



RF EXPOSURE REPORT

REPORT NO.: SA980903H06

MODEL NO.: WMP-ND04

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Alpha Networks Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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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 our lab, 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	30
1500-100,000	1.0	30

F = Frequency in MHz

3. Friis Formula

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

where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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.

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 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**



A D T

6. TEST RESULTS

6.1 Antenna Gain

There are four antennas provided to this EUT, please refer to the following table:

For 2.4GHz							
Chain	Manufacture	Model name	Antenna Gain (dBi)	Cable loss (dB)	Net Gain (dBi)	Antenna Type	Connector
Chain (0) Antenna (1)	WHA YU GROUP	C037-510987-A (SSR-91251)	4	0.6	3.4	Dipole	SMA Straight Plug Reverse
Chain (1) Antenna (2)	WHA YU GROUP	C037-510987-A (SSR-91251)	4	0.6	3.4	Dipole	SMA Straight Plug Reverse
For 5GHz							
Chain	Manufacture	Model name	Antenna Gain (dBi)	Cable loss (dB)	Net Gain (dBi)	Antenna Type	Connector
Chain (0) Antenna (1)	WHA YU GROUP	C037-510988-A (SSR-91252)	Band1: 7.128 Band2: 7.128 Band3: 7.841 Band4: 7.841	1.1	Band1: 6.028 Band2: 6.028 Band3: 6.741 Band4: 6.741	Dipole	SMA Straight Plug Reverse
Chain (1) Antenna (2)	WHA YU GROUP	C037-510988-A (SSR-91252)	Band1: 7.128 Band2: 7.128 Band3: 7.841 Band4: 7.841	1.1	Band1: 6.028 Band2: 6.028 Band3: 6.741 Band4: 6.741	Dipole	SMA Straight Plug Reverse

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

For 15.247(2.4GHz):

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	162.2	0.071	1.0
6	2437	190.5	0.083	1.0
11	2462	109.6	0.048	1.0

802.11g: 13.1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1	2412	409.3	0.178	1.0
6	2437	583.5	0.254	1.0
11	2462	399.2	0.174	1.0

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	390.4	0.170	1.0
6	2437	625.6	0.272	1.0
11	2462	289.2	0.126	1.0

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	313.6	0.136	1.0
4	2437	515.3	0.224	1.0
7	2452	246.3	0.107	1.0

For 15.247(5GHz):

802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
149	5745	404.6	0.380	1.0
157	5785	395.9	0.372	1.0
165	5825	403.4	0.379	1.0

802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
149	5745	412.6	0.388	1.0
157	5785	408.9	0.384	1.0
165	5825	403.7	0.379	1.0

802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
151	5755	390.0	0.366	1.0
159	5795	385.5	0.362	1.0

For 15.407(5GHz):

802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
36	5180	27.7	0.022	1.0
40	5200	27.3	0.022	1.0
48	5240	28.5	0.023	1.0

802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
36	5180	21.0	0.017	1.0
40	5200	20.7	0.017	1.0
48	5240	20.8	0.017	1.0

802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
38	5190	29.2	0.023	1.0
46	5230	37.9	0.030	1.0