# FCC 47 CFR PART 15 SUBPART C: 2009 AND ANSI C63.4: 2003

## TEST REPORT

## For

## 11n USB Dongle

## Model Number: WL307n

## Brand: ETOP

## Issued for

## E-TOP NETWORK TECHNOLOGY INC.

**No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan,R.O.C.**

## Issued by

**Compliance Certification Services Inc.**
**Tainan Lab.**
**No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.**
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# REVISION HISTORY

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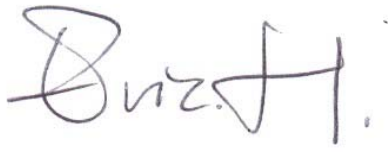
# 1. TEST REPORT CERTIFICATION

| | |
|---|---|
| **Applicant** | ：E-TOP NETWORK TECHNOLOGY INC. |
| **Address** | ：No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan,R.O.C. |
| **Manufacture** | ：Amigo Technology Inc. |
| **Address** | ：5F., No. 63, Ln. 77, Xing′ ai Rd., Neihu Dist., Taipei City 114, Taiwan. |
| **Equipment Under Test** | ：11n USB Dongle |
| **Model Number** | ：WL307n |
| **Brand Name** | ：ETOP |
| **Date of Test** | ：December 01 ~ December 11, 2010 |

| **APPLICABLE STANDARD** | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| FCC Part 15 Subpart C : 2009 AND ANSI C63.4 : 2003 | No non-compliance noted |

**Approved by:** **Reviewed by:**



**Jeter Wu**
Assistant Manager

**Eric Huang**
Assistant Section Manager

# 2. EUT DESCRIPTION

## 2.1 DESCRIPTION OF EUT & POWER

| | |
|---|---|
| **Product Name** | 11n USB Dongle |
| **Model Number** | WL307n |
| **Brand** | ETOP |
| **Frequency Range** | IEEE 802.11b/g, 802.11n HT20 (DTS Band):2412MHz～2462MHz IEEE 802.11n HT40 (DTS Band):2422MHz～2452MHz |
| **Transmit Power** | IEEE 802.11b Mode : 13.46dBm (DTS Band) (22.1820 mW)<br>IEEE 802.11g Mode : 20.70dBm (DTS Band) (117.4898 mW)<br>IEEE 802.11n HT20 Mode : 20.35dBm (DTS Band) (108.3927 mW)<br>IEEE 802.11n HT40 Mode : 18.36dBm (DTS Band) (68.5488 mW) |
| **Channel Spacing** | IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz |
| **Channel Number** | IEEE 802.11b/g, 802.11n HT20:11 Channels<br>IEEE 802.11n HT40 :7 Channels |
| **Transmit Data Rate** | IEEE 802.11b :11, 5.5, 2, 1Mbps<br>IEEE 802.11g : 54, 48 ,36, 24, 18, 12, 9, 6Mbps<br>IEEE 802.11n HT20 : 130, 117 ,104, 78, 65, 58.5, 52, 39, 26, 19.5, 3, 6.5Mbps<br>IEEE 802.11n HT40 : 300, 270, 243 ,216, 162, 135, 121.5, 108, 81, 54, 40.5, 27, 13.5Mbps |
| **Type of Modulation** | IEEE 802.11b：DSSS (CCK, DQPSK, DBPSK) |
| | IEEE 802.11g：OFDM (64QAM, 16QAM, QPSK, BPSK) |
| | IEEE 802.11n HT20/40：OFDM (64QAM, 16QAM, QPSK, BPSK) |
| **Frequency Selection** | By software / firmware |
| **Antenna Type** | Two antennas (1TX2RX)<br>Antenna 1: Printed PIFA Antenna (1RX)<br>Antenna Model: AU-4622<br>Antenna Gain: 0dBi<br>Connector: PIFA<br>Manufacture: E-Top Network Technology Inc.<br>Antenna 2: Dipole Antenna(1TX1RX)<br>Antenna Model: S01-XY31708<br>Antenna Gain: 7dBi<br>Connector: SMA Reverse<br>Manufacture: XinXie Technology(SHENZHEN) co,Ltd. |
| **Power Source** | 5Vdc (Powered from host device) |

| | |
|---|---|
| **Temperature Range** | 0 ~ +40°C |

**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: SJ9-WL307N 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 manual.

4. To add a series model is for business necessary. The different of the each model is shown as belows:

| Company & Address | Brand | Model | Product Name |
|---|---|---|---|
| E-Top Network Technology Inc.<br>No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan,R.O.C. | ETOP | WL306n,WL307n | 11n USB Dongle |
| Amigo Technology Inc.<br>1F, No. 333, Sec. 1, Ti-Ding BLVD., NeiHu, Taipei 114, Taiwan | Amigo | WL306n,WL307n | 11n USB Dongle |
| CNet Technology Inc.<br>1F,No.30,Industry E.RD.IX,Science-Based Industrial Park,Hsin-Chu,Taiwan,R.O.C. | CNet | CWL-9xx Series, CWL-907 | Long RangeWireless-N USB Adapter |
| Sapido Technology Inc.<br>No. 383., Sec. 2, Minsheng Rd., West Central District, Tainan 700, Taiwan, R.O.C. | SAPIDO | AU-4612,AU- 4622, AU- 4632 | $N^+$ Long Range USB Adapter |

# 3. DESCRIPTION OF TEST MODES

The EUT is a 11n USB Dongle.

The RF chipset is manufactured by Ralink Technology, Corp.

The antenna peak gain 7.0dBi (highest gain) were chosen for full testing.

**IEEE 802.11 b ,802.11g ,802.11n HT20 mode (DTS Band)**

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 mode: 11Mbps data rates (worst case) were chosen for full testing.

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

IEEE 802.11n HT20 mode: 6.5Mbps data rates (worst case) were chosen for full testing.

**IEEE 802.11n HT40 mode (DTS Band)**

The EUT had been tested under operating condition.

There are three channels have been tested as following:

| Channel | Frequency (MHz) |
|---|---|
| Low | 2422 |
| Middle | 2437 |
| High | 2452 |

IEEE 802.11n HT40 mode: 13.5Mbps data rates (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, peak power 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 CFR 47 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

No. 8, Jiu Cheng Ling, Jiaokeng Village,Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.4: 2003 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 Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 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 TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037 and 455173).

## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | FCC | 3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements | 455173<br>TW-1037 |
| Taiwan | TAF | CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, EN 60601-1-2,<br>CISPR 22, CNS 13438, EN 55022, EN 55024, AS/NZS CISPR 22<br>CISPR 14, EN 55014-1, EN 55014-2, CNS 13783-1, CISPR 22, CNS 13439, EN 55013,<br>FCC Method-47 CFR Part 15 Subpart B,<br>IC ICES-003, VCCI V-3 & V-4<br>FCC Method-47 CFR Part 15 Subpart C and ANSI C63.4, LP 0002<br>EN / IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8 / -11<br>EN 61000-3-2, EN 61000-3-3<br>EN 61000-6-3, EN 61000-6-1, AS/NZS 4251.1,<br>EN 61000-6-4, EN 61000-6-2, AS/NZS 4251.2,<br>EN 61204-3, EN 50130-4, EN 62040-2,<br>EN 50371, EN 50385, AS/NZS 4268,<br>ETSI EN 300 386<br>ETSI EN 300 328, ETSI EN 301 489-1/-3/-9/-17<br>ETSI EN 301 893, ETSI EN 300 220-2/-1<br>ETSI EN 300 440-2/-1<br>ETSI EN 301 357-2/-1<br>RSS-310, RSS-210 Issue 7, RSS-Gen Issue 2 | Testing Laboratory 1109 |
| Taiwan | BSMI | CNS 13438, CNS 13783-1, CNS13439 | SL2-IN-E-0039<br>SL2-R1/R2-0039<br>SL2-A1-E-0039 |
| Canada | Industry Canada | RSS210, Issue 7 | IC 2324H-1 |

* No part of this report may be used to claim or imply product endorsement by TAF 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:

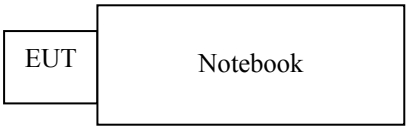
| PARAMETER | UNCERTAINTY |
|---|---|
| Radiated Emission, 30 to 200 MHz<br>Test Site : OATS-6 | ±3.38dB |
| Radiated Emission, 200 to 1000 MHz<br>Test Site : OATS-6 | ±3.04dB |
| Radiated Emission, 1 to 26.5 GHz | ± 2.38 dB |
| Power Line Conducted Emission | ±2.01dB |
| Band Edge MU | 0.302dBuV |
| Band Width | 136.49kHz |
| Channel Separation MU | 361.69Hz |
| Duty Cycle MU | 0.064ms |
| Peak Output Power MU | 1.904dB |
| Frequency Stability MU | 0.223kHz |

This measurement uncertainty is confidence of approximately 95%, k=2

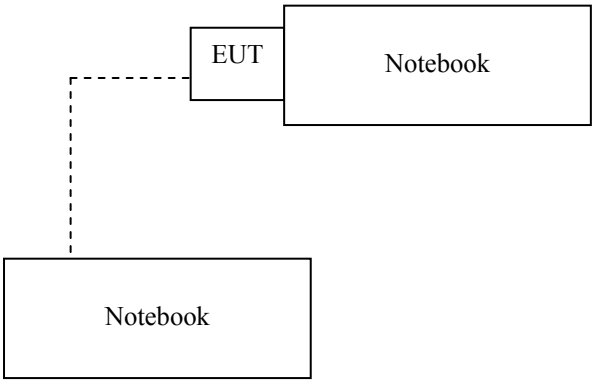
# 7. SETUP OF EQUIPMENT UNDER TEST

## 7.1 SETUP CONFIGURATION OF EUT

**Above 1GHz Test Setup:**




**Below 1GHz Test Setup:**



## 7.2 SUPPORT EQUIPMENT

| No. | Product | Manufacturer | Model No. | FCC ID | Signal Cable |
|---|---|---|---|---|---|
| 1 | Notebook | IBM | R51 | DoC | Power cable, unshd, 1.6m |
| 2 | Notebook | IBM | T43 | DoC | Power cable, unshd, 1.6m |

| No. | Signal cable description | |
|---|---|---|
| A | N/A | N/A |

**REMARK:**
1. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 7.3 EUT OPERATING CONDITION

**RF Setup**

1. Set up all notebooks like the setup diagram.
2. The "**RTL8191SU"** software was used for testing
3. Set b/g/n mode、con TX/RX、channel、bandwith、data rate、transmit power
4. Start to test

(1) **TX Mode:**

⇨ **Tx Mode:CCK 、OFDM、 HT MixMode** (Bandwidth: 20、40)

⇨ **Tx Data Rate: 11Mbps long** (IEEE 802.11b mode )
**6Mbps** (IEEE 802.11g mode )
**6.5Mbps** (IEEE 802.11n HT20 mode )
**13.5Mbps (**IEEE 802.11n HT40 mode **)**

**Power control mode**

**Target Power:** IEEE 802.11b Channel Low (2412MHz) = **23**
IEEE 802.11b Channel Middle (2437MHz) = **27**
IEEE 802.11b Channel High (2462MHz) = **31**
**Target Power:** IEEE 802.11g Channel Low (2412MHz) = **23**
IEEE 802.11g Channel Middle (2437MHz) = **27**
IEEE 802.11g Channel High (2462MHz) = **31**
**Target Power:** IEEE 802.11n HT20 Channel Low (2412MHz) = **23**
IEEE 802.11 n HT20 Channel Middle (2437MHz) = **27**
IEEE 802.11 n HT20 Channel High (2462MHz) = **31**
**Target Power:** IEEE 802.11n HT40 Channel Low (2422MHz) = **24**
IEEE 802.11 n HT40 Channel Middle (2437MHz) = **27**
IEEE 802.11 n HT40 Channel High (2452MHz) = **29**

(2) **RX Mode：**

**Start RX**

3. All of the functions are under run.
4. Start test.

**Normal Link Setup**

1. Set up all computers like the setup diagram.
2. All of the function are under run.
3. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
4. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
5. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).

Start test.

# 8. APPLICABLE LIMITS AND TEST RESULTS

## 8.1 6DB BANDWIDTH

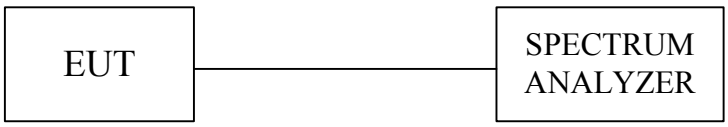
**LIMIT**

§ 15.207(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

**TEST EQUIPMENTS**

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSEK 30 | 835253/002 | JUL. 14, 2011 |

**TEST SETUP**




**TEST PROCEDURE**

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

## TEST RESULTS

No non-compliance noted.

**IEEE 802.11b mode**

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Minimum Limit (kHz) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 10321 | 500 | PASS |
| Middle | 2437 | 10321 | 500 | PASS |
| High | 2462 | 10321 | 500 | PASS |

**NOTE :** 1. At finial test to get the worst-case emission at11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11g mode**

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Minimum Limit (kHz) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 16733 | 500 | PASS |
| Middle | 2437 | 16733 | 500 | PASS |
| High | 2462 | 16733 | 500 | PASS |

**NOTE :** 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 mode**

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Minimum Limit (kHz) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 17936 | 500 | PASS |
| Middle | 2437 | 17936 | 500 | PASS |
| High | 2462 | 17936 | 500 | PASS |

**NOTE :** 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

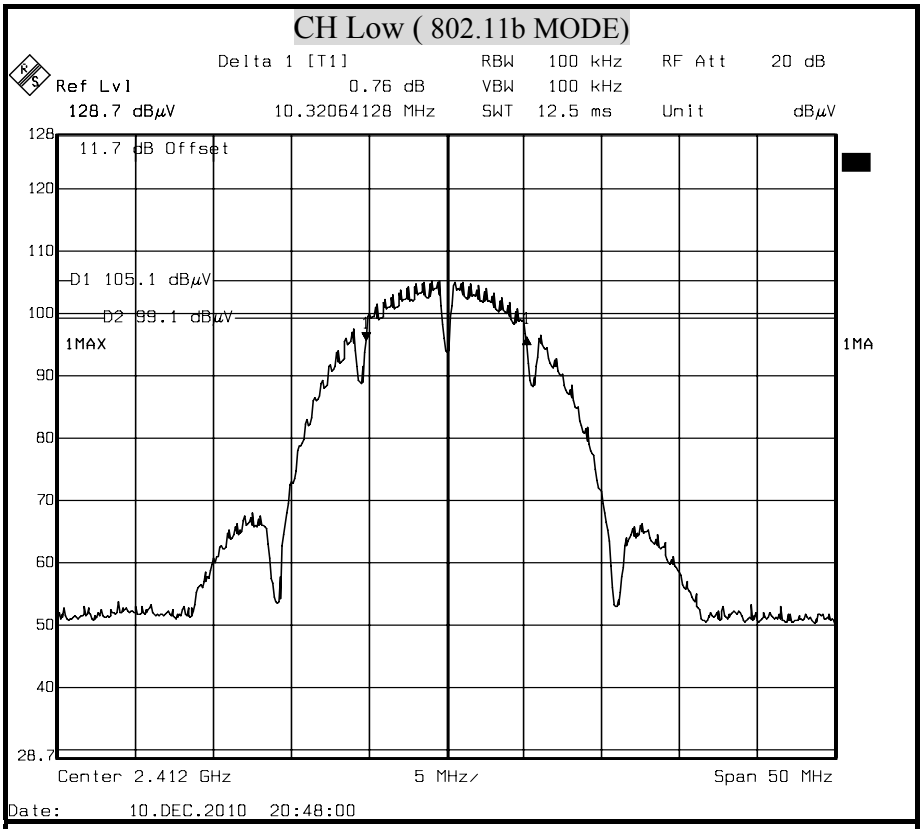
**IEEE 802.11n HT40 mode**

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Minimum Limit (kHz) | Pass / Fail |
|---|---|---|---|---|
| Low | 2422 | 36673 | 500 | PASS |
| Middle | 2437 | 36673 | 500 | PASS |
| High | 2452 | 36673 | 500 | PASS |

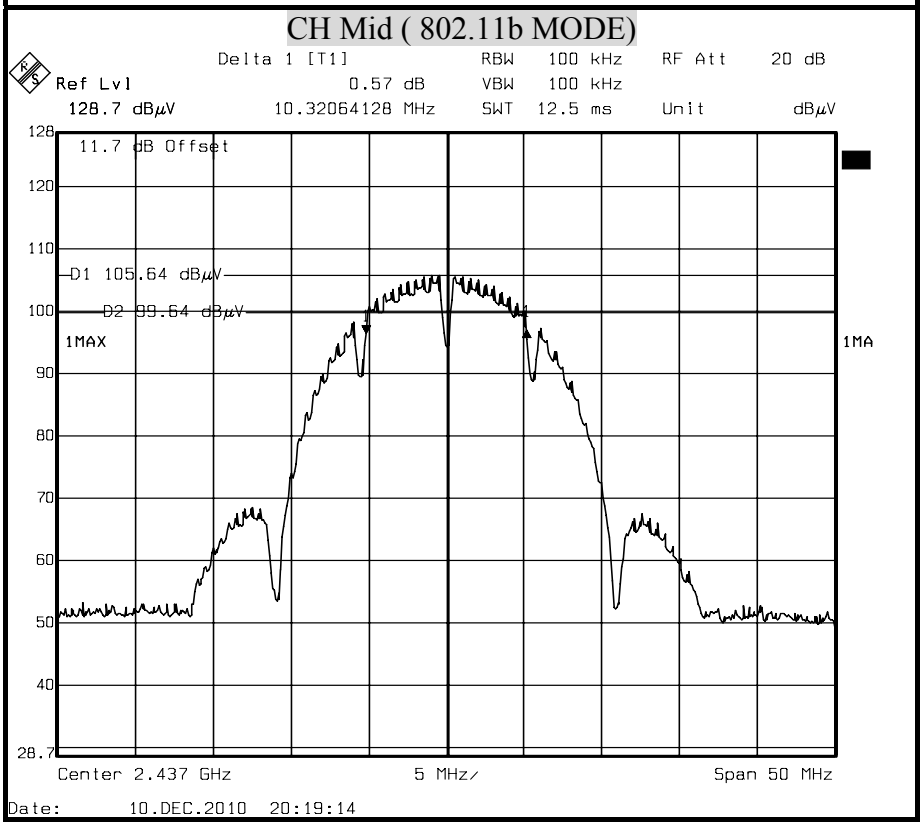
**NOTE :** 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

## 6dB BANDWIDTH ( 802.11b MODE)

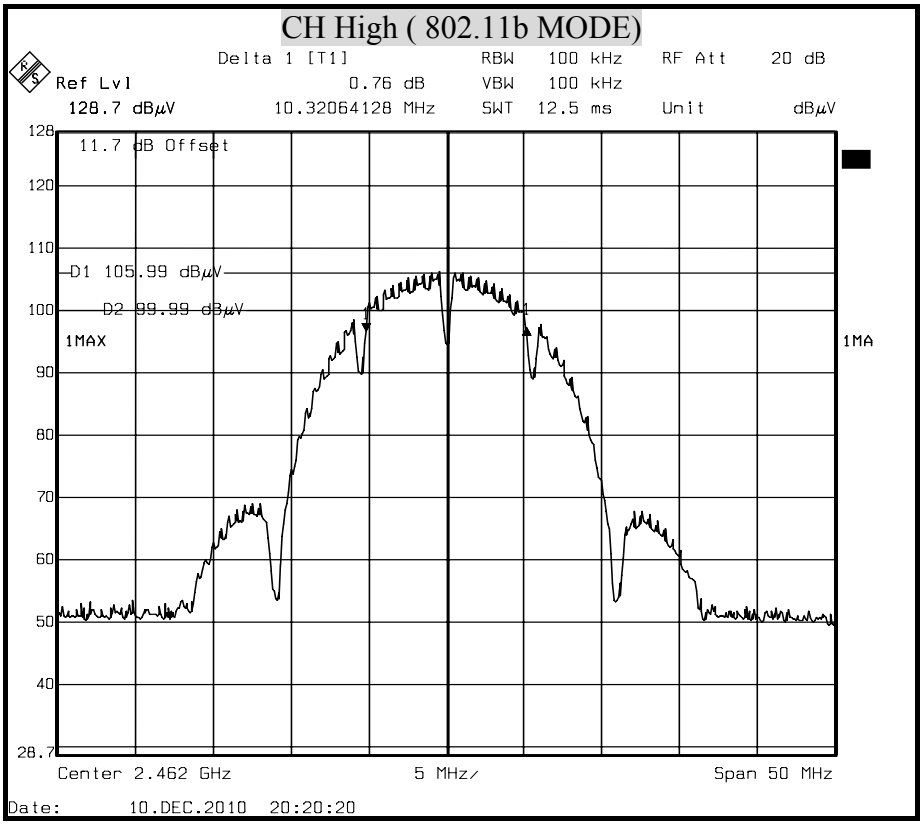
CH Low ( 802.11b MODE)




CH Mid ( 802.11b MODE)

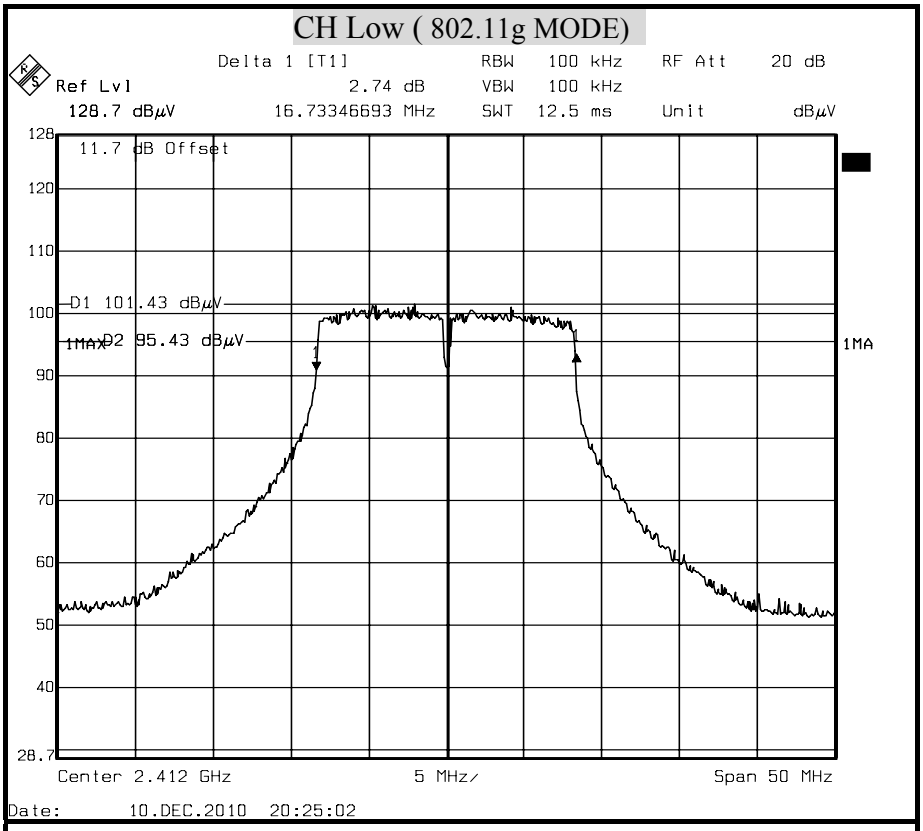


CH High ( 802.11b MODE)

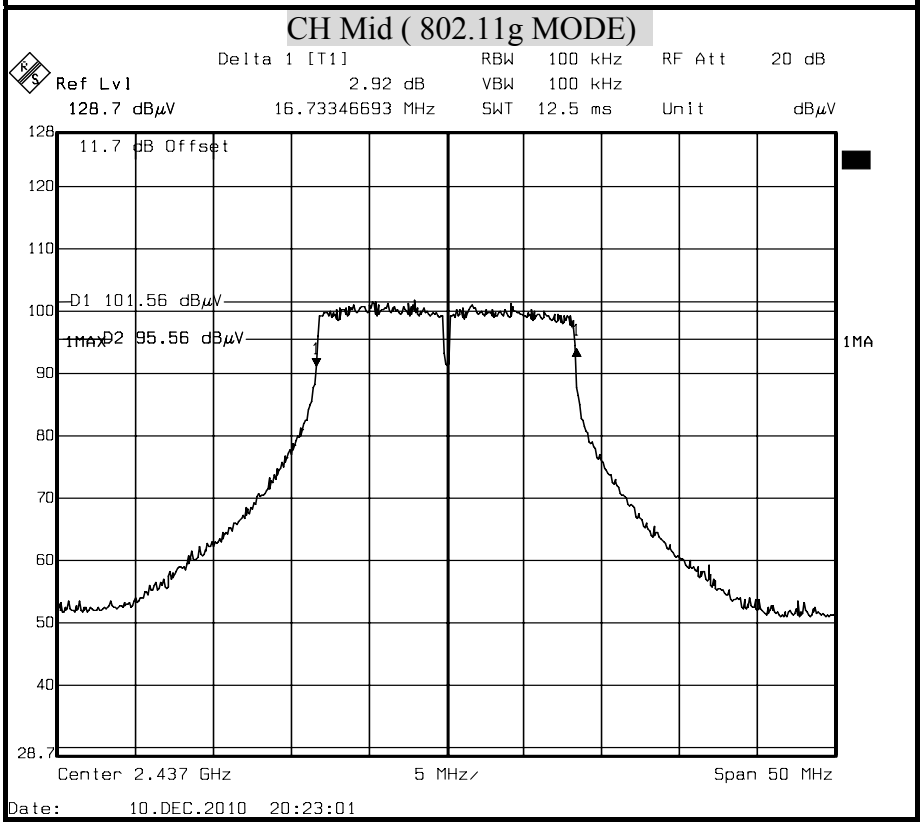


## 6dB BANDWIDTH ( 802.11g MODE)

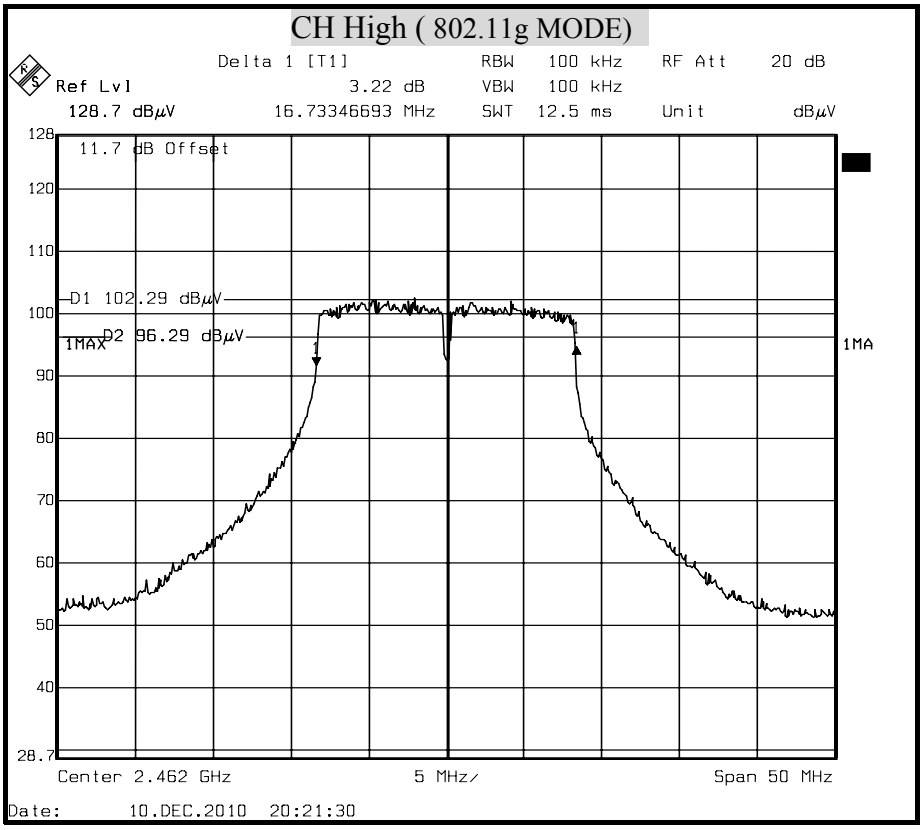
CH Low ( 802.11g MODE)




CH Mid ( 802.11g MODE)

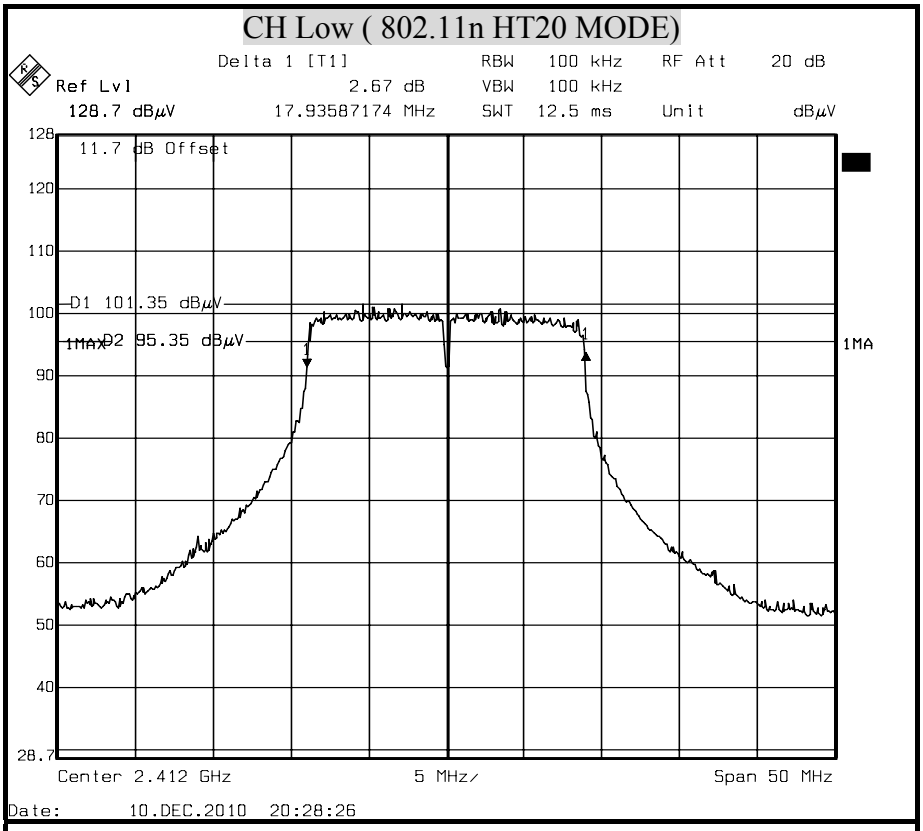


CH High ( 802.11g MODE)

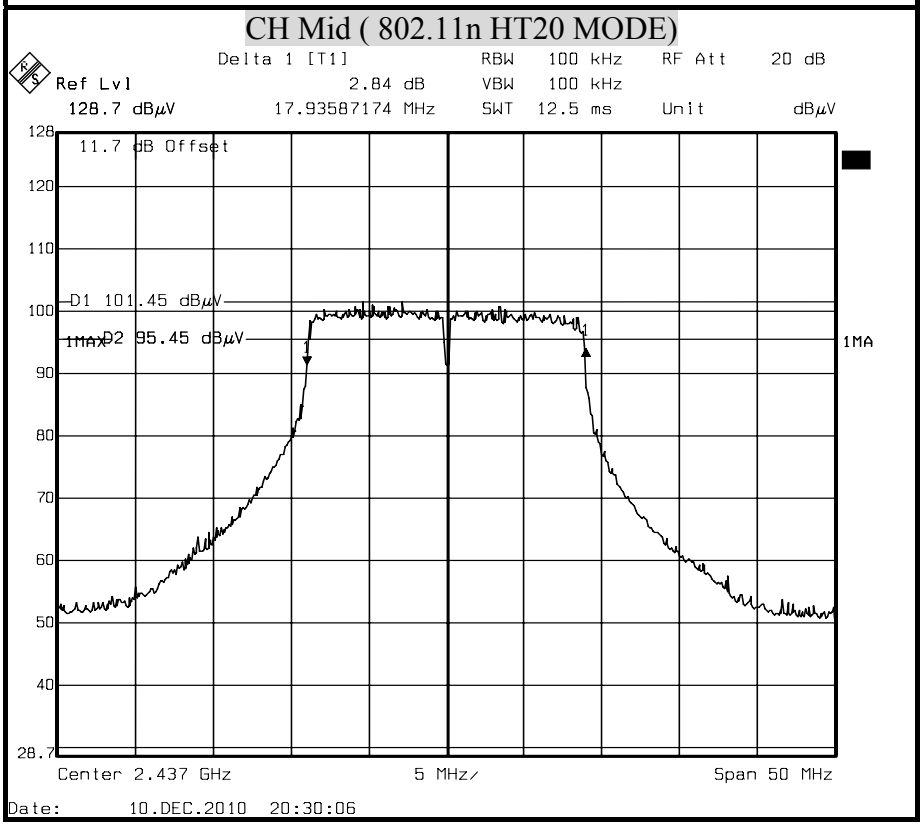


## 6dB BANDWIDTH ( 802.11n HT20 MODE)

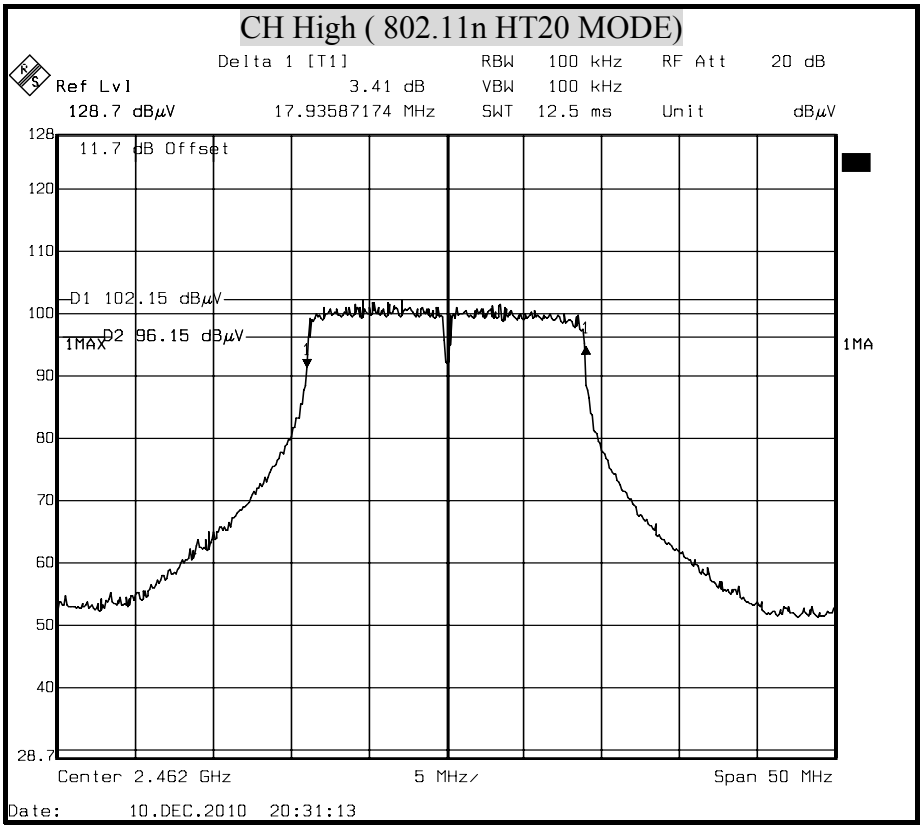
CH Low ( 802.11n HT20 MODE)




