



RF EXPOSURE REPORT

REPORT NO.: SA970702L10

MODEL NO.: DMC250

ACCORDING: FCC Guidelines for Human Exposure
IEEE C95.1

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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 : $P_d = (P_{out} * G) / (4 * \pi * r^2)$

where

P_d = power density in mW/cm^2

P_{out} = 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

P_d 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:

No.	Antenna Type	For 2.4GHz Gain (dBi)	For 5GHz Gain (dBi)	Antenna Connector
CHAIN(0)	Dipole	3	3	UFL-style
CHAIN(1)	Dipole	2.5	3.5(5250-5350MHz) 3.75(5470-5725MHz) 3.75(5725-5825MHz)	UFL-style

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	96.383	0.038	1.0
6	2437	95.280	0.038	1.0
11	2462	93.756	0.037	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	224.905	0.089	1.0
6	2437	227.510	0.090	1.0
11	2462	220.293	0.087	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	227.031	0.090	1.0
6	2437	229.930	0.091	1.0
11	2462	220.587	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	2422	213.813	0.085	1.0
4	2437	215.604	0.086	1.0
7	2452	209.678	0.083	1.0



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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	27.040	0.013	1.0
2	5200	28.119	0.013	1.0
4	5240	25.645	0.012	1.0
5	5260	23.768	0.011	1.0
7	5300	23.388	0.011	1.0
8	5320	23.659	0.011	1.0
9	5500	27.227	0.013	1.0
14	5600	22.131	0.010	1.0
19	5700	21.281	0.010	1.0
20	5745	20.230	0.010	1.0
22	5785	22.594	0.011	1.0
23	5805	24.831	0.012	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	25.391	0.012	1.0
2	5200	26.919	0.013	1.0
4	5240	30.810	0.015	1.0
5	5260	28.931	0.014	1.0
7	5300	27.125	0.013	1.0
8	5320	27.215	0.013	1.0
9	5500	29.584	0.014	1.0
14	5600	28.966	0.014	1.0
19	5700	26.673	0.013	1.0
20	5745	28.794	0.014	1.0
22	5785	33.135	0.016	1.0
23	5805	34.813	0.016	1.0



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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	42.318	0.020	1.0
2	5230	28.997	0.014	1.0
3	5270	29.939	0.014	1.0
4	5310	30.086	0.014	1.0
5	5510	28.383	0.013	1.0
7	5590	26.611	0.013	1.0
9	5670	28.663	0.014	1.0
10	5755	23.002	0.011	1.0
11	5795	34.957	0.016	1.0