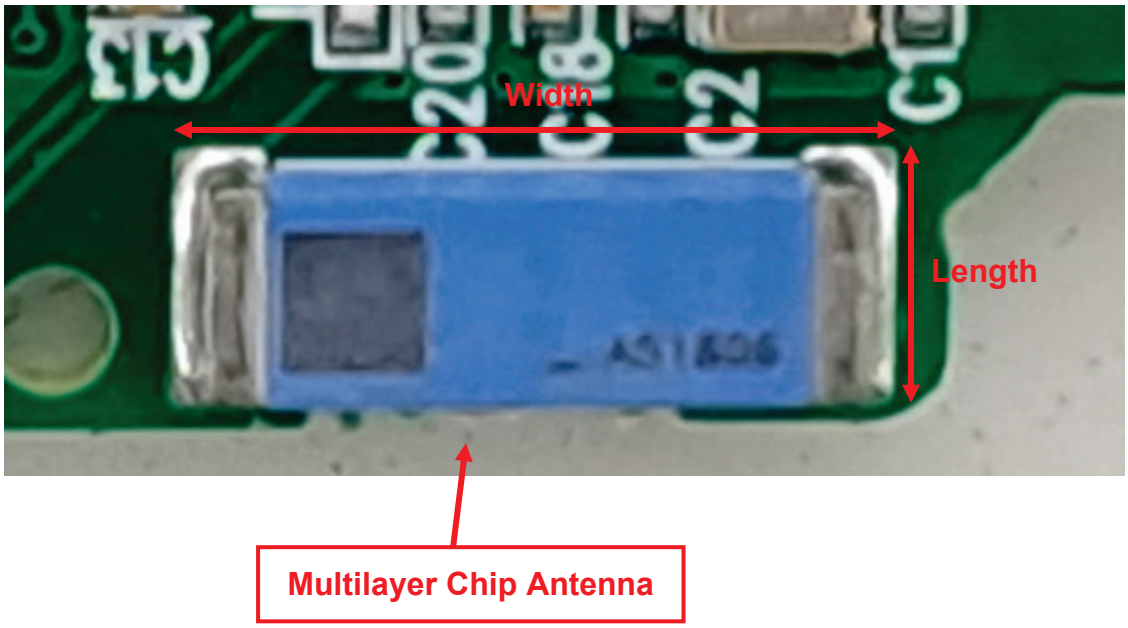
Antenna Information

Item	Contents
Antenna Type	Multilayer Chip Antenna
Antenna peak gain	3.5 dBi
Manufacturer / Model name	AMOTECH Co., LTD. / ALA931C5
Address of manufacturer	5B 1L, Namdong Industrial complex, 617 Namchondong, Namdonggu, Incheon, Korea
Test Laboratory	AMOTECH Co., LTD.
Antenna Length	0.3 cm
Antenna Width	0.9 cm



Model name: exmars03

Data sheet
of Multilayer Chip Antenna

Part No. : ALA931C5

January 23, 2008

AMOTECH Co., LTD.

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

Notes
The contents of this data sheet are subject to change without notice. Please confirm the specifications and delivery conditions when placing your order.

1. SPECIFICATIONS

1.1 Electrical Specifications

No	ITEM	SPEC.	Remark
1	Frequency Range	2.4 ~2.485 GHz	for ISM
2	VSWR	2.5 : 1 max.	
3	Gain	Avg. -3 dBi min.	
4	Polarization	Linear	
5	Azimuth Beam Pattern	Omni-directional	
6	Impedance	Nominal 50 Ω	

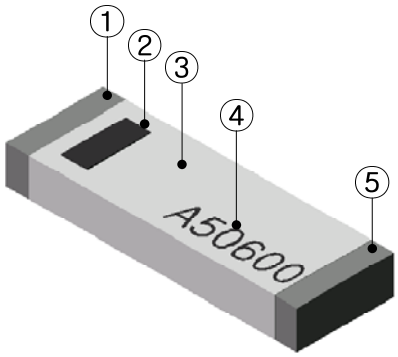
※ These values are measured on the matched reference test board.

