



## Test Report

Product Name : Wireless LAN Card

Model No.: WL-127

FCC ID.: MSQWL127

Applicant : ASUSTeK COMPUTER INC.

Address : 4FL., No, 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Date of Receipt : May 27, 2003

Date of Test : May 27, 2003

Report No. : 036L303FI

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

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

# Test Report Certification

Test Date : May 27, 2003

Report No. : 036L303FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : Wireless LAN Card

Applicant : ASUSTeK COMPUTER INC.

Address : 4FL., No, 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Manufacturer : ASUSTeK COMPUTER INC.

Model No. : WL-127

Rated Voltage : AC 120V/60Hz

Trade Name : ASUS

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.247

Measurement Procedure : ANSI C63.4: 1992

Test Result : Complied



Test results relate only to the samples tested.

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Documented By :



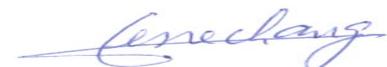
( Grace Lin )

Tested By :



( Tony Hsieh )

Approved By :



( Gene Chang )

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- Attachment 1: EUT Test Photographs
- Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Wireless LAN Card
Trade Name	ASUS
Model No.	WL-127
PC Chassis	Chenbro , B6251-200
EUT Mother Board	ASUS , P4C800
CPU	Intel, 2.8GHz
HDD	Maxtor , D540X-4K, BSMI ID: 3902A815
CD-ROM	TEAC, CD-540E
FDD	Panasonic, JU-257A605P
VGA Card	ASUS , C117/64M
Sound Card	On Board
Lan Card	On Board
S.P.S	Seventeam , ST-250BLP, BSMI ID: 3892D860
Power Cord	Non-shielded, 1.8m
Antenna Card	Antenna#1:MFR: Ninput output, M/N: W122-085-D200, Antenna Gain: +2.07dbi Antenna#2:MFR:Inpag, M/N: 2.4GHz AP Antenna, Antenna Gain: +2.45 dbi

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2412 MHz	Channel 5:	2432 MHz	Channel 9:	2452 MHz
Channel 2:	2417 MHz	Channel 6:	2437 MHz	Channel 10:	2457 MHz
Channel 3:	2422 MHz	Channel 7:	2442 MHz	Channel 11:	2462 MHz
Channel 4:	2427 MHz	Channel 8:	2447 MHz		

Note:

1. This device is a 2.4GHz Wireless LAN Card included a 2.4GHz receiving function.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart B for 2.4GHz Receiver.
3. Quietek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode:                      Mode 1: Normal operation-Antenna # 1  
    Mode 2: Normal operation-Antenna # 2

## 1.2. Operational Description

EUT is a Wireless LAN Card with wireless LAN adapter. This device provided 11 channels and four kind of transmitting speed 1,2,5.5 and 11Mbps. The device of RF carrier is DQPSK, DB PSK and CCK.

The device adapts direct sequence spread spectrum modulation. The Connector antenna was provides diversity function to improve the receiving function.

This Wireless LAN Card is an IEEE 802.11b Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission, the Wireless LAN Card transfers data at speeds up to 64/128-bit Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any 802.11b network.

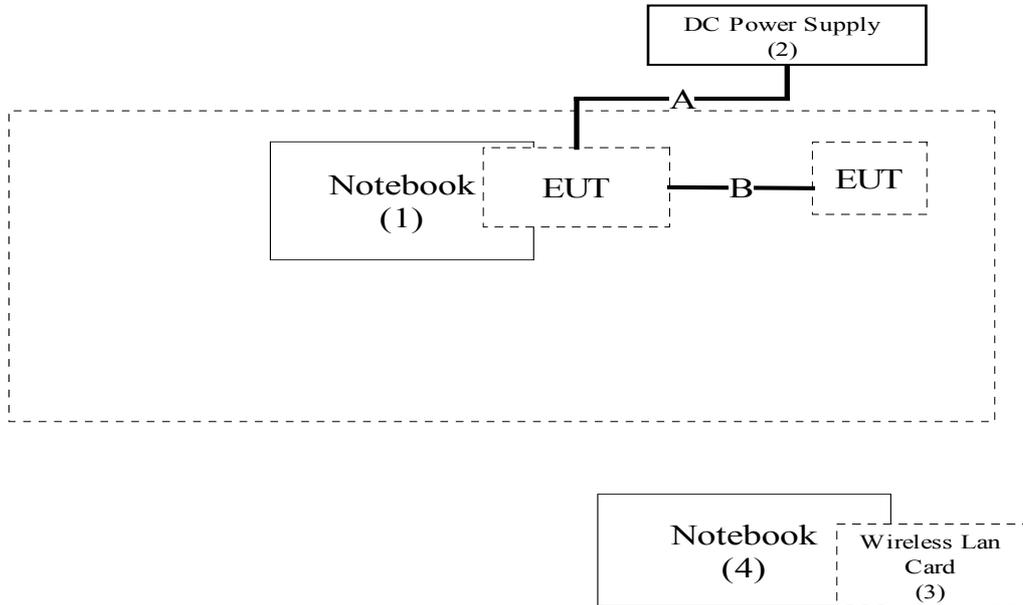
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
(1)	Notebook	ASUS	S1300	26NP018680	DoC	Non-shielded, 1.8m
(2)	DC power supply	Topward	6303D	670302	DoC	Non-shielded, 1.8m
(3)	Wireless LAN Card	LEMEL	LM-WLC030	1231Q048877	H8NWLC030	N/A
(4)	Notebook	ASUS	S1300	24NP035390	DoC	Non-shielded, 1.8m

	Signal Cable Type	Signal cable Description
A.	DC Power Cord	Non-Shielded, 1.8m
B.	Antenna Cable	Shielded, 0.7m

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT and simulators as shown on 1.4
- (2) Turn on the power of all equipment.
- (3) Notebook PC reads data from disk.
- (4) Data will be transmitting and receiving through EUT.
- (5) The transmitted and receive status will be shown on the monitor.
- (6) Repeat the above procedure (3) to (5)

**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: June 22, 2001 File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2



July 03, 2001 Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
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 E-Mail : [service@quietek.com](mailto:service@quietek.com)

## 2. Conducted Emission

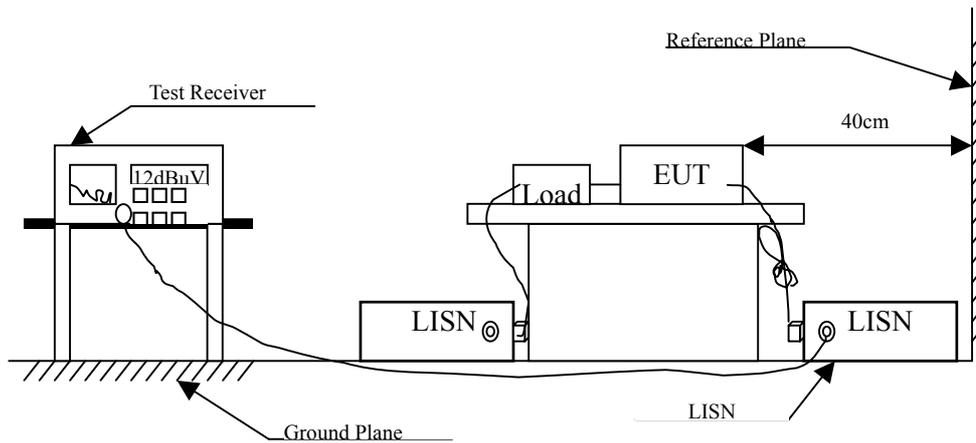
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2003	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2003	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2003	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2003	
5	No.4 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	uV	dBuV
0.15 - 0.50	66-56 <sup>(註)</sup>	56-46 <sup>(註)</sup>
0.50-5.0	56	46
5.0 - 30	60	50

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:1992 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.5. Test Result of Conducted Emission

Product : Wireless LAN Card  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Normal operation-Antenna # 1

Frequency	Cable	LISN	Reading	Emission	Limits
MHz	Loss	Factor	Level	Level	
	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
* 0.162	0.21	0.10	46.92	47.23	65.38
0.226	0.21	0.10	37.72	38.03	62.61
0.295	0.21	0.10	33.79	34.10	60.40
0.502	0.21	0.10	25.93	26.24	56.00
2.509	0.09	0.14	20.10	20.33	56.00
17.431	0.41	0.40	34.19	35.01	60.00
Average					
* 0.162	0.21	0.10	45.30	45.61	55.38
0.226	0.21	0.10	36.70	37.01	52.61
0.295	0.21	0.10	32.80	33.11	50.40
0.502	0.21	0.10	24.30	24.61	46.00
2.509	0.09	0.14	19.20	19.43	46.00
17.431	0.41	0.40	33.50	34.32	50.00

