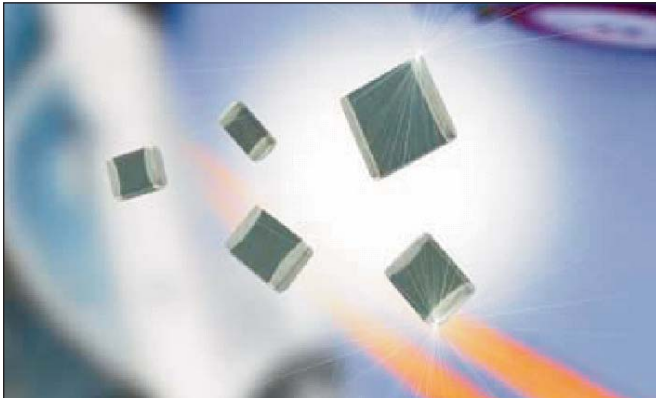


# Medium Power MLV (VC13, 14, 15, 20)



## Medium Power Multilayer Chip Varistor

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



#### GENERAL DESCRIPTION

AVX's Transient Voltage Suppression (TVS) devices address six trends in today's electronic circuits: (1) mandatory ESD protection, (2) mandatory EMI control, (3) signal integrity improvement, (4) PCB downsizing, (5) reduced component placement costs, and (6) protection from induced slow speed transient voltages and currents.

AVX's Medium Power Multilayer Varistors include 3 series of products as listed below:

- Standard 1210 Series (VJ13)
- Telecom Series (VC14)
- Automotive Range (VC13, 14, 15, 20)

#### 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 DIMENSIONS: mm (inches)

	Type	IEC Size	L	I	bm	t max
	VC20	1206	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	0.50±0.25 (0.020±0.010)	1.70 (0.067)
VC13	1210	3.20±0.20 (0.126±0.008)	2.50±0.20 (0.098±0.008)	0.50±0.25 (0.020±0.010)	1.70 (0.067)	
VC14	1812	4.50±0.20 (0.177±0.008)	3.20±0.20 (0.126±0.008)	0.50±0.25 (0.020±0.010)	1.70 (0.067)	
VC15	2220	5.70±0.20 (0.224±0.008)	5.00±0.20 (0.197±0.008)	0.50±0.25 (0.020±0.010)	1.70 (0.067)	

#### PART NUMBERING

<b>VC</b>	<b>14</b>	<b>M</b>	<b>T</b>	<b>0950</b>	<b>K</b>	<b>BA</b>
<b>Varistor Series</b> VC = Unplated VJ = Plated	<b>Chip Size</b> 20 = 1206 13 = 1210 14 = 1812 15 = 2220	<b>Code</b> M = Standard P = Pro Grade	<b>Series Code</b> A = Automotive T = Telecom C = Standard	<b>AC Operating Voltage</b>	<b>1mA Voltage Tolerance</b> K = ±10%	<b>Packaging</b> BA = Tape & Reel VC20: 4000 pcs/reel VC13: 2000 pcs/reel VC14: 1500 pcs/reel VC15: 1250 pcs/reel

# Medium Power MLV (VC13, 14, 15, 20)



## Medium Power Multilayer Chip Varistor

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

#### STANDARD SERIES - VJ13 (1210)

#### FEATURES

- Plated Ni Barrier Terminations
- Bi-Directional Protection
- Fast Turn-On Time
- Multiple Strike Capability
- Provides EMC Capacitance
- 1210 EIA Case Size

