

AVX Multilayer Ceramic Transient Voltage Suppressors

PART NUMBER IDENTIFICATION

Surface Mount Devices

Important: For part number identification only, not for construction of part numbers.

The information below only defines the numerical value of part number digits, and cannot be used to construct a desired set of electrical limits. Please refer to the TransGuard® part number data (blue sections, pages 3-8 & 14,16 & 22) for the correct electrical ratings.

VC 1206 05 D 150 R P

TERMINATION FINISH:

X = Pt/Pd/Ag (Non-Plated)

P = Ni/Sn Alloy (Plated)

PACKAGING (Pcs/Reel):

STYLE	"D"	"R"	"T"
VC0402*	N/A	4,000	10,000
VC0603	1,000	4,000	10,000
VC0805	1,000	4,000	10,000
VC1206*	1,000	4,000	10,000
VC1210*	1,000	2,000	10,000

CLAMPING VOLTAGE:

Where:	100 = 10.0V	500 = 50.0V
	150 = 15.5V	560 = 56.0V
	200 = 20.0V	580 = 58.0V
	250 = 25.0V	620 = 62.0V
	300 = 30.0V	650 = 65.0V
	390 = 39.0V	101 = 100.0V
	400 = 40.0V	121 = 120.0V

ENERGY:

Where:	A = 0.1J	H = 1.2J
	C = 0.3J	J = 1.5J
	D = 0.4J	P = 3.0J
	F = 0.7J	V = 0.02J
	G = 0.9J	X = 0.05J

WORKING VOLTAGE:

Where:	03 = 3.3 VDC	18 = 18.0 VDC
	05 = 5.6 VDC	26 = 26.0 VDC
	09 = 9.0 VDC	30 = 30.0 VDC
	12 = 12.0 VDC	48 = 48.0 VDC
	14 = 14.0 VDC	60 = 60.0 VDC

CASE SIZE DESIGNATOR:

SIZE	LENGTH	WIDTH
0402	1.00±0.10mm (0.040"±0.004")	0.5±0.10mm (0.020"±0.004")
0603	1.60±0.15mm (0.063"±0.006")	0.8±0.15mm (0.032"±0.006")
0805	2.01±0.2mm (0.079"±0.008")	1.25±0.2mm (0.049"±0.008")
1206	3.20±0.2mm (0.126"±0.008")	1.60±0.2mm (0.063"±0.008")
1210	3.20±0.2mm (0.126"±0.008")	2.49±0.2mm (0.098"±0.008")

CASE STYLE:

C = Chip

PRODUCT DESIGNATOR:

V = Varistor

*Contact Factory for Availability

MARKING:

All standard surface mount TransGuard® chips will **not** be marked. Marked chips will be considered a special; contact factory for minimum order requirement and price adder.

Axial Leaded Devices

Important: For part number identification only, not for construction of part numbers.

The information below only defines the numerical value of part number digits, and cannot be used to construct a desired set of electrical limits. Please refer to the TransGuard® part number data (blue section, page 9) for the correct electrical ratings.

V A 1000 05 D 150 R L

LEAD FINISH:

Copper clad steel, solder coated

PACKAGING (Pcs/Reel):

STYLE	"D"	"R"	"T"
VA1000	1,000	3,000	7,500
VA2000	1,000	2,500	5,000

CLAMPING VOLTAGE:

Where:	100 = 10.0V	580 = 58.0V
	150 = 15.5V	650 = 65.0V
	300 = 30.0V	101 = 100.0V
	400 = 40.0V	121 = 120.0V

ENERGY:

Where:	A = 0.1J
	D = 0.4J
	K = 2.0J

WORKING VOLTAGE:

Where:	03 = 3.3 VDC	26 = 26.0 VDC
	05 = 5.6 VDC	30 = 30.0 VDC
	14 = 14.0 VDC	48 = 48.0 VDC
	18 = 18.0 VDC	60 = 60.0 VDC

CASE SIZE DESIGNATOR:

SIZE	LENGTH	DIAMETER
1000	4.32mm (0.170")	2.54mm (0.100")
2000	4.83mm (0.190")	3.56mm (0.140")

CASE STYLE:

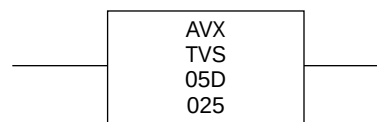
A = Axial

PRODUCT DESIGNATOR:

V = Varistor

MARKING:

All axial TransGuards® are marked with vendor identification, product identification, voltage/energy rating code and date code (see example below):



Where: AVX = Always AVX (Vendor Identification)
 TVS = Always TVS (Product Identification - Transient Voltage Suppressor)
 05D = Working VDC and Energy Rating (Joules)
 Where: 05 = 5.6 VDC, D = 0.4J
 025 = Three Digit Date Code
 Where: 0 = Last digit of year (2000)
 25 = Week of year

AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 5.6, 9, 14 OR 18 VDC
0402 SURFACE MOUNT

Dimensions:	Actual Size:	
	Length	1.0 ± 0.10mm (0.040" ± 0.004")
	Width	0.5 ± 0.10mm (0.020" ± 0.004")
	Thickness	0.6mm Max. (0.024")
	Termination Band Width	0.25 ± 0.15mm (0.010" ± 0.006")
	Termination Separation	0.3mm Min. (0.012")
	Termination Finish	X = Pt/Pd/Ag (Non-Plated) P = Ni/Sn Alloy (Plated) - Contact Factory for Availability

