佳邦科技股份有限公司
INPAQ TECHNOLOGY CO., LTD.

# MLVS0603LAM Series

## Data Sheet

| | |
|---|---|
| **Product Name** | **MLVS0603LAM Series** |
| **Series** | **Multilayer Varistor** |
| **Size** | **EIA 0603** |
| **Version** | **A1** |

## 1. Scope

(1) Qualified based on AEC-Q200
(2) RoHS compliant
(3) Meet IEC 61000-4-5 standard
(4) SMD type zinc oxide based ceramic chip
(5) Insulator over coat keeps excellent low and stable leakage current
(6) Quick response time (<0.5ns)
(7) High transient current capability
(8) High reliability
(9) Compact size for EIA0603

### Applications

Protection against automotive related transient overvoltage

## 2. Explanation of Part Number

| MLV | S | 0603 | L | AM | 04 | 581 | F |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (5) | (6) | (7) |

1. Multilayer varistor
2. Type: S=single
3. Size
4. Lead free series
5. Automotive series
6. Max. AC voltage
7. Typical Capacitance: “581” means $58 \times 10^1$
8. Control Code

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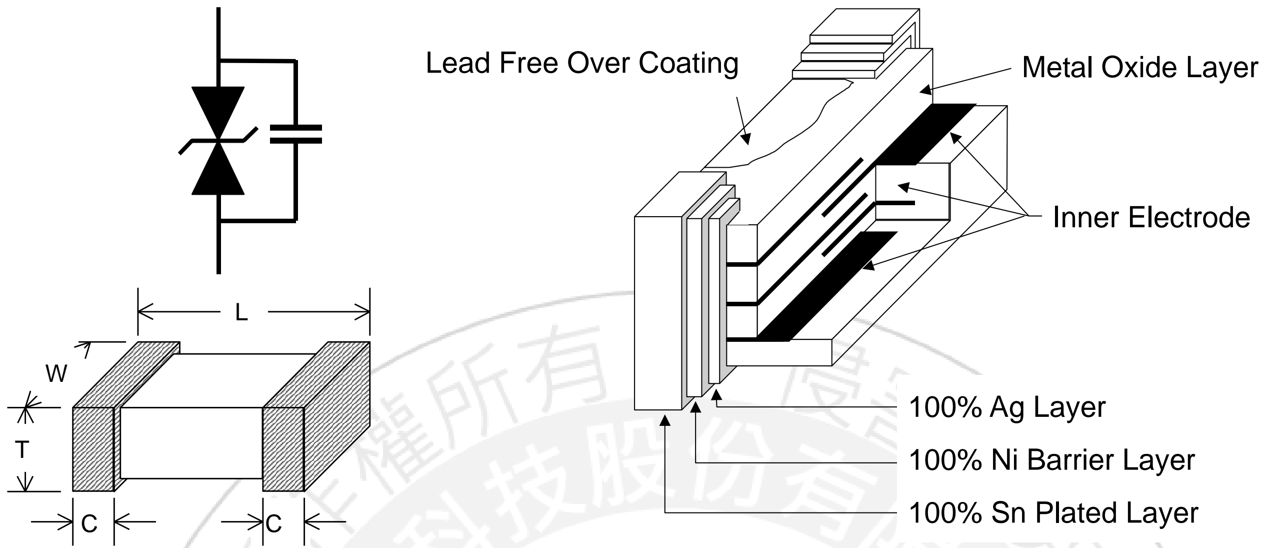
## 3. Construction & Dimension




| Unit: mm | 0603 |
|---|---|
| L | 1.60±0.15 |
| W | 0.80±0.1 |
| t | 0.80±0.1 |
| c | 0.30±0.20 |

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# 4. Part ratings and characteristics

