

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:

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

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



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

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

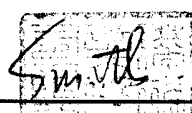
SPECIFICATION FOR APPROVAL

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	

WHA YU GROUP

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

譚裕實業股份有限公司

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

Tel: + 886-3-5714225 (REP)

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

TAI HWA ELECTRONIC CO., LTD. (CHINA)

台樺電業製品廠

Address: Pak Ho District, Hou Street Town,

Dong Guan City, Guangdong, China

Tel: + 86-769-5599375 • + 86-769-5912375

Fax: + 86-769-5599376

SHANGHAI HUA YU ELECTRONIC CO., LTD. (CHINA)

上海華裕電子有限公司

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 :

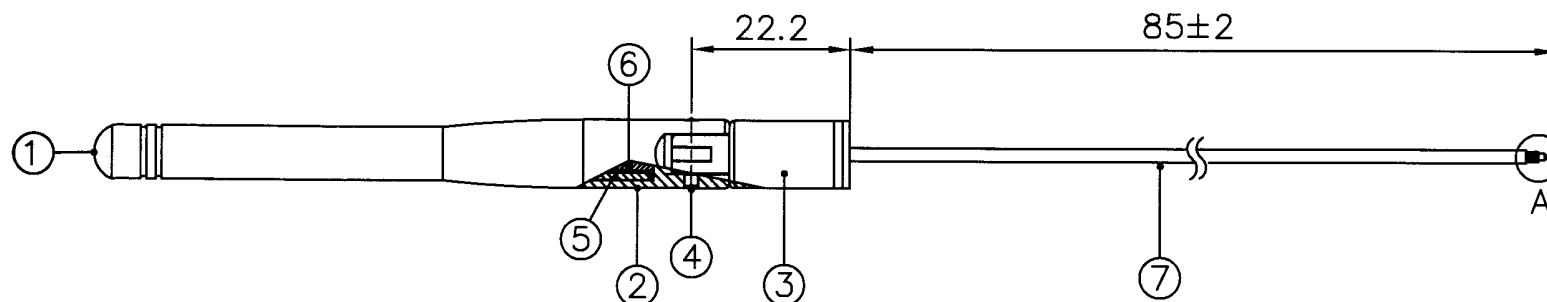
- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave..... $1/2 \lambda$ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

2. Physical Properties :

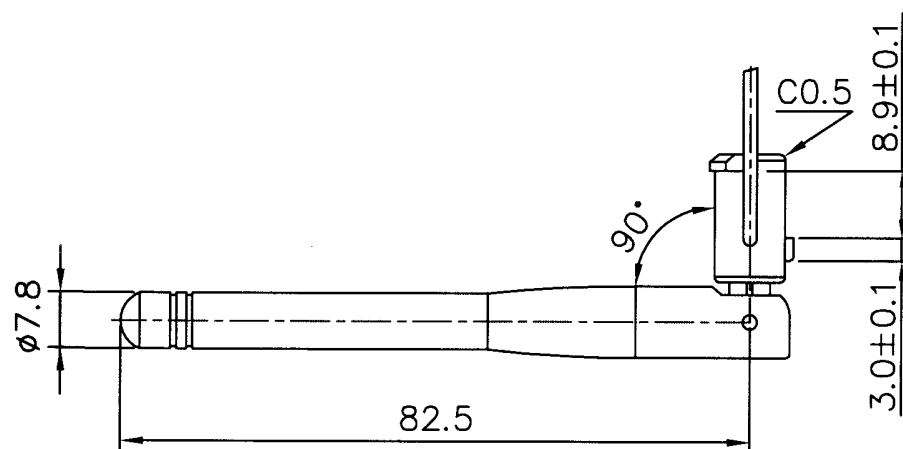
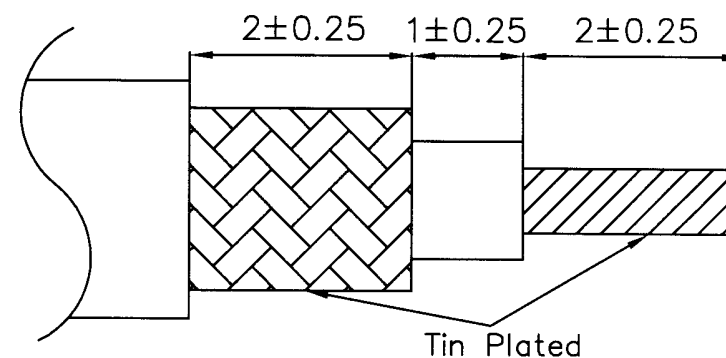
- 2.1 Cable..... RG-178 Cable
- 2.2 Antenna Cover..... TPE
- 2.3 Antenna Base..... PC
- 2.4 Operating Temp. -20°C ~ +65°C
- 2.5 Storage Temp. -30°C ~ +75°C
- 2.6 Color Cool Gray 4C