CH Mid ( 802.11n HT20 MODE)

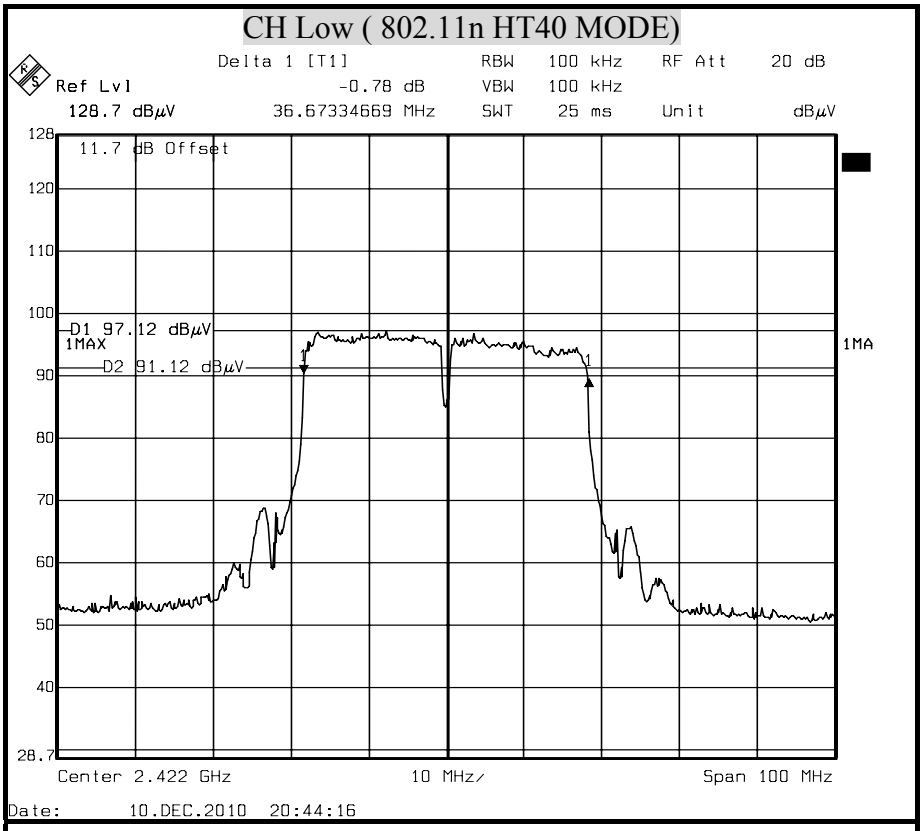


CH High ( 802.11n HT20 MODE)

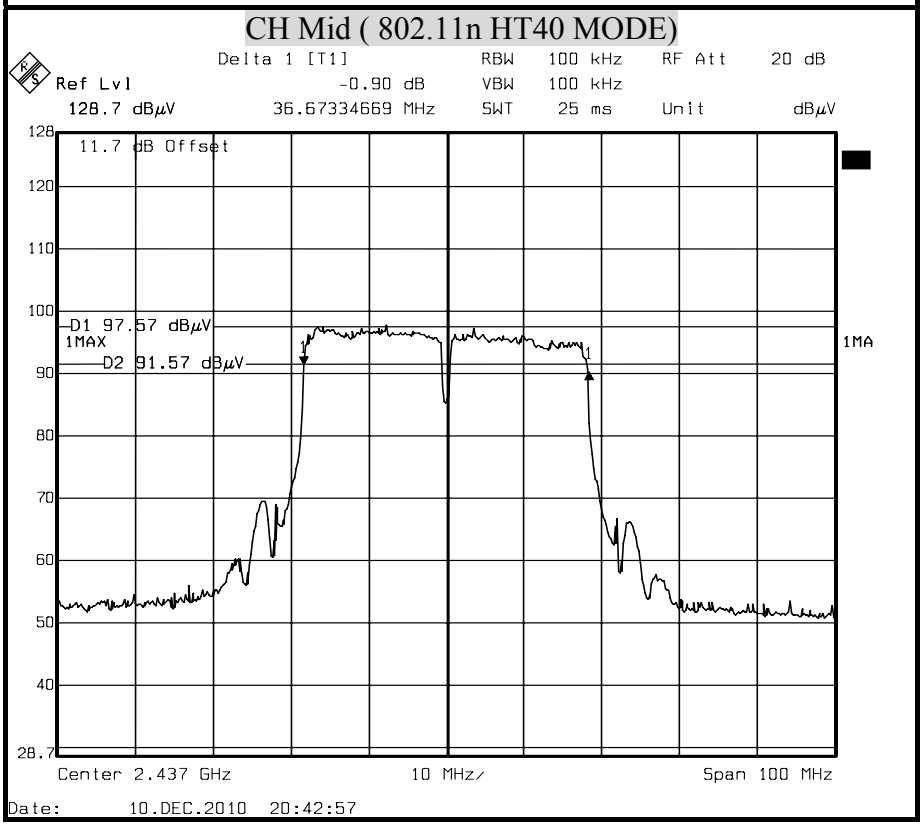


## 6dB BANDWIDTH ( 802.11n HT40 MODE)

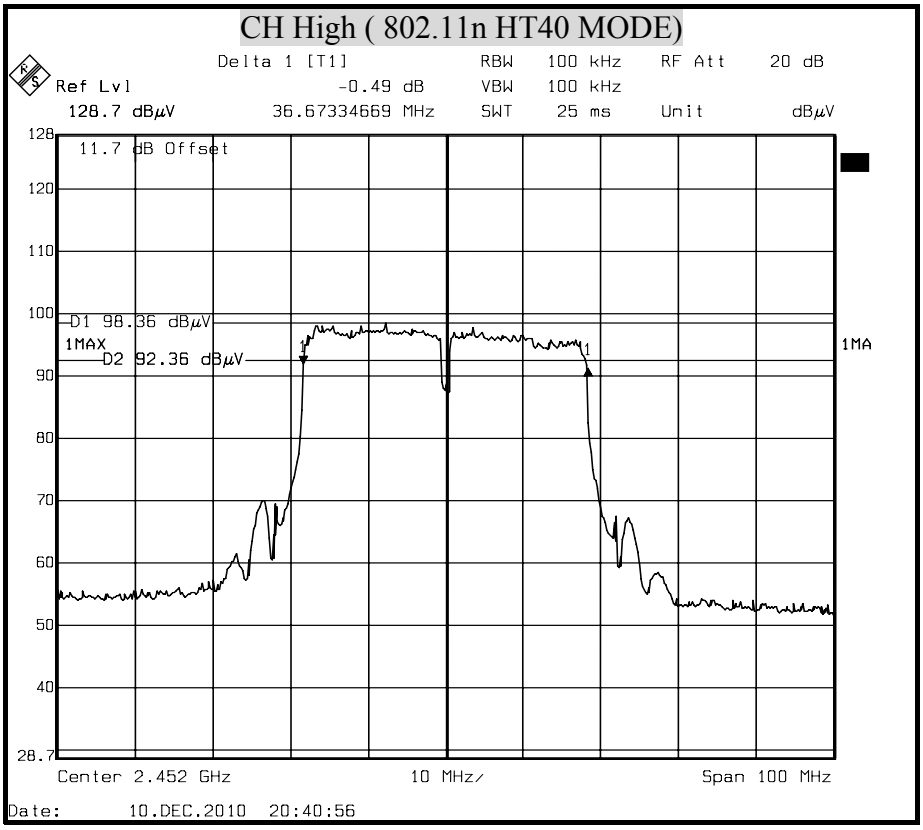
CH Low ( 802.11n HT40 MODE)




CH Mid ( 802.11n HT40 MODE)



CH High ( 802.11n HT40 MODE)



## 8.2 MAXIMUM PEAK OUTPUT POWER

**LIMIT**

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

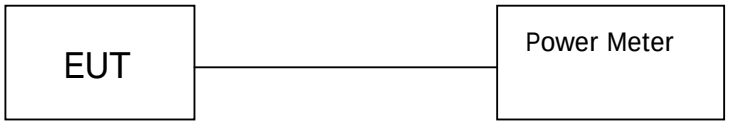
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**TEST EQUIPMENTS**

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Power Meter | Anritsu | ML2487A | 6K00003888 | MAY 11, 2011 |

**TEST SETUP**




**TEST PROCEDURE**

Connect the EUT to power meter, set the center frequency of the power meter to the channel center frequency. Set the RBW to 1MHz and VBW to 3MHz.

**TEST RESULTS**

No non-compliance noted

Total peak power calculation formula:
10 log (10^ (Chain 0 Power / 10)).

The maximum antenna gain is 7.0Bi for other than fixed, point-to-point operations, therefore the imit is 30 dBm.
In the legacy mode, the effective antenna gain is
10 x Log (10^ (Chain 0 / 10)) = 7.0dBi.
Peak Power Limit=30(dBm)-(7-6)(dBi)=29(dBm)

**IEEE 802.11b mode**

| Channel | Channel Frequency (MHz) | Peak Power (dBm) | Peak Power Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 12.86 | 29 | PASS |
| Middle | 2437 | 13.33 | 29 | PASS |
| High | 2462 | 13.46 | 29 | PASS |

**NOTE** : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the power meter to allow for direct reading of power.

**IEEE 802.11g mode**

| Channel | Channel Frequency (MHz) | Peak Power (dBm) | Peak Power Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 19.91 | 29 | PASS |
| Middle | 2437 | 19.66 | 29 | PASS |
| High | 2462 | 20.70 | 29 | PASS |

**NOTE** : 1.At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the power meter to allow for direct reading of power.

**IEEE 802.11n HT20 mode**

| Channel | Channel Frequency (MHz) | Peak Power (dBm) | Peak Power Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | 19.22 | 29 | PASS |
| Middle | 2437 | 19.94 | 29 | PASS |
| High | 2462 | 20.35 | 29 | PASS |

**NOTE** : 1.At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the power meter to allow for direct reading of power.

**IEEE 802.11n HT40 mode**

| Channel | Channel Frequency (MHz) | Peak Power (dBm) | Peak Power Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2422 | 17.58 | 29 | PASS |
| Middle | 2437 | 17.84 | 29 | PASS |
| High | 2452 | 18.36 | 29 | PASS |

**NOTE** : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the power meter to allow for direct reading of power.

## IEEE 802.11b mode

**Average Power Data**

| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2412 | 10.68 |
| Middle | 2437 | 11.07 |
| High | 2462 | 11.28 |

## IEEE 802.11g mode

**Average Power Data**

| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2412 | 10.19 |
| Middle | 2437 | 10.26 |
| High | 2462 | 10.83 |

## IEEE 802.11n HT20 mode

**Average Power Data**

| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2412 | 9.88 |
| Middle | 2437 | 10.00 |
| High | 2462 | 10.42 |

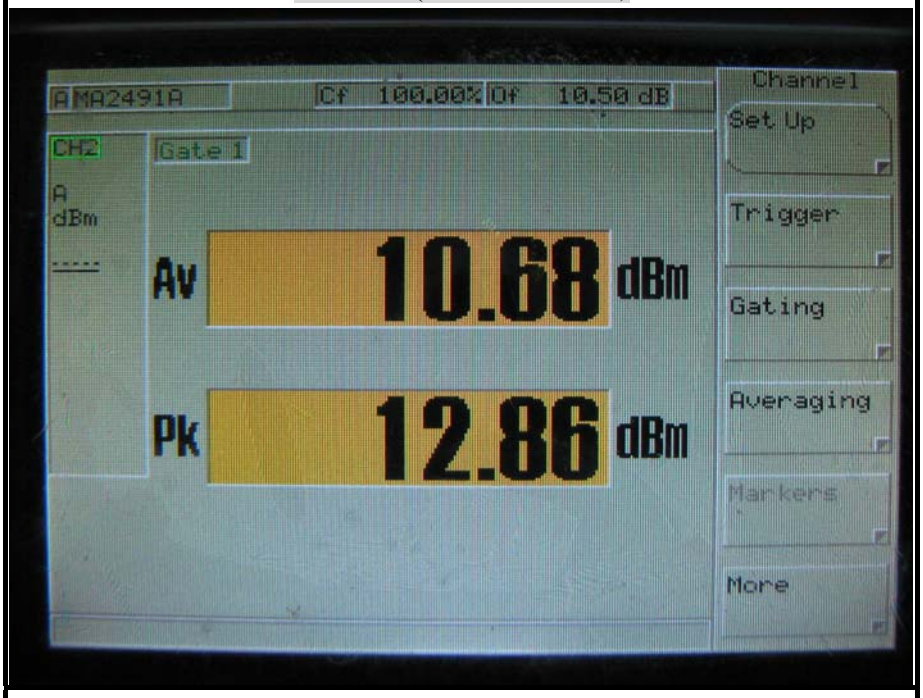
## IEEE 802.11n HT40 mode

**Average Power Data**

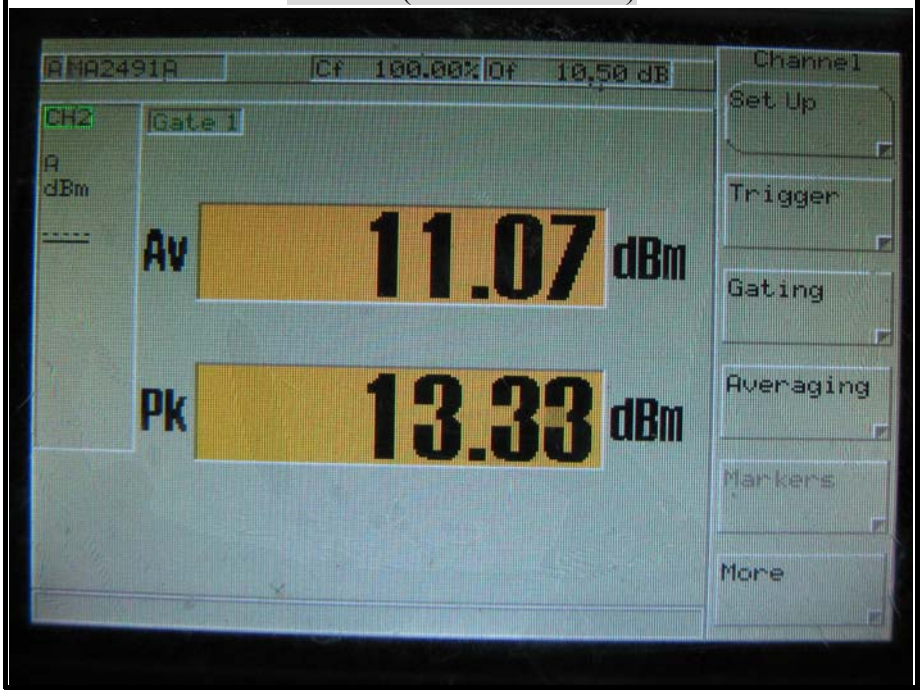
| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2422 | 8.86 |
| Middle | 2437 | 9.36 |
| High | 2452 | 8.86 |

**MAXIMUM PEAK OUTPUT POWER ( 802.11b MODE)**

CH Low ( 802.11b MODE)



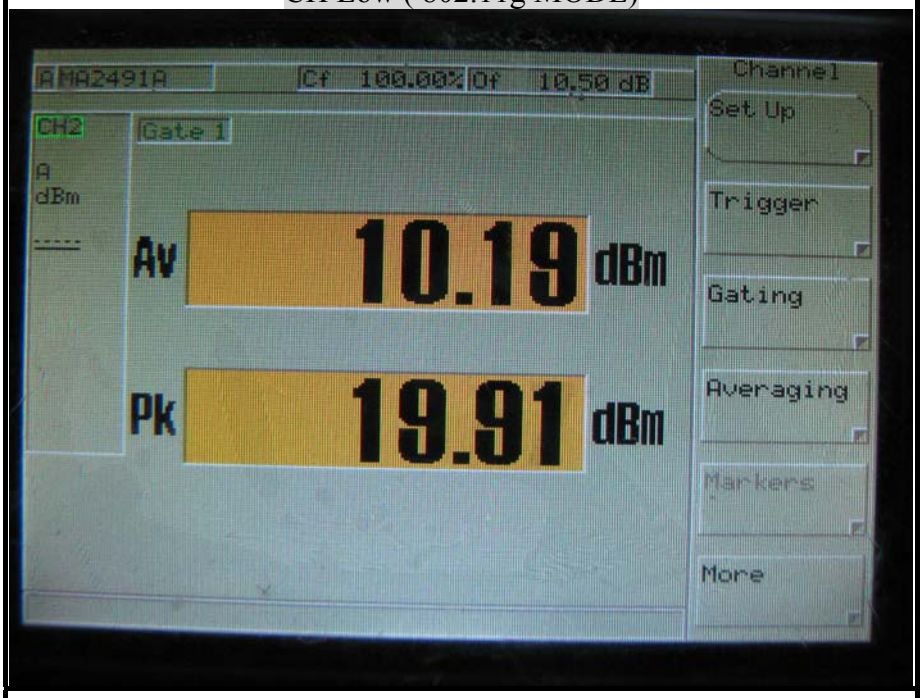

CH Mid ( 802.11b MODE)



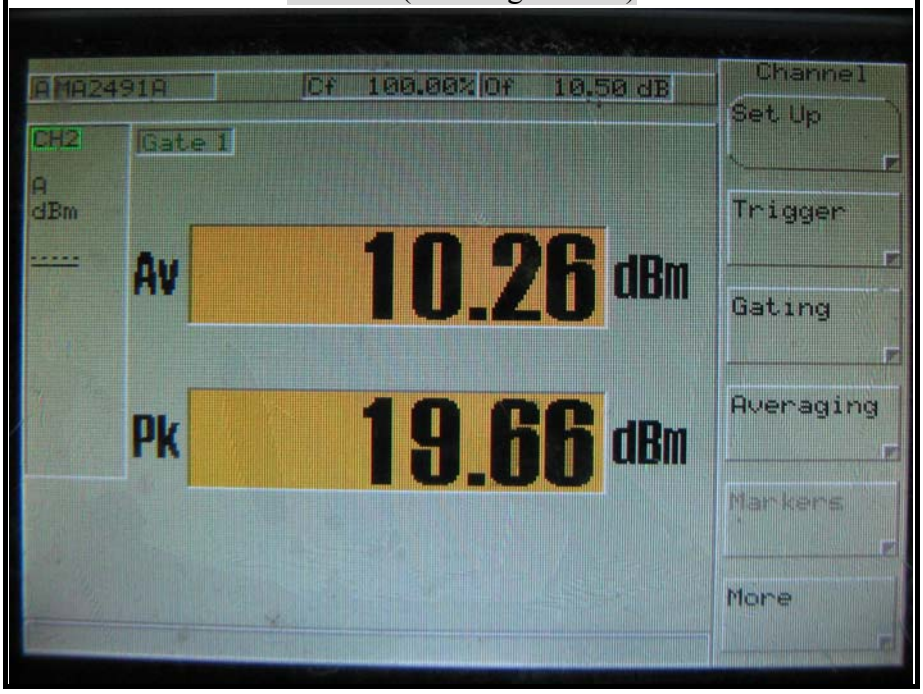
CH High ( 802.11b MODE)

**MAXIMUM PEAK OUTPUT POWER ( 802.11g MODE )**

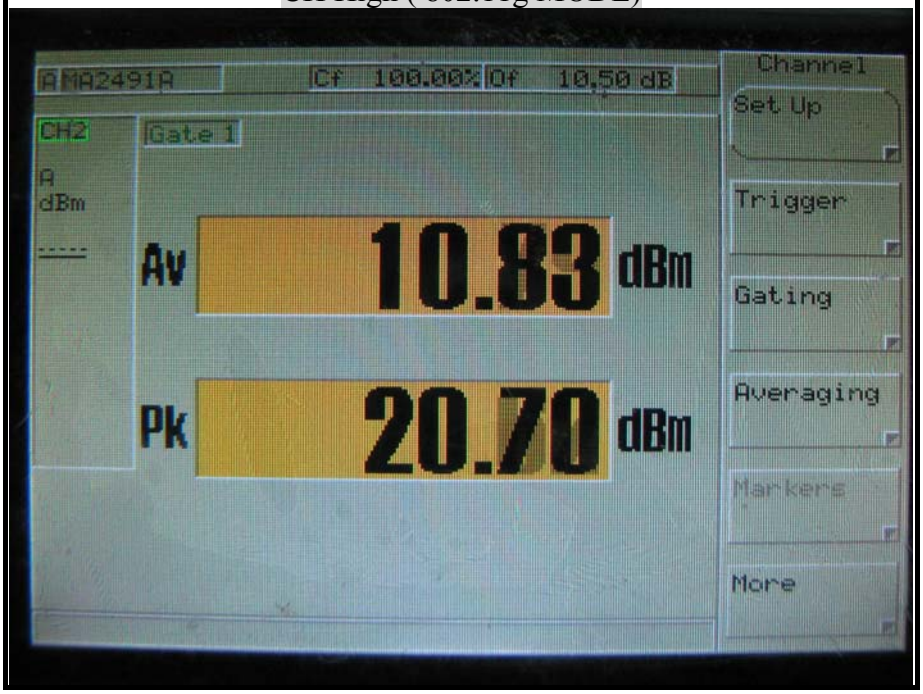
CH Low ( 802.11g MODE)




CH Mid ( 802.11g MODE)

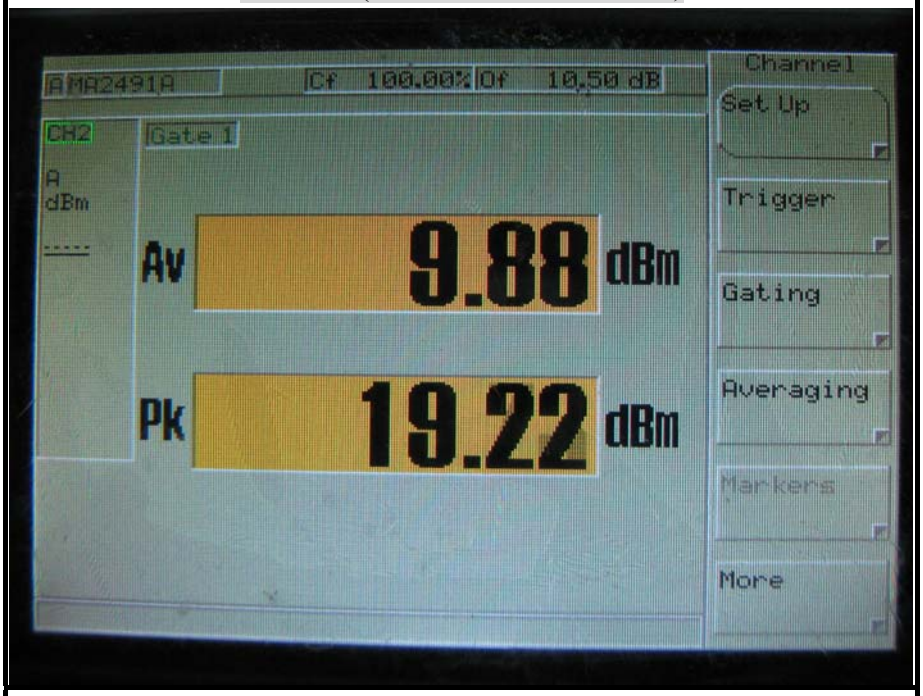


CH High ( 802.11g MODE)

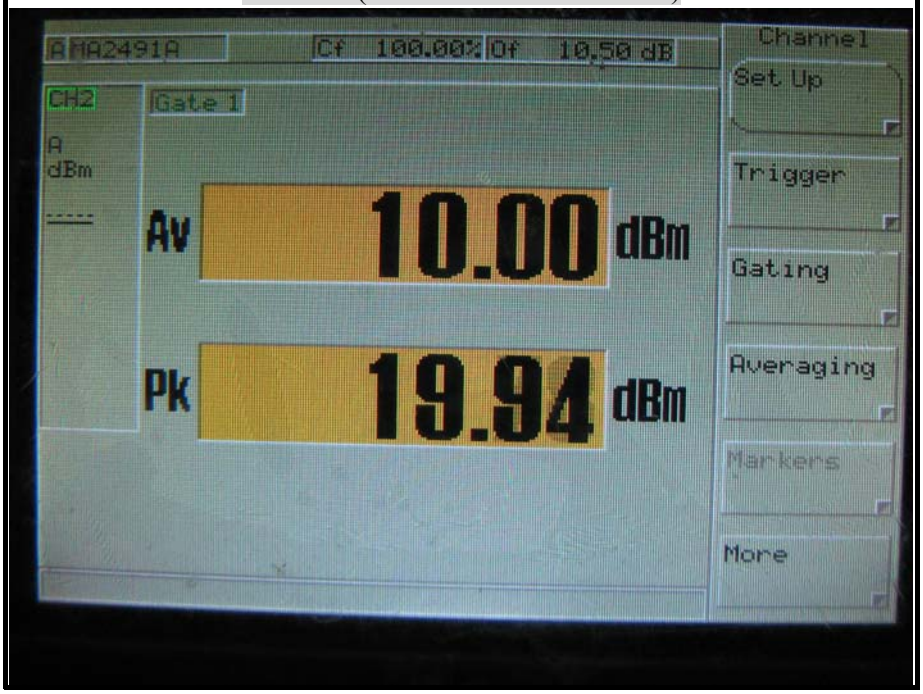


**MAXIMUM PEAK OUTPUT POWER ( 802.11n HT20 MODE )**

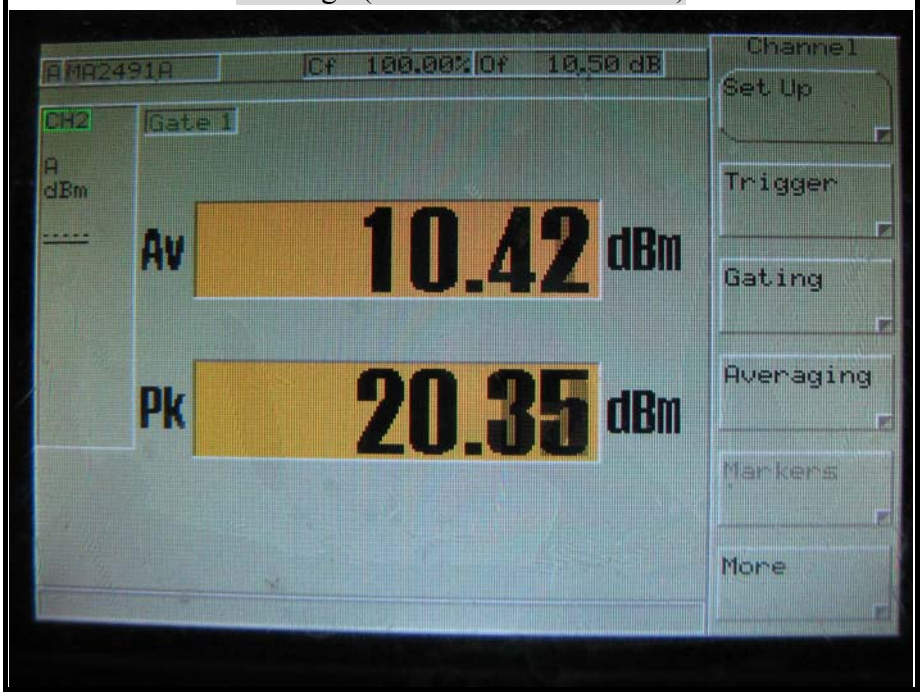
CH Low ( 802.11n HT20 MODE )




CH Mid ( 802.11n HT20 MODE )

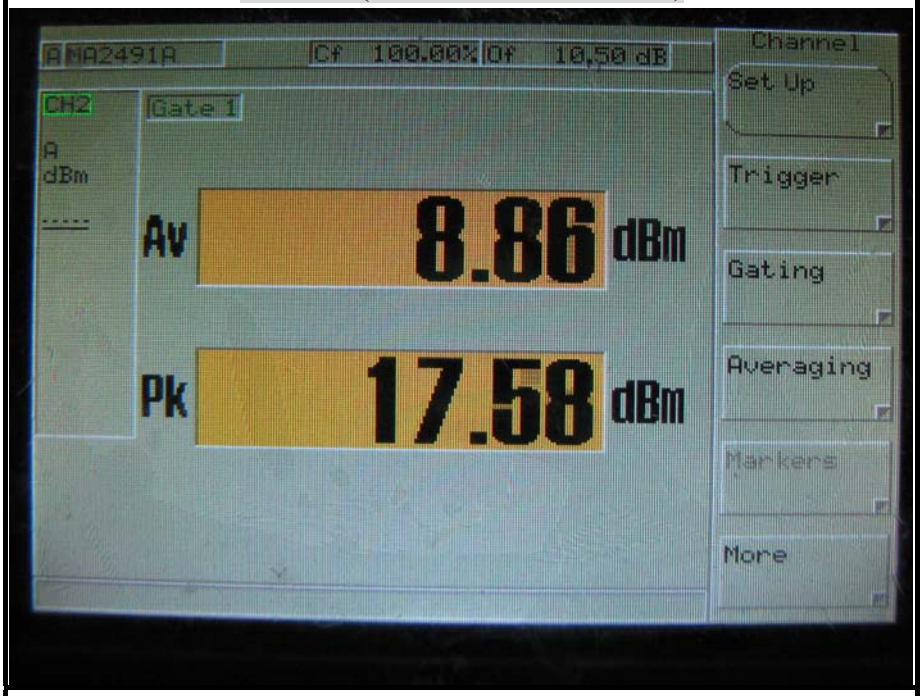


CH High ( 802.11n HT20 MODE )

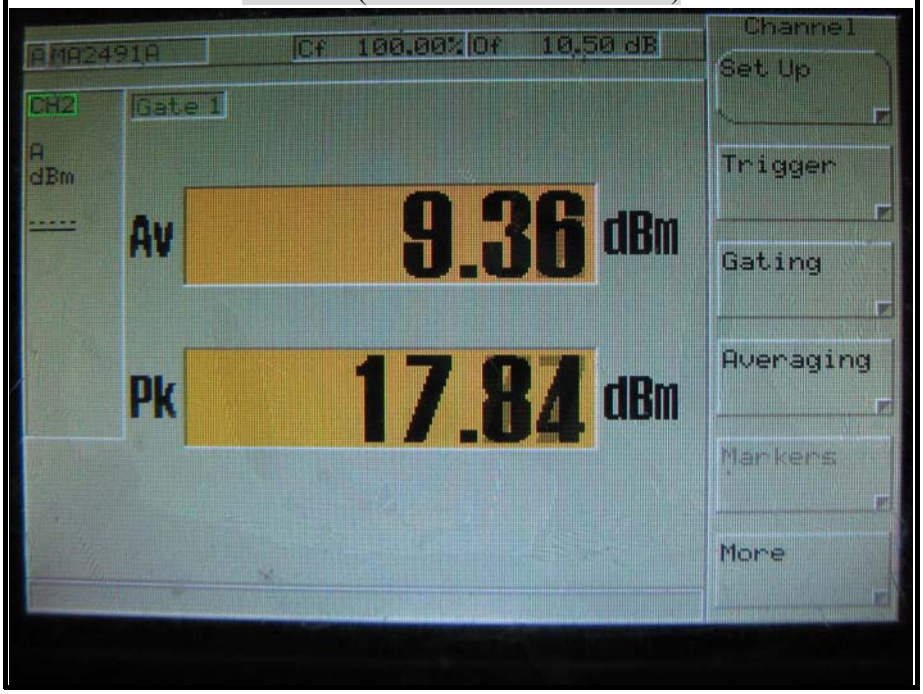


**MAXIMUM PEAK OUTPUT POWER ( 802.11n HT40 MODE )**

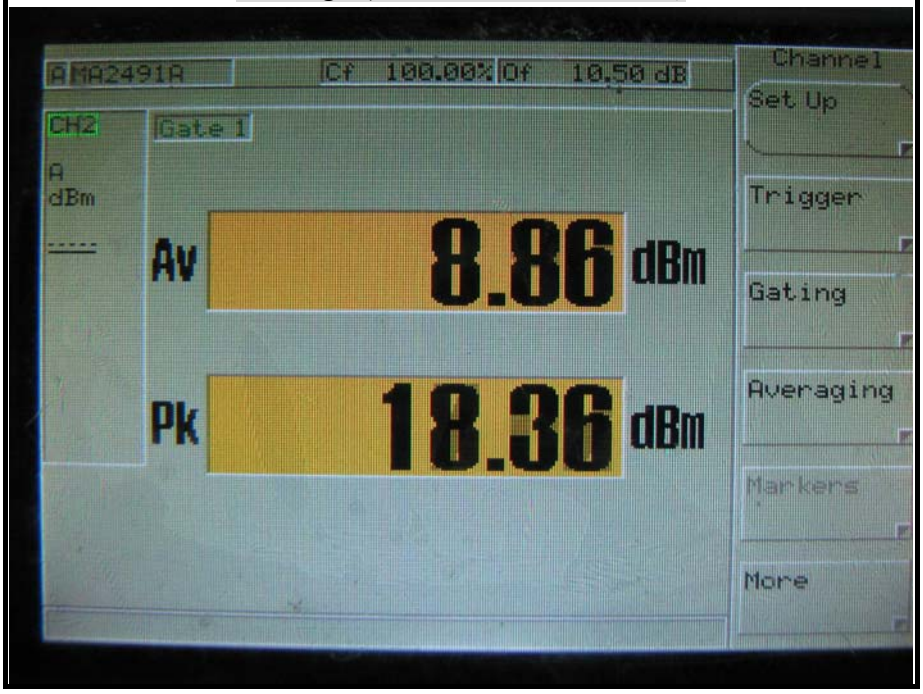
CH Low ( 802.11n HT40 MODE )




CH Mid ( 802.11n HT40 MODE )



CH High ( 802.11n HT40 MODE )



## 8.3 MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density ($mW/cm^2$) | Average Time |
|---|---|---|---|---|
| (A) Limits for Occupational / Control Exposures | | | | |
| 300-1,500 | -- | -- | F/300 | 6 |
| 1,500-100,000 | -- | -- | 5 | 6 |
| (B) Limits for General Population / Uncontrol Exposures | | | | |
| 300-1,500 | -- | -- | F/1500 | 6 |
| 1,500-100,000 | -- | -- | 1 | 30 |

**CALCULATIONS**

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

*Where* $E$ = *Field strength in Volts / meter*

$P$ = *Power in Watts*

$G$ = *Numeric antenna gain*

$d$ = *Distance in meters*

$S$ = *Power density in milliwatts / square centimeter*

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

*P (mW) = P (W) / 1000 and*

*d (cm) = d(m) / 100*

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

*Where* $d$ = *Distance in cm*

$P$ = *Power in mW*

$G$ = *Numeric antenna gain*

$S$ = *Power density in* $mW / cm^2$

**LIMIT**

Power Density Limit, S=1.0mW/cm$^2$

**TEST RESULTS**

No non-compliance noted.

