# FCC PART 15.247

# TEST REPORT

For

## Mirahome (Shanghai) Technology Co., ltd.

Room 2403，Wiselogic International Center,No. 66 North Shanxi Road, Shanghai, China

**FCC ID: 2AJ5M-MPB-001**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Intelligent Controller |

| | |
|---|---|
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| **Report Number:** | RKS161031002-00A |
| **Report Date:** | 2016-11-30 |
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**Note**: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

The Mirahome (Shanghai) Technology Co., ltd.'s product, model number: MPB-001and MM-001 (FCC ID: 2AJ5M-MPB-001)) or the "EUT" in this report was a Intelligent Controller, which was measured approximately: 91 mm (L) x89 mm (W)) x35 mm (H), rated input voltage: DC 19V supply by adapter.

**All measurement and test data in this report was gathered from production sample serial number: 20161020008 (Assigned by the BACL. The EUT supplied by the applicant was received on 2016-10-20)*

## Objective

This report is prepared on behalf of Mirahome (Shanghai) Technology Co., ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

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

N/A

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB558074 D01 DTS Meas Guidance v03r05.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration

For 802.11b, 802.11g and 802.11n-HT20 mode, 11 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 1 | 2412 | 8 | 2447 |
| 2 | 2417 | 9 | 2452 |
| 3 | 2422 | 10 | 2457 |
| 4 | 2427 | 11 | 2462 |
| 5 | 2432 | / | / |
| 6 | 2437 | / | / |
| 7 | 2442 | / | / |

EUT was tested with Channel 1, 6 and 11.

## Equipment Modifications

No modification was made to the EUT tested.

## EUT Exercise Software

RF test tool: COM debug tool V3.8.1.

The worst case (the duty cycle=100%) was performed under:
802.11b: Data rate:1 Mbps, Power level:17
802.11g: Data rate: 6 Mbps, Power level: 17
802.11n-HT20: Data rate: MCS0, Power level: 17

## Support Equipment List and Details

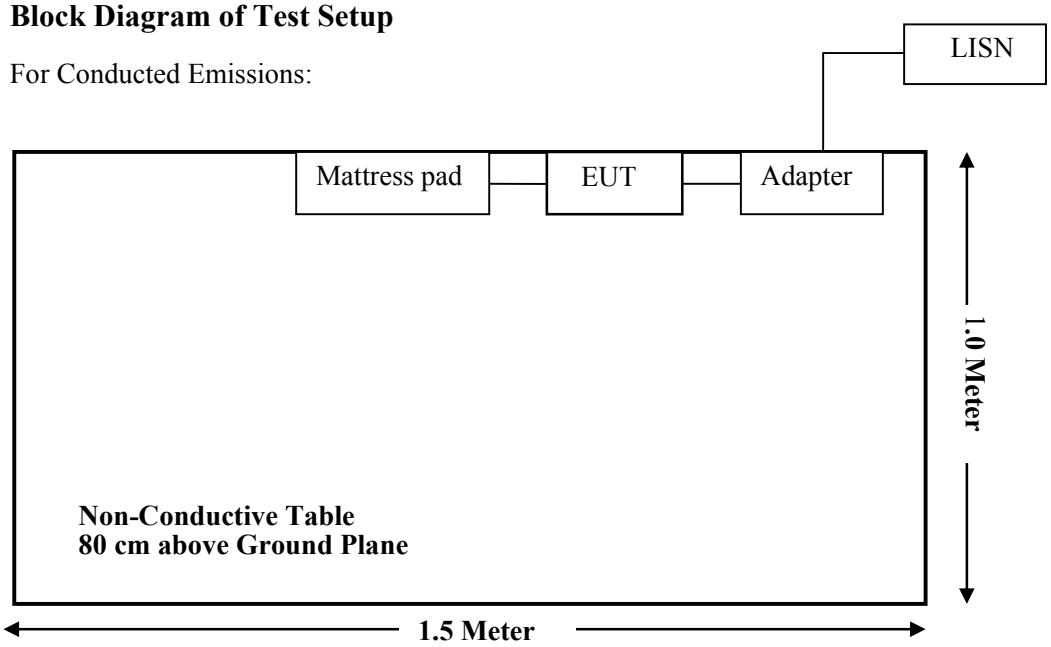
| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| Mirahome | mattress pad | / | / |

## External I/O Cable

| Cable Description | Length (m) | From Port | To |
|---|---|---|---|
| Power Cable | 0.8 | Power Source | Adapter |

## Block Diagram of Test Setup

For Conducted Emissions:



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| §15.247 (i), §1.1307 (b) (1)& §2.1091 | RF Exposure | Compliance |
| §15.203 | Antenna Requirement | Compliance |
| §15.207 (a) | AC Line Conducted Emissions | Compliance |
| §15.247(d) | Spurious Emissions at Antenna Port | Compliance |
| §15.205, §15.209, §15.247(d) | Spurious Emissions | Compliance |
| §15.247 (a)(2) | 6 dB Emission Bandwidth | Compliance |
| §15.247(b)(3) | Maximum Conducted Output Power | Compliance |
| §15.247(d) | 100 kHz Bandwidth of Frequency Band Edge | Compliance |
| §15.247(e) | Power Spectral Density | Compliance |

# FCC§15.247 (i), §1.1310& §2.1091 –RF Exposure

## Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field Strength (V/m)** | **Magnetic Field Strength (A/m)** | **Power Density (mW/cm²)** | **Averaging Time (minutes)** |
| 0.3-1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f²) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | | f/1500 | 30 |
| 1500-100,000 | / | | 1.0 | 30 |

f = frequency in MHz; * = Plane-wave equivalent power density;

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

**Calculated Formulary:**
Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. $mW/cm^2$);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:**

| Mode | Frequency (MHz) | Antenna Gain | | Target Power | | Evaluation Distance (cm) | Power Density ($mW/cm^2$) | MPE Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|---|---|
| | | (dBi) | (numeric) | (dBm) | (mW) | | | |
| 802.11b | 2437 | 1.5 | 1.41 | 18.00 | 63.10 | 20 | 0.0177 | 1.0 |
| 802.11g | 2437 | 1.5 | 1.41 | 17.00 | 50.12 | 20 | 0.0141 | 1.0 |
| 802.11n HT20 | 2412 | 1.5 | 1.41 | 17.00 | 50.12 | 20 | 0.0141 | 1.0 |

**Note:** The target output power: 802.11b:17±1.0dBm
802.11g:16±1.0dBm
802.11n:16±1.0dBm

Please refer to the Technical Specification, which declared by the Manufacturer.

**Result:** The device meet FCC MPE at 20 cm distance

# FCC §15.203 - ANTENNA REQUIREMENT

## Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

## Antenna Connector Construction

The EUT has a PCB antenna arrangement for wifi, which the antenna gain are 1.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

# FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

## Applicable Standard

FCC§15.207

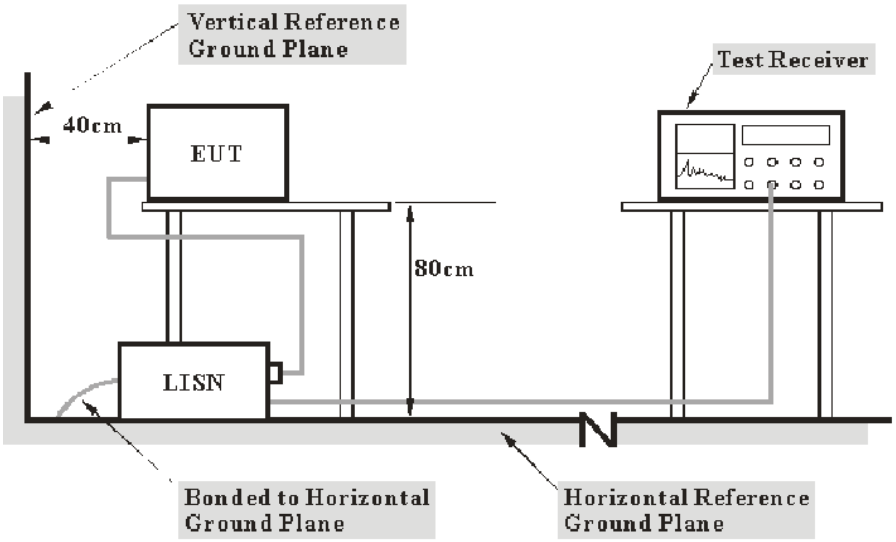
## Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

| Port | Expanded Measurement uncertainty |
|---|---|
| AC Mains | 3.26 dB (k=2, 95% level of confidence) |
| CAT 3 | 3.70 dB (k=2, 95% level of confidence) |
| CAT 5 | 3.86 dB (k=2, 95% level of confidence) |
| CAT 6 | 4.64 dB (k=2, 95% level of confidence) |

## EUT Setup




Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | EMI Test Receiver | ESCS30 | 834115/007 | 2016-11-12 | 2017-11-11 |
| Rohde & Schwarz | LISN | ESH3-Z5 | 862770/011 | 2016-10-10 | 2017-10-10 |
| FCC | ISN | FCC-TLISN-T8-02 | 20376 | 2016-07-04 | 2017-07-03 |
| MICRO-COAX | Coaxial line | UFB-293B-1-0480-50X50 | 97F0173 | 2016-09-08 | 2017-09-07 |
| Rohde & Schwarz | CE Test software | EMC 32 | V 09.10.0 | / | / |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss

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

Margin = Limit – Corrected Amplitude

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

**18.44dB** at **0.445000 MHz** in the **Line** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than $U_{cispr}$, if $L_m$ is less than $L_{lim}$, it implies that the EUT complies with the limit.

## Test Data

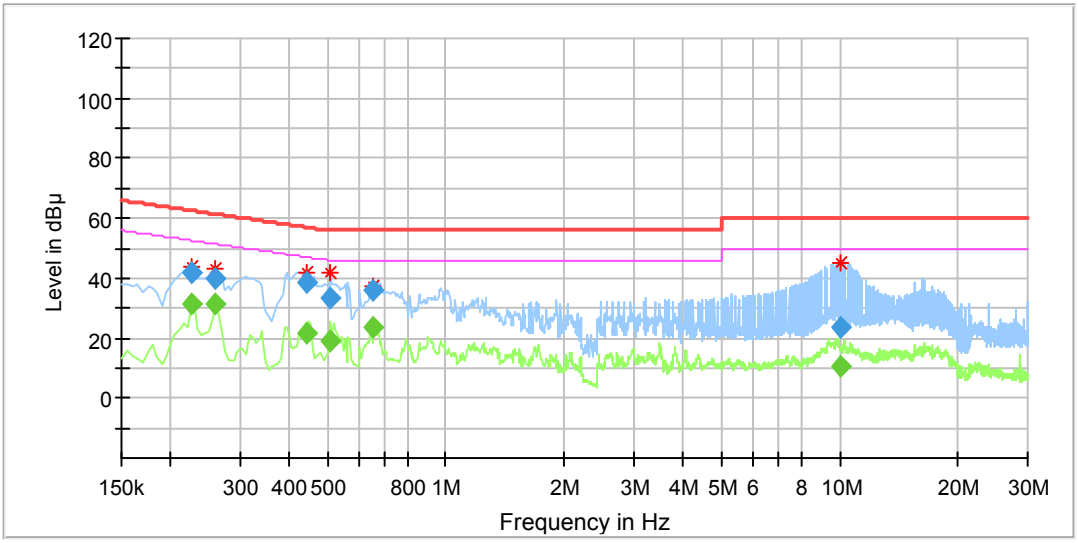
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23 ℃ |
| **Relative Humidity:** | 56 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Peter Jiang on 2016-11-29.*