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance	Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C	L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)	nH (typ.)
Test Condition	<50µA	1mA DC	8/20µS†	8/20µs	10/1000µS	0.5Vrms @: 1MHz	di/dt = 100mA/nS
VC040205X150__	5.6	7.6 - 9.3	15.5	20	0.05	360	<1.0
VC040209X200__	9.0	11.0 - 14.0	20.0	20	0.05	230	<1.0
VC040214X300__	14.0	16.5 - 20.3	30.0	20	0.05	120	<1.0
VC040218X400__	18.0	22.9 - 28.0	40.0	20	0.05	90	<1.0

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated) Contact Factory for Availability

Packaging (Pcs/Reel): see page 2

StaticGuard

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance	Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C	L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)	nH (typ.)
Test Condition	<10µA	<1µA DC	8/20µS†	8/20µs	10/1000µS	0.5Vrms @: 1 MHz	di/dt = 100mA/ns
VC04LC18V500__	≤18.0	N/A	<50.0	15	0.02	40	<1.0

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated) Contact Factory for Availability

Packaging (Pcs/Reel): see page 2

Note: Details of Performance Curves shown on page 4.

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50µA leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating
<0.05 Joule

Pulse Current & Waveform
1A 8/20µS

I_{peak} —Maximum peak current which may be applied with the specified waveform without device failure

E_{tran} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1MHz

L—Device inductance measured with a current edge rate of 100 mA/nS

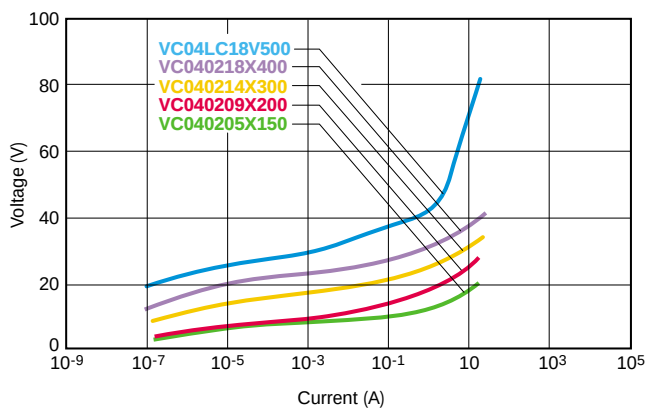
Dimensions: Millimeters (Inches)

AVX Multilayer Ceramic Transient Voltage Suppressors

TYPICAL PERFORMANCE CURVES (0402 CHIP SIZE)

VOLTAGE/CURRENT CHARACTERISTICS

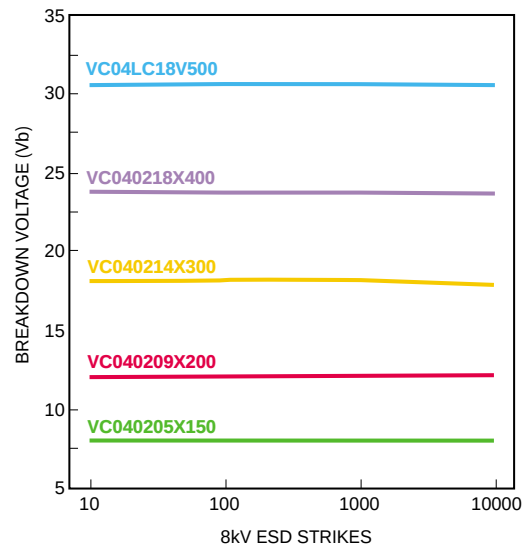
Multilayer construction and improved grain structure result in excellent transient clamping characteristics up to 20 amps peak current, while maintaining very low leakage currents under DC operating conditions. The VI curves below show the voltage/current characteristics for the 5.6V, 9V, 14V, 18V and low capacitance StaticGuard parts with currents ranging from parts of a micro amp to tens of amps.



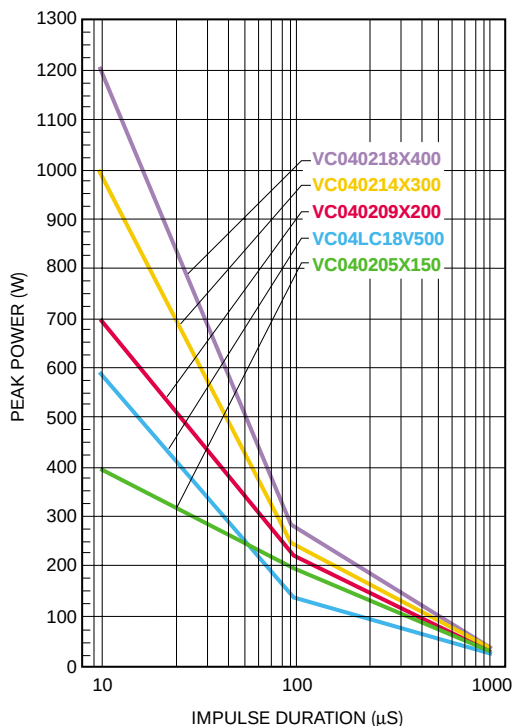
PULSE DEGRADATION

Traditionally varistors have suffered degradation of electrical performance with repeated high current pulses resulting in decreased breakdown voltage and increased leakage current. It has been suggested that irregular intergranular boundaries and bulk material result in restricted current paths and other non-Schottky barrier paralleled conduction paths in the ceramic. Repeated pulsing of TransGuard transient voltage suppressors with 150Amp peak $8 \times 20\mu\text{S}$ waveforms shows negligible degradation in breakdown voltage and minimal increases in leakage current. This does not mean that TransGuard suppressors do not suffer degradation, but it occurs at much higher current.

