

## GENERAL DESCRIPTION

The CAN BUS and FlexRay varistor is a zinc oxide (ZnO) based ceramic semiconductor device with non-linear voltage-current characteristics (bi-directional) similar to back-to-back Zener diodes and an EMC capacitor in parallel (see equivalent circuit model). They have the added advantage of greater current and energy handling capabilities as well as EMI/RFI attenuation. Devices are fabricated by a ceramic sintering process that yields a structure of conductive ZnO grains surrounded by electrically insulating barriers, creating varistor like behavior.



## HOW TO ORDER

|                                |  |  |                             |
|--------------------------------|--|--|-----------------------------|
| <b>CAN</b>                     | <b>0001</b>  | <b>D</b>   | <b>P</b>                    |
| Style                          | Case Size  | Packaging Code<br>(Reel Size)  | Termination                 |
| CAN = CAN BUS<br>FLX = FlexRay | 0001 = 0603 Discrete<br>0002 = 0405 2-Element<br>0004 = 0612 4-Element<br>0005 = 0402 Discrete | D = 7" reel (1,000 pcs.)<br>R = 7" reel (4,000 pcs.)<br>T = 13" reel (10,000 pcs.)<br>W = 7" reel (10,000 pcs.) 0402 and 0201 only | P = Ni/Sn Alloy<br>(Plated) |

## PERFORMANCE CHARACTERISTICS

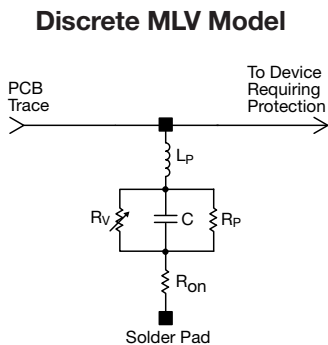
| AVX Part No. | V <sub>W</sub> (DC) | V <sub>W</sub> (AC) | V <sub>B</sub> | I <sub>L</sub> | E <sub>T</sub> | I <sub>P</sub> | Cap. | Case Size | Elements |
|--------------|---------------------|---------------------|----------------|----------------|----------------|----------------|------|-----------|----------|
| CAN0001__    | ≤18                 | ≤14                 | 120            | 2              | 0.015          | 4              | 22   | 0603      | 1        |
| CAN0002__    | ≤18                 | ≤14                 | 70             | 2              | 0.015          | 4              | 22   | 0405      | 2        |
| CAN0004__    | ≤18                 | ≤14                 | 100            | 2              | 0.015          | 4              | 22   | 0612      | 4        |
| CAN0005__    | ≤18                 | ≤14                 | 33             | 2              | 0.015          | 4              | 37   | 0402      | 1        |
| FLX0005__    | ≤18                 | ≤14                 | 26             | 5              | 0.020          | 4              | 17   | 0402      | 1        |

Termination Finish Code  
Packaging Code

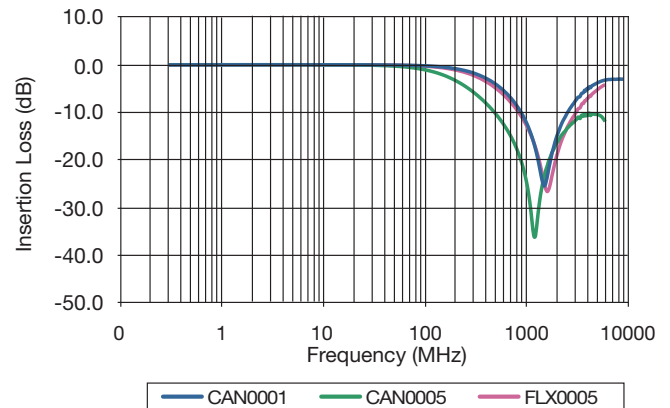
V<sub>W</sub>(DC) DC Working Voltage (V)  
 V<sub>W</sub>(AC) AC Working Voltage (V)  
 V<sub>B</sub> Typical Breakdown Voltage (V @ 1mA<sub>DC</sub>)  
 V<sub>C</sub> Clamping Voltage (V @ I<sub>TC</sub>)  
 I<sub>TC</sub> Test Current for V<sub>C</sub> (A, 8x20μS)

I<sub>L</sub> Maximum Leakage Current at the Working Voltage (μA)  
 E<sub>T</sub> Transient Energy Rating (J, 10x1000μS)  
 I<sub>P</sub> Peak Current Rating (A, 8x20μS)  
 Cap Maximum Capacitance (pF) @ 1 MHz and 0.5Vrms  
 Temp Range -55°C to +125°C