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Normal operation-Antenna # 1

Frequency	Cable	LISN	Reading	Emission	Limits
MHz	Loss	Factor	Level	Level	
	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
* 0.162	0.21	0.10	48.45	48.76	65.38
0.228	0.21	0.10	39.59	39.90	62.52
0.295	0.21	0.10	35.95	36.26	60.40
0.423	0.21	0.10	28.82	29.13	57.38
2.615	0.09	0.14	20.41	20.64	56.00
17.431	0.41	0.40	34.37	35.19	60.00
Average					
* 0.162	0.21	0.10	47.60	47.91	55.38
0.228	0.21	0.10	38.70	39.01	52.52
0.295	0.21	0.10	35.30	35.61	50.40
0.423	0.21	0.10	27.40	27.71	47.38
2.615	0.09	0.14	17.80	18.03	46.00
17.431	0.41	0.40	33.10	33.92	50.00

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 2: Normal operation-Antenna # 2

Frequency	Cable	LISN	Reading	Emission	Limits
MHz	Loss	Factor	Level	Level	
	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
* 0.163	0.21	0.10	47.47	47.78	65.31
0.228	0.21	0.10	37.28	37.59	62.52
0.298	0.21	0.10	35.48	35.79	60.29
0.400	0.21	0.10	29.93	30.24	57.85
2.513	0.09	0.14	20.73	20.96	56.00
15.177	0.32	0.35	32.68	33.35	60.00
Average					
* 0.163	0.21	0.10	46.90	47.21	55.31
0.228	0.21	0.10	36.10	36.41	52.52
0.298	0.21	0.10	32.50	32.81	50.29
0.400	0.21	0.10	28.70	29.01	47.85
2.513	0.09	0.14	19.10	19.33	46.00
15.177	0.32	0.35	29.50	30.17	50.00

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 2: Normal operation-Antenna # 2

Frequency	Cable	LISN	Reading	Emission	Limits
MHz	Loss	Factor	Level	Level	
	dB	dB	dBuV	dBuV	dBuV
=====					
Quasi-Peak					
* 0.163	0.21	0.10	48.56	48.87	65.31
0.228	0.21	0.10	39.96	40.27	62.52
0.296	0.21	0.10	36.43	36.74	60.36
0.423	0.21	0.10	29.22	29.53	57.38
2.611	0.09	0.14	20.84	21.07	56.00
15.611	0.32	0.36	33.34	34.02	60.00
Average					
* 0.163	0.21	0.10	47.20	47.51	55.31
0.228	0.21	0.10	38.40	38.71	52.52
0.296	0.21	0.10	35.10	35.41	50.36
0.423	0.21	0.10	28.70	29.01	47.38
2.611	0.09	0.14	19.10	19.33	46.00
15.611	0.32	0.36	30.40	31.08	50.00

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

### 3. Peak Power Output

#### 3.1. Test Equipment

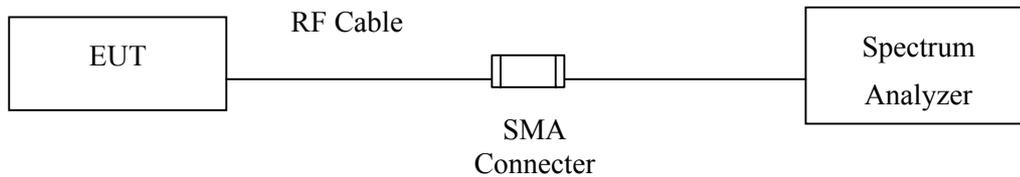
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2003

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

#### 3.2. Test Setup

##### Conduction Power Measurement



#### 3.3. Limits

The maximum peak power shall be less 1 Watt.

### 3.4. Test Result of Peak Power Output

Product : Wireless LAN Card  
Test Item : Peak Power Output Data  
Test Site : No.3OATS  
Test Mode : Normal Operation

#### Data Speed: 11Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2414.0	17.40 dBm	1Watt= 30 dBm	Pass
6	2438.9	16.75 dBm	1Watt= 30 dBm	Pass
11	2463.9	15.92 dBm	1Watt= 30 dBm	Pass

## 4. Radiated Emission

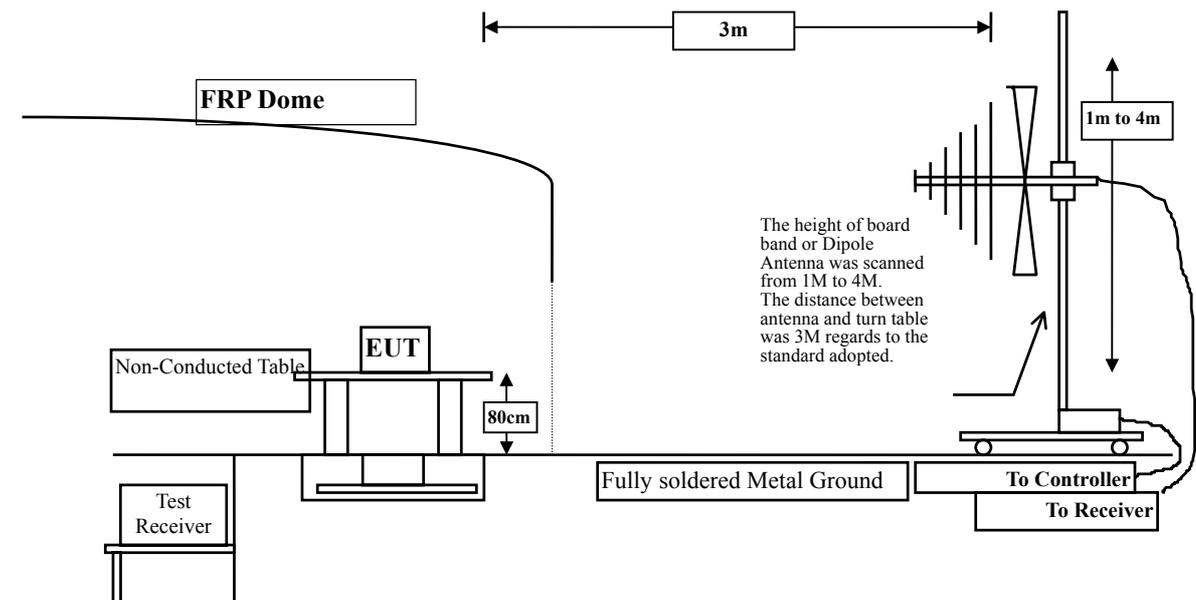
### 4.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2003
	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2003
	Pre-Amplifier	HP	8447D/3307A01812	May, 2003
	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
	Horn Antenna	EM	EM6917 / 103325	May, 2003
Site # 2	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2003
	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2003
	Pre-Amplifier	HP	8447D/3307A01814	May, 2003
	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2002
	Horn Antenna	EM	EM6917 / 103325	May, 2003
Site # 3	X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2003
	X Spectrum Analyzer	Advantest	3162 / 100803480	May, 2003
	X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2003
	X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2003
	X Horn Antenna	ETS	3115 / 0005-6160	Jul., 2002
	X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	Jul., 2002

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

### 4.2. Test Setup



### 4.3. Limits

#### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209(a) Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### 4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30 )is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

#### 4.5. Test Result of Radiated Emission

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1(Channel 1)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
<b>Horizontal</b>								
<b>Peak Detector</b>								
4823.685	4.23	31.21	19.89	40.35	55.91	18.09	74.00	54.00
7235.967	5.63	35.86	21.44	33.48	53.52	20.48	74.00	54.00
9648.254	7.00	37.84	19.69	28.41	53.57	20.43	74.00	54.00
<b>Average</b>								
4823.685	4.23	31.21	19.89	29.75	45.31	8.69	54.00	54.00
<b>Vertical</b>								
<b>Peak Detector</b>								
4824.215	4.23	31.21	19.89	39.80	55.36	18.64	74.00	54.00
7235.894	5.63	35.86	21.44	32.63	52.67	21.33	74.00	54.00
9647.680	7.00	37.84	19.69	27.86	53.02	20.98	74.00	54.00
<b>Average</b>								
4824.215	4.23	31.21	19.89	28.42	43.98	10.02	54.00	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1(Channel 6)

Frequency	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Peak Limit	Average Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV/m

