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# Glass Encapsulated SMD Varistor MLV

## (VJ12, 20, 13, 14, 15, 32)

### Transient Voltage Suppression, ESD Protection Devices & EMI Devices



#### GENERAL DESCRIPTION

AVX's Professional Multilayer Varistors include 3 series of glass coated products as listed below:

- Standard M0/MC/PC Series
- Telecom MT Series
- Automotive MA/PA/QA Series

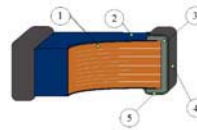
The glass encapsulation process ensures high insulation resistance values after reflow soldering and excellent SMT compatibility. This protection ensures reliability and acid-resistance against harsh environment like chlorite flux.

#### TYPICAL APPLICATIONS

Mainly used to reduce transient over-voltages in a very wide range of electronic products. Some example applications are:

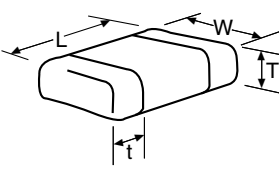
- 1) Telecom, 2) Automotive, 3) Consumer Electronics, and 4) Industrial Applications.

#### PHYSICAL CHARACTERISTICS



- 1 Zinc varistor
- 2 Glass lead-free encapsulation
- 3 Silver termination
- 4 Nickel barrier
- 5 Tin 100%

#### PHYSICAL DIMENSIONS: mm (inches)

	Type	IEC Size	L	W	T	Land Length t
	VJ12	0805	2.01±0.20 (0.079±0.008)	1.25±0.15 (0.049±0.006)	1.3 max. (0.051 max.)	0.15...0.55 (0.006...0.022)
VJ20	1206	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.7 max. (0.067 max.)	0.25...0.75 (0.010...0.030)	
VJ13	1210	3.20±0.30 (0.126±0.012)	2.50±0.25 (0.098±0.010)	1.7 max. (0.067 max.)	0.25...0.75 (0.010...0.030)	
VJ14	1812	4.50±0.30 (0.177±0.012)	3.20±0.30 (0.126±0.012)	2.0 max. (0.079 max.)	0.25...1.00 (0.010...0.039)	
VJ15	2220	5.70±0.40 (0.224±0.016)	5.00±0.40 (0.197±0.016)	2.5 max. (0.098 max.)	0.25...1.00 (0.010...0.039)	
VJ32	3220	8.20±0.40 (0.323±0.016)	5.00±0.40 (0.197±0.016)	2.5 max. (0.098 max.)	0.35...1.30 (0.014...0.051)	

#### PART NUMBERING

**VJ**  
**Varistor Termination**  
 VJ = Plated Ni/Sn100%  
 VU = Plated Ni/SnPb  
 VC = Hybrid AgPdPt

**14**  
**Chip Size**  
 12 = 0805  
 20 = 1206  
 13 = 1210  
 14 = 1812  
 15 = 2220  
 32 = 3220

**MT**  
**Series Code**  
 M0, MC/QC = Industrial  
 MT = Telecom  
 MA/PA/QA = Automotive

**0950**  
**Operating Voltage**  
 AC or DC

**K**  
**1mA Voltage Tolerance**  
 K = ±10%

**BA**  
**Packaging**  
 BA = Tape & Reel  
 VJ12 = 4000 pcs/reel  
 VJ20 = 3000 pcs/reel  
 VJ13 = 2000 pcs/reel  
 VJ14 = 1250 pcs/reel  
 VJ15 = 1250 pcs/reel  
 VJ32 = 1000 pcs/reel



# Glass Encapsulated SMD Varistor MLV

(VJ12, 20, 13, 14, 15, 32)

## Automotive MLV Range – MA, PA and QA Series

### AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA and PA SERIES

#### FEATURES

- Well suited to protect against automotive related transients
- Response time <1ns
- Load Dump capability 1J to 50J according to ISO standard DP7637 pulse 5
- Jump start capability
- Complying to AEC-Q 200
- VJ: Nickel and Tin (100%) plated Termination suitable for lead free soldering
- VC: PdPtAg termination for hybrid assembly without glass coating
- RoHS Compliant, IMDS Registration upon request

#### GENERAL CHARACTERISTICS

Storage Temperature: -55°C to +150°C  
 Operating Temperature: -55°C to +125°C\*  
 \* 150°C upon request  
 Available in case size 0805 to 3220  
 Working voltage from 16Vdc to 42Vdc

#### APPLICATIONS

- Protection of various semiconductor elements from overvoltage.
- Absorption of switching surge and electrostatic surge for relays and motors.
- Protection of electronic equipment for automobiles from induced lightning surge.

