

## *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**

<b>Granted FCC ID</b>	:	NHPWLB1200
<b>Product name</b>	:	IEEE 802.11b Wireless LAN PCI Adaptor
<b>Model name</b>	:	WLB-1200; WLB-1201; TEW-228PI; FD1814; FD814-A; ALL0181; S21191; GW-7100PCI; DWL-510
<b>Classification</b>	:	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
<b>Frequency Range</b>	:	2.412 GHz ~ 2.462GHz
<b>Supported Channel</b>	:	11 Channel
<b>Modulation Skill</b>	:	DBPSK, DQPSK, CCK
<b>Power Type</b>	:	Power by the Protocol Control Information interface 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:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{92.875 \times 1.514}{4p(20)^2} = 2.79 \times 10^{-2} \text{ mW / cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{92.875 \times 1.514}{4p}} = 3.345 \text{ cm}$$

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:

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

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



弘晶科技股份有限公司  
PARNER TECHNOLOGY CO., LTD.

高生國際企業有限公司

SUPERGRADE INTERNATIONAL ENTERPRISE LTD.

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：C512-510052-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03月18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 :

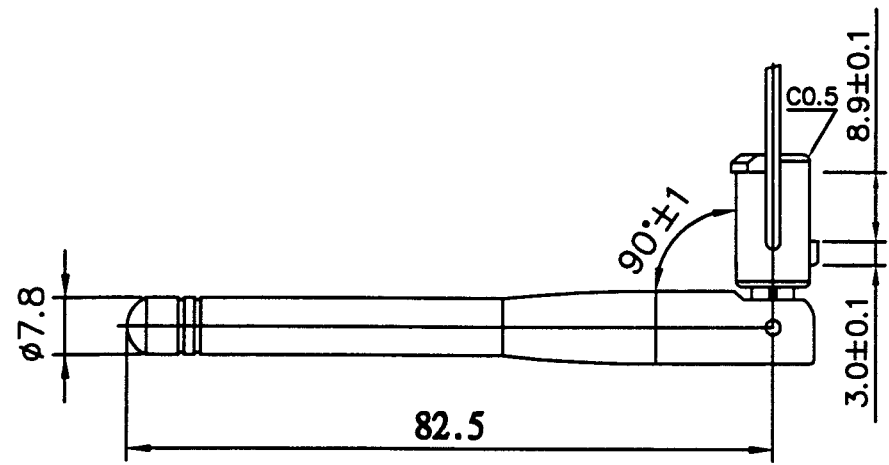
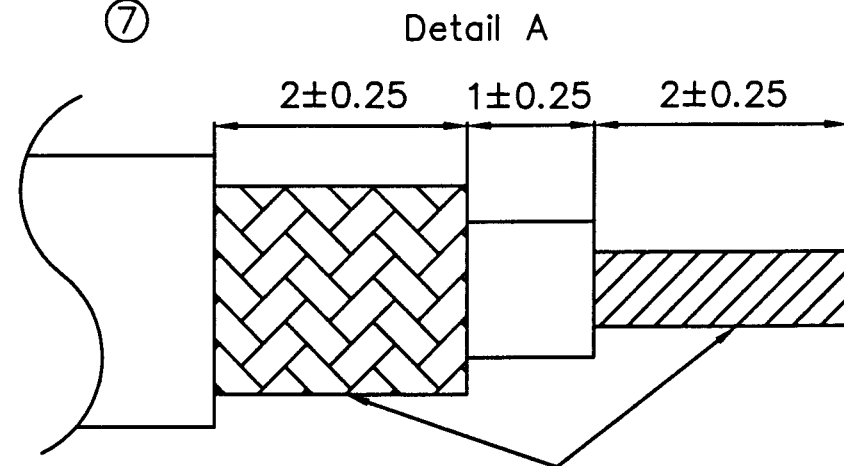
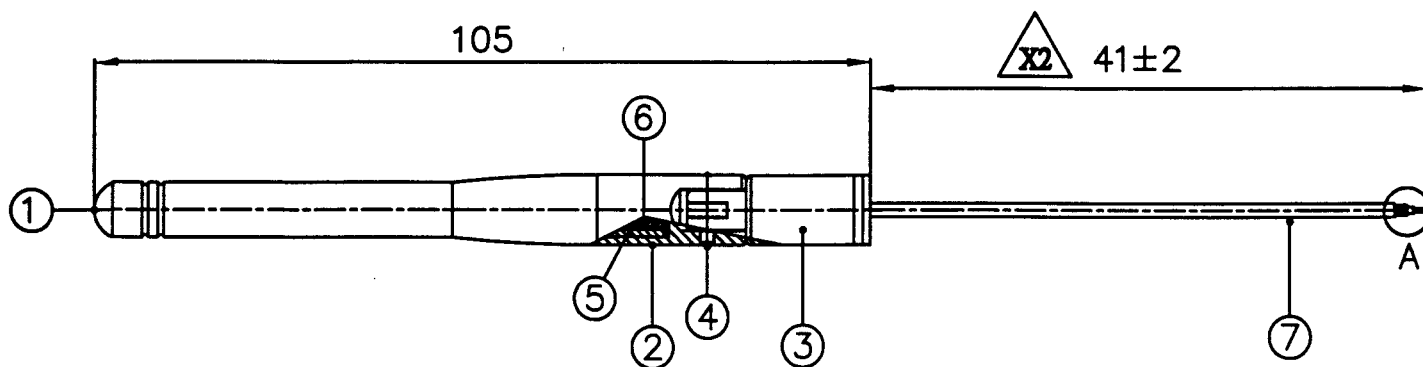
- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance ..... 50Ω Nominal
- 1.3 VSWR .....2.0 Max.
- 1.4 Return Loss..... -9.5 dB Maximum
- 1.5 Electrical Wave..... 1/2 λ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