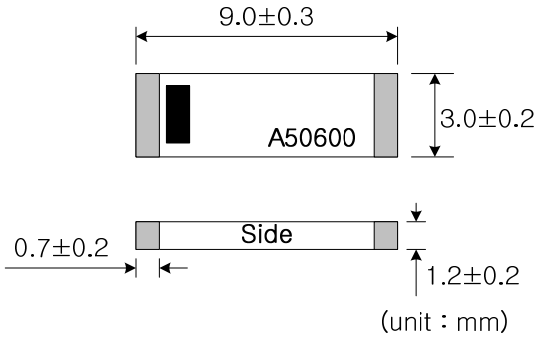
※ ALA931C5 has higher self-resonance-frequency than ALA931C4.

1.2 Mechanical Specifications

No	ITEM	SPEC.	Remark
1	Internal Electrode	Ag	Pb-free
2	External Electrode	Ag/Ni/Sn	Pb-free
3	Dimensions (L x W x H)	9.0 x 3.0 x 1.2	mm
4	Unit Weight	97 ± 9	mg
5	Operating Temperature	-35 ~ +85	℃

1.3 Appearance and Dimensions

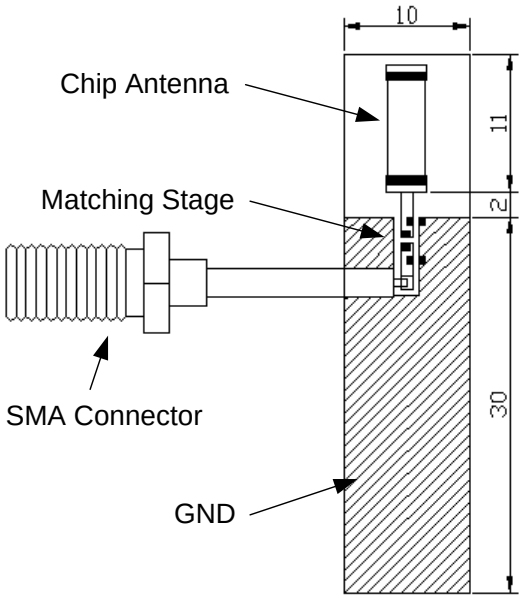




No	Name	Function	Material
1	External Electrode	Soldering, Input Port	Ag/Ni/Sn
2	Direction index	Indication of Input Port	Ceramic
4	Ceramic Body	-	Ceramic
3	Model & Serial No. index	-	Ceramic
5	External Electrode	Soldering	Ag/Ni/Sn