#### PART NUMBERS

	Case Size EIA	Working Voltage		Breakdown Voltage at 1mA			Vclamp (8x20µs)		Max. Peak current (8x20µs) Amp.	Max. leakage current at Vdc µA	Energy (10x 1000µs) J	Energy Load-Dump (x10**) J	Jump Start (5mn) max. V	Mean Power Dissipation W	Typical Cap 1KHz/.5Vrms pF	T max. mm
		Vrms	Vdc	min	Nom	max	Vp	Ip (A)								
<b>12-16 V Power Supply</b>																
*VJ12PA0160K--	0805	14	16	22	24.5	27	40	1	120	15	0.3	1	24.5	0.005	500	1.3
VJ20MA0160K--	1206	14	16	22	24.5	27	40	1	200	15	0.6	1.5	24.5	0.008	800	1.7
VJ20PA0160K--	1206	14	16	22	24.5	27	40	1	300	15	1.1	2	24.5	0.008	1 100	1.7
VJ13MA0160K--	1210	14	16	22	24.5	27	40	2.5	400	15	1.6	3	24.5	0.010	1 800	1.7
VJ13PA0160K--	1210	14	16	22	24.5	27	40	2.5	500	15	2	5	24.5	0.010	2 300	1.7
VJ14MA0160K--	1812	14	16	22	24.5	27	40	5	800	15	2.4	6	25.5	0.015	5 400	2.0
VJ14PA0160K--	1812	14	16	22	24.5	27	40	5	1000	15	2.9	10	25.5	0.015	6 200	2.0
VJ15MA0160K--	2220	14	16	22	24.5	27	40	10	1200	15	5.8	12	25.5	0.030	11 000	2.0
VJ15PA0160K--	2220	14	16	22	24.5	27	40	10	1500	15	7.2	25	25.5	0.030	16 000	2.0
VJ15QA0160K--	2220	14	16	22	24.5	27	40	10	1800	15	7.5	35	25.5	0.030	25 000	2.0
VJ32PA0160K--	3220	14	16	22	24.5	27	40	10	2000	15	13.8	50	24.5	0.040	30 000	2.5
<b>12-22 V Power Supply</b>																
VJ20PA0220K--	1206	17	22	27	30	33	49	1	250	15	1	2	26	0.008	1 000	1.7
VJ13PA0220K--	1210	17	22	27	30	33	49	2.5	400	15	1.7	5	26	0.010	2 000	1.7
VJ14PA0220K--	1812	17	22	27	30	33	49	5	700	15	2.5	10	26	0.015	6 000	2.0
VJ15PA0220K--	2220	17	22	27	30	33	49	10	1200	15	6.8	25	26	0.030	15 000	2.0
VJ32PA0220K--	3220	17	22	27	30	33	49	10	2000	15	13	50	26	0.040	25 000	2.5
<b>12-26 V Power Supply</b>																
VJ20PA0260K--	1206	23	26	31.5	35	38.5	57	1	200	15	1	2	30	0.008	600	1.7
VJ13PA0260K--	1210	23	26	31.5	35	38.5	57	2.5	300	15	1.7	5	30	0.010	1 200	1.7
VJ14PA0260K--	1812	23	26	31.5	35	38.5	57	5	600	15	2.5	10	30	0.015	3 000	2.0
VJ15PA0260K--	2220	23	26	31.5	35	38.5	57	10	1200	15	6.8	25	30	0.030	7 000	2.0
VJ32PA0260K--	3220	23	26	31.5	35	38.5	57	10	1800	15	13	50	30	0.040	15 000	2.5
<b>24-34 V Power Supply</b>																
VJ20PA0340K--	1206	30	34	42.3	47	51.7	77	1	200	15	1.5	1.5	47	0.008	300	1.7
VJ13PA0340K--	1210	30	34	42.3	47	51.7	77	2.5	350	15	3.5	3	47	0.010	650	1.7
VJ14PA0340K--	1812	30	34	42.3	47	51.7	77	5	600	15	5	6	47	0.015	1 800	2.0
VJ15MA0340K--	2220	30	34	42.3	47	51.7	77	10	1200	15	10	12	47	0.030	4 000	2.0
VJ15PA0340K--	2220	30	34	42.3	47	51.7	77	10	1200	15	12	25	47	0.030	7 000	2.0
VJ32PA0340K--	3220	30	34	42.3	47	51.7	77	10	2000	15	13	50	47	0.040	10 000	2.5
<b>24-42 V Power Supply</b>																
*VJ20PA0420K--	1206	37	42	50.4	56	61.6	91	1	150	15	1.5	1.5	47	0.008	140	1.7
*VJ13PA0420K--	1210	37	42	50.4	56	61.6	91	2.5	250	15	3.5	3	47	0.010	300	1.7
*VJ14PA0420K--	1812	37	42	50.4	56	61.6	91	5	500	15	5	6	47	0.015	800	2.0
*VJ15PA0420K--	2220	37	42	50.4	56	61.6	91	10	900	15	12	12	47	0.030	1 800	2.0
*VJ32PA0420K--	3220	37	42	50.4	56	61.6	91	10	1300	15	13	50	47	0.040	2 800	2.5

\* under development

\*\* time interval between pulses: 60s min.

VC with hybrid solderable termination same electrical characteristics

Other voltage or energy values available upon request



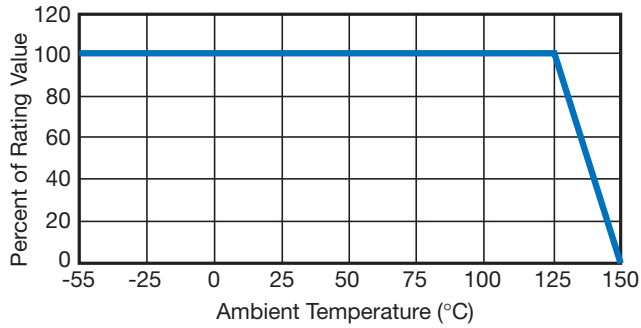
# Glass Encapsulated SMD Varistor MLV

(VJ12, 20, 13, 14, 15, 32)

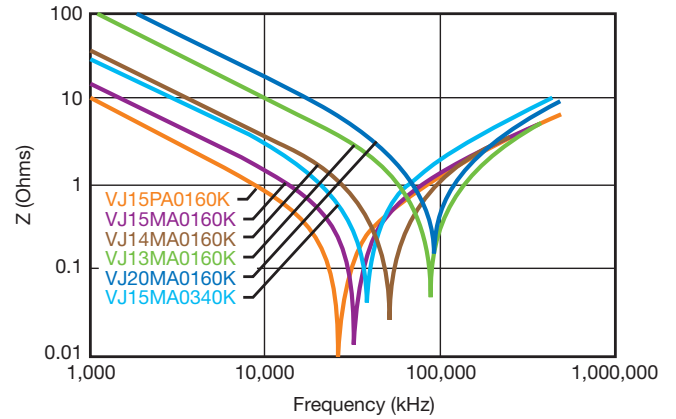
## Automotive MLV Range – MA, PA and QA Series

