

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

Granted FCC ID	: NHPWLB2006
Product name	: 802.11b Wireless Access Point
Model name	: as Appendix A of Test Report
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
Power Type	: Powered by Adaptor (1) or (2) (1) Model: DSA-0151A-05A I/P: 200-240VAC, 50-60Hz, 0.4A ; O/P: 5VDC, 2.4A (2) Model: RH41-0501200DG I/P: 230VAC, 50Hz, 78mA ; O/P: 5VDC, 1.2A, 6VA

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:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{85.902 \times 1.514}{4\pi(20)^2} = 0.0259 \text{ mW} / \text{cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{85.902 \times 1.514}{4\pi}} = 3.217 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 3.217cm."

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:

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

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



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**TAI HWA ELECTRONIC CO., LTD.(CHINA)
SHANGHAI HUA YU ELECTRONIC CO., LTD.(CHINA)**

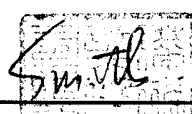
SPECIFICATION FOR APPROVAL

CUSTOMER: 友勁科技股份有限公司

PART NAME: 2.4G RF Antenna Assembly

PART NO: 11722B028A57*02 **REVISION:**

W. Y. P / NO.: C056-510120-A **REV.:** X2

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :	2005/10/22	

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WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)

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Address: #70 Shui Li Road, Hsin Chu City, Taiwan, R.O.C.

Tel: + 886-3-5714225 (REP)

Fax: + 886-3-5713853 • + 886-3-5723600

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Address: Pak Ho District, Hou Street Town,

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Address: Lian Ho Village, Bai Ho Town, Qing

Pu Country Shanghai, China

Tel: + 86-21-59741348 • + 86-21-59743624

Fax: + 86-21-59741347

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

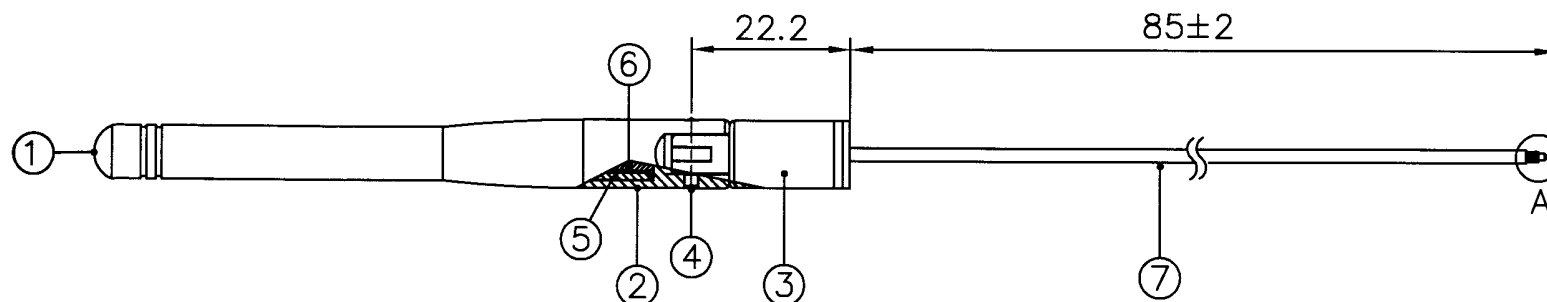
- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave..... $1/2 \lambda$ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

