APPROVAL SHEET

Type : Multilayer Chip Antenna
Part No. : ALA931C5

	Check	Consent	Approval

Amotech	Written	Checked		Approved
	조영희	이인희	khyhee	
	12/18	12/18	12/18	12/18

2007. 2. 7

AMOTECH Co., Ltd.

Content

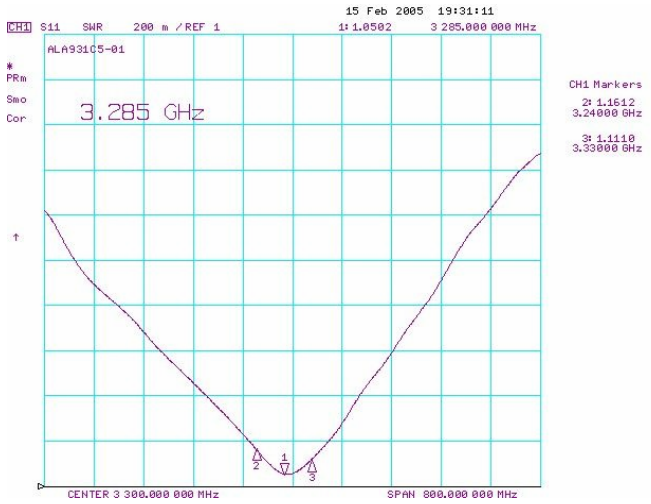
1. Revision Record

Date	Title	Content	Remark
2006.12.18		New drawing up	

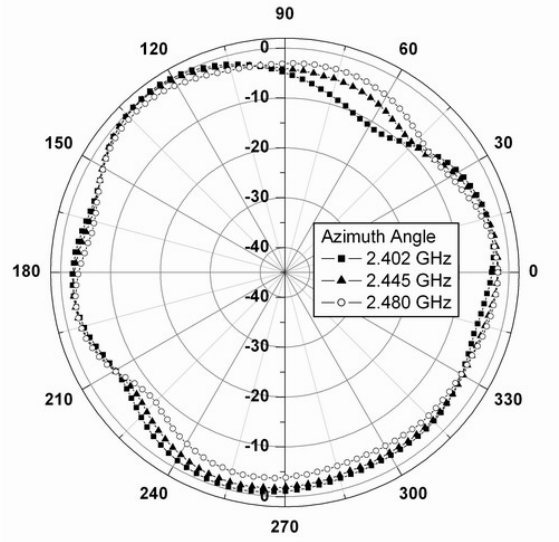
2. Specifications

2.1 Electrical specifications

No	Item	Spec.	Remark
1	Frequency Range	2400~2500	ISM Band
2	VSWR	Max. 3.0:1 @3285±45 MHz	On manual jig
3	Radiation Gain	Max. 0 dBi @azimuth co-pol.	Measured after matching on testboard
4	Radiation Pattern	Omni-directional	
5	Impedance	Nominal 50 Ω	



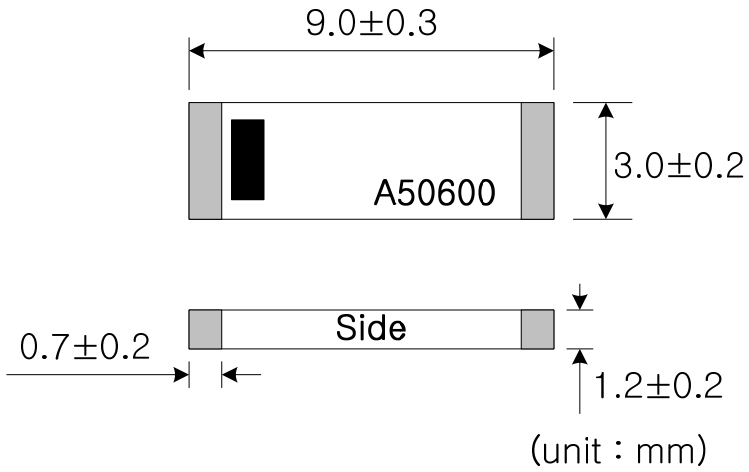
[VSWR : measured on manual jig]



[Radiation Gain : Measured on Ref. Board]

