

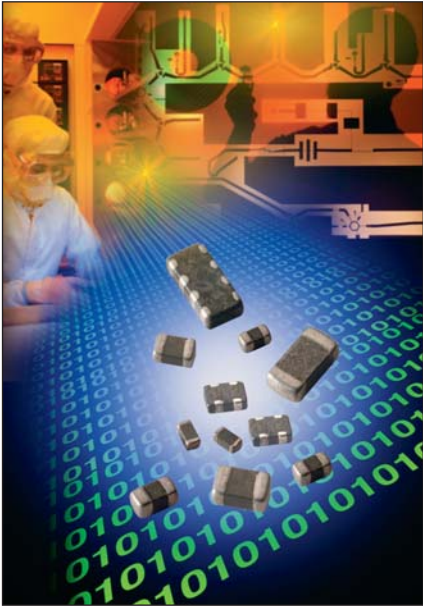
## ESD Protection for Low Leakage Requirements

### GENERAL DESCRIPTION

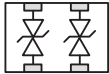
Faster semiconductor clock speeds and an increasing reliance on batteries as power sources have resulted in the need for varistors that exhibit very low leakage current. The UltraGuard (UG) Series of AVX Transient Voltage Suppressors address this problem.

The UG Series is the ideal transient protection solution for high clock speed integrated circuit application, battery-operated device, backlit display, medical/instrument application, low voltage power conversion circuits and power supervisory chip sets. In addition, UltraGuard's low leakage characteristics are also suitable for optic circuits like LDD, SerDes, and laser diodes.

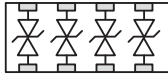
The UG Series is offered as discrete chips (0402, 0603, and 0805), 2-element packages (0405 and 0508), and 4-element packages (0612).



**Discrete Chips**  
0402, 0603,  
and 0805



**2-Element Arrays**  
(0405 and 0508)



**4-Element Arrays**  
(0612)

### HOW TO ORDER

**VC**  
VC=Surface  
Mount Chip

**UG**  
**Series**  
UG = Low  
Leakage  
Series

**04**  
**Case Size**  
04 = 0402  
06 = 0603  
08 = 0805

**0180**  
**Maximum  
Working  
Voltage**  
0030 = 3.0V<sub>DC</sub>  
0050 = 5.0V<sub>DC</sub>  
0075 = 7.5V<sub>DC</sub>  
0100 = 10.0V<sub>DC</sub>  
0150 = 15.0V<sub>DC</sub>  
0180 = 18.0V<sub>DC</sub>

**L**  
**Capacitance**  
L = Low  
H = High

**1**  
**No. of  
Elements**

**W**  
**Packaging  
(pieces per  
reel)**  
D = 1,000  
(7" reel)  
R = 4,000  
(7" reel)  
T = 10,000  
(13" reel)  
W = 10,000  
(7" reel,  
0402 only)

**P**  
**Termination  
Finish**  
P = Ni/Sn Alloy  
(Plated)

### HOW TO ORDER

**MG**  
MG=Array

**UG**  
**Series**  
UG = Low  
Leakage  
Series

**06**  
**Case Size**  
04 = 0405  
05 = 0508  
06 = 0612

**0150**  
**Maximum  
Working  
Voltage**  
0030 = 3.0V<sub>DC</sub>  
0050 = 5.0V<sub>DC</sub>  
0075 = 7.5V<sub>DC</sub>  
0100 = 10.0V<sub>DC</sub>  
0150 = 15.0V<sub>DC</sub>