2. Physical Properties :

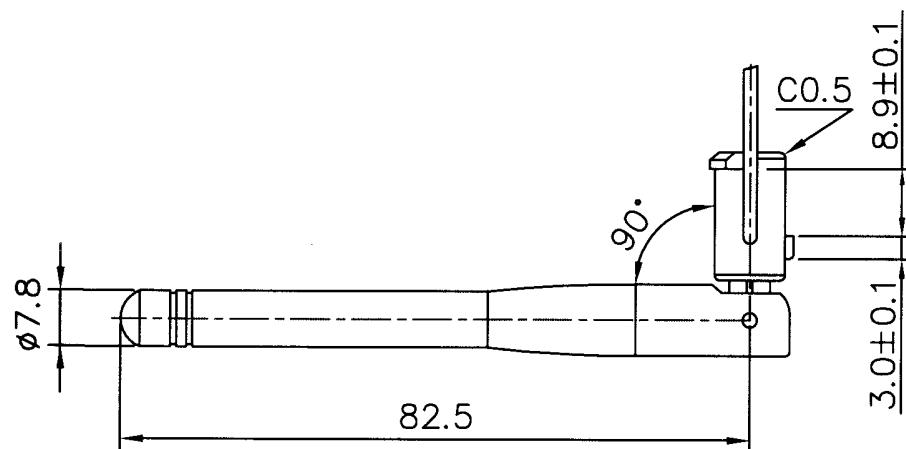
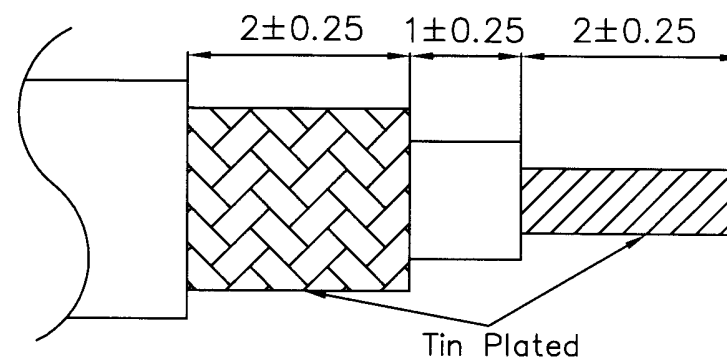
- 2.1 Cable..... RG-178 Cable
- 2.2 Antenna Cover..... TPE
- 2.3 Antenna Base..... PC
- 2.4 Operating Temp. -20°C ~ +65°C
- 2.5 Storage Temp. -30°C ~ +75°C
- 2.6 Color Cool Gray 4C

CG-

REV	DATE	DESCRIPTION
X1	10/13-2003	New Issue
X2	10/22-2003	Changed PART NO.



Detail A



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

CUSTOMER'S SIGNATURE

XX	±5	APPROVED
X	±3.0	Smith 10/23
X	±1.0	CHECKED
XX	±0.5	10/23
XXX	±0.1	DRAWING
⊕	⊖	10-22-03

CUSTOMER: 友勤科技股份有限公司

PART NO : 11722B028A57*02

PARTNAME: RF Antenna Cable Assembly

W.Y PNO : C056-510120-A

REV UNIT FILE : SSR-2643

X2 m/m SHEET : 1/1

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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



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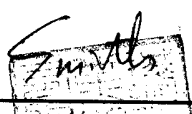
SPECIFICATION FOR APPROVAL

CUSTOMER: 友勁科技股份有限公司

PART NAME: 2.4G RF Antenna Assembly

PART NO: 11722B028A57*03 **REVISION:**

W. Y. P / NO.: C056-510113-A **REV.:** X2

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :	2003-10-22	

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RF Antenna Cable Assembly

Specification

1. Electrical Properties :

- 1.1 Frequency Rang.....2.4GHz ~ 2.5GHz
- 1.2 Impedance 50 Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss.....-10dB 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 Cable
- 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 Cool Gray 4C
- 2.7 Core.....RH 4*2*10

CG-xx

REV	DATE	DESCRIPTION
X1	10/03-2003	New Issue
X2	10/22-2003	Changed PART NO.