### TEMPERATURE CHARACTERISTICS

For Current, Energy and Power



### IMPEDANCE CHARACTERISTICS



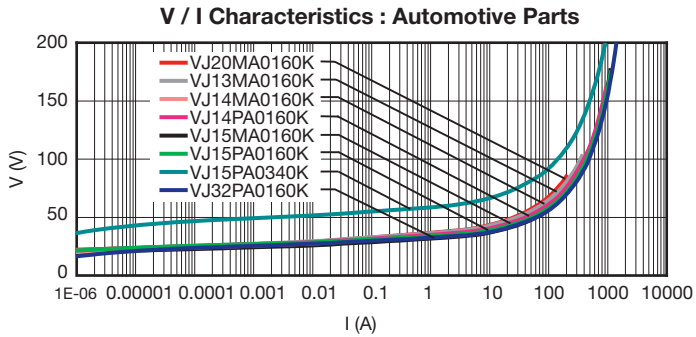
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(VJ12, 20, 13, 14, 15, 32)

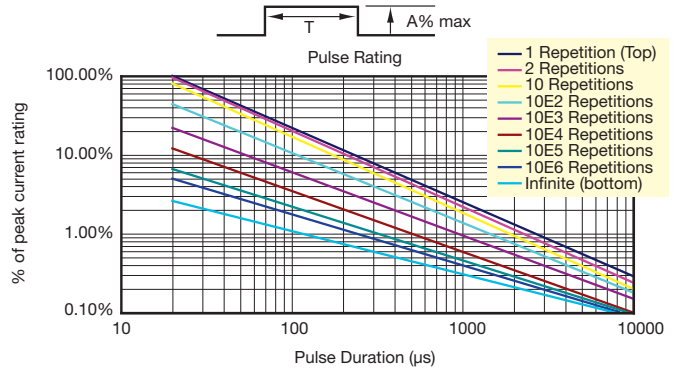
Automotive MLV Range – MA and PA Series

## AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA and PA SERIES

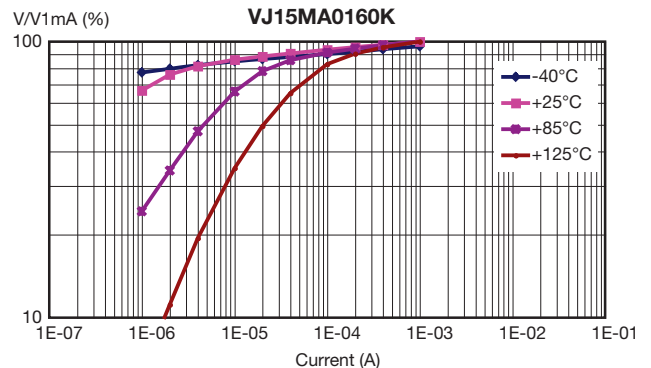
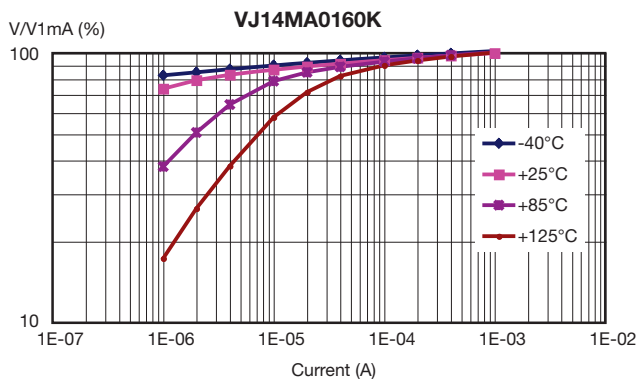
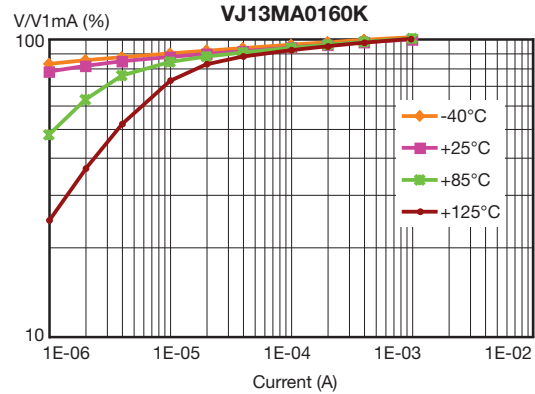
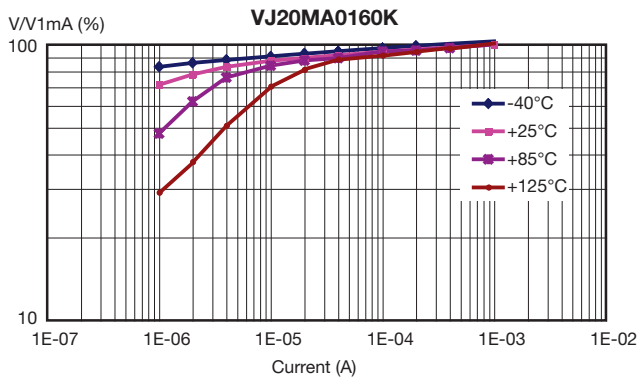
### V / I CHARACTERISTICS



### PULSE RATING



### TEMPERATURE DEPENDENCE OF V/I CHARACTERISTICS

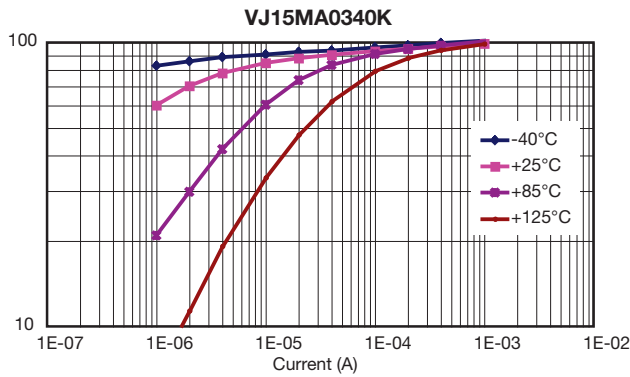
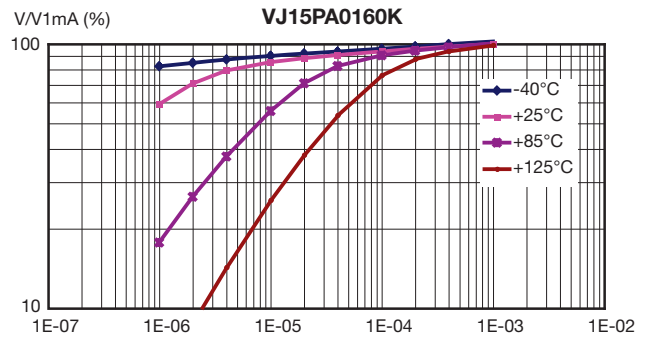
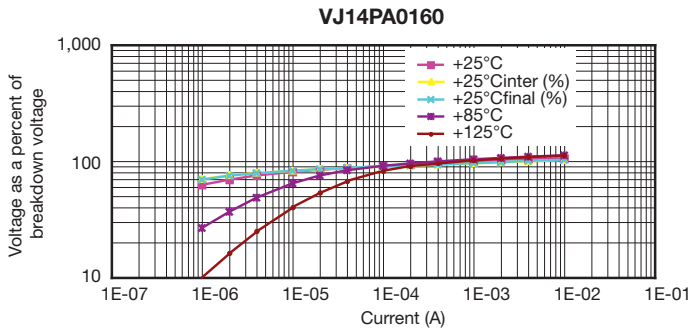


