



FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4 : 2003

TEST REPORT (Class II Permissive Change Report)

For

Mini Card bg WLAN Module

Model : GMEWLGR-2

Issued for

Billionton Systems Inc.

No. 21, Sui-Lih Rd., Hsin-Chu, 300, Taiwan

Issued by

**Compliance Certification Services Inc.
Hsinchu Lab.**

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	10/25/2007	Initial Issue	All Page 34	C. F. Wu



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1. TEST REPORT CERTIFICATION

Applicant : Billionton Systems Inc.
Address : No. 21, Sui-Lih Rd., Hsin-Chu, 300, Taiwan
Equipment Under Test : Mini Card bg WLAN Module
Model : GMEWLGR-2
Tested Date : August 13 ~ October 05, 2007

APPLICABLE STANDARD	
STANDARD	TEST RESULT
FCC Part 15 Subpart C:2006 AND ANSI C63.4:2003	No non-compliance noted

Approved by:

Reviewed by:

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WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.



2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	Mini Card bg WLAN Module
Model Number	GMEWLGR-2
Frequency Range	IEEE 802.11b/g : 2412MHz to 2462MHz
Transmit Power	IEEE 802.11b : 18.73dBm IEEE 802.11g : 13.81dBm
Channel Spacing	IEEE 802.11b/g : 5MHz
Channel Number	IEEE 802.11b/g : 11 Channels
Transmit Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48, 36, 24, 18, 12, 9, 6 Mbps
Type of Modulation	IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g : OFDM (64QAM, 16AQM, QPSK, BPSK)
Frequency Selection	by software / firmware
Power Source	5.0VDC (From Notebook PC, Powered From Host Device)

Antenna List :

No.	Antenna Type	Manufacturer	Model	Antenna Gain
1	PIFA Antenna	ECS	S20	2.03dBi
2	PIFA Antenna	ECS	S40	2.34dBi
3	PIFA Antenna	FVC	S20	-0.8dBi
4	PIFA Antenna	FVC	L41	-0.04dBi
5	PIFA Antenna	FVC	L45	-0.04dBi
6	PIFA Antenna	FVC	L51	0.53dBi
7	PIFA Antenna	FVC	L52	-0.24dBi
8	PIFA Antenna	FVC	L56	-0.24dBi
9	PIFA Antenna	FVC	L71	1.48dBi
10	PIFA Antenna	FVC	L75	1.48dBi
11	PIFA Antenna	FVC(MIMO)	L55-ID3	2.01dBi
12	PIFA Antenna	FVC(MIMO)	L55-ID4	1.85dBi
13	PIFA Antenna	FVC(MIMO)	L55II(ID1&ID2)	0.95dBi
14	PIFA Antenna	JEN	U30.U40	2.99dBi
15	PIFA Antenna	JEN	U50	2.53dBi
16	PIFA Antenna	WGT	S20	1.05dBi
17	PIFA Antenna	WGT	S40	0.84dBi
18	PIFA Antenna	WGT	L41	-0.24dBi
19	PIFA Antenna	WGT	L45	0.66dBi
20	PIFA Antenna	WGT	L51	1.68dBi
21	PIFA Antenna	WGT	L55II(ID1&ID2)	1.99dBi
22	PIFA Antenna	WGT	L55IIBT	1.99dBi
23	PIFA Antenna	WGT	U30.U40	-1.83dBi
24	PIFA Antenna	WGT	U50	-0.66dBi

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: NLFGMEWLGR-2 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the User's manual of the EUT.



2.2 DESCRIPTION OF CLASS II CHABNGE

The major change filed under this application are :

1. Add antennas.

3. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b : 11Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11g : 6Mbps data rate (worst case) were chosen for full testing.

The worst-case data rates are determined according to the description above, based on the investigations by measuring the PSD and average power across all the data rates, bandwidths, modulations and spatial stream modes.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CRF 47 2.1046, 2046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at Rm.258, Bldg.17, NO.195 , Sec. 4, Chung Hsing Rd., Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200118-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: 90585 and 90584).

**5.4 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP	EN 55014-1, AS/NZS 1044, CNS 13783-1, IEC/CISPR 14-1, IEC/CISPR 22, EN 55022, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, AS/NZS CISPR 22, AS/NZS 3548, IEC 61000-4-2/3/4/5/6/8/11	 200118-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 90585, 90584
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-1229/1189 C-1250/1294
Taiwan	TAF	FCC Method-47 CFR Part 15 Subpart C,D,E, CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, CNS 13803, CISPR 13, CNS 13439, FCC Method-47 CFR Part 15 Subpart B, CISPR 14-1, EN 55014-1, CNS 13783-1, EN 55015, CNS 14115, CISPR 22, EN 55022, VCCI CNS 13438, EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 0240
Taiwan	BSMI	CNS 13803, CNS 13438, CNS 13439, CNS 13783-1, CNS 14115	 SL2-IS-E-0002 SL2-IN-E-0002 SL2-A1-E-0002 SL2-R1-E-0002 SL2-R2-E-0002 SL2-L1-E-0002
Canada	Industry Canada	RSS-GEN Issue 2	 IC 4417-1

* No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.



6. CALIBRATION AND UNCERTAINTY

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5 GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.1 dB

Uncertainty figures are valid to a confidence level of 95%



7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	ASUS	M5000	53NP009982	PD9WM3B2100
2	Notebook PC	DELL	Latitude D610	CN-0C4708-48643-625-5565	FCC DoC
3	Router	D-LINK	DI-524	DY0E369003043	KA2DI524G

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

RF :

TX Mode:

1. Set up whole system for test as shown on diagram.
2. Run QAU257 Test software (Ralink QA Test Program for 2571 USB(Working!)).
3. Select : (1) IEEE 802.11b: LONG rate 11Mbps
(2) IEEE 802.11g: OFDM rate 6Mbps
4. Power control
IEEE 802.11b: Channel Low(2412MHz)Low=B
IEEE 802.11b: Channel Low(2437MHz)Middle=B
IEEE 802.11b: Channel Low(2462MHz)High=B
IEEE 802.11g : Channel Low(2412MHz)Low=9
IEEE 802.11g : Channel Low(2437MHz)Middle=9
IEEE 802.11g : Channel Low(2462MHz)High=9
5. Start TX

RX Mode: Start RX

Normal operating :

1. Setup whole system for test as shown on diagram
2. Notebook PC (1) ping 192.168.0.122 -t to Notebook PC (2).
3. All of the function are under run.
4. Start test.



8. APPLICABLE LIMITS AND TEST RESULTS

8.1 RADIATED EMISSIONS

8.1.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) 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
¹ 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 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field 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 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, 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.



§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

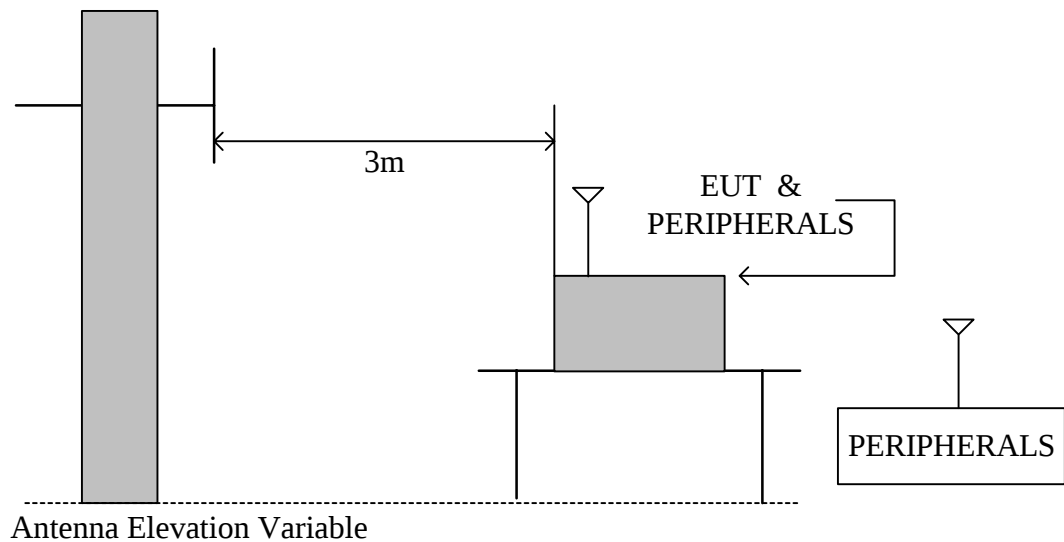
TEST EQUIPMENT

The following test equipment is utilized in making the measurements contained in this report.

