

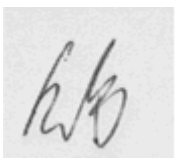
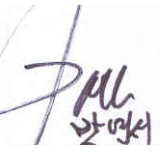



ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	1/37

# ANTENNA SPECIFICATION

	Prepared by	Reviewed by	Check by	Approved by
R F				
	09/03/12			
R & D				
	09/03/12			09/03/12

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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## 8. Antenna Data

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- 8.2. Antenna Drawing
- 8.3. Packing Spec Drawing
- 8.4. Reliability Test
- 8.5. Environment Test Report

ace antenna **A**

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## 1. Approval Check List

Approval Check List				
No	Date	Change Contents	Change Cause	Rev
1	2009.03.12	ANTENNA SPECIFICATION		A
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

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## 2. Material Certification

No	Part material	Raw material	Processing	Finishing	EA	Raw material company	Processing Plant	Etc
1	CARRIER	PC(141R-701)	MOLD	-	1	GE	SHIN-A	-
2	PATTERN	C5210	PRESS	Ni PLATED	1	YENAN	YUHAN Precision Co.	-
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

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### 3. Technical Specifications

#### 3.1 Electrical Specifications.

##### - Slide Down

Electrical Spec.										
Frequency Range (MHz)	GSM850 / GSM900 (824~960MHz)				DCS / PCS / WCDMA (1710~2170MHz)					
V.S.W.R (Max.)	824 MHz		960 MHz		1710 MHz			2170 MHz		
	3.9:1 below		4.3:1 below		5.3:1 below			6.0:1 below		
PEAK GAIN (Min., E2-Plane)	GSM850		GSM900		DCS		PCS		WCDMA	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-8.8 dBi	-7.1 dBi	-6.9 dBi	-7.4 dBi	-19.2 dBi	-14.7 dBi	-13.7 dBi	-12.9 dBi	-12.6 dBi	-13.6 dBi
AVERAGE GAIN (Min., H-Plane)	GSM850		GSM900		DCS		PCS		WCDMA	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-6.0 dBi	-6.5 dBi	-6.7 dBi	-7.7 dBi	-14.2 dBi	-10.4 dBi	-8.4 dBi	-9.6 dBi	-9.6 dBi	-14.4 dBi

##### - Slide Up

Electrical Spec.										
Frequency Range (MHz)	GSM850 / GSM900 (824~960MHz)				DCS / PCS / WCDMA (1710~2170MHz)					
V.S.W.R (Max.)	824 MHz		960 MHz		1710 MHz			2170 MHz		
	4.0:1 below		3.7:1 below		5.3:1 below			5.9:1 below		
PEAK GAIN (Min., E2-Plane)	GSM850		GSM900		DCS		PCS		WCDMA	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-5.7 dBi	-4.1 dBi	-3.5 dBi	-3.3 dBi	-20.6 dBi	-13.3 dBi	-13.1 dBi	-14.0 dBi	-13.7 dBi	-15.8 dBi
AVERAGE GAIN (Min., H-Plane)	GSM850		GSM900		DCS		PCS		WCDMA	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-4.5 dBi	-4.7 dBi	-4.3 dBi	-4.7 dBi	-13.7 dBi	-9.8 dBi	-8.2 dBi	-9.5 dBi	-9.4 dBi	-11.9 dBi

Impedance(Nominal)	50 ohms
Polarization	VERTICAL
Radiation Pattern	OMNI-DIRECTIONAL
Maximum Power	2 W

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### 3.2 Mechanical Specifications

Mechanical Spec.	
Connector	Board contact pin type
Overall length	See drawing
Operating Temperature	-40°C ~+85 °C
Weight	About 1.3g (Unit)

### 3.3 Packing Specifications

Packing Spec.		
PRODUCT	QUANTITY (Antenna)	MATERIAL
TRAY	1/50EA	P.S (0.8t)
TRAY INNER PAD	2/1000EA	SW 2 type (B corrugated paper)
CARTON BOX	1000EA/1BOX	DW 2 type (AB corrugated paper)

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## 4. Test Equipment

The equipment for antenna test is as follows,

- ◆ Network Analyzer (E5071C) to measure the V.S.W.R., Standing wave ratio(SWR) and impedance bandwidth of antenna
- ◆ Standard horn antennas adjustable to the GSM850/GSM900 bands
- ◆ Standard horn antennas adjustable to the DCS/PCS/WCDMA bands
- ◆ Anechoic Chamber installed the cables, connectors and equipments for measurements
- ◆ Digital Caliper to measure the dimensions
- ◆ Torque Driver to measure the torque force of the helix
- ◆ Push/Pull gauge to measure the pulling forces
- ◆ Climatic Chamber for environmental tests

ace antenna A



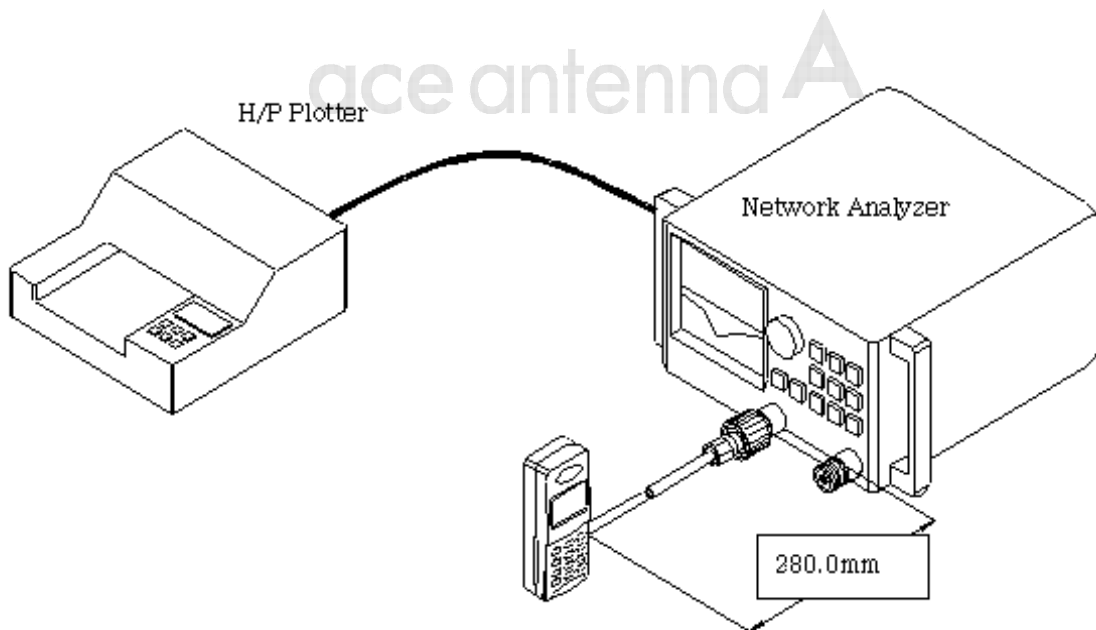
<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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## 5. Electrical Demands

### 5.1 V.S.W.R

The V.S.W.R characteristics must be satisfied the electrical demands in the below table.

Frequency Range (MHz)	GSM850 / GSM900 (824~960MHz)		DCS / PCS / WCDMA (1710~2170MHz)	
V.S.W.R (Slide Down)	824 MHz	960 MHz	1710 MHz	2170 MHz
	3.9:1 below	4.3:1 below	5.3:1 below	6.0:1 below
V.S.W.R (Slide Up)	824 MHz	960 MHz	1710 MHz	2170 MHz
	4.0:1 below	3.7:1 below	5.3:1 below	5.9:1 below



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## 5.2 Radiation Pattern

The radiation pattern must have the omni-directional characteristic in GSM850/GSM900/DCS/PCS/WCDMA band.

## 5.3 Gain

The gain is expressed as dBi. with condition (E2, H-Plane), the minimum Gain of antenna must be satisfied the electrical demands in the below table.

### – Slide Down State

Electrical Spec.	BAND									
	GSM850		GSM900		DCS		PCS		WCDMA	
Frequency Range (MHz)										
PEAK GAIN (Min., E2-Plane)	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-8.8 dBi	-7.1 dBi	-6.9 dBi	-7.4 dBi	-19.2 dBi	-14.7 dBi	-13.7 dBi	-12.9 dBi	-12.6 dBi	-13.6 dBi
AVERAGE GAIN (Min., H-Plane)	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-6.0 dBi	-6.5 dBi	-6.7 dBi	-7.7 dBi	-14.2 dBi	-10.4 dBi	-8.4 dBi	-9.6 dBi	-9.6 dBi	-14.4 dBi

### – Slide Up State

Electrical Spec.	BAND									
	GSM850		GSM900		DCS		PCS		WCDMA	
Frequency Range (MHz)										
PEAK GAIN (Min., E2-Plane)	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-5.7 dBi	-4.1 dBi	-3.5 dBi	-3.3 dBi	-20.6 dBi	-13.3 dBi	-13.1 dBi	-14.0 dBi	-13.7 dBi	-15.8 dBi
AVERAGE GAIN (Min., H-Plane)	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
	-4.5 dBi	-4.7 dBi	-4.3 dBi	-4.7 dBi	-13.7 dBi	-9.8 dBi	-8.2 dBi	-9.5 dBi	-9.4 dBi	-11.9 dBi

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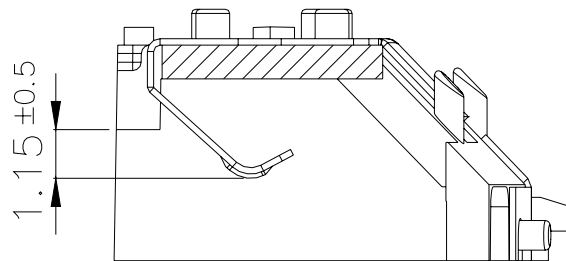
## 6. Mechanical Demands

### 6.1. Contact Pin Force Test

Contact pin of antenna must keep 200g/f  $\pm$ 150 in operation distance.

(Operation distance of antenna is same to under drawing.)

(PCB overlap : 0mm~1.65mm)



### 6.2. Contact Pin Resistance Test.

After assemble antenna to test equipment, Contact pins are pressed to nominal assembly position 500 times. The antenna contact force must satisfy of (6.1) operation force. (Cycle time: 60 times/min )

### 6.3 Drop Test

The antenna is attached to the handset. The handset is dropped with the antenna downward onto a concrete surface at 1.5 m height and 6 plane.

The number of drop is 2 times.

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

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## 7.Environmental Demands

### 7.1 Operation Temperature Test

- Test A: Place the antennas for testing in chamber. The chamber condition should be as follows: 1hours at  $-20^{\circ}\text{C}$ .
- Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.
- Test B: Place the antennas for testing in chamber. The chamber condition should be as follows: 1hours at  $70^{\circ}\text{C}$ .
- Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.

ace antenna **A**

### 7.2 Temperature Change Test

The object of temperature test is to evaluate the reliability of antenna component at temperature change.

Test: Temperature cycle is as follows. 2 hours at  $-40^{\circ}\text{C}$ .

