Test Report

Product Name : 802.11b WLAN Mini-USB Adaptor

Model No.: WN-210

FCC ID.: QDWAB014WN210

Applicant : AirVast Technology Inc.

Address : 4F-1, No. 1, Ln. 21, Hsin Hua Rd., Kueishan Industrial Park, Taoyuan 330, Taiwan, R.O.C.

Date of Receipt : Oct. 25, 2002

Date of Test : Oct. 31, 2002

Report No. : 02AL063FI

The test results relate only to the samples tested.
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Test Date : Oct. 31, 2002
Report No. : 02AL063FI

QuieTek Corporation
Accredited by NIST (NVLAP)
NVLAP Lab Code: 200347-0

Product Name	:	802.11b WLAN Mini-USB Adaptor
Applicant	:	AirVast Technology Inc.
Address	:	4F-1, No. 1, Ln. 21, Hsin Hua Rd., Kueishan Industrial Park, Taoyuan 330, Taiwan, R.O.C.
Manufacturer	:	Argus Technologies Co., LTD
Model No.	:	WN-210
FCC ID.	:	QDWAB014WN210
Rated Voltage	:	DC 5V
Trade Name	:	AirVast
Measurement Standard	:	FCC Part 15 Subpart C Paragraph 15.247
Measurement Procedure	:	ANSI C63.4: 1992
Test Result	:	Complied

NVLAP
NVLAP Lab Code : 200347-0

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Documented By : (Julie Xu)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	:	802.11b WLAN Mini-USB Adaptor
Trade Name	:	AirVast
FCC ID.	:	QDWAB014WN210
Model No.	:	WN-210
Frequency Range	:	2400 MHz to 2483.5MHz
Channel Number	:	11
Chip Rate	:	11Mbps and 5.5Mbps: CCK; 2Mbps: DQPSK 1Mbps: DBPSK
Type of Modulation	:	Direct Sequence Spread Spectrum
Antenna type	:	Printed
Antenna Gain	:	1.1dBi
Operator Selection of Operating Frequency	:	By software
USB Cable	:	Non-shielded, 1.5m, one ferrite core bonded..

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 802.11b WLAN Mini-USB Adaptor included a 2.4GHz receiving function, a 2.4GHz transmitting function.
2. Regards to the frequency band operation; two rate that were included the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 02AL063F under Declaration of Conformity.

1.2. Operational Description

EUT is a 802.11b WLAN Mini-USB Adaptor with 11 channels. This device provided 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 scolded on PCB provides diversity function to improve the receiving function.

This Broadband Wireless Router 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 Direst Sequence Spread Spectrum (DSSS) radio transmission, the Broadband Wireless Router 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 IEEE 802.11b network.

1.3. Tested System Datails

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	DELL	PP01L	N/A	DoC	Non-shielded, 1.8m
(2)	Monitor	ADI	CM703	038054T10203876A	DoC	Non-shielded, 1.8m
(3)	Modem	ACEEX	DM-1414	0102027557	IFAXDM1414	Non-shielded, 1.8m
(4)	Microphone& Earphone	TOKTO	SX-MI	N/A	DoC	N/A
(5)	Mouse	HITACHI	PC-KM1300	N/A	JNZ201213	N/A
(6)	Monitor	SONY	PVM-14M2U	2105742	DoC	Non-shielded, 1.8m
(7)	Printer	EPSON	Color 680	023913	DoC	Non-shielded, 1.8m
(8)	Notebook	DELL	PP01L	N/A	DoC	Non-shielded, 1.8m
(9)	AP	ASUS	AC300	N/A	DoC	Non-shielded, 1.8m

Signal Cable Type		Signal cable Description
A.	Monitor Cable	Shielded, 1.8m, a ferrite core bonded.
B.	Modem Cable	Shielded, 1.5m
C.	Microphone & Earphone Cable	Non-shielded, 1.8m.
D.	Mouse Cable	Non-shielded, 1.0m.
E.	Monitor Cable	Shielded, 1.2m
F.	Printer Cable	Shielded, 1.7m
G.	USB Cable	Shielded, 1.5m, a ferrite core bonded.
H.	Telecom Cable	Non-shielded, 6.0m.
I.	LAN Cable	Non-shielded, 6.0m.
J.	LAN Cable	Non-shielded, 1.0m.

