Pantech

APPROVAL No.		ISSUE	

APPROVAL SPECIFICATION

TITLE : Built-in Antenna

DWG No. : KRS-SHOW-MA

PART No. : KRS-SHOW-MA

MODEL : SHOW

CONDITION : 1. Cellular / US-PCS

2.

3.

4.

We would like to approval the suited product.

	Prepared by	Reviewed by	Check by	Approved by
Pantech Approval				
Supplier Approval	Prepared by	Reviewed by	Check by	Approved by
				

SUPPLIER : KARAM Solution

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REVISION LIST

REVISION	DATE	CHANGE CONTRNTS	CHANGE CAUSE	REMARK
ISSUE 1	2010.02.02		**FIRST APPROVAL SPECIFICATION**	
FROM ISSUE TO	2010. . .			
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ANTENNA SPECIFICATION

KARAM Solution

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1. Technical Items

1.1 Electrical Spec.

Electrical Spec.								
Frequency Range (MHz)	Cellular				US-PCS			
	Tx1		Rx1		Tx2		Rx2	
	824 – 849MHz		869 - 894MHz		1850 - 1910MHz		1930 - 1990MHz	
Slide Position	Slide Down	Slide Up	Slide Down	Slide Up	Slide Down	Slide Up	Slide Down	Slide Up
V.S.W.R (Max)	4.0	4.0	3.0	2.5	3.0	2.5	3.5	4.0
GAIN (E2, Peak Min)	-15.0dBi	-15.5dBi	-14.0dBi	-13.0dBi	-3.0dBi	0.5dBi	-3.0dBi	-0.5dBi
Impedance (Nominal)	50 ohms							
Polarization	VERTICAL							
Radiation Pattern	OMNI-DIRECTIONAL							
Maximum Power	2 Watts							

1.2 Mechanical Spec.

Mechanical Spec.	
Connector	CONTACT PIN TYPE
Overall length	See drawing
Operation Temperature	-30℃ ~ +80℃
Weight	0.9 g

2. Test Equipment

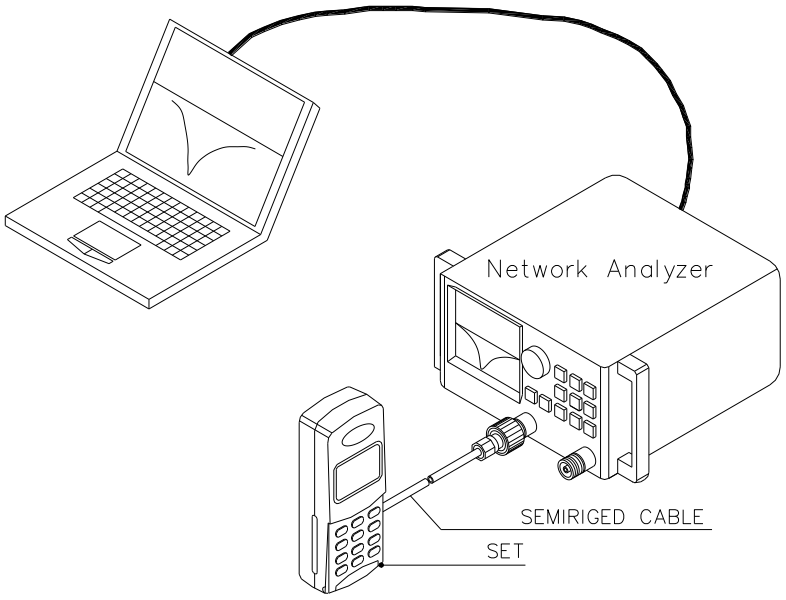
The test equipments for antenna are as follows

- ♦ Network Analyzer (Agilent 8753ES) to measure the V.S.W.R and impedance of antenna
- ♦ Spectrum Analyzer to measure the receiving signal intensity
- ♦ Standard Horn antenna that is adjustable in the Cellular band
- ♦ Standard Horn antenna that is adjustable in the US-PCS band
- ♦ Anechoic Chamber installed the cables, connectors and equipments for measurement
- ♦ Dogmatic Caliper to measure the dimensions
- ♦ Torque Driver to measure the torque force of the helix
- ♦ Push/Pull gauge to measure the pulling force
- ♦ Climatic Chamber for environmental test

3. Electrical Demands

3.1 V.S.W.R

The V.S.W.R characteristics must satisfy the electrical demands. The V.S.W.R of antenna must be less than 4.0:1(824 ~ 894MHz) at Cellular, 4.0:1(1850 ~ 1990MHz) at US-PCS band on the free space.

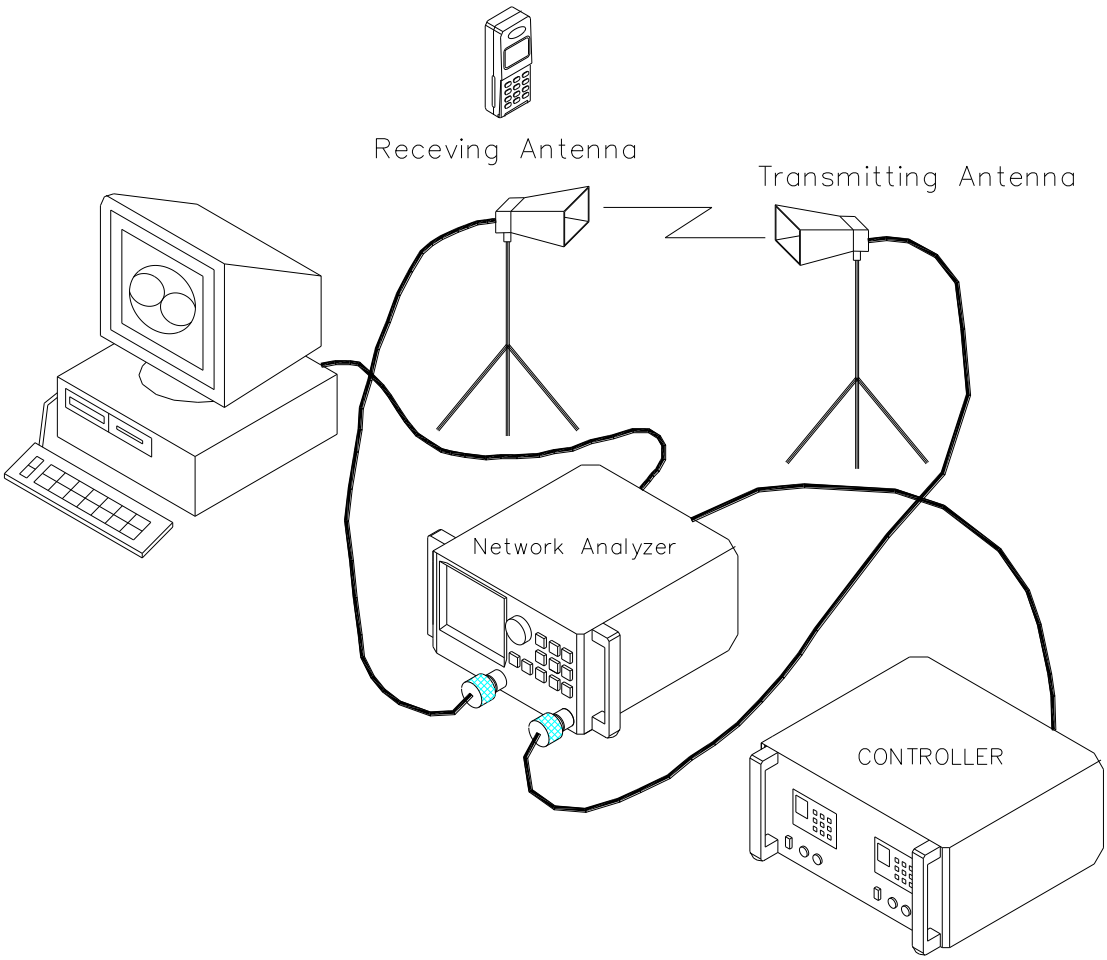


3.2 Radiation Pattern

The radiation pattern must have the omni-directional characteristic in Cellular/PCS Band and H-PLANE.

