



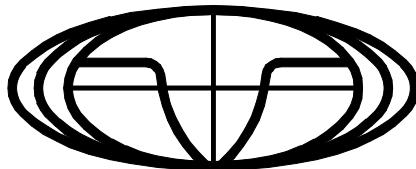
**GALTRONICS (GTK) LTD.**

Revision: P1

Part No: 02036136-04425

**ANTENNA SPECIFICATION**

Project No: 04425



**PRODUCT SPECIFICATION**

**850MHz, 1900MHz**

**P9050  
INTERNAL ANTENNA  
02036136-04425**

<b><u>DISTRIBUTION LIST:</u></b>	3.Customer	
1. QC 2. SALES		
<b><u>APPROVED BY</u></b>	<b><u>SIGNATURE</u></b>	<b><u>DATE</u></b>
Engineering Department Manager Denis		2010-02-22
RF Manager James		2010-02-22
Mechanical Engineer Branden		2010-02-22
RF Engineer Duke		2010-02-22
<b><u>Approved By Customer(As Required):</u></b>		

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**ANTENNA SPECIFICATION****\* PURPOSE AND SCOPE**

The purpose of this document is to establish a product specification for the antenna product that Galtronics is developing for customer. Any changes or additions to this specification can affect schedule and/or cost of the product and should be negotiated between Galtronics and Customer before being incorporated into the specification. Upon agreement of this specification Galtronics will make no changes without written approval from Customer. Any changes requested by Customer will be given to Galtronics with sufficient time frame to evaluate the cost impact and react as required.

The development of this product within Galtronics was conducted according to the Design Control Procedure SOP-006E.

**- RELATED DOCUMENTS**

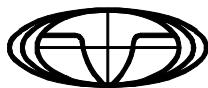
SOP006E	Product Launch Procedure (Design Control)
EN006E	Reliability Guidelines
EIA-STD-556	Outer Shipping Container Bar Code Label Standard

**- ABBREVIATIONS AND DEFINITIONS**

$\Omega$	Ohm
$^\circ$	Degree
$^\circ\text{C}$	Celsius (degrees Centigrade)
cm	Centimetre
g	Grams
GHz	Gigahertz
Hz	Hertz
kg	Kilograms
MHz	Megahertz
M	Meter
mm	Millimetre
N	Newton
PCB	Printed Circuit Board
RH	Relative Humidity
W	Watt

Design Specification: A preliminary target specification to guide the design process.

Product Specification: A final specification for the qualified product.

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**ANTENNA SPECIFICATION****1. PRODUCT REVISION**

1.1 The list of approval sheet revision

<u>REV NO.</u>	<u>CUSTOMER REV NO</u>	<u>DATE</u>	<u>DESCRIPTION</u>
P-1	A	23. Feb, 10	RELEASED FOR CUSTOMER APPROVAL

**2. MATERIAL CERTIFICATION****2.1 Description and part number****2.1.1 DESCRIPTION**

The antenna consists of two components – Element and Carrier.

**2.1.2 PART NUMBER**

Galtronics Part number	Frequency Band	Customer Part number
02036136-04425	850MHz, 1900MHz	

**2.1.3 PART LIST**

PART NUMBER	PART NAME	MATERIAL & FINISH	PROCESS	SUPPLIER	Q'TY	Remark
02036136-04425	Internal Antenna Assembly	—	—	Galtronics China Wuxi		
50-5309-09	Plated Antenna Assembly	Electro Overall Cu(7.0~17.0um) & Electro Overall Ni(3.0~7.0um)0um)Plating	Cutting Machine	—	1	—
28-5447-07	Pattern-Printed Carrier	Printing Fixing Solution	Printing Machine	—	1	—
28-5447-03	Carrier	Poly Carbonate (Grade : HF-1023IM/Color : Gray)	Mold Tooling & Injection Machine	Galtronics China Wuxi		

