance (C)	
	Volt	Volt	Volt	Amp	Joule	pF	
	< 15 μA	1 mA (DC)	1A,8/20 μs	8/20 μS	10/1000 μS	1 KHz	1 MHz
0402 / 0603							
JMV0402E200T220	12.0	15.0~25.0	50.0	1max.	0.05max.	—	22
JMV0402E270T150	17.0	21.6~32.4	66.0	1max.	0.05max.	—	15
JMV0402E270T300	17.0	21.6~32.4	66.0	1max.	0.05max.	—	30
JMV0402E520T030	17.0	41.6~56.0	130.0	1max.	0.05max.	—	3.0
JMV0603E270T150	17.0	21.6~32.4	66.0	2max.	0.05max.	—	15
JMV0603E270T300	17.0	21.6~32.4	66.0	2max.	0.05max.	—	30
JMV0603E520T030	17.0	41.6~56.0	130.0	2max.	0.05max.	—	3.0
JMV0603E620T150	17.0	55.8~68.2	120.0	2max.	0.05max.	—	15
JMV0603E620T300	17.0	55.8~68.2	120.0	2max.	0.05max.	—	30

V_W - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.
V_b - The voltage acrossed the device measured at 1mA DC current.
V_c - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.
I_p - The max. peak current applied with specified waveform without any possibility of device fail.
E_t - The max. energy which dissipated with the specified waveform without any possibility of device fail.
C - The device capacitance measured with zero volt bias, 1.0 Vrms and 1 KHz / 0.5 Vrms and 1 MHz.

Carrier Tape Specifications



Dimensions of Embossed Tape

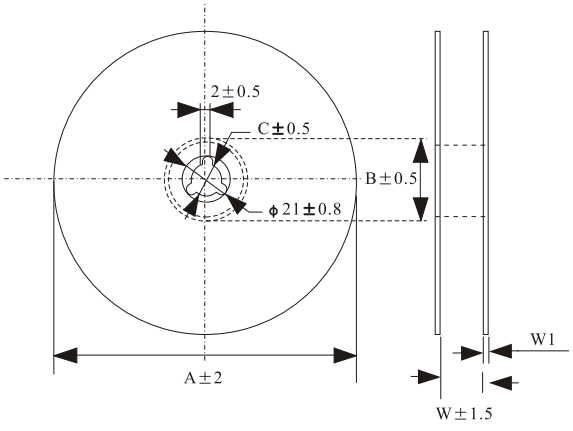
Size	$A_0 \pm 0.1$ (mm)	$B_0 \pm 0.1$ (mm)	$P_1 \pm 0.1$ (mm)	t_1 / t_2 (mm)	t_3 / t_4 (mm)	Quantity / Reel (Pcs)	
						Paper Tape	Embossed Tape
0402	0.62	1.10	2	—	1.0 max / 1.1 max	10000	—
0603	1.08	1.88	4	—	1.0 max / 1.1 max	4000	—
0805	1.42	2.30	4	0.6 max / 2.0 max	1.0 max / 1.1 max	4000	4000
1206	1.88	3.50	4	0.6 max / 2.9 max	—	—	3000
1210	2.18	3.46	4	0.6 max / 2.9 max	—	—	2000
1812	3.66	4.95	8	0.6 max / 2.9 max	—	—	1000
2220	5.10	5.97	8	0.6 max / 2.9 max	—	—	1000

A_0 : Width of Cavity
B_0 : Length of Cavity
P_1 : Pitch

t_1 : Embossed Tape Thickness
t_2 : Height of Embossed Tape

t_3 : Paper Tape for Width
t_4 : Paper Tape Bottom Width

Reel Specifications



Dimensions mm

Size	A	B	C	W	W1
0402	178	60	13	10	1.6
0603	178	60	13	10	1.6
0805	178	60	13	10	1.6
1206	178	60	13	10	1.6
1210	178	60	13	10	1.6
1812	178	60	13.5	13.6	1.6
2220	178	60	13.5	13.6	1.6

PRODUCT INTRODUCTION

Zinc oxide varistor is a voltage dependent resistor with symmetrical voltage-current characteristics that is designed to protect all kinds of electronic devices or elements from switching and induced lightning surges. Its non linear exponent characteristic with broad using range and mass production is gradually being used by various level of electric engineering.

久尹氧化鋅壓敏電阻

氧化鋅壓敏電阻又稱「突波吸收器」,係一種具有電壓-電流對稱特性之電壓屬性電阻器。它主要的設計是用來保護所有的電子產品或元件免於受開關或雷擊誘發所產生之突波的影響,而其非線性指數的特性與廣泛的應用範圍以及可以量產等優點,已逐漸地被應用在各種不同領域的電子工程方面。

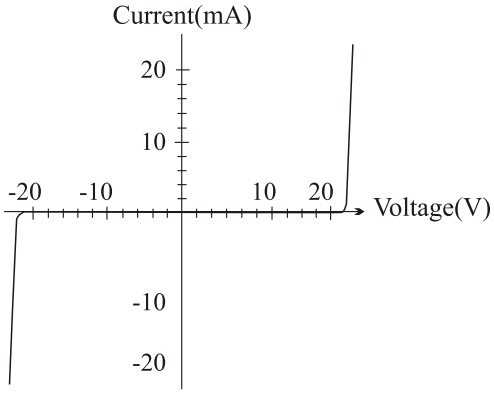
FEATURES

- Fast response time.
- Low leakage current.
- Excellent voltage ratio.
- Wide voltage & energy ratio.
- Low standby power and no follow on current.
- High performance in surge current handling capability.
- High performance in clamping voltage characteristics.

特性介紹

- 反應時間快速。
- 低漏電流。
- 優越之電壓比。
- 寬廣之電壓及能量比。
- 低備用電力且無後續電流。
- 高效能之突波電流處理能力。
- 抑制電壓特性之穩定執行能力。

V-I Characteristics of varistor



壓敏電阻之V-I特性

（如左圖）

APPLICATION

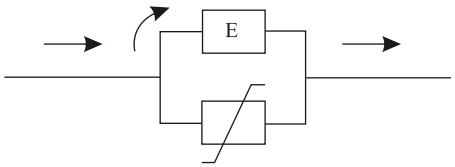
- IC, diode, transistor, thyristor, triac, and other semiconductor protection.
- Suppression of main borne transients in consumer electronics and industrial electronics.
- Suppression of internally generated spikes in electronics circuit.
- Surge protection in communication, measuring and controller electronics.
- Surge protection in electronic home appliances and gas and petroleum appliances.
- Relay and electromagnetic value surge absorption.

應用範圍

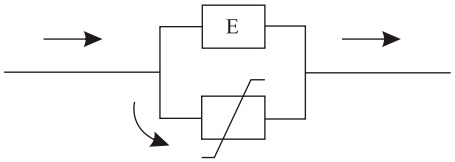
- 保護IC，二極體，電晶體，閘流體，屏遮半導體及其他半導體等電子元件。
- 抑制消費性電子及工業用電子產品內部主電源所產生的瞬間突波。
- 抑制電子線路上內發性的突波。
- 通信、量測及電控等電子器材之突波保護。
- 房舍所裝置的以及瓦斯和油類設施上所裝置的電子器材之突波保護。
- 繼電器和電磁閥之突波吸收。

The varistor's rest state has a high impedance(several megaohms) in relation to the component to be protected and does not change the characteristics of the electric circuit. In the presence of transient voltage (over the breakdown voltage of varistor), the varistor then has a low impedance (a few ohms) and short circuits, i.e. the assembly E to be protected.

壓敏電阻在休息狀態時,相對於受保護的電子元件而言,具有很高的阻抗(數兆歐姆)而且不會改變原設計之電路特性。但當瞬間突波電壓出現(超過壓敏電阻之崩潰電壓時),該壓敏電阻之阻抗會變低(僅有幾個歐姆而已)並造成原線路短路;換言之;電子產品或元件E因此而受到保護(如下圖)。



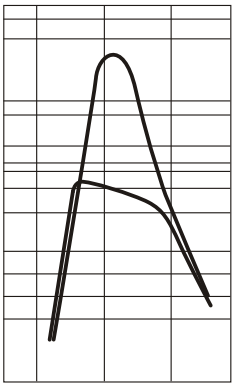
Rest State



Protective State

Surge Suppression of Varistor

壓敏電阻之突波抑制功能


Time 時間

Max. withstanding voltage of protected device
受保護電子產品之最高耐電壓
Max. clamping voltage of varistor
壓敏電阻之最高抑制電壓
The real clamping voltage occurred
眞正產生之抑制電壓
Varistor voltage
壓敏電壓(崩潰電壓)
Operating voltage of protected device
受保護電子產品之工作電壓

(如左圖)

PARAMETERS DEFINITION

Varistor voltage (Breakdown Voltage):

The varistor voltage is the voltage across the varistor measured at a specified current Ic (0.1mA or 1mA) of specified duration.

Maximum allowable voltage:

The Maximum allowable voltage corresponds to the rest state of the varistor. The rest state voltage offers a low leakage current in order to limit the power consumption of the protected device and not to disturb the circuit to be protected.

Non linear exponent (α):

The varistor voltage-current characteristic is defined by the equation: $I=KV^{\alpha}$ where K is a constant dependent on geometry, and α is the non linear exponent. We usually take two points (V_1,I_1), (V_2,I_2) to estimate the value of α.

$$\alpha=\frac{\log I_1/I_2}{\log V_1/V_2}$$

In which I_1 and I_2 are the current value corresponding to the voltage value V_1 and V_2.

參數名詞解釋

壓敏電壓(即崩潰電壓):

壓敏電壓係以一定的電流Ic(0.1mA或1mA)於一定的時間內通過壓敏電阻所量取之電壓。

最高工作電壓:

最高工作電壓表示壓敏電阻在該電壓之下仍爲休息狀態。休息狀態之壓敏電阻僅有很小的漏電流,以限制受保護電子產品之電力消耗,同時不致干擾到受保護的線路。

非線性指數(即α 值):

壓敏電阻之電壓-電流(V-I)特性係由公式$I=KV^{\alpha}$所定義的, K是一幾何常數,而α則是非線性指數。吾人通常截取二點(V_1,I_1)及(V_2,I_2)來計算其α值,

即 $$\alpha=\frac{\log I_1/I_2}{\log V_1/V_2}$$

I_1及I_2係電壓等於V_1及V_2時相對應之電流值。

Maximum clamping voltage:

Maximum clamping voltage is the maximum voltage Vp between two terminals with the specified standard impulse current Ip (8x20 μ sec). The voltage value is an indication on the protective function of the varistor.

Energy(Joule):

Maximum energy from one or a burst of pulses. It is the value within the varistor change of ±10% when one impulse of 10x1000 μ sec is applied.

E = K × Vm × Im × T

E : Energy(Joule)

K : Constant = 1.4

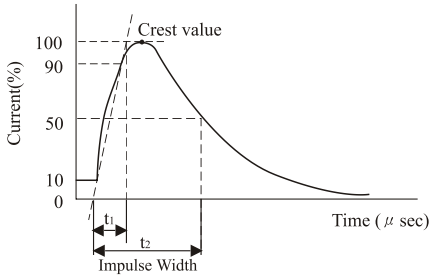
Vm : Max. clamping voltage at Im.

Im : Max. allowable single surge current of 10x1000 μ sec.

T : Duration of surge current (1000 μ sec)

Withstanding surge current:

Withstanding surge current is the maximum peak current for the varistor with the specified standard impulse current (8x20 μ sec) applied one time or two times and corresponding to a permissible variation of 10% in the varistor voltage change.



t_1=8 t_2=20 for 8 × 20 μ sec
t_1=10 t_2=1000 for 10 × 1000 μ sec

Rated wattage

The maximum power that can be applied within the specified ambient temperature.

Capacitance

The capacitance of varistor is the reference value measured between the varistor terminals at specified frequency.

Pulse lifetime rating

This is expressed as the maximum allowable number of impulse currents applied. 8x20 μ sec impulse current (or 10x1000 μ sec) is applied at prescribed interval. This curve also provides for derating current as required with repetitive pulsing.

GENERAL CHARACTERISTICS

- Storage temperature : -40℃~+125℃
- Max. response time : 25 n sec.
- Max. operating temperature : -40℃~+125℃
- Temp. coefficient of voltage : ±0.05% / ℃ max.

最高抑制電壓:

最高抑制電壓係以一定之標準衝擊電流Ip(8x20 μ sec)於壓敏電阻二條引線端點之間所量得的最高電壓Vp。該電壓值同時也是壓敏電阻發揮其保護功能的一項指標。

能量(即焦耳值):

表示一次脈衝之最大能量,亦即以10x1000 μ sec衝擊一次而壓敏電壓之變化仍在10%以內之焦耳值。其公式:

E = K×Vm×Im×T

E : 能量(焦耳)

K : 常數,約等於1.4。

Vm : 電流在Im時之最高抑制電壓。

Im : 最大允許之10x1000 μ sec單一突波電流。

T : 突波電流延續時間(1000 μ sec)

耐突波電流(即突波耐量):

突波耐量乃壓敏電阻以一定之標準衝擊電流(8x20 μ sec)衝擊1次或2次時,壓敏電壓之變化在10%以內的最大脈衝電流。

(如左圖)

額定功率(即瓦特數):

表示在一定的環境溫度下所能消耗的最大功率。

電容值:

壓敏電阻之電容值係以一定的頻率於引線端點之間所量得的參考值。

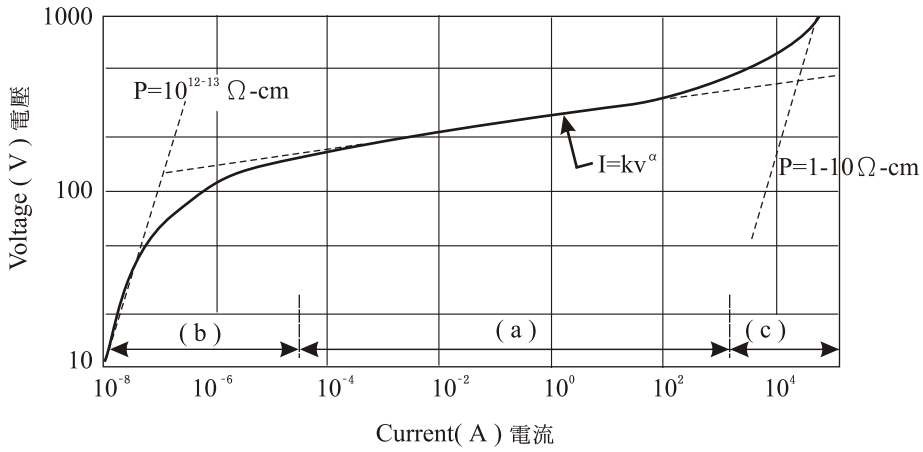
額定脈衝壽命:

表示壓敏電阻以8x20 μ sec.(或10x1000 μ sec.)的衝擊電流,依規定的間隔時間連續給予衝擊時所能承受之最高衝擊次數。其受衝擊時所呈現的曲線同時也提供了連續衝擊每次所需求的遞減電流。

JVR壓敏電阻之一般特性

- 儲存溫度:-40℃~+125℃
- 最大反應時間:25n sec.
- 最高工作溫度:-40℃~+125℃
- 電壓溫度係數:±0.05% / ℃ max.

CURRENT-VOLTAGE CHARACTERISTICS 電流-電壓特性曲線

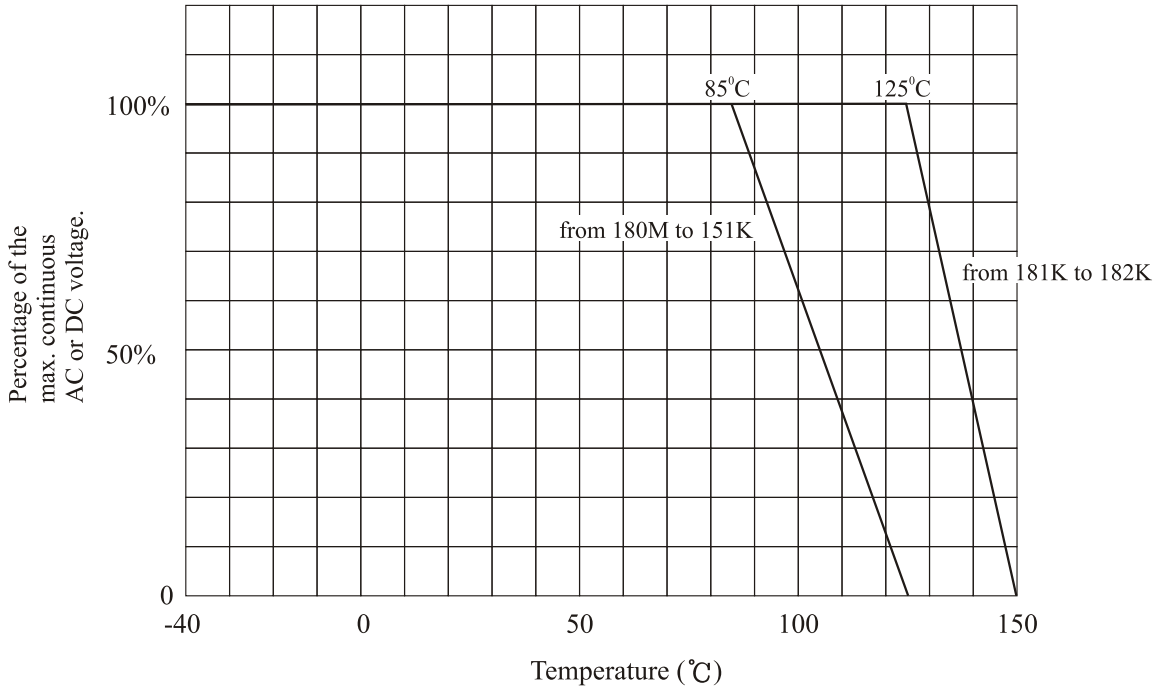


(a) Varistor action region
壓敏電阻工作區

(b) Prebreakdown region
預先崩潰區

(c) Upturn region
電壓上揚區

MAX. CONTINUOUS AC or DC VOLTAGE WITH TEMPERATURE



SOURCES OF SURGE VOLTAGE

- Direct lightning surges.
- Surge voltage by grounding fault.
- From magnetic induction.
- Induced lightning surges.
- Surge voltage by switching operation.
- From electrostatic induction.

突波電壓之來源

- 直接雷擊所產生的突波。
- 接地不良所產生的突波。
- 各種磁性所誘發的突波。
- 因雷擊間接誘發的突波。
- 開關電源所產生的突波。
- 靜電特性所誘發的突波。

HOW TO SELECT JOYIN VARISTOR

- To identify the source and route of surge.
- To decide the connection method of varistor.
- To decide varistor voltage and max. clamping voltage.
- To decide surge current waveform by calculation from surge voltage and surge impedance.
- To check whether the withstanding surge current and surge life of varistor is sufficient or not.
- To check the variation of electric power of protected device.
- To check whether the max. energy and energy life of varistor is enough or not.
- To check the relation:
  Max. withstanding voltage of protected device > Max. clamping voltage of varistor > The real clamping voltage occurred > Breakdown voltage of varistor > Operating voltage of protected device.
- To check whether the loss of capacitance of varistor in operating condition.
- To check whether the problem caused by excessive current of leakage.
- To check the connection method of varistor.
- To check the condition of varistor overload.
- To check any other problems by various operating conditions.
- To test and to verify by real practice.
- To check the connection of the grounding wire.

