



# FCC TEST REPORT

**REPORT NO.:** RF920127R01A

**MODEL NO.:** DWL-650+

**RECEIVED:** NA

**TESTED:** Jan. 27 ~ Feb. 6, 2003

**APPLICANT:** D-Link Corporation

**ADDRESS:** No.8,Li-Hsin VII Road Science Based  
Industrial Park Hsin-Chu,Taiwan

**ISSUED BY:** Advance Data Technology Corporation

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

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0528  
ILAC MRA



Lab Code: 200102-0



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## 1 CERTIFICATION

**PRODUCT :** 2.4GHz Wireless Cardbus Adapter  
**BRAND NAME :** D-Link  
**MODEL NO. :** DWL-650+  
**APPLICANT :** D-Link Corporation  
**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 Jan. 27 ~ Feb. 6, 2003, 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.

**CHECKED BY :** Emily Lu , **DATE :** Mar. 7, 2003  
Emily Lu

**APPROVED BY :** Dr. Alan Lane for , **DATE :** Mar. 7, 2003  
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>
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -14.57dBuV at 0.169MHz
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 -2.20dBuV at 7238.00MHz
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>	2.4GHz Wireless Cardbus Adapter
<b>MODEL NO.</b>	DWL-650+
<b>POWER SUPPLY</b>	3.3VDC from notebook
<b>MODULATION TYPE</b>	BPSK, QPSK, CCK, PBCC
<b>RADIO TECHNOLOGY</b>	DSSS
<b>TRANSFER RATE</b>	1/2/5.5/11/22Mbps
<b>FREQUENCY RANGE</b>	2412MHz ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11
<b>OUTPUT POWER</b>	17.89dBm
<b>ANTENNA TYPE</b>	Patch antenna
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. The EUT was designed with two kinds of Pre Amplifier. The details as below:

Item	Brand name	Model name
1	MAXIM	MAX2242
2	GATAX	GA2P4W22

2. For 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 1GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, worst case one, was chosen for final test.
2. Above 1GHz, the channel 1, 6, and 11 were tested individually.
3. Transfer rate 22Mbps, the worst case, was chosen for final test.
4. Two test results were presented in the following sections, for result A was EUT tested with amplifier model MAX2242 and result B was EUT tested with amplifier model GA2P4W22.

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a 2.4GHz Wireless Cardbus Adapter. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR 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	PP01L	TW-09C748-12800-190-B220	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017096	FCC DoC Approved
3	MODEM	ACEEX	1414	980020569	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 OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/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	847793/022	Mar. 12, 2003
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	828075/003	July 23, 2003
ROHDE & SCHWARZ 200-A Four-line V-Network	ENV4200	830326/018	Oct. 30, 2003
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Nov. 29, 2003
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/018	Nov. 29, 2003
EMCO-L.I.S.N. (for peripheral)	3825/2	90031627	July 23, 2003
Software	Cond-V2M1	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C05.01	July 19, 2003
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-305	Feb. 23, 2004
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-306	Feb. 23, 2004

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. "\*": These equipment are used for conducted telecom port test only (if tested).
  3. The test was performed in ADT Shielded Room No. 5.
  4. The VCCI Site Registration No. is C-1093.



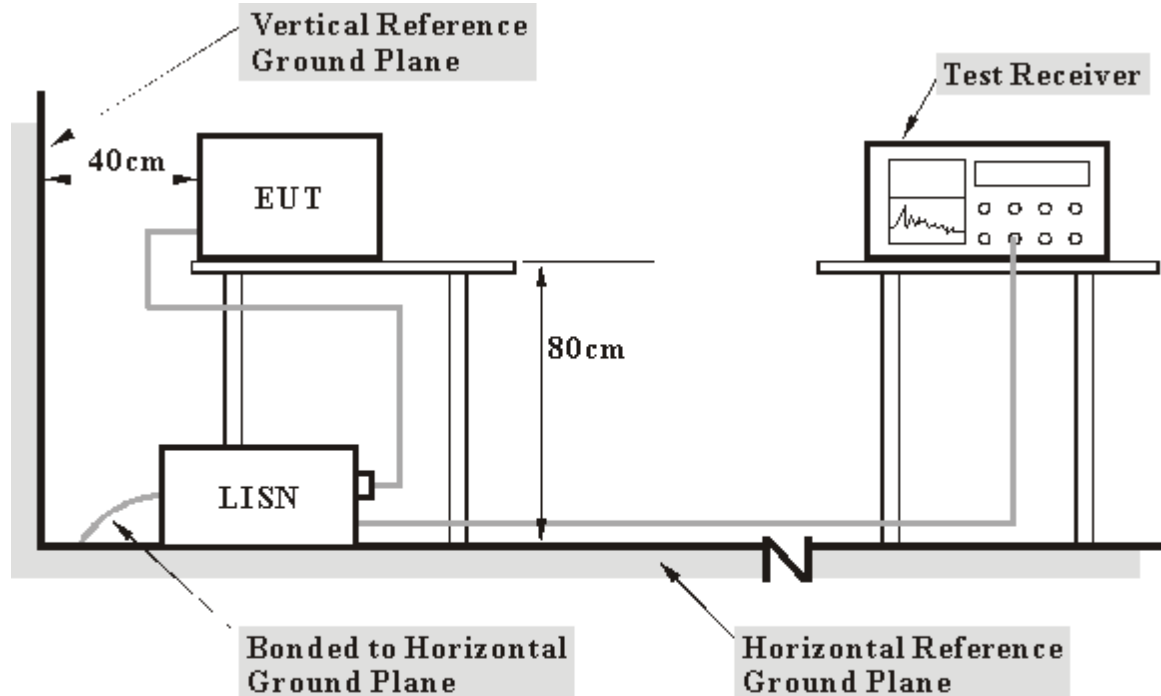
#### 4.1.3 TEST PROCEDURES

- 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 150kHz to 30MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 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. Connected the EUT 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.

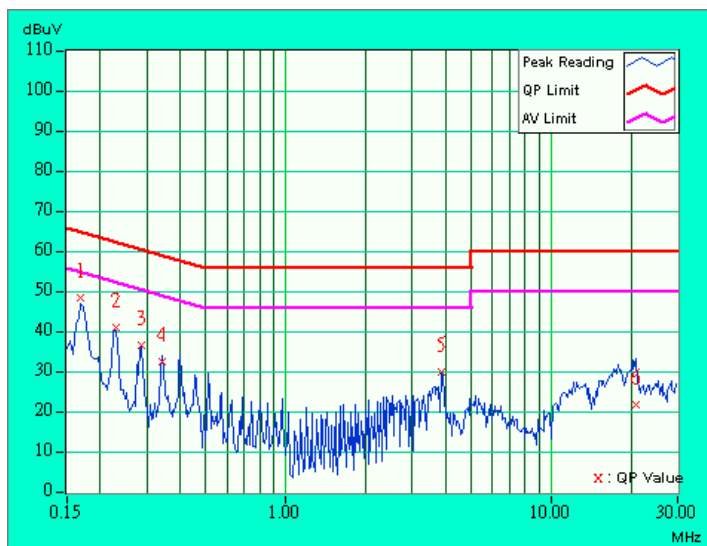


4.1.7 TEST RESULTS (A)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	47.25	-	47.35	-	64.98	54.98	-17.63	-
2	0.228	0.10	40.17	-	40.27	-	62.52	52.52	-22.25	-
3	0.287	0.10	35.51	-	35.61	-	60.62	50.62	-25.01	-
4	0.341	0.10	31.53	-	31.63	-	59.17	49.17	-27.54	-
5	3.879	0.39	28.84	-	29.23	-	56.00	46.00	-26.77	-
6	20.793	1.12	20.76	-	21.88	-	60.00	50.00	-38.12	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

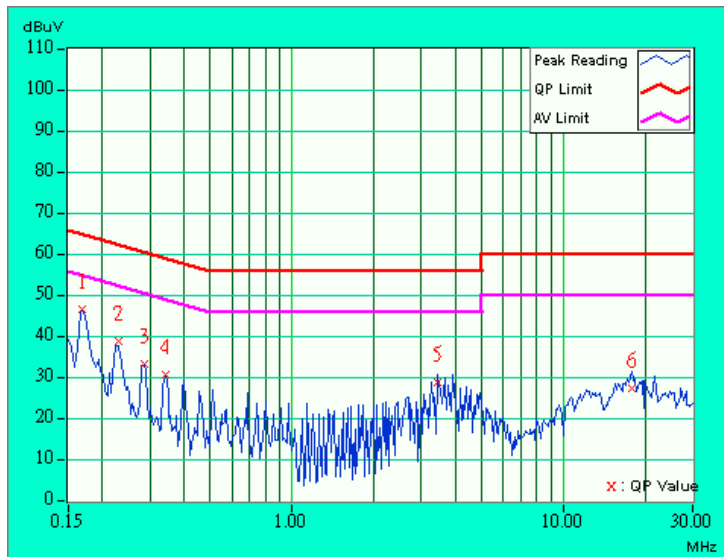




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.170	0.10	46.15	-	46.25	-	64.98	54.98	-18.73	-
2	0.228	0.10	38.04	-	38.14	-	62.52	52.52	-24.38	-
3	0.287	0.10	32.56	-	32.66	-	60.62	50.62	-27.96	-
4	0.341	0.10	30.14	-	30.24	-	59.17	49.17	-28.93	-
5	3.422	0.27	28.33	-	28.60	-	56.00	46.00	-27.40	-
6	17.961	0.68	26.61	-	27.29	-	60.00	50.00	-32.71	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

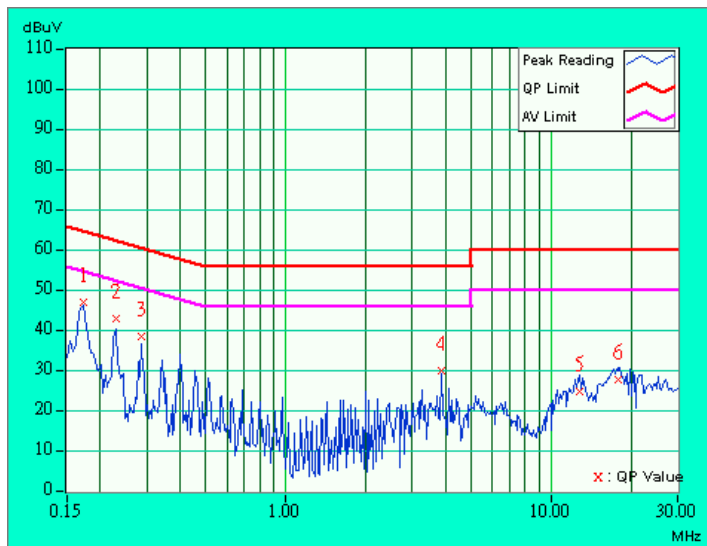




<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.10	46.03	-	46.13	-	64.79	54.79	-18.66	-
2	0.228	0.10	41.93	-	42.03	-	62.52	52.52	-20.49	-
3	0.287	0.10	37.39	-	37.49	-	60.62	50.62	-23.13	-
4	3.879	0.39	28.96	-	29.35	-	56.00	46.00	-26.65	-
5	12.785	0.71	23.98	-	24.69	-	60.00	50.00	-35.31	-
6	17.863	0.97	26.94	-	27.91	-	60.00	50.00	-32.09	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

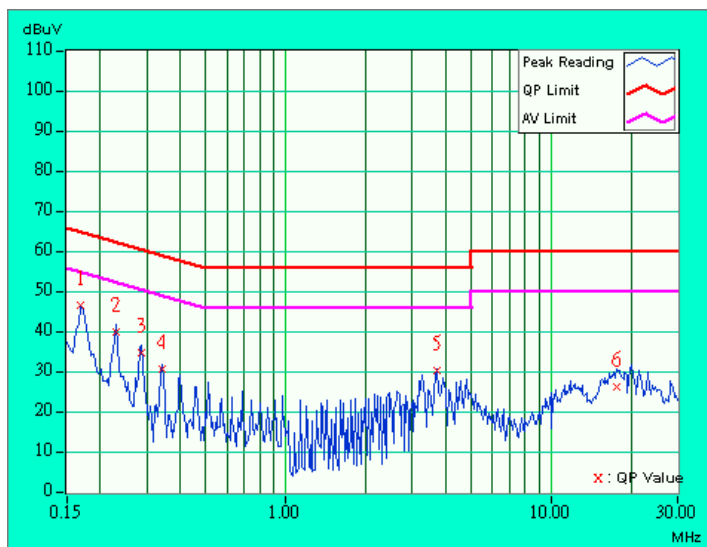




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.170	0.10	46.05	-	46.15	-	64.98	54.98	-18.83	-
2	0.228	0.10	39.28	-	39.38	-	62.52	52.52	-23.14	-
3	0.287	0.10	34.09	-	34.19	-	60.62	50.62	-26.43	-
4	0.341	0.10	30.09	-	30.19	-	59.17	49.17	-28.98	-
5	3.707	0.29	29.59	-	29.88	-	56.00	46.00	-26.12	-
6	17.668	0.66	25.74	-	26.40	-	60.00	50.00	-33.60	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

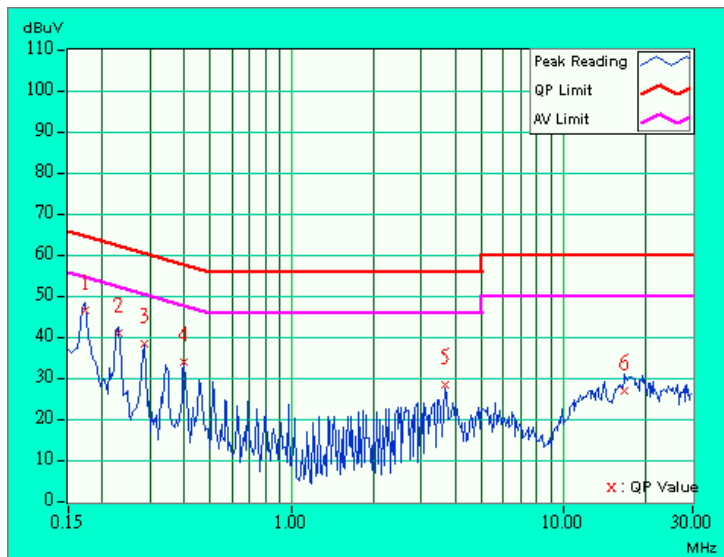




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.173	0.10	45.57	-	45.67	-	64.79	54.79	-19.12	-
2	0.228	0.10	40.27	-	40.37	-	62.52	52.52	-22.15	-
3	0.287	0.10	37.47	-	37.57	-	60.62	50.62	-23.05	-
4	0.400	0.10	33.25	-	33.35	-	57.85	47.85	-24.50	-
5	3.648	0.36	27.68	-	28.04	-	56.00	46.00	-27.96	-
6	16.879	0.91	26.20	-	27.11	-	60.00	50.00	-32.89	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.