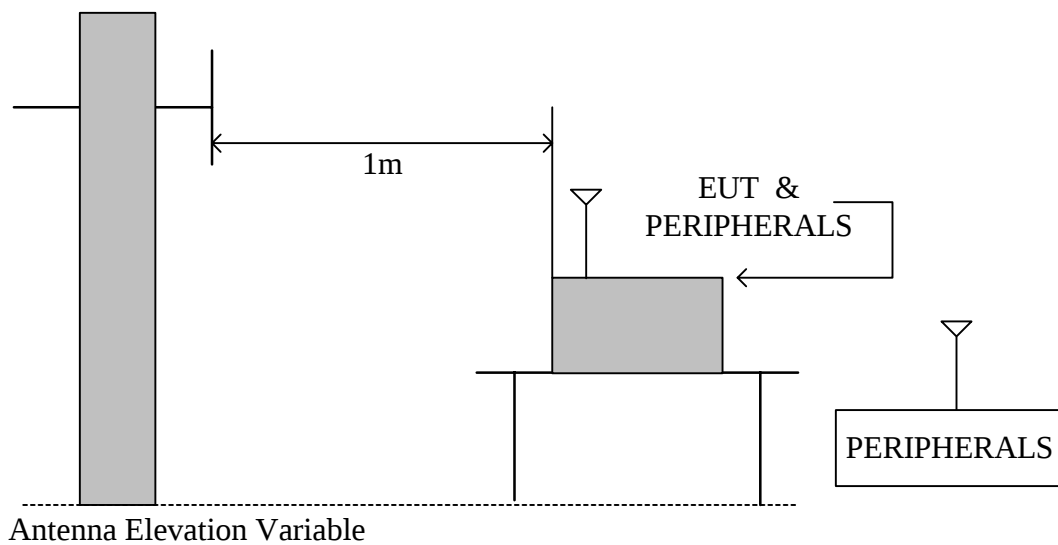
Manufacturer or Type	Model No.	Serial No.	Date of Calibration	Calibration Period	Remark
CHASE BILOG ANTENNA	CBL6112B	2817	August 28, 2007	1 Year	FINAL
R/S SPECTRUM ANALYZER	FSEK30	835253/002	October 18, 2006	1 Year	FINAL
AGILENT SPECTRUM ANALYZER	E4446A	MY43360132	June 06, 2007	1 Year	FINAL
R/S EMI TEST RECEIVER	ESCS 30	835418/008	September 02, 2007	1 Year	FINAL
OPEN SITE	-----	No.2	May 07, 2007	1 Year	FINAL
BELDEN N TYPE COAXIAL CABLE	9913-30M	001	August 21, 2007	1 Year	FINAL
Horn Antenna	AH-118	10089	August 30, 2007	1 Year	FINAL
Horn Antenna	AH-840	03077	February 25, 2007	1 Year	FINAL
Agilent Pre-amplifier	8449B	3008A01471	December 25, 2006	1 Year	FINAL
HP Amplifier	8447D	1937A02748	December 25, 2006	1 Year	FINAL
HP High pass filter	84300/80038	002	CAL. ON USE	1 Year	FINAL
HP High pass filter	84300/80039	003	CAL. ON USE	1 Year	FINAL
Loop Antenna ETS-LINDGREN	6502	2356	June 15, 2007	1 Year	FINAL
SCHAFFER BILOG ANTENNA	CBL6112B	2696	April 19, 2007	1 Year	FINAL
R/S TEST RECEIVER	ESCS 30	826547/004	June 13, 2007	1 Year	FINAL
OPEN SITE	-----	No.1	May 06, 2007	1 Year	FINAL
BELDEN N TYPE COAXIAL CABLE	9913-30M	002	April 27, 2007	1 Year	FINAL

TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.





TEST PROCEDURE

- 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. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 1 meter away from the interference-receiving antenna
- 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 polarization 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 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 120 KHz 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 and frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

TEST RESULTS

No non-compliance noted



8.1.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

Product Name	Mini Card bg WLAN Module	Test Date	2007/10/01
Model	GMEWLGR-2	Test By	YJ. Jeng
Test Mode	Normal operating	TEMP & Humidity	35°C, 66%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
37.76	15.65	0.91	19.40	21.10	40.00	35.97	37.67
94.02	10.24	1.46	27.30	25.10	43.50	39.00	36.80
143.99	11.92	1.59	19.80	20.00	43.50	33.31	33.51
216.00	11.74	1.93	25.70	19.60	43.50	39.37	33.27
359.08	16.13	2.51	22.30	20.90	46.00	40.95	39.55
750.71	20.85	3.77	17.60	17.80	46.00	42.22	42.42

Remark: Emission level (dBμV/m) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

**8.1.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz**

Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11b TX (CH Low)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1608.00	48.24	27.34	3.77	36.86	9.50	0.00	32.99	74.00	-41.01	P	1.00
1608.00	33.61	27.34	3.77	36.86	9.50	0.00	18.36	54.00	-35.64	A	1.00
3215.75	49.65	30.80	5.63	36.83	9.50	0.00	39.76	74.00	-34.24	P	1.00
3215.75	40.29	30.80	5.63	36.83	9.50	0.00	30.40	54.00	-23.60	A	1.00
4823.97	65.85	34.52	6.32	36.60	9.50	0.35	60.94	74.00	-13.06	P	1.00
4823.97	52.79	34.52	6.32	36.60	9.50	0.35	47.88	54.00	-6.12	A	1.00
6432.22	50.46	36.21	7.81	36.69	9.50	0.29	48.58	74.00	-25.42	P	1.00
6432.22	44.39	36.21	7.81	36.69	9.50	0.29	42.51	54.00	-11.49	A	1.00
7236.00	46.32	39.54	8.27	36.85	9.50	0.90	48.68	74.00	-25.32	P	1.00
7236.00	32.54	39.54	8.27	36.85	9.50	0.90	34.90	54.00	-19.10	A	1.00
Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1608.00	48.63	27.34	3.77	36.86	9.50	0.00	33.38	74.00	-40.62	P	1.00
1608.00	34.42	27.34	3.77	36.86	9.50	0.00	19.17	54.00	-34.83	A	1.00
3215.75	52.83	30.80	5.63	36.83	9.50	0.00	42.94	74.00	-31.06	P	1.00
3215.75	45.52	30.80	5.63	36.83	9.50	0.00	35.63	54.00	-18.37	A	1.00
4823.97	64.74	34.52	6.32	36.60	9.50	0.35	59.83	74.00	-14.17	P	1.00
4823.97	51.70	34.52	6.32	36.60	9.50	0.35	46.79	54.00	-7.21	A	1.00
6432.22	53.23	36.21	7.81	36.69	9.50	0.29	51.35	74.00	-22.65	P	1.00
6432.22	49.47	36.21	7.81	36.69	9.50	0.29	47.59	54.00	-6.41	A	1.00
7236.00	46.25	39.54	8.27	36.85	9.50	0.90	48.61	74.00	-25.39	P	1.00
7236.00	33.25	39.54	8.27	36.85	9.50	0.90	35.61	54.00	-18.39	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:

$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11b TX (CH Middle)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1625.07	49.80	27.48	3.80	36.85	9.50	0.00	34.72	74.00	-39.28	P	1.00
1625.07	38.32	27.48	3.80	36.85	9.50	0.00	23.24	54.00	-30.76	A	1.00
3249.19	48.32	30.80	5.65	36.81	9.50	0.00	38.46	74.00	-35.54	P	1.00
3249.19	38.71	30.80	5.65	36.81	9.50	0.00	28.85	54.00	-25.15	A	1.00
4874.05	65.28	34.60	6.32	36.61	9.50	0.30	60.38	74.00	-13.62	P	1.00
4874.05	52.27	34.60	6.32	36.61	9.50	0.30	47.37	54.00	-6.63	A	1.00
6498.72	52.77	36.30	7.93	36.72	9.50	0.30	51.08	74.00	-22.92	P	1.00
6498.72	48.67	36.30	7.93	36.72	9.50	0.30	46.98	54.00	-7.02	A	1.00
7311.00	46.32	39.61	8.30	36.93	9.50	0.83	48.63	74.00	-25.37	P	1.00
7311.00	32.65	39.61	8.30	36.93	9.50	0.83	34.96	54.00	-19.04	A	1.00
Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1625.07	51.67	27.48	3.80	36.85	9.50	0.00	36.59	74.00	-37.41	P	1.00
1625.07	42.87	27.48	3.80	36.85	9.50	0.00	27.79	54.00	-26.21	A	1.00
3249.19	54.12	30.80	5.65	36.81	9.50	0.00	44.26	74.00	-29.74	P	1.00
3249.19	49.54	30.80	5.65	36.81	9.50	0.00	39.68	54.00	-14.32	A	1.00
4874.05	64.24	34.60	6.32	36.61	9.50	0.30	59.34	74.00	-14.66	P	1.00
4874.05	51.44	34.60	6.32	36.61	9.50	0.30	46.54	54.00	-7.46	A	1.00
6498.72	53.61	36.30	7.93	36.72	9.50	0.30	51.92	74.00	-22.08	P	1.00
6498.72	50.31	36.30	7.93	36.72	9.50	0.30	48.62	54.00	-5.38	A	1.00
7311.00	46.87	39.61	8.30	36.93	9.50	0.83	49.18	74.00	-24.82	P	1.00
7311.00	33.69	39.61	8.30	36.93	9.50	0.83	36.00	54.00	-18.00	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:
$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11b TX (CH High)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1641.16	50.18	27.60	3.82	36.84	9.50	0.00	35.27	74.00	-38.73	P	1.00
1641.16	36.71	27.60	3.82	36.84	9.50	0.00	21.80	54.00	-32.20	A	1.00
3282.80	48.87	30.80	5.67	36.80	9.50	0.00	39.04	74.00	-34.96	P	1.00
3282.80	39.86	30.80	5.67	36.80	9.50	0.00	30.03	54.00	-23.97	A	1.00
4923.95	62.39	34.68	6.32	36.62	9.50	0.25	57.51	74.00	-16.49	P	1.00
4923.95	49.28	34.68	6.32	36.62	9.50	0.25	44.40	54.00	-9.60	A	1.00
6565.43	52.50	36.69	7.96	36.70	9.50	0.41	51.36	74.00	-22.64	P	1.00
6565.43	47.17	36.69	7.96	36.70	9.50	0.41	46.03	54.00	-7.97	A	1.00
7386.00	46.12	39.69	8.33	37.01	9.50	0.76	48.39	74.00	-25.61	P	1.00
7386.00	32.74	39.69	8.33	37.01	9.50	0.76	35.01	54.00	-18.99	A	1.00

Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1641.16	49.04	27.60	3.82	36.84	9.50	0.00	34.13	74.00	-39.87	P	1.00
1641.16	34.37	27.60	3.82	36.84	9.50	0.00	19.46	54.00	-34.54	A	1.00
3282.80	53.07	30.80	5.67	36.80	9.50	0.00	43.24	74.00	-30.76	P	1.00
3282.80	49.04	30.80	5.67	36.80	9.50	0.00	39.21	54.00	-14.79	A	1.00
4923.95	63.37	34.68	6.32	36.62	9.50	0.25	58.49	74.00	-15.51	P	1.00
4923.95	50.68	34.68	6.32	36.62	9.50	0.25	45.80	54.00	-8.20	A	1.00
6565.43	52.60	36.69	7.96	36.70	9.50	0.41	51.46	74.00	-22.54	P	1.00
6565.43	48.53	36.69	7.96	36.70	9.50	0.41	47.39	54.00	-6.61	A	1.00
7386.00	46.37	39.69	8.33	37.01	9.50	0.76	48.64	74.00	-25.36	P	1.00
7386.00	32.82	39.69	8.33	37.01	9.50	0.76	35.09	54.00	-18.91	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:
$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11g TX (CH Low)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1608.00	48.14	27.34	3.77	36.86	9.50	0.00	32.89	74.00	-41.11	P	1.00
1608.00	33.97	27.34	3.77	36.86	9.50	0.00	18.72	54.00	-35.28	A	1.00
3215.90	48.63	30.80	5.63	36.83	9.50	0.00	38.74	74.00	-35.26	P	1.00
3215.90	39.98	30.80	5.63	36.83	9.50	0.00	30.09	54.00	-23.91	A	1.00
4826.36	56.91	34.52	6.32	36.60	9.50	0.34	52.00	74.00	-22.00	P	1.00
4826.36	42.54	34.52	6.32	36.60	9.50	0.34	37.63	54.00	-16.37	A	1.00
6431.96	51.63	36.20	7.81	36.69	9.50	0.29	49.75	74.00	-24.25	P	1.00
6431.96	46.66	36.20	7.81	36.69	9.50	0.29	44.78	54.00	-9.22	A	1.00
7236.00	47.01	39.54	8.27	36.85	9.50	0.90	49.37	74.00	-24.63	P	1.00
7236.00	32.45	39.54	8.27	36.85	9.50	0.90	34.81	54.00	-19.19	A	1.00
Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1608.00	49.76	27.34	3.77	36.86	9.50	0.00	34.51	74.00	-39.49	P	1.00
1608.00	33.90	27.34	3.77	36.86	9.50	0.00	18.65	54.00	-35.35	A	1.00
3215.90	51.93	30.80	5.63	36.83	9.50	0.00	42.04	74.00	-31.96	P	1.00
3215.90	45.11	30.80	5.63	36.83	9.50	0.00	35.22	54.00	-18.78	A	1.00
4826.36	56.58	34.52	6.32	36.60	9.50	0.34	51.67	74.00	-22.33	P	1.00
4826.36	41.70	34.52	6.32	36.60	9.50	0.34	36.79	54.00	-17.21	A	1.00
6431.96	53.01	36.20	7.81	36.69	9.50	0.29	51.13	74.00	-22.87	P	1.00
6431.96	49.43	36.20	7.81	36.69	9.50	0.29	47.55	54.00	-6.45	A	1.00
7236.00	46.47	39.54	8.27	36.85	9.50	0.90	48.83	74.00	-25.17	P	1.00
7236.00	32.68	39.54	8.27	36.85	9.50	0.90	35.04	54.00	-18.96	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:
$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11g TX (CH Middle)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1625.05	49.32	27.48	3.80	36.85	9.50	0.00	34.24	74.00	-39.76	P	1.00
1625.05	37.69	27.48	3.80	36.85	9.50	0.00	22.61	54.00	-31.39	A	1.00
3249.38	49.58	30.80	5.65	36.81	9.50	0.00	39.72	74.00	-34.28	P	1.00
3249.38	39.91	30.80	5.65	36.81	9.50	0.00	30.05	54.00	-23.95	A	1.00
4870.12	58.00	34.59	6.32	36.61	9.50	0.30	53.10	74.00	-20.90	P	1.00
4870.12	43.34	34.59	6.32	36.61	9.50	0.30	38.44	54.00	-15.56	A	1.00
6498.56	51.75	36.30	7.93	36.72	9.50	0.30	50.06	74.00	-23.94	P	1.00
6498.56	46.74	36.30	7.93	36.72	9.50	0.30	45.05	54.00	-8.95	A	1.00
7311.00	46.32	39.61	8.30	36.93	9.50	0.83	48.63	74.00	-25.37	P	1.00
7311.00	32.58	39.61	8.30	36.93	9.50	0.83	34.89	54.00	-19.11	A	1.00
Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1625.05	51.42	27.48	3.80	36.85	9.50	0.00	36.34	74.00	-37.66	P	1.00
1625.05	41.91	27.48	3.80	36.85	9.50	0.00	26.83	54.00	-27.17	A	1.00
3249.38	50.89	30.80	5.65	36.81	9.50	0.00	41.03	74.00	-32.97	P	1.00
3249.38	42.18	30.80	5.65	36.81	9.50	0.00	32.32	54.00	-21.68	A	1.00
4870.12	56.17	34.59	6.32	36.61	9.50	0.30	51.27	74.00	-22.73	P	1.00
4870.12	41.73	34.59	6.32	36.61	9.50	0.30	36.83	54.00	-17.17	A	1.00
6498.56	53.44	36.30	7.93	36.72	9.50	0.30	51.75	74.00	-22.25	P	1.00
6498.56	50.17	36.30	7.93	36.72	9.50	0.30	48.48	54.00	-5.52	A	1.00
7311.00	46.20	39.61	8.30	36.93	9.50	0.83	48.51	74.00	-25.49	P	1.00
7311.00	32.64	39.61	8.30	36.93	9.50	0.83	34.95	54.00	-19.05	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:
$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



Product Name	Mini Card bg WLAN Module	Test Date	2007/09/14
Model	GMEWLGR-2	Test By	Gundam Lin
Test Mode	IEEE 802.11g TX (CH High)	TEMP & Humidity	33°C, 53%

Measurement Distance at 1m Horizontal polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1641.33	48.26	27.60	3.82	36.84	9.50	0.00	33.35	74.00	-40.65	P	1.00
1641.33	34.02	27.60	3.82	36.84	9.50	0.00	19.11	54.00	-34.89	A	1.00
3282.71	49.23	30.80	5.67	36.80	9.50	0.00	39.40	74.00	-34.60	P	1.00
3282.71	39.65	30.80	5.67	36.80	9.50	0.00	29.82	54.00	-24.18	A	1.00
4924.09	55.02	34.68	6.32	36.62	9.50	0.25	50.14	74.00	-23.86	P	1.00
4924.09	40.99	34.68	6.32	36.62	9.50	0.25	36.11	54.00	-17.89	A	1.00
6565.22	51.06	36.69	7.96	36.70	9.50	0.41	49.92	74.00	-24.08	P	1.00
6565.22	46.04	36.69	7.96	36.70	9.50	0.41	44.90	54.00	-9.10	A	1.00
7386.00	46.28	39.69	8.33	37.01	9.50	0.76	48.55	74.00	-25.45	P	1.00
7386.00	32.71	39.69	8.33	37.01	9.50	0.76	34.98	54.00	-19.02	A	1.00

