

RSS-GEN ISSUE 4, NOVEMBER 2014  
RSS-247, ISSUE 1, MAY 2015  
TEST REPORT

For

**Jinan USR IOT Technology Limited**

Floor11,Building1,No.1166XinluoStreet,Gaoxin Distric,Jinan,Shandong,250101,China

**IC: 20326-WIFI232S**

|  |   |
|--|---|
| <b>Report Type:</b><br>Original Report   | <b>Product Type:</b><br>Serial to WIFI Module |
| <b>Test Engineer:</b> Chris Wang   | <i>Chris Wang</i>                             |
| <b>Report Number:</b> RKS161117003-00B   |   |
| <b>Report Date:</b> 2016-11-23   |   |
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## GENERAL INFORMATION

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### Product Description for Equipment under Test

The Jinan USR IOT Technology Limited's product, model number: USR-WIFI232-Sb (IC: 20326-WIFI232S) or the "EUT" in this report is a Serial to WIFI Module, which was measured approximately: 22mm(L) × 13.5 mm(W) × 3mm(H), rated input voltage: DC 3.3V.

*Note: The product's series model number: USR-C210, USR-C215, USR-C216, USR-C217. The difference between them was explained in the declaration letter.*

*\*All measurement and test data in this report was gathered from production sample serial number: 20161110002. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-11-10.*

### Objective

This type approval report is prepared on behalf of Jinan USR IOT Technology Limited in accordance with RSS-247, ISSUE 1, MAY 2015 of the Innovation, Science and Economic Development Canada.

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

N/A

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the RSS-247, ISSUE 1, MAY 2015. Applicable Standard: License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.

### 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 of ISED website 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 and ISED Registration No.: 3062E. The test site has been approved by the FCC and ISED for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

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.

**EUT Exercise Software**

SecureCRT

The worst condition was performed under:

802.11b: Data rate:1 Mbps, Power level: 19

802.11g: Data rate: 6 Mbps, Power level: 19

802.11n-HT20: Data rate: MCS0, Power level: 19

**Support Equipment List and Details**

| Manufacturer | Description   | Model   | Serial Number         |
|--------------|---------------|---|-----------------------|
| DELL         | Notebook      | GX620   | D65874152             |
| USR IOT      | Adapter       | DQS051-0501000-HC<br>Input:AC100-240V 50/60Hz 0.15A max<br>Output:DC5.0V 1.0A | DQS051-0501000-16312A |
| USR IOT      | Control Board | USR-WIFI232-S-EVK V1.0  | /                     |
| USR IOT      | Antenna 1     | USR-WANT(antenna gain: 2dBi)  | /                     |
| USR IOT      | Antenna 2     | YM Smart ANT-01(antenna gain: 2dBi)   | /                     |

**External I/O Cable**

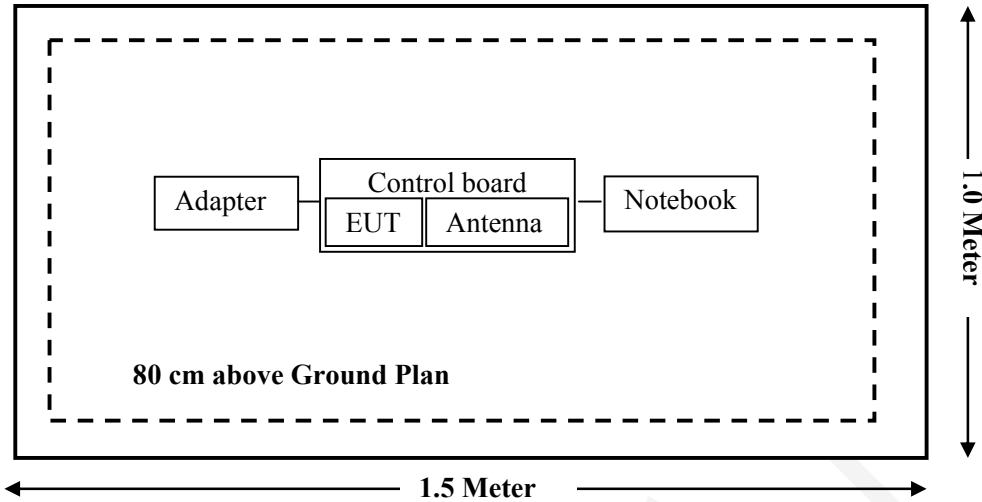
| Cable Description | Length (m) | From/Port     | To       |
|-------------------|------------|---------------|----------|
| Serial Port Cable | 0.8        | Control Board | Notebook |

**Equipment Modifications**

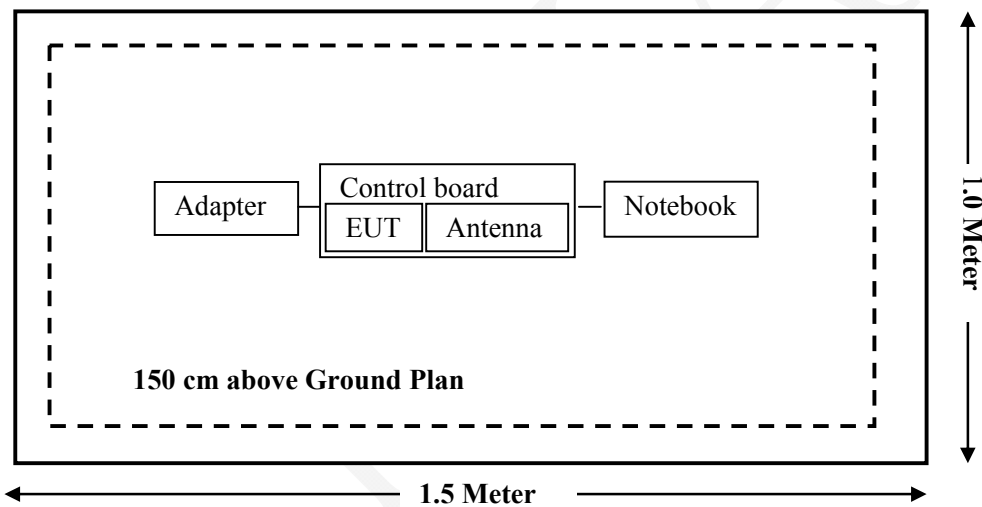
No modification was made to the EUT.

**Block Diagram of Test Setup**

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



**SUMMARY OF TEST RESULTS**

| <b>RSS-247 &amp; RSS-Gen Rules</b> | <b>Description of Test</b>   | <b>Result</b> |
|------------------------------------|--|---------------|
| RSS-Gen §8.3                       | Transmitter Antenna for Licence-Exempt Radio Apparatus                       | Compliance    |
| RSS-102 § 2.5.2                    | Exemption From Routine Evaluation Limits - RF Exposure Evaluation            | Compliance    |
| RSS-Gen §8.8                       | AC Power Lines Conducted Emission for Licence-Exempt Radio Apparatus         | Compliance    |
| RSS-247§5.5                        | Unwanted Emission Frequencies and Restricted Bands and Out of Band Emissions | Compliance    |
| RSS-247 §5.2 (1)                   | 6 dB Emission Bandwidth And 99% Occupied Bandwidth                           | Compliance    |
| RSS-247 §5.2 (2)                   | Peak Power Spectral Density  | Compliance    |
| RSS-247 §5.4                       | Transmitter output Power Measurement   | Compliance    |
| RSS-247 §5.5                       | Out of band emissions  | Compliance    |



## **RSS-GEN §8.3 - TRANSMITTER ANTENNA FOR LICENCE-EXEMPT RADIO APPARATUS**

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### **Applicable Standard**

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.<sup>9</sup> When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

### **Antenna Connector Construction**

There are two external monopole antennas used for the test. The maximum gains are both 2.0dBi.

**Result:** Compliance.

## RSS-102 § 2.5.2 –RF EXPOSURE EVALUATION

### Applicable Standard

According to RSS-102 Issue 5:

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz<sup>6</sup> and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

### Test Result: Pass

RF exposure evaluation exemption:

802.11b: Target power +antenna gain = 19.5 dBm + 2.0 dBi = 21.5 dBm <  $1.31 \times 10^{-2} f^{0.6834} = 2.72 \text{ W} = 34.35 \text{ dBm}$

802.11g: Target power +antenna gain = 19.5 dBm + 2.0 dBi = 21.5 dBm <  $1.31 \times 10^{-2} f^{0.6834} = 2.72 \text{ W} = 34.35 \text{ dBm}$

802.11n HT20: Target power +antenna gain = 19.5 dBm + 2.0 dBi = 21.5 dBm <  $1.31 \times 10^{-2} f^{0.6834} = 2.72 \text{ W} = 34.35 \text{ dBm}$

**Note:** The target power: 802.11b:  $18 \pm 1.5$  dBm  
802.11g:  $18 \pm 1.5$  dBm  
802.11n HT20:  $18 \pm 1.5$  dBm  
which declared by the Manufacturer.

## RSS-GEN §8.8 –AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus

### Applicable Standard

Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The more stringent limit applies at the frequency range boundaries.

The conducted emissions shall be measured with 50 ohm/50 microhenry line impedance stabilization network (LISN).

**Table 2 - AC Power Lines Conducted Emission Limits**

| Frequency range (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        |

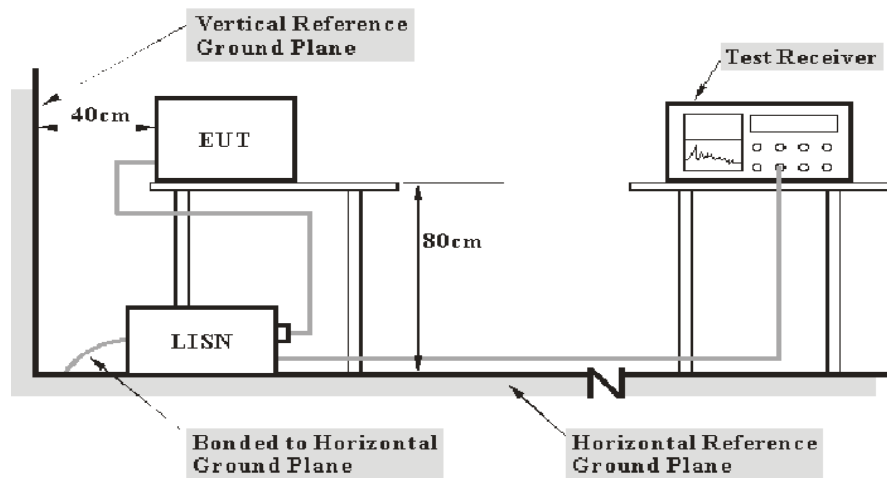
### Measurement Uncertainty

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 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                | 934115/007    | 2016-11-12       | 2017-11-11           |
| Rohde & Schwarz | LISN              | ESH3-Z5               | 862770/011    | 2016-11-12       | 2017-11-11           |
| Rohde & Schwarz | LISN              | ESH3-Z5               | 892239/018    | 2016-07-04       | 2017-07-03           |
| FCC             | ISN               | FCC-TLISN-T8-02       | 20376         | 2016-06-23       | 2017-06-22           |
| MICRO-COAX      | Coaxial line      | UFB-293B-1-0480-50X50 | 97F0173       | 2016-10-01       | 2017-10-01           |
| 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:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

### Test Results Summary

According to the recorded data in following table, the EUT complied with the RSS-Gen.

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

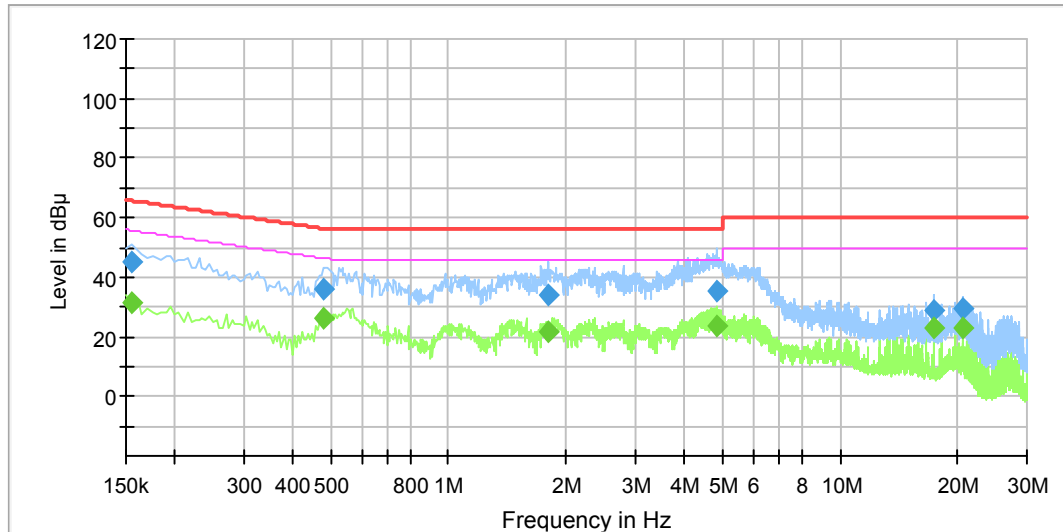
#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 23 °C     |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 101.0 kPa |

The testing was performed by Chris Wang on 2016-11-20.

