

# 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 Series
- Telecom MT Series
- Automotive MA/PA 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.

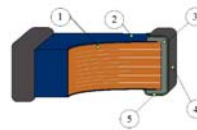
#### TYPICAL APPLICATIONS

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.

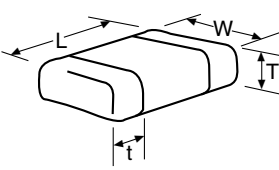
#### PHYSICAL CHARACTERISTICS

Construction Weight: <0.2g



- 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<br>(0.079±0.008) | 1.25±0.15<br>(0.049±0.006) | 1.3 max.<br>(0.051 max.) | 0.15...0.55<br>(0.006...0.022) |
|                                                                                     | VJ20 | 1206     | 3.20±0.20<br>(0.126±0.008) | 1.60±0.20<br>(0.063±0.008) | 1.7 max.<br>(0.067 max.) | 0.25...0.75<br>(0.010...0.030) |
|                                                                                     | VJ13 | 1210     | 3.20±0.30<br>(0.126±0.012) | 2.50±0.25<br>(0.098±0.010) | 1.7 max.<br>(0.067 max.) | 0.25...0.75<br>(0.010...0.030) |
|                                                                                     | VJ14 | 1812     | 4.50±0.30<br>(0.177±0.012) | 3.20±0.30<br>(0.126±0.012) | 2.0 max.<br>(0.079 max.) | 0.25...1.00<br>(0.010...0.039) |
|                                                                                     | VJ15 | 2220     | 5.70±0.40<br>(0.224±0.016) | 5.00±0.40<br>(0.197±0.016) | 2.5 max.<br>(0.098 max.) | 0.25...1.00<br>(0.010...0.039) |
|                                                                                     | VJ32 | 3220     | 8.20±0.40<br>(0.323±0.016) | 5.00±0.40<br>(0.197±0.016) | 2.5 max.<br>(0.098 max.) | 0.25...1.00<br>(0.010...0.039) |

#### 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 = Industrial  
 MT = Telecom  
 MA/PA = 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 **AVX**

## (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

#### FEATURES

- Available in case size 0805, 1206, 1210, 1812, 2220, (3220 under development)
- Nickel and Tin (100%) plated Termination
- Max Energy absorption: 1.5 to 25J (50J under development)
- Well suited to protect against automotive related transients
- Load Dump capabilities: according to ISO standard DP7637-2 12V and 24V pulse 5
- Jump start capability (12V): 24.5 V - 5mn
- Complying to main requirements of AECQ 200
- RoHS Compliant and IMDS Registration

#### GENERAL CHARACTERISTICS

Storage Temperature: -55°C to +150°C  
 Operating Temperature: -55°C to +125°C\*  
 \* 150°C upon request

#### 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

| Part Number    | Case Size<br>EIA | Working<br>Voltage | Breakdown<br>Voltage | Peak<br>current | Maximum<br>leakage<br>current at Vdc | Energy<br>10*1000µs | Energy<br>Load-Dump<br>(x10) | Jump Start         | T max                    |
|----------------|------------------|--------------------|----------------------|-----------------|--------------------------------------|---------------------|------------------------------|--------------------|--------------------------|
|                |                  | Vdc                | V(1mA)               | Amp. 8*20µs     | µA                                   | Joules              | Joules                       | Vmax<br>(5mn min.) | Thickness<br>mm (inches) |
| *VJ12PA0160--- | 0805             | 16                 | 24.5                 | 120             | 20                                   | 0.3                 | 1                            | 24.5               | 1.3                      |
| VJ20MA0160---  | 1206             | 16                 | 24.5                 | 200             | 20                                   | 0.6                 | 1.5                          | 24.5               | 1.7                      |
| VJ20PA0160---  | 1206             | 16                 | 24.5                 | 300             | 20                                   | 1.1                 | 2                            | 24.5               | 1.7                      |
| VJ13MA0160---  | 1210             | 16                 | 24.5                 | 400             | 20                                   | 1.6                 | 3                            | 24.5               | 1.7                      |
| VJ13PA0160---  | 1210             | 16                 | 24.5                 | 500             | 20                                   | 2                   | 5                            | 24.5               | 1.7                      |
| VJ14MA0160---  | 1812             | 16                 | 24.5                 | 800             | 20                                   | 2.4                 | 6                            | 25.5               | 2                        |
| VJ14PA0160---  | 1812             | 16                 | 24.5                 | 1000            | 20                                   | 2.9                 | 10                           | 25.5               | 2                        |
| VJ15MA0160---  | 2220             | 16                 | 24.5                 | 1200            | 20                                   | 5.8                 | 12                           | 25.5               | 2                        |
| VJ15PA0160---  | 2220             | 16                 | 24.5                 | 1500            | 20                                   | 7.2                 | 25                           | 25.5               | 2                        |
| VJ32PA0160---  | 3220             | 16                 | 24.5                 | 2000            | 20                                   | 13.8                | 50                           | 24.5               | 2.5                      |
| VJ15MA0340---  | 2220             | 34                 | 47                   | 1200            | 20                                   | 10                  | 12                           | 47                 | 2.5                      |
| VJ15PA0340---  | 2220             | 34                 | 47                   | 2000            | 20                                   | 13                  | 25                           | 47                 | 2.5                      |
| *VJ32PA0340    | 3220             | 34                 | 47                   | 2000            | 20                                   | 19                  | 50                           | 47                 | 2.5                      |