3.3 Gain

The gain is expressed as dBi that standardizes the half-wave length dipole antenna. The minimum Gain(E2 plane) of antenna must be bigger than –15.5dBi, in Cellular, -3.0dBi, in US-PCS band.



4. Environmental Demands

4.1 Operation Temperature Test

- Test A: Place the antennas for testing in chamber. The chamber condition should be as follows:

1hours at -20℃

- 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℃

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

4.2 Humidity Test

- Test: Place the antennas for testing in chamber. The chamber condition should be as follows:

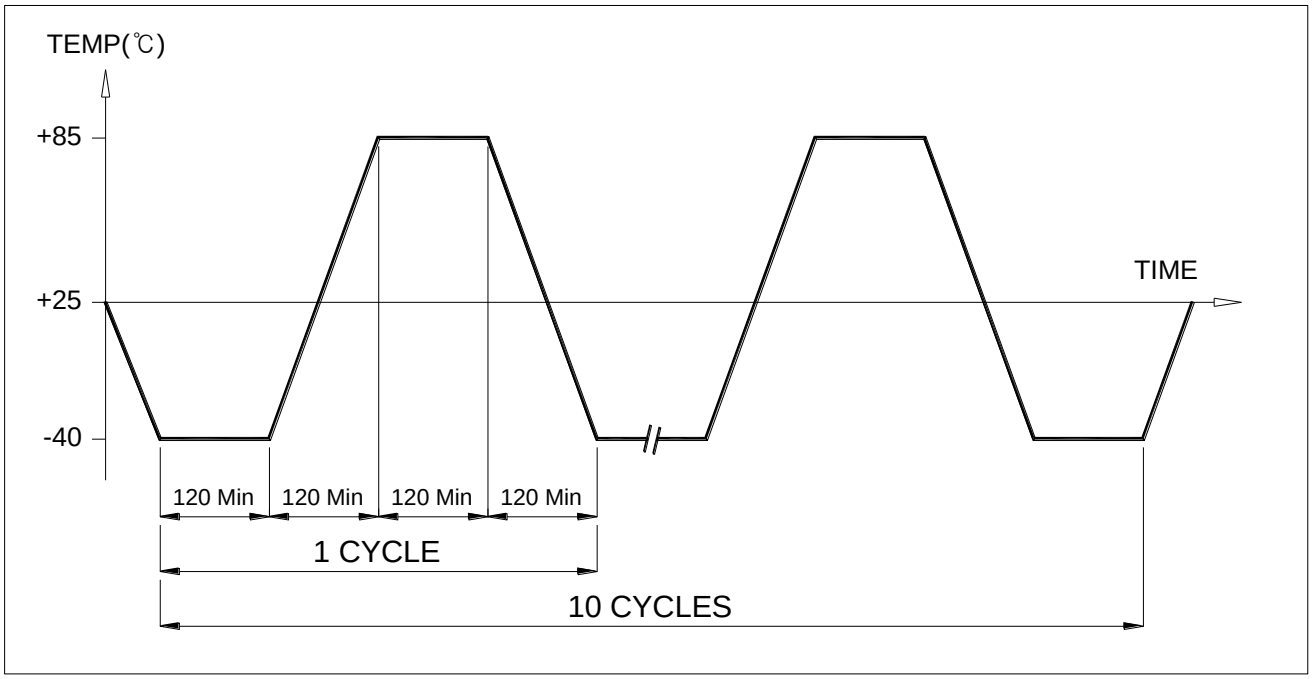
24hours at +55℃, Relative humidity is 95%.

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

4.3 Temperature Cycling Test

The antenna shall withstand 10 repeated cycles of 120 minutes at -40℃ and 120 minutes at +85℃ with a maximum transition time between temperature extremes of 120 minutes.

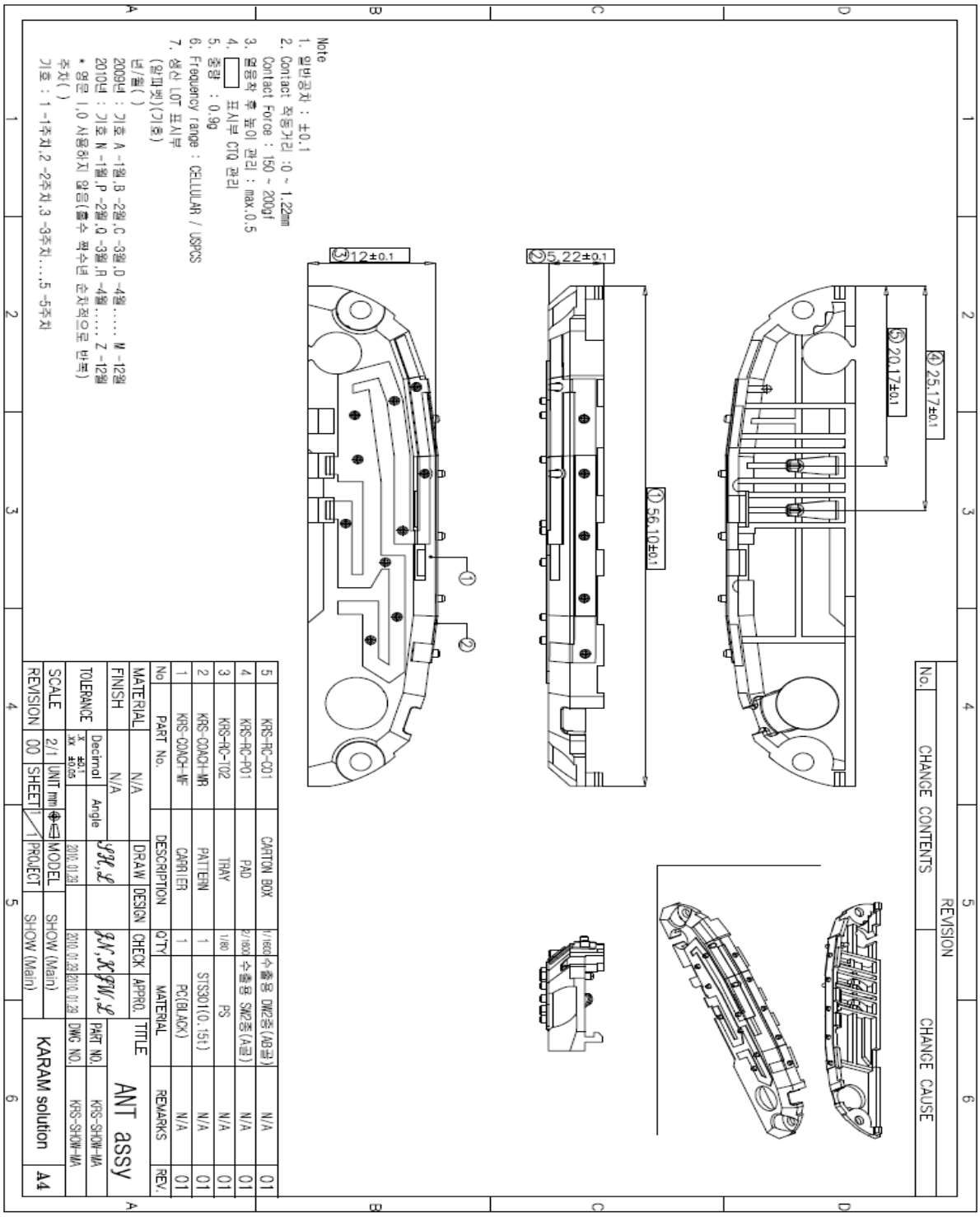
After the test, no visual deterioration shall occur. After the test, the antenna shall satisfy the electrical demands.



