FCC TEST REPORT

REPORT NO.: RF930607L15
MODEL NO.: AP-8110 PLUS
RECEIVED: June 7, 2004
TESTED: June 10~23, 2004

APPLICANT: SendFar Technology Co.,Ltd.

ADDRESS: 15FL., NO.866-2, Jung Jeng Rd., Junghe City,Taipei, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1 CERTIFICATION

PRODUCT :	Wireless Access Point
BRAND NAME :	SendFar
MODEL NO. :	AP-8110 PLUS
APPLICANT :	SendFar Technology Co.,Ltd.
TESTED :	June 10~23, 2004
TEST ITEM :	Engineering Sample
STANDARDS :	FCC Part 15, Subpart C (Section 15.247), ANSI C63.4-2001

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY: Stacy Hsueh, **DATE:** June 24, 2004
Stacy Hsueh

APPROVED BY: Cody Chang, **DATE:** June 24, 2004
Cody Chang / Supervisor

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is –16.58dB at 1.750MHz
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 –0.61dB at 2403.40MHz
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

NOTE: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Access Point
MODEL NO.	AP-8110 PLUS
POWER SUPPLY	48Vdc from POE
MODULATION TYPE	BPSK, QPSK, CCK
RADIO TECHNOLOGY	DSSS
TRANSFER RATE	11/5.5/2/1Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	23dBm
ANTENNA TYPE	Dipole antenna with 5dBi gain
DATA CABLE	30m RJ45 Shielded Cable. 1.8m RS232 Shielded Cable.
I/O PORTS	MIL-C-50 Style RS232 console port MIL-C-5015 Style Ethernet port
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT was powered by the following POE (Power over Ethernet)

Model:	F9191-4808
Input:	100-240Vac, 2A , 50-60Hz
Output:	48Vdc, 0.8A

2. The above EUT information was declared by manufacturer and 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 to 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, the worst case, was chosen for final test.
2. Above 1GHz, the channel 1, 6, and 11 were tested individually.
3. From our experience and technical viewpoint, we have chosen data rate 11Mbps for CCK technique, as the worst case for the test among other data rate.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C. (15.247)
ANSI C63.4:2001

All test items 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-09C748-12800-193-C800	FCC DoC Approved
2	NOTEBOOK COMPUTER	DELL	PP05L	20838027664	E2K24CLNS
3	PRINTER	EPSON	LQ-300+	DCGY054105	FCC DoC Approved

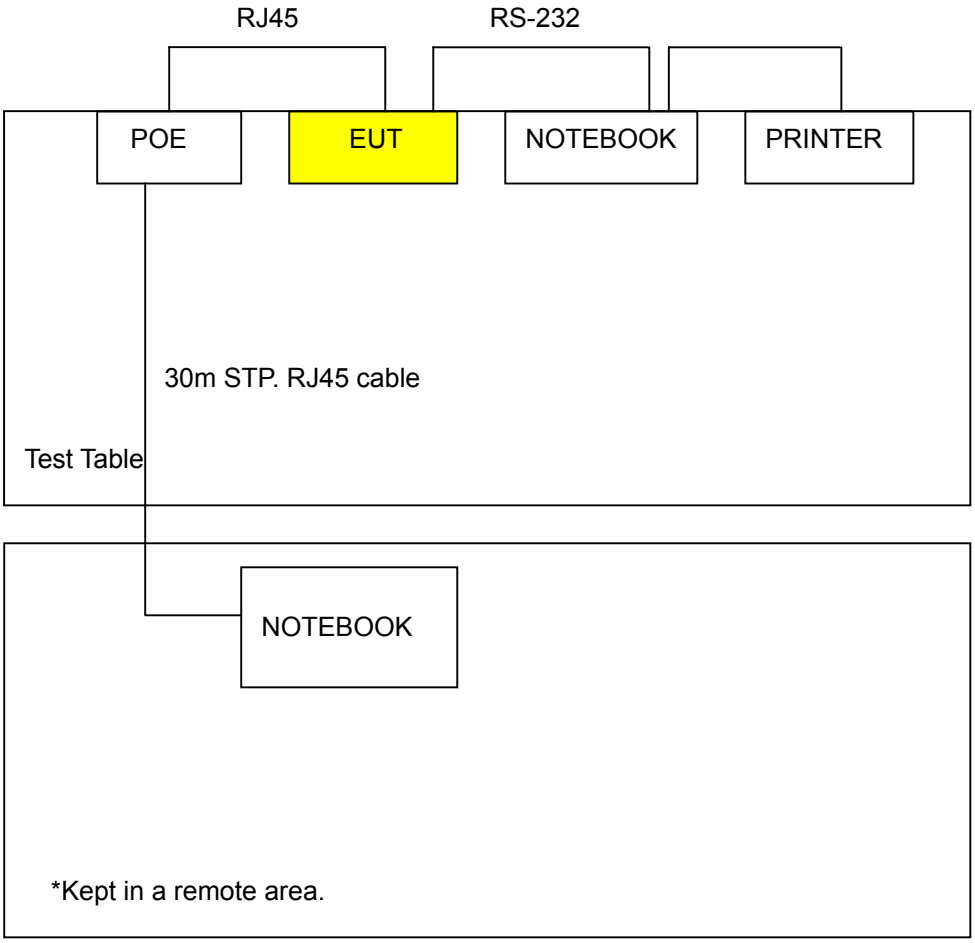
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	NA

NOTE:

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

2. Item 2 acted as a communication partner to transfer data.

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	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
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Dec. 11, 2004
RF signal cable Woken	5D-FB	Cable-HyC02-01	Mar. 07, 2005
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Mar. 10, 2005
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Mar. 04, 2005
Software ADT	ADT_Cond_V3	NA	NA

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. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

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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.

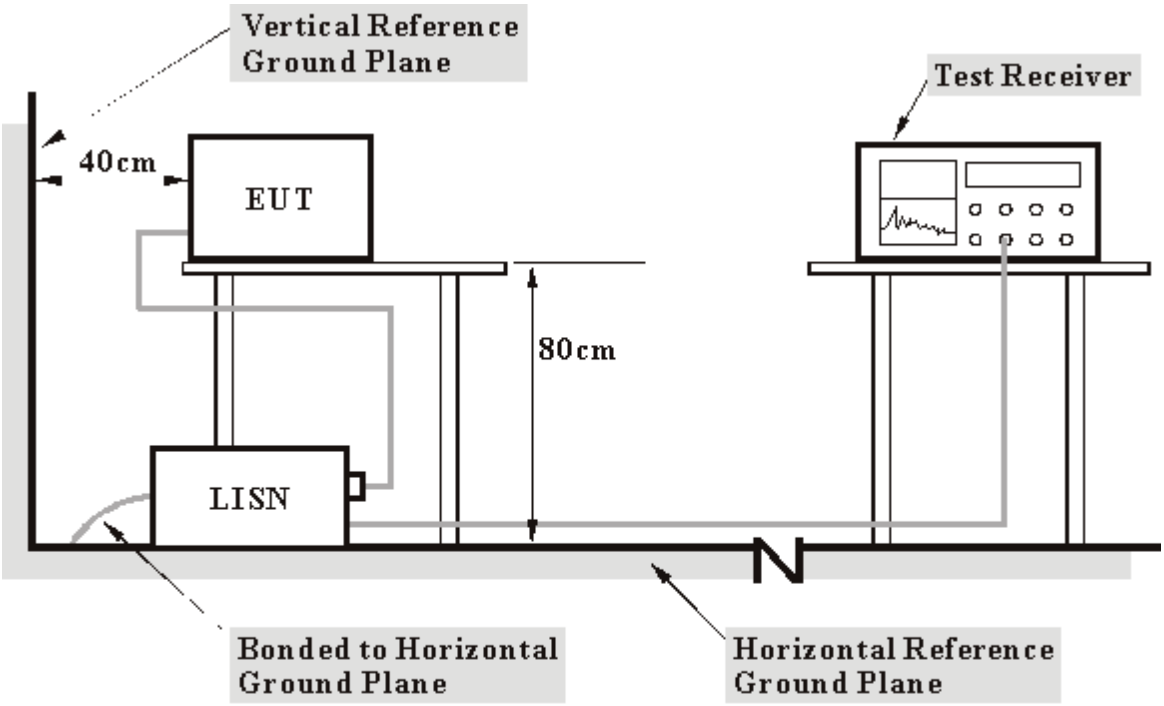
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels Limit –20dB was not recorded.

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

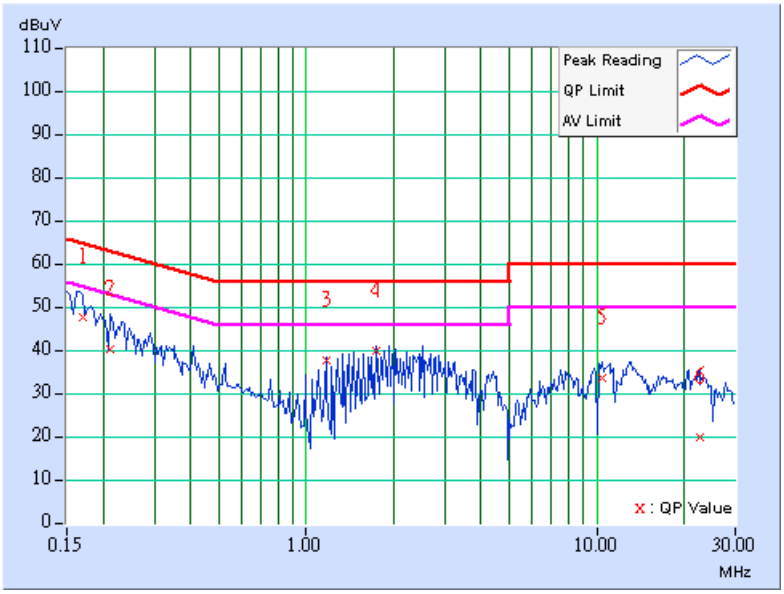
a. Placed the EUT on the testing table.
b. Prepared another notebook system to act as a communication partner and placed it outside of testing area.
c. The communication partner run a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ45 cable.
d. The communication partner sent data to EUT by command "PING".