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 10/23/03
X	±1.0	CHECKED
XX	±0.5	10/22/03
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

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.

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



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

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

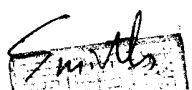
SPECIFICATION FOR APPROVAL

CUSTOMER: 友勁科技股份有限公司

PART NAME: 2.4G RF Antenna Assembly

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

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

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

WHA YU GROUP

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

譚裕實業股份有限公司

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

Tel: + 886-3-5714225 (REP)

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

TAI HWA ELECTRONIC CO., LTD. (CHINA)

台樺電業製品廠

Address: Pak Ho District, Hou Street Town,

Dong Guan City, Guangdong, China

Tel: + 86-769-5599375 • + 86-769-5912375

Fax: + 86-769-5599376

SHANGHAI HUA YU ELECTRONIC CO., LTD. (CHINA)

上海華裕電子有限公司

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 :

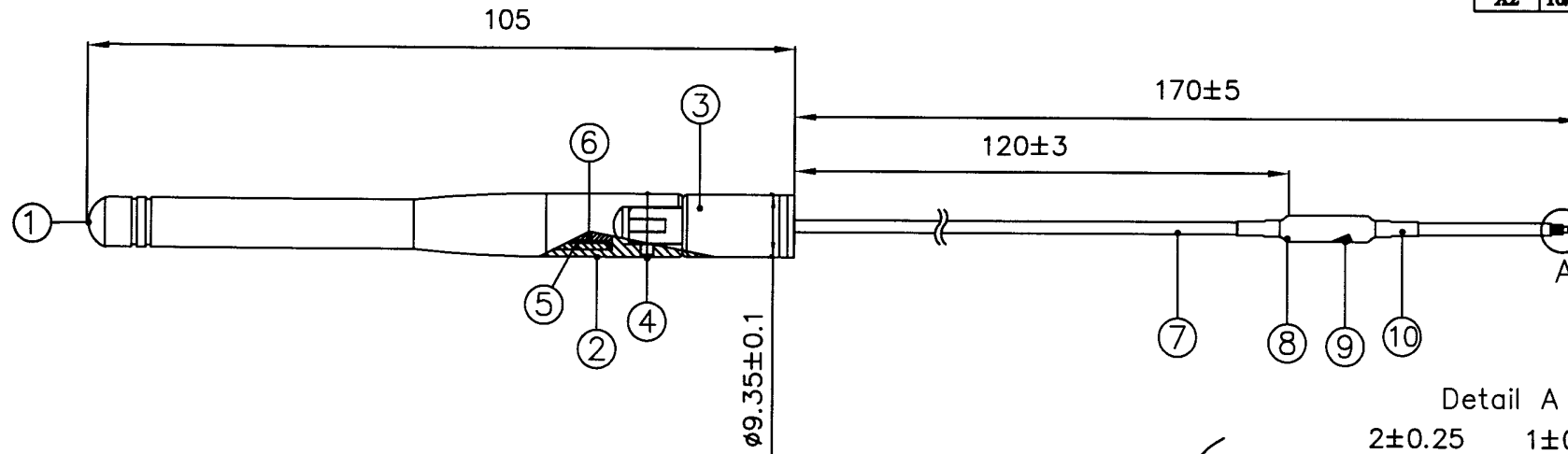
- 1.1 Frequency Rang.....2.4GHz ~ 2.5GHz
- 1.2 Impedance 50 Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss.....-10dB Maximum
- 1.5 Electrical Wave..... 1/2 λ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