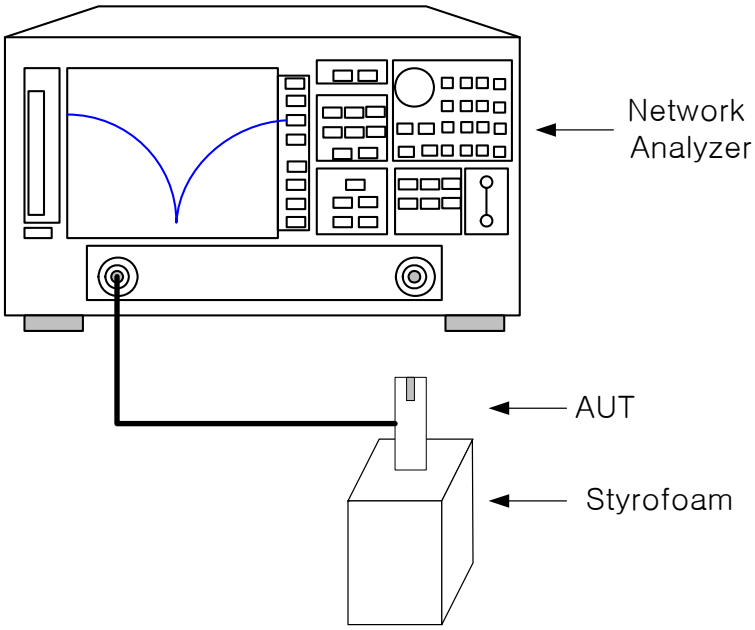
2. MEASUREMENT

2.1 Reference Test Board for Measurement

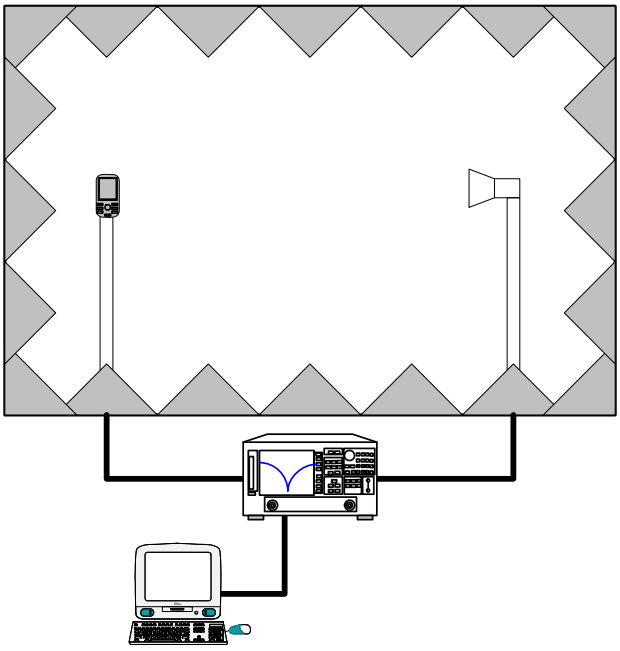


[Unit : mm]

2.2 Diagram for VSWR measurement



2.3 Diagram for radiation gain and pattern measurements

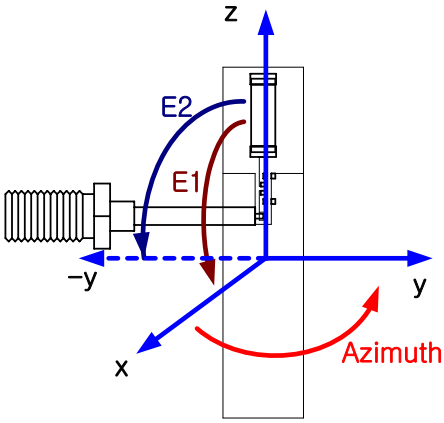


A. Anechoic chamber spec.

Parameters	Condition	Unit
Chamber size	8x4x4	m
Temperature	21.5	°C
Humidity	55	% RH
Measurement	S21 (8753ES)	
System software	Midas (Orbit/FR)	

B. Measurement coordinates

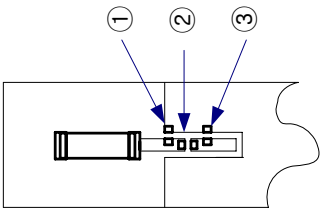
Measurement Plane	Symbol	Rotating direction
Azimuth	Azimuth	x→y
Elevation1	E1	z→x
Elevation2	E2	z →-y



