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	**:**	MSQWL130N
Product name	**:**	Super Speed N Wireless PCI Adapter
Model	**:**	WL-130N
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	**:**	IEEE 802.11b/g/n Draft 1.0 20M: 2.412GHz ~ 2.462GHz IEEE 802.11n Draft 1.0 40M: 2.422GHz ~ 2.452GHz
Supported Channel	**:**	IEEE 802.11b/g/n Draft 1.0 20M: 11 Channels IEEE 802.11n Draft 1.0 40M: 7 Channels
Modulation Skill	**:**	DBPSK, DQPSK, CCK, OFDM
Power Type	**:**	Powered by Protocol Control Information Interface of PC

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: $S = \frac{PG}{4\pi R^2} = \frac{233.92 \times 1.585}{4\pi (20)^2} = 0.0738 mW/cm^2$

Estimated safe separation: $R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{233.92 \times 1.585}{4\pi}} = 5.43 cm$

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

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

Appendix

Antenna Specification

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

SPECIFICATION FOR APPROVAL

CUSTOMER: *華碩電腦股份有限公司*

PART NAME: ***RF Antenna Cable Assembly***

PART NO.: ***REVISION:***

W. Y. P/NO.: ***C660S540174-A*** ***REV.: X1***

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :	04.03.10	

WHA YU GROUP

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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 :

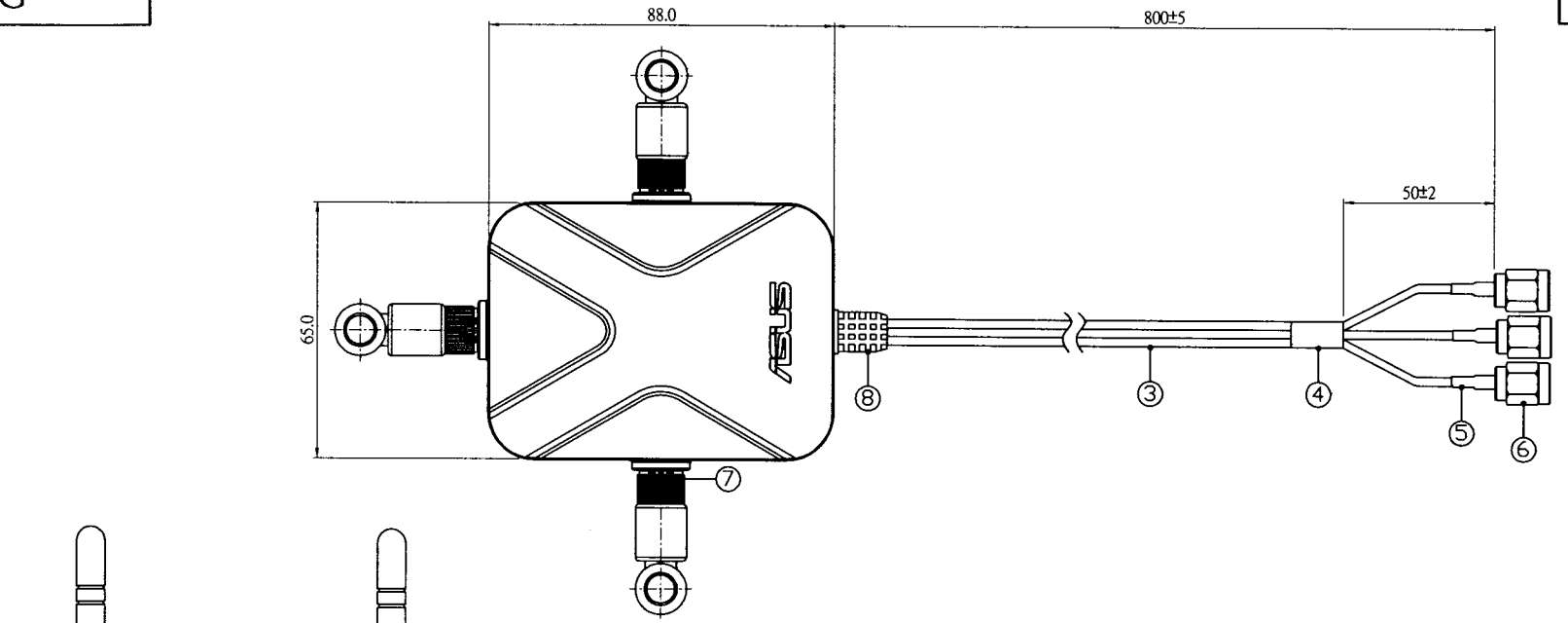
1.1	Frequency Range……	2.4GHz ~ 2.5GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.92 Max.
1.4	Return Loss……	-10 dB Maximum
1.5	Radiation ……	Omni-directional
1.6	Gain(peak)……	2.0dBi (excluding cable loss)
1.7	Cable Loss……	1.6dB
1.8	Polarization……	Linear Vertical
1.9	Admitted Power……	1W

