



# FCC TEST REPORT

**REPORT NO.:** RF900717R01

**MODEL NO.:** WM250-IF

**RECEIVED:** July 17, 2001

**TESTED:** July 17 ~ October 16, 2001

**APPLICANT:** BROMAX COMMUNICATIONS, INC.

**ADDRESS:** No.20, Kuang Fu Road, Hsinchu Industrial Park  
Hukou, Hsinchu, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** 47 14th Lin, ChiapauTsun, Linko, Taipei,  
Taiwan, R.O.C.

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0528



Lab Code: 200102-0



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# 1 CERTIFICATION

**PRODUCT :** WLAN Module  
**BRAND NAME :** Bromax  
**MODEL NO. :** WM250-IF  
**APPLICANT :** BROMAX COMMUNICATIONS, INC.  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from July 17, 2001 to July 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 : Gary Chang · DATE: Sept. 26, 2001  
Gary Chang

CHECKED BY : Emily Lu · DATE: Sep. 26, 2001  
Emily Lu

APPROVED BY : Alan Lane · DATE: Sept. 26, 2001  
Dr. Alan Lane, Manager



## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: 47 CFR Part 15, Subpart C</b>			
<b>Standard Section</b>	<b>Test Type and Limit</b>	<b>Result</b>	<b>REMARK</b>
15.107	AC Power Conducted Emission Limit: 48dBuV	PASS	Meet the requirement of limit Minimum passing margin is -9.07dBuV at 0.616MHz
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)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -2.90dBuV at 220.01MHz
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>	WLAN Module
<b>MODEL NO.</b>	WM250-IF
<b>POWER SUPPLY</b>	5VDC from host equipment
<b>MODULATION TYPE</b>	CCK, BPSK, QPSK
<b>RADIO TECHNOLOGY</b>	DSSS
<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>	14dBm
<b>ANTENNA TYPE</b>	Omni dipole antenna
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

- 1.The interface of this module is a modified PCMCIA. There are 68 pins for a normal PCMCIA Interface. In this product, there are only 50 pins. The other 18 useless pins have been discarded.
- 2.There are two difference antenna gain for the testing of the EUT. One antenna gain is 1dBi and another is 3dBi.
- 3.For a more detailed features description, please refer to the manufacturer's specifications or 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. There are two difference antenna output powers for the testing of the EUT. Test result (A) is for antenna gain = 1dBi and test result (B) is for antenna gain = 3dBi.

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a WLAN Module. 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**

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	Notebook	Dell	LATITUDE CP M233ST	7323C	FCC DoC Approved
2	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
3	MODEM	ACEEX	1414	980020510	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.

**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 (A)

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 equipments are used for the final measurement.



### 4.1.3 TEST INSTRUMENTS (B)

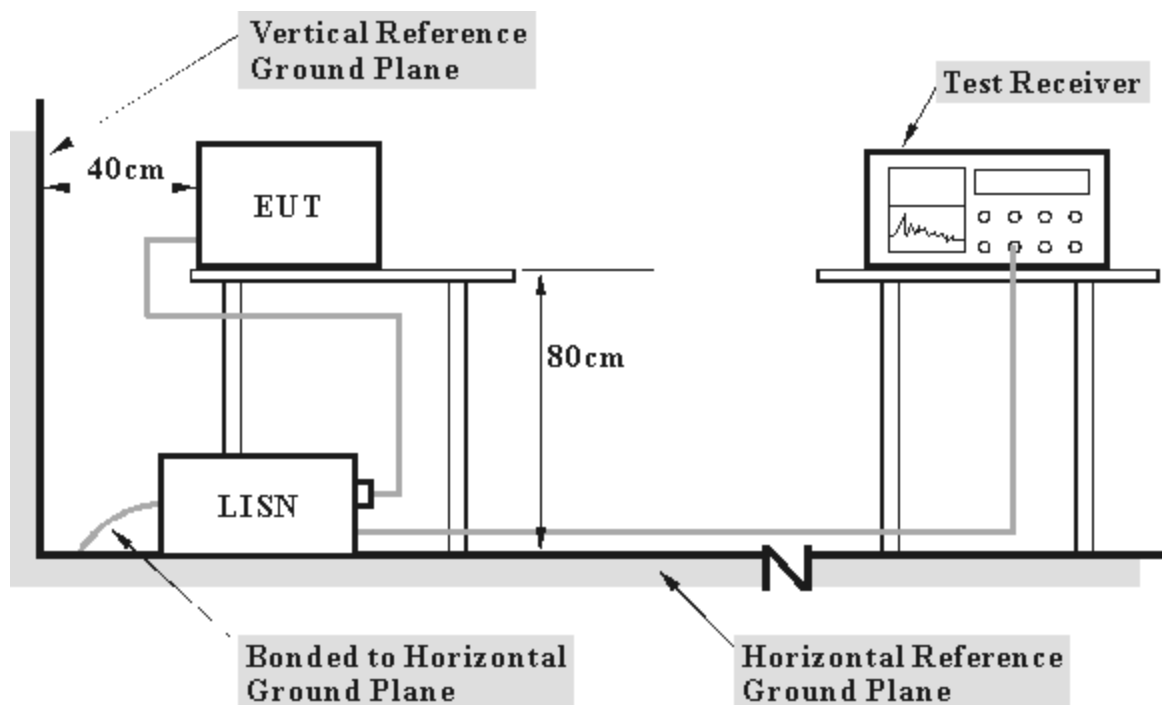
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 4, 2002
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 3, 2002
* ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 28, 2001
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 3, 2001
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 3, 2002
Software	Cond-V2J	NA	NA
RF cable (JYEBAO)	RG-58A/U	Cable-C02.01	July 5, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2002
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	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).

#### 4.1.4 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

#### 4.1.5 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.



#### 4.1.6 EUT OPERATING CONDITIONS

- a. Plug the EUT into the PCMCIA extender which connected to a computer system placed on a testing table.
- b. The computer system ran a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. The computer system sent "H" messages to 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.



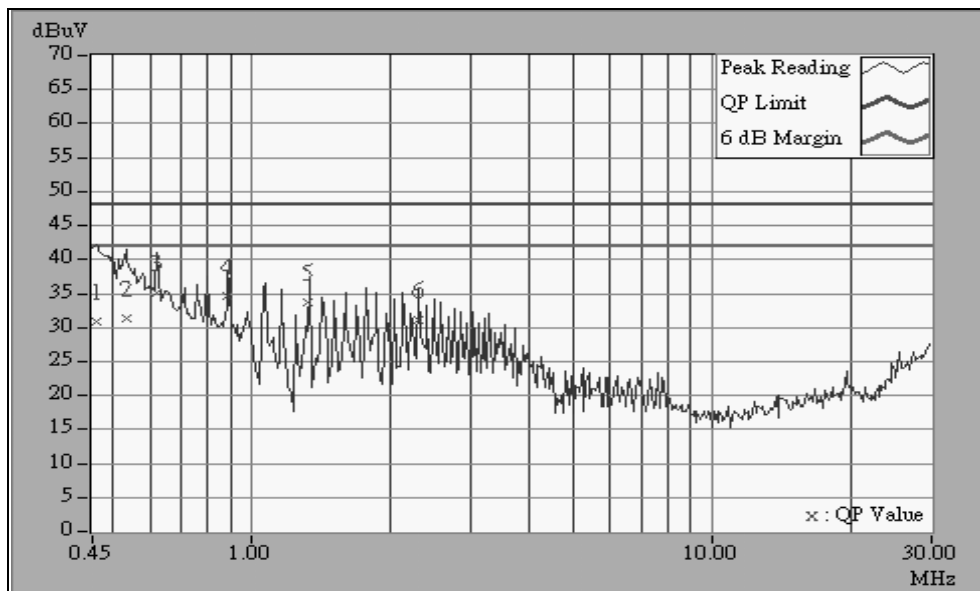
4.1.7 TEST RESULTS (A)

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.459	0.21	30.85	-	31.06	-	48.00	-	-16.94	-
2	0.532	0.22	31.43	-	31.65	-	48.00	-	-16.35	-
3	0.621	0.24	35.10	-	35.34	-	48.00	-	-12.66	-
4	0.885	0.28	34.57	-	34.85	-	48.00	-	-13.15	-
5	1.325	0.30	33.73	-	34.03	-	48.00	-	-13.97	-
6	2.299	0.31	31.06	-	31.37	-	48.00	-	-16.63	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



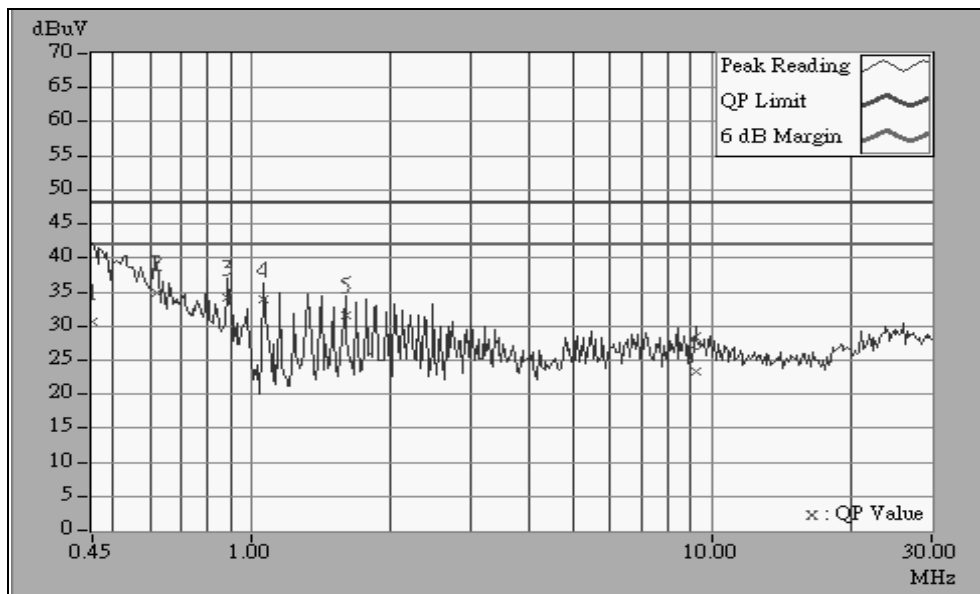


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.451	0.21	30.73	-	30.94	-	48.00	-	-17.06	-
2	0.619	0.24	34.94	-	35.18	-	48.00	-	-12.82	-
3	0.884	0.28	34.21	-	34.49	-	48.00	-	-13.51	-
4	1.061	0.30	33.90	-	34.20	-	48.00	-	-13.80	-
5	1.595	0.30	31.53	-	31.83	-	48.00	-	-16.17	-
6	9.240	0.49	23.44	-	23.93	-	48.00	-	-24.07	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



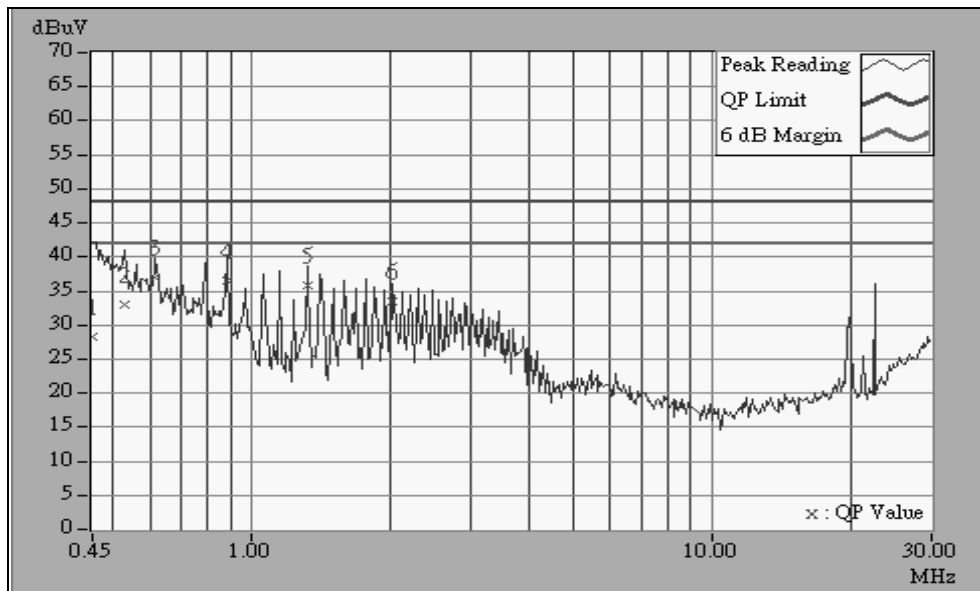


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.451	0.21	28.39	-	28.60	-	48.00	-	-19.40	-
2	0.528	0.22	32.98	-	33.20	-	48.00	-	-14.80	-
3	0.618	0.24	37.06	-	37.30	-	48.00	-	-10.70	-
4	0.880	0.28	36.45	-	36.73	-	48.00	-	-11.27	-
5	1.320	0.30	35.93	-	36.23	-	48.00	-	-11.77	-
6	2.027	0.30	33.58	-	33.88	-	48.00	-	-14.12	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



