

APPROVAL SHEET

Customer	:	PANTECH
Item	:	Revere
Description	:	Inverted F Antenna
Customer p/no	:	
Date	:	2011. 03.03

CUSTOMER'S APPROVED

A p p r o v e d			
	EN'GR	CHKD	APPD
M7 SYSTEM			
	Approval Date		
	Approval No.		
	DESC		

Rev No ;




	Cuit.	Mech.	Safety	EMI
Chkd				
Appd				



Document No.	KAT-1103-IN017P	Rev. No.	IR
Model Name	KIN-DU2-PC1052	Date	2011. 03.03
Application System	GSM850/GSM900/GSM1800/GSM1900 W850/W1900	Customer	PANTECH
Notice			
<p>DONGNAM Co., Ltd. [R&D Center] Address : 102-103, Bucheon-technopark, 364, Samjung-Dong, Ojung-Gu, Bucheon-city, Kyounggi-Do, Korea Tel : +82-32-621-1666 / Fax : +82-32-621-1670</p>			

DongNam's Approved

Project Manager : Min Kyu KIM

Investigation	Verification	Approval
		
Approval No.		
Approval Date		



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DONGNAM Co., Ltd.

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1. Revision History

Rev No.	Rev Date	Des.	Page	History	Drafter	Remarks
IR	2011. 03.03					



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2. Electrical And Mechanical Specifications

Electrical Specifications			
Frequency Range	824 MHz ~ 894 MHz / 880 MHz ~ 960 MHz 1710 MHz ~ 1880 MHz / 1850 MHz ~ 1990 MHz		
V.S.W.R	Folder Close	EGSM900	≤ 10.5
		GSM850	≤ 4.0
		DCS1800	≤ 6.5
		PCS1900	≤ 3.5
	Folder open	EGSM900	≤ 9.5
		GSM850	≤ 5.0
		DCS1800	≤ 6.0
		PCS1900	≤ 4.0
Gain(Avg.)	Folder Close	EGSM900	≥ -15.5 dBi
		GSM850	≥ -13.0 dBi
		DCS1800	≥ -13.0 dBi
		PCS1900	≥ -6.0 dBi
	Folder open	EGSM900	≥ -13.5 dBi
		GSM850	≥ -9.5 dBi
		DCS1800	≥ -10.5 dBi
		PCS1900	≥ -5.0 dBi
Nominal Impedance	50 ohm		
Radiation Pattern	Omni – Directional		
Polarization	Linear		
Power Handling	3 watts (max)		
Matching Value			

Mechanical Specifications	
Dimensions	39.46X12.23X6.56mm
Weight	1.05g
Radiator	STS304 / 0.15t
Operating Temp	-20 ~ 90 °C
Operating Humidity	0 ~ 95 %



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3 Measurement Setup

3.1 Test Equipments

Network Analyzer	HP8753E
Calibration Kit	HP85033E
Adaptor	SMA Type Female ↔ SMA male

3.2 Test Equipments Setting

Split display	On
Sweep setup	Number of points : 401
Test port power	0 dBm
Measure	Channel 1 : S11

3.3 Calibration

Calibration	Cal. Kit : 3.5mmD/E
Calibration menu	→ S11 1-Port
Open → Short → Load	
Done	



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4. Test Procedures

4.1 VSWR.

Step 1. Connect ANT port with cable included adaptor to port1 of Network analyzer.

Step 2. Point out markers on network analyzer display at

Step 3. Measurement Inspect VSWR

Step 1. Network analyzer에 측정 Cable이 달린 시료를 연결한다.

Step 2. Network analyzer에 측정하고자 하는 주파수를 display하도록 marker 한다

Step 3. 정재파 비(VSWR)를 측정한다

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4.2 Radiation pattern and Gain

Step 1. Calibrate chamber system for gain measurement using horn antenna. At the same time set up software program for chamber system control.

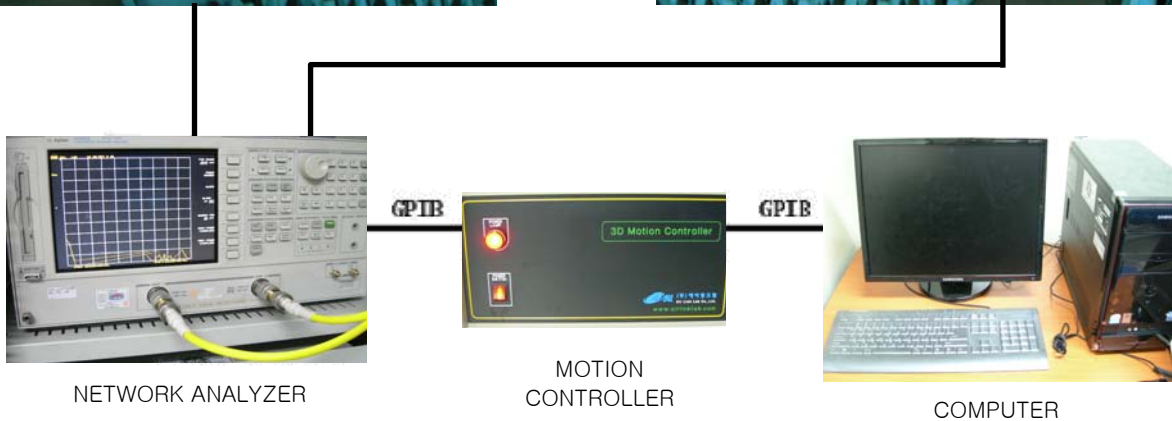
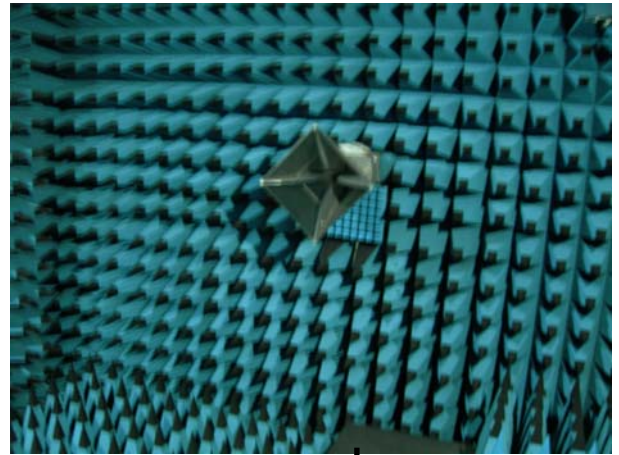
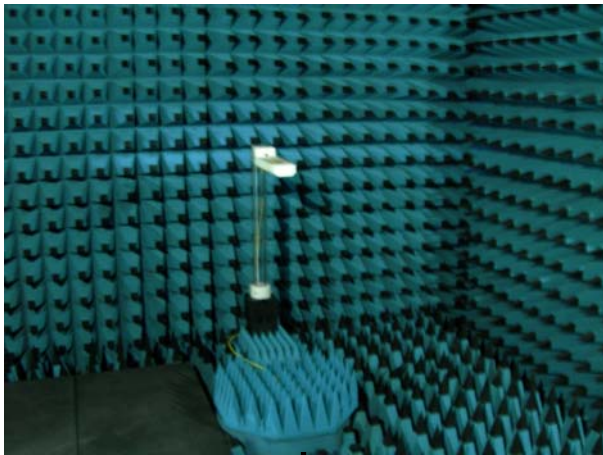
Step 2. Change over from a horn antenna to measuring antenna on target positioner.

