AMOTECH

SPECIFICATION

MULTILAYER CHIP VARISTOR

TYPE : AVFC 5 S 05 Q 050

January 29, 2004

AMOTECH CO., LTD. 17-2, JAMWON-DONG, SEOCHO-GU, SEOUL, KOREA TEL : 82-2-544-1383 FAX : 82-2-517-7183	DESIGNED	CHECKED	APPROVED

Revision record

Date	Content	Page

1. ELECTRICAL SPECIFICATON

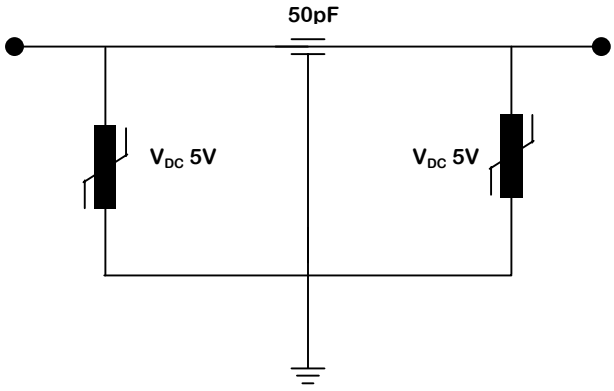
1-1 TEST CONDITION

Varistor voltage	In = 1 mA DC
Leakage current	Vdc = 5.5 V DC
Capacitance	f = 1MHz, Vrms = 0.5 V
Insulation resistance after reflow soldering	V = 3.6 V DC
Reflow soldering condition	Soldering paste : Tamura (Japan) RMA-20-21L Stencil : SUS, 120 ㎛ thickness Soldering profile : 220 ℃, 5 sec.

1-2 ELECTRICAL SPECIFICATION

Maximum allowable continuous DC voltage	5	V
Varistor voltage / nominal voltage / breakdown voltage	10~14	V
Nonlinearity coefficient	＞ 10	
Leakage current at continuous DC voltage	< 20	uA
Response time	＜ 1	ns
Capacitance measured at 1MHz	50	pF
Capacitance tolerance	-30to +30	%
Insulation resistance	> 10	MΩ
Operating ambient temperature	-55 to +125	℃
Storage temperature	-55 to +150	℃

1-3 EQUIVALENT CIRCUIT



1-4 FREQUENCY CHARATERISTICS

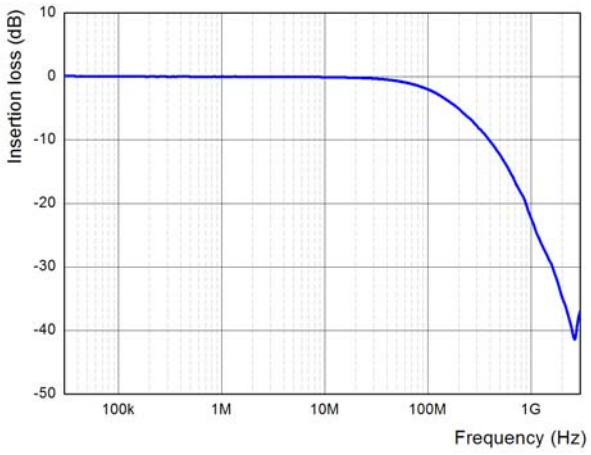


FIG 1. FREQUENCY vs. INSERTION LOSS CURVE

1-5 ESD PROTECTION EFFICIENCY

- Contact 8kV ESD strike

FIG 2. ESD Curve INPUT (IEC61000-4-2 standard waveform)

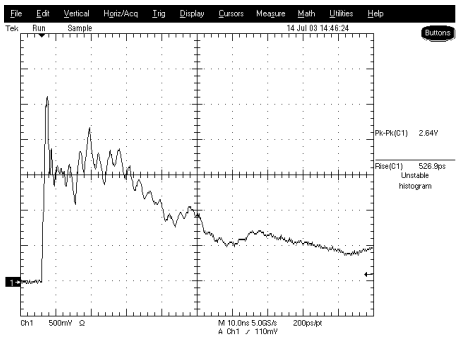
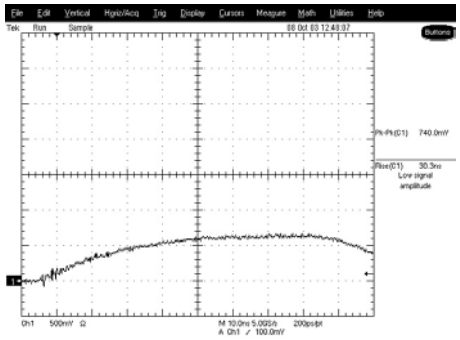