4.1.7 TEST RESULTS

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	1	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.171	0.10	46.73	-	46.83	-	64.93	54.93	-18.09	-
2	0.213	0.10	39.28	-	39.38	-	63.11	53.11	-23.73	-
3	1.168	0.25	36.91	-	37.16	-	56.00	46.00	-18.84	-
4	1.750	0.26	39.07	-	39.33	-	56.00	46.00	-16.67	-
5	10.438	0.54	32.64	-	33.18	-	60.00	50.00	-26.82	-
6	22.629	1.05	19.09	-	20.14	-	60.00	50.00	-39.86	-

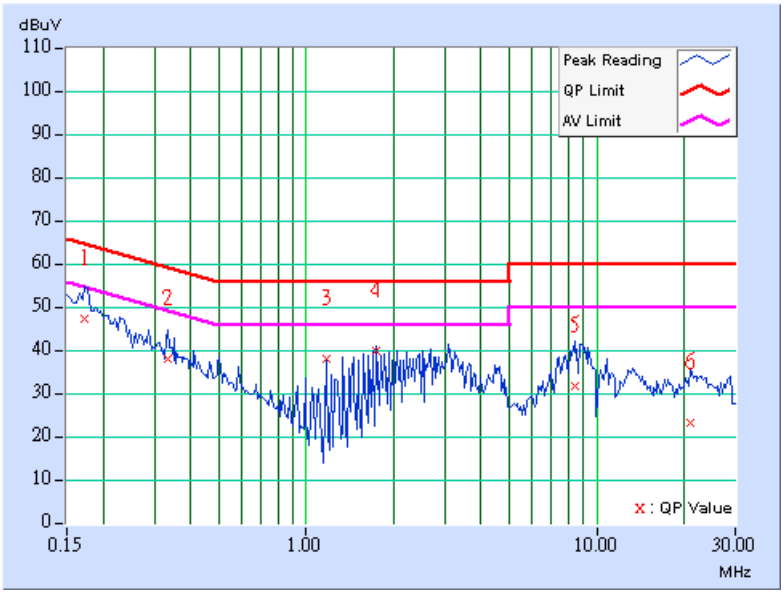
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	1	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.173	0.10	46.67	-	46.77	-	64.79	54.79	-18.03	-
2	0.334	0.11	37.43	-	37.54	-	59.36	49.36	-21.82	-
3	1.168	0.24	37.59	-	37.83	-	56.00	46.00	-18.17	-
4	**1.750**	**0.25**	**39.17**	**-**	**39.42**	**-**	**56.00**	**46.00**	**-16.58**	-
5	8.367	0.45	31.05	-	31.50	-	60.00	50.00	-28.50	-
6	21.086	0.66	22.55	-	23.21	-	60.00	50.00	-36.79	-

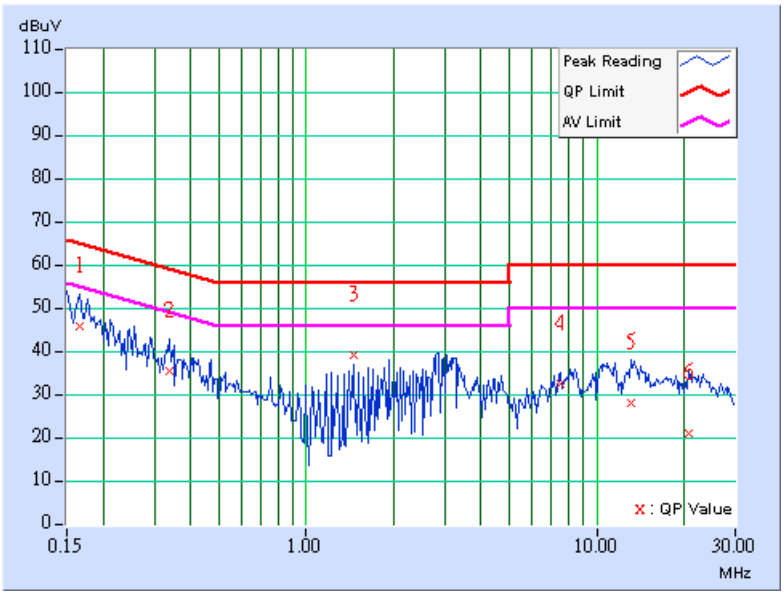
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	6	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.166	0.10	45.03	-	45.13	-	65.18	55.18	-20.04	-
2	0.338	0.11	34.69	-	34.80	-	59.26	49.26	-24.47	-
3	1.461	0.25	38.38	-	38.63	-	56.00	46.00	-17.37	-
4	7.543	0.46	31.77	-	32.23	-	60.00	50.00	-27.77	-
5	13.082	0.63	27.05	-	27.68	-	60.00	50.00	-32.32	-
6	20.711	0.95	19.99	-	20.94	-	60.00	50.00	-39.06	-

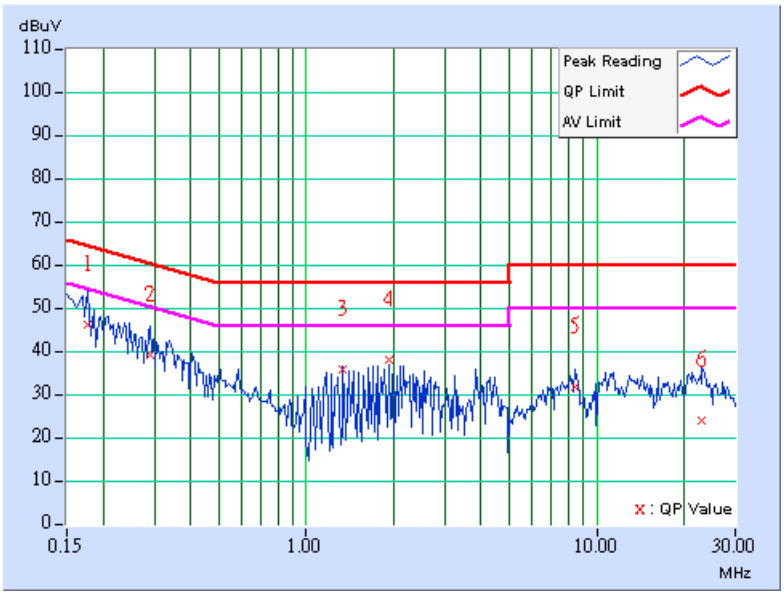
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	6	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.10	45.68	-	45.78	-	64.61	54.61	-18.83	-
2	0.291	0.11	38.51	-	38.62	-	60.51	50.51	-21.89	-
3	1.340	0.24	35.39	-	35.63	-	56.00	46.00	-20.37	-
4	1.926	0.25	37.42	-	37.67	-	56.00	46.00	-18.33	-
5	8.461	0.45	31.19	-	31.64	-	60.00	50.00	-28.36	-
6	23.113	0.68	23.43	-	24.11	-	60.00	50.00	-35.89	-

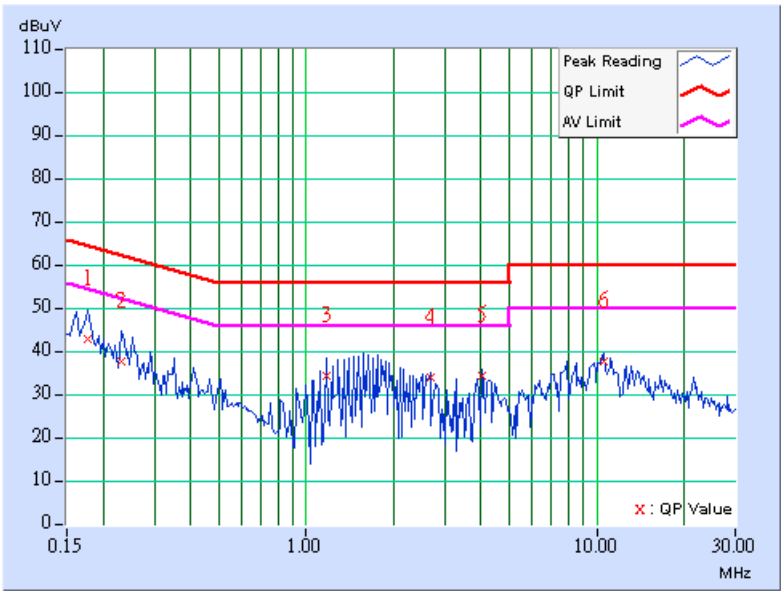
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	11	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.177	0.10	42.57	-	42.67	-	64.61	54.61	-21.94	-
2	0.232	0.10	37.27	-	37.37	-	62.38	52.38	-25.00	-
3	1.172	0.25	34.04	-	34.29	-	56.00	46.00	-21.71	-
4	2.688	0.28	33.54	-	33.82	-	56.00	46.00	-22.18	-
5	4.031	0.31	33.82	-	34.13	-	56.00	46.00	-21.87	-
6	10.578	0.55	37.20	-	37.75	-	60.00	50.00	-22.25	-

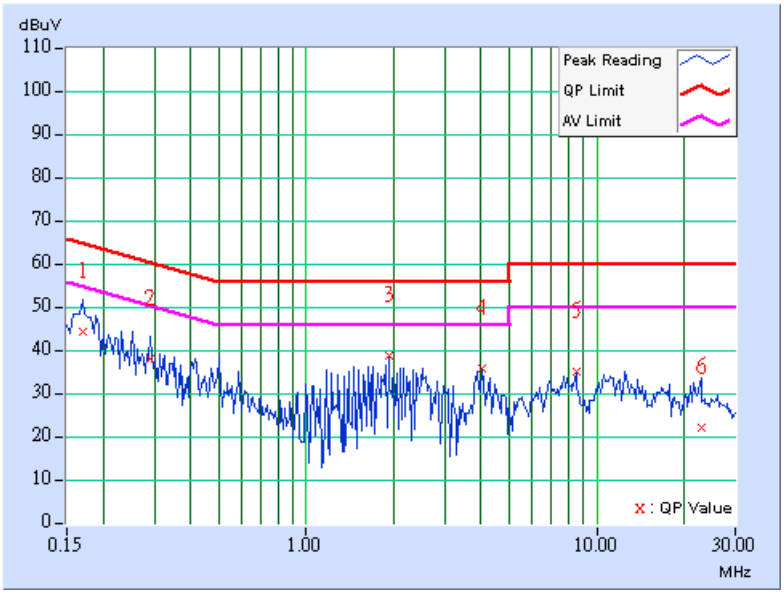
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	11	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**PHASE**	Netural (N)
ENVIRONMENTAL CONDITIONS	26deg. C, 60% RH, 991 hPa	**TESTED BY**: Hardaway Lee	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	43.73	-	43.83	-	64.98	54.98	-21.16	-
2	0.291	0.11	37.58	-	37.69	-	60.51	50.51	-22.82	-
3	1.930	0.25	38.04	-	38.29	-	56.00	46.00	-17.71	-
4	4.035	0.30	35.11	-	35.41	-	56.00	46.00	-20.59	-
5	8.484	0.45	34.39	-	34.84	-	60.00	50.00	-25.16	-
6	22.926	0.68	21.63	-	22.31	-	60.00	50.00	-37.69	-

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
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Feb. 09, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 15, 2004
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170242	Feb. 23, 2005
Preamplifier Agilent	8447D	2944A10631	Jan. 15, 2005
Preamplifier Agilent	8449B	3008A01960	Jan. 22, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219272/4	Mar. 04, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	219275/4	Mar. 04, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA
Turn Table ADT.	TT100.	TT93021704	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA

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. The test was performed in HwaYa Chamber 3.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The IC Site Registration No. is IC4924-4.