Step 3. Start a software program for chamber system control & measuring

Step 1. Horn 안테나를 이용하여 Chamber system를 Calibration함과 동시에 Chamber system을 Control 하기 위한 software를 setup한다.

Step 2. Horn 안테나를 측정할 안테나로 교체한다.

Step 3. Gain과 효율을 측정한다.





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5. Measurement Data

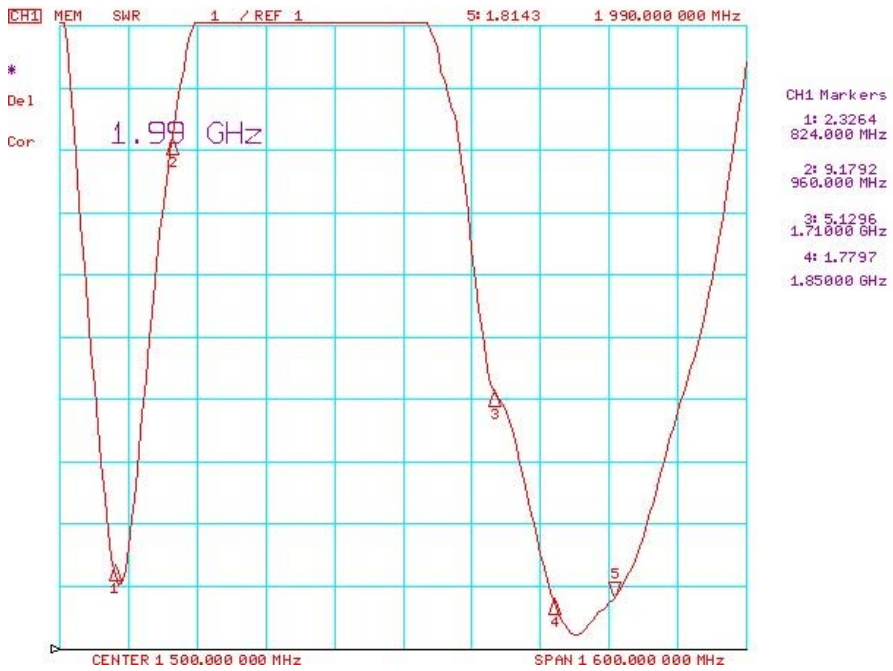
Model Name	KIN-DU2-PC1052		
Written by	Min Kyu KIM	Authorized by	YOUNGCHUN AHN
Instrument	Network Analyzer: 8753ES (HP)		
Subject	Inverted F Antenna		
Frequency	824 MHz ~ 894 MHz / 880 MHz ~ 960 MHz 1710 MHz ~ 1880 MHz / 1850 MHz ~ 1990 MHz		

Items		Spec		Test Result (#1)
Frequency		824 MHz ~ 894 MHz / 880 MHz ~ 960 MHz 1710 MHz ~ 1880 MHz / 1850 MHz ~ 1990 MHz		O.K
V.S.W.R	Folder Close	EGSM900	≤ 10.5	O.K
		GSM850	≤ 4.0	O.K
		DCS1800	≤ 6.5	O.K
		PCS1900	≤ 3.5	O.K
	Folder open	EGSM900	≤ 9.5	O.K
		GSM850	≤ 5.0	O.K
		DCS1800	≤ 6.0	O.K
		PCS1900	≤ 4.0	O.K
Gain(Avg.)	Folder Close	EGSM900	≥ -15.5 dBi	O.K
		GSM850	≥ -13.0 dBi	O.K
		DCS1800	≥ -13.0 dBi	O.K
		PCS1900	≥ -6.0 dBi	O.K
	Folder open	EGSM900	≥ -13.5 dBi	O.K
		GSM850	≥ -9.5 dBi	O.K
		DCS1800	≥ -10.5 dBi	O.K
		PCS1900	≥ -5.0 dBi	O.K
Polarization		Linear		Linear

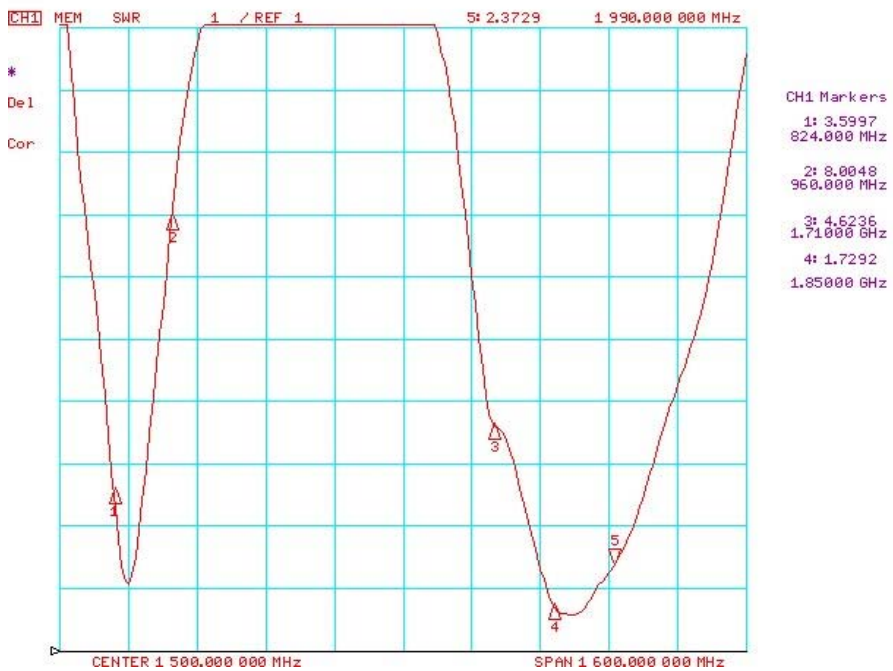
	Document No. KAT-1103-IN017P	Model Name KIN-DU2-PC1052	Rev. No. IR
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5.1 SWR

