Glass Encapsulated MLV
SMD Varistor (VJ12, 20, 13, 14, 15, 32)

Transient Voltage Suppression, ESD Protection Devices & EMI Devices



GENERAL DESCRIPTION

KYOCERA AVX 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 acidresistance 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
4) Industrial Applications

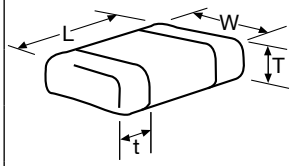
PHYSICAL CHARACTERISTICS



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)	2.5max. (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

RoHS COMPLIANT

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Glass Encapsulated MLV
SMD Varistor (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 85Vdc

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)	Max. leakage current at Vdc	Energy (10x 1000µs)	Energy Load-Dump (x10**)	Jump Start (5mn)	Mean Power Dissipation	Typical Cap 1KHz/ .5Vrms	T max.
		V_{rms}	V_{dc}	min	Nom	max	V_p	I_p (A)	Amp.	µA	J	J	max. V	W	pF	mm
		12-16 V Power Supply														
*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	24.5	0.015	5 400	2.0
VJ14PA0160K--	1812	14	16	22	24.5	27	40	5	1000	15	2.9	10	24.5	0.015	6 200	2.0
VJ15MA0160K--	2220	14	16	22	24.5	27	40	10	1200	15	5.8	12	24.5	0.030	11 000	2.0
VJ15PA0160K--	2220	14	16	22	24.5	27	40	10	1500	15	7.2	25	24.5	0.030	16 000	2.0
VJ15QA0160K--	2220	14	16	22	24.5	27	40	10	2000	15	7.5	35	24.5	0.030	25 000	2.0
VJ32PA0160K--	3220	14	16	22	24.5	27	40	10	3000	15	13.8	50	24.5	0.040	30 000	2.5
		12-22 V Power Supply														
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	1500	15	6.8	25	26	0.030	15 000	2.0
VJ32PA0220K--	3220	17	22	27	30	33	49	10	3000	15	13	50	26	0.040	25 000	2.5
		12-26 V Power Supply														
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	1500	15	6.8	25	30	0.030	7 000	2.0
VJ32PA0260K--	3220	23	26	31.5	35	38.5	57	10	3000	15	13	50	30	0.040	15 000	2.5
		24-34 V Power Supply														
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	1500	15	12	25	47	0.030	7 000	2.0
VJ32PA0340K--	3220	30	34	42.3	47	51.7	77	10	3000	15	13	50	47	0.040	10 000	2.5
		24-42 V Power Supply														
*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	1500	15	12	12	47	0.030	1 800	2.0
*VJ32PA0420K--	3220	37	42	50.4	56	61.6	91	10	3000	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

RoHS COMPLIANT

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SMD Varistor (VJ12, 20, 13, 14, 15, 32)
Automotive MLV Range – MA, PA and QA Series

	Case Size EIA	Working Voltage		Breakdown Voltage at 1mA			Vclamp (8x20µs)		Max. Peak current (8x20µs)	Max. leakage current at Vdc	Energy (10x 1000µs)	Energy Load-Dump (x10**)	Jump Start (5mn)	Mean Power Dissipation	Typical Cap 1KHz/ .5Vrms	T max.
		V_{rms}	V_{dc}	min	Nom	max	V_p	I_p (A)	Amp.	µA	J	J	max. V	W	pF	mm
		24-65 V Power Supply														
*VJ20MA0650K--	1206	50	65	76.5	85	93.5	135	1	150	15	1.5	1.5	70	0.008	200	1.7
*VJ13MA0650K--	1210	50	65	76.5	85	93.5	135	2.5	250	15	3.5	3	70	0.010	200	1.7
*VJ14MA0650K--	1812	50	65	76.5	85	93.5	135	5	500	15	5	6	70	0.015	400	2.0
*VJ15MA0650K--	2220	50	65	76.5	85	93.5	135	10	1000	15	12	12	70	0.030	800	2.0
*VJ32MA0650K--	3220	50	65	76.5	85	93.5	135	10	1500	15	13	50	70	0.040	3500	2.5
		24-85 V Power Supply														
*VJ20MA0850K--	1206	60	85	99	110	121	165	1	120	15	1.5	1.5	90	0.008	120	1.7
*VJ13MA0850K--	1210	60	85	99	110	121	165	2.5	200	15	3.5	3	90	0.010	200	1.7
*VJ14MA0850K--	1812	60	85	99	110	121	165	5	500	15	5	6	90	0.015	400	2.0
*VJ15MA0850K--	2220	60	85	99	110	121	165	10	1000	15	12	12	90	0.030	800	2.0
*VJ32MA0850K--	3220	60	85	99	110	121	165	10	1500	15	13	50	90	0.040	2500	2.5