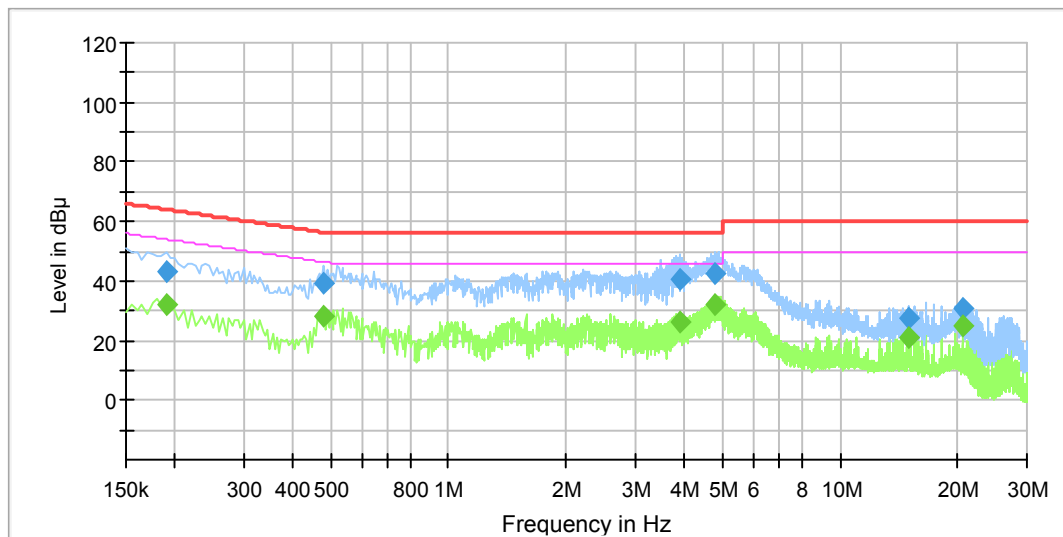
EUT operation mode: Transmitting

## AC 120V/60 Hz, Line



| Frequency (MHz) | QuasiPeak (dBμV) | Average (dB μ V) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.155000        | ---              | 31.15            | 9.000           | L1   | 10.3       | 24.58       | 55.73        | Compliance |
| 0.155000        | 45.10            | ---              | 9.000           | L1   | 10.3       | 20.63       | 65.73        | Compliance |
| 0.480000        | ---              | 26.32            | 9.000           | L1   | 10.3       | 20.02       | 46.34        | Compliance |
| 0.480000        | 36.08            | ---              | 9.000           | L1   | 10.3       | 20.26       | 56.34        | Compliance |
| 1.795000        | ---              | 21.98            | 9.000           | L1   | 10.4       | 24.02       | 46.00        | Compliance |
| 1.795000        | 33.97            | ---              | 9.000           | L1   | 10.4       | 22.03       | 56.00        | Compliance |
| 4.865000        | ---              | 23.62            | 9.000           | L1   | 10.5       | 22.38       | 46.00        | Compliance |
| 4.865000        | 35.51            | ---              | 9.000           | L1   | 10.5       | 20.49       | 56.00        | Compliance |
| 17.360000       | ---              | 22.80            | 9.000           | L1   | 10.5       | 27.20       | 50.00        | Compliance |
| 17.360000       | 28.58            | ---              | 9.000           | L1   | 10.5       | 31.42       | 60.00        | Compliance |
| 20.520000       | ---              | 23.24            | 9.000           | L1   | 10.5       | 26.76       | 50.00        | Compliance |
| 20.520000       | 29.27            | ---              | 9.000           | L1   | 10.5       | 30.73       | 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    |
|-----------------|------------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.190000        | ---              | 32.02            | 9.000           | N    | 10.3       | 22.02       | 54.04        | Compliance |
| 0.190000        | 42.93            | ---              | 9.000           | N    | 10.3       | 21.11       | 64.04        | Compliance |
| 0.480000        | ---              | 27.92            | 9.000           | N    | 10.3       | 18.42       | 46.34        | Compliance |
| 0.480000        | 39.27            | ---              | 9.000           | N    | 10.3       | 17.07       | 56.34        | Compliance |
| 3.885000        | ---              | 26.16            | 9.000           | N    | 10.5       | 19.84       | 46.00        | Compliance |
| 3.885000        | 40.63            | ---              | 9.000           | N    | 10.5       | 15.37       | 56.00        | Compliance |
| 4.780000        | ---              | 32.39            | 9.000           | N    | 10.6       | 13.61       | 46.00        | Compliance |
| 4.780000        | 42.58            | ---              | 9.000           | N    | 10.6       | 13.42       | 56.00        | Compliance |
| 15.025000       | ---              | 20.77            | 9.000           | N    | 10.5       | 29.23       | 50.00        | Compliance |
| 15.025000       | 27.74            | ---              | 9.000           | N    | 10.5       | 32.26       | 60.00        | Compliance |
| 20.520000       | ---              | 24.91            | 9.000           | N    | 10.5       | 25.09       | 50.00        | Compliance |
| 20.520000       | 30.62            | ---              | 9.000           | N    | 10.5       | 29.38       | 60.00        | Compliance |

**Note:**

- 1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
- 2) Corrected Amplitude = Reading + Corr.
- 3) Margin = Limit –Corrected Amplitude

## **RSS-247§5.5 – UNWANTED EMISSION FREQUENCIES AND RESTRICTED BANDS AND OUT OF BAND EMISSIONS**

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### **Applicable Standard**

According to RSS-247§5.5

Restricted bands, identified in Table 3, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply: (a) fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of Table 3; (b) unwanted emissions falling into restricted bands of Table 3 shall comply with the limits specified in RSS-Gen; (c) unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### **Measurement Uncertainty**

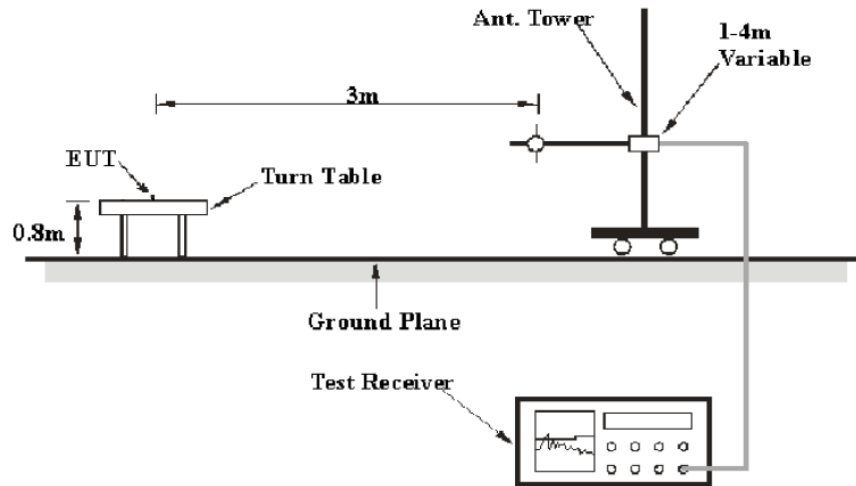
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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

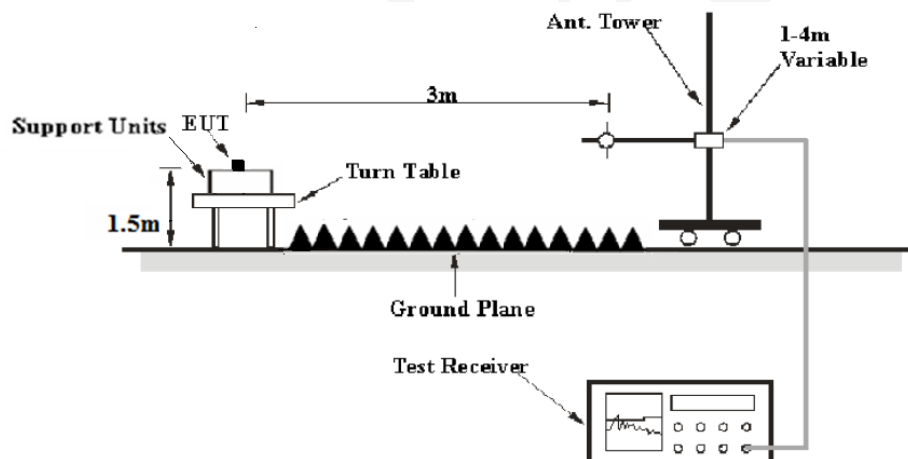


## EUT Setup

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 RSS-247§5.5 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 Instrument | 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          | 2016-01-11       | 2019-01-10           |
| EMCO              | Horn Antenna       | 3116            | 2516          | 2016-11-07       | 2019-11-06           |
| Rohde & Schwarz   | Signal Analyzer    | FSIQ26          | 836131/009    | 2016-09-20       | 2017-09-20           |
| Narda             | Pre-amplifier      | AFS42-00101800  | 2001270       | 2016-09-08       | 2017-09-08           |
| DUCOMMUN          | Pre-amplifier      | ALN-22093530-01 | 990147        | 2016-09-17       | 2017-09-16           |
| Champrotek        | Chamber            | Chamber A       | 1#            | /                | /                    |
| R&S               | Auto test Software | EMC32           | V 09.10.0     | 2015-12-16       | 2016-12-15           |
| 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

### Test Results Summary

According to the recorded data in following table, the EUT complied with the RSS-247§5.5.

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.

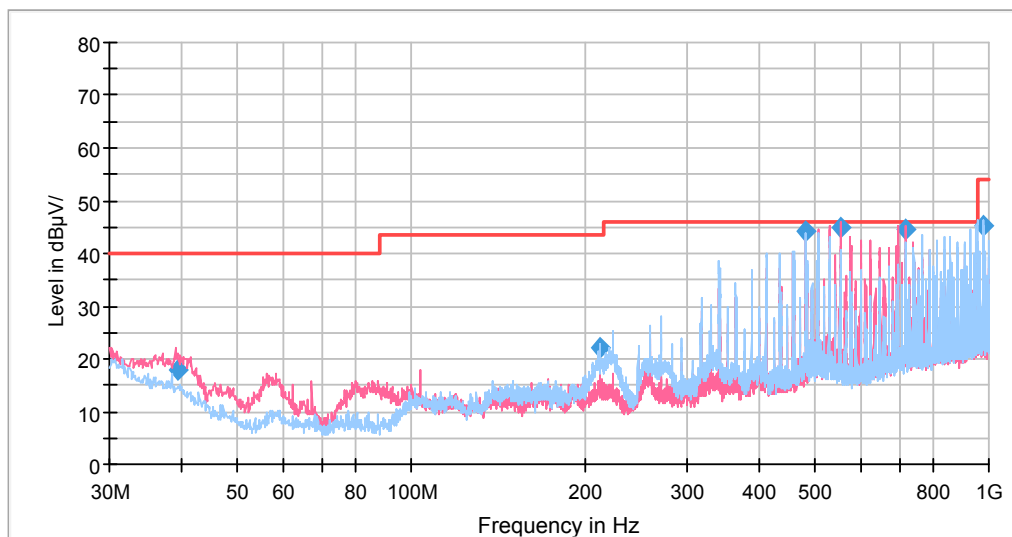
**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24 °C     |
| <b>Relative Humidity:</b> | 55 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

The testing was performed by Chris Wang on 2016-11-20.

**30 MHz-1 GHz:**

EUT operation mode: 802.11b middle channel (worst case)



| Frequency (MHz) | Receiver       |                       | Turntable Degree | Rx Antenna  |             | Corrected Factor (dB) | Corrected Amplitude (dBμV/m) | RSS-247        |             |
|-----------------|----------------|-----------------------|------------------|-------------|-------------|-----------------------|------------------------------|----------------|-------------|
|                 | Reading (dBμV) | Detector (PK/QP/Ave.) |                  | Height (cm) | Polar (H/V) |                       |                              | Limit (dBμV/m) | Margin (dB) |
| 39.43335        | 27.77          | QP                    | 125              | 100         | V           | -10.0                 | 17.77                        | 40.0           | 22.23       |
| 211.77865       | 34.53          | QP                    | 128              | 100         | H           | -12.5                 | 22.03                        | 43.5           | 21.47       |
| 482.39610       | 50.20          | QP                    | 210              | 100         | H           | -6.10                 | 44.10                        | 46.0           | 1.90        |
| 553.03635       | 50.27          | QP                    | 32               | 100         | V           | -5.40                 | 44.87                        | 46.0           | 1.13        |
| 717.80675       | 47.02          | QP                    | 45               | 100         | V           | -2.40                 | 44.62                        | 46.0           | 1.38        |
| 976.64285       | 45.25          | QP                    | 59               | 100         | H           | 0.10                  | 45.35                        | 53.9           | 8.55        |

**1GHz-25GHz***EUT operation mode: Transmitting***Antenna 1****802.11b Mode**

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247          |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|------------------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit            | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB<br>μ<br>V/m) | (dB)   |
| Low Channel (2412 MHz)    |          |              |           |            |       |                  |                     |                  |        |
| 2412.00                   | 106.98   | PK           | 154       | 122        | V     | -3.04            | 103.94              | /                | /      |
| 2412.00                   | 102.49   | Ave          | 154       | 122        | V     | -3.04            | 99.45               | /                | /      |
| 2412.00                   | 102.40   | PK           | 154       | 249        | H     | -3.04            | 99.36               | /                | /      |
| 2412.00                   | 97.14    | Ave          | 154       | 249        | H     | -3.04            | 94.10               | /                | /      |
| 2390.00                   | 48.36    | PK           | 88        | 122        | V     | -3.05            | 45.31               | 74               | 28.69  |
| 2390.00                   | 35.19    | Ave          | 88        | 122        | V     | -3.05            | 32.14               | 54               | 21.86  |
| 2301.00                   | 41.12    | PK           | 127       | 200        | H     | -3.11            | 38.01               | 74               | 35.99  |
| 2301.00                   | 27.91    | Ave          | 127       | 200        | H     | -3.11            | 24.80               | 54               | 29.20  |
| 4824.00                   | 45.60    | PK           | 98        | 105        | H     | 7.19             | 52.79               | 74               | 21.21  |
| 4824.00                   | 35.27    | Ave          | 98        | 105        | H     | 7.19             | 42.46               | 54               | 11.54  |
| 6632.00                   | 39.00    | PK           | 129       | 188        | V     | 13.62            | 52.62               | 74               | 21.38  |
| 6632.00                   | 25.82    | Ave          | 129       | 188        | V     | 13.62            | 39.44               | 54               | 14.56  |
| 7236.00                   | 38.64    | PK           | 129       | 219        | V     | 16.00            | 54.64               | 74               | 19.36  |
| 7236.00                   | 22.69    | Ave          | 129       | 219        | V     | 16.00            | 38.69               | 54               | 15.31  |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |                  |        |
| 2437.00                   | 106.57   | PK           | 348       | 186        | V     | -3.02            | 103.55              | /                | /      |
| 2437.00                   | 102.08   | Ave          | 348       | 186        | V     | -3.02            | 99.06               | /                | /      |
| 2437.00                   | 99.96    | PK           | 211       | 226        | H     | -3.02            | 96.94               | /                | /      |
| 2437.00                   | 95.07    | Ave          | 211       | 226        | H     | -3.02            | 92.05               | /                | /      |
| 1152.00                   | 46.58    | PK           | 125       | 202        | V     | -9.53            | 37.05               | 74               | 36.95  |
| 1152.00                   | 35.72    | Ave          | 125       | 202        | V     | -9.53            | 26.19               | 54               | 27.81  |
| 3373.00                   | 38.89    | PK           | 16        | 177        | V     | 1.14             | 40.03               | 74               | 33.97  |
| 3373.00                   | 24.01    | Ave          | 16        | 177        | V     | 1.14             | 25.15               | 54               | 28.85  |
| 4874.00                   | 52.16    | PK           | 326       | 134        | V     | 7.27             | 59.43               | 74               | 14.57  |
| 4874.00                   | 38.67    | Ave          | 326       | 134        | V     | 7.27             | 45.94               | 54               | 8.06   |
| 6481.00                   | 34.96    | PK           | 246       | 194        | V     | 13.03            | 47.99               | 74               | 26.01  |
| 6481.00                   | 22.19    | Ave          | 246       | 194        | V     | 13.03            | 35.22               | 54               | 18.78  |
| 7311.00                   | 36.45    | PK           | 313       | 102        | V     | 16.33            | 52.78               | 74               | 21.22  |
| 7311.00                   | 21.60    | Ave          | 313       | 102        | V     | 16.33            | 37.93               | 54               | 16.07  |

| Frequency               | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|-------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                         | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                   | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| High Channel (2462 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2462.00                 | 105.38   | PK           | 180       | 175        | V     | -3.00            | 102.38              | /         | /      |
| 2462.00                 | 100.98   | Ave          | 180       | 175        | V     | -3.00            | 97.98               | /         | /      |
| 2462.00                 | 99.78    | PK           | 189       | 106        | H     | -3.00            | 96.78               | /         | /      |
| 2462.00                 | 95.64    | Ave          | 189       | 106        | H     | -3.00            | 92.64               | /         | /      |
| 2483.50                 | 59.83    | PK           | 281       | 187        | H     | -2.99            | 56.84               | 74        | 17.16  |
| 2483.50                 | 46.31    | Ave          | 281       | 187        | H     | -2.99            | 43.32               | 54        | 10.68  |
| 2576.00                 | 39.23    | PK           | 4         | 154        | V     | -2.50            | 36.73               | 74        | 37.27  |
| 2576.00                 | 27.12    | Ave          | 4         | 154        | V     | -2.50            | 24.62               | 54        | 29.38  |
| 4924.00                 | 51.15    | PK           | 167       | 182        | V     | 7.34             | 58.49               | 74        | 15.51  |
| 4924.00                 | 38.29    | Ave          | 167       | 182        | V     | 7.34             | 45.63               | 54        | 8.37   |
| 6658.00                 | 38.03    | PK           | 352       | 245        | V     | 13.72            | 51.75               | 74        | 22.25  |
| 6658.00                 | 25.19    | Ave          | 352       | 245        | V     | 13.72            | 38.91               | 54        | 15.09  |
| 7386.00                 | 36.36    | PK           | 222       | 171        | V     | 16.65            | 53.01               | 74        | 20.99  |
| 7386.00                 | 23.90    | Ave          | 222       | 171        | V     | 16.65            | 40.55               | 54        | 13.45  |