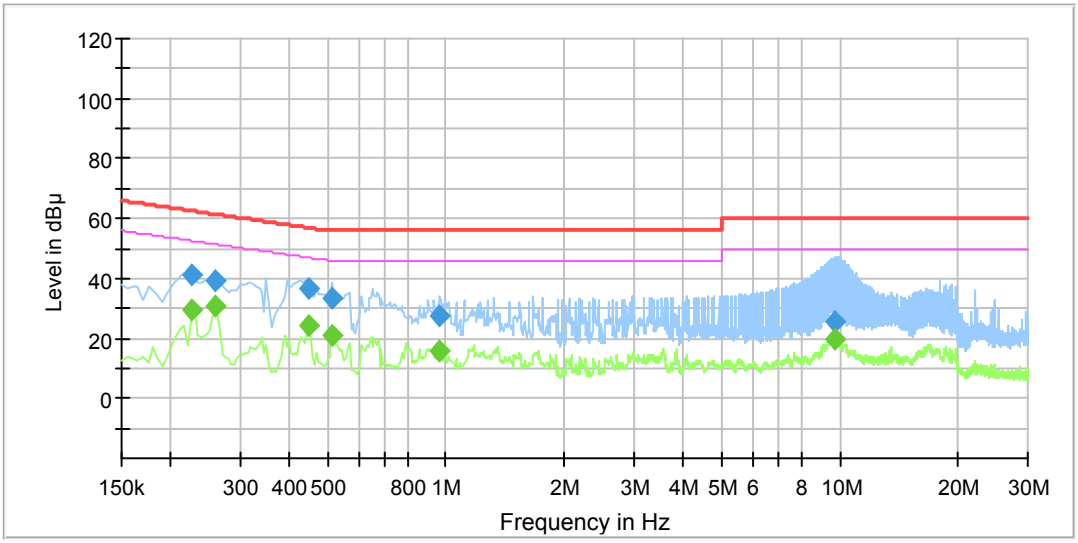
*Test Mode: Transmitting*

**AC 120V/60 Hz, Line**




| Frequency (MHz) | QuasiPeak (dBµV) | Average (dB µ V) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|---|---|---|---|---|---|---|---|---|
| 0.225000 | --- | 31.20 | 9.000 | L1 | 10.3 | 21.43 | 52.63 | Compliance |
| 0.225000 | 41.97 | --- | 9.000 | L1 | 10.3 | 20.66 | 62.63 | Compliance |
| 0.260000 | --- | 31.24 | 9.000 | L1 | 10.3 | 20.19 | 51.43 | Compliance |
| 0.260000 | 40.16 | --- | 9.000 | L1 | 10.3 | 21.27 | 61.43 | Compliance |
| 0.445000 | --- | 21.72 | 9.000 | L1 | 10.3 | 25.25 | 46.97 | Compliance |
| 0.445000 | 38.53 | --- | 9.000 | L1 | 10.3 | 18.44 | 56.97 | Compliance |
| 0.510000 | --- | 18.94 | 9.000 | L1 | 10.3 | 27.06 | 46.00 | Compliance |
| 0.510000 | 33.63 | --- | 9.000 | L1 | 10.3 | 22.37 | 56.00 | Compliance |
| 0.655000 | --- | 23.95 | 9.000 | L1 | 10.3 | 22.05 | 46.00 | Compliance |
| 0.655000 | 35.70 | --- | 9.000 | L1 | 10.3 | 20.30 | 56.00 | Compliance |
| 10.000000 | --- | 10.77 | 9.000 | L1 | 10.5 | 39.23 | 50.00 | Compliance |
| 10.000000 | 23.68 | --- | 9.000 | L1 | 10.5 | 36.32 | 60.00 | Compliance |

**AC 120V/60 Hz, Neutral**




| Frequency (MHz) | QuasiPeak (dBµV) | Average (dB µ V) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|---|---|---|---|---|---|---|---|---|
| 0.225000 | --- | 29.55 | 9.000 | N | 10.3 | 23.08 | 52.63 | Compliance |
| 0.225000 | 41.23 | --- | 9.000 | N | 10.3 | 21.40 | 62.63 | Compliance |
| 0.260000 | --- | 30.66 | 9.000 | N | 10.3 | 20.77 | 51.43 | Compliance |
| 0.260000 | 38.97 | --- | 9.000 | N | 10.3 | 22.46 | 61.43 | Compliance |
| 0.450000 | --- | 24.41 | 9.000 | N | 10.3 | 22.47 | 46.88 | Compliance |
| 0.450000 | 36.82 | --- | 9.000 | N | 10.3 | 20.06 | 56.88 | Compliance |
| 0.515000 | --- | 20.84 | 9.000 | N | 10.3 | 25.16 | 46.00 | Compliance |
| 0.515000 | 33.21 | --- | 9.000 | N | 10.3 | 22.79 | 56.00 | Compliance |
| 0.965000 | --- | 15.84 | 9.000 | N | 10.3 | 30.16 | 46.00 | Compliance |
| 0.965000 | 27.47 | --- | 9.000 | N | 10.3 | 28.53 | 56.00 | Compliance |
| 9.685000 | --- | 19.44 | 9.000 | N | 10.5 | 30.56 | 50.00 | Compliance |
| 9.685000 | 25.88 | --- | 9.000 | N | 10.5 | 34.12 | 60.00 | Compliance |

# FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

## Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

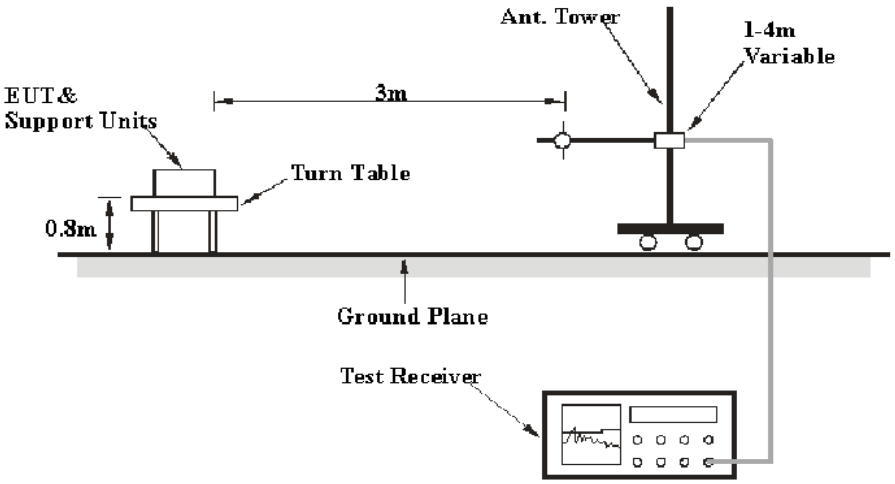
## Measurement Uncertainty

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

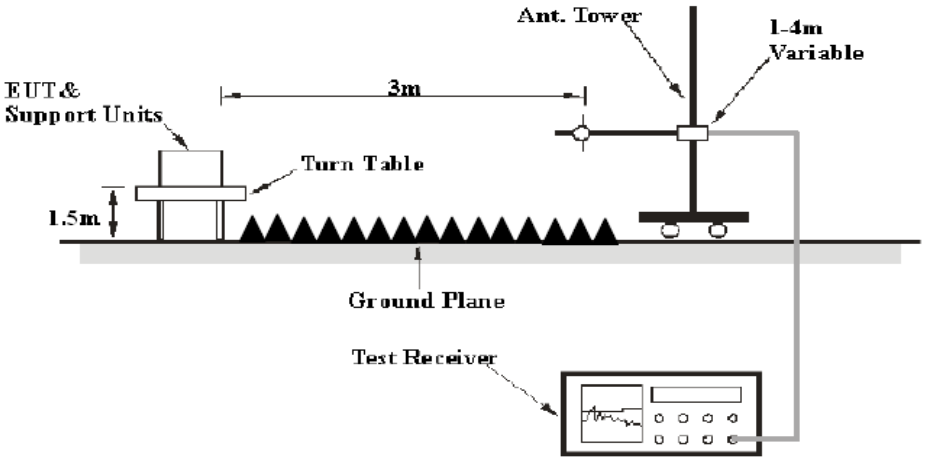
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

## EUT Setup

**Below 1 GHz:**



**Above 1GHz:**




The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Detector |
|---|---|---|---|---|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1MHz | 3 MHz | / | PK |
| | 1MHz | 10 Hz | / | Ave. |

## Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Sonoma Instrunent | Amplifier | 330 | 171377 | 2016-10-21 | 2017-10-21 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100195 | 2016-11-12 | 2017-11-11 |
| Sunol Sciences | Broadband Antenna | JB3 | A090314-2 | 2016-01-09 | 2019-01-08 |
| ETS | Horn Antenna | 3115 | 6229 | 2016-11-07 | 2017-11-06 |
| EMCO | Horn Antenna | 3116 | 2516 | 2016-11-07 | 2019-11-06 |
| Rohde & Schwarz | Signal Analyzer | FSV40 | 101116 | 2016-07-04 | 2017-07-03 |
| Narda | Pre-amplifier | AFS42-00101800 | 2001270 | 2016-09-08 | 2017-09-08 |
| champrotek | Chamber | Chamber A | 1# | / | / |
| R&S | Auto test Software | EMC32 | V 09.10.0 | / | / |
| BACL | RF cable | KS-LAB-012 | KS-LAB-012 | 2015-12-16 | 2016-12-15 |
| BACL | RF cable | KS-LAB-010 | KS-LAB-010 | 2016-09-16 | 2017-09-15 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

## Test Results Summary

According to the recorded data in following table, the EUT complied with the Subpart C, section 15.205, 15.209 and 15.247.

**2.94 dB** at **144.002000MHz** in the **Vertical** polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than $U_{cispr}$, if $L_m$ is less than $L_{lim}$, it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

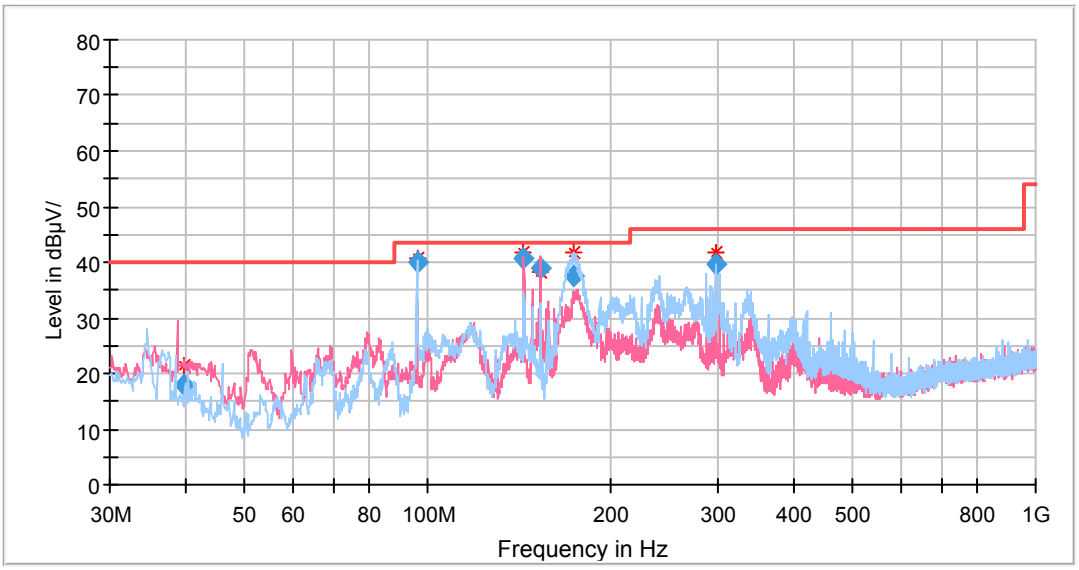
| | |
|---|---|
| **Temperature:** | 25 ℃ |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Ada Yu on 2016-11-30.*

*EUT operation mode: Transmitting*

**30 MHz-1 GHz**

*The worst case was performed under 802.11b mode*




| Frequency (MHz) | Receiver | | Turntable Degree | Rx Antenna | | Corrected Factor (dB) | Corrected Amplitude (dBµV/m) | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBµV) | Detector (PK/QP/Ave.) | | Height (cm) | Polar (H/V) | | | Limit (dB µ V/m) | Margin (dB) |
| 39.573600 | 28.00 | QP | 246.0 | 101.0 | V | -10.0 | 18.00 | 40.00 | 22.00 |
| 96.012200 | 56.34 | QP | 232.0 | 199.0 | H | -16.2 | 40.14 | 43.50 | 3.36 |
| 144.002000 | 52.56 | QP | 172.0 | 101.0 | V | -12.0 | 40.56 | 43.50 | 2.94 |
| 153.606400 | 51.30 | QP | 178.0 | 101.0 | V | -12.3 | 39.00 | 43.50 | 4.50 |
| 174.203150 | 49.53 | QP | 301.0 | 199.0 | H | -12.1 | 37.43 | 43.50 | 6.07 |
| 297.606000 | 50.07 | QP | 249.0 | 101.0 | H | -10.4 | 39.67 | 46.00 | 6.33 |

