

## FCC PART 15.247

## TEST REPORT

For

**Lithe Audio Ltd**

Unit 3 Stockwell Works, Stephenson Way, Crawley, West Sussex, UK RH10 1TN

**FCC ID: 2AQOB-LWF1**

|                                           |                                                                                                                                                                                                                            |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report    | <b>Product Type:</b><br>WI-FI CEILING SPEAKER                                                                                                                                                                              |
| <b>Test Engineer:</b> Stone Zhang         | <i>Stone Zhang</i>                                                                                                                                                                                                         |
| <b>Report Number:</b> RSHA180906008-00B   |                                                                                                                                                                                                                            |
| <b>Report Date:</b> 2018-12-25            |                                                                                                                                                                                                                            |
| <b>Reviewed By:</b> Oscar Ye<br>RF Leader | <i>Oscar Ye</i>                                                                                                                                                                                                            |
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## GENERAL INFORMATION

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

|              |                             |
|--------------|-----------------------------|
| Applicant    | Lithe Audio Ltd             |
| Test Model   | LWF1                        |
| Product Type | WI-FI CEILING SPEAKER       |
| Dimension    | 22.5mm(L)*22.5mm(W)*10mm(H) |
| Rate Voltage | DC 24V from adapter         |

#### *Adapter Information:*

*Model: TDX-2402500*

*Input: AC100-240 V 50/60Hz 2A*

*Output: 24.0V, 2.5A*

*\*All measurement and test data in this report was gathered from production sample serial number: 20180906008 (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-09-06)*

### Objective

This report is prepared on behalf of *Lithe Audio Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

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

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

No related Submittal(s)/Grant(s)

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 15.247 Meas Guidance v05.

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

**Measurement Uncertainty**

| Item                               |             | Measurement Uncertainties |
|------------------------------------|-------------|---------------------------|
| AC Power Lines Conducted Emissions |             | ±3.19 dB                  |
| RF conducted test with spectrum    |             | ±0.9dB                    |
| RF Output Power with Power meter   |             | ±0.5dB                    |
| Radiated emission                  | 30MHz~1GHz  | ±6.11dB                   |
|                                    | 1GHz~6GHz   | ±4.45dB                   |
|                                    | 6GHz~18GHz  | ±5.23dB                   |
|                                    | 18GHz~40GHz | ±5.65dB                   |
| Occupied Bandwidth                 |             | ±0.5kHz                   |
| Temperature                        |             | ±1.0℃                     |
| Humidity                           |             | ±6%                       |

*The Measurement Uncertainties listed above have been calculated for a k=2 Coverage Factor(corresponding to approximately a 95% level of confidence). These Uncertainty values were not taken into account in determining compliance with Limits.*

**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.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

Channel list for 802.11b, 802.11g and 802.11n-HT20 mode:

| 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.

#### For Conducted Test:

802.11b & 802.11g&802.11n: each transmit chains were tested

#### For Radiated Test:

802.11b & 802.11g, SISO for each transmit chain  
For 802.11n: MIMO for two transmit chains

### Equipment Modifications

No modification was made to the EUT tested.

### EUT Exercise Software

RF test tool: teraterm-4.85

Pre-scan with all the data rates, and the worst case was performed as below:

| Mode         | Data rate | Power level |         |
|--------------|-----------|-------------|---------|
|              |           | Chain 0     | Chain 1 |
| 802.11b      | 1 Mbps    | 5           | 7       |
| 802.11g      | 6 Mbps    | 0           | 0       |
| 802.11n-HT20 | MCS0      | 0           | 0       |

**Support Equipment List and Details**

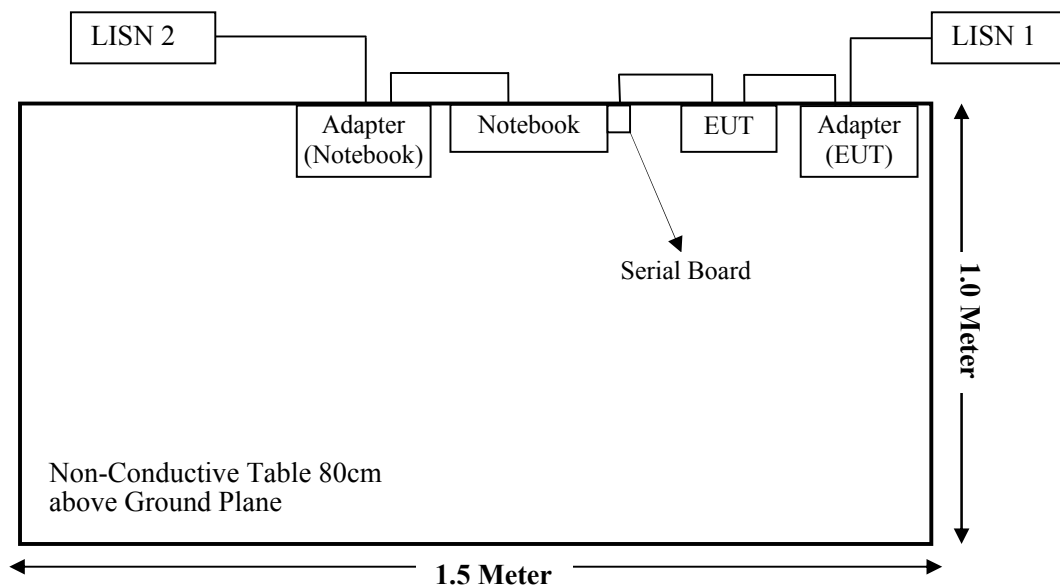
| Manufacturer | Description  | Model      | Serial Number |
|--------------|--------------|------------|---------------|
| DELL         | Notebook     | GX620      | D65874152     |
| DELL         | Adapter      | LA65NS0-00 | DF263         |
| Lithe Audio  | Serial Board | /          | /             |

**External I/O Cable**

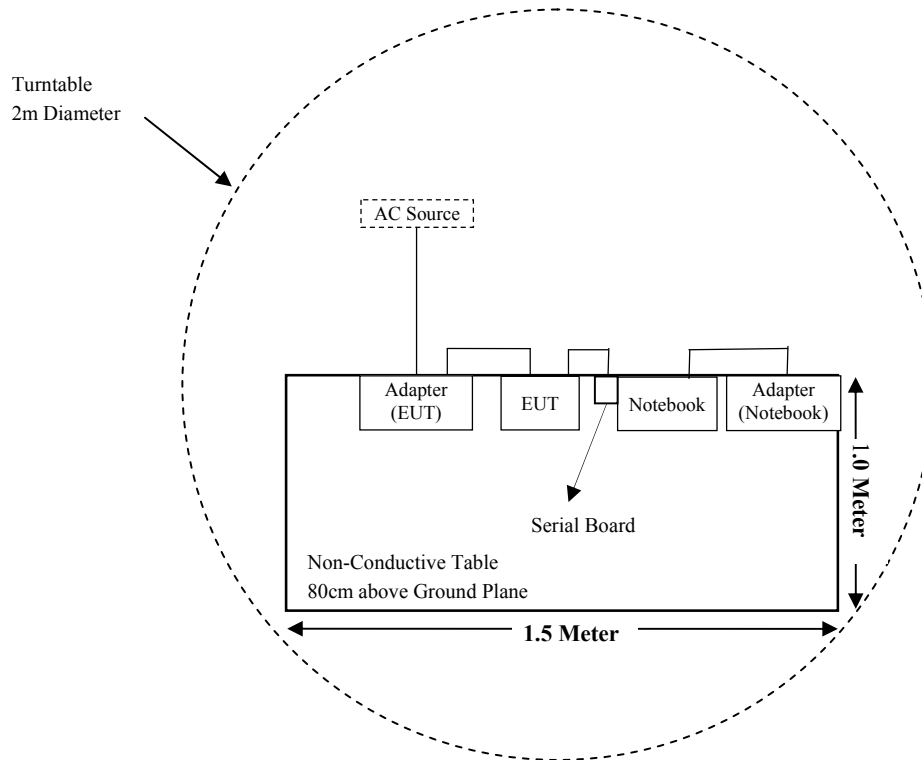
| Cable Description | Length (m) | From Port | To                 |
|-------------------|------------|-----------|--------------------|
| Power Cable-1     | 1.0        | EUT       | Adapter (EUT)      |
| Power Cable-2     | 1.2        | Notebook  | Adapter (Notebook) |
| RJ45 Cable        | 1.8        | EUT       | Notebook           |

**Block Diagram of Test Setup**

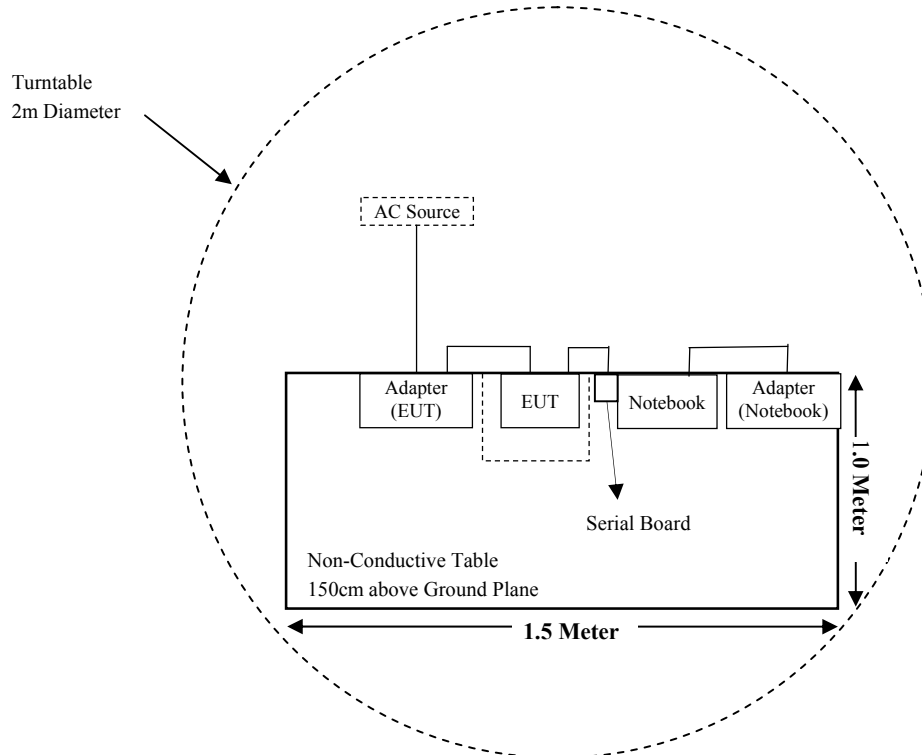
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



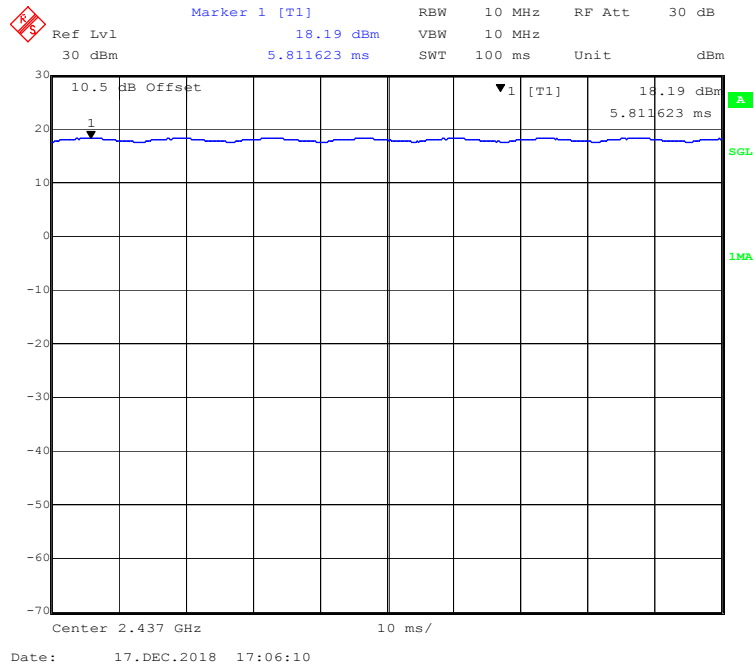
**SUMMARY OF TEST RESULTS**

| FCC Rules                    | Description of Test                | Result    |
|------------------------------|------------------------------------|-----------|
| §1.1310 & §2.1091            | Maximum Permissible Exposure (MPE) | Compliant |
| §15.203                      | Antenna Requirement                | Compliant |
| §15.207 (a)                  | AC Line Conducted Emissions        | Compliant |
| §15.247(d)                   | Spurious Emissions at Antenna Port | Compliant |
| §15.205, §15.209, §15.247(d) | Spurious Emissions                 | Compliant |
| §15.247 (a)(2)               | 6 dB Emission Bandwidth            | Compliant |
| §15.247(b)(3)                | Maximum Conducted Output Power     | Compliant |
| §15.247(d)                   | Band Edge                          | Compliant |
| §15.247(e)                   | Power Spectral Density             | Compliant |

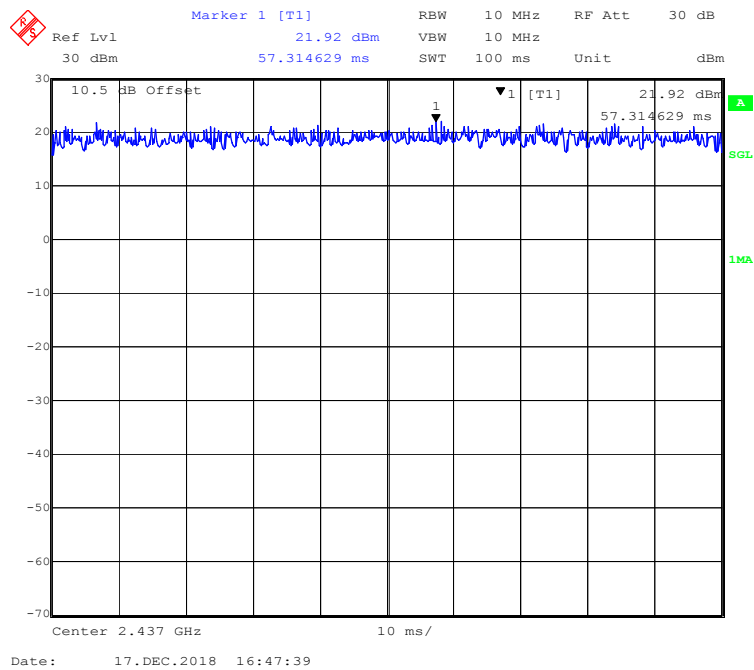
### Duty Cycle Pre-scan

Duty Cycle (Chain 0):

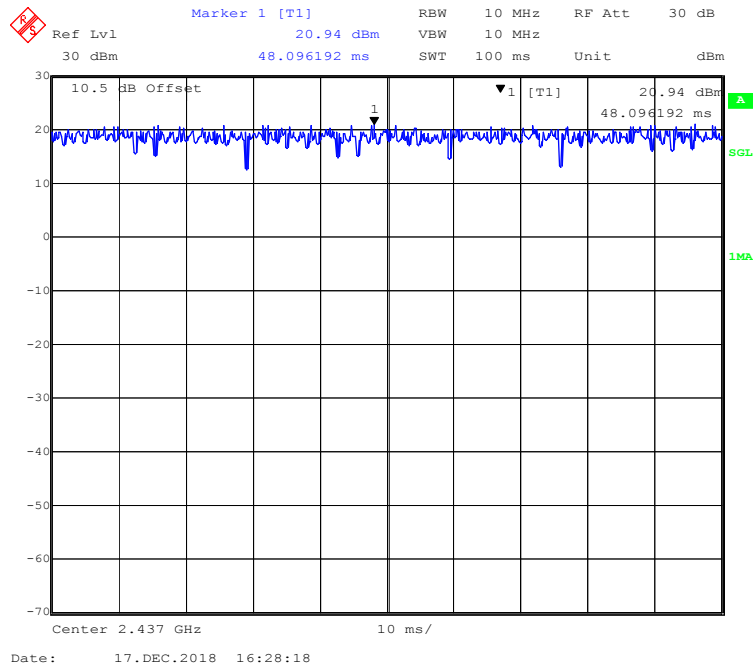
#### 802.11b Mode Middle Channel



#### 802.11g Mode Middle Channel

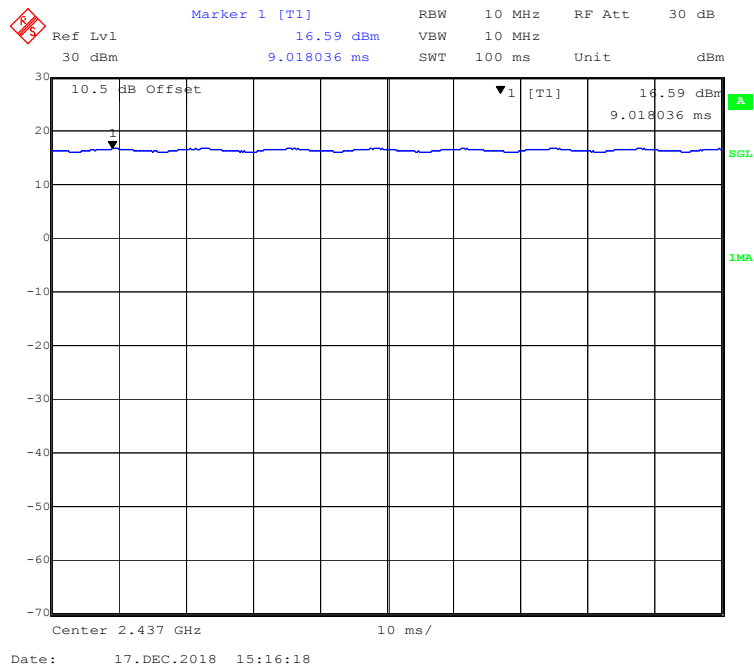


### 802.11n-HT20 Mode Middle Channel

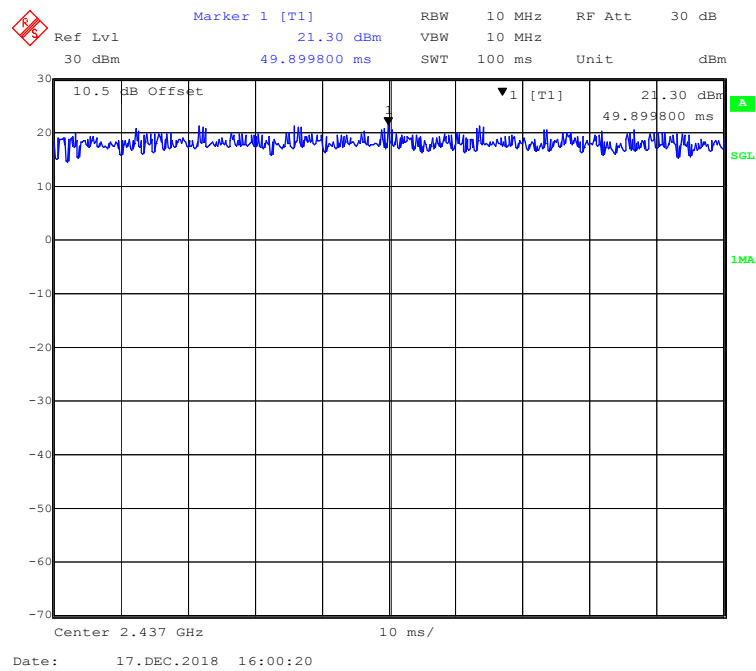


### Duty Cycle (Chain 1):

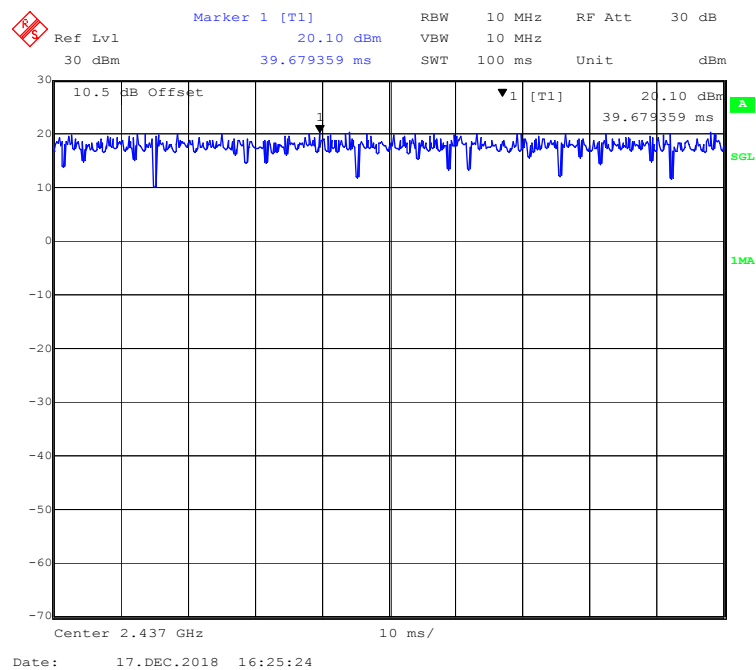
### 802.11b Mode Middle Channel



### 802.11g Mode Middle Channel



### 802.11n-HT20 Mode Middle Channel



| Mode         | Duty Cycle | T(ms) | 1/T(kHz) | 10log(1/x) |
|--------------|------------|-------|----------|------------|
| 802.11b      | 100.00%    | /     | /        | 0.00       |
| 802.11g      | 100.00%    | /     | /        | 0.00       |
| 802.11n-HT20 | 100.00%    | /     | /        | 0.00       |

Note: “x” means the Duty Cycle.

**TEST EQUIPMENT LIST**

| Manufacturer                               | Description        | Model      | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------------------------|--------------------|------------|---------------|------------------|----------------------|
| <b>Radiated Emission Test (Chamber 1#)</b> |                    |            |               |                  |                      |
| Rohde & Schwarz                            | EMI Test Receiver  | ESCI       | 100195        | 2018-11-12       | 2019-11-11           |
| Sunol Sciences                             | Broadband Antenna  | JB3        | A090413-1     | 2016-12-26       | 2019-12-25           |
| Sonoma Instrunent                          | Pre-amplifier      | 310N       | 171205        | 2018-08-15       | 2019-08-14           |
| Rohde & Schwarz                            | Auto test Software | EMC32      | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable      | Cable-8    | 008           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-9    | 009           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-10   | 010           | 2018-08-15       | 2019-08-14           |
| <b>Radiated Emission Test (Chamber 2#)</b> |                    |            |               |                  |                      |
| Rohde & Schwarz                            | EMI Test Receiver  | ESU40      | 100207        | 2018-08-27       | 2019-08-26           |
| ETS-LINDGREN                               | Horn Antenna       | 3115       | 6229          | 2016-01-11       | 2019-01-10           |
| ETS-LINDGREN                               | Horn Antenna       | 3116       | 00084159      | 2016-10-18       | 2019-10-17           |
| A.H.Systems, inc                           | Amplifier          | 2641-1     | 466           | 2018-09-11       | 2019-09-10           |
| EM Electronics                             | Amplifier          | EM18G40G   | 060726        | 2018-03-22       | 2019-03-21           |
| MICRO-TRONICS                              | Notch filter       | BRM50702   | F02           | 2018-08-05       | 2019-08-04           |
| Narda                                      | Attenuator         | 10dB       | 010           | 2018-08-15       | 2019-08-14           |
| Rohde & Schwarz                            | Auto test Software | EMC32      | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable      | Cable-6    | 006           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-11   | 011           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-12   | 012           | 2018-08-15       | 2019-08-14           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-13   | 013           | 2018-08-15       | 2019-08-14           |
| <b>RF Conducted Test</b>                   |                    |            |               |                  |                      |
| Rohde & Schwarz                            | Signal Analyzer    | FSIQ26     | 836131/009    | 2018-11-12       | 2019-11-11           |
| Narda                                      | Attenuator         | 10dB       | 010           | 2018-12-12       | 2019-12-11           |
| Agilent                                    | Power Meter        | N1912A     | MY5000492     | 2018-11-18       | 2019-11-17           |
| Agilent                                    | Power Sensor       | N1921A     | MY54210024    | 2018-11-18       | 2019-11-17           |
| Lithe                                      | RF Cable           | Lithe01    | C01           | Each Time        | /                    |
| <b>Conducted Emission Test</b>             |                    |            |               |                  |                      |
| Rohde & Schwarz                            | EMI Test Receiver  | ESCS30     | 834115/007    | 2018-11-12       | 2019-11-11           |
| Rohde & Schwarz                            | LISN               | ESH3-Z5    | 862770/011    | 2018-11-12       | 2019-11-11           |
| Rohde & Schwarz                            | LISN               | ENV216     | 3560655016    | 2018-11-12       | 2019-11-11           |
| BACL                                       | Auto test Software | BACL-EMC   | CE001         | /                | /                    |
| Narda                                      | Attenuator/6dB     | 10690812-2 | 26850-6       | 2018-01-10       | 2019-01-09           |
| MICRO-COAX                                 | Coaxial Cable      | Cable-15   | 015           | 2018-08-15       | 2019-08-14           |

\* **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).

## **FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to §2.1091 and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

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

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

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

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

### **Calculated Formulary:**

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:****For worst case:**

| Mode         | Frequency (MHz) | Antenna Gain |           | Tune-up Conducted Power |        | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|--------------|-----------------|--------------|-----------|-------------------------|--------|--------------------------|-------------------------------------|---------------------------------|
|              |                 | (dBi)        | (numeric) | (dBm)                   | (mW)   |                          |                                     |                                 |
| 802.11b      | 2412-2462       | 2.00         | 1.58      | 19                      | 79.43  | 20                       | 0.0630                              | 1.0000                          |
| 802.11g      |                 | 2.00         | 1.58      | 21                      | 125.89 | 20                       | 0.0999                              | 1.0000                          |
| 802.11n-HT20 |                 | 2.00         | 1.58      | 23                      | 199.53 | 20                       | 0.1584                              | 1.0000                          |

**Note:**

According to 662911 D01 Multiple Transmitter Output v02r01, for 802.11n:  
 Directional gain =  $G_{ANT} + 10 \cdot \log(N_{ANT})$  dBi = 2.0dBi + 10 \* log(2) = 5.01dBi

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

## **FCC §15.203 - ANTENNA REQUIREMENT**

### **Applicable Standard**

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

- a. Antenna must be permanently attached to the unit.
  - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

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

### **Antenna Connector Construction**

The EUT has two FPC antennas, which use unique type of connector to attach to the EUT; fulfill the requirement of this section. Please refer to the EUT photos.

| Chain | Antenna Type | Max. Antenna Gain |
|-------|--------------|-------------------|
| 0     | FPC          | 2.0 dBi           |
| 1     | FPC          | 2.0 dBi           |

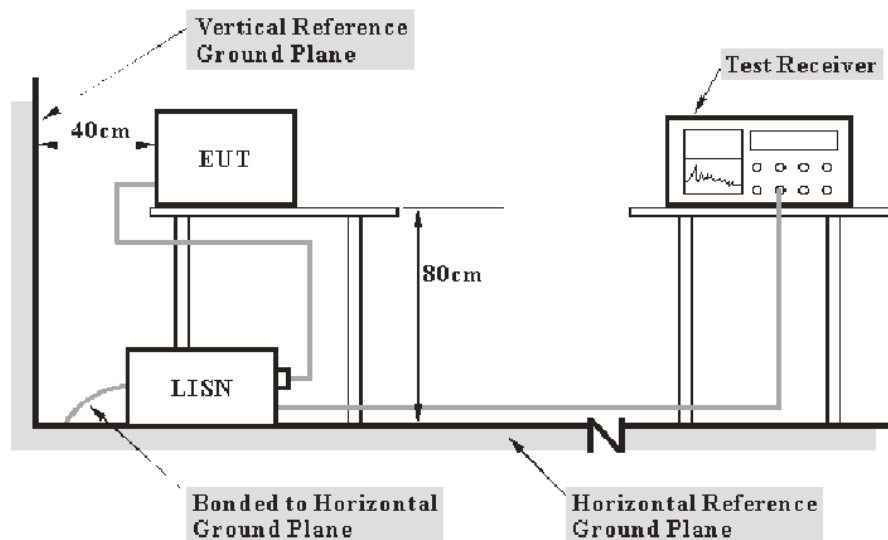
**Result:** Compliant.

