

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 : MSQWL500GPV2

Product Name : ASUS Wireless Router

Model Name : WL-500gP V2

Frequency Range : 2.412GHz ~ 2.462GHz

Channel Spacing : 5MHz

Support Channel : 11 Channels

Modulation Skill : DBPSK, DQPSK, CCK, OFDM

Power Type : Powered by the switching adapter,
Manufacture.: UMEC
Model: UP0181B-05PA
I/P: 100-240VAC 50/60Hz 0.4A MAX.
O/P: +5VDC 2.5A 12.5W MAX.
181cm length, Shielded, no ferrite core

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:
$$S = \frac{PG}{4\pi R^2} = \frac{271.02 \times 1.585}{4\pi(20)^2} = 0.085mW / cm^2$$

Estimated safe separation:
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{271.02 \times 1.585}{4\pi}} = 5.847cm$$

Note: "The safe estimated separation that the user must maintain from the antenna is at least 6.5cm"

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)

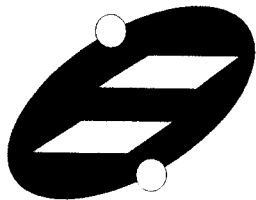
The Numeric gain G of antenna with a gain specified in dB is determined by:

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

$$G = \text{Log}^{-1} (2.00 / 10) = 1.585$$

Appendix

Antenna Specification



WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)
 TAI HWA ELECTRONIC CO., LTD.(CHINA)
 SHANGHAI HUA YU ELECTRONIC CO., LTD.(CHINA)
 AEON TECH CO., LTD. (CHINA)

SPECIFICATION FOR APPROVAL

CUSTOMER: 華碩電腦股份有限公司

PART NAME: RF Antenna Assembly

PART NO.: 14G151028010

REVISION:

W. Y. P/NO.: C660-510103-A

REV.: XI

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :	4 18.06	

WHA YU GROUP

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

華裕實業股份有限公司

Address: No.326, Sec 2, Kung Tao 5 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, Hiu Street Town, Dong Guan City, Guangdong, China

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

Fax: + 86-769-5599376

HUA HONG INTERNATIONAL LTD.

華弘國際有限公司

Rm.1103A,President Commercial Centre,608 Nathan Road,Mong Kok,Kowloon,Hong Kong

Tel: + 86-852-27712210

Fax: + 86-852-23843747

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

上海華裕電子有限公司

Address:3586,Wai Qing Song Road, Qing Pu County, Shanghai China

Tel: + 86-21-59741348 · + 86-21-59744101~4

Fax: + 86-21-59741347

SU ZHOU AEON TECH CO., LTD. (CHINA)

蘇州華廣電通有限公司

Address:Limin North Road, LiLi Town,LiLi Industrial Park,LinHu Economic Zone

Wujiang City,Jiangsu Province,China

Tel: + 86-512-63627980

Fax: + 86-512-63627981

Contents

<i>Item</i>	<i>Description</i>	<i>Page</i>
1.	天線規格表 1
2.	成品圖 2
3.	測試報告 3~5
4.	Cable 規格 6~7
5.	Connector 材質特性 8
6.	SGS 測試 9~44

