

## EMC TEST REPORT

### No. 170900370SHA-002

Applicant : Chanje Energy, Inc.  
1025 Rollins Rd, Burlingame CA 94010

Manufacturer : Jiangsu AZX Electronic Technology Co., Ltd.  
Danyang City, Jiangsu Province, Huang Town,  
Jiangshu Economic Development Zone

Product Name : media unit

Type/Model : P6D047910110

**TEST RESULT : PASS**

#### SUMMARY

The equipment complies with the requirements according to the following standard(s) or specification:

**47CFR Part 15 (2016):** Radio Frequency Devices (Subpart C)

**ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

Date of issue: August 24, 2017

Prepared by:



Nemo Li (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)



## Description of Test Facility

Name: Intertek Testing Service Limited Shanghai  
Address: Building No.86, 1198 Qinzhou Road(North), Shanghai 200233, P.R.  
China

FCC Designation Number: CN1175  
IC Assigned Code: 2402B-1

Name of contact: Jonny Jing  
Tel: 86 21 61278271  
Fax: 86 21 54262353

## Content

|                                                                |           |
|----------------------------------------------------------------|-----------|
| <b>SUMMARY.....</b>                                            | <b>1</b>  |
| <b>1 GENERAL INFORMATION .....</b>                             | <b>5</b>  |
| 1.1 Description of Client.....                                 | 5         |
| 1.2 Identification of the EUT .....                            | 5         |
| 1.3 Technical Specification.....                               | 6         |
| <b>2 TEST SPECIFICATIONS.....</b>                              | <b>7</b>  |
| 2.1 Standards or specification .....                           | 7         |
| 2.2 Mode of operation during the test.....                     | 7         |
| 2.3 Test software list .....                                   | 7         |
| 2.4 Test peripherals list .....                                | 8         |
| 2.5 Instrument list .....                                      | 9         |
| 2.6 Test Summary .....                                         | 10        |
| <b>3 MINIMUM 6dB BANDWIDTH .....</b>                           | <b>11</b> |
| 3.1 Limit.....                                                 | 11        |
| 3.2 Test Configuration .....                                   | 11        |
| 3.3 Test Procedure and test setup.....                         | 11        |
| 3.4 Test Protocol .....                                        | 12        |
| <b>4 MAXIMUM CONDUCTED OUTPUT POWER .....</b>                  | <b>20</b> |
| 4.1 Test limit .....                                           | 20        |
| 4.2 Test Configuration .....                                   | 20        |
| 4.3 Test procedure and test setup .....                        | 21        |
| 4.4 Test protocol .....                                        | 22        |
| <b>5 POWER SPECTRUM DENSITY .....</b>                          | <b>23</b> |
| 5.1 Test limit .....                                           | 23        |
| 5.2 Test Configuration .....                                   | 23        |
| 5.3 Test procedure and test setup .....                        | 24        |
| 5.4 Test Protocol .....                                        | 25        |
| <b>6 EMISSION OUTSIDE THE FREQUENCY BAND.....</b>              | <b>33</b> |
| 6.1 Test limit .....                                           | 33        |
| 6.2 Test Configuration .....                                   | 33        |
| 6.3 Test procedure and test setup .....                        | 33        |
| 6.4 Test Protocol .....                                        | 35        |
| <b>7 RADIATED EMISSIONS IN RESTRICTED FREQUENCY BANDS.....</b> | <b>55</b> |
| 7.1 Test limit .....                                           | 55        |
| 7.2 Test Configuration .....                                   | 55        |
| 7.3 Test procedure and test setup .....                        | 56        |
| 7.4 Test Protocol .....                                        | 57        |
| <b>8 POWER LINE CONDUCTED EMISSION .....</b>                   | <b>61</b> |
| 8.1 Limit.....                                                 | 61        |
| 8.2 Test configuration .....                                   | 61        |
| 8.3 Test procedure and test set up .....                       | 62        |
| 8.4 Test protocol .....                                        | 63        |
| <b>9 OCCUPIED BANDWIDTH .....</b>                              | <b>64</b> |
| 9.1 Test limit .....                                           | 64        |
| 9.2 Test Configuration .....                                   | 64        |



|     |                                     |    |
|-----|-------------------------------------|----|
| 9.3 | Test procedure and test setup ..... | 64 |
| 9.4 | Test protocol .....                 | 65 |

## **1 GENERAL INFORMATION**

### **1.1 Description of Client**

Applicant : Chanje Energy, Inc.  
1025 Rollins Rd, Burlingame CA 94010

Manufacturer : Jiangsu AZX Electronic Technology Co., Ltd.  
Danyang City, Jiangsu Province, Huang Town, Jiangshu  
Economic Development Zone

### **1.2 Identification of the EUT**

Product Name : media unit  
Type/model : P6D047910110  
FCC ID : 2AM7KP6D047910110

### 1.3 Technical Specification

Operation Frequency : 2400~2483.5 MHz;  
Band  
Type of Modulation : CCK, BPSK, QPSK, DSSS, OFDM  
EUT Modes of : 802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)  
Modulation  
Channel Number : 11Channel for 2412MHz~2462MHz for 11b,11g,11n  
(HT20),  
7 Channel for 2422MHz~2452MHz for 11n(HT40)  
Description of EUT : EUT is a media unit with Bluetooth and WiFi function.  
Antenna : Pole antenna, 2dBi max  
Rating : DC 12V  
EUT type : ☒ Table top  
☐ Floor standing  
Sample received date : July 23, 2017  
Date of test : July 23, 2017 ~ August 18, 2017

## 2 TEST SPECIFICATIONS

### 2.1 Standards or specification

47CFR Part 15 (2016)  
ANSI C63.10 (2013)  
KDB 558074 (v04)

### 2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

The lowest, middle and highest channel were tested as representatives.

| Freq. Band      | Modulation    | Lowest(MHz) | Middle(MHz) | Highest(MHz) |
|-----------------|---------------|-------------|-------------|--------------|
| 2400-2483.5 MHz | 802.11b       | 2412        | 2437        | 2462         |
|                 | 802.11g       | 2412        | 2437        | 2462         |
|                 | 802.11n(HT20) | 2412        | 2437        | 2462         |
|                 | 802.11n(HT40) | 2422        | 2437        | 2452         |

### Data rate VS Power

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

After this pre-scan, we choose the following table of the data rate as the worst case.

| Freq. Band     | Modulation    | Worst case data rate |
|----------------|---------------|----------------------|
| 2400-2483.5MHz | 802.11b       | 1Mbps                |
|                | 802.11g       | 6Mbps                |
|                | 802.11n(HT20) | MCS0                 |
|                | 802.11n(HT40) | MCS0                 |

### 2.3 Test software list

| Test Items         | Software | Manufacturer | Version |
|--------------------|----------|--------------|---------|
| Conducted emission | ESxS-K1  | R&S          | V2.1.0  |
| Radiated emission  | ES-K1    | R&S          | V1.71   |

#### 2.4 Test peripherals list

| Item No. | Name            | Band and Model   | Description             |
|----------|-----------------|------------------|-------------------------|
| 1        | Laptop computer | HP ProBook 6470b | 100-240V AC,<br>50/60Hz |



## 2.5 Instrument list

| Selected                            | Instrument                  | EC no.    | Model         | Valid until date |
|-------------------------------------|-----------------------------|-----------|---------------|------------------|
| <input type="checkbox"/>            | Shielded room               | EC 2838   | GB88          | 2018-1-8         |
| <input type="checkbox"/>            | EMI test receiver           | EC 2107   | ESCS 30       | 2017-10-19       |
| <input type="checkbox"/>            | A.M.N.                      | EC 3119   | ESH2-Z5       | 2017-12-01       |
| <input checked="" type="checkbox"/> | Semi anechoic chamber       | EC 3048   | -             | 2017-9-9         |
| <input checked="" type="checkbox"/> | EMI test receiver           | EC 3045   | ESIB26        | 2017-10-19       |
| <input checked="" type="checkbox"/> | Broadband antenna           | EC 4206   | CBL 6112D     | 2018-6-1         |
| <input checked="" type="checkbox"/> | Horn antenna                | EC 3049   | HF906         | 2017-9-23        |
| <input type="checkbox"/>            | Horn antenna                | EC 4792-1 | 3117          | 2017-8-24        |
| <input checked="" type="checkbox"/> | Horn antenna                | EC 4792-3 | HAP18-26W     | 2018-6-11        |
| <input checked="" type="checkbox"/> | Pre-amplifier               | EC 5262   | pre-amp 18    | 2018-6-20        |
| <input type="checkbox"/>            | Test Receiver               | EC 4501   | ESCI 7        | 2018-2-23        |
| <input checked="" type="checkbox"/> | PXA Signal Analyzer         | EC5338    | N9030A        | 2018-3-3         |
| <input checked="" type="checkbox"/> | Power sensor/Power meter    | EC4318    | N1911A/N1921A | 2018-5-12        |
| <input type="checkbox"/>            | Power sensor                | EC5338-1  | U2021XA       | 2017-12-29       |
| <input type="checkbox"/>            | MXG Analog Signal Generator | EC5338-2  | N5181A        | 2017-8-29        |
| <input type="checkbox"/>            | MXG Vector Signal Generator | EC5175    | N51812B       | 2018-3-3         |

## 2.6 Test Summary

**This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.**

| TEST ITEM                                  | FCC REFERENCE   | RESULT |
|--------------------------------------------|-----------------|--------|
| Minimum 6dB Bandwidth & Occupied bandwidth | 15.247(a)(2)    | Pass   |
| Maximum peak output power                  | 15.247(b)       | Pass   |
| Power spectrum density                     | 15.247(e)       | Pass   |
| Radiated emission                          | 15.205 & 15.209 | Pass   |
| Emission outside the frequency band        | 15.247(d)       | Pass   |
| Power line conducted emission              | 15.207          | Pass   |
| Occupied bandwidth                         | -               | Tested |

Notes: 1: NA =Not Applicable

2: This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

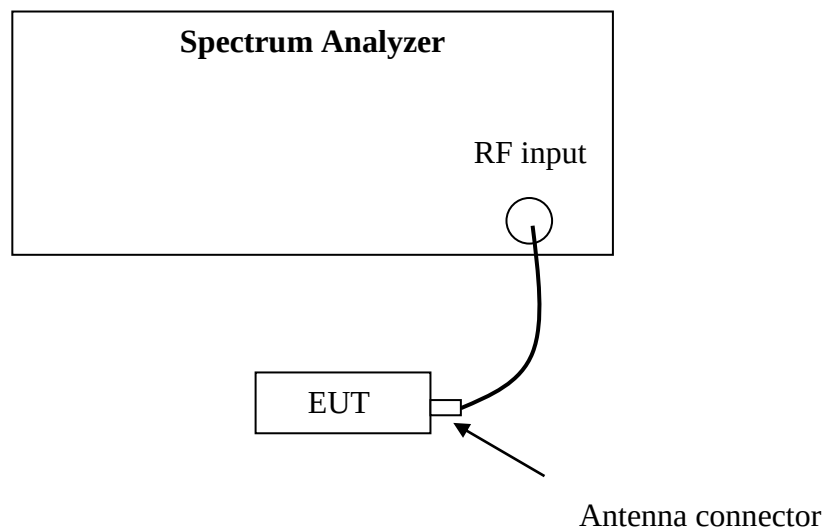
### 3 Minimum 6dB Bandwidth

**Test result:** Pass

#### 3.1 Limit

For systems using digital modulation techniques that 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.

#### 3.2 Test Configuration



#### 3.3 Test Procedure and test setup

The minimum 6dB bandwidth per FCC §15.247(a)(2) is measured using the Spectrum Analyzer according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance v04” for compliance to FCC 47CFR 15.247 requirements (clause 8.2).

- 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.

