MPE TEST REPORT

OET65, IEEE C95.1, RSS-102

CATEGORY:	Mobile Module
PRODUCT NAME:	802.11b + BlueTooth COMBO SIP
FCC ID.:	IXMWM-BB-AG-01
MODEL NAME:	WM-BB-AG-01

APPLICANT: **Universal Scientific Industrial Co., Ltd**
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Statements:

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The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.

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1. Introduction

Radio power energy is available everywhere in our daily environment. More and more application involves radio energy, which makes RF hazard becomes more and more important to human health. International organization such as IEEE or FCC spent a lot of effort to investigate the risk of placing human body in RF energy environment and try to define a rule to limit the RF emission of the radio device for protection of human health. SAR and MPE was defined as 2 major evaluation methods for RF hazard. SAR is mainly used for RF device which could be very close to the human body, and MPE is for device not going to be carried with the human body. In short, portable device has to follow the rule of SAR and mobile one MPE.

This test report is for the evaluation of MPE on Mobile device which the separation distance between the antenna and the human body, under normal use condition, is longer than 20cm.

2. MPE (Maximum Permissible Exposure)

2.1 Limits

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F = frequency in MHz

2.2 MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } \boldsymbol{Pd}\ (mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)
P = Peak RF output power (mW)
G = EUT Antenna numeric gain (numeric)
d = Separation distance between radiator and human body (m)

The formula can be changed to

$$\boldsymbol{Pd} = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain of the used antenna, the RF power density can be obtained.

2.3 Calculated Result

Maximum power density of each transmitter.

Transmitter	Channel No.	Antenna Gain (numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
BlueTooth	Channel 00	0.98	1.762	0.00003	1
802.11b	Channel 01	0.83	28.184	0.0046	1

Power Density Ratio Calculation.

PDR 1	PDR 2	Sum	Limit
0.00003/1 = 0.00003	0.0046/1 = 0.0046	0.00463	1.0

The sum of the power density ratio is smaller than 1.0, which fulfill the RF exposure requirement.