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

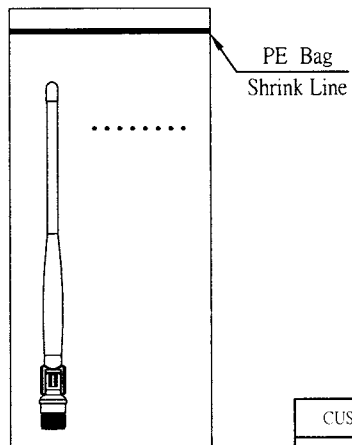
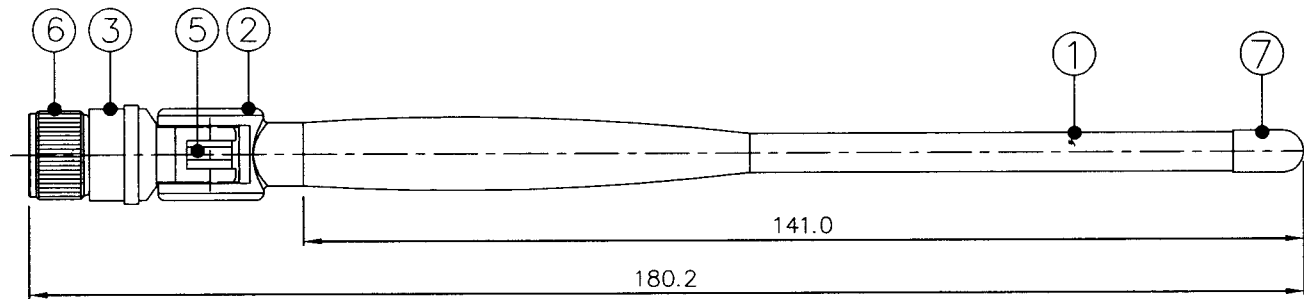
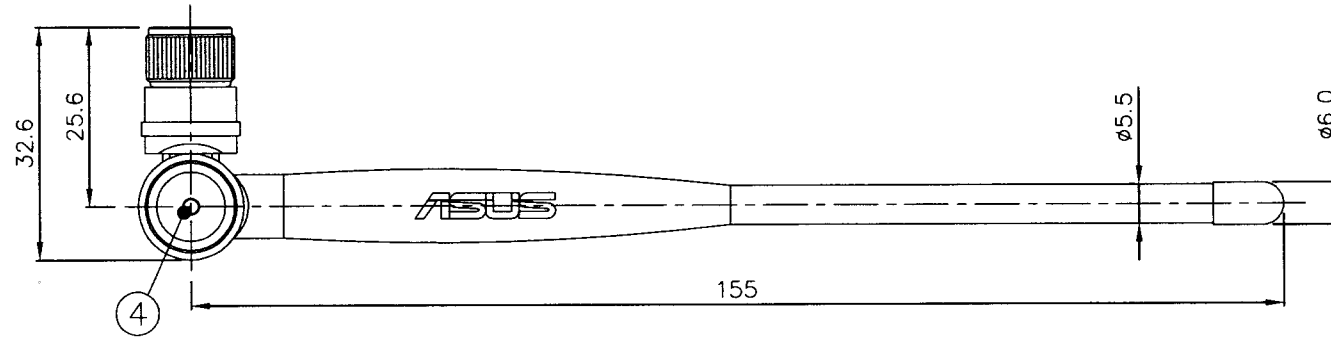
- 1.1 Frequency Range..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10 dB Maximum
- 1.5 Radiation Omni-directional
- 1.6 Gain(peak)..... 1.8dBi
- 1.7 Polarization..... Linear Vertical
- 1.8 Admitted Power..... 1W

2. Physical Properties :

- 2.1 Cable..... RG-178 Coaxial Cable
- 2.2 Antenna Cover..... TPE
- 2.3 Antenna Base..... PC
- 2.4 Antenna Base..... PBT
- 2.5 Operating Temp. -20 ~ +65
- 2.6 Storage Temp. -30 ~ +75
- 2.7 Color White
- 2.8 Connector..... SMA Plug Reverse

CG-

REV	DATE	DESCRIPTION
X1	3/8-2006	New Issue



Packing : 10 pcs/bag

NO	DESCRIPTION	QTY	REMARK
7	Antenna Head Cap	TPE ; Color : White	1
6	Connector	SMA Plug Reverse(Ni Plated)	1
5	Cable	RG-178 Cable	1
4	Rivet	POM , White	2
3	Antenna Base	PBT ; Color : White	1
2	Antenna Base	PC ; Color : White	1
1	Antenna Body	TPE ; Color : White	1

CUSTOMER'S SIGNATURE

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

APPROVED
 3/8/06
 CHECKED
 鄭香廷 3/8/06
 DRAWING
 程淑娟

CUSTOMER: ASUS		
PART NO :		
PARTNAME: RF Antenna Assembly		
W.Y PNO : C660-510103-A		
REV	UNIT	FILE :
X1	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.