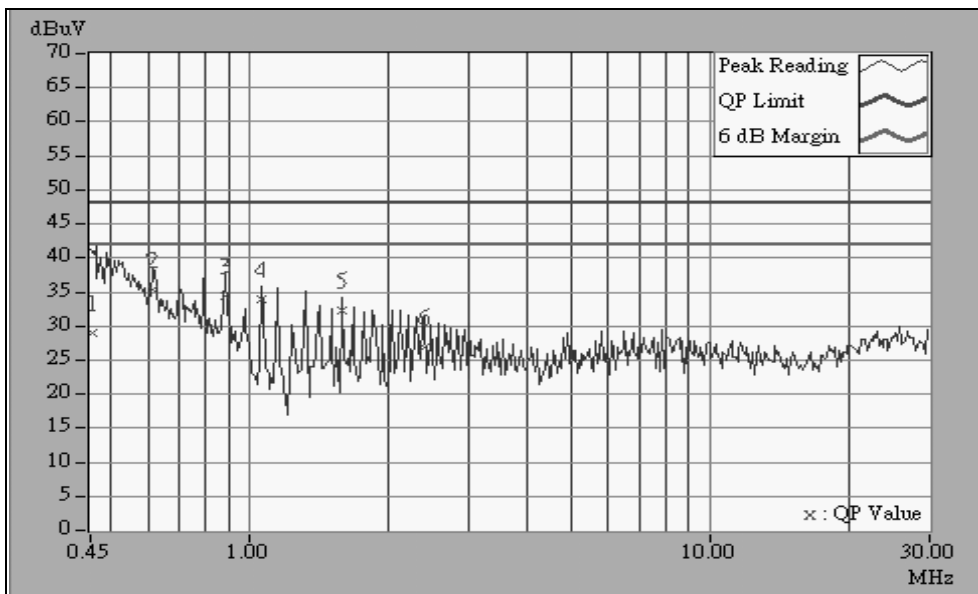


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (Uv)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.455	0.21	29.09	-	29.30	-	48.00	-	-18.70	-
2	0.618	0.24	35.28	-	35.52	-	48.00	-	-12.48	-
3	0.882	0.28	34.51	-	34.79	-	48.00	-	-13.21	-
4	1.057	0.30	34.04	-	34.34	-	48.00	-	-13.66	-
5	1.590	0.30	32.35	-	32.65	-	48.00	-	-15.35	-
6	2.391	0.32	26.79	-	27.11	-	48.00	-	-20.89	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.





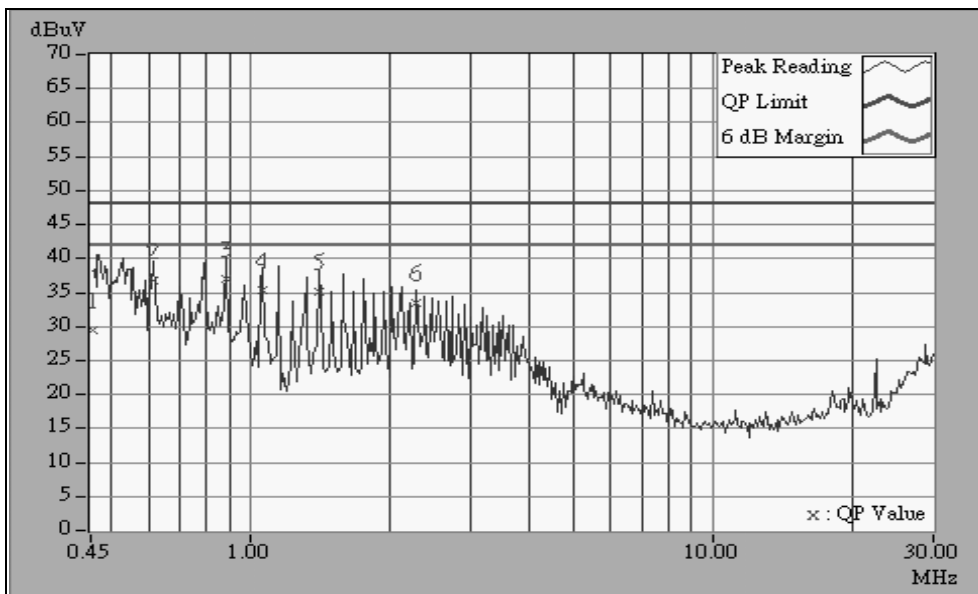


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.452	0.21	29.54	-	29.75	-	48.00	-	-18.25	-
2	0.614	0.24	36.72	-	36.96	-	48.00	-	-11.04	-
3	0.880	0.28	37.08	-	37.36	-	48.00	-	-10.64	-
4	1.059	0.30	35.39	-	35.69	-	48.00	-	-12.31	-
5	1.410	0.30	35.20	-	35.50	-	48.00	-	-12.50	-
6	2.285	0.31	33.45	-	33.76	-	48.00	-	-14.24	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.



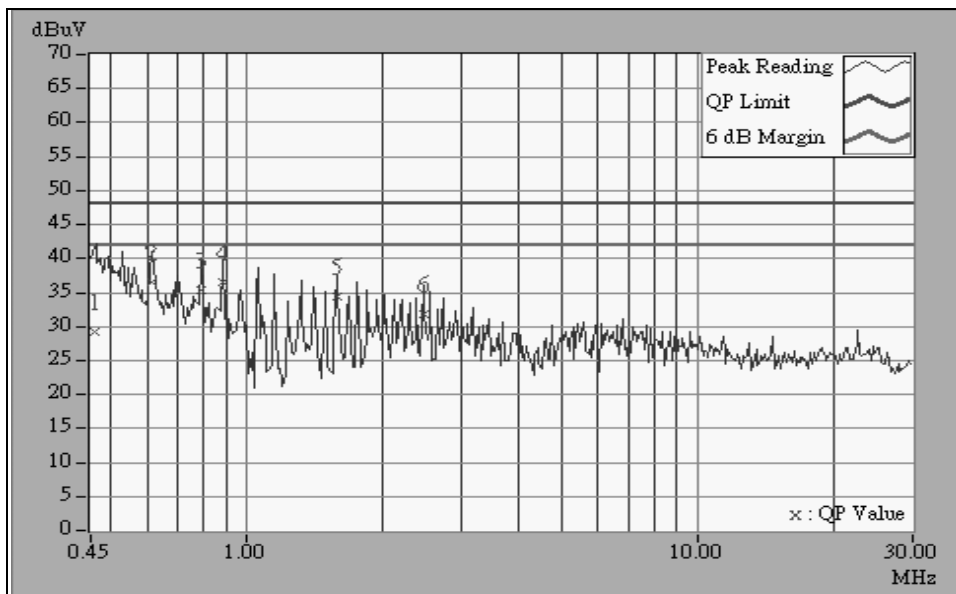


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Netural (N)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.461	0.21	29.21	-	29.42	-	48.00	-	-18.58	-
2	0.614	0.24	36.45	-	36.69	-	48.00	-	-11.31	-
3	0.794	0.27	35.32	-	35.59	-	48.00	-	-12.41	-
4	0.880	0.28	36.60	-	36.88	-	48.00	-	-11.12	-
5	1.586	0.30	34.47	-	34.77	-	48.00	-	-13.23	-
6	2.461	0.32	31.89	-	32.21	-	48.00	-	-15.79	-

**NOTE:**

1. QP. and AV. are abbreviations of quasi-peak and average individually.
2. "-": NA
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Emission Level = Reading Value + Correction Factor.





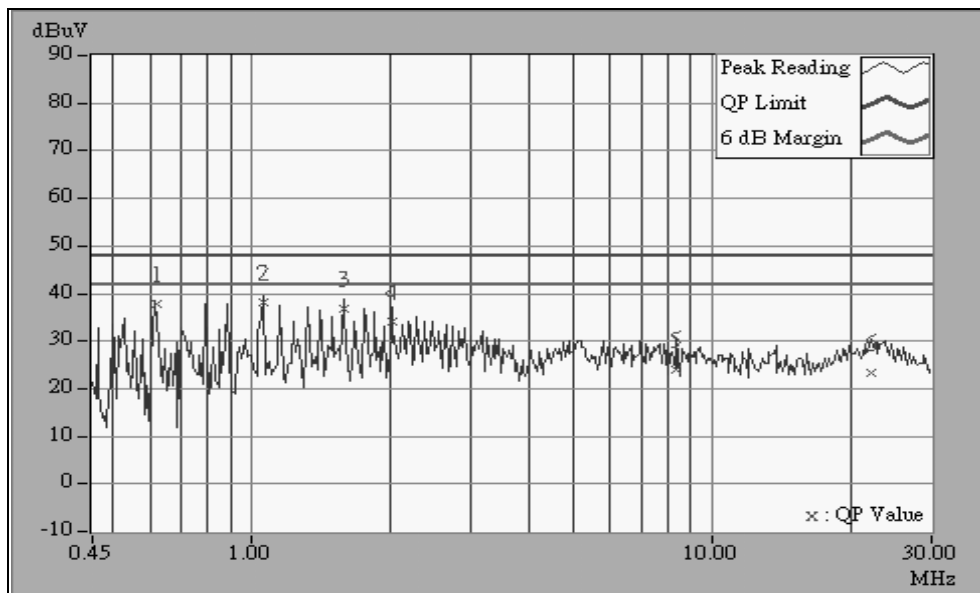
4.1.8 TEST RESULTS (B)

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.619	0.10	37.65	-	37.75	-	48.00	-	-10.25	-
2	1.057	0.10	38.02	-	38.12	-	48.00	-	-9.88	-
3	1.583	0.10	36.84	-	36.94	-	48.00	-	-11.06	-
4	2.020	0.10	34.26	-	34.36	-	48.00	-	-13.64	-
5	8.360	0.45	24.07	-	24.52	-	48.00	-	-23.48	-
6	22.122	1.04	23.19	-	24.23	-	48.00	-	-23.77	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.



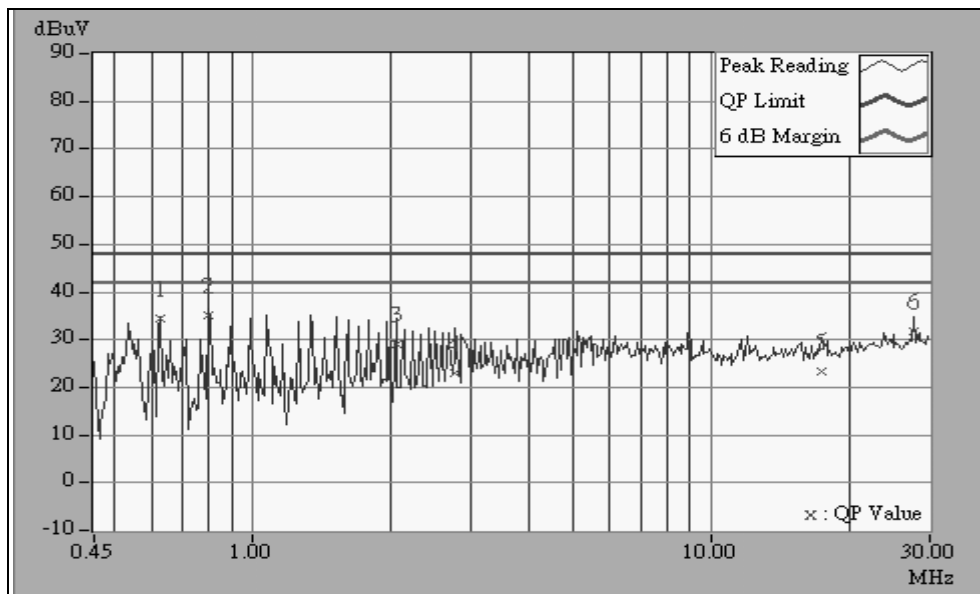


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa	<b>TESTED BY:</b> James Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.624	0.10	34.42	-	34.52	-	48.00	-	-13.48	-
2	0.802	0.10	35.18	-	35.28	-	48.00	-	-12.72	-
3	2.055	0.11	29.20	-	29.31	-	48.00	-	-18.69	-
4	2.770	0.18	23.13	-	23.31	-	48.00	-	-24.69	-
5	17.394	0.70	23.50	-	24.20	-	48.00	-	-23.80	-
6	27.742	0.95	31.89	-	32.84	-	48.00	-	-15.16	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.