3. MEASUREMENT RESULT

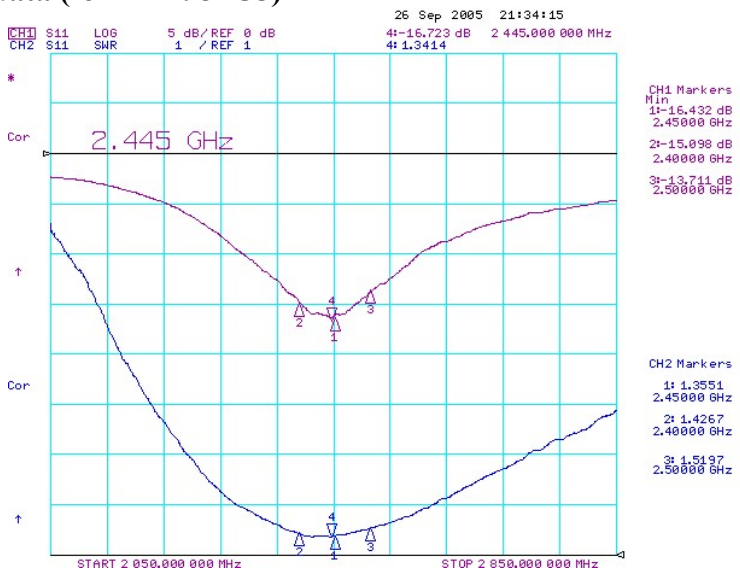
3.1 VSWR & Smithchart

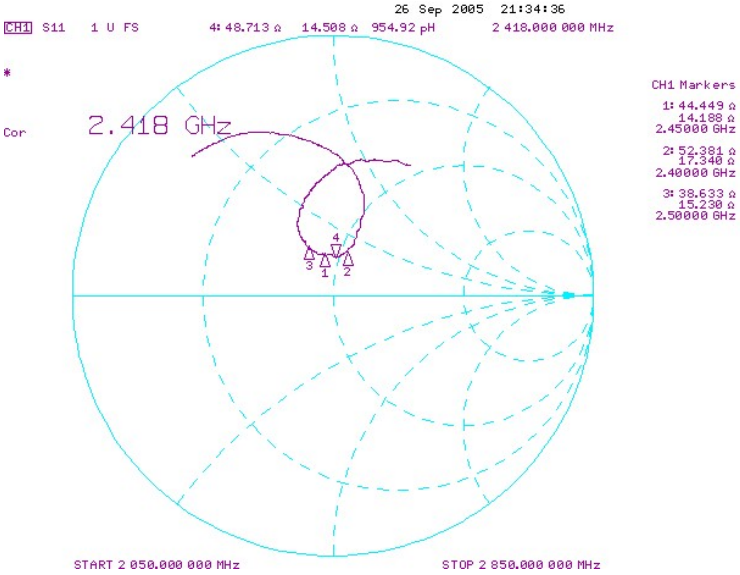
A. Matching Value (recommend for reference testboard only)