* under development

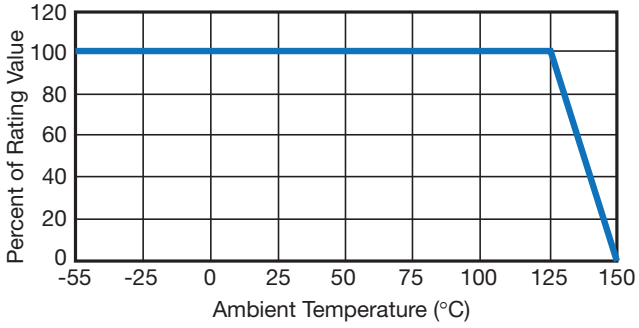
** time interval between pulses: 60s min.

VC with hybrid solderable termination same electrical characteristics

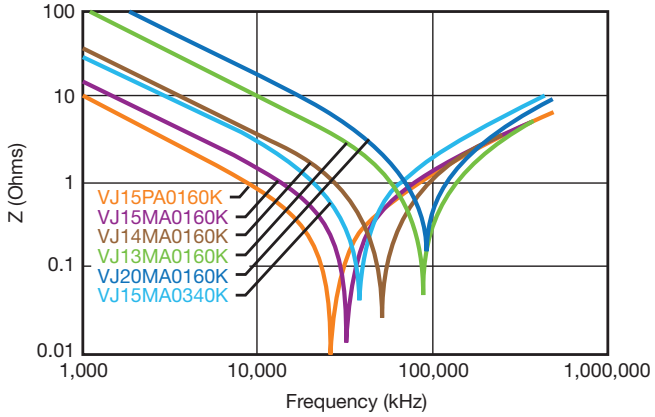
Other voltage or energy values available upon request

TEMPERATURE CHARACTERISTICS

For Current, Energy and Power



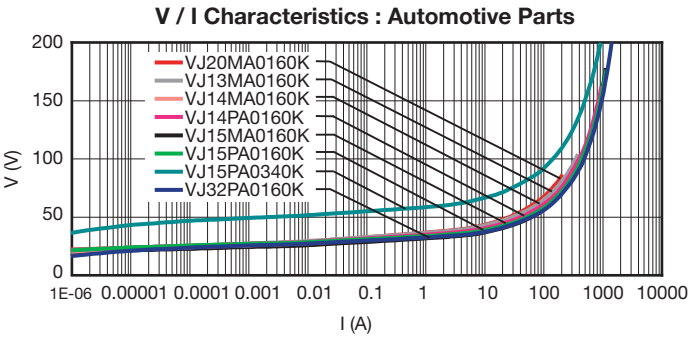
IMPEDANCE CHARACTERISTICS



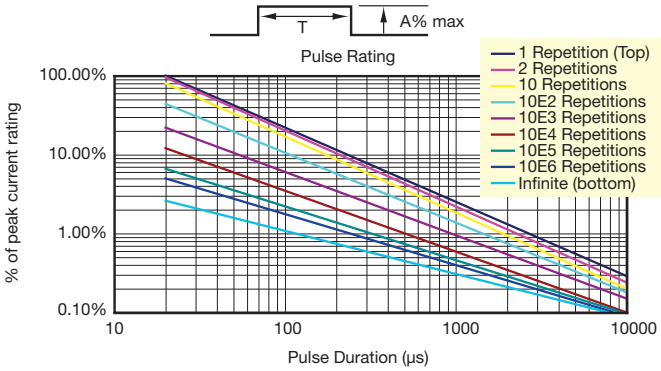
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AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA & PA SERIES

