

SPK ELECTRONICS CO., LTD.

SPK-GGSM-W001

規格書

Specification

客 戶：

Customer

品 名： GSM + GPS Active combo Antenna

Part name

型 號： SPK-GGSM-W001

Model Name

SPK ELECTRONICS CO., LTD.

SPECIFICATION LIST			TYPE OF PRODUCT		
			GPS+GSM Antenna		
ITEM	INDEX	PAGE			
A	概述 Introduction.....	3			
B	結構與材料 Structure and Material.....	3			
C	外型尺寸 Dimension.....	3			
D	電氣特性 Electrical Characteristics.....	4~5			
E	產品測試條件 Product Testing Conditions.....	5			
F	天線電氣性能測試條件 Antenna Electrical Characteristics Test Conditions.....	5			
G	天線電氣性能測試報告 Antenna Electrical Characteristics Test Report.....	6~22			
<div style="border: 2px solid red; border-radius: 15px; padding: 10px; display: inline-block; color: red; font-weight: bold;">RoHS Compliant Parts</div>					
					Approvals
Rev	Date	Description	Edited by	Prepared	Hui
01	2009.11.23	NEW RELEASE	Hui	Checked	GWP
02	2009.12.01	CHANGE GSM ANTENNA TEST RESULT	Hui	Approved	Jeff
				Issued No	1.0
				Sheet	2 OF 22

Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 3/22
-----------------	-----------------	-------------

A. 概述 Introduction

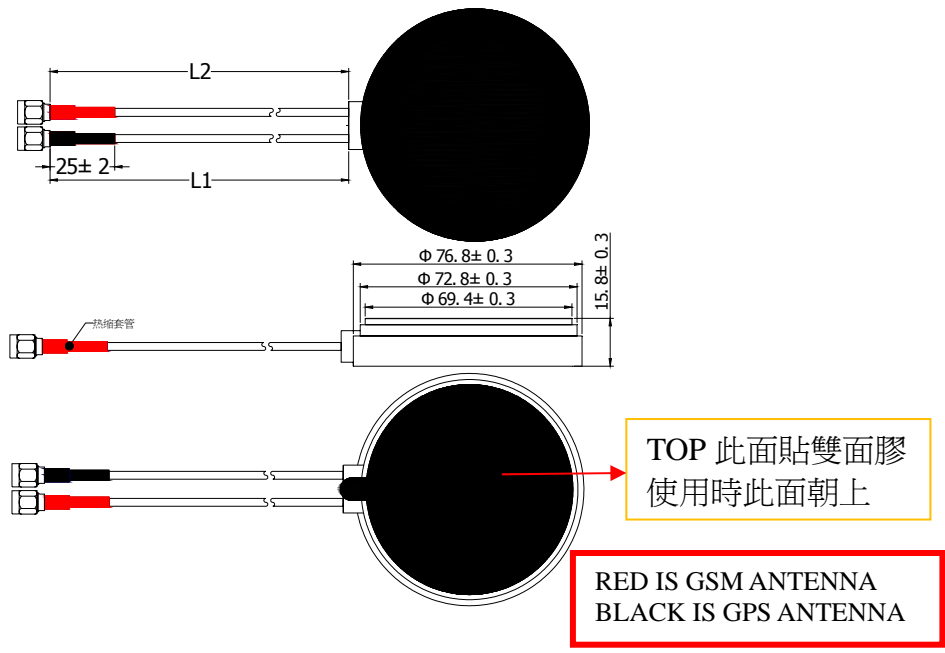
GPS 主動天線系列產品用於 GPS 產品中，採用設計低雜訊放大電路，產品外型呈扁平狀小型結構，性能具有低反射損耗、軸比小、增益高的特點;本產品採用的工藝和材料符合 RoHS 要求。

GPS active antenna and its series are designed to be used for GPS products. The antenna outline is compact size, featuring low RL, low Axial Ratio but high gain, etc. Pb-free, RoHS compliant.

B. 結構及材料 Structure and Material

No	Part Name 名稱	規格型號 SPEC
a	Antenna 天線	Dielectric Ceramics
b	PCB 電路板	FR-4
c	Shielding 隔離罩	Tinplate
d	Cable 電纜線	RG174/U 3M or 5M or Other
e	Connector 接頭形式	SMA or Other

C. 外型尺寸 Dimension



SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 4/22
-----------------	-----------------	-------------

D. 電氣性能 Electrical Characteristics

a. 天線特性 Antenna Electrical Characteristics

特性 / 天線	GPS
衛星頻率 Satellite Frequency	1575.42 ±1.023MHz
電壓駐波比 V.S.W.R	1.5:1
頻寬 Band Width	10 MHz
阻抗 Impedence	50 ohm
最高增益 Peak Gain	5.0dBic (Based on 70×70 mm ground plane)
天線極化 Polarization	RHCP

特性 / 天線	GSM
頻率範圍 Frequency Range	824~894MHz/1710~2170 MHz
電壓駐波比 V.S.W.R	2.0:1
阻抗 Impedence	50 ohm
增益 Gain	1 dBi Typical without cable & connector
方向 Azimuth	Omni-directional
天線極化 Polarization	Linear Polarization

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 5/22
-----------------	-----------------	-------------

b. 低雜訊放大器性能 LNA Electrical Characteristics

特性	型號	GPS LNA
放大器增益 LNA Gain (Without cable)		27dB Typical (Without cable +25°C±10°C)
雜訊係數 Noise Figure		1.5dB (+25°C±10°C)
直流電壓 DC Voltage		3.3 V
輸出駐波比 Output VSWR		1.5 Max
直流電流 DC current		12.5 mA MAX.

E. 產品測試條件 Product Testing Conditions

工作溫度 Working Temp	-25°C ~ +65°C
存儲溫度 Storage Temp	-45°C ~ +85°C
振動 Vibration	Sine sweep 1g(0-p) 10~50~10Hz each axis

F. 天線電氣性能測試條件 Antenna Electrical Characteristics Test Conditions

1. GSM antenna with 3M length cable and SMA connector.
2. GPS antenna at passive with 10cm length cable and SMA connector.

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 6/22
-----------------	-----------------	-------------

G. 天線測試報告 Antenna Test Report

I. SUMMARY :

This report to account for the measurement setup and result of the Antenna.

1. The measurement setup includes s-parameter, pattern, and gain measurement.
2. The measured data for Antenna are presented and analysis.

II. S-PARAMETER MEASUREMENT :

A. Reflection coefficient :

(a) Instrument : Network Analyzer.

(b) Setup :

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

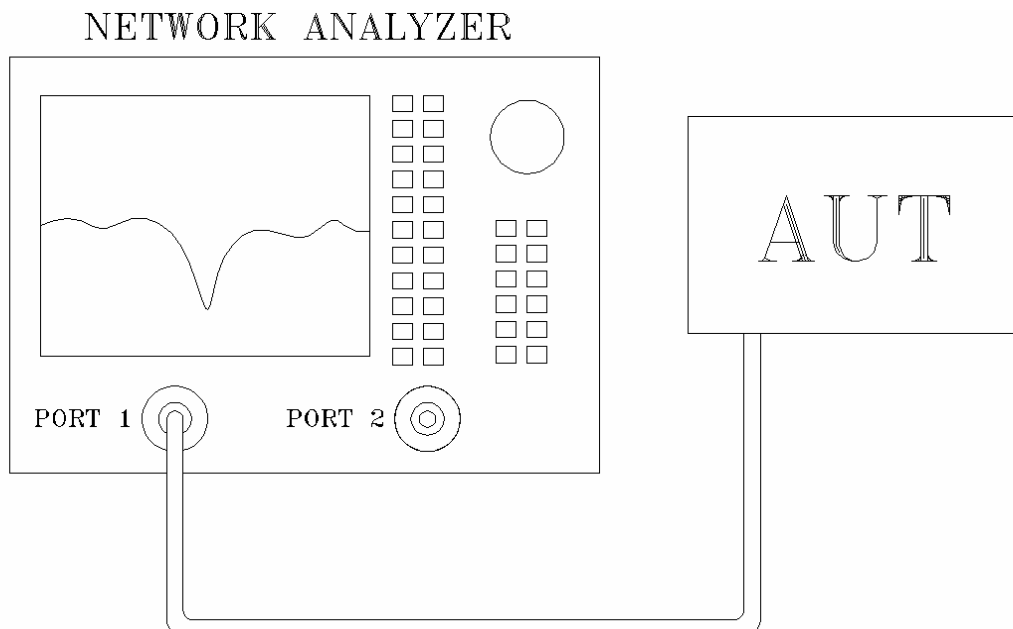


Fig.1 Antenna measured in Network Analyzer

SPK ELECTRONICS CO., LTD.