4.4 Salt spray Test

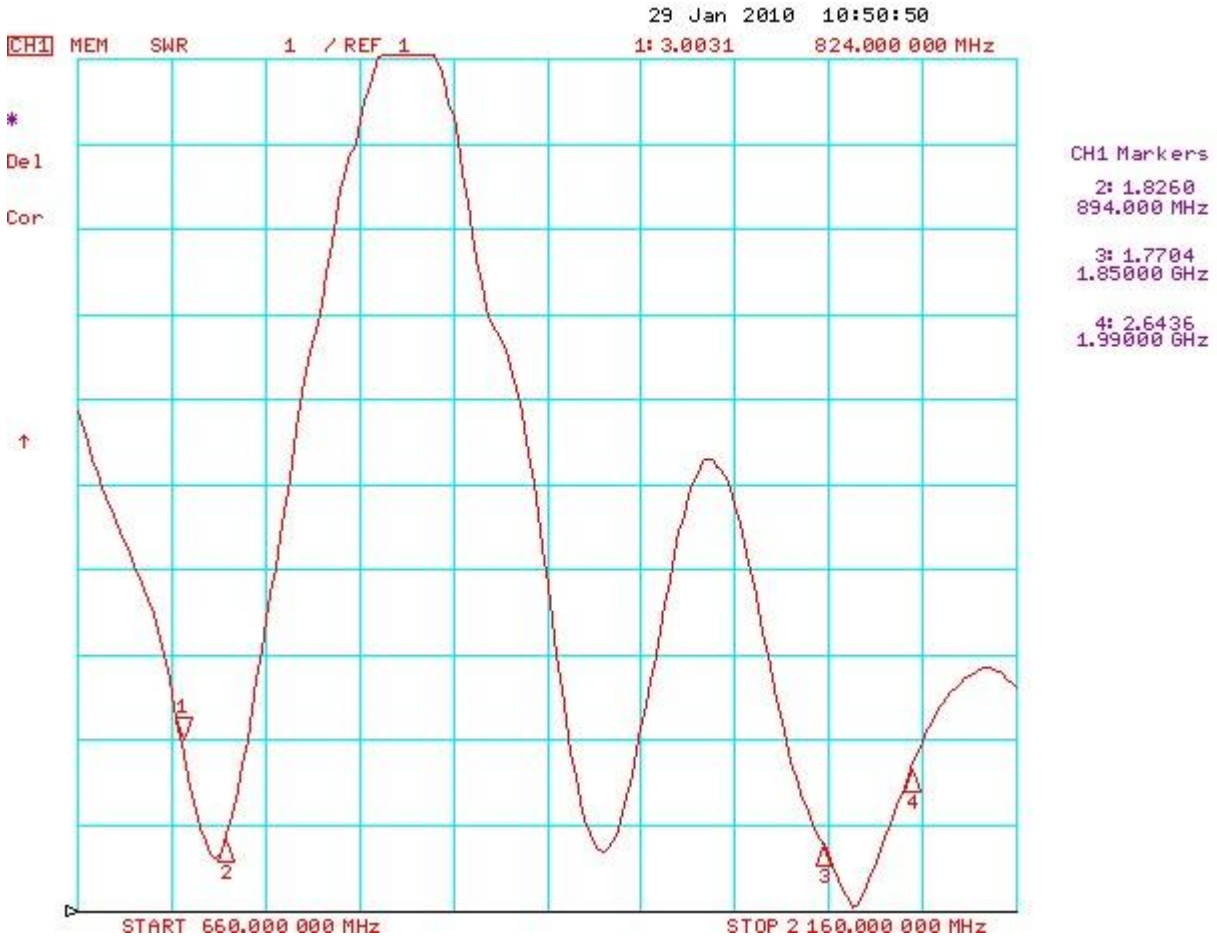
In salt fog chamber, expose test antennas to a 35℃, 5% salt fog atmosphere for 48 hours. After the test, the antenna shall be continued. The antenna shall satisfy the electrical demands.

5. Antenna Drawing

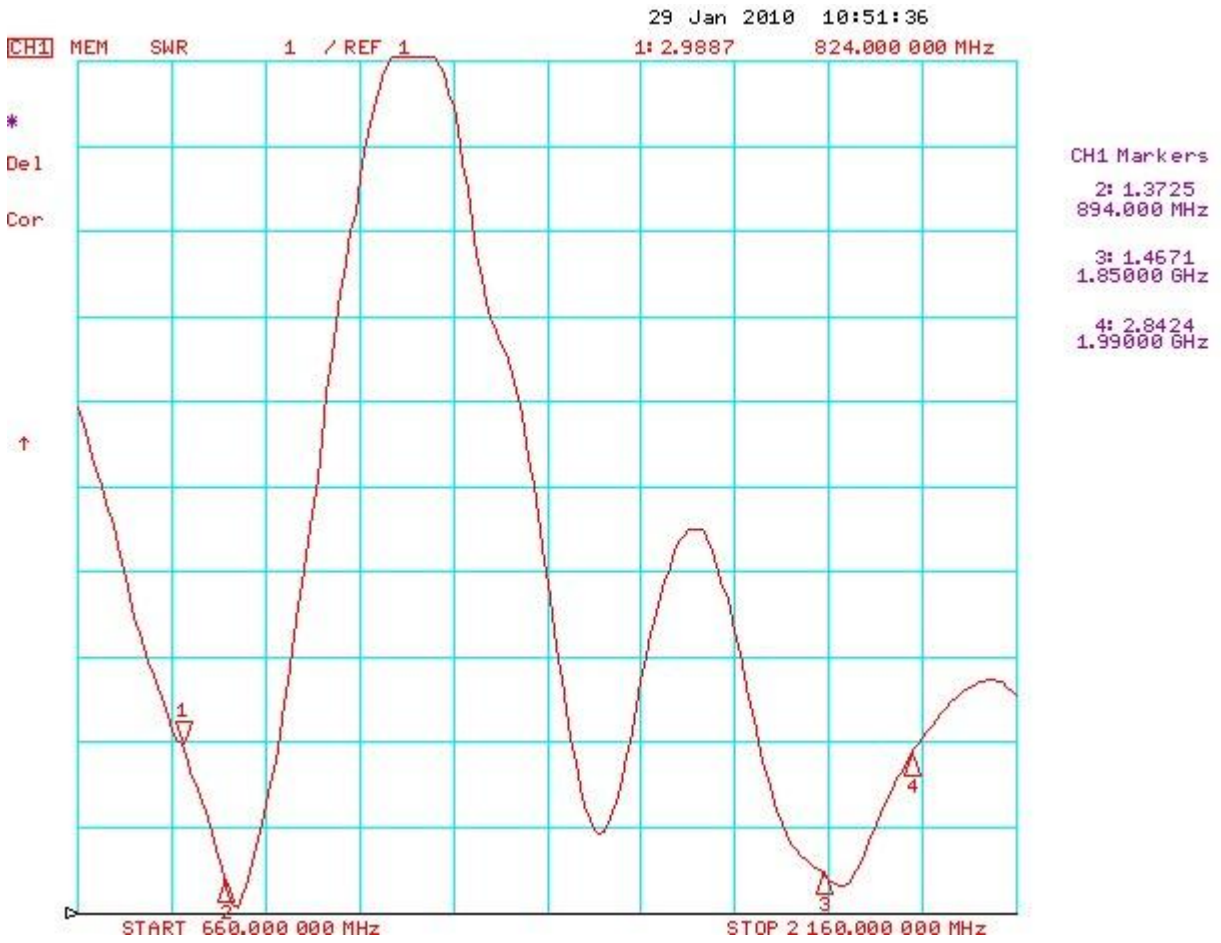


6. Electrical data

6.1 V.S.W.R

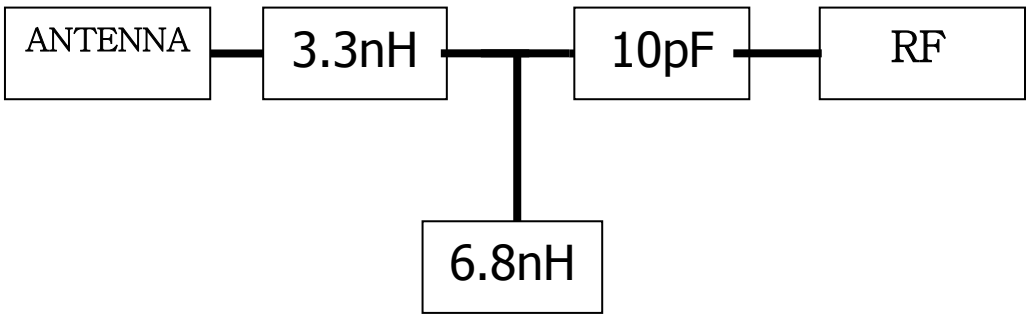


[Slide Down]