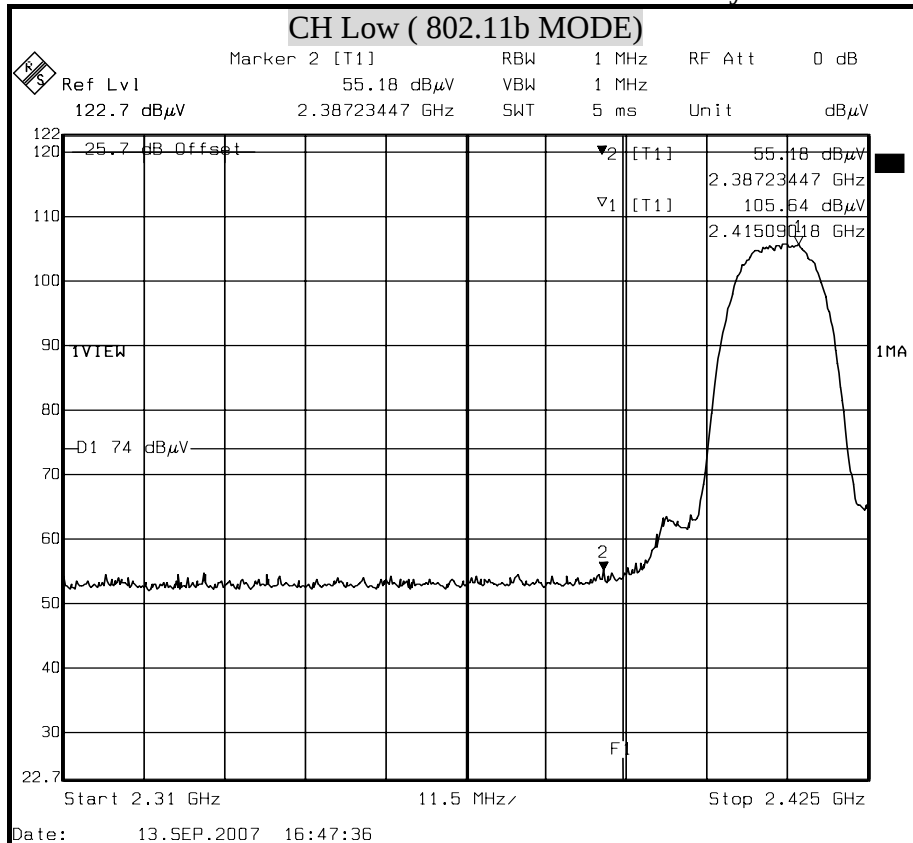
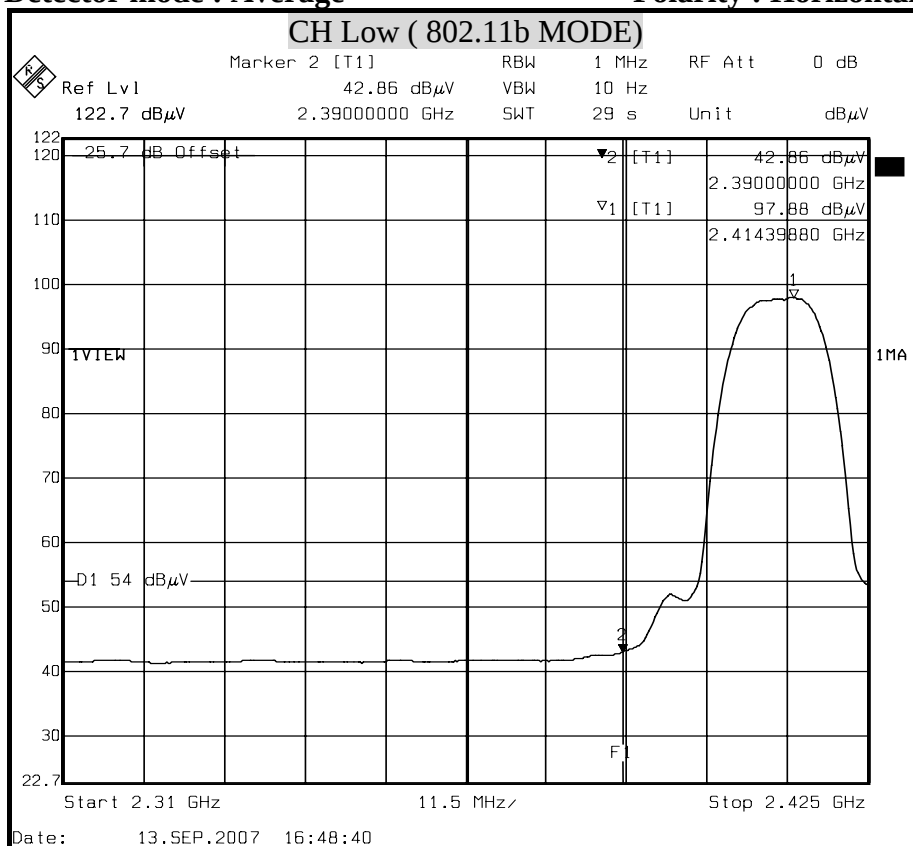
Measurement Distance at 1m Vertical polarity											
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
1641.33	47.60	27.60	3.82	36.84	9.50	0.00	32.69	74.00	-41.31	P	1.00
1641.33	34.04	27.60	3.82	36.84	9.50	0.00	19.13	54.00	-34.87	A	1.00
3282.71	51.06	30.80	5.67	36.80	9.50	0.00	41.23	74.00	-32.77	P	1.00
3282.71	45.55	30.80	5.67	36.80	9.50	0.00	35.72	54.00	-18.28	A	1.00
4924.28	54.61	34.68	6.32	36.62	9.50	0.25	49.73	74.00	-24.27	P	1.00
4924.28	40.47	34.68	6.32	36.62	9.50	0.25	35.59	54.00	-18.41	A	1.00
6565.22	51.93	36.69	7.96	36.70	9.50	0.41	50.79	74.00	-23.21	P	1.00
6565.22	47.31	36.69	7.96	36.70	9.50	0.41	46.17	54.00	-7.83	A	1.00
7386.00	47.26	39.69	8.33	37.01	9.50	0.76	49.53	74.00	-24.47	P	1.00
7386.00	33.12	39.69	8.33	37.01	9.50	0.76	35.39	54.00	-18.61	A	1.00

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
4. The result basic equation calculation is as follow:
$$\text{Level} = \text{Reading} + \text{AF} + \text{Cable} - \text{Preamp} + \text{Filter} - \text{Dist}, \text{Margin} = \text{Level} - \text{Limit}$$
5. The other emission levels were 20dB below the limit
6. The test limit distance is 3M limit.



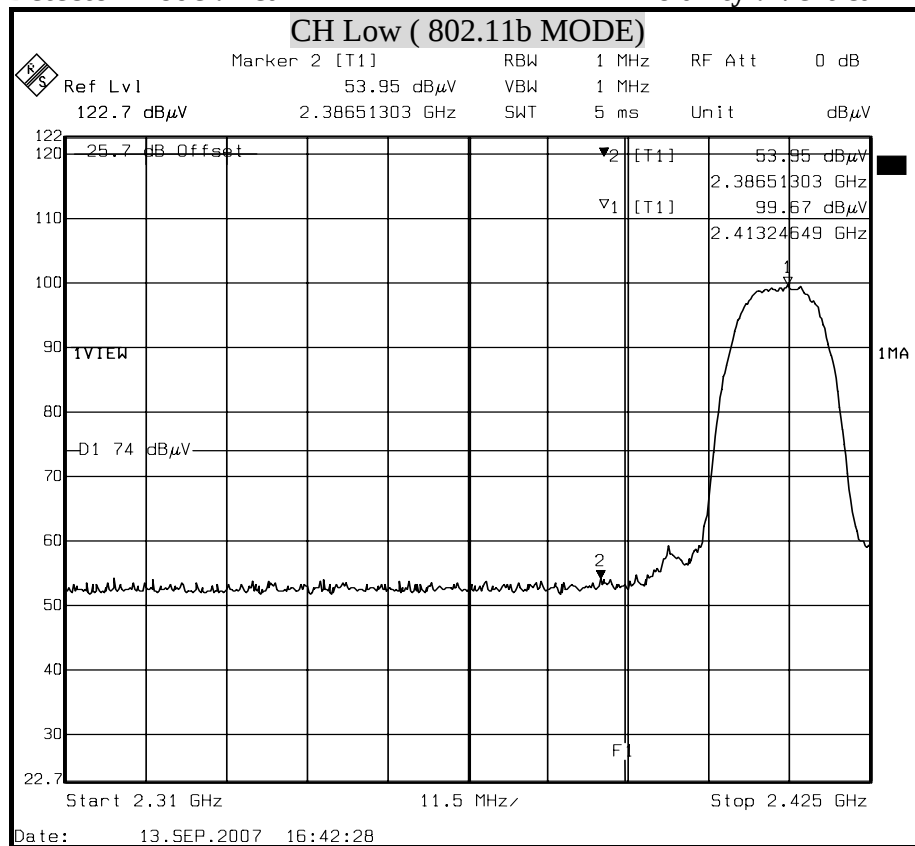
8.1.4 RESTRICTED BAND EDGES

Detector mode : Peak**Polarity : Horizontal****Detector mode : Average****Polarity : Horizontal**



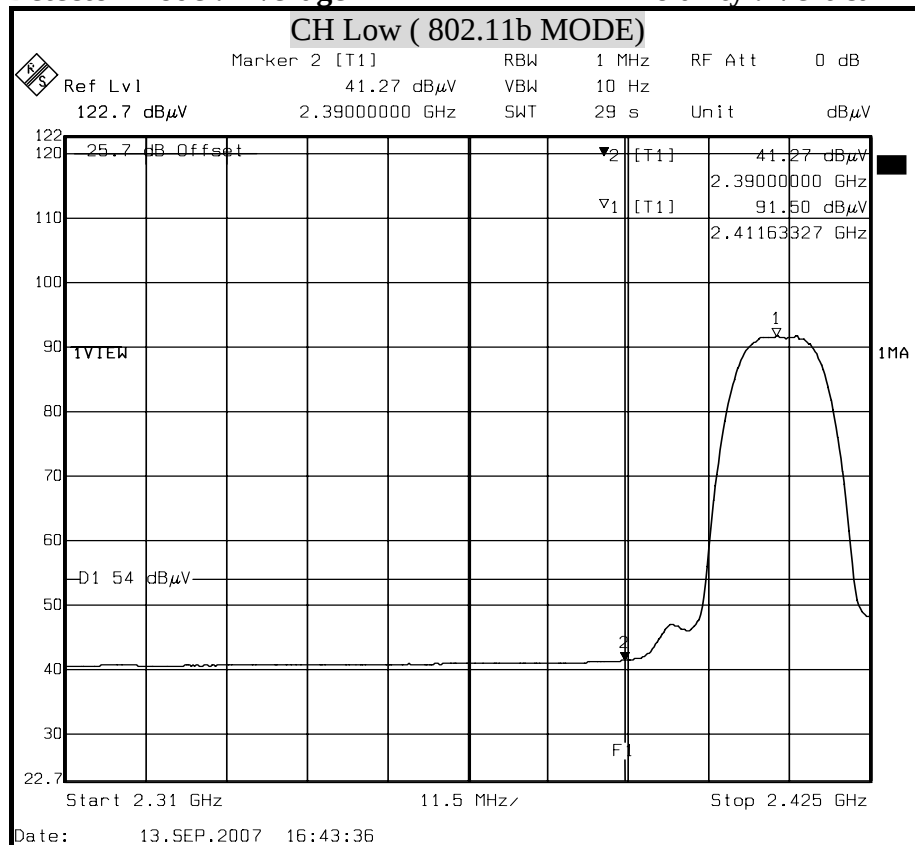
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

