

ATID Co., Ltd

Model Name: AT870

Date: May, 17, 2008

PRODUCT SPECIFICATION

Product : Antenna

Mechanic Eng'r	RF Eng'r	Mfg. Eng'r	Approved By

KWANG HYUN AIRTECH

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1. General

1.1 The Product

Model Name	KH-GMTI-AT870
Antenna Type	HERICAL
Applications	GSM850/GSM900/DCS1800/PCS1900

1.2 Electrical Properties

Frequency Range(Tx)	GSM850	824 ~ 849 MHz
	GSM900	880 ~ 915 MHz
	DCS1800	1710 ~ 1785 MHz
	PCS1900	1850 ~ 1910 MHz
Frequency Range(Rx)	GSM850	869 ~ 894 MHz
	GSM900	925 ~ 960 MHz
	DCS1800	1805 ~ 1880 MHz
	PCS1900	1930 ~ 1990 MHz
Impedance	50Ω ± 10Ω	
VSWR	GSM850	Less Than 5.9:1
	GSM900	Less Than 3.1:1
	DCS1800	Less Than 8.6:1
	PCS1900	Less Than 4.5:1
Radiation Pattern	Omni-Directional	
Polarization	Vertical	

1.3 Mechanical Properties

Dimension	38.16mm(L) x 9.96mm(W) x 6.16mm(H)
Operational Temperature	-30°C ~ +70°C
Connector Type	Snap in Type

2. Electrical Properties

2.1 Frequency Band

Service \ Band	GSM850	GSM900	DCS1800	PCS1900
Tx(MHz)	824 ~ 849	880 ~ 915	1710 ~ 1785	1850 ~ 1910
Rx(MHz)	869 ~ 894	925 ~ 960	1805 ~ 1880	1930 ~ 1990

2.2 Impedance

2.2.1 Normal Value

$50\Omega \pm 10\Omega$

2.2.1 Measuring Method

The impedance over the frequency bands shall be as close as possible to 50Ω after matching. Both free space and talk position are considered.

2.3 VSWR

2.3.1 Maximum values in free space

Service \ VSWR	GSM850		GSM900		DCS1800		PCS1900	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
VSWR	5.9:1	2.4:1	3.1:1	2.4:1	8.6:1	3.5:1	4.5:1	2.4:1

2.3.2 Measuring Method

A 50Ω coaxial cable is connected(soldered) to the 50Ω point, at the duplex-filter on the main PCB. The connection of the coaxial cable shall be done to introduce a minimum of mismatch. As much as possible the coaxial cable arrangement shall prevent influences from induced currents on the cable. In the other end, the coaxial cable is connected to a network analyzer. The measurement is performed at room temperature. The handset, including the PCB, must not in any significant way differ from the mass produced handset, i.e. the antenna feeding network has to be equivalent to the feeding network in mass production. The specification shall be met in the entire frequency band. The free space means that the handset is placed on a non-conductive surface of cellular plastic.

2.4 Gain(dBi)

2.4.1 Typical minimum values in maximum direction

Service \ Gain	GSM850		GSM900		DCS1800		PCS1900	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
Gain	-10.65	-7.30	-5.80	-4.80	-11.27	-8.15	-7.59	-7.35

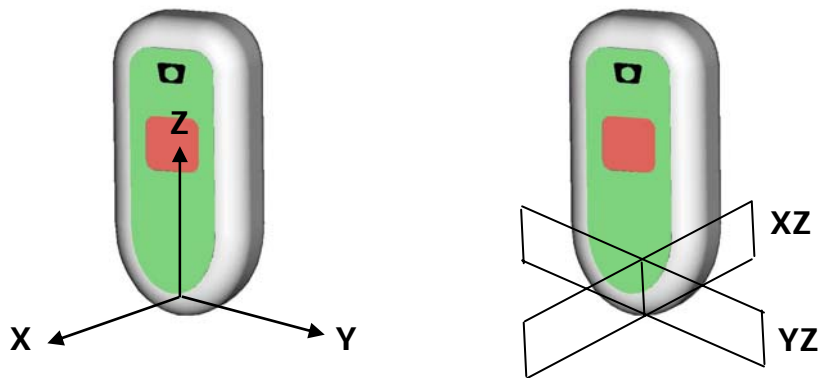
2.4.2 Measuring Method

The connection is done according to 2.3.2.

Radiation patterns are measured at 6 different frequencies : Txmin, Txmid, Txmax, Rxmin, Rxmid and Rxmax.

The antenna is measured in 2 orthogonal E-planes(XZ Plane(E1), YZ Plane(E2)) in free space, according to the figure 1 below.

The antenna is also measured in the H-plane as well as in talk position.



(a) Coordinate system for the cellular phone

(b) E-Plane

Figure 1. Gain Test

3. Mechanical Properties

3.1 Appearance

The appearance shall be according to the mechanical drawing on page 16.
The antenna shall have no cuts, abrasion or other mechanical damages.

3.2 Drop

3.2.1 Drops

1 drop in retracted mode(3cycles)

3.2.2 Drop Height

1.5m

3.2.3 Drop Angle

180°

3.2.4 Actual handset applied

3.2.5 Demands

The original shape shall be possible to restore. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.2.6 Measuring Method

The antenna is placed in the handset or an equivalent test fixture.

The handset is dropped with the antenna downwards onto a metal plate.

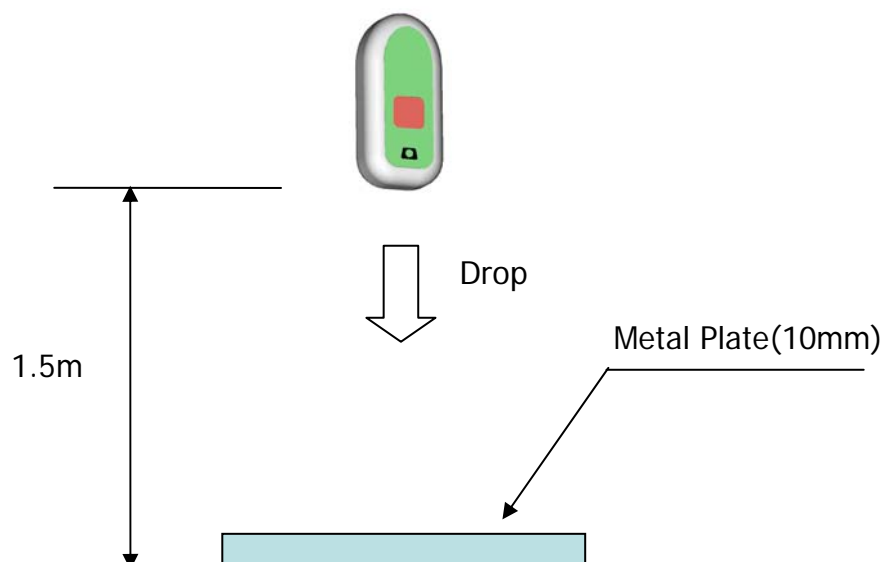


Figure 2. Drop Test

4. Environment Resistance Properties

4.1 Operational Temperature

4.1.1. Low Operational Temperature

TLO = -30°C

4.1.2 High Operational Temperature

THO = +70°C

4.1.3 Demands

No visual deterioration shall occur, and the antenna shall satisfy the electrical demands, according to 2.4.1, during the test.

4.1.4 Measuring Method

The antenna is placed in a climatic chamber at temperature TLO.

The antenna is taken out after 1 hour, and VSWR is immediately measured.

The antenna is placed in a climatic chamber at temperature THO.

The antenna is taken out after 1 hour, and VSWR is immediately measured.

4.2 Temperature Cycling

4.2.1 Low Cycling Temperature

TLC = -40°C

4.2.2 High Cycling Temperature

THC = +80°C

4.2.3 Demands

No visual deterioration shall occur during the test. The antenna shall satisfy the electrical demands, according to 2.4.1.

4.2.4 Measuring Method

The antenna is placed in a climatic chamber. The temperature is cycled as follows : The temperature is kept constantly at TLC for 1 hour, increased to THC during 1 hour, kept constantly at THC for 1 hour, and then decreased to TLC during 1 hour.

This procedure is repeated 10 times, ending at room temperature according to figure 3 below.

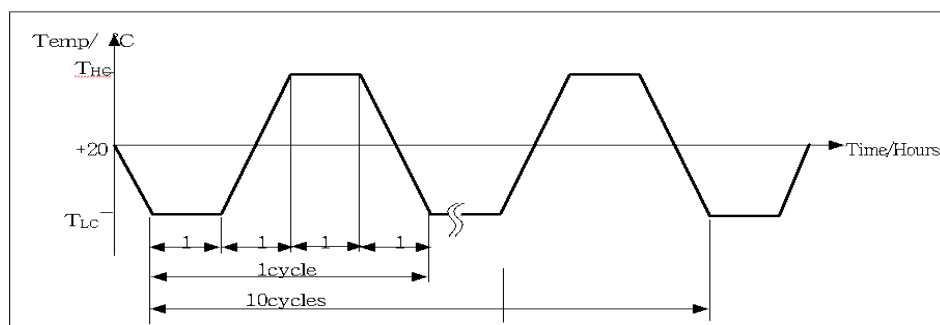


Figure 3. Temperature Cycling

4.3 Humidity

4.3.1 Relative Humidity

95%

4.3.2 Temperature

+55°C

4.3.3 Demands

No visual deterioration shall occur during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

4.3.4 Measuring Method

The antenna is placed in a climatic chamber for 24 hours. The antenna is taken out from the chamber and measured after another 24 hours in room temperature.

