

# Wellsco International Group Co., Ltd

## TEST REPORT

**SCOPE OF WORK**

FCC TESTING-21-1251

**REPORT NUMBER**

180611011SZN-002

**ISSUE DATE**

26 June 2018

**[REVISED DATE]**

[-----]

**PAGES**

74

**DOCUMENT CONTROL NUMBER**

FCC ID 247\_b

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**Wellsco International Group Co., Ltd**

Application  
For  
Certification

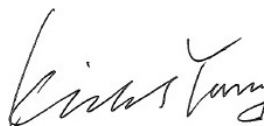
**FCC ID: 2AP52WEL1251****Sports Camera****Model: 21-1251****2.4GHz Wi-Fi Transceiver**

Report No.: 180611011SZN-002

We hereby certify that the sample of the above item is considered to comply with the  
requirements of FCC Part 15, Subpart C for Intentional Radiator,  
mention 47 CFR [10-1-17]

**Prepared and Checked by:**

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**Engineer**

**Approved by:**

**Kidd Yang**  
**Technical Supervisor**  
**Date: 26 June 2018**

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**Intertek Testing Service Shenzhen Ltd. Longhua Branch**

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## MEASUREMENT/TECHNICAL REPORT

### Sports Camera

Model: 21-1251

FCC ID: 2AP52WEL1251

This report concerns (check one) Original Grant ☒ Class II Change ☐

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until :   
date

Company Name agrees to notify the Commission by:   
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-17] Edition] provision.

Report prepared by:

**Damon Wang**  
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| Exhibit type          | File Description           | Filename            |
|-----------------------|----------------------------|---------------------|
| Test Report           | Test Report                | report.pdf          |
| Test Setup Photo      | Radiated Emission          | radiated photos.pdf |
| External Photo        | External Photo             | external photos.pdf |
| Internal Photo        | Internal Photo             | internal photos.pdf |
| Block Diagram         | Block Diagram              | block.pdf           |
| Schematics            | Circuit Diagram            | circuit.pdf         |
| Operation Description | Technical Description      | descri.pdf          |
| ID Label/Location     | Label Artwork and Location | label.pdf           |
| User Manual           | User Manual                | manual.pdf          |
| Cover Letter          | Confidentiality Letter     | request.pdf         |
| Cover Letter          | Letter of Agency           | agency.pdf          |

## **EXHIBIT 1**

### **SUMMARY OF TEST RESULTS**

## 1.0 Summary of Test results

### Sports Camera

Model: 21-1251

FCC ID: 2AP52WEL1251

| TEST ITEM                              | REFERENCE    | RESULTS             |
|----------------------------------------|--------------|---------------------|
| Max. Output power                      | 15.247(b)(3) | Pass                |
| 6 dB Bandwidth                         | 15.247(a)(2) | Pass                |
| Max. Power Density                     | 15.247(e)    | Pass                |
| Out of Band Antenna Conducted Emission | 15.247(d)    | Pass                |
| Radiated Emission in Restricted Bands  | 15.247(d)    | Pass                |
| Antenna Requirement                    | 15.203       | Pass<br>(See Notes) |

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

## **EXHIBIT 2**

### **GENERAL DESCRIPTION**

## 2.0 General Description

### 2.1 Product Description

The Equipment Under Test (EUT) is a Sports Camera with Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing. The EUT is powered by rechargeable battery (DC 3.7V) which can be charged by USB port(DC 5V). The WIFI feature will stop working when the EUT is connected to computer or a power adapter. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM. CCK, DQPSK, DBPSK for DSSS

Antenna Type: Integral Antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

### 2.2 Related Submittal(s) Grants

This is an application for certification of:  
DTS- Part 15 Digital Transmission Systems (2.4GHz Wi-Fi transmitter portion).

### 2.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.10: 2013 and KDB 558074 D01 v04. Radiated emission measurement was performed in semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

The Semi-anechoic chamber used to collect the radiated data is Intertek **Testing Services Shenzhen Ltd. Longhua Branch** and located at 1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

## **EXHIBIT 3**

### **SYSTEM TEST CONFIGURATION**

### **3.0 System Test Configuration**

#### **3.1 Justification**

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by one fully rechargeable battery (DC 3.7V) which can be charged by USB port(DC 5V) during the test.

On 802.11b/g/n-HT20 mode, only one antenna is used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The unit was operated standalone and placed at the centre of turntable.

Radiated emissions measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

#### **3.2 EUT Exercising Software**

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

### 3.3 Special Accessories

N/A.

### 3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 3.5 Equipment Modification

Any modifications installed previous to testing by Wellsco International Group Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

### 3.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

| Description                    | Manufacturer | Model No. |
|--------------------------------|--------------|-----------|
| iPod<br>(Provided by Intertek) | Apple        | A1421     |

## **EXHIBIT 4**

### **MEASUREMENT RESULTS**

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 13, 2018

Model: 21-1251

#### 4.0 Measurement Results

##### 4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter have a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

| IEEE 802.11b (Antenna Gain = 0dBi) (CCK, 1Mbps) |                                 |                 |
|-------------------------------------------------|---------------------------------|-----------------|
| Frequency (MHz)                                 | Output in dBm<br>(Peak Reading) | Output in mWatt |
| Low Channel: 2412                               | 12.77                           | 18.92           |
| Middle Channel: 2437                            | 12.36                           | 17.22           |
| High Channel: 2462                              | 12.17                           | 16.48           |

| IEEE 802.11g (Antenna Gain = 0dBi) (16QAM, 6Mbps) |                                 |                 |
|---------------------------------------------------|---------------------------------|-----------------|
| Frequency (MHz)                                   | Output in dBm<br>(Peak Reading) | Output in mWatt |
| Low Channel: 2412                                 | 15.36                           | 34.36           |
| Middle Channel: 2437                              | 15.05                           | 31.99           |
| High Channel: 2462                                | 14.77                           | 29.99           |

| IEEE 802.11n-HT20 (Antenna Gain = 0dBi) (64QAM, 6Mbps) |                                 |                 |
|--------------------------------------------------------|---------------------------------|-----------------|
| Frequency (MHz)                                        | Output in dBm<br>(Peak Reading) | Output in mWatt |
| Low Channel: 2412                                      | 15.75                           | 37.58           |
| Middle Channel: 2437                                   | 15.46                           | 35.16           |
| High Channel: 2462                                     | 15.19                           | 33.04           |

Cable loss: 1.0 dB    External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 15.75dBm

EUT max. e.i.r.p = 37.58mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 13, 2018

Model: 21-1251

#### 4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v04. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

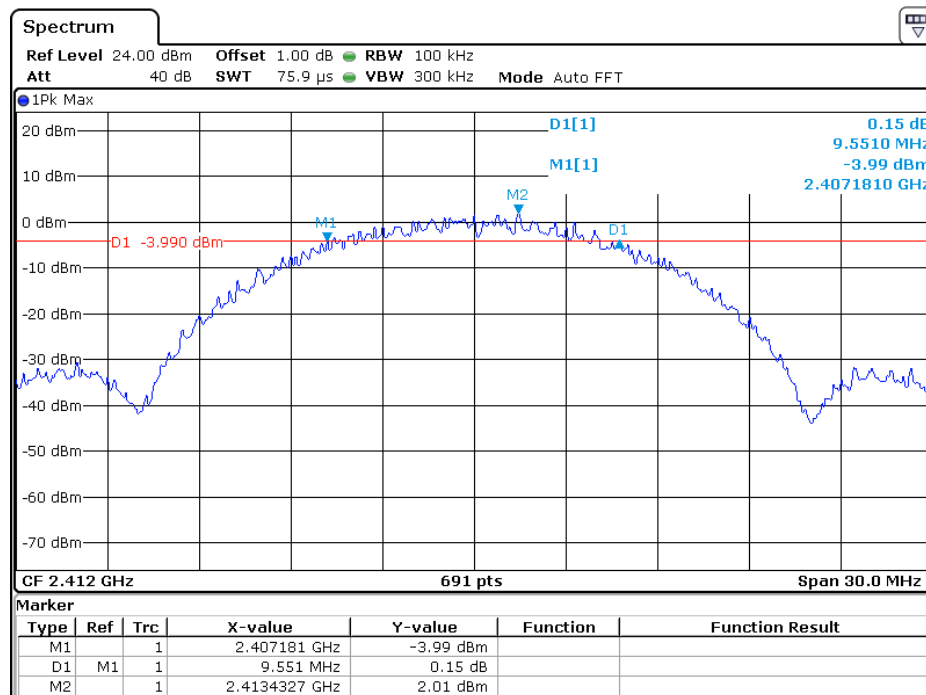
| IEEE 802.11b (CCK, 1Mbps) |                      |
|---------------------------|----------------------|
| Frequency (MHz)           | 6 dB Bandwidth (MHz) |
| 2412                      | 9.551                |
| 2437                      | 9.595                |
| 2462                      | 9.378                |

| IEEE 802.11g (16QAM, 6Mbps) |                      |
|-----------------------------|----------------------|
| Frequency (MHz)             | 6 dB Bandwidth (MHz) |
| 2412                        | 16.454               |
| 2437                        | 16.454               |
| 2462                        | 16.454               |

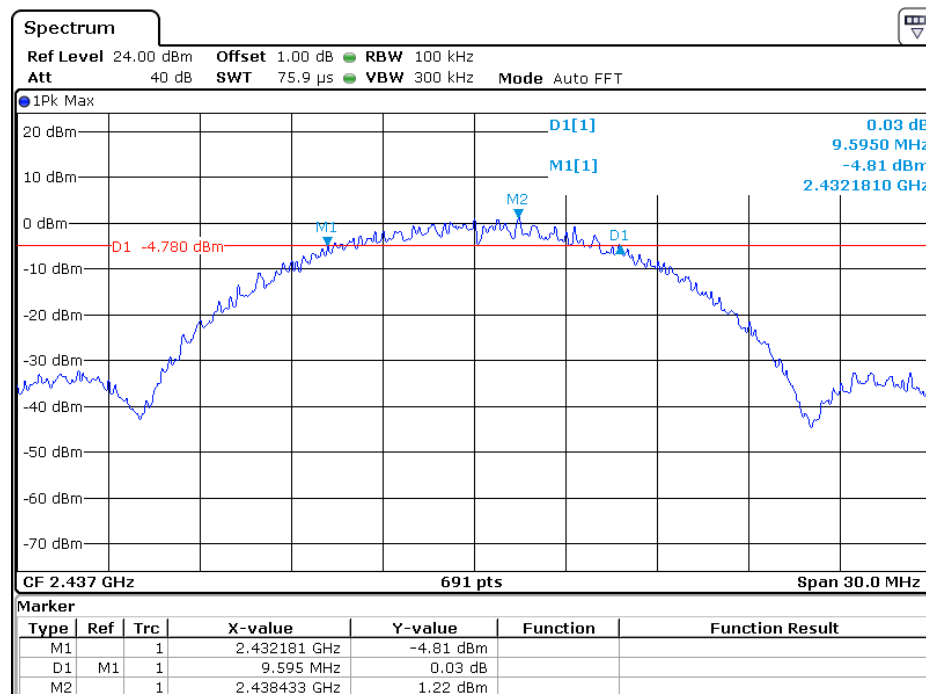
| IEEE 802.11n-HT20 (64QAM, 6Mbps) |                      |
|----------------------------------|----------------------|
| Frequency (MHz)                  | 6 dB Bandwidth (MHz) |
| 2412                             | 17.713               |
| 2437                             | 17.757               |
| 2462                             | 17.757               |

The test plots are attached as below.