**1GHz-25GHz**

**802.11b Mode:**

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Low Channel (2412 MHz) | | | | | | | | | |
| 2412.0 | 102.45 | PK | 97 | 143 | V | -3.0 | 99.41 | / | / |
| 2412.0 | 98.03 | Ave | 97 | 143 | V | -3.0 | 94.99 | / | / |
| 2412.0 | 97.72 | PK | 198 | 131 | H | -3.0 | 94.68 | / | / |
| 2412.0 | 92.97 | Ave | 198 | 131 | H | -3.0 | 89.93 | / | / |
| 2390.0 | 44.36 | PK | 227 | 185 | V | -3.0 | 41.32 | 74 | 32.68 |
| 2390.0 | 31.61 | Ave | 227 | 185 | V | -3.0 | 28.57 | 54 | 25.43 |
| 2400.0 | 45.08 | PK | 350 | 144 | V | -3.0 | 42.04 | 74 | 31.96 |
| 2400.0 | 34.65 | Ave | 350 | 144 | V | -3.0 | 31.61 | 54 | 22.39 |
| 4824.0 | 32.58 | PK | 238 | 199 | H | 7.2 | 39.77 | 74 | 34.23 |
| 4824.0 | 27.44 | Ave | 238 | 199 | H | 7.2 | 34.63 | 54 | 19.37 |
| 6620.0 | 31.51 | PK | 68 | 211 | V | 13.6 | 45.09 | 74 | 28.91 |
| 6620.0 | 23.32 | Ave | 68 | 211 | V | 13.6 | 36.90 | 54 | 17.10 |
| 7236.0 | 28.53 | PK | 305 | 230 | H | 16.0 | 44.53 | 74 | 29.47 |
| 7236.0 | 22.76 | Ave | 305 | 230 | H | 16.0 | 38.76 | 54 | 15.24 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Mar gin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V ) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Middle Channel (2437 MHz) | | | | | | | | | |
| 2437.0 | 101.78 | PK | 275 | 116 | V | -3.0 | 98.76 | / | / |
| 2437.0 | 97.16 | Ave | 275 | 116 | V | -3.0 | 94.14 | / | / |
| 2437.0 | 97.74 | PK | 108 | 118 | H | -3.0 | 94.72 | / | / |
| 2437.0 | 93.19 | Ave | 108 | 118 | H | -3.0 | 90.17 | / | / |
| 1853.3 | 39.42 | PK | 337 | 149 | V | -5.7 | 33.72 | 74 | 34.48 |
| 1853.3 | 22.0 | Ave | 337 | 149 | V | -5.7 | 16.33 | 54 | 31.87 |
| 1696.0 | 44.08 | PK | 173 | 114 | H | -5.4 | 38.65 | 74 | 35.35 |
| 1696.0 | 34.23 | Ave | 173 | 114 | H | -5.4 | 28.80 | 54 | 25.20 |
| 4874.0 | 33.96 | PK | 177 | 230 | V | 7.3 | 41.22 | 74 | 32.78 |
| 4874.0 | 29.73 | Ave | 177 | 230 | V | 7.3 | 36.99 | 54 | 17.01 |
| 6677.0 | 31.37 | PK | 132 | 204 | H | 13.8 | 45.16 | 74 | 28.84 |
| 6677.0 | 22.84 | Ave | 132 | 204 | H | 13.8 | 36.63 | 54 | 17.37 |
| 7311.0 | 28.40 | PK | 80 | 233 | H | 16.3 | 44.73 | 74 | 29.27 |
| 7311.0 | 22.45 | Ave | 80 | 233 | H | 16.3 | 38.78 | 54 | 15.22 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| High Channel (2462 MHz) | | | | | | | | | |
| 2462.0 | 103.00 | PK | 63 | 212 | V | -3.0 | 99.99 | / | / |
| 2462.0 | 98.14 | Ave | 63 | 212 | V | -3.0 | 95.13 | / | / |
| 2462.0 | 99.12 | PK | 239 | 226 | H | -3.0 | 96.11 | / | / |
| 2462.0 | 94.94 | Ave | 239 | 226 | H | -3.0 | 91.93 | / | / |
| 2483.5 | 45.73 | PK | 224 | 196 | V | -3.0 | 42.74 | 74 | 31.26 |
| 2483.5 | 32.27 | Ave | 224 | 196 | V | -3.0 | 29.28 | 54 | 24.72 |
| 2563.0 | 46.78 | PK | 190 | 130 | V | 4.2 | 50.98 | 74 | 23.02 |
| 2563.0 | 36.42 | Ave | 190 | 130 | V | 4.2 | 40.62 | 54 | 13.38 |
| 4924.0 | 32.48 | PK | 161 | 229 | H | 14.0 | 46.48 | 74 | 27.52 |
| 4924.0 | 28.31 | Ave | 161 | 229 | H | 14.0 | 42.31 | 54 | 11.69 |
| 6681.0 | 29.44 | PK | 12 | 178 | H | 13.8 | 43.24 | 74 | 30.76 |
| 6681.0 | 21.85 | Ave | 12 | 178 | H | 13.8 | 35.65 | 54 | 18.35 |
| 7386.0 | 27.60 | PK | 139 | 168 | H | 16.7 | 44.25 | 74 | 29.75 |
| 7386.0 | 22.53 | Ave | 139 | 168 | H | 16.7 | 39.18 | 54 | 14.82 |

**802.11g Mode:**

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Low Channel (2412 MHz) | | | | | | | | | |
| 2412.0 | 96.45 | PK | 112 | 193 | V | -3.0 | 93.41 | / | / |
| 2412.0 | 92.19 | Ave | 112 | 193 | V | -3.0 | 89.15 | / | / |
| 2412.0 | 93.04 | PK | 5 | 134 | H | -3.0 | 90.00 | / | / |
| 2412.0 | 88.24 | Ave | 5 | 134 | H | -3.0 | 85.20 | / | / |
| 2390.0 | 43.97 | PK | 71 | 227 | V | -3.0 | 40.93 | 74 | 33.07 |
| 2390.0 | 33.24 | Ave | 71 | 227 | V | -3.0 | 30.20 | 54 | 23.80 |
| 2400.0 | 43.70 | PK | 87 | 198 | V | -3.0 | 40.66 | 74 | 33.34 |
| 2400.0 | 35.64 | Ave | 87 | 198 | V | -3.0 | 32.60 | 54 | 21.40 |
| 4824.0 | 32.43 | PK | 218 | 133 | H | 7.2 | 39.62 | 74 | 34.38 |
| 4824.0 | 27.74 | Ave | 218 | 133 | H | 7.2 | 34.93 | 54 | 19.07 |
| 6620.0 | 31.82 | PK | 214 | 119 | V | 13.6 | 45.40 | 74 | 28.60 |
| 6620.0 | 22.01 | Ave | 214 | 119 | V | 13.6 | 35.59 | 54 | 18.41 |
| 7236.0 | 28.92 | PK | 351 | 163 | H | 16.0 | 44.92 | 74 | 29.08 |
| 7236.0 | 24.65 | Ave | 351 | 163 | H | 16.0 | 40.65 | 54 | 13.35 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Middle Channel (2437 MHz) | | | | | | | | | |
| 2437.0 | 97.33 | PK | 331 | 224 | V | -3.0 | 94.31 | / | / |
| 2437.0 | 92.84 | Ave | 331 | 224 | V | -3.0 | 89.82 | / | / |
| 2437.0 | 94.27 | PK | 111 | 125 | H | -3.0 | 91.25 | / | / |
| 2437.0 | 90.00 | Ave | 111 | 125 | H | -3.0 | 86.98 | / | / |
| 1477.0 | 43.14 | PK | 293 | 173 | V | -7.0 | 36.16 | 74 | 37.84 |
| 1477.0 | 32.02 | Ave | 293 | 173 | V | -7.0 | 25.04 | 54 | 28.96 |
| 1696.0 | 45.87 | PK | 163 | 230 | H | -5.4 | 40.44 | 74 | 33.56 |
| 1696.0 | 34.80 | Ave | 163 | 230 | H | -5.4 | 29.37 | 54 | 24.63 |
| 4874.0 | 33.96 | PK | 302 | 167 | V | 7.3 | 41.22 | 74 | 32.78 |
| 4874.0 | 28.31 | Ave | 302 | 167 | V | 7.3 | 35.57 | 54 | 18.43 |
| 6677.0 | 31.57 | PK | 132 | 146 | H | 13.8 | 45.36 | 74 | 28.64 |
| 6677.0 | 21.90 | Ave | 132 | 146 | H | 13.8 | 35.69 | 54 | 18.31 |
| 7311.0 | 26.34 | PK | 338 | 129 | H | 16.3 | 42.67 | 74 | 31.33 |
| 7311.0 | 21.37 | Ave | 338 | 129 | H | 16.3 | 37.70 | 54 | 16.30 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| High Channel (2462 MHz) | | | | | | | | | |
| 2462.0 | 97.42 | PK | 122 | 136 | V | -3.0 | 94.41 | / | / |
| 2462.0 | 93.30 | Ave | 122 | 136 | V | -3.0 | 90.29 | / | / |
| 2462.0 | 93.59 | PK | 263 | 149 | H | -3.0 | 90.58 | / | / |
| 2462.0 | 89.17 | Ave | 263 | 149 | H | -3.0 | 86.16 | / | / |
| 2483.5 | 43.03 | PK | 113 | 122 | V | -3.0 | 40.04 | 74 | 33.96 |
| 2483.5 | 32.59 | Ave | 113 | 122 | V | -3.0 | 29.60 | 54 | 24.40 |
| 2563.0 | 46.38 | PK | 231 | 171 | V | 4.2 | 50.58 | 74 | 23.42 |
| 2563.0 | 37.01 | Ave | 231 | 171 | V | 4.2 | 41.21 | 54 | 12.79 |
| 4924.0 | 32.07 | PK | 312 | 185 | H | 14.0 | 46.07 | 74 | 27.93 |
| 4924.0 | 26.39 | Ave | 312 | 185 | H | 14.0 | 40.39 | 54 | 13.61 |
| 6681.0 | 29.87 | PK | 262 | 145 | H | 13.8 | 43.67 | 74 | 30.33 |
| 6681.0 | 22.95 | Ave | 262 | 145 | H | 13.8 | 36.75 | 54 | 17.25 |
| 7386.0 | 26.21 | PK | 195 | 214 | H | 16.7 | 42.86 | 74 | 31.14 |
| 7386.0 | 20.92 | Ave | 195 | 214 | H | 16.7 | 37.57 | 54 | 16.43 |

**802.11n-HT20 Mode:**

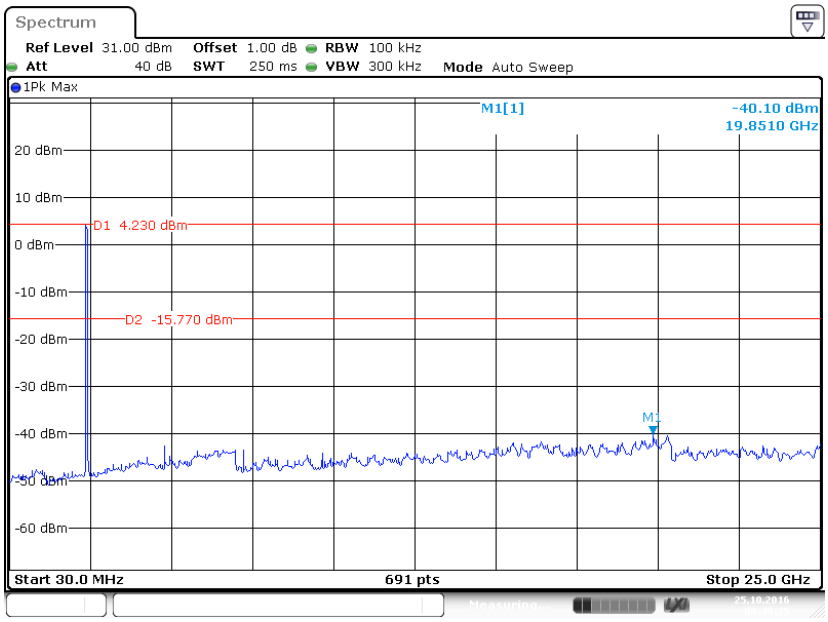
| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Low Channel (2412 MHz) | | | | | | | | | |
| 2412.0 | 96.06 | PK | 156 | 173 | V | -3.0 | 93.02 | / | / |
| 2412.0 | 91.07 | Ave | 156 | 173 | V | -3.0 | 88.03 | / | / |
| 2412.0 | 92.24 | PK | 104 | 248 | H | -3.0 | 89.20 | / | / |
| 2412.0 | 87.60 | Ave | 104 | 248 | H | -3.0 | 84.56 | / | / |
| 2390.0 | 44.64 | PK | 320 | 153 | V | -3.0 | 41.60 | 74 | 32.40 |
| 2390.0 | 32.79 | Ave | 320 | 153 | V | -3.0 | 29.75 | 54 | 24.25 |
| 2400.0 | 45.13 | PK | 307 | 248 | V | -3.0 | 42.09 | 74 | 31.91 |
| 2400.0 | 34.62 | Ave | 307 | 248 | V | -3.0 | 31.58 | 54 | 22.42 |
| 4824.0 | 33.67 | PK | 200 | 240 | H | 7.2 | 40.86 | 74 | 33.14 |
| 4824.0 | 29.06 | Ave | 200 | 240 | H | 7.2 | 36.25 | 54 | 17.75 |
| 6620.0 | 30.03 | PK | 144 | 242 | V | 13.6 | 43.61 | 74 | 30.39 |
| 6620.0 | 22.05 | Ave | 144 | 242 | V | 13.6 | 35.63 | 54 | 18.37 |
| 7236.0 | 28.92 | PK | 15 | 186 | H | 16.0 | 44.92 | 74 | 29.08 |
| 7236.0 | 24.63 | Ave | 15 | 186 | H | 16.0 | 40.63 | 54 | 13.37 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| Middle Channel (2437 MHz) | | | | | | | | | |
| 2437.0 | 96.12 | PK | 120 | 130 | V | -3.0 | 93.10 | / | / |
| 2437.0 | 91.46 | Ave | 120 | 130 | V | -3.0 | 88.44 | / | / |
| 2437.0 | 92.98 | PK | 254 | 240 | H | -3.0 | 89.96 | / | / |
| 2437.0 | 88.95 | Ave | 254 | 240 | H | -3.0 | 85.93 | / | / |
| 1477.0 | 43.18 | PK | 214 | 144 | V | -7.0 | 36.20 | 74 | 37.80 |
| 1477.0 | 32.85 | Ave | 214 | 144 | V | -7.0 | 25.87 | 54 | 28.13 |
| 1696.0 | 45.71 | PK | 129 | 136 | H | -5.4 | 40.28 | 74 | 33.72 |
| 1696.0 | 36.19 | Ave | 129 | 136 | H | -5.4 | 30.76 | 54 | 23.24 |
| 4874.0 | 32.76 | PK | 338 | 225 | V | 7.3 | 40.02 | 74 | 33.98 |
| 4874.0 | 27.33 | Ave | 338 | 225 | V | 7.3 | 34.59 | 54 | 19.41 |
| 6677.0 | 31.72 | PK | 240 | 238 | H | 13.8 | 45.51 | 74 | 28.49 |
| 6677.0 | 21.40 | Ave | 240 | 238 | H | 13.8 | 35.19 | 54 | 18.81 |
| 7311.0 | 26.23 | PK | 334 | 156 | H | 16.3 | 42.56 | 74 | 31.44 |
| 7311.0 | 20.55 | Ave | 334 | 156 | H | 16.3 | 36.88 | 54 | 17.12 |