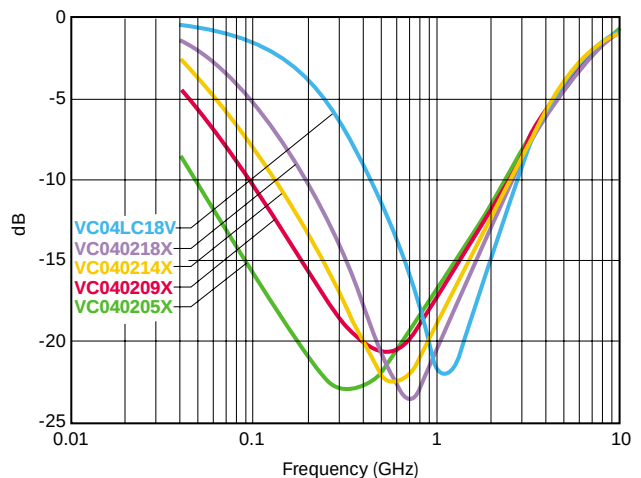
ESD TEST OF 0402 PARTS



PEAK POWER VS PULSE DURATION



INSERTION LOSS CHARACTERISTICS



AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 3.3, 5.6, 9, 14, 18, 26 OR 30 VDC
0603 SURFACE MOUNT

Dimensions:	Actual Size:	
	Length	1.6 ± 0.15mm (0.063" ± 0.006")
	Width	0.80 ± 0.15mm (0.032" ± 0.006")
	Thickness	0.9mm Max. (0.035")
	Termination Band Width	0.35 ± 0.15mm (0.014" ± 0.006")
	Termination Separation	0.7mm Min. (0.028")
	Termination Finish	X = Pt/Pd/Ag (Non-Plated) P = Ni/Sn Alloy (Plated)

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance	Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C	L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)	nH (typ.)
Test Condition	<50µA	1mA DC	8/20µS†	8/20µs	10/1000µS	0.5Vrms @: 1kHz 1 MHz	di/dt = 100mA/nS
VC060303A100 __	3.3#	4.1 - 6.0	10	30	0.1	1800 1230	<1.0
VC060305A150 __	5.6	7.6 - 9.3	15.5	30	0.1	1000 825	<1.0
VC060309A200 __	9.0	11.0 - 14.0	20	30	0.1	650 550	<1.0
VC060314A300 __	14.0	16.5 - 20.3	30	30	0.1	500 424	<1.0
VC060318A400 __	18.0	22.9 - 28.0	40	30	0.1	275 225	<1.0
VC060326A580 __	26.0	31.0 - 38.0	58	30	0.1	200 160	<1.0
VC060330A650 __	30.0	37.0 - 46.0	65	30	0.1	175 150	<1.0
VC06LC18X500 __	See pages 14-15 for specification and performance details.						

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated)

Packaging: (Pcs/Reel) see page 2

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50µA leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating
0.1 Joule

Pulse Current & Waveform
2A 8/20µS

I_{peak} —Maximum peak current which may be applied with the specified waveform without device failure

E_{tran} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1kHz

L—Device inductance measured with a current edge rate of 100 mA/nS

Dimensions: Millimeters (Inches)

#Test condition <100µA

AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 3.3, 5.6, 9, 12, 14, 18, 26 OR 30 VDC
0805 SURFACE MOUNT

Dimensions:	Actual Size:	
	Length	2.01 ± 0.2mm (0.079" ± 0.008")
	Width	1.25 ± 0.2mm (0.049" ± 0.008")
	Thickness	1.02mm Max. (0.040")
	Land Length	0.71mm Max. (0.028")
	Termination Finish	X = Pt/Pd/Ag (Non-Plated) P = Ni/Sn Alloy (Plated)

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance		Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C		L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)		nH (typ.)
Test Condition	<50µA	1mA DC	8/20µS†	8/20µs	10/1000µS	0.5Vrms @: 1kHz 1 MHz		di/dt = 100mA/nS
VC080503A100 __	3.3#	4.1 - 6.0	10	40	0.1	1300	930	<1.5
VC080503C100 __	3.3#	3.7 - 5.6	10	120	0.3	5500	4000	1.5
VC080505A150 __	5.6	7.6 - 9.3	15.5	40	0.1	1250	860	<1.5
VC080505C150 __	5.6	7.1 - 8.7	15.5	120	0.3	3500	2400	1.5
VC080509A200 __	9	11.0 - 14.0	20	40	0.1	780	585	<1.5
VC080512A250 __	12	14.0 - 18.3	25	40	0.1	525	400	<1.5
VC080514A300 __	14	16.5 - 20.3	30	40	0.1	375	280	<1.5
VC080514C300 __	14	15.9 - 19.4	30	120	0.3	1100	820	1.5
VC080518A400 __	18*	22.9 - 28.0	40	30	0.1	350	275	<1.5
VC080518C400 __	18*	22.5 - 27.5	40	100	0.3	650	500	1.5
VC080526A580 __	26	31.0 - 37.9	58	30	0.1	140	110	<1.5
VC080526C580 __	26	30.5 - 37.3	58	100	0.3	250	190	1.5
VC080530A650 __	30	37.0 - 46.0	65	30	0.1	100	80	<1.5
VC08LC18A500 __	See pages 14-15 for specification and performance details.							