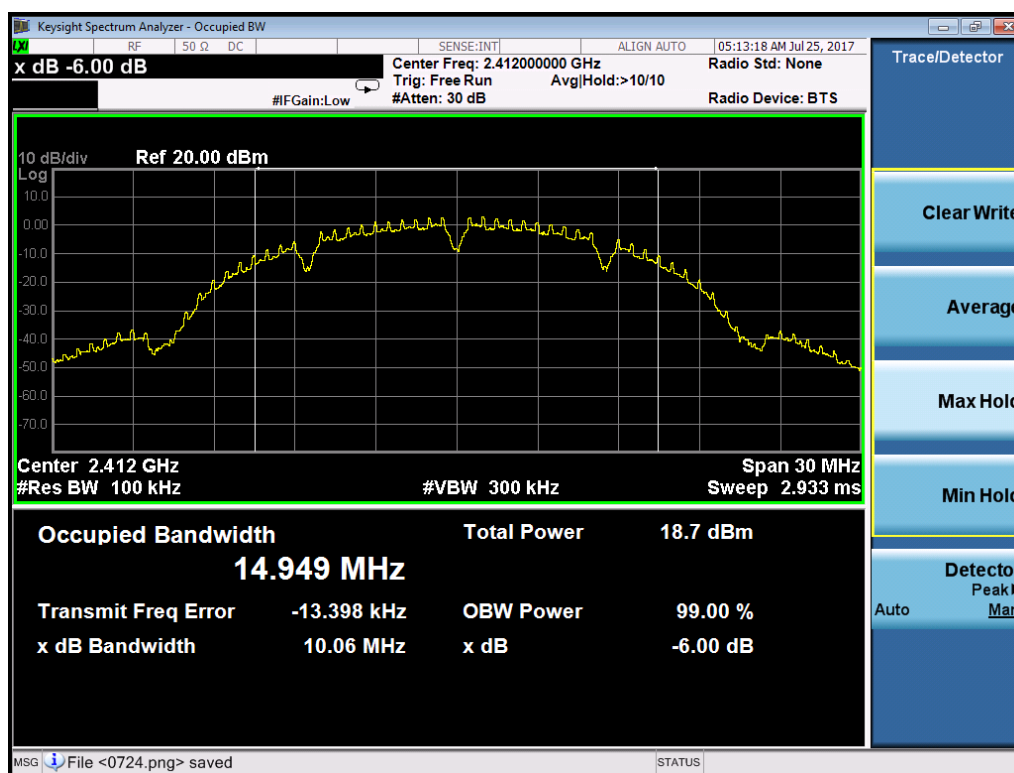
### 3.4 Test Protocol

Temperature: 25 °C

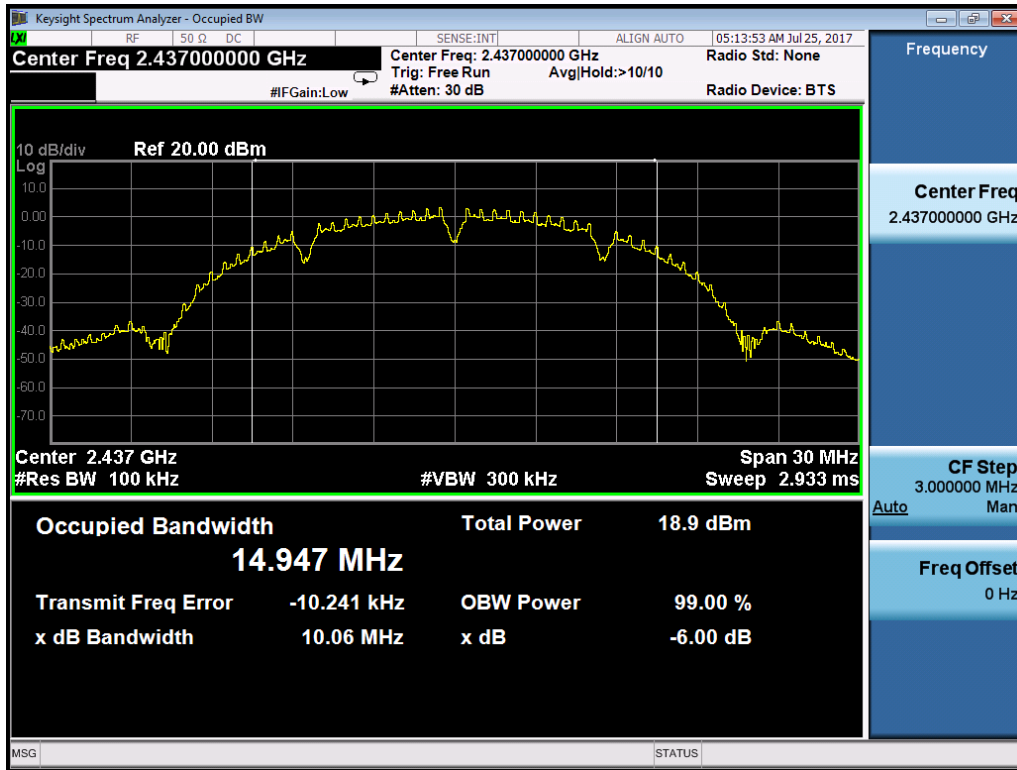
Relative Humidity: 55 %

| Mode    | Channel | Minimum 6dB Bandwidth (MHz) |   |   | Limits (MHz) |
|---------|---------|-----------------------------|---|---|--------------|
|         |         | Port0                       | - | - |              |
| 802.11b | L       | 10.06                       | - | - | > 0.5        |
|         | M       | 10.06                       | - | - | > 0.5        |
|         | H       | 10.07                       | - | - | > 0.5        |

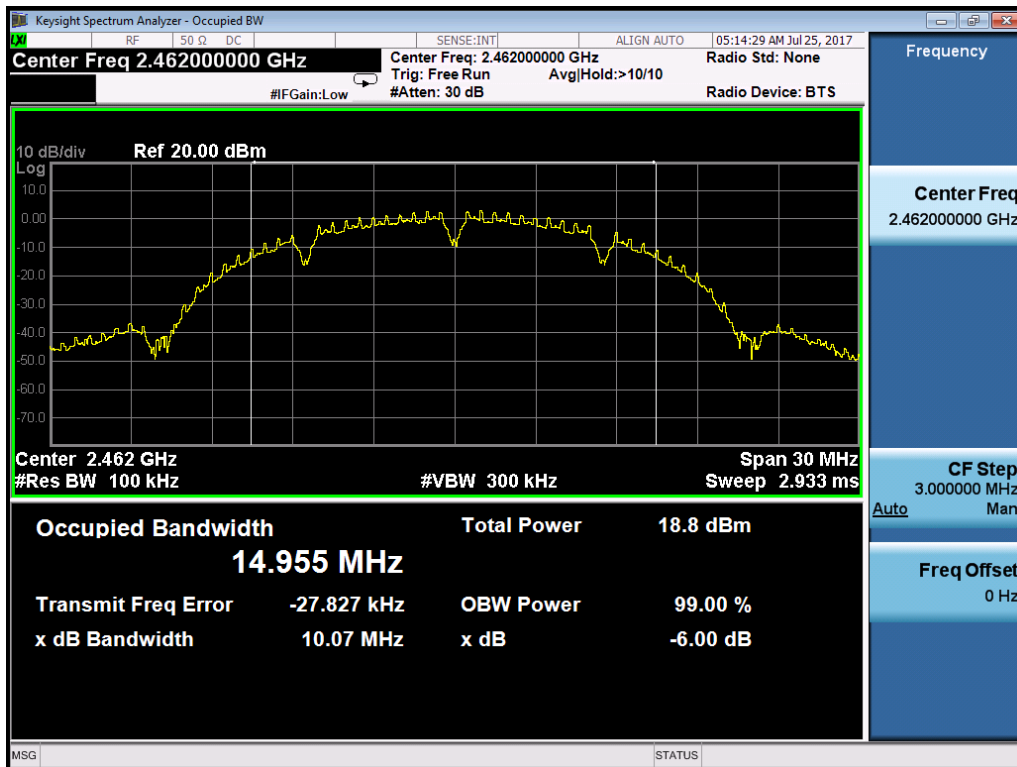
#### Channel L



### Channel M

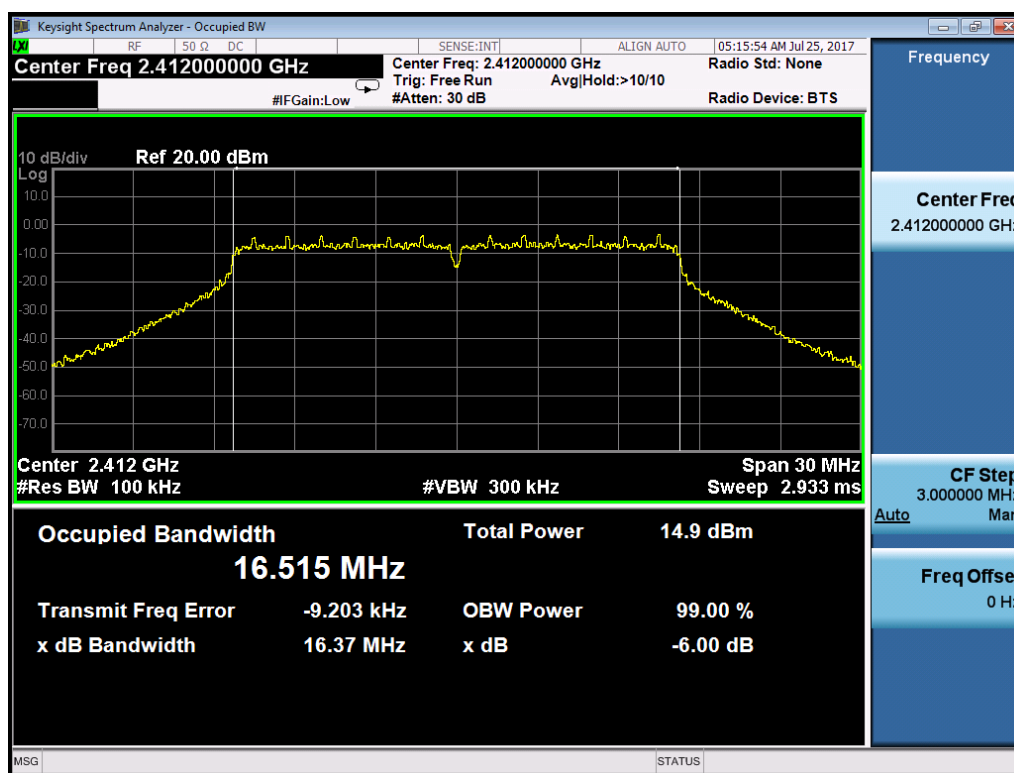


### Channel H

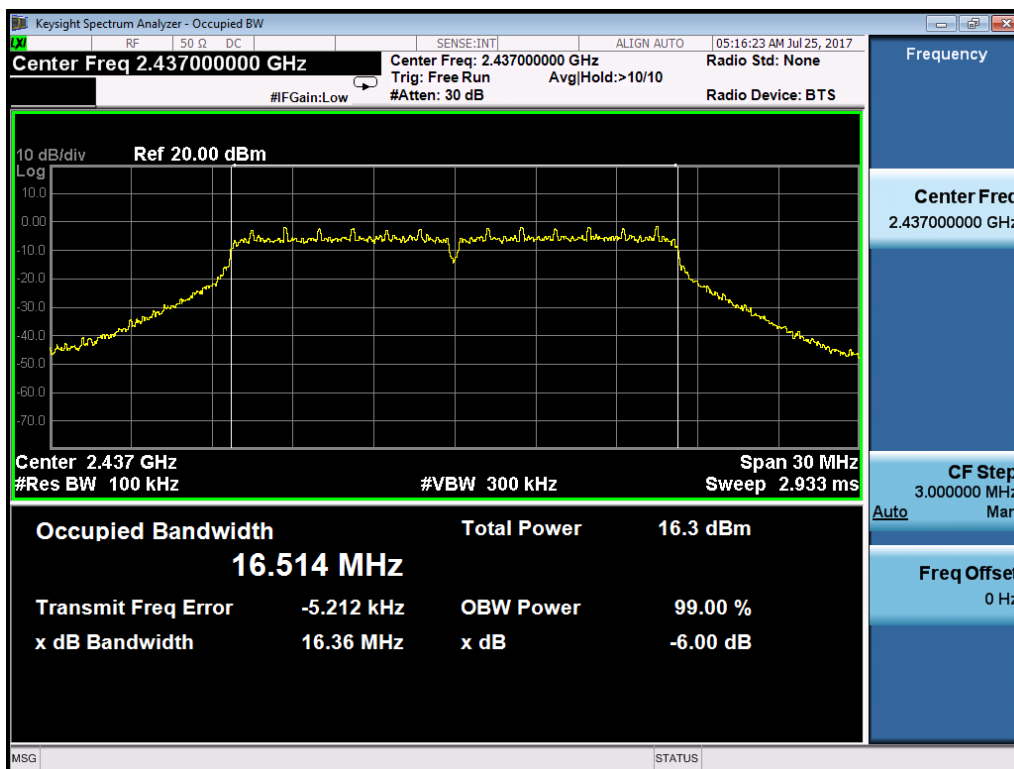


| Mode    | Channel | Minimum 6dB Bandwidth (MHz) |   |   | Limits (MHz) |
|---------|---------|-----------------------------|---|---|--------------|
|         |         | Port0                       | - | - |              |
| 802.11g | L       | 16.37                       | - | - | > 0.5        |
|         | M       | 16.36                       | - | - | > 0.5        |
|         | H       | 16.37                       | - | - | > 0.5        |

