

# APPROVAL SHEET

## MULTILAYER CHIP VARISTOR

For ESD / Surge Protection

VZ0402,VZ0603,VZ0805,VZ1206

Green Material Series – RoHS Compliance

Customer : \_\_\_\_\_

Approval No : \_\_\_\_\_

Issue Date : \_\_\_\_\_

Customer Approval :



### DESCRIPTION

Walsin Multilayer Chip Varistor is a family of Transient Voltage Surge Suppression products. Today, electronic circuits are becoming smaller and more sensitive to external interference. Walsin Multilayer Chip Varistor is designed to protect components from destruction of transients and ESD (Electronic Static Discharge). The wide operating voltage and energy range make Walsin Multilayer Chip Varistor suitable for numerous applications on I/O protection, Vcc protection, Keyboard protection, LCD protection, Sensor protection...etc. The Walsin Chip Varistor is manufactured by Multilayer fabrication technology providing excellent voltage clamping ability and is supplied in leadless, surface mount form, compatible with modern reflow and wave soldering procedures.

### FEATURES

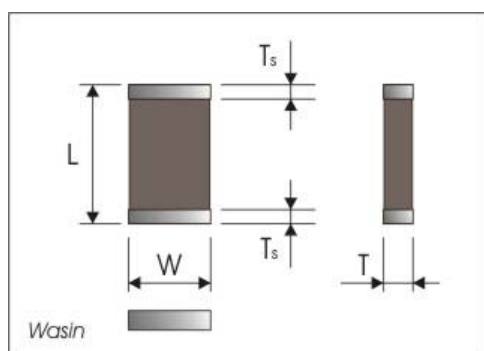
1. Multilayer fabrication technology
2. -55°C to 125°C operating temperature Range
3. Operating voltage range  $V_{M(DC)}$  at 5.5V ~ 85V
4. Able to withstand ESD test of IEC-61000-4-2
5. Bi-directional clamping characteristic

### APPLICATIONS

1. Protection of cellular phones, PDA, High Speed Data Line...etc.
2. ESD Protection for components sensitive to IEC 61000-4-2, Provides Circuit Board Transient Voltage Protection for Transistors.
3. Protection of Video & Audio Ports.

### ELECTRICAL DATA

Item	General Specification
<b>Continuous Rating :</b> Steady State Applied Voltage : DC voltage Range ( $V_{MDC}$ ) AC voltage Range ( $V_{MDC\ RMS}$ )	5.5V to 85V 4V to 60V
<b>Transient Rating :</b> Non-Repetitive Surge Current ( 8/20 $\mu$ s) Non-Repetitive Surge Energy, 10/1000 $\mu$ s Waveform, ( $W_{TM}$ ) Operating Ambient Temperature Range ( $T_A$ ) Storage Temperature Range ( $T_{STG}$ ) Temperature Coefficient ( $\alpha V$ ) of clamping Voltage ( $V_C$ ) at Specified Test Current	20A to 100A 0.05J to 1.0J -55° C to 125° C -55° C to 150° C <0.01 %/° C



### DIMENSIONS

SIZE	VZ0402	VZ0603	VZ0805	VZ1206
L	1.00 ± 0.10	1.60 ± 0.15	2.00 ± 0.20	3.20 ± 0.20
W	0.50 ± 0.10	0.80 ± 0.15	1.25 ± 0.20	1.60 ± 0.20
T	0.50 ± 0.10	0.80 ± 0.15	0.80 ± 0.20	0.80 ± 0.10 mm* 1.10 ± 0.20 mm**
Ts	0.25 ± 0.15	0.35 ± 0.15	0.50 ± 0.20	0.65 ± 0.25