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

G=7.0dBi=5.01187233627272 dB

IEEE 802.11b =0.0796*22.1896*5.01187234/400=0.022123

IEEE 802.11g =0.0796*117.4897*5.01187234/400=0.117180

IEEE 802.11n HT20 =0.0796*108.3926*5.01187234/400=0.108107

IEEE 802.11n HT40 =0.0796*68.5488*5.01187234/400=0.068368

| Mode | Minimum separation distance (cm) | Output Power (dBm) | Output Power (mw) | Antenna Gain (dBi) | Power Density Limit (mW/cm$^2$) | Power Density at 20cm (mW/cm$^2$) |
|---|---|---|---|---|---|---|
| IEEE 802.11b | 20 | 13.46 | 22.18 | 7.00 | 1.00 | 0.022123 |
| IEEE 802.11g | 20 | 20.70 | 117.49 | 7.00 | 1.00 | 0.117180 |
| IEEE 802.11n HT20 | 20 | 20.35 | 108.39 | 7.00 | 1.00 | 0.108107 |
| IEEE 802.11n HT40 | 20 | 18.36 | 68.55 | 7.00 | 1.00 | 0.068368 |

**REMARK:** For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm$^2$ even if the calculation indicates that the power density would be larger.

## 8.4 POWER SPECTRAL DENSITY

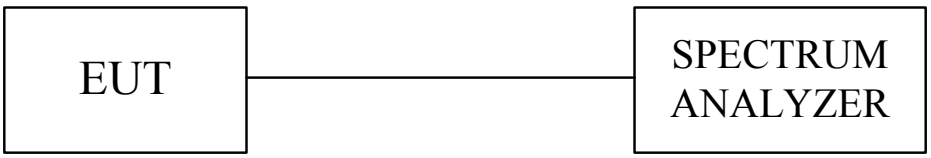
**LIMIT**

§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

**TEST EQUIPMENTS**

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSEK 30 | 835253/002 | JUL. 14, 2011 |

**TEST SETUP**




**TEST PROCEDURE**

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=3KHz and VBW≧RBW, 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.

**TEST RESULTS**

No non-compliance noted.

Total power spectral density calculation formula:
10 log (10^ (Chain 0 PPSD / 10) + 10^ (Chain1 PPSD / 10))

**IEEE 802.11b mode**

| Channel | Channel Frequency (MHz) | Final RF Power Level in 3KHz BW (dBm) | Maximum Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | -21.24 | 7.00 | Pass |
| Middle | 2437 | -20.73 | 7.00 | Pass |
| High | 2462 | -20.45 | 7.00 | Pass |

**NOTE** : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11g mode**

| Channel | Channel Frequency (MHz) | Final RF Power Level in 3KHz BW (dBm) | Maximum Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | -21.44 | 7.00 | Pass |
| Middle | 2437 | -21.39 | 7.00 | Pass |
| High | 2462 | -20.48 | 7.00 | Pass |

**NOTE** : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 mode**

| Channel | Channel Frequency (MHz) | Final RF Power Level in 3KHz BW (dBm) | Maximum Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2412 | -20.59 | 7.00 | Pass |
| Middle | 2437 | -20.59 | 7.00 | Pass |
| High | 2462 | -19.94 | 7.00 | Pass |

**NOTE** : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

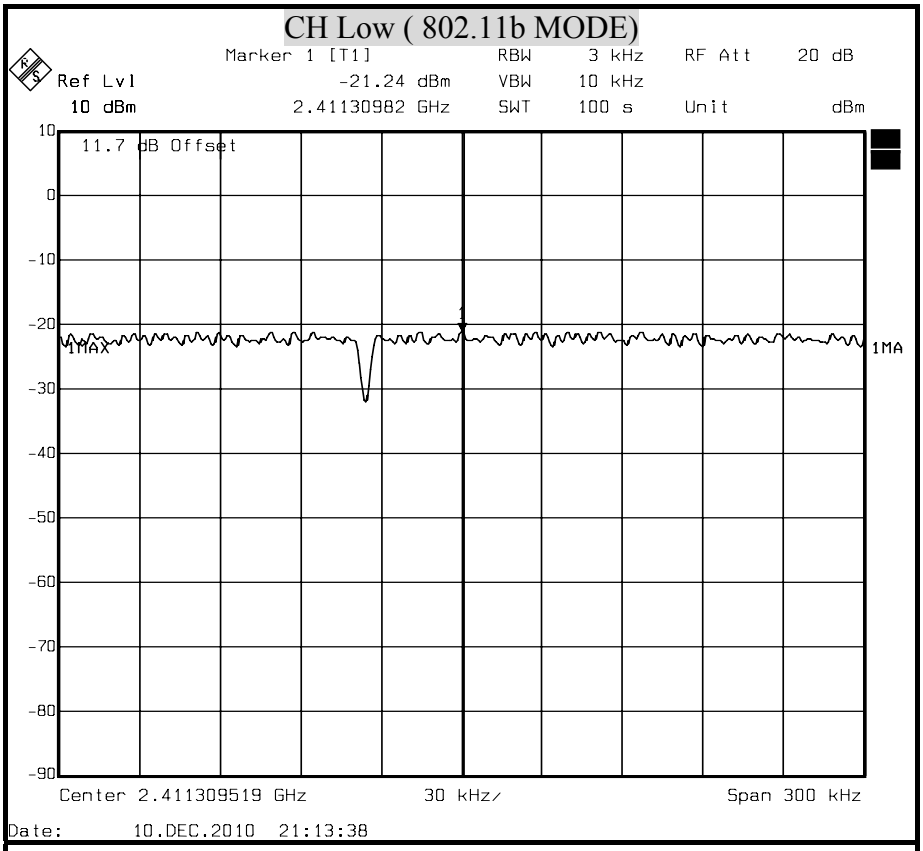
**IEEE 802.11n HT40 mode**

| Channel | Channel Frequency (MHz) | Final RF Power Level in 3KHz BW (dBm) | Maximum Limit (dBm) | Pass / Fail |
|---|---|---|---|---|
| Low | 2422 | -25.05 | 7.00 | Pass |
| Middle | 2437 | -23.67 | 7.00 | Pass |
| High | 2452 | -23.13 | 7.00 | Pass |

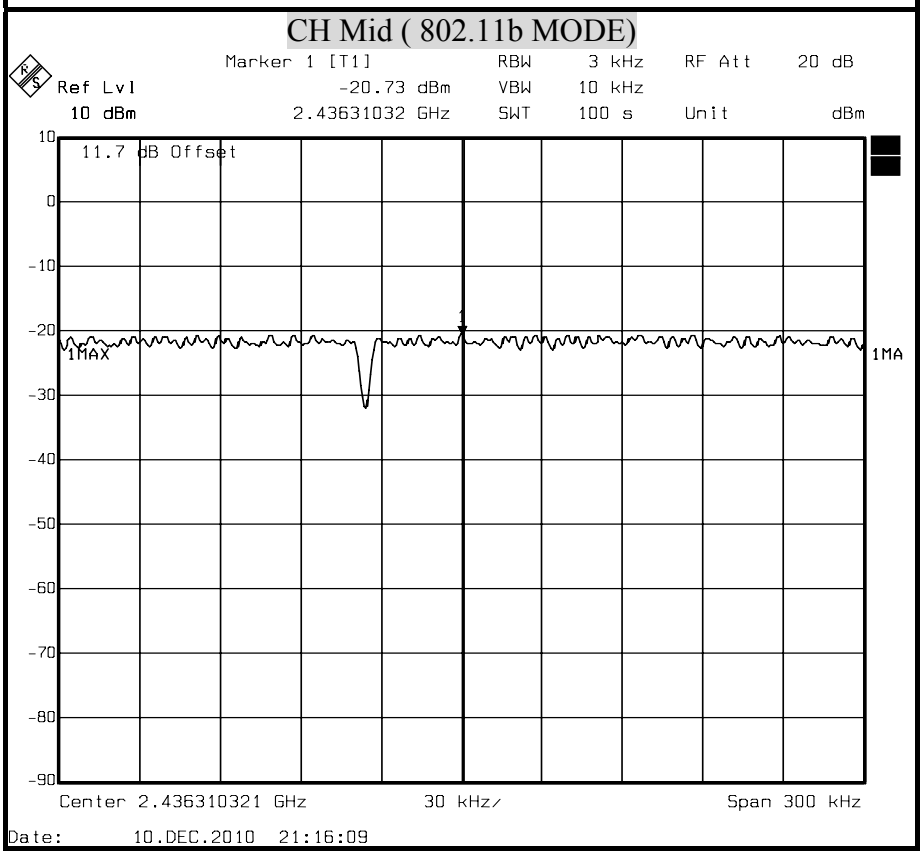
**NOTE** : 1. At finial test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

## POWER SPECTRAL DENSITY ( IEEE 802.11b MODE)

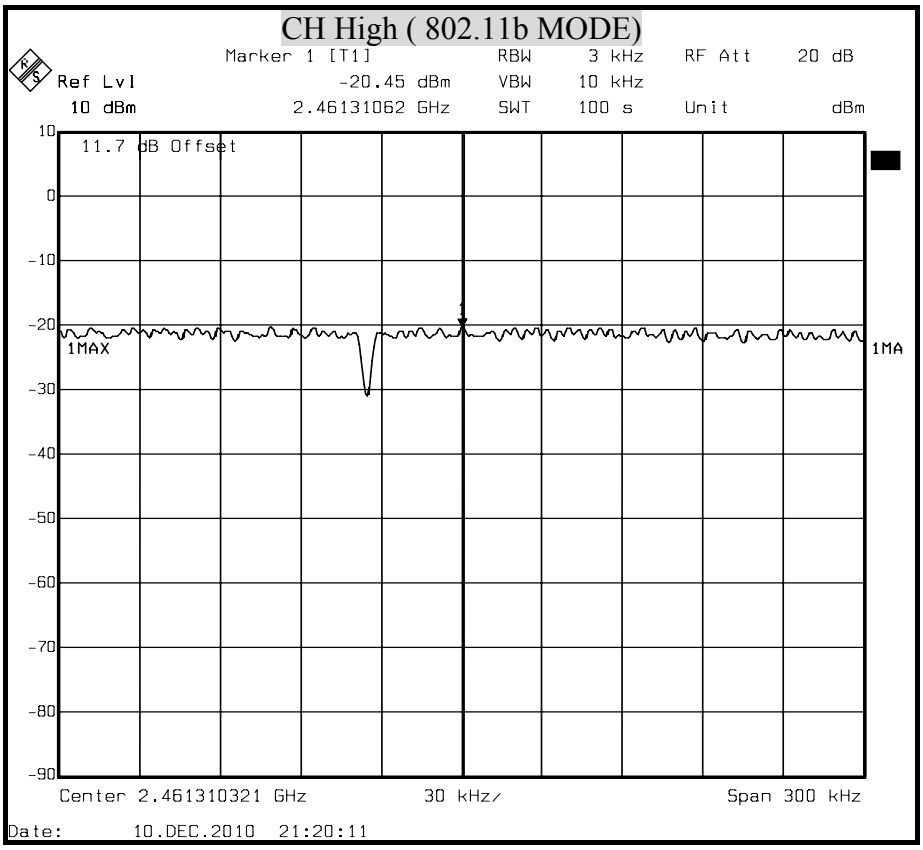
CH Low ( 802.11b MODE)




CH Mid ( 802.11b MODE)

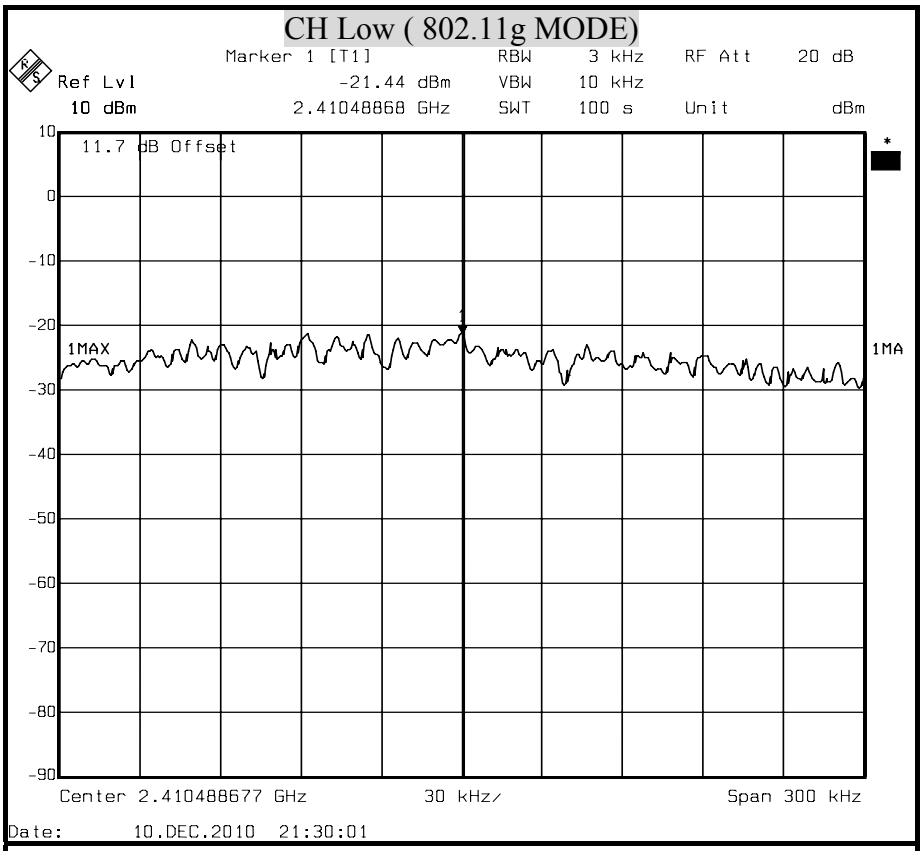


CH High ( 802.11b MODE)

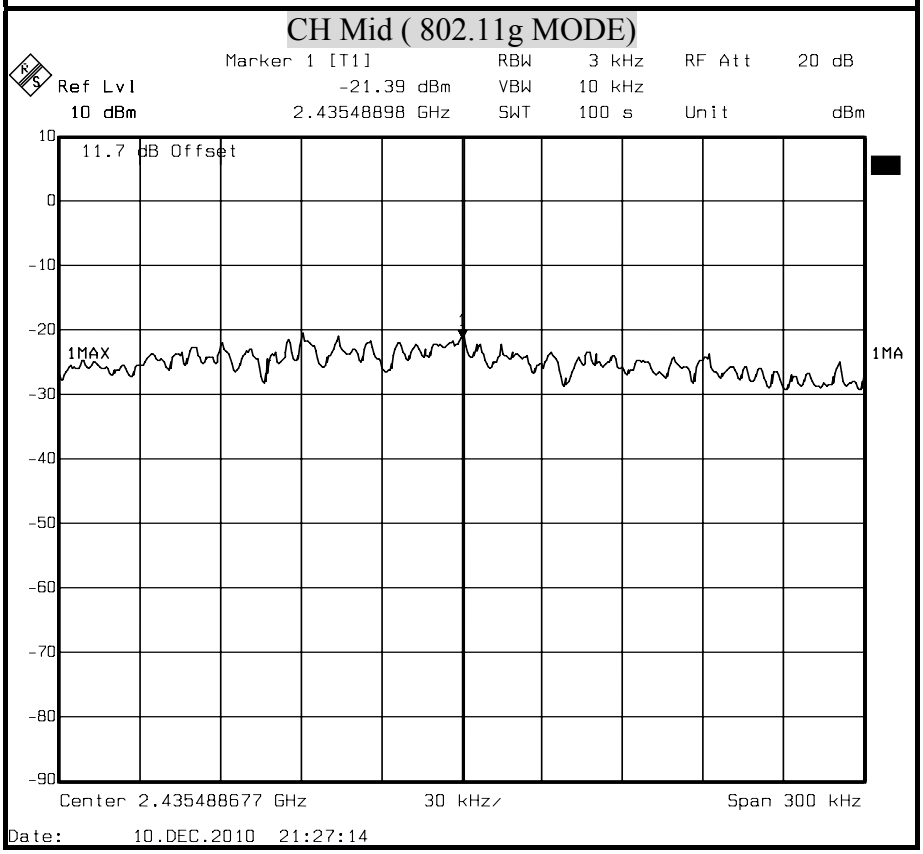


## POWER SPECTRAL DENSITY ( IEEE 802.11g MODE )

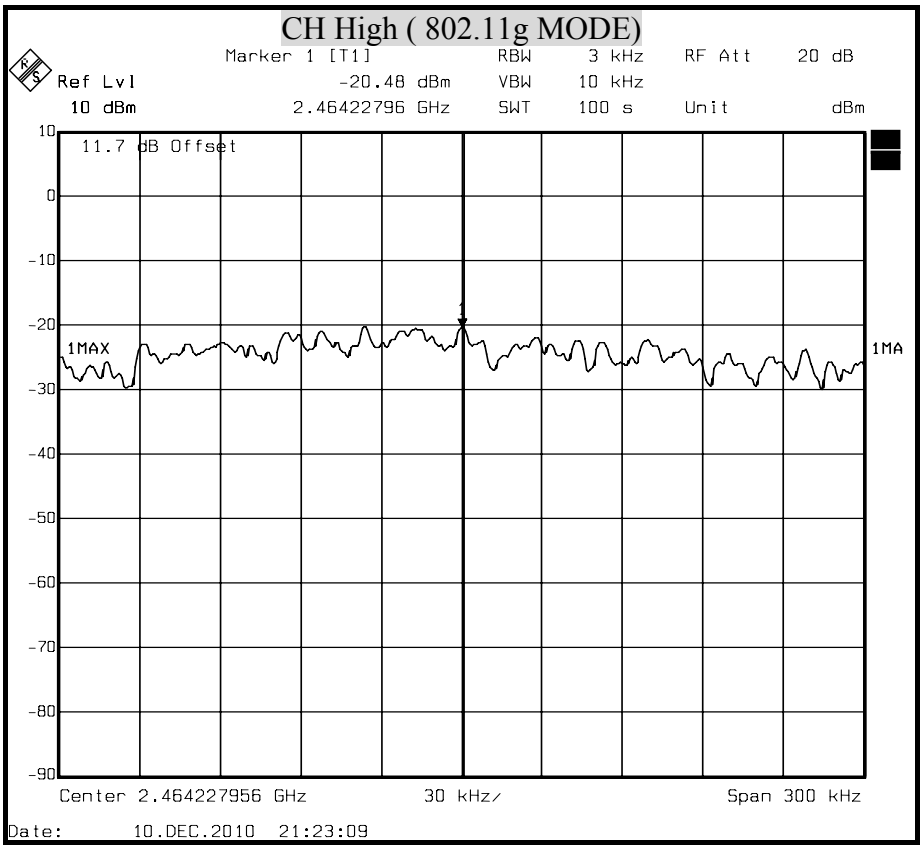
CH Low ( 802.11g MODE)




CH Mid ( 802.11g MODE)

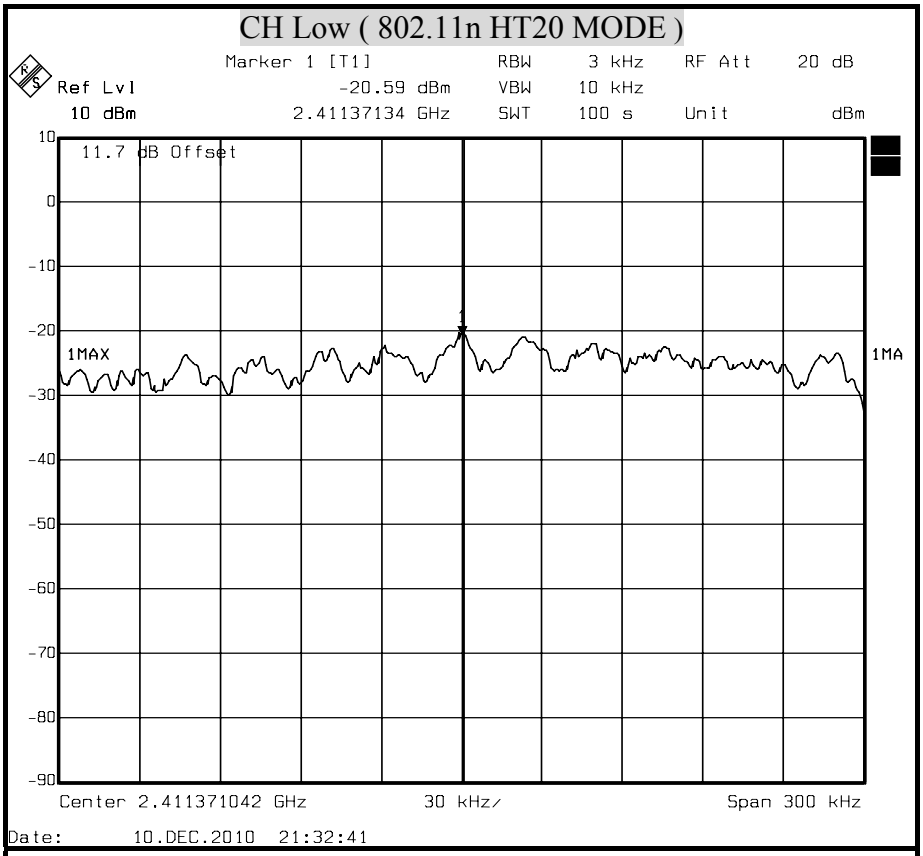


CH High ( 802.11g MODE)

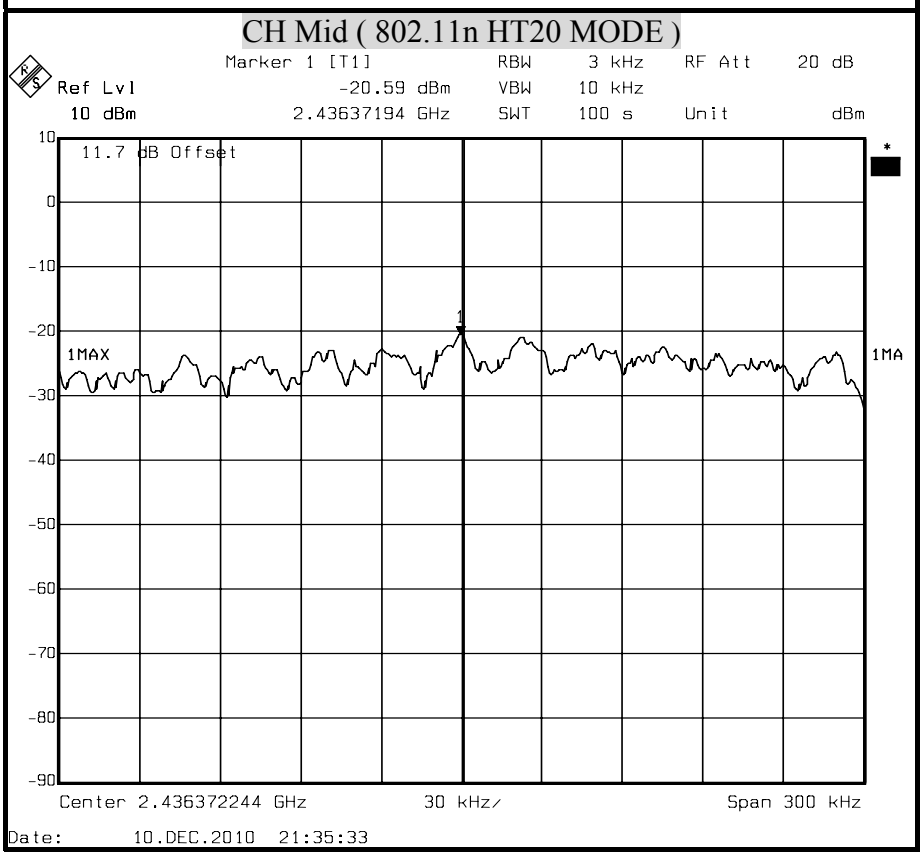


## POWER SPECTRAL DENSITY ( 802.11n HT20 MODE )

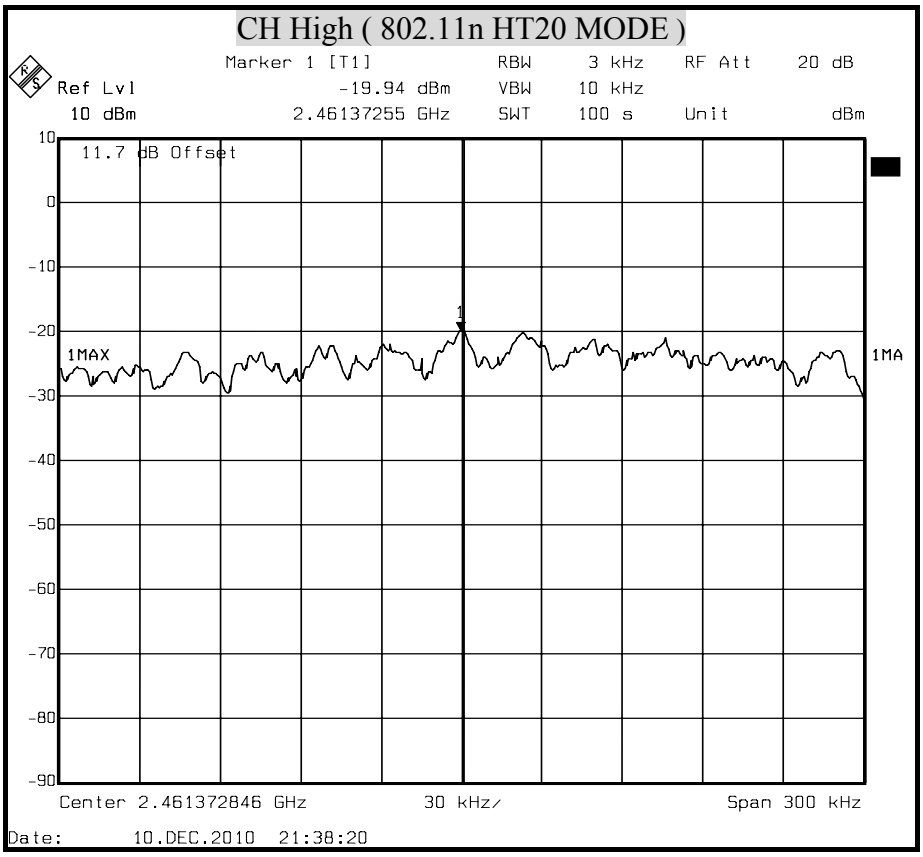
CH Low ( 802.11n HT20 MODE )




CH Mid ( 802.11n HT20 MODE )

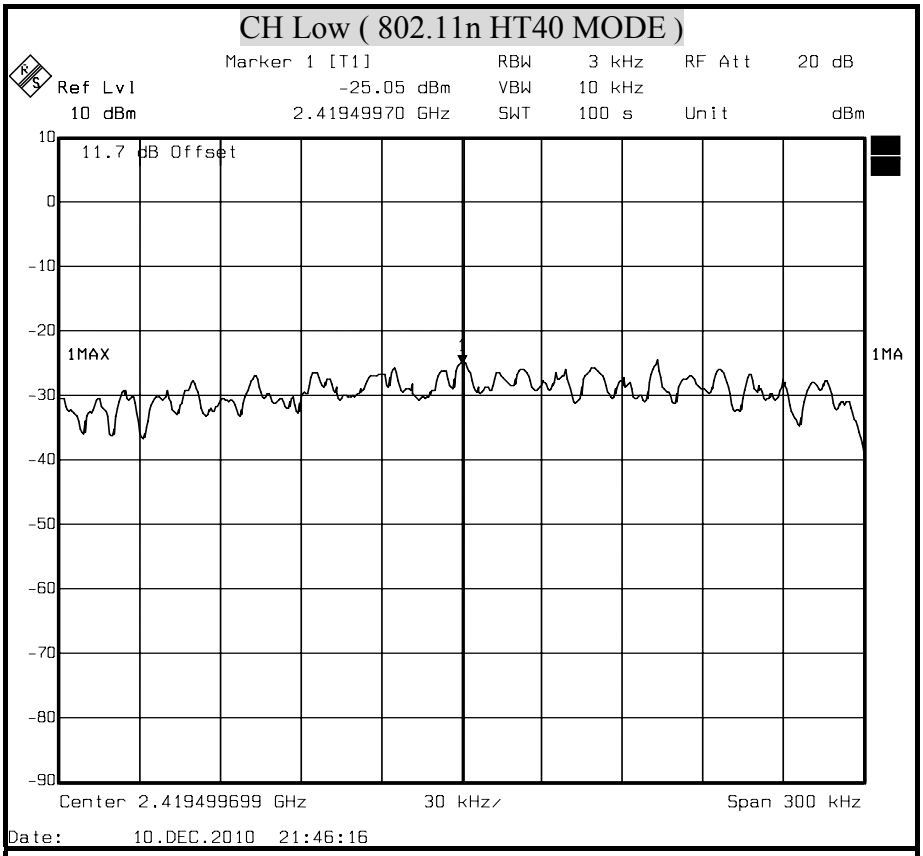


CH High ( 802.11n HT20 MODE )

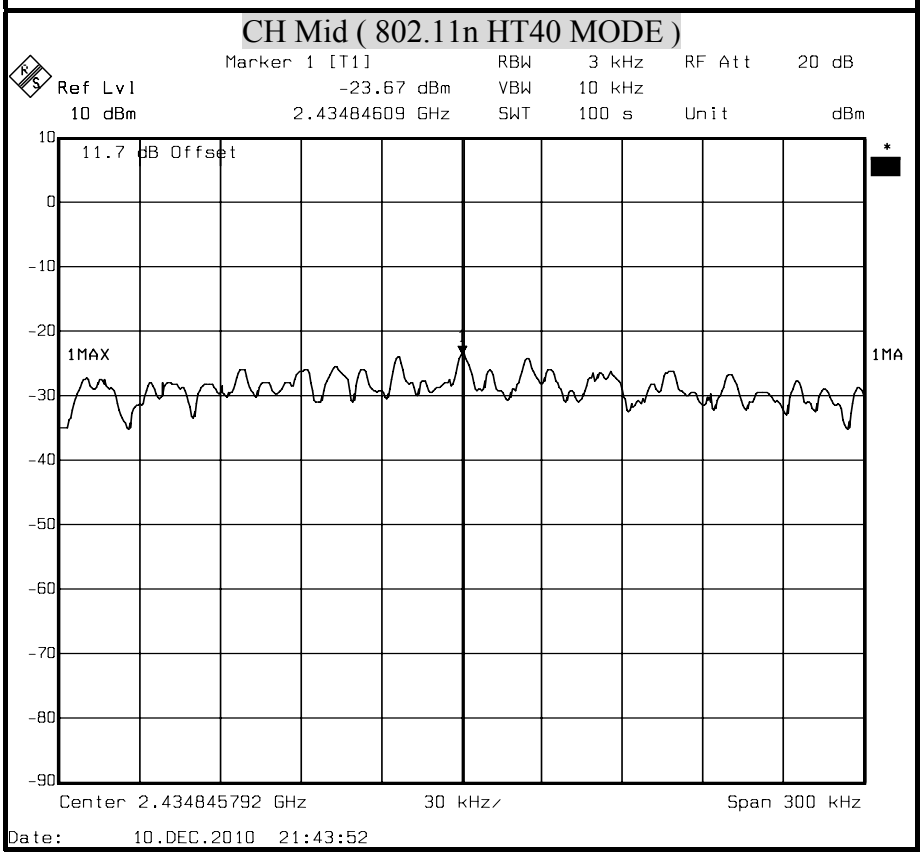


## POWER SPECTRAL DENSITY ( 802.11n HT40 MODE )

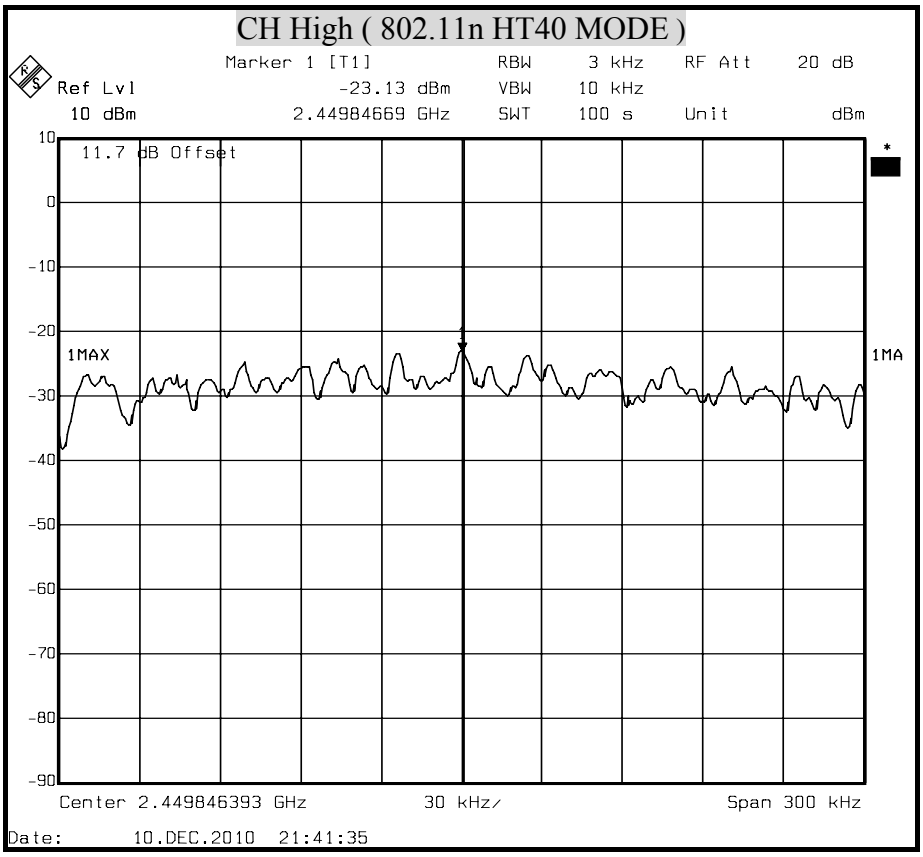
CH Low ( 802.11n HT40 MODE )




CH Mid ( 802.11n HT40 MODE )



CH High ( 802.11n HT40 MODE )



## 8.5 CONDUCTED SPURIOUS EMISSION

**LIMITS**

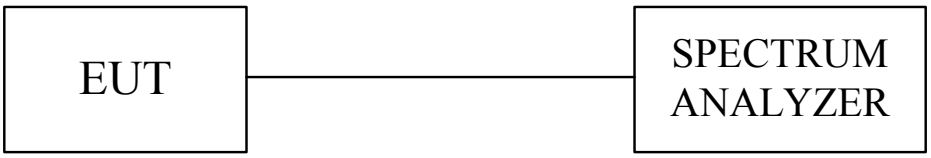
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. 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)).