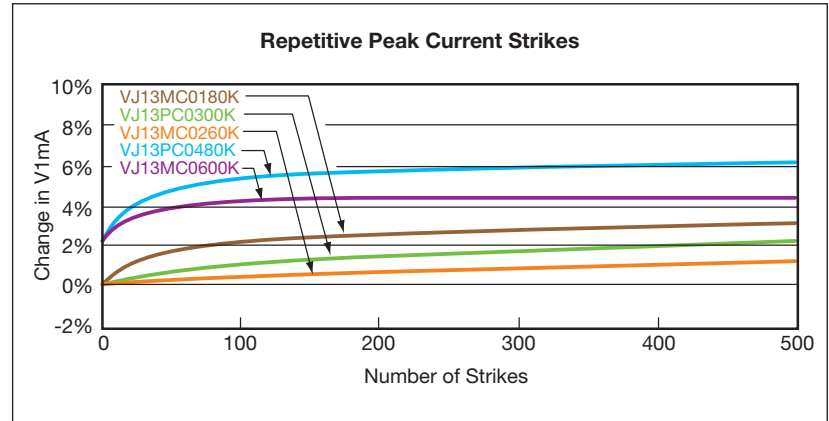
#### TARGET APPLICATIONS

Consumer Electronic Products

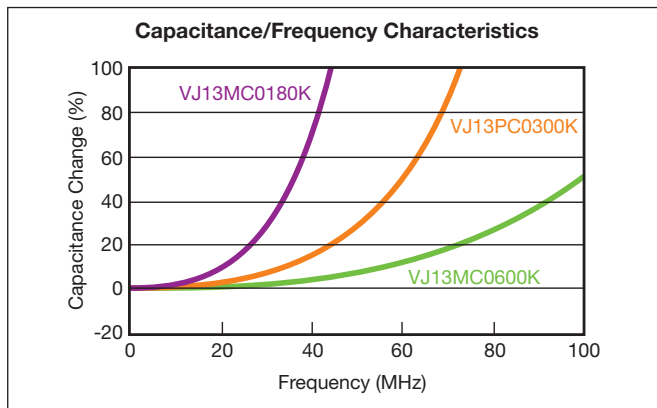
#### GENERAL CHARACTERISTICS

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

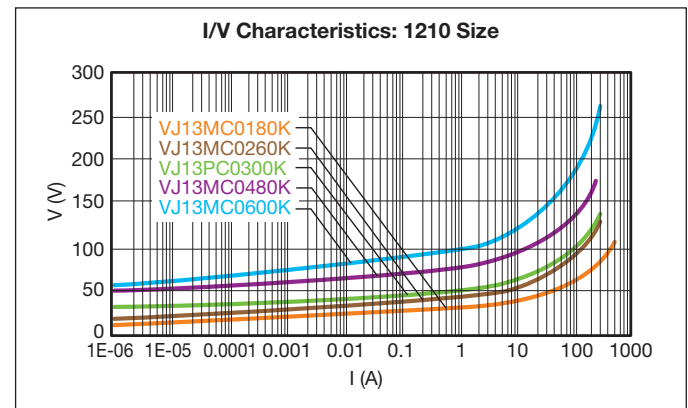
#### PULSE DEGRADATION



#### CAP VS FREQ CHARACTERISTICS



#### V/I CHARACTERISTICS

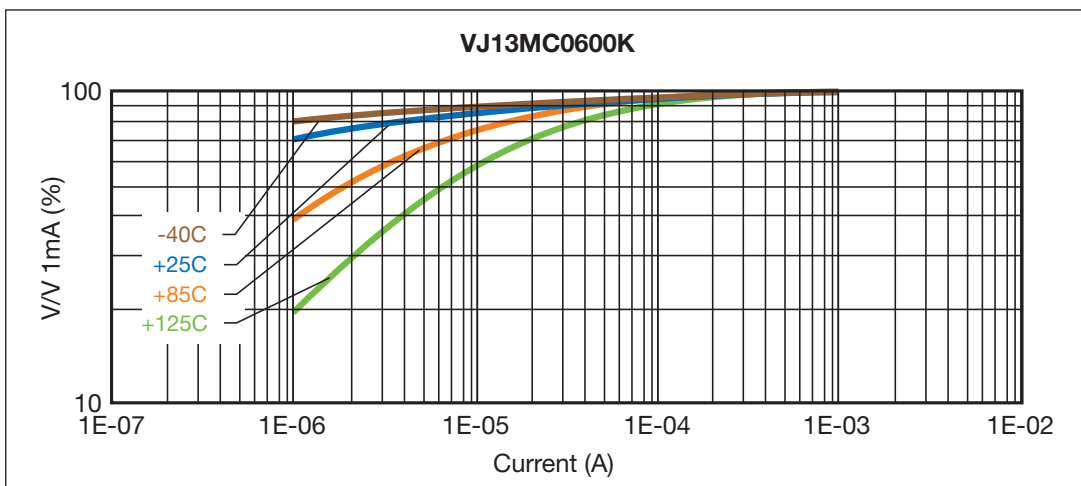
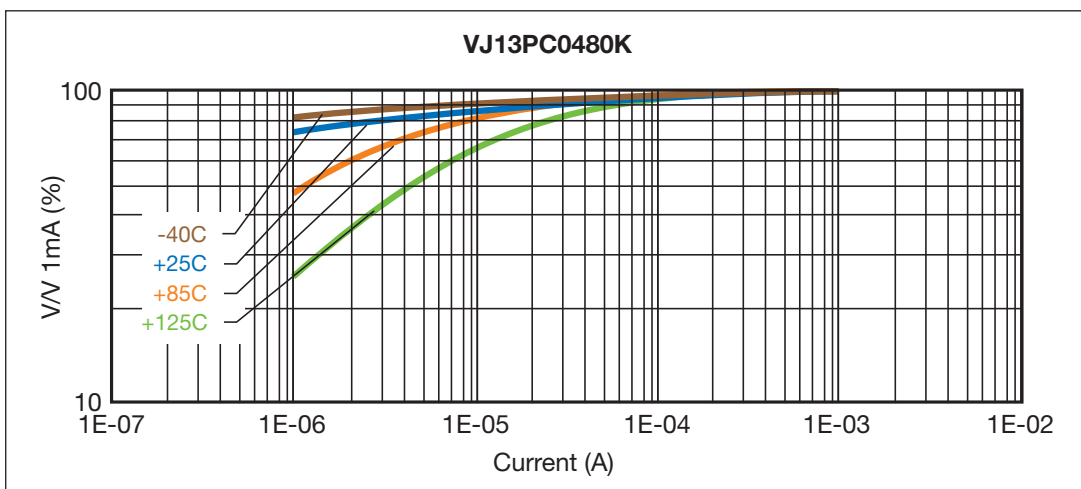
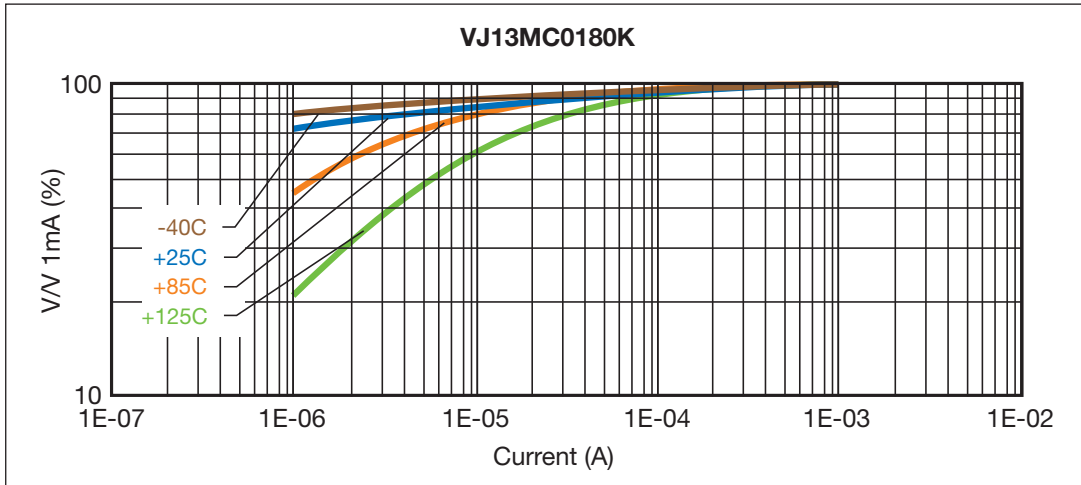


#### PART NUMBERS

Part Number	Operating Voltage	Vnominal At 1mA DC			Vclamp (8x20µs)		Energy (10x1000µs)	Max. Peak Current (8x20µs)	Typical CAP (1kHz/.5Vrms)
	Vdc	min	Nom	max	Vp	Ip(A)	J	A	pF
VJ13MC0180KBA	18	21.5	24	26.5	45	10	1.5	500	3000
VJ13MC0260KBA	26	29.7	33	36.3	62	10	1.2	300	1120
VJ13MC0300KBA	30	35	39	43	73	10	0.9	220	1020
VJ13PC0300KBA	30	35	39	43	73	10	1.2	280	1150
VJ13MC0480KBA	48	54.5	60.5	66.5	110	10	0.9	220	800
VJ13PC0480KBA	48	54.5	60.5	66.5	110	10	1.2	250	840
VJ13MC0600KBA	60	67	75	83	126	10	1.5	250	600

