

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	:	PY3CG814WGV2
Product name	:	Wireless Cable Modem Gateway
Model name	:	CG814WG v2
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 AC to DC adapter, Model: PWR-10030-01 I/P: 120VAC, 60Hz, 18W O/P: 12VDC, 1A

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:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{288.40 \times 1.51356}{4p(20)^2} = 0.0868 \text{ mW} / \text{cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{288.40 \times 1.51356}{4p}} = 5.8938 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 5.89 cm."

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)

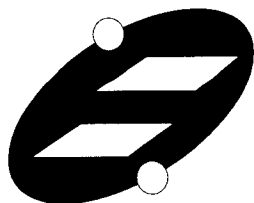
The Numeric gain G of antenna with a gain specified in dB is determined by:

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

$$G = \text{Log}^{-1} (1.80 / 10) = 1.51356$$

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: 華碩科技股份有限公司

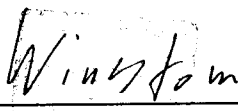
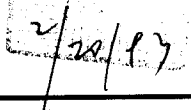
PART NAME: RF Antenna Assembly

PART NO.:

REVISION:

W. Y. P/NO.: C660-510003-A

REV.: X1

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

WHA YU GROUP

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Fax: + 86-852-23843747

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

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Fax: + 86-21-59741347

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Wujiang City, Jiangsu Province, China

Tel: + 86-512-63627980

Fax: + 86-512-63627981

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

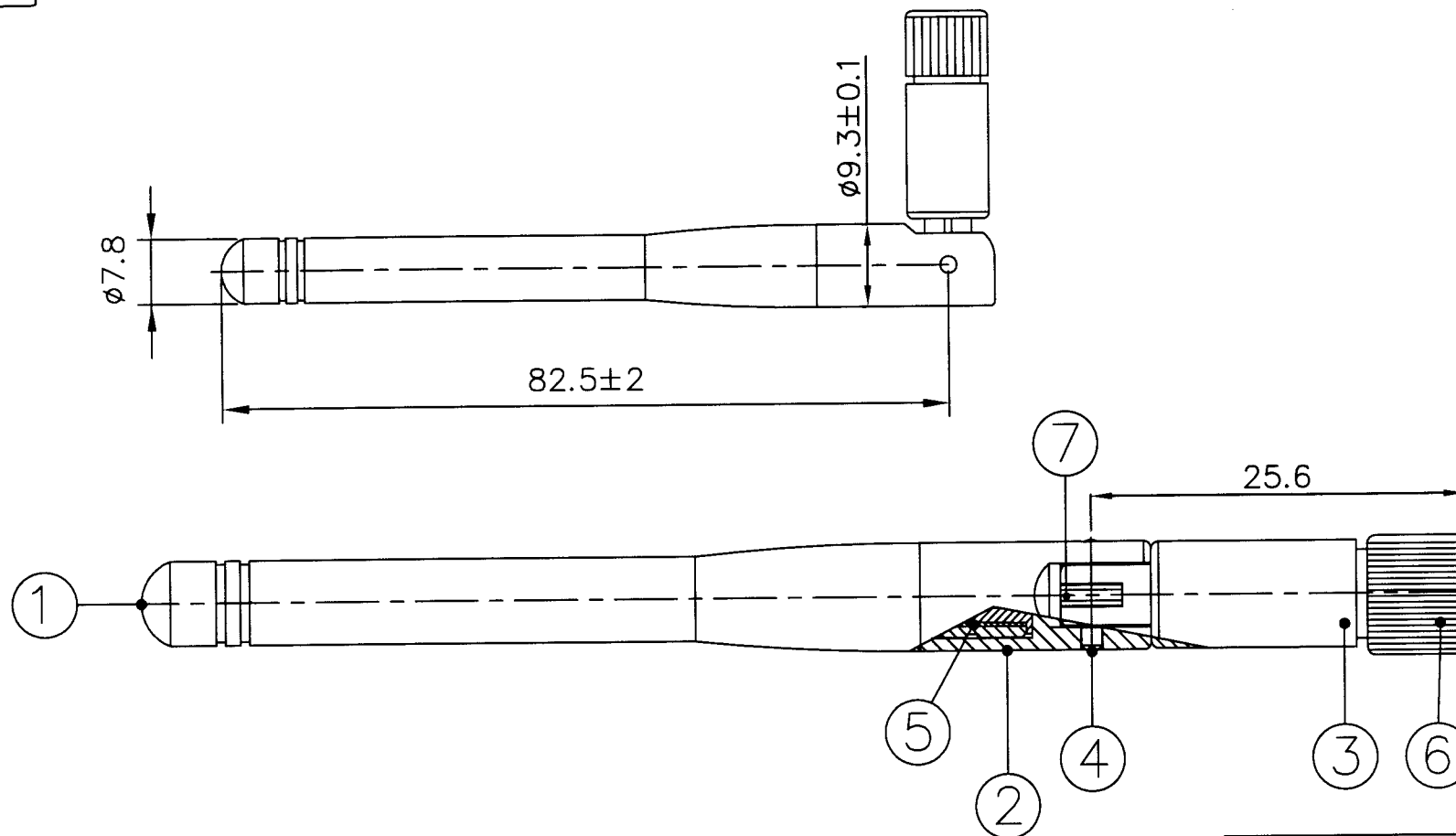
- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave..... $1/2 \lambda$ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

