

## 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:

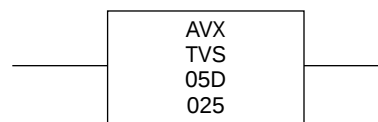
A = Axial

#### 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)<br>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 @:<br>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 @:<br>1 MHz | di/dt =<br>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

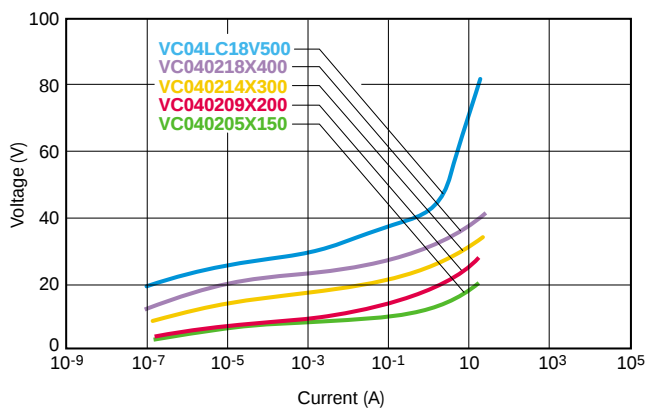
Dimensions: Millimeters (Inches)

## AVX Multilayer Ceramic Transient Voltage Suppressors

### TYPICAL PERFORMANCE CURVES (0402 CHIP SIZE)

#### VOLTAGE/CURRENT CHARACTERISTICS

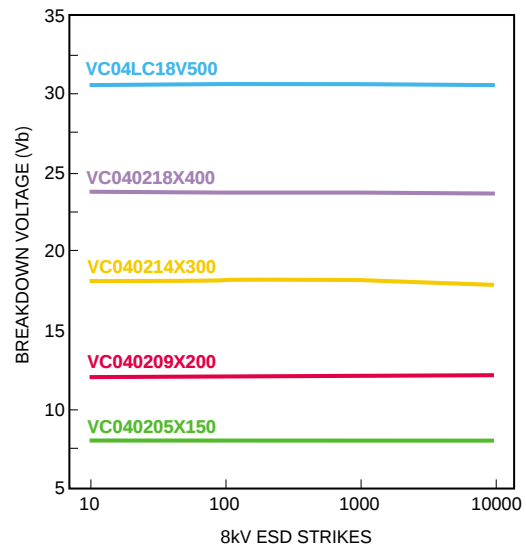
Multilayer construction and improved grain structure result in excellent transient clamping characteristics up to 20 amps peak current, while maintaining very low leakage currents under DC operating conditions. The VI curves below show the voltage/current characteristics for the 5.6V, 9V, 14V, 18V and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



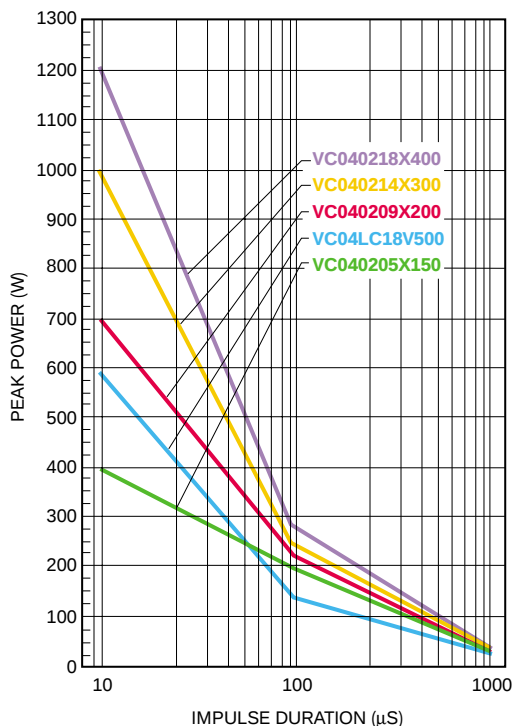
#### PULSE DEGRADATION

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.

