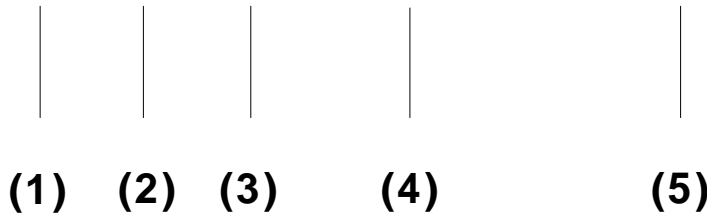


# GSM850/E-GSM900/DCS1800/PCS1900 Helical Antenna

## 1 . Explanation of Title :

**W T H 4 3 0 0 3**



(1) System code :

(2) Area code :

(3) Product type :

(4) Customer code :

(5) Suffix :

## 2 . Summary :

This report is to account for the measurement setup and results of Quad-Band. The measurement setup includes reflection coefficient, pattern, and gain measurements.

<b>DRAWING :</b> RUF	<b>DESIGNED BY :</b> Jeffery	<b>CHECKED BY :</b> Jason	<b>APPROVED BY :</b> D.S.M
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>X.XX=</b>	<b>Part No.</b> 112010003
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

**2 – 1 . Frequency Band :**

<b>Frequency</b>	<b>T<sub>x</sub> (MHz)</b>	<b>R<sub>x</sub> (MHz)</b>
<b>GSM/850E</b>	<b>824~849</b>	<b>870~894</b>
<b>GSM</b>	<b>880 ~ 915</b>	<b>925 ~ 960</b>
<b>DCS</b>	<b>1710 ~ 1785</b>	<b>1805 ~ 1880</b>
<b>PCS</b>	<b>1850~1909</b>	<b>1930~1990</b>

**3 . Measurement Setup :**

**(1) Reflection Coefficient Measurement :**

**(a) Instrument :** Network Analyzer

**(b) Setup :**

- (I) Calibrate the Network Analyzer by one port calibration using O.S.L calibration kits.
- (II) Connect the antenna under test to the Network Analyzer.
- (III) Measure the S11(reflection coefficient) shown in Fig. 1.
- (IV) Generally, the S11 is less than –10dB to ensure the 90% power into antenna and only less than 10% power back to system.

<b>DRAWING :</b> <b>RUF</b>	<b>DESIGNED BY :</b> <b>Jeffery</b>	<b>CHECKED BY :</b> <b>Jason</b>	<b>APPROVED BY :</b> <b>D.S.M</b>
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>Part No.</b>	<b>112010003</b>
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

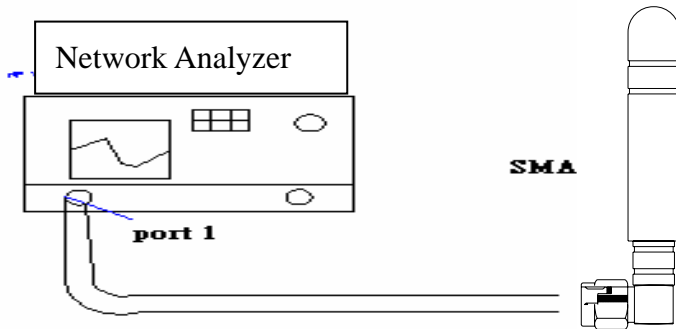


Fig.1

**(2) Pattern measurement :**

a . The S.P.K.'S anechoic chamber is a far-field measurement system with size of 7m×3.3m×3.3m. The quiet zone region is 30cm x 30cm x 30cm in the center of the rotator.