4.4 Sinusoidal Vibration

4.4.1 Vibration Frequencies

10-55-10Hz(1cycle)

4.4.2 Sweep Rate

1 octave/min(logarithmic)

4.4.3 Maximum Amplitude

$A = 1.52\text{mm}$

4.4.4 Maxim Acceleration

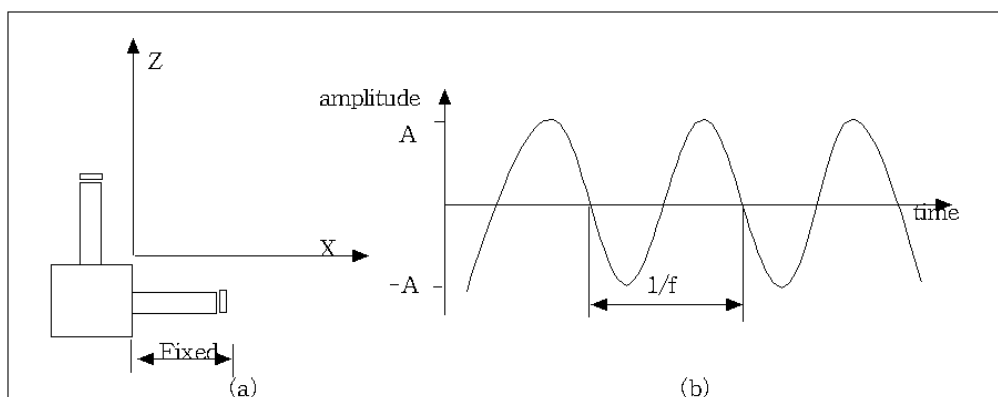
2g

4.4.5 Crossover Frequency

18.2Hz

4.4.6 Measuring Method

The fixed antenna is assembled in the test equipment. The vibration is done both in x-and z-directions, according to figure 4(a), with a duration of 1 hour in each direction.



