

PRODUCT SPECIFICATION

MULTILAYER CHIP VARISTOR

For Surge Protection

Size 0603

VZ0603 Green Material Series

*Contents in this sheet are subject to change without prior notice.

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.

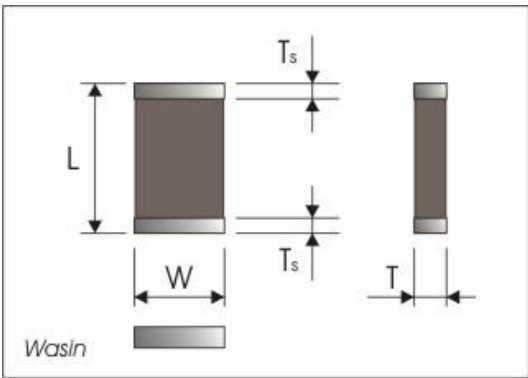
Features

1. Multilayer fabrication technology
2. -40°C to 85°C operating temperature Range
3. Operating voltage range $V_{M(DC)}$ at $5.5\text{V} \sim 38\text{V}$
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.

Dimensions

Figure	Symbol	VZ0603 Series
 <p>The diagram shows a top view and a side view of the varistor. The top view is a rectangle with length L and width W. The side view shows the thickness T. The terminal electrode thickness is labeled Ts. The Walsin logo is in the bottom left corner of the diagram area.</p>	L	$1.60 \pm 0.15 \text{ mm}$
	W	$0.80 \pm 0.15 \text{ mm}$
	T	0.90 mm (max.)
	Ts	$0.35 \pm 0.15 \text{ mm}$

*Terminal electrode : Ni / Sn electrode

Part Number Identification

VZ	0603	M	050	A	G	T
Type Code	Chip Size	Style	Rated Voltage	Surge Current	Termination	Packing
VZ: Walsin Varistor For Surge Protection	0402 0603	M: Multilayer A: Array	050 = 5.5V 070 = 7V 090 = 9V 140 = 14V 180 = 18V	A: Standard C: High Current	G: Green Material	T: Reeled

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
								@1KHz
	V _{M(DC)}	V _{M(AC)}	I _{TM}	W _{TM}	V _c	V _{N(DC)Min.}	V _{N(DC)Max.}	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
VZ0603M050AGT	5.5	4	30	0.1	20 at 1A	7.5	10.5	650
VZ0603M090AGT	9	6	30	0.1	24 at 1A	10.2	13.8	300
VZ0603M140AGT	14	11	30	0.1	30 at 1A	15.3	20.7	210
VZ0603M180AGT	18	14	30	0.1	39 at 1A	21.6	26.4	160
VZ0603M220AGT	22	17	30	0.1	44 at 1A	24.3	29.7	145
VZ0603M260AGT	26	20	30	0.1	54 at 1A	29.7	36.3	130
VZ0603M300AGT	30	25	30	0.1	65 at 1A	35.1	42.9	110
VZ0603M380AGT	38	30	30	0.1	77 at 1A	42.3	51.7	90

Reference Data

Parameter	Symbol		Value	Unit
Leakage current at V _v × 80% (at initial state)	I _W	<	50	μ A
Leakage current at V _v × 80% (after surge test)	I _{WA}	<	200	μ A
Response time	T _{rise}	<	1	ns
Operation ambient temperature	T _{OPT}		-40 ~ +85	°C
Storage temperature range	T _{STG}		-40 ~ +125	°C
Reflow solder profile temperature (recommend)			260°C (3~10sec)	
			245°C (10~20sec)	

Notes:

- * 1 The varistor breakdown voltage was measured at 1mA.
- * 2 The clamping voltage was measured at 8/20 μ s standard current, 0603(1A)
- * 3 The peak current was tested at 8/20 μ s waveform.
- * 4 The capacitance and energy values only for customer reference, it's not formal specification.
- * 5 The components shall be employed within 1 year, in the nitrogen condition.