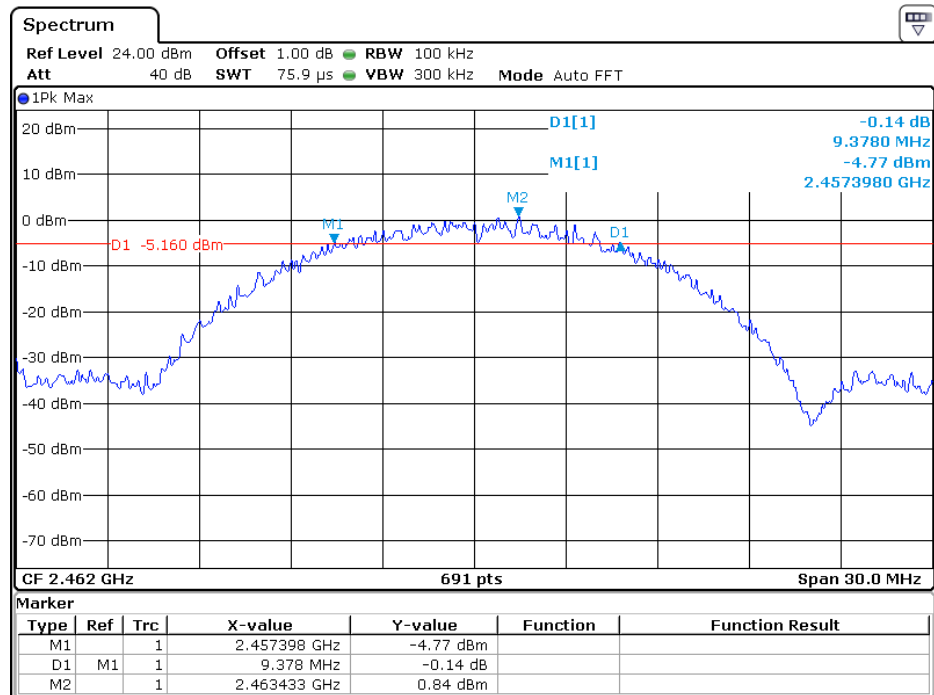
802.11b



Date: 13 JUN 2018 16:58:21

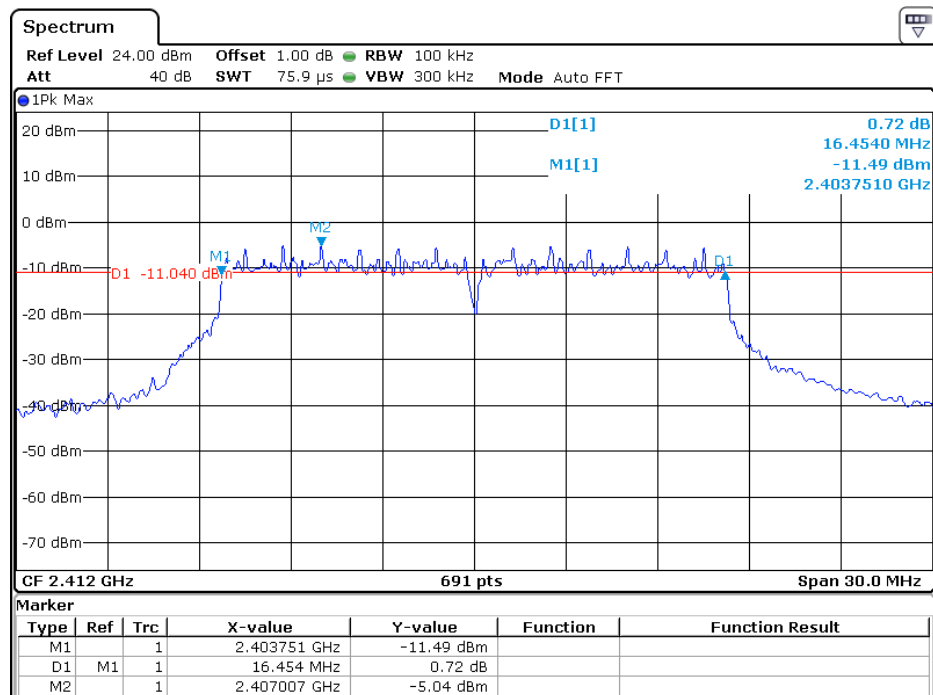


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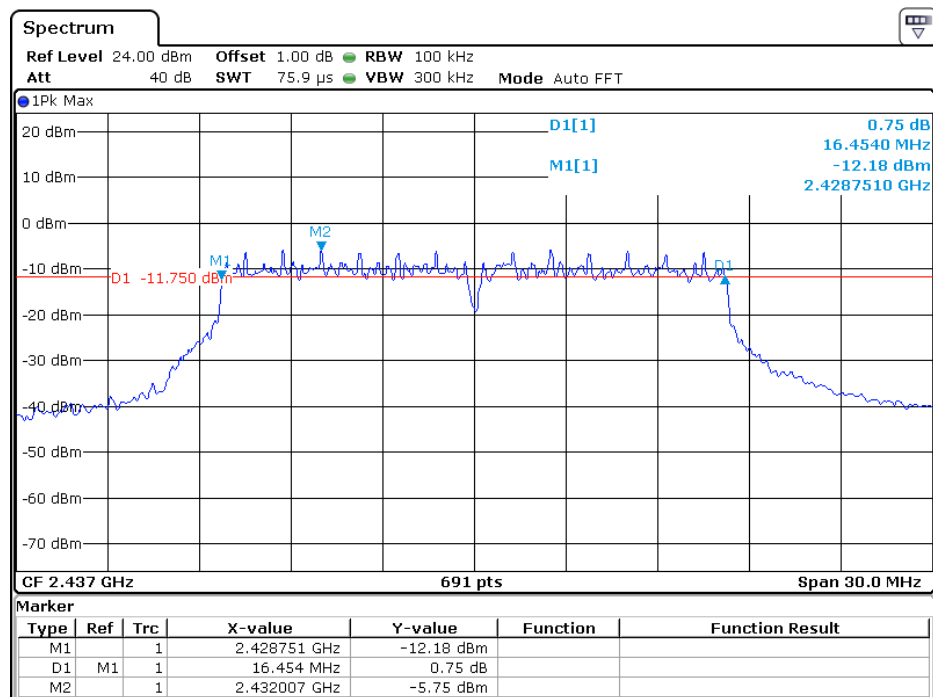


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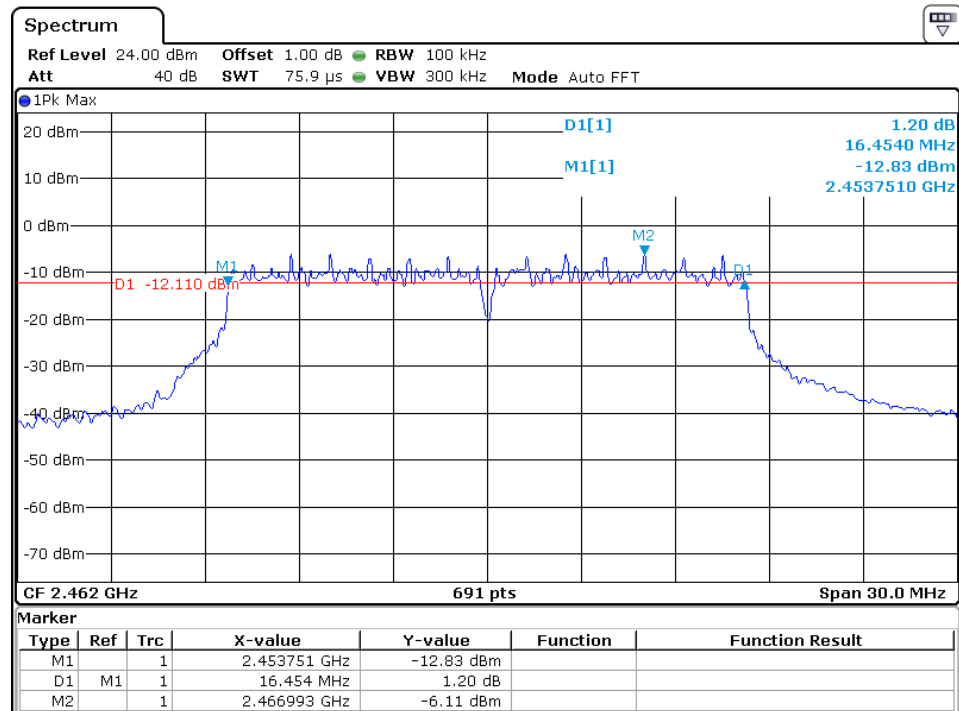
802.11g



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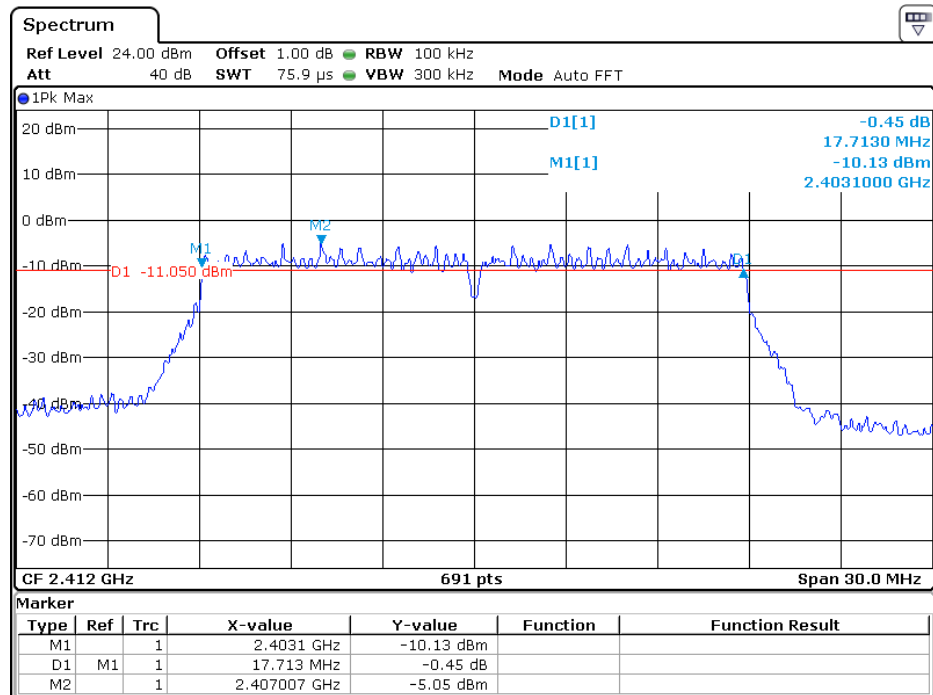


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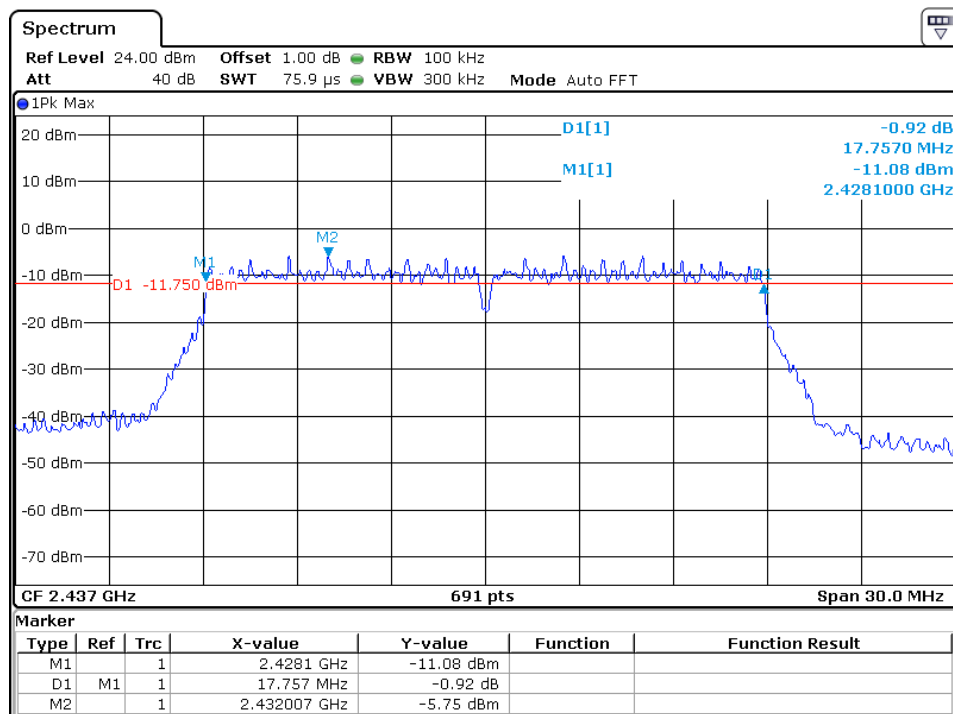


Date: 13 JUN 2018 17:17:53

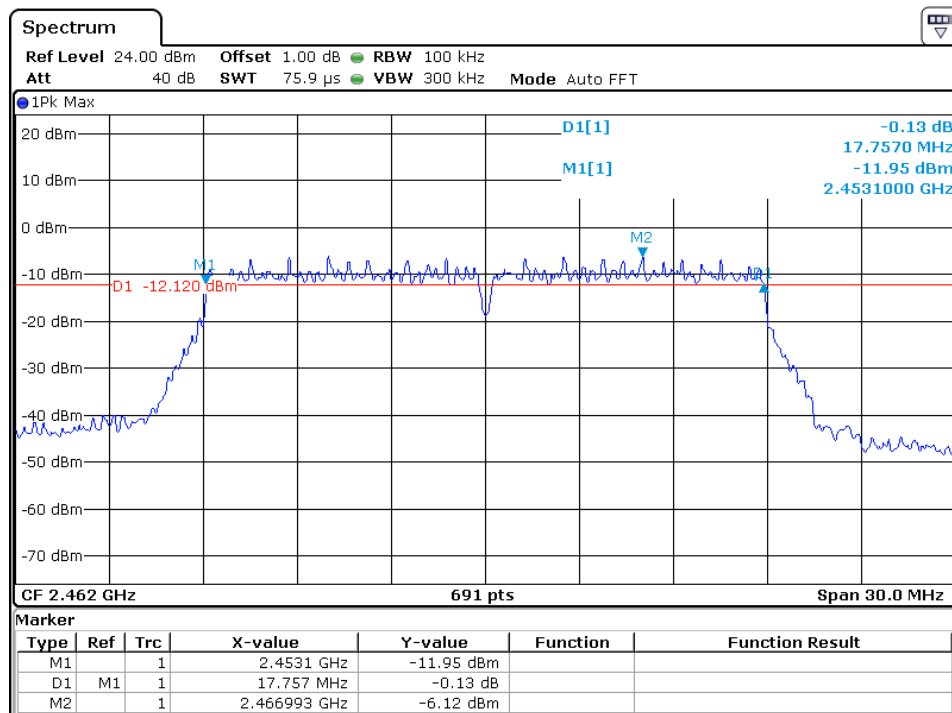
## 802.11n-HT20



Date: 13 JUN 2018 17:32:54



Date: 13 JUN 2018 17:37:33



Date: 13 JUN 2018 17:40:37

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 13, 2018

Model: 21-1251

#### 4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v04.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

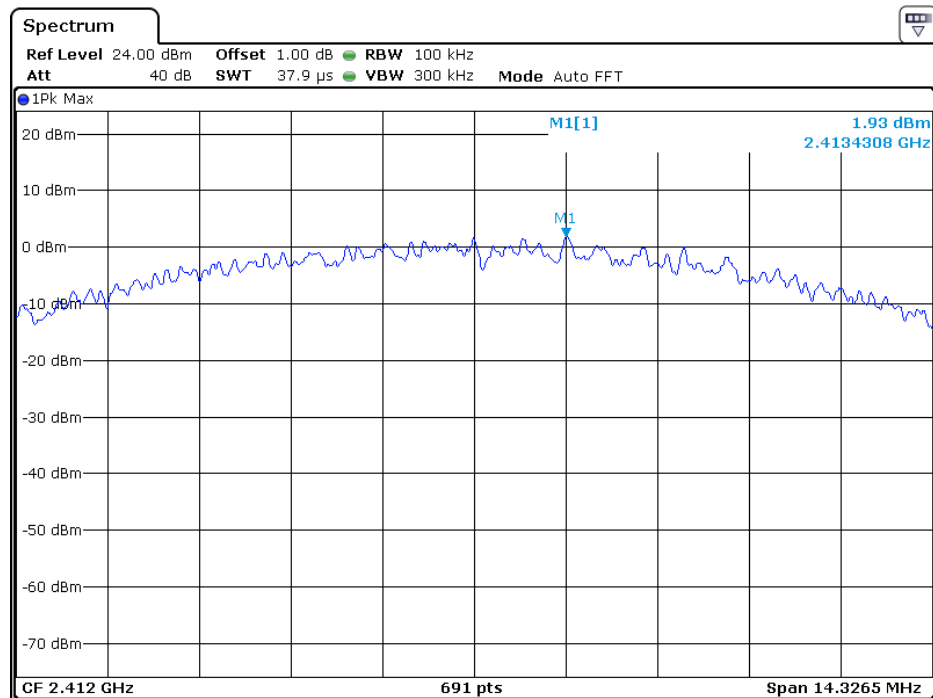
| IEEE 802.11b (CCK, 1Mbps) |                               |
|---------------------------|-------------------------------|
| Frequency (MHz)           | Power Density with RBW 100KHz |
| 2412                      | 1.93                          |
| 2437                      | 1.20                          |
| 2462                      | 0.81                          |

