

# Product Specification

Model : ELVIS

PART NAME	An Internal CDMA/USPCS Antenna For Mobile Handset		
Part No.	M3-4830		
Application	ELVIS	Part App. No.	

Approved

Electrical Engineer

Sang Ki Woo



Electrical Manager/Director

Sang Kyu Kang



Mechanical Engineer

You Jin Cho



Mechanical Manager/Director

Joon Wan Lee



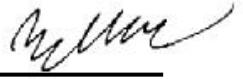
QC Manager/Director

Jun Won Joung



Managing Director/V.P.

Young Min Jo



## – Table of Contents –

1. Revision sheet
2. Matter Certification
3. Product number name & Application range/object
  - A. Name of product
  - B. Product summary
  - C. Application range
  - D. Application object
4. Technical properties
  - 4.1 Electrical specifications
  - 4.2 Mechanical specifications
  - 4.3 Packing specifications
5. Condition of Test
  - 5.1 Condition of environment test
  - 5.2 Requirement of test
6. Electrical properties
  - 6.1 VSWR
  - 6.2 Radiation pattern
  - 6.3 Antenna gain
7. Mechanical properties
  - 7.1 FORCE test for contact part
  - 7.2 Repeat test for contact part
  - 7.3 Drop test

## 8. Environment properties

- 8.1 Temperature, humidity CYCLE test
- 8.2 High temperature, high humidity test
- 8.3 High temperature, low temperature action test
- 8.4 High temperature leaving test
- 8.5 Low temperature leaving test
- 8.6 Salt water atomizing test

## 9. . The rest of require document

- 9.1 Electrical performance data
- 9.2 Mechanical drawing
- 9.3 Packing shape drawing
- 9.4 Record of dimension examination
- 9.5 Record of performance examination
- 9.6 Record of dependence examination
- 9.7 Q/C process drawing
- 9.8 Electrical performance Test of using Jig (V.S.W.R)

## 1. Revision sheet

Revision sheet					
NO	Date	Before change	After change	Reason	REV
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

## 2. Matter Certification

## 3. Product number name & Application range/purpose

### 3.1 Product number name

ELVIS ANTENNA PART NUMBER (PART NO.)

- Handset Model : ELVIS
- Antenna Type : Internal
- Antenna Part Number : M3-4830
- Revision : Rev 0

### 3.2 Summary of Product

As Mobile phone of Folder type operating internal antenna, this design operating CDMA&USPCS band, characterized low minimizing and have low SAR.

### 3.3 Application range

This antenna apply to internal antenna mobile phone of Folder type operated to CDMA&USPCS band.

### 3.4 Application Purpose

As taking charge of transmit- receive of wireless mobile phone, this antenna will be able to have communication comfort with base station and for decreasing expensed power of mobile phone.

## 4. Technical properties

### 4.1 Electrical specifications

Frequency Range		CDMA (824MHz~894MHz)		USPCS (1850MHz~1990MHz)	
		Tx (824MHz~849MHz)	Rx (869MHz~894MHz)	Tx (1850MHz~1910MHz)	Rx (1930MHz~1990MHz)
Gain (dBi)	Slide Down	-7.5 dBi above	-7 dBi above	-6.5 dBi above	-4.5 dBi above
	Slide Up	-5 dBi above	-4.5 dBi above	-5.5 dBi above	-4 dBi above
VSWR	Slide Down	4:1 below		5.5:1 below	5.5:1 below
	Slide Up	3.5:1 below		4.5:1 below	3:1 below
Impedance		50Ω			
Polarization		Verticality			
Radiation Pattern		Isotropic			
Max power		2 Watt			

### 4.2 Mechanical specifications

Connector	CONTACT PIN TYPE
Dimension	Consult drawing
Operating Temperature	-30°C ~ +80°C
Weight	3 g

### 4.3 Packing specifications

Part name	Quality	Material	Remarks
TRAY	50EA	P.S(about 0.5t)	N/A
CARTON BOX	1000EA	DW 2kinds (AB type)	N/A

## 5. Condition of test

### 5.1 Condition of environment test

Electrical, Mechanical , environment test performance after the pre-processing with a normal state.

