

MLVS0603 Series Engineering Specification

1. Scope

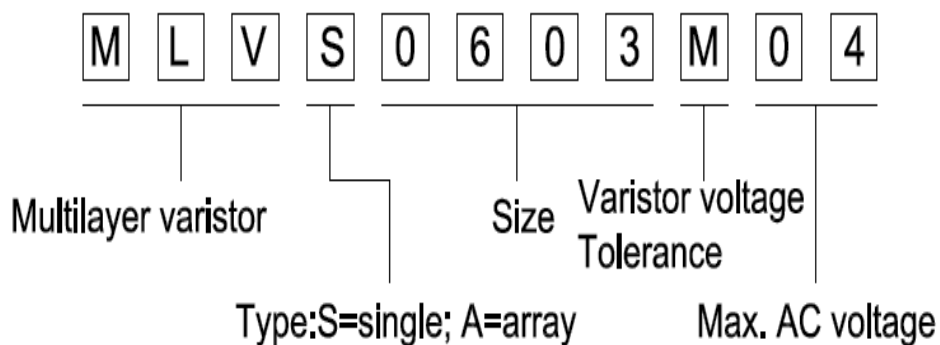
- (1) SMD type zinc oxide based ceramic chip
- (2) Lead free plating termination provided good solderability characteristic
- (3) Insulator over coat keeps excellent low and stable leakage current
- (4) Quick response time (<1ns)
- (5) Low clamping voltage
- (6) High transient current capability
- (7) Meet IEC 61000-4-2 standard
- (8) Compact size for ELA0603

Applications

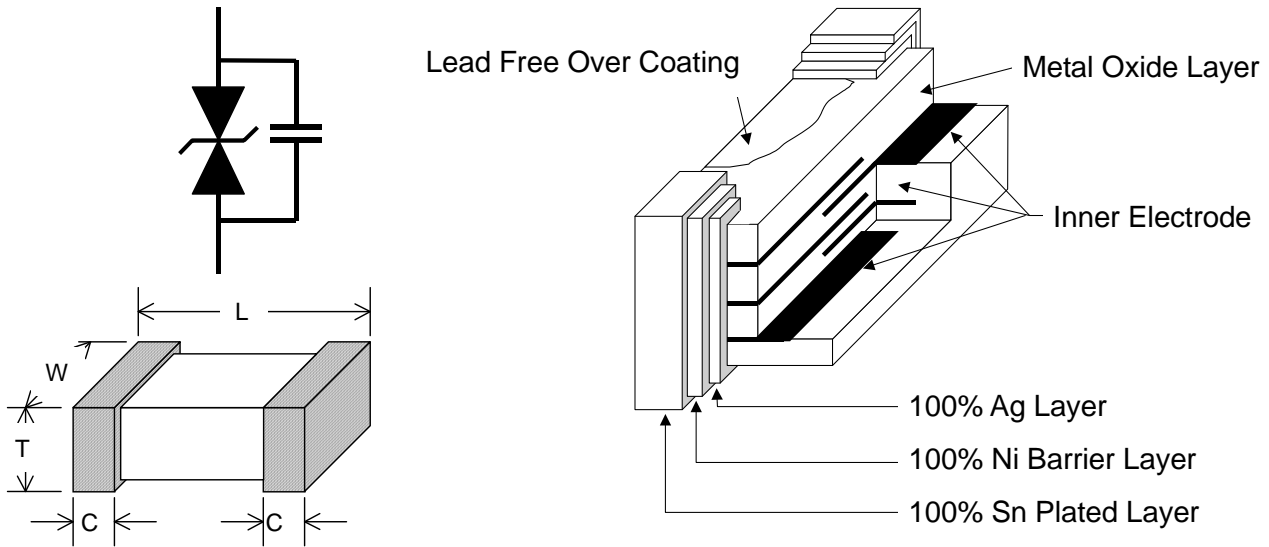
Applications for Mother Board and Notebook, Cellular Phone, PDA, handheld device, DSC, DV, Scanner, and Set-Top Box etc.

Suitable for Push-Button, Power Line and Low Frequency single line over voltage protect.

2. Explanation of Part Number



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 |

4. Part ratings and characteristics

4.1. Rating (25±5°C)

| Symbol | Working voltage | | Varistor voltage | | Clamping Voltage | Capacitance | Peak current | Transient energy |
|----------------|-----------------|--------------|------------------|--------------|---------------------|--------------|--------------|------------------|
| | V_{RMS} | V_{DC} | V_V | ΔV_V | V_c | C_p | i_{max} | W_{max} |
| Units | Volts | Volts (Max.) | Volts | % | Volts (Max.) | pF (Typical) | Amps (Max.) | Joules (Max.) |
| Test Condition | | < 10 μA | 1mA DC | | 1 A 8/20 μs | 1MHz | 8/20 μs | 10/1000 μs |
| MLVS0603M04 | 4 | 5.5 | 8 | 20 | 19 | 270 | 30 | 0.1 |
| MLVS0603M07 | 7 | 9 | 12.5 | 20 | 27 | 210 | 30 | 0.1 |
| MLVS0603K11 | 11 | 14 | 18 | 10 | 35 | 150 | 30 | 0.1 |

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

V_{DC} – Maximum DC operating voltage the varistor can maintain and not exceed $10\mu A$

leakage current

V_V –Voltage across the device measured at 1mA DC current.

