MPE Test Report

of

Product Name

FCC Part 15 Subpart B & C & E

of

WLAN a+b+g mini-PCI Module (RoHS version)

Model

CM9; CM9-GP

(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.
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Contents of Report

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 C63.4:2003
Equipment Tested:	WLAN 802.11a/b/g mini-PCI module (RoHS version)
Model:	CM9;CM9-GP
Applied by:	Wistron Neweb Corporation
Sample received Date:	2006/03/21
Final test Date :	2006/04/03- 2006/04/12
Test Result	PASS
Test Site:	Chamber 02, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
Test Engineer:	Jerry Chiou

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 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 contains 14 pages, including 1 cover page , 1 contents page, and 12 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 (EUT)

Description:	WLAN 802.11a/b/g mini-PCI module (RoHS version)
Model No.:	CM9 ; CM9GP
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: Dipole	(FCF-004 , made by Long-Chu Co.)
Antenna 2: Dipole	(DBA-IPEX-01 , made by Long-Chu Co.)
Antenna 3: Dipole	(SRSM5150MRA;SRSM2400MRA , made by CUSLICRAFT)
Antenna 4: Dipole	(DBA-BSMA-01 , made by Wistron NeWeb)
Antenna 5: Dipole	(DBA-SSMA-01, made by Wistron NeWeb)
Antenna 6: Dipole	(DBA-IPEX-02 , made by Long-Chu Co.)
Antenna 7: Dipole	(1770460-1 , made by TYCO)
Antenna 8: Printed	(1770461-1 , made by TYCO)
Antenna 9: Printed	(1770462-1 , made by TYCO)
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter.
Antenna peak Gain:	
Antenna 1:	4.00 dBi (11b/g) ,3.50 dBi(11a)
Antenna 2:	1.89 dBi (11b/g) ,3.11 dBi(11a)
Antenna 3:	2.00 dBi (11b/g) ,2.00 dBi(11a)
Antenna 4:	2.00 dBi (11b/g) ,2.50 dBi(11a)
Antenna 5:	2.00 dBi (11b/g) ,2.50 dBi(11a)
Antenna 6:	2.91 dBi (11b/g) ,3.19 dBi(11a)
Antenna 7:	2.49 dBi (11b/g) ,3.64 dBi(11a)
Antenna 8:	-1.6 dBi (11b/g) ,2.19 dBi(11a)
Antenna 9:	2.81 dBi (11b/g) ,1.19 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		

There are some differences from the original application:

A. Add one model, CM9-GP. It has some changes:

1. The components of WoW(Wake on wireless) circuit become nonpop..

(Remove Q11,Q12,Q9,R5,R10,R6,U7 ; Add : R9)

The RF performance remain the same after removing above components)

2. All IC switch to Rohs-compliant package. All the dies in the IC are the same.

B. Add new antennas for both CM9 and CM9-GP

Antenna List

No	Antenna Manufacturer	Antenna Model	Antenna Type	Antenna Connect	Antenna Gain	addition
1	TYCO	1770460-1	Dipole	IPX-MHF	2.49 dBi (2.4GHz) 3.64 dBi(5GHz)	Yes
2	TYCO	1770461-1	Printed	IPX-MHF	-1.6 dBi (2.4GHz) 2.19 dBi(5GHz)	Yes
3	TYCO	1770461-1	Printed	IPX-MHF	2.81 dBi (2.4GHz) 1.19 dBi(5GHz)	Yes

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 nine antennas in the EUT:
The antenna 1,2,3,4,5,6,7 are Dipole type.
The antenna 8,9 are Printed type.

The antenna 1,2,3,4,5,6 (with CM9) has already been tested. Please refer to ISL report 04LR018FC.

All antennas (with CM9-GP)have been tested. The worse data of each antenna type are shown. Configuration list as below:

CM9-GP	Dipole Antenna	Printed Antenna
802.11a	Antenna 7	Antenna 8
802.11b/g	Antenna 1	Antenna 9

2.1 General Test Conditions

1. During the test, the EUT was set in continuously transmitting mode with a duty cycle of 99%.
2. The channel 1, 6, 11 of 802.11b/g of EUT were all tested.