**802.11g Mode**

| Frequency              | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                        | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                  | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Low Channel (2412 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2412.00                | 103.99   | PK           | 90        | 229        | V     | -3.04            | 100.95              | /         | /      |
| 2412.00                | 99.10    | Ave          | 90        | 229        | V     | -3.04            | 96.06               | /         | /      |
| 2412.00                | 98.70    | PK           | 90        | 248        | H     | -3.04            | 95.66               | /         | /      |
| 2412.00                | 94.93    | Ave          | 90        | 248        | H     | -3.04            | 91.89               | /         | /      |
| 2390.00                | 51.52    | PK           | 45        | 122        | V     | -3.05            | 48.47               | 74        | 25.53  |
| 2390.00                | 38.56    | Ave          | 45        | 122        | V     | -3.05            | 35.51               | 54        | 18.49  |
| 2307.00                | 39.85    | PK           | 164       | 176        | H     | -3.06            | 36.79               | 74        | 37.21  |
| 2307.00                | 25.98    | Ave          | 164       | 176        | H     | -3.06            | 22.92               | 54        | 31.08  |
| 4824.00                | 41.89    | PK           | 119       | 110        | V     | 7.19             | 49.08               | 74        | 24.92  |
| 4824.00                | 25.12    | Ave          | 119       | 110        | V     | 7.19             | 32.31               | 54        | 21.69  |
| 6655.00                | 36.62    | PK           | 54        | 196        | H     | 13.71            | 50.33               | 74        | 23.67  |
| 6655.00                | 23.02    | Ave          | 54        | 196        | H     | 13.71            | 36.73               | 54        | 17.27  |
| 7236.00                | 32.03    | PK           | 119       | 165        | H     | 16.00            | 48.03               | 74        | 25.97  |
| 7236.00                | 20.87    | Ave          | 119       | 165        | H     | 16.00            | 36.87               | 54        | 17.13  |

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247          |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|------------------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit            | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB<br>μ<br>V/m) | (dB)   |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |                  |        |
| 2437.00                   | 104.01   | PK           | 24        | 197        | V     | -3.02            | 101.99              | /                | /      |
| 2437.00                   | 99.14    | Ave          | 24        | 197        | V     | -3.02            | 96.12               | /                | /      |
| 2437.00                   | 98.59    | PK           | 295       | 126        | H     | -3.02            | 95.57               | /                | /      |
| 2437.00                   | 94.10    | Ave          | 295       | 126        | H     | -3.02            | 91.08               | /                | /      |
| 1070.00                   | 51.93    | PK           | 75        | 153        | H     | -10.17           | 41.76               | 74               | 32.24  |
| 1070.00                   | 47.23    | Ave          | 75        | 153        | H     | -10.17           | 37.06               | 54               | 16.94  |
| 3212.00                   | 39.05    | PK           | 129       | 131        | V     | 0.72             | 39.77               | 74               | 34.23  |
| 3212.00                   | 24.61    | Ave          | 129       | 131        | V     | 0.72             | 25.33               | 54               | 28.67  |
| 4874.00                   | 42.10    | PK           | 160       | 242        | V     | 7.27             | 49.37               | 74               | 24.63  |
| 4874.00                   | 35.39    | Ave          | 160       | 242        | V     | 7.27             | 32.66               | 54               | 11.34  |
| 6427.00                   | 37.47    | PK           | 129       | 128        | V     | 11.67            | 49.14               | 74               | 24.86  |
| 6427.00                   | 23.05    | Ave          | 129       | 128        | V     | 11.67            | 34.72               | 54               | 19.28  |
| 7311.00                   | 31.18    | PK           | 191       | 148        | H     | 16.33            | 47.51               | 74               | 26.49  |
| 7311.00                   | 20.85    | Ave          | 191       | 148        | H     | 16.33            | 37.18               | 54               | 16.82  |

| Frequency               | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247          |        |
|-------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|------------------|--------|
|                         | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit            | Margin |
| (MHz)                   | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB<br>μ<br>V/m) | (dB)   |
| High Channel (2462 MHz) |          |              |           |            |       |                  |                     |                  |        |
| 2462.00                 | 103.14   | PK           | 180       | 215        | V     | -3.00            | 100.14              | /                | /      |
| 2462.00                 | 98.35    | Ave          | 180       | 215        | V     | -3.00            | 95.35               | /                | /      |
| 2462.00                 | 98.54    | PK           | 173       | 104        | H     | -3.00            | 95.54               | /                | /      |
| 2462.00                 | 93.76    | Ave          | 173       | 104        | H     | -3.00            | 90.76               | /                | /      |
| 2483.50                 | 54.01    | PK           | 51        | 230        | H     | -2.99            | 51.02               | 74               | 22.98  |
| 2483.50                 | 42.16    | Ave          | 51        | 230        | H     | -2.99            | 39.17               | 54               | 14.83  |
| 2535.00                 | 48.44    | PK           | 24        | 202        | V     | -2.76            | 45.68               | 74               | 28.32  |
| 2535.00                 | 28.13    | Ave          | 24        | 202        | V     | -2.76            | 25.37               | 54               | 28.63  |
| 4924.00                 | 45.75    | PK           | 8         | 217        | V     | 7.34             | 53.09               | 74               | 20.91  |
| 4924.00                 | 28.11    | Ave          | 8         | 217        | V     | 7.34             | 35.45               | 54               | 18.55  |
| 6658.00                 | 39.35    | PK           | 131       | 131        | V     | 13.72            | 53.07               | 74               | 20.93  |
| 6658.00                 | 31.59    | Ave          | 131       | 131        | V     | 13.72            | 45.31               | 54               | 8.69   |
| 7386.00                 | 32.84    | PK           | 280       | 129        | H     | 16.65            | 49.49               | 74               | 24.51  |
| 7386.00                 | 20.76    | Ave          | 280       | 129        | H     | 16.65            | 37.41               | 54               | 16.59  |

## 802.11n-HT20 Mode

| Frequency              | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                        | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                  | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Low Channel (2412 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2412.00                | 101.98   | PK           | 7         | 165        | V     | -3.04            | 98.94               | /         | /      |
| 2412.00                | 96.43    | Ave          | 7         | 165        | V     | -3.04            | 93.39               | /         | /      |
| 2412.00                | 98.55    | PK           | 220       | 204        | H     | -3.04            | 95.51               | /         | /      |
| 2412.00                | 93.17    | Ave          | 220       | 204        | H     | -3.04            | 90.13               | /         | /      |
| 2390.00                | 47.98    | PK           | 102       | 205        | V     | -3.05            | 44.93               | 74        | 29.07  |
| 2390.00                | 36.42    | Ave          | 102       | 205        | V     | -3.05            | 33.37               | 54        | 20.63  |
| 2307.00                | 40.33    | PK           | 174       | 229        | V     | -3.06            | 37.27               | 74        | 36.73  |
| 2307.00                | 26.19    | Ave          | 174       | 229        | V     | -3.06            | 23.13               | 54        | 30.87  |
| 4824.00                | 38.56    | PK           | 288       | 142        | V     | 7.19             | 45.75               | 74        | 28.25  |
| 4824.00                | 26.12    | Ave          | 288       | 142        | V     | 7.19             | 33.31               | 54        | 20.69  |
| 6432.00                | 40.79    | PK           | 215       | 245        | V     | 12.74            | 53.53               | 74        | 20.47  |
| 6432.00                | 33.95    | Ave          | 215       | 245        | V     | 12.74            | 46.69               | 54        | 7.31   |
| 7236.00                | 32.89    | PK           | 105       | 145        | V     | 16.00            | 48.89               | 74        | 25.11  |
| 7236.00                | 21.02    | Ave          | 105       | 145        | V     | 16.00            | 37.02               | 54        | 16.98  |

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2437.00                   | 102.07   | PK           | 134       | 208        | V     | -3.02            | 99.05               | /         | /      |
| 2437.00                   | 97.02    | Ave          | 134       | 208        | V     | -3.02            | 94.00               | /         | /      |
| 2437.00                   | 98.91    | PK           | 343       | 110        | H     | -3.02            | 95.89               | /         | /      |
| 2437.00                   | 93.32    | Ave          | 343       | 110        | H     | -3.02            | 90.30               | /         | /      |
| 1047.00                   | 52.20    | PK           | 338       | 225        | H     | -10.35           | 41.85               | 74        | 32.15  |
| 1047.00                   | 47.61    | Ave          | 338       | 225        | H     | -10.35           | 37.26               | 54        | 16.74  |
| 3341.00                   | 39.31    | PK           | 302       | 190        | V     | 1.06             | 40.37               | 74        | 33.63  |
| 3341.00                   | 25.46    | Ave          | 302       | 190        | V     | 1.06             | 26.52               | 54        | 27.48  |
| 4874.00                   | 44.32    | PK           | 299       | 141        | V     | 7.27             | 51.59               | 74        | 22.41  |
| 4874.00                   | 36.14    | Ave          | 299       | 141        | V     | 7.27             | 43.41               | 54        | 10.59  |
| 6516.00                   | 35.55    | PK           | 22        | 117        | V     | 13.20            | 48.75               | 74        | 25.25  |
| 6516.00                   | 21.88    | Ave          | 22        | 117        | V     | 13.20            | 35.08               | 54        | 18.92  |
| 7311.00                   | 31.14    | PK           | 37        | 112        | V     | 16.33            | 47.47               | 74        | 26.53  |
| 7311.00                   | 21.97    | Ave          | 37        | 112        | V     | 16.33            | 38.30               | 54        | 15.70  |



| Frequency               | Receiver     |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247        |        |
|-------------------------|--------------|--------------|-----------|------------|-------|------------------|---------------------|----------------|--------|
|                         | Reading      | Detector     |           | Height     | Polar |                  |                     | Limit          | Margin |
| (MHz)                   | (dB $\mu$ V) | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dB $\mu$ V/m)      | (dB $\mu$ V/m) | (dB)   |
| High Channel (2462 MHz) |              |              |           |            |       |                  |                     |                |        |
| 2462.00                 | 99.17        | PK           | 109       | 135        | V     | -3.00            | 96.17               | /              | /      |
| 2462.00                 | 94.52        | Ave          | 109       | 135        | V     | -3.00            | 91.52               | /              | /      |
| 2462.00                 | 96.98        | PK           | 167       | 184        | H     | -3.00            | 93.98               | /              | /      |
| 2462.00                 | 91.61        | Ave          | 167       | 184        | H     | -3.00            | 88.61               | /              | /      |
| 2483.50                 | 52.78        | PK           | 59        | 220        | V     | -2.99            | 49.79               | 74             | 24.21  |
| 2483.50                 | 41.23        | Ave          | 59        | 220        | V     | -2.99            | 38.24               | 54             | 15.76  |
| 2571.00                 | 39.59        | PK           | 74        | 188        | H     | -2.53            | 37.06               | 74             | 36.94  |
| 2571.00                 | 25.93        | Ave          | 74        | 188        | H     | -2.53            | 23.40               | 54             | 30.60  |
| 4924.00                 | 45.63        | PK           | 5         | 205        | V     | 7.34             | 52.97               | 74             | 21.03  |
| 4924.00                 | 36.87        | Ave          | 5         | 205        | V     | 7.34             | 44.21               | 54             | 9.79   |
| 6662.00                 | 36.71        | PK           | 286       | 216        | H     | 13.73            | 50.44               | 74             | 23.56  |
| 6662.00                 | 23.02        | Ave          | 286       | 216        | H     | 13.73            | 36.75               | 54             | 17.25  |
| 7386.00                 | 31.99        | PK           | 315       | 173        | V     | 16.65            | 48.64               | 74             | 25.36  |
| 7386.00                 | 22.27        | Ave          | 315       | 173        | V     | 16.65            | 38.92               | 54             | 15.08  |

**Antenna 2****802.11b Mode**

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Low Channel (2412 MHz)    |          |              |           |            |       |                  |                     |           |        |
| 2412.00                   | 106.93   | PK           | 42        | 170        | V     | -3.04            | 103.89              | /         | /      |
| 2412.00                   | 101.77   | Ave          | 42        | 170        | V     | -3.04            | 98.73               | /         | /      |
| 2412.00                   | 102.40   | PK           | 282       | 206        | H     | -3.04            | 99.36               | /         | /      |
| 2412.00                   | 97.94    | Ave          | 282       | 206        | H     | -3.04            | 94.9                | /         | /      |
| 2390.00                   | 47.77    | PK           | 167       | 141        | V     | -3.05            | 44.72               | 74        | 29.28  |
| 2390.00                   | 35.48    | Ave          | 167       | 141        | V     | -3.05            | 32.43               | 54        | 21.57  |
| 2301.00                   | 41.05    | PK           | 337       | 148        | H     | -3.11            | 37.94               | 74        | 36.06  |
| 2301.00                   | 27.88    | Ave          | 337       | 148        | H     | -3.11            | 24.77               | 54        | 29.23  |
| 4824.00                   | 46.12    | PK           | 321       | 150        | H     | 7.19             | 53.31               | 74        | 20.69  |
| 4824.00                   | 35.19    | Ave          | 321       | 150        | H     | 7.19             | 42.38               | 54        | 11.62  |
| 6632.00                   | 39.56    | PK           | 23        | 105        | V     | 13.62            | 53.18               | 74        | 20.82  |
| 6632.00                   | 26.17    | Ave          | 23        | 105        | V     | 13.62            | 39.79               | 54        | 14.21  |
| 7236.00                   | 38.59    | PK           | 283       | 109        | V     | 16.00            | 54.59               | 74        | 19.41  |
| 7236.00                   | 22.23    | Ave          | 283       | 109        | V     | 16.00            | 38.23               | 54        | 15.77  |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2437.00                   | 106.84   | PK           | 8         | 230        | V     | -3.02            | 103.82              | /         | /      |
| 2437.00                   | 101.62   | Ave          | 8         | 230        | V     | -3.02            | 98.6                | /         | /      |
| 2437.00                   | 99.60    | PK           | 215       | 147        | H     | -3.02            | 96.58               | /         | /      |
| 2437.00                   | 94.58    | Ave          | 215       | 147        | H     | -3.02            | 91.56               | /         | /      |
| 1152.00                   | 47.02    | PK           | 66        | 163        | V     | -9.53            | 37.49               | 74        | 36.51  |
| 1152.00                   | 36.34    | Ave          | 66        | 163        | V     | -9.53            | 26.81               | 54        | 27.19  |
| 3373.00                   | 39.41    | PK           | 349       | 100        | V     | 1.14             | 40.55               | 74        | 33.45  |
| 3373.00                   | 23.79    | Ave          | 349       | 100        | V     | 1.14             | 24.93               | 54        | 29.07  |
| 4874.00                   | 52.62    | PK           | 8         | 145        | V     | 7.27             | 59.89               | 74        | 14.11  |
| 4874.00                   | 38.98    | Ave          | 8         | 145        | V     | 7.27             | 46.25               | 54        | 7.75   |
| 6481.00                   | 35.50    | PK           | 72        | 112        | V     | 13.03            | 48.53               | 74        | 25.47  |
| 6481.00                   | 21.66    | Ave          | 72        | 112        | V     | 13.03            | 34.69               | 54        | 19.31  |
| 7311.00                   | 37.16    | PK           | 176       | 129        | V     | 16.33            | 53.49               | 74        | 20.51  |
| 7311.00                   | 21.64    | Ave          | 176       | 129        | V     | 16.33            | 37.97               | 54        | 16.03  |

| Frequency               | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|-------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                         | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                   | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| High Channel (2462 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2462.00                 | 105.21   | PK           | 180       | 175        | V     | -3.00            | 102.21              | /         | /      |
| 2462.00                 | 101.24   | Ave          | 180       | 175        | V     | -3.00            | 98.24               | /         | /      |
| 2462.00                 | 98.99    | PK           | 189       | 106        | H     | -3.00            | 95.99               | /         | /      |
| 2462.00                 | 96.05    | Ave          | 189       | 106        | H     | -3.00            | 93.05               | /         | /      |
| 2483.50                 | 59.59    | PK           | 281       | 187        | H     | -2.99            | 56.6                | 74        | 17.40  |
| 2483.50                 | 46.75    | Ave          | 281       | 187        | H     | -2.99            | 43.76               | 54        | 10.24  |
| 2576.00                 | 38.90    | PK           | 4         | 154        | V     | -2.50            | 36.4                | 74        | 37.60  |
| 2576.00                 | 26.43    | Ave          | 4         | 154        | V     | -2.50            | 23.93               | 54        | 30.07  |
| 4924.00                 | 51.44    | PK           | 167       | 182        | V     | 7.34             | 58.78               | 74        | 15.22  |
| 4924.00                 | 38.09    | Ave          | 167       | 182        | V     | 7.34             | 45.43               | 54        | 8.57   |
| 6658.00                 | 38.64    | PK           | 352       | 245        | V     | 13.72            | 52.36               | 74        | 21.64  |
| 6658.00                 | 25.64    | Ave          | 352       | 245        | V     | 13.72            | 39.36               | 54        | 14.64  |
| 7386.00                 | 35.89    | PK           | 222       | 171        | V     | 16.65            | 52.54               | 74        | 21.46  |
| 7386.00                 | 24.30    | Ave          | 222       | 171        | V     | 16.65            | 40.95               | 54        | 13.05  |