EquiValent to V_b , “Breakdown Voltage”.

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

C_p – Device capacitance measured with zero volt bias 1Vrms at 1MHz.

Capacitance Tolerance: $M=\pm 20\%$, $K=\pm 10\%$.

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 ... +85°C |
| Storage temperature (on board) | -40... +85°C |
| Response time | <1 ns |
| Solderability | 245±5°C , 3 ±1sec |
| Solder leach resistance | 260±5°C , 10 ±1sec |

5.2. Environmental Specifications

| Characteristics | Specifications | Test condition |
|-------------------|----------------------------------|--|
| Bias humidity | $\Delta V_V / V_V \leq \pm 10\%$ | 90%RH, 40°C, Working voltage, 1000 hours |
| Thermal shock | $\Delta V_V / V_V \leq \pm 10\%$ | -40°C to 85°C, 30 min. Cycle, 5 cycles |
| Full load voltage | $\Delta V_V / V_V \leq \pm 10\%$ | Working voltage, 85°C, 1000 hours |

5.3. Storage Condition with package

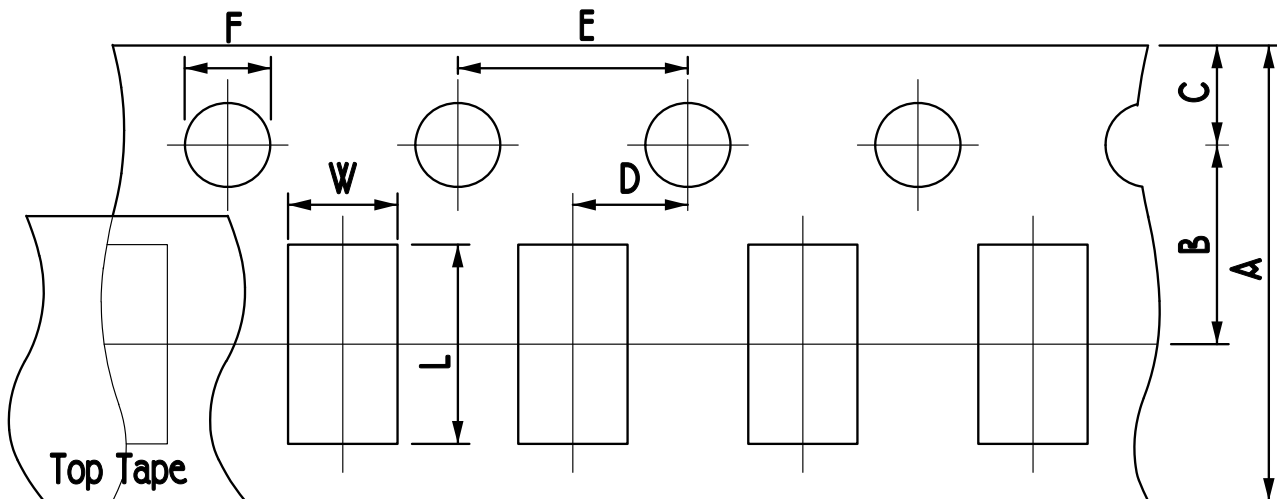
Storage Time: 12 months max

Storage Temperature : 5 to 40°C

Relative Humidity: to 65 %

6. Taping Package and Label Marking

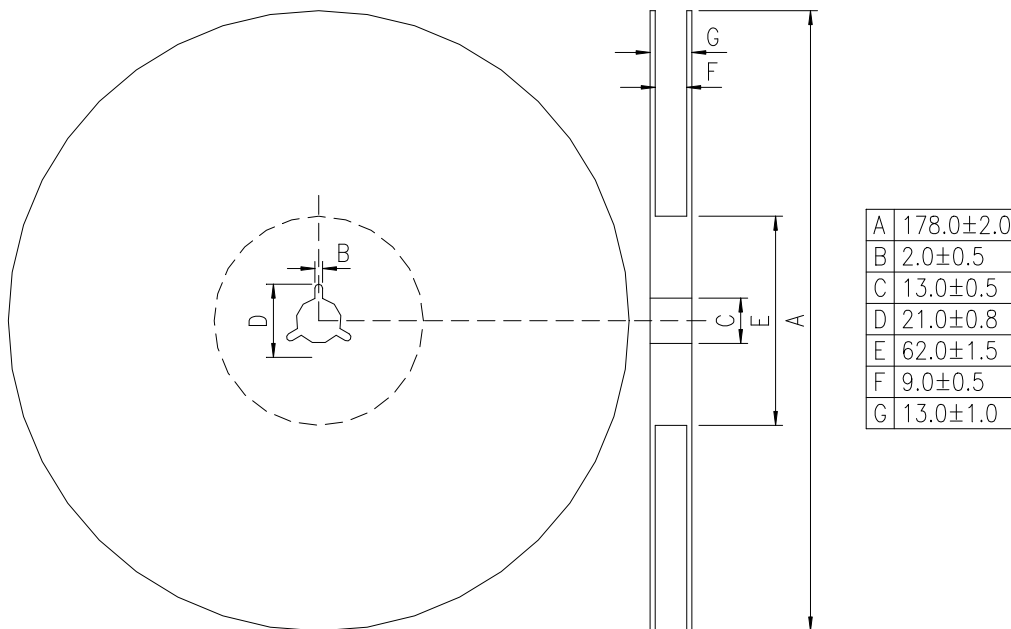
6.1. Carrier tape dimensions



UNIT: mm

| A | B | C | D | E | F | L | 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 | 1.05± 0.15 |