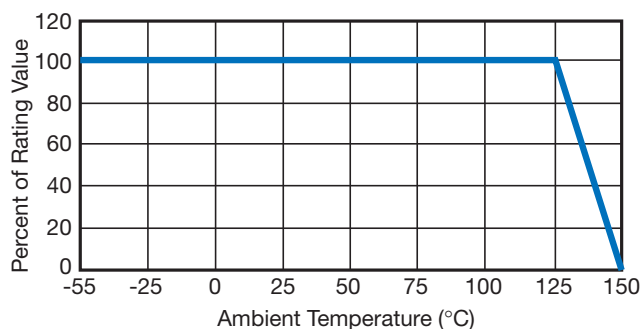
\* under development

Hybrid termination AgPdPt upon request

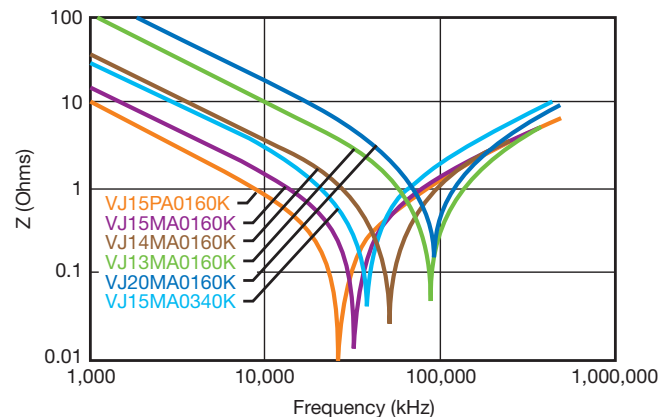


#### TEMPERATURE CHARACTERISTICS

For Current, Energy and Power



#### IMPEDANCE CHARACTERISTICS



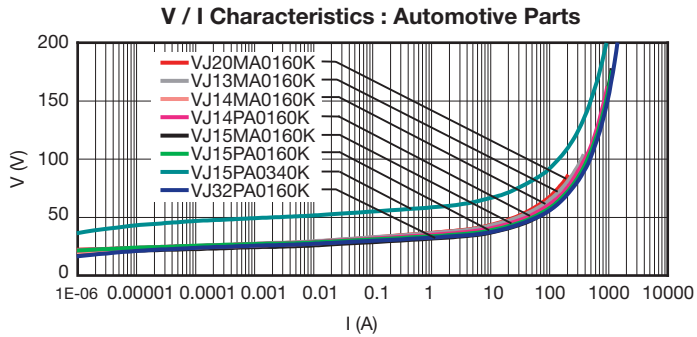
# Glass Encapsulated SMD Varistor MLV

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

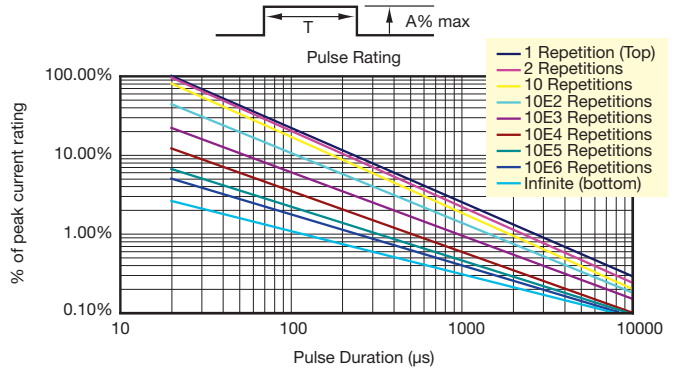
### Automotive MLV Range – MA and PA Series