| IEEE 802.11g (16QAM, 6Mbps) |                               |
|-----------------------------|-------------------------------|
| Frequency (MHz)             | Power Density with RBW 100KHz |
| 2412                        | -4.98                         |
| 2437                        | -5.65                         |
| 2462                        | -6.22                         |

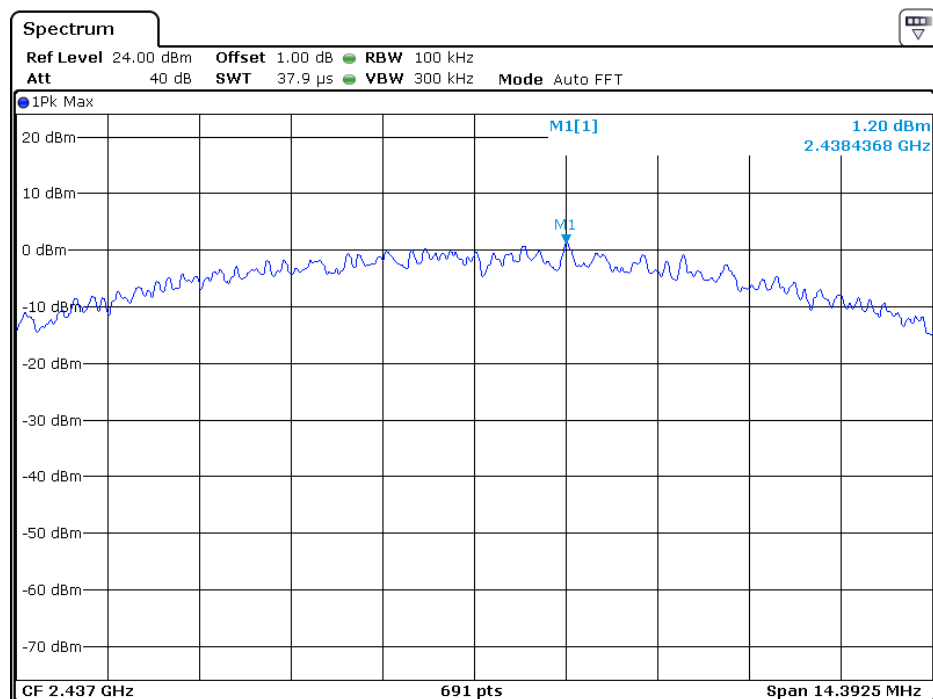
| IEEE 802.11n-HT20 (64QAM, 6Mbps) |                               |
|----------------------------------|-------------------------------|
| Frequency (MHz)                  | Power Density with RBW 100KHz |
| 2412                             | -5.07                         |
| 2437                             | -5.72                         |
| 2462                             | -6.12                         |

The test plots are attached as below.

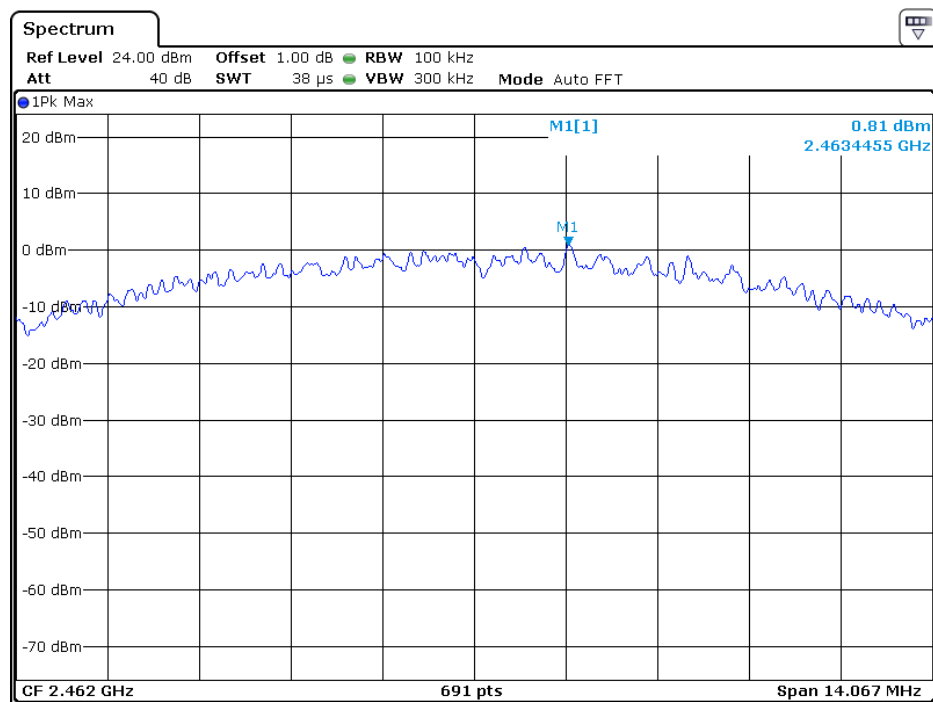
802.11b



Date: 13 JUN 2018 16:59:25

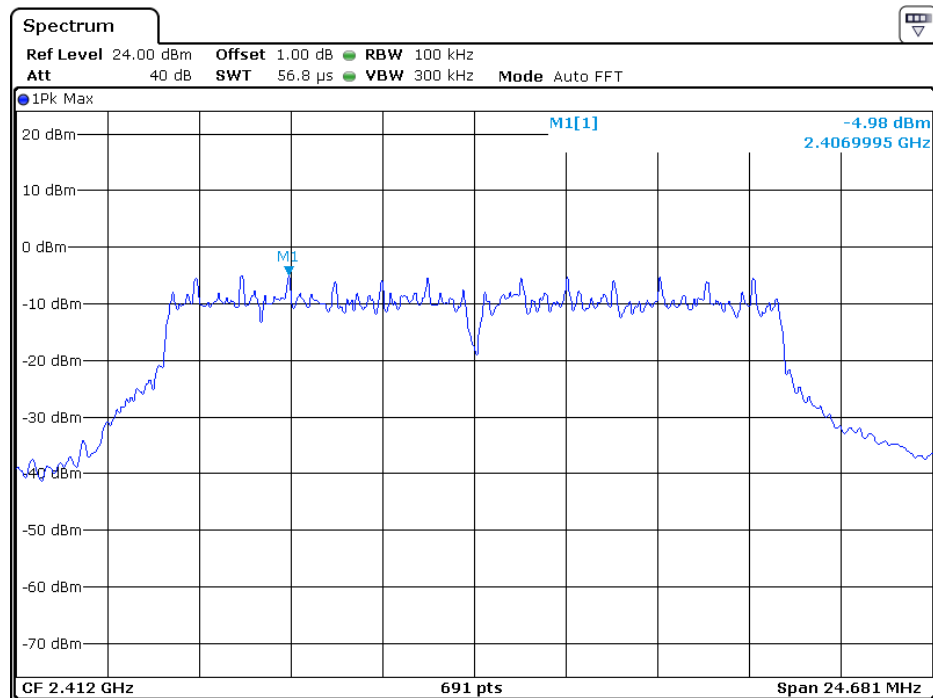


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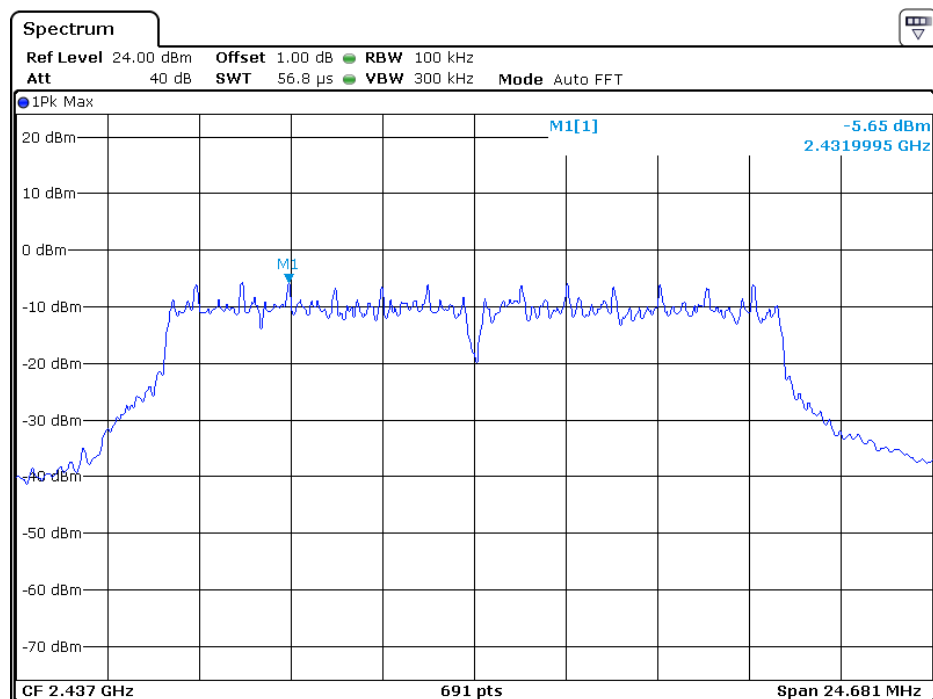