FIG 3. ESD Curve OUTPUT



1-6 Reliability testing procedures

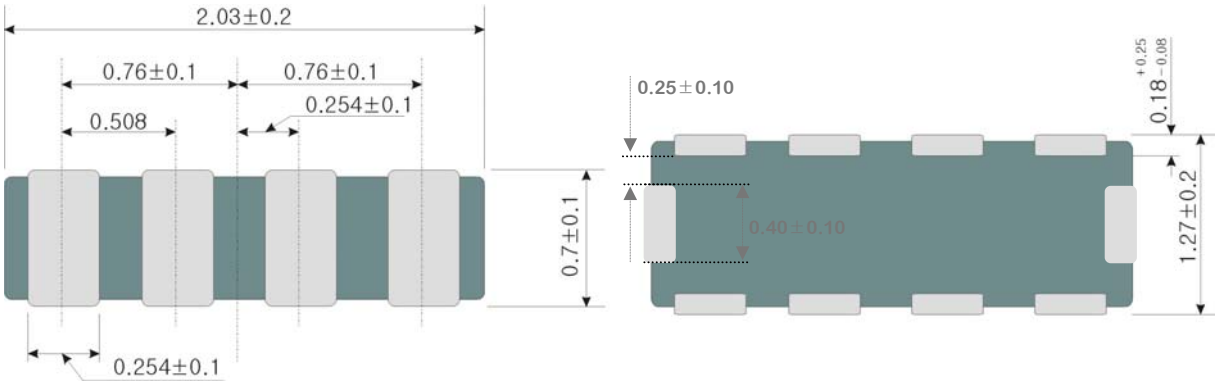
Reliability parameter	Test	Test methods and remarks	Test requirement
Pulse current capability	Imax 8/20 μs	IEC 1051-1, Test 4.5. 10 pulses in the same direction at 2 pulses per minute at maximum peak current	d|Vn|/Vn≤10% no visible damage
Electrostatic discharge capability	ESD C=150 pF, R=330Ω	IEC 61000-4-2 Each 10 times in positive/negative direction in 10 sec at 8KV contact discharge (Level 4)	d|Vn|/Vn≤10% no visible damage
Environmental reliability	Thermal shock	IEC 68-2-14 Condition for 1 cycle Step 1 : Min. –40℃, 30±3 min. Step 2 : Max. +125℃, 30±3 min. Number of cycles: 30 times	d|Vn|/Vn≤5% no visible damage
	Low temperature	IEC 68-2-1 Place the chip at -40±5℃ for 1000±12hrs. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤5% no visible damage
	High temperature	IEC 68-2-2 Place the chip at 125±5℃ for 1000±24hrs. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤5% no visible damage
	Heat resistance	IEC 68-2-3 Apply the rated voltage for 1000±48hrs at 85±3℃. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤5% no visible damage
	Humidity resistance	IEC 68-2-30 Place the chip at 40±2℃ and 90 to 95% humidity for 1000±24hrs. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤10% no visible damage
	Pressure cooker test	Place the chip at 2 atm, 120℃, 85%RH for 60 hrs. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤10% no visible damage
	Operating life	Apply the rated voltage for 1000±48hrs at 125±3℃. Remove and place for 24±2hrs at room temp. condition, then measure	d|Vn|/Vn≤10% no visible damage

Mechanical Reliability	Solderability	IEC 68-2-58 Solder bath method, 230±5℃, 2s	At least 95% of terminal electrode is covered by new solder
	Resistance to soldering heat	IEC 68-2-58 Solder bath method, 260±5℃, 10±0.5s, 270±5℃, 3±0.5s	d|Vn|/Vn≤5% no visible damage
	Bending strength	IEC 68-2-21 Warp:2mm, Speed:0.5mm/sec, Duration: 10sec. The measurement shall be made with board in the bent position	d|Vn|/Vn≤5% no visible damage
	Adhesive strength	IEC 68-2-22 Applied force on SMD chip by fracture from PCB	Strength>10 N no visible damage