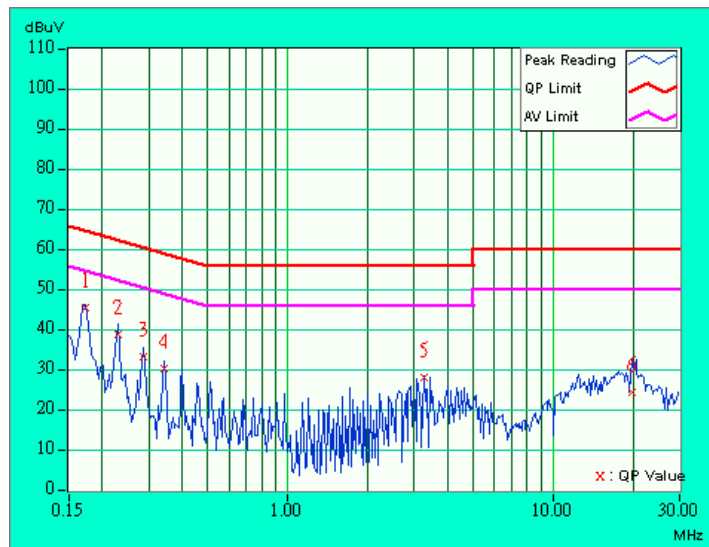




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Netural (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.10	44.64	-	44.74	-	64.79	54.79	-20.05	-
2	0.228	0.10	38.08	-	38.18	-	62.52	52.52	-24.34	-
3	0.287	0.10	32.58	-	32.68	-	60.62	50.62	-27.94	-
4	0.341	0.10	29.57	-	29.67	-	59.17	49.17	-29.50	-
5	3.250	0.26	27.41	-	27.67	-	56.00	46.00	-28.33	-
6	19.977	0.80	23.65	-	24.45	-	60.00	50.00	-35.55	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.



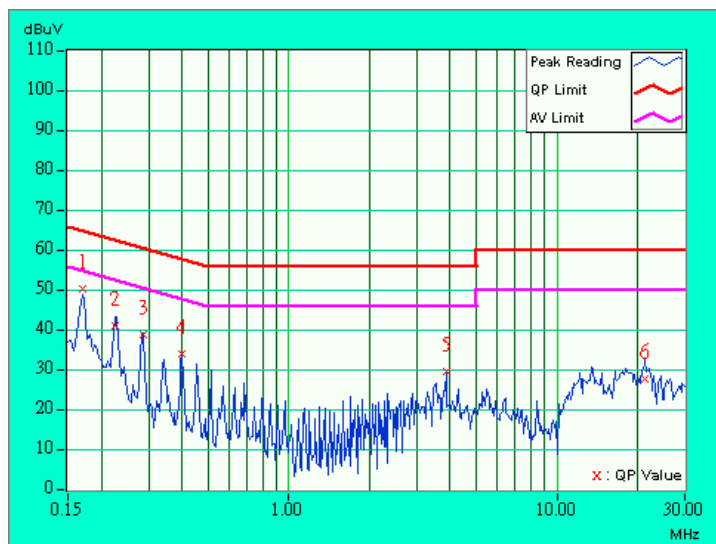


4.1.8 TEST RESULTS (B)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	49.07	-	49.17	-	64.98	54.98	-15.81	-
2	0.224	0.10	40.03	-	40.13	-	62.66	52.66	-22.53	-
3	0.287	0.10	37.70	-	37.80	-	60.62	50.62	-22.82	-
4	0.400	0.10	33.05	-	33.15	-	57.85	47.85	-24.70	-
5	3.871	0.39	28.42	-	28.81	-	56.00	46.00	-27.19	-
6	21.313	1.13	26.82	-	27.95	-	60.00	50.00	-32.05	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

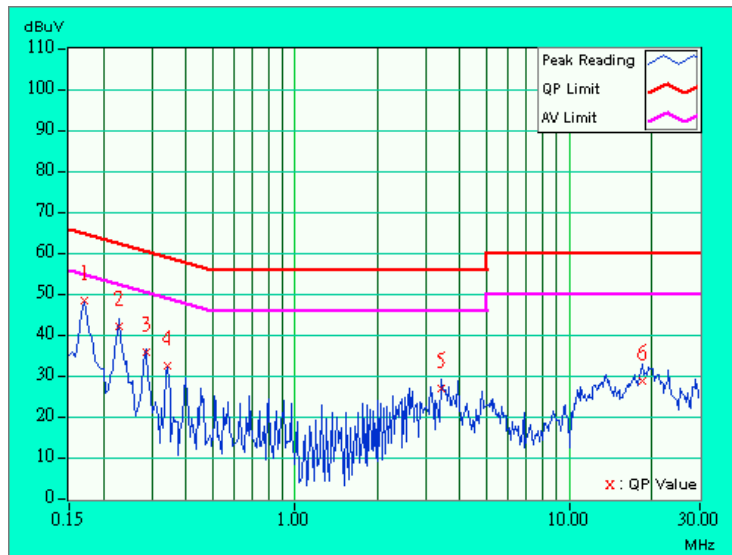




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.170	0.10	47.87	-	47.97	-	64.98	54.98	-17.01	-
2	0.228	0.10	41.69	-	41.79	-	62.52	52.52	-20.73	-
3	0.287	0.10	35.25	-	35.35	-	60.62	50.62	-25.27	-
4	0.341	0.10	31.91	-	32.01	-	59.17	49.17	-27.16	-
5	3.414	0.27	26.15	-	26.42	-	56.00	46.00	-29.58	-
6	18.449	0.71	28.03	-	28.74	-	60.00	50.00	-31.26	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

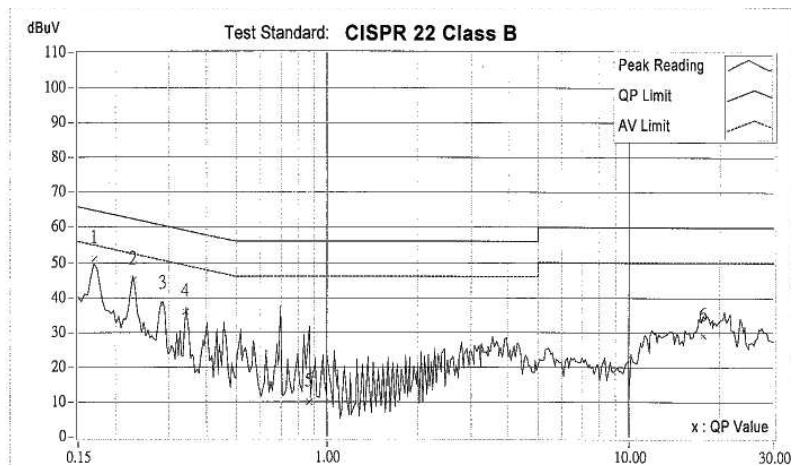




<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.170	0.10	50.09	-	50.19	-	64.98	54.98	-14.79	-
2	0.228	0.10	44.29	-	44.39	-	62.52	52.52	-18.13	-
3	0.287	0.10	36.94	-	37.04	-	60.62	50.62	-23.58	-
4	0.341	0.10	34.78	-	34.88	-	59.17	49.17	-24.29	-
5	0.873	0.18	8.98	-	9.16	-	56.00	46.00	-46.84	-
6	17.605	0.96	28.07	-	29.03	-	60.00	50.00	-30.97	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

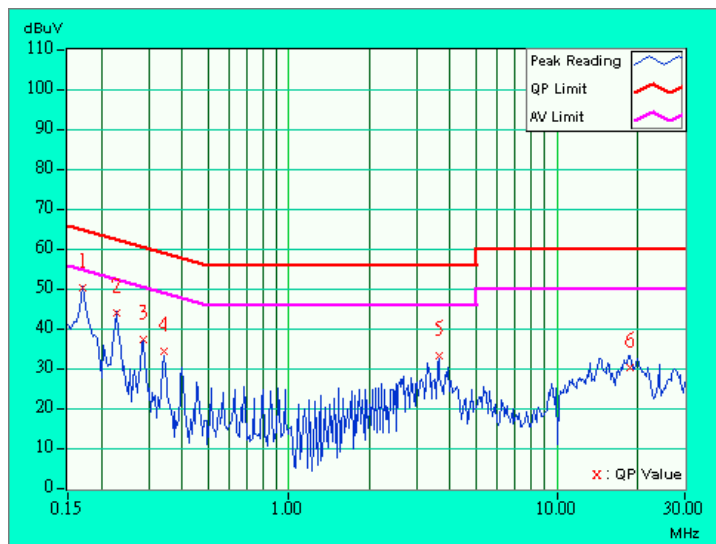




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (Uv)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	49.47	-	49.57	-	64.98	54.98	-15.41	-
2	0.228	0.10	43.33	-	43.43	-	62.52	52.52	-19.09	-
3	0.287	0.10	36.54	-	36.64	-	60.62	50.62	-23.98	-
4	0.341	0.10	33.60	-	33.70	-	59.17	49.17	-25.47	-
5	3.648	0.28	32.55	-	32.83	-	56.00	46.00	-23.17	-
6	18.754	0.73	29.80	-	30.53	-	60.00	50.00	-29.47	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

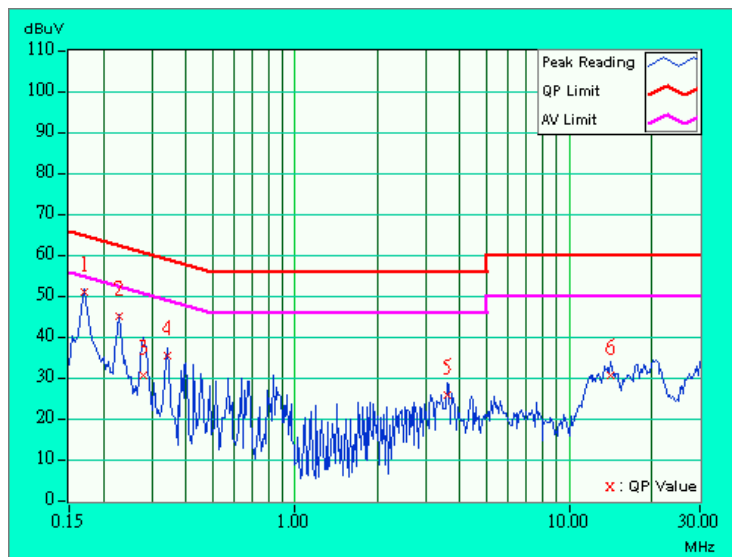




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	50.31	-	50.41	-	64.98	54.98	-14.57	-
2	0.228	0.10	44.53	-	44.63	-	62.52	52.52	-17.89	-
3	0.279	0.10	29.83	-	29.93	-	60.85	50.85	-30.92	-
4	0.341	0.10	34.80	-	34.90	-	59.17	49.17	-24.27	-
5	3.586	0.36	25.22	-	25.58	-	56.00	46.00	-30.42	-
6	14.184	0.77	29.97	-	30.74	-	60.00	50.00	-29.26	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.

