

FCC TEST REPORT

REPORT NO.: RF930624H05A

MODEL NO.: WM610-P

RECEIVED: Jun. 24, 2004

TESTED: Jun. 28 to Jul. 05, 2004

APPLICANT: CyberTAN Technology, Inc.

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1 CERTIFICATION

PRODUCT : 54M WLAN Mini PCI Module
BRAND NAME : CyberTAN
MODEL NO. : WM610-P
TESTED: Jun. 28 to Jul. 05, 2004
APPLICANT : CyberTAN Technology, Inc.
TEST ITEM: ENGINEERING SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247),
ANSI C63.4-2001

The above equipment (Model: WM610-P) 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 :  , **DATE:** May 10, 2006
(Midoli Peng)

TECHNICAL ACCEPTANCE :  , **DATE:** May 10, 2006
Responsible for RF (Hank Chung)

APPROVED BY :  , **DATE:** May 10, 2006
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -16.16 dB at 0.220 MHz
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 -2.3 dB at 2390.00MHz
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

PRODUCT	54M WLAN Mini PCI Module
MODEL NO.	WM610-P
POWER SUPPLY	5Vdc from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
RADIO TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	1/2/5.5/6/9/11/12/18/24/36/48/54Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	802.11b: 35.075 mW 802.11g: 44.668 mW
ANTENNA TYPE	Dipole antenna (Antenna cable with one core)
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT operates in the 2.4GHz frequency spectrum with throughput of up to 54Mbps.
2. The EUT complies with IEEE 802.11g draft standards, and backwards compatible with IEEE 802.11b products.
3. The above EUT information was declared by the 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 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		



3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	NA

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11g	1 to 11	11	OFDM	BPSK	6

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11g	1 to 11	11	OFDM	BPSK	6

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	11
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6

**Bandedge Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 11	DSSS	CCK	11
802.11g	1 to 11	1, 11	OFDM	BPSK	6

Antenna Port Conducted Measurement:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	11
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6



3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a 54M WLAN Mini PCI Module. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

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

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



3.5 DESCRIPTION OF SUPPORT UNITS

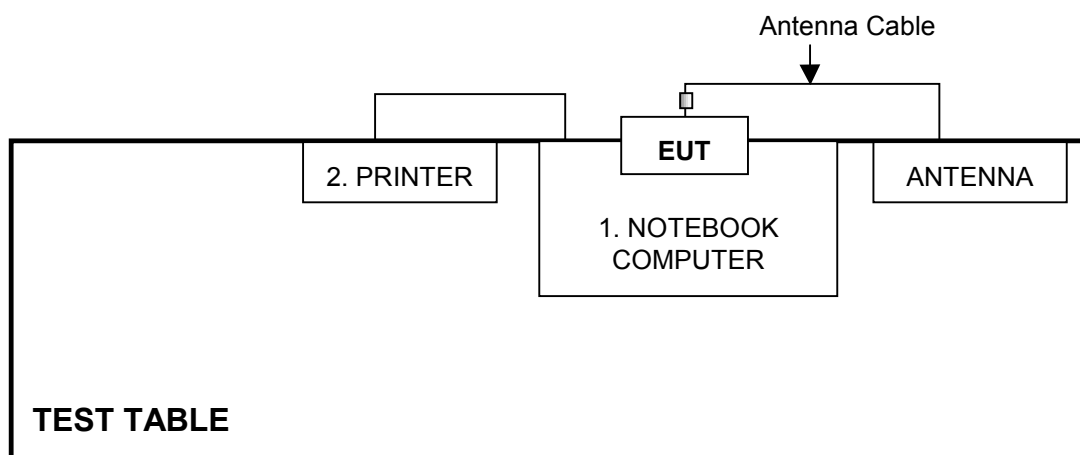
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	Compaq	N800C	470048-515	FCC DoC
2	PRINTER	HP	C2642A	MY79F1C3MZ	B94C2642X

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core

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

3.6 CONFIGURATION OF SYSTEM UNDER TEST



NOTE: 1. Please refer to the photos of test configuration in Item 5 also.

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 μ 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

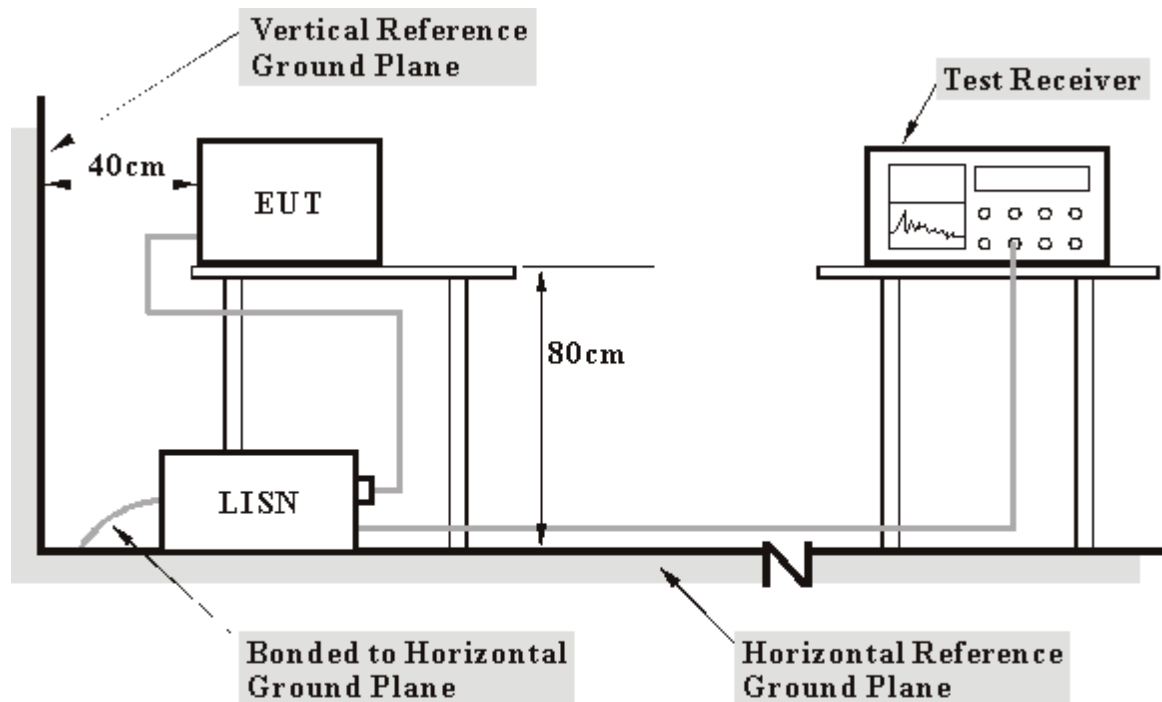
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	847124/029	Dec. 04, 2004
ROHDE & SCHWARZ LISN (for EUT)	ESHS-Z5	848773/004	Nov. 04, 2004
KYORITSU LISN (for peripheral)	KNW-407	8/1395/12	Jul. 27, 2004
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 02, 2005
Terminator(for KYORITSU)	50	3	May 10, 2005
Software	Cond-V2e	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 ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

4. TEST PROCEDURES

- The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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.
- Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.3 TEST SETUP



- Note:**
- Support units were connected to second LISN.
 - 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.



4.1.4 EUT OPERATING CONDITIONS

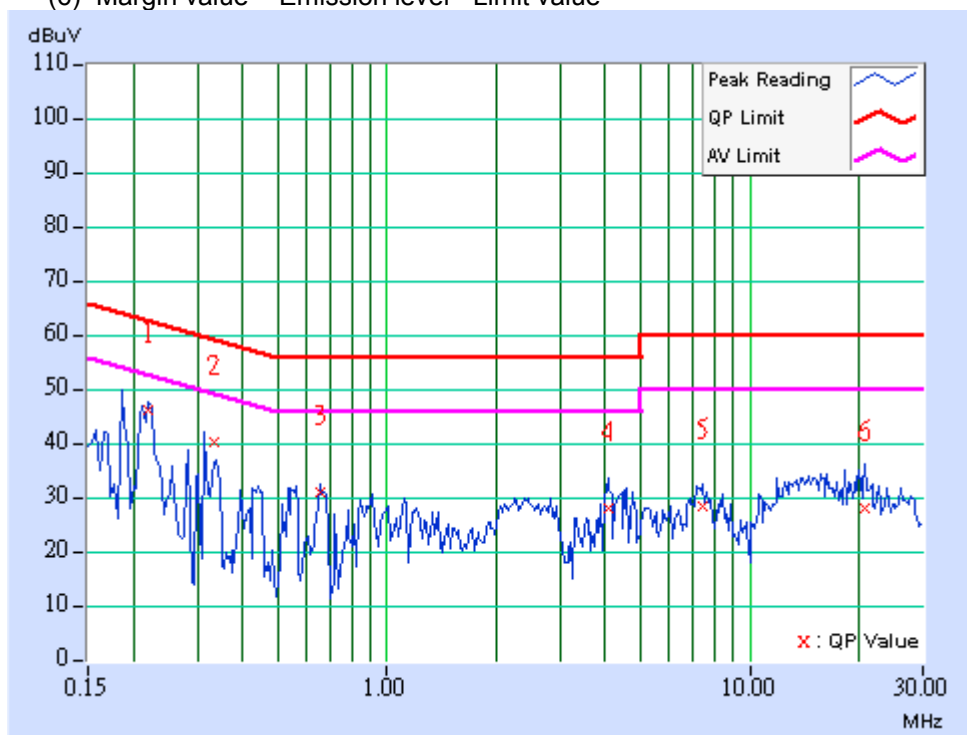
- a. Plug the EUT into the support unit 1 (Notebook computer) which placed on a testing table.
- b. The support unit 1 (Notebook computer) ran a test program "INPROCOMM" to enable EUT under transmission condition continuously at specific channel frequency.
- c. The support unit 1 (Notebook computer) sends "H" messages to printer, and the printer prints them on paper.

