RF EXPOSURE REPORT

REPORT NO.: RF920725H01G
MODEL NO.: IP200

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Accton Technology Corporation

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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, 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 : $Pd = (Pout*G) / (4*pi*r^2)$

where
Pd = power density in mW/cm^2
Pout = 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

Pd 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.

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).

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

This device is not fixed inside the host equipment, it is connected with host through wire. So it is easy to be re-located in the place where at least 20 cm far 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

Antenna 1: The maximum Gain of the antenna is 1.5dBi. (for 2.4GHz)
Antenna 1: The maximum Gain of the antenna is 4.5dBi. (for 5GHz)
Antenna 2: The maximum Gain of the antenna is 3.0dBi. (for 2.3-2.5GHz)
Antenna 3: The maximum Gain of the antenna is 9.0dBi. (for 2.3-2.5GHz)

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

For Part 802.11b:

Antenna 1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	36.56	0.011	1.0
6	2437	67.61	0.019	1.0
11	2462	33.81	0.010	1.0

Antenna 2

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	77.625	0.0308	1.0
6	2437	85.114	0.0338	1.0
11	2462	52.481	0.0208	1.0

Antenna 3

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	31.623	0.050	1.0
6	2437	67.608	0.107	1.0
11	2462	31.623	0.050	1.0

For Part 802.11g:

Antenna 1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	41.98	0.012	1.0
6	2437	66.07	0.019	1.0
11	2462	39.90	0.011	1.0

Antenna 2

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	50.119	0.0199	1.0
6	2437	125.893	0.0500	1.0
11	2462	51.286	0.0203	1.0

Antenna 3

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	16.982	0.0268	1.0
6	2437	112.202	0.1773	1.0
11	2462	25.704	0.0406	1.0

For 802.11a (5GHz Band):

FOR FREQUENCY 5.15~5.35GHz

Normal Mode :

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5180	32.58	0.018	1.0
4	5240	34.43	0.019	1.0
5	5260	97.72	0.055	1.0
8	5320	32.66	0.018	1.0

Turbo Mode :

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5210	32.58	0.018	1.0
2	5250	35.73	0.020	1.0
3	5290	36.06	0.020	1.0

FOR FREQUENCY 5.725~5.850GHz

Normal Mode :

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
9	5745	120.23	0.067	1.0
11	5785	109.65	0.061	1.0
13	5825	125.89	0.071	1.0

Turbo Mode :

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
4	5760	107.15	0.060	1.0
5	5800	102.33	0.057	1.0