RF EXPOSURE REPORT

REPORT NO.: SA970829H06
MODEL NO.: WMP600N

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Cisco-Linksys LLC

ADDRESS: 121 Theory Drive Irvine, CA 92617, USA

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen,
Chiung Lin Hsiang, Hsin Chu Hsien,
Taiwan, R.O.C.

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 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 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 two antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	Antenna Gain (dBi)	Antenna Connector
Chain(0)	Dipole	2	RSMA
Chain(1)	Dipole	2	RSMA

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

For 15.247(2.4GHz) :
For Part 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	81.283	0.026	1.0
6	2437	85.114	0.027	1.0
11	2462	112.202	0.035	1.0

For Part 802.11g:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	204.174	0.064	1.0
6	2437	199.526	0.063	1.0
11	2462	208.930	0.066	1.0

DRAFT 802.11n (20MHz) OFDM

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	224.642	0.071	1.0
6	2437	227.017	0.072	1.0
11	2462	224.463	0.071	1.0

DRAFT 802.11n (40MHz) OFDM

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2422	190.998	0.060	1.0
4	2437	224.404	0.071	1.0
7	2452	229.630	0.072	1.0

For 15.247(5GHz) :

For Part 802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5745	122.744	0.039	1.0
3	5785	109.901	0.035	1.0
5	5825	110.917	0.035	1.0

For DRAFT 802.11n (20MHz) OFDM:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5745	283.616	0.089	1.0
3	5785	274.832	0.087	1.0
5	5825	278.808	0.088	1.0

DRAFT 802.11n (40MHz) OFDM

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5755	265.157	0.084	1.0
3	5795	266.937	0.084	1.0

For 15.407(5GHz) :
For Part 802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5180	20.989	0.007	1.0
2	5200	22.131	0.007	1.0
4	5240	24.547	0.008	1.0
5	5260	23.823	0.008	1.0
7	5300	24.266	0.008	1.0
8	5320	24.604	0.008	1.0
9	5500	26.853	0.008	1.0
14	5600	21.979	0.007	1.0
19	5700	23.014	0.007	1.0

For DRAFT 802.11n (20MHz) OFDM:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5180	27.514	0.009	1.0
2	5200	27.887	0.009	1.0
4	5240	26.826	0.008	1.0
5	5260	27.269	0.009	1.0
7	5300	28.042	0.009	1.0
8	5320	28.510	0.009	1.0
9	5500	29.739	0.009	1.0
14	5600	24.861	0.008	1.0
19	5700	21.359	0.007	1.0

DRAFT 802.11n (40MHz) OFDM

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5190	16.297	0.005	1.0
2	5230	26.072	0.008	1.0
3	5270	27.330	0.009	1.0
4	5310	17.649	0.006	1.0
5	5510	27.048	0.009	1.0
7	5590	26.705	0.008	1.0
9	5670	25.589	0.008	1.0