4.1.5 TEST RESULTS

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	26 deg. C, 65%RH, 972 hPa	TESTED BY	Sky Liao

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	0.220	0.29	45.06	-	45.35	-	62.81	52.81	-17.46	-
2	0.334	0.23	38.91	-	39.14	-	59.36	49.36	-20.22	-
3	0.658	0.24	29.76	-	30.00	-	56.00	46.00	-26.00	-
4	4.059	0.40	26.73	-	27.13	-	56.00	46.00	-28.87	-
5	7.418	0.63	27.04	-	27.67	-	60.00	50.00	-32.33	-
6	20.832	1.40	26.58	-	27.98	-	60.00	50.00	-32.02	-

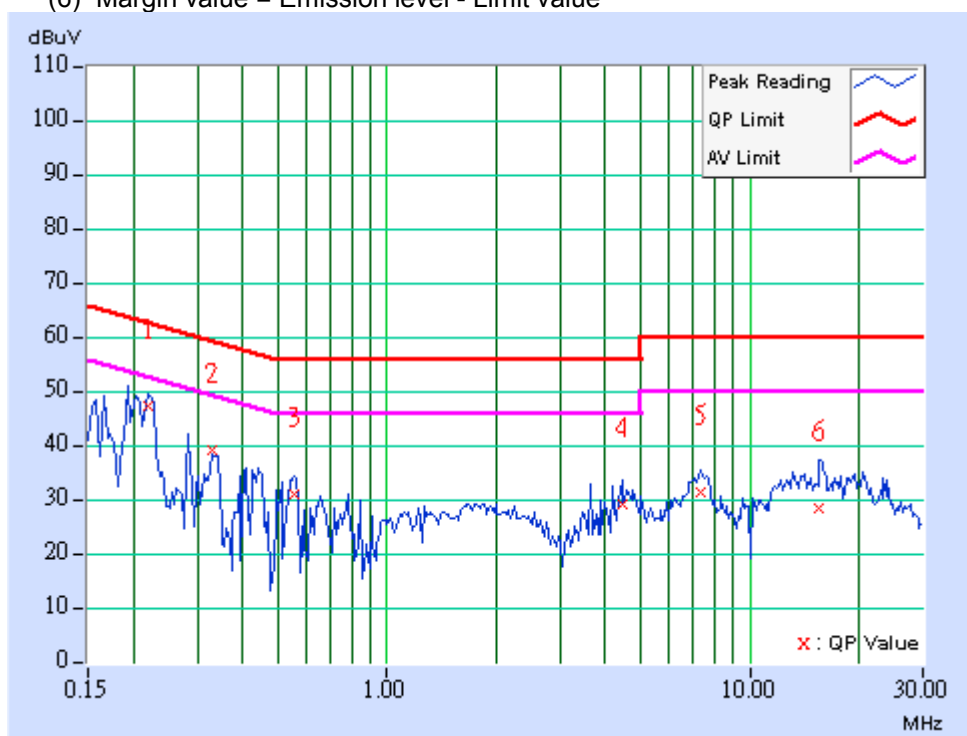
- NOTES:** (1) "**": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5)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



EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	26 deg. C, 65%RH, 972 hPa	TESTED BY	Sky Liao

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	0.220	0.29	46.36	-	46.65	-	62.81	52.81	-16.16	-
2	0.330	0.24	38.16	-	38.40	-	59.46	49.46	-21.06	-
3	0.556	0.23	29.94	-	30.17	-	56.00	46.00	-25.83	-
4	4.438	0.42	28.13	-	28.55	-	56.00	46.00	-27.45	-
5	7.336	0.57	30.44	-	31.01	-	60.00	50.00	-28.99	-
6	15.496	1.11	27.42	-	28.53	-	60.00	50.00	-31.47	-

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

Frequencies (MHz)	Field strength (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	8594ER	3829U04676	Aug. 30, 2004
ADVANTEST Spectrum Analyzer	R3271A	85060311	Jun 16, 2005
CHASE RF Pre_Amplifier	CPA9232	1057	May. 10, 2005
HP Pre_Amplifier	8449B	3008A01922	Oct. 13, 2004
ROHDE & SCHWARZ Test Receiver	ESVS 10	849231 /019	Sep. 30, 2004
CHASE Broadband Antenna	CBL6111c	2730	Jul 30, 2004
Schwarzbeck Horn_Antenna	3115	5619	Jun 16, 2005
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170192	Feb. 16, 2005
SCHWARZBECK Tunable Dipole Antenna	UHAP	897	Mar. 07, 2005
SCHWARZBECK Tunable Dipole Antenna	VHAP	880	Mar. 07, 2005
RF Switches (ARNITSU)	CS-201	1565157	Dec. 01, 2004
RF CABLE (Chaintek) 1GHz-20GHz	SF102	22054-2	Feb. 10, 2005
RF Cable(RICHTEC)	9913-30M	STCCAB-30M- 1GHz-021	Dec. 01, 2004
Software	AS60P8	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Tunable Dipole Antenna) 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. C.
5. The FCC Site Registration No. is 656396.
6. The VCCI Site Registration No. is R-1626.
7. The CANADA Site Registration No. is IC 4824-3.



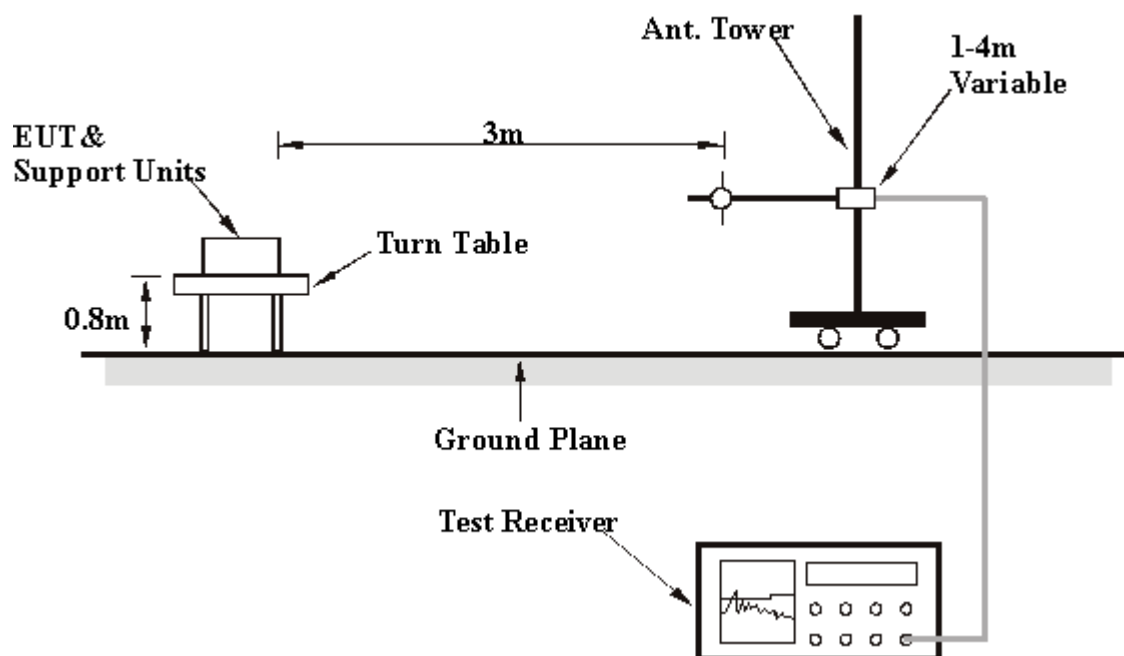
4.2.3 TEST PROCEDURES

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

NOTE:

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

4.2.4 TEST SETUP



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

4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.4.