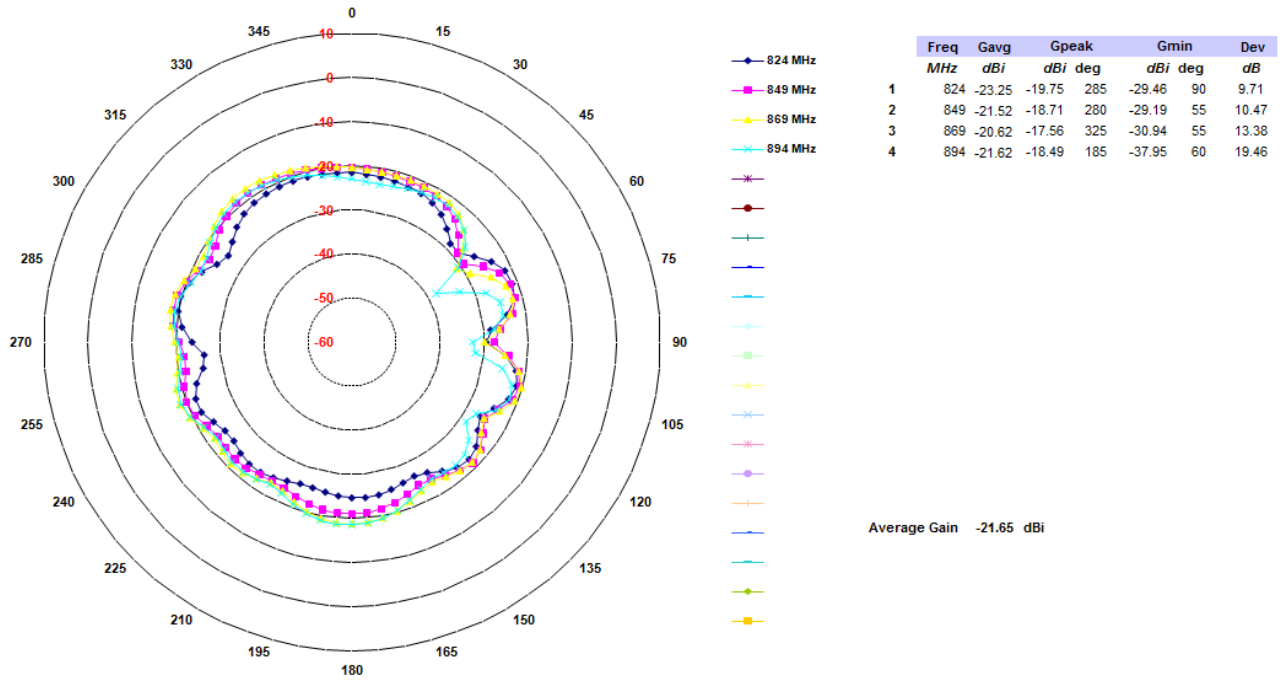


[Slide Up]

→ Matching Network



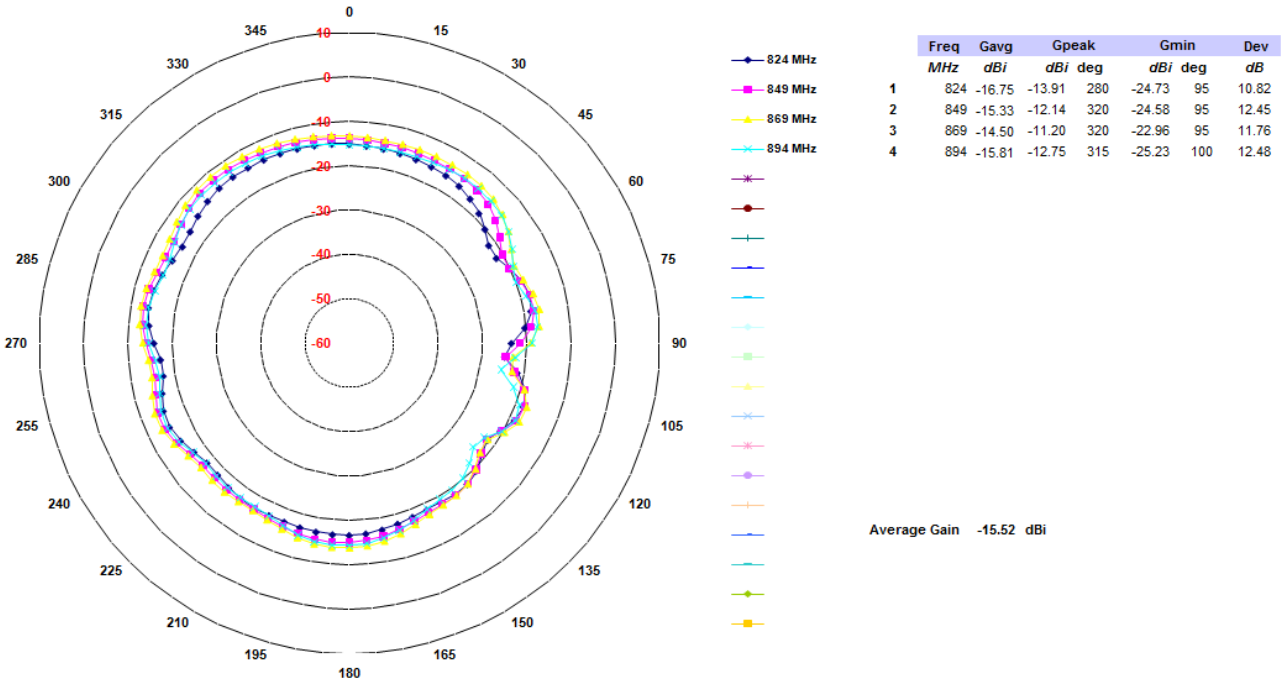
6.2 GAIN (With Matching Circuit)



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-23.25	-19.75	285	-29.46	90	9.71
2	849	-21.52	-18.71	280	-29.19	55	10.47
3	869	-20.62	-17.56	325	-30.94	55	13.38
4	894	-21.62	-18.49	185	-37.95	60	19.46