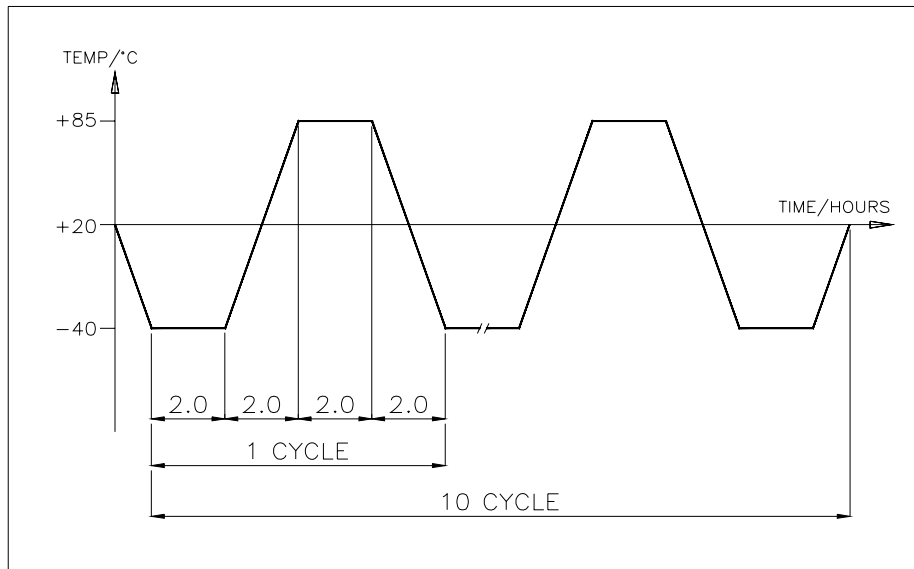
2 hours at  $+85^{\circ}\text{C}$ .

Temperature increase/decrease time (Temperature change time) is

2 hours. 10 cycles.

Final measurements: The antenna shall be visually inspected and electrically and mechanically checked as required by products standard.

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### 7.3 High Humidity Test

Test: Place the antennas for testing in chamber. The chamber condition should be as follows: 24hours at +55°C, Relative humidity is 95%.

Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.

### 7.4 Vibration Test

After assemble antenna to test equipment, Do test in X, Z direction per 1hour as a under spec. The antenna shall be visually inspected and electrically and mechanically checked as required by products standard. The test must satisfy to IEC 68-2-6 spec

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Vibration frequency	F=5~55~5Hz(1cycle)
Sweeping Rate	0.5 octave/min
Maximum displacement	1.5mm
Maximum acceleration	2 g
Crossover Frequency	18.0Hz

### 7.5 Salt spray Test

Sprayed with the salt spray solution for a period of 96 hours at a temperature of +35°C.

The antenna shall be visually inspected and electrically and mechanically checked as required by products standard. The test must satisfy to IEC 68-2-11 spec .

ace antenna A

### 7.6 Storage temperature Test

After antenna are stored for a period of 96 hours at a temperature of -30 °C and a relative humidity of 95 %. Stored for a period of 96 hours at a temperature of +80 °C and a relative humidity of 95 % (total: 192 hour)

The antenna shall be visually inspected and electrically and mechanically checked as required by products standard.

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## 8. Antenna data

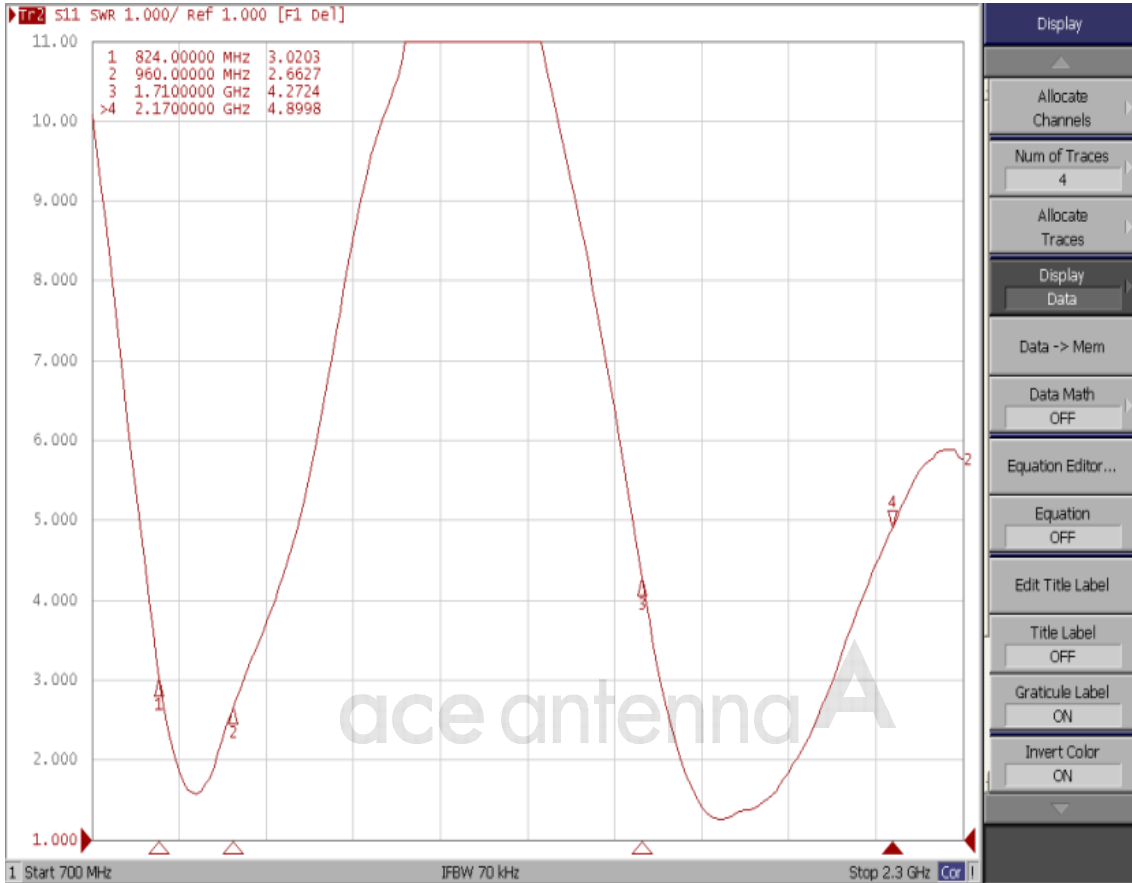
### 8.1. Electrical data(V.S.W.R & GAIN)

→ V.S.W.R (Slide Down)

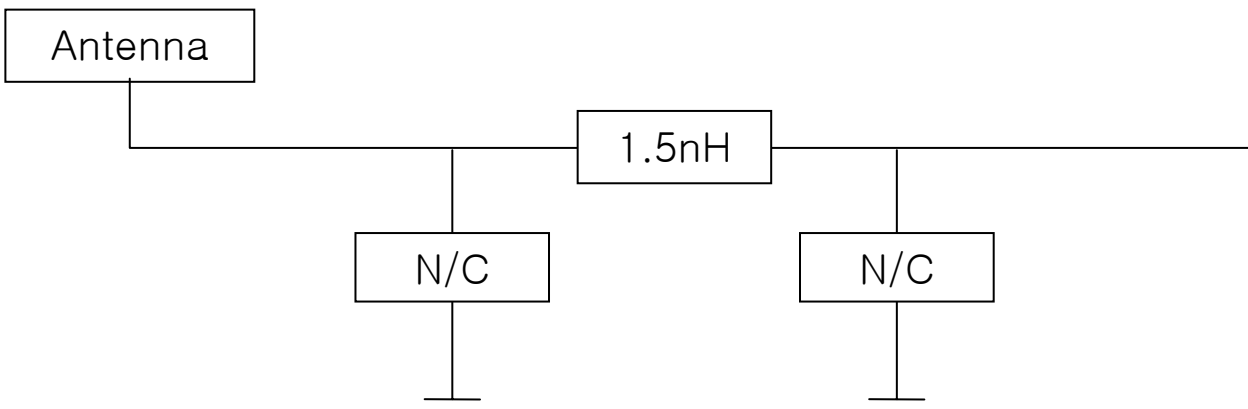


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→ V.S.W.R (Slide Up)



→ Matching Circuit Diagram



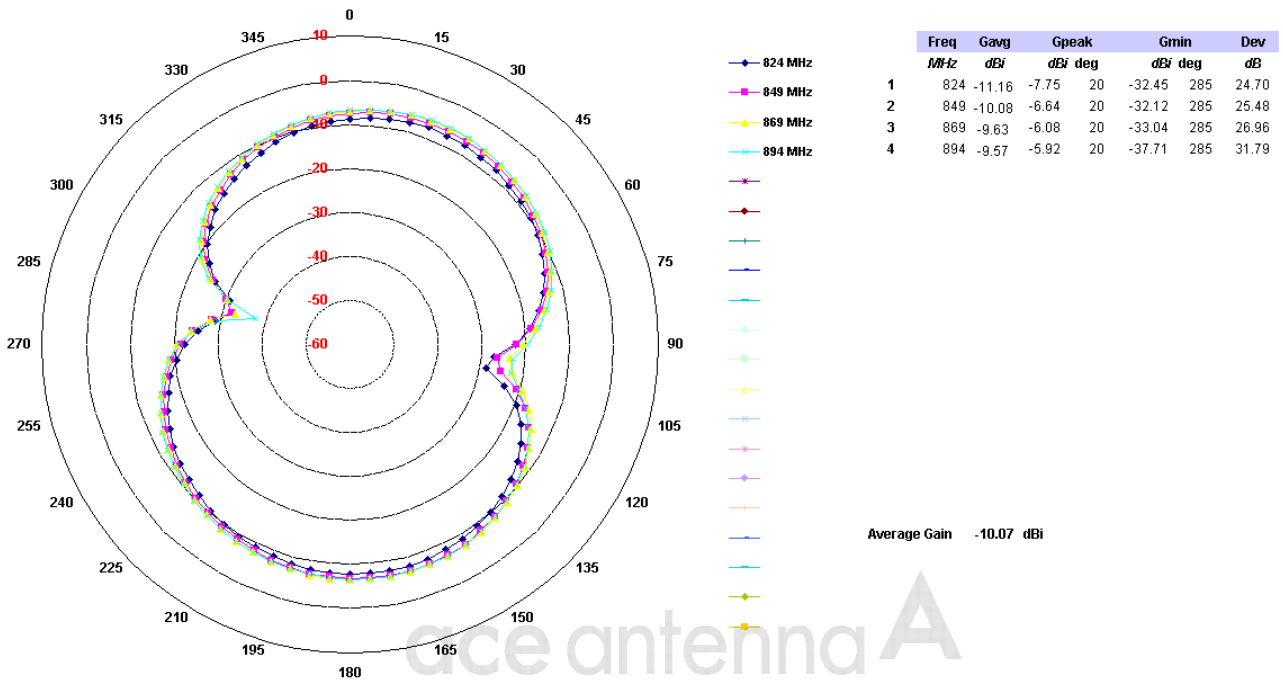


<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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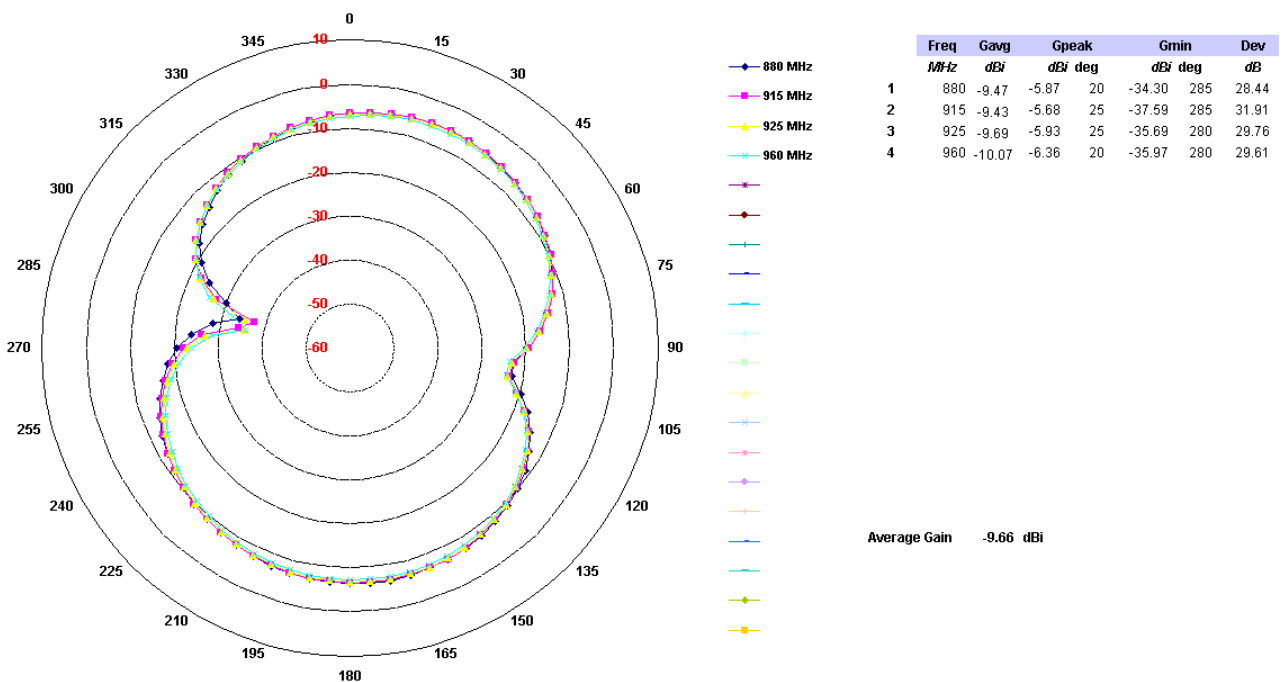
→ GAIN (with Matching Circuit)