2.2 Mechanical specifications

No	Item	Spec.		Unit
1	Dimensions	W	9.0 ±0.3	mm
		D	3.0 ±0.2	
		H	1.2 ±0.2	
2	Unit Weight	97± 9		mg
3	Operation Temp.	−30 ~ +70		℃
4	Storage Temp.	−40 ~ +85		℃



[Chip Antenna dimension]

2.3 Index method of Part No. & Lot No.

Part No. ALA (1) 931 (2) C5 (3)

(1) : Amotech Antenna
(2) : Chip size
(3) : Version & frequency

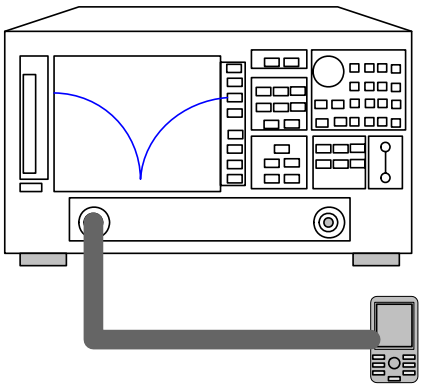
Lot No. MA (1) 09 (2) A5 (3) 0506 (4) 01 (5)

(1) : Mass product Antenna
(2) : Chip size
(3) : Version & frequency
(4) : Y/M
(5) : Serial No. of product

3. Test Method

3.1 VSWR

Equipment : Network Analyzer 8753ES



[Test procedure]

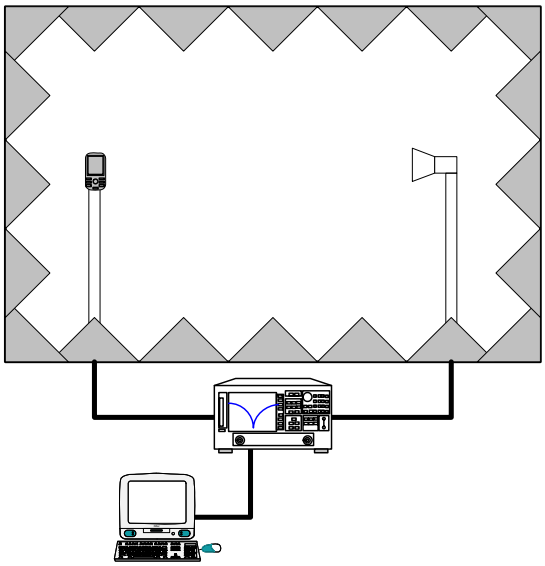
ⓐ Setup as shown picture.

ⓑ Calibrate Network Analyzer in frequency range of $f_0 \pm$ 400 MHz, verify that the value of return loss(S_{11}) is under −55dB with termination(50ohm)

ⓒ After connect a mobile set or manual jig for single chip antenna to Network Analyzer, measure the max. value of VSWR in frequency range of spec.

3.2 Radiation gain

Equipment : Anechoic chamber , Network Analyzer 8753ES



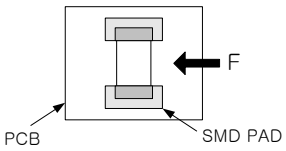
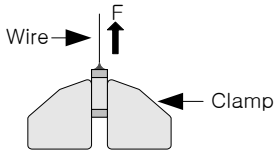
[Test procedure]

ⓐ Calibrate network analyzer and anechoic chamber using reference horn antenna.

ⓑ Set-up operation software (frequency, angle step, etc.)