2. Physical Properties :

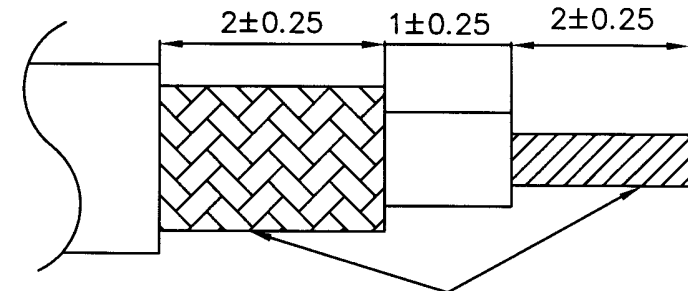
- 2.1 Cable..... RG-178 Cable
- 2.2 Antenna Cover..... TPE
- 2.3 Antenna Base.....PC
- 2.4 Operating Temp. -20°C ~ +65°C
- 2.5 Storage Temp. -30°C ~ +75°C
- 2.6 Color Cool Gray 4C
- 2.7 Core.....RH 4*2*10

CG-xx

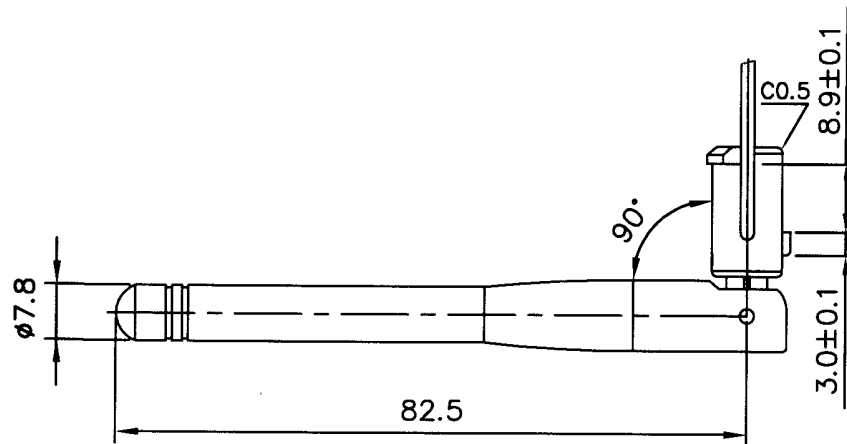
REV	DATE	DESCRIPTION
X1	10/03-2003	New Issue
X2	10/22-2003	Changed PART NO.



Detail A



Tin Plated



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 SIGNATURE

XX	±3.0	APPROVED
X	±2.0	CHECKED
X	±1.0	DRAWING
XX	±0.5	
XXX	±0.1	

CUSTOMER: 友勤科技股份有限公司

PART NO: 11722B028A57*03

PARTNAME: RF Antenna Cable Assembly

W.Y.P.N.O: C056-510113-A

REV UNIT FILE: SSR-2643

X2 m/m SHEET: 1/1

Wha Yu
INDUSTRIAL CO.,LTD.

譚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.

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



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

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

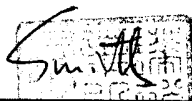
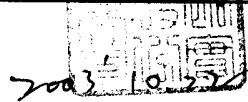
SPECIFICATION FOR APPROVAL

CUSTOMER: 友勁科技股份有限公司

PART NAME: 2.4G RF Antenna Assembly

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

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

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

WHA YU GROUP

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

譚裕實業股份有限公司

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

Tel: + 886-3-5714225 (REP)

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

TAI HWA ELECTRONIC CO., LTD. (CHINA)

台樺電業製品廠

Address: Pak Ho District, Hou Street Town,

Dong Guan City, Guangdong, China

Tel: + 86-769-5599375 • + 86-769-5912375

Fax: + 86-769-5599376

SHANGHAI HUA YU ELECTRONIC CO., LTD. (CHINA)

上海華裕電子有限公司

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 :