A normal state means temperature  $15^{\circ}\text{C} \sim 25^{\circ}\text{C}$  and relative humidity 25%~80%, atmospheric pressure  $86 \sim 106\text{kPa}$ .

The Purpose of pre-processing remove past record before test or process sample to neutralize partially.

This mean first process of test method , measurement of sample property and purpose in order to stability.

(The normal state :  $20^{\circ}\text{C}$ , air state)

- Mechanical test have pre-processing to one hour.
- Mechanical test after environment test have pre-processing to two hours.
- only, after pre-processing extend pre-processing at past record test.

### 5.2 Equipment of test

In order to test this antenna, below equipment need.

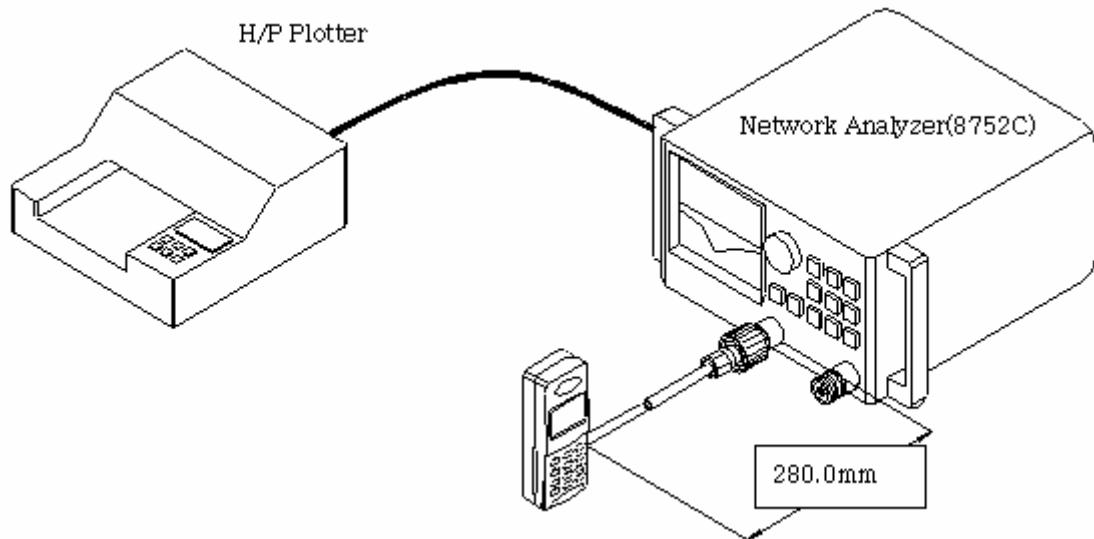
- Network Analyzer for antenna VSWR and impedance measurement.
- Spectrum Analyzer for receive propagation intensity measurement.
- Standard antenna is like reference horn antenna with CDMA&GPS&USPCS band.
- Chamber have cable, connector, equipment of measurement.
- Digital Vernier calipers for dimension measurement.
- PUSH PULL GAUGE for PROBE PIN Force test.
- Temperature chamber for environment measurement.
- A Vibrator.
- Brine atomizing tester.

## 6. Electrical properties

### 6.1 VSWR

This antenna is satisfied requirement that below expressing VSWR.

Division		CDMA(824MHz~894MHz )		USPCS ( 1850MHz~1990MHz)		비고
		Tx (824MHz~849MHz)	Rx (869MHz~894MHz)	Tx (1850MHz~1910MHz)	Rx (1930MHz~1990MHz)	
The air state	Slide Down	4:1 below	5.5:1 below	5.5:1 below	2.5:1 below	N/4A
	Slide Up	3.5:1 below	4:1 below	4.5:1 below	3:1 below	