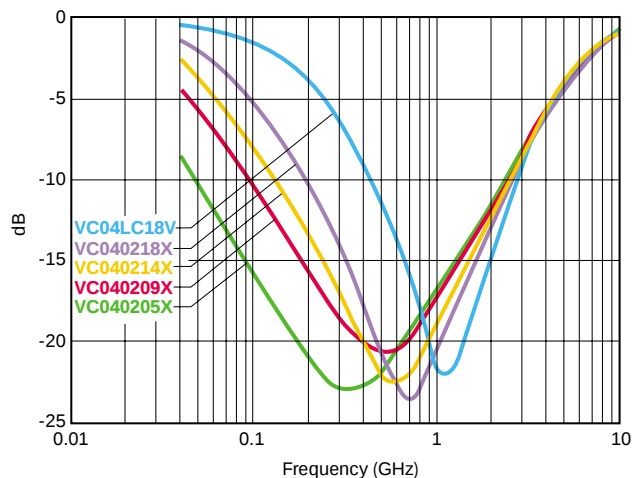
#### ESD TEST OF 0402 PARTS



#### 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**

|                    |                        |                                                                                   |
|--------------------|------------------------|-----------------------------------------------------------------------------------|
| <b>Dimensions:</b> | <b>Actual Size:</b>    |  |
|                    | 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)<br>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 @:<br>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**

|                    |                     |                                                                                   |
|--------------------|---------------------|-----------------------------------------------------------------------------------|
| <b>Dimensions:</b> | <b>Actual Size:</b> |  |
|                    | 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)<br>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 @:<br>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)<br>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 @:<br>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

0.1 Joule

≥0.4 Joules

Pulse Current & Waveform

2A 8/20µS

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**

|                    |                     |                                                                                          |
|--------------------|---------------------|------------------------------------------------------------------------------------------|
| <b>Dimensions:</b> | <b>Actual Size:</b> |                                                                                          |
|                    | 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)<br>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  | <50 $\mu$ A     | 1mA DC            | 8/20 $\mu$ S†    | 8/20 $\mu$ s | 10/1000 $\mu$ S  | 0.5Vrms @:<br>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 50 $\mu$ 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

≥0.4 Joules

Pulse Current & Waveform

10A 8/20 $\mu$ S

$I_{peak}$ —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:

|               | <b>VA1000</b>                    | <b>VA2000</b>                |
|---------------|----------------------------------|------------------------------|
| 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 $\mu$ A                                                | 1mA DC            | 8/20 $\mu$ S†    | 8/20 $\mu$ s | 10/1000 $\mu$ S  | 0.5Vrms @:<br>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 $\mu$ 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 $\mu$ S

10A 8/20 $\mu$ 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)

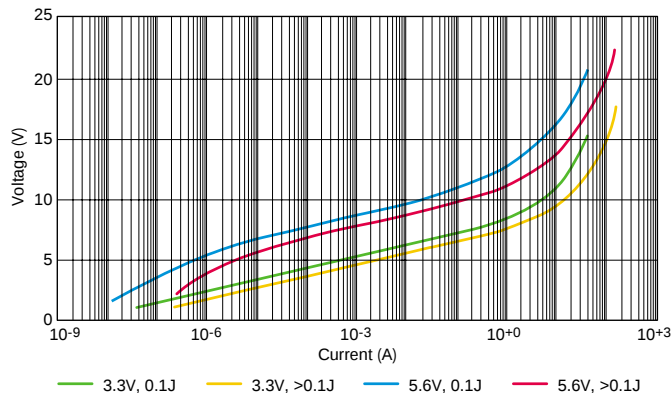
#Test condition <100 $\mu$ A

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

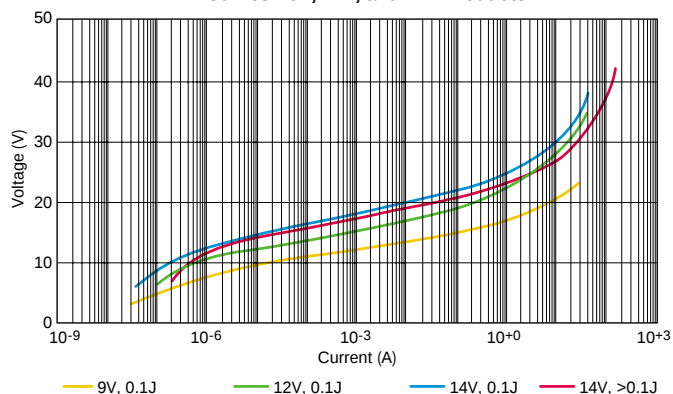
#### VOLTAGE/CURRENT CHARACTERISTICS

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.