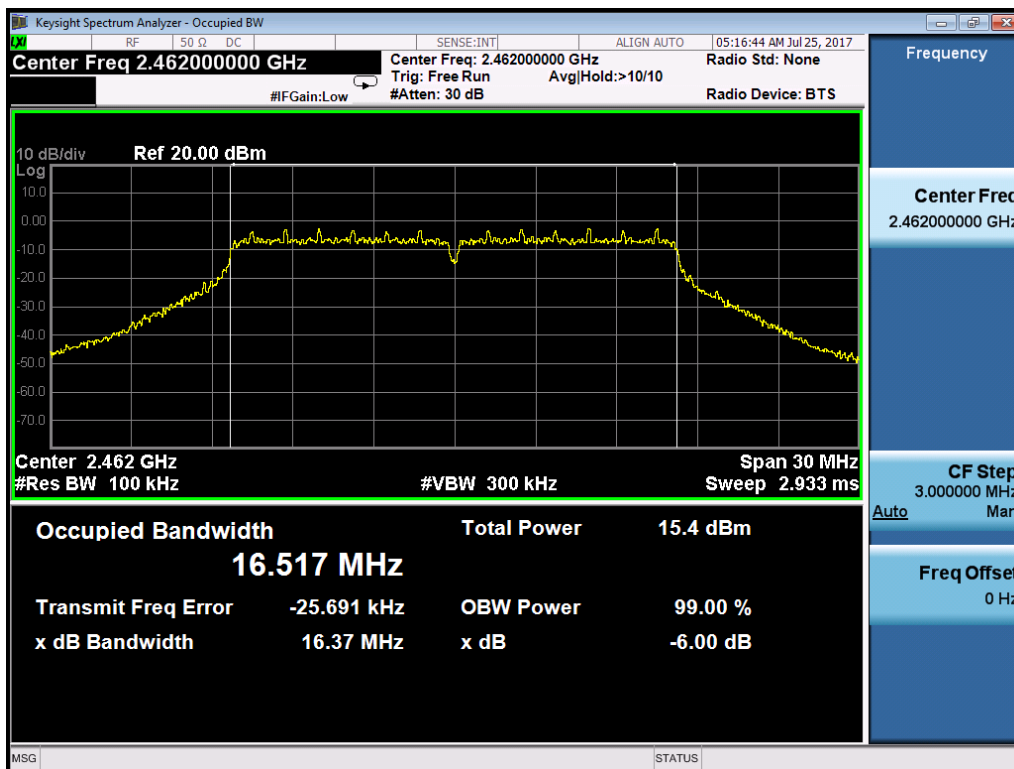
### Channel L



## Channel M

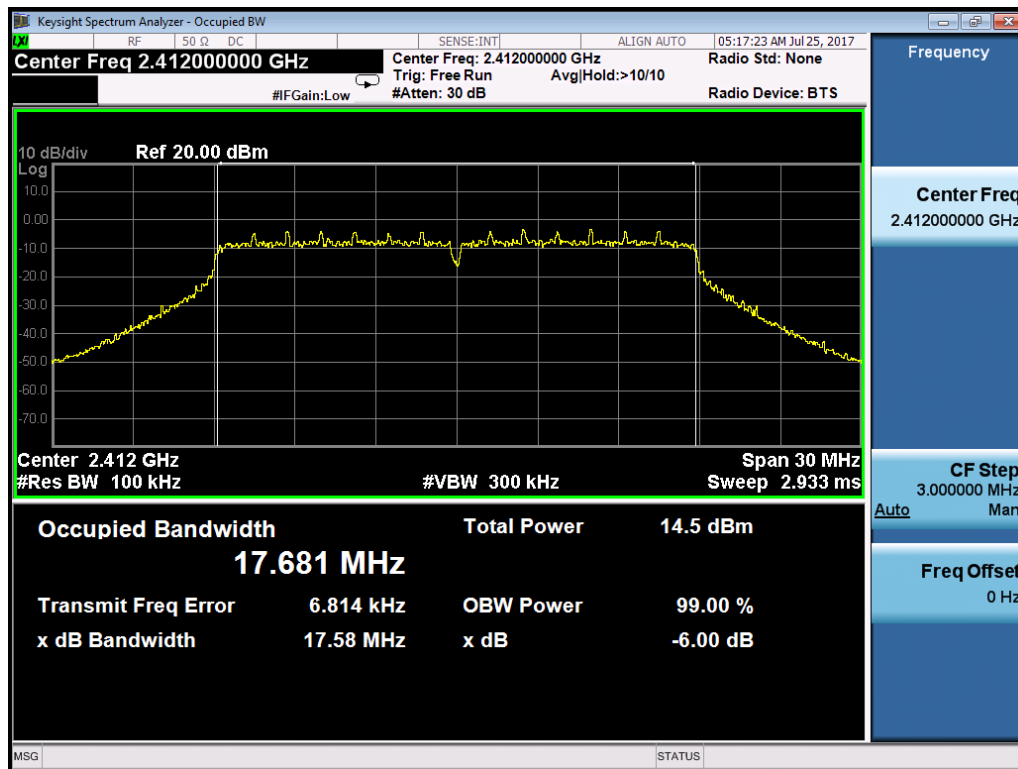


## Channel H



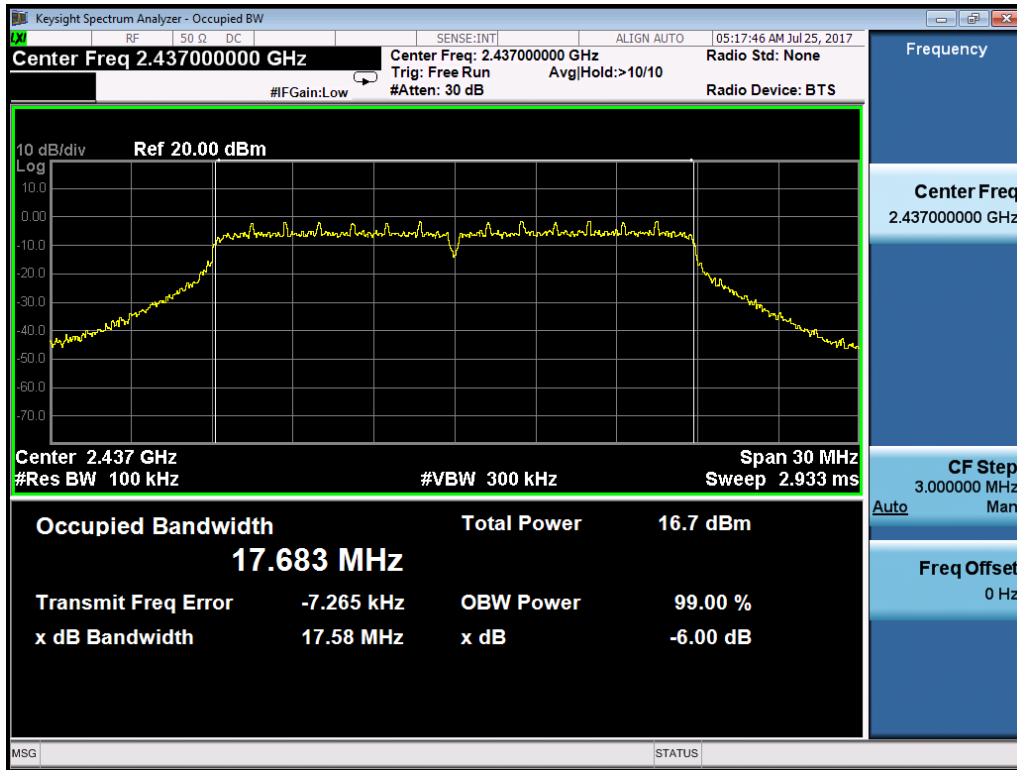
| Mode          | Channel | Minimum 6dB Bandwidth (MHz) |   |   | Limits (MHz) |
|---------------|---------|-----------------------------|---|---|--------------|
|               |         | Port0                       | - | - |              |
| 802.11n(HT20) | L       | 17.58                       | - | - | > 0.5        |
|               | M       | 17.58                       | - | - | > 0.5        |
|               | H       | 17.58                       | - | - | > 0.5        |

### Channel L

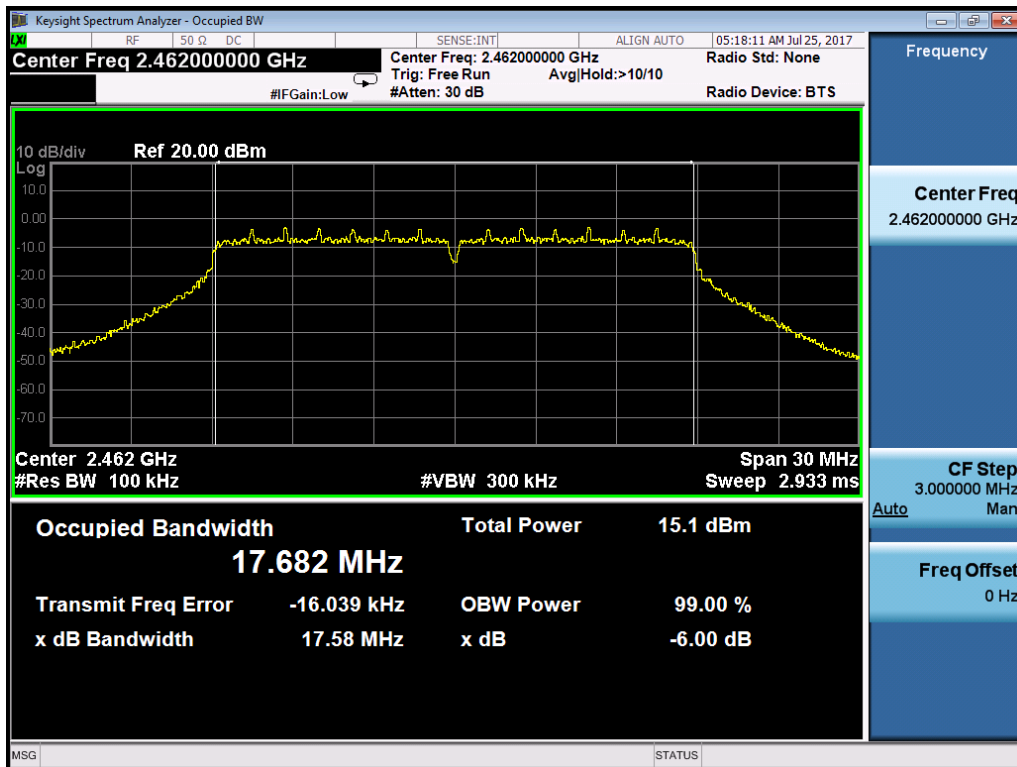




### Channel M

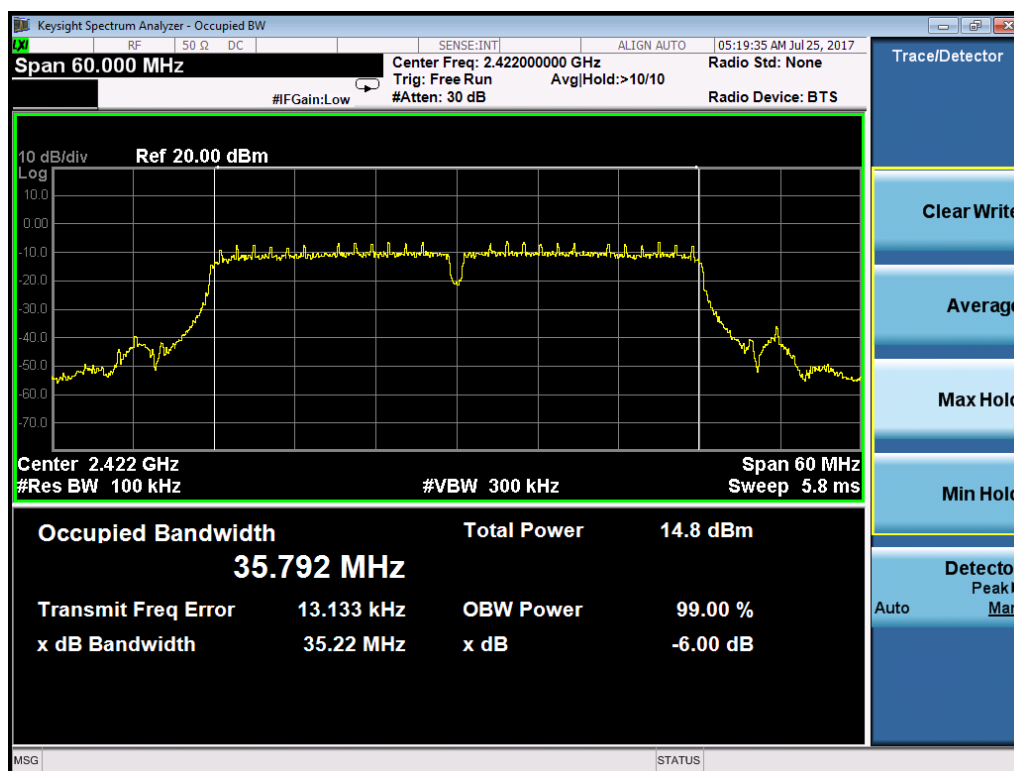


### Channel H

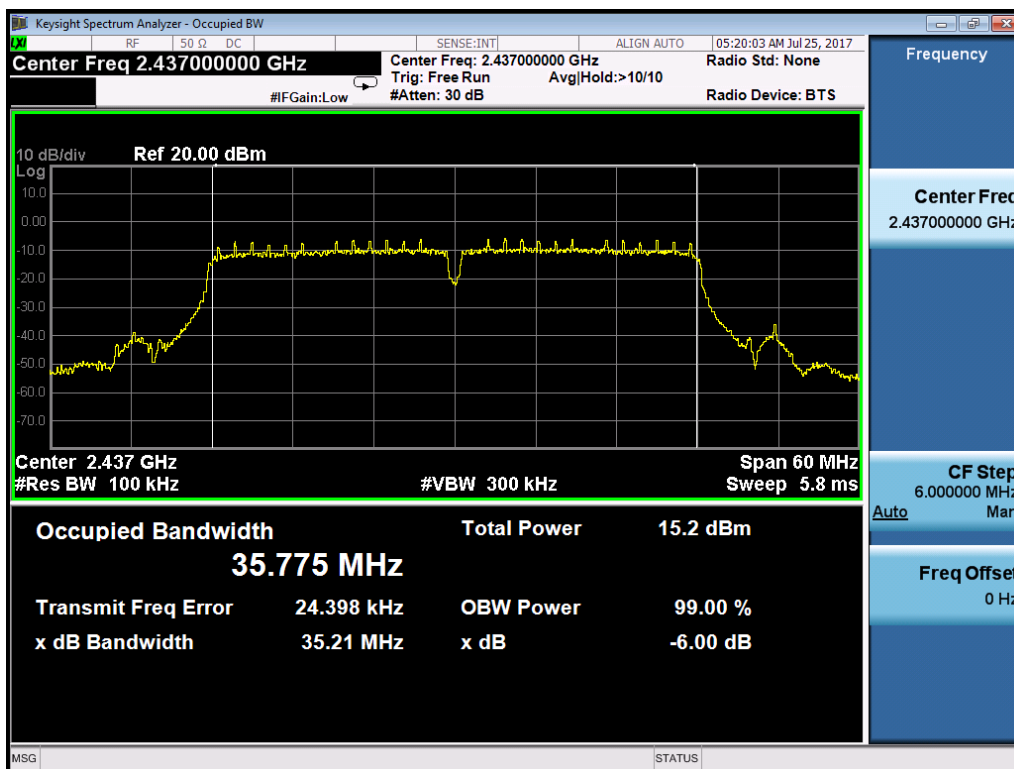


| Mode          | Channel | Minimum 6dB Bandwidth (MHz) |   |   | Limits (MHz) |
|---------------|---------|-----------------------------|---|---|--------------|
|               |         | Port0                       | - | - |              |
| 802.11n(HT40) | L       | 35.22                       | - | - | > 0.5        |
|               | M       | 35.21                       | - | - | > 0.5        |
|               | H       | 35.21                       | - | - | > 0.5        |

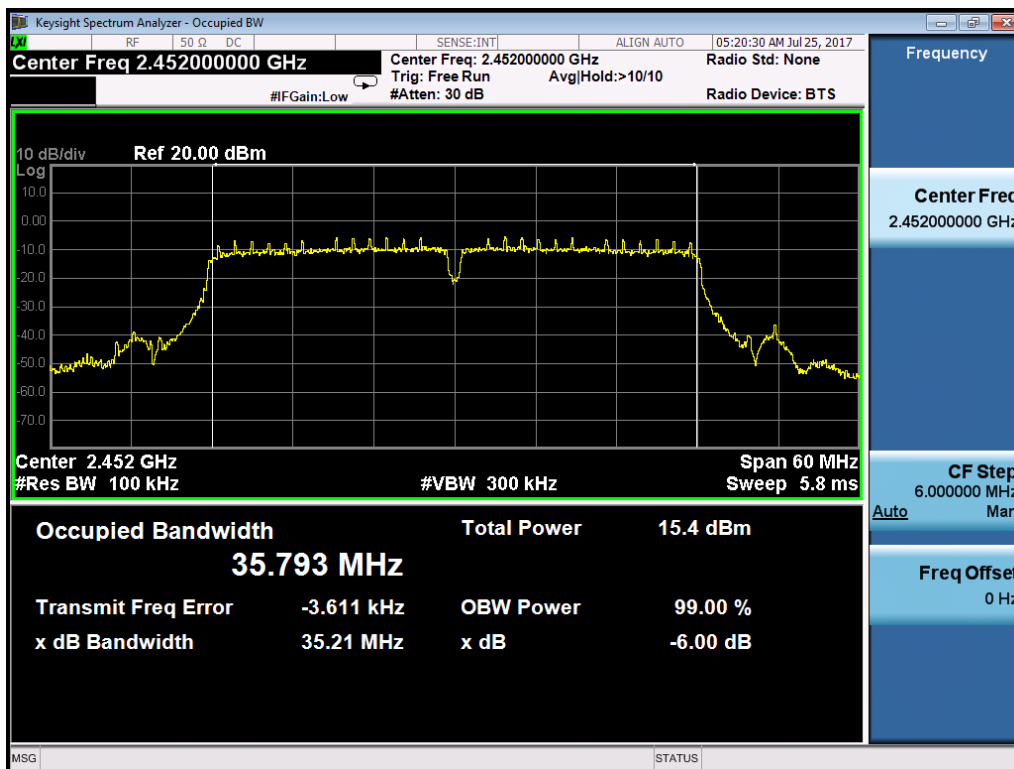
### Channel L



## Channel M



## Channel H



## 4 Maximum Conducted Output power

**Test result:** Pass

### 4.1 Test limit

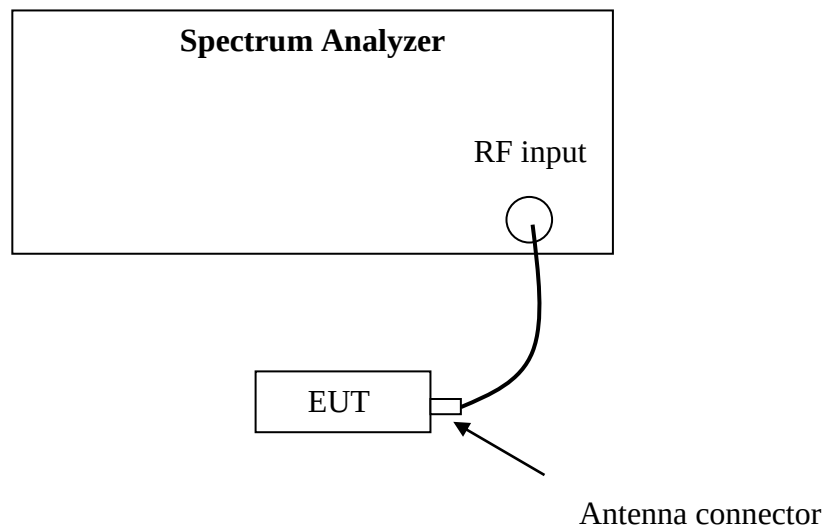
☐ For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt

☐ For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

☒ For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt (EIRP: 4 watt).