- E2-Plane

→ [GSM850 Slide Down]

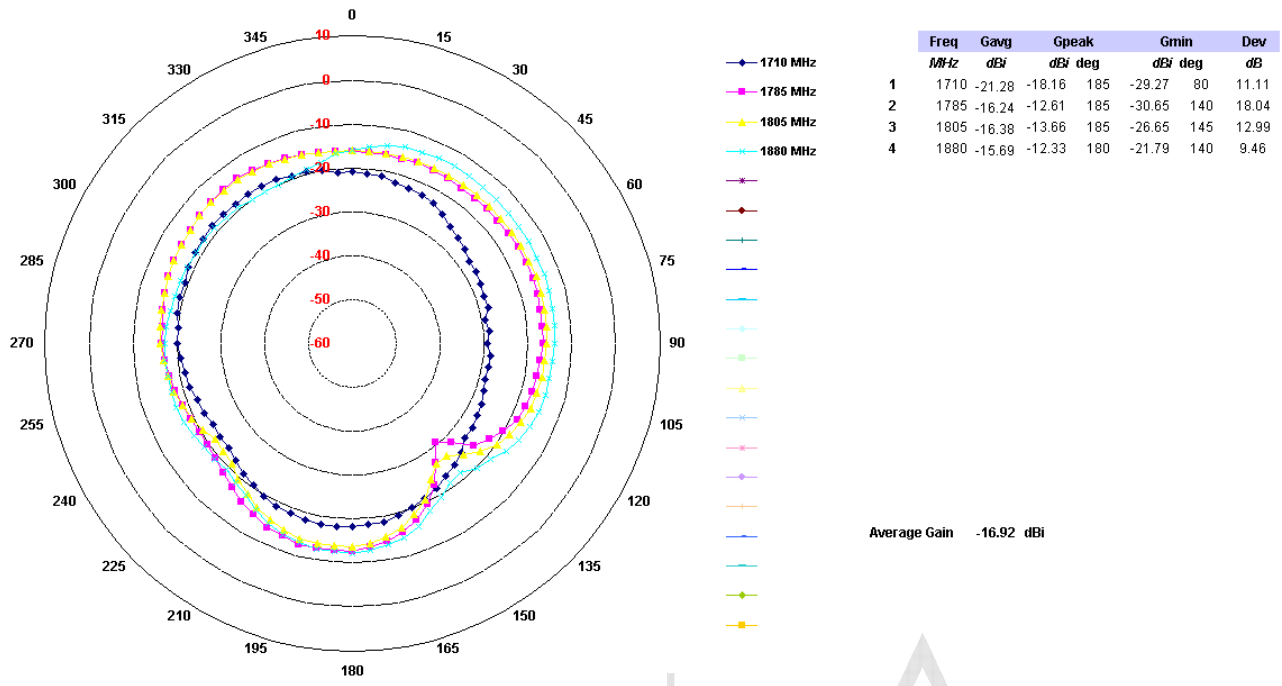


→ [GSM900 Slide Down]



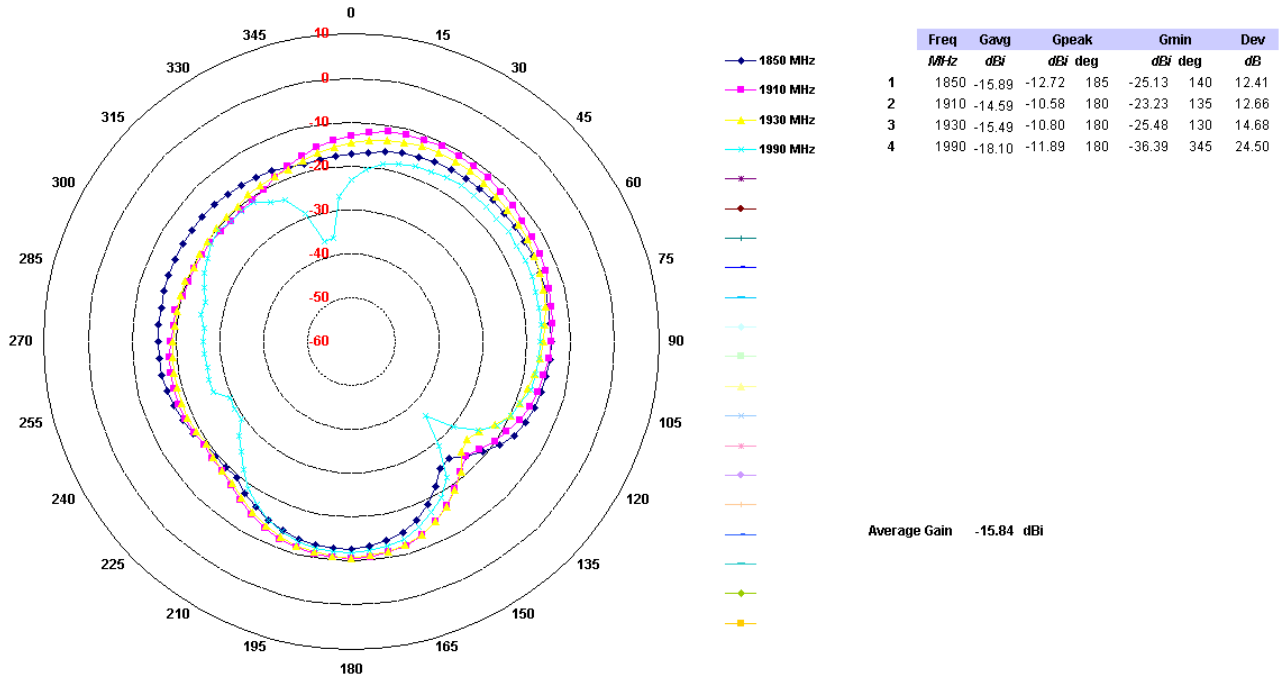
<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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→ [DCS Slide Down]



ace antenna A

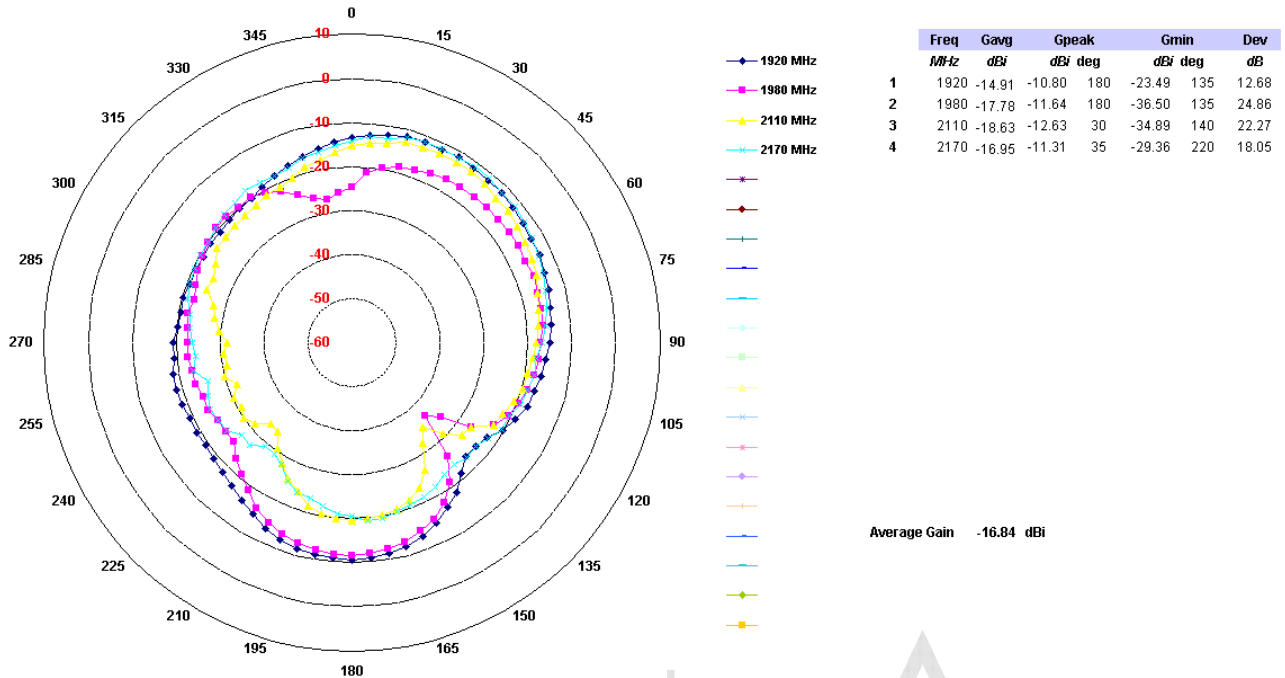
→ [PCS Slide Down]



ace antenna A

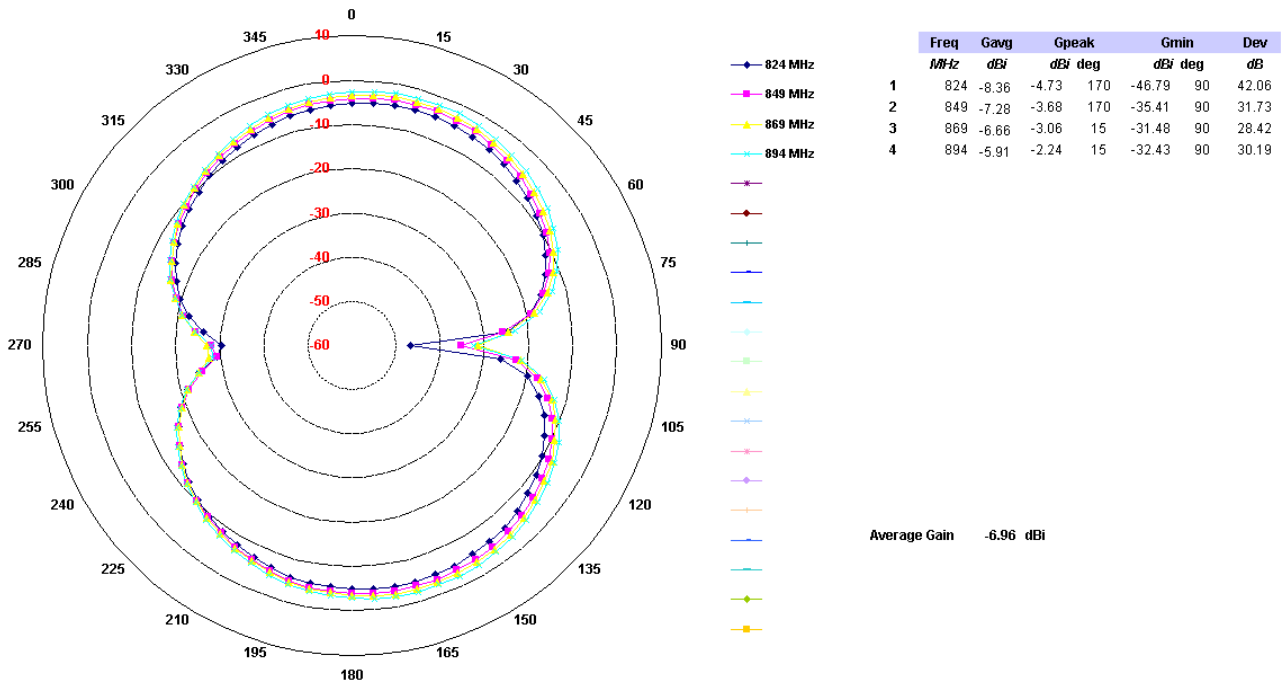
<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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→ [WCDMA Slide Down]