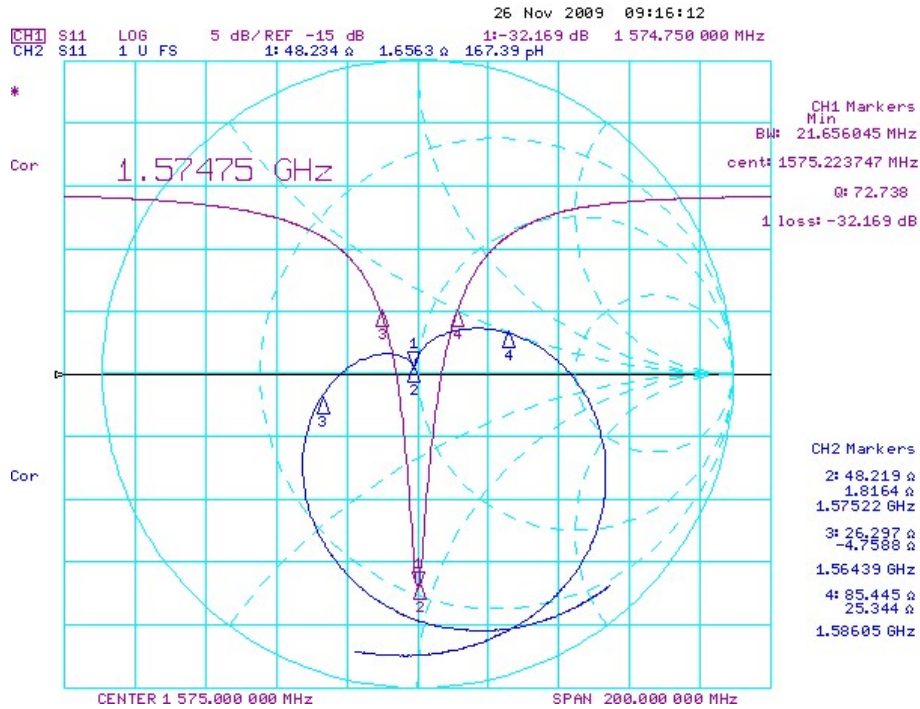
TYPE OF PRODUCT

GPS+GSM Antenna

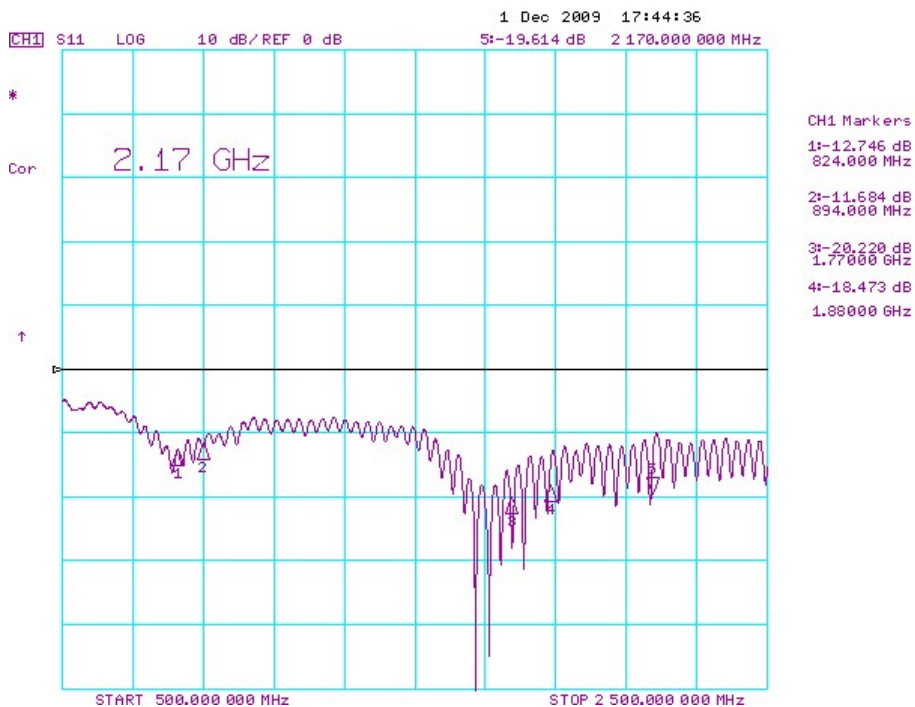
PAGE : 7/22

III. S-PARAMETER TEST RESULT :

A. GPS



B. GSM



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT Antenna	GPS+GSM	PAGE : 8/22
----------------------------	---------	-------------

III. THE TEST INFORMATION IN ANECHOIC CHAMBER

A. Measurement System:

- (a) Instruments: anechoic antenna, network analyzer, standard gain horns antenna.
- (b) Anechoic chamber description:
 - (1) The anechoic chamber is a far-field measurement system with size of 3.25M*2.84M*6.4M. The quiet zone of this chamber shall be greater than 70cm @ 0.9GHz, 50cm @ 1.8GHz, 44cm @ 2.4GHz, 28cm @ 5.8GHz, 16cm @ 18GHz.
 - (2) Fig.2 shows the interior components of the anechoic chamber. The antenna standard antenna as probe and antenna under test is 3M. The antenna under test is fixed on two step rotators. We control the rotating angle for accurate or rough measurement.

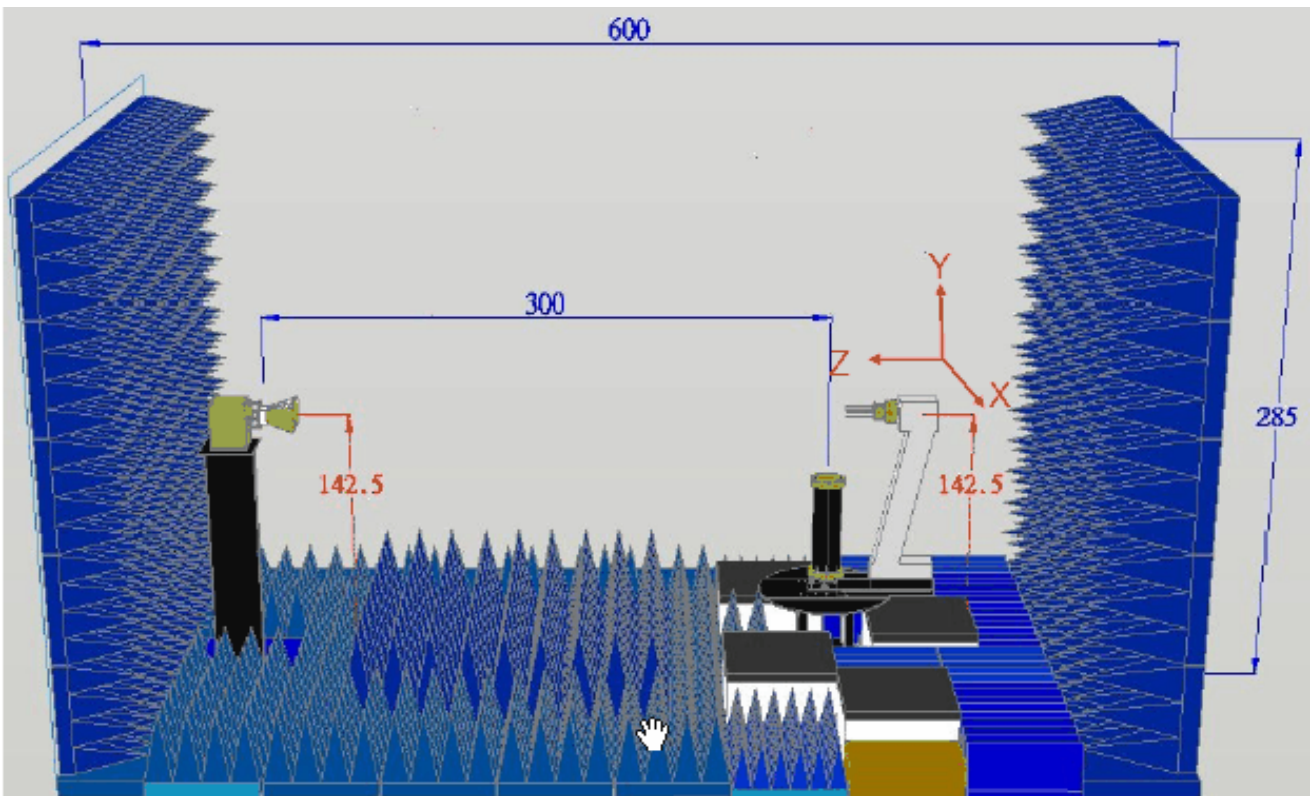


Fig.2 The interior components of the anechoic

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

GPS+GSM Antenna

PAGE : 9/22

- (3) While we measure the radiation patterns by rotating AUT with 360 degrees phi axis along 180 degrees theta axis 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

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

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

- (4) The axis defined in the Fig.3.

