

FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

**Actiontec Electronics, Inc.**

760 N. Mary Avenue, Sunnyvale, CA 94085

**FCC ID: LNQ802MRG**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> 802.11b/g Wireless Modular
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<b>Report No.:</b> R0509211	
<b>Report Date:</b> 2005-09-28	
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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

The *Actiontec Electronics, Inc.* product, FCC ID: *LNQ802MRG* or the "EUT" as referred to in this report is a 802.11b/g Wireless Modular which measures approximately 61mmL x 52mmW x 3mmH.

The emission designator is 12M1G1D (802.11b) & 16M5G1D (802.11g).

*\* The test data gathered are from production sample, serial number: 00904BCA20E3, provided by the manufacturer.*

### Objective

This type approval report is prepared on behalf of *Actiontec Electronics, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A , B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emission, Conducted and Spurious Radiated Emission.

### Related Submittal(s)/Grant(s)

No Related Submittals

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

### Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA with registration number:90464.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to ANSI C63.4-2003.

### Schematics and Block Diagram

Please refer to Appendix A.

### Equipment Modifications

No modifications were made to the EUT.

### Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Matsonic	Main board	MS9087C	/	DOC
Seagate	Hard drive	ST340014A	5JX71GVN	DOC
Sony	CD-ROM Drive	CDU5211	10BD0239226	DOC
Tigerpro	Power supply	TP-300	D2B003696	DOC
Compaq	Monitor	HSTND-1L01	CNN4240LBU	DOC
Compaq	Keyboard with mouse	KPM3B34	404236261V6	DOC

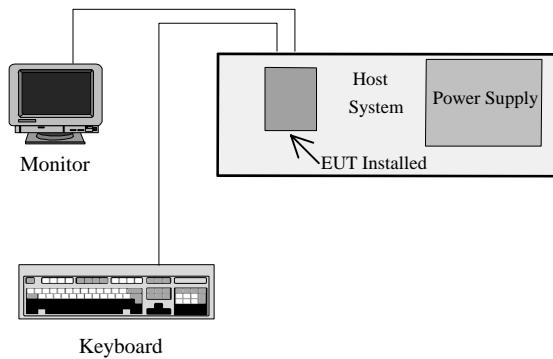
### External I/O Cabling List and Details

Cable Description	Length (M)	From	To
Shielded Cable	1.5	Keyboard	Host
Shielded Video Cable	1.5	Monitor	Host

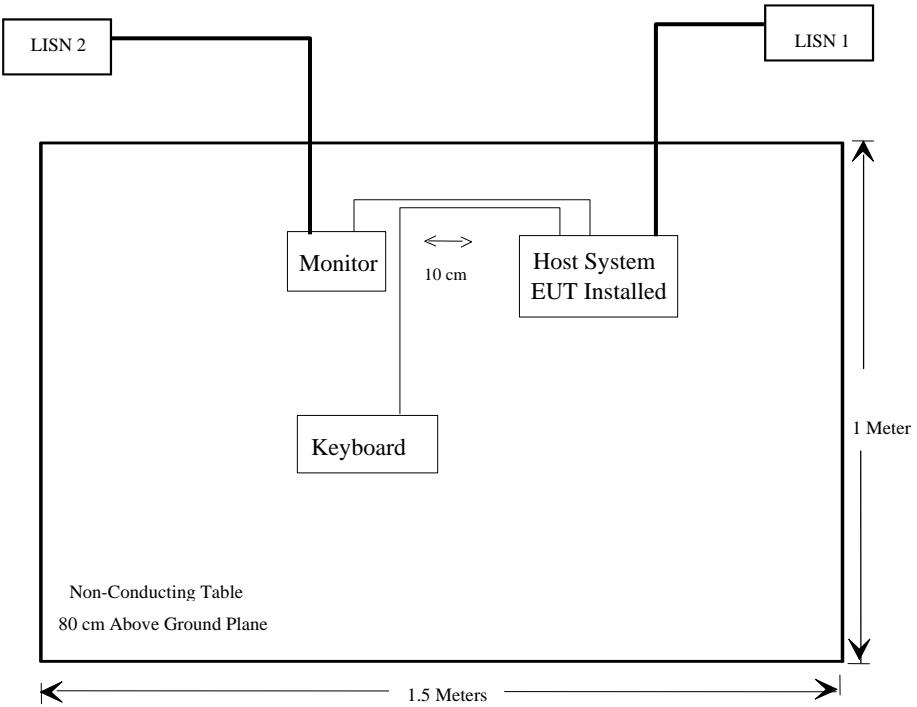
### Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
Tigerpro	Power supply	TP-300	D2B003696	DOC

## Configuration of Test System



## Test Setup Block Diagram



**SUMMARY OF TEST RESULTS FOR FCC PART 15.247**

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091	RF Exposure	Pass
§15.203	Antenna Requirement	Pass
§15.205	Restricted Band	Pass
§ 15.207 (a)	Conducted Emissions	Pass
§2.1051	Spurious Emission at Antenna Port	Pass
§15.209 (a)	Radiated Emission	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247 (b)(3)	Maximum Peak Output Power	Pass
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Pass
§15.247 (e)	Peak Power Spectral Density	Pass

## §1.1307(b)(1) & §2.1091 - RF EXPOSURE

According to §15.247(b)(5) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

### Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 17.20 (dBm)

Maximum peak output power at antenna input terminal: 52.48(mW)

Predication frequency: 2450 (MHz)

Antenna Gain (typical): 5 (dBi)

antenna gain: 3.16 (numeric)

Prediction distance: 20 (cm)

Power density at predication frequency at 20 cm: 0.03 (mW/cm<sup>2</sup>)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm<sup>2</sup>)

### Test Result

The EUT is a mobile device. The Power density at predication frequency at 20 cm is 0.03 mW/cm<sup>2</sup> within the limit of 1.0 mW/cm<sup>2</sup>.

## **ANTENNA REQUIREMENT**

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According to § 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 § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna used in this product is SMA plug reverse antenna with maximum Gain of 5dBi.

## §15.207(a) - CONDUCTED EMISSION

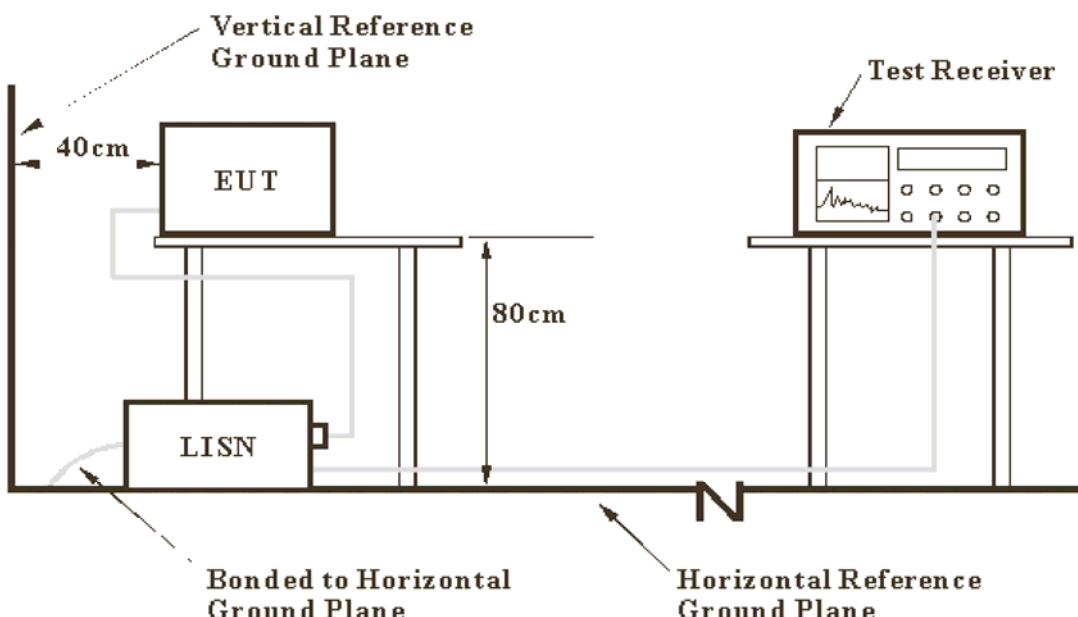
### Limits Of Conducted Emission Measurement

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 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.

## Test Equipment List and Details

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.

## Test Procedure

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under Limit - 20dB was not recorded.

## EUT Operating Conditions

- a. Connected the EUT and extended card into a notebook system placed on a testing table.
- b. The notebook system ran a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. The computer system sent "H" messages to its screen.
- d. The computer system sent "H" messages to modem.
- e. The computer system sent "H" messages to printer, and the printer prints them on paper.
- f. Item c ~ e were repeated.

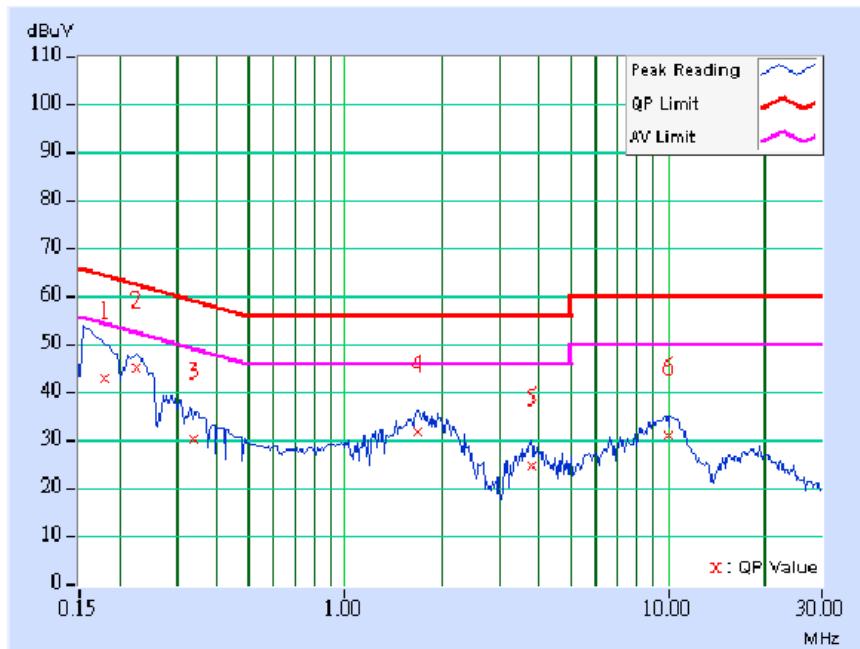
## Conducted Emissions Test Data

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.180	0.10	42.32	-	42.42	-	64.50	54.50	-22.08	-
2	0.224	0.10	44.65	-	44.75	-	62.66	52.66	-17.91	-
3	0.339	0.11	29.81	-	29.92	-	59.24	49.24	-29.32	-
4	1.676	0.26	31.22	-	31.48	-	56.00	46.00	-24.52	-
5	3.781	0.31	24.10	-	24.41	-	56.00	46.00	-31.59	-
6	10.027	0.53	30.45	-	30.98	-	60.00	50.00	-29.02	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

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



<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	1	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.194	0.10	41.18	-	41.28	-	63.85	53.85	-22.57	-
2	<b>0.222</b>	<b>0.10</b>	<b>44.77</b>	-	<b>44.87</b>	-	<b>62.76</b>	<b>52.76</b>	<b>-17.88</b>	-
3	0.336	0.11	30.31	-	30.42	-	59.31	49.31	-28.89	-
4	1.820	0.25	31.20	-	31.45	-	56.00	46.00	-24.55	-
5	3.930	0.30	25.59	-	25.89	-	56.00	46.00	-30.11	-
6	9.766	0.48	30.71	-	31.19	-	60.00	50.00	-28.81	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

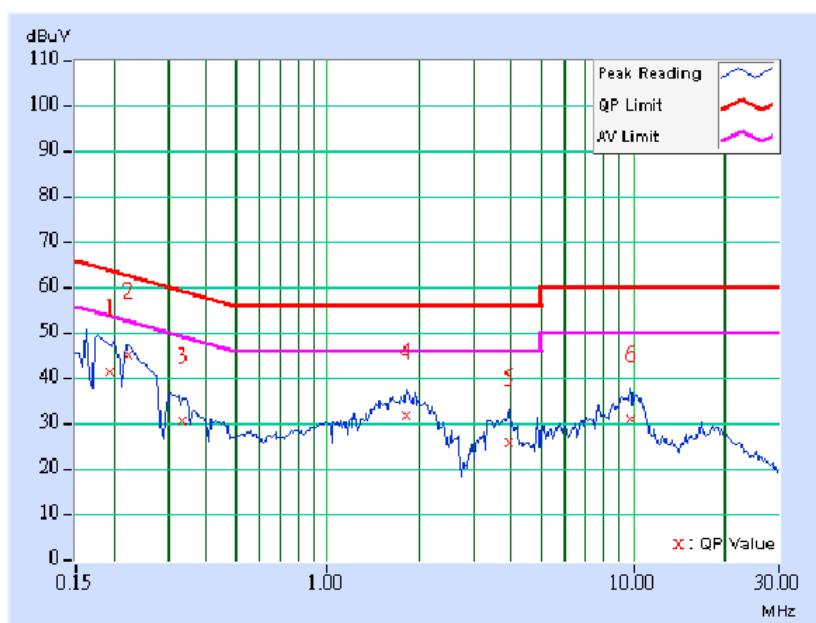
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

3. The emission levels of other frequencies were very low against the limit.

4. Margin value = Emission level - Limit value

5. Correction factor = Insertion loss + Cable loss

6. Emission Level = Correction Factor + Reading Value.

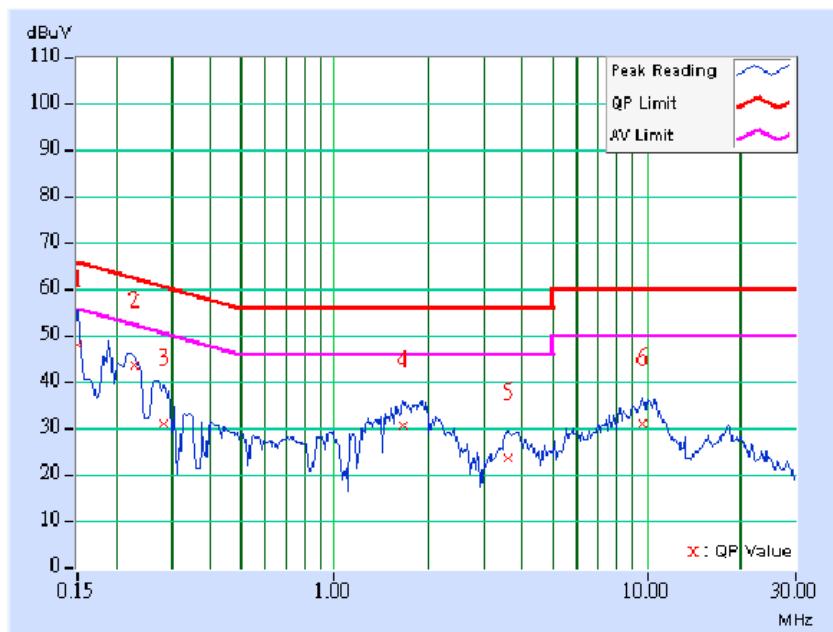


<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.11	47.65	-	47.76	-	66.00	56.00	-18.24	-
2	0.228	0.10	43.10	-	43.20	-	62.53	52.53	-19.33	-
3	0.281	0.11	30.54	-	30.65	-	60.78	50.78	-30.13	-
4	1.652	0.26	30.06	-	30.32	-	56.00	46.00	-25.68	-
5	3.586	0.30	23.36	-	23.66	-	56.00	46.00	-32.34	-
6	9.688	0.52	30.76	-	31.28	-	60.00	50.00	-28.72	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

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



<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	6	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.213	0.10	38.93	-	39.03	-	63.08	53.08	-24.04	-
2	0.227	0.10	43.91	-	44.01	-	62.54	52.54	-18.53	-
3	0.270	0.10	32.82	-	32.92	-	61.12	51.12	-28.20	-
4	1.855	0.25	31.10	-	31.35	-	56.00	46.00	-24.65	-
5	3.582	0.29	26.00	-	26.29	-	56.00	46.00	-29.71	-
6	10.059	0.49	31.26	-	31.75	-	60.00	50.00	-28.25	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

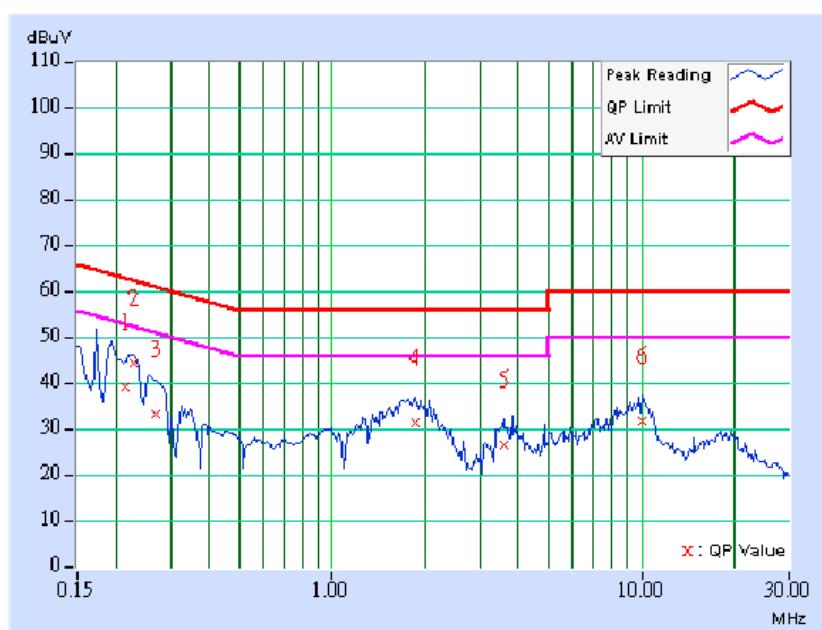
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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.

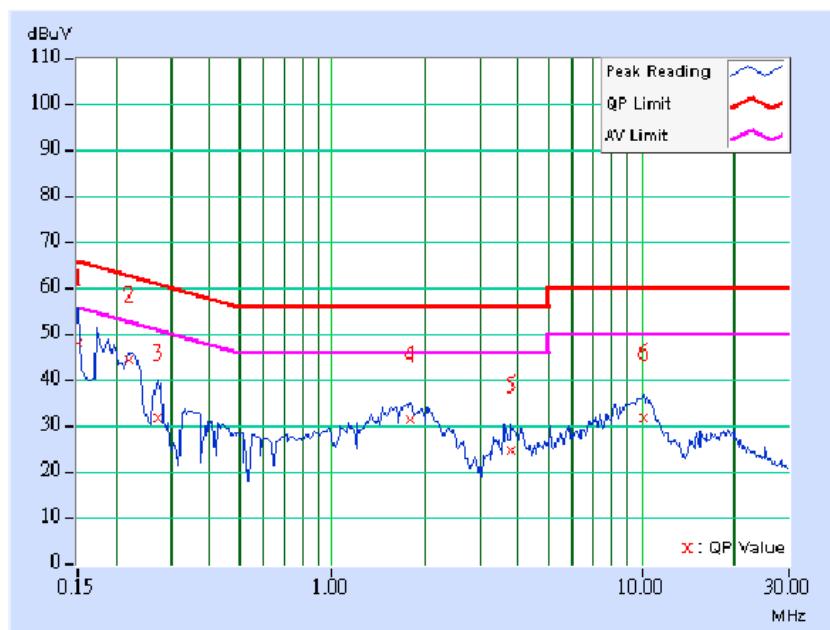


<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	47.62	-	47.72	-	66.00	56.00	-18.27	-
2	0.220	0.10	43.83	-	43.93	-	62.83	52.83	-18.90	-
3	0.271	0.10	31.42	-	31.52	-	61.08	51.08	-29.56	-
4	1.797	0.26	30.76	-	31.02	-	56.00	46.00	-24.98	-
5	3.801	0.31	24.13	-	24.44	-	56.00	46.00	-31.56	-
6	10.191	0.54	31.50	-	32.04	-	60.00	50.00	-27.96	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

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



<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	11	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 70%RH, 991 hPa	<b>TESTED BY</b>	Steven Lu

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.225	0.10	44.32	-	44.42	-	62.64	52.64	-18.22	-
2	0.231	0.10	43.50	-	43.60	-	62.42	52.42	-18.82	-
3	0.345	0.11	28.85	-	28.96	-	59.07	49.07	-30.11	-
4	1.598	0.25	30.34	-	30.59	-	56.00	46.00	-25.41	-
5	3.672	0.29	26.12	-	26.41	-	56.00	46.00	-29.59	-
6	10.105	0.49	31.73	-	32.22	-	60.00	50.00	-27.78	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

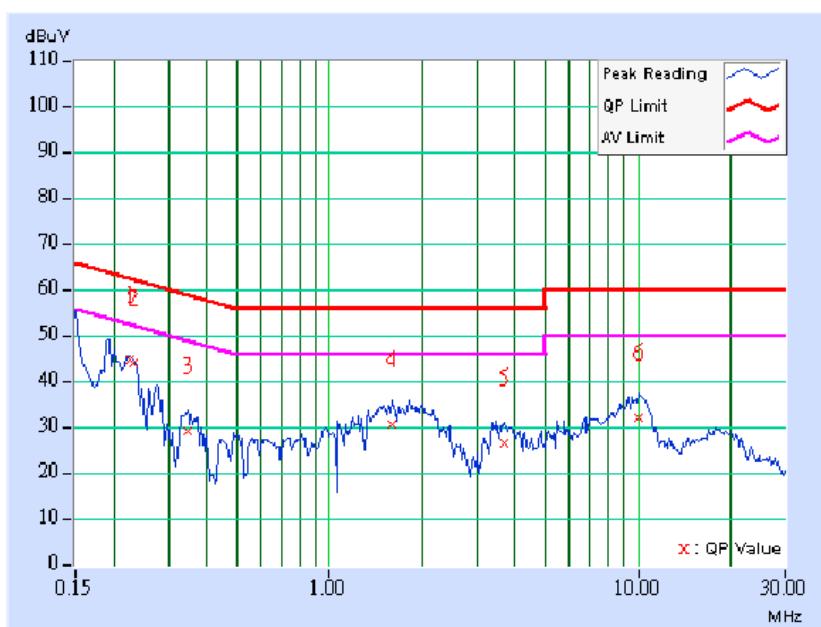
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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.



## §2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Standard Applicable

Requirements: CFR 47, § 2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

### Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Hewlett Packard	Spectrum Analyzer	8564E	3943A01781	10/04/2004

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Measurement Result

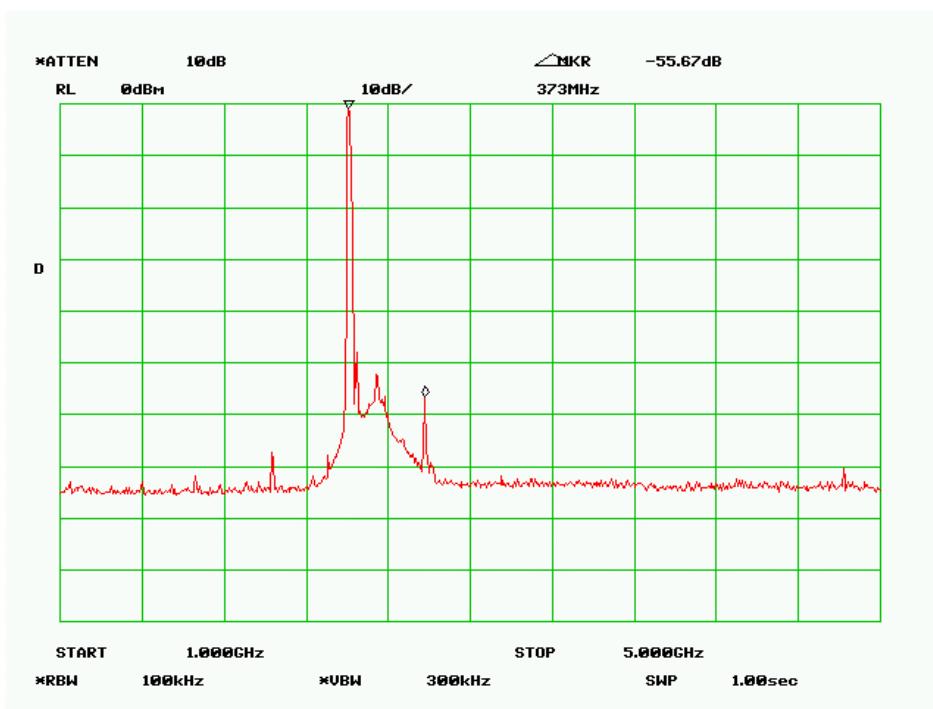
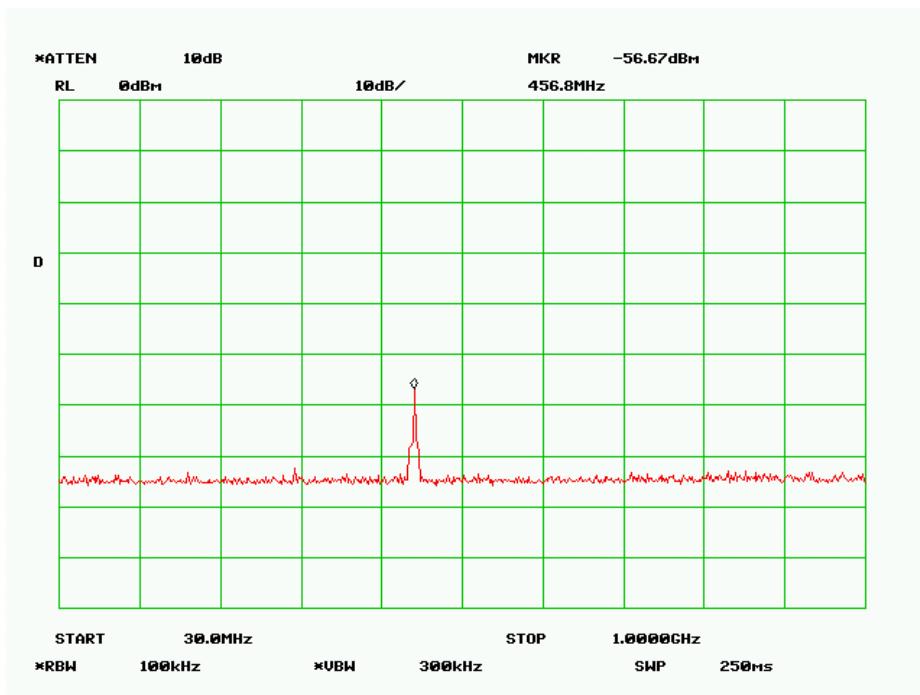
Please refer to following pages for plots of spurious emission.

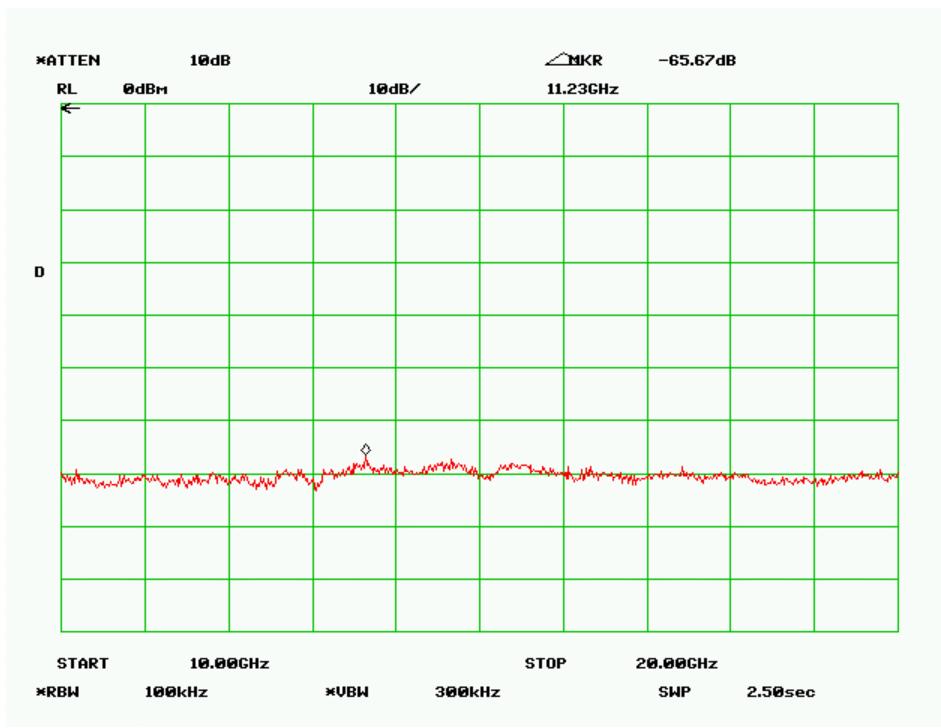
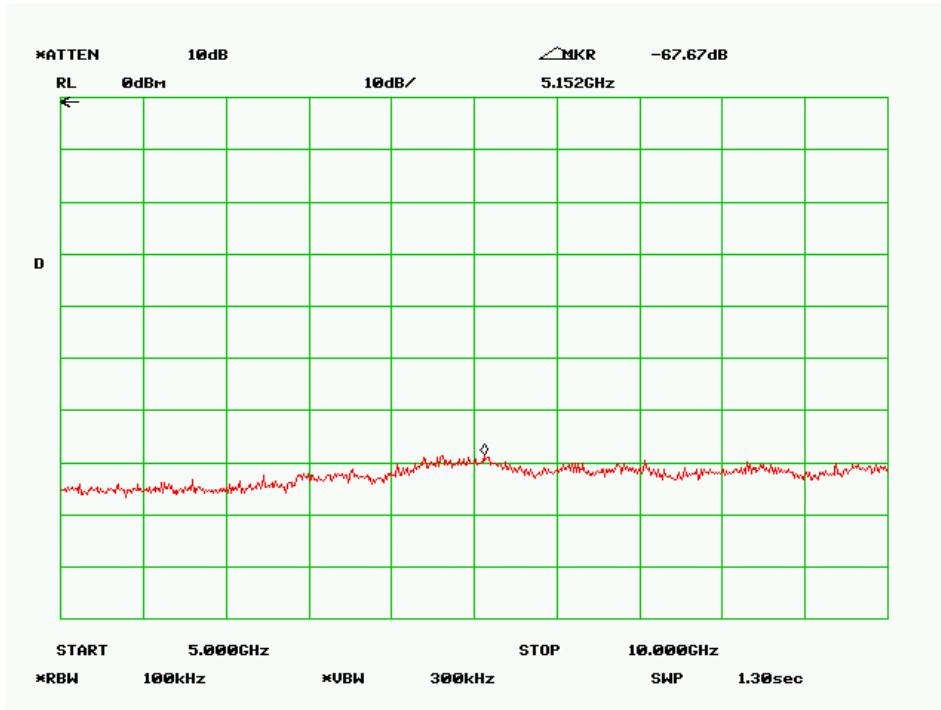
### Environmental Conditions

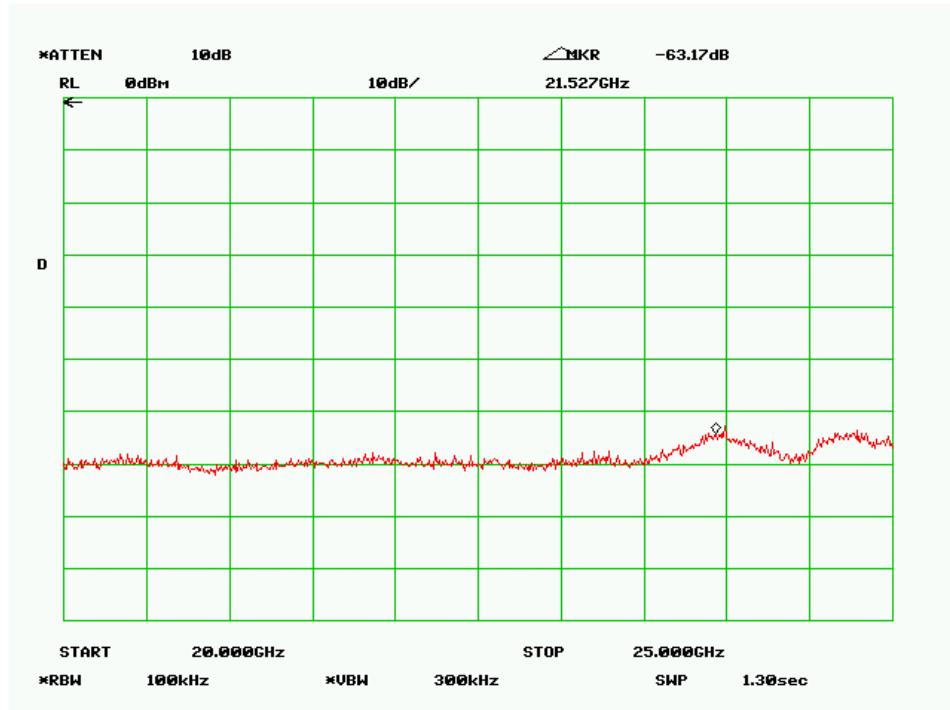
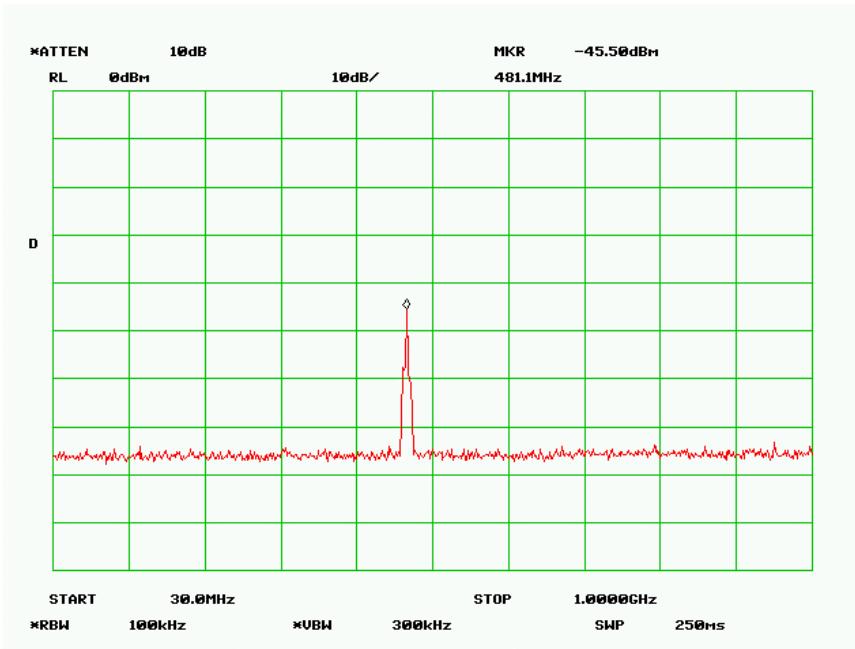
Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1018 mbar

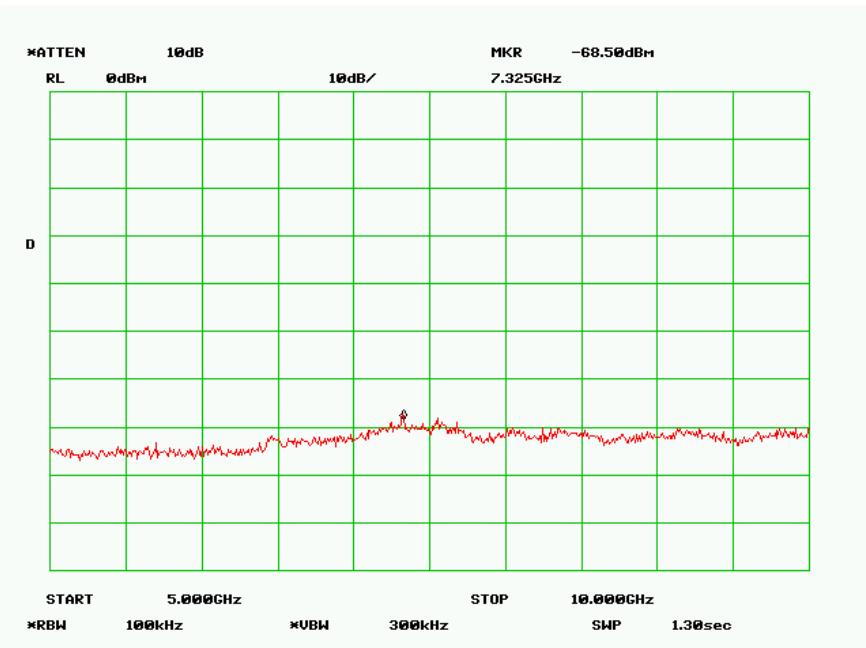
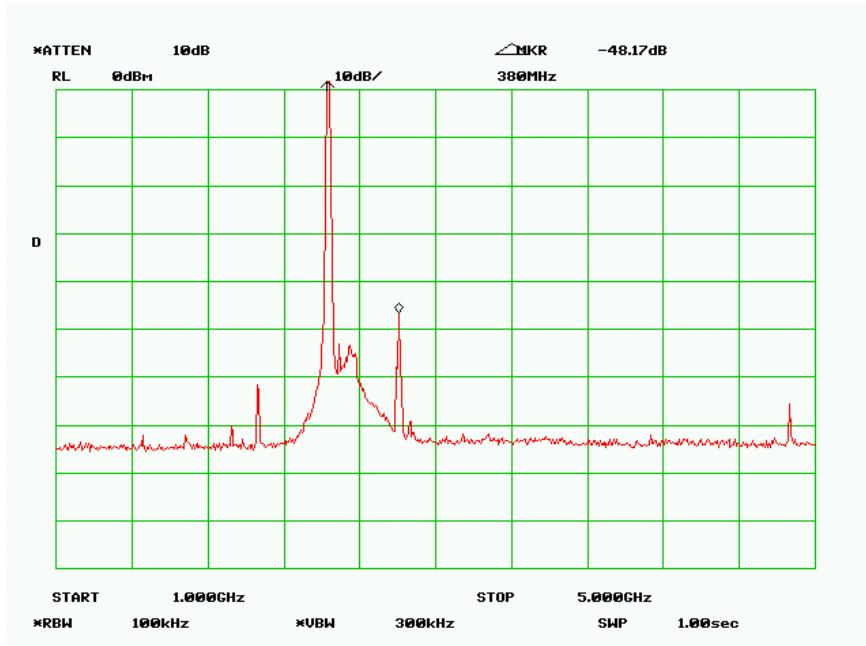
\*The testing was performed by Oscar Au on 2005-09-16.

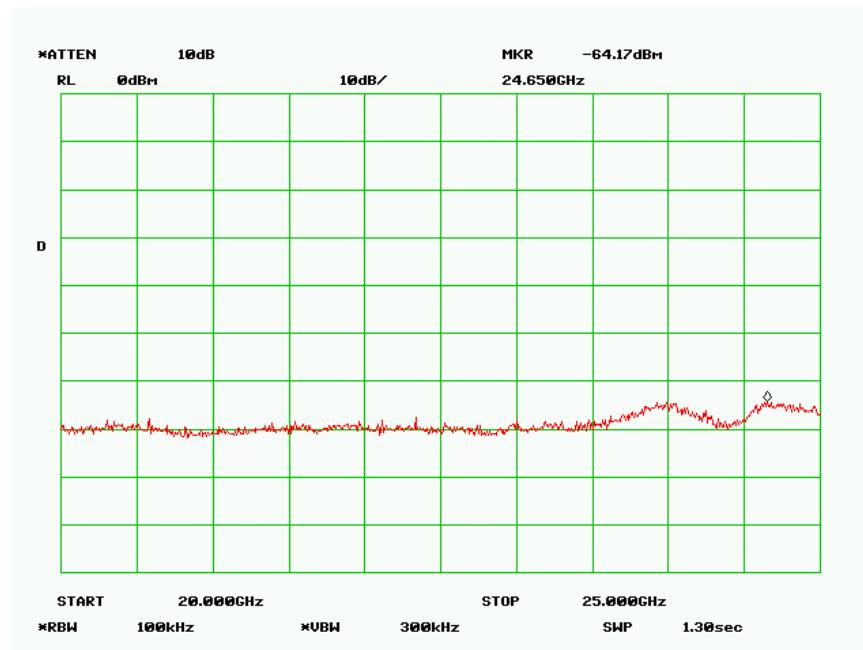
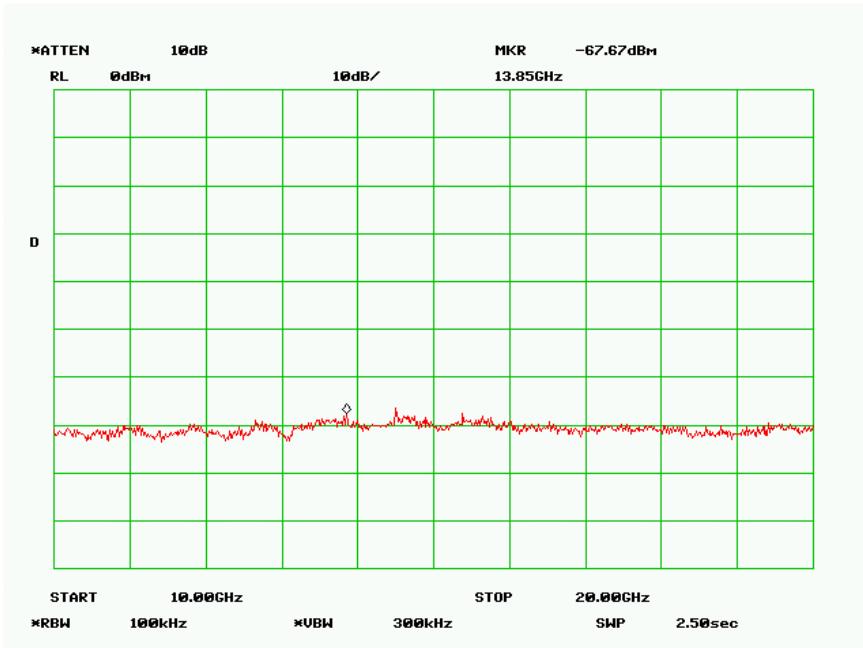
802.11b

