

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 : MSQWL520GUGC

Product name : Broad Range Wireless Family Router

Model : WL-520gU

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, OFDM

Power Type : Powered by the switching adapter,

Manufacture: UNIFIVE

Model: US300520

I/P: 100 ~ 240VAC ~ 50/60Hz 0.3A

O/P: 5VDC 2.0A MAX.

183cm length, non-shielded, without 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:
$$S = \frac{PG}{4\pi R^2} = \frac{226.46 \times 1.585}{4\pi(20)^2} = 0.0714 \text{ mW/cm}^2$$

Estimated safe separation:
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{226.46 \times 1.585}{4\pi}} = 5.34 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.73cm"

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)

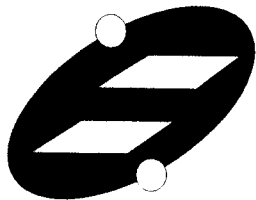
The Numeric gain G of antenna with a gain specified in dB is determined by:

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

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

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

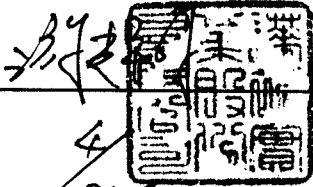
PART NAME: RF Antenna Assembly

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

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Fax: + 86-512-63627981

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RF Antenna Cable Assembly

Specification

1. Electrical Properties :

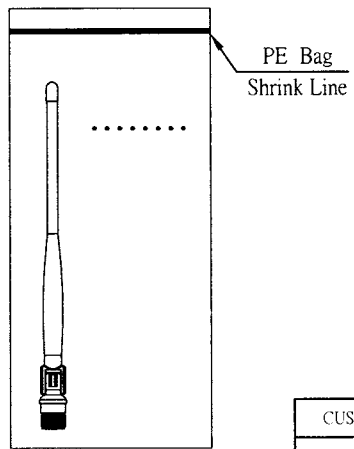
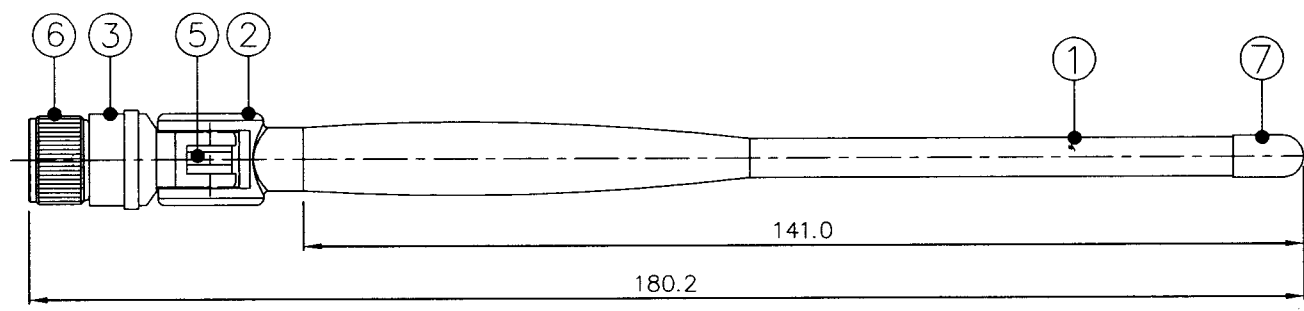
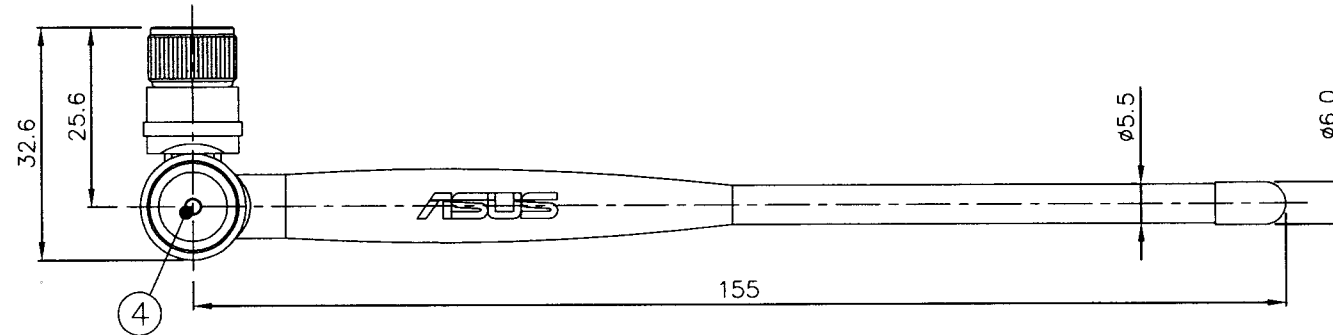
- 1.1 Frequency Range..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10 dB Maximum
- 1.5 Radiation Omni-directional
- 1.6 Gain(peak)..... 1.8dBi
- 1.7 Polarization..... Linear Vertical
- 1.8 Admitted Power..... 1W