Terminal electrode : Ni / Sn electrode

Note: \* means VZ1206 5.5Vdc~22Vdc items

\*\*means VZ1206 26Vdc~85Vdc items

**DEVICE RATING AND SPECIFICATIONS**

Part Number	MAXIMUM RATINGS					SPECIFICATIONS		
	Max. Continuous Working Voltage		Maximum Non-Repetitive Surge Current (8/20 $\mu$ s)	Maximum Non-Repetitive Surge Energy (10/1000 $\mu$ s)	Max. Clamping Voltage at Specified Current (8/20 $\mu$ s)	Nominal Voltage At 1mA (DC) Current		Typical Capacitance
	$V_{M(DC)}$	$V_{M(AC)}$	$I_{TM}$	$W_{TM}$	$V_c$	$V_{N(DC)}$ Min.	$V_{N(DC)}$ Max.	@1KHz
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	C (pF)
VZ0402M050AGT	5.5	4	20	0.05	20 at 1A	8.0	11.0	295
VZ0402M090AGT	9	6	20	0.05	23 at 1A	10.2	13.8	190
VZ0402M110AGT	11	8	20	0.05	25 at 1A	12.75	17.25	160
VZ0402M140AGT	14	11	20	0.05	30 at 1A	15.3	20.7	135
VZ0402M180AGT	18	14	20	0.05	40 at 1A	21.6	26.4	93
VZ0603M050AGT	5.5	4	30	0.1	20 at 1A	8.0	11.0	800
VZ0603M090AGT	9	6	30	0.1	23 at 1A	10.2	13.8	680
VZ0603M140AGT	14	11	30	0.1	30 at 1A	15.3	20.7	350
VZ0603M180AGT	18	14	30	0.1	39 at 1A	21.6	26.4	270
VZ0603M260AGT	26	20	30	0.1	54 at 1A	29.7	36.3	200
VZ0603M300AGT	30	25	30	0.1	65 at 1A	35.1	42.9	120
VZ0603M380AGT	38	30	30	0.1	77 at 1A	42.3	51.7	100
VZ0805M050AGT	5.5	4	80	0.1	20 at 1A	8.0	11.0	1600
VZ0805M090AGT	9	6	80	0.1	23 at 1A	10.2	13.8	1180
VZ0805M180AGT	18	14	100	0.2	39 at 1A	21.6	26.4	550
VZ0805M220AGT	22	17	100	0.2	44 at 1A	24.3	29.7	400
VZ0805M260AGT	26	20	100	0.3	54 at 1A	29.7	36.3	350
VZ0805M300AGT	30	25	100	0.3	65 at 1A	35.1	42.9	310
VZ0805M380AGT	38	30	100	0.3	77 at 1A	42.3	51.7	280
VZ0805M450AGT	45	35	80	0.3	90 at 1A	50.4	61.6	195
VZ1206M050AGT	5.5	4	100	0.2	20 at 1A	8.0	11.0	3200
VZ1206M140AGT	14	11	100	0.3	30 at 1A	15.3	20.7	1150
VZ1206M180AGT	18	14	100	0.3	38 at 1A	21.6	26.4	900
VZ1206M220AGT	22	17	100	0.4	44 at 1A	24.3	29.7	840
VZ1206M260AGT	26	20	100	0.5	54 at 1A	29.7	36.3	490
VZ1206M300AGT	30	25	100	0.6	65 at 1A	35.1	42.9	440
VZ1206M380AGT	38	30	100	0.7	77 at 1A	42.3	51.7	400
VZ1206M450AGT	45	35	100	0.8	90 at 1A	50.4	61.6	310
VZ1206M560AGT	56	40	100	1.0	110 at 1A	61.2	74.8	280
VZ1206M650AGT	65	50	100	0.5	135 at 1A	73.8	90.2	240
VZ1206M850AGT	85	60	100	0.6	165 at 1A	90.0	110	160

## STANDARD TESTING CONDITION

Unless otherwise specified

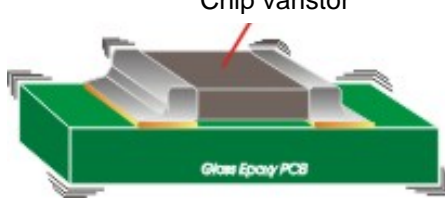
- Temperature : 15 ~ 35°C
- Humidity : 25%RH ~ 85%RH
- Atmospheric pressure : 86kPa ~ 106kPa