**802.11g Mode**

| Frequency              | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                        | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                  | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Low Channel (2412 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2412.00                | 101.93   | PK           | 352       | 212        | V     | -3.04            | 98.89               | /         | /      |
| 2412.00                | 96.67    | Ave          | 352       | 212        | V     | -3.04            | 93.63               | /         | /      |
| 2412.00                | 98.44    | PK           | 106       | 201        | H     | -3.04            | 95.4                | /         | /      |
| 2412.00                | 92.77    | Ave          | 106       | 201        | H     | -3.04            | 89.73               | /         | /      |
| 2390.00                | 47.64    | PK           | 56        | 240        | V     | -3.05            | 44.59               | 74        | 29.41  |
| 2390.00                | 36.81    | Ave          | 56        | 240        | V     | -3.05            | 33.76               | 54        | 20.24  |
| 2307.00                | 40.13    | PK           | 0         | 199        | H     | -3.06            | 37.07               | 74        | 36.93  |
| 2307.00                | 26.24    | Ave          | 0         | 199        | H     | -3.06            | 23.18               | 54        | 30.82  |
| 4824.00                | 38.32    | PK           | 53        | 145        | V     | 7.19             | 45.51               | 74        | 28.49  |
| 4824.00                | 26.42    | Ave          | 53        | 145        | V     | 7.19             | 33.61               | 54        | 20.39  |
| 6655.00                | 40.8     | PK           | 41        | 230        | H     | 13.71            | 54.51               | 74        | 19.49  |
| 6655.00                | 33.62    | Ave          | 41        | 230        | H     | 13.71            | 47.33               | 54        | 6.67   |
| 7236.00                | 32.99    | PK           | 351       | 102        | H     | 16.00            | 48.99               | 74        | 25.01  |
| 7236.00                | 20.98    | Ave          | 351       | 102        | H     | 16.00            | 36.98               | 54        | 17.02  |

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247          |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|------------------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit            | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB<br>μ<br>V/m) | (dB)   |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |                  |        |
| 2437.00                   | 101.85   | PK           | 145       | 188        | V     | -3.02            | 98.83               | /                | /      |
| 2437.00                   | 96.63    | Ave          | 145       | 188        | V     | -3.02            | 93.61               | /                | /      |
| 2437.00                   | 98.68    | PK           | 4         | 102        | H     | -3.02            | 95.66               | /                | /      |
| 2437.00                   | 93.09    | Ave          | 4         | 102        | H     | -3.02            | 90.07               | /                | /      |
| 1070.00                   | 51.92    | PK           | 143       | 150        | H     | -10.17           | 41.75               | 74               | 32.25  |
| 1070.00                   | 47.93    | Ave          | 143       | 150        | H     | -10.17           | 37.76               | 54               | 16.24  |
| 3212.00                   | 39.11    | PK           | 26        | 238        | V     | 0.72             | 39.83               | 74               | 34.17  |
| 3212.00                   | 25.32    | Ave          | 26        | 238        | V     | 0.72             | 26.04               | 54               | 27.96  |
| 4874.00                   | 43.95    | PK           | 80        | 221        | V     | 7.27             | 51.22               | 74               | 22.78  |
| 4874.00                   | 36.31    | Ave          | 80        | 221        | V     | 7.27             | 43.58               | 54               | 10.42  |
| 6427.00                   | 35.72    | PK           | 12        | 163        | V     | 11.67            | 47.39               | 74               | 26.61  |
| 6427.00                   | 22.02    | Ave          | 12        | 163        | V     | 11.67            | 33.69               | 54               | 20.31  |
| 7311.00                   | 31.29    | PK           | 255       | 250        | H     | 16.33            | 47.62               | 74               | 26.38  |
| 7311.00                   | 21.41    | Ave          | 255       | 250        | H     | 16.33            | 37.74               | 54               | 16.26  |

| Frequency               | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247          |        |
|-------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|------------------|--------|
|                         | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit            | Margin |
| (MHz)                   | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB<br>μ<br>V/m) | (dB)   |
| High Channel (2462 MHz) |          |              |           |            |       |                  |                     |                  |        |
| 2462.00                 | 102.97   | PK           | 89        | 113        | V     | -3.00            | 99.97               | /                | /      |
| 2462.00                 | 98.78    | Ave          | 89        | 113        | V     | -3.00            | 95.78               | /                | /      |
| 2462.00                 | 98.42    | PK           | 209       | 247        | H     | -3.00            | 95.42               | /                | /      |
| 2462.00                 | 93.83    | Ave          | 209       | 247        | H     | -3.00            | 90.83               | /                | /      |
| 2483.50                 | 53.95    | PK           | 305       | 238        | H     | -2.99            | 50.96               | 74               | 23.04  |
| 2483.50                 | 42.34    | Ave          | 305       | 238        | H     | -2.99            | 39.35               | 54               | 14.65  |
| 2535.00                 | 48.29    | PK           | 62        | 215        | V     | -2.76            | 45.53               | 74               | 28.47  |
| 2535.00                 | 28.16    | Ave          | 62        | 215        | V     | -2.76            | 25.4                | 54               | 28.60  |
| 4924.00                 | 45.83    | PK           | 128       | 246        | V     | 7.34             | 53.17               | 74               | 20.83  |
| 4924.00                 | 27.31    | Ave          | 128       | 246        | V     | 7.34             | 34.65               | 54               | 19.35  |
| 6658.00                 | 39.25    | PK           | 273       | 168        | V     | 13.72            | 52.97               | 74               | 21.03  |
| 6658.00                 | 31.22    | Ave          | 273       | 168        | V     | 13.72            | 44.94               | 54               | 9.06   |
| 7386.00                 | 32.92    | PK           | 332       | 132        | H     | 16.65            | 49.57               | 74               | 24.43  |
| 7386.00                 | 20.79    | Ave          | 332       | 132        | H     | 16.65            | 37.44               | 54               | 16.56  |

## 802.11n-HT20 Mode

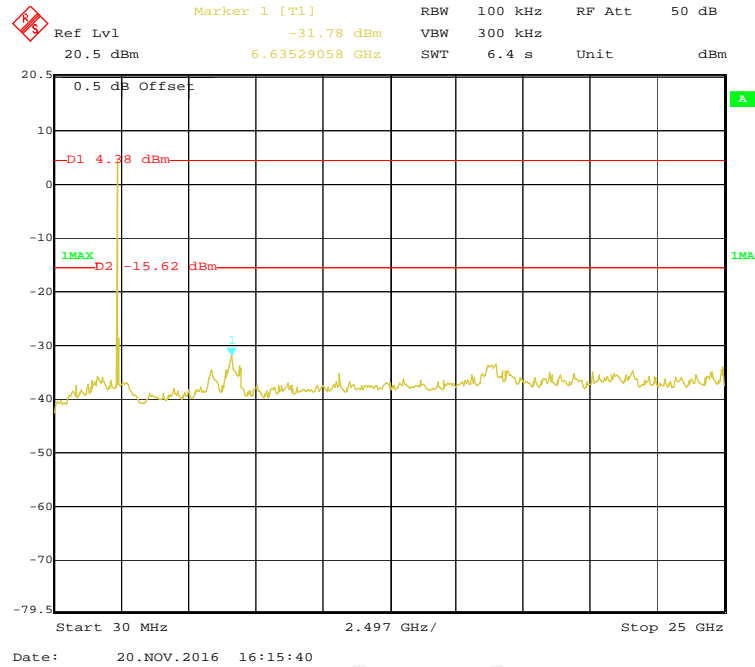
| Frequency              | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                        | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                  | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Low Channel (2412 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2412.00                | 102.25   | PK           | 347       | 103        | V     | -3.04            | 99.21               | /         | /      |
| 2412.00                | 96.33    | Ave          | 347       | 103        | V     | -3.04            | 93.29               | /         | /      |
| 2412.00                | 98.32    | PK           | 82        | 203        | H     | -3.04            | 95.28               | /         | /      |
| 2412.00                | 92.83    | Ave          | 82        | 203        | H     | -3.04            | 89.79               | /         | /      |
| 2390.00                | 47.94    | PK           | 94        | 114        | V     | -3.05            | 44.89               | 74        | 29.11  |
| 2390.00                | 36.53    | Ave          | 94        | 114        | V     | -3.05            | 33.48               | 54        | 20.52  |
| 2307.00                | 40.64    | PK           | 29        | 230        | V     | -3.06            | 37.58               | 74        | 36.42  |
| 2307.00                | 26.55    | Ave          | 29        | 230        | V     | -3.06            | 23.49               | 54        | 30.51  |
| 4824.00                | 38.90    | PK           | 302       | 161        | V     | 7.19             | 46.09               | 74        | 27.91  |
| 4824.00                | 25.78    | Ave          | 302       | 161        | V     | 7.19             | 32.97               | 54        | 21.03  |
| 6432.00                | 41.18    | PK           | 354       | 206        | V     | 12.74            | 53.92               | 74        | 20.08  |
| 6432.00                | 34.26    | Ave          | 354       | 206        | V     | 12.74            | 47.00               | 54        | 7.00   |
| 7236.00                | 32.62    | PK           | 20        | 218        | V     | 16.00            | 48.62               | 74        | 25.38  |
| 7236.00                | 21.21    | Ave          | 20        | 218        | V     | 16.00            | 37.21               | 54        | 16.79  |

| Frequency                 | Receiver |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247   |        |
|---------------------------|----------|--------------|-----------|------------|-------|------------------|---------------------|-----------|--------|
|                           | Reading  | Detector     |           | Height     | Polar |                  |                     | Limit     | Margin |
| (MHz)                     | (dBμV)   | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dBμV/m)            | (dB μV/m) | (dB)   |
| Middle Channel (2437 MHz) |          |              |           |            |       |                  |                     |           |        |
| 2437.00                   | 101.98   | PK           | 157       | 150        | V     | -3.02            | 98.96               | /         | /      |
| 2437.00                   | 97.41    | Ave          | 157       | 150        | V     | -3.02            | 94.39               | /         | /      |
| 2437.00                   | 99.36    | PK           | 130       | 194        | H     | -3.02            | 96.34               | /         | /      |
| 2437.00                   | 92.89    | Ave          | 130       | 194        | H     | -3.02            | 89.87               | /         | /      |
| 1047.00                   | 52.45    | PK           | 23        | 228        | H     | -10.35           | 42.10               | 74        | 31.90  |
| 1047.00                   | 47.81    | Ave          | 23        | 228        | H     | -10.35           | 37.46               | 54        | 16.54  |
| 3341.00                   | 39.07    | PK           | 182       | 187        | V     | 1.06             | 40.13               | 74        | 33.87  |
| 3341.00                   | 25.06    | Ave          | 182       | 187        | V     | 1.06             | 26.12               | 54        | 27.88  |
| 4874.00                   | 44.34    | PK           | 244       | 196        | V     | 7.27             | 51.61               | 74        | 22.39  |
| 4874.00                   | 35.71    | Ave          | 244       | 196        | V     | 7.27             | 42.98               | 54        | 11.02  |
| 6516.00                   | 35.79    | PK           | 165       | 129        | V     | 13.20            | 48.99               | 74        | 25.01  |
| 6516.00                   | 22.17    | Ave          | 165       | 129        | V     | 13.20            | 35.37               | 54        | 18.63  |
| 7311.00                   | 30.66    | PK           | 280       | 218        | V     | 16.33            | 46.99               | 74        | 27.01  |
| 7311.00                   | 22.43    | Ave          | 280       | 218        | V     | 16.33            | 38.76               | 54        | 15.24  |

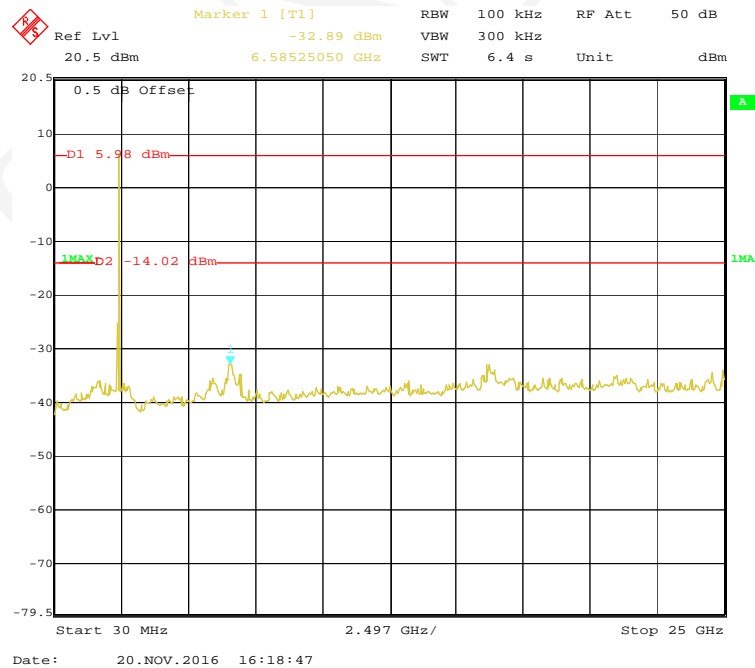
| Frequency               | Receiver     |              | Turntable | Rx Antenna |       | Corrected Factor | Corrected Amplitude | RSS-247        |        |
|-------------------------|--------------|--------------|-----------|------------|-------|------------------|---------------------|----------------|--------|
|                         | Reading      | Detector     |           | Height     | Polar |                  |                     | Limit          | Margin |
| (MHz)                   | (dB $\mu$ V) | (PK/QP/Ave.) | Degree    | (cm)       | (H/V) | (dB)             | (dB $\mu$ V/m)      | (dB $\mu$ V/m) | (dB)   |
| High Channel (2462 MHz) |              |              |           |            |       |                  |                     |                |        |
| 2462.00                 | 98.86        | PK           | 57        | 109        | V     | -3.00            | 95.86               | /              | /      |
| 2462.00                 | 94.85        | Ave          | 57        | 109        | V     | -3.00            | 91.85               | /              | /      |
| 2462.00                 | 96.75        | PK           | 102       | 158        | H     | -3.00            | 93.75               | /              | /      |
| 2462.00                 | 91.16        | Ave          | 102       | 158        | H     | -3.00            | 88.16               | /              | /      |
| 2483.50                 | 52.97        | PK           | 297       | 168        | V     | -2.99            | 49.98               | 74             | 24.02  |
| 2483.50                 | 40.97        | Ave          | 297       | 168        | V     | -2.99            | 37.98               | 54             | 16.02  |
| 2571.00                 | 39.82        | PK           | 220       | 129        | H     | -2.53            | 37.29               | 74             | 36.71  |
| 2571.00                 | 25.44        | Ave          | 220       | 129        | H     | -2.53            | 22.91               | 54             | 31.09  |
| 4924.00                 | 45.28        | PK           | 52        | 222        | V     | 7.34             | 52.62               | 74             | 21.38  |
| 4924.00                 | 36.51        | Ave          | 52        | 222        | V     | 7.34             | 43.85               | 54             | 10.15  |
| 6662.00                 | 36.37        | PK           | 78        | 238        | H     | 13.73            | 50.10               | 74             | 23.90  |
| 6662.00                 | 22.91        | Ave          | 78        | 238        | H     | 13.73            | 36.64               | 54             | 17.36  |
| 7386.00                 | 32.03        | PK           | 278       | 183        | V     | 16.65            | 48.68               | 74             | 25.32  |
| 7386.00                 | 22.46        | Ave          | 278       | 183        | V     | 16.65            | 39.11               | 54             | 14.89  |