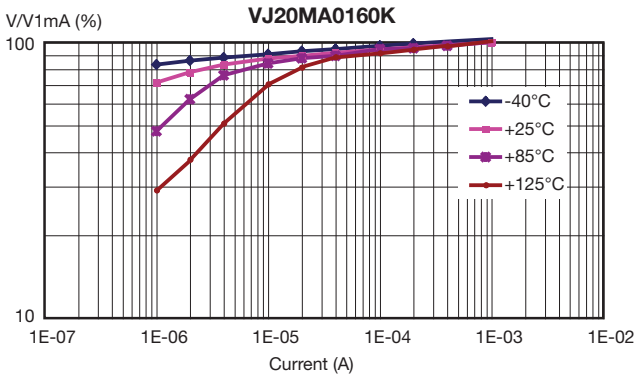
V / I CHARACTERISTICS

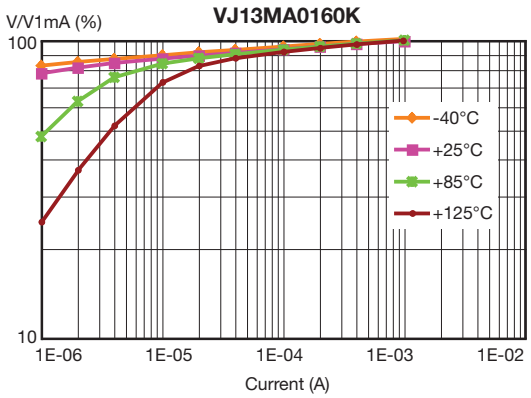


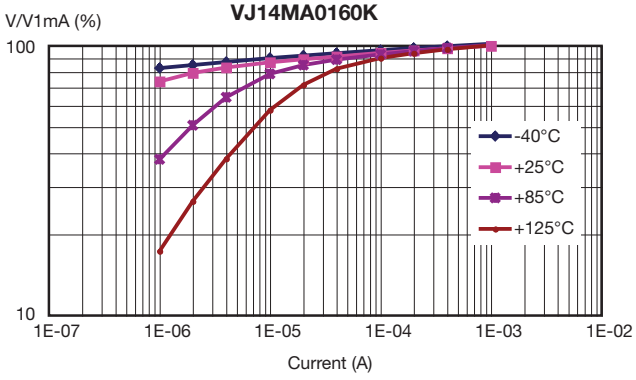
PULSE RATING

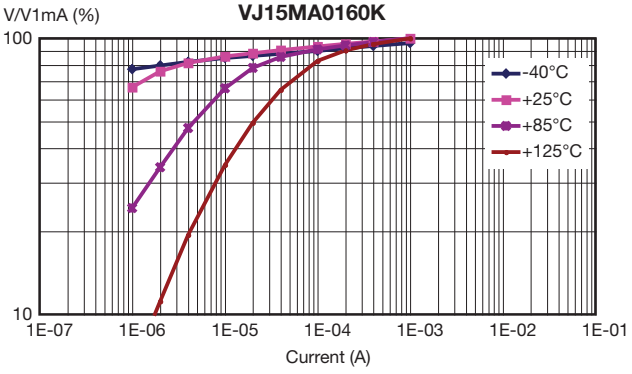


TEMPERATURE DEPENDENCE OF V/I CHARACTERISTICS



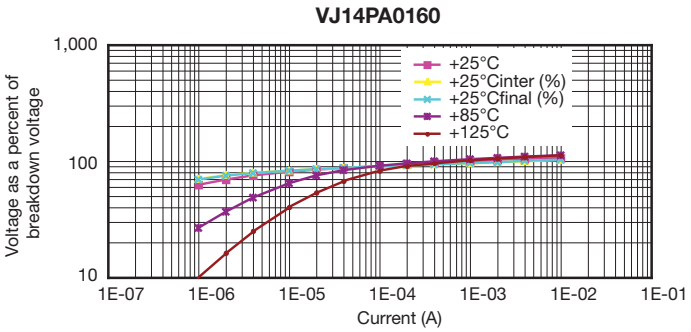


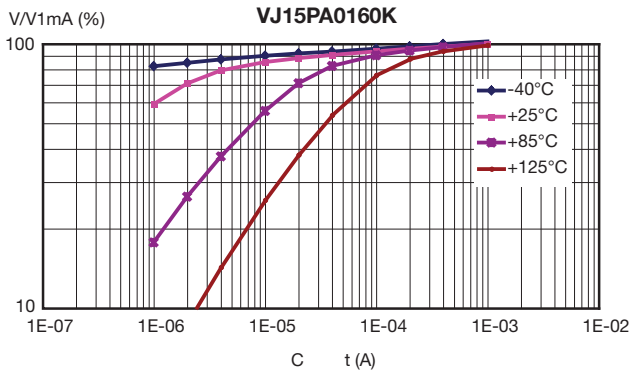


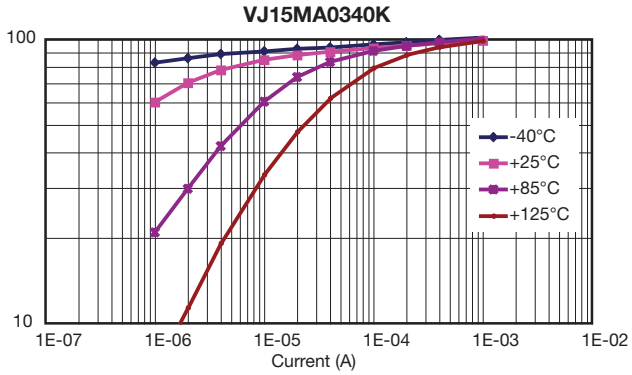


RoHS COMPLIANT

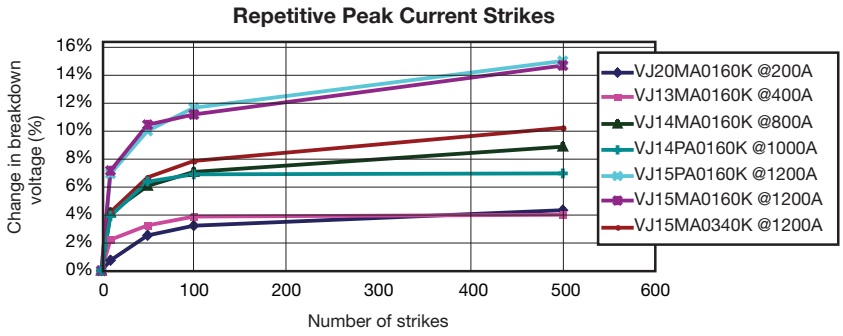
AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA AND PA SERIES







