



# RF EXPOSURE REPORT

**REPORT NO.:** SA950302L10

**MODEL NO.:** WUSB54GX4

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

**APPLICANT:** Cisco-Linksys LLC

**ADDRESS:** 121 Theory Drive Irvine, CA 92617 (USA)

**ISSUED BY:** Advance Data Technology Corporation

**LAB ADDRESS:** No. 47, 14<sup>th</sup> Ling, Chia Pau Tsuen, Lin Kou Hsiang  
244, Taipei Hsien, Taiwan, R.O.C.

**TEST LOCATION:** No. 19, Hwa Ya 2<sup>nd</sup> Rd., Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, 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	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

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 1.8dBi or 1.513 (numeric).

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

#### 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	21.232	21.135	13.27	13.25	42.367	16.27	0.013	1.0
6	2437	47.424	12.589	16.76	11.00	60.013	17.78	0.018	1.0
11	2462	21.135	10.471	13.25	10.20	31.606	15.00	0.010	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	39.902	22.439	16.01	13.51	62.341	17.95	0.019	1.0
6	2437	39.994	22.439	16.02	13.51	62.433	17.95	0.019	1.0
11	2462	39.892	15.959	15.55	12.03	55.851	17.47	0.017	1.0

#### ACE 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	20.370	11.220	13.09	10.50	31.590	15.00	0.010	1.0
4	2437	25.235	10.069	14.02	10.03	35.304	15.48	0.011	1.0
7	2452	20.091	8.933	13.03	9.51	29.024	14.63	0.009	1.0