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

### 4.2 Test Configuration



### **4.3 Test procedure and test setup**

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance v04” for compliance to FCC 47CFR 15.247 requirements (clause 9.1.2).

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

#### 4.4 Test protocol

Temperature: 25 °C

Relative Humidity: 55 %

| Mode    | Channel | Reading (dBm) |   |   | Total Power (dBm) | Limit (dBm) |
|---------|---------|---------------|---|---|-------------------|-------------|
|         |         | Port0         | - | - |                   |             |
| 802.11b | L       | 16.58         | - | - | 16.58             | 30          |
|         | M       | 17.18         | - | - | 17.18             | 30          |
|         | H       | 17.85         | - | - | 17.85             | 30          |

| Mode    | Channel | Reading (dBm) |   |   | Total Power (dBm) | Limit (dBm) |
|---------|---------|---------------|---|---|-------------------|-------------|
|         |         | Port0         | - | - |                   |             |
| 802.11g | L       | 21.23         | - | - | 21.23             | 30          |
|         | M       | 22.60         | - | - | 22.60             | 30          |
|         | H       | 22.46         | - | - | 22.46             | 30          |

| Mode           | Channel | Reading (dBm) |   |   | Total Power (dBm) | Limit (dBm) |
|----------------|---------|---------------|---|---|-------------------|-------------|
|                |         | Port0         | - | - |                   |             |
| 802.11n (HT20) | L       | 20.73         | - | - | 20.73             | 30          |
|                | M       | 22.48         | - | - | 22.48             | 30          |
|                | H       | 21.51         | - | - | 21.51             | 30          |

| Mode           | Channel | Reading (dBm) |   |   | Total Power (dBm) | Limit (dBm) |
|----------------|---------|---------------|---|---|-------------------|-------------|
|                |         | Port0         | - | - |                   |             |
| 802.11n (HT40) | L       | 21.60         | - | - | 21.60             | 30          |
|                | M       | 20.21         | - | - | 20.21             | 30          |
|                | H       | 20.73         | - | - | 20.73             | 30          |

Note:

Reading port x (mW) =  $10^{(\text{reading port x (dBm)}/10)}$

x = 0, 1, 2.

Total Power (mW) = reading port 0 (mW) + reading port 1 (mW) + reading port 2 (mW)

Total power (dBm) =  $10 * \log(\text{Total power (mW)})$

## 5 Power spectrum density

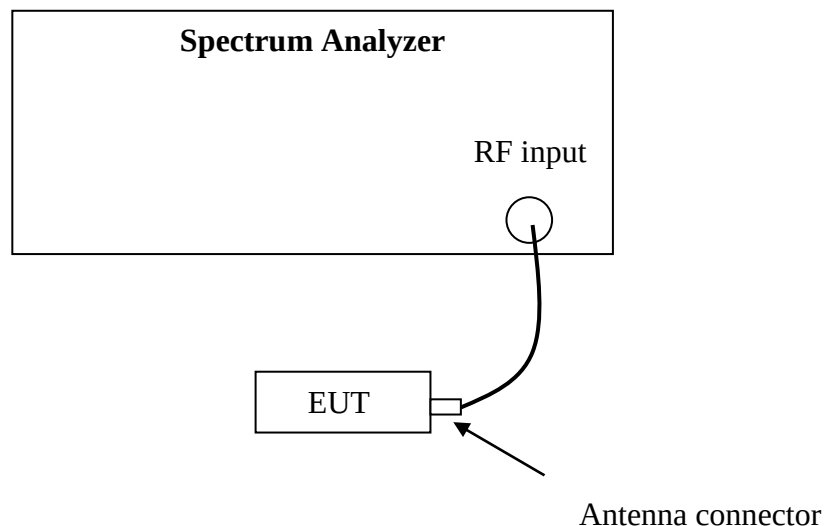
**Test result:** Pass

### 5.1 Test limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and  $8 + (6 - \text{antenna gain} - \text{beam forming gain})$ .

### 5.2 Test Configuration



### 5.3 Test procedure and test setup

The power output per FCC §15.247(e) was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance v04” (clause 10.2) for compliance to FCC 47CFR 15.247 requirements.

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the *DTS bandwidth*.
- c) Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d) Set the VBW  $\geq 3 \times \text{RBW}$ .
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



## 5.4 Test Protocol

Temperature: 25 °C

Relative Humidity: 55 %

| Mode    | Channel | PSD (dBm) |   |   | Total PSD (dBm) | Limit (dBm) |
|---------|---------|-----------|---|---|-----------------|-------------|
|         |         | Port 0    | - | - |                 |             |
| 802.11b | L       | 4.302     | - | - | 4.302           | 8           |
|         | M       | 4.184     | - | - | 4.184           | 8           |
|         | H       | 4.227     | - | - | 4.227           | 8           |

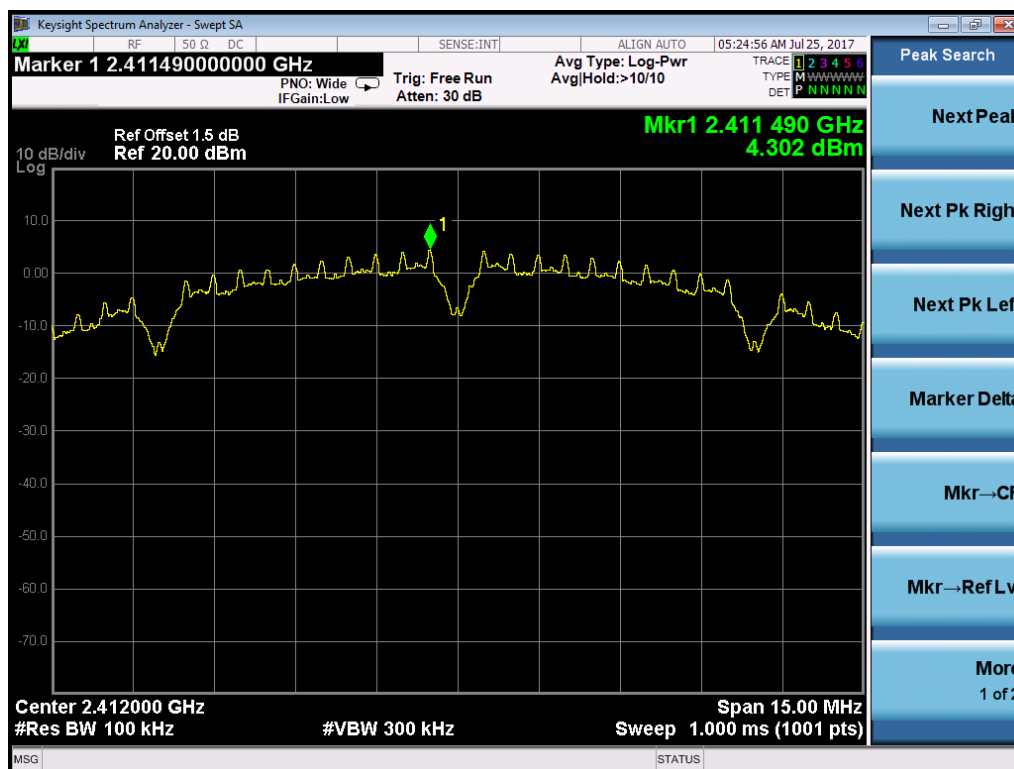
Note 1:

PSD port x (mW) =  $10^{(PSD \text{ port } x \text{ (dBm)}/10)}$ ; x = 0, 1, 2.

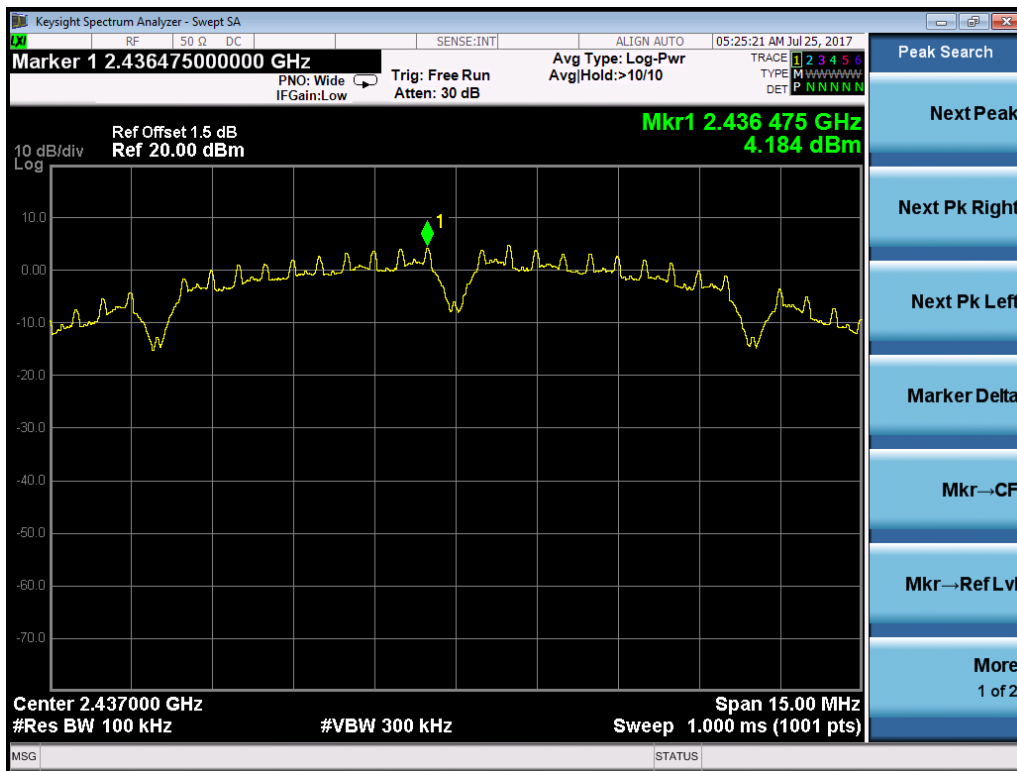
Total PSD (mW) = PSD port 0 (mW) + PSD port 1 (mW) + PSD port 2 (mW)

Total PSD (dBm) =  $10 * \log(\text{Total PSD (mW)})$

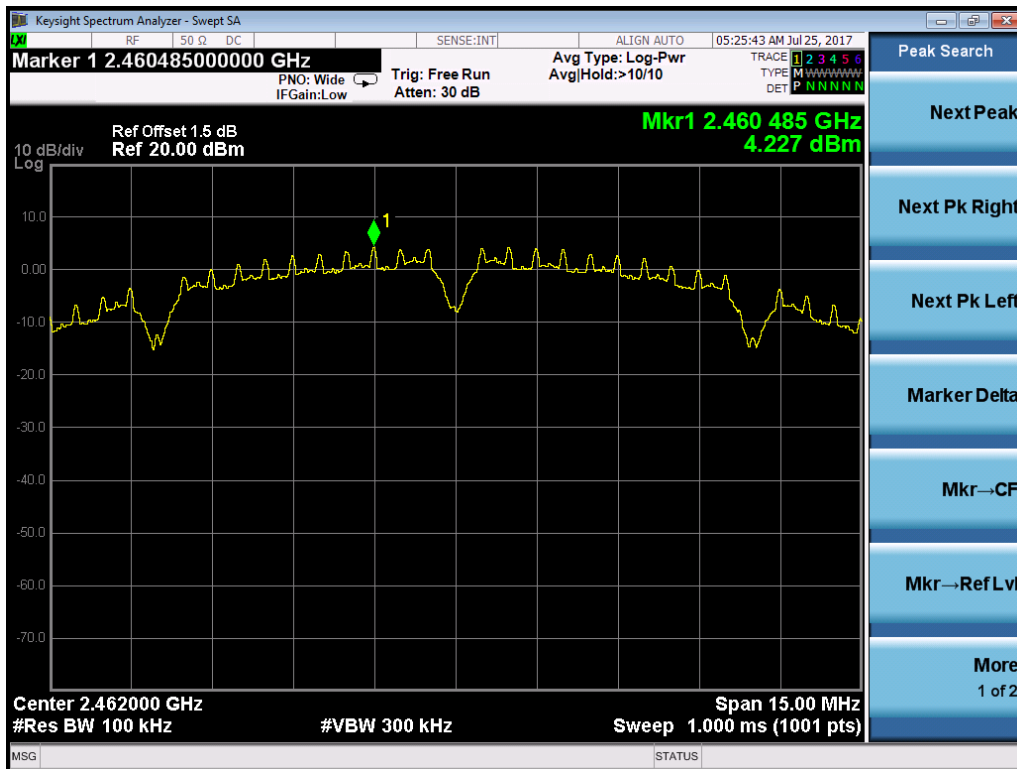
Channel L



### Channel M



### Channel H



| Mode    | Channel | PSD (dBm) |   |   | Total PSD (dBm) | Limit (dBm) |
|---------|---------|-----------|---|---|-----------------|-------------|
|         |         | Port 0    | - | - |                 |             |
| 802.11g | L       | -1.327    | - | - | -1.327          | 8           |
|         | M       | 0.095     | - | - | 0.095           | 8           |
|         | H       | -0.896    | - | - | -0.896          | 8           |