# Conducted Spurious Emissions at Antenna Port

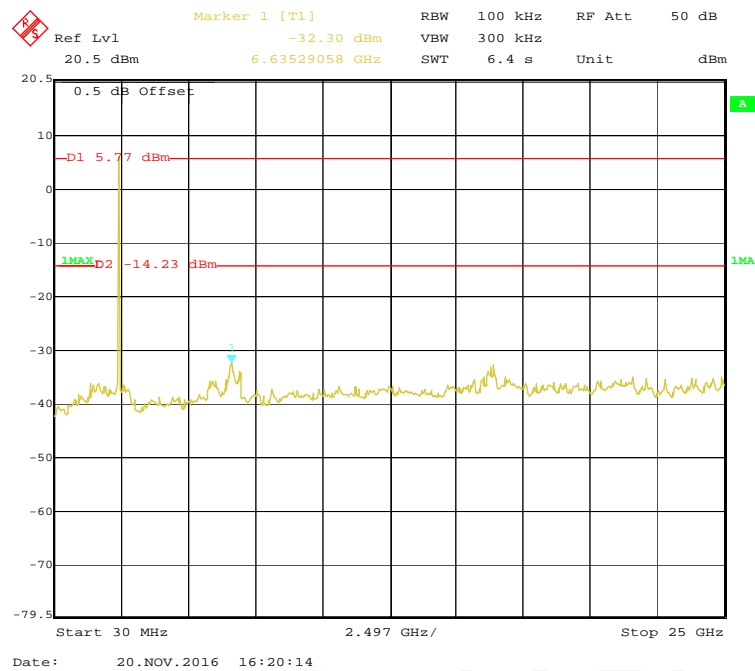
## 802.11b Low Channel



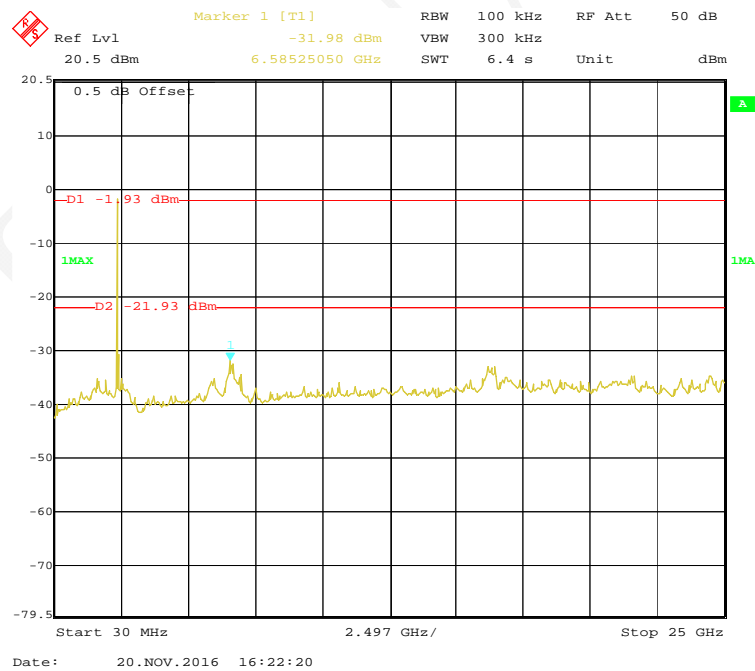
## 802.11b Middle Channel



### 802.11b High Channel

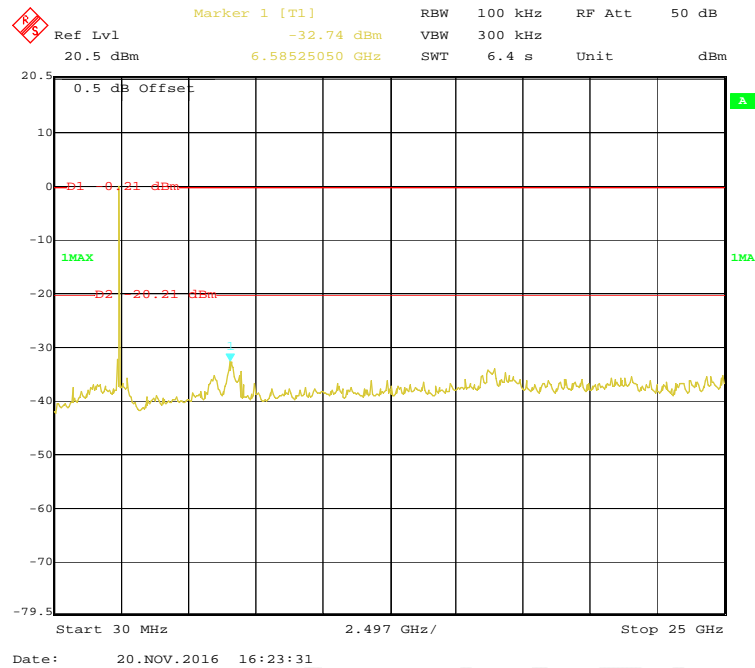


### 802.11g Low Channel

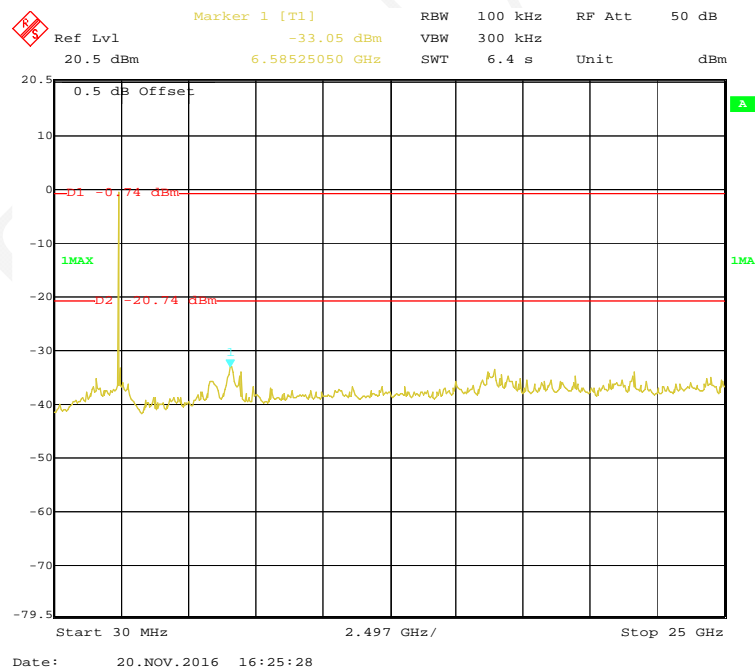




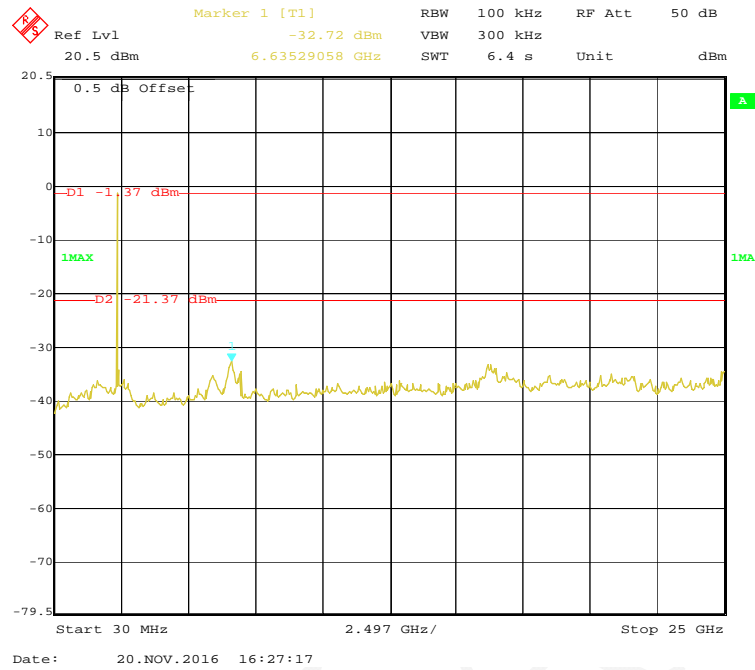
### 802.11g Middle Channel



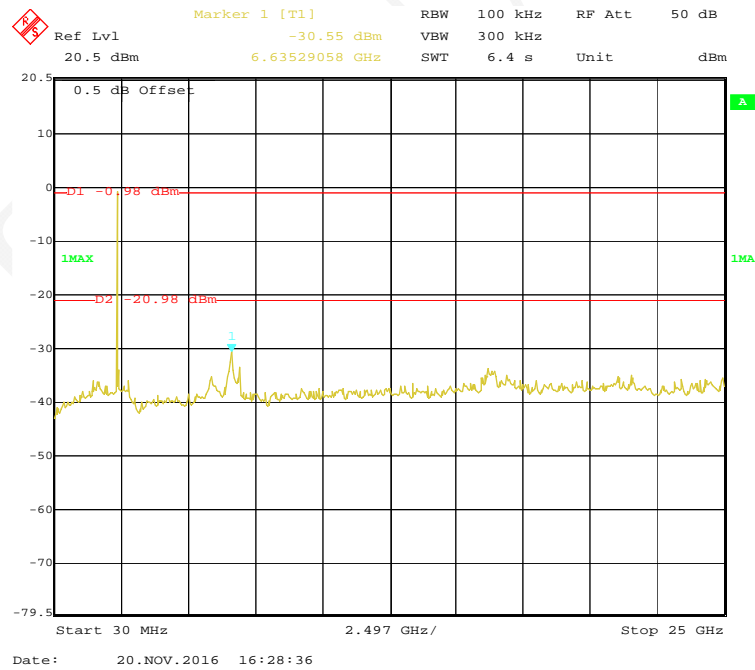
### 802.11g High Channel



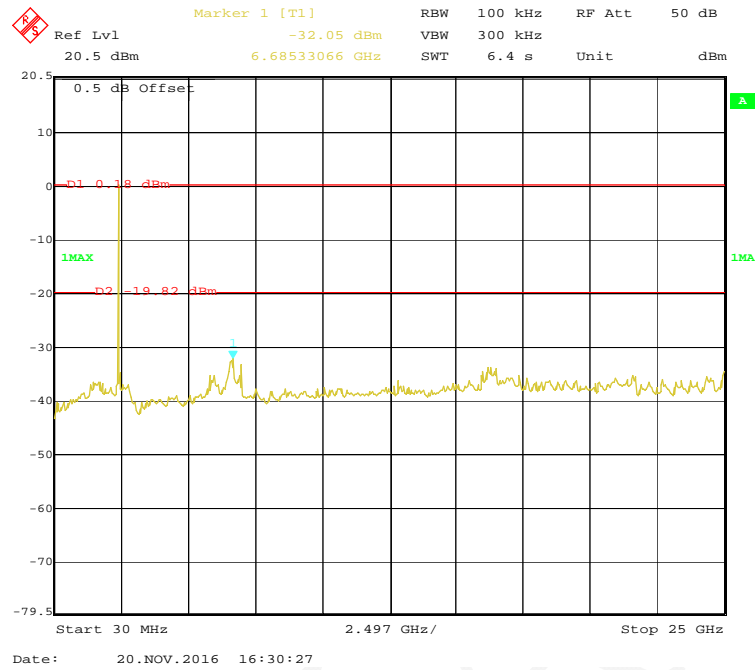
### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel



### 802.11n-HT20 High Channel



## RSS-247 §5.2 (1) – 6 dB EMISSION BANDWIDTH AND 99% OCCUPIED BANDWIDTH

### Applicable Standard

Frequency hopping and digital modulation systems operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, this section applies to systems that employ frequency hopping (FH) and digital modulation technology in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques. A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-247.

Digital modulation systems, these include systems employing digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to all three 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   | FSIQ26      | 836131/009    | 2016-09-20       | 2017-09-20           |
| Rohde & Schwarz | EMI Test Receiver | ESCI        | 100195        | 2016-11-12       | 2017-11-11           |
| BACL            | TS 8997 Cable-01  | T-KS-EMC086 | T-KS-EMC086   | 2015-12-10       | 2016-12-10           |

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

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24 °C     |
| <b>Relative Humidity:</b> | 60 %      |
| <b>ATM Pressure:</b>      | 101.7 kPa |

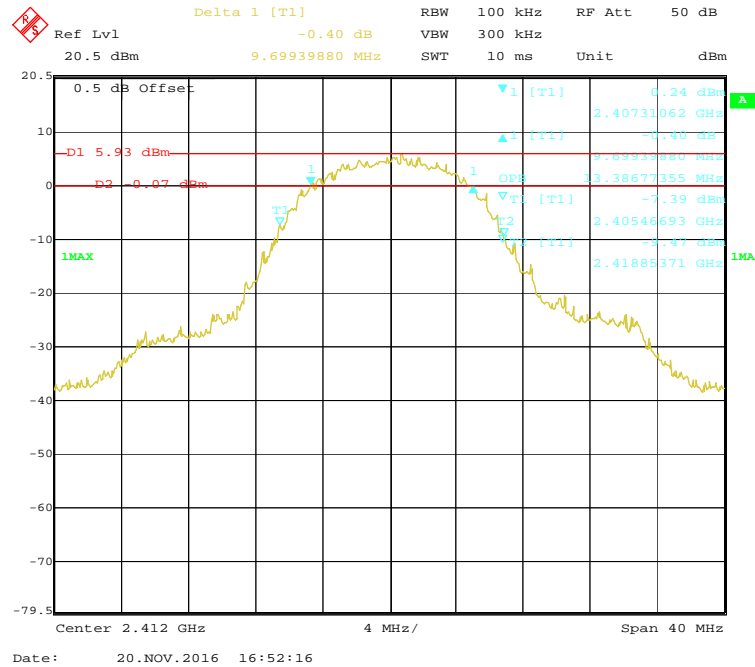
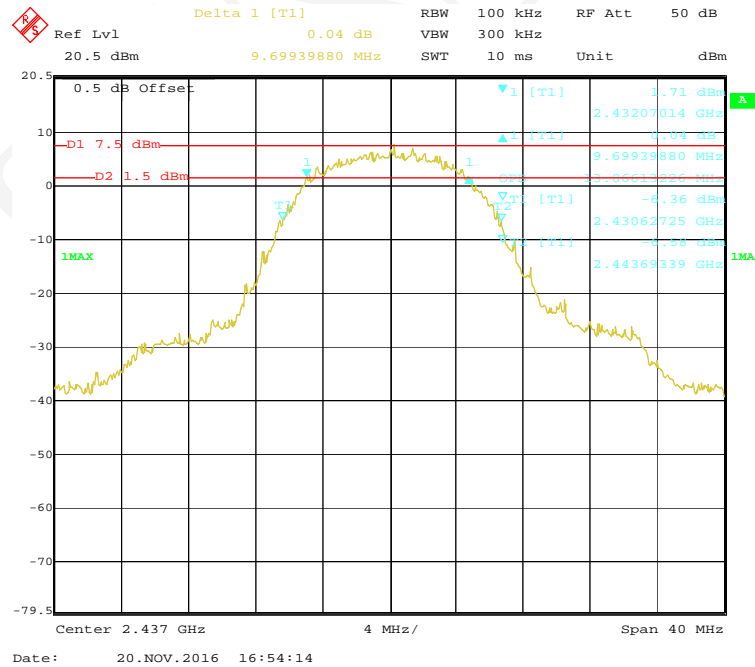
*The testing was performed by Chris Wang on 2016-11-20.*