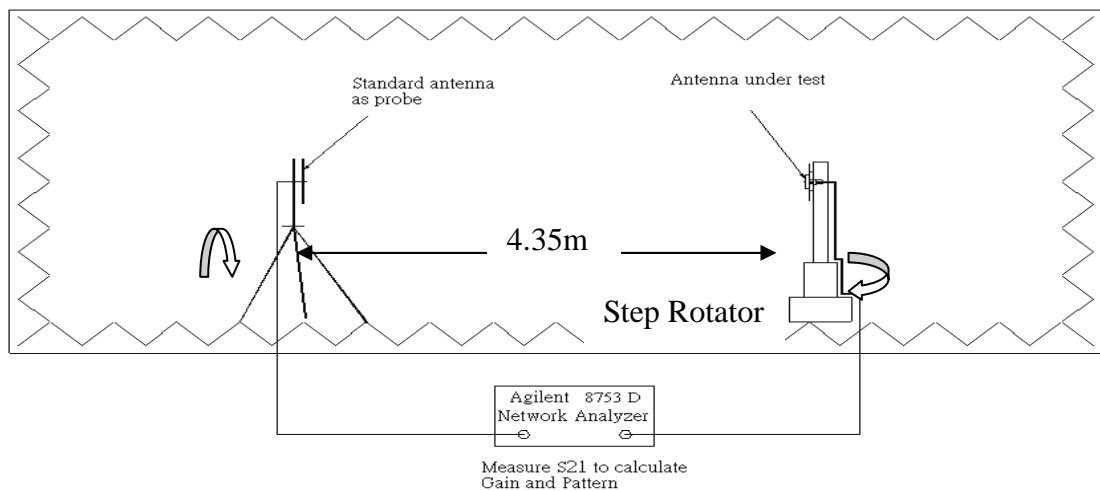


Fig.2 The interior components of the anechoic chamber

- b . The probing antenna is the BBHA 9120 LFA 700MHz ~ 6GHz module (9120D horn antenna), which is placed in the one side of the chamber room. And the antenna under testing (AUT) is placed in the other side of the chamber. The distance between the probing antenna and the AUT is about 4m.
- c . While we measure the radiation patterns by rotating AUT with 360 degrees and repeat again by replacing the AUT with the standard gain antenna under test, we compare both data and using a formula to obtain the gain of AUT. The standard gain antenna is a gain horn (BBHA 9120 LFA 700MHz~6GHZ).

<b>DRAWING :</b> RUF	<b>DESIGNED BY :</b> Jeffery	<b>CHECKED BY :</b> Jason	<b>APPROVED BY :</b> D.S.M
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
X=	X.X=	X.XX=	<b>Part No.</b> 112010003
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

**S. P. K. ELECTRONICS CO., LTD.**

$$G_{AUT} = G_{stand} + P_{AUT} - P_{stand}$$

$G_{AUT}$  : Gain of AUT

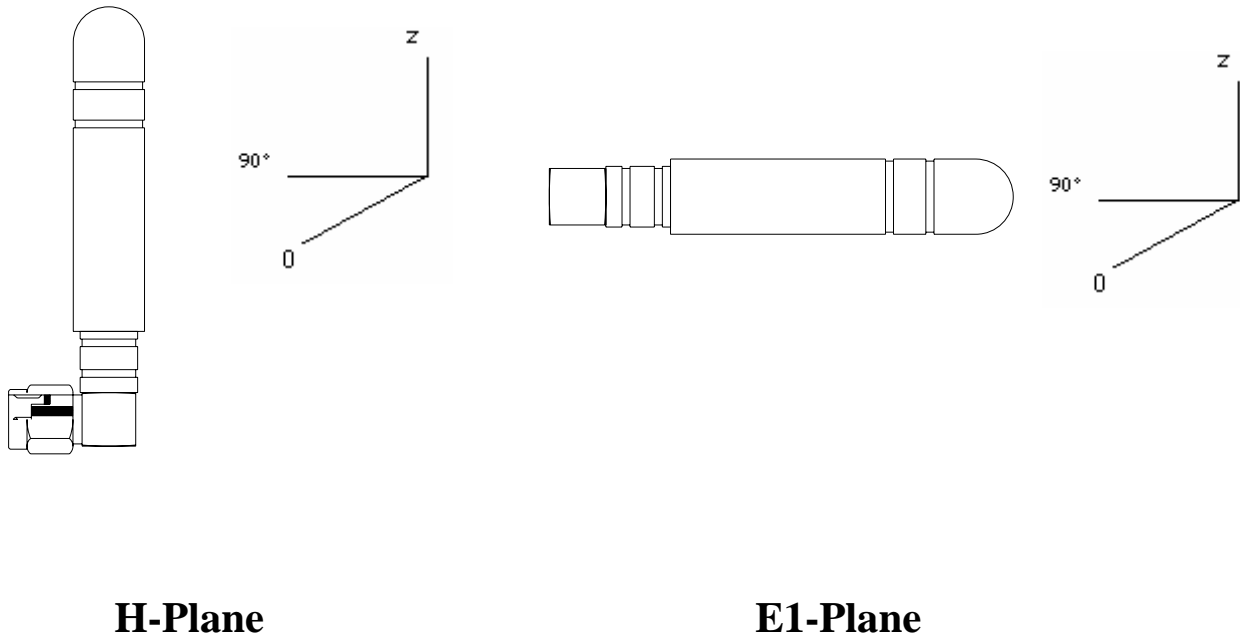
$G_{stand}$  : Gain of Standard Gain Antenna

