

## ***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** : RTQLW2110P

**Product name** : IEEE 802.11b Wireless LAN PCI Adaptor

**Model name** : LW2110P

**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

**Power Type** : Power by the Protocol Control Information of computer

### 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:

**Friis Transmission Formula:** 
$$S = \frac{PG}{4\pi R^2} = \frac{92.897 \times 1.514}{4\pi (20)^2} = 0.02798 \text{ mW/cm}^2$$

**Estimated safe separation:** 
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{92.897 \times 1.514}{4\pi}} = 3.345 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 3.345 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:

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

$$G = \text{Log}^{-1} (1.8 / 10) = 1.514$$



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樣品承認書  
APPROVAL SHEET

客戶名稱：友勁科技股份有限公司

(CUSTOMER)

製造廠牌：譚裕實業

(BRAND)

品名編號：C512-510070-A

(DESCRIPTION)

客戶編號：

(CUSTOMER P/N)

客戶機種編號：

(CUSTOMER MODEL NO.)

樣品數量：

(SAMPLE QTY)

承認書日期：92 年 4 月 1 日

(ISSUE DATE)

承認日期： 年 月 日

(APPROVAL DATE)

AUTHORIZED SIGNATURE

PARNER TECHNOLOGY

CUSTOMER

☐ 新竹市科學園里民享一街119號  
119, Min-hsiang St. 1, Science Park Alley,  
Hsin-Chu, Taiwan, R.O.C.  
TEL : 886-3-578-2269  
FAX : 886-3-578-2369

☐ 台北市士林區大南路415號3樓  
3F, No. 415, Da-Nan Rd., Shih-Lin District, Taipei  
City.  
TEL : 886-2-2888-1868 聯絡人：洪世澤  
FAX : 886-2-2888-1869

# RF Antenna Cable Assembly

## Specification

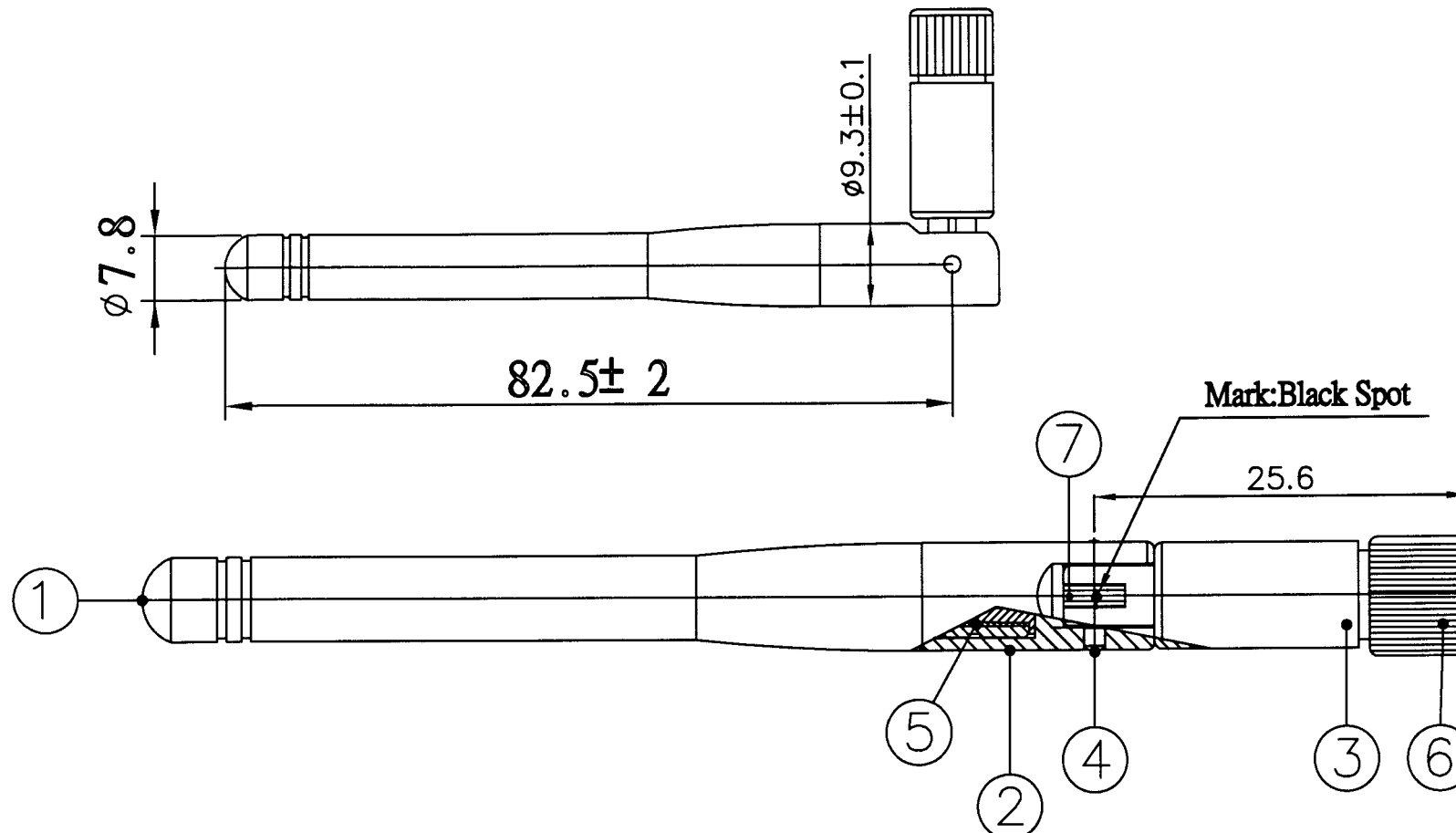
### 1. Electrical Properties :

- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance ..... 50 $\Omega$  Nominal
- 1.3 VSWR .....2.0 Max.
- 1.4 Return Loss..... -9.5 dB Maximum
- 1.5 Electrical Wave..... 1/2  $\lambda$  Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

### 2. Physical Properties :

- 2.1 Cable..... RG-178 50 $\Omega$
- 2.2 Connector..... SMA Straight Plug/Reverse
- 2.3 Antenna Cover..... TPE
- 2.4 Antenna Base..... PC
- 2.5 Operating Temp. ....-20 $^{\circ}$ C ~ +65 $^{\circ}$ C
- 2.6 Storage Temp. ....-30 $^{\circ}$ C ~ +75 $^{\circ}$ C
- 2.7 Color .....Black

| REV | DATE       | DESCRIPTION |
|-----|------------|-------------|
| XI  | 04/01-2003 | New Issue   |



| NO | DESCRIPTION   | QTY                                    | REMARK |
|----|---------------|----------------------------------------|--------|
| 7  | Cable         | RG-178 , Translucent Brown ; 50 Ω      | 1      |
| 6  | Connector     | SMA Straight Plug ReverseColor ; Black | 1      |
| 5  | Ground Tube   | Brass , Ni plated                      | 1      |
| 4  | Rivet         | Brass , Cr Plated (Black)              | 2      |
| 3  | Antenna Base  | PC ; Color : Black                     | 1      |
| 2  | Antenna Base  | PC ; Color : Black                     | 1      |
| 1  | Antenna Cover | TPE ; Color : Black                    | 1      |

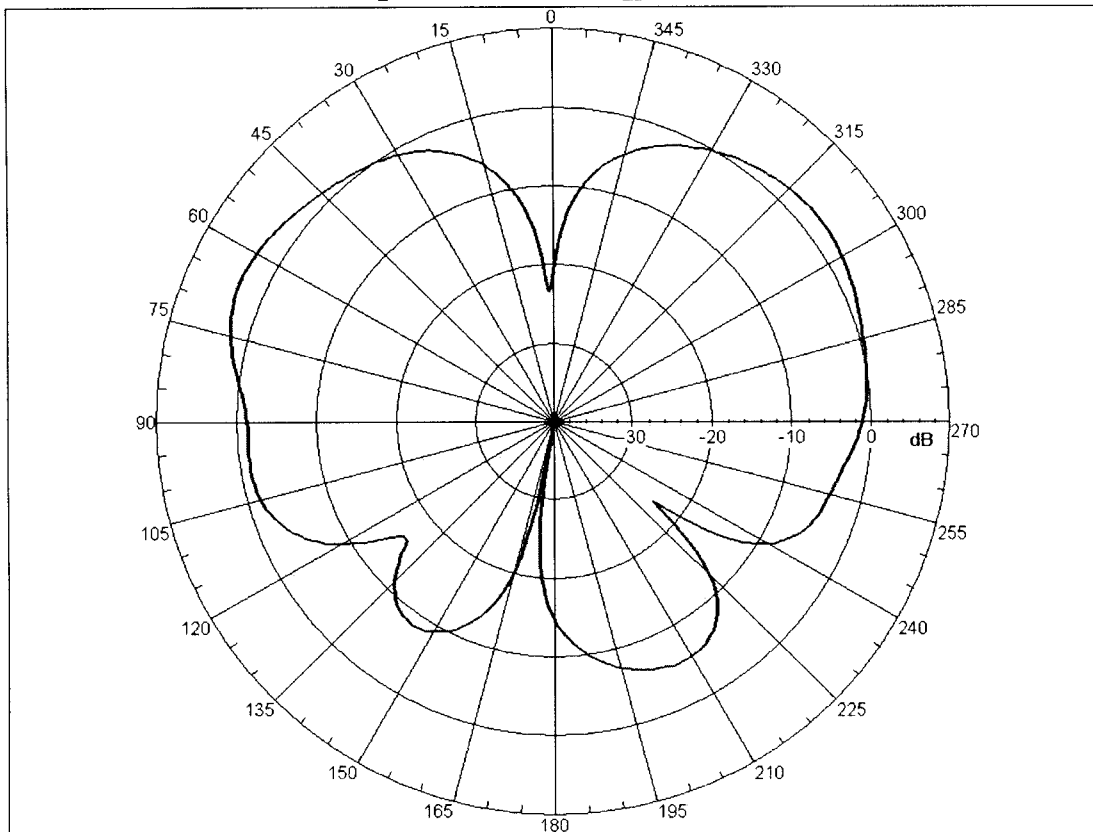
|                      |     |      |          |                      |                                     |
|----------------------|-----|------|----------|----------------------|-------------------------------------|
| CUSTOMER'S SIGNATURE | XX  | ±3.0 | APPROVED | CUSTOMER: 弘鼎科技股份有限公司 |                                     |
|                      | X   | ±2.0 | Sm. 4/6  |                      |                                     |
|                      | X   | ±1.0 | CHECKED  |                      |                                     |
|                      | XX  | ±0.5 | PERV     |                      |                                     |
|                      | XXX | ±0.1 | DRAWING  |                      |                                     |
|                      |     |      |          |                      | PART NO :                           |
|                      |     |      |          |                      | PARTNAME: RF Antenna Cable Assembly |
|                      |     |      |          |                      | W.Y.P/NO : C512-510070-A            |
|                      |     |      |          |                      | REV UNIT FILE :                     |
|                      |     |      |          |                      | XI m/m SHEET : 1/1                  |