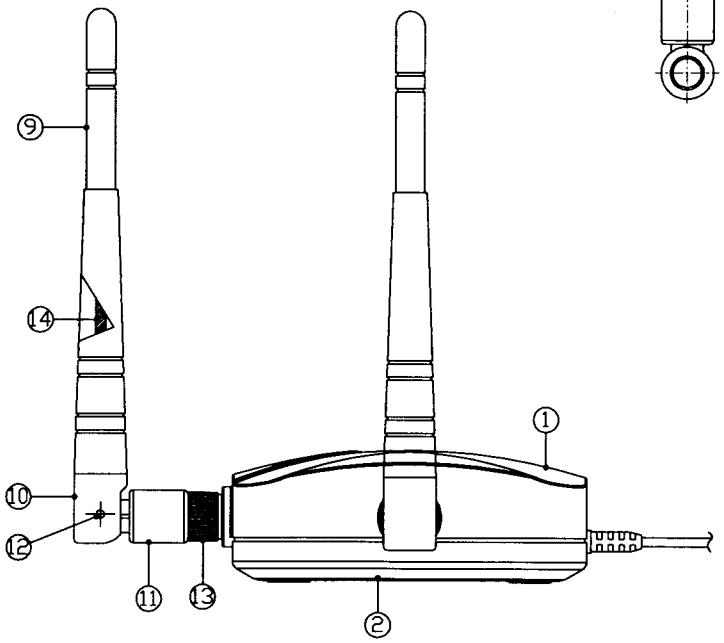
2. Physical Properties :

2.1	Cable……	RG-174 Coaxial Cable
2.2	Antenna Cover……	TPE
2.3	Antenna Base……	PC
2.4	Antenna Base……	PBT
2.5	Antenna Stand……	ABS
2.6	Operating Temp. ……	-20℃ ~ +65℃
2.7	Storage Temp. ……	-30℃ ~ +75℃
2.8	Color ……	Black
2.9	Connector…..……	SMA Plug Reverse Connector
2.10	Connector…..……	SMA Jack Reverse Connector

CG-

REV	DATE	DESCRIPTION
X1	3/23-2007	New Issue





NO	DESCRIPTION	QTY	REMARK
14	Cable	RG-178 Cable	3	
13	Connector	Big SMA Plug Reverse	3	
12	Rivet	POM ; Pure White	6	
11	Antenna Base	PBT ; Color : Black	3	
10	Antenna Base	PC ; Color : Black	3	
9	Antenna Body	TPE ; Color : Black	3	
8	SR	PVC ; Color : Black	1	
7	Connector	SMA Straight Jack/Reverse	3	
6	Connector	SMA Straight Plug/Reverse	3	
5	Tube	Heat Shrink Tube	3	
4	Tube	Heat Shrink Tube	1	
3	Cable	RG-174 三併線	1	
2	Box Bottom	ABS ; Color : Black	1	
1	Box Top	ABS ; Color : Black	1	