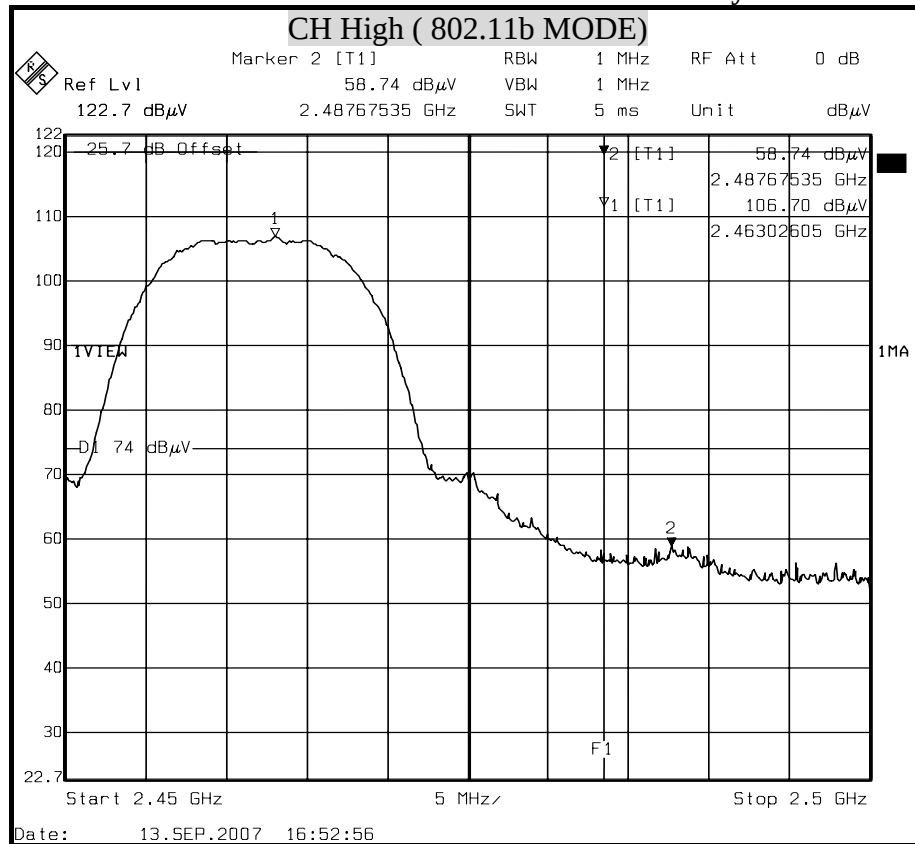
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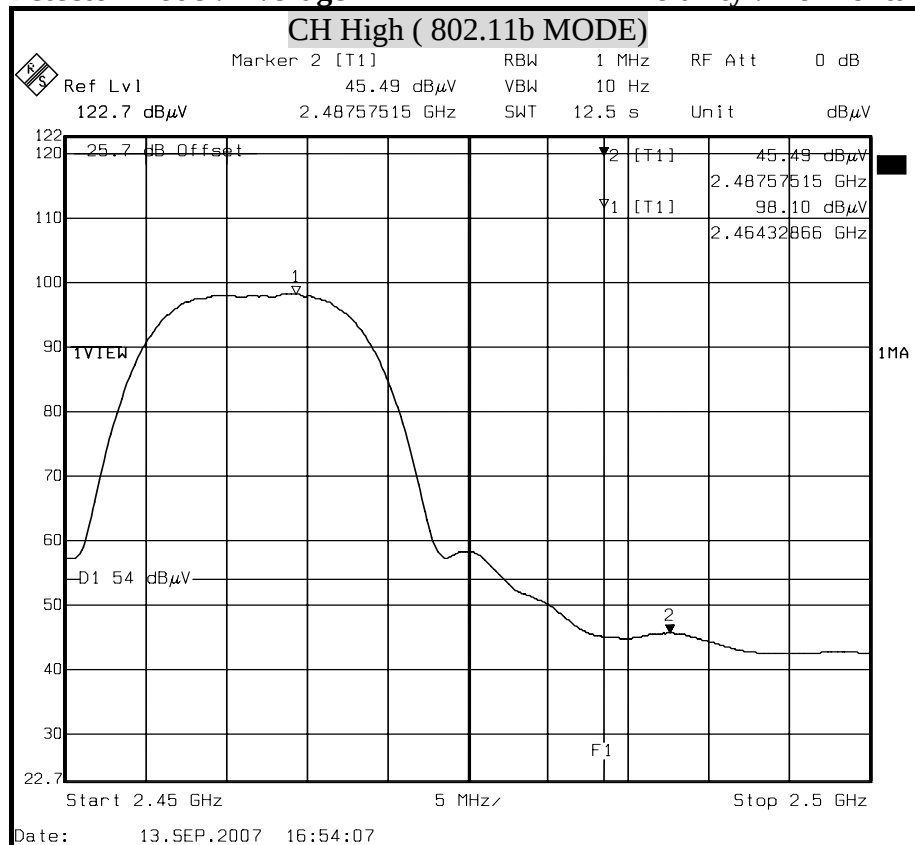
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

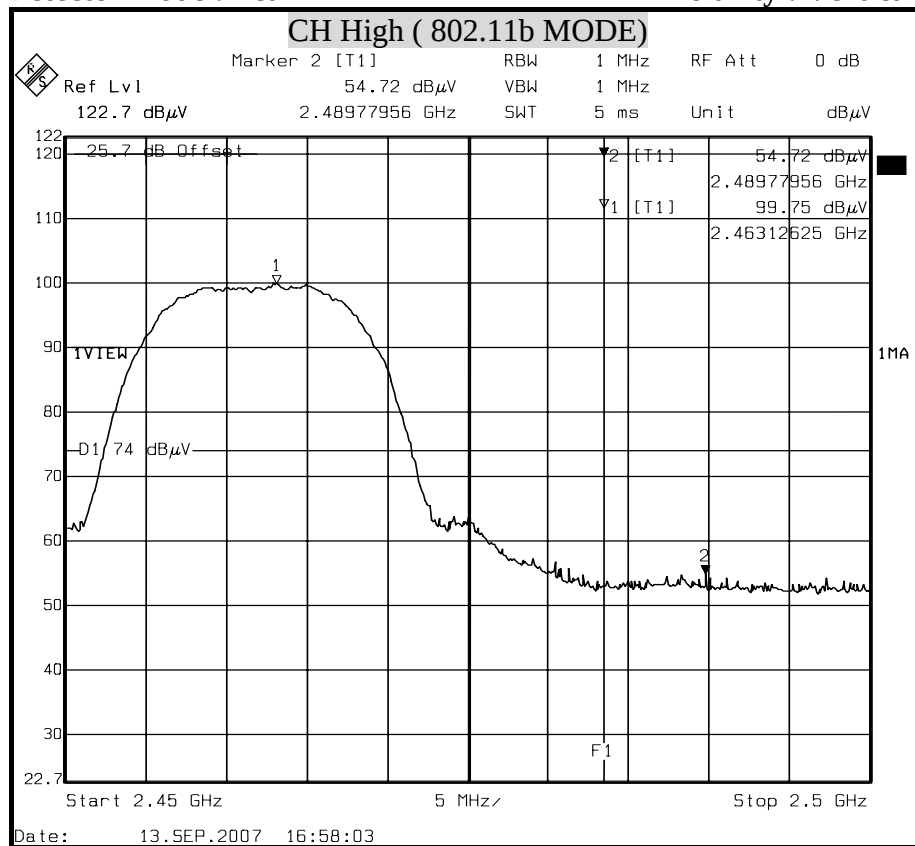
Polarity : Horizontal





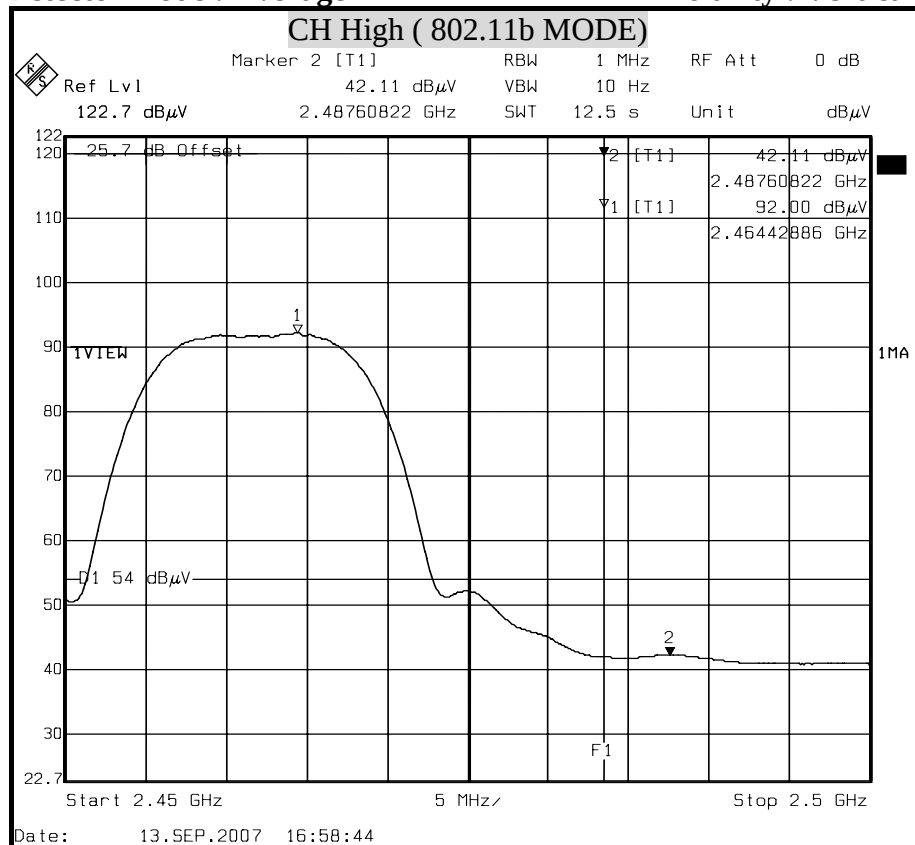
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