**ANTENNA SPECIFICATION****3. ELECTRICAL SPECIFICATIONS:****3.1 FREQUENCY BAND**

BAND	FREQUENCY
850	TX(824-849MHz)
	RX(869-894MHz)
1900	TX(1850-1910MHz)
	RX(1930-1990MHz)

**3.2 IMPEDANCE - Nominal impedance: 50Ω****3.3 MATCHING REQUIREMENTS.**

In order to assure the best performance of the antenna, the matching shall be evaluated in free space with the antenna vertically positioned. Galtronics shall give design support to the customer to obtain the optimum matching circuit for the antenna system.

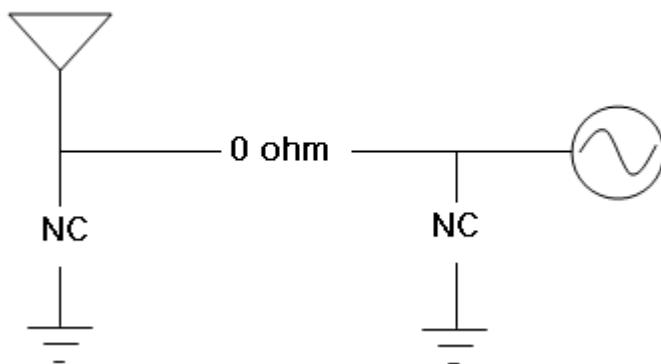
The antenna shall comply with the Electrical Specification requirements, as set out below, while mounted on the customer supplied handset containing the PCB with the matching circuit. The handset with PCB is to be supplied by the customer and should be representative of the production parts. Any modifications in the handset or PCB can affect the performance of the antenna and should be discussed with Galtronics to determine the affect of such changes on antenna performance and delivery requirements.

Galtronics 는 안테나의 최대성능을 보장하기 위해 자유공간에 놓여진 안테나에서 최적의 매칭 값을 얻을 수 있도록 설계 회로를 제공한다.

Customer 가 제공한 PCB 가 포함된 handset 에 안테나를 장착하여 요구된 전기적 특성을 만족한다.

PCB 와 handset 은 고객으로부터 제공되며 제조 부품들로 구성되어야 한다.

Handset 이나 PCB 의 변경사항은 안테나 성능에 영향을 미칠 수 있다. 그리고 그러한 변경사항들은 반드시 사전에 Galtronics 와 논의 되어져야만 한다.

**Sparrow Matching Network for temporary****FIGURE 1. Matching Circuit**

**ANTENNA SPECIFICATION****3.4 INPUT VSWR****3.4.1 MAXIMUM VALUES OF VSWR IN FREQUENCY BAND ( PHONE JIG SPECIFICATION )**

BAND	FREQUENCY	Open	Close
850	824	4.5	2.0
	894	8.5	4.0
1900	1850	5.0	5.0
	1990	4.0	5.0

\* Means pending on final PCB and matching circuit

**3.4.2 TEST METHOD (Engineering)**

The antenna is tested while mounted on the handset with the matching circuit (Fig 2). The handset is positioned in the air.

매칭 회로가 구성된 handset에 안테나를 장착하여 시험을 진행한다.(Fig 2)  
Hand set은 자유공간에 위치한다.



**FIGURE 2. Test Method**

**3.4.3 TEST METHOD (Production)**

In mass production it is not practical to use the handset supplied by customer. Galtronics will design a representative production test fixture for use on the processes that require electrical testing. The results of the test fixture will be correlated to the results obtained on the customer handset.

대량생산에서는 고객이 제공한 handset은 실제 사용 되지 않는다.  
Galtronics는 전기적 테스트를 위한 생산 Test Jig를 제작 한다. Test Jig에서 얻은 결과는 고객의 handset 결과와 상관 된다.