CUSTOMER'S SINGATURE

XX.	±5
X.	±3.0
.X	±1.0
.XX	±0.5
.XXX	±0.1

APPROVED

CHECKED 廖志明 2.07

DRAWING 4/2.07

CUSTOMER:	ASUS		
PART NO :			
PARTNAME:	RF Antenna Cable Assembly		
W.Y P/NO :	C660S540174-A		
REV	UNIT	FILE :	
X1	mm	SHEET :	1/1

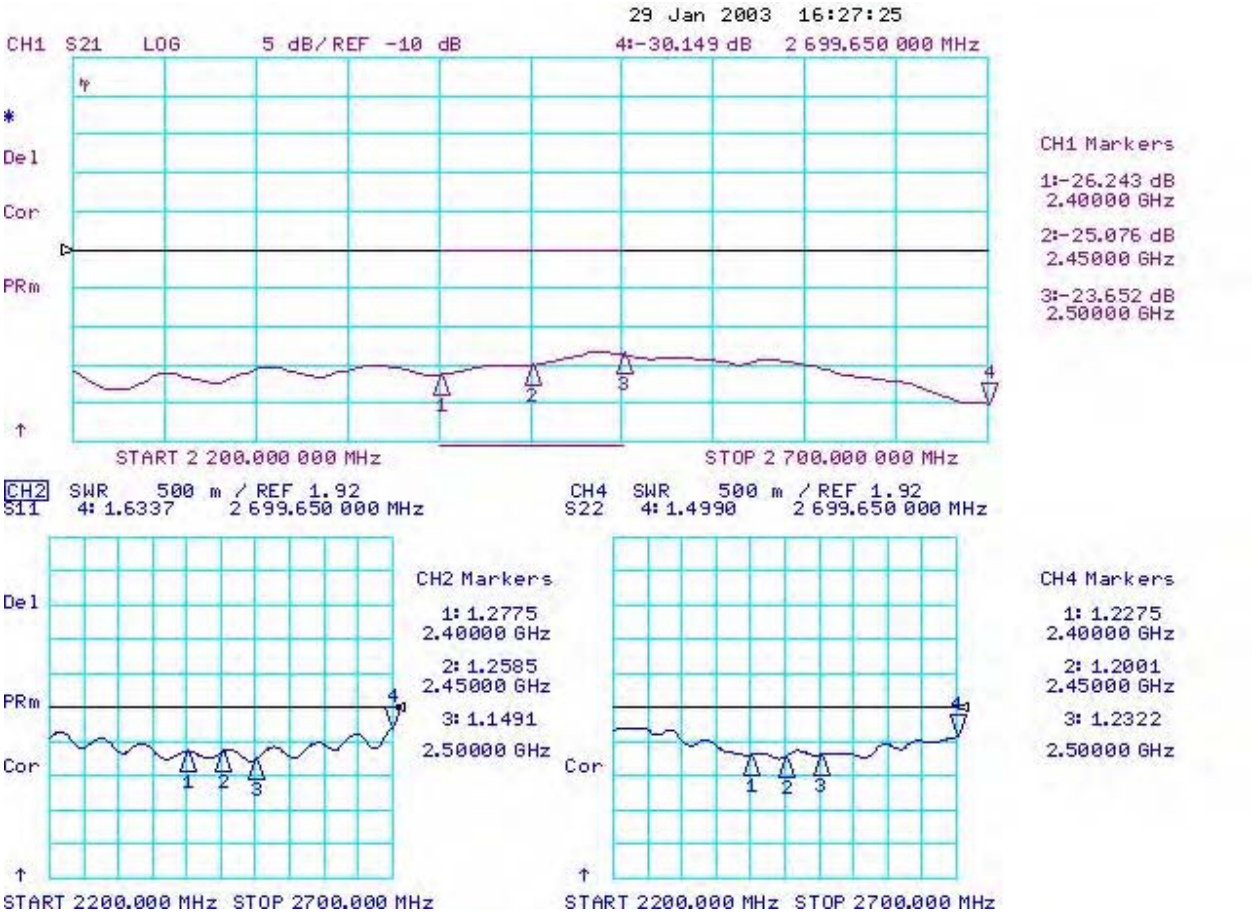
M.gear Wha Yu Group

RF Antenna Assembly

P/No.C660S540174–A SSR-70917 Spec:2.4~2.5GHz

S11：L