### 2. Physical Properties :

- 2.1 Cable..... RG-178 50Ω
- 2.2 Antenna Cover..... TPE
- 2.3 Antenna Base..... PC
- 2.4 Operating Temp. .... -20°C ~ +65°C
- 2.5 Storage Temp. .... -30°C ~ +75°C
- 2.6 Color .....Black

CG-xx

REV	DATE	DESCRIPTION
X1	02/24-2003	New Issue
X2	03/07-2003	Changed Tolerance From 41±5 to 41±2



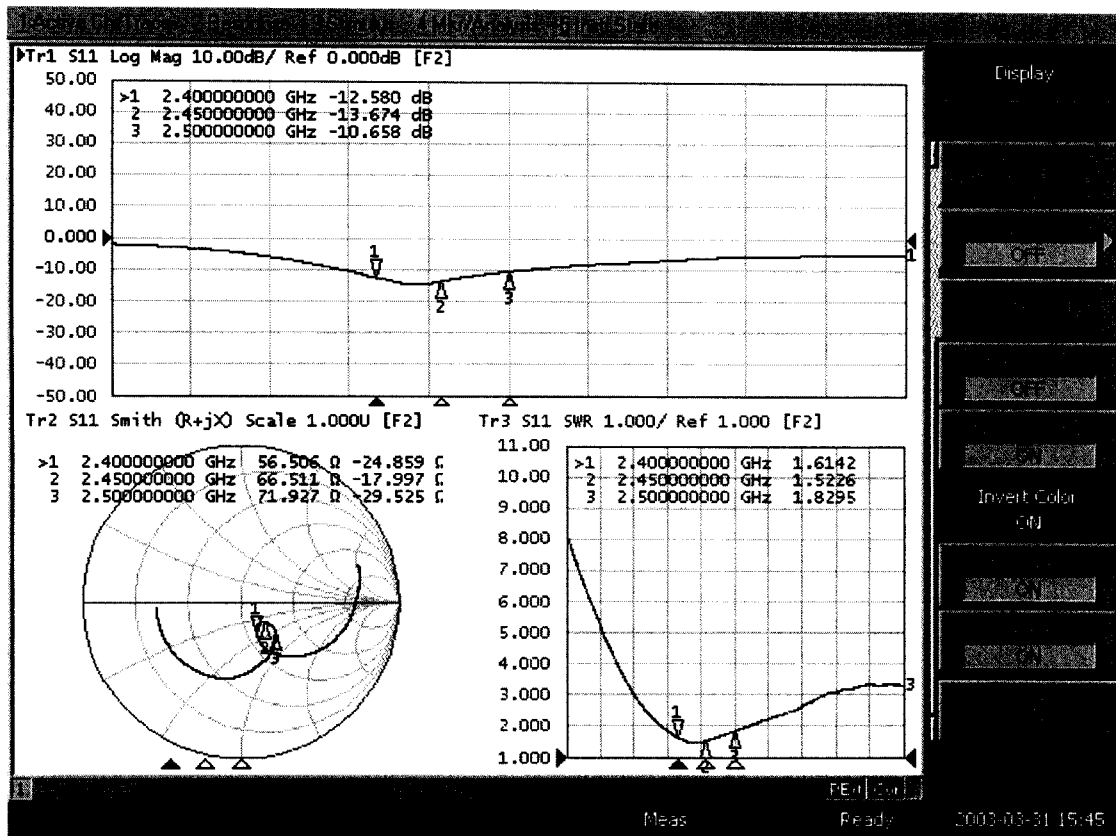
NO	DESCRIPTION	QTY	REMARK
