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 Filed Strength (H) (A/m)	Power Density (S) (mW/cm2)	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: $S = \frac{PG}{4pR^2} = \frac{288.40 \times 1.51356}{4p(20)^2} = 0.0868 mW/cm^2$

Estimated safe separation: $R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{288.40x1.51356}{4p}} = 5.8938 cm$

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 = Log $^{-1}$ (***dB*** antenna gain / 10)

G = 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 :	Winston	
DATE :	2/20/07	

WHA YU GROUP

WHA YU INDUSTRIAL CO., LTD.(HEAD OFFICE)
譁裕實業股份有限公司
Address: #70 Shui Li Road, Hsin Chu Ciry, Taiwan, R.O.C.
Tel:+886-3-5714225(REP.)
Fax:+ 886-3-5713853 · + 886-3-5723600

TAI HWA ELECTRONC CO., LTD. (CHINA)
台樺電業制品廠
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)
上海譁裕電子有限公司
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

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

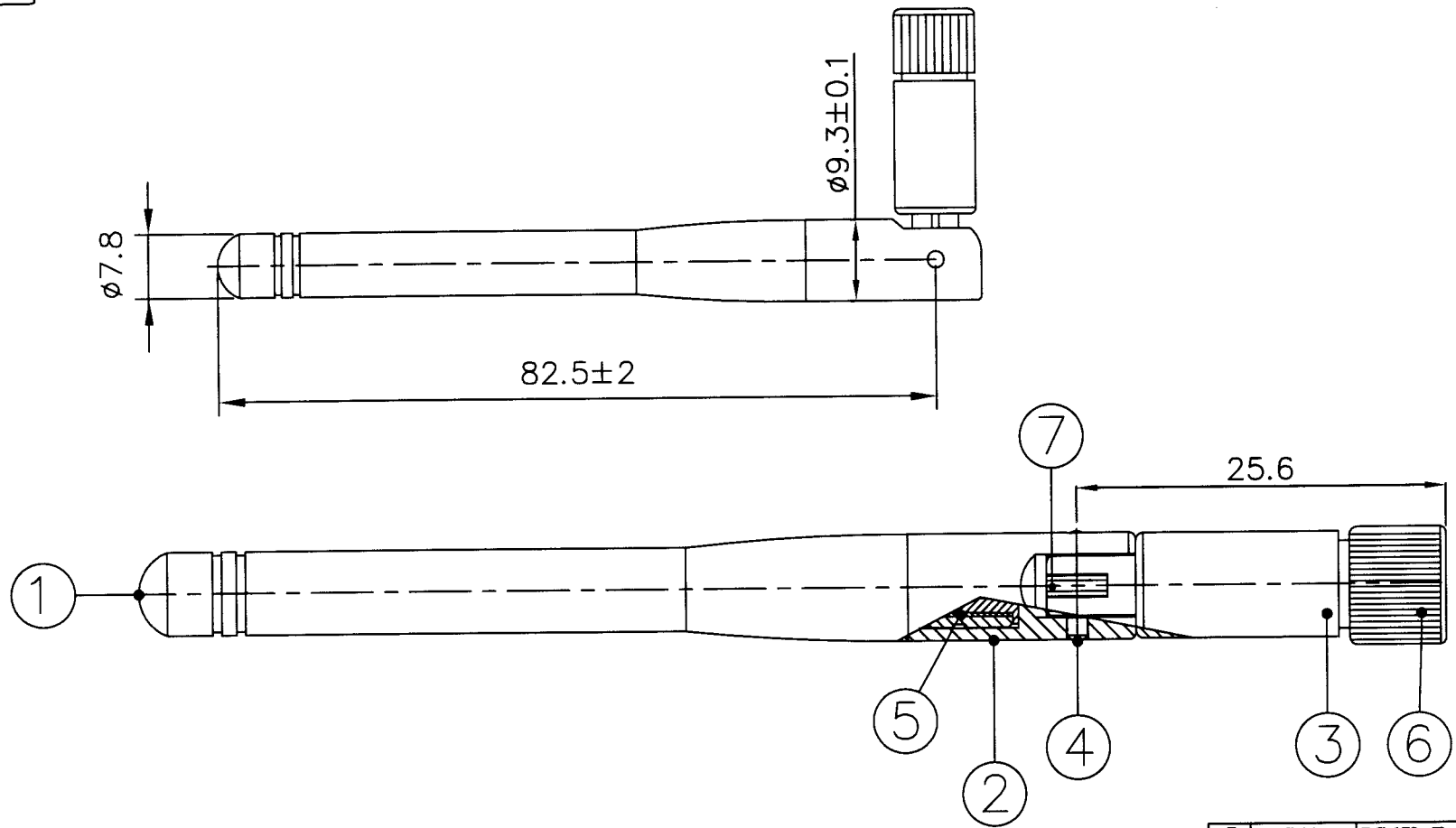
1.1 Frequency Rang.....	2.4GHz ~ 2.5GHz
1.2 Impedance	50Ω Nominal
1.3 VSWR	1.92 Max.
1.4 Return Loss.....	-10dB Maximum
1.5 Electrical Wave.....	1/2 λ Diople
1.6 Gain.....	1.8 dBi
1.7 Admitted Power.....	1W

