

## *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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f <sup>2</sup>	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/cm<sup>2</sup>)

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

**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**

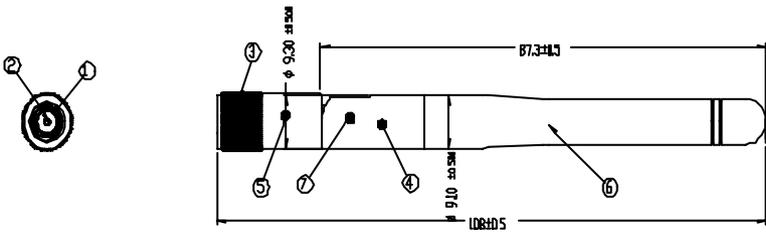
2.4 G ANTENNA WITH RP-SMA PLUG

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C





**ELECTRICAL PERFORMANCE :**  
 1.Impedance : 51 ohms  
 2.Frequency Range : 2.4--2.5 GHz  
 3.VSWR : 2.0 maximum  
 4.Gain: 5dBi

ITEM	DESCRIPTION	MATERIALS	FINISHED
7	銷仔	Brass	鍍鎳
6	帽套	TPR	Black
5	底座	ABS	Black
4	天線座	ABS	Black
3	RP SMA焊絲	Brass	鍍錫絲
2	Contact 端子	Be.Copper	鍍金20u"
1	RP SMA+體	Brass	鍍金4u"

REV. DESCRIPTION		ECN	DRAWN	DATE	TITLE		DRAWN BY		CHECKED BY		DATE		REV. 1		REV. 1	
A	Sample		Yang	07/30/2002	RP SMA 2.4--2.5GHz Antenna		Yang	Yang								
REVISIONS																

# NInput Output

Enterprise Corp.

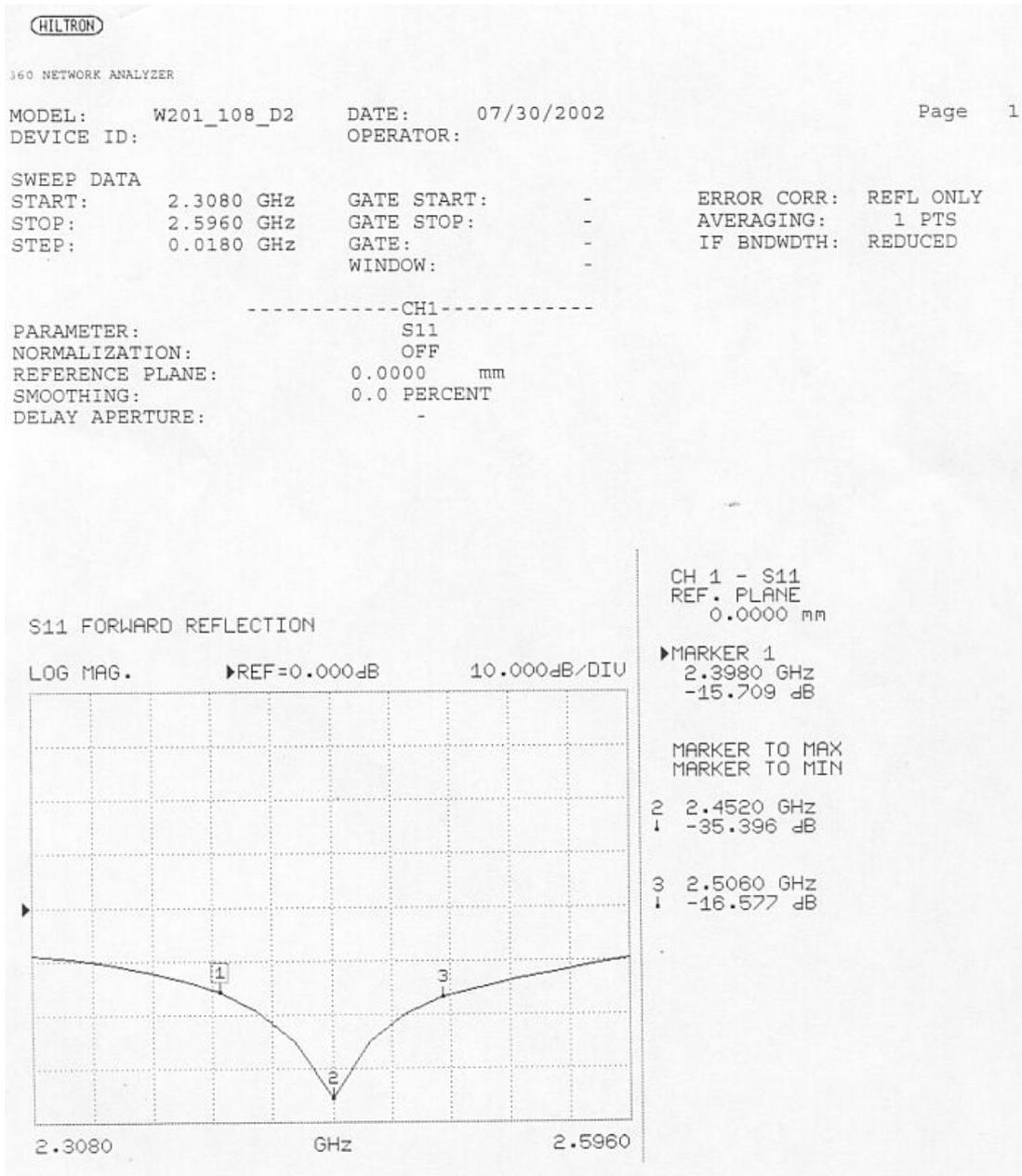
# PRODUCT SPECIFICATION

RP-SMA R/A JACK  
PCB RECEPTACLE

DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



<b>Ninput Output</b> Enterprise Corp.	<b>PRODUCT SPECIFICATION</b> 2.4 G ANTENNA WITH RP-SMA PLUG	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
--	--	--

**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°C ~ +50°C
- 2-5 Storage Temperature Range ..... -20°C ~ +50°C

## IO ANTENNA PATTEM

ANTENNA TEST NO. -

TEST DATE: 2017-10-27

TEST FREQUENCY: 2450MHz

TEST POLARIZATION: VERTICAL  
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

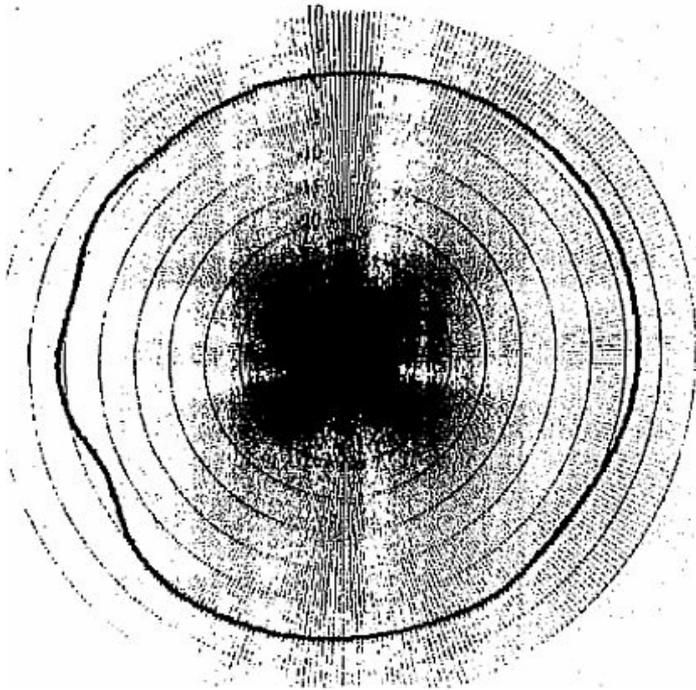
TEST CHAMBER: RF CHAMBER

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

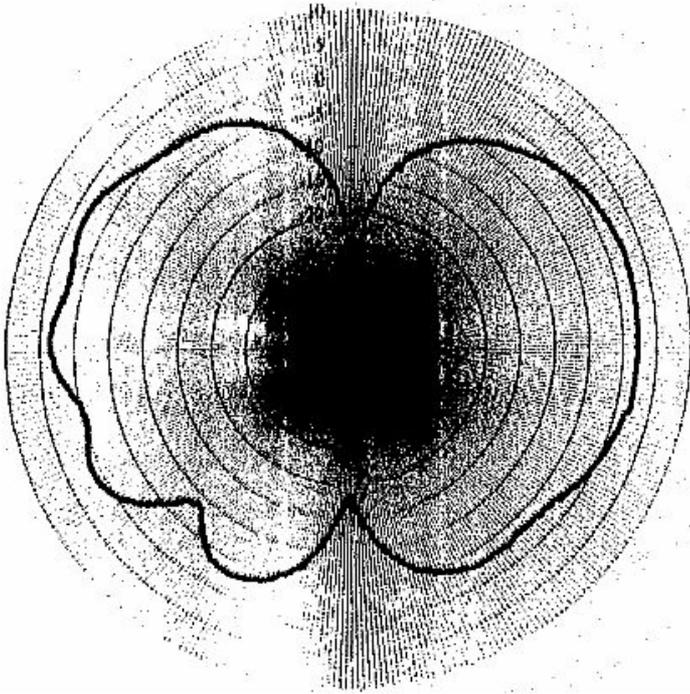
TEST CHAMBER:RF CHAMBER

TEST PERSONNEL: Yang

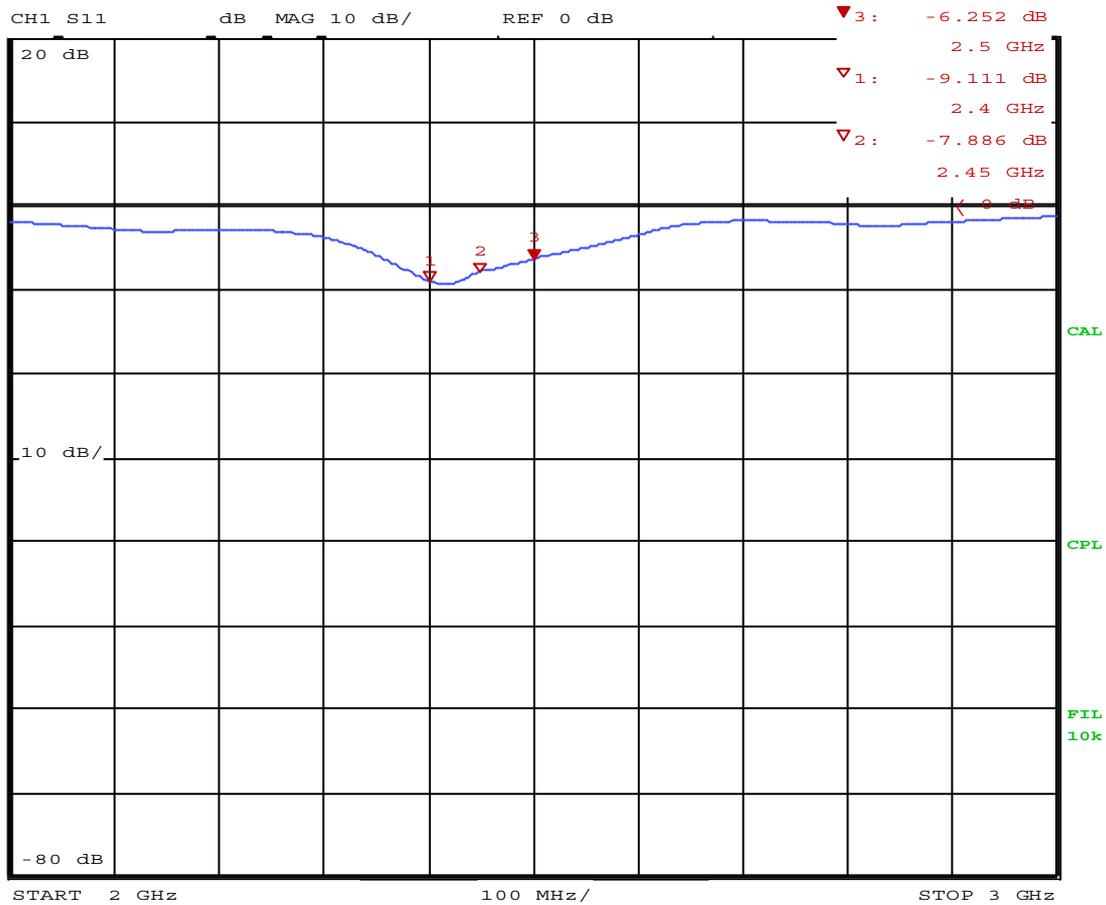
MAX GAIN: 3.52 dBi

MIN GAIN: -35.06 dBi

AVE GAIN: -3.38 dBi

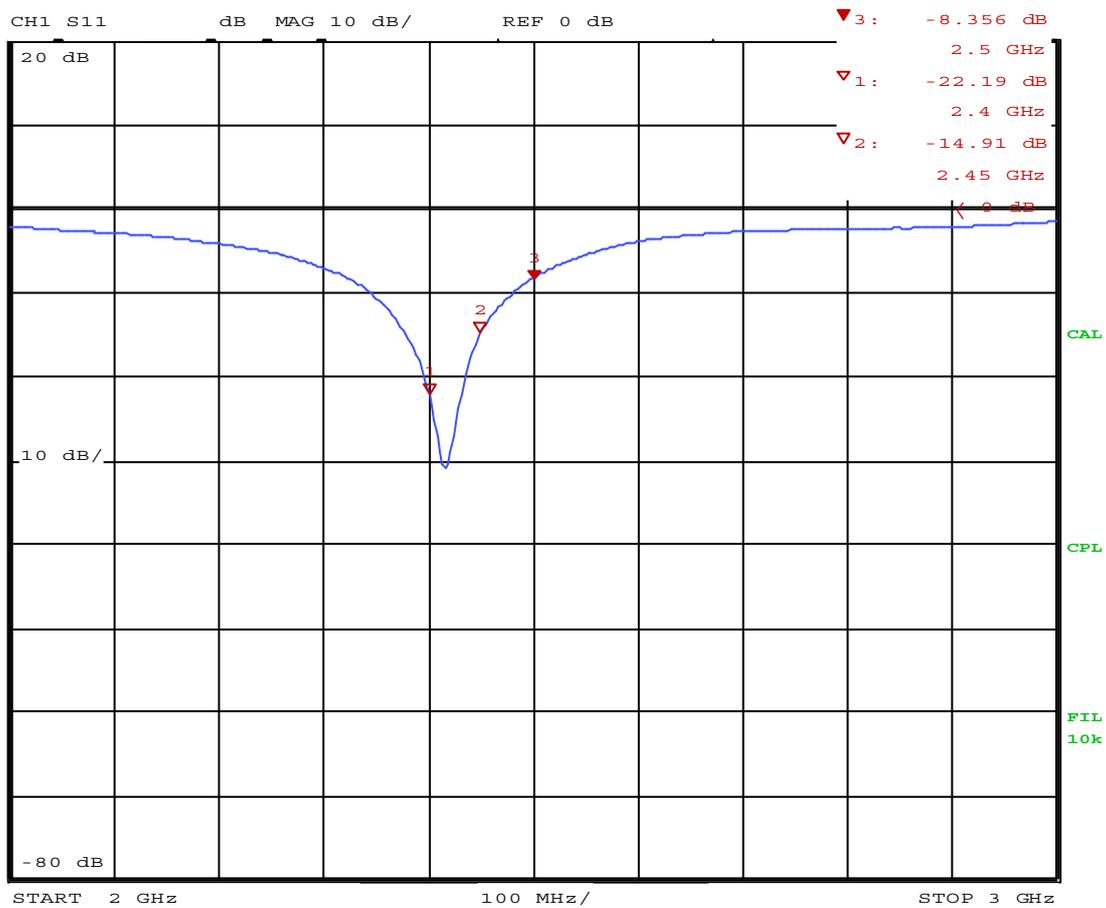


return loss of small I-F antenna on main board (1058x932x16M wmf)

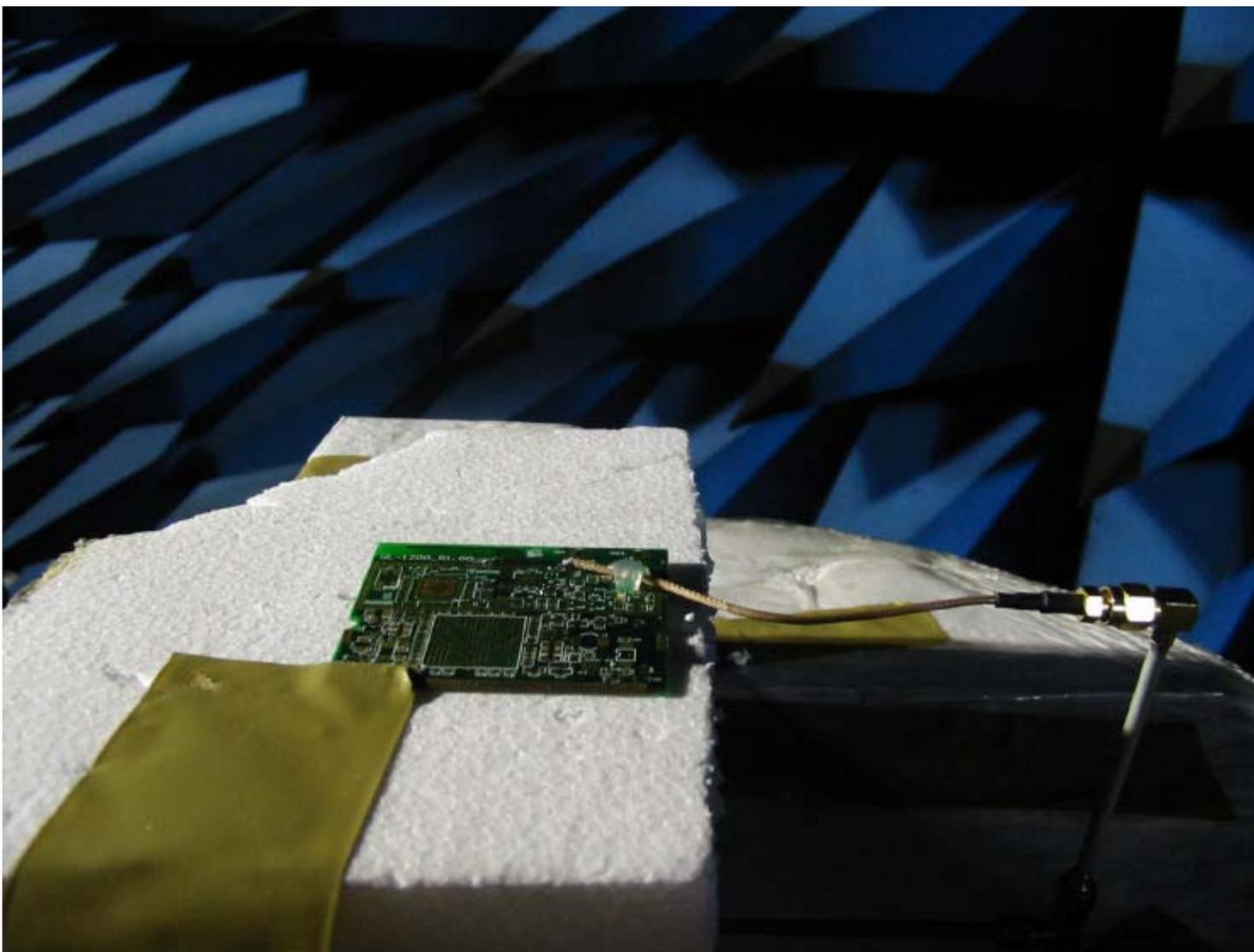


Date: 28.MAR.03 02:18:30

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



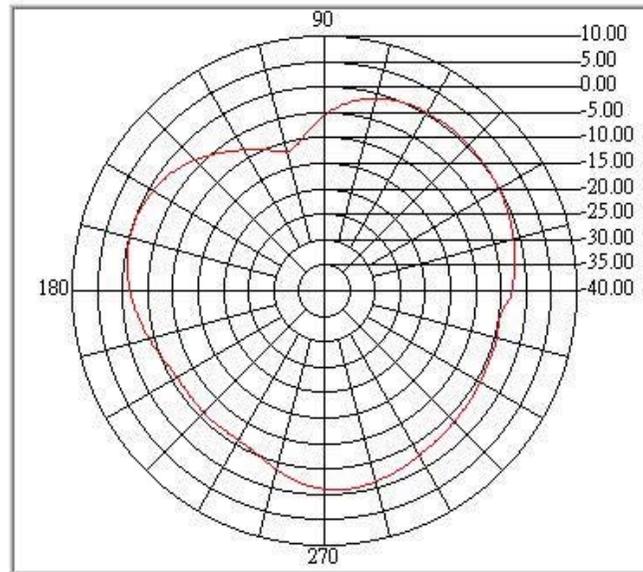
Date: 28.MAR.03 02:14:25



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

*Training Research Co., Ltd.*

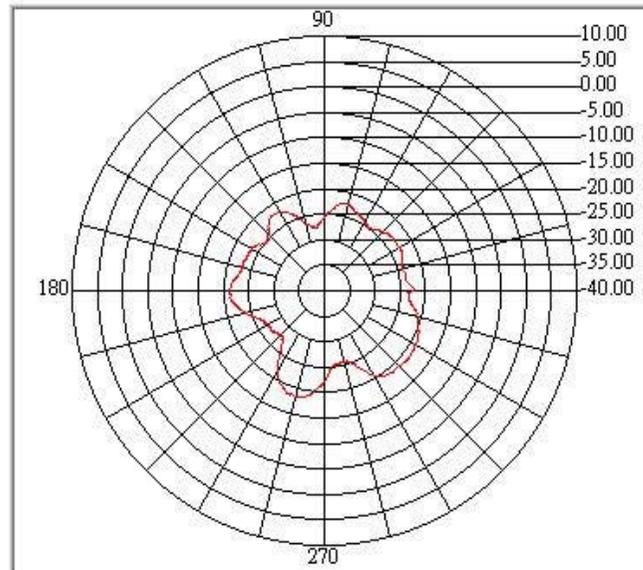
Tel: 02-26935155 Fax: 02-26934440

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:** -23.06 dBi

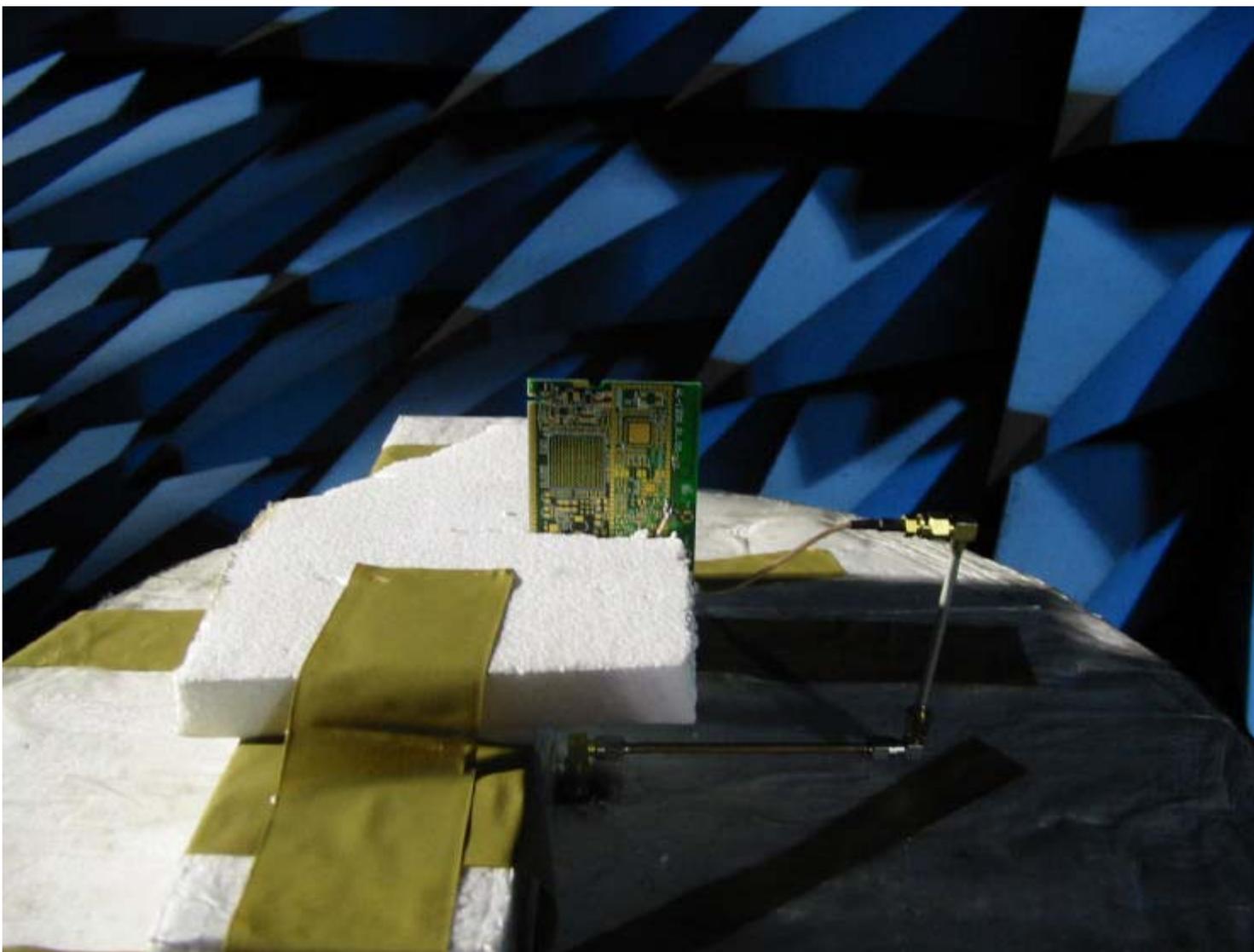
Test engineer: \_\_\_\_\_

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

*Training Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

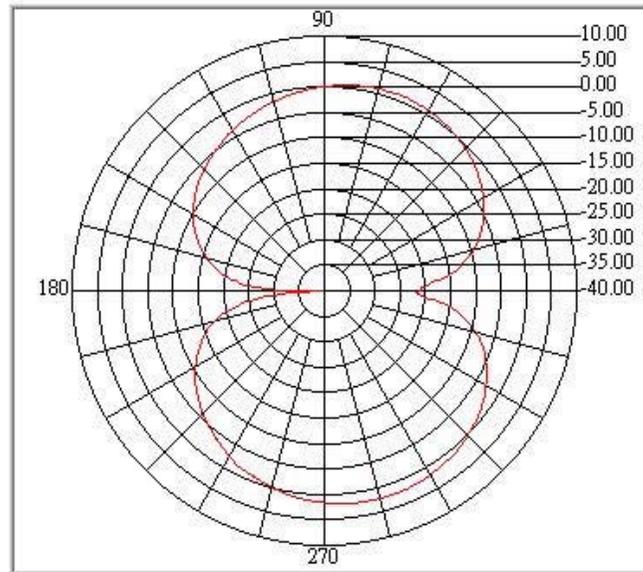
URL: <http://www.trclab.com.tw>



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

*Training Research Co., Ltd.*

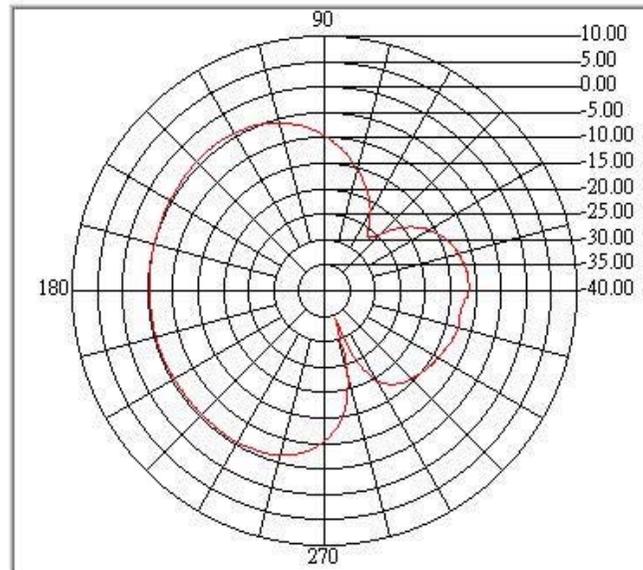
Tel: 02-26935155 Fax: 02-26934440

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

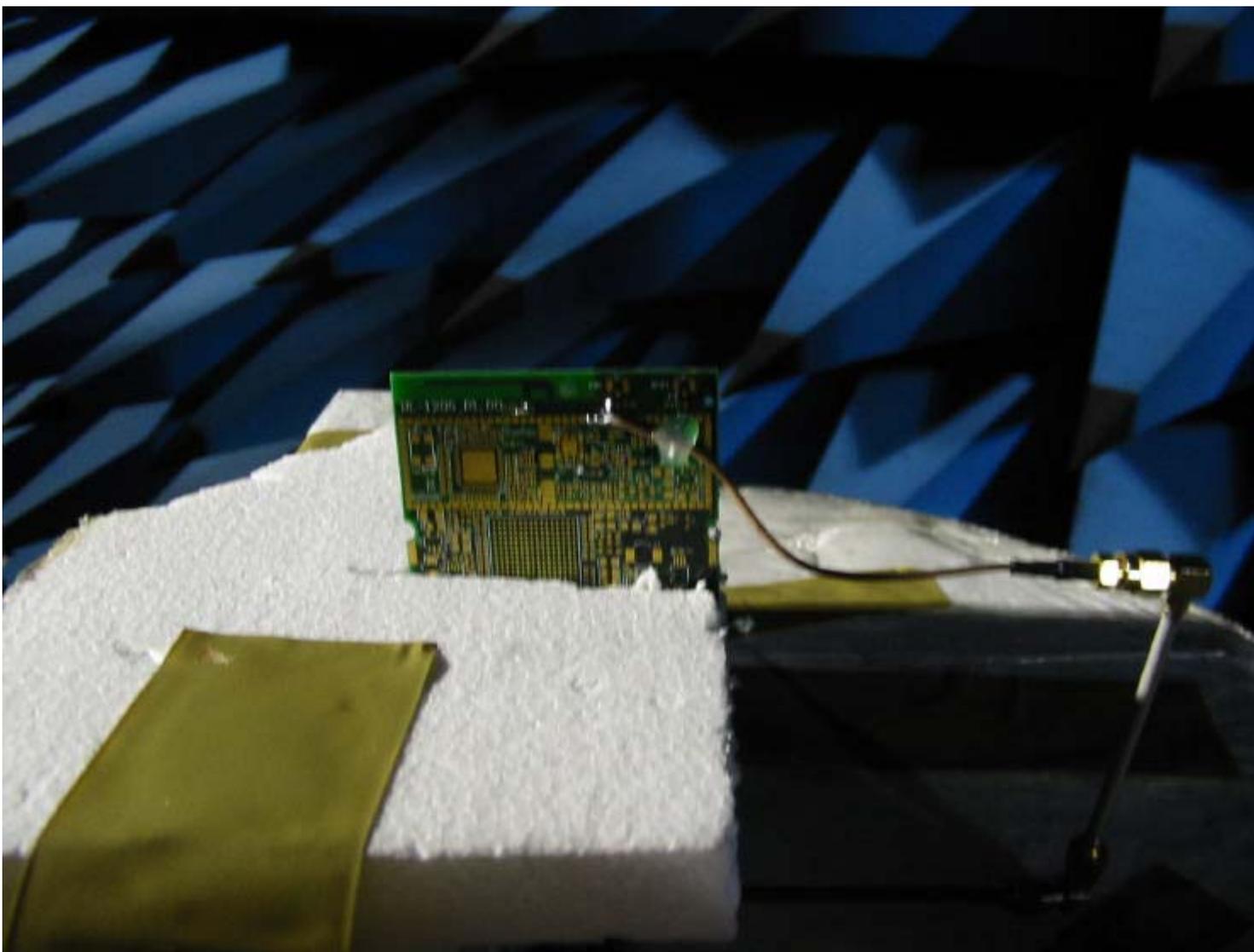
Test engineer: \_\_\_\_\_

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

*Training Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

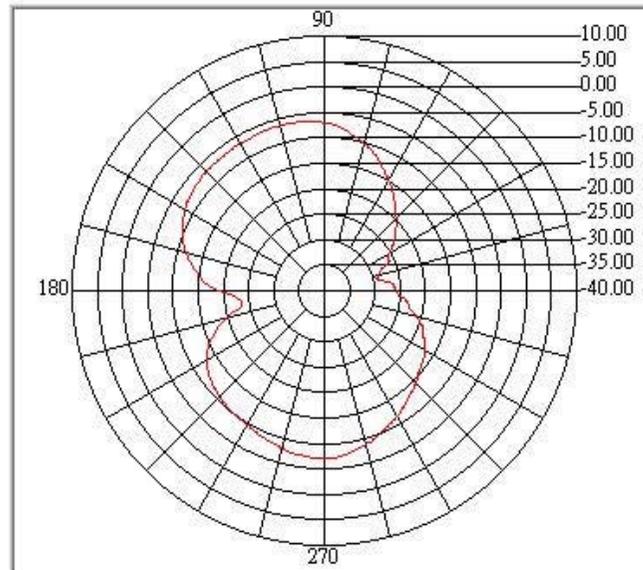
URL: <http://www.trclab.com.tw>



Model No: WL120G-Z

Antenna Position: Horizontal

Frequency  MHz



Peak: -6.37 dBi

Peak Angle: 105.88 Degree

Average: -13.80 dBi

Test engineer: \_\_\_\_\_

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

*Training Research Co., Ltd.*

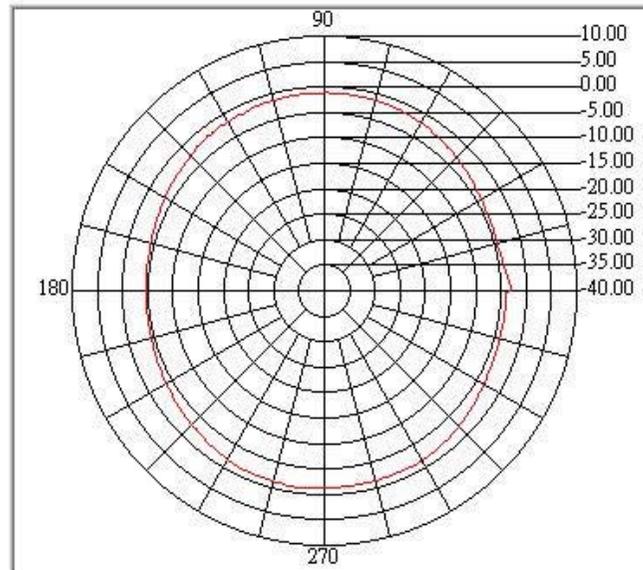
Tel: 02-26935155 Fax: 02-26934440

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

*Training Research Co., Ltd.*

Tel: 02-26935155 Fax: 02-26934440

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