7	Cable	RG-178 ,50Ω ,Translucent Brown	1
6	Insulator	ABS Compound ,White	1
5	Ground Tube	Brass ,Ni Plated	1
4	Rivet	Brass ,Cr Plated (Black)	2
3	Antenna Base	PC ; Color :Black	1
2	Antenna Base	PC ; Color :Black	1
1	Antenna Body	TPE ; Color :Black	1

CUSTOMER'S SIGNATURE

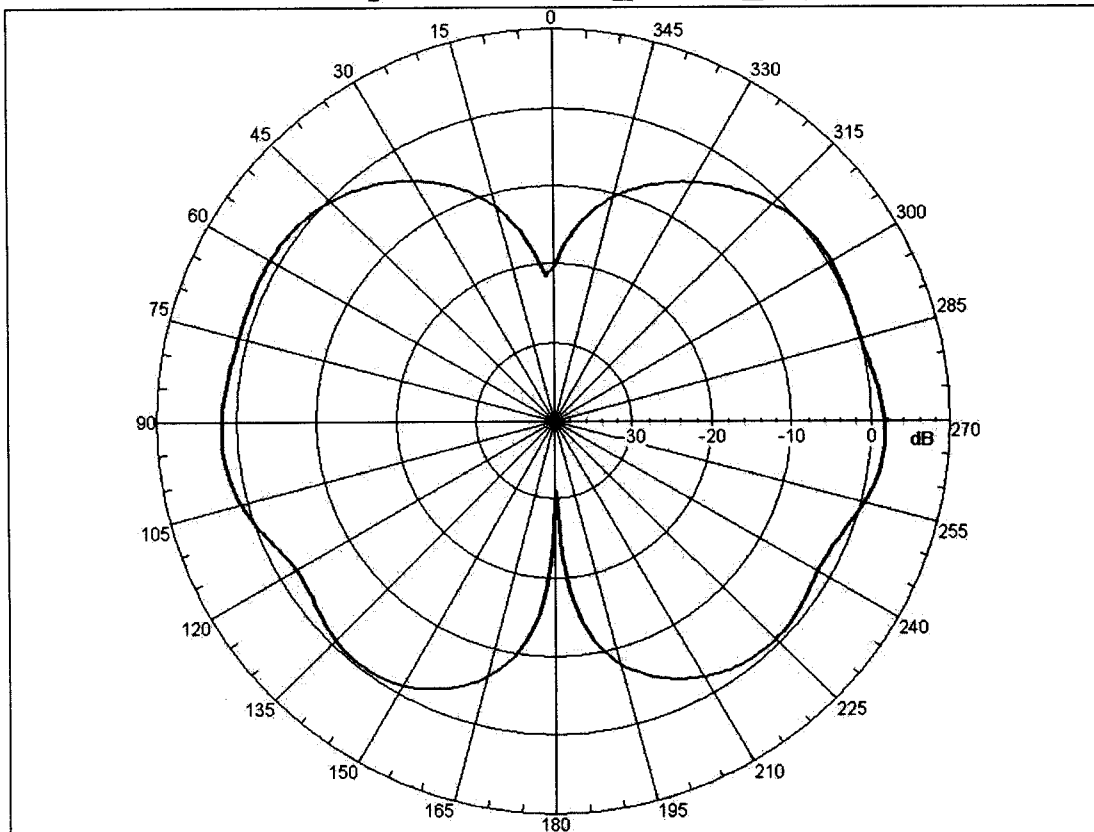
APPROVED  
 XX ±3.0  
 X ±2.0  
 X ±1.0  
 XX ±0.5  
 XXX ±0.1  
 DRAWING  
 Jane  
 20030309