$P_{AUT}$  : Measured Power of AUT

$P_{stand}$  : Measured Power of Standard Gain Antenna

- d . The scanning method is CW wave with 6 degree by one step.
- e . We measure the radiation pattern in the free space situation at the lowest, middle and highest frequency for the H(X-Y) 、E1(Y-Z) planes, which defined in figure next page.

**(3) Plane definition :**

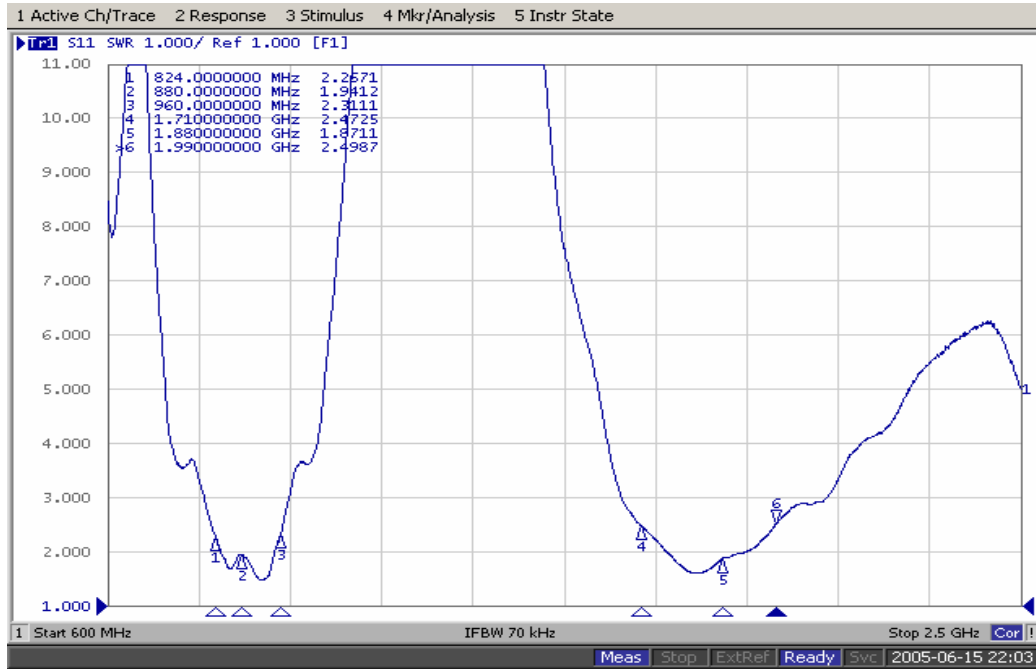


**Fig.3 The plane definition for H and E1 planes.**

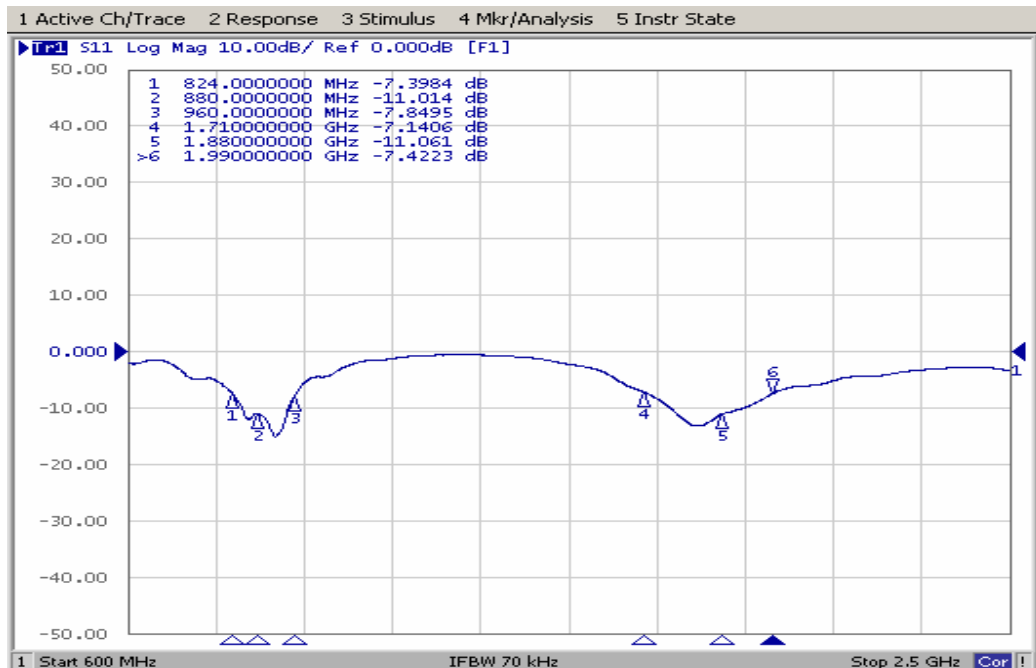
<b>DRAWING :</b> RUF	<b>DESIGNED BY :</b> Jeffery	<b>CHECKED BY :</b> Jason	<b>APPROVED BY :</b> D.S.M
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>X.XX=</b>	<b>Part No.</b> 112010003
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

## 4 . VSWR and Return loss :

### 4 – 1 VSWR Value



### 4 – 2 Return loss :



DRAWING : <b>RUF</b>	DESIGNED BY : <b>Jeffery</b>	CHECKED BY : <b>Jason</b>	APPROVED BY : <b>D.S.M</b>
UNLESS OTHER SPECIFIED TOLERANCES ON :		TITLE:	<b>SPK-WA-WTH43003</b>
X=	X.X=	X.XX=	Part No. <b>112010003</b>
REV. : A1	UNIT : mm	Document No.	

	<b>Frequency (MHz)</b>				
<b>VSWR</b>	<b>824MHz</b>	<b>960MHz</b>	<b>1710MHz</b>	<b>1880MHz</b>	<b>1990MHz</b>
<b>Value</b>	<b>≤3.0</b>	<b>≤3.0</b>	<b>≤3.0</b>	<b>≤3.0</b>	<b>≤3.0</b>