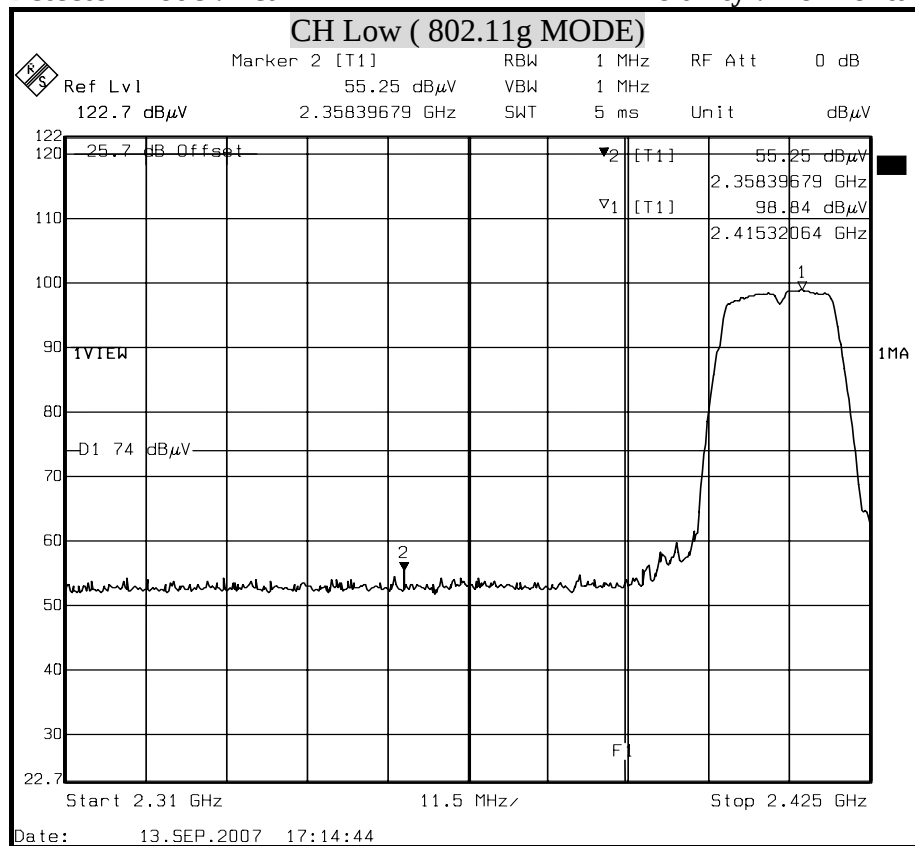
Polarity : Vertical





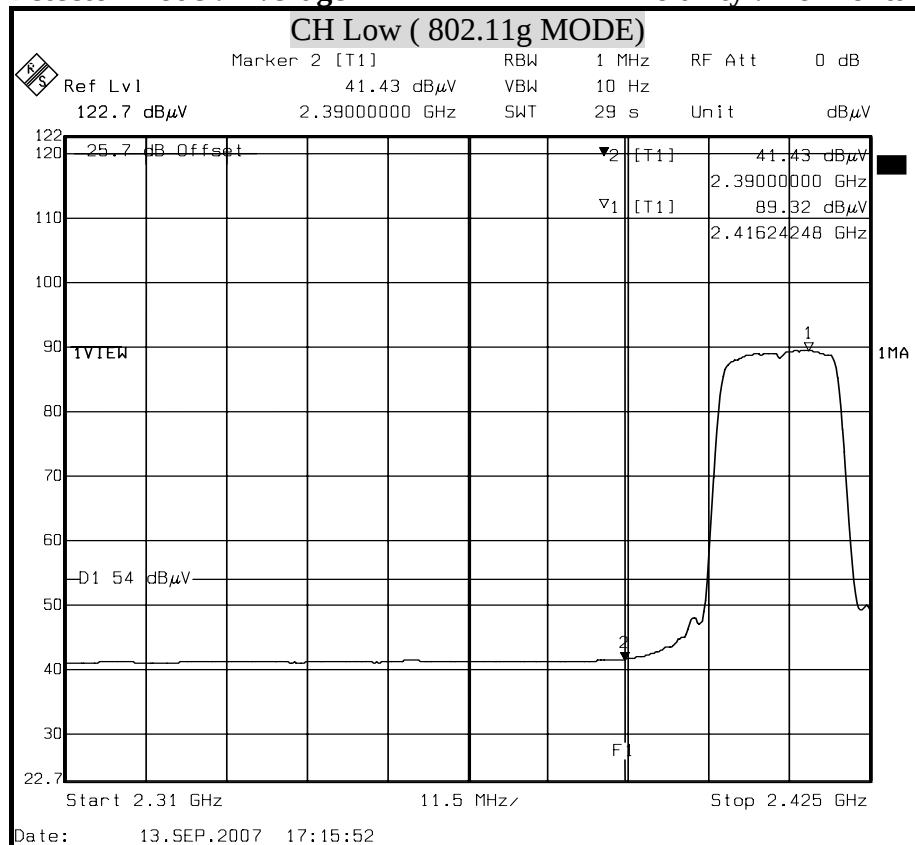
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

