



# FCC TEST REPORT

**REPORT NO.:** RF920107R02A

**MODEL NO.:** WBA-200 (Brand: Cellvision),  
WRA-200 (Brand: Cellvision),

**OEM MODEL NO.:** CDINW00214 (Brand: CenDyne),  
CDINW00215 (Brand: CenDyne).

**RECEIVED:** NA

**TESTED:** Jan. 7~ Jan. 21, 2003

**APPLICANT:** Cellvision Systems Inc.

**ADDRESS:** 18F-7, No. 79, Sec. 1, Hsin Taiwu Road, Hsichih,  
Taipei, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

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

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0528  
ILAC MRA



Lab Code: 200102-0



## Table of Contents

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



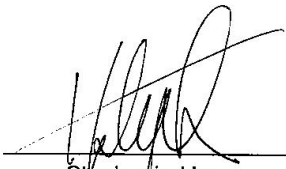
4.5.5	TEST SETUP .....	37
4.5.6	EUT OPERATING CONDITION .....	37
4.5.7	TEST RESULTS .....	38
4.6	<b>BAND EDGES MEASUREMENT .....</b>	<b>42</b>
4.6.1	LIMITS OF BAND EDGES MEASUREMENT .....	42
4.6.2	TEST INSTRUMENTS .....	42
4.6.3	TEST PROCEDURE .....	42
4.6.4	DEVIATION FROM TEST STANDARD .....	42
4.6.5	EUT OPERATING CONDITION .....	43
4.6.6	TEST RESULTS .....	43
4.7	<b>ANTENNA REQUIREMENT .....</b>	<b>46</b>
4.7.1	STANDARD APPLICABLE .....	46
4.7.2	ANTENNA CONNECTED CONSTRUCTION .....	46
5	<b>PHOTOGRAPHS OF THE TEST CONFIGURATION .....</b>	<b>47</b>
6	<b>INFORMATION ON THE TESTING LABORATORIES.....</b>	<b>49</b>

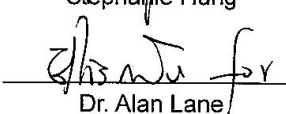


# 1 CERTIFICATION

**PRODUCT NAME :** Bridge AP/Repeater AP  
**MODEL NO. :** WBA-200 (Brand: Cellvision),  
WRA-200 (Brand: Cellvision)  
**OEM MODEL NO.:** CDINW00214 (Brand: CenDyne),  
CDINW00215 (Brand: CenDyne)  
**APPLICANT :** Cellvision System 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 Jan. 7~ Jan. 21, 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.

**PREPARED BY:**  , **DATE:** June 30, 2003  
Stephanie Hung

**APPROVED BY:**  , **DATE:** June 30, 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 $-2.39\text{dBuV}$ at 0.218MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is $-2.20\text{dBuV}$ at 2088.00 / 2483.50MHz
15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(c)	Band Edge Measurement Limit: 20dB 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>	Bridge AP/Repeater AP
<b>MODEL NO.</b>	WBA-200 (Brand: Cellvision), WRA-200 (Brand: Cellvision)
<b>OEM MODEL NO.</b>	CDINW00214 (Brand: CenDyne), CDINW00215 (Brand: CenDyne).
<b>POWER SUPPLY</b>	5.0VDC from Adapter
<b>MODULATION TYPE</b>	BPSK, QPSK, CCK, PBCC (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>	17.03dBm
<b>ANTENNA TYPE</b>	Dipole antenna
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. The EUT was operated with following Adapter

<b>Model No.:</b>	MA1-10050
<b>Input power :</b>	100-120V-0.5A,50-60Hz
<b>Output power :</b>	+5.0VDC----2.5A

2. Two brands are identical except their outer appearance.
3. 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 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. This EUT data can be up to 22Mbps that to be worse case, was chosen to do the final test.

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bridge AP/Repeater AP. 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-09C748-12800-19O-B220	FCC DoC APPROVED
2	USB 10/100 Fast Ethernet	D-Link	DU-E100	UR15001597	FCC DoC APPROVED

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

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





## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY 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. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 03, 2003
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 02, 2003
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Nov. 29, 2003
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Nov. 29, 2003
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 02, 2003
Software	Cond-V2M1	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C02.01	July 5, 2003
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2003
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 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 conducted telecom port test only (if tested).
  3. The test was performed in ADT Shielded Room No. 2.
  4. The VCCI Site Registration No. is C-240.



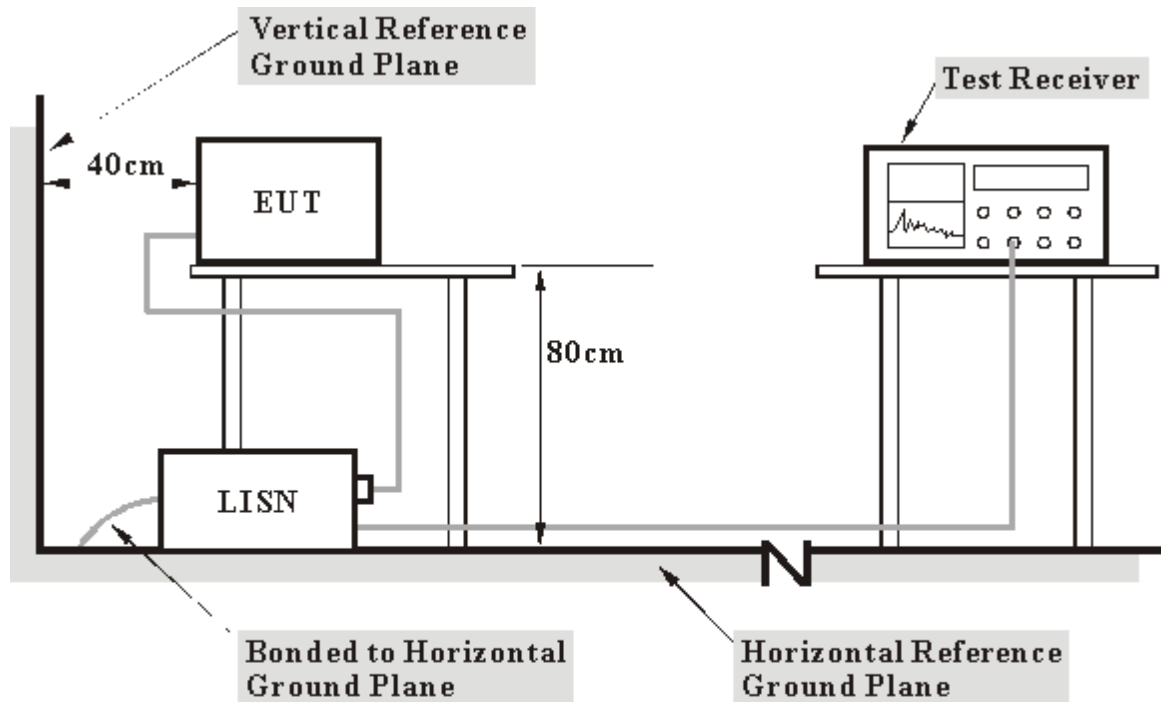
#### 4.1.3 TEST PROCEDURES

- 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 150 kHz to 30 MHz 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. Placed the EUT on the testing table.
- b. Prepared another computer system to act as a communication partner and placed it outside of testing area.
- c. The communication partner run a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ 45 cable.
- d. The communication partner sent data to EUT by command "PIN".