**3.4.4 TEST METHOD (Customer)**

Galtronics supply the antennas. And then, assemble antenna into the handset before checking the RF performance. (Refer to the Fig. 3)

Galtronics가 제공한 안테나를 handset에 조립하여 RF 성능을 확인한다. (Refer to the Fig. 3)



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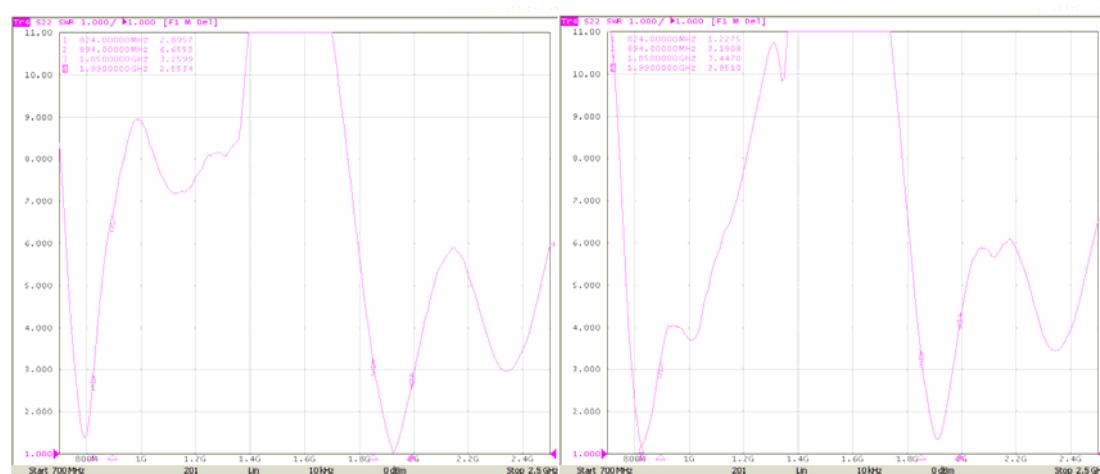
**FIGURE 3. The Antenna**

### 3.4.5 TEST METHOD (RF Test Jig Data)

The antenna is tested while mounted on the test jig that is positioned in the air.

자유공간에 위치한 Test Jig에 안테나를 거치하고 시험을 진행한다.

### 3.4.6 Phone VSWR DATA



< Open >

< Close >

**FIGURE 4. Phone Jig VSWR**

### 3.4.7 MAXIMUM VALUES OF VSWR IN FREQUENCY BAND ( RF TEST JIG SPECIFICATION )

\*\*Means pending on the RF test jig

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**ANTENNA SPECIFICATION****3.5 GAIN****3.5.1 MINIMUM GAIN VALUES FOR PEAK AND AVERAGE IN AZIMUTH/ ELEVATION PLANE :**(Measured in the Aplus tech Chamber in Galtronics Korea)  
(unit : dBi)

BAND	FREQUENCY (MHz)	PLANE	Peak Gain Open	Peak Gain Close	Average Gain Open	Average Gain Close
850	824	H	-7.5	-3.5	-10.5	-6.0
		E1	-7.5	-3.5	-12.0	-9.5
		E2	-9.0	-7.0	-13.5	-1.0
	894	H	-11.0	-3.5	-14.5	-6.0
		E1	-11.5	-3.5	-16.0	-9.0
		E2	-13.5	-6.5	-16.0	-11.5
1900	1850	H	-4.0	-5.0	-7.5	-7.0
		E1	-1.0	-2.5	-7.5	-8.0
		E2	-1.5	-2.0	-8.0	-8.5
	1990	H	-3.5	-7.0	-8.0	-11.0
		E1	-0.5	-2.5	-7.0	-10.0
		E2	-2.0	-3.5	-8.0	-11.0

**\*\* Means pending on final PCB and matching circuit****3.5.2 MEASURED GAIN VALUES FOR PEAK AND AVERAGE IN AZIMUTH/ ELEVATION PLANE**(Measured in the APLUS TECH Chamber in Galtronics Korea)  
(unit : dBi)

