

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

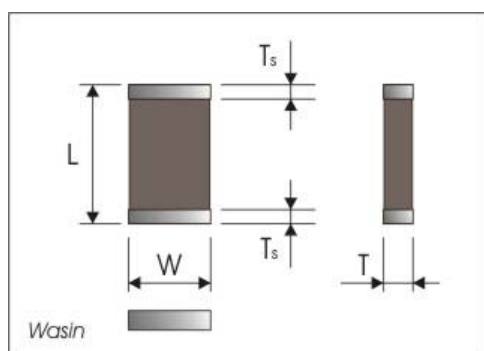
1. Multilayer fabrication technology
2. -55°C to 125°C operating temperature Range
3. Operating voltage range $V_{M(DC)}$ at 5.5V ~ 85V
4. Able to withstand ESD test of IEC-61000-4-2
5. Bi-directional clamping characteristic

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 |
|---|---|
| Continuous Rating : Steady State Applied Voltage : DC voltage Range (V_{MDC}) AC voltage Range ($V_{MDC\ RMS}$) | 5.5V to 85V 4V to 60V |
| Transient Rating : Non-Repetitive Surge Current(8/20 μ s) Non-Repetitive Surge Energy, 10/1000 μ s Waveform, (W_{TM}) Operating Ambient Temperature Range (T_A) Storage Temperature Range (T_{STG}) Temperature Coefficient (αV) 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 μ s) | Maximum Non-Repetitive Surge Energy (10/1000 μ s) | Max. Clamping Voltage at Specified Current (8/20 μ 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

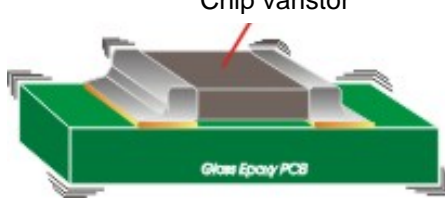
- Temperature : 15 ~ 35°C
- Humidity : 25%RH ~ 85%RH
- Atmospheric pressure : 86kPa ~ 106kPa

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 | ΔV at 1mA < 10% | | | | | | | | | | | | | | | |
| Low temperature storage | -40±3°C for 1000 hours Measurement to be made after keeping at room temp. for 24 ±2hr | ΔV 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 | ΔV 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 | ΔV 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 | | | | | | | | | | | | | | | |

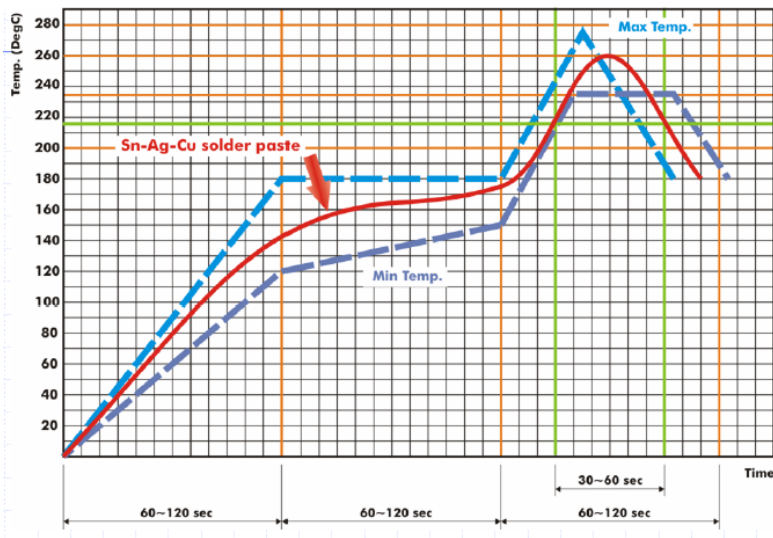
2. Mechanical Reliability

| 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 | ΔV 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 ΔV at 1mA < 10% |



SOLDERING CONDITION

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



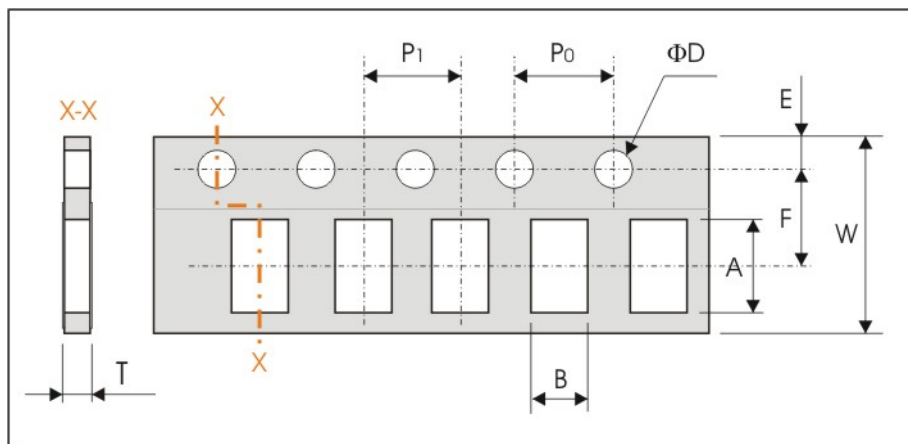
Infrared soldering profile

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

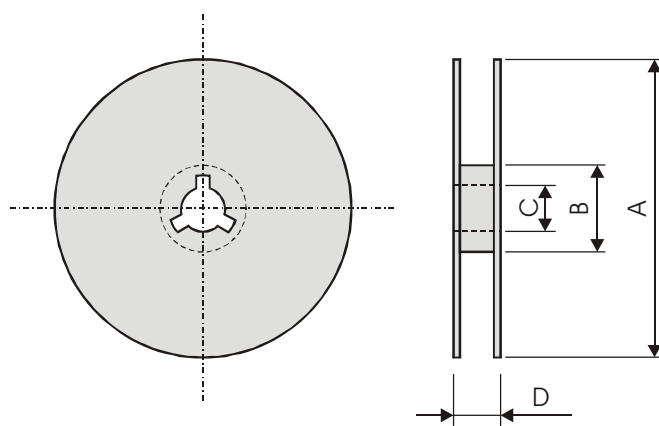


| Series | A | B | E | F | ΦD |
|---------------|-------------|-------------|-------------|-------------|-------------|
| VH0402 Series | 1.12 ± 0.03 | 0.62 ± 0.03 | 1.75 ± 0.05 | 3.50 ± 0.05 | 1.55 ± 0.05 |
| VZ0603 Series | 1.80 ± 0.05 | 0.95 ± 0.05 | 1.75 ± 0.05 | 3.50 ± 0.05 | 1.55 ± 0.05 |
| VZ0805 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.