

# FCC PART 15.247 TEST REPORT

For

**Binatone Electronics International Ltd.**

Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong, China

**FCC ID:VLJ-MDC300GW**

|                                                                                                                                                                                                                                                                               |                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                        | <b>Product Name:</b><br>DVR |
| <b>Report Number:</b> RDG180802009-00A                                                                                                                                                                                                                                        |                             |
| <b>Report Date:</b> 2018-10-10                                                                                                                                                                                                                                                |                             |
| <b>Reviewed By:</b> Jerry Zhang<br>EMC Manager                                                                                                                                                                                                                                |                             |
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This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA\* or any agency of the Federal Government. \* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “\*”

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## GENERAL INFORMATION

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

|                             |                                             |
|-----------------------------|---------------------------------------------|
| <b>EUT Name:</b>            | DVR                                         |
| <b>EUT Model:</b>           | MDC300GW                                    |
| <b>FCC ID:</b>              | VLJ-MDC300GW                                |
| <b>Rated Input Voltage:</b> | DC3.7V from battery or DC5.0V from USB port |
| <b>External Dimension:</b>  | 10.8cm*9cm*5cm                              |
| <b>Serial Number:</b>       | 180802009                                   |
| <b>EUT Received Date:</b>   | 2018.08.01                                  |

### Objective

This report is prepared on behalf of *Binatone Electronics International Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Rules Part 15-Subpart C, 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 KDB 558074 D01 15.247 Meas Guidance v05.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

### Measurement Uncertainty

| Parameter                         | Measurement Uncertainty                                                                                              |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Occupied Channel Bandwidth        | ±5 %                                                                                                                 |
| RF output power, conducted        | ±0.61dB                                                                                                              |
| Power Spectral Density, conducted | ±0.61 dB                                                                                                             |
| Unwanted Emissions, radiated      | 30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB |
| Unwanted Emissions, conducted     | ±1.5 dB                                                                                                              |
| Temperature                       | ±1 °C                                                                                                                |
| Humidity                          | ±5%                                                                                                                  |
| DC and low frequency voltages     | ±0.4%                                                                                                                |
| Duty Cycle                        | 1%                                                                                                                   |
| AC Power Lines Conducted Emission | 3.12 dB (150 kHz to 30 MHz)                                                                                          |

### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

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

For 2.4GHz band, total 11 channels are provided:

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

For 802.11b, 802.11g, and 802.11n ht20 modes were test with channel 1,6,11.

For 802.11n ht40 mode was tested with channel 3, 6, 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.

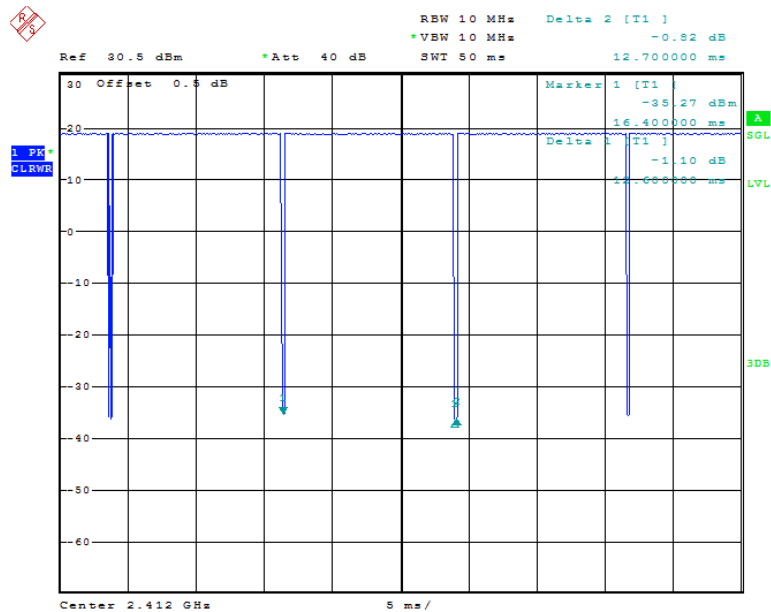
### EUT Exercise Software

The software “SecureCRT.exe” was used for testing, which was provided by manufacturer. The maximum power was configured by default level, per pretest the conducted output power, 802.11g and n modes power in difference power level, all test items performed at Low, Middle and High Channel, radiation bandedge test and output power were tested with additional channels according to the pretest output power test results.

The maximum duty cycle as following table:

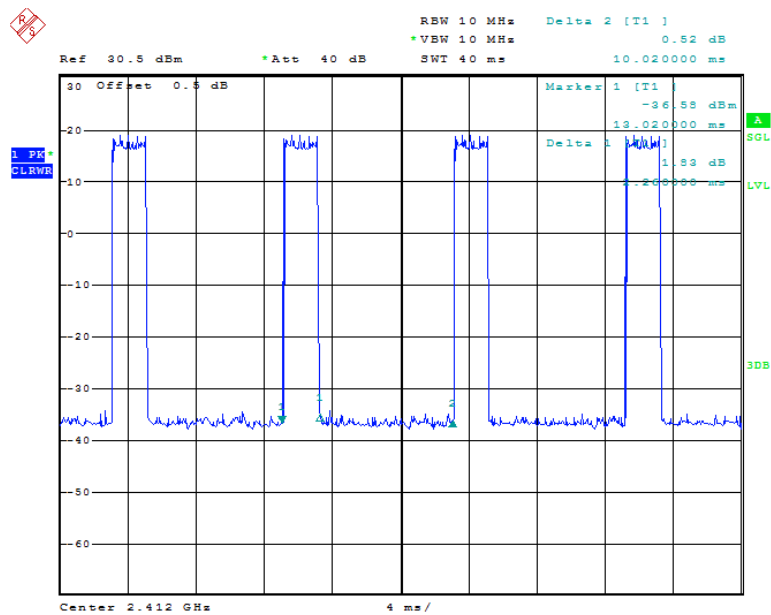
| Test mode    | T <sub>on</sub> (ms) | T <sub>on+off</sub> (ms) | Duty Cycle(x) (%) |
|--------------|----------------------|--------------------------|-------------------|
| 802.11b      | 12.6                 | 12.7                     | 99.21             |
| 802.11g      | 2.26                 | 10.02                    | 22.55             |
| 802.11n ht20 | 2.10                 | 10.10                    | 20.79             |
| 802.11n ht40 | 1.06                 | 9.94                     | 10.66             |

## 802.11b



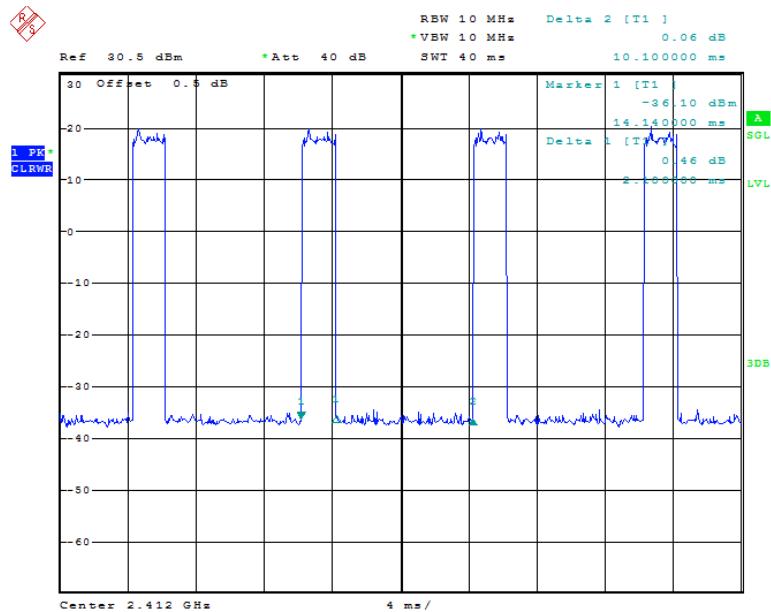
Date: 21.AUG.2018 16:19:08

## 802.11g



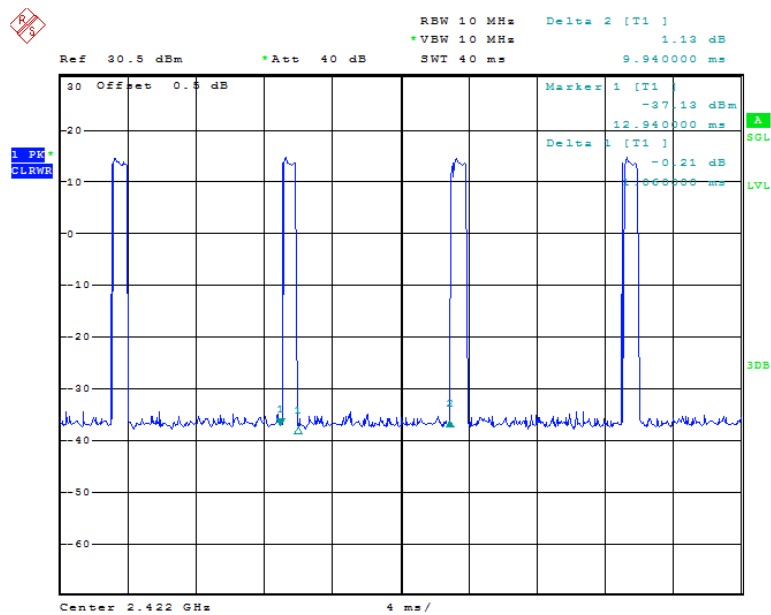
Date: 21.AUG.2018 16:16:28

### 802.11n ht20



Date: 21.AUG.2018 16:13:06

### 802.11n ht40



Date: 21.AUG.2018 16:14:45

**Local Support Equipment List and Details**

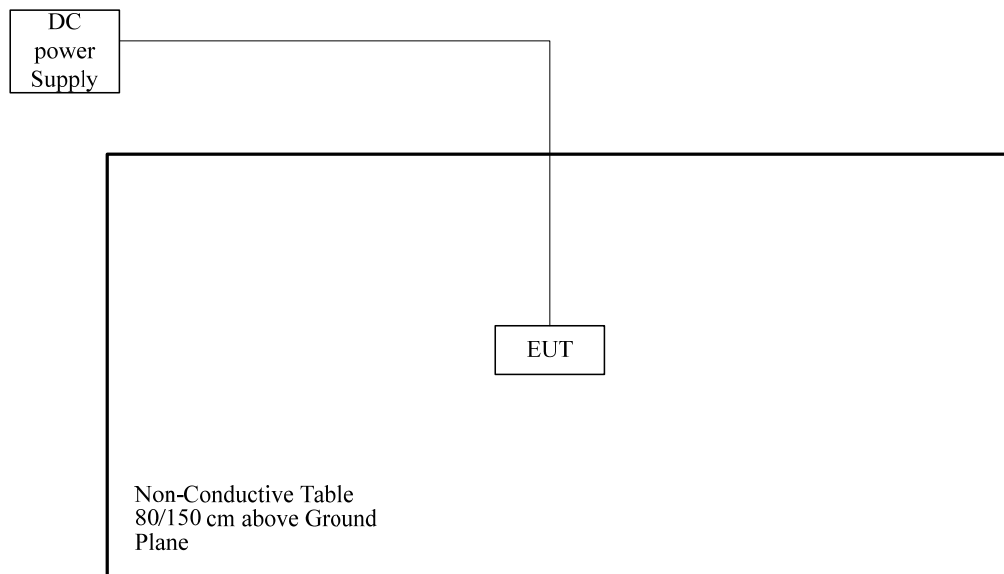
| Manufacturer   | Description     | Model   | Serial Number |
|----------------|-----------------|---------|---------------|
| Pro instrument | DC Power Supply | pps3300 | 3300012       |

**Support Cable List and Details**

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From    | To  |
|-------------------|----------------|--------------|------------|---------|-----|
| DC Cable          | No             | No           | 2.0        | Adapter | EUT |

**Equipment Modifications**

No modification was made to the EUT.

**Configuration of Test Setup**

**SUMMARY OF TEST RESULTS**

| FCC Rules                           | Description of Test                      | Result         |
|-------------------------------------|------------------------------------------|----------------|
| FCC §15.207 (i) & §1.1310 & §2.1091 | Maximum Permissible Exposure (MPE)       | Compliance     |
| §15.203                             | Antenna Requirement                      | Compliance     |
| §15.207 (a)                         | AC Line Conducted Emissions              | Not Applicable |
| §15.205, §15.209, §15.247(d)        | Spurious Emissions                       | Compliance     |
| §15.247 (a)(2)                      | 6 dB Bandwidth                           | Compliance     |
| §15.247(b)(3)                       | Maximum Conducted Output Power           | Compliance     |
| §15.247(d)                          | 100 kHz Bandwidth of Frequency Band Edge | Compliance     |
| §15.247(e)                          | Power Spectral Density                   | Compliance     |

Not Applicable: the device was powered by battery.

## FCC §15.247 (i) , §1.1310 , §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

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

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

| (B) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                                   | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
| 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.

### Calculation Formula:

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$  = 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:

| Frequency Range (MHz) | Antenna Gain |           | Maximum Power Including Tolerance |        | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|-----------------------|--------------|-----------|-----------------------------------|--------|--------------------------|-------------------------------------|---------------------------------|
|                       | (dBi)        | (numeric) | (dBm)                             | (mW)   |                          |                                     |                                 |
| 2412-2462             | 1            | 1.26      | 24                                | 251.19 | 20.00                    | 0.06                                | 1.0                             |

Note:

The Maximum Power Including Tolerance was declared by manufacturer.