1.4. Configuration of Tested System

EUT: Tx

EUT: Rx

1.5. EUT Exercise Software

1.4.1 Setup the EUT and simulators as shown on 1.3.

1.4.2 Turn on the power of all equipment.

1.4.3 Notebook PC reads data from disk.

1.4.4 Data will be transmitted through EUT.

1.4.5 The transmit status will be shown on the monitor.

1.4.6 Repeat the above procedure 1.4.3 to 1.4.5

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

NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : 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, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2002	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2002	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	No.2 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 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	Quasi-peak	Average
0.15 – 0.5	66 to 56	56 to 46
0. 5 –5	56	46
5 – 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 refer 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 invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5.

2.6. Test Result of Conducted Emission

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Conducted Emission Test
Test Site : No.4 Shielded Room
Power Line : Line 1
Test Mode : Normal Operation

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level dBuV	Emission Level dBuV	Limits dBuV
Quasi-Peak Detector					
*0.181	0.21	0.10	48.04	48.35	64.43
0.240	0.21	0.10	40.10	40.41	62.10
0.297	0.21	0.10	34.63	34.94	60.32
3.815	0.17	0.16	29.40	29.73	56.00
7.103	0.33	0.19	26.79	27.30	60.00
19.138	0.34	0.44	23.82	24.60	60.00
Average Detector					
0.181	0.21	0.10	38.90	39.21	54.44
0.240	0.21	0.10	30.80	31.11	52.10
0.297	0.21	0.10	28.10	28.41	50.33
3.815	0.17	0.16	19.70	20.03	46.00
7.103	0.33	0.19	7.60	8.11	50.00
19.138	0.34	0.44	19.20	19.98	50.00

Remarks :

1. All Readings below 1GHz are Quasi-Peak and Average value.
2. “ * ” means that this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Conducted Emission Test
Test Site : No.4 Shielded Room
Power Line : Line 2
Test Mode : Normal Operation

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level dBuV	Emission Level dBuV	Limits dBuV
Quasi-Peak Detector					
*0.177	0.21	0.10	48.65	48.96	64.61
0.240	0.21	0.10	38.97	39.28	62.10
0.298	0.21	0.10	33.33	33.64	60.29
3.576	0.23	0.16	28.02	28.40	56.00
7.107	0.33	0.19	26.73	27.24	60.00
14.205	0.30	0.33	27.88	28.51	60.00
Average Detector					
0.177	0.21	0.10	40.40	40.71	54.63
0.240	0.21	0.10	29.40	29.71	52.10
0.298	0.21	0.10	25.10	25.41	50.30
3.576	0.23	0.16	22.20	22.58	46.00
7.107	0.33	0.19	8.20	8.71	50.00
14.206	0.30	0.33	12.20	12.83	50.00

Remarks :

1. All Readings below 1GHz are Quasi-Peak and Average value.
2. " * " means that 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, 2002

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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Peak Power Output Data
Test Site : No.2 OATS
Test Mode : Normal Operation

Data Speed: 1Mbps

Channel No.	Frequency(MHz)	Measurement	Required Limit	Result
1	2410.80	11.64dBm	1Watt= 30 dBm	Pass
6	2435.80	10.42dBm	1Watt= 30 dBm	Pass
11	2460.80	8.13dBm	1Watt= 30 dBm	Pass

Data Speed: 11Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2410.80	11.42dBm	1Watt= 30 dBm	Pass
6	2435.70	10.00dBm	1Watt= 30 dBm	Pass
11	2460.80	7.86dBm	1Watt= 30 dBm	Pass

4. RF Exposure Evaluation

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)
LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

4.1. Fries Formula

Fries transmission formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm^2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.2. EUT Operation condition

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.3. Test Result of RF Exposure Evaluation

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : RF Exposure Evaluation Data
Test Site : No.2 OATS
Test Mode : Normal Operation

4.3.1 Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2dBi.