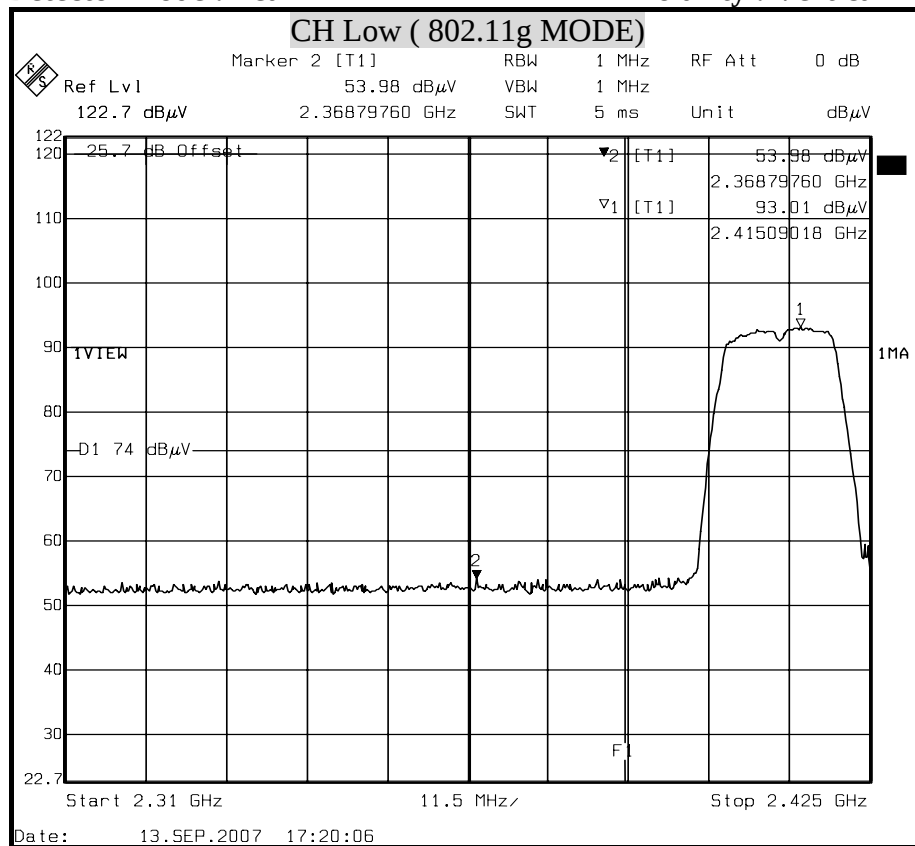
Polarity : Horizontal





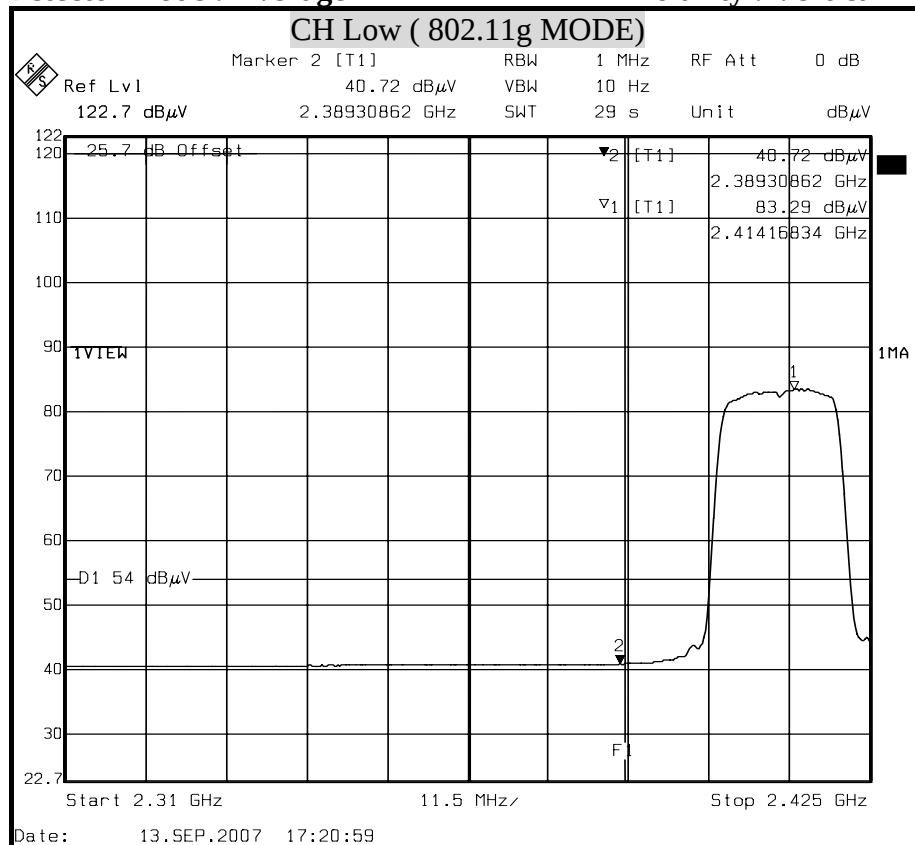
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

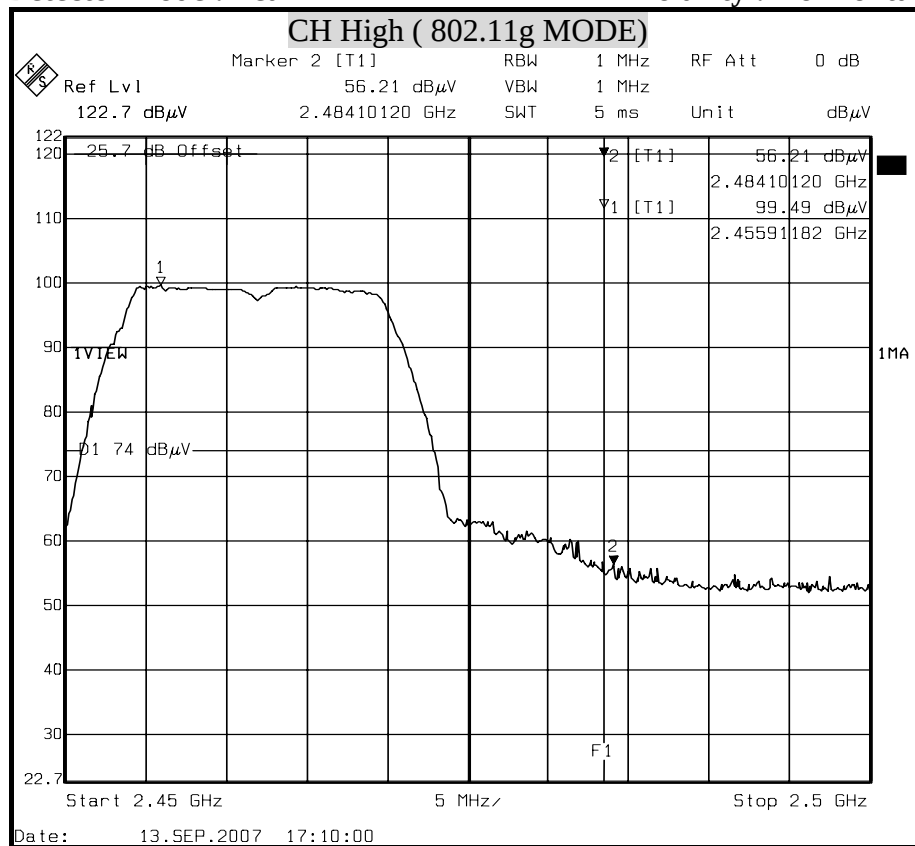
Polarity : Vertical





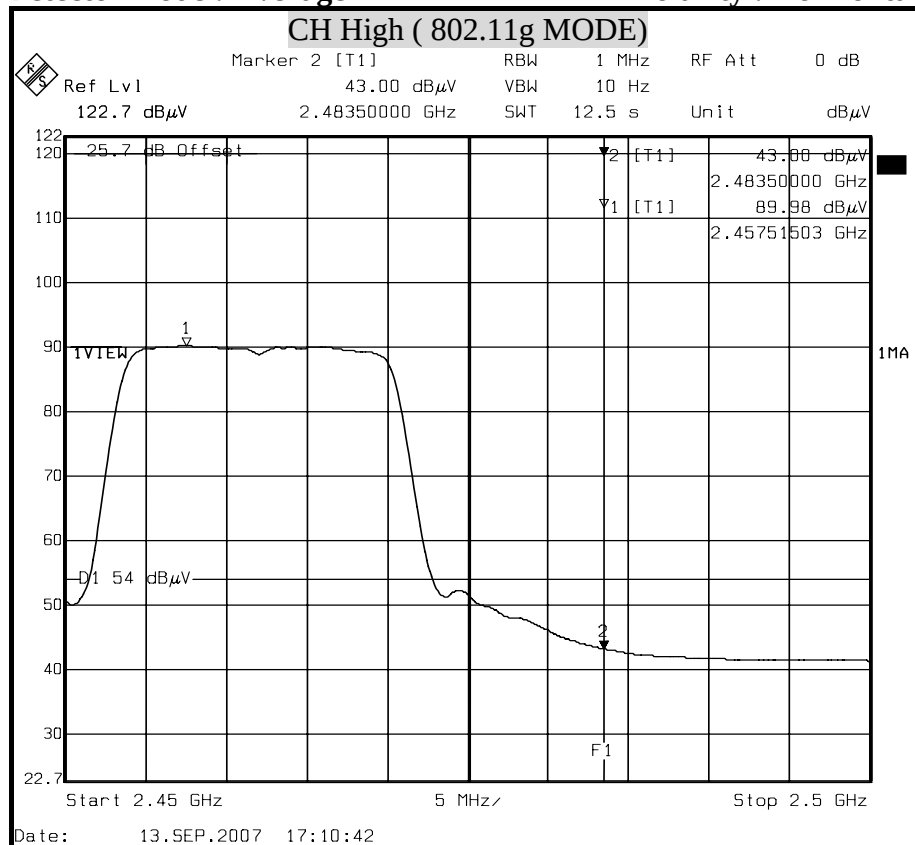
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

