



RF EXPOSURE REPORT

REPORT NO.: DRE-12NO0102VNTY-A5

MODEL NO.: iwi666, iwi666-B

FCC ID: RS3IWI666

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

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RF Exposure Measurement

1. Introduction

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC) calibrated for antenna measurement in ADT (SHANGHAI), and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached. Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

2. RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
300-1500	F/300	6
1500-100,000	5	6
(B)Limits For General Population / Uncontrolled Exposure				
300-1500	F/1500	6
1500-100,000	1.0	30

F = Frequency in MHz



3. Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

where P_d = power density in mW/cm^2 P_{out} = output power to antenna in mW G = gain of antenna in linear scale $\pi = 3.1416$ R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, $1 mW/cm^2$. If we know the maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the MPE value at distance 20cm.

4. EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5. Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as Mobile Device

6. Test Results

6.1. Antenna Gain

The maximum Gain measured in Fully Anechoic Chamber is 2.0dBi or 1.58489 (numeric)

For 11n mode, The antenna gain is $2dBi + 10\log(2) = 5dBi$ or 3.16228 (numeric)

6.2. Output Power Into Antenna & RF Exposure value at distance 20cm:



For Part 802.11b:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1	2412	27.10	0.0085	1.0
6	2437	27.86	0.0088	1.0
11	2462	27.42	0.0086	1.0

For Part 802.11g:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1	2412	50.35	0.0159	1.0
6	2437	47.64	0.0150	1.0
11	2462	45.60	0.0144	1.0

For Part 802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1	2412	91.41	0.0575	1.0
6	2437	112.61	0.0708	1.0
11	2462	97.06	0.0611	1.0

For Part 802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1	2422	93.15	0.0586	1.0
6	2437	88.04	0.0554	1.0
11	2452	85.08	0.0535	1.0

With 3G/4G Dongle: MF112

Worst case list as below.

Channel Frequency (MHz)	Output Power (mW) (EIRP)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1880	128.82	0.0256	1.0



CONCLUSION:

Both of the WLAN and 3G/4G dongle can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \dots \text{etc.} < 1$ CPD = Calculation power density LPD = Limit of power density

Therefore, the worst-case situation is $0.0708 / 1 + 0.0256 / 1 = 0.0964$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.



APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, BUREAU VERITAS ADT (Shanghai) Corporation, were founded in 2004 to provide our best service in EMC, Radio and Vehicle consultation. Our laboratories are accredited by the following accreditation bodies according to ISO/IEC 17025 (2005).

USA	A2LA Certificate No.: 2343.01
China	CNAS Certificate No.: L2810

Copies of accreditation certificates could be inquired from our office. If you have any comments, please feel free to contact us at the following:

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