



# RF EXPOSURE REPORT

**REPORT NO.:** SA960118L01

**MODEL NO.:** DAP-1555

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

**APPLICANT:** D-Link Corporation

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**ISSUED BY:** Advance Data Technology Corporation

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**TEST LOCATION:** No. 19, Hwa Ya 2<sup>nd</sup> Rd, Wen Hwa Tsuen, Kwei  
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R.O.C.



## 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	30
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

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

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:

For 2.400 ~ 2.4385GHz band:

#### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2412	50.816	17.06	0.016	1.000
6	2437	56.754	17.54	0.018	1.000
11	2462	58.210	17.65	0.018	1.000

#### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	2412	71.285	18.53	0.022	1.000
6	2437	71.945	18.57	0.023	1.000
11	2462	63.387	18.02	0.020	1.000

**DRAFT 802.11n (20MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	2412	40.087	50.582	40.272	16.03	17.04	16.05	130.941	21.17	0.041	1.000
6	2437	50.816	64.269	63.973	17.06	18.08	18.06	179.058	22.53	0.056	1.000
11	2462	40.458	50.234	51.050	16.07	17.01	17.08	141.742	21.51	0.045	1.000

**DRAFT 802.11n (40MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	2422	28.510	28.445	28.379	14.55	14.54	14.53	85.334	19.31	0.027	1.000
4	2437	28.184	28.510	28.774	14.50	14.55	14.59	85.468	19.32	0.027	1.000
7	2452	28.840	28.774	28.184	14.60	14.59	14.50	85.798	19.33	0.027	1.000

**For 5.150 ~ 5.250GHz band:****802.11a OFDM MODULATION:**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	5180	40.832	16.11	0.013	1.000
2	5200	40.458	16.07	0.013	1.000
4	5240	36.224	15.59	0.011	1.000

**DRAFT 802.11n (20MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	5180	13.032	13.122	16.144	11.15	11.18	12.08	42.298	16.26	0.013	1.000
2	5200	12.972	12.794	16.106	11.13	11.07	12.07	41.872	16.22	0.013	1.000
4	5240	12.942	12.589	16.106	11.12	11.00	12.07	41.637	16.19	0.013	1.000

**DRAFT 802.11n (40MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	5190	12.882	13.002	16.293	11.10	11.14	12.12	42.177	16.25	0.013	1.000
2	5230	12.706	13.032	16.255	11.04	11.15	12.11	41.993	16.23	0.013	1.000

**For 5.725 ~ 5.850GHz band:****802.11a OFDM MODULATION:**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
1	5745	82.224	19.15	0.026	1.000
3	5785	80.538	19.06	0.025	1.000
5	5825	81.658	19.12	0.026	1.000



**DRAFT 802.11n (20MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	5745	39.902	40.272	40.179	16.01	16.05	16.04	120.353	20.80	0.038	1.000
3	5785	39.994	40.644	40.179	16.02	16.09	16.04	120.817	20.82	0.038	1.000
5	5825	40.644	40.365	40.087	16.09	16.06	16.03	121.096	20.83	0.038	1.000

**DRAFT 802.11n (40MHz) OFDM MODULATION:**

CHAN.	CHAN. FREQ. (MHz)	PEAK POWER OUTPUT (mW)			PEAK POWER OUTPUT (dBm)			TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/CM <sup>2</sup> )
		CHAIN0	CHAIN1	CHAIN2	CHAIN0	CHAIN1	CHAIN2				
1	5755	36.224	35.892	36.058	15.59	15.55	15.57	108.174	20.34	0.034	1.000
2	5795	36.308	35.563	35.892	15.60	15.51	15.55	107.763	20.32	0.034	1.000