| Frequency | Receiver | | Turntable | Rx Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/205/209 | |
|---|---|---|---|---|---|---|---|---|---|
| | Reading | Detector | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBµV) | (PK/QP/Ave.) | Degree | (cm) | (H/V) | (dB) | (dBµV/m) | (dB µ V/m) | (dB) |
| High Channel (2462 MHz) | | | | | | | | | |
| 2462.0 | 96.80 | PK | 341 | 110 | V | -3.0 | 93.79 | / | / |
| 2462.0 | 92.79 | Ave | 341 | 110 | V | -3.0 | 89.78 | / | / |
| 2462.0 | 91.10 | PK | 100 | 235 | H | -3.0 | 88.09 | / | / |
| 2462.0 | 86.17 | Ave | 100 | 235 | H | -3.0 | 83.16 | / | / |
| 2483.5 | 42.90 | PK | 245 | 224 | V | -3.0 | 39.91 | 74 | 34.09 |
| 2483.5 | 32.82 | Ave | 245 | 224 | V | -3.0 | 29.83 | 54 | 24.17 |
| 2563.0 | 45.26 | PK | 354 | 125 | V | 4.2 | 49.46 | 74 | 24.54 |
| 2563.0 | 35.28 | Ave | 354 | 125 | V | 4.2 | 39.48 | 54 | 14.52 |
| 4924.0 | 32.80 | PK | 330 | 126 | H | 14.0 | 46.80 | 74 | 27.20 |
| 4924.0 | 26.95 | Ave | 330 | 126 | H | 14.0 | 40.95 | 54 | 13.05 |
| 6681.0 | 29.06 | PK | 97 | 152 | H | 13.8 | 42.86 | 74 | 31.14 |
| 6681.0 | 23.10 | Ave | 97 | 152 | H | 13.8 | 36.90 | 54 | 17.10 |
| 7386.0 | 27.70 | PK | 97 | 215 | H | 16.7 | 44.35 | 74 | 29.65 |
| 7386.0 | 22.50 | Ave | 97 | 215 | H | 16.7 | 39.15 | 54 | 14.85 |

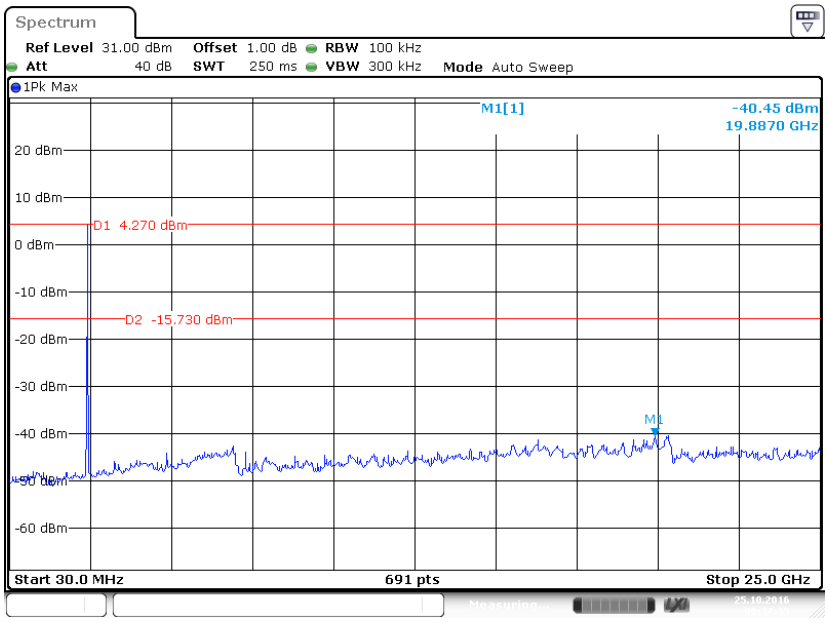
## Conducted Spurious Emissions at Antenna Port