BAND	FREQUENCY (MHz)	PLANE	Peak Gain Open	Peak Gain Close	Average Gain Open	Average Gain Close
850	824	H	-6.0	-2.1	-8.8	-4.2
		E1	-6.1	-2.1	-10.7	-8.0
		E2	-7.7	-5.3	-12.0	-9.3
	894	H	-9.4	-1.8	-12.8	-4.5
		E1	-10.0	-1.8	-14.7	-7.7
		E2	-12.0	-5.0	-14.7	-10.0
1900	1850	H	-2.2	-1.3	-5.7	-5.4
		E1	0.7	-1.3	-6.0	-6.4
		E2	-0.1	-4.6	-6.2	-7.0
	1990	H	-2.1	-4.2	-6.4	-9.3
		E1	1.1	-4.5	-5.5	-8.2
		E2	-0.6	-6.7	-6.7	-9.5

**\*\* Means pending on final PCB and matching circuit**



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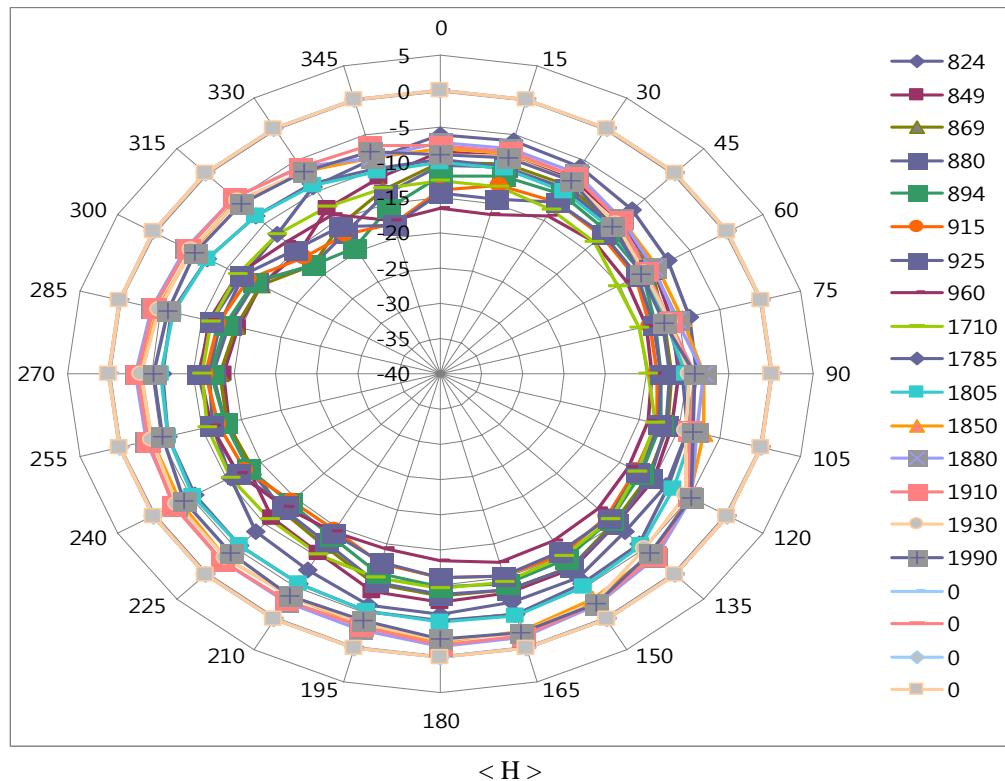
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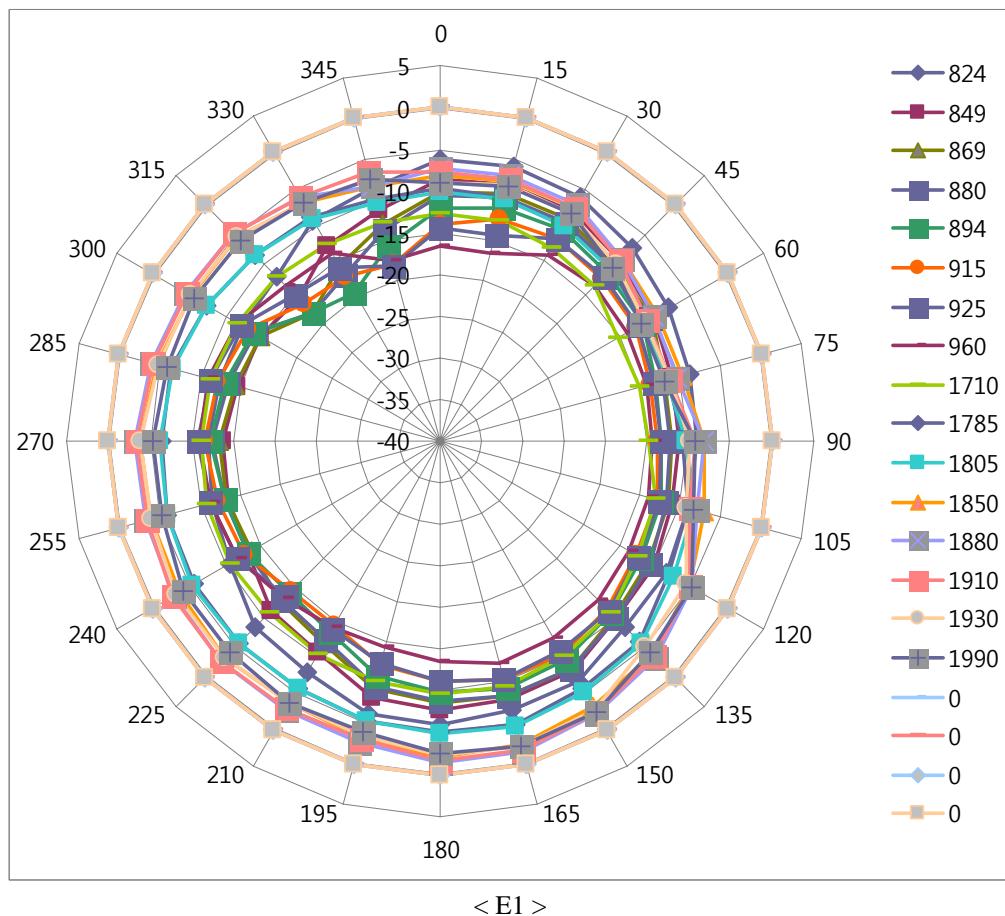
## ANTENNA SPECIFICATION