Date: 13 JUN 2018 17:11:11

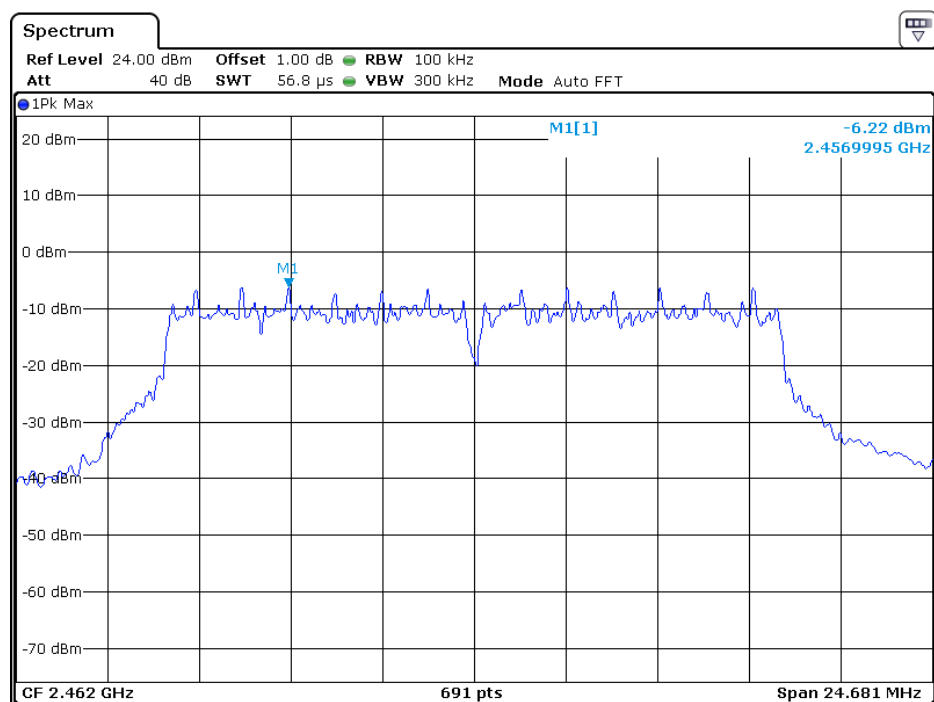
802.11g



Date: 13 JUN 2018 17:24:22

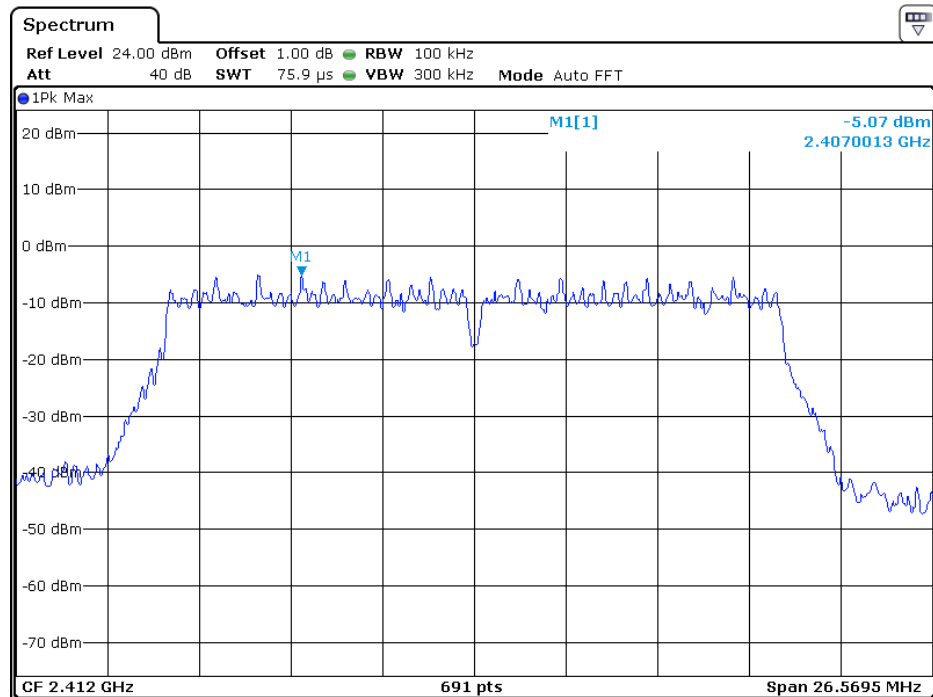


Date: 13 JUN 2018 17:21:21

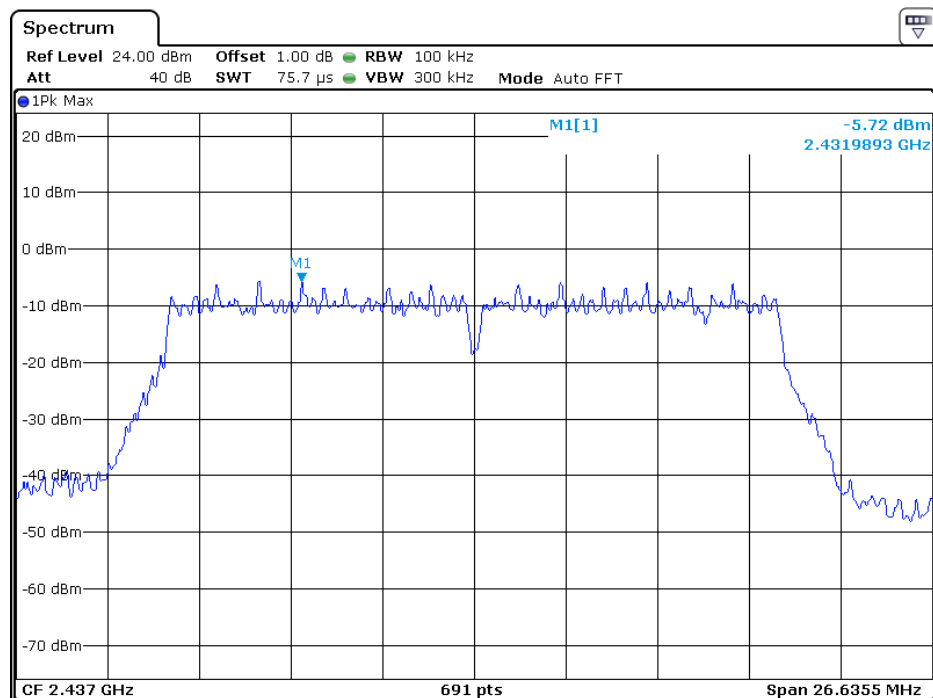


Date: 13 JUN 2018 17:18:21

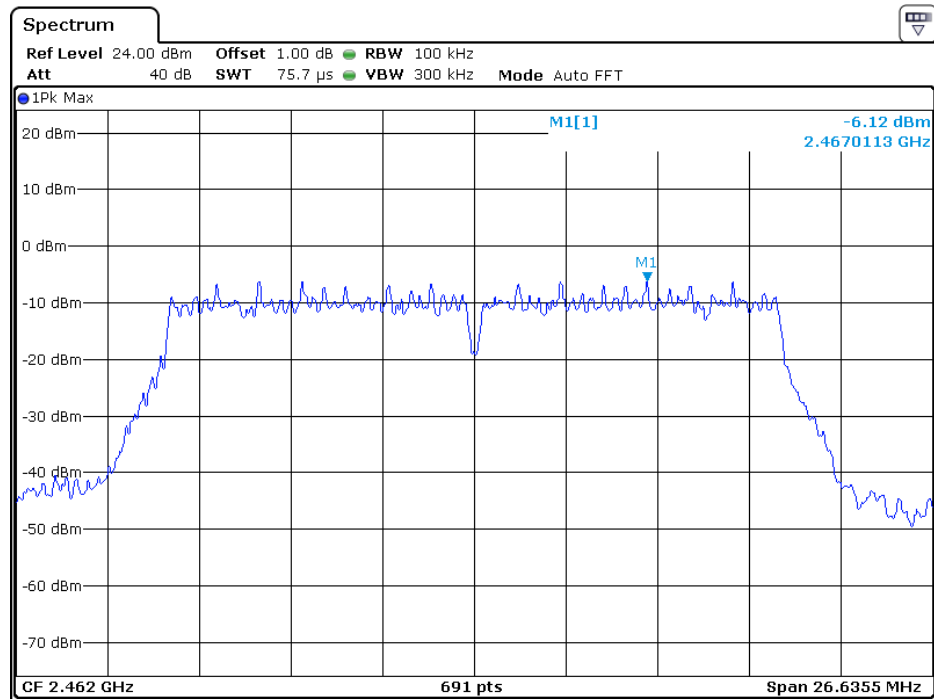
## 802.11n-HT20



Date: 13 JUN 2018 17:33:33



Date: 13 JUN 2018 17:38:02



Date: 13 JUN 2018 17:41:04

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 13, 2018

Model: 21-1251

#### 4.4 Out of Band Conducted Emissions, FCC Rule 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. The Measurement Procedure was set according to the FCC KDB 558074 D01 v04.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

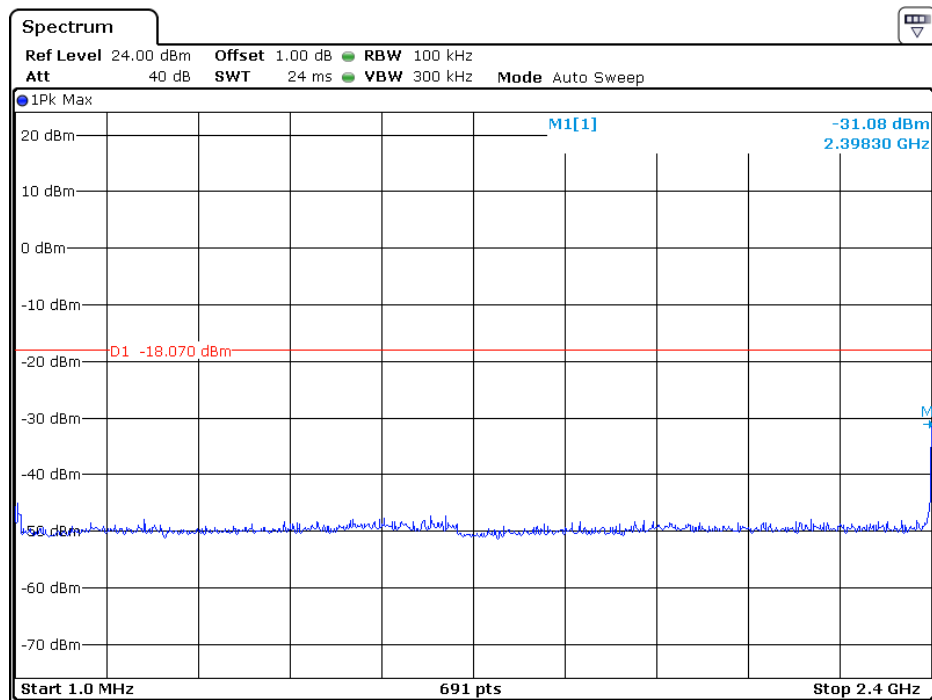
Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20.

The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

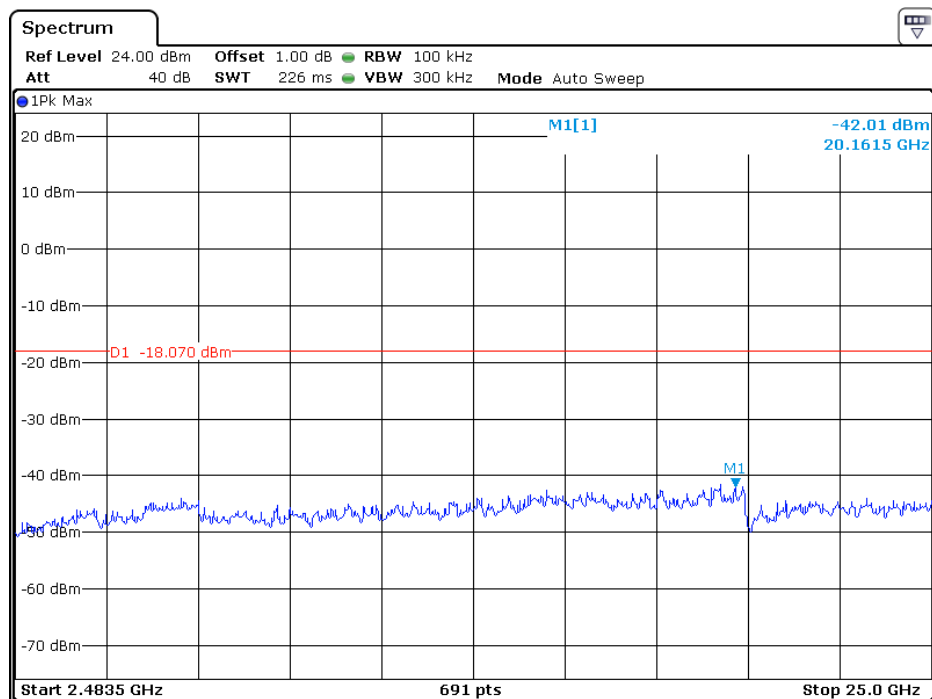
The test plots are attached as below.

802.11b

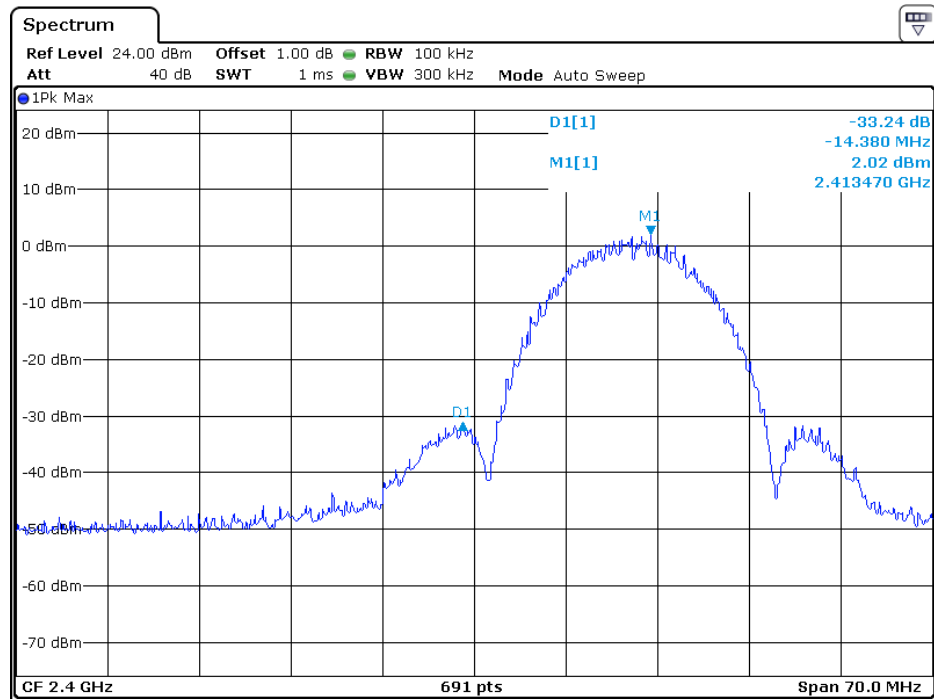
Channel 01 (2412MHz) Reference Level: 1.93dBm