如何選用久尹壓敏電阻

- 確定突波的來源及其通路。
- 確定壓敏電阻的連接方式。
- 確定所需要的壓敏電壓及最高抑制電壓。
- 依突波電壓和突波阻抗計算出突波電流的波形。
- 檢查壓敏電阻的突波耐量和脈衝壽命是否足夠。
- 檢查受保護電子產品所使用電源的變動(穩定)程度。
- 檢查壓敏電阻的最大能量和能量壽命是否足夠。
- 檢查下列關係是否正確:
  受保護電子產品之最高耐電壓 > 壓敏電阻之最高抑制電壓 > 眞正產生之抑制電壓 > 壓敏電阻之崩潰電壓 > 受保護電子產品之工作電壓
- 檢查壓敏電阻於工作狀態下是否損失其電容值。
- 若出現問題先檢查是否漏電流太大之原因。
- 檢查壓敏電阻連接方式是否適當。
- 檢查壓敏電阻負荷是否過大。
- 檢查壓敏電阻於工作狀態下是否有其他任何問題。
- 受保護電子產品以實際操作來測試及確認所使用之壓敏電阻。
- 檢查接地線之連接狀況。

EXAMPLES OF APPLICATIONS

Varistor voltage selection in line circuit

Power supply voltage	Type
100V AC	JV◇□□△201K JV◇□□△221K JV◇□□△241K JV◇□□△271K
200V AC	JV◇□□△391K JV◇□□△431K JV◇□□△471K
12V DC	JV◇□□△220L
24V DC	JV◇□□△390K

Varistor voltage selection in line to ground circuit

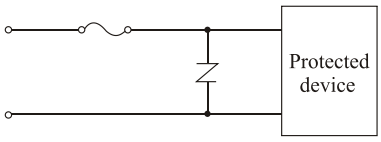
Power supply voltage	Type
100V AC, 200V AC	JV◇□□△431K JV◇□□△471K JV◇□□△751K to JV◇□□△182K

◇ : R=RoHS, H=RoHS+Halogen free +Non flammable
□ : Element size (disc dia.)
△ : Series (N or S or U, see p.18)

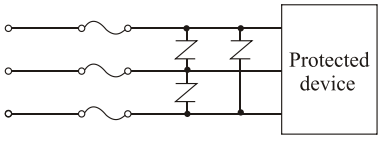
應用說明

Line Circuit

AC/DC single-phase circuit



AC three-phase circuit



Varistor voltage selection in switching circuit protection

Power supply voltage	Type
12V DC	JV◇□□△220L
24V DC	JV◇□□△390K
100V DC	JV◇□□△151K
100V AC	JV◇□□△201K JV◇□□△241K JV◇□□△221K JV◇□□△271K

Varistor voltage selection in telecommunication circuit protection

Power supply voltage	Type
12V DC	JV◇□□△220L JV◇□□△820K to JV◇□□△182K
24V DC	JV◇□□△390K JV◇□□△820K to JV◇□□△182K

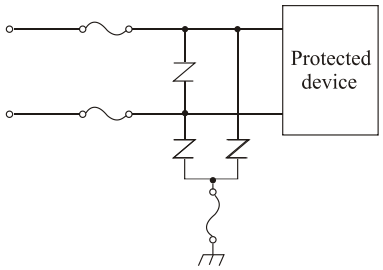
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable
□ : Element size (disc dia.)
△ : Series (N or S or U, see p.10)

Fuse current selection if fuse being in series with varistor to protect from follow-on surge current after varistor damaged

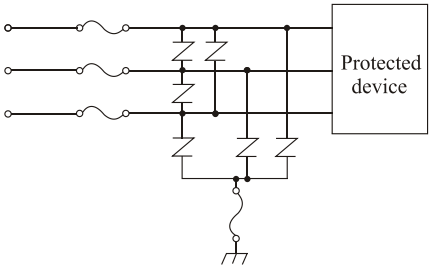
Varistor	5mm	7mm	10mm	14mm	20mm
Nominal fuse current	≦1A	≦3A	≦5A	≦10A	≦10A

Line and Ground

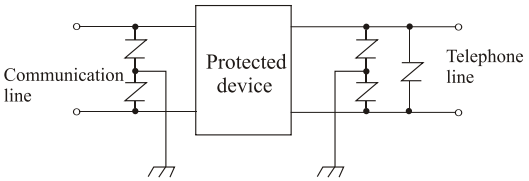
AC/DC single-phase circuit



AC three-phase circuit

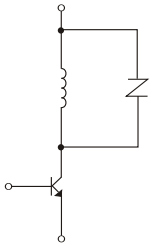


Telecommunication Circuit Protection

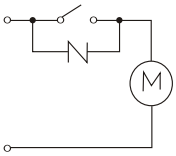


Switching Circuit Protection

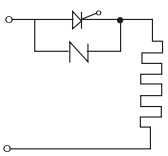
Relay protection



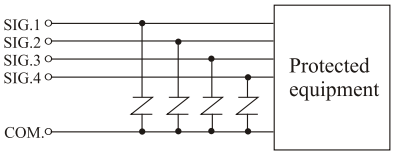
Spark elimination



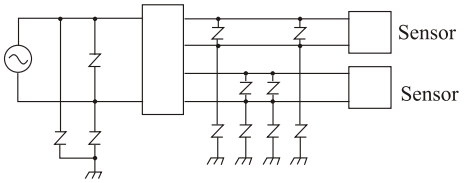
Semiconductor protection



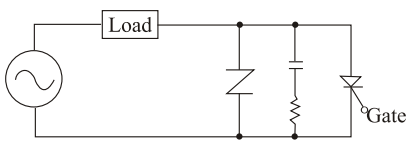
Surge protection of signal line



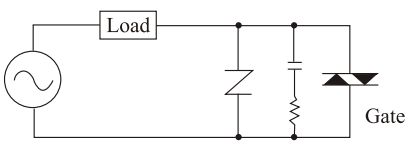
Fire alarm system



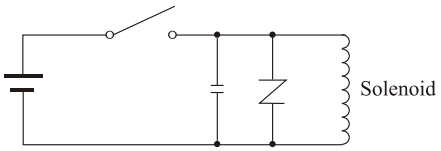
Thyristor protection



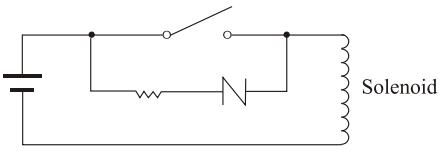
Triac protection



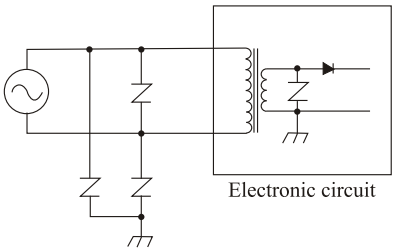
Solenoid



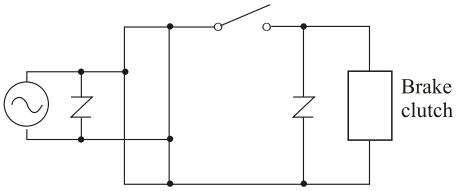
Pontact Protection



Stove & Boiler



Brake & Clutch



CHECK LIST IN SERIES AND PARALLEL OPERATION OF VARISTORS

Item	Series	Parallel
Objective	Higher voltage capability Higher energy capability (No Selection is required)	Higher current capability Higher energy capability (Selection is required)
Application Range	All voltages and currents.	All voltages-but for higher currents, i.e.,>100A
Models Applicable	All, must have same withstanding surge current ratings.	All models
Precautions	Withstanding surge current ratings must be equal.	Must be identical voltage rated models. Must test and select units for similar V-I characteristics.
Effect on Rating	The same current ratings with single unit. Voltage ratings additive. Energy ratings additive. Clamp voltages additive.	Current ratings function of current sharing. The same voltage ratings with single unit. Energy ratings as above in proportion to current sharing. Clamp voltages determined by composite V-I characteristic of matched units.

欲將多顆敏壓電阻器以串聯或並聯使用應確認的項目

項目	串聯	並聯
目的	較高電壓。 較高能量。 〈不須挑選〉	較大電流。 較高能量。 〈需要挑選〉
應用範圍	所有電壓及電流	所有電壓，但較大電流(>100A)
型號適用性	須有相同的額定突波耐量。	所有型號。
注意事項	額定突波耐量必須相同。	必須是單一額定電壓。 必須挑選類似的V-I特性。
對額定值的影響	須與單一元件額定電流相同。 額定電壓增加。 額定能量增加。 殘壓增加。	額定電流決定於電流分配方式。 須與單一元件額定電壓相同。 額定能量與電流分配成正比。 殘壓決定於合成之V-I曲線。

Terminal pull strength

After gradually applying the load specified below and keeping the unit fixed for 10 ±1 seconds , with no remarkable mechanical damage.

Terminal diameter	Loading weight in pull strength
0.6 mm	10N (1.02 Kg)
0.8 mm	10N (1.02 Kg)
1.0 mm	20N (2.04 Kg)

端子拉力強度測試

以漸進的方式逐漸增加壓敏電阻二條引線端點之負荷，直至下表所指定的重量爲止，然後使其穩定地維持10±1 秒鐘即可，同時目視檢查有無顯著的傷害。

引線直徑	引線直接下拉重量
0.6 mm	10N (1.02 Kg)
0.8 mm	10N (1.02 Kg)
1.0 mm	20N (2.04 Kg)

Terminal bending strength

The unit is secured with one terminal kept in vertical and the weight specified above is applied in the axial direction. The terminal is gradually bent by 90° in one direction, then 90° in the opposite direction, and again back to the original position. It is repeated two times, with no remarkable mechanical damage.

Terminal diameter	Loading weight in bending strength
0.6 mm	5N (0.51 Kg)
0.8 mm	5N (0.51 Kg)
1.0 mm	10N (1.02 Kg)

端子彎曲強度測試

當前項拉力試驗完成後，引線須保持 90° 垂直狀態，二條引線則成一軸線方向。然後將其中一條引線逐漸朝原方向彎折90°，之後朝反方向彎折90°，最後再朝原方向彎折90°回到原位，重覆測試2次，同時目視檢查有無顯著的傷害。

引線直徑	引線彎曲橫拉重量
0.6 mm	5N (0.51 Kg)
0.8 mm	5N (0.51 Kg)
1.0 mm	10N (1.02 Kg)

Vibration

Subjected to simple harmonic motion of 0.75 mm amplitude with 1.5mm maximum total excursion between limits of 10~55 Hz. Frequency scan is traversed in one minute. This motion is applied for period of 2 hours in each of three mutually perpendicular directions, with no remarkable mechanical damage.

振動測試

振動機之設定條件爲：簡單的諧振運動，振幅0.75mm，頻率10~55Hz，其總游移幅度最大爲1.5mm，1分鐘之內應做頻率掃瞄確認。依此條件之振動試驗，必須就三個軸向各做2個小時，同時目視檢查有無顯著的傷害。

Solderability

After dipping the terminal to a depth of approximately 3mm from the body in a soldering bath of 235 ±5℃ for 2 ±0.5 seconds , the terminal is visually examined. Approximately 95% of the terminals should be covered with new solder uniformly.

焊錫性測試

將引線浸入錫槽，深度爲距產品本體底部約3mm，錫溫235±5℃ 浸2±0.5 秒鐘後，以目視檢查沾錫覆蓋面積必須大於95%。

Resistance to soldering heat

The terminal is dipped into a soldering bath with temperature of 260 ±5℃ to a point of 2~2.5mm from the body of the unit , be held there for 10±1 sec (5N series : 5±1 sec.)and then stored at room temperature and normal humidity for 1 to 2 hours . The change of Vb shall be measured and meet the requirement of △ Vb/Vb≦±5% with no remarkable mechanical damage

焊錫耐熱性測試

同焊錫性試驗方法將引線浸260±5℃ 之錫槽內10±1秒鐘(5N系列5±1 秒)後，置於室溫和正常濕度下1~2小時，測試其電壓(Vb)的變化，△Vb/Vb 必須小於等於±5%，同時目視檢查有無顯著的傷害。

Damp heat load

The component is subjected to 40 ±2℃ , 90 to 95% R.H. and the maximum allowable voltage for 1000 hours and then stored at room temperature and normal humidity for 1 to 2 hours . The change of Vb is measured and must meet the requirement of △Vb/Vb≦±10%.

耐濕負荷測試

樣品在40±2℃ ，相對濕度90~95%R.H.置於最大工作電壓的環境下儲放1000小時後，取出置於室溫和正常濕度下1~2小時，測試其電壓(Vb)的變化。△Vb/Vb必須小於等於±10%。

Temperature cycle

The following temperature cycle is repeated five times:

(1) -40±3°C keeping 30±3 minutes, then
(2) Room temperature keeping 15±3 minutes, then
(3) 125±2°C keeping 30±3 minutes, then
(4) Room temperature keeping 15±3 minutes

Afterwards, the component should be stored at room temperature and normal humidity for 1~2 hours. The change of Vb is then measured and must meet the requirement of ΔVb/Vb ≦±5% with no remarkable mechanical damage.

溫度變化測試

每一週期之衝擊溫度需依下列步驟執行：

(1) 在-40±3°C停留30±3 分鐘，然後
(2) 室溫停留15±3 分鐘，然後
(3) 在125±2°C停留30±3 分鐘，然後
(4) 室溫停留15±3分鐘

反覆衝擊五次之後，將產品取出置於室溫和正常溼度下1~2小時後，量測其電壓(Vb)之變化，ΔVb/Vb 必須≦±5%，同時目視檢查有無顯著傷害。

Humidity

The component is subjected to 40±2℃, 90 to 95% R.H. for 1000 hours without load and then stored at room temperature and normal humidity for 1 to 2 hours . The change of Vb should be measured and meet the requirement of ΔVb/Vb≦±5% .

耐濕性測試

樣品在40±2℃，相對濕度90~95%，置於無負載環境1000小時後，取出置於室溫和正常濕度下1~2小時，測試其電壓(Vb)的變化，ΔVb/Vb必須小於等於±5%。

Impulse life

The impulse current listed in this catalog is applied 1000 times continuously with the interval of 30 seconds at room temperature. The change of Vb should be measured and meet the requirement of ΔVb/Vb≦ ±10%.

脈衝壽命試驗

樣品在室溫條件下，依突波壽命之脈衝電流8x20μs脈衝電流以間隔30秒之頻率連續衝擊1000次，測試其電壓(Vb)的變化，ΔVb/Vb必須小於等於±10%，同時目視檢查外觀有無顯著傷害。

Low temperature storage

The component is subjected to -40±2℃ without load for 1000 hours and then stored at room temperature and normal humidity for 1 to 2 hours . The change of Vb should be measured and meet the requirement of ΔVb/Vb ≦±5%.

低溫儲存測試

樣品在-40℃±2℃，置於無負載環境1000小時後，取出置於室溫和正常濕度下1~2小時，測試其電壓(Vb)的變化。ΔVb/Vb必須小於等於±5%。

High temperature load

After being continuously applied the maximum allowable voltage at 85℃±2℃ (180k~151K); 125℃ (181k~182K) for 1000 hours, the specimen is stored at room temperature and humidity for 1 to 2 hours. The change of Vb should be measured and meet the requirement of ΔVb/Vb ≦±10% .

高溫負載測試

樣品持續加以最大工作電壓之負載，於85℃±2℃(180k~151K)；125℃ (181k~182K) 的環境下工作 1000小時後，取出置於室溫和正常濕度下1~2小時，測試其電壓(Vb)的變化。ΔVb/Vb必須小於等於±10%。

High temperature storage

The component is subjected to 125±2℃ for 1000 hours in a drying oven without load and then stored at room temperature and humidity for 1 to 2 hours. The change of Vb should be measured and meet the requirement of ΔVb/Vb ≦ ±5% .

高溫儲存測試

樣品先在125±2℃的烤箱中，無負載的儲放1000小時，然後取出置於室溫和正常濕度下1~2小時，在測試其電壓(Vb)的變化。ΔVb/Vb必須小於等於±5%。

Withstanding voltage

Withstanding Voltage (Body Insulation)	The specified voltage is applied between both terminals of the component connected together for 1 minute, with no remarkable mechanical damage.	
	2500Vrms(AC)	Test Voltage (AC)

耐電壓測試

在室溫條件下於包封材料與導線間通入2500Vrms(AC)電壓1分鐘後，同時目視檢查有無顯著的損壞。

ORDERING CODE

JV R 07 N 181 K 6 5 Y AW

Joyin ZnO Varistor
久尹氧化鋅壓敏電阻

R=RoHS
H=RoHS + Halogen free + Non Flammable

Element Size (disc dia.)
瓷片直徑別

05 = ϕ 5mm
07 = ϕ 7mm
10 = ϕ 10mm
14 = ϕ 14mm
20 = ϕ 20mm

Series 系列別

N=Standard 標準系列
S=High Surge 高突波電流系列
U=Ultra Surge 超高突波電流系列

Varistor Voltage 電壓值

The first two digits indicate voltage.
前兩位數字代表電壓

The third digit signifies the number of zeroes.
第三位數字代表電壓0的次數

for example 例如：

080=8V
180=18V
181=180V
182=1800V

Varistor Voltage Tolerance
壓敏電壓容許差

K = ±10%
L = ±15%
M = ±20%
P = ±25%

Lead Diameter
線徑

6 = 0.6 ± 0.05mm
8 = 0.8 ± 0.05mm
1 = 1.0 ± 0.05mm

Lead Length & Packaging
腳長及包裝方式

50 = 5 ± 1.0mm for Straight lead
5 ± 0.5mm for Kink lead
U4 = 24mm min. for Bulk and Kink lead
U5 = 25mm min. for Bulk and Straight lead
AW= H0 16mm for Ammo and Kink lead
AY = H0 20mm for Ammo and Straight lead
RW= H0 16mm for T/R and Kink lead
RY = H0 20mm for T/R and Straight lead

* Special spec per request.

Lead Style 腳型

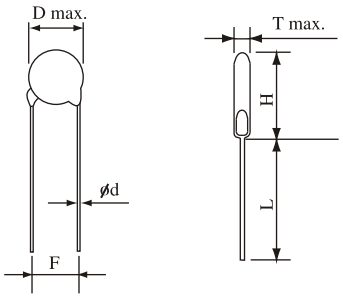
Y=Vertical Kink Lead (standard)
P =Straight Lead

* Special lead styles per request

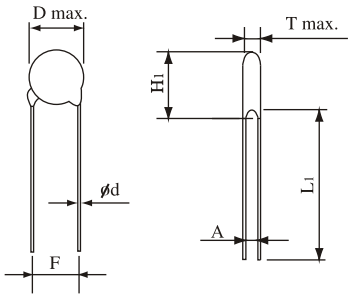
Lead Spacing 線距

5=5.0mm
7=7.5mm
1=10mm

Kinked Lead (Y Type)



Straight Lead (P Type)



Dimension Table unit:mm

Diameter	5mm	7mm	10mm	14mm	20mm
D max.	7.5	9.0	12.5	16.5	23
d±0.05	0.6	0.6	0.8	0.8	1.0
F±1.0	5.0	5.0	7.5	7.5	10.0
H max.	11.0	13	18/*19	22/*23	28/*29
L_1 min.	25.0	25.0	25.0	25.0	25.0
L min.	24.0	24.0	24.0	24.0	24.0

*Just for 182K

Table of T max., A & H_1 max. unit:mm

Diameter	5mm			7mm			10mm			14mm			20mm		
Type No.	T max.	A±0.8	H_1 max.	T max.	A±0.8	H_1 max.	T max.	A±0.8	H_1 max.	T max.	A±0.8	H_1 max.	T max.	A±0.8	H_1 max.
180M	4.5	0.8	10.5	4.5	0.8	12.0	4.9	0.8	15.5	5.0	0.9	19.5	-	-	-
220M/L	4.5	0.9	10.5	4.5	0.9	12.0	4.9	0.9	15.5	5.0	1.0	19.5	5.3	1.0	26.5
270M/K	4.7	0.9	10.5	4.7	0.9	12.0	5.1	0.9	15.5	5.2	1.1	19.5	5.4	1.1	26.5
330M/K	4.7	1.0	10.5	4.7	1.0	12.0	5.1	1.0	15.5	5.2	1.2	19.5	5.4	1.2	26.5
390L/K	4.7	1.2	10.5	4.7	1.2	12.0	5.1	1.2	15.5	5.2	1.4	19.5	5.4	1.4	26.5
470L/K	5.0	1.2	10.5	5.0	1.2	12.0	5.5	1.2	15.5	5.6	1.4	19.5	5.6	1.4	26.5
560L/K	5.0	1.4	10.5	5.0	1.4	12.0	5.5	1.4	15.5	5.6	1.6	19.5	5.6	1.6	26.5
680L/K	5.5	1.7	10.5	5.5	1.7	12.0	6.0	1.7	15.5	6.1	1.9	19.5	6.1	1.9	26.5
820K	3.8	0.8	10.5	3.8	0.8	12.0	4.3	0.8	15.5	4.4	1.0	19.5	-	-	-
101K	3.9	0.8	10.5	3.9	0.8	12.0	4.4	0.8	15.5	4.5	1.0	19.5	5.1	1.2	26.5
121K	4.1	0.9	10.5	4.1	0.9	12.0	4.5	0.9	15.5	4.6	1.1	19.5	5.3	1.3	26.5
151K	4.5	1.2	10.5	4.5	1.2	12.0	4.9	1.2	15.5	5.1	1.4	19.5	5.6	1.6	26.5
181K	4.1	1.0	10.5	4.1	1.0	12.0	4.5	1.0	15.5	4.7	1.2	19.5	5.2	1.4	26.5
201K	4.2	1.0	10.5	4.2	1.0	12.0	4.6	1.0	15.5	4.8	1.2	19.5	5.3	1.4	26.5
221K	4.3	1.1	10.5	4.3	1.1	12.0	4.7	1.1	15.5	4.9	1.3	19.5	5.4	1.5	26.5
241K	4.4	1.1	10.5	4.4	1.3	12.0	4.8	1.3	15.5	5.0	1.5	19.5	5.5	1.7	26.5
271K	4.6	1.3	10.5	4.6	1.4	12.0	5.0	1.4	15.5	5.2	1.5	19.5	5.7	1.9	26.5
301K	4.8	1.3	10.5	4.8	1.5	12.0	5.2	1.6	15.5	5.4	1.7	19.5	5.9	2.1	26.5
331K	4.9	1.3	10.5	4.9	1.5	12.0	5.3	1.6	15.5	5.5	1.7	19.5	6.0	2.1	26.5
361K	5.1	1.8	10.5	5.1	1.9	12.0	5.5	1.9	15.5	5.7	2.1	19.5	6.2	2.3	26.5
391K	5.3	2.0	11.0	5.3	2.0	12.5	5.7	2.2	16.0	5.9	2.2	20.0	6.4	2.4	26.5
431K	6.1	2.1	11.0	6.1	2.0	12.5	6.5	2.5	16.0	6.7	2.5	20.0	7.2	2.7	26.5
471K	6.4	2.2	11.0	6.4	2.3	12.5	6.8	2.6	16.0	7.0	2.7	20.0	7.5	2.9	27.0
511K	6.6	2.5	11.5	6.6	2.5	13.0	7.0	3.1	16.5	7.2	3.1	20.5	7.7	3.3	27.0
561K	6.9	2.8	11.5	6.9	2.8	13.0	7.3	3.4	16.5	7.5	3.4	20.5	8.0	3.6	27.0
621K	7.2	3.1	11.5	7.2	3.1	13.0	7.6	4.0	16.5	7.8	3.8	20.5	8.3	4.1	27.0
681K	7.5	3.4	11.5	7.5	3.4	13.0	8.0	4.4	16.5	8.2	4.1	20.5	8.7	4.4	27.0
751K	7.9	3.7	11.5	7.9	3.7	13.0	8.4	4.4	16.5	8.6	4.3	20.5	9.1	4.5	27.0
781K	-	-	-	8.1	3.9	13.0	8.6	4.6	16.5	8.8	4.6	20.5	9.3	4.8	27.0
821K	-	-	-	8.3	4.1	13.0	8.8	4.6	16.5	9.0	4.6	20.5	9.5	4.8	27.0
911K	-	-	-	-	-	-	9.4	5.4	16.5	9.6	5.4	20.5	10.1	5.7	27.0
102K	-	-	-	-	-	-	9.9	5.4	16.5	10.1	5.6	20.5	10.7	5.8	27.0
112K	-	-	-	-	-	-	10.5	5.7	16.5	10.7	6.1	20.5	11.2	6.3	27.0
182K	-	-	-	-	-	-	12.6	9.8	18.5	12.8	10.2	22.5	13.5	10.4	29.0

RATING AND CHARACTERISTICS

Standard Varistor - 5mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@5A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇05N180M65□△△	18	± 20%	11	14	※ 40	100	50	0.01	0.6	☆ ★
JV◇05N220L65□△△	22	± 15%	14	18	※ 48				0.7	☆ ★
JV◇05N270K65□△△	27	± 10%	17	22	※ 60				0.9	☆ ★
JV◇05N330K65□△△	33		20	26	※ 73				1.1	☆ ★
JV◇05N390K65□△△	39		25	31	※ 86				1.2	☆ ★
JV◇05N470K65□△△	47		30	38	※104				1.5	☆ ★
JV◇05N560K65□△△	56		35	45	※123				1.8	☆ ★
JV◇05N680K65□△△	68		40	56	※150				2.1	☆ ★
JV◇05N820K65□△△	82		50	65	145	400	200	0.1	2.8	☆ ★
JV◇05N101K65□△△	100		60	85	175				3.5	☆ ★
JV◇05N121K65□△△	120		75	100	210				4.0	☆ ★
JV◇05N151K65□△△	150		95	125	260				5.5	☆ ★
JV◇05N181K65□△△	180		115	150	320				6.5	☆ ★
JV◇05N201K65□△△	200		130	170	355				7.1	✪ ☆ ★ ★
JV◇05N221K65□△△	220		140	180	380				7.8	✪ ☆ ★ ★
JV◇05N241K65□△△	240		150	200	415				8.4	✪ ☆ ★ ★
JV◇05N271K65□△△	270		175	225	475				9.9	✪ ☆ ★ ★
JV◇05N301K65□△△	300		195	250	525				10.5	✪ ☆ ★ ★
JV◇05N331K65□△△	330		210	275	575				11.5	✪ ☆ ★ ★
JV◇05N361K65□△△	360		230	300	620				13.0	✪ ☆ ★ ★
JV◇05N391K65□△△	390		250	320	675				15.0	✪ ☆ ★ ★
JV◇05N431K65□△△	430		275	350	745				16.5	✪ ☆ ★ ★
JV◇05N471K65□△△	470		300	385	810				17.5	✪ ☆ ★ ★
JV◇05N511K65□△△	510		320	418	880				18.5	✪ ☆ ★ ★
JV◇05N561K65□△△	560		350	460	940				19.5	✪ ☆ ★ ★
JV◇05N621K65□△△	620		385	505	1050				20.5	✪ ☆ ★ ★
JV◇05N681K65□△△	680		420	560	1150				21.5	✪ ☆ ★ ★
JV◇05N751K65□△△	750		460	615	1290				22.5	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 1A.

◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

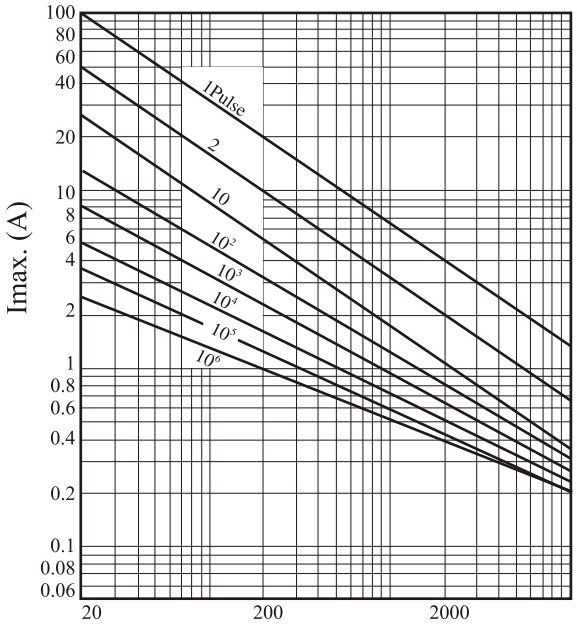
△△ : Lead Length & Packaging (see p.18)

Application notes for UL , CSA and VDE recongnized components related standards

Standard No.	UL1414	UL1449(3rd Edition)	CSA C22.2	VDE IEC61051-1 IEC61051-2 IEC61051-2-2
Title	Across- the- line Components	Transient Voltage Surge Suppressors	Accessories and parts for electronic equipment	Varistors for use in electronic equipment
File No.	E154922	E325508	LR101867-1/-8/-15	19006-4790-0002
Symbols	✪	☆	★	★

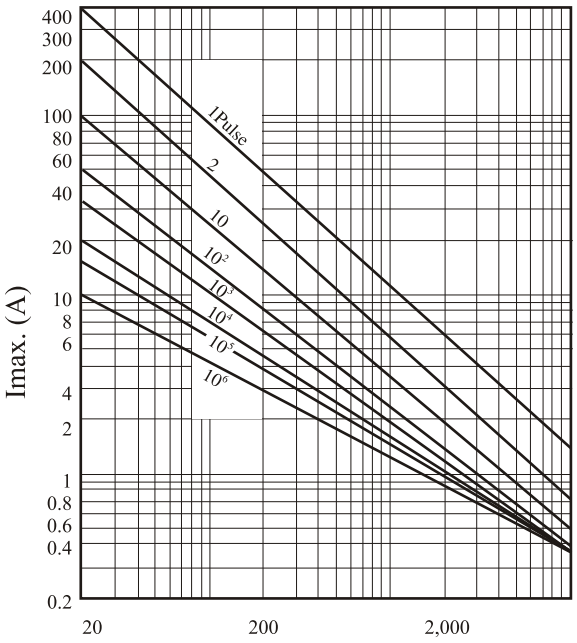
PULSE LIFETIME RATINGS - 5mm

5N180M~680K



Rectangular Wave (μ sec.)

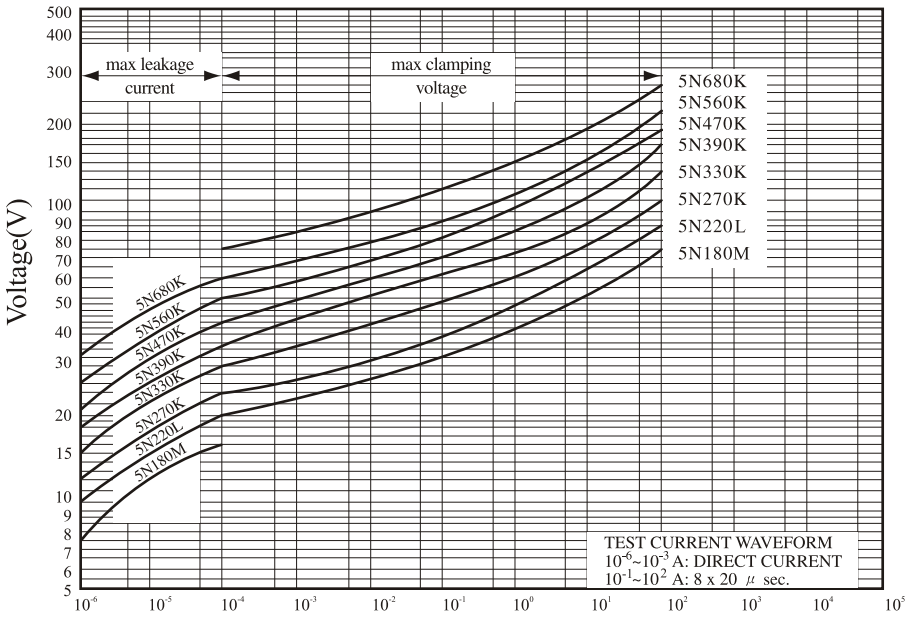
5N820K~751K



Rectangular Wave (μ sec.)

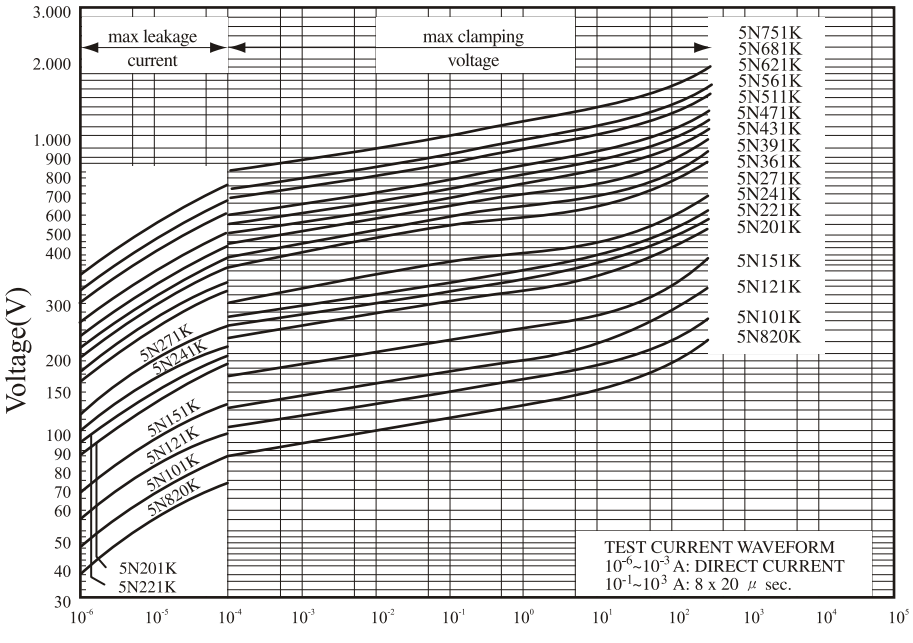
V-I CHARACTERISTIC CURVE - 5mm

5N180M~680K



Current(A)

5N820K~751K



Current(A)

RATING AND CHARACTERISTICS

Standard Varistor - 7mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@10A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇07N180M65□△△	18	± 20%	11	14	※ 36	250	125	0.02	1.2	☆ ★
JV◇07N220L65□△△	22	± 15%	14	18	※ 43				1.4	☆ ★
JV◇07N270K65□△△	27	± 10%	17	22	※ 53				1.7	☆ ★
JV◇07N330K65□△△	33		20	26	※ 65				2.2	☆ ★
JV◇07N390K65□△△	39		25	31	※ 77				2.4	☆ ★
JV◇07N470K65□△△	47		30	38	※ 93				3.0	☆ ★
JV◇07N560K65□△△	56		35	45	※ 110				3.5	☆ ★
JV◇07N680K65□△△	68		40	56	※ 135				4.3	☆ ★
JV◇07N820K65□△△	82		50	65	135	1200	600	0.25	5.5	☆ ★
JV◇07N101K65□△△	100		60	85	165				7.0	☆ ★
JV◇07N121K65□△△	120		75	100	200				8.0	☆ ★
JV◇07N151K65□△△	150		95	125	250				11.0	☆ ★
JV◇07N181K65□△△	180		115	150	300				13.0	☆ ★
JV◇07N201K65□△△	200		130	170	340				14.3	✪ ☆ ★ ★
JV◇07N221K65□△△	220		140	180	360				15.5	✪ ☆ ★ ★
JV◇07N241K65□△△	240		150	200	395				16.8	✪ ☆ ★ ★
JV◇07N271K65□△△	270		175	225	455				19.8	✪ ☆ ★ ★
JV◇07N301K65□△△	300		195	250	505				21.0	✪ ☆ ★ ★
JV◇07N331K65□△△	330		210	275	550				23.0	✪ ☆ ★ ★
JV◇07N361K65□△△	360		230	300	595				26.0	✪ ☆ ★ ★
JV◇07N391K65□△△	390		250	320	650				30.0	✪ ☆ ★ ★
JV◇07N431K65□△△	430		275	350	710				33.0	✪ ☆ ★ ★
JV◇07N471K65□△△	470		300	385	775				35.0	✪ ☆ ★ ★
JV◇07N511K65□△△	510		320	418	842				37.0	✪ ☆ ★ ★
JV◇07N561K65□△△	560		350	460	920				39.0	✪ ☆ ★ ★
JV◇07N621K65□△△	620		385	505	1025				41.0	✪ ☆ ★ ★
JV◇07N681K65□△△	680		420	560	1120				43.0	✪ ☆ ★ ★
JV◇07N751K65□△△	750		460	615	1240				45.0	✪ ☆ ★ ★
JV◇07N781K65□△△	780		485	640	1290				46.0	✪ ☆ ★ ★
JV◇07N821K65□△△	820		510	670	1355				47.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 2.5 A.

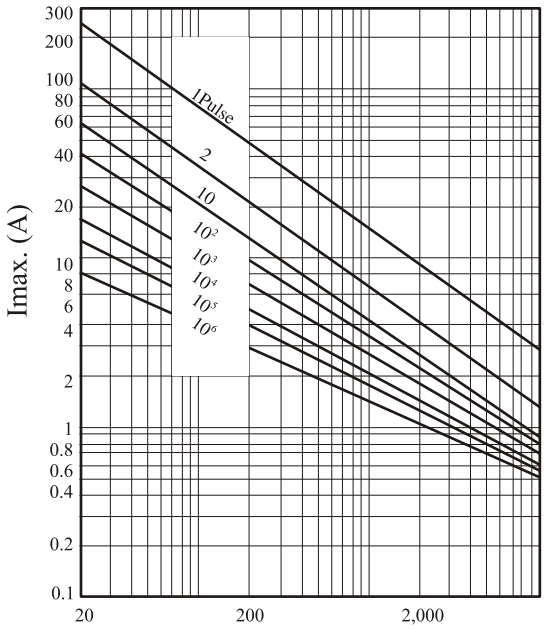
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

△△ : Lead Length & Packaging (see p.18)

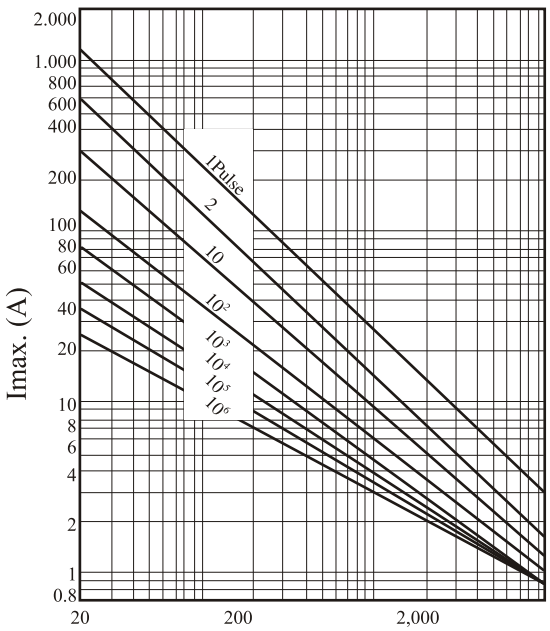
PULSE LIFETIME RATINGS -7mm

7N180M~680K



Rectangular Wave (μ sec.)

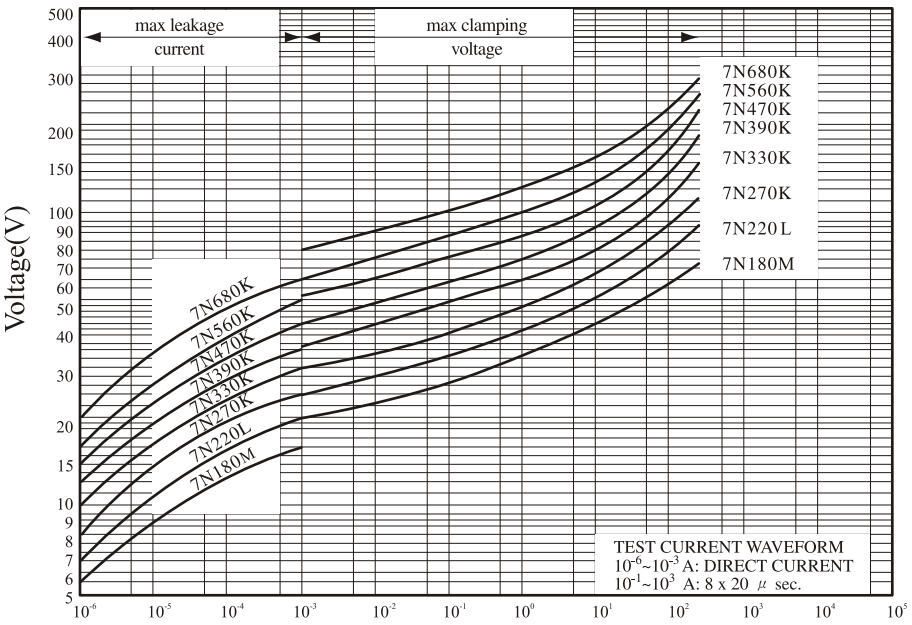
7N820K~821K



Rectangular Wave (μ sec.)

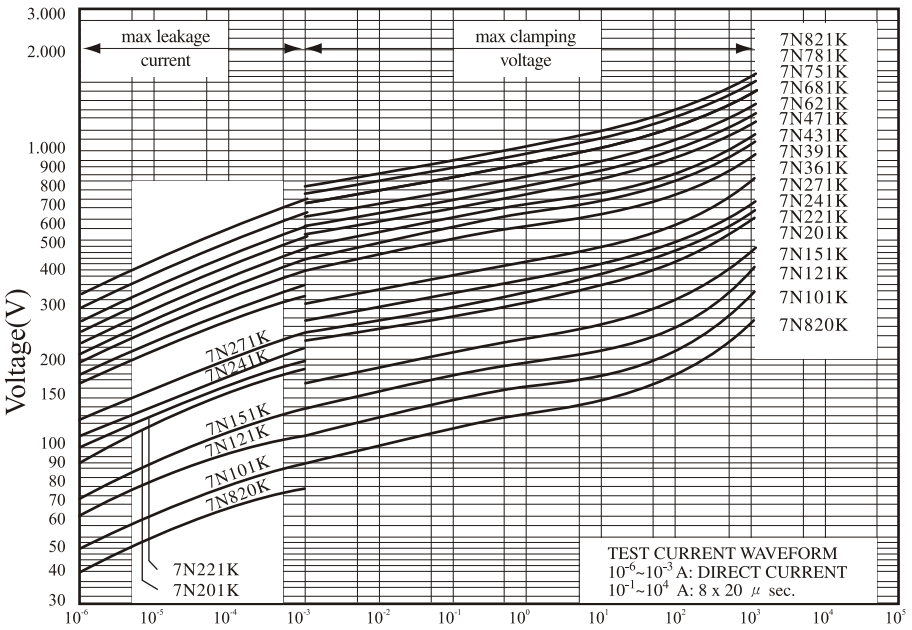
V-I CHARACTERISTIC CURVE -7mm

7N180M~680K



Current(A)

7N820K~821K



Current(A)

RATING AND CHARACTERISTICS

Standard Varistor - 10mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@25A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇10N180M87□△△	18	± 20%	11	14	※ 36	500	250	0.05	2.4	☆ ★
JV◇10N220L87□△△	22	± 15%	14	18	※ 43				2.7	☆ ★
JV◇10N270K87□△△	27	± 10%	17	22	※ 53				3.5	☆ ★
JV◇10N330K87□△△	33		20	26	※ 65				4.4	☆ ★
JV◇10N390K87□△△	39		25	31	※ 77				4.7	☆ ★
JV◇10N470K87□△△	47		30	38	※ 93				6.0	☆ ★
JV◇10N560K87□△△	56		35	45	※110				7.0	☆ ★
JV◇10N680K87□△△	68		40	56	※135				8.5	☆ ★
JV◇10N820K87□△△	82		50	65	135	2500	1250	0.4	11.0	☆ ★
JV◇10N101K87□△△	100		60	85	165				14.0	☆ ★
JV◇10N121K87□△△	120		75	100	200				16.0	☆ ★
JV◇10N151K87□△△	150		95	125	250				22.0	☆ ★
JV◇10N181K87□△△	180		115	150	300				26.0	☆ ★
JV◇10N201K87□△△	200		130	170	340				28.5	✪ ☆ ★ ★
JV◇10N221K87□△△	220		140	180	360				31.0	✪ ☆ ★ ★
JV◇10N241K87□△△	240		150	200	395				33.5	✪ ☆ ★ ★
JV◇10N271K87□△△	270		175	225	455				39.5	✪ ☆ ★ ★
JV◇10N301K87□△△	300		195	250	505				42.0	✪ ☆ ★ ★
JV◇10N331K87□△△	330		210	275	550				46.0	✪ ☆ ★ ★
JV◇10N361K87□△△	360		230	300	595				52.0	✪ ☆ ★ ★
JV◇10N391K87□△△	390		250	320	650				60.0	✪ ☆ ★ ★
JV◇10N431K87□△△	430		275	350	710				66.0	✪ ☆ ★ ★
JV◇10N471K87□△△	470		300	385	775				70.0	✪ ☆ ★ ★
JV◇10N511K87□△△	510		320	418	842				74.0	✪ ☆ ★ ★
JV◇10N561K87□△△	560		350	460	920				78.0	✪ ☆ ★ ★
JV◇10N621K87□△△	620		385	505	1025				82.0	✪ ☆ ★ ★
JV◇10N681K87□△△	680		420	560	1120				86.0	✪ ☆ ★ ★
JV◇10N751K87□△△	750		460	615	1240				90.0	✪ ☆ ★ ★
JV◇10N781K87□△△	780		485	640	1290				92.0	✪ ☆ ★ ★
JV◇10N821K87□△△	820		510	670	1355				94.0	✪ ☆ ★ ★
JV◇10N911K87□△△	910		550	745	1500				102.0	✪ ☆ ★ ★
JV◇10N102K87□△△	1000		625	825	1650				112.0	✪ ☆ ★ ★
JV◇10N112K87□△△	1100		680	895	1815				124.0	✪ ☆ ★ ★
JV◇10N182K87□△△	1800		1000	1465	2970				174.0	✪ ☆ ★

※ The clamping voltage from 180M to 680K are tested at current 5A.