**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

**TEST SETUP**




**TEST RESULTS**

No non-compliance noted.

## TEST DATA

**IEEE 802.11b mode**

**Low**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2412 | 11.7 | 92.92 | 104.62 | N/A | N/A | --- |
| 6554.66934 | 11.7 | 44.84 | 56.54 | 84.62 | -28.08 | Pass |
| 8676.51303 | 11.7 | 43.57 | 55.27 | 84.62 | -29.35 | Pass |

**Mid**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2437 | 11.7 | 93.49 | 105.19 | N/A | N/A | --- |
| 6660.76152 | 11.7 | 44.62 | 56.32 | 85.19 | -28.87 | Pass |
| 7933.86774 | 11.7 | 43.50 | 55.2 | 85.19 | -29.99 | Pass |

**High**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2462 | 11.7 | 93.66 | 105.36 | N/A | N/A | --- |
| 6660.76152 | 11.7 | 44.73 | 56.43 | 85.36 | -28.93 | Pass |
| 12601.92385 | 11.7 | 43.66 | 55.36 | 85.36 | -30.00 | Pass |

**IEEE 802.11g mode**

**Low**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2412 | 11.7 | 89.33 | 101.03 | N/A | N/A | --- |
| 6979.03808 | 11.7 | 47.64 | 59.34 | 81.03 | -21.69 | Pass |
| 13821.98397 | 11.7 | 44.77 | 56.47 | 81.03 | -24.56 | Pass |

**Mid**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2437 | 11.7 | 89.92 | 101.62 | N/A | N/A | --- |
| 6607.71543 | 11.7 | 44.96 | 56.66 | 81.62 | -24.96 | Pass |
| 10427.03407 | 11.7 | 42.00 | 53.7 | 81.62 | -27.92 | Pass |

**High**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2462 | 11.7 | 90.80 | 102.5 | N/A | N/A | --- |
| 6660.76152 | 11.7 | 45.01 | 56.71 | 82.50 | -25.79 | Pass |
| 11753.18637 | 11.7 | 43.91 | 55.61 | 82.50 | -26.89 | Pass |

**IEEE 802.1120 mode**

**Low**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2412 | 11.7 | 88.23 | 99.93 | N/A | N/A | --- |
| 6925.99198 | 11.7 | 44.85 | 56.55 | 79.93 | -23.38 | Pass |
| 13768.93788 | 11.7 | 44.60 | 56.3 | 79.93 | -23.63 | Pass |

**Mid**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2437 | 11.7 | 88.74 | 100.44 | N/A | N/A | --- |
| 6925.99198 | 11.7 | 44.49 | 56.19 | 80.44 | -24.25 | Pass |
| 10427.03407 | 11.7 | 42.73 | 54.43 | 80.44 | -26.01 | Pass |

**High**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2462 | 11.7 | 90.19 | 101.89 | N/A | N/A | --- |
| 6925.99198 | 11.7 | 44.93 | 56.63 | 81.89 | -25.26 | Pass |
| 10798.35671 | 11.7 | 42.20 | 53.9 | 81.89 | -27.99 | Pass |

**IEEE 802.1140 mode**

**Low**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2422 | 11.7 | 85.86 | 97.56 | N/A | N/A | --- |
| 6979.03808 | 11.7 | 43.91 | 55.61 | 77.56 | -21.95 | Pass |
| 12654.96994 | 11.7 | 43.46 | 55.16 | 77.56 | -22.40 | Pass |

**Mid**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2437 | 11.7 | 85.59 | 97.29 | N/A | N/A | --- |
| 6979.03808 | 11.7 | 45.28 | 56.98 | 77.29 | -20.31 | Pass |
| 12442.78557 | 11.7 | 44.60 | 56.3 | 77.29 | -20.99 | Pass |

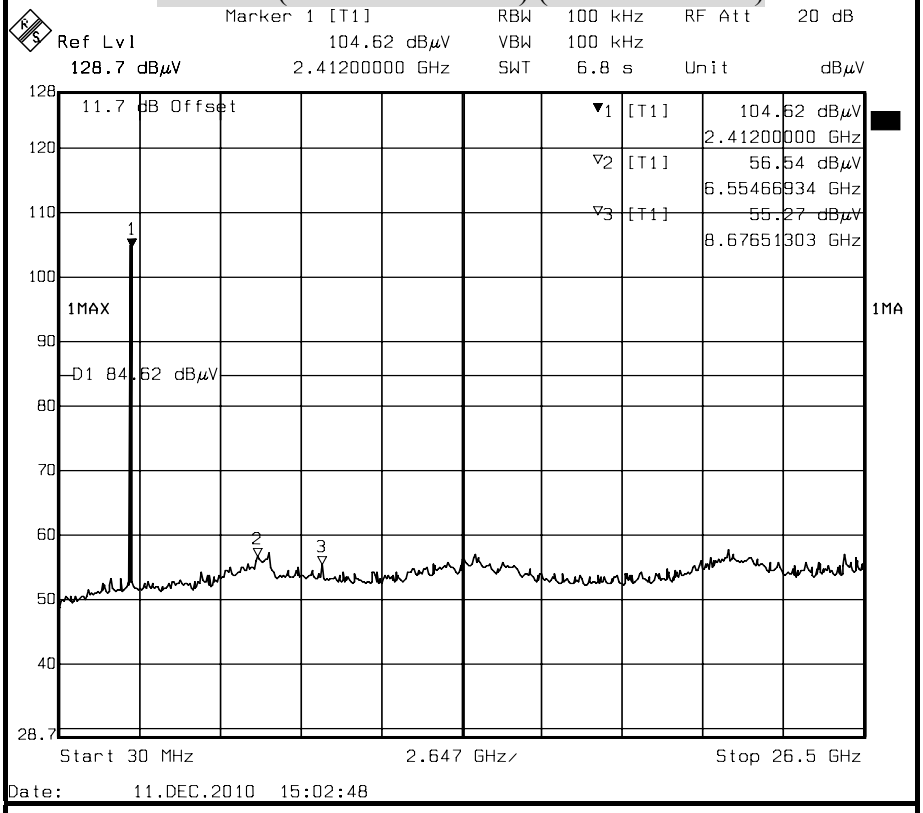
**High**

| Frequency (MHz) | Offset (dB) | Reading (dBμV) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|
| 2452 | 11.7 | 85.21 | 96.91 | N/A | N/A | --- |
| 6925.99198 | 11.7 | 44.19 | 55.89 | 76.91 | -21.02 | Pass |
| 11965.37074 | 11.7 | 42.33 | 54.03 | 76.91 | -22.88 | Pass |

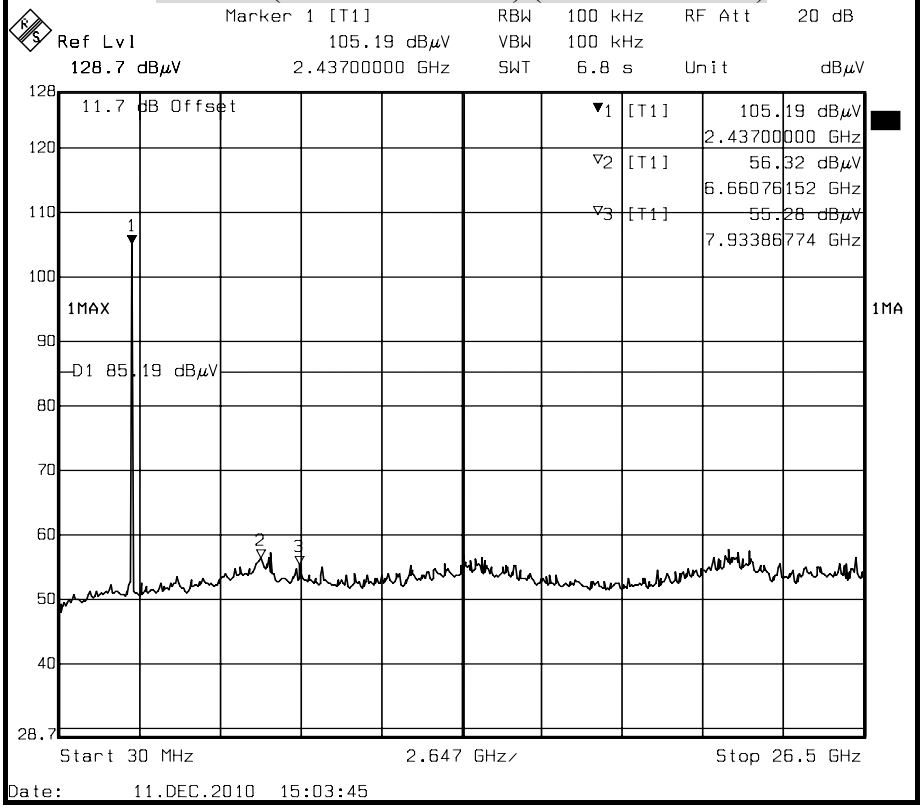
## OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

## ( IEEE 802.11b MODE)

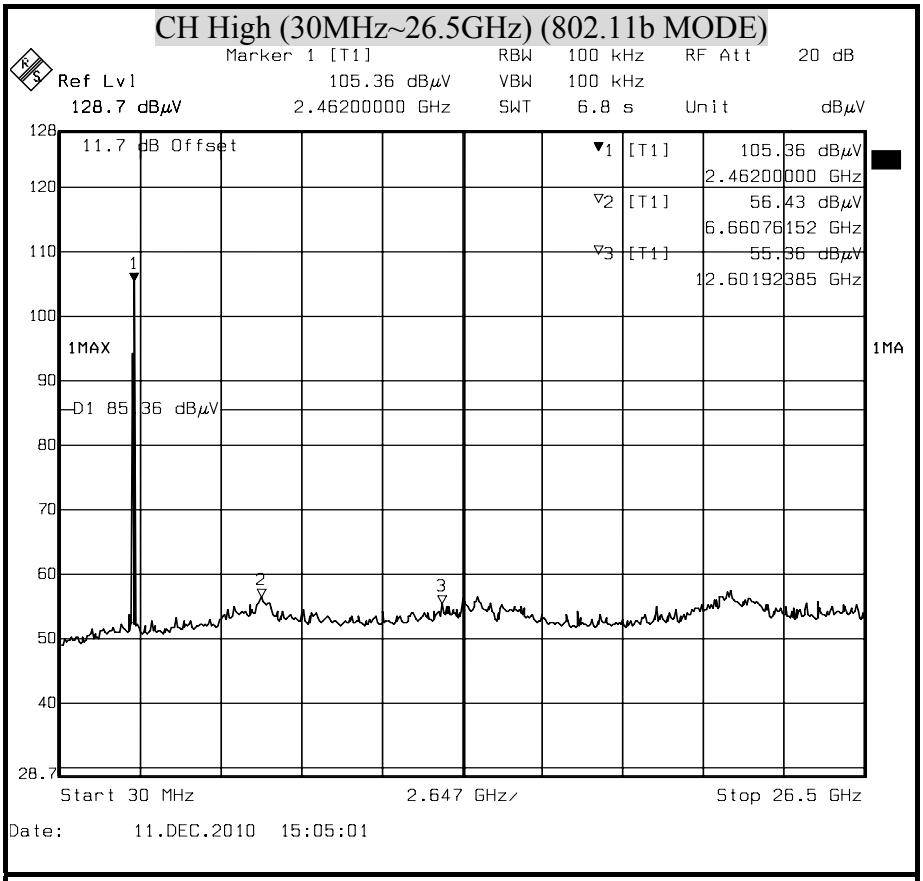
CH Low (30MHz~26.5GHz) (802.11b MODE)



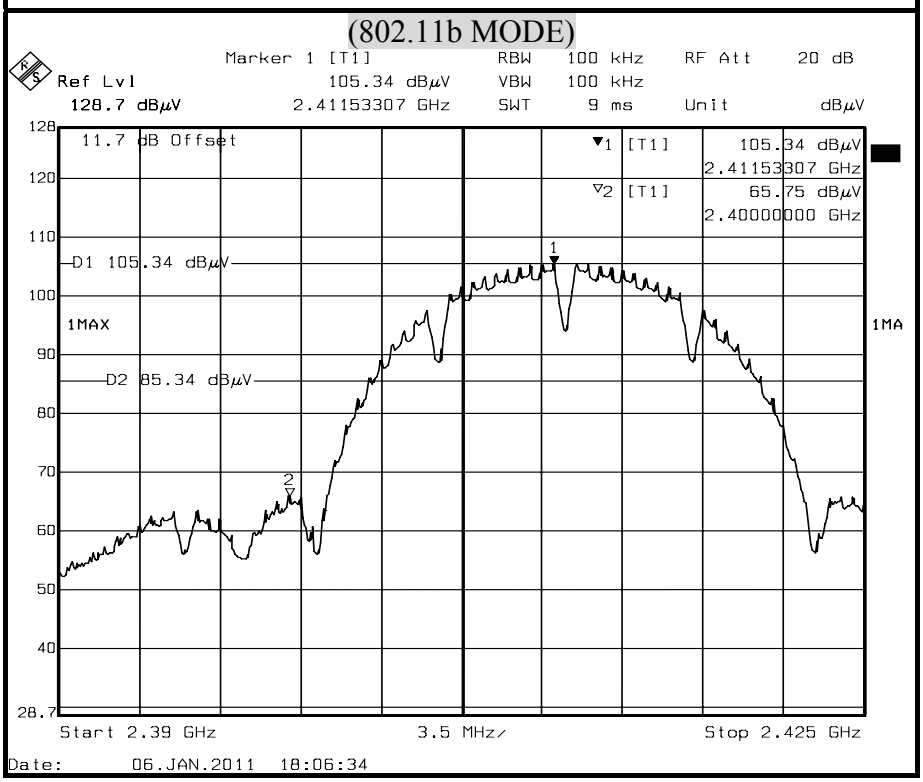

CH Mid (30MHz~26.5GHz) (802.11b MODE )



CH High (30MHz~26.5GHz) (802.11b MODE)



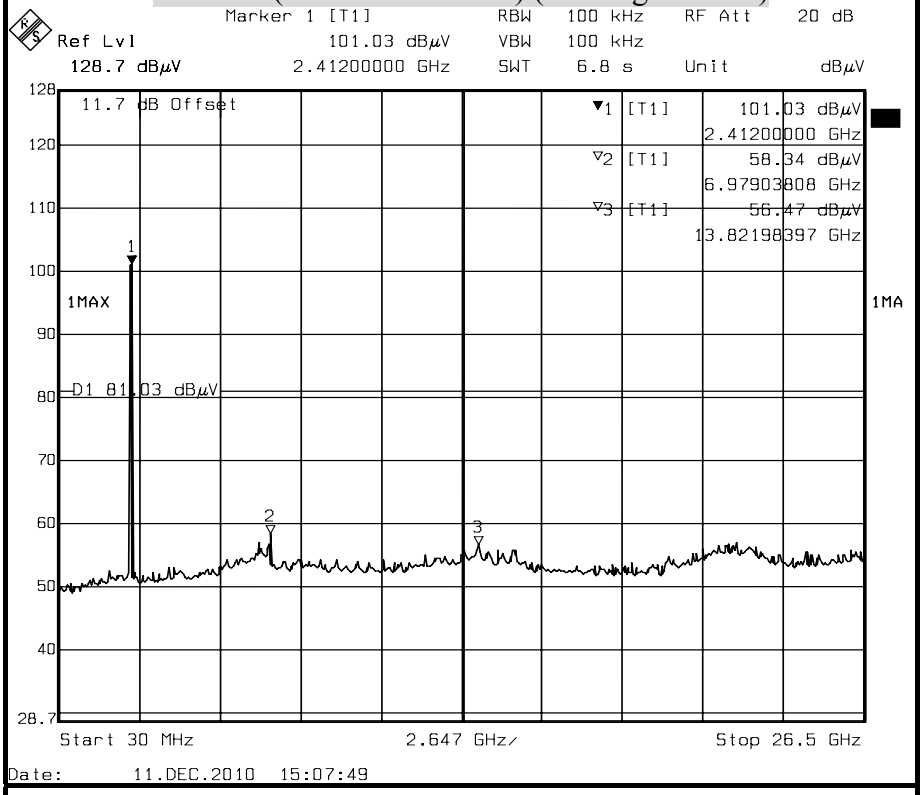

(802.11b MODE)



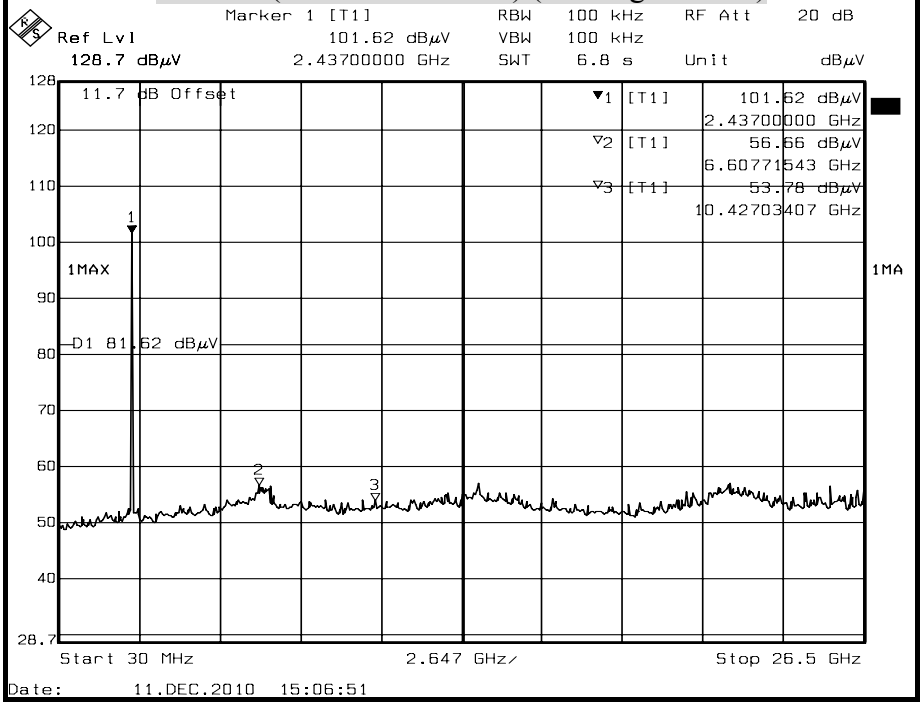
## OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

## ( 802.11g MODE)

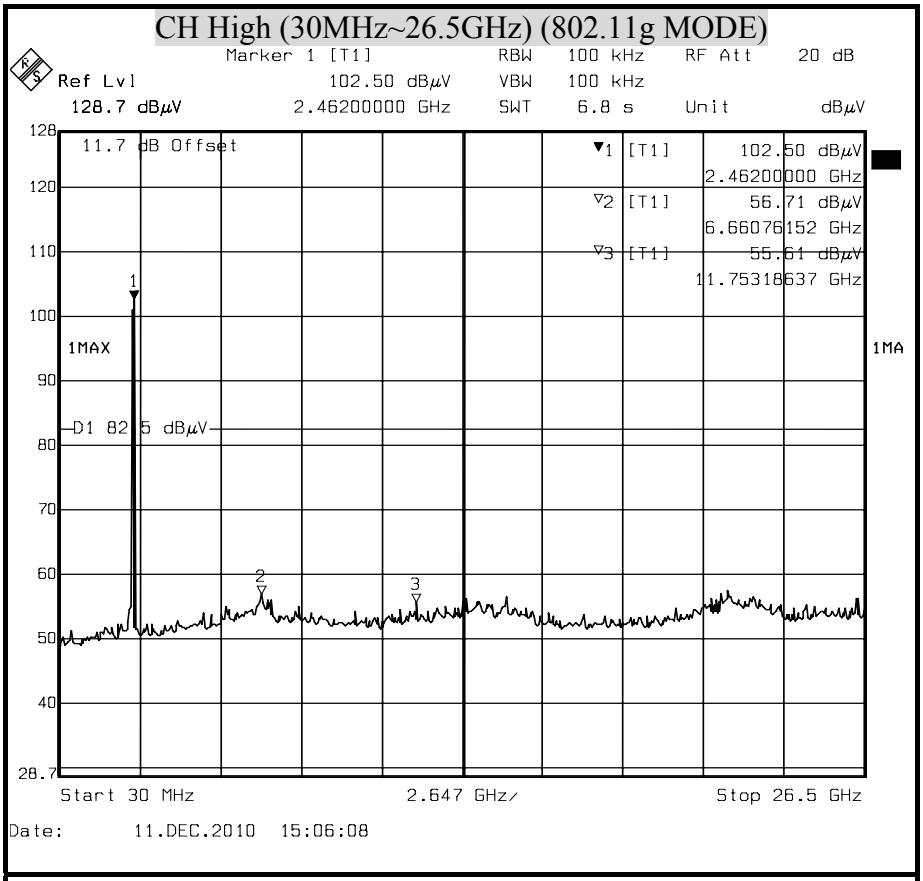
CH Low (30MHz~26.5GHz) (802.11g MODE )



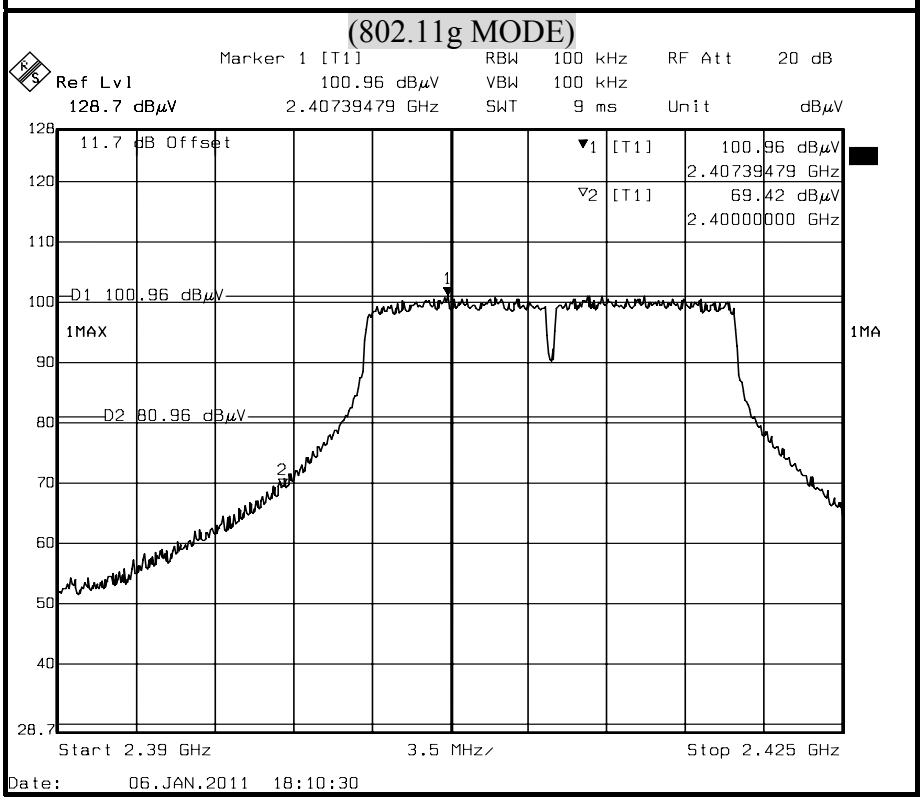

CH Mid (30MHz~26.5GHz) (802.11g MODE )



CH High (30MHz~26.5GHz) (802.11g MODE)



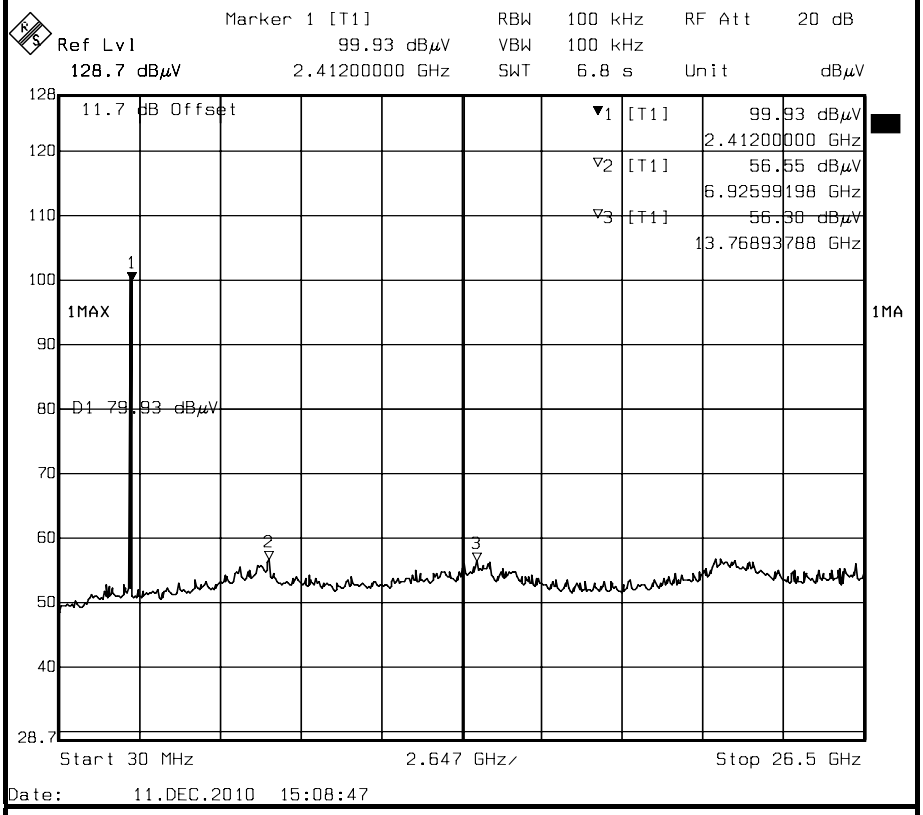

(802.11g MODE)



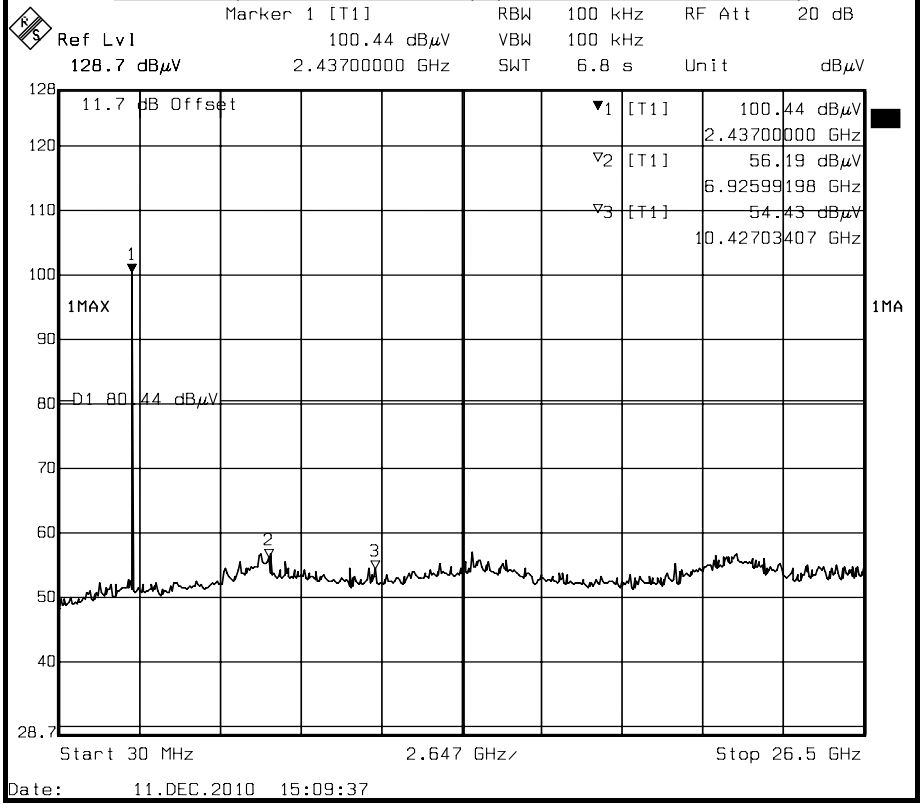
## OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

## ( 802.11n HT20 MODE )

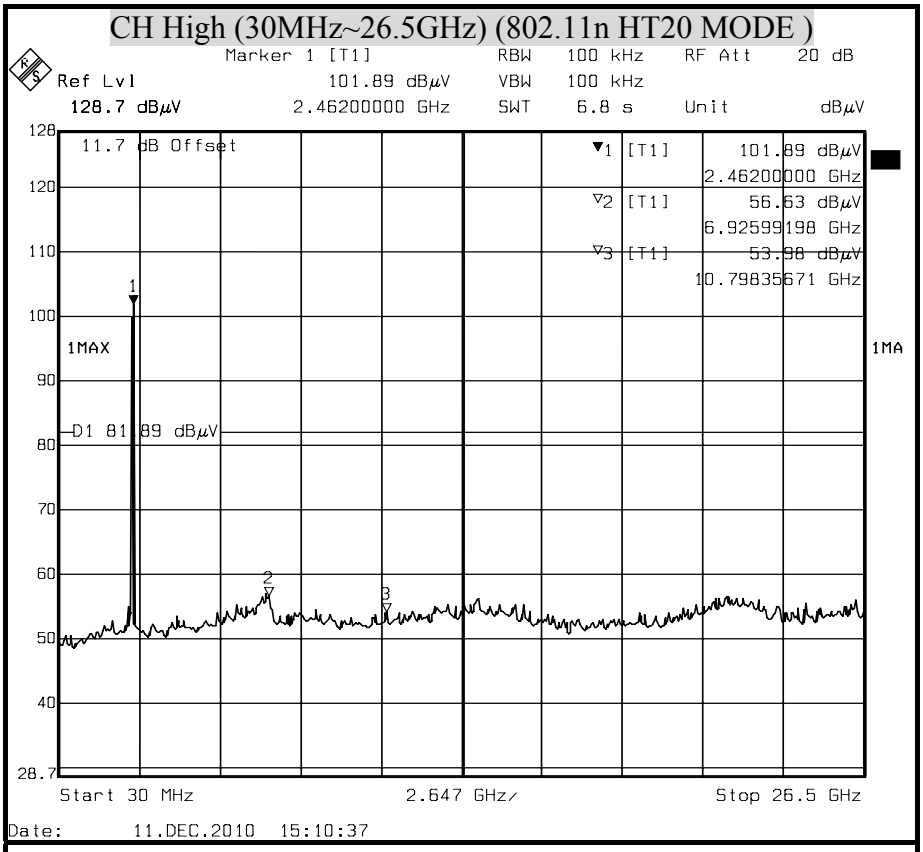
CH Low (30MHz~26.5GHz) (802.11n HT20 MODE )



