LABORATORY MEASUREMENTS

Pursuant To
47 CFR Part 15 Subpart B (August 20, 2002)
And
FCC Procedure ANSI C63.4 (2001)

0597
ILAC MRA

Applicant	: Z-COM, Inc. 7F-2, No. 9, Prosperity 1st RD., Science-Based Industrial Park, Hsinchu, Taiwan
Model No.	: XG-950
Issue Date	: Aug. 7, 2003
Test Site Location	: No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

We attest to the accuracy of this report：
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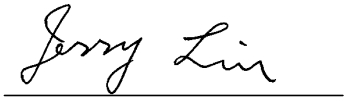
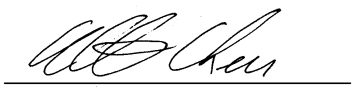
Project Engineer



Jerry Liu

Reviewed By



Elton Chen

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1. General Information

1.1 General Description of EUT

Product	: IEEE 802.11g Wireless LAN PCI Card
Model No.	: XG-950
Applicant	: Z-COM, Inc.
FCC ID.	: M4Y-0XG950
Rated Power	: 3.3Vdc
Power Cord	: N/A
Data Cable	: N/A
Sample receiving date	: July 24, 2003
Testing date	: July 24, 2003 ~ Aug. 7, 2003

1.2 Additional information about the EUT

The 802.11g Wireless LAN PCI Card is a standard PCI adapter that fits into any standard PCI slot in a desktop computer. The 802.11g Wireless LAN PCI Card is an enhanced high-performance, that supports high-speed wireless networking at home, at office or in public places. 802.11g Wireless LAN PCI Card is able to communicate with any 802.11b and 802.11g compliant products.

For more detail features, please refer to user's Manual.

1.3 Description of Peripherals

Peripherals	Manufacturer	Product No.	Serial No.
PC	HP	DTPC-16	SG20400787
Key Board	HP	SK-2502C	M011234429
Monitor	HP	D8897	CN14835153
Mouse	HP	M-S48a	LZE14652508
Printer	HP	C2642A	TH86K1N2ZB
Modem	Dynalink	V1456VQE	00V230A00051494

2. Test Specifications

2.1 Standards

Both conducted and radiated emission tests were performed according to the procedures in ANSI C63.4: 2001. Test results are in compliance with the requirements of 47 CFR Part 15 (August 20, 2002).

The EUT setup configuration please refer to the photo of test configuration in item.

2.2 Definition of Device Classification

Unintentional radiator:
A device that intentionally generates radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device:
A digital device which is marketed for use in a residential environment, notwithstanding use in a commercial, business of industrial environment. Example of such devices is designed to market for the general public.

Note:
A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

2.3 EUT Operation Condition

The EUT was transmitted continuously during all the test.

After verifying the maximum output power, we found the maximum output power of 802.11b was occurred at 11Mbps data rate and 802.11g was occurred at 54Mbps data rate. The final test was executed under this condition and recorded in this report individually.

3. Test Condition

3.1 Test Equipment

Equipment	Brand	Model No.	ITS ID No.
EMI Test Receiver	Rohde & Schwarz	ESCS 30	EC318
EMI Test Receiver	Rohde & Schwarz	ESMI	EC317
Shield Room	N/A	N/A	N/A
Spectrum Analyzer	Advantest	R3162	EC347
Turn Table	Electro-Metrics	EM4710	EP306
Bilog Antenna	Electro-Metrics	EM-6917-1	EC325
Antenna Tower	Electro-Metrics	EM-4720	EP307

Note:
The calibration interval of the above instruments is 12 months.

3.2 EUT Grounding

The unit is grounded as normal use.

3.3 Test Environment

If ambient levels of emissions exceed the appropriated limit, the following steps were taken to assure compliance. First, the measurement bandwidth was reduced, if this did not affect the peak readings. Such a reduction can allow much closer examination close to local ambient signals. Second, the antenna could be brought closer to the EUT. Finally, in severe cases, testing was re-performed at night or other time when the offending signal was off in the air.

3.4 Test Platform

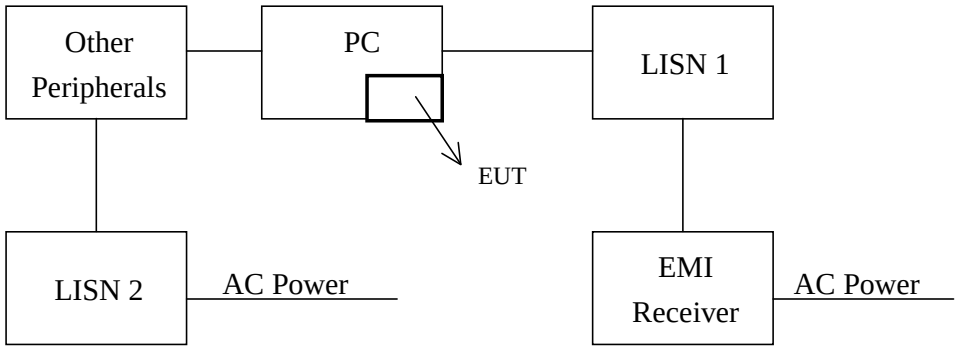
Tests were made on a 0.8 meter high, 1m×1.5m non-conductive platform.