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter semi-anechoic chamber. 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.

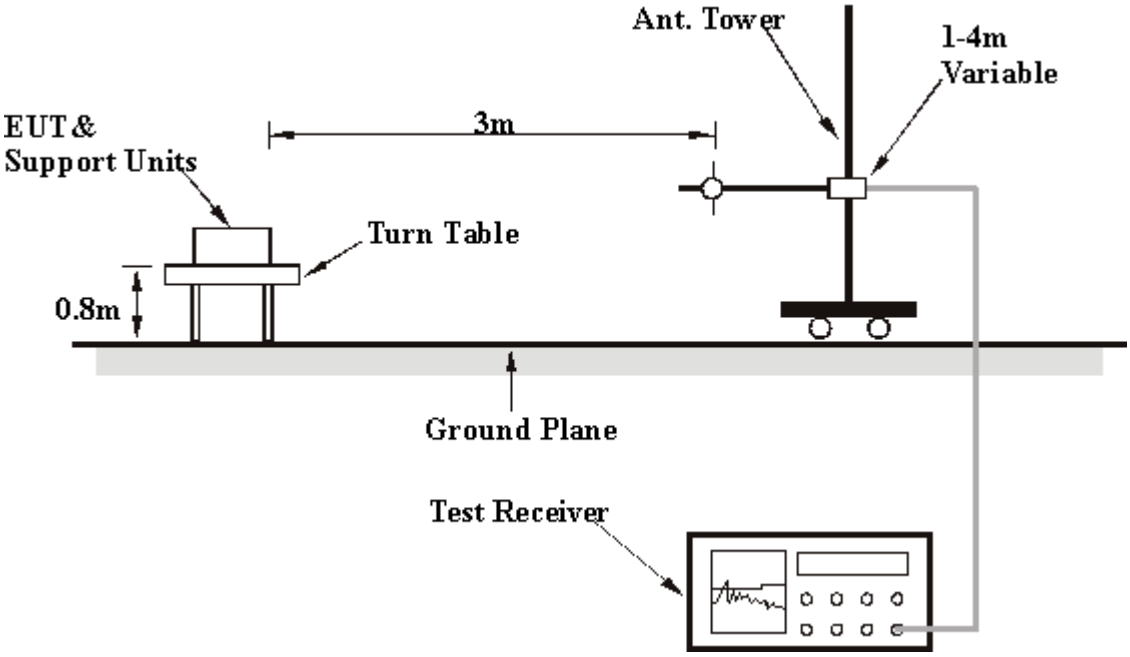
NOTE:

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 10 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

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	11	**FREQUENCY RANGE**	Below 1000 MHz
INPUT POWER (SYSTEM)	120 Vac, 60Hz	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	28deg. C, 75% RH, 991 hPa	**TESTED BY**: Allen 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	64.99	36.04 QP	40.00	-3.96	4.00 H	307	22.99	13.05
2	131.08	41.27 QP	43.50	-2.23	3.00 H	352	27.54	13.74
3	199.98	42.41 QP	43.50	-1.09	1.00 H	259	31.14	11.27
4	239.94	37.86 QP	46.00	-8.14	1.25 H	223	24.90	12.96
5	265.88	44.85 QP	46.00	-1.15	1.00 H	244	31.35	13.50
6	401.28	35.93 QP	46.00	-10.07	1.00 H	28	19.16	16.76
7	432.38	31.56 QP	46.00	-14.44	1.75 H	256	14.01	17.55
8	531.52	37.88 QP	46.00	-8.12	1.25 H	262	18.75	19.13
9	601.50	30.34 QP	46.00	-15.66	1.00 H	262	9.49	20.85
10	749.99	44.98 QP	46.00	-1.02	1.00 H	160	21.74	23.24
11	803.67	32.89 QP	46.00	-13.11	1.75 H	232	9.40	23.49

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	79.98	38.95 QP	40.00	-1.05	1.74 V	138	29.07	9.88
2	131.08	37.71 QP	43.50	-5.79	1.00 V	340	23.97	13.74
3	199.12	35.24 QP	43.50	-8.26	1.00 V	46	23.90	11.34
4	265.21	42.53 QP	46.00	-3.47	1.00 V	277	29.06	13.47
5	300.20	30.65 QP	46.00	-15.35	2.00 V	352	16.23	14.41
6	370.18	33.58 QP	46.00	-12.42	1.25 V	163	17.57	16.01
7	531.52	38.13 QP	46.00	-7.87	1.25 V	247	19.00	19.13
8	560.68	30.04 QP	46.00	-15.96	1.50 V	196	10.29	19.75
9	663.71	29.52 QP	46.00	-16.48	1.25 V	166	7.90	21.62
10	749.24	43.53 QP	46.00	-2.47	1.75 V	256	20.31	23.22

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + CorrectionFactor(dB/m)
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.

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	1	**FREQUENCY RANGE**	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH, 991 hPa	**TESTED BY**: Allen 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	2038.00	45.39 PK	74.00	-28.61	1.00 H	171	13.44	31.95
1	2038.00	38.48 AV	54.00	-15.52	1.00 H	171	6.53	31.95
2	2390.00	40.09 PK	74.00	-33.91	1.04 H	231	6.73	33.36
2	2390.00	32.51 AV	54.00	-21.49	1.04 H	231	-0.85	33.36
3	*2412.00	104.03 PK			1.04 H	231	70.59	33.44
3	*2412.00	96.45 AV			1.04 H	231	63.01	33.44
4	2453.20	53.23 PK	74.00	-20.77	1.06 H	215	19.64	33.59
4	2453.20	50.35 AV	54.00	-3.65	1.06 H	215	16.76	33.59
5	4076.00	48.40 PK	74.00	-25.60	1.53 H	25	10.01	38.39
5	4076.00	35.80 AV	54.00	-18.20	1.53 H	25	-2.59	38.39

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	2038.00	47.53 PK	74.00	-26.47	1.24 V	3	15.58	31.95
1	2038.00	42.54 AV	54.00	-1.46	1.24 V	3	10.59	31.95
2	2390.00	54.25 PK	74.00	-19.75	1.26 V	351	20.89	33.36
2	2390.00	46.76 AV	54.00	-7.24	1.26 V	351	13.40	33.36
3	*2412.00	118.19 PK			1.26 V	351	84.75	33.44
3	*2412.00	110.70 AV			1.26 V	351	77.26	33.44
4	2453.20	67.21 PK	74.00	-6.79	1.00 V	225	33.62	33.59
5	4076.00	48.95 PK	74.00	-25.05	1.10 V	310	10.56	38.39
5	4076.00	35.49 AV	54.00	-18.51	1.10 V	310	-2.90	38.39

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

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	6	**FREQUENCY RANGE**	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH, 991 hPa	**TESTED BY**: Allen 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	2063.00	44.77 PK	74.00	-29.23	1.07 H	198	12.73	32.04
1	2063.00	37.74 AV	54.00	-16.26	1.07 H	198	5.70	32.04
2	*2437.00	106.87 PK			1.09 H	218	73.34	33.53
2	*2437.00	99.16 AV			1.09 H	218	65.63	33.53
3	4176.00	49.08 PK	74.00	-24.92	1.05 H	205	10.32	38.76
3	4176.00	36.39 AV	54.00	-17.61	1.05 H	205	-2.37	38.76

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	2063.00	43.60 PK	74.00	-30.40	1.15 V	232	11.56	32.04
1	2063.00	35.19 AV	54.00	-18.81	1.15 V	232	3.15	32.04
2	*2437.00	117.86 PK			1.05 V	355	84.33	33.53
2	*2437.00	110.22 AV			1.05 V	355	76.69	33.53
3	4126.00	50.38 PK	74.00	-23.62	1.53 V	275	11.83	38.55
3	4126.00	37.55 AV	54.00	-16.45	1.53 V	275	-1.00	38.55

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

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
CHANNEL	11	**FREQUENCY RANGE**	1~25 GHz
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 70% RH, 991 hPa	**TESTED BY**: Allen 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	2088.00	43.87 PK	74.00	-30.13	1.00 H	174	11.74	32.13
1	2088.00	31.29 AV	54.00	-22.71	1.00 H	174	-0.84	32.13
2	2403.40	61.18 PK	74.00	-12.82	1.19 H	277	27.77	33.41
2	**2403.40**	**53.39 AV**	**54.00**	**-0.61**	**1.19 H**	**277**	**19.98**	**33.41**
3	*2462.00	102.09 PK			1.19 H	277	68.47	33.62
3	*2462.00	94.30 AV			1.19 H	277	60.68	33.62
4	2483.50	40.44 PK	74.00	-33.56	1.19 H	277	6.74	33.70
4	2483.50	32.65 AV	54.00	-21.35	1.19 H	277	-1.05	33.70
5	4176.00	49.79 PK	74.00	-24.21	1.00 H	167	11.03	38.76
5	4176.00	35.88 AV	54.00	-18.12	1.00 H	167	-2.88	38.76

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	2088.00	45.04 PK	74.00	-28.96	1.00 V	8	12.91	32.13
1	2088.00	35.86 AV	54.00	-18.14	1.00 V	8	3.73	32.13
3	*2462.00	120.03 PK			1.21 V	193	86.41	33.62
3	*2462.00	111.83 AV			1.21 V	193	78.21	33.62
4	2483.50	58.38 PK	74.00	-15.62	1.21 V	193	24.68	33.70
4	2483.50	50.18 AV	54.00	-3.82	1.21 V	193	16.48	33.70
5	4176.00	49.37 PK	74.00	-24.63	1.00 V	357	10.61	38.76
5	4176.00	35.84 AV	54.00	-18.16	1.00 V	357	-2.92	38.76

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 0.5MHz.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004

