



# FCC TEST REPORT

**REPORT NO.:** RF901025R01

**MODEL NO.:** EW2104, WBR400,  
WBR500, Hawking WR254S

**RECEIVED:** October 15, 2001

**TESTED:** Oct. 17 ~ Oct. 31, 2001

**APPLICANT:** ARGUS TECHNOLOGIES CO., LTD.

**ADDRESS:** 8F, No.183, Kang Chien Rd., Nei-Hu District,  
Taipei, Taiwan 114, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** 47 14th Ling, Chia Pau Tsuen, Linkou Hsiang,  
Taipei, Taiwan, R.O.C.

This test report consists of 49 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, NVLAP or any government agencies. The test results in the report only apply to the tested sample.



0528  
ILAC MRA

NVLAP®

Lab Code: 200102-0



## Table of Contents

1	CERTIFICATION .....	4
2	SUMMARY OF TEST RESULTS.....	5
3	GENERAL INFORMATION .....	6
3.1	GENERAL DESCRIPTION OF EUT.....	6
3.2	DESCRIPTION OF TEST MODES.....	7
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	7
3.4	DESCRIPTION OF SUPPORT UNITS.....	8
4	TEST TYPES AND RESULTS.....	9
4.1	CONDUCTED EMISSION MEASUREMENT .....	9
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	9
4.1.2	TEST INSTRUMENTS.....	9
4.1.3	TEST PROCEDURES .....	10
4.1.4	TEST SETUP .....	10
4.1.5	EUT OPERATING CONDITIONS.....	11
4.1.6	TEST RESULTS .....	12
4.2	RADIATED EMISSION MEASUREMENT .....	18
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT .....	18
4.2.2	TEST INSTRUMENTS .....	19
4.2.3	TEST PROCEDURES .....	20
4.2.4	TEST SETUP .....	21
4.2.5	EUT OPERATING CONDITIONS.....	21
4.2.6	TEST RESULTS .....	22
4.3	6DB BANDWIDTH MEASUREMENT .....	27
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT.....	27
4.3.2	TEST INSTRUMENTS .....	27
4.3.3	TEST PROCEDURE.....	28
4.3.4	TEST SETUP .....	28
4.3.5	EUT OPERATING CONDITIONS.....	28
4.3.6	TEST RESULTS .....	29
4.4	MAXIMUM PEAK OUTPUT POWER .....	33
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT .....	33
4.4.2	INSTRUMENTS.....	33
4.4.3	TEST PROCEDURES .....	34
4.4.4	TEST SETUP .....	34
4.4.5	EUT OPERATING CONDITIONS.....	34
4.4.6	TEST RESULTS .....	35
4.5	POWER SPECTRAL DENSITY MEASUREMENT.....	36
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	36
4.5.2	TEST INSTRUMENTS.....	36
4.5.3	TEST PROCEDURE.....	37
4.5.4	TEST SETUP .....	37
4.5.5	EUT OPERATING CONDITION .....	37
4.5.6	TEST RESULTS .....	38
4.6	BAND EDGES MEASUREMENT .....	42



4.6.1	LIMITS OF BAND EDGES MEASUREMENT .....	42
4.6.2	TEST INSTRUMENTS.....	42
4.6.3	TEST PROCEDURE.....	42
4.6.4	EUT OPERATING CONDITION .....	43
4.6.5	TEST RESULTS .....	43
4.7	ANTENNA REQUIREMENT .....	46
4.7.1	STANDARD APPLICABLE.....	46
4.7.2	ANTENNA CONNECTED CONSTRUCTION .....	46
5	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	47
6	INFORMATION ON THE TESTING LABORATORIES .....	49



## 1 CERTIFICATION

**PRODUCT :** Wireless Router  
**BRAND NAME :** ARGUS  
**MODEL NO. :** EW2104, WBR400, WBR500,  
Hawking WR254S  
**APPLICANT :** ARGUS TECHNOLOGIES CO.  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-1992, Canada RSS 210,  
New Zealand RFS 29

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Oct. 17, 2001 to Oct. 31, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY : James Lee • DATE: Nov. 5, 2001  
James Lee

CHECKED BY : Emily Lu • DATE: Nov. 5, 2001  
Emily Lu

APPROVED BY : Alan Lane • DATE: Nov. 5, 2001  
Dr. Alan Lane, Manager

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.107	AC Power Conducted Emission Limit: 48dBuV	PASS	Meet the requirement of limit Minimum passing margin is -3.78dBuV at 0.8187MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -2.0dBuV at 748.00MHz
15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(c)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless Router
<b>MODEL NO.</b>	EW2104, WBR400, WBR500, Hawking WR254S
<b>POWER SUPPLY</b>	5VDC from AC adapter
<b>MODULATION TYPE</b>	DSSS
<b>RADIO TECHNOLOGY</b>	BPSK/QPSK/CCK
<b>TRANSFER RATE</b>	1/2/5.5/11Mbps
<b>FREQUENCY RANGE</b>	2412MHz ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11
<b>OUTPUT POWER</b>	13.6dBm
<b>ANTENNA TYPE</b>	Dipole antenna
<b>POWER CABLE</b>	1.8m (nonshielded)
<b>I/O PORTS</b>	RJ45, WAN, Serial Port
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

1. The EUT is operated with the following power adapter.

<b>Brand Name:</b>	Touch
<b>Model No. :</b>	SP9715-A
<b>Input Power :</b>	100-240V, 0.6A, 50-60Hz
<b>Output Power :</b>	DC 5V, 2.0A

2. The model EW2104, WBR400, WBR500 and Hawking WR254S are identical except for model number.

3. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided in this EUT.

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

**NOTE:** 1. Below 1 GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, worst case one, was chosen for final test.  
 2. Above 1 GHz, the channel 1, 6, and 11 were tested individually.

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Router. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC CFR 47 Part 15, Subpart C. (15.247)**

**ANSI C63.4 : 1992, Canada RSS 210, New Zealand RFS 29**

All tests have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Personal Computer	HP	Brio BA410	SG12902766	FCC DoC APPROVED
2	COLOR MONITOR	HP	D2842A	KR93473168	BEJCB910
3	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110111	F4ZDA-104G
4	PS/2 MOUSE	LOGITECH	M-S43	LZE00703207	DZL211106
5	MODEM	ACEEX	1414	980020510	IFAXDM1414
6	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
7	Notebook	Dell	PP01L	TW-09C748-12800-19O-B220	FCC DoC APPROVED
8	10/100 LAN PC CARD	3COM	3CCFE575CT-D	6ZE1316B4E	FCC DoC APPROVED

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m b1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core. raid shielded wire, terminated with VGA connector via metallic frame, w/o core.
3	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
4	1.8 m foil shielded wire, terminated with PS/2 connector via drain wire, w/o core.
5	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
6	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
7	NA
8	NA

**NOTE:** All power cords of the above support units are non shielded (1.8m).



## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class B (dBuV)	
	Quasi-peak	Average
0.45 – 30	48	-

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS30	834115/016	Feb. 21, 2002
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ESH2-Z5	892107/003	July 10, 2002
ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Dec. 12, 2001
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/018	Dec. 3, 2001
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	July 10, 2002
Software	Cond-V2J	NA	NA
RF cable (JYEBAO)	RG-58A/U	Cable-C03.01	July 11, 2002
Terminator (For EMCO LISN)	NA	E1-01-300	Feb. 20, 2002
Terminator (For EMCO LISN)	NA	E1-01-301	Feb. 20, 2002
Shielded Room	Site 3	ADT-C03	NA
VCCI Site Registration No.	Site 3	C-274	NA

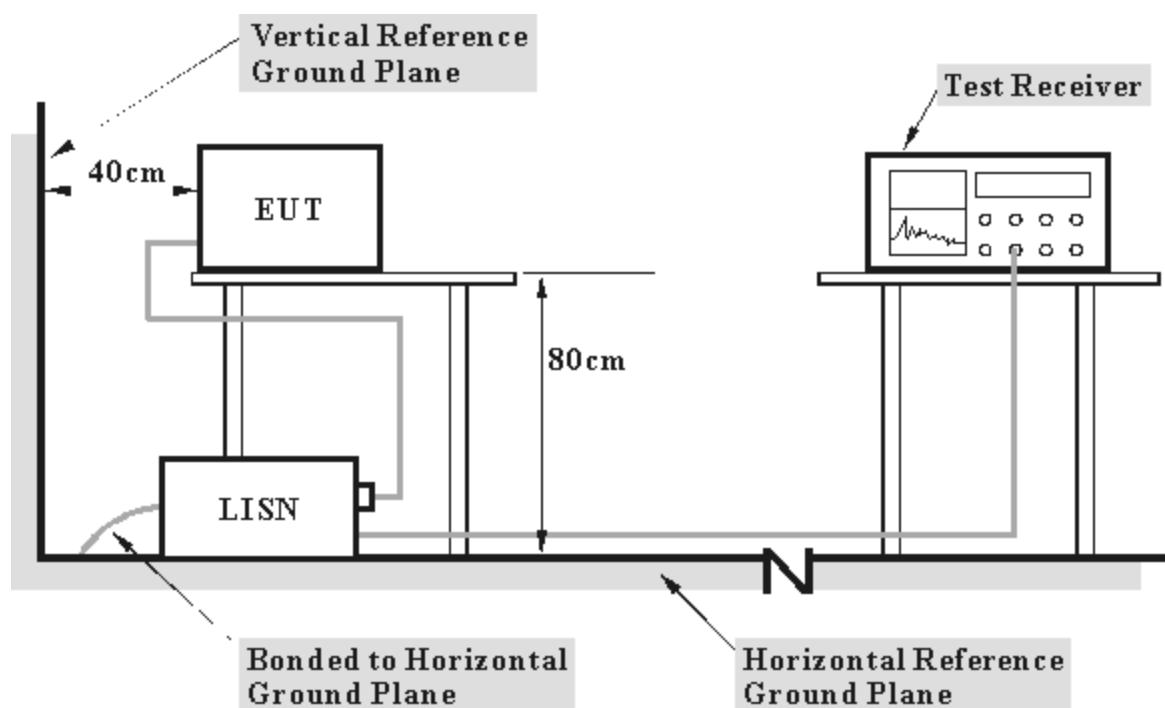
**NOTE:**

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. “\*\*”: These equipment are used for conducted telecom port test only (if tested).