Average Gain -21.65 dBi

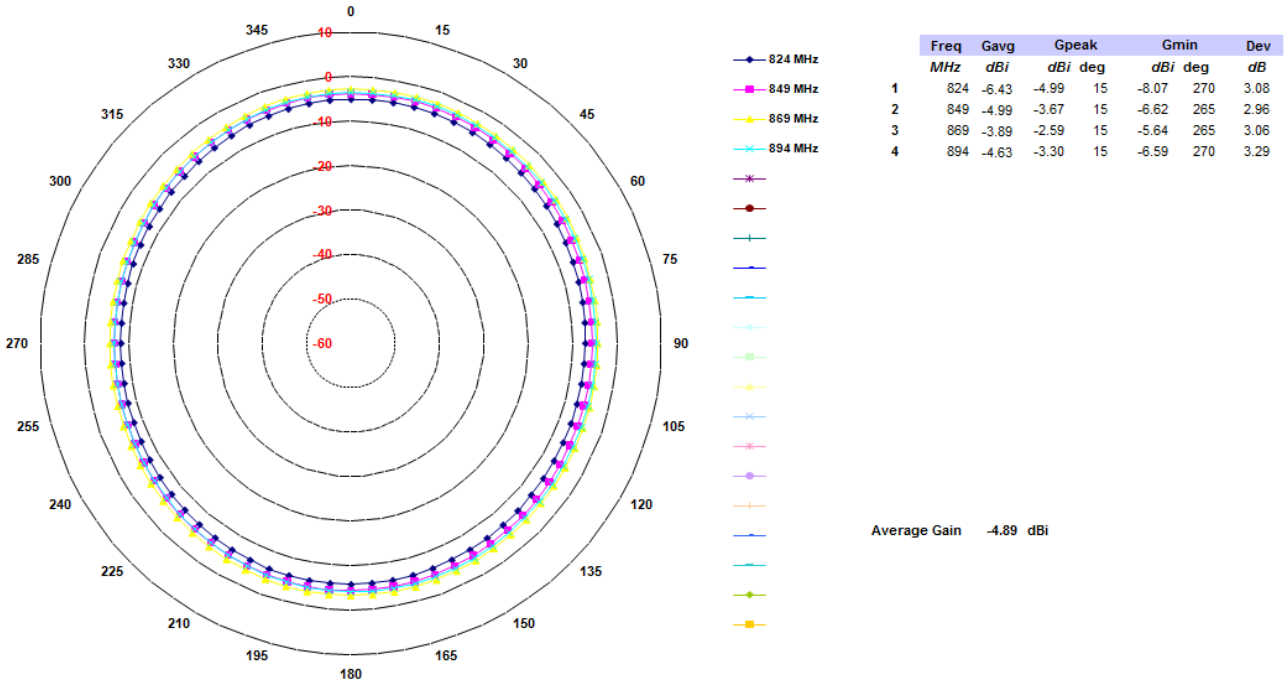
[Cellular Band : Slide Down E1-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-16.75	-13.91	280	-24.73	95	10.82
2	849	-15.33	-12.14	320	-24.58	95	12.45
3	869	-14.50	-11.20	320	-22.96	95	11.76
4	894	-15.81	-12.75	315	-25.23	100	12.48

Average Gain -15.52 dBi

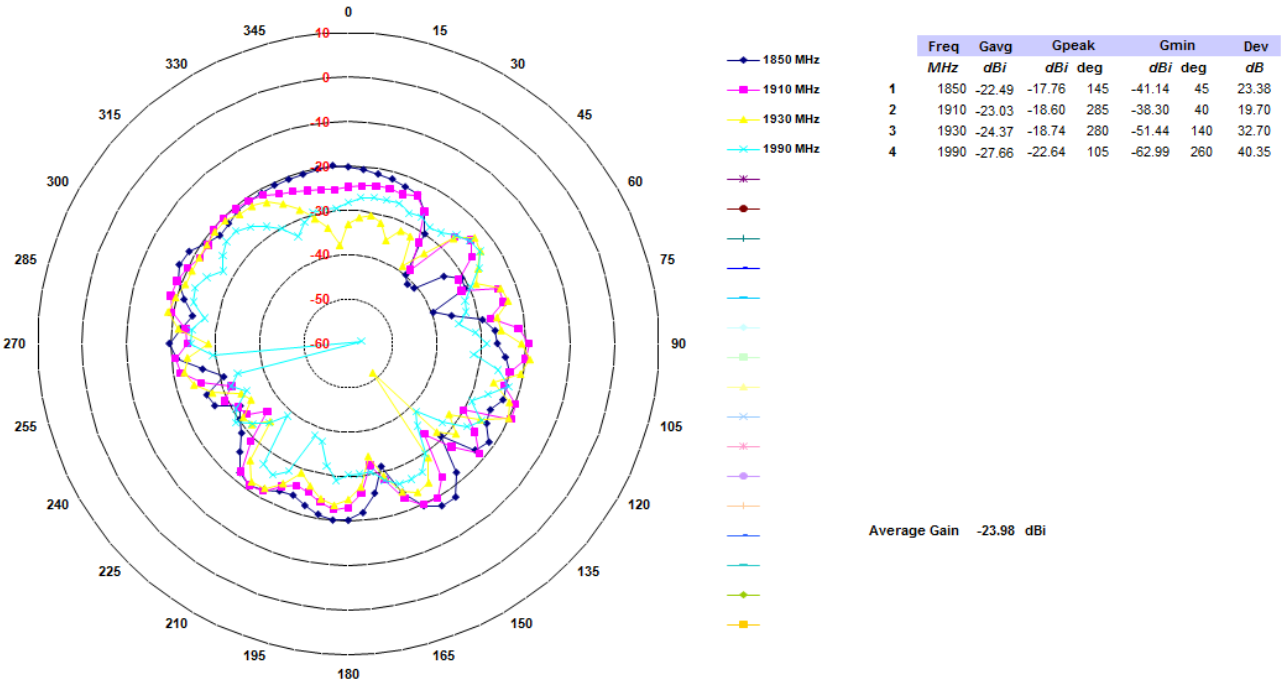
[Cellular Band : Slide Down E2-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-6.43	-4.99	15	-8.07	270	3.08
2	849	-4.99	-3.67	15	-6.62	265	2.96
3	869	-3.89	-2.59	15	-5.64	265	3.06
4	894	-4.63	-3.30	15	-6.59	270	3.29

Average Gain -4.89 dBi

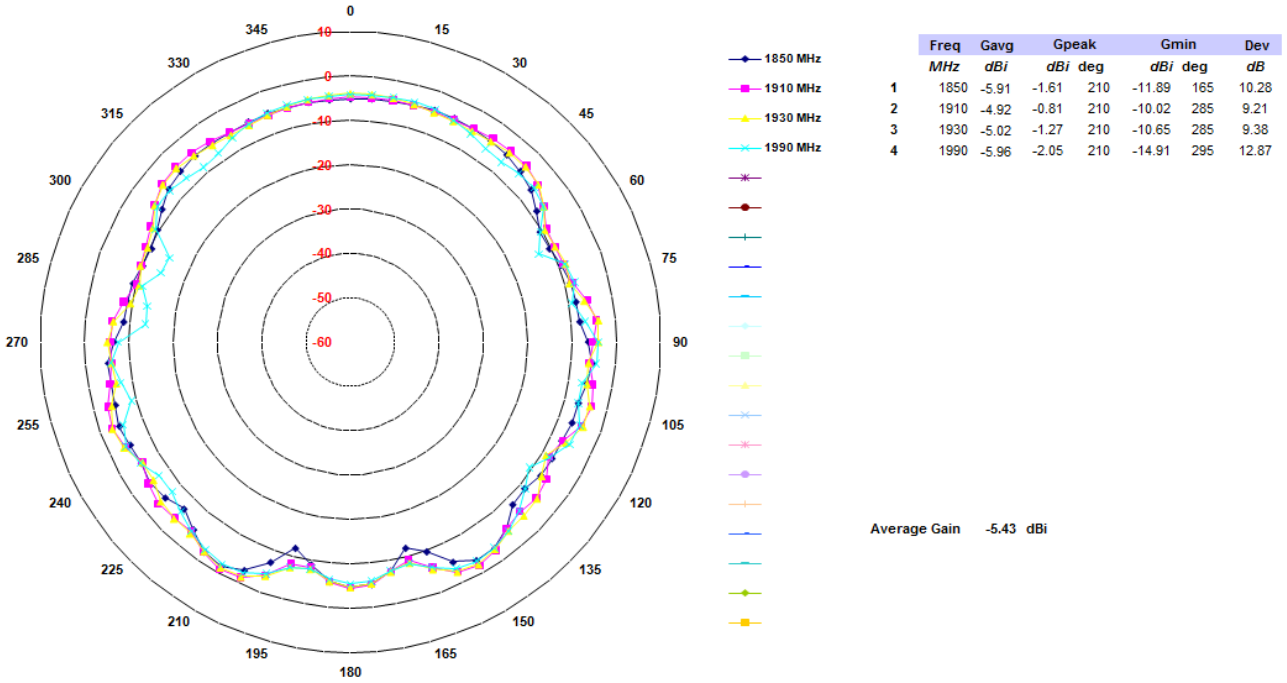
[Cellular Band : Slide Down H-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-22.49	-17.76	145	-41.14	45	23.38
2	1910	-23.03	-18.60	285	-38.30	40	19.70
3	1930	-24.37	-18.74	280	-51.44	140	32.70
4	1990	-27.66	-22.64	105	-62.99	260	40.35