2. Physical Properties :

2.1 Cable.....	RG-178 Cable
2.2 Antenna Cover.....	TPE
2.3 Antenna Base.....	PC
2.4 Operating Temp.	-20℃ ~ +65℃
2.5 Storage Temp.	-30℃ ~ +75℃
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 SINGATURE

XX.	±3.0
X.	±2.0
.X	±1.0
.XX	±0.5
.XXX	±0.1

APPROVED Winston 3/20

CHECKED

DRAWING Jane

CUSTOMER: 華碩科技股份有限公司

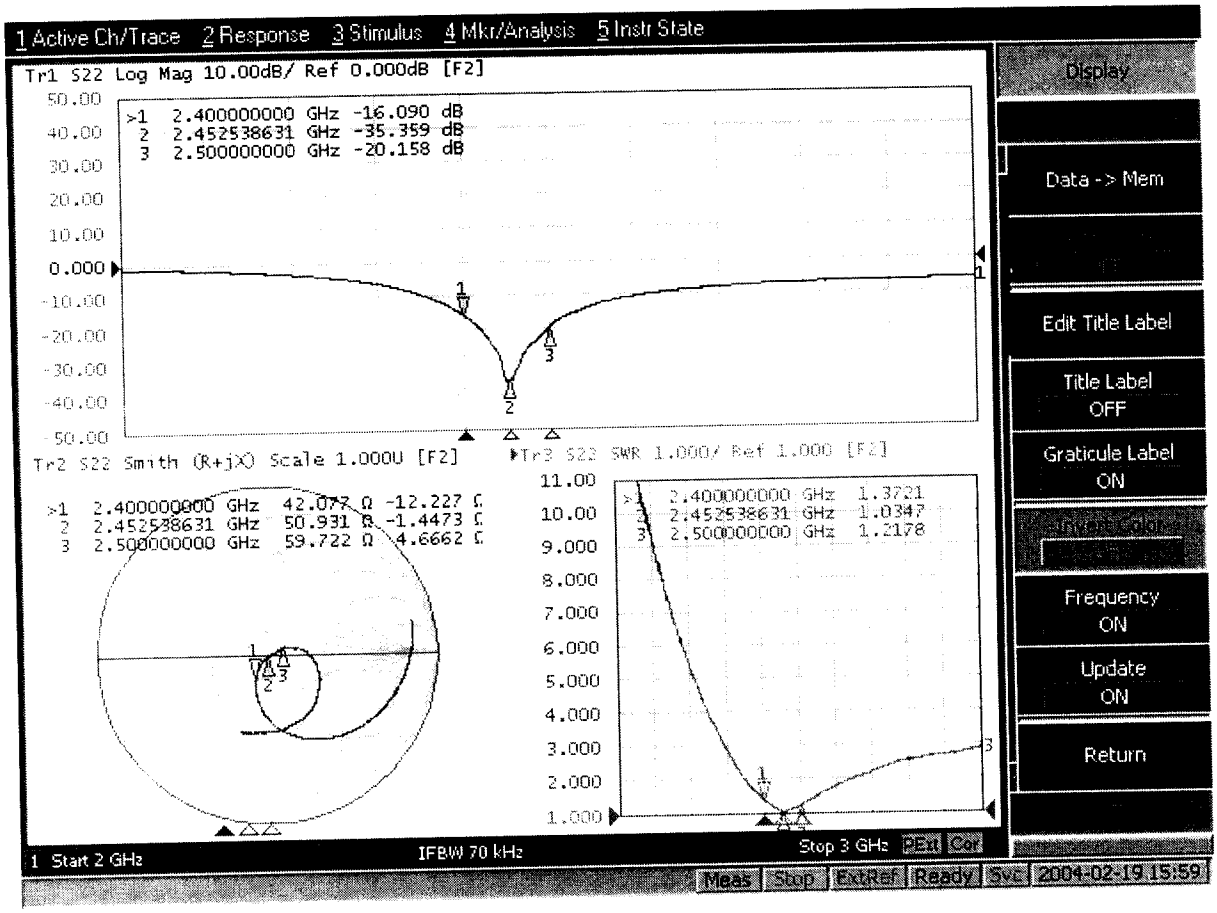
PART NO :