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

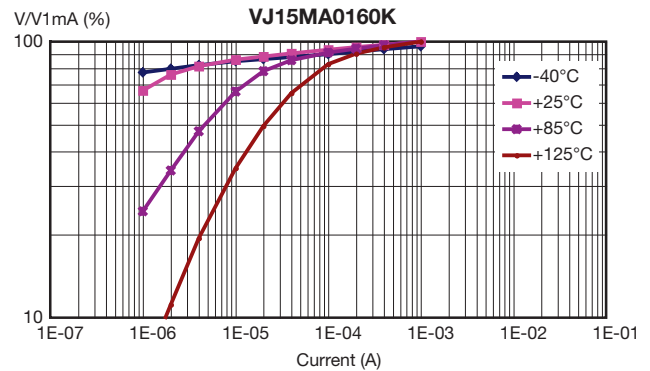
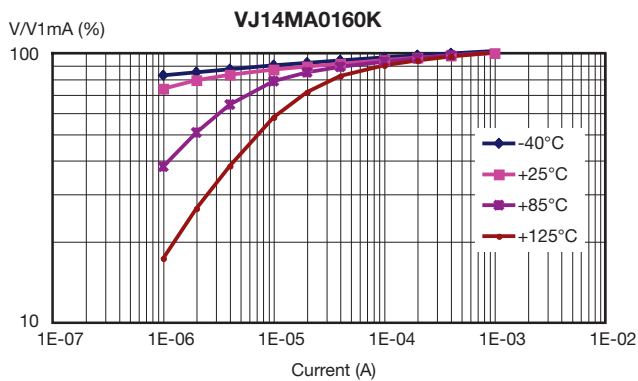
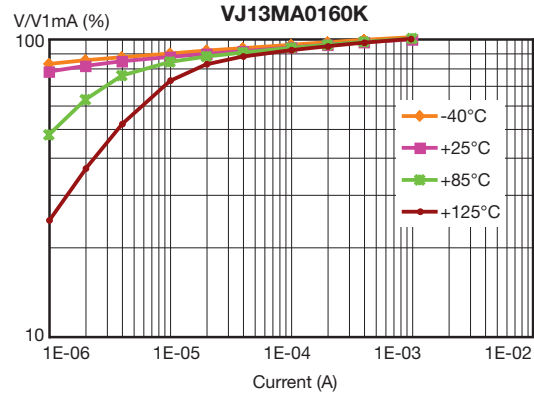
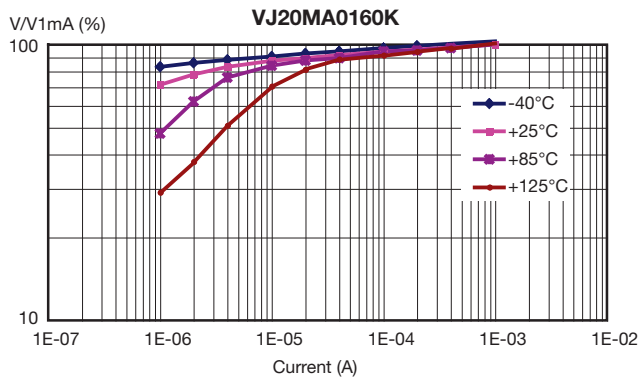
#### V / I CHARACTERISTICS



#### PULSE RATING



#### TEMPERATURE DEPENDENCE OF V/I CHARACTERISTICS

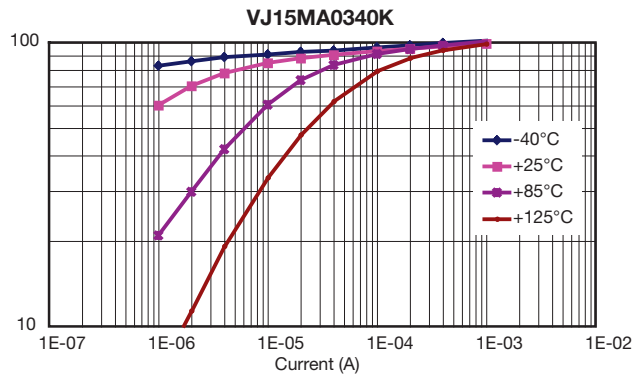
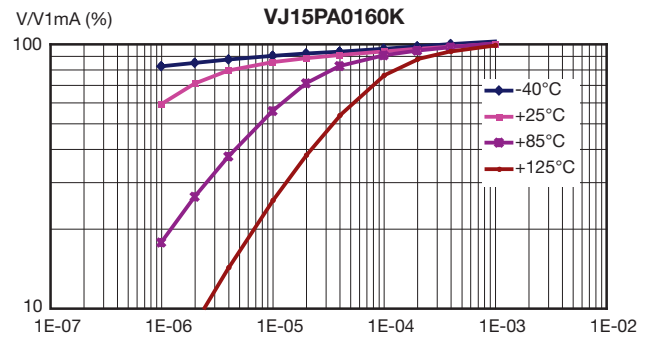
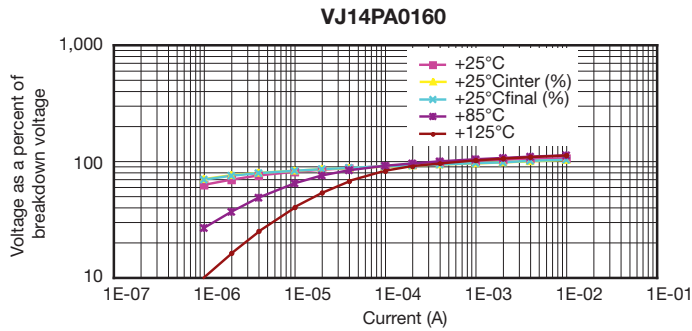