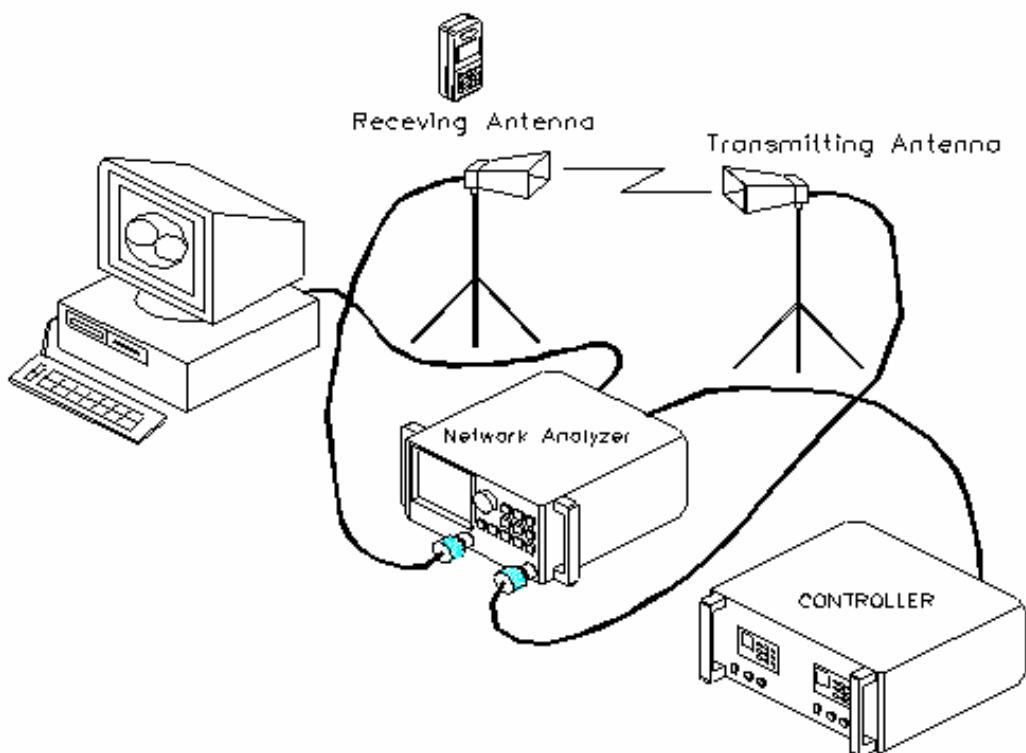
## 6.2 Radiation Pattern

This antenna radiation pattern have to isotropic.

## 6.3 Antenna Gain

Antenna Gain express [dBi] using horn antenna is reference antenna.

Frequency Range		CDMA( 824MHz~894MHz )		USPCS ( 1850MHz~1990MHz )	
		Tx ( 824MHz~849MHz )	Rx ( 869MHz~894MHz )	Tx ( 1850MHz~1910MHz )	Rx ( 1930MHz~1990MHz )
Gain(dBi)	Slide Down	-7.5 dBi above	-7 dBi above	-6.5 dBi above	-4.5 dBi above
	Slide Up	-5 dBi above	-4.5 dBi above	-5.5 dBi above	-4 dBi above

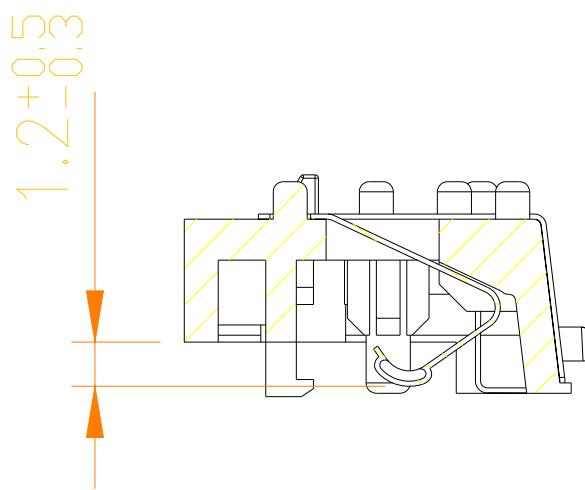


## 7. Mechanical Properties

### 7.1 FORCE test for contact part.

Antenna contact pin must keep 100 to 300 g/f within (common difference inclusion) moving distance.

(Moving street of antenna is same with appending drawing.)



### 7.2 Repeat test for contact part.

After antenna assemble to test equipment,

As maximum value of the actuality moving street 500th repeatedly click.

