



# RF EXPOSURE REPORT

**REPORT NO.:** SA950822L15  
**MODEL NO.:** WPIM-125GN  
**SERIES MODEL NO.:** AWLH6045

**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 <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

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 1.79dBi or 1.51008(numeric)

### 6.2 Output Power Into Antenna & RF Exposure value at distance 20cm:

Antenna gain: 1.79dBi:

#### 802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2)	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	45.499	44.771	16.58	16.51	90.270	19.56	0.027	1.0
6	2437	72.111	70.958	18.58	18.51	143.069	21.56	0.043	1.0
11	2462	40.551	39.902	16.08	16.01	80.453	19.06	0.024	1.0

#### 802.11g OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2)	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	57.148	56.494	17.57	17.52	113.642	20.56	0.034	1.0
6	2437	114.551	114.025	20.59	20.57	228.576	23.59	0.069	1.0
11	2462	57.016	56.624	17.56	17.53	113.640	20.56	0.034	1.0



### DRAFT 802.11n (20MHz) OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	28.774	28.314	14.59	14.52	57.088	17.57	0.017	1.0
6	2437	63.973	63.241	18.06	18.01	127.215	21.05	0.038	1.0
11	2462	28.774	28.249	14.59	14.51	57.023	17.56	0.017	1.0

### DRAFT 802.11n (40MHz) OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2422	18.072	17.824	12.57	12.51	35.896	15.55	0.011	1.0
4	2437	51.404	51.050	17.11	17.08	102.455	20.11	0.031	1.0
7	2452	18.030	17.947	12.56	12.54	35.978	15.56	0.011	1.0

### 802.11b(CB mode) DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/CM2))	LIMIT OF POWER DENSITY (mW/CM2)
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2422	28.576	28.314	14.56	14.52	56.890	17.55	0.017	1.0
4	2437	72.277	71.945	18.59	18.57	144.222	21.59	0.043	1.0
7	2452	25.527	25.177	14.07	14.01	50.704	17.05	0.015	1.0