**Test Result:** Pass.

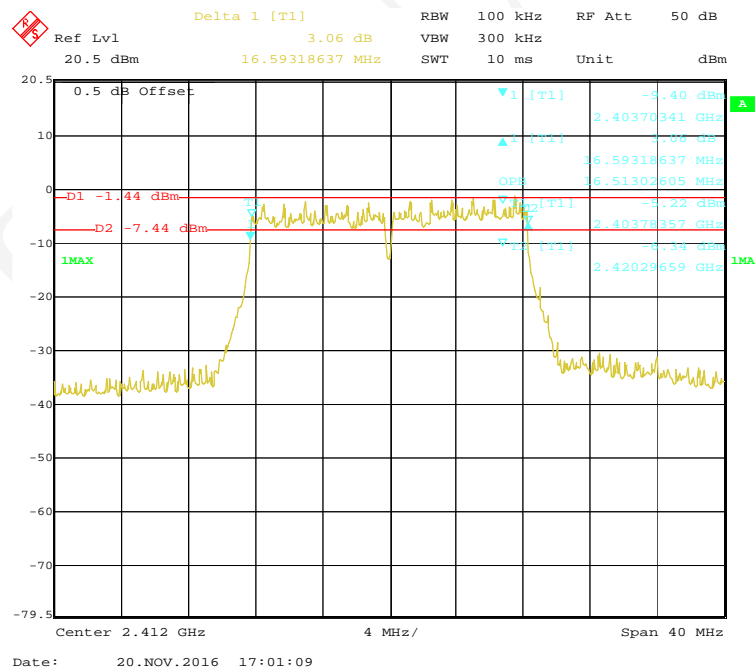
Please refer to the following tables and plots.

*Test Mode: Transmitting*

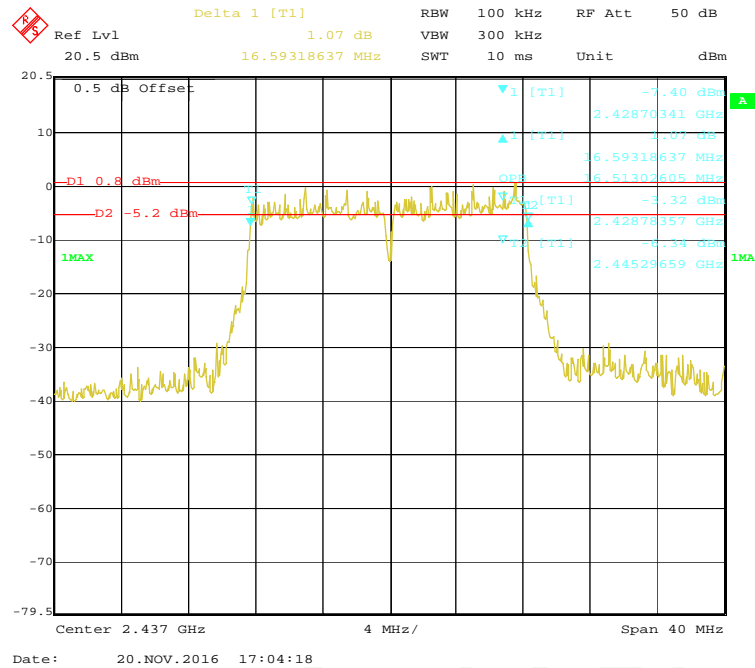
| Mode              | Channel | Frequency | 6 dB Emission Bandwidth | 99% Occupied Bandwidth | Limit      |
|-------------------|---------|-----------|-------------------------|------------------------|------------|
|                   |         | (MHz)     | (MHz)                   | (MHz)                  | (MHz)      |
| 802.11b mode      | Low     | 2412      | 9.70                    | 13.39                  | $\geq 0.5$ |
|                   | Middle  | 2437      | 9.70                    | 13.07                  | $\geq 0.5$ |
|                   | High    | 2462      | 9.62                    | 12.59                  | $\geq 0.5$ |
| 802.11g mode      | Low     | 2412      | 16.59                   | 16.51                  | $\geq 0.5$ |
|                   | Middle  | 2437      | 16.59                   | 16.51                  | $\geq 0.5$ |
|                   | High    | 2462      | 16.59                   | 16.51                  | $\geq 0.5$ |
| 802.11n-HT20 mode | Low     | 2412      | 17.64                   | 17.64                  | $\geq 0.5$ |
|                   | Middle  | 2437      | 17.64                   | 17.64                  | $\geq 0.5$ |
|                   | High    | 2462      | 17.64                   | 17.64                  | $\geq 0.5$ |

**6dB Bandwidth:****802.11b Low Channel****802.11b Middle Channel**

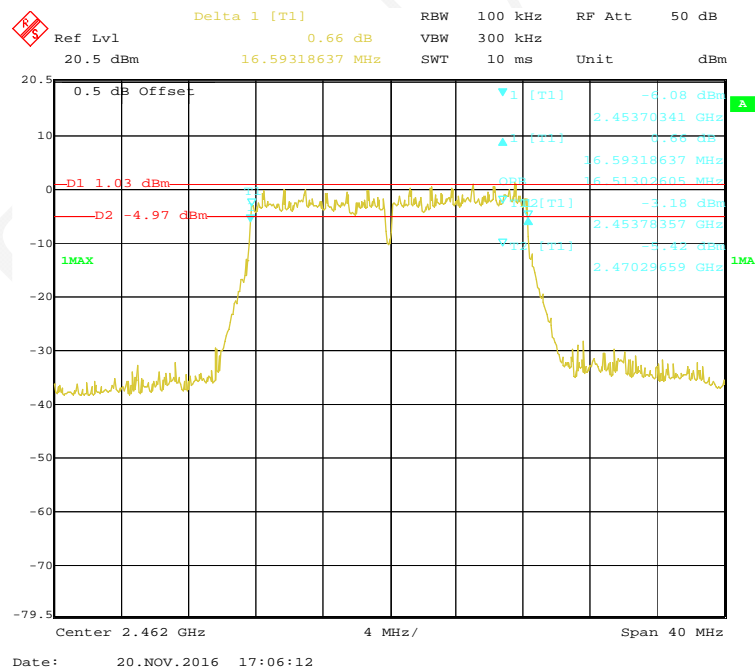
## 802.11g Low Channel



### 802.11g Middle Channel

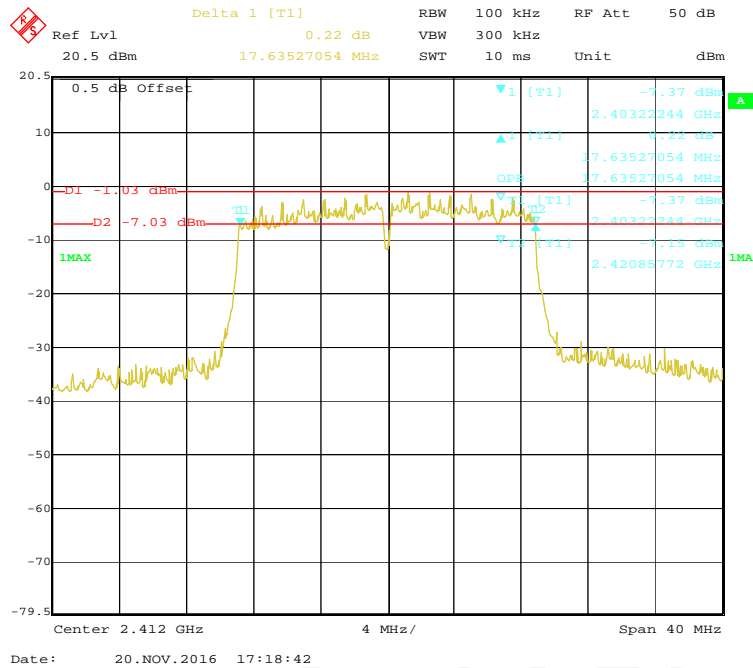


### 802.11g High Channel

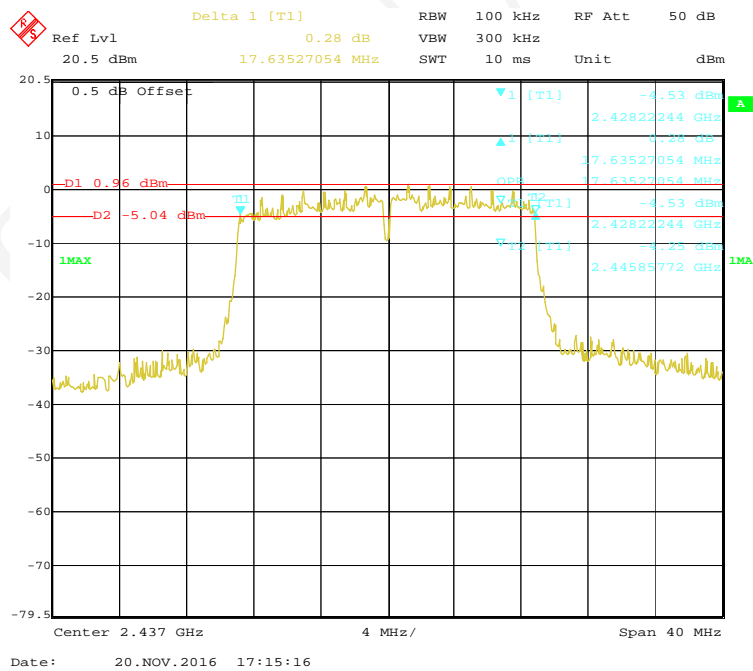




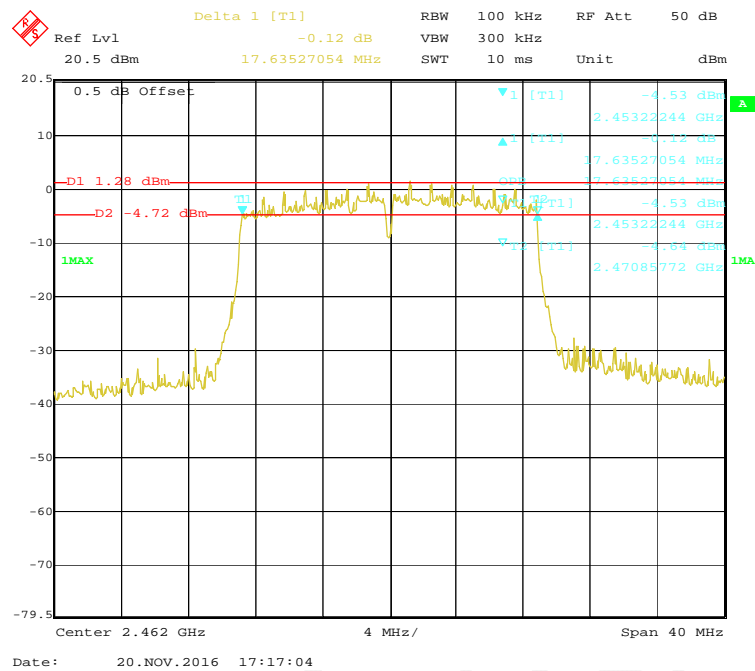
### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel



## 802.11n-HT20 High Channel



## RSS-247 §5.2 (2) – PEAK POWER SPECTRAL DENSITY

### Applicable Standard

Frequency hopping and digital modulation systems operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, this section applies to systems that employ frequency hopping (FH) and digital modulation technology in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques. A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-247.

The transmitter power spectral density conducted from the transmitter 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 Section 5.4 (4), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

### Test Procedure

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:  $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .
3. Set the VBW  $\geq 3 \times \text{RBW}$ .
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 | FSIQ26     | 836131/009    | 2016-09-20       | 2017-09-20           |
| BACL            | RF cable        | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 24°C      |
| Relative Humidity: | 60 %      |
| ATM Pressure:      | 101.7 kPa |

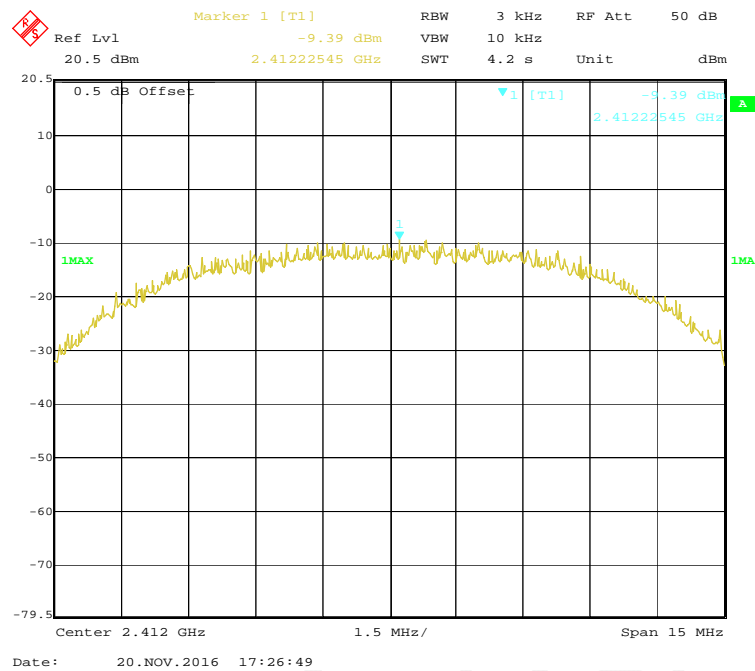
The testing was performed by Chris Wang on 2016-11-20.

Please refer to the following tables and plots.