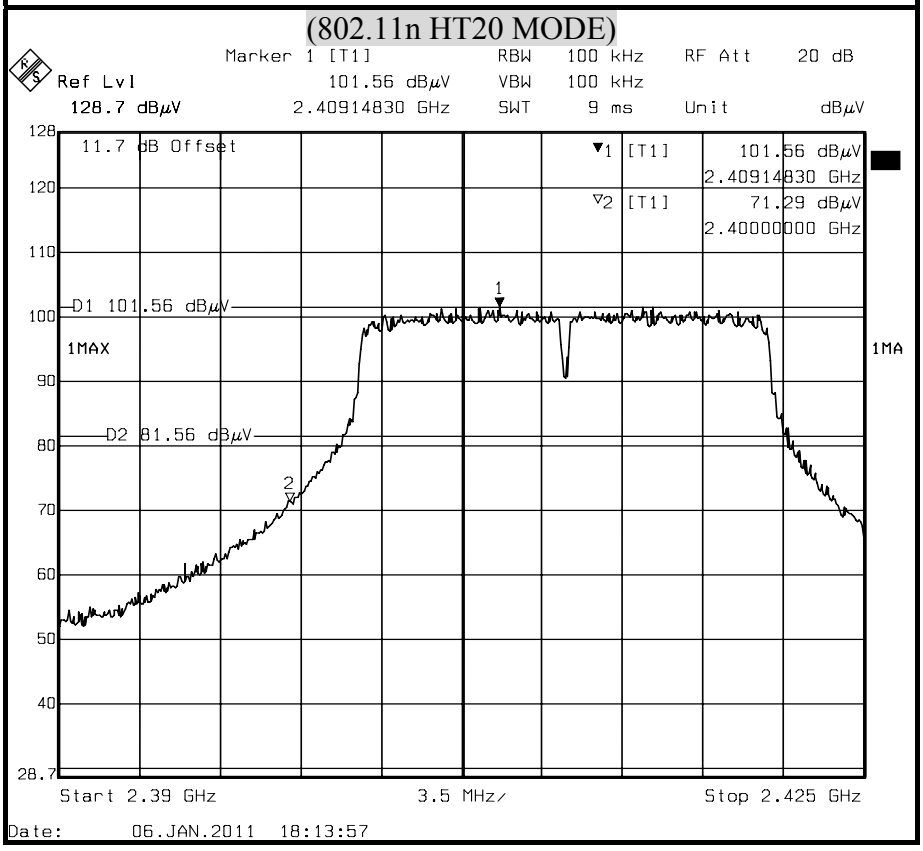

CH Mid (30MHz~26.5GHz) (802.11n HT20 MODE )



CH High (30MHz~26.5GHz) (802.11n HT20 MODE )



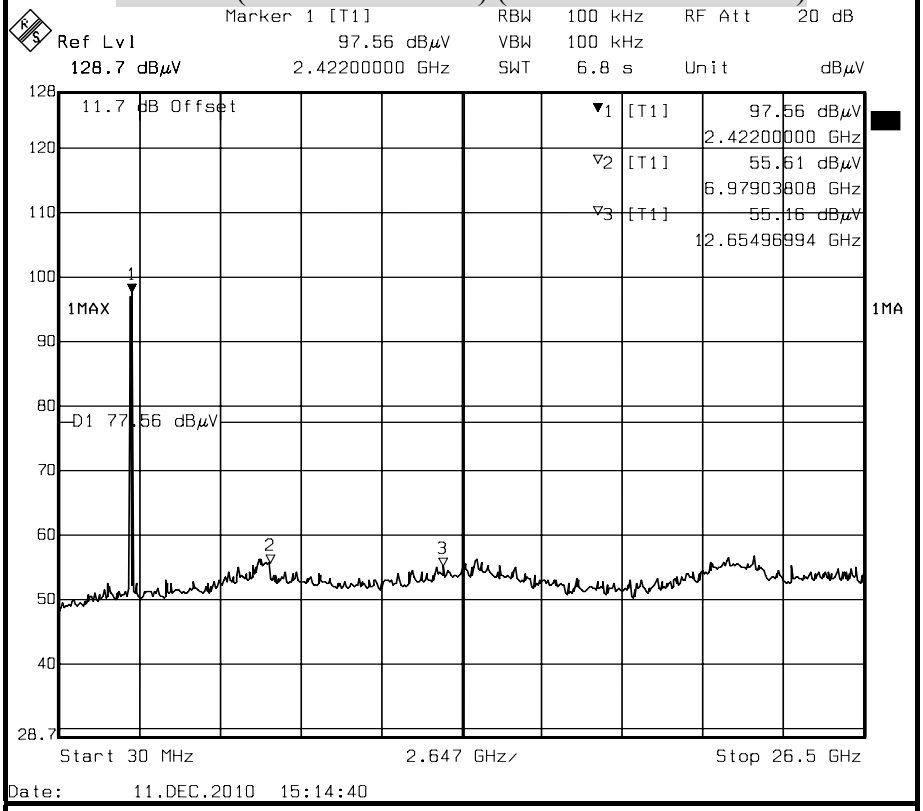

(802.11n HT20 MODE)



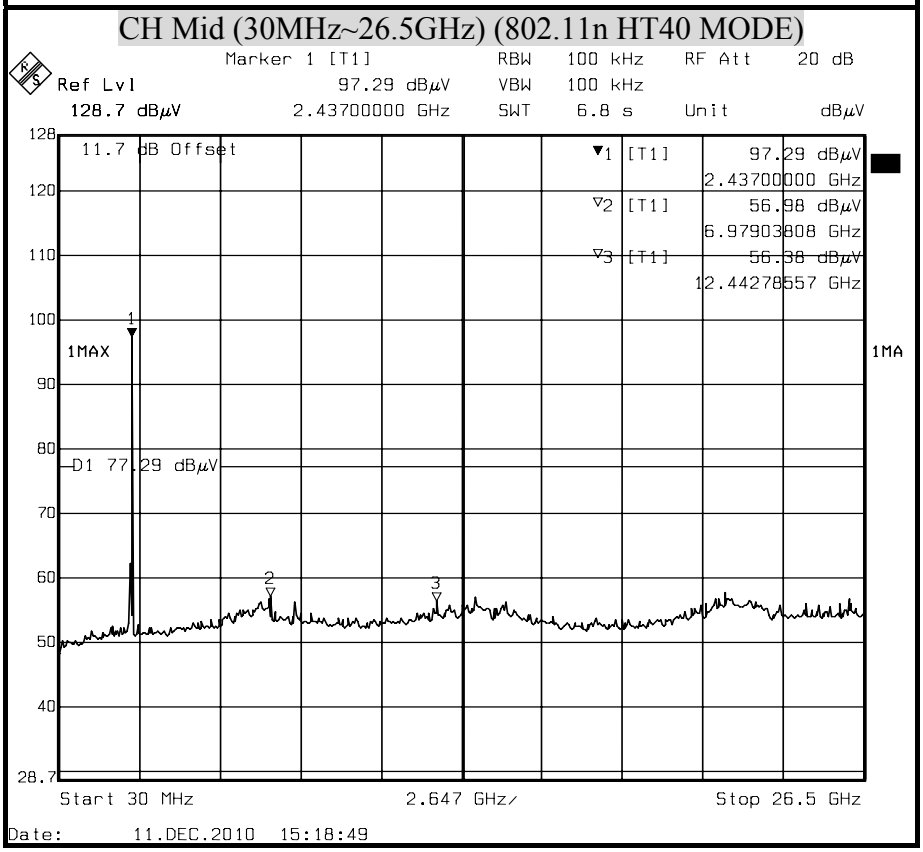
## OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

## ( 802.11n HT40 MODE )

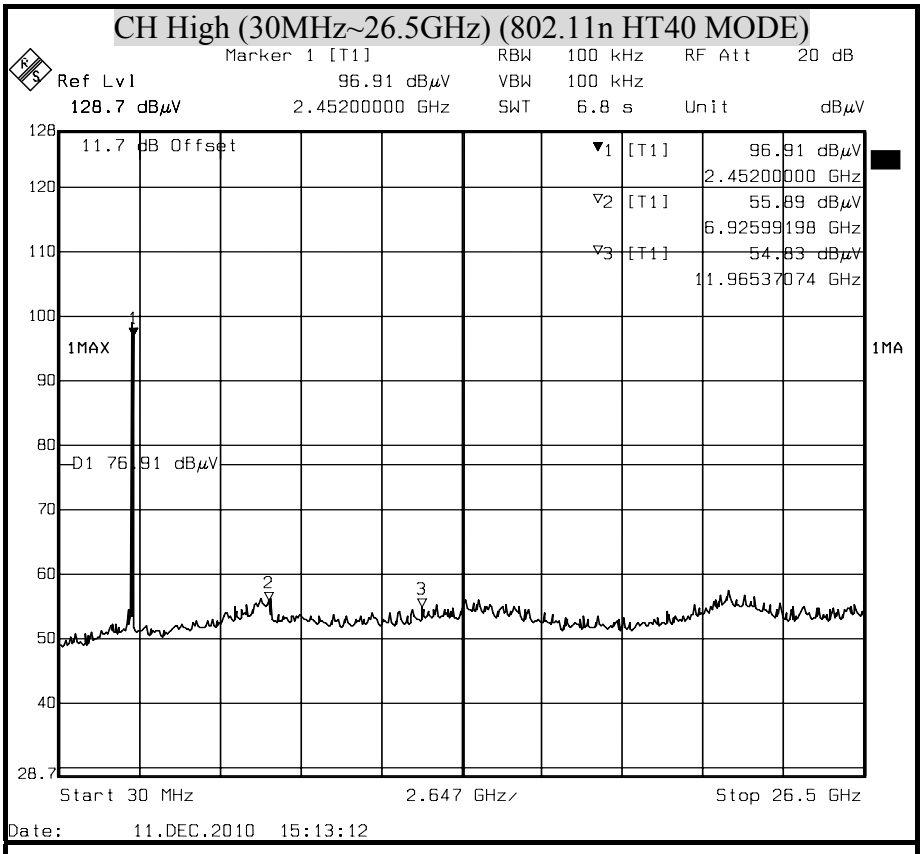
CH Low (30MHz~26.5GHz) (802.11n HT40 MODE)



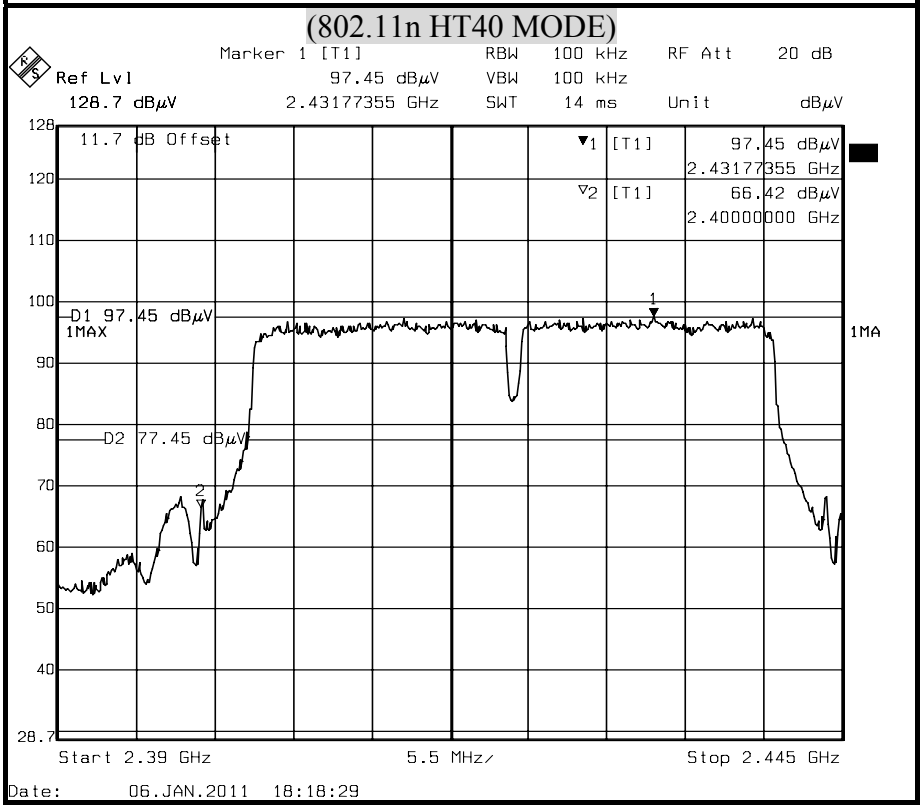

CH Mid (30MHz~26.5GHz) (802.11n HT40 MODE)



CH High (30MHz~26.5GHz) (802.11n HT40 MODE)




(802.11n HT40 MODE)



# 8.6 RADIATED EMISSIONS

## 8.6.1 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 is 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.

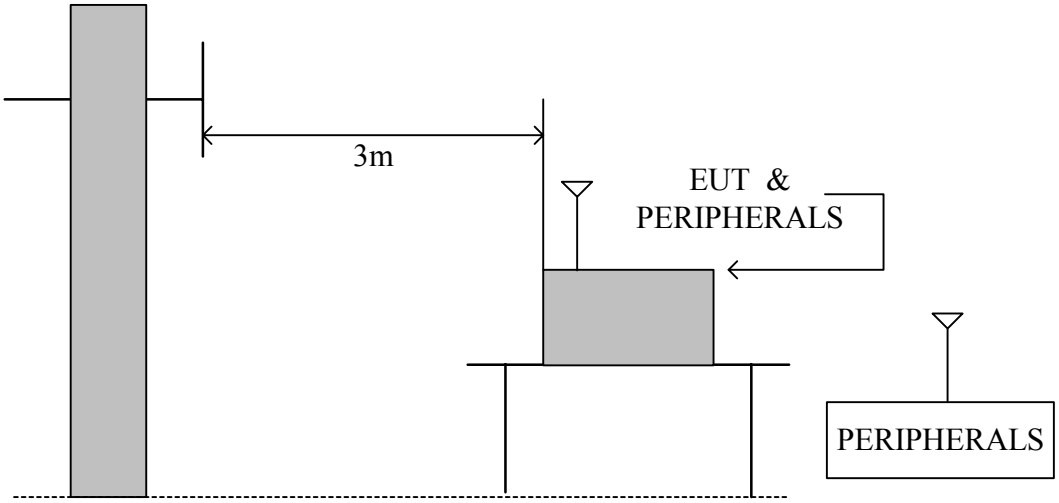
**TEST EQUIPMENTS**

The following test equipments are utilized in making the measurements contained in this report.

| Open Area Test Site # 6 | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| TYPE N COAXIAL CABLE | SUHNER | CHA9513 | 6 | NOV. 17, 2011 |
| BI-LOG Antenna | Sunol | JB1 | A070506-2 | OCT. 4, 2011 |
| LOOP ANTENNA | EMCO | 6502 | 8905-2356 | JUN. 10, 2011 |
| Pre-Amplifier | HP | 8447F | 2944A03817 | NOV. 23, 2011 |
| EMI Receiver | R&S | ESVS10 | 833206/012 | MAY 10, 2011 |
| RF Cable | SUHNER | SUCOFLEX104PEA | 20520/4PEA | NOV. 10, 2011 |
| Horn Antenna | Com-Power | AH-118 | 071032 | DEC. 27, 2011 |
| Spectrum Analyzer | R&S | FSEK 30 | 835253/002 | JUL. 14, 2011 |
| Pre-Amplifier | MITEQ | AFS44-00108650-42-10P-44 | 1205908 | NOV. 23, 2011 |
| Turn Table | Yo Chen | 001 | ---------- | N.C.R. |
| Antenna Tower | AR | TP1000A | 309874 | N.C.R. |
| Controller | CT | SC101 | ---------- | N.C.R. |
| RF Swicth | E-INSTRUMENT TELH LTD | ERS-180A | EC1204141 | NOV. 17, 2011 |
| Test S/W | e-3 (5.04303e) | | | |

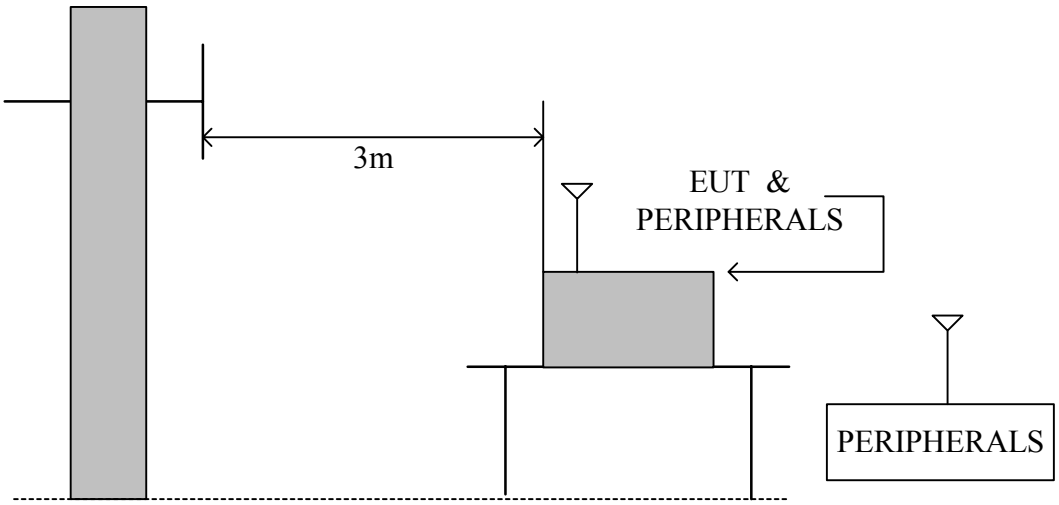
**TEST SETUP**

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




Antenna Elevation Variable

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




Antenna Elevation Variable

## 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. White 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. White measuring the radiated emission above 1GHz, the EUT was set 3 meters 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.

4. **No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)**

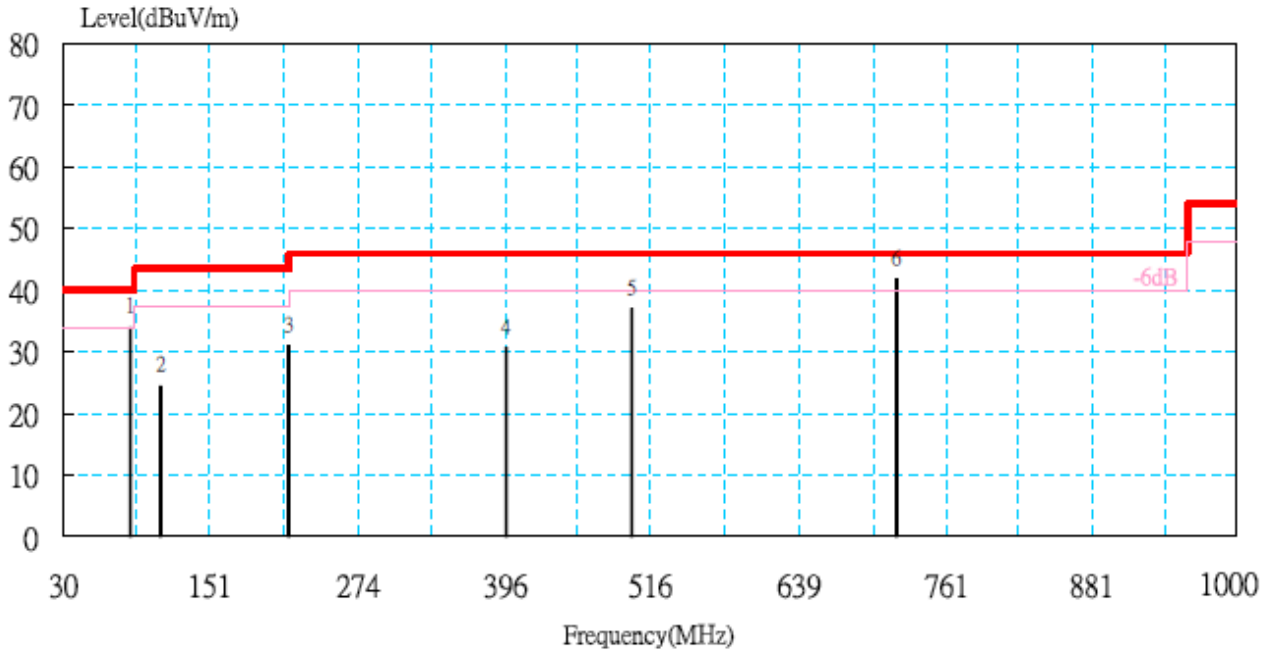
## TEST RESULTS

No non-compliance noted.

## 8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

| Product Name | 11n USB Dongle | Test Date | 2010/12/2 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | Normal operating / worst case | TEMP& Humidity | 22.8°C,53% |

Horizontal

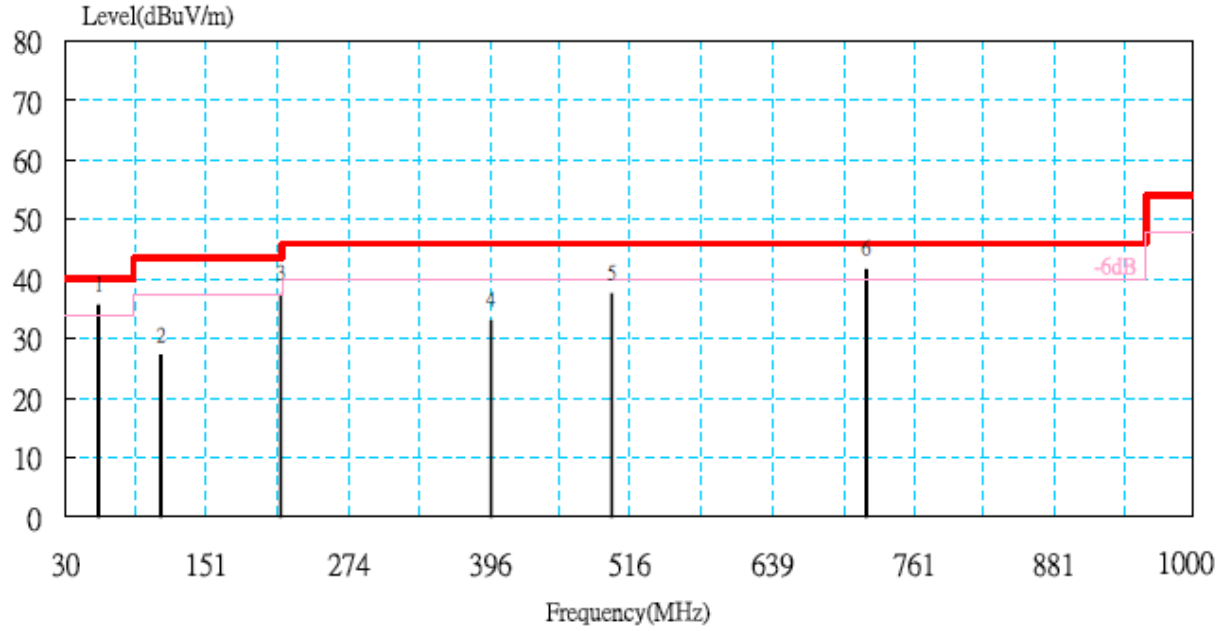



| No. | Freq-Uency (MHz) | Meter Reading at 3 m Level (dBμV) | Antenna Factor (dB/m) | Cable Loss (dB) | Emission at 3 m Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Mode PK/QP |
|---|---|---|---|---|---|---|---|---|
| 1 | 85.14 | 24.21 | 8.21 | 1.48 | 33.90 | 40.00 | -6.10 | QP |
| 2 | 110.62 | 14.63 | 8.07 | 1.69 | 24.39 | 43.50 | -19.11 | QP |
| 3 | 216.00 | 15.33 | 13.01 | 2.62 | 30.96 | 43.50 | -12.54 | QP |
| 4 | 396.53 | 10.47 | 16.27 | 3.88 | 30.63 | 46.00 | -15.37 | QP |
| 5 | 500.03 | 13.96 | 18.14 | 4.82 | 36.92 | 46.00 | -9.08 | QP |
| 6 | 719.25 | 14.85 | 20.97 | 5.85 | 41.67 | 46.00 | -4.33 | QP |

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

| Product Name | 11n USB Dongle | Test Date | 2010/12/2 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | Normal operating / worst case | TEMP& Humidity | 22.8°C,53% |

Vertical




| No. | Freq-Uency (MHz) | Meter Reading at 3 m Level (dBμV) | Antenna Factor (dB/m) | Cable Loss (dB) | Emission at 3 m Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Mode PK/QP |
|---|---|---|---|---|---|---|---|---|
| 1 | 58.41 | 22.96 | 11.45 | 1.19 | 35.60 | 40.00 | -4.40 | QP |
| 2 | 112.62 | 16.79 | 8.61 | 1.70 | 27.10 | 43.50 | -16.40 | QP |
| 3 | 215.63 | 21.76 | 13.02 | 2.62 | 37.40 | 43.50 | -6.10 | QP |
| 4 | 396.15 | 12.84 | 16.27 | 3.88 | 32.98 | 46.00 | -13.02 | QP |
| 5 | 500.02 | 14.52 | 18.14 | 4.82 | 37.48 | 46.00 | -8.52 | QP |
| 6 | 719.63 | 14.74 | 20.97 | 5.85 | 41.56 | 46.00 | -4.44 | QP |

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

## 8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11b mode / CH Low | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1596.03 | 52.78 | 27.33 | 2.22 | 41.58 | 0.84 | 41.58 | 74.00 | -32.42 | P |
| * | 1596.03 | 42.65 | 27.33 | 2.22 | 41.58 | 0.84 | 31.45 | 54.00 | -22.55 | A |
| * | 4824.06 | 53.05 | 33.17 | 3.73 | 42.38 | 0.69 | 48.26 | 74.00 | -25.74 | P |
| * | 4824.06 | 46.15 | 33.17 | 3.73 | 42.38 | 0.69 | 41.36 | 54.00 | -12.64 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11b mode / CH Low | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.75 | 56.57 | 27.33 | 2.22 | 41.58 | 0.84 | 45.37 | 74.00 | -28.63 | P |
| * | 1595.75 | 45.94 | 27.33 | 2.22 | 41.58 | 0.84 | 34.74 | 54.00 | -19.26 | A |
| * | 4824.18 | 60.08 | 33.17 | 3.73 | 42.38 | 0.69 | 55.29 | 74.00 | -18.71 | P |
| * | 4824.18 | 57.38 | 33.17 | 3.73 | 42.38 | 0.69 | 52.59 | 54.00 | -1.41 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11b mode / CH Middle | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.71 | 51.87 | 27.33 | 2.22 | 41.58 | 0.84 | 40.67 | 74.00 | -33.33 | P |
| * | 1595.71 | 42.32 | 27.33 | 2.22 | 41.58 | 0.84 | 31.12 | 54.00 | -22.88 | A |
| * | 4873.99 | 52.99 | 33.32 | 3.74 | 42.43 | 0.71 | 48.33 | 74.00 | -25.67 | P |
| * | 4873.99 | 45.86 | 33.32 | 3.74 | 42.43 | 0.71 | 41.20 | 54.00 | -12.80 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11b mode / CH Middle | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.74 | 56.69 | 27.33 | 2.22 | 41.58 | 0.84 | 45.49 | 74.00 | -28.51 | P |
| * | 1595.74 | 46.01 | 27.33 | 2.22 | 41.58 | 0.84 | 34.81 | 54.00 | -19.19 | A |
| * | 4874.01 | 59.54 | 33.32 | 3.74 | 42.43 | 0.71 | 54.88 | 74.00 | -19.12 | P |
| * | 4874.01 | 56.98 | 33.32 | 3.74 | 42.43 | 0.71 | 52.32 | 54.00 | -1.68 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11b mode / CH High | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.69 | 53.12 | 27.33 | 2.22 | 41.58 | 0.84 | 41.92 | 74.00 | -32.08 | P |
| * | 1595.69 | 43.28 | 27.33 | 2.22 | 41.58 | 0.84 | 32.08 | 54.00 | -21.92 | A |
| * | 4924.06 | 53.16 | 33.47 | 3.76 | 42.48 | 0.73 | 48.64 | 74.00 | -25.36 | P |
| * | 4924.06 | 46.37 | 33.47 | 3.76 | 42.48 | 0.73 | 41.85 | 54.00 | -12.15 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11b TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11b mode / CH High | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.73 | 56.24 | 27.33 | 2.22 | 41.58 | 0.84 | 45.04 | 74.00 | -28.96 | P |
| * | 1595.73 | 45.89 | 27.33 | 2.22 | 41.58 | 0.84 | 34.69 | 54.00 | -19.31 | A |
| * | 4924.09 | 60.06 | 33.47 | 3.76 | 42.48 | 0.73 | 55.54 | 74.00 | -18.46 | P |
| * | 4924.09 | 57.32 | 33.47 | 3.76 | 42.48 | 0.73 | 52.80 | 54.00 | -1.20 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11g mode / CH Low | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.93 | 52.46 | 27.33 | 2.22 | 41.58 | 0.84 | 41.26 | 74.00 | -32.74 | P |
| * | 1595.93 | 41.99 | 27.33 | 2.22 | 41.58 | 0.84 | 30.79 | 54.00 | -23.21 | A |
| * | 4824.06 | 52.14 | 33.17 | 3.73 | 42.38 | 0.69 | 47.35 | 74.00 | -26.65 | P |
| * | 4824.06 | 40.63 | 33.17 | 3.73 | 42.38 | 0.69 | 35.84 | 54.00 | -18.16 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11g mode / CH Low | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.86 | 56.84 | 27.33 | 2.22 | 41.58 | 0.84 | 45.64 | 74.00 | -28.36 | P |
| * | 1595.86 | 46.85 | 27.33 | 2.22 | 41.58 | 0.84 | 35.65 | 54.00 | -18.35 | A |
| * | 4824.03 | 59.76 | 33.17 | 3.73 | 42.38 | 0.69 | 54.97 | 74.00 | -19.03 | P |
| * | 4824.03 | 47.41 | 33.17 | 3.73 | 42.38 | 0.69 | 42.62 | 54.00 | -11.38 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11g mode / CH Middle | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.79 | 53.16 | 27.33 | 2.22 | 41.58 | 0.84 | 41.96 | 74.00 | -32.04 | P |
| * | 1595.79 | 41.52 | 27.33 | 2.22 | 41.58 | 0.84 | 30.32 | 54.00 | -23.68 | A |
| * | 4874.03 | 52.94 | 33.32 | 3.74 | 42.43 | 0.71 | 48.28 | 74.00 | -25.72 | P |
| * | 4874.03 | 42.03 | 33.32 | 3.74 | 42.43 | 0.71 | 37.37 | 54.00 | -16.63 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11g mode / CH Middle | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.83 | 56.48 | 27.33 | 2.22 | 41.58 | 0.84 | 45.28 | 74.00 | -28.72 | P |
| * | 1595.83 | 46.15 | 27.33 | 2.22 | 41.58 | 0.84 | 34.95 | 54.00 | -19.05 | A |
| * | 4874.02 | 60.52 | 33.32 | 3.74 | 42.43 | 0.71 | 55.86 | 74.00 | -18.14 | P |
| * | 4874.02 | 48.19 | 33.32 | 3.74 | 42.43 | 0.71 | 43.53 | 54.00 | -10.47 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11g mode / CH High | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.91 | 52.69 | 27.33 | 2.22 | 41.58 | 0.84 | 41.49 | 74.00 | -32.51 | P |
| * | 1595.91 | 42.61 | 27.33 | 2.22 | 41.58 | 0.84 | 31.41 | 54.00 | -22.59 | A |
| * | 4924.08 | 53.19 | 33.47 | 3.76 | 42.48 | 0.73 | 48.67 | 74.00 | -25.33 | P |
| * | 4924.08 | 41.95 | 33.47 | 3.76 | 42.48 | 0.73 | 37.43 | 54.00 | -16.57 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11g TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11g mode / CH High | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.77 | 56.95 | 27.33 | 2.22 | 41.58 | 0.84 | 45.75 | 74.00 | -28.25 | P |
| * | 1595.77 | 46.77 | 27.33 | 2.22 | 41.58 | 0.84 | 35.57 | 54.00 | -18.43 | A |
| * | 4924.08 | 60.75 | 33.47 | 3.76 | 42.48 | 0.73 | 56.23 | 74.00 | -17.77 | P |
| * | 4924.08 | 47.69 | 33.47 | 3.76 | 42.48 | 0.73 | 43.17 | 54.00 | -10.83 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT20 mode / CH Low | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.79 | 53.52 | 27.33 | 2.22 | 41.58 | 0.84 | 42.32 | 74.00 | -31.68 | P |
| * | 1595.79 | 42.46 | 27.33 | 2.22 | 41.58 | 0.84 | 31.26 | 54.00 | -22.74 | A |
| * | 4824.03 | 52.14 | 33.17 | 3.73 | 42.38 | 0.69 | 47.35 | 74.00 | -26.65 | P |
| * | 4824.03 | 40.63 | 33.17 | 3.73 | 42.38 | 0.69 | 35.84 | 54.00 | -18.16 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT20 mode / CH Low | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.84 | 56.00 | 27.33 | 2.22 | 41.58 | 0.84 | 44.80 | 74.00 | -29.20 | P |
| * | 1595.84 | 46.01 | 27.33 | 2.22 | 41.58 | 0.84 | 34.81 | 54.00 | -19.19 | A |
| * | 4824.09 | 61.29 | 33.17 | 3.73 | 42.38 | 0.69 | 56.50 | 74.00 | -17.50 | P |
| * | 4824.09 | 47.84 | 33.17 | 3.73 | 42.38 | 0.69 | 43.05 | 54.00 | -10.95 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT20 mode / CH Middle | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.86 | 52.46 | 27.33 | 2.22 | 41.58 | 0.84 | 41.26 | 74.00 | -32.74 | P |
| * | 1595.86 | 42.73 | 27.33 | 2.22 | 41.58 | 0.84 | 31.53 | 54.00 | -22.47 | A |
| * | 4874.06 | 52.96 | 33.32 | 3.74 | 42.43 | 0.71 | 48.30 | 74.00 | -25.70 | P |
| * | 4874.06 | 41.02 | 33.32 | 3.74 | 42.43 | 0.71 | 36.36 | 54.00 | -17.64 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT20 mode / CH Middle | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.73 | 57.16 | 27.33 | 2.22 | 41.58 | 0.84 | 45.96 | 74.00 | -28.04 | P |
| * | 1595.73 | 46.52 | 27.33 | 2.22 | 41.58 | 0.84 | 35.32 | 54.00 | -18.68 | A |
| * | 4874.07 | 60.95 | 33.32 | 3.74 | 42.43 | 0.71 | 56.30 | 74.00 | -17.70 | P |
| * | 4874.07 | 47.85 | 33.32 | 3.74 | 42.43 | 0.71 | 43.20 | 54.00 | -10.80 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT20 mode / CH High | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.85 | 52.41 | 27.33 | 2.22 | 41.58 | 0.84 | 41.21 | 74.00 | -32.79 | P |
| * | 1595.85 | 42.63 | 27.33 | 2.22 | 41.58 | 0.84 | 31.43 | 54.00 | -22.57 | A |
| * | 4924.09 | 52.69 | 33.47 | 3.76 | 42.48 | 0.73 | 48.17 | 74.00 | -25.83 | P |
| * | 4924.09 | 41.51 | 33.47 | 3.76 | 42.48 | 0.73 | 36.99 | 54.00 | -17.01 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT20 TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT20 mode / CH High | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.93 | 55.84 | 27.33 | 2.22 | 41.58 | 0.84 | 44.64 | 74.00 | -29.36 | P |
| * | 1595.93 | 44.29 | 27.33 | 2.22 | 41.58 | 0.84 | 33.09 | 54.00 | -20.91 | A |
| * | 4924.08 | 60.71 | 33.47 | 3.76 | 42.48 | 0.73 | 56.19 | 74.00 | -17.81 | P |
| * | 4924.08 | 47.09 | 33.47 | 3.76 | 42.48 | 0.73 | 42.57 | 54.00 | -11.43 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT40 mode / CH Low | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.86 | 52.78 | 27.33 | 2.22 | 41.58 | 0.84 | 41.58 | 74.00 | -32.42 | P |
| * | 1595.86 | 42.65 | 27.33 | 2.22 | 41.58 | 0.84 | 31.45 | 54.00 | -22.55 | A |
| * | 4844.04 | 52.49 | 33.23 | 3.74 | 42.40 | 0.70 | 47.76 | 74.00 | -26.24 | P |
| * | 4844.04 | 40.12 | 33.23 | 3.74 | 42.40 | 0.70 | 35.39 | 54.00 | -18.61 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH Low) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT40 mode / CH Low | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.89 | 56.31 | 27.33 | 2.22 | 41.58 | 0.84 | 45.11 | 74.00 | -28.89 | P |
| * | 1595.89 | 45.85 | 27.33 | 2.22 | 41.58 | 0.84 | 34.65 | 54.00 | -19.35 | A |
| * | 4844.07 | 56.67 | 33.23 | 3.74 | 42.40 | 0.70 | 51.94 | 74.00 | -22.06 | P |
| * | 4844.07 | 46.39 | 33.23 | 3.74 | 42.40 | 0.70 | 41.66 | 54.00 | -12.34 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT40 mode / CH Middle | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1596.02 | 53.15 | 27.33 | 2.22 | 41.58 | 0.84 | 41.95 | 74.00 | -32.05 | P |
| * | 1596.02 | 42.90 | 27.33 | 2.22 | 41.58 | 0.84 | 31.70 | 54.00 | -22.30 | A |
| * | 4874.13 | 52.74 | 33.32 | 3.74 | 42.43 | 0.71 | 48.09 | 74.00 | -25.91 | P |
| * | 4874.13 | 41.27 | 33.32 | 3.74 | 42.43 | 0.71 | 36.62 | 54.00 | -17.38 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH Middle) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT40 mode / CH Middle | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.92 | 55.78 | 27.33 | 2.22 | 41.58 | 0.84 | 44.58 | 74.00 | -29.42 | P |
| * | 1595.92 | 44.83 | 27.33 | 2.22 | 41.58 | 0.84 | 33.63 | 54.00 | -20.37 | A |
| * | 4874.07 | 56.84 | 33.32 | 3.74 | 42.43 | 0.71 | 52.19 | 74.00 | -21.81 | P |
| * | 4874.07 | 47.39 | 33.32 | 3.74 | 42.43 | 0.71 | 42.74 | 54.00 | -11.26 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Horizontal

| | TX / IEEE 802.11n HT40 mode / CH High | | | | Measurement Distance at 3m Horizontal polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.75 | 53.15 | 27.33 | 2.22 | 41.58 | 0.84 | 41.95 | 74.00 | -32.05 | P |
| * | 1595.75 | 42.44 | 27.33 | 2.22 | 41.58 | 0.84 | 31.24 | 54.00 | -22.76 | A |
| * | 4904.06 | 52.96 | 33.41 | 3.75 | 42.46 | 0.72 | 48.38 | 74.00 | -25.62 | P |
| * | 4904.06 | 41.06 | 33.41 | 3.75 | 42.46 | 0.72 | 36.48 | 54.00 | -17.52 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

| Product Name | 11n USB Dongle | Test Date | 2010/12/8 |
|---|---|---|---|
| Model | WL307n | Test By | John Chen |
| Test Mode | IEEE 802.11n HT40 TX (CH High) | TEMP& Humidity | 23.2℃,47% |