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

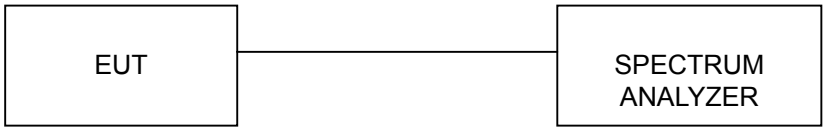
4.3.3 TEST PROCEDURE

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

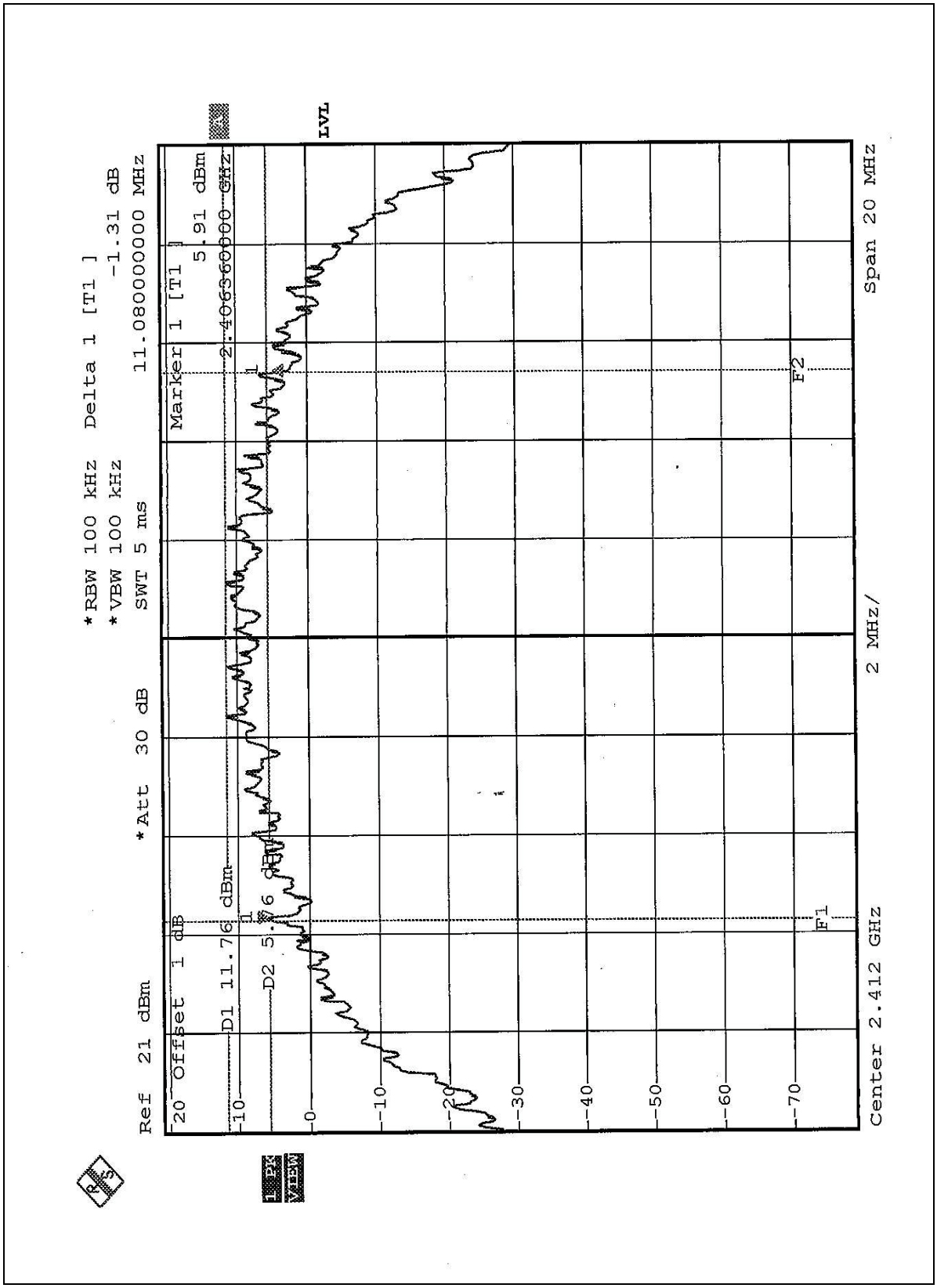
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

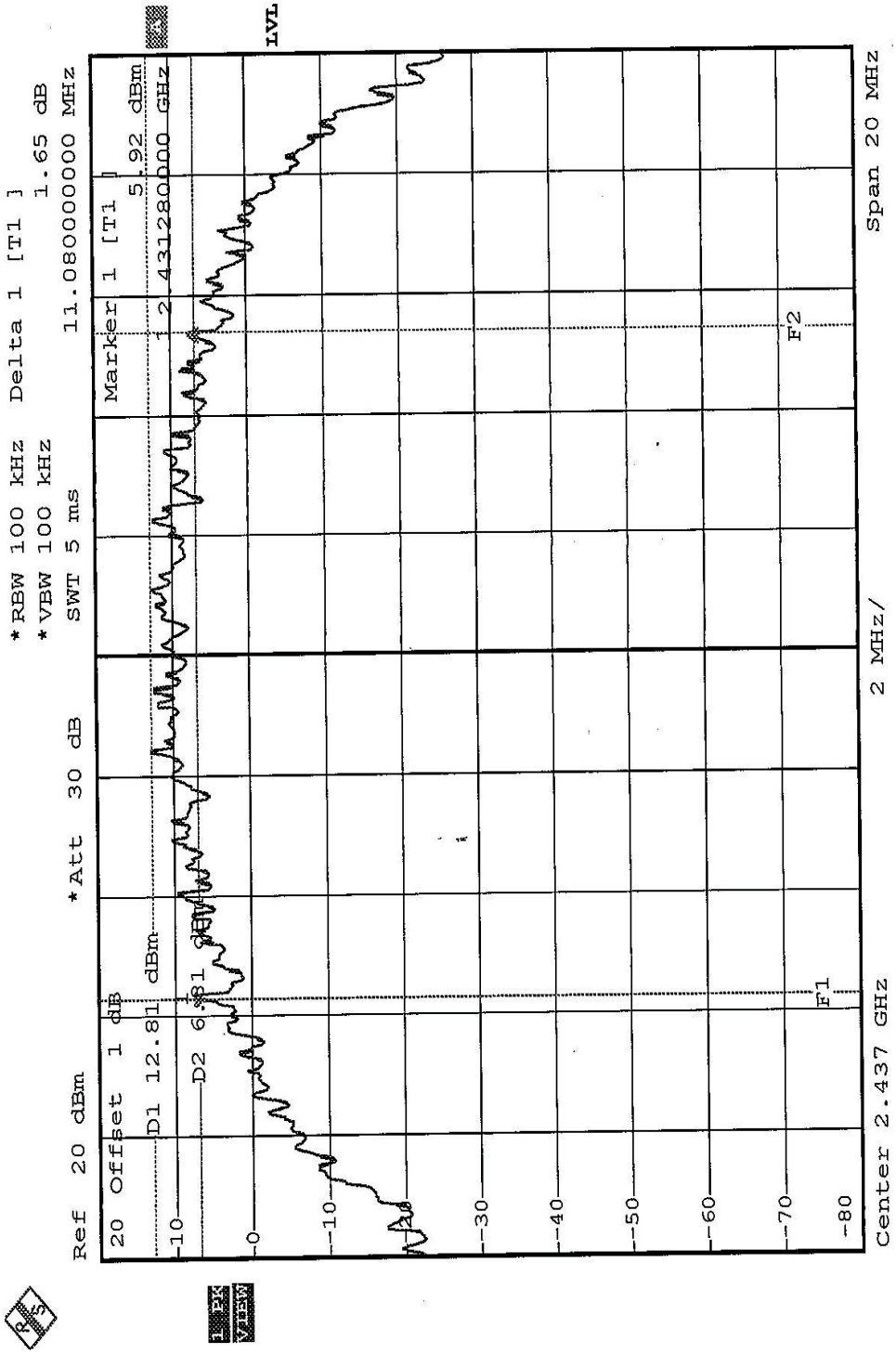
EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 65% RH, 991 hPa
TESTED BY	Allen Chang		

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	11.08	0.5	PASS
6	2437	11.08	0.5	PASS
11	2462	11.00	0.5	PASS

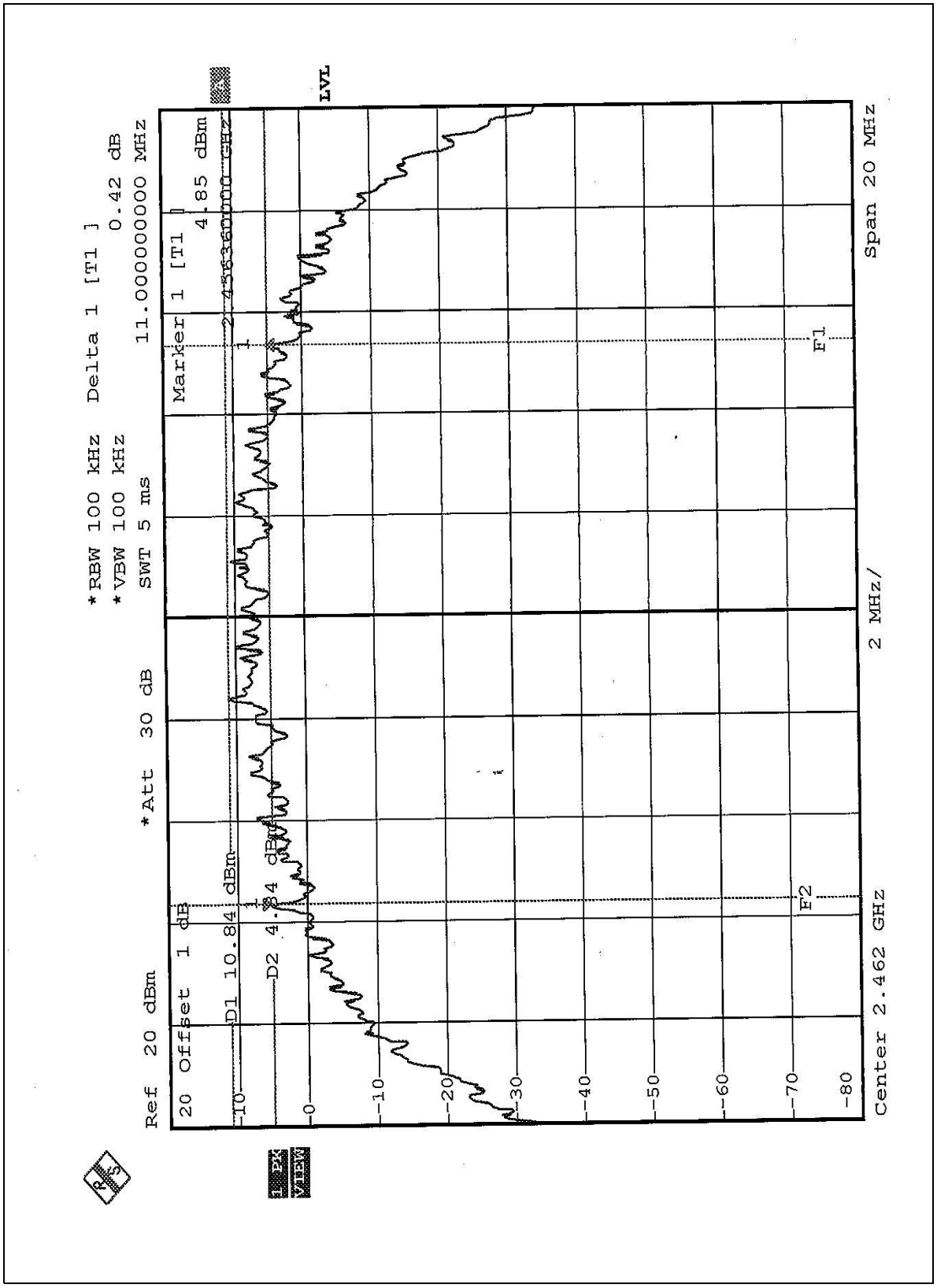
CH1


Ref 21 dBm
Offset 1 dB
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
-1.31 dB
11.08000000 MHz
Marker 1 [T1]
5.91 dBm
2.406360000 GHz
D1 11.76 dBm
D2 5.76 dBm
LVL
Center 2.412 GHz
2 MHz/
Span 20 MHz
F1
F2

CH6


Ref 20 dBm
20 Offset 1 dB
D1 12.81 dBm
D2 6.81 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
1.65 dB
11.08000000 MHz
Marker 1 [T1]
5.92 dBm
2.431280000 GHz
IVL
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

CH11


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 5 ms
Delta 1 [T1]
0.42 dB
11.000000000 MHz
Marker 1 [T1]
4.85 dBm
2.456360000 GHz
20 Offset 1 dB
D1 10.84 dBm
D2 4.84 dBm
LVL
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz

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
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 31, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	B048470	Feb. 1, 2005
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.