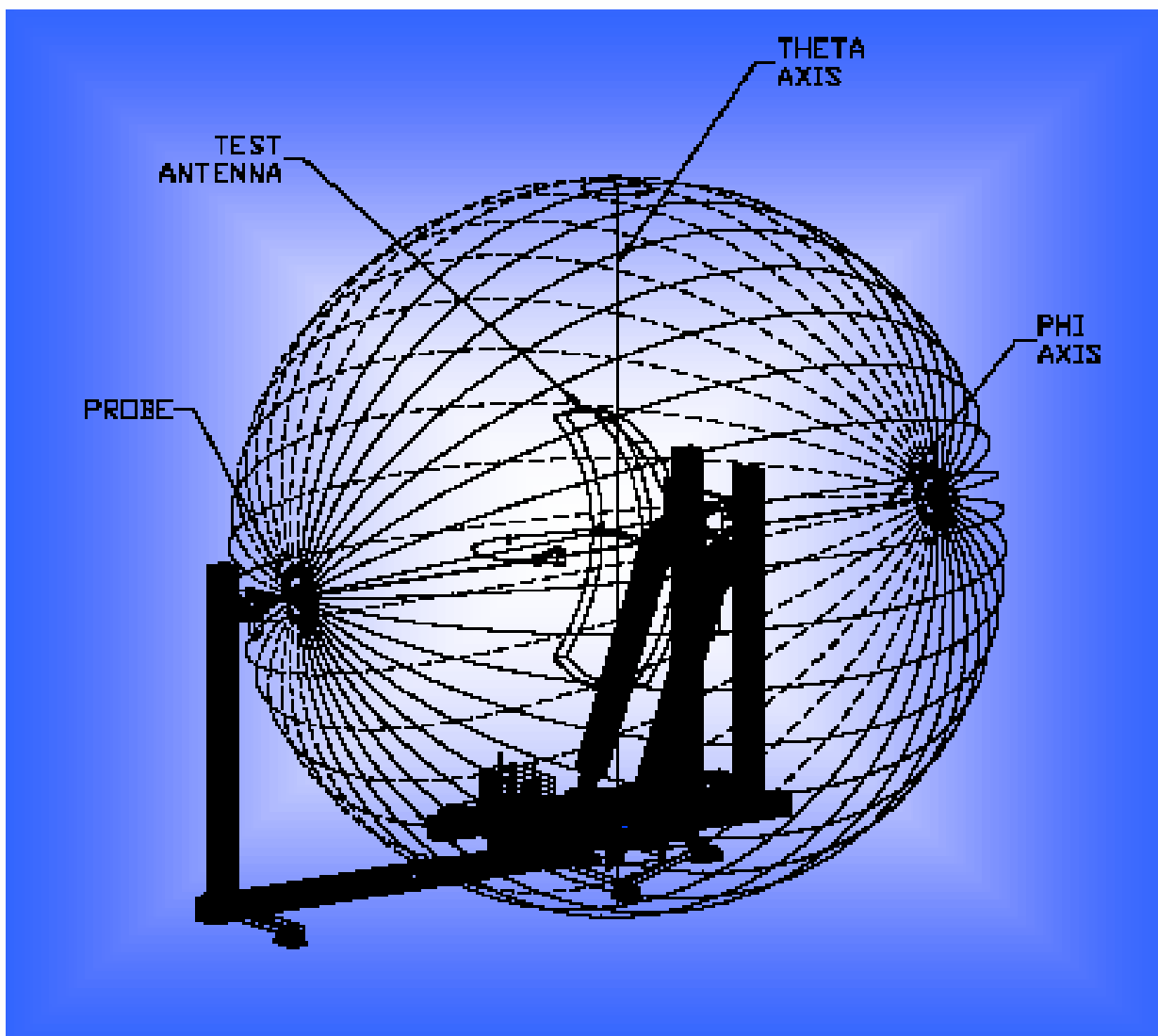


Fig.3 The axis defined

Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

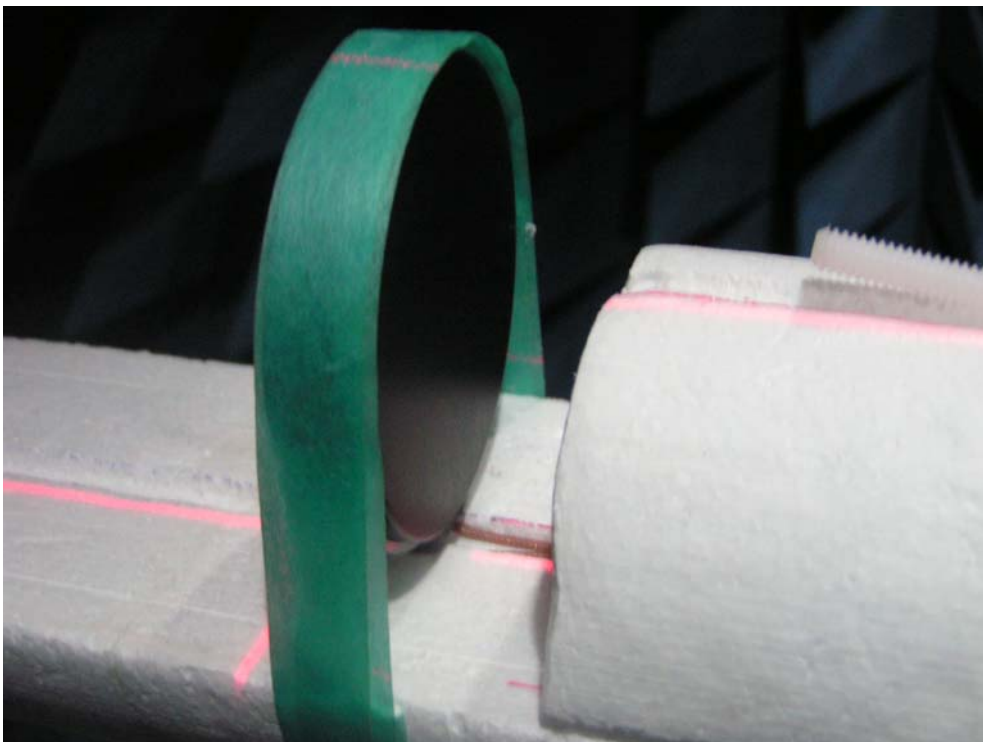
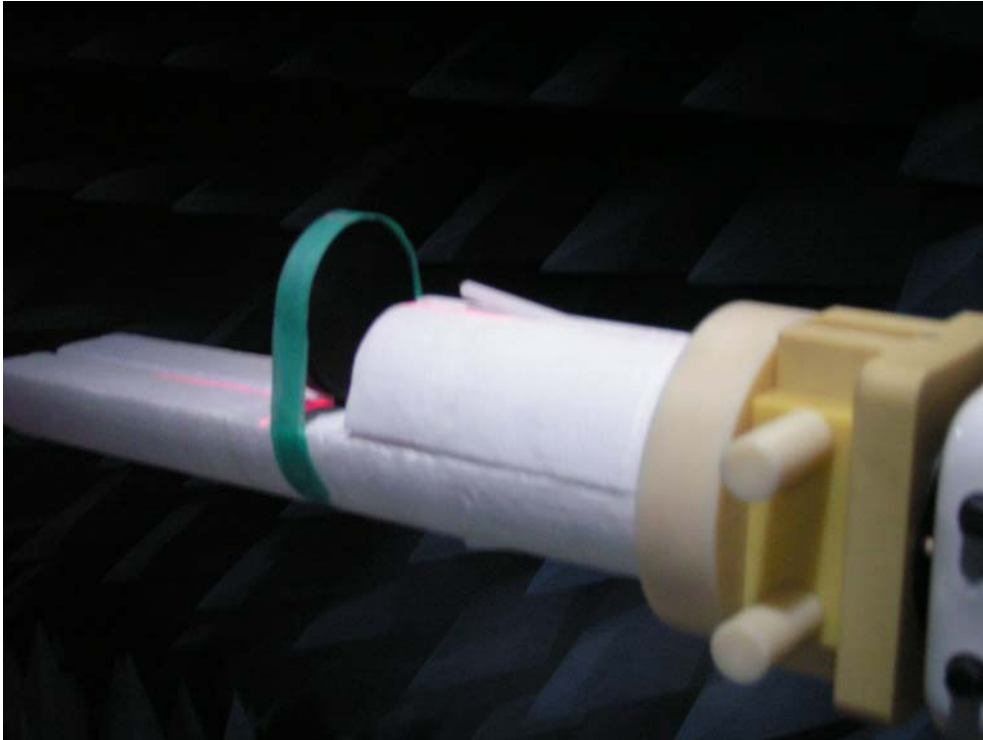
SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

GPS+GSM Antenna

PAGE : 10/22

V. CHAMBER TEST PICTURE



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 11/22
-----------------	-----------------	--------------