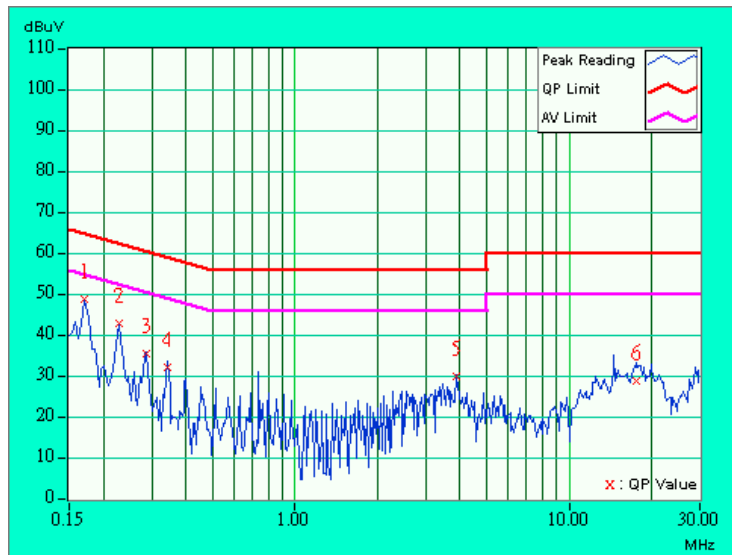




<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Netural (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<b>TESTED BY:</b> Gary Chang	

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	0.170	0.10	48.28	-	48.38	-	64.98	54.98	-16.60	-
2	0.228	0.10	42.42	-	42.52	-	62.52	52.52	-20.00	-
3	0.287	0.10	34.93	-	35.03	-	60.62	50.62	-25.59	-
4	0.341	0.10	31.70	-	31.80	-	59.17	49.17	-27.37	-
5	3.871	0.29	29.22	-	29.51	-	56.00	46.00	-26.49	-
6	17.695	0.66	28.17	-	28.83	-	60.00	50.00	-31.17	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value.
  5. Correction factor = Insertion loss + Cable loss.
  6. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**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 13, 2003
* HP Preamplifier	8447D	2944A08485	Apr. 29, 2003
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01292	Aug. 07, 2003
*Spectrum Analyzer	8593E	3926A04191	Mar. 28, 2003
*Test Receiver	ESI7	838496/016	Feb. 23, 2004
SCHAFFNER Tunable Dipole Antenna	VHBA 9123	459	Nov. 22, 2003
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 02, 2003
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 03, 2003
* EMCO Horn Antenna	3115	9312-4192	Apr. 09, 2003
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	ADT_Radiated_V5.09	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Jul. 11. 2003
* TIMES RF cable	LMR-600	CABLE-ST5-01	Jul. 11. 2003

- NOTE:**
1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
  2. "\*" = These equipment are used for the final measurement.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The test was performed in ADT Open Site No. 5.
  5. The VCCI Site Registration No. is R-1039.



#### 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.

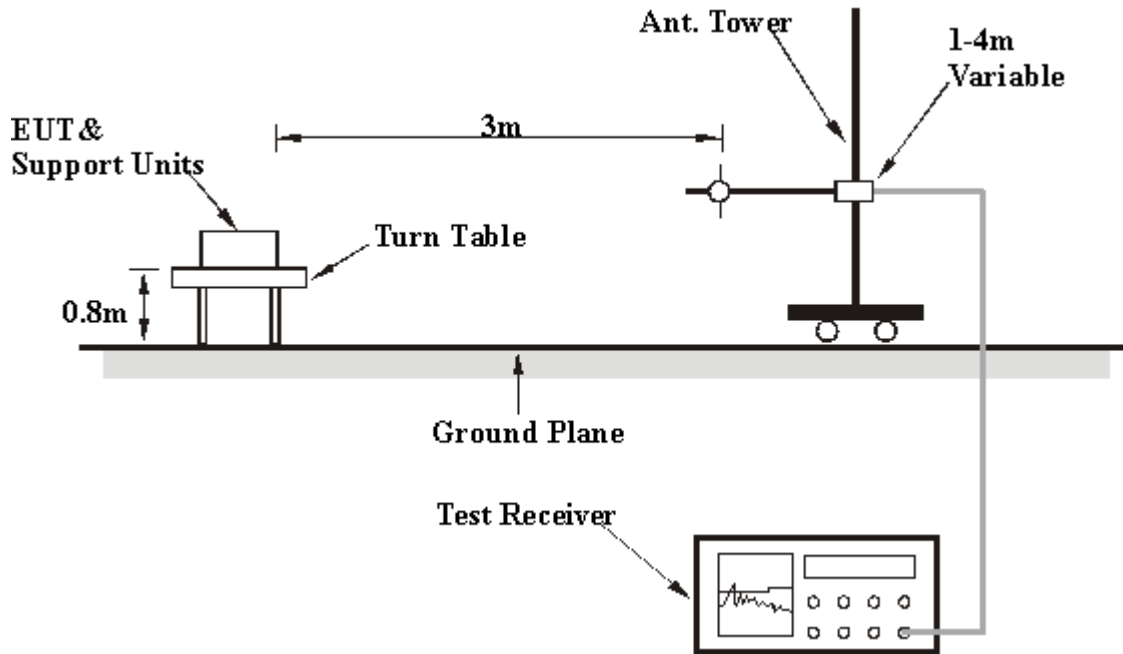
**NOTE:**

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 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.5 TEST SETUP



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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS (A)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Below 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	219.99	35.8 QP	46.00	-10.20	1.19 H	77	23.00	12.80
2	263.99	33.7 QP	46.00	-12.30	1.42 H	311	17.00	16.70
3	308.01	31.6 QP	46.00	-14.40	1.30 H	305	14.70	16.90
4	352.01	39.8 QP	46.00	-6.20	1.06 H	38	22.00	17.70
5	396.01	32.8 QP	46.00	-13.20	1.29 H	275	13.80	19.00
6	440.01	34.9 QP	46.00	-11.10	1.13 H	53	15.20	19.60
7	527.97	31.1 QP	46.00	-14.90	1.37 H	295	9.90	21.10
8	572.00	31.6 QP	46.00	-14.40	1.76 H	26	9.80	21.80
9	616.13	30.9 QP	46.00	-15.10	1.39 H	276	8.20	22.70
10	748.01	31.5 QP	46.00	-14.50	1.17 H	247	7.40	24.10
11	792.01	29.8 QP	46.00	-16.20	1.42 H	67	5.00	24.80

**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)	Correction Factor (dB/m)
1	219.99	30.8 QP	46.00	-15.20	1.12 V	320	18.00	12.80
2	263.99	27.9 QP	46.00	-18.10	1.22 V	223	11.20	16.70
3	352.00	32.1 QP	46.00	-13.90	1.50 V	108	14.40	17.70
4	396.00	28.6 QP	46.00	-17.40	1.18 V	247	9.60	19.00
5	528.00	32.7 QP	46.00	-13.30	1.25 V	44	11.60	21.10
6	704.01	29.7 QP	46.00	-16.30	1.35 V	257	6.60	23.10
7	747.97	30.1 QP	46.00	-15.90	1.56 V	131	6.00	24.10

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2412.00	110.2 PK			1.68 H	180	77.40	32.80
1	*2412.00	100.2 AV			1.68 H	180	67.50	32.80
2	4824.00	46.2 PK	74.00	-27.80	1.37 H	114	9.20	36.90
3	7238.00	50.4 PK	74.00	-23.60	1.23 H	45	8.90	41.40
3	7238.00	39.4 AV	54.00	-14.60	1.23 H	45	-2.10	36.90

<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)	Correction Factor (dB/m)
1	*2412.00	112.4 PK			1.24 V	65	79.70	32.80
1	*2412.00	102.9 AV			1.24 V	65	70.20	32.80
2	4824.00	46.2 PK	74.00	-27.80	1.14 V	54	9.20	36.90
3	7237.00	48.4 PK	74.00	-25.60	1.19 V	227	6.90	41.40

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “ : Fundamental frequency.



<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2437.00	111.2 PK			1.26 H	193	78.40	32.80
1	*2437.00	101.4 AV			1.26 H	193	68.60	32.80
2	4874.00	45.4 PK	74.00	-28.60	1.52 H	37	8.20	37.10
3	7312.00	49.5 PK	74.00	-24.50	1.34 H	55	7.90	41.60

#### 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)	Correction Factor (dB/m)
1	*2437.00	105.8 PK			1.23 V	179	73.00	32.80
1	*2437.00	96.7 AV			1.23 V	179	63.90	32.80
2	4874.00	45.9 PK	74.00	-28.10	1.35 V	45	8.70	37.10
3	7310.00	49.5 PK	74.00	-24.50	1.52 V	32	7.90	41.50

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. " \* " : Fundamental frequency.



<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2463.00	112.6 PK			1.06 H	276	79.70	32.90
1	*2463.00	102.9 AV			1.06 H	276	70.00	32.90
2	4924.00	46.1 PK	74.00	-27.90	1.25 H	82	8.70	37.30
3	7388.00	49.9 PK	74.00	-24.10	1.19 H	35	8.30	41.70

#### 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)	Correction Factor (dB/m)
1	*2463.00	110.5 PK			1.59 V	78	77.70	32.90
1	*2463.00	100.9 AV			1.59 V	78	68.10	32.90
2	4924.00	47.1 PK	74.00	-26.90	1.34 V	342	9.70	37.30
3	7388.00	51.0 PK	74.00	-23.00	1.21 V	45	9.40	41.70
3	7388.00	41.5 AV	54.00	-12.50	1.21 V	45	-0.10	37.30

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “ : Fundamental frequency.



## 4.2.8 TEST RESULTS (B)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Below 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	176.01	27.7 QP	43.50	-15.80	1.17 H	2	17.10	10.60
2	264.01	35.7 QP	46.00	-10.30	1.23 H	40	19.10	16.70
3	308.01	38.7 QP	46.00	-7.30	1.29 H	2	21.80	16.90
4	352.00	38.0 QP	46.00	-8.00	1.28 H	44	20.30	17.70
5	396.01	37.4 QP	46.00	-8.60	1.13 H	55	18.40	19.00
6	440.01	36.5 QP	46.00	-9.50	1.35 H	323	16.80	19.60
7	484.01	28.5 QP	46.00	-17.50	1.31 H	169	7.80	20.70
8	616.01	28.8 QP	46.00	-17.20	1.10 H	11	6.10	22.70
9	748.01	31.2 QP	46.00	-14.80	1.30 H	2	7.10	24.10

**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)	Correction Factor (dB/m)
1	308.01	33.1 QP	46.00	-12.90	1.35 V	3	16.20	16.90
2	352.00	41.0 QP	46.00	-5.00	1.37 V	212	23.30	17.70
3	396.00	35.8 QP	46.00	-10.20	1.57 V	45	16.80	19.00
4	440.00	37.0 QP	46.00	-9.00	1.16 V	262	17.40	19.60
5	528.00	32.2 QP	46.00	-13.80	1.10 V	228	11.10	21.10
6	572.00	29.8 QP	46.00	-16.20	1.13 V	81	8.00	21.80
7	748.00	30.0 QP	46.00	-16.00	1.30 V	42	5.90	24.10

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.





<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2412.00	106.3 PK			1.60 H	259	73.60	32.80
1	*2412.00	96.5 AV			1.60 H	259	63.70	32.80
2	4824.00	45.4 PK	74.00	-28.60	1.16 H	74	8.40	36.90
3	7238.00	59.8 PK	74.00	-14.20	1.21 H	80	18.30	41.40
3	7238.00	50.3 AV	54.00	-3.70	1.21 H	80	8.90	36.90

<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)	Correction Factor (dB/m)
1	*2412.00	110.3 PK			1.69 V	258	77.60	32.80
1	*2412.00	100.5 AV			1.69 V	258	67.70	32.80
2	4824.00	47.3 PK	74.00	-26.70	1.41 V	22	10.40	36.90
3	7238.00	61.6 PK	74.00	-12.40	1.67 V	165	20.10	41.40
3	7238.00	51.8 AV	54.00	-2.20	1.67 V	165	10.30	36.90

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. " \* " : Fundamental frequency.



<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2437.00	110.5 PK			1.09 H	24	77.70	32.80
1	*2437.00	100.7 AV			1.09 H	24	67.90	32.80
2	4874.00	46.2 PK	74.00	-27.80	1.36 H	254	9.10	37.10
3	7311.00	58.3 PK	74.00	-15.70	1.30 H	78	16.70	41.50
3	7311.00	48.8 AV	54.00	-5.20	1.30 H	78	7.30	37.10

#### 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)	Correction Factor (dB/m)
1	*2437.00	109.1 PK			1.59 V	257	76.30	32.80
1	*2437.00	99.2 AV			1.59 V	257	66.40	32.80
2	4874.00	47.4 PK	74.00	-26.60	1.21 V	45	10.20	37.10
3	7310.00	61.1 PK	74.00	-12.90	1.51 V	143	19.50	41.50
3	7310.00	50.9 AV	54.00	-3.10	1.51 V	143	9.30	37.10

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. " \* " : Fundamental frequency.