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

### Applicable Standard

FCC§15.207

### EUT Setup



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

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

### 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.

## 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:

$$\text{Corrected Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Transient Limiter Attenuation (dB)}$$

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:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V)} - \text{Corrected Amplitude (dB}\mu\text{V)}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

### Test Data

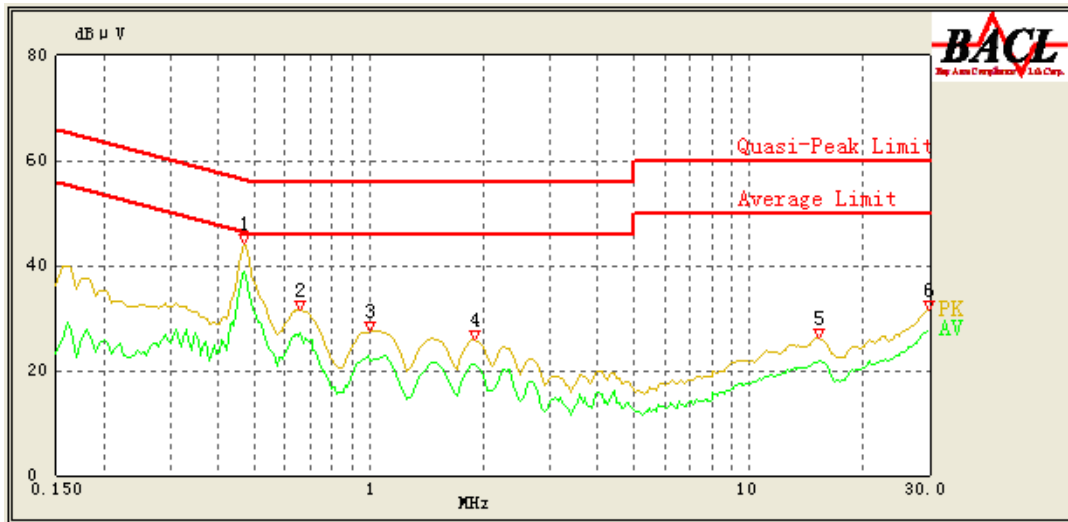
#### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 48 %      |
| <b>ATM Pressure:</b>      | 101.3 kPa |

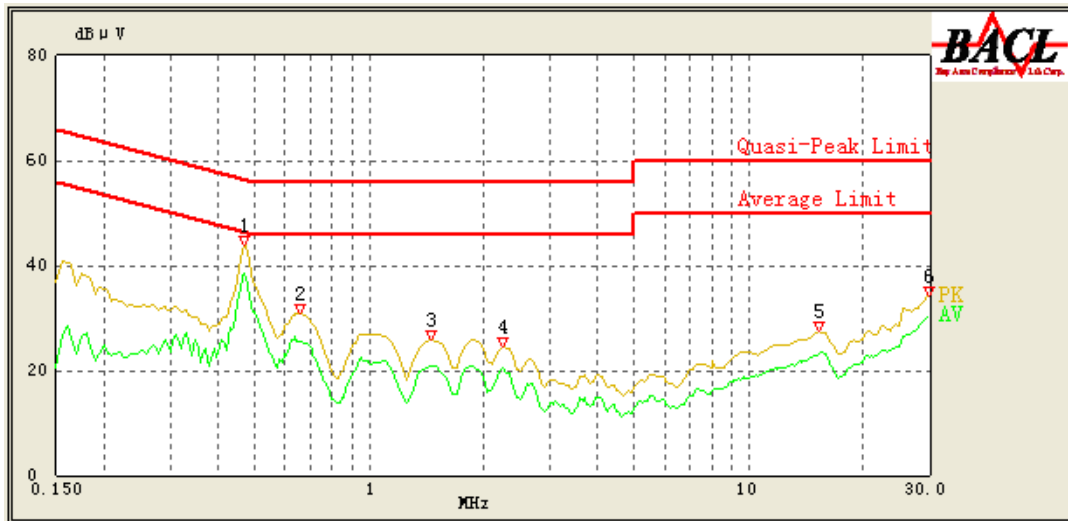
*The testing was performed by Stone Zhang on 2018-12-17.*

EUT operation mode: Transmitting in 802.11g mode low channel of Chain0 (Worst case)

AC 120V/60 Hz, Line



| Frequency (MHz) | Corrected Amplitude (dBμV) | Detector (PK/AV/QP) | Bandwidth (kHz) | Line | Corrected Factor (dB) | Limit (dBμV) | Margin (dB) | Comment    |
|-----------------|----------------------------|---------------------|-----------------|------|-----------------------|--------------|-------------|------------|
| 0.470           | 44.01                      | QP                  | 9.000           | L1   | 16.07                 | 56.51        | 12.85       | Compliance |
| 0.470           | 38.73                      | AV                  | 9.000           | L1   | 16.07                 | 46.51        | 8.13        | Compliance |
| 0.655           | 31.49                      | QP                  | 9.000           | L1   | 15.98                 | 56.00        | 24.51       | Compliance |
| 0.655           | 27.25                      | AV                  | 9.000           | L1   | 15.98                 | 46.00        | 18.75       | Compliance |
| 1.000           | 27.43                      | QP                  | 9.000           | L1   | 15.88                 | 56.00        | 28.57       | Compliance |
| 1.000           | 21.87                      | AV                  | 9.000           | L1   | 15.88                 | 46.00        | 24.13       | Compliance |
| 1.900           | 25.99                      | QP                  | 9.000           | L1   | 15.85                 | 56.00        | 30.01       | Compliance |
| 1.900           | 21.30                      | AV                  | 9.000           | L1   | 15.85                 | 46.00        | 24.70       | Compliance |
| 15.300          | 26.18                      | QP                  | 9.000           | L1   | 16.22                 | 60.00        | 33.82       | Compliance |
| 15.300          | 21.95                      | AV                  | 9.000           | L1   | 16.22                 | 50.00        | 28.05       | Compliance |
| 29.750          | 31.62                      | QP                  | 9.000           | L1   | 16.58                 | 60.00        | 28.38       | Compliance |
| 29.750          | 27.95                      | AV                  | 9.000           | L1   | 16.58                 | 50.00        | 22.05       | Compliance |

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

| Frequency (MHz) | Corrected Amplitude (dBμV) | Detector (PK/AV/QP) | Bandwidth (kHz) | Line | Corrected Factor (dB) | Limit (dBμV) | Margin (dB) | Comment    |
|-----------------|----------------------------|---------------------|-----------------|------|-----------------------|--------------|-------------|------------|
| 0.470           | 43.75                      | QP                  | 9.000           | N    | 16.10                 | 56.51        | 13.11       | Compliance |
| 0.470           | 38.56                      | AV                  | 9.000           | N    | 16.10                 | 46.51        | 8.30        | Compliance |
| 0.655           | 30.87                      | QP                  | 9.000           | N    | 16.02                 | 56.00        | 25.13       | Compliance |
| 0.660           | 25.46                      | AV                  | 9.000           | N    | 16.01                 | 46.00        | 20.54       | Compliance |
| 1.450           | 25.80                      | QP                  | 9.000           | N    | 15.93                 | 56.00        | 30.20       | Compliance |
| 1.450           | 20.98                      | AV                  | 9.000           | N    | 15.93                 | 46.00        | 25.02       | Compliance |
| 2.250           | 24.36                      | QP                  | 9.000           | N    | 15.91                 | 56.00        | 31.64       | Compliance |
| 2.250           | 20.34                      | AV                  | 9.000           | N    | 15.91                 | 46.00        | 25.66       | Compliance |
| 15.300          | 27.37                      | QP                  | 9.000           | N    | 16.02                 | 60.00        | 32.63       | Compliance |
| 15.300          | 23.21                      | AV                  | 9.000           | N    | 16.02                 | 50.00        | 26.79       | Compliance |
| 29.800          | 34.25                      | QP                  | 9.000           | N    | 16.34                 | 60.00        | 25.75       | Compliance |
| 29.850          | 30.44                      | AV                  | 9.000           | N    | 16.34                 | 50.00        | 19.56       | Compliance |

**Note:**

1) Corrected Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

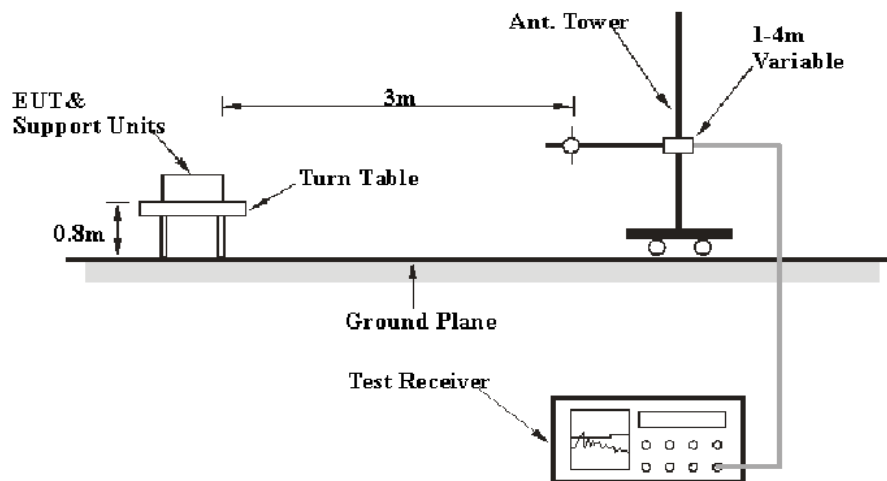
2) Margin (dB) = Limit (dBμV) – Corrected Amplitude (dBμV)

**FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS****Applicable Standard**

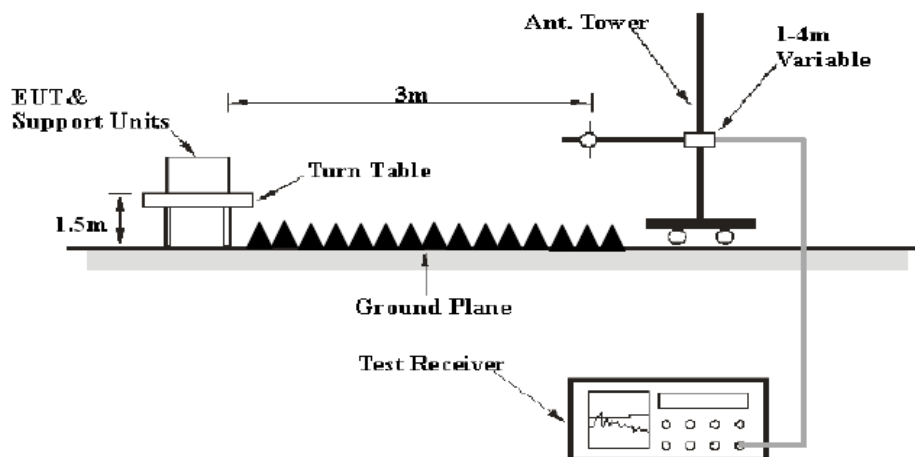
FCC §15.247 (d); §15.209; §15.205;

**EUT Setup**

**Below 1 GHz:**



**Above 1GHz:**



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

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

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

| Frequency Range   | RBW     | Video B/W               | IF B/W  | Detector |
|-------------------|---------|-------------------------|---------|----------|
| 30 MHz - 1000 MHz | 120 kHz | 300 kHz                 | 120 kHz | QP       |
| Above 1GHz        | 1MHz    | 3 MHz                   | /       | PK       |
|                   | 1MHz    | 10 Hz <sup>Note 1</sup> | /       | Ave      |
|                   | 1MHz    | > 1/T <sup>Note 2</sup> |         | Ave      |

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

## 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 mode for frequencies above 1 GHz.

## 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:

$$\text{Corrected Amplitude (dB}\mu\text{V /m)} = \text{Meter Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Amplifier Gain (dB)}$$

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:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Corrected Amplitude (dB}\mu\text{V /m)}$$

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

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

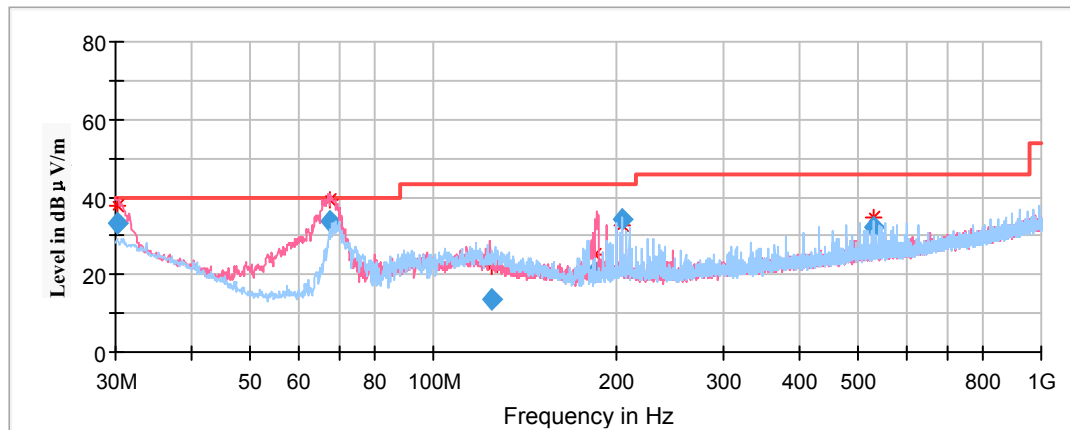
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24.8°C    |
| <b>Relative Humidity:</b> | 51 %      |
| <b>ATM Pressure:</b>      | 101.2 kPa |

The testing was performed by Stone Zhang on 2018-12-17

**Test Result:** Compliant.

**Spurious Emission Test:****30MHz-1GHz:**

Pre-scan with 802.11b, 802.11g and 802.11n-HT20 modes of operation in the X,Y and Z axes of orientation, the worst case 802.11g mode low channel of chain 0 in X-axis of orientation was recorded



| Frequency<br>(MHz) | Corrected<br>Amplitude | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|------------------------|----------------|----------------|---------------------|-------------------------------|-------------------|----------------|
|                    | QuasiPeak<br>(dBμV/m)  | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                   |                |
| 30.187345          | 33.27                  | 101.0          | V              | 173.0               | -4.1                          | 40.00             | 6.73           |
| 67.582750          | 33.77                  | 101.0          | V              | 147.0               | -17.4                         | 40.00             | 6.23           |
| 124.581050         | 13.69                  | 101.0          | V              | 278.0               | -11.4                         | 43.50             | 29.81          |
| 185.022600         | 20.57                  | 101.0          | V              | 220.0               | -13.3                         | 43.50             | 22.93          |
| 204.992550         | 34.02                  | 199.0          | H              | 34.0                | -12.3                         | 43.50             | 9.48           |
| 528.374750         | 32.40                  | 199.0          | H              | 110.0               | -5.9                          | 46.00             | 13.60          |

**1GHz-18GHz****802.11b Mode (Chain 0):**

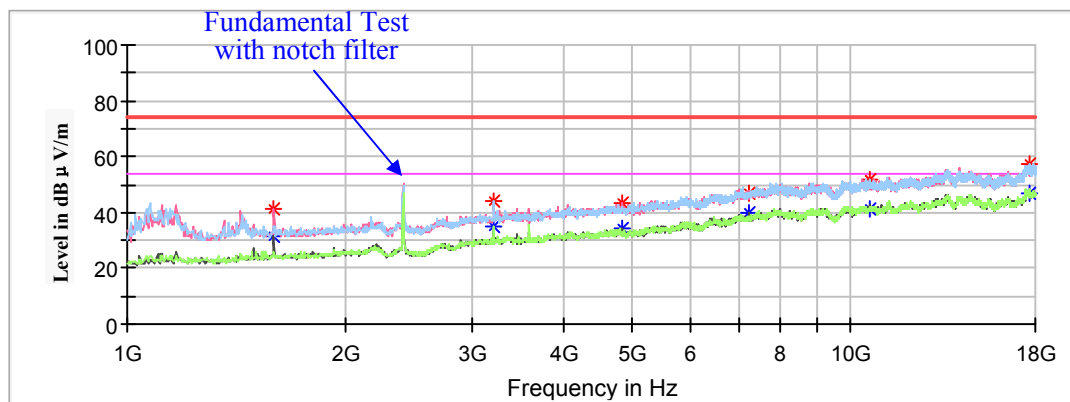
(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)  
 Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)  
 Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)

**Low Channel: 2412MHz**

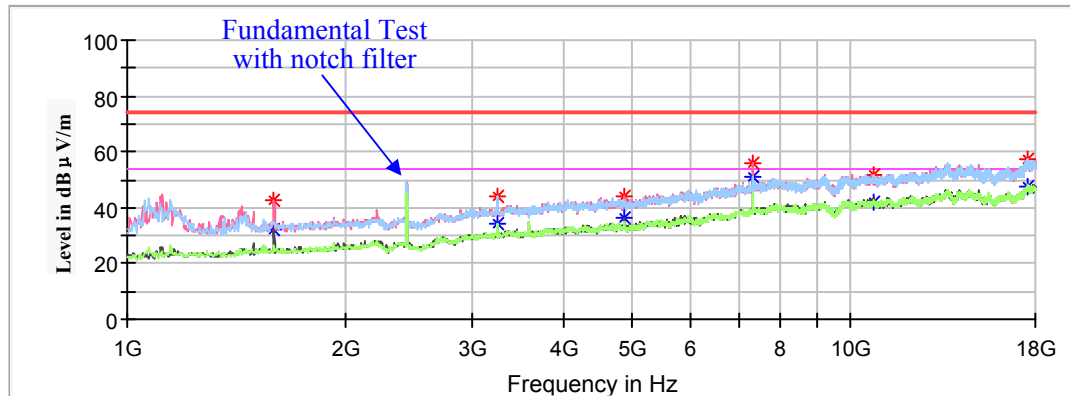
Full Spectrum



| Frequency (MHz) | Corrected Amplitude     |                         | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------------|-------------------------|-------------|-------------|------------------|-------------------------|----------------------|-------------|
|                 | MaxPeak (dB $\mu$ V /m) | Average (dB $\mu$ V /m) | Height (cm) | Polar (H/V) |                  |                         |                      |             |
| 1591.600000     | ---                     | 31.27                   | 150.0       | V           | 61.0             | -7.2                    | 54.00                | 22.73       |
| 1591.600000     | 41.14                   | ---                     | 150.0       | V           | 61.0             | -7.2                    | 74.00                | 32.86       |
| 3213.400000     | ---                     | 34.79                   | 200.0       | H           | 130.0            | -1.3                    | 54.00                | 19.21       |
| 3213.400000     | 44.30                   | ---                     | 200.0       | H           | 130.0            | -1.3                    | 74.00                | 29.70       |
| 4824.000000     | ---                     | 34.26                   | 200.0       | V           | 46.0             | 1.9                     | 54.00                | 19.74       |
| 4824.000000     | 43.59                   | ---                     | 200.0       | V           | 46.0             | 1.9                     | 74.00                | 30.41       |
| 7236.000000     | 47.14                   | ---                     | 200.0       | V           | 5.0              | 9.0                     | 74.00                | 26.86       |
| 7236.000000     | ---                     | 39.62                   | 200.0       | V           | 5.0              | 9.0                     | 54.00                | 14.38       |
| 10622.000000    | ---                     | 41.18                   | 200.0       | H           | 302.0            | 12.9                    | 54.00                | 12.82       |
| 10622.000000    | 51.96                   | ---                     | 200.0       | H           | 302.0            | 12.9                    | 74.00                | 22.04       |
| 17643.000000    | ---                     | 46.74                   | 200.0       | H           | 78.0             | 17.3                    | 54.00                | 7.26        |
| 17643.000000    | 57.17                   | ---                     | 150.0       | H           | 78.0             | 17.3                    | 74.00                | 16.83       |

**Middle Channel: 2437MHz**

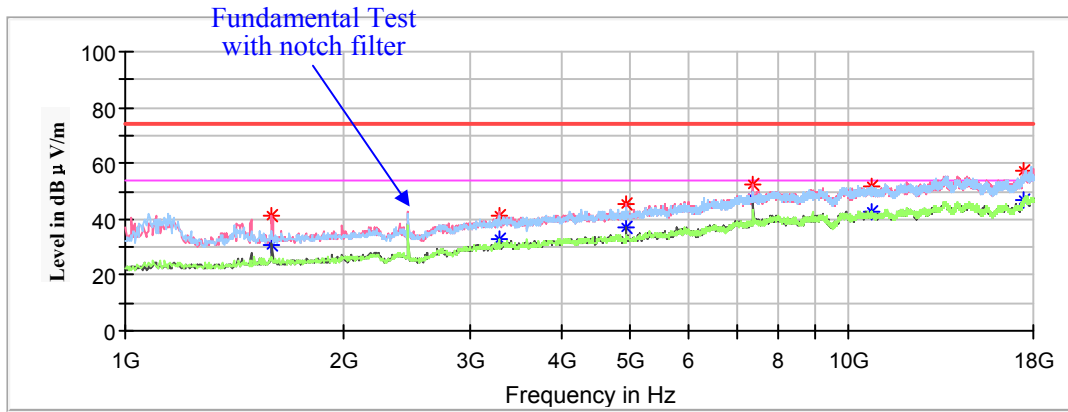
Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1595.000000     | ---                 | 32.32             | 200.0       | V           | 66.0             | -7.2                    | 54.00          | 21.68       |
| 1595.000000     | 42.51               | ---               | 200.0       | V           | 66.0             | -7.2                    | 74.00          | 31.49       |
| 3247.400000     | ---                 | 34.37             | 150.0       | H           | 137.0            | -1.2                    | 54.00          | 19.63       |
| 3247.400000     | 43.84               | ---               | 150.0       | H           | 137.0            | -1.2                    | 74.00          | 30.16       |
| 4874.000000     | ---                 | 36.65             | 150.0       | V           | 25.0             | 1.9                     | 54.00          | 17.35       |
| 4874.000000     | 43.75               | ---               | 150.0       | V           | 25.0             | 1.9                     | 74.00          | 30.25       |
| 7311.000000     | 55.71               | ---               | 150.0       | V           | 200.0            | 9.2                     | 74.00          | 18.29       |
| 7311.000000     | ---                 | 51.34             | 150.0       | V           | 200.0            | 9.2                     | 54.00          | 2.66        |
| 10754.600000    | ---                 | 41.74             | 200.0       | H           | 77.0             | 13.1                    | 54.00          | 12.26       |
| 10754.600000    | 51.68               | ---               | 200.0       | H           | 77.0             | 13.1                    | 74.00          | 22.32       |
| 17547.800000    | ---                 | 47.27             | 150.0       | H           | 335.0            | 17.2                    | 54.00          | 6.73        |
| 17547.800000    | 57.33               | ---               | 150.0       | H           | 335.0            | 17.2                    | 74.00          | 16.67       |

**High Channel: 2462MHz**

Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1591.600000     | ---                 | 30.98             | 150.0       | V           | 72.0             | -7.2                    | 54.00          | 23.02       |
| 1591.600000     | 41.00               | ---               | 150.0       | V           | 72.0             | -7.2                    | 74.00          | 33.00       |
| 3281.400000     | 41.48               | ---               | 200.0       | H           | 276.0            | -1.2                    | 74.00          | 32.52       |
| 3281.400000     | ---                 | 33.00             | 200.0       | H           | 276.0            | -1.2                    | 54.00          | 21.00       |
| 4924.000000     | ---                 | 37.26             | 150.0       | V           | 34.0             | 2.0                     | 54.00          | 16.74       |
| 4924.000000     | 45.72               | ---               | 150.0       | V           | 34.0             | 2.0                     | 74.00          | 28.28       |
| 7386.000000     | ---                 | 47.40             | 150.0       | V           | 200.0            | 9.4                     | 54.00          | 6.60        |
| 7386.000000     | 52.28               | ---               | 150.0       | V           | 200.0            | 9.4                     | 74.00          | 21.72       |
| 10741.000000    | ---                 | 42.49             | 200.0       | H           | 245.0            | 13.1                    | 54.00          | 11.51       |
| 10741.000000    | 51.75               | ---               | 200.0       | H           | 245.0            | 13.1                    | 74.00          | 22.25       |
| 17466.200000    | ---                 | 46.85             | 150.0       | V           | 355.0            | 17.0                    | 54.00          | 7.15        |
| 17466.200000    | 57.50               | ---               | 150.0       | V           | 355.0            | 17.0                    | 74.00          | 16.50       |

**802.11b Mode (Chain 1):**

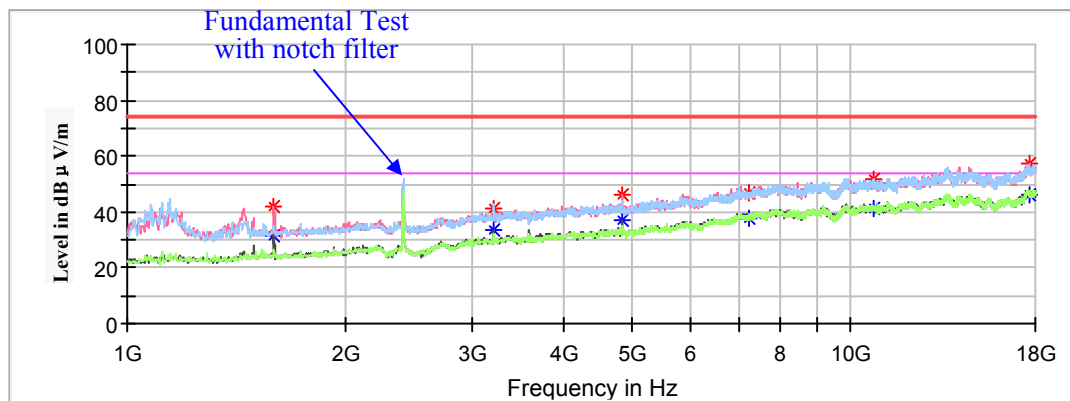
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)  
 Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)  
 Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)