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated)

Packaging (Pcs/Reel): see page 2

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50µA leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating	Pulse Current & Waveform
0.1 Joule	2A 8/20µS
0.2 - 0.3 Joules	5A 8/20µS

I_{peak} —Maximum peak current which may be applied with the specified waveform without device failure

E_{tran} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1kHz

L—Device inductance measured with a current edge rate of 100 mA/nS

*Withstands 24.5 VDC for 5 minutes (automotive applications)

Dimensions: Millimeters (Inches)

#Test condition <100µA

AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 3.3, 5.6, 14, 18, 26, 30 OR 48 VDC
1206 SURFACE MOUNT

Dimensions:	Actual Size:	
Length	3.20 ± 0.2mm (0.126" ± 0.008")	
Width	1.60 ± 0.2mm (0.063" ± 0.008")	
Thickness	1.02mm Max. (0.040")	
Land Length	0.71mm Max. (0.028")	
Termination Finish	X = Pt/Pd/Ag (Non-Plated) P = Ni/Sn Alloy (Plated) - Contact Factory for Availability	

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance		Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C		L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)		nH (typ.)
Test Condition	<50µA	1mA DC	8/20µS†	8/20µs	10/1000µS	0.5Vrms @: 1kHz 1 MHz		di/dt = 100mA/nS
VC120603A100 __	3.3#	4.1 - 6.0	10	40	0.1	2000	1500	<1.7
VC120603D100 __	3.3#	3.7 - 5.6	10	150	0.4	4700	3800	1.7
VC120605A150 __	5.6	7.6 - 9.3	15.5	40	0.1	1200	870	<1.7
VC120605D150 __	5.6	7.1 - 8.7	15.5	150	0.4	3000	2300	1.7
VC120614A300 __	14	16.5 - 20.3	30	40	0.1	600	500	<1.7
VC120614D300 __	14	15.9 - 19.4	30	150	0.4	1200	900	1.7
VC120618A400 __	18*	22.9 - 28.0	40	30	0.1	350	270	<1.7
VC120618D400 __	18*	22.5 - 27.5	40	150	0.4	800	635	1.7
VC120626D580 __	26	30.5 - 37.3	58	120	0.4	550	450	1.7
VC120630D650 __	30	36.0 - 45.0	65	120	0.4	500	400	1.7
VC120648D101 __	48	56.0 - 68.0	100	100	0.4	225	185	1.7
VC12LC18A500 __	See pages 14-15 for specification and performance details.							

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated) Contact Factory for Availability

Packaging (Pcs/Reel): see page 2

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50µA leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating	Pulse Current & Waveform
0.1 Joule	2A 8/20µS
≥0.4 Joules	10A 8/20µS

I_{peak} —Maximum peak current which may be applied with the specified waveform without excessive leakage

E_{tran} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1kHz

L—Device inductance measured with a current edge rate of 100 mA/nS

*Withstands 24.5 VDC for 5 minutes (automotive applications)

Dimensions: Millimeters (Inches)

#Test condition <100µA

AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 18, 26, 30, 48 OR 60 VDC
1210 SURFACE MOUNT

Dimensions:	Actual Size:	
	Length	3.20 ± 0.2mm (0.126" ± 0.008")
	Width	2.49 ± 0.2mm (0.098" ± 0.008")
	Thickness	1.70mm Max. (0.067")
	Land Length	0.71mm Max. (0.028")
	Termination Finish	X = Pt/Pd/Ag (Non-Plated) P = Ni/Sn Alloy (Plated) - Contact Factory for Availability

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance	Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C	L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)	nH (typ.)
Test Condition	<50μA	1mA DC	8/20μS†	8/20μs	10/1000μS	0.5Vrms @: 1kHz 1 MHz	di/dt = 100mA/nS
VC121018J390 __	18*	21.5 - 26.5	39	500	1.5	3100 2400	2.0
VC121026H560 __	26	29.7 - 36.3	56	300	1.2	2150 1675	2.0
VC121030G620 __	30	35.0 - 43.0	62	220	0.9	1900 1530	2.0
VC121030H620 __	30	35.0 - 43.0	62	280	1.2	1975 1575	2.0
VC121048G101 __	48	54.5 - 66.5	100	220	0.9	500 430	2.0
VC121048H101 __	48	54.5 - 66.5	100	250	1.2	525 450	2.0
VC121060J121 __	60	67.0 - 83.0	120	250	1.5	450 375	2.0

Termination Finish: X = Pt/Pd/Ag (Non-Plated)
P = Ni/Sn Alloy (Plated) Contact Factory for Availability
Packaging (Pcs/Reel): see page 2

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50μA leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating Pulse Current & Waveform
≥0.4 Joules 10A 8/20μS

I_{peak} —Maximum peak current which may be applied with the specified waveform without device failure

E_{tran} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1kHz

L—Device inductance measured with a current edge rate of 100 mA/nS

*Withstands 24.5 VDC for 5 minutes (automotive applications)

Dimensions: Millimeters (Inches)

AVX Multilayer Ceramic Transient Voltage Suppressors

VOLTAGES = 3.3, 5.6, 14, 18, 26, 30, 48, 60 VDC
AXIAL LEADED

Dimensions:

	VA1000	VA2000
Body Length	(L) = 4.32mm Max. (0.170")	4.83mm Max. (0.190")
Body Diameter	(D) = 2.54mm Max. (0.100")	3.56mm Max. (0.140")
Lead Diameter	= 0.51 ± .05mm (0.020 ± 0.002)	0.51 ± .05mm (0.020 ± 0.002)
Lead Length	= 25.4mm Min. (1")	25.4mm Min. (1")
Lead Finish	Copper Clad Steel, Solder Coated	