<b>EUT</b>	2.4GHz Wireless Carbus Adapter	<b>MODEL</b>	DWL-650+
<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>	25deg. C, 60%RH, 1005hPa	<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)	Correction Factor (dB/m)
1	*2463.00	110.3 PK			1.03 H	64	77.50	32.90
1	*2463.00	100.8 AV			1.03 H	64	68.00	32.90
2	4924.00	47.6 PK	74.00	-26.40	1.62 H	155	10.20	37.30
3	7386.00	58.1 PK	74.00	-15.90	1.22 H	78	16.50	41.70
3	7386.00	48.3 AV	54.00	-5.70	1.22 H	78	6.70	37.30

#### 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)	Correction Factor (dB/m)
1	*2463.00	110.0 PK			1.25 V	284	77.10	32.90
1	*2463.00	99.9 AV			1.25 V	284	67.00	32.90
2	4924.00	46.4 PK	74.00	-27.60	1.12 V	54	9.10	37.30
3	7386.00	58.1 PK	74.00	-15.90	1.35 V	221	16.40	41.70
3	7386.00	49.5 AV	54.00	-4.50	1.35 V	221	7.80	37.30

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “ : 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 24, 2003

**NOTE:** 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 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



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

#### 4.3.6 EUT OPERATING CONDITIONS

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



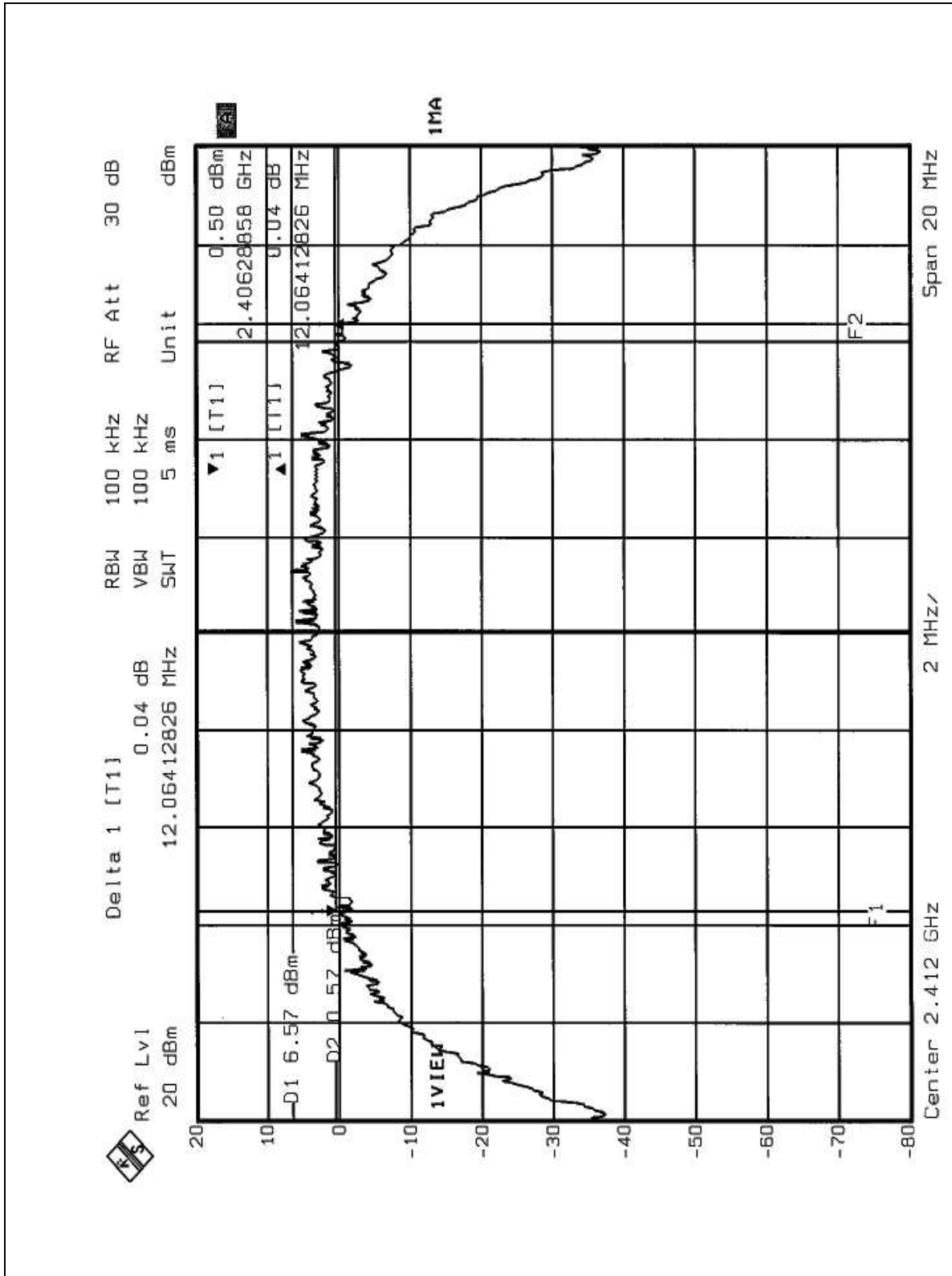
## 4.3.7 TEST RESULTS (A)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

<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	12.06	0.5	PASS
6	2437	12.63	0.5	PASS
11	2462	12.67	0.5	PASS

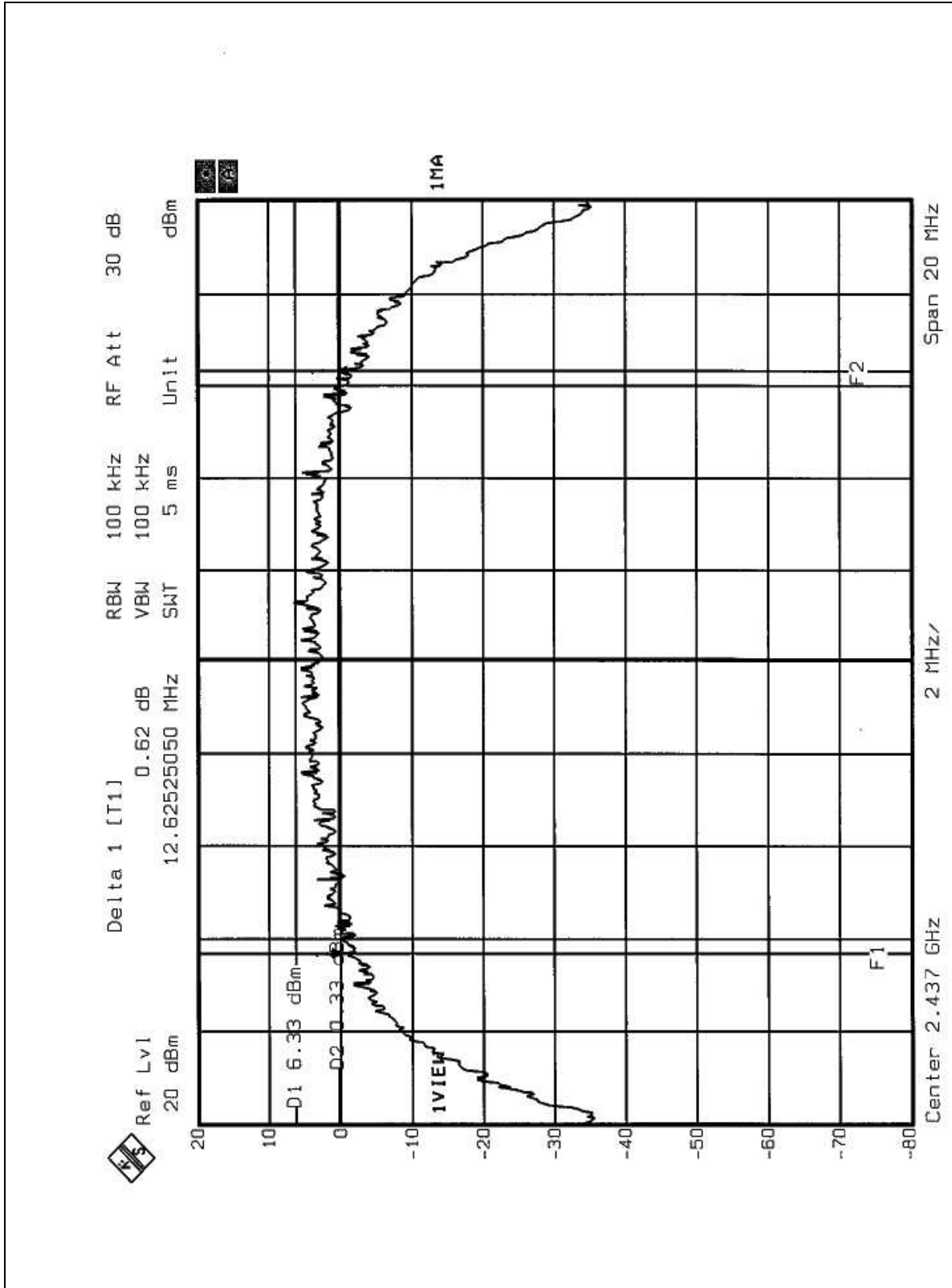


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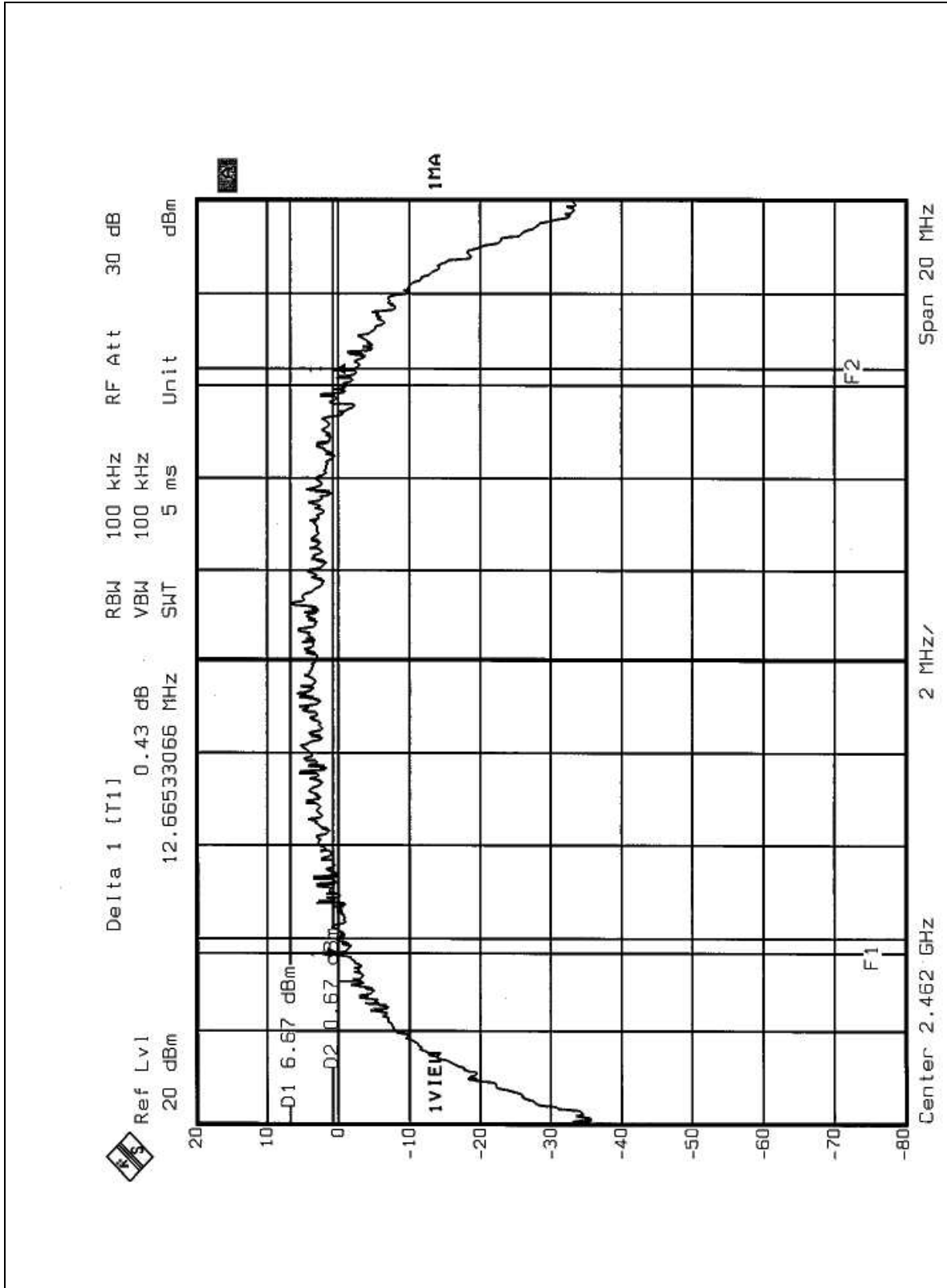
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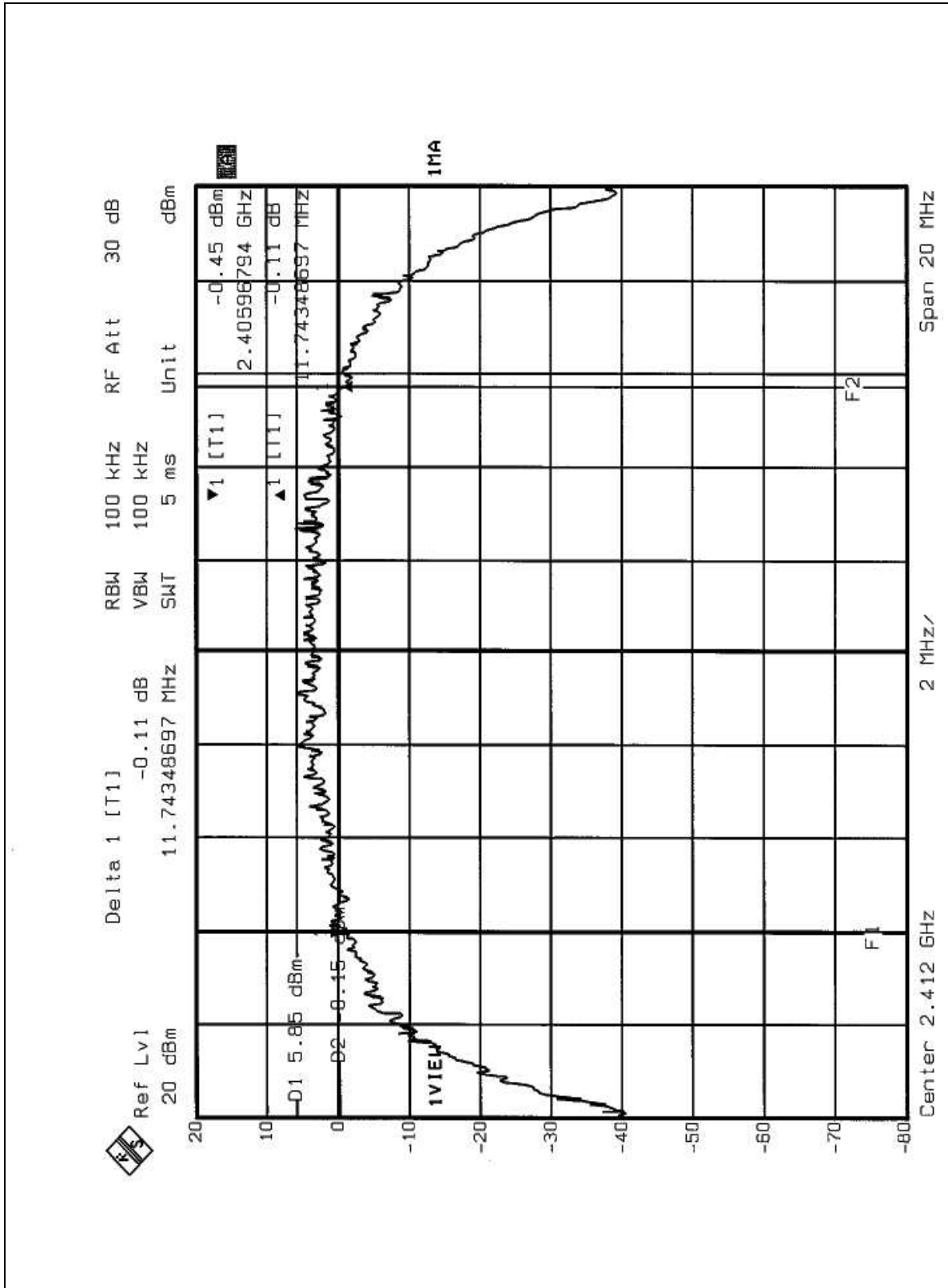
## 4.3.8 TEST RESULTS (B)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>6dB BANDWIDTH (MHz)</b>	<b>MINIMUM LIMIT (MHz)</b>	<b>PASS/FAIL</b>
1	2412	11.74	0.5	PASS
6	2437	11.66	0.5	PASS
11	2462	11.66	0.5	PASS