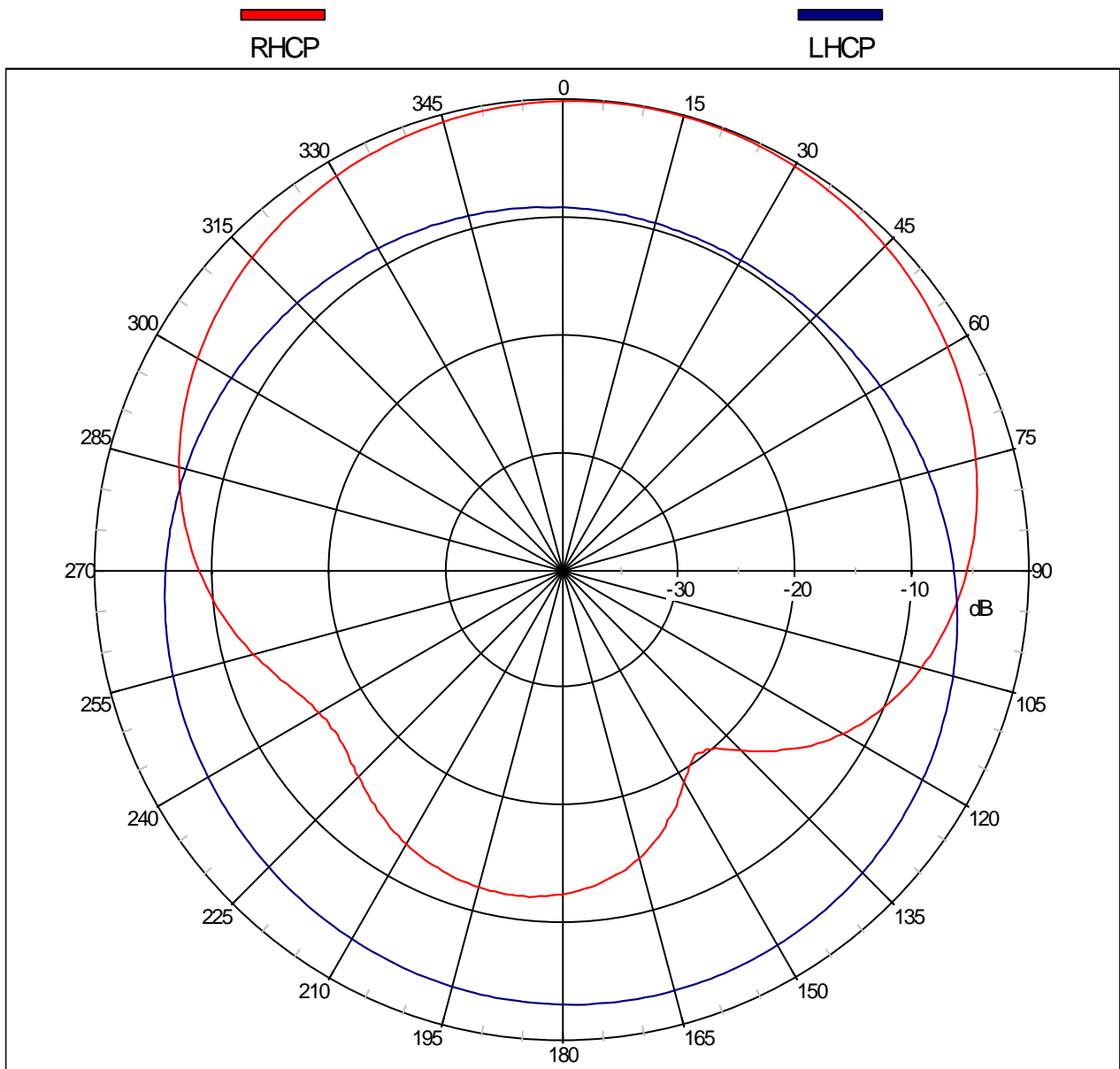
VI. CHAMBER TEST RESULT

A. GPS antenna frequency @ 1575MHz

Antenna Gain : -0.09101 dBic

Axial Ratio : 2.49

Far-field amplitude of GPS+GSM Antenna_Wieson @ GPS1575MHz.NSI



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT	GPS+GSM Antenna	PAGE : 12/22
-----------------	-----------------	--------------

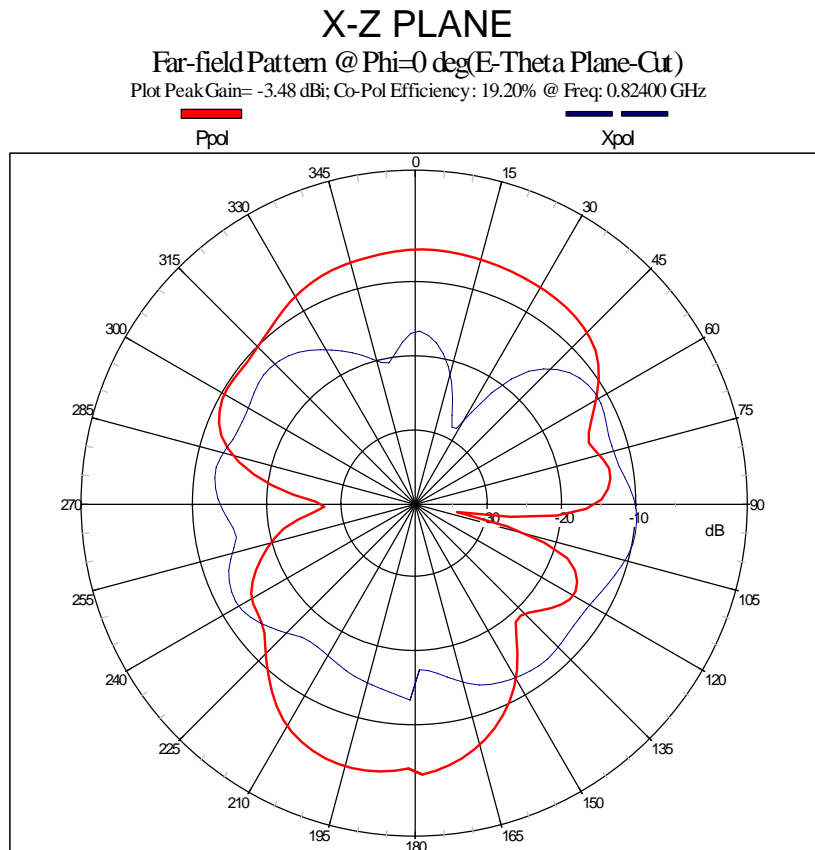
B. GSM antenna frequency @ 824~894MHz、1710~2170MHz

(a) Value

Frequency (GHz)	Total Power Gain(dBi)	Total Efficiency(%)	3D-avgGain(dBi)
0.824	-2.48	19	-7.17
0.838	-0.99	18	-7.41
0.852	-2.01	16	-7.83
0.866	-1.42	22	-6.6
0.880	-0.93	22	-6.59
0.894	-1.16	19	-7.19
1.710	-0.86	26	-5.88
1.744	1.13	31	-5.03
1.846	0.85	28	-5.48
1.880	-0.04	28	-5.58
1.900	-0.15	26	-5.79
1.945	-1.13	24	-6.16
1.990	-1.63	22	-6.56
2.125	-2.4	17	-7.62
2.170	-2.83	15	-8.1

(b) 2D Pattern

(1) 824MHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

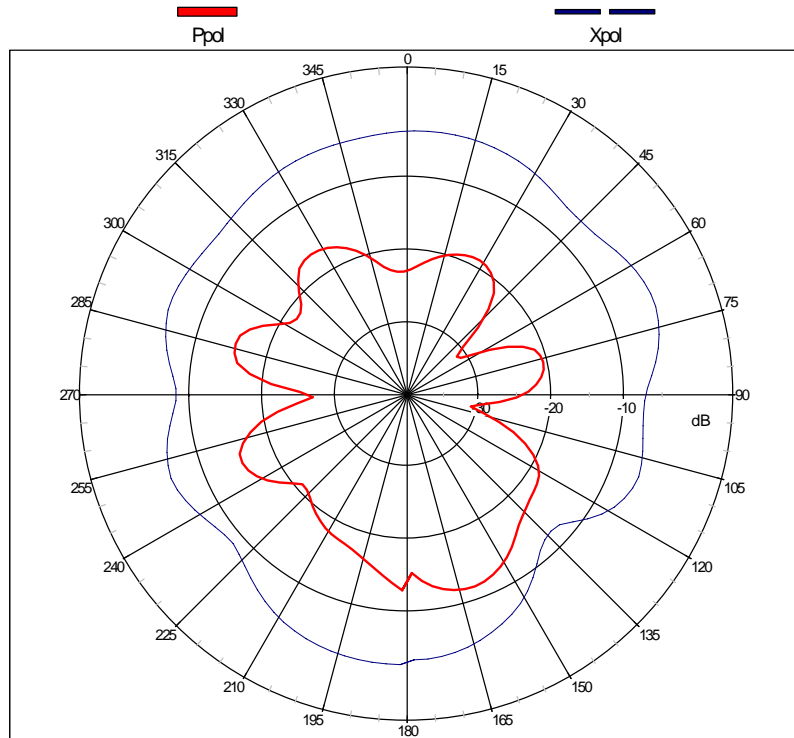
GPS+GSM Antenna

PAGE : 13/22

Y-Z PLANE

Far-field Pattern @ $\Phi=90$ deg (E-Theta Plane-Cut)

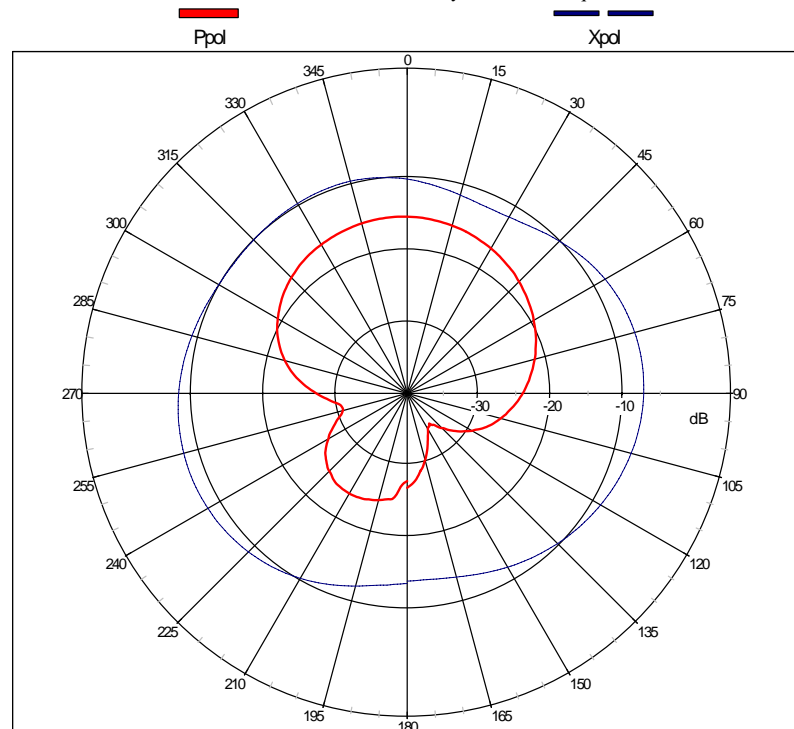
Plot Peak Gain = -2.94 dBi; Co-Pol Efficiency: 19.20% @ Freq: 0.82400 GHz



