



# RF EXPOSURE REPORT

**REPORT NO.:** SA951222H01  
**MODEL NO.:** RSVLC-0301B  
**FCC ID:** B94RSVLC-0301B

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

**APPLICANT:** Hewlett-Packard Company

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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 <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  $mW/cm^2$

$P_{out}$  = 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 nine antennas provided to this EUT, please refer to the following table:

No.	Model No.	Frequency Range (GHz)	Antenna Coverage	Antenna Type	Gain	Connector
1	SA2-05005L-A5	2.4-2.5	Omni	Dipole	2.5dBi	RP SMA plug
2	J8441A	2.4-2.5	Omni	Dipole	4.4 dBi	Reverse SMA (male)
3	J8442A	2.4-2.5	Omni	Panel	1.5 dBi	Reverse SMA (male)
4	J8443A	2.4-2.5	Directional	Panel	6.7 dBi	Reverse SMA (male)
5	J8444A	2.4-2.5	Omni	Dipole	7.4 dBi	Reverse SMA (male)
6	J8445A	2.4-2.5	Directional	Panel	6.5 dBi	Reverse SMA (male)
7	J8446A	2.4-2.5	Directional	Panel	10.7 dBi	Reverse SMA (male)
8	J8997A	2.4-2.5/4.9-5.99	Omni	Panel	3 dBi / 4dBi	Reverse SMA (male)
9	J8999A	2.4-2.5/4.9-5.99	Directional	Panel	6.9 dBi / 7.7dBi	Reverse SMA (male)

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

**For Part 802.11b:**

ANTENNA 1

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	40.738	0.014	1.0
6	2437	138.676	0.049	1.0
11	2462	31.117	0.011	1.0

ANTENNA 2

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	28.510	0.016	1.0
6	2437	138.038	0.076	1.0
11	2462	26.303	0.014	1.0

ANTENNA 3

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	30.200	0.008	1.0
6	2437	120.226	0.034	1.0
11	2462	31.769	0.009	1.0

ANTENNA 4

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	24.547	0.023	1.0
6	2437	109.648	0.102	1.0
11	2462	21.878	0.020	1.0

ANTENNA 5

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	24.547	0.027	1.0
6	2437	117.490	0.128	1.0
11	2462	21.878	0.024	1.0

ANTENNA 6

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	21.878	0.019	1.0
6	2437	57.544	0.051	1.0
11	2462	20.893	0.019	1.0

ANTENNA 7

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	14.125	0.033	1.0
6	2437	28.184	0.066	1.0
11	2462	18.197	0.043	1.0

ANTENNA 8

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	33.729	0.013	1.0
6	2437	138.676	0.055	1.0
11	2462	42.658	0.017	1.0

ANTENNA 9

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	15.488	0.015	1.0
6	2437	46.774	0.046	1.0
11	2462	31.842	0.031	1.0



**For Part 802.11g:**

**ANTENNA 1**

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	54.954	0.019	1.0
6	2437	231.739	0.082	1.0
11	2462	49.317	0.017	1.0

**ANTENNA 2**

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	38.905	0.021	1.0
6	2437	117.490	0.064	1.0
11	2462	38.019	0.021	1.0

**ANTENNA 3**

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	43.652	0.012	1.0
6	2437	223.872	0.063	1.0
11	2462	43.652	0.012	1.0

**ANTENNA 4**

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	38.019	0.035	1.0
6	2437	204.174	0.190	1.0
11	2462	35.481	0.033	1.0

**ANTENNA 5**

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	38.905	0.043	1.0
6	2437	181.970	0.199	1.0
11	2462	28.840	0.032	1.0

ANTENNA 6

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	35.481	0.032	1.0
6	2437	87.096	0.077	1.0
11	2462	28.840	0.026	1.0

ANTENNA 7

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	10.715	0.025	1.0
6	2437	10.471	0.024	1.0
11	2462	10.593	0.025	1.0

ANTENNA 8

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	47.863	0.019	1.0
6	2437	204.174	0.081	1.0
11	2462	66.069	0.026	1.0

ANTENNA 9

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
1	2412	23.442	0.023	1.0
6	2437	22.909	0.022	1.0
11	2462	21.380	0.021	1.0