

MPE Test Report

of

WLAN 802.11b Mini-PCI Module

Model

EM-200B

(Brand: Wistron NeWeb)

Applied by:

Wistron NeWeb Corporation
No. 10-1, Li-hsin Road I,
Science-based Industrial Park Hsinchu 300,
Taiwan, R. O. C



Test Performed by:

(NVLAP Lab. Code: 200234-0)



International Standards Laboratory

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NVLAP Lab. Code: 200234-0; VCCI: R-1435, C-1440; NEMKO Aut. No: ELA 113; BSMI Lab. Code: SL2-IN-E-0013

Contents of Report

1.	. General.....	1
1.1	Certification of Accuracy of Test Data.....	1
2.	Description of Equipment Under Test.....	2
2.1	EUT.....	2
2.2	General Test Conditions	3
3.	RF Exposure Measurement: MPE	4
3.1	Applied Standards.....	4
3.2	Limits for Maximum Permissible Exposure (MPE)	4
3.3	Test Procedure	4
3.4	Test Setup	4
3.5	Test Data:.....	5
3.6	RF Exposure Calculations:	5
3.7	Appendix : Test Equipment	6
3.7.1	Test Equipment List.....	6

1. . General

1.1 Certification of Accuracy of Test Data

The test results contained in this report accurately represent the measurements of the Electrical Field characteristics and the energy generated by sample equipment under test at the time of the test.

Equipment Tested **WLAN 802.11b Mini-PCI Module**
Model:EM-200B
Applied by Wistron NeWeb Corp.

Sample received Date: 2003/04/26

Final test Date : 2003/05/4

Temperature 24° C
Humidity: 58%

Test Engineer: Jerry Chiou

The results show that the sample equipment tested as described in this report is in compliance with the FCC Section 15.247(b)(5) & 1.1307(b)(1) MPE.

Approve & Signature



Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 8 pages, including 1 cover page , 1 contents page, and 6 pages for the test description.

This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

2. Description of Equipment Under Test

2.1 EUT

Description:	WLAN 802.11b Mini-PCI Module
Model No.:	EM-200B
FCC ID:	NKREM200B
Brand:	Wistron NeWeb
Frequency Range :	2412 - 2462 MHz
Support channel:	11 Channels
Modulation Skill:	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
Power Type of LAN module:	3.3V DC from Notebook PC

The channel and the operation frequency of 802.11b is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

There are four kinds of antenna been tested.. The Details are listed below:

Ant. Model:	CA8-I	5600	888E	M300N
Antennas Type:	PIFA Type in Metal	PIFA Type in Metal	PIFA Type in Metal	PIFA Type in Metal
Peak Gain at 2.4GHz:	0.35dBi	0.47dBi	3.12dBi	-2.95dBi
Ant. Manufacturer:	WNC	CLEVO	CLEVO	CLEVO

During the test, the EUT was tested as a modular device of a notebook PC using a PCMCIA extender board to extend the EUT outside the notebook PC enclosure. The EUT was then connected to a set of antennas via its transmit and receive connectors.

2.2 General Test Conditions

1. During the test, the EUT was set in continuously transmitting mode with a duty cycle of 100%.
2. The channel 1, 6, 11 of of 802.11b of EUT were all tested.

3. RF Exposure Measurement: MPE

3.1 Applied Standards

FCC 47 CFR Part 15 Section 15.247(b)(5) & Part 1 Section 1.1307(b)(1)

3.2 Limits for Maximum Permissible Exposure (MPE)

A. Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (S) (mW/cm ²)	Average Time (Minutes)
300-1500	----	-----	f/300	6
1500-100,000	----	-----	5	6

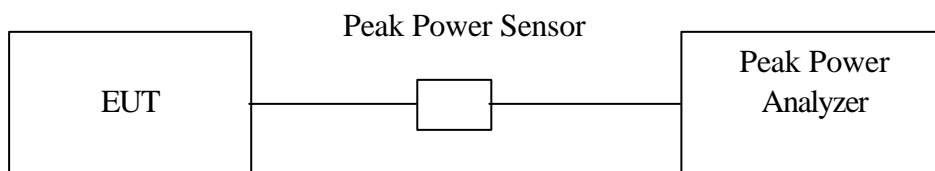
B. Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (S) (mW/cm ²)	Average Time (Minutes)
300-1500	----	-----	f/1500	30
1500-100,000	----	-----	1.0	30

3.3 Test Procedure

1. The Transmitter output of EUT was connected to the peak power analyzer through an attenuator.

3.4 Test Setup



3.5 Test Data:

Table Maximum Peak Output Power

Chennel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)
1	2412	76.348	18.828
6	2437	79.708	19.015
11	2462	82.928	19.187

3.6 RF Exposure Calculations:

From FCC 1.1310, the maximum permissible RF exposure for an uncontrolled environment is 1 mW/cm².

The Minimum Allowable Distance ,R, of EUT is calculated as follows:

$$\text{Friis Transmission Formula: } P_d = (P_{out} * G) / (4 * \pi * R^2) \\ R = [(P_{out} * G) / (4 * \pi * P_d)]^{1/2}$$

Where P_d = power density in mW/cm² = 1mW/ cm²
 Maxmium Peak Gain at 2.4GHz: 3.12dBi (refer to antenna spec.)
 G = antenna numeric gain = $\text{Log}^{-1}(\text{dB gain}/10) = 2.051$
 P_{out} = output power to antenna in mW (Refer to table 4.3.1)
 $\pi = 3.1416$

Since the host equipment is a notebook computer, the normal use distance is more than 20cm, the suitable standard for RF exposure is §1.1307(b)(1) MPE test. According to the result of 4.3.1, the calculated minimum allowance distance of EUT is listed below:

Table 5.2.1 MPE Minimum Allowance Distance of EUT

Channel	Frequency (MHz)	Maximum output power (mW)	Minimum Allowance Distance (cm)
1	2412	76.348	3.53
7	2442	79.708	3.60
11	2462	82.929	3.68

The minimum allowable distance is very close to the enclosure of the antenna and also very far away from the human being under normal use condition. So, the RF exposure warning or SAR Measurement is not needed.

3.7 Appendix : Test Equipment

3.7.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
RF	Peak Power Analyzer	HP	8990A	3621A01269	9/Dec./2002	9/Dec./2003
RF	Peak Power Sensor	HP	84815A	3318A01828	11/May/2001	11/May/2004

Note: Calibration traceable to NIST or national or international standards.