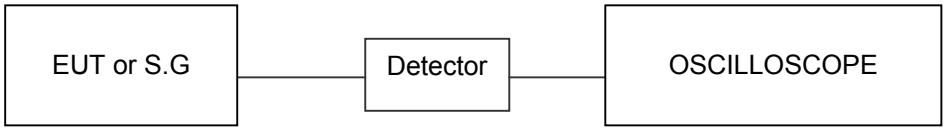
4.4.3 TEST PROCEDURES

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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.1.6

4.4.7 TEST RESULTS

EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 65% RH, 991 hPa
TESTED BY	Allen Chang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	23.00	30	PASS
6	2437	23.00	30	PASS
11	2462	23.00	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	Aug. 12, 2004

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

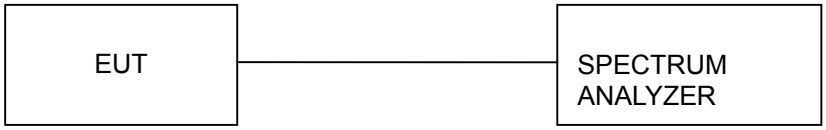
4.5.3 TEST PROCEDURE

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

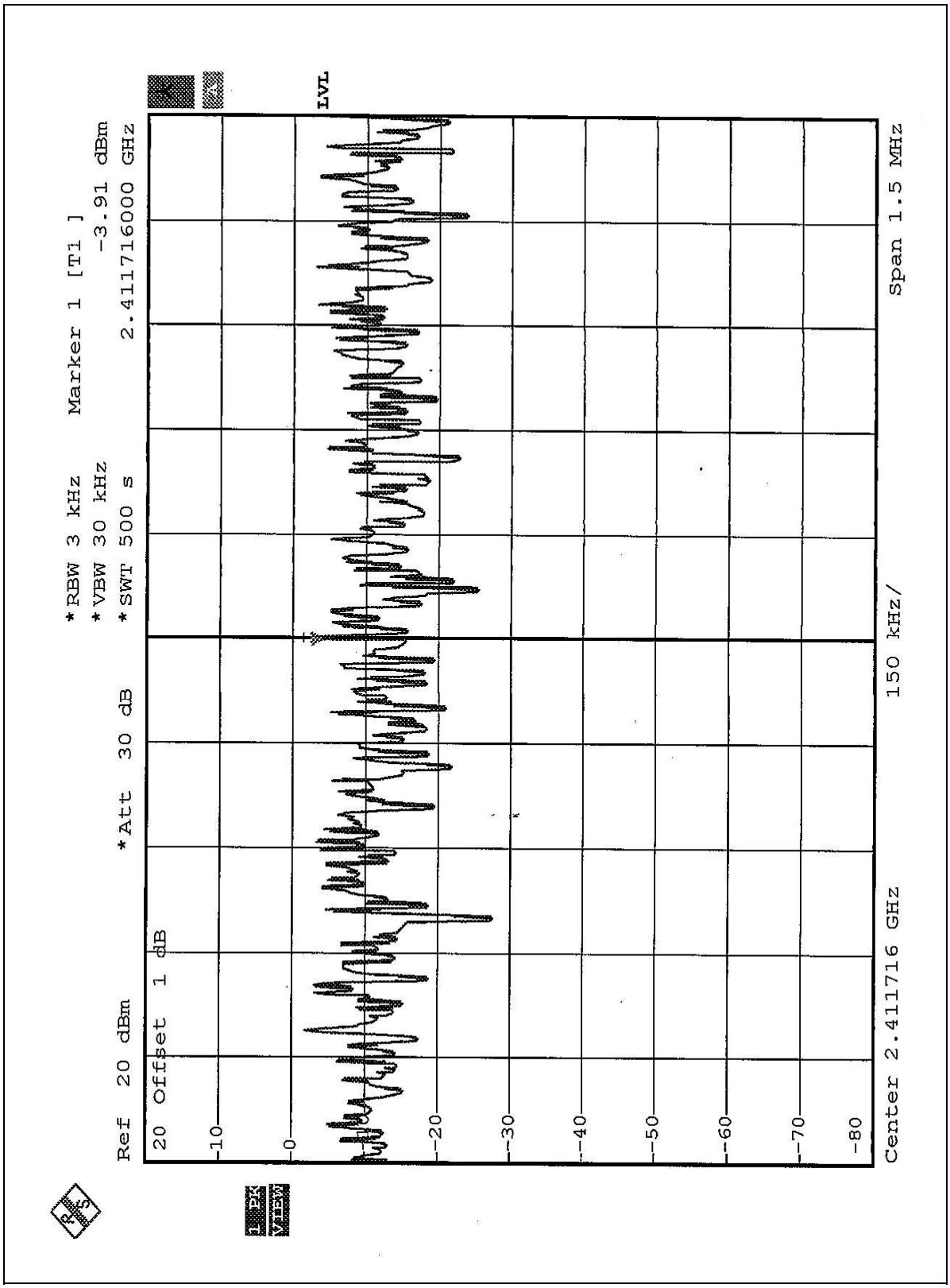
Same as 4.1.6

4.5.7 TEST RESULTS

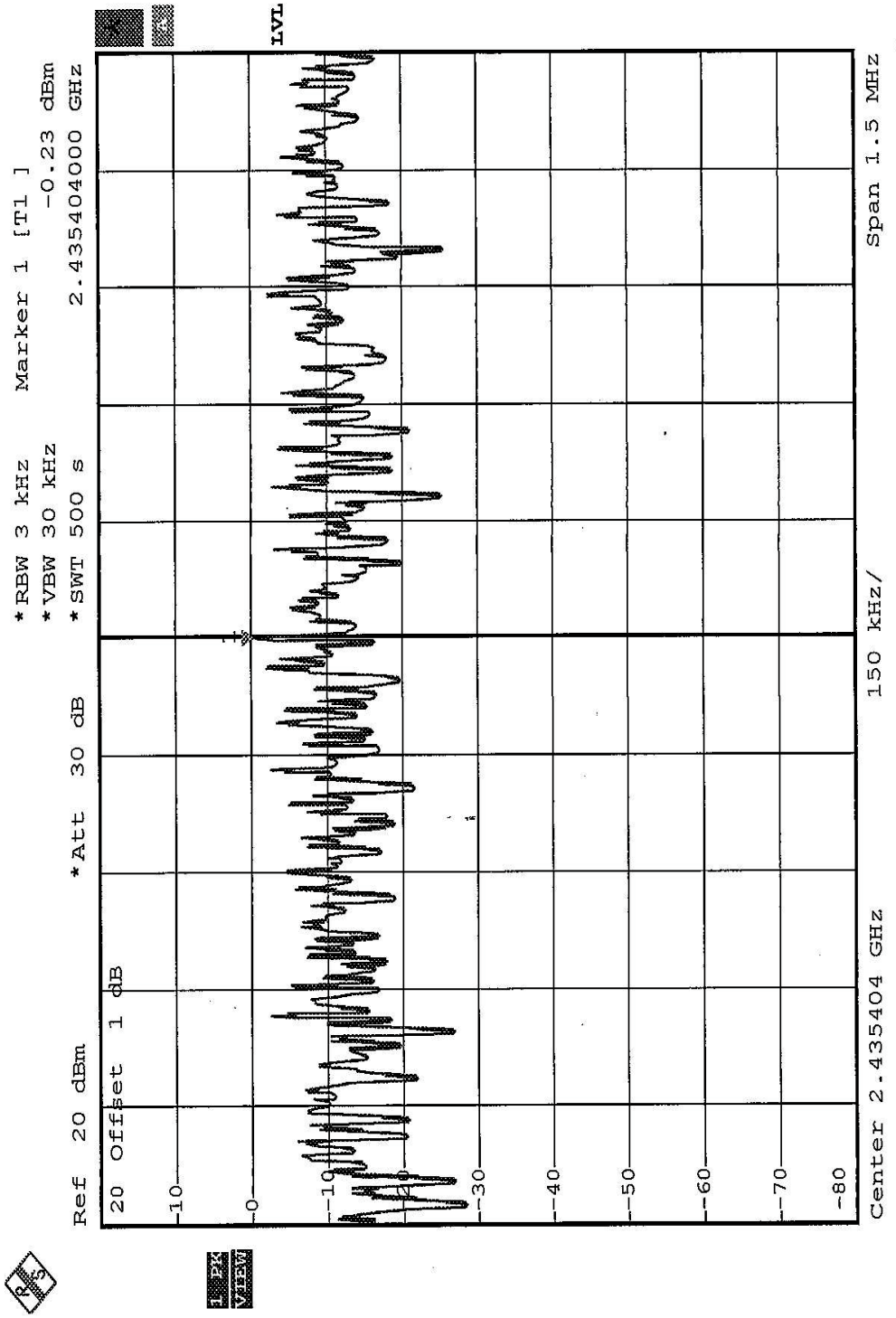
EUT	Wireless Access Point	**MODEL**	AP-8110 PLUS
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 65% RH, 991 hPa
TESTED BY	Allen Chang		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-3.91	8	PASS
6	2437	-0.23	8	PASS
11	2462	-3.09	8	PASS

