



# PRODUCT SPECIFICATION

**DOCUMENT NO. ENS000135100**

<b>DESCRIPTION</b>	<b>DRAWN BY</b>	<b>DESIGNED BY</b>	<b>CHECKED BY</b>	<b>APPROVED BY</b>
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## MLVS2220PDG Series Engineering Specification

### 1. Scope

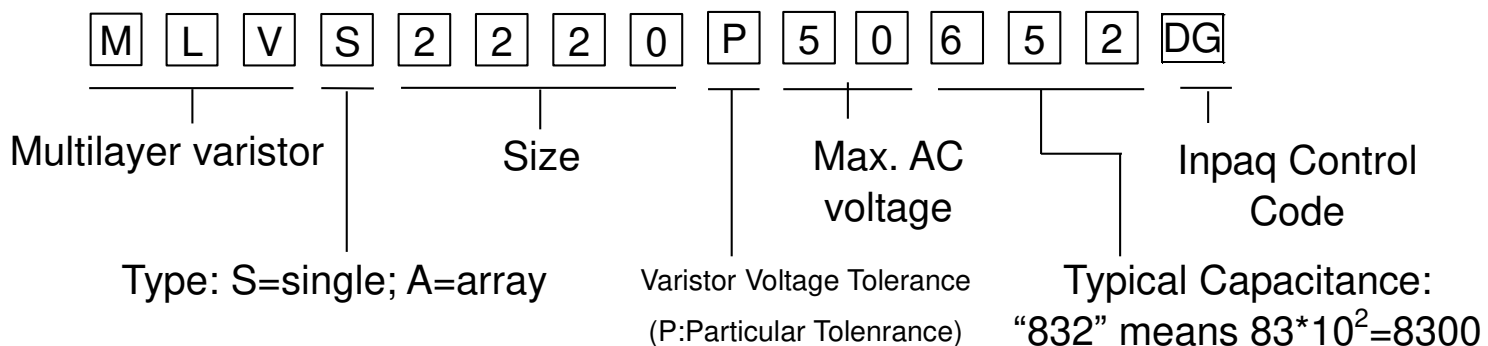
- (1) SMD type zinc oxide based ceramic chip
- (2) Lead free plating termination provided good solderability characteristic
- (3) Insulator over coat keeps excellent low and stable leakage current
- (4) Quick response time (<1ns)
- (5) Low clamping voltage
- (6) High transient current capability
- (7) High reliability
- (8) Meet IEC 61000-4-5 standard
- (9) Compact size for EIA2220

### Applications

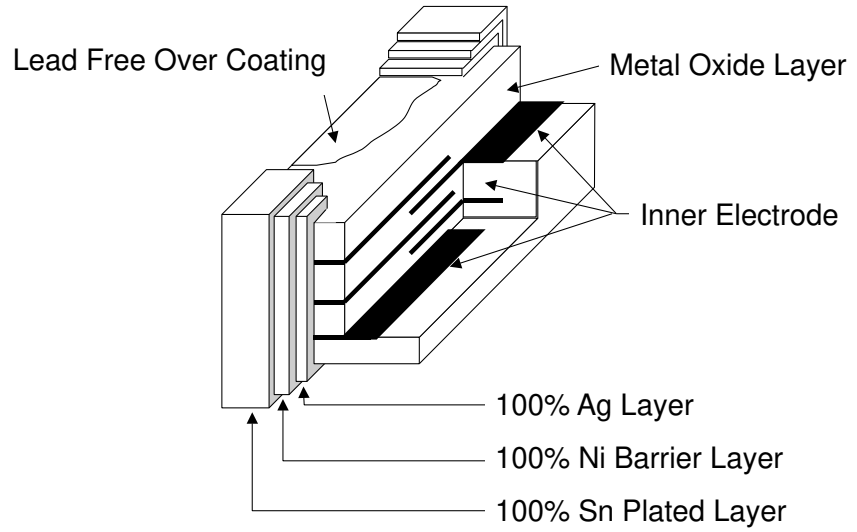
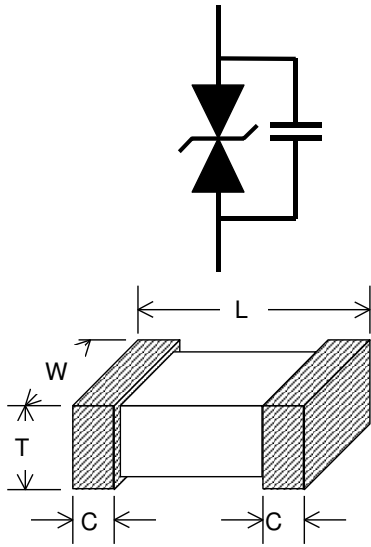
**Applications** for Mother Board and Notebook, Cellular Phone, PDA, handheld device, DSC, DV, Scanner, and Set-Top Box etc.