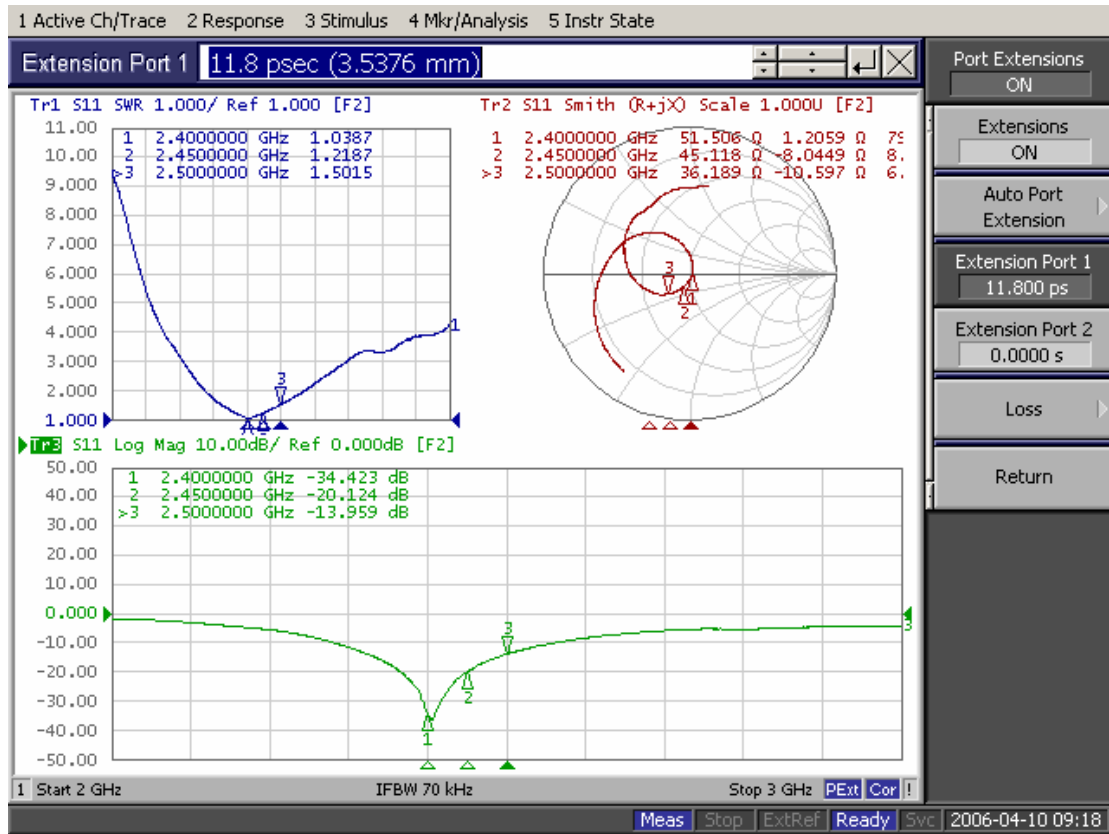


華裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

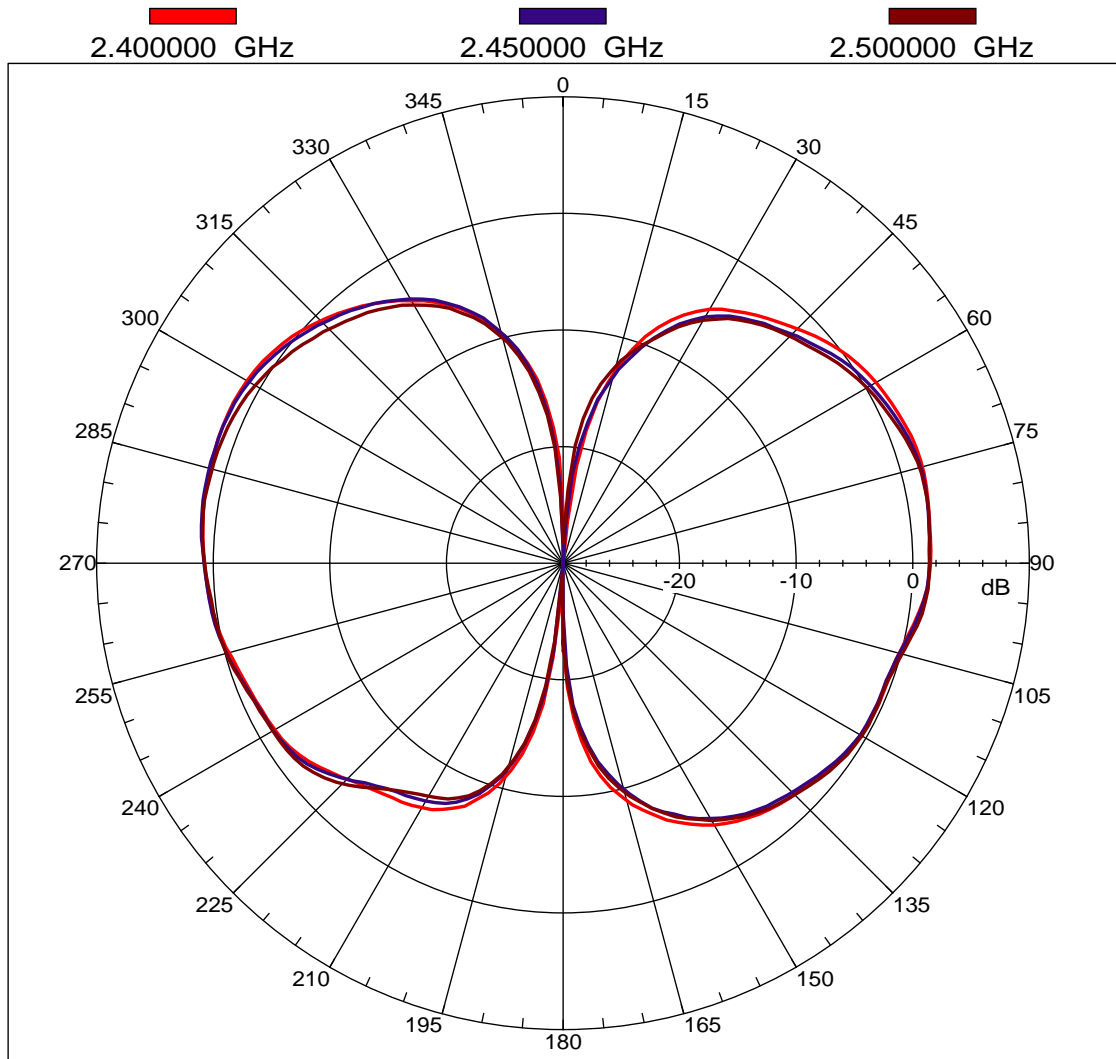
RF Antenna Assembly

P/NO : C660-510103-A SPEC : 2.4GHz

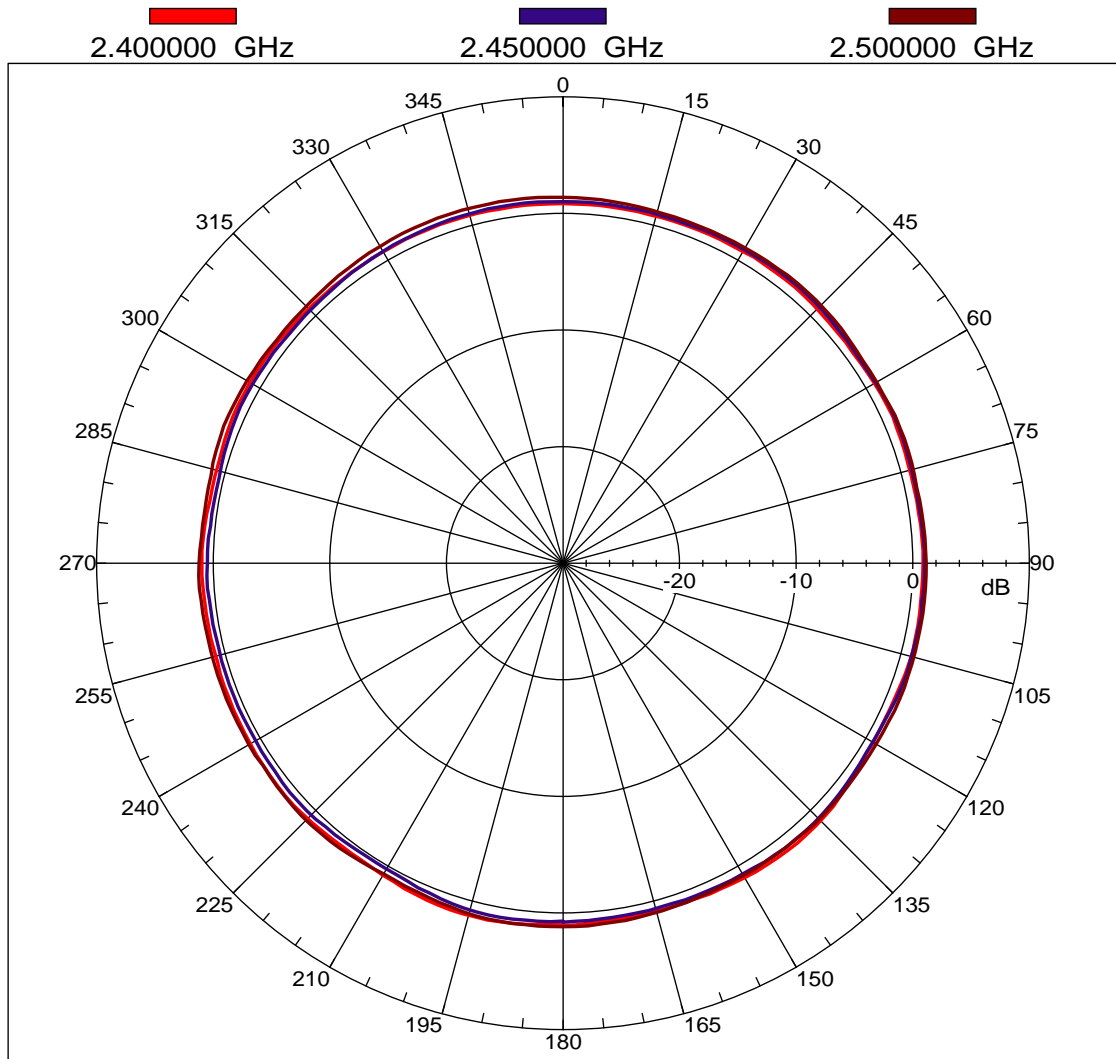


4/13/2006

Far-field amplitude of C660-510103-A-H.nsi



Far-field amplitude of C660-510103-A-V.nsi



PRODUCT SPECIFICATION	ISSUED DATE	July.12, 2000	PAGE	1/2
	REVISION		REVISION NO.	

PRODUCT NAME : Coaxial Cable
RATING : -55°C ~ 200°C
ITEM : RG 178 B/U

誠謹

No.	Revised Date	Revised Details	Page	Report

REPORTED BY :

APPROVED BY :



Q.C Engineer HOON LEE



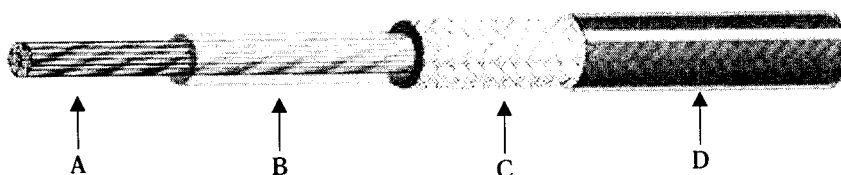
Q.C Manager SOON-MOK SHIN

PRODUCT SPECIFICATION	ISSUED DATE	July.12, 2000	PAGE	2/2
	REVISION		REVISION NO.	

1. APPLICATIONS

This specification is applies to Coaxial Cable manufactured by the YOUNG CHANG SILICONE CO.,LTD

2. STRUCTURE



- A. Conductor: SCCS
- B. Insulation : PFA
- C. Shield : Silver-Plated Copper
- D. Jacket : FEP

3. DIMENSION

Conductor (SCCS)			Insulation		Shield		Jacket	
Structure	Cross sectional area	Diameter	Material	Diameter	Material	Diameter	Material	Diameter
Q'ty/mmφ	mm ² (SQ)	mmφ		mmφ		mmφ		mmφ
7/0.102	0.06	0.30	PFA	0.84±0.05	SPC	1.25	FEP	1.80±0.10

4. ELECTRIC PROPERTIES

Impedance	Capacitance	Maximum Attenuation (dB/100ft)				Dielectric Sterngth
		100Mhz	400Mhz	1Ghz	3Ghz	
ohms	pF/ft(Max)					V/1min
50 ± 2	32	16.0	33.0	52.0	94.0	2000