## 4.1. Ratings (25ºC for characteristics, 125ºC for maximum ratings)

| | Working voltage | | Varistor voltage | Clamping Voltage | Capacitance | Peak current | Transient energy |
|---|---|---|---|---|---|---|---|
| **Symbol** | $V_{RMS}$ | $V_{DC}$ | $V_V$ | Vc | Cp | $i_{max}$ | $W_{max}$ |
| **Units** | Volts (Max.) | Volts (Max.) | Volts | Volts (Max.) | pF (Typical) | Amps (Max.) | Joules (Max.) |
| **Test Condition** | | < 10 μA | 1mA DC | 1A 8/20μs | 1KHz | 8/20μs | 10/1000μs |
| MLVS0603LAM04581F | 4 | 5.5 | 7~10 | 21 | 580 | 20 | 0.1 |
| MLVS0603LAM06281F | 6 | 9 | 11~15.5 | 30 | 280 | 30 | 0.1 |
| MLVS0603LAM14250F | 14 | 16 | 23~34.2 | 70[2A] | 25 | 2 | 0.05 |
| MLVS0603LAM14131F | 14 | 18 | 22~28 | 45 | 130 | 30 | 0.2 |
| MLVS0603LAM17750F | 17 | 22 | 25~41 | 54 | 75 | 30 | 0.2 |
| MLVS0603LAM20101F | 20 | 26 | 30~43 | 67 | 100 | 30 | 0.1 |
| MLVS0603LAM25101F | 25 | 31 | 36~44 | 71 | 100 | 30 | 0.2 |
| MLVS0603LAM25140F | 25 | 32 | 51~71 | 124 | 14 | 5 | 0.1 |
| MLVS0603LAM30650F | 30 | 38 | 42~51 | 80 | 65 | 30 | 0.1 |

$V_{RMS}$ – Maximum AC operating voltage the varistor can maintain and not exceed 10μA leakage current

$V_{DC}$ – Maximum DC operating voltage the varistor can maintain and not exceed 10μA leakage current

$V_V$ – Voltage across the device measured at 1mA DC current. Equivalent to Vb, "Breakdown Voltage".

Vc – Maximum peak voltage across the varistor measured at 8/20us waveform and 1A pulse current

Cp – Device capacitance measured with zero volt bias 1Vrms.

$i_{max}$ – Maximum peak current which may be applied with 8/20us waveform without device failure

$W_{max}$ – Maximum energy that may be dissipated with the 10/1000us waveform without device failure

# 5.General electrical specifications

## 5.1. General technical data

| Operating temperature | -40 …+125°C |
|---|---|
| Storage temperature (on board) | -40… +125°C |
| Response time | <1 ns |
| Solderability | 245±5°C, 5 +0/-0.5sec |
| Solder leach resistance | 260±5°C,10 ±1sec |