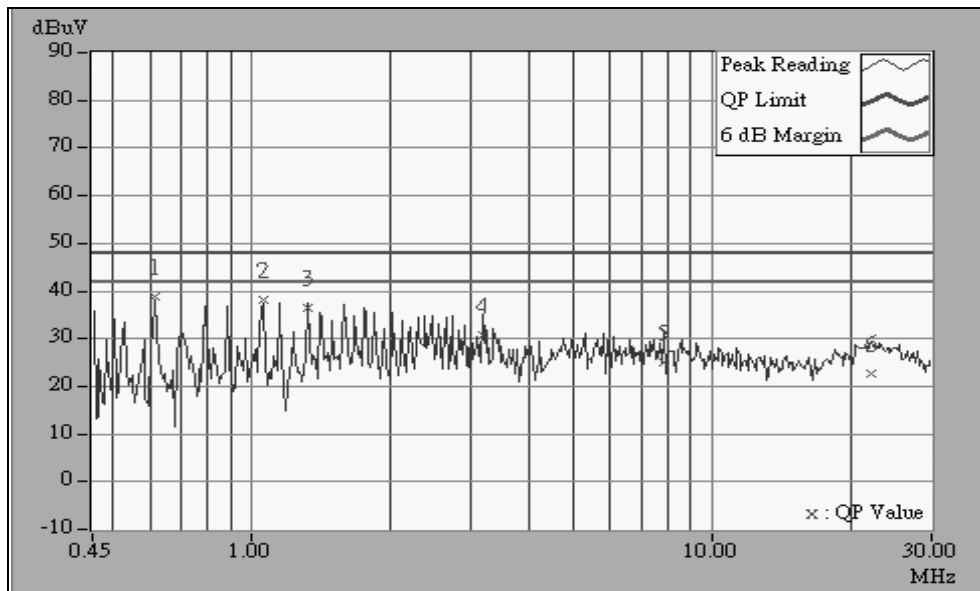


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa	<b>TESTED BY:</b> James Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.616	0.10	38.83	-	38.93	-	48.00	-	-9.07	-
2	1.055	0.10	38.08	-	38.18	-	48.00	-	-9.82	-
3	1.321	0.10	36.49	-	36.59	-	48.00	-	-11.41	-
4	3.173	0.22	30.82	-	31.04	-	48.00	-	-16.96	-
5	7.845	0.43	24.93	-	25.36	-	48.00	-	-22.64	-
6	22.161	1.04	22.55	-	23.59	-	48.00	-	-24.41	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.



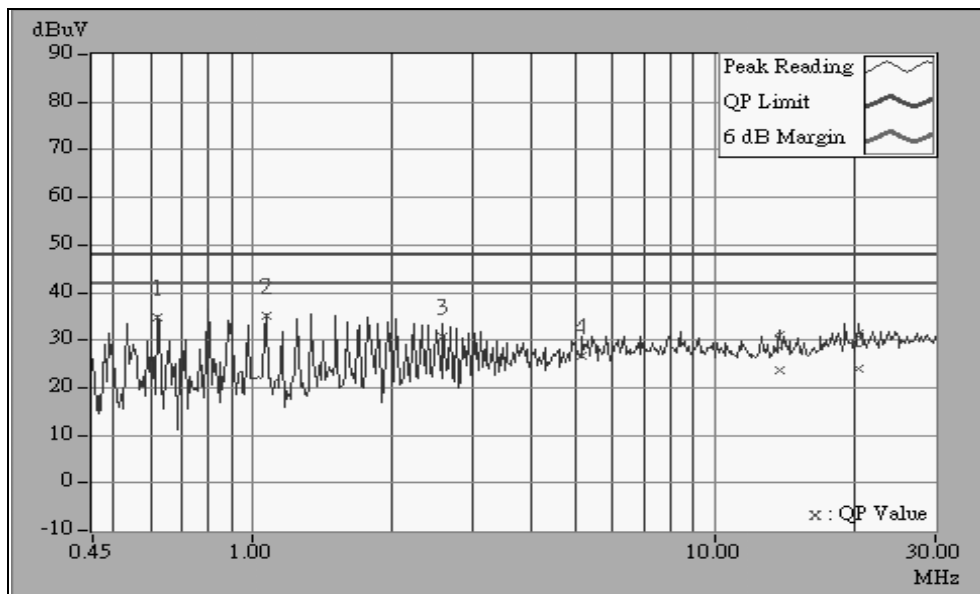


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa	<b>TESTED BY:</b> James Lee	

No	Freq.	Corr. Factor	Reading Value [dB (Uv)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.621	0.10	34.71	-	34.81	-	48.00	-	-13.19	-
2	1.066	0.10	35.23	-	35.33	-	48.00	-	-12.67	-
3	2.579	0.16	30.59	-	30.75	-	48.00	-	-17.25	-
4	5.157	0.32	26.65	-	26.97	-	48.00	-	-21.03	-
5	13.877	0.56	23.64	-	24.20	-	48.00	-	-23.80	-
6	20.430	0.81	23.92	-	24.73	-	48.00	-	-23.27	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.



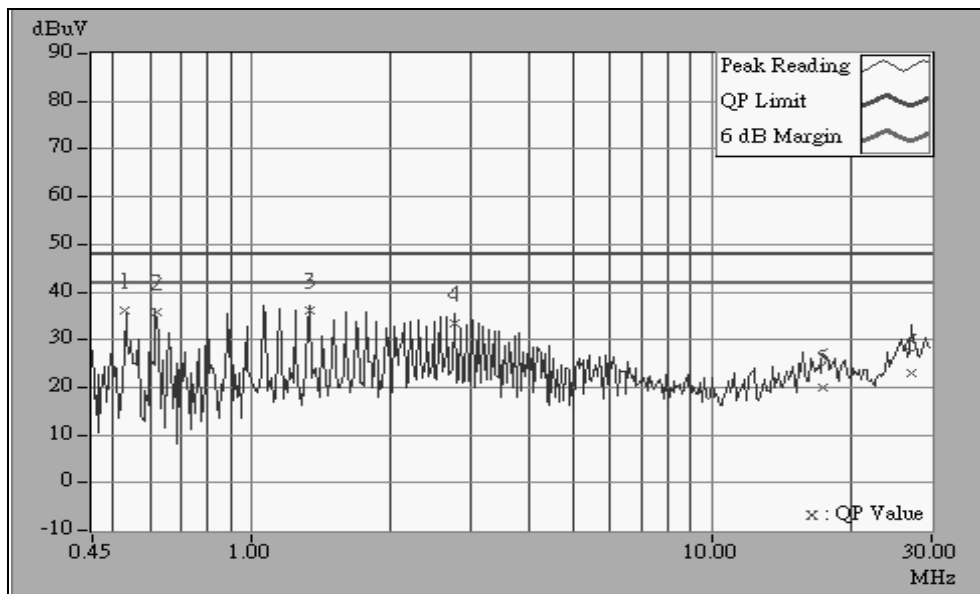


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa	<b>TESTED BY:</b> James Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.531	0.10	36.08	-	36.18	-	48.00	-	-11.82	-
2	0.620	0.10	35.87	-	35.97	-	48.00	-	-12.03	-
3	1.329	0.10	36.08	-	36.18	-	48.00	-	-11.82	-
4	2.747	0.17	33.36	-	33.53	-	48.00	-	-14.47	-
5	17.380	0.90	19.88	-	20.78	-	48.00	-	-27.22	-
6	27.118	1.14	22.86	-	24.00	-	48.00	-	-24.00	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.



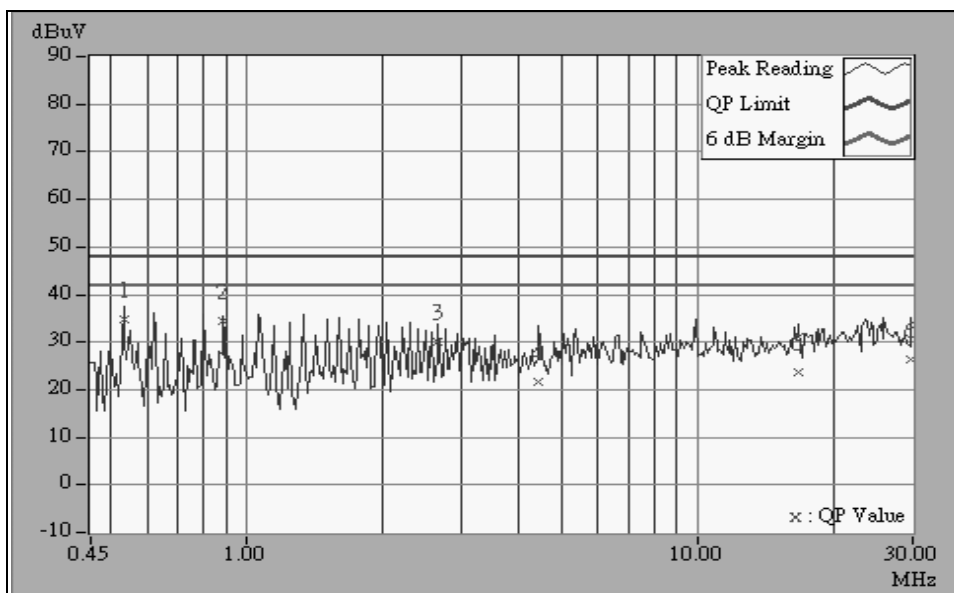


<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Netural (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 70%RH, 1005 hPa	<b>TESTED BY:</b> James Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.531	0.10	34.64	-	34.74	-	48.00	-	-13.26	-
2	0.887	0.10	34.43	-	34.53	-	48.00	-	-13.47	-
3	2.661	0.17	30.19	-	30.36	-	48.00	-	-17.64	-
4	4.442	0.31	21.54	-	21.85	-	48.00	-	-26.15	-
5	16.704	0.67	23.67	-	24.34	-	48.00	-	-23.66	-
6	29.845	1.00	26.25	-	27.25	-	48.00	-	-20.75	-

**NOTE:**

6. QP. and AV. are abbreviations of quasi-peak and average individually.
7. "-": NA
8. The emission levels of other frequencies were very low against the limit.
9. Margin value = Emission level - Limit value
10. Emission Level = Reading Value + Correction Factor.







## 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	2944A08485	Nov. 3, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* 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
* Antenna (Horn)	BBHA9120-D	D130	July 10, 2002
Open Field Test Site	Site 5	ADT-R05	July 28, 2002
VCCI Site Registration No.	Site 5	R-1039	NA
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 equipments are used for the final measurement.