**Horizontal Peak Detector**

4873.662	4.26	31.31	19.87	40.38	56.09	17.91	74.00	54.00
7311.068	5.67	35.96	21.50	31.35	51.48	22.52	74.00	54.00
9747.698	7.06	37.91	19.48	26.96	52.46	21.54	74.00	54.00

**Average**

4873.662	4.26	31.31	19.87	29.60	45.31	8.69	54.00	54.00
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**Vertical Peak Detector**

4873.740	4.26	31.31	19.87	38.93	54.64	19.36	74.00	54.00
7312.054	5.67	35.96	21.50	32.54	52.67	21.33	74.00	54.00
9748.114	7.07	37.92	19.43	25.80	51.37	22.63	74.00	54.00

**Average**

4873.740	4.26	31.31	19.87	29.79	45.50	8.50	54.00	54.00
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Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1(Channel 11)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
<b>Horizontal</b>								
<b>Peak Detector</b>								
4923.558	4.29	31.42	19.85	40.86	56.72	17.28	74.00	54.00
7386.223	5.72	36.09	21.56	31.59	51.84	22.16	74.00	54.00
9848.725	7.13	37.99	19.22	27.25	53.16	20.84	74.00	54.00
<b>Average</b>								
4923.558	4.29	31.42	19.85	28.72	44.58	9.42	54.00	54.00
<b>Vertical</b>								
<b>Peak Detector</b>								
4924.615	4.31	31.48	19.84	40.21	56.17	17.83	74.00	54.00
7386.116	5.72	36.09	21.56	32.06	52.31	21.69	74.00	54.00
9847.844	7.13	37.99	19.22	26.93	52.84	21.16	74.00	54.00
<b>Average</b>								
4924.615	4.31	31.48	19.84	28.97	44.93	9.07	54.00	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (Channel 1)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Peak	Average
MHz	Loss	Factor		Level	Level		Limit	Limit
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV/m

**Horizontal**

**Peak Detector**

4824.625	4.23	31.21	19.89	41.07	56.63	17.37	74.00	54.00
7237.100	5.63	35.86	21.44	32.63	52.67	21.33	74.00	54.00
9649.240	7.00	37.84	19.69	27.86	53.02	20.98	74.00	54.00

**Average**

4824.625	4.23	31.21	19.89	29.82	45.38	8.62	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

**Vertical**

**Peak Detector**

4824.628	4.23	31.21	19.89	40.56	56.12	17.88	74.00	54.00
7236.598	5.63	35.86	21.44	33.12	53.16	20.84	74.00	54.00
9648.264	7.00	37.84	19.69	27.46	52.62	21.38	74.00	54.00

**Average**

4824.628	4.23	31.21	19.89	28.62	44.18	9.82	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (Channel 6)

Frequency	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Peak Limit	Average Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV/m

**Horizontal**

**Peak Detector**

4874.450	4.26	31.31	19.87	40.43	56.14	17.86	74.00	54.00
7311.280	5.67	35.96	21.50	32.01	52.14	21.86	74.00	54.00
9747.889	7.06	37.91	19.48	27.19	52.69	21.31	74.00	54.00

**Average**

4874.450	4.26	31.31	19.87	28.64	44.35	9.65	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

**Vertical**

**Peak Detector**

4873.985	4.26	31.31	19.87	41.06	56.77	17.23	74.00	54.00
7312.301	5.67	35.96	21.50	31.46	51.59	22.41	74.00	54.00
9748.227	7.07	37.92	19.43	27.60	53.17	20.83	74.00	54.00

**Average**

4873.985	4.26	31.31	19.87	29.07	44.78	9.22	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2(Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Peak	Average
MHz	Loss	Factor		Level	Level		Limit	Limit
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	dBuV/m

### Horizontal

#### Peak Detector

4923.950	4.29	31.42	19.85	41.06	56.92	17.08	74.00	54.00
7385.270	5.72	36.09	21.56	31.57	51.82	22.18	74.00	54.00
9848.341	7.13	37.99	19.22	26.57	52.48	21.52	74.00	54.00

#### Average

4923.950	4.29	31.42	19.85	28.75	44.61	9.39	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

### Vertical

#### Peak Detector

4924.116	4.31	31.48	19.84	40.68	56.64	17.36	74.00	54.00
7385.160	5.72	36.09	21.56	32.16	52.41	21.59	74.00	54.00
9846.781	7.13	37.99	19.22	27.03	52.94	21.06	74.00	54.00

#### Average

4924.116	4.31	31.48	19.84	29.31	45.27	8.73	54.00	54.00
----------	------	-------	-------	-------	-------	------	-------	-------

#### Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1 (Channel 1)

Frequency	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal:**

76.955	1.11	7.31	0.00	14.89	23.31	16.69	40.00
126.964	1.37	11.57	0.00	17.18	30.12	13.38	43.50
260.559	2.05	12.95	0.00	14.80	29.81	16.19	46.00
324.154	2.39	12.24	0.00	17.20	31.83	14.17	46.00
412.547	2.84	15.76	0.00	11.66	30.26	15.74	46.00
* 562.117	3.61	17.23	0.00	13.99	34.83	11.17	46.00

**Vertical:**

60.228	1.02	5.15	0.00	20.31	26.48	13.52	40.00
111.889	1.29	11.12	0.00	17.27	29.68	13.82	43.50
180.645	1.64	8.41	0.00	19.66	29.72	13.78	43.50
241.118	1.95	10.96	0.00	14.35	27.26	18.74	46.00
388.240	2.71	15.53	0.00	16.41	34.66	11.34	46.00
* 442.155	2.99	16.97	0.00	16.95	36.91	9.09	46.00

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1 (Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal:</b>							
82.115	1.14	7.99	0.00	19.34	28.46	11.54	40.00
132.514	1.40	11.49	0.00	16.45	29.34	14.16	43.50
166.247	1.57	9.12	0.00	14.30	24.99	18.51	43.50
224.118	1.87	8.88	0.00	17.95	28.70	17.30	46.00
* 289.995	2.21	12.24	0.00	20.47	34.92	11.08	46.00
401.251	2.78	14.76	0.00	16.42	33.97	12.03	46.00
<b>Vertical:</b>							
* 82.770	1.14	7.53	0.00	21.01	29.68	10.32	40.00
142.118	1.45	10.00	0.00	18.27	29.72	13.78	43.50
192.344	1.70	8.08	0.00	17.49	27.28	16.22	43.50
296.388	2.24	12.13	0.00	17.10	31.46	14.54	46.00
326.285	2.40	12.51	0.00	14.57	29.48	16.52	46.00
526.340	3.43	16.81	0.00	12.04	32.28	13.72	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1 (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
	Loss	Factor		Level	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal:**

56.229	1.00	5.93	0.00	18.54	25.48	14.52	40.00
120.551	1.34	11.62	0.00	17.82	30.78	12.72	43.50
174.241	1.61	8.76	0.00	19.35	29.73	13.77	43.50
280.340	2.16	11.99	0.00	16.34	30.49	15.51	46.00
374.195	2.64	14.20	0.00	14.62	31.46	14.54	46.00
* 482.559	3.20	16.73	0.00	14.21	34.14	11.86	46.00

**Vertical:**

70.215	1.08	6.58	0.00	19.63	27.29	12.71	40.00
138.284	1.43	10.30	0.00	14.95	26.68	16.82	43.50
182.055	1.65	8.36	0.00	15.48	25.50	18.00	43.50
203.889	1.77	8.56	0.00	17.88	28.21	15.29	43.50
310.458	2.31	12.20	0.00	17.49	32.00	14.00	46.00
* 427.997	2.92	17.48	0.00	14.28	34.67	11.33	46.00

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (Channel 1)

Frequency	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal:**

74.157	1.10	7.00	0.00	19.62	27.72	12.28	40.00
120.515	1.34	11.62	0.00	16.41	29.37	14.13	43.50
144.528	1.46	10.66	0.00	17.18	29.30	14.20	43.50
214.517	1.82	7.97	0.00	19.38	29.17	14.33	43.50
320.685	2.37	11.99	0.00	17.42	31.78	14.22	46.00
* 560.274	3.60	17.32	0.00	13.58	34.50	11.50	46.00

**Vertical:**

56.992	1.01	5.55	0.00	19.55	26.11	13.89	40.00
162.574	1.55	8.47	0.00	18.57	28.60	14.90	43.50
188.593	1.68	8.01	0.00	20.15	29.84	13.66	43.50
228.648	1.89	9.73	0.00	19.30	30.93	15.07	46.00
344.000	2.49	12.82	0.00	16.28	31.59	14.41	46.00
* 462.250	3.10	16.47	0.00	15.20	34.76	11.24	46.00

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (Channel 6)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor		Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal:**