**Result: Compliance,** The device meets FCC MPE at 20 cm distance

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

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### **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.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

### **Antenna Connector Construction**

The EUT has one internal antenna arrangement, and the antenna gain is 1.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

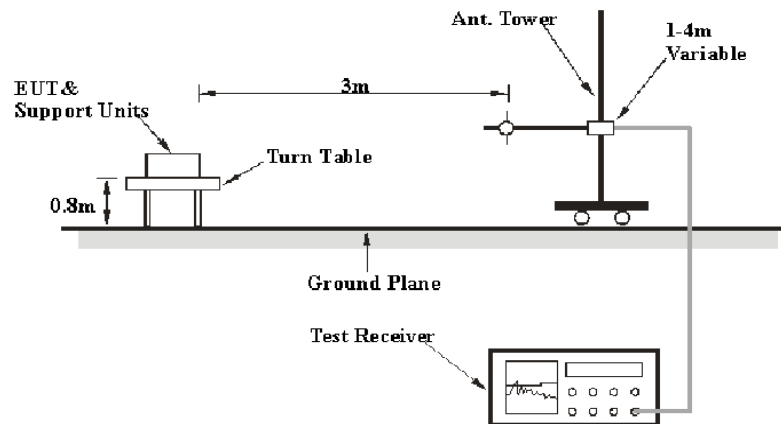
## FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

### Applicable Standard

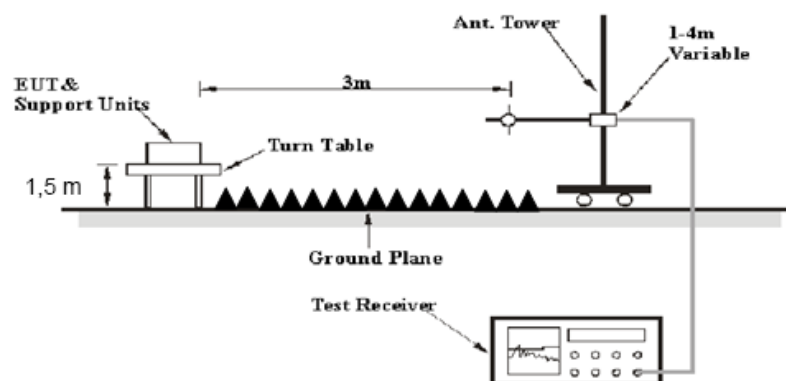
FCC §15.247 (d); §15.209; §15.205;

### EUT Setup

#### Below 1GHz:



#### Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 10eters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz.

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

30MHz-1000MHz:

| Measurement | RBW     | Video B/W | IF B/W |
|-------------|---------|-----------|--------|
| QP          | 120 kHz | 300 kHz   | 120kHz |

1GHz- 25GHz:

| Measurement | Duty cycle | RBW  | Video B/W |
|-------------|------------|------|-----------|
| PK          | Any        | 1MHz | 3 MHz     |
| AV          | >98%       | 1MHz | 10 Hz     |
|             | <98%       | 1MHz | 1/T       |

Note: T is minimum transmission duration

## Test Procedure

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

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

## Corrected Amplitude & Margin Calculation

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

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

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

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

**Test Equipment List and Details**

| Manufacturer          | Description       | Model                      | Serial Number      | Calibration Date | Calibration Due Date |
|-----------------------|-------------------|----------------------------|--------------------|------------------|----------------------|
| R&S                   | EMI Test Receiver | ESCI                       | 100035             | 2018-08-03       | 2019-08-03           |
| Farad                 | Test Software     | EZ-EMC                     | V1.1.4.2           | N/A              | N/A                  |
| Sunol Sciences        | Antenna           | JB3                        | A060611-3          | 2017-07-21       | 2019-07-21           |
| Unknown               | Coaxial Cable     | C-NJNJ-50                  | C-0400-02          | 2017-09-05       | 2018-09-05           |
| Unknown               | Coaxial Cable     | C-NJNJ-50                  | C-0075-02          | 2017-09-05       | 2018-09-05           |
| Unknown               | Coaxial Cable     | C-NJNJ-50                  | C-2200-01          | 2017-09-05       | 2018-09-05           |
| HP                    | Amplifier         | 8447F                      | 2443A01912         | 2017-09-05       | 2018-09-05           |
| Agilent               | Spectrum Analyzer | E4440A                     | SG43360054         | 2018-01-04       | 2019-01-04           |
| ETS-Lindgren          | Horn Antenna      | 3115                       | 000 527 35         | 2016-01-05       | 2019-01-04           |
| Ducommun Technologies | Horn Antenna      | ARH-4223-02                | 1007726-01<br>1304 | 2016-11-18       | 2019-11-18           |
| Unknown               | Coaxial Cable     | C-SJSJ-50                  | C-0800-01          | 2018-09-05       | 2019-09-05           |
| Unknown               | Coaxial Cable     | C-2.4J2.4J-50              | C-0700-02          | 2018-06-27       | 2019-06-27           |
| MITEQ                 | Amplifier         | AFS42-00101800-<br>25-S-42 | 2001271            | 2018-09-05       | 2019-09-05           |
| Quinstar              | Amplifier         | QLW-18405536-JO            | 15964001001        | 2018-06-27       | 2019-06-27           |
| E-Microwave           | Band-stop Filters | OBSF-2400-2483.5-<br>S     | OE01601525         | 2018-06-16       | 2019-06-16           |
| Micro-tronics         | High Pass Filter  | HPM50111                   | S/N-G217           | 2018-06-16       | 2019-06-16           |

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

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

|                           |         |
|---------------------------|---------|
| <b>Temperature:</b>       | 2605 °C |
| <b>Relative Humidity:</b> | 58%     |
| <b>ATM Pressure:</b>      | 99.9kPa |

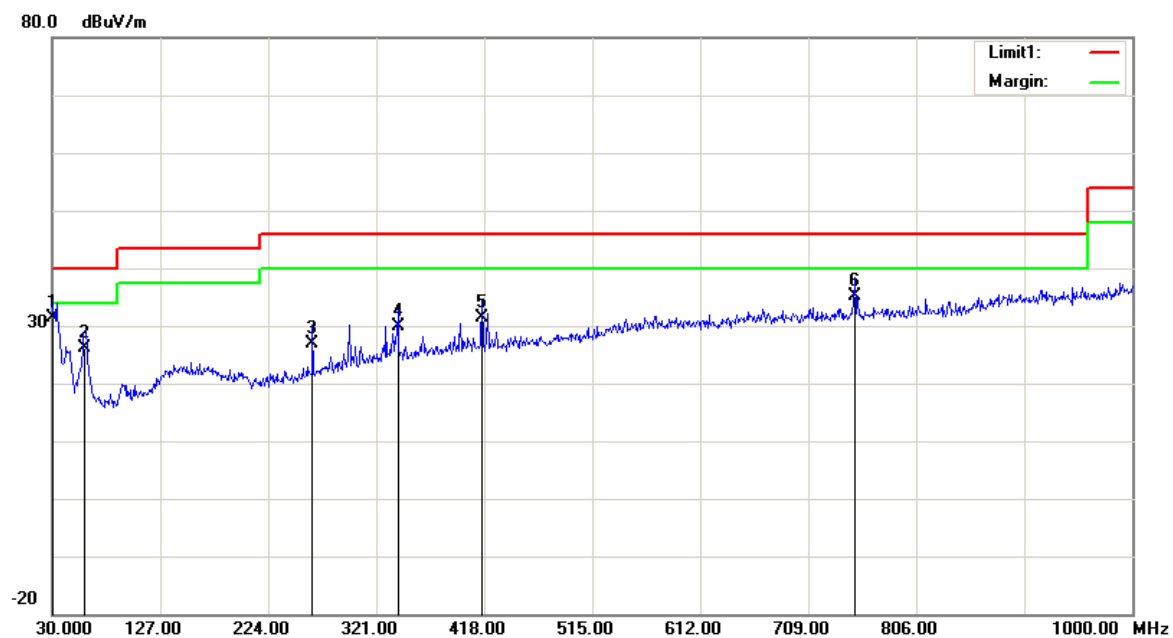
\* The testing was performed by Tyler Pan on 2018-08-25.

Test Result: Compliance, please Refer to the following data

Test Mode: Transmitting

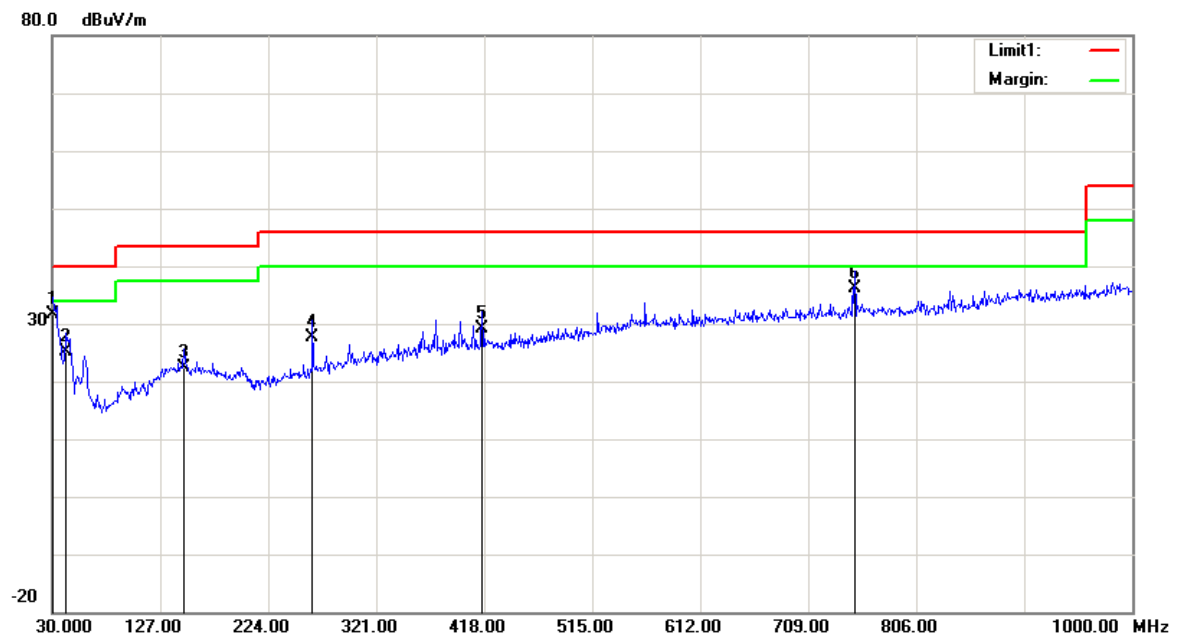
1) 30MHz-1GHz (802.11b mode Middle channel was the worst):

Horizontal:



| Frequency (MHz) | Receiver Reading (dBuV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 30.0000         | 32.78                   | QP       | -1.48                    | 31.30               | 40.00          | 8.70        |
| 59.1000         | 39.43                   | QP       | -13.23                   | 26.20               | 40.00          | 13.80       |
| 263.7700        | 32.38                   | QP       | -5.38                    | 27.00               | 46.00          | 19.00       |
| 340.4000        | 32.10                   | QP       | -2.30                    | 29.80               | 46.00          | 16.20       |
| 416.0600        | 31.63                   | QP       | -0.33                    | 31.30               | 46.00          | 14.70       |
| 750.7100        | 27.89                   | QP       | 7.31                     | 35.20               | 46.00          | 10.80       |

## Vertical:



| Frequency (MHz) | Receiver Reading (dBuV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 30.9700         | 33.61                   | QP       | -1.91                    | 31.70               | 40.00          | 8.30        |
| 42.6100         | 33.04                   | QP       | -7.84                    | 25.20               | 40.00          | 14.80       |
| 148.3400        | 28.37                   | QP       | -5.87                    | 22.50               | 43.50          | 21.00       |
| 263.7700        | 33.08                   | QP       | -5.38                    | 27.70               | 46.00          | 18.30       |
| 416.0600        | 29.53                   | QP       | -0.33                    | 29.20               | 46.00          | 16.80       |
| 750.7100        | 28.89                   | QP       | 7.31                     | 36.20               | 46.00          | 9.80        |

## 2) 1-26.5 GHz:

802.11b Mode:

| Frequency<br>(MHz)       | Receiver          |          | Rx Antenna     |                  | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector | Polar<br>(H/V) | Factor<br>(dB/m) |                       |                           |                                    |                   |                |
| Low Channel: 2412 MHz    |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2412.00                  | 67.30             | PK       | H              | 28.12            | 1.81                  | 0.00                      | 97.23                              | N/A               | N/A            |
| 2412.00                  | 62.81             | AV       | H              | 28.12            | 1.81                  | 0.00                      | 92.74                              | N/A               | N/A            |
| 2412.00                  | 64.46             | PK       | V              | 28.12            | 1.81                  | 0.00                      | 94.39                              | N/A               | N/A            |
| 2412.00                  | 59.76             | AV       | V              | 28.12            | 1.81                  | 0.00                      | 89.69                              | N/A               | N/A            |
| 2390.00                  | 28.74             | PK       | H              | 28.08            | 1.80                  | 0.00                      | 58.62                              | 74.00             | 15.38          |
| 2390.00                  | 17.28             | AV       | H              | 28.08            | 1.80                  | 0.00                      | 47.16                              | 54.00             | 6.84           |
| 4824.00                  | 47.58             | PK       | H              | 32.95            | 3.19                  | 37.20                     | 46.52                              | 74.00             | 27.48          |
| 4824.00                  | 35.14             | AV       | H              | 32.95            | 3.19                  | 37.20                     | 34.08                              | 54.00             | 19.92          |
| 7236.00                  | 45.88             | PK       | H              | 35.81            | 4.77                  | 37.27                     | 49.19                              | 74.00             | 24.81          |
| 7236.00                  | 33.64             | AV       | H              | 35.81            | 4.77                  | 37.27                     | 36.95                              | 54.00             | 17.05          |
| Middle Channel: 2437 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2437.00                  | 70.32             | PK       | H              | 28.17            | 1.82                  | 0.00                      | 100.31                             | N/A               | N/A            |
| 2437.00                  | 65.82             | AV       | H              | 28.17            | 1.82                  | 0.00                      | 95.81                              | N/A               | N/A            |
| 2437.00                  | 68.17             | PK       | V              | 28.17            | 1.82                  | 0.00                      | 98.16                              | N/A               | N/A            |
| 2437.00                  | 64.61             | AV       | V              | 28.17            | 1.82                  | 0.00                      | 94.60                              | N/A               | N/A            |
| 4874.00                  | 47.97             | PK       | H              | 33.05            | 3.26                  | 37.21                     | 47.07                              | 74.00             | 26.93          |
| 4874.00                  | 36.55             | AV       | H              | 33.05            | 3.26                  | 37.21                     | 35.65                              | 54.00             | 18.35          |
| 7311.00                  | 45.76             | PK       | H              | 36.01            | 4.64                  | 37.36                     | 49.05                              | 74.00             | 24.95          |
| 7311.00                  | 33.44             | AV       | H              | 36.01            | 4.64                  | 37.36                     | 36.73                              | 54.00             | 17.27          |
| High Channel: 2462 MHz   |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2462.00                  | 69.07             | PK       | H              | 28.22            | 1.83                  | 0.00                      | 99.12                              | N/A               | N/A            |
| 2462.00                  | 65.40             | AV       | H              | 28.22            | 1.83                  | 0.00                      | 95.45                              | N/A               | N/A            |
| 2462.00                  | 67.62             | PK       | V              | 28.22            | 1.83                  | 0.00                      | 97.67                              | N/A               | N/A            |
| 2462.00                  | 63.50             | AV       | V              | 28.22            | 1.83                  | 0.00                      | 93.55                              | N/A               | N/A            |
| 2483.50                  | 25.66             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 55.77                              | 74.00             | 18.23          |
| 2483.50                  | 16.24             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 46.35                              | 54.00             | 7.65           |
| 4924.00                  | 47.63             | PK       | H              | 33.15            | 3.27                  | 37.22                     | 46.83                              | 74.00             | 27.17          |
| 4924.00                  | 35.24             | AV       | H              | 33.15            | 3.27                  | 37.22                     | 34.44                              | 54.00             | 19.56          |
| 7386.00                  | 45.86             | PK       | H              | 36.20            | 4.51                  | 37.46                     | 49.11                              | 74.00             | 24.89          |
| 7386.00                  | 33.54             | AV       | H              | 36.20            | 4.51                  | 37.46                     | 36.79                              | 54.00             | 17.21          |