Average Gain -23.98 dBi

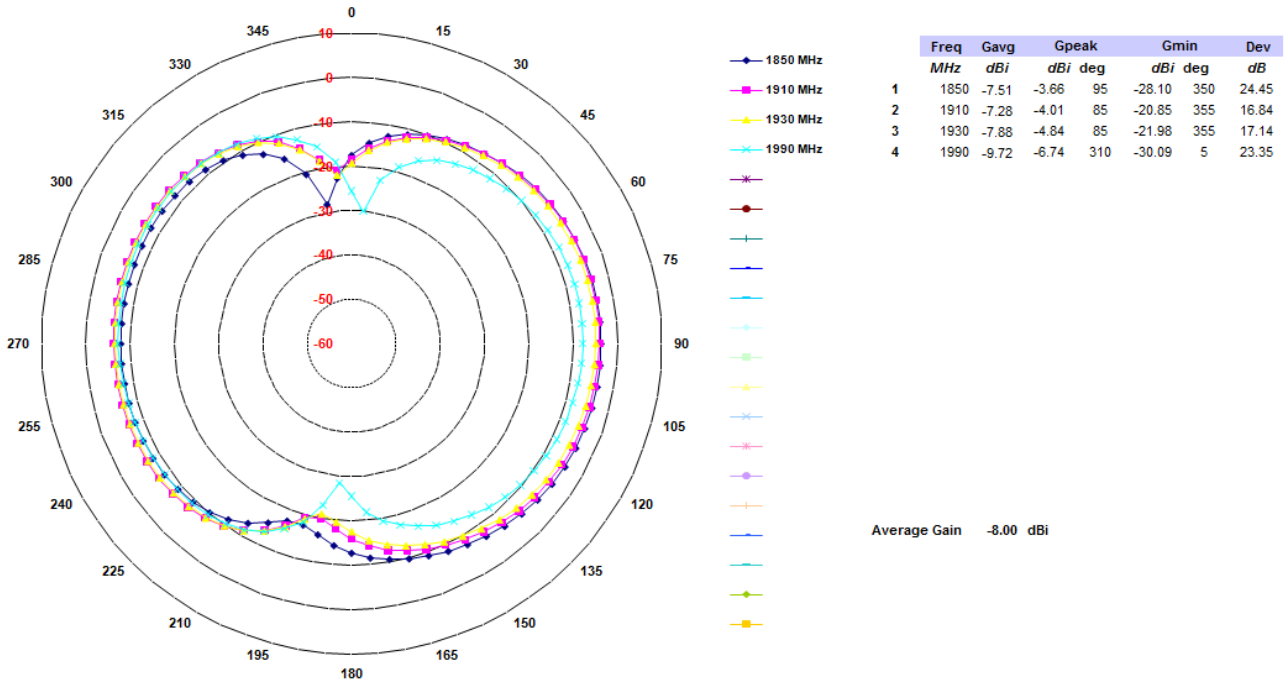
[US-PCS Band : Slide Down E1-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-5.91	-1.61	210	-11.89	165	10.28
2	1910	-4.92	-0.81	210	-10.02	285	9.21
3	1930	-5.02	-1.27	210	-10.65	285	9.38
4	1990	-5.96	-2.05	210	-14.91	295	12.87

Average Gain -5.43 dBi

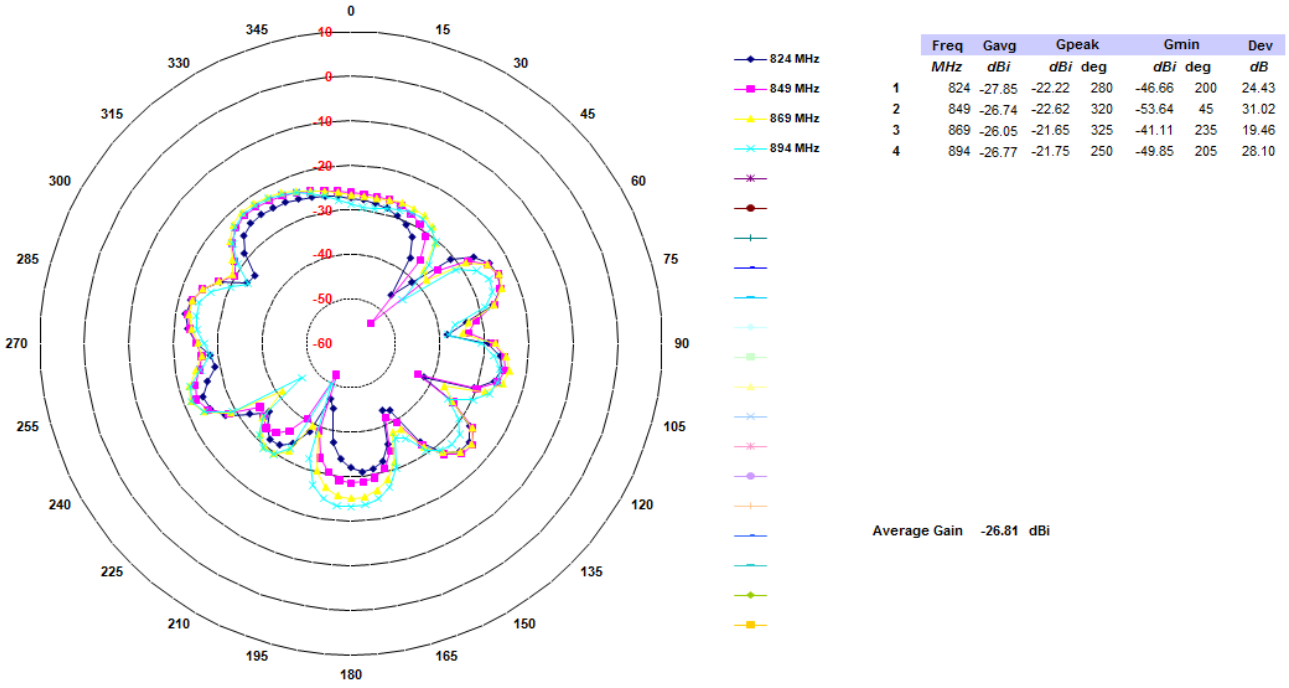
[US-PCS Band : Slide Down E2-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-7.51	-3.66	95	-28.10	350	24.45
2	1910	-7.28	-4.01	85	-20.85	355	16.84
3	1930	-7.88	-4.84	85	-21.98	355	17.14
4	1990	-9.72	-6.74	310	-30.09	5	23.35