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 450 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 4.1.4 TEST SETUP



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



#### 4.1.5 EUT OPERATING CONDITIONS

- a. Placed the EUT (with a computer system) on the testing table.
- b. The computer system sent data to EUT by command "PIN" via an RJ 45 cable.
- c. The computer system sent "H" messages to Color Monitor and Monitor displayed "H" patterns on its screen.
- d. The computer system sent "H" messages to modem.
- e. The computer system sent "H" messages to printer, and the printer prints them on paper.
- f. Prepared another computer system to act as a communication partner and placed it outside of testing area.
- g. The communication partner run a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ 45 cable.
- h. The communication partner sent data to EUT by command "PIN".

## 4.1.6 TEST RESULTS

<b>EUT</b>		Wireless Router		<b>MODEL</b>	EW2104	
<b>MODE</b>		Channel 1		<b>6dB BANDWIDTH</b>	10 kHz	
<b>INPUT POWER (SYSTEM)</b>		120Vac, 60 Hz		<b>PHASE</b>	Line (L)	
<b>ENVIRONMENTAL CONDITIONS</b>		25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee		

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.477	0.11	34.14	-	34.25	-	48.00	-	-13.75	-
2	0.750	0.16	42.50	-	42.66	-	48.00	-	-5.34	-
3	2.048	0.20	35.25	-	35.45	-	48.00	-	-12.55	-
4	3.891	0.29	36.37	-	36.66	-	48.00	-	-11.34	-
5	8.669	0.38	38.61	-	38.99	-	48.00	-	-9.01	-
6	24.092	0.52	34.38	-	34.90	-	48.00	-	-13.10	-

Remarks: 1. "": Undetectable

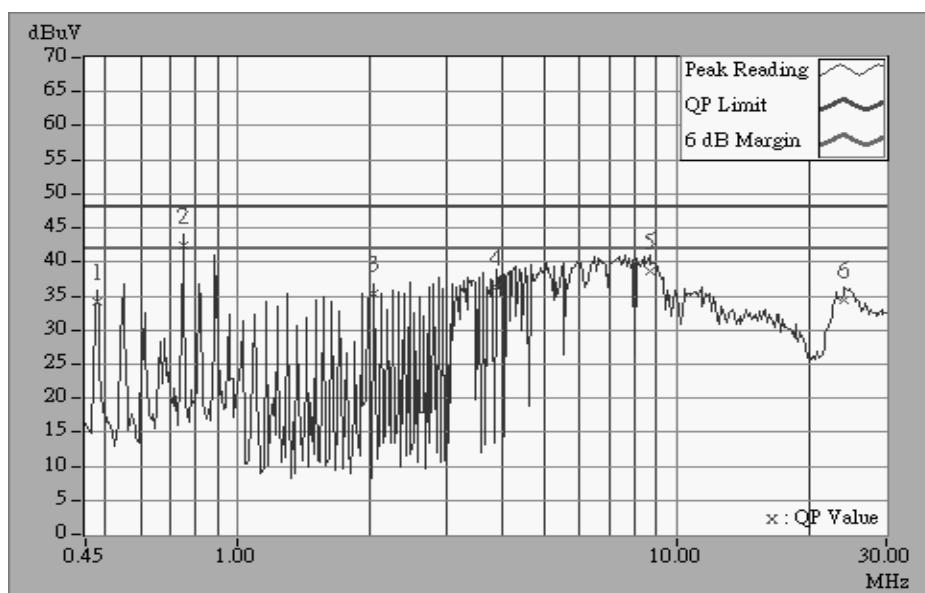
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. "-": NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.477	0.11	40.84	-	40.95	-	48.00	-	-7.05	-
2	0.818	0.17	44.01	-	44.18	-	48.00	-	-3.82	-
3	1.911	0.20	40.11	-	40.31	-	48.00	-	-7.69	-
4	5.051	0.32	41.61	-	41.93	-	48.00	-	-6.07	-
5	8.531	0.38	41.91	-	42.29	-	48.00	-	-5.71	-
6	22.180	0.94	37.30	-	38.24	-	48.00	-	-9.76	-

Remarks: 1. "": Undetectable

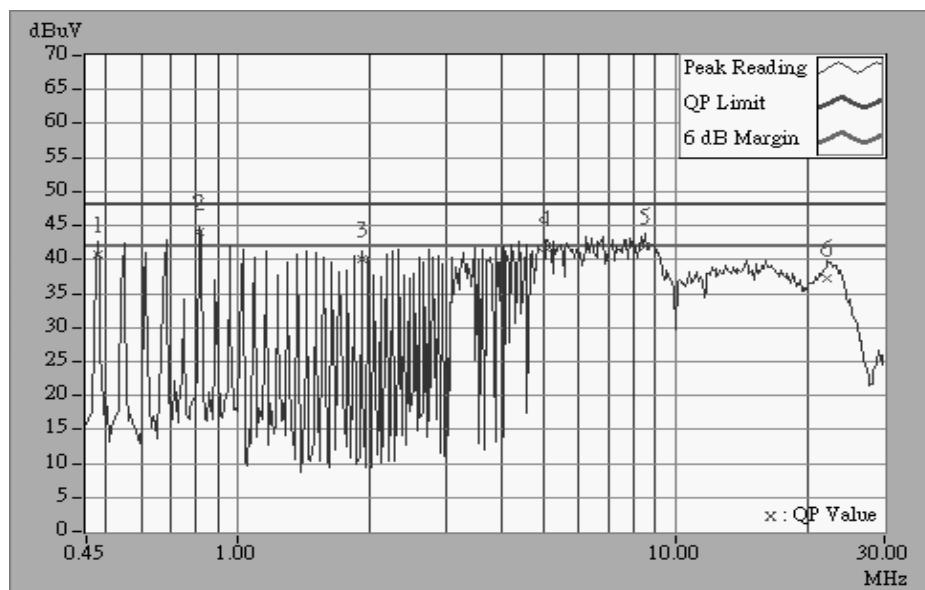
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. "-": NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.477	0.11	34.18	-	34.29	-	48.00	-	-13.71	-
2	0.751	0.16	42.75	-	42.91	-	48.00	-	-5.09	-
3	1.297	0.20	34.77	-	34.97	-	48.00	-	-13.03	-
4	2.935	0.25	36.32	-	36.57	-	48.00	-	-11.43	-
5	8.465	0.37	39.10	-	39.47	-	48.00	-	-8.53	-
6	23.891	0.52	34.40	-	34.92	-	48.00	-	-13.08	-

Remarks: 1. "": Undetectable

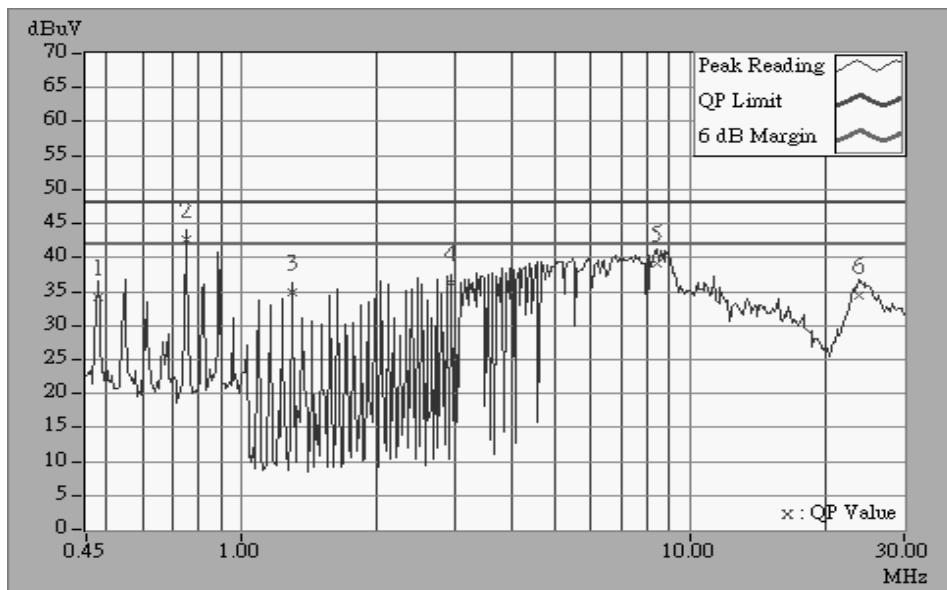
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. "-": NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.478	0.11	40.90	-	41.01	-	48.00	-	-6.99	-
2	0.818	0.17	44.03	-	44.20	-	48.00	-	-3.80	-
3	1.910	0.20	39.83	-	40.03	-	48.00	-	-7.97	-
4	2.867	0.24	40.39	-	40.63	-	48.00	-	-7.37	-
5	8.465	0.37	41.29	-	41.66	-	48.00	-	-6.34	-
6	23.004	0.96	37.27	-	38.23	-	48.00	-	-9.77	-