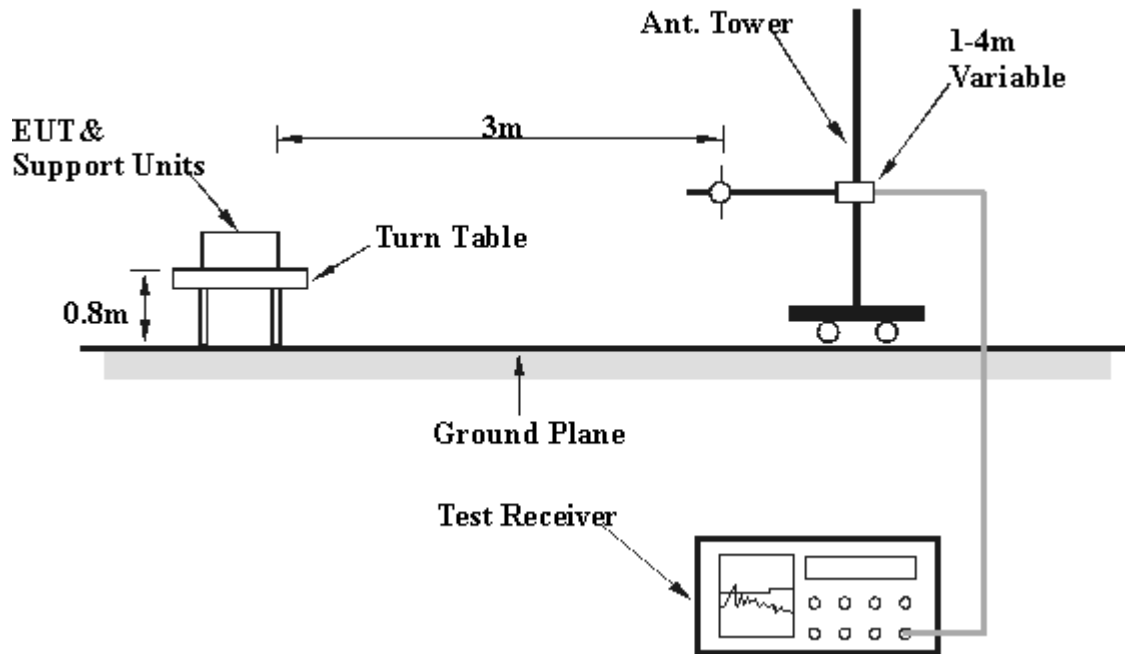
#### 4.2.3 TEST PROCEDURES

- 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 peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection 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 (A)

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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>	30 deg. C, 60 % RH, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	132.25	40.0 QP	43.50	-3.50	1.04H	21	26.50	10.97	2.52	0.00	-13.49
2	176.40	39.7 QP	43.50	-3.80	1.20H	88	28.27	8.73	2.65	0.00	-11.39
3	220.01	43.1 QP	46.00	-2.90	1.13H	139	30.73	9.58	2.82	0.00	-12.41
4	264.75	33.7 QP	46.00	-12.30	1.35H	228	18.70	12.00	2.96	0.00	-14.96
5	308.47	39.6 QP	46.00	-6.40	1.23H	156	23.70	12.77	3.15	0.00	-15.93
6	395.17	39.5 QP	46.00	-6.50	1.38H	139	20.80	15.22	3.46	0.00	-18.69
7	440.05	37.4 QP	46.00	-8.60	1.18H	191	18.20	15.93	3.27	0.00	-19.21
8	528.47	37.1 QP	46.00	-8.90	2.32H	355	16.40	17.04	3.67	0.00	-20.72
9	572.14	36.7 QP	46.00	-9.30	1.30H	173	15.70	17.38	3.61	0.00	-21.00
10	748.20	36.8 QP	46.00	-9.20	1.66H	195	13.80	18.80	4.21	0.00	-23.03

**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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	132.47	40.3 QP	43.50	-3.20	1.01V	211	26.80	10.97	2.52	0.00	-13.49
2	176.40	32.2 QP	43.50	-11.30	1.08V	5	20.80	8.73	2.65	0.00	-11.38
3	220.47	32.3 QP	46.00	-13.70	1.56V	84	19.70	9.73	2.83	0.00	-12.57
4	396.47	37.1 QP	46.00	-8.90	2.15V	139	18.40	15.22	3.46	0.00	-18.68
5	527.85	36.4 QP	46.00	-9.60	1.44V	263	15.70	17.03	3.67	0.00	-20.71
6	748.50	37.2 QP	46.00	-8.80	2.05V	8	14.20	18.80	4.21	0.00	-23.03
7	792.00	38.4 QP	46.00	-7.60	1.12V	329	15.20	19.10	4.10	0.00	-23.21
8	880.14	36.6 QP	46.00	-9.40	1.56V	246	12.40	19.63	4.54	0.00	-24.17

**NOTE:**

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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>	30 deg. C, 60 % RH, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2038.50	46.5 PK	74.00	-27.50	1.00H	339	16.88	26.31	3.29	0.00	-29.60
2	*2412.80	96.7 PK	-	-	1.52H	339	65.59	27.45	3.62	0.00	-31.08
3	*2412.80	89.8 AV	-	-	1.52H	339	58.70	27.45	3.62	0.00	-31.08
4	4075.90	51.6 PK	74.00	-22.40	1.17H	234	16.79	30.03	4.77	0.00	-34.80
5	4824.80	50.7 PK	74.00	-23.30	1.37H	108	14.10	31.35	5.21	0.00	-36.56
6	8150.70	58.7 PK	74.00	-15.30	1.99H	181	14.87	36.85	6.97	0.00	-43.81.
7	8150.70	45.6 AV	54.00	-8.40	1.99H	181	1.80	36.85	6.97	0.00	-43.82

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2038.50	47.4 PK	74.00	-26.60	1.31V	189	17.85	26.31	3.29	0.00	-29.60
2	*2413.80	103.5 PK	-	-	1.29V	7	72.40	27.45	3.62	0.00	-31.08
3	*2413.80	96.5 AV	-	-	1.29V	7	65.40	27.45	3.62	0.00	-31.08
4	4075.80	51.0 PK	74.00	-23.00	1.57V	313	16.17	30.03	4.77	0.00	-34.80
5	4824.50	51.2 PK	74.00	-22.80	1.35V	303	14.60	31.35	5.21	0.00	-36.56
6	8175.50	57.0 PK	74.00	-17.00	1.95V	228	13.20	36.82	6.98	0.00	-43.81
7	8175.50	45.0 AV	54.00	-9.00	1.95V	228	1.20	36.82	6.98	0.00	-43.81

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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>	30 deg. C, 60 % RH, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2063.70	47.6 PK	74.00	-26.40	1.06H	143	17.90	26.37	3.31	0.00	-29.68
2	*2437.80	98.7 PK	-	-	1.09H	342	67.54	27.52	3.64	0.00	-31.17
3	*2437.80	90.2 AV	-	-	1.09H	342	59.02	27.52	3.64	0.00	-31.17
4	4126.50	51.2 PK	74.00	-22.80	1.06H	290	16.32	30.10	4.79	0.00	-34.89
5	4875.20	50.5 PK	74.00	-23.50	1.18H	225	13.78	31.44	5.25	0.00	-36.69
6	8250.50	55.5 PK	74.00	-18.50	1.11H	200	11.70	36.76	7.01	0.00	-43.77.
7	8250.50	45.2 AV	54.00	-8.80	1.11H	198	1.40	36.76	7.01	0.00	-43.78

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2063.10	48.1 PK	74.00	-25.90	1.32V	337	18.40	26.37	3.31	0.00	-29.68
2	*2437.40	105.3 PK	-	-	1.11V	236	74.15	27.52	3.64	0.00	-31.17
3	*2437.40	99.3 AV	-	-	1.11V	236	68.10	27.52	3.64	0.00	-31.17
4	4125.90	51.8 PK	74.00	-22.20	1.05V	172	16.86	30.10	4.79	0.00	-34.89
5	4875.50	50.9 PK	74.00	-23.10	1.64V	265	14.20	31.44	5.25	0.00	-36.69
6	8250.50	58.7 PK	74.00	-15.30	1.52V	182	14.90	36.76	7.01	0.00	-43.77.
7	8250.50	44.4 AV	54.00	-9.60	1.52V	182	0.63	36.76	7.01	0.00	-43.78

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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>	30 deg. C, 60 % RH, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2087.60	47.4 PK	74.00	-26.60	1.17H	175	17.62	26.44	3.33	0.00	-29.77
2	*2463.50	98.1 PK	-	-	1.56H	7	66.84	27.59	3.66	0.00	-31.26
3	*2463.50	89.6 AV	-	-	1.56H	7	58.40	27.59	3.66	0.00	-31.26
4	2483.50	48.7 PK	74.00	-25.30	1.23H	264	17.40	27.66	3.68	0.00	-31.33
5	4175.50	50.6 PK	74.00	-23.40	1.35H	165	15.61	30.18	4.81	0.00	-34.98
6	4925.40	51.1 PK	74.00	-22.90	1.34H	132	14.32	31.53	5.28	0.00	-36.81
7	8350.10	57.2 PK	74.00	-16.80	1.08H	197	13.53	36.64	7.07	0.00	-43.72
8	8350.10	44.9 AV	54.00	-9.10	1.08H	197	1.20	36.64	7.07	0.00	-43.71

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2088.80	48.0 PK	74.00	-26.00	1.13V	42	18.20	26.44	3.33	0.00	-29.77
2	*2463.50	105.4 PK	-	-	1.22V	343	74.18	27.59	3.66	0.00	-31.26
3	*2463.50	98.3 AV	-	-	1.22V	343	67.10	27.59	3.66	0.00	-31.26
4	2483.50	50.0 PK	74.00	-24.00	1.88V	133	18.64	27.66	3.68	0.00	-31.33
5	4175.00	52.2 PK	74.00	-21.80	1.14V	157	17.24	30.18	4.81	0.00	-34.98
6	4925.40	50.6 PK	74.00	-23.40	1.13V	336	13.80	31.53	5.28	0.00	-36.81
7	8350.90	59.3 PK	74.00	-14.70	1.42V	175	15.59	36.64	7.07	0.00	-43.71.
8	8350.90	44.7 AV	54.00	-9.30	1.42V	175	1.00	36.64	7.07	0.00	-43.71

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.





## 4.2.7 TEST RESULTS (B)

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	132.00	39.3 QP	43.50	-4.20	1.09H	120	27.00	11.16	1.13	0.00	-12.29
2	176.01	30.4 QP	43.50	-13.10	1.03H	176	20.00	9.08	1.33	0.00	-10.41
3	220.00	29.6 QP	46.00	-16.40	1.08H	223	18.00	10.12	1.51	0.00	-11.63
4	308.01	31.3 QP	46.00	-14.70	1.04H	282	16.00	13.38	1.91	0.00	-15.29
5	396.02	33.2 QP	46.00	-12.80	1.13H	312	15.00	15.96	2.22	0.00	-18.18
6	704.00	33.5 QP	46.00	-12.50	1.08H	254	11.00	19.38	3.16	0.00	-22.54
7	747.99	35.4 QP	46.00	-10.60	1.24H	192	12.00	20.14	3.26	0.00	-23.40

**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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	132.00	33.3 QP	43.50	-10.20	1.04V	48	21.00	11.16	1.13	0.00	-12.29
2	220.00	35.6 QP	46.00	-10.40	1.02V	114	24.00	10.12	1.51	0.00	-11.63
3	264.20	34.5 QP	46.00	-11.50	1.09V	245	20.10	12.75	1.70	0.00	-14.45
4	440.02	37.7 QP	46.00	-8.30	1.06V	275	19.00	16.32	2.38	0.00	-18.70
5	484.00	31.4 QP	46.00	-14.60	1.17V	180	12.00	16.96	2.47	0.00	-19.43
6	528.03	37.2 QP	46.00	-8.80	1.19V	226	17.00	17.62	2.60	0.00	-20.22
7	704.10	36.5 QP	46.00	-9.50	1.25V	169	14.00	19.38	3.16	0.00	-22.54
8	748.01	34.4 QP	46.00	-11.60	1.29V	122	11.00	20.14	3.26	0.00	-23.40
9	791.95	33.9 QP	46.00	-12.10	1.22V	153	10.00	20.60	3.31	0.00	-23.91

**NOTE:**

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2038.00	46.2 PK	74.00	-27.80	1.86H	230	51.00	25.20	4.86	34.90	4.84
2	*2413.40	93.2 PK	-	-	1.12H	126	61.00	27.11	5.10	0.00	-32.21
3	*2413.40	86.2 AV	-	-	1.12H	126	54.00	27.11	5.10	0.00	-32.21
4	4075.00	51.4 PK	74.00	-22.60	1.64H	35	49.06	30.13	6.78	34.52	-2.39
5	4824.00	51.0 PK	74.00	-23.00	1.41H	289	47.00	31.43	7.23	34.63	-4.02

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2037.80	45.2 PK	74.00	-28.80	1.64V	354	50.00	25.20	4.86	34.90	4.84
2	*2412.00	99.4 PK	-	-	1.90V	3	67.19	27.11	5.10	0.00	-32.21.
3	*2412.00	95.3 AV	-	-	1.90V	3	63.10	27.11	5.10	0.00	-32.21.
4	4075.00	50.4 PK	74.00	-23.60	1.64V	149	48.00	30.13	6.78	34.52	-2.39
5	4824.00	50.2 PK	74.00	-23.80	1.29V	10	46.20	31.43	7.23	34.63	-4.03

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2063.00	46.5 PK	74.00	-27.50	1.24H	4	51.00	25.41	4.96	34.90	4.53
2	*2438.00	95.6 PK	-	-	1.18H	357	63.21	27.33	5.08	0.00	-32.40
3	*2438.00	90.4 AV	-	-	1.18H	357	58.00	27.33	5.08	0.00	-32.40
4	4125.00	50.1 PK	74.00	-23.90	1.24H	4	47.64	30.32	6.70	34.56	-2.46
5	4874.00	52.1 PK	74.00	-21.90	1.36H	354	48.00	31.47	7.21	34.63	-4.05

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2063.00	46.2 PK	74.00	-27.80	1.05V	88	50.70	25.41	4.96	34.90	4.53
2	*2437.80	99.6 PK	-	-	1.12V	126	67.19	27.33	5.08	0.00	-32.40
3	*2437.80	95.5 AV	-	-	1.12V	126	63.10	27.33	5.08	0.00	-32.40
4	4125.00	49.7 PK	74.00	-24.30	1.01V	48	47.20	30.32	6.70	34.56	-2.46
5	4874.10	50.3 PK	74.00	-23.70	1.04V	62	46.20	31.47	7.21	34.63	-4.05

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.