Date: 13 JUN 2018 17:02:29

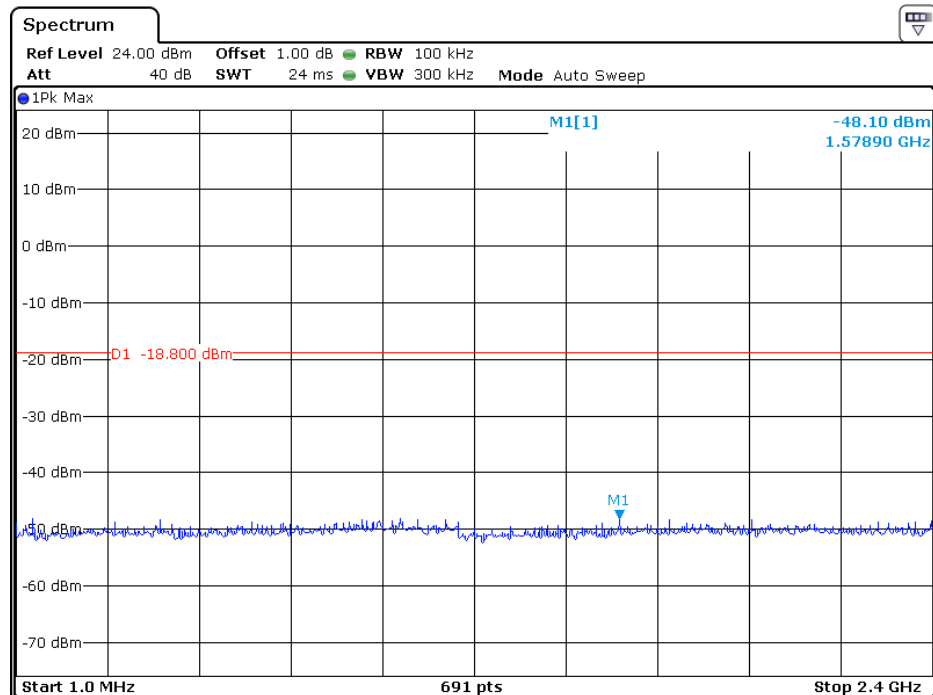


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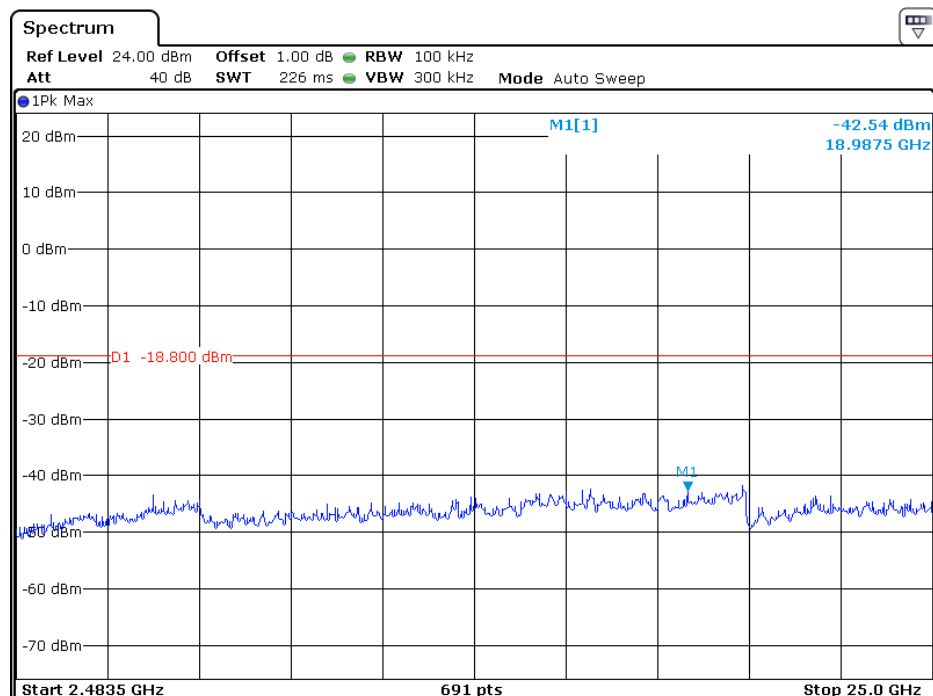


Date: 13 JUN 2018 17:00:32

Channel 06 (2437MHz) Reference Level: 1.20dBm

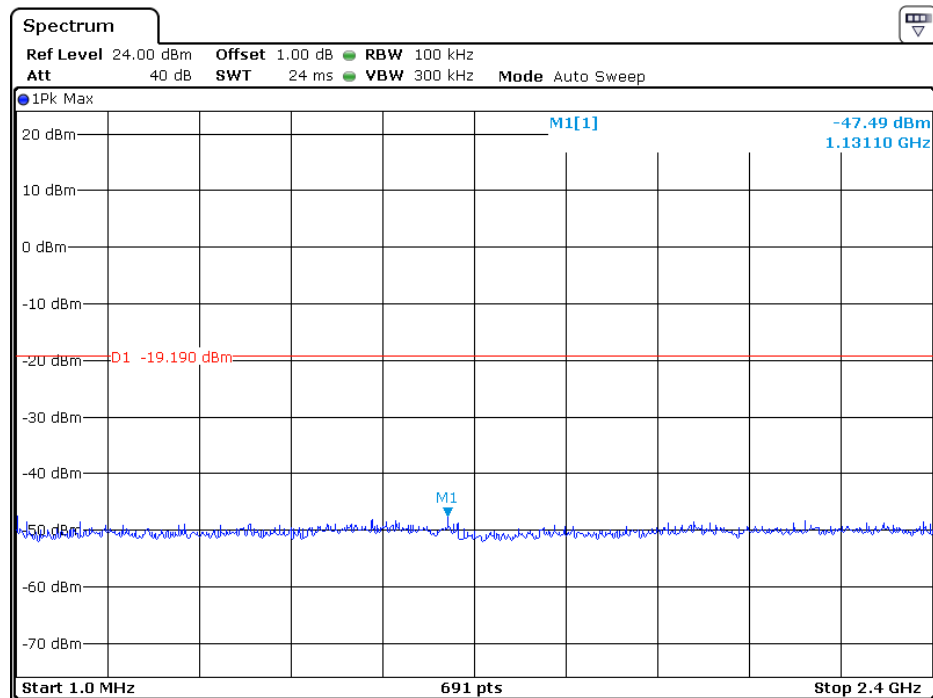


Date: 13 JUN 2018 17:08:46

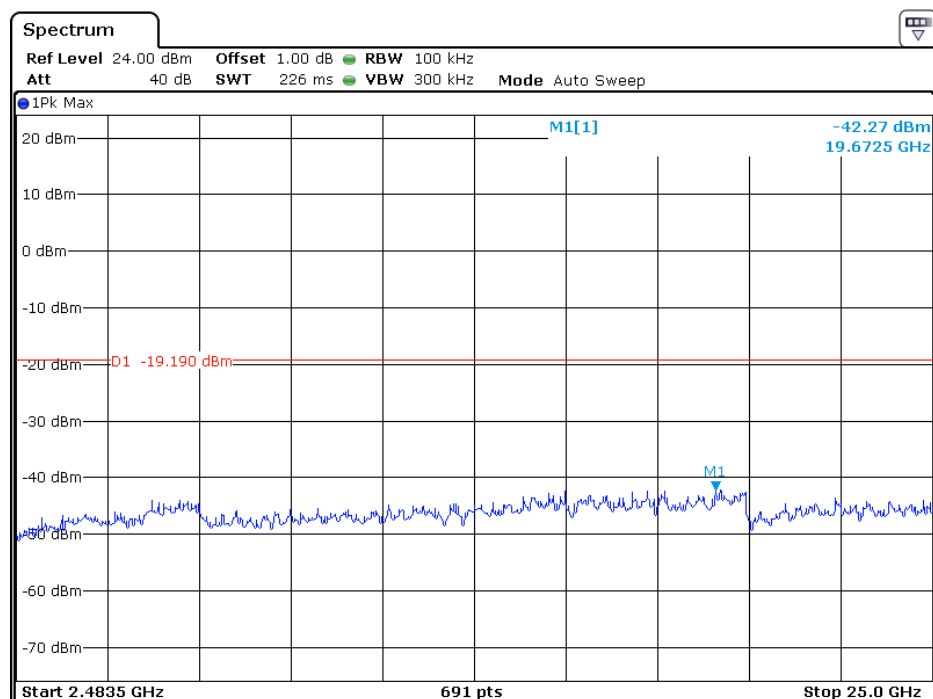


Date: 13 JUN 2018 17:09:06

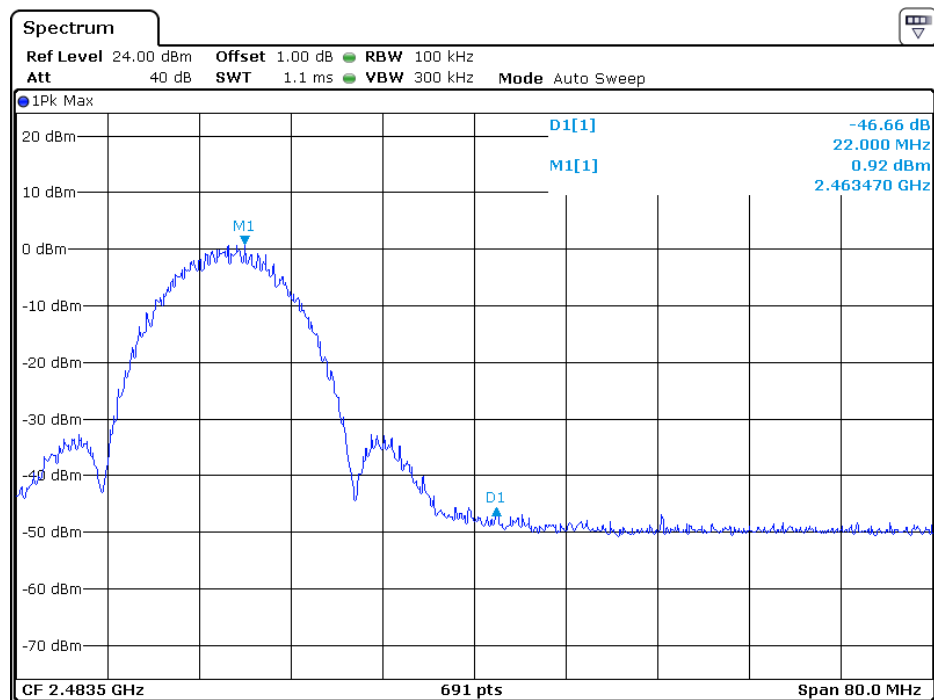
Channel 11 (2462MHz) Reference Level: 0.81dBm



