

## *Measurement of MPE*

### 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>Applicant</b>	:	11Wave Technology Inc.,
<b>Applicant Address</b>	:	No. 6 Lane35 jihu Rd., Neihu, Taipei, Taiwan 114, R.O.C.
<b>Classification</b>	:	Portable Device
		(i) Under normal use condition, the antenna is at least 20cm away from the user;
		(ii) Warning statement for keeping 2.5cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
<b>Model No.</b>	:	PWC-351, 11WP-611AL, 11WP-611ALXXXX
		(X : 0~1, A~Z, a~z, Blank)
<b>Granted FCC ID</b>	:	QS4-611AL
<b>Frequency Range</b>	:	2.412 GHz ~ 2.462GHz
<b>Support Channel</b>	:	11 Channel
<b>Modulation Skill</b>	:	BPSK, QPSK, CCK
<b>Power Type</b>	:	By the PCMCIA of Notebook

**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:**

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{14.620 \times 2}{4p(2.5)^2} 0.372 \text{ mW/cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{14.620 \times 2}{4p}} = 1.525 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 1.890 cm."

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:

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

$$G = \text{Log}^{-1} (2.0 / 10) = 1.584$$