4.2.6 TEST RESULTS

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 11	FREQUENCY RANGE	30-1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	66.61	36.10 QP	40.00	-3.90	2.63 H	166	30.20	5.90
2	133.12	34.20 QP	43.50	-9.30	2.44 H	172	21.40	12.80
3	166.58	33.40 QP	43.50	-10.10	1.85 H	182	22.40	11.00
4	199.95	30.40 QP	43.50	-13.10	1.76 H	162	20.60	9.80
5	233.22	27.90 QP	46.00	-18.10	1.42 H	200	15.80	12.10
6	299.92	32.70 QP	46.00	-13.30	1.30 H	183	17.30	15.40
7	360.00	29.20 QP	46.00	-16.80	1.07 H	197	11.90	17.30
8	366.58	35.60 QP	46.00	-10.40	1.12 H	172	18.10	17.50
9	760.00	31.60 QP	46.00	-14.40	1.14 H	23	5.20	26.40
10	879.99	29.40 QP	46.00	-16.60	1.44 H	242	1.30	28.10

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	80.00	24.00 QP	40.00	-16.00	1.51 V	17	15.80	8.20
2	160.00	23.50 QP	43.50	-20.00	1.94 V	66	11.90	11.60
3	166.47	36.20 QP	43.50	-7.30	1.00 V	204	25.30	11.00
4	200.05	28.20 QP	43.50	-15.30	1.93 V	48	18.50	9.80
5	499.99	24.60 QP	46.00	-21.40	1.28 V	243	3.00	21.50
6	679.99	27.40 QP	46.00	-18.60	1.13 V	357	3.30	24.10
7	719.99	26.50 QP	46.00	-19.50	1.00 V	3	1.40	25.10
8	879.99	29.40 QP	46.00	-16.60	1.65 V	278	1.30	28.10

- 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.

4.2.7 TEST RESULTS –DSSS

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 1	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	41.30 PK	74.00	-32.70	1.31 H	212	12.40	28.90
2	2390.00	48.80 PK	74.00	-25.20	1.31 H	350	15.00	33.80
3	*2412.00	102.90 PK			1.30 H	349	73.00	29.90
3	*2412.00	95.40 AV			1.30 H	349	65.50	29.90
4	4824.00	45.00 PK	74.00	-29.00	1.21 H	94	8.80	36.20
5	7236.00	49.40 PK	74.00	-24.60	1.12 H	302	7.70	41.70
6	9648.00	54.00 PK	74.00	-20.00	1.27 H	160	9.10	44.90
6	9648.00	42.50 AV	54.00	-11.50	1.27 H	160	-2.40	44.90

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	43.20 PK	74.00	-30.80	1.50 V	354	14.20	28.90
2	2390.00	58.90 PK	74.00	-15.10	1.03 V	352	25.10	33.80
2	2390.00	50.80 AV	54.00	-3.20	1.03 V	352	17.00	33.80
3	*2412.00	113.00 PK			1.02 V	351	83.10	29.90
3	*2412.00	104.90 AV			1.02 V	351	75.00	29.90
4	4824.00	44.50 PK	74.00	-29.50	1.41 V	78	8.30	36.20
5	7236.00	49.10 PK	74.00	-24.90	1.22 V	358	7.40	41.70
6	9648.00	54.50 PK	74.00	-19.50	1.56 V	75	9.60	44.90
6	9648.00	42.60 AV	54.00	-11.40	1.56 V	75	-2.30	44.90

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. The limit value is defined as per 15.247
6. “ * “ : Fundamental frequency

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 6	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	43.60 PK	74.00	-30.40	1.23 H	350	14.60	29.10
2	*2437.00	100.70 PK			1.24 H	350	70.70	30.00
2	*2437.00	94.00 AV			1.24 H	350	64.00	30.00
3	4874.00	44.30 PK	74.00	-29.70	1.23 H	244	7.90	36.50
4	7311.00	50.40 PK	74.00	-23.60	1.06 H	88	8.70	41.80
5	9748.00	54.90 PK	74.00	-19.10	1.36 H	170	10.30	44.60
5	9748.00	42.50 AV	54.00	-11.50	1.36 H	170	-2.20	44.60

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	2063.00	43.50 PK	74.00	-30.50	1.50 V	3	14.40	29.10
2	*2437.00	114.00 PK			1.55 V	241	84.00	30.00
2	*2437.00	106.00 AV			1.55 V	241	76.00	30.00
3	4874.00	45.50 PK	74.00	-28.50	1.09 V	234	9.10	36.50
4	7311.00	50.30 PK	74.00	-23.70	1.00 V	17	8.50	41.80
5	9748.00	54.70 PK	74.00	-19.30	1.21 V	117	10.10	44.60
5	9748.00	42.20 AV	54.00	-11.80	1.21 V	117	-2.40	44.60

- 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. The limit value is defined as per 15.247
 6. “ * “ : Fundamental frequency



EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 11	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	42.90 PK	74.00	-31.10	1.22 H	4	13.70	29.20
2	*2462.00	100.40 PK			1.25 H	344	70.30	30.10
2	*2462.00	92.70 AV			1.25 H	344	62.70	30.10
3	2483.50	44.90 PK	74.00	-29.10	1.26 H	345	14.80	30.10
4	4924.00	45.60 PK	74.00	-28.40	1.09 H	342	8.90	36.70
5	7386.00	49.50 PK	74.00	-24.50	1.10 H	43	7.60	41.80
6	9848.00	52.80 PK	74.00	-21.20	1.42 H	145	8.40	44.40
6	9848.00	40.00 AV	54.00	-14.00	1.42 H	145	-4.40	44.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2088.00	43.60 PK	74.00	-30.40	1.17 V	356	14.40	29.20
2	*2462.00	112.10 PK			1.25 V	29	82.00	30.10
2	*2462.00	104.40 AV			1.25 V	29	74.30	30.10
3	2483.50	56.60 PK	74.00	-17.40	1.26 V	30	26.40	30.10
3	2483.50	48.90 AV	54.00	-5.10	1.26 V	30	18.80	30.10
4	4924.00	48.60 PK	74.00	-25.40	1.18 V	28	11.90	36.70
5	7386.00	49.00 PK	74.00	-25.00	1.16 V	332	7.10	41.80
6	9848.00	53.50 PK	74.00	-20.50	1.08 V	254	9.10	44.40
6	9848.00	40.10 AV	54.00	-13.90	1.08 V	254	-4.30	44.40

- 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. The limit value is defined as per 15.247
 6. “ * ” : Fundamental frequency

4.2.8 TEST RESULTS - OFDM

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 1	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	43.20 PK	74.00	-30.80	1.22 H	353	14.20	28.90
2	2390.00	51.70 PK	74.00	-22.30	1.04 H	335	17.90	33.80
2	2390.00	41.20 AV	54.00	-12.80	1.04 H	335	7.40	33.80
3	*2412.00	100.90 PK			1.03 H	334	71.00	29.90
3	*2412.00	90.40 AV			1.03 H	334	60.50	29.90
4	4824.00	44.30 PK	74.00	-29.70	1.18 H	23	8.10	36.20
5	7236.00	49.90 PK	74.00	-24.10	1.20 H	300	8.20	41.70
6	9648.00	52.30 PK	74.00	-21.70	1.01 H	120	7.40	44.90
6	9648.00	40.30 AV	54.00	-13.70	1.01 H	120	-4.60	44.90

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	42.70 PK	74.00	-31.30	1.00 V	350	13.70	28.90
2	2390.00	62.40 PK	74.00	-11.60	1.60 V	242	28.50	33.80
2	2390.00	51.70 AV	54.00	-2.30	1.60 V	242	17.90	33.80
3	*2412.00	111.60 PK			1.59 V	241	81.70	29.90
3	*2412.00	100.90 AV			1.59 V	241	71.00	29.90
4	4824.00	44.90 PK	74.00	-29.10	1.15 V	346	8.60	36.20
5	7236.00	49.20 PK	74.00	-24.80	1.33 V	157	7.60	41.70
6	9648.00	52.30 PK	74.00	-21.70	1.11 V	75	7.40	44.90
6	9648.00	40.30 AV	54.00	-13.70	1.11 V	75	-4.60	44.90

- 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. The limit value is defined as per 15.247
 6. “ * ” : Fundamental frequency

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 6	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	44.00 PK	74.00	-30.00	1.20 H	3	14.90	29.10
2	*2437.00	99.70 PK			1.05 H	336	69.70	30.00
2	*2437.00	90.00 AV			1.05 H	336	60.00	30.00
3	4874.00	44.60 PK	74.00	-29.40	1.11 H	26	8.20	36.50
4	7311.00	48.90 PK	74.00	-25.10	1.21 H	318	7.20	41.80
5	9748.00	52.60 PK	74.00	-21.40	1.02 H	119	7.90	44.60
5	9748.00	40.40 AV	54.00	-13.60	1.02 H	119	-4.30	44.60