<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<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, 1050 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2088.00	45.7 PK	74.00	-28.30	1.04H	353	50.00	25.62	5.02	34.90	4.26
2	*2463.00	93.4 PK	-	-	1.15H	60	61.00	27.33	5.08	0.00	-32.40
3	*2463.00	85.4 AV	-	-	1.15H	60	53.00	27.33	5.08	0.00	-32.40
4	2483.50	45.9 PK	74.00	-28.10	1.53H	2	48.25	27.54	5.06	34.90	2.31
5	4175.50	50.8 PK	74.00	-23.20	1.18H	9	48.25	30.41	6.68	34.58	-2.52
6	4924.00	51.1 PK	74.00	-22.90	1.13H	23	47.00	31.51	7.21	34.62	-4.10

#### 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	2088.00	46.7 PK	74.00	-27.30	1.46V	8	51.00	25.62	5.02	34.90	4.26
2	*2463.00	100.9 PK	-	-	1.89V	356	68.50	27.33	5.08	0.00	-32.40
3	*2463.00	94.5 AV	-	-	1.89V	356	62.10	27.33	5.08	0.00	-32.40
4	2483.50	48.5 PK	74.00	-25.50	1.46V	8	50.81	27.54	5.06	34.90	2.31
5	4176.00	53.3 PK	74.00	-20.70	1.11V	68	50.79	30.41	6.68	34.58	-2.51
6	4176.00	45.5 AV	54.00	-8.50	1.11V	68	43.00	30.41	6.68	34.58	-2.51
7	4924.00	51.1 PK	74.00	-22.90	1.48V	357	47.00	31.51	7.21	34.62	-4.10

#### NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss  
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " \* " : Fundamental frequency
5. The other emission levels were very low against the limit.



### 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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

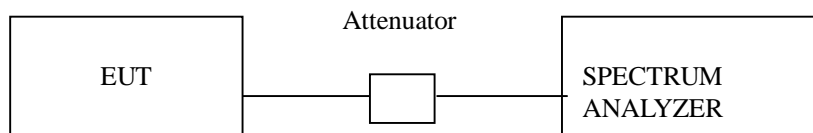
**NOTE:**

- 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.

#### 4.3.3. 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



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

#### 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.



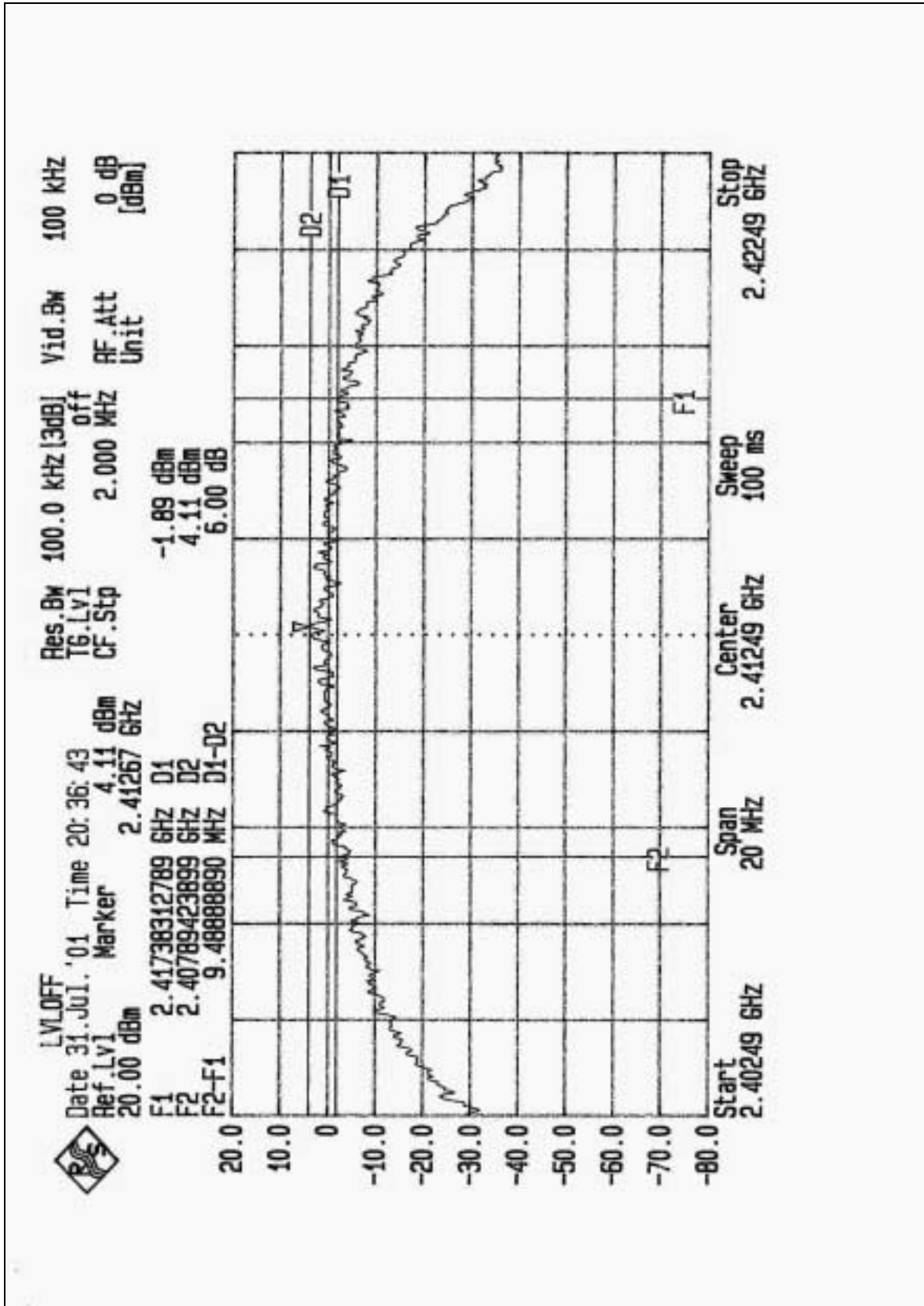
4.3.6. TEST RESULTS

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>6 dB BANDWIDTH (MHz)</b>	<b>MINIMUM LIMIT (MHz)</b>	<b>PASS/FAIL</b>
1	2412	9.49	0.5	PASS
6	2437	9.51	0.5	PASS
11	2462	9.36	0.5	PASS