Remarks: 1. \*\*: Undetectable

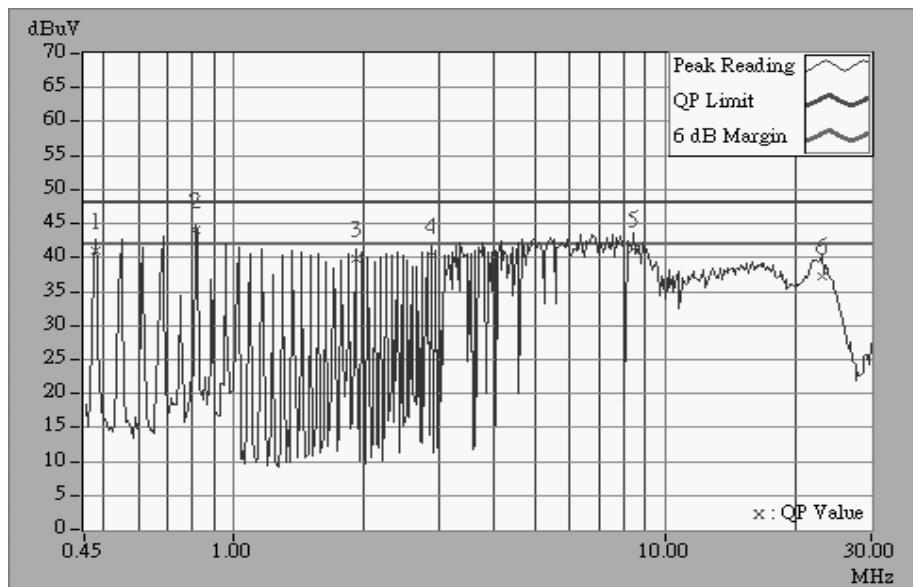
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.479	0.11	34.08	-	34.19	-	48.00	-	-13.81	-
2	0.752	0.16	42.06	-	42.22	-	48.00	-	-5.78	-
3	2.116	0.21	35.08	-	35.29	-	48.00	-	-12.71	-
4	5.596	0.33	38.11	-	38.44	-	48.00	-	-9.56	-
5	8.602	0.38	39.91	-	40.29	-	48.00	-	-7.71	-
6	23.618	0.53	33.71	-	34.24	-	48.00	-	-13.76	-

Remarks: 1. \*\*: Undetectable

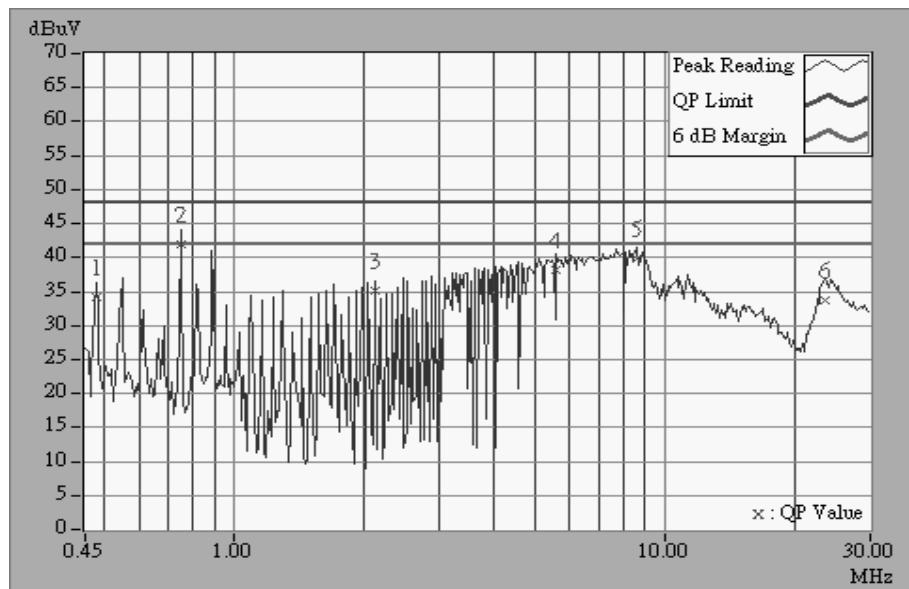
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> James Lee

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.477	0.11	40.90	-	41.01	-	48.00	-	-6.99	-
2	0.819	0.17	44.05	-	44.22	-	48.00	-	-3.78	-
3	1.570	0.20	39.63	-	39.83	-	48.00	-	-8.17	-
4	2.458	0.22	39.71	-	39.93	-	48.00	-	-8.07	-
5	8.738	0.38	40.80	-	41.18	-	48.00	-	-6.82	-
6	22.664	0.95	37.74	-	38.69	-	48.00	-	-9.31	-

Remarks: 1. \*\*: Undetectable

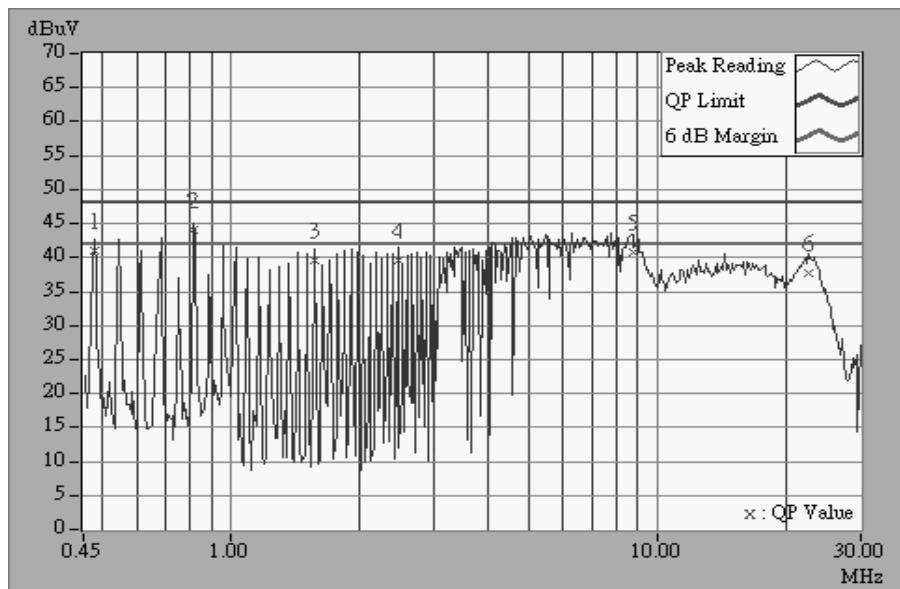
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field Strength of Fundamental	
	uV/m	dBuV/m
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*HP Spectrum Analyzer	8590L	3544A01176	May 7, 2002
*HP Preamplifier	8447D	2944A08119	July 11, 2002
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2002
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 2, 2002
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 15, 2002
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 2, 2002
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 2, 2002
Open Field Test Site	Site 5	ADT-R05	July 28, 2002
Site Registration No.	FCC: 90422 Canada IC: IC 3789 VCCI : R-1039		

**NOTE:**

1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
3. \*\* = These equipment are used for the final measurement.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz.



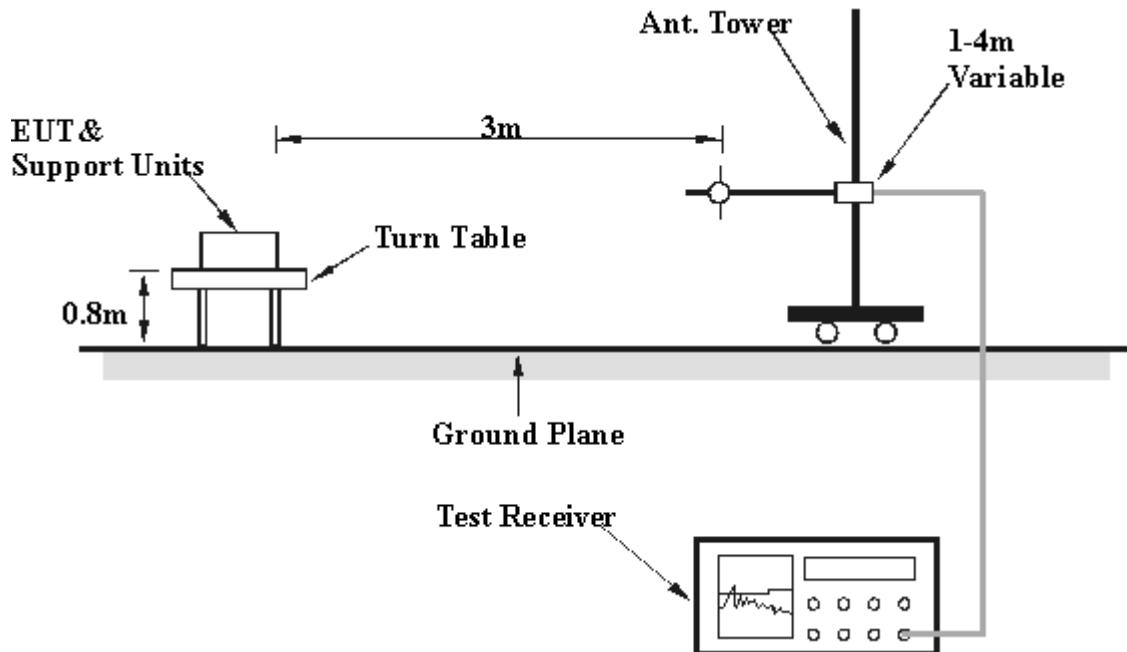
#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.5.