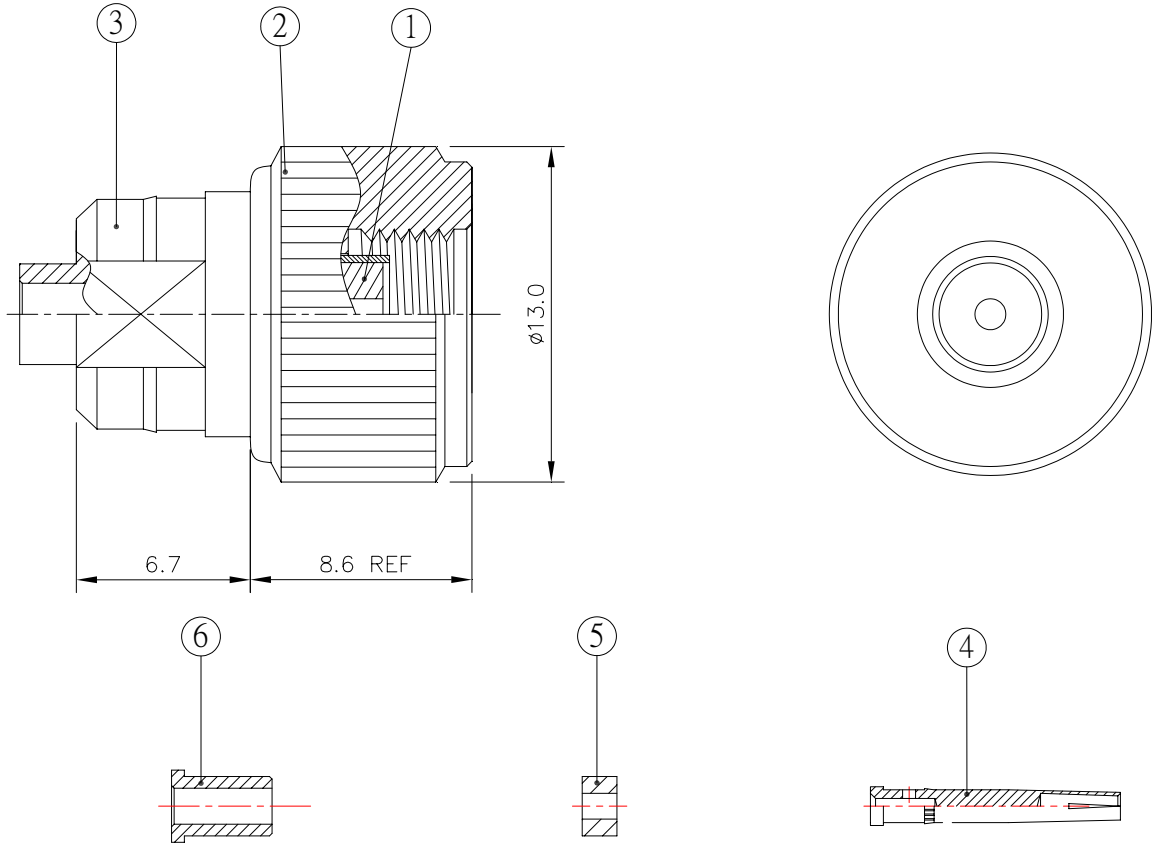
譚裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

Connector 材質證明書

譚裕料號 Whayu P/N	100-2001182-AZ	產品名稱 Product Name	Big SMA Plug Reverse Straight For RG-178
-------------------	----------------	----------------------	--