**Low Channel: 2412MHz**

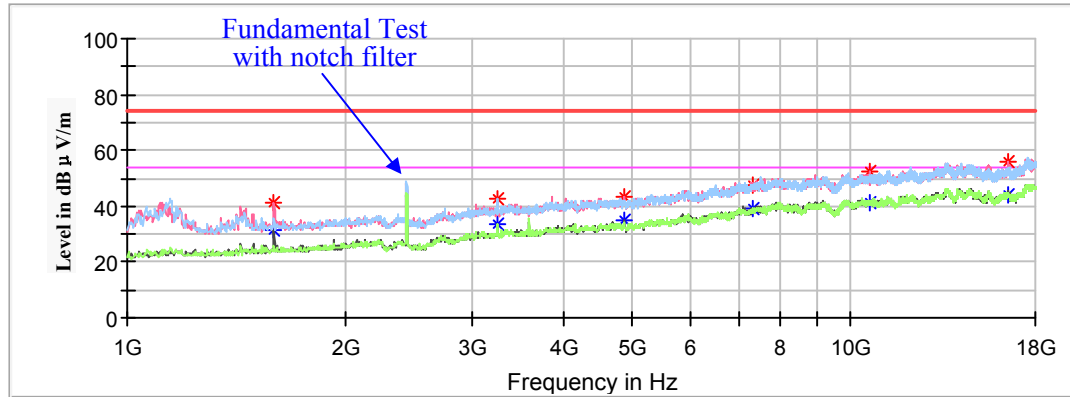
Full Spectrum



| Frequency (MHz) | Corrected Amplitude     |                         | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------------|-------------------------|-------------|-------------|------------------|-------------------------|----------------------|-------------|
|                 | MaxPeak (dB $\mu$ V /m) | Average (dB $\mu$ V /m) | Height (cm) | Polar (H/V) |                  |                         |                      |             |
| 1591.600000     | ---                     | 31.40                   | 200.0       | V           | 66.0             | -7.2                    | 54.00                | 22.60       |
| 1591.600000     | 41.71                   | ---                     | 200.0       | V           | 66.0             | -7.2                    | 74.00                | 32.29       |
| 3213.400000     | ---                     | 33.48                   | 150.0       | V           | 226.0            | -1.3                    | 54.00                | 20.52       |
| 3213.400000     | 41.28                   | ---                     | 150.0       | V           | 226.0            | -1.3                    | 74.00                | 32.72       |
| 4824.000000     | ---                     | 37.23                   | 200.0       | H           | 19.0             | 1.9                     | 54.00                | 16.77       |
| 4824.000000     | 46.21                   | ---                     | 200.0       | H           | 19.0             | 1.9                     | 74.00                | 27.79       |
| 7236.000000     | 46.55                   | ---                     | 200.0       | H           | 178.0            | 9.0                     | 74.00                | 27.45       |
| 7236.000000     | ---                     | 38.06                   | 200.0       | H           | 178.0            | 9.0                     | 54.00                | 15.94       |
| 10747.800000    | ---                     | 41.57                   | 150.0       | H           | 124.0            | 13.1                    | 54.00                | 12.43       |
| 10747.800000    | 52.05                   | ---                     | 150.0       | H           | 124.0            | 13.1                    | 74.00                | 21.95       |
| 17643.000000    | ---                     | 46.11                   | 150.0       | V           | 84.0             | 17.3                    | 54.00                | 7.89        |
| 17643.000000    | 57.05                   | ---                     | 150.0       | V           | 84.0             | 17.3                    | 74.00                | 16.95       |

**Middle Channel: 2437MHz**

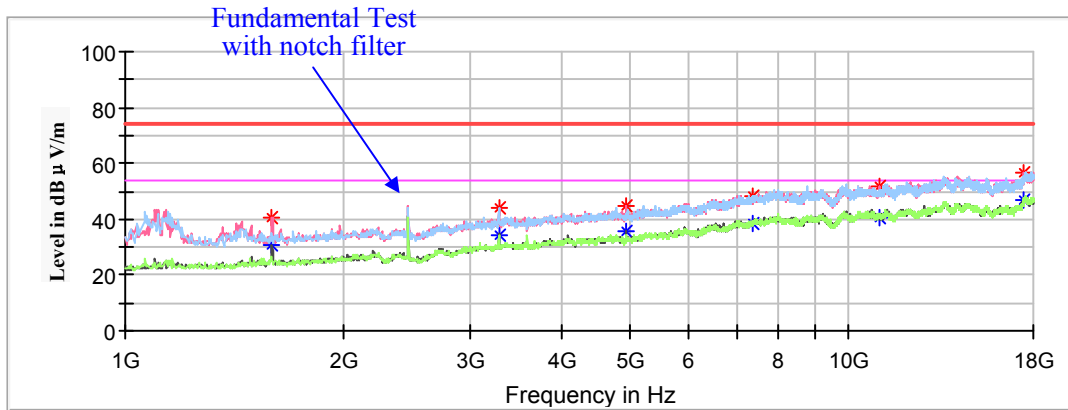
Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1595.000000     | ---                 | 31.79             | 150.0       | V           | 59.0             | -7.2                    | 54.00          | 22.21       |
| 1595.000000     | 40.95               | ---               | 150.0       | V           | 59.0             | -7.2                    | 74.00          | 33.05       |
| 3247.400000     | ---                 | 33.37             | 200.0       | H           | 307.0            | -1.2                    | 54.00          | 20.63       |
| 3247.400000     | 42.84               | ---               | 200.0       | H           | 307.0            | -1.2                    | 74.00          | 31.16       |
| 4874.000000     | ---                 | 34.92             | 200.0       | H           | 27.0             | 1.9                     | 54.00          | 19.08       |
| 4874.000000     | 43.29               | ---               | 200.0       | H           | 27.0             | 1.9                     | 74.00          | 30.71       |
| 7311.000000     | ---                 | 38.88             | 200.0       | H           | 35.0             | 9.2                     | 54.00          | 15.12       |
| 7311.000000     | 47.89               | ---               | 200.0       | H           | 35.0             | 9.2                     | 74.00          | 26.11       |
| 10649.200000    | ---                 | 41.46             | 150.0       | V           | 201.0            | 12.9                    | 54.00          | 12.54       |
| 10649.200000    | 52.34               | ---               | 150.0       | V           | 201.0            | 12.9                    | 74.00          | 21.66       |
| 16514.200000    | ---                 | 44.15             | 200.0       | V           | 124.0            | 13.7                    | 54.00          | 9.85        |
| 16514.200000    | 55.63               | ---               | 200.0       | V           | 124.0            | 13.7                    | 74.00          | 18.37       |

**High Channel: 2462MHz**

Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1595.000000     | 40.28               | ---               | 150.0       | V           | 57.0             | -7.2                    | 74.00          | 33.72       |
| 1595.000000     | ---                 | 30.76             | 150.0       | V           | 57.0             | -7.2                    | 54.00          | 23.24       |
| 3281.400000     | ---                 | 34.50             | 200.0       | H           | 352.0            | -1.2                    | 54.00          | 19.50       |
| 3281.400000     | 44.14               | ---               | 200.0       | H           | 352.0            | -1.2                    | 74.00          | 29.86       |
| 4924.000000     | ---                 | 35.61             | 200.0       | H           | 314.0            | 2.0                     | 54.00          | 18.39       |
| 4924.000000     | 44.43               | ---               | 200.0       | H           | 314.0            | 2.0                     | 74.00          | 29.57       |
| 7386.000000     | ---                 | 38.71             | 200.0       | H           | 257.0            | 9.4                     | 54.00          | 15.29       |
| 7386.000000     | 48.23               | ---               | 200.0       | H           | 257.0            | 9.4                     | 74.00          | 25.77       |
| 11033.400000    | ---                 | 40.77             | 150.0       | V           | 339.0            | 13.4                    | 54.00          | 13.23       |
| 11033.400000    | 51.55               | ---               | 150.0       | V           | 339.0            | 13.4                    | 74.00          | 22.45       |
| 17500.200000    | ---                 | 46.86             | 200.0       | V           | 21.0             | 17.2                    | 54.00          | 7.14        |
| 17500.200000    | 56.96               | ---               | 200.0       | V           | 21.0             | 17.2                    | 74.00          | 17.04       |

**802.11g Mode(Chain 0):**

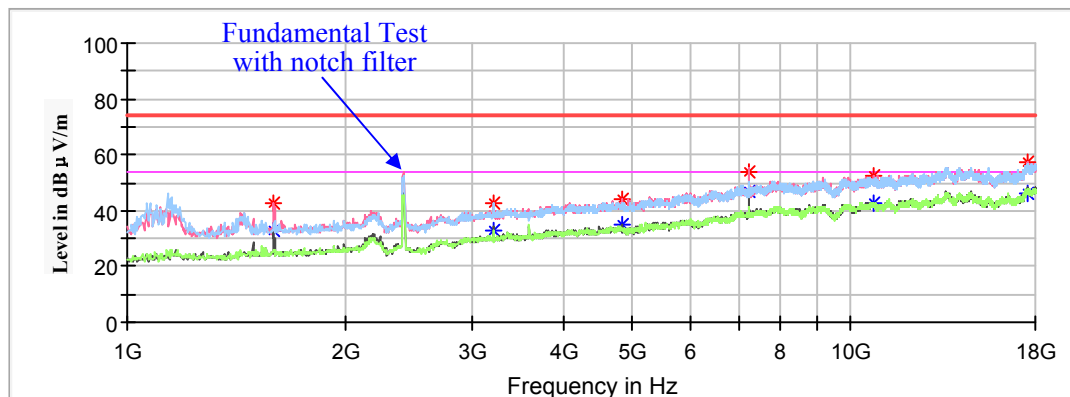
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)  
 Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)  
 Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)

**Low Channel: 2412MHz**

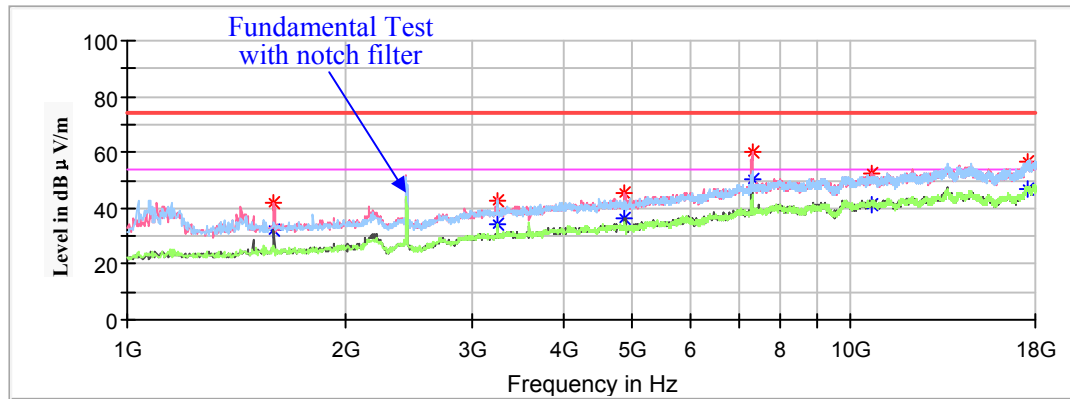
Full Spectrum



| Frequency (MHz) | Corrected Amplitude     |                         | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------------|-------------------------|-------------|-------------|------------------|-------------------------|----------------------|-------------|
|                 | MaxPeak (dB $\mu$ V /m) | Average (dB $\mu$ V /m) | Height (cm) | Polar (H/V) |                  |                         |                      |             |
| 1591.600000     | 42.60                   | ---                     | 150.0       | V           | 63.0             | -7.2                    | 74.00                | 31.40       |
| 1591.600000     | ---                     | 32.93                   | 150.0       | V           | 63.0             | -7.2                    | 54.00                | 21.07       |
| 3213.400000     | 42.80                   | ---                     | 200.0       | H           | 358.0            | -1.3                    | 74.00                | 31.20       |
| 3213.400000     | ---                     | 32.94                   | 200.0       | H           | 358.0            | -1.3                    | 54.00                | 21.06       |
| 4824.000000     | 43.82                   | ---                     | 150.0       | V           | 0.0              | 1.9                     | 74.00                | 30.18       |
| 4824.000000     | ---                     | 34.94                   | 150.0       | V           | 0.0              | 1.9                     | 54.00                | 19.06       |
| 7236.000000     | 54.13                   | ---                     | 150.0       | V           | 3.0              | 9.0                     | 74.00                | 19.87       |
| 7236.000000     | ---                     | 46.55                   | 150.0       | V           | 3.0              | 9.0                     | 54.00                | 7.45        |
| 10741.000000    | ---                     | 42.32                   | 200.0       | V           | 121.0            | 13.1                    | 54.00                | 11.68       |
| 10741.000000    | 52.64                   | ---                     | 200.0       | V           | 121.0            | 13.1                    | 74.00                | 21.36       |
| 17544.400000    | ---                     | 46.27                   | 150.0       | V           | 140.0            | 17.2                    | 54.00                | 7.73        |
| 17544.400000    | 57.18                   | ---                     | 150.0       | V           | 140.0            | 17.2                    | 74.00                | 16.82       |

**Middle Channel: 2437MHz**

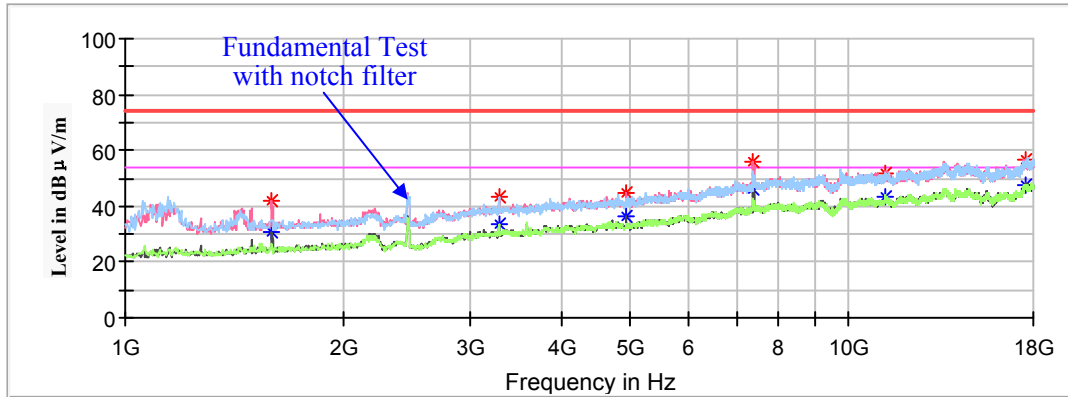
Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1595.000000     | ---                 | 32.22             | 150.0       | V           | 72.0             | -7.2                    | 54.00          | 21.78       |
| 1595.000000     | 41.64               | ---               | 150.0       | V           | 72.0             | -7.2                    | 74.00          | 32.36       |
| 3247.400000     | 42.76               | ---               | 200.0       | H           | 332.0            | -1.2                    | 74.00          | 31.24       |
| 3247.400000     | ---                 | 34.60             | 200.0       | H           | 332.0            | -1.2                    | 54.00          | 19.40       |
| 4874.000000     | ---                 | 36.06             | 150.0       | V           | 21.0             | 1.9                     | 54.00          | 17.94       |
| 4874.000000     | 45.26               | ---               | 150.0       | V           | 21.0             | 1.9                     | 74.00          | 28.74       |
| 7311.000000     | ---                 | 50.58             | 150.0       | V           | 200.0            | 9.2                     | 54.00          | 3.42        |
| 7311.000000     | 60.15               | ---               | 150.0       | V           | 200.0            | 9.2                     | 74.00          | 13.85       |
| 10673.000000    | ---                 | 41.51             | 200.0       | V           | 354.0            | 13.0                    | 54.00          | 12.49       |
| 10673.000000    | 52.31               | ---               | 200.0       | V           | 354.0            | 13.0                    | 74.00          | 21.69       |
| 17575.000000    | ---                 | 46.75             | 150.0       | H           | 200.0            | 17.3                    | 54.00          | 7.25        |
| 17575.000000    | 56.97               | ---               | 150.0       | H           | 200.0            | 17.3                    | 74.00          | 17.03       |

**High Channel: 2462MHz**

Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBµV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBµV /m)   | Average (dBµV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1591.600000     | ---                 | 30.83             | 200.0       | V           | 66.0             | -7.2                    | 54.00          | 23.17       |
| 1591.600000     | 41.83               | ---               | 200.0       | V           | 66.0             | -7.2                    | 74.00          | 32.17       |
| 3281.400000     | ---                 | 33.54             | 200.0       | H           | 332.0            | -1.2                    | 54.00          | 20.46       |
| 3281.400000     | 43.62               | ---               | 200.0       | H           | 332.0            | -1.2                    | 74.00          | 30.38       |
| 4924.000000     | ---                 | 36.50             | 150.0       | V           | 27.0             | 2.0                     | 54.00          | 17.50       |
| 4924.000000     | 44.70               | ---               | 150.0       | V           | 27.0             | 2.0                     | 74.00          | 29.30       |
| 7386.000000     | ---                 | 46.27             | 150.0       | V           | 9.0              | 9.4                     | 54.00          | 7.73        |
| 7386.000000     | 56.20               | ---               | 150.0       | V           | 9.0              | 9.4                     | 74.00          | 17.80       |
| 11237.400000    | ---                 | 43.14             | 200.0       | H           | 320.0            | 13.2                    | 54.00          | 10.86       |
| 11237.400000    | 51.91               | ---               | 200.0       | H           | 320.0            | 13.2                    | 74.00          | 22.09       |
| 17564.800000    | ---                 | 47.29             | 150.0       | V           | 123.0            | 17.3                    | 54.00          | 6.71        |
| 17564.800000    | 56.84               | ---               | 150.0       | V           | 123.0            | 17.3                    | 74.00          | 17.16       |

**802.11g Mode(Chain 1):**

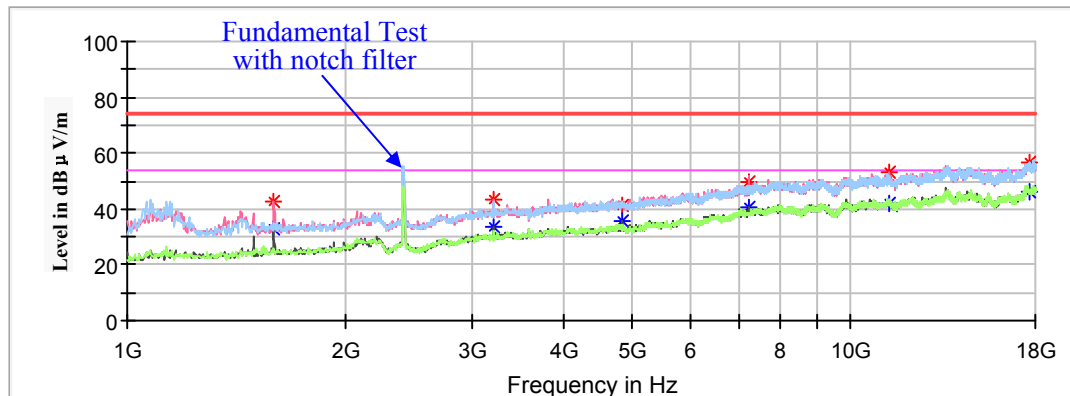
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)  
 Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)  
 Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)

**Low Channel1: 2412MHz**

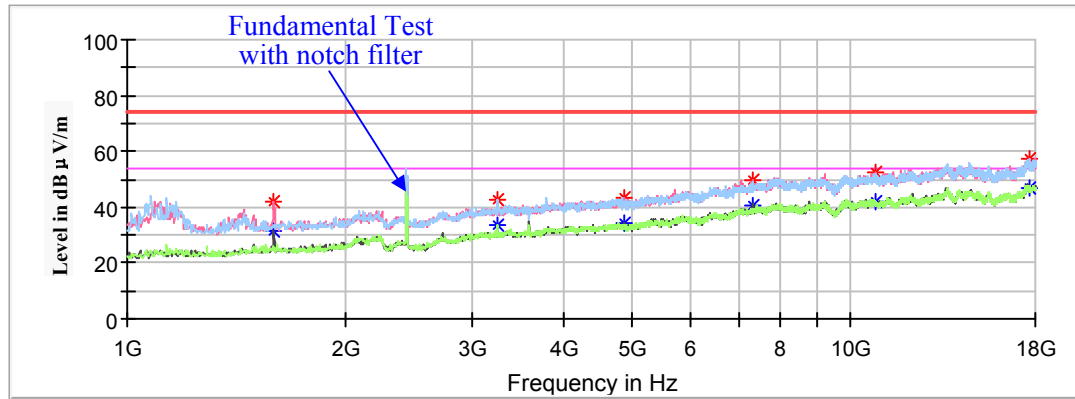
Full Spectrum



| Frequency (MHz) | Corrected Amplitude     |                         | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------------|-------------------------|-------------|-------------|------------------|-------------------------|----------------------|-------------|
|                 | MaxPeak (dB $\mu$ V /m) | Average (dB $\mu$ V /m) | Height (cm) | Polar (H/V) |                  |                         |                      |             |
| 1591.600000     | ---                     | 32.74                   | 200.0       | V           | 66.0             | -7.2                    | 54.00                | 21.26       |
| 1591.600000     | 42.78                   | ---                     | 200.0       | V           | 66.0             | -7.2                    | 74.00                | 31.22       |
| 3213.400000     | ---                     | 33.47                   | 150.0       | V           | 246.0            | -1.3                    | 54.00                | 20.53       |
| 3213.400000     | 43.23                   | ---                     | 150.0       | V           | 246.0            | -1.3                    | 74.00                | 30.77       |
| 4824.000000     | 41.53                   | ---                     | 200.0       | V           | 27.0             | 1.9                     | 74.00                | 32.47       |
| 4824.000000     | ---                     | 35.55                   | 200.0       | V           | 27.0             | 1.9                     | 54.00                | 18.45       |
| 7236.000000     | 49.35                   | ---                     | 200.0       | V           | 246.0            | 8.9                     | 74.00                | 24.65       |
| 7236.000000     | ---                     | 40.70                   | 200.0       | V           | 246.0            | 8.9                     | 54.00                | 13.30       |
| 11291.800000    | ---                     | 42.28                   | 200.0       | V           | 220.0            | 13.1                    | 54.00                | 11.72       |
| 11291.800000    | 53.43                   | ---                     | 200.0       | V           | 220.0            | 13.1                    | 74.00                | 20.57       |
| 17653.200000    | ---                     | 46.32                   | 150.0       | H           | 181.0            | 17.4                    | 54.00                | 7.68        |
| 17653.200000    | 56.37                   | ---                     | 150.0       | H           | 181.0            | 17.4                    | 74.00                | 17.63       |

**Middle Channel: 2437MHz**

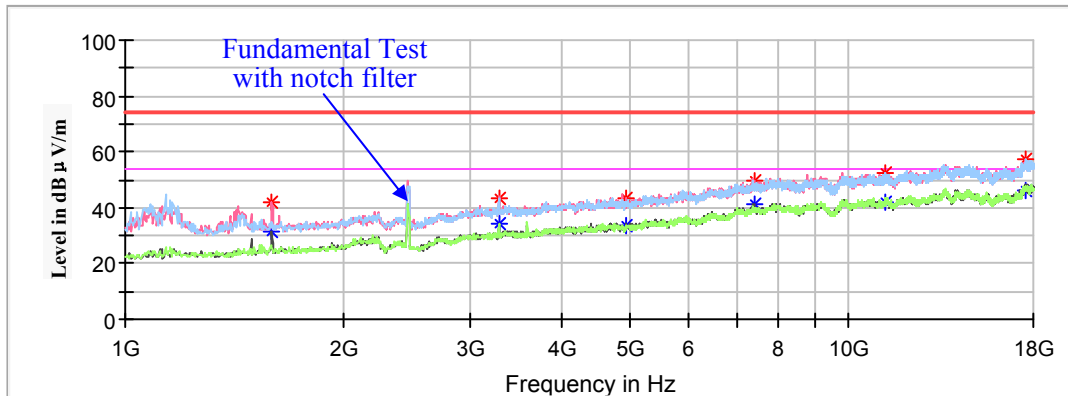
Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBµV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBµV /m)   | Average (dBµV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1591.600000     | ---                 | 31.75             | 200.0       | V           | 66.0             | -7.2                    | 54.00          | 22.25       |
| 1591.600000     | 41.88               | ---               | 200.0       | V           | 66.0             | -7.2                    | 74.00          | 32.12       |
| 3247.400000     | ---                 | 33.50             | 150.0       | H           | 97.0             | -1.2                    | 54.00          | 20.50       |
| 3247.400000     | 42.46               | ---               | 150.0       | H           | 97.0             | -1.2                    | 74.00          | 31.54       |
| 4874.000000     | ---                 | 34.53             | 150.0       | V           | 35.0             | 1.9                     | 54.00          | 19.47       |
| 4874.000000     | 43.23               | ---               | 150.0       | V           | 35.0             | 1.9                     | 74.00          | 30.77       |
| 7311.000000     | ---                 | 40.87             | 150.0       | V           | 225.0            | 9.2                     | 54.00          | 13.13       |
| 7311.000000     | 49.90               | ---               | 150.0       | V           | 225.0            | 9.2                     | 74.00          | 24.10       |
| 10815.800000    | ---                 | 42.06             | 150.0       | V           | 199.0            | 13.2                    | 54.00          | 11.94       |
| 10815.800000    | 52.12               | ---               | 150.0       | V           | 199.0            | 13.2                    | 74.00          | 21.88       |
| 17615.800000    | ---                 | 46.92             | 200.0       | H           | 230.0            | 17.3                    | 54.00          | 7.08        |
| 17615.800000    | 57.27               | ---               | 200.0       | H           | 230.0            | 17.3                    | 74.00          | 16.73       |

**High Channel: 2462MHz**

Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1591.600000     | ---                 | 31.49             | 150.0       | V           | 57.0             | -7.2                    | 54.00          | 22.51       |
| 1591.600000     | 41.88               | ---               | 150.0       | V           | 57.0             | -7.2                    | 74.00          | 32.12       |
| 3281.400000     | ---                 | 34.44             | 200.0       | H           | 0.0              | -1.2                    | 54.00          | 19.56       |
| 3281.400000     | 43.44               | ---               | 200.0       | H           | 0.0              | -1.2                    | 74.00          | 30.56       |
| 4924.000000     | ---                 | 33.77             | 200.0       | V           | 25.0             | 2.0                     | 54.00          | 20.23       |
| 4924.000000     | 43.67               | ---               | 200.0       | V           | 25.0             | 2.0                     | 74.00          | 30.33       |
| 7386.000000     | ---                 | 41.22             | 200.0       | V           | 251.0            | 9.4                     | 54.00          | 12.78       |
| 7386.000000     | 49.88               | ---               | 200.0       | V           | 251.0            | 9.4                     | 74.00          | 24.12       |
| 11230.600000    | ---                 | 42.15             | 200.0       | H           | 282.0            | 13.2                    | 54.00          | 11.85       |
| 11230.600000    | 52.36               | ---               | 200.0       | H           | 282.0            | 13.2                    | 74.00          | 21.64       |
| 17602.200000    | 57.23               | ---               | 150.0       | V           | 355.0            | 17.3                    | 74.00          | 16.77       |
| 17602.200000    | ---                 | 46.33             | 150.0       | V           | 355.0            | 17.3                    | 54.00          | 7.67        |

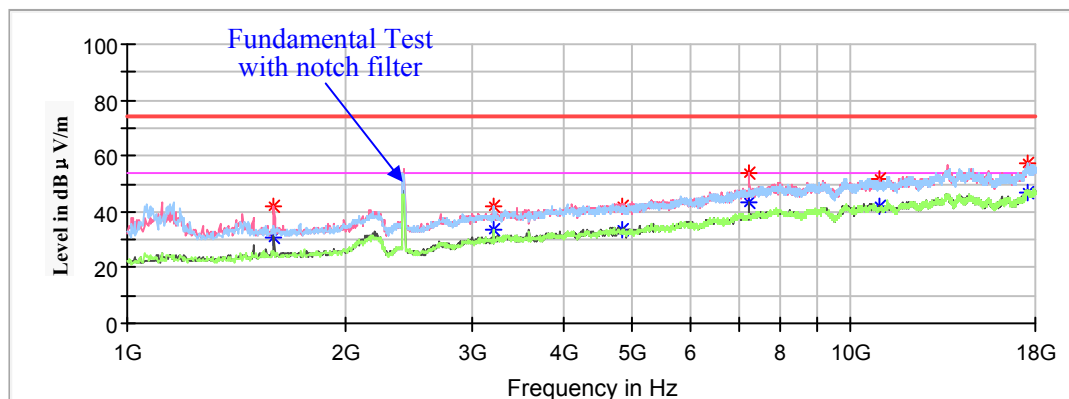
**802.11n-HT20 Mode(Chain0+Chain1):**

Note:

1. This test was performed with the 2.4-2.5GHz notch filter.
2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB)  
 Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)  
 Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)

**Low Channel: 2412MHz**

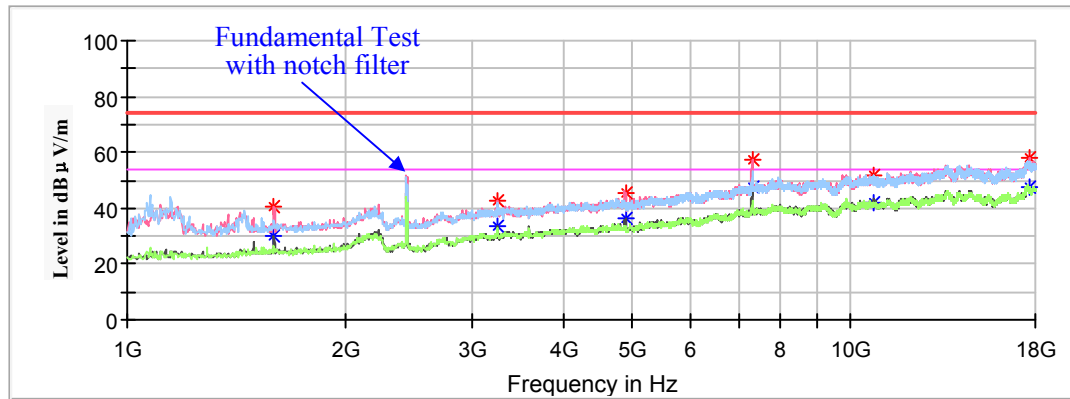
Full Spectrum



| Frequency (MHz) | Corrected Amplitude     |                         | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------------|-------------------------|-------------|-------------|------------------|-------------------------|----------------------|-------------|
|                 | MaxPeak (dB $\mu$ V /m) | Average (dB $\mu$ V /m) | Height (cm) | Polar (H/V) |                  |                         |                      |             |
| 1591.600000     | ---                     | 30.44                   | 150.0       | V           | 61.0             | -7.2                    | 54.00                | 23.56       |
| 1591.600000     | 41.99                   | ---                     | 150.0       | V           | 61.0             | -7.2                    | 74.00                | 32.01       |
| 3213.400000     | ---                     | 33.45                   | 150.0       | H           | 130.0            | -1.3                    | 54.00                | 20.55       |
| 3213.400000     | 42.18                   | ---                     | 150.0       | H           | 130.0            | -1.3                    | 74.00                | 31.82       |
| 4824.000000     | ---                     | 33.61                   | 200.0       | V           | 346.0            | 1.9                     | 54.00                | 20.39       |
| 4824.000000     | 41.90                   | ---                     | 200.0       | V           | 346.0            | 1.9                     | 74.00                | 32.10       |
| 7236.000000     | ---                     | 43.05                   | 200.0       | V           | 188.0            | 9.0                     | 54.00                | 10.95       |
| 7236.000000     | 54.11                   | ---                     | 200.0       | V           | 188.0            | 9.0                     | 74.00                | 19.89       |
| 10928.000000    | ---                     | 41.87                   | 200.0       | V           | 0.0              | 13.4                    | 54.00                | 12.13       |
| 10928.000000    | 51.77                   | ---                     | 200.0       | V           | 0.0              | 13.4                    | 74.00                | 22.23       |
| 17554.600000    | ---                     | 47.17                   | 150.0       | H           | 290.0            | 17.2                    | 54.00                | 6.83        |
| 17554.600000    | 57.51                   | ---                     | 150.0       | H           | 290.0            | 17.2                    | 74.00                | 16.49       |

**Middle Chain0+Chain1: 2437MHz**

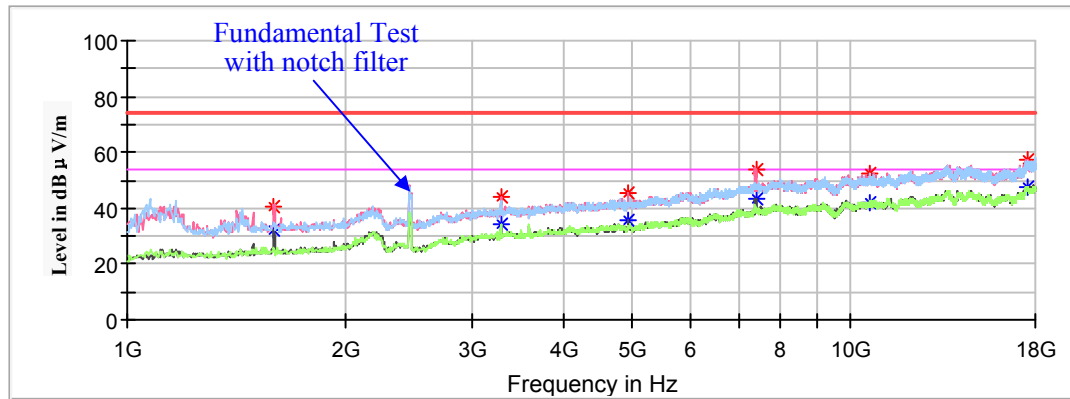
Full Spectrum



| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBµV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBµV /m)   | Average (dBµV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1591.600000     | ---                 | 30.39             | 150.0       | V           | 69.0             | -7.2                    | 54.00          | 23.61       |
| 1591.600000     | 40.53               | ---               | 150.0       | V           | 69.0             | -7.2                    | 74.00          | 33.47       |
| 3247.400000     | 42.46               | ---               | 200.0       | V           | 239.0            | -1.2                    | 74.00          | 31.54       |
| 3247.400000     | ---                 | 33.87             | 200.0       | V           | 239.0            | -1.2                    | 54.00          | 20.13       |
| 4874.000000     | 45.32               | ---               | 200.0       | V           | 34.0             | 1.9                     | 74.00          | 28.68       |
| 4874.000000     | ---                 | 36.04             | 200.0       | V           | 34.0             | 1.9                     | 54.00          | 17.96       |
| 7311.000000     | 57.67               | ---               | 200.0       | V           | 200.0            | 9.2                     | 74.00          | 16.33       |
| 7311.000000     | ---                 | 47.30             | 200.0       | V           | 200.0            | 9.2                     | 54.00          | 6.70        |
| 10758.000000    | ---                 | 41.80             | 150.0       | H           | 27.0             | 13.1                    | 54.00          | 12.20       |
| 10758.000000    | 51.78               | ---               | 150.0       | H           | 27.0             | 13.1                    | 74.00          | 22.22       |
| 17636.200000    | ---                 | 47.62             | 200.0       | V           | 175.0            | 17.3                    | 54.00          | 6.38        |
| 17636.200000    | 57.93               | ---               | 200.0       | V           | 175.0            | 17.3                    | 74.00          | 16.07       |

**High Chain0+Chain1: 2462MHz**

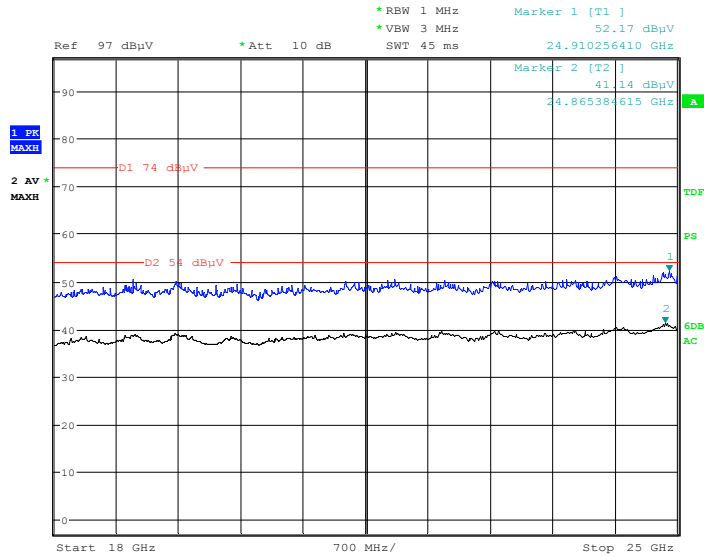
Full Spectrum



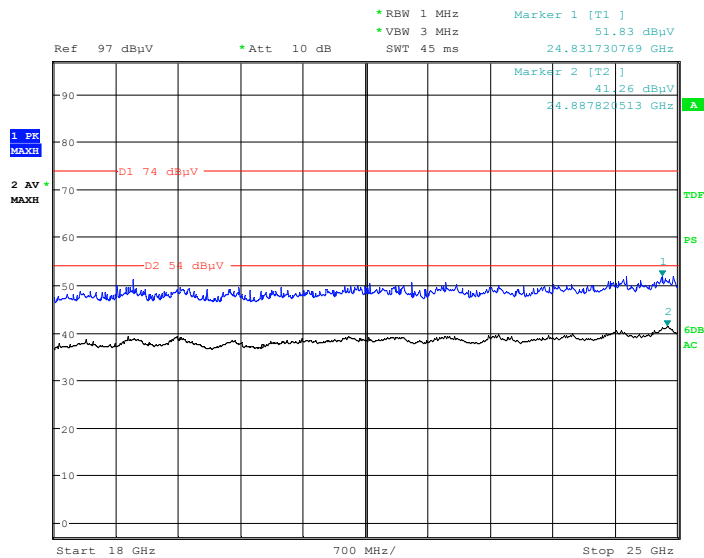
| Frequency (MHz) | Corrected Amplitude |                   | Rx Antenna  |             | Turntable Degree | Corrected Factor (dB/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|-------------------|-------------|-------------|------------------|-------------------------|----------------|-------------|
|                 | MaxPeak (dBμV /m)   | Average (dBμV /m) | Height (cm) | Polar (H/V) |                  |                         |                |             |
| 1595.000000     | ---                 | 31.87             | 150.0       | V           | 58.0             | -7.2                    | 54.00          | 22.13       |
| 1595.000000     | 40.64               | ---               | 150.0       | V           | 58.0             | -7.2                    | 74.00          | 33.36       |
| 3281.400000     | ---                 | 34.12             | 200.0       | V           | 239.0            | -1.2                    | 54.00          | 19.88       |
| 3281.400000     | 43.74               | ---               | 200.0       | V           | 239.0            | -1.2                    | 74.00          | 30.26       |
| 4924.000000     | ---                 | 35.95             | 200.0       | V           | 26.0             | 2.0                     | 54.00          | 18.05       |
| 4924.000000     | 45.26               | ---               | 200.0       | V           | 26.0             | 2.0                     | 74.00          | 28.74       |
| 7386.000000     | 54.12               | ---               | 200.0       | V           | 2.0              | 9.4                     | 74.00          | 19.88       |
| 7386.000000     | ---                 | 43.50             | 200.0       | V           | 2.0              | 9.4                     | 54.00          | 10.50       |
| 10642.400000    | ---                 | 41.79             | 150.0       | H           | 142.0            | 12.9                    | 54.00          | 12.21       |
| 10642.400000    | 52.18               | ---               | 150.0       | H           | 142.0            | 12.9                    | 74.00          | 21.82       |
| 17602.200000    | ---                 | 47.44             | 200.0       | V           | 11.0             | 17.3                    | 54.00          | 6.56        |
| 17602.200000    | 57.34               | ---               | 150.0       | V           | 11.0             | 17.3                    | 74.00          | 16.66       |

**18GHz-25GHz**

Pre-scan with 802.11b, 802.11g and 802.11n-HT20 modes of operation in the X,Y and Z axes of orientation, the worst case 802.11g mode low channel of chain 0 in X-axis of orientation was recorded

**Horizontal**

Date: 22.DEC.2018 14:29:45

**Vertical**

Date: 22.DEC.2018 15:16:13

**Fundamental Test & Restricted Bands Emissions Test:**

Note:

1. The test was performed with a 10dB Attenuator.

2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB) + Attenuator (dB)

Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V)Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V /m)**802.11b Mode (Chain 0):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

| Frequency<br>(MHz)      | Corrected Amplitude        |                            | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|-------------------------|----------------------------|----------------------------|----------------|----------------|---------------------|-------------------------------|-------------------------|----------------|
|                         | MaxPeak<br>(dB $\mu$ V /m) | Average<br>(dB $\mu$ V /m) | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                         |                |
| Low Channel: 2412MHz    |                            |                            |                |                |                     |                               |                         |                |
| 2412                    | ---                        | 105.46                     | 269            | H              | 251                 | 16                            | /                       | /              |
| 2412                    | 107.74                     | ---                        | 269            | H              | 251                 | 16                            | /                       | /              |
| 2412                    | ---                        | 104.26                     | 130            | V              | 225                 | 16                            | /                       | /              |
| 2412                    | 106.34                     | ---                        | 130            | V              | 225                 | 16                            | /                       | /              |
| 2390                    | ---                        | 48.93                      | 243            | H              | 219                 | 16.1                          | 54                      | 5.07           |
| 2390                    | 58.55                      | ---                        | 243            | H              | 219                 | 16.1                          | 74                      | 15.45          |
| Middle Channel: 2437MHz |                            |                            |                |                |                     |                               |                         |                |
| 2437                    | 108.5                      | ---                        | 125            | H              | 193                 | 16.2                          | /                       | /              |
| 2437                    | ---                        | 106.54                     | 125            | H              | 193                 | 16.2                          | /                       | /              |
| 2437                    | 107.81                     | ---                        | 295            | V              | 210                 | 16.2                          | /                       | /              |
| 2437                    | ---                        | 105.43                     | 295            | V              | 210                 | 16.2                          | /                       | /              |
| High Channel: 2462MHz   |                            |                            |                |                |                     |                               |                         |                |
| 2462                    | ---                        | 105.62                     | 158            | H              | 207                 | 16.3                          | /                       | /              |
| 2462                    | 107.49                     | ---                        | 158            | H              | 207                 | 16.3                          | /                       | /              |
| 2462                    | ---                        | 104.57                     | 106            | V              | 218                 | 16.3                          | /                       | /              |
| 2462                    | 106.31                     | ---                        | 106            | V              | 218                 | 16.3                          | /                       | /              |
| 2483.5                  | ---                        | 49.64                      | 165            | H              | 237                 | 16.3                          | 54                      | 4.36           |
| 2483.5                  | 61.61                      | ---                        | 165            | H              | 237                 | 16.3                          | 74                      | 12.39          |

**802.11b Mode (Chain 1):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

| Frequency<br>(MHz)      | Corrected Amplitude  |                      | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|-------------------------|----------------------|----------------------|----------------|----------------|---------------------|-------------------------------|-------------------|----------------|
|                         | MaxPeak<br>(dBμV /m) | Average<br>(dBμV /m) | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                   |                |
| Low Channel: 2412MHz    |                      |                      |                |                |                     |                               |                   |                |
| 2412                    | ---                  | 103.65               | 134            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | 105.79               | ---                  | 134            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | ---                  | 102.81               | 103            | V              | 237                 | 16.1                          | /                 | /              |
| 2412                    | 104.35               | ---                  | 103            | V              | 237                 | 16.1                          | /                 | /              |
| 2390                    | ---                  | 49.38                | 276            | H              | 219                 | 16.1                          | 54                | 4.62           |
| 2390                    | 58.3                 | ---                  | 276            | H              | 219                 | 16.1                          | 74                | 15.7           |
| Middle Channel: 2437MHz |                      |                      |                |                |                     |                               |                   |                |
| 2437                    | 105.81               | ---                  | 290            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 103.82               | 290            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | 104.65               | ---                  | 150            | V              | 201                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 102.83               | 150            | V              | 201                 | 16.2                          | /                 | /              |
| High Channel: 2462MHz   |                      |                      |                |                |                     |                               |                   |                |
| 2462                    | ---                  | 104.35               | 170            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | 106.4                | ---                  | 170            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | ---                  | 103.52               | 205            | V              | 215                 | 16.3                          | /                 | /              |
| 2462                    | 105.84               | ---                  | 205            | V              | 215                 | 16.3                          | /                 | /              |
| 2483.5                  | ---                  | 49.54                | 283            | H              | 237                 | 16.3                          | 54                | 4.46           |
| 2483.5                  | 59.05                | ---                  | 283            | H              | 237                 | 16.3                          | 74                | 14.95          |

**802.11g Mode (Chain 0):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

| Frequency<br>(MHz)      | Corrected Amplitude  |                      | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|-------------------------|----------------------|----------------------|----------------|----------------|---------------------|-------------------------------|-------------------|----------------|
|                         | MaxPeak<br>(dBμV /m) | Average<br>(dBμV /m) | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                   |                |
| Low Channel: 2412MHz    |                      |                      |                |                |                     |                               |                   |                |
| 2412                    | ---                  | 102.86               | 158            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | 104.57               | ---                  | 158            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | ---                  | 102.58               | 272            | V              | 245                 | 16.1                          | /                 | /              |
| 2412                    | 103.56               | ---                  | 272            | V              | 245                 | 16.1                          | /                 | /              |
| 2390                    | ---                  | 50.38                | 302            | H              | 219                 | 16.1                          | 54                | 3.62           |
| 2390                    | 61.15                | ---                  | 302            | H              | 219                 | 16.1                          | 74                | 12.85          |
| Middle Channel: 2437MHz |                      |                      |                |                |                     |                               |                   |                |
| 2437                    | 103.6                | ---                  | 129            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 102.37               | 129            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | 103.23               | ---                  | 204            | V              | 189                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 101.43               | 204            | V              | 189                 | 16.2                          | /                 | /              |
| High Channel: 2462MHz   |                      |                      |                |                |                     |                               |                   |                |
| 2462                    | ---                  | 101.24               | 344            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | 103.32               | ---                  | 344            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | ---                  | 100.96               | 170            | V              | 225                 | 16.3                          | /                 | /              |
| 2462                    | 102.64               | ---                  | 170            | V              | 225                 | 16.3                          | /                 | /              |
| 2483.5                  | ---                  | 52.46                | 135            | H              | 237                 | 16.3                          | 54                | 1.54           |
| 2483.5                  | 65.59                | ---                  | 135            | H              | 237                 | 16.3                          | 74                | 8.41           |

**802.11g Mode (Chain 1):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

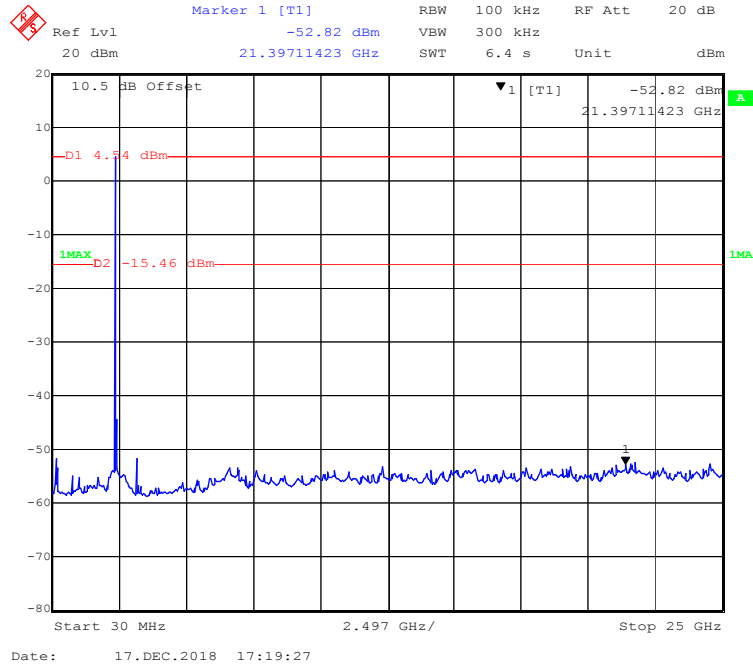
| Frequency<br>(MHz)      | Corrected Amplitude  |                      | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|-------------------------|----------------------|----------------------|----------------|----------------|---------------------|-------------------------------|-------------------|----------------|
|                         | MaxPeak<br>(dBμV /m) | Average<br>(dBμV /m) | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                   |                |
| Low Channel: 2412MHz    |                      |                      |                |                |                     |                               |                   |                |
| 2412                    | ---                  | 101.36               | 159            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | 102.58               | ---                  | 159            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | ---                  | 100.91               | 152            | V              | 238                 | 16.1                          | /                 | /              |
| 2412                    | 101.76               | ---                  | 152            | V              | 238                 | 16.1                          | /                 | /              |
| 2390                    | ---                  | 50.32                | 196            | H              | 219                 | 16.1                          | 54                | 3.68           |
| 2390                    | 60.97                | ---                  | 196            | H              | 219                 | 16.1                          | 74                | 13.03          |
| Middle Channel: 2437MHz |                      |                      |                |                |                     |                               |                   |                |
| 2437                    | 101.27               | ---                  | 331            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 100.32               | 331            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | 100.98               | ---                  | 135            | V              | 198                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 99.86                | 135            | V              | 198                 | 16.2                          | /                 | /              |
| High Channel: 2462MHz   |                      |                      |                |                |                     |                               |                   |                |
| 2462                    | ---                  | 100.52               | 315            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | 102.6                | ---                  | 315            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | ---                  | 100.37               | 222            | V              | 226                 | 16.3                          | /                 | /              |
| 2462                    | 101.94               | ---                  | 222            | V              | 226                 | 16.3                          | /                 | /              |
| 2483.5                  | ---                  | 51.77                | 129            | H              | 237                 | 16.3                          | 54                | 2.23           |
| 2483.5                  | 61.63                | ---                  | 129            | H              | 237                 | 16.3                          | 74                | 12.37          |

**802.11n-HT20 Mode (Chain0+Chain1):** (Pre-scan in the X, Y and Z axes of orientation, the worst case in Y-axis of orientation was recorded)

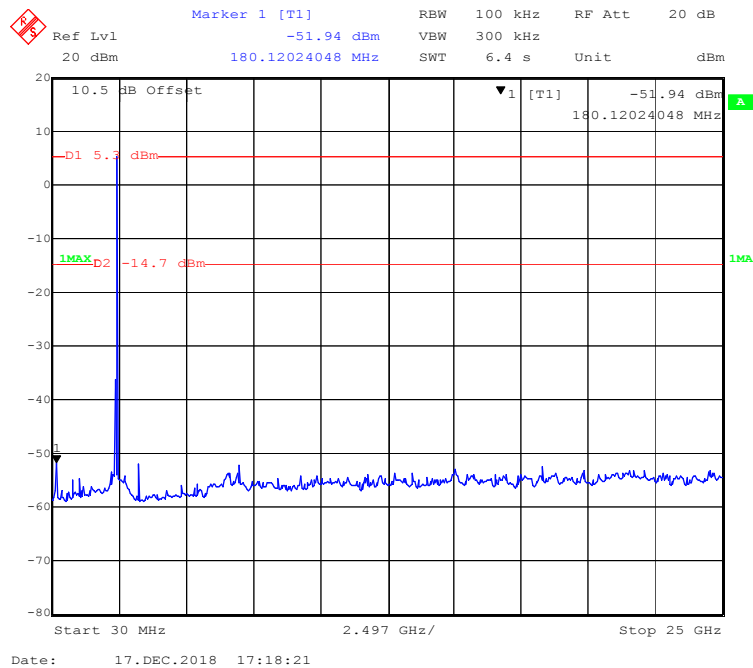
| Frequency<br>(MHz)      | Corrected Amplitude  |                      | Rx Antenna     |                | Turntable<br>Degree | Corrected<br>Factor<br>(dB/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|-------------------------|----------------------|----------------------|----------------|----------------|---------------------|-------------------------------|-------------------|----------------|
|                         | MaxPeak<br>(dBμV /m) | Average<br>(dBμV /m) | Height<br>(cm) | Polar<br>(H/V) |                     |                               |                   |                |
| Low Channel: 2412MHz    |                      |                      |                |                |                     |                               |                   |                |
| 2412                    | ---                  | 101.36               | 182            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | 103.39               | ---                  | 182            | H              | 251                 | 16.1                          | /                 | /              |
| 2412                    | ---                  | 100.85               | 307            | V              | 247                 | 16.1                          | /                 | /              |
| 2412                    | 102.65               | ---                  | 307            | V              | 247                 | 16.1                          | /                 | /              |
| 2390                    | ---                  | 51.85                | 203            | H              | 219                 | 16.1                          | 54                | 2.15           |
| 2390                    | 63.47                | ---                  | 203            | H              | 219                 | 16.1                          | 74                | 10.53          |
| Middle Channel: 2437MHz |                      |                      |                |                |                     |                               |                   |                |
| 2437                    | 104.24               | ---                  | 156            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 102.65               | 156            | H              | 193                 | 16.2                          | /                 | /              |
| 2437                    | 103.65               | ---                  | 307            | V              | 202                 | 16.2                          | /                 | /              |
| 2437                    | ---                  | 101.26               | 307            | V              | 202                 | 16.2                          | /                 | /              |
| High Channel: 2462MHz   |                      |                      |                |                |                     |                               |                   |                |
| 2462                    | ---                  | 102.28               | 226            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | 103.81               | ---                  | 226            | H              | 207                 | 16.3                          | /                 | /              |
| 2462                    | ---                  | 101.31               | 306            | V              | 228                 | 16.3                          | /                 | /              |
| 2462                    | 102.86               | ---                  | 306            | V              | 228                 | 16.3                          | /                 | /              |
| 2483.5                  | ---                  | 51.84                | 264            | H              | 237                 | 16.3                          | 54                | 2.16           |
| 2483.5                  | 67.29                | ---                  | 264            | H              | 237                 | 16.3                          | 74                | 6.71           |