ace antenna A

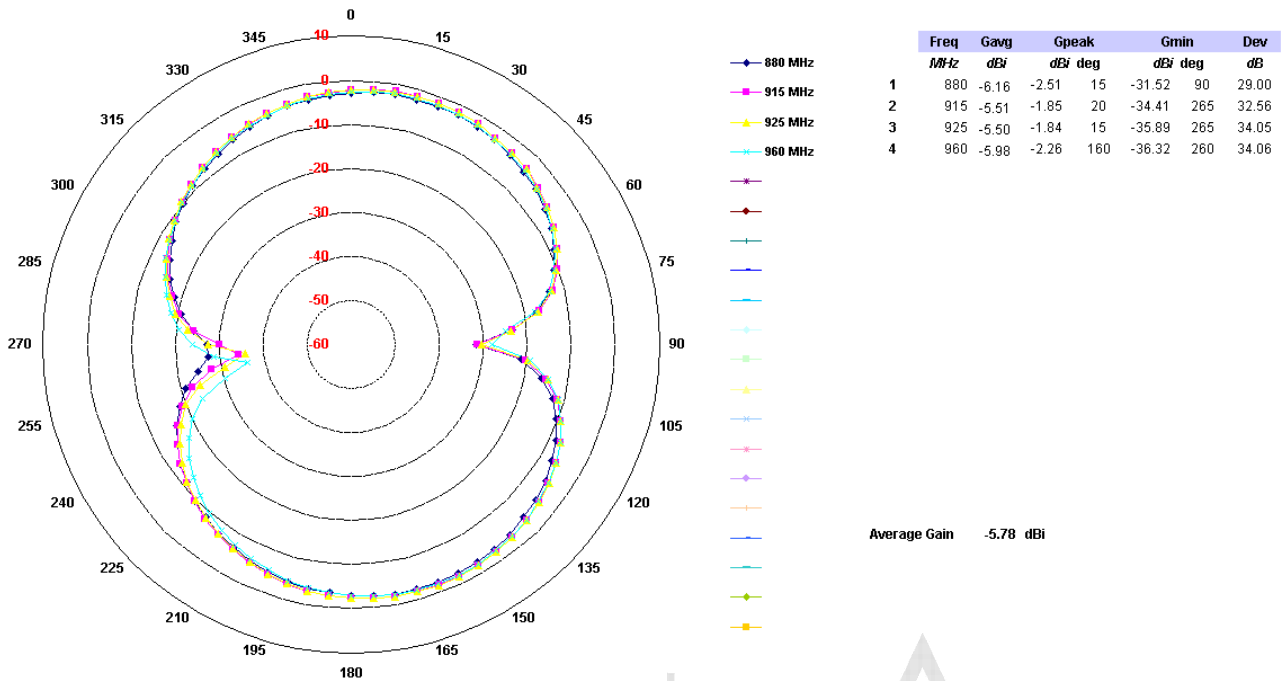
→ [GSM850 Slide Up]



ace antenna A

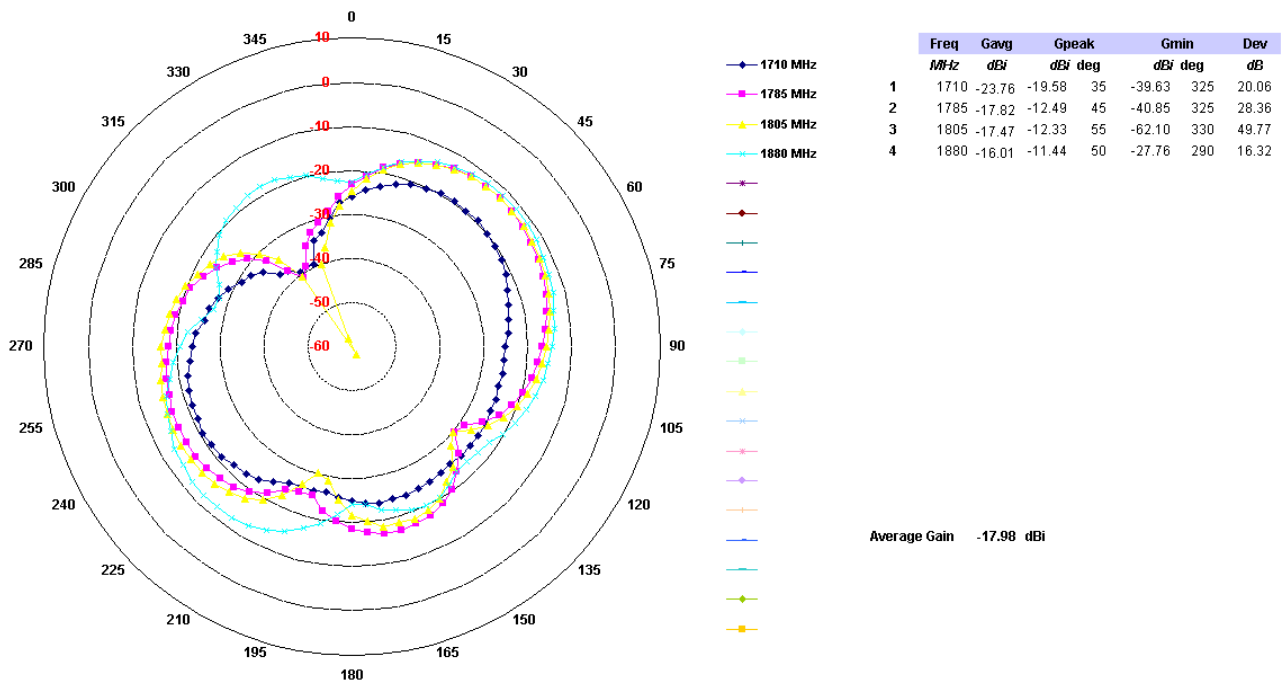
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→ [GSM900 Slide Up]



ace antenna A

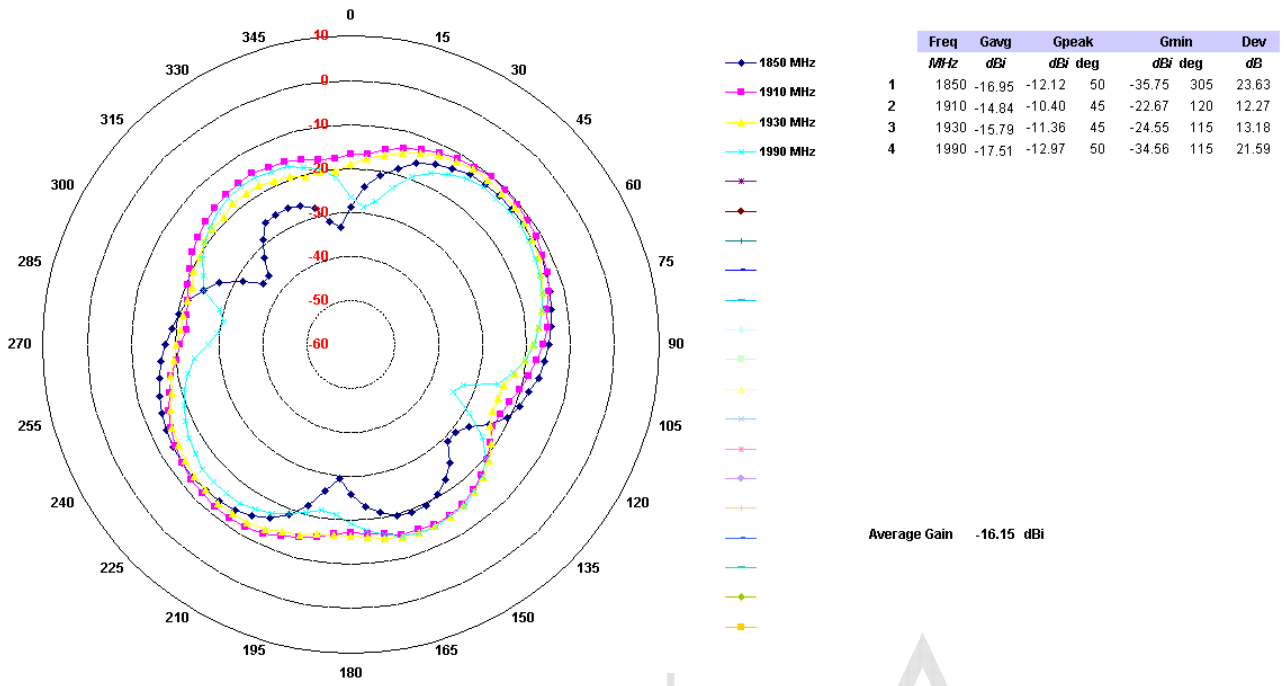
→ [DCS Slide Up]



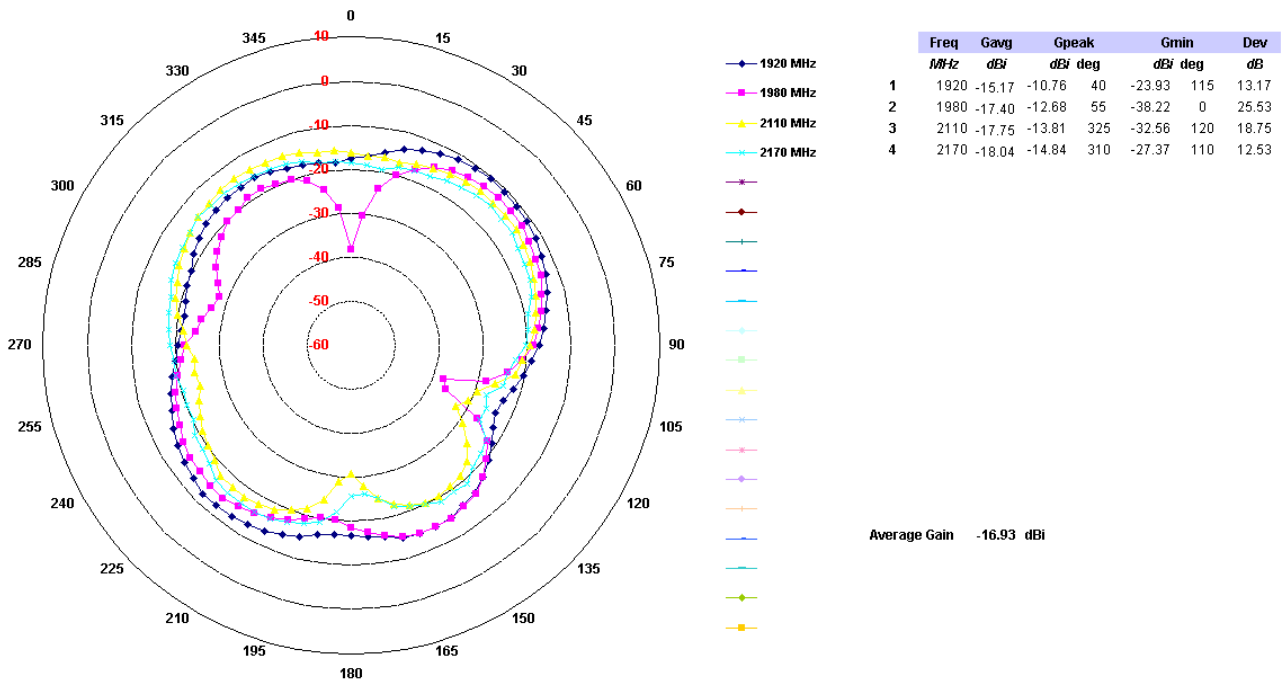
ace antenna A

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→ [PCS Slide Up]