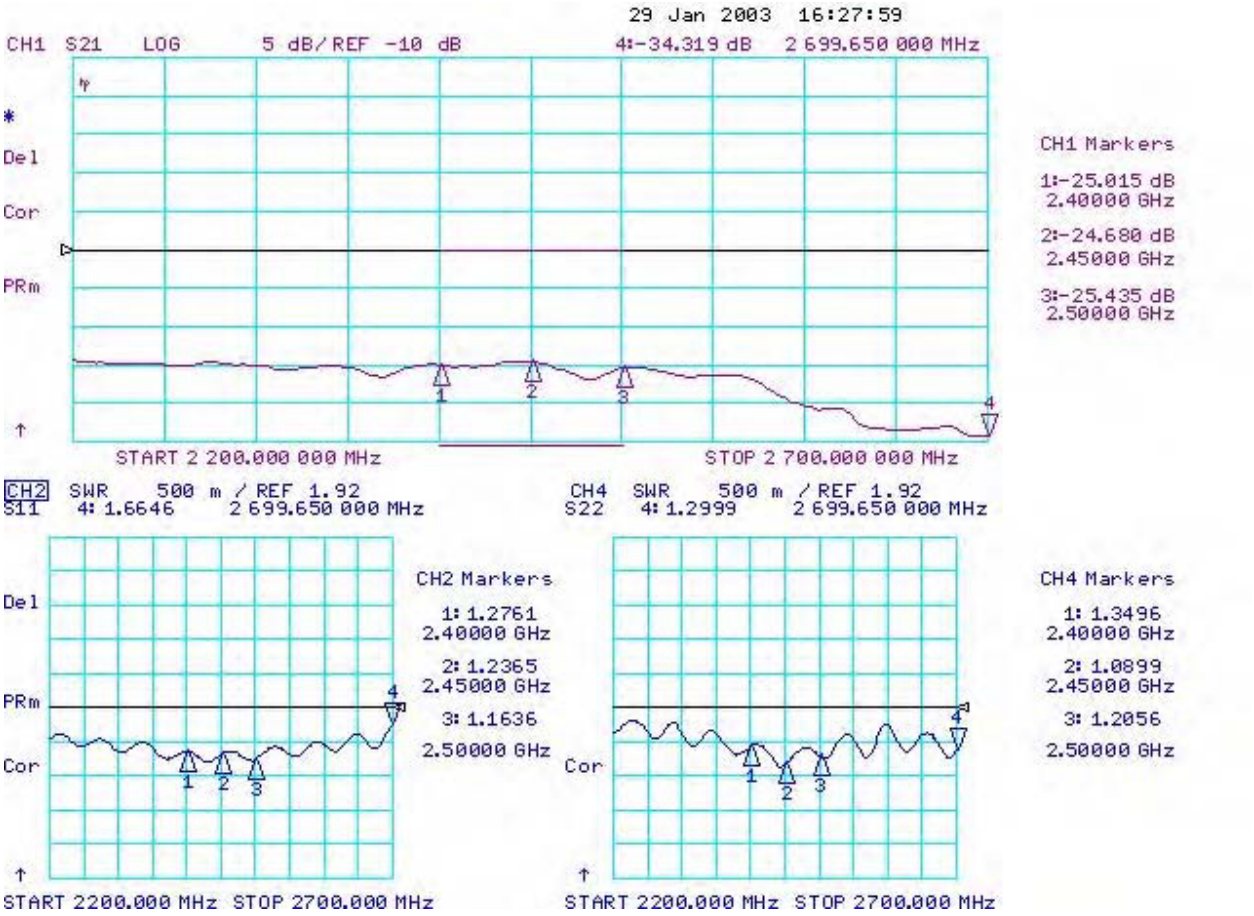
S22：M



2007.3.26

S11：L

S22：R



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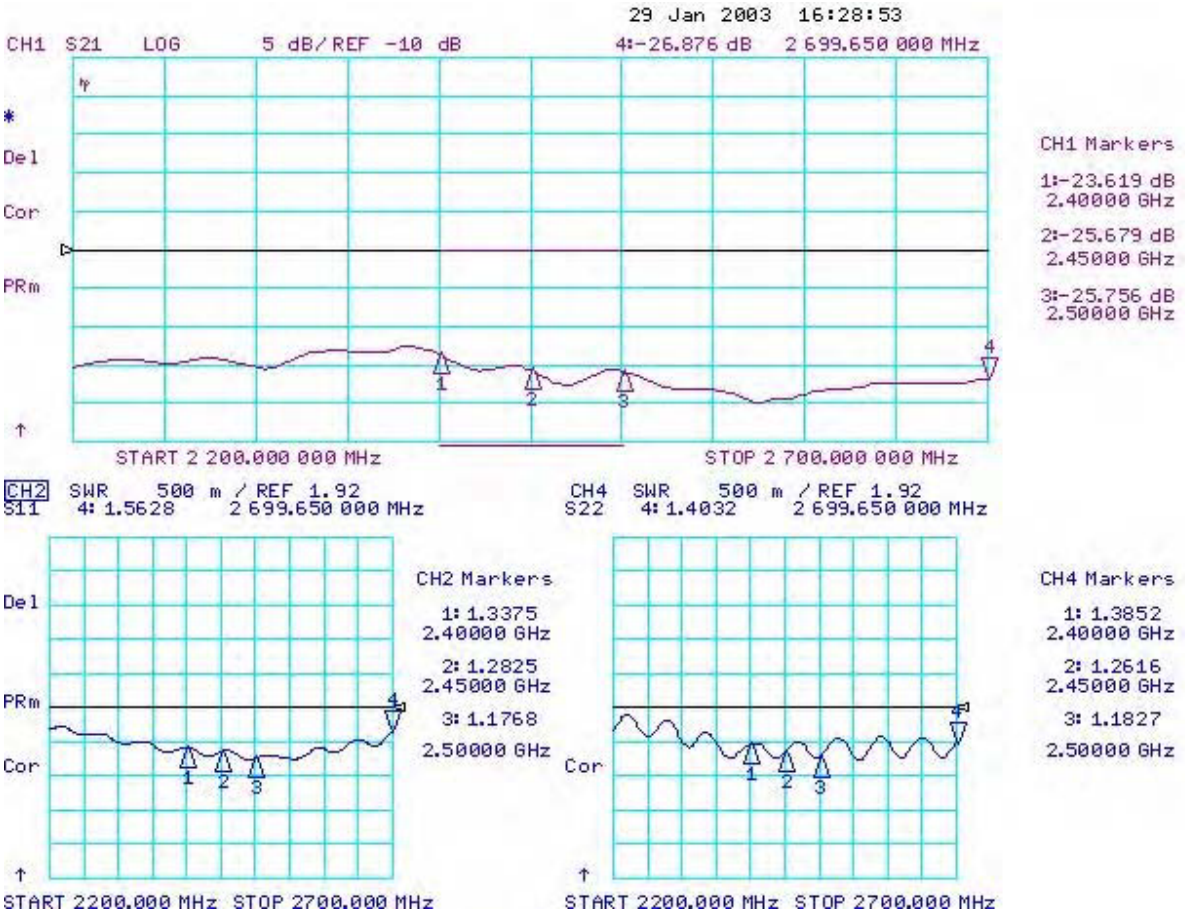
RF Antenna Assembly