①	N/C
②	2.7 nH
③	1.2 nH

B. Measured data (for ALA931C5)

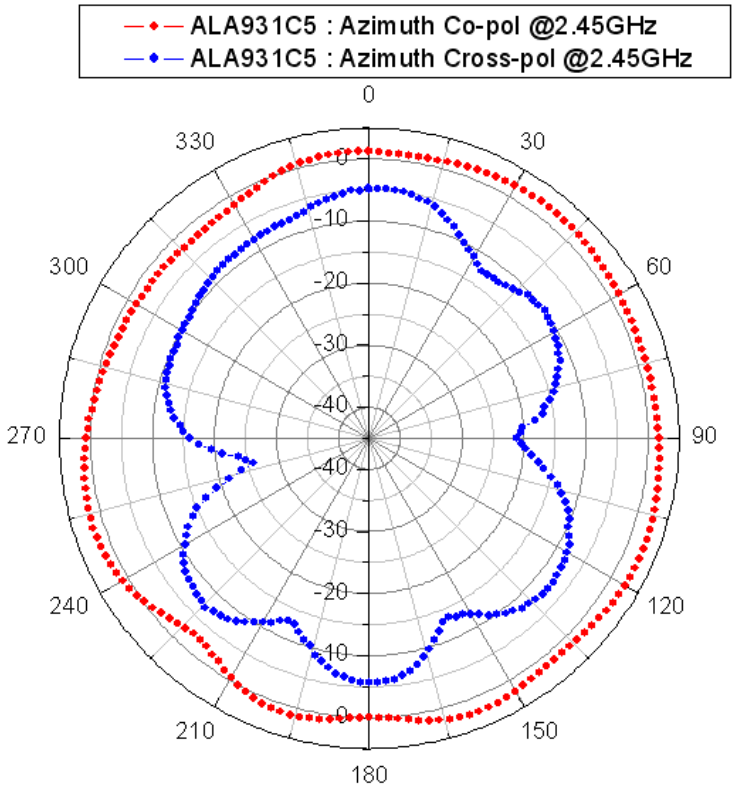




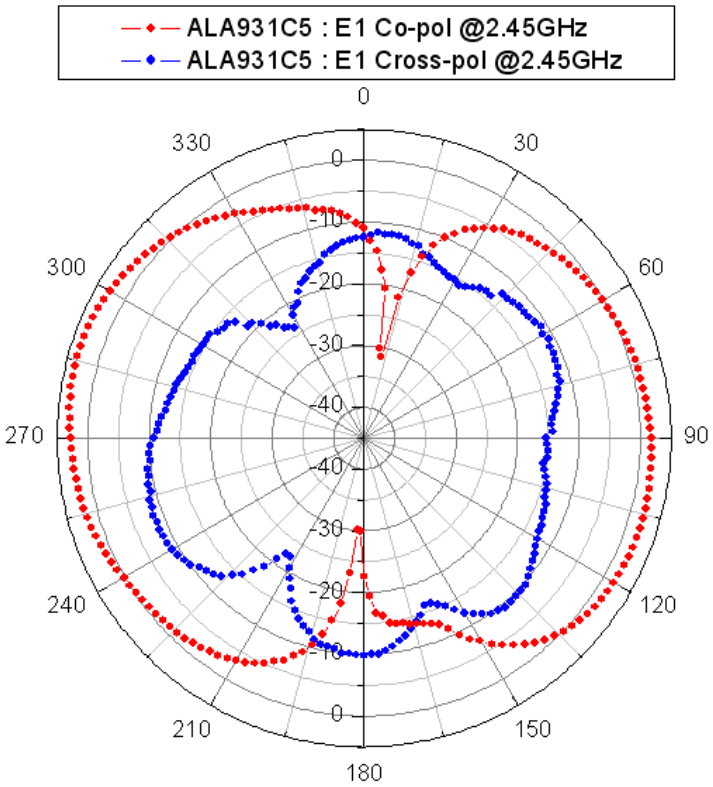
3.2 Radiation Gain and Pattern

[Measured data table]

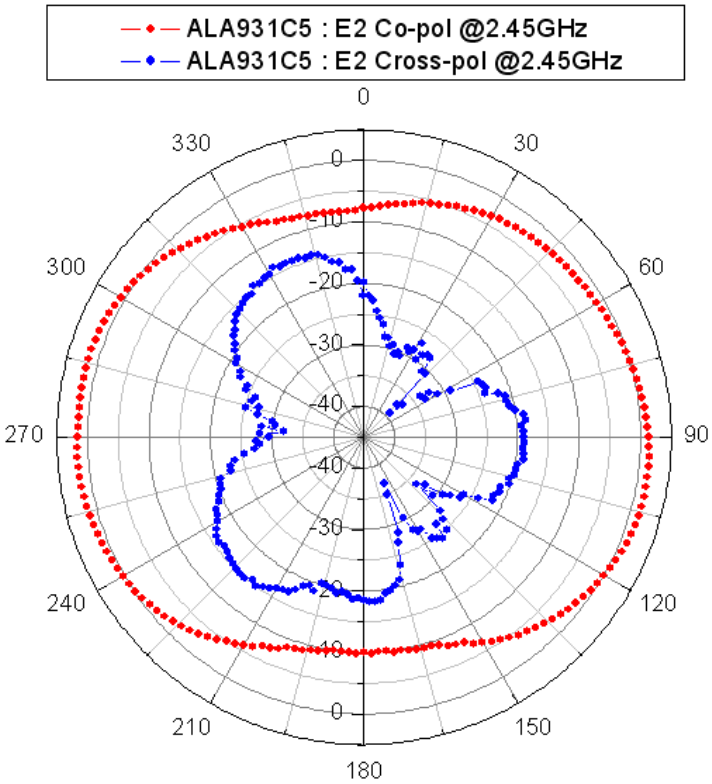
	Peak Gain (dBi)	Average Gain (dBi)	Remark
Azimuth	2.8	1.0	@2.45 GHz
Elevation1	3.5	-0.7	@2.45 GHz
Elevation2	1.7	-1.6	@2.45 GHz