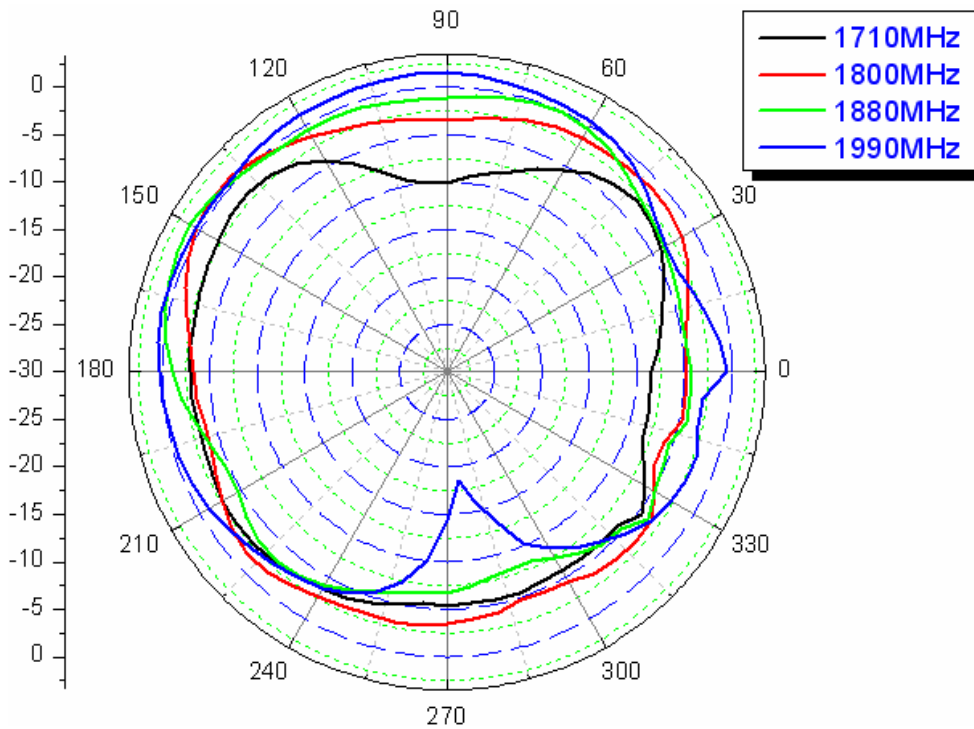
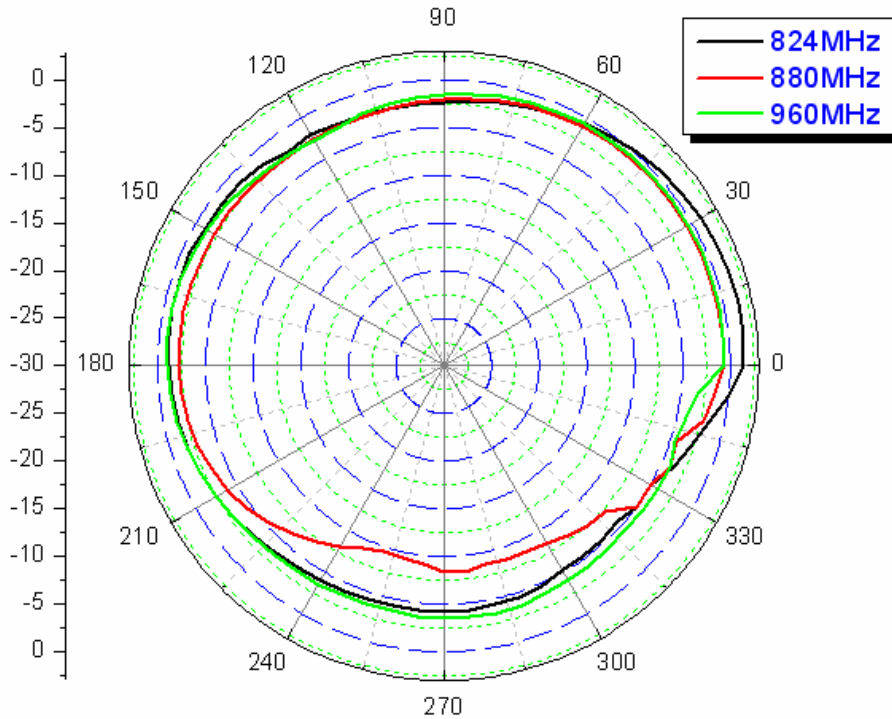
### 5. Gain and Radiation pattern :

#### 5 – 1 Antenna Gain :

<b>Frequency (MHz)</b>	<b>H Plane</b>			<b>E1 Plane</b>		
<b>Unit dBi</b>	<b>Max.</b>	<b>Min.</b>	<b>Avg.</b>	<b>Max.</b>	<b>Min.</b>	<b>Avg.</b>
<b>824</b>	1.52	-5.61	-1.64	-0.45	-10.65	-4.09
<b>880</b>	-0.60	-9.54	-2.94	-1.88	-12.53	-4.42
<b>960</b>	-0.42	-4.52	-2.06	-1.36	-10.19	-4.47
<b>1710</b>	-1.89	-10.09	-3.62	-0.65	-13.31	-3.39
<b>1800</b>	0.79	-9.60	-2.60	1.20	-13.02	-2.30
<b>1880</b>	1.16	-10.93	-2.54	1.03	-11.55	-2.98
<b>1990</b>	1.57	-18.53	-1.21	1.44	-15.88	-2.22