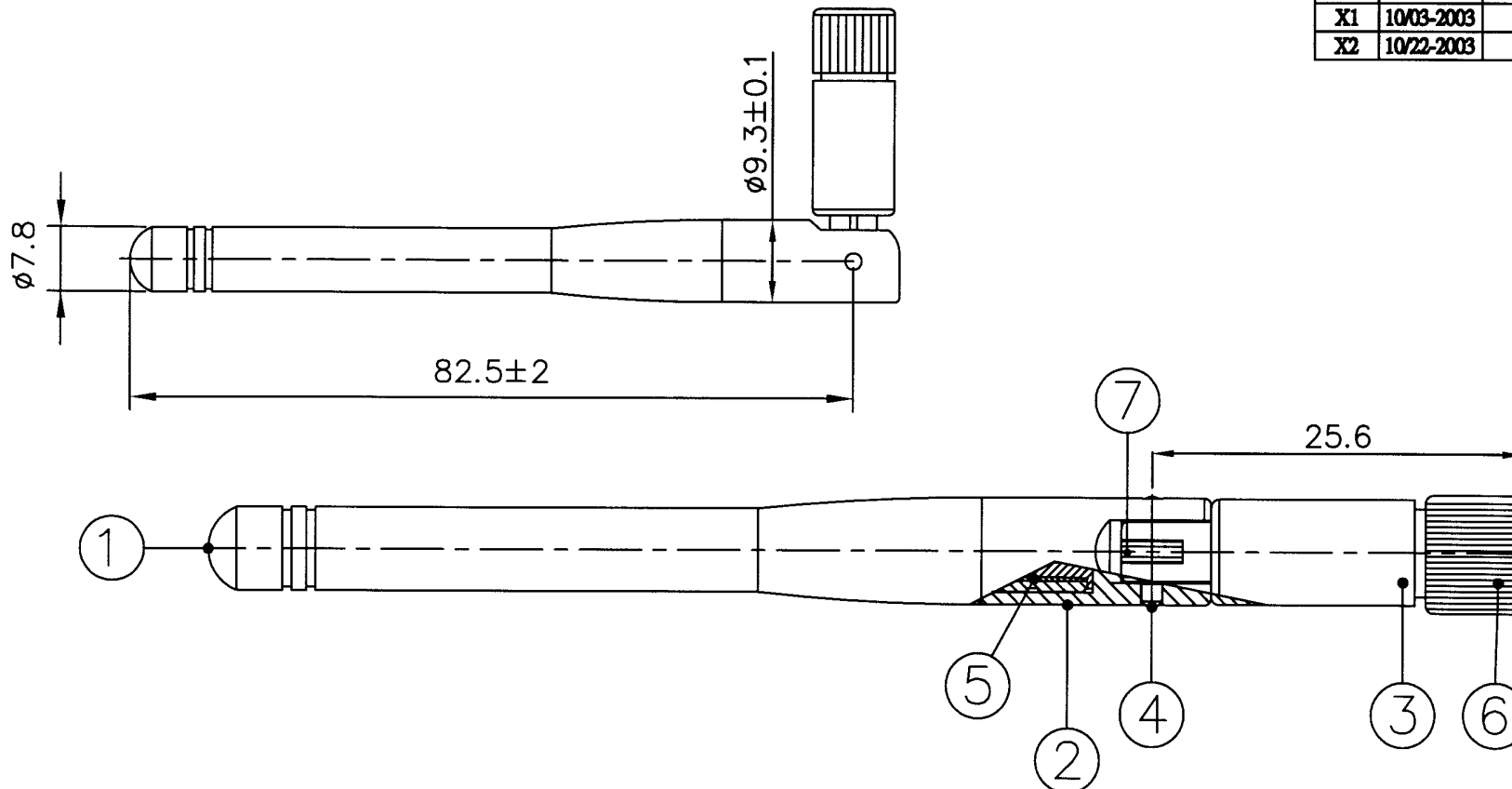
- 1.1 Frequency Rang.....2.4GHz ~ 2.5GHz
- 1.2 Impedance 50 Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave..... 1/2 λ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

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



Wha Yu
INDUSTRIAL CO., LTD.

華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.

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