Contact of antenna must satisfy action force of 6.1 clauses after test.

cycle time: 60th/min

### 7.3 DROP TEST

After antenna is assembled to the Handset, the antenna is attached to handset and dropped with the antenna downwards from the height 1.5m onto a steel surface for 6 times.

Antenna must not have external appearance bug and electrical, mechanical properties must satisfy requirement.

## 8. ENVIRONMENT TEST

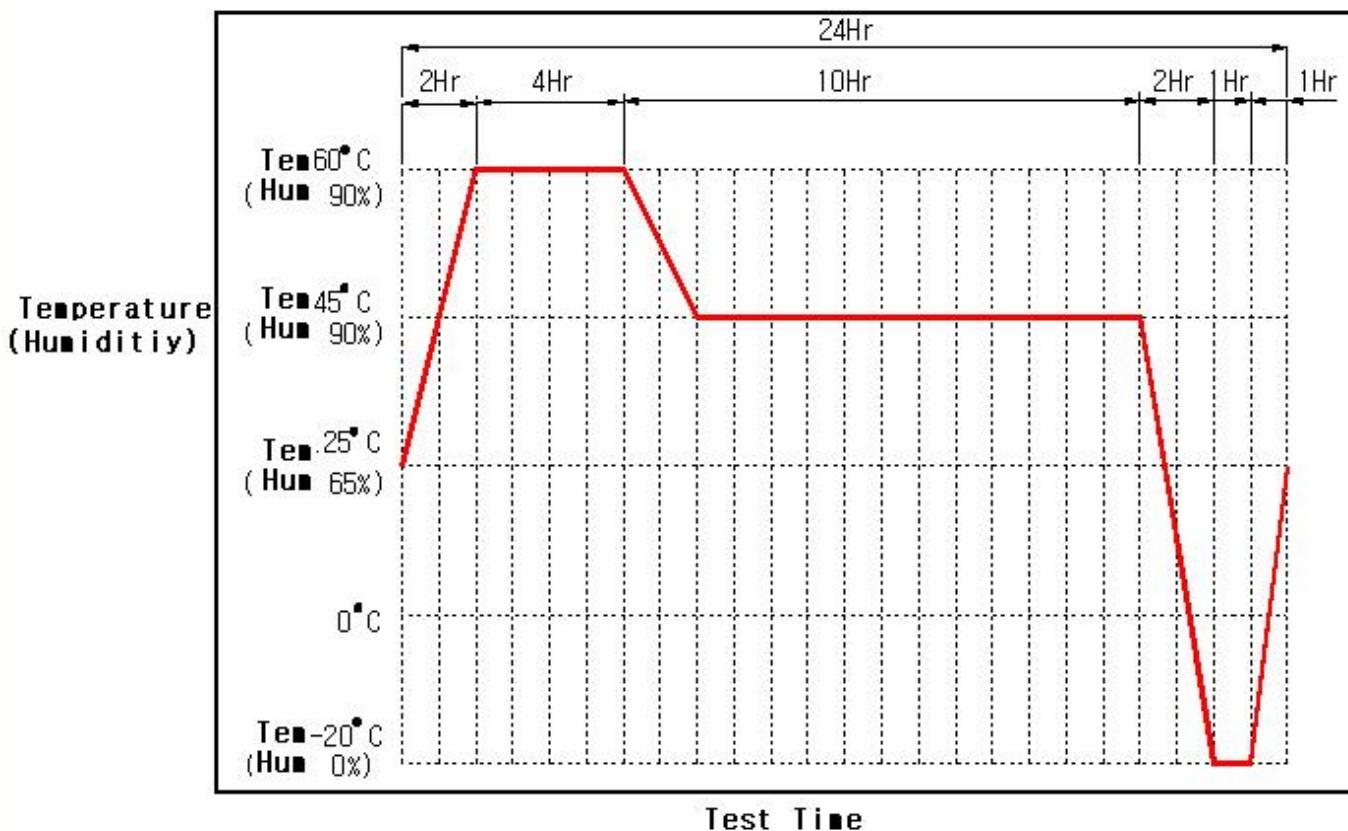
### 8.1 TEMPERATURE, HUMIDITY CYCLE TEST.