# Conducted Spurious Emissions at Antenna Port

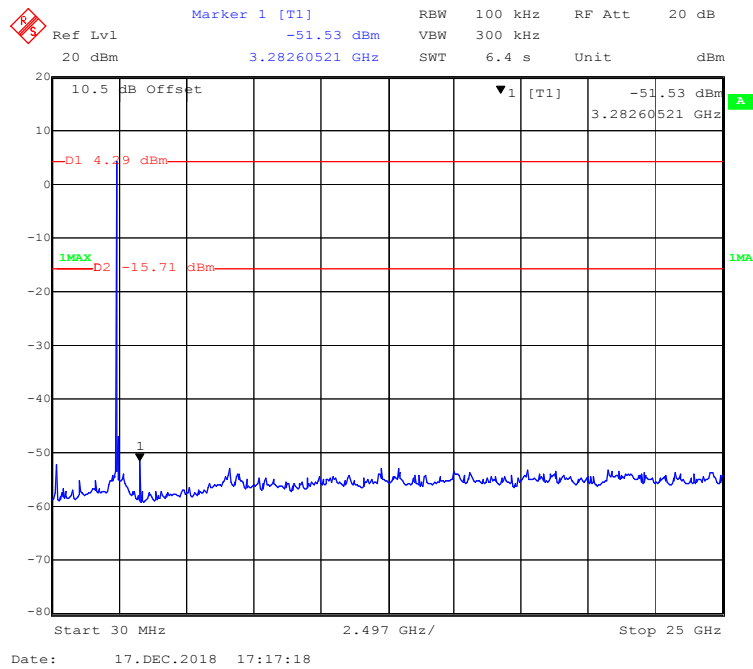
## Chain0: 802.11b Low Channel



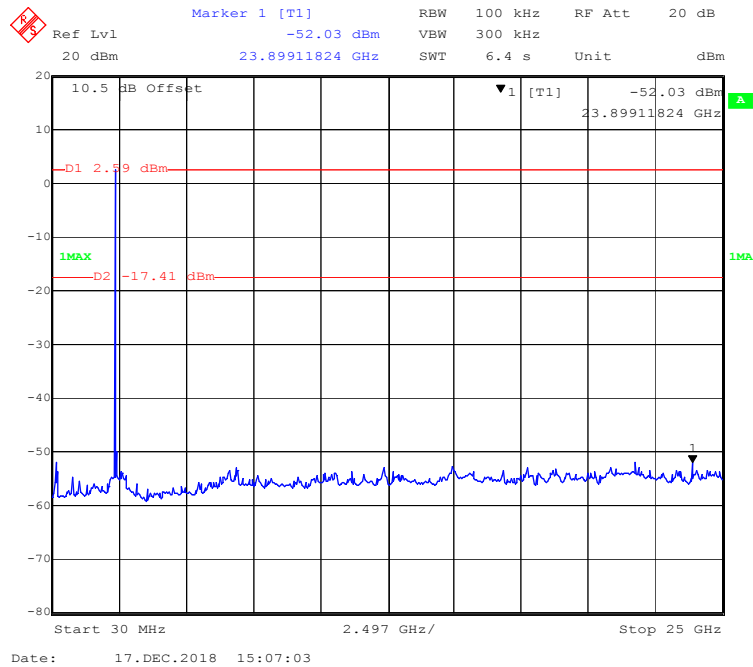
## Chain0: 802.11b Middle Channel



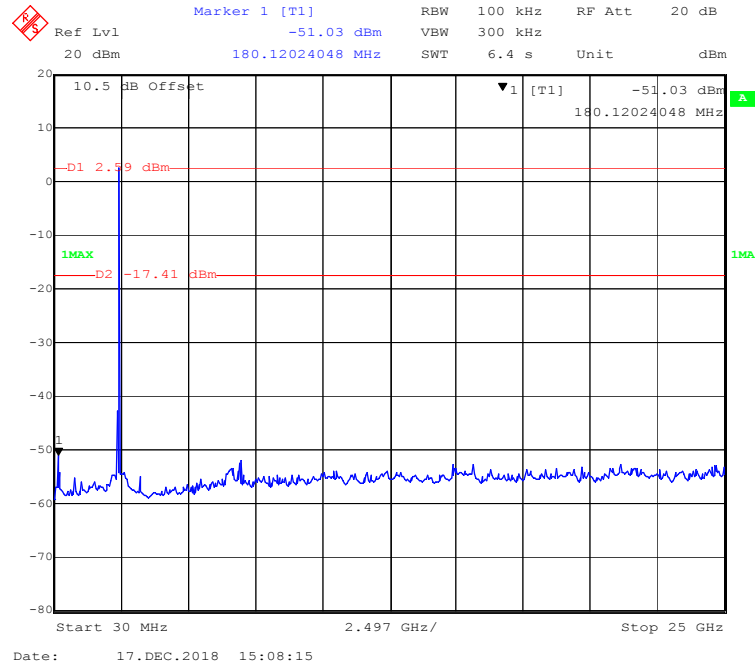
### Chain0: 802.11b High Channel



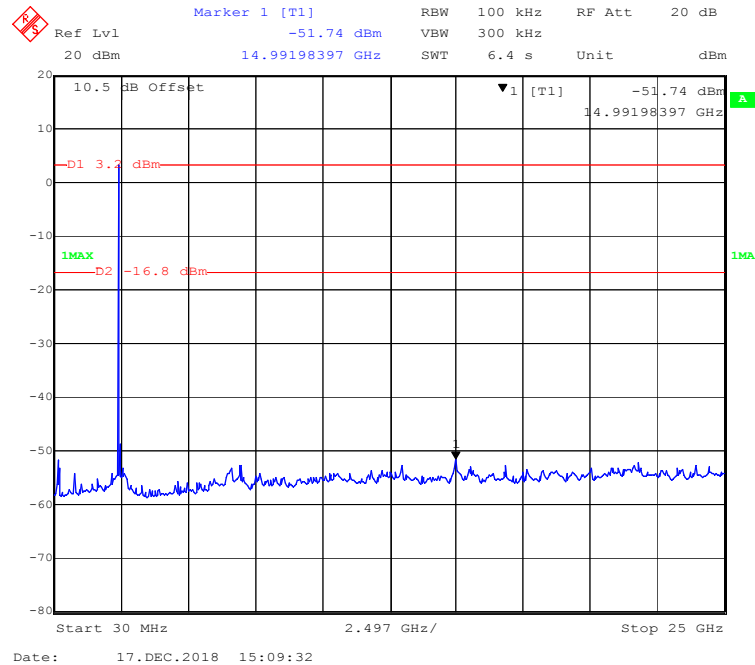
### Chain1: 802.11b Low Channel

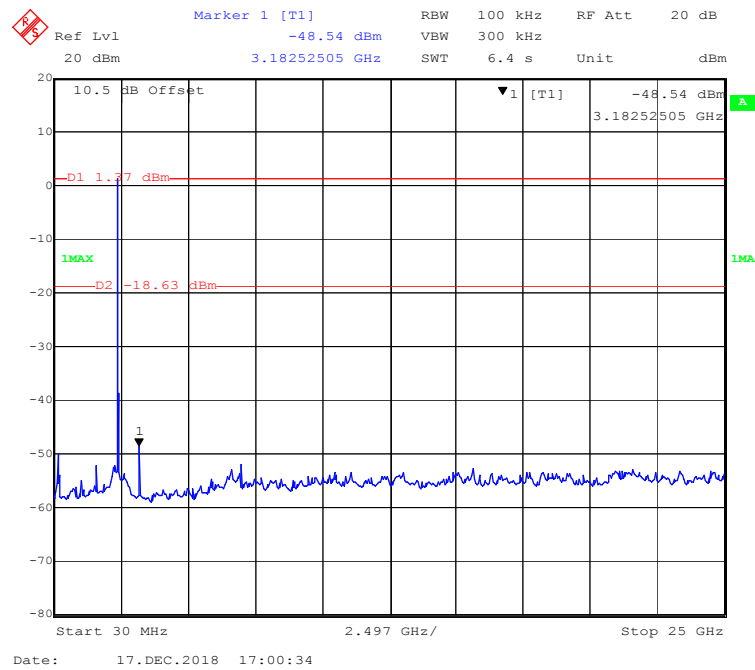
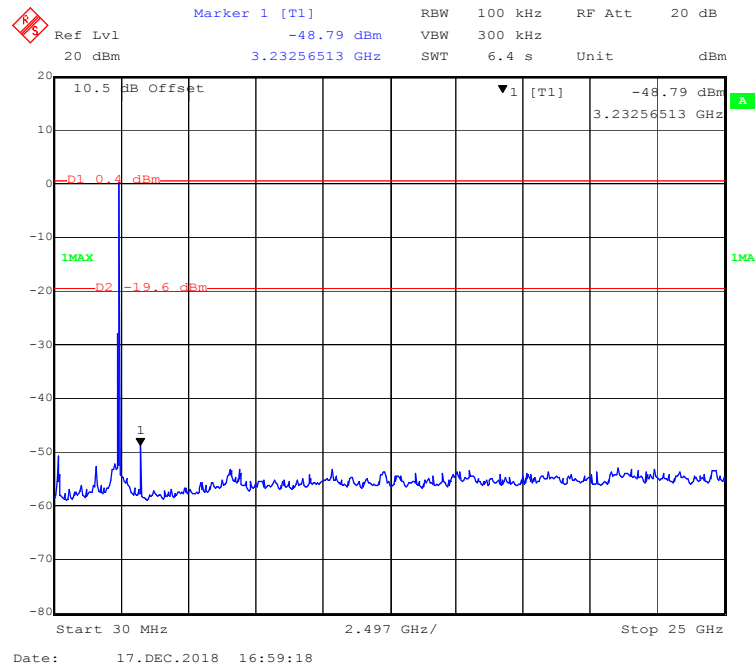


### Chain1: 802.11b Middle Channel

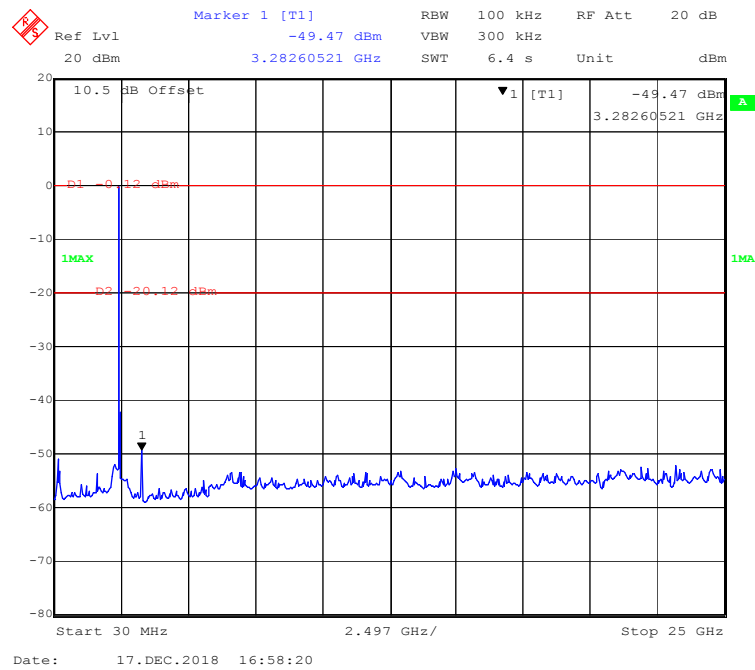


### Chain1: 802.11b High Channel

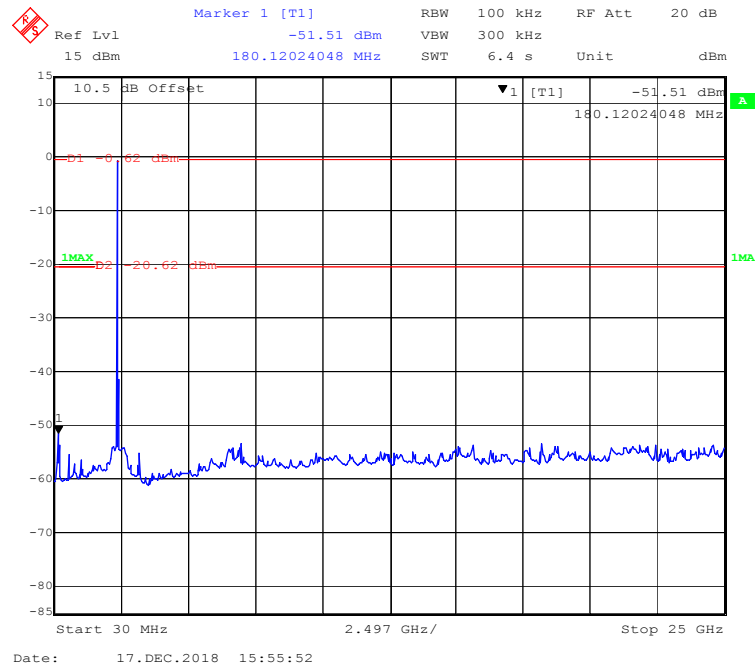


**Chain0: 802.11g Low Channel****Chain0: 802.11g Middle Channel**

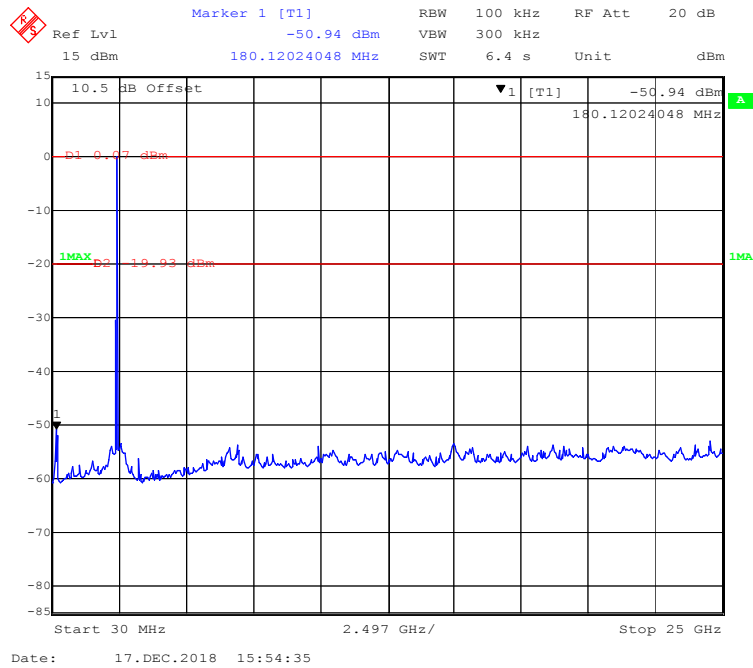
### Chain0: 802.11g High Channel



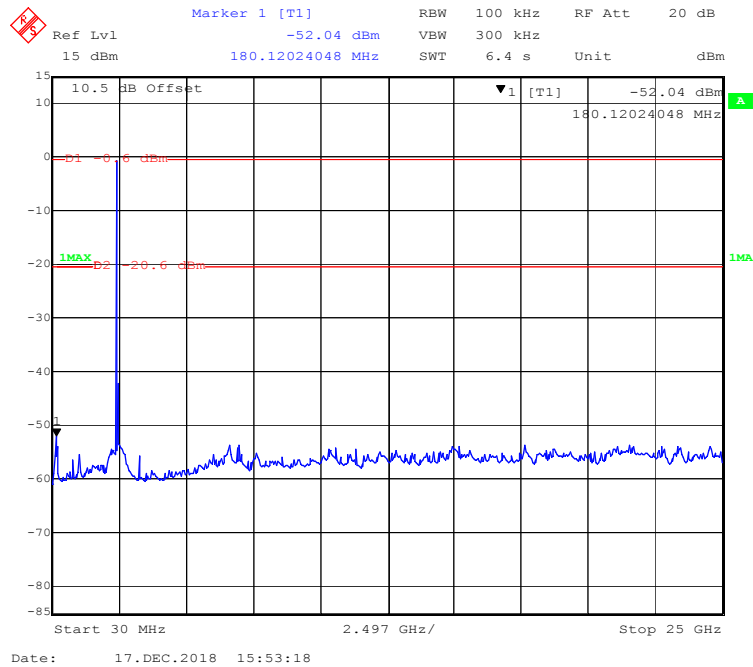
### Chain1: 802.11g Low Channel

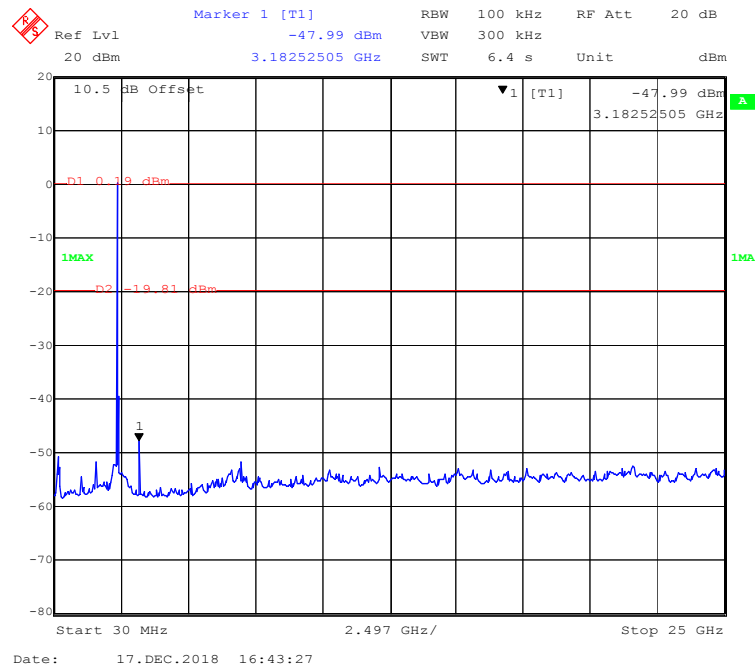
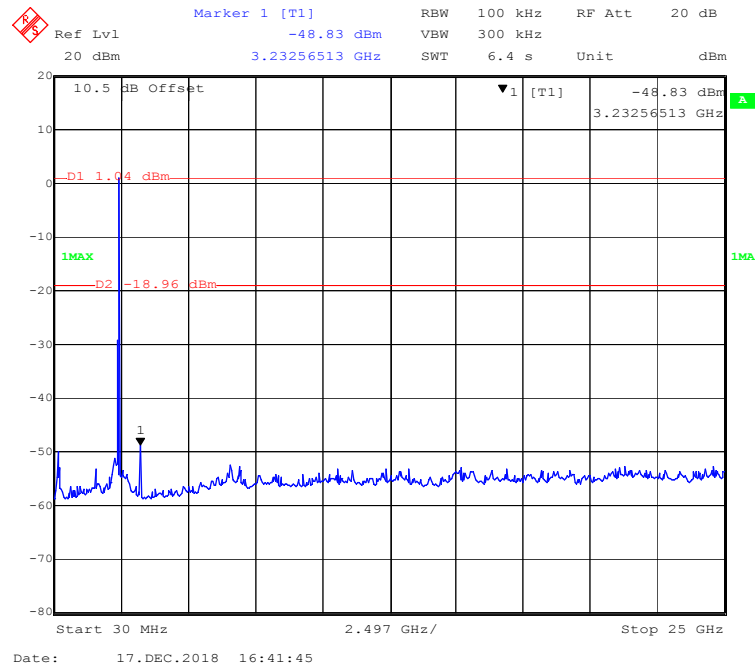


### Chain1: 802.11g Middle Channel

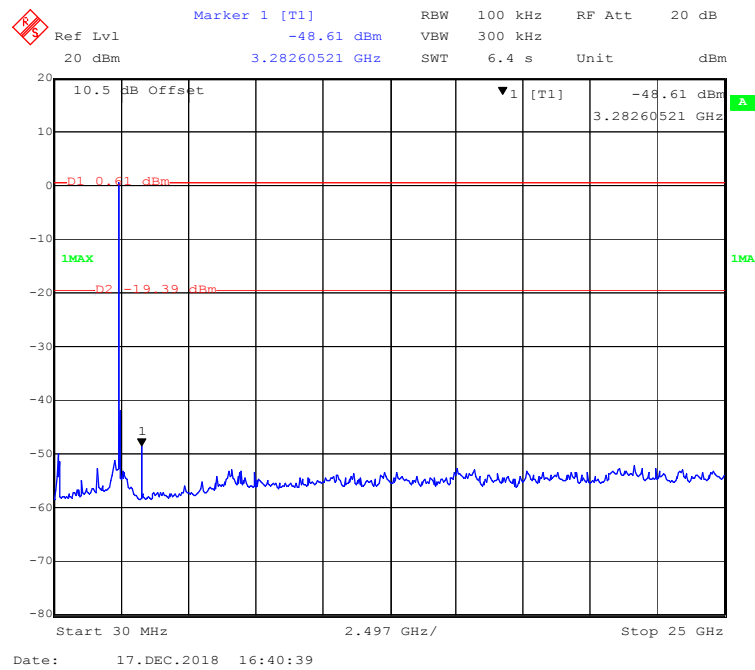


### Chain1: 802.11g High Channel

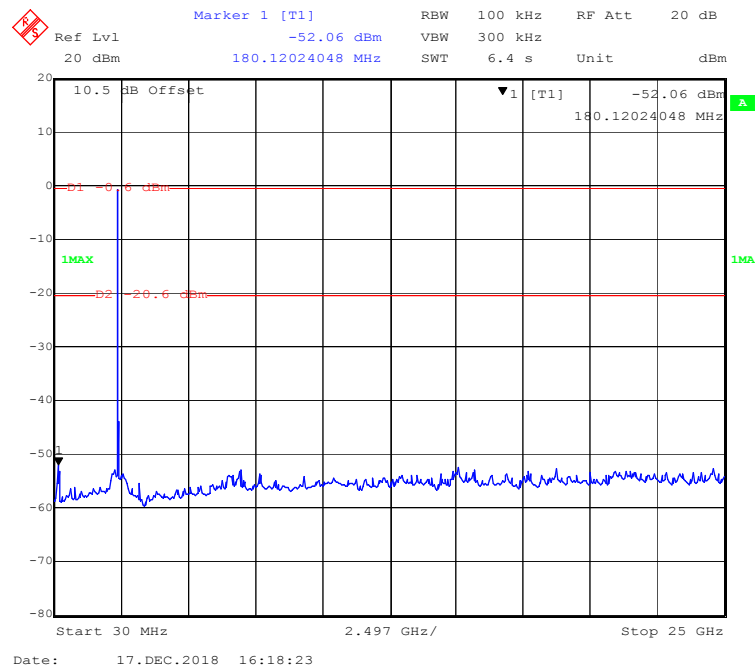


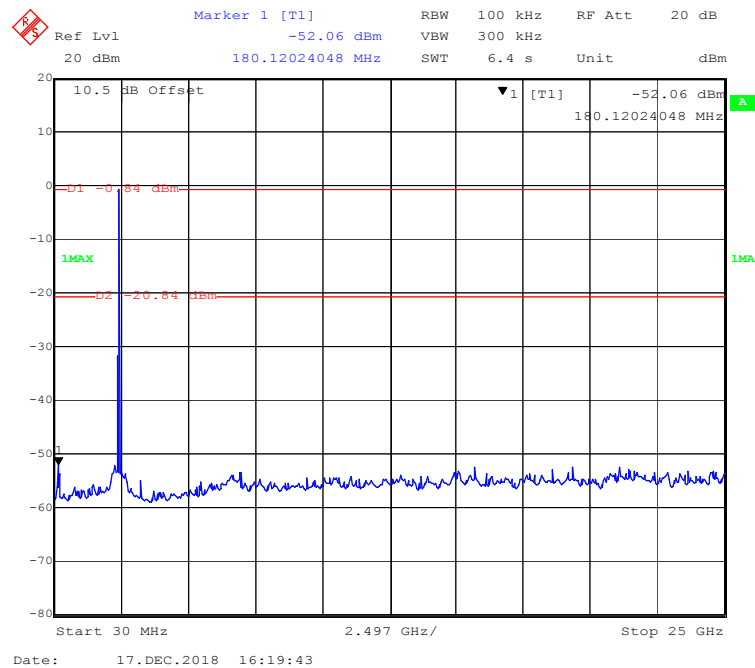
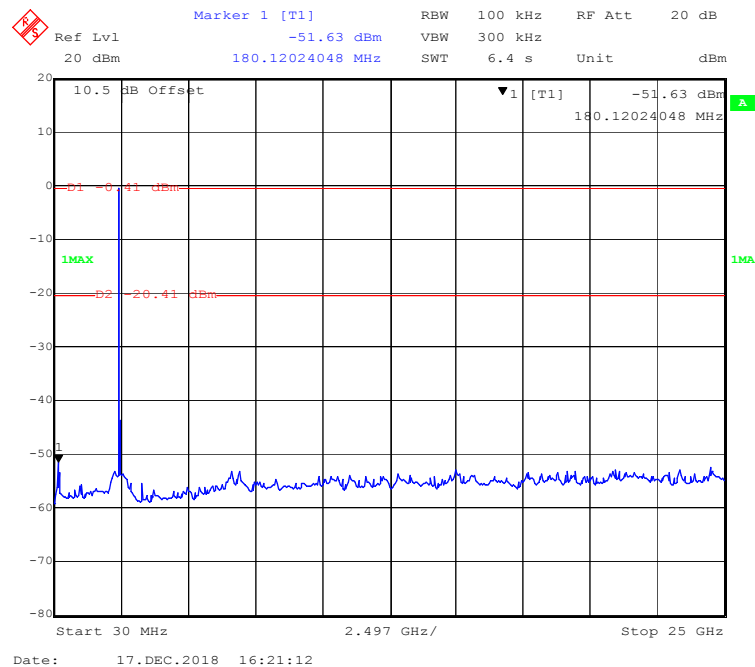
**Chain0: 802.11n-HT20 Low Channel****Chain0: 802.11n-HT20 Middle Channel**

### Chain0: 802.11n-HT20 High Channel



### Chain1: 802.11n-HT20 Low Channel



**Chain0: 802.11n-HT20 Middle Channel****Chain0: 802.11n-HT20 High Channel**

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

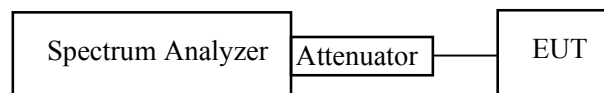
### Applicable Standard

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

### Test Procedure

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 24.8°C    |
| Relative Humidity: | 51 %      |
| ATM Pressure:      | 101.1 kPa |

*The testing was performed by Stone Zhang on 2018-12-17*

**Test Result:** Compliant.

*EUT operation mode: Transmitting*

| Channel           | Frequency<br>(MHz) | 6 dB Emission Bandwidth<br>(MHz) |        | Limit<br>(kHz) |
|-------------------|--------------------|----------------------------------|--------|----------------|
|                   |                    | Chain0                           | Chain1 |                |
| 802.11b mode      |                    |                                  |        |                |
| Low               | 2412               | 10.100                           | 10.100 | ≥500           |
| Middle            | 2437               | 10.100                           | 10.100 | ≥500           |
| High              | 2462               | 10.040                           | 10.100 | ≥500           |
| 802.11g mode      |                    |                                  |        |                |
| Low               | 2412               | 16.473                           | 16.473 | ≥500           |
| Middle            | 2437               | 16.473                           | 16.473 | ≥500           |
| High              | 2462               | 16.473                           | 16.473 | ≥500           |
| 802.11n-HT20 mode |                    |                                  |        |                |
| Low               | 2412               | 17.375                           | 17.375 | ≥500           |
| Middle            | 2437               | 17.375                           | 17.555 | ≥500           |
| High              | 2462               | 17.555                           | 17.555 | ≥500           |

Delta 1 [T1] -0.44 dB  
 RBW 100 kHz RF Att 20 dB  
 Ref Lvl 20 dBm VBW 300 kHz  
 20 dBm 10.10020040 MHz SWT 7.5 ms Unit dBm

10.5 dB Offset  
 -D1 5.38 dBm  
 -D2 -0.62 dBm  
 1MAX

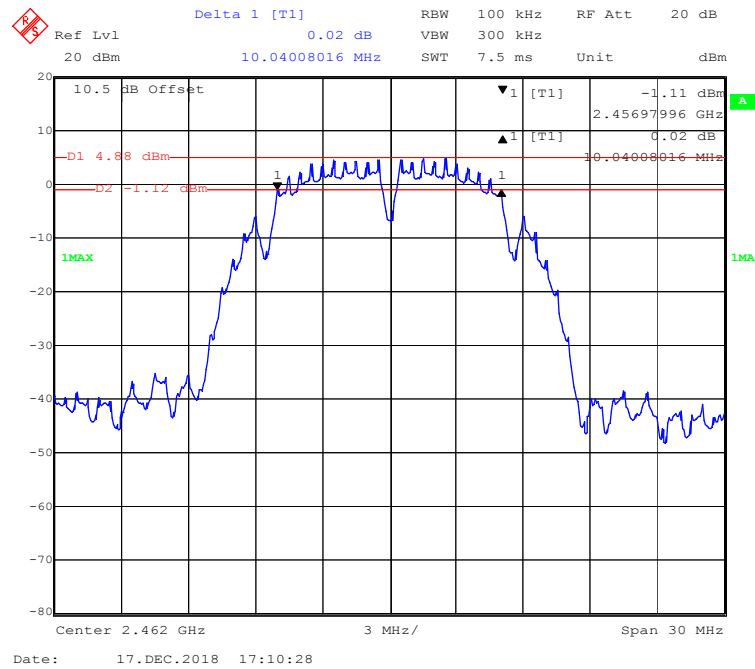
1 [T1] -0.26 dBm  
 1 [T1] -0.44 dB  
 10.10020040 MHz