802.11g Mode:

| Frequency<br>(MHz)           | Receiver          |          | Rx Antenna     |                  | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|------------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                              | Reading<br>(dBμV) | Detector | Polar<br>(H/V) | Factor<br>(dB/m) |                       |                           |                                    |                   |                |
| Low Channel: 2412 MHz        |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2412.00                      | 68.93             | PK       | H              | 28.12            | 1.81                  | 0.00                      | 98.86                              | N/A               | N/A            |
| 2412.00                      | 59.83             | AV       | H              | 28.12            | 1.81                  | 0.00                      | 89.76                              | N/A               | N/A            |
| 2412.00                      | 66.10             | PK       | V              | 28.12            | 1.81                  | 0.00                      | 96.03                              | N/A               | N/A            |
| 2412.00                      | 57.25             | AV       | V              | 28.12            | 1.81                  | 0.00                      | 87.18                              | N/A               | N/A            |
| 2390.00                      | 35.32             | PK       | H              | 28.08            | 1.80                  | 0.00                      | 65.20                              | 74.00             | 8.80           |
| 2390.00                      | 22.41             | AV       | H              | 28.08            | 1.80                  | 0.00                      | 52.29                              | 54.00             | 1.71           |
| 4824.00                      | 47.55             | PK       | H              | 32.95            | 3.19                  | 37.20                     | 46.49                              | 74.00             | 27.51          |
| 4824.00                      | 35.10             | AV       | H              | 32.95            | 3.19                  | 37.20                     | 34.04                              | 54.00             | 19.96          |
| 7236.00                      | 45.77             | PK       | H              | 35.81            | 4.77                  | 37.27                     | 49.08                              | 74.00             | 24.92          |
| 7236.00                      | 33.42             | AV       | H              | 35.81            | 4.77                  | 37.27                     | 36.73                              | 54.00             | 17.27          |
| Middle Channel: 2437 MHz     |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2437.00                      | 72.54             | PK       | H              | 28.17            | 1.82                  | 0.00                      | 102.53                             | N/A               | N/A            |
| 2437.00                      | 63.52             | AV       | H              | 28.17            | 1.82                  | 0.00                      | 93.51                              | N/A               | N/A            |
| 2437.00                      | 69.31             | PK       | V              | 28.17            | 1.82                  | 0.00                      | 99.30                              | N/A               | N/A            |
| 2437.00                      | 60.22             | AV       | V              | 28.17            | 1.82                  | 0.00                      | 90.21                              | N/A               | N/A            |
| 4874.00                      | 47.79             | PK       | H              | 33.05            | 3.26                  | 37.21                     | 46.89                              | 74.00             | 27.11          |
| 4874.00                      | 35.53             | AV       | H              | 33.05            | 3.26                  | 37.21                     | 34.63                              | 54.00             | 19.37          |
| 7311.00                      | 46.08             | PK       | H              | 36.01            | 4.64                  | 37.36                     | 49.37                              | 74.00             | 24.63          |
| 7311.00                      | 33.76             | AV       | H              | 36.01            | 4.64                  | 37.36                     | 37.05                              | 54.00             | 16.95          |
| Additional Channel: 2457 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2457.00                      | 70.05             | PK       | H              | 28.21            | 1.83                  | 0.00                      | 100.09                             | N/A               | N/A            |
| 2457.00                      | 61.98             | AV       | H              | 28.21            | 1.83                  | 0.00                      | 92.02                              | N/A               | N/A            |
| 2457.00                      | 69.79             | PK       | V              | 28.21            | 1.83                  | 0.00                      | 99.83                              | N/A               | N/A            |
| 2457.00                      | 60.47             | AV       | V              | 28.21            | 1.83                  | 0.00                      | 90.51                              | N/A               | N/A            |
| 2483.50                      | 34.40             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 64.51                              | 74.00             | 9.49           |
| 2483.50                      | 20.92             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 51.03                              | 54.00             | 2.97           |
| High Channel: 2462 MHz       |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2462.00                      | 66.51             | PK       | H              | 28.22            | 1.83                  | 0.00                      | 96.56                              | N/A               | N/A            |
| 2462.00                      | 57.02             | AV       | H              | 28.22            | 1.83                  | 0.00                      | 87.07                              | N/A               | N/A            |
| 2462.00                      | 64.44             | PK       | V              | 28.22            | 1.83                  | 0.00                      | 94.49                              | N/A               | N/A            |
| 2462.00                      | 55.53             | AV       | V              | 28.22            | 1.83                  | 0.00                      | 85.58                              | N/A               | N/A            |
| 2483.50                      | 37.62             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 67.73                              | 74.00             | 6.27           |
| 2483.50                      | 23.42             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 53.53                              | 54.00             | 0.47           |
| 4924.00                      | 47.58             | PK       | H              | 33.15            | 3.27                  | 37.22                     | 46.78                              | 74.00             | 27.22          |
| 4924.00                      | 35.22             | AV       | H              | 33.15            | 3.27                  | 37.22                     | 34.42                              | 54.00             | 19.58          |
| 7386.00                      | 46.10             | PK       | H              | 36.20            | 4.51                  | 37.46                     | 49.35                              | 74.00             | 24.65          |
| 7386.00                      | 33.85             | AV       | H              | 36.20            | 4.51                  | 37.46                     | 37.10                              | 54.00             | 16.90          |

802.11n ht20 Mode:

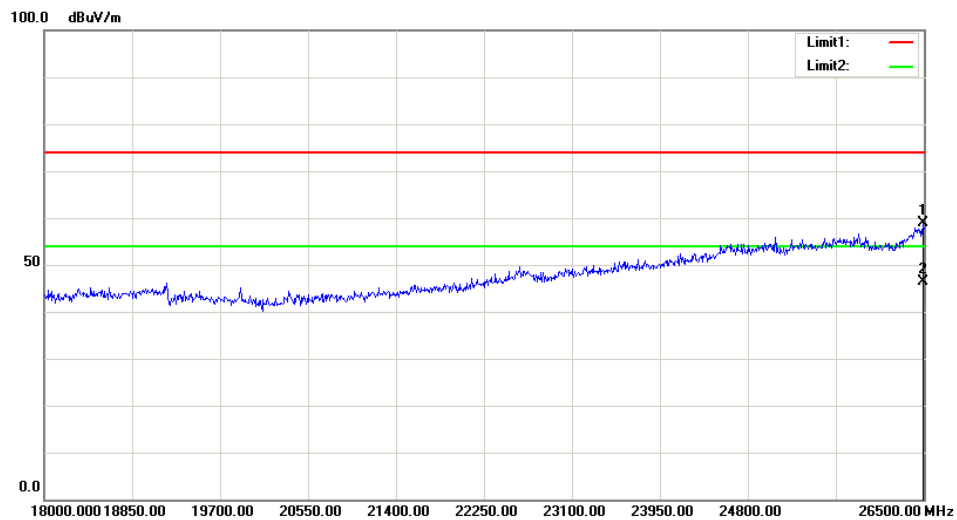
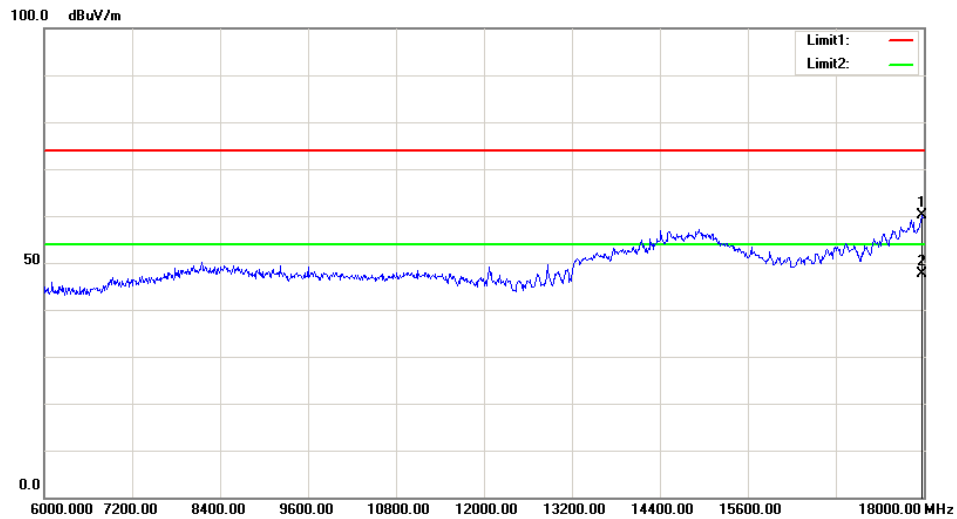
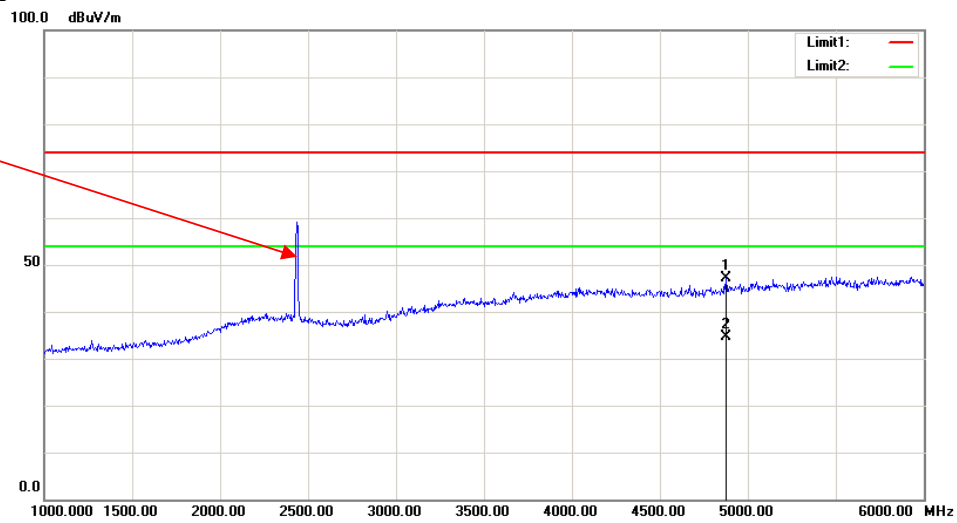
| Frequency<br>(MHz)           | Receiver          |          | Rx Antenna     |                  | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|------------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                              | Reading<br>(dBμV) | Detector | Polar<br>(H/V) | Factor<br>(dB/m) |                       |                           |                                    |                   |                |
| Low Channel: 2412 MHz        |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2412.00                      | 68.04             | PK       | H              | 28.12            | 1.81                  | 0.00                      | 97.97                              | N/A               | N/A            |
| 2412.00                      | 58.67             | AV       | H              | 28.12            | 1.81                  | 0.00                      | 88.60                              | N/A               | N/A            |
| 2412.00                      | 66.45             | PK       | V              | 28.12            | 1.81                  | 0.00                      | 96.38                              | N/A               | N/A            |
| 2412.00                      | 56.89             | AV       | V              | 28.12            | 1.81                  | 0.00                      | 86.82                              | N/A               | N/A            |
| 2390.00                      | 29.83             | PK       | H              | 28.08            | 1.80                  | 0.00                      | 59.71                              | 74.00             | 14.29          |
| 2390.00                      | 16.84             | AV       | H              | 28.08            | 1.80                  | 0.00                      | 46.72                              | 54.00             | 7.28           |
| 4824.00                      | 47.56             | PK       | H              | 32.95            | 3.19                  | 37.20                     | 46.50                              | 74.00             | 27.50          |
| 4824.00                      | 35.30             | AV       | H              | 32.95            | 3.19                  | 37.20                     | 34.24                              | 54.00             | 19.76          |
| 7236.00                      | 45.78             | PK       | H              | 35.81            | 4.77                  | 37.27                     | 49.09                              | 74.00             | 24.91          |
| 7236.00                      | 33.42             | AV       | H              | 35.81            | 4.77                  | 37.27                     | 36.73                              | 54.00             | 17.27          |
| Middle Channel: 2437 MHz     |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2437.00                      | 72.05             | PK       | H              | 28.17            | 1.82                  | 0.00                      | 102.04                             | N/A               | N/A            |
| 2437.00                      | 62.10             | AV       | H              | 28.17            | 1.82                  | 0.00                      | 92.09                              | N/A               | N/A            |
| 2437.00                      | 69.75             | PK       | V              | 28.17            | 1.82                  | 0.00                      | 99.74                              | N/A               | N/A            |
| 2437.00                      | 59.83             | AV       | V              | 28.17            | 1.82                  | 0.00                      | 89.82                              | N/A               | N/A            |
| 4874.00                      | 47.83             | PK       | H              | 33.05            | 3.26                  | 37.21                     | 46.93                              | 74.00             | 27.07          |
| 4874.00                      | 35.39             | AV       | H              | 33.05            | 3.26                  | 37.21                     | 34.49                              | 54.00             | 19.51          |
| 7311.00                      | 45.93             | PK       | H              | 36.01            | 4.64                  | 37.36                     | 49.22                              | 74.00             | 24.78          |
| 7311.00                      | 33.56             | AV       | H              | 36.01            | 4.64                  | 37.36                     | 36.85                              | 54.00             | 17.15          |
| Additional Channel: 2452 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2452.00                      | 70.98             | PK       | H              | 28.20            | 1.83                  | 0.00                      | 101.01                             | N/A               | N/A            |
| 2452.00                      | 60.92             | AV       | H              | 28.20            | 1.83                  | 0.00                      | 90.95                              | N/A               | N/A            |
| 2452.00                      | 70.17             | PK       | V              | 28.20            | 1.83                  | 0.00                      | 100.20                             | N/A               | N/A            |
| 2452.00                      | 60.23             | AV       | V              | 28.20            | 1.83                  | 0.00                      | 90.26                              | N/A               | N/A            |
| 2483.50                      | 35.50             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 65.61                              | 74.00             | 8.39           |
| 2483.50                      | 23.15             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 53.26                              | 54.00             | 0.74           |
| Additional Channel: 2457 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2457.00                      | 67.55             | PK       | H              | 28.21            | 1.83                  | 0.00                      | 97.59                              | N/A               | N/A            |
| 2457.00                      | 57.36             | AV       | H              | 28.21            | 1.83                  | 0.00                      | 87.40                              | N/A               | N/A            |
| 2457.00                      | 67.31             | PK       | V              | 28.21            | 1.83                  | 0.00                      | 97.35                              | N/A               | N/A            |
| 2457.00                      | 57.17             | AV       | V              | 28.21            | 1.83                  | 0.00                      | 87.21                              | N/A               | N/A            |
| 2483.50                      | 38.05             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 68.16                              | 74.00             | 5.84           |
| 2483.50                      | 23.15             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 53.26                              | 54.00             | 0.74           |
| High Channel: 2462 MHz       |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2462.00                      | 65.88             | PK       | H              | 28.22            | 1.83                  | 0.00                      | 95.93                              | N/A               | N/A            |
| 2462.00                      | 55.90             | AV       | H              | 28.22            | 1.83                  | 0.00                      | 85.95                              | N/A               | N/A            |
| 2462.00                      | 64.04             | PK       | V              | 28.22            | 1.83                  | 0.00                      | 94.09                              | N/A               | N/A            |
| 2462.00                      | 54.11             | AV       | V              | 28.22            | 1.83                  | 0.00                      | 84.16                              | N/A               | N/A            |
| 2483.50                      | 32.01             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 62.12                              | 74.00             | 11.88          |
| 2483.50                      | 16.73             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 46.84                              | 54.00             | 7.16           |
| 4924.00                      | 47.33             | PK       | H              | 33.15            | 3.27                  | 37.22                     | 46.53                              | 74.00             | 27.47          |
| 4924.00                      | 34.86             | AV       | H              | 33.15            | 3.27                  | 37.22                     | 34.06                              | 54.00             | 19.94          |
| 7386.00                      | 45.63             | PK       | H              | 36.20            | 4.51                  | 37.46                     | 48.88                              | 74.00             | 25.12          |
| 7386.00                      | 33.25             | AV       | H              | 36.20            | 4.51                  | 37.46                     | 36.50                              | 54.00             | 17.50          |