Folder Close



Folder Open

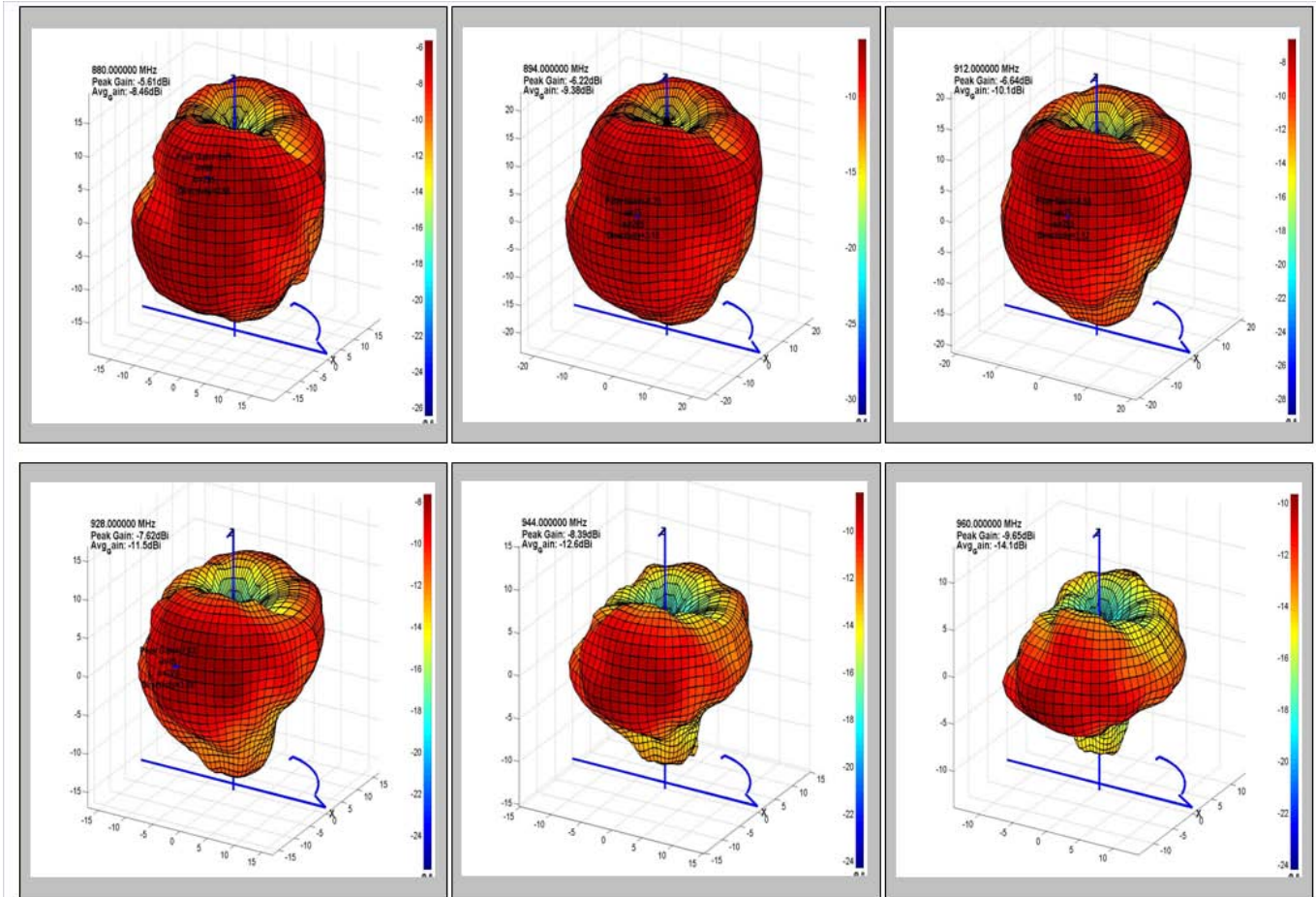


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5.2 Gain & Pattern

Folder Close

EGSM900

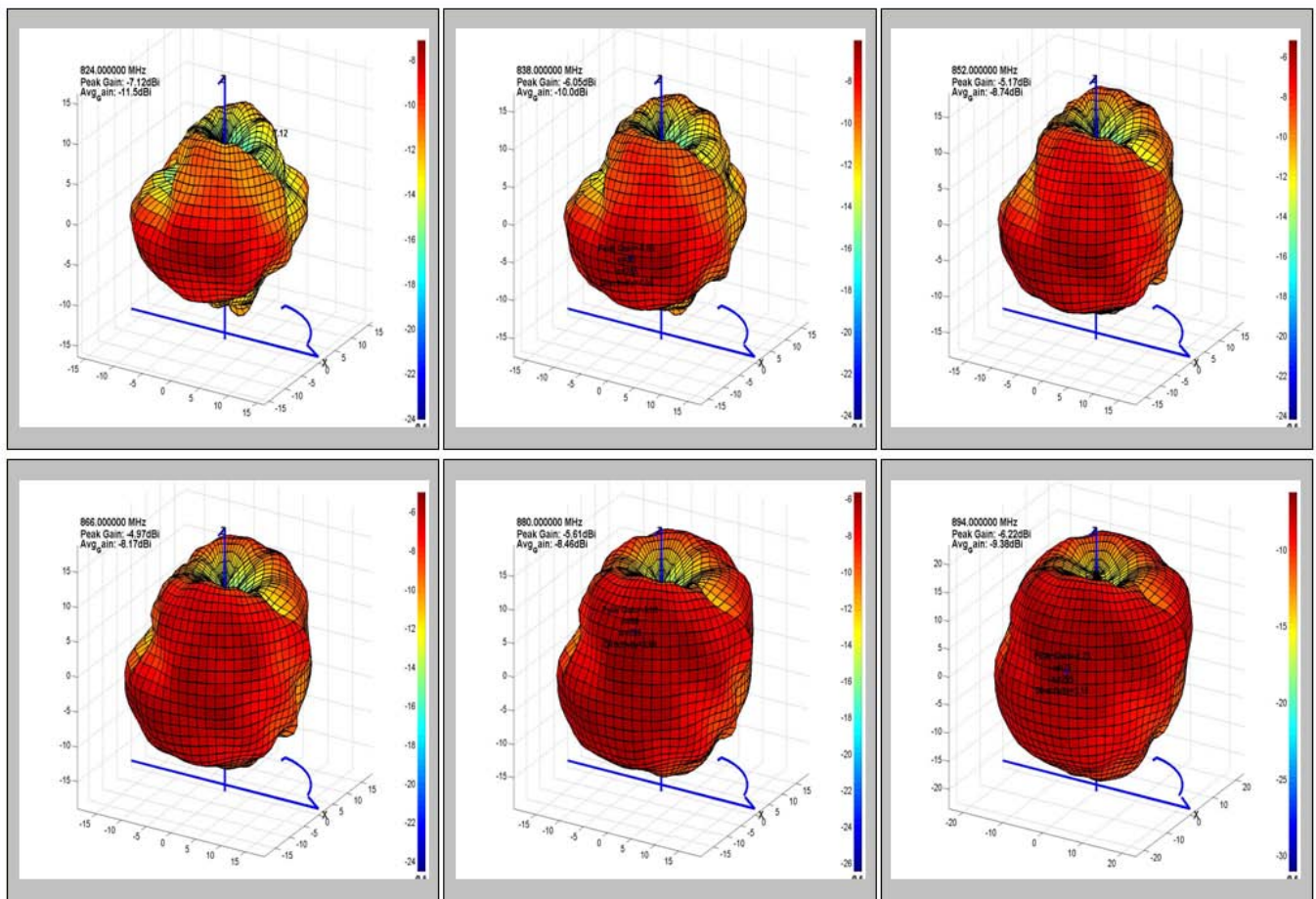


Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
880.000000 MHz	14.2 %	-17.8 dBi	-9.0 dBi	-8.5 dBi	-9.6 dBi	-6.1 dBi	-5.6 dBi	Theta60/Pie285	2.86 dB
894.000000 MHz	11.5 %	-19.3 dBi	-9.8 dBi	-9.4 dBi	-11.1 dBi	-6.7 dBi	-6.2 dBi	Theta75/Pie285	3.15 dB
912.000000 MHz	9.6 %	-20.2 dBi	-10.6 dBi	-10.2 dBi	-12.7 dBi	-7.0 dBi	-6.6 dBi	Theta75/Pie285	3.52 dB
928.000000 MHz	7.1 %	-21.7 dBi	-12.0 dBi	-11.5 dBi	-14.7 dBi	-7.9 dBi	-7.6 dBi	Theta75/Pie270	3.89 dB
944.000000 MHz	5.4 %	-22.9 dBi	-13.1 dBi	-12.7 dBi	-16.5 dBi	-8.9 dBi	-8.4 dBi	Theta90/Pie120	4.26 dB
