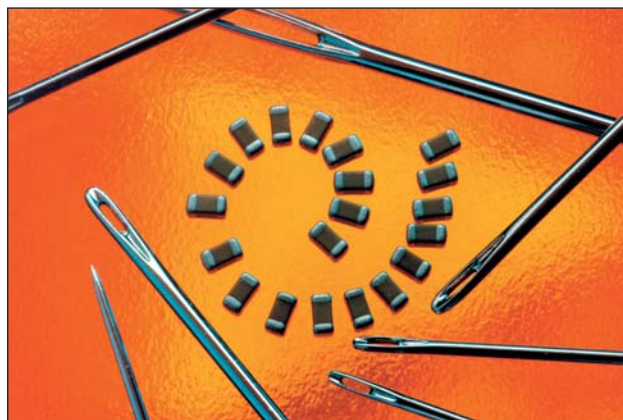


# StaticGuard

## AVX Multilayer Ceramic Transient Voltage Suppressors ESD Protection for CMOS, Bi Polar and SiGe Based Systems



### GENERAL DESCRIPTION

The StaticGuard Series are low capacitance versions of the TransGuard and are designed for general ESD protection of CMOS, Bi-Polar, and SiGe based systems. The low capacitance makes these products suitable for use in high speed data transmission lines.

### GENERAL CHARACTERISTICS

- Operating Temperature:  
-55°C to 125°C
- Working Voltage:  $\leq 18\text{Vdc}$
- Case Size: 0402, 0603, 0805, 1206

### FEATURES

- Typical ESD failure voltage for CMOS and/or Bi Polar is  $\geq 200\text{V}$
- Low capacitance ( $<200\text{pF}$ ) is required for high-speed data transmission.
- Low leakage current ( $I_L$ ) is necessary for battery operated equipment.
- 15kV ESD pulse (air discharge) per IEC 61000-4-2, Level 4, generates  $< 20$  millijoules of energy.

### APPLICATIONS

- Sensors
- CMOS
- SiGe based systems
- Higher speeded data lines
- Capacitance sensitive applications and more

### HOW TO ORDER

| VC            | 06                                               | LC             | 18              | X                                                     | 500              | R                                                       | P           |
|---------------|--------------------------------------------------|----------------|-----------------|-------------------------------------------------------|------------------|---------------------------------------------------------|-------------|
| Varistor Chip | Case Size                                        | Low Cap Design | Working Voltage | Energy Rating                                         | Clamping Voltage | Packaging (PCS/REEL)                                    | Termination |
|               | 04 = 0402<br>06 = 0603<br>08 = 0805<br>12 = 1206 |                | 18 = 18.0VDC    | A = 0.10 Joules<br>V = 0.02 Joules<br>X = 0.05 Joules | 500 = 50V        | D = 1,000*<br>R = 4,000*<br>T = 10,000*<br>W = 10,000** | P = Ni/Sn   |

\*Not available for 0402

\*\*Only available for 0402

### ELECTRIAL CHARACTERISTICS

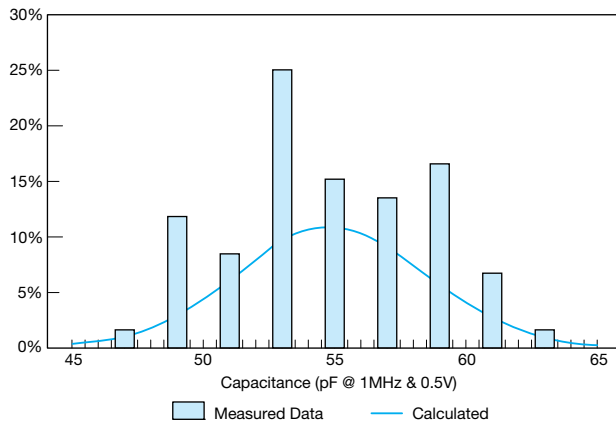
| AVX PN       | V <sub>W</sub> (DC) | V <sub>W</sub> (AC) | V <sub>B</sub> | V <sub>C</sub> | I <sub>VC</sub> | I <sub>L</sub> | E <sub>T</sub> | I <sub>P</sub> | Cap | Freq | Size |
|--------------|---------------------|---------------------|----------------|----------------|-----------------|----------------|----------------|----------------|-----|------|------|
| VC04LC18V500 | $\leq 18.0$         | $\leq 14.0$         | 25-40          | 50             | 1               | 10             | 0.02           | 15             | 40  | M    | 0402 |
| VC06LC18X500 | $\leq 18.0$         | $\leq 14.0$         | 25-40          | 50             | 1               | 10             | 0.05           | 30             | 50  | M    | 0603 |
| VC08LC18A500 | $\leq 18.0$         | $\leq 14.0$         | 25-40          | 50             | 1               | 10             | 0.1            | 30             | 80  | M    | 0805 |
| VC12LC18A500 | $\leq 18.0$         | $\leq 14.0$         | 25-40          | 50             | 1               | 10             | 0.1            | 30             | 200 | K    | 1206 |