Average Gain -8.00 dBi

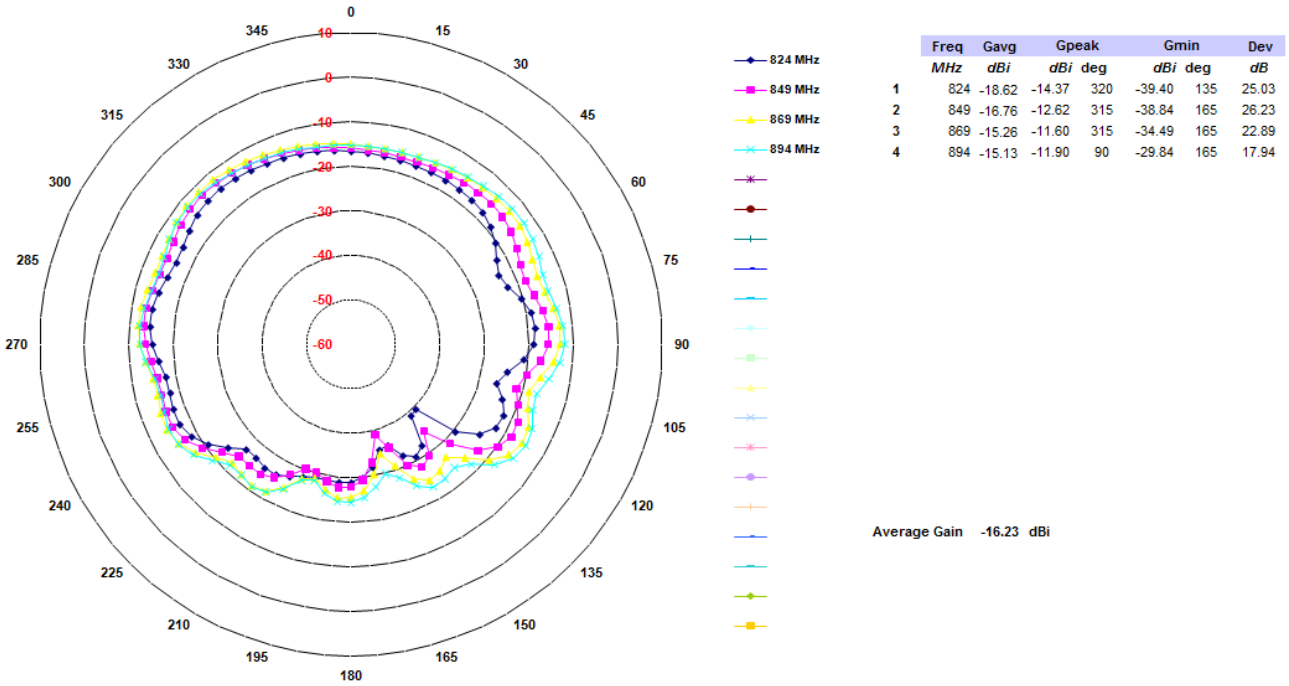
[US-PCS Band : Slide Down H-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-27.85	-22.22	280	-46.66	200	24.43
2	849	-26.74	-22.62	320	-53.64	45	31.02
3	869	-26.05	-21.65	325	-41.11	235	19.46
4	894	-26.77	-21.75	250	-49.85	205	28.10

Average Gain -26.81 dBi

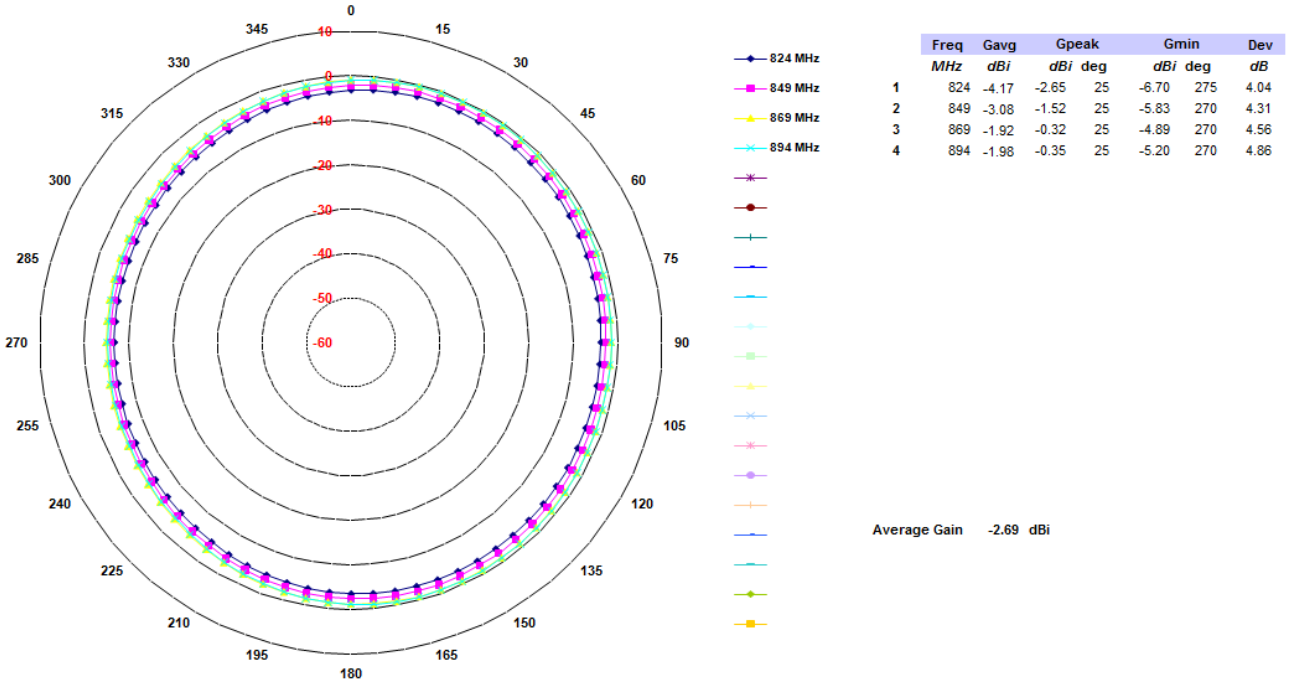
[Cellular Band : Slide Up E1-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-18.62	-14.37	320	-39.40	135	25.03
2	849	-16.76	-12.62	315	-38.84	165	26.23
3	869	-15.26	-11.60	315	-34.49	165	22.89
4	894	-15.13	-11.90	90	-29.84	165	17.94

Average Gain -16.23 dBi

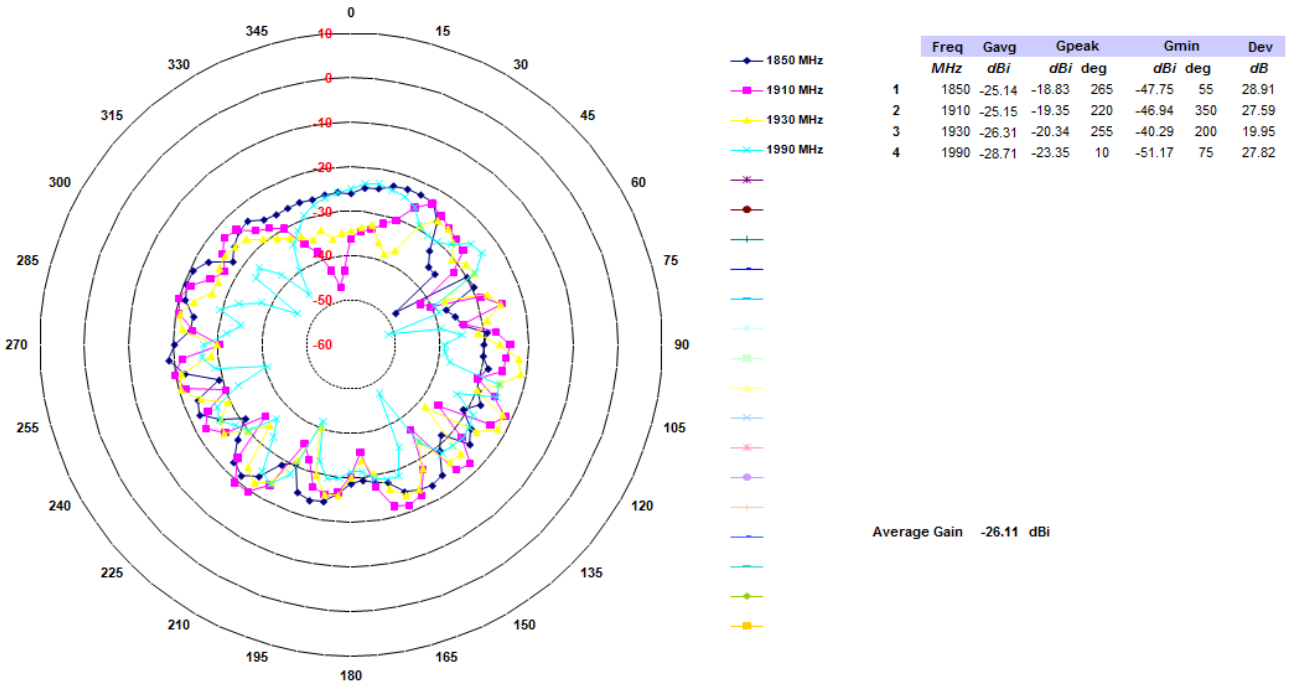
[Cellular Band : Slide Up E2-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	824	-4.17	-2.65	25	-6.70	275	4.04
2	849	-3.08	-1.52	25	-5.83	270	4.31
3	869	-1.92	-0.32	25	-4.89	270	4.56
4	894	-1.98	-0.35	25	-5.20	270	4.86