960.000000 MHz	3.8 %	-24.3 dBi	-14.6 dBi	-14.2 dBi	-17.1 dBi	-9.9 dBi	-9.7 dBi	Theta90/Pie120	4.52 dB



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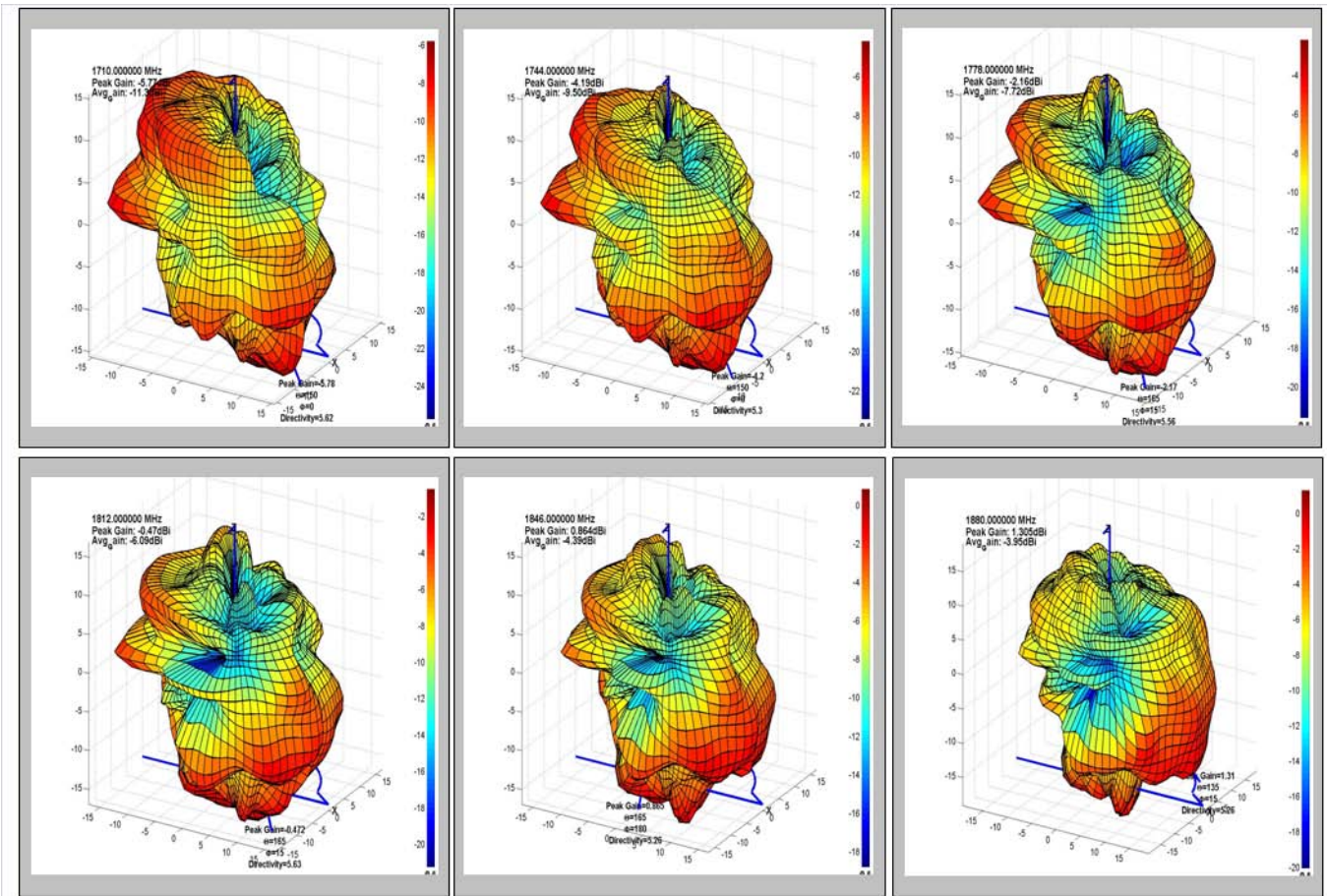
GSM850



Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
824.000000 MHz	7.0 %	-20.3 dBi	-12.2 dBi	-11.6 dBi	-14.9 dBi	-7.5 dBi	-7.1 dBi	Theta90/Pie105	4.43 dB
838.000000 MHz	9.8 %	-18.7 dBi	-10.7 dBi	-10.1 dBi	-13.0 dBi	-6.4 dBi	-6.1 dBi	Theta90/Pie285	4.04 dB
852.000000 MHz	13.3 %	-17.4 dBi	-9.4 dBi	-8.7 dBi	-11.8 dBi	-5.6 dBi	-5.2 dBi	Theta90/Pie105	3.57 dB
866.000000 MHz	15.2 %	-17.0 dBi	-8.8 dBi	-8.2 dBi	-9.1 dBi	-5.5 dBi	-5.0 dBi	Theta90/Pie105	3.20 dB
880.000000 MHz	14.2 %	-17.8 dBi	-9.0 dBi	-8.5 dBi	-9.6 dBi	-6.1 dBi	-5.6 dBi	Theta60/Pie285	2.86 dB
894.000000 MHz	11.5 %	-19.3 dBi	-9.8 dBi	-9.4 dBi	-11.1 dBi	-6.7 dBi	-6.2 dBi	Theta75/Pie285	3.15 dB