[ALA931C5 radiation pattern : Azimuth@2.45GHz]



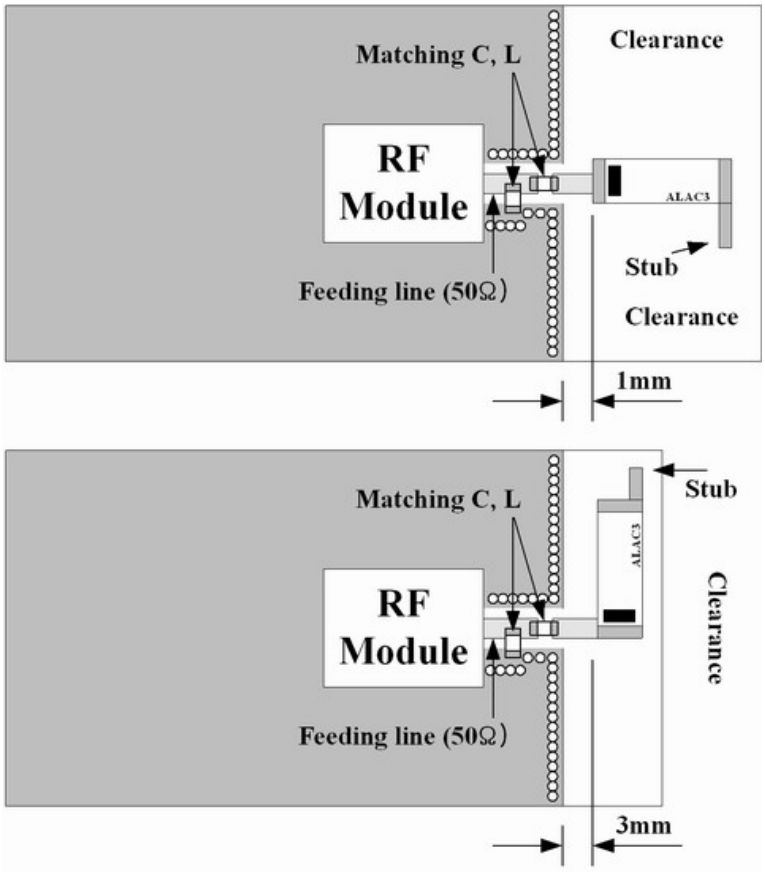
[ALA931C5 radiation pattern : Elevation1@2.45GHz]



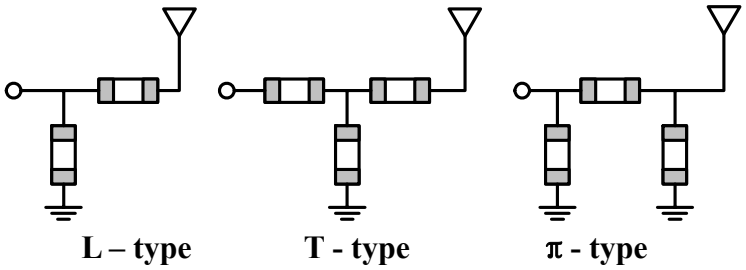
[ALA931C5 Radiation Pattern : Elevation2@2.45GHz]