Average Gain -2.69 dBi

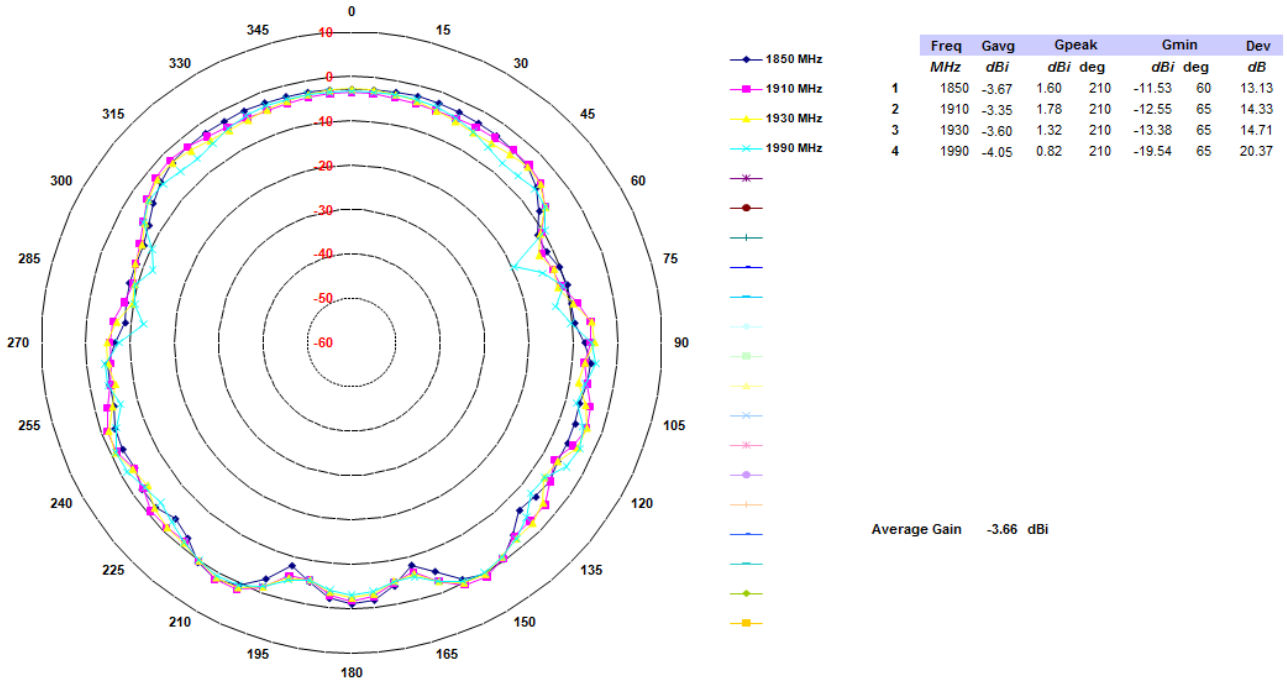
[Cellular Band : Slide Up H-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-25.14	-18.83	265	-47.75	55	28.91
2	1910	-25.15	-19.35	220	-46.94	350	27.59
3	1930	-26.31	-20.34	255	-40.29	200	19.95
4	1990	-28.71	-23.35	10	-51.17	75	27.82

Average Gain -26.11 dBi

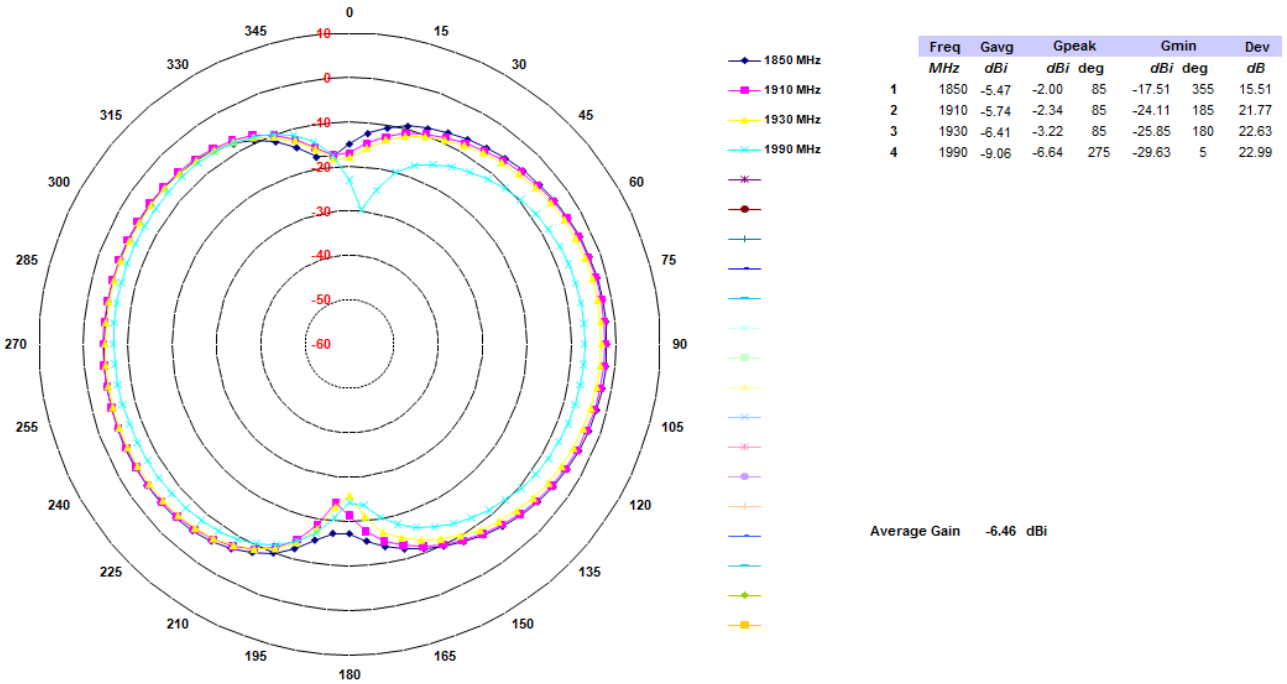
[US-PCS Band : Slide Up E1-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-3.67	1.60	210	-11.53	60	13.13
2	1910	-3.35	1.78	210	-12.55	65	14.33
3	1930	-3.60	1.32	210	-13.38	65	14.71
4	1990	-4.05	0.82	210	-19.54	65	20.37

Average Gain -3.66 dBi

[US-PCS Band : Slide Up E2-plane]



	Freq	Gavg	Gpeak		Gmin		Dev
	MHz	dBi	dBi	deg	dBi	deg	dB
1	1850	-5.47	-2.00	85	-17.51	355	15.51
2	1910	-5.74	-2.34	85	-24.11	185	21.77
3	1930	-6.41	-3.22	85	-25.85	180	22.63
4	1990	-9.06	-6.64	275	-29.63	5	22.99

Average Gain -6.46 dBi

[US-PCS Band : Slide Up H-plane]