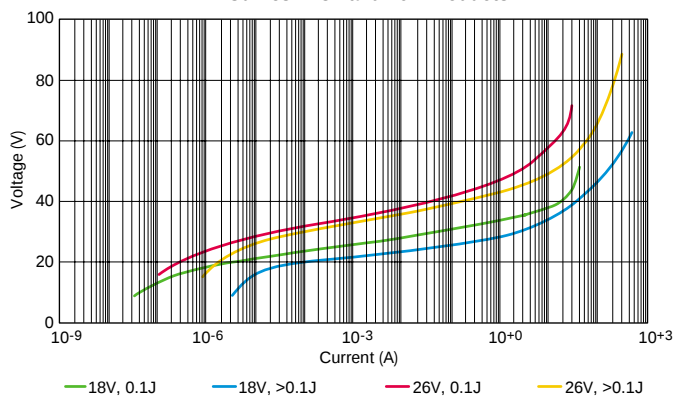
VI Curves - 3.3V and 5.6V Products



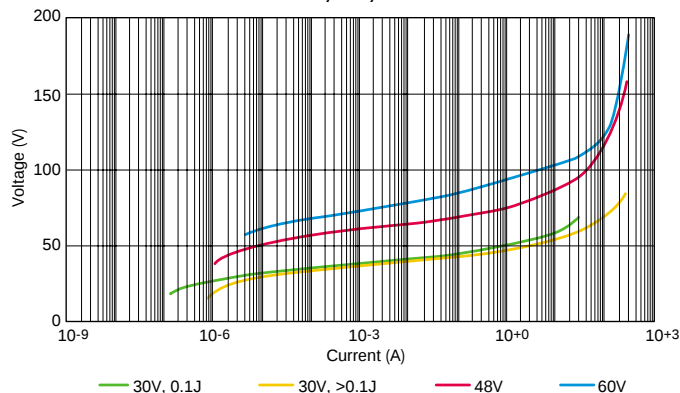
VI Curves - 9V, 12V, and 14V Products



VI Curves - 18V and 26V Products

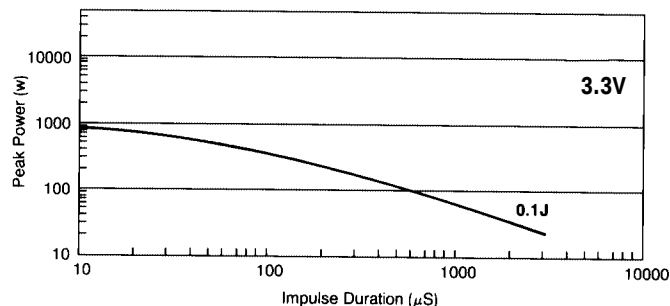


VI Curves - 30V, 48V, and 60V Products

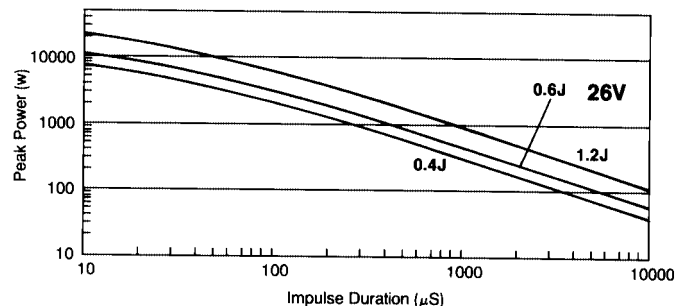


### TYPICAL PERFORMANCE CURVES (0603, 0805, 1206 & 1210 CHIP SIZES)

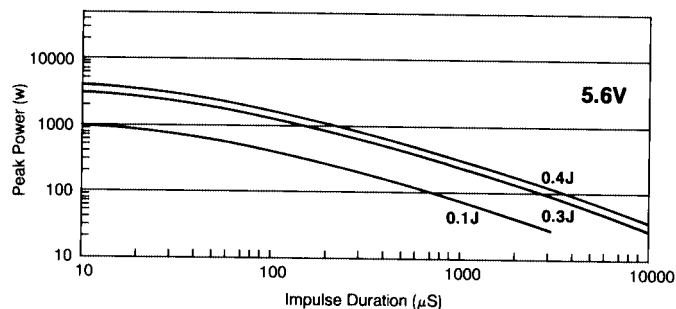
TYPICAL PULSE RATING CURVE  
3.3V MULTILAYER TRANSGUARD®