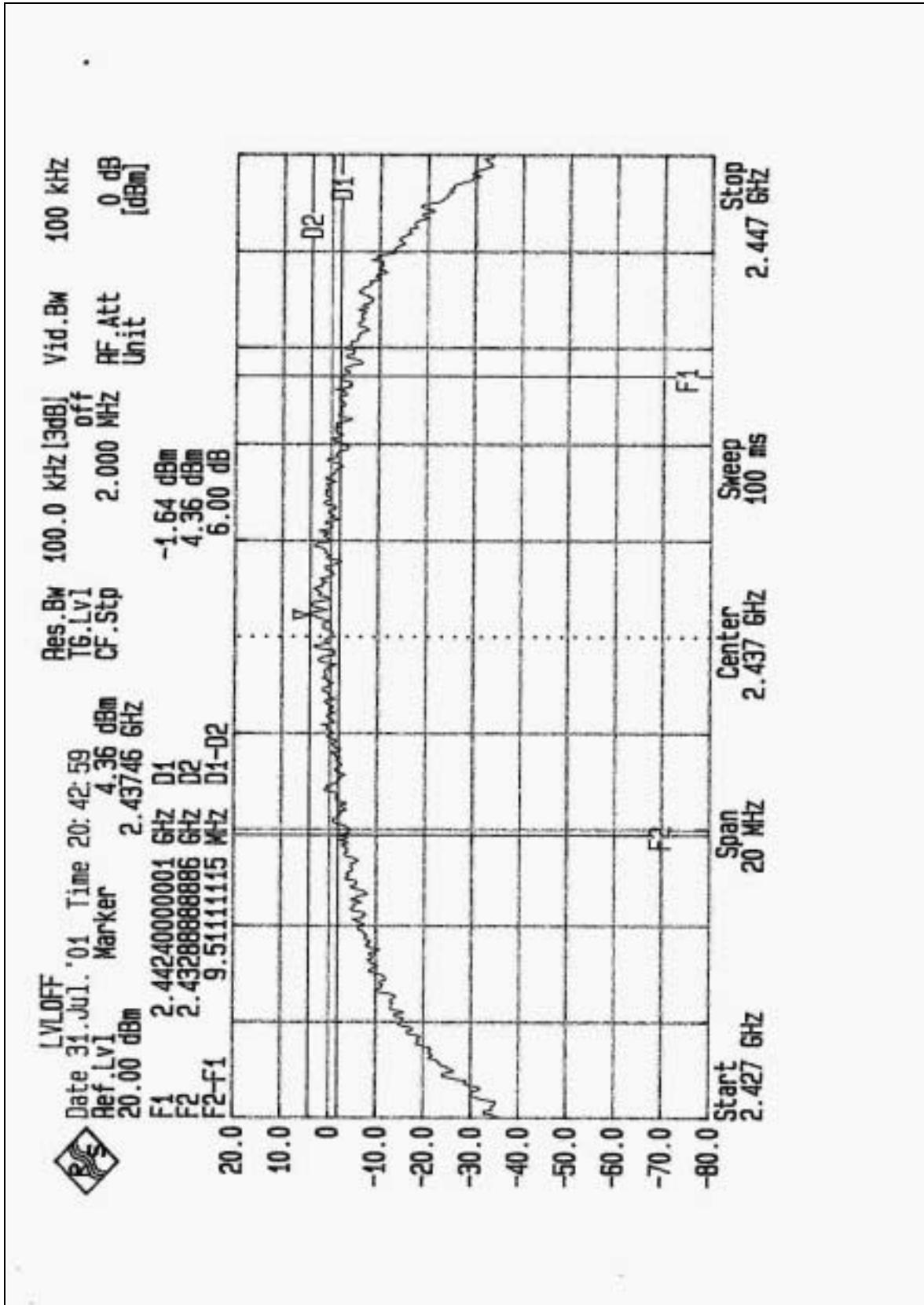
CH1





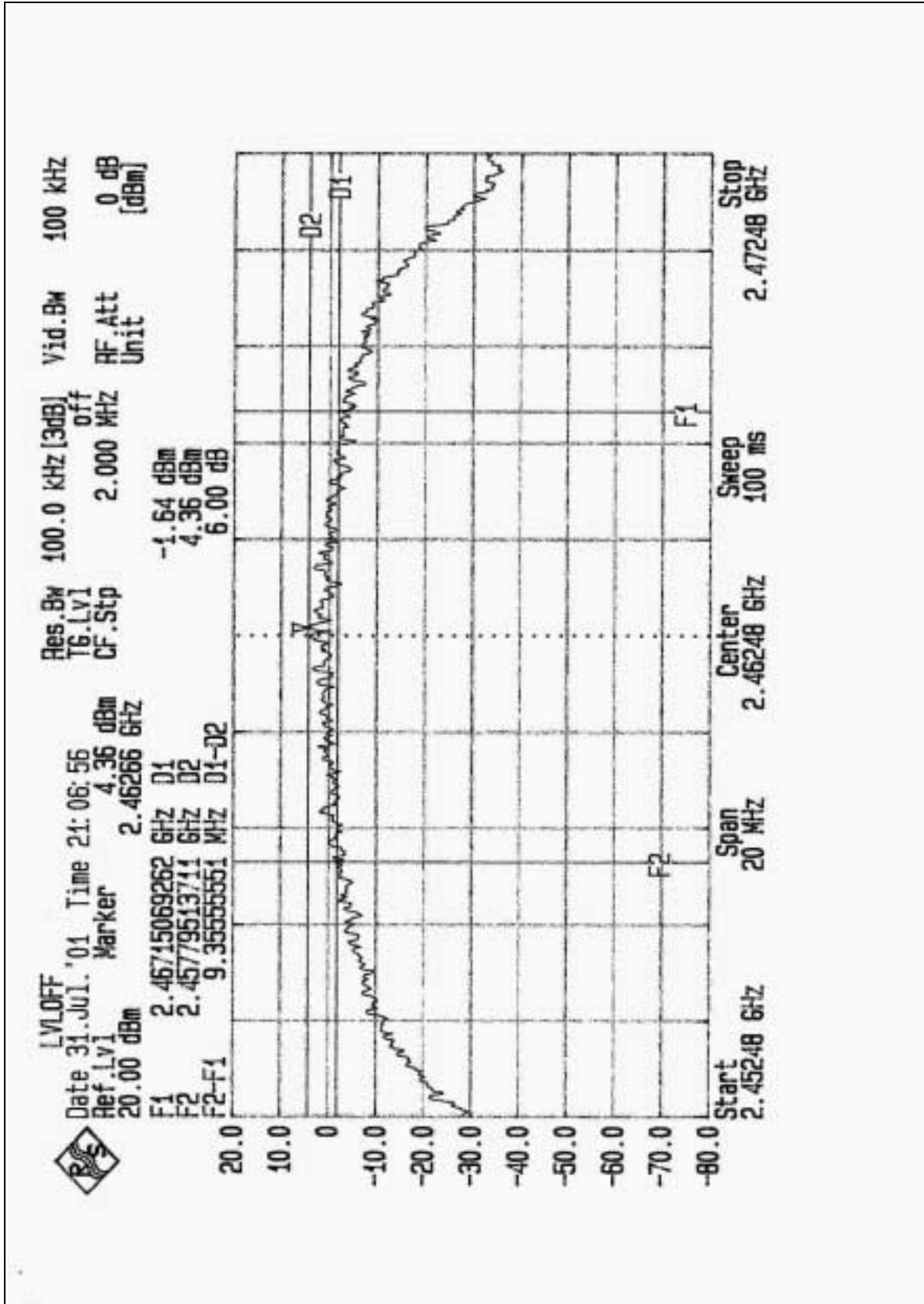


CH6





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. TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
Single Channel Power Meter	NRVS	100026	Feb. 21, 2002
ROHDER & SCHWARZ 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 and the peak output power was measured and recorded. The center frequency of the spectrum analyzer was set to the fundamental frequency and using 3 MHz RBW and 3 MHz VBW.

#### 4.4.4. TEST SETUP



#### 4.4.5. EUT OPERATING CONDITIONS

Same as Item 4.3.5



## 4.4.6. TEST RESULTS

<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 60%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>PASS/FAIL</b>
1	2412	14.32	30	PASS
6	2437	14.26	30	PASS
11	2462	13.89	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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

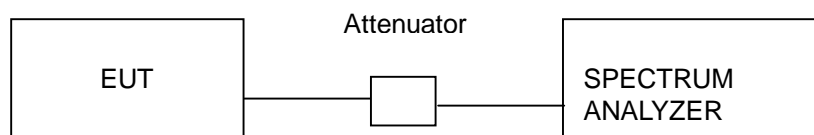
**NOTE:**

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/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

#### 4.5.4. TEST SETUP



#### 4.5.5. EUT OPERATING CONDITIONS

Same as 4.3.5



## 4.5.6. TEST RESULTS

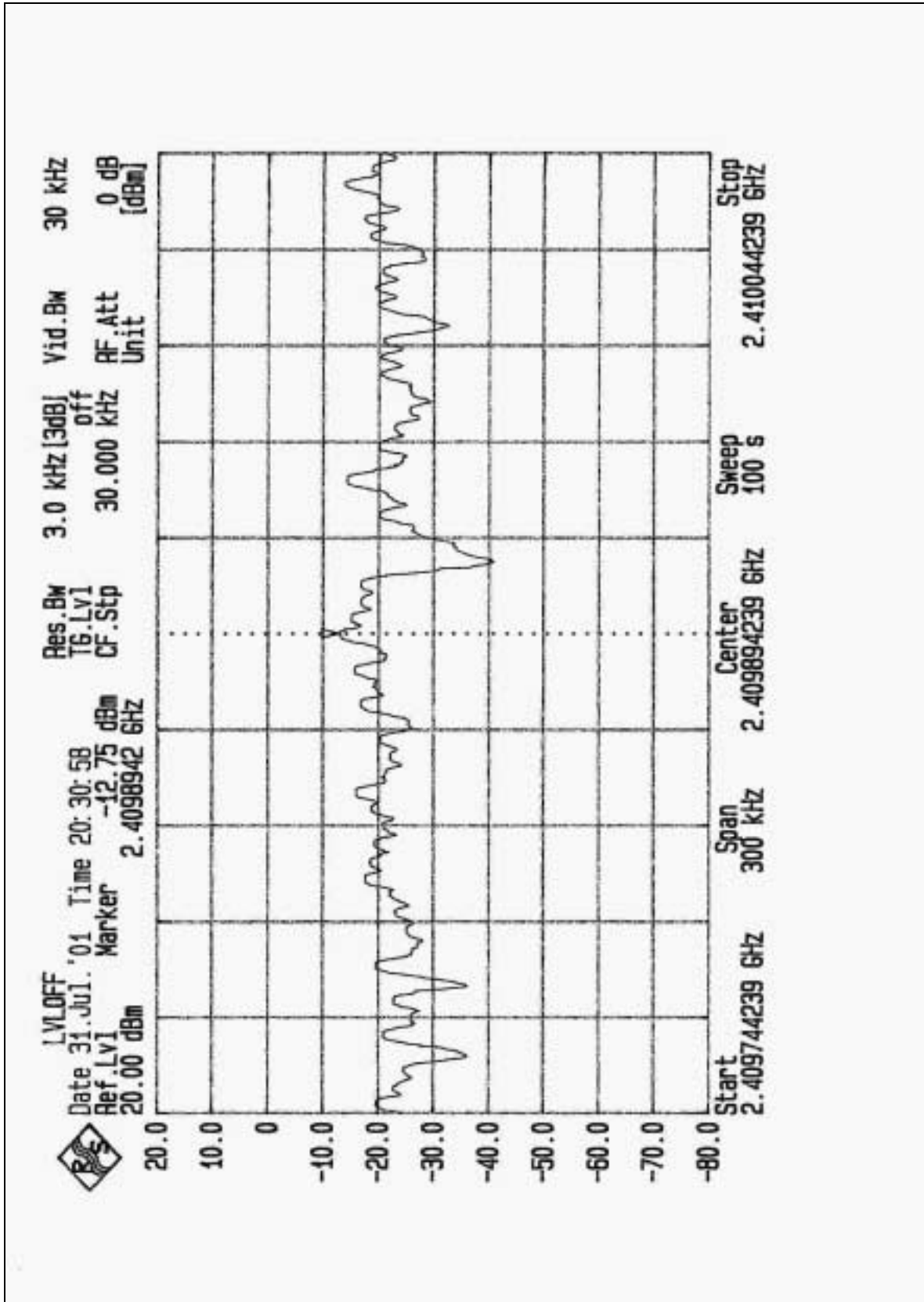
<b>EUT</b>	WLAN Module	<b>MODEL</b>	WM250-IF
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 76%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

<b>CHANNEL NUMBER</b>	<b>CHANNEL FREQUENCY (MHz )</b>	<b>RF POWER LEVEL IN 3 KHz BW (dBm)</b>	<b>MAXIMUM LIMIT (dBm)</b>	<b>PASS/FAIL</b>
1	2412	-12.75	8	PASS
6	2437	-10.44	8	PASS
11	2462	-10.54	8	PASS