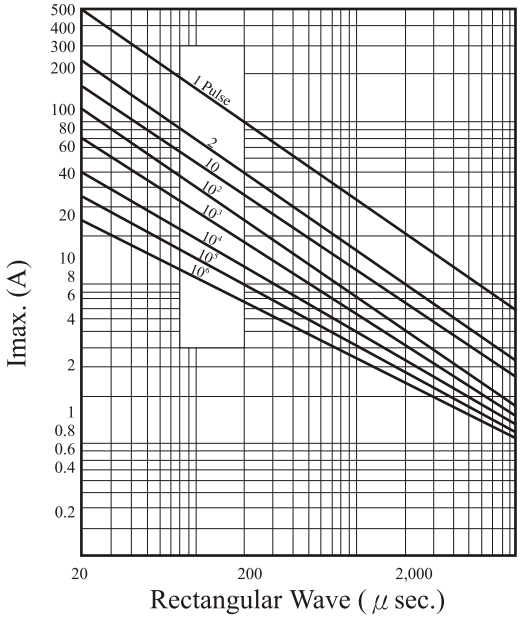
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

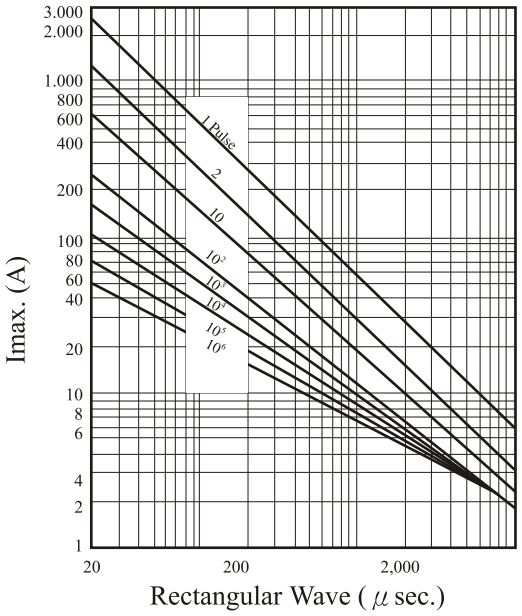
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 10mm

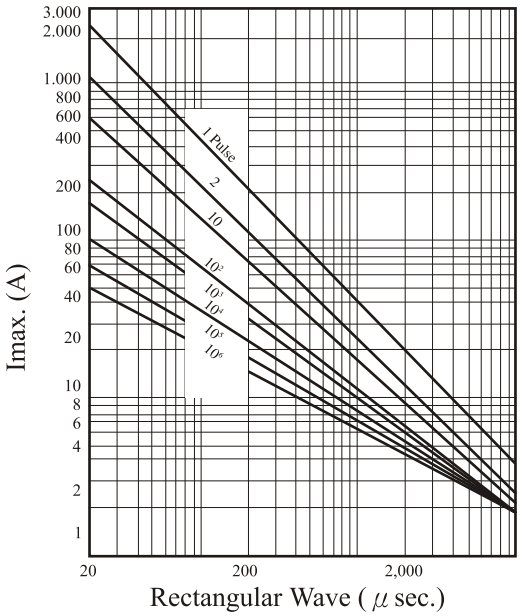
10N180M~680K



10N820K~471K

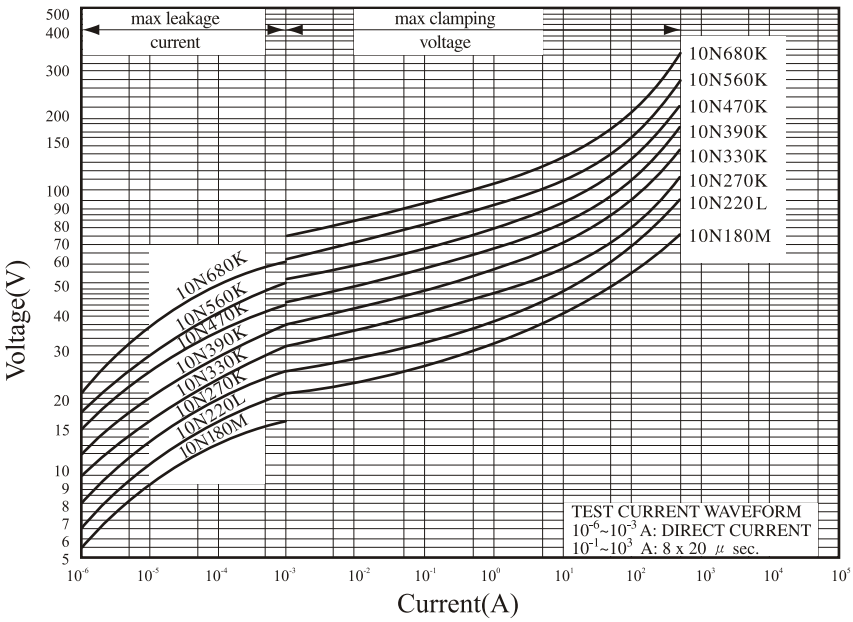


10N511K~182K

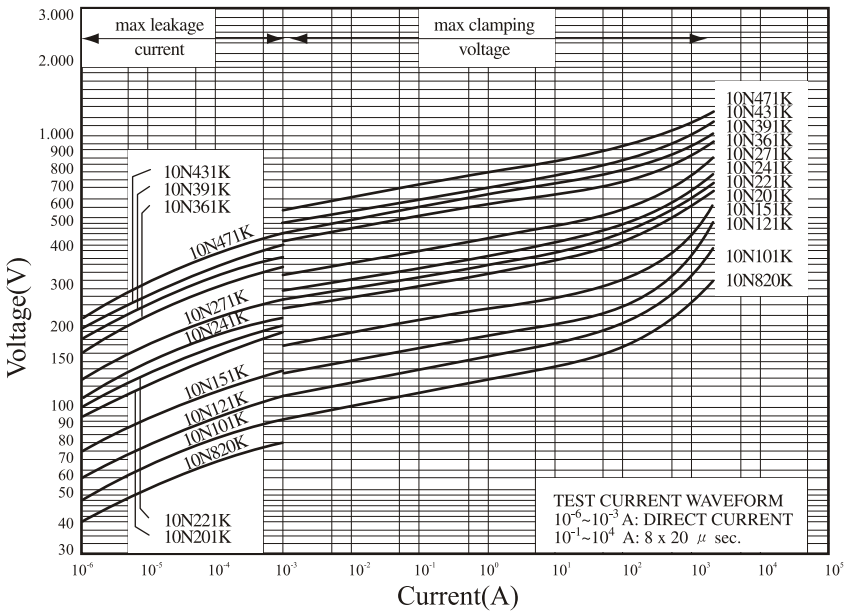


V-I CHARACTERISTIC CURVE - 10mm

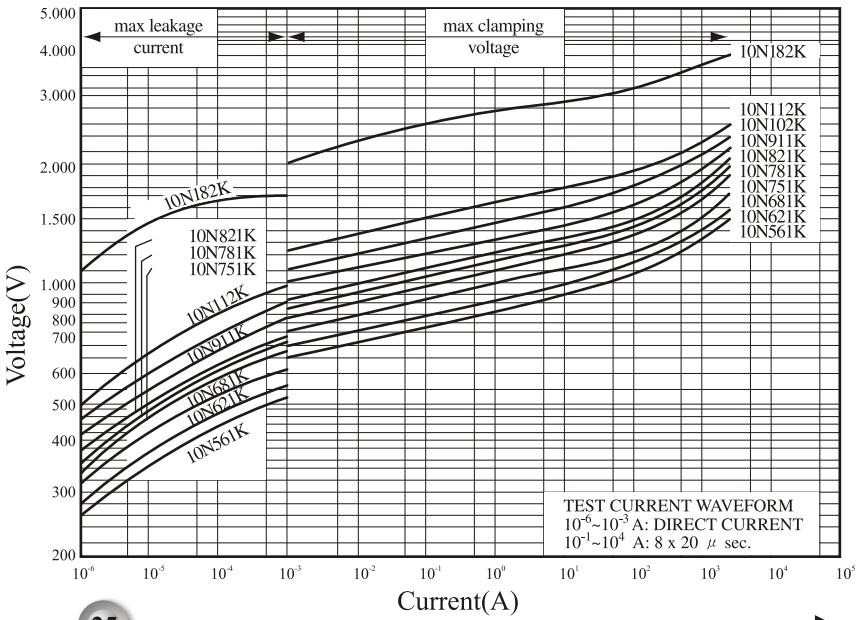
10N180M~680K



10N820K~471K



10N561K~182K



RATING AND CHARACTERISTICS

Standard Varistor - 14mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@50A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇14N180M87□△△	18	± 20%	11	14	※ 36	1000	500	0.1	4.7	☆ ★
JV◇14N220L87 □△△	22	± 15%	14	18	※ 43				5.4	☆ ★
JV◇14N270K87□△△	27	± 10%	17	22	※ 53				6.9	☆ ★
JV◇14N330K87□△△	33		20	26	※ 65				8.8	☆ ★
JV◇14N390K87□△△	39		25	31	※ 77				9.4	☆ ★
JV◇14N470K87□△△	47		30	38	※ 93				12.0	☆ ★
JV◇14N560K87□△△	56		35	45	※110				14.0	☆ ★
JV◇14N680K87□△△	68		40	56	※135				17.0	☆ ★
JV◇14N820K87□△△	82		50	65	135	4500	2500	0.6	22.0	☆ ★
JV◇14N101K87□△△	100		60	85	165				28.0	☆ ★
JV◇14N121K87□△△	120		75	100	200				32.0	☆ ★
JV◇14N151K87□△△	150		95	125	250				44.0	☆ ★
JV◇14N181K87□△△	180		115	150	300				52.0	☆ ★
JV◇14N201K87□△△	200		130	170	340				57.0	✪ ☆ ★ ★
JV◇14N221K87□△△	220		140	180	360				62.0	✪ ☆ ★ ★
JV◇14N241K87□△△	240		150	200	395				67.0	✪ ☆ ★ ★
JV◇14N271K87□△△	270		175	225	455				79.0	✪ ☆ ★ ★
JV◇14N301K87□△△	300		195	250	505				84.0	✪ ☆ ★ ★
JV◇14N331K87□△△	330		210	275	550				92.0	✪ ☆ ★ ★
JV◇14N361K87□△△	360		230	300	595				104.0	✪ ☆ ★ ★
JV◇14N391K87□△△	390		250	320	650				120.0	✪ ☆ ★ ★
JV◇14N431K87□△△	430		275	350	710				132.0	✪ ☆ ★ ★
JV◇14N471K87□△△	470		300	385	775				140.0	✪ ☆ ★ ★
JV◇14N511K87□△△	510		320	418	842				148.0	✪ ☆ ★ ★
JV◇14N561K87□△△	560		350	460	920				156.0	✪ ☆ ★ ★
JV◇14N621K87□△△	620		385	505	1025				164.0	✪ ☆ ★ ★
JV◇14N681K87□△△	680		420	560	1120				172.0	✪ ☆ ★ ★
JV◇14N751K87□△△	750		460	615	1240				180.0	✪ ☆ ★ ★
JV◇14N781K87□△△	780		485	640	1290				184.0	✪ ☆ ★ ★
JV◇14N821K87□△△	820		510	670	1355				188.0	✪ ☆ ★ ★
JV◇14N911K87□△△	910		550	745	1500				204.0	✪ ☆ ★ ★
JV◇14N102K87□△△	1000		625	825	1650				224.0	✪ ☆ ★ ★
JV◇14N112K87□△△	1100		680	895	1815				248.0	✪ ☆ ★ ★
JV◇14N182K87□△△	1800		1000	1465	2970				348.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 10A.

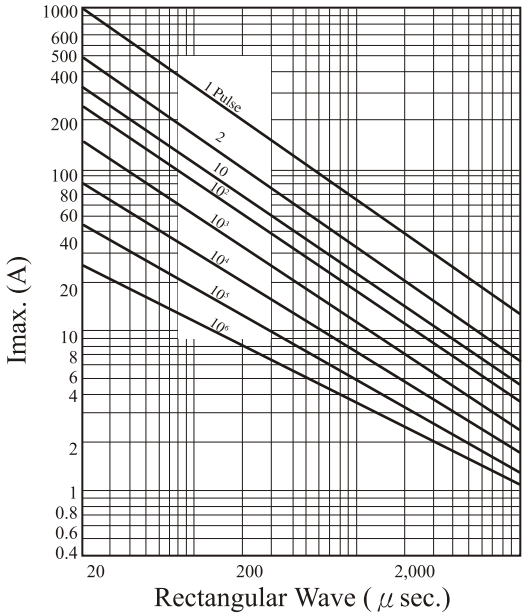
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

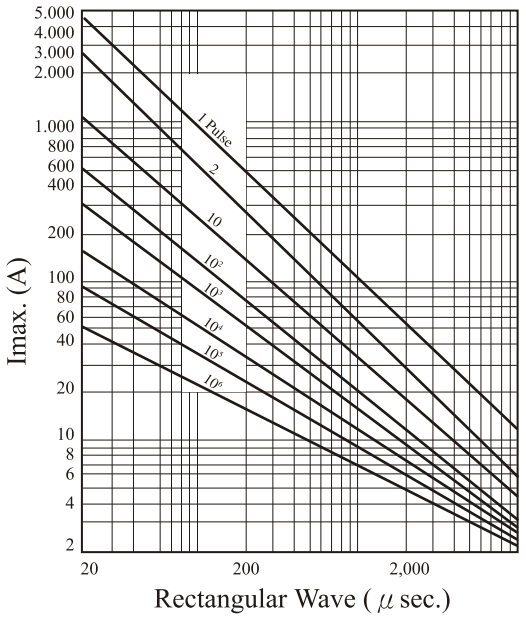
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 14mm

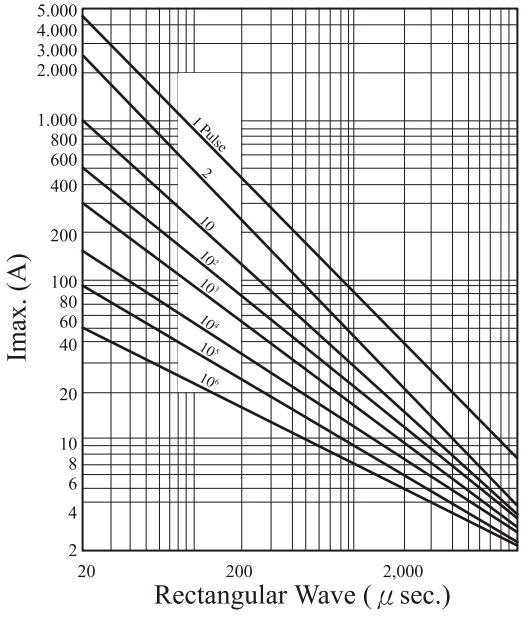
14N180M~680K



14N820K~471K

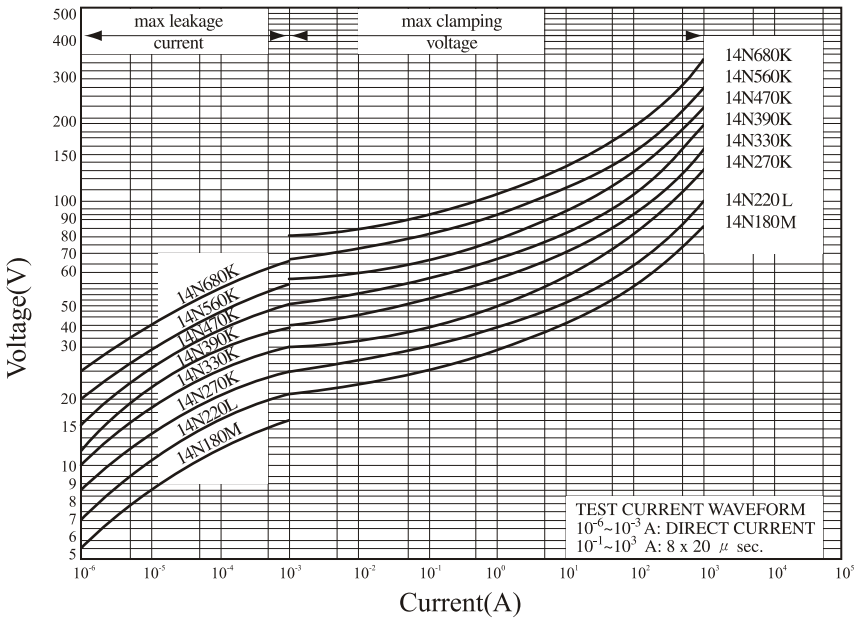


14N511K~182K

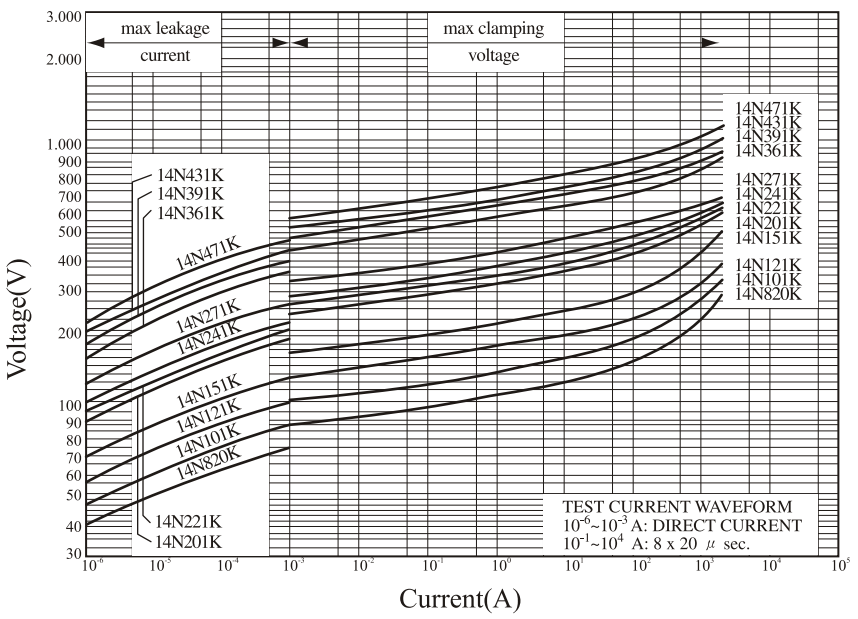


V-I CHARACTERISTIC CURVE - 14mm

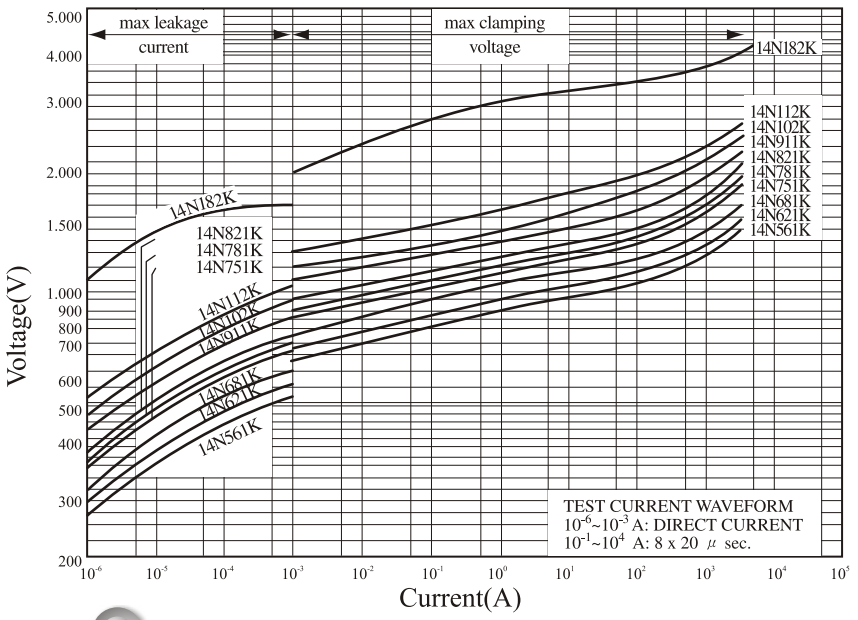
14N180M~680K



14N820K~471K



14N561K~182K



RATING AND CHARACTERISTICS

Standard Varistor - 20mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@100A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇20N220M11□△△	22	± 20%	14	18	※ 43	2000	1000	0.2	8.0	☆ ★
JV◇20N270M11□△△	27		17	22	※ 53				10.0	☆ ★
JV◇20N330M11□△△	33		20	26	※ 65				12.0	☆ ★
JV◇ 20N390L11□△△	39	± 15%	25	31	※ 77				14.0	☆ ★
JV◇ 20N470L11□△△	47		30	38	※ 93				17.0	☆ ★
JV◇ 20N560L11□△△	56		35	45	※ 110				20.0	☆ ★
JV◇ 20N680L11□△△	68		40	56	※ 135				24.0	☆ ★
JV◇20N101K11□△△	100	± 10%	60	85	165	6500	4000	1.0	56.0	☆ ★
JV◇20N121K11□△△	120		75	100	200				64.0	☆ ★
JV◇20N151K11□△△	150		95	125	250				88.0	☆ ★
JV◇20N181K11□△△	180		115	150	300				104.0	☆ ★
JV◇20N201K11□△△	200		130	170	340				114.0	✪ ☆ ★ ★
JV◇20N221K11□△△	220		140	180	360				124.0	✪ ☆ ★ ★
JV◇20N241K11□△△	240		150	200	395				134.0	✪ ☆ ★ ★
JV◇20N271K11□△△	270		175	225	455				158.0	✪ ☆ ★ ★
JV◇20N301K11□△△	300		195	250	505				168.0	✪ ☆ ★ ★
JV◇20N331K11□△△	330		210	275	550				184.0	✪ ☆ ★ ★
JV◇20N361K11□△△	360		230	300	595				208.0	✪ ☆ ★ ★
JV◇20N391K11□△△	390		250	320	650				240.0	✪ ☆ ★ ★
JV◇20N431K11□△△	430		275	350	710				264.0	✪ ☆ ★ ★
JV◇20N471K11□△△	470		300	385	775				280.0	✪ ☆ ★ ★
JV◇20N511K11□△△	510		320	418	842				296.0	✪ ☆ ★ ★
JV◇20N561K11□△△	560		350	460	920				312.0	✪ ☆ ★ ★
JV◇20N621K11□△△	620		385	505	1025				328.0	✪ ☆ ★ ★
JV◇20N681K11□△△	680		420	560	1120				344.0	✪ ☆ ★ ★
JV◇20N751K11□△△	750		460	615	1240				360.0	✪ ☆ ★ ★
JV◇20N781K11□△△	780		485	640	1290				368.0	✪ ☆ ★ ★
JV◇20N821K11□△△	820		510	670	1355				376.0	✪ ☆ ★ ★
JV◇20N911K11□△△	910		550	745	1500				408.0	✪ ☆ ★ ★
JV◇20N102K11□△△	1000		625	825	1650				448.0	✪ ☆ ★ ★
JV◇20N112K11□△△	1100		680	895	1815				496.0	✪ ☆ ★ ★
JV◇20N182K11□△△	1800		1000	1465	2970				695.0	✪ ☆ ★ ★

※ The clamping voltage from 220M to 680L are tested at current 20A.