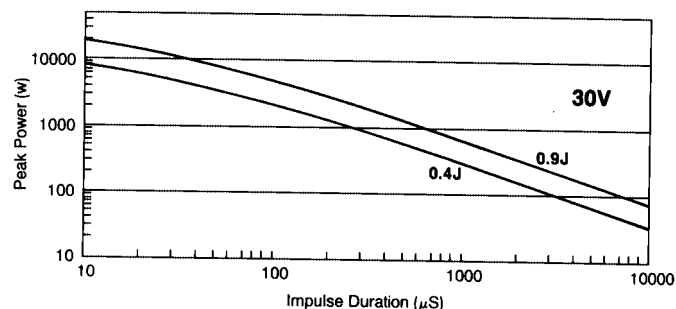
TYPICAL PULSE RATING CURVE  
26V MULTILAYER TRANSGUARD®



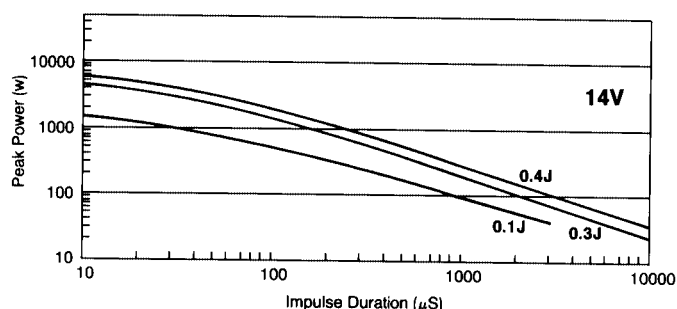
TYPICAL PULSE RATING CURVE  
5.6V MULTILAYER TRANSGUARD®



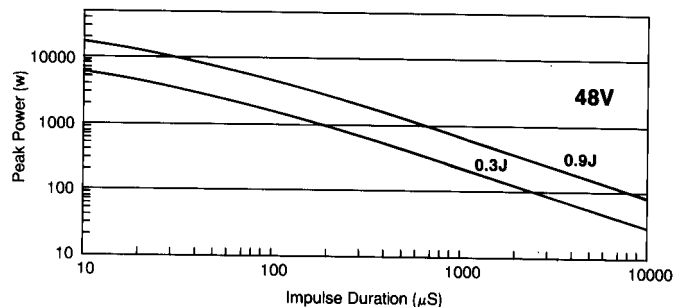
TYPICAL PULSE RATING CURVE  
30V MULTILAYER TRANSGUARD®



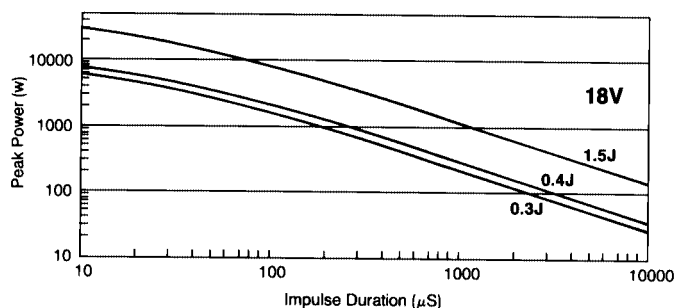
TYPICAL PULSE RATING CURVE  
14V MULTILAYER TRANSGUARD®



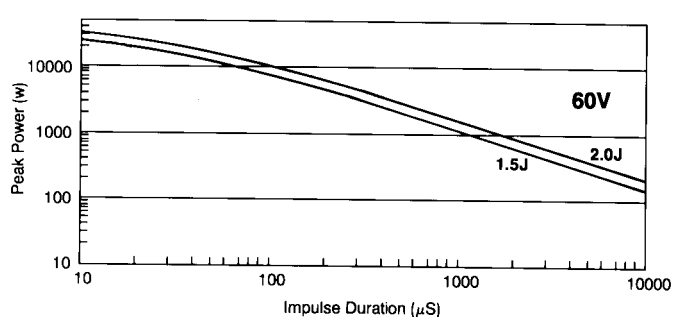
TYPICAL PULSE RATING CURVE  
48V MULTILAYER TRANSGUARD®