# Glass Encapsulated SMD Varistor MLV **AVX**

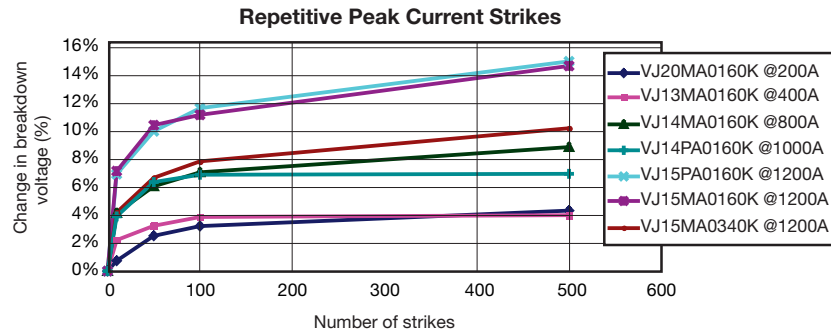
(VJ12, 20, 13, 14, 15, 32)

## Automotive MLV Range – MA and PA Series

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



### PULSE DEGRADATION



# Glass Encapsulated SMD Varistor MLV

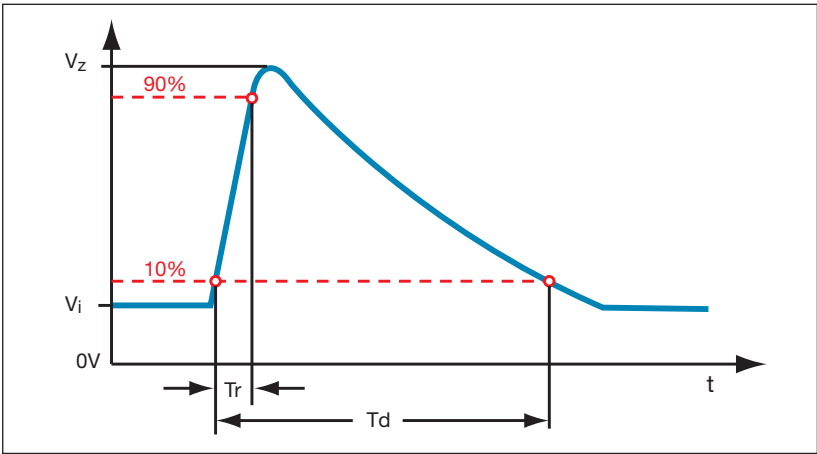
## (VJ12, 20, 13, 14, 15, 32)

### 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

$V_i = 13.5V$   
 $T_d = 100 \text{ to } 350ms$   
 $R_i = 2 \text{ Ohms (Internal Resistance)}$   
 $V_z = 70 \text{ to } 200V$   
 Number of Pulses = 10 Pulses  
 Other Load Dump Simulations can be achieved

#### 24V Network

$V_i = 27V$   
 $T_d = 100 \text{ to } 350ms$   
 $R_i = 2 \text{ Ohms (Internal Resistance)}$   
 $V_z = 70 \text{ to } 200V$   
 Number of Pulses = 10 Pulses