### \* MEASURED RADIATION PATTERN

Open



< H >



< E1 >



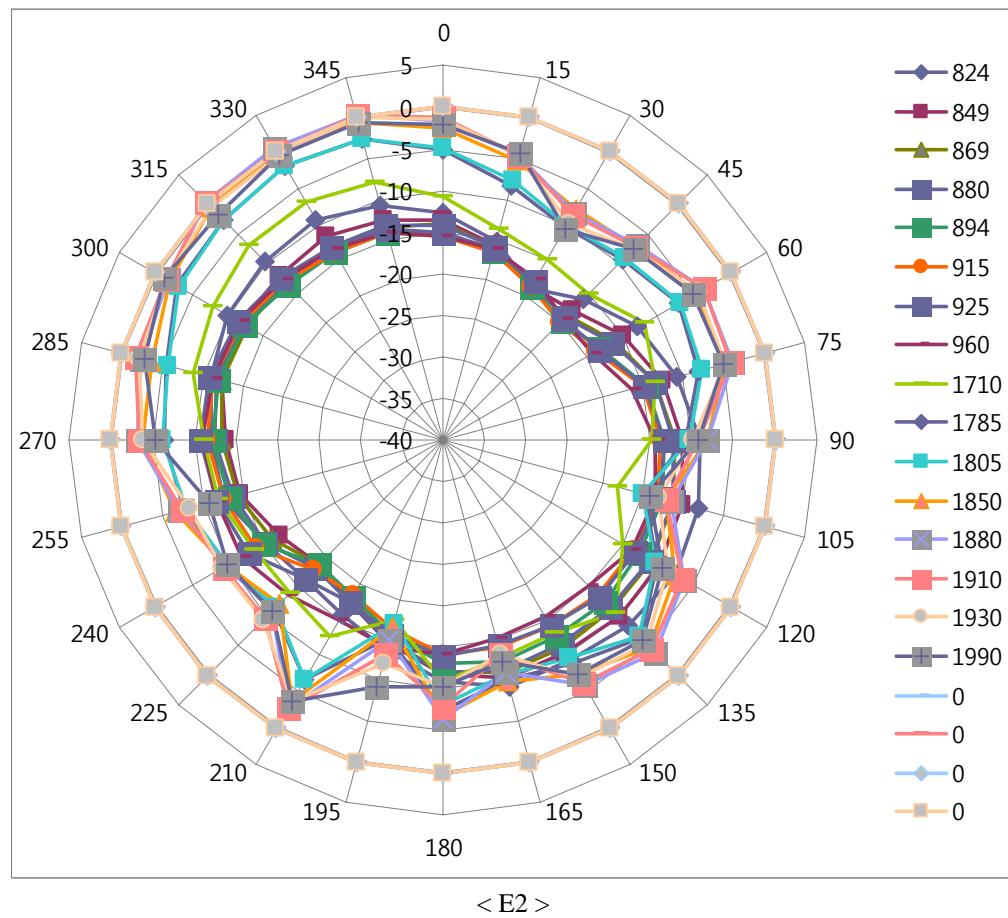
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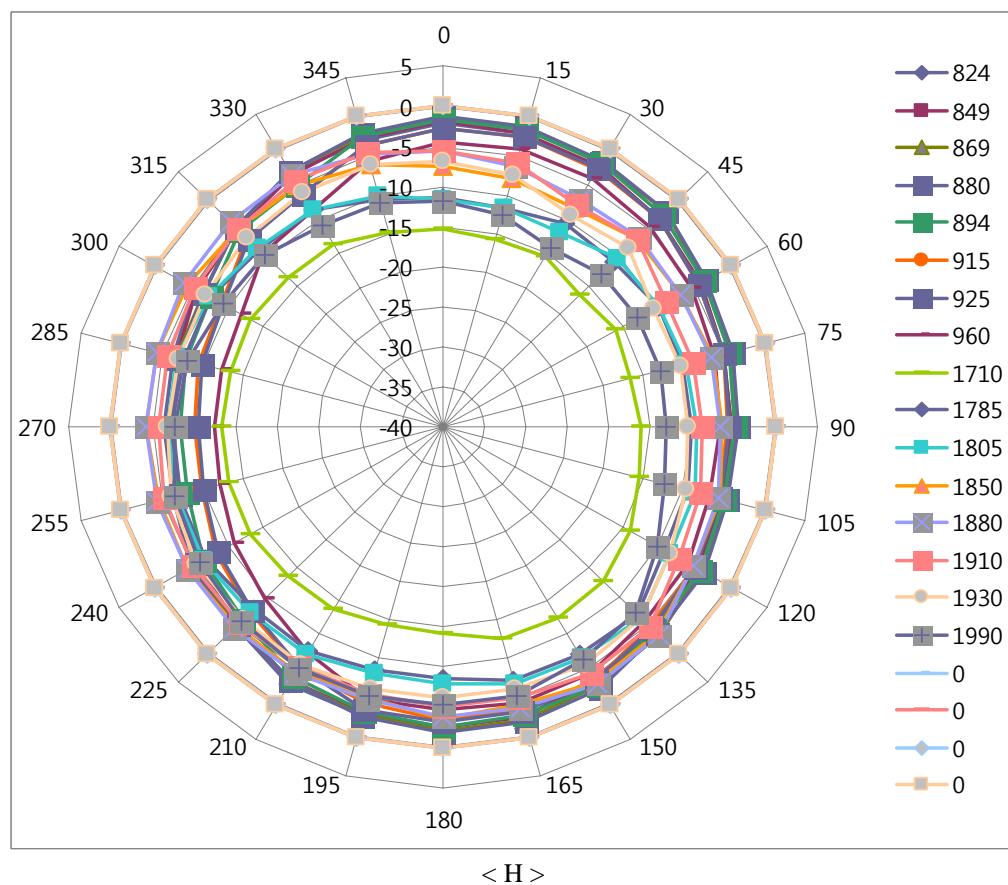
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## ANTENNA SPECIFICATION