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	2063.00	43.10 PK	74.00	-30.90	1.20 V	359	14.10	29.10
2	*2437.00	110.30 PK			1.25 V	244	80.30	30.00
2	*2437.00	99.80 AV			1.25 V	244	69.80	30.00
3	4874.00	45.30 PK	74.00	-28.70	1.34 V	181	8.90	36.50
4	7311.00	49.30 PK	74.00	-24.70	1.33 V	67	7.50	41.80
5	9748.00	52.60 PK	74.00	-21.40	1.00 V	55	7.90	44.60
5	9748.00	40.20 AV	54.00	-13.80	1.00 V	55	-4.40	44.60

- 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. The limit value is defined as per 15.247
 6. “ * ” : Fundamental frequency

EUT	54M WLAN Mini PCI Module	MODEL	WM610-P
MODE	Channel 11	FREQUENCY RANGE	1000~25000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION & BANDWIDTH	Peak (PK) Average (AV) 1 MHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60%RH, 972 hPa	TESTED BY	Tony Chen

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	44.30 PK	74.00	-29.70	1.22 H	1	15.10	29.20
2	*2462.00	97.60 PK			1.84 H	213	67.50	30.10
2	*2462.00	87.60 AV			1.84 H	213	57.50	30.10
3	2483.50	47.50 PK	74.00	-26.50	1.85 H	214	17.30	30.10
4	4924.00	45.40 PK	74.00	-28.60	1.14 H	23	8.70	36.70
5	7386.00	49.50 PK	74.00	-24.50	1.08 H	295	7.60	41.80
6	9848.00	52.30 PK	74.00	-21.70	1.00 H	181	7.90	44.40
6	9848.00	40.30 AV	54.00	-13.70	1.00 H	181	-4.10	44.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2088.00	43.30 PK	74.00	-30.70	1.17 V	357	14.10	29.20
2	*2462.00	110.90 PK			1.20 V	2	80.80	30.10
2	*2462.00	100.70 AV			1.20 V	2	70.70	30.10
3	2483.50	61.70 PK	74.00	-12.30	1.21 V	1	31.60	30.10
3	2483.50	50.60 AV	54.00	-3.40	1.21 V	1	20.50	30.10
4	4924.00	45.60 PK	74.00	-28.40	1.56 V	344	8.90	36.70
5	7386.00	49.30 PK	74.00	-24.70	1.36 V	57	7.50	41.80
6	9848.00	52.60 PK	74.00	-21.40	1.01 V	63	8.20	44.40
6	9848.00	40.30 AV	54.00	-13.70	1.01 V	63	-4.10	44.40

- 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. 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
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 27, 2004

NOTE:

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

4.3.3 TEST PROCEDURE

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

4.3.4 TEST SETUP



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

4.3.5 EUT OPERATING CONDITIONS

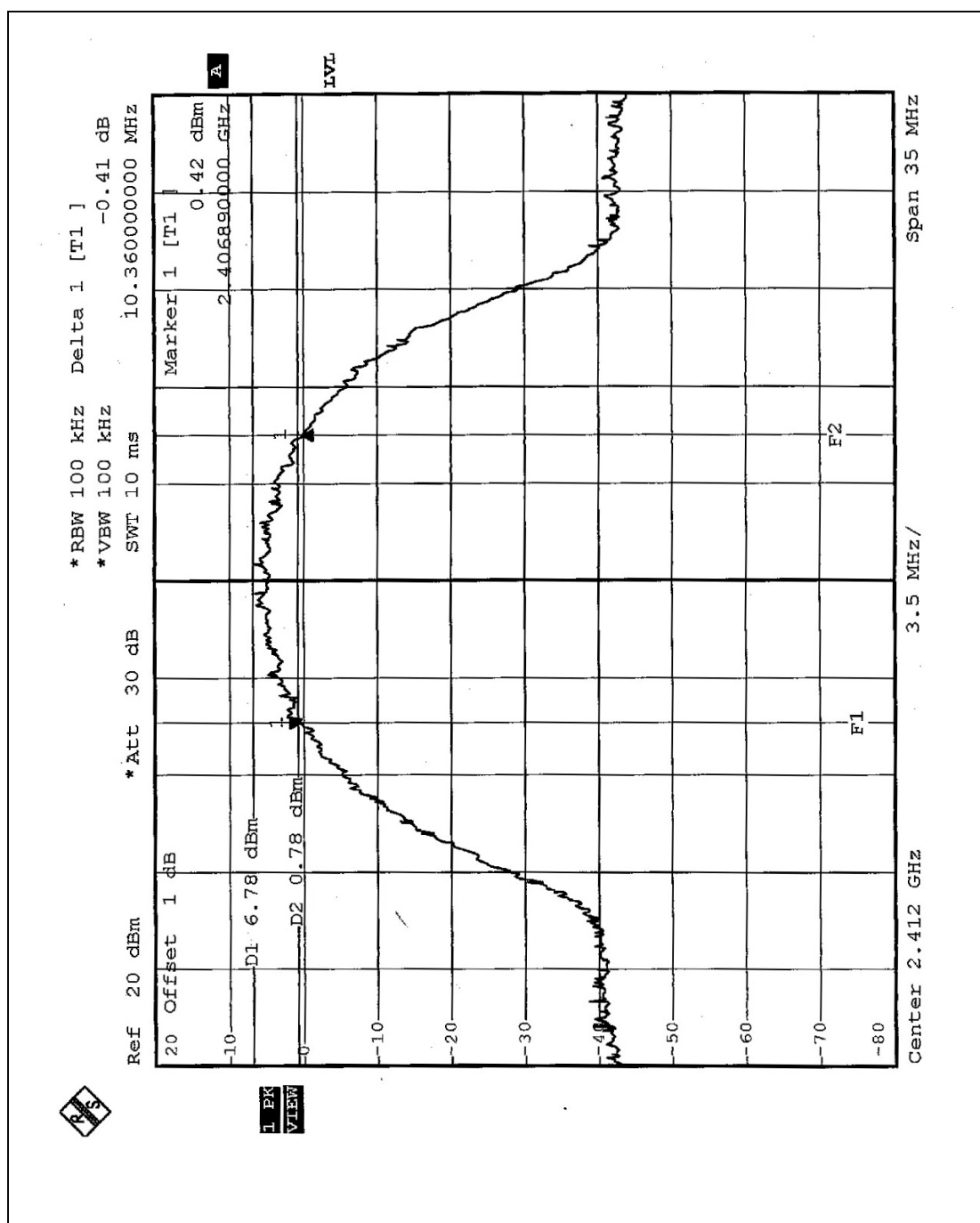
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.6 TEST RESULTS-DSSS

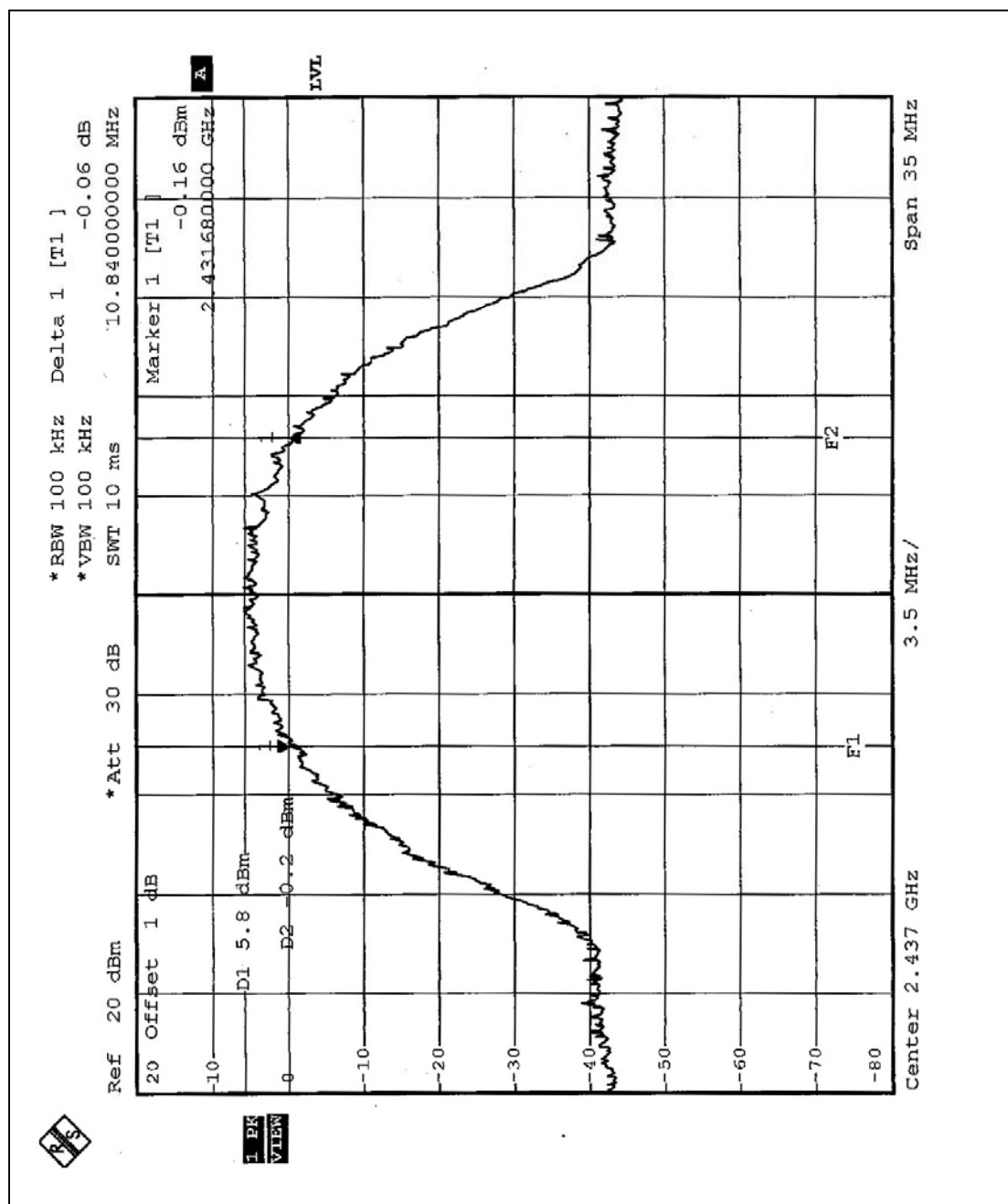
EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	10.36	0.5	PASS
6	2437	10.84	0.5	PASS
11	2462	10.57	0.5	PASS