6.2. Taping reel dimensions



| | |
|---|-----------|
| 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

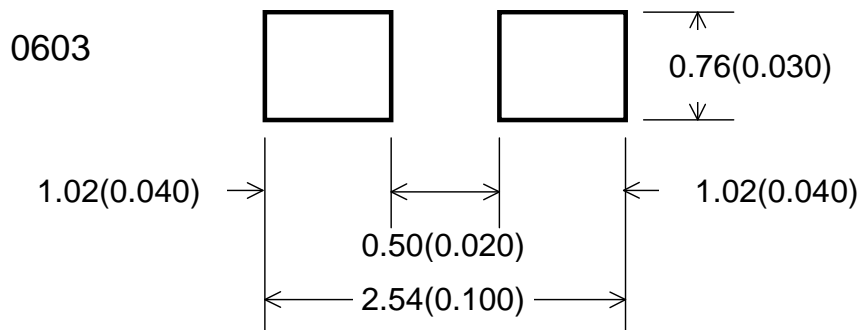
- (1) Standard quantity : 4000pcs/Reel for MLVS0603
- (2) Shipping quantity is a multiple of standard quantity.

7. Precautions for Handling

7.1. Solder cream in reflow soldering

Refer to the recommendable land pattern as printing mask pattern for 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 components.
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.

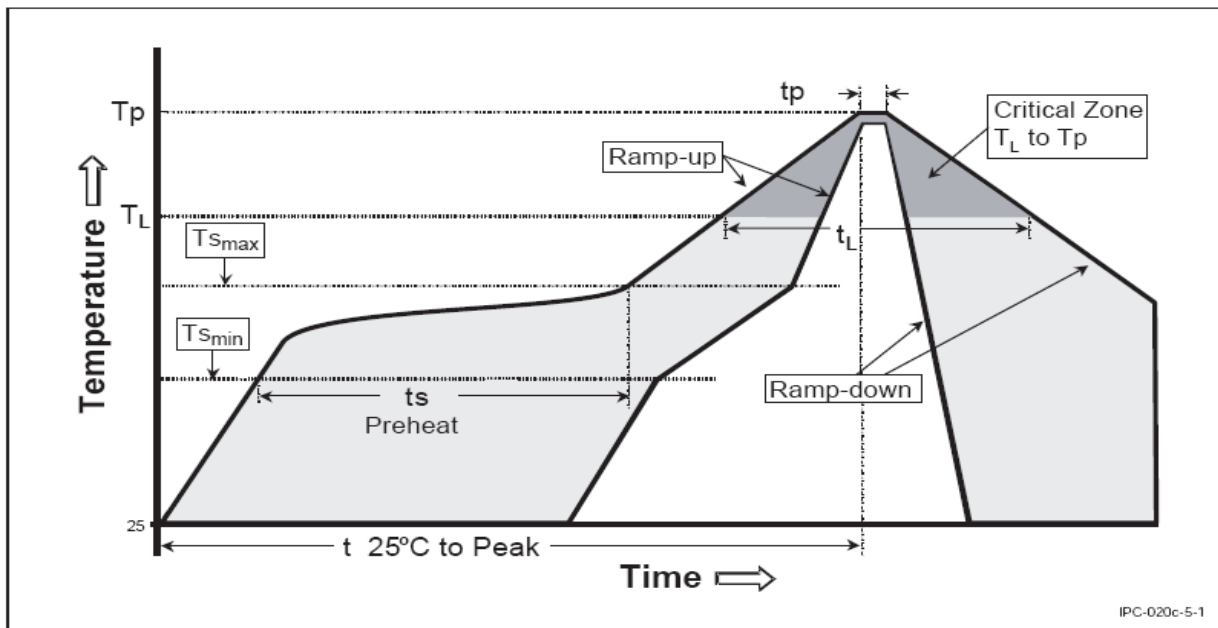
7.3. Precaution for soldering

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

Do not give heat shock over 100°C 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 (T _{smax} to T _p) | 3° C/second max. |
| Preheat – Temperature Min (T _{sm}) – Temperature Max (T _{sm}) – Time (t _{sm} to t _{sm}) | 150 °C 200 °C 60-180 seconds |
| Time maintained above: – Temperature (T _L) – Time (t _L) | 217 °C 60-150 seconds |
| Peak/Classification Temperature (T _p) | 260 °C |
| Time within 5 °C of actual Peak Temperature (t _p) | 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 280°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.