#### STANDARD SERIES - VJ13 (1210)

#### TEMPERATURE DEPENDENCE OF V/I CHARACTERISTIC



# Medium Power MLV (VC13, 14, 15, 20)



## Medium Power Multilayer Chip Varistor

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

#### TELECOM SERIES - VC14 (1812)

#### FEATURES

- Pd/Ag Terminations
- High Energy Ratings (up to 6 Joules with 1812 case)
- Multiple Strike Capability
- Provides EMC Capacitance
- Effective Alternative to Leaded MOVs between 60-90Vrms
- Specified in accordance to CCITT 10/700ms Pulse test

#### TARGET APPLICATIONS

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

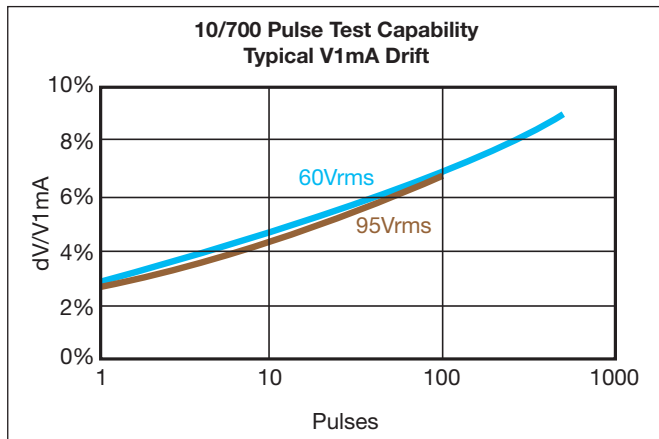
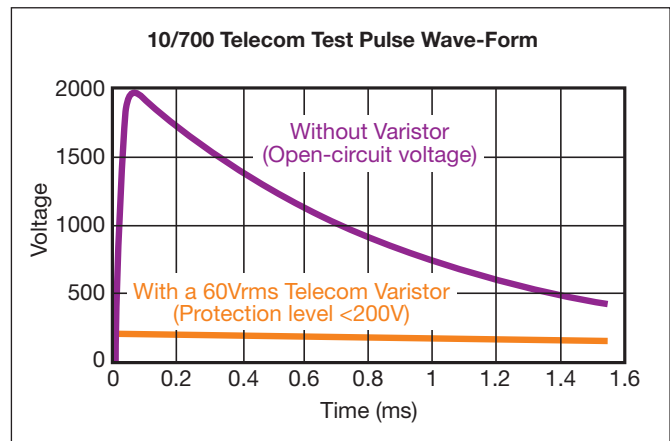
#### GENERAL CHARACTERISTICS

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

#### CCITT 10x700µs TEST

A test pulse of 10x700µs 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 voltage at the equipment connected 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	Operating Voltage		Vclamp (8x20µs)		Energy (10x1000µs) J	Max Ipeak (8x20µs) 1 Surge Ip (A)	Mean Power Dissipation W	CCITT 10Pulse (10x700µs) V	Typical Cap pF
	Vrms	Vdc	Vp	Ip					
VC14MT0600KBA	60	85	200	45	6	400	0.015	2000	400
VC14MT0950KBA	95	125	270	45	5	250	0.015	2000	250



# Medium Power MLV (VJ13, 14, 15, 20)



## Medium Power Multilayer Chip Varistor

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

#### AUTOMOTIVE SERIES – VJ13, 14, 15, 20

#### FEATURES

- Pd/Ag Terminations
- High Energy Ratings (up to 25 Joules with 2220 case size)
- Multiple Strike Capability
- Provides EMC Capacitance
- Well suited to protect against automotive related transients
- Specified with “Load Dump” and “Jump Start” Test Requirements