#### ANTENNA 5EA : 5 CYCLE TEST

Verify that the samples continued to operate as intended following the exposure.

The samples are placed in an TEMP. & HUMI. TEST CHAMBER

- ① TEMPERATURE 25°C, HUMIDITY 65% → TEMPERATURE 60°C, HUMIDITY 95% : TIME 2Hr.
- ② TEMPERATURE 60°C, HUMIDITY 95% : TIME 4Hr.
- ③ TEMPERATURE 60°C, HUMIDITY 90% → TEMPERATURE 45°C, HUMIDITY 90% : TIME 2Hr
- ④ TEMPERATURE 45°C, HUMIDITY 90% : TIME 12Hr
- ⑤ TEMPERATURE 45°C, HUMIDITY 90% → TEMPERATURE -20°C, HUMIDITY 0% : TIME 2Hr
- ⑥ TEMPERATURE -20°C, HUMIDITY 0% : TIME 2Hr
- ⑦ TEMPERATURE -20°C, HUMIDITY 0% → TEMPERATURE 25°C, HUMIDITY 65% : TIME 1Hr



## 8.2 HIGH TEMPERATURE, HIGH HUMIDITY TEST.

ANTENNA 5EA : 1 CYCLE TEST

Verify that the samples continued to operate as intended following the exposure.

The samples are placed in an TEMP. & HUMI. TEST CHAMBER maintained at a temperature of 65°C, Humidity 90% and maintained for 96 hours

## 8.3 HIGH TEMPERATURE , LOW TEMPERATURE TEST.

ANTENNA 5EA : 1 CYCLE TEST

Verify that the samples continued to operate as intended following the exposure

The samples are placed in an TEMP. & HUMI. TEST CHAMBER

1) TEMPERATURE 60°C, HUMIDITY 0% : TIME 2Hr.

2) TEMPERATURE -20°C, HUMIDITY 0% : TIME 2Hr.

## 8.4 HIGH TEMPERATURE TEST.

ANTENNA 5EA : 1 CYCLE TEST

Verify that the samples continued to operate as intended following the exposure.

The samples are placed in an TEMP. & HUMI. TEST CHAMBER maintained at a temperature of 85°C, Humidity 0% and maintained for 48 hours.

## 8.5 LOW TEMPERATURE TEST

ANTENNA 5EA : 1 CYCLE TEST

Verify that the samples continued to operate as intended following the exposure.

The samples are placed in an TEMP. & HUMI. TEST CHAMBER maintained at a temperature of -40°C, Humidity 0% and maintained for 48 hours

## 8.6 SALT WATER SPRAY TEST.

ANTENNA 5EA : 1 CYCLE TEST

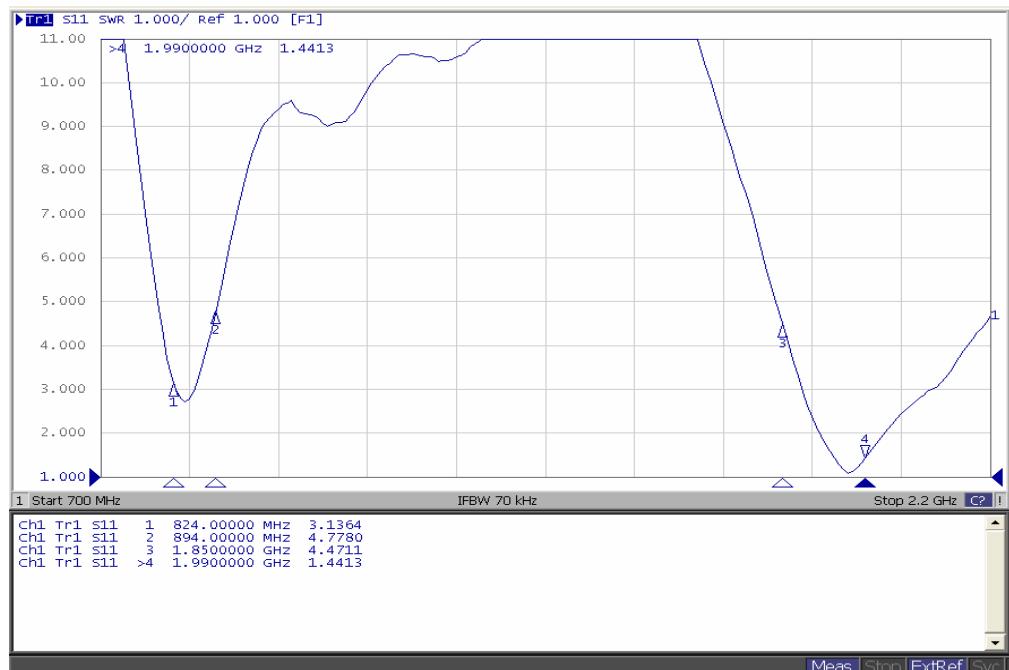
Verify that the samples continued to operate as intended following the exposure.