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 Black
- 2.7 Connector..... SMA Plug Reverse

CG-

REV	DATE	DESCRIPTION
X1	02/19-2004	New Issue



NO	DESCRIPTION	QTY	REMARK
7	Cable	RG-178, Translucent Brown; 50 Ω	1
6	Connector	SMA Straight Plug/Reverse	1
5	Ground Tube	Brass, Ni plated	1
4	Rivet	Brass, Black Surfaced	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	±3.0	APPROVED
X	±2.0	Winston 2/22
X	±1.0	CHECKED
XX	±0.5	
XXX	±0.1	DRAWING
		Jane

CUSTOMER: 華碩科技股份有限公司

PART NO :

PARTNAME: RF Antenna Cable Assembly

W.Y P/NO : C660-510003-A

REV UNIT FILE :

X1 mm SHEET: 1/1

Wha Yu
INDUSTRIAL CO.,LTD.

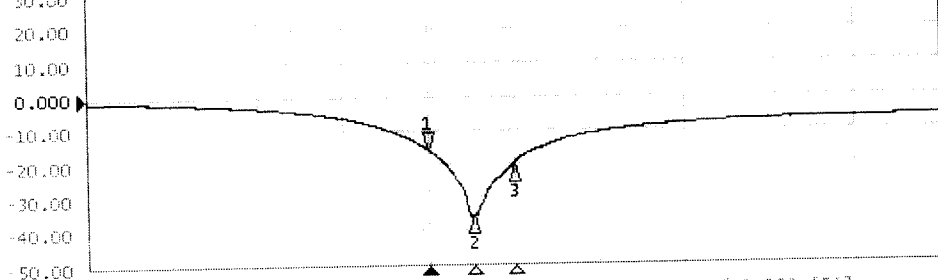
華裕實業股份有限公司

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1 Active Ch/Trace 2 Response 3 Stimulus 4 Mkr/Analysis 5 Instr State

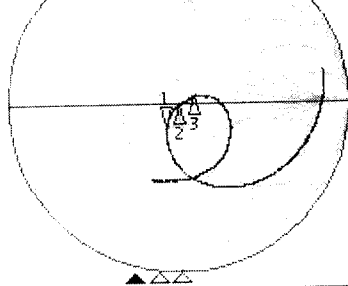
Tr1 S22 Log Mag 10.00dB/ Ref 0.000dB [F2]

>1	2.400000000 GHz	-16.090 dB
2	2.452538631 GHz	-35.359 dB
3	2.500000000 GHz	-20.158 dB



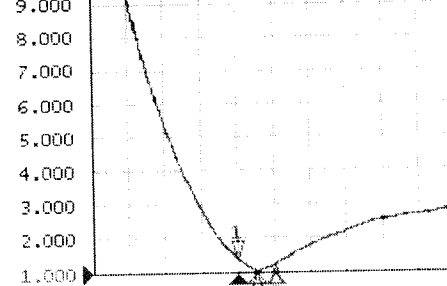
Tr2 S22 Smith (R+jX) Scale 1.000U [F2]

>1	2.400000000 GHz	42.077 Ω	-12.227 Ω
2	2.452538631 GHz <th>50.931 Ω</th> <th>-1.4473 Ω</th>	50.931 Ω	-1.4473 Ω
3	2.500000000 GHz <th>59.722 Ω</th> <th>4.6662 Ω</th>	59.722 Ω	4.6662 Ω



Tr3 S22 SWR 1.000/ Ref 1.000 [F2]