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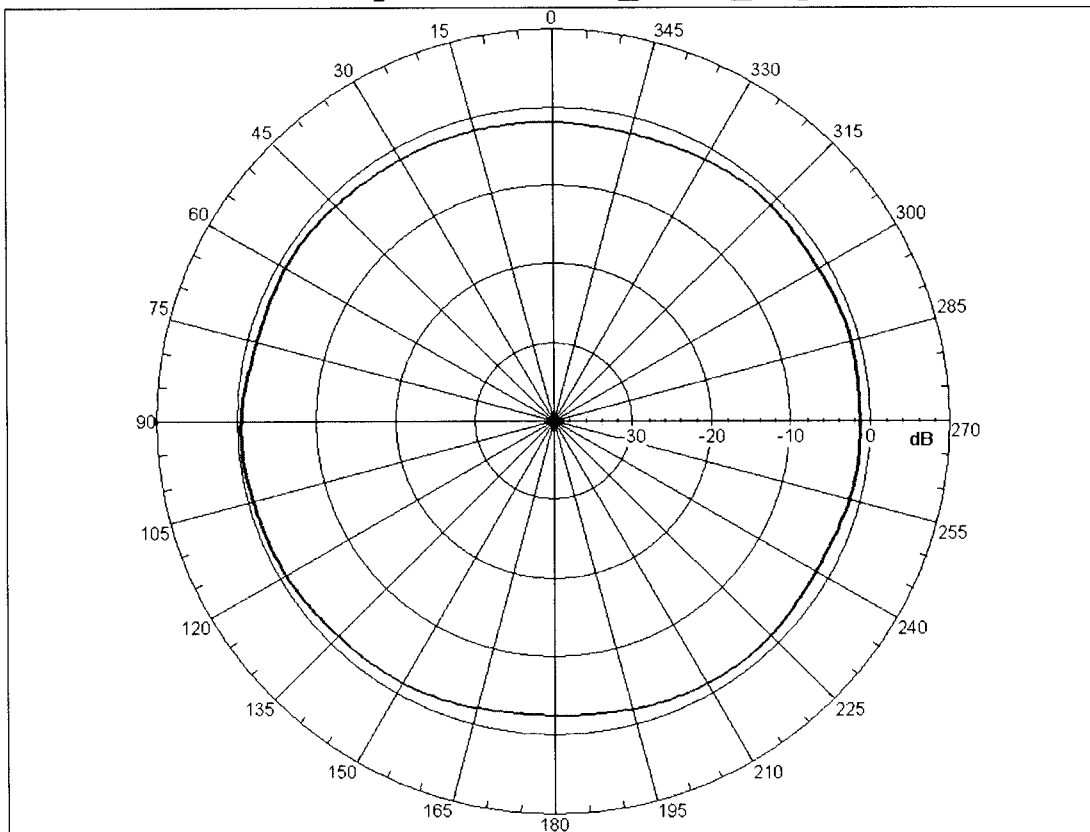
pci\_sma\_e-plane (1000x808x24b jpeg)