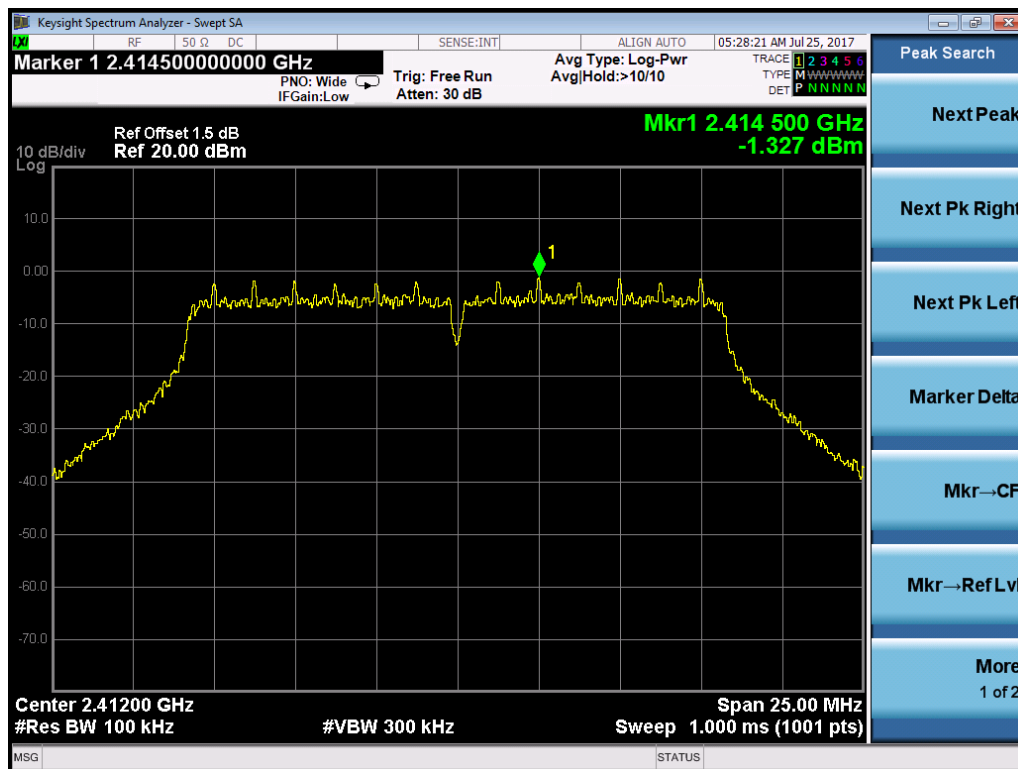
Note 1:

PSD port x (mW) =  $10^{(\text{PSD port x (dBm)}/10)}$ ; x = 0, 1, 2.

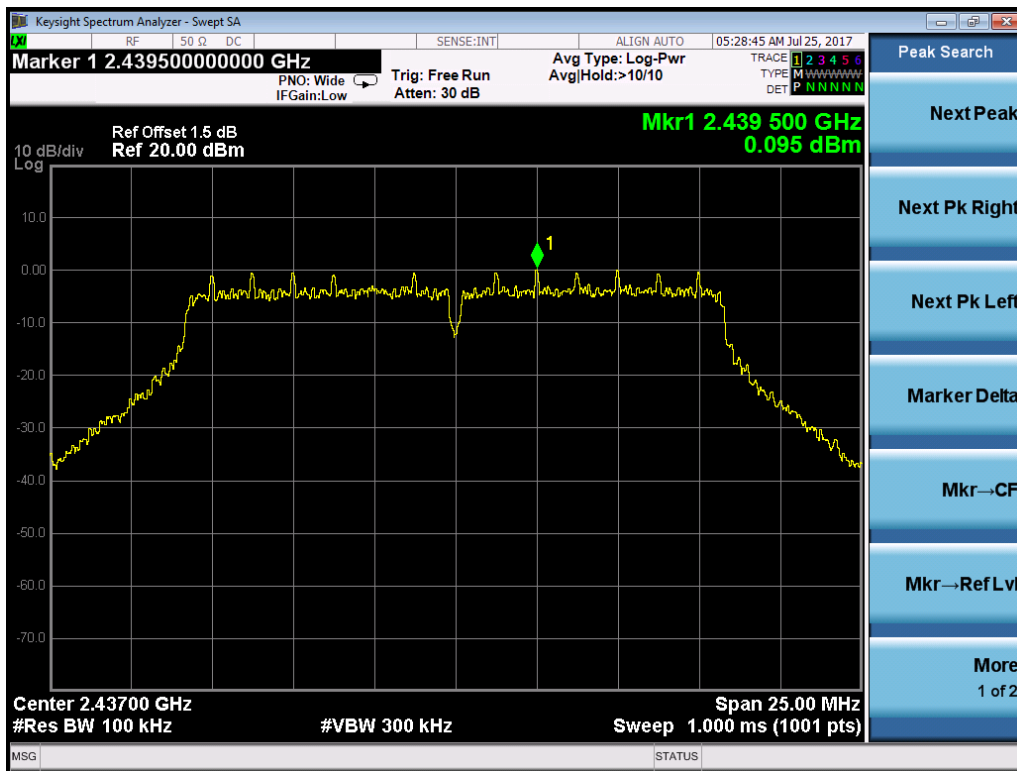
Total PSD (mW) = PSD port 0 (mW) + PSD port 1 (mW) + PSD port 2 (mW)

Total PSD (dBm) =  $10 * \log(\text{Total PSD (mW)})$

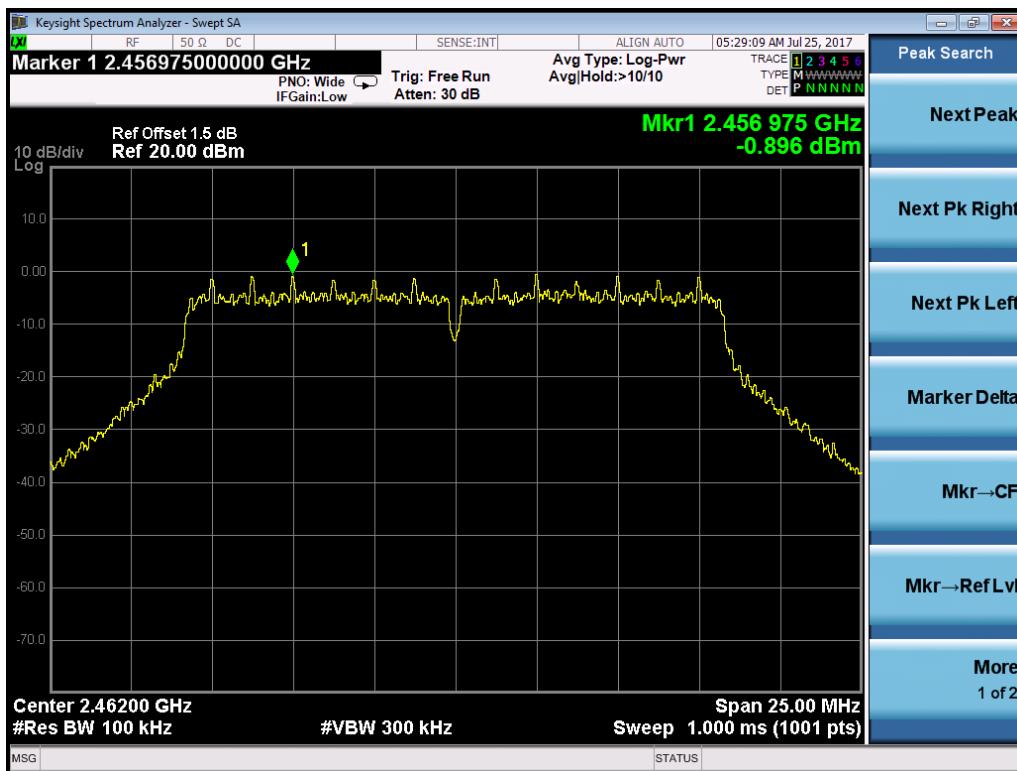
### Channel L



### Channel M



### Channel H



| Mode              | Channel | PSD (dBm) |   |   | Total PSD (dBm) | Limit (dBm) |
|-------------------|---------|-----------|---|---|-----------------|-------------|
|                   |         | Port 0    | - | - |                 |             |
| 802.11n<br>(HT20) | L       | -2.133    | - | - | -2.133          | 8           |
|                   | M       | -0.107    | - | - | -0.107          | 8           |
|                   | H       | -1.506    | - | - | -1.506          | 8           |

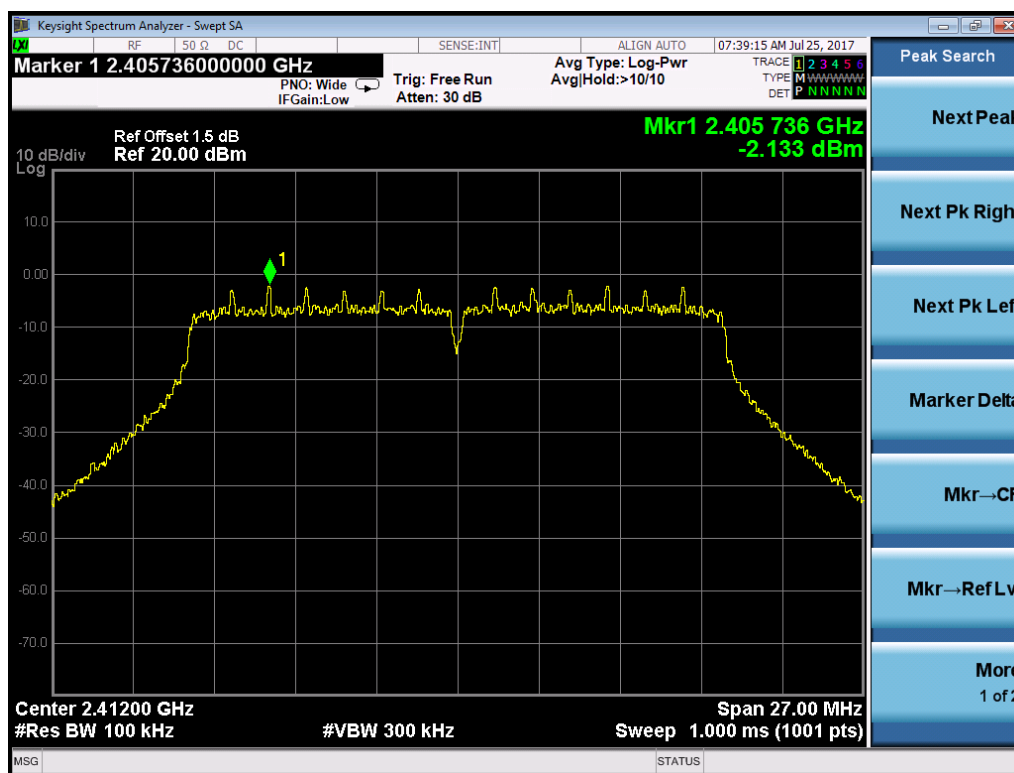
Note 1:

PSD port x (mW) =  $10^{(PSD \text{ port } x \text{ (dBm)}/10)}$ ; x = 0, 1, 2.

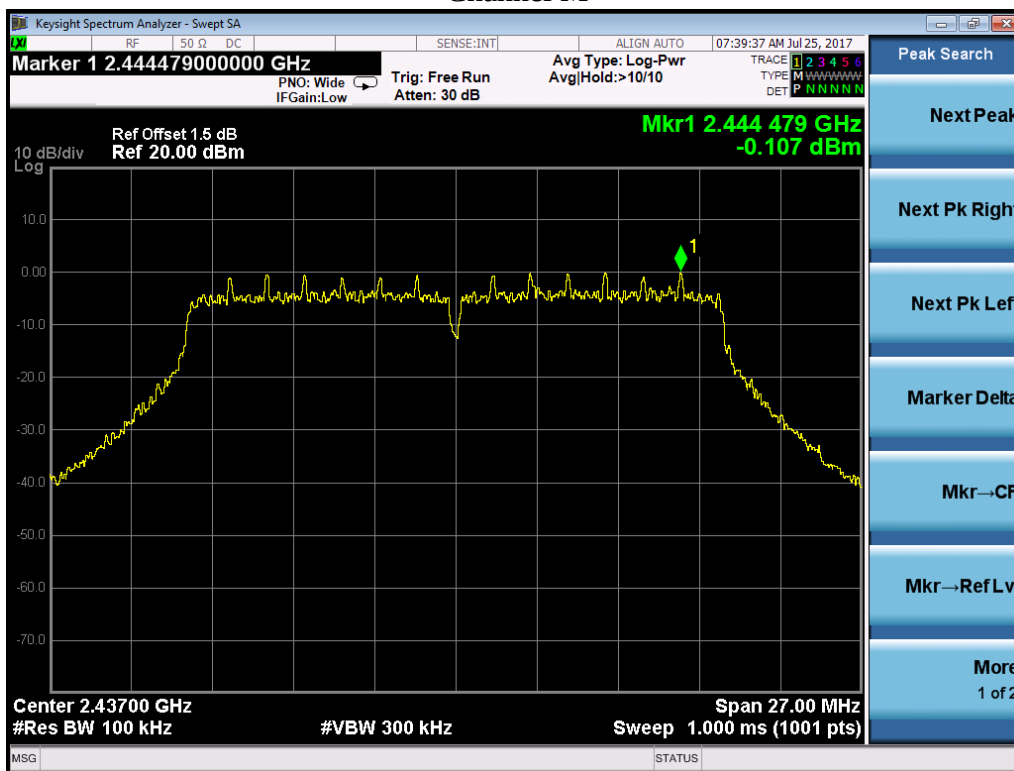
Total PSD (mW) = PSD port 0 (mW) + PSD port 1 (mW) + PSD port 2 (mW)