2. Material Specification

Body	ZnO based ceramics
Internal electrode	Silver – Palladium
External electrode	Silver – Nickel – Tin
Thickness of Ni/Sn plating layer	Nickel ＞ 1 ㎛, Tin ＞ 2 ㎛

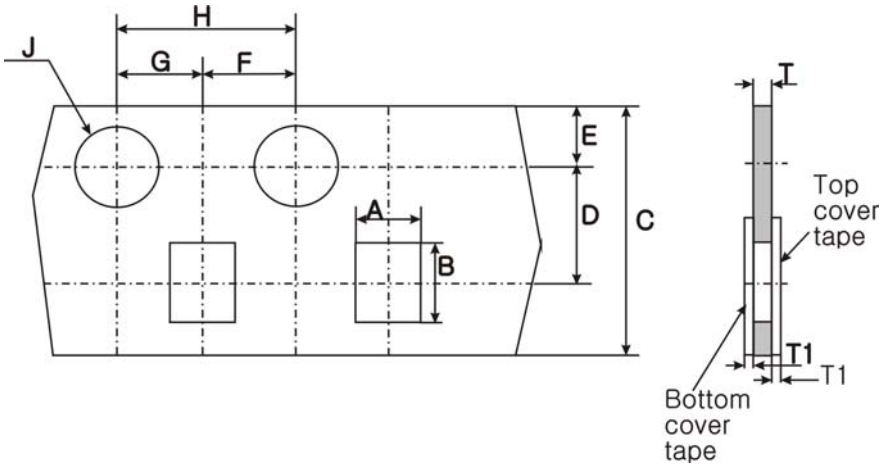
3. Dimension Specification



Unit : mm

4. Package Specification

4-1 Paper carrier tape package



	A	B	C	D	E	F	G	H	J	T	T1
Spec.	1.550	2.30	8.00	3.50	1.75	2.00	2.00	4.00	1.55	0.60	0.1
Tolerance	±0.05	±0.05	±0.10	±0.05	±0.05	±0.05	±0.05	±0.10	±0.03	±0.05	Max.

4-1 Material for package

4-1-1 Paper carrier tape

Laminated virgin pulp

4-1-2 Top tape

Polyester film

4-1-3 Bottom tape

Adhesive coated paper

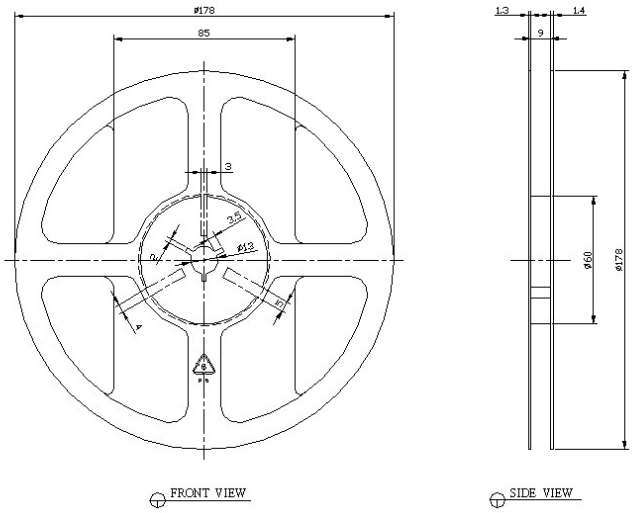
4-1-4 Plastic reel

GPPS (General Purpose Poly Styrene) resin

4-1-5 Plastic bag

PE (Poly ethylene)

4-2 Reel package



4-3 Box package

4-3-1 Small box

85 (W) x 85 (D) x 65 (T) (mm)

5 reel (4,000 ea/reel × 5 reel = 20,000 ea)

4-3-2 Medium box

195 (W) x 335 (D) x 205 (T) (mm)

5 small box (20,000 ea/small box ×5 small box = 100,000 ea)

4-3-3 Large box

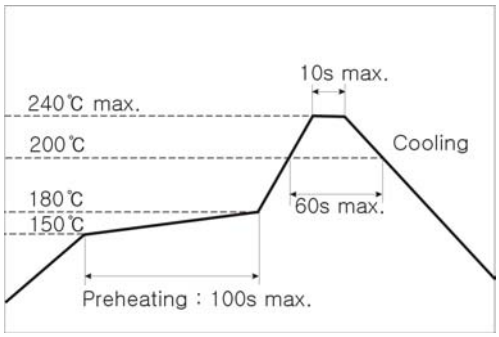
370 (W) x 400 (D) x 275 (T) (mm)