### 802.11b Low Channel



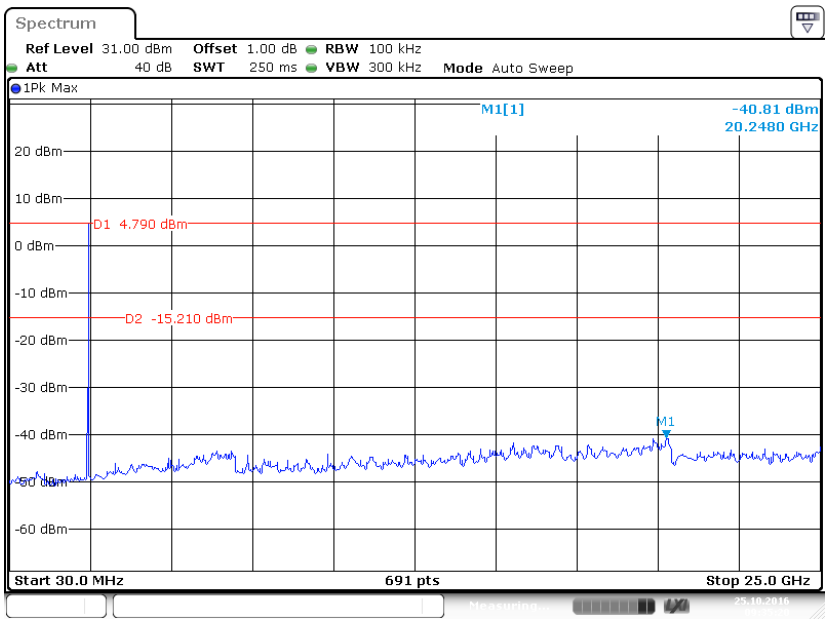

Date:25.OCT.2016 09:40:25

### 802.11b Middle Channel



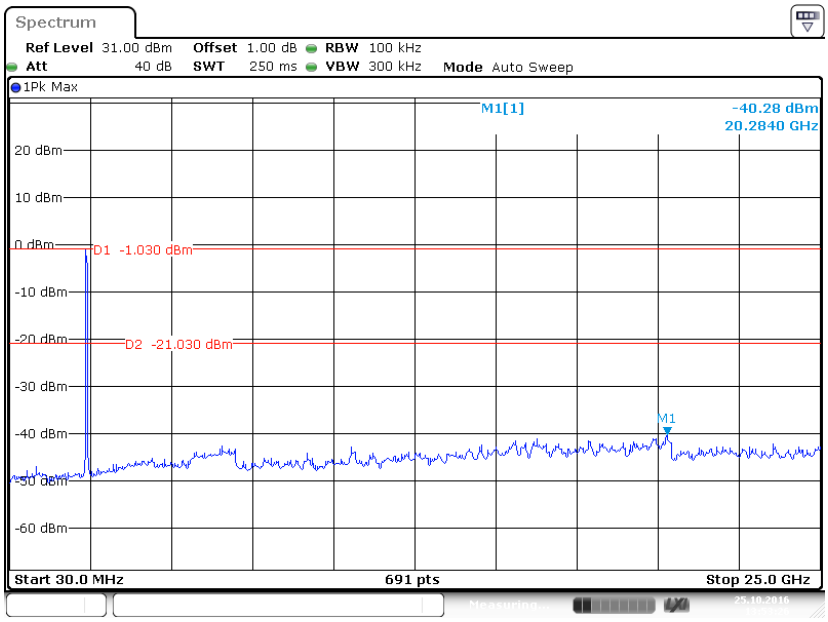

Date:25.OCT.2016 09:37:34

## 802.11b High Channel



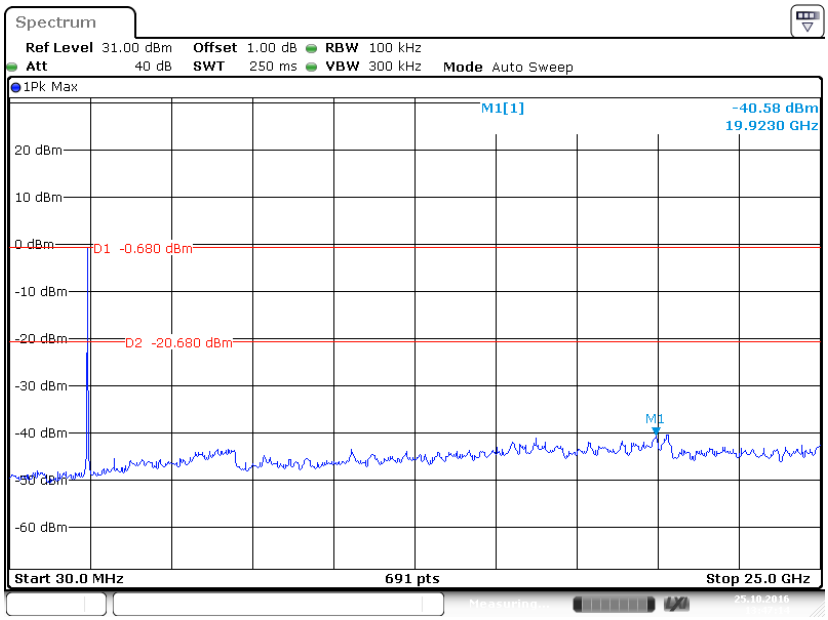

Date:25.OCT.2016 09:35:20

## 802.11g Low Channel



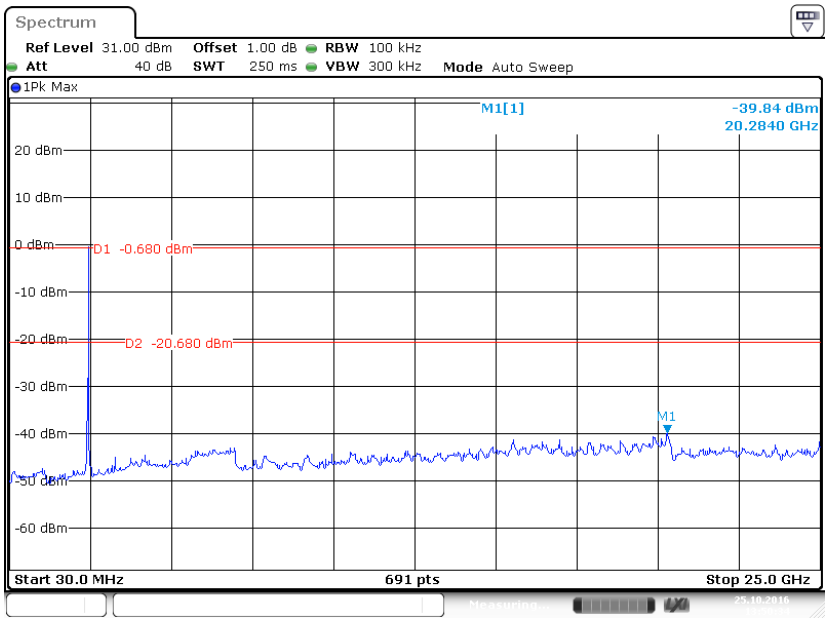

Date:25.OCT.2016 13:53:26

## 802.11g Middle Channel



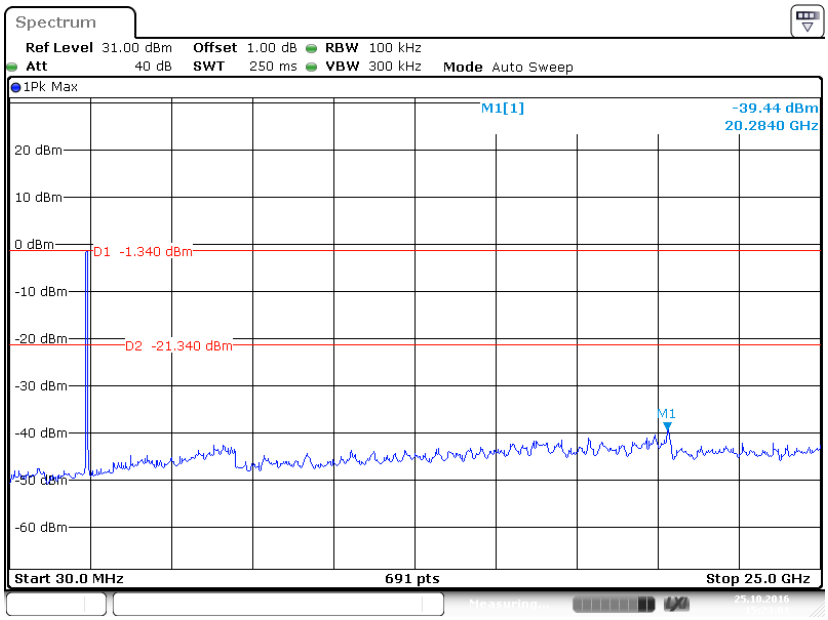

Date: 25.OCT.2016 13:47:15

## 802.11g High Channel



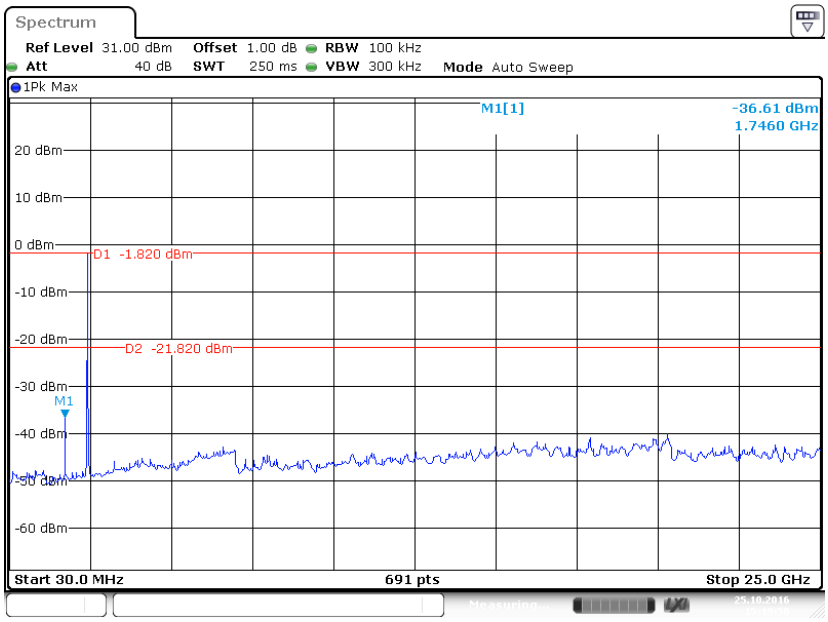

Date: 25.OCT.2016 13:50:34

## 802.11n-HT20 Low Channel



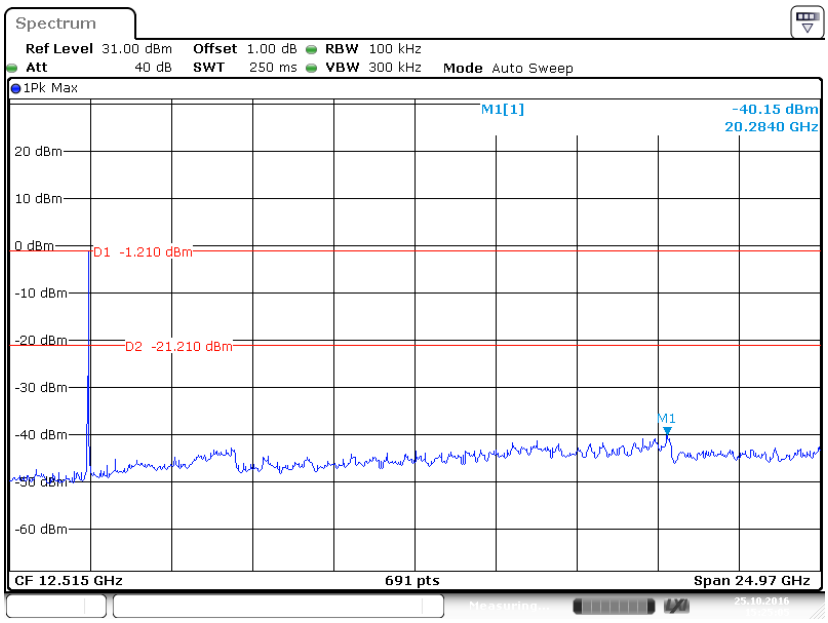

Date: 25.OCT.2016 15:23:01

## 802.11n-HT20 Middle Channel




Date: 25.OCT.2016 15:19:51

## 802.11n-HT20 High Channel




Date: 25.OCT.2016 15:25:05

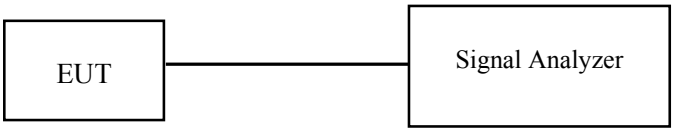
# FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

## Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

## Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | Signal Analyzer | FSV40 | 101116 | 2016-07-04 | 2017-07-03 |
| BACL | RF cable | KS-LAB-012 | KS-LAB-012 | 2015-06-16 | 2016-12-15 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 ℃ |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Ada Yu on 2016-10-25*

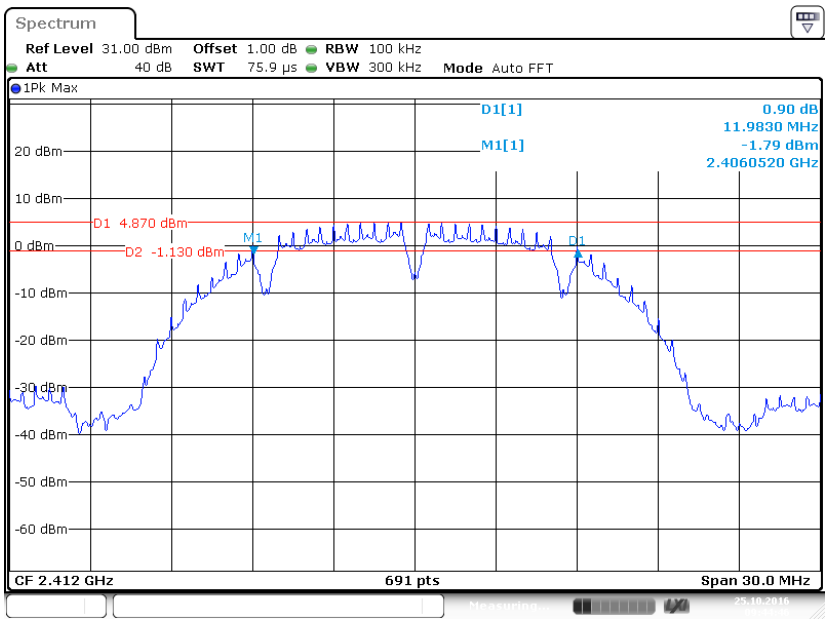
**Test Result:** Pass.

Please refer to the following tables and plots.

*EUT operation mode: Transmitting*

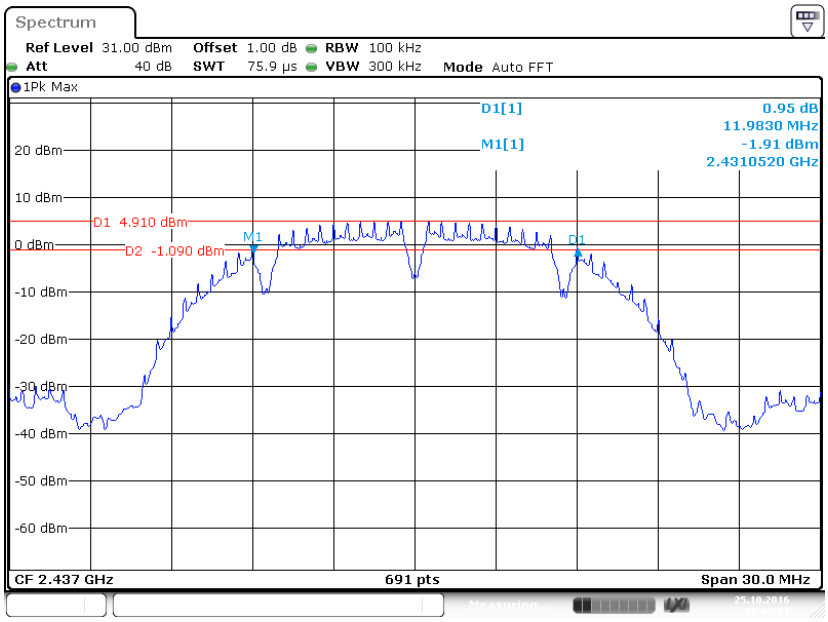
| Channel | Frequency (MHz) | 6 dB Emission Bandwidth (MHz) | Limit (kHz) |
|---|---|---|---|
| 802.11b mode | | | |
| Low | 2412 | 11.98 | ⩾500 |
| Middle | 2437 | 11.98 | ⩾500 |
| High | 2462 | 12.03 | ⩾500 |
| 802.11g mode | | | |
| Low | 2412 | 16.41 | ⩾500 |
| Middle | 2437 | 16.37 | ⩾500 |
| High | 2462 | 16.41 | ⩾500 |
| 802.11n-HT20 mode | | | |
| Low | 2412 | 17.63 | ⩾500 |
| Middle | 2437 | 17.63 | ⩾500 |
| High | 2462 | 17.63 | ⩾500 |