Center 2.412 GHz 3 MHz/ Span 30 MHz

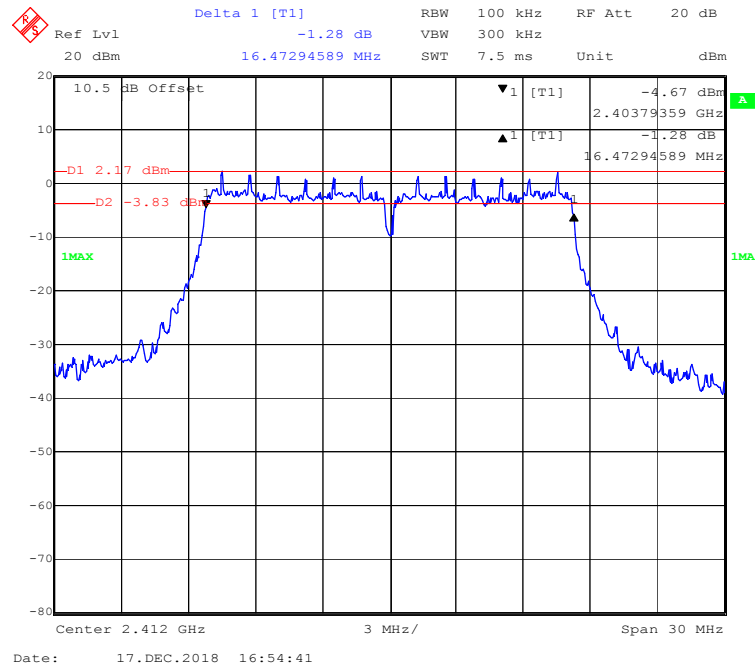
Date: 17.DEC.2018 17:13:29

[illegible]

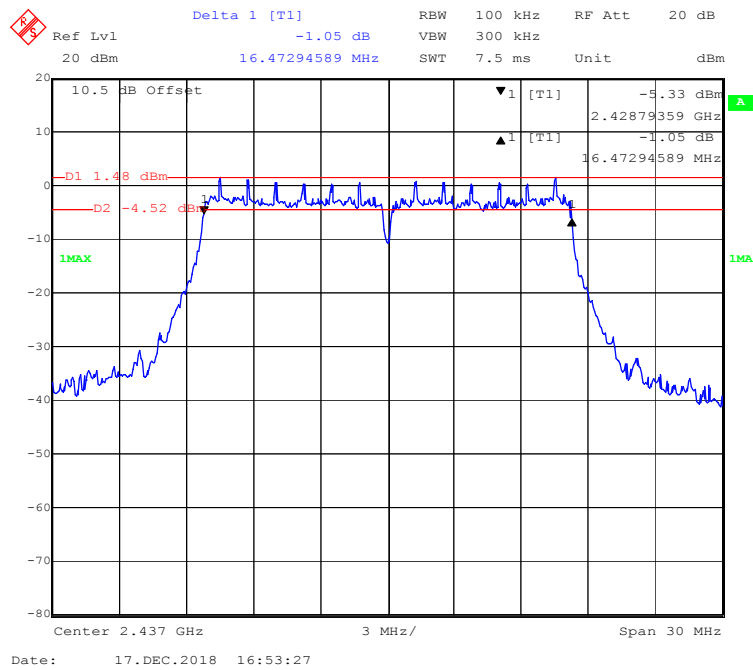
### Chain0: 802.11b High Channel



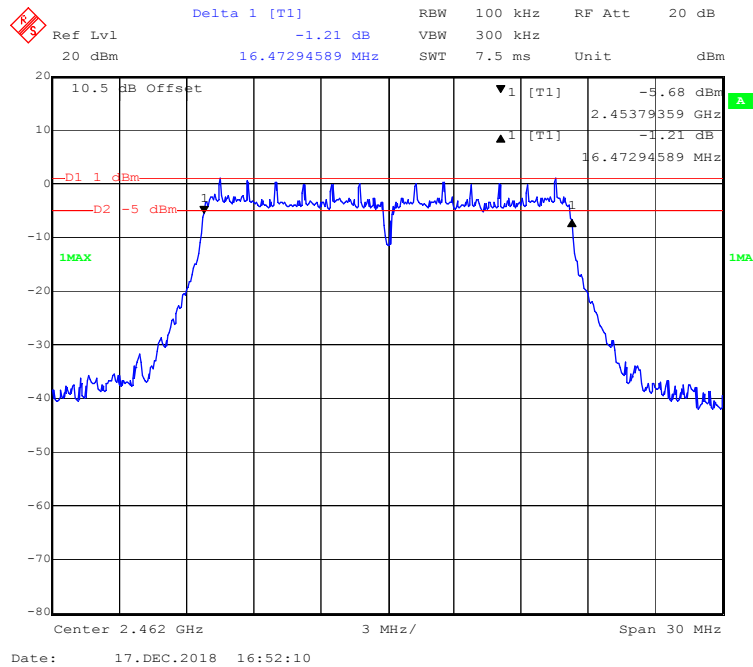
### Chain0: 802.11g Low Channel



### Chain0: 802.11g Middle Channel



### Chain0: 802.11g High Channel



10.5 dB Offset

Ref Lvl 20 dBm

Delta 1 [T1] -0.39 dB

RBW 100 kHz

VBW 300 kHz

SWT 7.5 ms

RF Att 20 dB

Unit dBm

2.40325251 GHz

17.37474950 MHz

-4.25 dBm

-0.39 dB

-D1 1.39 dBm

-D2 -4.61 dBm

1MAX

Center 2.412 GHz

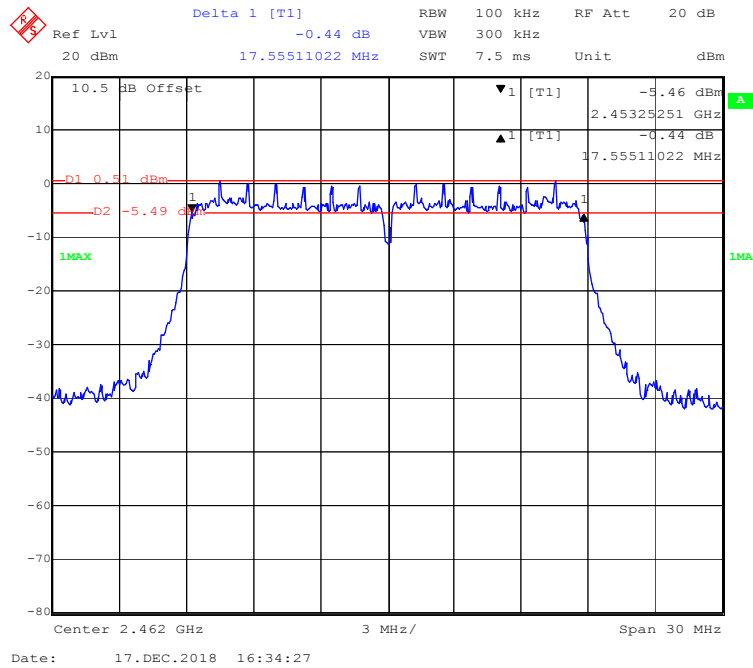
3 MHz/

Span 30 MHz

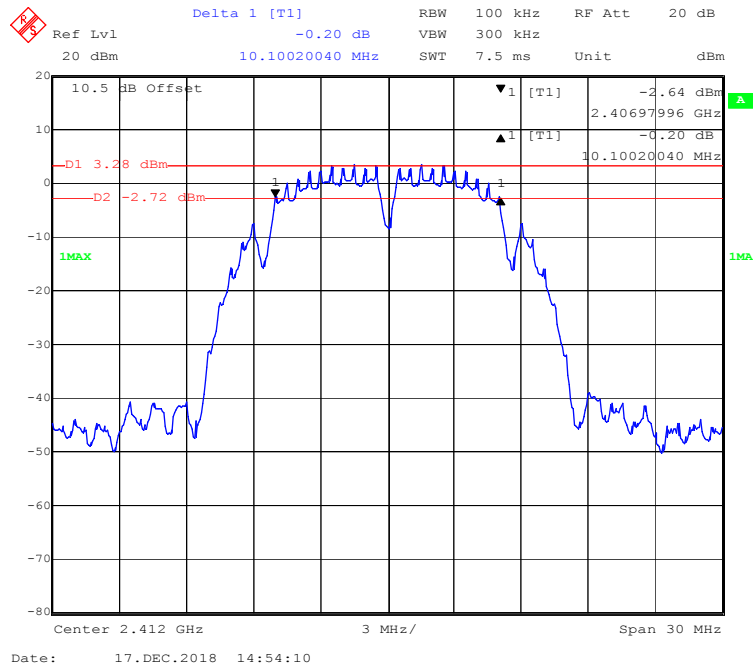
Date: 17.DEC.2018 16:36:56

Delta 1 [T1] 0.21 dB  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 7.5 ms  
 RF Att 20 dB  
 Ref Lvl 20 dBm  
 Unit dBm  
 17.37474950 MHz  
 10.5 dB Offset  
 -5.00 dBm  
 2.428251 GHz  
 0.21 dB  
 17.37474950 MHz  
 -D1 1.08 dBm  
 -D2 -4.92 dBm  
 1MAX  
 1MA  
 Center 2.437 GHz  
 3 MHz/  
 Span 30 MHz  
 Date: 17.DEC.2018 16:35:44

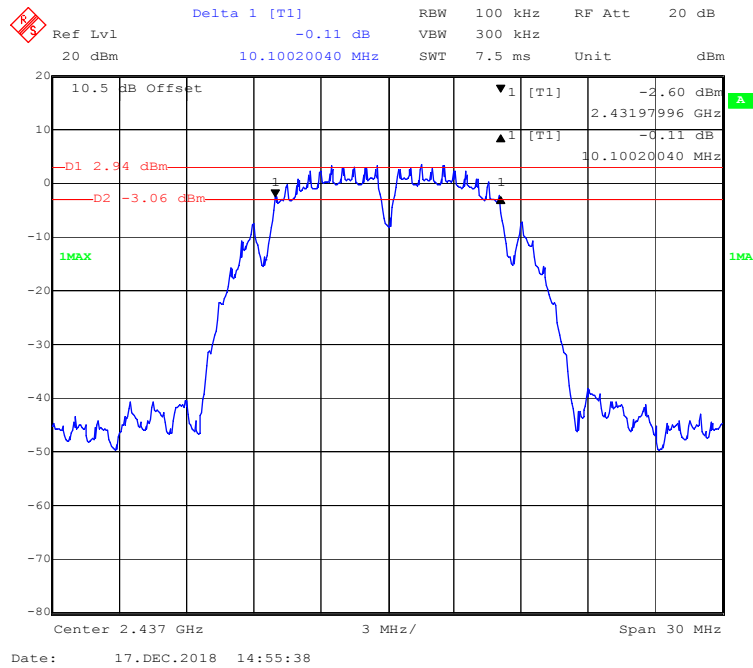
### Chain0: 802.11n-HT20 High Channel



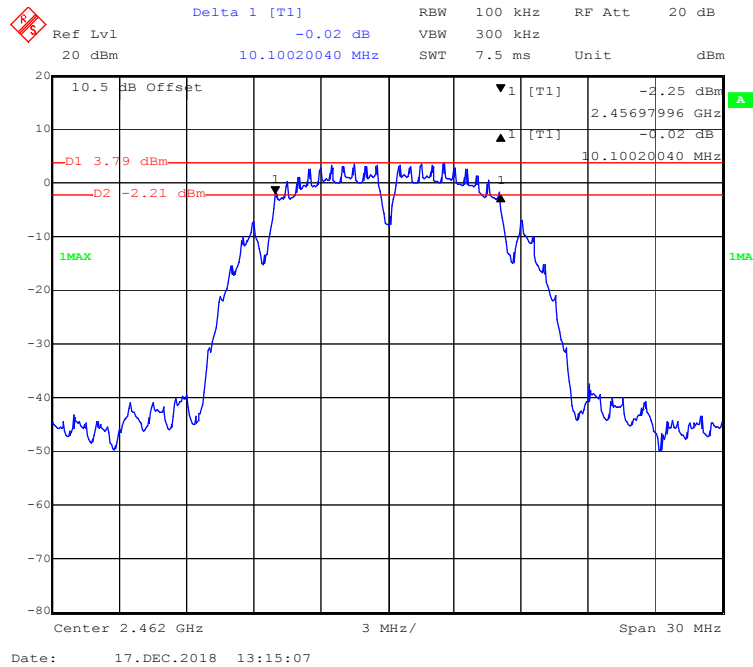
### Chain1: 802.11b Low Channel



### Chain1: 802.11b Middle Channel



### Chain1: 802.11b High Channel



Delta 1 [T1] -0.53 dB  
 Ref Lvl 15 dBm  
 RBW 100 kHz  
 RF Att 20 dB  
 15 dBm  
 16.47294589 MHz  
 SWT 7.5 ms  
 Unit dBm

10.5 dB Offset  
 -6.44 dBm  
 2.40379359 GHz  
 -0.53 dB  
 16.47294589 MHz  
 -5.41 dBm  
 1MAX  
 1MAX

Center 2.412 GHz  
 3 MHz/  
 Span 30 MHz

Date: 17.DEC.2018 15:48:56

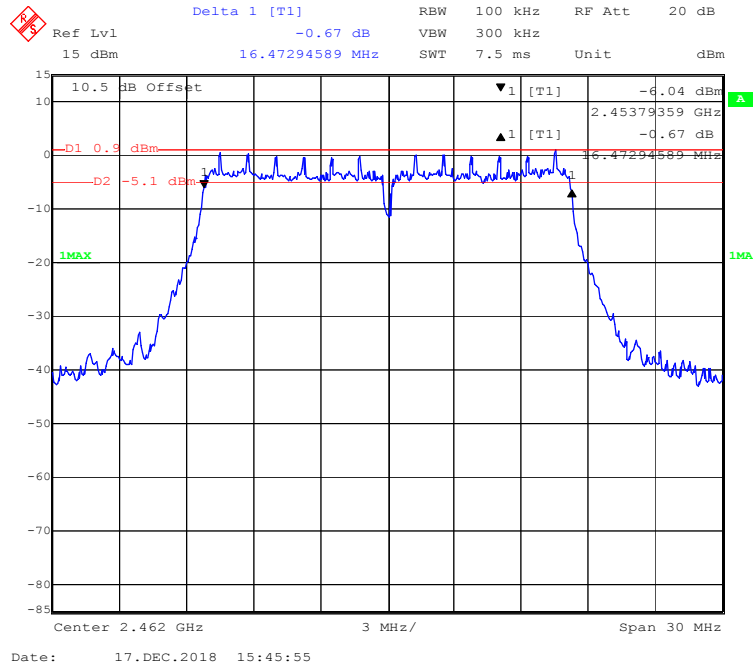
**Parameters:**

- Center: 2.437 GHz
- Span: 30 MHz
- RBW: 100 kHz
- VBW: 300 kHz
- SWT: 7.5 ms
- RF Att: 20 dB
- Ref Lvl: 15 dBm
- Delta 1 [T1]: -0.43 dB
- D1: 0.68 dBm
- D2: -5.32 dBm
- IMAX

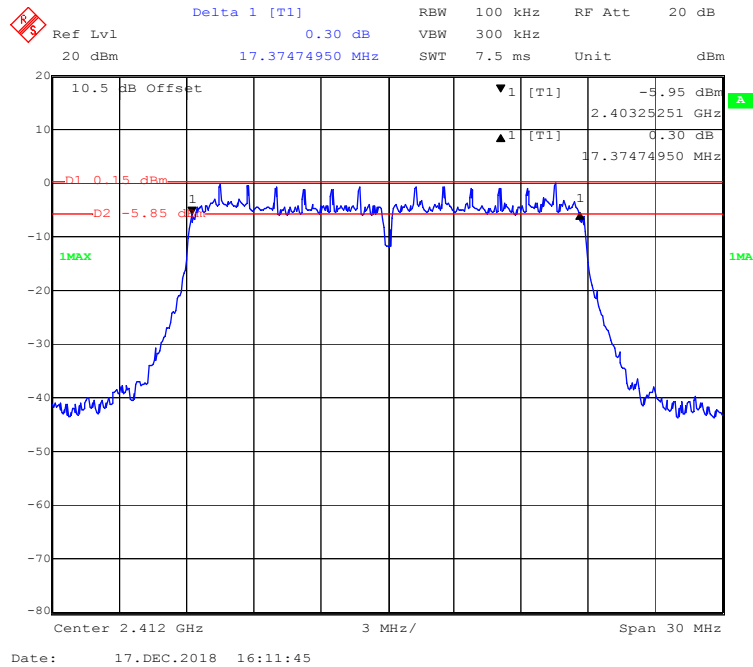
**Signal Data:**

| Marker   | Frequency (GHz) | Power (dBm) |
|----------|-----------------|-------------|
| ▼ 1 [T1] | 2.42879359      | -6.27       |
| ▲ 1 [T1] | 2.42879359      | -0.43       |

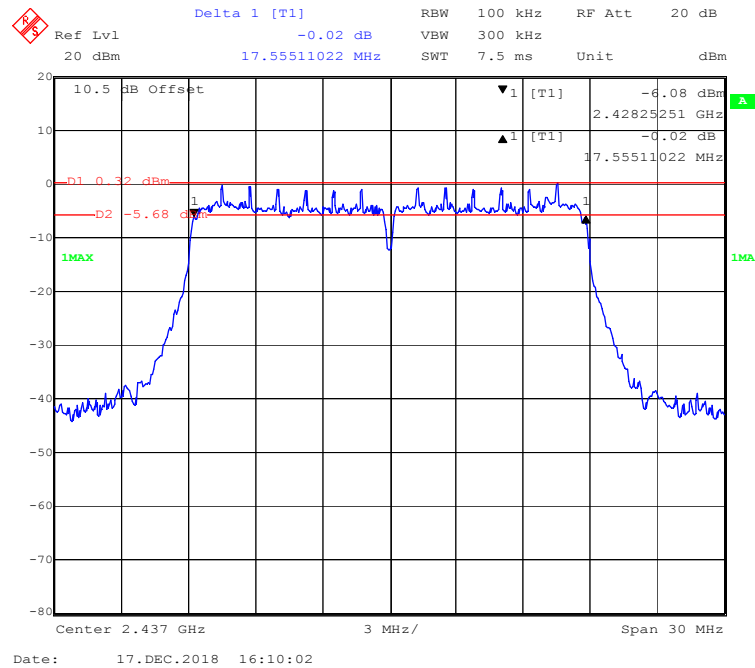
### Chain1: 802.11g High Channel



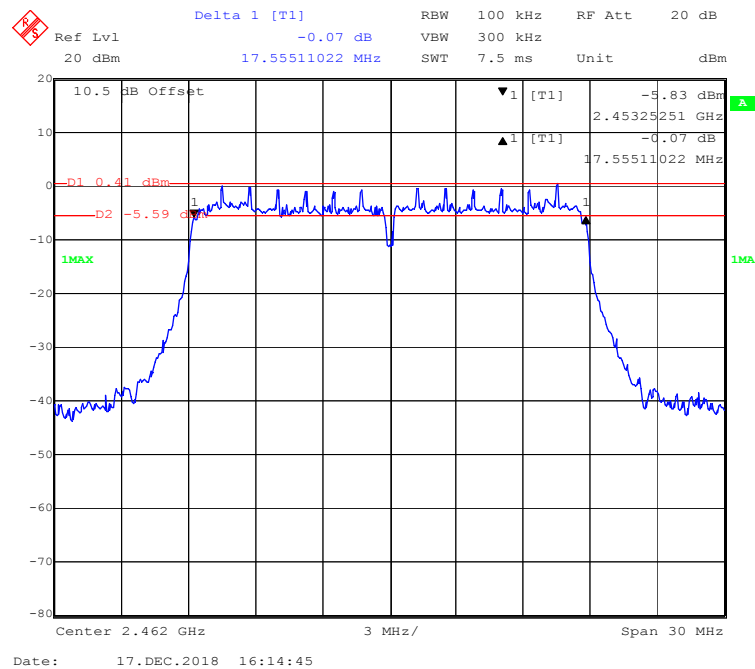
### Chain1: 802.11n-HT20 Low Channel



### Chain1: 802.11n-HT20 Middle Channel



### Chain1: 802.11n-HT20 High Channel



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

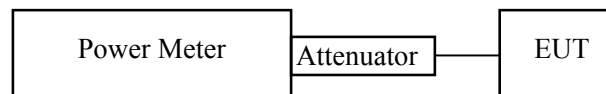
### **Applicable Standard**

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

### **Test Procedure**

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.



### **Test Data**

#### **Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24.8°C    |
| <b>Relative Humidity:</b> | 51 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

*The testing was performed by Stone Zhang on 2018-12-17.*

**Test Result:** Compliant.

*EUT operation mode: Transmitting*

| Test mode    | Channel | Frequency (MHz) | Max Conducted Peak Output Power (dBm) |        |       | Limit (dBm) | Result |
|--------------|---------|-----------------|---------------------------------------|--------|-------|-------------|--------|
|              |         |                 | Chain0                                | Chain1 | Total |             |        |
| 802.11b      | Low     | 2412            | 18.55                                 | 16.29  | /     | 30          | Pass   |
|              | Middle  | 2437            | 18.03                                 | 16.39  | /     | 30          | Pass   |
|              | High    | 2462            | 17.66                                 | 16.69  | /     | 30          | Pass   |
| 802.11g      | Low     | 2412            | 20.93                                 | 19.71  | /     | 30          | Pass   |
|              | Middle  | 2437            | 20.52                                 | 19.66  | /     | 30          | Pass   |
|              | High    | 2462            | 19.99                                 | 19.77  | /     | 30          | Pass   |
| 802.11n-HT20 | Low     | 2412            | 19.98                                 | 19.22  | 22.63 | 30          | Pass   |
|              | Middle  | 2437            | 20.60                                 | 19.22  | 22.97 | 30          | Pass   |
|              | High    | 2462            | 19.60                                 | 19.35  | 22.49 | 30          | Pass   |

Note: The total output power= $10\log_{10}(10^{\text{Chain 0/10}} + 10^{\text{Chain 1/10}})$

## **FCC §15.247(d) – BAND EDGE**

### **Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### **Test Procedure**

According to ANSI C63.10-2013 sub-clause 6.10.

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

### **Test Data**

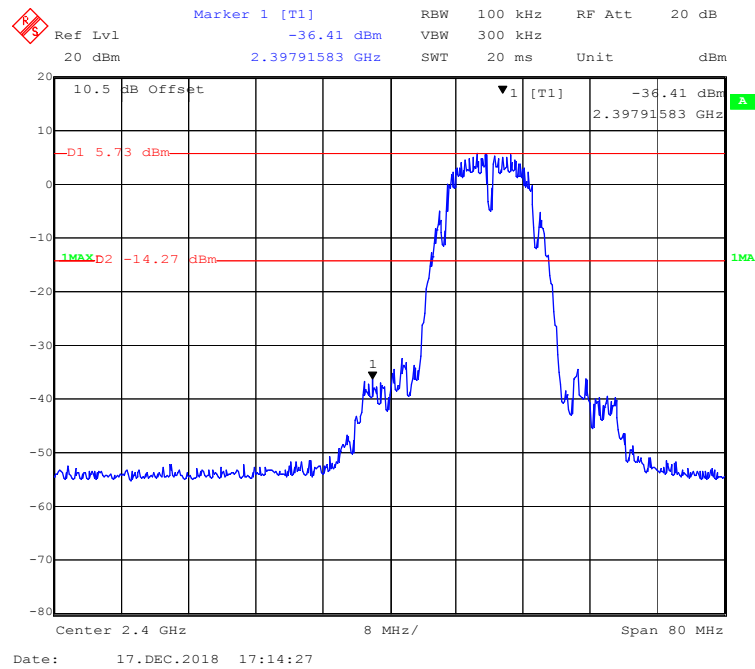
#### **Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24.8°C    |
| <b>Relative Humidity:</b> | 51 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

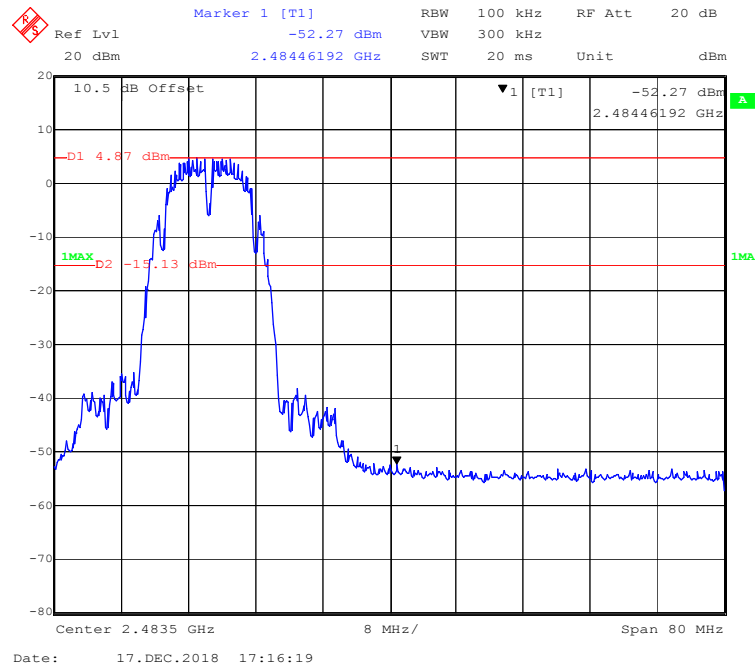
*The testing was performed by Stone Zhang on 2018-12-17 .*