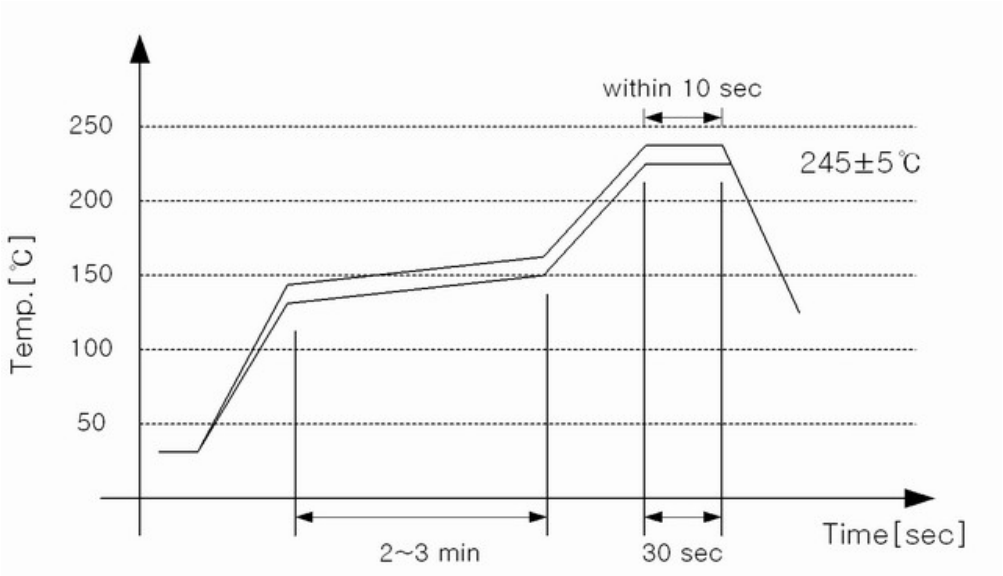
ⓒ After connecting AUT on holder, measure radiation gain.

4. Reliability Test

No	ITEM	TEST CONDITION	TEST REQUIREMENTS
1	Adhesive Strength of Termination	1. Applied force on SMD chip till detached point from PCB. 	1. No mechanical damage by forces applied on the right. 2. Strength (F) > 7 kgf
2	Tensile Strength	1. Wire : 0.6~0.8 tined Cu wire 	1. No mechanical damage by forces applied on the right. 2. Strength (F) > 3 kgf
3	Thermal Shock (Temperature Cycle)	1. 1 cycle / step 1 : -40 ± 3℃, 30 min step 2 : +125 ± 3℃, 30 min 2. Number of cycle : 30 3. Measure after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
4	High Temperature Resistance	1. Temperature : +125 ± 5℃ 2. Time : 1000 ± 24 hrs 3. Measure f_C after left for 24 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
5	Low Temperature Resistance	1. Temperature : -40 ± 5℃ 2. Time : 1000 ± 24 hrs 3. Measure f_C after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
6	Humidity (Steady Condition)	1. Humidity : 85 % RH 1. Temperature : +85 ± 3℃ 2. Time : 1000 ± 24 hrs 3. Measure f_C after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)

5. Soldering Recommend

5.1 Reflow profile for Pb-free



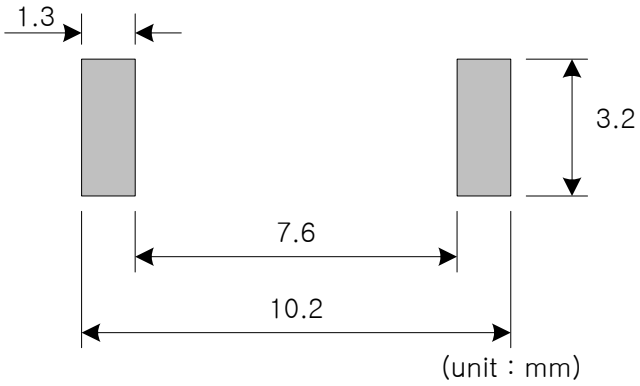
This product is designed for reflow soldering only. Do not use flow (wave) soldering.

① Use non-activated flux (Cl content 0.2% max.)

② Follow the recommended soldering conditions to avoid damage.

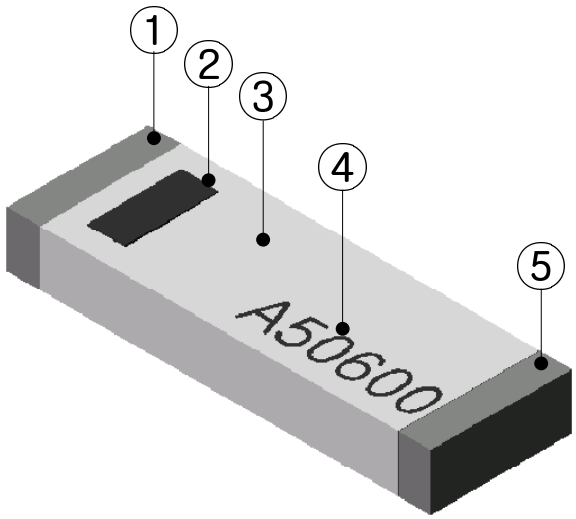
③ Reflow-cycle is max. 3 times.

