RF EXPOSURE REPORT

REPORT NO.: SA950414L16
MODEL NO.: G420

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: ELITEGROUP COMPUTER SYSTEMS CO., LTD.

ADDRESS: 2F. No. 240, Sec. 1, Nei Hu Road, Taipei, Taiwan 114, R.O.C

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

A fixed radio is inside this device, so it is easy to be re-located in the place where at least 20cm far 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 are –1.09449dBi or 0.777233 (numeric) (For 2.4G), -0.84897dBi or 0.822438 (numeric) (For 5.0G) and –1.51038dBi or 0.706256 (numeric)(For Bluetooth)

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

WLAN Information:

802.11b modulation

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	40.179	0.00621	1.0
6	2437	39.811	0.00616	1.0
11	2462	40.087	0.00620	1.0

802.11g modulation

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	35.892	0.00555	1.0
6	2437	35.975	0.00556	1.0
11	2462	36.058	0.00558	1.0

802.11a modulation

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5180	28.184	0.00461	1.0
4	5240	28.314	0.00463	1.0
5	5260	28.445	0.00465	1.0
8	5320	28.379	0.00464	1.0
9	5745	36.058	0.00590	1.0
11	5785	35.727	0.00585	1.0
13	5825	35.892	0.00587	1.0

Bluetooth Information:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
0	2402	1.016	0.00014	1.0
39	2441	0.822	0.00012	1.0
78	2480	0.596	0.00008	1.0

CONCULSION:

Both of the WLAN and Bluetooth can transmit simultaneously, the formula of calculated the MPE is:

CPD_1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Therefore, the calculation of this situation is 0.00621 / 1 +0.00014 / 1 = 0.00635, which is less than the “1” limit.