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DCS1800

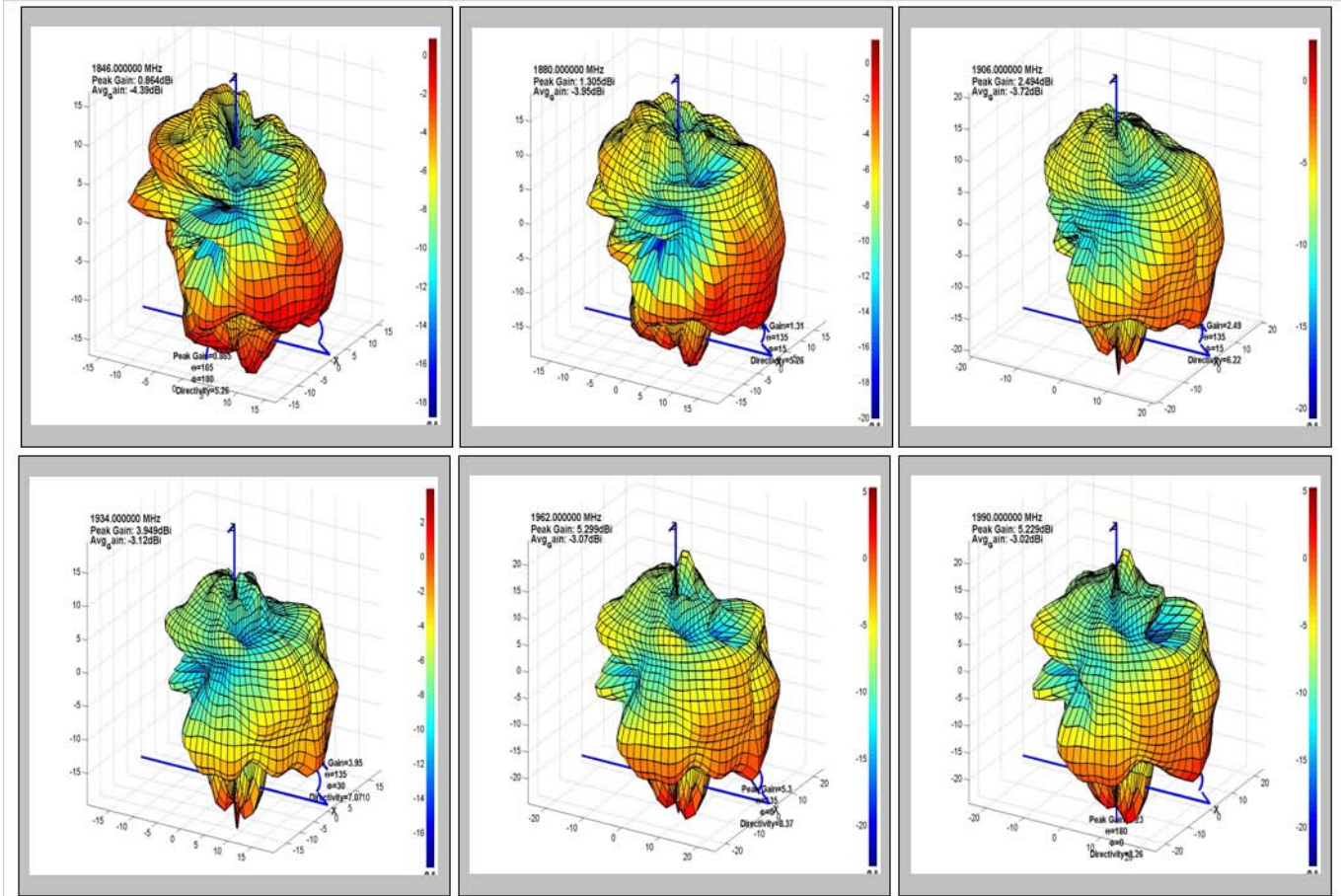


Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
1710.000000 MHz	7.3 %	-17.0 dBi	-12.8 dBi	-11.4 dBi	-10.1 dBi	-6.9 dBi	-5.8 dBi	Theta150/Pie0	5.62 dB
1744.000000 MHz	11.2 %	-14.9 dBi	-11.0 dBi	-9.5 dBi	-7.7 dBi	-4.5 dBi	-4.2 dBi	Theta150/Pie0	5.30 dB
1778.000000 MHz	16.9 %	-13.2 dBi	-9.2 dBi	-7.7 dBi	-5.5 dBi	-2.4 dBi	-2.2 dBi	Theta165/Pie15	5.56 dB
1812.000000 MHz	24.6 %	-11.8 dBi	-7.5 dBi	-6.1 dBi	-3.7 dBi	-0.8 dBi	-0.5 dBi	Theta165/Pie15	5.63 dB
1846.000000 MHz	36.4 %	-10.4 dBi	-5.6 dBi	-4.4 dBi	-2.6 dBi	0.4 dBi	0.9 dBi	Theta165/Pie180	5.26 dB
1880.000000 MHz	40.2 %	-10.5 dBi	-5.0 dBi	-4.0 dBi	-2.9 dBi	0.9 dBi	1.3 dBi	Theta135/Pie15	5.26 dB