AVX Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Peak Current	Transient Energy	Capacitance		Inductance
Symbol	V_{WM}	V_B	V_C	I_{peak}	E_{trans}	C		L
Units	Volts (max.)	Volts	Volts (max.)	Amp (max.)	Joules (max.)	pF (typ.)		nH (typ.)
Test Condition	<50 μ A	1mA DC	8/20 μ S†	8/20 μ s	10/1000 μ S	0.5Vrms @: 1kHz 1 MHz		di/dt = 100mA/nS
VA100003A100 _ L	3.3#	4.1 - 6.0	10	40	0.1	1500	1100	3.5
VA100003D100 _ L	3.3#	3.7 - 5.6	10	150	0.4	4700	3800	3.5
VA100005A150 _ L	5.6	7.6 - 9.3	15.5	40	0.1	1000	750	3.5
VA100005D150 _ L	5.6	7.1 - 8.7	15.5	150	0.4	2800	2150	3.5
VA100014A300 _ L	14	16.5 - 20.3	30	40	0.1	400	300	3.5
VA100014D300 _ L	14	15.9 - 19.4	30	150	0.4	1200	900	3.5
VA100018A400 _ L	18	22.9 - 28.0	40	40	0.1	350	270	3.5
VA100018D400 _ L	18	22.5 - 27.5	40	150	0.4	900	700	3.5
VA100026D580 _ L	26	30.5 - 37.3	58	120	0.4	700	550	3.5
VA100030D650 _ L	30	36.0 - 45.0	65	120	0.4	600	500	3.5
VA100048D101 _ L	48	56.0 - 68.0	100	100	0.4	200	165	3.5
VA200060K121 _ L	60	67.0 - 83.0	120	300	2.0	400	340	3.5
VA10LC18A500 _ L	See pages 14-15 for specification and performance details.							

Lead Finish: L = Copper Clad Steel, Solder Coated

Packaging (Pcs/Reel): see page 2

V_{WM} —Maximum steady-state DC operating voltage the varistor can maintain and not exceed 50 μ A leakage current

V_B —Voltage across the device measured at 1mA DC current

V_C —Maximum peak voltage across the varistor measured at a specified pulse current and waveform

†Transient Energy Rating

0.1 Joule

≥0.4 Joules

Pulse Current & Waveform

2A 8/20 μ S

10A 8/20 μ S

I_{peak} —Maximum peak current which may be applied with the specified waveform without device failure

E_{trans} —Maximum energy which may be dissipated with the specified waveform without device failure

C—Device capacitance measured with zero volt bias 0.5Vrms and 1kHz

L—Device inductance measured with a current edge rate of 100 mA/nS

Dimensions: Millimeters (Inches)

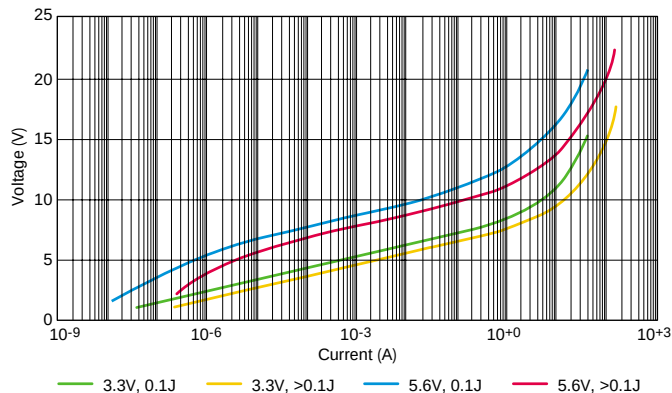
#Test condition <100 μ A

TYPICAL PERFORMANCE CURVES (0603, 0805, 1206 & 1210 CHIP SIZES)

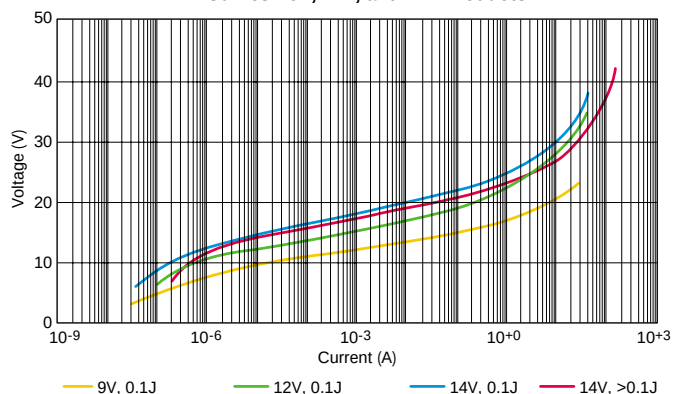
VOLTAGE/CURRENT CHARACTERISTICS

Multilayer construction and improved grain structure result in excellent transient clamping characteristics up to 500 amps peak current, depending on case size and energy rating, while maintaining very low leakage currents under DC operating conditions. The VI curve below shows the voltage/current characteristics for the 3.3V, 5.6V, 12V, 14V, 18V, 26V, 30V, 48V and 60VDC parts with currents ranging from parts of a micro amp to tens of amps.