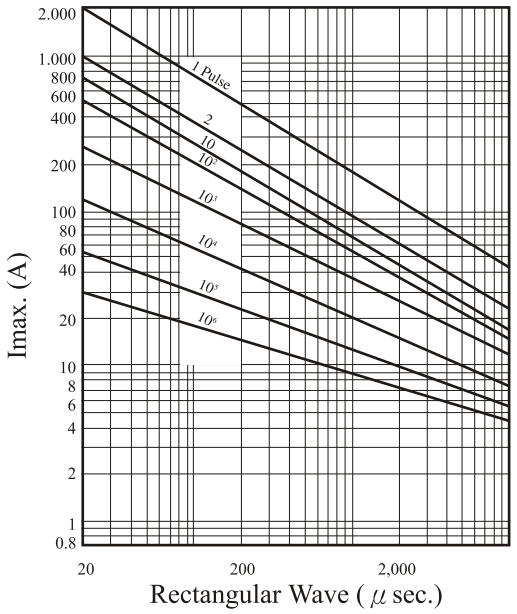
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

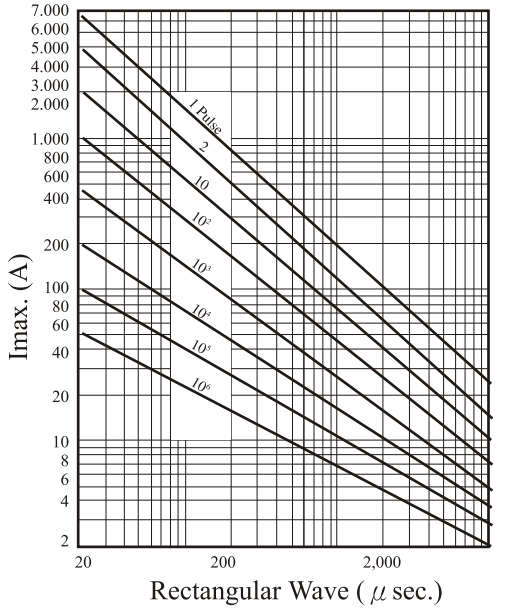
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 20mm

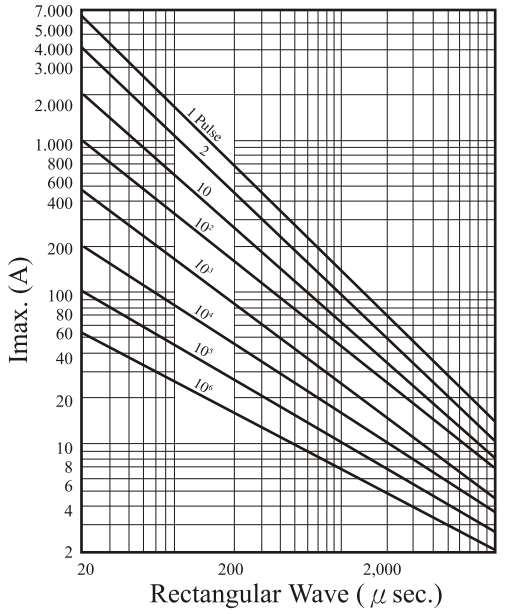
20N220M ~ 680L



20N101K ~ 471K

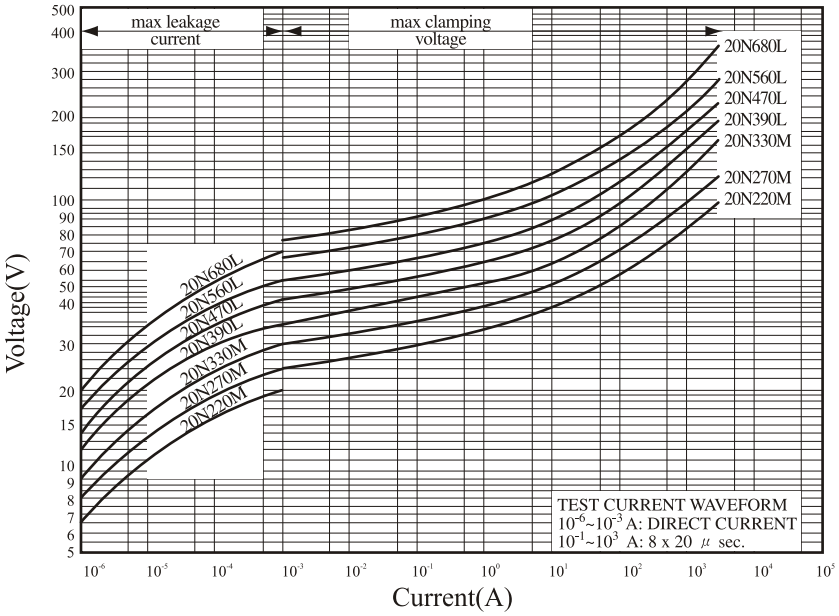


20N511K~182K

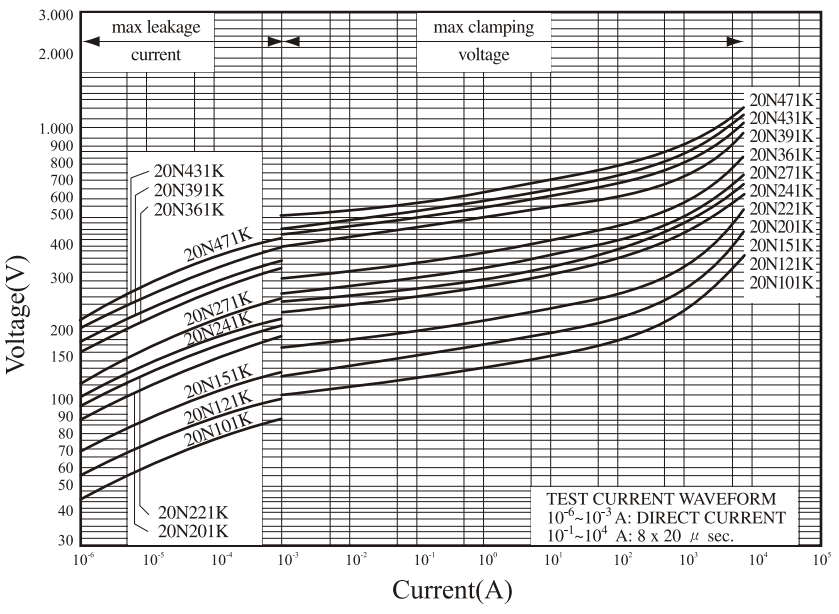


V-I CHARACTERISTIC CURVE - 20mm

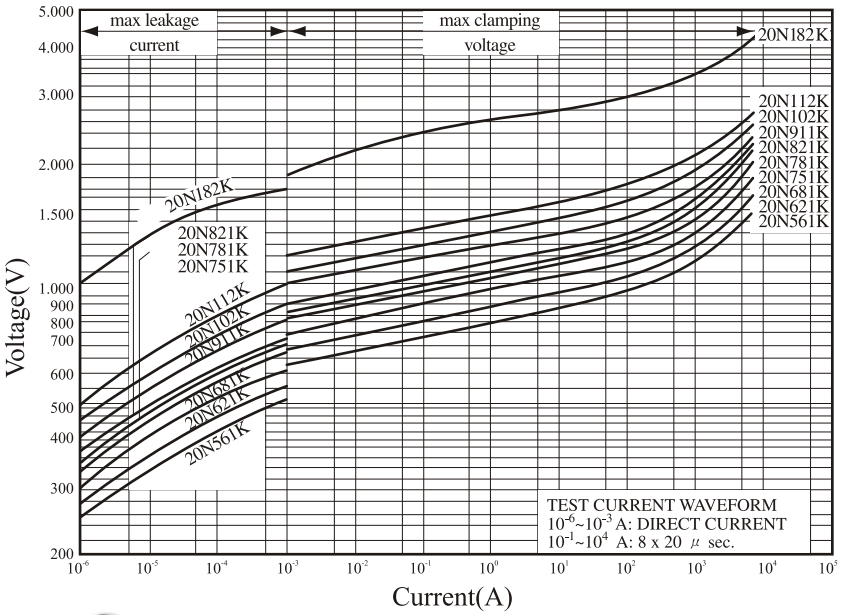
20N220M ~ 680L



20N101K ~ 471K



20N561K~182K



RATING AND CHARACTERISTICS

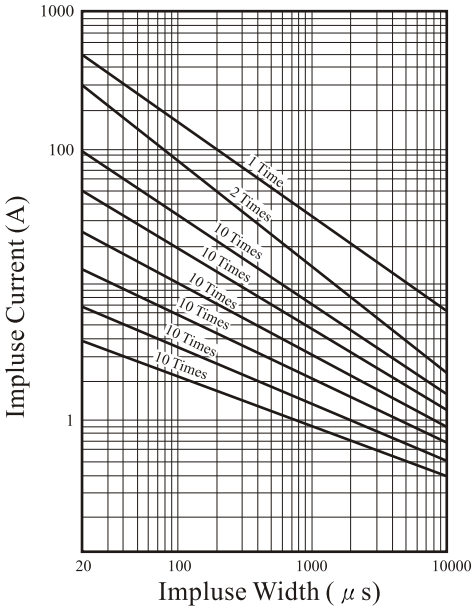
Ordering Code	Varistor Voltage at 1 mA	Maximum Allowable Voltage		Maximum Clamping Voltage		Withstanding Surge Current (8/20 μs)	Rated Wattage	Energy (10/1000 μs)	Certification
	DC (V)	ACrms (V)	DC (V)	Vc (V)	IP (A)	High Surge (A)	(W)	High Surge (J)	
JVR25N820K11□△△	82(74-90)	50	65	135	150	18000	1.20	80	★ ★
JVR25N101K11□△△	100(90-110)	60	85	165				100	★ ★
JVR25N121K11□△△	120(108-132)	75	100	200				120	★ ★
JVR25N151K11□△△	150(135-165)	95	125	250				160	★ ★
JVR25N181K11□△△	180(162-198)	115	150	300				175	★ ★
JVR25N201K11□△△	200(185-225)	130	170	340				190	✪ ☆ ★ ★
JVR25N221K11□△△	220(198-242)	140	180	360				200	✪ ☆ ★ ★
JVR25N241K11□△△	240(216-264)	150	200	395				220	✪ ☆ ★ ★
JVR25N271K11□△△	270(243-297)	175	225	455				255	✪ ☆ ★ ★
JVR25N301K11□△△	300(270-330)	190	250	500				275	✪ ☆ ★ ★
JVR25N331K11□△△	330(297-363)	210	275	550				300	✪ ☆ ★ ★
JVR25N361K11□△△	360(324-396)	230	300	595				330	✪ ☆ ★ ★
JVR25N391K11□△△	390(351-429)	250	320	650				360	✪ ☆ ★ ★
JVR25N431K11□△△	430(387-473)	275	350	710				380	✪ ☆ ★ ★
JVR25N471K11□△△	470(423-517)	300	385	775				400	✪ ☆ ★ ★
JVR25N511K11□△△	510(459-561)	320	415	845				420	✪ ☆ ★ ★
JVR25N561K11□△△	560(504-616)	350	460	925				440	✪ ☆ ★ ★
JVR25N621K11□△△	620(558-682)	385	505	1025				450	✪ ☆ ★ ★
JVR25N681K11□△△	680(612-748)	420	560	1120				460	✪ ☆ ★ ★
JVR25N751K11□△△	750(675-825)	460	615	1240				510	✪ ☆ ★ ★
JVR25N781K11□△△	780(702-858)	485	640	1290				530	✪ ☆ ★ ★
JVR25N821K11□△△	820(738-902)	510	670	1355				570	✪ ☆ ★ ★
JVR25N911K11□△△	910(819-1001)	550	745	1500				620	✪ ☆ ★ ★
JVR25N102K11□△△	1000(900-1100)	625	825	1650				685	✪ ☆ ★ ★
JVR25N112K11□△△	1100(990-1210)	680	895	1815				770	✪ ☆ ★ ★
JVR25N122K11□△△	1200(1080-1320)	750	990	1980				770	★ ★

□ : **Lead Style (Y=Vertical kink, P=Straight)**

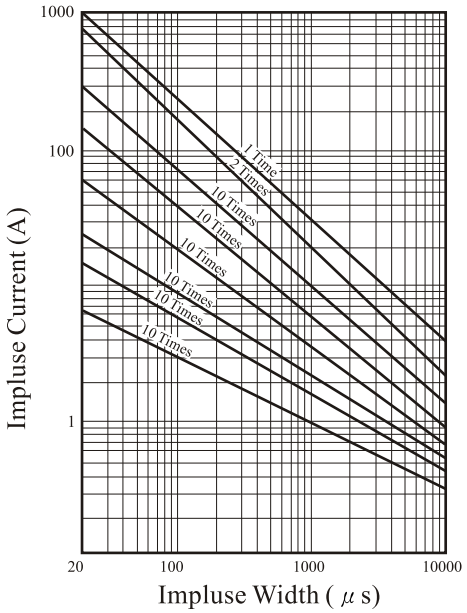
△△ : **Lead Length & Packaging (see p.18)**

PULSE LIFETIME RATINGS - 25mm

25N180K~680K

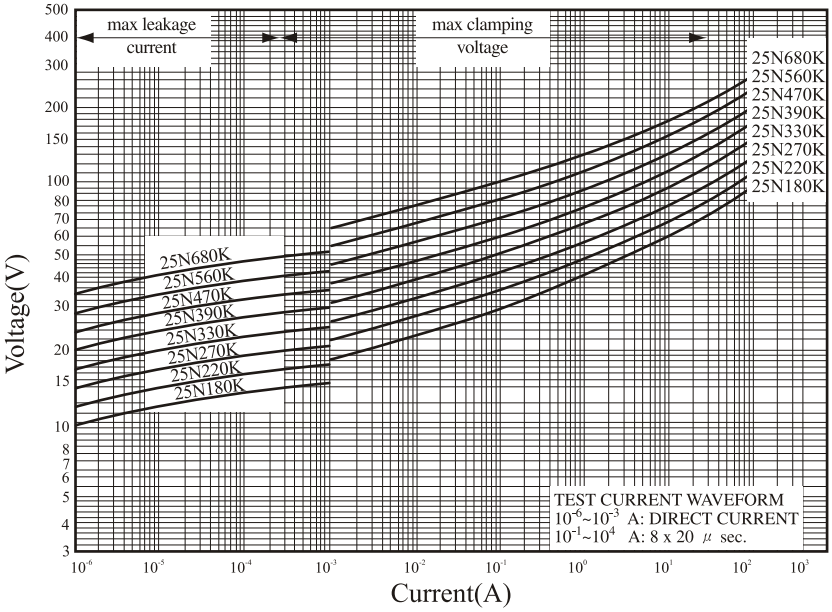


25N820K~162K

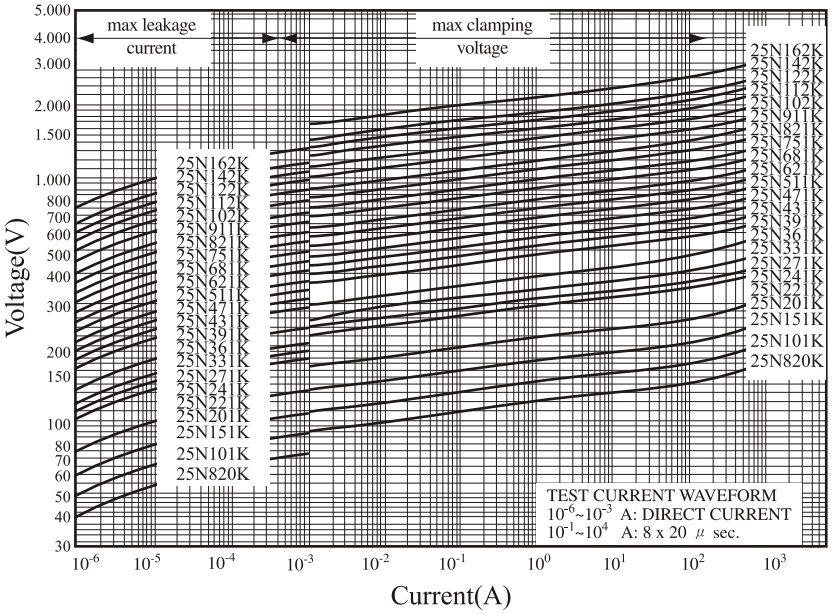


V-I CHARACTERISTIC CURVE - 25mm

25N180K~680K



25N820K~162K



RATING AND CHARACTERISTICS

High Surge Varistor - 5mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@5A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇05S180M65□△△	18	± 20%	11	14	※ 40	250	125	0.01	0.7	☆ ★
JV◇05S220L65□△△	22	± 15%	14	18	※ 48				0.8	☆ ★
JV◇05S270K65□△△	27	± 10%	17	22	※ 60				1.1	☆ ★
JV◇05S330K65□△△	33		20	26	※ 73				1.3	☆ ★
JV◇05S390K65□△△	39		25	31	※ 86				1.5	☆ ★
JV◇05S470K65□△△	47		30	38	※104				1.8	☆ ★
JV◇05S560K65□△△	56		35	45	※123				2.2	☆ ★
JV◇05S680K65□△△	68		40	56	※150				2.6	☆ ★
JV◇05S820K65□△△	82		50	65	145	800	600	0.1	3.5	☆ ★
JV◇05S101K65□△△	100		60	85	175				4.5	☆ ★
JV◇05S121K65□△△	120		75	100	210				5.5	☆ ★
JV◇05S151K65□△△	150		95	125	260				6.5	☆ ★
JV◇05S181K65□△△	180		115	150	320				8.0	☆ ★
JV◇05S201K65□△△	200		130	170	355				8.5	✪ ☆ ★ ★
JV◇05S221K65□△△	220		140	180	380				9.0	✪ ☆ ★ ★
JV◇05S241K65□△△	240		150	200	415				10.5	✪ ☆ ★ ★
JV◇05S271K65□△△	270		175	225	475				11.0	✪ ☆ ★ ★
JV◇05S301K65□△△	300		195	250	525				12.0	✪ ☆ ★ ★
JV◇05S331K65□△△	330		210	275	575				13.0	✪ ☆ ★ ★
JV◇05S361K65□△△	360		230	300	620				16.0	✪ ☆ ★ ★
JV◇05S391K65□△△	390		250	320	675				17.0	✪ ☆ ★ ★
JV◇05S431K65□△△	430		275	350	745				20.0	✪ ☆ ★ ★
JV◇05S471K65□△△	470		300	385	810				21.0	✪ ☆ ★ ★
JV◇05S511K65□△△	510		320	418	880				22.0	✪ ☆ ★ ★
JV◇05S561K65□△△	560		350	460	940				25.0	✪ ☆ ★ ★
JV◇05S621K65□△△	620		385	505	1050				27.0	✪ ☆ ★ ★
JV◇05S681K65□△△	680		420	560	1150				28.0	✪ ☆ ★ ★
JV◇05S751K65□△△	750		460	615	1290				29.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 1A.

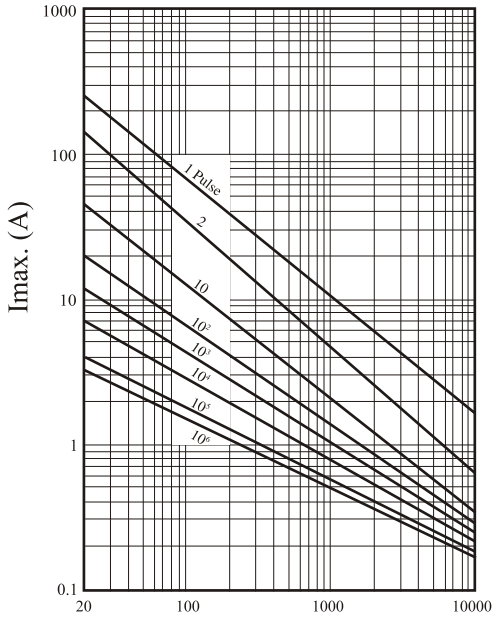
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

△△ : Lead Length & Packaging (see p.18)

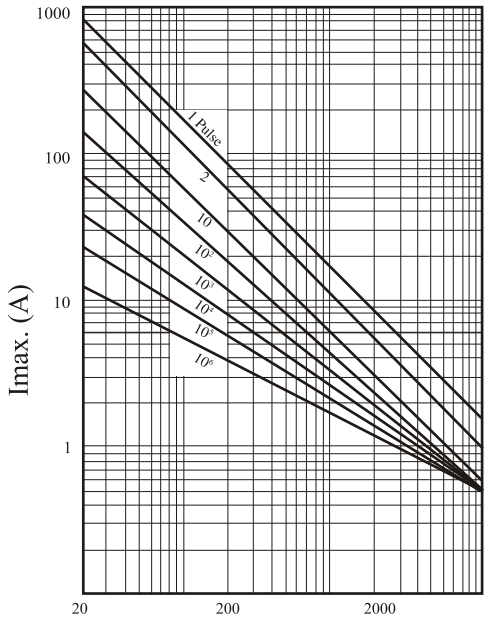
PULSE LIFETIME RATINGS - 5mm

5S180M~680K



Rectangular Wave (μ sec.)

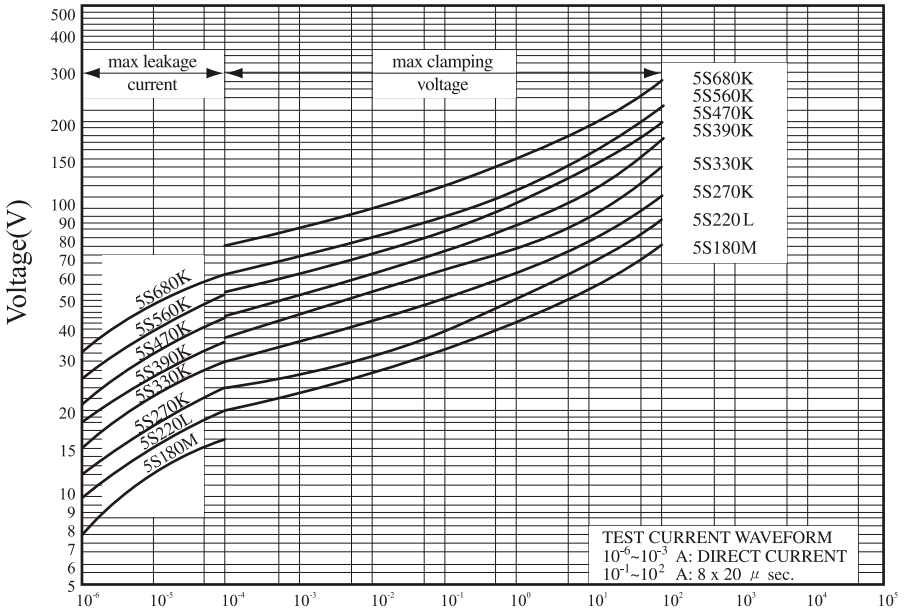
5S820K~751K



Rectangular Wave (μ sec.)