# Glass Encapsulated SMD Varistor MLV

(VJ12, 20, 13, 14, 15, 32)

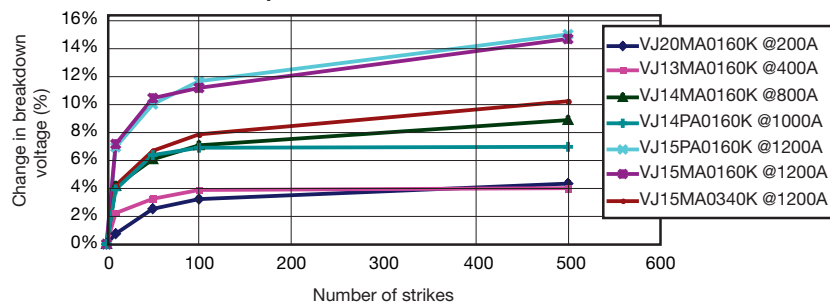
## Automotive MLV Range – MA and PA Series

### AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA and PA SERIES



### PULSE DEGRADATION

#### Repetitive Peak Current Strikes



# Glass Encapsulated SMD Varistor MLV

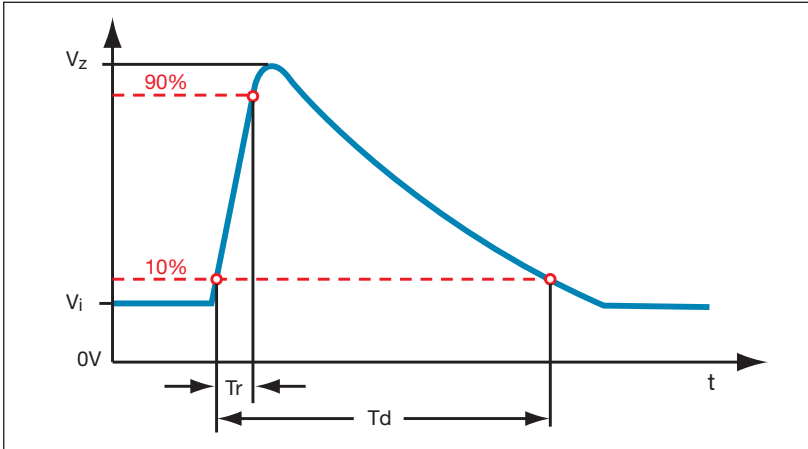
## (VJ12, 20, 13, 14, 15, 32)

### Automotive MLV Range – MA and PA Series

#### AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA and PA SERIES

#### AUTOMOTIVE LOAD DUMP TEST

(According to ISO DP7637/2 Pulse 5)



When using the test method indicated below, the amount of Energy dissipated by the varistor must not exceed the Load Dump Energy value specified in the product table.

Voltage Pulse applied to the varistor:

#### 12V Network

$V_i = 13.5V$

$T_d = 100$  to  $350ms$

$R_i = 2$  Ohms (Internal Resistance)

$V_z = 70$  to  $200V$

Number of Pulses = 10 Pulses

Other Load Dump Simulations can be achieved

#### 24V Network

$V_i = 27V$

$T_d = 100$  to  $350ms$

$R_i = 2$  Ohms (Internal Resistance)

$V_z = 70$  to  $200V$

Number of Pulses = 10 Pulses

#### Pulse 5: Typical $V_z$ max versus Pulse duration and $R_s$

	0.5 $\Omega$	1 $\Omega$	2 $\Omega$	4 $\Omega$
<b>VJ20PA0160K</b>				
50ms	33	34	39	49
100ms	31	31	34	43
200ms	27	28	33	43
400ms	28	30	34	42
<b>VJ13PA0160K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
50ms	44	48	57	75
100ms	36	39	46	60
200ms	33	33	39	50
400ms	28	28	34	46
<b>VJ14PA0160K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
50ms	60	68	85	125
100ms	46	52	62	77
200ms	37	41	50	63
400ms	32	35	43	54
<b>VJ15PA0160K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
50ms	80	116	145	188
100ms	61	80	104	140
200ms	47	60	78	100
400ms	39	47	58	74

	0.5 $\Omega$	1 $\Omega$	2 $\Omega$	4 $\Omega$
<b>VJ15QA0160K</b>				
100ms	65	78	91	117
200ms	54	60	73	92
400ms	44	51	60	75
<b>VJ15MA0340K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
100ms	66	78	91	117
200ms	55	60	73	92
400ms	49	53	60	75
<b>VJ15PA0340K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
100ms	80	90	108	134
200ms	60	67	80	106
400ms	58	62	69	85
<b>VJ32PA0160K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
100ms	102	120	175	200
200ms	72	85	120	158
400ms	53	62	78	105
<b>VJ32PA0340K</b>	<b>0.5 <math>\Omega</math></b>	<b>1 <math>\Omega</math></b>	<b>2 <math>\Omega</math></b>	<b>4 <math>\Omega</math></b>
100ms	90	105	133	170
200ms	70	79	98	132
400ms	62	70	83	106