Date: 13 JUN 2018 17:12:02



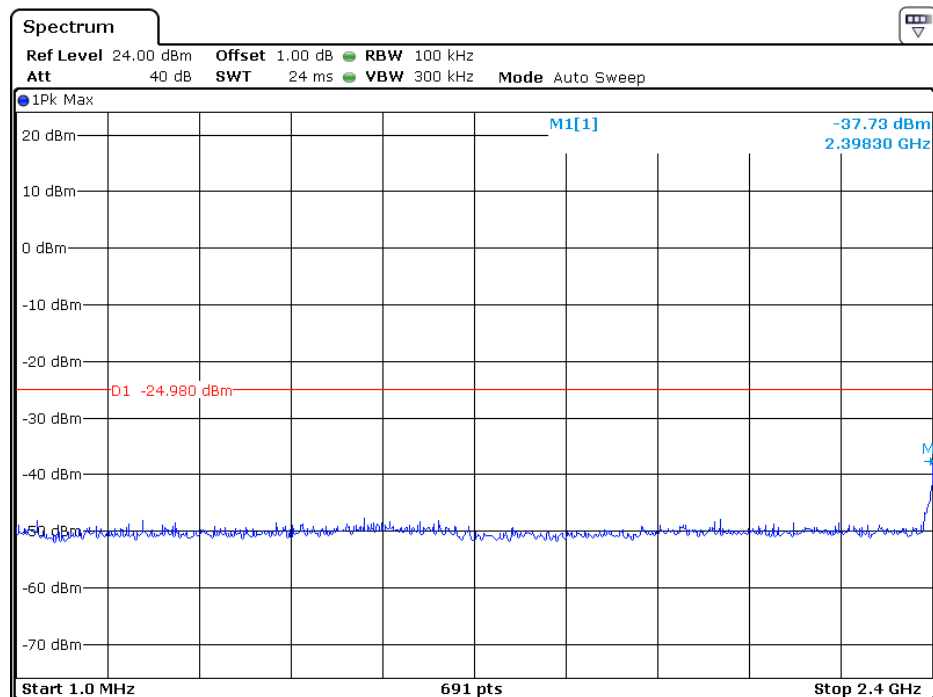
Date: 13 JUN 2018 17:12:20



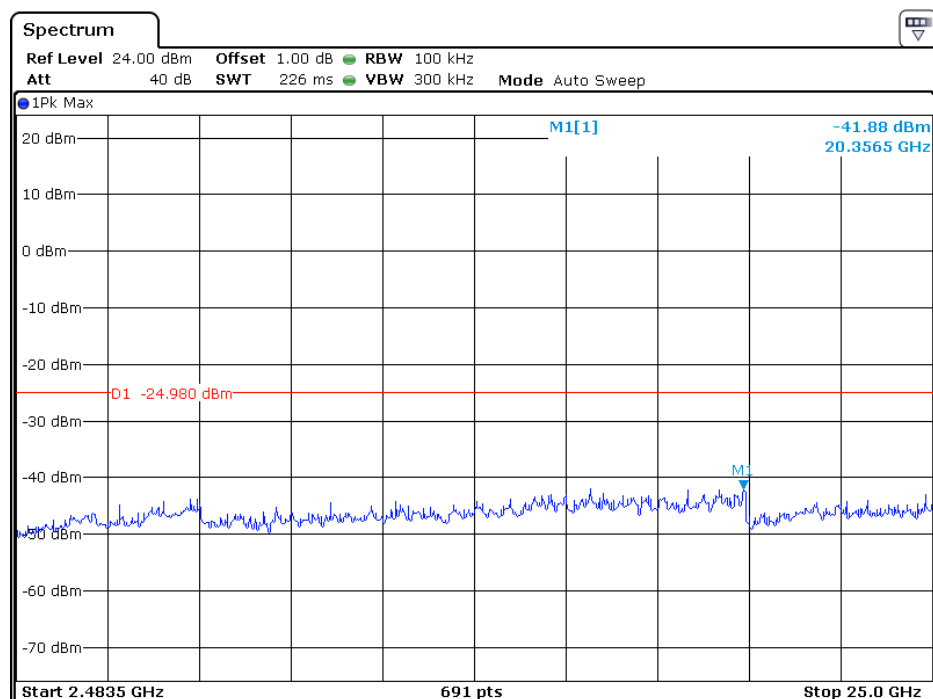
Date: 13 JUN 2018 17:12:53

802.11g

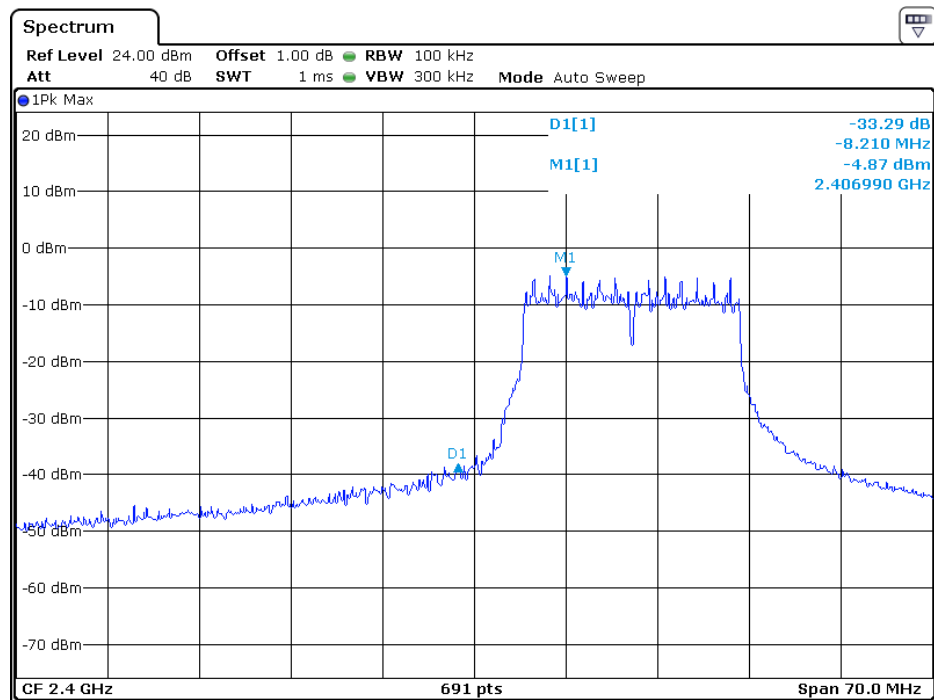
Channel 01 (2412MHz) Reference Level: -4.98dBm



Date: 13 JUN 2018 17:25:20

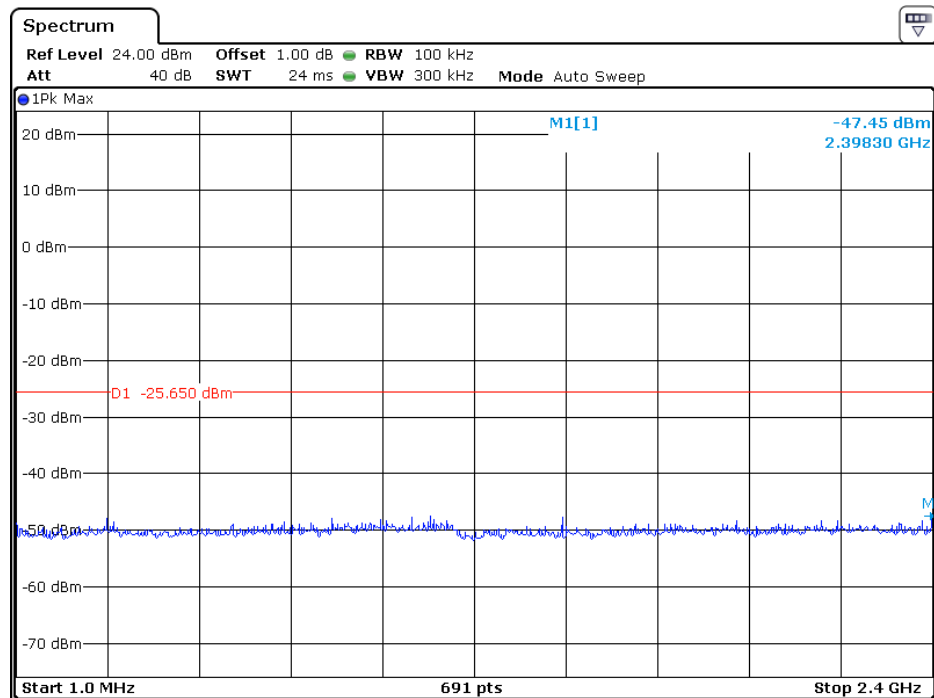


Date: 13 JUN 2018 17:25:35

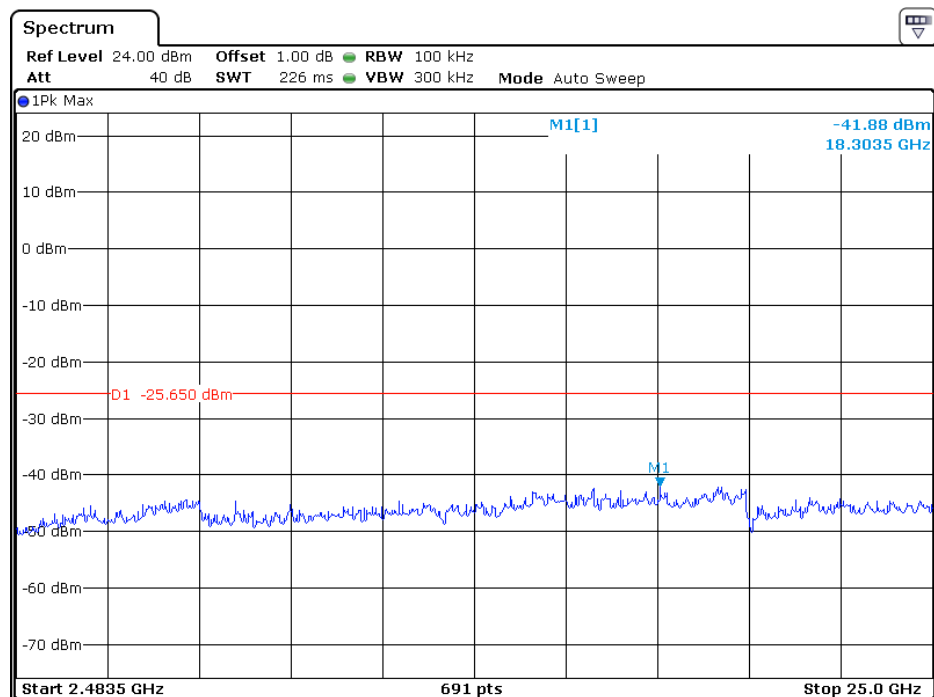


Date: 13 JUN 2018 17:26:06

Channel 06 (2437MHz) Reference Level: -5.65dBm

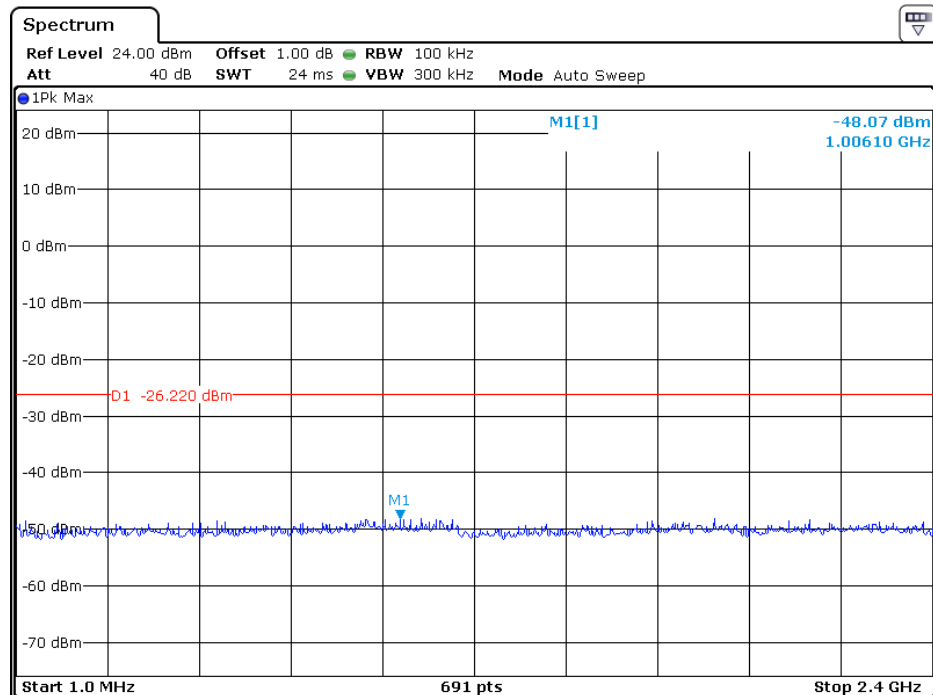


Date: 13 JUN 2018 17:22:12

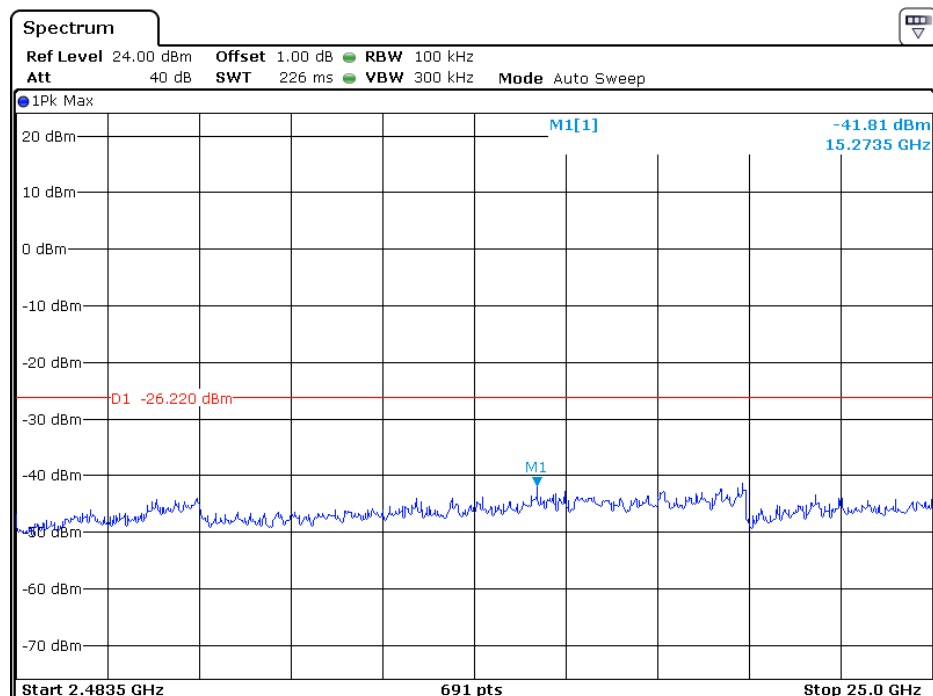


Date: 13 JUN 2018 17:22:34

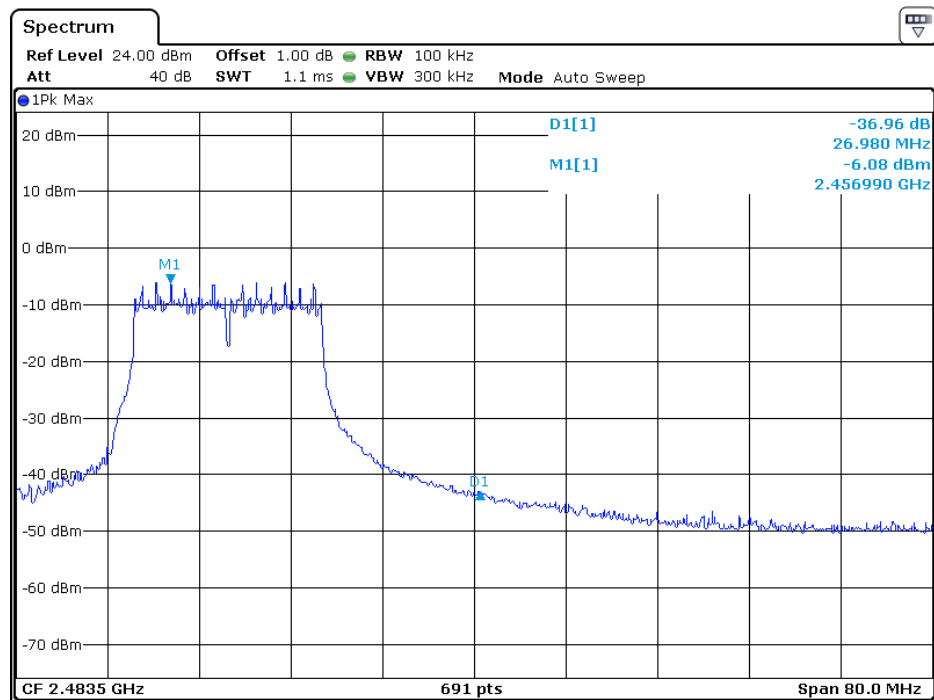
Channel 11 (2462MHz) Reference Level: -6.22dBm