## 4.2.6 TEST RESULTS

<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> Gary Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)	
1	125.00	31.6 QP	43.50	-11.90	1.52H	337	19.00	11.47	1.10	0.00	-12.57	
2	150.00	32.5 QP	43.50	-11.00	2.11H	305	21.00	10.30	1.20	0.00	-11.51	
3	200.00	36.8 QP	43.50	-6.70	1.79H	109	26.40	8.98	1.42	0.00	-10.40	
4	250.00	30.7 QP	46.00	-15.30	1.83H	51	17.00	12.02	1.66	0.00	-13.69	
5	300.00	31.1 QP	46.00	-14.90	1.49H	38	16.00	13.18	1.88	0.00	-15.06	
6	375.00	34.7 QP	46.00	-11.30	1.00H	99	17.40	15.13	2.14	0.00	-17.27	
7	400.00	34.8 QP	46.00	-11.20	2.55H	281	16.50	16.11	2.24	0.00	-18.35	
8	450.00	36.8 QP	46.00	-9.20	1.10H	15	18.00	16.37	2.41	0.00	-18.78	
9	500.00	40.8 QP	46.00	-5.20	1.01H	286	21.00	17.26	2.50	0.00	-19.77	
10	528.00	38.4 QP	46.00	-7.60	1.81H	319	18.20	17.62	2.60	0.00	-20.23	
11	550.00	36.8 QP	46.00	-9.20	1.03H	330	16.20	17.93	2.68	0.00	-20.61	
12	600.00	36.6 QP	46.00	-9.40	1.92H	63	15.20	18.61	2.83	0.00	-21.44	
13	625.00	36.0 QP	46.00	-10.00	1.30H	309	14.20	18.91	2.92	0.00	-21.83	
14	650.00	38.3 QP	46.00	-7.70	3.19H	357	16.00	19.23	3.02	0.00	-22.25	
15	700.00	37.5 QP	46.00	-8.50	1.42H	141	15.00	19.31	3.15	0.00	-22.46	
16	725.00	36.0 QP	46.00	-10.00	1.41H	195	13.00	19.76	3.21	0.00	-22.97	
17	748.50	41.4 QP	46.00	-4.60	1.39H	38	18.00	20.14	3.26	0.00	-23.41	
18	750.00	39.4 QP	46.00	-6.60	1.56H	6	16.00	20.18	3.26	0.00	-23.44	
19	800.00	39.0 QP	46.00	-7.00	1.71H	343	15.00	20.69	3.32	0.00	-24.02	
20	850.00	38.0 QP	46.00	-8.00	1.21H	59	14.00	20.48	3.50	0.00	-23.98	
21	875.00	37.2 QP	46.00	-8.80	1.42H	235	13.00	20.63	3.54	0.00	-24.18	
22	950.00	38.2 QP	46.00	-7.80	2.56H	315	13.20	21.20	3.79	0.00	-25.00	

**NOTE:**

- 1 Emission level = Raw Value - Correction Factor
- 2 Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
- 3 The other emission levels were very low against the limit.
- 4 Margin value = Emission level - Limit value



<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> Gary Chang

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	50.00	36.5 QP	40.00	-3.50	1.10V	141	26.00	9.78	0.71	0.00	-10.48
2	125.00	34.6 QP	43.50	-8.90	1.30V	294	22.00	11.47	1.10	0.00	-12.57
3	150.00	34.5 QP	43.50	-9.00	1.05V	81	23.00	10.30	1.20	0.00	-11.52
4	200.00	38.4 QP	43.50	-5.10	1.06V	281	28.00	8.98	1.42	0.00	-10.41
5	250.00	36.7 QP	46.00	-9.30	2.04V	63	23.00	12.02	1.66	0.00	-13.70
6	350.00	33.3 QP	46.00	-12.70	1.24V	322	17.00	14.21	2.04	0.00	-16.25
7	400.00	36.5 QP	46.00	-9.50	1.46V	162	18.20	16.11	2.24	0.00	-18.36
8	450.00	37.8 QP	46.00	-8.20	1.36V	161	19.00	16.37	2.41	0.00	-18.79
9	500.00	35.5 QP	46.00	-10.50	1.48V	80	15.70	17.26	2.50	0.00	-19.77
10	528.00	35.2 QP	46.00	-10.80	1.43V	146	15.00	17.62	2.60	0.00	-20.22
11	550.00	35.4 QP	46.00	-10.60	2.01V	227	14.80	17.93	2.68	0.00	-20.60
12	625.00	37.6 QP	46.00	-8.40	1.60V	27	15.80	18.91	2.92	0.00	-21.84
13	650.00	39.3 QP	46.00	-6.70	2.19V	256	17.00	19.23	3.02	0.00	-22.25
14	700.00	38.5 QP	46.00	-7.50	1.79V	131	16.00	19.31	3.15	0.00	-22.46
15	748.00	44.0 QP	46.00	-2.00	1.34V	140	20.60	20.14	3.26	0.00	-23.40
16	750.00	40.4 QP	46.00	-5.60	1.34V	30	17.00	20.18	3.26	0.00	-23.44
17	775.00	38.7 QP	46.00	-7.30	1.20V	339	15.00	20.43	3.29	0.00	-23.72
18	800.00	38.2 QP	46.00	-7.80	1.07V	49	14.20	20.69	3.32	0.00	-24.01
19	850.00	41.2 QP	46.00	-4.80	1.03V	194	17.20	20.48	3.50	0.00	-23.98
20	875.00	38.2 QP	46.00	-7.80	1.19V	69	14.00	20.63	3.54	0.00	-24.18
21	900.00	38.4 QP	46.00	-7.60	1.00V	342	14.00	20.80	3.58	0.00	-24.39
22	950.00	38.0 QP	46.00	-8.00	1.83V	280	13.00	21.20	3.79	0.00	-24.99

**NOTE:**

- 1 Emission level = Raw Value - Correction Factor
- 2 Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
- 3 The other emission levels were very low against the limit.
- 4 Margin value = Emission level - Limit value



<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 1	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> Gary Chang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2037.40	48.0 PK	74.00	-26.00	1.55H	353	52.85	25.20	4.86	34.90	4.84
2	*2413.40	97.1 PK	-	-	1.33H	12	64.93	27.11	5.10	0.00	-32.22
3	*2413.40	89.6 AV	-	-	1.33H	12	57.40	27.11	5.10	0.00	-32.22
4	4076.00	50.4 PK	74.00	-23.60	1.39H	35	48.00	30.13	6.78	34.52	-2.39
5	4824.10	51.8 PK	74.00	-22.20	1.59H	311	47.80	31.43	7.23	34.63	-4.02

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2038.00	51.9 AV	54.00	-2.10	1.19V	75	56.70	25.20	4.86	34.90	4.84
2	*2412.00	100.3 PK	-	-	1.77V	335	68.13	27.11	5.10	0.00	-32.21
3	*2412.00	92.6 AV	-	-	1.77V	335	60.34	27.11	5.10	0.00	-32.21
4	4076.00	51.4 PK	74.00	-22.60	1.58V	312	49.00	30.13	6.78	34.52	-2.39
5	4824.00	52.0 PK	74.00	-22.00	1.44V	138	48.00	31.43	7.23	34.63	-4.02

**NOTE:**

1. Emission level = Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. The limit value is defined as per 15.247
6. “\*”: Fundamental frequency



<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 6	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> Gary Chang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2062.40	47.0 PK	74.00	-27.00	1.81H	340	51.50	25.41	4.96	34.90	4.53
2	*2437.00	98.3 PK	-	-	1.00H	37	65.85	27.33	5.08	0.00	-32.41
3	*2437.00	90.6 AV	-	-	1.00H	37	58.20	27.33	5.08	0.00	-32.41
4	4126.00	51.9 PK	74.00	-22.10	1.11H	104	49.40	30.32	6.70	34.56	-2.46
5	4874.10	52.1 PK	74.00	-21.90	1.39H	3	48.00	31.47	7.21	34.63	-4.05

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2063.00	49.5 PK	74.00	-24.50	1.17V	6	54.00	25.41	4.96	34.90	4.53
2	*2437.40	101.1 PK	-	-	1.89V	340	68.70	27.33	5.08	0.00	-32.40
3	*2437.40	94.4 AV	-	-	1.89V	340	62.00	27.33	5.08	0.00	-32.40
4	4126.00	50.9 PK	74.00	-23.10	1.52V	260	48.40	30.32	6.70	34.56	-2.46
5	4874.20	51.9 PK	74.00	-22.10	1.29V	25	47.80	31.47	7.21	34.63	-4.06

**NOTE:**

1. Emission level = Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. The limit value is defined as per 15.247
6. “\*”: Fundamental frequency



<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa		<b>TESTED BY:</b> Gary Chang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2088.00	48.4 PK	74.00	-25.60	1.14H	6	52.64	25.62	5.02	34.90	4.26
2	*2463.00	93.1 PK	-	-	1.73H	298	60.67	27.33	5.08	0.00	-32.40
3	*2463.00	85.4 AV	-	-	1.73H	298	53.00	27.33	5.08	0.00	-32.40
4	2483.50	47.7 PK	74.00	-26.30	1.72H	288	50.00	27.54	5.06	34.90	2.31
5	4176.00	51.5 PK	74.00	-22.50	1.41H	306	49.00	30.41	6.68	34.58	-2.51
6	4924.00	51.1 PK	74.00	-22.90	1.46H	229	47.00	31.51	7.21	34.62	-4.10

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2088.00	52.6 PK	74.00	-21.40	1.03V	28	56.88	25.62	5.02	34.90	4.26
2	*2463.00	101.4 PK	-	-	1.00V	43	69.02	27.33	5.08	0.00	-32.41
3	*2463.00	93.6 AV	-	-	1.00V	43	61.20	27.33	5.08	0.00	-32.41
4	2483.50	50.7 PK	74.00	-23.30	1.03V	343	53.00	27.54	5.06	34.90	2.31
5	4176.00	51.5 PK	74.00	-22.50	1.46V	81	49.00	30.41	6.68	34.58	-2.51
6	4924.00	50.1 PK	74.00	-23.90	1.46V	291	45.96	31.51	7.21	34.62	-4.10

**NOTE:**

1. Emission level= Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. The limit value is defined as per 15.247
6. “\*”: Fundamental frequency



## 4.3 6DB BANDWIDTH MEASUREMENT

### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 17, 2002

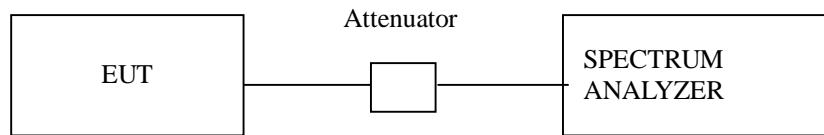
Notes:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