V<sub>W</sub>(DC) DC Working Voltage [V]  
V<sub>W</sub>(AC) AC Working Voltage [V]  
V<sub>B</sub> Typical Breakdown Voltage (Min-Max)  
[V @ 1mA<sub>DC</sub>, 25°C]  
V<sub>C</sub> Clamping Voltage [V @ I<sub>VC</sub>]  
I<sub>VC</sub> Test Current for V<sub>C</sub> [A, 8x20μs]

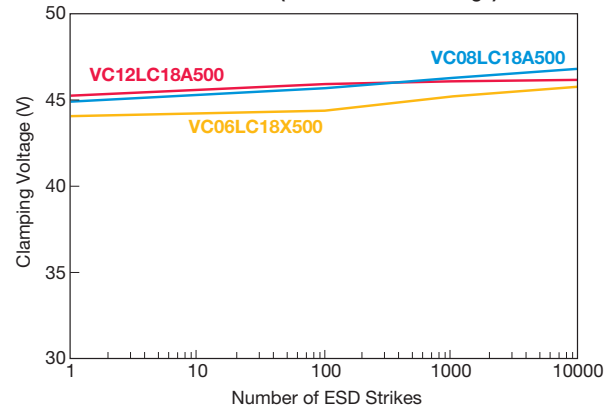
I<sub>L</sub> Maximum leakage current at the working  
voltage, 25°C [μA]  
E<sub>T</sub> Transient Energy Rating [J, 10x1000μs]  
I<sub>P</sub> Peak Current Rating [A, 8x20μs]  
Cap Typical capacitance [pF] @ frequency specified  
and 0.5V<sub>W</sub>, 25°C, K = 1kHz, M = 1MHz

### TYPICAL PERFORMANCE DATA

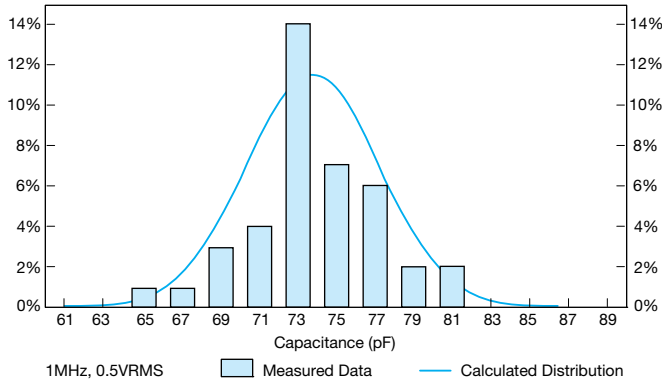
VC06LC18X500 Capacitance Histogram



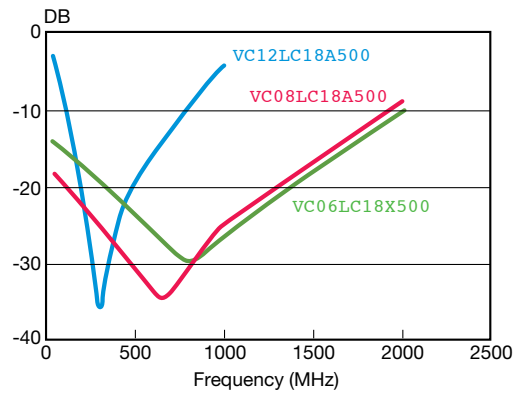
StaticGuard ESD RESPONSE  
IEC 61000-4-2 (8 Kv Contact Discharge)