# Glass Encapsulated SMD Varistor MLV

## (VJ12, 20, 13, 14, 15)

### Industrial MLV Range – M0 Series

#### INDUSTRIAL MLV RANGE – VJ12, 20, 13, 14, 15 M0 SERIES

#### FEATURES

- Glass encapsulation device with very low leakage current under DC operating conditions
- Device available in case size 1206, 1210, 1812, 2220 (3220)
- Nickel and Tin (100%) plated Termination (Hybrid AgPdPt termination available upon request)
- Bi-Directional protection. Fast Turn-On Time.
- Excellent transient clamping characteristics up to 1200amps peak current
- Multi strike capability. Provide EMC Capacitance
- RoHS Compliant

#### GENERAL CHARACTERISTICS

Storage Temperature: -55°C to +150°C  
 Operating Temperature: -55°C to +125°C

#### TYPICAL APPLICATIONS

Many uses to reduce transient over-voltage in the very wide range of electronic products in the Professional, Industrial and Consumer Applications.

Type	Case Size	Vrms	VDC	Breakdown Voltage	Max. Clamping Voltage	Ip (A)	Maximum Leakage Current	Energy 10*1000µs	Max. Peak Current 8*20µs	Cap. Typical (1KHz/0.5V)
		(V)	(V)	(V)	Vp (V)		µA	(J)	(A)	(pF)
VJ20M00140K---	1206	14	18	22±10%	38	1	15	0.5	200	800
VJ13M00140K---	1210	14	18	22±10%	38	2.5	15	1.5	400	1800
VJ14M00140K---	1812	14	18	22±10%	38	5	15	2.3	800	4200
VJ15M00140K---	2220	14	18	22±10%	38	10	15	5.8	1200	9600
VJ20M00170K---	1206	17	22	27±10%	44	1	15	0.6	200	800
VJ13M00170K---	1210	17	22	27±10%	44	2.5	15	1.7	500	1600
VJ14M00170K---	1812	17	22	27±10%	44	5	15	2.7	800	3700
VJ15M00170K---	2220	17	22	27±10%	44	10	15	7.2	1200	8600
VJ20M00200K---	1206	20	26	33±10%	54	1	15	0.7	200	600
VJ13M00200K---	1210	20	26	33±10%	54	2.5	15	1.9	400	1200
VJ14M00200K---	1812	20	26	33±10%	54	5	15	3	800	3000
VJ15M00200K---	2220	20	26	33±10%	54	10	15	7.8	1200	6400
VJ20M00250K---	1206	25	31	39±10%	65	1	15	1	200	400
VJ13M00250K---	1210	25	31	39±10%	65	2.5	15	1.7	300	1100
VJ14M00250K---	1812	25	31	39±10%	65	5	15	3.7	800	2400
VJ15M00250K---	2220	25	31	39±10%	65	10	15	9.6	1200	5500
VJ20M00300K---	1206	30	38	47±10%	77	1	15	1.1	200	350
VJ13M00300K---	1210	30	38	47±10%	77	2.5	15	2	300	750
VJ14M00300K---	1812	30	38	47±10%	77	5	15	4.2	800	1900
VJ15M00300K---	2220	30	38	47±10%	77	10	15	12	1200	4200
VJ20M00350K---	1206	35	45	56±10%	90	1	15	0.6	200	260
VJ13M00350K---	1210	35	45	56±10%	90	2.5	15	1.5	300	530
VJ14M00350K---	1812	35	45	56±10%	90	5	15	4	500	1400
VJ15M00350K---	2220	35	45	56±10%	90	10	15	7.7	1000	2800
VJ20M00400K---	1206	40	56	68±10%	110	1	15	0.7	200	180
VJ13M00400K---	1210	40	56	68±10%	110	2.5	15	2.3	250	380
VJ14M00400K---	1812	40	56	68±10%	110	5	15	4.8	500	800
VJ15M00400K---	2220	40	56	68±10%	110	10	15	9	1000	2000
VJ20M00500K---	1206	50	65	82±10%	135	1	15	0.8	200	160
VJ13M00500K---	1210	50	65	82±10%	135	2.5	15	1.6	200	300
VJ14M00500K---	1812	50	65	82±10%	135	5	15	4.5	400	800
VJ15M00500K---	2220	50	65	82±10%	135	10	15	5.6	800	1400
VJ20M00600K---	1206	60	85	100±10%	165	1	15	0.9	120	100
VJ13M00600K---	1210	60	85	100±10%	165	2.5	15	2.0	200	210
VJ14M00600K---	1812	60	85	100±10%	165	5	15	5.8	400	600
VJ15M00600K---	2220	60	85	100±10%	165	10	15	6.8	800	1100