Total PSD (dBm) =  $10 * \log(\text{Total PSD (mW)})$

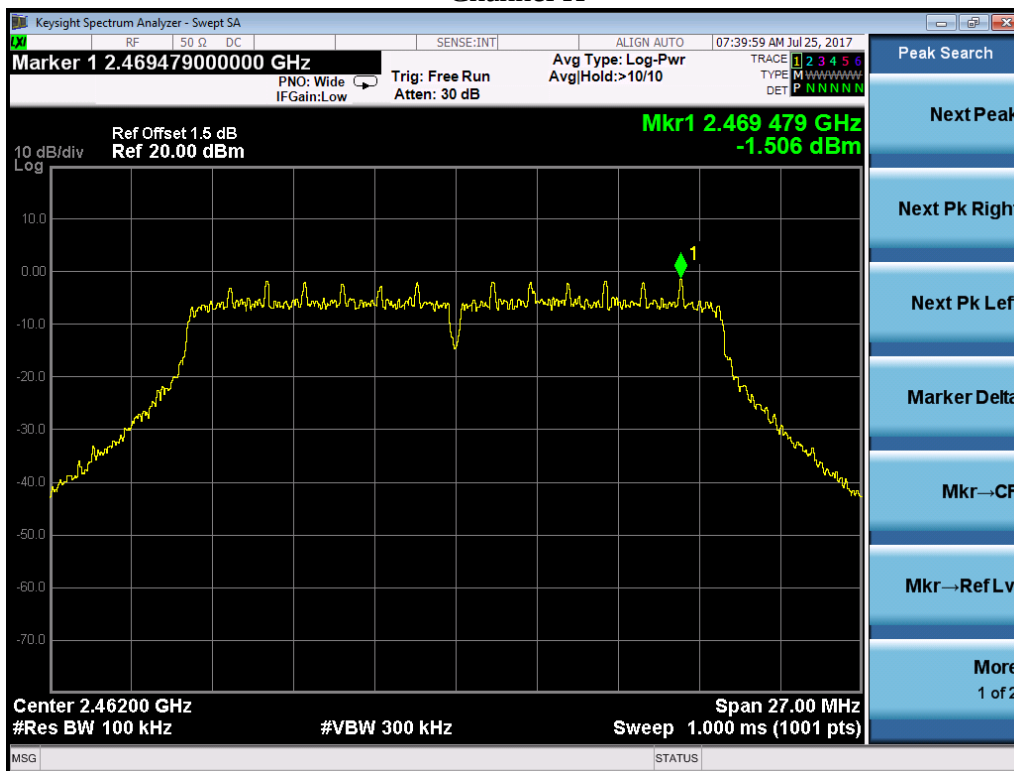
### Channel L



### Channel M



### Channel H



| Mode           | Channel | PSD (dBm) |   |   | Total PSD (dBm) | Limit (dBm) |
|----------------|---------|-----------|---|---|-----------------|-------------|
|                |         | Port 0    | - | - |                 |             |
| 802.11n (HT40) | L       | -4.923    | - | - | -4.923          | 8           |
|                | M       | -5.140    | - | - | -5.140          | 8           |
|                | H       | -4.444    | - | - | -4.444          | 8           |

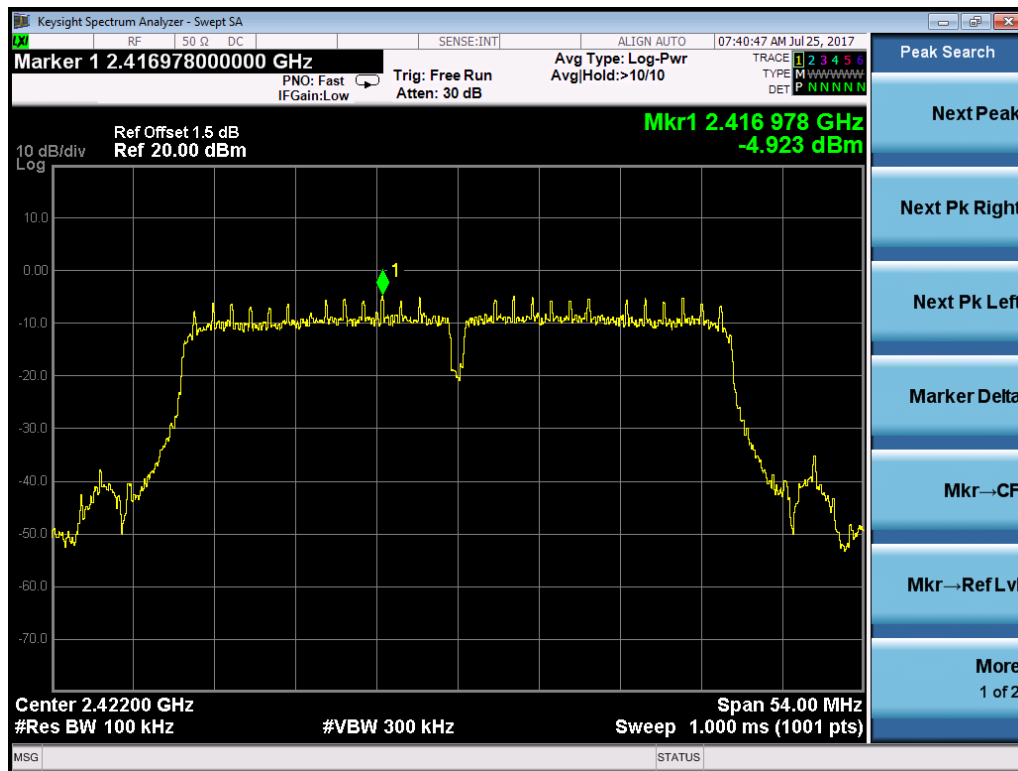
Note 1:

PSD port x (mW) =  $10^{(\text{PSD port x (dBm)}/10)}$ ; x = 0, 1, 2.

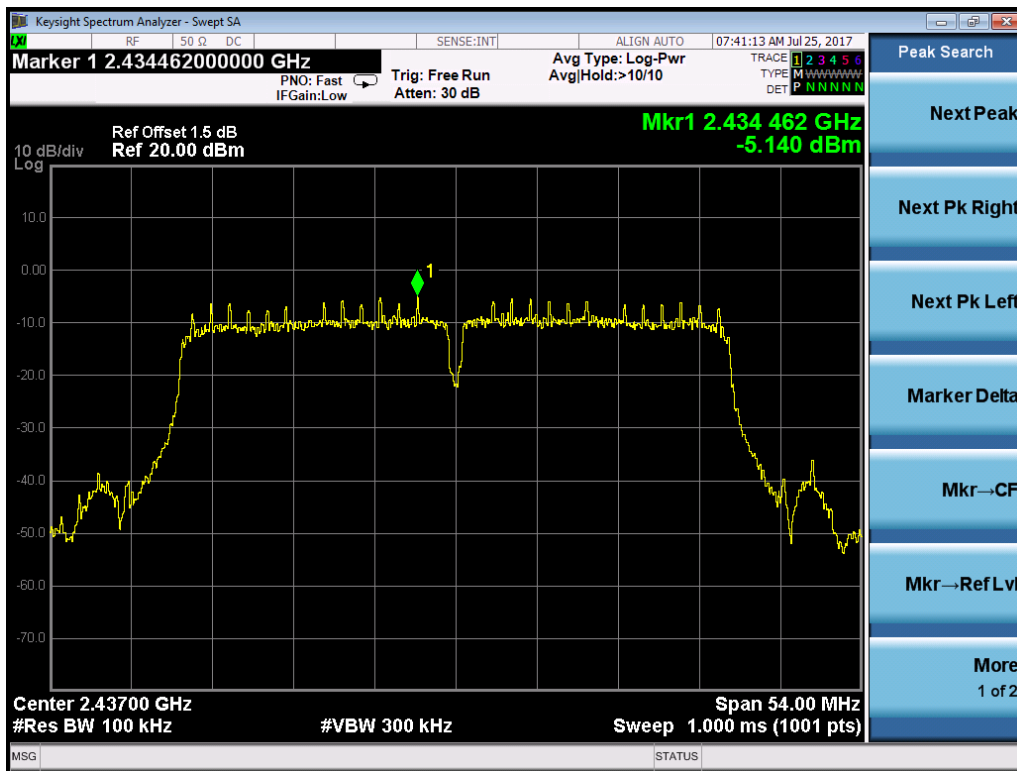
Total PSD (mW) = PSD port 0 (mW) + PSD port 1 (mW) + PSD port 2 (mW)

Total PSD (dBm) =  $10 * \log(\text{Total PSD (mW)})$

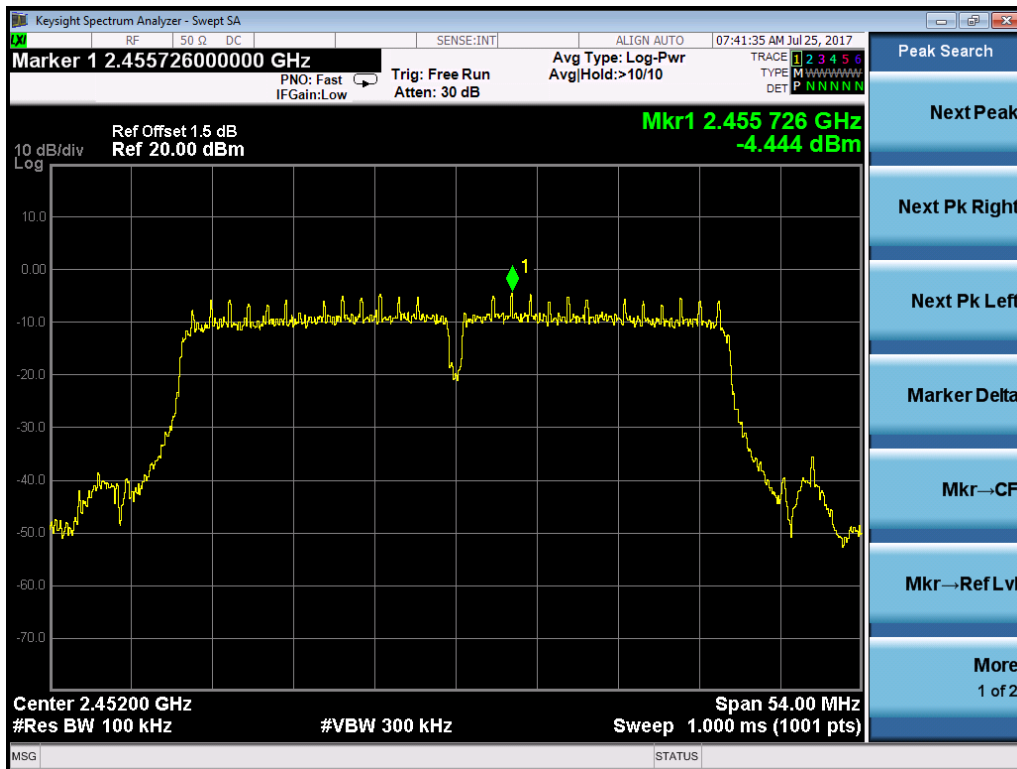
### Channel L



### Channel M



### Channel H





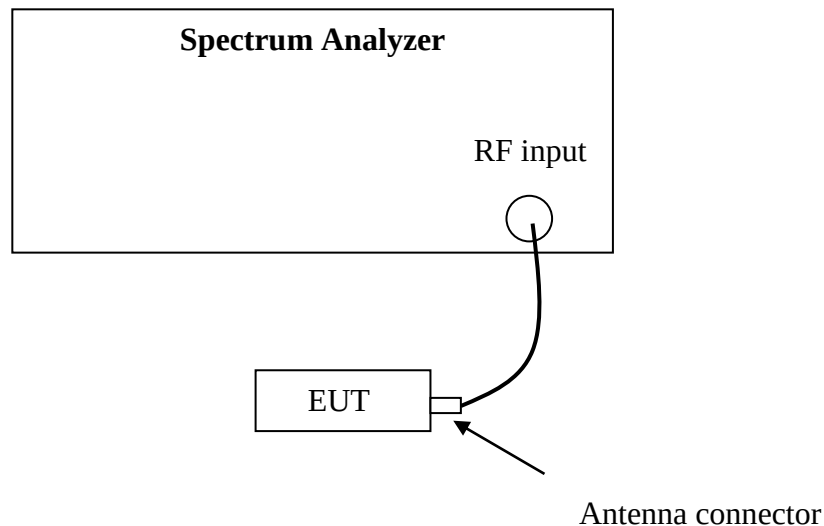
## 6 Emission outside the frequency band

**Test result:** Pass

### 6.1 Test limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

### 6.2 Test Configuration



### 6.3 Test procedure and test setup

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance v04” (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

#### Reference level measurement

Establish a reference level by using the following procedure:

- Set instrument center frequency to DTS channel center frequency.
- Set the span to  $\geq 1.5$  times the *DTS bandwidth*.
- Set the RBW = 100 kHz.
- Set the VBW  $\geq 3 \times$  RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.

- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

**Emission level measurement**

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW  $\geq 3 \times$  RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

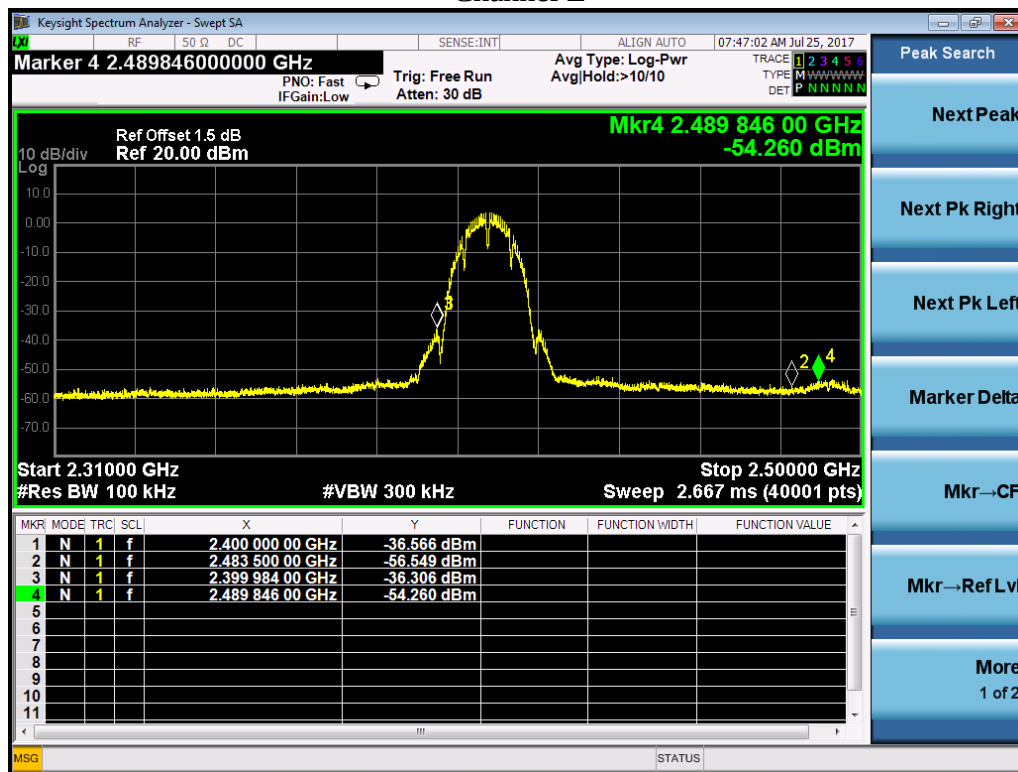
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

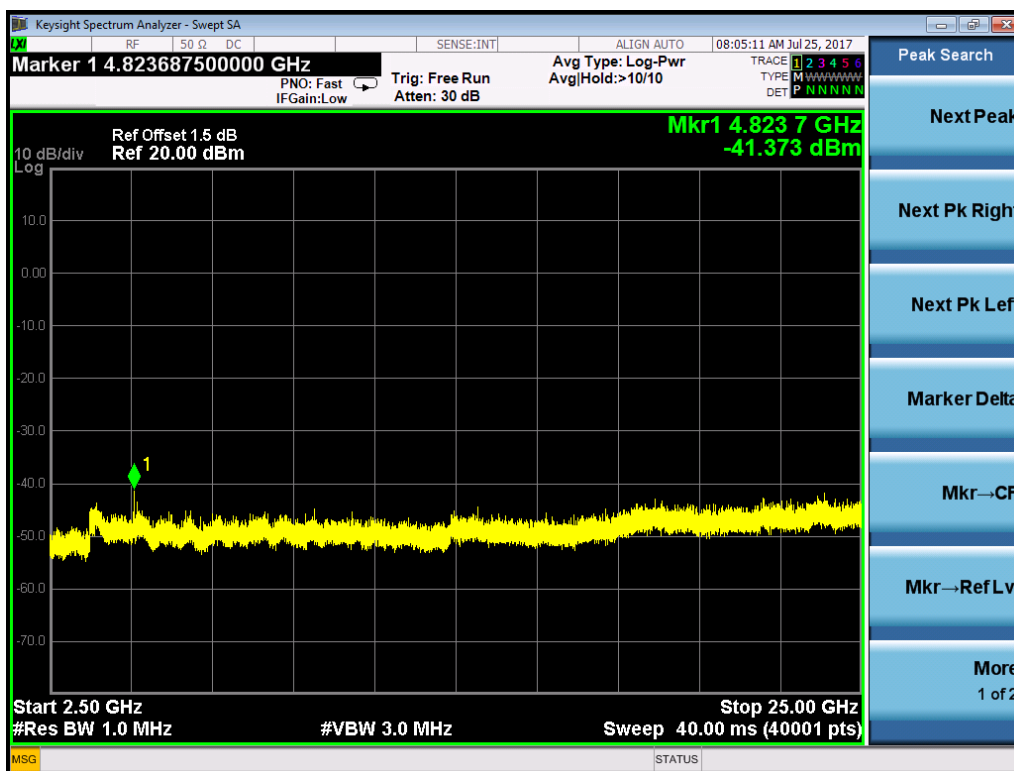
## 6.4 Test Protocol

Temperature: 25 °C  
Relative Humidity: 55 %

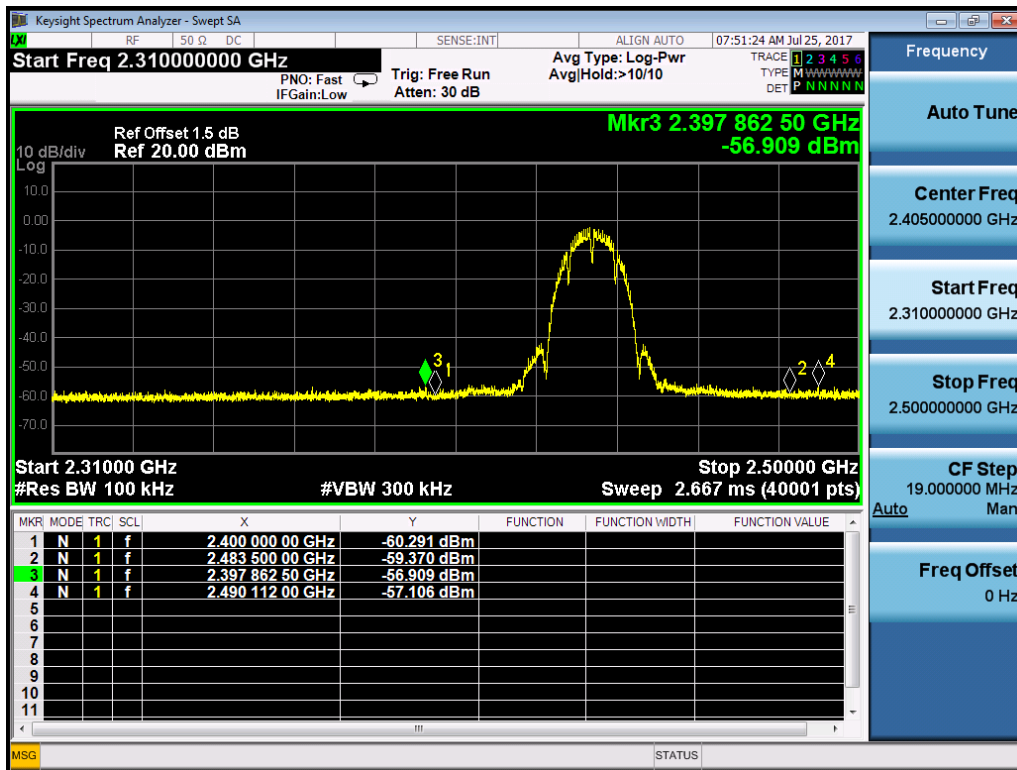
| Mode    | Channel | Result |   |   | Limits (dB) |
|---------|---------|--------|---|---|-------------|
|         |         | Port0  | - | - |             |
| 802.11b | L       | Pass   | - | - | $\geq 20$   |
|         | M       | Pass   | - | - | $\geq 20$   |
|         | H       | Pass   | - | - | $\geq 20$   |

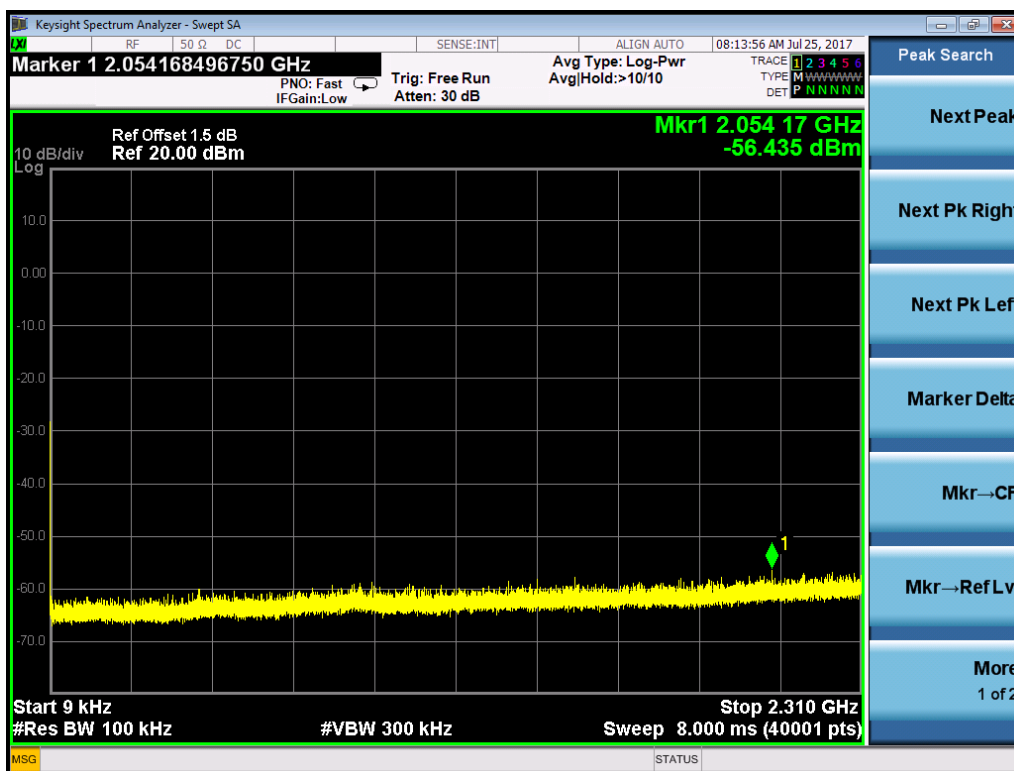
Channel L



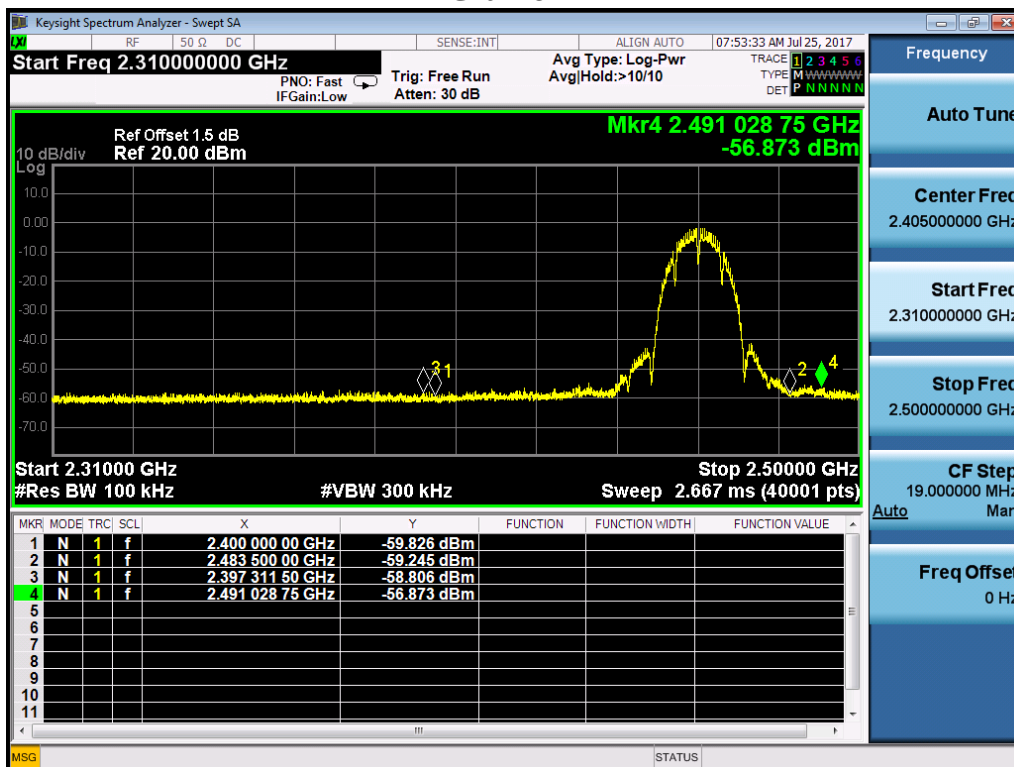


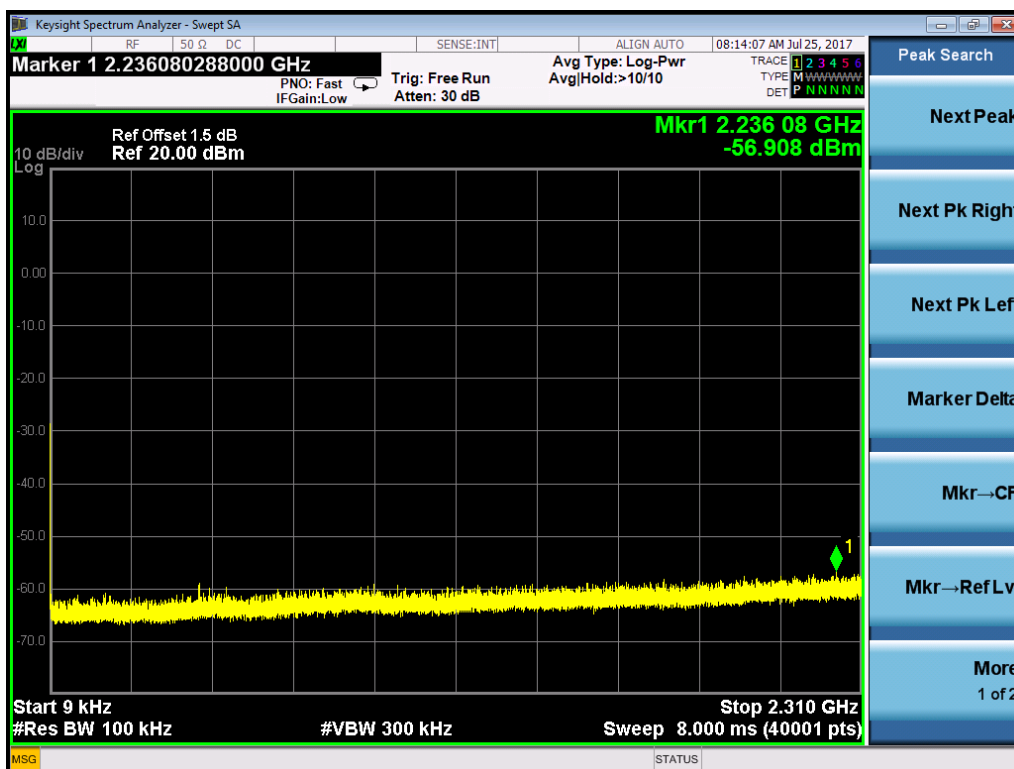
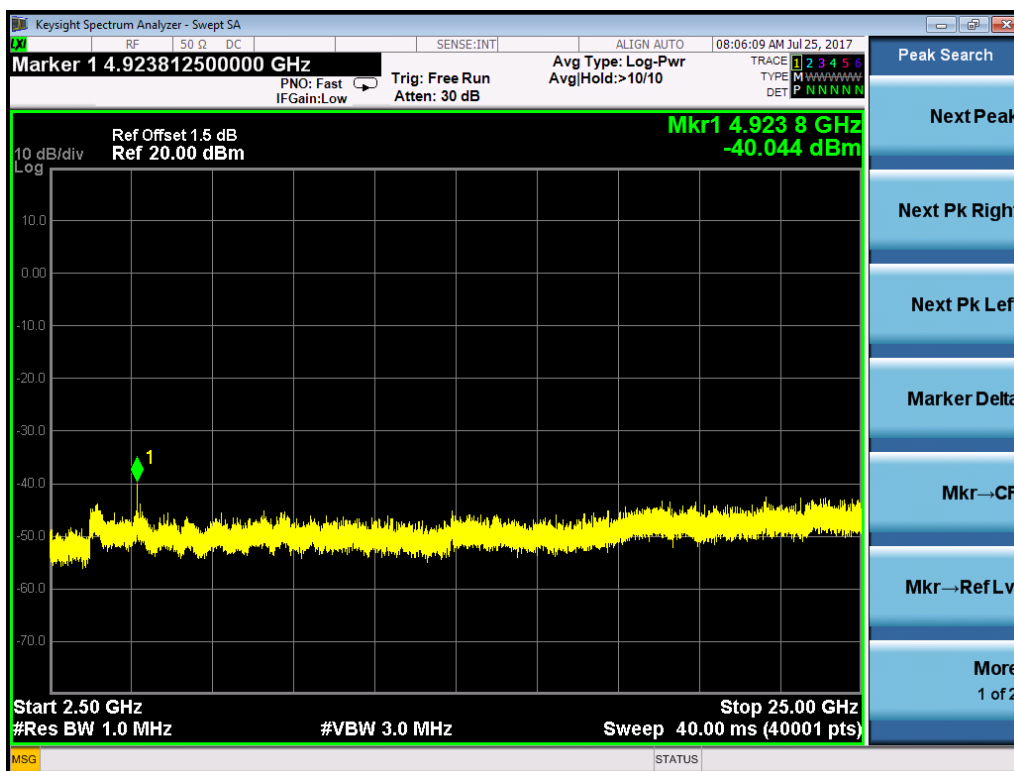
# Channel M