The samples are placed in an SALT WATER SPRAY TEST CHAMBER maintained at a temperature of 35°C, concentration of salt 5% and maintained for 48 hours

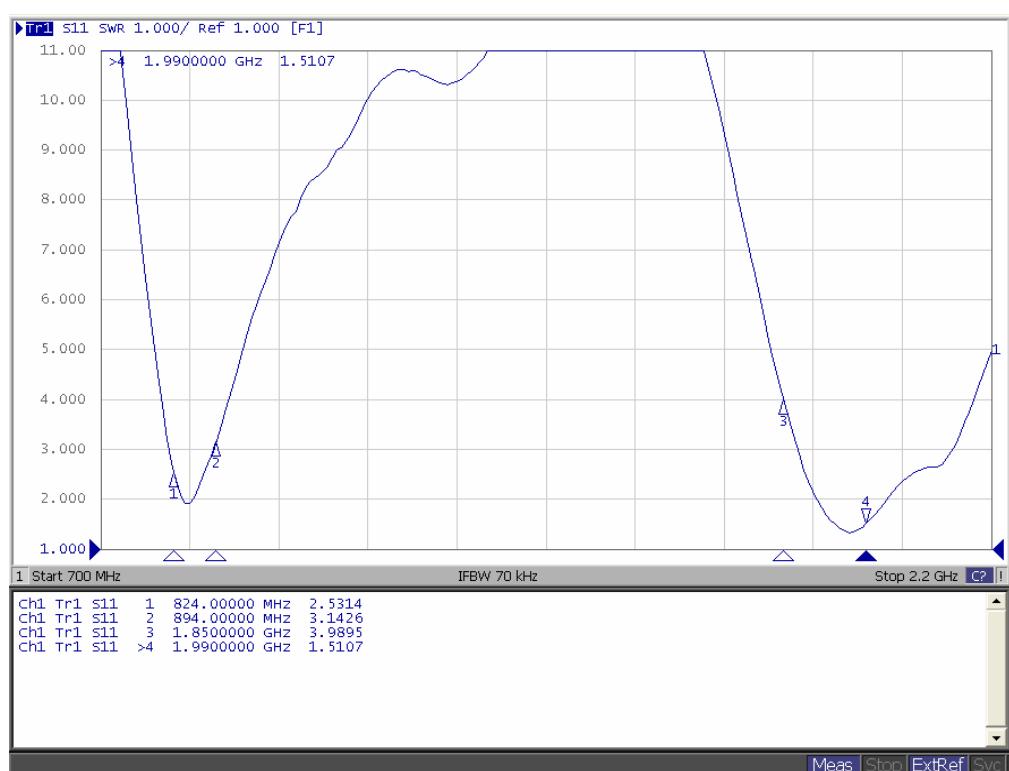
## 9 The rest of require document

### 9.1 Electrical performance data

#### – V.S.W.R of the air state Slide-Down



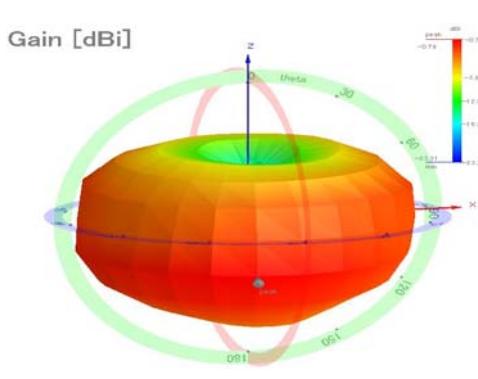
#### – V.S.W.R of the air state Slide-Up