PULSE DEGRADATION



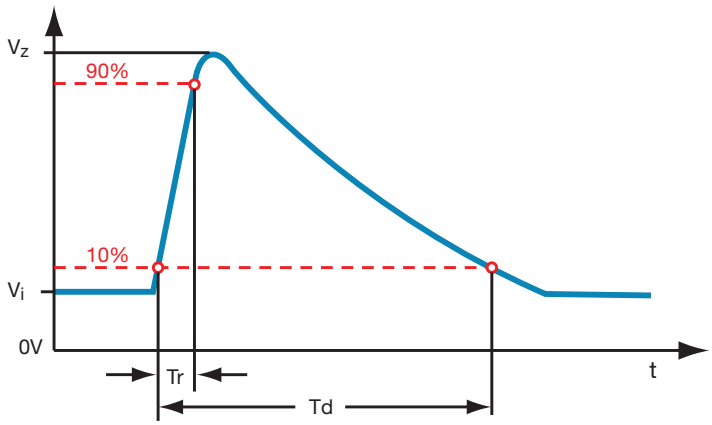
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AUTOMOTIVE SERIES – VJ12, 20, 13, 14, 15, 32 MA AND PA SERIES

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
Vi = 13.5V
Td = 100 to 350ms
Ri = 2 Ohms (Internal Resistance)
Vz - 70 to 200V
Number of Pulses = 10 Pulses
Other Load Dump Simulations can be achieved

24V Network
Vi = 27V
Td = 100 to 350ms
Ri = 2 Ohms (Internal Resistance)
Vz - 70 to 200V
Number of Pulses = 10 Pulses