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	CUSTOMER: ASUS PART NO : PARTNAME: RF Antenna Assembly W.Y PNO : C660-510103-A REV UNIT FILE : X1 m/m SHEET : 1/1
	X.	±2.0	CHECKED	
	.X	±1.0		
	.XX	±0.5		
	.XXX	±0.1	DRAWING	


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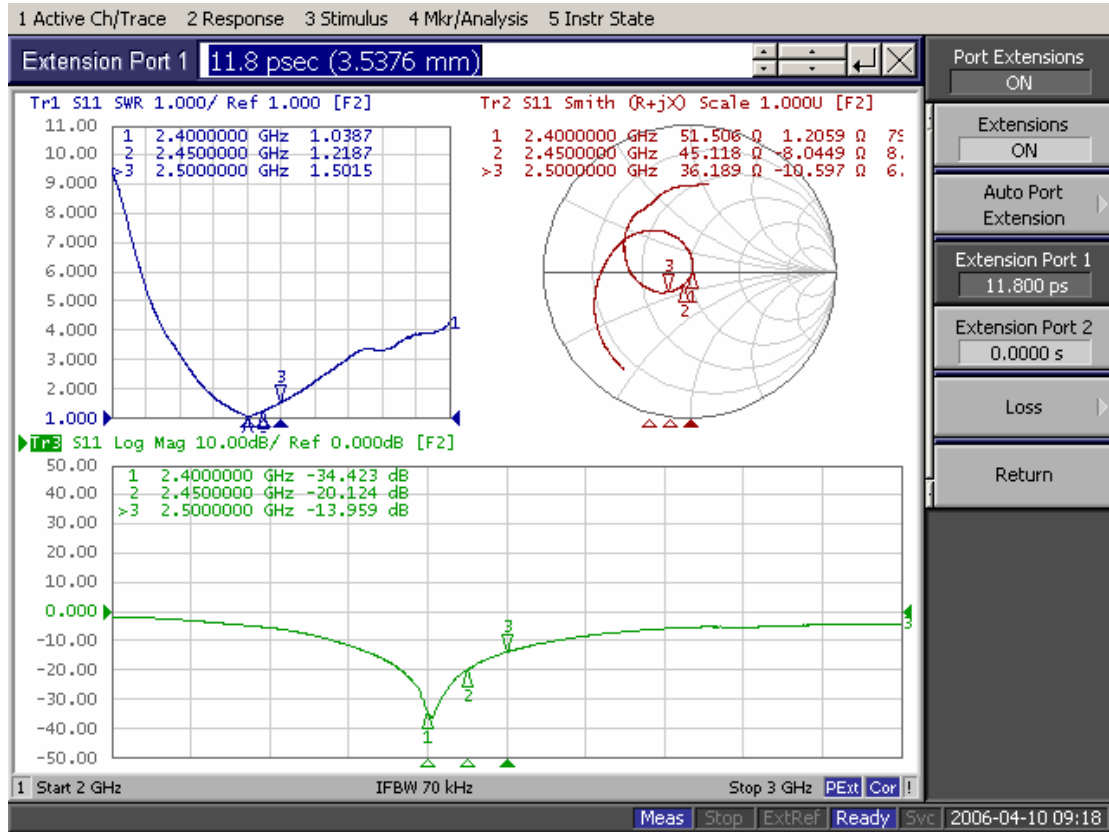


