

MPE Test Report

of

Product Name

FCC Part 15 Subpart B & C & E

of

WLAN a+b+g mini-PCI Module

Model

CM9

(Brand: Wistron NeWeb)

Applied by:

Wistron Neweb Corporation
No. 10-1, Li-hsin Road 1,
Science-based Indus
Taiwan, R. O. C.

Test Performed by:

International Standards Laboratory

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325
Taiwan, R.O.C.
Tel:(03)407-1718 Fax:(03)407-1738

Report Number: ISL-04LR018MPE

Issue Date: 2004/05/26

HC LAB:NVLAP:200234-0;VCCI: R-341,C-354;NEMKO:ELA 113a,113c;BSMI:SL2-IN-E-0037;SL2-R1-E-0037;CNLA:1178
LT LAB:NVLAP:200234-0;VCCI: R-1435,C-1440;NEMKO:ELA 113b,113d;BSMI:SL2-IN-E-0013;CNLA:0997

Contents of Report

1.	. General.....	錯誤! 尚未定義書籤。
1.1	Certification of Accuracy of Test Data.....	錯誤! 尚未定義書籤。
2.	Description of Equipment Under Test.....	i
2.1	EUT.....	錯誤! 尚未定義書籤。
2.2	General Test Conditions	4
3.	RF Exposure Measurement: MPE	錯誤! 尚未定義書籤。
3.1	Applied Standards.....	錯誤! 尚未定義書籤。
3.2	Limits for Maximum Permissible Exposure (MPE)	錯誤! 尚未定義書籤。
3.3	Test Procedure	錯誤! 尚未定義書籤。
3.4	Test Setup	錯誤! 尚未定義書籤。
3.5	Test Data:.....	錯誤! 尚未定義書籤。
3.6	RF Exposure Calculations:	錯誤! 尚未定義書籤。
3.7	Appendix : Test Equipment	9
3.7.1	Test Equipment List.....	9

1. General

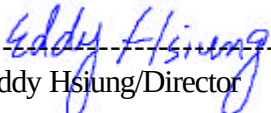
1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247) CFR 47 Part 15 Subpart E (Section 15.407)
Test Procedure:	ANSI C63.4: 2001
Equipment Tested:	WLAN a+b+g mini-PCI Module
Model:	CM9
Applied by:	Wistron Neweb Corporation
Sample received Date:	2004/05/10
Final test Date :	2004/05/20
Test Site:	Chamber 02, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
 Test Engineer:	 Mailes Hsieh

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

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 11 pages, including 1 cover page , 1 contents page, and 9 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.
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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).
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2. Description of Equipment Under Test (EUT)

Description:	WLAN a+b+g Mini- PCI module
Model No.:	CM9
FCC ID:	NKRCM9
Brand:	Wistron NeWeb
Frequency Range 802.11a:	5150~5350 MHz, 5725~5825 MHz
Frequency Range 802.11b/g:	2400~2483.5 MHz
Support channel:	
802.11a Normal mode	12 Channels
802.11a Turbo mode	5 Channels
802.11b/g	11 Channels
Modulation Skill:	
802.11a Normal mode	OFDM (6 Mbps – 54 Mbps)
802.11a Turbo mode	OFDM (12 Mbps – 108 MBps)
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type:	
Antenna 1: PIFA	(DMA , made by Wistron NeWeb)
Antenna 2: Dipole	(GA30038-YMSE , made by GigaAnt Co.)
Antenna 3: Dipole	(FCF-004 , made by Long-Chu Co.)
Antenna 4: Dipole	(DBA-IPEX-01 , made by Long-Chu Co.)
Antenna 5: Dipole	(SRSM5150MRA;SRSM2400MRA , made by CUSLICRAFT)
Antenna 6: Dipole	(DBA-BSMA-01 , made by Long-Chu Co.)
Antenna 7: Dipole	(DBA-SSMA-01, made by Long-Chu Co.)
Antenna 8: Dipole	(DBA-IPEX-02 , made by Long-Chu Co.)
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter.
Antenna peak Gain:	
Antenna 1:	2.68 dBi (11b/g) ,4.87 dBi(11a)
Antenna 2:	2.40 dBi (11b/g) ,5.90 dBi(11a)
Antenna 3:	4.00 dBi (11b/g) ,3.50 dBi(11a)
Antenna 4:	1.89 dBi (11b/g) ,3.11 dBi(11a)
Antenna 5:	2.00 dBi (11b/g) ,2.00 dBi(11a)
Antenna 6:	1.34 dBi (11b/g) ,1.65 dBi(11a)
Antenna 7:	1.29 dBi (11b/g) ,2.06 dBi(11a)
Antenna 8:	2.91 dBi (11b/g) ,3.19 dBi(11a)
WLAN Power Type :	3.3V DC from the EUT

The channel and the operation frequency of 802.11b and 802.11g 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		

The channel and the operation frequency of 802.11a Normal Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5180	07	5300
02	5200	08	5320
03	5220	09	5745
04	5240	10	5765
05	5260	11	5785
06	5280	12	5805

The channel and the operation frequency of 802.11a Turbo Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5210	04	5760
02	5250	05	5800
03	5290		

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. There are eight antennas in the EUT:

Antenna 1 is PIFA type.