Structural Drawing



Material

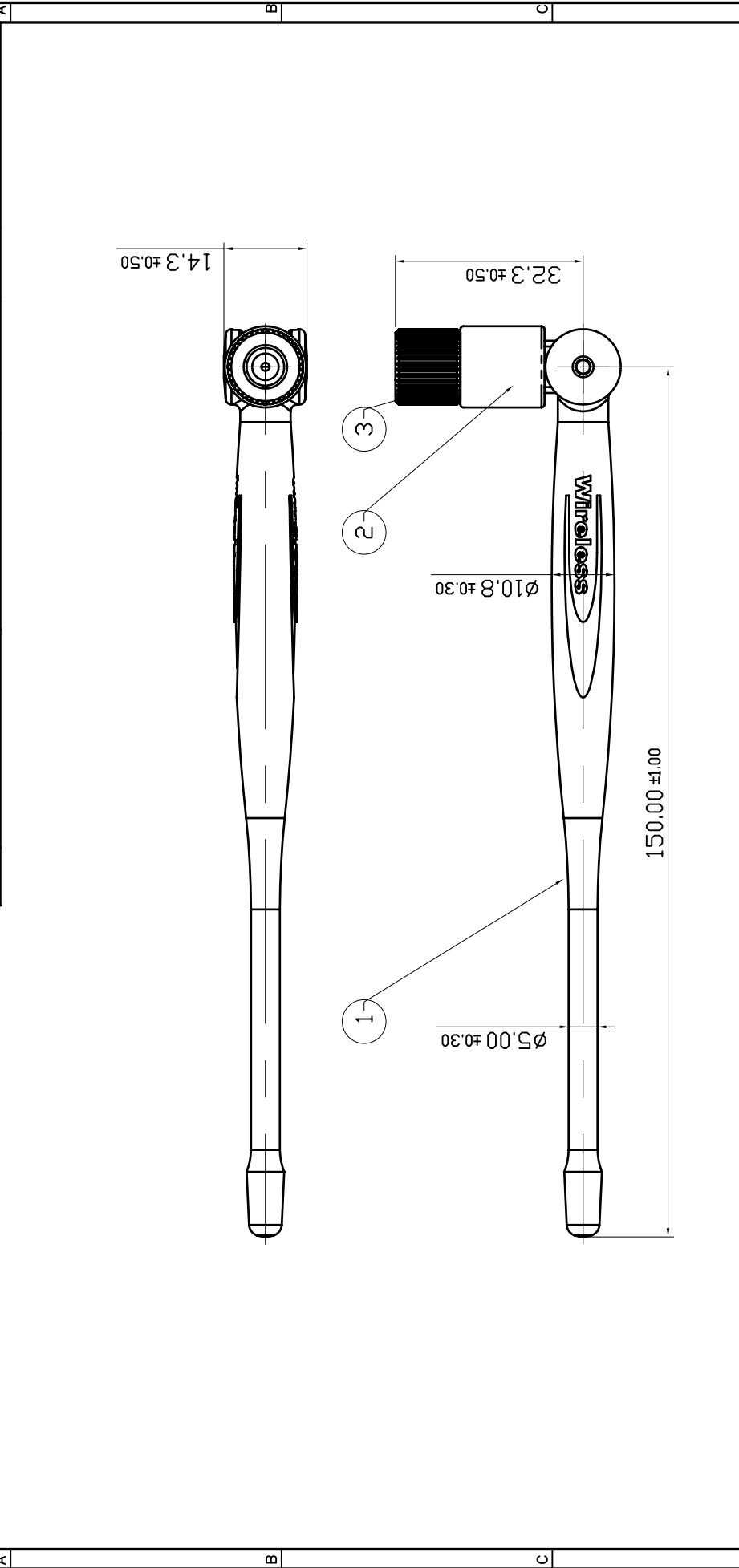
Surface

		Material							Surface	
1	Dielectric	Teflon	PTFE							N/A
2	Shell	Brass	Cu	Pb	Fe	Fe+Sn	Zn	Nickel		
3	Body	Brass	Cu	Pb	Fe	Fe+Sn	Zn	Nickel		
4	Pin	Phosphor Bronze	Cu	Sn	P	Zn	Pb	Gold		
5	Dielectric	Teflon	PTFE							N/A