**Test Result:** *Compliant.*

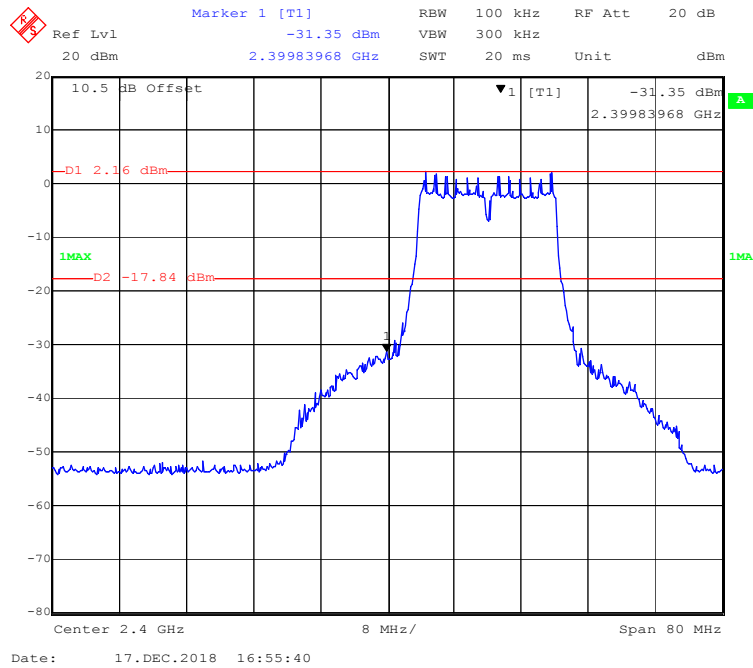
### Chain0: 802.11b Mode Left Side



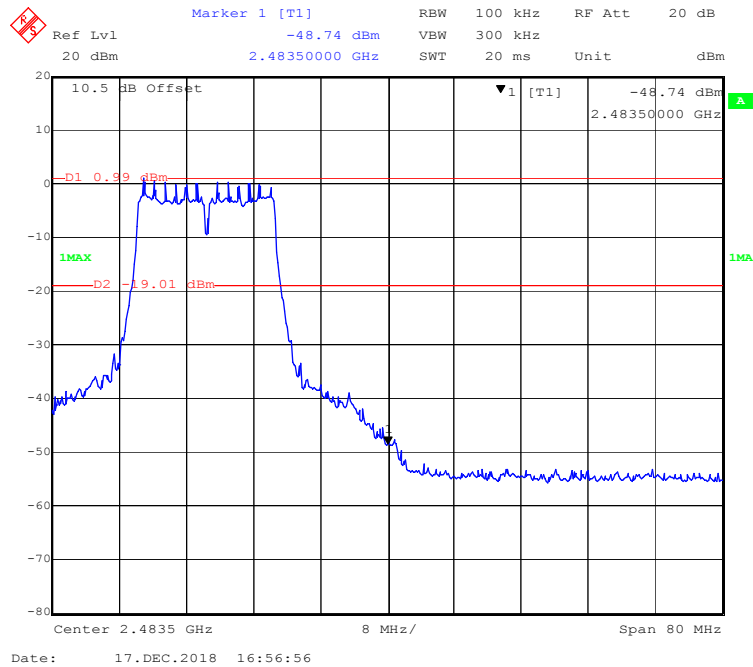
### Chain0: 802.11b Mode Right Side



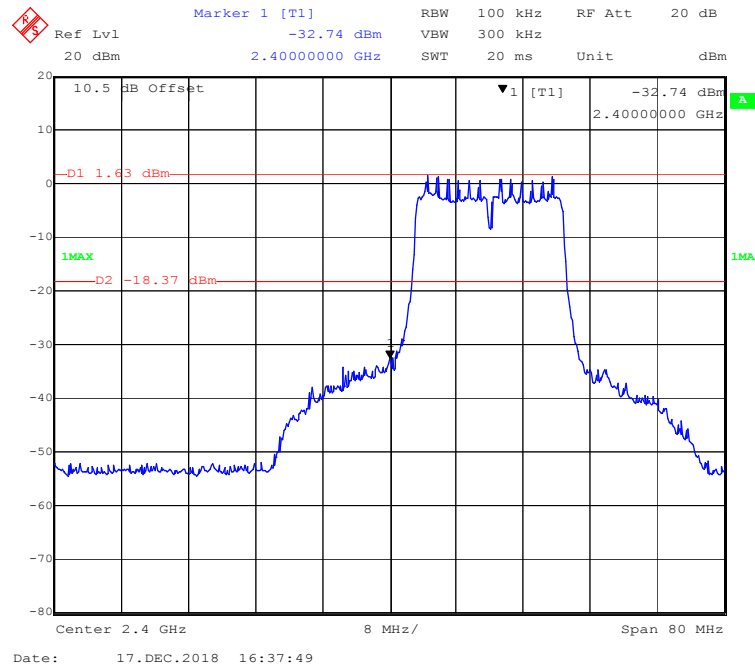
### Chain0: 802.11g Mode Left Side



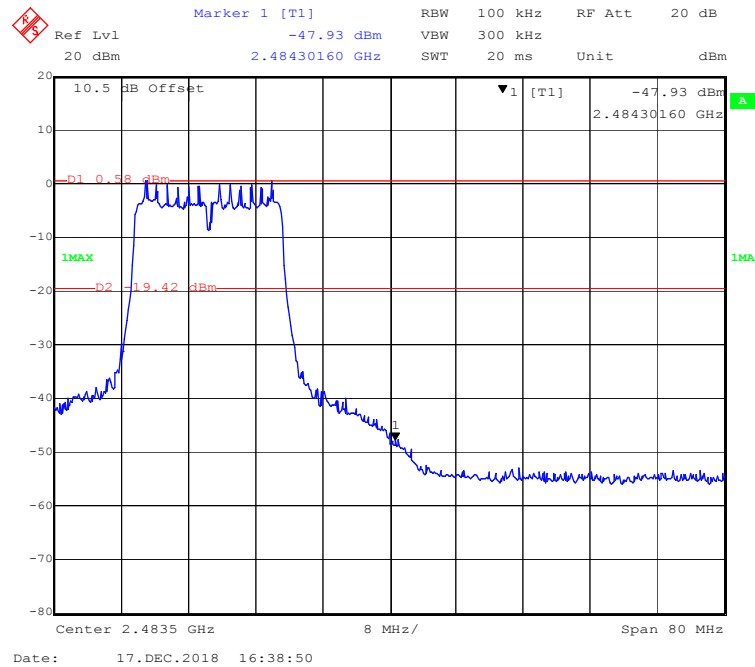
### Chain0: 802.11g Mode Right Side



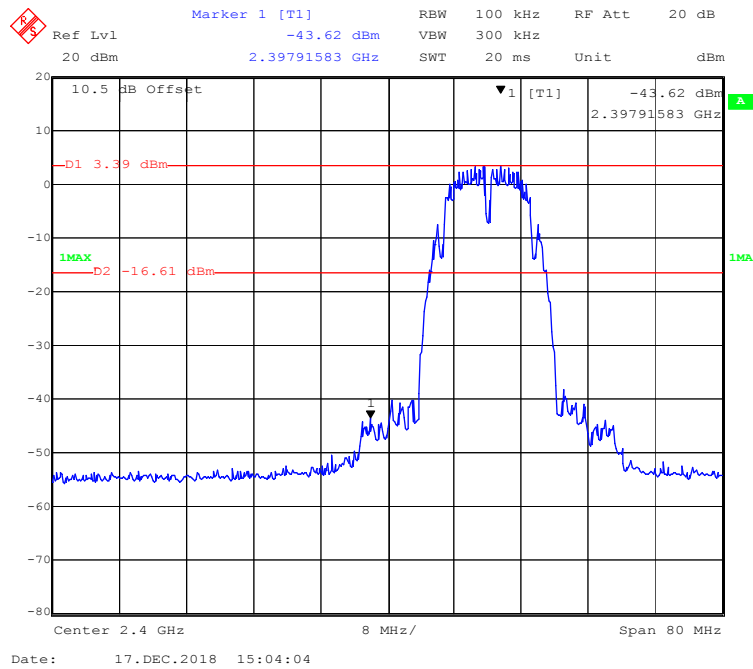
### Chain0: 802.11n-HT20 Mode Left Side



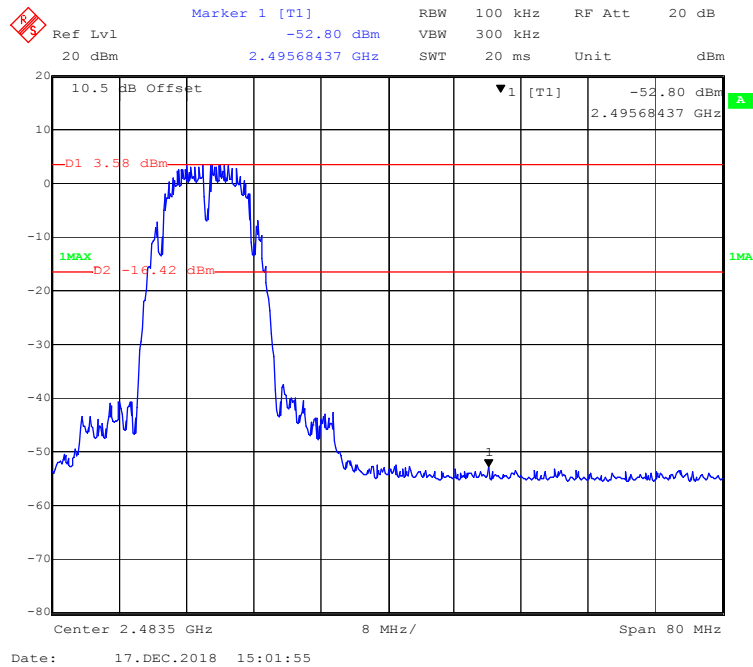
### Chain0: 802.11n-HT20 Mode Right Side



### Chain1: 802.11b Mode Left Side



### Chain1: 802.11b Mode Right Side



Marker 1 [T1]  
 Ref Lvl -36.86 dBm  
 15 dBm 2.39967936 GHz  
 RBW 100 kHz RF Att 20 dB  
 VBW 300 kHz  
 SWT 20 ms Unit dBm

10.5 dB Offset  
 ▼ 1 [T1] -36.86 dBm  
 2.39967936 GHz

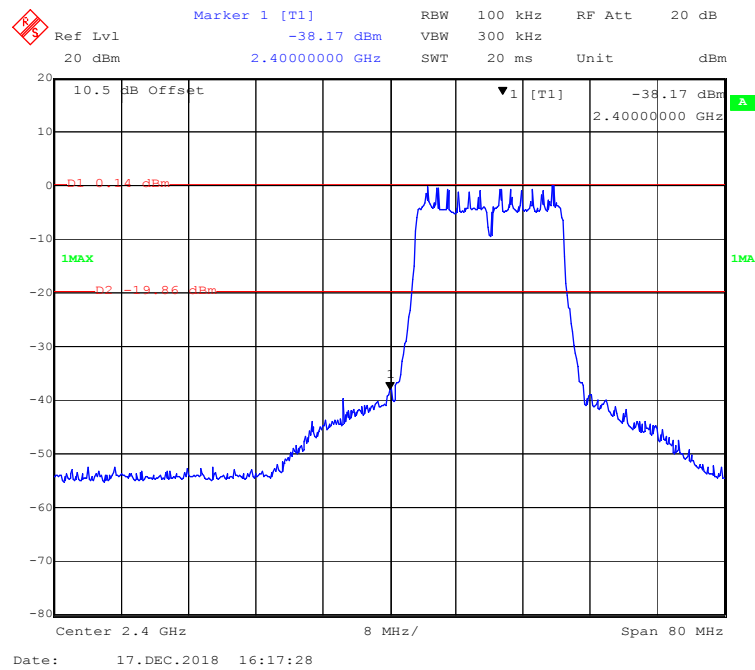
D1 0.59 dBm  
 1MAX D2 -19.41 dBm

Center 2.4 GHz 8 MHz/ Span 80 MHz

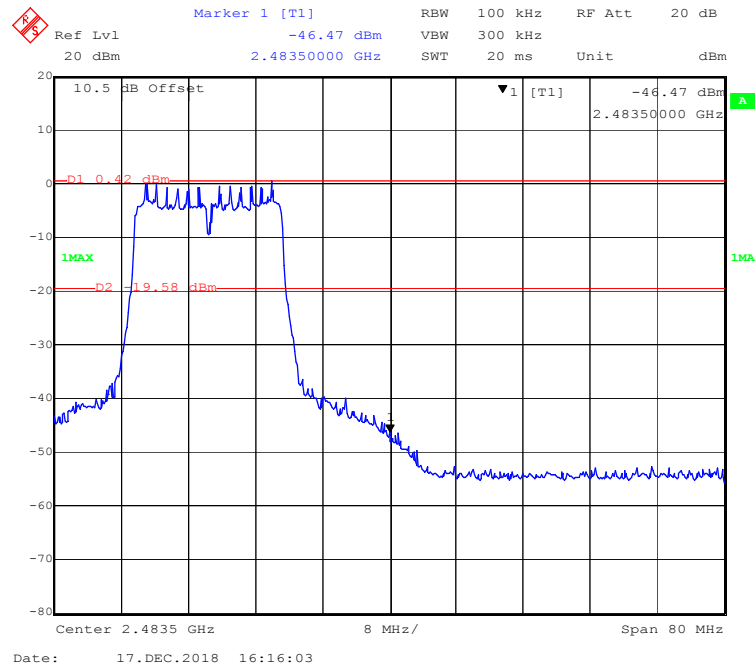
Date: 17.DEC.2018 15:50:02

REF Lvl 15 dBm  
 Ref Lvl 15 dBm  
 10.5 dB Offset  
 Marker 1 [T1]  
 -47.51 dBm  
 2.48382064 GHz  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 20 ms  
 RF Att 20 dB  
 Unit dBm  
 -47.51 dBm  
 2.48382064 GHz  
 -D1 0.93 dBm  
 -19.07 dBm  
 -55 dBm  
 Center 2.4835 GHz  
 8 MHz/  
 Span 80 MHz  
 Date: 17.DEC.2018 15:51:48

### Chain1: 802.11n-HT20 Mode Left Side



### Chain1: 802.11n-HT20 Mode Right Side



## **FCC §15.247(e) - POWER SPECTRAL DENSITY**

### **Applicable Standard**

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

### **Test Procedure**

According to ANSI C63.10-2013 sub-clause 11.10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to:  $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .
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 Data**

#### **Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 24.8°C    |
| <b>Relative Humidity:</b> | 51 %      |
| <b>ATM Pressure:</b>      | 101.1 kPa |

*The testing was performed by Stone Zhang on 2018-12-17*

**Test Result:** Compliant

EUT operation mode: Transmitting

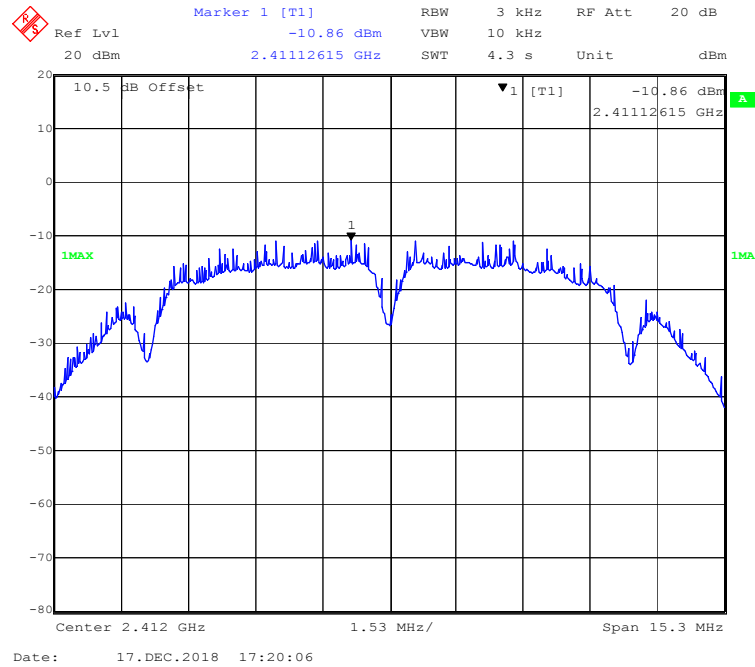
| Channel           | Frequency<br>(MHz) | PSD<br>(dBm/3kHz) |        |        | Limit<br>(dBm/3kHz) |
|-------------------|--------------------|-------------------|--------|--------|---------------------|
|                   |                    | Chain0            | Chain1 | Total  |                     |
| 802.11b mode      |                    |                   |        |        |                     |
| Low               | 2412               | -10.86            | -13.02 | /      | ≤8                  |
| Middle            | 2437               | -11.24            | -12.84 | /      | ≤8                  |
| High              | 2462               | -12.01            | -12.41 | /      | ≤8                  |
| 802.11g mode      |                    |                   |        |        |                     |
| Low               | 2412               | -14.31            | -15.90 | /      | ≤8                  |
| Middle            | 2437               | -15.82            | -16.48 | /      | ≤8                  |
| High              | 2462               | -15.88            | -16.35 | /      | ≤8                  |
| 802.11n-HT20 mode |                    |                   |        |        |                     |
| Low               | 2412               | -15.23            | -16.22 | -12.69 | ≤8                  |
| Middle            | 2437               | -15.13            | -15.15 | -12.13 | ≤8                  |
| High              | 2462               | -15.56            | -16.47 | -12.98 | ≤8                  |

Note:

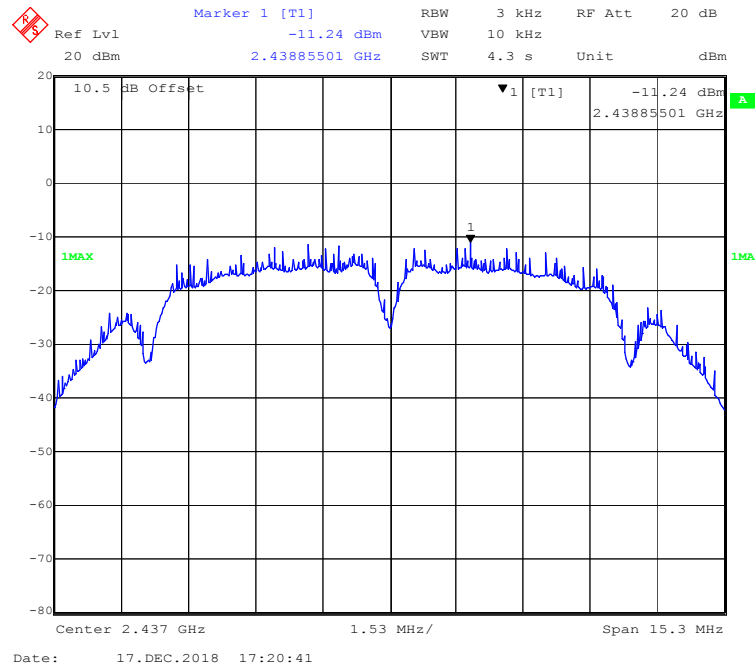
The total PSD=10 Log<sub>10</sub> (10<sup>^</sup> (Chain 0/10) +10<sup>^</sup> (Chain 1/10))

**Chain0:**

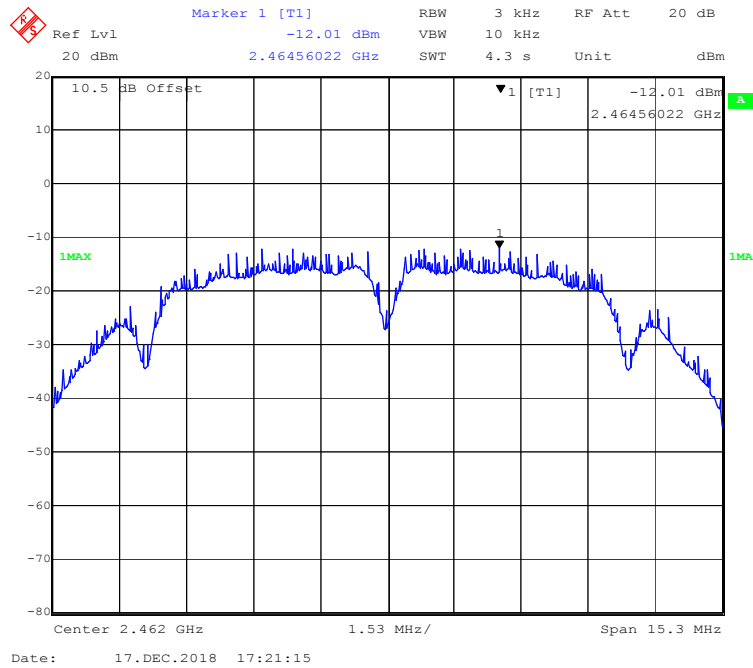
**802.11b Low Channel**



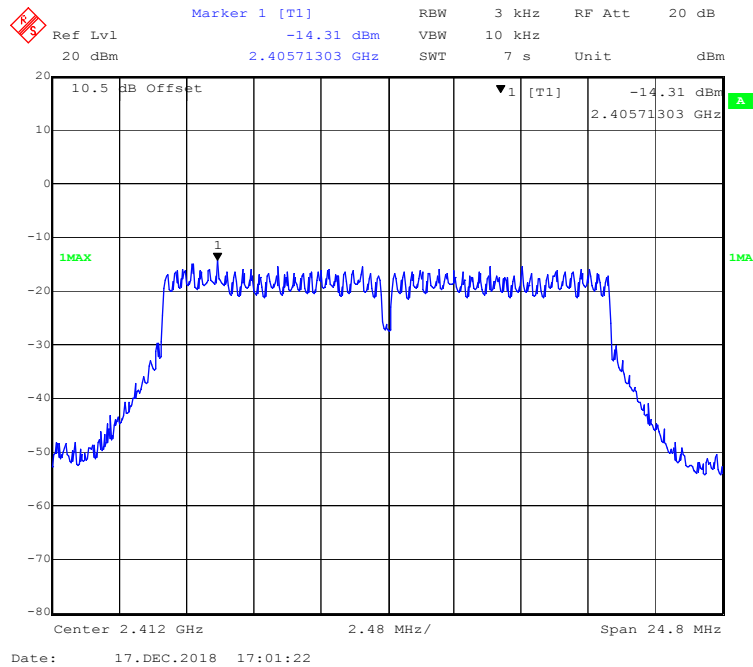
**802.11b Middle Channel**



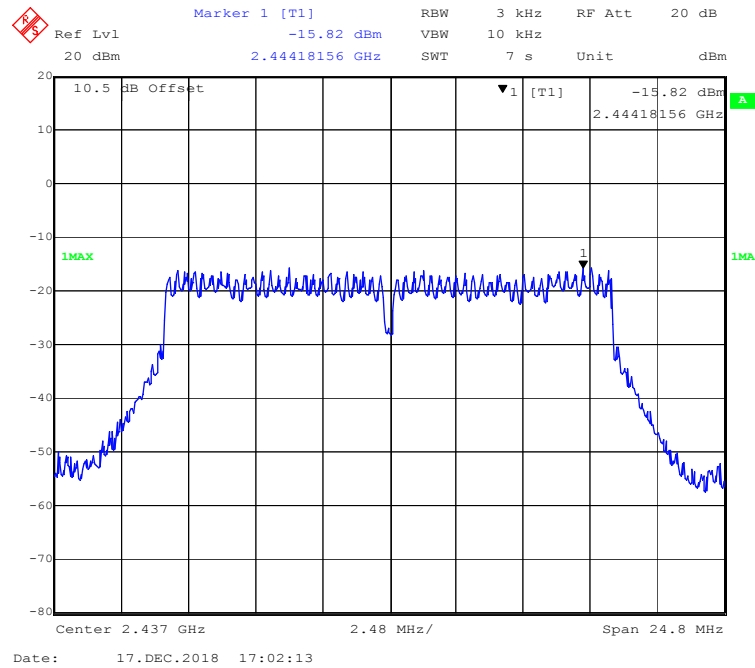
### 802.11b High Channel



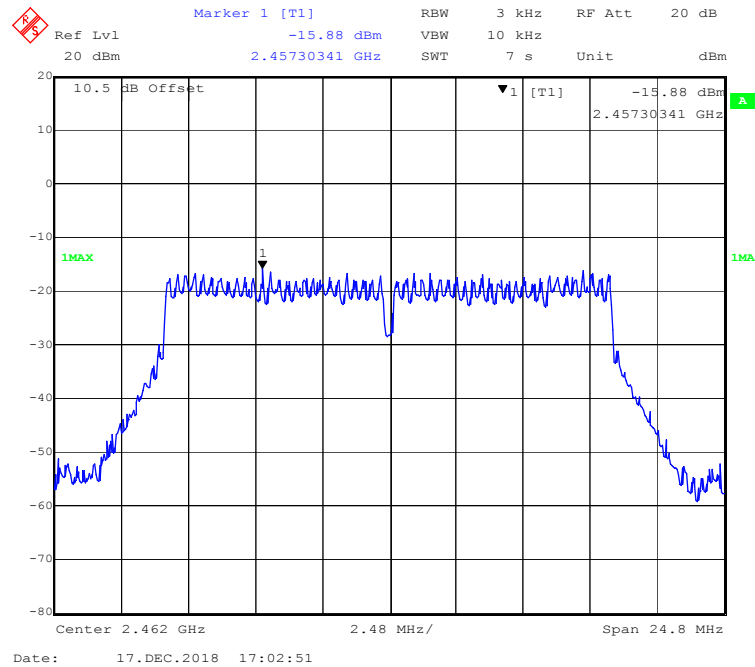
### 802.11g Low Channel



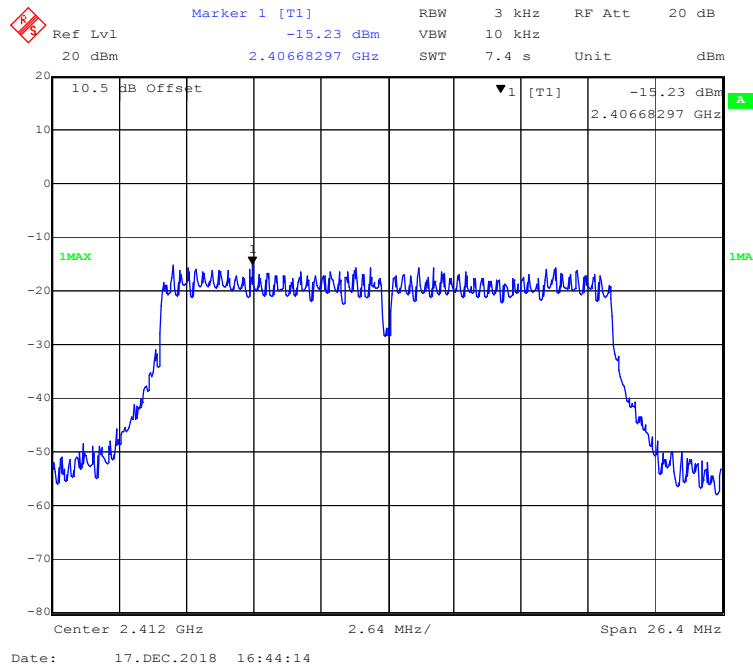
### 802.11g Middle Channel



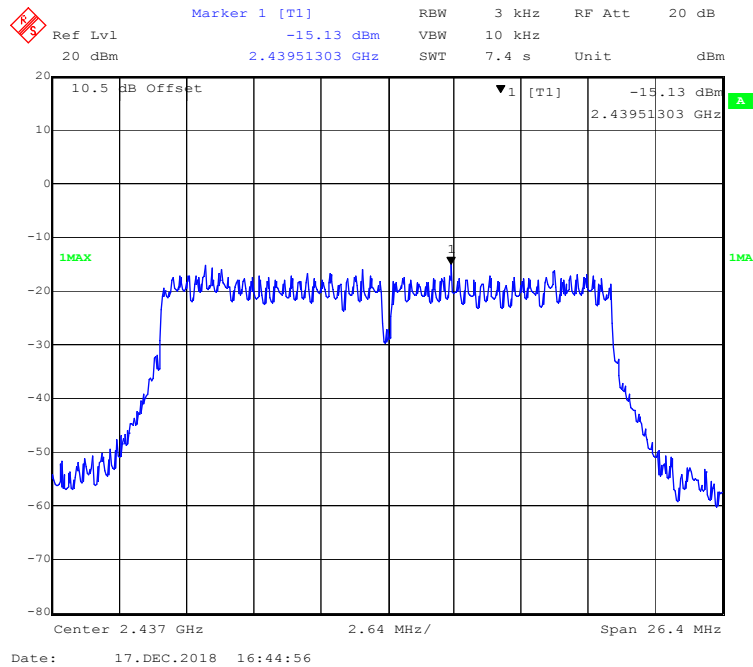
### 802.11g High Channel



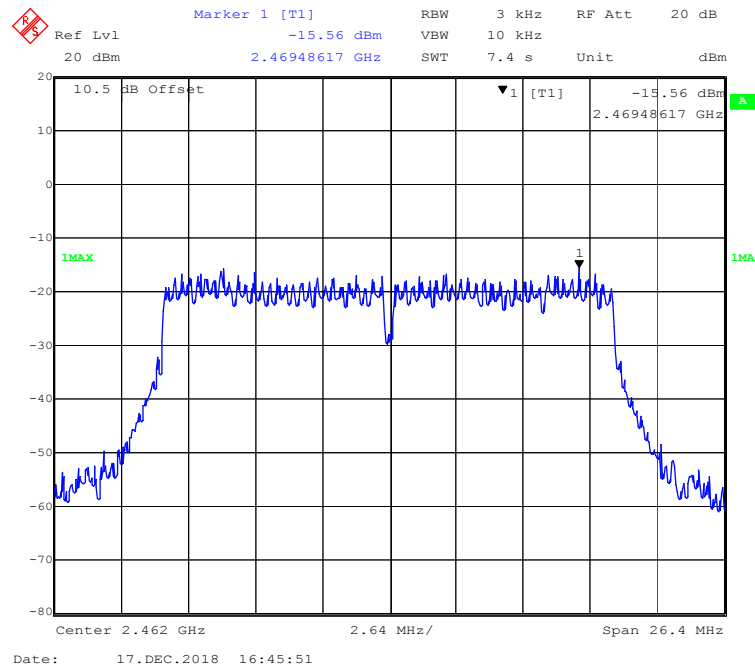
### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel

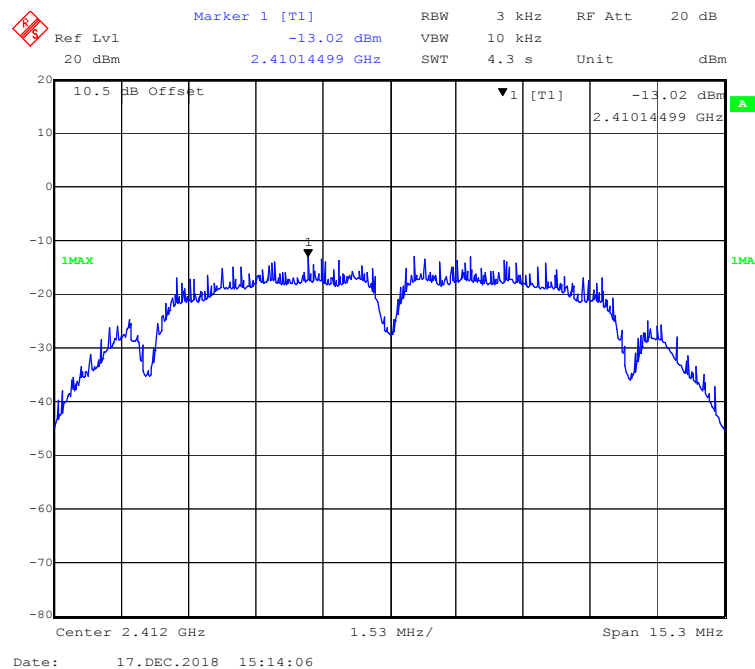


### 802.11n-HT20 High Channel

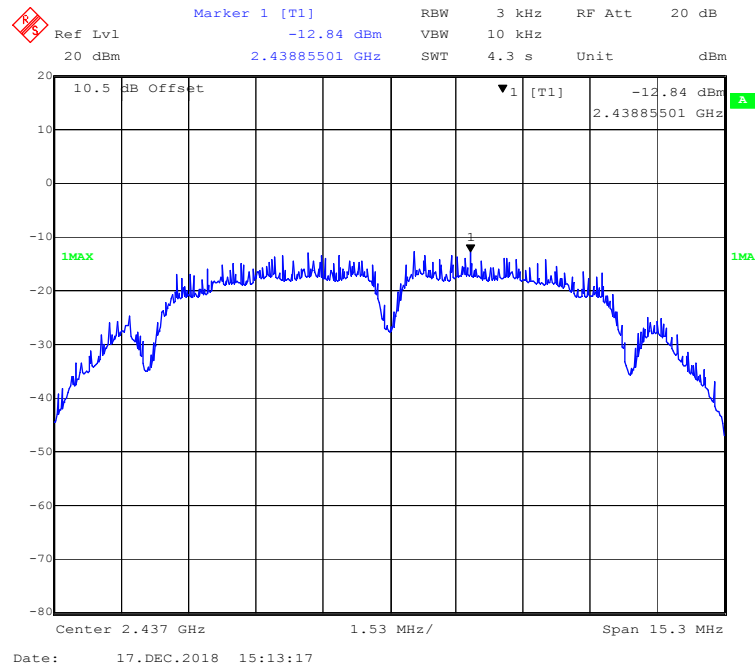


### Chain1:

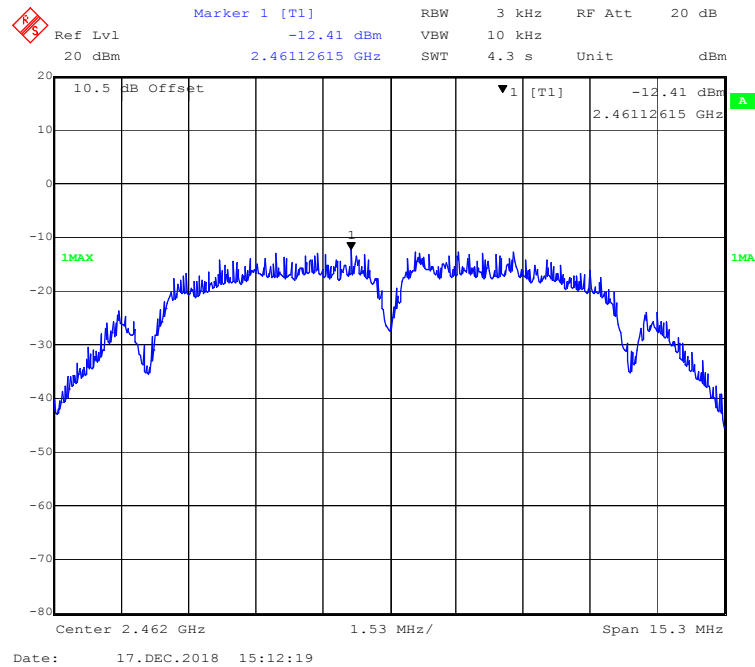
### 802.11b Low Channel



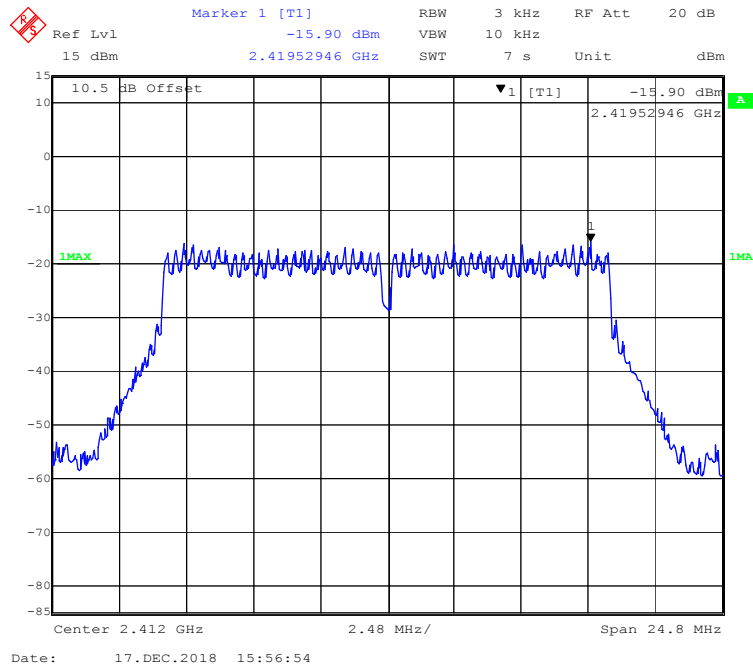
### 802.11b Middle Channel



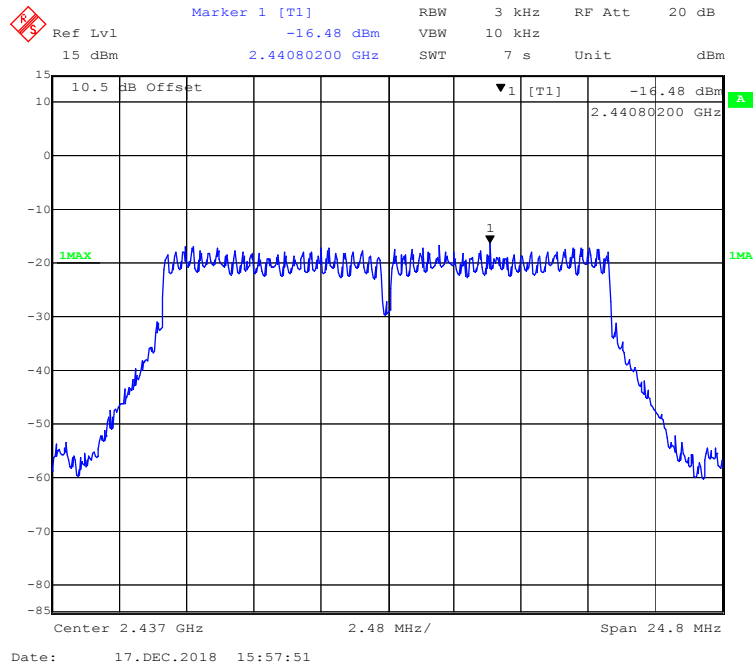
### 802.11b High Channel



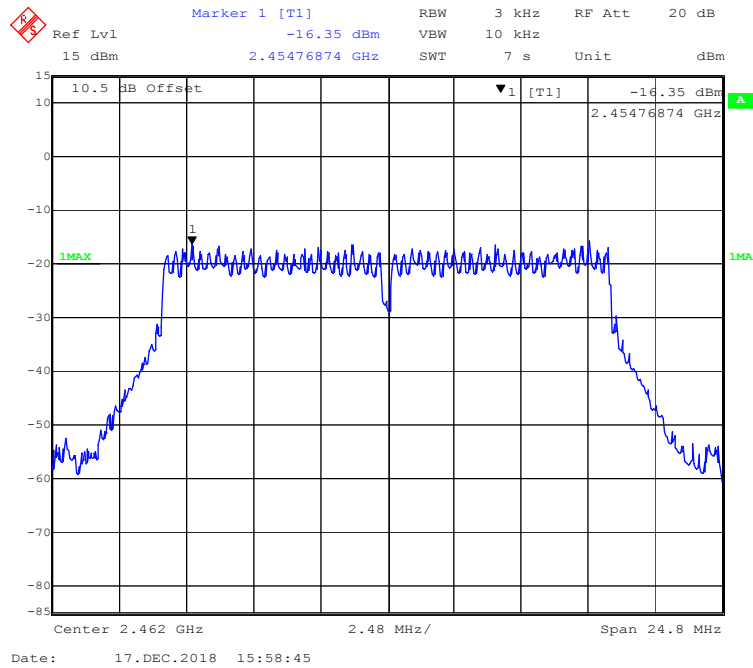
### 802.11g Low Channel



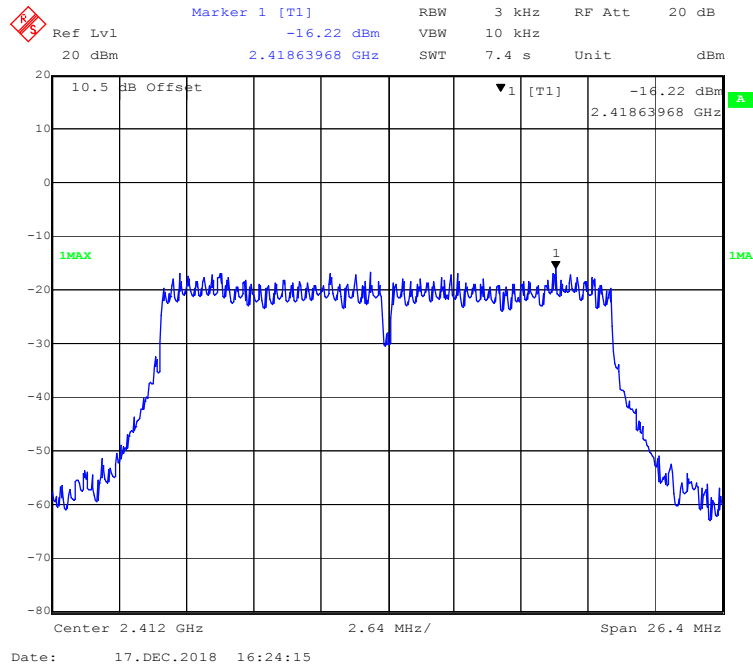
### 802.11g Middle Channel



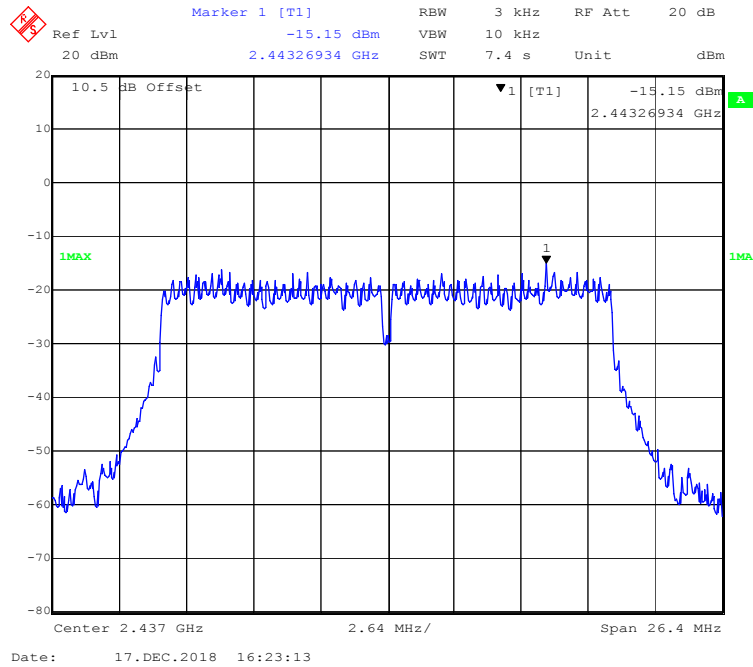
### 802.11g High Channel



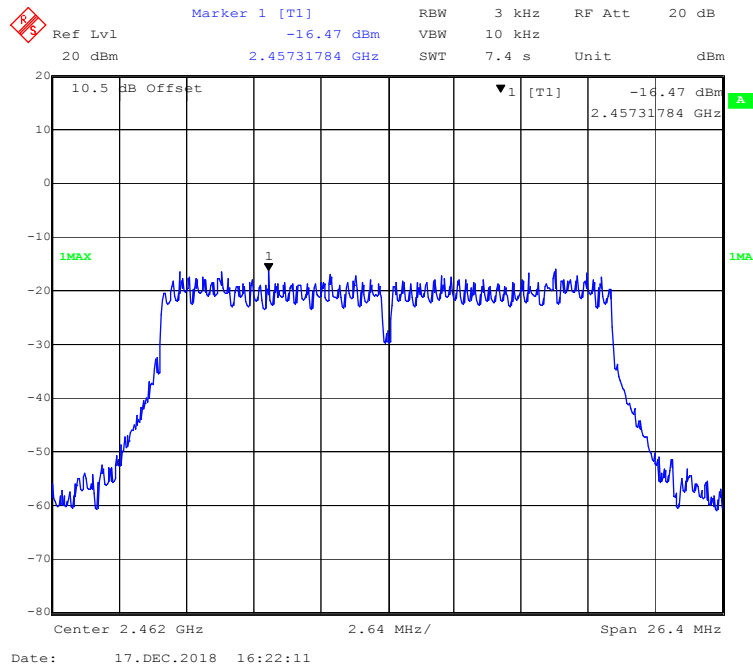
### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel



### 802.11n-HT20 High Channel



## APPENDIX A (INFORMATIVE)- A2LA CERTIFICATE AND SCOPE OF ACCREDITATION



### SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

BAY AREA COMPLIANCE LABORATORIES CORP. (KUNSHAN)  
No. 248 Chenghu Road  
Kunshan, Jiangsu Province, People's Republic of China  
Mr. John Chan Phone: +86 0512 86175000

#### ELECTRICAL

Valid To: September 30, 2020

Certificate Number: 4323.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following EMC, Radio, and Telecommunication tests:

#### Test Technology:

##### Emissions

Radiated and Conducted

#### Test Method(s):

ANSI C63.4:2014;  
ANSI C63.10:2010;  
ANSI C63.26:2015;  
ANSI 63.17:2013;  
FCC 47 CFR Parts 15B (using ANSI C63.4:2014) and 18 (using FCC MP-5:1986); FCC OST/MP-5 (1986);  
EN 55011; IEC/CISPR 11; AS/NZS CISPR 11;  
EN 55014-1; IEC/CISPR 14-1; AS/NZS CISPR 14.1;  
EN 55014-2; IEC/CISPR 14-2; AS/NZS CISPR 14.2;

CNS 13439; CNS 13803; CNS 14115;  
CNS 13438 (up to 6GHz); CNS 13783-1;

EN 55015; IEC CISPR 15; AS/NZS CISPR 15;  
EN 61547; IEC 61547;  
EN 55032; IEC/CISPR 32; AS/NZS CISPR 32; GB 9254;  
EN 55024; CISPR 24; AS/NZS CISPR 24;  
CISPR 25;  
EN 55035; CISPR 35;  
VCCI V-3; VCCI-CISPR 32;  
EN 50130-4;

ICES-003 Issue 6 (2016);  
ICES-005 Issue 4 (Dec 2015);

IDA TS EMC, Issue 1, Rev. 1 (March 2000)

##### Harmonics

EN 61000-3-2; IEC 61000-3-2; AS/NZS 61000.3.2; GB 17625.1

##### Flicker

EN 61000-3-3; IEC 61000-3-3; AS/NZS 61000.3.3; GB 17625.2

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5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

| <u>Test Technology:</u>                        | <u>Test Method(s):</u>                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Immunity</b>                                |                                                                                                                                                                                                                                                                                                                                                                                             |
| Electrostatic Discharge (ESD)                  | EN 61000-4-2; IEC 61000-4-2                                                                                                                                                                                                                                                                                                                                                                 |
| Radiated Immunity                              | EN 61000-4-3; IEC 61000-4-3                                                                                                                                                                                                                                                                                                                                                                 |
| Electrical Fast Transient (EFT) / Burst        | EN 61000-4-4; IEC 61000-4-4                                                                                                                                                                                                                                                                                                                                                                 |
| Surge                                          | EN 61000-4-5; IEC 61000-4-5                                                                                                                                                                                                                                                                                                                                                                 |
| Conducted Immunity                             | EN 61000-4-6; IEC 61000-4-6                                                                                                                                                                                                                                                                                                                                                                 |
| Magnetic Field Immunity                        | EN 61000-4-8; IEC 61000-4-8                                                                                                                                                                                                                                                                                                                                                                 |
| Voltage Dips, Short Interrupts, and Variations | EN 61000-4-11; IEC 61000-4-11                                                                                                                                                                                                                                                                                                                                                               |
| <b>Generic and Product Family Standards</b>    | EN 61000-6-1; IEC 61000-6-1;<br>EN 61000-6-2; IEC 61000-6-2;<br>EN 61000-6-3; IEC 61000-6-3; AS/NZS 61000-6.3;<br>EN 61000-6-4; IEC 61000-6-4; AS/NZS 61000.6.4;<br>EN 61326-1; IEC 61326-1;<br>EN 61326-2-1; IEC 61326-2-1;<br>EN 61326-2-2; IEC 61326-2-2;<br>EN 61326-2-3; IEC 61326-2-3;<br>EN 61326-2-4; IEC 61326-2-4;<br>EN 61326-2-5; IEC 61326-2-5;<br>EN 61326-2-6; IEC 61326-2-6 |
| Specific Absorption Rate(SAR)                  | EN 50360;<br>EN 50566;<br>EN 62209-1; IEC 62209-1;<br>EN 62209-2; IEC 62209-2;<br>RSS-102, Issue 5 (March 2015);<br>MIC Article 14-2;<br>IEEE 1528:2013                                                                                                                                                                                                                                     |
| RF Exposure                                    | EN 50364;<br>EN 50385;<br>EN 50383;<br>EN 50400;<br>EN 50421;<br>EN 50663;<br>IEC 62233;<br>EN 62311; IEC 62311;<br>EN 62479;<br>EN 62493; IEC 62493;<br>IEEE Std C95.3;<br>IEEE Std C95.1;<br>EN 50384                                                                                                                                                                                     |

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| <u>Test Technology:</u> | <u>Test Method(s):</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| ACA                     | ACA Standard 2013 Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| AS/NZS                  | AS/NZS 4268;<br>AS/NZS 4295;<br>AS/NZS 4771;<br>AS/CA S042.1;<br>AS/ACIF S042.3;<br>AS/CA S042.4;<br>AS/NZS 2772.1;<br>AS/NZS 2772.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Europe                  | ETSI EN 300 086;<br>ETSI EN 300 113;<br>ETSI EN 300 219;<br>ETSI EN 300 220-1; -2; -3-1; -3-2; -4;<br>ETSI EN 300 296;<br>ETSI EN 300 328;<br>ETSI EN 300 330;<br>ETSI EN 300 373-1;<br>ETSI EN 300 390;<br>ETSI EN 300 422-1; -2; -3; -4;<br>ETSI EN 300 440;<br>ETSI EN 301 166;<br>ETSI EN 301 178;<br>ETSI EN 301 357;<br>ETSI EN 301 406;<br>ETSI EN 301 489-1; -3; -5; -6; -9; -17; -19; -23; -34; -50; -52;<br>ETSI EN 301 502;<br>ETSI EN 301 511;<br>ETSI EN 301 526;<br>ETSI EN 301 783;<br>ETSI EN 301 893;<br>ETSI EN 301 908-1; -2; -3; -8; -9; -10; -11; -12; -13; -14; -15; -16;<br>-17; -18; -19; -20; -21; -22;<br>ETSI EN 302 208;<br>ETSI EN 302 208;<br>ETSI EN 303 345;<br>ETSI EN 303 413;<br>ETSI EN 303 417;<br>ETSI EN 303 609 |
| HKCA                    | HKTA 1033 ISSUE 6;<br>HKTA 1034 ISSUE 3;<br>HKTA 1035 ISSUE 6;<br>HKTA 1039 ISSUE 4;<br>HKTA 1048 ISSUE 2;<br>HKTA 1061 ISSUE 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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**Test Technology:**

Japan

Canada

Singapore (TMDA)

Taiwan

FCC/US

**Test Method(s):**

MIC Article 2-1 Item (8);  
 MIC Article 2-1 Item (13);  
 MIC Article 2-1 Item (19);  
 MIC Article 2-1 Item (19)-2;  
 MIC Article 2-1 Item (19)-3;  
 MIC Article 2-1 Item (19)-3-2;  
 MIC Article 2-1 Item (19)-11  
 RSS-112, Issue 1 (February 2008);  
 RSS-119, Issue 12 (May 2015);  
 RSS-123, Issue 3, (February 2015);  
 RSS-130, Issue 1 (October 2013);  
 RSS-131, Issue 3 (January 2017 Updated May 2017);  
 RSS-132, Issue 3 (January 2013);  
 RSS-133, Issue 6 (January 2013);  
 RSS-134, Issue 2 (February 5, 2016);  
 RSS-139, Issue 3 (July 2015);  
 RSS-199, Issue 3 (December 2016);  
 RSS-210, Issue 9 (August 2016);  
 RSS-213, Issue 3 (March 2015);  
 RSS-215, Issue 2 (June 2009);  
 RSS-216, Issue 2 (January 20, 2016);  
 RSS-247, Issue 2 (February 2017);  
 RSS-310, Issue 4 (July 2015);  
 RSS-Gen, Issue 5 (April 2018);  
 RSS-102 Issue 5 March 2015

IDA TS CMT Issue 1;  
 IDA TS SRD Issue 1 Rev 7;  
 TMDA TS CBS Issue 1;  
 TMDA TS CMT Issue 1

LP0002;  
 PLMN04;  
 PLMN05;  
 PLMN06;  
 PLMN08;  
 LP0001;  
 PLMN09;  
 PLMN10

TIA/EIA 603-D (2010);  
 ANSI/TIA 603-D (2010);  
 TIA/EIA 603-E (2016);  
 ANSI/TIA 603-E (2016);  
 TIA-102.CAAA-E;  
 TIA-102.CAAA-D;  
 TIA-470.210:2010;  
 47 CFR FCC Part 15/C/D/E (with DFS)/E (without DFS)/F, 18,  
 20, 22, 24, 25, 27, 73, 74, 80, 87, 90, 95, 97, 101

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Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1<sup>1</sup>

| Rule Subpart/Technology                                                                                                                                     | Test Method                                                | Maximum Frequency (MHz) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------|
| <u>Unintentional Radiators</u><br>Part 15B                                                                                                                  | ANSI C63.4:2014                                            | 40000                   |
| <u>Industrial, Scientific, and Medical Equipment</u><br>Part 18                                                                                             | FCC MP-5:1986                                              | 40000                   |
| <u>Intentional Radiators</u><br>Part 15C                                                                                                                    | ANSI C63.10:2013                                           | 325000                  |
| <u>Unlicensed Personal Communication Systems Devices</u><br>Part 15D                                                                                        | ANSI C63.17:2013                                           | 40000                   |
| <u>U-NII without DFS Intentional Radiators</u><br>Part 15E                                                                                                  | ANSI C63.10:2013                                           | 40000                   |
| <u>U-NII with DFS Intentional Radiators</u><br>Part 15E                                                                                                     | FCC KDB 905462 D02 (v02)                                   | 40000                   |
| <u>UWB Intentional Radiators</u><br>Part 15F                                                                                                                | ANSI C63.10:2013                                           | 200000                  |
| <u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u><br>Parts 22 (cellular), 24, 25 (non-microwave), and 27                             | ANSI/TIA-603-D/E;<br>TIA-102.CAAA-D/E;<br>ANSI C63.26:2015 | 40000                   |
| <u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u><br>Parts 22 (non-cellular), 90 (non-microwave), 95, 97, and 101 (non-microwave) | ANSI/TIA-603-D/E;<br>TIA-102.CAAA-D/E;<br>ANSI C63.26:2015 | 40000                   |
| <u>Maritime and Aviation Radio Services</u><br>Parts 80 and 87                                                                                              | ANSI/TIA-603-D/E;<br>ANSI C63.26:2015                      | 40000                   |
| <u>Microwave and Millimeter Bands Radio Services</u><br>Parts 25, 30, 74, 90 (M, DSRC, Y, Z), Part 95 (M and L), and 101                                    | ANSI/TIA-603-D/E;<br>TIA-102.CAAA-D/E;<br>ANSI C63.26:2015 | 40000                   |

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Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1<sup>1</sup>

| Rule Subpart/Technology                                                                                                                 | Test Method                                                | Maximum Frequency (MHz) |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------|
| <u>Broadcast Radio Services</u><br>Parts 73 and 74 (non-microwave)                                                                      | ANSI/TIA-603-D/E;<br>TIA-102.CAAA-D/E;<br>ANSI C63.26:2015 | 40000                   |
| <u>RF Exposure</u><br>Devices Subject to SAR Requirements                                                                               | IEEE Std 1528:2013                                         | 2600                    |
| <u>Signal Boosters</u><br>Part 20(Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) | ANSI C63.26:2015                                           | 40000                   |

<sup>1</sup>Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.

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## Accredited Laboratory

A2LA has accredited

### **BAY AREA COMPLIANCE LABORATORIES CORP. (KUNSHAN)**

*Jiangsu Province, People's Republic of China*

for technical competence in the field of

### Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 9<sup>th</sup> day of August 2018.

A handwritten signature in black ink, appearing to read 'L. L. L.', written over a horizontal line.

President and CEO  
For the Accreditation Council  
Certificate Number 4323.01  
Valid to September 30, 2020

*For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

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