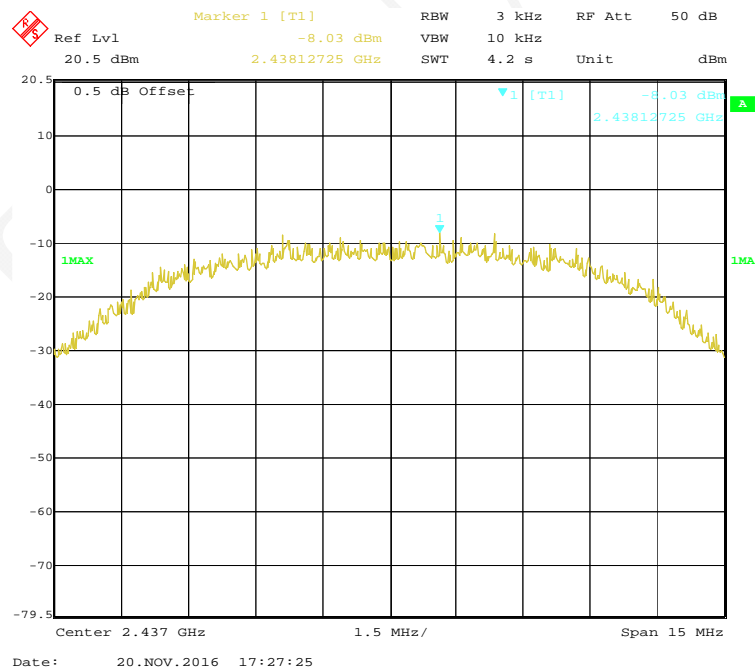
*Test Mode: Transmitting*

| Channel           | Frequency<br>(MHz) | PSD<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) |
|-------------------|--------------------|-------------------|---------------------|
| 802.11b mode      |                    |                   |                     |
| Low               | 2412               | -9.39             | $\leq 8$            |
| Middle            | 2437               | -8.03             | $\leq 8$            |
| High              | 2462               | -8.62             | $\leq 8$            |
| 802.11g mode      |                    |                   |                     |
| Low               | 2412               | -16.47            | $\leq 8$            |
| Middle            | 2437               | -14.08            | $\leq 8$            |
| High              | 2462               | -14.51            | $\leq 8$            |
| 802.11n-HT20 mode |                    |                   |                     |
| Low               | 2412               | -17.26            | $\leq 8$            |
| Middle            | 2437               | -14.05            | $\leq 8$            |
| High              | 2462               | -14.55            | $\leq 8$            |

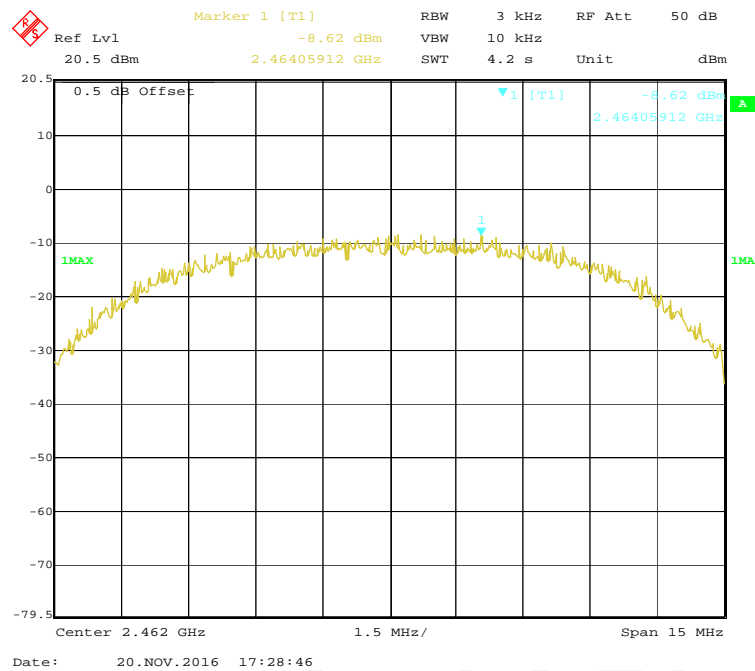
### Power Spectral Density, 802.11b Low Channel



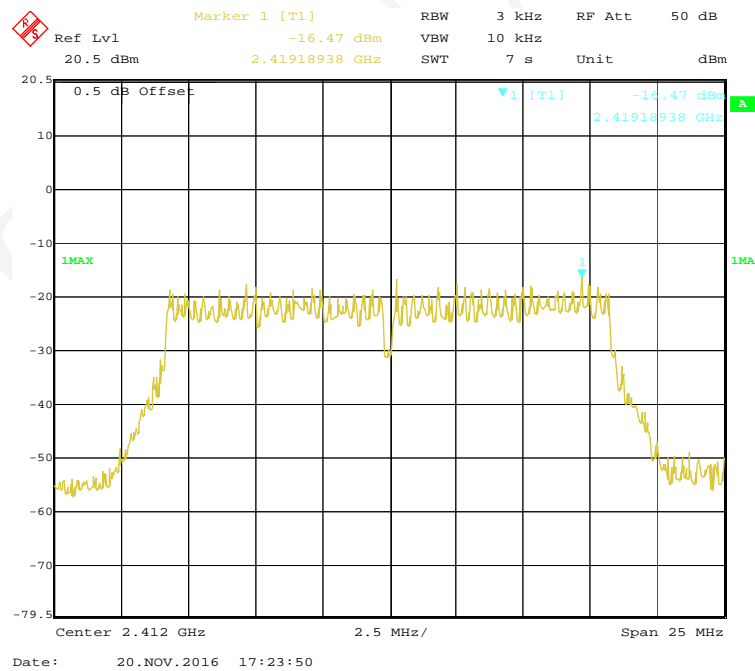
### Power Spectral Density, 802.11b Middle Channel



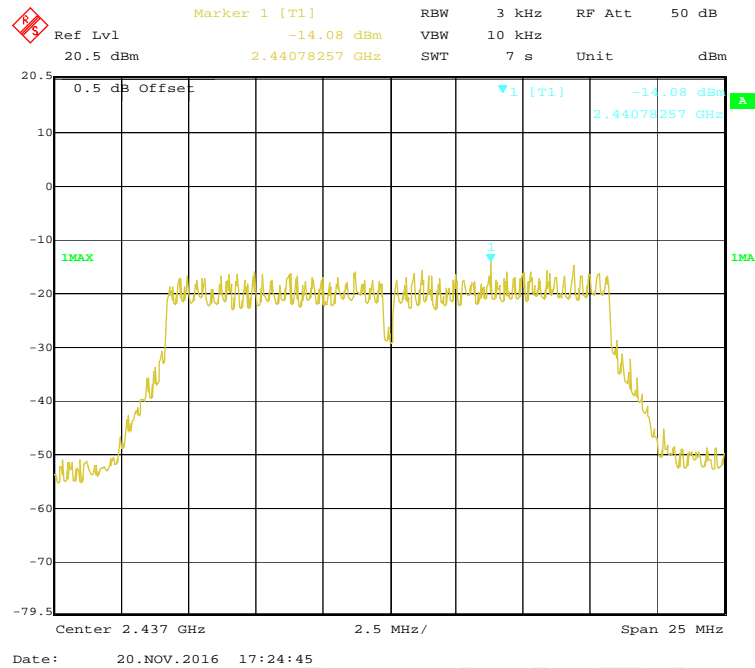
### Power Spectral Density, 802.11b High Channel



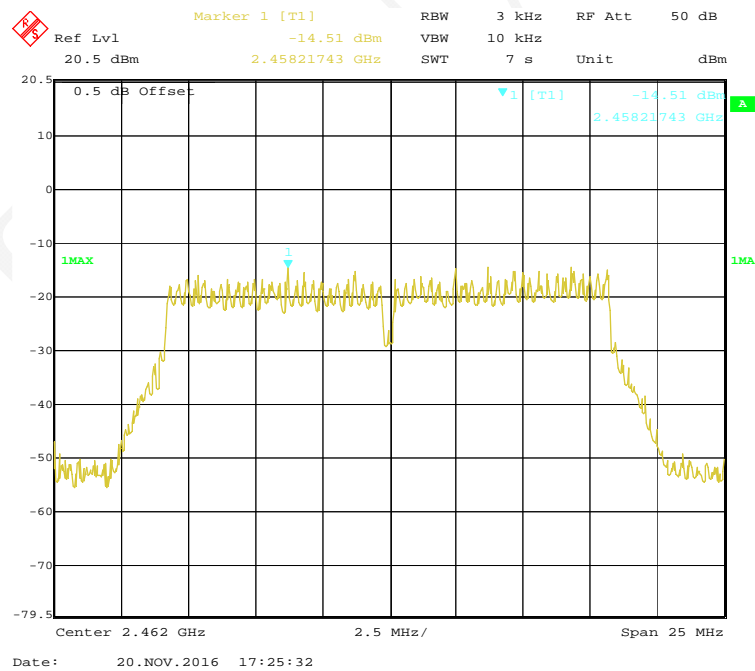
### Power Spectral Density, 802.11g Low Channel



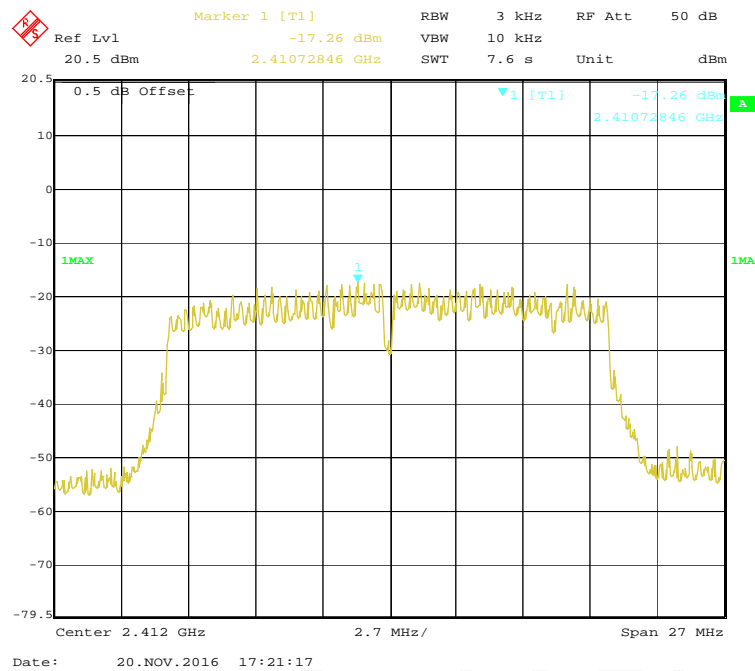
### Power Spectral Density, 802.11g Middle Channel



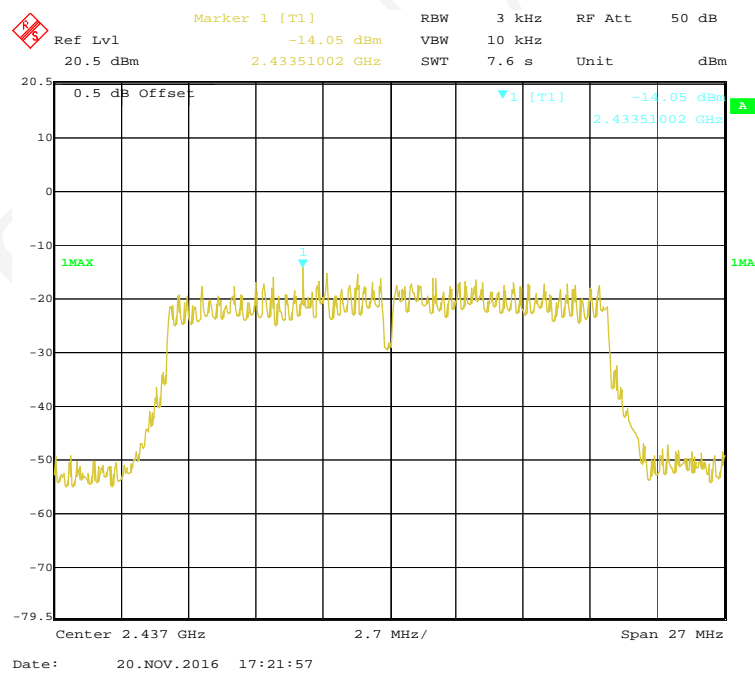
### Power Spectral Density, 802.11g High Channel



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

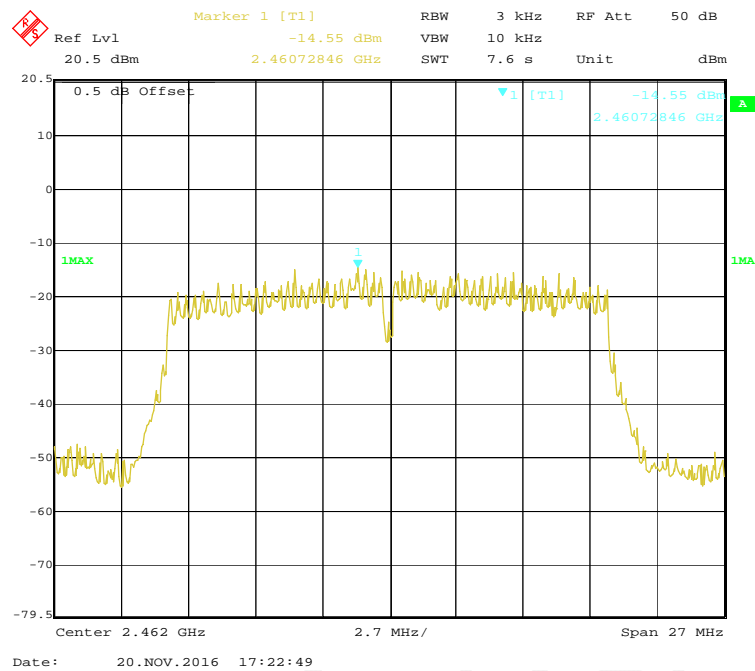


### Power Spectral Density, 802.11n-HT20 Middle Channel





Power Spectral Density, 802.11n-HT20 High Channel



## RSS-247 §5.4 - TRANSMITTER OUTPUT POWER MEASUREMENT

### Applicable Standard

According to RSS-247 §5.4 (4), for systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen).

