RF EXPOSURE REPORT

REPORT NO. : SA931126L09

MODEL NO. : F6D3230-4

ACCORDING : FCC Guidelines for Human Exposure

IEEE C95.1

APPLICANT : Delta Networks INC.

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ISSUED BY : Advance Data Technology Corporation

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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 the product, under normal use condition, is at least 20cm away from the body of the user. Warming statement for keeping 20cm separation distance and the prohibition of operating next to a person has been printed on the user's manual. So, this product is classified as the Mobile Device.

6 Test Results

6.1 Antenna Gain

The maximum Gain measured in Fully Anechoic Chamber are 2dBi or 1.585 (numeric) for 2.4GHz and 3dBi or 1.995 (numeric) for 5GHz.

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

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	63.973	0.020	1.0
6	2437	50.466	0.016	1.0
11	2462	63.387	0.020	1.0

802.11a (Normal mode)

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5180	20.091	0.008	1.0
4	5240	20.464	0.008	1.0
5	5260	20.091	0.008	1.0
8	5320	20.230	0.008	1.0
9	5745	20.091	0.008	1.0
11	5785	20.324	0.008	1.0
13	5825	20.184	0.008	1.0

802.11a (Turbo mode)

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5210	20.230	0.008	1.0
2	5250	20.230	0.008	1.0
3	5290	20.230	0.008	1.0
4	5760	20.184	0.008	1.0
5	5800	20.277	0.008	1.0

Note: Both of the 2.4GHz and 5GHz bands can not transmit simultaneously, the maximum power density value is 0.020mW/cm^2 (for 2.4GHz) and 0.008mW/cm^2 (for 5GHz) which is less than the 1mW/cm^2 limit.