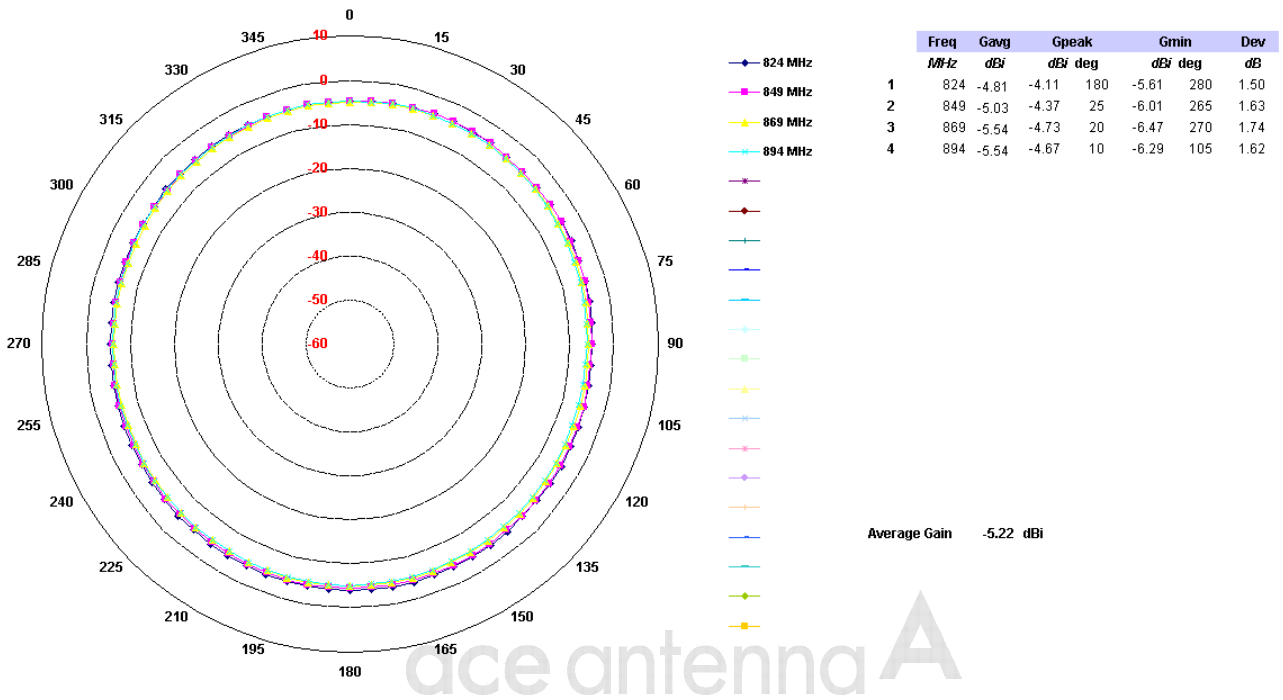
→ [WCDMA Slide Up]



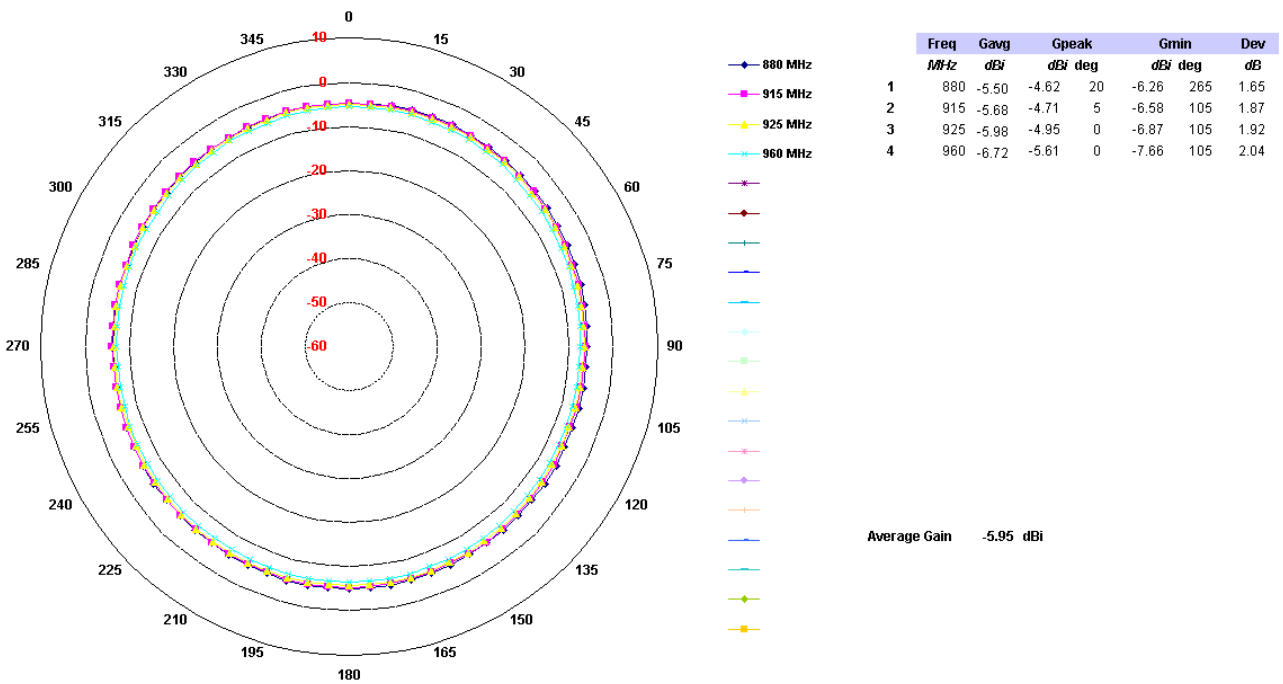
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- H-Plane

→ [GSM850 Slide Down]

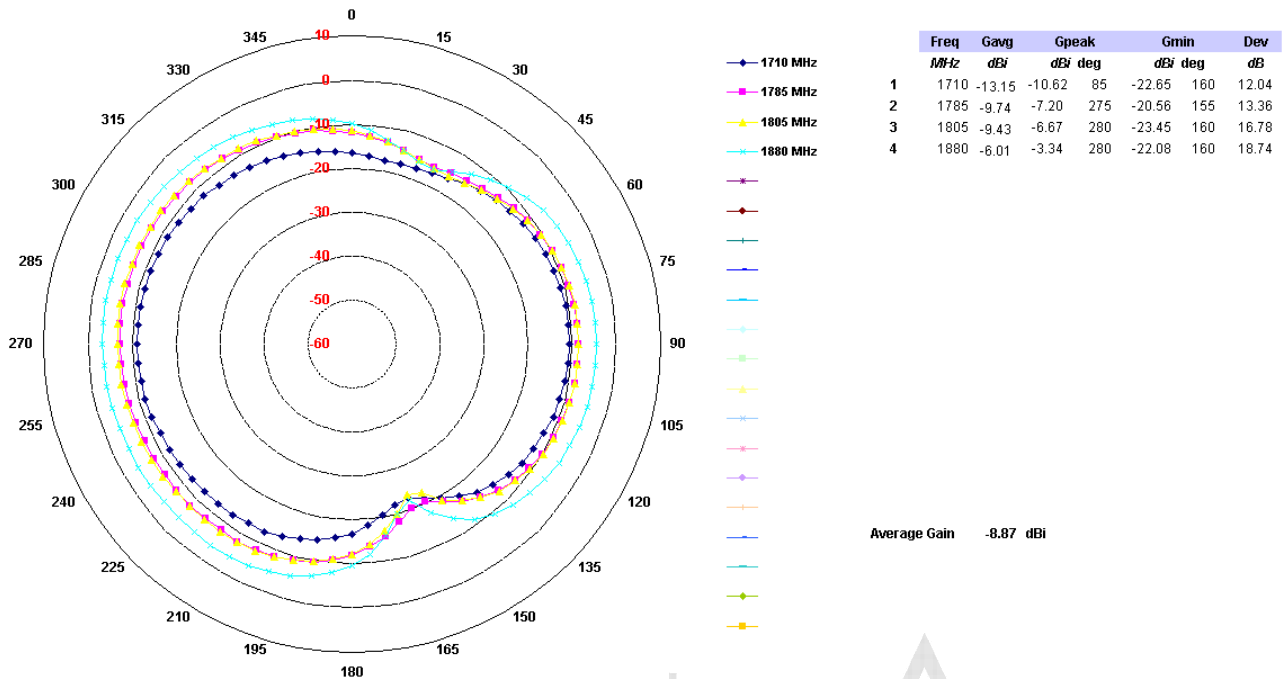


→ [GSM900 Slide Down]

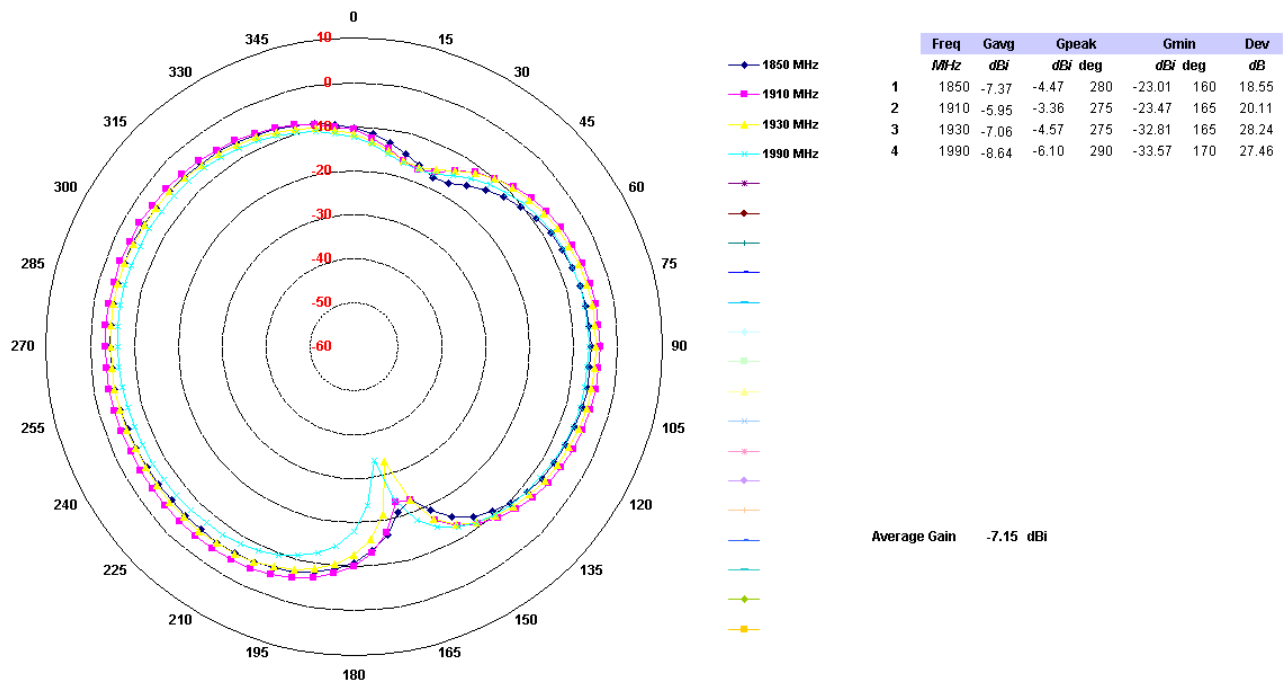


<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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→ [DCS Slide Down]