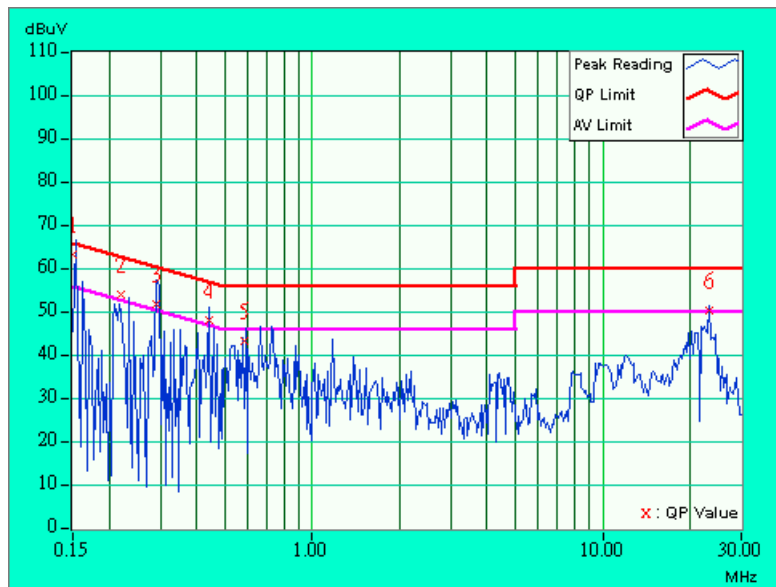


4.1.7 TEST RESULTS

<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.150	0.10	62.18	42.17	62.28	42.27	66.00	56.00	-3.72	-13.73
2	0.220	0.10	52.85	46.63	52.95	46.73	62.82	52.82	-9.87	-6.09
3	0.291	0.10	50.67	38.41	50.77	38.51	60.50	50.50	-9.73	-11.99
4	0.441	0.10	47.01	21.45	47.11	21.55	57.04	47.04	-9.93	-25.49
5	0.585	0.10	42.23	-	42.33	-	56.00	46.00	-13.67	-
6	23.126	1.26	49.28	45.00	50.54	46.26	60.00	50.00	-9.46	-3.74

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

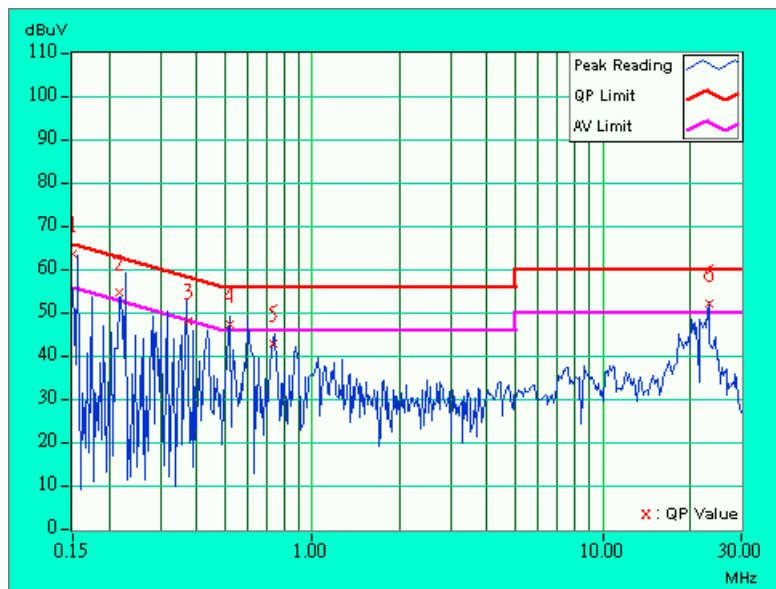




<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.150	0.10	62.44	49.28	62.54	49.38	66.00	56.00	-3.46	-6.62
2	0.218	0.10	53.84	50.40	53.94	50.50	62.89	52.89	-8.95	-2.39
3	0.376	0.10	47.00	-	47.10	-	58.36	48.36	-11.26	-
4	0.518	0.10	46.37	14.54	46.47	14.64	56.00	46.00	-9.53	-31.36
5	0.739	0.10	41.81	-	41.91	-	56.00	46.00	-14.09	-
6	23.129	1.13	51.11	46.20	52.24	47.33	60.00	50.00	-7.76	-2.67

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

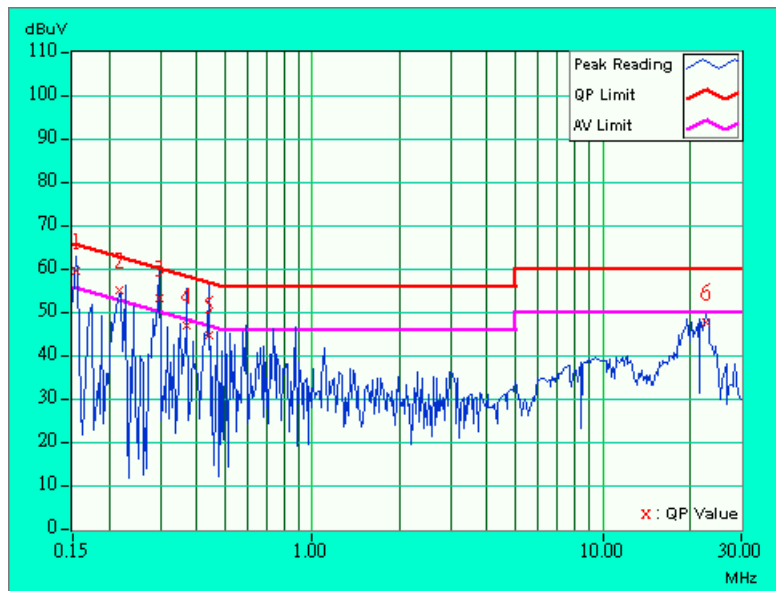




<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.153	0.10	58.52	34.64	58.62	34.74	65.84	55.84	-7.22	-21.10
2	0.216	0.10	53.96	49.95	54.06	50.05	62.97	52.97	-8.91	-2.92
3	0.297	0.10	51.97	21.04	52.07	21.14	60.33	50.33	-8.26	-29.19
4	0.368	0.10	45.75	-	45.85	-	58.54	48.54	-12.69	-
5	0.441	0.10	43.49	-	43.59	-	57.04	47.04	-13.45	-
6	22.577	1.25	46.70	-	47.95	-	60.00	50.00	-12.05	-

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

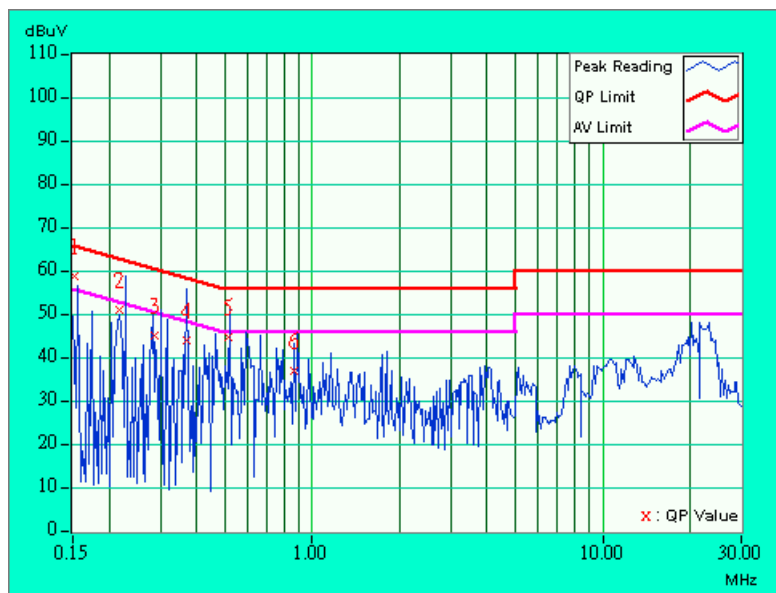




<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.152	0.10	58.86	34.13	58.96	34.23	65.88	55.88	-6.92	-21.65
2	0.216	0.10	51.16	-	51.26	-	62.97	52.97	-11.71	-
3	0.288	0.10	45.15	-	45.25	-	60.57	50.57	-15.32	-
4	0.372	0.10	43.84	-	43.94	-	58.46	48.46	-14.52	-
5	0.512	0.10	44.58	-	44.68	-	56.00	46.00	-11.32	-
6	0.870	0.10	36.84	-	36.94	-	56.00	46.00	-19.06	-