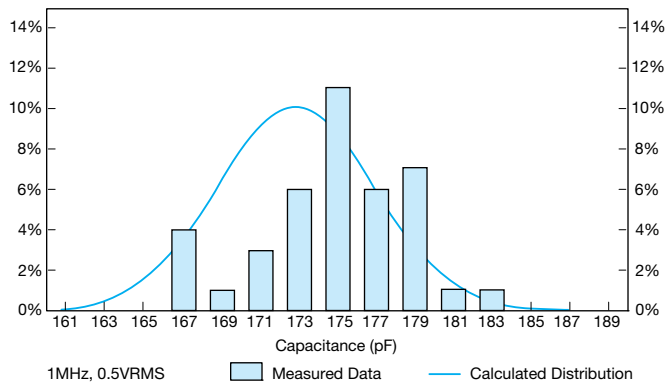
VC08LC18A500 Capacitance Histogram



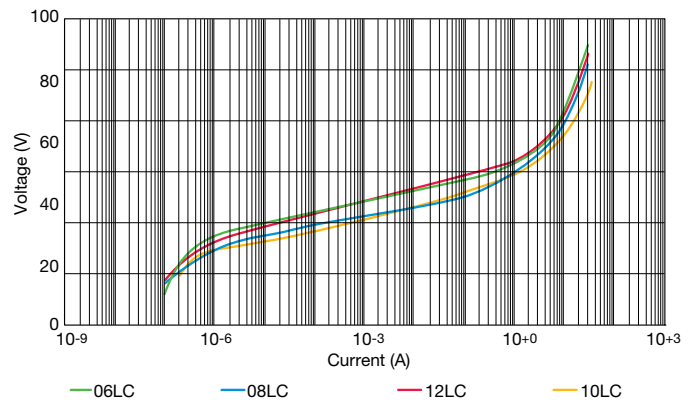
StaticGuard S21



VC12LC18A500 Capacitance Histogram



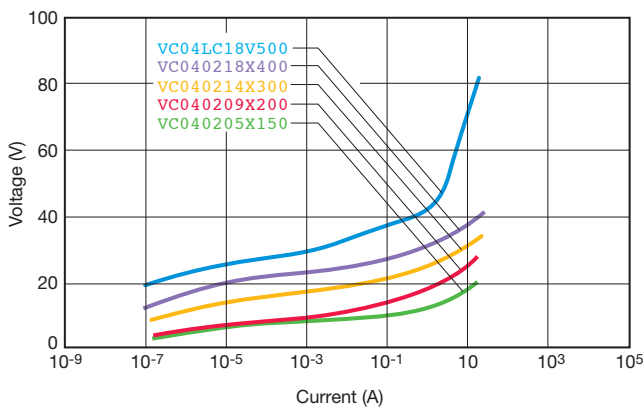
VI Curves - StaticGuard Products



### TYPICAL PERFORMANCE CURVES (0402 CHIP SIZE)

#### VOLTAGE/CURRENT CHARACTERISTICS

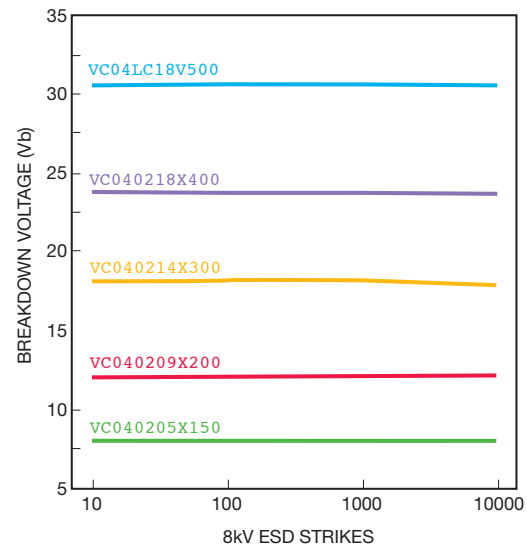
Multilayer construction and improved grain structure result in excellent transient clamping characteristics up to 20 amps peak current, while maintaining very low leakage currents under DC operating conditions. The VI curves below show the voltage/current characteristics for the 5.6V, 9V, 14V, 18V and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



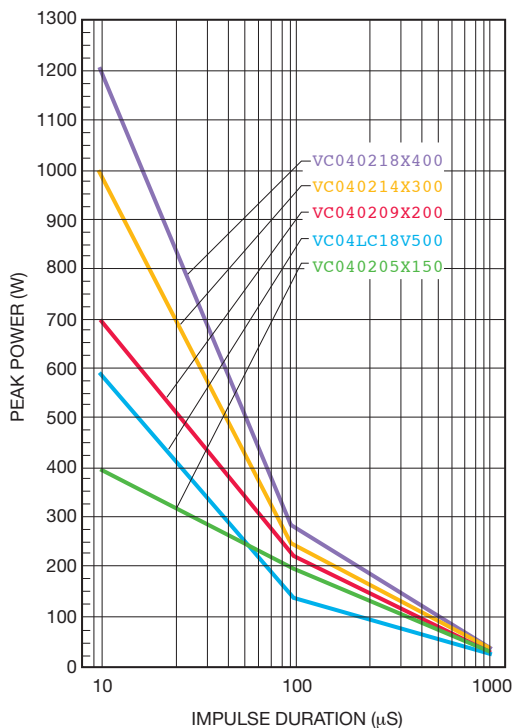
#### PULSE DEGRADATION

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 x 20μS waveforms shows negligible degradation in breakdown voltage and minimal increases in leakage current.

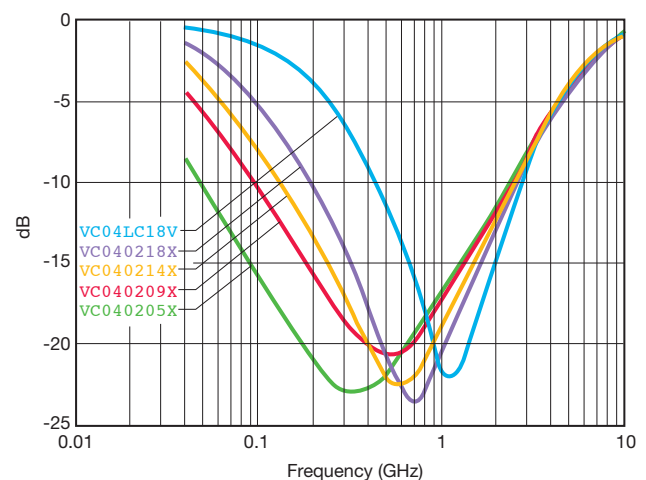
#### ESD TEST OF 0402 PARTS



#### PEAK POWER VS PULSE DURATION



#### INSERTION LOSS CHARACTERISTICS



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