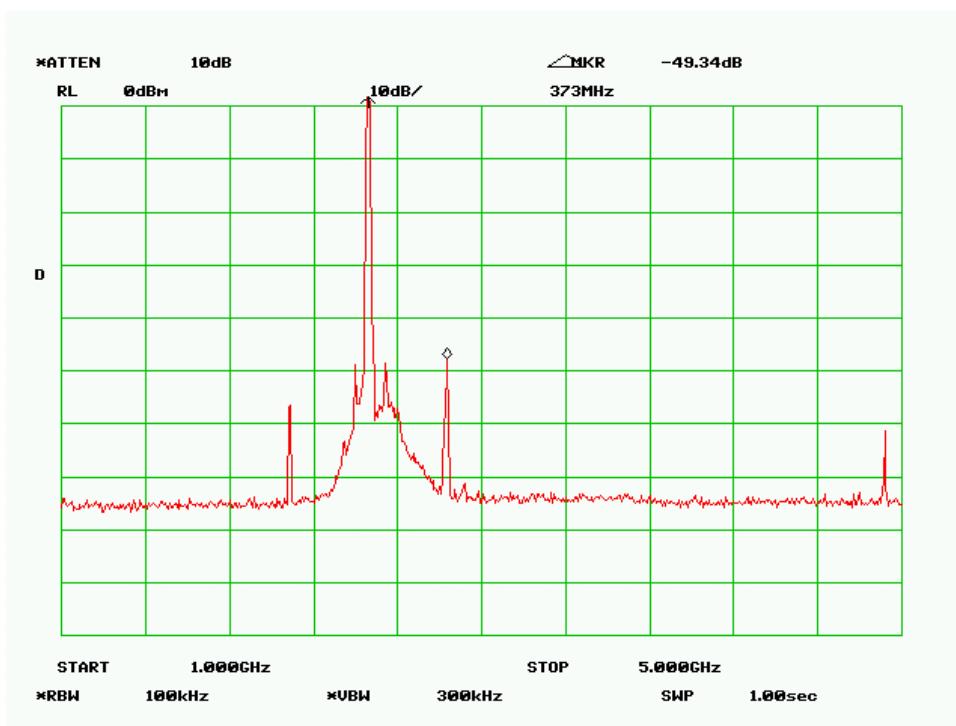
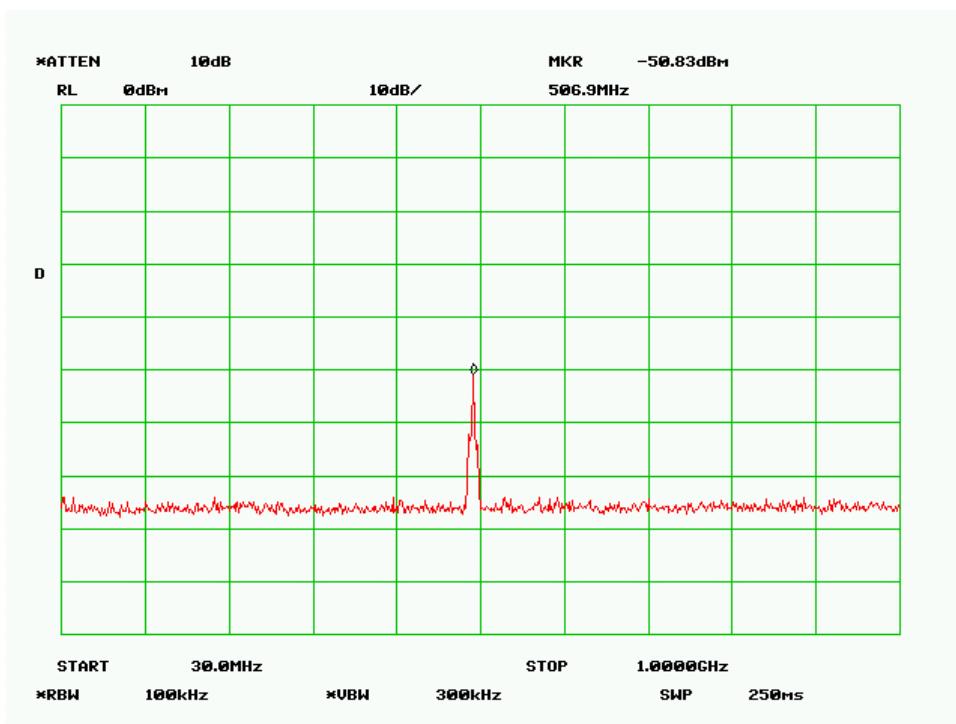
*Channel 1, Low Channel*

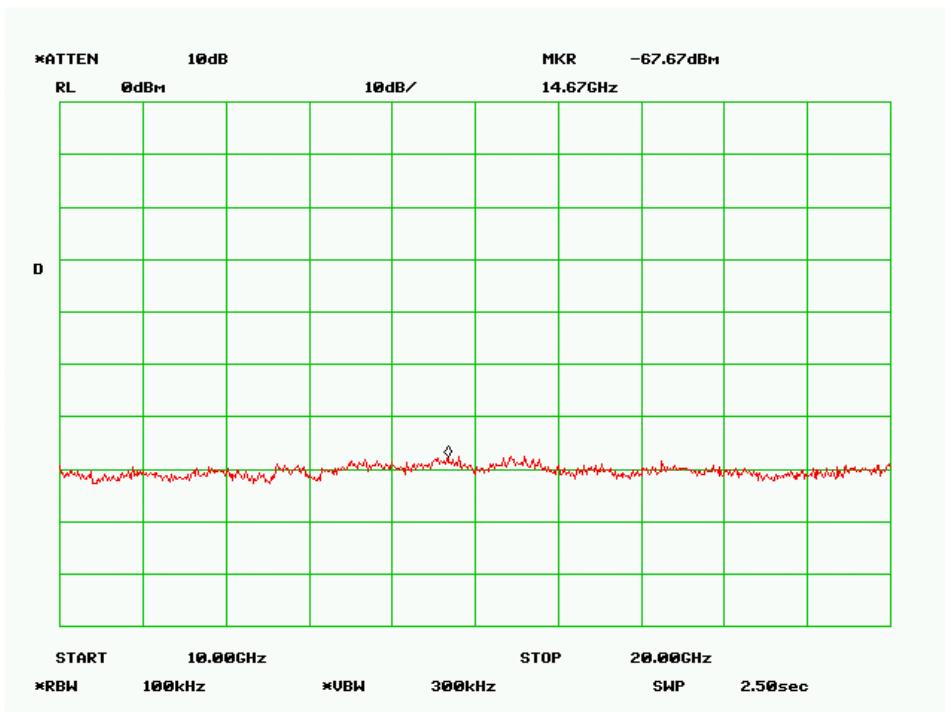
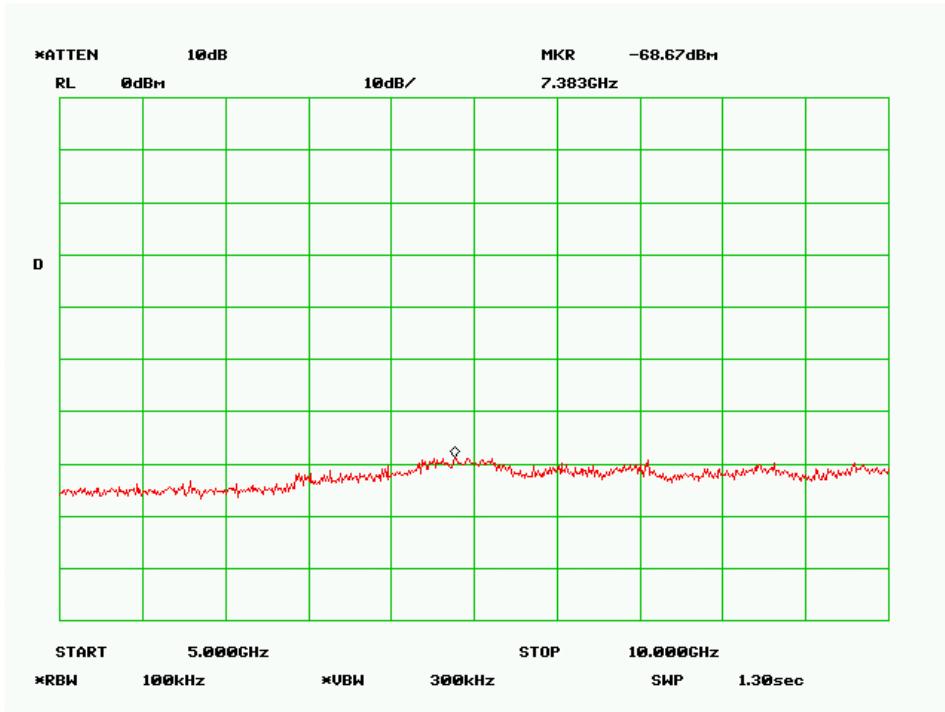


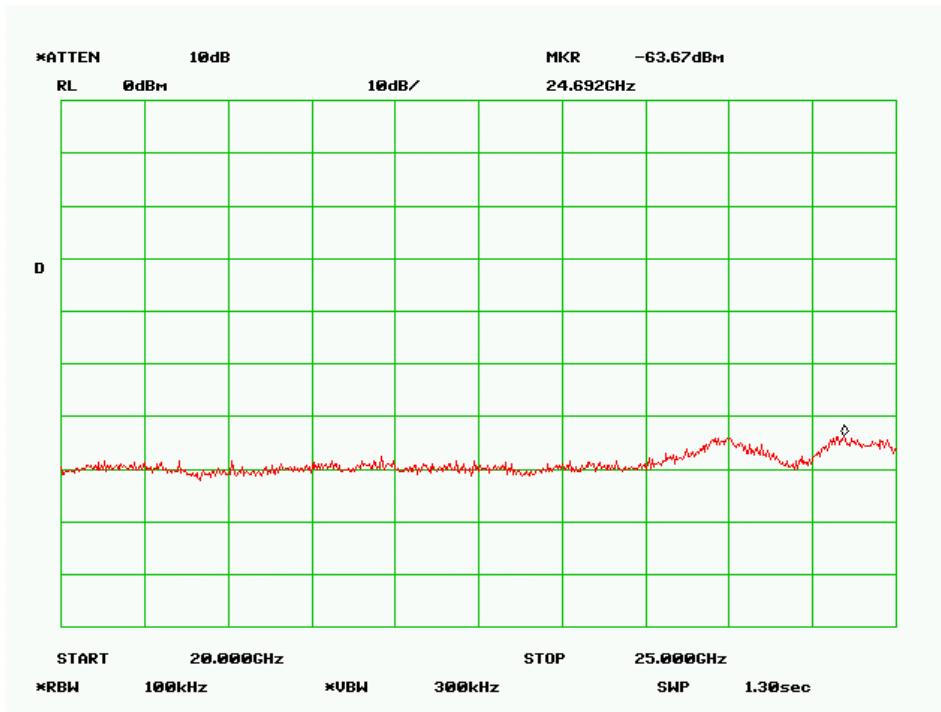
*Channel6, Mid Channel*





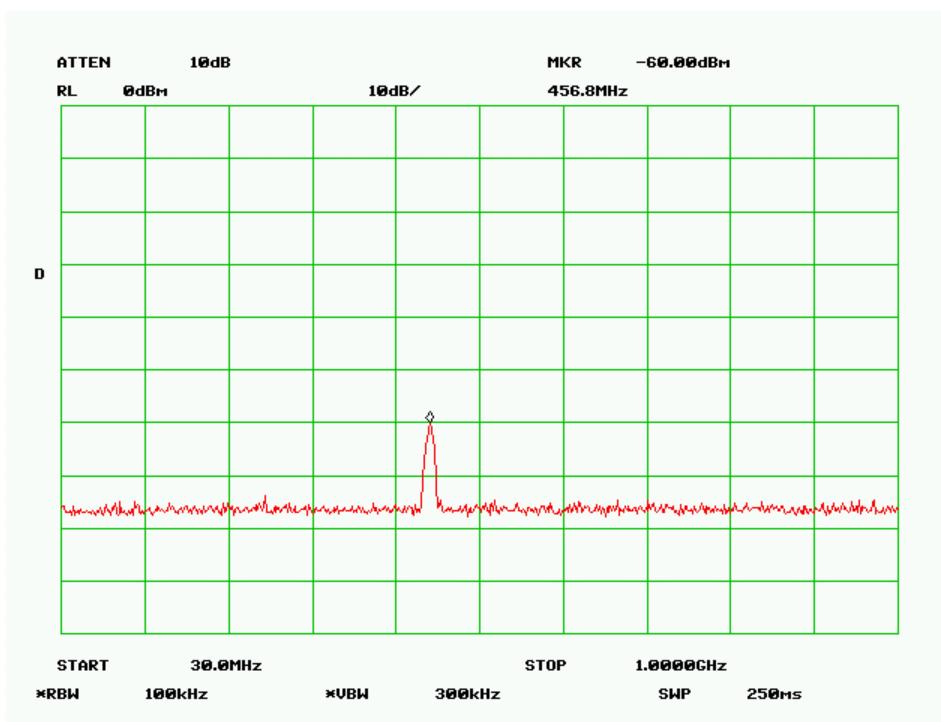
*Channel 11, High Channel*

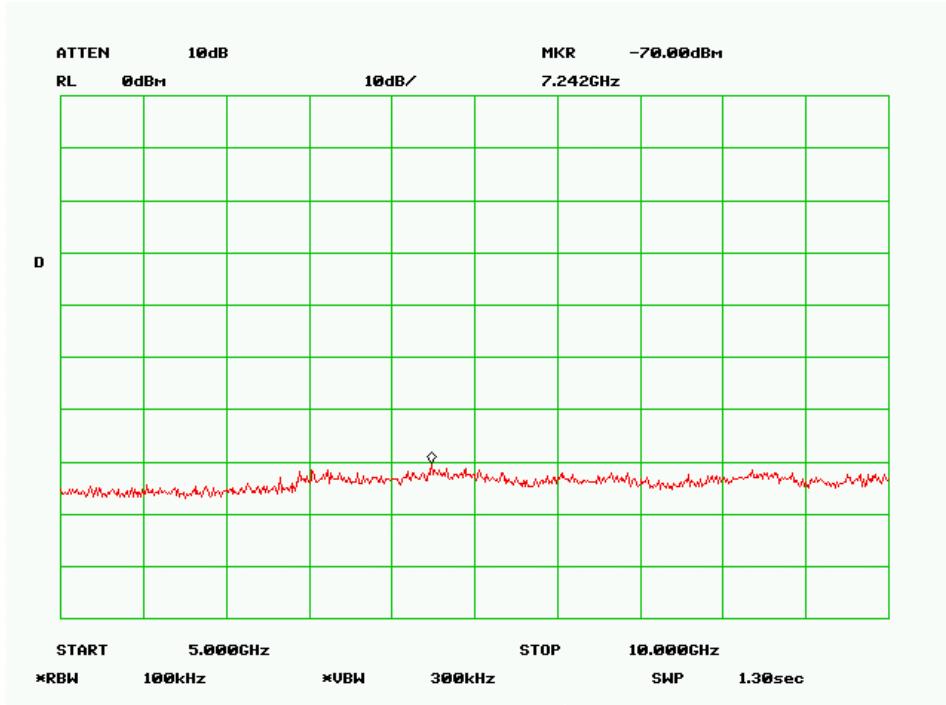
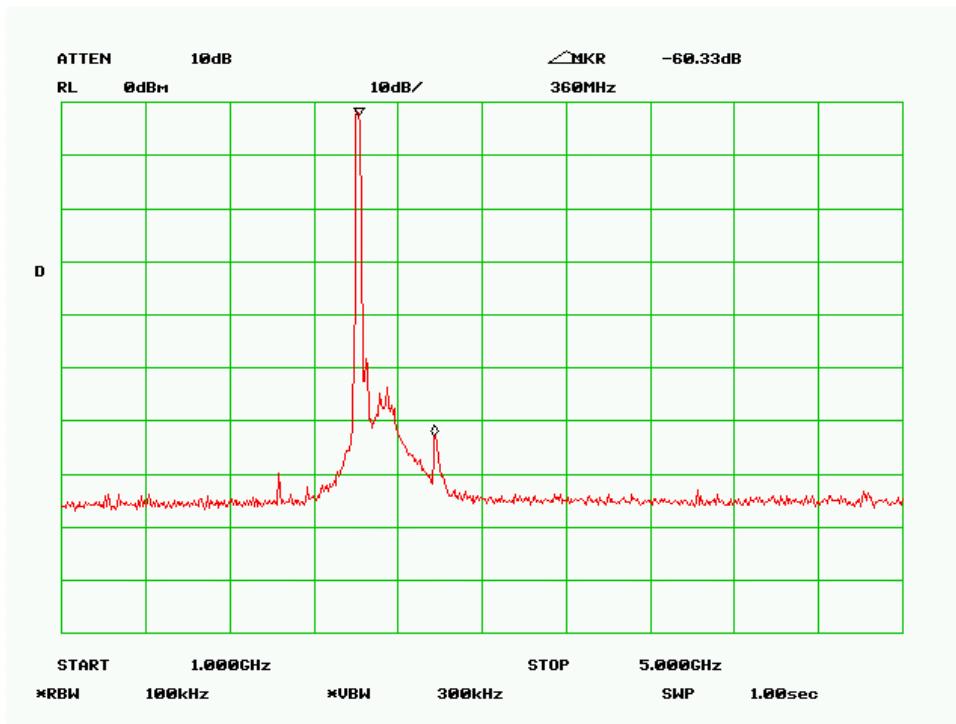


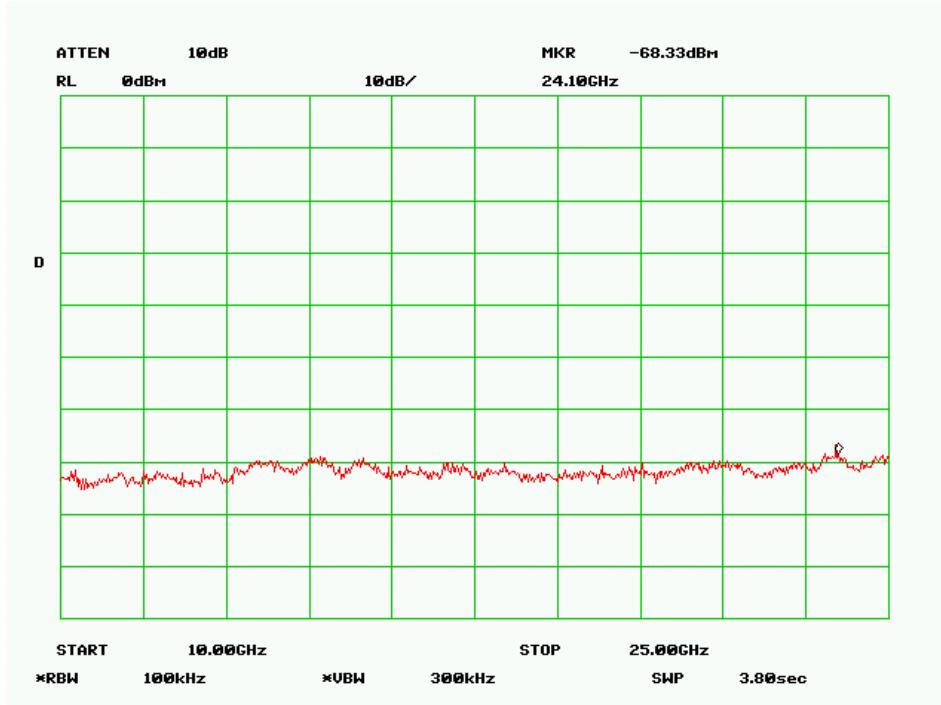
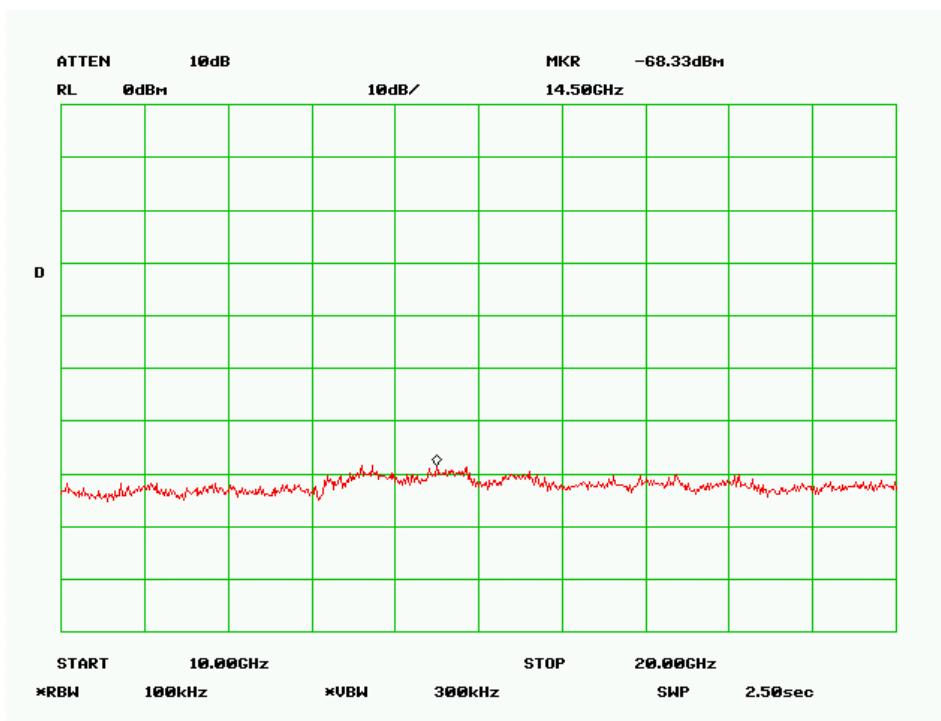