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

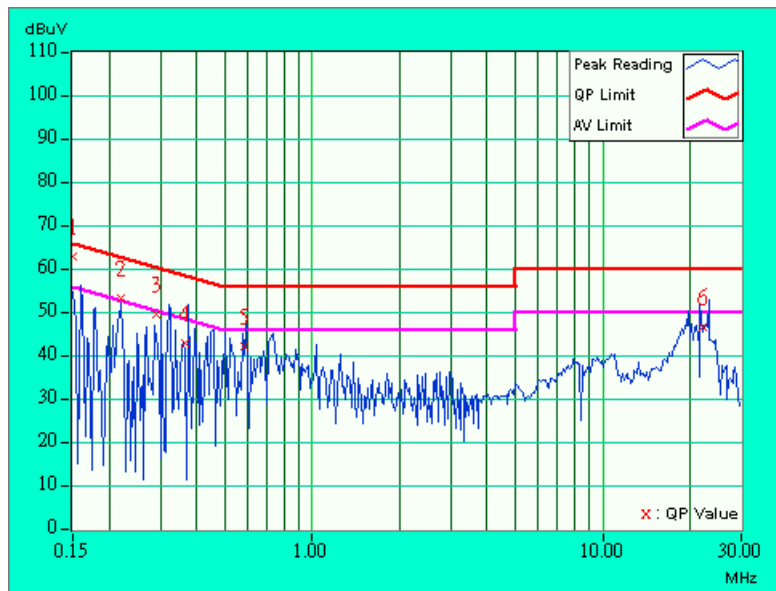




<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.150	0.10	61.83	43.65	61.93	43.75	66.00	56.00	-4.07	-12.25
2	0.219	0.10	52.18	-	52.28	-	62.86	52.86	-10.58	-
3	0.290	0.10	48.57	-	48.67	-	60.52	50.52	-11.85	-
4	0.364	0.10	41.57	-	41.67	-	58.64	48.64	-16.97	-
5	0.582	0.10	41.10	-	41.20	-	56.00	46.00	-14.80	-
6	22.211	1.24	45.51	-	46.75	-	60.00	50.00	-13.25	-

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



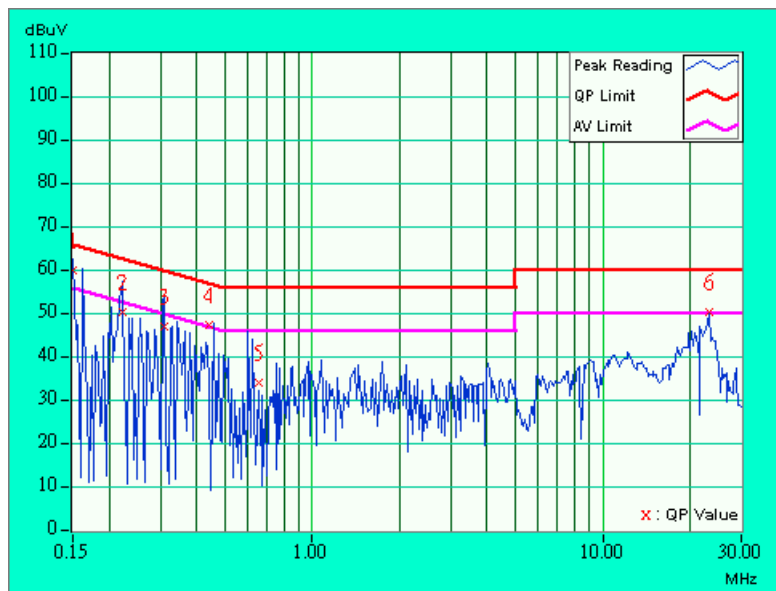




<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	21deg.C, 63%RH, 1005 hPa	<b>TESTED BY:</b> Cody Chang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]		QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.150	0.10	58.80	38.94	58.90	39.04	66.00	56.00	-7.10	-16.96
2	0.222	0.10	49.27	-	49.37	-	62.74	52.74	-13.37	-
3	0.309	0.10	46.00	-	46.10	-	60.00	50.00	-13.90	-
4	0.440	0.10	46.19	-	46.29	-	57.06	47.06	-10.77	-
5	0.651	0.10	32.84	-	32.94	-	56.00	46.00	-23.06	-
6	23.129	1.13	49.30	44.80	50.43	45.93	60.00	50.00	-9.57	-4.07

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





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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	3520A00667	Aug. 26, 2003
*CHASE Preamplifier	CPA9231A/4	3215	Nov. 06, 2003
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01292	Aug. 07, 2003
* ROHDE & SCHWARZ TEST RECEIVER	ESVS10	846285/012	Sept. 16, 2003
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 13, 2004
SCHAFFNER Tunable Dipole Antenna	VHBA 9123	459	Nov. 22, 2003
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
* CHASE BILOG Antenna	CBL6112B	2751	March 21, 2004
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	June 30, 2004
* EMCO Horn Antenna	3115	9312-4192	March 23, 2004
* CHANCE Turn Table & Tower Controller	ACS-I	NA	NA
* Software	ADT_Radiated_V5.09	NA	NA
* ANRITSU RF Switches	MP59B	M51167	Aug. 21, 2003
* TIMES RF cable	LMR-600	CABLE-ST6-01	Aug. 21, 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. 6.
  5. The VCCI Site Registration No. is R-728.



#### 4.2.3 TEST PROCEDURES

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

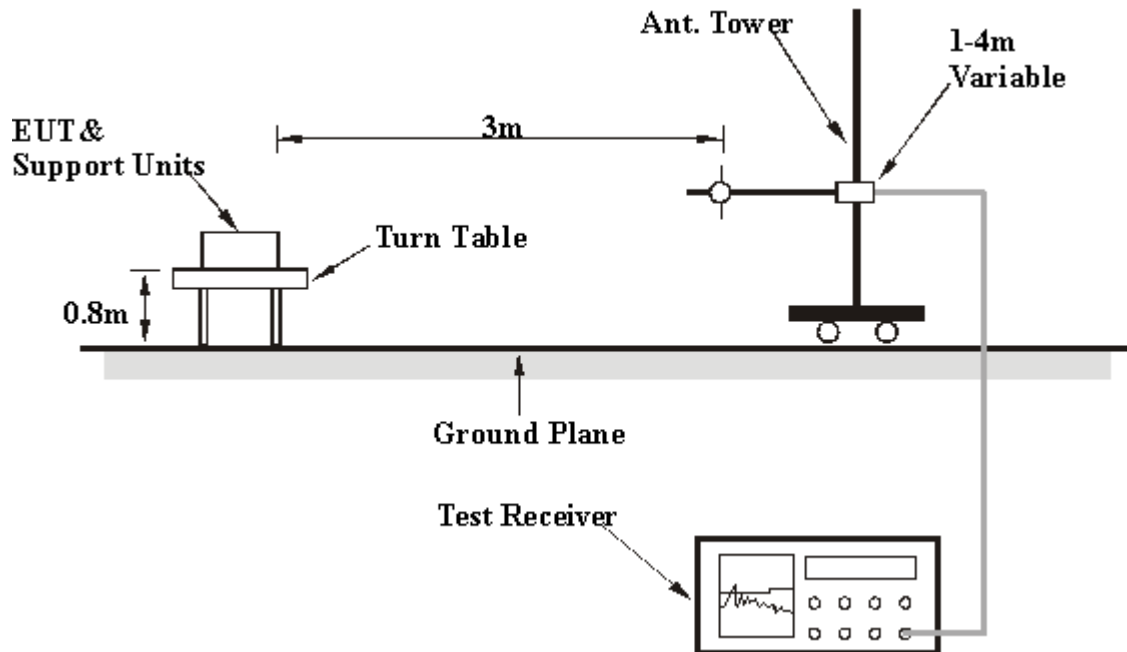
**NOTE:**

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

#### 4.2.4 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

<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Below 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

**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	125.00	24.6 QP	43.50	-18.90	1.15 H	125	12.10	12.60
2	150.00	26.0 QP	43.50	-17.50	1.75 H	158	14.60	11.40
3	175.00	30.2 QP	43.50	-13.30	1.45 H	220	20.00	10.20
4	176.00	27.2 QP	43.50	-16.20	1.54 H	200	17.10	10.10
5	225.00	28.7 QP	46.00	-17.30	1.64 H	245	17.00	11.70
6	250.00	30.7 QP	46.00	-15.30	1.35 H	274	17.50	13.20
7	375.00	33.2 QP	46.00	-12.80	1.32 H	112	16.60	16.70
8	500.00	36.2 QP	46.00	-9.80	1.11 H	317	16.90	19.40
9	525.00	30.2 QP	46.00	-15.80	1.50 H	100	10.20	20.00
10	575.00	37.6 QP	46.00	-8.40	1.62 H	112	16.50	21.10
11	625.00	32.0 QP	46.00	-14.00	1.15 H	160	10.60	21.40
12	704.00	27.6 QP	46.00	-18.40	1.00 H	247	6.00	21.60
13	748.00	31.8 QP	46.00	-14.20	1.98 H	212	9.50	22.30
14	750.00	36.4 QP	46.00	-9.60	1.00 H	125	14.00	22.30
15	800.00	31.2 QP	46.00	-14.80	1.37 H	110	8.50	22.80
16	836.00	30.2 QP	46.00	-15.80	1.55 H	223	7.20	23.10