(a) Vibration directions

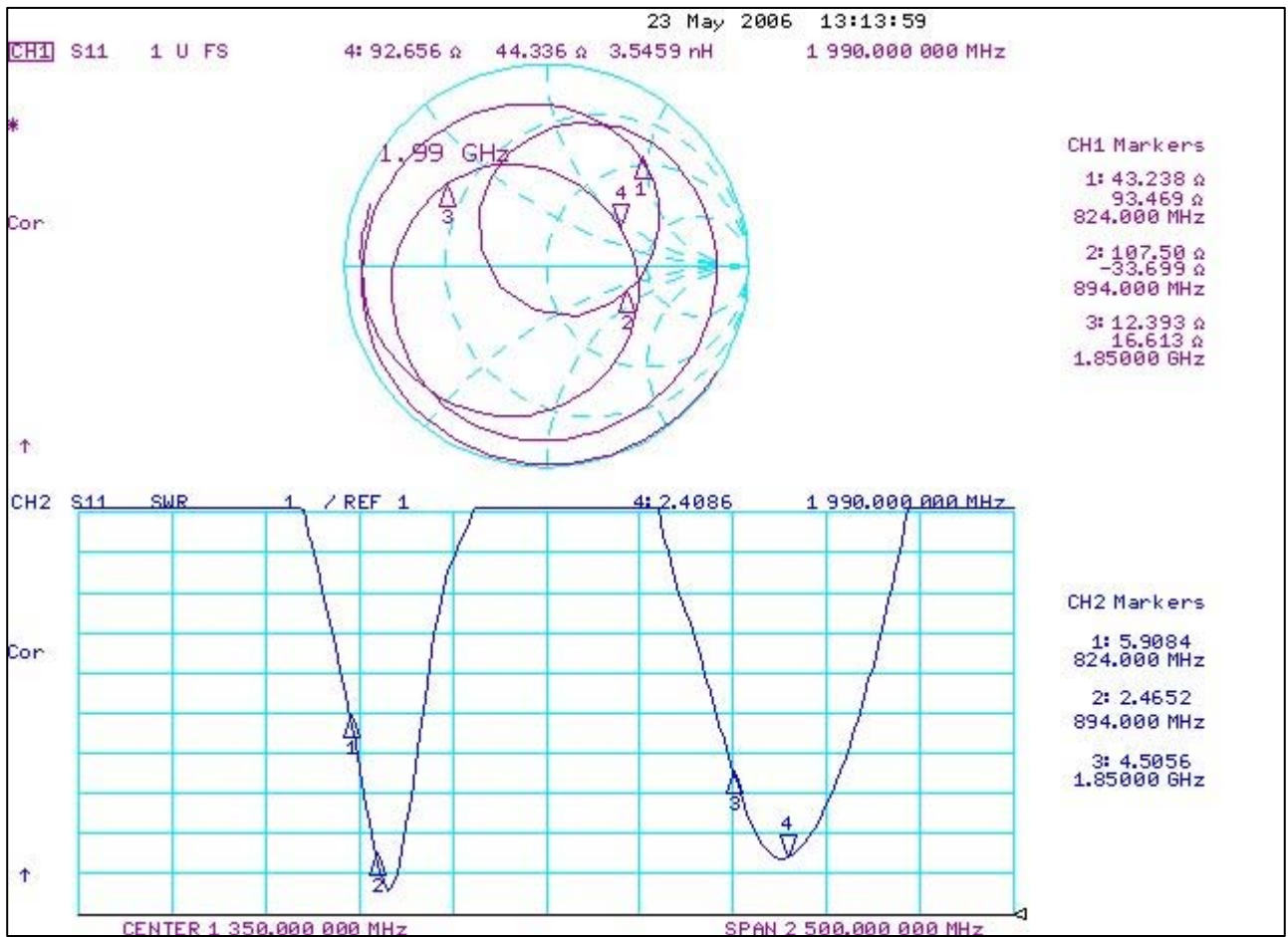
(b) Vibration form

Figure 4. Sinusoidal Vibrator

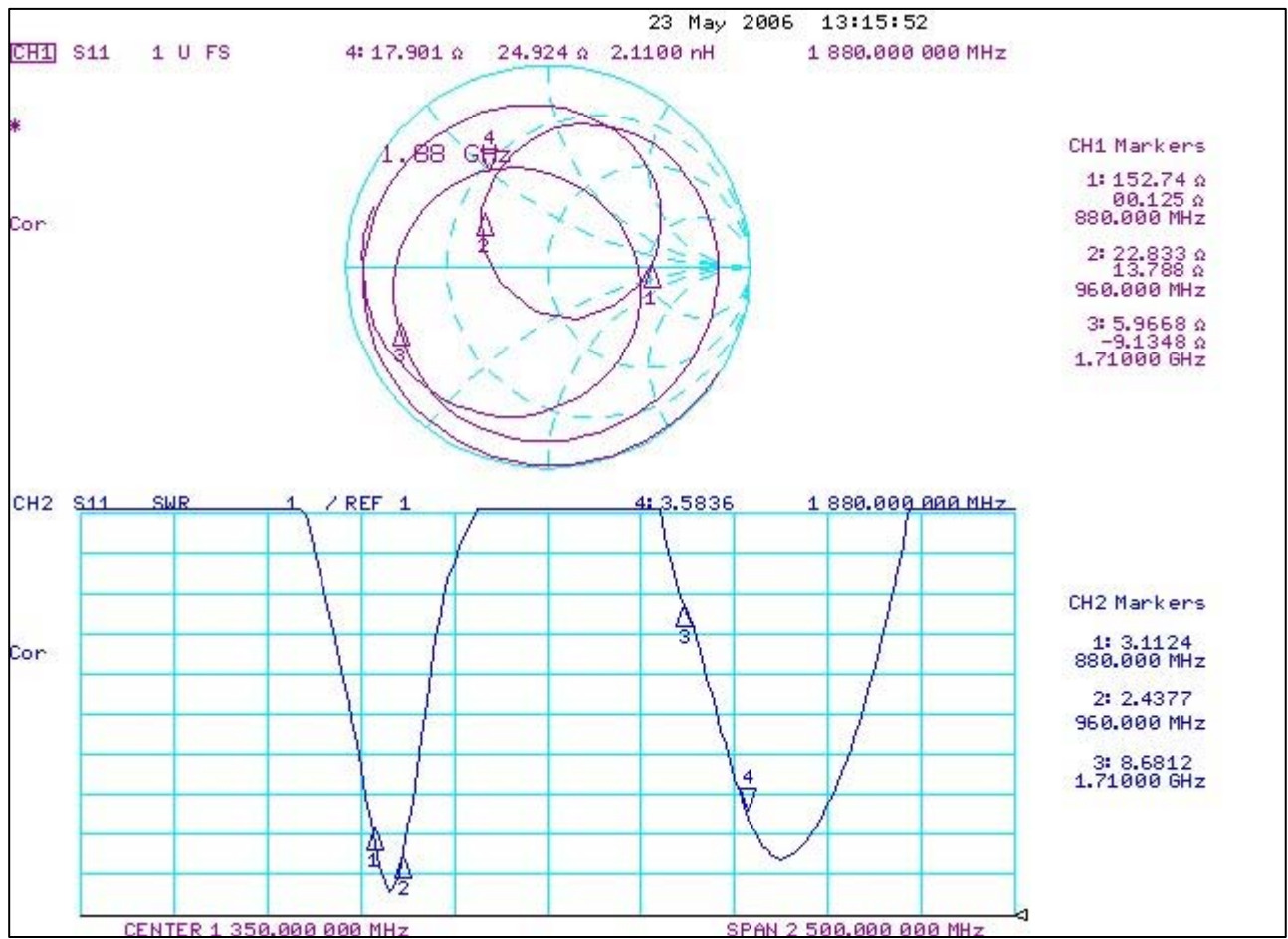
5. Test Data

5.1 Network Data

5.1.1 GSM850 / PCS1900

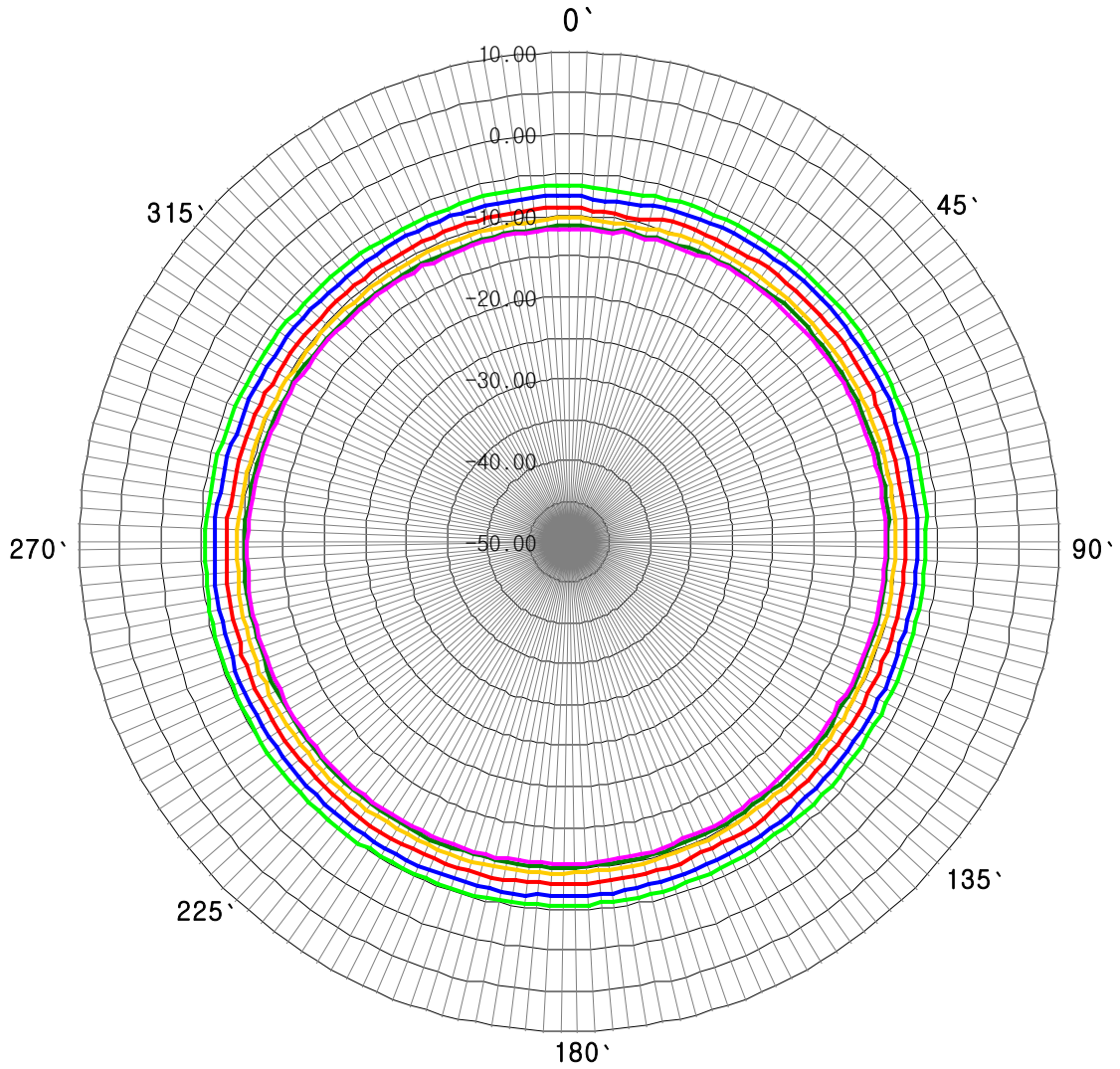


5.1.2 GSM900 / DCS1800



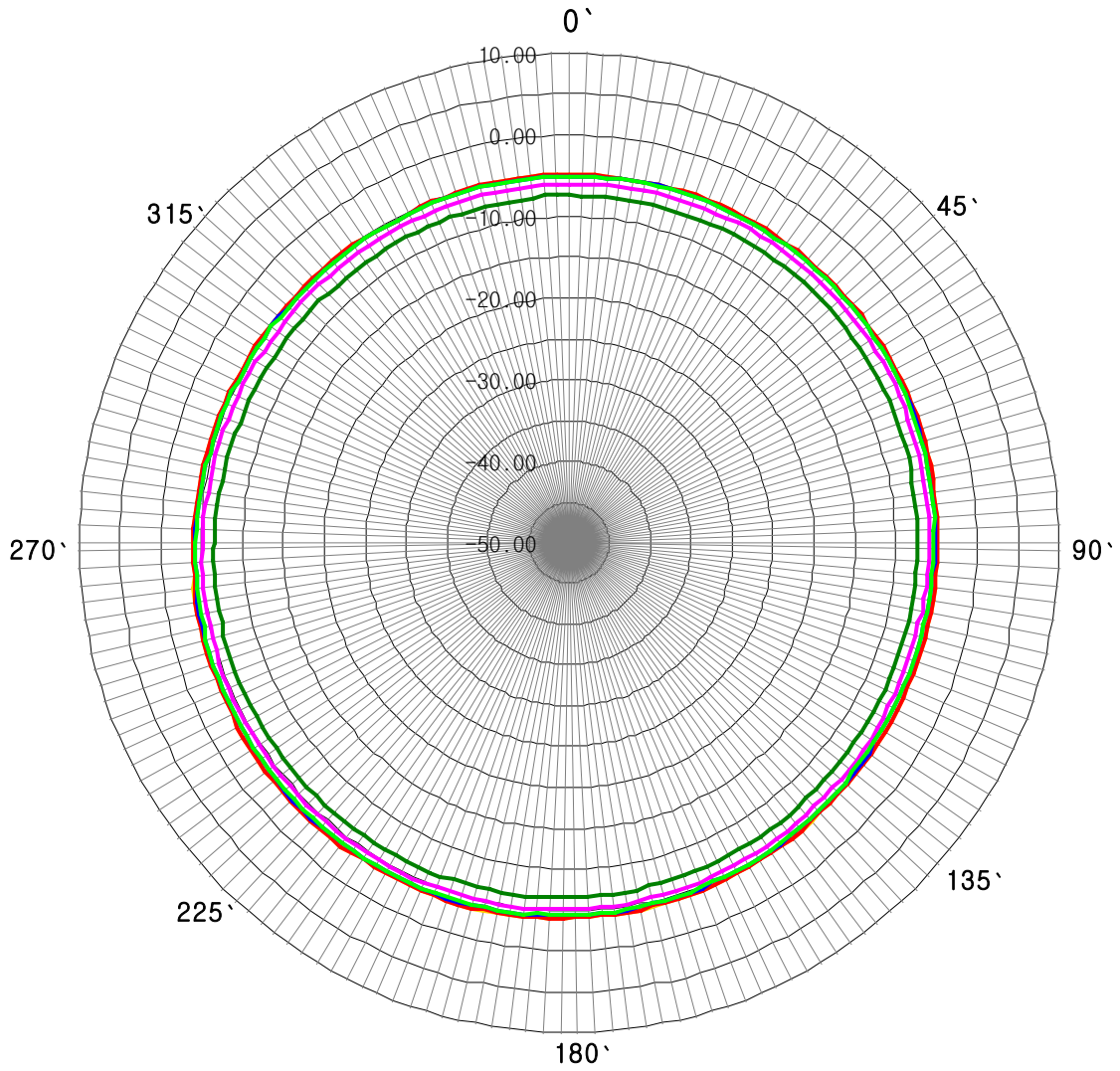
5.2 Radiation Pattern Data

5.2.1 GSM850



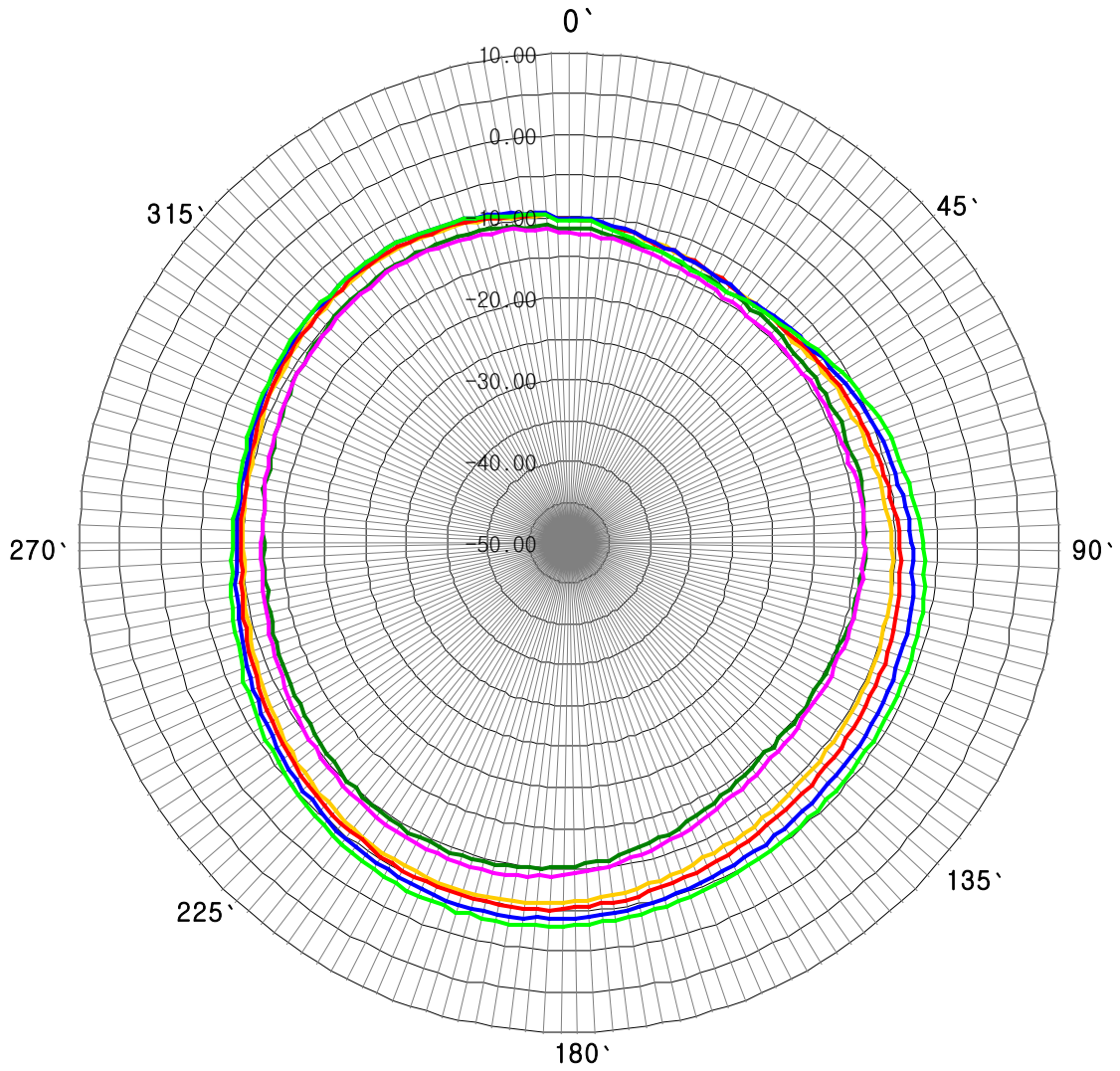
Frequency	Max.	Min.	Avg.
880Mhz	-9.87	-11.73	-10.81
898Mhz	-10.23	-12.02	-11.18
915Mhz	-8.98	-10.76	-9.96
925Mhz	-7.74	-9.78	-8.67