105

170±5

120±3

9.35±0.1

Detail A

2±0.25 1±0.25 2±0.25

Tin Plated

NO	DESCRIPTION	QTY	REMARK
10	Cable	Heat Shrink Tube	1
9	Core	RH 4*10*2	1
8	Tube	Heat Shrink Tube	1
7	Cable	RG-178 Cable	1
6	Insulator	ABS Compound, White	1
5	Ground Tube	Brass, Ni Plated	1
4	Rivet	Brass, Plated (Ni)	2
3	Antenna Base	PC; Color: Cool Gray 4C	1
2	Antenna Base	PC; Color: Cool Gray 4C	1
1	Antenna Body	TPE; Color: Cool Gray 4C	1

82.5

7.8

90°

3.0±0.1

8.9±0.1

0.5

XX	±3.0	APPROVED
X <td>±2.0</td> <td>Smith 10/22/03</td>	±2.0	Smith 10/22/03
X <td>±1.0</td> <td>CHECKED</td>	±1.0	CHECKED
XX <td>±0.5</td> <td>10/22/03</td>	±0.5	10/22/03
XXX <td>±0.1</td> <td>DRAWING</td>	±0.1	DRAWING

CUSTOMER'S SINGATURE

CUSTOMER: 友勁科技股份有限公司

PART NO : 11722B028A57*03

PARTNAME: RF Antenna Cable Assembly

W.Y P/NO : C056-510113-A

REV UNIT FILE : SSR-2643

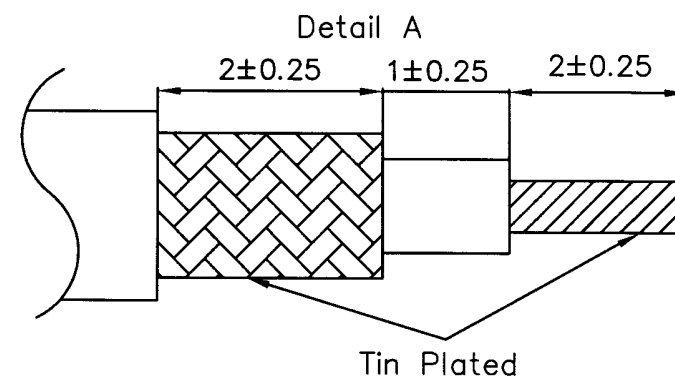
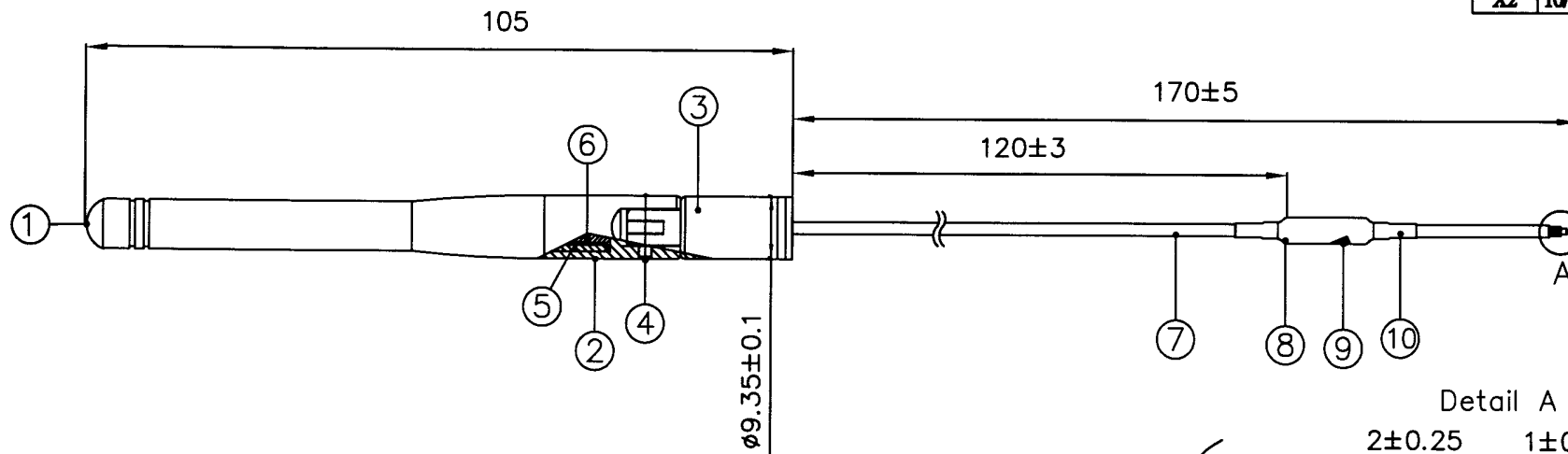
X2 m/m SHEET : 1/1

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REV	DATE	DESCRIPTION
X1	10/03-2003	New Issue
X2	10/22-2003	Changed PART NO.