*	76.990	1.11	7.31	0.00	21.50	29.92	10.08	40.00
	118.540	1.32	11.74	0.00	14.26	27.32	16.18	43.50
	170.584	1.59	8.93	0.00	19.35	29.87	13.63	43.50
	250.174	2.00	11.81	0.00	18.30	32.11	13.89	46.00
	322.054	2.37	12.22	0.00	14.20	28.79	17.21	46.00
	412.021	2.84	15.64	0.00	11.54	30.02	15.98	46.00

**Vertical:**

	82.747	1.14	7.53	0.00	19.14	27.81	12.19	40.00
	128.925	1.38	10.53	0.00	17.32	29.23	14.27	43.50
	146.850	1.47	9.62	0.00	15.24	26.33	17.17	43.50
	220.381	1.85	9.12	0.00	19.64	30.61	15.39	46.00
	348.574	2.51	13.27	0.00	14.58	30.36	15.64	46.00
*	516.270	3.37	16.59	0.00	14.30	34.26	11.74	46.00

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless LAN Card  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (Channel 11)

Frequency	Cable	Probe	PreAMP	Reading	Emission	Margin	Limit
MHz	Loss	Factor		Level	Level	dB	dBuV/m
	dB	dB/m	dB	dBuV	dBuV/m		

**Horizontal:**

68.194	1.06	5.99	0.00	18.36	25.42	14.58	40.00
120.558	1.34	11.62	0.00	16.52	29.48	14.02	43.50
150.627	1.49	10.32	0.00	17.28	29.09	14.41	43.50
* 262.155	2.06	13.08	0.00	18.50	33.65	12.35	46.00
356.258	2.55	13.52	0.00	14.20	30.28	15.72	46.00
468.000	3.12	16.68	0.00	13.27	33.08	12.92	46.00

**Vertical:**

49.548	0.97	6.90	0.00	17.58	25.45	14.55	40.00
120.258	1.33	10.36	0.00	16.34	28.03	15.47	43.50
186.524	1.67	8.16	0.00	19.57	29.40	14.10	43.50
241.510	1.96	11.06	0.00	17.31	30.33	15.67	46.00
362.140	2.58	14.38	0.00	15.84	32.79	13.21	46.00
* 486.241	3.22	16.48	0.00	13.66	33.36	12.64	46.00

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss.

## 5. Band Edge

### 5.1. Test Equipment

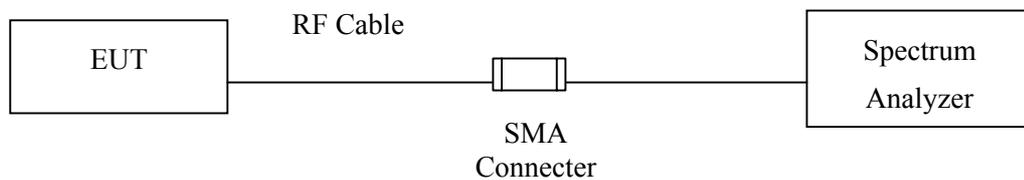
The following test equipments are used during the band edge tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2003
X Test Receiver	R & S	ESCS 30 / 825442/14	May, 2003
X Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2003
X Pre-Amplifier	HP	8447D/3307A01812	May, 2003
X Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
X Horn Antenna	EM	EM6917 / 103325	May, 2003

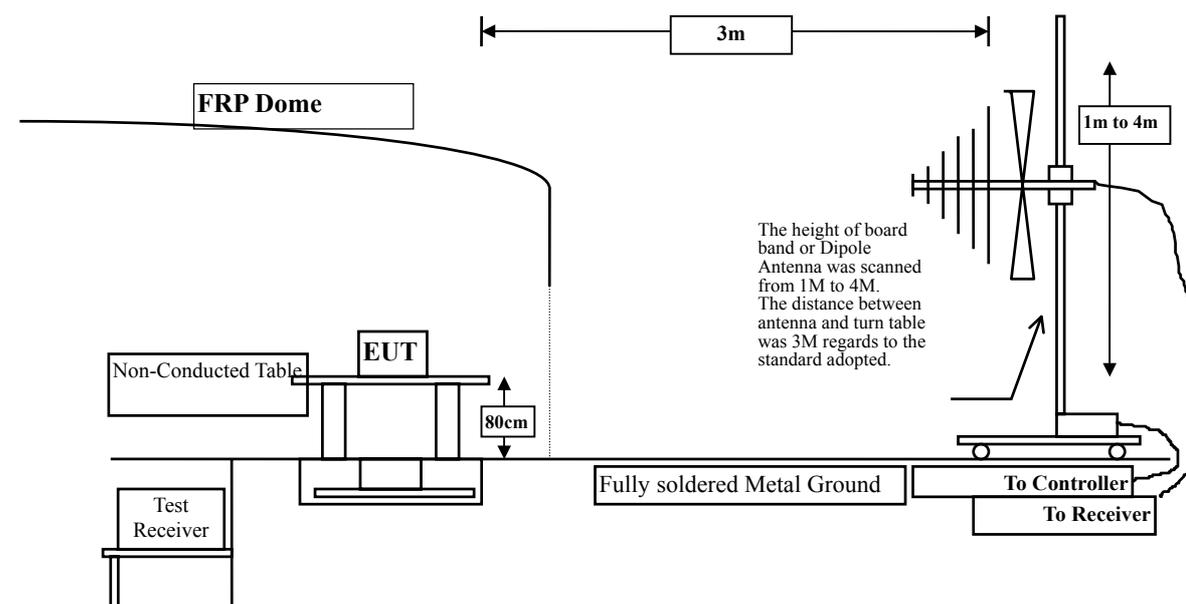
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

### 5.2. Test Setup

#### RF Conducted Measurement:



#### RF Radiated Measurement:



### 5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30 )is 120 kHz, above 1GHz are 1 MHz.

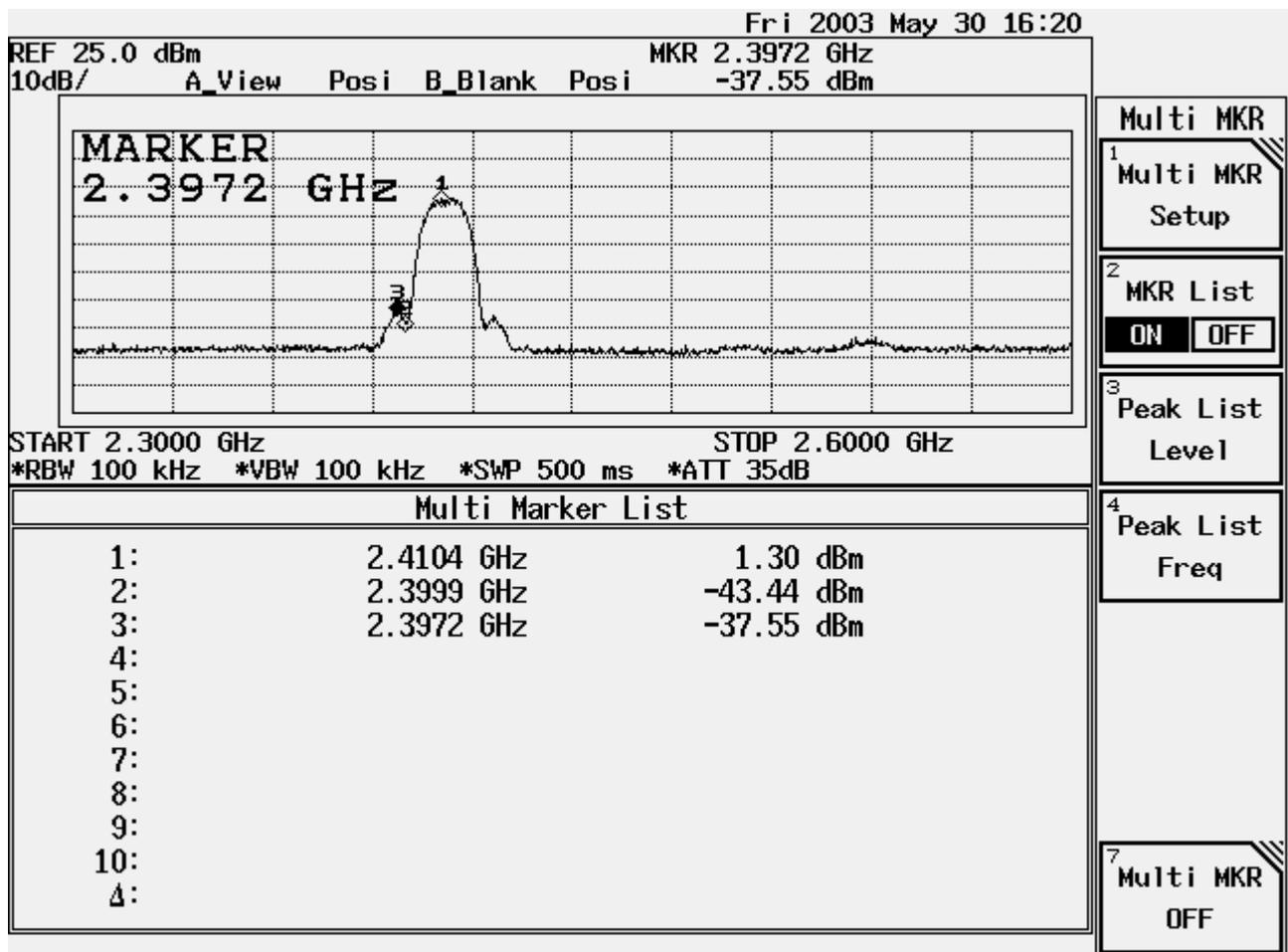
### 5.5. Test Result of Band Edge

Product : Wireless LAN Card  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode1: Normal Operation (11Mbps)