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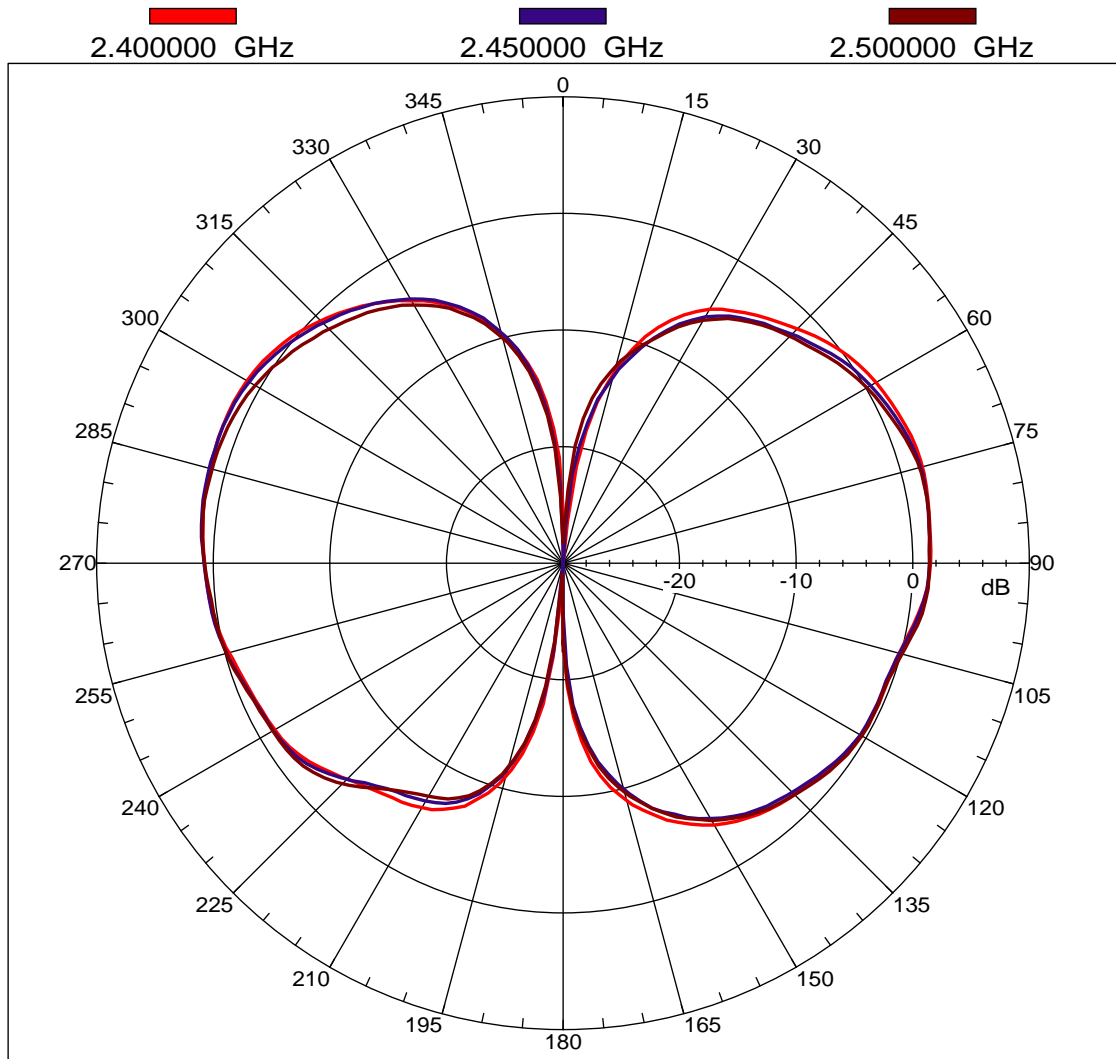
RF Antenna Assembly

