

Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

Granted FCC ID : MSQWL500G

Product name : Wireless Router

Model name : WL-500g

Classification : Mobile Device

(i) Under normal use condition, the antenna is at least 20cm away from the user;

(ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual

Frequency Range : 2.412 GHz ~ 2.462GHz

Supported Channel : 11 Channel

Modulation Skill : DBPSK, DQPSK, CCK, OFDM

Power Type : Powered by Switching Power Adaptor

Manufacturer: DVE

Model: DSA-0101F-05 A

I/P: AC 100-240V, 50-60Hz, 0.3 A, 10VA

O/P: +5VDC, 2A, 10W

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	—	—	f/300	6
1500-100,000	—	—	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	—	—	f/1500	30
1500-100,000	—	—	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{135.207 \times 2.249}{4p(20)^2} = 6.049 \times 10^{-2} \text{ mW / cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{135.207 \times 2.249}{4p}} = 4.919 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.919 cm."

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dBi antenna gain} / 10)$$

$$G = \text{Log}^{-1} (3.52 / 10) = 2.249$$

Input Output Enterprise Corp.	PRODUCT SPECIFICATION	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
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PRODUCT NAME

2.4G ANTENNA WITH RP SMA

PART NUMBER



W201-108-D2

Signed By Customers

Approved By:

供應商： 垠 旺 精 密 股 份 有 限 公 司

TEL:02-2917-7528;FAX:02-2912-1659

台北縣新店市寶興路37號 3樓

Input Output

Enterprise Corp.

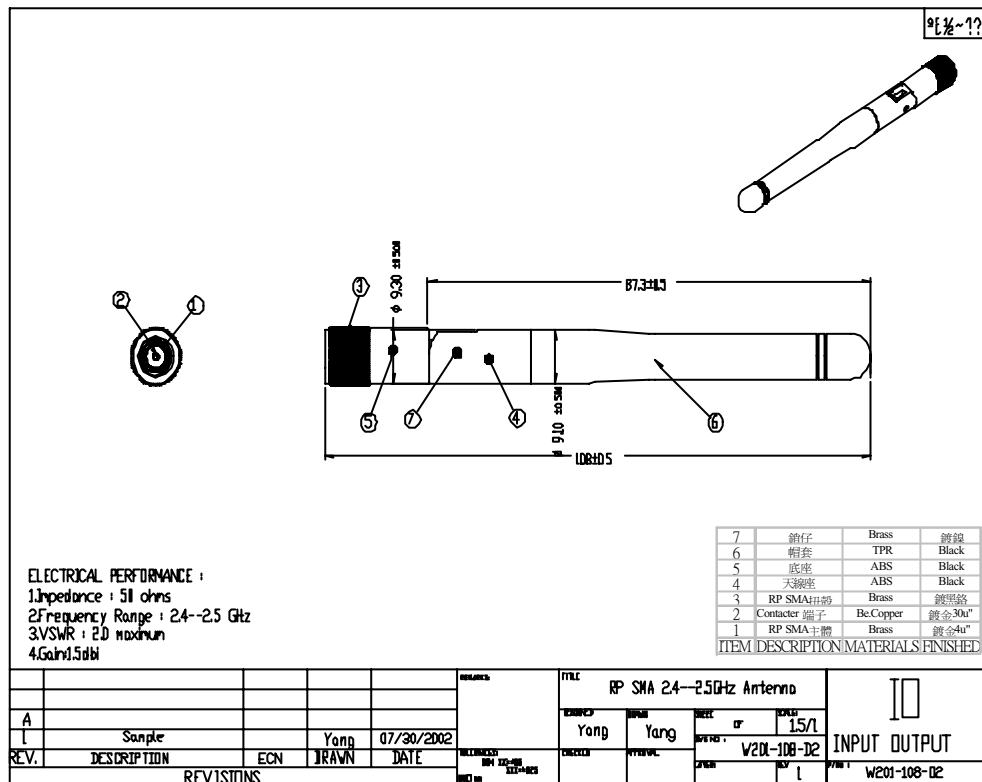
PRODUCT SPECIFICATION

2.4 G ANTENNA WITH RP-SMA PLUG

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



Input Output

Enterprise Corp.

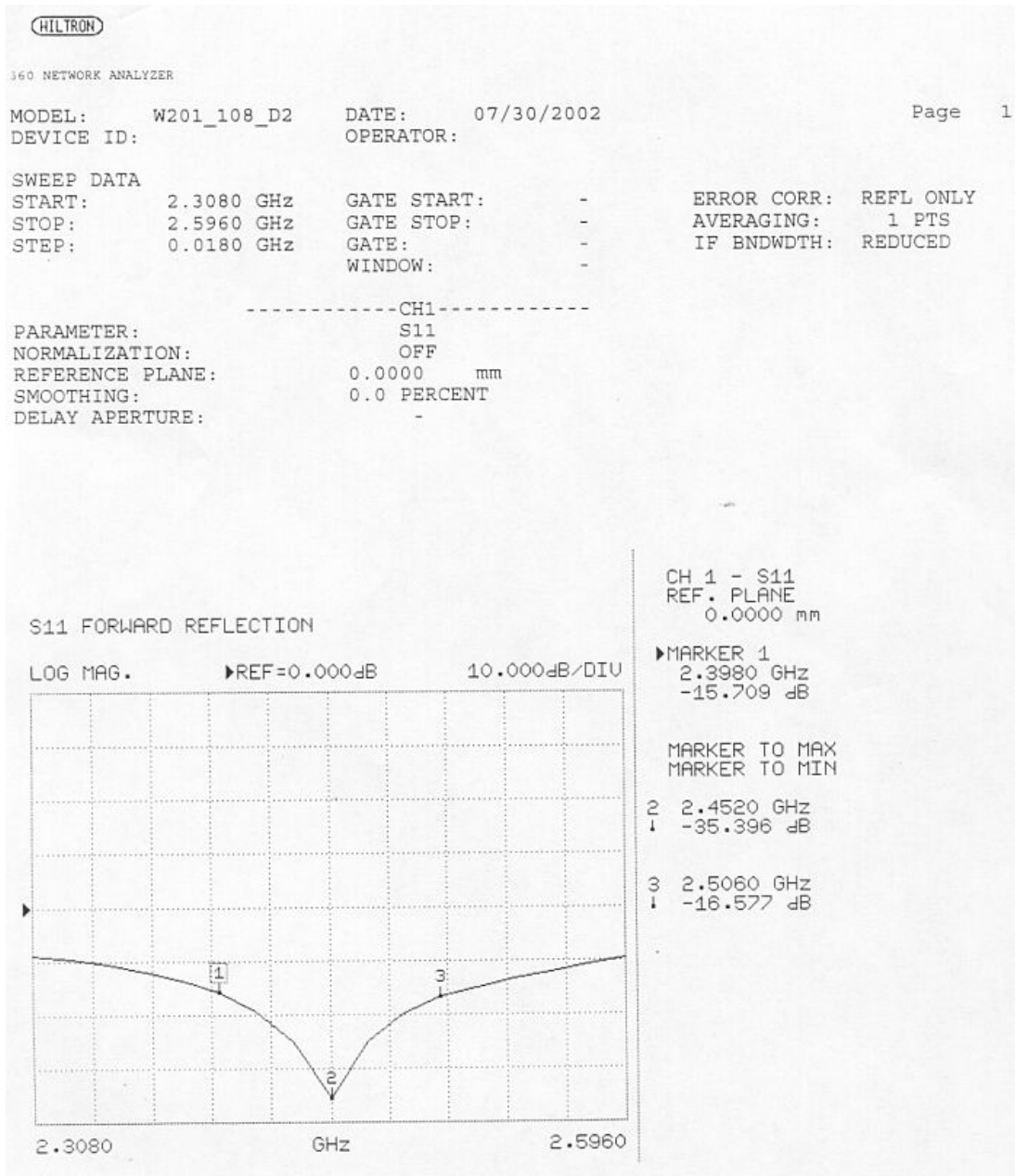
PRODUCT SPECIFICATION

RP-SMA R/A JACK
PCB RECEPTACLE

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



Input Output Enterprise Corp.	PRODUCT SPECIFICATION 2.4 G ANTENNA WITH RP-SMA PLUG	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
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W201-108-D2 2.4G ANTENNA SPECIFICATION

1. Electrical Properties

- 1-1 Frequency Range 2.4~2.5GHz
- 1-2 Impedance 50 Ohms nominal
- 1-3 V.S.W.R 2.0 (Max.)
- 1-4 Return Loss ± 10.0 dB(Max.)
- 1-5 Max. Gain 3.52dBi
- 1-6 Polarization Vertical
- 1-7 Admitted Power 1 W
- 1-8 Electrical Wave 1/4 λ Dipole

2. Mechanical Properties

- 2-1 Connector Reverse SMA Plug
- Cable RG178
- 2-3 Antenna Body T.P.R.
- 2-4 Operating Temperature Range.. $20^{\circ}\text{C} \sim +50^{\circ}\text{C}$
- 2-5 Storage Temperature Range $-20^{\circ}\text{C} \sim +50^{\circ}\text{C}$

IO ANTENNA PATTEM

ANTENNA TEST NO. -

TEST DATE: 2007-10-27

TEST FREQUENCY: 2450MHz

TEST POLARIZATION: VERTICAL
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

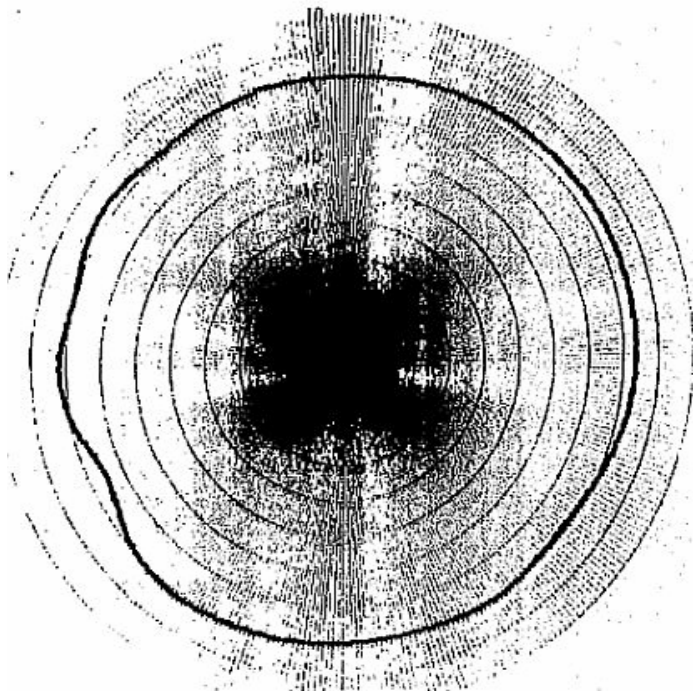
TEST CHAMBER: RF CHAMBER

TEST PERSONNEL: Yang

MAX GAIN: 1.93 dBi

MIN GAIN: -2.54 dBi

AVE GAIN: 0.64 dBi



IO ANTENNA PATTEM

ANTENNA TEST NO.

TEST DATE:2002/06/20

TEST FREQUENCY:2450MHz

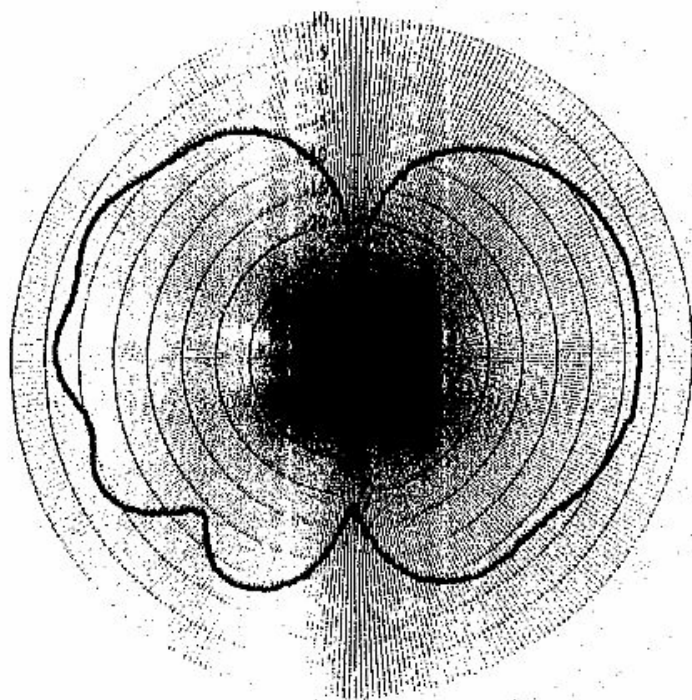
TEST POLARIZATION:HORIZONTAL
(E-PLANE)

TEST ANTENNA:HORN ANTENNA

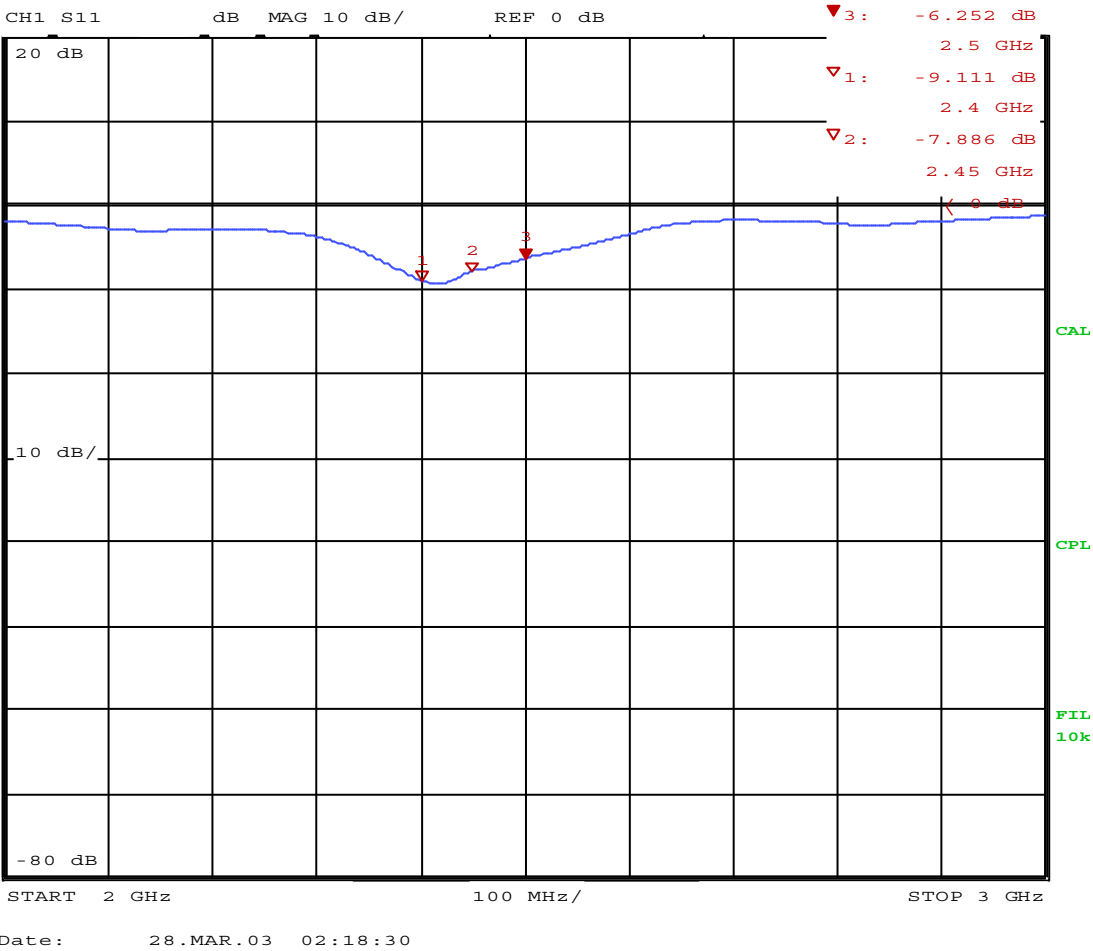
TEST CHAMBER:RF CHAMBER

TEST PERSONNEL: Yang

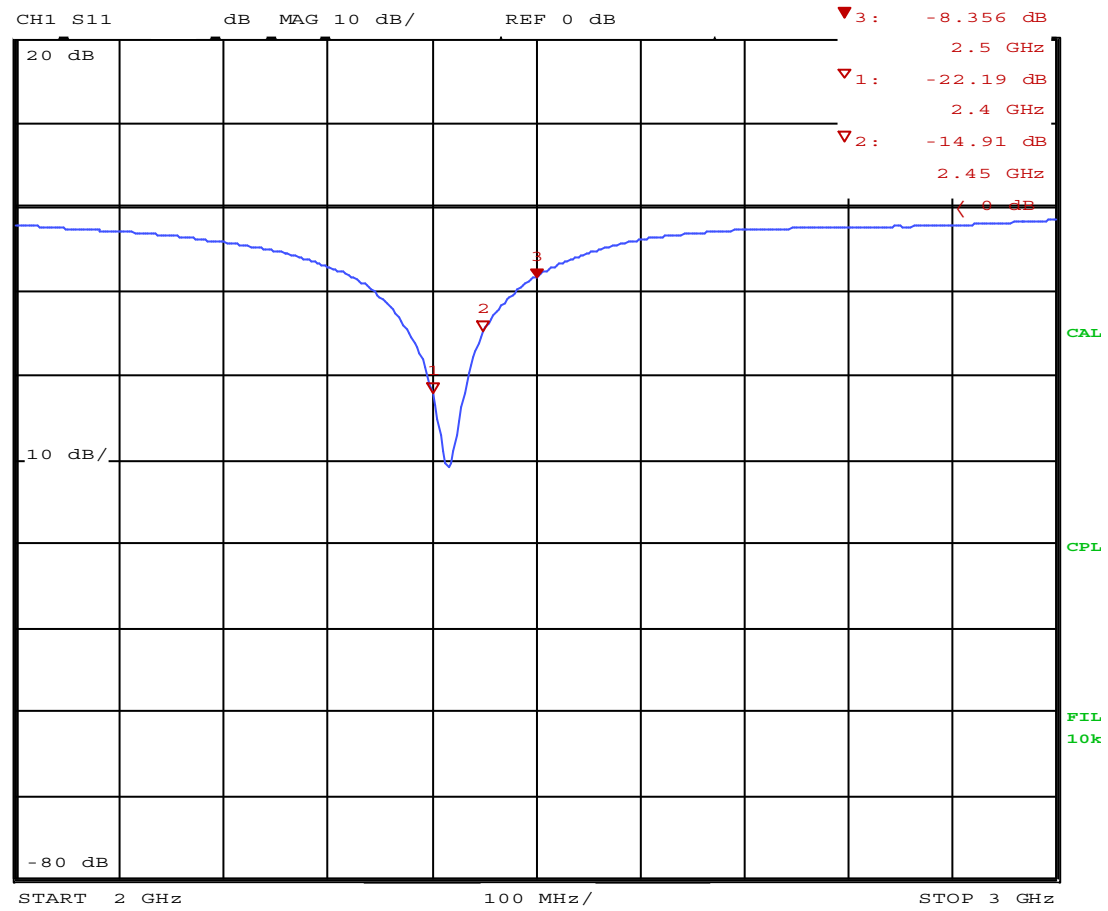
MAX GAIN:	3.52 dBi
MIN GAIN:	-35.06 dBi
AVE GAIN:	-3.38 dBi



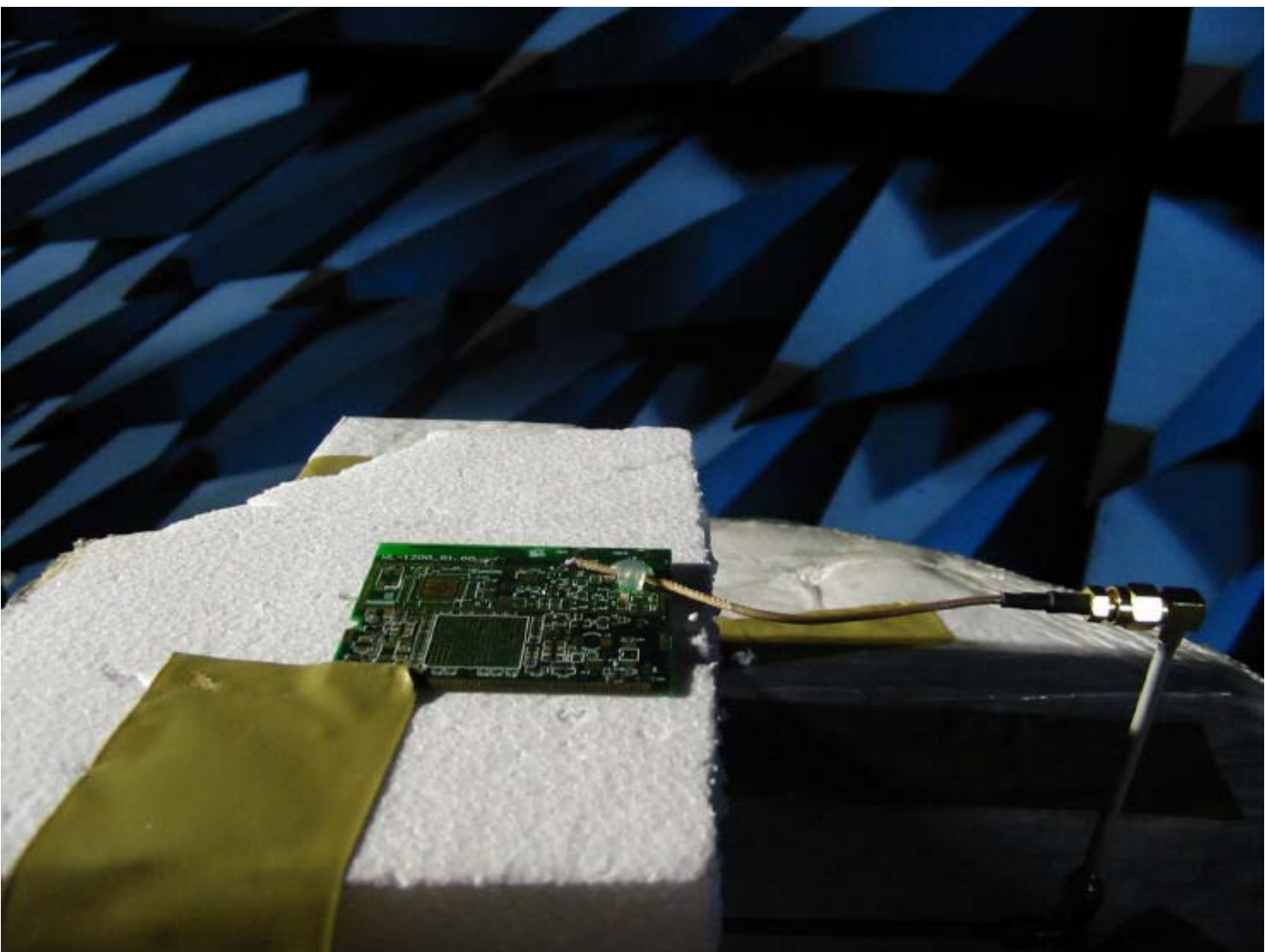
return loss of small I-F antenna on main board (1058x932x16M wmf)



return loss of small I-F antenna (1058x932x16M wmf)



Date: 28.MAR.03 02:14:25

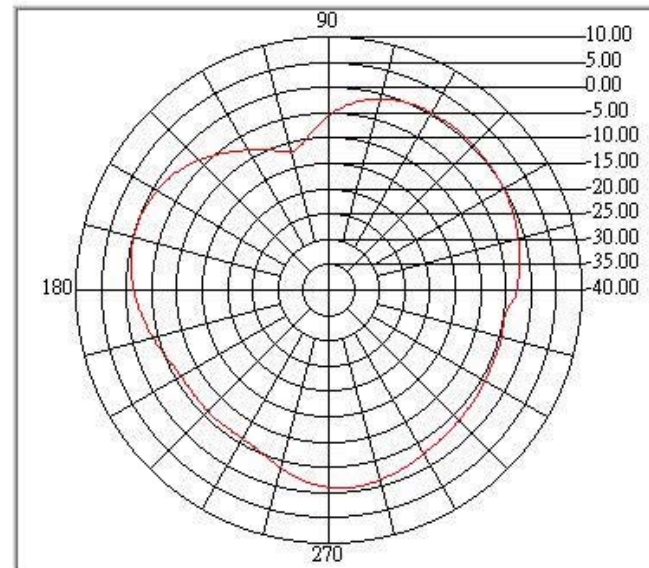


WL120G-X (1200x1600x16M).jpg

Model No: WL120G-X

Antenna Position: Horizontal

Frequency **MHz**



Peak: 0.55 dBi

Peak Angle: 49.59 Degree

Average: -3.28 dBi

Test engineer: _____

Test date: 2003/4/1 at AM 08:49

Traininig Research Co., Ltd.

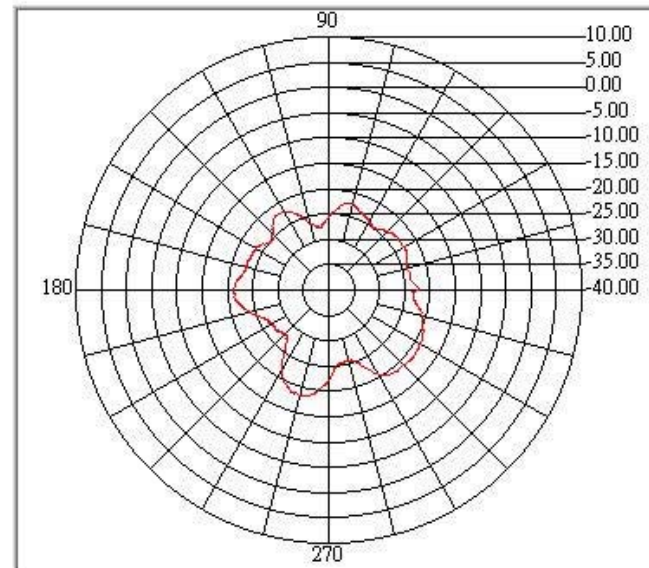
Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

Model No: WL120G-X

Antenna Position: Vertical

Frequency **MHz**



Peak: -18.39 dBi

Peak Angle: 254.08 Degree

Average: -23.06dBi

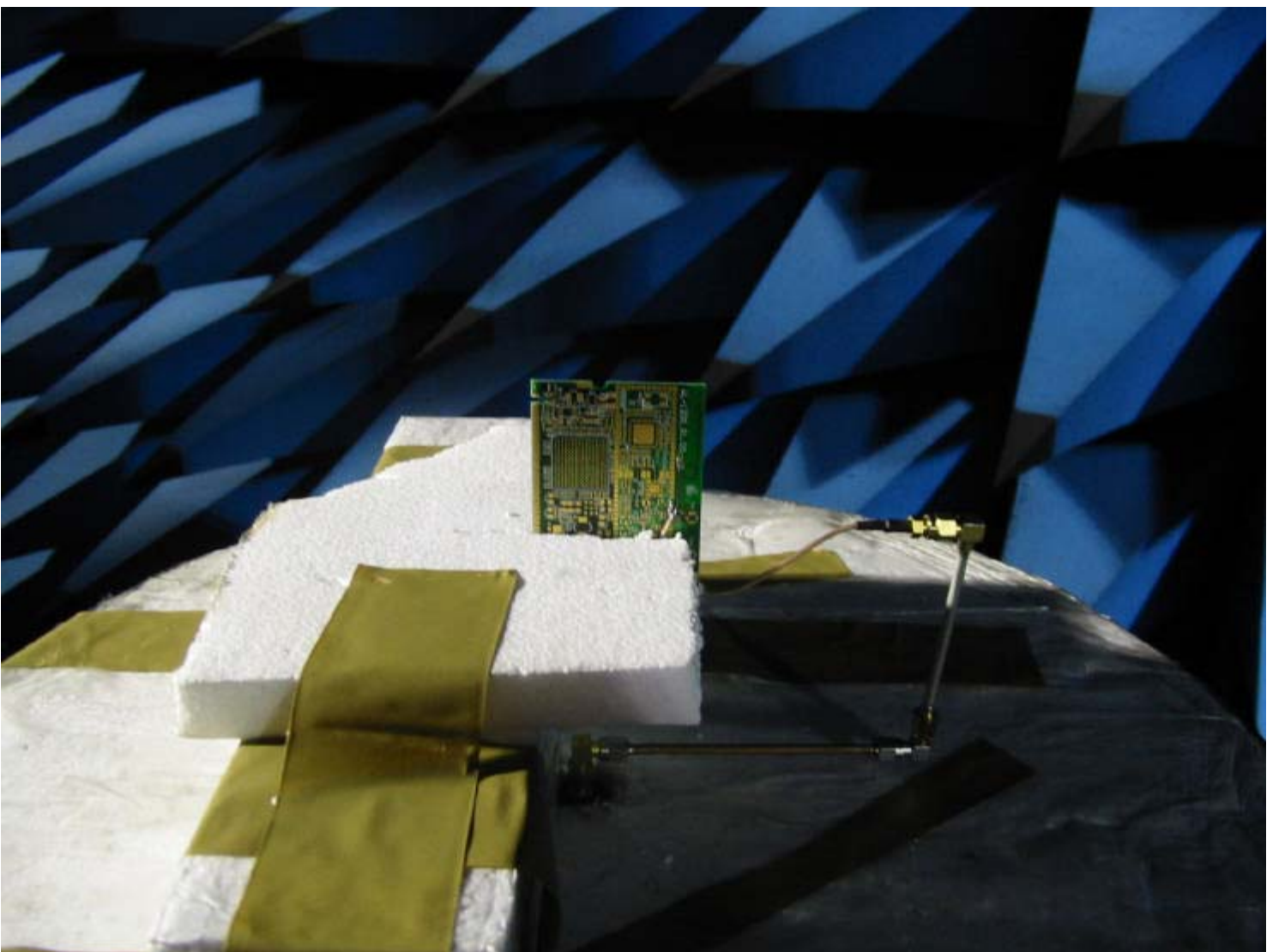
Test engineer: _____

Test date: 2003/4/1 at AM 08:46

Traininig Research Co., Ltd.

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

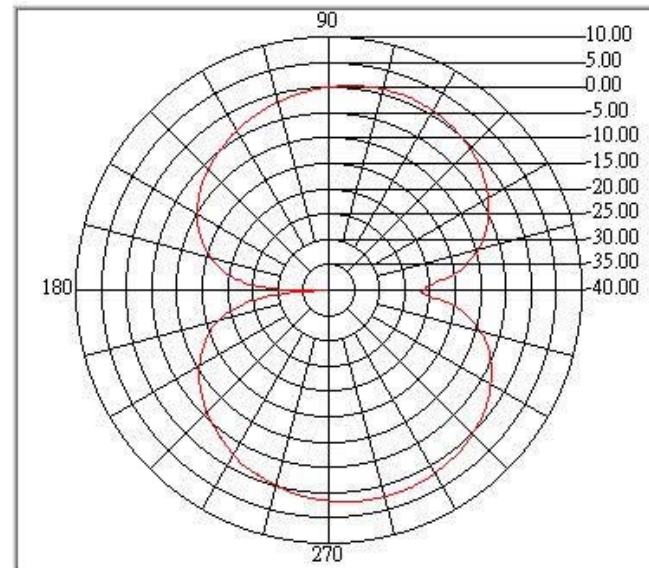


WL120G-Y (1200x1600x16M.jpg)

Model No: WL120G-Y

Antenna Position: Horizontal

Frequency **MHz**



Peak: 2.24 dBi

Peak Angle: 284.69 Degree

Average: -5.91 dBi

Test engineer: _____

Test date: 2003/4/1 at AM 08:57

Traininig Research Co., Ltd.

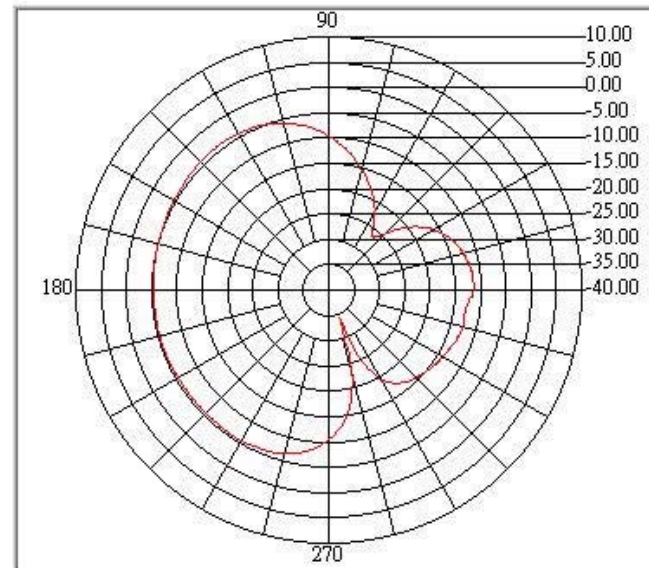
Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

Model No: WL120G-Y

Antenna Position: Vertical

Frequency **MHz**



Peak: -4.04 dBi

Peak Angle: 127.96 Degree

Average: -11.11dBi

Test engineer: _____

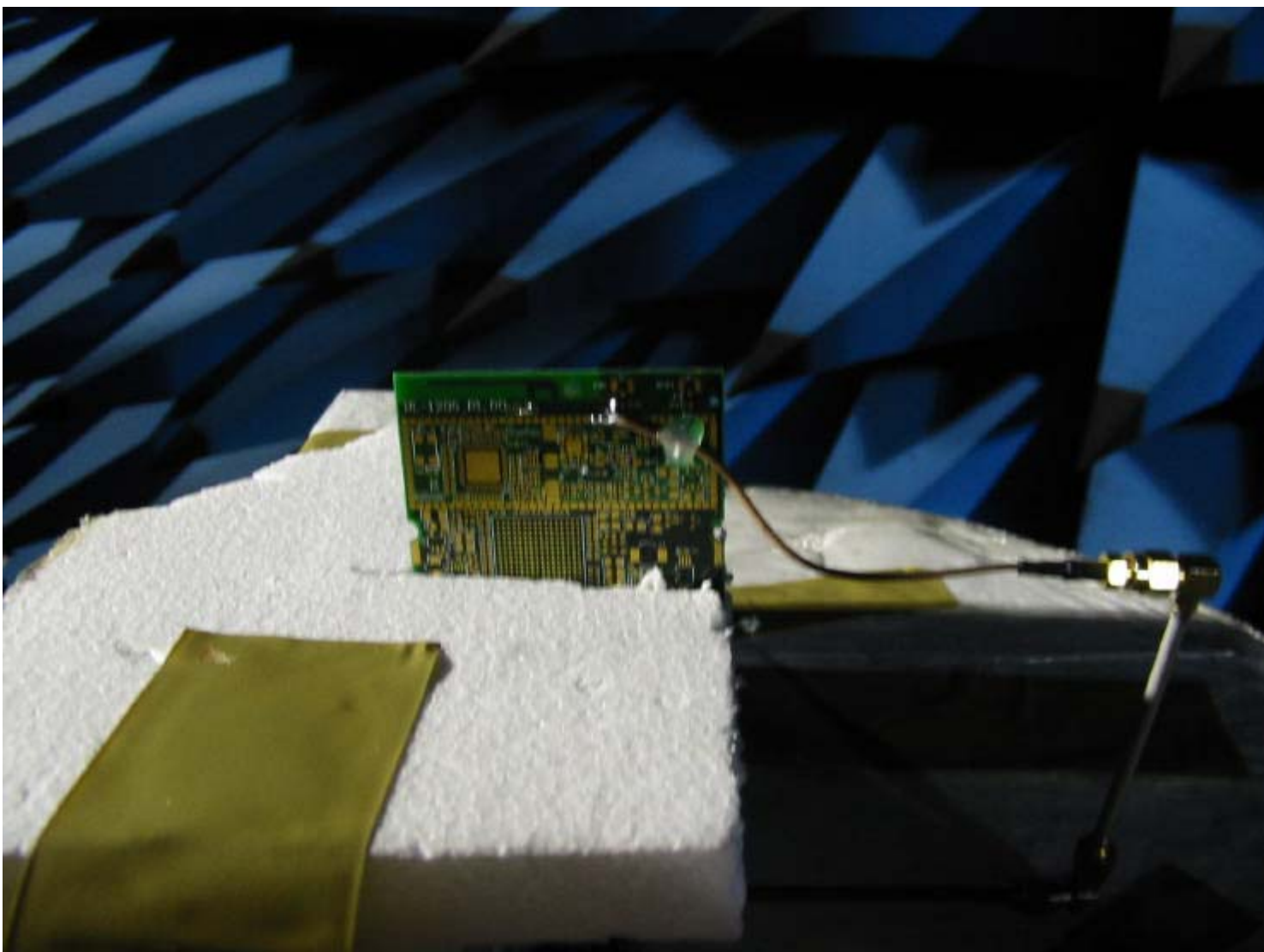
Test date: 2003/4/1 at AM 08:58

Traininig Research Co., Ltd.

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

WL120G-Y_2450_ver (639x784x16M).pdf

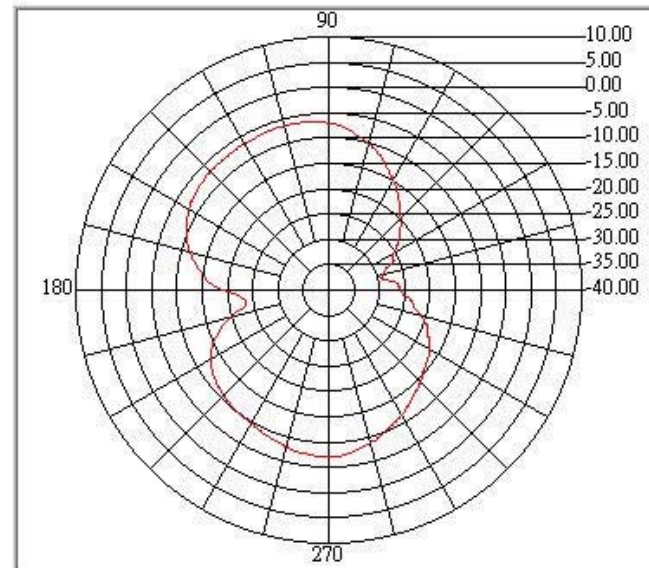


WL1205-Z (1200x1600x16M).jpg

Model No: WL120G-Z

Antenna Position: Horizontal

Frequency **MHz**



Peak: -6.37 dBi

Peak Angle: 105.88 Degree

Average: -13.80dBi

Test engineer: _____

Test date: 2003/4/1 at AM 09:03

Traininig Research Co., Ltd.

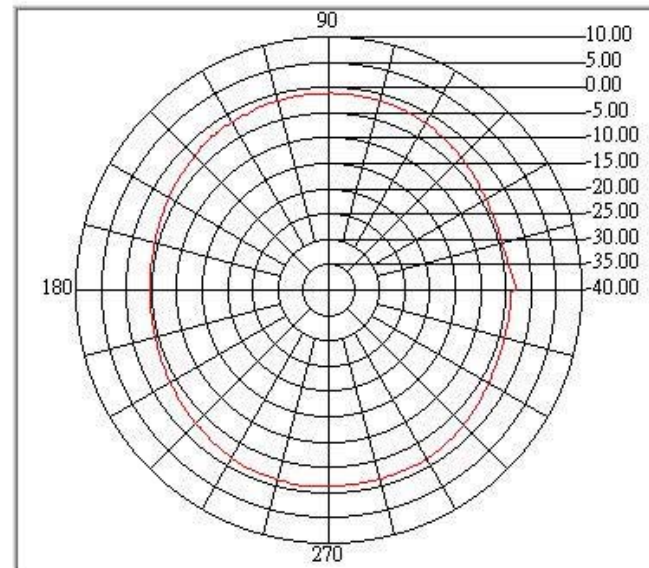
Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>

Model No: WL120G-Z

Antenna Position: Vertical

Frequency **MHz**



Peak: -1.00 dBi

Peak Angle: 263.05 Degree

Average: -2.70 dBi

Test engineer: _____

Test date: 2003/4/1 at AM 09:01

Traininig Research Co., Ltd.

Tel: 02-26935155 Fax: 02-26934440

URL: <http://www.trclab.com.tw>