5.2 PCB land pattern



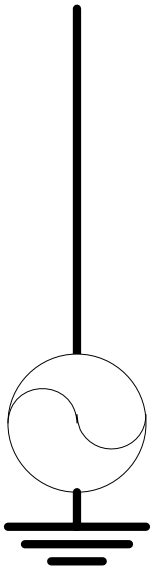
6. Structure and Material

6.1 Material



No	Part	Function	Material
1	External Electrode	Soldering, Feeding	Ag/Ni/Sn
2	Direction Index	Feeding Index	Ceramic
3	Ceramic Body	-	Ceramic
4	Text	Part No. Index	Ceramic
5	External Electrode	Soldering	Ag/Ni/Sn

6.2 Equivalent symbol

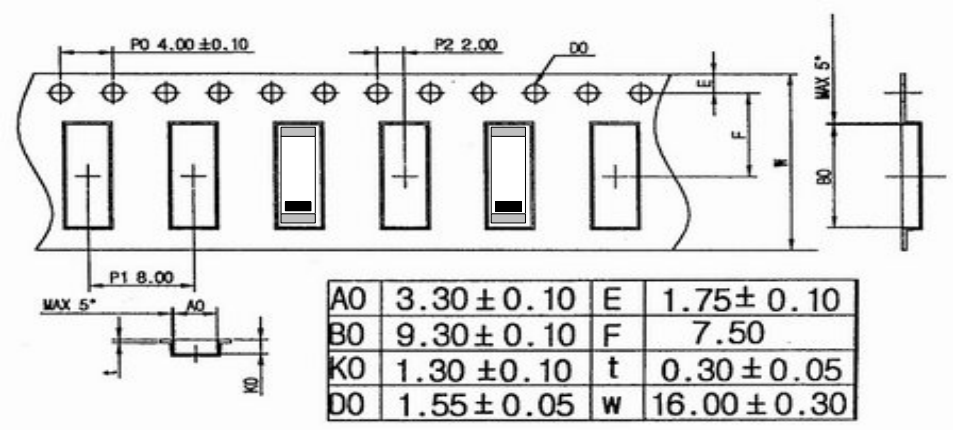


7. Cautions

① Storage environment must be at ambient temperature of 15~35℃ and ambient humidity of 45~75 % RH. (MSL Level 2)
② Chip antenna can experience degradation of termination solder ability when subjected to high temperature of humidity, or if exposed to sulfur or chlorine gases.
③ Avoid mechanical shock (ex. falling) to the chip antenna to prevent mechanical cracking inside of the ceramic dielectric due to its own weight.

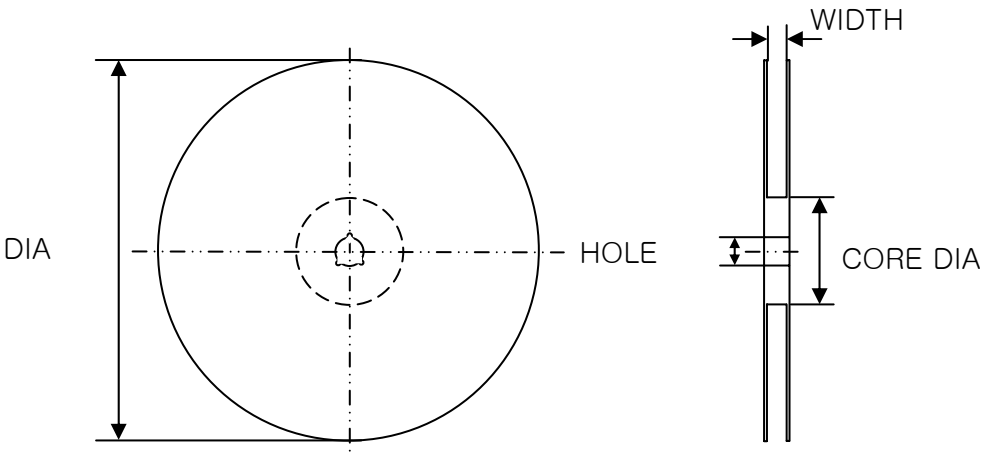
8. Packing Method

8.1 Carrier-tape



A0	3.30±0.10	E	1.75±0.10
B0	9.30±0.10	F	7.50
K0	1.30±0.10	t	0.30±0.05
D0	1.55±0.05	w	16.00±0.30