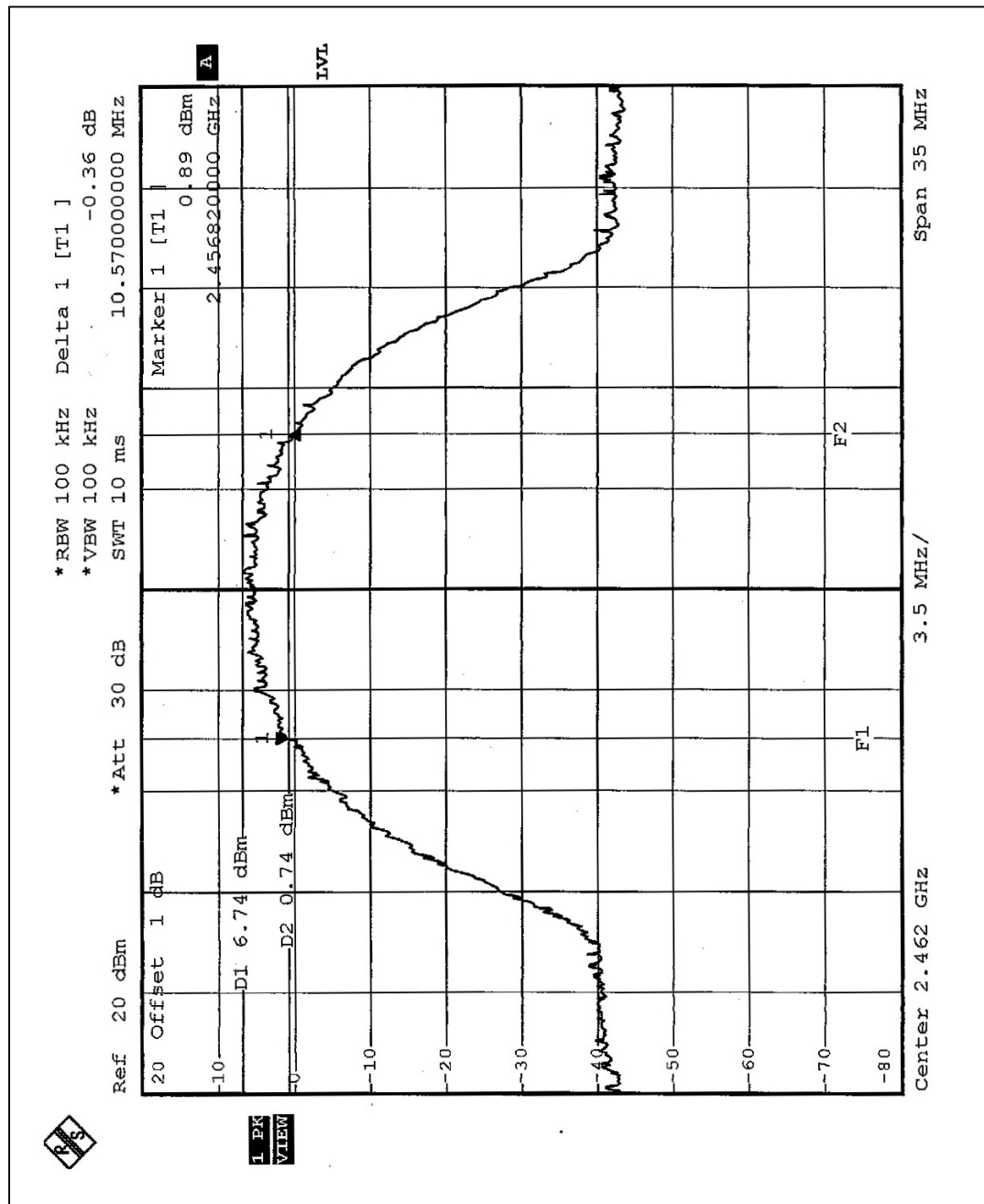
CH1



CH6



CH11

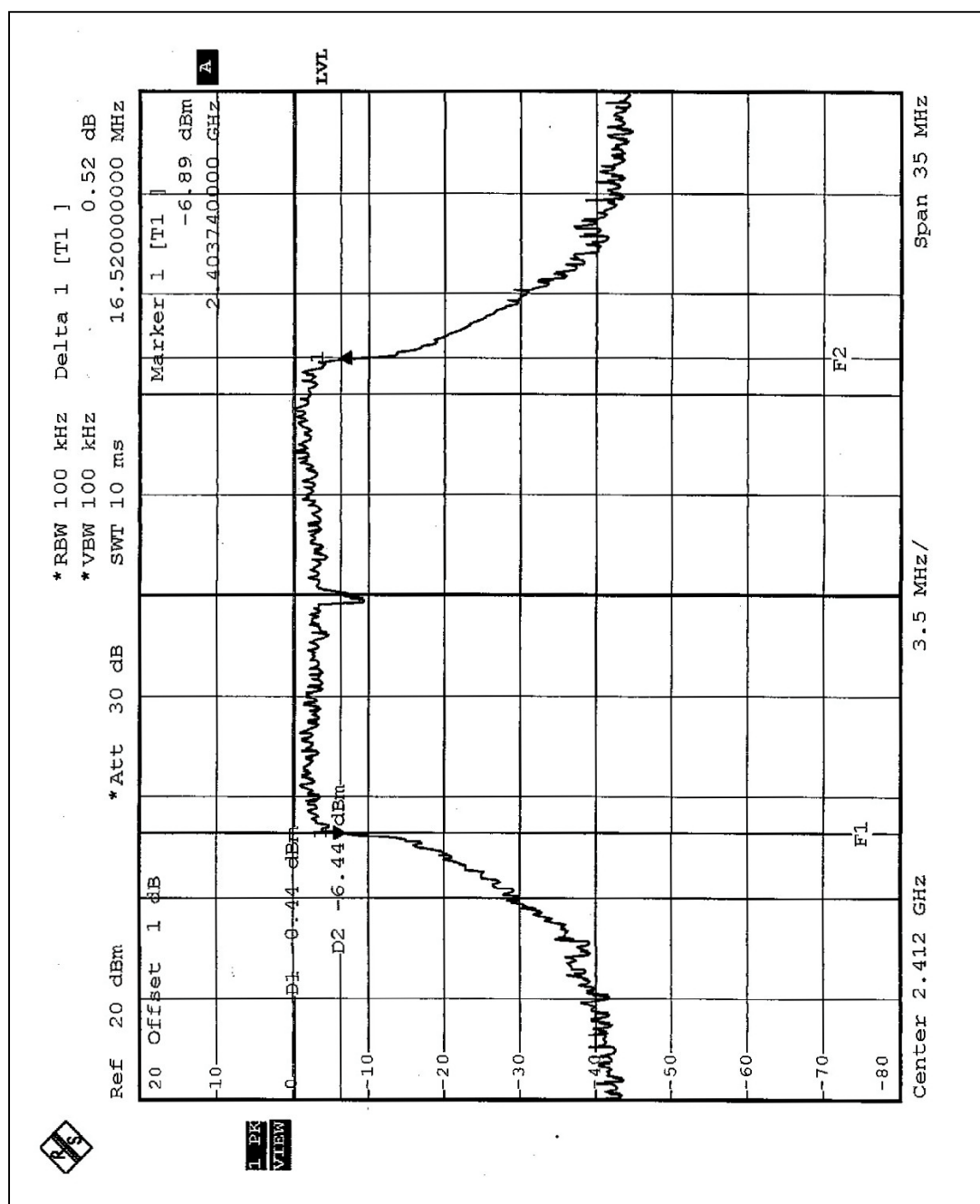


4.3.7 TEST RESULTS-OFDM

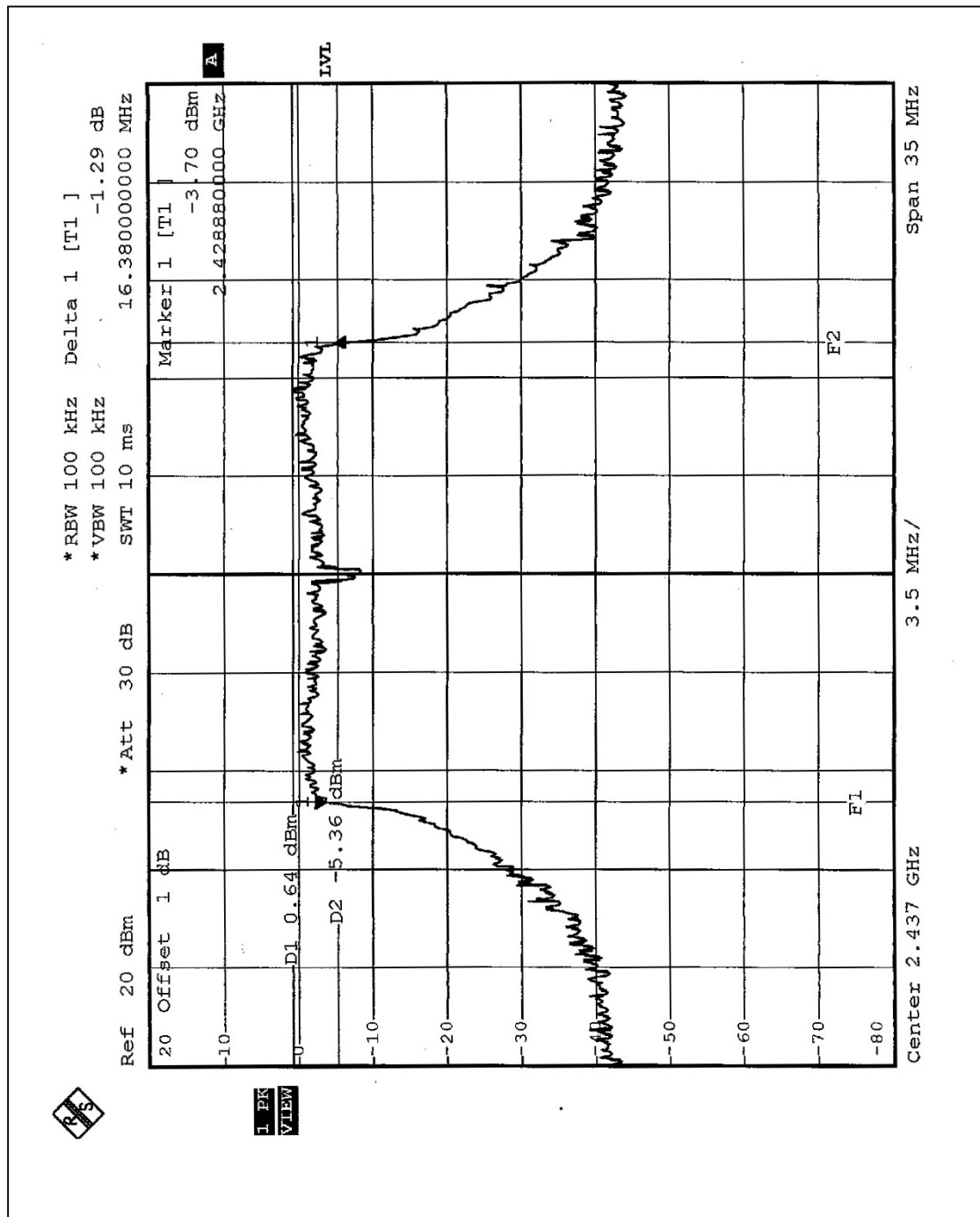
EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.52	0.5	PASS
6	2437	16.38	0.5	PASS
11	2462	16.45	0.5	PASS

CH1



CH6



1 PK
VIEW

* RBW 100 kHz Delta 1 [T1] -1.41 dB
 * VBW 100 kHz
 * Att 30 dB SWT 10 ms
 Ref 20 dBm

20 Offset 1 dB

D1 0.28 dBm
 D2 -5.72 dBm

Marker 1 [T1] -3.99 dBm
 2.453810000 GHz

F1
 F2

Center 2.462 GHz Span 35 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	FSP40	100036	Nov. 27, 2004
Agilent SIGNAL GENERATOR	E8257C	MY43320668	Jan. 1, 2005
TEKTRONIX OSCILLOSCOPE	TDS 220	B027241	Jun. 30, 2005
NARDA DETECTOR	4503A	FSCM99899	NA