Date: 13 JUN 2018 17:19:27



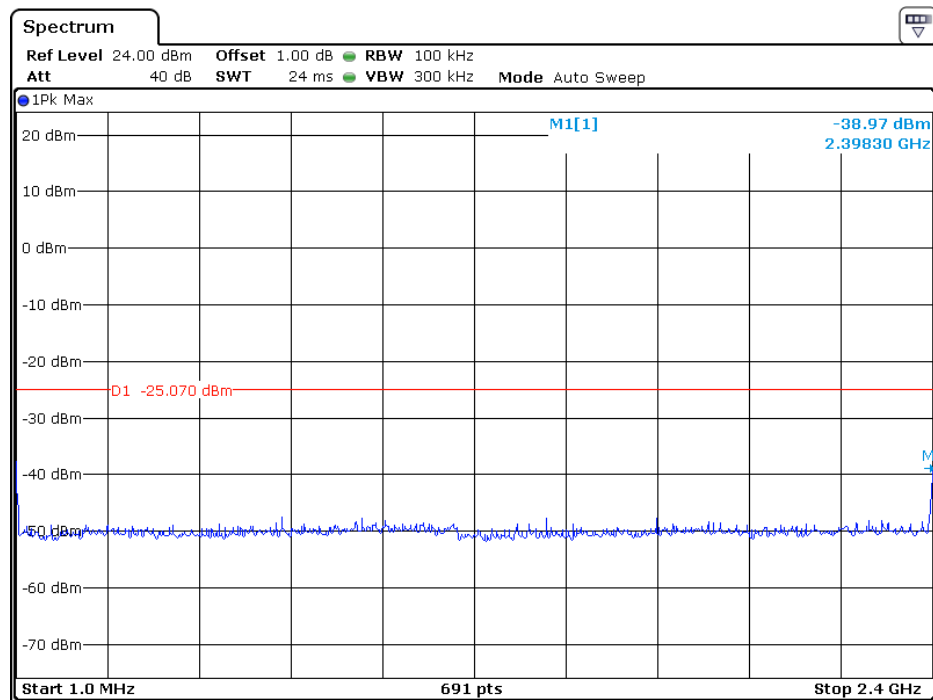
Date: 13 JUN 2018 17:19:56



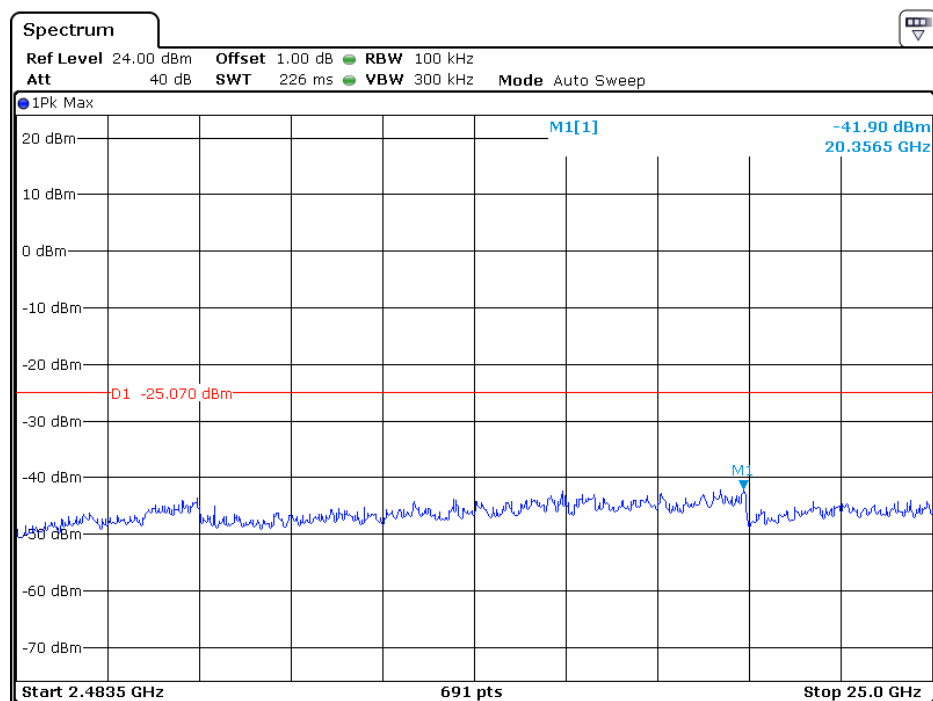
Date: 13 JUN 2018 17:16:34

802.11n-HT20

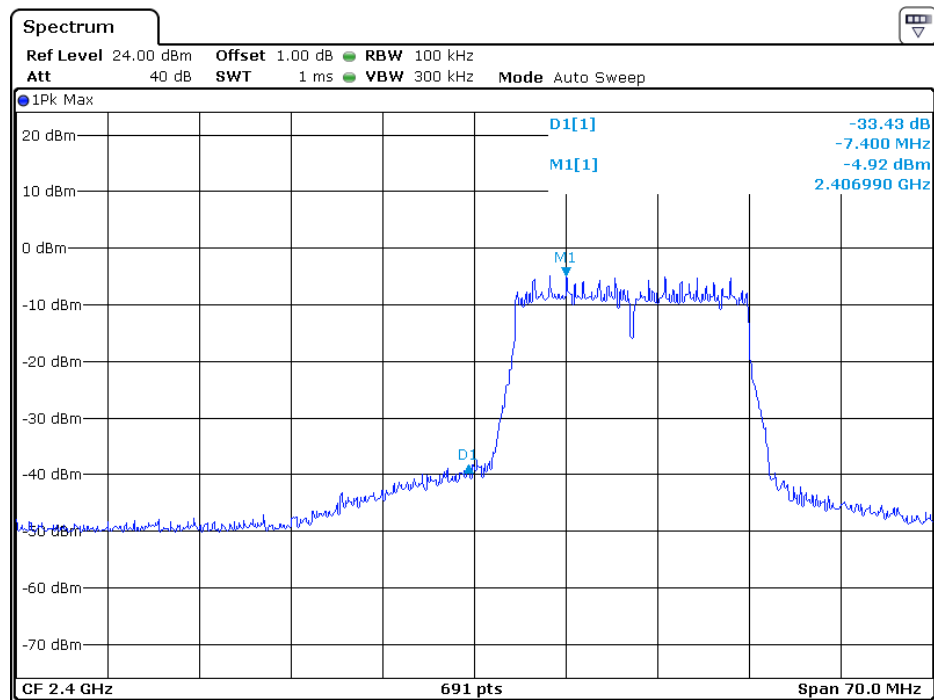
Channel 01 (2412MHz) Reference Level: -5.07dBm