**RF Radiated Measurement:**

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1	<2400	>20	Pass

Figure Channel 1:



Product : Wireless LAN Card  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Normal operation-Antenna # 1 (11Mbps)

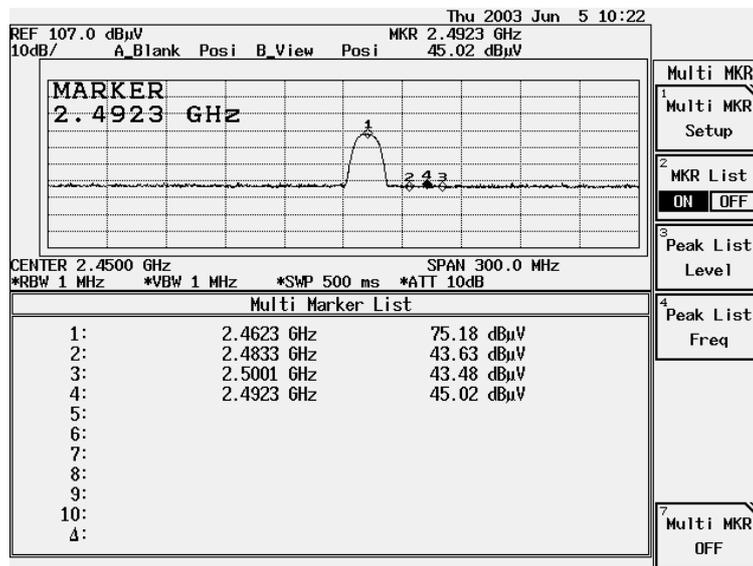
**RF Radiated Measurement (Peak):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Horizontal)	2492.3	45.02	55.77	74.00	54.00	Pass
11(Vertical)	2496.5	45.76	56.51	74.00	54.00	Pass

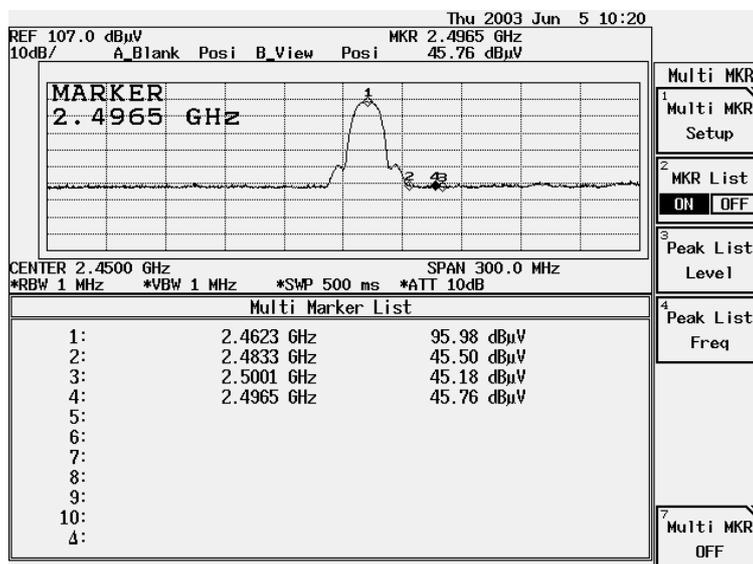
**RF Radiated Measurement (Average):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Horizontal)	2492.3	31.85	42.60	74.00	54.00	Pass
11(Vertical)	2496.5	32.84	43.59	74.00	54.00	Pass

**Figure Channel 11:** (Horizontal)



**Figure Channel 11:** (Vertical)



Product : Wireless LAN Card  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Normal operation-Antenna # 2 (11Mbps)

**RF Radiated Measurement(Peak):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Horizontal)	2496.5	45.71	56.46	74.00	54.00	Pass
11(Vertical)	2494.4	45.26	56.01	74.00	54.00	Pass

**RF Radiated Measurement (Average):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Horizontal)	2496.5	32.08	42.83	74.00	54.00	Pass
11(Vertical)	2494.4	32.24	42.99	74.00	54.00	Pass

Figure Channel 11: (Horizontal)

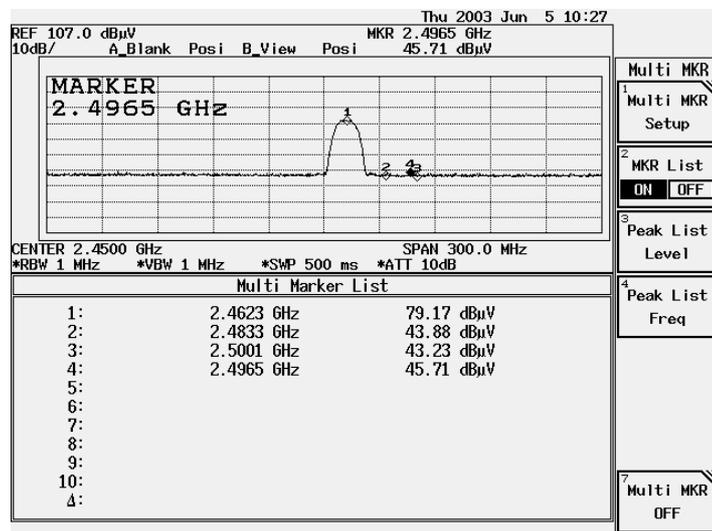
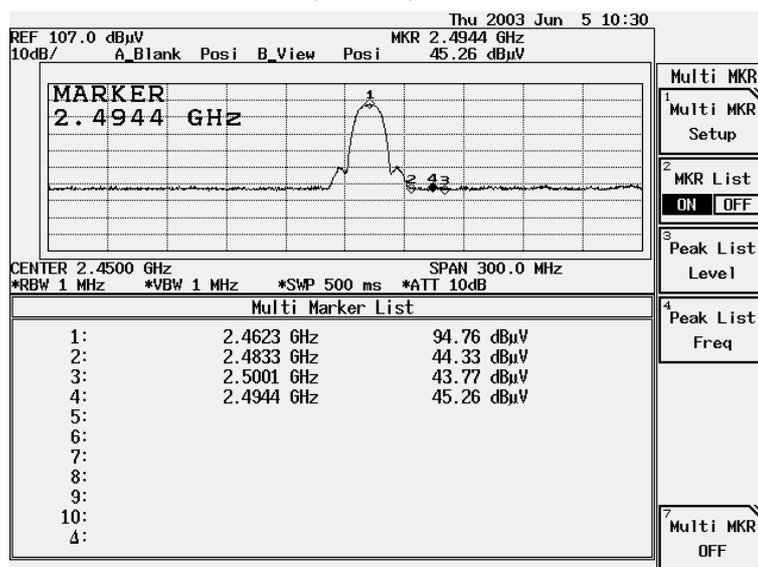


Figure Channel 11: (Vertical)



Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

**6. Occupied Bandwidth**

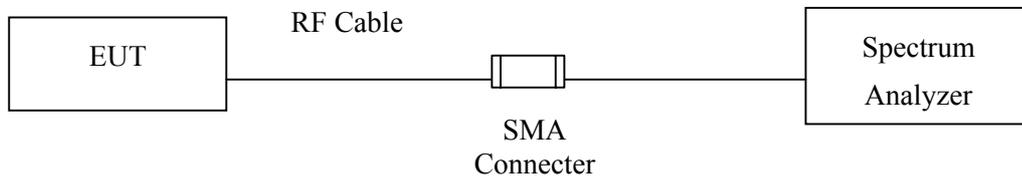
**6.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2003