Close





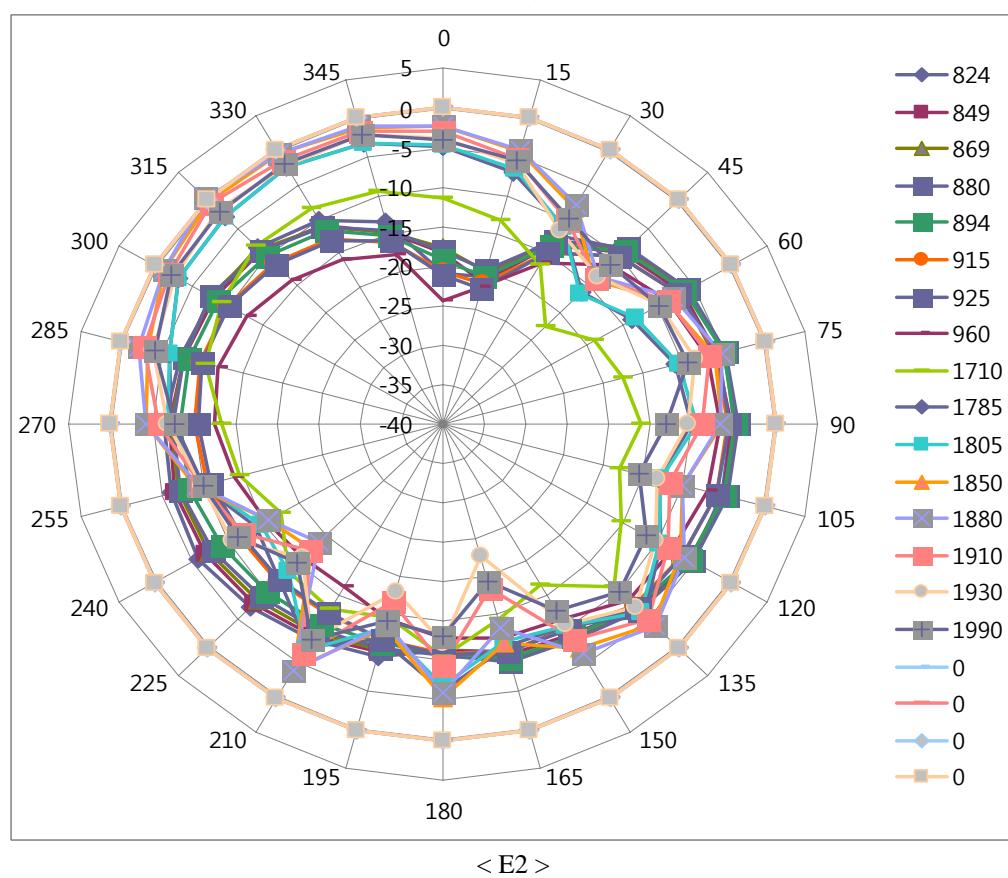
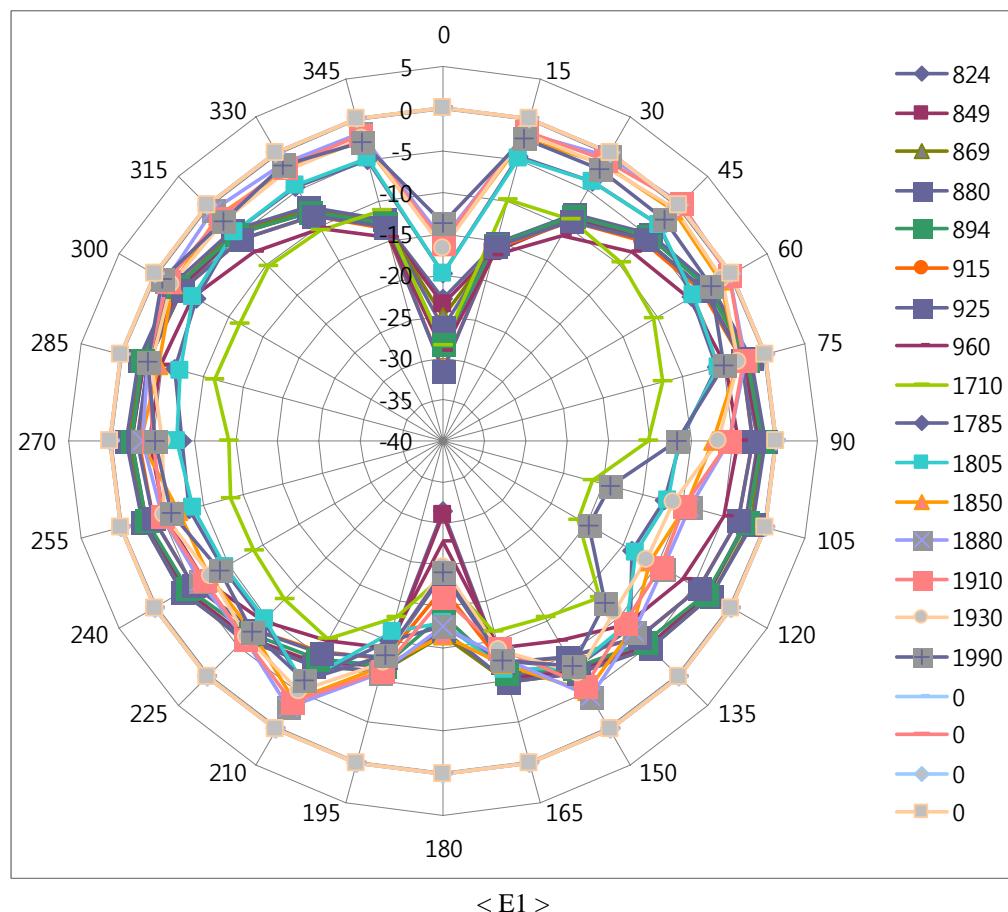
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### **3.5.3 TEST METHOD:**

The antenna is tested while mounted on handset with the correct matching circuit in free space. Radiation patterns are measured on following frequencies:

자유공간에서 매칭 회로가 구성되어있는 handset 에 안테나를 장착하여 시험한다.  
아래 주파수를 사용하여 방사패턴을 측정한다.

824MHz, 849MHz, 869MHz, 894MHz, 1850MHz, 1910MHz, 1930MHz, 1990MHz

The antenna is measured for 2 elevation cuts at two different azimuth positions ( $\phi = 0$ ,  $\phi = 90$ ). Azimuth(H)  $\theta = 90^\circ$ , Elevation  $\phi = 0^\circ$ ,  $\phi = 90^\circ$  에서 각각 자른면을 기준으로 한다.

The results of the test will be correlated to the customer handset and the measurement environment. (Refer to Fig. 2)

측정할 handset 과 측정환경에 따라 차이를 보일 수 있다.