<b>DRAWING :</b> <b>RUF</b>	<b>DESIGNED BY :</b> <b>Jeffery</b>	<b>CHECKED BY :</b> <b>Jason</b>	<b>APPROVED BY :</b> <b>D.S.M</b>
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>X.XX=</b>	<b>Part No.</b> <b>112010003</b>
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

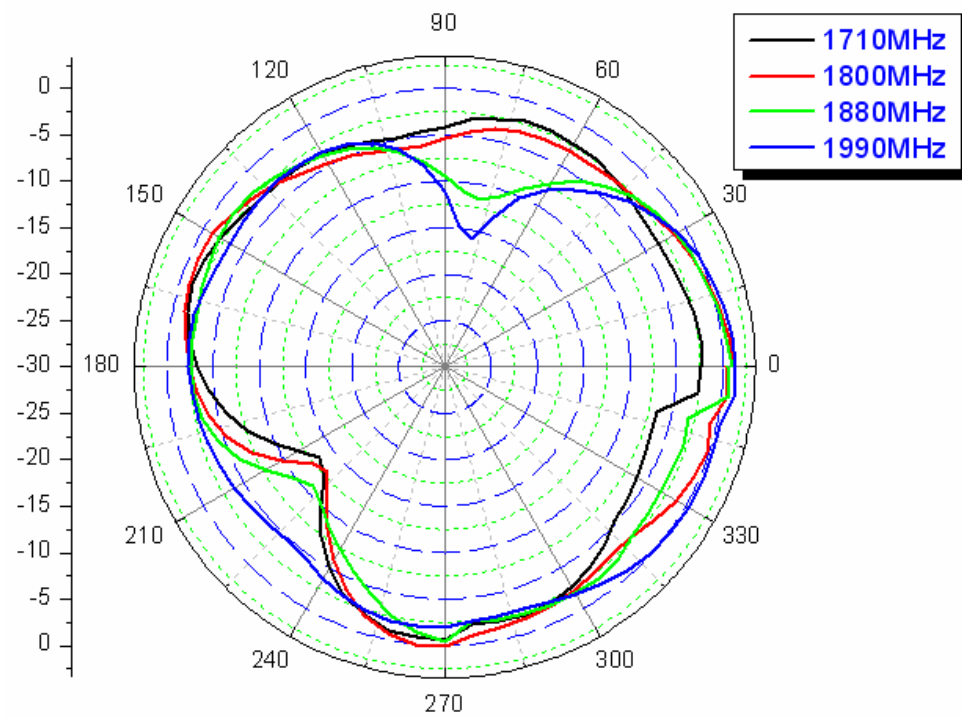
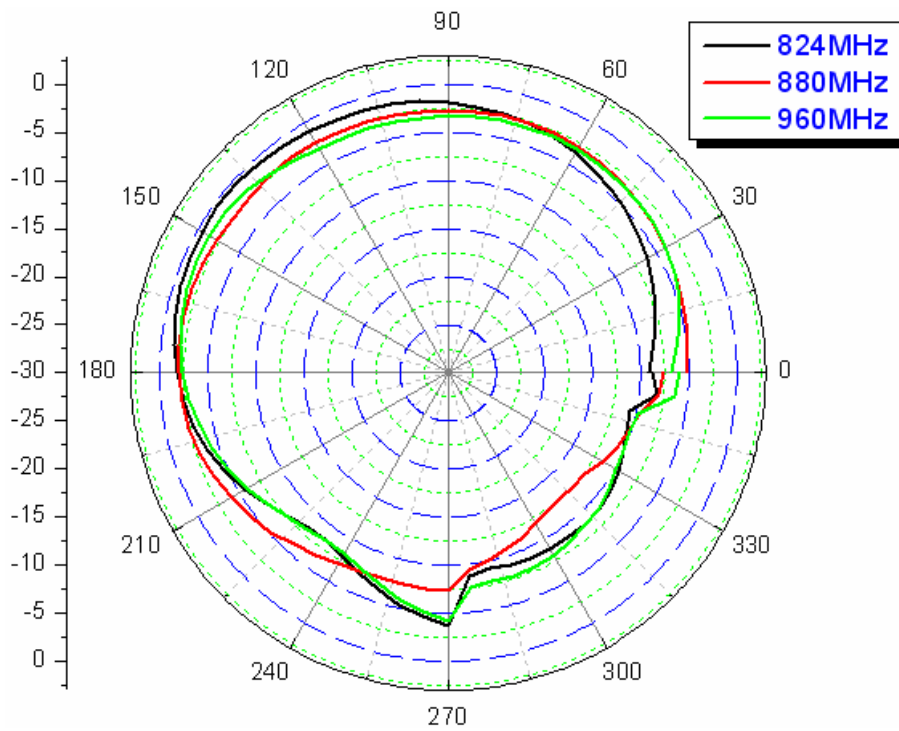
5 - 2 Radiation Patterns :