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

| VJ20MA0160K | 0.5 Ohm | 1 Ohm | 2 Ohms |
|-------------|---------|-------|--------|
| 50ms        | 33      | 34    | 39     |
| 100ms       | 31      | 31    | 34     |
| 200ms       | 27      | 28    | 33     |
| 400ms       | 28      | 30    | 34     |
| VJ13PA0160K | 0.5 Ohm | 1 Ohm | 2 Ohms |
| 50ms        | 44      | 48    | 57     |
| 100ms       | 36      | 39    | 46     |
| 200ms       | 33      | 33    | 39     |
| 400ms       | 29      | 28    | 34     |
| VJ14PA0160K | 0.5 Ohm | 1 Ohm | 2 Ohms |
| 50ms        | 60      | 68    | 85     |
| 100ms       | 46      | 52    | 62     |
| 200ms       | 37      | 41    | 50     |
| 400ms       | 32      | 35    | 43     |
| VJ15PA0160K | 0.5 Ohm | 1 Ohm | 2 Ohms |
| 50ms        | 98      | 116   | 150    |
| 100ms       | 66      | 80    | 104    |
| 200ms       | 50      | 60    | 78     |
| 400ms       | 41      | 47    | 58     |
| VJ32PA0160K | 0.5 Ohm | 1 Ohm | 2 Ohms |
| 50ms        | 146     | 186   | 200    |
| 100ms       | 105     | 131   | 179    |
| 200ms       | 72      | 88    | 113    |
| 400ms       | 54      | 67    | 96     |



# 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      | 20                      | 0.5              | 200                      | 900                      |
| VJ13M00140K--- | 1210      | 14   | 18  | 22±10%            | 38                    | 2.5    | 20                      | 1.6              | 400                      | 1800                     |
| VJ14M00140K--- | 1812      | 14   | 18  | 22±10%            | 38                    | 5      | 20                      | 2.3              | 800                      | 4200                     |
| VJ15M00140K--- | 2220      | 14   | 18  | 22±10%            | 38                    | 10     | 20                      | 5.8              | 1200                     | 9600                     |
| VJ20M00170K--- | 1206      | 17   | 22  | 27±10%            | 44                    | 1      | 20                      | 0.6              | 200                      | 800                      |
| VJ13M00170K--- | 1210      | 17   | 22  | 27±10%            | 44                    | 2.5    | 20                      | 1.7              | 500                      | 2500                     |
| VJ14M00170K--- | 1812      | 17   | 22  | 27±10%            | 44                    | 5      | 20                      | 2.7              | 800                      | 3700                     |
| VJ15M00170K--- | 2220      | 17   | 22  | 27±10%            | 44                    | 10     | 20                      | 7.2              | 1200                     | 8600                     |
| VJ20M00200K--- | 1206      | 20   | 26  | 33±10%            | 54                    | 1      | 20                      | 0.7              | 200                      | 550                      |
| VJ13M00200K--- | 1210      | 20   | 26  | 33±10%            | 54                    | 2.5    | 20                      | 1.9              | 500                      | 1200                     |
| VJ14M00200K--- | 1812      | 20   | 26  | 33±10%            | 54                    | 5      | 20                      | 3                | 800                      | 2800                     |
| VJ15M00200K--- | 2220      | 20   | 26  | 33±10%            | 54                    | 10     | 20                      | 7.8              | 1200                     | 6400                     |
| VJ20M00250K--- | 1206      | 25   | 31  | 39±10%            | 65                    | 1      | 20                      | 1                | 200                      | 500                      |
| VJ13M00250K--- | 1210      | 25   | 31  | 39±10%            | 65                    | 2.5    | 20                      | 1.7              | 500                      | 1100                     |
| VJ14M00250K--- | 1812      | 25   | 31  | 39±10%            | 65                    | 5      | 20                      | 3.7              | 800                      | 2600                     |
| VJ15M00250K--- | 2220      | 25   | 31  | 39±10%            | 65                    | 10     | 20                      | 9.6              | 1200                     | 5800                     |
| VJ20M00300K--- | 1206      | 30   | 38  | 47±10%            | 77                    | 1      | 20                      | 1.1              | 200                      | 400                      |
| VJ13M00300K--- | 1210      | 30   | 38  | 47±10%            | 77                    | 2.5    | 20                      | 2                | 400                      | 1200                     |
| VJ14M00300K--- | 1812      | 30   | 38  | 47±10%            | 77                    | 5      | 20                      | 4.2              | 800                      | 1800                     |
| VJ15M00300K--- | 2220      | 30   | 38  | 47±10%            | 77                    | 10     | 20                      | 12               | 1200                     | 4200                     |
| VJ20M00350K--- | 1206      | 35   | 45  | 56±10%            | 90                    | 1      | 20                      | 0.6              | 200                      | 260                      |
| VJ13M00350K--- | 1210      | 35   | 45  | 56±10%            | 90                    | 2.5    | 20                      | 1.5              | 300                      | 1200                     |
| VJ14M00350K--- | 1812      | 35   | 45  | 56±10%            | 90                    | 5      | 20                      | 4                | 500                      | 2500                     |
| VJ15M00350K--- | 2220      | 35   | 45  | 56±10%            | 90                    | 10     | 20                      | 10               | 1000                     | 4000                     |
| VJ20M00400K--- | 1206      | 40   | 56  | 68±10%            | 110                   | 1      | 20                      | 0.7              | 100                      | 190                      |
| VJ13M00400K--- | 1210      | 40   | 56  | 68±10%            | 110                   | 2.5    | 20                      | 2.3              | 250                      | 380                      |
| VJ14M00400K--- | 1812      | 40   | 56  | 68±10%            | 110                   | 5      | 20                      | 4.8              | 500                      | 800                      |
| VJ15M00400K--- | 2220      | 40   | 56  | 68±10%            | 110                   | 10     | 20                      | 9                | 1000                     | 2000                     |
| VJ20M00500K--- | 1206      | 50   | 65  | 82±10%            | 135                   | 1      | 20                      | 0.8              | 100                      | 130                      |
| VJ13M00500K--- | 1210      | 50   | 65  | 82±10%            | 135                   | 2.5    | 20                      | 1.6              | 250                      | 700                      |
| VJ14M00500K--- | 1812      | 50   | 65  | 82±10%            | 135                   | 5      | 20                      | 4.5              | 400                      | 600                      |
| VJ15M00500K--- | 2220      | 50   | 65  | 82±10%            | 135                   | 10     | 20                      | 7                | 800                      | 1400                     |
| VJ20M00600K--- | 1206      | 60   | 85  | 100±10%           | 165                   | 1      | 20                      | 0.9              | 100                      | 100                      |
| VJ13M00600K--- | 1210      | 60   | 85  | 100±10%           | 165                   | 2.5    | 20                      | 1.5              | 250                      | 600                      |
| VJ14M00600K--- | 1812      | 60   | 85  | 100±10%           | 165                   | 5      | 20                      | 4.5              | 400                      | 500                      |
| VJ15M00600K--- | 2220      | 60   | 85  | 100±10%           | 165                   | 10     | 20                      | 6.8              | 800                      | 1100                     |

