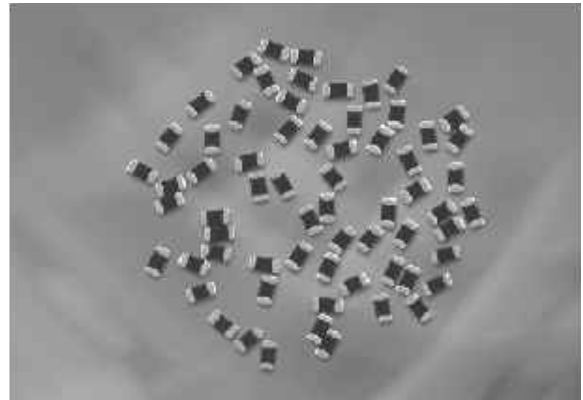


**Introduction**

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.

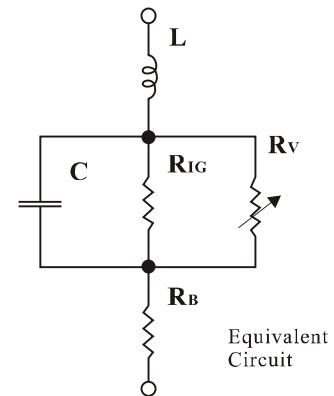


**Features**

- 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



**General Characteristics**

**JMV S series 、 JMV C series**

**0402~0805**

- Operating ambient temperature range : -55°C ~ 125°C
- Storage temperature range : -55°C ~ 150°C

**1206~2220**

- Operation ambient temperature range: -55°C ~ 85°C
- Storage temperature range : -55°C ~ 125°C

**JMV E series**

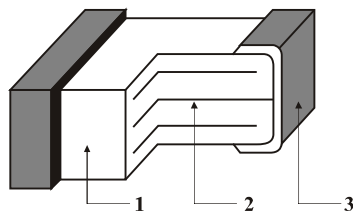
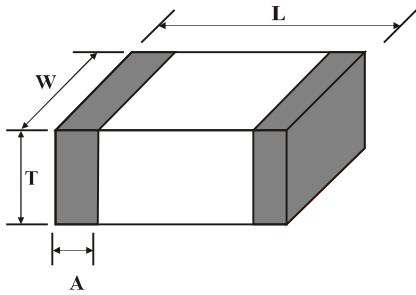
- Operating ambient temperature range : -55°C ~ 85°C
- Storage temperature range : -55°C ~ 125°C

**JMV A series**

- Operating ambient temperature range : -55°C ~ 125°C
- Storage temperature range : -55°C ~ 150°C



Introduction



Chip Dimensions

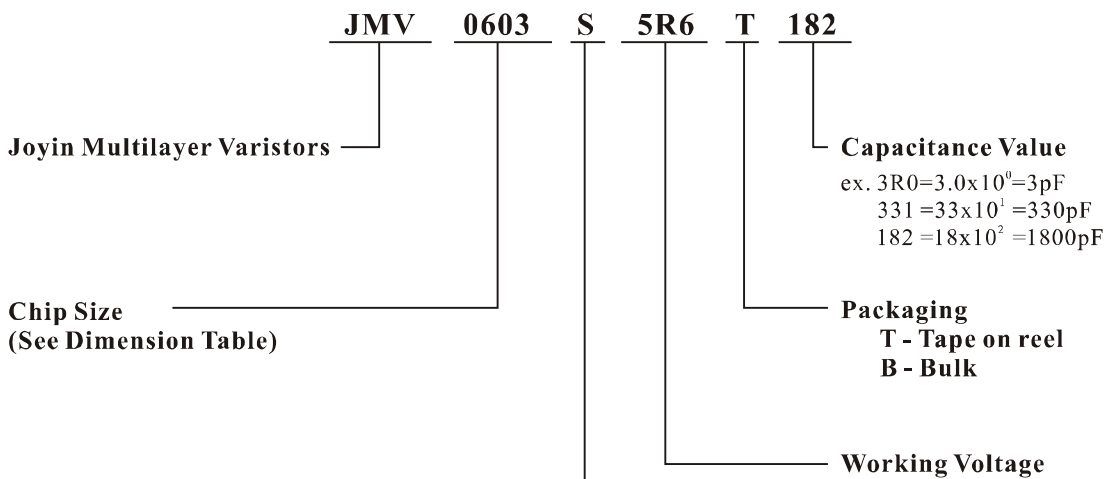
inch (mm)

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 ± 0.50)	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



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)