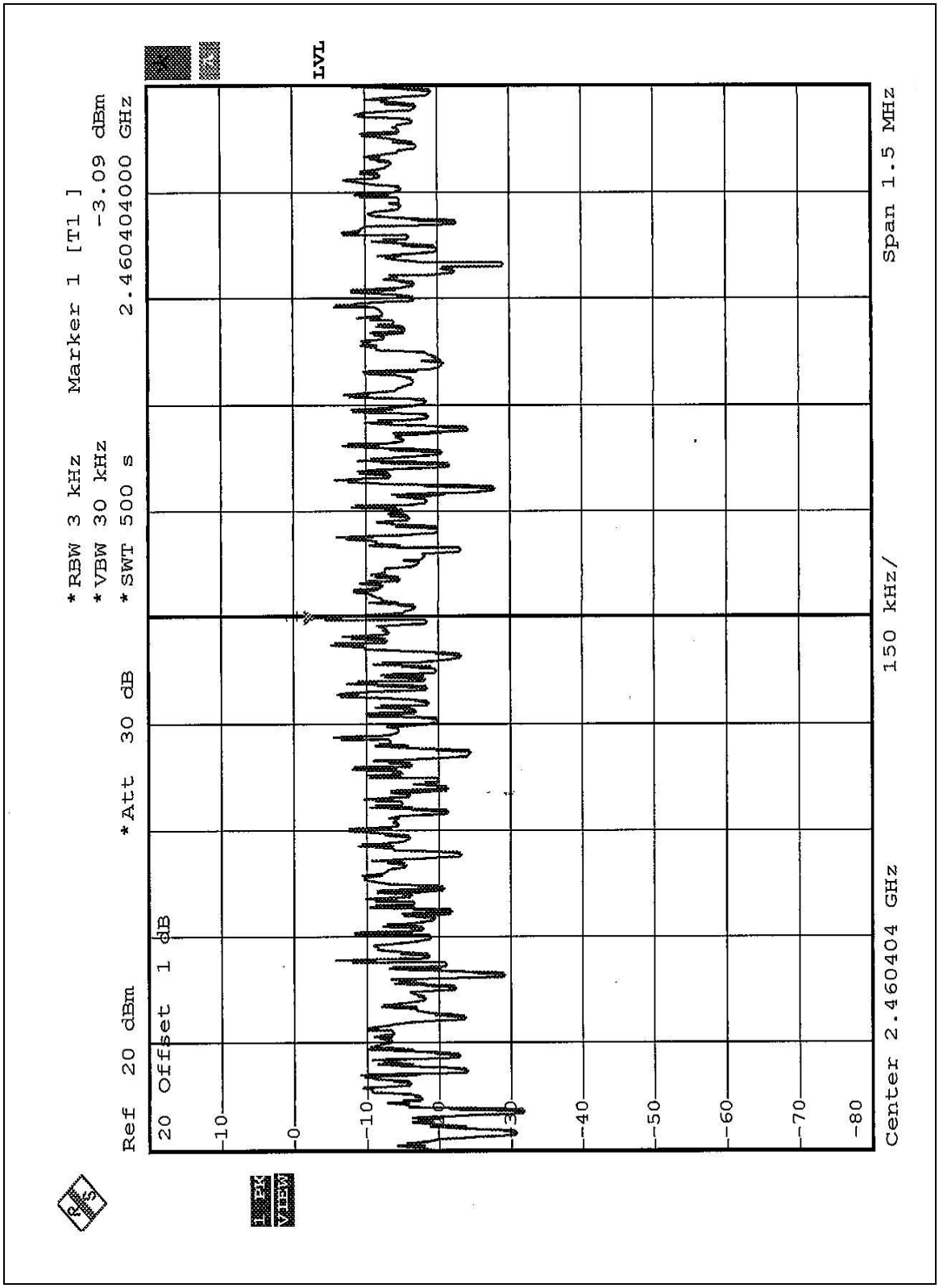
CH1


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-3.91 dBm
2.411716000 GHz
LVL
PK
VBW
Center 2.411716 GHz
150 kHz/
Span 1.5 MHz

CH6


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-0.23 dBm
2.435404000 GHz
Center 2.435404 GHz
150 kHz/
Span 1.5 MHz
10
0
-10
-20
-30
-40
-50
-60
-70
-80
PK
VBW
IVL

CH11


Ref 20 dBm
20 Offset 1 dB
*Att 30 dB
*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-3.09 dBm
2.460404000 GHz
LVL
Span 1.5 MHz
150 kHz/
Center 2.460404 GHz
-10
0
-10
-20
-30
-40
-50
-60
-70
-80
1 PK
VBW

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	Aug. 12, 2004

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 100MHz 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