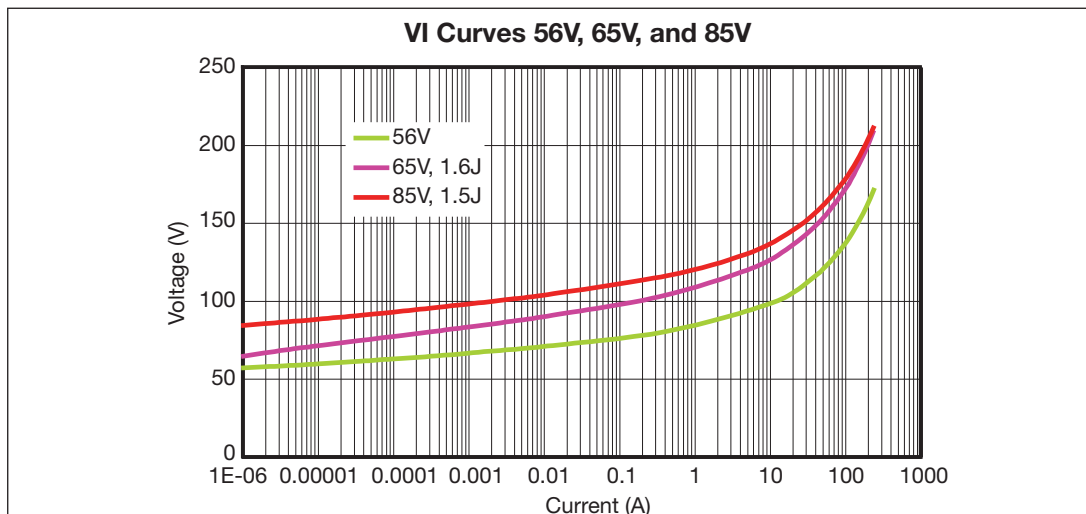
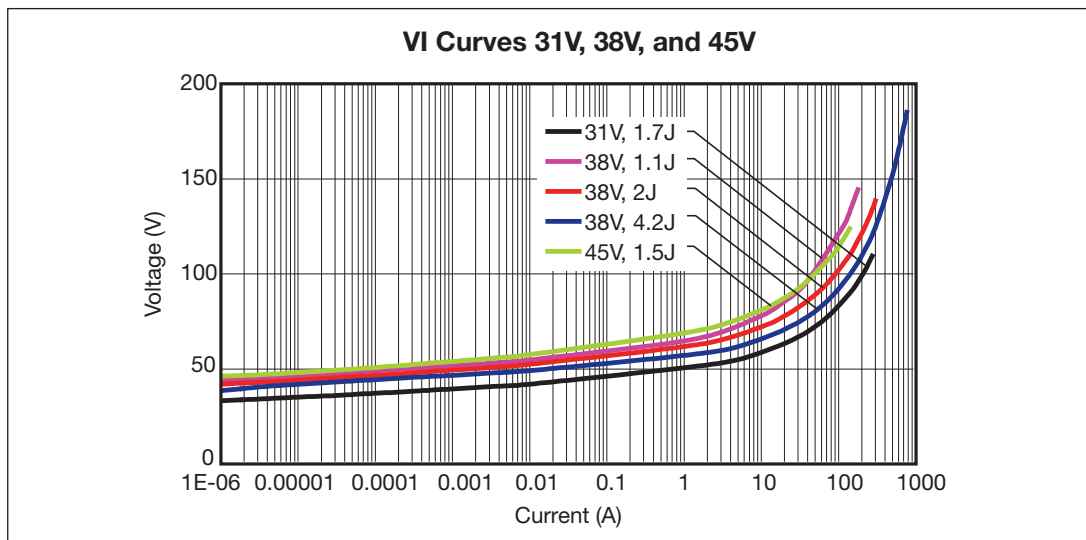
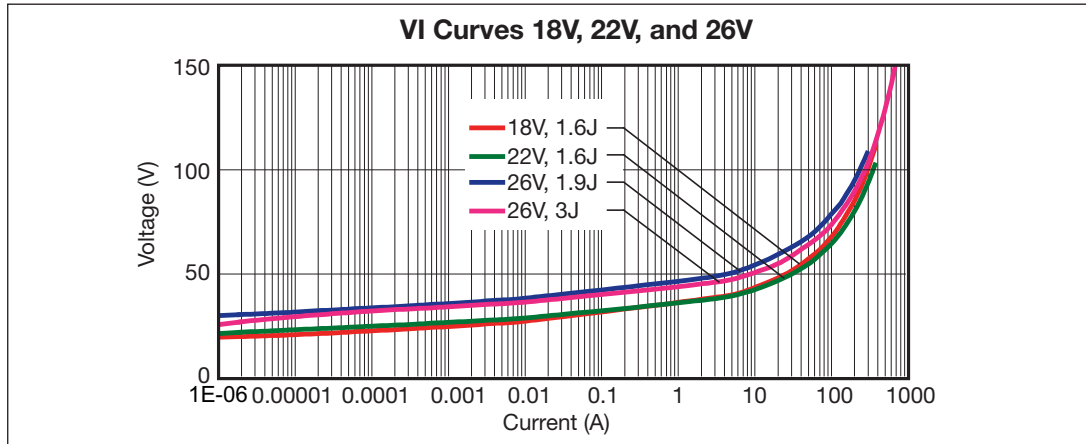