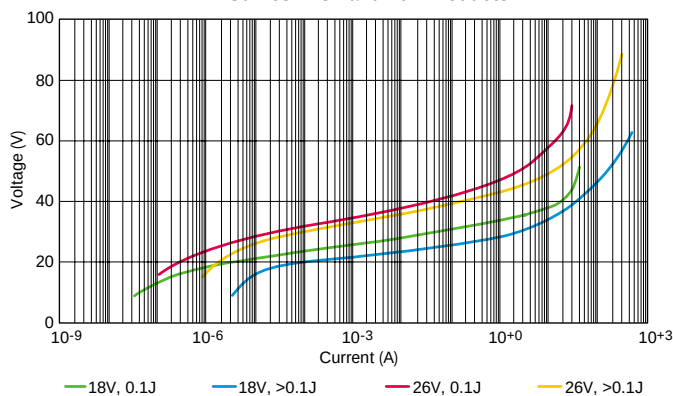
VI Curves - 3.3V and 5.6V Products



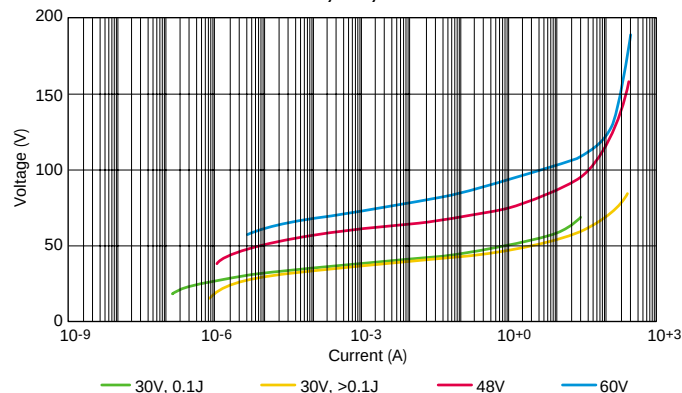
VI Curves - 9V, 12V, and 14V Products



VI Curves - 18V and 26V Products

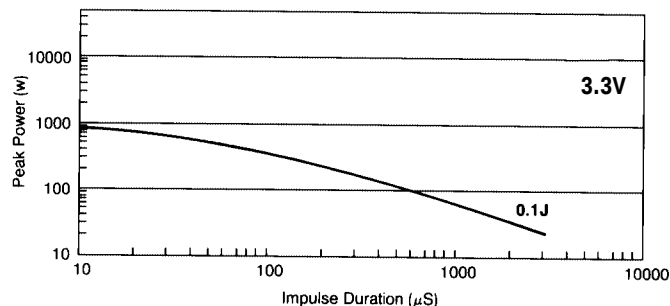


VI Curves - 30V, 48V, and 60V Products

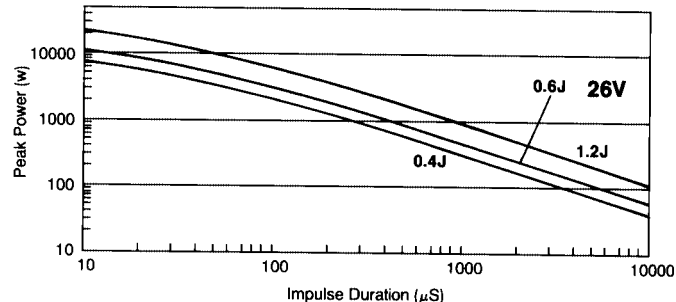


TYPICAL PERFORMANCE CURVES (0603, 0805, 1206 & 1210 CHIP SIZES)

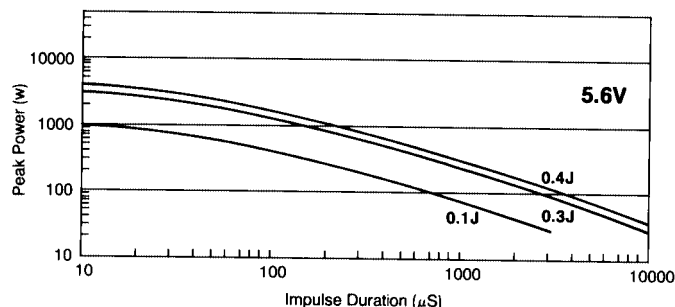
TYPICAL PULSE RATING CURVE
3.3V MULTILAYER TRANSGUARD®



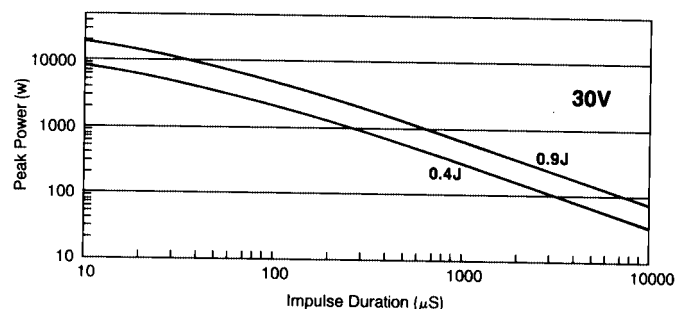
TYPICAL PULSE RATING CURVE
26V MULTILAYER TRANSGUARD®



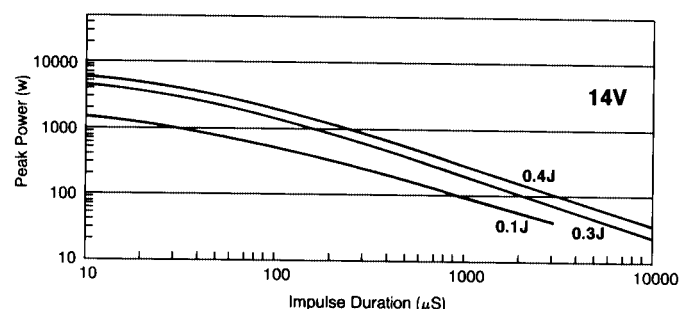
TYPICAL PULSE RATING CURVE
5.6V MULTILAYER TRANSGUARD®



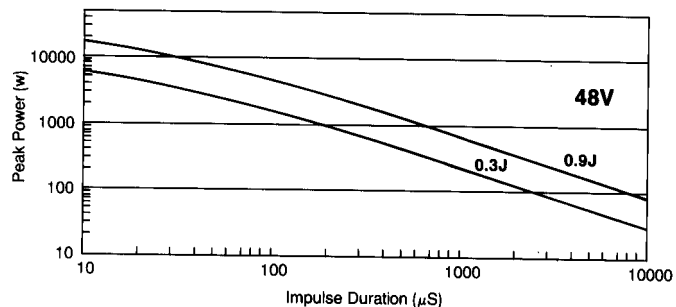
TYPICAL PULSE RATING CURVE
30V MULTILAYER TRANSGUARD®