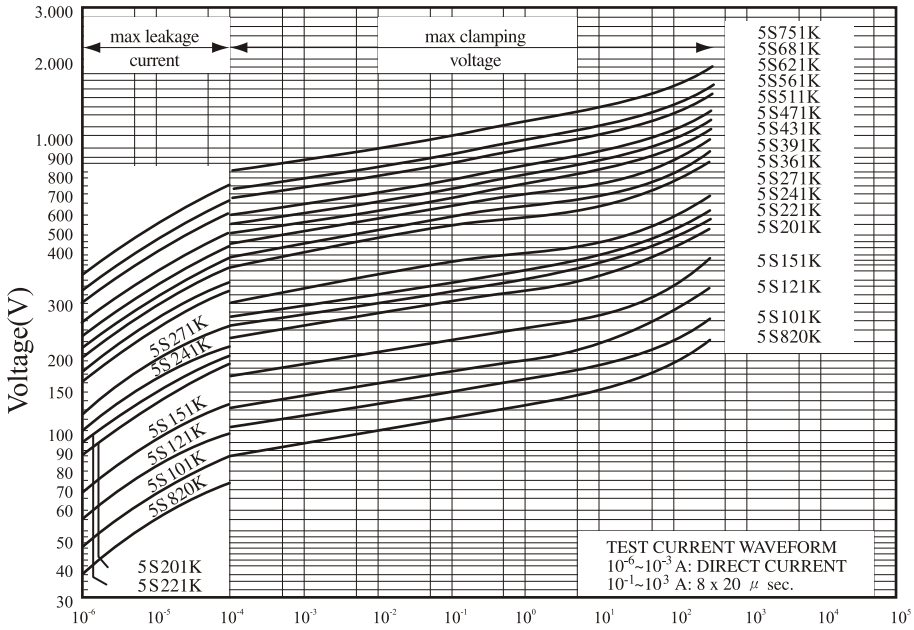
V-I CHARACTERISTIC CURVE - 5mm

5S180M~680K



Current(A)

5S820K~751K



Current(A)

RATING AND CHARACTERISTICS

High Surge Varistor - 7mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@10A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇07S180M65□△△	18	± 20%	11	14	※ 36	500	250	0.02	1.5	☆ ★
JV◇07S220L65 □△△	22	± 15%	14	18	※ 43				1.7	☆ ★
JV◇07S270K65□△△	27	± 10%	17	22	※ 53				2.1	☆ ★
JV◇07S330K65□△△	33		20	26	※ 65				2.8	☆ ★
JV◇07S390K65□△△	39		25	31	※ 77				3.0	☆ ★
JV◇07S470K65□△△	47		30	38	※ 93				3.8	☆ ★
JV◇07S560K65□△△	56		35	45	※110				4.4	☆ ★
JV◇07S680K65□△△	68		40	56	※135				5.4	☆ ★
JV◇07S820K65□△△	82		50	65	135	1750	1250	0.25	7.0	☆ ★
JV◇07S101K65□△△	100		60	85	165				9.0	☆ ★
JV◇07S121K65□△△	120		75	100	200				11.0	☆ ★
JV◇07S151K65□△△	150		95	125	250				13.0	☆ ★
JV◇07S181K65□△△	180		115	150	300				16.0	☆ ★
JV◇07S201K65□△△	200		130	170	340				17.5	✪ ☆ ★ ★
JV◇07S221K65□△△	220		140	180	360				19.0	✪ ☆ ★ ★
JV◇07S241K65□△△	240		150	200	395				21.0	✪ ☆ ★ ★
JV◇07S271K65□△△	270		175	225	455				24.0	✪ ☆ ★ ★
JV◇07S301K65□△△	300		195	250	505				26.0	✪ ☆ ★ ★
JV◇07S331K65□△△	330		210	275	550				28.0	✪ ☆ ★ ★
JV◇07S361K65□△△	360		230	300	595				32.0	✪ ☆ ★ ★
JV◇07S391K65□△△	390		250	320	650				35.0	✪ ☆ ★ ★
JV◇07S431K65□△△	430		275	350	710				40.0	✪ ☆ ★ ★
JV◇07S471K65□△△	470		300	385	775				42.0	✪ ☆ ★ ★
JV◇07S511K65□△△	510		320	418	842				45.0	✪ ☆ ★ ★
JV◇07S561K65□△△	560		350	460	920				51.0	✪ ☆ ★ ★
JV◇07S621K65□△△	620		385	505	1025				54.0	✪ ☆ ★ ★
JV◇07S681K65□△△	680		420	560	1120				56.0	✪ ☆ ★ ★
JV◇07S751K65□△△	750		460	615	1240				58.0	✪ ☆ ★ ★
JV◇07S781K65□△△	780		485	640	1290				59.0	✪ ☆ ★ ★
JV◇07S821K65□△△	820		510	670	1355				60.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 2.5A.

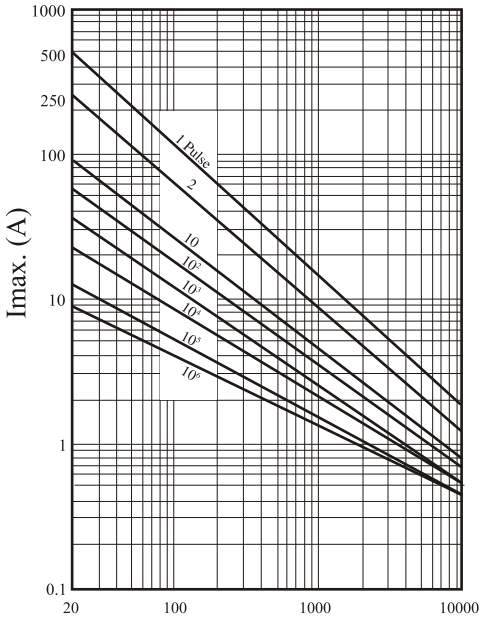
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

△△ : Lead Length & Packaging (see p.18)

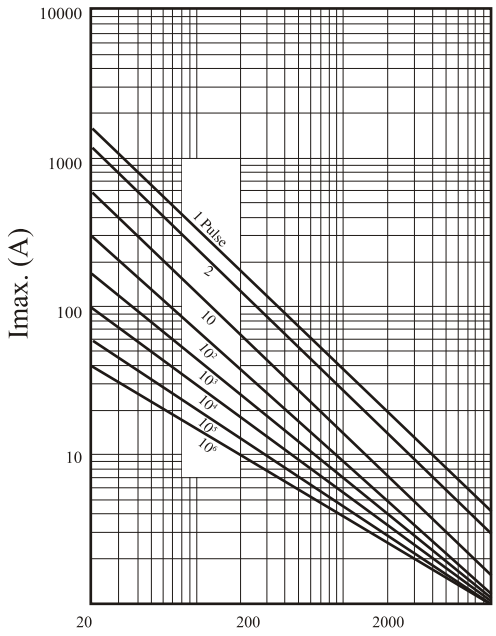
PULSE LIFETIME RATINGS - 7mm

7S180M~680K



Rectangular Wave (μ sec.)

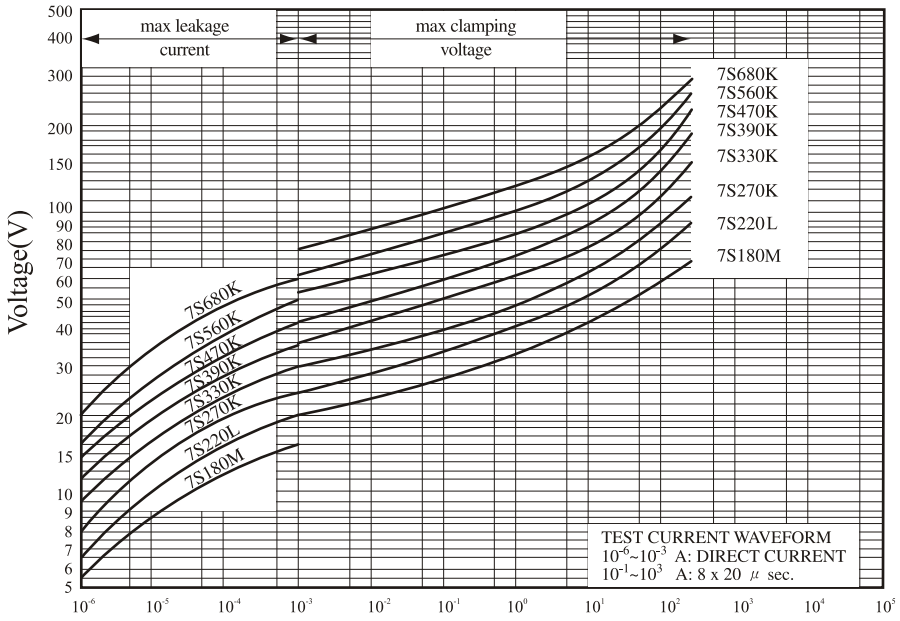
7S820K~821K



Rectangular Wave (μ sec.)

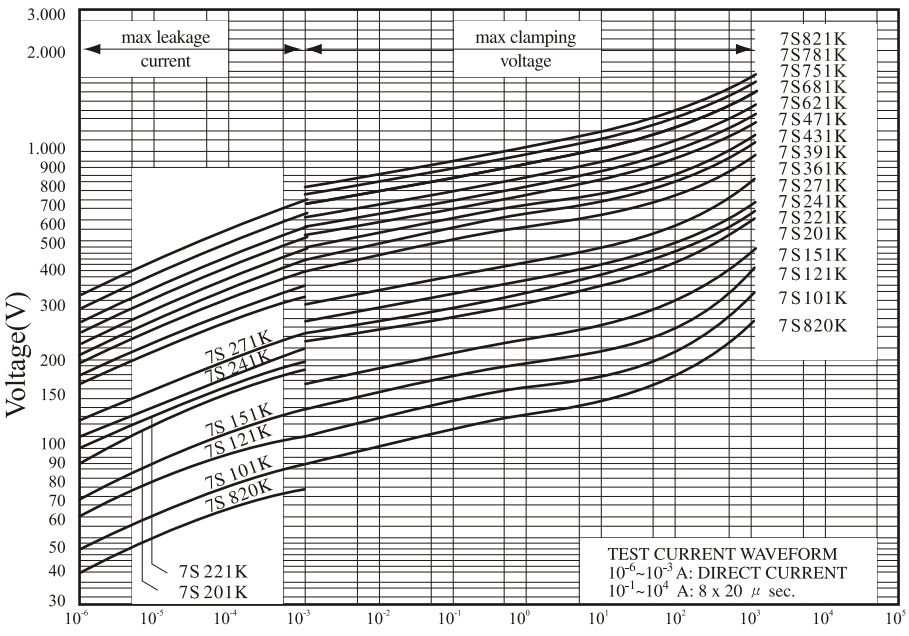
V-I CHARACTERISTIC CURVE - 7mm

7S180M~680K



Current(A)

7S820K~821K



Current(A)

RATING AND CHARACTERISTICS

High Surge Varistor - 10mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@25A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇10S180M87□△△	18	± 20%	11	14	※ 36	1000	500	0.05	2.6	☆ ★
JV◇10S220L87□△△	22	± 15%	14	18	※ 43				3.2	☆ ★
JV◇10S270K87□△△	27	± 10%	17	22	※ 53				3.9	☆ ★
JV◇10S330K87□△△	33		20	26	※ 65				4.8	☆ ★
JV◇10S390K87□△△	39		25	31	※ 77				5.6	☆ ★
JV◇10S470K87□△△	47		30	38	※ 93				6.8	☆ ★
JV◇10S560K87□△△	56		35	45	※ 110				8.1	☆ ★
JV◇10S680K87□△△	68		40	56	※ 135				9.8	☆ ★
JV◇10S820K87□△△	82		50	65	135	3500	2500	0.4	14.0	☆ ★
JV◇10S101K87□△△	100		60	85	165				18.0	☆ ★
JV◇10S121K87□△△	120		75	100	200				22.0	☆ ★
JV◇10S151K87□△△	150		95	125	250				25.0	☆ ★
JV◇10S181K87□△△	180		115	150	300				32.0	☆ ★
JV◇10S201K87□△△	200		130	170	340				35.0	✪ ☆ ★ ★
JV◇10S221K87□△△	220		140	180	360				39.0	✪ ☆ ★ ★
JV◇10S241K87□△△	240		150	200	395				42.0	✪ ☆ ★ ★
JV◇10S271K87□△△	270		175	225	455				49.0	✪ ☆ ★ ★
JV◇10S301K87□△△	300		195	250	505				52.0	✪ ☆ ★ ★
JV◇10S331K87□△△	330		210	275	550				58.0	✪ ☆ ★ ★
JV◇10S361K87□△△	360		230	300	595				65.0	✪ ☆ ★ ★
JV◇10S391K87□△△	390		250	320	650				70.0	✪ ☆ ★ ★
JV◇10S431K87□△△	430		275	350	710				80.0	✪ ☆ ★ ★
JV◇10S471K87□△△	470		300	385	775				85.0	✪ ☆ ★ ★
JV◇10S511K87□△△	510		320	418	842				92.0	✪ ☆ ★ ★
JV◇10S561K87□△△	560		350	460	920				102.0	✪ ☆ ★ ★
JV◇10S621K87□△△	620		385	505	1025				107.0	✪ ☆ ★ ★
JV◇10S681K87□△△	680		420	560	1120				112.0	✪ ☆ ★ ★
JV◇10S751K87□△△	750		460	615	1240				115.0	✪ ☆ ★ ★
JV◇10S781K87□△△	780		485	640	1290				116.0	✪ ☆ ★ ★
JV◇10S821K87□△△	820		510	670	1355				118.0	✪ ☆ ★ ★
JV◇10S911K87□△△	910		550	745	1500				127.0	✪ ☆ ★ ★
JV◇10S102K87□△△	1000		625	825	1650				140.0	✪ ☆ ★ ★
JV◇10S112K87□△△	1100		680	895	1815				155.0	✪ ☆ ★ ★
JV◇10S182K87□△△	1800		1000	1465	2970				247.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 5A.

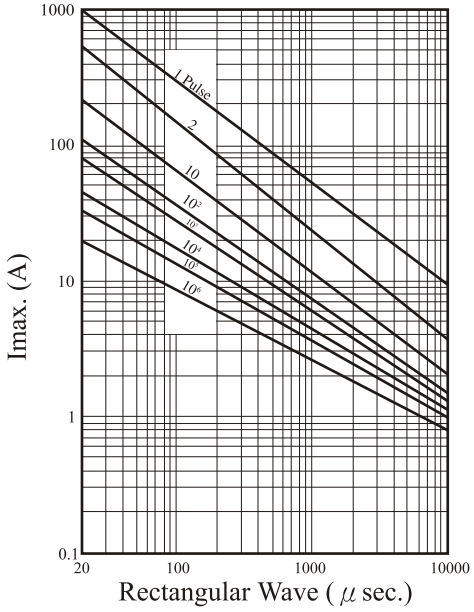
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

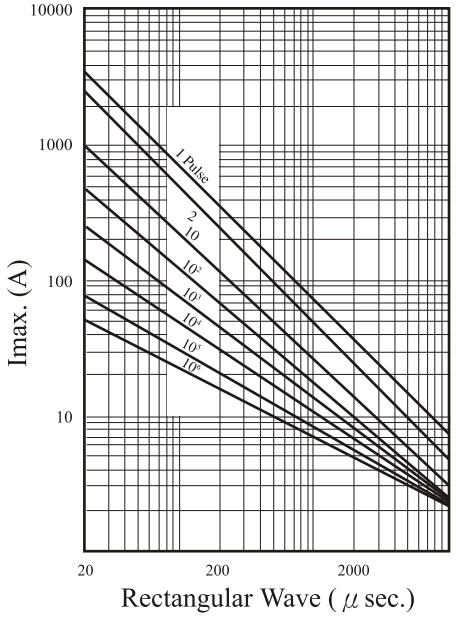
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 10mm

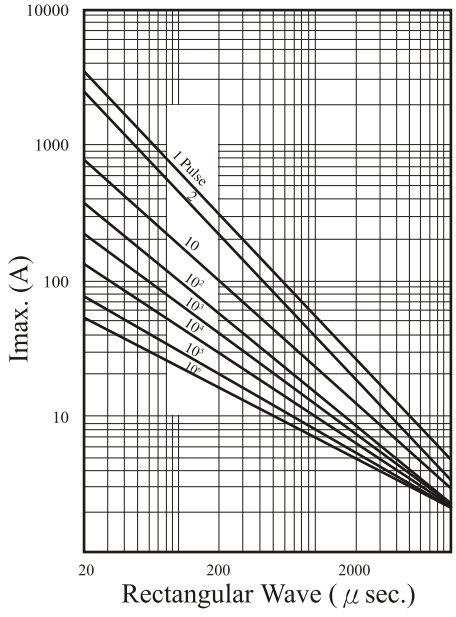
10S180M~ 680K



10S820K~471K

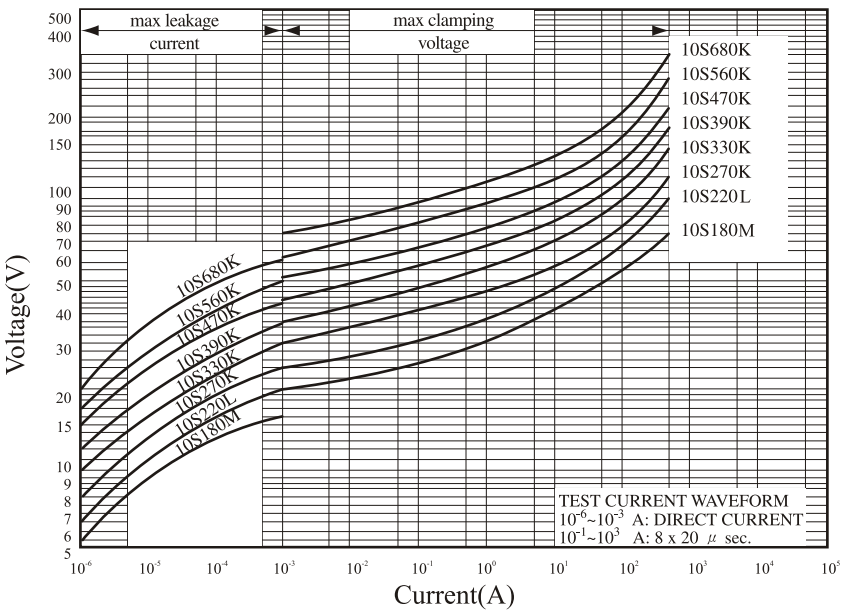


10S511K~182K

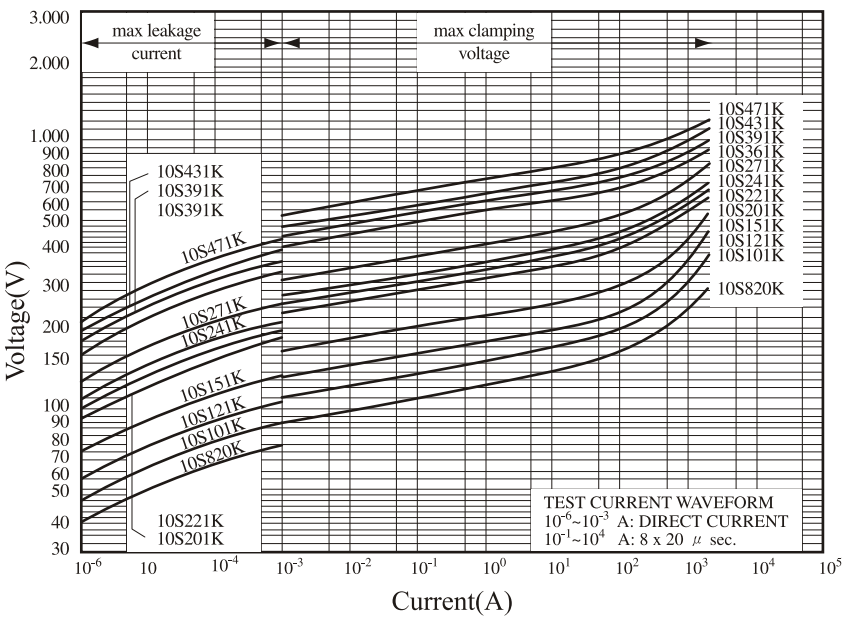


V-I CHARACTERISTIC CURVE - 10mm

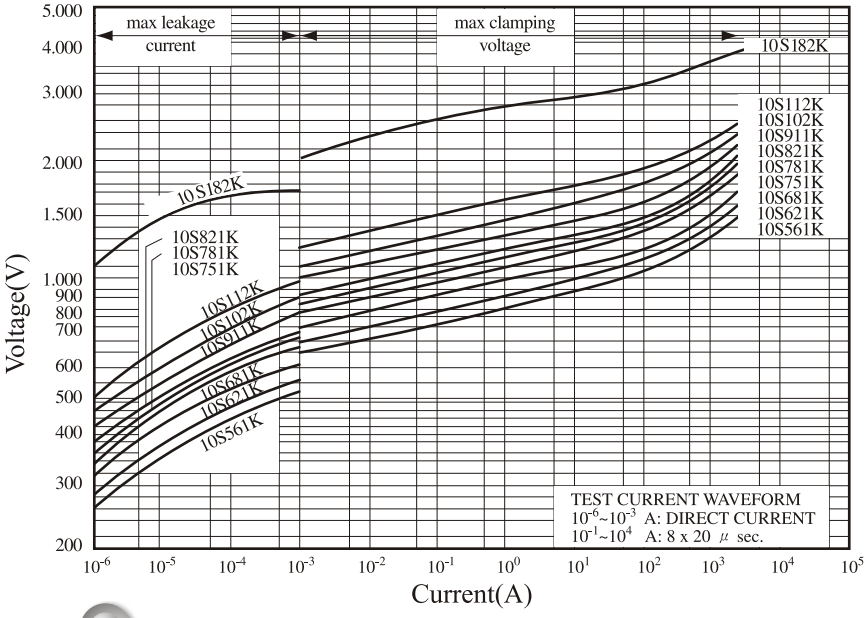
10S180M~680K



10S820K~471K



10S561K~182K



RATING AND CHARACTERISTICS

High Surge Varistor - 14mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@50A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇14S180M87□△△	18	± 20%	11	14	※ 36	2000	1000	0.1	5.2	☆ ★
JV◇ 14S220L87□△△	22	± 15%	14	18	※ 43				6.3	☆ ★
JV◇14S270K87□△△	27	± 10%	17	22	※ 53				7.8	☆ ★
JV◇14S330K87□△△	33		20	26	※ 65				9.5	☆ ★
JV◇14S390K87□△△	39		25	31	※ 77				11.0	☆ ★
JV◇14S470K87□△△	47		30	38	※ 93				14.0	☆ ★
JV◇14S560K87□△△	56		35	45	※110				16.0	☆ ★
JV◇14S680K87□△△	68		40	56	※135				20.0	☆ ★
JV◇14S820K87□△△	82		50	65	135	6000	4500	0.6	28.0	☆ ★
JV◇14S101K87□△△	100		60	85	165				36.0	☆ ★
JV◇14S121K87□△△	120		75	100	200				44.0	☆ ★
JV◇14S151K87□△△	150		95	125	250				53.0	☆ ★
JV◇14S181K87□△△	180		115	150	300				65.0	☆ ★
JV◇14S201K87□△△	200		130	170	340				70.0	✪ ☆ ★ ★
JV◇14S221K87□△△	220		140	180	360				78.0	✪ ☆ ★ ★
JV◇14S241K87□△△	240		150	200	395				84.0	✪ ☆ ★ ★
JV◇14S271K87□△△	270		175	225	455				99.0	✪ ☆ ★ ★
JV◇14S301K87□△△	300		195	250	505				105.0	✪ ☆ ★ ★
JV◇14S331K87□△△	330		210	275	550				115.0	✪ ☆ ★ ★
JV◇14S361K87□△△	360		230	300	595				130.0	✪ ☆ ★ ★
JV◇14S391K87□△△	390		250	320	650				140.0	✪ ☆ ★ ★
JV◇14S431K87□△△	430		275	350	710				155.0	✪ ☆ ★ ★
JV◇14S471K87□△△	470		300	385	775				175.0	✪ ☆ ★ ★
JV◇14S511K87□△△	510		320	418	842				190.0	✪ ☆ ★ ★
JV◇14S561K87□△△	560		350	460	920				205.0	✪ ☆ ★ ★
JV◇14S621K87□△△	620		385	505	1025				215.0	✪ ☆ ★ ★
JV◇14S681K87□△△	680		420	560	1120				225.0	✪ ☆ ★ ★
JV◇14S751K87□△△	750		460	615	1240				230.0	✪ ☆ ★ ★
JV◇14S781K87□△△	780		485	640	1290				233.0	✪ ☆ ★ ★
JV◇14S821K87□△△	820		510	670	1355				235.0	✪ ☆ ★ ★
JV◇14S911K87□△△	910		550	745	1500				255.0	✪ ☆ ★ ★
JV◇14S102K87□△△	1000		625	825	1650				283.0	✪ ☆ ★ ★
JV◇14S112K87□△△	1100		680	895	1815				310.0	✪ ☆ ★ ★
JV◇14S182K87□△△	1800		1000	1465	2970				510.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680K are tested at current 10A.