Vertical

| | TX / IEEE 802.11n HT40 mode / CH High | | | | Measurement Distance at 3m Vertical polarity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | Reading | AF | Cable Loss | Pre-amp | Filter | Level | Limit | Margin | Mark |
| | (MHz) | (dBμV) | (dB/m) | (dB) | (dB) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | (P/Q/A) |
| * | 1595.83 | 56.19 | 27.33 | 2.22 | 41.58 | 0.84 | 44.99 | 74.00 | -29.01 | P |
| * | 1595.83 | 46.31 | 27.33 | 2.22 | 41.58 | 0.84 | 35.11 | 54.00 | -18.89 | A |
| * | 4904.03 | 57.65 | 33.41 | 3.75 | 42.46 | 0.72 | 53.07 | 74.00 | -20.93 | P |
| * | 4904.03 | 47.84 | 33.41 | 3.75 | 42.46 | 0.72 | 43.26 | 54.00 | -10.74 | A |

**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. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

## 8.6.4 RESTRICTED BAND EDGES

**IEEE 802.11b mode**

| Channel | Polarity | Freq.(MHz) | Level(dBuV) | Limit(dBuV) | Margin(dB) | Detector |
|---|---|---|---|---|---|---|
| | H | 2390.00 | 57.57 | 74 | -16.43 | Peak |
| | H | 2390.00 | 45.4 | 54 | -8.60 | Average |
| | V | 2390.00 | 59.35 | 74 | -14.65 | Peak |
| LOW | V | 2390.00 | 45.23 | 54 | -8.77 | Average |
| | H | 2483.50 | 57.38 | 74 | -16.62 | Peak |
| | H | 2483.50 | 45.09 | 54 | -8.91 | Average |
| | V | 2483.50 | 57.91 | 74 | -16.09 | Peak |
| HIGH | V | 2483.50 | 45.49 | 54 | -8.51 | Average |

**IEEE 802.11g mode**

| Channel | Polarity | Freq.(MHz) | Level(dBuV) | Limit(dBuV) | Margin(dB) | Detector |
|---|---|---|---|---|---|---|
| | H | 2390.00 | 56.86 | 74 | -17.14 | Peak |
| | H | 2390.00 | 45.47 | 54 | -8.53 | Average |
| | V | 2390.00 | 62.02 | 74 | -11.98 | Peak |
| LOW | V | 2390.00 | 47.77 | 54 | -6.23 | Average |
| | H | 2483.50 | 57.85 | 74 | -16.15 | Peak |
| | H | 2483.50 | 45.13 | 54 | -8.87 | Average |
| | V | 2483.50 | 60.91 | 74 | -13.09 | Peak |
| HIGH | V | 2483.50 | 46.87 | 54 | -7.13 | Average |

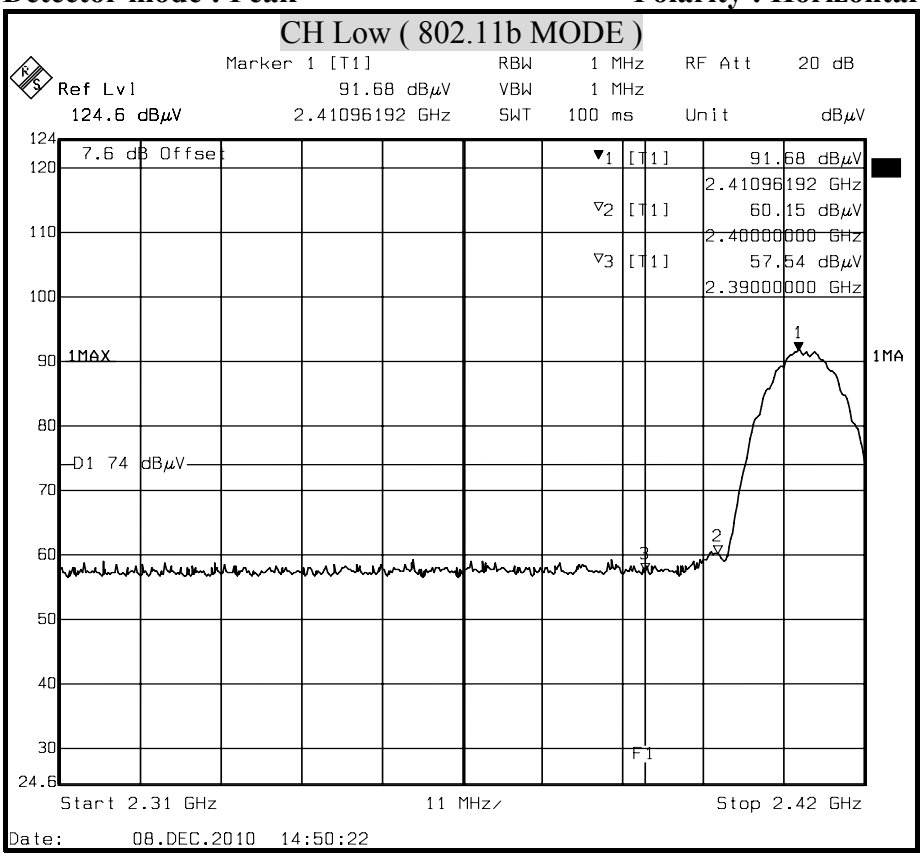
**IEEE 802.11n HT20 mode**

| Channel | Polarity | Freq.(MHz) | Level(dBuV) | Limit(dBuV) | Margin(dB) | Detector |
|---|---|---|---|---|---|---|
| | H | 2390.00 | 58.74 | 74 | -15.26 | Peak |
| | H | 2390.00 | 45.5 | 54 | -8.50 | Average |
| | V | 2390.00 | 65.68 | 74 | -8.32 | Peak |
| LOW | V | 2390.00 | 48.27 | 54 | -5.73 | Average |
| | H | 2483.50 | 57.42 | 74 | -16.58 | Peak |
| | H | 2483.50 | 45.09 | 54 | -8.91 | Average |
| | V | 2483.50 | 62.07 | 74 | -11.93 | Peak |
| HIGH | V | 2483.50 | 47.18 | 54 | -6.82 | Average |

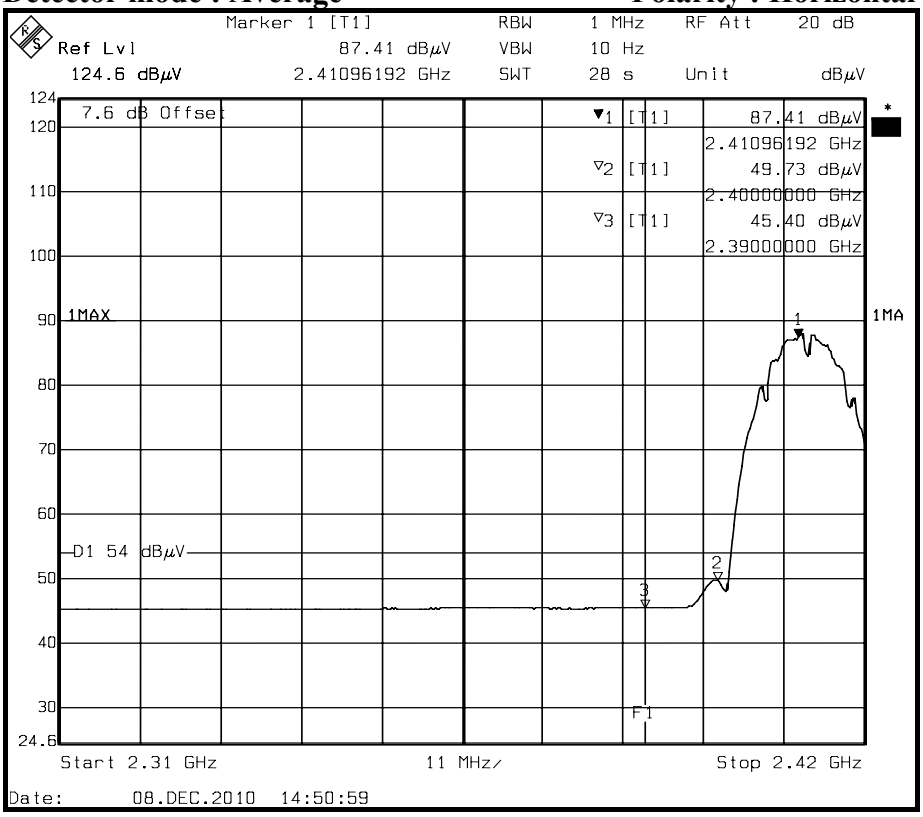
**IEEE 802.11n HT40 mode**

| Channel | Polarity | Freq.(MHz) | Level(dBuV) | Limit(dBuV) | Margin(dB) | Detector |
|---|---|---|---|---|---|---|
| | H | 2390.00 | 57.67 | 74 | -16.33 | Peak |
| | H | 2390.00 | 45.53 | 54 | -8.47 | Average |
| | V | 2390.00 | 62.24 | 74 | -11.76 | Peak |
| LOW | V | 2390.00 | 49.41 | 54 | -4.59 | Average |
| | H | 2483.50 | 57.43 | 74 | -16.57 | Peak |
| | H | 2483.50 | 45.10 | 54 | -8.90 | Average |
| | V | 2483.50 | 60.81 | 74 | -13.19 | Peak |
| HIGH | V | 2483.50 | 47.82 | 54 | -6.18 | Average |

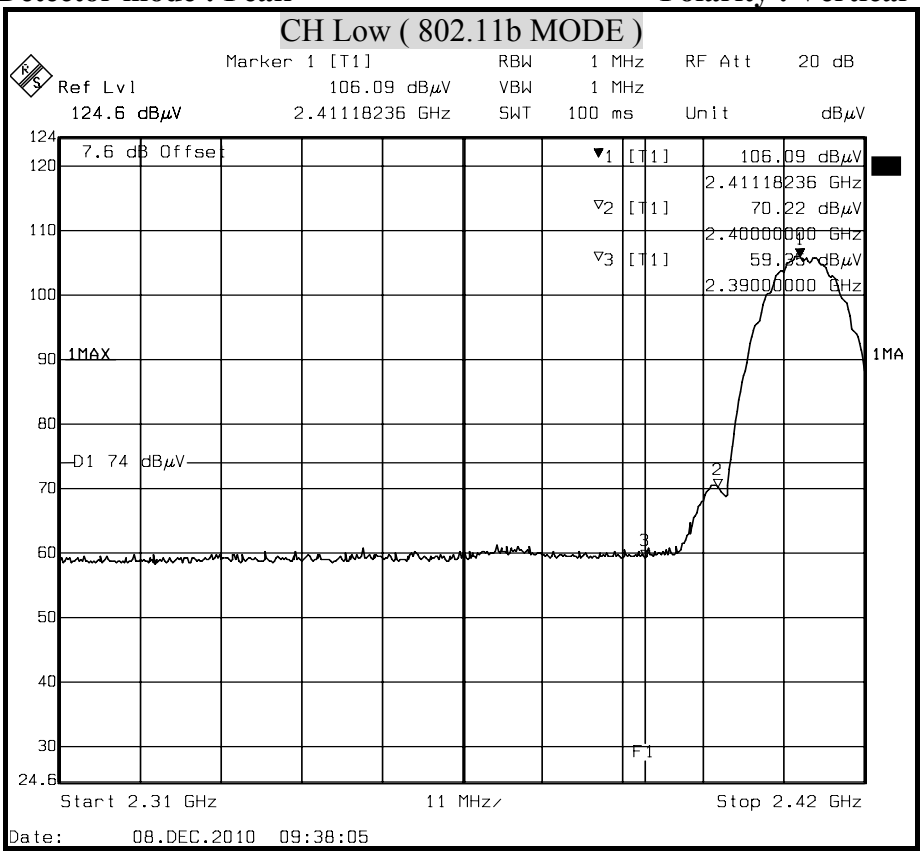
**Detector mode : Peak** **Polarity : Horizontal**



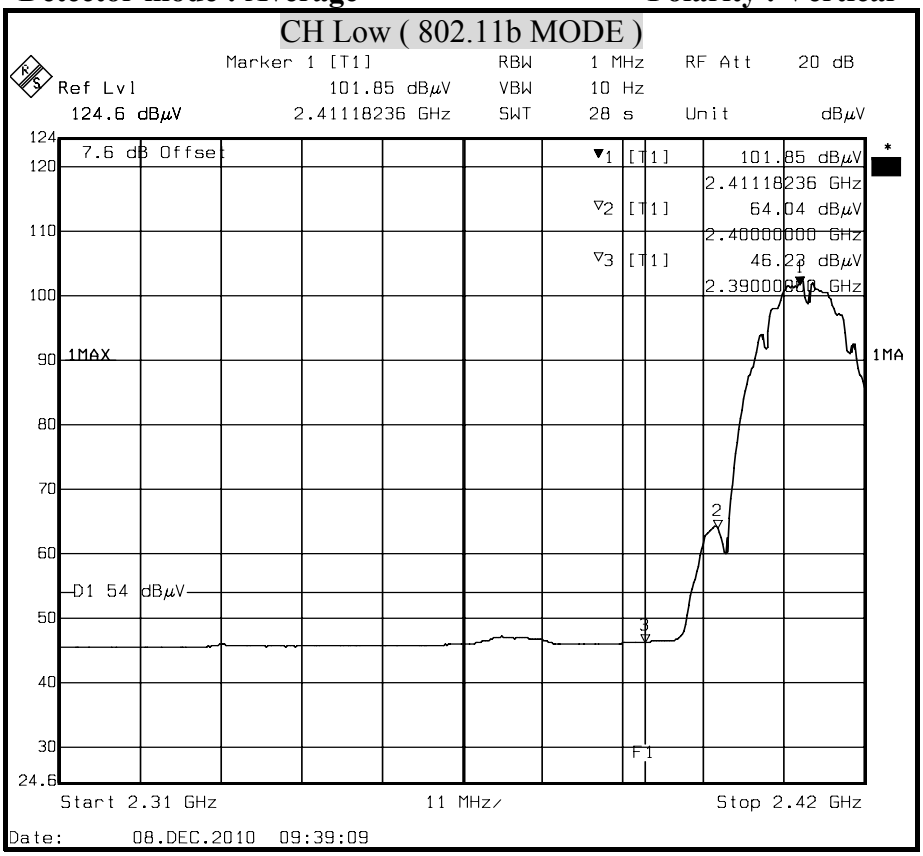

**Detector mode : Average** **Polarity : Horizontal**



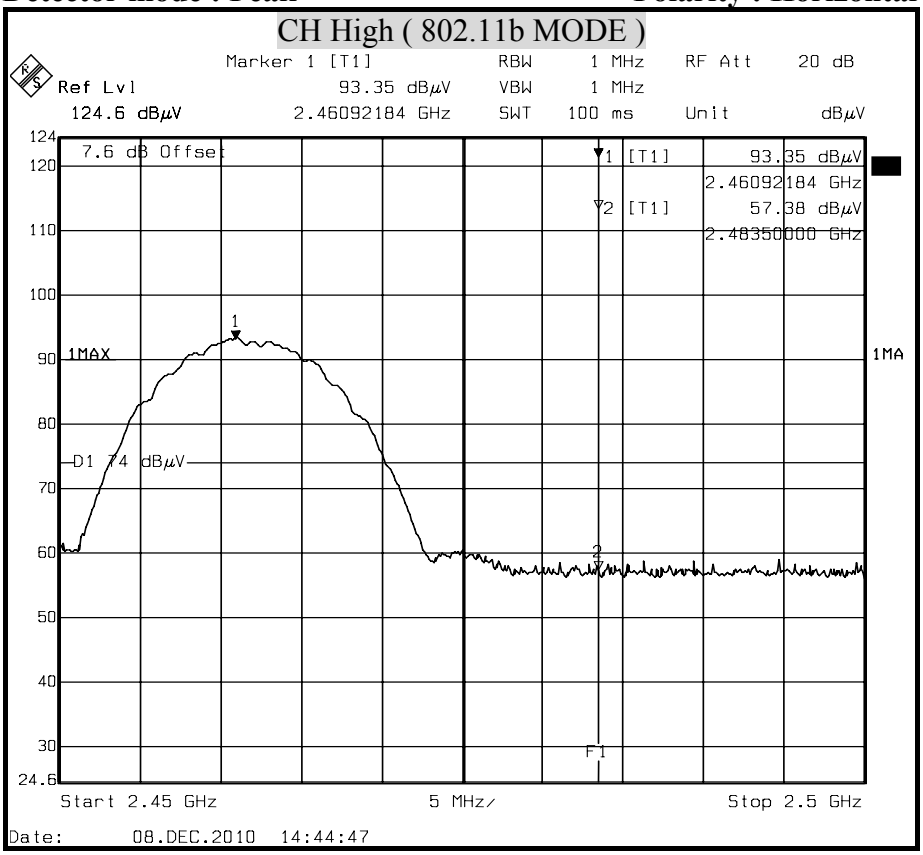
**Detector mode : Peak** **Polarity : Vertical**



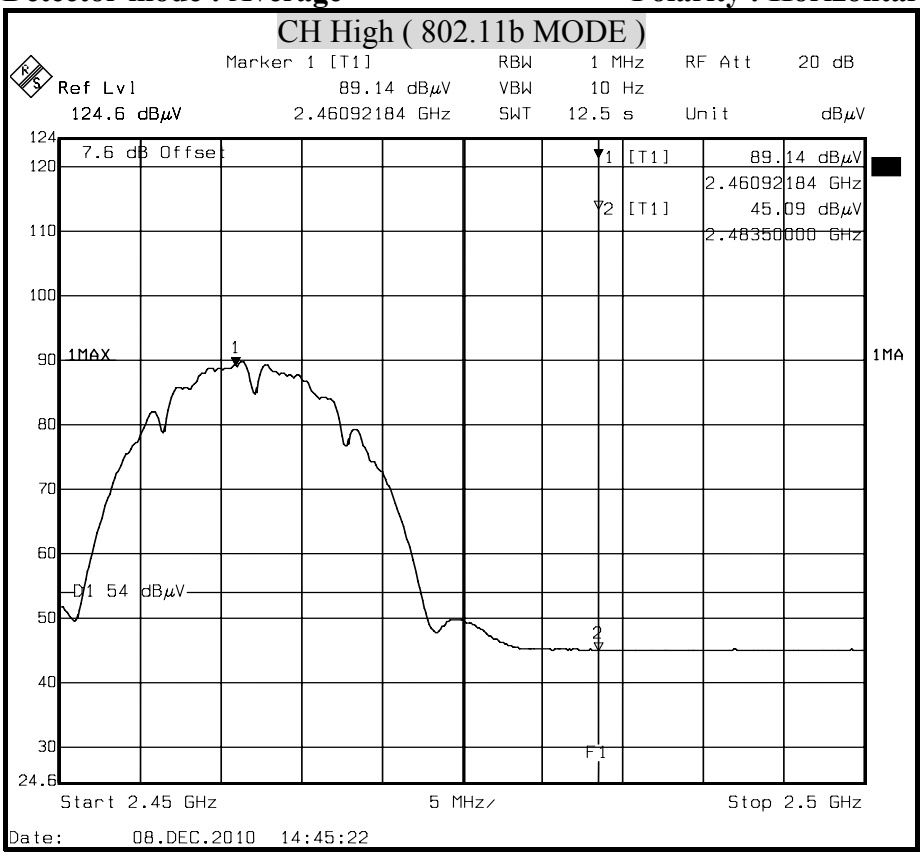

**Detector mode : Average** **Polarity : Vertical**



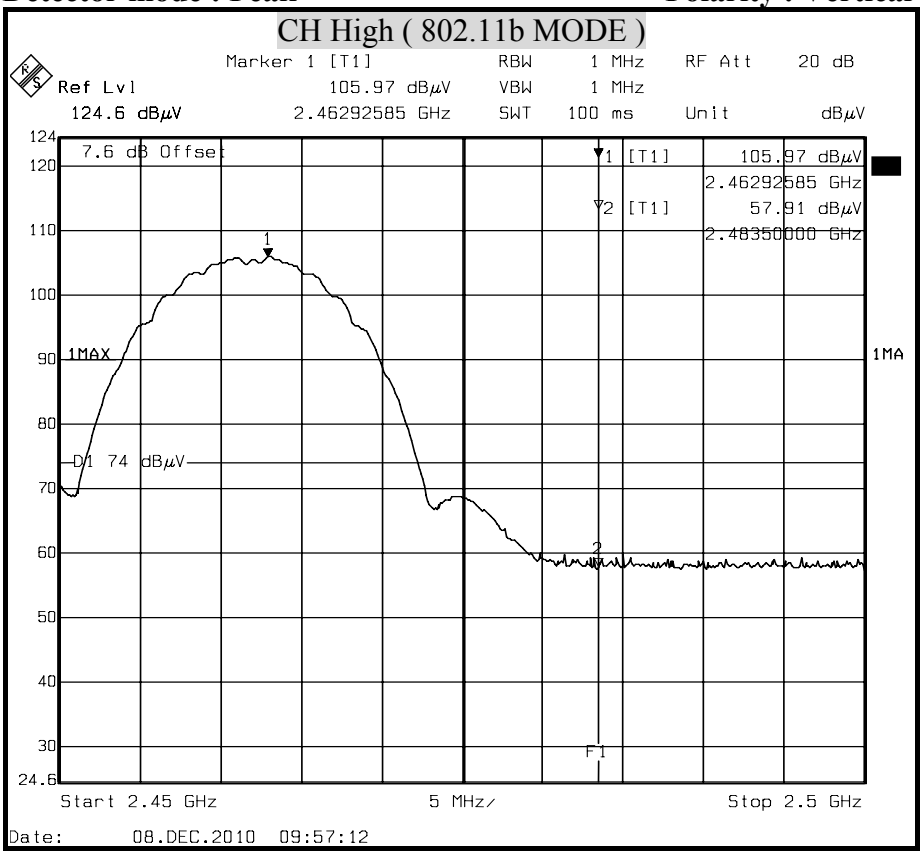
**Detector mode : Peak** **Polarity : Horizontal**



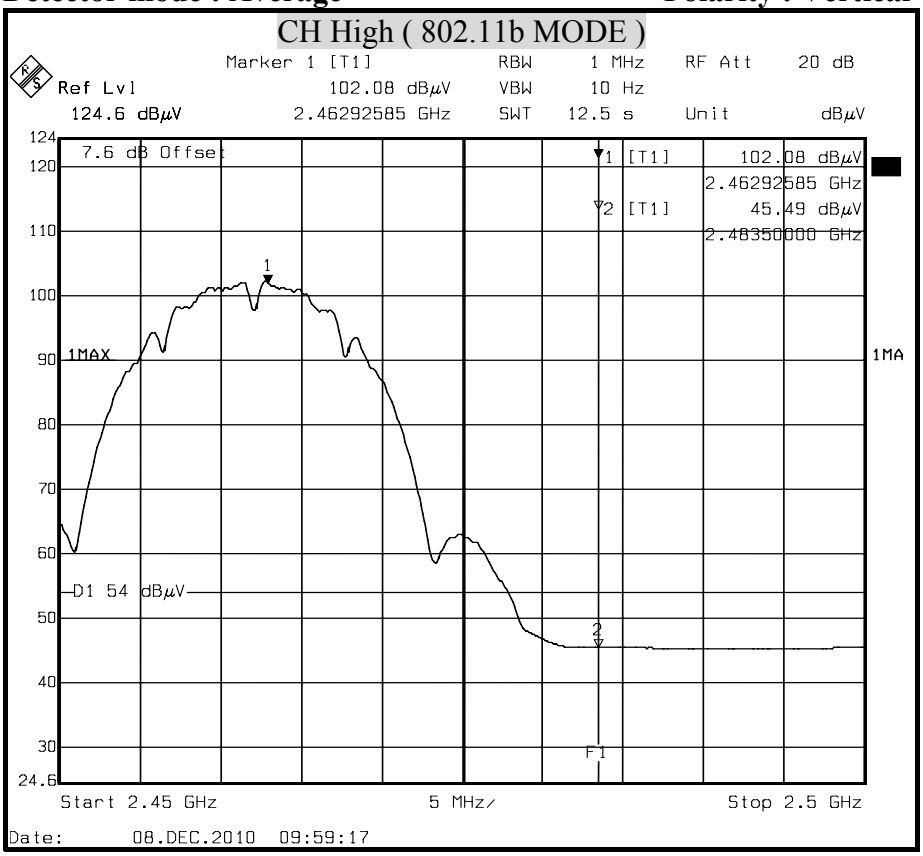

**Detector mode : Average** **Polarity : Horizontal**



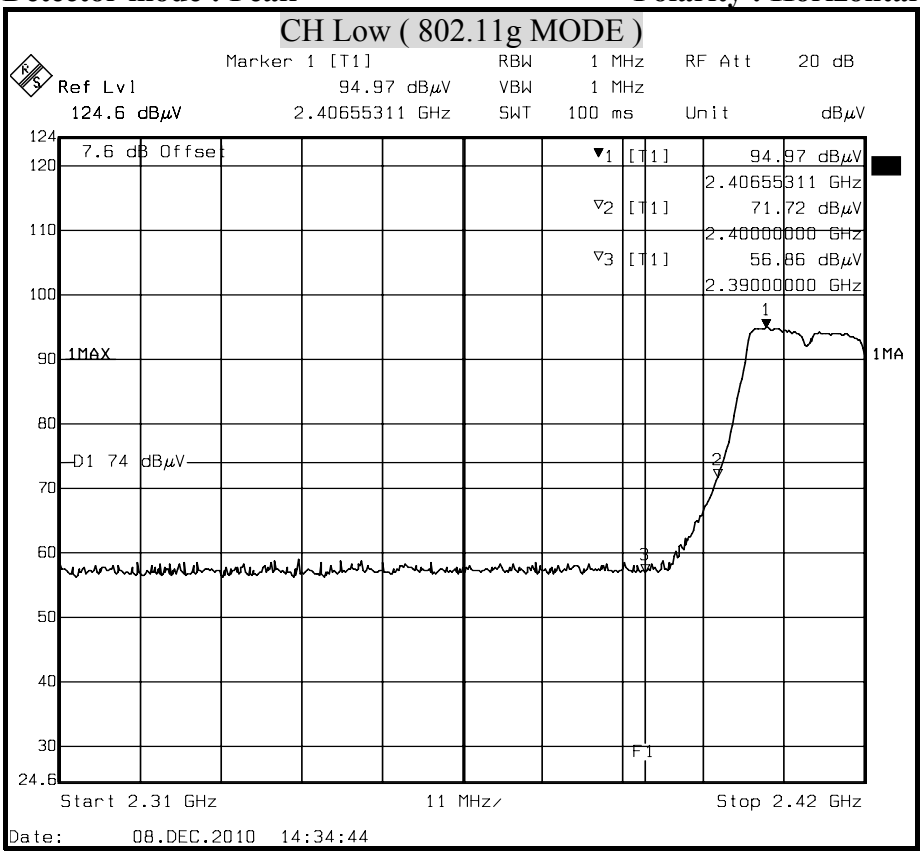
**Detector mode : Peak** **Polarity : Vertical**



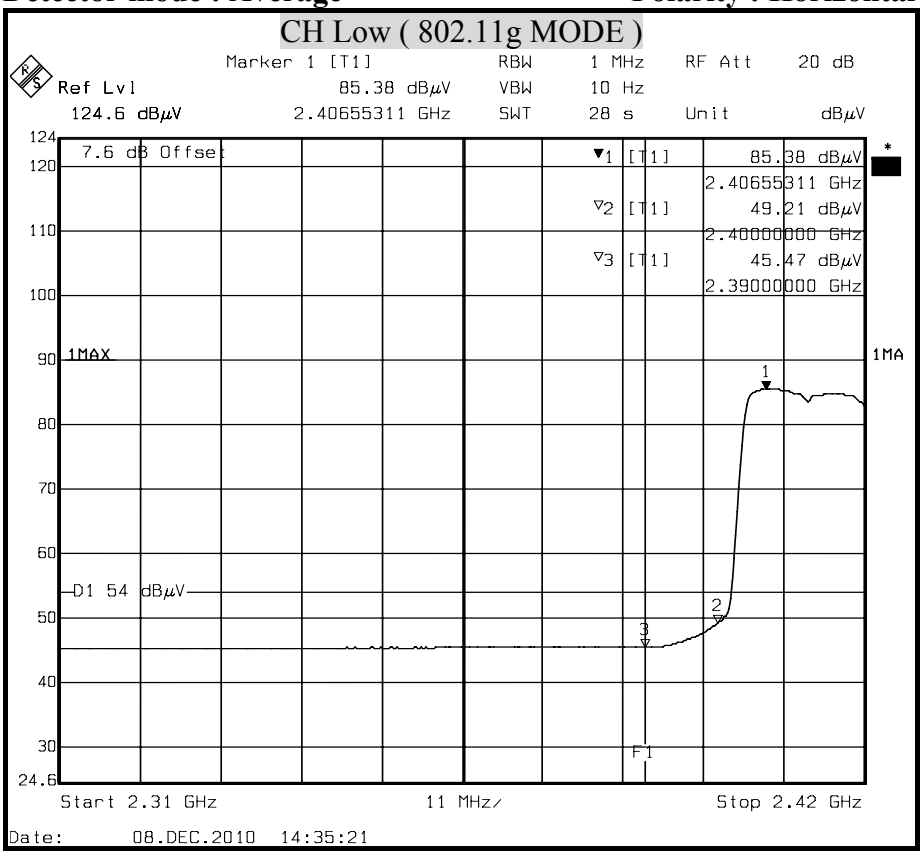

**Detector mode : Average** **Polarity : Vertical**



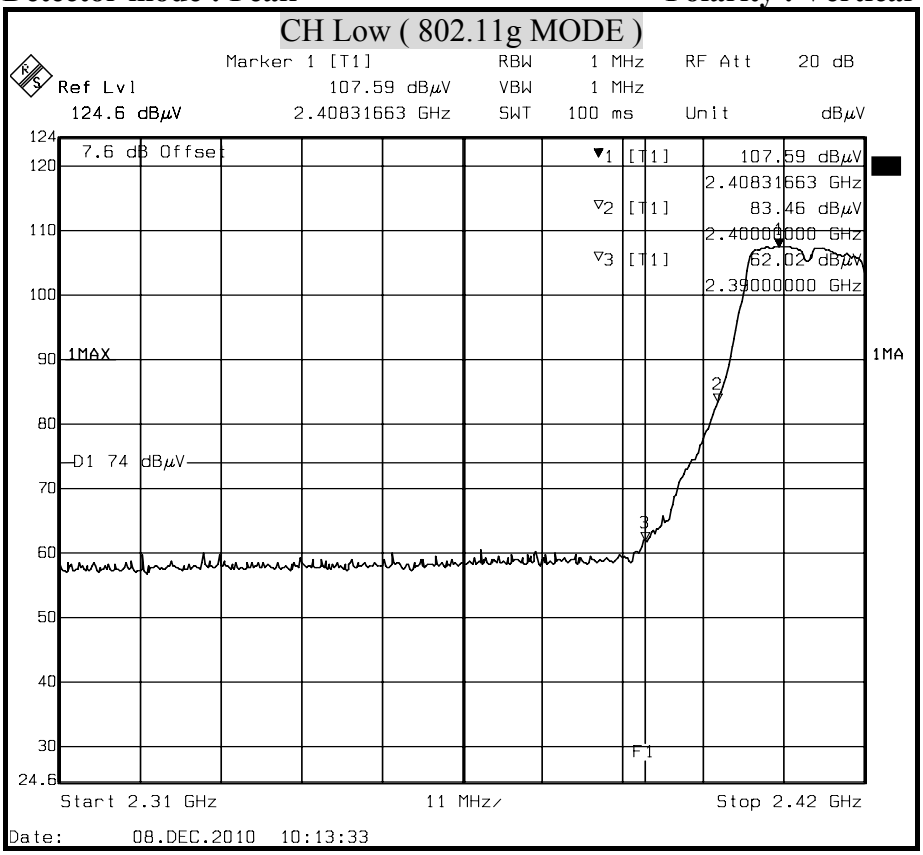
**Detector mode : Peak** **Polarity : Horizontal**



