RF EXPOSURE REPORT

REPORT NO.: SA950601L13
MODEL NO.: WNR834M

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Netgear Incorporated
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ISSUED BY: Advance Data Technology Corporation

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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

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

The maximum Gain measured in Fully Anechoic Chamber is 2.18dBi or 1.65196(numeric)

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

Antenna gain: 2.18dBi:

802.11b DSSS MODULATION:

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	51.286	50.933	17.10	17.07	102.219	20.095	0.034	1.0
6	2437	64.417	63.826	18.09	18.05	128.243	21.080	0.042	1.0
11	2462	45.290	44.978	16.56	16.53	90.268	19.555	0.030	1.0

802.11g OFDM MODULATION:

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	51.168	50.699	17.09	17.05	101.867	20.080	0.033	1.0
6	2437	90.157	89.536	19.55	19.52	179.693	22.545	0.059	1.0
11	2462	40.458	39.994	16.07	16.02	80.452	19.055	0.026	1.0

DRAFT 802.11n (20MHz) OFDM modulation

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	51.168	50.699	17.09	17.05	101.867	20.080	0.033	1.0
6	2437	89.536	90.157	19.52	19.55	179.693	22.545	0.059	1.0
11	2462	40.738	40.272	16.10	16.05	81.010	19.085	0.027	1.0

DRAFT 802.11n (40MHz) OFDM modulation

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	32.137	31.696	15.07	15.01	63.833	18.050	0.021	1.0
4	2437	40.458	40.179	16.07	16.04	80.637	19.065	0.026	1.0
7	2452	32.285	32.137	15.09	15.07	64.422	18.090	0.021	1.0

802.11b(CB mode) DSSS MODULATION:

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	40.644	40.365	16.09	16.06	81.009	19.085	0.027	1.0
4	2437	72.111	71.450	18.58	18.54	143.561	21.570	0.047	1.0
7	2452	35.975	35.481	15.56	15.50	71.456	18.540	0.023	1.0