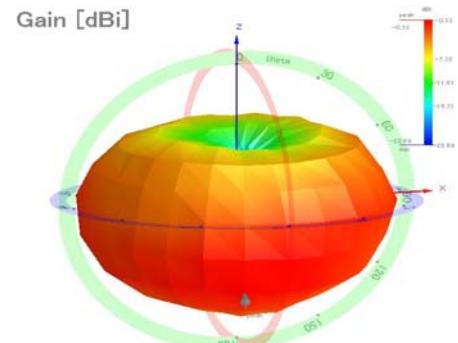
## - 3D Gain ( Slide Up )

Freq.	Peak Gain [dBi]				Avg. Gain [dBi]				Beam Width			Eff.
	3D	H	E1	E2	3D	H	E1	E2	H	E1	E2	
824	-0.79	-2.22	-0.94	-1.56	-4.59	-2.99	-7.39	-7.67	0.0	98.6	37.3	34.74
849	0.41	-0.75	0.36	-0.51	-3.39	-1.69	-6.13	-6.37	0.0	101.4	34.6	45.82
869	0.13	-0.62	0.13	-0.87	-3.58	-1.70	-6.29	-6.52	0.0	103.4	36.1	43.90
894	-0.33	-0.78	-0.43	-1.51	-4.00	-1.94	-6.69	-6.88	0.0	76.5	95.6	39.85
1850	-1.63	-2.51	-1.91	-2.54	-5.39	-6.13	-5.34	-5.02	119.1	138.9	30.3	28.89
1910	0.20	-0.55	0.10	-0.66	-3.67	-4.49	-3.93	-3.03	125.6	62.6	61.7	42.98
1930	0.52	-0.28	0.52	-0.30	-3.33	-4.19	-3.71	-2.64	128.6	63.2	61.3	46.50
1990	0.15	-0.46	0.15	-0.43	-3.84	-4.82	-4.43	-3.52	104.9	69.8	55.2	41.29

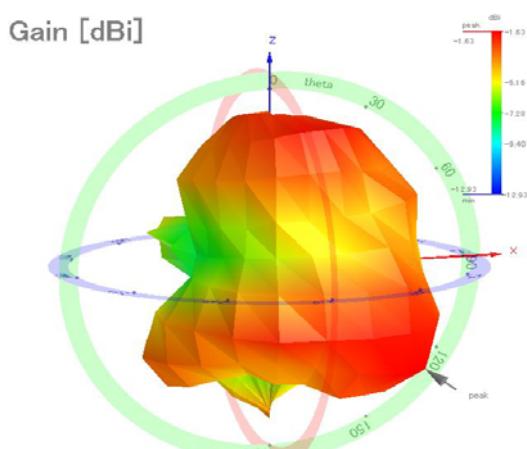
## - 3D Radiation pattern ( Slide Up )