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

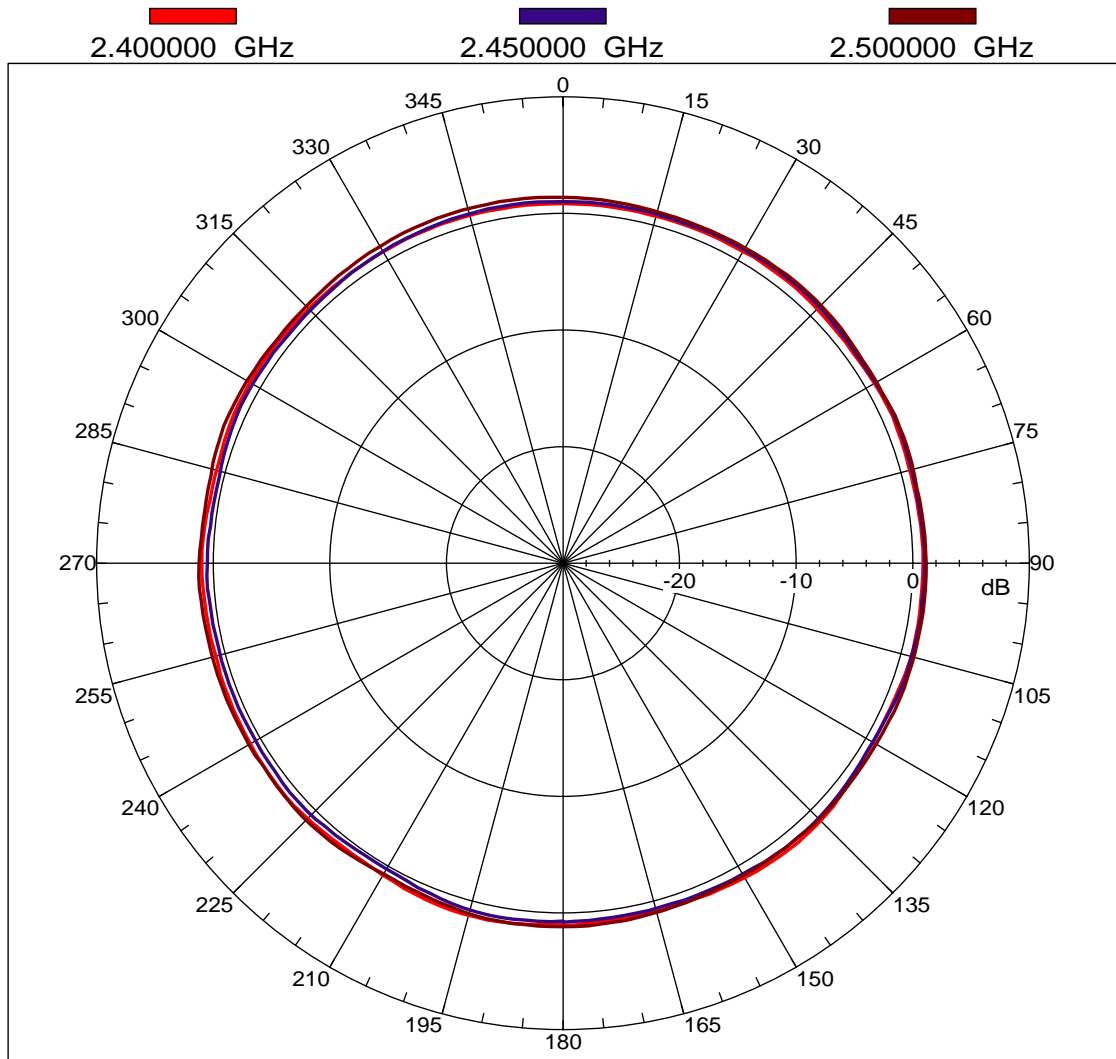


4/13/2006

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

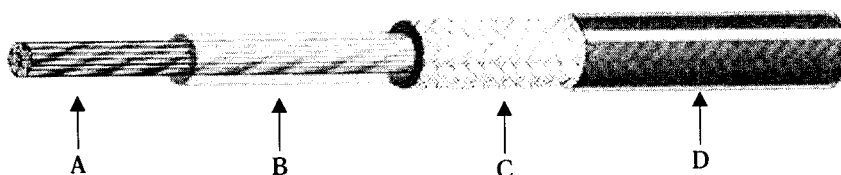
Q.C Manager SOON-MOK SHIN