Electrical Reliability

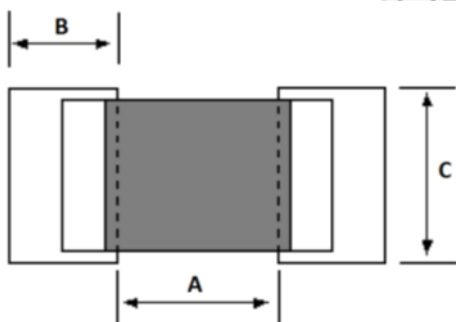
Test item	Test condition / Test method	Specification															
High temperature storage	+125±3℃ for 1000 hours Measurement to be made after keeping at room temp. for 24 ±2hr	△V at 1mA < 10%															
Low temperature storage	-40±3℃ for 1000 hours Measurement to be made after keeping at room temp. for 24 ±2hr	△V at 1mA < 10%															
Humidity storage	40±2℃ , 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"> <thead> <tr> <th>Step</th><th>Temp.(℃)</th><th>Time(min.)</th></tr> </thead> <tbody> <tr> <td>1</td><td>-40±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℃</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.(℃)	Time(min.)	1	-40±3	30±3	2	room temp.	2~3	3	+125±3℃	30±2	4	room temp.	2~3	△V at 1mA < 10%
Step	Temp.(℃)	Time(min.)															
1	-40±3	30±3															
2	room temp.	2~3															
3	+125±3℃	30±2															
4	room temp.	2~3															

Soldering Recommendations

1. Recommended solder pad layout

(Unit : mm)

	A	B	C
0402	0.4 ~ 0.6	0.6 ~ 0.9	0.5 ~ 0.7
0603	0.9 ~ 1.2	0.9 ~ 1.2	0.8 ~ 1.0
0805	1.0 ~ 1.5	1.0 ~ 1.5	1.2 ~ 1.5



2. The SIR test of the solder paste shall be done (Based on JIS-Z-3284)

3. Steel plate and foot distance printing

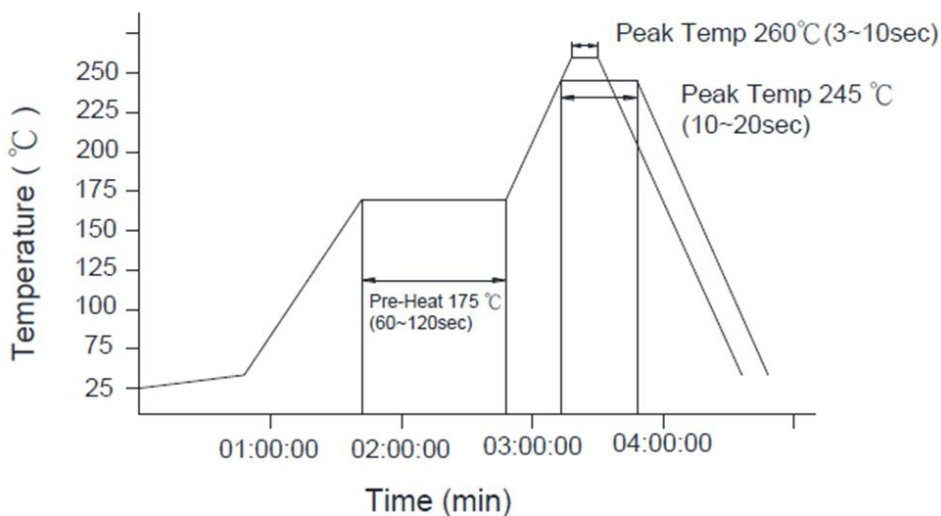
Foot distance printing (mm)	Steel plate thickness (mm)
≥ 0.65mm	0.18mm
0.50~0.65mm	0.15mm
0.40~0.50mm	0.12mm
≤ 0.40mm	0.10mm

4. The IR reflow and temperature of soldering for Pb free process

☆IR reflow Pb free process suggestion profile

(1) The solder recommend is Sn96.5/Ag3.5 and thickness recommend as shown in table 5.3

4. The IR reflow and temperature of soldering for Pb free process



☆IR reflow Pb free process suggestion profile

- (1) The solder recommend is Sn96.5/Ag3.5 and thickness recommend
- (2) Ramp-up rate (217°C to peak) +3°C/second max.
- (3) Temp. maintain at 175±25°C 180 seconds max.
- (4) Temp. maintain above 217°C 60~150 seconds
- (5) Peak temperature range 245 +20/-10°C within 5°C of actually peak temperature (tp) 10~20 seconds
- (6) Ramp down rate -6°C/second max.

※Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of the manufacturing process and the specification of the reflow furnace.

5. Resistance to soldering heat and high temperature resistance : 260°C , 10sec 3 times

6. Hand soldering

In hand soldering of the varistors, large temperature gradient between preheated the varistors and the tip of soldering iron may cause electrical failures and mechanical damages such as cracking or breaking of the devices. The soldering shall be carefully controlled and carried out, so that the temperature gradient is kept minimum with following recommended conditions for hand soldering.