## SPECIFICATION

### 1. Electrical Reliability

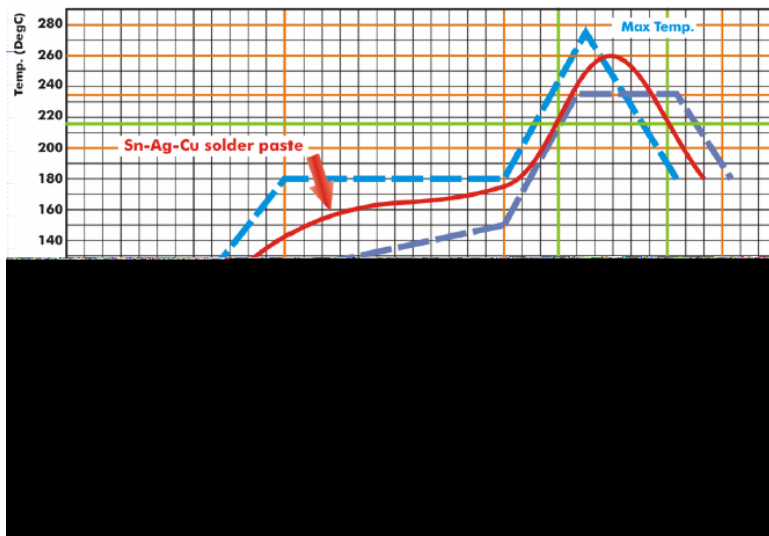
Test item	Test condition / Test method	Specification															
High temperature storage	+125±3°C for 1000 hours Measurement to be made after keeping at room temp. for 24 ±2hr	△V at 1mA < 10%															
Low temperature storage	-40±3°C for 1000 hours Measurement to be made after keeping at room temp. for 24 ±2hr	△V at 1mA < 10%															
Humidity storage	40±2°C , 90 ~95%RH for 500 hours Measurement to be made after keeping at room temp. for 24 ±2hr	△V at 1mA < 10%															
Temperature cycles	Times : 5 cycles <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>room temp.</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>+125±3°C</td> <td>30±2</td> </tr> <tr> <td>4</td> <td>room temp.</td> <td>2~3</td> </tr> </tbody> </table> Measurement to be made after keeping at room temp. for 24 ±2hr	Step	Temp.(°C)	Time(min.)	1	-55±3	30±3	2	room temp.	2~3	3	+125±3°C	30±2	4	room temp.	2~3	△V at 1mA < 10%
Step	Temp.(°C)	Time(min.)															
1	-55±3	30±3															
2	room temp.	2~3															
3	+125±3°C	30±2															
4	room temp.	2~3															

### 2. Mechanical Reliability

Test item	Test condition / Test method	Specification
Solderability	Solder temp. : 230±5°C Immersion time : 2±0.5 sec Immersion and emersion rates : 25mm/s	Min 90% electrode shall be covered with solder.
Resistance to Soldering Heat	Pre-heating : 120~ 150°C , 60 sec Solder temp. : 260±5°C Immersion time : 10±1 sec Measurement to be made after keeping at room temp. for 24 ±2h	△V at 1mA < 10% Disappearance of electrode due to immersion into solder shall not exceed 25% of edges of each electrode.
Adhesive Strength of Termination	Solder chip on PCB and applied 0805/1206 Series: 10N(1Kgf) for 10 sec 0402/0603 Series: 5N(0.5Kgf) for 10 sec  <div style="text-align: center;">  <p>Chip varistor</p> </div>	No visible damage
Vibration	Solder chip on PCB. Frequency : 10 Hz~55 Hz~10 Hz (1min) Oscillation amplitude : 1.5 mm Times : 2 hrs in each of three perpendicular direction	No visible damage
Bending Test	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of 1mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 sec..	No visible damage △V at 1mA < 10%

### SOLDERING CONDITION

Typical examples of soldering processes that provide reliable joints without any damage are given in figure below:



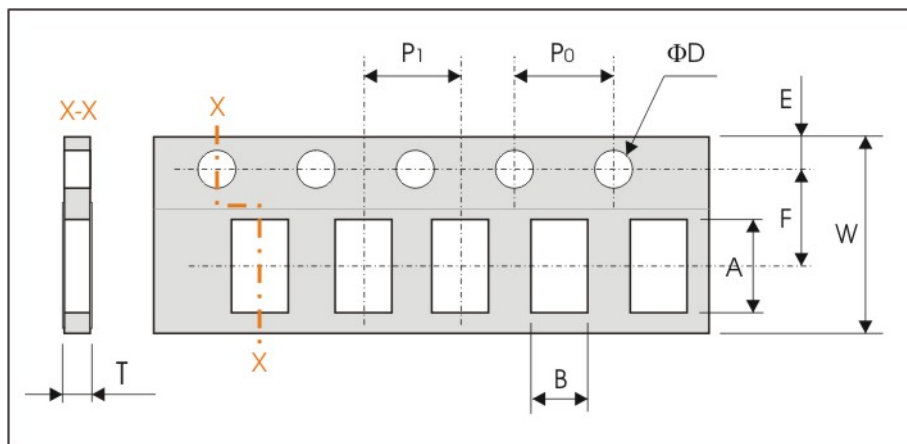
Infrared soldering profile

### ORDERING CODE

VZ	0402	M	050	A	G	T
Type Code	Chip Size	Style	Rated Voltage	Capacitance Tolerance	Termination	Packing
VZ: Walsin Varistor	Code is LxW(in inches) 0402=04x02 0603=06x03 0805=08x05 1206=12x06	M: Multilayer A: Array	050 = 5.5V 070 = 7V 090 = 9V 140 = 14V 180 = 18V	A: Standard	G: Green Material	T: Reeled B: Bulk

## PACKAGING

Paper Tape specifications (unit :mm) and Packaging quantity

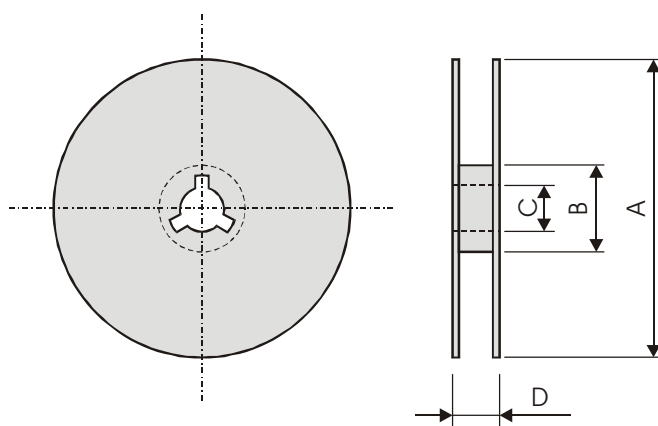


Series	A	B	E	F	ΦD
VH0402 Series	1.12 ± 0.03	0.62 ± 0.03	1.75 ± 0.05	3.50 ± 0.05	1.55 ± 0.05
VZ0603 Series	1.80 ± 0.05	0.95 ± 0.05	1.75 ± 0.05	3.50 ± 0.05	1.55 ± 0.05
VZ0805 Series	2.25 ± 0.05	1.45 ± 0.05	1.75 ± 0.05	3.50 ± 0.05	1.55 ± 0.05
VZ1206 Series	3.50 ± 0.05	1.88 ± 0.05	1.75 ± 0.05	3.50 ± 0.05	1.55 ± 0.05

Series	P0	P1	T	W	Quantity/Reel
VH0402 Series	4.00 ± 0.10	2.00 ± 0.10	0.60 ± 0.03	8.00 ± 0.20	10Kpcs
VZ0603 Series	4.00 ± 0.10	2.00 ± 0.10	0.87 ± 0.05	8.00 ± 0.20	4Kpcs
VZ1206 Series	4.00 ± 0.10	2.00 ± 0.10	1.24 ± 0.05	8.00 ± 0.20	4KGcs

- Tape Material : Paper tape.

## Reel dimensions



Symbol	A	B	C	D
Dimension	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	10.0±1.5

## CAUTION OF HANDLING

### Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

- (1) Aircraft equipment
- (2) Aerospace equipment
- (3) Undersea equipment
- (4) Medical equipment
- (5) Traffic signal equipment
- (6) Applications of similar complexity and /or reliability requirements to the applications listed in the above.

### Storage condition

- (1) Products should be used in 6 months from the day of WALSIN outgoing inspection, which can be confirmed.
- (2) Storage environment condition.
  - Products should be storage in the warehouse on the following conditions.
  - Temperature : -10 to +40°C
  - Humidity : 30 to 70% relative humidity
  - Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid or it may cause oxidization of electrode, resulting in poor solderability.
  - Products should be storage on the palette for the prevention of the influence from humidity, dust and son on.
  - Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.
  - Products should be storage under the airtight packaged condition.

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