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

**6.2. Test Setup**



**6.3. Limits**

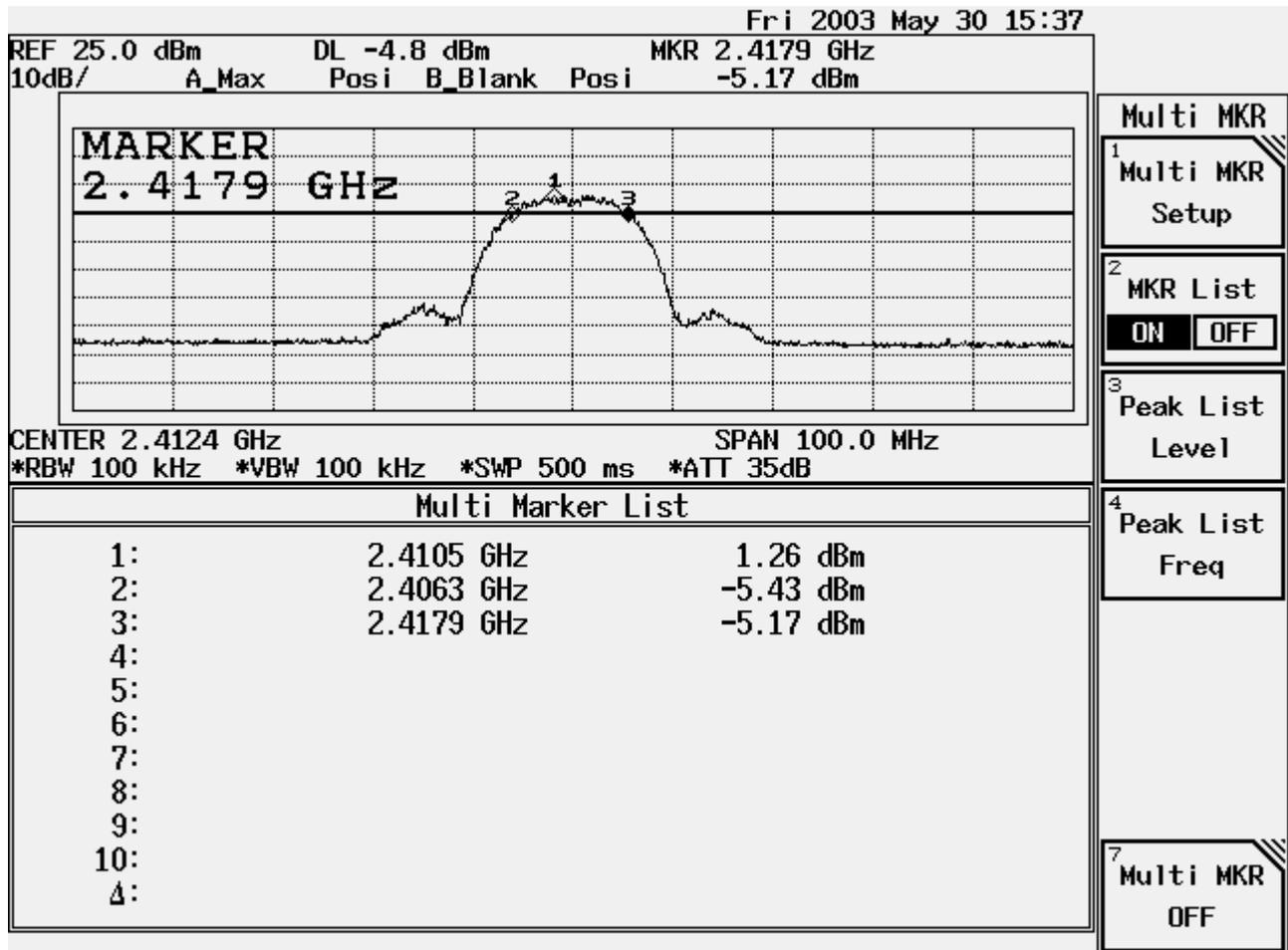
The minimum bandwidth shall be at least 500kHz.

### 6.4. Test Result of Occupied Bandwidth

Product : Wireless LAN Card  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (11Mbps)	2417.9	11600	>500	Pass

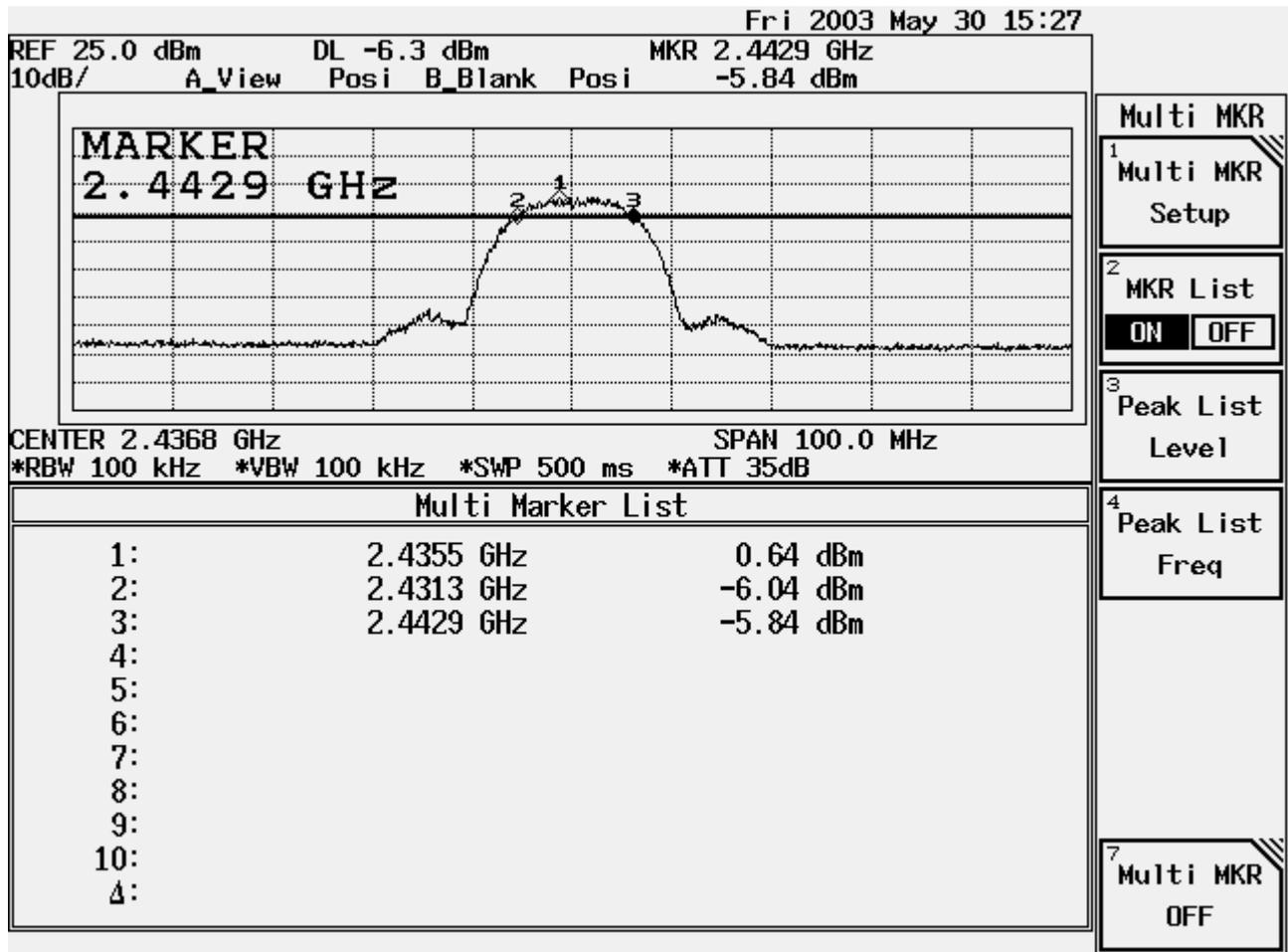
Figure Channel 1: 11Mbps



Product : Wireless LAN Card  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Channel 6

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (11Mbps)	2442.9	11600	>500	Pass