CUSTOMER: 弘品科技股份有限公司  
 PART NO :  
 PARTNAME: RF Antenna Cable Assembly  
 W.Y P/NO : C512-510052-A  
 REV UNIT FILE :  
 X2 m/m SHEET: 1/1

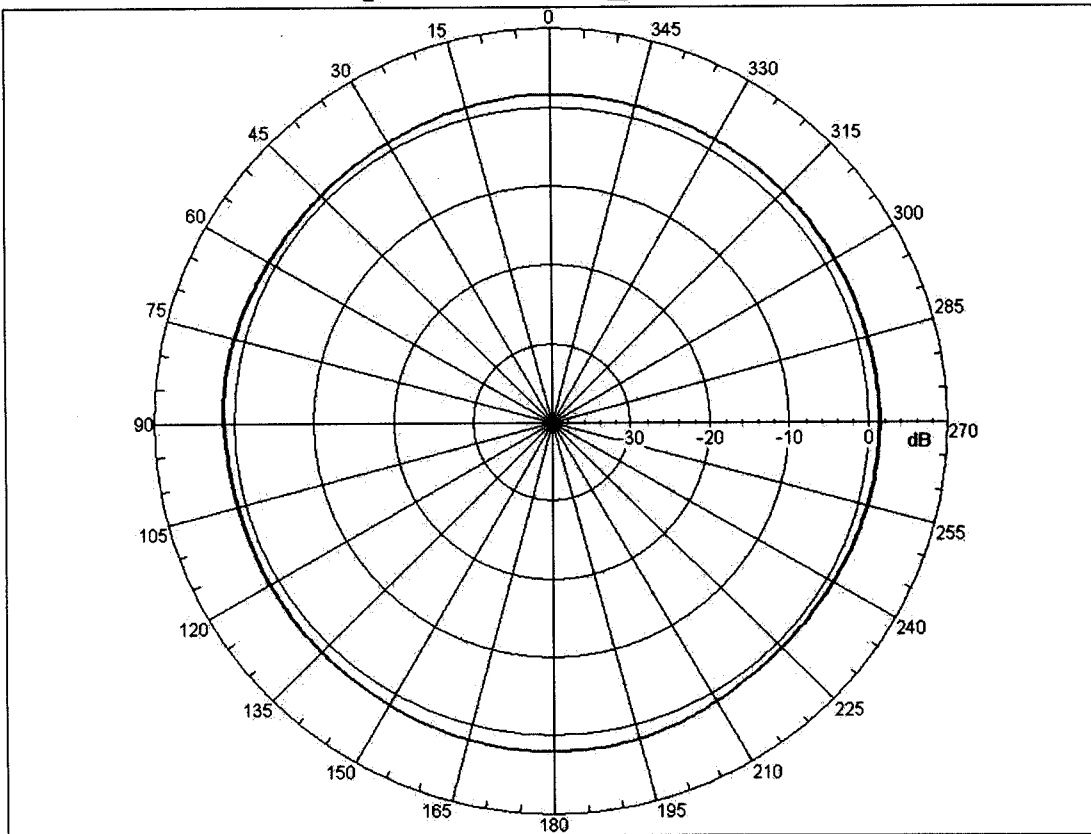
**Wha Yu**  
**INDUSTRIAL CO.,LTD.**  
**譯裕實業股份有限公司**  
 THIS DRAWING, AND ITS INHERENT DESIGN CONCEPTS, ARE THE PROPERTY OF WHA YU AND AS SUCH MAY NOT BE COPIED, REPRODUCED, OR GIVEN TO THIRD PARTIES WITHOUT THE WRITTEN CONSENT OF WHA YU.