## 802.11b Low Channel



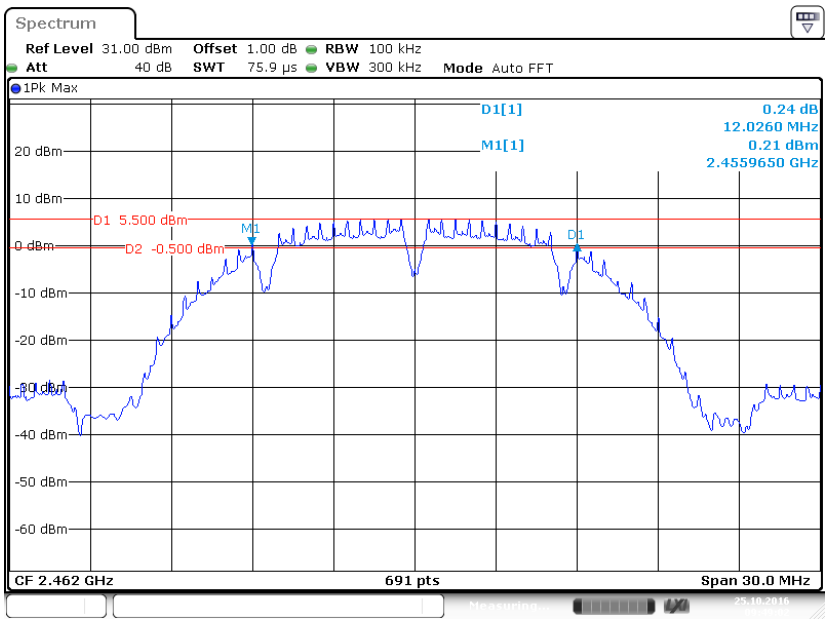

Date:25.OCT.2016 09:44:47

## 802.11b Middle Channel



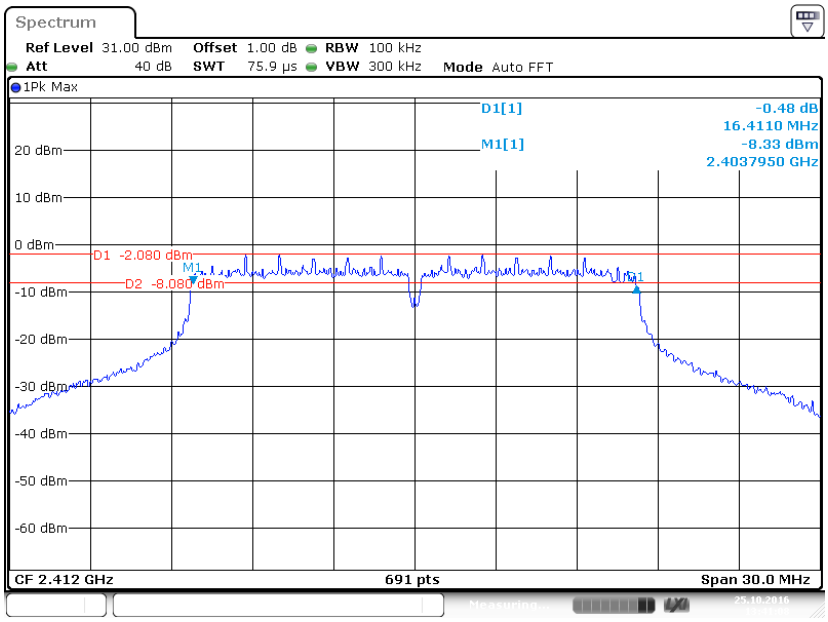

Date:25.OCT.2016 09:47:21

## 802.11b High Channel



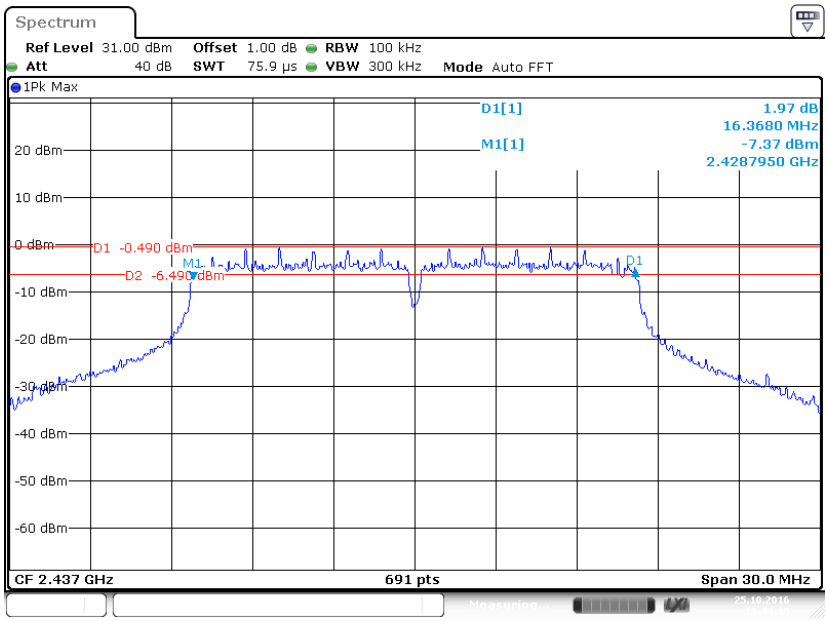

Date: 25.OCT.2016 09:49:02

## 802.11g Low Channel



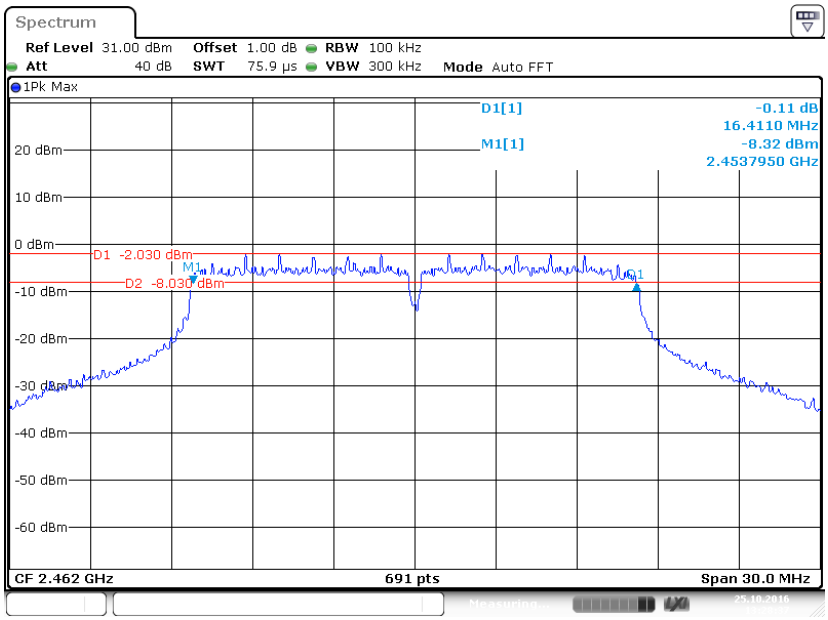

Date: 25.OCT.2016 13:41:08

## 802.11g Middle Channel



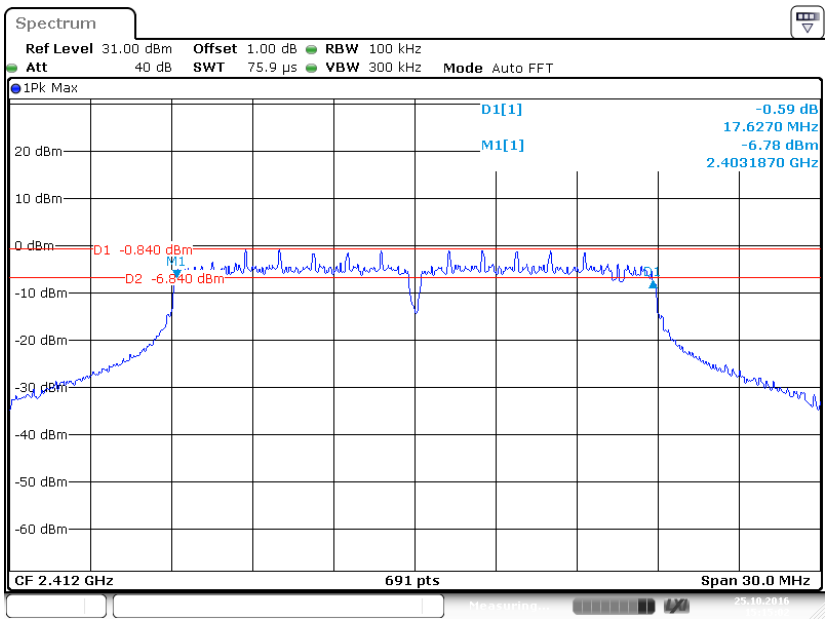

Date:25.OCT.2016 13:44:11

## 802.11g High Channel



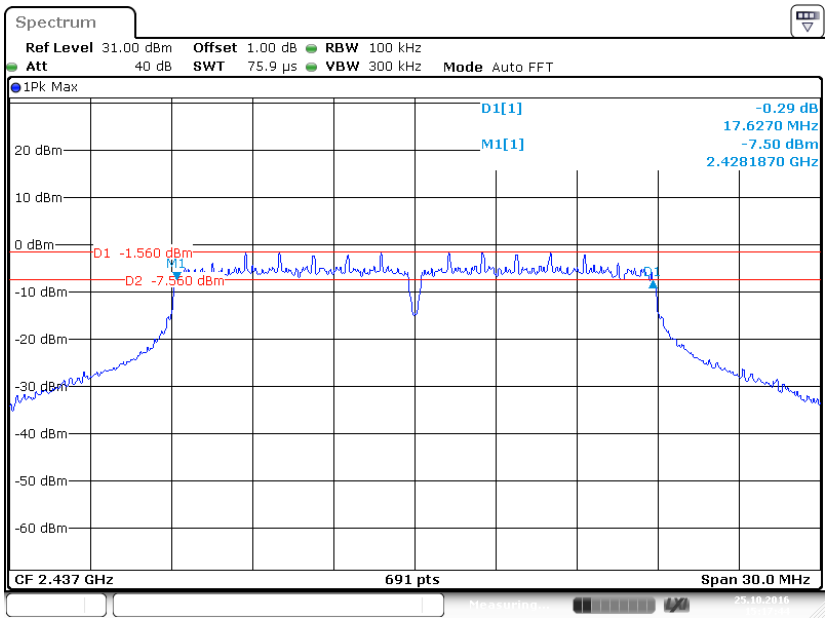

Date:25.OCT.2016 13:28:37

## 802.11n-HT20 Low Channe



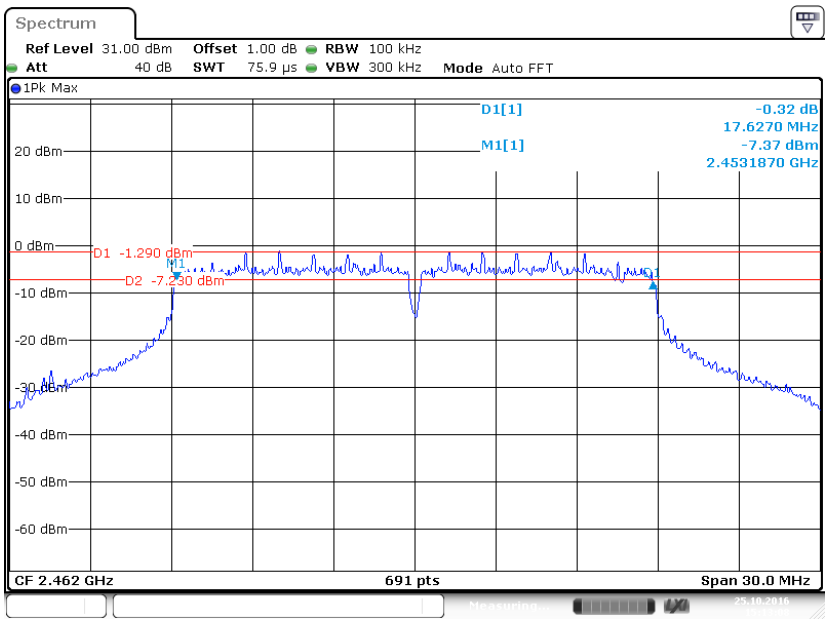

Date:25.OCT.2016 15:15:03

## 802.11n-HT20 Middle Channel




Date:25.OCT.2016 15:17:45

## 802.11n-HT20 High Channel




Date: 25.OCT.2016 15:13:08

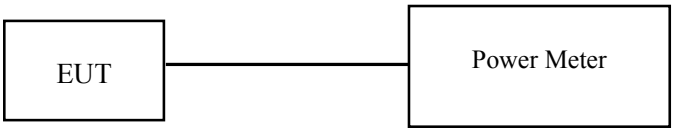
# FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

## Applicable Standard

According to FCC §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. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

## Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | OSP120 BASE UNIT | OSP120 | 101247 | 2016-07-04 | 2017-07-03 |
| Agilent | Power Sensor | N1921A | MY54210016 | 2015-12-18 | 2016-12-17 |
| BACL | RF cable | KS-LAB-012 | KS-LAB-012 | 2015-06-16 | 2016-12-15 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 26 ℃ |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.1 kPa |

*The testing was performed by Ada Yu on 2016-10-25*

*EUT operation mode: Transmitting*

| Channel | Frequency (MHz) | Max Conducted Peak Output Power (dBm) | Limit (dBm) |
|---|---|---|---|
| 802.11b | | | |
| Low | 2412 | 16.23 | 30 |
| Middle | 2437 | 17.01 | 30 |
| High | 2462 | 16.82 | 30 |
| 802.11g | | | |
| Low | 2412 | 15.58 | 30 |
| Middle | 2437 | 16.19 | 30 |
| High | 2462 | 15.81 | 30 |
| 802.11n-HT20 | | | |
| Low | 2412 | 16.07 | 30 |
| Middle | 2437 | 15.57 | 30 |
| High | 2462 | 15.83 | 30 |

# FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

## Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | Signal Analyzer | FSV40 | 101116 | 2016-07-04 | 2017-07-03 |
| BACL | RF cable | KS-LAB-012 | KS-LAB-012 | 2015-06-16 | 2016-12-15 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

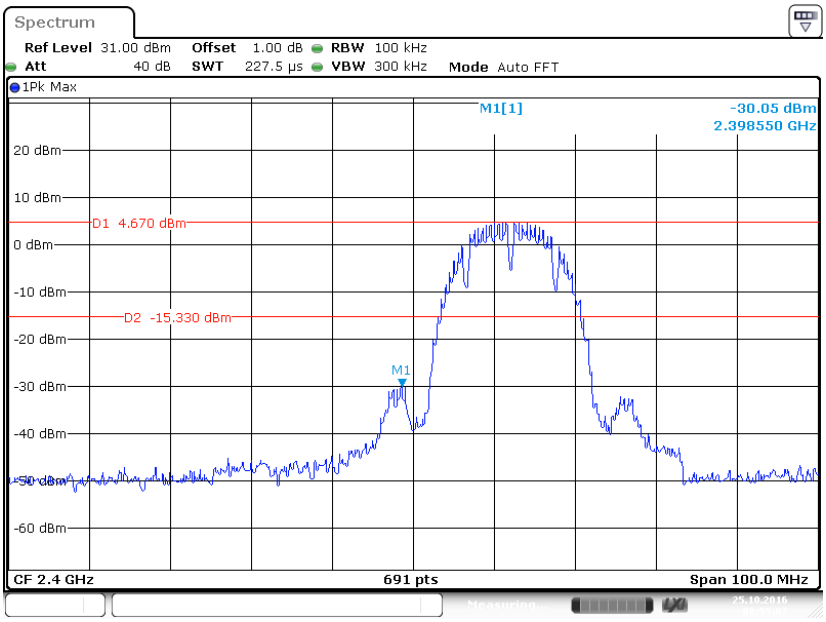
| | |
|---|---|
| **Temperature:** | 27 ℃ |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Ada Yu on 2016-10-25.*

**Test Result:** *Compliance*

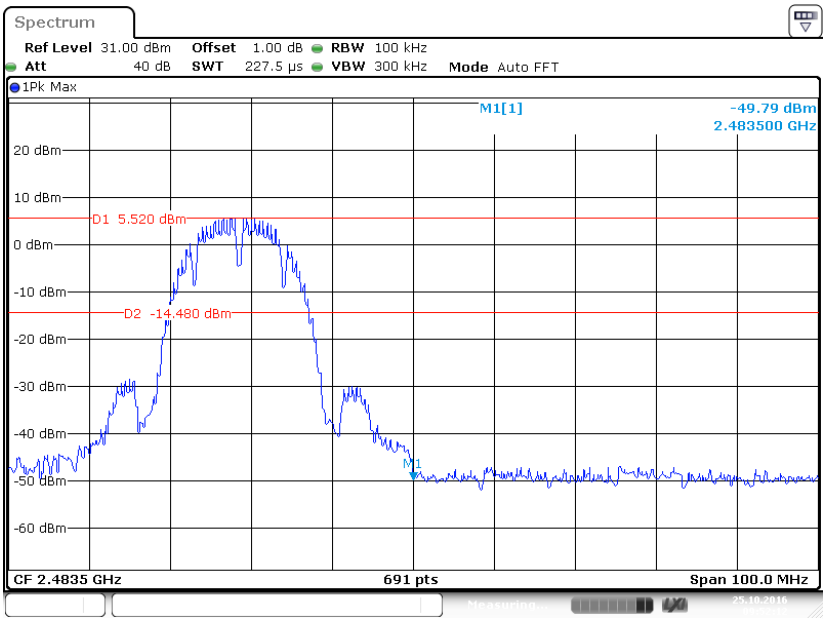
Please refer to the following table and plots.