PARTNAME: RF Antenna Cable Assembly

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

REV	UNIT	FILE :
X1	m/m	SHEET : 1/1

Wha Yu INDUSTRIAL CO.,LTD.
華裕實業股份有限公司


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
50.00
40.00
30.00
20.00
10.00
0.000
-10.00
-20.00
-30.00
-40.00
-50.00
Tr2 S22 Smith (R+jX) Scale 1.000U [F2]
>1 2.400000000 GHz 42.072 Ω -12.227 Ω
2 2.452538631 GHz 50.931 Ω -1.4473 Ω
3 2.500000000 GHz 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 1.0347
3 2.500000000 GHz 1.2178
11.00
10.00
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
1 Start 2 GHz
IFBW 70 kHz
Stop 3 GHz
Display
Data -> Mem
Edit Title Label
Title Label OFF
Graticule Label ON
Frequency ON
Update ON
Return
Meas
Stop
ExtRef
Ready
Svc
2004-02-19 15:59

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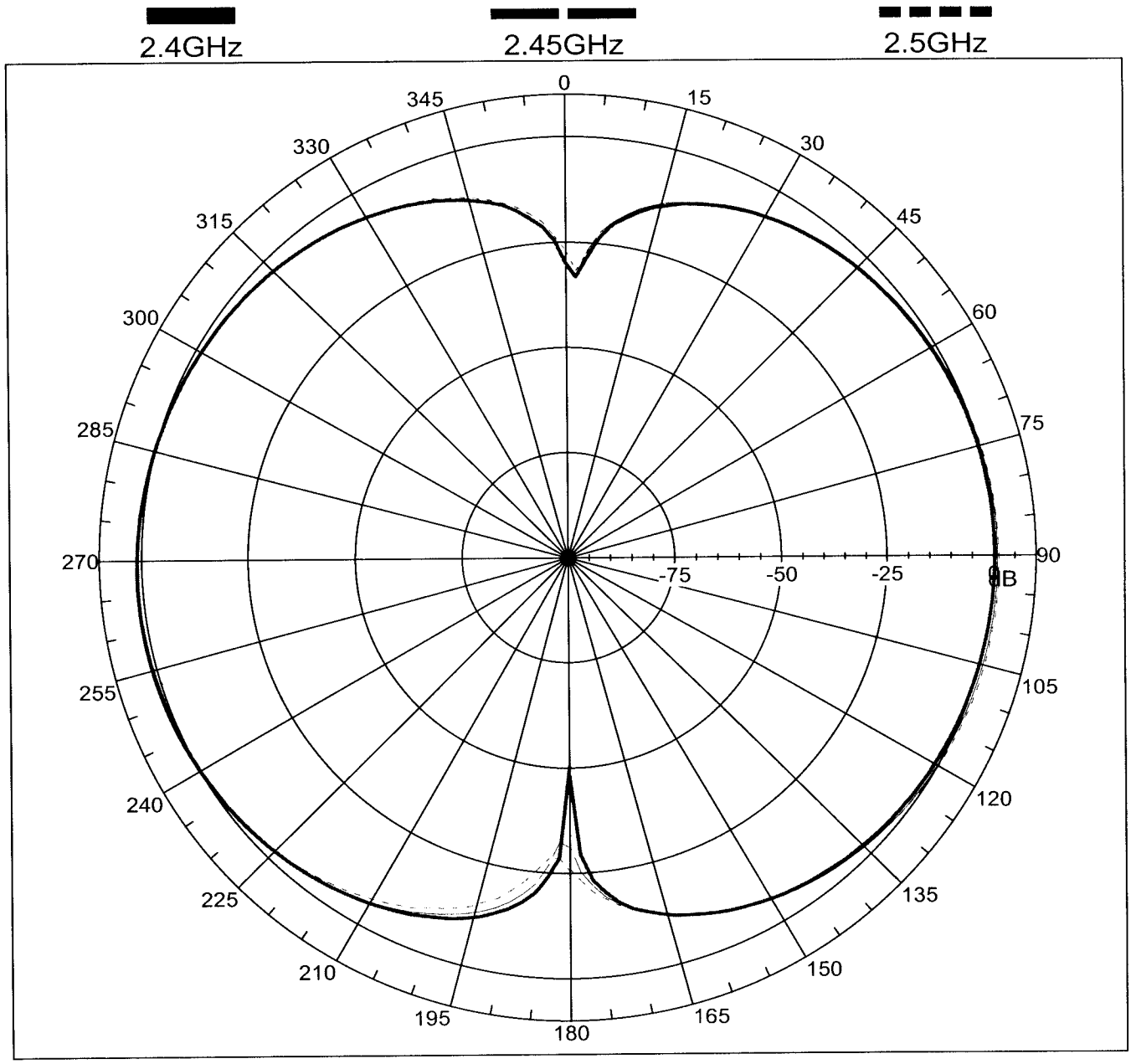
WHA YU INDUSTRIAL CO., LTD