943Mhz	-6.26	-8.17	-7.18
960Mhz	-5.15	-6.81	-6.05

5.2.2 GSM900



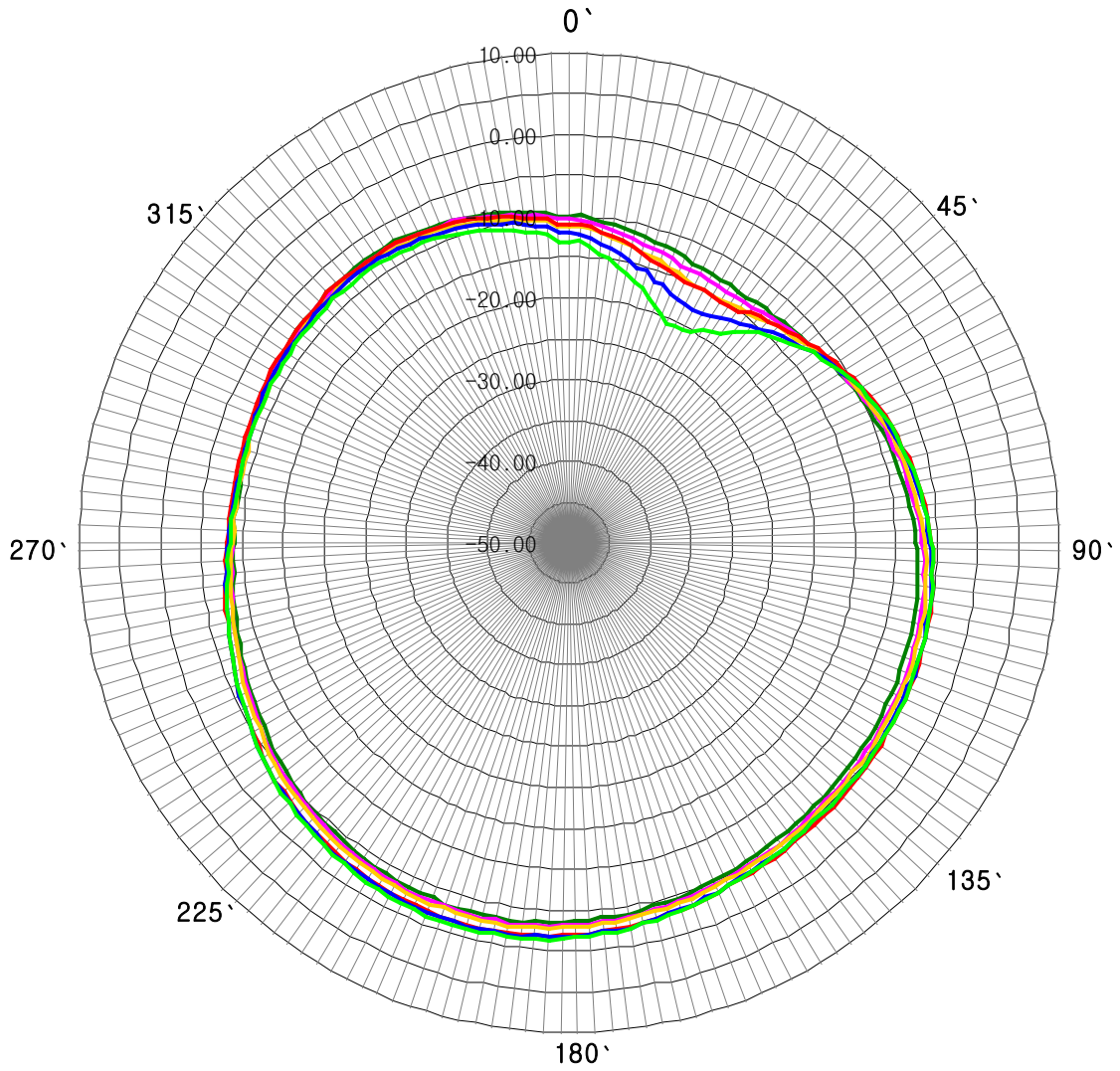
Frequency	Max.	Min.	Avg.
880Mhz	-6.17	-7.77	-7.10
898Mhz	-4.76	-6.31	-5.69
915Mhz	-3.68	-5.22	-4.61
925Mhz	-3.69	-5.23	-4.62
943Mhz	-3.95	-5.48	-4.87
960Mhz	-4.03	-5.57	-4.92

5.2.3 DCS1800



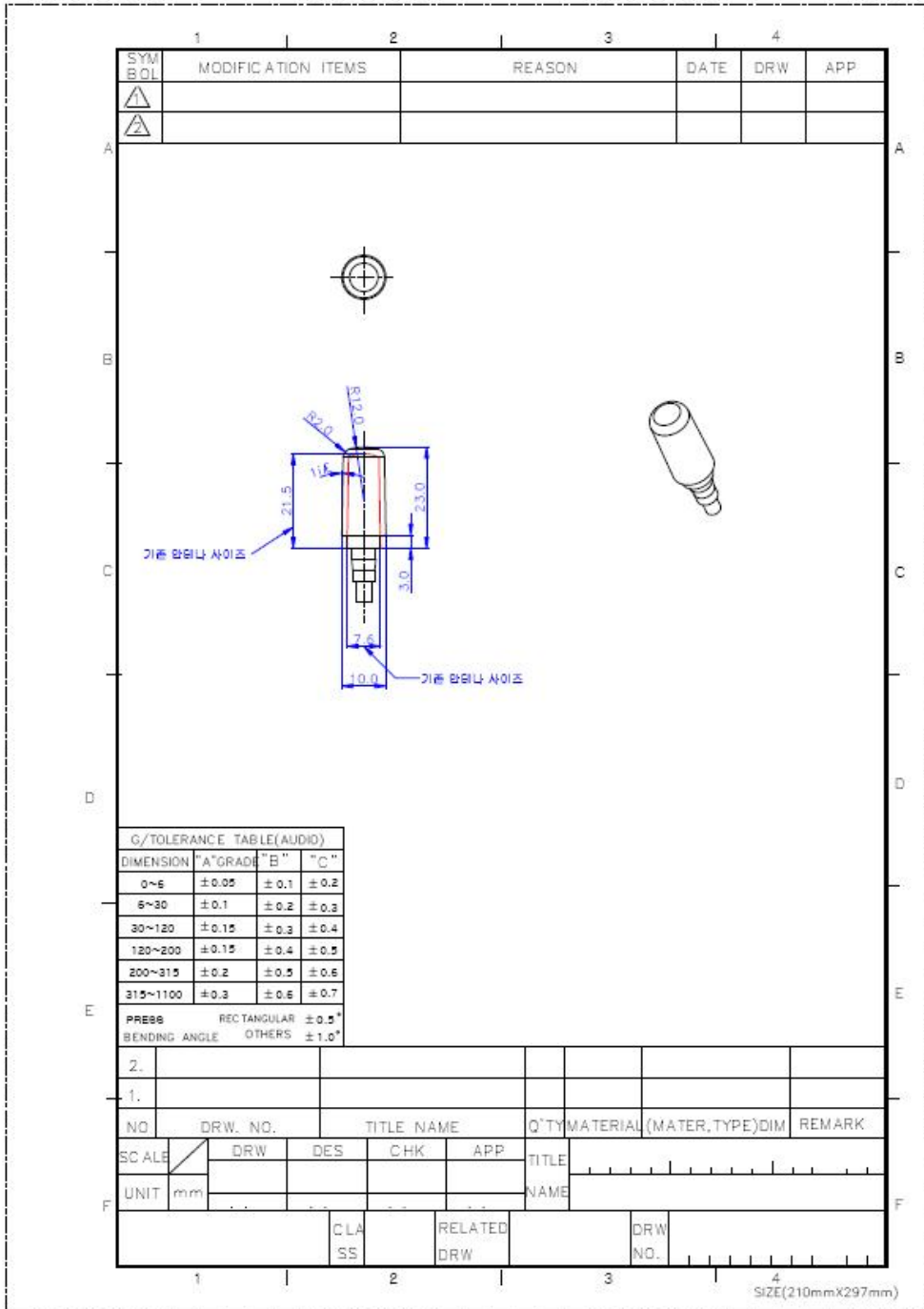
Frequency	Max.	Min.	Avg.
1710Mhz	-9.50	-15.12	-12.27
1745Mhz	-8.65	-14.89	-12.12
1785Mhz	-5.47	-13.20	-9.41
1805Mhz	-4.95	-13.22	-8.91
1840Mhz	-3.80	-13.24	-8.04
1880Mhz	-2.90	-13.92	-7.50