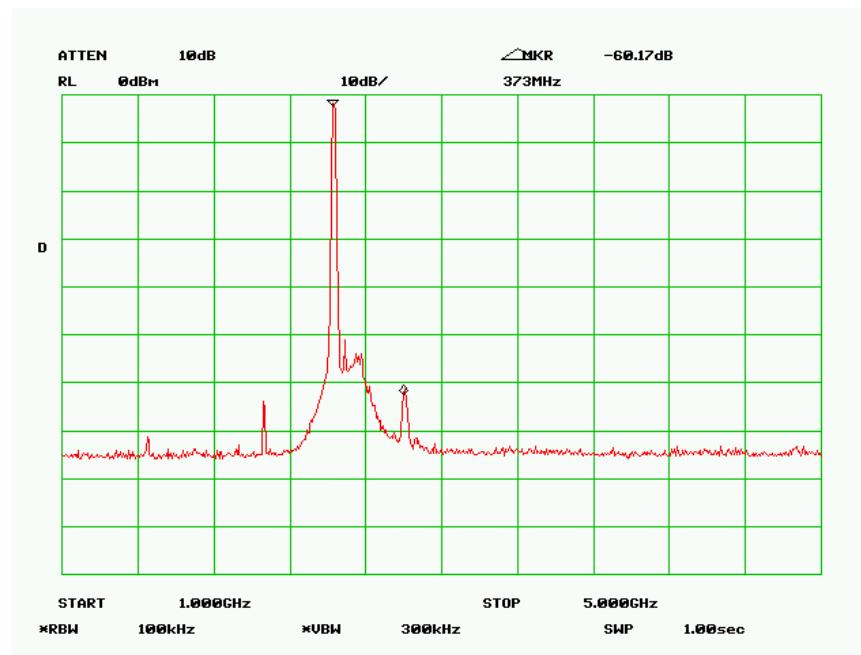
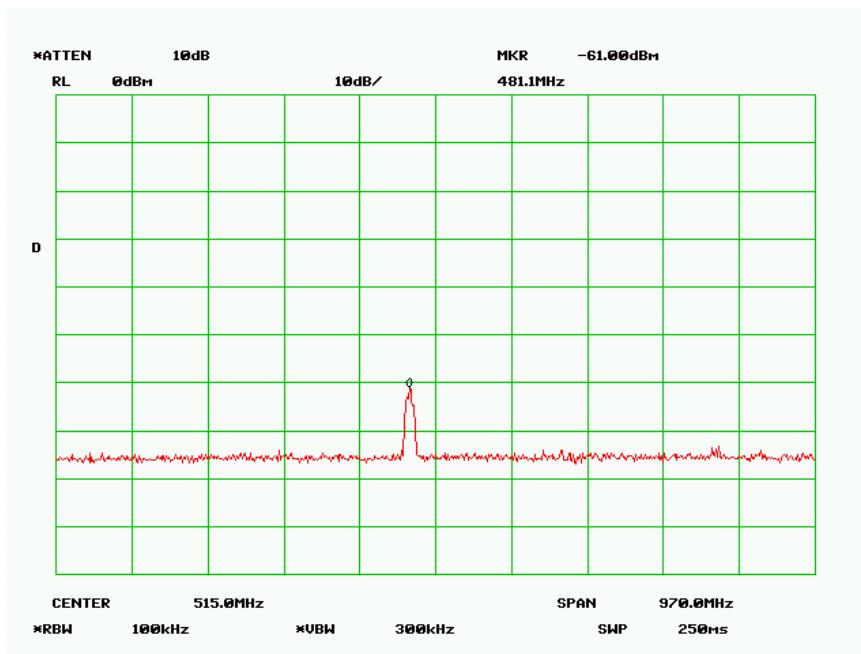
802.11g

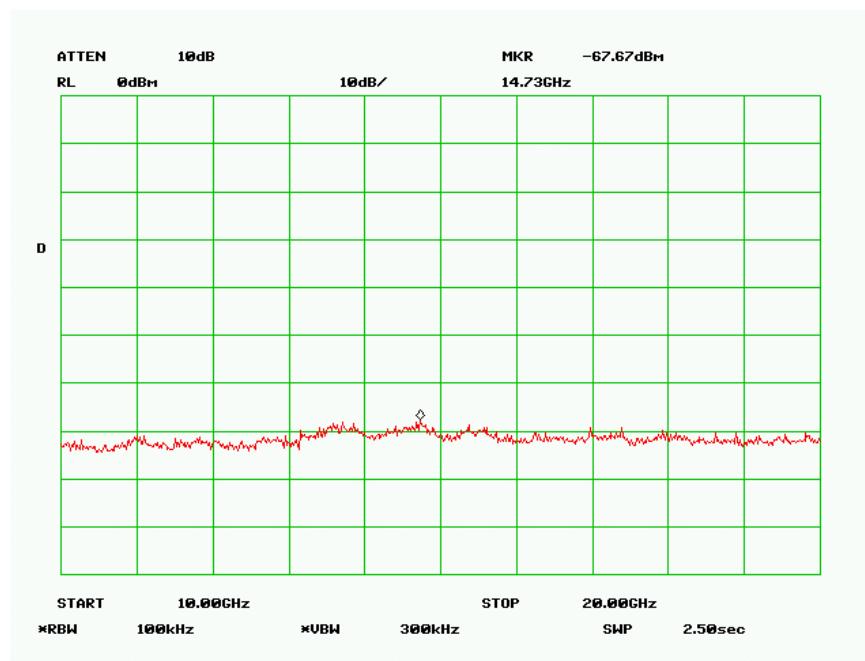
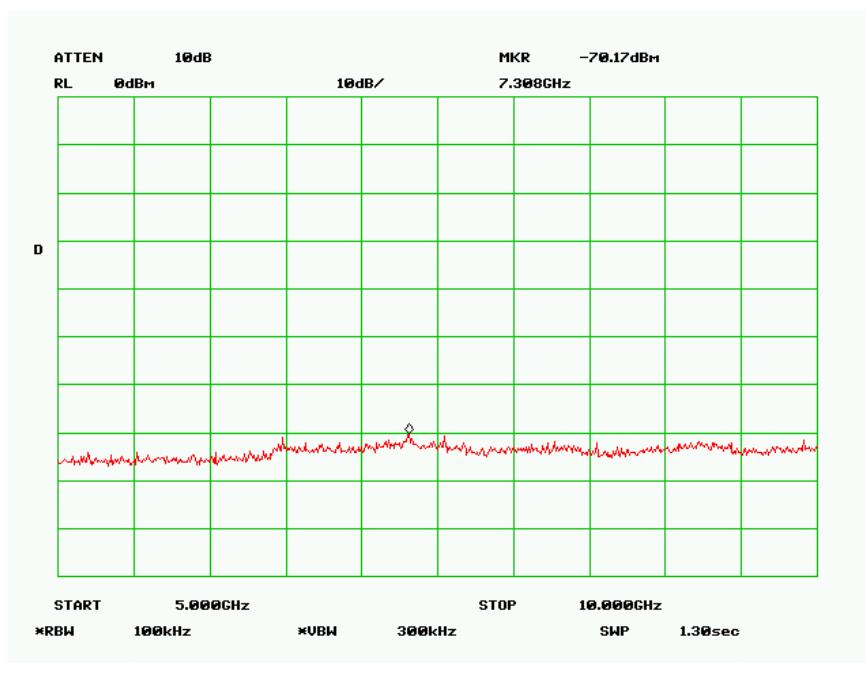
*Channel 1, Low Channel*

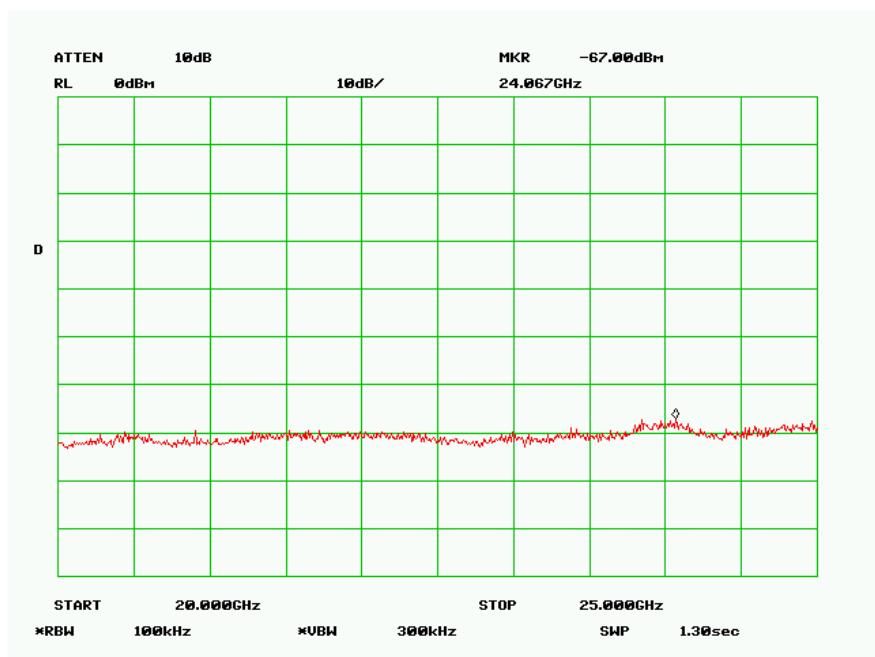




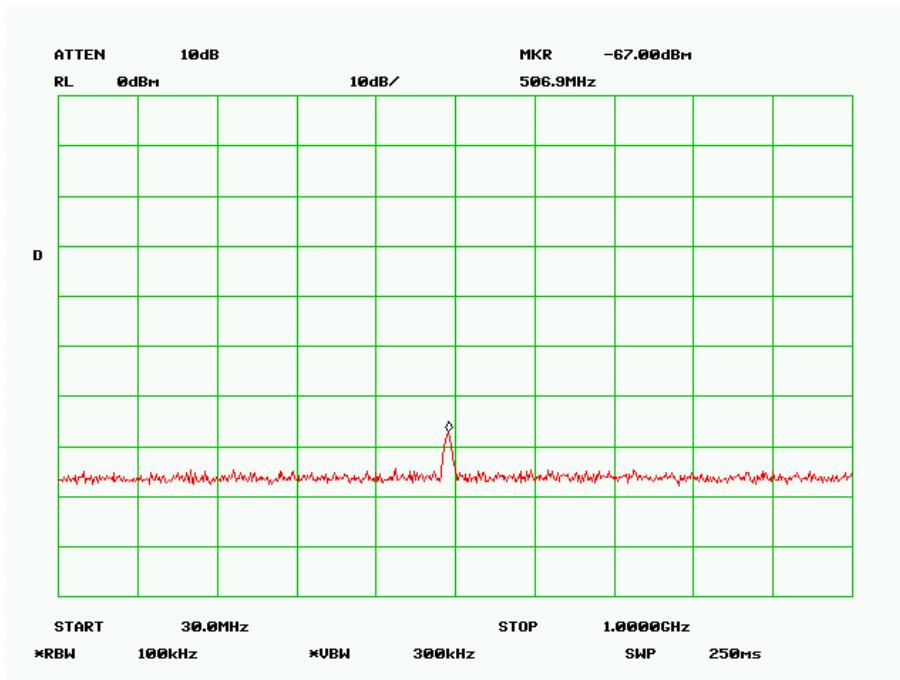


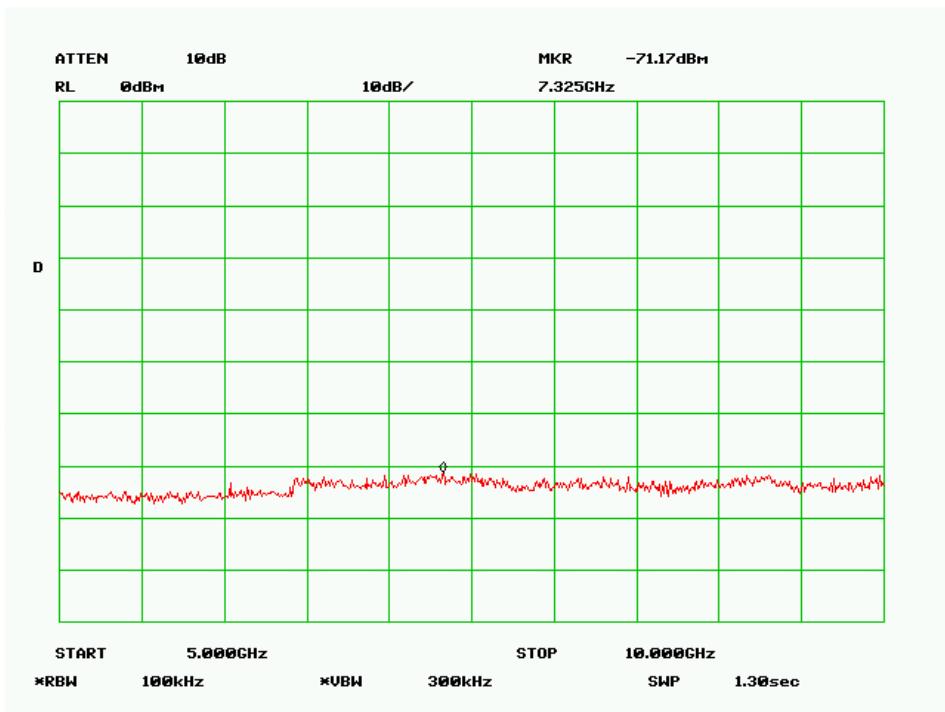
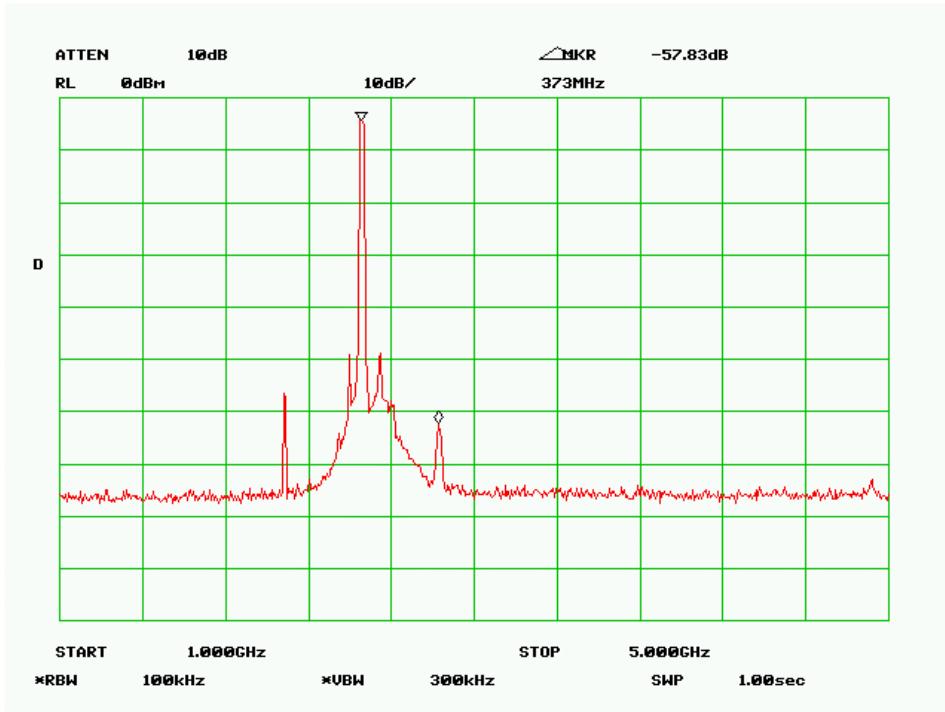
*Channel 6, Mid Channel*

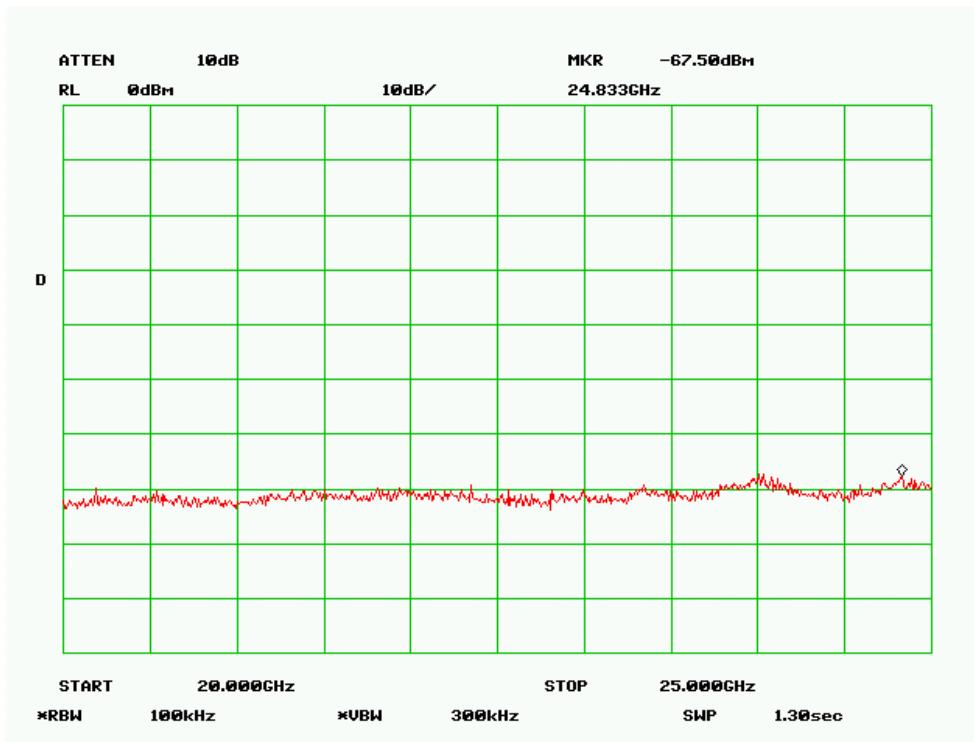
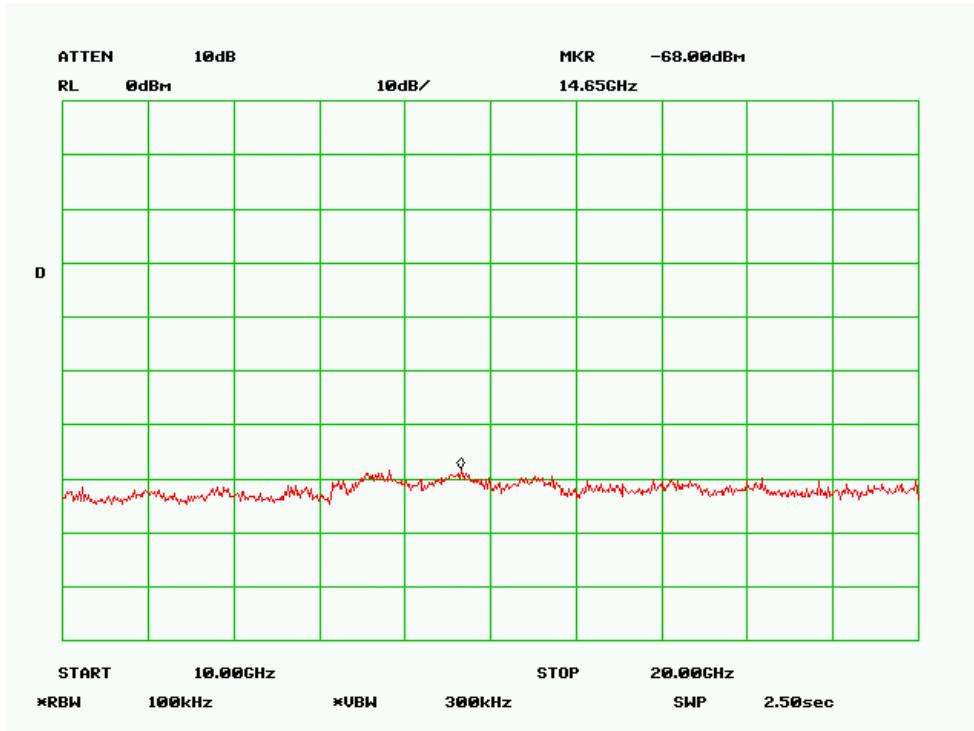




Channel 11, High Channel







## §15.205 & §15.209 - SPURIOUS RADIATED EMISSION

### Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is  $\pm 4.0$  dB.

According to §15.205, except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
<sup>1</sup> 0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	( <sup>2</sup> )

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510MHz

<sup>2</sup> Above 38.6

Except as provided in paragraph (d) and (e), the filed strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

According to §15.209, the device shall meet radiated emission general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	Field Strength (dB $\mu$ V/meter)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

## EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected to the power adapter which is connected with 120Vac/60Hz power source.

## Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 30 to 25000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	RBW	Video B/W
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

For Average measurement: RBW = 1MHz, VBW = 10Hz (above 1000MHz)

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Analyzer, Spectrum	8565EC	3946A00131	08/06/2005
ETS	Antenna, Log- Periodic	3148	4-1155	12/14/2004
ETS	Antenna, Biconical	3110B	9603-2315	12/14/2004
HP	Amplifier, Pre	8447D	2944A10198	08/20/2005
HP	Amplifier, Pre, Microwave	8449B	3147A00400	06/14/2005
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	04/20/2005
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	09/29/2004
Sunol Sciences	Antenna	JB1	A013105-3	02/11/2005

\* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Jan. 13, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Dec. 15, 2004
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-407	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170241	Feb. 23, 2005
Preamplifier Agilent	8449B	3008A01961	Jan. 22, 2005
Preamplifier Agilent	8447D	2944A10629	Jan. 14, 2005
RF signal cable HUBER+SUHNER	SUCOFLEX 104	218182/4	Mar. 04, 2005
RF signal cable HUBER+SUHNER	SUCOFLEX 104	218194/4	Mar. 04, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower ADT.	AT100	AT93021702	NA
Turn Table ADT.	TT100.	TT93021702	NA
Controller ADT.	SC100.	SC93021702	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 1.
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 IC4924-2.

## Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "Qp" in the data table.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC 15.209 Limit}$$

## Environmental Conditions

Temperature:	28° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

*\*The testing was performed by Oscar Au on 2005-09-26.*

## Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

### 802.11b:

**-1.3 dB at 7308.00 MHz** in the **Vertical** polarization

### 802.11g:

**-13.1 dB at 1560.00 MHz** in the **Vertical** polarization

**Radiated Emission Test Result**

802.11b, Low Channel

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	1	<b>FREQUENCY RANGE</b>	1 ~ 25 GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 65 % RH, 991 hPa	<b>TESTED BY</b>	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	60.56 PK	89.26	-28.70	1.41 H	148	28.49	32.07
1	2038.00	59.66 AV	81.33	-21.67	1.41 H	148	27.59	32.07
2	2388.40	48.33 PK	74.00	-25.67	1.77 H	253	14.51	33.82
2	2388.40	40.40 AV	54.00	-13.60	1.77 H	253	6.58	33.82
3	*2412.00	109.26 PK			1.77 H	253	75.33	33.93
3	*2412.00	101.33 AV			1.77 H	253	67.40	33.93
4	4076.00	49.21 PK	74.00	-24.79	1.03 H	84	10.60	38.61
4	4076.00	36.93 AV	54.00	-17.07	1.03 H	84	-1.68	38.61
5	4824.00	55.62 PK	74.00	-18.38	1.05 H	19	14.96	40.66
5	4824.00	41.28 AV	54.00	-12.72	1.05 H	19	0.62	40.66

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	60.35 PK	90.95	-30.60	1.10 V	235	28.28	32.07
1	2038.00	59.38 AV	82.94	-23.56	1.10 V	235	27.31	32.07
2	2388.40	50.02 PK	74.00	-23.98	1.00 V	260	16.20	33.82
2	2388.40	42.01 AV	54.00	-11.99	1.00 V	260	8.19	33.82
3	*2412.00	110.95 PK			1.00 V	260	77.02	33.93
3	*2412.00	102.94 AV			1.00 V	260	69.01	33.93
4	4076.00	51.68 PK	74.00	-22.32	1.03 V	3	13.07	38.61
4	4076.00	42.96 AV	54.00	-11.04	1.03 V	3	4.35	38.61
5	4824.00	58.99 PK	74.00	-15.01	1.37 V	265	18.33	40.66
5	4824.00	45.71 AV	54.00	-8.29	1.37 V	265	5.05	40.66

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(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.
5. “\*”: Fundamental frequency.

## 802.11b, Mid Channel

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
2436.0000	110.6	270	2.5	v	28.7	2.0	35.6	105.7			Fund/Peak
2436.0000	114.3	270	2.0	h	28.7	2.0	35.6	109.4			Fund/Peak
2436.0000	103.5	270	2.5	v	28.7	2.0	35.6	98.6			Ave
2436.0000	107.5	270	2.0	h	28.7	2.0	35.6	102.6			Ave
7308.0000	48.5	200	1.5	v	36.7	4.3	36.8	52.7	54	-1.3	Ave
7308.0000	48.1	270	1.5	h	36.7	4.3	36.8	52.3	54	-1.7	Ave
3995.0000	54.0	180	2.0	v	30.0	2.7	35.9	50.8	54	-3.2	Ave
4268.0000	50.8	200	2.0	v	31.8	2.9	36.2	49.3	54	-4.7	Ave
1560.0000	58.1	200	2.0	v	24.8	1.9	35.6	49.2	54	-4.9	Ave
2811.0000	51.5	200	1.5	v	28.9	2.4	36.4	46.4	54	-7.6	Ave
3995.0000	47.0	160	3.0	h	30.0	2.7	35.9	43.8	54	-10.2	Ave
1560.0000	51.5	200	1.5	h	24.8	1.9	35.6	42.6	54	-11.5	Ave
4872.0000	41.1	200	1.5	h	32.5	3.1	34.8	41.9	54	-12.1	Ave
7308.0000	57.3	200	1.5	v	36.7	4.3	36.8	61.5	74	-12.5	Peak
4268.0000	62.7	200	2.0	v	31.8	2.9	36.2	61.2	74	-12.8	Peak
2811.0000	46.2	30	2.0	h	28.9	2.4	36.4	41.1	54	-12.9	Ave
7308.0000	56.6	270	1.5	h	36.7	4.3	36.8	60.8	74	-13.2	Peak
4268.0000	41.4	160	2.0	h	31.8	2.9	36.2	39.9	54	-14.1	Ave
3995.0000	62.7	180	2.0	v	30.0	2.7	35.9	59.5	74	-14.5	Peak
4872.0000	38.1	200	1.5	v	32.5	3.1	34.8	38.9	54	-15.1	Ave
2811.0000	63.3	200	1.5	v	28.9	2.4	36.4	58.2	74	-15.8	Peak
1560.0000	66.2	200	2.0	v	24.8	1.9	35.6	57.3	74	-16.8	Peak
3112.0000	75.5	180	2.5	h	29.8	2.5	35.5	72.3	89.4	-17.1	Peak
4872.0000	54.3	200	1.5	h	32.5	3.1	34.8	55.1	74	-18.9	Peak
5477.0000	62.9	200	2.0	v	34.0	3.2	33.3	66.7	85.65	-18.9	Peak
5750.0000	63.2	200	2.0	v	34.1	3.4	34.3	66.4	85.65	-19.3	Peak
3995.0000	57.8	160	3.0	h	30.0	2.7	35.9	54.6	74	-19.4	Peak
2811.0000	59.1	30	2.0	h	28.9	2.4	36.4	54.0	74	-20.0	Peak

## 802.11b High Channel

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	11	<b>FREQUENCY RANGE</b>	1 ~ 25 GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 65 % RH, 991 hPa	<b>TESTED BY</b>	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	60.40 PK	88.14	-27.74	1.01 H	145	28.10	32.30
1	2088.00	59.57 AV	80.87	-21.30	1.01 H	145	27.27	32.30
2	*2462.00	108.14 PK			1.14 H	246	73.98	34.16
2	*2462.00	100.87 AV			1.14 H	246	66.71	34.16
3	2487.10	51.51 PK	74.00	-22.49	1.14 H	246	17.23	34.28
3	2487.10	44.24 AV	54.00	-9.76	1.14 H	246	9.96	34.28
4	4176.00	49.54 PK	74.00	-24.46	1.01 H	92	10.63	38.91
4	4176.00	37.15 AV	54.00	-16.85	1.01 H	92	-1.76	38.91
5	4924.00	53.82 PK	74.00	-20.18	1.06 H	28	12.96	40.86
5	4924.00	40.11 AV	54.00	-13.89	1.06 H	28	-0.75	40.86

**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	58.95 PK	89.94	-30.49	1.10 V	70	26.65	32.30
1	2088.00	58.95 AV	82.26	-23.31	1.10 V	70	26.65	32.30
2	*2462.00	109.94 PK			1.24 V	262	75.78	34.16
2	*2462.00	102.26 AV			1.24 V	262	68.10	34.16
3	2487.10	53.31 PK	74.00	-20.69	1.24 V	262	19.03	34.28
3	2487.10	45.63 AV	54.00	-8.37	1.24 V	262	11.35	34.28
4	4176.00	52.06 PK	74.00	-21.94	1.24 V	265	13.15	38.91
4	4176.00	44.05 AV	54.00	-9.95	1.24 V	265	5.14	38.91
5	4924.00	54.51 PK	74.00	-19.49	1.14 V	118	13.65	40.86
5	4924.00	42.49 AV	54.00	-11.51	1.14 V	118	1.63	40.86

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(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.
5. “\*” : Fundamental frequency.

## 802.11g Low Channel

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>CHANNEL</b>	1	<b>FREQUENCY RANGE</b>	1 ~ 25 GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 65 % RH, 991 hPa	<b>TESTED BY</b>	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	59.46 PK	79.31	-19.85	1.05 H	144	27.39	32.07
1	2038.00	58.43 AV	70.33	-11.90	1.05 H	144	26.36	32.07
2	2390.00	44.16 PK	74.00	-29.84	1.44 H	96	10.33	33.83
2	2390.00	35.18 AV	54.00	-18.82	1.44 H	96	1.35	33.83
3	*2412.00	99.31 PK			1.44 H	96	65.38	33.93
3	*2412.00	90.33 AV			1.44 H	96	56.40	33.93
4	4076.00	49.69 PK	74.00	-24.31	1.04 H	82	11.08	38.61
4	4076.00	37.82 AV	54.00	-16.18	1.04 H	82	-0.79	38.61
5	4824.00	54.34 PK	74.00	-19.66	1.15 H	249	13.68	40.66
5	4824.00	40.56 AV	54.00	-13.44	1.15 H	249	-0.10	40.66

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	59.03 PK	86.62	-27.59	1.12 V	248	26.96	32.07
1	2038.00	57.90 AV	77.19	-19.29	1.12 V	248	25.83	32.07
2	2390.00	51.47 PK	74.00	-22.53	1.00 V	282	17.64	33.83
2	2390.00	42.04 AV	54.00	-11.96	1.00 V	282	8.21	33.83
3	*2412.00	106.62 PK			1.00 V	282	72.69	33.93
3	*2412.00	97.19 AV			1.00 V	282	63.26	33.93
4	4076.00	50.44 PK	74.00	-23.56	1.51 V	286	11.83	38.61
4	4076.00	41.76 AV	54.00	-12.24	1.51 V	286	3.15	38.61
5	4824.00	53.30 PK	74.00	-20.70	1.38 V	275	12.64	40.66
5	4824.00	39.57 AV	54.00	-14.43	1.38 V	275	-1.09	40.66

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(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.
5. “\*”: Fundamental frequency.

## 802.11g, Mid Channel

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
2436.0000	101.3	80	1.5	v	28.7	2.0	35.6	96.4			Fund/Peak
2436.0000	106.6	90	2.0	h	28.7	2.0	35.6	101.7			Fund/Peak
2436.0000	91.5	80	1.5	v	28.7	2.0	35.6	86.6			Ave
2436.0000	97.2	90	2.0	h	28.7	2.0	35.6	92.3			Ave
1560.0000	49.9	180	1.5	v	24.8	1.9	35.6	41.0	54	-13.1	Ave
7308.0000	34.5	270	2.0	h	36.7	4.3	36.8	38.7	54	-15.3	Ave
7308.0000	34.0	200	1.5	v	36.7	4.3	36.8	38.2	54	-15.8	Ave
2810.0000	41.8	160	2.0	h	28.9	2.4	36.4	36.7	54	-17.3	Ave
7308.0000	52.1	270	2.0	h	36.7	4.3	36.8	56.3	74	-17.7	Peak
2810.0000	39.8	180	2.0	v	28.9	2.4	36.4	34.7	54	-19.3	Ave
3314.0000	51.3	260	2.0	v	29.8	2.5	36.4	47.2	66.55	-19.3	Ave

## 802.11g High Channel

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	1 ~ 25 GHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	30 deg. C, 65 % RH, 991 hPa	<b>TESTED BY</b>	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	60.67 PK	81.83	-21.16	1.03 H	157	28.37	32.30
1	2088.00	59.62 AV	72.16	-12.54	1.03 H	157	27.32	32.30
2	*2462.00	101.83 PK			1.18 H	238	67.67	34.16
2	*2462.00	92.16 AV			1.18 H	238	58.00	34.16
3	2483.50	49.71 PK	74.00	-24.29	1.18 H	238	15.45	34.26
3	2483.50	40.04 AV	54.00	-13.96	1.18 H	238	5.78	34.26
4	4176.00	50.11 PK	74.00	-23.89	1.05 H	171	11.20	38.91
4	4176.00	36.76 AV	54.00	-17.24	1.05 H	171	-2.15	38.91
5	4924.00	51.75 PK	74.00	-22.25	1.08 H	304	10.89	40.86
5	4924.00	37.76 AV	54.00	-16.24	1.08 H	304	-3.10	40.86

**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	58.38 PK	85.75	-27.37	1.12 V	250	26.08	32.30
1	2088.00	57.06 AV	76.25	-19.19	1.12 V	250	24.76	32.30
2	*2462.00	105.75 PK			1.00 V	259	71.59	34.16
2	*2462.00	96.25 AV			1.00 V	259	62.09	34.16
3	2483.50	53.63 PK	74.00	-20.37	1.00 V	259	19.37	34.26
3	2483.50	44.13 AV	54.00	-9.87	1.00 V	259	9.87	34.26
4	4176.00	51.89 PK	74.00	-22.11	1.28 V	272	12.98	38.91
4	4176.00	42.72 AV	54.00	-11.28	1.28 V	272	3.81	38.91
5	4924.00	53.03 PK	74.00	-20.97	1.14 V	308	12.17	40.86
5	4924.00	39.70 AV	54.00	-14.30	1.14 V	308	-1.16	40.86

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(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.
5. “\*” : Fundamental frequency.

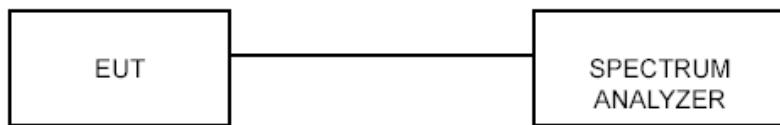
## §15.247(a)(2) – 6 dB BANDWIDTH

### Standard Applicable

According to §15.247(a)(2), for digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

### Measurement 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.



### Equipment Lists

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

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

### EUT Operating Conditions

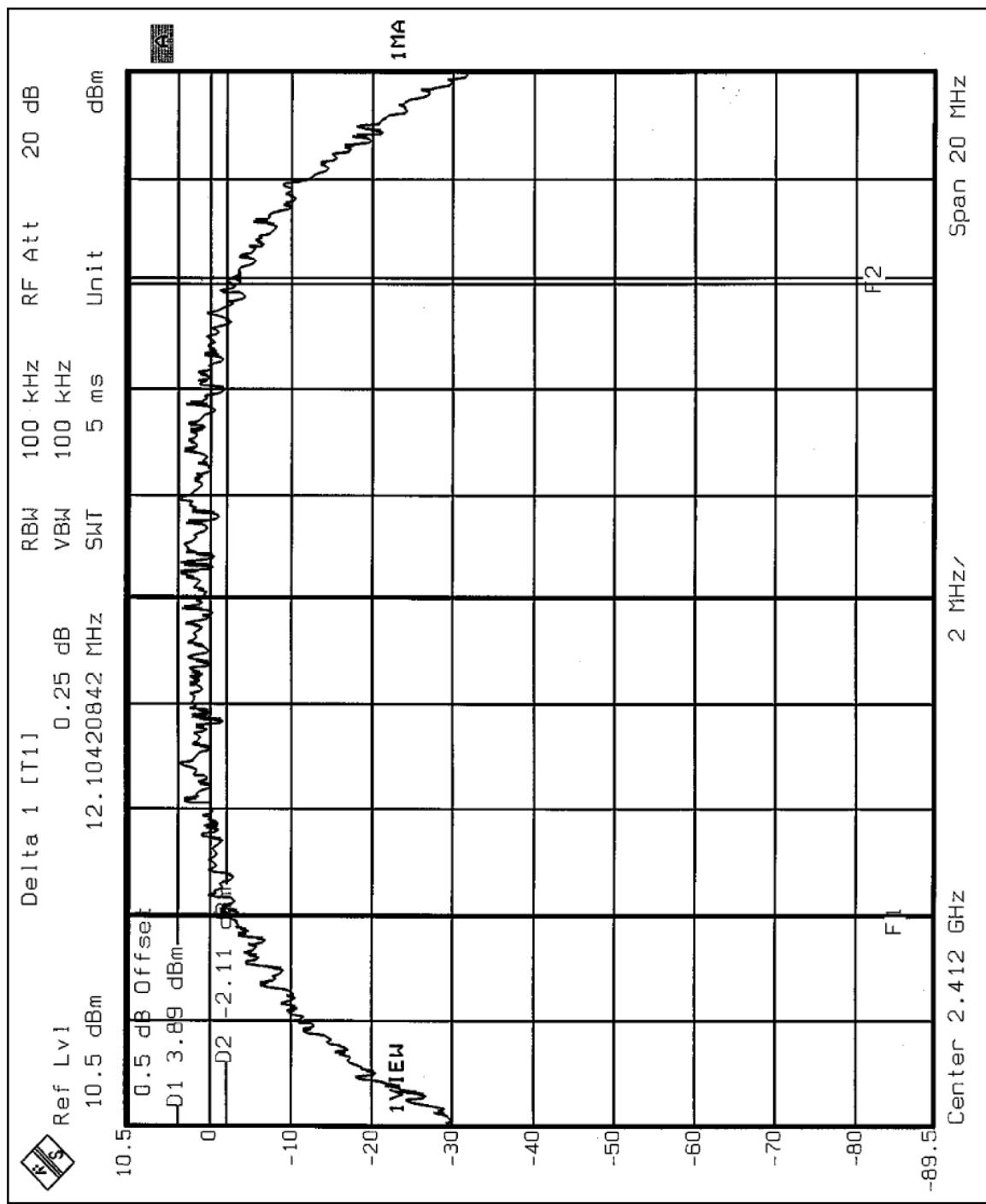
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

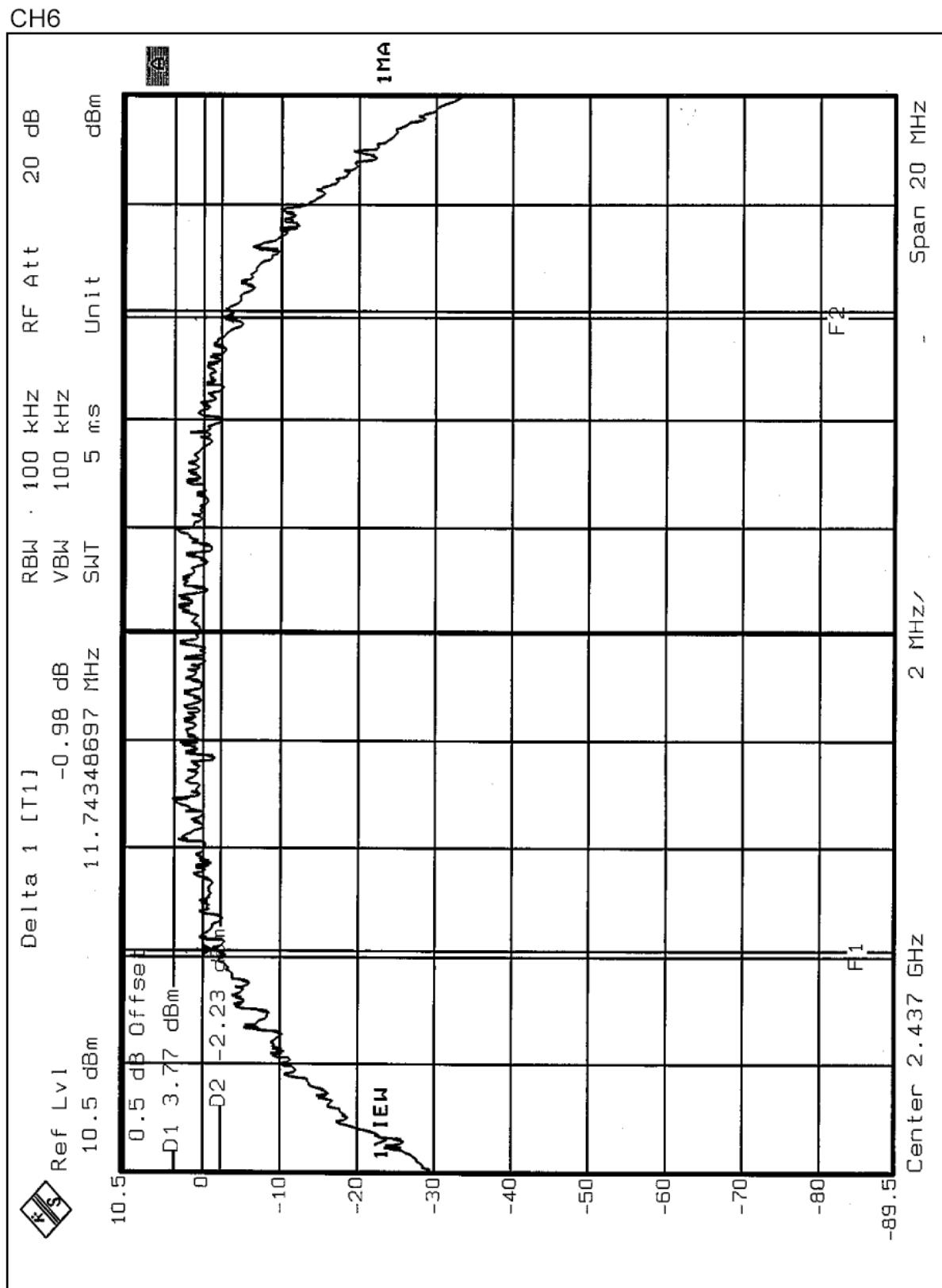
**Measurement Result**

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

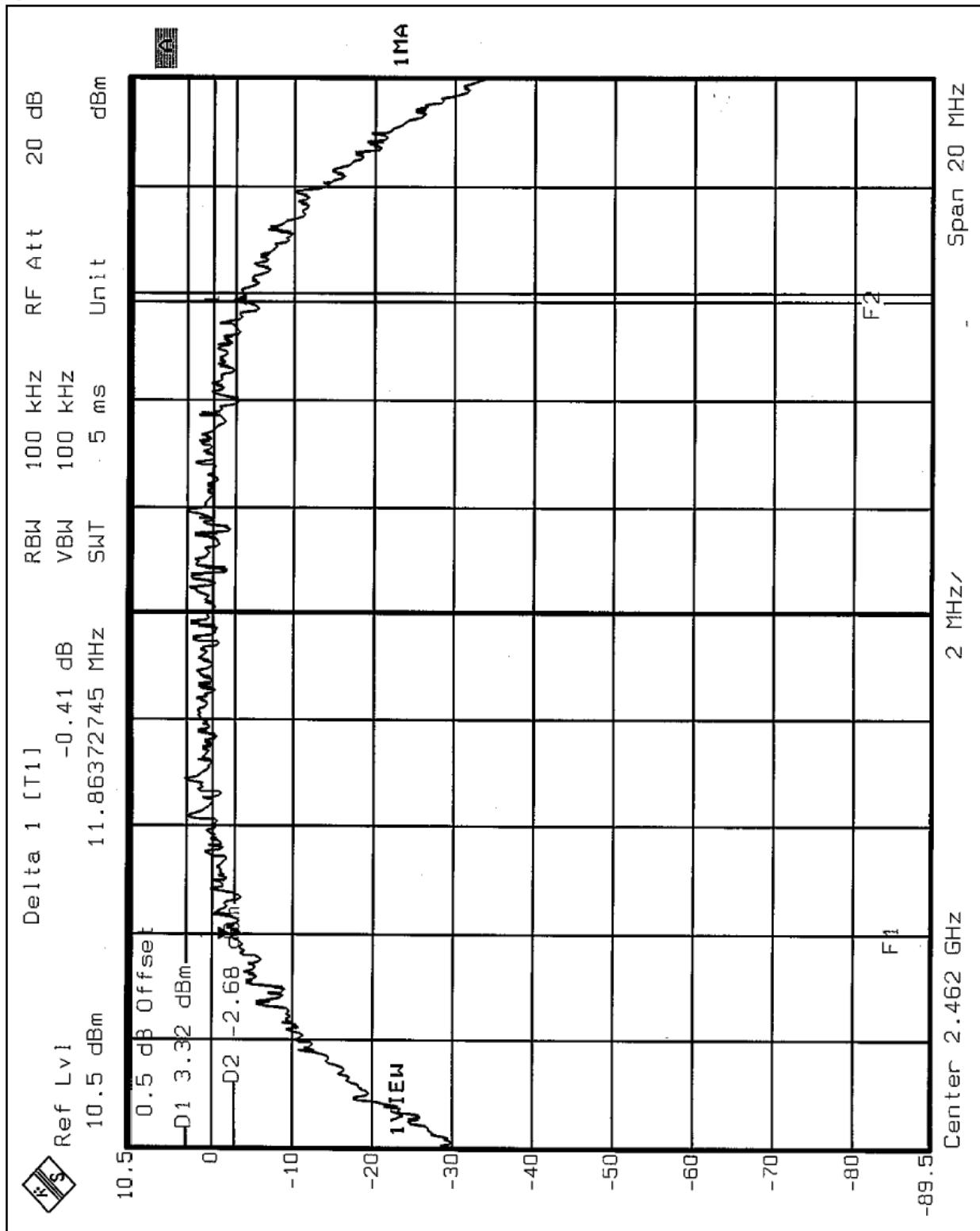
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	12.10	0.5	PASS
6	2437	11.74	0.5	PASS
11	2462	11.86	0.5	PASS