X-Y PLANE

Far-field Pattern @ $\Theta=90$ deg (E-Phi Plane-Cut)

Plot Peak Gain = -7.24 dBi; Co-Pol Efficiency: 19.20% @ Freq: 0.82400 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

GPS+GSM Antenna

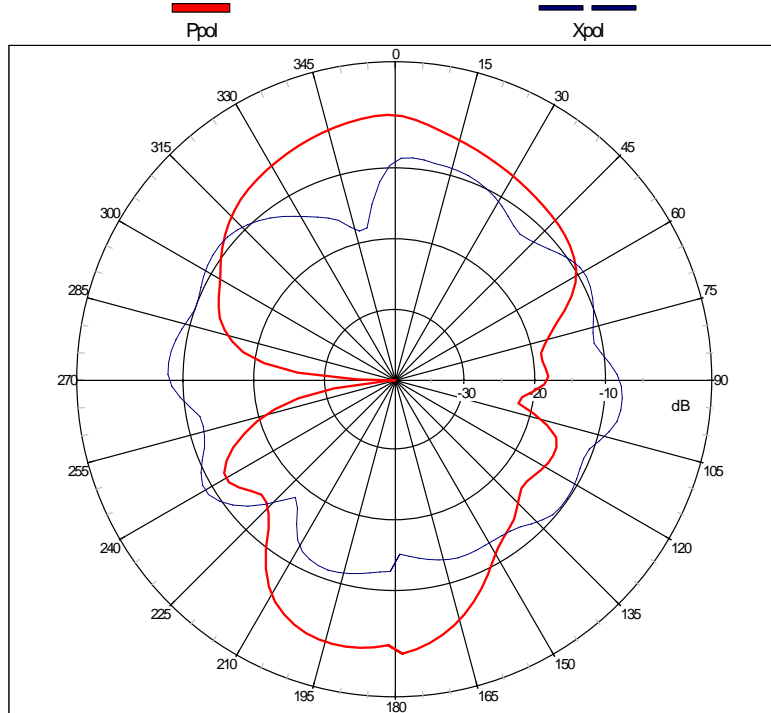
PAGE : 14/22

(2) 880MHz

X-Z PLANE

Far-field Pattern @ $\Phi=0$ deg (E-Theta Plane-Cut)

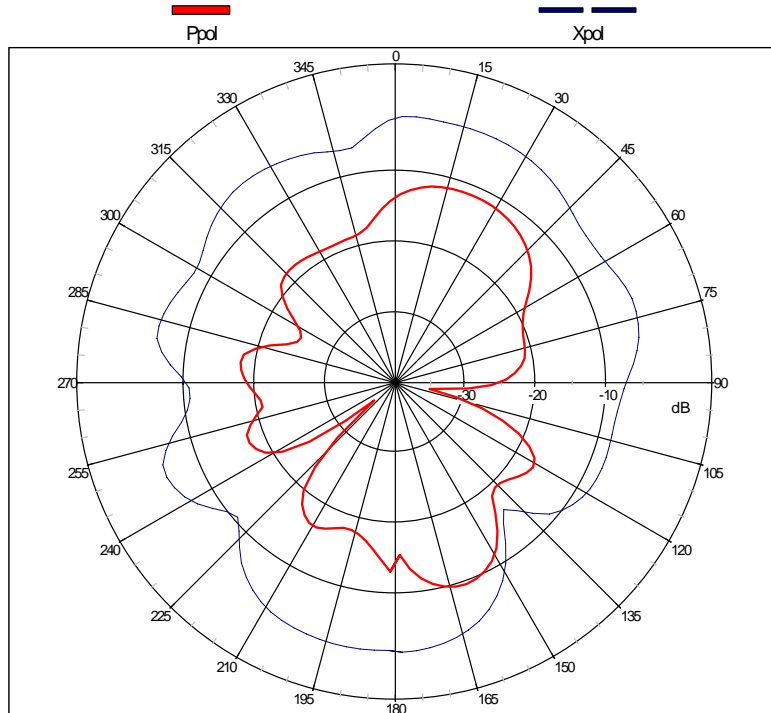
Plot Peak Gain = -1.40 dBi; Co-Pol Efficiency: 21.95% @ Freq: 0.88000 GHz



Y-Z PLANE

Far-field Pattern @ $\Phi=90$ deg (E-Theta Plane-Cut)

Plot Peak Gain = -1.93 dBi; Co-Pol Efficiency: 21.95% @ Freq: 0.88000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

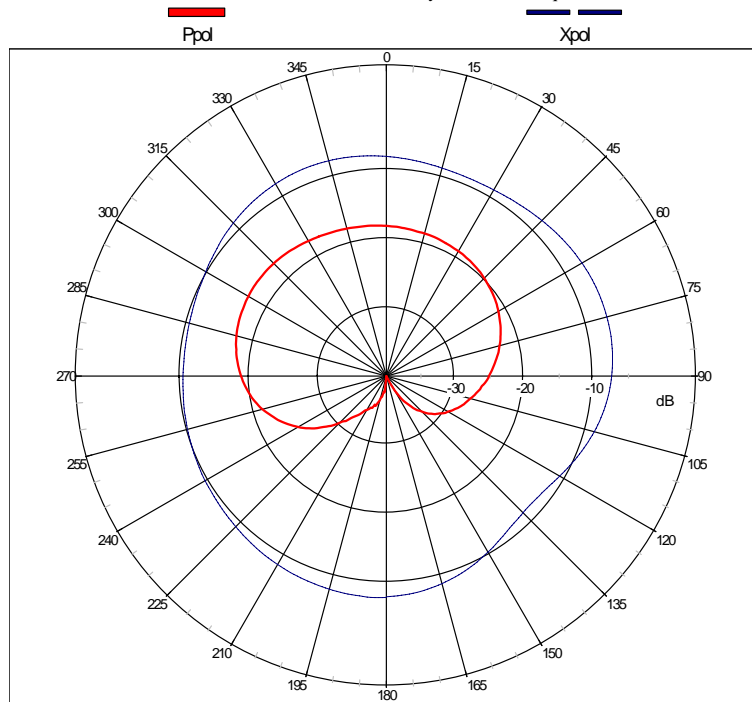
TYPE OF PRODUCT

GPS+GSM Antenna

PAGE : 15/22

X-Y PLANE

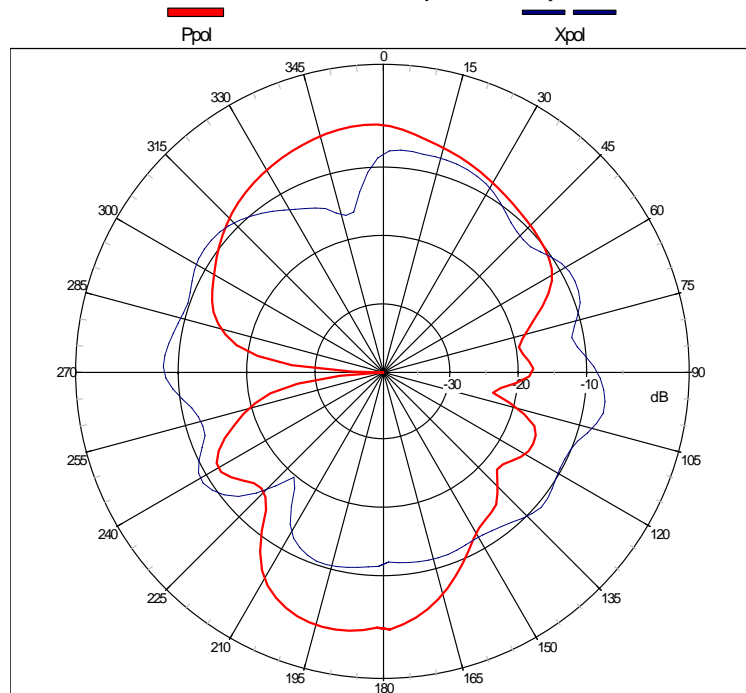
Far-field Pattern @ Theta=90 deg(E-Phi Plane-Cut)
Plot Peak Gain=-6.99 dBi; Co-Pol Efficiency: 21.95% @ Freq: 0.88000 GHz



(3) 894MHz

X-Z PLANE

Far-field Pattern @ Phi=0 deg(E-Theta Plane-Cut)
Plot Peak Gain=-1.79 dBi; Co-Pol Efficiency: 19.11% @ Freq: 0.89400 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