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

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

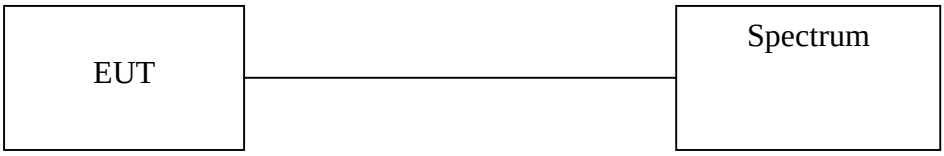
3.1 Applied Standards

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)

3.5 Data (For Dipole Antenna)

802.11a

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
TYCO, Model: 1770460-1	Dipole	3.64	2.31	5180 (Normal Mode)	14.48	28.06	20	0.1291	0.01291
				5240 (Normal Mode)	13.92	24.65	20	0.1134	0.01134
				5260 (Normal Mode)	18.39	68.98	20	0.3173	0.03173
				5320 (Normal Mode)	17.61	57.62	20	0.2651	0.02651
				5745 (Normal Mode)	20.01	100.28	20	0.4612	0.04612
				5805 (Normal Mode)	20.04	101.00	20	0.4645	0.04645
				5210 (Turbo Mode)	16.83	48.14	20	0.2214	0.02214
				5250 (Turbo Mode)	16.89	48.83	20	0.2246	0.02246
				5290 (Turbo Mode)	19.76	94.67	20	0.4354	0.04354
				5760 (Turbo Mode)	19.29	84.98	20	0.3909	0.03909
				5800 (Turbo Mode)	17.26	53.24	20	0.2449	0.02449

802.11b

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
Long-Chu Co. Model: FCF-004	Dipole	4.00	2.51	2412	22.599	181.93	20	0.9091	0.09091
				2437	22.724	187.24	20	0.9357	0.09357
				2462	22.724	187.24	20	0.9357	0.09357

802.11g

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
Long-Chu Co. Model: FCF-004	Dipole	4.00	2.51	2412	22.881	194.13	20	0.9701	0.09701
				2437	22.631	183.27	20	0.9159	0.09159
				2462	22.912	195.52	20	0.9771	0.09771

3.6 Data (For Printed Antenna)

802.11a

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
TYCO, Model: 1770461-1	Printed	2.19	1.66	5180 (Normal Mode)	14.48	28.06	20	0.0924	0.00924
				5240 (Normal Mode)	13.92	24.65	20	0.0812	0.00812
				5260 (Normal Mode)	18.39	68.98	20	0.2272	0.02272
				5320 (Normal Mode)	17.61	57.62	20	0.1898	0.01898
				5745 (Normal Mode)	20.01	100.28	20	0.3303	0.03303
				5805 (Normal Mode)	20.04	101.00	20	0.3327	0.03327
				5210 (Turbo Mode)	16.83	48.14	20	0.1586	0.01586
				5250 (Turbo Mode)	16.89	48.83	20	0.1609	0.01609
				5290 (Turbo Mode)	19.76	94.67	20	0.3118	0.03118
				5760 (Turbo Mode)	19.29	84.98	20	0.2799	0.02799
				5800 (Turbo Mode)	17.26	53.24	20	0.1754	0.01754

802.11b

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
TYCO, Model: 1770462-1	Printed	2.81	1.91	2412	22.599	181.93	20	0.6912	0.06912
				2437	22.724	187.24	20	0.7114	0.07114
				2462	22.724	187.24	20	0.7114	0.07114

802.11g

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m2)	Power Density (mW/cm2)
TYCO, Model: 1770462-1	Printed	2.81	1.91	2412	22.881	194.13	20	0.7376	0.07376
				2437	22.631	183.27	20	0.6964	0.06964
				2462	22.912	195.52	20	0.7429	0.07429

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

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 05	Peak Power Analyzer	HP	8990A	3621A01269	02/15/2006	02/15/2007
Chamber 05	Power Sensor Radar	HP	84815A	3318A01828	02/15/2006	02/15/2007

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