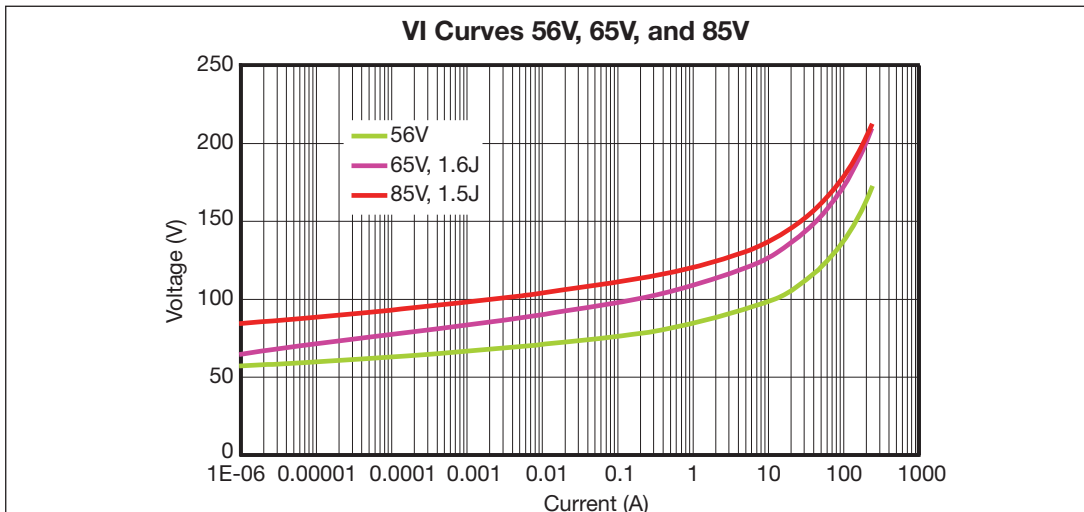
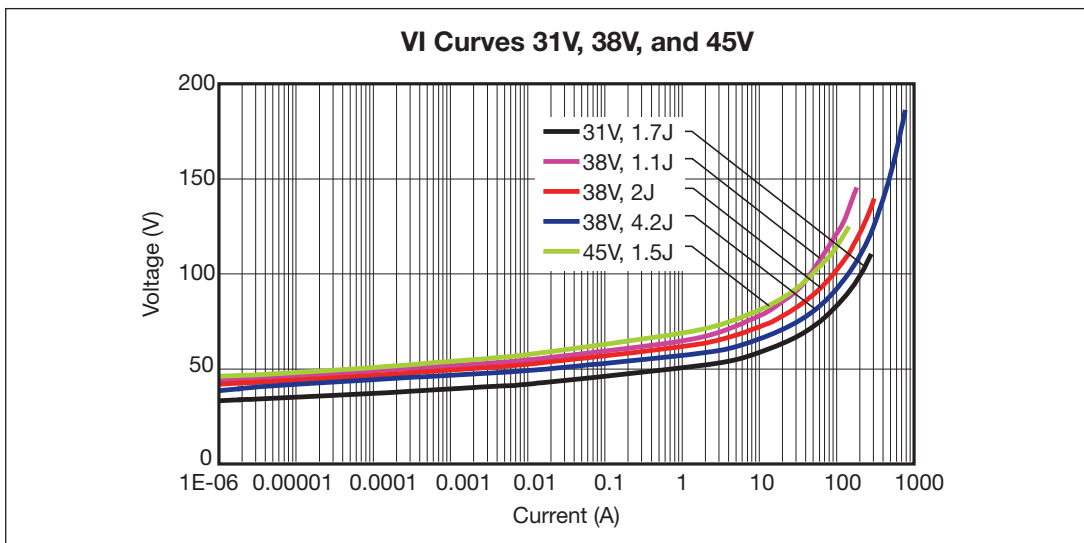
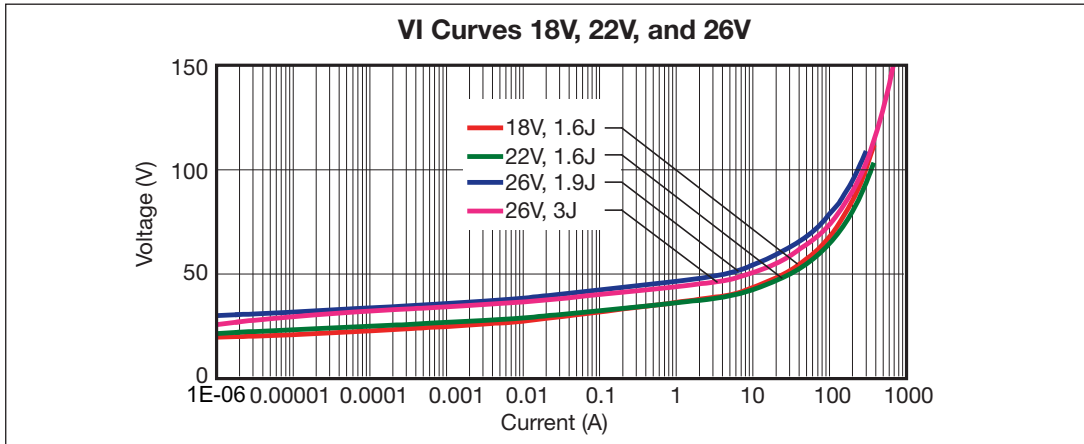
# Glass Encapsulated SMD Varistor MLV

(VJ12, 20, 13, 14, 15)

## Industrial MLV Range – M0 Series

### INDUSTRIAL MLV RANGE – VJ12, 20, 13, 14, 15 M0 SERIES

#### V/I CHARACTERISTIC



# Glass Encapsulated SMD Varistor MLV

## VJ13 Standard Range

### Industrial MLV Range – MC/PC Series

#### INDUSTRIAL MLV RANGE – VJ13 MC/PC SERIES

#### FEATURES

- Glass encapsulation device with very low leakage current under DC operating conditions
- Device available in 1210 case size
- Bi-Directional protection. Fast Turn-On Time.
- Nickel and Tin (100%) plated Termination (Hybrid AgPdPt termination available upon request)
- Excellent transient clamping characteristics up to 500amps peak current
- Multi strike capability. Provide EMC Capacitance
- RoHS Compliant

#### GENERAL CHARACTERISTICS

Storage Temperature: -55°C to +150°C  
 Operating Temperature: -55°C to +125°C  
 Working Voltage: 18Vdc to 60Vdc

#### TYPICAL APPLICATIONS

- Protection of various semiconductor elements from over-voltage
- Industrial equipment
- Consumer Electronics
- Plug-in cards, remote controls
- Home automation

Part Number	Working Voltage	Breakdown Voltage Voltage at 1mA			Vclamp (8x20µs)		max. peak current (8x20µs)	Energy (10x1000µs)	CAP (1KHz/.5Vrms)
	Vdc	min	Nom	max	Vp	Ip(A)	Amp.	J	pF
VJ13MC0180K--	18	21.6	24	26.5	45	10	500	1.5	2200
VJ13MC0260K--	26	29.7	33	36.3	62	10	300	1.2	1200
VJ13MC0300K--	30	35.1	39	42.9	73	10	220	0.9	1000
VJ13PC0300K--	30	35.1	39	42.9	73	10	280	1.2	1000
VJ13MC0480K--	48	54.5	60.5	66.5	110	10	220	0.9	800
VJ13PC0480K--	48	54.5	60.5	66.5	110	10	250	1.2	500
VJ13MC0600K--	60	67	75	83	126	10	250	1.5	400