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

### 2. Explanation of Part Number



### 3. Construction & Dimension



Unit: mm	2220
L	5.70±0.4
W	5.20±0.4
T	4.0 Max.
C	1.4 Max

**4. Part ratings and characteristics**

**4.1. Ratings (25°C for characteristics, 125°C for maximum ratings)**

**4.2.**

	Working voltage		Varistor voltage	Clamping Voltage	Capacitance	Peak current
Symbol	$V_{RMS}$	$V_{DC}$	$V_V$	$V_c$	$C_p$	$i_{max}$
Units	Volts	Volts	Volts	Volts	pF	Amps
	(Max.)	(Max.)		(Max.)	(Typical)	(Max.)
Test Condition		< 50 $\mu A$	1mA DC	10A 8/20 $\mu s$	1KHz	8/20 $\mu s$ (1Time)
MLVS2220P14832DG	14	16	21.4~27.8	55	8300	1500
MLVS2220P14193DG	14	16	21.4~27.9	55	19000	4000
MLVS2220P50652DG	50	65	73.8~90.2	140	6500	4500

$V_{RMS}$  – Maximum AC operating voltage the varistor can maintain and not exceed 50 $\mu A$  leakage current

$V_{DC}$  – Maximum DC operating voltage the varistor can maintain and not exceed 50 $\mu A$  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 8/20 $\mu s$  waveform

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

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

8/20 $\mu s$  : Calibration method by short circuit

## 5. General electrical specifications

### 5.1. General technical data

Operating temperature	-55 ... +125°C
Storage temperature (on board)	-55 ... +125°C
Response time	<1 ns
Solderability	245±5°C, 5 +0/-0.5sec
Solder leach resistance	260±5°C, 10 ±1sec
Number of reflow cycles	3 times (Max.)

### 5.2. Taping Package Storage Condition

Storage Time: 12 months max.

Storage Temperature: 5 to 40°C

Relative Humidity: 65% max.

## 6. Precautions for Handling

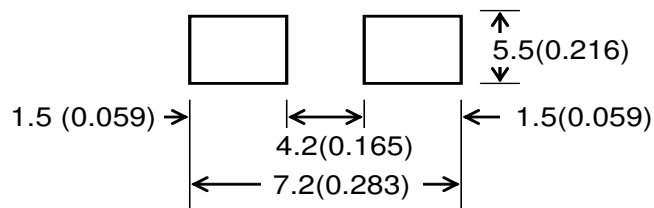
### 6.1. Solder cream in reflow soldering

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

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

Dimensions: millimeters (inches)

2220



### 6.2. 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.

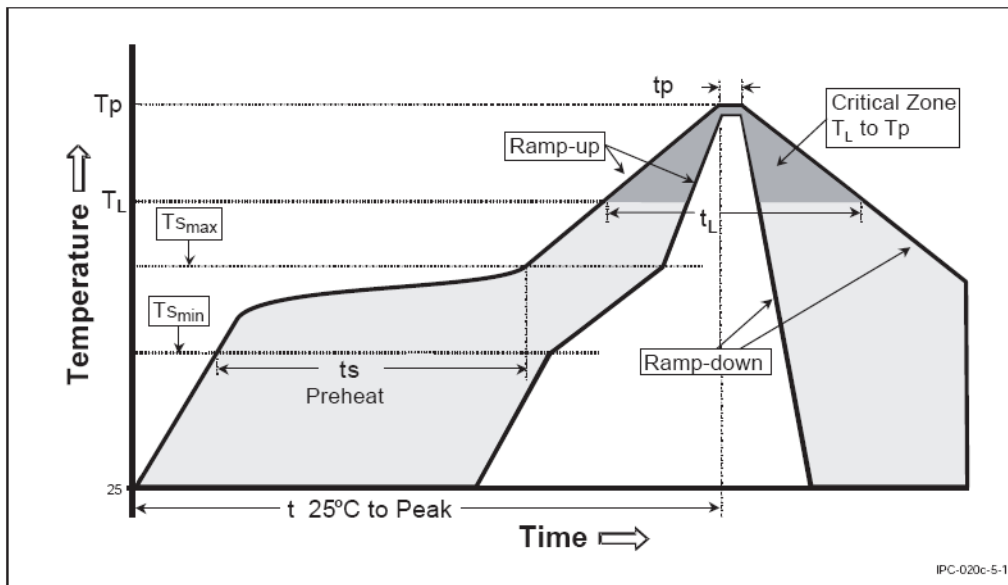
### 6.3. Precaution for soldering

Note that rapid heating, rapid cooling or local heating will easily damage the component.