### 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 a 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           |
| Rohde & Schwarz | Signal Analyzer  | FSIQ26     | 836131/009    | 2016-09-20       | 2017-09-20           |
| Agilent         | Power Sensor     | N1921A     | MY54210016    | 2015-12-18       | 2016-12-17           |
| BACL            | RF cable         | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |

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

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 24 °C     |
| Relative Humidity: | 60 %      |
| ATM Pressure:      | 101.7 kPa |

*The testing was performed by Chris Wang on 2016-11-18.*

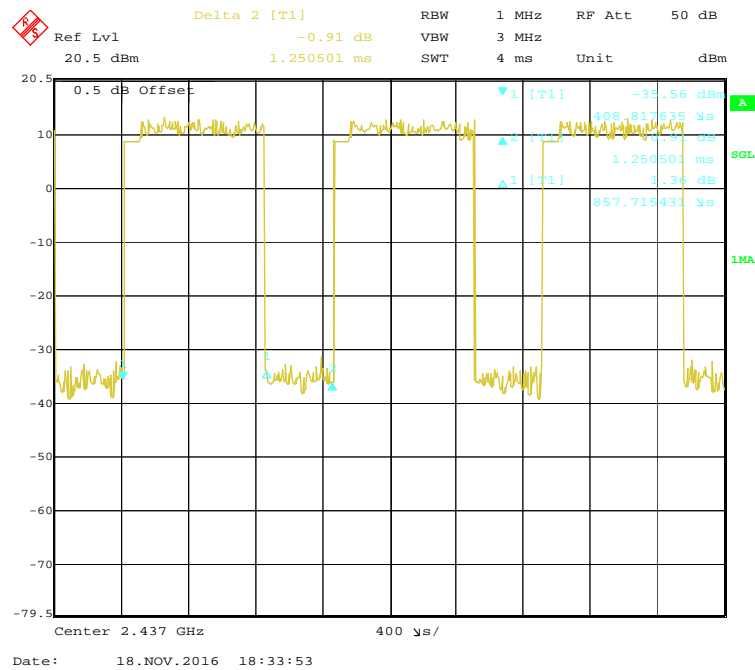
*Test Mode: Transmitting*

| Channel      | Frequency (MHz) | Max Conducted Peak Output Power (dBm) | Conducted Average Output Power Reading (dBm) | Corrected Factor $10\log(1/x)$ (dB) | Conducted Average Output Power (dBm) | Limit (dBm) | Result |
|--------------|-----------------|---------------------------------------|--|-------------------------------------|--------------------------------------|-------------|--------|
| 802.11b      |                 |                                       |  |                                     |                                      |             |        |
| Low          | 2412            | 21.16                                 | 16.20  | 1.64                                | 17.84                                | 30          | Pass   |
| Middle       | 2437            | 22.15                                 | 17.32  | 1.64                                | 18.96                                | 30          | Pass   |
| High         | 2462            | 21.81                                 | 17.06  | 1.64                                | 18.70                                | 30          | Pass   |
| 802.11g      |                 |                                       |  |                                     |                                      |             |        |
| Low          | 2412            | 18.42                                 | 11.61  | 4.98                                | 16.59                                | 30          | Pass   |
| Middle       | 2437            | 20.23                                 | 13.45  | 4.98                                | 18.43                                | 30          | Pass   |
| High         | 2462            | 20.58                                 | 13.86  | 4.98                                | 18.84                                | 30          | Pass   |
| 802.11n-HT20 |                 |                                       |  |                                     |                                      |             |        |
| Low          | 2412            | 18.35                                 | 11.46  | 5.17                                | 16.63                                | 30          | Pass   |
| Middle       | 2437            | 20.27                                 | 13.47  | 5.17                                | 18.64                                | 30          | Pass   |
| High         | 2462            | 20.67                                 | 13.75  | 5.17                                | 18.92                                | 30          | Pass   |

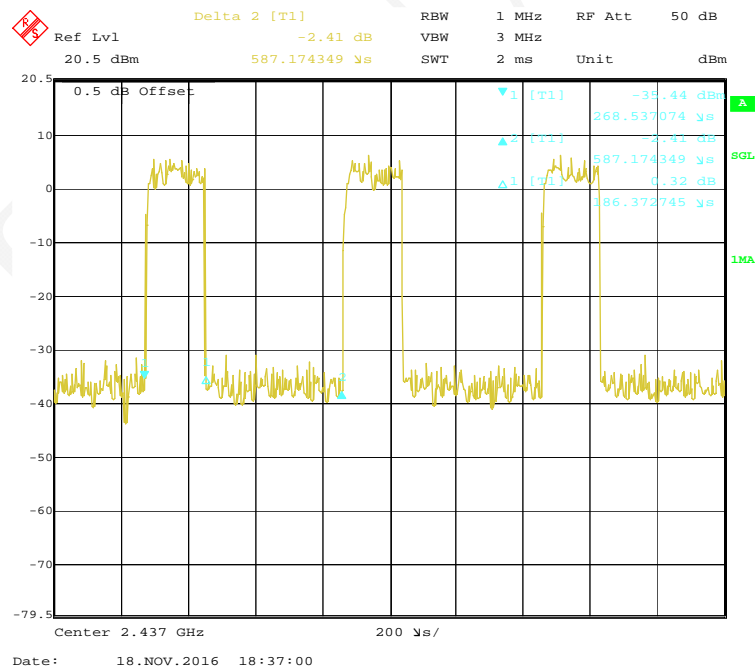
Note: x is the duty cycle. For 802.11b:  $x=0.685$ ; For 802.11g:  $x=0.317$ ; For 802.11n20:  $x=0.303$ .

Conducted Average Output Power= Reading+ Corrected Factor

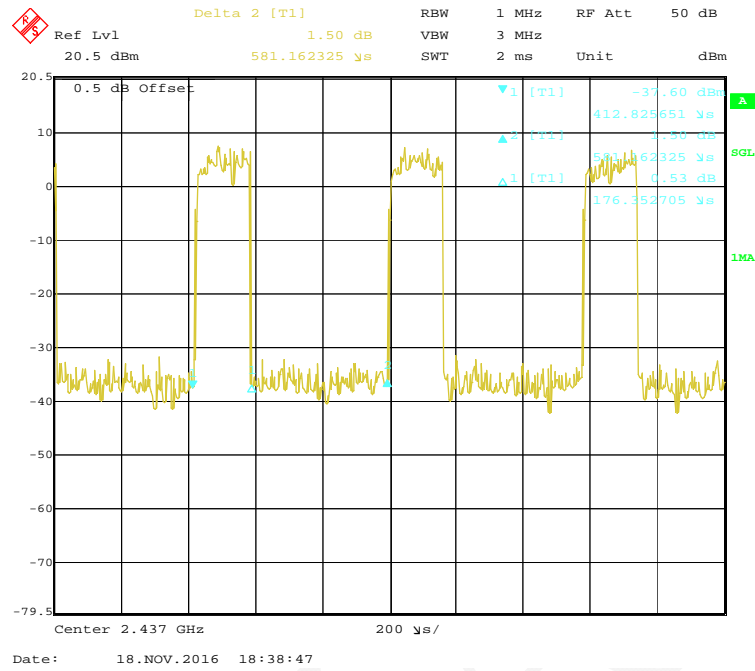
### 802.11b Mode Middle Channel



### 802.11g Mode Middle Channel



### 802.11n20 Mode Middle Channel



## **RSS-247 §5.5 - OUT OF BAND EMISSIONS**

### **Applicable Standard**

According to RSS-247 §5.5.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### **Test Equipment List and Details**

| Manufacturer    | Description      | Model       | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|------------------|-------------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer  | FSIQ26      | 836131/009    | 2016/09/20       | 2017/09/20           |
| BACL            | TS 8997 Cable-01 | T-KS-EMC086 | T-KS-EMC086   | 2015/12/10       | 2016/12/10           |

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

### **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 both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz 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 Data**

#### **Environmental Conditions**

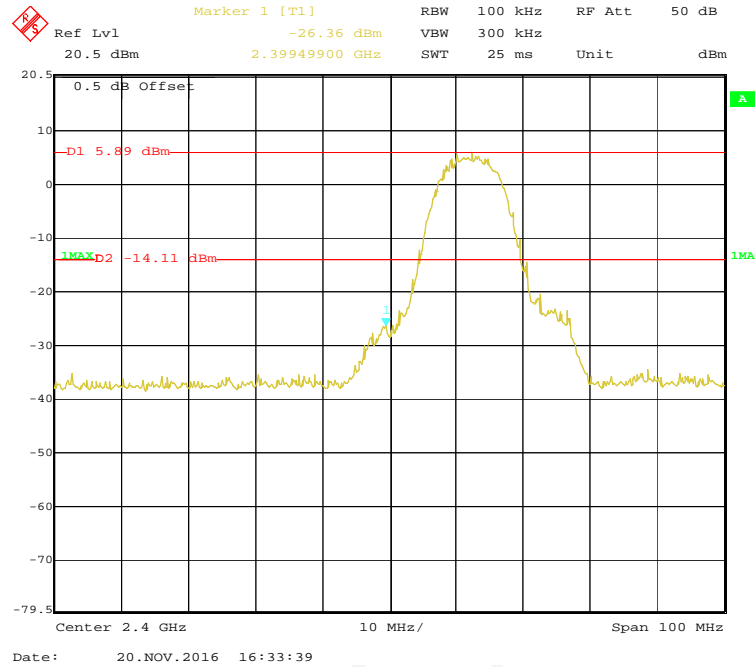
|                    |           |
|--------------------|-----------|
| Temperature:       | 24 °C     |
| Relative Humidity: | 60 %      |
| ATM Pressure:      | 101.7 kPa |

*The testing was performed by Chris Wang on 2016-11-20.*

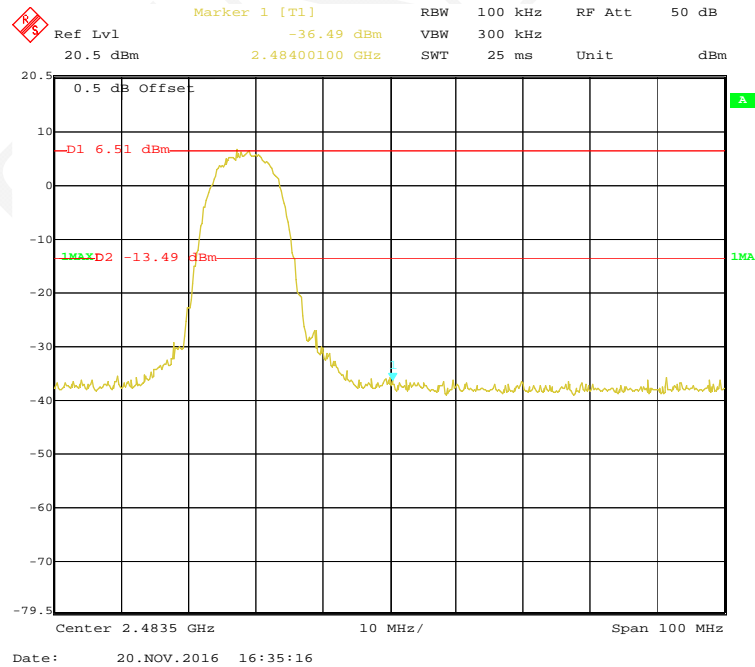
**Test Result:** *Compliance*

Please refer to the following plots.

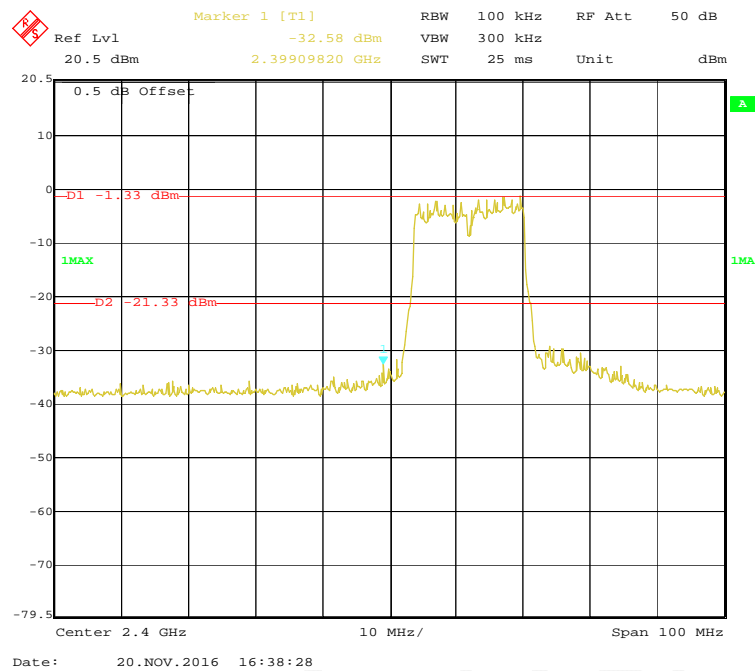
### 802.11b: Band Edge, Left Side



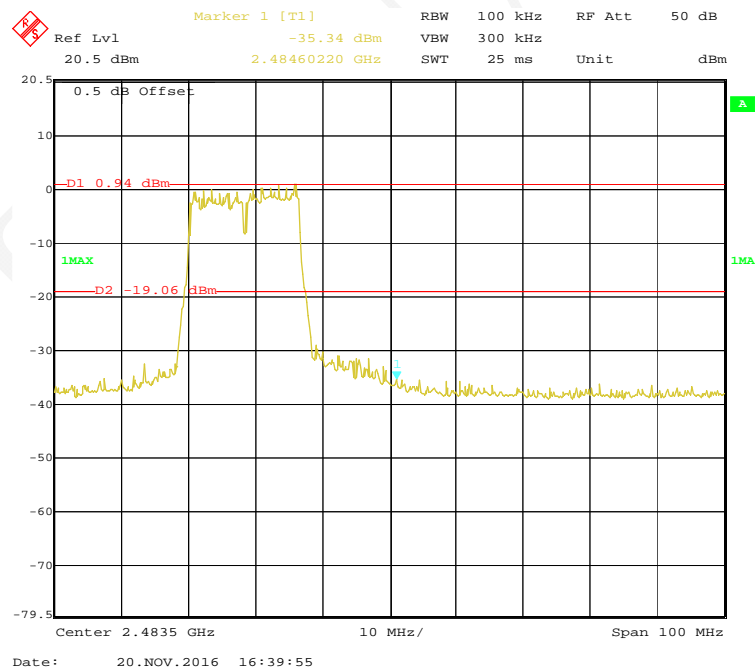
### 802.11b: Band Edge, Right Side



### 802.11g: Band Edge, Left Side

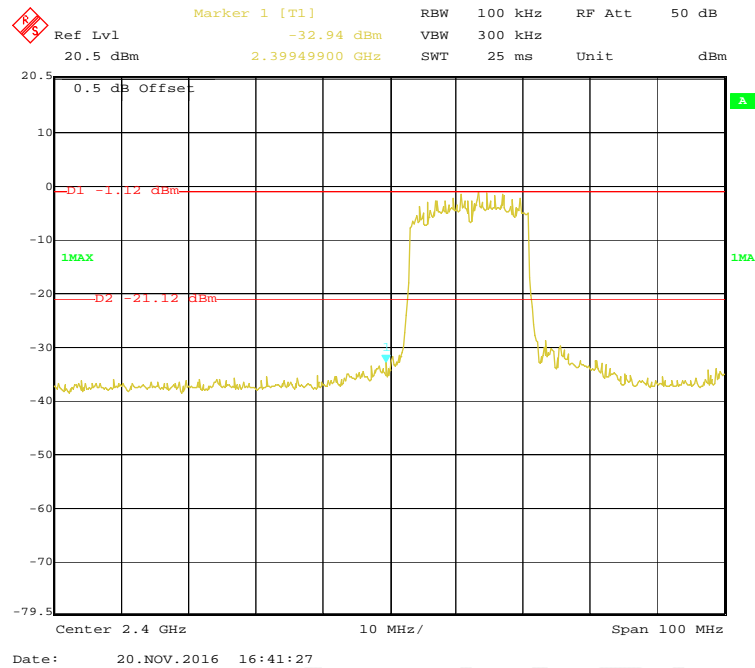


### 802.11g: Band Edge, Right Side

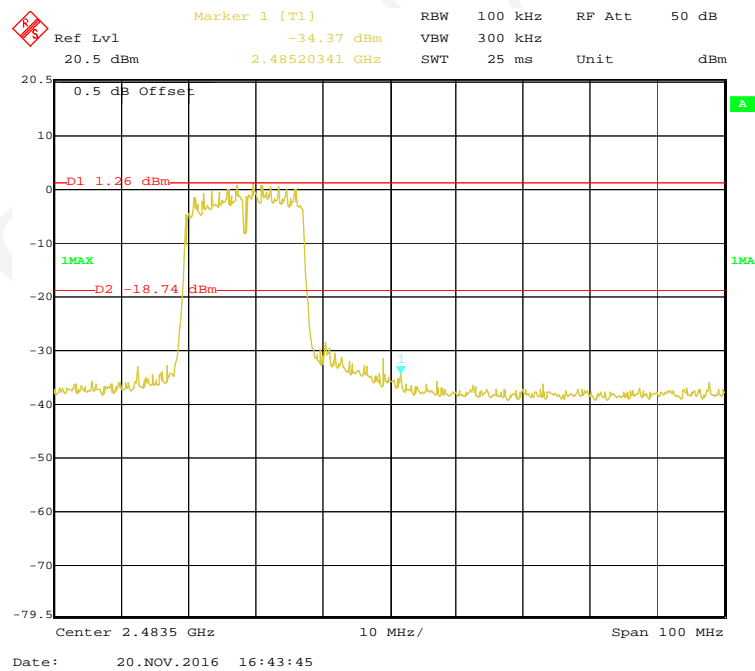




### 802.11n-HT20: Band Edge, Left Side



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



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