Pulse 5: Typical Vz max versus Pulse duration and Rs

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

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

RoHS COMPLIANT

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: -55ºC to +150ºC

Operating Temperature: -55ºC to +125ºC

TYPICAL APPLICATIONS

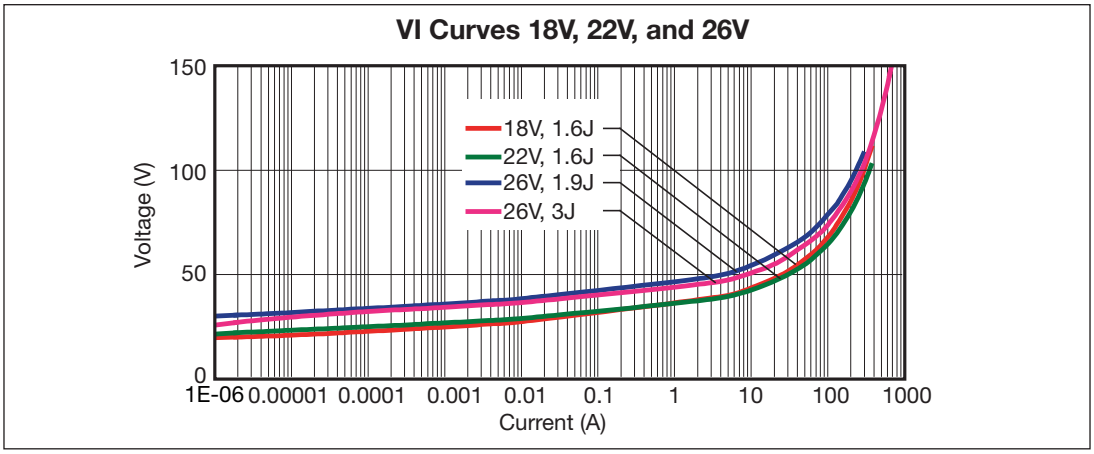
Many uses to reduce transient over-voltage in the very wide range of electronic products in the Professional, Industrial and Consumer Applications.

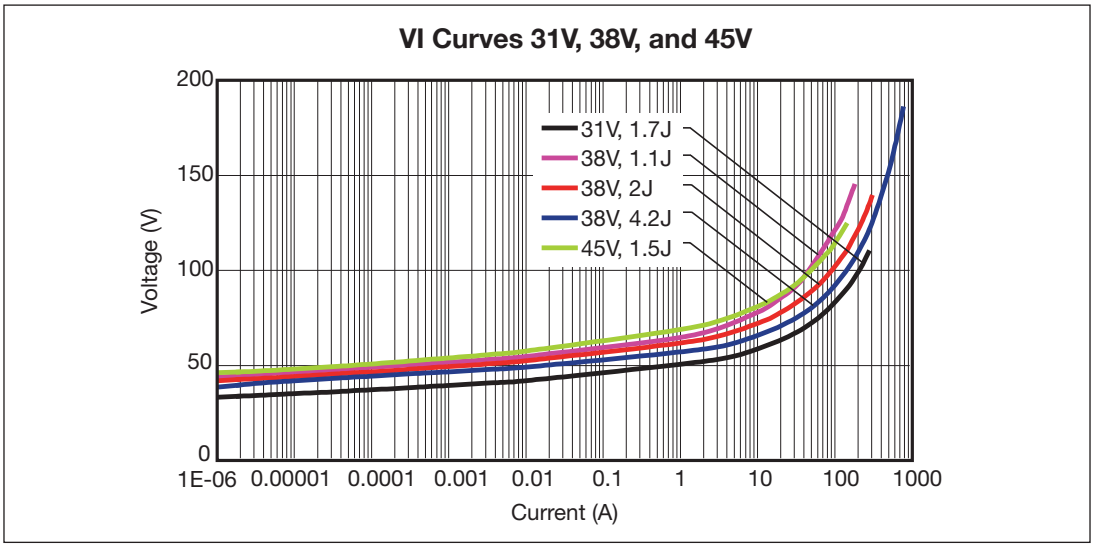
Type	Case Size	Vrms	VDC	Breakdown Voltage	Max. Clamping Voltage		Maximum Leakage Current	Energy 10*1000µs	Max. Peak Current 8*20µs	Cap. Typical (1KHz/0.5V)
		(V)	(V)	(V)	Vp (V)	Ip (A)	µA	(J)	(A)	(pF)
VJ20M00140K---	1206	14	18	22±10%	38	1	15	0.5	200	800
VJ13M00140K---	1210	14	18	22±10%	38	2.5	15	1.5	400	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