Far-field amplitude of PCI\_41mm\_E-plane.nsi



Far-field amplitude of PCI\_41mm\_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



# RF Antenna Cable Assembly

## Specification

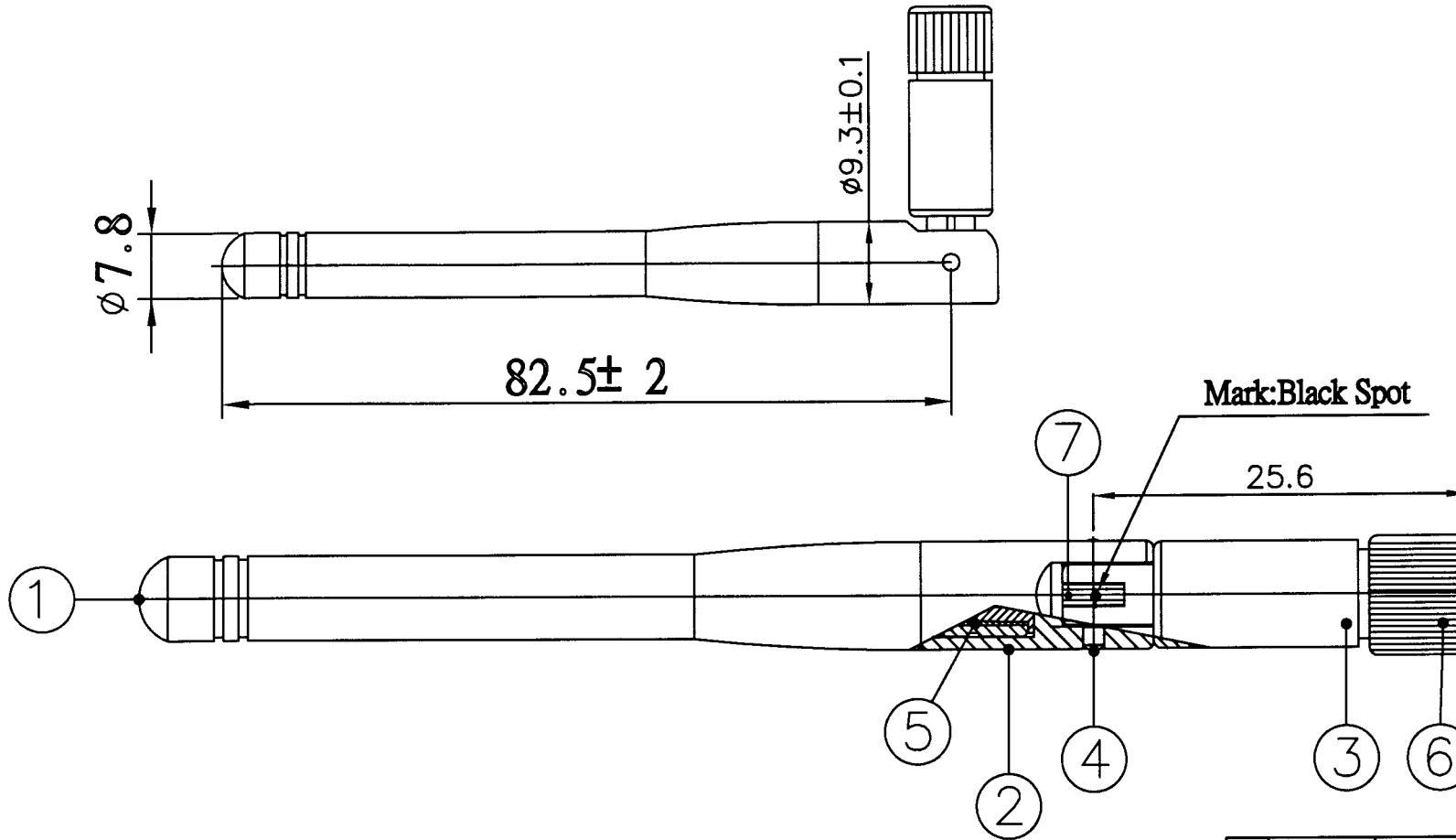
### 1. Electrical Properties :

