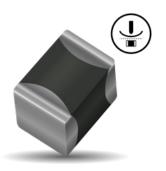
# **Multilayer Varistor with FLEXITERM®**

## **General Specifications**



ROHS



## **GENERAL DESCRIPTION**

With increased requirements from the automotive industry for additional component robustness, KYOCERA AVX recognized the need to product a MLV with enhancedmechanical strength. It was noted that many components may be subject to severe flexing and vibration when used under the hood automotive and other harsh environment applications.

To satisfy the requirement for enhanced mechanical strength, KYOCERA AVX had to find a way of ensuring electrical integrity is maitaied whilst external forces are being applied to the component. It was found that the structure of the termination needed to be flexible and after uch research and development, KYOCERA AVX launched FLEXITERM®, multilayer varistor. The industry standard for flexure is 2mm milmum. Using FLEXITERM®, KYOCERA AVX provides up to 5mm of flexure without internal cracking.

As well as for automotive applications, FLEXITERM<sup>®</sup> will product Design Engineers with a satisfactory solution when designing PCB's which may be sbject to high levels of board flexure.

### **PRODUCT ADVANTAGES**

- Operating Temperature Range: -55°C to +125/150°C
- Qualified in 0603, 0805, 1206, and 1210 Case Sizes
- High Mechanical Performance Guaranteed to withstand 5mm Bend Test
- Increased Temperature Cycling Performance ≥ 3000 Cycles
- Flexible Termination System
- Reduction in Circuit Board Flex Failures
- Reduction in Circuit Board Flex Failures
- AEC-Q200 Qualified or Commercial Grade Products Available

### **APPLICATIONS**

#### High Flexure Stress

• e.g. Depanelization: Components Near Edges of Board

#### Variable Temperature Applications

- Soft Termination Offers Improved Reliability Performance in Applications Where There is a Large Termperature Variation
- e.eg. Engine Sensors: Direct Connection to Battery Rail

#### Automotive Applications

- Improved Reliability
- · Excellent Mechanical and Thermo-Mechanical Performance

### **HOW TO ORDER**

| VC   | AS                   | 0805 | 18   | Α   | 400  | R  | Z                                     |
|--|----------------------|------|--|---|--|--|---------------------------------------|
|  | Т                    | Т    | T  | Т   | Т  | Т  | Т                                     |
| Varistor Chip<br>VC = Varistor Chip<br>VT = Varistor Temp<br>Rated | Automotive<br>Series |      | $\begin{array}{l} \textbf{Working Voltage} \\ 05 = 5.6 V_{dc} \\ 14 = 14 V_{dc} \\ 18 = 18 V_{dc} \\ 26 = 26 V_{dc} \\ 30 = 30 V_{dc} \end{array}$ | Energy Rating<br>A = 0.1J<br>C = 0.3J<br>D = 0.4J<br>J = 1.5J | Clamping<br>Voltage<br>150= 18V                  | <b>Packaging</b><br>D = 7" (1000)*<br>R = 7" (4000)* | <b>Terminations</b><br>Z = FLEXITERM® |
|  |                      |      |  |   | 300 = 32V<br>390 = 42V<br>400 = 42V<br>580 = 60V | T = 13" (1000)                                       |                                       |
|  |                      |      |  |   | 650 = 67V  |  | Doug                                  |

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.

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# Multilayer Varistor with FLEXITERM®

## **Specifications and Test Methods**

### **PERFORMANCE TESTING**

#### **AEC-Q200 Qualification**

- Created by the Automotive Electronics
  Council
- Specification defining stress test qualification for passive components

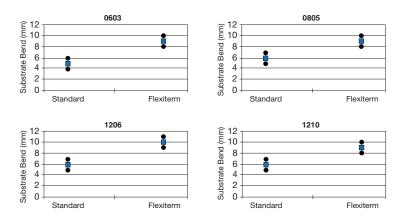
#### Testing

- Key tests used to compare soft termination to AEC-Q200 qualifications:
- Bend Test
- Temperature Cycle Test



## **BOARD BEND TEST RESULTS**

AEC-Q200 Vrs KYOCERA AVX FLEXITERM® Bend Test



#### **TABLE SUMMARY**

Typical bend test results are show below:

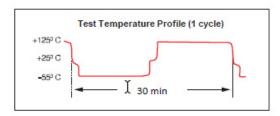
| Style        | Conventional Termination | FLEXTERM     |
|--------------|--------------------------|--------------|
| 0603         | >2mm                     | >5mm         |
| 0805<br>1206 | >2mm<br>>2mm             | >5mm<br>>5mm |
| 1206         | >2mm                     | >5mm         |
| 1210         | >211111                  | >511111      |

### **TEMPERATURE CYCLE TEST PROCEDURE**

#### Test Procedure as per AEC-Q200:

The test is conducted to determine the resistance of the component when it is exposed toextremes of alternating high and low temperatures.