#### 4.3.4 TEST SETUP



#### 4.3.5 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

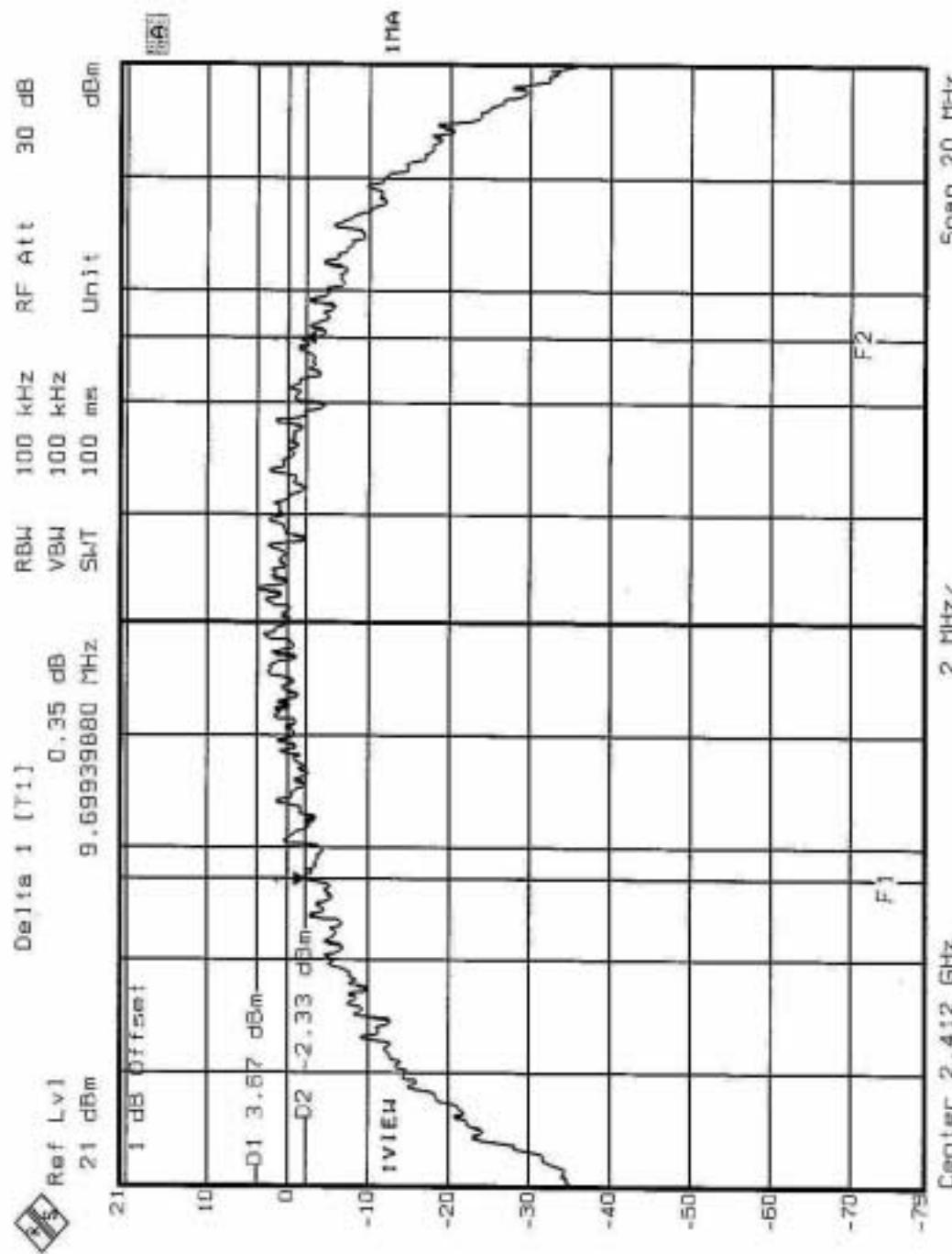


## 4.3.6 TEST RESULTS

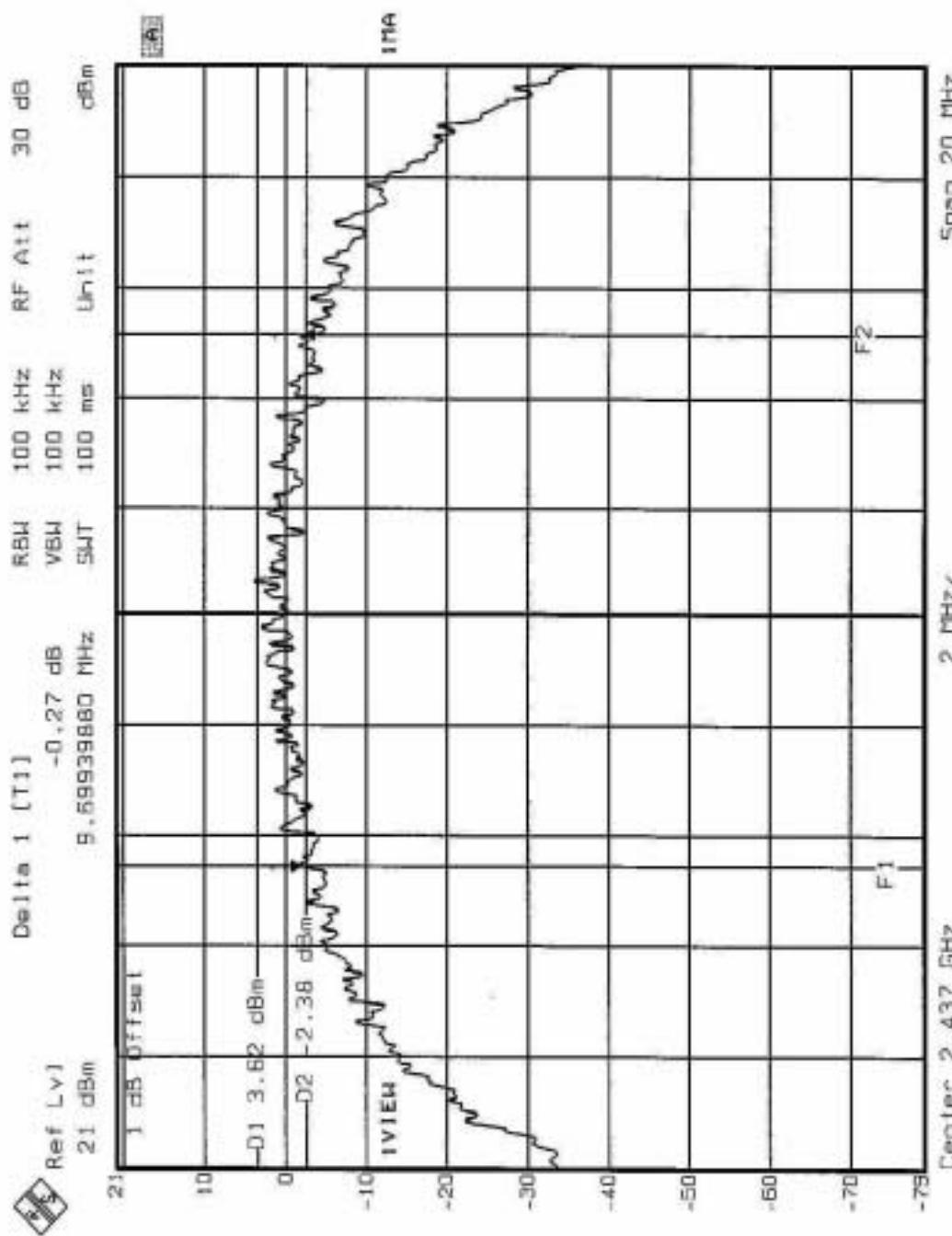
<b>EUT</b>	Wireless router	<b>MODEL</b>	EW2104
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 70%RH, 1005 hPa
<b>TESTED BY:</b> Bruce Shiau			

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.70	0.5	PASS
6	2437	9.70	0.5	PASS
11	2462	10.34	0.5	PASS