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PCS1900



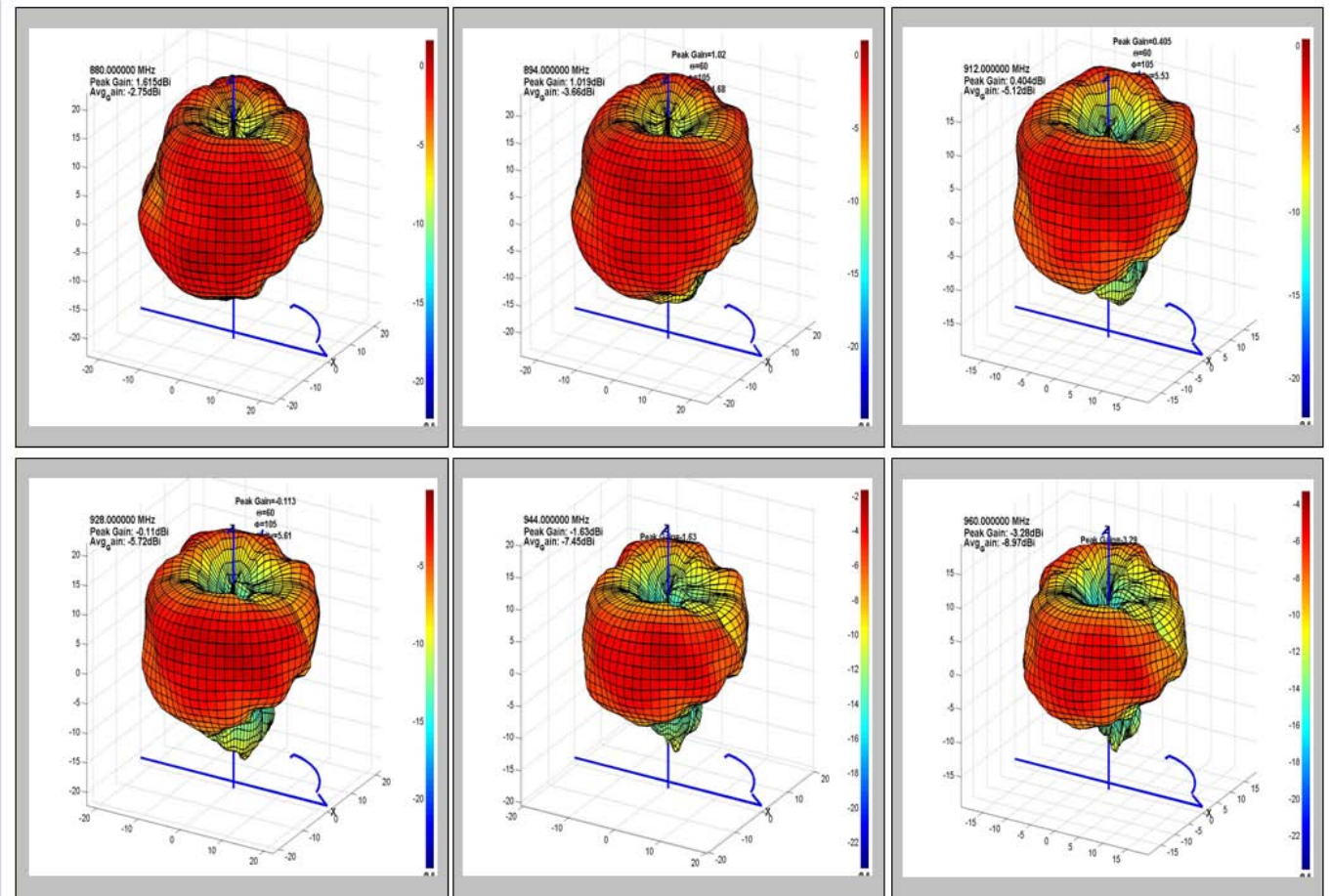
Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
1846.000000 MHz	36.4 %	-10.4 dBi	-5.6 dBi	-4.4 dBi	-2.6 dBi	0.4 dBi	0.9 dBi	Theta165/Pie180	5.26 dB
1880.000000 MHz	40.2 %	-10.5 dBi	-5.0 dBi	-4.0 dBi	-2.9 dBi	0.9 dBi	1.3 dBi	Theta135/Pie15	5.26 dB
1906.000000 MHz	42.4 %	-10.2 dBi	-4.8 dBi	-3.7 dBi	-1.7 dBi	2.1 dBi	2.5 dBi	Theta135/Pie15	6.22 dB
1934.000000 MHz	48.7 %	-8.8 dBi	-4.5 dBi	-3.1 dBi	0.8 dBi	3.5 dBi	3.9 dBi	Theta135/Pie30	7.07 dB
1962.000000 MHz	49.3 %	-8.0 dBi	-4.7 dBi	-3.1 dBi	1.7 dBi	3.9 dBi	5.3 dBi	Theta135/Pie0	8.37 dB
1990.000000 MHz	49.8 %	-7.7 dBi	-4.8 dBi	-3.0 dBi	2.2 dBi	4.1 dBi	5.2 dBi	Theta180/Pie0	8.26 dB