#### GENERAL CHARACTERISTICS

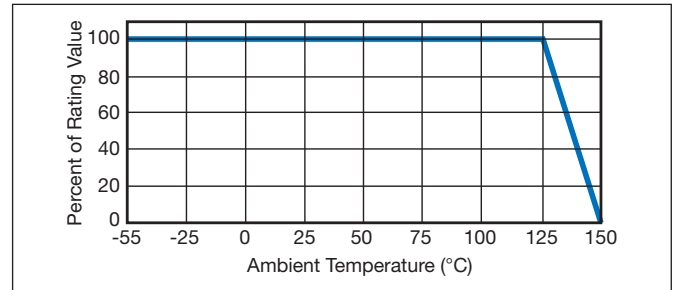
Storage Temperature: -55°C to +125°C  
 Operating Temperature: -55°C to +125°C

#### TARGET APPLICATIONS

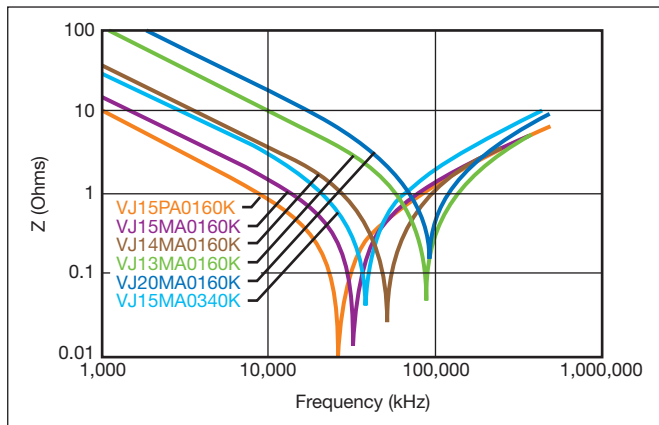
Automotive and other Consumer Products

#### TEMPERATURE CHARACTERISTICS

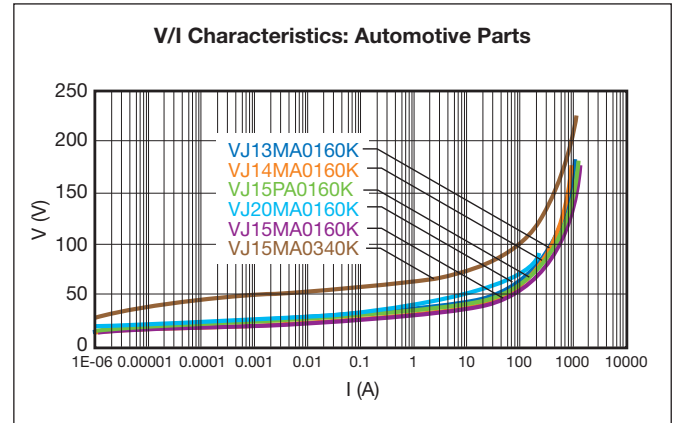
For Current, Energy and Power



#### IMPEDANCE CHARACTERISTICS



#### V/I CHARACTERISTICS



#### PART NUMBERS

Part Number	Case Size	Operating Voltage		Vnominal At 1mA DC			Vclamp (8x20µs)		Leakage At Vdc µA	Energy (10x1000µs) J	Load Dump (10x) J	Jump Start 5min Max V	Max.Peak Current (8x20µs) Ip (A)	Mean Power Dissipation W	CAP (1kHz/.5Vrms) pF
		Vrms	Vdc	min	Nom	max	Vp	Ip(A)							
VJ20MA0160KBA	1206	14	16	22	24.5	27	40	1	50	0.6	1.5	24.5	200	0.008	900
VJ13MA0160KBA	1210	14	16	22	24.5	27	40	2.5	25	1.6	3	24.5	400	0.010	1800
VJ14MA0160KBA	1812	14	16	22	24.5	27	40	5	100	2.4	6	24.5	800	0.015	5000
VJ15MA0160KBA	2220	14	16	22	24.5	27	40	10	100	5.8	12	24.5	1200	0.030	11000
VJ15PA0160KBA	2220	14	16	22	24.5	27	40	10	100	5.8	25	24.5	1200	0.030	16000
VJ15MA0340KBA	2220	30	34	42.3	47	51.7	77	10	100	12	12	50	1200	0.030	4000