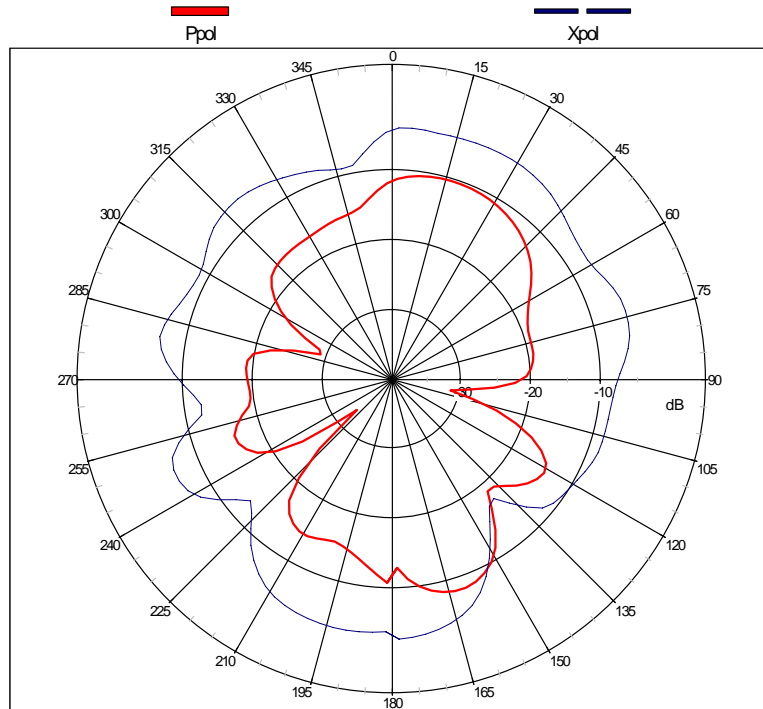
TYPE OF PRODUCT

GPS+GSM Antenna

PAGE : 16/22

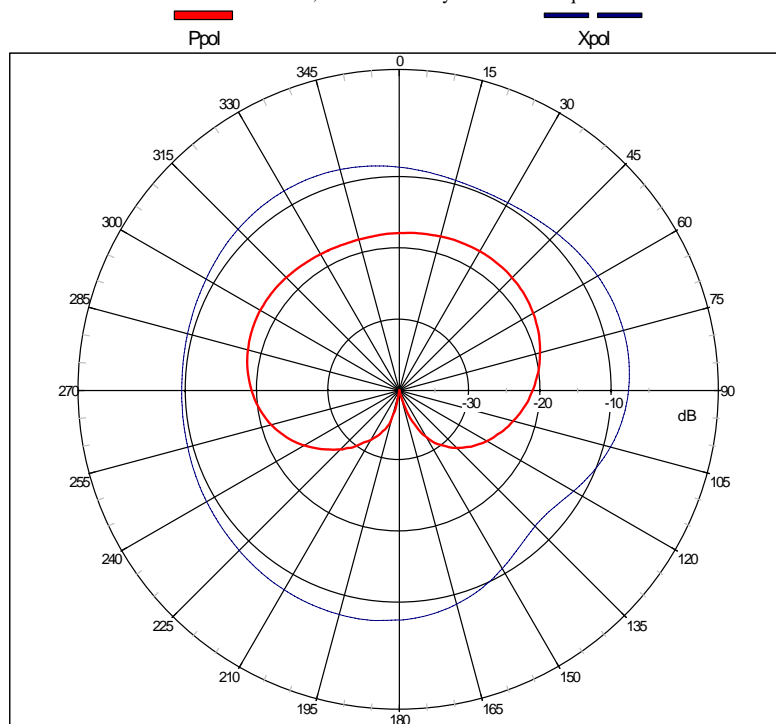
Y-Z PLANE

Far-field Pattern @ Phi=90 deg(E-Theta Plane-Cut)
Plot Peak Gain=-2.98 dBi; Co-Pol Efficiency: 19.11% @ Freq: 0.89400 GHz



X-Y PLANE

Far-field Pattern @ Theta=90 deg(E-Phi Plane-Cut)
Plot Peak Gain=-7.48 dBi; Co-Pol Efficiency: 19.11% @ Freq: 0.89400 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

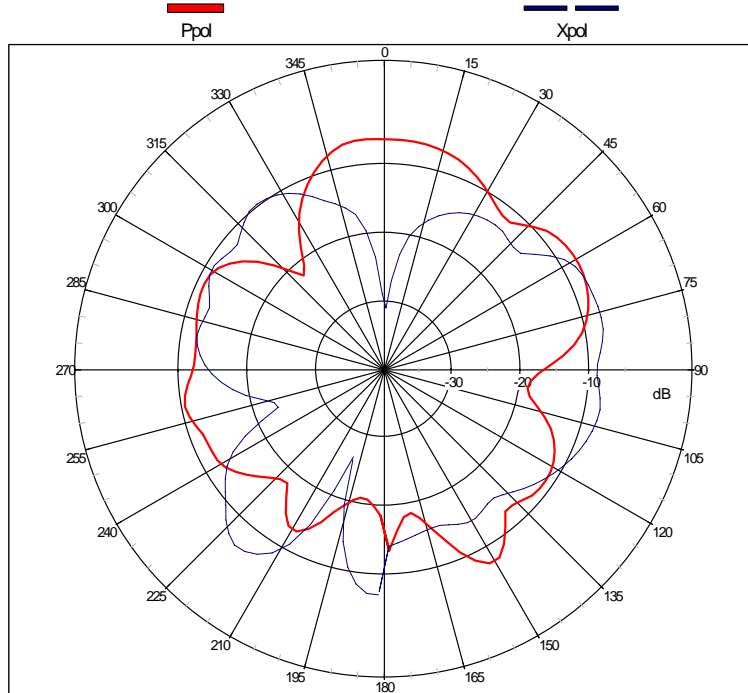
GPS+GSM Antenna

PAGE : 17/22

(4) 1710MHz

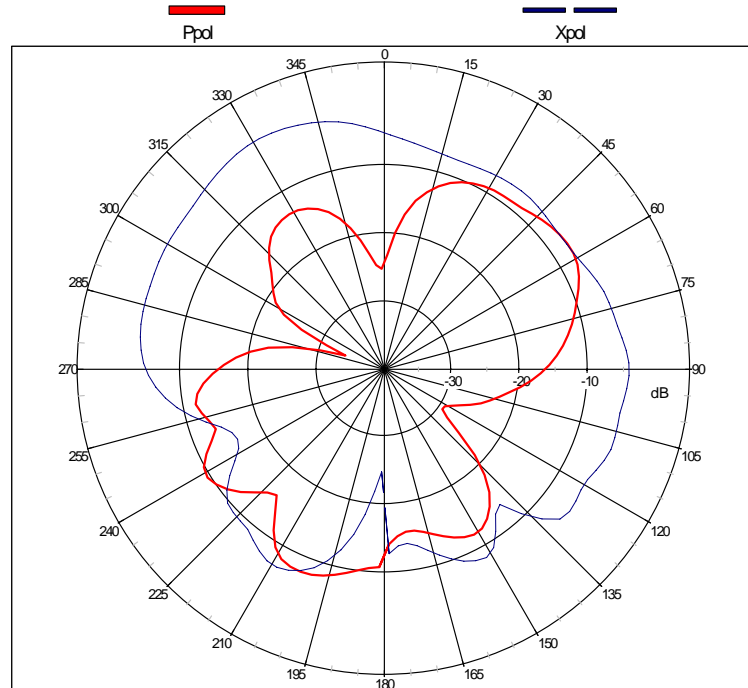
X-Z PLANE

Far-field Pattern @ $\Phi=0$ deg (E-Theta Plane-Cut)
Plot Peak Gain= -6.38 dBi; Co-Pol Efficiency: 25.80% @ Freq: 1.71000 GHz



Y-Z PLANE

Far-field Pattern @ $\Phi=90$ deg (E-Theta Plane-Cut)
Plot Peak Gain= -1.58 dBi; Co-Pol Efficiency: 25.80% @ Freq: 1.71000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

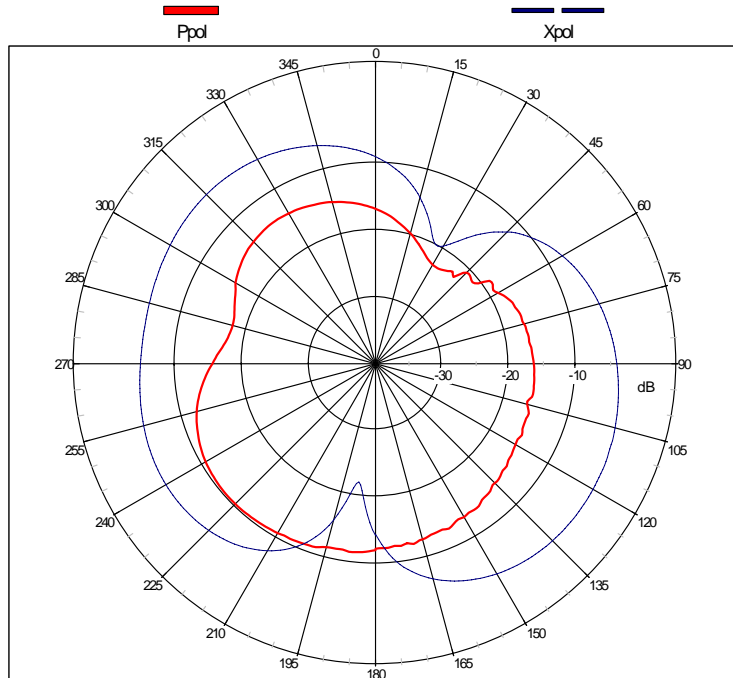
GPS+GSM Antenna

PAGE : 18/22

X-Y PLANE

Far-field Pattern @ Theta=90 deg(E-Phi Plane-Cut)