5.2.4 PCS1900



Frequency	Max.	Min.	Avg.
1850Mhz	-3.41	-13.02	-7.68
1880Mhz	-2.97	-13.86	-7.51
1910Mhz	-2.67	-15.17	-7.59
1930Mhz	-1.71	-15.38	-6.97
1960Mhz	-1.54	-17.68	-7.41
1990Mhz	-1.23	-20.79	-7.68

6. Mechanical Drawing



Date	05 - 26 - 2008
REV NO.	Ver 1.0

A T I D

SPECIFICATION

DESCRIPTION	Wlan-Antenna		
MODEL NO.	KH - 2.45 - AT		
APPROVED. DATE	2008. 05. 26		
ATID	ATID.CO.LTD		
ERAE ANTENNA	작 성	검 토	승 인

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【INTRODUCTION】

THIS ANTENNA IS DESIGNED TO USE WITH WIRELESS LAN (2.4-2.5 Ghz)
IN THE FREQUENCY BAND 2.45GHz FOR A WIRE ANTENNA.

1. ELECTRICAL SPECIFICATION

- 1-1 USE FREQUENCY : 2.45 Ghz \pm 3% MHz
- 1-2 RADIATION PATTERN : OMNI DIRECTIONAL
- 1-3 POLARIZATION : VERTICAL
- 1-4 IMPEDANCE : 50 OHMS NOMINAL
- 1-5 VSWR : LESS THAN 1.8

2. MECHANICAL SPECIFICATION

- 2-1 MATERIAL : PCB,
- 2-2 STUD :
- 2-3 SLEEVE :

3. MODEL NUMBER

KH - 2.45 - AT



4. SMITH Chart

24 Nov 2008 22:05:23

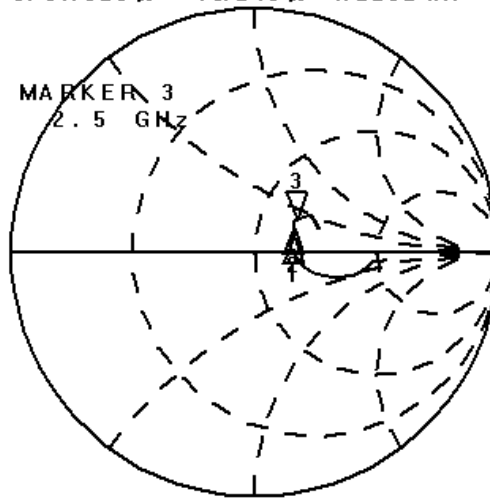
CH1 S22 1 U FS 3: 67.820 μ 19.246 μ 1.2252 nH 2 500.000 000 MHz

hp

Del

Cor

f



CH1 Markers

- 1: 68.395 μ
9.5977 μ
2.40000 GHz
- 2: 67.453 μ
14.766 μ
2.45000 GHz

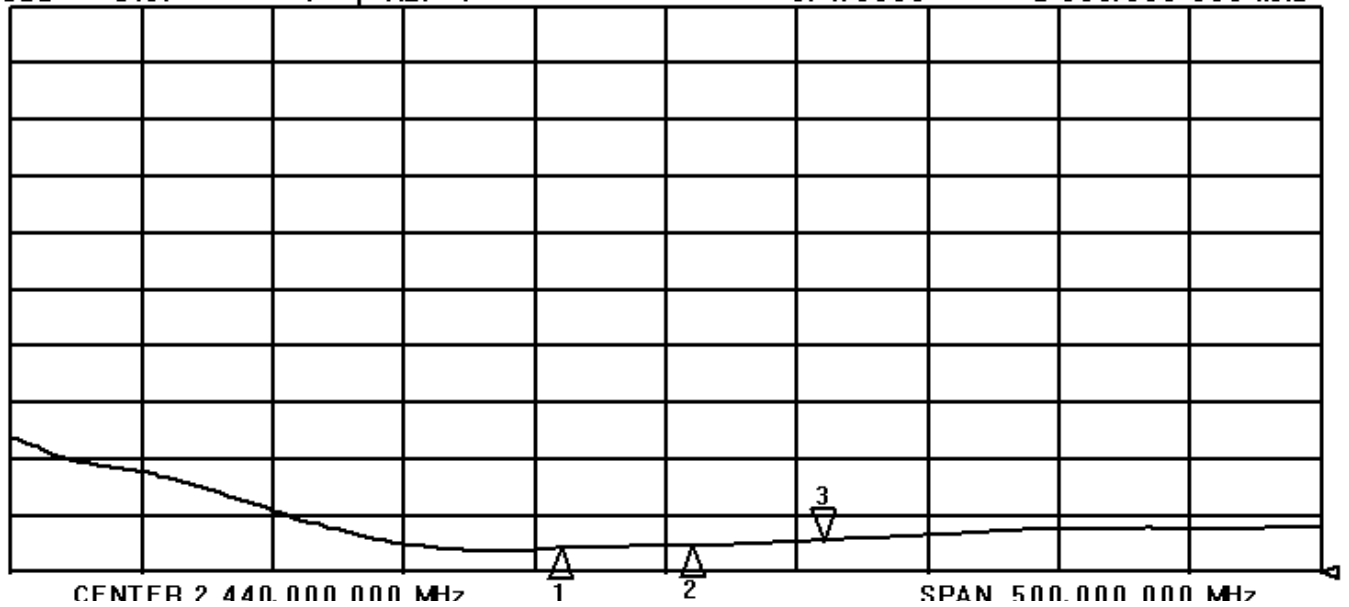
5. VSWR Diagram

CH2 S22 SWR 1 / REF 1 3: 1.5630 2 500.000 000 MHz

Del

Cor

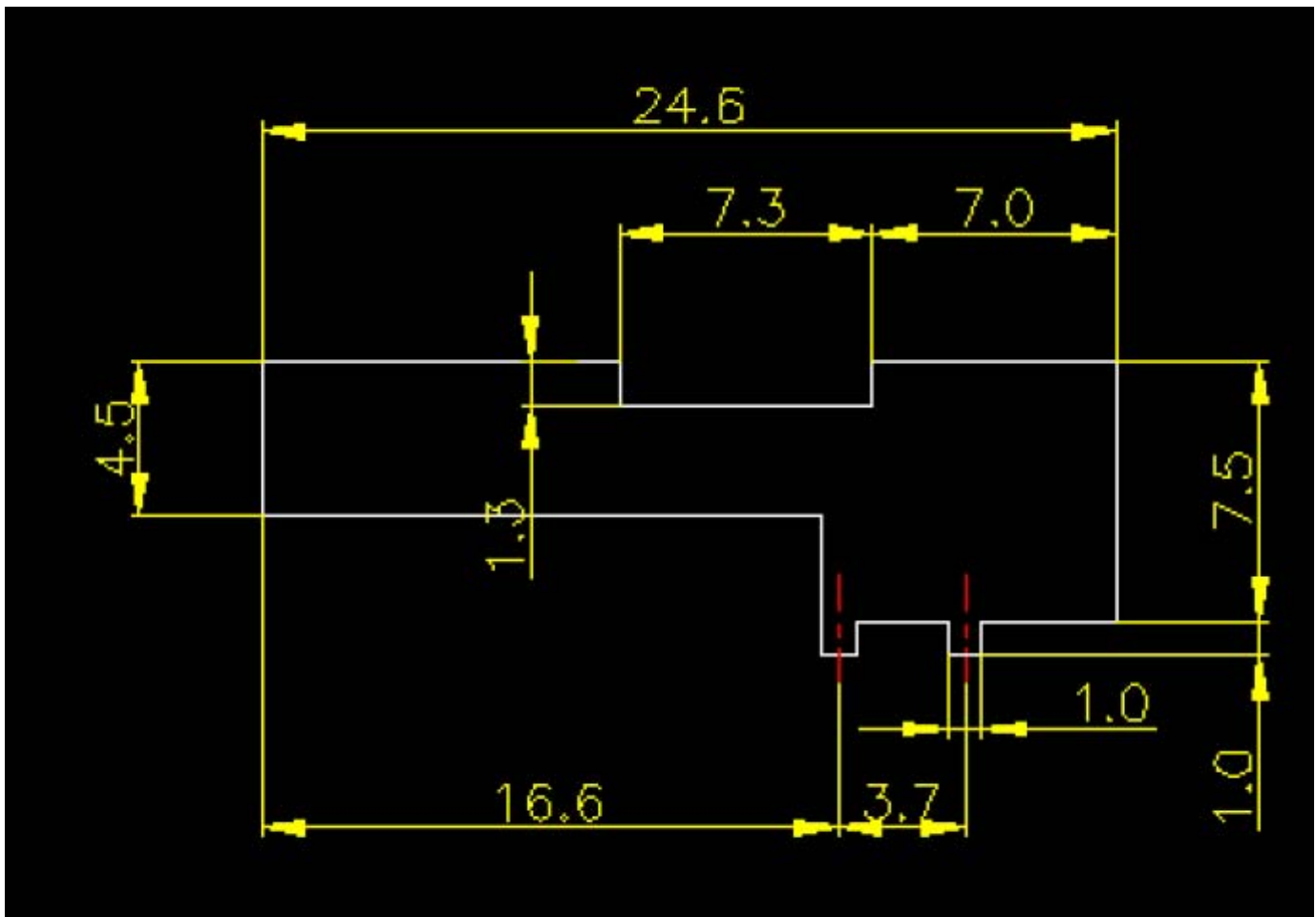
f



6. Antenna Gain

Frequency	Eff. (%)	Ave. Gain (dBi)	Peak Gain (dBi)	Directivity (dBi)
2400 MHz	27	-5.64	-0.88	4.76
2445 MHz	20	-6.92	-2.89	4.03
2447 MHz	20	-6.91	-2.43	4.48
2475 MHz	16	-7.85	-4.08	3.77
2484 MHz	21	-6.76	-2.11	4.65
2500 MHz	17	-7.69	-3.93	3.76