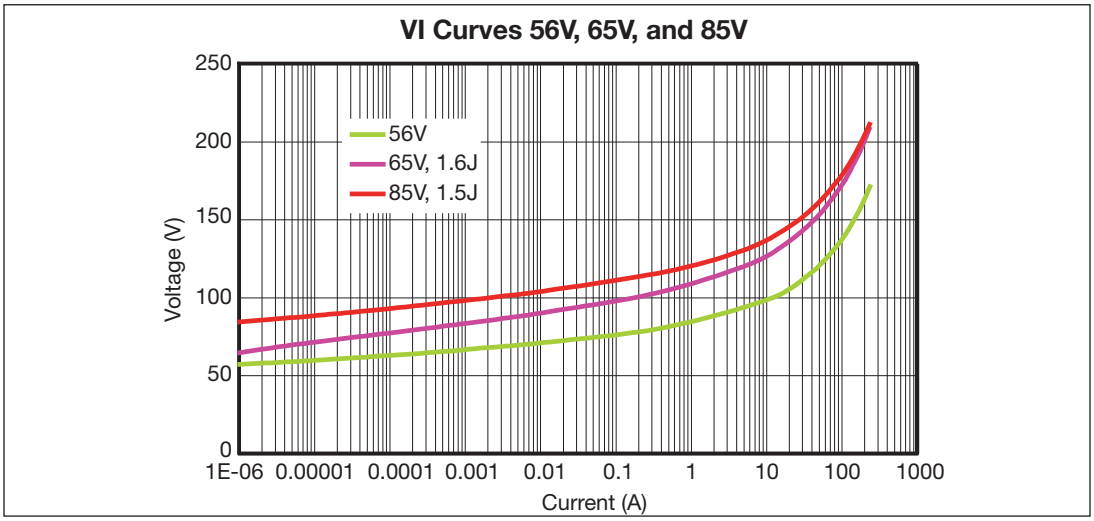
RoHS COMPLIANT

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INDUSTRIAL MLV RANGE – VJ12, 20, 13, 14, 15 M0 SERIES
V/I CHARACTERISTIC







RoHS COMPLIANT

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: -55ºC to +150ºC

Operating Temperature: -55ºC to +125ºC

Working Voltage: 18Vdc to 60Vdc

TYPICAL APPLICATIONS

- Protection of various semiconductor elements from overvoltage
- 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	530
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

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TELECOM MLV RANGE - VJ14 MT SERIES

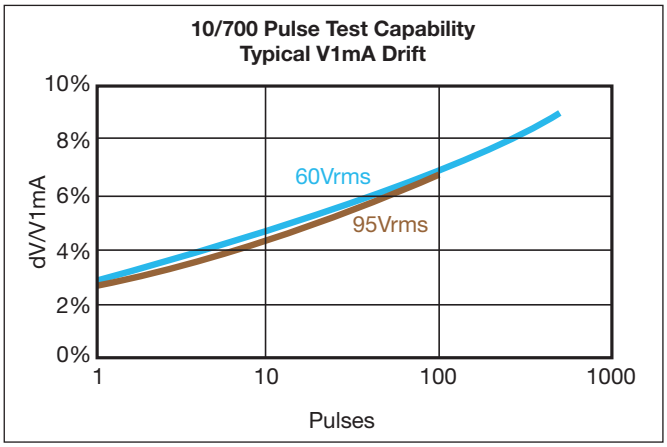
FEATURES

- 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

CCITT 10X700MS 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.