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Folder Open

EGSM900

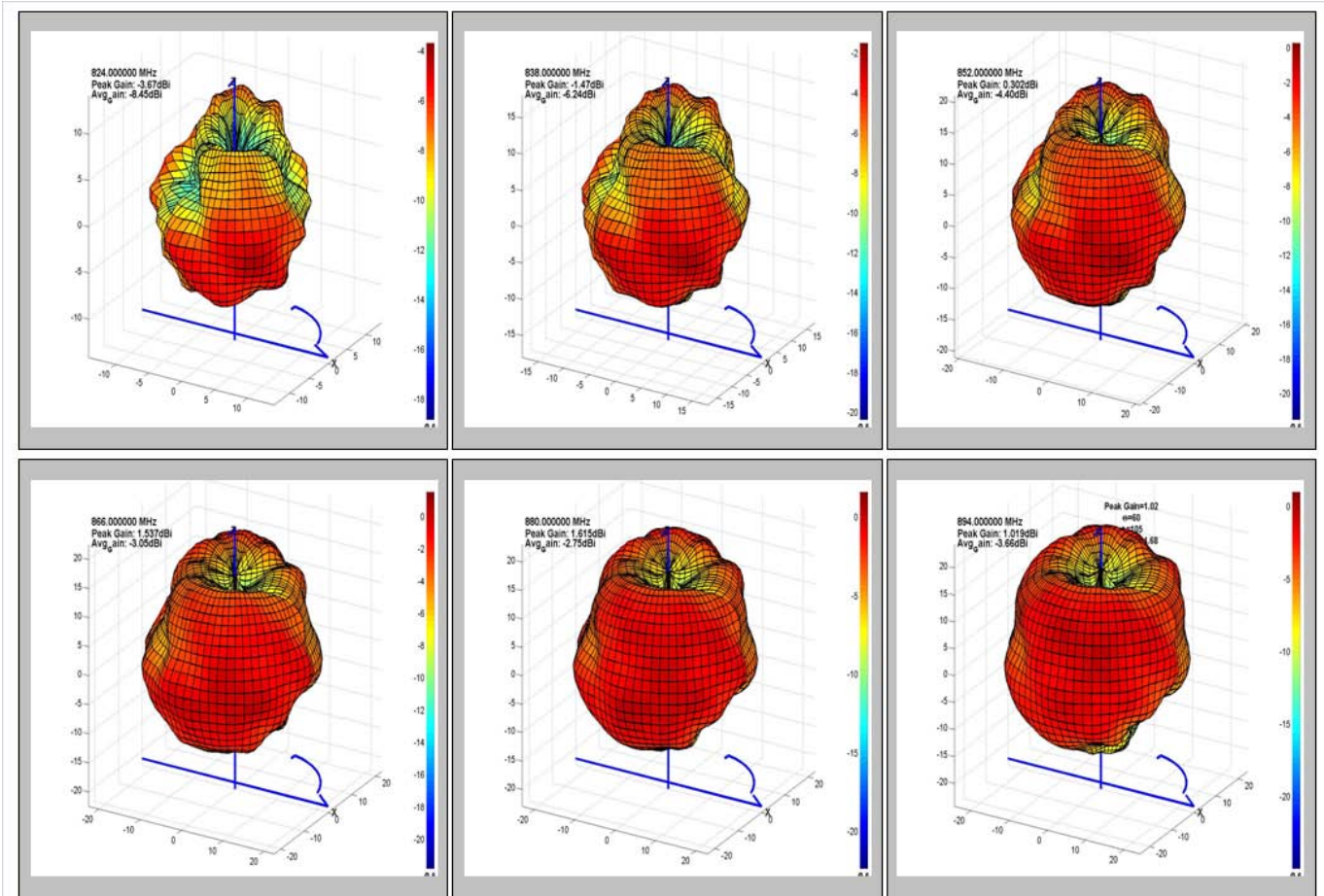


Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
880.000000 MHz	53.0 %	-11.1 dBi	-3.4 dBi	-2.8 dBi	-4.5 dBi	1.0 dBi	1.6 dBi	Theta90/Pie120	4.37 dB
894.000000 MHz	43.0 %	-12.0 dBi	-4.3 dBi	-3.7 dBi	-5.5 dBi	0.9 dBi	1.0 dBi	Theta60/Pie105	4.68 dB
912.000000 MHz	30.7 %	-13.2 dBi	-5.9 dBi	-5.1 dBi	-6.9 dBi	0.3 dBi	0.4 dBi	Theta60/Pie105	5.53 dB
928.000000 MHz	26.8 %	-13.5 dBi	-6.5 dBi	-5.7 dBi	-7.3 dBi	-0.2 dBi	-0.1 dBi	Theta60/Pie105	5.61 dB
944.000000 MHz	18.0 %	-15.0 dBi	-8.3 dBi	-7.5 dBi	-8.6 dBi	-1.9 dBi	-1.6 dBi	Theta75/Pie120	5.82 dB
960.000000 MHz	12.7 %	-16.3 dBi	-9.9 dBi	-9.0 dBi	-9.4 dBi	-3.6 dBi	-3.3 dBi	Theta75/Pie120	5.68 dB



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GSM850

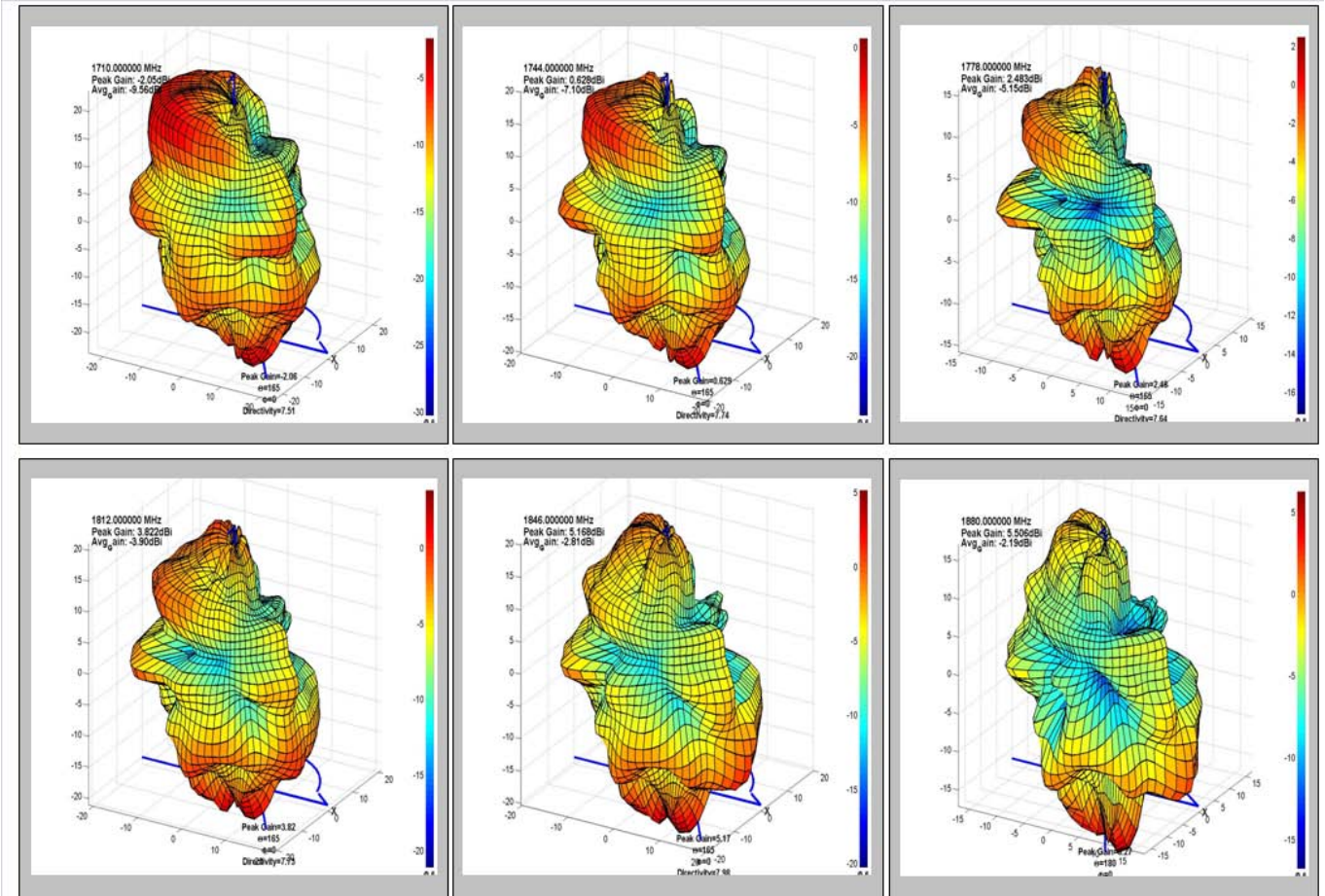


Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
824.000000 MHz	14.3 %	-17.1 dBi	-9.1 dBi	-8.5 dBi	-10.9 dBi	-4.6 dBi	-3.7 dBi	Theta90/Pie120	4.78 dB
838.000000 MHz	23.7 %	-14.9 dBi	-6.9 dBi	-6.2 dBi	-8.7 dBi	-2.4 dBi	-1.5 dBi	Theta90/Pie120	4.77 dB
852.000000 MHz	36.2 %	-12.8 dBi	-5.1 dBi	-4.4 dBi	-6.7 dBi	-0.7 dBi	0.3 dBi	Theta90/Pie120	4.71 dB
866.000000 MHz	49.4 %	-11.3 dBi	-3.8 dBi	-3.1 dBi	-5.0 dBi	0.5 dBi	1.5 dBi	Theta90/Pie120	4.60 dB
880.000000 MHz	53.0 %	-11.1 dBi	-3.4 dBi	-2.8 dBi	-4.5 dBi	1.0 dBi	1.6 dBi	Theta90/Pie120	4.37 dB
894.000000 MHz	43.0 %	-12.0 dBi	-4.3 dBi	-3.7 dBi	-5.5 dBi	0.9 dBi	1.0 dBi	Theta60/Pie105	4.68 dB