<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Below 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

<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	125.00	37.0 QP	43.50	-6.50	1.45 V	292	24.40	12.60
2	150.00	34.9 QP	43.50	-8.60	1.55 V	142	23.50	11.40
3	174.98	30.7 QP	43.50	-12.80	1.20 V	62	20.50	10.20
4	176.01	28.3 QP	43.50	-15.20	1.10 V	174	18.20	10.10
5	225.00	28.2 QP	46.00	-17.80	1.32 V	112	16.50	11.70
6	250.00	36.2 QP	46.00	-9.80	1.00 V	46	23.00	13.20
7	375.00	34.3 QP	46.00	-11.70	1.25 V	46	17.60	16.70
8	500.00	36.5 QP	46.00	-9.50	1.56 V	193	17.10	19.40
9	525.00	33.9 QP	46.00	-12.10	1.25 V	118	13.90	20.00
10	575.00	37.2 QP	46.00	-8.80	1.68 V	204	16.10	21.10
11	625.00	39.3 QP	46.00	-6.70	1.25 V	200	17.90	21.40
12	704.00	30.8 QP	46.00	-15.20	1.12 V	70	9.20	21.60
13	748.00	37.2 QP	46.00	-8.80	1.25 V	186	14.90	22.30
14	750.00	36.6 QP	46.00	-9.40	1.12 V	194	14.30	22.30
15	800.00	28.3 QP	46.00	-17.70	1.57 V	280	5.50	22.80

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



<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 1	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

<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	2038.00	53.2 PK	74.00	-20.80	1.00 H	122	20.30	32.90
1	2038.00	51.5 AV	54.00	-2.50	1.00 H	122	18.60	32.90
2	2375.32	60.3 PK	74.00	-13.70	1.25 H	52	27.20	33.10
2	2375.32	49.3 AV	54.00	-4.70	1.25 H	52	16.20	33.10
3	*2412.00	101.8 PK			1.25 H	52	68.60	33.10
3	*2412.00	93.1 AV			1.25 H	52	60.00	33.10
4	4076.00	44.5 PK	74.00	-29.50	1.41 H	332	5.40	39.10

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2038.00	50.7 PK	74.00	-23.30	1.22 V	18	17.80	32.90
1	2038.00	48.5 AV	54.00	-5.50	1.22 V	18	15.60	32.90
2	2373.65	62.7 PK	74.00	-11.30	1.18 V	198	29.60	33.10
2	2373.65	51.7 AV	54.00	-2.30	1.18 V	198	18.60	33.10
3	*2412.00	105.3 PK			1.18 V	198	72.20	33.10
3	*2412.00	96.3 AV			1.18 V	198	63.20	33.10
4	4076.16	45.5 PK	74.00	-28.50	1.06 V	132	6.40	39.10

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





<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 6	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

<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	2063.00	53.2 PK	74.00	-20.80	1.17 H	81	20.20	33.00
1	2063.00	51.1 AV	54.00	-2.90	1.17 H	81	18.10	33.00
2	*2437.00	102.9 PK			1.25 H	77	69.60	33.30
2	*2437.00	93.8 AV			1.25 H	77	60.50	33.30
3	4126.00	42.2 PK	74.00	-31.80	1.13 H	287	3.00	39.10

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2063.00	52.4 PK	74.00	-21.60	1.00 V	139	19.40	33.00
1	2063.00	50.8 AV	54.00	-3.20	1.00 V	139	17.80	33.00
2	*2437.00	103.8 PK			1.00 V	60	70.50	33.30
2	*2437.00	95.2 AV			1.00 V	60	62.00	33.30
3	4126.00	43.5 PK	74.00	-30.50	1.51 V	139	4.40	39.10

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



<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 60%RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

<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	2088.00	54.2 PK	74.00	-19.80	1.25 H	203	21.10	33.10
1	2088.00	51.8 AV	54.00	-2.20	1.25 H	203	18.60	33.10
2	*2462.00	105.4 PK			1.15 H	220	72.00	33.40
2	*2462.00	96.6 AV			1.15 H	220	63.20	33.40
3	2483.50	63.1 PK	74.00	-10.90	1.15 H	220	29.60	33.50
3	2483.50	51.5 AV	54.00	-2.50	1.15 H	220	18.00	33.50
4	4176.00	43.1 PK	74.00	-30.90	1.15 H	115	4.10	38.90

<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	2088.00	53.9 PK	74.00	-20.10	1.23 V	156	20.80	33.10
1	2088.00	51.4 AV	54.00	-2.60	1.23 V	156	18.30	33.10
2	*2462.00	104.7 PK			1.00 V	60	71.30	33.40
2	*2462.00	95.7 AV			1.00 V	60	62.40	33.40
3	2483.50	60.8 PK	74.00	-13.20	1.00 V	60	27.30	33.50
3	2483.50	51.8 AV	54.00	-2.20	1.00 V	60	18.30	33.50
4	4176.00	47.4 PK	74.00	-26.60	1.05 V	255	8.40	38.90

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



### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

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

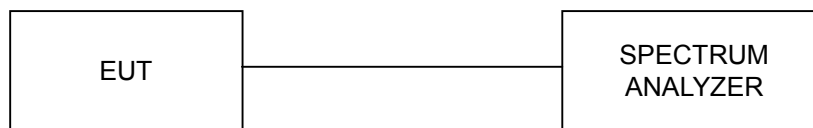
#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 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 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 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.



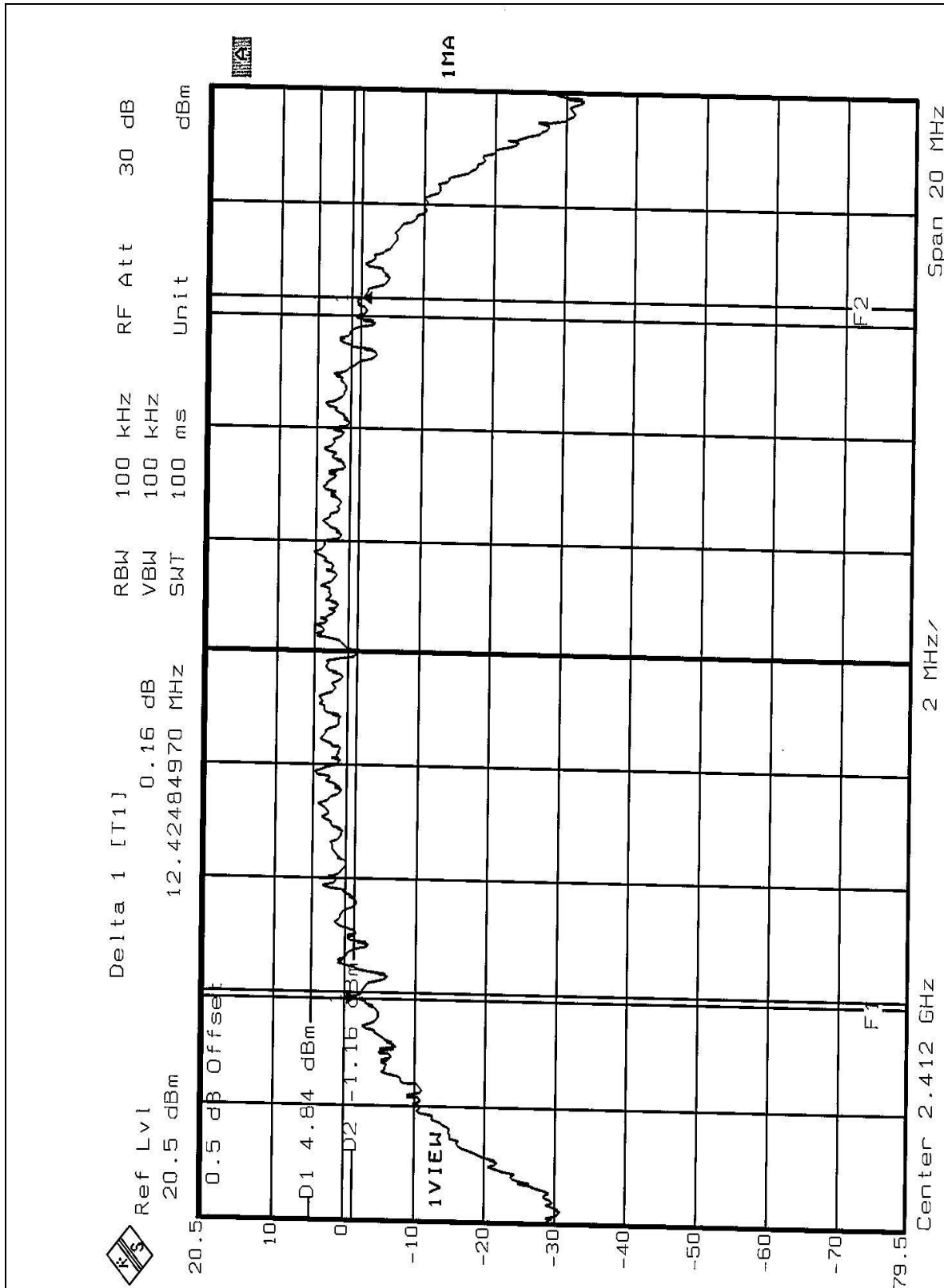
## 4.3.7 TEST RESULTS

<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 67%RH, 1005 hPa
<b>TRANSFER RATE</b>	22Mbps	<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	12.425	0.5	PASS
6	2437	12.545	0.5	PASS
11	2462	12.665	0.5	PASS