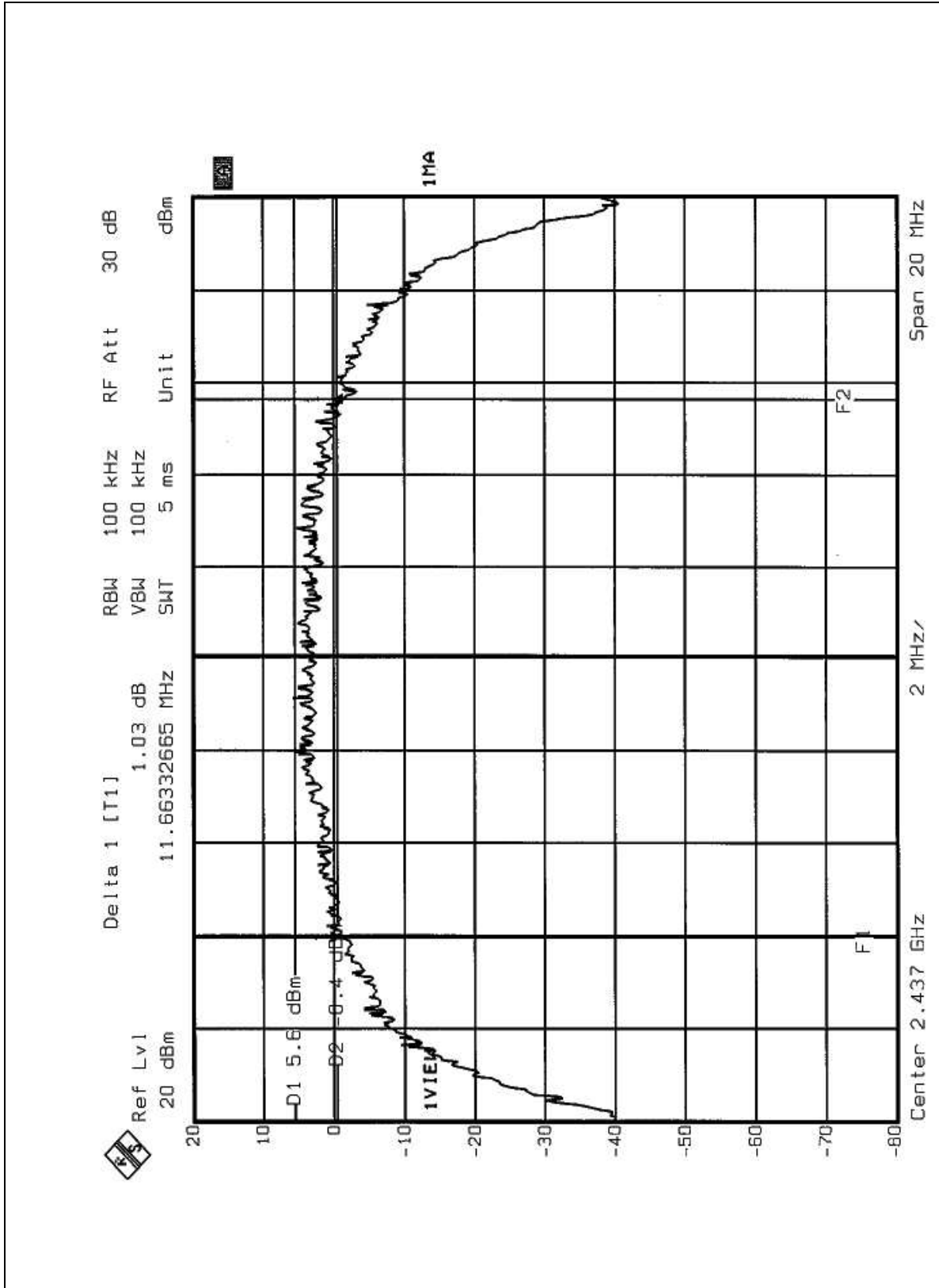


CH1



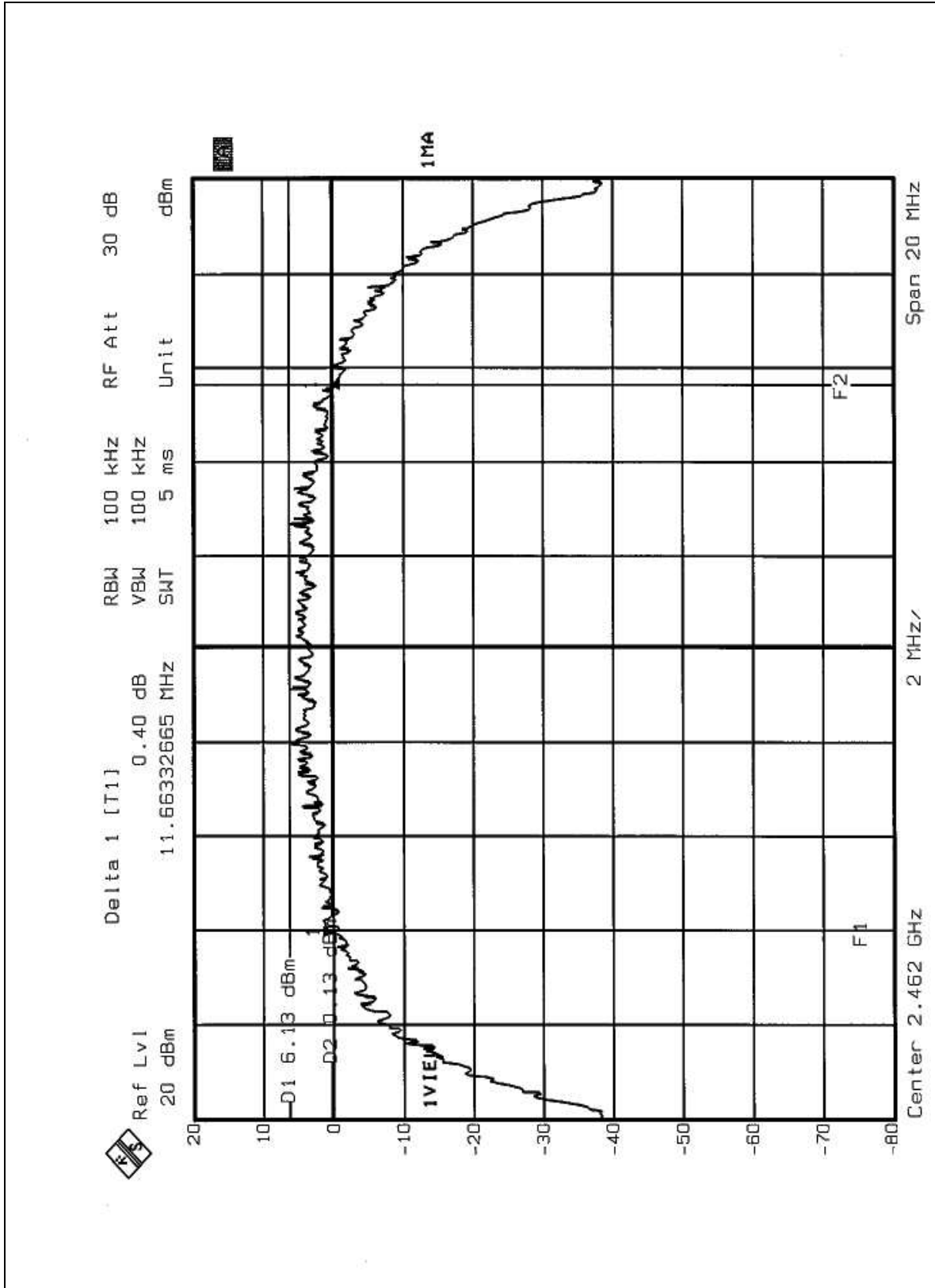


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#### 4.4 MAXIMUM PEAK OUTPUT POWER

##### 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
POWER METER	E4416A	GB41291118	Jul. 30, 2003
PEAK POWER SENSOR	E9327A	US40440722	Jul. 30, 2003

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



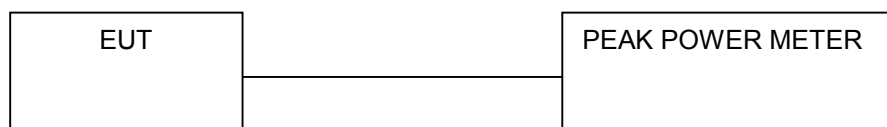
#### 4.4.3 TEST PROCEDURES

The transmitter output was connected to the peak power meter.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



4.4.7 TEST RESULTS (A)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	17.69	30	PASS
6	2437	17.76	30	PASS
11	2462	17.81	30	PASS

4.4.8 TEST RESULTS (B)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	17.76	30	PASS
6	2437	17.72	30	PASS
11	2462	17.89	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
SPECTRUM ANALYZER	FSEK30	100049	July 24, 2003

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

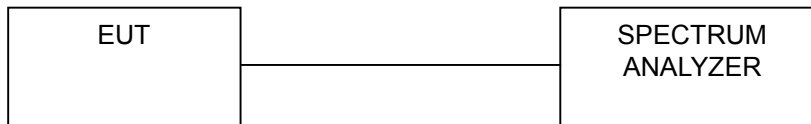
#### 4.5.3 TEST PROCEDURE

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 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6.



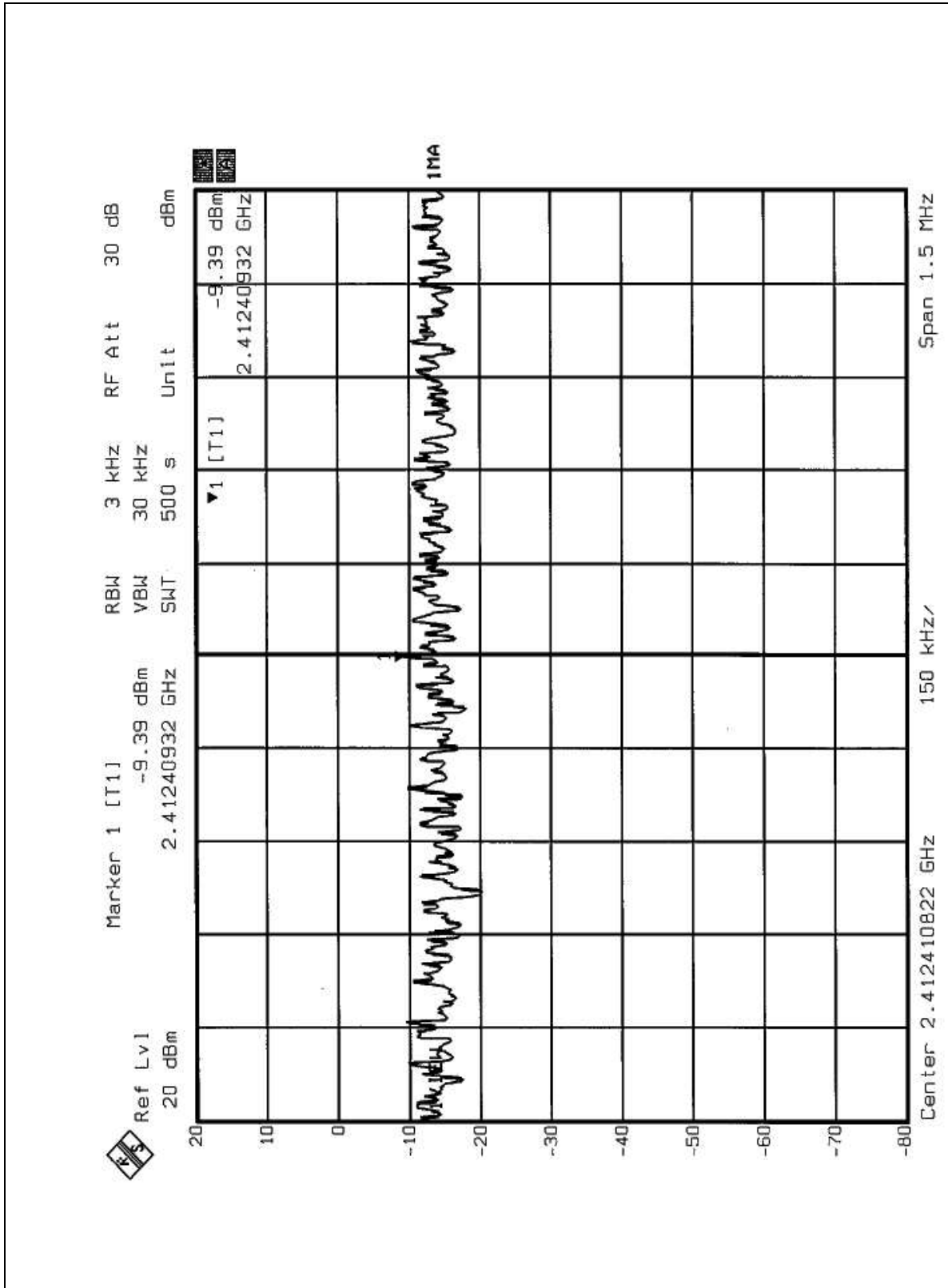
## 4.5.7 TEST RESULTS (A)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