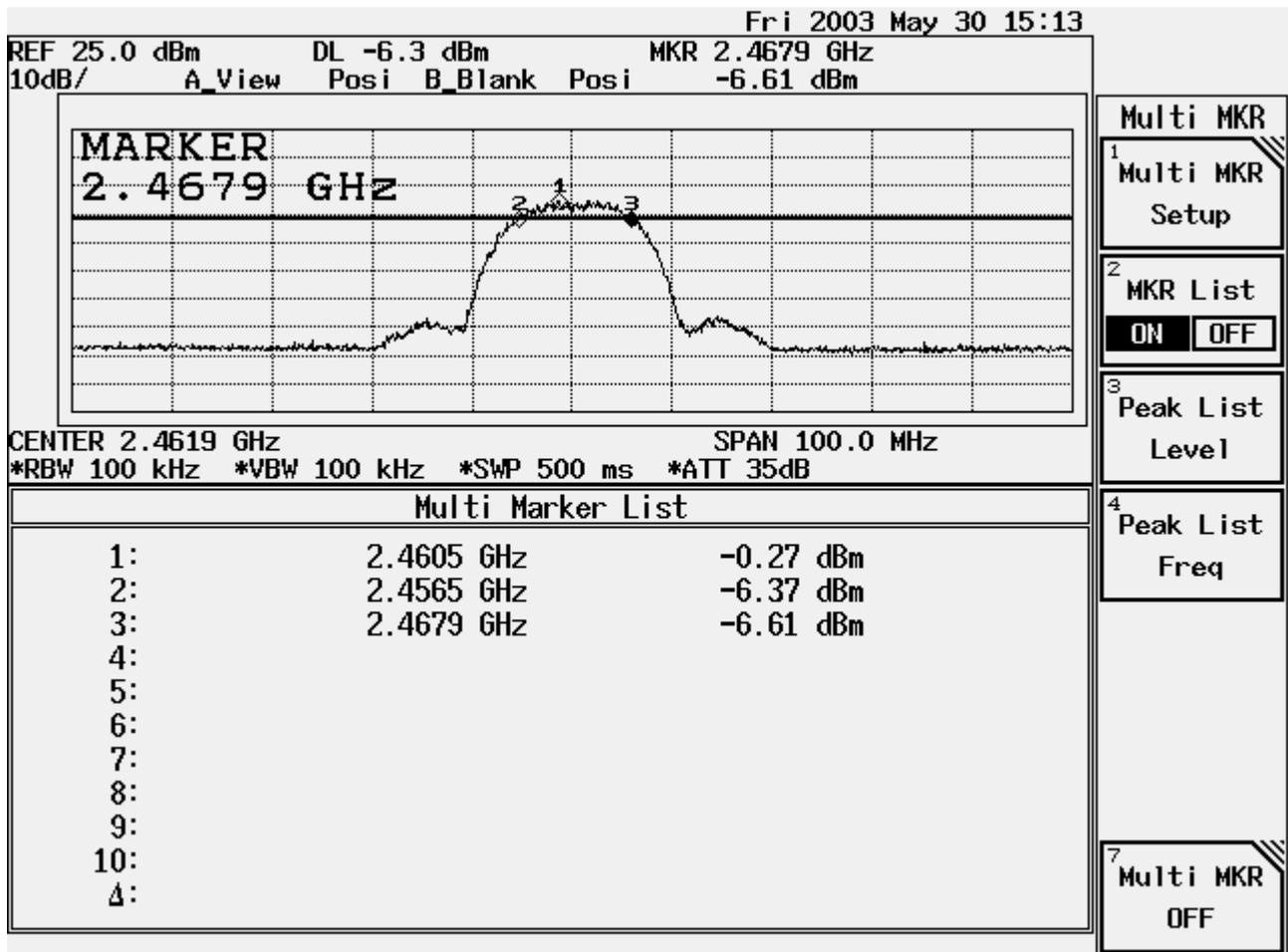
Figure Channel 6: 11Mbps



Product : Wireless LAN Card  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Channel 11

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (11Mbps)	2467.9	11400	>500	Pass

Figure Channel 11: 11Mbps



**7. Power Density**

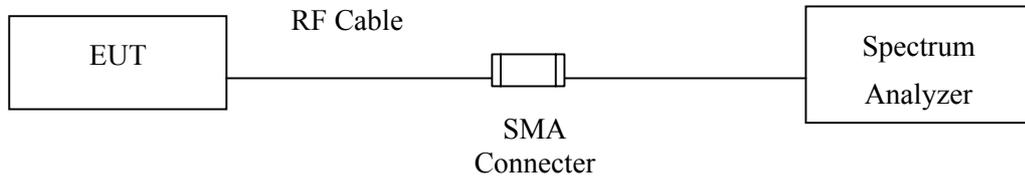
**7.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2003

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

**7.2. Test Setup**



**7.3. Limits**

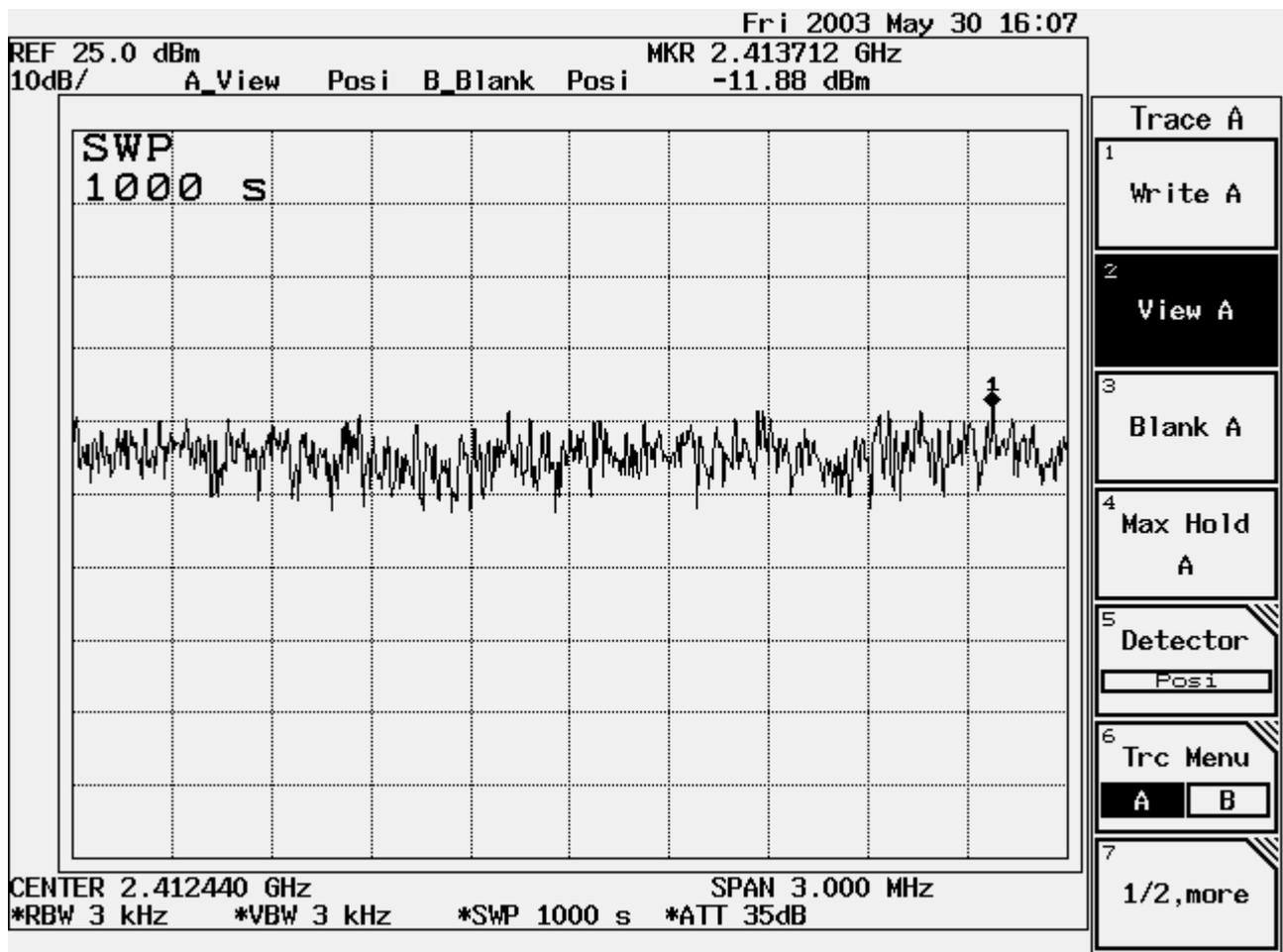
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 7.4. Test Result of Power Density