6	Ferrule	Brass	Cu	Pb	Fe	Fe+Sn	Zn	Nickel		

Remark :



1	2	3	4	5
NO.	NAME	FINISH	MAT'L	Q'TY
1.	Housing	WHITE	ABS	1
2.	Hinge	WHITE	ABS	1
3.	Connector	WHITE	ABS	1
				MEMO



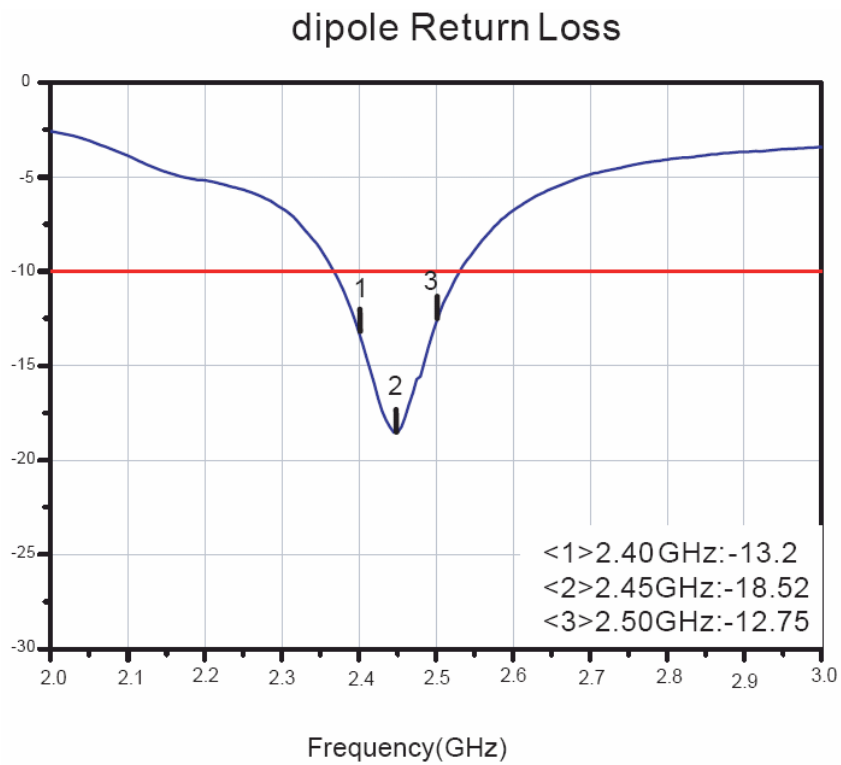
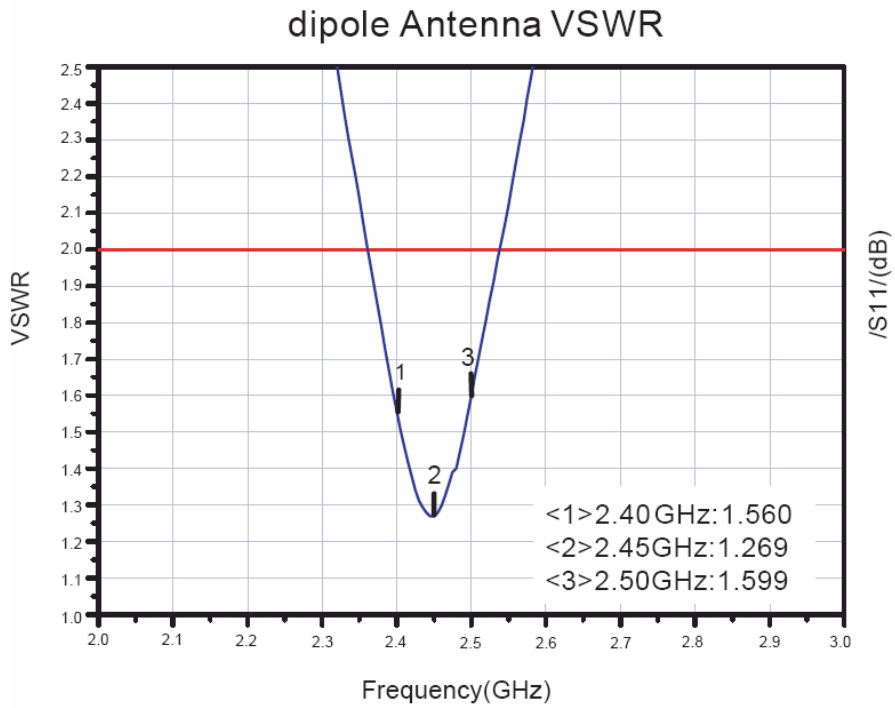
ARISTOTILE ENTERPRISES INC. 亞驪企業股份有限公司