7. Antenna Lay-Out



Preliminary

SPECIFICATION

MULTILAYER CHIP ANTENNA

**Model No. : ALA621C2
ALA621C3
ALA621C4**

January 1, 2005

SEJONG TRONICS CO.,LTD TEL : 82-2-586-6012 FAX : 82-2-586-6082	WRITTEN	CHECKED	APPROVED

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

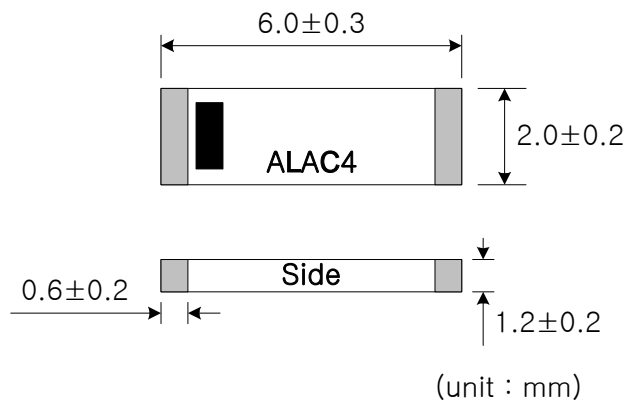
ITEM	SPEC.		Unit
Center Frequency	ALA621C2	2.51	GHz
	ALA621C3	2.95	
	ALA621C4	3.38	
Gain	0 max.		dB _i
VSWR	2.5 : 1 max.		
Polarization	Linear		
Azimuth Beam Pattern	Omni-directional		
Impedance	50		Ω

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

1.2 Mechanical Specifications

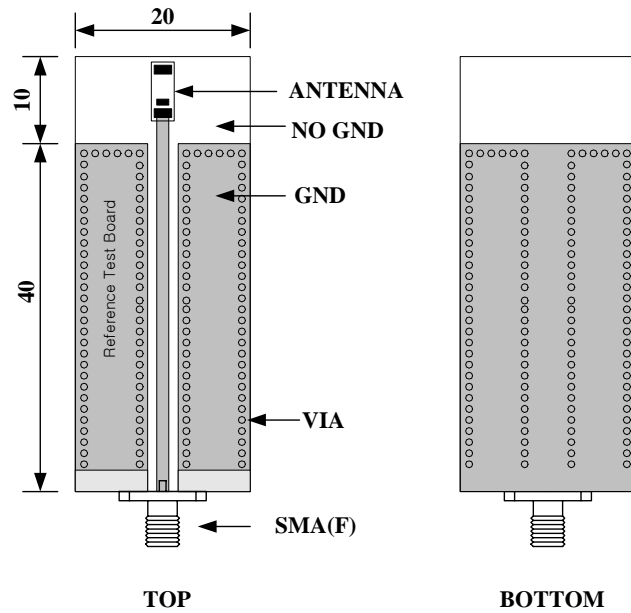
Internal Electrode	Ag	
External Electrode	Ag/Ni/Sn	
Dimensions (L x W x H)	6 x 2 x 1	mm
Unit Weight	46 ± 2	mg
Operating Temperature	-35 ~ +85	°C