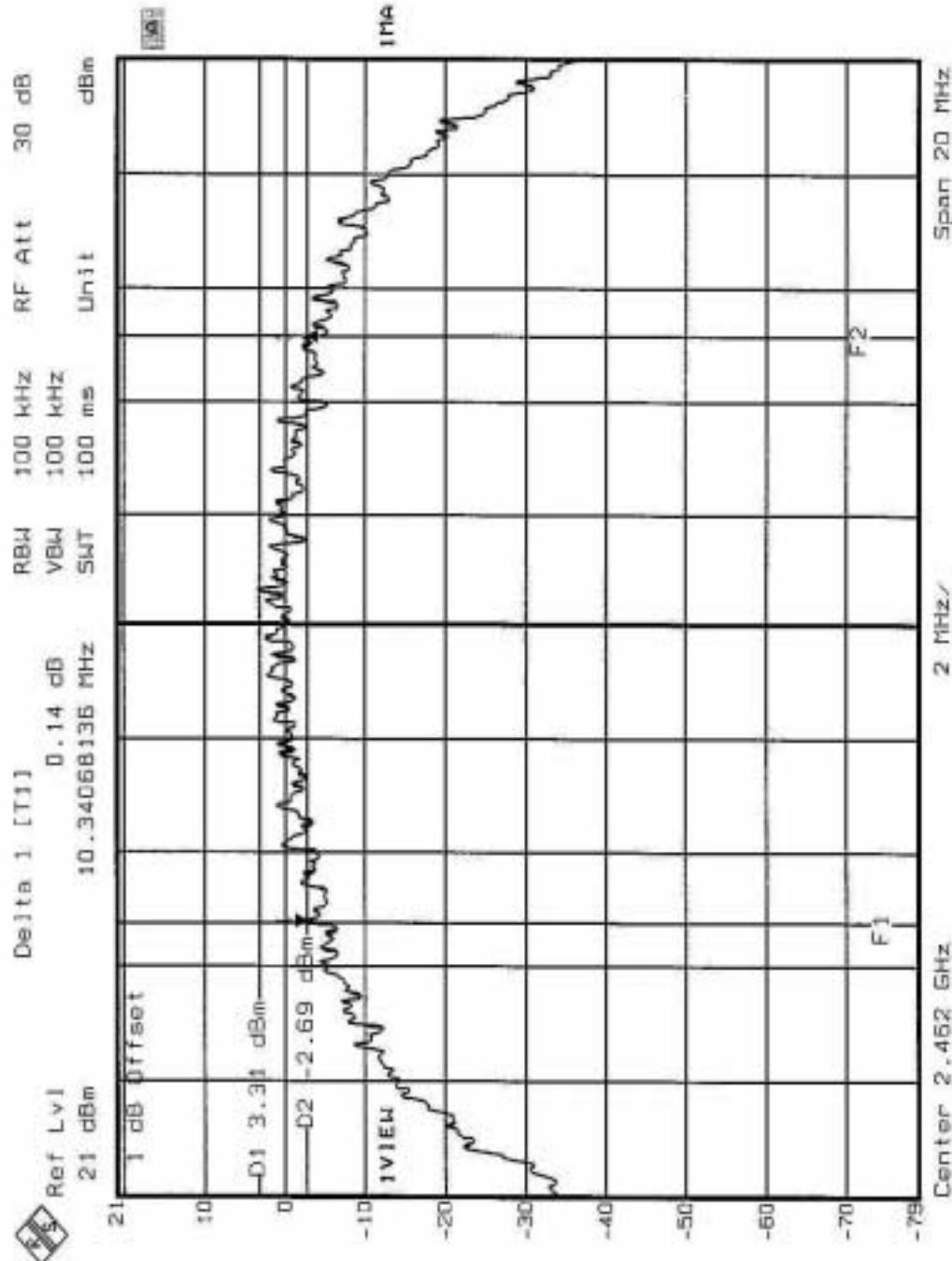
CH1



CH6



CH11





#### 4.4 MAXIMUM PEAK OUTPUT POWER

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SINGLE CHANNEL POWER METER	NRVS	100026	Feb. 21, 2002
PEAK POWER SENSOR	NRV-Z32	100013	May 23, 2002

**NOTE:** 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.4.3 TEST PROCEDURES

The transmitter output was connected to the peak power meter.

#### 4.4.4 TEST SETUP



#### 4.4.5 EUT OPERATING CONDITIONS

Same as Item 3.4.5



## 4.4.6 TEST RESULTS

<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 70%RH, 1005 hPa
<b>TESTED BY:</b> Bruce Shiau			

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	13.59	30	PASS
6	2437	13.57	30	PASS
11	2462	13.35	30	PASS



## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 17, 2002

**NOTE:** 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

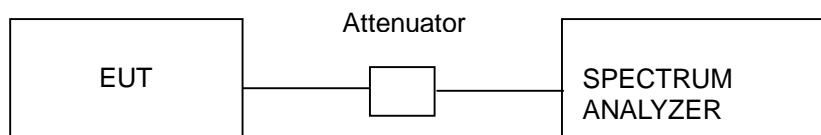
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3 kHz for a full response of the mixer in the spectrum analyzer.

#### 4.5.4 TEST SETUP



#### 4.5.5 EUT OPERATING CONDITION

Same as Item 3.4.5

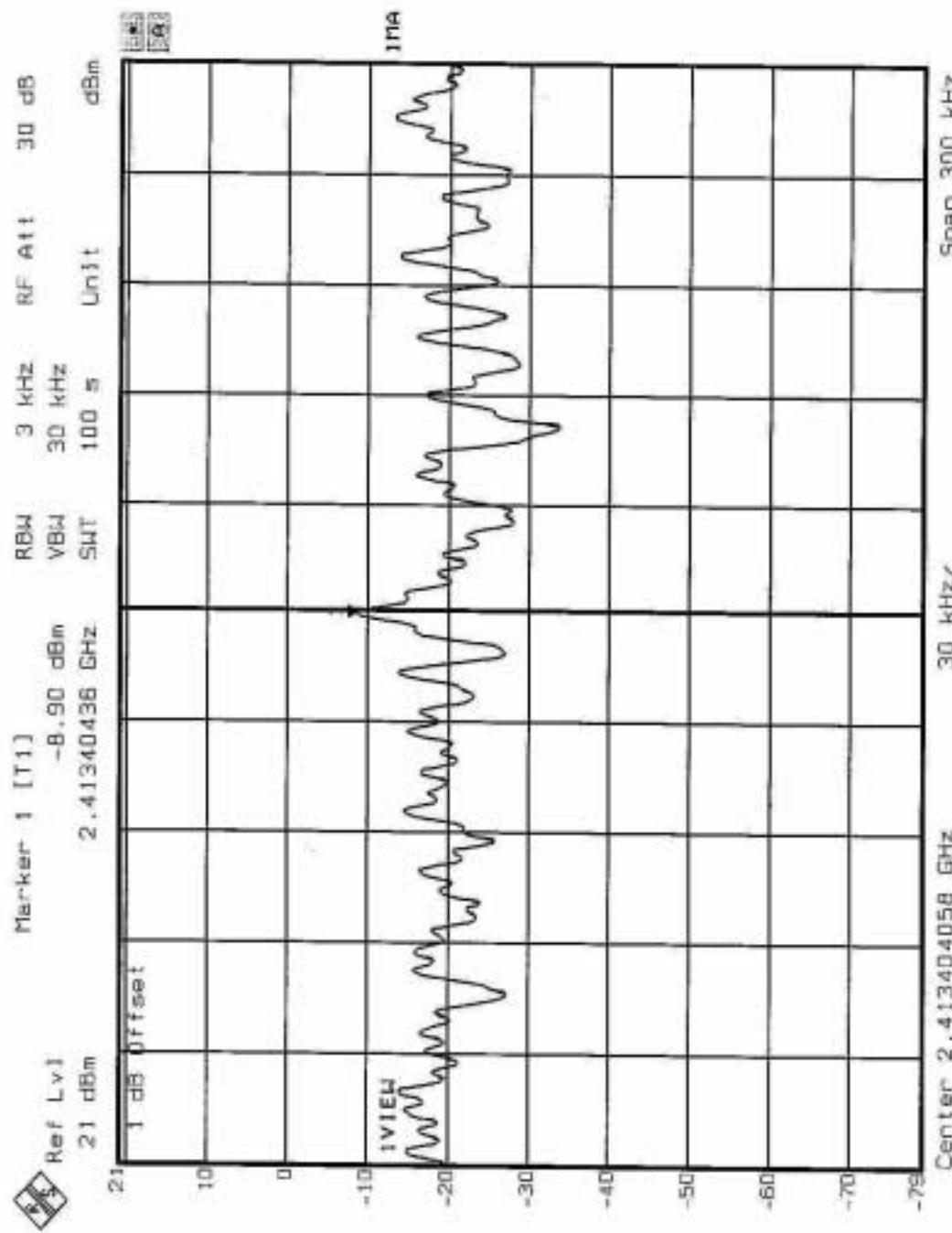


## 4.5.6 TEST RESULTS

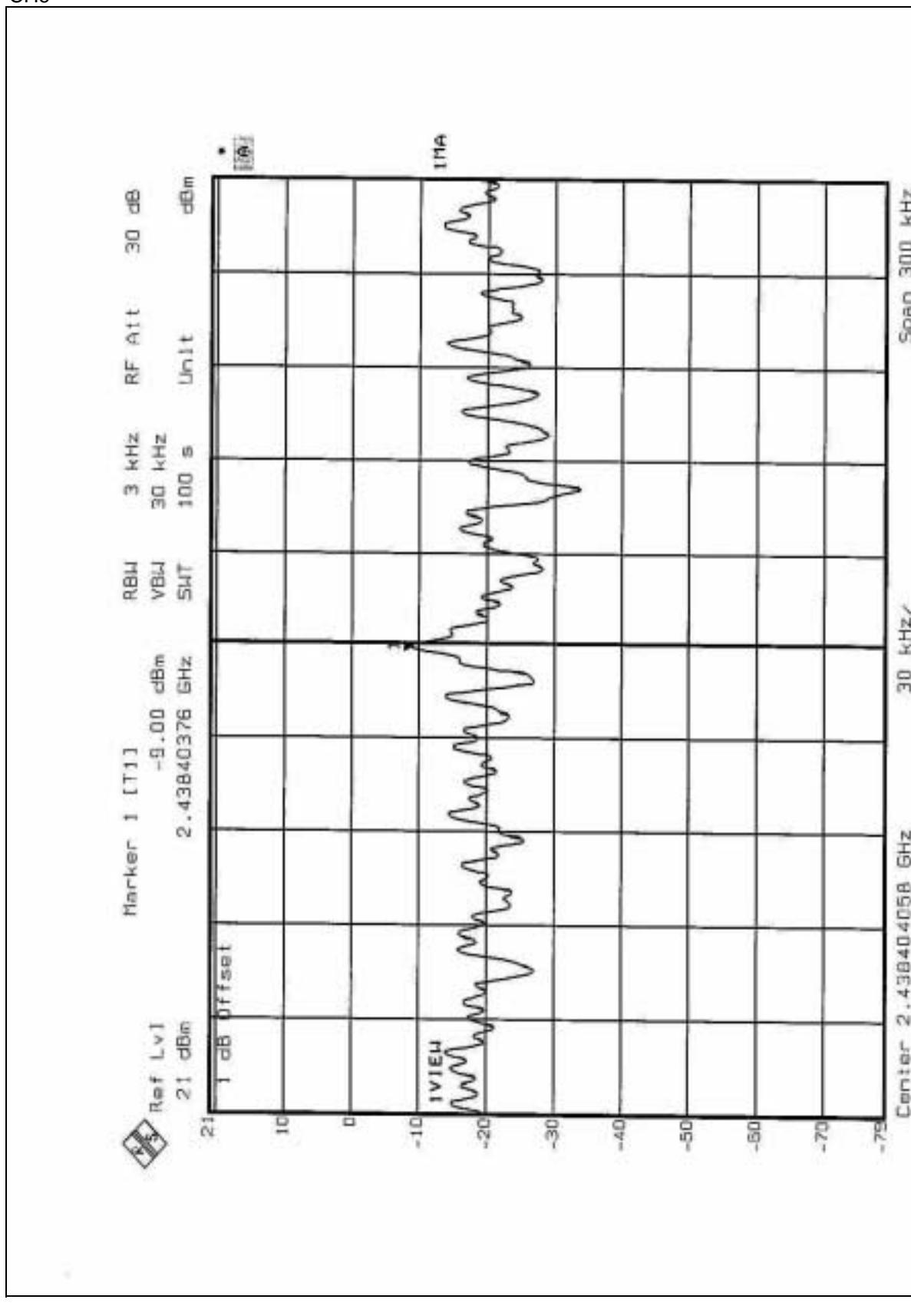
<b>EUT</b>	Wireless Router	<b>MODEL</b>	EW2104
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 70%RH, 1005 hPa
<b>TESTED BY:</b> Bruce Shiau			