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

### 2. Physical Properties :


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

REV	DATE	DESCRIPTION
XI	04/01-2003	New Issue



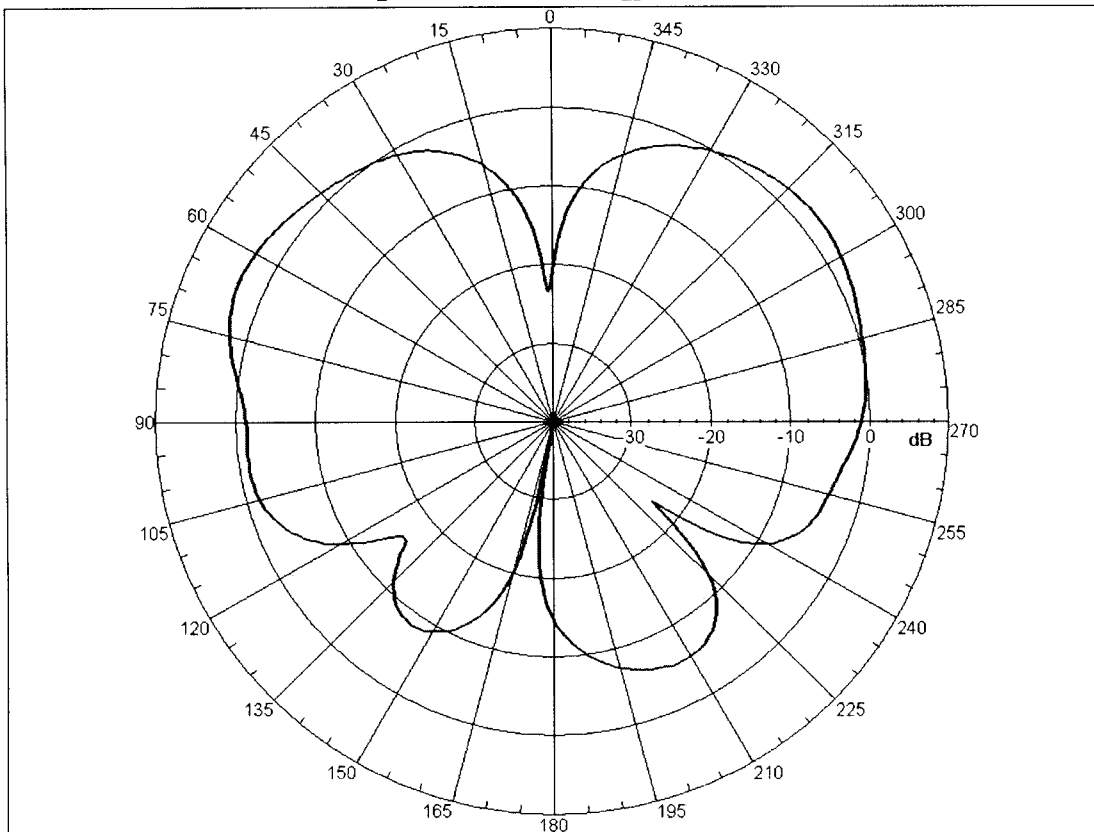
NO	DESCRIPTION	QTY	REMARK
7	Cable	RG-178, Translucent Brown; 50 $\Omega$	1
6	Connector	SMA Straight Plug Reverse Color; Black	1
5	Ground Tube	Brass, Ni plated	1
4	Rivet	Brass, Cr Plated (Black)	2
3	Antenna Base	PC; Color: Black	1
2	Antenna Base	PC; Color: Black	1
1	Antenna Cover	TPE; Color: Black	1