# Medium Power MLV (VJ13, 14, 15, 20)



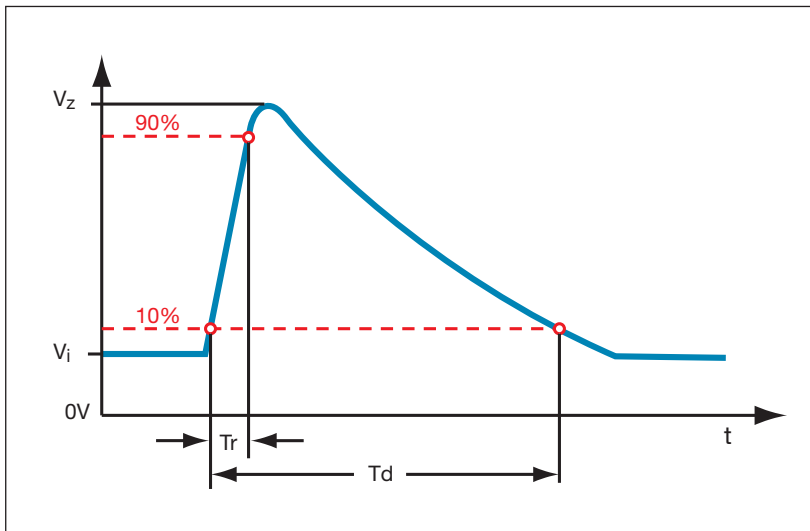
## Medium Power Multilayer Chip Varistor

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

#### AUTOMOTIVE SERIES – VJ13, 14, 15, 20

#### 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

$V_i = 27V$

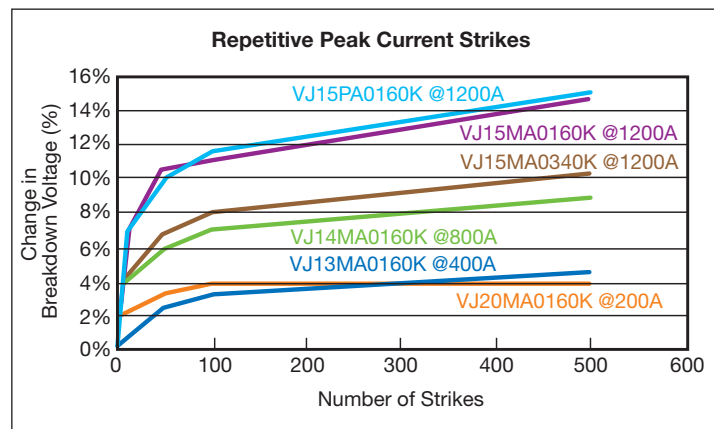
$T_d = 100$  to  $350ms$

$R_i = 2$  Ohms (Internal Resistance)

