RF EXPOSURE REPORT

REPORT NO.: RF920811R03

MODEL NO.: WMP55AG v1.1

ACCORDING: FCC Guidelines for Human Exposure

IEEE C95.1

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RF Exposure Measurement (Mobile Device)

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

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warming statement for keeping 20cm separation distance and the prohibition of operating next to a person has been printed on the user's manual. So, this product is classified as the **Mobile Device.**

6 Test Results

6.1 Antenna Gain

The maximum Gain measured in Fully Anechoic Chamber is 1dBi or 1.26(numeric) for 2.4GHz band, and 3dBi or 2(numeric) for 5GHz band.

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

For Part 802.11b (CCK technique):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	55.98	0.014	1
6	2437	52.00	0.013	1
11	2462	50.47	0.013	1

For Part 802.11g (OFDM technique):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	46.99	0.012	1
6	2437	45.39	0.011	1
11	2462	44.98	0.011	1

For Part 802.11a (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	41.40	0.016	1
4	5240	42.07	0.017	1
5	5260	43.85	0.017	1
8	5320	40.64	0.016	1
9	5745	36.06	0.014	1
12	5805	34.20	0.014	1

For Part 802.11a (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	37.50	0.015	1
2	5250	41.98	0.017	1
3	5290	34.04	0.014	1
4	5760	27.35	0.011	1
5	5800	27.73	0.011	1