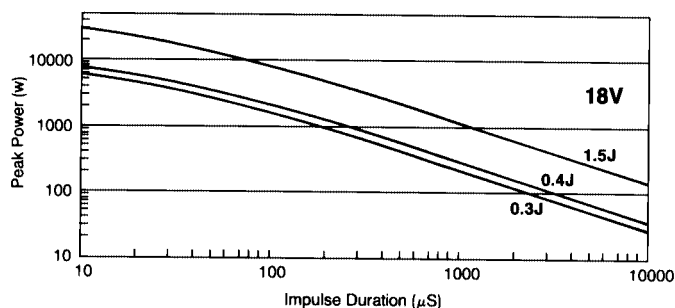
TYPICAL PULSE RATING CURVE
14V MULTILAYER TRANSGUARD®



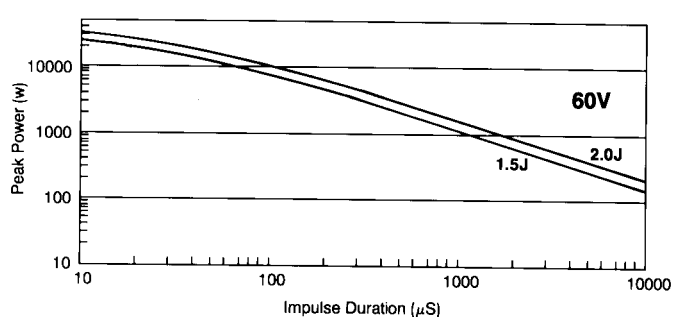
TYPICAL PULSE RATING CURVE
48V MULTILAYER TRANSGUARD®



TYPICAL PULSE RATING CURVE
18V MULTILAYER TRANSGUARD®



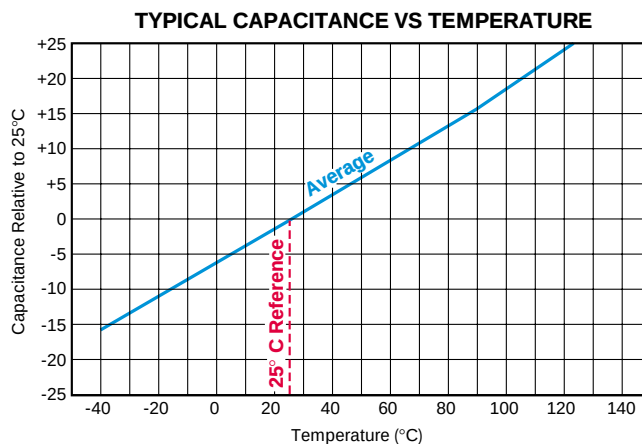
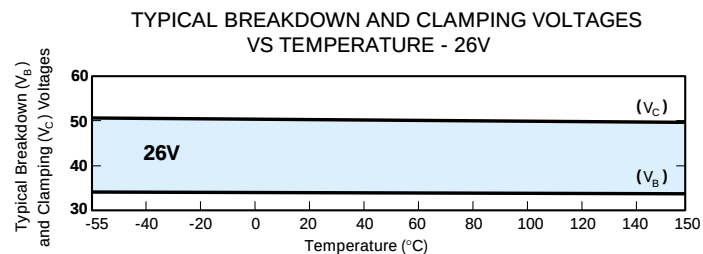
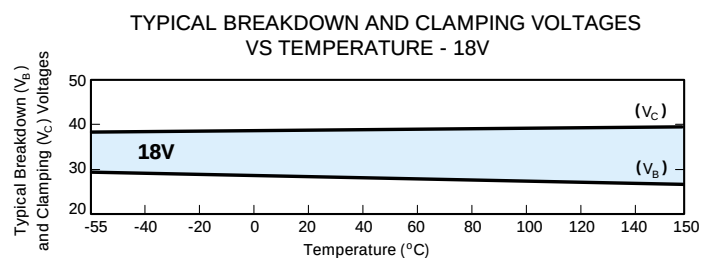
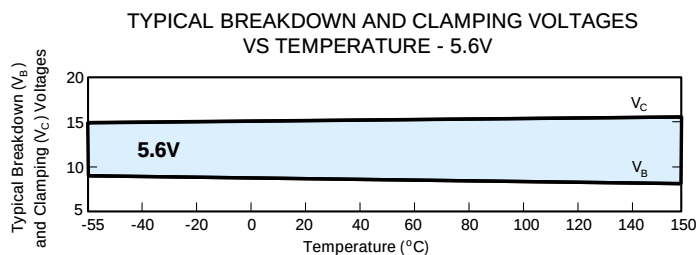
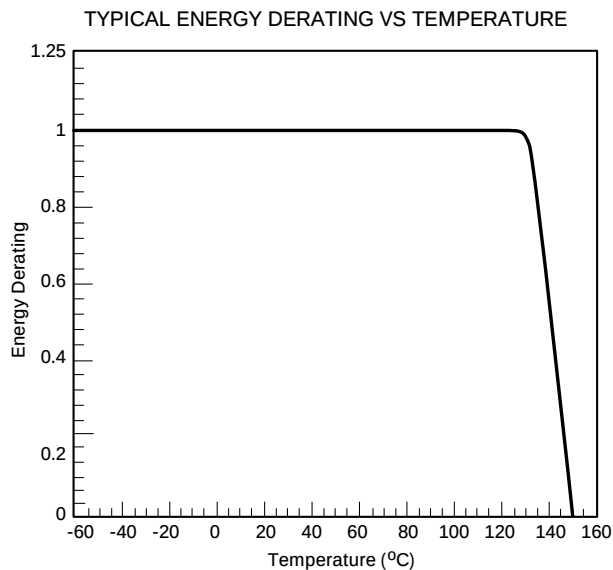
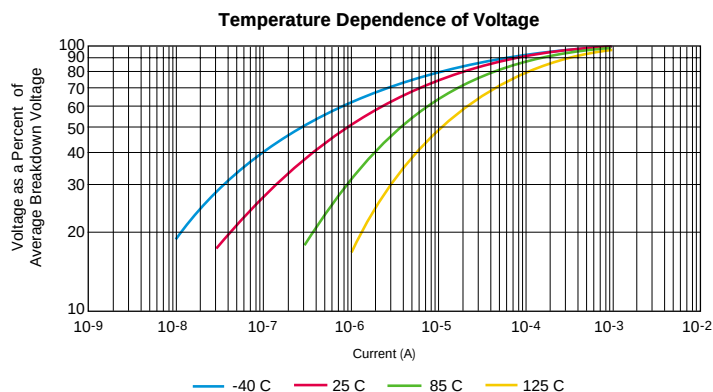
TYPICAL PULSE RATING CURVE
60V MULTILAYER TRANSGUARD®