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-8.90	8	PASS
6	2437	-9.00	8	PASS
11	2462	-9.29	8	PASS

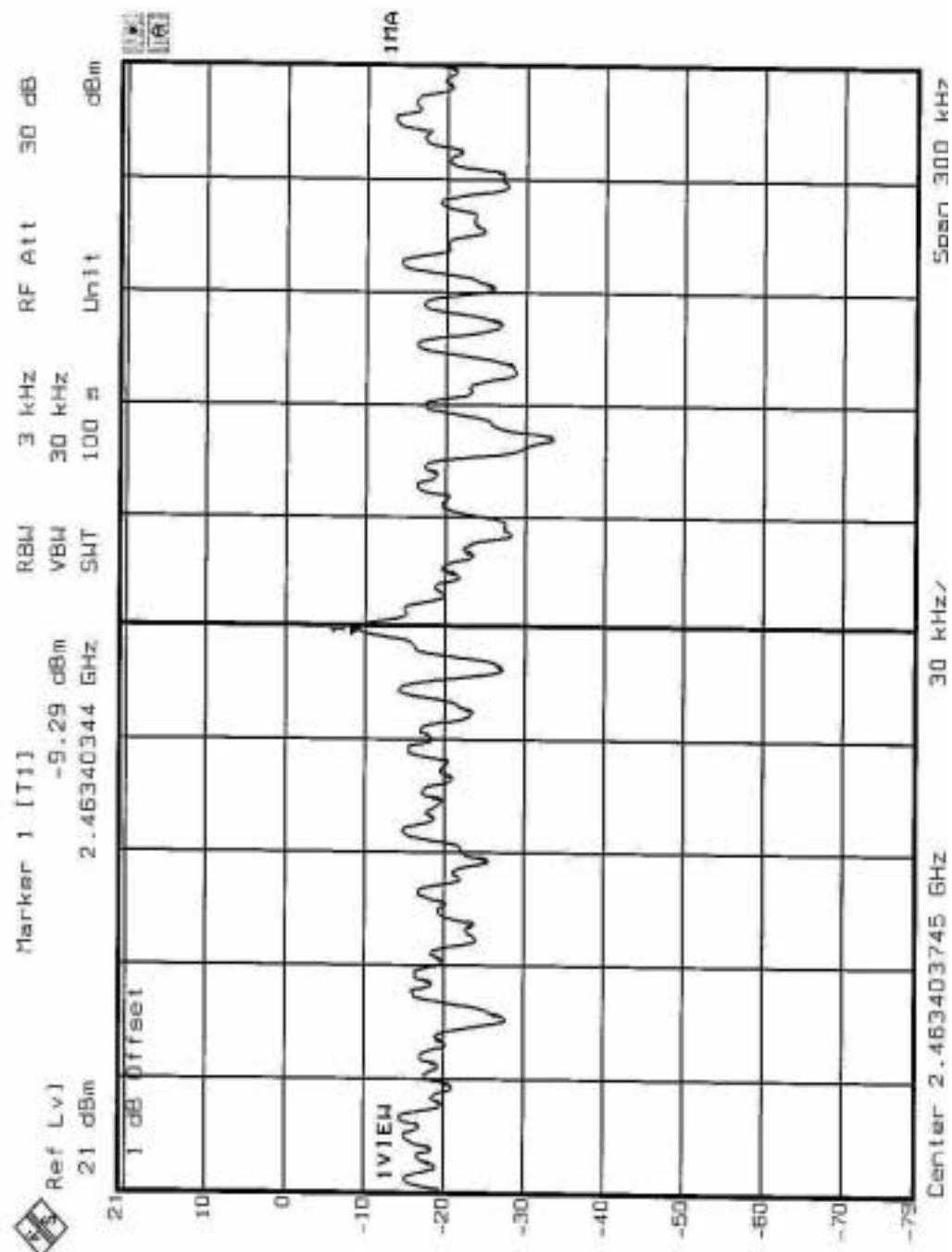
CH1



CH6



CH11





## 4.6 BAND EDGES MEASUREMENT

### 4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	July 17, 2002

#### NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.

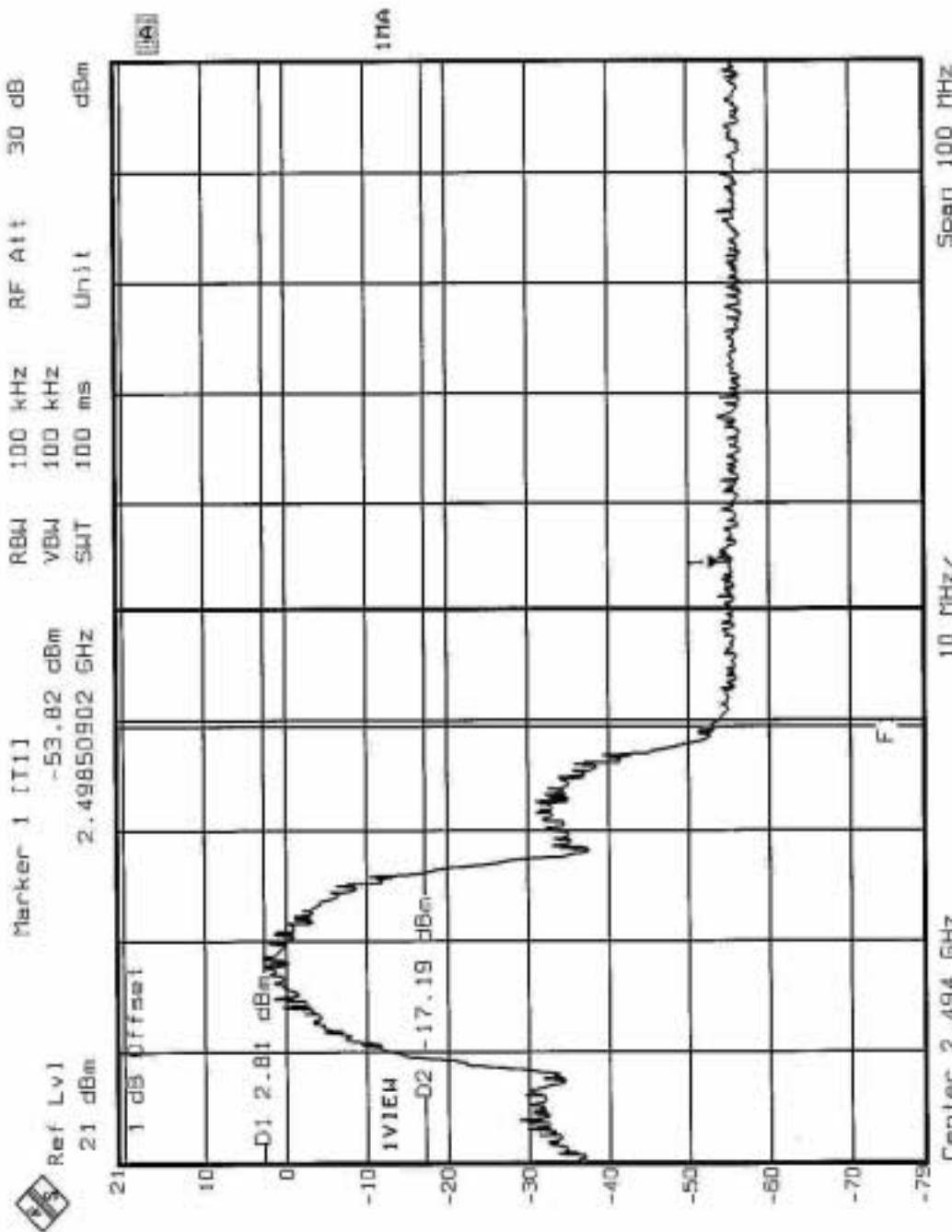
#### 4.6.4 EUT OPERATING CONDITION

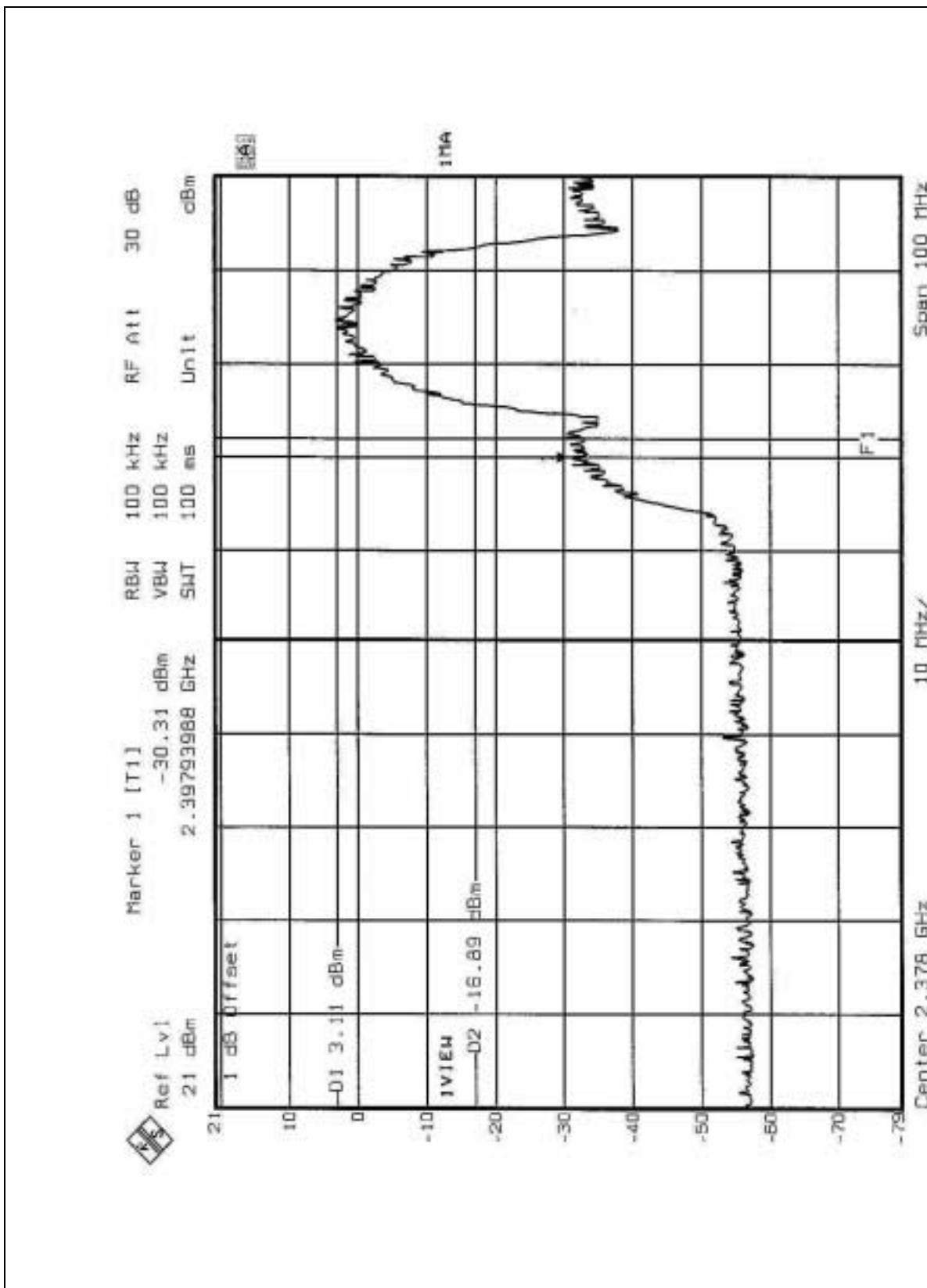
Same as Item 3.4.5

#### 4.6.5 TEST RESULTS

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

**NOTE:** The band edge emission plot on the following 2 pages shows 56.63dB delta between carrier maximum power and local maximum emission in restrict band (2.4985GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.6 (Page 26) is 93.6dB<sub>UV</sub>/m, so the maximum field strength in restrict band is  $93.6 - 56.63 = 36.97$  dB<sub>UV</sub>/m which is under 54 dB<sub>UV</sub>/m limit.







## 4.7 ANTENNA REQUIREMENT

### 4.7.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

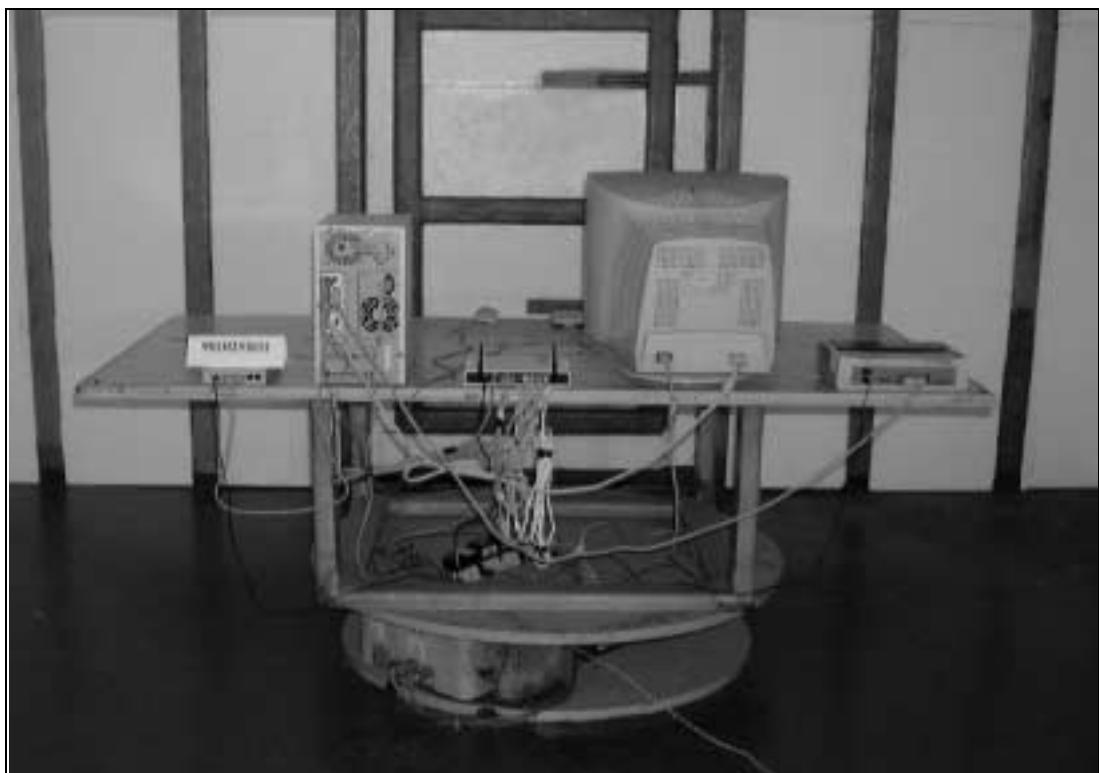
