RF EXPOSURE REPORT

REPORT NO.: SA950424L13

MODEL NO.: WNR834M

ACCORDING: FCC Guidelines for Human Exposure

IEEE C95.1

APPLICANT: Netgear Incorporated

ADDRESS: 4500 Great America Parkway Santa Clara, CA 95054, U.S.A.

ISSUED BY: Advance Data Technology Corporation

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang 244, Taipei Hsien, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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

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

This device is fixed inside the host equipment. 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 2.18dBi or 1.652 (numeric).

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

802.11b DSSS MODULATION: SINGLE TX

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm²)	LIMIT OF POWER DENSITY (mW/cm²)
1	2412	35.563	0.012	1.0
6	2437	63.973	0.021	1.0
11	2462	32.211	0.011	1.0

802.11b DSSS MODULATION: DUAL TX

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	45.186	44.875	16.55	16.52	90.061	19.55	0.030	1.0
6	2437	51.404	50.699	17.11	17.05	102.103	20.09	0.034	1.0
11	2462	50.933	50.350	17.07	17.02	101.283	20.06	0.033	1.0

802.11G OFDM modulation: Single TX

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
1	2412	40.179	0.013	1.0
6	2437	56.885	0.019	1.0
11	2462	39.811	0.013	1.0

802.11G OFDM MODULATION: DUAL TX

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	22.542	22.699	13.53	13.56	45.241	16.56	0.015	1.0
6	2437	25.351	25.586	14.04	14.08	50.937	17.07	0.017	1.0
11	2462	22.751	22.594	13.57	13.54	45.345	16.57	0.015	1.0

DRAFT 802.11n (20MHz) OFDM MODULATION: SINGLE TX

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm^2)	LIMIT OF POWER DENSITY (mW/cm^2)
1	2412	32.285	0.011	1.0
6	2437	50.699	0.017	1.0
11	2462	31.915	0.010	1.0

DRAFT 802.11n (20MHz) OFDM MODULATION: DUAL TX

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	22.542	22.699	13.53	13.56	45.241	16.56	0.014	1.0
6	2437	25.351	25.586	14.04	14.08	50.937	17.07	0.016	1.0
11	2462	22.751	22.594	13.57	13.54	45.345	16.57	0.014	1.0

DRAFT 802.11n (40MHz) OFDM MODULATION: SINGLE TX

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm²)	LIMIT OF POWER DENSITY (mW/cm²)
1	2422	22.439	0.007	1.0
4	2437	39.994	0.013	1.0
7	2452	25.586	0.008	1.0

DRAFT 802.11n (40MHz) OFDM MODULATION: DUAL TX

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2422	22.594	22.491	13.54	13.52	45.085	16.54	0.014	1.0
4	2437	40.365	40.179	16.06	16.04	80.544	19.06	0.025	1.0
7	2452	25.177	25.177	14.01	14.01	50.354	17.02	0.016	1.0