802.11n ht40 Mode:

| Frequency<br>(MHz)           | Receiver          |          | Rx Antenna     |                  | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|------------------------------|-------------------|----------|----------------|------------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                              | Reading<br>(dBμV) | Detector | Polar<br>(H/V) | Factor<br>(dB/m) |                       |                           |                                    |                   |                |
| Low Channel: 2422 MHz        |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2422.00                      | 68.19             | PK       | H              | 28.14            | 1.81                  | 0.00                      | 98.14                              | N/A               | N/A            |
| 2422.00                      | 59.10             | AV       | H              | 28.14            | 1.81                  | 0.00                      | 89.05                              | N/A               | N/A            |
| 2422.00                      | 66.94             | PK       | V              | 28.14            | 1.81                  | 0.00                      | 96.89                              | N/A               | N/A            |
| 2422.00                      | 57.88             | AV       | V              | 28.14            | 1.81                  | 0.00                      | 87.83                              | N/A               | N/A            |
| 2390.00                      | 34.86             | PK       | H              | 28.08            | 1.80                  | 0.00                      | 64.74                              | 74.00             | 9.26           |
| 2390.00                      | 19.57             | AV       | H              | 28.08            | 1.80                  | 0.00                      | 49.45                              | 54.00             | 4.55           |
| 4844.00                      | 47.68             | PK       | H              | 32.99            | 3.22                  | 37.20                     | 46.69                              | 74.00             | 27.31          |
| 4844.00                      | 35.16             | AV       | H              | 32.99            | 3.22                  | 37.20                     | 34.17                              | 54.00             | 19.83          |
| 7266.00                      | 45.72             | PK       | H              | 35.89            | 4.72                  | 37.31                     | 49.02                              | 74.00             | 24.98          |
| 7266.00                      | 33.34             | AV       | H              | 35.89            | 4.72                  | 37.31                     | 36.64                              | 54.00             | 17.36          |
| Middle Channel: 2437 MHz     |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2437.00                      | 72.54             | PK       | H              | 28.17            | 1.82                  | 0.00                      | 102.53                             | N/A               | N/A            |
| 2437.00                      | 63.41             | AV       | H              | 28.17            | 1.82                  | 0.00                      | 93.40                              | N/A               | N/A            |
| 2437.00                      | 70.14             | PK       | V              | 28.17            | 1.82                  | 0.00                      | 100.13                             | N/A               | N/A            |
| 2437.00                      | 61.20             | AV       | V              | 28.17            | 1.82                  | 0.00                      | 91.19                              | N/A               | N/A            |
| 4874.00                      | 47.87             | PK       | H              | 33.05            | 3.26                  | 37.21                     | 46.97                              | 74.00             | 27.03          |
| 4874.00                      | 35.43             | AV       | H              | 33.05            | 3.26                  | 37.21                     | 34.53                              | 54.00             | 19.47          |
| 7311.00                      | 46.15             | PK       | H              | 36.01            | 4.64                  | 37.36                     | 49.44                              | 74.00             | 24.56          |
| 7311.00                      | 33.77             | AV       | H              | 36.01            | 4.64                  | 37.36                     | 37.06                              | 54.00             | 16.94          |
| Additional Channel: 2442 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2442.00                      | 70.98             | PK       | H              | 28.18            | 1.82                  | 0.00                      | 100.98                             | N/A               | N/A            |
| 2442.00                      | 61.39             | AV       | H              | 28.18            | 1.82                  | 0.00                      | 91.39                              | N/A               | N/A            |
| 2442.00                      | 67.87             | PK       | V              | 28.18            | 1.82                  | 0.00                      | 97.87                              | N/A               | N/A            |
| 2442.00                      | 58.57             | AV       | V              | 28.18            | 1.82                  | 0.00                      | 88.57                              | N/A               | N/A            |
| 2483.50                      | 39.15             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 69.26                              | 74.00             | 4.74           |
| 2483.50                      | 22.88             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 52.99                              | 54.00             | 1.01           |
| Additional Channel: 2447 MHz |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2447.00                      | 62.28             | PK       | H              | 28.19            | 1.82                  | 0.00                      | 92.29                              | N/A               | N/A            |
| 2447.00                      | 53.18             | AV       | H              | 28.19            | 1.82                  | 0.00                      | 83.19                              | N/A               | N/A            |
| 2447.00                      | 61.12             | PK       | V              | 28.19            | 1.82                  | 0.00                      | 91.13                              | N/A               | N/A            |
| 2447.00                      | 53.07             | AV       | V              | 28.19            | 1.82                  | 0.00                      | 83.08                              | N/A               | N/A            |
| 2483.50                      | 25.13             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 55.24                              | 74.00             | 18.76          |
| 2483.50                      | 14.12             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 44.23                              | 54.00             | 9.77           |
| High Channel: 2452 MHz       |                   |          |                |                  |                       |                           |                                    |                   |                |
| 2452.00                      | 62.41             | PK       | H              | 28.20            | 1.83                  | 0.00                      | 92.44                              | N/A               | N/A            |
| 2452.00                      | 53.37             | AV       | H              | 28.20            | 1.83                  | 0.00                      | 83.40                              | N/A               | N/A            |
| 2452.00                      | 60.11             | PK       | V              | 28.20            | 1.83                  | 0.00                      | 90.14                              | N/A               | N/A            |
| 2452.00                      | 51.08             | AV       | V              | 28.20            | 1.83                  | 0.00                      | 81.11                              | N/A               | N/A            |
| 2483.50                      | 30.01             | PK       | H              | 28.27            | 1.84                  | 0.00                      | 60.12                              | 74.00             | 13.88          |
| 2483.50                      | 16.54             | AV       | H              | 28.27            | 1.84                  | 0.00                      | 46.65                              | 54.00             | 7.35           |
| 4904.00                      | 47.10             | PK       | H              | 33.11            | 3.30                  | 37.21                     | 46.30                              | 74.00             | 27.70          |
| 4904.00                      | 34.57             | AV       | H              | 33.11            | 3.30                  | 37.21                     | 33.77                              | 54.00             | 20.23          |
| 7356.00                      | 45.66             | PK       | H              | 36.13            | 4.56                  | 37.42                     | 48.93                              | 74.00             | 25.07          |
| 7356.00                      | 33.12             | AV       | H              | 36.13            | 4.56                  | 37.42                     | 36.39                              | 54.00             | 17.61          |

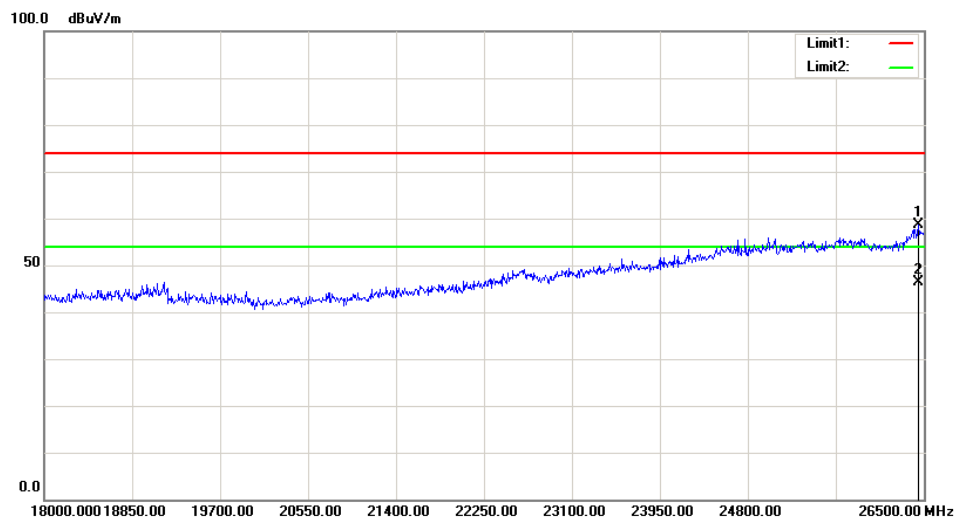
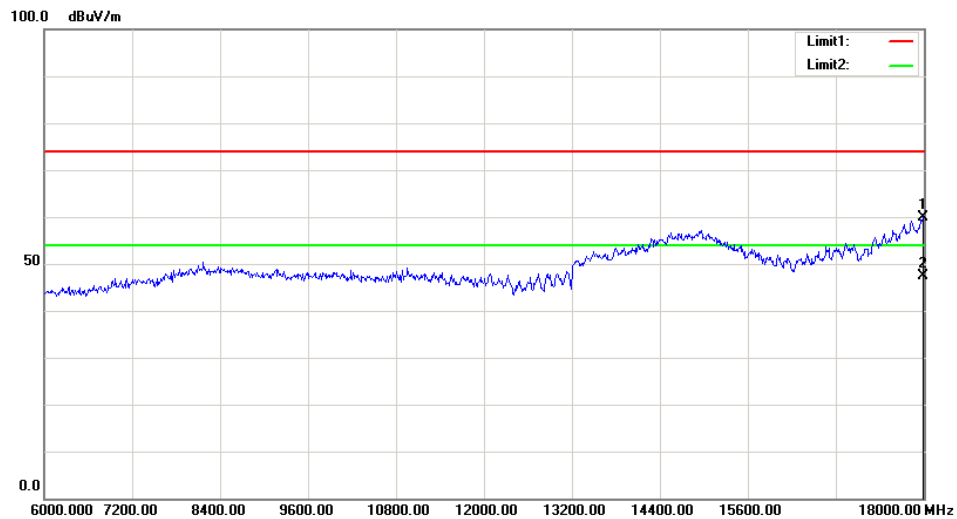
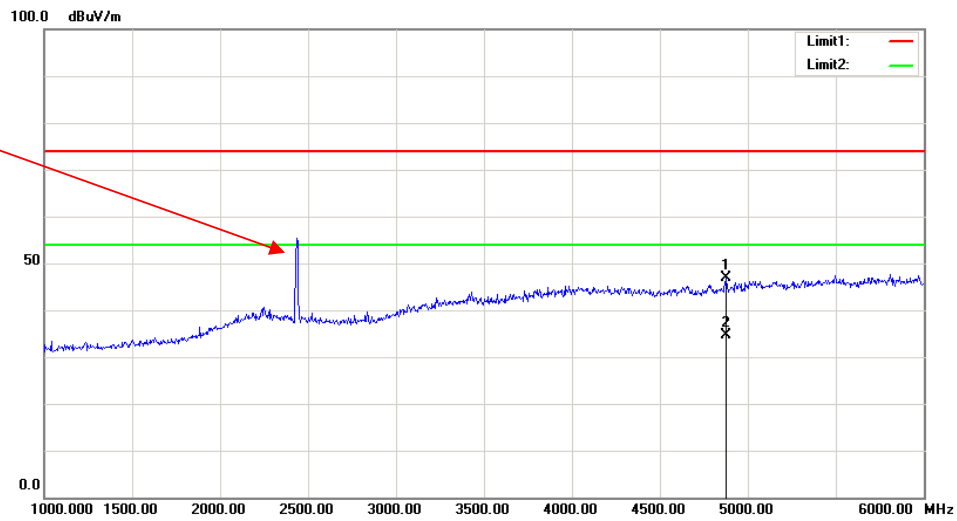
# **Worst plots (802.11b Mode middle channel)** **Horizontal**