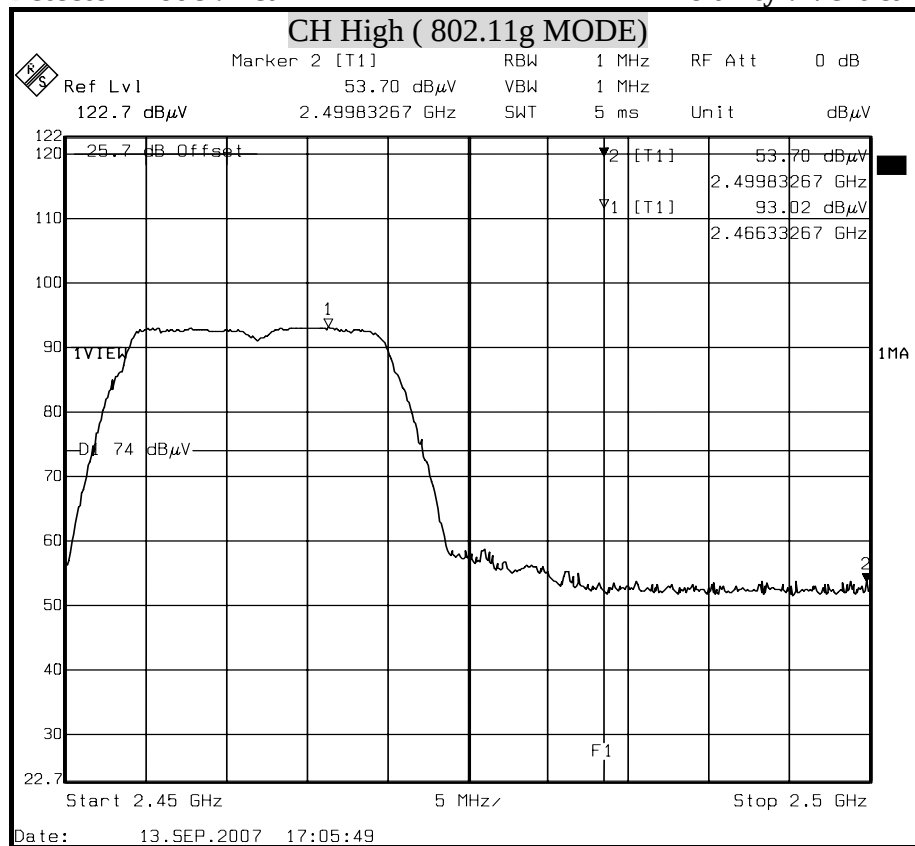
Polarity : Horizontal





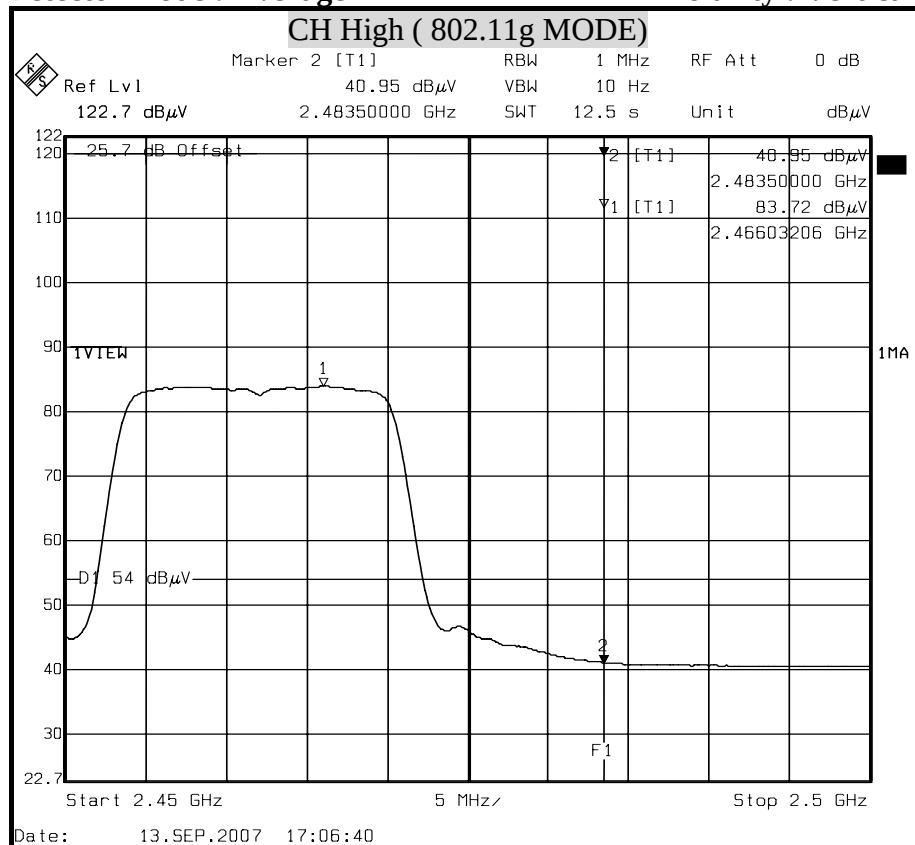
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

Polarity : Vertical





9. ANTENNA REQUIREMENT

9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

9.2 ANTENNA CONNECTED CONSTRUCTION

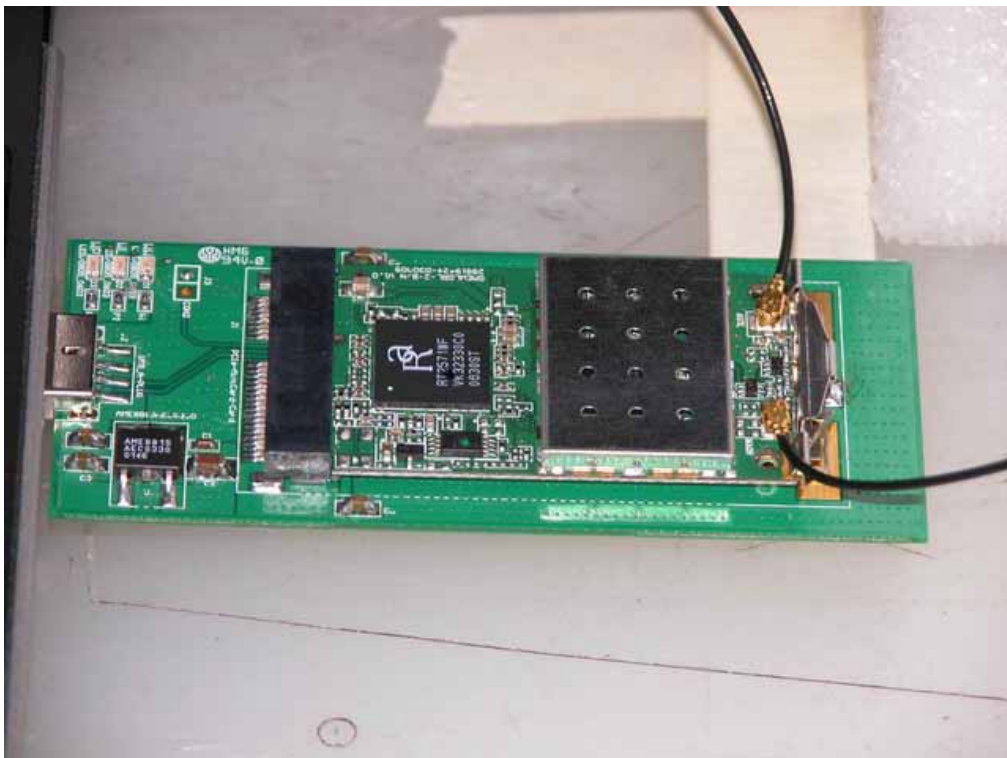
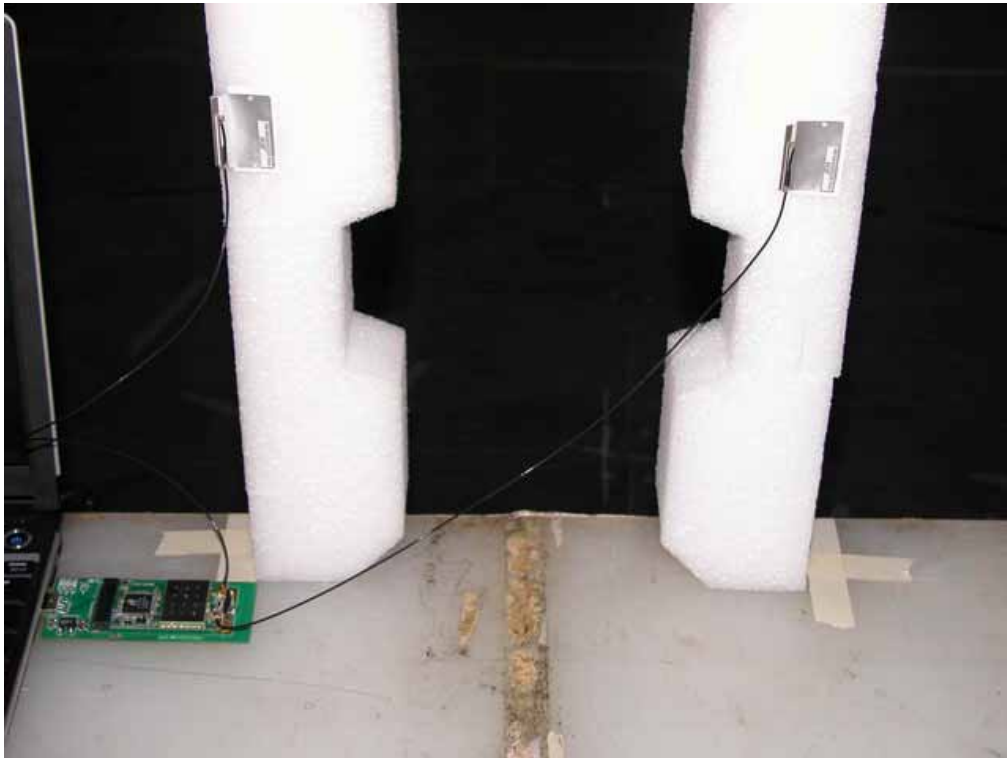
No.	Antenna Type	Manufacturer	Model	Antenna Gain
1	PIFA Antenna	ECS	S20	2.03dBi
2	PIFA Antenna	ECS	S40	2.34dBi
3	PIFA Antenna	FVC	S20	-0.8dBi
4	PIFA Antenna	FVC	L41	-0.04dBi
5	PIFA Antenna	FVC	L45	-0.04dBi
6	PIFA Antenna	FVC	L51	0.53dBi
7	PIFA Antenna	FVC	L52	-0.24dBi
8	PIFA Antenna	FVC	L56	-0.24dBi
9	PIFA Antenna	FVC	L71	1.48dBi
10	PIFA Antenna	FVC	L75	1.48dBi
11	PIFA Antenna	FVC(MIMO)	L55-ID3	2.01dBi
12	PIFA Antenna	FVC(MIMO)	L55-ID4	1.85dBi
13	PIFA Antenna	FVC(MIMO)	L55II(ID1&ID2)	0.95dBi
14	PIFA Antenna	JEN	U30.U40	2.99dBi
15	PIFA Antenna	JEN	U50	2.53dBi
16	PIFA Antenna	WGT	S20	1.05dBi
17	PIFA Antenna	WGT	S40	0.84dBi
18	PIFA Antenna	WGT	L41	-0.24dBi
19	PIFA Antenna	WGT	L45	0.66dBi
20	PIFA Antenna	WGT	L51	1.68dBi
21	PIFA Antenna	WGT	L55II(ID1&ID2)	1.99dBi
22	PIFA Antenna	WGT	L55IIBT	1.99dBi
23	PIFA Antenna	WGT	U30.U40	-1.83dBi
24	PIFA Antenna	WGT	U50	-0.66dBi



APPENDIX SETUP PHOTOS

RADIATED EMISSION MEASUREMENT SETUP







RADIATED RF MEASUREMENT SETUP