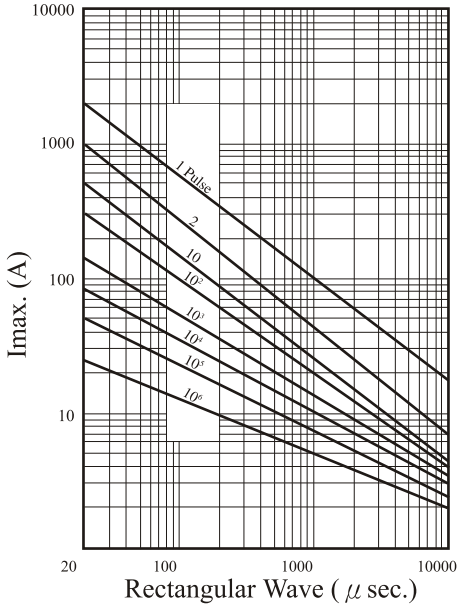
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

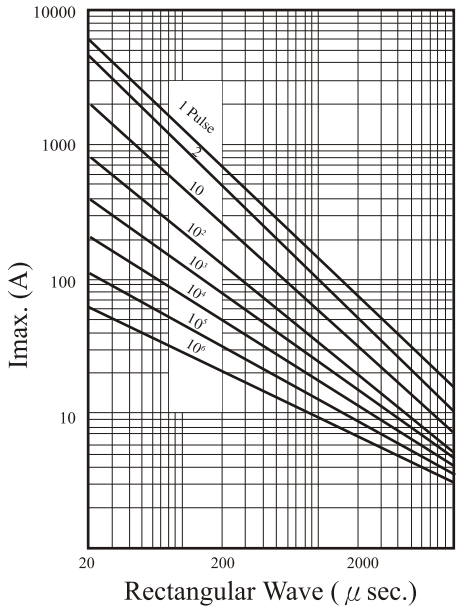
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 14mm

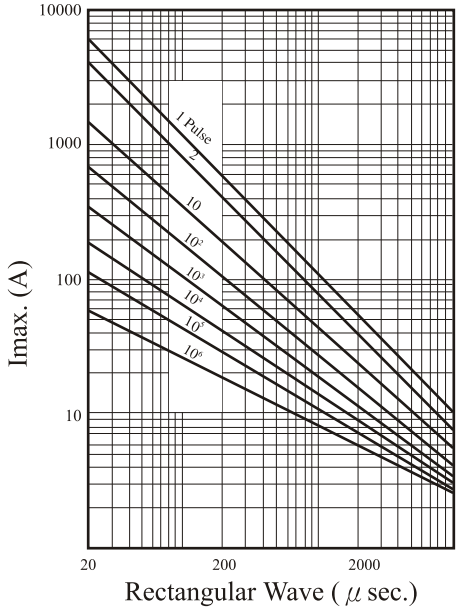
14S180M~ 680K



14S820K~ 471K

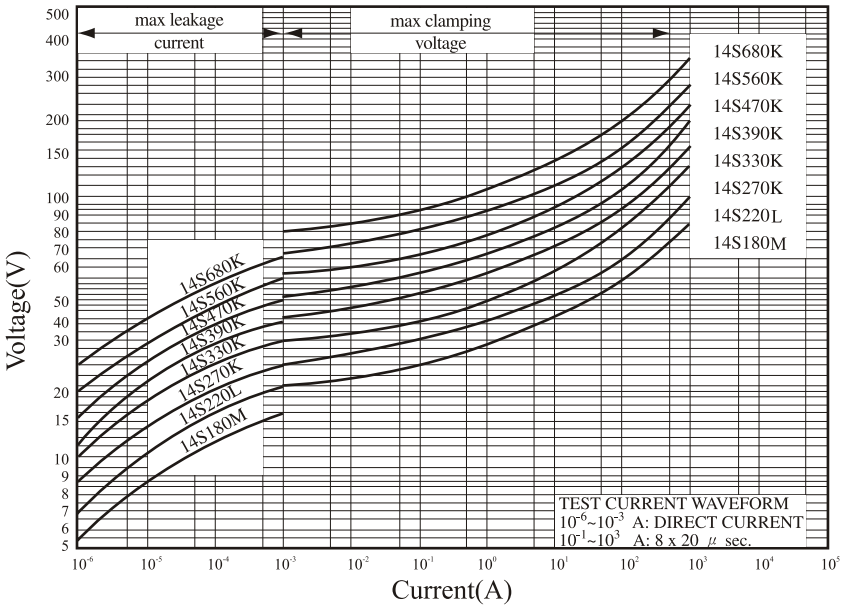


14S511K~182K

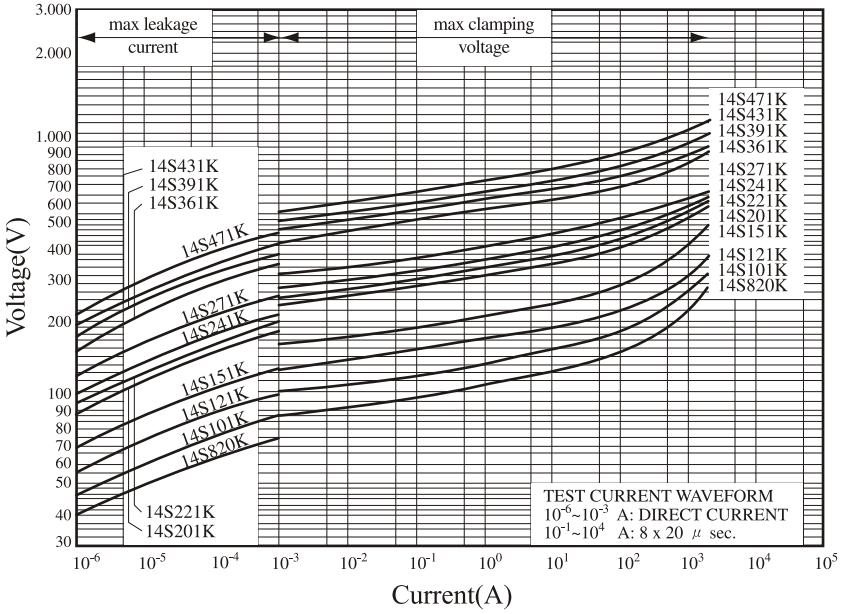


V-I CHARACTERISTIC CURVE - 14mm

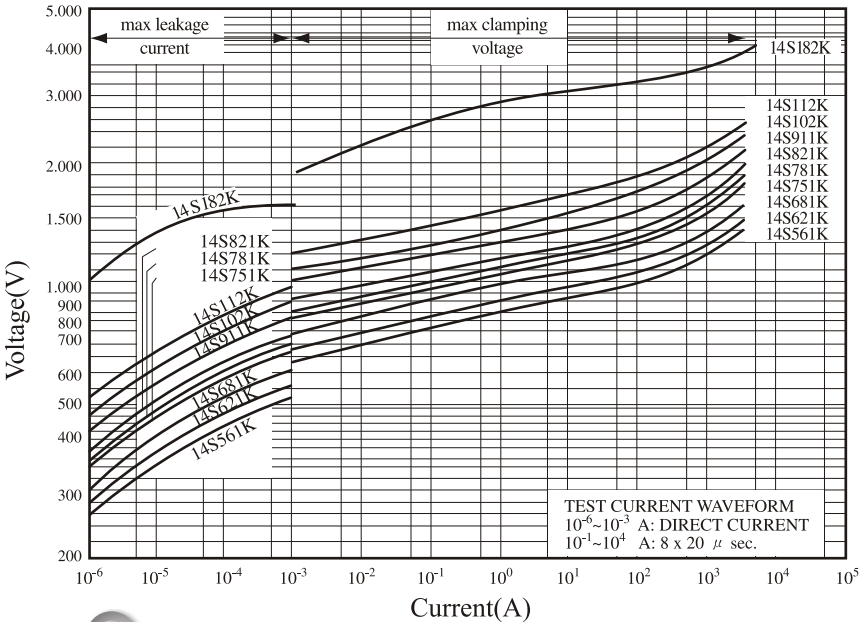
14S180M~ 680K



14S820K~ 471K



14S561K~JVR14S182K



RATING AND CHARACTERISTICS

High Surge Varistor - 20mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	ACrms (V)	DC (V)	V@100A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇20S220M11□△△	22	± 20%	14	18	※ 43	3000	2000	0.2	16.0	☆ ★
JV◇20S270M11□△△	27		17	22	※ 53				19.0	☆ ★
JV◇20S330M11□△△	33		20	26	※ 65				24.0	☆ ★
JV◇20S390L11□△△	39	± 15%	25	31	※ 77				28.0	☆ ★
JV◇20S470L11□△△	47		30	38	※ 93				34.0	☆ ★
JV◇20S560L11□△△	56		35	45	※ 110				41.0	☆ ★
JV◇20S680L11□△△	68		40	56	※ 135				49.0	☆ ★
JV◇20S101K11□△△	100	± 10%	60	85	165	10000	6500	1.0	72.0	☆ ★
JV◇20S121K11□△△	120		75	100	200				88.0	☆ ★
JV◇20S151K11□△△	150		95	125	250				106.0	☆ ★
JV◇20S181K11□△△	180		115	150	300				130.0	☆ ★
JV◇20S201K11□△△	200		130	170	340				140.0	✪ ☆ ★ ★
JV◇20S221K11□△△	220		140	180	360				155.0	✪ ☆ ★ ★
JV◇20S241K11□△△	240		150	200	395				168.0	✪ ☆ ★ ★
JV◇20S271K11□△△	270		175	225	455				190.0	✪ ☆ ★ ★
JV◇20S301K11□△△	300		195	250	505				210.0	✪ ☆ ★ ★
JV◇20S331K11□△△	330		210	275	550				228.0	✪ ☆ ★ ★
JV◇20S361K11□△△	360		230	300	595				255.0	✪ ☆ ★ ★
JV◇20S391K11□△△	390		250	320	650				275.0	✪ ☆ ★ ★
JV◇20S431K11□△△	430		275	350	710				303.0	✪ ☆ ★ ★
JV◇20S471K11□△△	470		300	385	775				350.0	✪ ☆ ★ ★
JV◇20S511K11□△△	510		320	418	842				382.0	✪ ☆ ★ ★
JV◇20S561K11□△△	560		350	460	920				410.0	✪ ☆ ★ ★
JV◇20S621K11□△△	620		385	505	1025				420.0	✪ ☆ ★ ★
JV◇20S681K11□△△	680		420	560	1120				430.0	✪ ☆ ★ ★
JV◇20S751K11□△△	750		460	615	1240				440.0	✪ ☆ ★ ★
JV◇20S781K11□△△	780		485	640	1290				450.0	✪ ☆ ★ ★
JV◇20S821K11□△△	820		510	670	1355				460.0	✪ ☆ ★ ★
JV◇20S911K11□△△	910		550	745	1500				510.0	✪ ☆ ★ ★
JV◇20S102K11□△△	1000		625	825	1650				566.0	✪ ☆ ★ ★
JV◇20S112K11□△△	1100		680	895	1815				620.0	✪ ☆ ★ ★
JV◇20S182K11□△△	1800		1000	1465	2970				1020.0	✪ ☆ ★ ★

※ The clamping voltage from 180M to 680L are tested at current 20A.

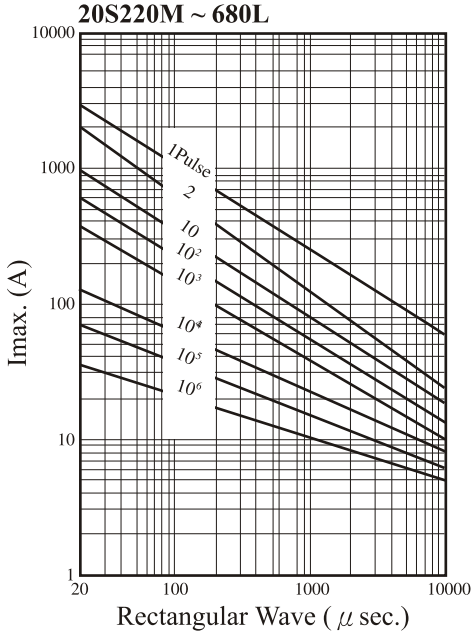
◇ : R=RoHS, H=RoHS+Halogen free +Non flammable

□ : Lead Style (Y=Vertical kink, P=Straight)

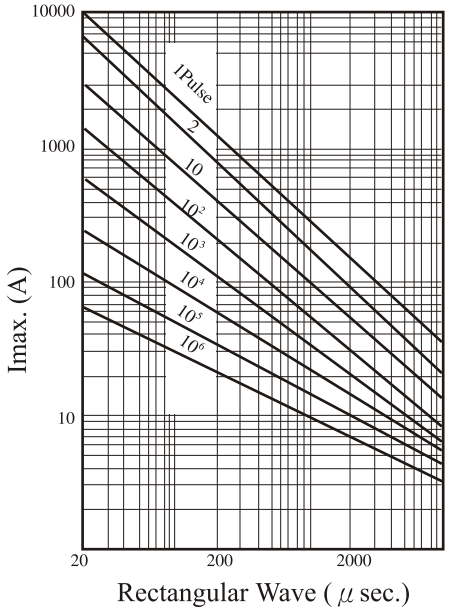
△△ : Lead Length & Packaging (see p.18)

PULSE LIFETIME RATINGS - 20mm

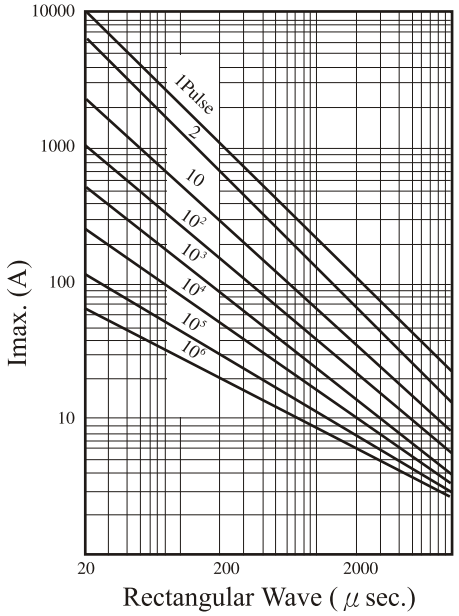
20S220M ~ 680L



20S101K ~ 471K

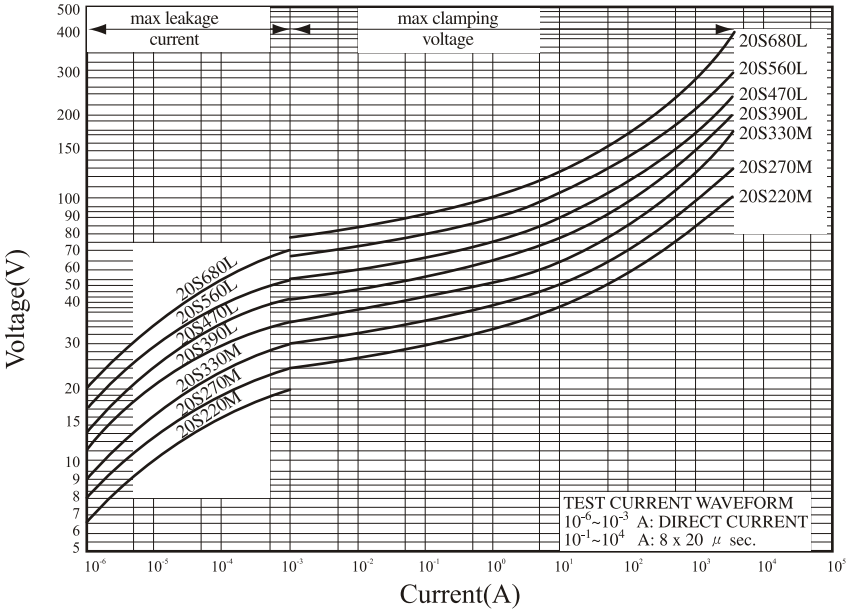


20S511K~182K

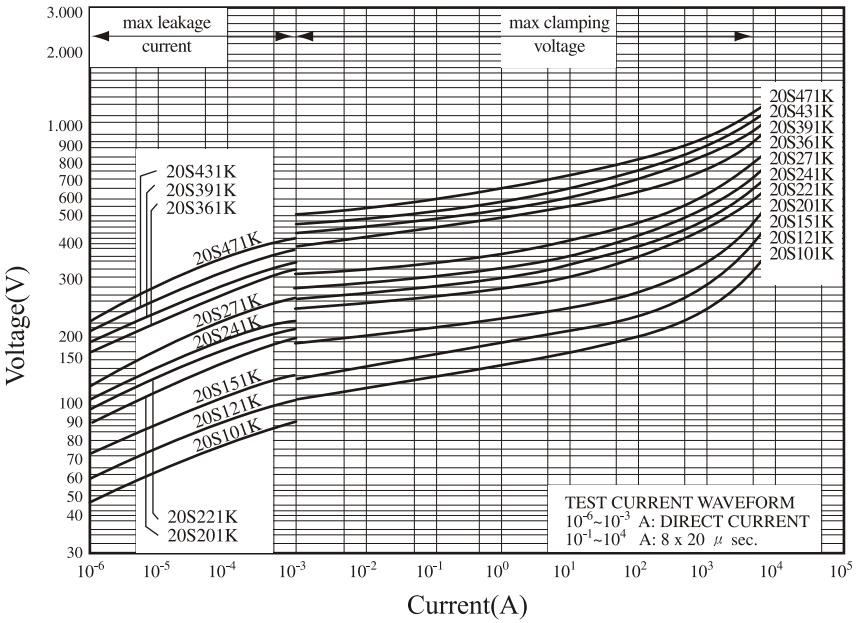


V-I CHARACTERISTIC CURVE - 20mm

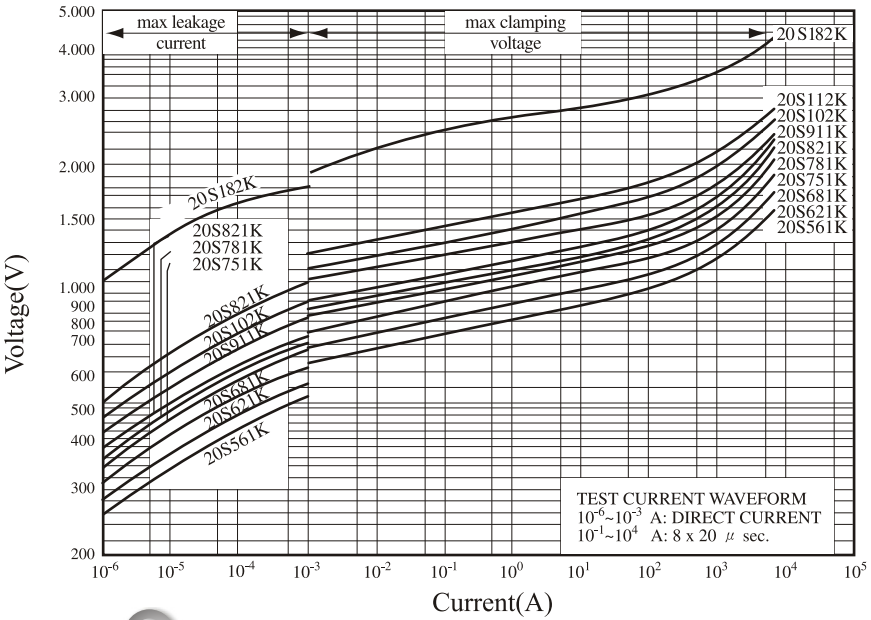
20S220M ~ 680L



20S101K ~ 471K



20S561K~182K



RATING AND CHARACTERISTICS

Ultra Surge Varistor - 14mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	Acrms (V)	DC (V)	V@50A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇14U201K87□△△	200	± 10%	130	170	340	6500	6000	0.6	84	☆ ★
JV◇14U221K87□△△	220		140	180	360				93	☆ ★
JV◇14U241K87□△△	240		150	200	395				101	☆ ★

RATING AND CHARACTERISTICS

Ultra Surge Varistor - 20mm

Ordering Code	Varistor Voltage at 1 mA		Maximum Allowable Voltage		Maximum Clamping Voltage	Withstanding Surge Current (8/20 μs)		Rated Wattage	Energy (10/1000 μs)	Certification (ref to p.20)
	DC (V)	Tolerance	Acrms (V)	DC (V)	V@100A (V)	1 Time (A)	2 Times (A)	(W)	(J)	
JV◇20U201K11□△△	200	± 10%	130	170	340	12500	10000	1.0	168	☆ ★
JV◇20U221K11□△△	220		140	180	360				186	☆ ★
JV◇20U241K11□△△	240		150	200	395				202	☆ ★

For application required ratings not shown, contact Joyin application engineering.