VC with hybrid solderable termination same electrical characteristics  
 Other voltage values available upon request

# Glass Encapsulated SMD Varistor MLV (VJ14)



## Telecom MLV Range – MT Series

### TELECOM MLV RANGE - VJ14 MT SERIES

#### FEATURES

- Effective alternative to leaded MOVs between 60 and 90 Vrsm
- High Energy Ratings up to 6 Joules with 1812 case size
- Nickel barrier or hybrid AgPdPt terminations
- Multiple Strike Capability
- Provide EMC Capacitance
- Specified in accordance to CCITT 10/1000µs Pulse test
- RoHS Compliant and IMDS Registration

#### TARGET APPLICATIONS

- Phone Lines, ADSL Lines, and other Telecom Circuits
- Consumer Products

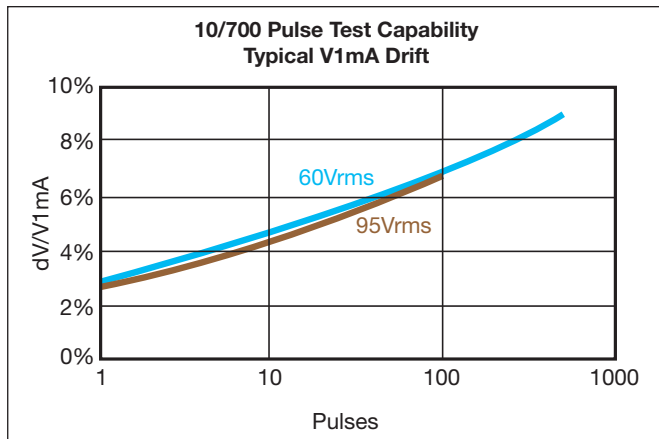
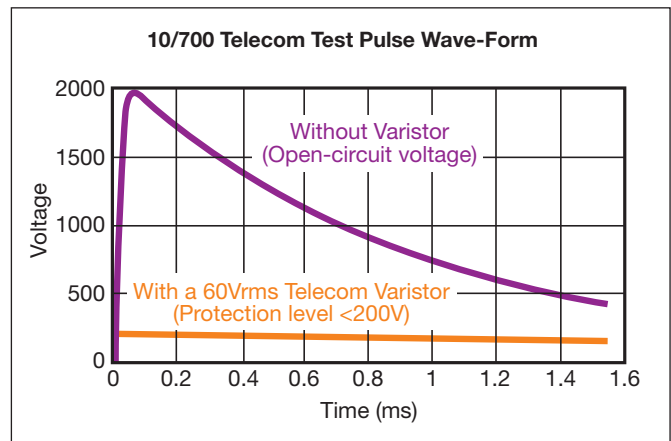
#### GENERAL CHARACTERISTICS

Storage Temperature: -55°C to +125°C  
 Operating Temperature: -55°C to +125°C

#### CCITT 10x700µs TEST

A pulse of 10 x 700µs duration as specified by CCITT or IEC 61000-4-5 is often used to check the interference immunity of Telecom equipment.

The curves show that the 60Vrms Varistor can reduce the interference of the equipment from 2KV to less than 200V.



Ten pulses with a duration of 10x700µs applied at one minute intervals are specified for telecom equipment.

The curves show the V1mA drift when more than 10 pulses are applied.

#### PART NUMBERS

Part Number	Case Size	Operating Voltage		Breakdown Voltage V(1mA)	Max. Clamping Voltage		CCITT 10 Pulses 10*700µs Amp.	I max. 8*20µs Amp.	Energy 10*1000µs Joules	Mean Power Dissipation W	Typical Cap. pF
		Vac	Vdc		V	Amp.					
VJ14MT0600---	1812	60	85	107	200	45	45	400	6	0.015	400
VJ14MT0750---	1812	75	100	120	250	45	45	400	6	0.015	400
VJ14MT0950---	1812	95	125	150	270	45	45	250	5	0.015	280

Hybrid termination AgPdPt (VC Range) upon request



# Glass Encapsulated SMD Varistor MLV

## (VJ32/VC32)



### GENERAL DESCRIPTION

The VJ32/VC32M0 Series offers the designer a surface mount solution with higher voltage ratings and transient energy ratings. This Multilayer Layer Surface Mount Varistor replaces the traditional radial-lead Varistors with reduced size and weight. The glass encapsulation ensures the high performances in voltage up to 300Vrms reliability and acid-resistance against harsh environment like chlorite soldering flux.



### FEATURES

- Lead less surface mount chip 3220 Case Size
- Voltage Ratings from 175Vrms to 300 Vrms
- VJ32 with Ni barrier/100% Sn Termination (for lead free soldering applications)  
VC32 with hybrid PdPtAg Termination (not suitable for lead free soldering)
- Operating temperature from -55°C to +85°C
- RoHS Compliant

### APPLICATIONS

- MOV (Radial) Replacement
- Suppression of transient on line voltage
- Electric Meters
- Industrial Equipment
- Mains PSUs
- Telecommunications
- Consumer Electronics