Plot Peak Gain= -2.56 dBi; Co-Pol Efficiency: 25.80% @ Freq: 1.71000 GHz

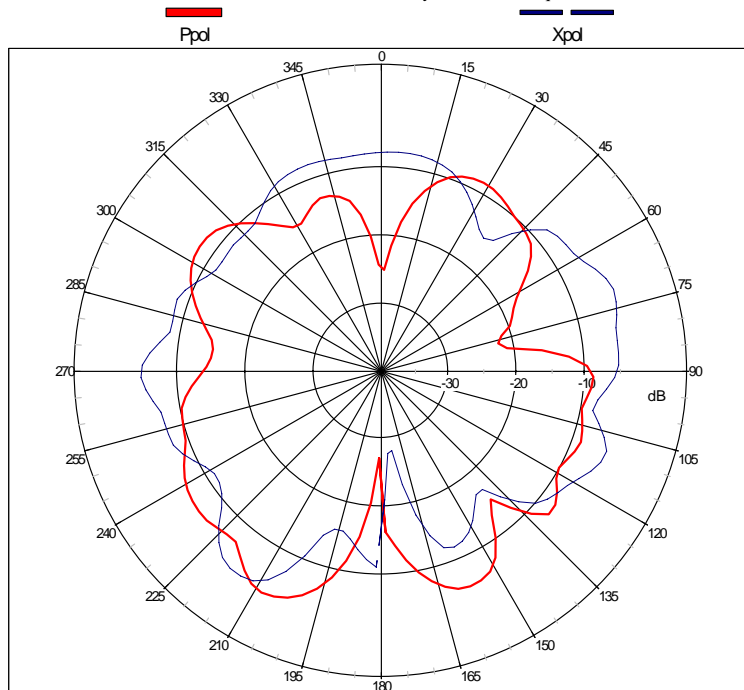


(5) 1880MHz

X-Z PLANE

Far-field Pattern @ Phi=0 deg(E-Theta Plane-Cut)

Plot Peak Gain= -3.15 dBi; Co-Pol Efficiency: 27.67% @ Freq: 1.88000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

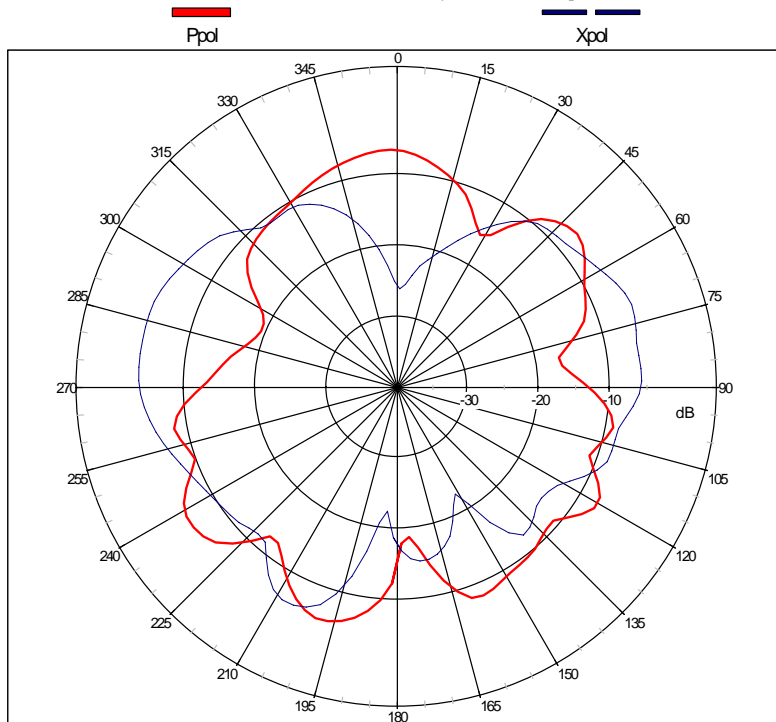
GPS+GSM Antenna

PAGE : 19/22

Y-Z PLANE

Far-field Pattern @ Phi=90 deg(E-Theta Plane-Cut)

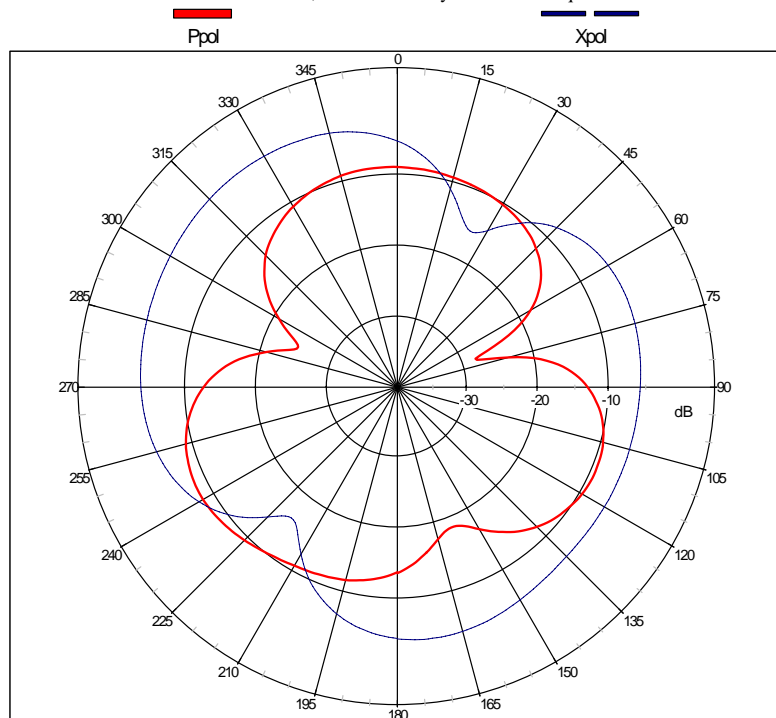
Plot Peak Gain= -3.69 dBi; Co-Pol Efficiency: 27.67% @ Freq: 1.88000 GHz



X-Y PLANE

Far-field Pattern @ Theta=90 deg(E-Phi Plane-Cut)

Plot Peak Gain= -2.43 dBi; Co-Pol Efficiency: 27.67% @ Freq: 1.88000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

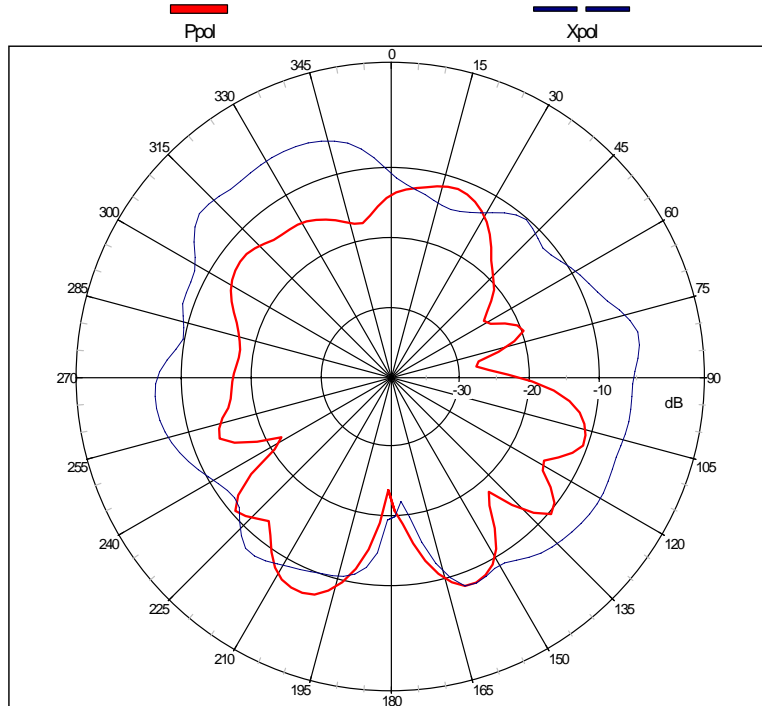
GPS+GSM Antenna

PAGE : 20/22

(6) 1990MHz

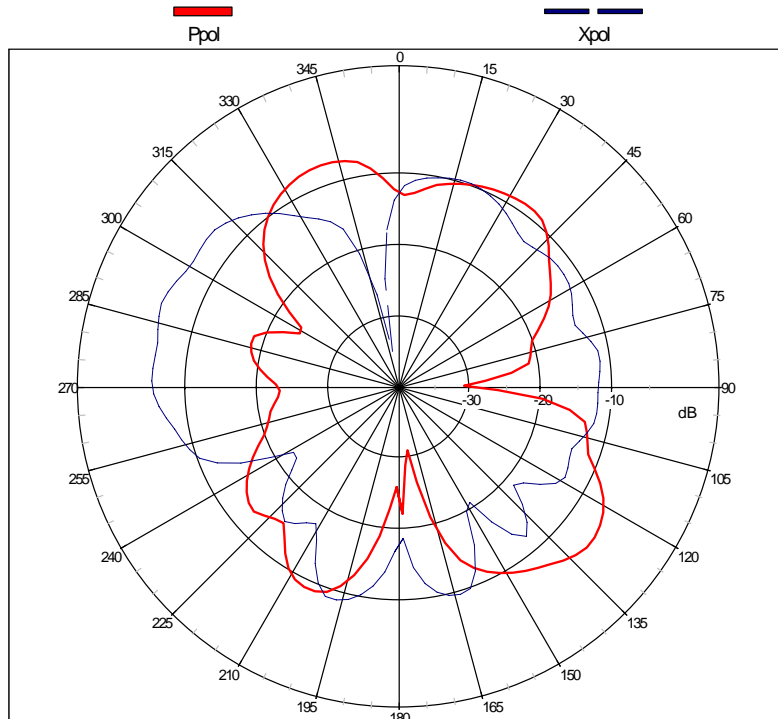
X-Z PLANE

Far-field Pattern @ $\Phi=0$ deg (E-Theta Plane-Cut)
Plot Peak Gain= -3.96 dBi; Co-Pol Efficiency: 22.08% @ Freq: 1.99000 GHz