CUSTOMER'S SIGNATURE	XX	$\pm 3.0$	APPROVED	CUSTOMER: 弘鼎科技股份有限公司
	X	$\pm 2.0$	Sm. 6/10	
	X	$\pm 1.0$	CHECKED	PART NO :
	XX	$\pm 0.5$	pe 2/10	PARTNAME: RF Antenna Cable Assembly
	XXX	$\pm 0.1$	DRAWING	W.Y P/NO : C512-510070-A
				REV UNIT FILE :
				XI m/m SHEET: 1/1

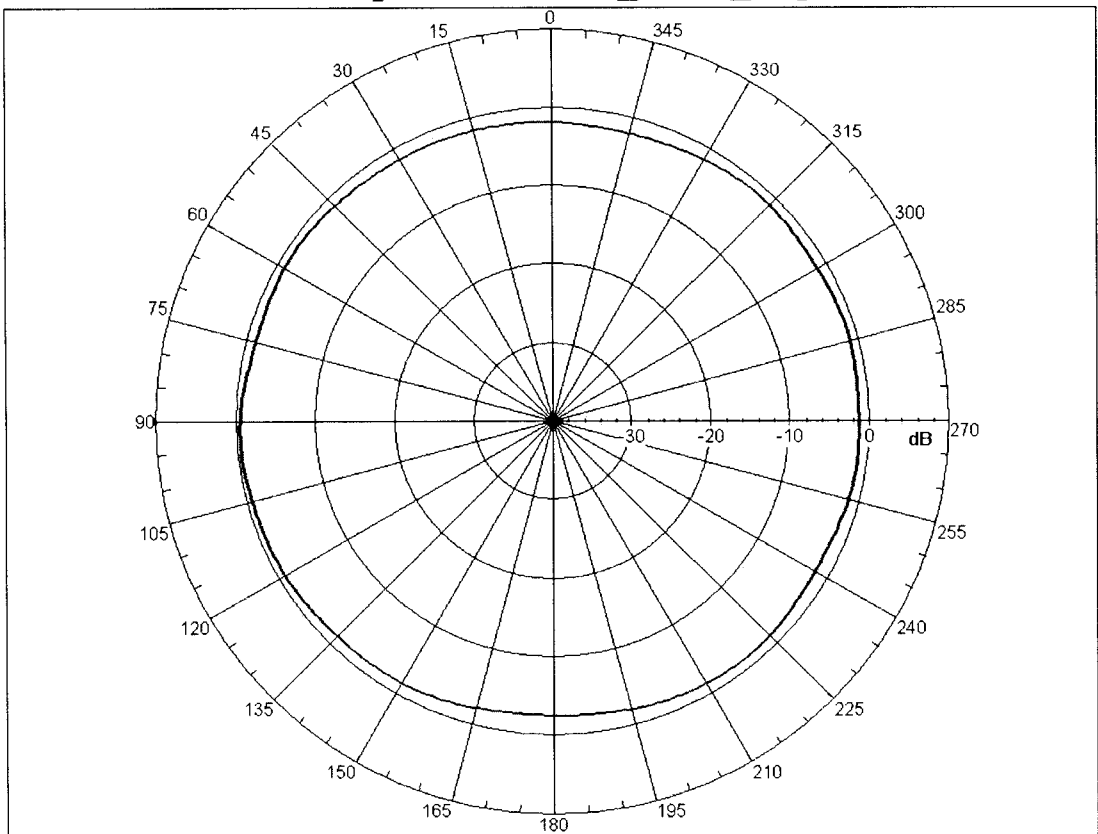