## 5.2. Storage Condition with package

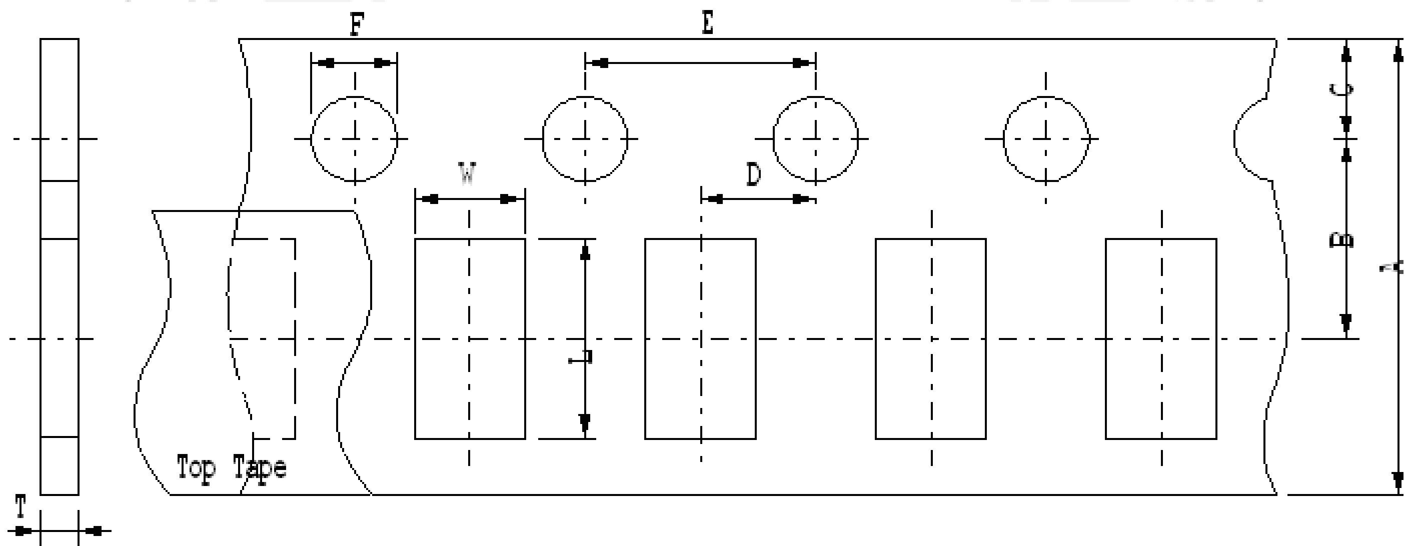
Storage Time: 12 months max

Storage Temperature: 5 to 40°C

Relative Humidity: 65% max

# 6. Taping Package and Label Marking

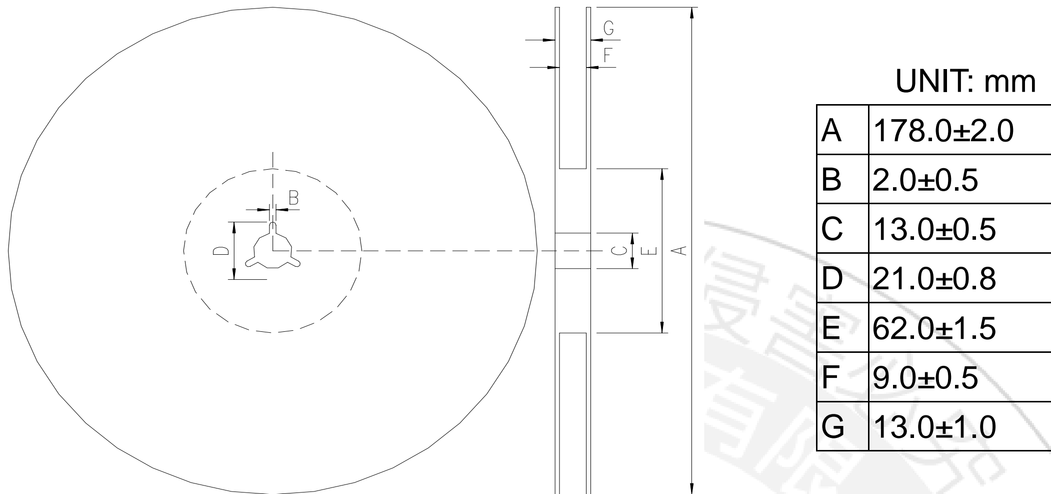
## 6.1. Carrier tape dimensions




UNIT: mm

| A | B | C | D | E | F | L | T | W |
|---|---|---|---|---|---|---|---|---|
| 8.00±0.30 | 3.50±0.05 | 1.75±0.10 | 2.00±0.05 | 4.00±0.10 | 1.50±0.10 | 1.90±0.15 | 0.95±0.05 | 1.05±0.15 |

### 6.2. Taping reel dimensions




UNIT: mm

| | |
|---|---|
| A | 178.0±2.0 |
| B | 2.0±0.5 |
| C | 13.0±0.5 |
| D | 21.0±0.8 |
| E | 62.0±1.5 |
| F | 9.0±0.5 |
| G | 13.0±1.0 |

### 6.3. Taping specifications

There shall be the portion having no product in both the head and the end of taping, and there shall be the cover tape in the head of taping.

### 6.4. Label Marking

The label specified as follows shall be put on the side of reel.

(1) Part No.

(2) Quantity

(3) Lot No.

*Part No. And Quantity shall be marked on outer packaging.

### 6.5. Quantity of products in the taping package

(1) Standard quantity: 4,000pcs/Reel for MLVS0603LAMF series

(2) Shipping quantity is a multiple of standard quantity.

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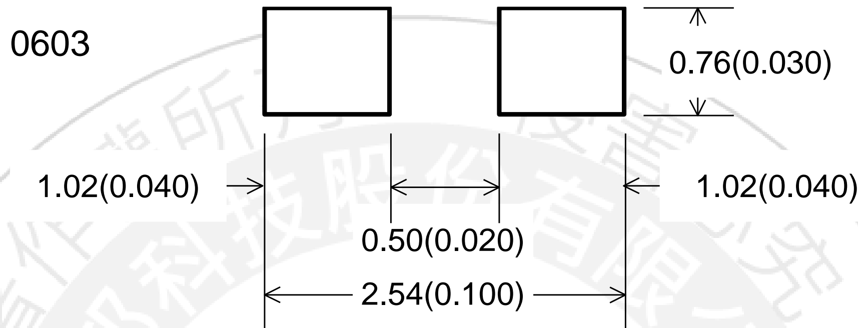
# 7. Precautions for Handling

## 7.1. Solder cream in reflow soldering

Refer to the recommendable land pattern as printing mask pattern for solder solder cream.