Antenna 2 is Dipole in printed type.

Antenna 3, 5,6,7 are Dipole type in reverse SMA connector.

Antenna 4,8 are Dipole type in Hirose connector.

All antennas have been tested. The worse data of each type are shown, so, four sets of radiated data are listed in the test report.

2.1 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/g of EUT were all tested.
3. The channel 1, 4, 5, 8, 9, 12 of of 802.11a normal mode of EUT were all tested. The channel 1, 2, 3, 4, 5 of of 802.11a turbol mode of EUT were all tested.

3. RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

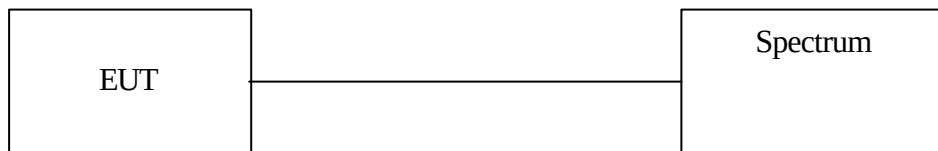
3.1 Applied Standards

FCC PART 1.1307, 1.1310, 2.1091, 2.1093 RF EXPOSURE

3.2 Test Procedure

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

3.3 Test Setup



3.4 Calculation for Maximum Permissible Exposure (MPE)

From FCC 1.1310 Table 1B, the maximum permissible RF exposure for an uncontrolled environment is 1 mW/cm². The actual power density for the EUT with the antenna is calculated as shown below.

$$S = (P \times G) / (4 \times \pi \times d^2)$$

where:

S = power density

P = transmitter conducted power in (W)

G = antenna numeric gain

d = distance to radiation center (m)

802.11b:

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m ²)	Power Density (mW/cm ²)
Long-Chu Electronics Corp. Model: FCF-004	Dipole	4	2.51	2412	22.599	181.93	20	0.908	0.0908
				2437	22.724	187.24	20	0.935	0.0935
				2462	22.724	187.24	20	0.935	0.0935

802.11g:

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m ²)	Power Density (mW/cm ²)
Long-Chu Electronics Corp. Model: FCF-00	Dipole	4	2.51	2412	22.881	194.13	20	0.969	0.0969
				2437	22.631	183.27	20	0.915	0.0915
				2462	22.912	195.52	20	0.976	0.0976

802.11a:

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m ²)	Power Density (mW/cm ²)
GigaAnt Co. Model: GA30038-YMSE	Dipole	5.9	3.89	5180 (Normal Mode)	14.481	28.06	20	0.217	0.0217
				5240 (Normal Mode)	13.918	24.65	20	0.19	0.019
				5260 (Normal Mode)	18.387	68.97	20	0.533	0.0533
				5320 (Normal Mode)	17.606	57.62	20	0.446	0.0446
				5745 (Normal Mode)	20.012	100.27	20	0.776	0.0776
				5805 (Normal Mode)	20.043	100.99	20	0.781	0.0781
				5210 (Turbo Mode)	16.825	48.14	20	0.372	0.0372
				5250 (Turbo Mode)	16.887	48.83	20	0.377	0.0377
				5290 (Turbo Mode)	19.762	94.669	20	0.732	0.0732
				5760 (Turbo Mode)	19.293	83.75	20	0.648	0.0648
				5800 (Turbo Mode)	17.262	53.23	20	0.412	0.0412

***Antennas Type:**

Antenna 1: PIFA (DMA , made by Wistron NeWeb)
Antenna 2: Dipole(GA30038-YMSE , made by GigaAnt Co.)
Antenna 3: Dipole(FCF-004 , made by Long-Chu Co.)
Antenna 4: Dipole(DBA-IPEX-01 , made by Long-Chu Co.)
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***Antenna peak Gain:**

Antenna 1: 2.68 dBi (11b/g) ,4.87 dBi(11a)
Antenna 2: 2.40 dBi (11b/g) ,5.90 dBi(11a)
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Antenna 8: 2.91 dBi (11b/g) ,3.19 dBi(11a)

WARNING:

It is the responsibility of the installer to ensure that the EUT is a WLAN module and a specified antenna inside. Only the specified antennas listed above may be used. The use of any other antenna is expressly forbidden in accordance with FCC rules CFR 47 part 15.204.

NOTICE:

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits for an uncontrolled environment when installed as directed. This equipment should be installed and operated with the specified antennas listed above in a fixed-mount configuration, installed with a maximum of 22.912 dBm of radiated output power during normal operation

4. Appendix : Test Equipment

4.1 Test Equipment List

Equipment Name: Spectrum Analyzer 08
Brand: Advantest
Model: R3132
S/N: 111000867
Last Cal. Date: 11/21/2003
Next Cal. Date: 11/21/2004

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