**Wha Yu**  
**INDUSTRIAL CO.,LTD.**  
**譚裕實業股份有限公司**

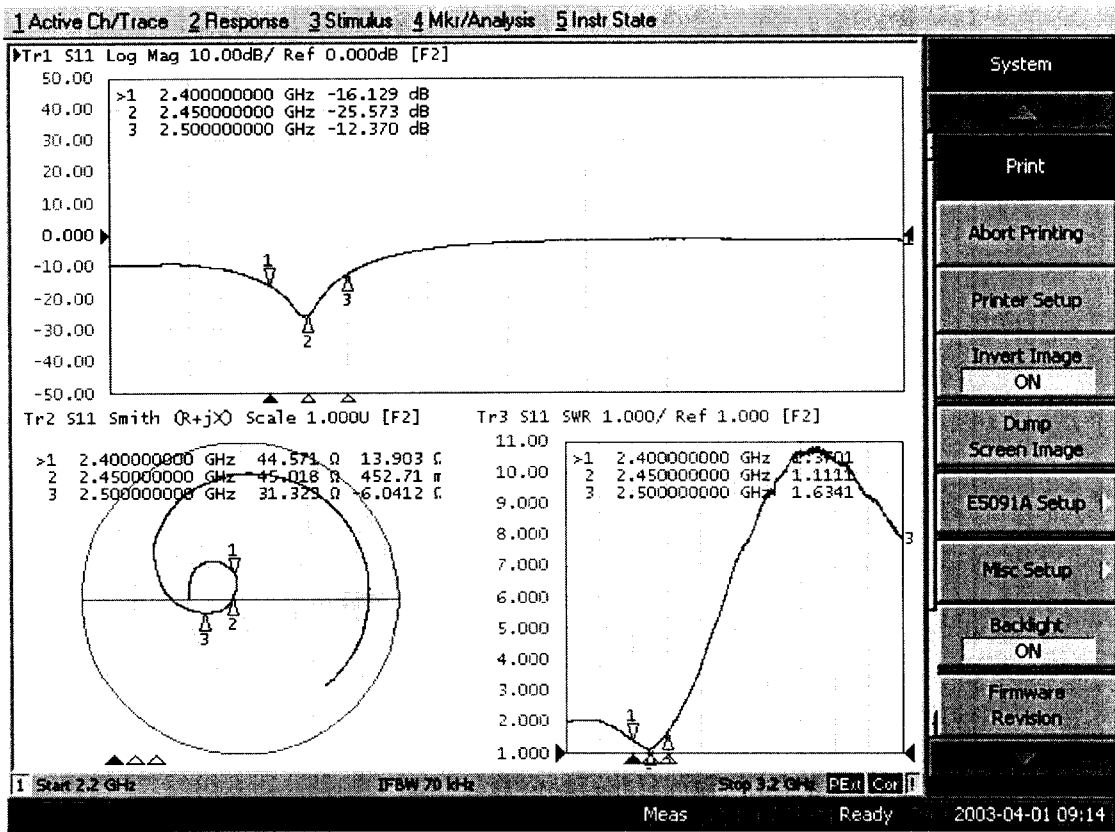
THIS DRAWING, AND ITS INHERANT DESIGN CONCEPTS, ARE THE PROPERTY OF WHA YU AND AS SUCH MAY NOT BE COPIED, REPRODUCED, OR GIVEN TO THIRD PARTIES WITHOUT THE WRITTEN CONSENT OF WHA YU.

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



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