<b>CHANNEL</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	-9.39	8	PASS
6	2437	-9.33	8	PASS
11	2462	-9.30	8	PASS

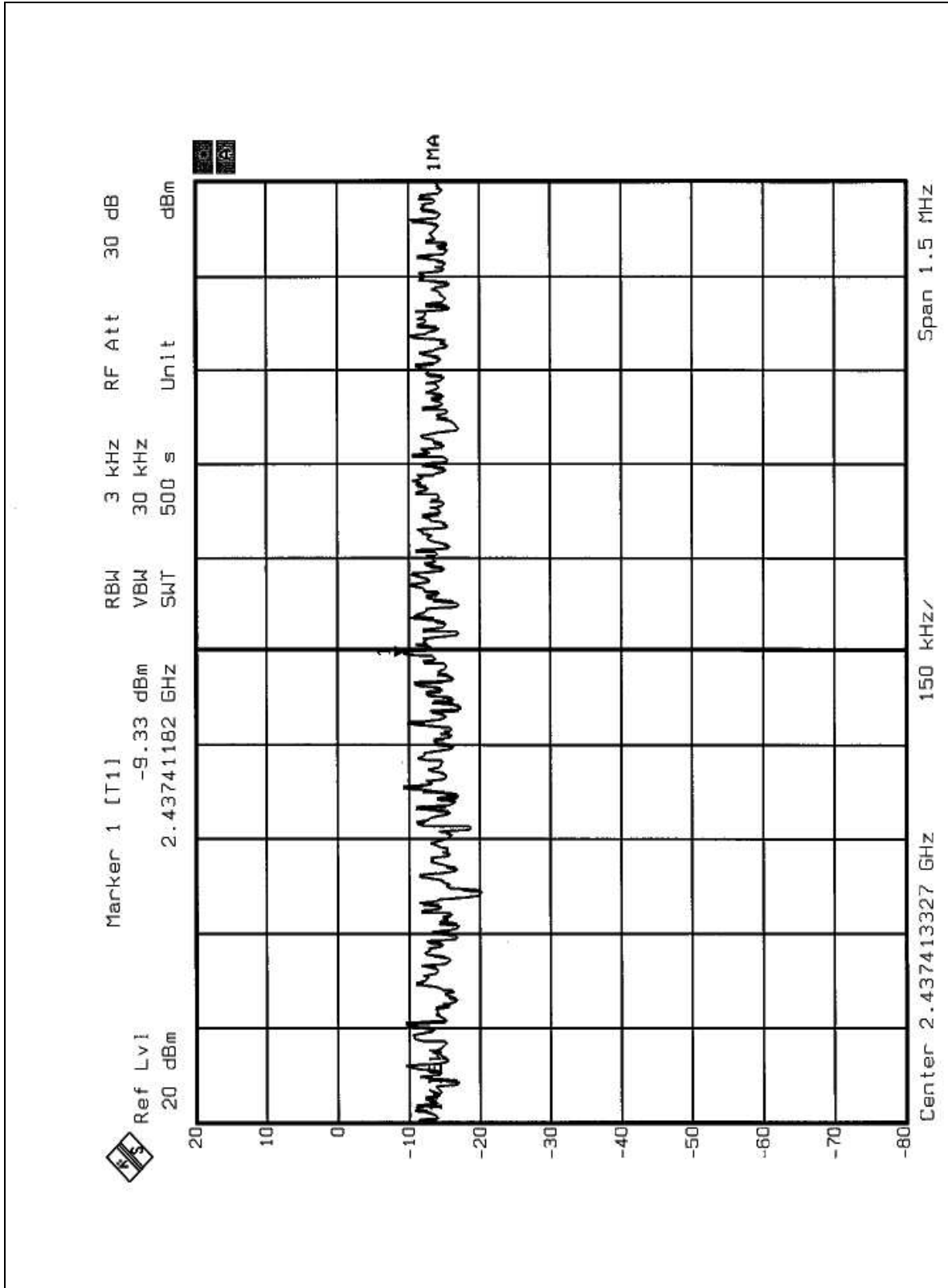


CH1



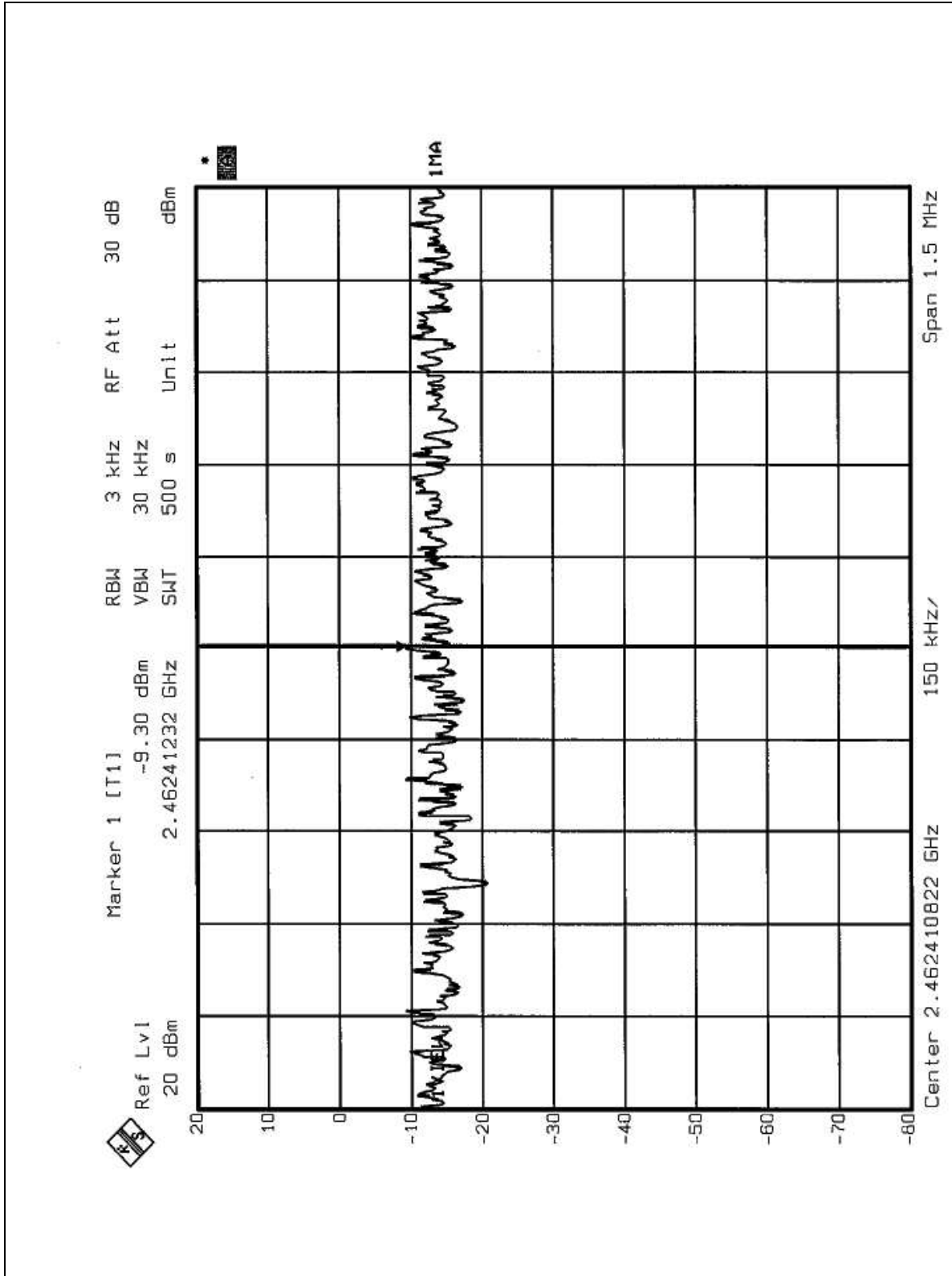


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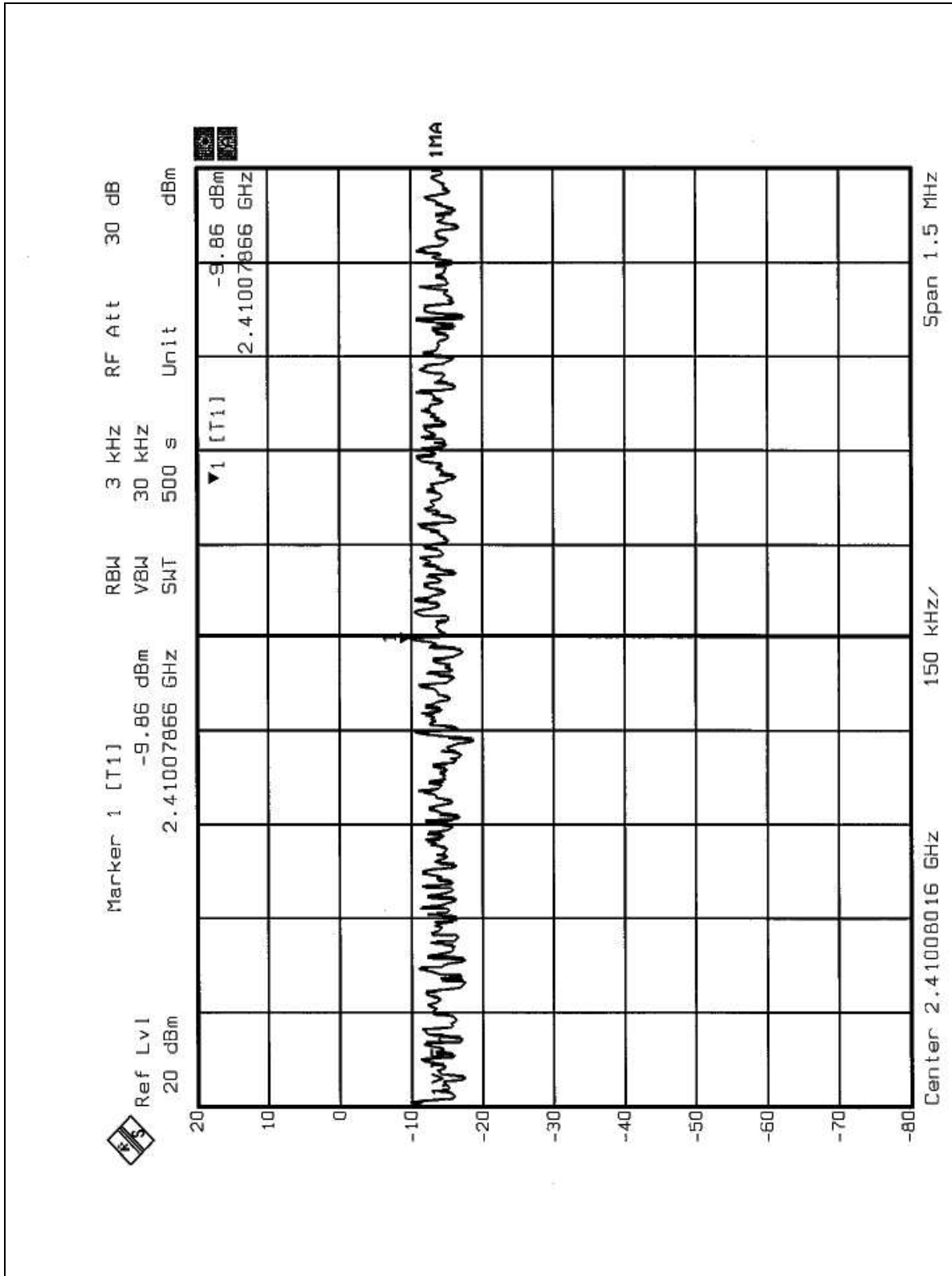
## 4.5.8 TEST RESULTS (B)

<b>EUT</b>	2.4GHz Wireless Cardbus Adapter	<b>MODEL</b>	DWL-650+
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 63%RH, 1005hPa
<b>TESTED BY:</b> Ansen Lei			