1.3 Appearance and Dimensions

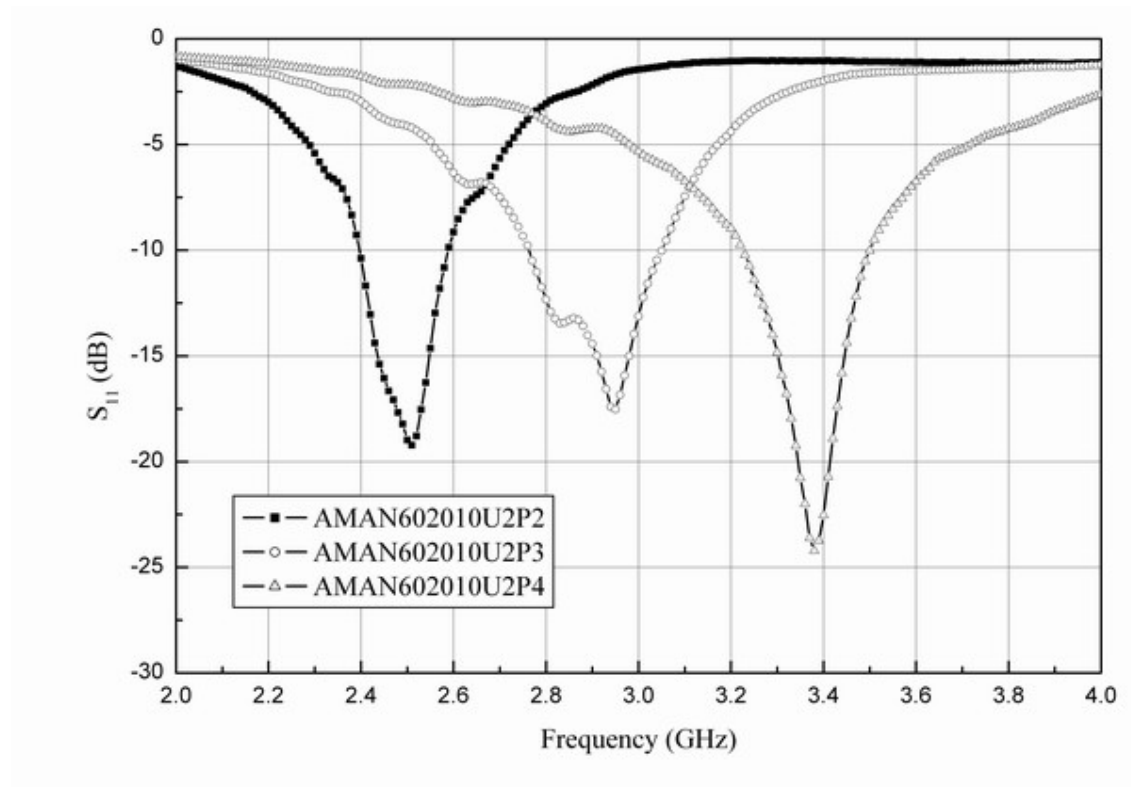


2. MEASUREMENT

2.1 Reference Test Board for Measurement



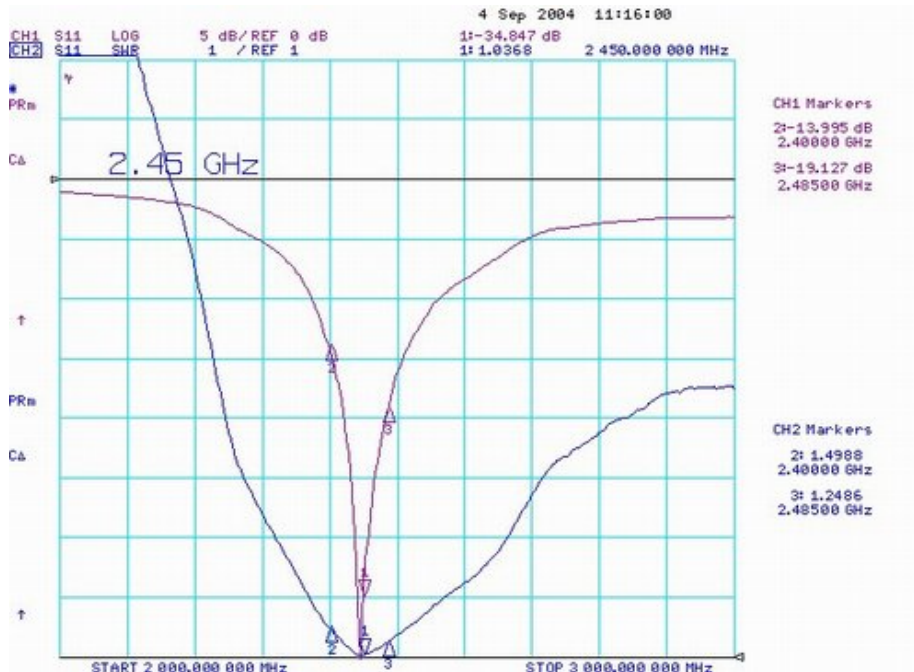
2.2 Electrical Characteristic



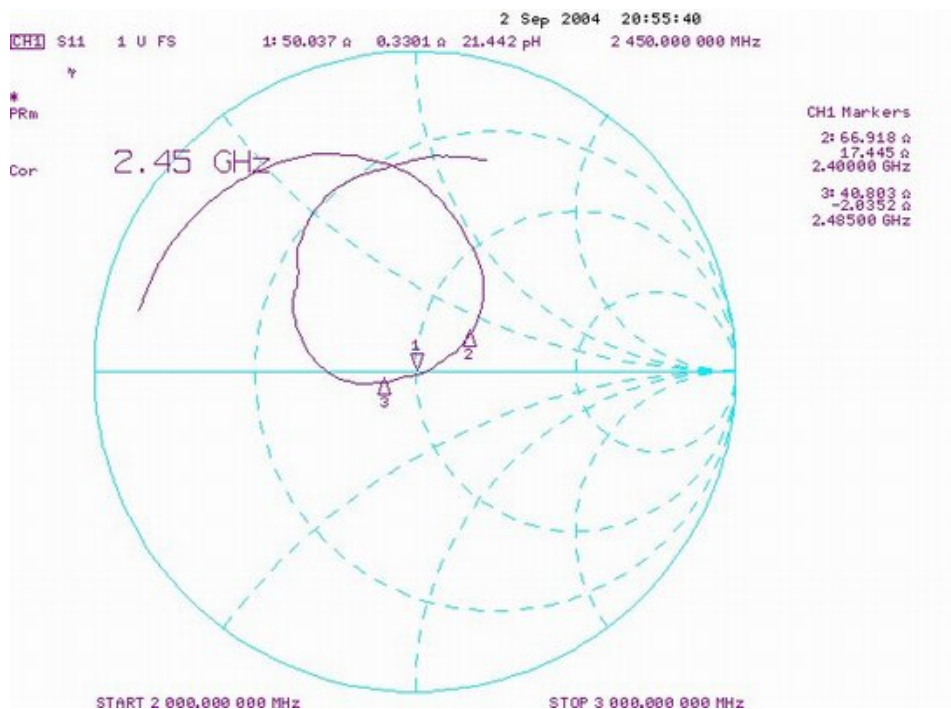
2.3 Electrical Characteristic (ALA621C2)

- Bluetooth matching on the reference test board

A. S_{11} (Return Loss)

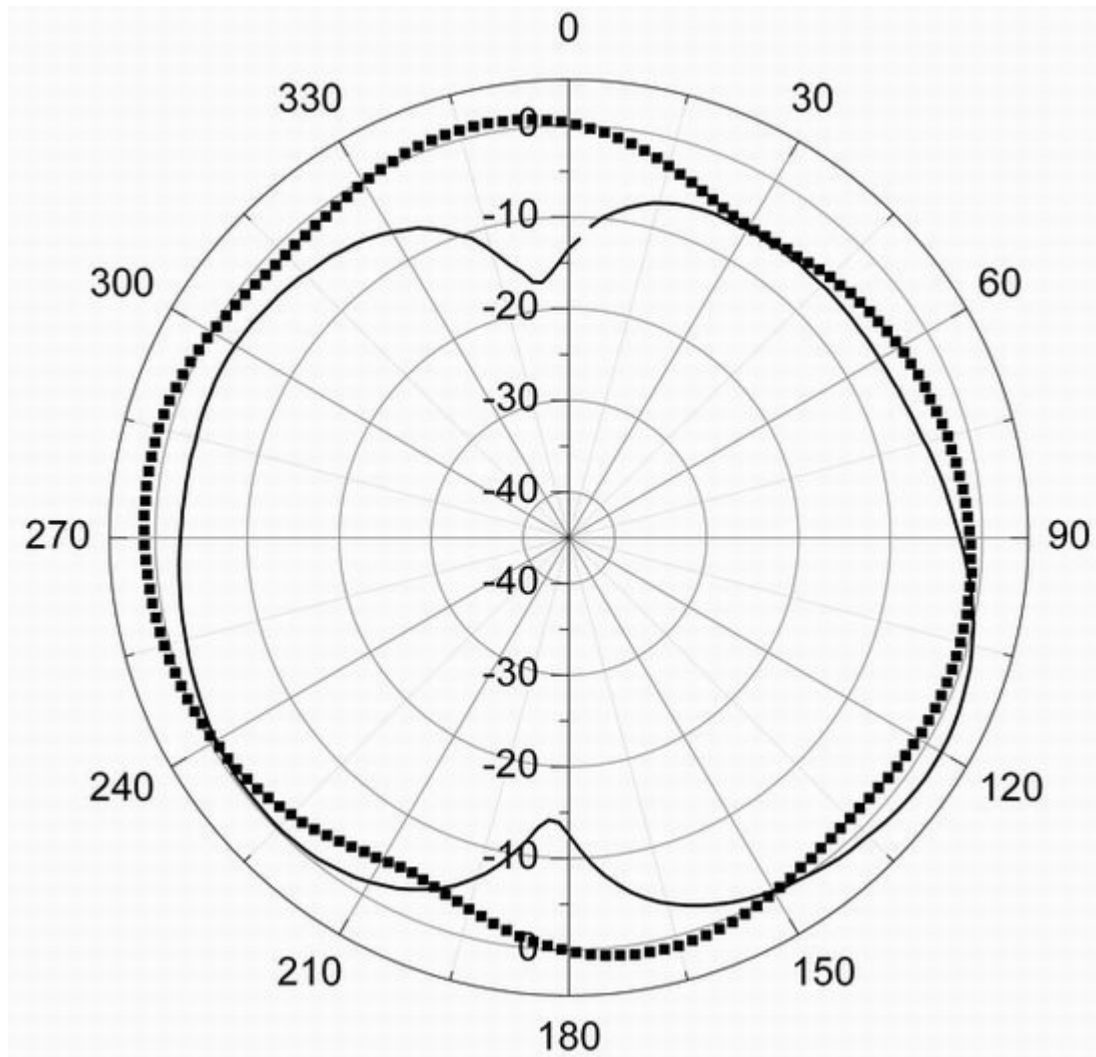


B. S_{11} (Smith chart)



2.4 Radiation Characteristic (ALA621C2)

- Bluetooth matching on the reference test board



- Measurement Setup

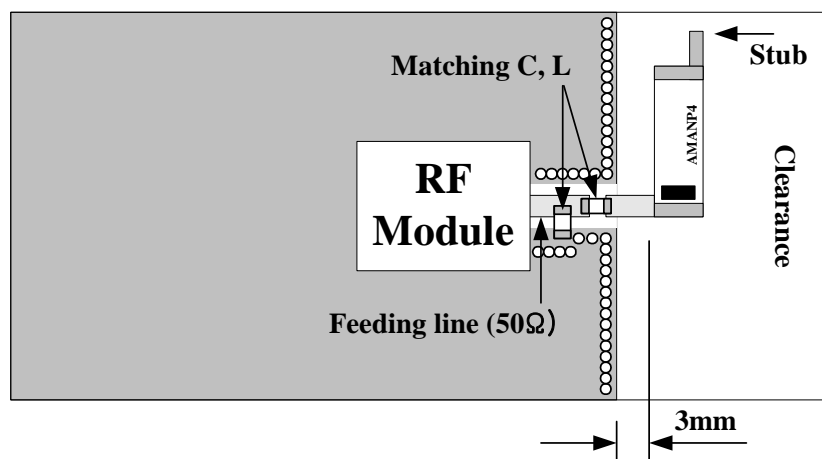
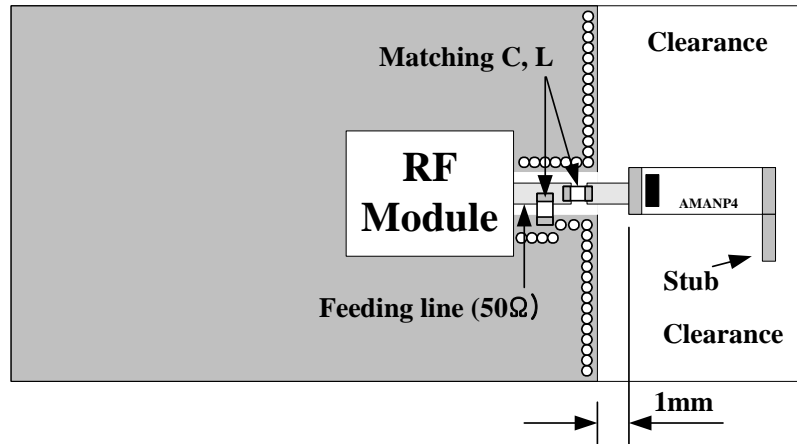
- 8x4x4 Anechoic Chamber
- Matching on the standard test board
- Temp. : 25°C / Humidity : 50~55%

- Measurement Result (@2.45GHz)

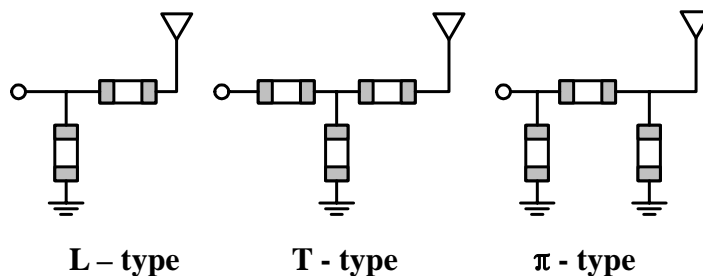
	Avg. (dBi)	Min. (dBi)	Max. (dBi)
Azimuth	-1.30	-5.87	1.29
Elevation	-4.29	-16.98	1.84

3. SUGGESTED LAYOUT & MATCHING CIRCUIT

3.1 Layout (recommended only)

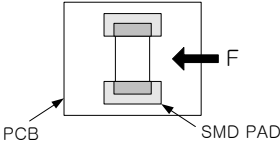
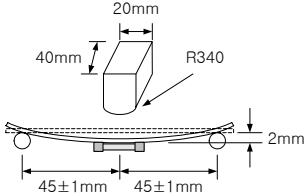
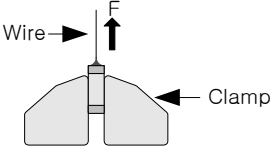
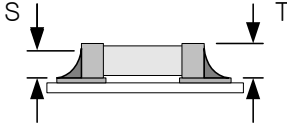


