



RF EXPOSURE REPORT

REPORT NO.: SA950427L10

MODEL NO.: WLI-PCI-G300N

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 : $P_d = (P_{out} * G) / (4 * \pi * r^2)$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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 1.79dBi or 1.510 (numeric).

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

802.11b DSSS MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm ²)	LIMIT OF POWER DENSITY (mW/cm ²)
1	2412	101.158	0.030	1.0
6	2437	178.238	0.054	1.0
11	2462	68.707	0.021	1.0

802.11g OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	TOTAL OUTPUT POWER TO ANTENNA (mW)	POWER DENSITY (mW/cm ²)	LIMIT OF POWER DENSITY (mW/cm ²)
1	2412	130.918	0.039	1.0
6	2437	181.970	0.055	1.0
11	2462	102.329	0.031	1.0



DRAFT 802.11n (20MHz) OFDM modulation - DUAL TX

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	80.724	79.799	19.07	19.02	160.523	22.06	0.048	1.0
6	2437	159.956	159.221	22.04	22.02	319.177	25.04	0.096	1.0
11	2462	80.353	79.616	19.05	19.01	159.969	22.04	0.048	1.0

DRAFT 802.11n (40MHz) OFDM modulation - DUAL TX

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	71.450	71.450	18.54	18.54	142.899	21.55	0.043	1.0
4	2437	89.950	89.743	19.54	19.53	179.693	22.55	0.054	1.0
7	2452	61.376	60.954	17.88	17.85	122.330	20.88	0.037	1.0