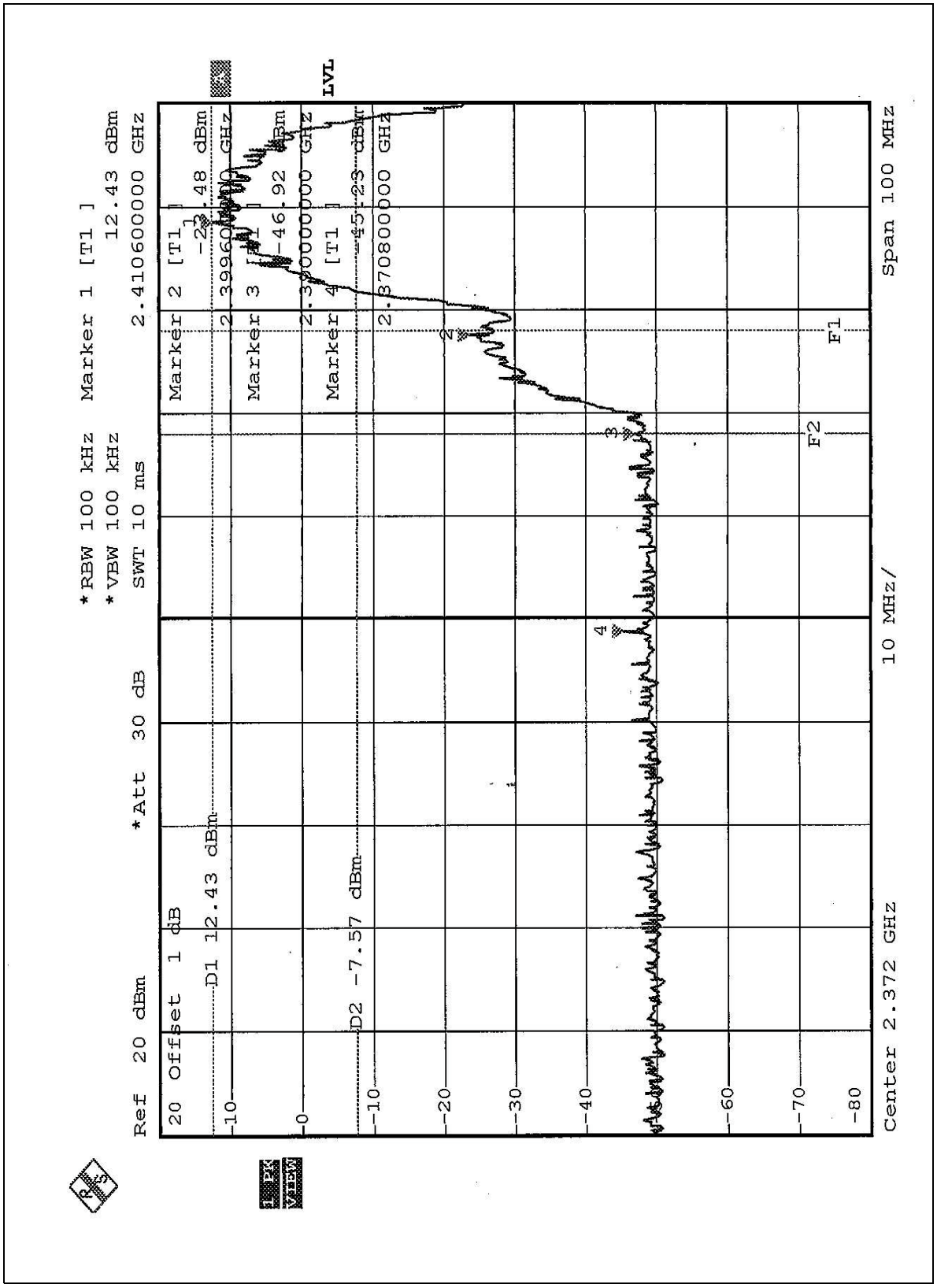
Same as Item 4.1.6

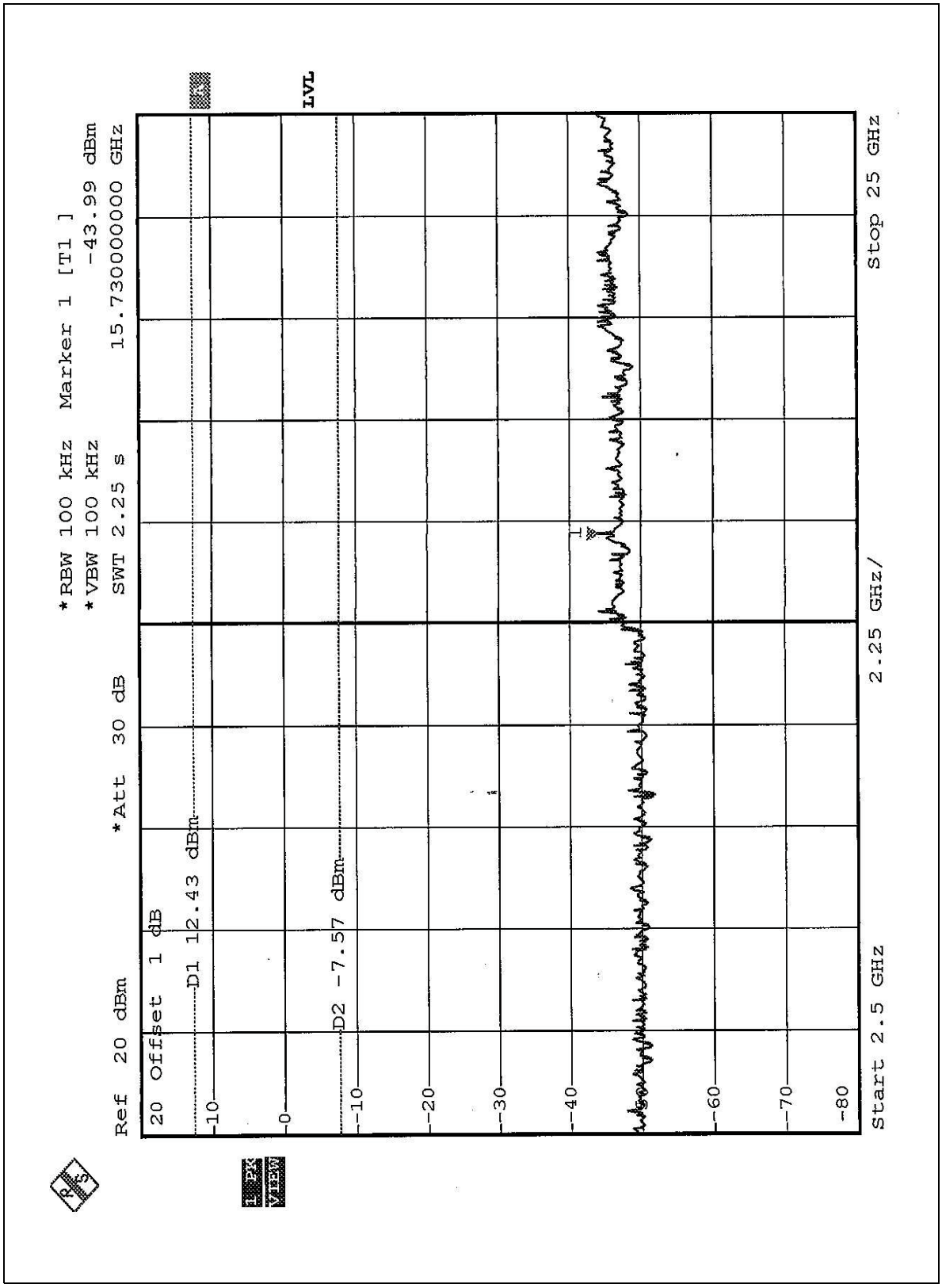
4.6.6 TEST RESULTS

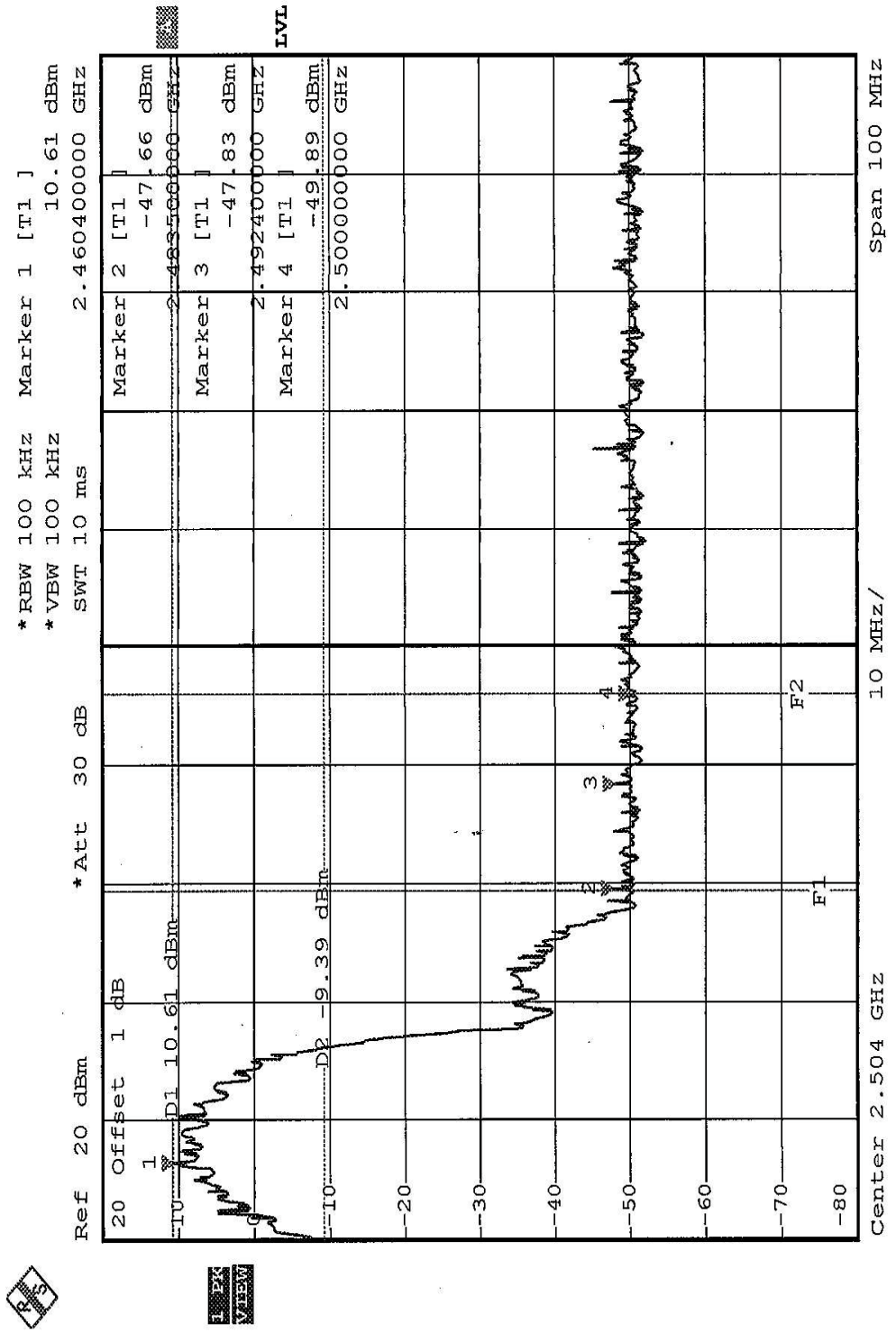
The spectrum plots are attached on the following 4 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

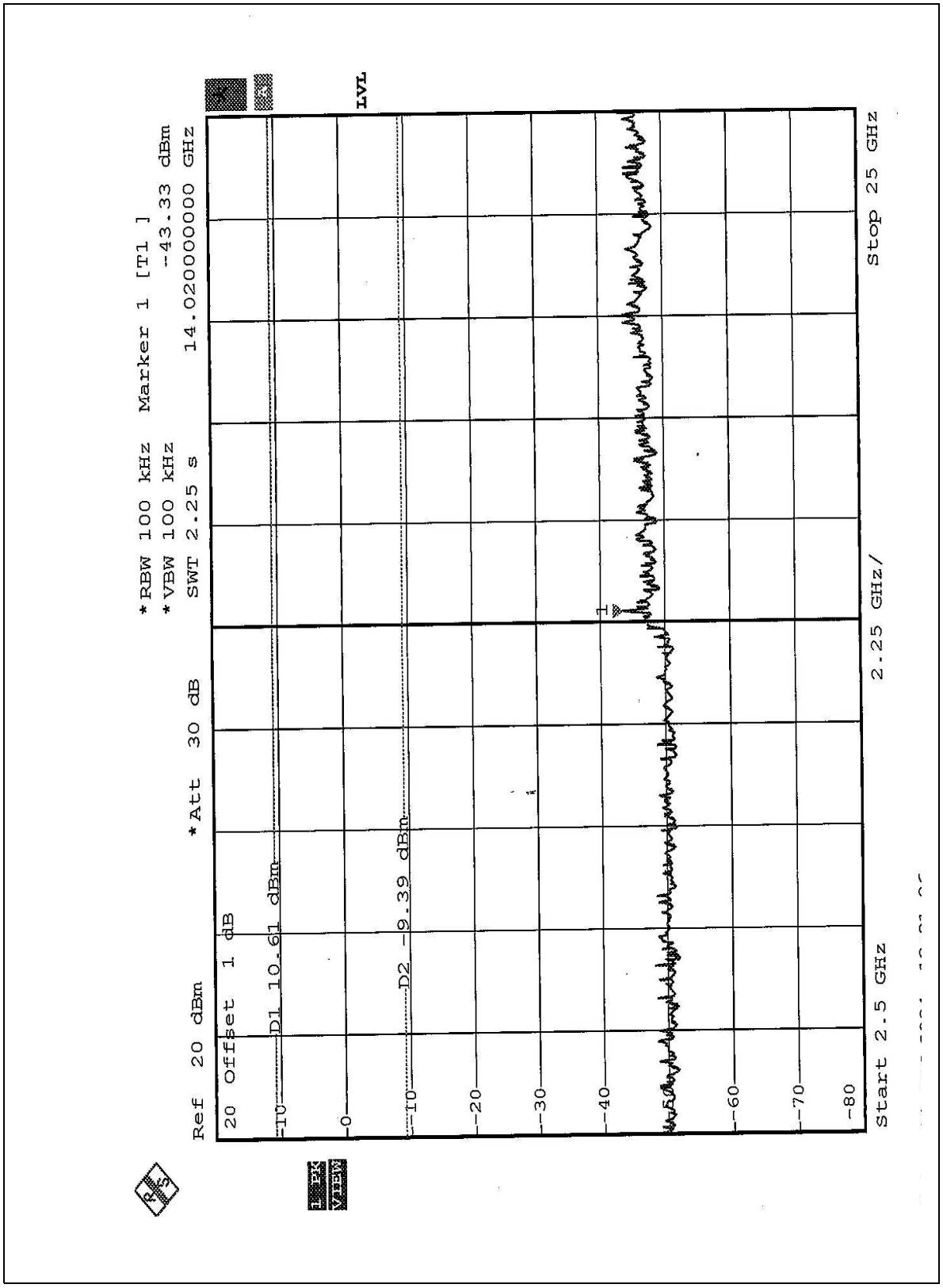
NOTE:
The band edge emission plot on the following 1~2 pages show 57.66dB delta between carrier maximum power and local maximum emission in restrict band (2.3708GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 110.70 dBuV/m, so the maximum field strength in restrict band is 110.70-57.66=53.04dBuV/m which is under 54dBuV/m limit.

The band edge emission plot on the following 3~4 pages show 58.27dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 111.83dBuV/m, so the maximum field strength in restrict band is 111.83-58.27=53.56dBuV/m which is under 54dBuV/m limit.


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
12.43 dBm
2.410600000 GHz
Marker 2 [T1]
-23.48 dBm
2.399600000 GHz
Marker 3 [T1]
-46.92 dBm
2.390000000 GHz
Marker 4 [T1]
-45.23 dBm
2.370800000 GHz
D1 12.43 dBm
D2 -7.57 dBm
LVL
Center 2.372 GHz
10 MHz/
Span 100 MHz


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.25 s
Marker 1 [T1]
-43.99 dBm
15.730000000 GHz
20 Offset 1 dB
D1 12.43 dBm
D2 -7.57 dBm
LVL
1 PK
VIEW
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 10 ms
Marker 1 [T1]
10.61 dBm
2.460400000 GHz
20 Offset 1 dB
D1 10.61 dBm
D2 -9.39 dBm
Marker 2 [T1]
-47.66 dBm
2.483500000 GHz
Marker 3 [T1]
-47.83 dBm
2.492400000 GHz
Marker 4 [T1]
-49.89 dBm
2.500000000 GHz
LVL
F1
F2
Center 2.504 GHz
10 MHz/
Span 100 MHz


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
SWT 2.25 s
Marker 1 [T1]
-43.33 dBm
14.02000000 GHz
20 Offset 1 dB
D1 10.61 dBm
D2 -9.39 dBm
LVL
Start 2.5 GHz
2.25 GHz/
Stop 25 GHz