10	Cable	Heat Shrink Tube	1	
9	Core	RH 4*10*2	1	
8	Tube	Heat Shrink Tube	1	
7	Cable	RG-178 Cable	1	
6	Insulator	ABS Compound ,White	1	
5	Ground Tube	Brass ,Ni Plated	1	
4	Rivet	Brass , Plated (Ni)	2	
3	Antenna Base	PC ; Color : Cool Gray 4C	1	
2	Antenna Base	PC ; Color : Cool Gray 4C	1	
1	Antenna Body	TPE ; Color : Cool Gray 4C	1	
NO	DESCRIPTION		QTY	REMARK

CUSTOMER'S SINGATURE	XX	±3.0	APPROVED	CUSTOMER: 友勤科技股份有限公司		
	X	±2.0				
	X	±1.0	CHECKED			
	XX	±0.5				
	XXX	±0.1	DRAWING			
						
				CUSTOMER: 友勤科技股份有限公司		
				PART NO : 11722B028A57*03		
				PARTNAME: RF Antenna Cable Assembly		
				W.Y PNO : C056-510113-A		
				REV	UNIT	FILE : SSR-2643
				X2	m/m	SHEET : 1/1



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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



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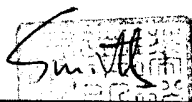
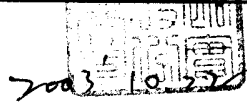
SPECIFICATION FOR APPROVAL