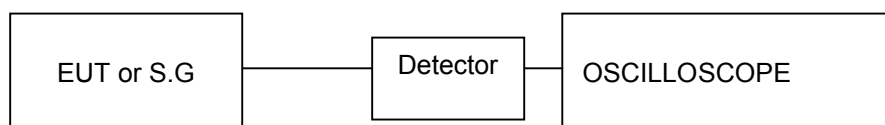
NOTE:

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 peak 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 peak reading on oscilloscope. Record the power level.

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITIONS

Same as Item 4.3.5

4.4.6 TEST RESULTS- DSSS

EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	34.995	15.44	30	PASS
6	2437	34.834	15.42	30	PASS
11	2462	35.075	15.45	30	PASS

4.4.7 TEST RESULTS- OFDM

EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	44.668	16.5	30	PASS
6	2437	40.738	16.1	30	PASS
11	2462	39.811	16.0	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
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 27, 2004

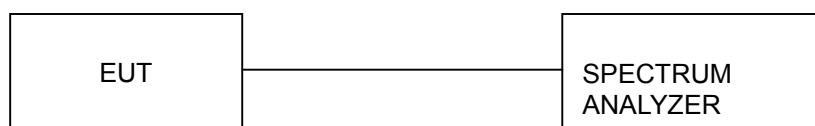
NOTE:

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

4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

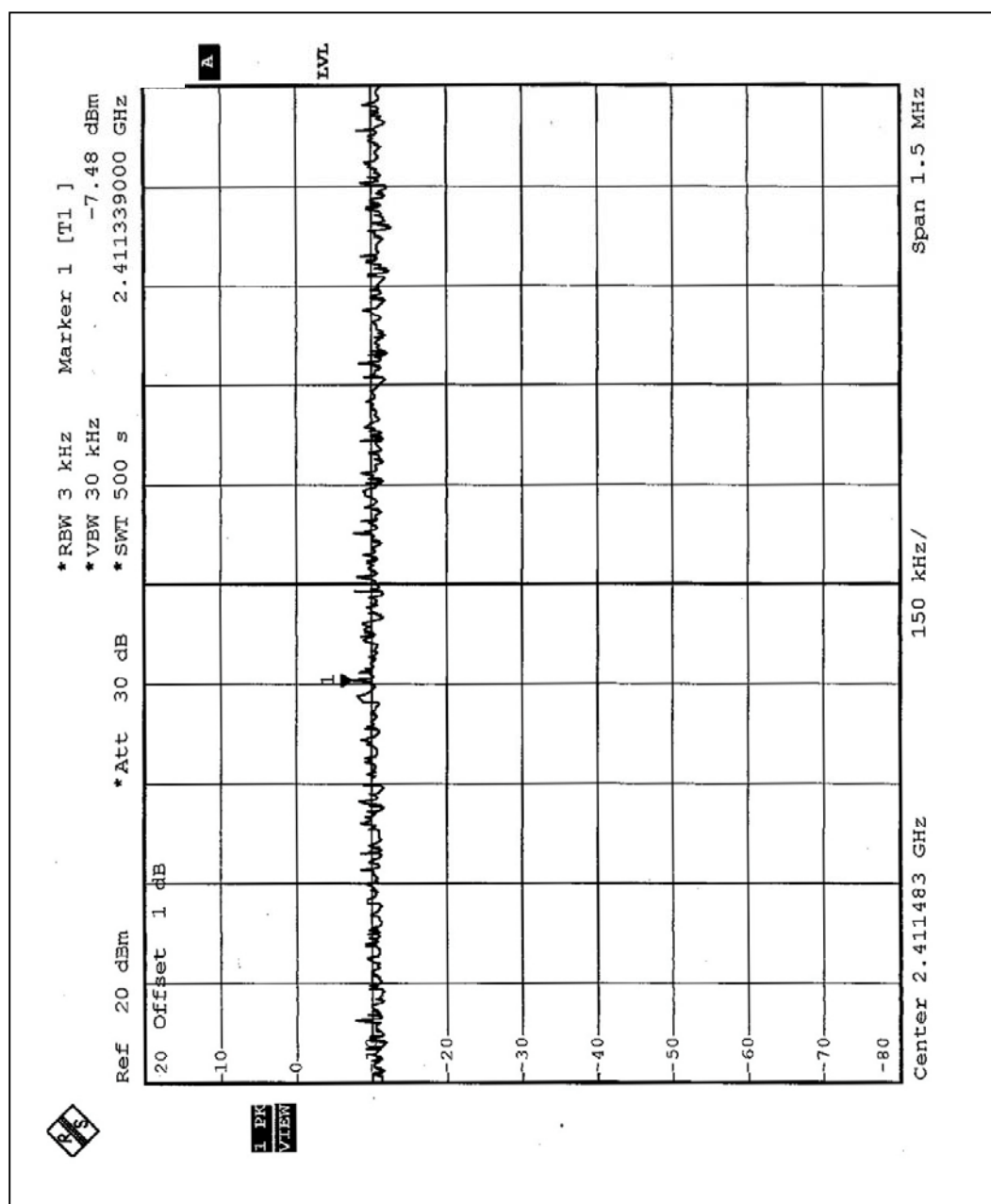
Same as 4.3.5

4.5.6 TEST RESULTS-DSSS

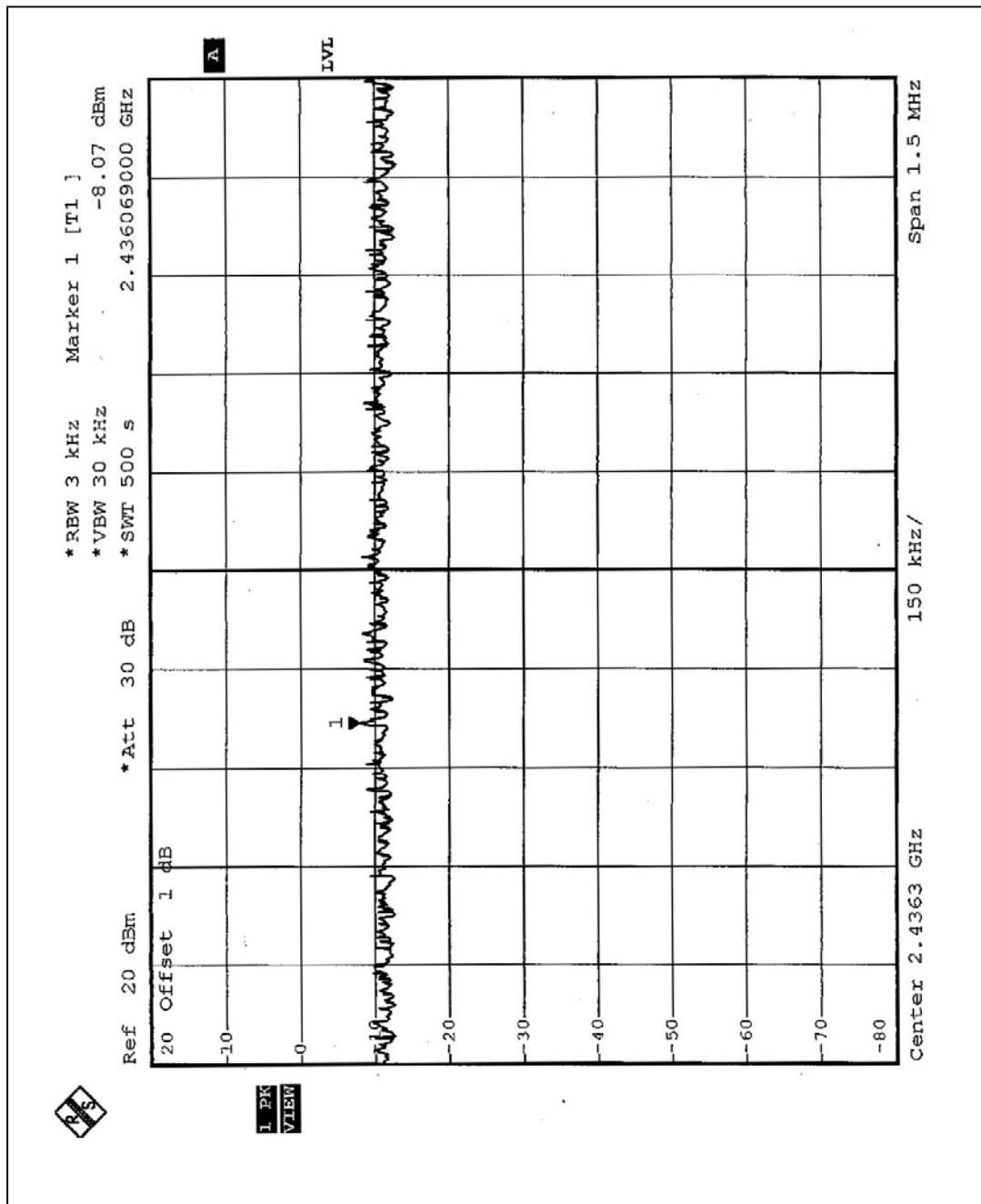
EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-7.48	8	PASS
6	2437	-8.07	8	PASS
11	2462	-6.7	8	PASS