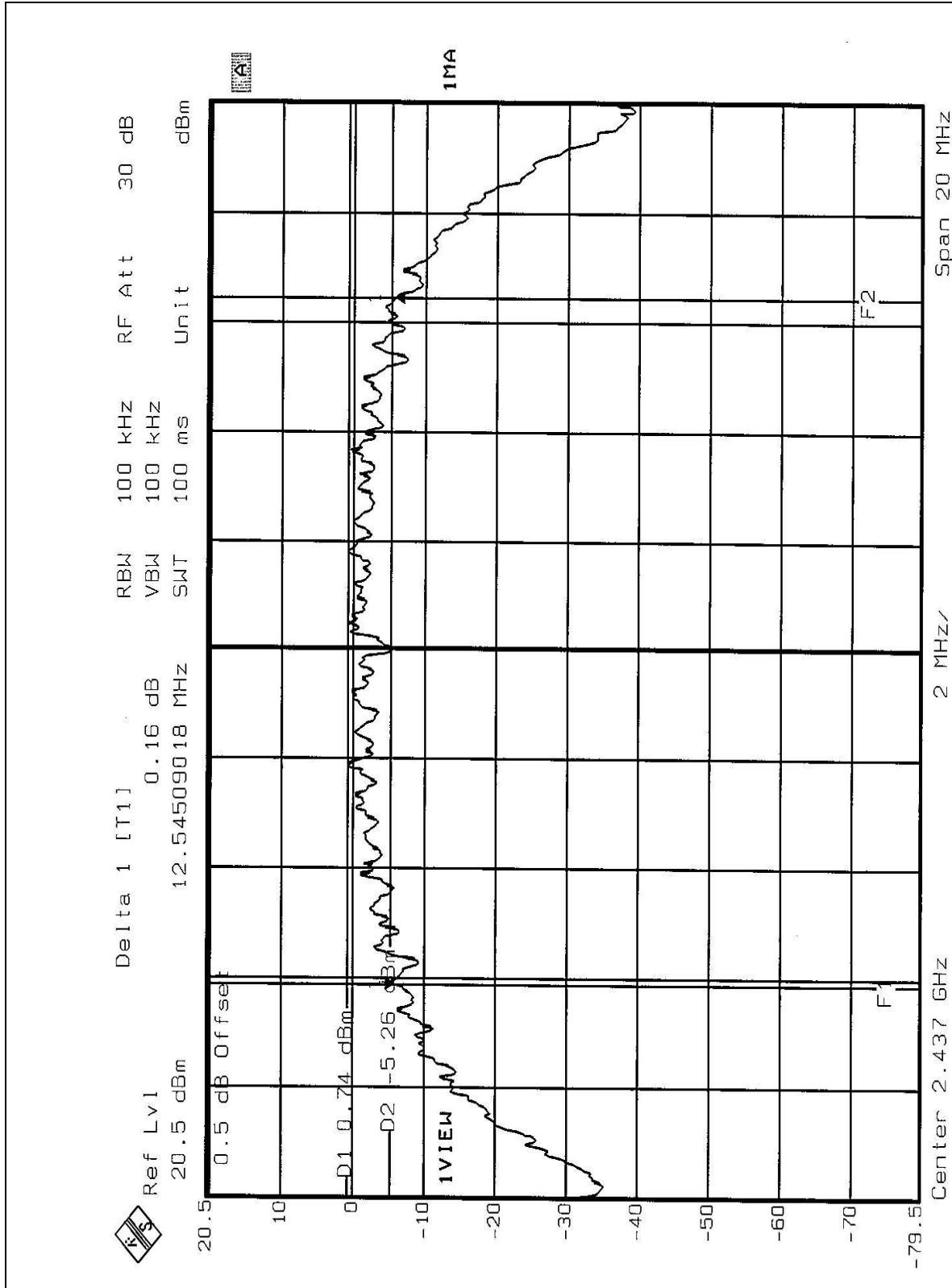


CH1



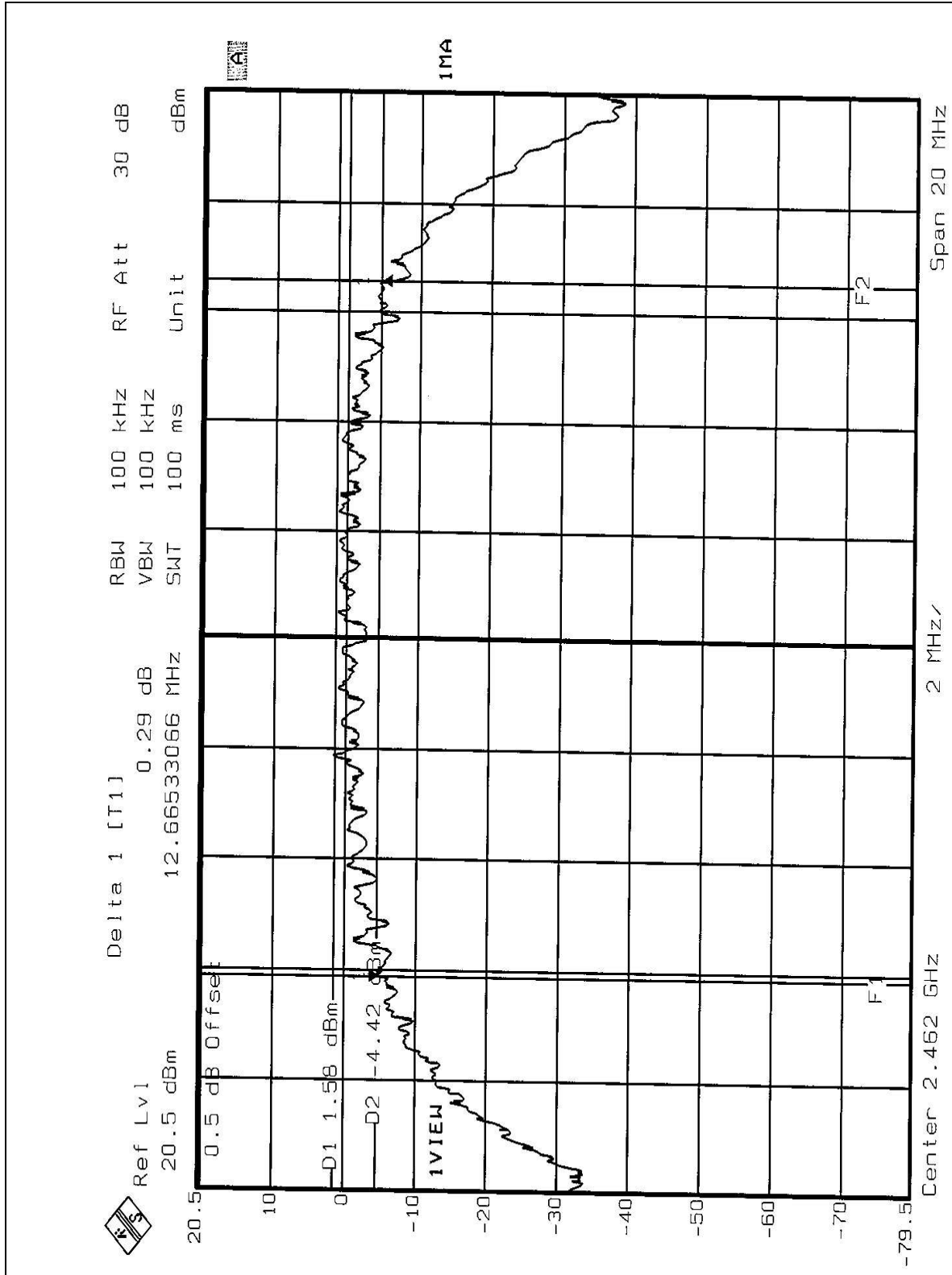


CH6





CH11







#### 4.4 MAXIMUM PEAK OUTPUT POWER

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

The Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Jul. 24, 2003
R&S SIGNAL GENERATOR	SMP04	100011	May 28, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	B048470	Mar. 05, 2004
NARDA DETECTOR	4503A	FSCM99899	NA