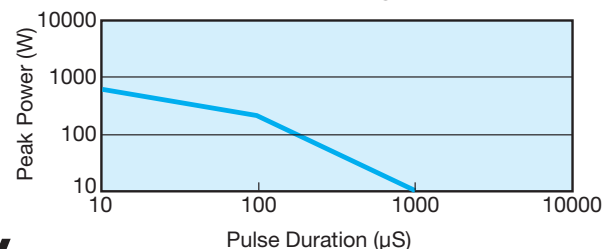
## EQUIVALENT CIRCUIT MODEL



Where: R<sub>V</sub> = Voltage Variable resistance (per VI curve)  
 R<sub>P</sub> ≥ 10<sup>12</sup> Ω  
 C = defined by voltage rating and energy level  
 R<sub>On</sub> = turn on resistance  
 L<sub>p</sub> = parallel body inductance



## Typical Pulse Rating Curve



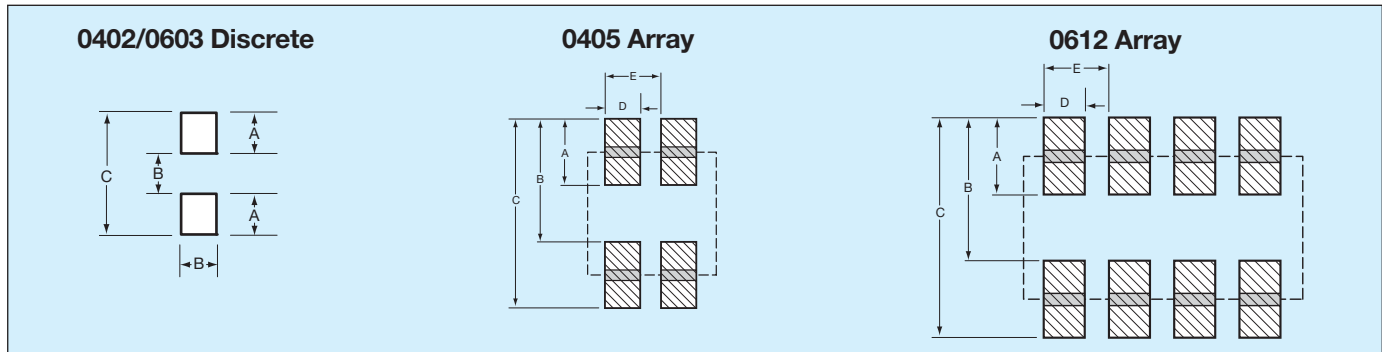
## PHYSICAL DIMENSIONS

mm (inches)

|                 | 0402 Discrete             | 0603 Discrete             | 0405 Array                | 0612 Array                |
|-----------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Length          | 1.00 ±0.10 (0.040 ±0.004) | 1.60 ±0.15 (0.063 ±0.006) | 1.00 ±0.15 (0.039 ±0.006) | 1.60 ±0.20 (0.063 ±0.008) |
| Width           | 0.50 ±0.10 (0.020 ±0.004) | 0.80 ±0.15 (0.032 ±0.006) | 1.37 ±0.15 (0.054 ±0.006) | 3.20 ±0.20 (0.126 ±0.008) |
| Thickness       | 0.60 Max. (0.024 Max.)    | 0.90 Max. (0.035 Max.)    | 0.66 Max. (0.026 Max.)    | 1.22 Max. (0.048 Max.)    |
| Term Band Width | 0.25 ±0.15 (0.010 ±0.006) | 0.35 ±0.15 (0.014 ±0.006) | 0.36 ±0.10 (0.014 ±0.004) | 0.41 ±0.10 (0.016 ±0.010) |

## SOLDER PAD DIMENSIONS

mm (inches)



## APPLICATION

AVX CAN BUS and FlexRay varistors offer significant advantages in general areas of a typical CAN or FlexRay network as shown on the right. Some of the advantages over diodes include:

- space savings
- higher ESD capability @ 25kV contact
- higher in rush current (4A) 8 x 20µS
- FIT rate ≤0.1 failures (per billion hours)

|               | A               | B               | C                | D               | E               |
|---------------|-----------------|-----------------|------------------|-----------------|-----------------|
| 0402 Discrete | 0.61<br>(0.024) | 0.51<br>(0.020) | 1.70<br>(0.067)  | -               | -               |
| 0603 Discrete | 0.89<br>(0.035) | 0.76<br>(0.030) | 2.54<br>(0.100)  | -               | -               |
| 0405 Array    | 0.46<br>(0.018) | 0.74<br>(0.029) | 0.12<br>(0.0047) | 0.38<br>(0.015) | 0.64<br>(0.025) |
| 0612 Array    | 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) |