TYPICAL PERFORMANCE CURVES (0603, 0805, 1206 & 1210 CHIP SIZES)

TEMPERATURE CHARACTERISTICS

TransGuard® suppressors are designed to operate over the full temperature range from -55°C to +125°C. This operating temperature range is for both surface mount and axial leaded products.



TYPICAL PERFORMANCE CURVES (0603, 0805, 1206 & 1210 CHIP SIZES)

PULSE DEGRADATION

Traditionally varistors have suffered degradation of electrical performance with repeated high current pulses resulting in decreased breakdown voltage and increased leakage current. It has been suggested that irregular intergranular boundaries and bulk material result in restricted current paths and other non-Schottky barrier paralleled conduction paths in the ceramic. Repeated pulsing of both 5.6 and 14V TransGuard transient voltage suppressors with

150Amp peak 8 x 20µs waveforms shows negligible degradation in breakdown voltage and minimal increases in leakage current. This does not mean that TransGuard suppressors do not suffer degradation, but it occurs at much higher current. The plots of typical breakdown voltage vs number of 150A pulses are shown below.

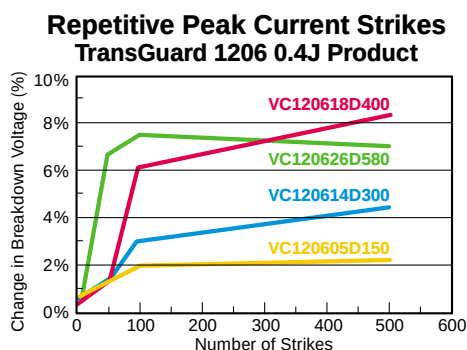


Figure 1

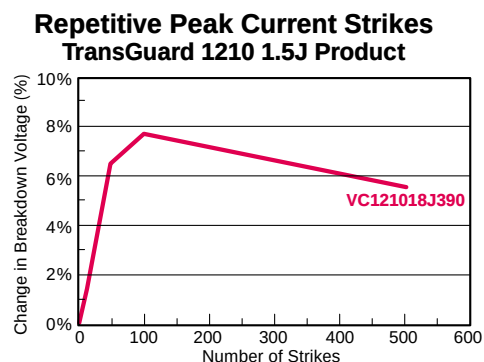


Figure 3

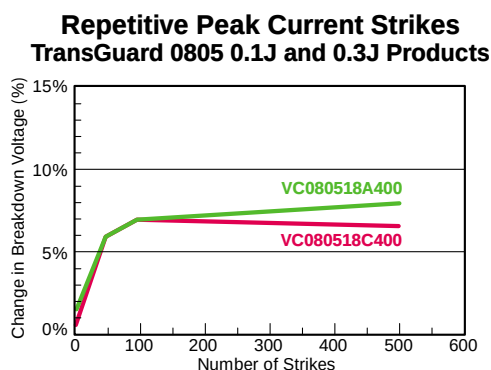


Figure 2

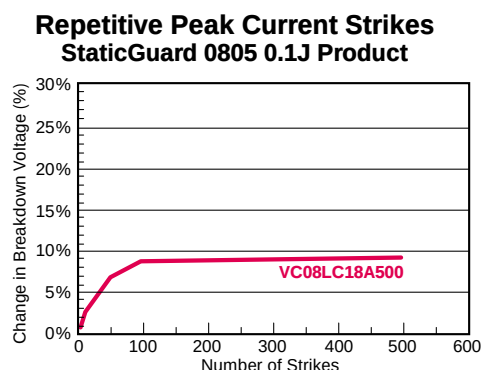
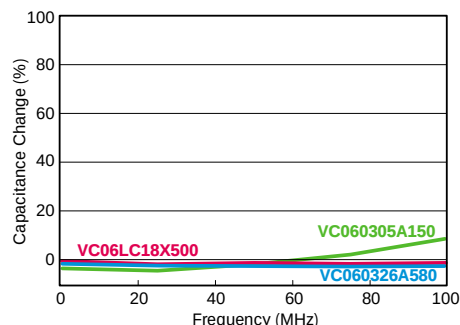


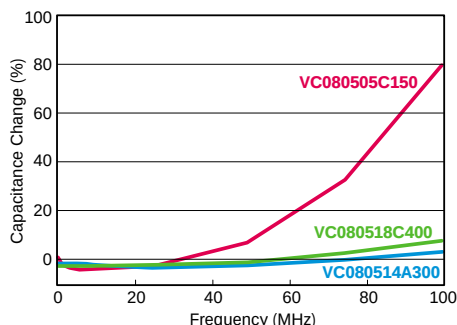
Figure 4

CAPACITANCE/FREQUENCY CHARACTERISTICS

TransGuard Capacitance vs Frequency 0603



TransGuard Capacitance vs Frequency 0805



TransGuard Capacitance vs Frequency 1206