Fundamental  
Test with Band  
Rejection Filter



**Vertical**

Fundamental  
Test with Band  
Rejection Filter



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

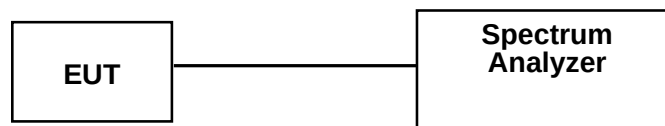
### Applicable Standard

According to FCC §15.247(a) (2)

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

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) 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 Equipment List and Details

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSP 38      | 100478        | 2017-12-08       | 2018-12-08           |
| Unknown      | Coaxial Cable     | C-SJ00-0010 | C0010/01      | Each time        | N/A                  |

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

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25.8 °C   |
| Relative Humidity: | 64 %      |
| ATM Pressure:      | 100.2 kPa |

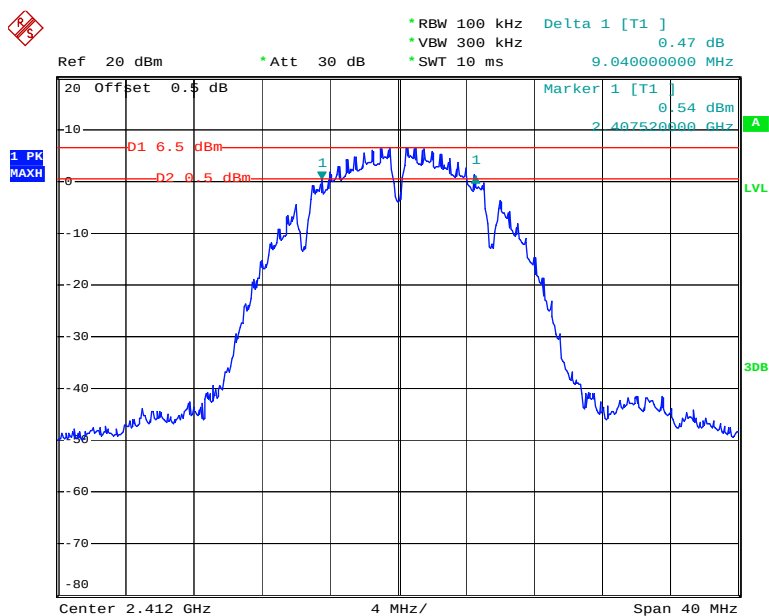
\* The testing was performed by Kami Zhou on 2018-08-21

Test Mode: Transmitting

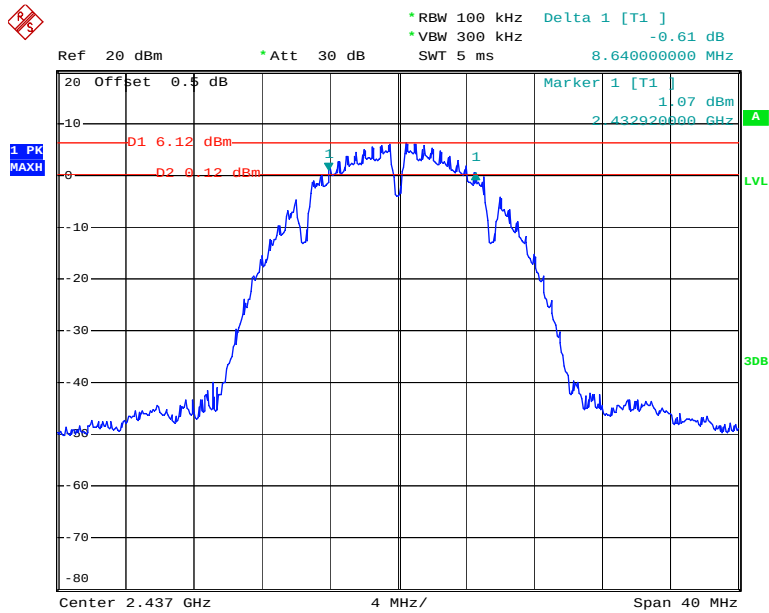
Test Result: Compliance. Please refer to the following table and plots.

| Test mode    | Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Limit (MHz) |
|--------------|---------|-----------------|----------------------|-------------|
| 802.11b      | Low     | 2412            | 9.04                 | $\geq 0.5$  |
|              | Middle  | 2437            | 8.64                 | $\geq 0.5$  |
|              | High    | 2462            | 8.64                 | $\geq 0.5$  |
| 802.11g      | Low     | 2412            | 16.08                | $\geq 0.5$  |
|              | Middle  | 2437            | 16.64                | $\geq 0.5$  |
|              | High    | 2462            | 16.16                | $\geq 0.5$  |
| 802.11n ht20 | Low     | 2412            | 16.80                | $\geq 0.5$  |
|              | Middle  | 2437            | 17.36                | $\geq 0.5$  |
|              | High    | 2462            | 17.28                | $\geq 0.5$  |
| 802.11n ht40 | Low     | 2422            | 35.20                | $\geq 0.5$  |
|              | Middle  | 2437            | 35.36                | $\geq 0.5$  |
|              | High    | 2452            | 32.64                | $\geq 0.5$  |