4.3.2 Output Power Into Antenna & RF Exposure Evaluation Distance

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Minimum Allowable Distance ® From Skin(cm)
1 (1Mbps)	2410.80	14.58814	1.280546199
1 (11Mbps)	2410.80	13.86756	1.248519275
6 (1Mbps)	2435.80	11.01539	1.112743975
6 (11Mbps)	2435.70	10	1.060218191
11 (1Mbps)	2460.80	6.501297	0.854860502
11 (11Mbps)	2460.80	6.10942	0.828696017

The distance r (4th column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement. So, RF exposure limit warning or SAR test are not required.

5. Radiated Emission

5.1. 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, 2002
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
		Pre-Amplifier	HP	8447D/3307A01812	May, 2002
		Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
		Horn Antenna	EM	EM6917 / 103325	May, 2002
Site # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2002
	X	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2002
	X	Pre-Amplifier	HP	8447D/3307A01814	May, 2002
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2002
	X	Horn Antenna	EM	EM6917 / 103325	May, 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.

5.2. Test Setup

5.3. 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.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
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.

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 additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field dtrength 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 harminics is checked.

5.5. Test Result of Radiated Emission

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS

Test Mode : Channel 1 (1 Mbps)

Frequency	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Limit
MHz	dB	dB/m	Db	dBuV	dBuV/m	dB	dBuV/m
Horizontal							
Peak Detector:							
4823.490	6.17	33.64	19.50	29.23	49.54	24.46	74.00
<7235.414	7.33	36.77	18.34	24.54	50.30	23.70	74.00
<9646.824	8.73	38.25	15.86	20.68	51.80	22.20	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4823.870	6.17	33.64	19.50	29.98	50.29	23.71	74.00
<7235.677	7.33	36.77	18.34	24.60	50.36	23.64	74.00
<9646.981	8.73	38.25	15.86	20.94	52.06	21.94	74.00
Average Detector:							
--							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 6 (1 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
Peak Detector:							
4875.970	6.21	33.77	19.50	28.98	49.47	24.53	74.00
<7313.815	7.37	36.98	18.27	24.62	50.70	23.30	74.00
<9751.762	8.87	38.35	15.82	20.20	51.60	22.40	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4875.841	6.21	33.77	19.50	29.06	49.55	24.45	74.00
<7313.818	7.37	36.98	18.27	25.32	51.40	22.60	74.00
<9751.724	8.87	38.35	15.82	20.76	52.16	21.84	74.00
Average Detector:							
- -							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 11 (1 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
Peak Detector:							
4924.018	6.23	33.90	19.49	29.31	49.96	24.04	74.00
<7386.059	7.42	37.14	18.22	24.63	50.97	23.03	74.00
<9847.979	8.97	38.44	15.70	19.69	51.40	22.60	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4924.069	6.23	33.90	19.49	29.68	50.33	23.67	74.00
<7386.056	7.42	37.14	18.22	24.76	51.10	22.90	74.00
<9847.974	8.97	38.44	15.70	20.11	51.82	22.18	74.00
Average Detector:							
--							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS

Test Mode : Channel 1 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
Peak Detector:							
4824.031	6.17	33.64	19.50	30.07	50.38	23.62	74.00
<7236.093	7.33	36.77	18.34	25.94	51.70	22.30	74.00
<9648.031	8.73	38.25	15.86	20.98	52.10	21.90	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4824.095	6.17	33.64	19.50	29.51	49.82	24.18	74.00
<7236.091	7.33	36.77	18.34	25.02	50.78	23.22	74.00
<9648.042	8.73	38.25	15.86	20.77	51.89	22.11	74.00
Average Detector:							
--							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 6 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
Peak Detector:							
4874.820	6.21	33.77	19.50	29.06	49.55	24.45	74.00
<7312.340	7.37	36.98	18.27	25.96	52.04	21.96	74.00
<9749.672	8.87	38.35	15.82	20.36	51.76	22.24	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4874.881	6.21	33.77	19.50	29.07	49.56	24.44	74.00
<7312.420	7.37	36.98	18.27	24.84	50.92	23.08	74.00
<9749.678	8.87	38.35	15.82	21.00	52.40	21.60	74.00
Average Detector:							
- -							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : Harmonic Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 11 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
Peak Detector:							
4925.609	6.23	33.90	19.49	29.76	50.41	23.59	74.00
<7388.367	7.42	37.14	18.22	24.60	50.94	23.06	74.00
<9851.127	8.97	38.44	15.70	19.57	51.28	22.72	74.00
Average Detector:							
--							
Vertical							
Peak Detector:							
4925.615	6.23	33.90	19.49	30.26	50.91	23.09	74.00
<7388.341	7.42	37.14	18.22	24.96	51.30	22.70	74.00
<9851.135	8.97	38.44	15.70	20.17	51.88	22.12	74.00
Average Detector:							
--							

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. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
4. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS

Test Mode : Channel 1 (1 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
52.485	0.99	6.64	0.00	16.84	24.47	15.53	40.00
152.485	1.51	10.20	0.00	16.37	28.08	15.42	43.50
188.279	1.69	8.00	0.00	16.44	26.13	17.37	43.50
214.854	1.82	7.97	0.00	18.20	27.99	15.51	43.50
348.674	2.51	13.15	0.00	16.90	32.56	13.44	46.00
433.745	2.95	15.75	0.00	12.70	31.40	14.60	46.00
*714.254	4.40	18.28	0.00	10.20	32.87	13.13	46.00
Vertical							
*71.495	1.08	6.60	0.00	18.27	25.95	14.05	40.00
132.487	1.40	10.55	0.00	15.20	27.15	16.35	43.50
166.840	1.57	8.47	0.00	17.24	27.28	16.22	43.50
272.648	2.12	12.12	0.00	15.20	29.43	16.57	46.00
396.784	2.77	15.89	0.00	11.47	30.12	15.88	46.00
526.142	3.43	16.81	0.00	10.24	30.48	15.52	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS

Test Mode : Channel 6 (1 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
67.495	1.07	5.99	0.00	16.47	23.53	16.47	40.00
128.660	1.37	11.59	0.00	14.99	27.95	15.55	43.50
162.347	1.56	9.19	0.00	15.99	26.74	16.76	43.50
300.631	2.26	12.46	0.00	13.70	28.42	17.58	46.00
458.734	3.08	16.58	0.00	11.68	31.35	14.65	46.00
*586.947	3.75	17.92	0.00	12.47	34.13	11.87	46.00
Vertical							
80.347	1.14	7.22	0.00	15.29	23.65	16.35	40.00
119.347	1.33	10.39	0.00	14.22	25.95	17.55	43.50
188.614	1.69	8.01	0.00	13.84	23.54	19.96	43.50
*248.712	2.00	11.53	0.00	18.20	31.73	14.27	46.00
344.715	2.49	12.82	0.00	16.20	31.51	14.49	46.00
459.627	3.08	16.42	0.00	11.87	31.37	14.63	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 11 (1 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
52.684	0.99	6.64	0.00	15.84	23.47	16.53	40.00
140.576	1.44	10.98	0.00	17.23	29.65	13.85	43.50
172.151	1.60	8.93	0.00	16.24	26.77	16.73	43.50
280.945	2.17	12.02	0.00	14.70	28.89	17.11	46.00
483.462	3.22	16.65	0.00	11.64	31.51	14.49	46.00
*630.011	3.96	18.63	0.00	10.47	33.05	12.95	46.00
Vertical							
86.947	1.16	8.06	0.00	18.24	27.46	12.54	40.00
113.998	1.31	10.85	0.00	15.70	27.86	15.64	43.50
178.547	1.64	8.28	0.00	14.76	24.68	18.82	43.50
260.844	2.06	13.10	0.00	16.04	31.20	14.80	46.00
395.475	2.75	15.79	0.00	13.47	32.01	13.99	46.00
*562.366	3.61	19.05	0.00	12.65	35.32	10.68	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 1 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
76.885	1.11	7.32	0.00	16.76	25.18	14.82	40.00
126.348	1.36	11.57	0.00	13.44	26.37	17.13	43.50
166.495	1.57	9.09	0.00	15.02	25.68	17.82	43.50
271.648	2.12	11.93	0.00	17.40	31.45	14.55	46.00
351.267	2.53	13.07	0.00	13.69	29.28	16.72	46.00
*476.253	3.16	16.86	0.00	11.89	31.91	14.09	46.00
Vertical							
48.595	0.96	7.00	0.00	16.74	24.71	15.29	40.00
138.525	1.43	10.30	0.00	14.77	26.49	17.01	43.50
175.334	1.61	8.52	0.00	14.99	25.12	18.38	43.50
204.884	1.77	8.56	0.00	17.25	27.58	15.92	43.50
312.481	2.33	12.33	0.00	13.95	28.60	17.40	46.00
431.817	2.95	17.36	0.00	12.47	32.78	13.22	46.00
*588.412	3.75	19.61	0.00	10.20	33.55	12.45	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 6 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
64.412	1.04	5.73	0.00	18.24	25.01	14.99	40.00
148.226	1.48	10.54	0.00	16.72	28.74	14.76	43.50
194.887	1.72	8.05	0.00	17.24	27.01	16.49	43.50
211.647	1.81	8.29	0.00	12.84	22.95	20.55	43.50
*375.247	2.65	14.20	0.00	16.99	33.84	12.16	46.00
462.770	3.10	16.62	0.00	11.40	31.12	14.88	46.00
Vertical							
82.226	1.14	7.53	0.00	17.45	26.12	13.88	40.00
118.495	1.32	10.49	0.00	12.48	24.29	19.21	43.50
241.744	1.96	11.06	0.00	16.24	29.25	16.75	46.00
371.541	2.63	14.87	0.00	15.20	32.70	13.30	46.00
446.723	3.02	17.05	0.00	11.84	31.91	14.09	46.00
*762.150	4.65	20.40	0.00	9.84	34.89	11.11	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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 : 802.11b WLAN Mini-USB Adaptor
Test Item : General Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Channel 11 (11 Mbps)

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal							
131.848	1.40	11.69	0.00	13.48	26.57	16.93	43.50
174.148	1.61	8.76	0.00	12.88	23.25	20.25	43.50
248.576	2.00	11.46	0.00	16.94	30.40	15.60	46.00
362.570	2.59	13.83	0.00	14.27	30.70	15.30	46.00
418.756	2.87	15.90	0.00	12.05	30.82	15.18	46.00
*681.475	4.24	18.57	0.00	9.65	32.45	13.55	46.00
Vertical							
84.244	1.15	7.66	0.00	16.24	25.05	14.95	40.00
162.477	1.56	8.47	0.00	16.78	26.81	16.69	43.50
308.454	2.31	12.17	0.00	13.45	27.93	18.07	46.00
319.248	2.35	12.51	0.00	16.24	31.10	14.90	46.00
462.740	3.10	16.47	0.00	10.48	30.04	15.96	46.00
*546.991	3.53	18.72	0.00	11.75	34.01	11.99	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss- PreAMP.
3. 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. Band Edge

6.1. 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, 2002
X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2002
X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
X	Pre-Amplifier	HP	8447D/3307A01812	May, 2002
X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
X	Horn Antenna	EM	EM6917 / 103325	May, 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.