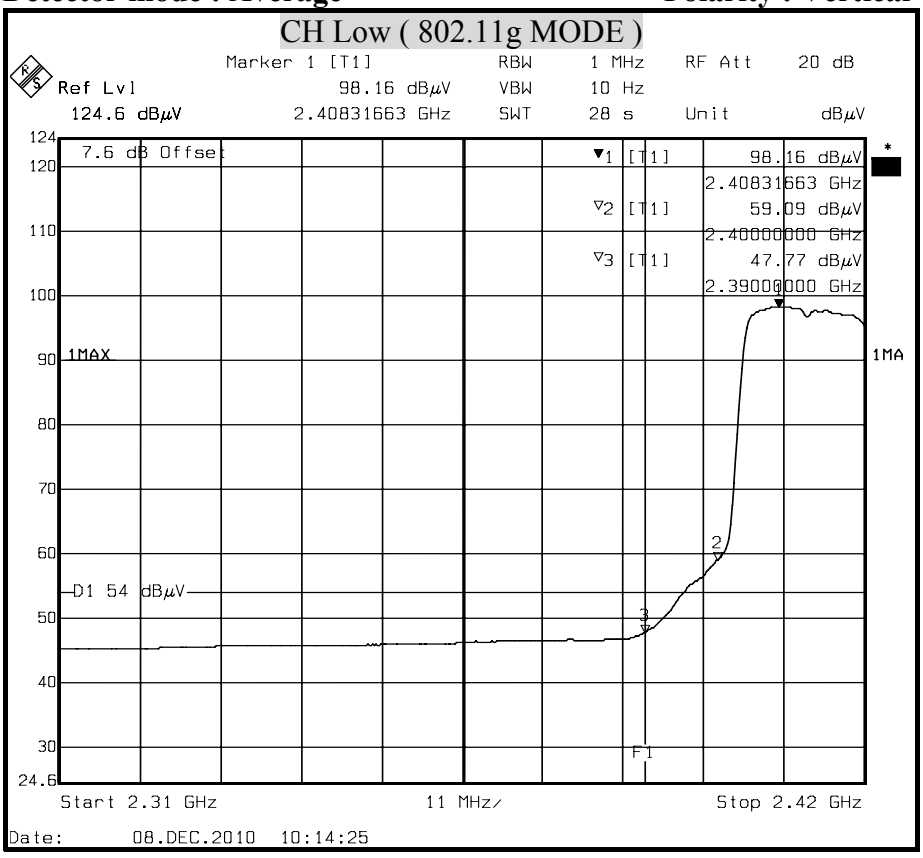

**Detector mode : Average** **Polarity : Horizontal**



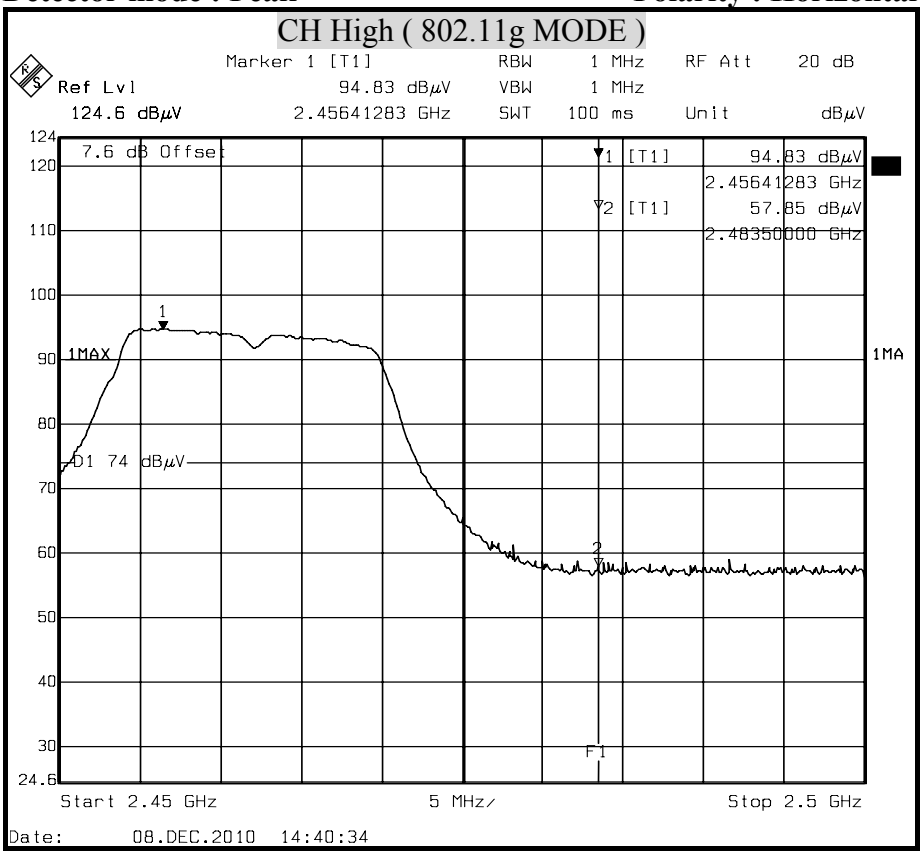
**Detector mode : Peak** **Polarity : Vertical**



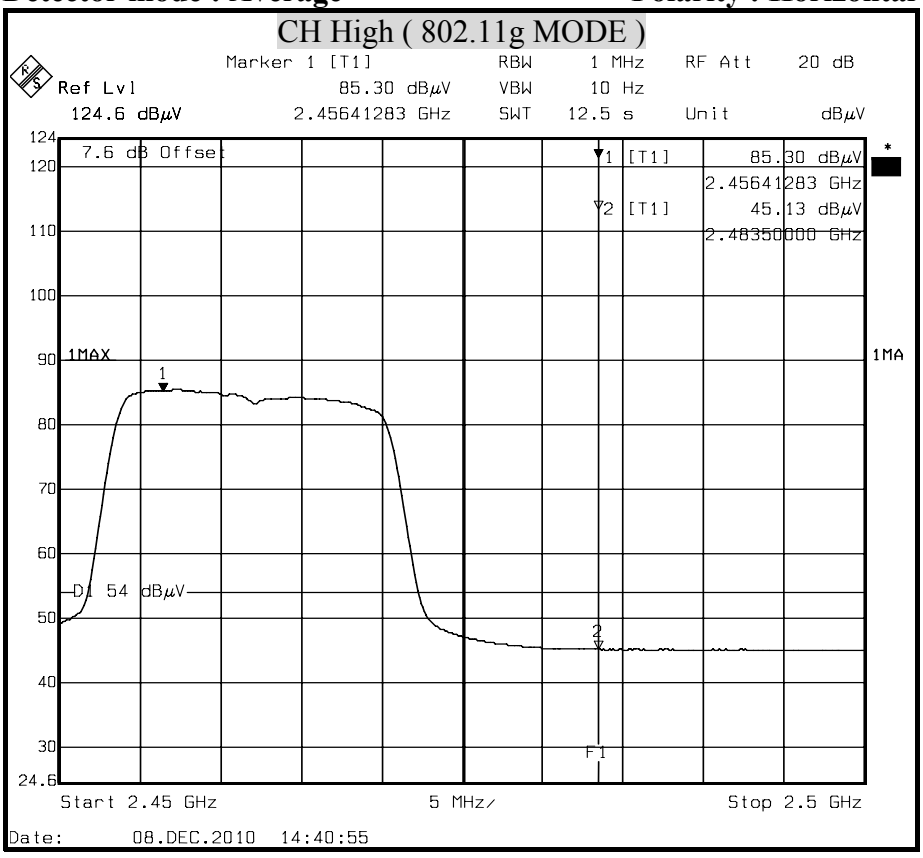

**Detector mode : Average** **Polarity : Vertical**



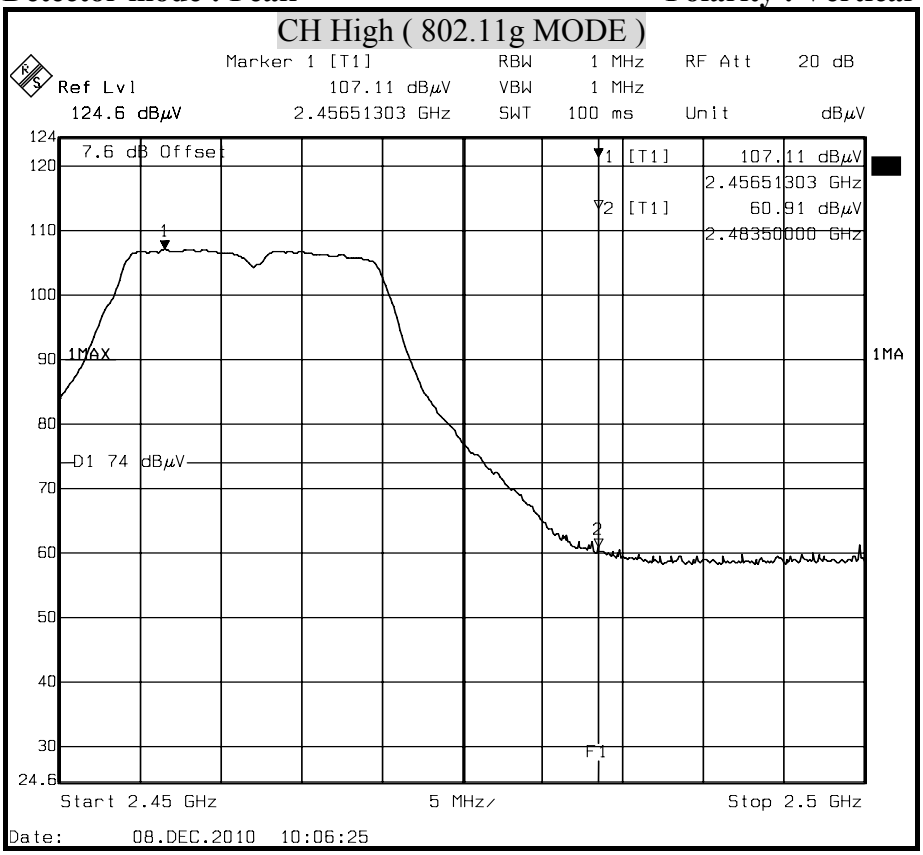
**Detector mode : Peak** **Polarity : Horizontal**



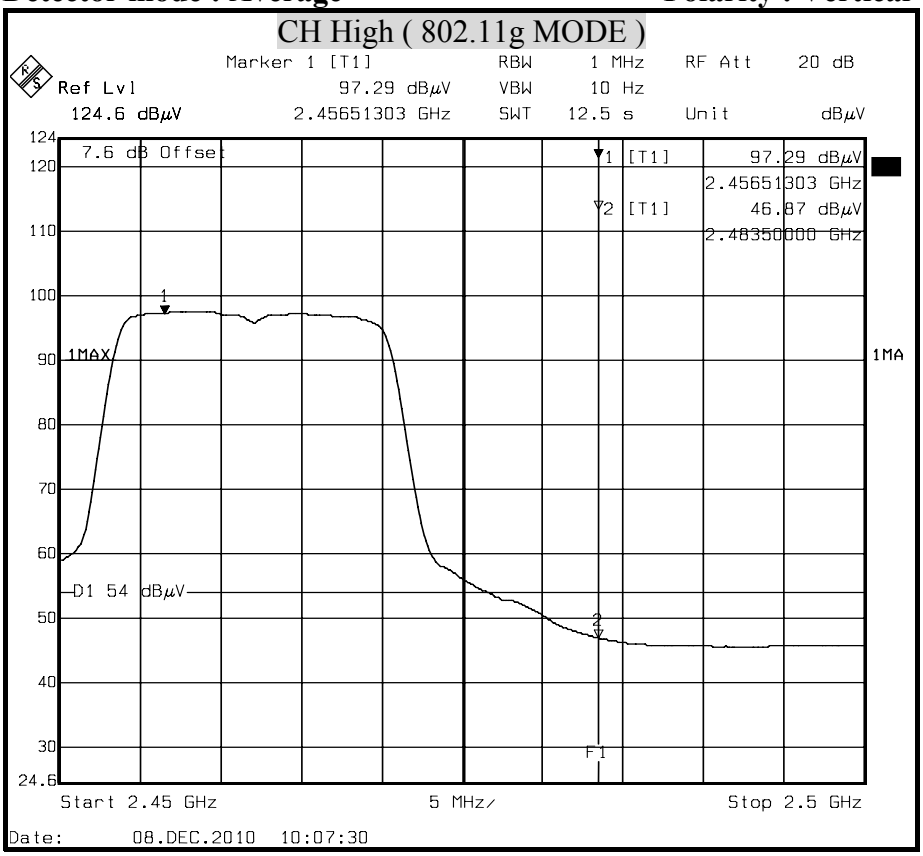

**Detector mode : Average** **Polarity : Horizontal**



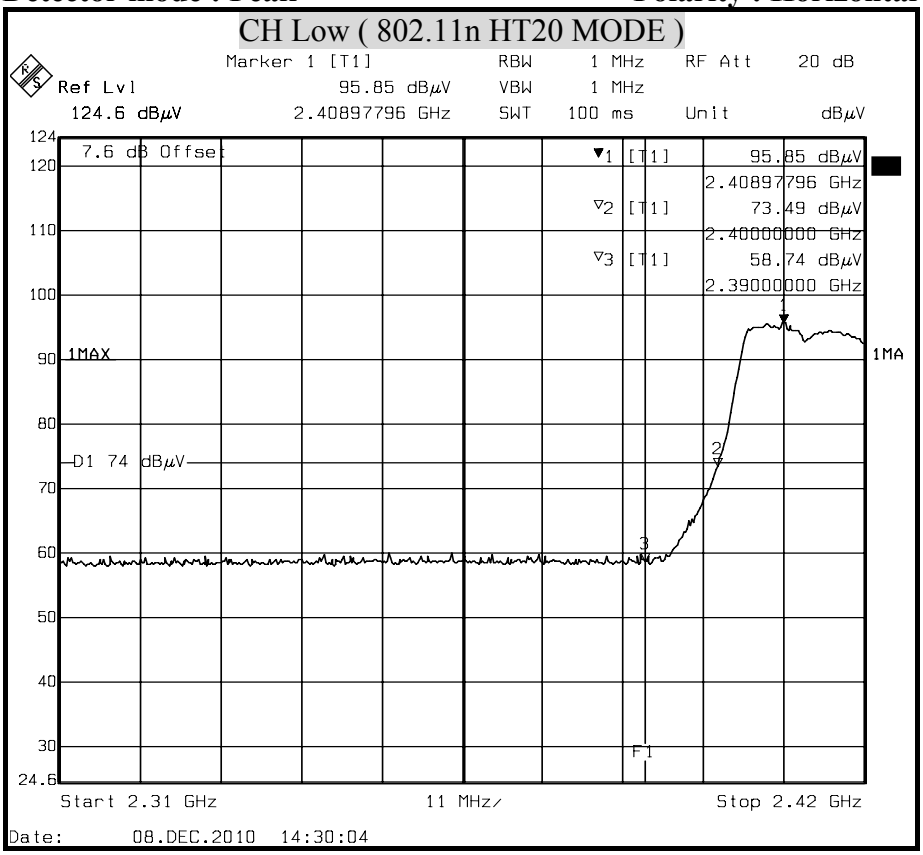
**Detector mode : Peak** **Polarity : Vertical**



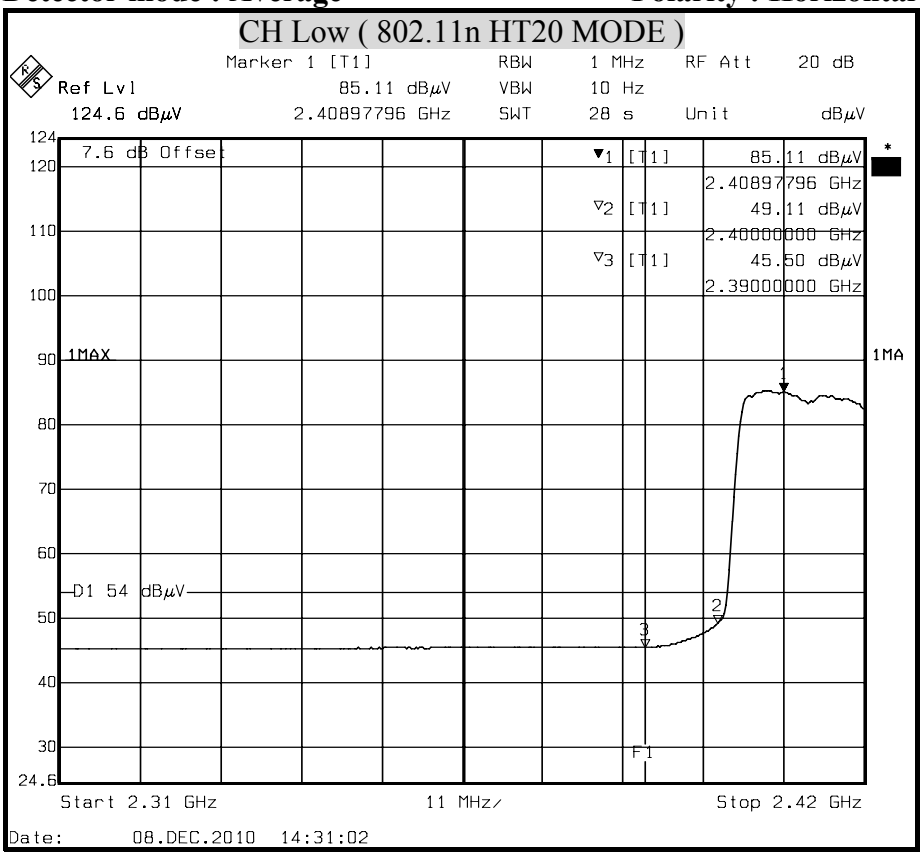

**Detector mode : Average** **Polarity : Vertical**



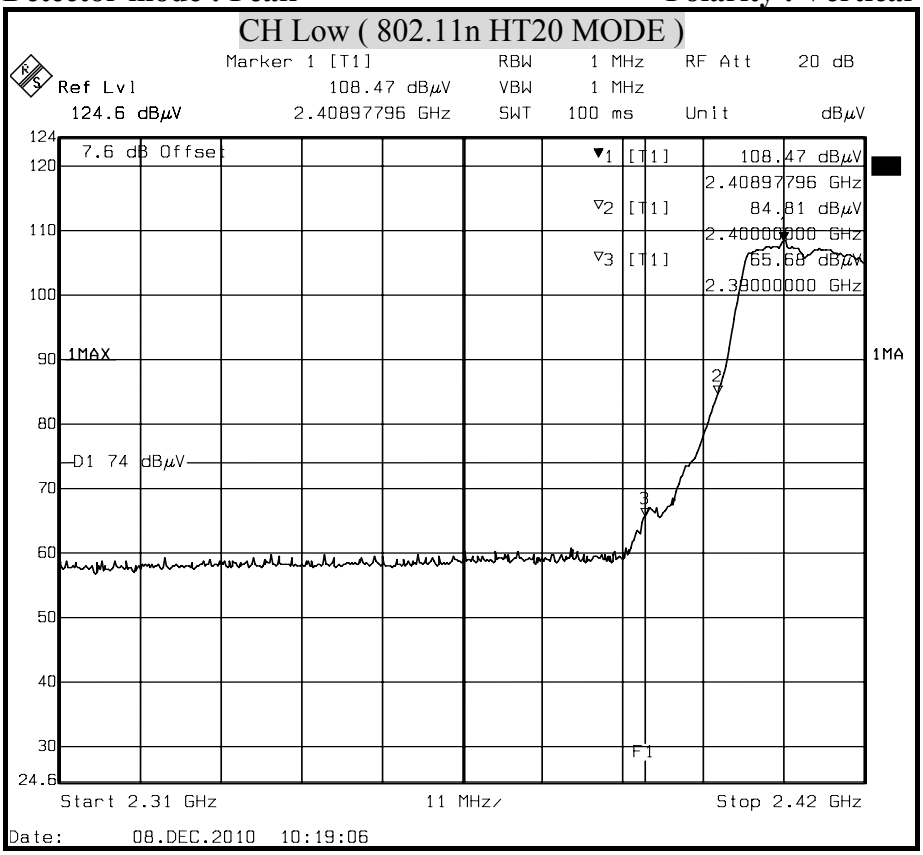
**Detector mode : Peak** **Polarity : Horizontal**



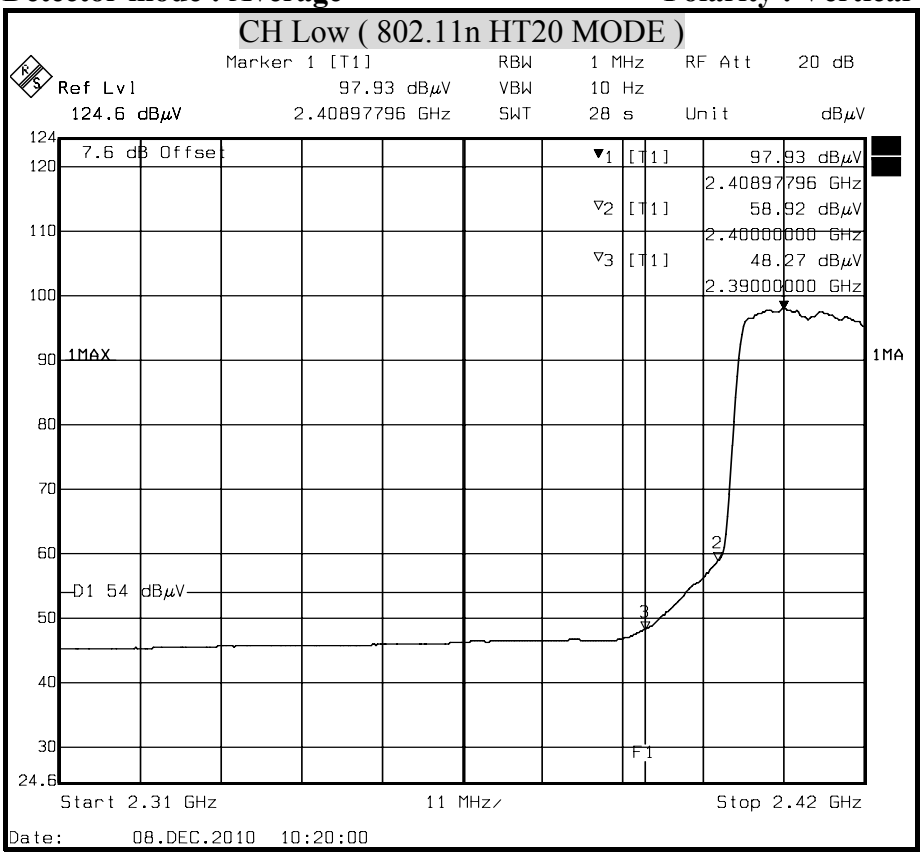

**Detector mode : Average** **Polarity : Horizontal**



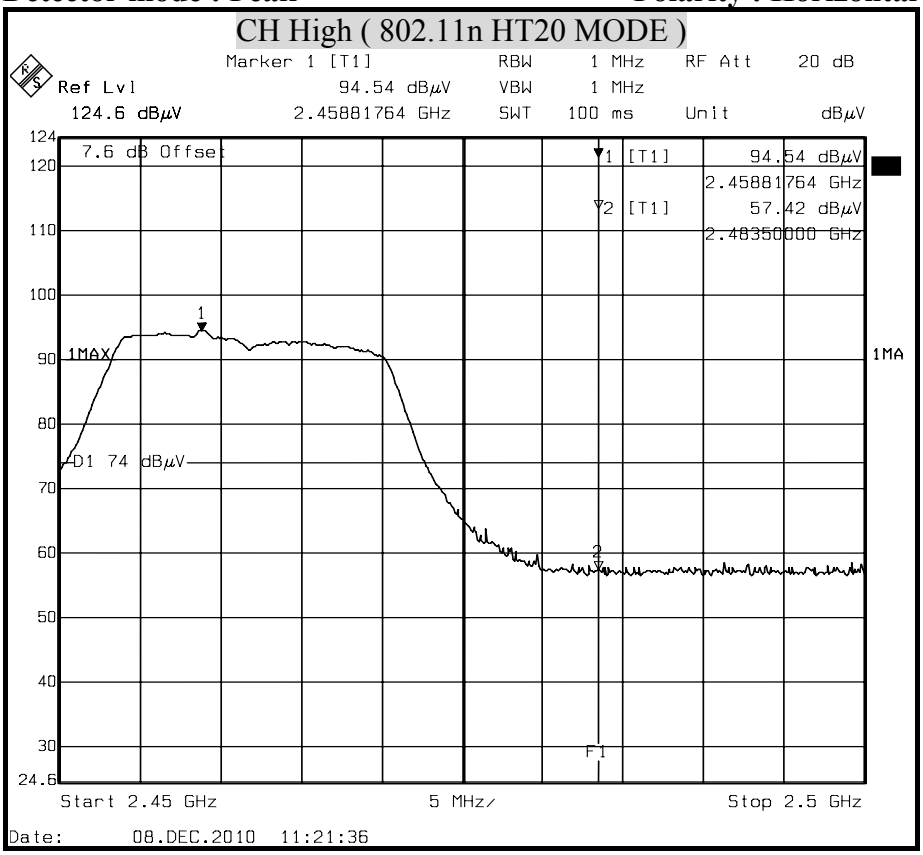
**Detector mode : Peak** **Polarity : Vertical**



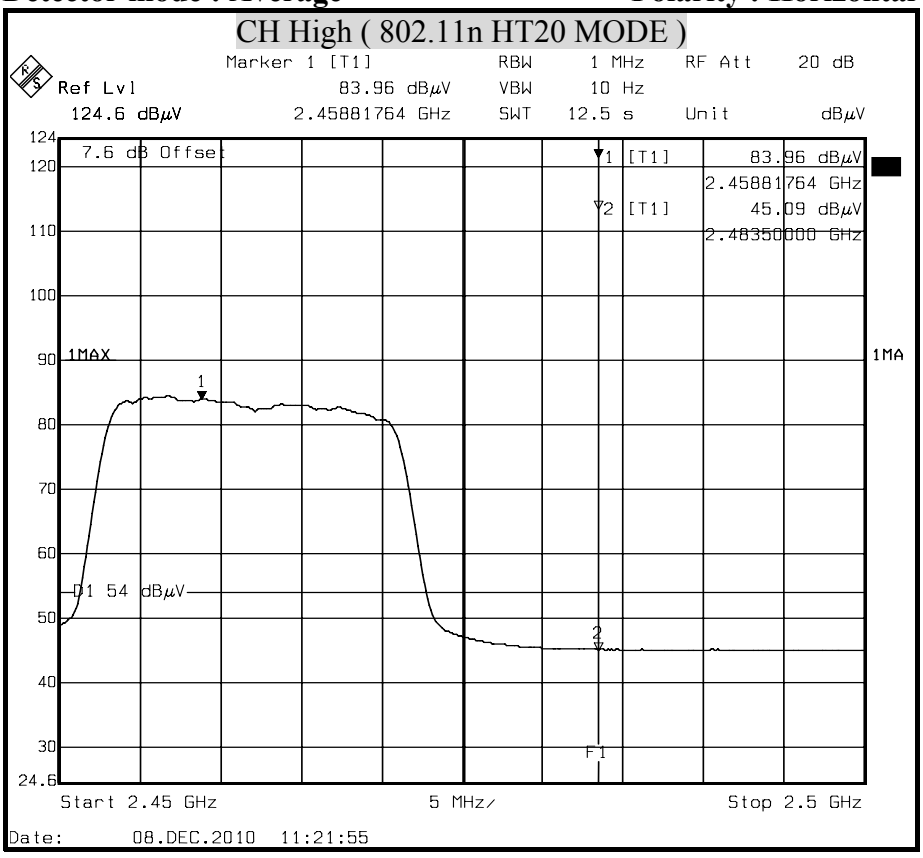

**Detector mode : Average** **Polarity : Vertical**



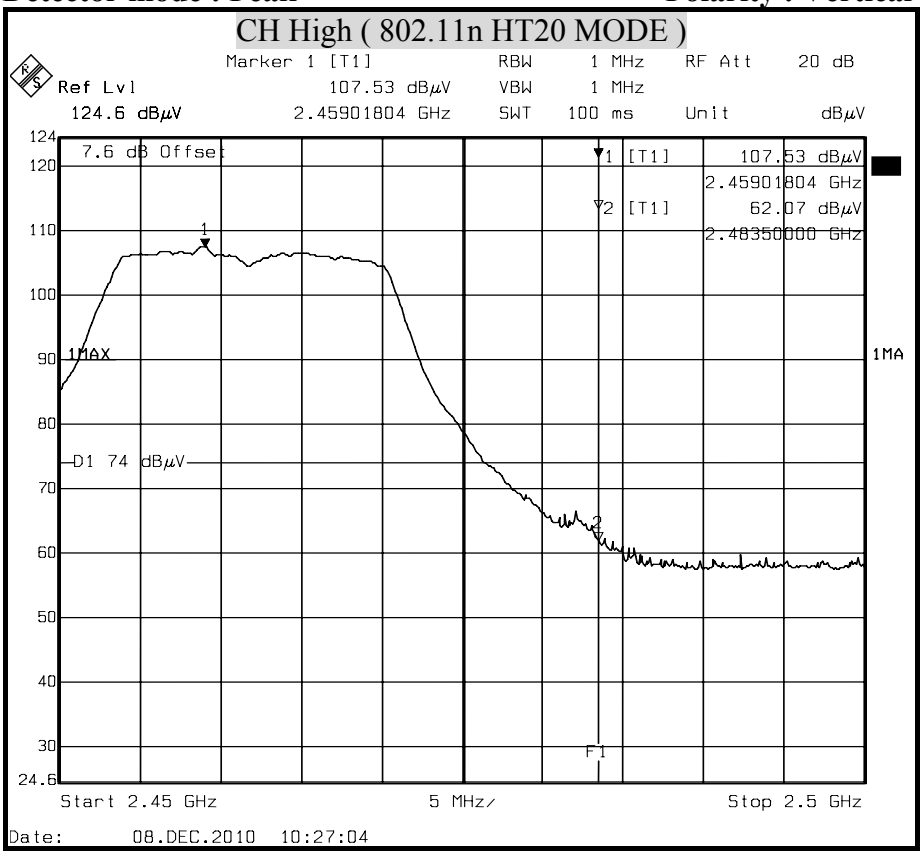
**Detector mode : Peak** **Polarity : Horizontal**