4.7 ANTENNA REQUIREMENT

4.7.1 STANDARD APPLICABLE

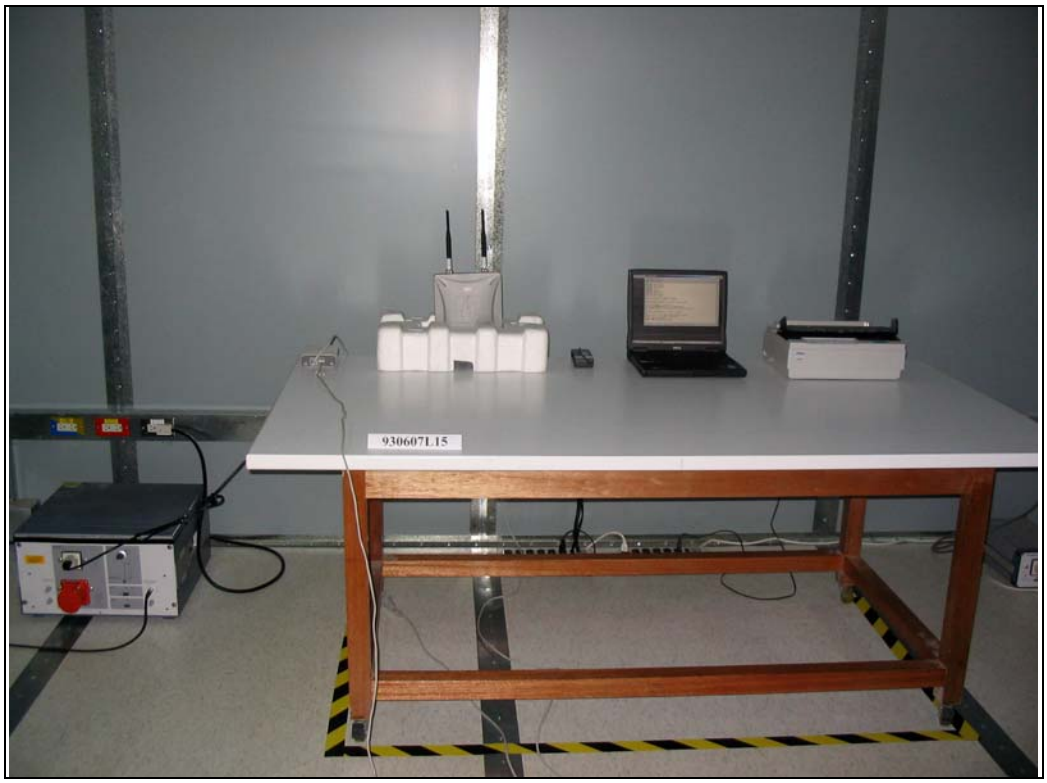
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

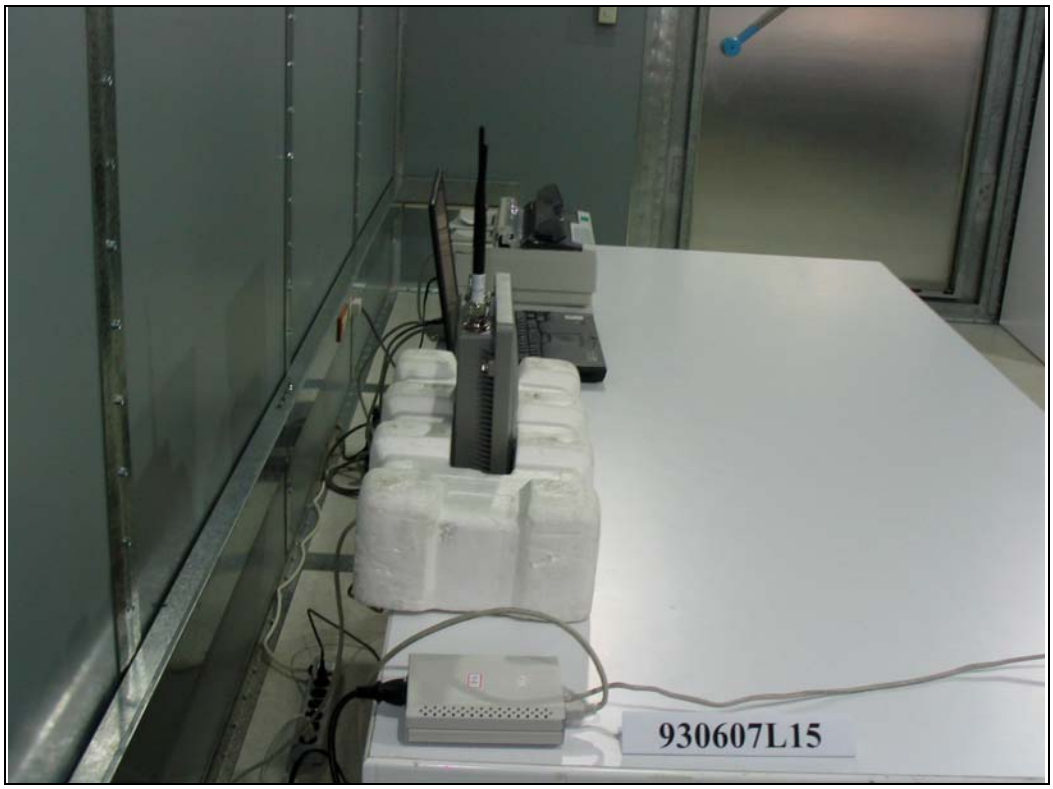
4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Dipole antenna with Reveres N Type the maximum Gain of this antenna is 5dBi.

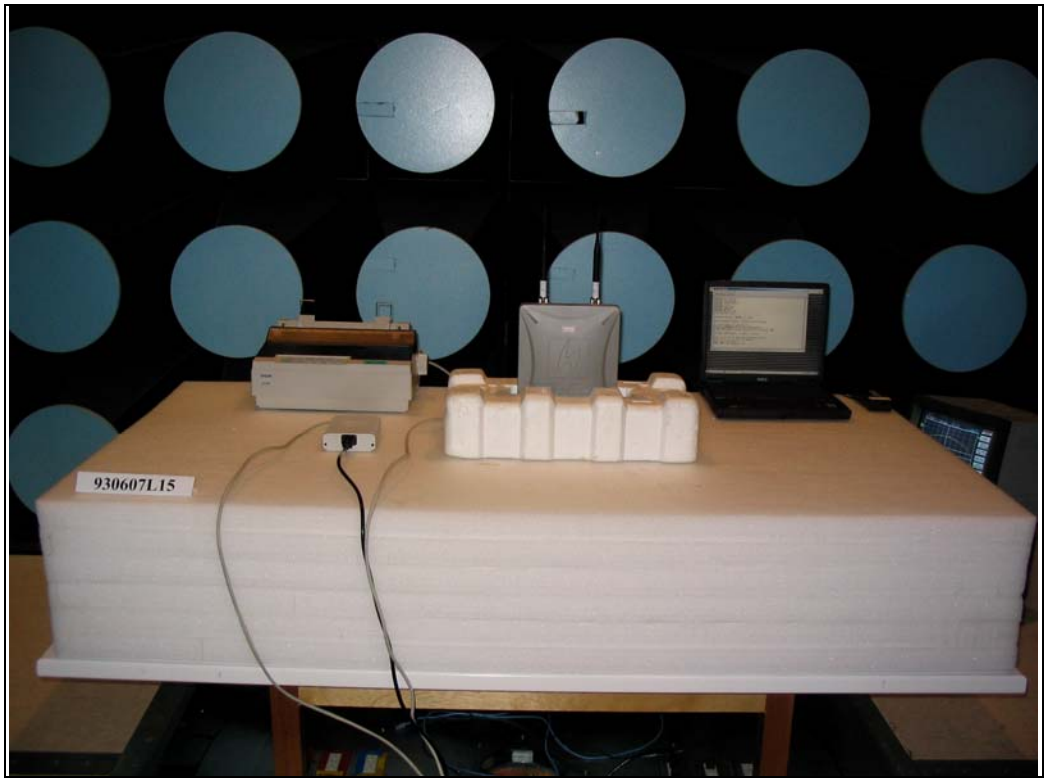
5 PHOTOGRAPHS OF THE TEST CONFIGURATION

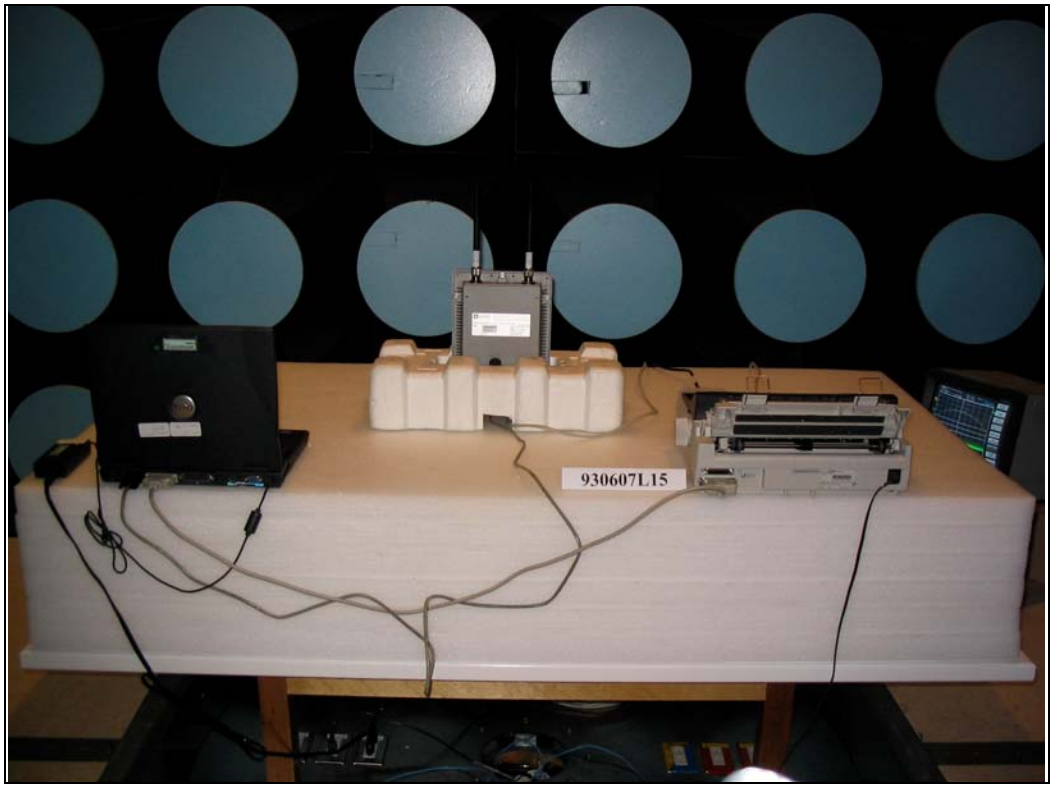
CONDUCTED EMISSION TEST





RADIATED EMISSION TEST





6 INFORMATION ON THE TESTING LABORATORIES

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

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

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

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
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Fax: 886-3-3185050

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Tel: 886-3-3270910
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Web Site: www.adt.com.tw

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

Report Format Version 1.0