H-Plane

<b>DRAWING :</b> <b>RUF</b>	<b>DESIGNED BY :</b> <b>Jeffery</b>	<b>CHECKED BY :</b> <b>Jason</b>	<b>APPROVED BY :</b> <b>D.S.M</b>
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>Part No.</b>	<b>112010003</b>
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	

**S. P. K. ELECTRONICS CO., LTD.**



E1-Plane

<b>DRAWING :</b> <b>RUF</b>	<b>DESIGNED BY :</b> <b>Jeffery</b>	<b>CHECKED BY :</b> <b>Jason</b>	<b>APPROVED BY :</b> <b>D.S.M</b>
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
<b>X=</b>	<b>X.X=</b>	<b>Part No.</b>	<b>112010003</b>
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	



**6. Mechanical Specification :**

**6-1. Mechanical Configuration :**

The appearance of the antenna is according to drawing Figure 6 - 1.

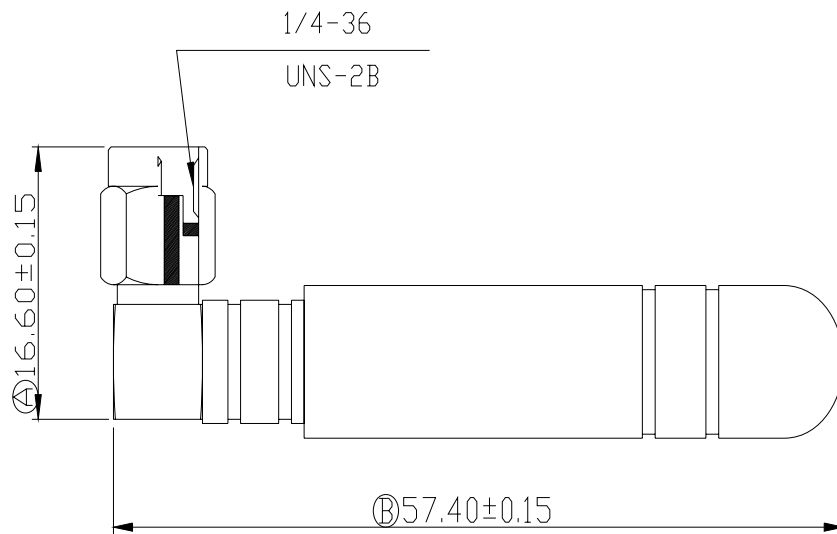


Figure 6-1 Antenna drawing

<b>DRAWING :</b> RUF	<b>DESIGNED BY :</b> Jeffery	<b>CHECKED BY :</b> Jason	<b>APPROVED BY :</b> D.S.M
<b>UNLESS OTHER SPECIFIED TOLERANCES ON :</b>		<b>TITLE:</b>	<b>SPK-WA-WTH43003</b>
X=	X.X=	X.XX=	<b>Part No.</b> 112010003
<b>REV. : A1</b>	<b>UNIT : mm</b>	<b>Document No.</b>	