4. SUGGESTED LAYOUT & MATCHING CIRCUIT

4.1 Layout (recommend only)

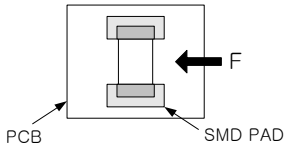
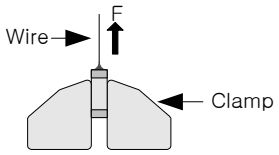


4.2 Matching Circuit (recommend only)



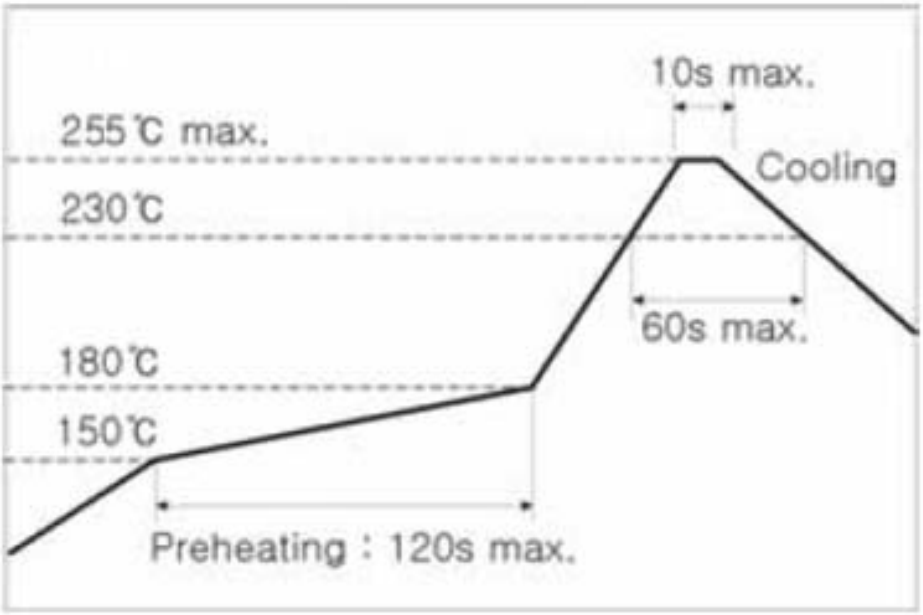
For usable matching, the ground stability must be guaranteed with sufficient via holes and the case effects should be considered. Finally, using one or more lumped chip elements and a tuning stub are recommended for better results.

5. 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)