**L**  
**Capacitance**  
L = Low  
H = High

**4**  
**No. of  
Elements**  
2 = 2 Elements  
4 = 4 Elements

**D**  
**Packaging  
(pieces per  
reel)**  
D = 1,000  
(7" reel)  
R = 4,000  
(7" reel)  
T = 10,000  
(13" reel)

**P**  
**Termination  
Finish**  
P = Ni/Sn Alloy  
(Plated)



## ESD Protection for Low Leakage Requirements

| AVX Part Number | V <sub>W</sub> | V <sub>W</sub> | V <sub>B</sub> (Min) | V <sub>C</sub> | I <sub>VC</sub> | I <sub>L</sub> | E <sub>T</sub> | I <sub>P</sub> | Cap  | Freq | Case | Elements |
|-----------------|----------------|----------------|----------------------|----------------|-----------------|----------------|----------------|----------------|------|------|------|----------|
| MGUG040030L2 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.05           | 15             | 300  | M    | 0405 | 2        |
| MGUG050030L2 __ | 3.0            | 2.3            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0508 | 2        |
| MGUG060030L4 __ | 3.0            | 2.3            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0612 | 4        |
| VCUG040030L1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.05           | 20             | 175  | M    | 0402 | 1        |
| VCUG060030L1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.1            | 30             | 750  | K    | 0603 | 1        |
| VCUG080030H1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.3            | 120            | 3000 | K    | 0805 | 1        |
| VCUG080030L1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.1            | 40             | 1100 | K    | 0805 | 1        |
| VCUG120030H1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.4            | 150            | 3000 | K    | 1206 | 1        |
| VCUG120030L1 __ | 3.0            | 2.3            | 6.8                  | 18             | 1               | 1              | 0.1            | 40             | 1200 | K    | 1206 | 1        |
| MGUG040050L2 __ | 5.0            | 3.5            | 20                   | 50             | 1               | 1              | 0.02           | 15             | 40   | M    | 0405 | 2        |
| MGUG050050L2 __ | 5.0            | 3.5            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0508 | 2        |
| MGUG060050L4 __ | 5.0            | 3.5            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0612 | 4        |
| VCUG040050L1 __ | 5.0            | 3.5            | 10.8                 | 22             | 1               | 1              | 0.05           | 20             | 175  | M    | 0402 | 1        |
| VCUG060050L1 __ | 5.0            | 3.5            | 10.8                 | 22             | 1               | 1              | 0.1            | 30             | 550  | K    | 0603 | 1        |
| VCUG080050L1 __ | 5.0            | 3.5            | 10.8                 | 22             | 1               | 1              | 0.1            | 40             | 750  | K    | 0805 | 1        |
| VCUG120050H1 __ | 5.0            | 3.5            | 16.3                 | 32             | 1               | 1              | 0.4            | 150            | 1050 | K    | 1206 | 1        |
| VCUG120050L1 __ | 5.0            | 3.5            | 16.3                 | 32             | 1               | 1              | 0.1            | 40             | 600  | K    | 1206 | 1        |
| MGUG040075L2 __ | 7.5            | 5.3            | 20                   | 50             | 1               | 1              | 0.02           | 15             | 40   | M    | 0405 | 2        |
| MGUG050075L2 __ | 7.5            | 5.3            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0508 | 2        |
| MGUG060075L4 __ | 7.5            | 5.3            | 17.2                 | 32             | 1               | 1              | 0.1            | 30             | 425  | M    | 0612 | 4        |
| VCUG040075L1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.05           | 20             | 85   | M    | 0402 | 1        |
| VCUG060075L1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.1            | 30             | 350  | K    | 0603 | 1        |
| VCUG080075H1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.3            | 120            | 900  | K    | 0805 | 1        |
| VCUG080075L1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.1            | 40             | 325  | K    | 0805 | 1        |
| VCUG120075H1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.4            | 150            | 1050 | K    | 1206 | 1        |
| VCUG120075L1 __ | 7.5            | 5.3            | 16.3                 | 32             | 1               | 1              | 0.1            | 40             | 600  | K    | 1206 | 1        |
| MGUG040100L2 __ | 10             | 7.1            | 20                   | 50             | 1               | 1              | 0.02           | 15             | 40   | M    | 0405 | 2        |
| MGUG050100L2 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.1            | 30             | 225  | M    | 0508 | 2        |
| MGUG060100L4 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.1            | 15             | 120  | M    | 0612 | 4        |
| VCUG040100L1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.05           | 20             | 65   | M    | 0402 | 1        |
| VCUG060100L1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.1            | 30             | 150  | K    | 0603 | 1        |
| VCUG080100H1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.3            | 100            | 550  | K    | 0805 | 1        |
| VCUG080100L1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.1            | 30             | 225  | K    | 0805 | 1        |
| VCUG120100H1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.4            | 150            | 900  | K    | 1206 | 1        |
| VCUG120100L1 __ | 10             | 7.1            | 23                   | 42             | 1               | 1              | 0.1            | 30             | 350  | K    | 1206 | 1        |
| MGUG040150L2 __ | 15             | 11             | 20                   | 50             | 1               | 1              | 0.02           | 15             | 50   | M    | 0405 | 2        |
| MGUG050150L2 __ | 15             | 11             | 20                   | 50             | 1               | 1              | 0.1            | 20             | 50   | M    | 0508 | 2        |
| MGUG060150L4 __ | 15             | 11             | 20                   | 50             | 1               | 1              | 0.05           | 20             | 75   | M    | 0612 | 4        |
| VCUG040150L1 __ | 15             | 11             | 25                   | 50             | 1               | 1              | 0.02           | 15             | 40   | M    | 0402 | 1        |
| VCUG060150L1 __ | 15             | 11             | 31.1                 | 60             | 1               | 1              | 0.1            | 30             | 155  | K    | 0603 | 1        |
| VCUG080150H1 __ | 15             | 11             | 31.1                 | 60             | 1               | 1              | 0.3            | 100            | 250  | K    | 0805 | 1        |
| VCUG080150L1 __ | 15             | 11             | 31.1                 | 60             | 1               | 1              | 0.1            | 30             | 120  | K    | 0805 | 1        |
| VCUG120150H1 __ | 15             | 11             | 31.1                 | 60             | 1               | 1              | 0.4            | 120            | 500  | K    | 1206 | 1        |
| VCUG040180L1 __ | 18             | 14             | 28                   | 55             | 1               | 1              | 0.05           | 10             | 30   | M    | 0402 | 1        |
| VCUG080320L1 __ | 32             | 22             | 42.3                 | 77             | 1               | 1              | 0.1            | 40             | 50   | M    | 0805 | 1        |