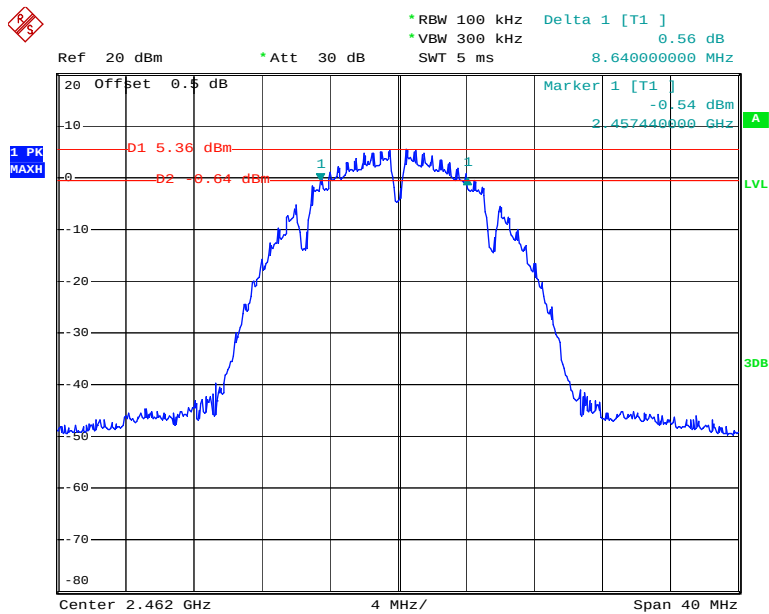
### 802.11b Low Channel



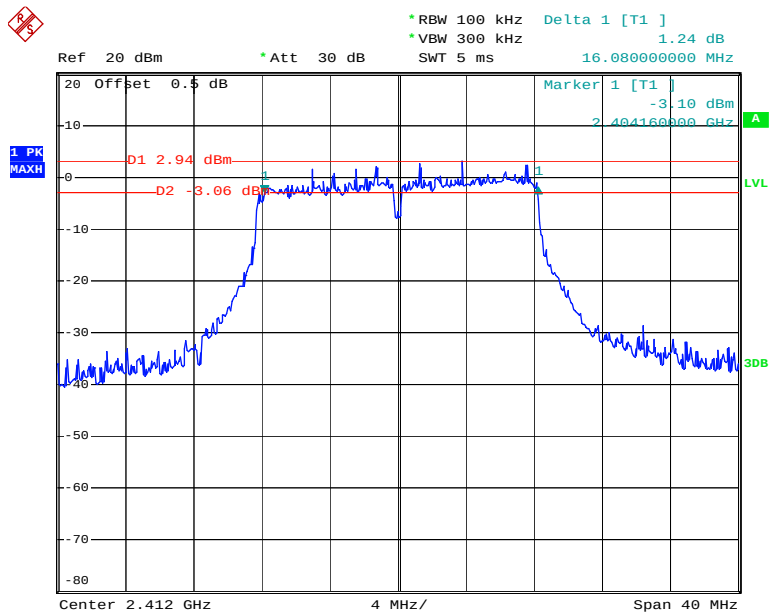
Date: 21.AUG.2018 15:39:28

**802.11b Middle Channel**

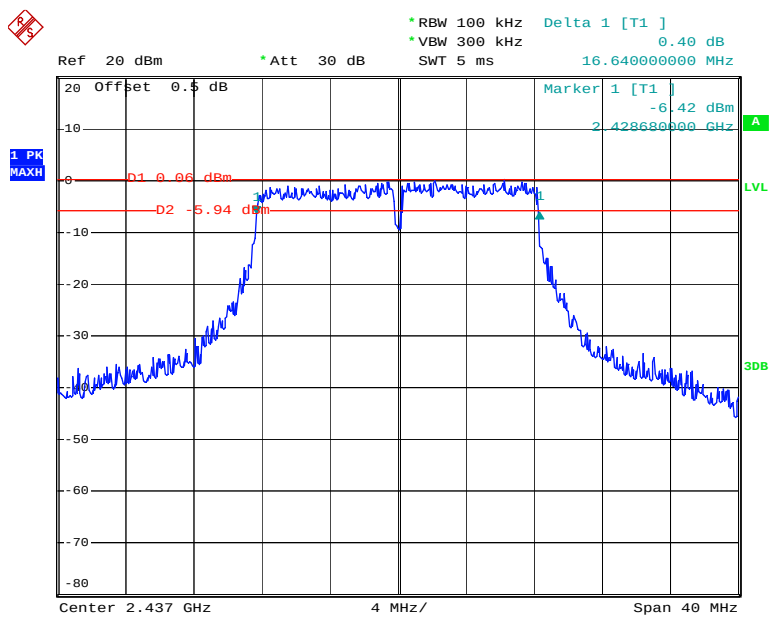
Date: 21.AUG.2018 15:43:16

**802.11b High Channel**

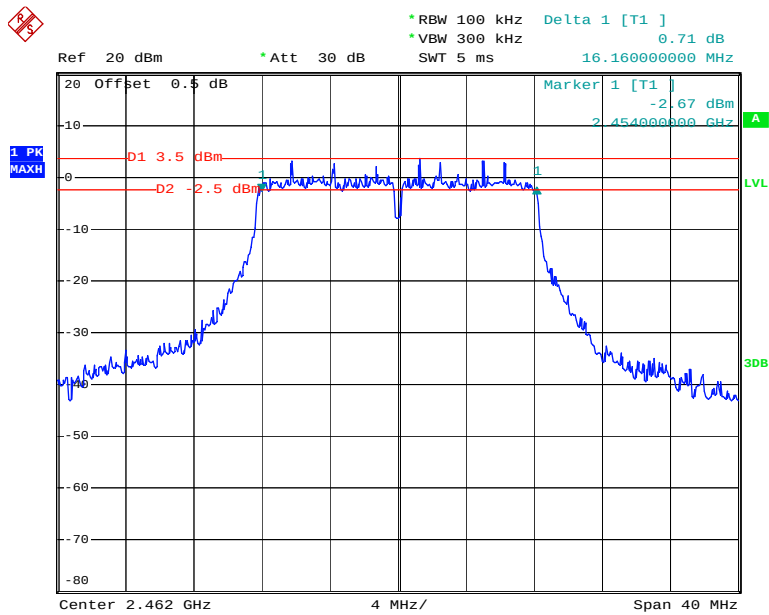
Date: 21.AUG.2018 15:54:06

**802.11g Low Channel**

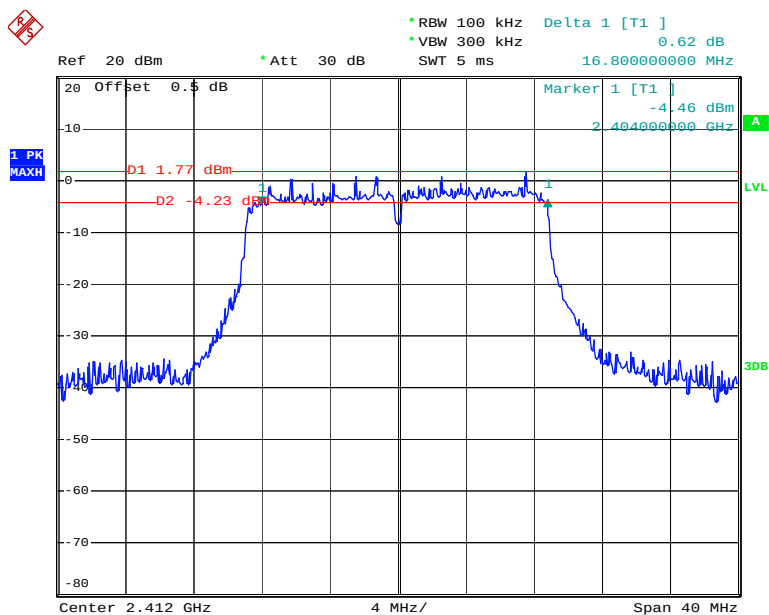
Date: 21.AUG.2018 10:49:29

**802.11g Middle Channel**

Date: 21.AUG.2018 10:44:57

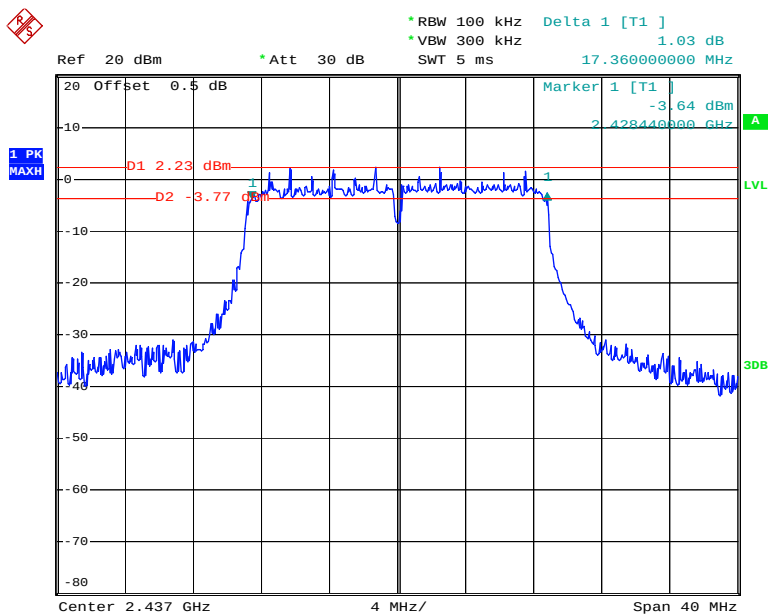
**802.11g High Channel**

Date: 21.AUG.2018 10:41:42

**802.11n ht20 Low Channel**

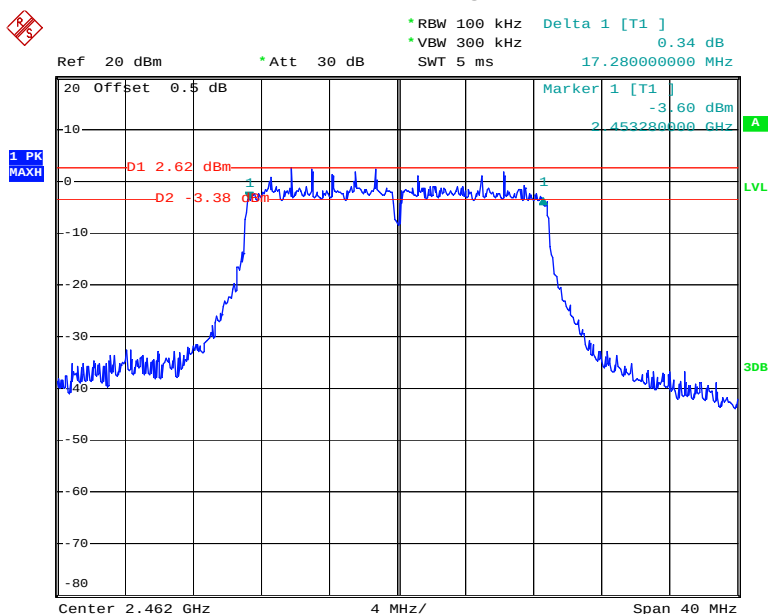
Date: 21.AUG.2018 10:54:00

## 802.11n ht20 Middle Channel



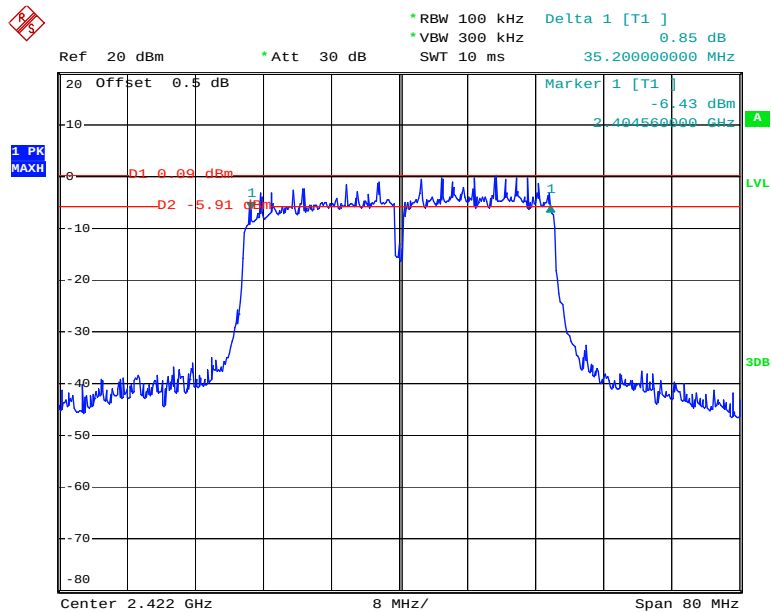
Date: 21.AUG.2018 10:17:27

## 802.11n ht20 High Channel



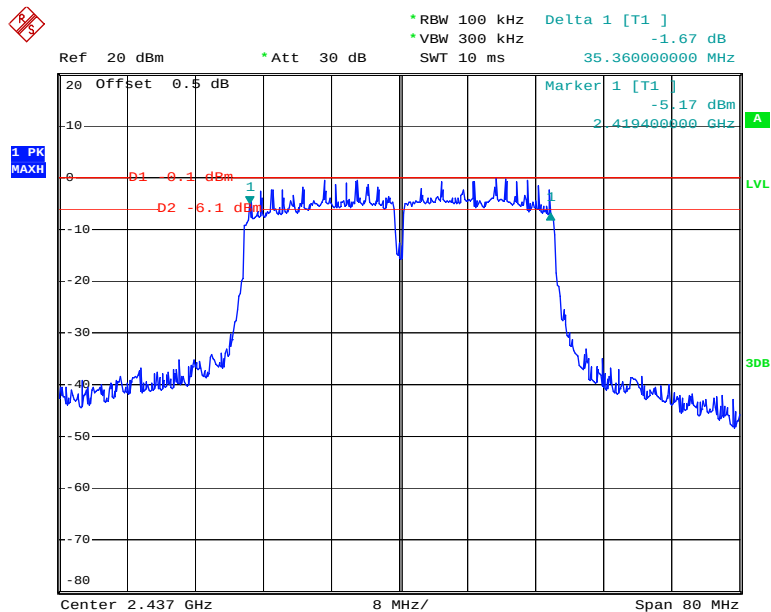
Date: 21.AUG.2018 10:21:46

## 802.11n ht40 Low Channel



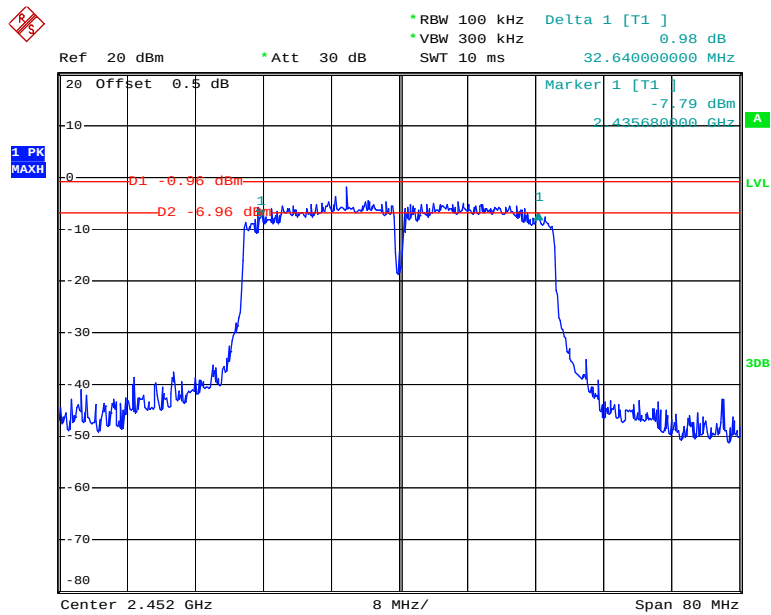
Date: 21.AUG.2018 10:58:26

## 802.11n ht40 Middle Channel



Date: 21.AUG.2018 10:28:17

### 802.11n ht40 High Channel



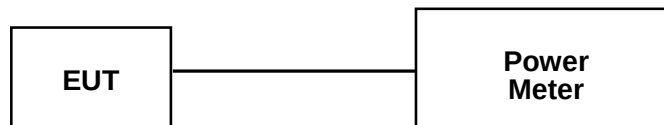
Date: 21.AUG.2018 10:33:16

**FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER****Applicable Standard**

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

**Test Procedure**

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.
4. Set the power Meter to test Peak output power, record the result as peak power.
5. Set the power meter to test average output power, record the result as average power.

**Test Equipment List and Details**

| Manufacturer | Description               | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|---------------------------|-------------|---------------|------------------|----------------------|
| Unknown      | Coaxial Cable             | C-SJ00-0010 | C0010/01      | Each time        | N/A                  |
| Agilent      | USB Wideband Power Sensor | U2022XA     | MY5417006     | 2017-12-11       | 2018-12-11           |

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

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

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25.8 °C   |
| <b>Relative Humidity:</b> | 64 %      |
| <b>ATM Pressure:</b>      | 100.2 kPa |

\* The testing was performed by Kami Zhou on 2018-08-21

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table.

| Test mode    | Frequency (MHz) | Max Peak Conducted Output Power (dBm) | Limit (dBm) |
|--------------|-----------------|---------------------------------------|-------------|
| 802.11b      | 2412            | 18.23                                 | 30          |
|              | 2437            | 18.45                                 | 30          |
|              | 2462            | 17.94                                 | 30          |
| 802.11g      | 2412            | 22.42                                 | 30          |
|              | 2437            | 22.58                                 | 30          |
|              | 2457            | 22.73                                 | 30          |
|              | 2462            | 15.06                                 | 30          |
| 802.11n ht20 | 2412            | 21.86                                 | 30          |
|              | 2437            | 22.05                                 | 30          |
|              | 2452            | 22.34                                 | 30          |
|              | 2457            | 20.92                                 | 30          |
|              | 2462            | 14.19                                 | 30          |
| 802.11n ht40 | 2422            | 23.15                                 | 30          |
|              | 2437            | 23.12                                 | 30          |
|              | 2442            | 22.79                                 | 30          |
|              | 2447            | 15.79                                 | 30          |
|              | 2452            | 15.65                                 | 30          |

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

### **Applicable Standard**

According to FCC§15.247(d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### **Test Procedure**

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

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

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSP 38      | 100478        | 2017-12-08       | 2018-12-08           |
| Unknown      | Coaxial Cable     | C-SJ00-0010 | C0010/01      | Each time        | N/A                  |

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

### **Test Data**

#### **Environmental Conditions**

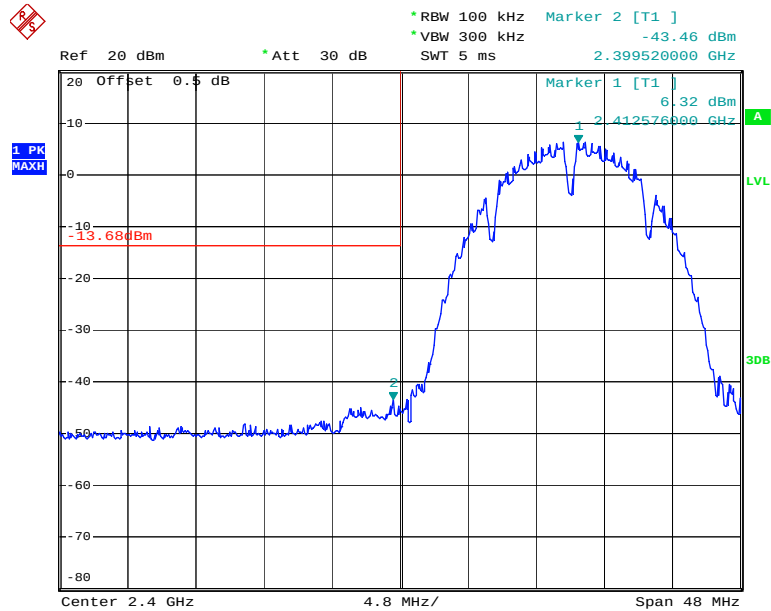
|                    |           |
|--------------------|-----------|
| Temperature:       | 25.8 °C   |
| Relative Humidity: | 64 %      |
| ATM Pressure:      | 100.2 kPa |

\* The testing was performed by Kami Zhou on 2018-08-21

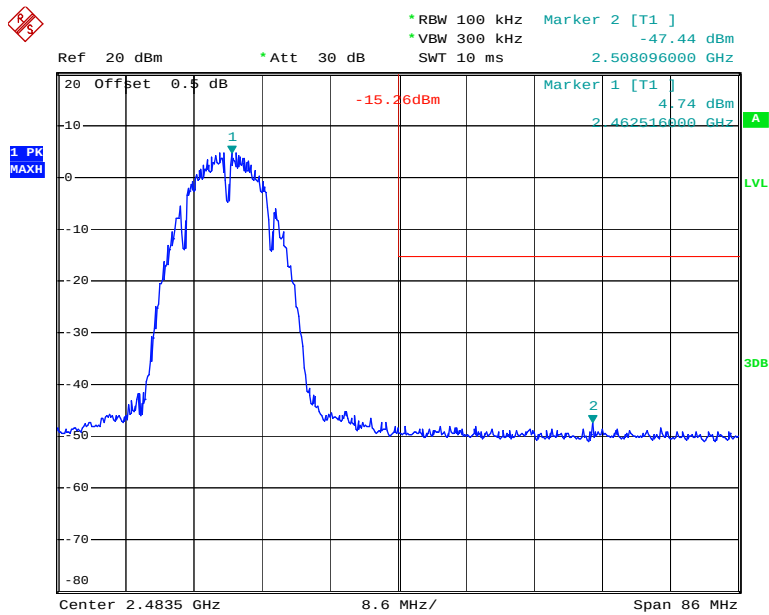
Test mode: Transmitting

Test Result: Compliance. Please refer to following plots.

