RF EXPOSURE REPORT

REPORT NO.: SA951116L07

MODEL NO.: DWA-556

ACCORDING: FCC Guidelines for Human Exposure

IEEE C95.1

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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

This device is fixed inside the host equipment. 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 is 2dBi or 1.585(numeric).

6.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE VALUE AT DISTANCE 20cm:

802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)		
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2
1	2412	56.234	56.754	57.148	17.50	17.54	17.57
6	2437	55.847	57.016	57.677	17.47	17.56	17.61
11	2462	56.364	57.412	57.943	17.51	17.59	17.63

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM^2))	LIMIT OF POWER DENSITY (mW/CM^2)
1	2412	170.136	22.31	0.0536	1.0
6	2437	170.540	22.32	0.0538	1.0
11	2462	171.718	22.35	0.0541	1.0

802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)		
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2
1	2412	34.914	35.975	36.559	15.43	15.56	15.63
6	2437	44.771	45.814	47.098	16.51	16.61	16.73
11	2462	34.674	35.727	36.308	15.40	15.53	15.60

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM^2))	LIMIT OF POWER DENSITY (mW/CM^2)
1	2412	107.448	20.31	0.0339	1.0
6	2437	137.683	21.39	0.0434	1.0
11	2462	106.709	20.28	0.0336	1.0

DRAFT 802.11n (20MHz) OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)		
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2
1	2412	28.119	28.774	28.973	14.49	14.59	14.62
6	2437	39.902	40.458	40.832	16.01	16.07	16.11
11	2462	28.708	29.376	29.854	14.58	14.68	14.75

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM^2))	LIMIT OF POWER DENSITY (mW/CM^2)
1	2412	85.866	19.34	0.0271	1.0
6	2437	121.192	20.83	0.0382	1.0
11	2462	87.938	19.44	0.0277	1.0

DRAFT 802.11n (40MHz) OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)		
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2
1	2422	13.900	14.223	14.588	11.43	11.53	11.64
4	2437	21.979	22.856	23.496	13.42	13.59	13.71
7	2452	14.028	14.256	14.488	11.47	11.54	11.61

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM^2))	LIMIT OF POWER DENSITY (mW/CM^2)
1	2422	42.711	16.31	0.0135	1.0
4	2437	68.331	18.35	0.0215	1.0
7	2452	42.772	16.31	0.0135	1.0