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz )</b>	<b>RF POWER LEVEL IN 3kHz BW (dBm)</b>	<b>MAXIMUM LIMIT (dBm)</b>	<b>PASS/FAIL</b>
1	2412	-9.86	8	PASS
6	2437	-9.10	8	PASS
11	2462	-8.95	8	PASS



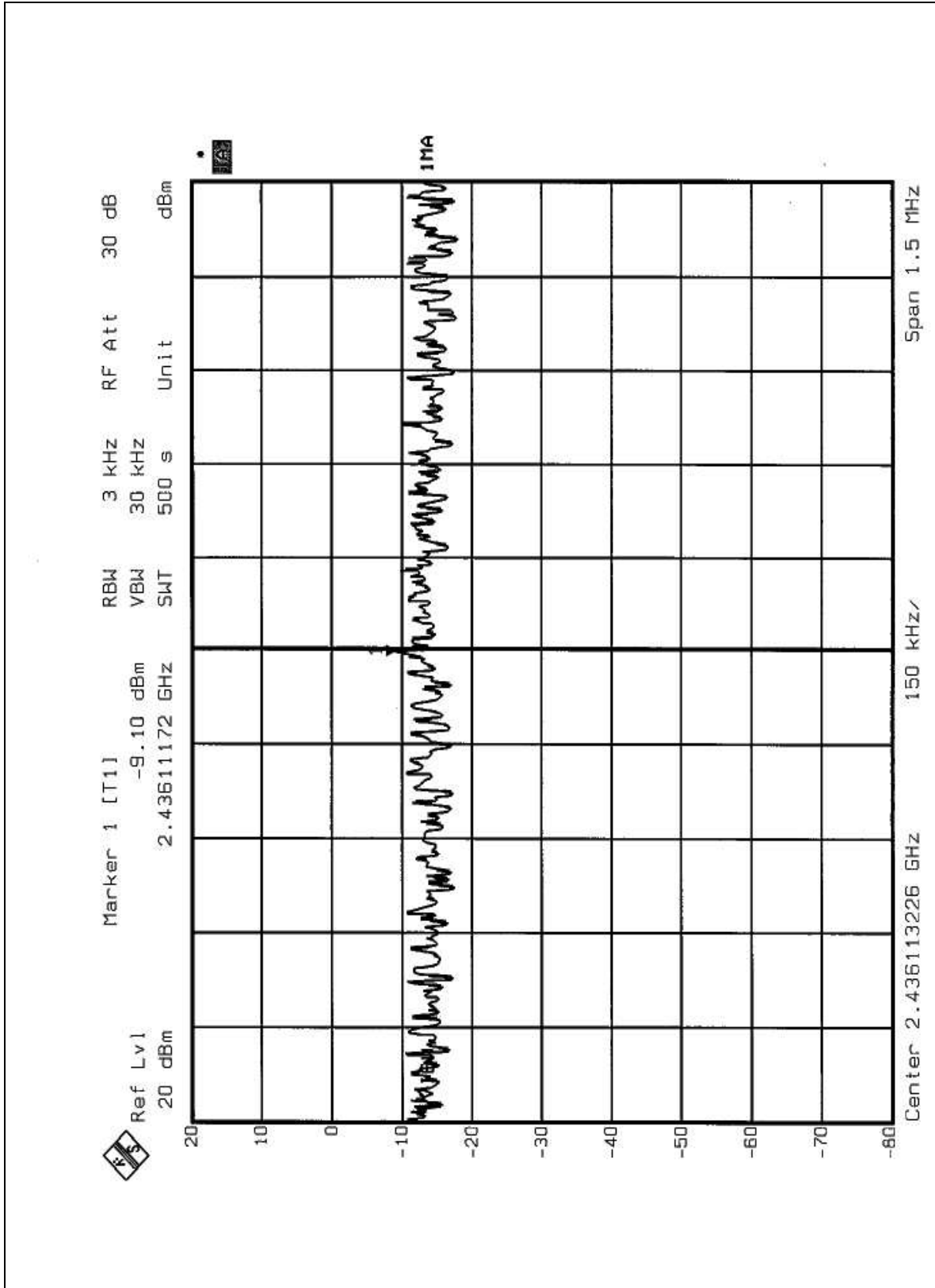
CH1





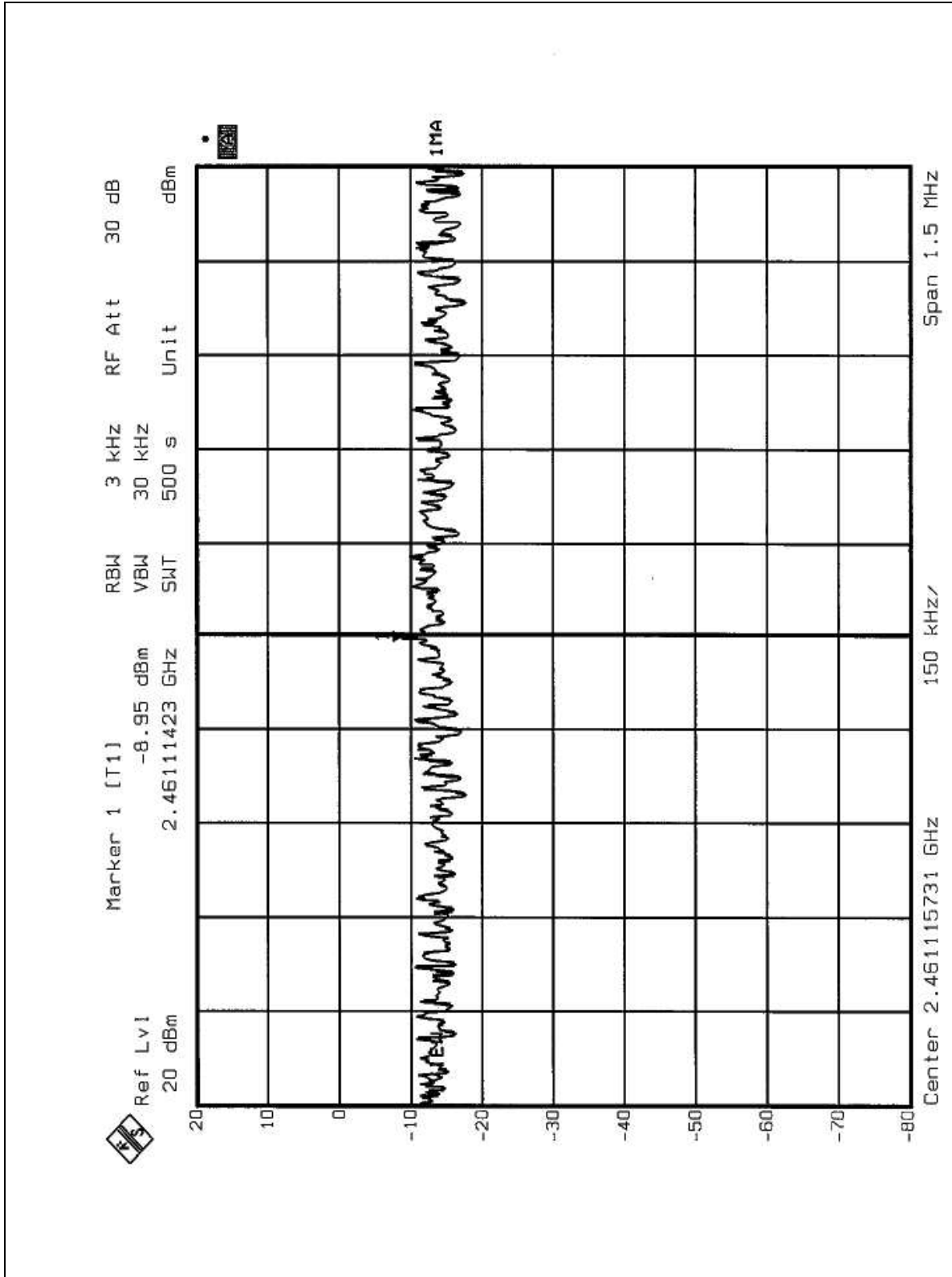


CH6





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 24, 2003

**NOTE:** 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 100kHz with suitable frequency span including 100kHz bandwidth from band edge. The band edges was measured and recorded.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 EUT OPERATING CONDITION

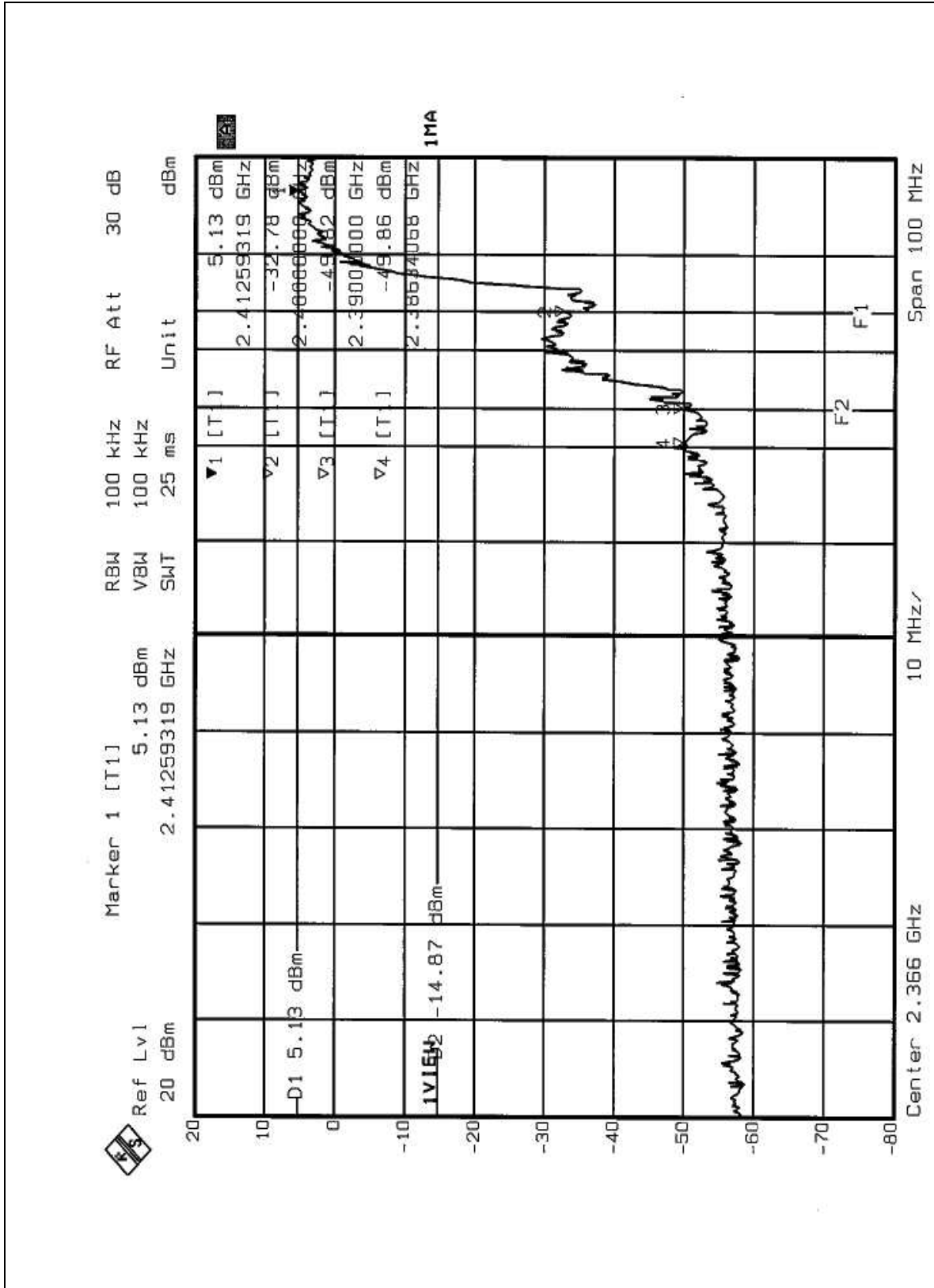
Same as Item 4.3.6.