CH1





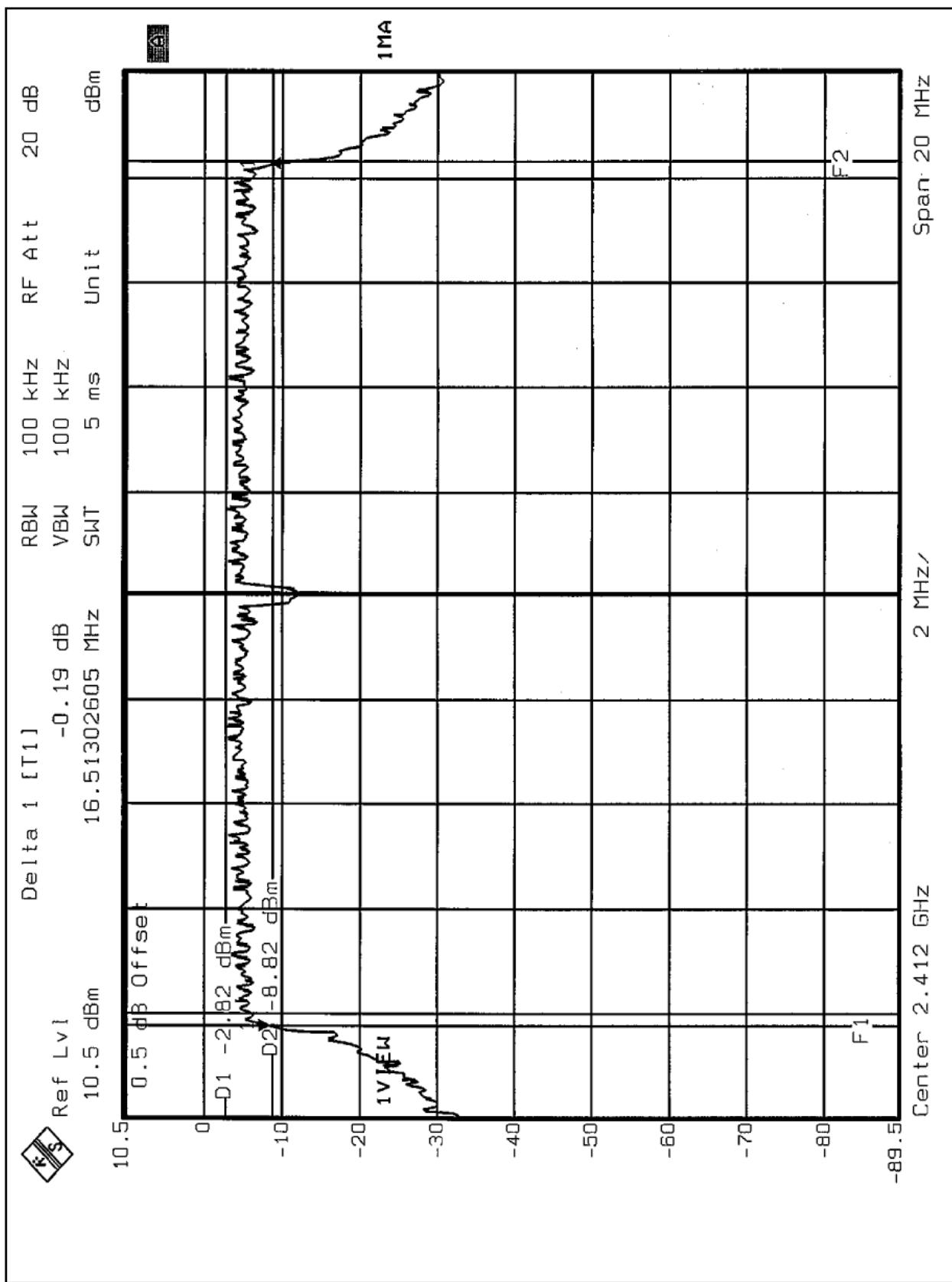
CH11



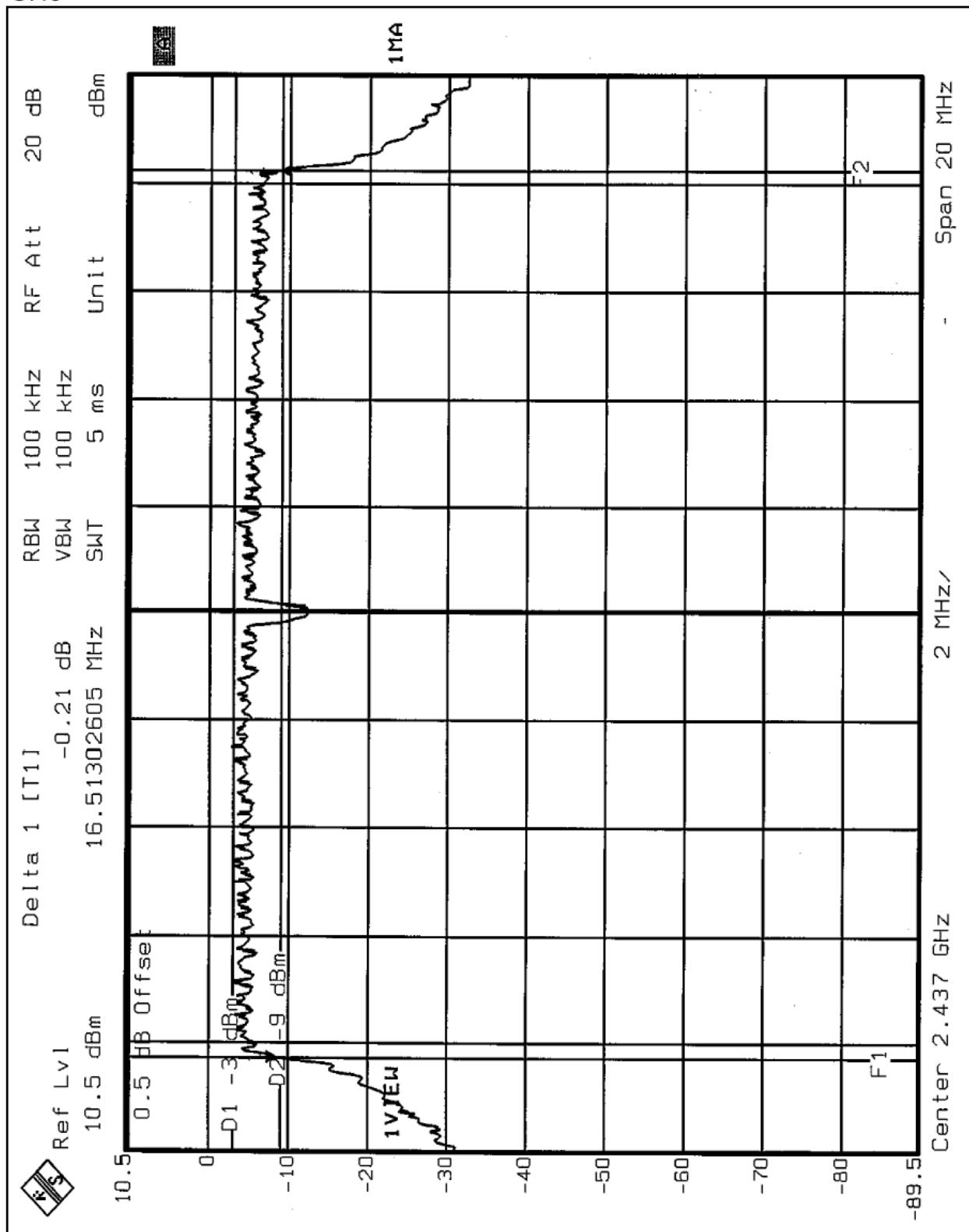
<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.51	0.5	PASS
6	2437	16.51	0.5	PASS
11	2462	16.55	0.5	PASS

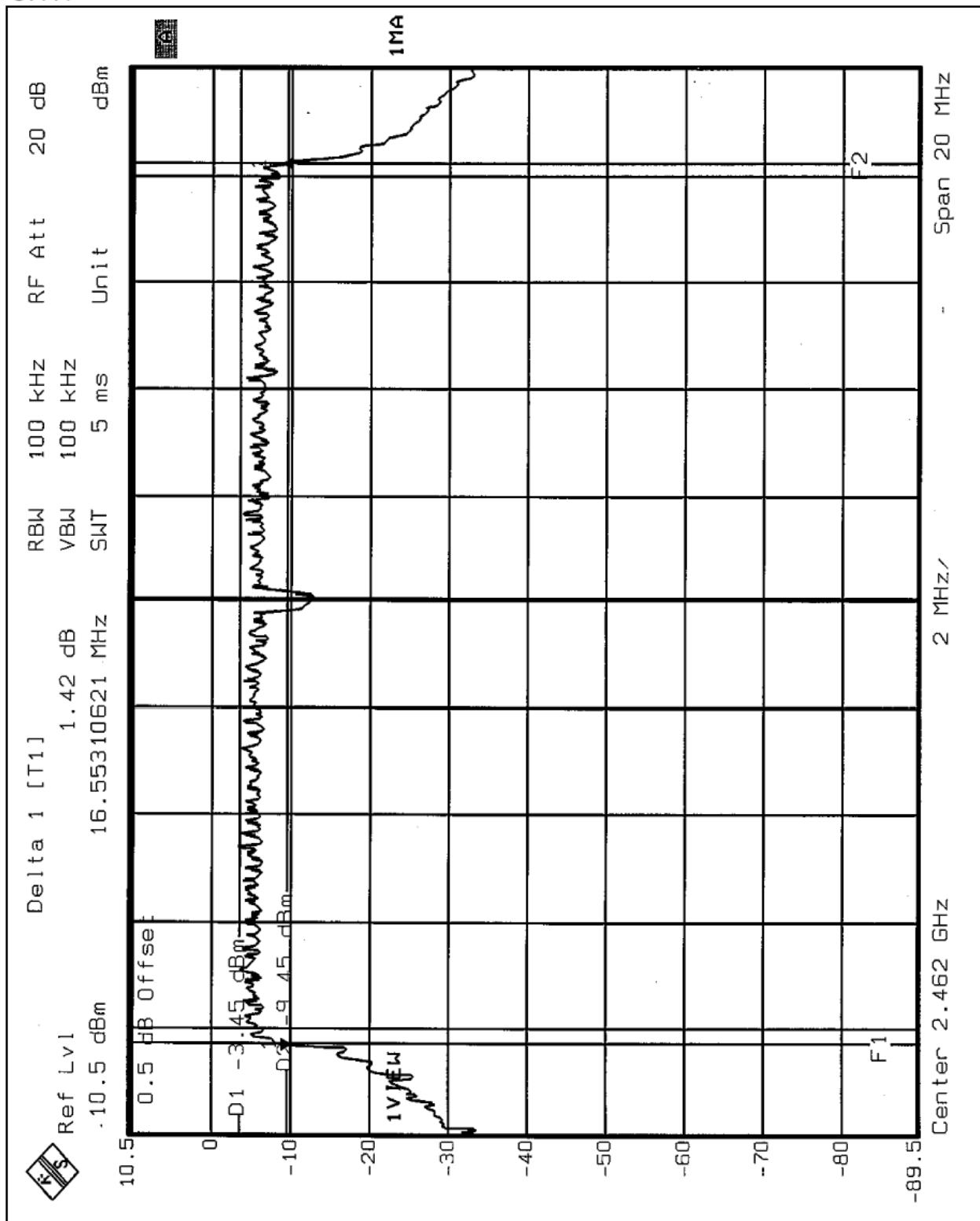
CH1



CH6



CH11



## §15.247(b)(3) - PEAK OUTPUT POWER MEASUREMENT

### Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

### Measurement Procedure

The transmitter output was connected to the peak power meter.



### Equipment Lists

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 31, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	C019167	Feb. 01, 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.

**Measurement Result**

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	17.10	30	PASS
6	2437	17.00	30	PASS
11	2462	17.20	30	PASS

<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	12.00	30	PASS
6	2437	12.10	30	PASS
11	2462	12.10	30	PASS

## §15.247(d) - 100 KHZ BANDWIDTH OF BAND EDGES

### Standard Applicable

According to §15.247(d), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) see §15.205(c)).

### Measurement Procedure

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### Equipment Lists

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

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

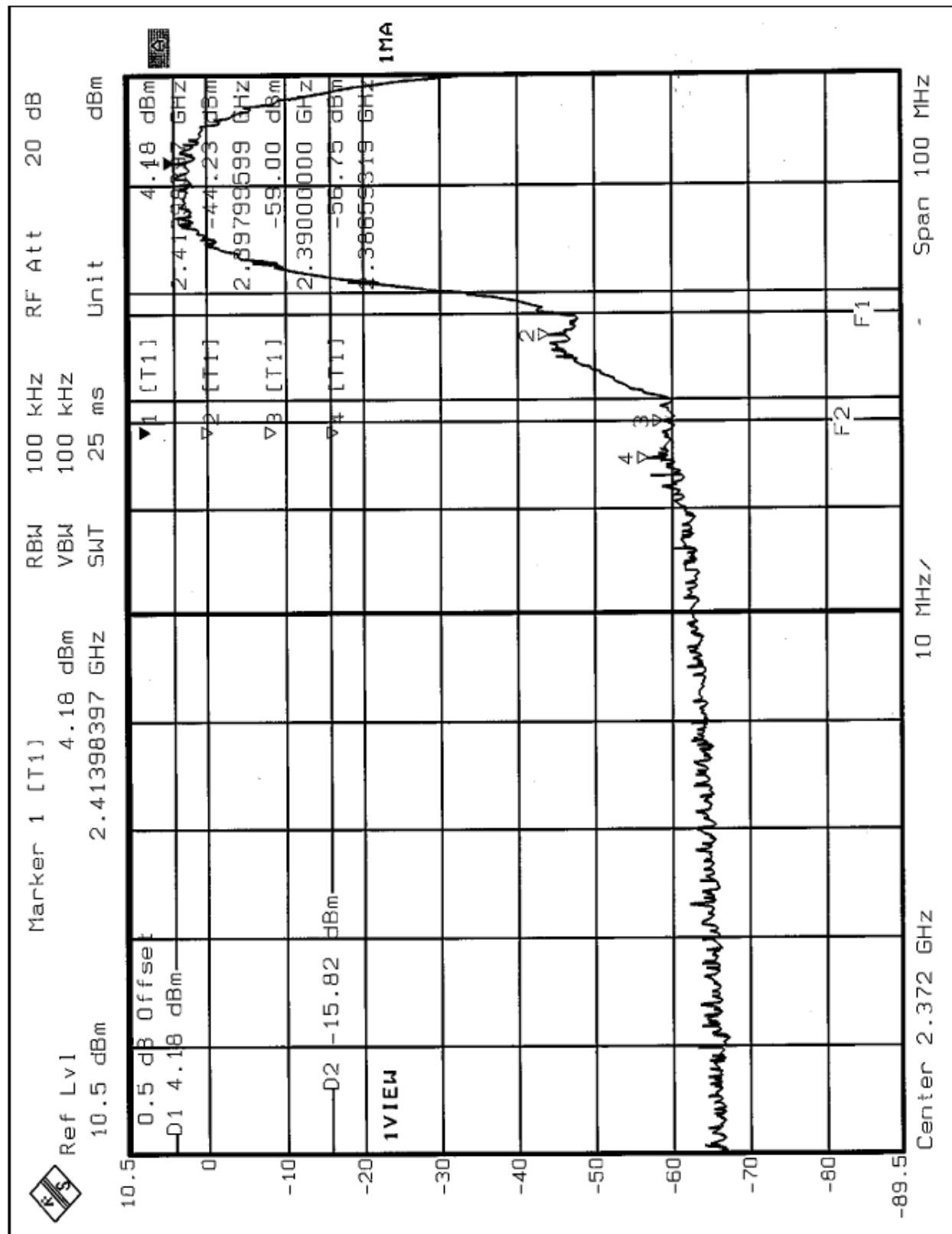
### Measurement Result

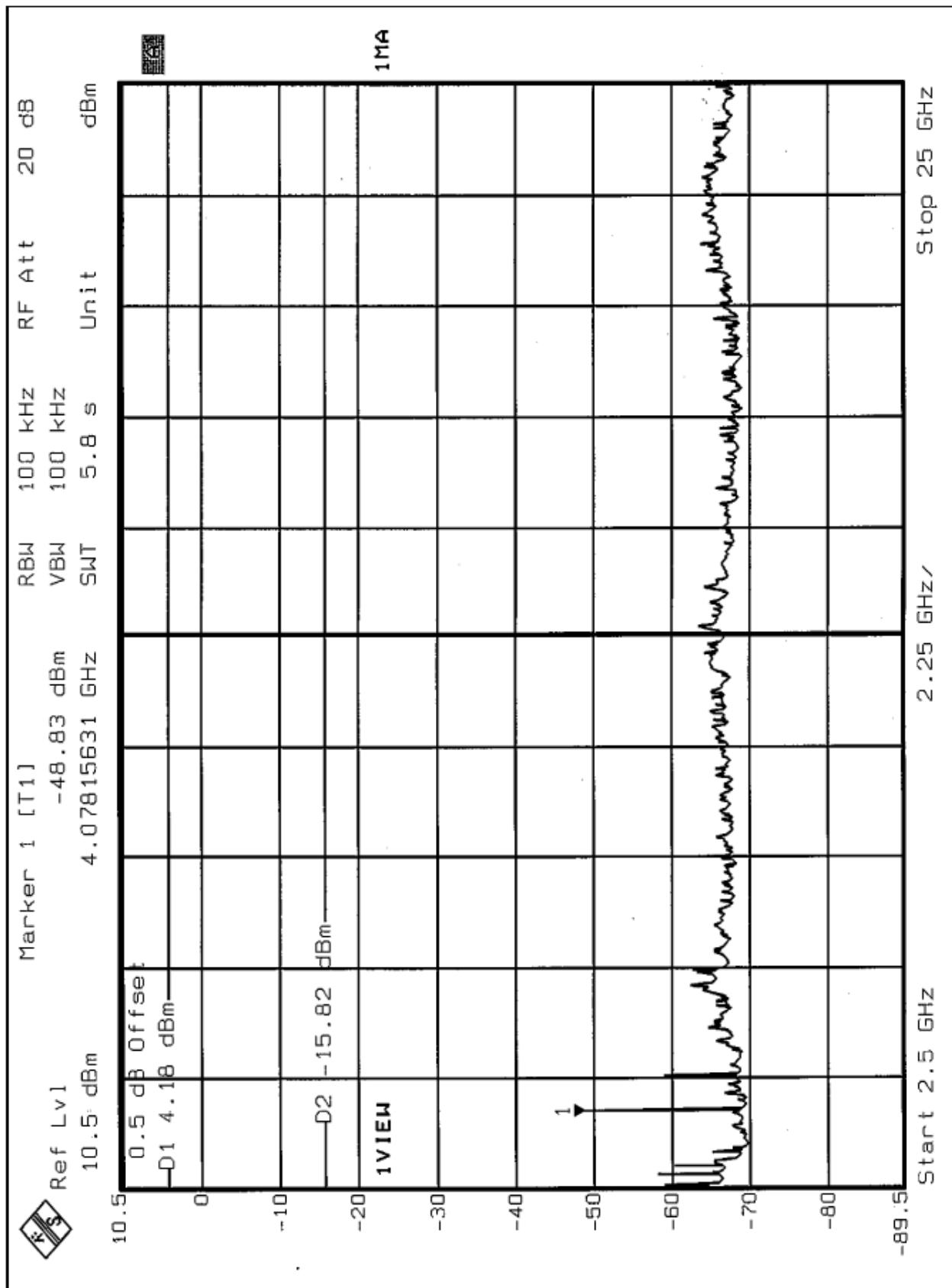
The spectrum plots are attached on the following 4 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