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



Part No.	Working Voltage (V <sub>w</sub> )	Breakdown Voltage (V <sub>b</sub> )	Clamping Voltage 8/20μS		Peak Current (I <sub>p</sub> )	Transient Energy (E <sub>t</sub> )	Typical Capacitance (C)	
	Volt	Volt	Volt	Amp	Amp	Joule	pF	
	<50 μ	1 mA (DC)	V <sub>c</sub>	I <sub>c</sub>	8/20μS	10/1000μS	1KHz	1MHz
<b>0402</b>								
JMV0402◇5R6T301	5.6	7.0~10.0	22.0	1.0	20	0.05	—	300
JMV0402◇090T201	9.0	10.0~15.0	32.0	1.0	20	0.05	—	200
JMV0402◇140T850	14.0	16.2~19.8	38.0	1.0	20	0.05	—	85
JMV0402◇180T550	18.0	21.6~26	45.0	1.0	20	0.05	—	55
<b>0603</b>								
JMV0603◇5R6T102	5.6	7.0~10.0	22.0	1.0	30	0.1	1000	—
JMV0603◇5R6T351	5.6	7.0~10.0	22.0	1.0	30	0.1	350	—
JMV0603◇090T651	9.0	10.0~15.0	30.0	1.0	30	0.1	650	—
JMV0603◇090T331	9.0	10.0~15.0	30.0	1.0	30	0.1	330	—
JMV0603◇140T451	14.0	16.2~19.8	37.0	1.0	30	0.1	450	—
JMV0603◇140T181	14.0	16.2~19.8	37.0	1.0	30	0.1	180	—
JMV0603◇180T281	18.0	21.6~26.0	48.0	1.0	30	0.1	280	—
JMV0603◇180T111	18.0	21.6~26.0	48.0	1.0	30	0.1	110	—
JMV0603◇260T151	26.0	31.0~38.0	62.0	1.0	30	0.1	150	—
JMV0603◇260T800	26.0	31.0~38.0	62.0	1.0	30	0.1	80	—
JMV0603◇300T101	30.0	37.0~46.0	73.0	1.0	30	0.1	100	—
<b>0805</b>								
JMV0805◇5R6T132	5.6	7.0~10.0	22.0	1.0	80	0.1	1300	—
JMV0805◇5R6T451	5.6	7.0~10.0	22.0	1.0	40	0.1	450	—
JMV0805◇5R6T661	5.6	7.0~10.0	22.0	1.0	40	0.1	660	—
JMV0805◇090T781	9.0	10.0~15.0	27.0	1.0	40	0.1	780	—
JMV0805◇090T271	9.0	10.0~15.0	27.0	1.0	40	0.1	270	—
JMV0805◇120T531	12.0	14.0~18.3	34.0	1.0	40	0.1	530	—
JMV0805◇120T431	12.0	14.0~18.3	34.0	1.0	40	0.1	430	—
JMV0805◇120T251	12.0	14.0~18.3	34.0	1.0	40	0.1	250	—
JMV0805◇140T381	14.0	16.2~19.8	37.0	1.0	40	0.1	380	—
JMV0805◇140T201	14.0	16.2~19.8	37.0	1.0	40	0.1	200	—
JMV0805◇180T351	18.0	21.6~26.0	48.0	1.0	40	0.1	350	—
JMV0805◇180T111	18.0	21.6~26.0	48.0	1.0	40	0.1	110	—
JMV0805◇260T161	26.0	31.0~38.0	62.0	1.0	40	0.1	160	—
JMV0805◇260T101	26.0	31.0~38.0	62.0	1.0	40	0.1	100	—
JMV0805◇300T101	30.0	37.0~46.0	73.0	1.0	40	0.1	100	—
JMV0805◇300T311	30.0	37.0~46.0	73.0	1.0	100	0.3	310	—

◇: S=JMV S series , A=JMV A series

V<sub>w</sub> - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.

V<sub>b</sub> - The voltage acrossed the device measured at 1mA DC current.

V<sub>c</sub> - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.

I<sub>p</sub> - The max. peak current applied with specified waveform without any possibility of device fail.