>1	2.400000000 GHz	1.3721
2	2.452538631 GHz <th>1.0347</th>	1.0347
3	2.500000000 GHz <th>1.2178</th>	1.2178



1 Start 2 GHz

IFBW 70 kHz

Stop 3 GHz

PEnt Cor

Meas

Stop

ExtRef

Ready

Svc

2004-02-19 15:59

Display

Data -> Mem

Edit Title Label

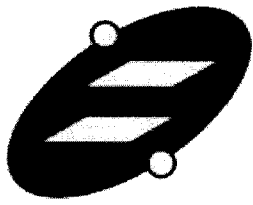
Title Label
OFF

Graticule Label
ON

Frequency
ON

Update
ON

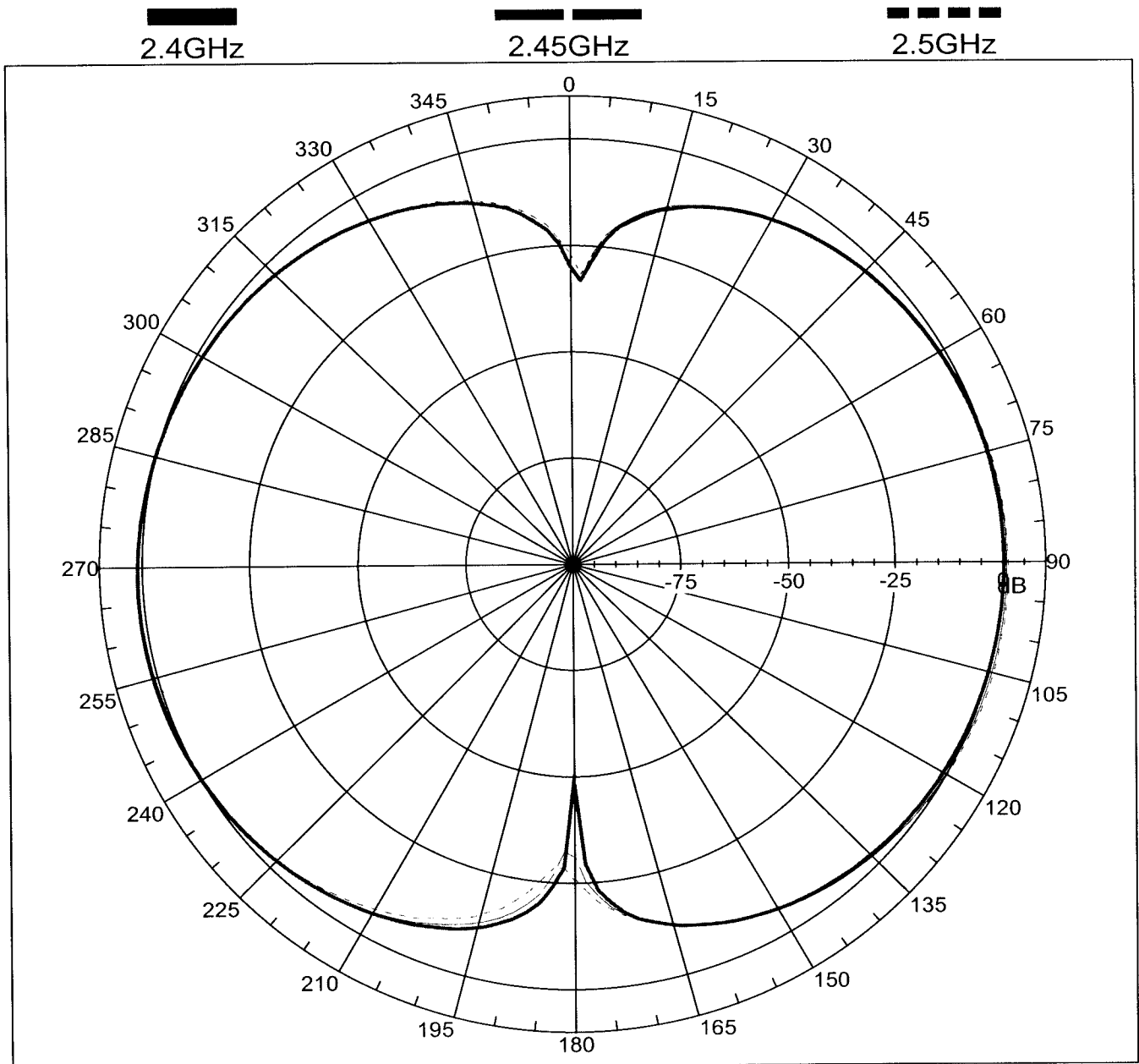
Return