14 small box (20,000 ea/small box ×14 small box =280,000 ea)

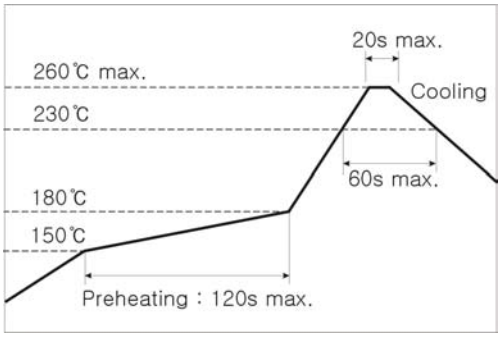
5. Soldering Recommendations

5-1 Soldering profile

5-1-1 Sn/Pb solder paste



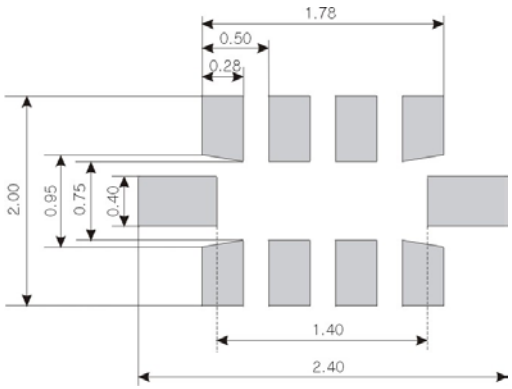
5-1-2 Pb free solder paste



5-2 Soldering guidelines

- Our chip varistors are designed for reflow soldering only. Do not use flow soldering
- Use Sn / Pb / Ag (62 / 36 / 2) or equivalent solder.
- Use non-activated flux (Cl content 0.2% max.)
- Follow the recommended soldering conditions to avoid varistor damage.

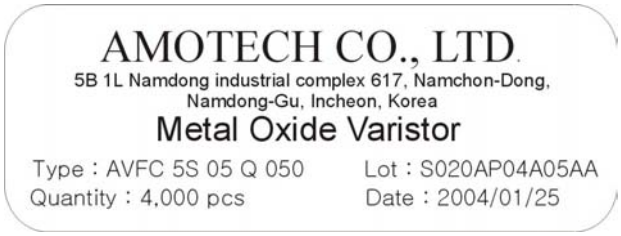
5-3 Solder pad layout



6. Storage condition

- Storage environment must be at an ambient temperature of 25~35 ℃ and an ambient humidity of 40~60 % RH
- Chip varistors can experience degradation of termination solderability when subjected to high temperature of humidity, or if exposed to sulfur or chlorine gases.
- Avoid mechanical shock (ex. Falling) to the chip varistor to prevent mechanical cracking inside of the ceramic dielectric due to its own weight.
- Use chips within 6 months.
  If 6 months of more have elapsed, check solderability before use.

7. DESCRIPTION ABOUT PACKAGE LABEL



AVFC 5S 05 Q 050

AVFC : Feedthru Type EMI_ESD filter

5 : Maximum continuous working voltage - Vdc

S : Varistor voltage tolerance – S is special order

05 : Chip size – 05 is 0508 (1.25 x 2.00 mm) size

Q : Configuration – Q means Quad array (4 element)

050 : Capacitance – 050 means 50 pF

Lot : S020AP04A05AA

S : Tape casting machine indication – S means first machine

Machine name	1st machine	2nd machine	3rd machine
Class	A	B	C

020 : Ceramic tape batch number

A : Printer type – A means Tepiko printer/stacker

		Printing machine		
		1st machine	2nd machine	3rd machine
Stacking machine	1st machine	A	B	C
	2nd machine	D	E	F
	3rd machine	G	H	I

P : Production type – P means mass production

04 : Production year – 2004

A : Production month – A means January

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Class	A	B	C	D	E	F	G	H	I	J	K	L

05 : Production date

A A : Sequence of stacking – AA means first stacking

Qunatity : 4,000 pcs

- Quantity of shipping chip varistor

Date : 2004/01/25

- Shipping date : January 27, 2004

8. Manufacturer and Place

8-1. Manufacturer

Amotech Co., Ltd.

8-2. Manufacturing place

5B 1L, Namdong Industrial complex, 617 Namchondong, Namdonggu, Incheon, Korea

9. Comment

We notice your company when we change design, manufacturing condition and raw material.