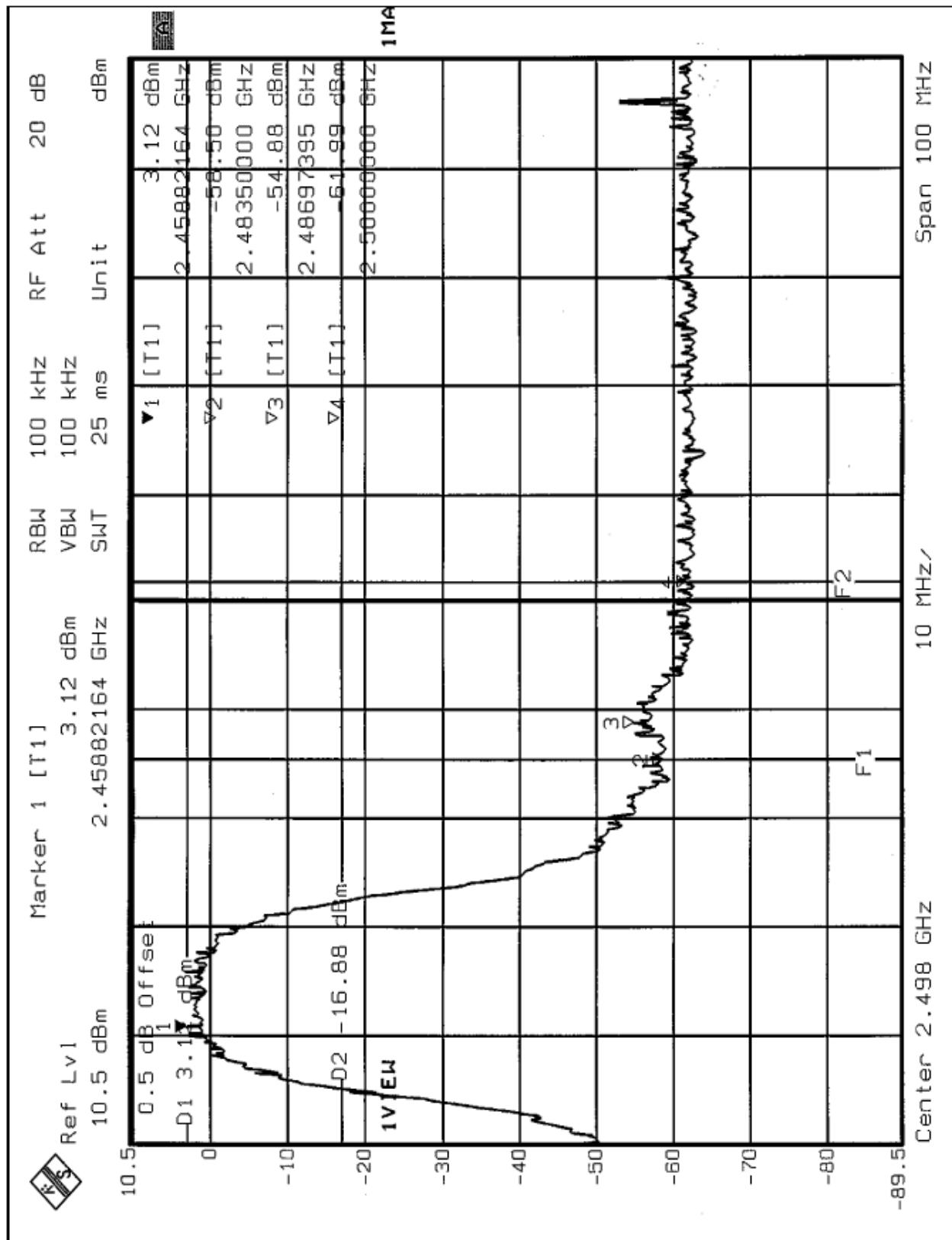
#### NOTE:

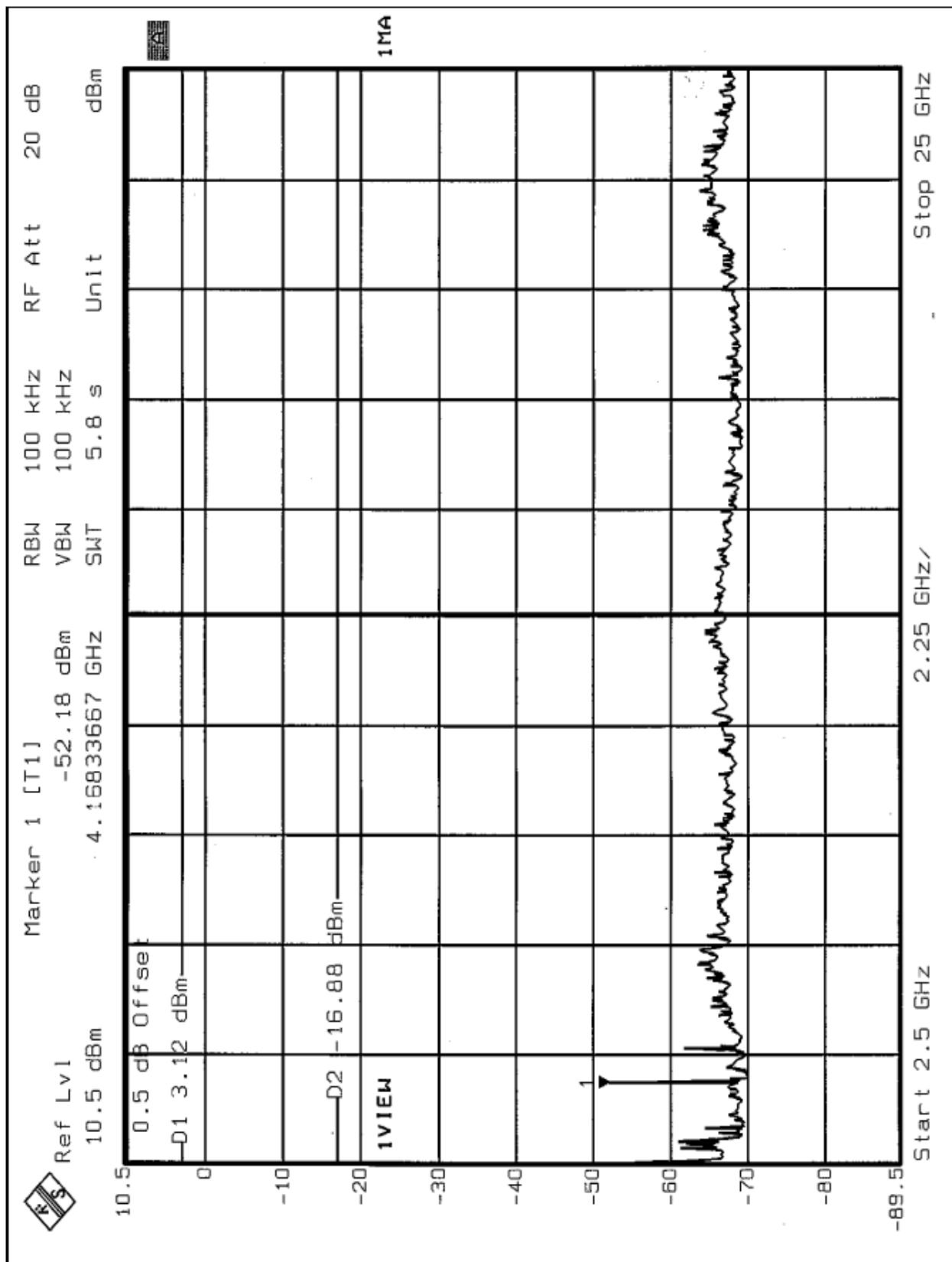
The band edge emission plot on the following 1~2 pages show 60.93dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.8 is 102.94dBuV/m, so the maximum field strength in restrict band is  $102.94 - 60.93 = 42.01$ dBuV/m which is under 54dBuV/m limit.

The band edge emission plot on the following 3~4 pages show 58.00dB 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 4.2.8 is 102.26dBuV/m, so the maximum field strength in restrict band is  $102.26 - 58.00 = 44.26$ dBuV/m which is under 54dBuV/m limit.









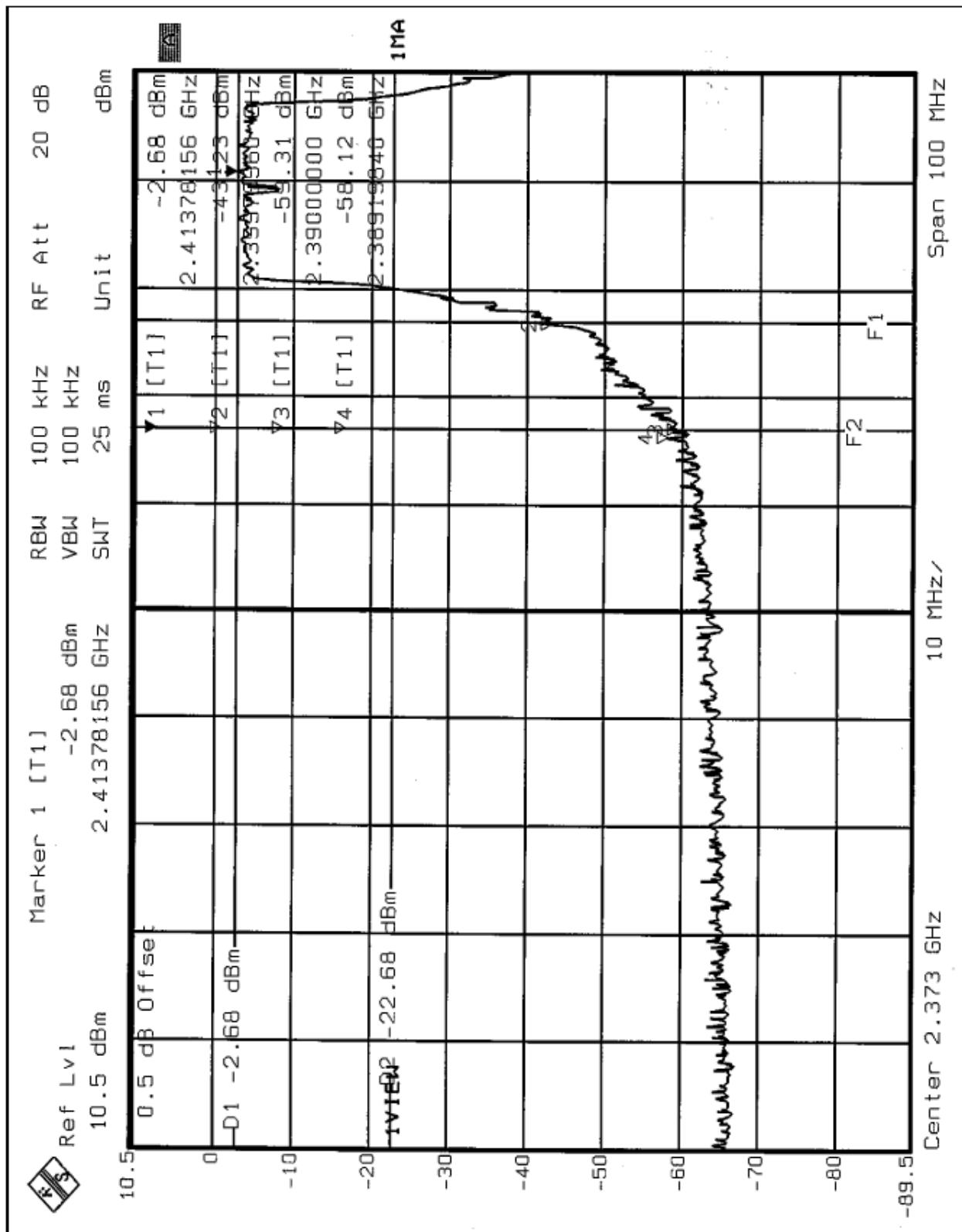
The spectrum plots are attached on the following 4 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

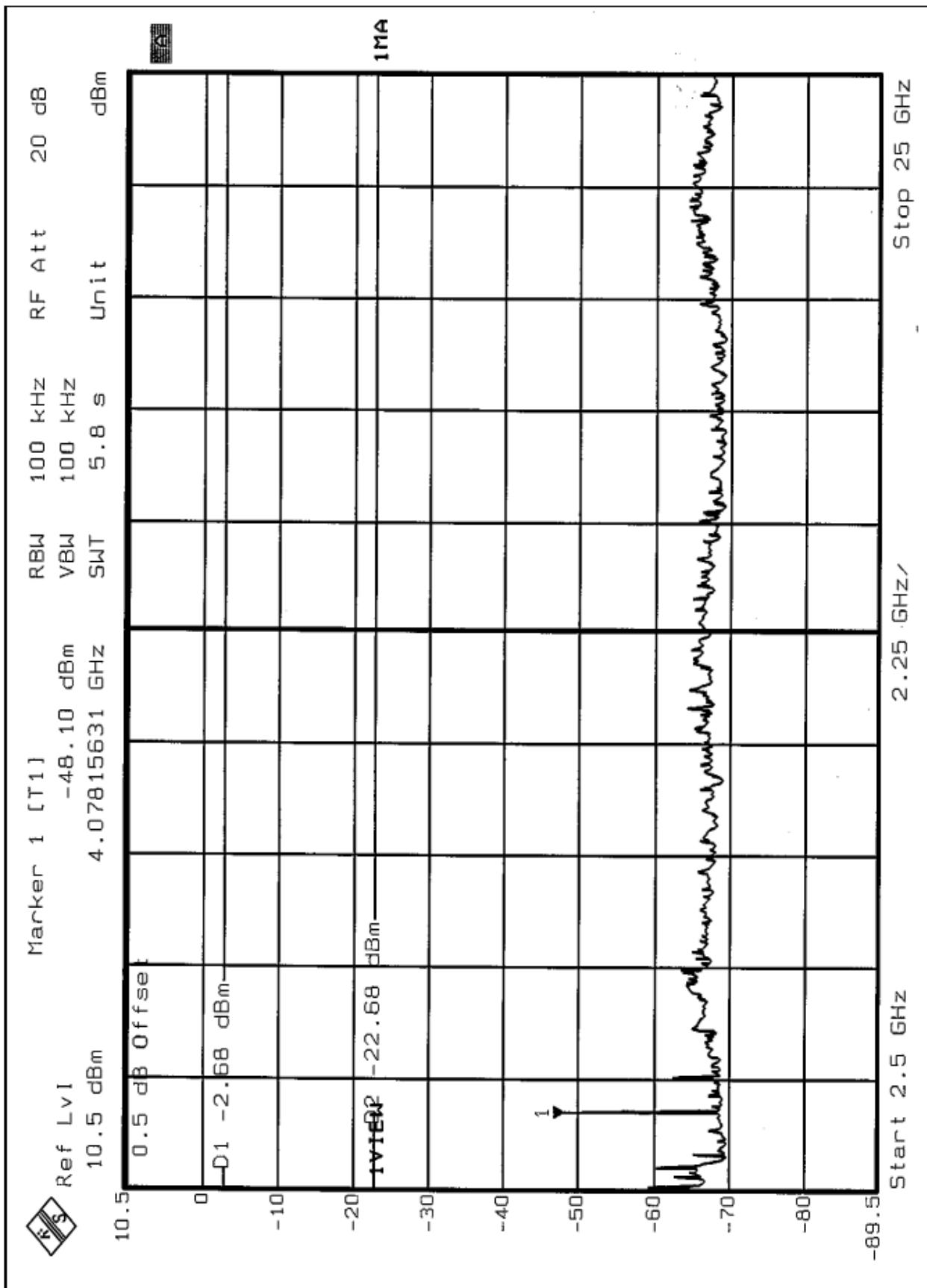
**NOTE :**

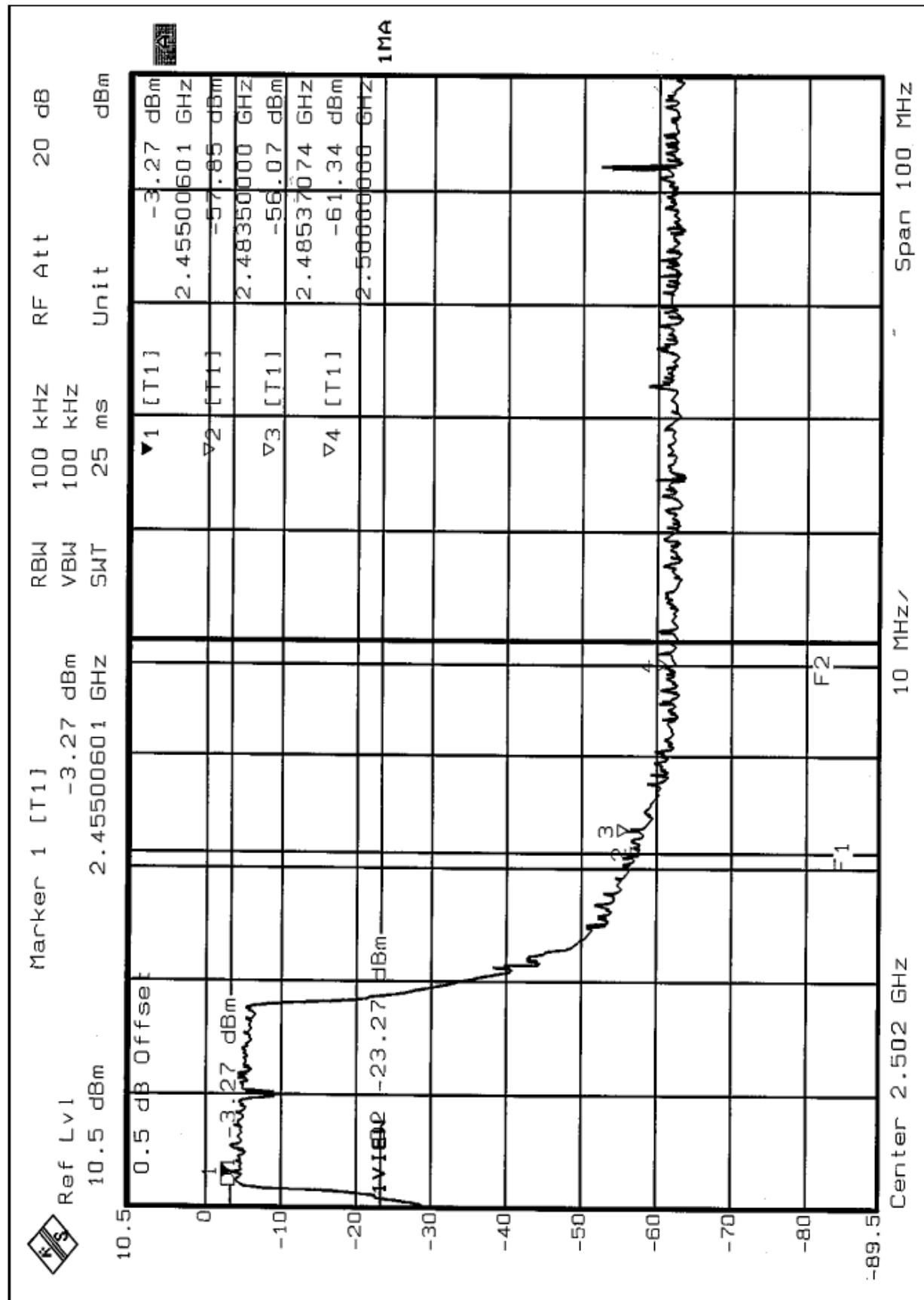
The band edge emission plot on the following 1~2 pages show 55.44dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.9 is 97.19dB<sub>UV</sub>/m, so the maximum field strength in restrict band is  $97.19 - 55.44 = 41.75$ dB<sub>UV</sub>/m which is under 54dB<sub>UV</sub>/m limit.