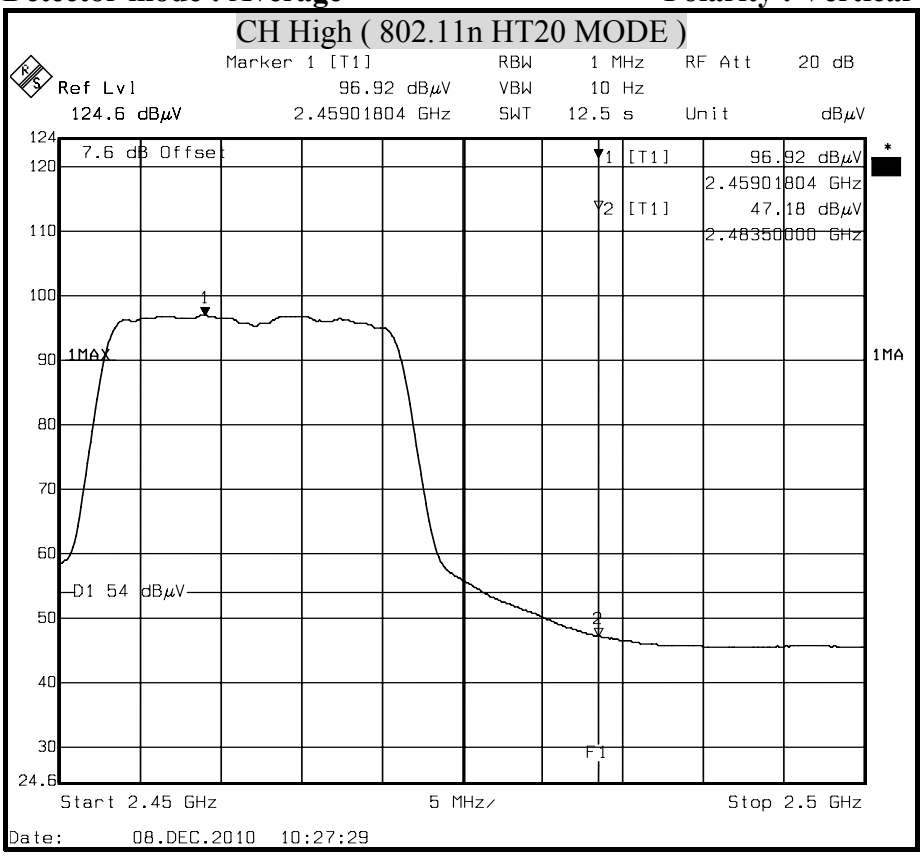

**Detector mode : Average** **Polarity : Horizontal**



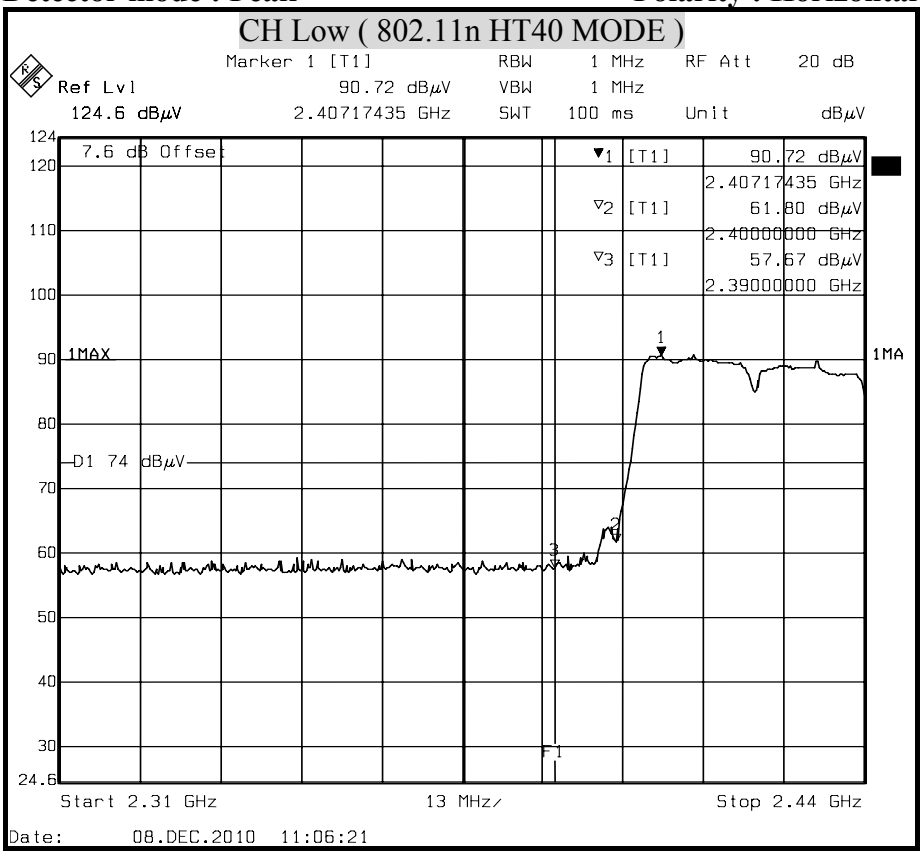
**Detector mode : Peak** **Polarity : Vertical**



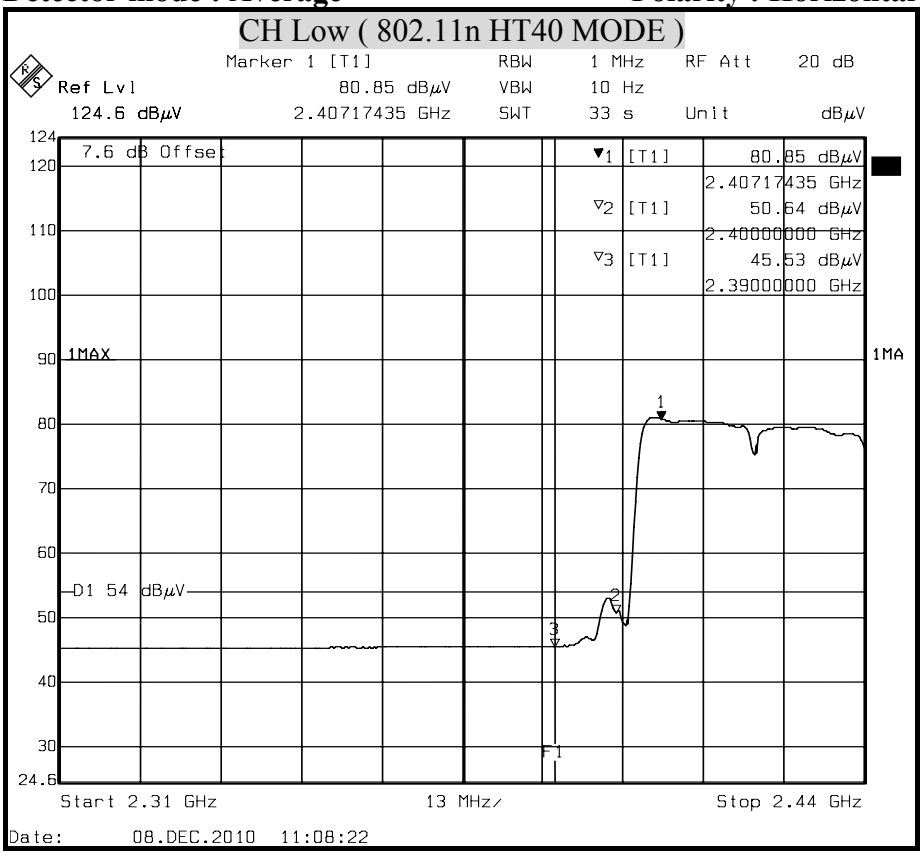

**Detector mode : Average** **Polarity : Vertical**



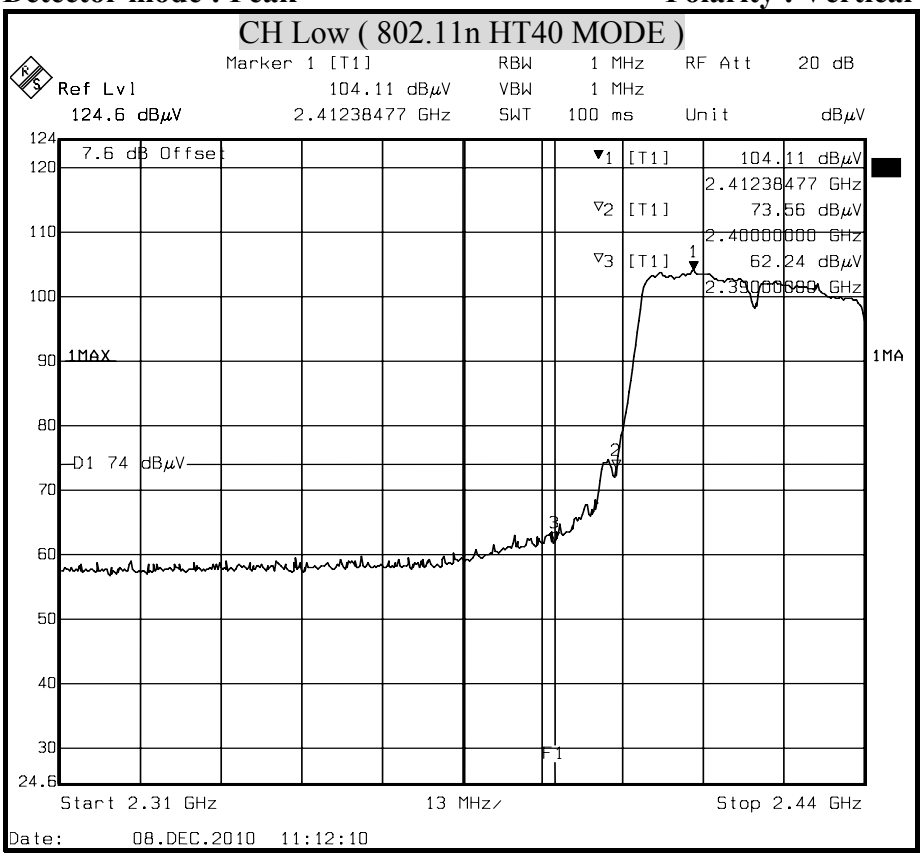
**Detector mode : Peak** **Polarity : Horizontal**



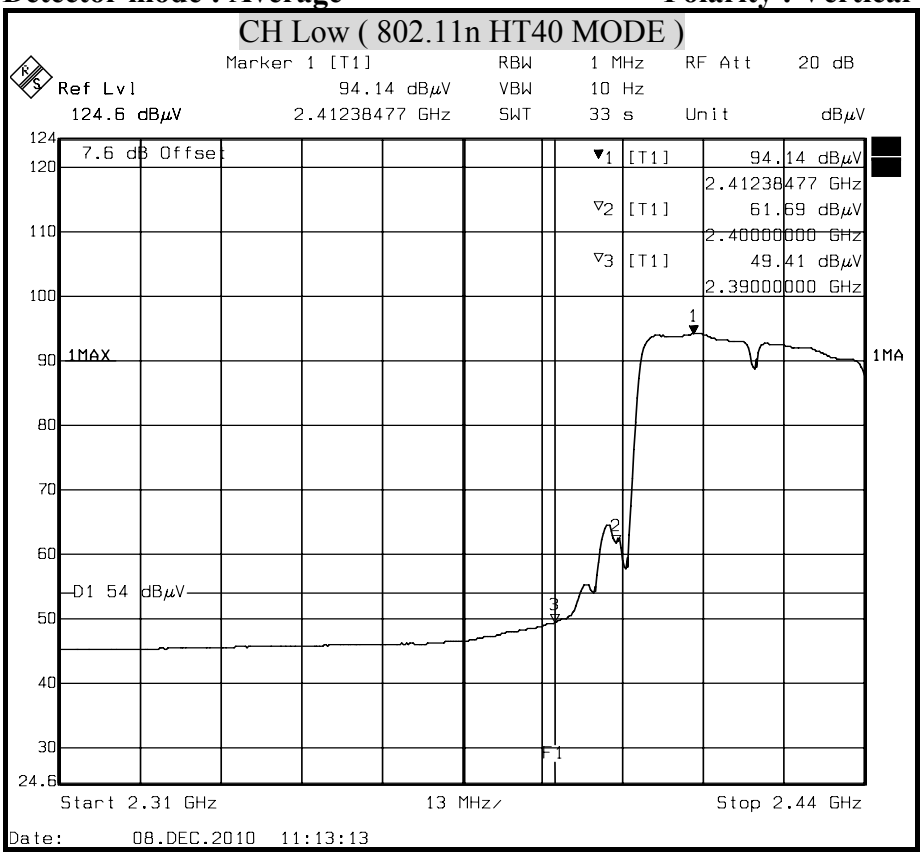

**Detector mode : Average** **Polarity : Horizontal**



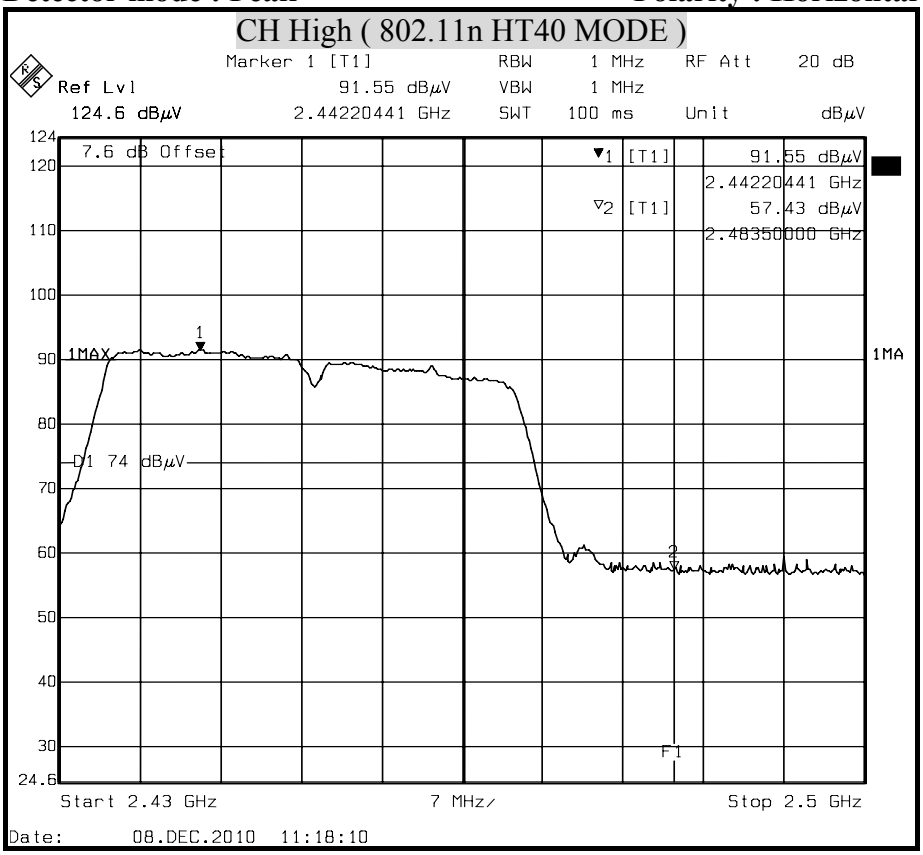
**Detector mode : Peak** **Polarity : Vertical**



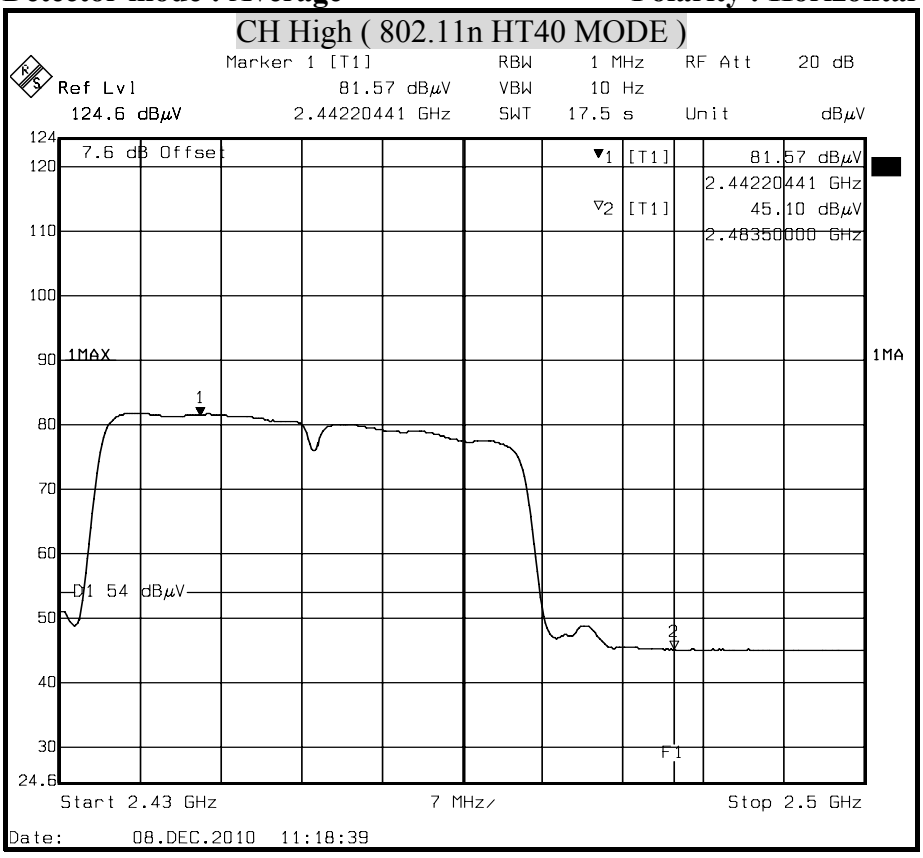

**Detector mode : Average** **Polarity : Vertical**



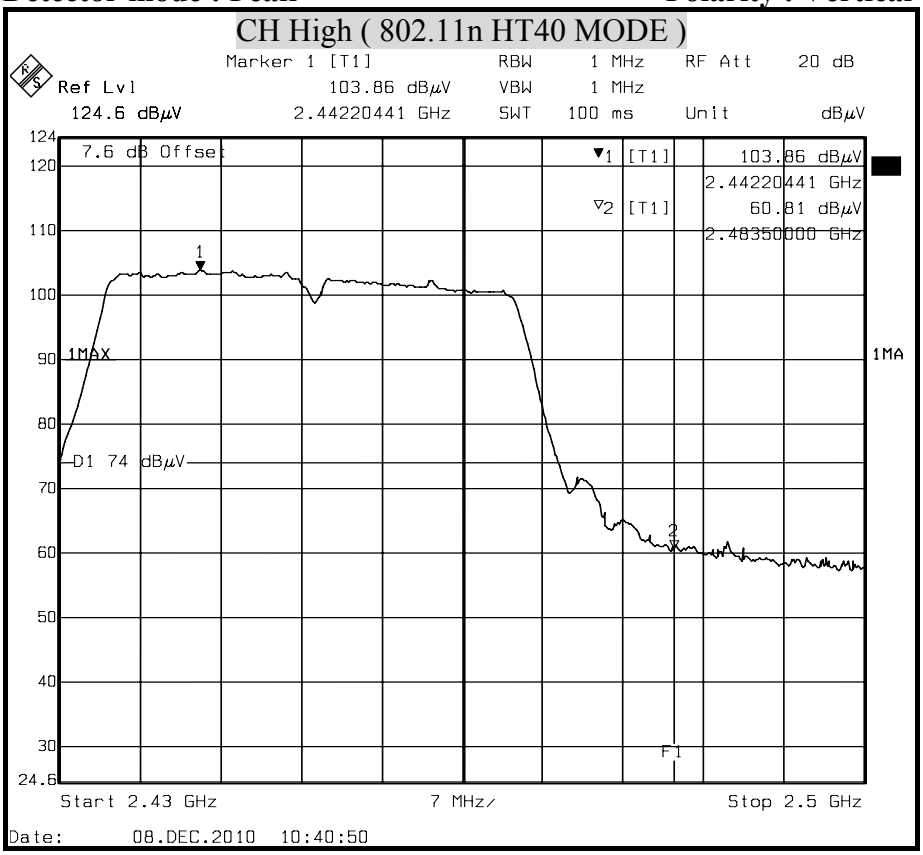
**Detector mode : Peak** **Polarity : Horizontal**



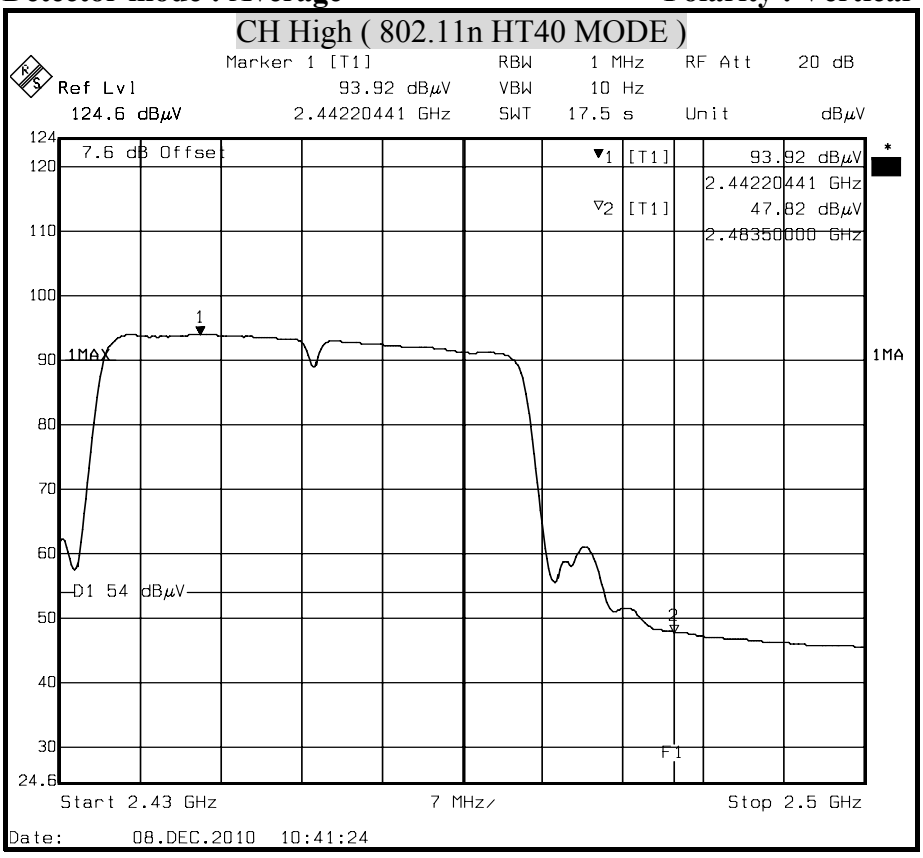

**Detector mode : Average** **Polarity : Horizontal**



**Detector mode : Peak** **Polarity : Vertical**




**Detector mode : Average** **Polarity : Vertical**



## 8.7 POWERLINE CONDUCTED EMISSIONS

**LIMITS**

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

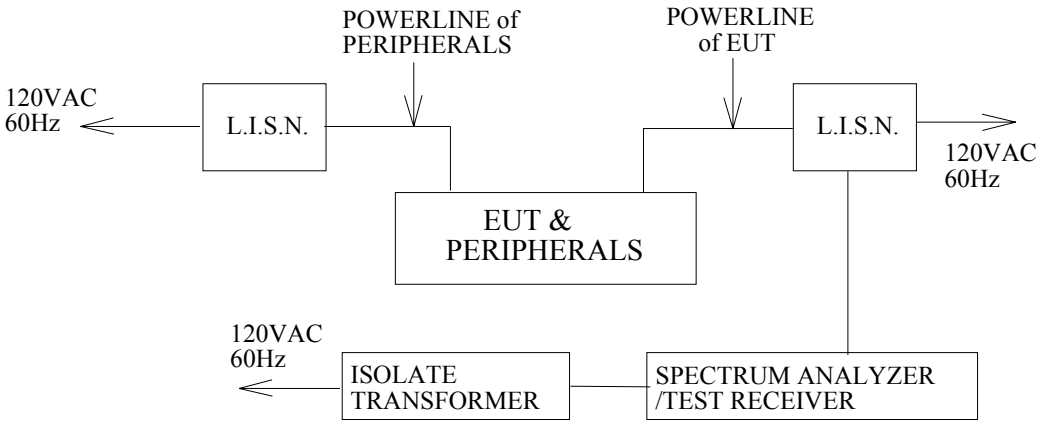
| Frequency of Emission (MHz) | Conducted limit (dBμv) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 to 56 | 56 to 46 |
| 0.5 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

**TEST EQUIPMENTS**

The following test equipments are used during the conducted power line tests：

| Conducted Emission room #1 | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| L.I.S.N. | SCHWARZBECK | NNLK 8121 | 8121-308 | MAR. 09, 2011 |
| TEST RECEIVER | Rohde & Schwarz | ESCS 30 | 100348 | JUL. 13, 2011 |
| BNC COAXIAL CABLE | CCS | BNC50 | 11 | OCT. 04, 2011 |
| Test S/W | e-3 (5.04211c)<br>R&S (2.27) | | | |

## TEST SETUP




## TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

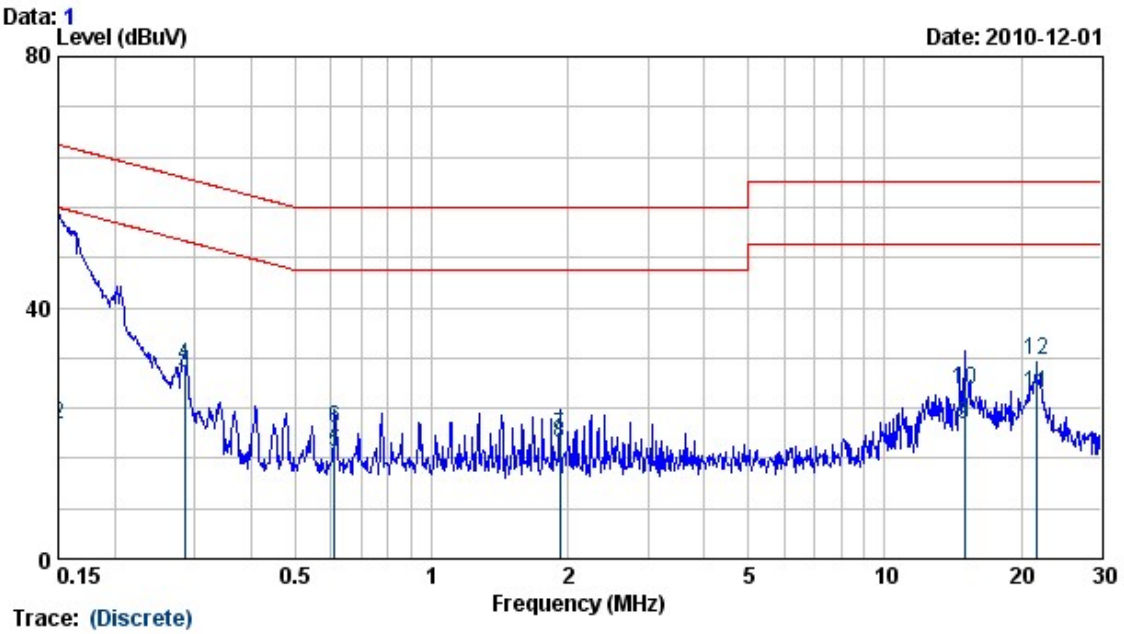
## TEST RESULTS

No non-compliance noted.

## CONDUCTED RF VOLTAGE MEASUREMENT

| Product Name | 11n USB Dongle | Test Date | 2010/12/01 |
|---|---|---|---|
| Model | WL307n | Test By | Hong Tsai |
| Test Mode | Normal operating / worst case | TEMP& Humidity | 24.4°C, 59% |

LINE

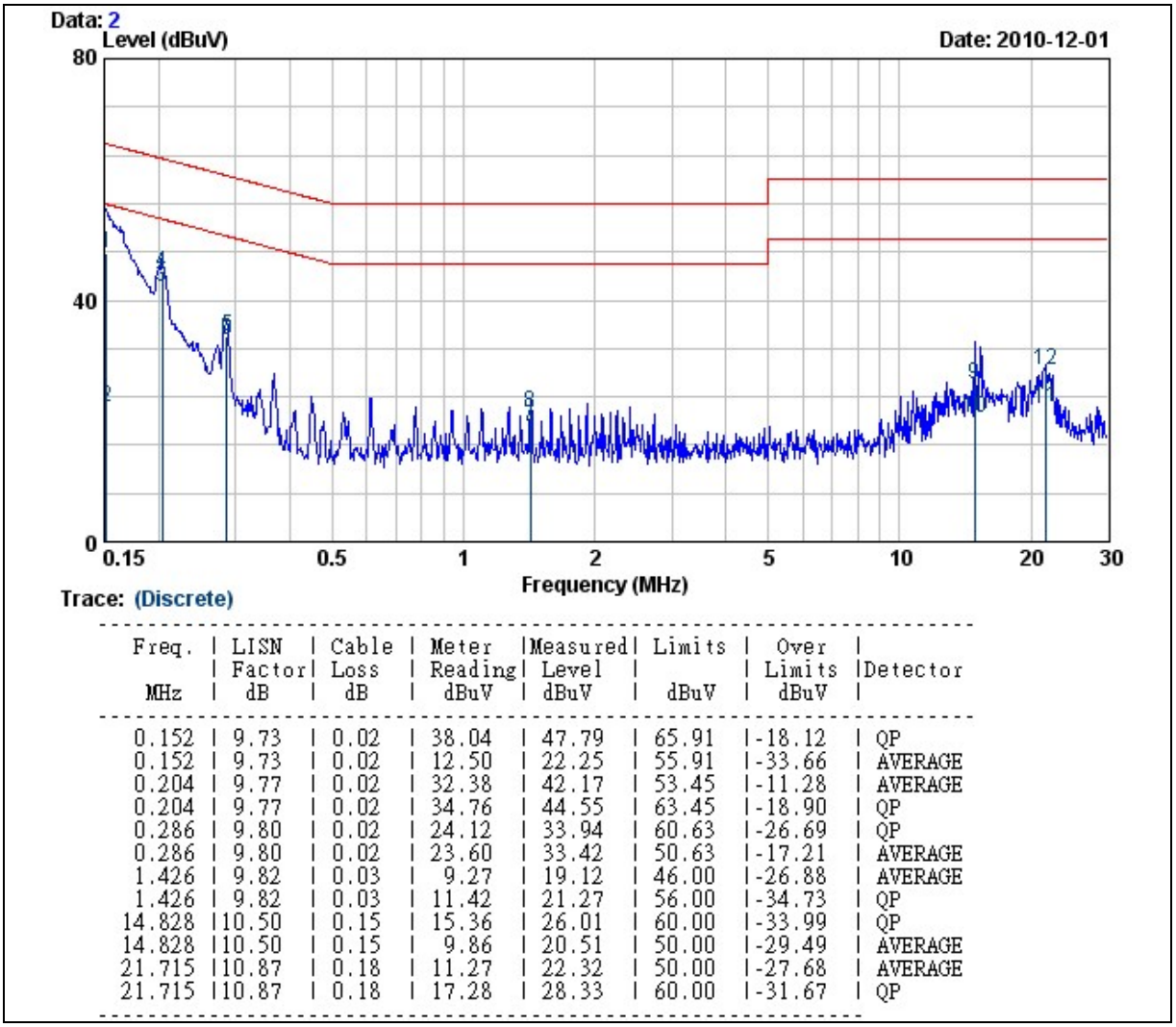



| Freq. MHz | LISN Factor dB | Cable Loss dB | Meter Reading dBuV | Measured Level dBuV | Limits dBuV | Over Limits dBuV | Detector |
|---|---|---|---|---|---|---|---|
| 0.150 | 9.74 | 0.02 | 38.52 | 48.28 | 66.00 | -17.72 | QP |
| 0.150 | 9.74 | 0.02 | 11.70 | 21.46 | 56.00 | -34.54 | AVERAGE |
| 0.285 | 9.81 | 0.02 | 19.77 | 29.60 | 50.68 | -21.08 | AVERAGE |
| 0.285 | 9.81 | 0.02 | 21.04 | 30.87 | 60.68 | -29.81 | QP |
| 0.611 | 9.82 | 0.02 | 7.05 | 16.89 | 46.00 | -29.11 | AVERAGE |
| 0.611 | 9.82 | 0.02 | 10.90 | 20.74 | 56.00 | -35.26 | QP |
| 1.918 | 9.80 | 0.03 | 9.88 | 19.71 | 56.00 | -36.29 | QP |
| 1.918 | 9.80 | 0.03 | 8.50 | 18.33 | 46.00 | -27.67 | AVERAGE |
| 14.986 | 10.63 | 0.15 | 10.67 | 21.45 | 50.00 | -28.55 | AVERAGE |
| 14.986 | 10.63 | 0.15 | 16.26 | 27.04 | 60.00 | -32.96 | QP |
| 21.600 | 11.02 | 0.18 | 15.20 | 26.40 | 50.00 | -23.60 | AVERAGE |
| 21.600 | 11.02 | 0.18 | 20.32 | 31.52 | 60.00 | -28.48 | QP |

**REMARK:**
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

| Product Name | 11n USB Dongle | Test Date | 2010/12/01 |
|---|---|---|---|
| Model | WL307n | Test By | Hong Tsai |
| Test Mode | Normal operating / worst case | TEMP& Humidity | 24.4°C, 59% |

NEUTRAL




| Freq. MHz | LISN Factor dB | Cable Loss dB | Meter Reading dBuV | Measured Level dBuV | Limits dBuV | Over Limits dBuV | Detector |
|---|---|---|---|---|---|---|---|
| 0.152 | 9.73 | 0.02 | 38.04 | 47.79 | 65.91 | -18.12 | QP |
| 0.152 | 9.73 | 0.02 | 12.50 | 22.25 | 55.91 | -33.66 | AVERAGE |
| 0.204 | 9.77 | 0.02 | 32.38 | 42.17 | 53.45 | -11.28 | AVERAGE |
| 0.204 | 9.77 | 0.02 | 34.76 | 44.55 | 63.45 | -18.90 | QP |
| 0.286 | 9.80 | 0.02 | 24.12 | 33.94 | 60.63 | -26.69 | QP |
| 0.286 | 9.80 | 0.02 | 23.60 | 33.42 | 50.63 | -17.21 | AVERAGE |
| 1.426 | 9.82 | 0.03 | 9.27 | 19.12 | 46.00 | -26.88 | AVERAGE |
| 1.426 | 9.82 | 0.03 | 11.42 | 21.27 | 56.00 | -34.73 | QP |
| 14.828 | 10.50 | 0.15 | 15.36 | 26.01 | 60.00 | -33.99 | QP |
| 14.828 | 10.50 | 0.15 | 9.86 | 20.51 | 50.00 | -29.49 | AVERAGE |
| 21.715 | 10.87 | 0.18 | 11.27 | 22.32 | 50.00 | -27.68 | AVERAGE |
| 21.715 | 10.87 | 0.18 | 17.28 | 28.33 | 60.00 | -31.67 | QP |

**REMARK:**
1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value

# 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 7dBi.

## 9.2 ANTENNA CONNECTED CONSTRUCTION

Two antennas (1TX 2RX)

**Antenna 1: Printed PIFA Antenna (1RX)**

Antenna Model: AU-4622

Antenna Gain: 0dBi

Connector: PIFA

Manufacture: E-Top Network Technology Inc.

Antenna 2: Dipole Antenna(1TX1RX)

Antenna Model: CY2400-13294M-01A

Antenna Gain: 7dBi

Connector: SMA Male female pin

Manufacture: CHIAN YAO CO., LTD..