# Glass Encapsulated SMD Varistor MLV **AVX** (VJ12, 20, 13, 14, 15)

## Industrial MLV Range – M0 Series

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

#### V/I CHARACTERISTIC



# Glass Encapsulated SMD Varistor MLV (VJ14)



## Telecom MLV Range – MT Series

### TELECOM MLV RANGE - VJ14 MT SERIES

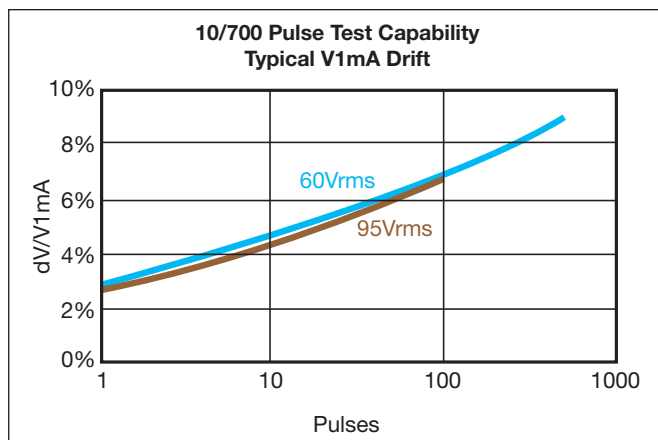
#### FEATURES

- Effective alternative to leaded MOVs between 60 and 90 Vrms
- 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 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.