P/No.C660S540174–A SSR-70917 Spec:2.4~2.5GHz

S11：M

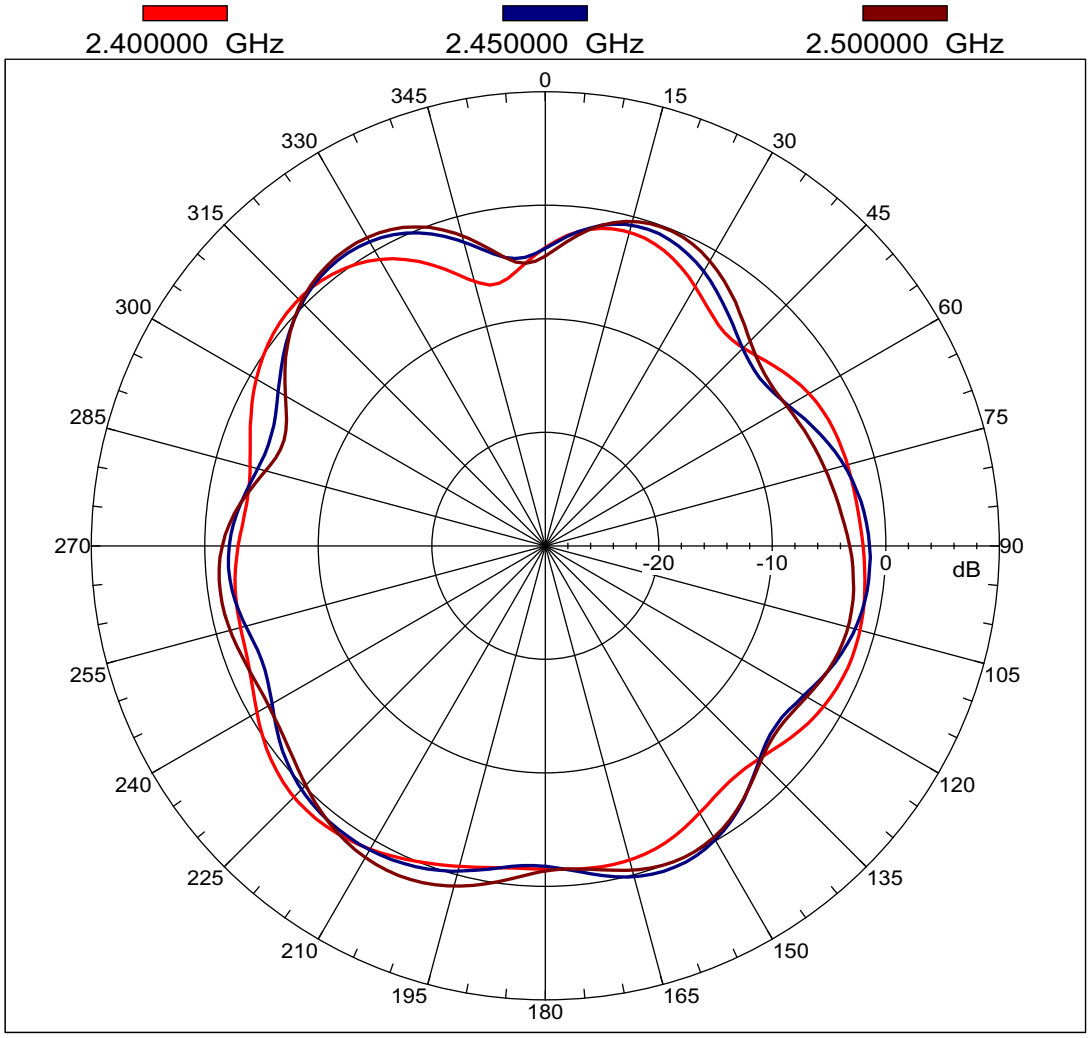
S22：R



2007.3.26

L

Far-field amplitude of