PROJECTION	UNITS	mm	TITLE
	SCALE	1/1	RFA-02-C15M3-01
	PAPER	A4	2.4GHz, 2dBi, White
APPD.	CHKD.	DESIGN	DWG NO.
			RFA-02-C15M3-01.DWG
REV	ECN	NAME	DATE
4.			
3.			
2.			
1.			

DATE: 03/08/06
DRAWN: J.W.Lee

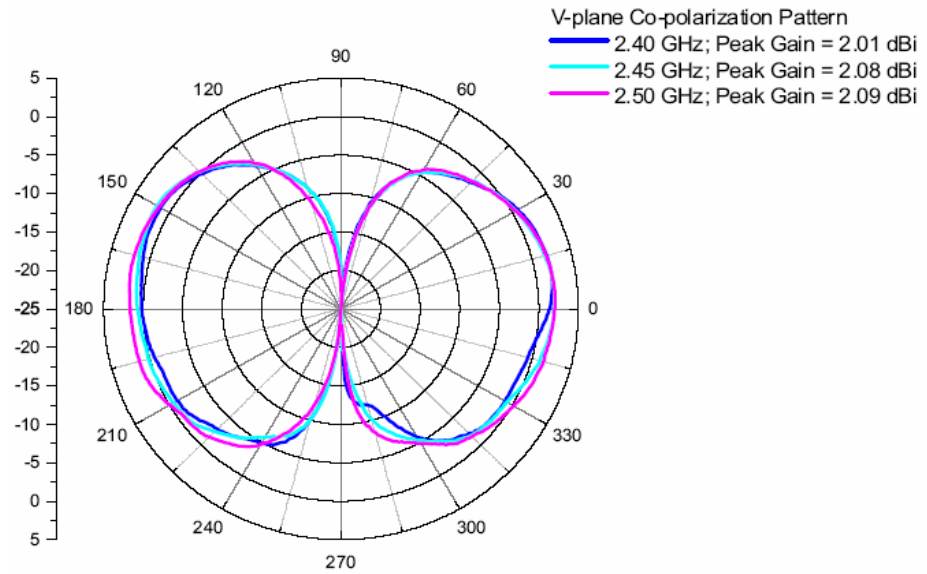
REV. SHEET: 1/1

VSWR



Dipole Antenna Radiation Pattern

V-Plane



H-Plane