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DCS1800

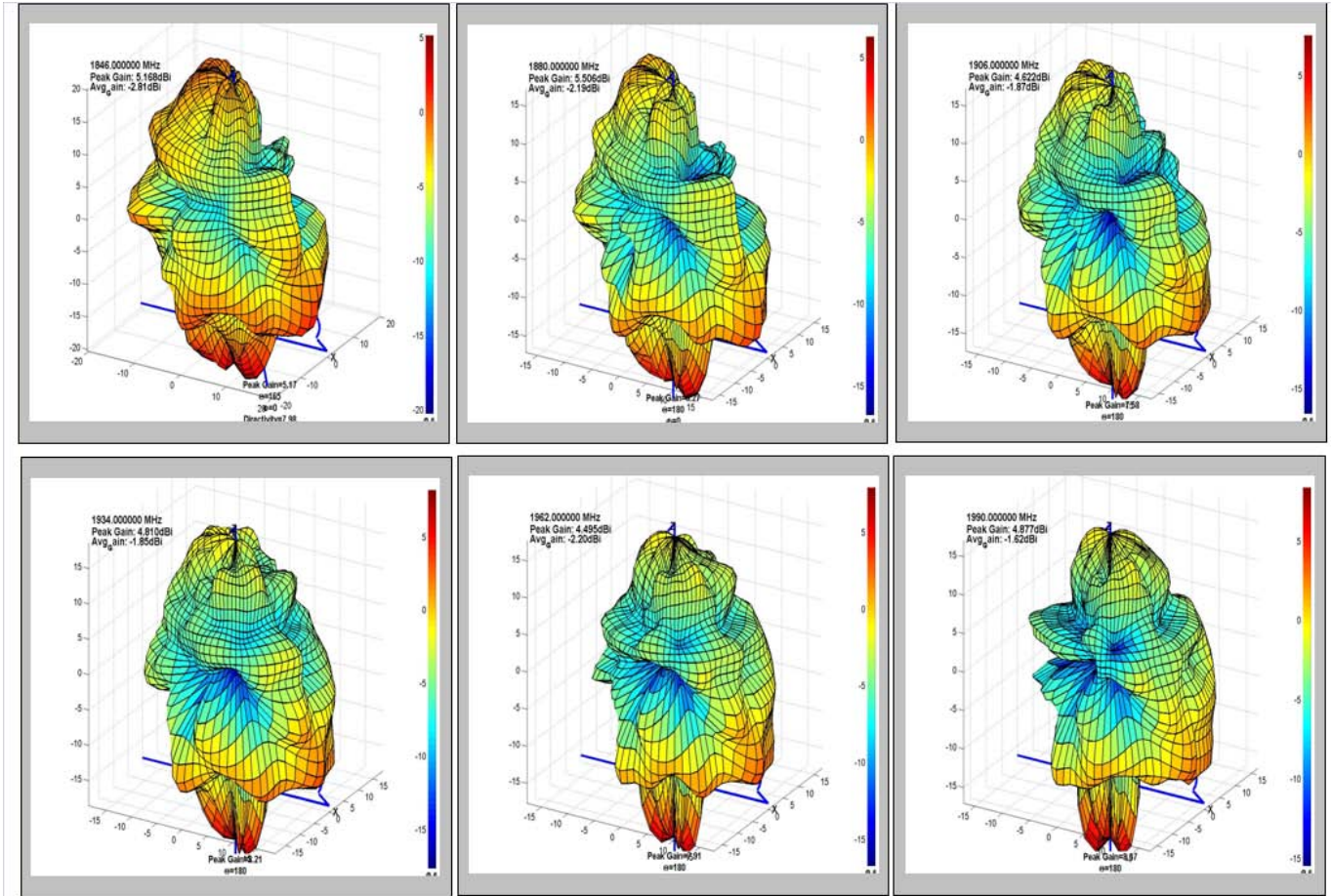


Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
1710.000000 MHz	11.0 %	-15.1 dBi	-11.0 dBi	-9.6 dBi	-6.1 dBi	-4.2 dBi	-2.1 dBi	Theta165/Pie0	7.51 dB
1744.000000 MHz	19.5 %	-12.3 dBi	-8.7 dBi	-7.1 dBi	-3.9 dBi	-1.3 dBi	0.6 dBi	Theta165/Pie0	7.74 dB
1778.000000 MHz	30.5 %	-10.3 dBi	-6.8 dBi	-5.2 dBi	-2.7 dBi	0.9 dBi	2.5 dBi	Theta165/Pie0	7.64 dB
1812.000000 MHz	40.7 %	-9.0 dBi	-5.5 dBi	-3.9 dBi	-1.0 dBi	2.6 dBi	3.8 dBi	Theta165/Pie0	7.73 dB
1846.000000 MHz	52.3 %	-7.8 dBi	-4.4 dBi	-2.8 dBi	1.5 dBi	4.1 dBi	5.2 dBi	Theta165/Pie0	7.98 dB
1880.000000 MHz	60.3 %	-7.1 dBi	-3.9 dBi	-2.2 dBi	3.3 dBi	4.5 dBi	5.5 dBi	Theta180/Pie0	7.70 dB



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PCS1900



Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
1846.000000 MHz	52.3 %	-7.8 dBi	-4.4 dBi	-2.8 dBi	1.5 dBi	4.1 dBi	5.2 dBi	Theta165/Pie0	7.98 dB
1880.000000 MHz	60.3 %	-7.1 dBi	-3.9 dBi	-2.2 dBi	3.3 dBi	4.5 dBi	5.5 dBi	Theta180/Pie0	7.70 dB
1906.000000 MHz	64.9 %	-6.7 dBi	-3.6 dBi	-1.9 dBi	4.6 dBi	4.6 dBi	4.6 dBi	Theta180/Pie0	6.50 dB
1934.000000 MHz	65.3 %	-6.8 dBi	-3.5 dBi	-1.9 dBi	5.2 dBi	5.2 dBi	4.8 dBi	Theta180/Pie0	6.66 dB
1962.000000 MHz	60.2 %	-7.2 dBi	-3.9 dBi	-2.2 dBi	4.9 dBi	4.9 dBi	4.5 dBi	Theta180/Pie0	6.70 dB
1990.000000 MHz	68.8 %	-6.5 dBi	-3.3 dBi	-1.6 dBi	5.3 dBi	5.4 dBi	4.9 dBi	Theta180/Pie0	6.50 dB