- Sample lot size quantity 77 pieces
- TC chamber cycle from -55°C to +125°C for 1000 cycles
- Interim electrical measurements at 250, 500, 1000 cycles
- Measure parameter capacitance leakage current, breakdown voltage



#### BOARD BEND TEST PROCEDURE

#### According to AEC-Q200

•

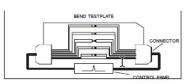
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Test Procedure as per AEC-Q200: Sample Size: 20 components

Span: 90mm Minimum deflection spec: 2mm

Components soldered onto FR4 PCB (Figure 1)

#### Board connected electrically to the test equipment



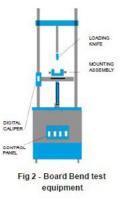
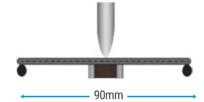


Fig 1 - PCB layout with electrical connections

## KYOCERA AVX ENHANCED SOFT TERMINATION BEND TEST PROCEDURE

#### Bend Test

The varistor is soldered to the printed circuit board as shown and is bent up to 10mm at 1mm per second:



- The board is placed on 2 supports yomm apart (varistor side down)
- The row of capacitors is aligned with the load stressing knife



- The load is applied and the deflection wherethe part starts to crack is recorded (Note: Equipment detexts the start of the crack using a highly sensitive current detection circuit)
- The maximum deflection capability is 10mm

The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

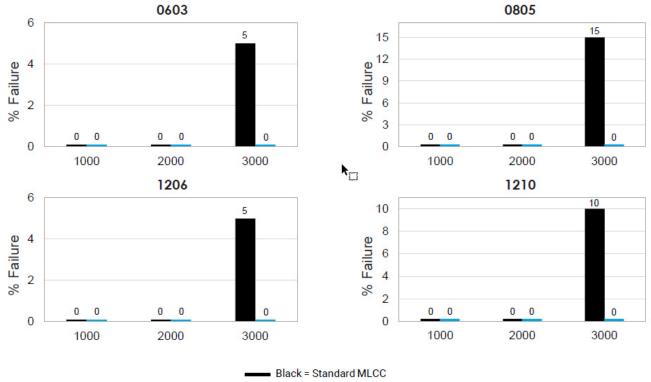


# **Multilayer Varistor FLEXITERM®**



## **Specifications and Test Methods**

### **BEYOND 1000 CYCLES: TEMPERATURE CYCLE TEST**



Blue = Soft Term MLV (Flexiterm)

# Soft Term - No Defects up to 3000 Cycles

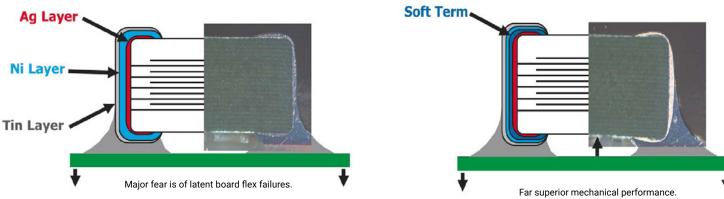
AEC-Q200 specification states 1000 cycles compared to KAVX 3000 temperature cycles

WITH SOFT TERMINATION

### **FLEXITERM® TEST SUMMARY**

- Qualified to AEC-Q200 test/specification with the exception of using KAVX 3000 temperature cycles (up to +150°C bend test guarenteed greater than 5mm).
- FLEXITERM provides performance compared to standardtermination systems.
- Board bend test improvement by a factor of 2 or 4 times.
- · Temperature Cycling:
- 0% Failure up to 3000 cycles
- o sigificant change in electrical characteristics up to 3000 cycles

# WITHOUT SOFT TERMINATION



Generally open failure mode beyond 5mm flexure.

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