CUSTOMER: 友勁科技股份有限公司

PART NAME: 2.4G RF Antenna Assembly

PART NO: 11723B02*357*00 **REVISION:**

W. Y. P / NO.: C056-510114-A **REV.:** X2

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

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譚裕實業股份有限公司

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Fax: + 86-21-59741347

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

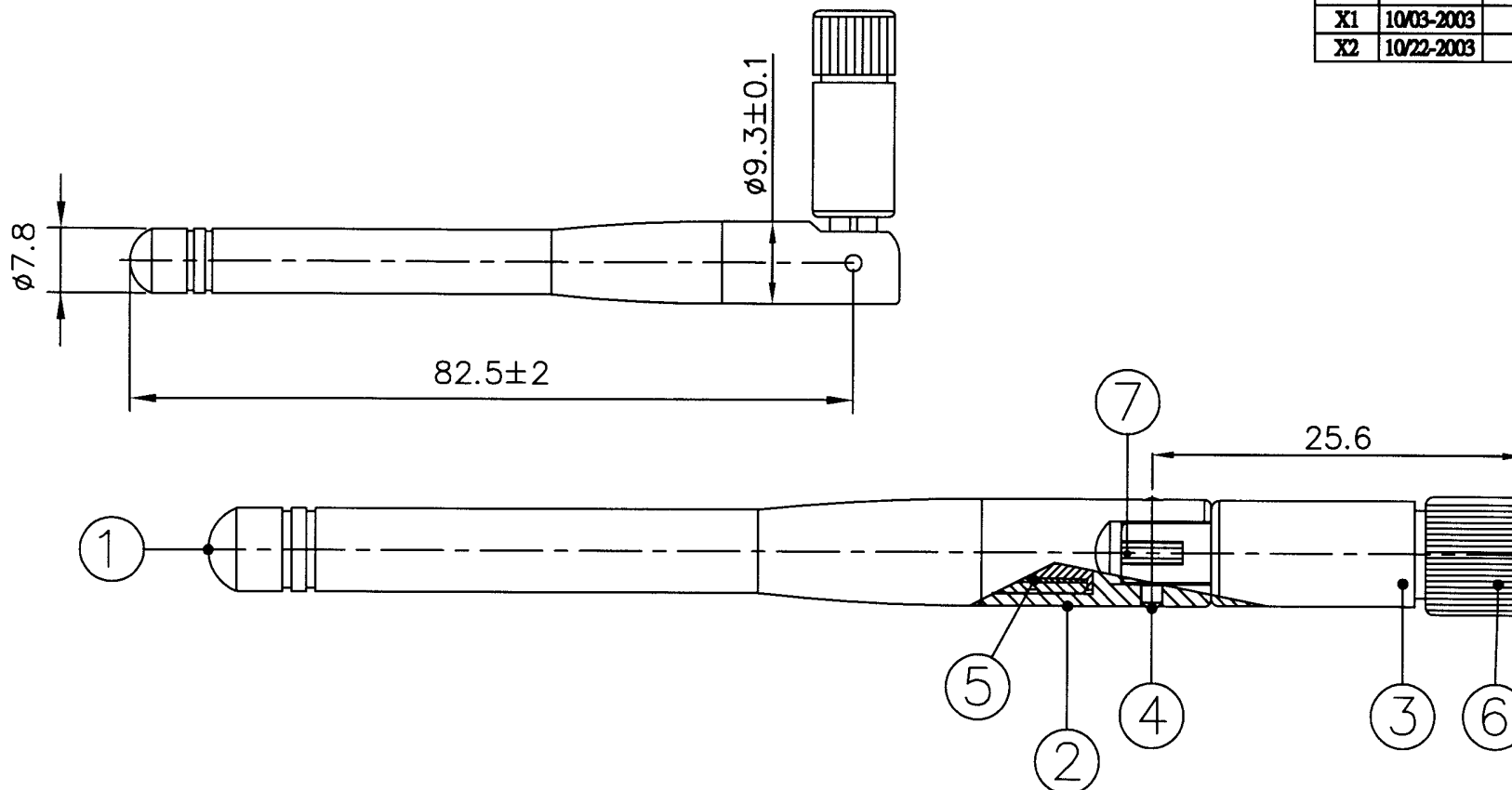
- 1.1 Frequency Rang.....2.4GHz ~ 2.5GHz
- 1.2 Impedance 50 Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave..... 1/2 λ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

2. Physical Properties :

- 2.1 Cable..... RG-178 Cable
- 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 Cool Gray 4C
- 2.7 Connector..... SMA Plug Reverse Plated Gold

CG-

REV	DATE	DESCRIPTION
X1	10/03-2003	New Issue
X2	10/22-2003	Changed PART NO.



7	Cable	RG-178, Translucent Brown; 50 Ω	1	
6	Connector	SMA Straight Plug/Reverse Plated Gold	1	
5	Ground Tube	Brass, Ni plated	1	
4	Rivet	Brass, Plated Ni	2	
3	Antenna Base	PC; Color: Cool Gray 4C	1	
2	Antenna Base	PC; Color: Cool Gray 4C	1	
1	Antenna Cover	TPE; Color: Cool Gray 4C	1	
NO	DESCRIPTION		QTY	REMARK

CUSTOMER'S SIGNATURE

XX	±5	APPROVED
X	±1.0	Smith 10/23
X	±0.1	CHECKED
XX	±0.01	Peter 10/23
XXX	±0.005	DRAWING
		10-22-03

CUSTOMER: 友勁科技股份有限公司

PART NO : 11723B02*357*00

PARTNAME: 24G RF Antenna Assembly

W.Y.PNO : C056-510114-A

REV UNIT FILE : SSR-2643

X2 m/m SHEET : 1/1



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- 2 Bend Radius.....0.35" Minimum
- 3 Operating Temperature Range -55°C ~ 200°C

3. Electrical Properties:

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- 2 Capacitance..... 32 pF/ft Maximum
- 3 Cut off Frequency..... 116 GHz
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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