3.2 Matching Circuit (recommended only)



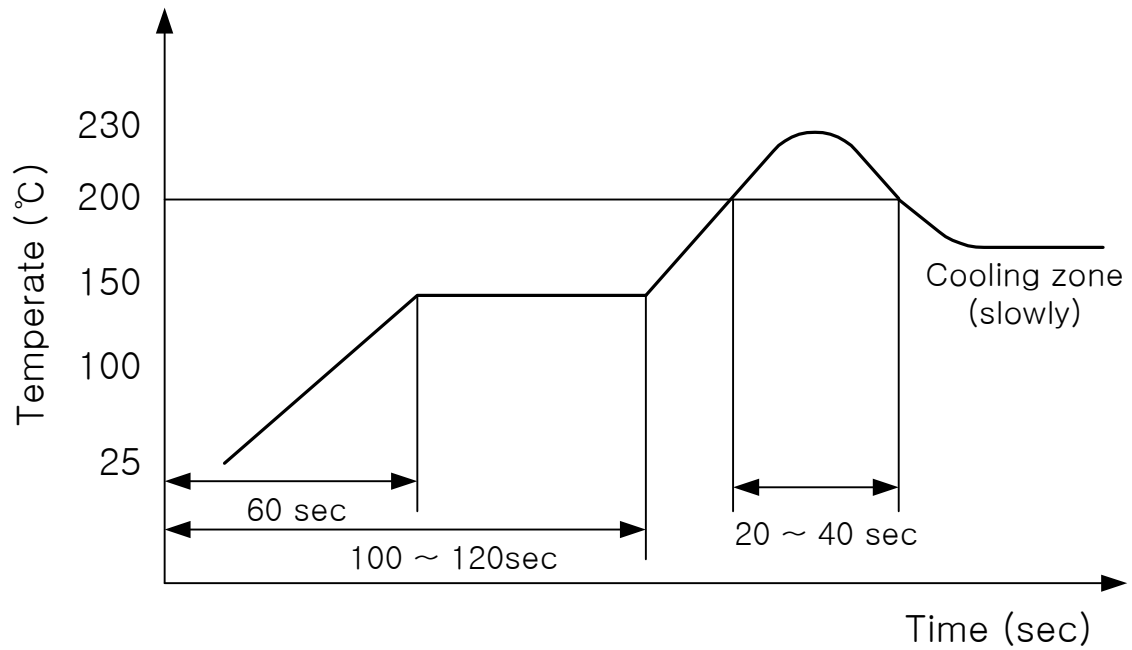
For usable matching, the **ground stability** must be guaranteed with **sufficient via holes** and the **case effects** should be considered. Finally, using one or more lumped chip elements and a tuning stub are recommended for better results.

4. RELIABILITY TEST

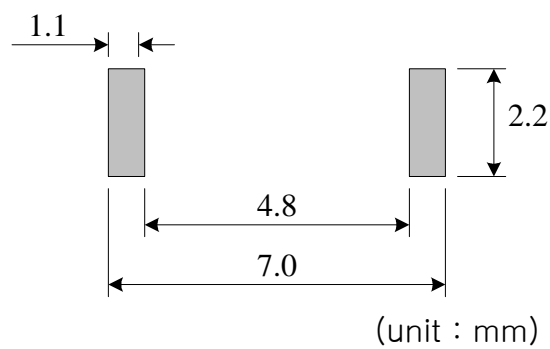
No	ITEM	TEST CONDITION	TEST REQUIREMENTS
1	Adhesive Strength of Termination	<p>1. Applied force on SMD chip till detached point from PCB.</p> 	<p>1. No mechanical damage by forces applied on the right. 2. Strength (F) > 5 kgf</p>
2	Bending Strength	<p>1. Warp : 2 mm 2. Speed : 0.5 mm/sec 3. Duration : 5 sec.</p> 	<p>1. No mechanical damage.</p>
3	Tensile Strength	<p>1. Wire : 0.6~0.8 tined Cu wire</p> 	<p>1. No mechanical damage by forces applied on the right. 2. Strength (F) > 5 kgf</p>
4	Solderability (Reflow Soldering)	<p>1. Preheat temperature : $160 \pm 10^\circ\text{C}$ 2. Soldering temperature : $230 \pm 5^\circ\text{C}$ 3. Soldering time : 10 sec max.</p> 	<p>1. More than 40% of the terminal electrode shall be covered with new solder. ($S \geq 0.4T$)</p>
5	Thermal Shock (Temperature Cycle)	<p>1. 1 cycle / step 1 : $-40 \pm 3^\circ\text{C}$, 30 min step 2 : $+125 \pm 3^\circ\text{C}$, 30 min 2. Number of cycle : 30 3. Measure f_c after left for 48 hrs min. at room temperature * Use reference test board</p>	<p>1. No visual damage 2. $\Delta f_c < 1.5\%$ ($\Delta f_c = f_{ci} - f_{cf} / f_{ci}$) f_{ci} : center frequency of initial condition (room temp) f_{cf} : center frequency after being cycled</p>
6	High Temperature Resistance	<p>1. Temperature : $+125 \pm 5^\circ\text{C}$ 2. Time : 1000 ± 24 hrs 3. Measure f_c after left for 24 hrs min. at room temperature * Use reference test board</p>	<p>1. No visual damage 2. $\Delta f_c < 1.5\%$</p>
7	Low Temperature Resistance	<p>1. Temperature : $-40 \pm 5^\circ\text{C}$ 2. Time : 1000 ± 24 hrs 3. Measure f_c after left for 48 hrs min. at room temperature * Use reference test board</p>	<p>1. No visual damage 2. $\Delta f_c < 1.5\%$</p>
8	Humidity (Steady Condition)	<p>1. Humidity : 90 ~ 95 % RH 1. Temperature : $+40 \pm 3^\circ\text{C}$ 2. Time : 500 ± 12 hrs 3. Measure f_c after left for 48 hrs min. at room temperature * Use reference test board</p>	<p>1. No visual damage 2. $\Delta f_c < 1.5\%$</p>

5. SOLDERING RECOMMENDATIONS

5.1 Reflow Soldering Profile

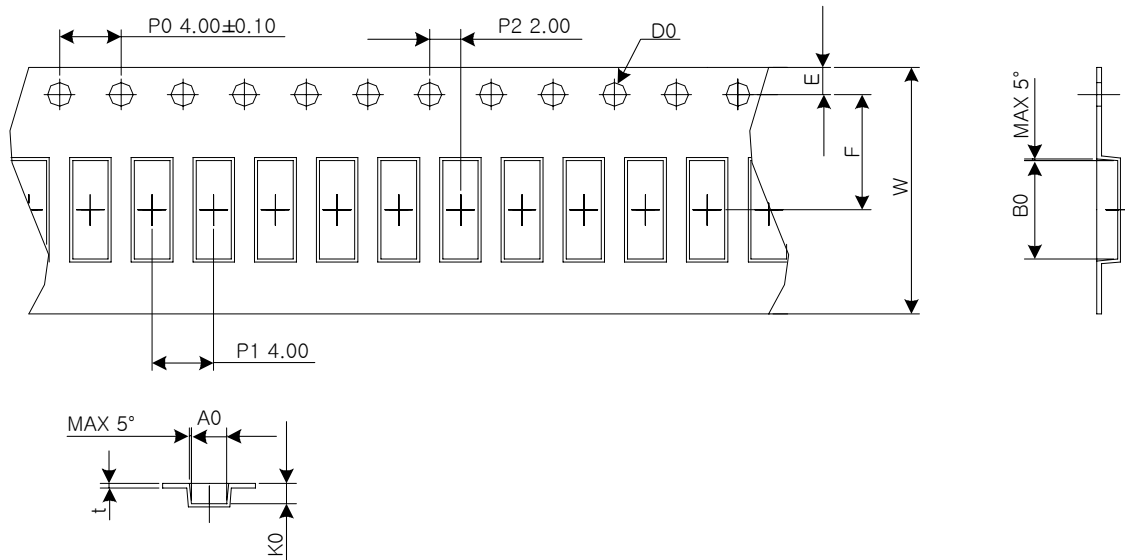


5.2 Soldering Land Pattern



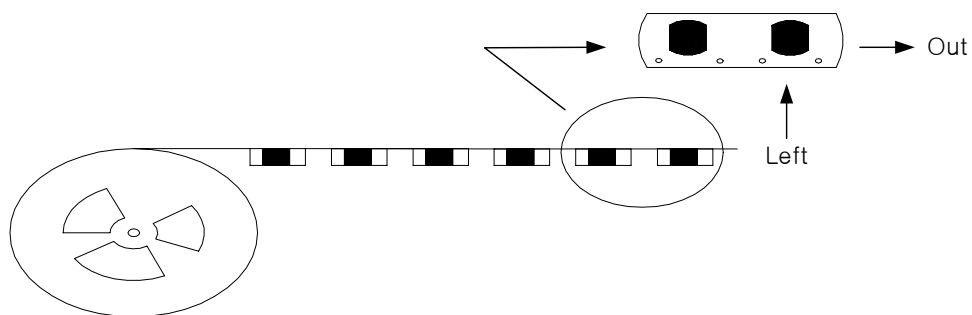
6. PACKING

6.1 Tape Dimension (unit : mm)



A0	2.30 ± 0.10	E	1.75 ± 0.10
B0	6.40 ± 0.10	F	7.50
K0	1.35 ± 0.10	t	0.30 ± 0.05
D0	1.55 ± 0.05	W	16.00 ± 0.30

6.2 Taping style



6.3 Packing quantity

1,000 pcs /Reel