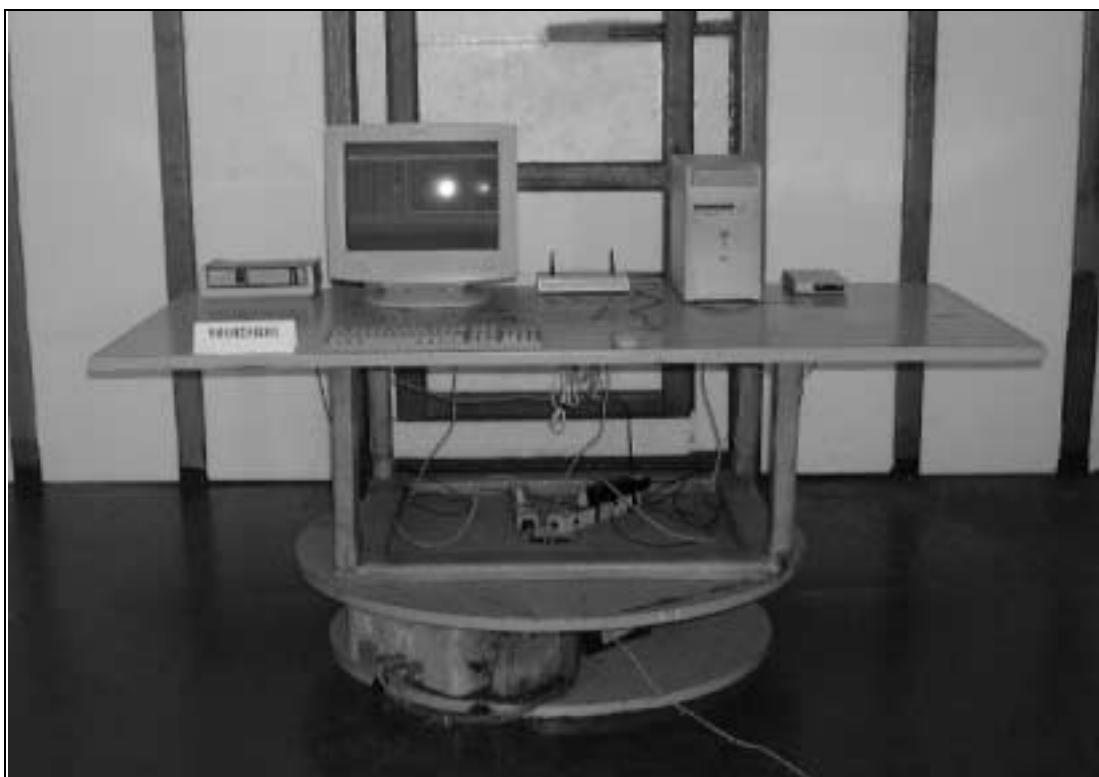
### 4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Dipole Antenna and the MMCX connector is used. The maximum Gain of the antenna is 1dBi only.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



## RADIATED EMISSION TEST





## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP, UL
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

If you have any comments, please feel free to contact us at the following:

**Lin Kou EMC Lab:**

Tel: 886-2-26052180  
Fax: 886-2-26052943

**Hsin Chu EMC Lab:**

Tel: 886-35-935343  
Fax: 886-35-935342

**Lin Kou Safety Lab:**

Tel: 886-2-26093195  
Fax: 886-2-26093184

**Lin Kou RF&Telecom Lab**

Tel: 886-3-3270910  
Fax: 886-3-3270892

**Email:** [service@mail.adt.com.tw](mailto:service@mail.adt.com.tw)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.