TYPICAL PULSE RATING CURVE  
18V MULTILAYER TRANSGUARD®



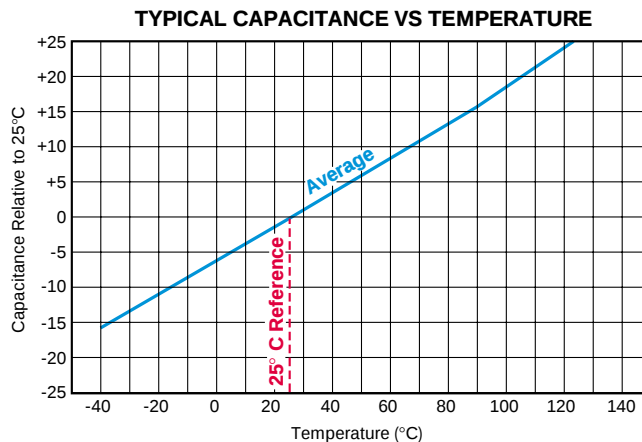
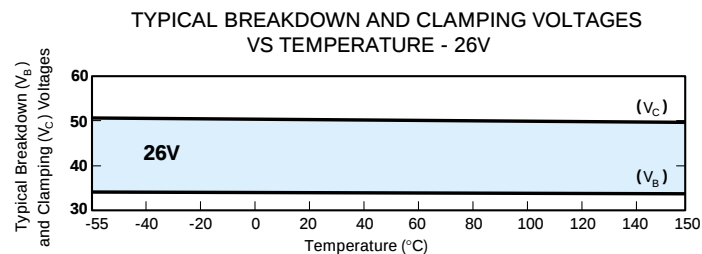
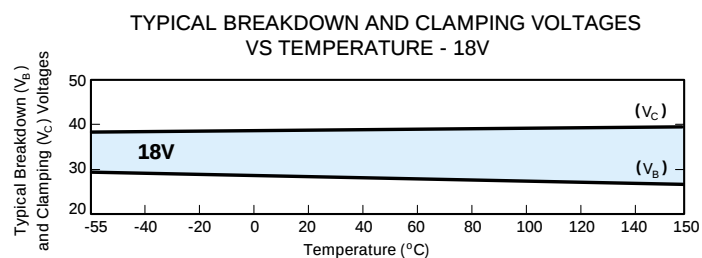
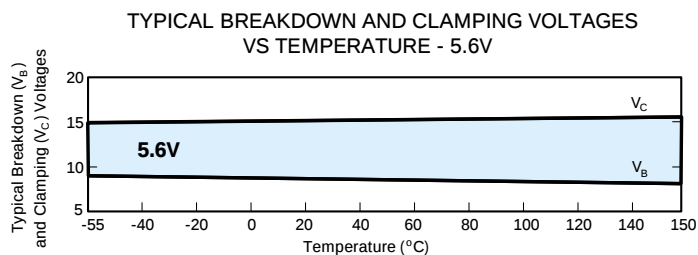
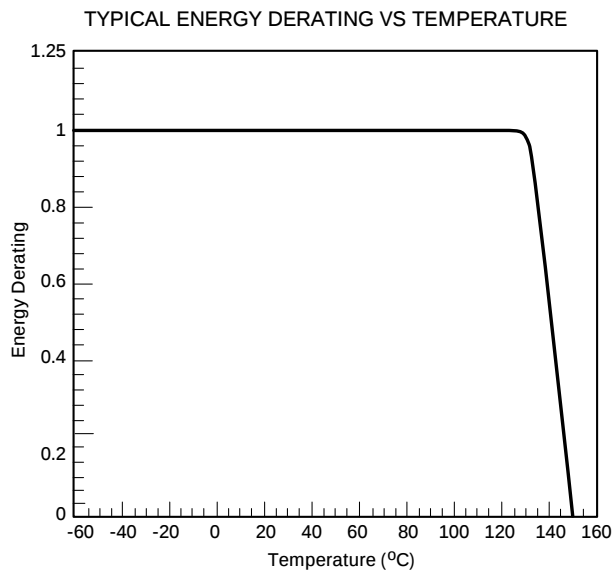
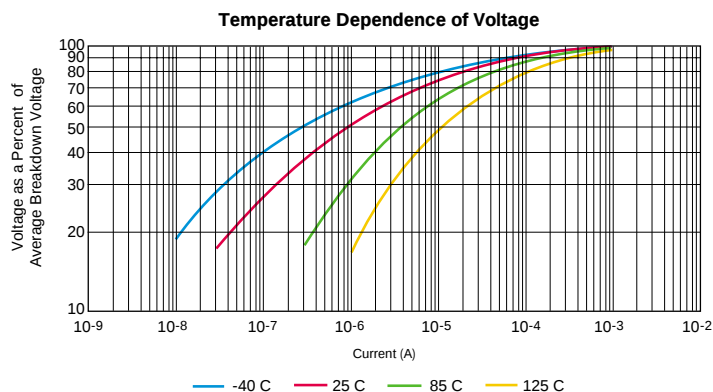
TYPICAL PULSE RATING CURVE  
60V MULTILAYER TRANSGUARD®