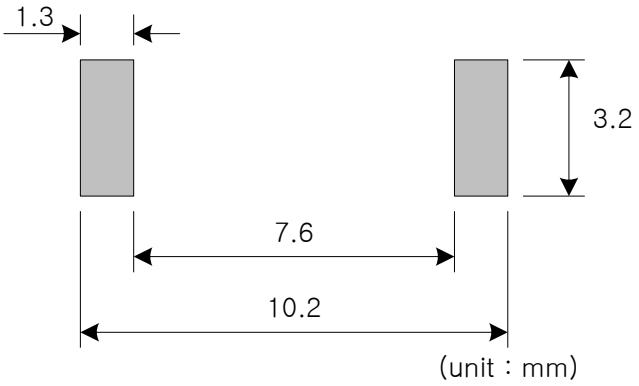
6. SOLDERING RECOMMENDATIOS

6.1 Reflow Soldering Profile



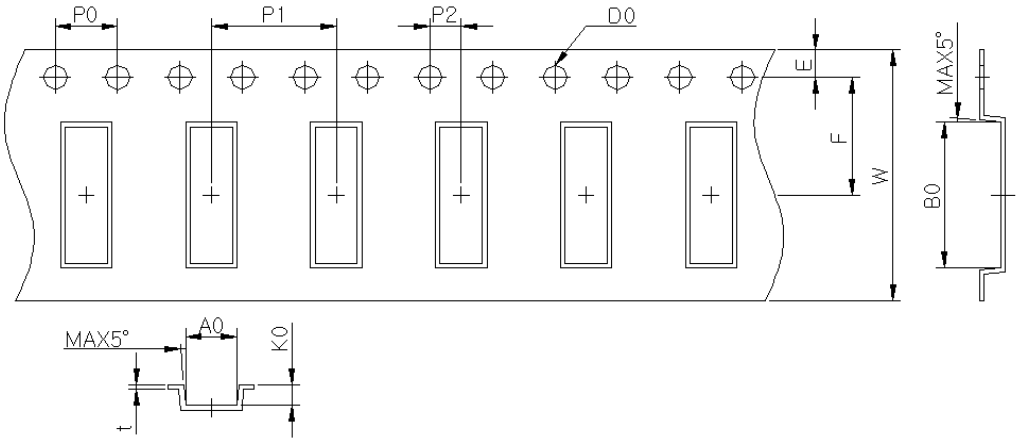
[Soldering Reflow Profile for Pb-free]

6.2 Soldering Land Pattern



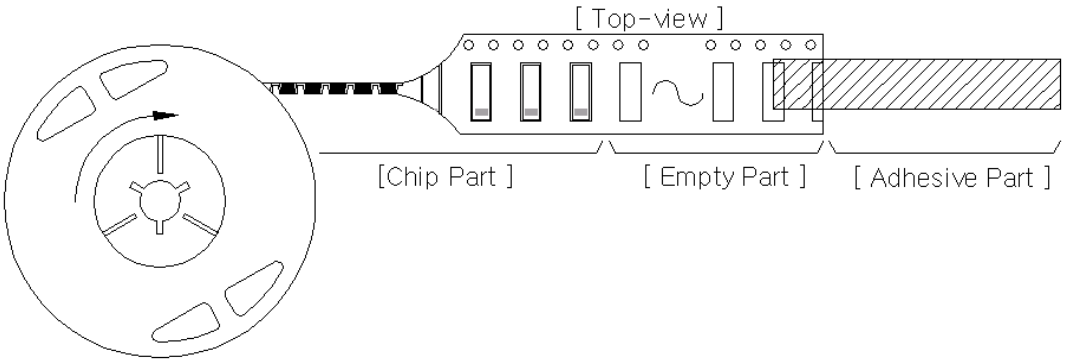
7. PACKING

7.1 Tape Dimension (unit : mm)



A0	3.30±0.10	P0	4.00±0.10	E	1.75±0.10
B0	9.30±0.10	P1	8.00±0.10	F	7.50±0.10
K0	1.30±0.10	P2	2.00±0.10	W	16.00±0.30
D0	1.55±0.05			t	0.30±0.05

7.2 Taping Style



7.3 Packing Unit

	Quantity	Size
Reel	1,000 ea	Φ7” x 16mm
Small Box	3,000 ea (3 reel*1,000ea/reel)	185 * 185 * 68 (mm^3)
Medium Box	15,000 ea (5 small box*3,000ea/small box)	365 * 200 * 200 (mm^3)
Large Box	42,000 ea (14 small box*3,000ea/small box)	390 * 390 * 280 (mm^3)

7.4 Description of Packing Label

AMOTECH CO.,LTD.
617 5B 1LT, Namchon-Dong, Namdong-Gu, Inchon, Korea
Multilayer Chip Antenna
Part No : ALA931C5
Lot No : MA09A5071001
Quantity : 1,000 pcs Date : 2007/10/01

AMOTECH CO., LTD.

Name of Company

617 5B 1LT, Namchon-Dong, Namdong-Gu, Inchon, Korea

Address of Manufacture

Multilayer Chip Antenna

Name of Component

Type : ALA931C5

ALA : Amotech LTCC Antenna
931 : Chip Size
C5 : Version & Frequency index

Lot No : MA09A4050101

MA : Mass-product Antenna
09 : Chip Size
A5 : Version & Frequency index
0710 : Year/Month
01 : Order of production

Quantity : 1,000 pcs

Quantity : 1,000 pcs

Date : 2007/10/01

Date : 2007/10/01

8. STORAGE CONDITION

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