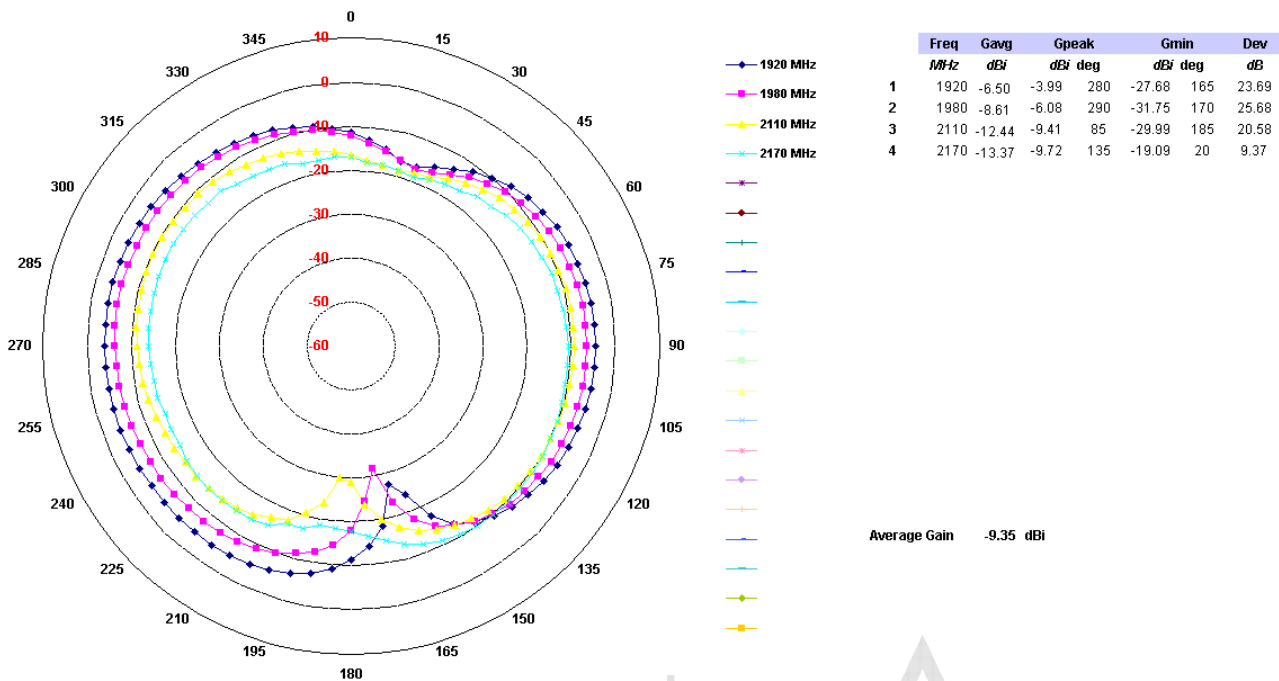


→ [PCS Slide Down]

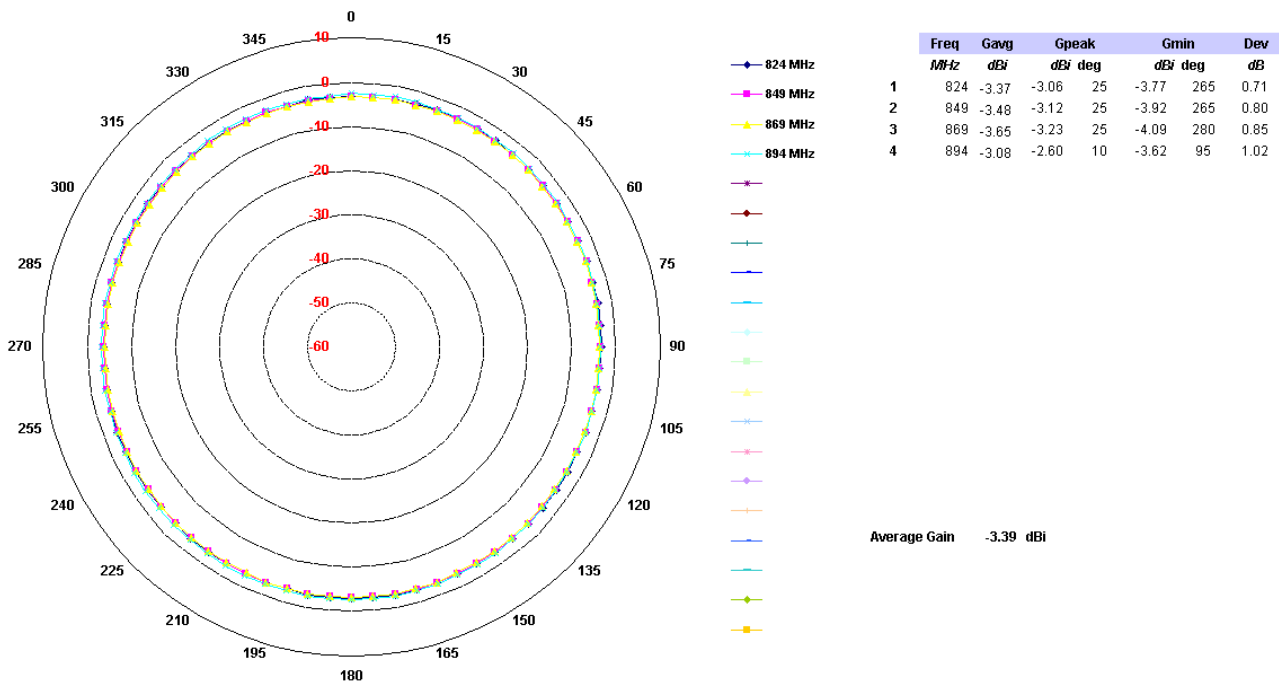


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→ [WCDMA Slide Down]



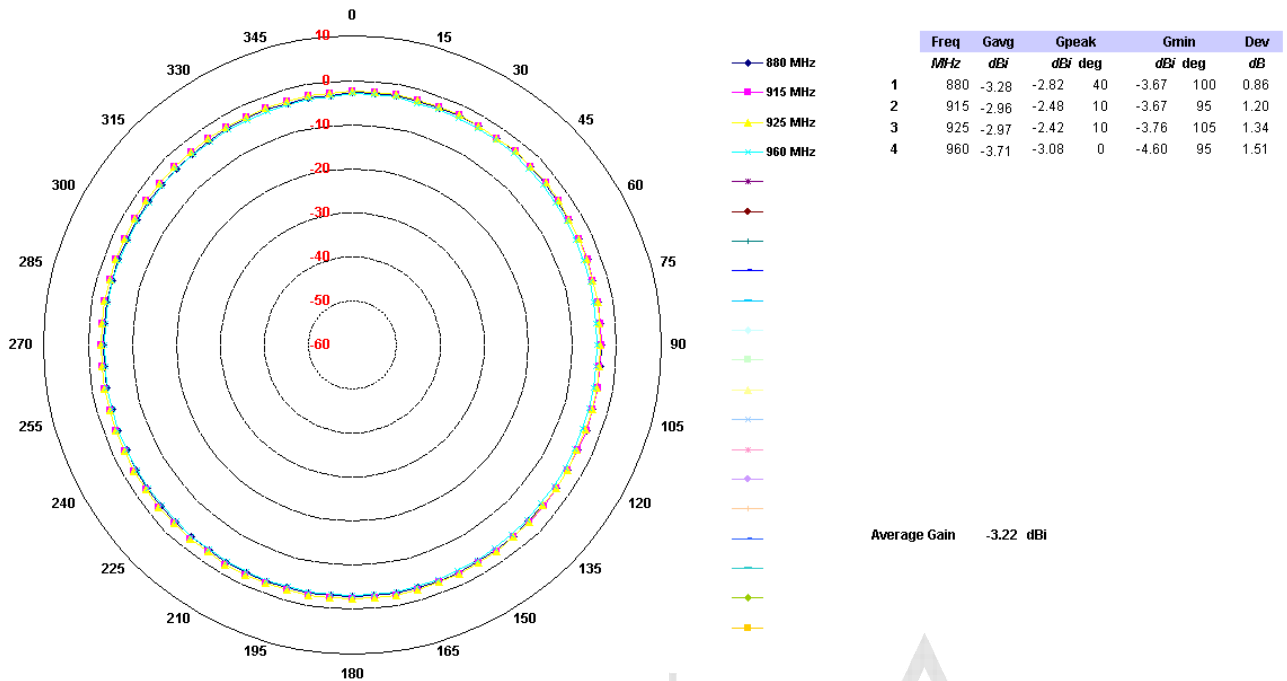
→ [GSM850 Slide Up]



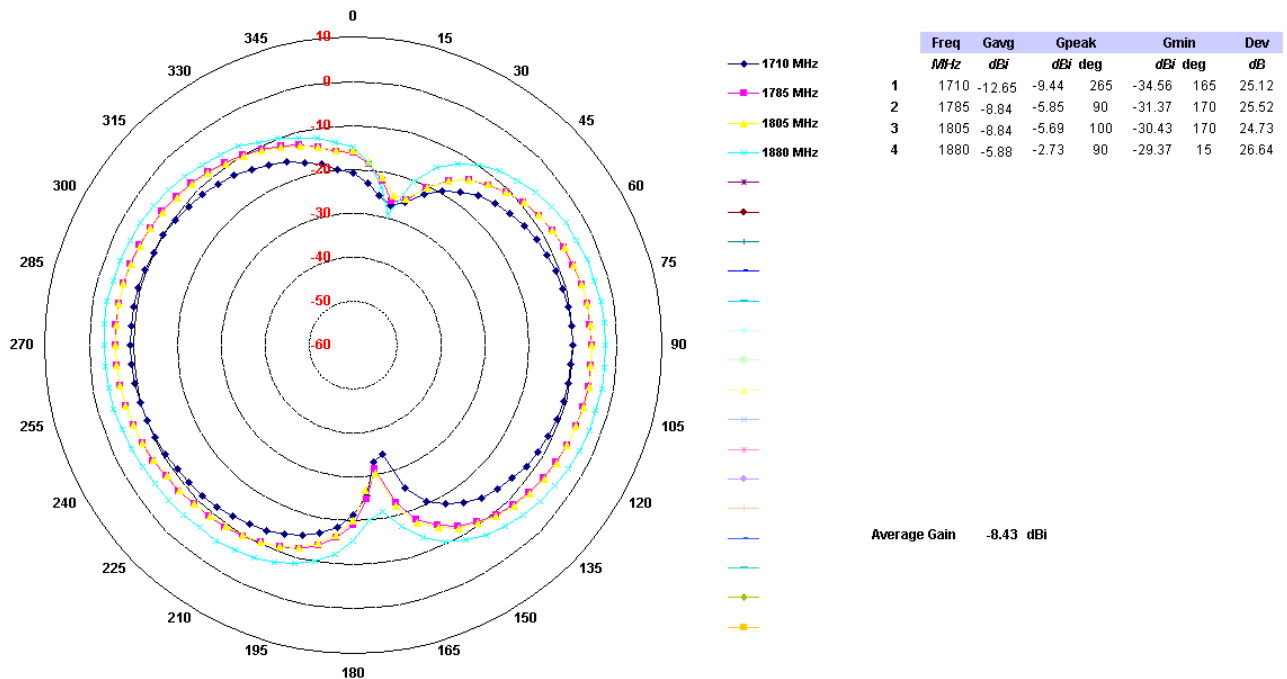


<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
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→ [GSM900 Slide Up]

