RF EXPOSURE REPORT

REPORT NO.: SA930507H07S
MODEL NO.: MP-620
FCC ID: QZE301

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

APPLICANT: Trapeze Networks, Inc.

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ISSUED BY: Advance Data Technology Corporation

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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

Product is professional installed in a place where at least 40cm far away from the body of the user. Warning statement to the user for keeping at least 40cm or more separation distance from the antenna has been included in users manual. So, this device is classified as **Mobile Device.**

6 Test Results

6.1 Antenna Gain

For 2.4GHz

Antenna 1: The maximum Gain of the antenna is 6.93dBi or 4.931738(numeric).
Antenna 2: The maximum Gain of the antenna is 8.93dBi or 7.816278(numeric).

For 5GHz

Antenna A: The maximum Gain of the antenna is 6.21dBi or 4.1783(numeric).
Antenna B: The maximum Gain of the antenna is 11.71dBi or 14.8252(numeric).
Antenna C: The maximum Gain of the antenna is 16.21dBi or 41.783(numeric).

For 2.4GHz						
No.	Model No.	Gain (dBi)	min. Cable Loss (dB)	Net Gain (dB)	Antenna Type	Antenna Connector
1	ANT-1360-OUT	8.0	1.07	6.93	2.4GHz Dipole	N-type
2	ANT-1120-OUT	10.0	1.07	8.93	2.4GHz 120° Sector	N-type
For 5GHz						
No.	Model No.	Gain (dBi)	min. Cable Loss (dB)	Net Gain (dB)	Antenna Type	Antenna Connector
A	ANT-5360-OUT	8.0	1.79	6.21	5GHz Dipole	N-type
B	ANT-5120-OUT	13.5	1.79	11.71	5GHz 120° Sector	N-type
C	ANT-5PNL-OUT	18.0	1.79	16.21	5GHz Directional Panel	N-type

Note:

1. All of the above antennas are outdoor Antenna.
2. From above antennas, the different type of antennas was chosen for final test and its data were recorded in this report.
3. All of the antennas are different type or frequency band, was selected as all antenna for the test.
4. Antenna Model No. ANT-5PNL-OUT can be used in point-to-point applications.

6.2 Output Power Into Antenna & RF Exposure value:

For 2.4GHz

802.11b:

Antenna 1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	22.909	0.006	1.0
6	2437	123.027	0.030	1.0
11	2462	35.481	0.009	1.0

Antenna 2

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	20.893	0.008	1.0
6	2437	123.027	0.048	1.0
11	2462	33.884	0.013	1.0

802.11g:

Antenna 1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	38.019	0.009	1.0
6	2437	177.828	0.044	1.0
11	2462	53.703	0.013	1.0

Antenna 2

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	2412	15.488	0.006	1.0
6	2437	120.226	0.047	1.0
11	2462	30.200	0.012	1.0

For 5GHz

Operated in 5250MHz ~ 5350MHz band: (15.407)

Antenna B

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5260	65.313	0.0482	1.0
2	5280	65.013	0.0479	1.0
4	5320	43.752	0.0323	1.0

Antenna C

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5260	23.768	0.0494	1.0
2	5280	23.768	0.0494	1.0
4	5320	15.560	0.0323	1.0

Operated in 5725 ~ 5850MHz band: (15.247)

Antenna A

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5745	316.228	0.0657	1.0
3	5785	285.102	0.0592	1.0
5	5825	281.838	0.0586	1.0

Antenna B

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5745	254.097	0.1874	1.0
3	5785	213.796	0.1576	1.0
5	5825	184.077	0.1357	1.0

Antenna C

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm^2)	Limit of Power Density (mW/cm^2)
1	5745	316.228	0.657	1.0
3	5785	285.102	0.592	1.0
5	5825	275.423	0.572	1.0

CONCULSION:

Both of the 11g and 11a can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \ldots\ldots$etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the calculation of this situation is 0.048 / 1 + 0.657 / 1 = 0.705, which is less than the “1” limit.