Product : Wireless LAN Card  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (11Mbps)	2413.712	-11.88	< 8dBm	Pass

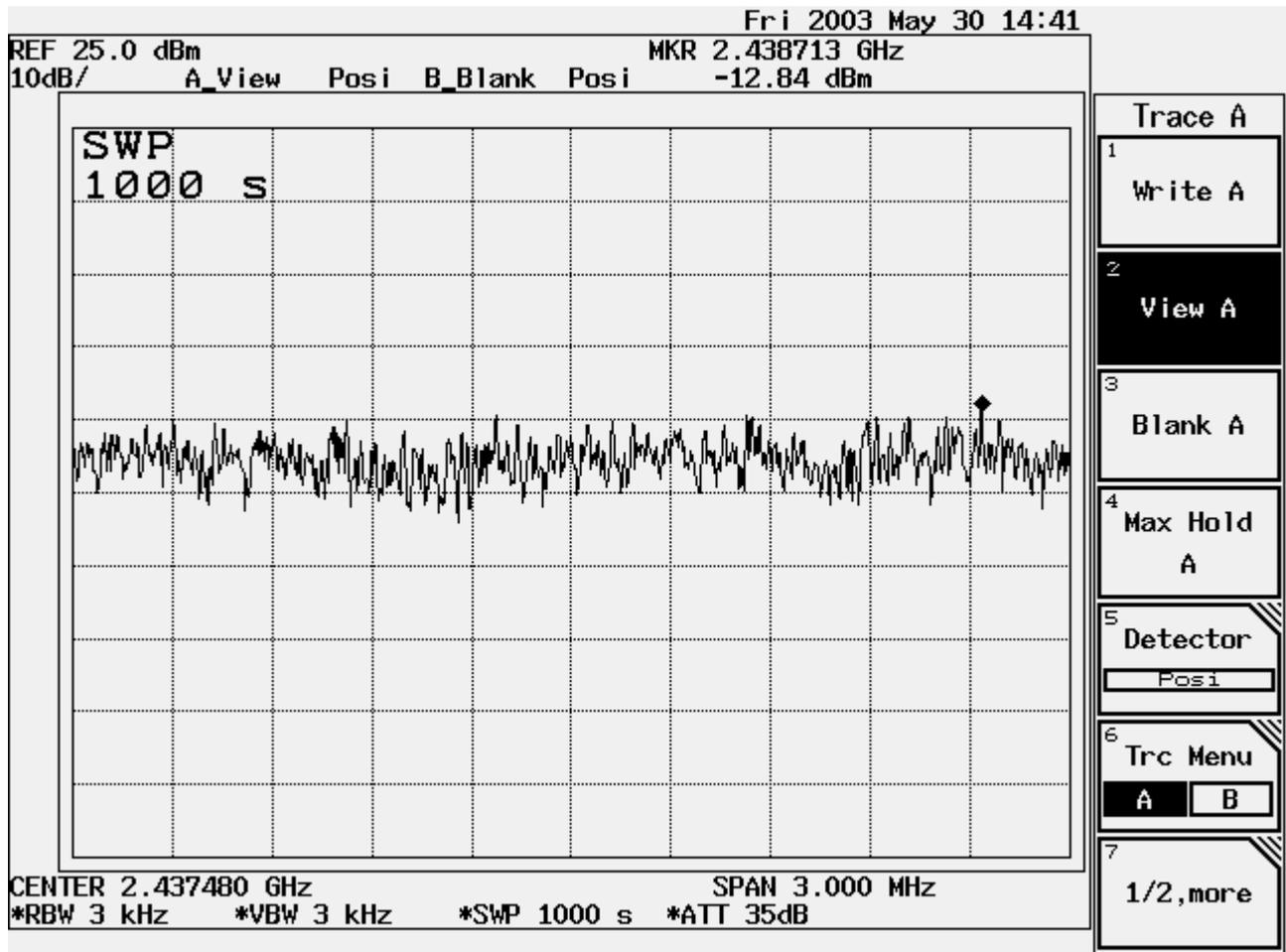
Figure Channel 1: 11Mbps



Product : Wireless LAN Card  
 Test Item : Power Density Data  
 Test Site : No.3OATS  
 Test Mode : Channel 6

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (11Mbps)	2438.713	-12.84	< 8dBm	Pass

Figure Channel 6: 11Mbps

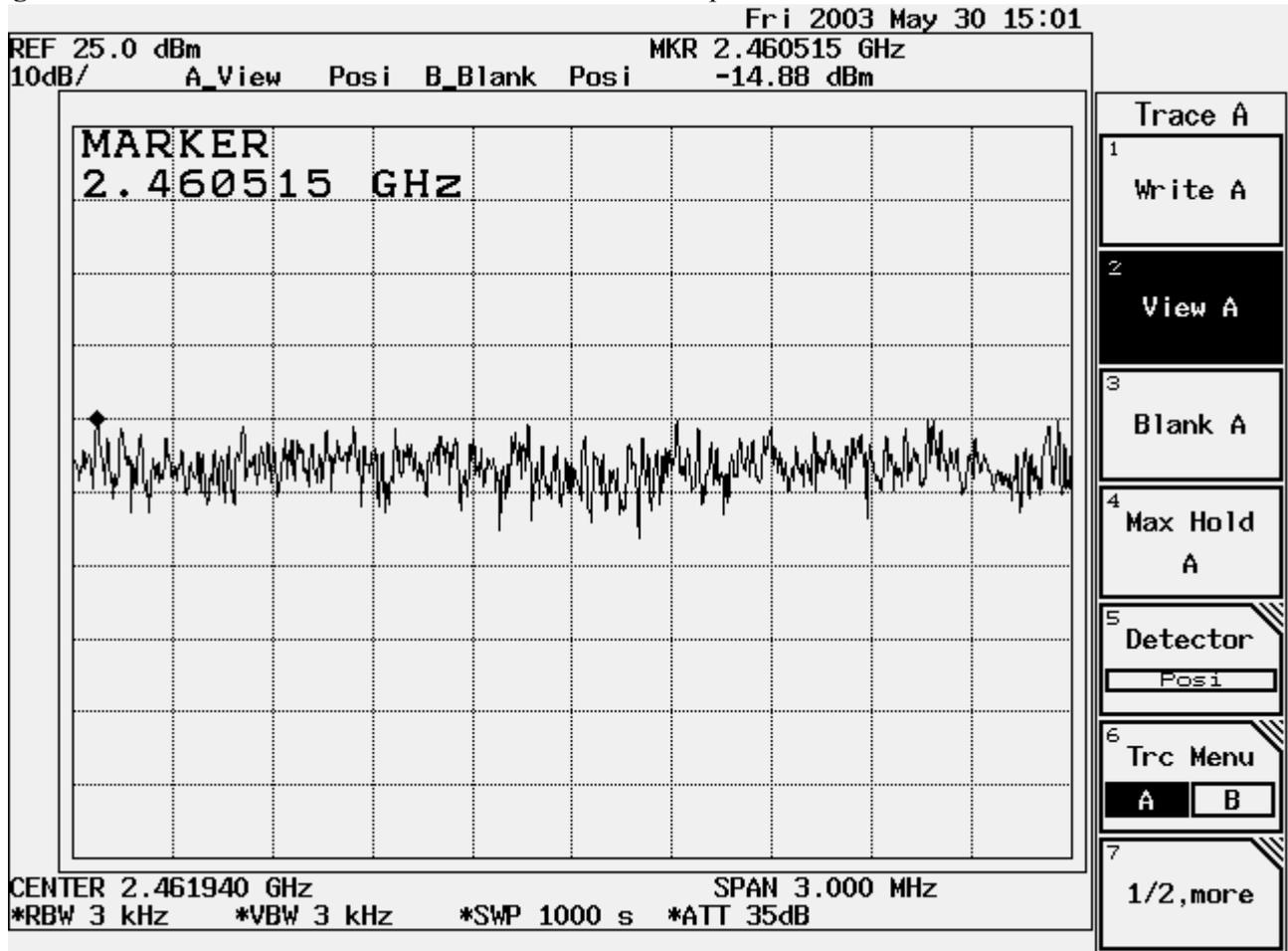


Product : Wireless LAN Card  
 Test Item : Density Data  
 Test Site : No.3 OATS  
 Test Mode : Channel 11

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (11Mbps)	2460.515	-14.88	< 8dBm	Pass

Figure Channel 11:

11Mbps



## 8. EMI Reduction Method During Compliance Testing

No modification was made during testing.

## Attachment 1: EUT Test Photographs

## Attachment 2: EUT Detailed Photographs