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



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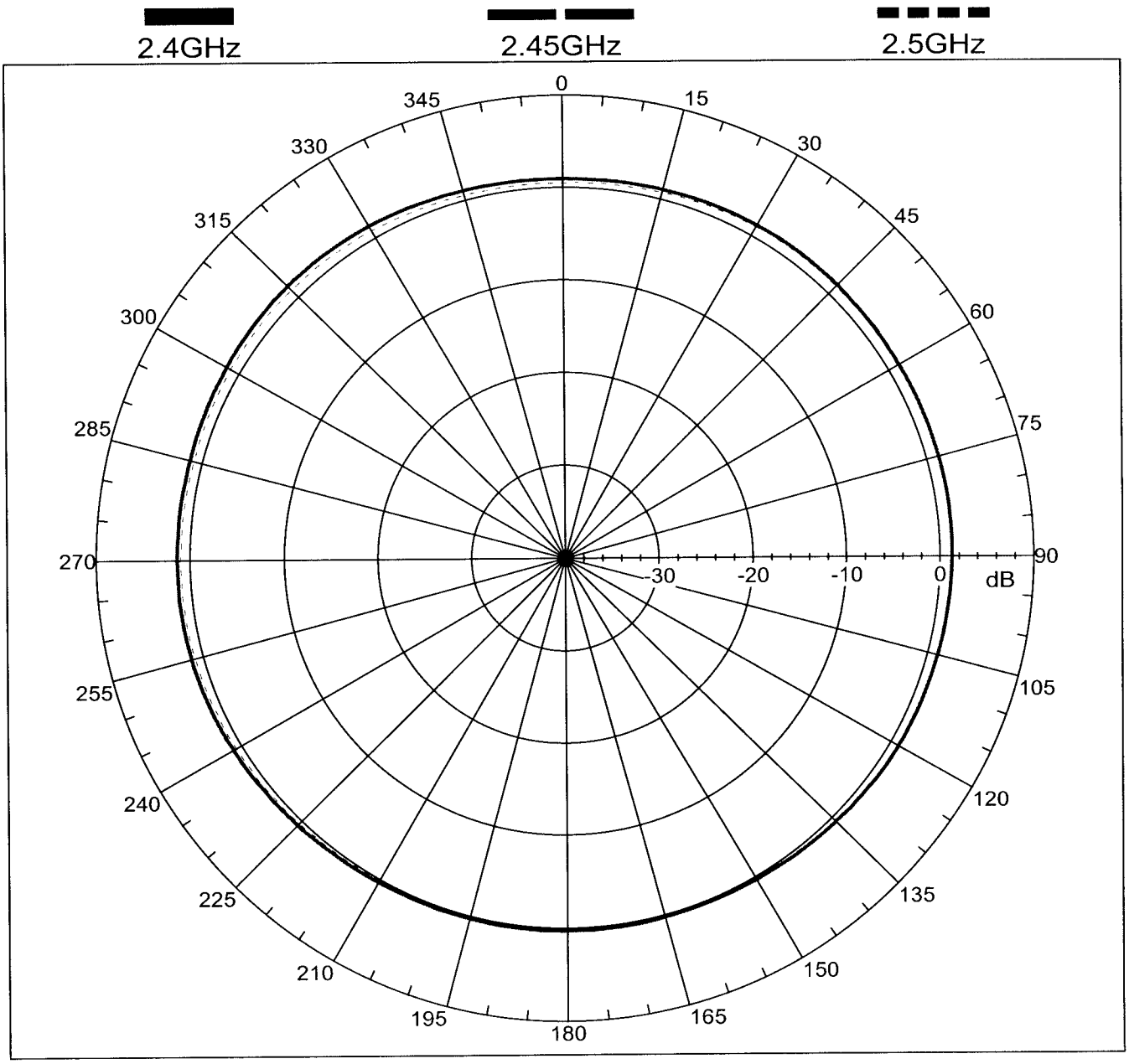
WHA YU INDUSTRIAL CO., LTD

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 Properities :
   - 1 Weight per 1000ft..... 6.3 lbs Maximum
   - 2 Bend Radius.....0.35" Mininum
   - 3 Operating Temperature Range -55℃~ 200℃

3. Electrical Properities:
   - 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