C660S540174-A SSR-70917 L V H-PLANE.nsi



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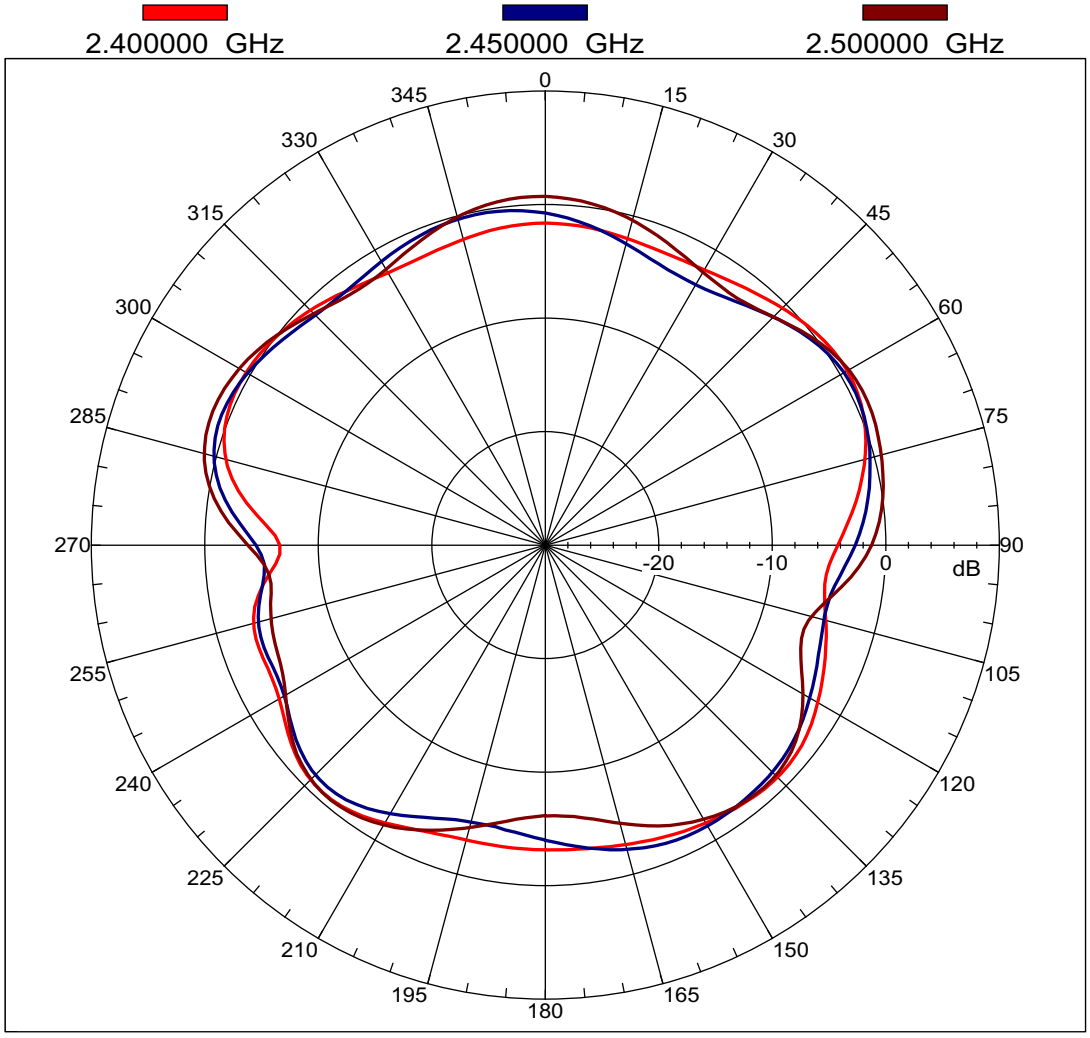
M