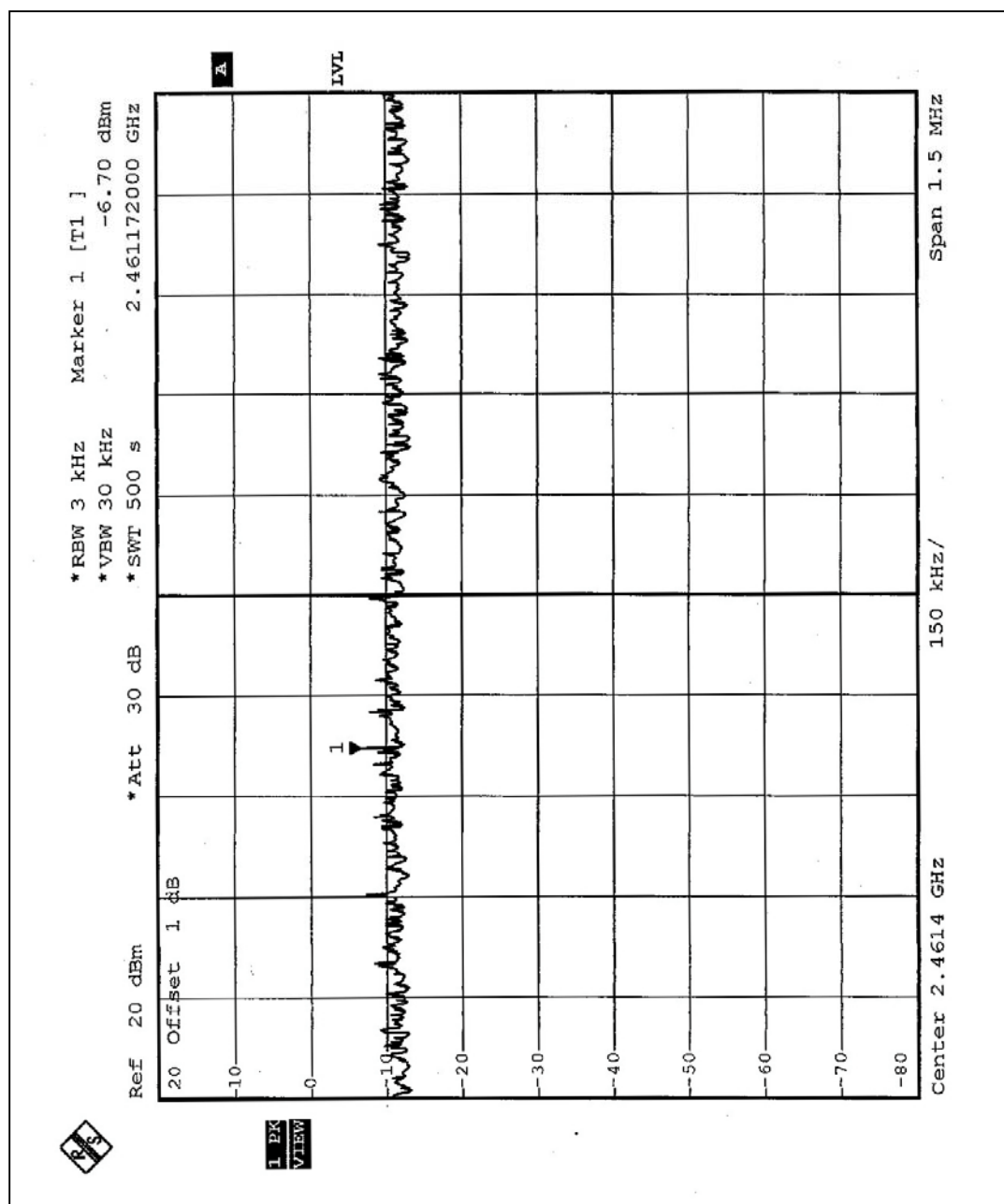
CH1



CH6



CH11

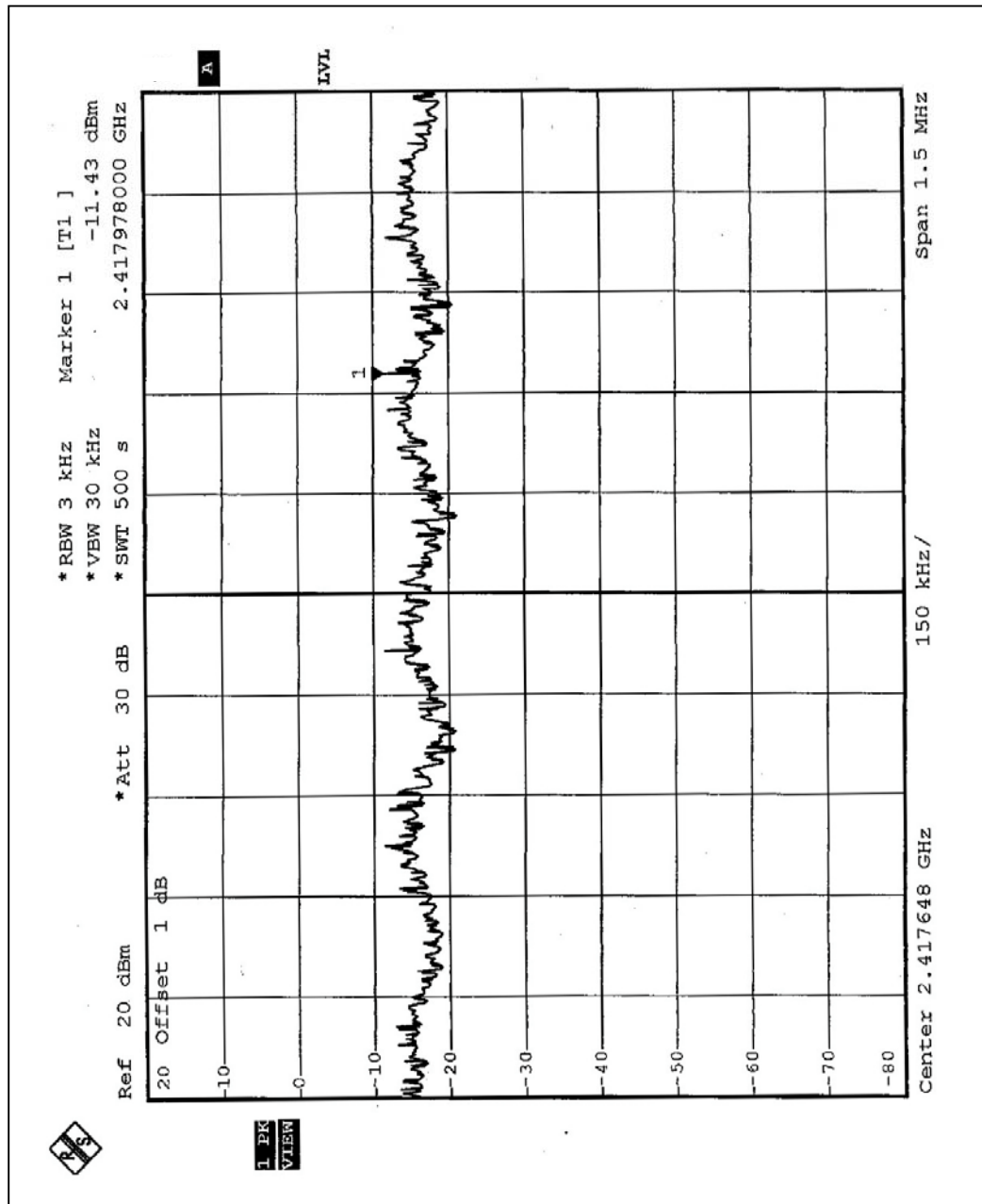


4.5.7 TEST RESULTS-OFDM

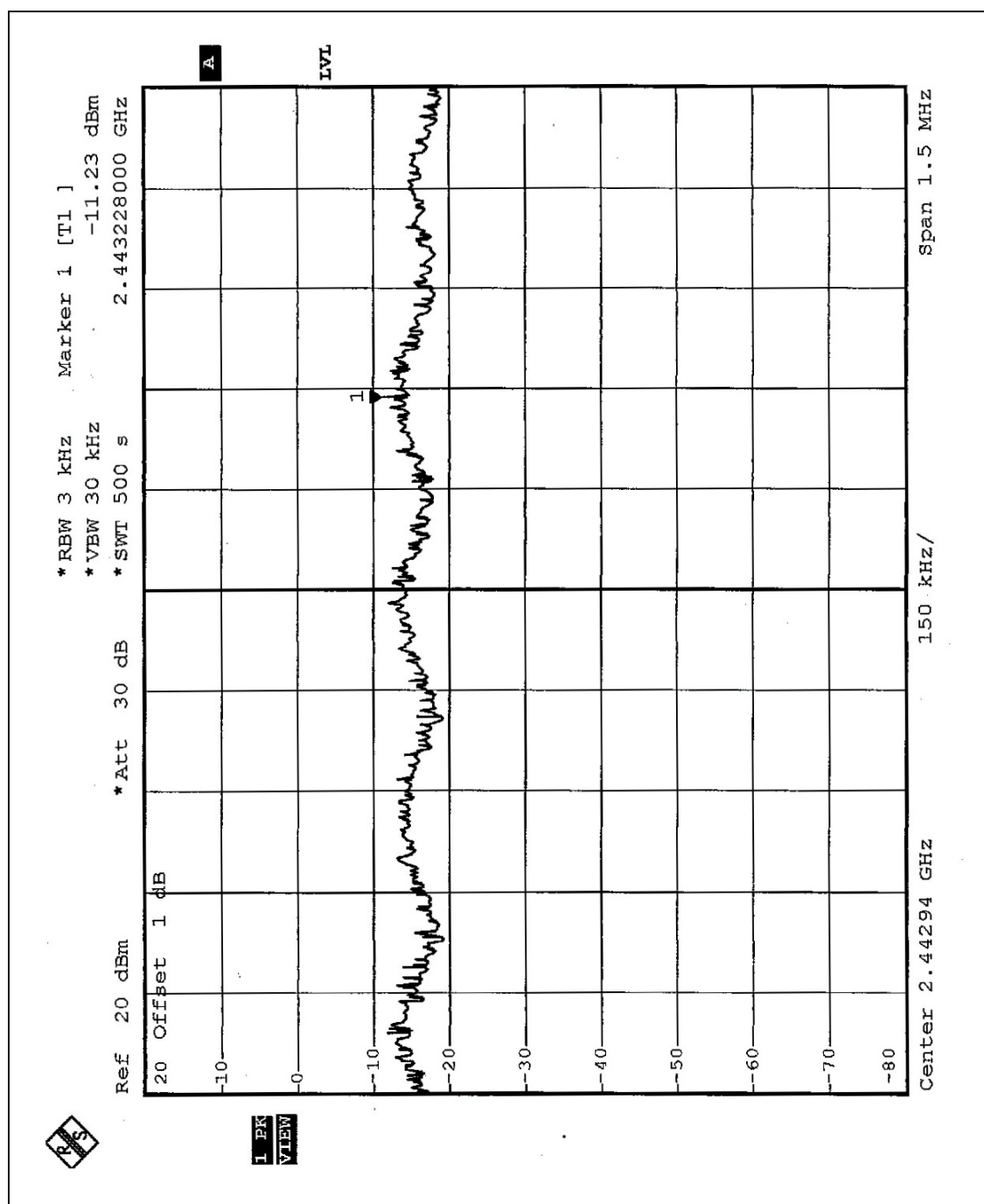
EUT	54M WLAN Mini PCI Module		
MODEL	WM610-P	ENVIRONMENTAL CONDITIONS	27 deg. C, 59%RH, 972 hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Sky Liao

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-11.43	8	PASS
6	2437	-11.23	8	PASS
11	2462	-11.02	8	PASS

CH1



CH6



CH11