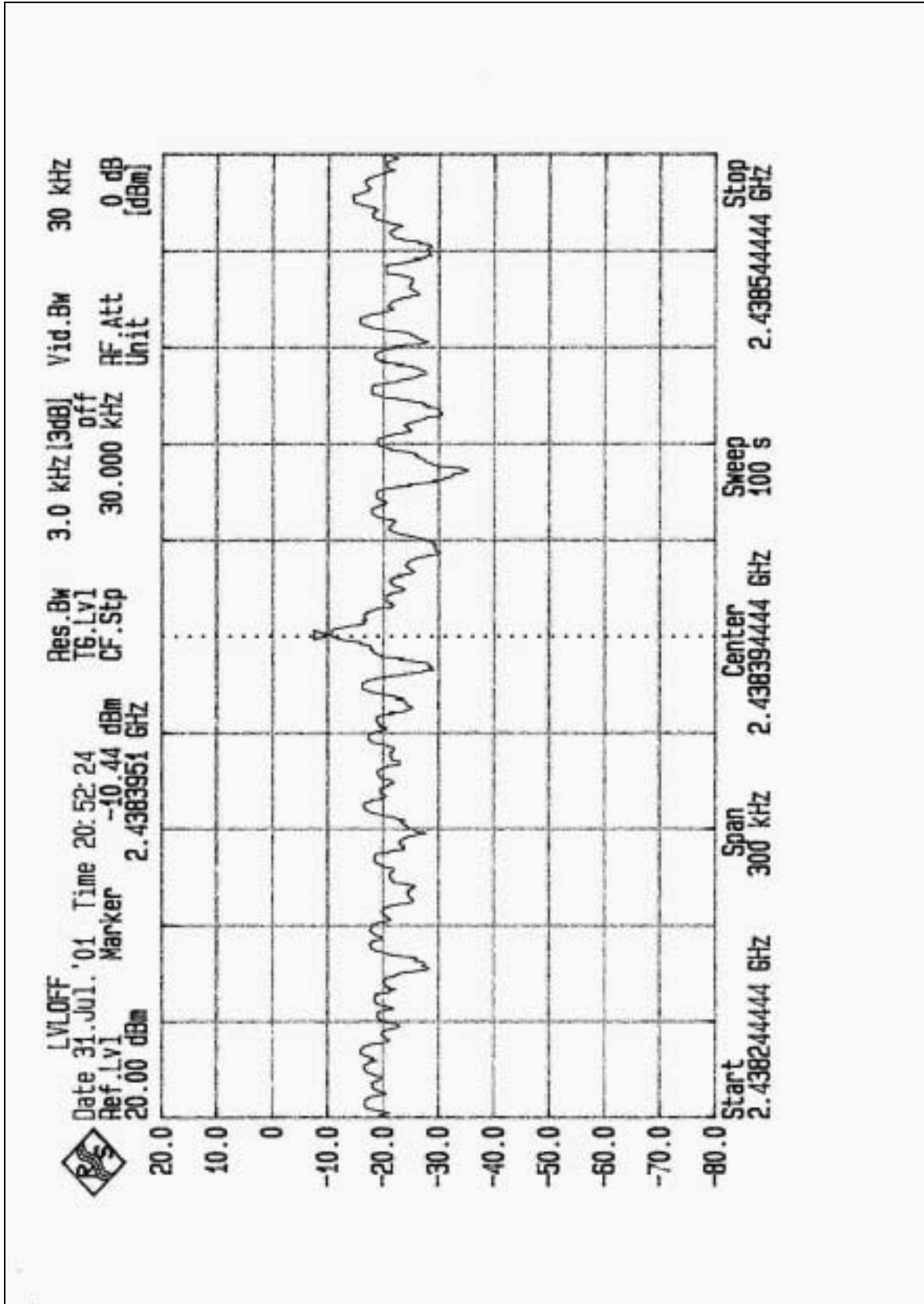


CH1



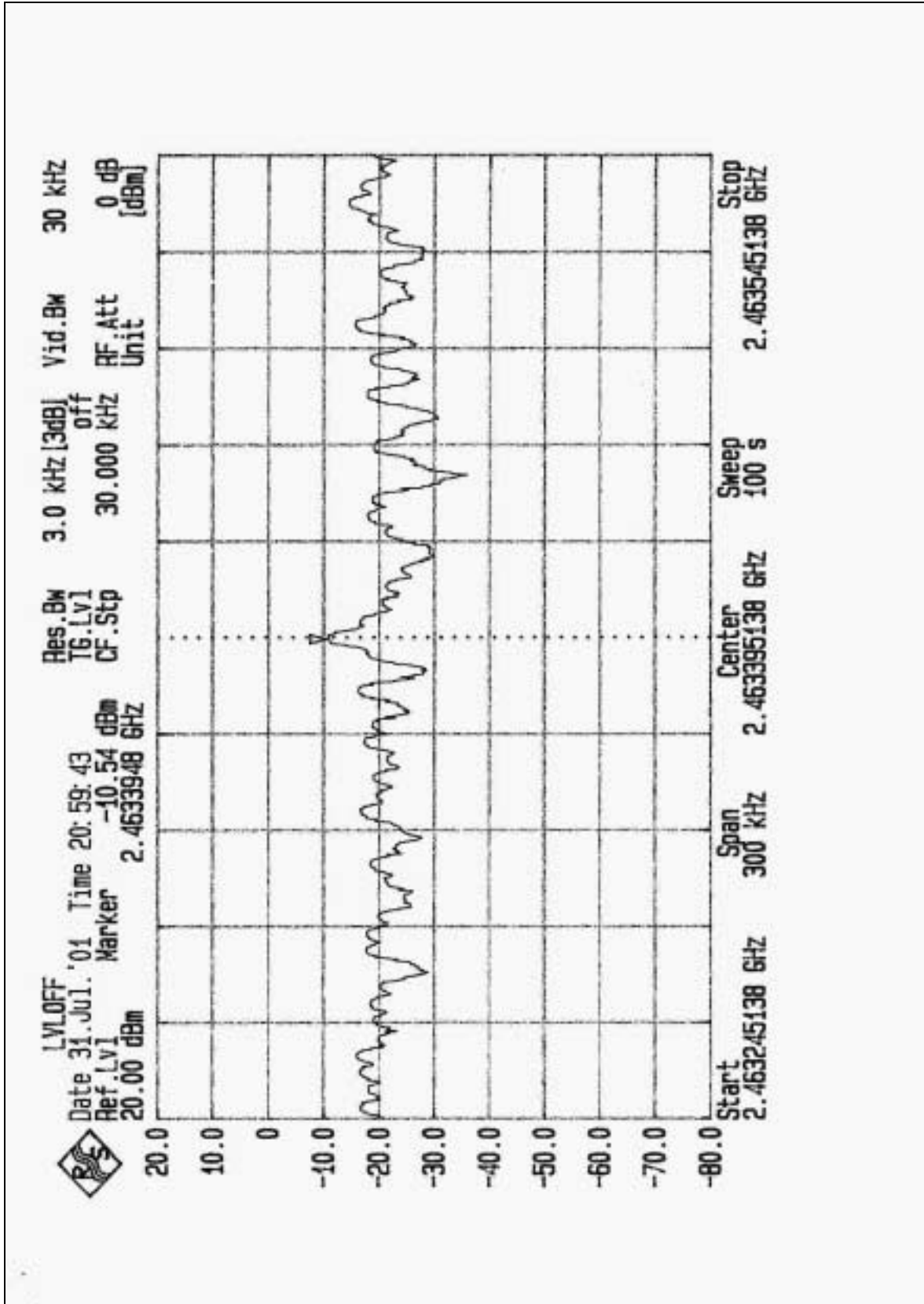


CH6





CH11





## 4.6. BAND EDGES MEASUREMENT

### 4.6.1. LIMITS OF BAND EDGES MEASUREMENT

Below  $-20\text{dB}$  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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	848926/005 846839/018	Dec 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

**NOTE:**

1. The measurement uncertainty is less than  $\pm 2.6\text{dB}$ , 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 lose 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.