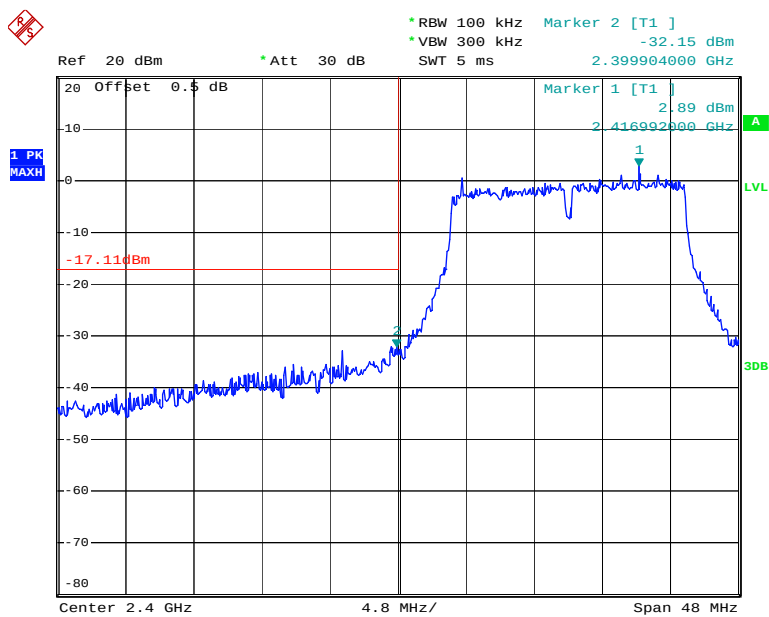
### 802.11b: Band Edge, Left Side



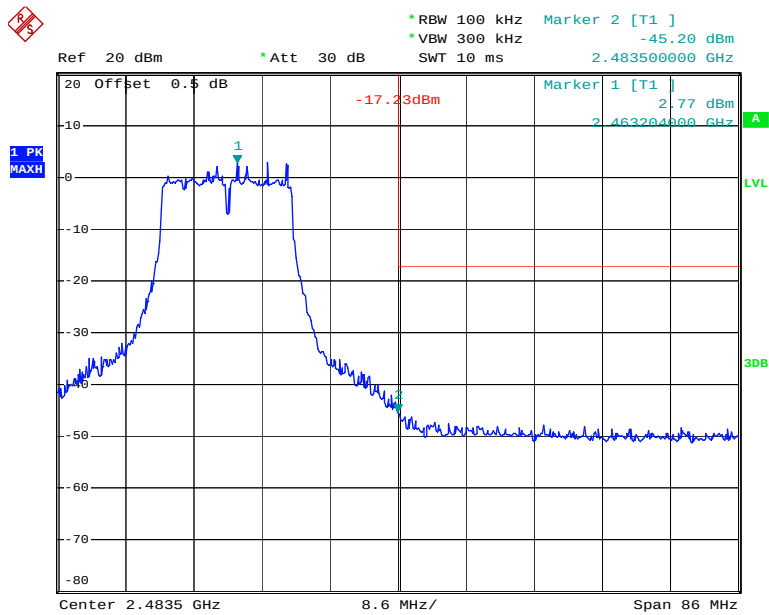
Date: 21.AUG.2018 15:41:19

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

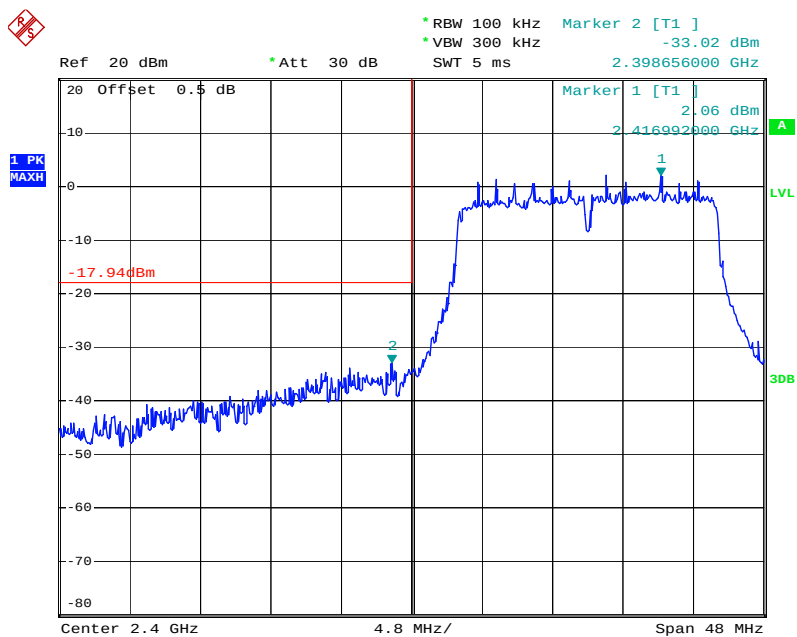
Date: 21.AUG.2018 15:56:03

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

Date: 21.AUG.2018 10:52:07

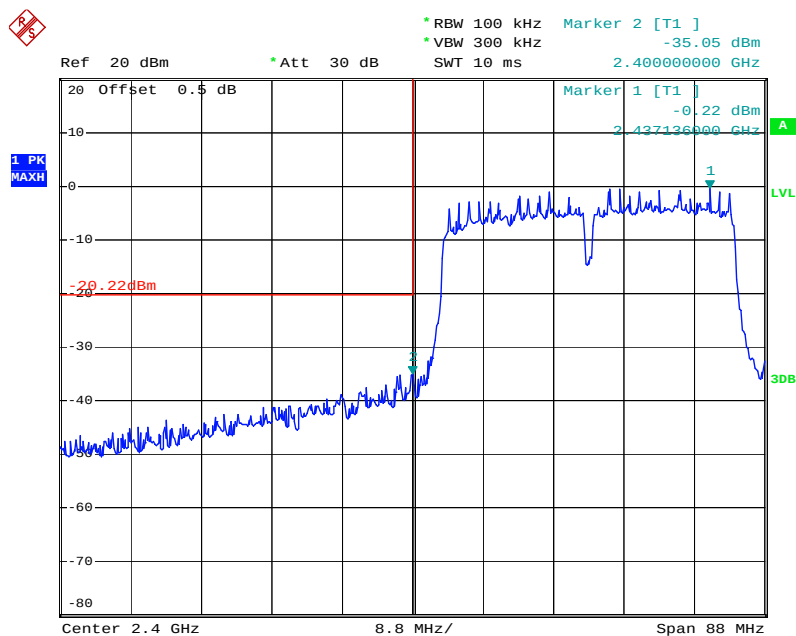
**802.11g: Band Edge, Right Side**

Date: 21.AUG.2018 10:43:56

**802.11n ht20 Band Edge, Left Side**

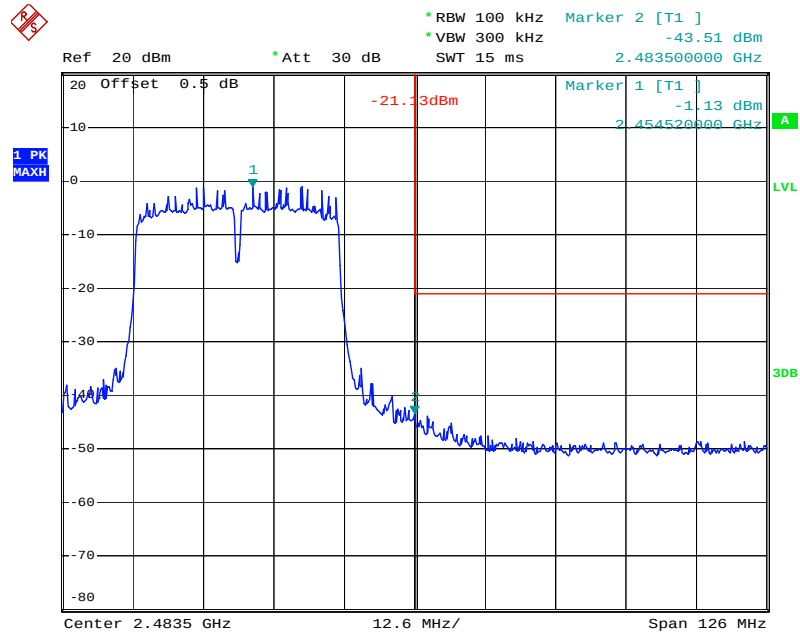
Date: 21.AUG.2018 10:56:50

### 802.11n ht40 Band Edge, Left Side



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### 802.11n ht40 Band Edge, Right Side



Date: 21.AUG.2018 10:37:08

## 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

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 was set 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 the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

### Test Equipment List and Details

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSP 38      | 100478        | 2017-12-08       | 2018-12-08           |
| R&S          | EMI Test Receiver | ESCI        | 101121        | 2018-03-23       | 2019-03-23           |
| Unknown      | Coaxial Cable     | C-SJ00-0010 | C0010/01      | Each time        | N/A                  |

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

### Test Data

#### Environmental Conditions

|                    |               |
|--------------------|---------------|
| Temperature:       | 24.8~28 °C    |
| Relative Humidity: | 52~64%        |
| ATM Pressure:      | 99.6~100.9kPa |

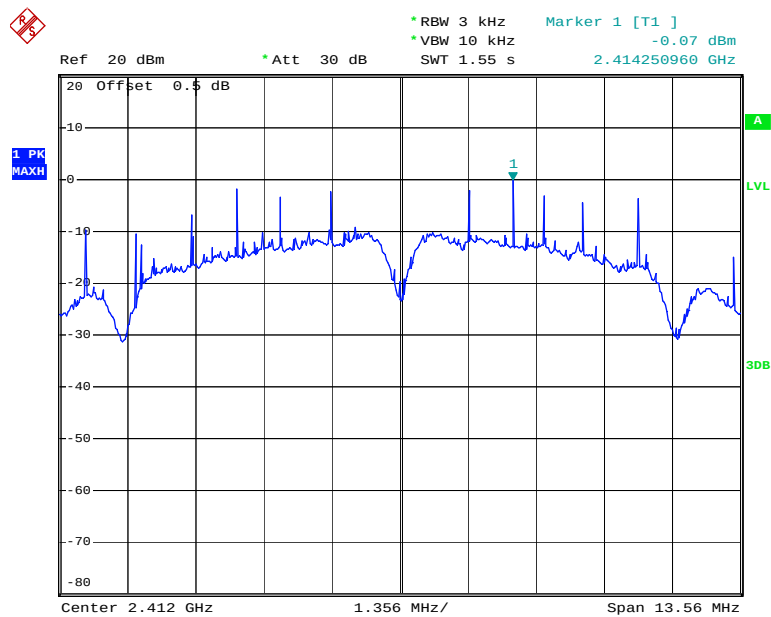
\* The testing was performed by Kami Zhou from 2018-08-21 to 2018-09-15

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots

| Test mode    | Channel | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) |
|--------------|---------|-----------------|----------------|------------------|
| 802.11b      | Low     | 2412            | -0.07          | $\leq 8$         |
|              | Middle  | 2437            | 0.26           | $\leq 8$         |
|              | High    | 2462            | -2.61          | $\leq 8$         |
| 802.11g      | Low     | 2412            | -14.73         | $\leq 8$         |
|              | Middle  | 2437            | -13.25         | $\leq 8$         |
|              | High    | 2462            | -21.32         | $\leq 8$         |
| 802.11n ht20 | Low     | 2412            | -12.80         | $\leq 8$         |
|              | Middle  | 2437            | -13.00         | $\leq 8$         |
|              | High    | 2462            | -22.20         | $\leq 8$         |
| 802.11n ht40 | Low     | 2422            | -15.32         | $\leq 8$         |
|              | Middle  | 2437            | -15.95         | $\leq 8$         |
|              | High    | 2452            | -25.16         | $\leq 8$         |

### Power Spectral Density, 802.11b Low Channel



Date: 21.AUG.2018 16:08:27

Ref 20 dBm      \* Att 30 dB      \* RBW 3 kHz      \* VBW 10 kHz      Marker 1 [T1]      0.26 dBm  
 SWT 1.45 s      2.438244160 GHz