6.2. Test Setup

RF Conducted Measurement:

RF Radiated Measurement:

6.3. 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)).

6.4. 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.

6.5. Test Result of Band Edge

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Band Edge Data
Test Site : No.2 OATS
Test Mode : Channel 1 (1Mbps)

RF Radiated Measurement:

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

Figure Channel 1: (Horizontal)

Figure Channel 1: (Vertical)

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Band Edge Data
Test Site : No.2 OATS
Test Mode : Channel 1 (11Mbps)

RF Radiated Measurement:

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

Figure Channel 1: (Horizontal)

Figure Channel 1: (Vertical)

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Band Edge Data
Test Site : No.2 OATS
Test Mode : Channel 11 (1Mbps)

RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
11(Horizontal)	2491.5	34.95	28.70	4.10	19.97	47.77	74	Pass
11 (Vertical)	2484.3	34.46	28.66	4.10	19.98	47.23	74	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.

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Band Edge Data
Test Site : No.1 OATS
Test Mode : Channel 11 (11Mbps)

RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
11(Horizontal)	2486.8	34.50	28.70	4.10	19.98	47.31	74	Pass
11 (Vertical)	2495.5	34.63	28.70	4.10	19.97	47.45	74	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.

7. Occupied Bandwidth

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, 2002

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 minimum bandwidth shall be at least 500kHz.

7.4. Test Result of Occupied Bandwidth

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Occupied Bandwidth Data
Test Site : No.2 OATS
Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (1Mbps)	2410.40	12400	>500	Pass
1 (11Mbps)	2410.40	11600	>500	Pass

Figure Channel 1: 1Mbps

Figure Channel 1: 11Mbps

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Occupied Bandwidth Data
Test Site : No.2 OATS
Test Mode : Channel 6

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (1Mbps)	2435.40	11300	>500	Pass
6 (11Mbps)	2435.40	11100	>500	Pass

Figure Channel 6: 1Mbps

Figure Channel 6: 11Mbps

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Occupied Bandwidth Data
Test Site : No.2 OATS
Test Mode : Channel 11

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (1Mbps)	2460.30	10000	>500	Pass
11 (11Mbps)	2462.60	10200	>500	Pass

Figure Channel 11: 1Mbps

Figure Channel 11: 11Mbps

8. Power Density

8.1. 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, 2002

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.

8.2. Test Setup

8.3. Limits

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

8.4. Test Result of Power Density

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Power Density Data
Test Site : No.2 OATS
Test Mode : Channel 1

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
1 (1Mbps)	2412.562	-16.59	< 8dBm	Pass
1 (11Mbps)	2410.560	-16.24	< 8dBm	Pass

Figure Channel 1: 1Mbps

Figure Channel 1: 11Mbps

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Power Density Data
Test Site : No.2 OATS
Test Mode : Channel 6

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (1Mbps)	2437.561	-17.87	< 8dBm	Pass
6 (11Mbps)	2435.560	-17.30	< 8dBm	Pass

Figure Channel 6: 1Mbps

Figure Channel 6: 11Mbps

Product : 802.11b WLAN Mini-USB Adaptor
Test Item : Density Data
Test Site : No.2 OATS
Test Mode : Channel 11

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (1Mbps)	2461.337	-19.70	< 8dBm	Pass
11 (11Mbps)	2461.337	-19.56	< 8dBm	Pass

Figure Channel 11: 1Mbps

Figure Channel 11: 11Mbps

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

Front View of Conducted Test

Back View of Conducted Test

Front View of Radiated Test

Back View of Radiated Test

Front View of High Frequency Radiated Test

Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

(1) EUT Photo

(2) EUT Photo

(3) EUT Photo

(4) EUT Photo

(5) EUT Photo

(6) EUT Photo

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