



# RF EXPOSURE REPORT

**REPORT NO.:** SA950703L07

**MODEL NO.:** DWA-552

**OEM MODEL NO.:** DWA-547

**ACCORDING:** FCC Guidelines for Human Exposure  
IEEE C95.1

**APPLICANT:** D-Link 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 <sup>2</sup> )	AVERAGE TIME (minutes)
<b>(A)LIMITS FOR OCCUPATIONAL / CONTROL EXPOSURES</b>				
300-1500	...	...	F/300	6
1500-100,000	...	...	5	6
<b>(B)LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE</b>				
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<sup>2</sup>

$P_{out}$  = 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

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	40.644	40.551	40.365	16.09	16.08	16.06
6	2437	71.779	71.285	70.958	18.56	18.53	18.51
11	2462	50.582	50.486	50.350	17.04	17.03	17.02

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2412	121.560	20.848	0.038	1.0
6	2437	214.022	23.305	0.067	1.0
11	2462	151.418	21.802	0.048	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	45.290	45.082	44.771	16.56	16.54	16.51
6	2437	56.885	56.754	56.364	17.55	17.54	17.51
11	2462	36.058	35.975	35.727	15.57	15.56	15.53

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2412	135.143	21.308	0.043	1.0
6	2437	170.003	22.305	0.054	1.0
11	2462	107.760	20.325	0.034	1.0



### DRAFT 802.11n (20MHz) OFDM modulation - TRIPLE TX

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	32.211	32.137	31.769	15.08	15.07	15.02
6	2437	57.016	56.754	56.364	17.56	17.54	17.51
11	2462	28.708	28.510	28.249	14.58	14.55	14.51

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2412	96.117	19.828	0.030	1.0
6	2437	170.134	22.308	0.054	1.0
11	2462	85.467	19.318	0.027	1.0



### DRAFT 802.11n (40MHz) OFDM modulation - TRIPLE TX

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	14.322	14.289	14.158	11.56	11.55	11.51
4	2437	28.708	28.510	28.184	14.58	14.55	14.50
7	2452	14.355	14.289	14.191	11.57	11.55	11.52

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2422	42.769	16.311	0.013	1.0
4	2437	85.402	19.315	0.027	1.0
7	2452	42.835	16.318	0.014	1.0