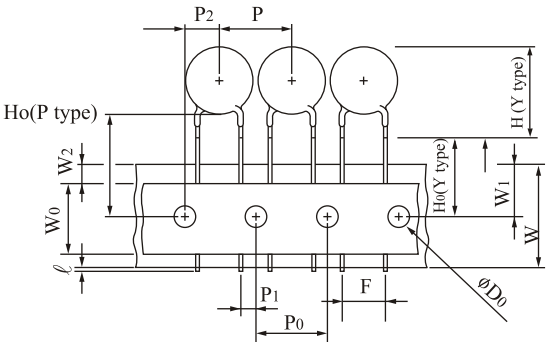
◇ : **R=RoHS, H=RoHS+Halogen free +Non flammable**

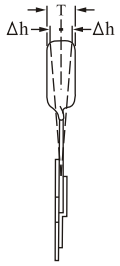
□ : **Lead Style (Y=Vertical kink, P=Straight)**

△△ : **Lead Length & Packaging (see p.18)**

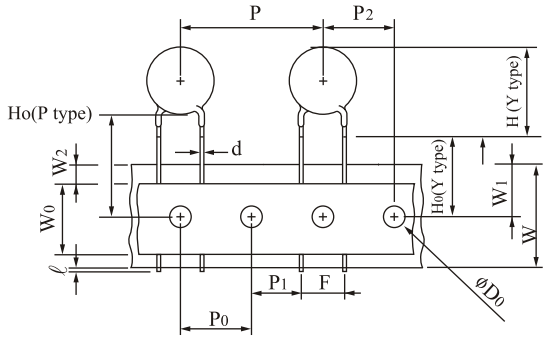
Tape and Reel Dimensions

1/2″ pitch





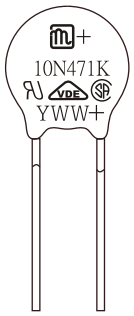
1.0″ pitch



Symbols	Item	5 / 7mm	10 / 14 mm	20 mm
ℓ	Cut out length	1.1 mm max.	1.1 mm max.	
H (Y type)	Height of Top	See H max. table		
H_0(Y type)	Height to seating plane	16.0±0.5mm(*±1.0mm)	16.0±0.5mm(*±1.0mm)	
H_0(P type)	Height of component from hole center	16.0~21.0 mm	16.0~21.0 mm	
Δh	Front to back deviation	0 ± 2.0 mm	0 ± 2.0 mm	
W	Carrier tape width	$18.0^{+1.0}_{-0.5}$ mm	$18.0^{+1.0}_{-0.5}$ mm	
W_0	Hold down tape width	10.0 mm	12.0 mm	
W_1	Sprocket hole position	$9.0^{+0.75}_{-0.5}$mm	$9.0^{+0.75}_{-0.5}$mm	
W_2	Adhesive tape position	3.0 mm max.	3.0 mm max.	
F	Component lead spacing	$5.0^{+0.8}_{-0.2}$ mm	$7.5^{+0.8}_{-0.2}$ mm	$10.0^{+0.8}_{-0.2}$ mm
P	Pitch of component	12.7 ± 1.0 mm	25.4 ± 1.0 mm	
P_0	Sprocket hole pitch	12.7 ± 0.3 mm	12.7 ± 0.3 mm	
P_1	Lead length from hole center to lead	3.85 ± 0.7 mm	8.95 ± 0.7 mm	7.7 ± 0.7 mm
P_2	Length from hole center to disk center	6.35 ± 1.3 mm	12.7 ± 1.3 mm	
D_0	Sprocket hole diameter	4.0 ± 0.2 mm	4.0 ± 0.2 mm	
d	Lead wire diameter	0.6 ± 0.05 mm	0.8 ± 0.05 mm	1.0 ± 0.05 mm
T	Disk thickness	See T max. table	See T max. table	
t_1	Total thickness tape	0.7 ± 0.05 mm	0.7 ± 0.05mm	
t_2	Total thickness	1.6 mm max.	1.8 mm max.	

* for manual line

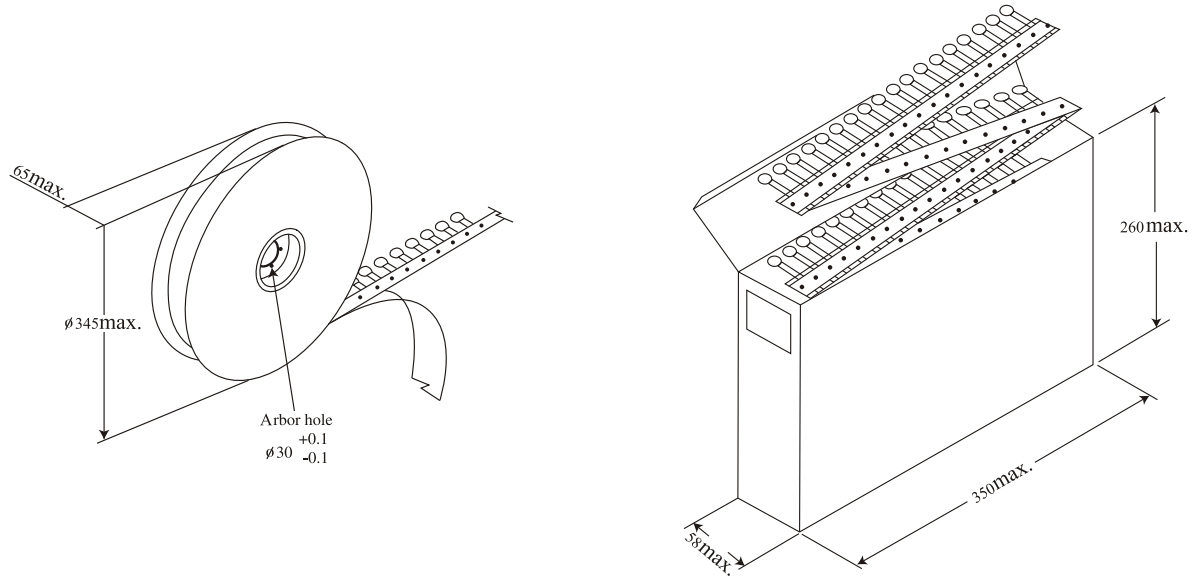
MARKING



+ : Taiwan Joyin
* : Dongguan Joyin
YWW : Date code
Y : Year
WW : Week
+ : RoHS
H : RoHS + Halogen free+ Non flammable

PACKAGING

in mm



Quantity per Packing Unit

in Pcs

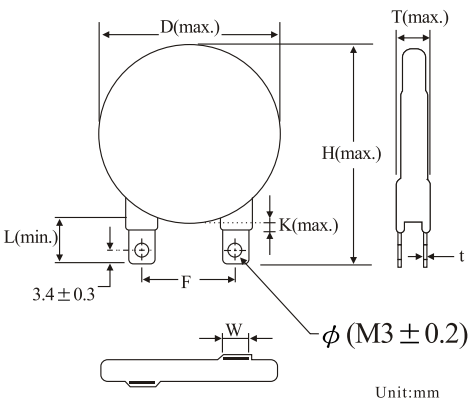
Series / Part No.	5mm			7mm			10mm			14mm			20mm		
	Bulk (box)	Reel	Ammo	Bulk (box)	Reel	Ammo	Bulk (box)	Reel	Ammo	Bulk (box)	Reel	Ammo	Bulk (box)	Reel	Ammo
180M~470K	5000	1500	1500	5000	1500	1500	2500	1000	500	1500	750	500	750	500	500
560K~680K	5000	1500	1000	5000	1500	1000	2500	1000	500	1500	750	500	750	500	500
820K~391K	5000	1500	1500	5000	1500	1500	2500	1000	500	1500	750	500	750	500	500
431K~471K	5000	1500	1000	5000	1000	1000	2000	750	500	1500	750	500	750	500	500
511K~821K	4000	1000	1000	4000	1000	1000	1500	500	500	750	500	500	450	500	500
911K~112K	-	-	-	-	-	-	1500	500	350	750	500	350	450	-	-
182K	-	-	-	-	-	-	750	-	-	450	-	-	300	-	-

Packaging	Bulk (box)	Reel	Reel (14mm, 20mm)	Ammo (5mm, 7mm)	Ammo (10mm,14mm)	Ammo (20mm)
Box size (mm)	290x155x110	350x350x105	346x346x72	335x245x43	347x246x50	348x255x60
Carton size (mm)	328x310x250	370x370x590	370x370x468	515x354x258	515x364x246	535x365x275
One carton with	4 Boxes	5 Boxes (10 reels)	6 Boxes(6 reels)	10 Boxes	8 Boxes	8 Boxes

RATING AND CHARACTERISTICS

Ordering Code	Varistor Voltage at 1 mA	Maximum Allowable Voltage		Maximum Clamping Voltage		Withstanding Surge Current (8/20 μs)	Energy (10/1000 μs)	Certification
	DC (V)	ACrms (V)	DC (V)	Vc (V)	IP (A)	1 Time (A)	10/1000 μs	
JVR32N201K	200(185-225)	130	170	340	200	30000	250	✪☆★
JVR32N241K	240(216-264)	150	200	395			290	✪☆★
JVR32N271K	270(243-297)	175	225	455			300	✪☆★
JVR32N331K	330(297-363)	210	275	550			360	✪☆★
JVR32N361K	360(324-396)	230	300	595			380	✪☆★
JVR32N391K	390(351-429)	250	320	650			400	✪☆★
JVR32N431K	430(387-473)	275	350	710			430	✪☆★
JVR32N471K	470(423-517)	300	385	775			460	✪☆★
JVR32N511K	510(459-561)	320	415	845			510	✪☆★
JVR32N621K	620(558-682)	385	505	1025			570	✪☆★
JVR32N681K	680(612-748)	420	560	1120			600	✪☆★
JVR32N751K	750(675-825)	460	615	1240			620	✪☆★
JVR32N781K	780(702-858)	485	640	1290			660	✪☆★
JVR32N821K	820(738-902)	510	670	1355			700	✪☆★
JVR32N911K	910(819-1001)	550	745	1500			750	✪☆★
JVR32N951K	950(855-1045)	575	765	1570			780	✪☆★
JVR32N102K	1000(900-1100)	625	825	1650			810	✪☆★
JVR32N112K	1100(990-1210)	680	895	1815			910	✪☆★
JVR32N122K	1200(1080-1320)	750	990	1980			960	★

DIMENSIONS



Unit:mm

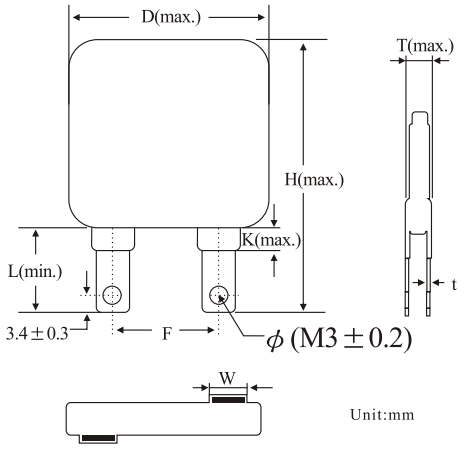
D(max.)	35.0
H(max.)	56.3
T(max.)	refer to right table
F(±1.0)	25.4
t(±0.1)	0.5
L(min.)	16.5
K(max.)	3.18
W(±0.5)	7.0
ϕ (M3±0.2)	3.8

Model	T(max.)	Model	T(max.)
201K	6.4	751K	10.0
241K	6.7	781K	10.2
271K	6.9	821K	10.8
331K	7.3	911K	11.2
361K	7.6	951K	11.0
391K	7.8	102K	11.2
431K	8.0	112K	12.3
471K	8.3	122K	13.0
511K	8.7		
621K	9.4		
681K	9.5		

RATING AND CHARACTERISTICS

Ordering Code	Varistor Voltage at 1 mA	Maximum Allowable Voltage		Maximum Clamping Voltage		Withstanding Surge Current (8/20 μs)	Energy (10/1000 μs)	Certification
	DC (V)	ACrms (V)	DC (V)	Vc (V)	IP (A)	1 Time (A)	10/1000 μs	
JVR34N201K	200(185-225)	130	170	340	300	45000	400	✪☆★
JVR34N221K	220(198-242)	140	180	360			450	✪☆★
JVR34N241K	240(216-264)	150	200	395			480	✪☆★
JVR34N271K	270(243-297)	175	225	455			540	✪☆★
JVR34N331K	330(297-363)	210	275	550			656	✪☆★
JVR34N361K	360(324-396)	230	300	595			745	✪☆★
JVR34N391K	390(351-429)	250	320	650			830	✪☆★
JVR34N431K	430(387-473)	275	350	710			920	✪☆★
JVR34N471K	470(423-517)	300	385	775			1000	✪☆★
JVR34N511K	510(459-561)	320	415	845			1060	✪☆★
JVR34N561K	560(504-616)	350	460	925			1150	✪☆★
JVR34N621K	620(558-682)	385	505	1025			1250	✪☆★
JVR34N681K	680(612-748)	420	560	1120			1250	✪☆★
JVR34N751K	750(675-825)	460	615	1240			1280	✪☆★
JVR34N781K	780(702-858)	485	640	1290			1350	✪☆★
JVR34N821K	820(738-902)	510	670	1355		40000	1395	✪☆★
JVR34N911K	910(819-1001)	550	745	1500			1475	✪☆★
JVR34N951K	950(855-1045)	575	765	1570			1485	✪☆★
JVR34N102K	1000(900-1100)	625	825	1650			1550	✪☆★
JVR34N112K	1100(990-1210)	680	895	1815			1700	✪☆★
JVR34N122K	1200(1080-1320)	750	990	1980			1750	★
JVR34N142K	1400(1260-1540)	880	1140	2310			1750	★
JVR34N162K	1600(1440-1760)	1000	1280	2640			2000	★

DIMENSIONS



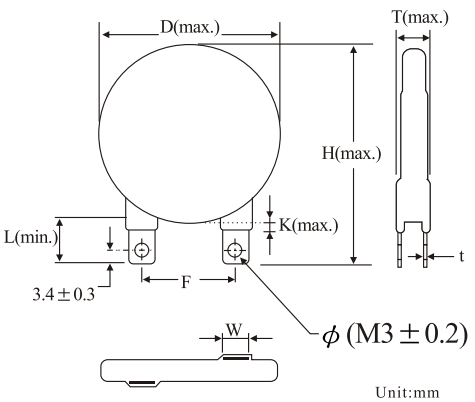
D(max.)	36.0
H(max.)	56.6
T(max.)	refer to right table
F(±1.0)	22
t(±0.1)	0.5
L(min.)	16.5
K(max.)	3.18
W(±0.5)	7.0
φ (M3±0.2)	3.8

Model	T(max.)	Model	T(max.)	Model	T(max.)
201K	6.4	621K	9.4	162K	13.3
221K	6.6	681K	9.5		
241K	6.7	751K	10.0		
271K	6.9	781K	10.2		
331K	7.3	821K	10.8		
361K	7.6	911K	11.2		
391K	7.8	951K	11.0		
431K	8.0	102K	11.2		
471K	8.3	112K	12.3		
511K	8.7	122K	13.0		
561K	9.0	142K	14.3		

RATING AND CHARACTERISTICS

Ordering Code	Varistor Voltage at 1 mA	Maximum Allowable Voltage		Maximum Clamping Voltage		Withstanding Surge Current (8/20 μs)	Energy (10/1000 μs)	Certification
	DC (V)	ACrms (V)	DC (V)	Vc (V)	IP (A)	1 Time (A)	10/1000 μs	
JVR40N201K	200(185-225)	130	170	340	300	45000	400	✪☆★
JVR40N241K	240(216-264)	150	200	395			480	✪☆★
JVR40N271K	270(243-297)	175	225	455			540	✪☆★
JVR40N331K	330(297-363)	210	275	550			656	✪☆★
JVR40N361K	360(324-396)	230	300	595			745	✪☆★
JVR40N391K	390(351-429)	250	320	650			830	✪☆★
JVR40N431K	430(387-473)	275	350	710			920	✪☆★
JVR40N471K	470(423-517)	300	385	775			1000	✪☆★
JVR40N511K	510(459-561)	320	415	845			1060	✪☆★
JVR40N621K	620(558-682)	385	505	1025			1250	✪☆★
JVR40N681K	680(612-748)	420	560	1120			1250	✪☆★
JVR40N751K	750(675-825)	460	615	1240			1280	✪☆★
JVR40N781K	780(702-858)	485	640	1290			1350	✪☆★
JVR40N821K	820(738-902)	510	670	1355		40000	1395	✪☆★
JVR40N911K	910(819-1001)	550	745	1500			1475	✪☆★
JVR40N951K	950(855-1045)	575	765	1570			1485	✪☆★
JVR40N102K	1000(900-1100)	625	825	1650			1550	✪☆★
JVR40N112K	1100(990-1210)	680	895	1815			1700	✪☆★
JVR40N122K	1200(1080-1320)	750	990	1980			1750	★
JVR40N142K	1400(1260-1540)	880	1140	2310			1750	★

DIMENSIONS



Unit:mm

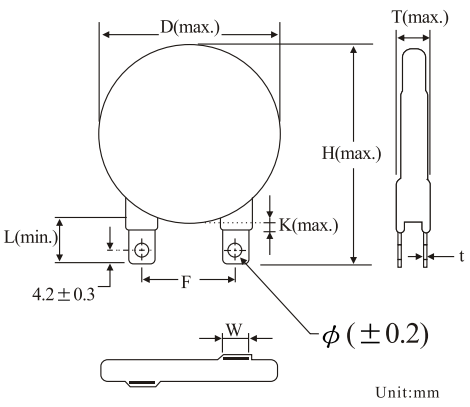
D(max.)	42.0
H(max.)	60.2
T(max.)	refer to right table
F(±1.0)	25.4
t(±0.1)	0.5
L(min.)	16.5
K(max.)	3.18
W(±0.5)	7.0
ϕ (M3±0.2)	3.8

Model	T(max.)	Model	T(max.)
201K	6.4	751K	10.0
241K	6.7	781K	10.2
271K	6.9	821K	10.8
331K	7.3	911K	11.2
361K	7.6	951K	11.0
391K	7.8	102K	11.2
431K	8.0	112K	12.3
471K	8.3	122K	13.0
511K	8.7	142K	14.3
621K	9.4		
681K	9.5		

RATING AND CHARACTERISTICS

Ordering Code	Varistor Voltage at 1 mA	Maximum Allowable Voltage		Maximum Clamping Voltage		Withstanding Surge Current (8/20 μs)	Energy (10/1000 μs)	Certification
	DC (V)	ACrms (V)	DC (V)	Vc (V)	IP (A)	1 Time (A)	10/1000 μs	
JVR53N201K	200(185-225)	130	170	340	500	60000	600	✪☆★
JVR53N241K	240(216-264)	150	200	395			720	✪☆★
JVR53N271K	270(243-297)	175	225	455			810	✪☆★
JVR53N331K	330(297-363)	210	275	550		70000	990	✪☆★
JVR53N361K	360(324-396)	230	300	595			1120	✪☆★
JVR53N391K	390(351-429)	250	320	650			1250	✪☆★
JVR53N431K	430(387-473)	275	350	710			1380	✪☆★
JVR53N471K	470(423-517)	300	385	775			1500	✪☆★
JVR53N511K	510(459-561)	320	415	845			1590	✪☆★
JVR53N621K	620(558-682)	385	505	1025			1880	✪☆★
JVR53N681K	680(612-748)	420	560	1120			1880	✪☆★
JVR53N751K	750(675-825)	460	615	1240			1920	✪☆★
JVR53N781K	780(702-858)	485	640	1290			2025	✪☆★
JVR53N821K	820(738-902)	510	670	1355		60000	2100	✪☆★
JVR53N911K	910(819-1001)	550	745	1500			2215	✪☆★
JVR53N951K	950(855-1045)	575	765	1570			2230	✪☆★
JVR53N102K	1000(900-1100)	625	825	1650			2325	✪☆★
JVR53N112K	1100(990-1210)	680	895	1815			2550	✪☆★
JVR53N122K	1200(1080-1320)	750	990	1980			2625	✪☆★
JVR53N142K	1400(1260-1540)	880	1140	2310			2625	★
JVR53N162K	1600(1440-1760)	1000	1280	2640			3000	★

DIMENSIONS



D(max.)	56.0
H(max.)	78.2
T(max.)	refer to right table
F(±1.0)	25.4
t(±0.1)	0.7
L(min.)	16.5
K(max.)	3.18
W(±0.5)	9.7
ϕ(±0.2)	4.15

Model	T(max.)	Model	T(max.)
201K	6.4	751K	10.0
241K	6.7	781K	10.2
271K	6.9	821K	10.8
331K	7.3	911K	11.2
361K	7.6	951K	11.0
391K	7.8	102K	11.2
431K	8.0	112K	12.3
471K	8.3	122K	13.0
511K	8.7	142K	14.3
621K	9.4	162K	13.3
681K	9.5		