### PART NUMBERS

AVX Part Number	Case Size	Operating voltage		Breakdown Voltage Voltage at 1mA			Max. Clamping Voltage 8*20µs		Max. Leakage Current µA	Energy 10*1000µs Joule	Max. Peak Current 8*20µs 1 Pulse A	Cap. Typical (1KHz,0.5V) pF
		Vrms	Vdc	Min.	Average	Max.	V	A				
VJ32M00140K--	3220	14	18	19.8	22	24.2	47	10	15	0.7	1500	15000
VJ32M00170K--	3220	17	22	24.3	27	29.7	57	10	15	0.9	1500	15000
VJ32M00200K--	3220	20	26	29.7	33	36.3	68	10	15	1.1	1500	15000
VJ32M00250K--	3220	25	31	35.1	39	42.9	79	10	15	1.2	1500	15000
VJ32M00300K--	3220	30	38	42.3	47	51.7	92	10	15	1.5	1500	15000
VJ32M00350K--	3220	35	45	50.4	56	61.6	107	10	15	1.8	1200	10000
VJ32M00400K--	3220	40	56	61.2	68	74.8	127	10	15	2.2	1200	10000
VJ32M00500K--	3220	50	66	73.8	82	90.2	135	10	15	2.5	1000	5000
VJ32M00600K--	3220	60	85	90.0	100	110	165	10	15	3	1000	5000
VJ32M00750K--	3220	75	102	108	120	132	200	10	15	3.5	600	2000
VJ32M00900K--	3220	95	127	135	150	165	250	10	15	6	600	1500
VJ32M01150K--	3220	115	153	162	180	198	295	10	15	6.5	300	350
VJ32M00131K--	3220	130	175	180	200	220	340	10	15	7	300	170
VJ32M00141K--	3220	140	180	198	220	242	360	10	15	7.5	300	140
VJ32M00151K--	3220	150	200	216	240	264	395	10	15	9	300	130
VJ32M01750K--	3220	175	225	243	270	297	455	10	15	9.5	300	120
VJ32M00231K--	3220	230	300	324	360	396	595	10	15	10	300	80
VJ32M00251K--	3220	250	330	351	390	429	650	10	15	11	300	75
VJ32M02750K--	3220	275	369	387	430	473	710	10	15	13	300	70
VJ32M00301K--	3220	300	385	423	470	517	775	10	15	15	300	65

VC32 Series with solderable hybrid termination. Glass encapsulation from 115Vrms to 300Vrms.  
Other voltage values available upon request

# Glass Encapsulated SMD Varistor MLV

(VJ13, 14, 15, 20)

## Surface Mounting Guide

### SURFACE MOUNTING GUIDE (VJ13, 14, 15, 20, 32)

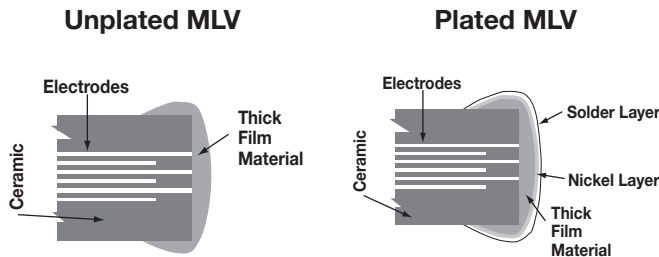
#### APPLICATIONS NOTES

#### SOLDERABILITY/LEACHING

Terminations to be well soldered after immersion in a 60/40 tin/lead solder bath at  $235 \pm 5^\circ\text{C}$  for  $2 \pm 1$  seconds. Terminations will resist leaching for at least the immersion times and conditions recommendations shown below.

P/N	Termination Type	Solder Tin/Lead	Solder Temp. °C	Immersion Time (sec)
VJ	Plated MLV Nickel and Matte Tin Plating Termination	60/40	$260 \pm 5$	$30 \pm 1$

- The visual standards used for evaluation of solder joints will need to be modified as lead free joints are not as bright as with tin-lead pastes and the fillet may not be as large.
- Lead-free solder pastes do not allow the same self alignment as lead containing systems. Standard mounting pads are acceptable, but machine set up may need to be modified.

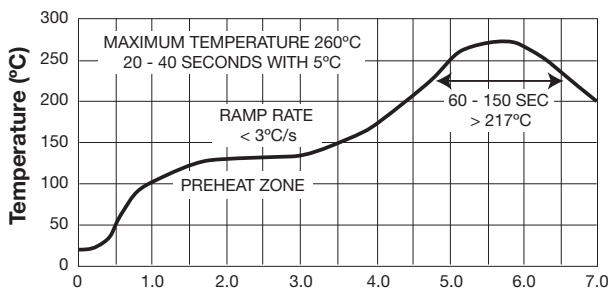


#### RECOMMENDED SOLDERING PROFILES

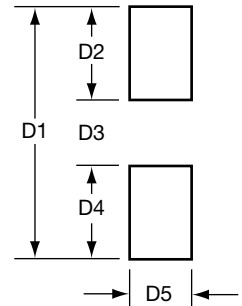
VJ products are compatible with a wide range of soldering conditions consistent with good manufacturing practice for surface mount components. This includes Pb free reflow processes and peak temperatures up to  $270^\circ\text{C}$ . Recommended profiles for reflow and wave soldering are shown below for reference.

VC products are recommended for lead soldering application or gluing techniques.

#### VJ Products Lead-Free Reflow Profile



#### RECOMMENDED SOLDER PAD LAYOUT



#### REFLOW SOLDERING

Dimensions in mm (inches)

Case Size	D1	D2	D3	D4	D5
1206	4.00 (0.157)	1.00 (0.039)	2.00 (0.079)	1.00 (0.039)	1.06 (0.042)
1210	4.00 (0.157)	1.00 (0.039)	2.00 (0.079)	1.00 (0.039)	2.05 (0.081)
1812	5.60 (0.220)	1.00 (0.039)	3.60 (0.142)	1.00 (0.039)	3.00 (0.118)
2220	6.60 (0.260)	1.00 (0.039)	4.60 (0.181)	1.00 (0.039)	5.00 (0.197)
3220	10.21 (0.402)	2.21 (0.087)	5.79 (0.228)	2.21 (0.087)	5.50 (0.217)

#### WAVE SOLDERING

Dimensions in mm (inches)

Case Size	D1	D2	D3	D4	D5
1206	5.00 (0.197)	1.50 (0.059)	2.00 (0.079)	1.50 (0.059)	1.06 (0.042)
1210	5.00 (0.197)	1.50 (0.059)	2.00 (0.079)	1.50 (0.059)	2.05 (0.081)
1812	6.60 (0.260)	1.50 (0.059)	3.60 (0.142)	1.50 (0.059)	3.00 (0.118)
2220	7.60 (0.299)	1.50 (0.059)	4.60 (0.181)	1.50 (0.059)	5.00 (0.197)
3220	11.21 (0.441)	1.50 (0.059)	5.79 (0.228)	1.50 (0.059)	5.50 (0.217)