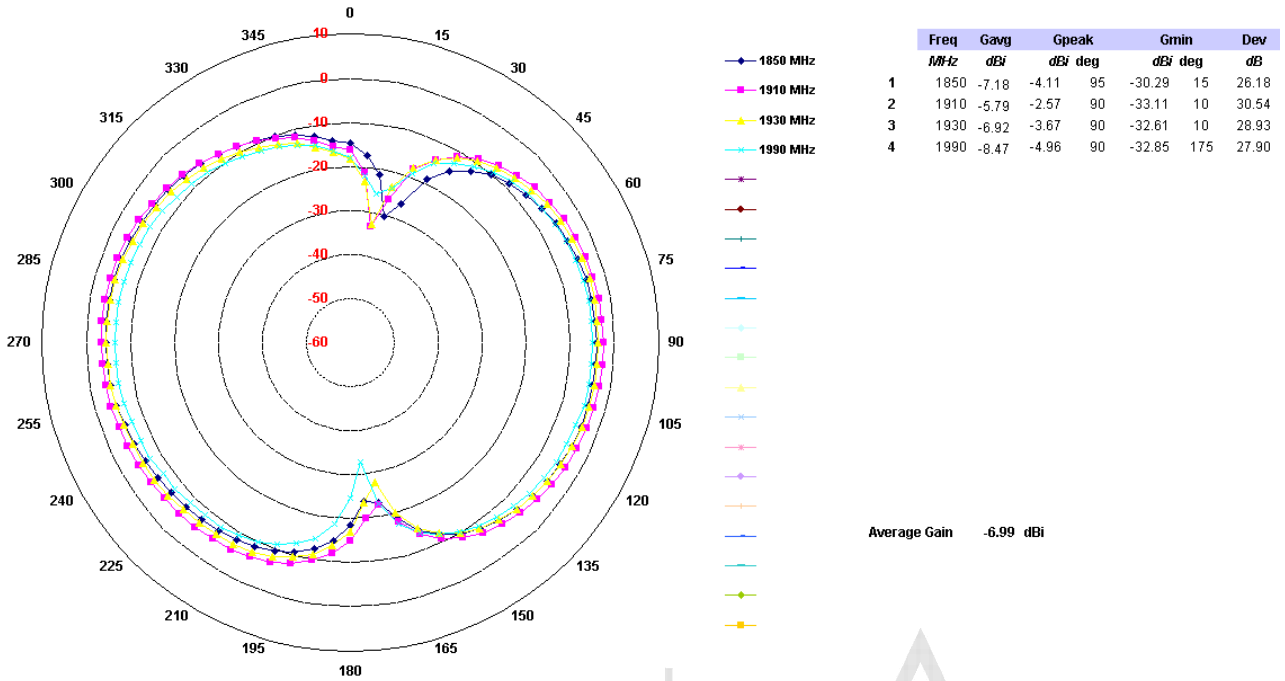


→ [DCS Slide Up]

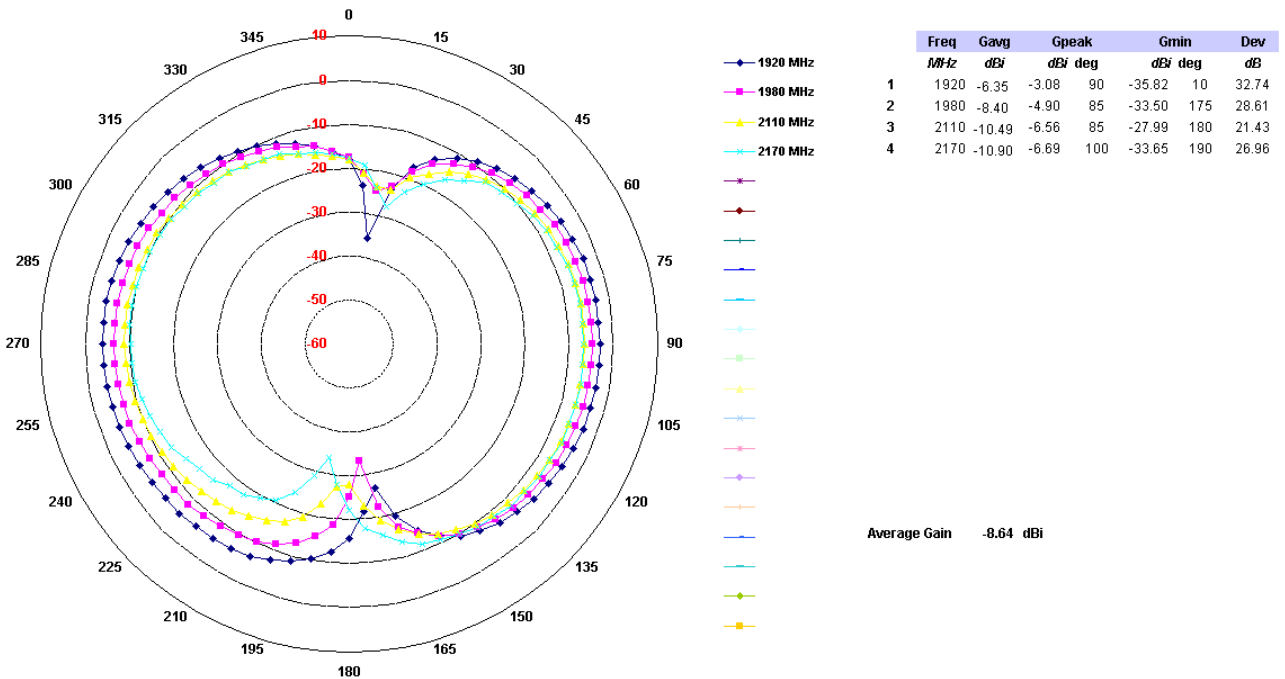


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→ [PCS Slide Up]

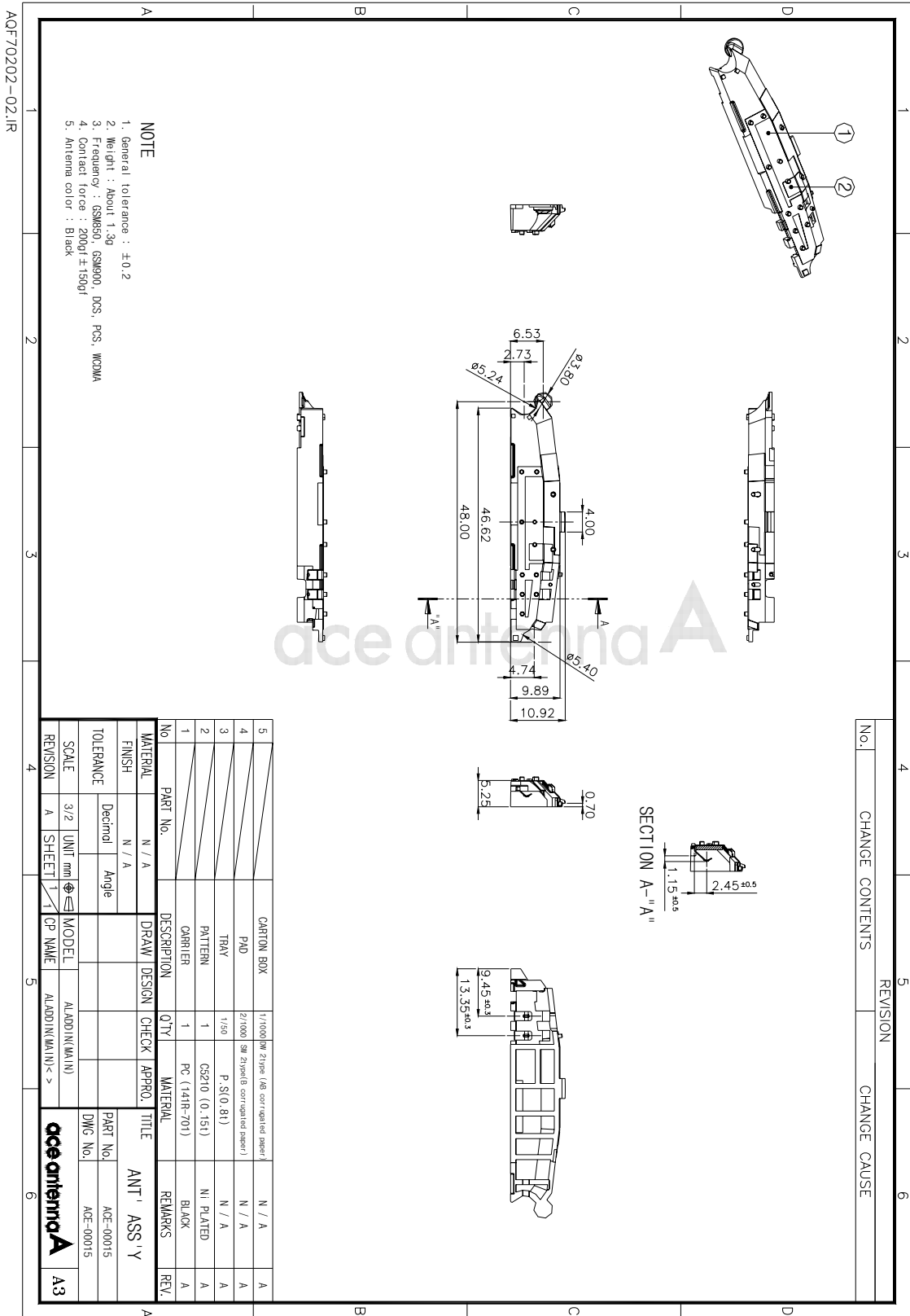


→ [WCDMA Slide Up]



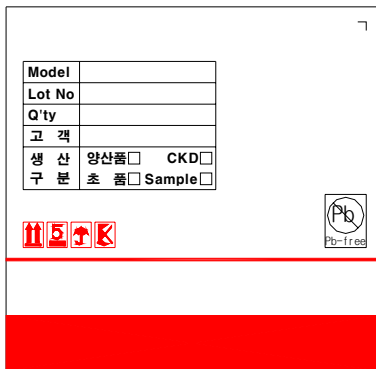
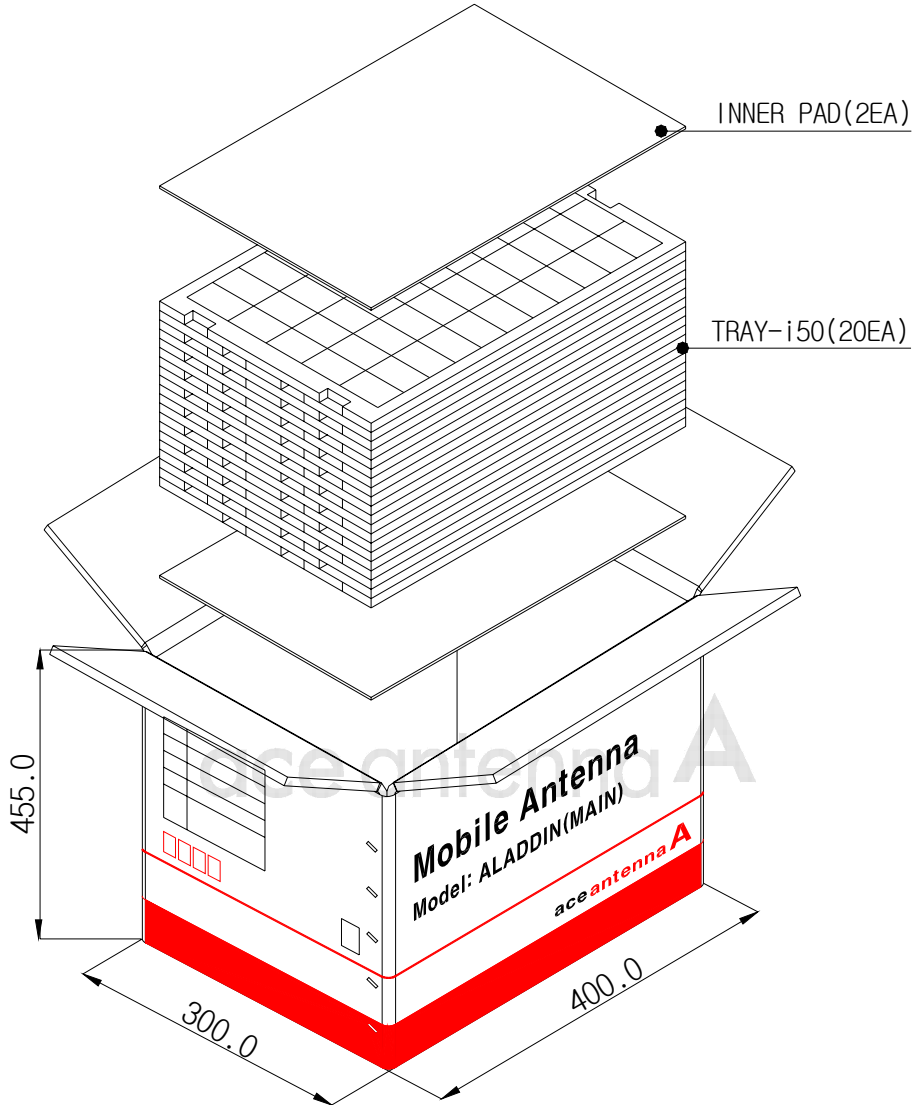
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### 8.2. Antenna Drawing



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8.3. Packing Spec Drawing.