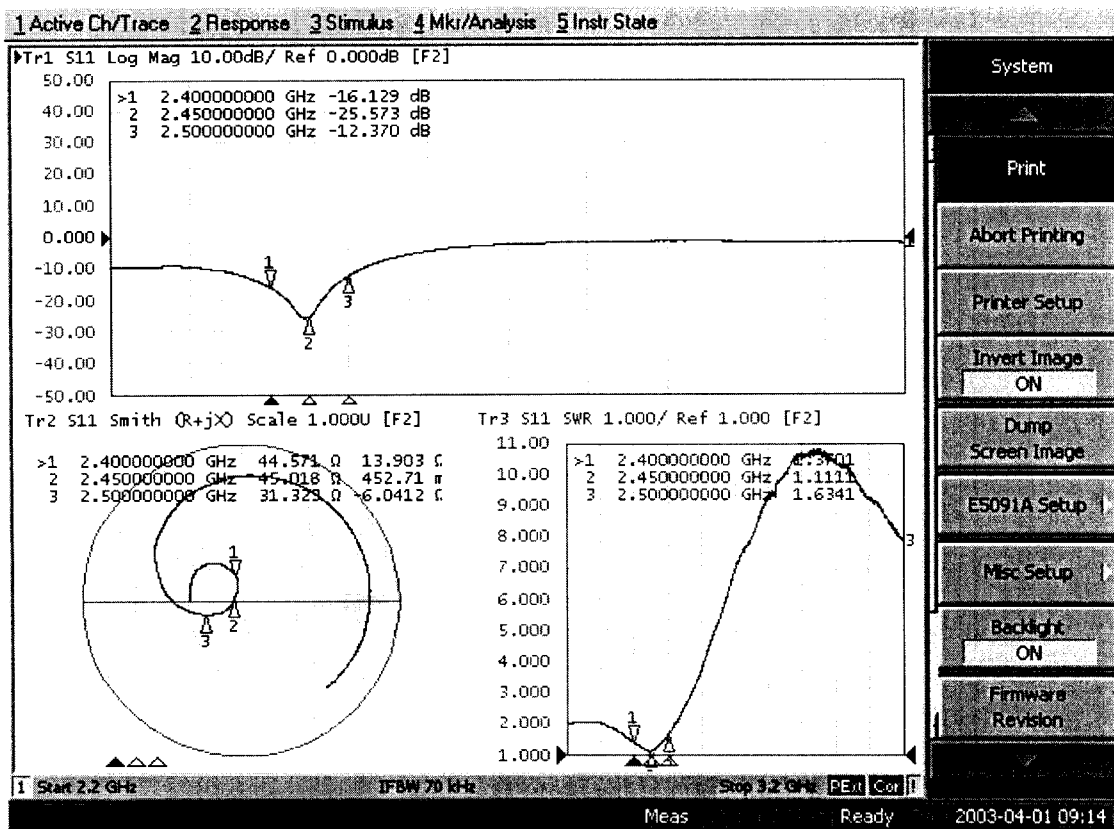
Far-field amplitude of PCI\_SMA\_E-plane.nsi



pci\_sma\_h-plane (1000x808x24b jpeg)

### Far-field amplitude of PCI\_SMA\_H-plane.nsi





## Cable Specification

**Cable :     Mil-C-17 Coaxial Cable RG-178**

### 1. Construction :

- 1 Conductor..... 30AWG 7/38 SCCS
- 2 Dielectric..... PTFE   OD : 0.033"±0.002"
- 3 Shielded.....38AWG SPC   OD : 0.051" Nominal
- 4 Jacket.....FEP   OD : 0.071"±0.004"

### 2. Physical Properties :

- 1 Weight per 1000ft..... 6.3 lbs Maximum
- 2 Bend Radius.....0.35" Minimum
- 3 Operating Temperature Range -55°C ~ 200°C

### 3. Electrical Properties:

- 1 Impedance..... 50±2 ohms
- 2 Capacitance..... 32 pF/ft Maximum
- 3 Cut off Frequency..... 116 GHz
- 4 Attenuation.....45.0 dB/100ft @ 1GHz  
64.4 dB/100ft @ 2GHz  
79.7 dB/100ft @ 3GHz  
92.7 dB/100ft @ 4GHz  
104.3 dB/100ft @ 5GHz  
115.0 dB/100ft @ 6GHz