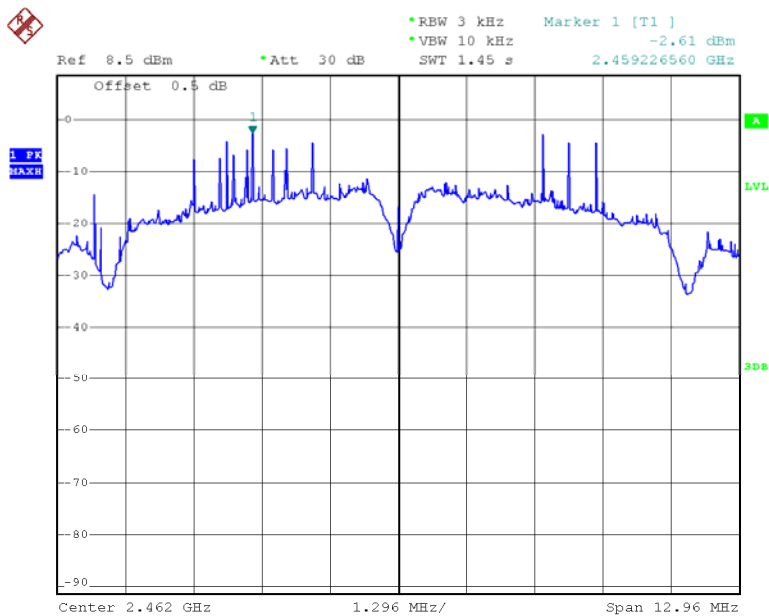
20 Offset 0.5 dB

1 PK  
MAXH

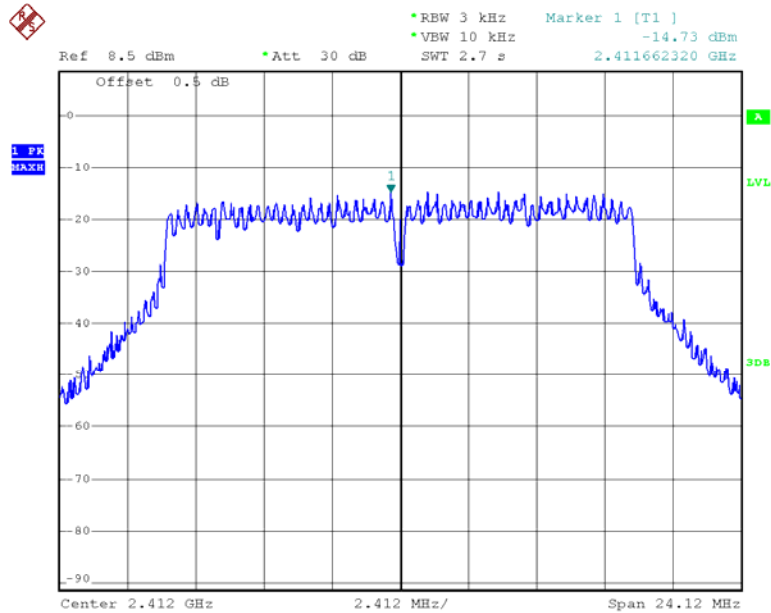
1.296 MHz/

Center 2.437 GHz      Span 12.96 MHz

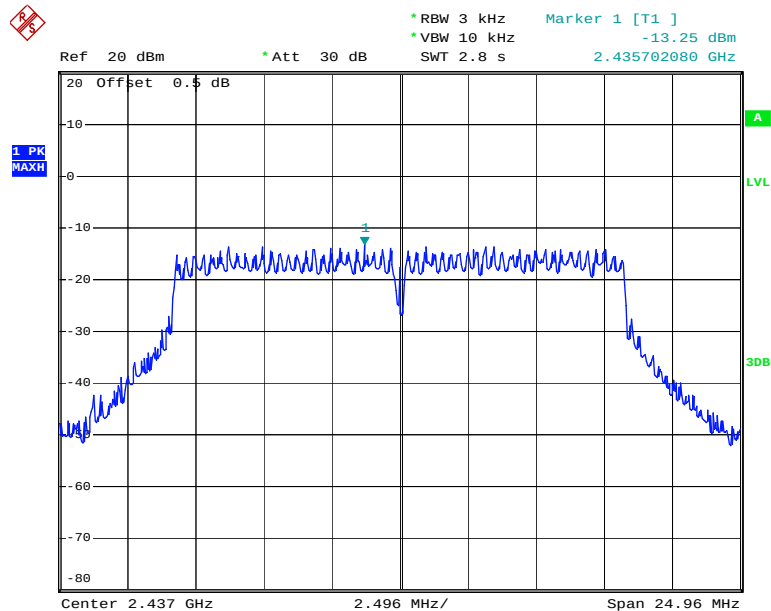
### Power Spectral Density, 802.11b High Channel



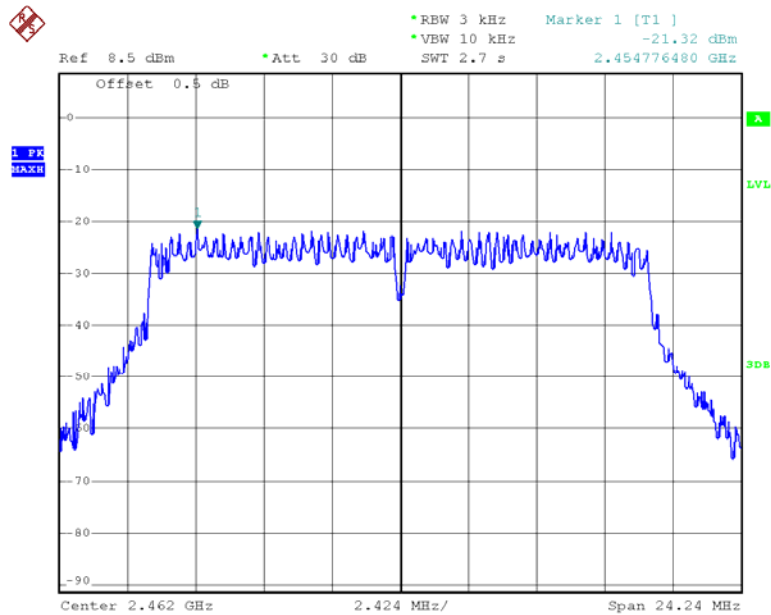
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**Power Spectral Density, 802.11g Low Channel**

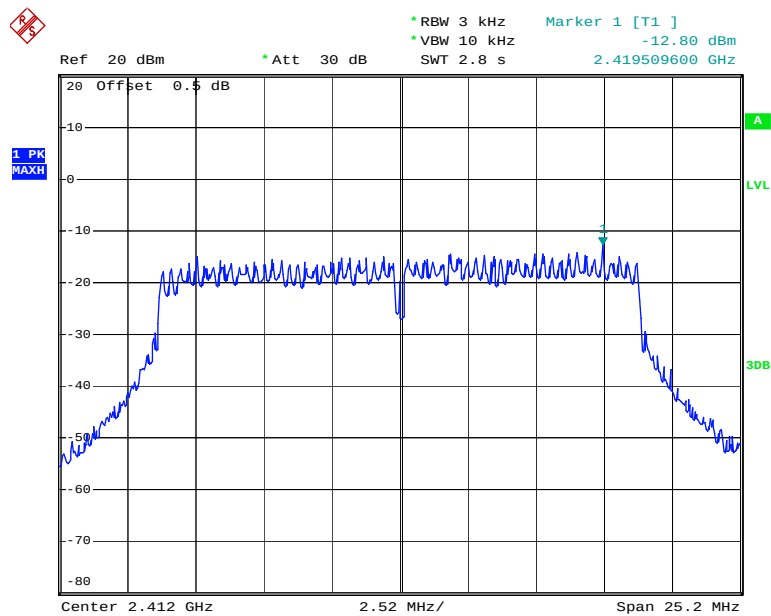
Date: 15.SEP.2018 15:25:38

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

Date: 21.AUG.2018 10:46:46

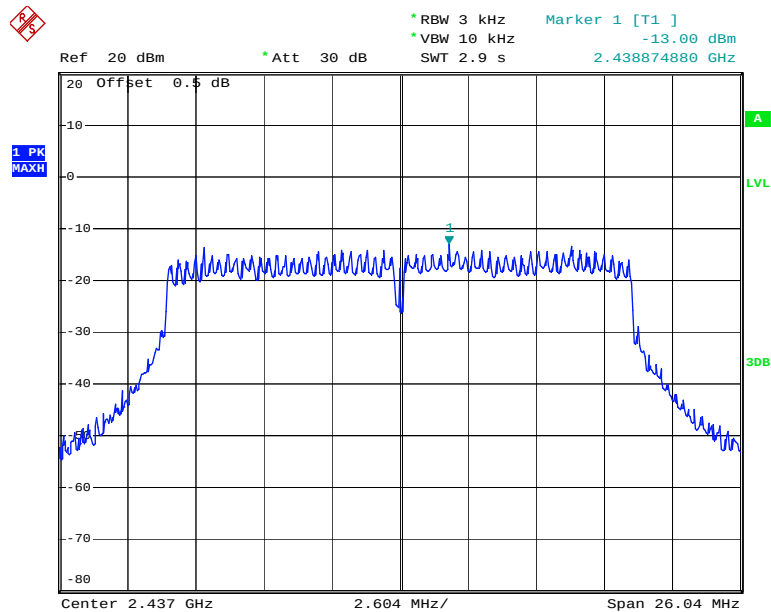
**Power Spectral Density, 802.11g High Channel**

Date: 15.SEP.2018 15:22:31

**Power Spectral Density, 802.11n ht20 Low Channel**

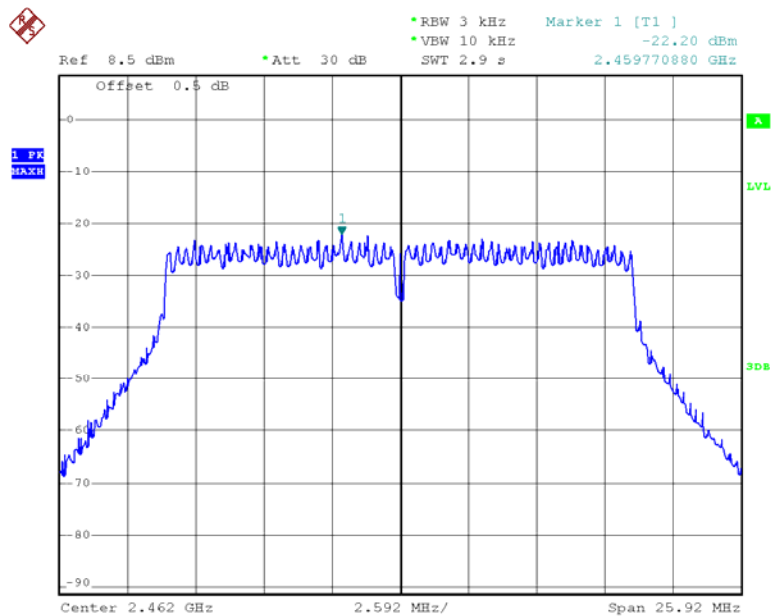
Date: 21.AUG.2018 10:55:43

### Power Spectral Density, 802.11n ht20 Middle Channel



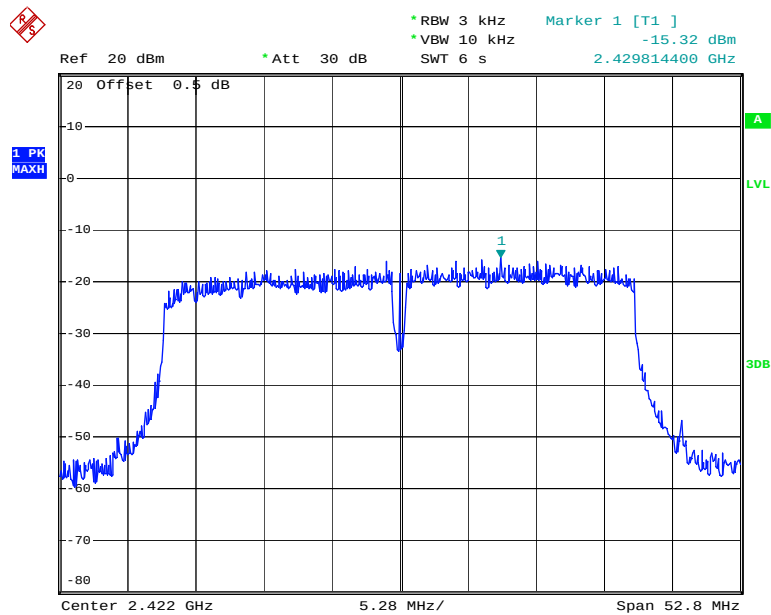
Date: 21.AUG.2018 10:19:35

### Power Spectral Density, 802.11n ht20 High Channel



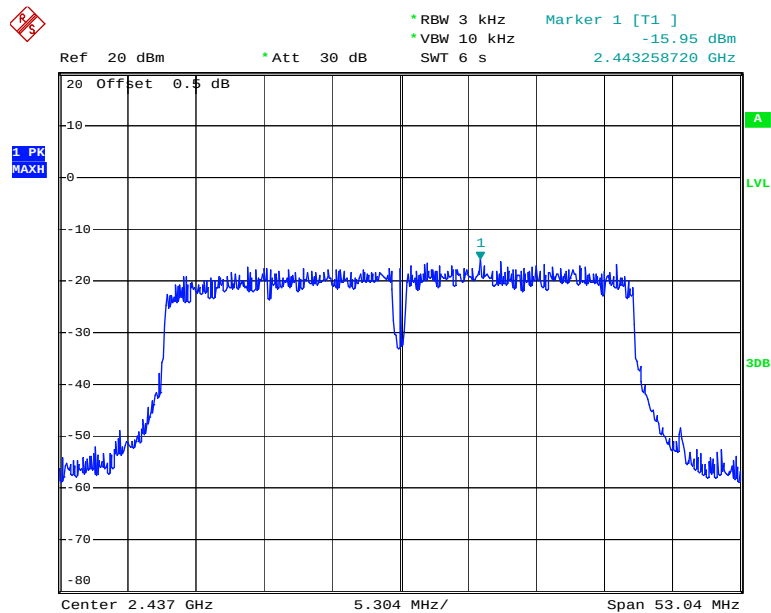
Date: 15.SEP.2018 15:19:02

### Power Spectral Density, 802.11n ht40 Low Channel



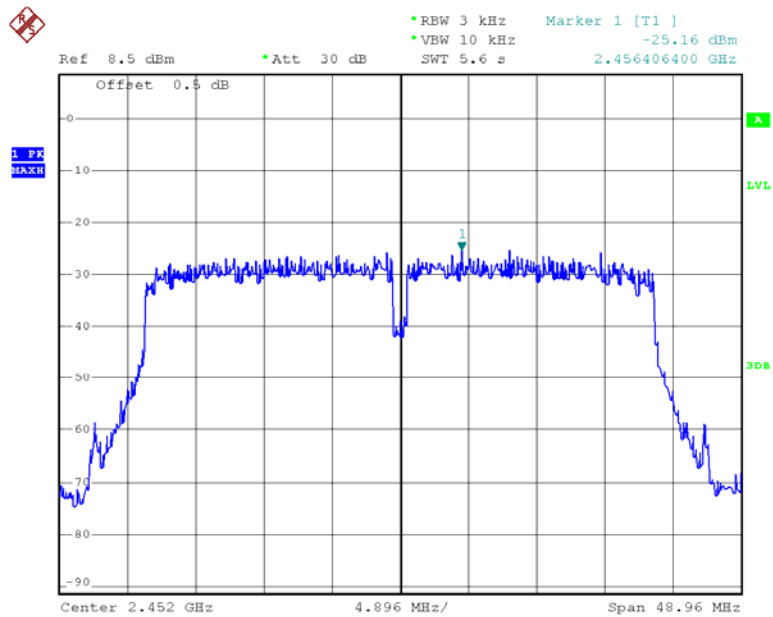
Date: 21.AUG.2018 11:02:30

### Power Spectral Density, 802.11n ht40 Middle Channel



Date: 21.AUG.2018 10:31:13

### Power Spectral Density, 802.11n ht40 High Channel



Date: 15.SEP.2018 15:34:46

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