**802.11b: Band Edge, Left Side**



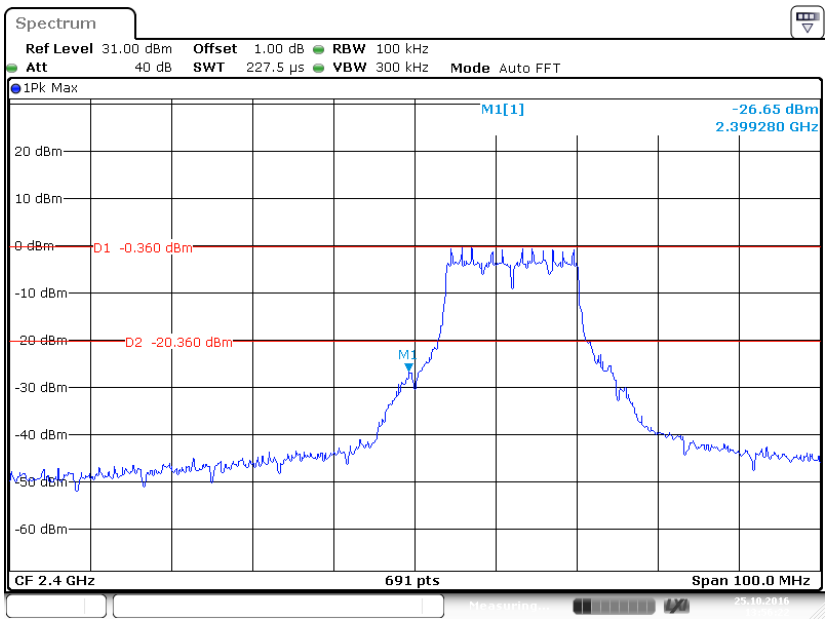

Date:25.OCT.2016 09:55:07

**802.11b: Band Edge, Right Side**



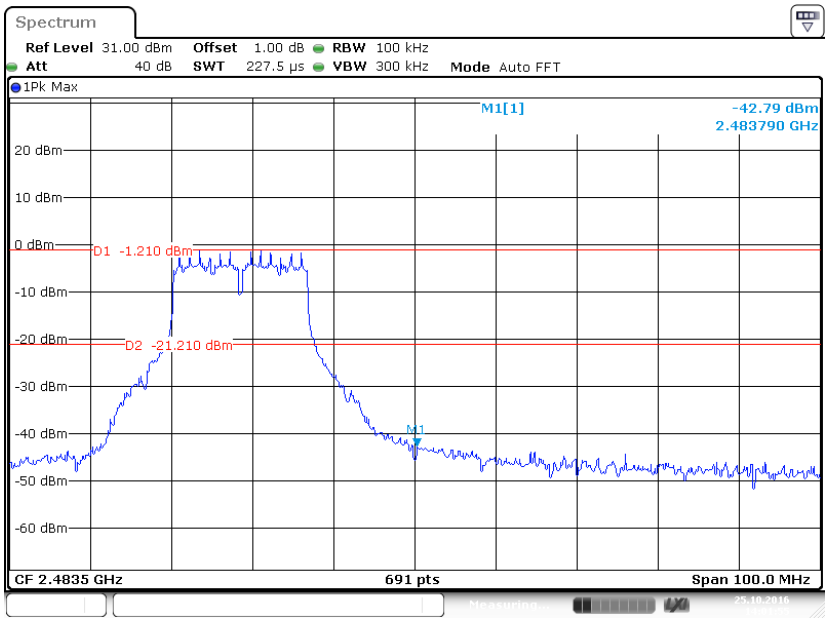

Date:25.OCT.2016 09:52:11

## 802.11g: Band Edge, Left Side



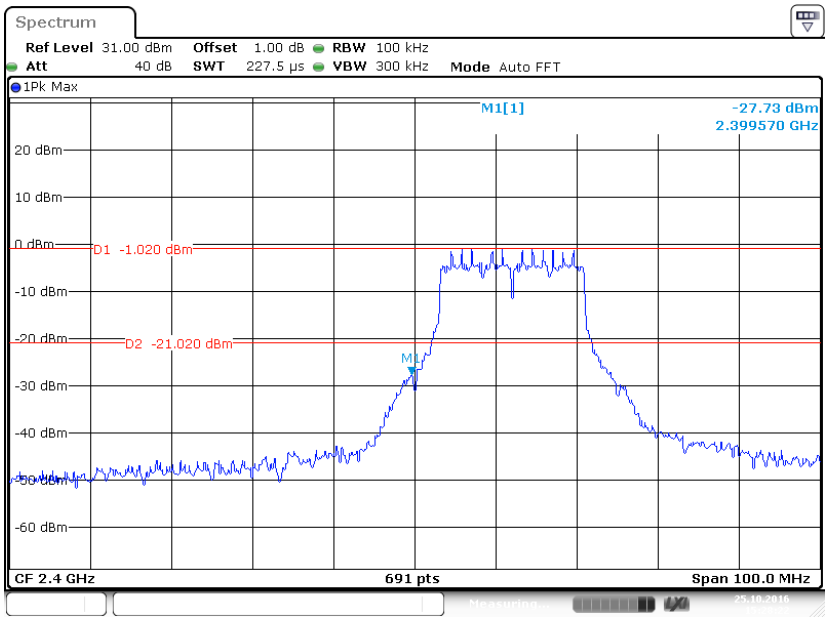

Date: 25.OCT.2016 13:56:22

## 802.11g: Band Edge, Right Side



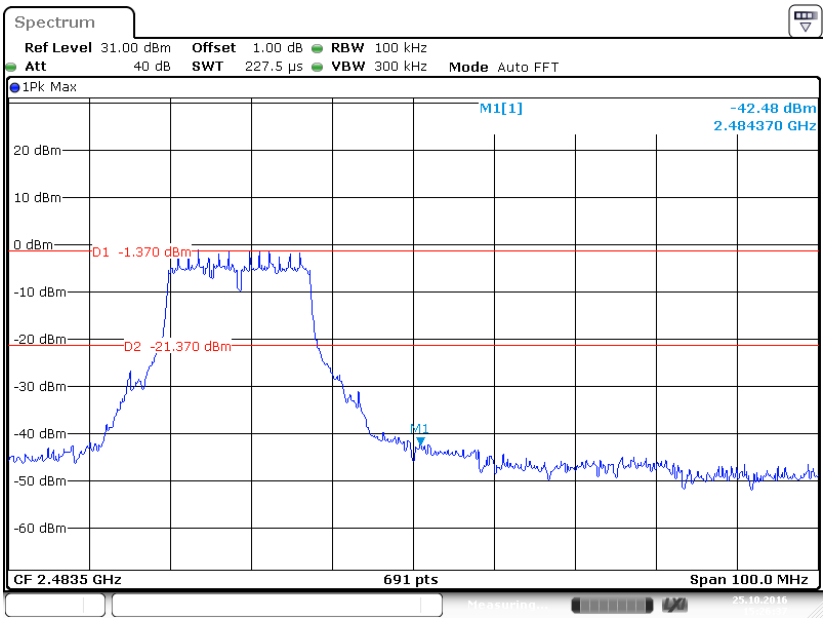

Date: 25.OCT.2016 14:01:55

## 802.11n-HT20: Band Edge, Left Side




Date:25.OCT.2016 15:28:22

## 802.11n-HT20: Band Edge, Right Side




Date:25.OCT.2016 15:26:37

# FCC §15.247(e) - POWER SPECTRAL DENSITY

## Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## Test Procedure

According to KDB558074 D01 DTS Meas Guidance v03r05 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | Signal Analyzer | FSV40 | 101116 | 2016-07-04 | 2017-07-03 |
| BACL | RF cable | KS-LAB-012 | KS-LAB-012 | 2015-06-16 | 2016-12-15 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 ℃ |
| **Relative Humidity:** | 55 % |
| **ATM Pressure:** | 101.0 kPa |

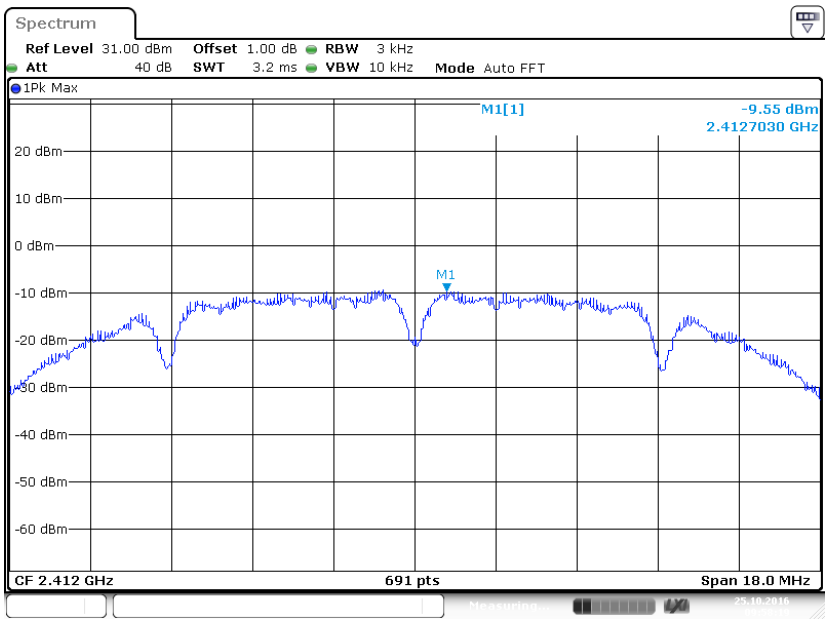
*The testing was performed by Ada Yu on 2016-10-25.*

*EUT operation mode: Transmitting*

**Test Result:** Pass

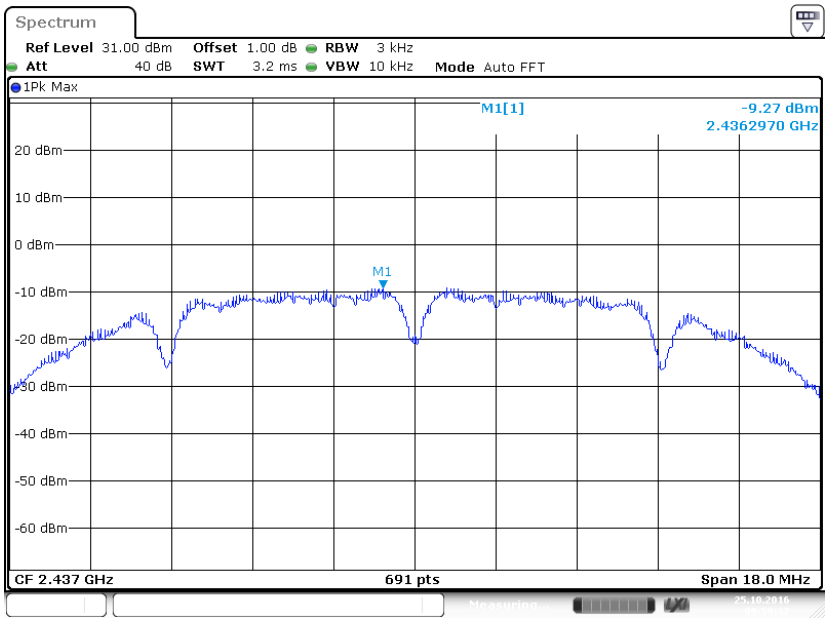
| Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) |
|---|---|---|---|
| 802.11b mode | | | |
| Low | 2412 | -9.55 | ≤8 |
| Middle | 2437 | -9.27 | ≤8 |
| High | 2462 | -8.52 | ≤8 |
| 802.11g mode | | | |
| Low | 2412 | -13.52 | ≤8 |
| Middle | 2437 | -13.92 | ≤8 |
| High | 2462 | -14.2 | ≤8 |
| 802.11n-HT20 mode | | | |
| Low | 2412 | -14.14 | ≤8 |
| Middle | 2437 | -14.79 | ≤8 |
| High | 2462 | -14.48 | ≤8 |