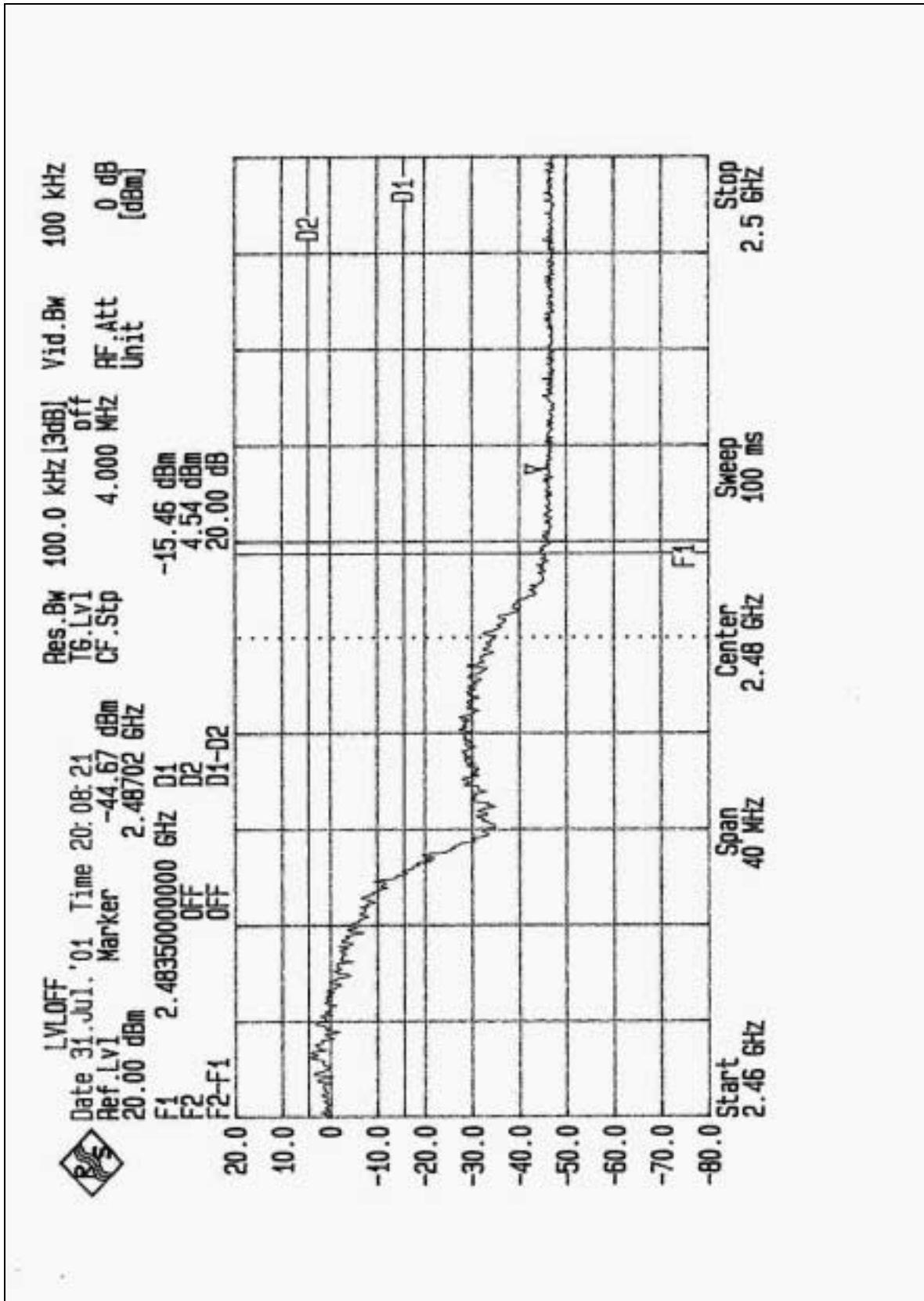
#### 4.6.4. EUT OPERATING CONDITION

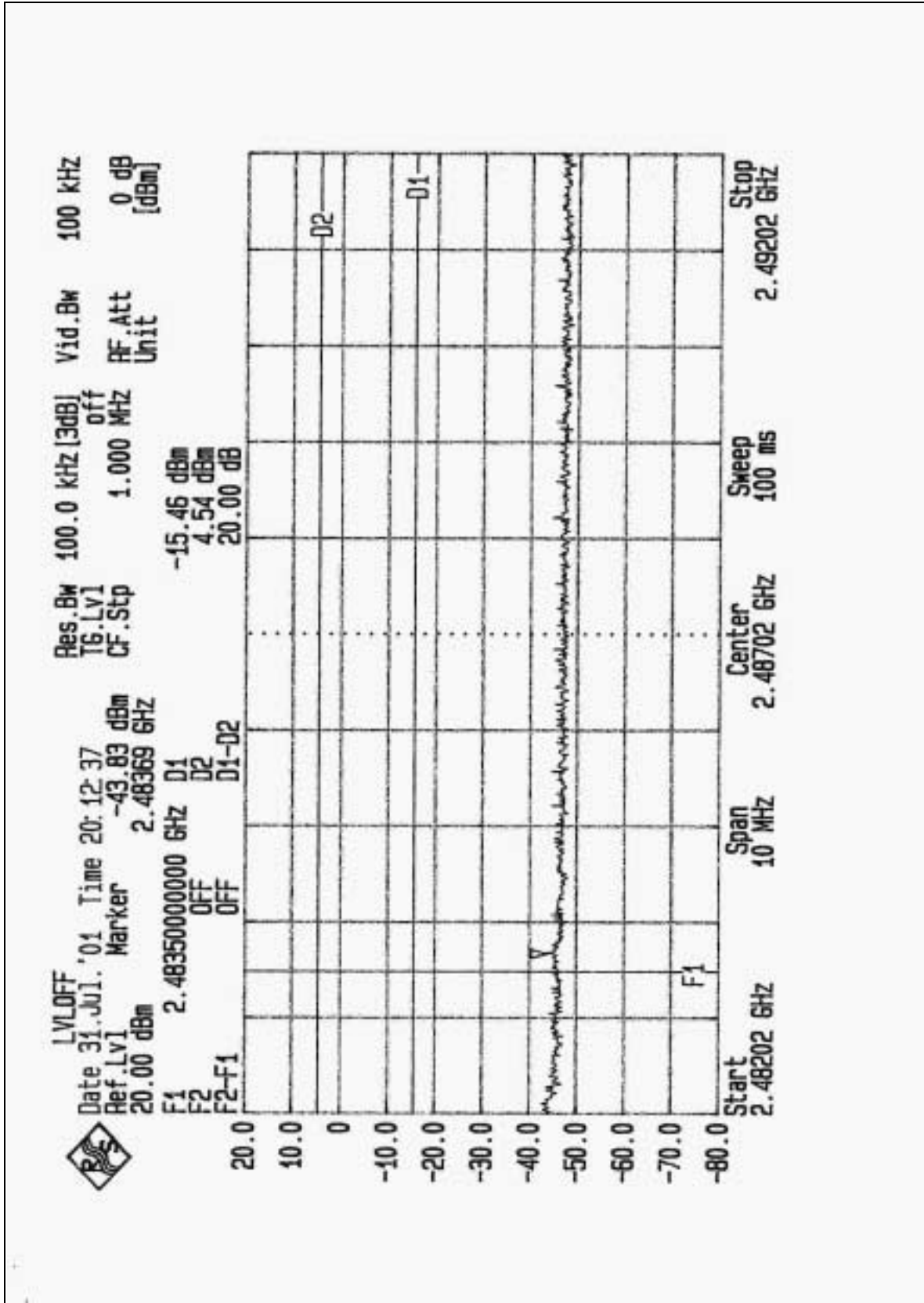
Same as Item 4.3.5

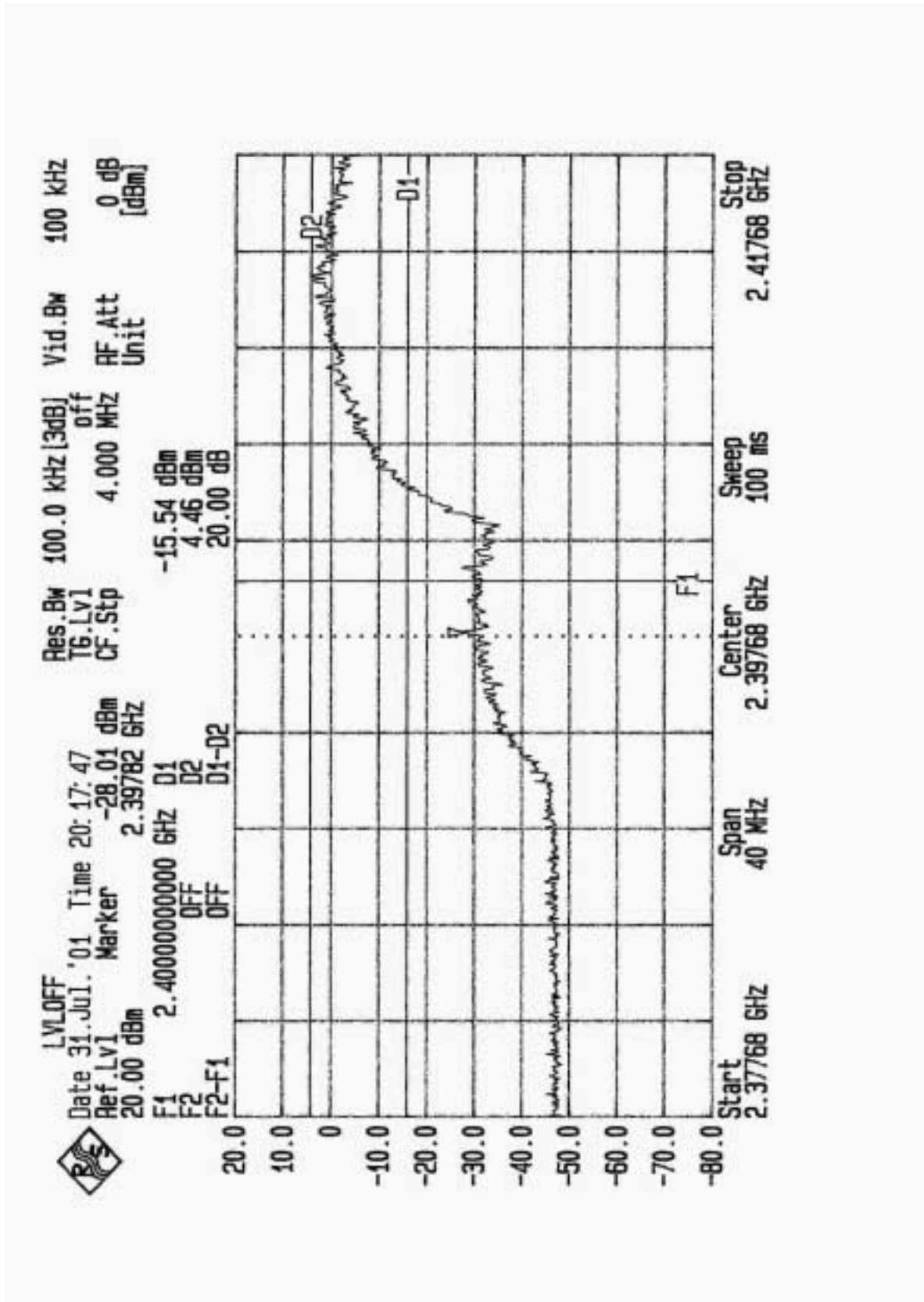
#### 4.6.5. TEST RESULTS

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).

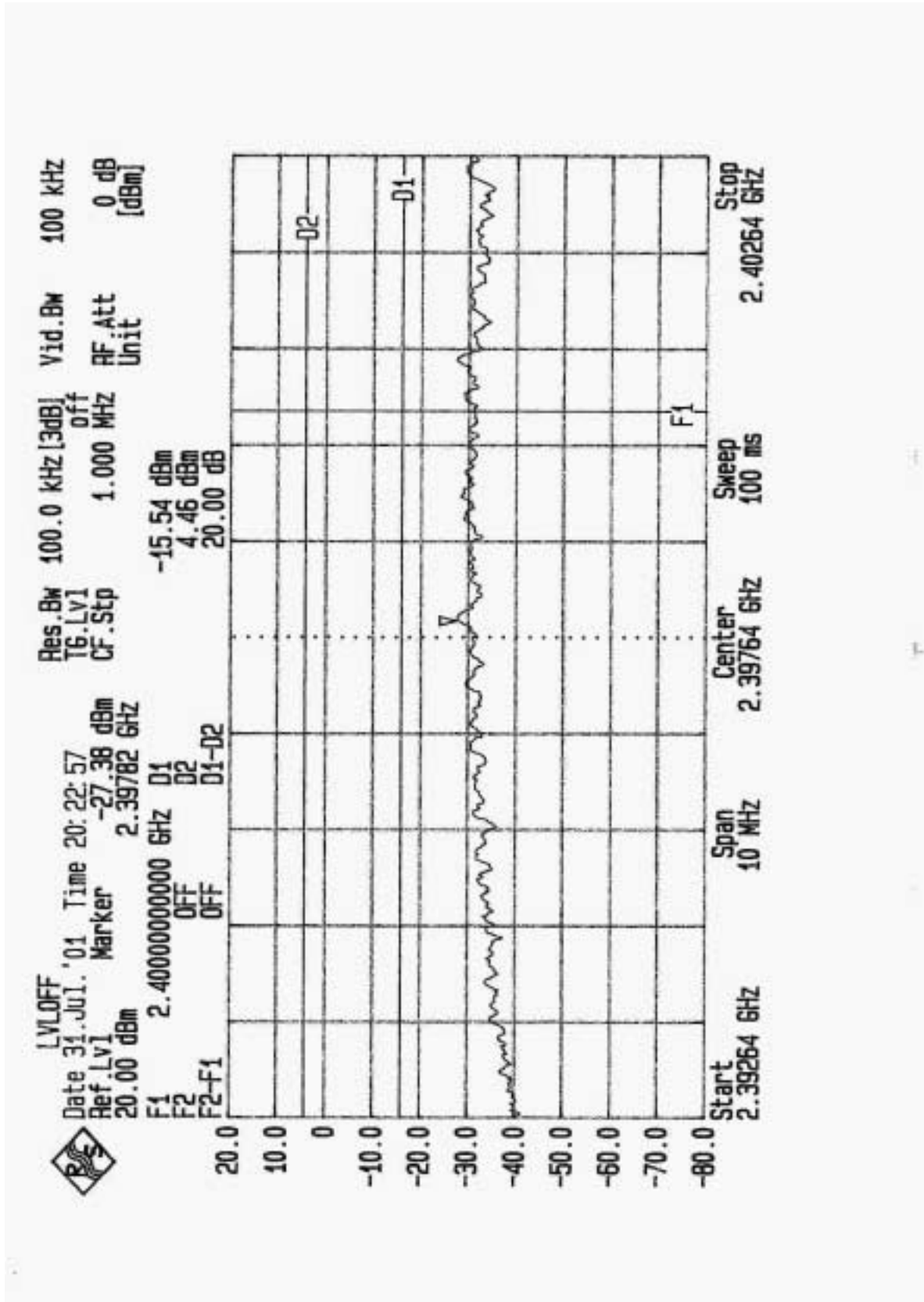
**NOTE:** The band edge emission plot on the following 2 pages shows 49.21dB delta between carrier maximum power and local maximum emission in restrict band (2.4870GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.6 (Page 25) is 98.3dBuV/m, so the maximum field strength in restrict band is  $98.3 - 49.21 = 49.09$ dBuV/m which is under 54 dBuV/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**

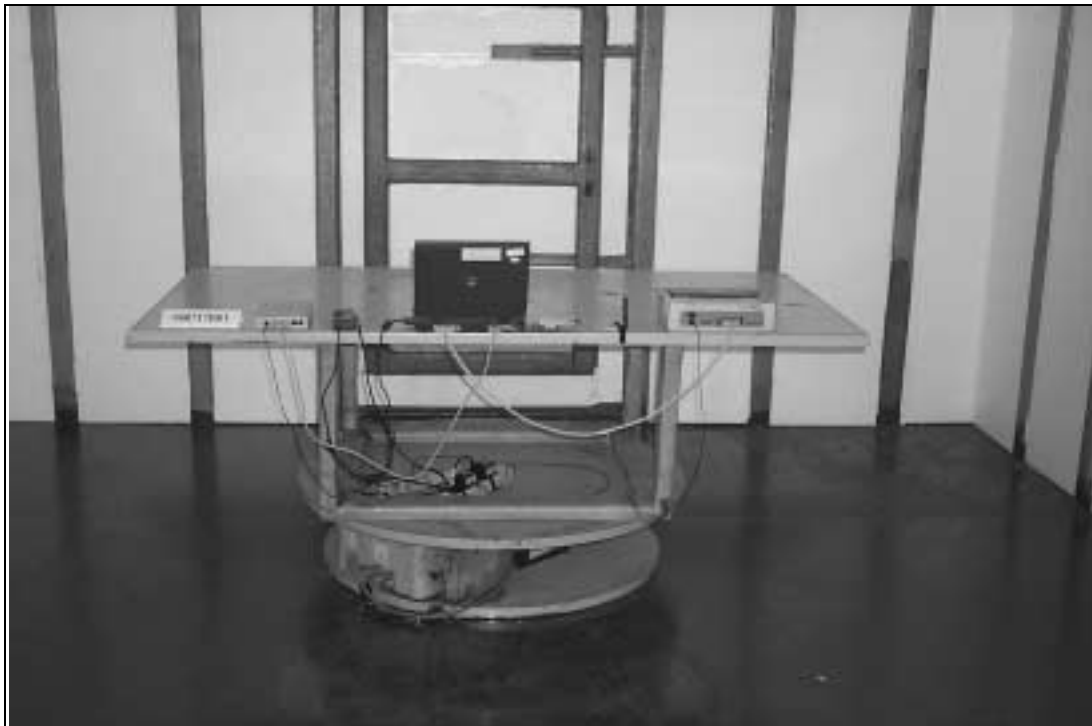
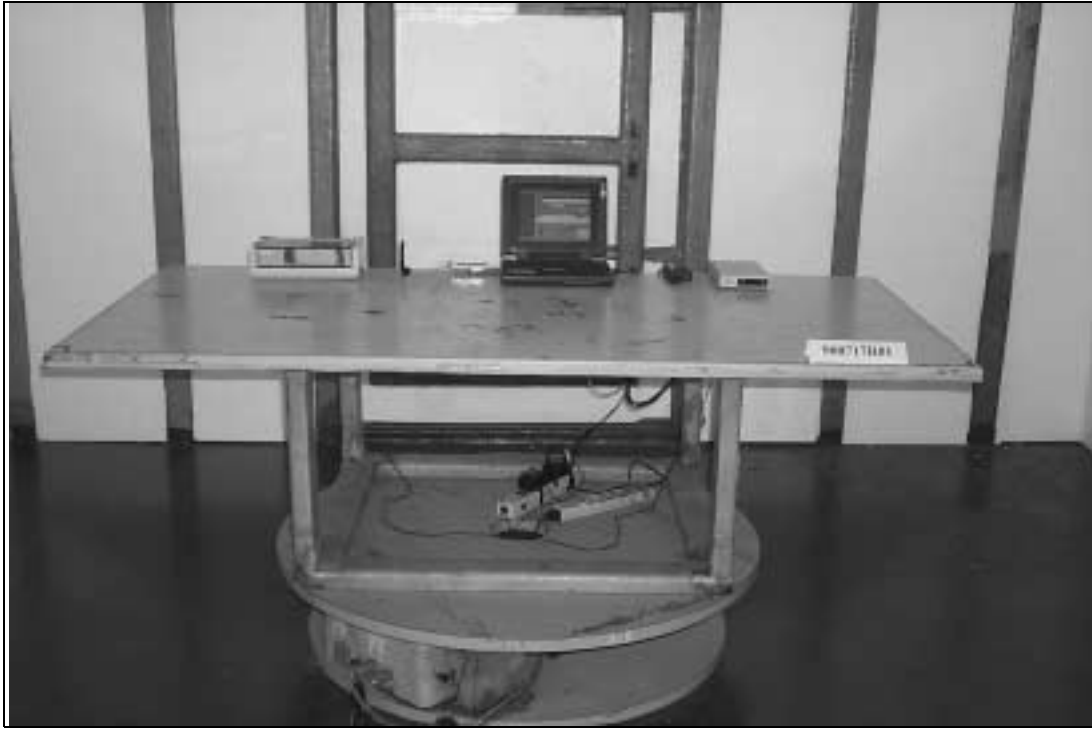
The maximum Gain antenna used in this product is Omni dipole antenna. The antenna connector type is MCX. And the maximum Gain of these antennas is only 3dBi.

## 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
<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).

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