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



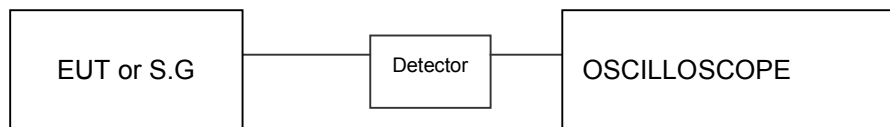
#### 4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

#### 4.4.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.4 TEST SETUP



#### 4.4.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



## 4.4.6 TEST RESULTS

<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 67%RH, 1005 hPa
<b>TRANSFER RATE</b>	22Mbps	<b>TESTED BY</b>	Ansen Lei

<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	17.14	30	PASS
6	2437	17.12	30	PASS
11	2462	17.33	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

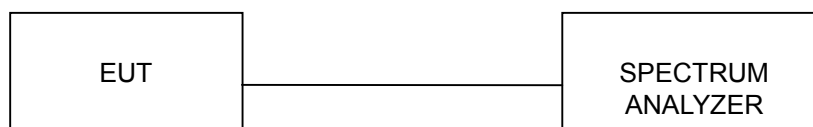
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

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

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



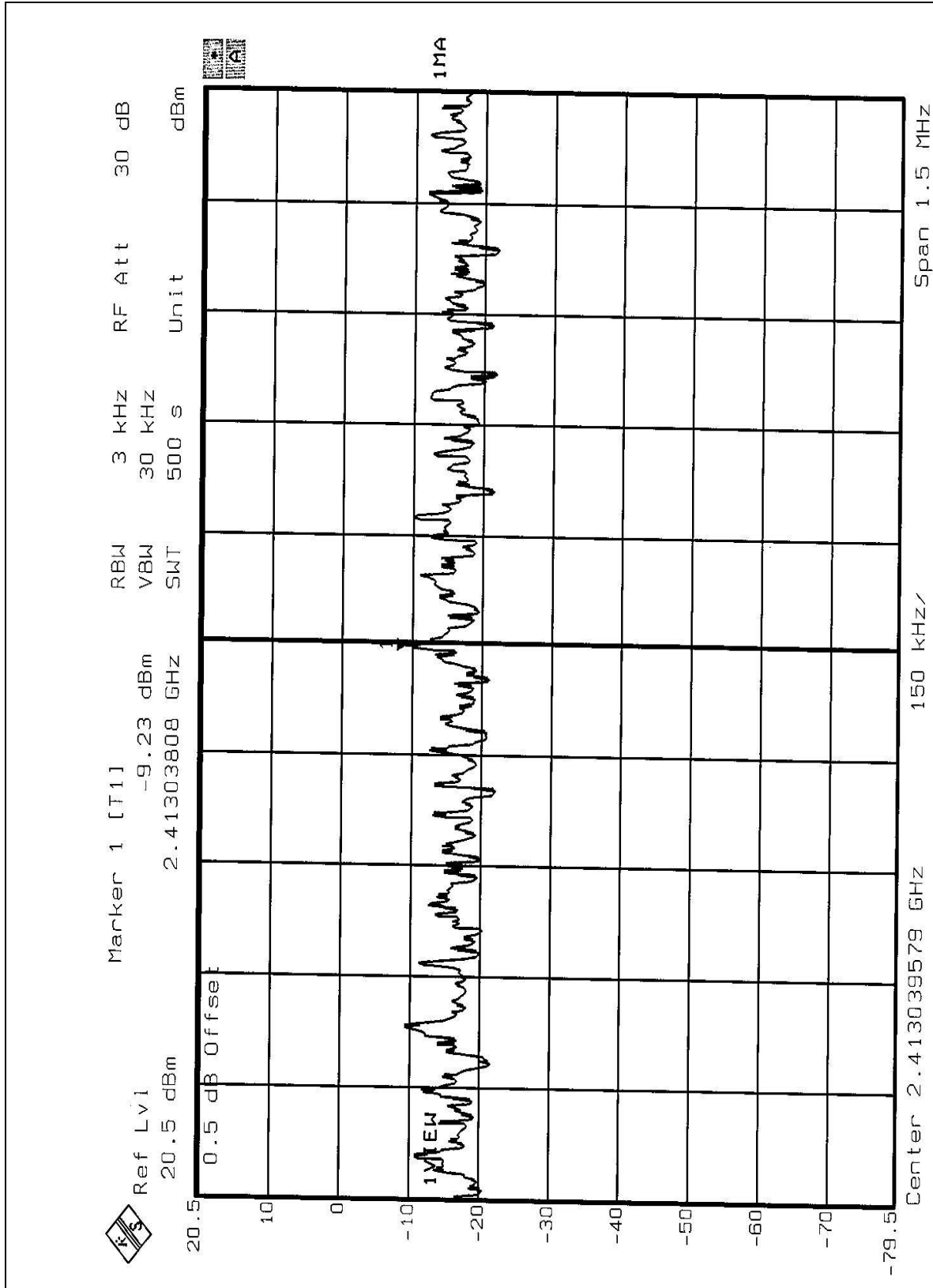
## 4.5.7 TEST RESULTS

<b>EUT</b>	Bridge AP/Repeater AP	<b>MODEL</b>	WBA-200
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 67%RH, 1005 hPa
<b>TRANSFER RATE</b>	22Mbps	<b>TESTED BY</b>	Ansen Lei

<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	-9.23	8	PASS
6	2437	-7.68	8	PASS
11	2462	-7.44	8	PASS