E<sub>t</sub> - 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**



Part No.	Working Voltage (V <sub>w</sub> )	Breakdown Voltage (V <sub>b</sub> )	Clamping Voltage 8/20μS		Peak Current (I <sub>p</sub> )	Transient Energy (E <sub>t</sub> )	Typical Capacitance (C)	
	Volt	Volt	Volt	Amp	Amp	Joule	pF	
	<50 μA	1 mA (DC)	V <sub>c</sub>	I <sub>c</sub>	8/20μS	10/1000μS	1KHz	1MHz
<b>1206</b>								
JMV1206◇5R6T152	5.6	7.0~10.0	22.0	1.0	150	1.0	1500	—
JMV1206◇120T801	12.0	14.0~18.3	34.0	1.0	150	0.6	800	—
JMV1206◇140T401	14.0	16.2~19.8	37.0	1.0	100	0.3	400	—
JMV1206◇140T801	14.0	16.2~19.8	37.0	1.0	200	0.5	800	—
JMV1206◇160T132	16.0	19.8~24.2	40.0	1.0	200	1.0	1300	—
JMV1206◇180T132	18.0	21.6~26.0	48.0	1.0	200	1.0	1300	—
JMV1206◇180T901	18.0	21.6~26.0	48.0	1.0	100	0.3	900	—
JMV1206◇260T901	26.0	31.0~38.0	62.0	1.0	200	1.0	900	—
JMV1206◇300T201	30.0	37.0~46.0	73.0	1.0	100	0.3	200	—
JMV1206◇300T401	30.0	37.0~46.0	73.0	1.0	100	0.3	400	—
JMV1206◇300T551	30.0	37.0~46.0	73.0	1.0	200	1.0	550	—
JMV1206◇330T551	33.0	39.0~47.0	75.0	1.0	180	1.0	550	—
JMV1206◇380T501	38.0	42.3~51.7	88.0	1.0	200	1.1	500	—
JMV1206◇450T551	45.0	50.4~61.6	95.0	1.0	180	0.8	550	—
JMV1206◇480T251	48.0	55.8~68.2	100.0	1.0	100	0.8	250	—
JMV1206◇560T101	56.0	61.0~77.0	120.0	1.0	100	0.3	100	—
JMV1206◇560T381	56.0	61.0~77.0	120.0	1.0	180	1.0	380	—
JMV1206◇650T241	65.0	73.8~90.2	135.0	1.0	100	0.6	240	—
<b>1210</b>								
JMV1210◇5R6T502	5.6	7.0~10.0	22.0	2.5	250	0.4	5000	—
JMV1210◇180T202	18.0	21.6~26.0	48.0	2.5	400	1.5	2000	—
JMV1210◇220T182	22.0	24.3~29.7	52.0	2.5	400	1.7	1800	—
JMV1210◇260T112	26.0	31.0~38.0	62.0	2.5	250	1.2	1100	—
JMV1210◇260T152	26.0	31.0~38.0	62.0	2.5	400	1.9	1500	—
JMV1210◇300T901	30.0	37.0~46.0	77.0	2.5	250	1.7	900	—
JMV1210◇300T122	30.0	37.0~46.0	77.0	2.5	400	1.9	1200	—
JMV1210◇450T951	45.0	50.4~61.6	95.0	2.5	250	2.2	950	—
<b>1812</b>								
JMV1812◇180T452	18.0	21.6~26.0	48.0	5	800	2.3	4500	—
JMV1812◇220T352	22.0	24.3~29.7	52.0	5	500	2.0	3500	—
JMV1812◇220T402	22.0	24.3~29.7	52.0	5	800	2.7	4000	—
JMV1812◇260T282	26.0	31.0~38.0	65.0	5	500	2.5	2800	—
JMV1812◇260T302	26.0	31.0~38.0	65.0	5	800	3.0	3000	—
JMV1812◇300T252	30.0	37.0~46.0	78.0	5	800	3.7	2500	—
JMV1812◇380T202	38.0	42.3~51.7	88.0	5	800	4.2	2000	—
<b>2220</b>								
JMV2220◇5R6T203	5.6	7.0~10.0	19.0	10	1200	1.4	20000	—
JMV2220◇180T153	18.0	22.0~27.0	56.0	10	1200	5.8	15000	—
JMV2220◇300T502	30.0	37.0~46.0	85.0	10	1200	9.6	5000	—
JMV2220◇380T402	38.0	42.3~51.7	88.0	10	1200	12.0	4000	—

◇: S=JMV S series , A=JMV A series

V<sub>w</sub> - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μ A leakage current.

V<sub>b</sub> - The voltage acrossed the device measured at 1mA DC current.

V<sub>c</sub> - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.

I<sub>p</sub> - The max. peak current applied with specified waveform without any possibility of device fail.

E<sub>t</sub> - 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 protection - C series

Part Number	Working Voltage (V <sub>w</sub> )	Clamping Voltage (V <sub>c</sub> )	ESD Withstanding	Capacitance (C)		Capacitance Tolerance
	Volt	Volt	Time	pF		
	< 15 μA	1A, 8/20 μs	8KV*	1 KHz	1 MHz	
<b>0402</b>						
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.

V<sub>w</sub>- The max. steady state DC operating voltage of which varistor could maintain also not exceeding 15 μA leakage current.

V<sub>c</sub>- 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.