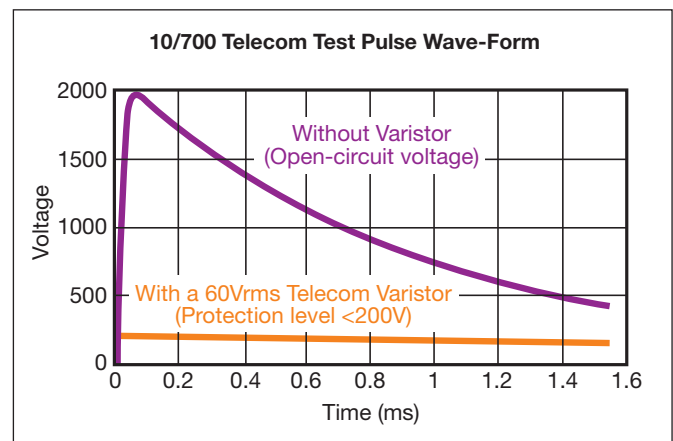
#### TARGET APPLICATIONS

- 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



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  | 100               | 400                   | 45   | 45                       | 400           | 6                | 0.015                  | 400          |
| VJ14MT0750--- | 1812      | 75                | 100 | 120               | 400                   | 45   | 45                       | 400           | 6                | 0.015                  | 400          |
| VJ14MT0950--- | 1812      | 95                | 125 | 150               | 250                   | 45   | 45                       | 250           | 5                | 0.015                  | 250          |

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 PN        | Case Size | Operating voltage |     | Breakdown Voltage Voltage at 1mA |         |      | Max. Clamping Voltage<br>8*20µs |    | Max.<br>Leakage<br>Current | Energy<br>10*1000µs | Max. Peak<br>Current<br>8*20µs<br>1 Pulse | Cap.<br>Typical<br>(1KHz,0.5V) |
|---------------|-----------|-------------------|-----|----------------------------------|---------|------|---------------------------------|----|----------------------------|---------------------|-------------------------------------------|--------------------------------|
|               |           | Vrms              | Vdc | Min.                             | Average | Max. | V                               | A  |                            |                     |                                           |                                |
| VJ32M01750K-- | 3220      | 175               | 225 | 245                              | 270     | 297  | 455                             | 10 | 15                         | 9.5                 | 300                                       | 120                            |
| VJ32M00231K-- | 3220      | 230               | 300 | 327                              | 360     | 396  | 595                             | 10 | 15                         | 10                  | 300                                       | 80                             |
| VJ32M00251K-- | 3220      | 250               | 330 | 355                              | 390     | 429  | 650                             | 10 | 15                         | 11                  | 300                                       | 75                             |
| VJ32M02750K-- | 3220      | 275               | 369 | 391                              | 430     | 473  | 710                             | 10 | 15                         | 13                  | 300                                       | 70                             |
| VJ32M00301K-- | 3220      | 300               | 385 | 427                              | 470     | 517  | 775                             | 10 | 15                         | 15                  | 300                                       | 65                             |

# Glass Encapsulated SMD Varistor MLV

## (VJ13, 14, 15, 20)

### Surface Mounting Guide

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

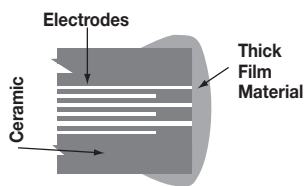
#### APPLICATIONS NOTES

#### SOLDERABILITY/LEACHING

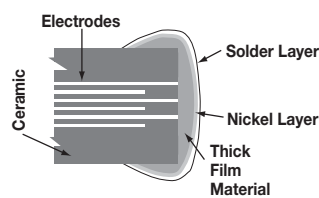
Terminations to be well soldered after immersion in a 60/40 tin/lead solder bath at  $235 \pm 5^\circ\text{C}$  for  $2 \pm 1$  seconds. Terminations will resist leaching for at least the immersion times and conditions recommendations shown below.

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

Unplated MLV



Plated MLV

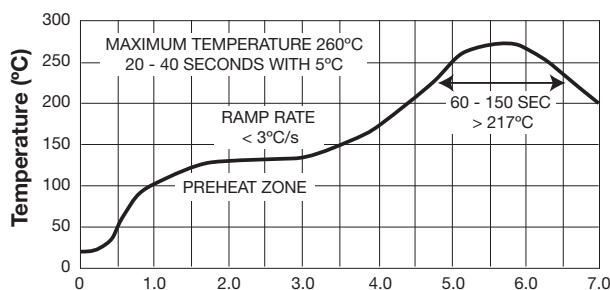


#### RECOMMENDED SOLDERING PROFILES

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 show below for reference.

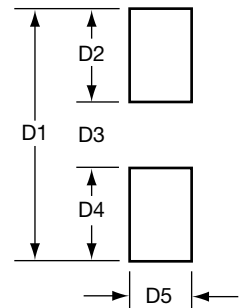
VC products are recommended for lead soldering application or gluing techniques.

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) |





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Электрон  
Связь**

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