**Power Spectral Density, 802.11b Low Channel**



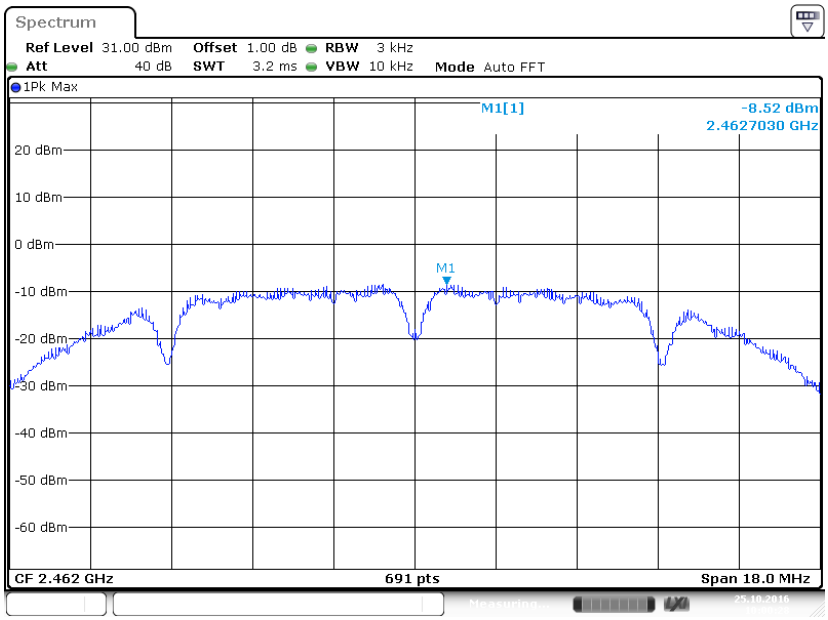

Date:25.OCT.2016 09:58:19

**Power Spectral Density, 802.11b Middle Channel**



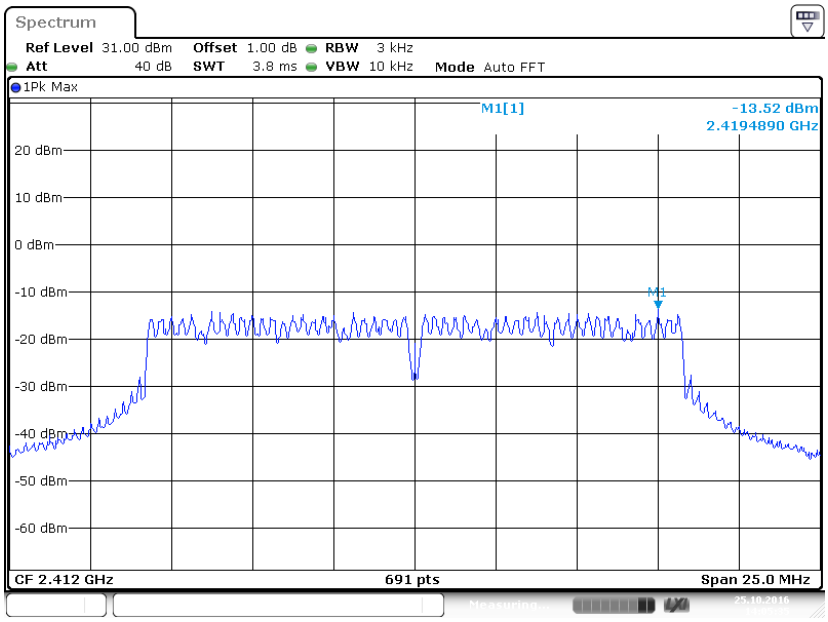

Date:25.OCT.2016 09:59:37

**Power Spectral Density, 802.11b High Channel**



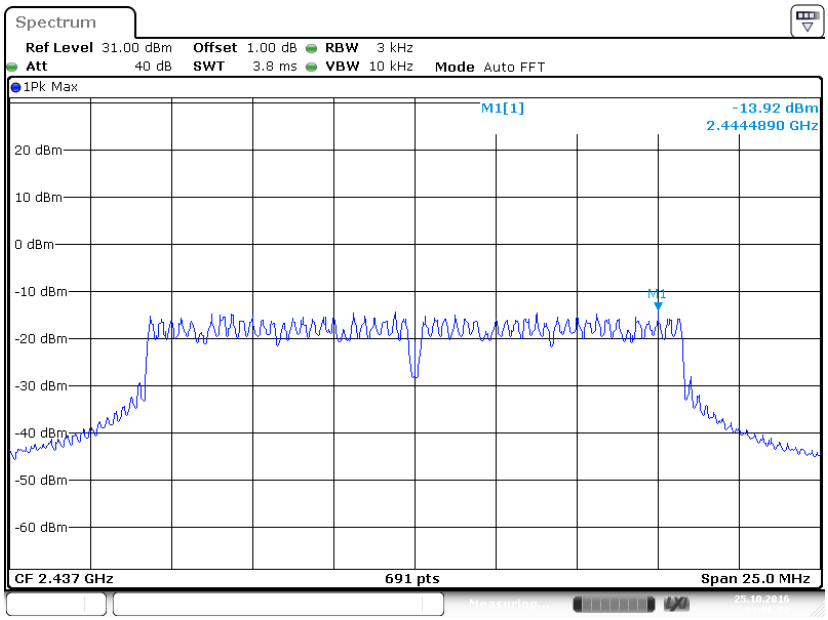

Date: 25.OCT.2016 10:00:29

**Power Spectral Density, 802.11g Low Channel**



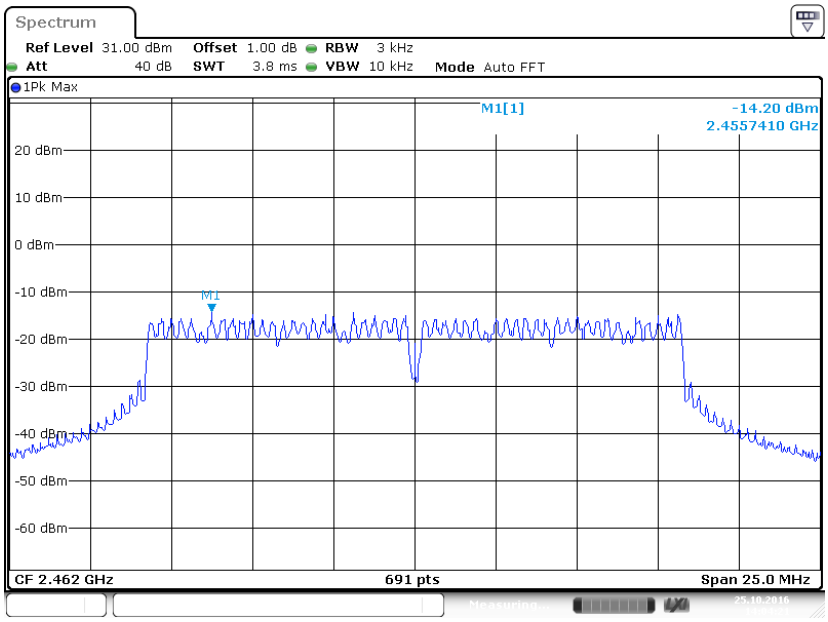

Date: 25.OCT.2016 14:05:35

**Power Spectral Density, 802.11g Middle Channel**



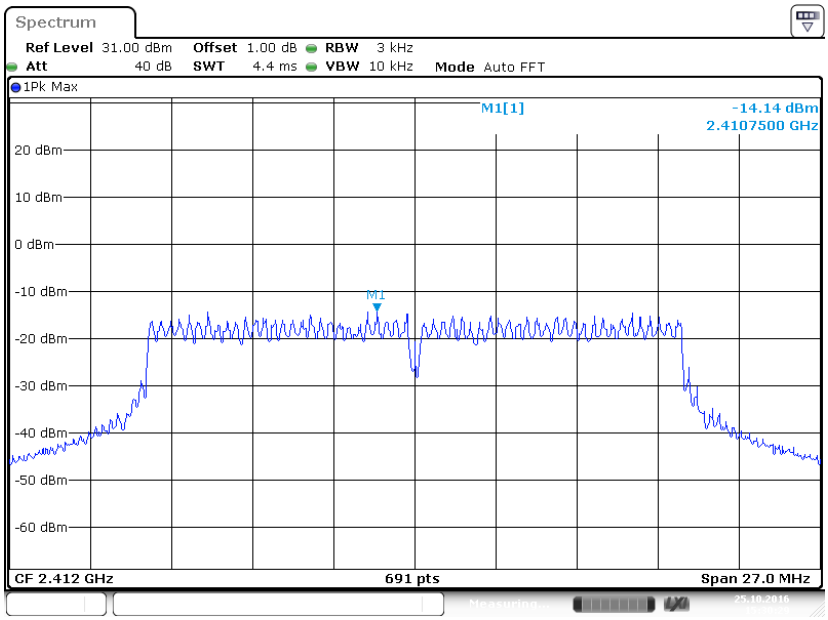

Date: 25.OCT.2016 14:06:52

**Power Spectral Density, 802.11g High Channel**



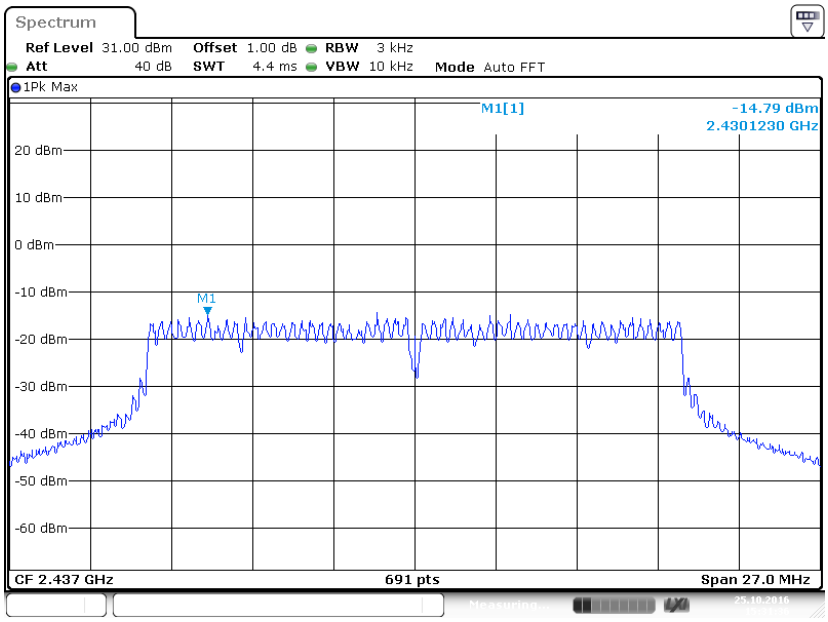

Date: 25.OCT.2016 14:04:21

**Power Spectral Density, 802.11n-HT20 Low Channel**



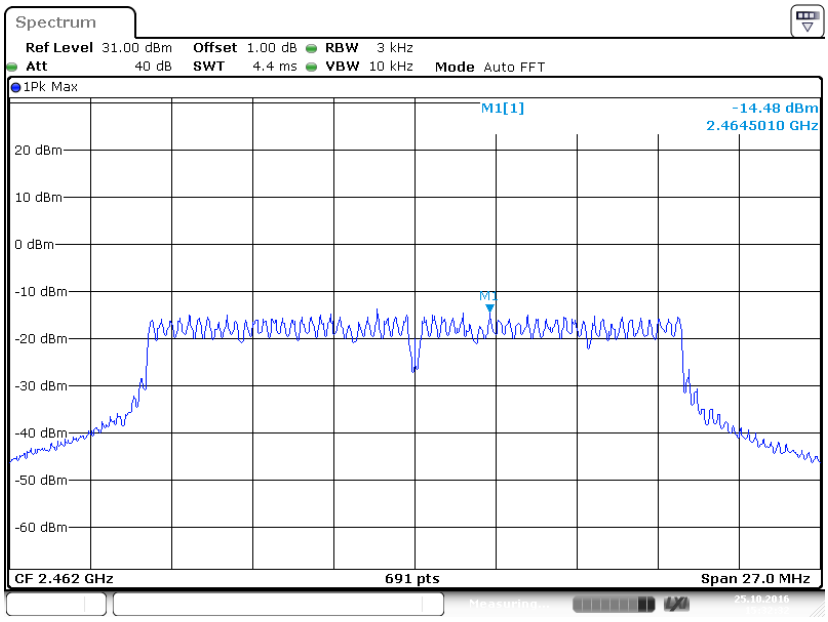

Date: 25.OCT.2016 15:30:29

**Power Spectral Density, 802.11n-HT20 Middle Channel**




Date: 25.OCT.2016 15:31:36

**Power Spectral Density, 802.11n-HT20 High Channel**




Date: 25.OCT.2016 15:32:32

******* END OF REPORT *******