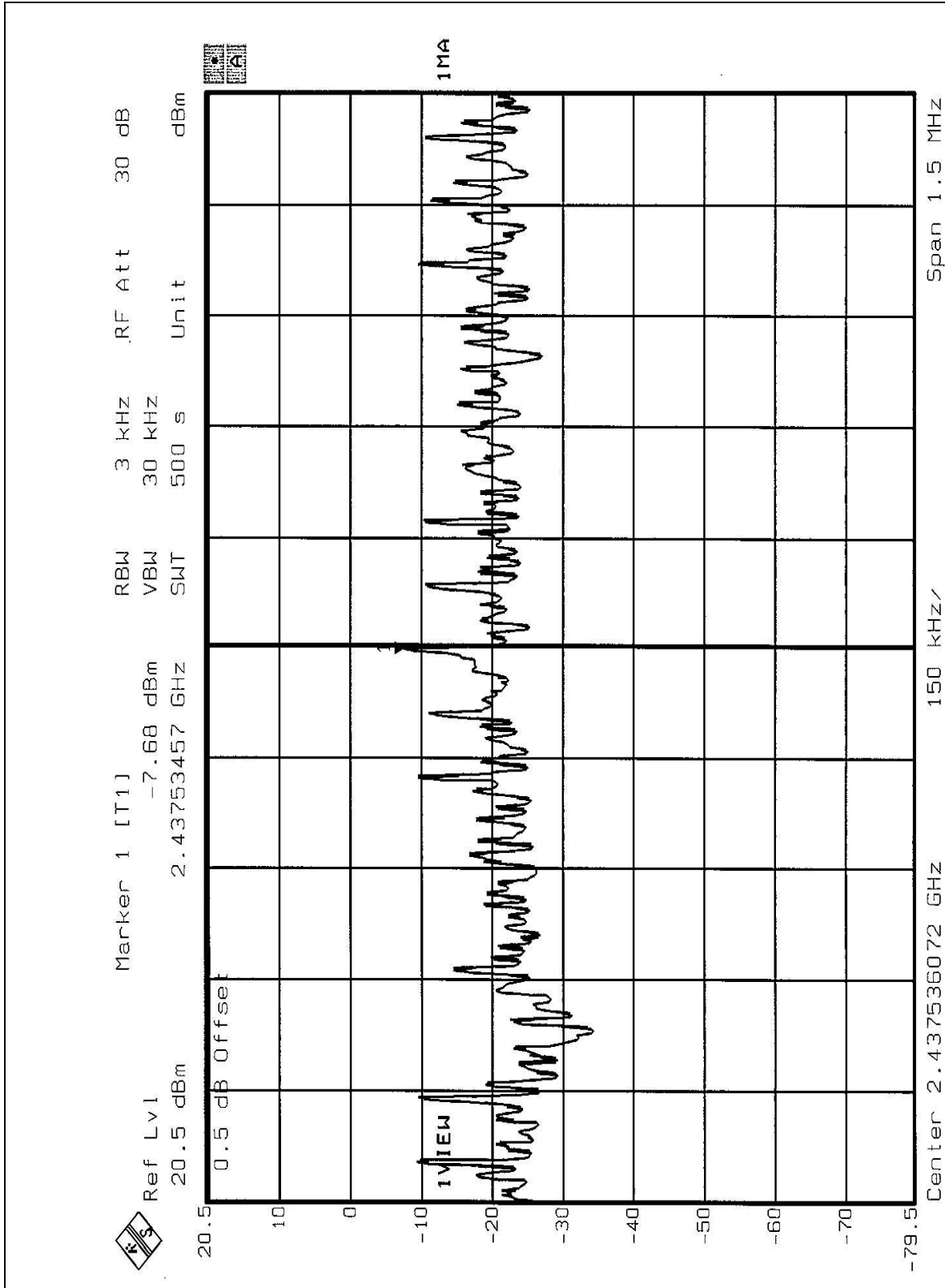


CH1





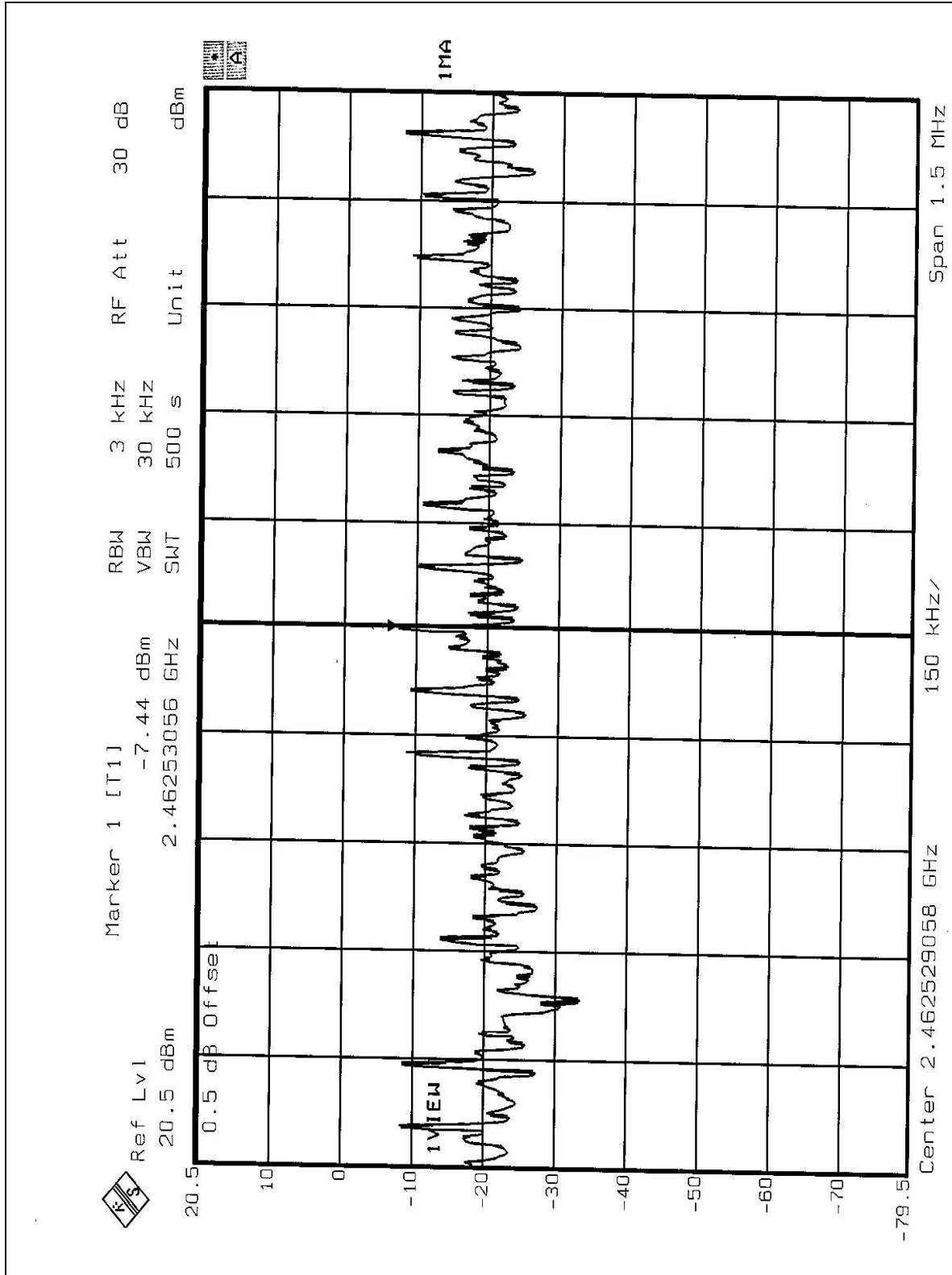
CH6







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 100 kHz with suitable frequency span including 100 kHz 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

