

## *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

<b>FCC ID</b>	:	MSQ6218-A1
<b>Product name</b>	:	ADSL Wireless Modem Router
<b>Model</b>	:	6388-A1-XXX; 6218-A1-XXX
<b>Classification</b>	:	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
<b>Frequency Range</b>	:	2.412 GHz ~ 2.462GHz
<b>Supported Channel</b>	:	11 Channels
<b>Modulation Skill</b>	:	DBPSK, DQPSK, CCK, OFDM
<b>Power Type</b>	:	Powered by the AC to AC adapter, Model: AA-1570DT I/P: 120VAC, 60Hz, 15W ; O/P: 15VAC, 700mA 183cm length, non-shielded, no ferrite core (AC to Adapter) 182cm length, non-shielded, no ferrite core (Adapter to Router)

**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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f <sup>2</sup>	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:** 
$$S = \frac{PG}{4\pi R^2} = \frac{49.77 \times 1.51}{4\pi(20)^2} = 0.01499 \text{ mW/cm}^2$$

**Estimated safe separation:** 
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{49.77 \times 1.51}{4\pi}} = 2.445 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 2.445cm"

Where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

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)

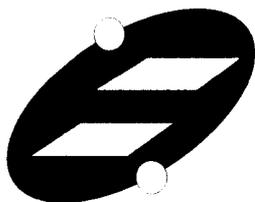
The Numeric gain G of antenna with a gain specified in dB is determined by:

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

$$G = \text{Log}^{-1} (1.8 / 10) = 1.51356$$

## *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.:** C660-510020-A

**REV.:** X2

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

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# RF Antenna Cable Assembly

## Specification

### 1. Electrical Properties :

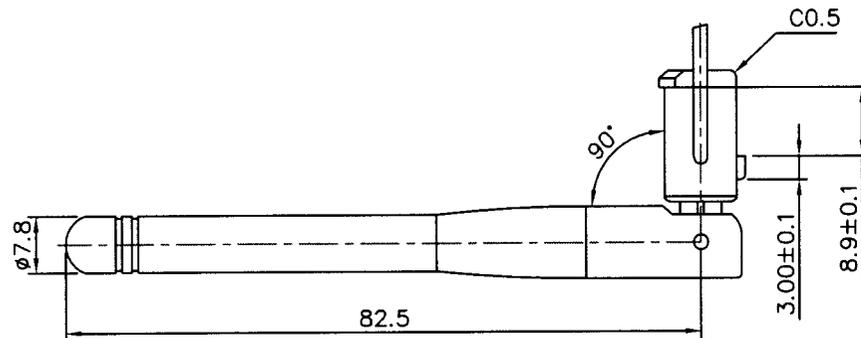
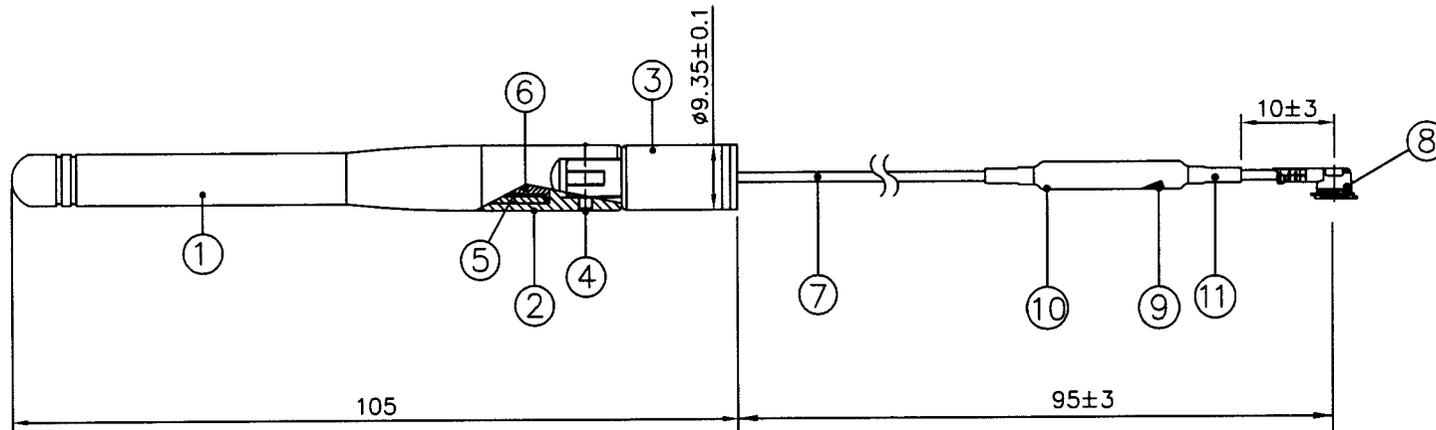
- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance .....  $50\Omega$  Nominal
- 1.3 VSWR ..... 1.92 Max.
- 1.4 Return Loss..... -10dB Maximum
- 1.5 Electrical Wave.....  $1/2 \lambda$  Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

### 2. Physical Properties :

- 2.1 Cable .....  $\phi$  1.13 Coaxial Cable
- 2.2 Antenna Cover ..... TPE
- 2.3 Antenna Base ..... PC
- 2.4 Operating Temp .....  $-20^{\circ}\text{C} \sim +65^{\circ}\text{C}$
- 2.5 Storage Temp .....  $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
- 2.6 Color ..... Black
- 2.7 Connector ..... MHF
- 2.8 Core..... RH 4\*25\*1.5

CG-XX

REV	DATE	DESCRIPTION
X1	07/16/2004	New Issue
X2	10/23/2004	Changed Cable Length



11	Tube	Heat Shrink Tube	2	
10	Tube	Heat Shrink Tube	1	
9	Core	RH 4*25*1.5	1	
8	Connector	MHF Connector	1	
7	Cable	Ø1.13 Coaxial Cable	1	
6	Insulator	POM, White	1	
5	Ground Tube	Brass; Ni Plated	1	
4	Rivet	Brass; Cr Plated (Black)	2	
3	Antenna Base	PC Color: Black	1	
2	Antenna Base	PC Color: Black	1	
1	Antenna Body	TPE Color: Black	1	
NO	DESCRIPTION		QTY	REMARK

CUSTOMER'S SIGNATURE	XX.	±3.0	APPROVED	CUSTOMER: 華碩科技股份有限公司 PART NO : PARTNAME: 2.4G RF Antenna Cable Assembly W.Y P/NO : C660-510020-A REV UNIT FILE : X2 m/m SHEET : 1/1
	X.	±2.0	 CHECKED  DRAWING 	
	.X	±1.0		
	.XX	±0.5		
	.XXX	±0.1		
	⊕	⊖		


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