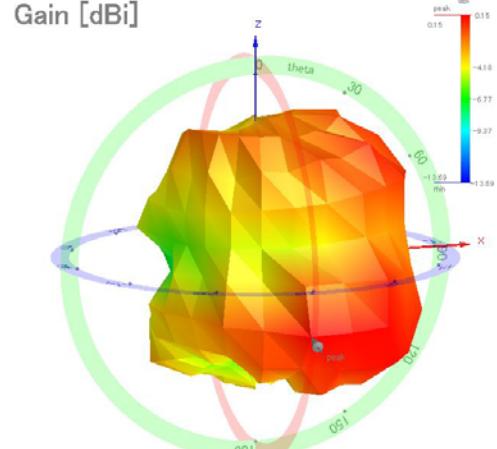
824MHz



894MHz



1850MHz

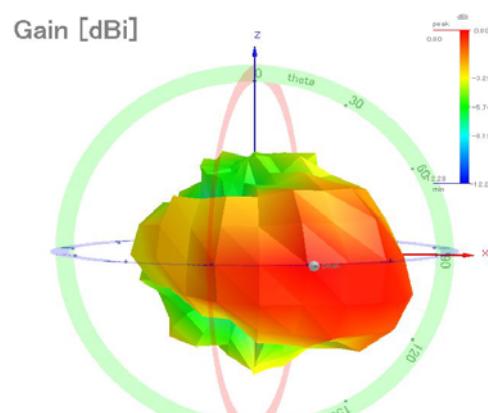
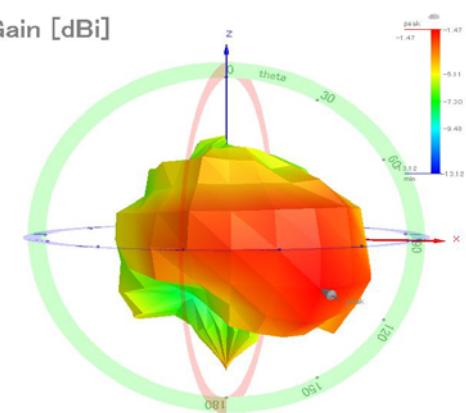
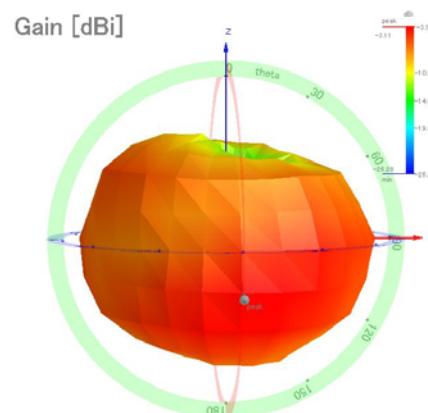
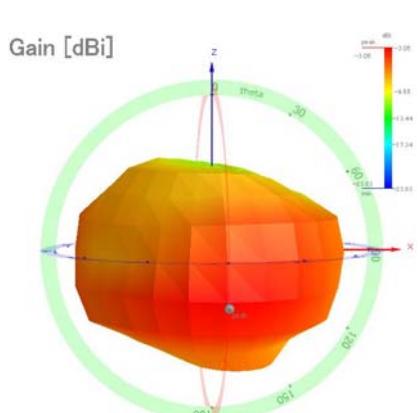


1990MHz

## - 3D Gain ( Slide Down )

Freq.	Peak Gain [dBi]				Avg. Gain [dBi]				Beam Width			Eff.
	3D	H	E1	E2	3D	H	E1	E2	H	E1	E2	
824	-3.05	-3.90	-3.05	-5.47	-7.07	-5.50	-8.27	-10.13	164.2	93.4	35.7	19.63
849	-1.69	-2.36	-1.69	-4.36	-5.74	-4.10	-7.06	-8.75	144.6	96.2	38.3	26.65
869	-2.13	-2.65	-2.13	-4.58	-6.09	-4.38	-7.54	-9.04	120.5	98.8	120.5	24.60
894	-3.11	-3.49	-3.11	-5.01	-6.76	-5.04	-8.38	-9.64	121.6	72.5	109.9	21.10
1850	-1.47	-1.78	-2.48	-3.33	-6.09	-6.09	-6.21	-5.83	150.1	111.5	125.3	24.58
1910	0.53	0.52	0.07	-0.92	-4.21	-4.10	-4.50	-3.98	139.7	81.4	93.8	37.92
1930	0.94	0.94	0.43	-0.40	-3.73	-3.56	-4.08	-3.47	166.7	82.1	91.8	42.38
1990	0.80	0.80	-0.20	-0.44	-4.16	-3.92	-4.56	-4.18	111.5	87.3	108.4	38.36

## - 3D Radiation pattern ( Slide Down )



## 9.2 Mechanical drawing

9.3 Packing shape drawing

9.4 Record of dimension examination

9.5 Record of performance examination

9.6 Record of dependence examination

9.7 Q/C process drawing

9.8 Electrical performance Test of using Jig (V.S.W.R)