Far-field amplitude of C660S540174-A SSR-70917 M V H-PLANE.nsi



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R

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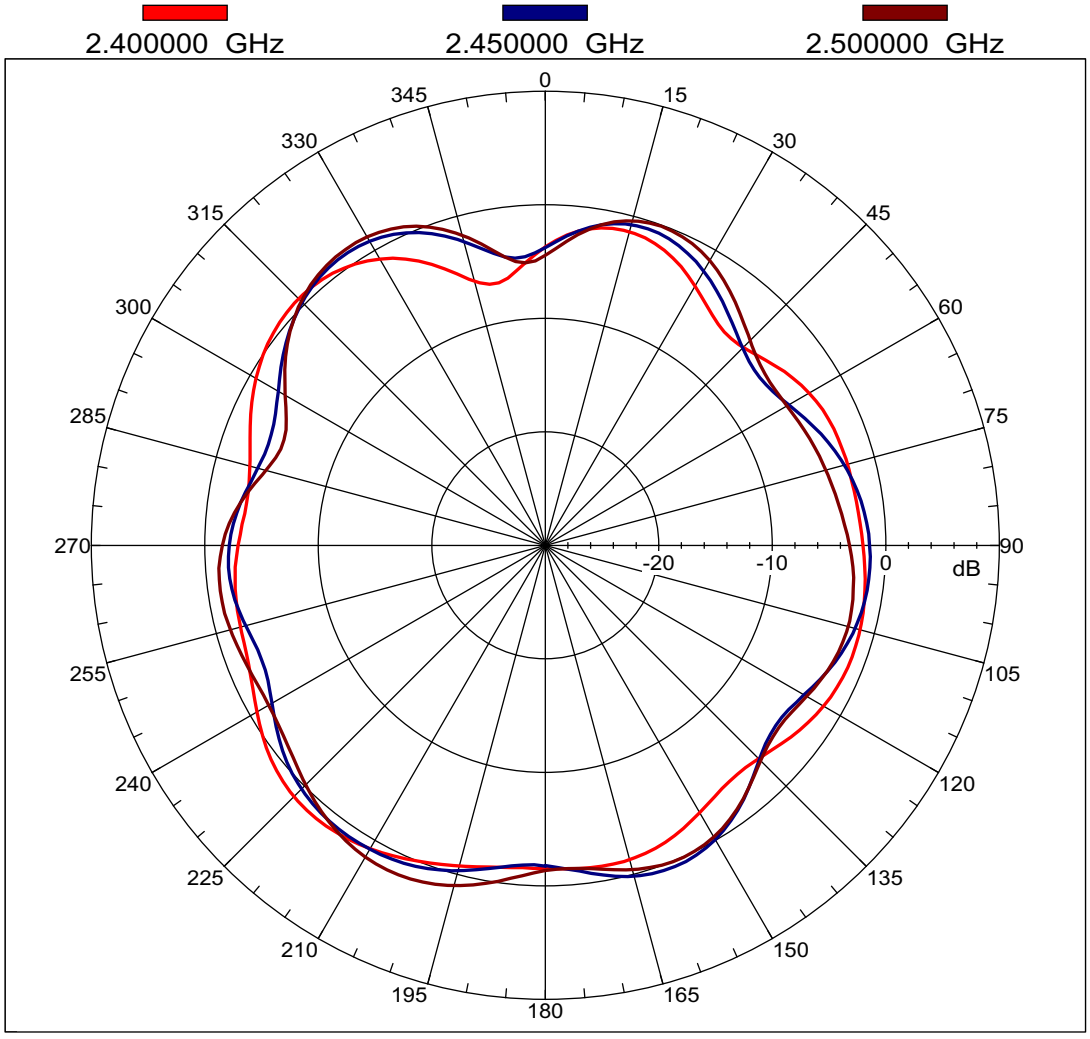

2007.03.28