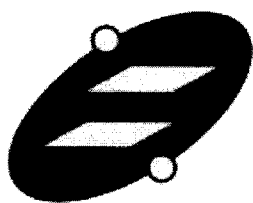


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WHA YU INDUSTRIAL CO., LTD

Far-field amplitude of 2.4GHz small dipole antenna-E-plane.nsi

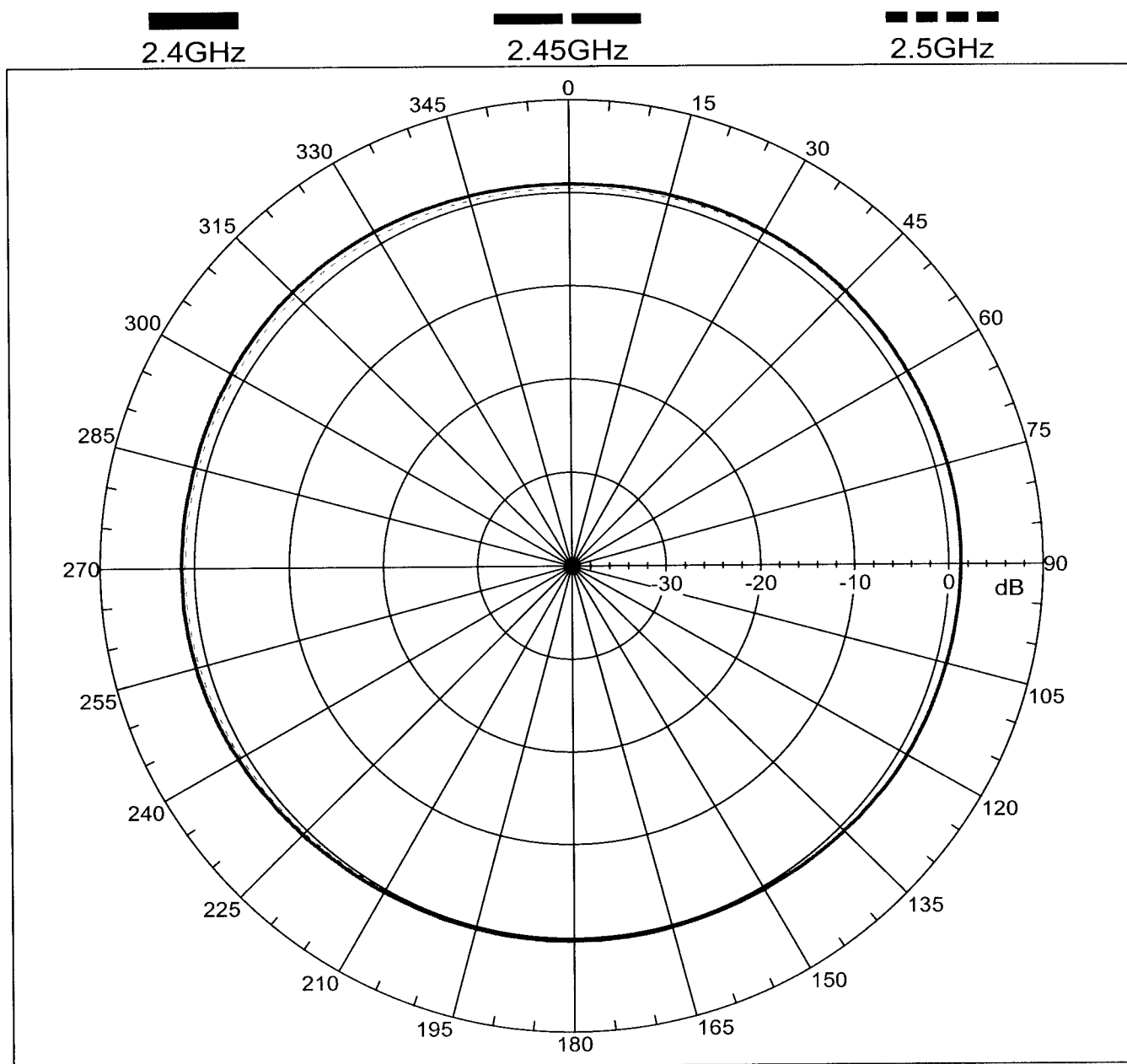




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WHA YU INDUSTRIAL CO., LTD

Far-field amplitude of 2.4GHz small dipole antenna-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