좌측면 인쇄 사양



양쪽 전면 인쇄 사양

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#### 8.4 Reliability Test.

#### 8.5. Environment test report

##### 8.5.1 CARRIER [ 141R-701 ]



#### Intertek Testing Center

340-2, Yongam-ri, Chongryang-myUn,  
Uiju-gun, Ulsan, 689-865 Korea  
Tel : 052-257-6754, Fax : 052-276-6792

### TEST REPORT

Applicant : GE Plastics Korea  
Address : 240-18, Mokhang-Dong, Chungju-Si,  
Chungcheongbuk-Do, Korea

Page: 1 of 5

Report No. UT07R-0872

Date: Jul. 13, 2007

Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : 141R-701  
Sample ID No. : UT07R-0872  
Manufacturer/Vender : GE Plastics Korea

Sample received : Jul. 11, 2007  
Testing Date : Jul. 11, 2007 ~ Jul. 13, 2007  
Testing Laboratory : Intertek Testing Center  
Testing Environment : Temperature : 22 °C      Relative Humidity: 51 %

Test Method(s) : Please see the following page(s).

Test Result(s) : Please see the following page(s).

\* Note 1 : The test results presented in this report relate only to the object tested.

\* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

Tested by,

E.Y.Lee / Chemist

Authorized by,

H.W.Yoo / Lab Manager

#### Intertek Testing Center

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ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	30/37



## Intertek Testing Center

340-2, Yongam-ri, Chongryang-myun,  
Uiju-gun, Ulsan, 689-865 Korea  
Tel : 052-257-6754, Fax : 052-276-6792

## TEST REPORT

Report No. UT07R-0872

Page: 2 of 5

Date: Jul. 13, 2007

Sample ID No. : UT07R-0872

Sample Description : 141R-701

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	µg/kg	With reference to BS EN 1122, by acid digestion and determined by ICP-OES	0.5	N.D
Lead (Pb)	µg/kg	With reference to US EPA 3052, by acid digestion and determined by ICP-OES	5	N.D
Mercury (Hg)	µg/kg	With reference to US EPA 3052, by acid digestion and determined by ICP-OES	2	N.D
Hexavalent Chromium (Cr <sup>6+</sup> )	µg/kg	US EPA 3060A and determined by UV-visible	1	N.D
Polybrominated Biphenyl (PBBs)				
Monobromobiphenyl	µg/kg	With reference to US EPA 3540C, by solvent extraction and determined by GC/MS Analysis	5	N.D
Dibromobiphenyl	µg/kg		5	N.D
Tribromobiphenyl	µg/kg		5	N.D
Tetrabromobiphenyl	µg/kg		5	N.D
Pentabromobiphenyl	µg/kg		5	N.D
Hexabromobiphenyl	µg/kg		5	N.D
Heptabromobiphenyl	µg/kg		5	N.D
Octabromobiphenyl	µg/kg		5	N.D
Nonabromobiphenyl	µg/kg		5	N.D
Decabromobiphenyl	µg/kg		5	N.D
Polybrominated Diphenyl Ether (PBDEs)				
Monobromodiphenyl ether	µg/kg	With reference to US EPA 3540C, by solvent extraction and determined by GC/MS Analysis	5	N.D
Dibromodiphenyl ether	µg/kg		5	N.D
Tribromodiphenyl ether	µg/kg		5	N.D
Tetrabromodiphenyl ether	µg/kg		5	N.D
Pentabromodiphenyl ether	µg/kg		5	N.D
Hexabromodiphenyl ether	µg/kg		5	N.D
Heptabromodiphenyl ether	µg/kg		5	N.D
Octabromodiphenyl ether	µg/kg		5	N.D
Nonabromodiphenyl ether	µg/kg		5	N.D
Decabromodiphenyl ether	µg/kg		5	N.D

Notes : µg/kg = ppm = parts per million

&lt; = Less than

N.D = Not detected ( &lt;MDL )

MDL = Method detection limit

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ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	31/37



**Intertek Testing Center**

340-2, Yongam-ri, Chongryang-myun,  
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## TEST REPORT

Report No. UT07R-0872

Page: 3 of 5

Date: Jul. 13, 2007

Sample ID No. : UT07R-0872

Sample Description : 141R-701

\* View of sample as received;-



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ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	32/37



Intertek Testing Center

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Ulsu-gun, Ulsan, 689-865 Korea  
Tel : 052-257-6754, Fax : 052-276-6792

## TEST REPORT

Report No. UT07R-0872

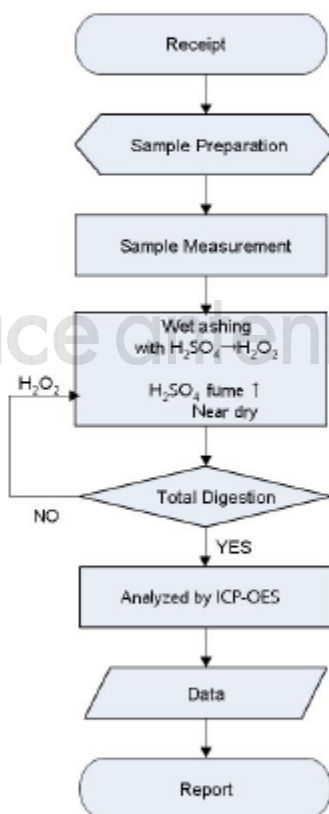
Page: 4 of 5

Date: Jul. 13, 2007

Sample ID No. : UT07R-0872

Sample Description : 141R-701

### Flow Chart Of Digestion ( EN 1122 for Cd )



\*\* Remarks : The samples were dissolved totally by pre-conditioning method according to above flow chart.

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ace antenna **A**



ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	33/37



Intertek Testing Center

340-2, Yongam-ri, Chongryang-myun,  
Uiju-gun, Ulsan, 689-865 Korea  
Tel : 052-257-6754, Fax : 052-276-6792

## TEST REPORT

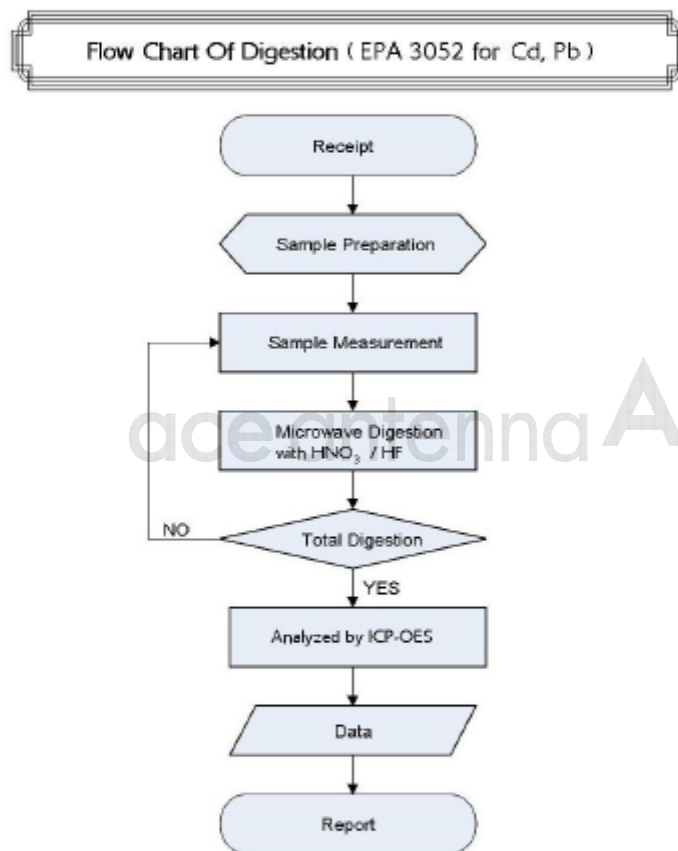
Report No. UT07R-0872

Page: 5 of 5

Date: Jul. 13, 2007

Sample ID No. : UT07R-0872

Sample Description : 141R-701



\*\* Remarks : The samples were dissolved totally by pre-conditioning method according to above flow chart.

Prepared by Eung Yong Lee, Chemist

Confirmed by Sang Chul Park, Senior Researcher

\*\*\*\*\* End of Report \*\*\*\*\*

Intertek Testing Center

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<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(MAIN)</b>	TYPE	Main antenna	PAGE	34/37

## 8.5.2 PATTERN [ C520 + Ni PLATED ]



**Test Report No. F690501.LF-CTSAYAA09-04295**

Issued Date: February 19, 2009 Page 1 of 4

**TO: YENAN TECHNOLOGY CO., LTD.**  
 Namdong complex 145B-4L #717-1  
 Gojan-dong  
 Namdong-gu  
 INCHEON  
 Korea

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

**Product Name** : Bronze C5210 (Ni) plated  
**SGS File No.** : AYAA09-04295  
**Received Date** : February 16, 2009  
**Test Performing Date** : February 17, 2009  
**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)

ace antenna A

Pluto Kim  
 Cindy Park  
 Jinee Song / Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

The accuracy is based on the Company's ability to detect Contaminants of Similar physical, chemical or molecular structure to those submitted for analysis. The Company does not guarantee the accuracy of the results for contaminants that are not included in the Company's database. The Company's database is not exhaustive and the results are only indicative of the contaminants present in the sample. The Company is not responsible for the results of the analysis. The accuracy cannot be guaranteed except in the case of the Company's standard method. The accuracy of the results is only for the sample(s) submitted for analysis.

FDS2 Ver:1.0.3

SGS Testing Korea Co., Ltd.

322, The O' Valley, 666-9, Hoggae-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-030  
 T+82 (0)31 4908 0000 F+82 (0)31 4908 0999 http://www.sgslab.co.kr www.kr.sgs.com/greenlab

Member of the SGS Group (Bodé & Générale de Surveillance)

ace antenna A



ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(MAIN)	TYPE	Main antenna	PAGE	36/37



**Test Report No.** F690501/LF-CTSAYAA09-04295

Issued Date: February 19, 2009 Page 3 of 4

**Sample No.** : AYAA09-04295.001  
**Sample Description** : Bronze C5210 (Ni) plated  
**Style/Item No.** : N/A

#### Halogen Contents

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	BS EN 14582:2007 , IC	30	N.D.

Picture of Sample as Received:



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

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