

## ***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>    | : | Mobile 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>         | : | PWA-645, 11WA321A-, 11WA-321AXXXX<br>(X : 0~9, A~Z, a~z, Blank), GWA-23B                                                                               |
| <b>Granted FCC ID</b>    | : | QS4-321A                                                                                                                                               |
| <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 Power Adaptor                                                                                                                                   |

### 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:** 
$$S = \frac{PG}{4\pi R^2} = \frac{102.09 \times 0.18}{4\pi (2.5)^2} 0.233 \text{ mW} / \text{cm}^2$$

**Estimated safe separation:** 
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{102.09 \times 0.18}{4\pi}} = 1.209 \text{ cm}$$

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:

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

$$G = \text{Log}^{-1} (1.8 / 10) = 0.18$$