



RF EXPOSURE REPORT

REPORT NO.: 100643FIA01

MODEL NO.: WUS-N10M

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Alpha Networks Inc.

ADDRESS: No.8 Li-shing 7th Rd., Science-based Industrial
Park, Hsinchu, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

LAB ADDRESS: 2F, C Building, No.1618, Yi Shan Rd., Shanghai,
China

TEST LOCATION: 2F, C Building, No.1618, Yi Shan Rd., Shanghai,
China

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	30
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/cm²

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

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 r .

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**.

6. TEST RESULTS

6.1 ANTENNA GAIN

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

No.	Antenna Type	Gain(dBi)	Antenna Connector
A	Diople	1.8 dBi	IPEX
B	Diople	1.6 dBi	IPEX
C	Diople	1.9 dBi	IPEX
D	Diople	1.8 dBi	IPEX
E	Diople	1.9 dBi	IPEX

6.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE VALUE AT DISTANCE 20cm:

802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1	2412	87.498	19.42	0.027	1
6	2437	80.724	19.07	0.025	1
11	2462	81.096	19.09	0.025	1

802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1	2412	196.789	22.94	0.061	1
6	2437	169.824	22.3	0.052	1
11	2462	181.552	22.59	0.056	1

**DRAFT 802.11n (20MHz) OFDM modulation:**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1	2412	194.984	22.9	0.060	1
6	2437	182.810	22.62	0.056	1
11	2462	187.068	22.72	0.058	1

DRAFT 802.11n (40MHz) OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM ²)	LIMIT OF POWER DENSITY (mW/CM ²)
1	2422	192.752	22.85	0.059	1
6	2437	184.077	22.65	0.057	1
11	2452	178.238	22.51	0.055	1