6.1 Recommended soldering condition 1 (with preheating)

(1) Solder

0.12~0.18mm thread solder (Sn96.5:Ag3.5) with soldering flux in the core
rosin-based and non-activated flux is recommended.

(2) Preheating

The varistors shall be preheated so that temperature gradient between the devices and the tip of soldering iron is 150°C or below.

(3) Soldering iron

Rated power of 20W max. with 3mm soldering tip in diameter

Temperature of soldering iron tip 380°C max., 3~5sec (The required amount of solder shall be melted in advance on the soldering tip.)

(4) Cooling

After soldering, the varistors shall be cooled gradually at room ambient temperature.

6.2 Recommended soldering condition 2 (without preheating)

(1) Solder iron tip shall not directly touch to ceramic dielectrics.

(2) Solder iron tip shall be fully preheated before soldering while soldering iron tip to the external electrode of varistors.

7. Post soldering cleaning

7.1 Residues of corrosive soldering fluxes on the PC board after cleaning may greatly have influences on the electrical characteristic and the reliability (such as humidity resistance) of the varistors which have been mounted on the board. It shall be confirmed that the characteristic and the reliability of the devices are not affected by the applied cleaning conditions.

7.2 When an ultrasonic cleaning is applied to the mounted varistors on PC boards. Following conditions are recommended for preventing failures or damages of the devices due to the large vibration energy and the resonance conditions caused by the ultrasonic waves.

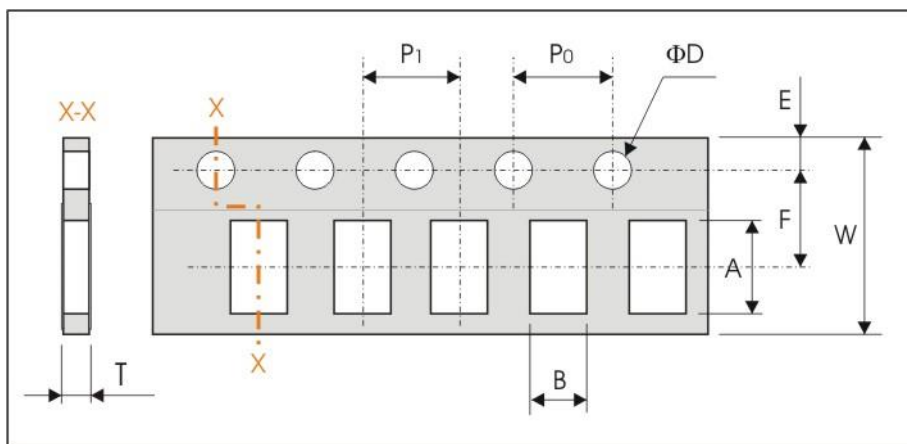
(1) Frequency 29MHz max.

(2) Radiated power 20W/liter max.

(3) Period 5 minutes max.

Packing

1. Paper Tape specifications (unit :mm) and Packaging quantity

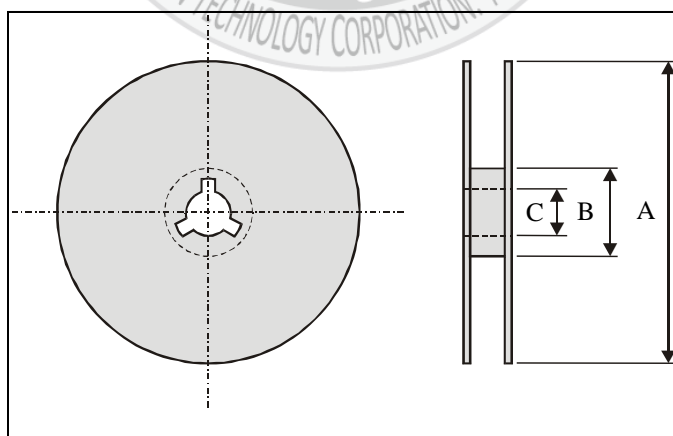


Series	A	B	E	F	ΦD
VZ0603 Series	1.90 ± 0.05	1.10 ± 0.05	1.75 ± 0.10	3.50 ± 0.05	$1.56 +0.1/- 0.05$

Series	P0	P1	T	W	Quantity/Reel
VZ0603 Series	4.00 ± 0.10	2.00 ± 0.10	0.95 ± 0.05	8.00 ± 0.20	4Kpcs

- Tape Material : Paper tape.

2. Reel dimensions



Index	A	B	C
Dimension (mm)	$\Phi 178.0 \pm 1.0$	$\Phi 60.0 \pm 0.5$	$\Phi 13.0 \pm 0.2$