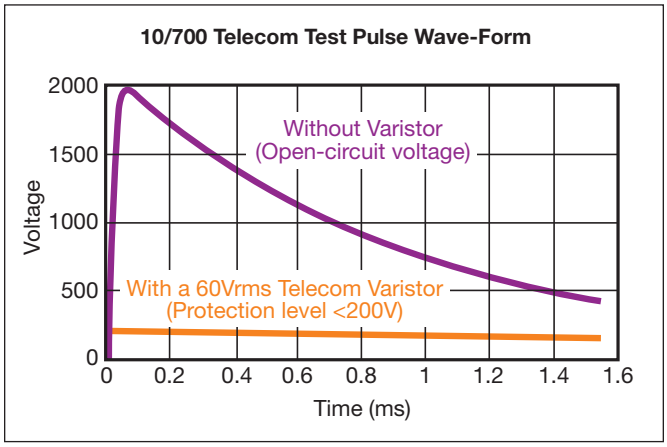
TARGET APPLICATIONS

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

GENERAL CHARACTERISTICS

Storage Temperature: -55ºC to +125ºC

Operating Temperature: -55ºC to +125ºC



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	Max. Clamping Voltage		CCITT 10 Pulses 10*700µs	I max. 8*20µs	Energy 10*1000µs	Mean Power Dissipation	Typical Cap.
	EIA	Vac	Vdc	V(1mA)	V	Amp.	Amp.	Amp.	Joules	W	pF
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

RoHS COMPLIANT

Glass Encapsulated MLV SMD Varistor (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

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

PART NUMBERS

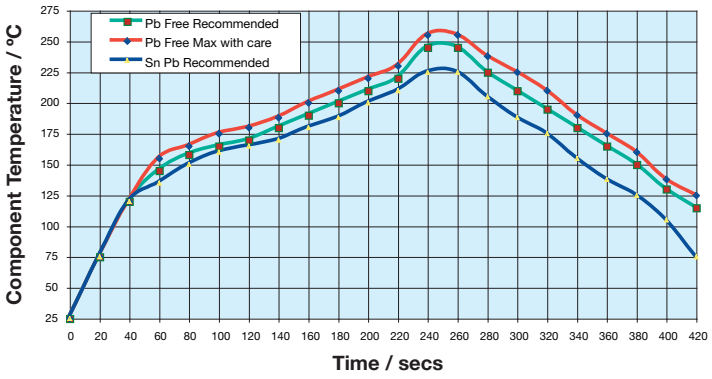
Part Number	Case Size	Operating voltage		Breakdown Voltage Voltage at 1mA			Max. Clamping Voltage 8*20µs		Max. Leakage Current	Energy 10*1000µs	Max. Peak Current 8*20µs 1 Pulse	Cap. Typical (1KHz,0.5V)
		Vrms	Vdc	Min.	Average	Max.	V	A	µA	Joule	A	pF
VJ32M00140K--	3220	14	18	19.8	22	24.2	47	10	15	0.7	1500	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	5000
VJ32M00400K--	3220	40	56	61.2	68	74.8	127	10	15	2.2	1200	5000
VJ32M00500K--	3220	50	66	73.8	82	90.2	135	10	15	2.5	1000	3500
VJ32M00600K--	3220	60	85	90.0	100	110	165	10	15	3	1000	2500
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

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SURFACE MOUNTING GUIDE (VJ13, 14, 15, 20, 32)
APPLICATIONS NOTES

Recommended Reflow Profiles

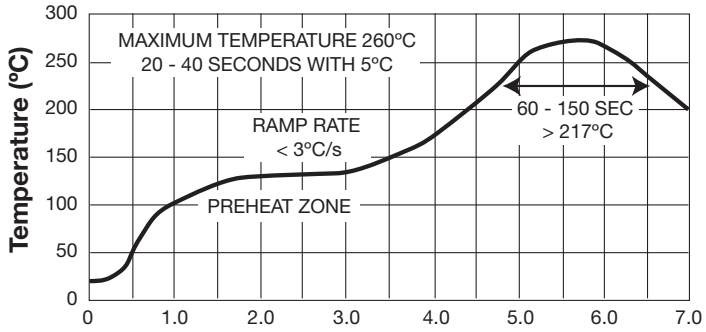


RECOMMENDED SOLDERING PROFILES

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°C. Recommended profiles for reflow and wave soldering are show below for reference.

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

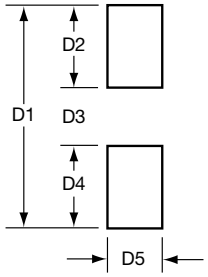
VJ Products Lead-Free Reflow Profile



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 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)

RoHS COMPLIANT