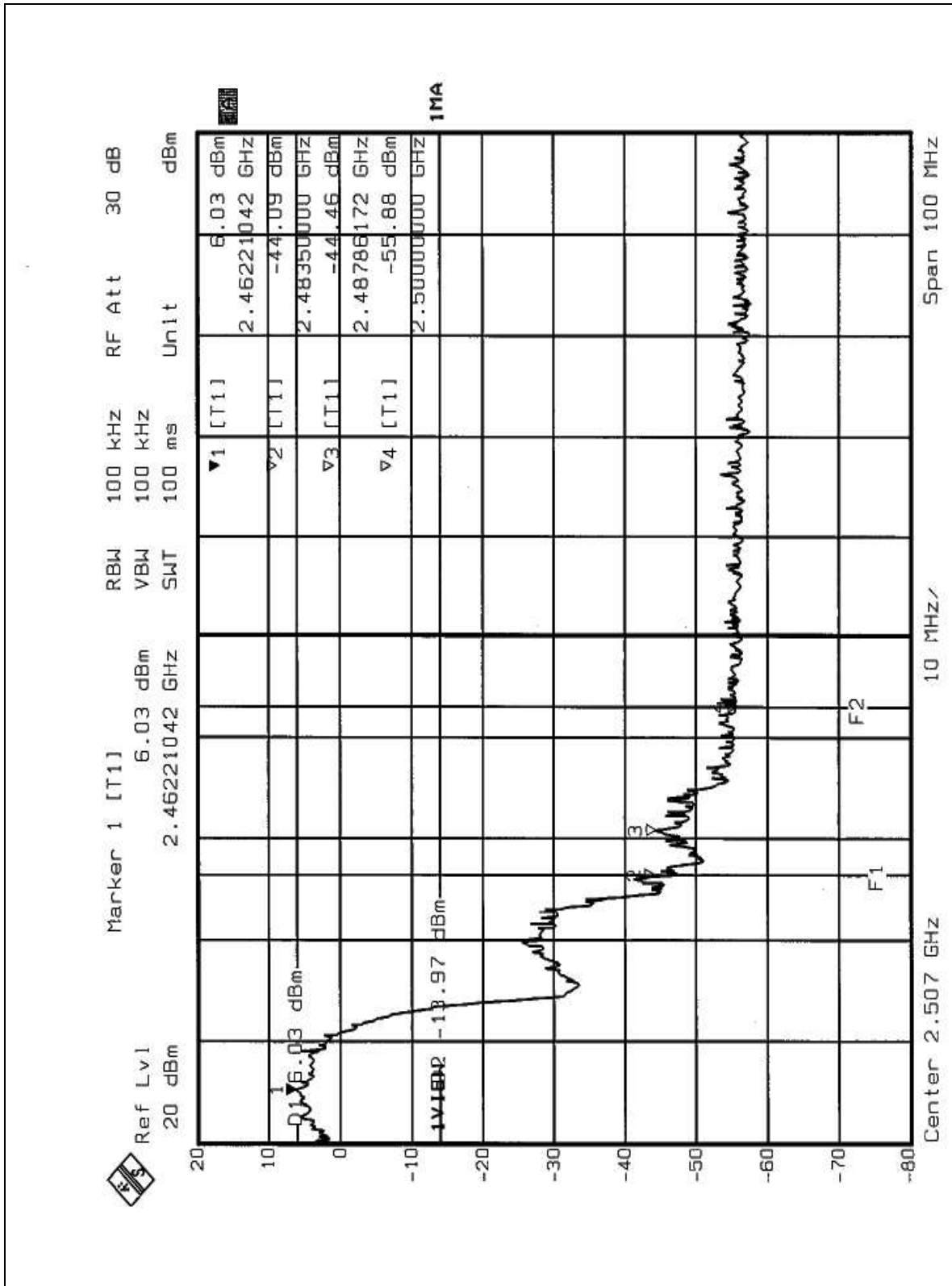


#### 4.6.6 TEST RESULTS (A)

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 54.95dB / 50.12dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz / 2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 102.9dBuV/m, so the maximum field strength in restrict band is  $102.9 - 50.12 = 52.78$ dBuV/m which is under 54dBuV/m limit.



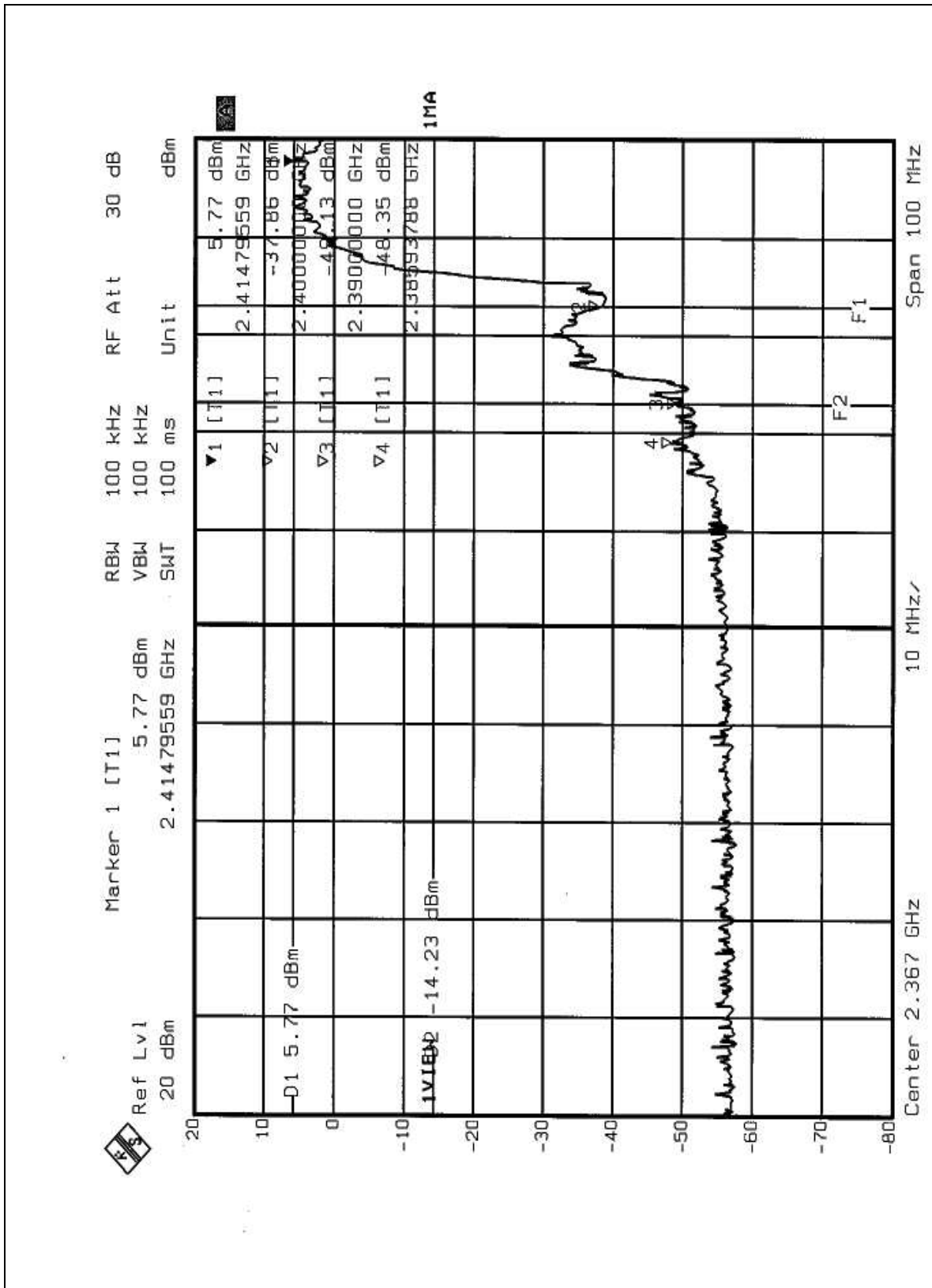




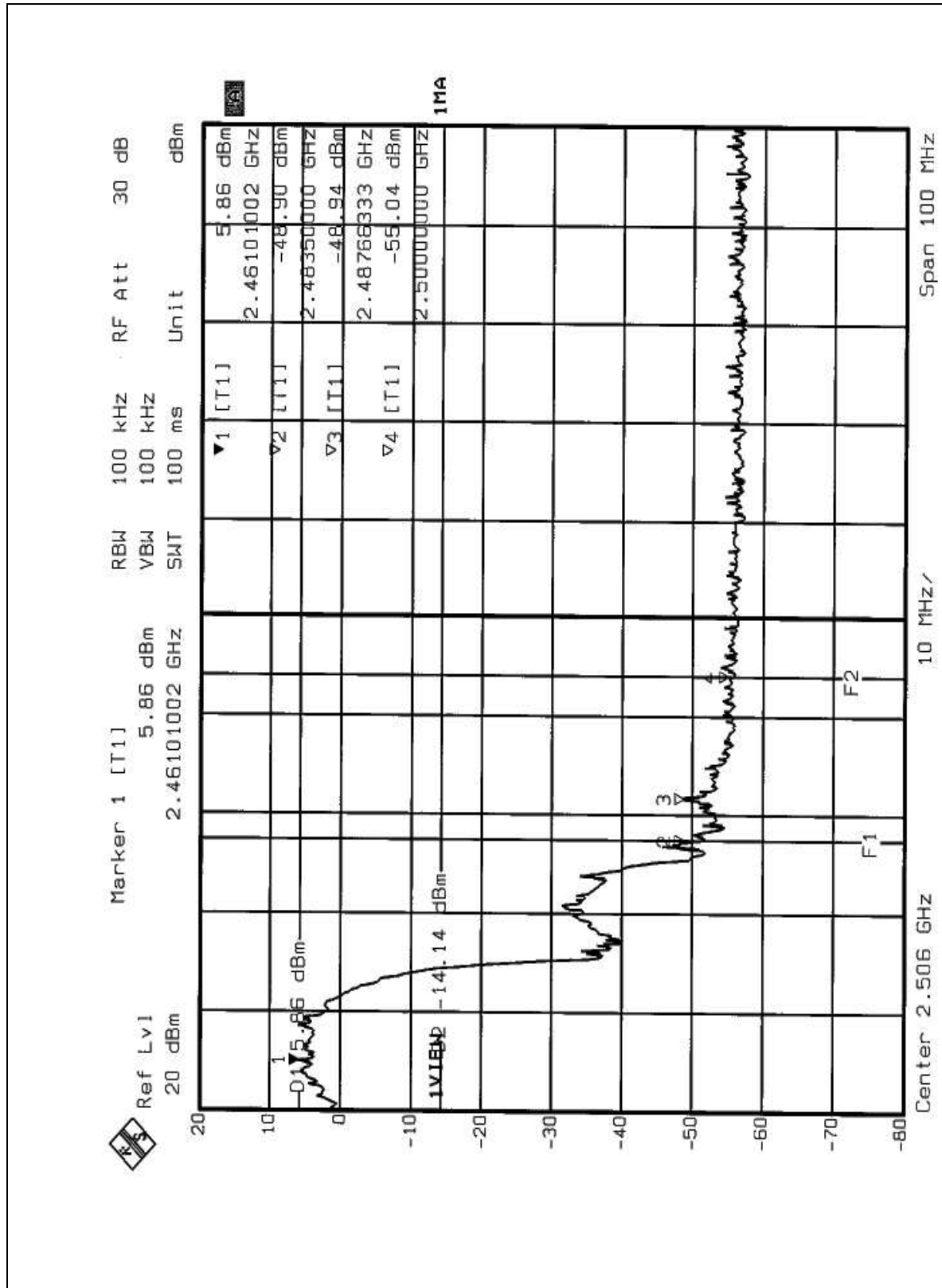
#### 4.6.7 TEST RESULTS (B)

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 54.12dB / 54.76dB delta between carrier maximum power and local maximum emission in restrict band (2.3859GHz / 2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.8 is 100.8dBuV/m, so the maximum field strength in restrict band is  $100.8 - 54.76 = 46.04$ dBuV/m which is under 54dBuV/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.

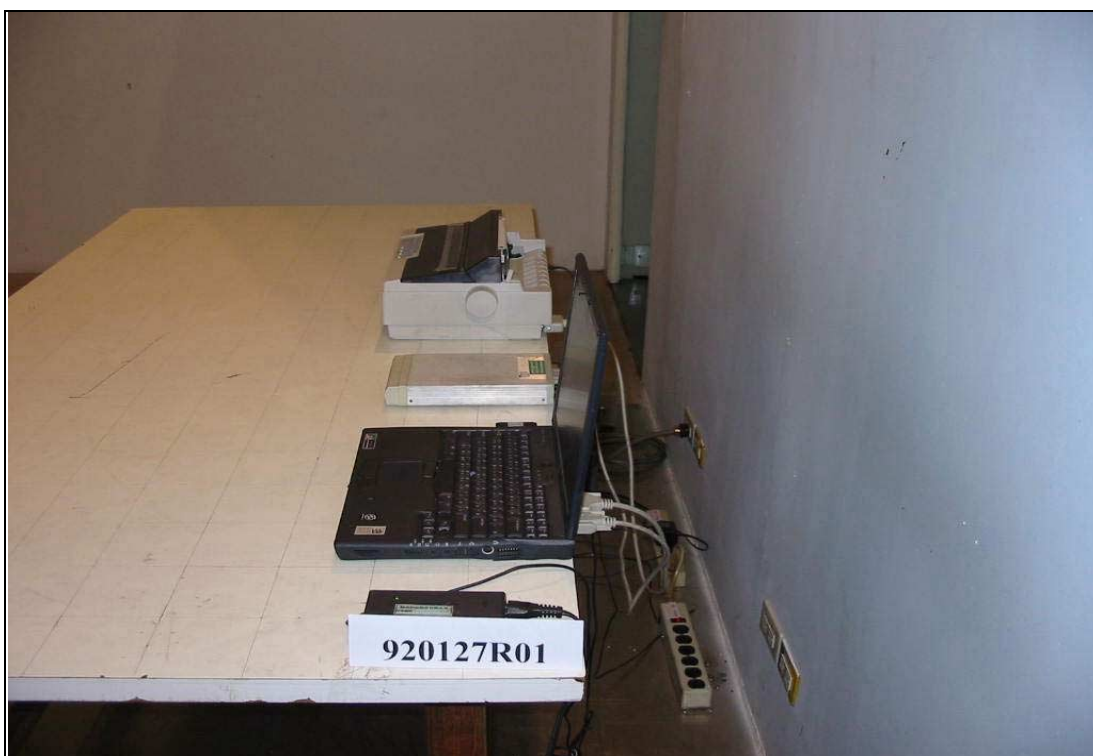
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.7.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is Patch Antenna. There is no antenna connector. And the maximum Gain of this antenna is only 2dBi.

## 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.