(1) Print solder in a thickness of 150 to 200 μm.

(2) Dimensions: millimeters (inches)




## 7.2. Precaution for handling of substrate

Do not exceed to bend the board after soldering this product extremely.

(Reference examples)

- Mounting place must be as far as possible from the position, which is close to the break line of board, or on the line of large holes of board.
- Do not bend extremely the board, in mounting another component.
  If necessary, use back-up pin (support pin) to prevent from bending extremely.
- Do not break the board by hand. We recommend using the machine or the jig to break it.

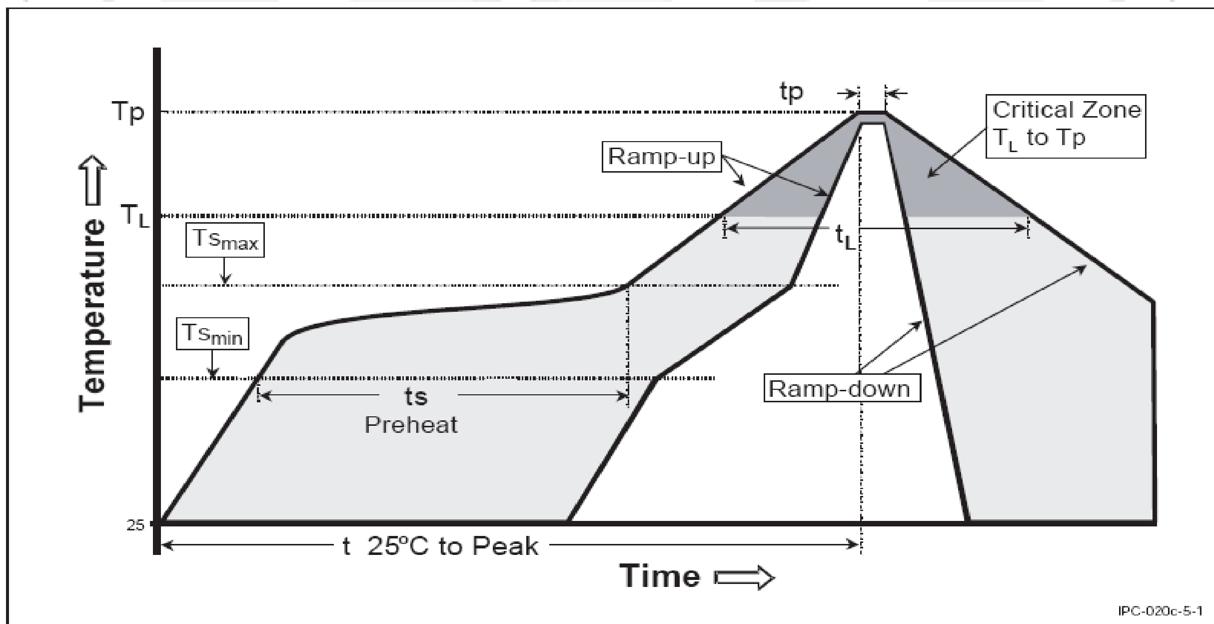
## 7.3. Precaution for soldering

Note that rapid heating, rapid cooling or local heating will easily damage this product.

Do not give heat shock over 100ºC in the process of soldering. We recommend taking preheating and gradual cooling.

### 7.4. Recommendable reflow soldering

| Profile Feature | Pb-Free Assembly |
|---|---|
| Average Ramp-Up Rate<br>(Tsmax to Tp) | 3° C/second max. |
| **Preheat**<br>– Temperature Min (Tsmin)<br>– Temperature Max (Tsmax)<br>– Time (tsmin to tsmax) | <br>150°C<br>200°C<br>60-180 seconds |
| Time maintained above:<br>– Temperature (TL)<br>– Time (tL) | <br>217°C<br>60-150 seconds |
| Peak/Classification Temperature (Tp) | 260°C |
| Time within 5 °C of actual Peak<br>Temperature (tp) | <br>20-40 seconds |
| Ramp-Down Rate | 6°C/second max. |
| Time 25 °C to Peak Temperature | 8 minutes max. |




*According to J-STD-020C

### 7.5. Soldering gun procedure

Note the follows, in case of using solder gun for replacement.

(1) The tip temperature must be less than 350°C for the period within 3 seconds by using soldering gun less than 30 W.

(2) The soldering gun tip shall not touch this product directly.

### 7.6. Soldering volume

Note that excess of soldering volume will easily get crack the body of this product.