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## ESD Protection for Low Leakage Requirements

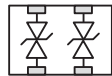
### GENERAL DESCRIPTION

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.

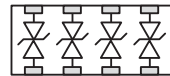
The UG Series is the ideal transient protection solution for high clock speed integrated circuit application, battery-operated device, backlit display, medical/instrument application, low voltage power conversion circuits and power supervisory chip sets. In addition, UltraGuard's low leakage characteristics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



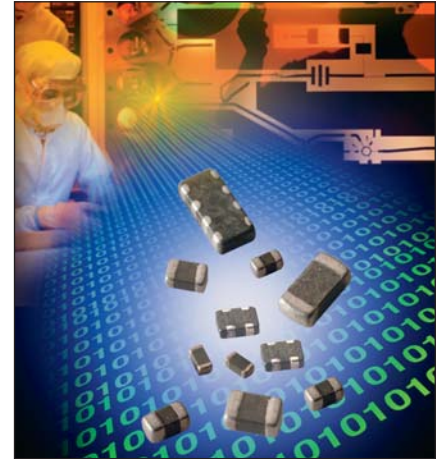
**Discrete Chips**  
0402, 0603,  
and 0805



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



**4-Element Arrays**  
(0612)



### GENERAL CHARACTERISTICS

- Operating Temperature: -55°C to +125°C
- Working Voltage: 3.0Vdc - 32Vdc
- Case Size: 0402-1206  
0405 2xArray, 0508 2xArray  
0612 4xArray
- Leakage: 1µA Max
- Energy: 0.02-1.2J
- Peak Current: 80-200A
- Typ Cap: 30-5000pF

### FEATURES

- Bi-Directional protection
- Ultra low leakage 1µA max
- Multi-strike capability
- Single, 2 and 4 element components
- Compact footprint
- EMI/RFI filtering

### APPLICATIONS

- Battery operated devices
- High clock speed IC
- Low voltage power conversion
- Power supervisory chip sets
- Optic circuits (LDD, SerDes)
- Laser diodes
- Any circuit with low leakage requirements

### HOW TO ORDER

<b>VC</b>	<b>UG</b>	<b>04</b>	<b>0180</b>	<b>L</b>	<b>1</b>	<b>W</b>	<b>P</b>
<b>Surface Mount Chip</b>	<b>Series</b> Low Leakage Series	<b>Case Size</b> 04 = 0402 06 = 0603 08 = 0805 12 = 1206	<b>Maximum Working Voltage</b> 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> 0320 = 32.0V <sub>dc</sub>	<b>Capacitance</b> L = Low H = High	<b>No. of Elements</b>	<b>Packaging (pieces per reel)</b> D = 1,000 (7" reel) R = 4,000 (7" reel) T = 10,000 (13" reel) W = 10,000 (7" reel, 0402 only)	<b>Termination Finish</b> P = Ni/Sn (Plated)
<b>MG</b>	<b>UG</b>	<b>06</b>	<b>0150</b>	<b>L</b>	<b>4</b>	<b>W</b>	<b>P</b>
<b>Array</b>	<b>Series</b> Low Leakage Series	<b>Case Size</b> 04 = 0405 05 = 0508 06 = 0612	<b>Maximum Working Voltage</b> 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>	<b>Capacitance</b> L = Low H = High	<b>No. of Elements</b> 2 = 2 Elements 4 = 4 Elements	<b>Packaging (pieces per reel)</b> D = 1,000 (7" reel) R = 4,000 (7" reel) T = 10,000 (13" reel)	<b>Termination Finish</b> P = Ni/Sn (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

└ 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

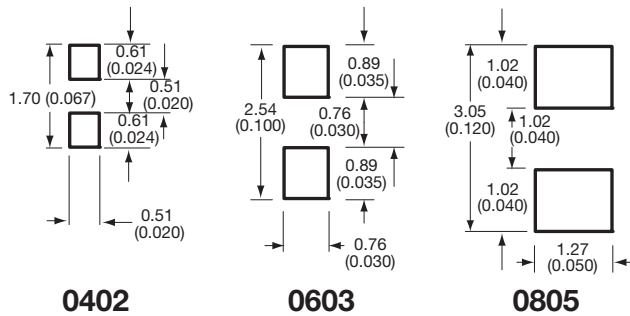
mm (inches)

	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 (0.035)	1.65 (0.065)	2.54 (0.100)	0.46 (0.018)	0.76 (0.030)

### 2-Element Arrays

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