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



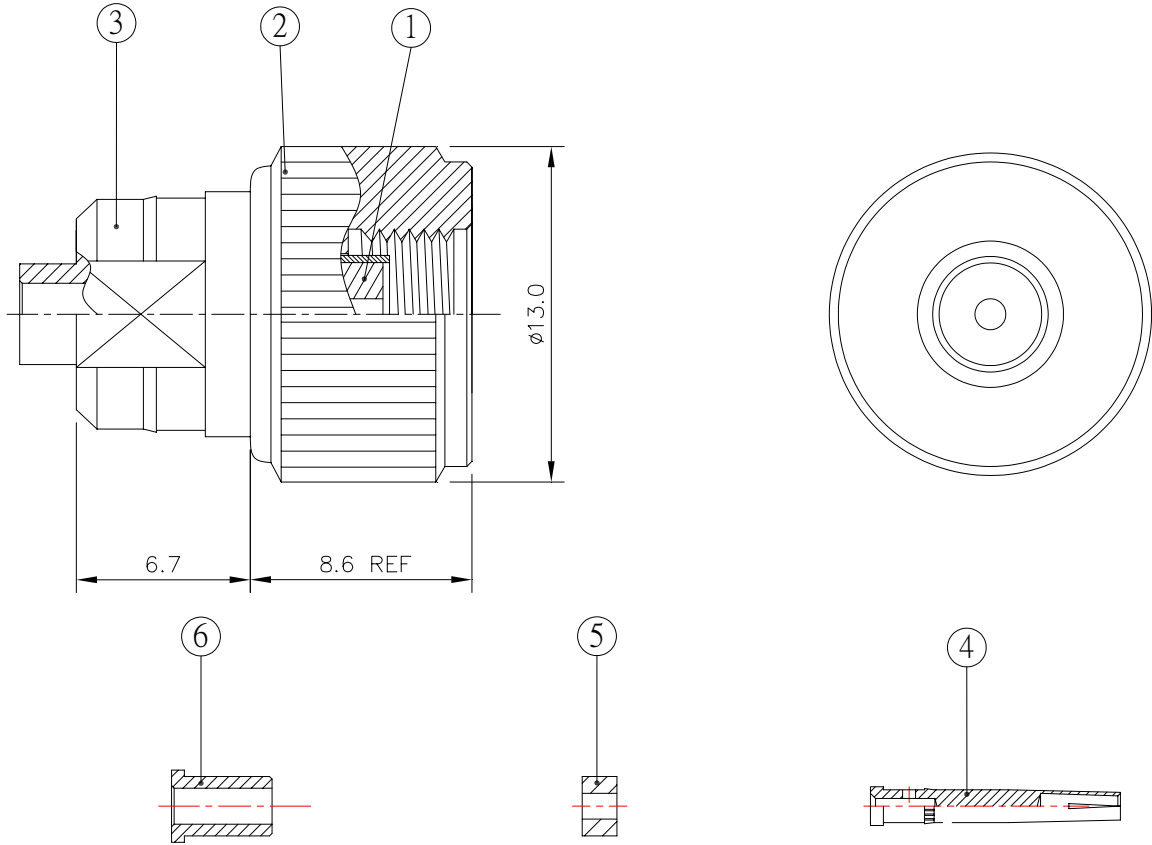
譚裕實業股份有限公司

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
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Structural Drawing