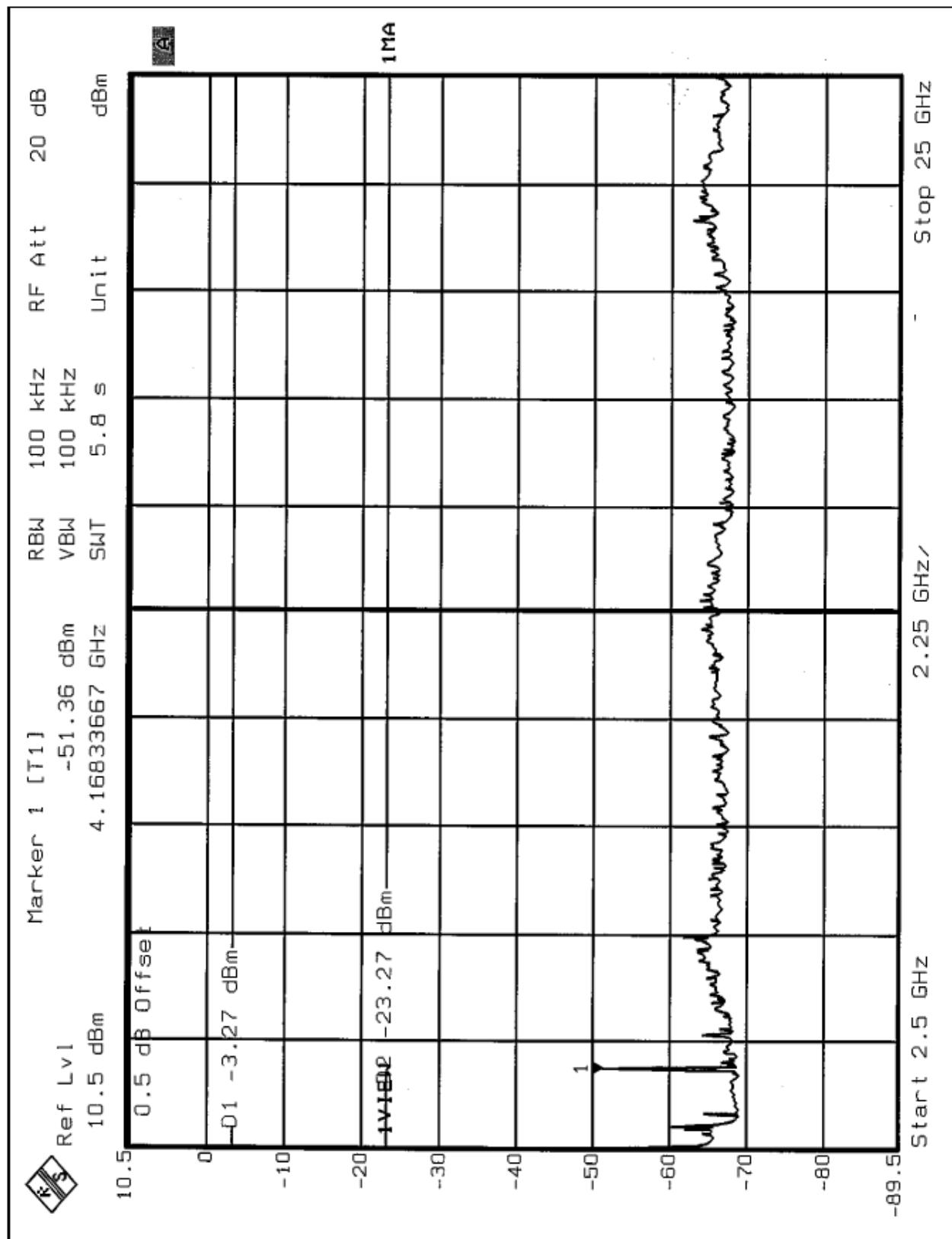
**NOTE :**

The band edge emission plot on the following 3~4 pages show 52.80dB 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 4.2.9 is 96.25dB<sub>UV</sub>/m, so the maximum field strength in restrict band is  $96.25 - 52.80 = 43.45$ dB<sub>UV</sub>/m which is under 54dB<sub>UV</sub>/m limit.









## §15.247(e) - POWER SPECTRAL DENSITY

### Standard Applicable

According to §15.247 (e), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### Measurement 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.

### Equipment Lists

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2005

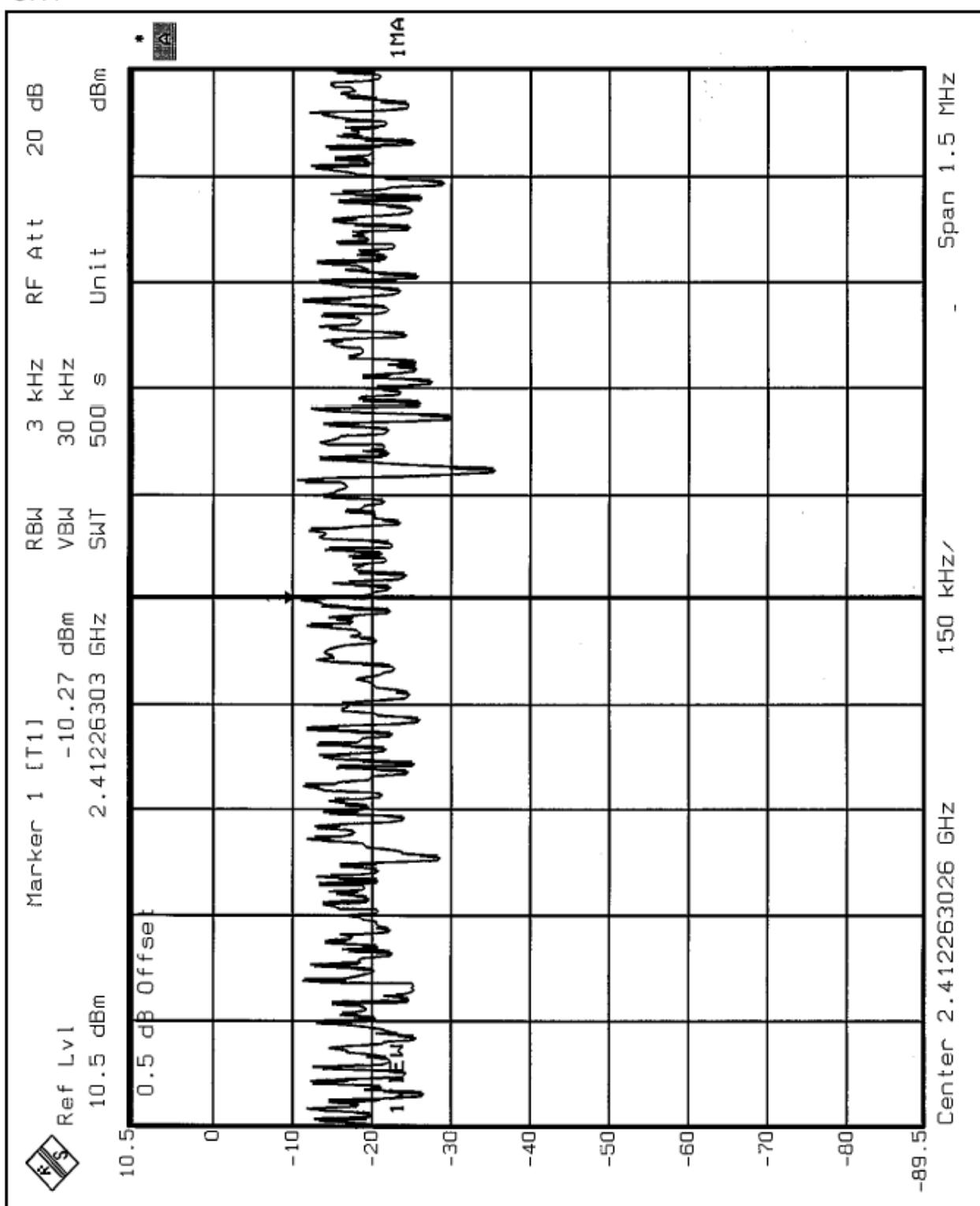
NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### Measurement Result

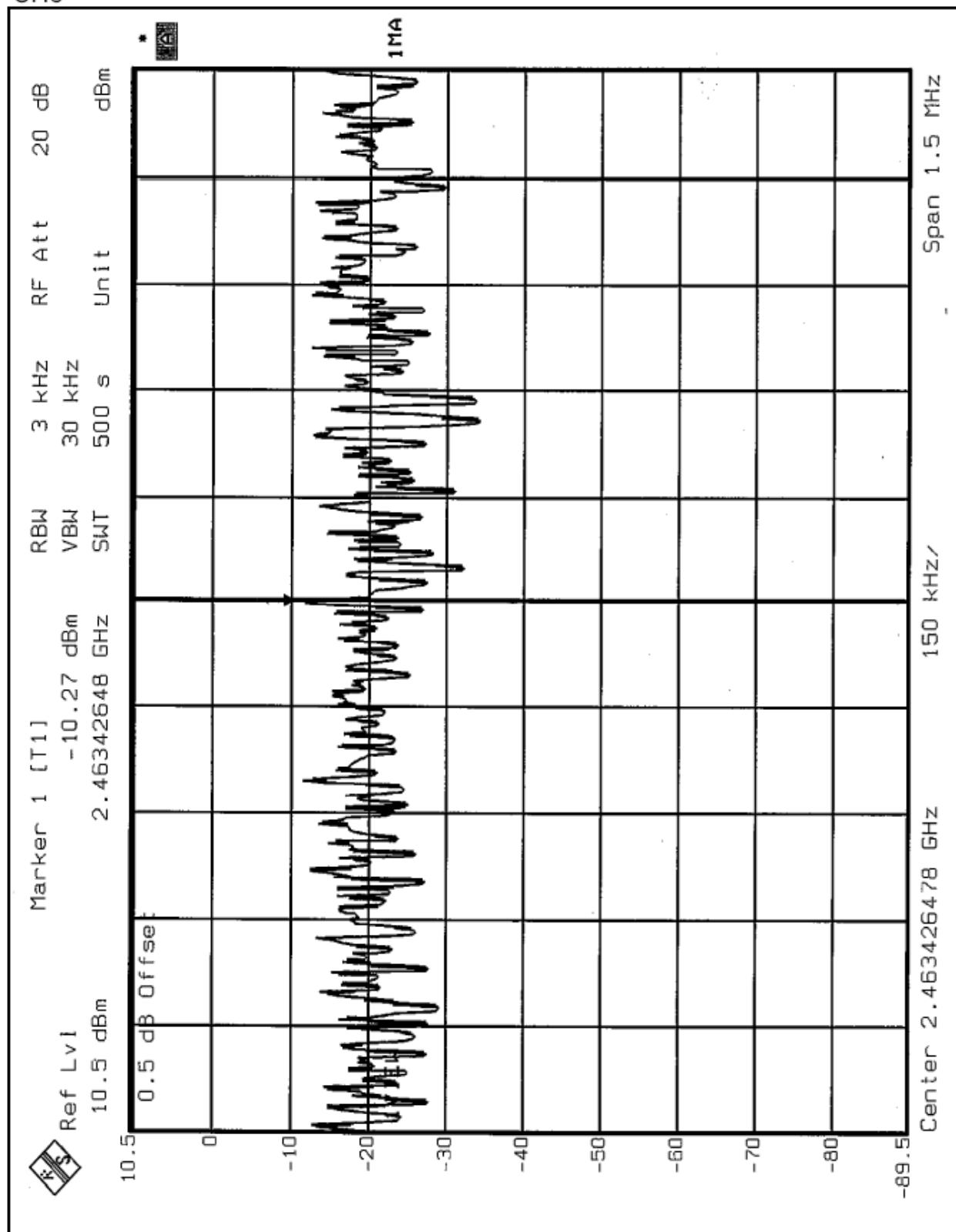
<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-10.27	8	PASS
6	2437	-10.27	8	PASS
11	2462	-9.28	8	PASS

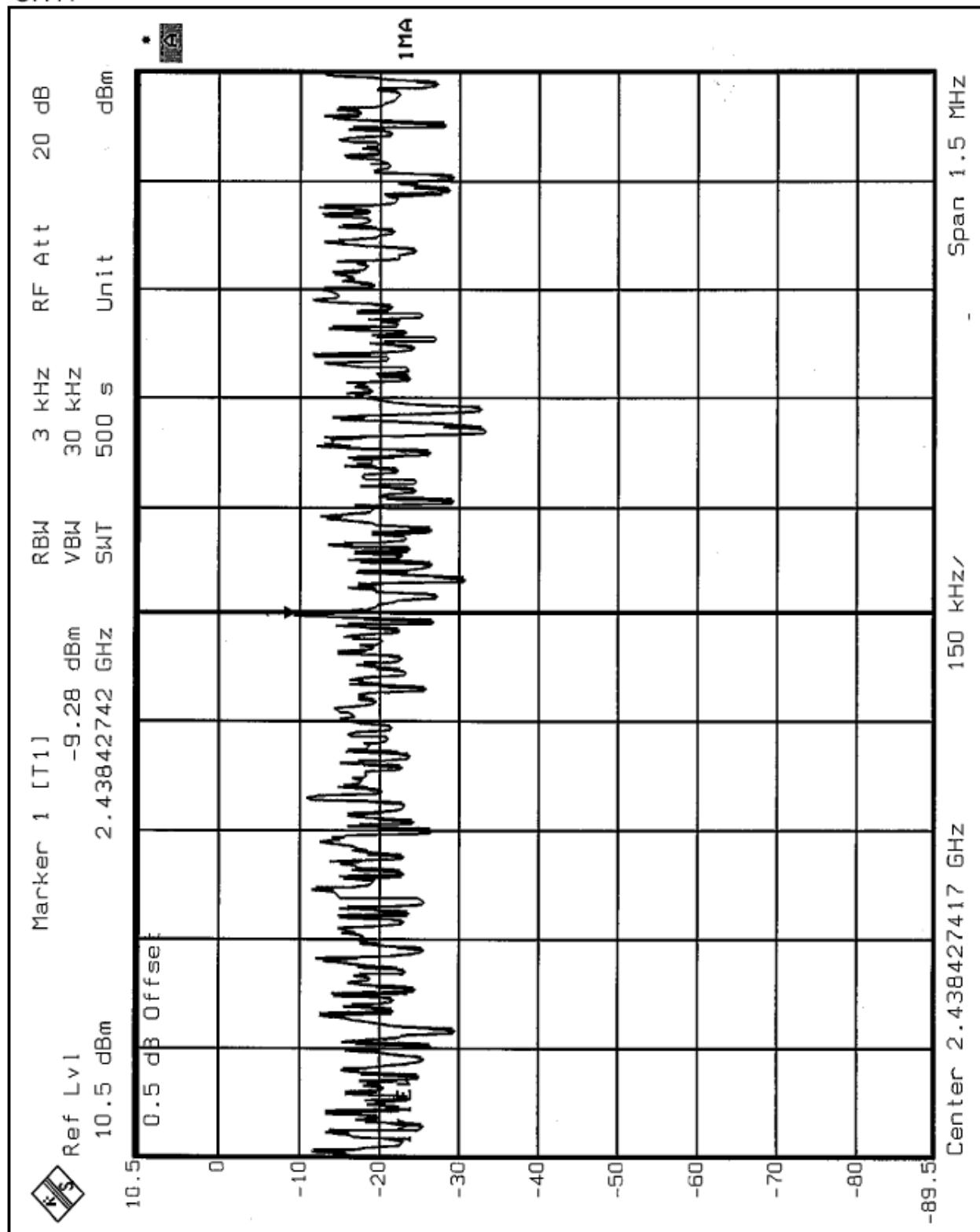
CH1



CH6



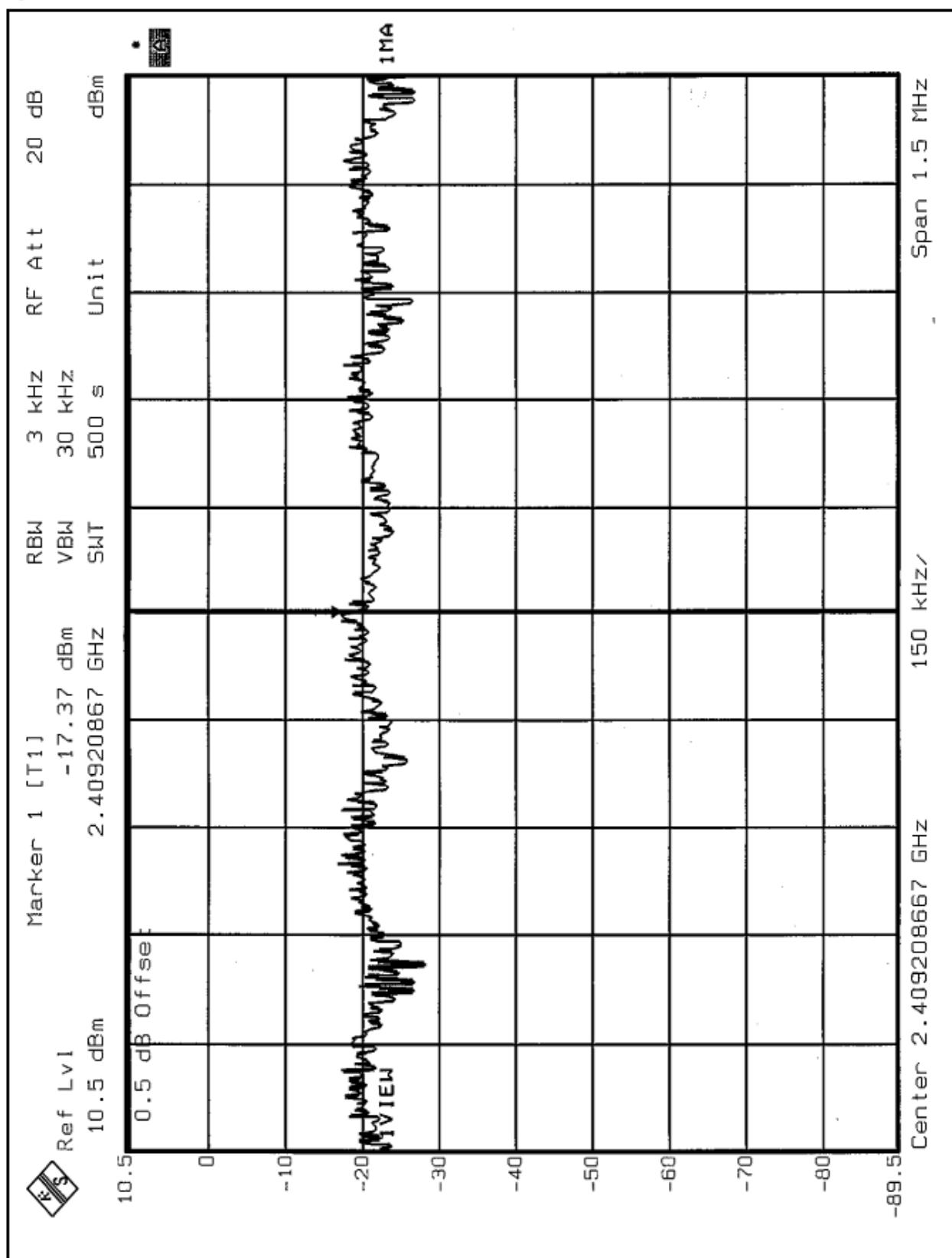
CH11



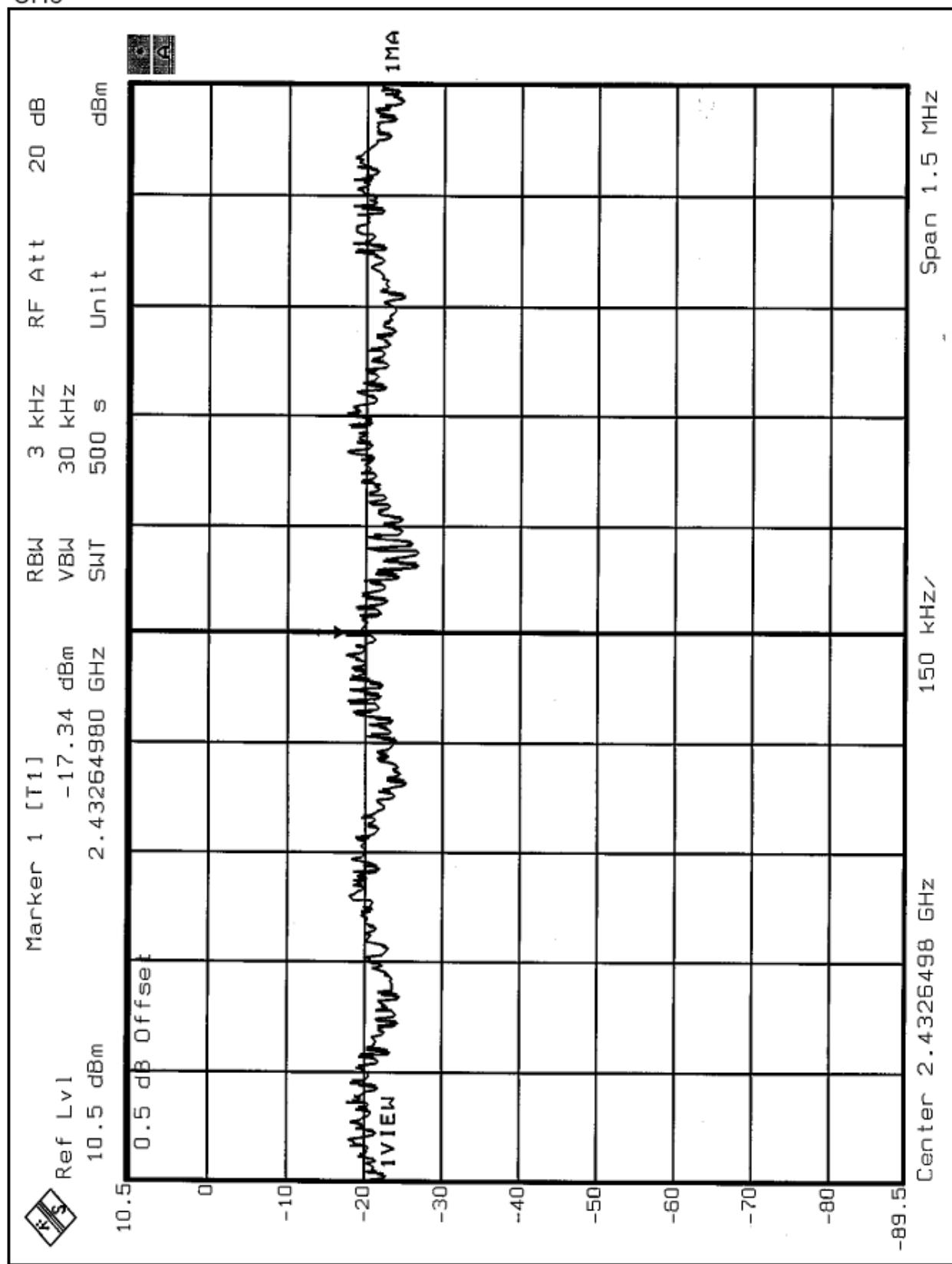
<b>EUT</b>	MiniPCI 802.11g Wireless LAN Card	<b>MODEL</b>	Q802MKG
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 62%RH, 991 hPa
<b>TESTED BY</b>	Steven Lu		

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-17.37	8	PASS
6	2437	-17.34	8	PASS
11	2462	-18.80	8	PASS

CH1



CH6



CH11