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



## for ESD protection - C series

Part Number	Working Voltage (Vw)	Clamping Voltage (Vc)	ESD Withstanding	Capacitance (C)		Capacitance Tolerance
	Volt	Volt	Time	pF		
	< 15 $\mu$ A	1A, 8/20 $\mu$ s	8KV*	1 KHz	1 MHz	%
<b>0603</b>						
JMV0603C050T4R7	5.0	50.0	1000	—	4.7	
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<sub>w</sub> - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 15 $\mu$ A leakage current.

V<sub>c</sub> - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.

C - The device capacitance measured with 1.0V<sub>rms</sub>, 1KHz/0.5rms, 1 MHz.

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



## for ESD protection - E series

Part No.	Working Voltage (V <sub>w</sub> )	Breakdown Voltage (V <sub>b</sub> )	Clamping Voltage (V <sub>c</sub> )	Peak Current (I <sub>p</sub> )	Transient Energy (E <sub>t</sub> )	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
<b>0402 / 0603</b>							
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<sub>w</sub> - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.

V<sub>b</sub> - The voltage acrossed the device measured at 1mA DC current.

V<sub>c</sub> - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.

I<sub>p</sub> - The max. peak current applied with specified waveform without any possibility of device fail.

E<sub>t</sub> - 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.

## for ESD Protection - Low capacitance Series

Part No.	Size (mm)	V <sub>w</sub>	Trigger Voltage* (V <sub>t</sub> )	Clamping Voltage* (V <sub>c</sub> )	ESD		ESD Pulse Withstand* min.	C <sub>p</sub> (1MHz) PF
					Contact	Air		
JES0402C5R5T0R1	0402	5.5	500	35	8KV	15KV	500	0.1
JES0402C120T0R1		12						
JES0603C5R5T0R1	0603	5.5						
JES0603C120T0R1		12						
JES0603C240T0R1		24						

\*Per IEC 61000-4-2, 8KV, Clamp measurement made 30ns after initiation of pulse, all test in contact discharge mode.

V<sub>w</sub> - The max. steady state DC operating voltage of which varistor could maintain also not exceeding 50 μA leakage current.

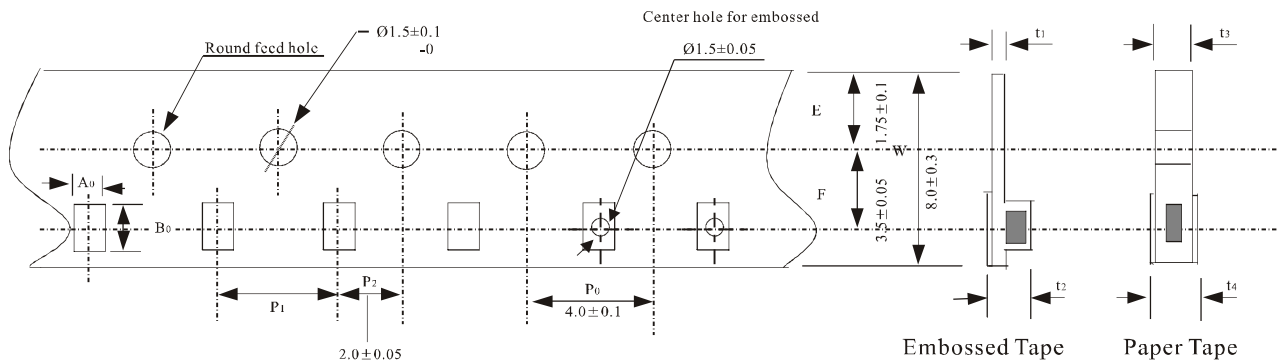
V<sub>c</sub> - The peak voltage acrossed the varistor measured at a specified pulse current and waveform.

C - The device capacitance measured with zero volt bias, 1 Mhz.





Carrier Tape Specifications



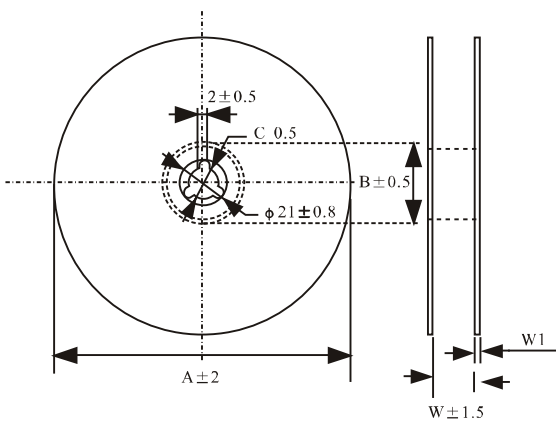
Dimensions of Embossed Tape

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     $t_3$  : Paper Tape for Width  
 $t_2$  : Height of Embossed Tape     $t_4$  : Paper Tape Bottom Width

Reel Specifications



Dimensions

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