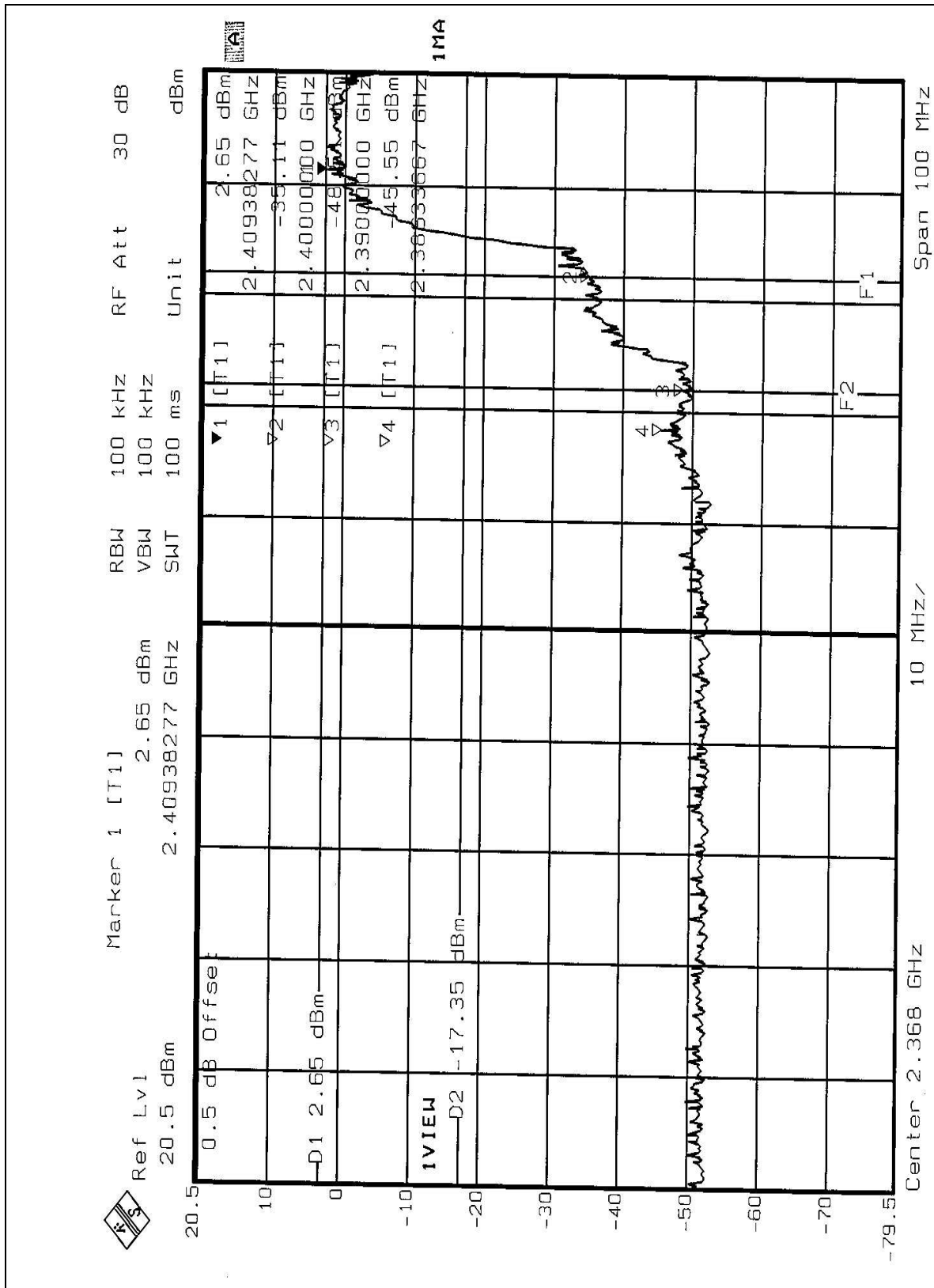
Same as Item 4.3.6

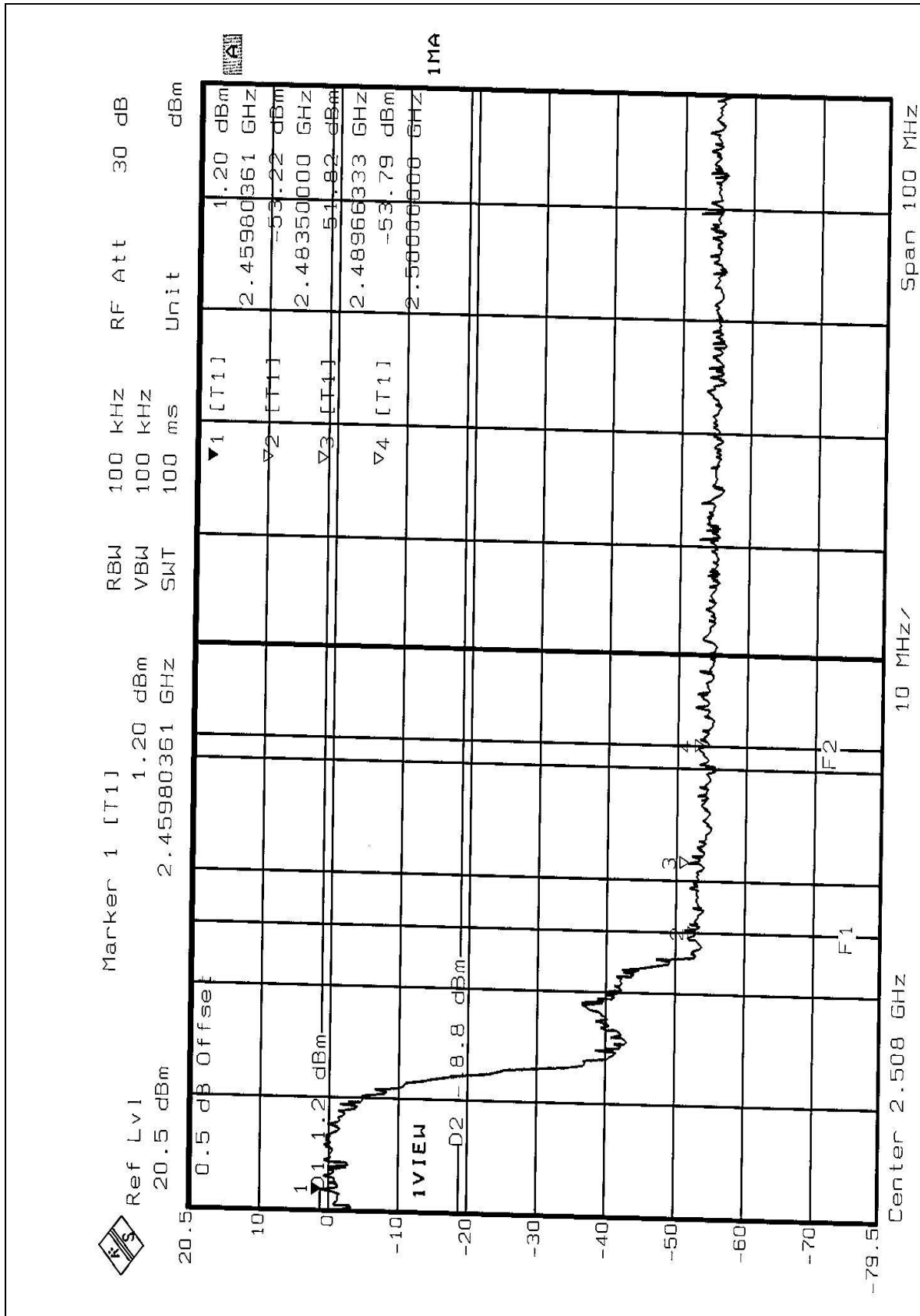
#### 4.6.6 TEST RESULTS

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).

**NOTE1:** The band edge emission plot on the following first page shows 48.20dB delta between carrier maximum power and local maximum emission in restrict band (2.3863GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 96.3dBuV/m, so the maximum field strength in restrict band is  $96.3-48.20=48.10$ dBuV/m which is under 54dBuV/m limit.

**NOTE2:** The band edge emission plot on the following second page shows 53.02dB delta between carrier maximum power and local maximum emission in restrict band (2.4897GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 96.6dBuV/m, so the maximum field strength in restrict band is  $96.6-53.02=43.58$ dBuV/m which is under 54dBuV/m limit.







## **4.7 ANTENNA REQUIREMENT**

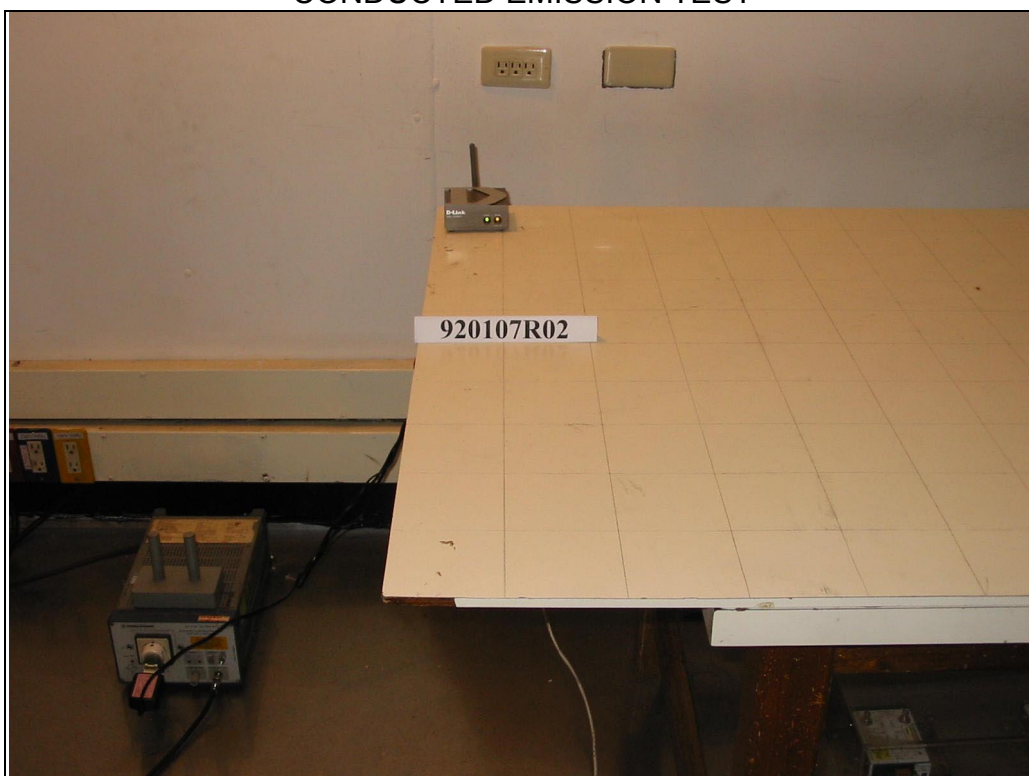
### **4.7.1 STANDARD APPLICABLE**

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 Dipole Antenna with Reverse SMA connector. The maximum Gain of the antenna is 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, UL
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	BSMI, DGT, CNLA

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

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

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