### 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.

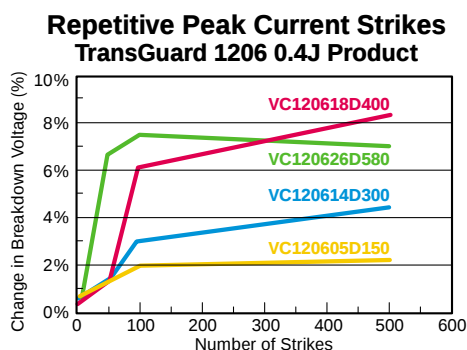


Figure 1

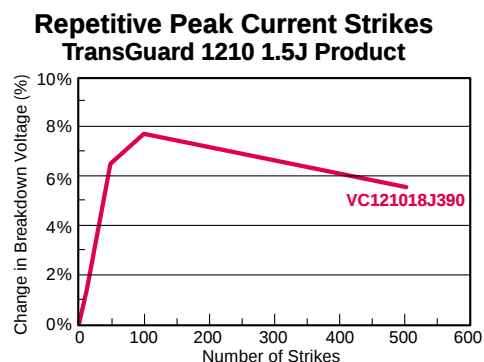


Figure 3

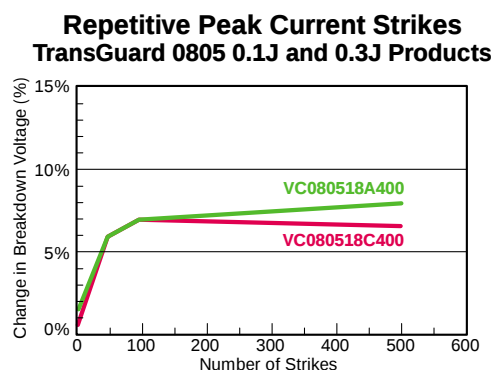


Figure 2

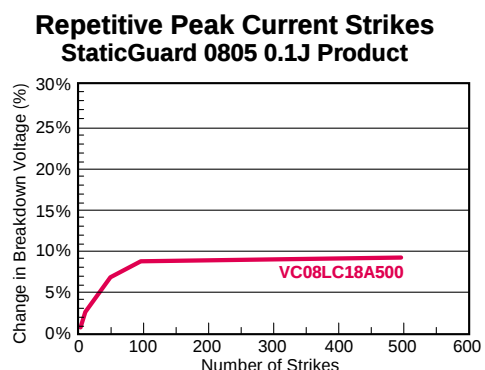
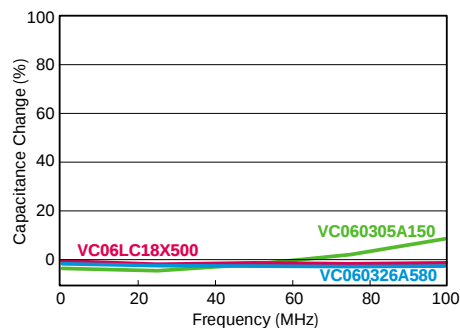


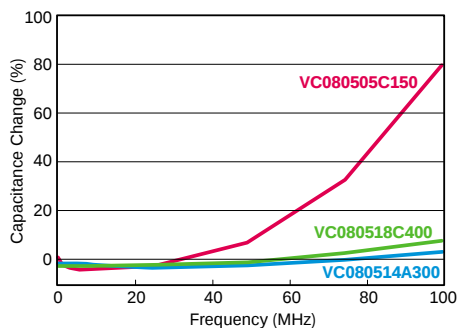
Figure 4

#### CAPACITANCE/FREQUENCY CHARACTERISTICS

TransGuard Capacitance vs Frequency 0603



TransGuard Capacitance vs Frequency 0805



TransGuard Capacitance vs Frequency 1206