8.2 Reel



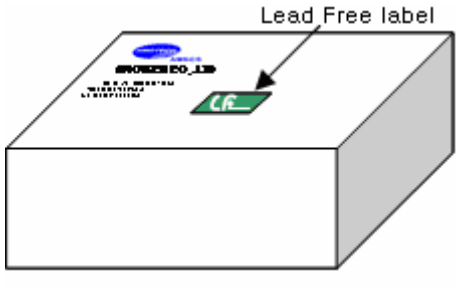
item	DIA	WIDTH	CORE DIA	HOLE
dimension(mm)	180.0 ± 0.3	17.0 ± 0.3	60.0 ± 1	13.0 ± 0.5

8.3 Packing box

8.3.1 Small box

Size : 185 (W) x 185 (D) x 68 (H) (mm)

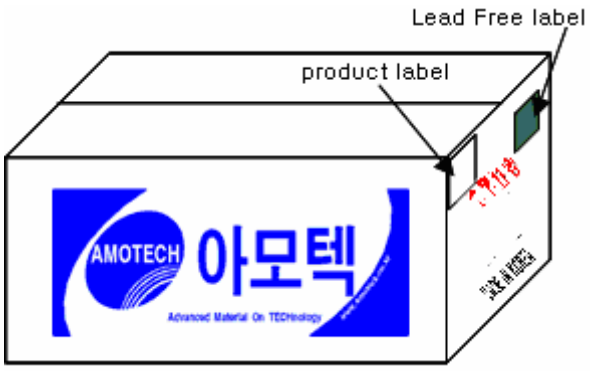
Q'TY : 3 reel (1,000 ea/reel × 3 reel = 3,000 ea)



8.3.2 Middle box

Size : 365 (W) x 200 (D) x 200 (H) (mm)

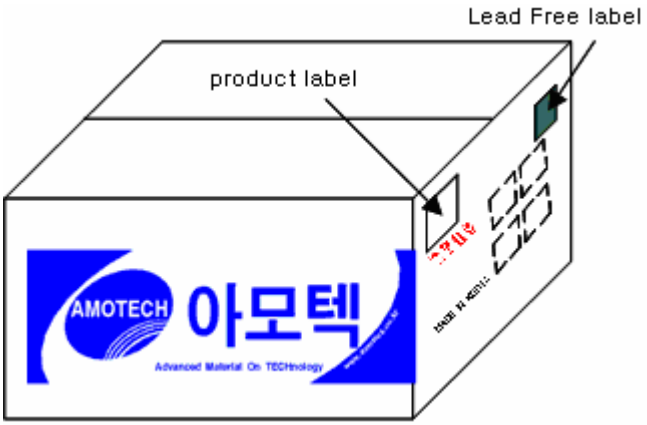
Q'TY : 5 small box(3,000 ea/small box × 5 small box = 15,000 ea)



8.3.3 Large box

Size : 390 (W) x 390 (D) x 280 (H) (mm)

Q'TY : 14 small box(3,000 ea/ small box ×14 small box = 42,000 ea)



9. Manufacture and Place

9.1 Manufacture

Amotech Co., Ltd

9.2 Place

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

Test Report No. F690501/LF-CTSGP06-24480

Date: September 25, 2006

To: **AMOTECH CO., LTD.**
5BL-1L, 617
Namchon-dong
Namdong-gu
INCHEON 405-100
Korea

The following merchandise was submitted and identified by the client as :

Commodity	:	Multilayer Chip Antenna
SGS File No.	:	GP06-24480
Received Date	:	September 18, 2006
Test Performing Date	:	September 19, 2006
Test Performed	:	SGS Testing Korea tested the sample(s) selected by applicant with following results
Test Results	:	For further details, please refer to following page(s)

SGS Testing Korea Co. Ltd.

Jade Jang
Monet Jeong
Jully Oh
Jerry Jung
/Testing Person

Jeff Jang / Chemical Lab Mgr

Sample No. : GP06-24480.001

Sample Description : Multilayer Chip Antenna

Style/Item No. : Multilayer Chip Antenna

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

Picture of Sample as Received:

*** End ***

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable