

Measurement of Maximum Permissible Exposure

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

FCC ID	:	MSQWL138GV2R2
Product name	:	ASUS WLAN PCI Card
Model name	:	WL-138g V2
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 Channels
Modulation Skill	:	DBPSK, DQPSK, CCK, OFDM
Power Type	:	Powered by PCI of client' s device

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:

Friis Transmission Formula:
$$S = \frac{PG}{4pR^2} = \frac{92.25714 \times 1.58489}{4p(20)^2} = 0.029 \text{ mW/cm}^2$$

Estimated safe separation:
$$R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{92.25714 \times 1.58489}{4p}} = 3.411 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 3.41cm."

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:

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

$$G = \text{Log}^{-1} (2.0 / 10) = 1.58489$$

Appendix

Antenna Specification

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



W205-108-D200

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.

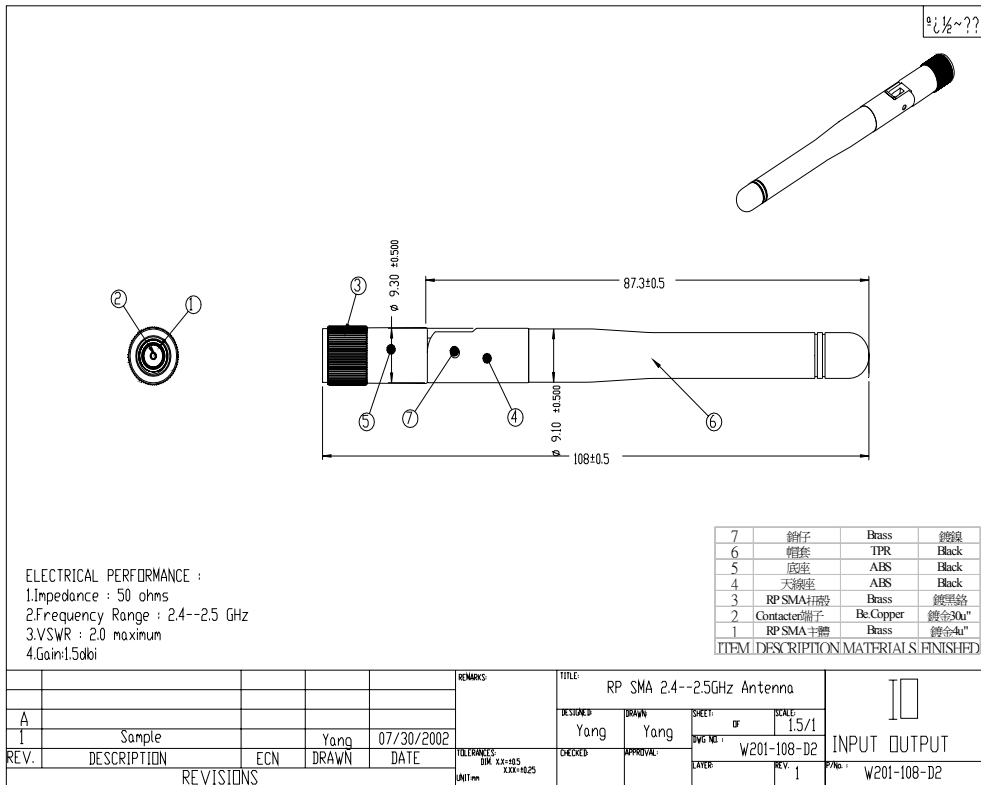
PRODUCT SPECIFICATION

2.4 G ANTENNA WITH RP-SMA PLUG

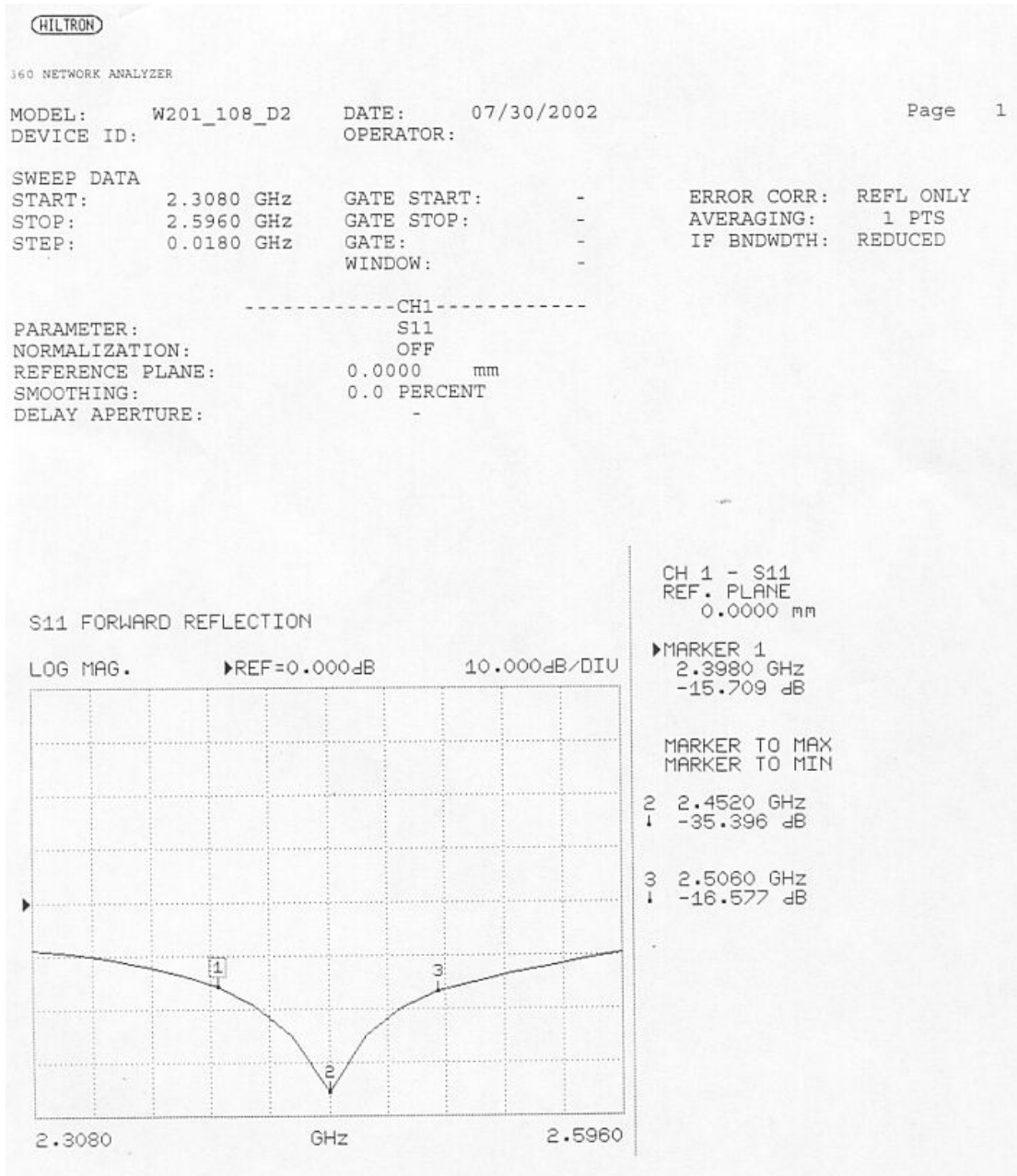
DOC. No: WL-TL-17

DATE: 25-MAR-02

REV. : C



NInput Output Enterprise Corp.	PRODUCT SPECIFICATION RP-SMA R/A JACK PCB RECEPTACLE	DOC. No: WL-TL-17 DATE: 25-MAR-02 REV. : C
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Ninput 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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W205-108-D200 2.4G ANTENNA
SPECIFICATION

1. Electrical Properties

- 1-1 Frequency Range2.4~2.5GHz
- 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.....2.0dBi
- 1-6 Polarization..... Vertical
- 1-7 Admitted Power.....1W
- 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: 11/11/1997

TEST FREQUENCY: 2450GHZ

TEST POLARIZATION: VERTICAL
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

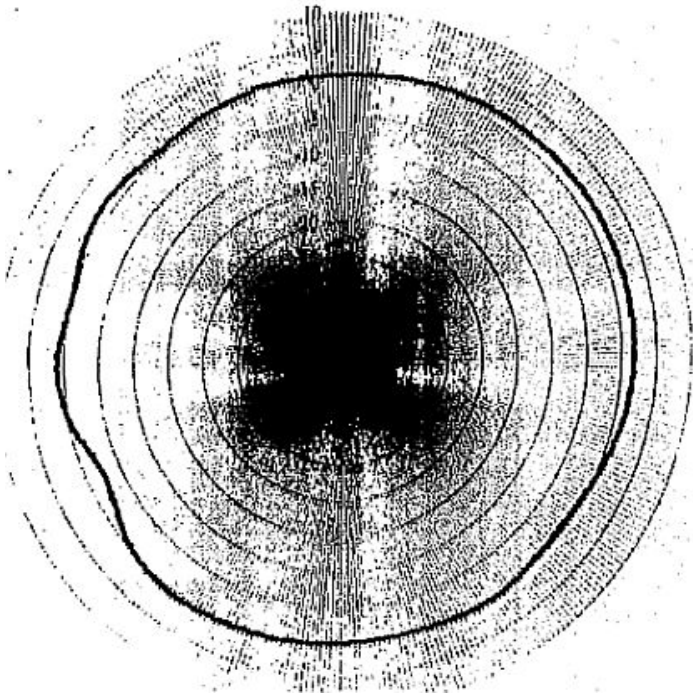
TEST CHAMBER: RF CHAMBER

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