Y-Z PLANE

Far-field Pattern @ $\Phi=90$ deg (E-Theta Plane-Cut)
Plot Peak Gain= -4.74 dBi; Co-Pol Efficiency: 22.08% @ Freq: 1.99000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

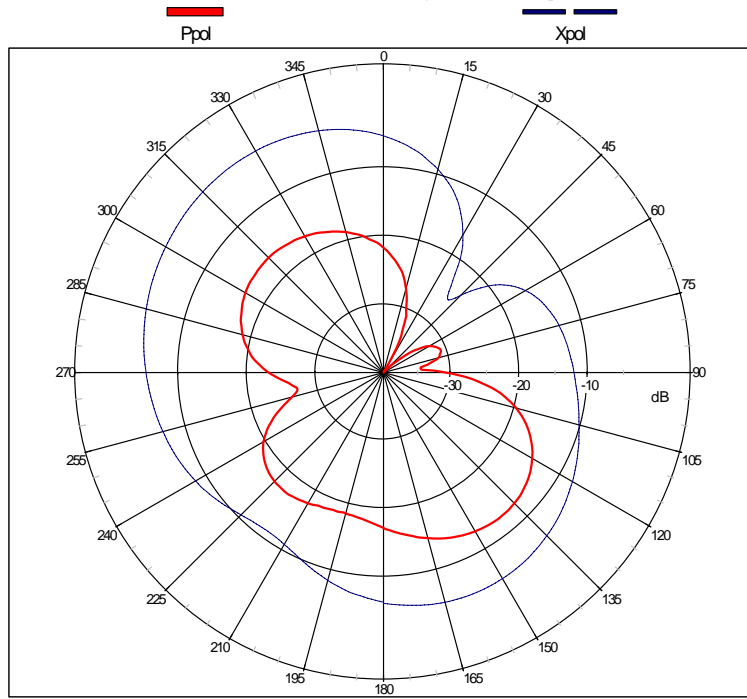
TYPE OF PRODUCT

GPS+GSM Antenna

PAGE : 21/22

X-Y PLANE

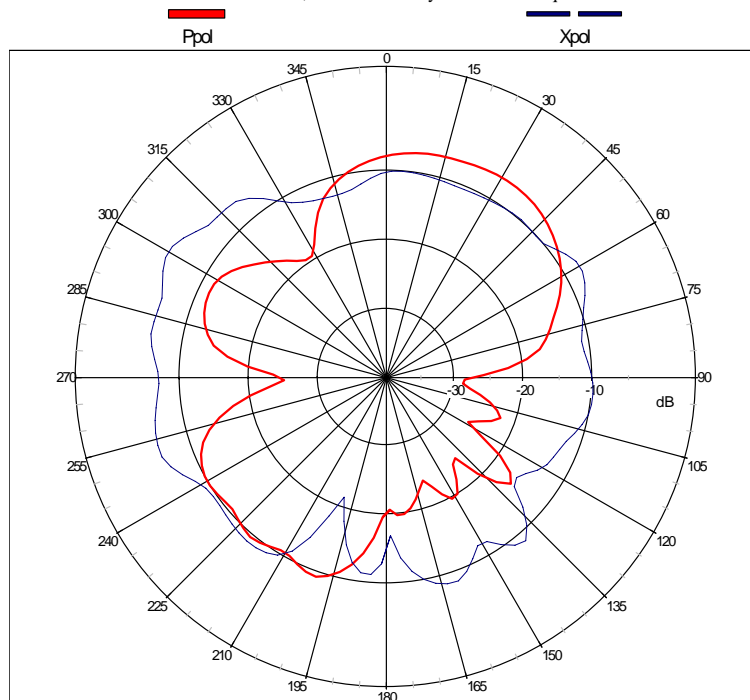
Far-field Pattern @ Theta=90 deg(E-Phi Plane-Cut)
Plot Peak Gain=-2.65 dBi; Co-Pol Efficiency: 22.08% @ Freq: 1.99000 GHz



(7) 2170MHz

X-Z PLANE

Far-field Pattern @ Phi=0 deg(E-Theta Plane-Cut)
Plot Peak Gain=-3.65 dBi; Co-Pol Efficiency: 15.47% @ Freq: 2.17000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>

SPK ELECTRONICS CO., LTD.

TYPE OF PRODUCT

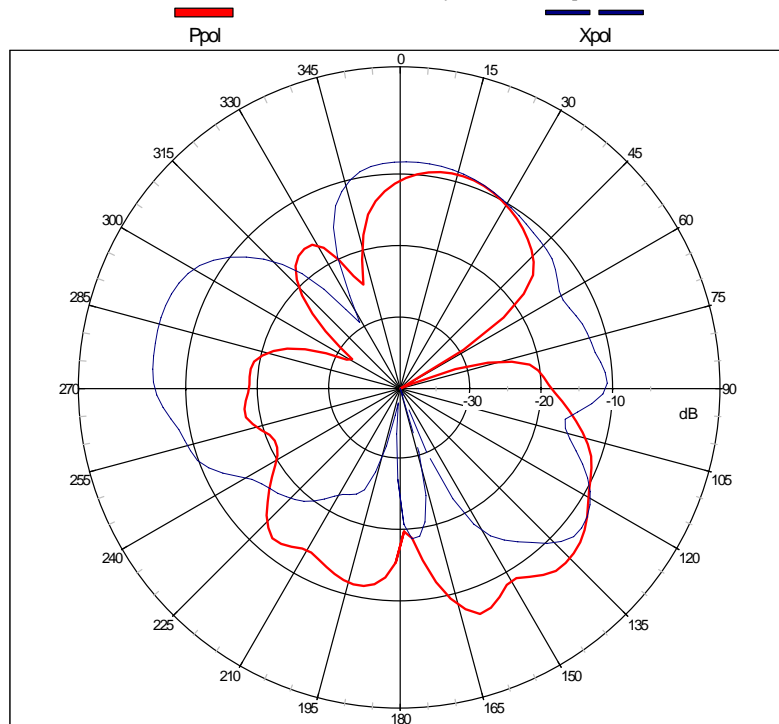
GPS+GSM Antenna

PAGE : 22/22

Y-Z PLANE

Far-field Pattern @ $\Phi=90$ deg (E-Theta Plane-Cut)

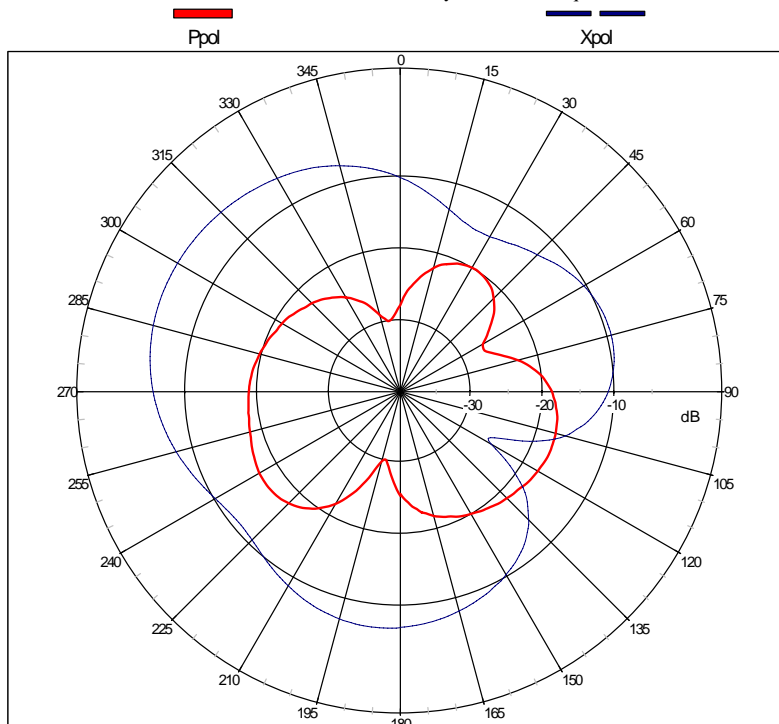
Plot Peak Gain= -5.11 dBi; Co-Pol Efficiency: 15.47% @ Freq: 2.17000 GHz



X-Y PLANE

Far-field Pattern @ $\Theta=90$ deg (E-Phi Plane-Cut)

Plot Peak Gain= -4.22 dBi; Co-Pol Efficiency: 15.47% @ Freq: 2.17000 GHz



Add : 10F,NO.510,SEC.5,CHUNG HSIAO E. RD, TAIPEI, TAIWAN

Tel : 02-2346-2323

Fax : 02-2346-3939

E-mail : spktw@ms34.hinet.net

WEB:<http://www.spkecl.com>