



# RF Exposure Evaluation Declaration

Product Name : WIRELESS-BGN 2X2 NETWORK MINI PCIE  
ADAPTER  
Model No. : WLE200N2  
FCC ID : TK4WLE200N2

Applicant : Compex Systems Pte Ltd  
Address : 135 Joo Seng Road, #08-01 PM Industrial Building  
Singapore 368363

Date of Receipt : 11/03/2013  
Test Date : 12/03/2013~25/04/2013  
Issued Date : 26/04/2013  
Report No. : 133S022R-RF-US-P05V01  
Report Version : V1.0

This case just change the name and address of the applicant, and there is no change for the software and hardware. The original test report(FCC ID: PPD-AR5B97) see as below.

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, CNAS or any agency of the Government.  
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

# RF EXPOSURE REPORT

**REPORT NO.:** SA980630H04

**MODEL NO.:** AR5B97

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

**APPLICANT:** Atheros Communications, Inc.

**ADDRESS:** 5480 Great America Parkway, Santa Clara, CA  
95054

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
Ltd., Taoyuan Branch

**LAB LOCATION:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

# 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 our lab, 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  $mW/cm^2$

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

Set 1					
Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)	Antenna Connector
Chain(0)	Inpaq	DAMA1BM3000402	Dipole	3.2	RPSMA
Chain(1)	Inpaq	DAMA1BM3000402	Dipole	3.2	RPSMA
Set 2					
Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)	Antenna Connector
Chain(0)	Wistron	81.EBJ15.005	PIFA	3.6	IPEX
Chain(1)	Wistron	81.EBJ15.005	PIFA	3.6	IPEX



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

### For Dipole antenna :

#### For Part 802.11b:

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	156.571	0.065	1.0
6	2437	159.809	0.066	1.0
11	2462	133.677	0.056	1.0

#### For Part 802.11g:

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	373.698	0.155	1.0
6	2437	509.854	0.212	1.0
11	2462	247.154	0.103	1.0

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

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	346.784	0.144	1.0
6	2437	504.509	0.210	1.0
11	2462	231.398	0.096	1.0

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

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	2422	359.761	0.150	1.0
4	2437	466.057	0.194	1.0
7	2452	256.192	0.106	1.0

**For PIFA antenna :****For Part 802.11b:**

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	156.571	0.071	1.0
6	2437	159.809	0.073	1.0
11	2462	133.677	0.061	1.0

**For Part 802.11g:**

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	373.698	0.170	1.0
6	2437	509.854	0.232	1.0
11	2462	247.154	0.113	1.0

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

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	346.784	0.158	1.0
6	2437	504.509	0.230	1.0
11	2462	231.398	0.105	1.0

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

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	2422	359.761	0.164	1.0
4	2437	466.057	0.212	1.0
7	2452	256.192	0.117	1.0