4. Conducted Emission Measurements (FCC 15.107)

4.1 Operating environment

Temperature:	24	℃	(10-40℃)
Relative Humidity:	70	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1061hPa)

4.2 Test Setup and procedure



The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.
All connecting cables of EUT and peripherals were moved to find the maximum emission

4.3 Conducted Emission Limits:

Freq. (MHz)	Maximum RF Line Voltage			
	Class A (dB μ V)		Class B (dB μ V)	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56	56~46
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

4.4 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ±2.6 dB.

4.5 Conducted Emission Data

(1) Line

EUT : XG-950

Worst Case Condition : 802.11b (DSSS modulation) Tx at low channel

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.23000	35.00	62.45	33.10	52.45	-27.45	-19.35
0.35000	31.60	58.96	30.80	48.96	-27.36	-18.16
2.30200	33.30	56.00	30.40	46.00	-22.70	-15.60
4.59800	35.00	56.00	31.90	46.00	-21.00	-14.10
6.94200	41.00	60.00	36.80	50.00	-19.00	-13.20
15.01400	41.10	60.00	36.60	50.00	-18.90	-13.40

(2) Neutral

EUT : XG-950

Test Condition : 802.11b (DSSS modulation) Tx at low channel

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.19000	26.60	64.04	23.80	54.04	-37.44	-30.24
0.23000	32.20	62.45	26.50	52.45	-30.25	-25.95
2.30200	33.10	56.00	30.60	46.00	-22.90	-15.40
4.59800	35.10	56.00	31.60	46.00	-20.90	-14.40
6.94200	40.80	60.00	36.80	50.00	-19.20	-13.20
14.96600	42.20	60.00	36.60	50.00	-17.80	-13.40

Remark:

1. Margin Value = Reading level - Limit value
2. The emission level of other frequency were very low against the limit

(1) Line

EUT : XG-950

Worst Case Condition : 802.11g (OFDM modulation) Tx at high channel

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.23000	35.10	62.45	33.20	52.45	-27.35	-19.25
0.35000	31.70	58.96	30.90	48.96	-27.26	-18.06
2.30300	32.10	56.00	29.10	46.00	-23.90	-16.90
4.59800	35.10	56.00	32.20	46.00	-20.90	-13.80
6.94200	41.10	60.00	36.60	50.00	-18.90	-13.40
14.96600	12.20	60.00	7.10	50.00	-47.80	-42.90

(2) Neutral

EUT : XG-950

Worst Case Condition : 802.11g (OFDM modulation) Tx at high channel

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.23000	32.30	62.45	26.60	52.45	-30.15	-25.85
0.35000	30.30	58.96	29.80	48.96	-28.66	-19.16
2.30200	33.50	56.00	30.40	46.00	-22.50	-15.60
4.59800	35.00	56.00	32.20	46.00	-21.00	-13.80
6.94200	41.00	60.00	36.50	50.00	-19.00	-13.50
14.99600	13.20	60.00	8.20	50.00	-46.80	-41.80

Remark:

1. Margin Value = Reading level - Limit value
2. The emission level of other frequency were very low against the limit

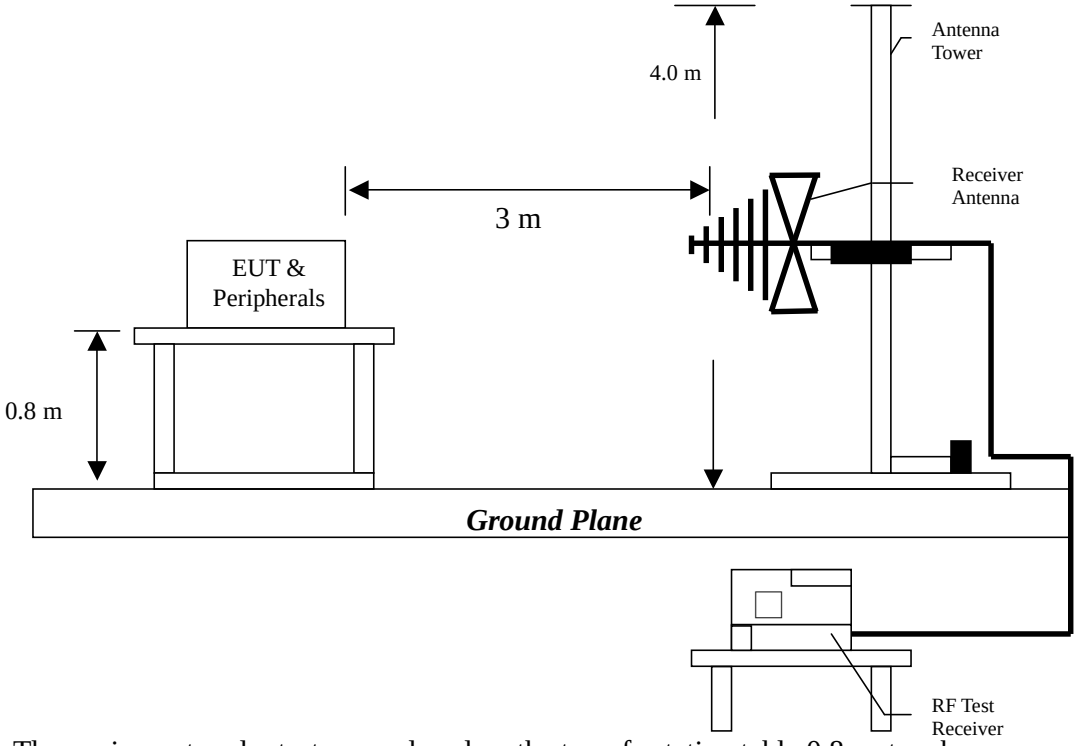
5. Radiated Emission Measurements (FCC 15.109)

5.1 Operating environment

Temperature:	25	℃	(10-40℃)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

5.2 Test Setup and procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



The equipment under test were placed on the top of rotation table 0.8 meter above ground plane.
The table was 360 degrees to determine the position of the highest radiation.
EUT is set 3 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna are set to make the measurement. The bandwidth was setting on the EMI meter 120 kHz.
The levels are quasi peak value readings. The frequency spectrum from 30MHz to 1000MHz was investigated.

5.3 Radiated Emission Limits:

According to FCC 15.109, except for Class A digital device, the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits:

Frequency MHz	Field Strength dB μ V/m
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

5.4 Uncertainty of Radiated Emission

Expanded uncertainty (k=2) of radiated emission measurement is ±4.98 dB.

5.5 Radiated Emission Test Data

(1) Polarity : Vertical
EUT : XG-950
Worst Case Condition : 802.11b (DSSS modulation) Tx at middle channel

Freq. (MHz)	Corr. Factor (dB/m)	Reading (dB μ V)	Calculated (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
35.8	12.85	23.85	36.70	40.00	-3.30	138	67
76.6	10.18	22.32	32.50	40.00	-7.50	121	80
90.1	10.03	21.47	31.50	43.50	-12.00	138	190
249.2	12.86	16.94	29.80	46.00	-16.20	109	311
860.3	24.42	6.48	30.90	46.00	-15.10	135	168
928.2	25.24	8.36	33.60	46.00	-12.40	125	345

(2) Polarity : Horizontal
EUT : XG-950
Worst Case Condition : 802.11b (DSSS modulation) Tx at middle channel

Freq. (MHz)	Corr. Factor (dB/m)	Reading (dB μ V)	Calculated (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
92.1	10.24	23.16	33.40	43.50	-10.10	143	187
198.8	12.03	18.17	30.20	43.50	-13.30	129	264
220.1	11.82	21.98	33.80	46.00	-12.20	118	155
249.2	12.86	28.24	41.10	46.00	-4.90	130	160
544.1	19.58	11.12	30.70	46.00	-15.30	165	173
645.0	21.32	9.88	31.20	46.00	-14.80	175	158

Remark:
1. Calculated level (dB μ V/m)= Correction Factor (dB/m)+ Meter Reading (dB μ V)
2. Correction Factor = Ant. Factor (dB/m) + cable loss (dB)
3. Margin Value = Calculated level- Limit Value

Appendix A1: Exterior photo of EUT

Appendix A2: Photo of Antenna

Appendix A3: Interior photo of EUT


XG-950


XG-950
D-Link
ANT.
LINK/ACT

Appendix B1: Conducted Emission Test Set-up (front)

Appendix B2: Conducted Emission Test Set-up (rear)

Appendix B3: Conducted Emission Test Set-up (side)

Appendix B4: Radiated Emission Test Set-up (front)

Appendix B5: Radiated Emission Test Set-up (rear)