Date: 13 JUN 2018 17:34:19

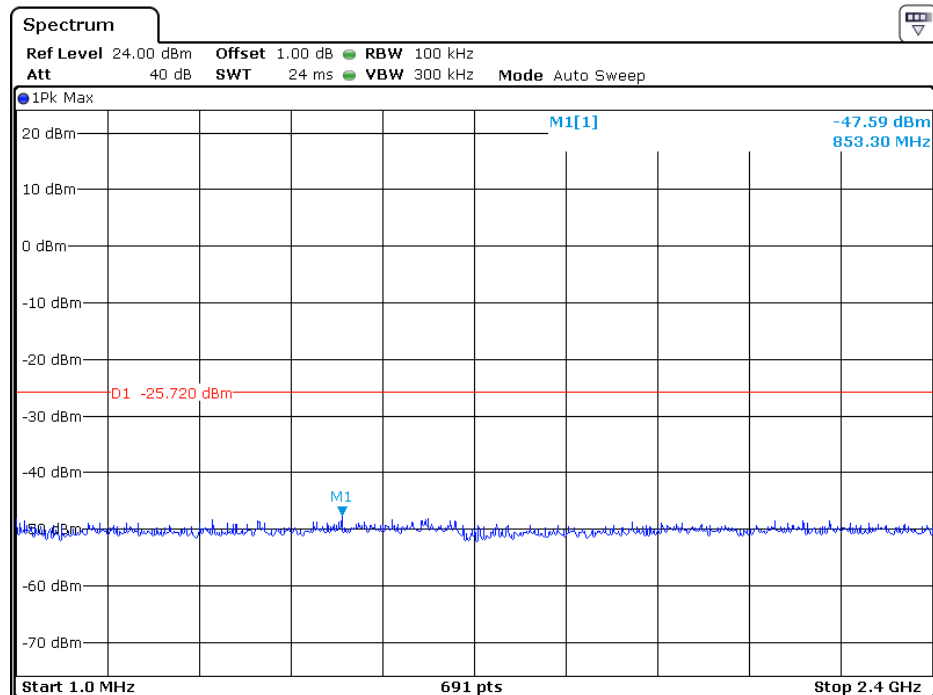


Date: 13 JUN 2018 17:34:40

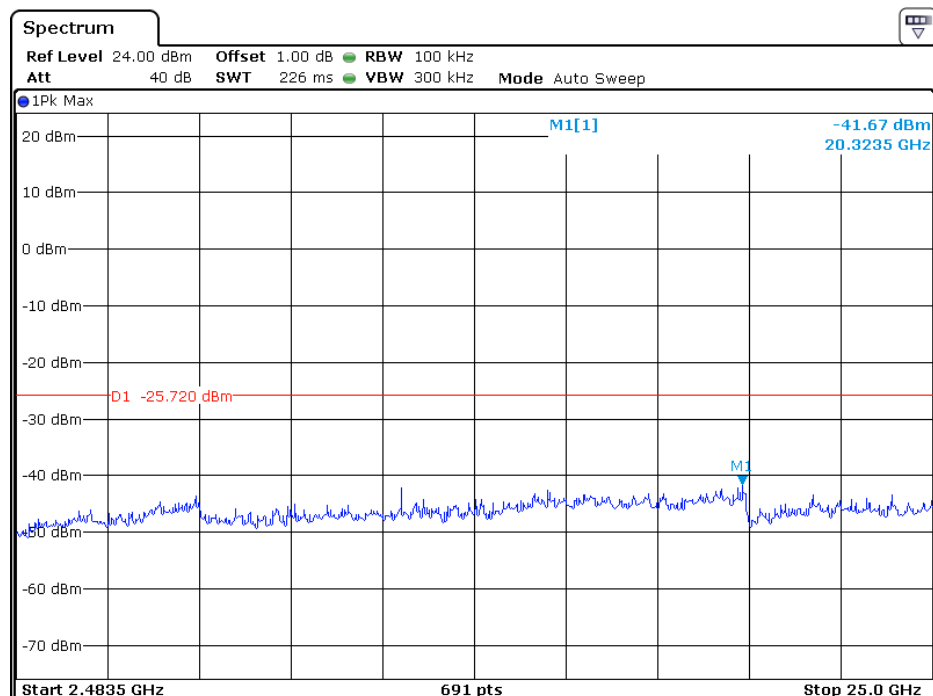


Date: 13 JUN 2018 17:35:41

Channel 06 (2437MHz) Reference Level: -5.72dBm

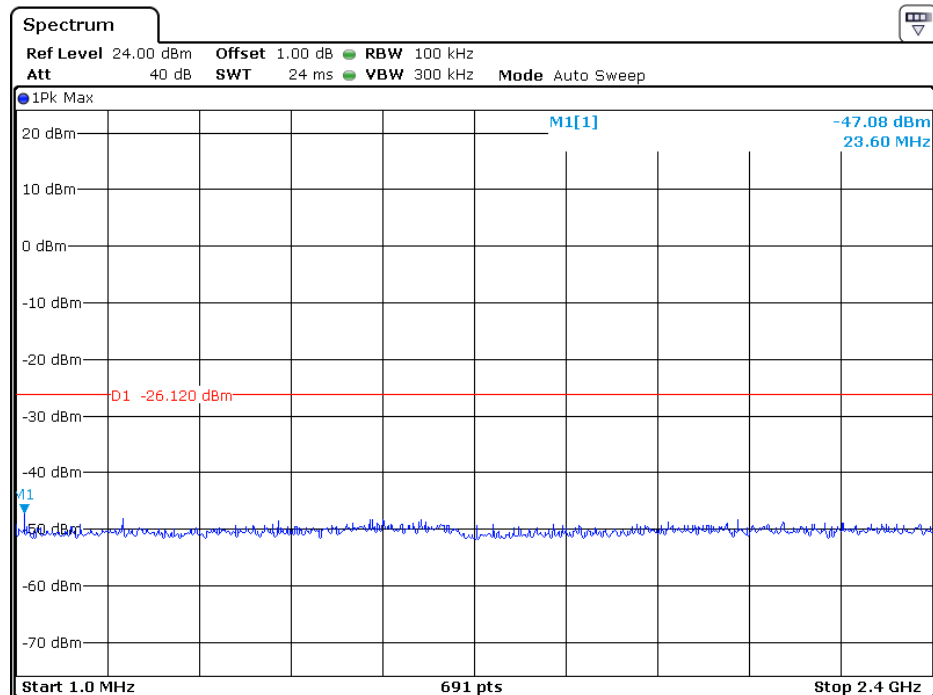


Date: 13 JUN 2018 17:38:58

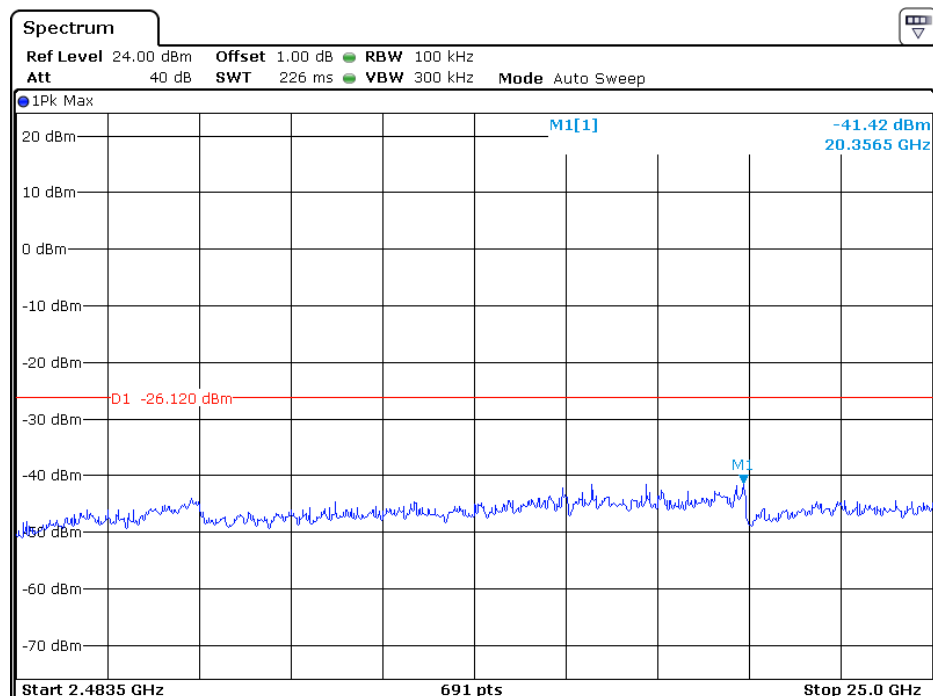


Date: 13 JUN 2018 17:39:22

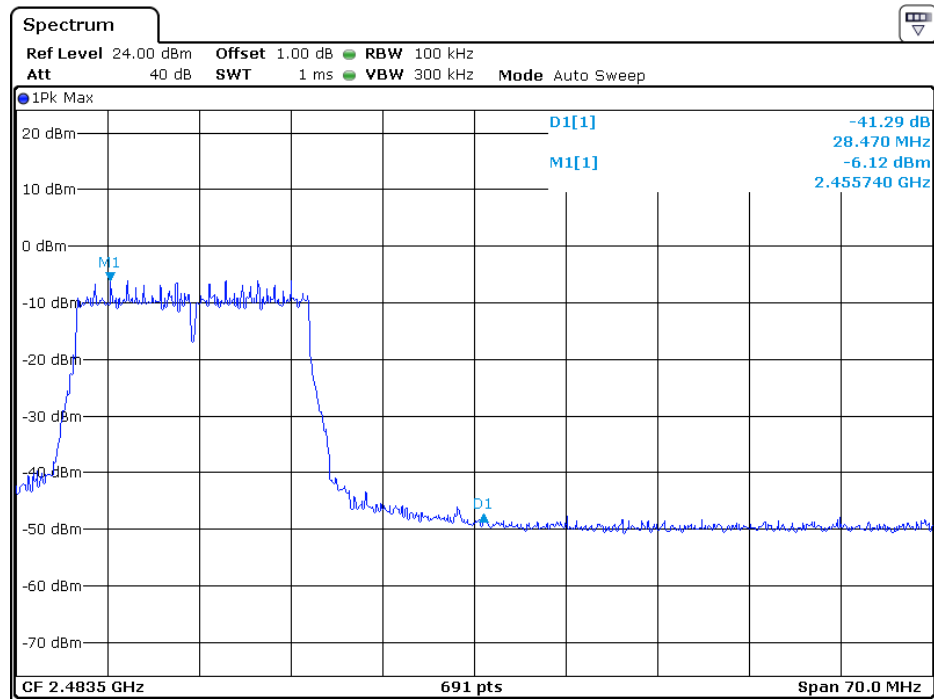
Channel 11 (2462MHz) Reference Level: -6.12dBm



Date: 13 JUN 2018 17:41:53



Date: 13 JUN 2018 17:42:14



Date: 13 JUN 2018 17:42:48

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 13, 2018

Model: 21-1251

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

☒ Not required, since all emissions are more than 20dB below fundamental

☐ See attached data sheet

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

#### 4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

#### 4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD$$

##### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

#### 4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11b-Channel 01)

at 4824.000MHz

is passed by 1.0dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11b-Channel 01)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|----------------------|-------------|
| Horizontal   | 58.615          | 25.6           | 20.0              | 13.3                | 18.9               | 40.0                 | -21.1       |
| Horizontal   | 744.405         | 39.3           | 20.0              | 15.7                | 35.0               | 46.0                 | -11.0       |
| Horizontal   | 887.965         | 37.2           | 20.0              | 19.3                | 36.5               | 46.0                 | -9.5        |
| Vertical     | 58.615          | 21.4           | 20.0              | 13.5                | 14.9               | 40.0                 | -25.1       |
| Vertical     | 538.280         | 30.3           | 20.0              | 15.8                | 26.1               | 46.0                 | -19.9       |
| Vertical     | 960.230         | 37.4           | 20.0              | 20.3                | 37.7               | 54.0                 | -16.3       |

NOTES: 1. Quasi-Peak detector is used for frequency below 1GHz.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11b-Channel 01)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4824.000       | 66.4           | 36.8              | 33.5                | 63.1               | 74.0                      | -10.9       |
| Horizontal   | *2389.700       | 61.8           | 36.4              | 29.1                | 54.5               | 74.0                      | -19.5       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4824.000       | 56.3           | 36.8              | 33.5                | 53.0               | 54.0                         | -1.0        |
| Horizontal   | *2389.700       | 50.1           | 36.4              | 29.1                | 42.8               | 54.0                         | -11.2       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11b-Channel 06)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4874.000       | 69.5           | 36.7              | 33.4                | 66.2               | 74.0                      | -7.8        |
| Horizontal   | *7311.000       | 59.4           | 36.6              | 35.8                | 58.6               | 74.0                      | -15.4       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4874.000       | 55.5           | 36.7              | 33.4                | 52.2               | 54.0                         | -1.8        |
| Horizontal   | *7311.000       | 45.4           | 36.6              | 35.8                | 44.6               | 54.0                         | -9.4        |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11b-Channel 11)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4924.000       | 68.9           | 36.8              | 33.3                | 65.4               | 74.0                      | -8.6        |
| Horizontal   | *2484.300       | 65.7           | 36.5              | 29.3                | 58.5               | 74.0                      | -15.5       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4924.000       | 54.8           | 36.8              | 33.3                | 51.3               | 54.0                         | -2.7        |
| Horizontal   | *2484.300       | 46.3           | 36.5              | 29.3                | 39.1               | 54.0                         | -14.9       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11g-Channel 01)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4824.000       | 60.4           | 36.8              | 33.5                | 57.1               | 74.0                      | -16.9       |
| Horizontal   | *2390.200       | 57.9           | 36.4              | 29.1                | 50.6               | 74.0                      | -23.4       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4824.000       | 45.9           | 36.8              | 33.5                | 42.6               | 54.0                         | -11.4       |
| Horizontal   | *2390.200       | 39.3           | 36.4              | 29.1                | 32.0               | 54.0                         | -22.0       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11g-Channel 06)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4874.000       | 60.7           | 36.7              | 33.4                | 57.4               | 74.0                      | -16.6       |
| Horizontal   | *7311.000       | 59.3           | 36.6              | 35.8                | 58.5               | 74.0                      | -15.5       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4874.000       | 46.1           | 36.7              | 33.4                | 42.8               | 54.0                         | -11.2       |
| Horizontal   | *7311.000       | 45.2           | 36.6              | 35.8                | 44.4               | 54.0                         | -9.6        |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11g-Channel 11)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4924.000       | 61.0           | 36.8              | 33.3                | 57.5               | 74.0                      | -16.5       |
| Horizontal   | *2484.50        | 57.5           | 36.5              | 29.3                | 50.3               | 74.0                      | -23.7       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4924.000       | 46.4           | 36.8              | 33.3                | 42.9               | 54.0                         | -11.1       |
| Horizontal   | *2484.500       | 38.4           | 36.5              | 29.3                | 31.2               | 54.0                         | -22.8       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 01)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4824.000       | 59.6           | 36.8              | 33.5                | 56.3               | 74.0                      | -17.7       |
| Horizontal   | *2390.000       | 56.8           | 36.4              | 29.1                | 49.5               | 74.0                      | -24.5       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4824.000       | 45.0           | 36.8              | 33.5                | 41.7               | 54.0                         | -12.3       |
| Horizontal   | *2390.000       | 37.5           | 36.4              | 29.1                | 30.2               | 54.0                         | -23.8       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 06)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4874.000       | 58.5           | 36.7              | 33.4                | 55.2               | 74.0                      | -18.8       |
| Horizontal   | *7311.000       | 59.4           | 36.6              | 35.8                | 58.6               | 74.0                      | -15.4       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4874.000       | 44.2           | 36.7              | 33.4                | 40.9               | 54.0                         | -13.1       |
| Horizontal   | *7311.000       | 45.6           | 36.6              | 35.8                | 44.8               | 54.0                         | -9.2        |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 11)

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *4924.000       | 58.3           | 36.8              | 33.3                | 54.8               | 74.0                      | -19.2       |
| Horizontal   | *2483.700       | 55.7           | 36.5              | 29.3                | 48.5               | 74.0                      | -25.5       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *4924.000       | 42.8           | 36.8              | 33.3                | 39.3               | 54.0                         | -14.7       |
| Horizontal   | *2483.700       | 37.3           | 36.5              | 29.3                | 30.1               | 54.0                         | -23.9       |

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

4.9 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

☐ Not required - No digital part

☐ Test results are attached

☒ Included in the separated report.

Applicant: Wellsco International Group Co., Ltd

Date of Test: June 15, 2018

Model: 21-1251

#### 4.10 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

|   |                                                                 |
|---|-----------------------------------------------------------------|
|   | See attached spectrum analyzer chart (s) for Transmitter timing |
|   | See Transmitter timing diagram provided by manufacturer         |
| x | Not applicable, duty cycle was not used.                        |

## **EXHIBIT 5**

### **EQUIPMENT PHOTOGRAPHS**

## 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

## **EXHIBIT 6**

### **PRODUCT LABELLING**

## 6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

## **EXHIBIT 7**

### **TECHNICAL SPECIFICATIONS**

## 7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

## **EXHIBIT 8**

### **INSTRUCTION MANUAL**

## 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

## **EXHIBIT 9**

### **CONFIDENTIALITY REQUEST**

## 9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

## **EXHIBIT 10**

### **MISCELLANEOUS INFORMATION**

## 10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

## **EXHIBIT 11**

### **TEST EQUIPMENT LIST**

### 11.0 Test Equipment List

| Equipment No. | Equipment           | Manufacturer    | Model No.    | Serial No. | Cal. Date   | Due Date    |
|---------------|---------------------|-----------------|--------------|------------|-------------|-------------|
| SZ182-02      | RF Power Meter      | Anritsu         | ML2496A      | 1302005    | 1-Jun-2018  | 1-Jun-2019  |
| SZ182-02-01   | Power Sensor        | Anritsu         | MA2411B      | 1207429    | 1-Jun-2018  | 1-Jun-2019  |
| SZ061-12      | BiConiLog Antenna   | ETS             | 3142E        | 00166158   | 20-Sep-2017 | 20-Sep-2018 |
| SZ185-01      | EMI Receiver        | R&S             | ESCI         | 100547     | 24-Jan-2018 | 24-Jan-2019 |
| SZ061-08      | Horn Antenna        | ETS             | 3115         | 00092346   | 20-Sep-2017 | 20-Sep-2018 |
| SZ061-06      | Active Loop Antenna | Electro-Metrics | EM-6876      | 217        | 11-May-2018 | 11-May-2019 |
| SZ056-03      | Spectrum Analyzer   | R&S             | FSP 30       | 101148     | 5-Jun-2018  | 5-Jun-2019  |
| SZ056-06      | Signal Analyzer     | R&S             | FSV 40       | 101101     | 7-Jul-2017  | 7-Jul-2018  |
| SZ181-04      | Preamplifier        | Agilent         | 8449B        | 3008A02474 | 24-Jan-2018 | 24-Jan-2019 |
| SZ188-01      | Anechoic Chamber    | ETS             | RFD-F/A-100  | 4102       | 16-Jan-2017 | 16-Jan-2019 |
| SZ062-02      | RF Cable            | RADIAL          | RG 213U      | --         | 8-Jan-2018  | 8-Jul-2018  |
| SZ062-05      | RF Cable            | RADIAL          | 0.04-26.5GHz | --         | 16-Mar-2018 | 16-Sep-2018 |
| SZ062-12      | RF Cable            | RADIAL          | 0.04-26.5GHz | --         | 16-Mar-2018 | 16-Sep-2018 |
| SZ067-04      | Notch Filter        | Micro-Tronics   | BRM50702-02  | --         | 5-Jun-2018  | 5-Jun-2019  |
| SZ185-02      | EMI Test Receiver   | R&S             | ESCI         | 100692     | 30-Oct-2017 | 30-Oct-2018 |
| SZ187-01      | Two-Line V-Network  | R&S             | ENV216       | 100072     | 30-Oct-2017 | 30-Oct-2018 |
| SZ187-02      | Two-Line V-Network  | R&S             | ENV216       | 100072     | 12-Jul-2017 | 12-Jul-2018 |
| SZ188-03      | Shielding Room      | ETS             | RFD-100      | 4100       | 16-Jan-2017 | 16-Jan-2019 |