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

### 6.4. Recommendable reflow soldering

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.
<b>Preheat</b>	
– Temperature Min (T <sub>smin</sub> )	150°C
– Temperature Max (T <sub>smax</sub> )	200°C
– Time (t <sub>smin</sub> to t <sub>smax</sub> )	60-180 seconds
Time maintained above:	
– Temperature (T <sub>L</sub> )	217°C
– Time (t <sub>L</sub> )	60-150 seconds
Peak/Classification Temperature (T <sub>p</sub> )	260°C
Time within 5 °C of actual Peak Temperature (t <sub>p</sub> )	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25 °C to Peak Temperature	8 minutes max.



\*According to J-STD-020C

### 6.5. Solder gun procedure

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

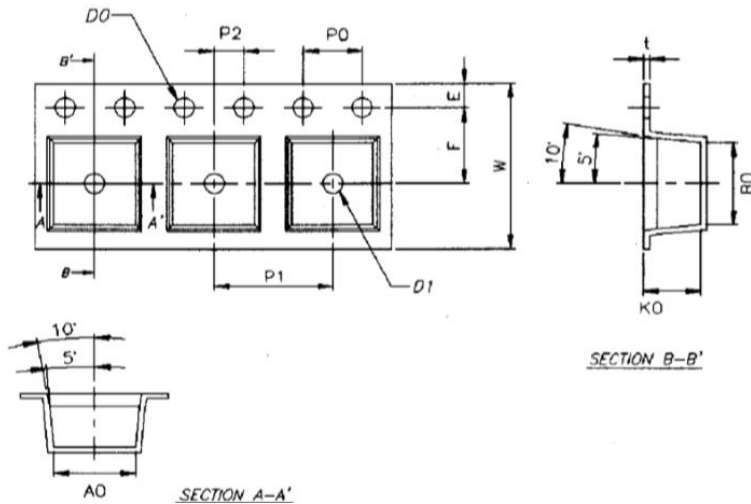
- (1) Use solder tip temperature must be less than 350°C for the period within 3 seconds by using soldering gun under 30W.
- (2) Soldering gun tip shall not touch component directly.

### 6.6. Soldering volume

Apply proper volume of solder paste, too much may cause crack of component body.

## 7. Taping Package and Label Marking

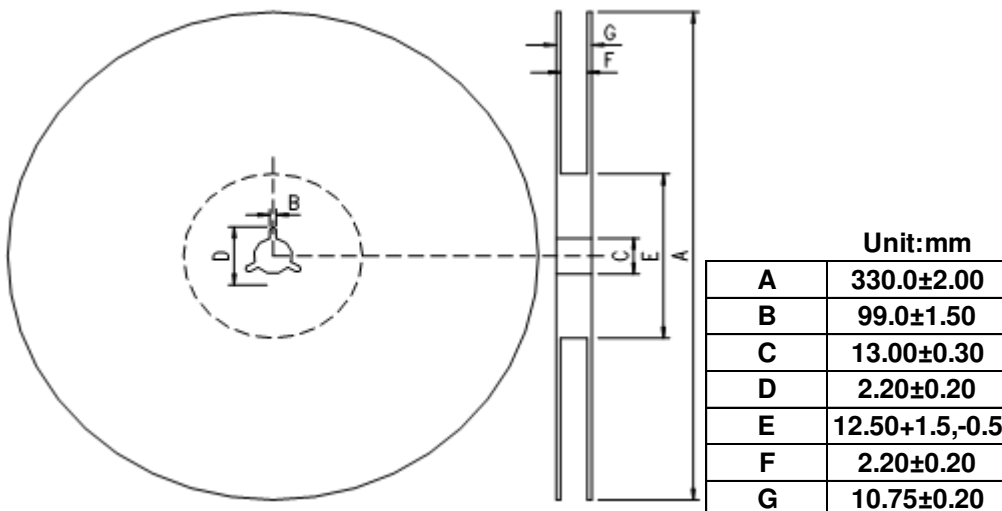
### 7.1. Carrier tape dimensions



Unit :mm

Type	Varistor voltage	W	E	F	D0	D1	P0	P1	P2	P0 x10
2220	<30V	12.00	1.75	5.50	1.50	1.50	4.00	8.00	2.00	40.00
	>30V	±0.30	±0.10	±0.05	+0.10,-0	+0.10,-0	±0.10	±0.10	±0.05	±0.20
	Varistor voltage	t	A0	B0	K0					
	<30V	0.40	5.45	5.95	4.10±0.10					
	>30V	±0.05	±0.05	±0.05	3.10±0.10					

### 7.2. Taping reel dimensions





**7.3. 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.

**7.4. 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.

**7.5. Quantity of products in the taping package**

- (1) Standard quantity: 1,500pcs/Reel
- (2) Shipping quantity is a multiple of standard quantity.