L Termination Finish Code  
 — Packaging Code

V<sub>CIR</sub> (DC) DC Circuit Voltage (V)  
 V<sub>CIR</sub> (AC) AC Circuit Voltage (V)  
 Cap Req Standard or Low  
 I<sub>L</sub> Maximum Leakage Current at the Circuit Voltage (μA)  
 Cap Typical Capacitance (pF) @ frequency specified and 0.5 Vrms  
 Freq Frequency at which capacitance is measured (K = 1kHz, M = 1MHz)

## ESD Protection for Low Leakage Requirements

### PHYSICAL DIMENSIONS

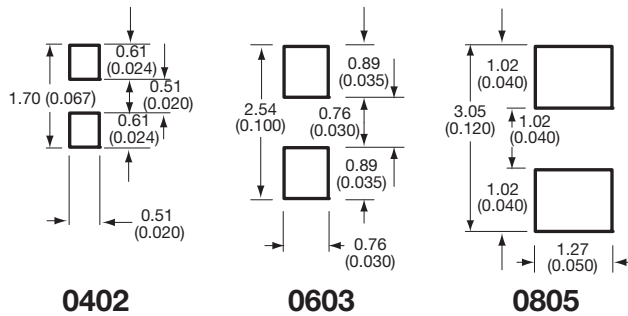
mm (inches)

|                 | 0402 Discrete             | 0603 Discrete             | 0805 Discrete             |
|-----------------|---------------------------|---------------------------|---------------------------|
| Length          | 1.00 ±0.10 (0.040 ±0.004) | 1.60 ±0.15 (0.063 ±0.006) | 2.01 ±0.20 (0.079 ±0.008) |
| Width           | 0.50 ±0.10 (0.020 ±0.004) | 0.80 ±0.15 (0.032 ±0.006) | 1.25 ±0.20 (0.049 ±0.008) |
| Thickness       | 0.60 Max. (0.024 Max.)    | 0.90 Max. (0.035 Max.)    | 1.02 Max. (0.040 Max.)    |
| Term Band Width | 0.25 ±0.15 (0.010 ±0.006) | 0.35 ±0.15 (0.014 ±0.006) | 0.71 Max. (0.028 Max.)    |

|                 | 0405 Array                | 0508 Array                | 0612 Array                |
|-----------------|---------------------------|---------------------------|---------------------------|
| Length          | 1.00 ±0.15 (0.039 ±0.006) | 1.25 ±0.20 (0.049 ±0.008) | 1.60 ±0.20 (0.063 ±0.008) |
| Width           | 1.37 ±0.15 (0.054 ±0.006) | 2.01 ±0.20 (0.079 ±0.008) | 3.20 ±0.20 (0.126 ±0.008) |
| Thickness       | 0.66 Max. (0.026 Max.)    | 1.02 Max. (0.040 Max.)    | 1.22 Max. (0.048 Max.)    |
| Term Band Width | 0.36 ±0.10 (0.014 ±0.004) | 0.41 ±0.10 (0.016 ±0.004) | 0.41 ±0.10 (0.016 ±0.004) |

### SOLDER PAD DIMENSIONS

mm (inches)



#### 0612 4-Element Array

| A               | B               | C               | D               | E               |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| 0.89<br>(0.035) | 1.65<br>(0.065) | 2.54<br>(0.100) | 0.46<br>(0.018) | 0.76<br>(0.030) |

#### 2-Element Arrays

|      | A               | B               | C               | D               | E               |
|------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 0405 | 0.46<br>(0.018) | 0.74<br>(0.029) | 1.20<br>(0.047) | 0.38<br>(0.015) | 0.64<br>(0.025) |
| 0508 | 0.89<br>(0.035) | 1.27<br>(0.050) | 2.16<br>(0.085) | 0.46<br>(0.018) | 0.76<br>(0.030) |