$V_z = 70$  to  $200V$

Number of Pulses = 10 Pulses

#### PULSE DEGRADATION



# Medium Power MLV (VJ13, 14, 15, 20)

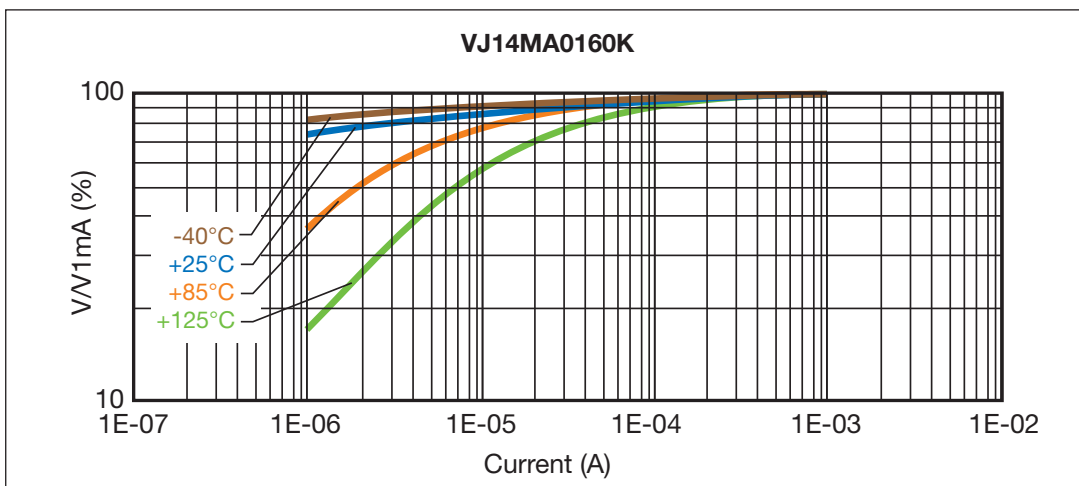
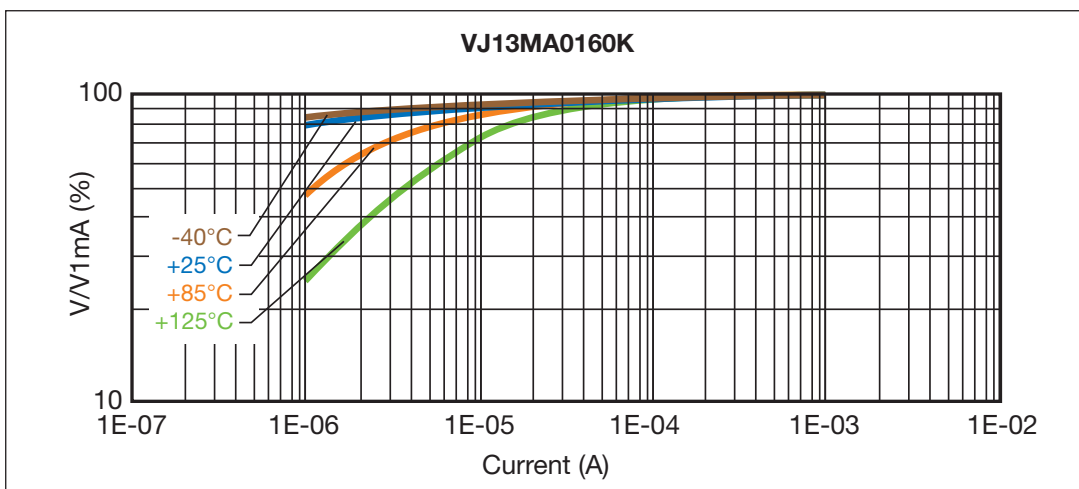
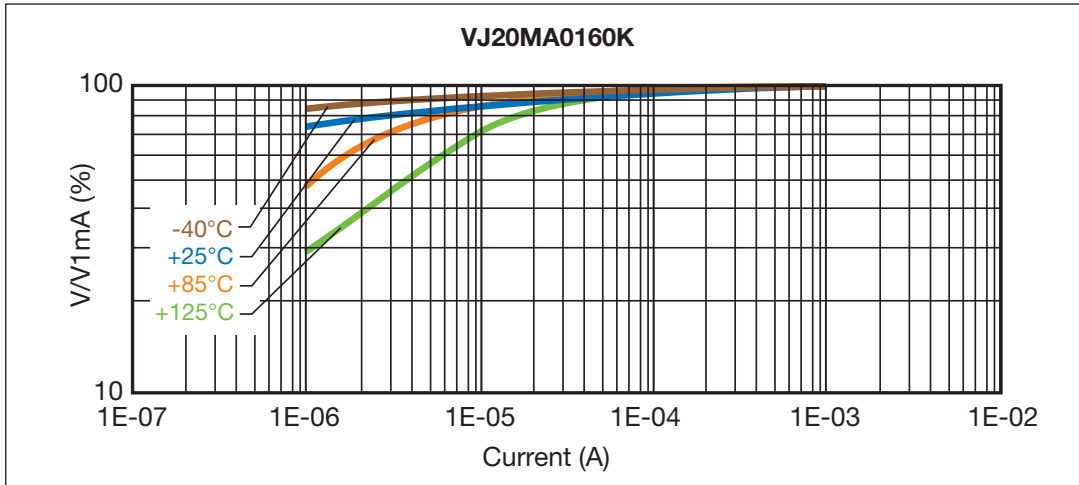


Medium Power Multilayer Chip Varistor

Transient Voltage Suppression, ESD Protection Devices & EMI Devices

## AUTOMOTIVE SERIES – VJ13, 14, 15, 20

### TEMPERATURE DEPENDENCE OF V/I CHARACTERISTIC



#### AUTOMOTIVE SERIES – VJ13, 14, 15, 20

#### TEMPERATURE DEPENDENCE OF V/I CHARACTERISTIC