Material

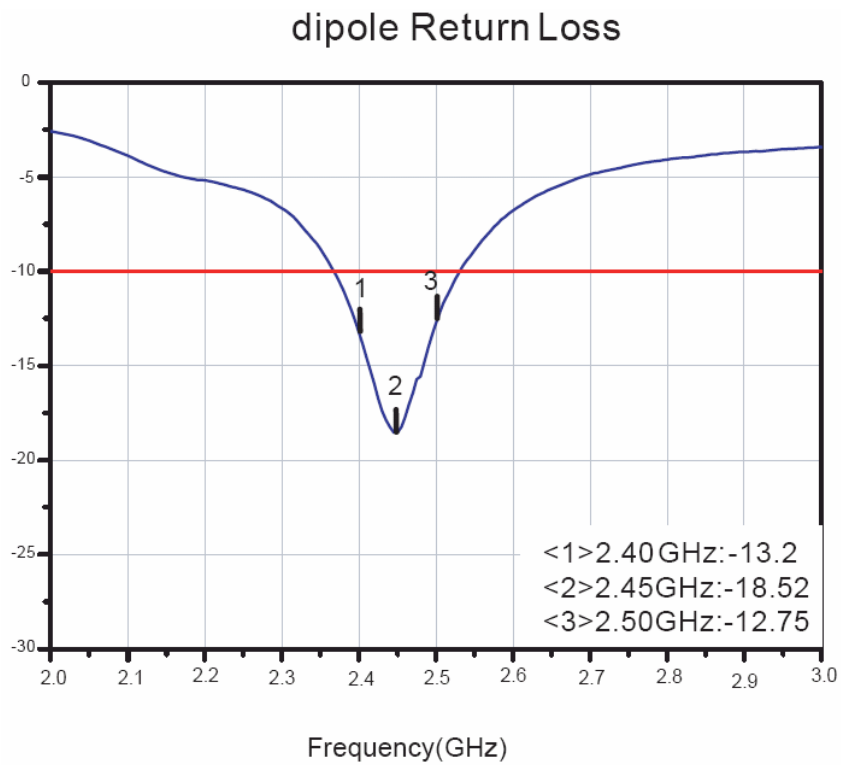
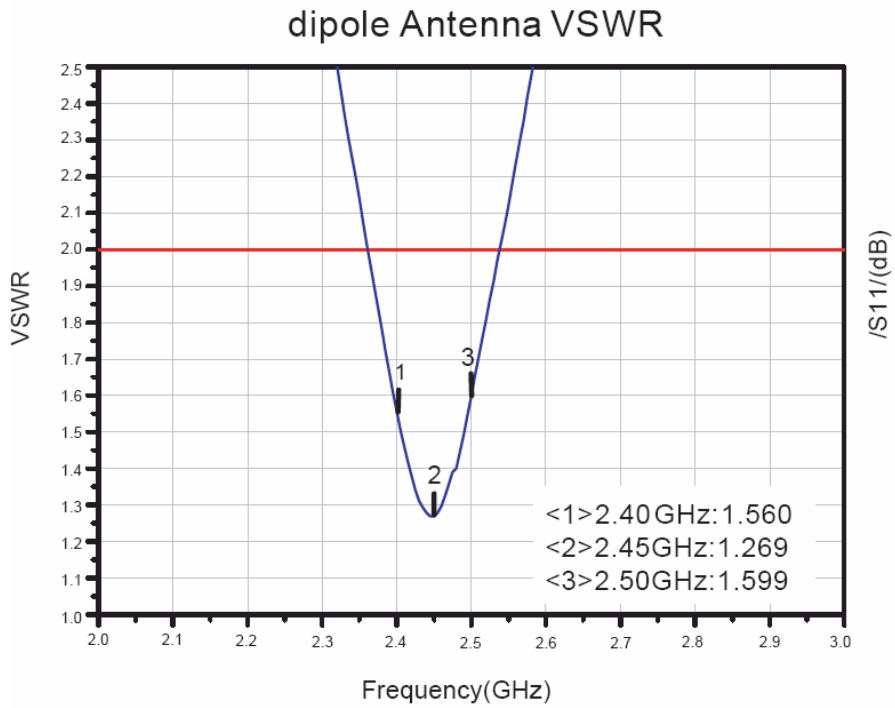
Surface

		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 :

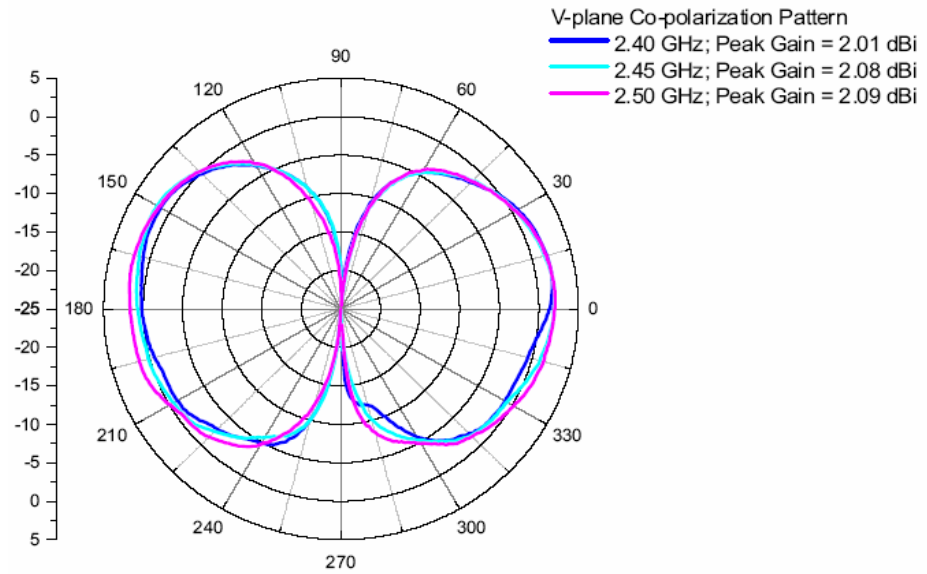


VSWR



Dipole Antenna Radiation Pattern

V-Plane



H-Plane