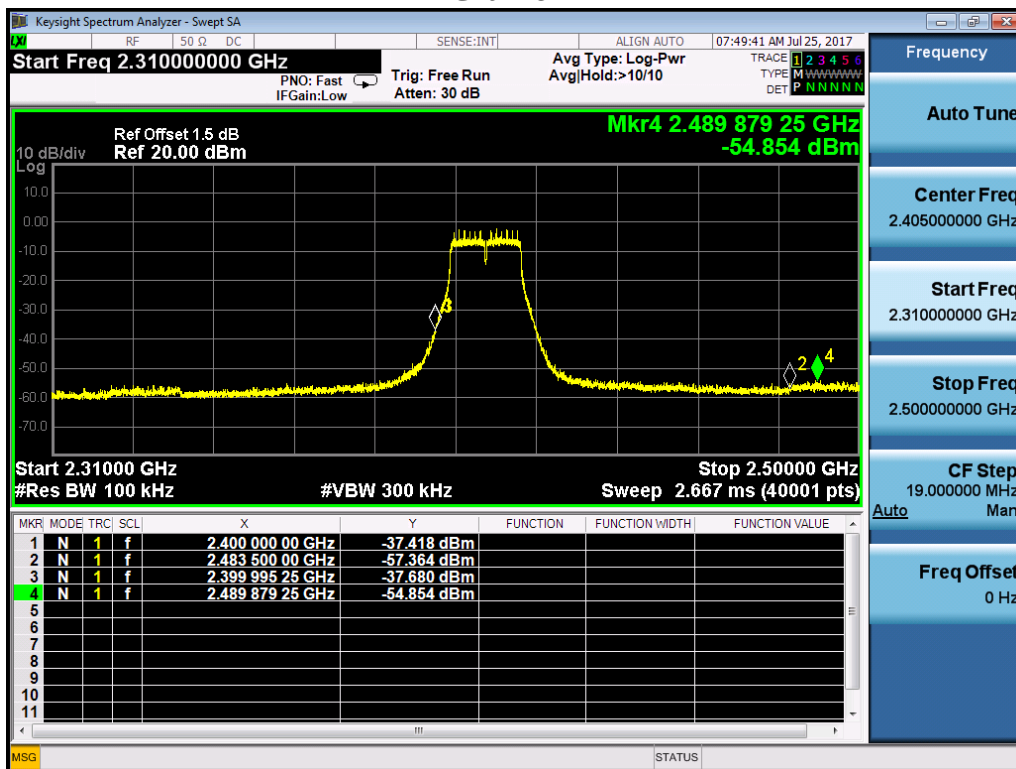
### Channel H



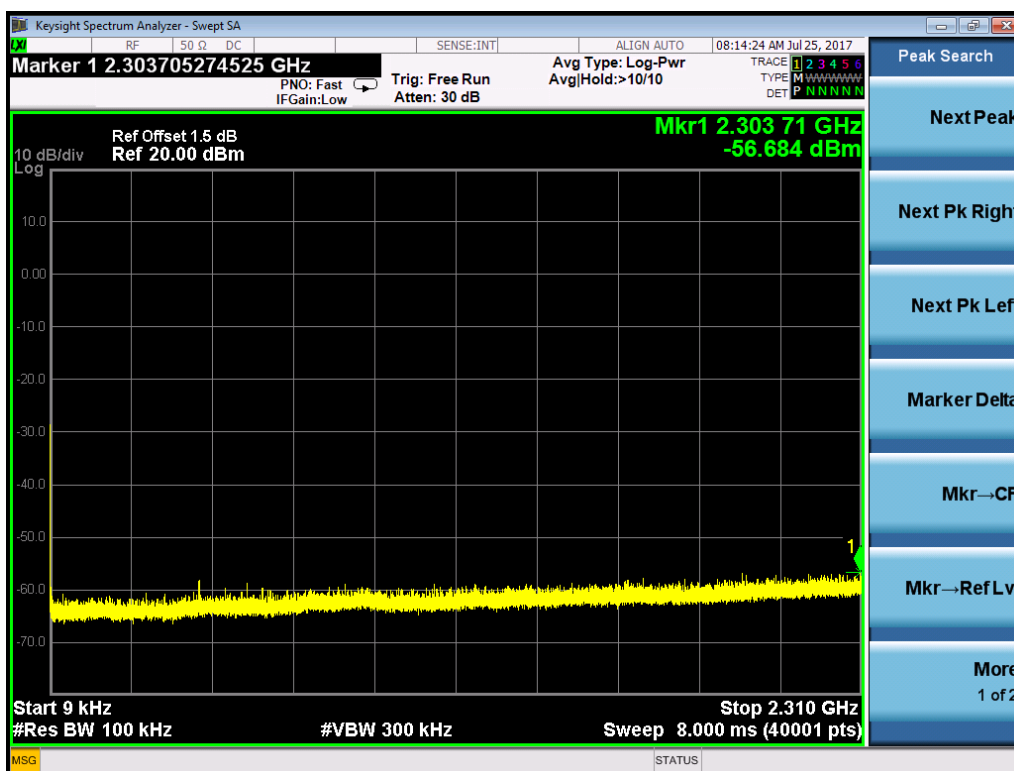
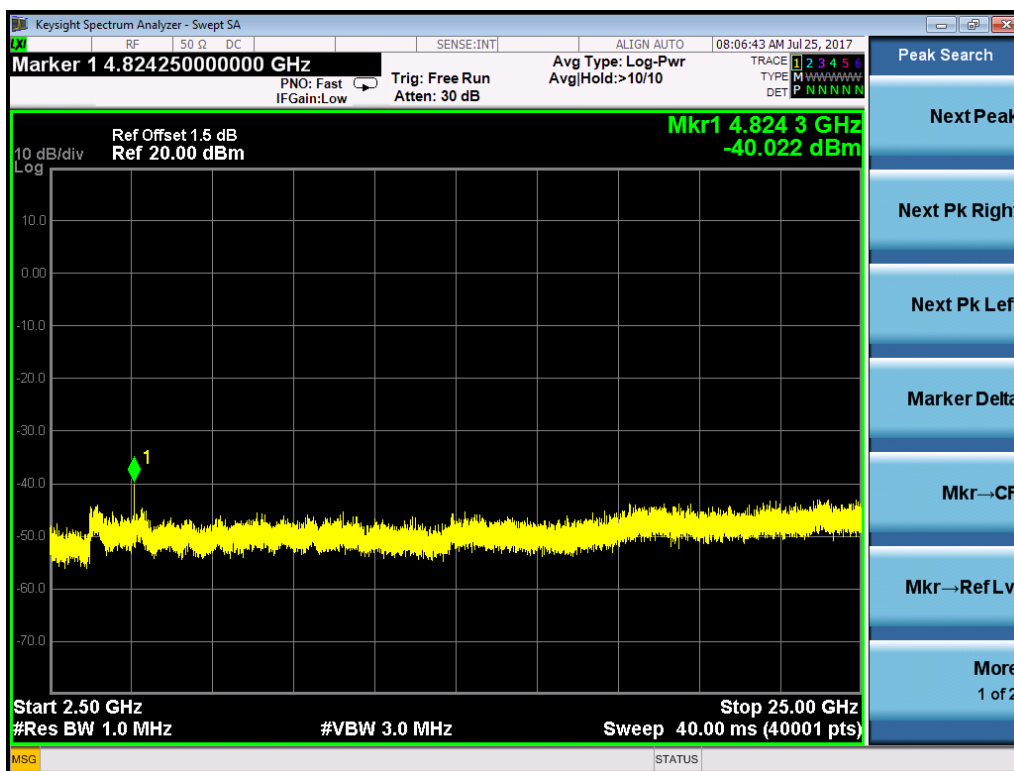


| Mode    | Channel | Result |   |   | Limits (dB) |
|---------|---------|--------|---|---|-------------|
|         |         | Port0  | - | - |             |
| 802.11g | L       | Pass   | - | - | $\geq 20$   |
|         | M       | Pass   | - | - | $\geq 20$   |
|         | H       | Pass   | - | - | $\geq 20$   |

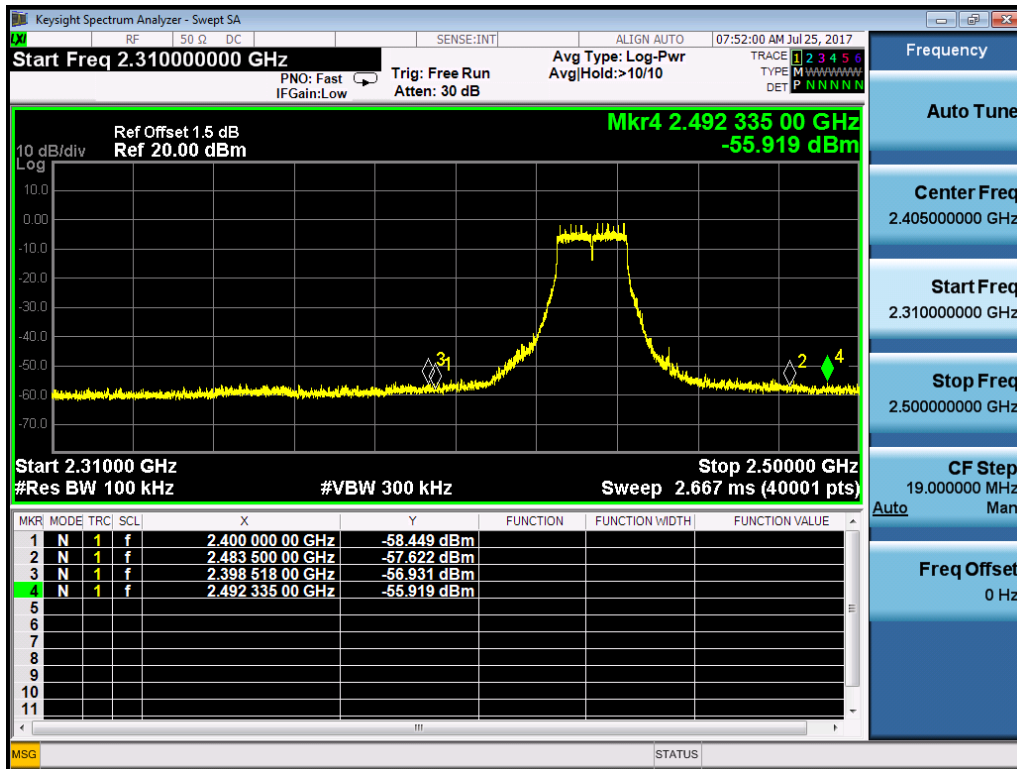
### Channel L

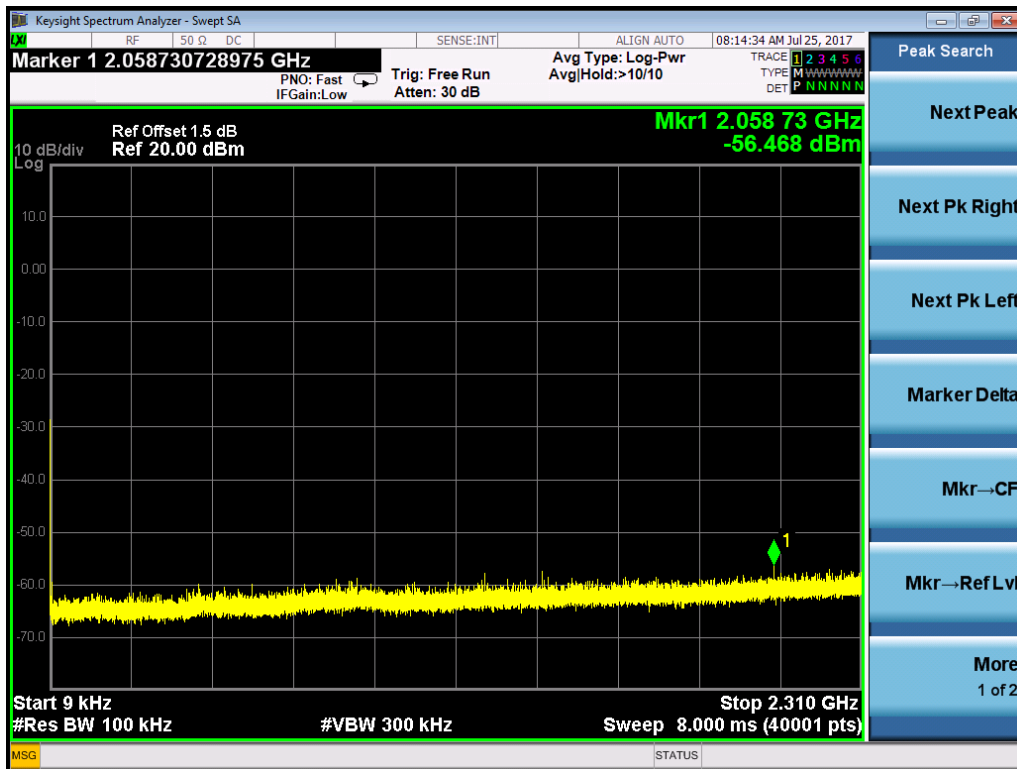




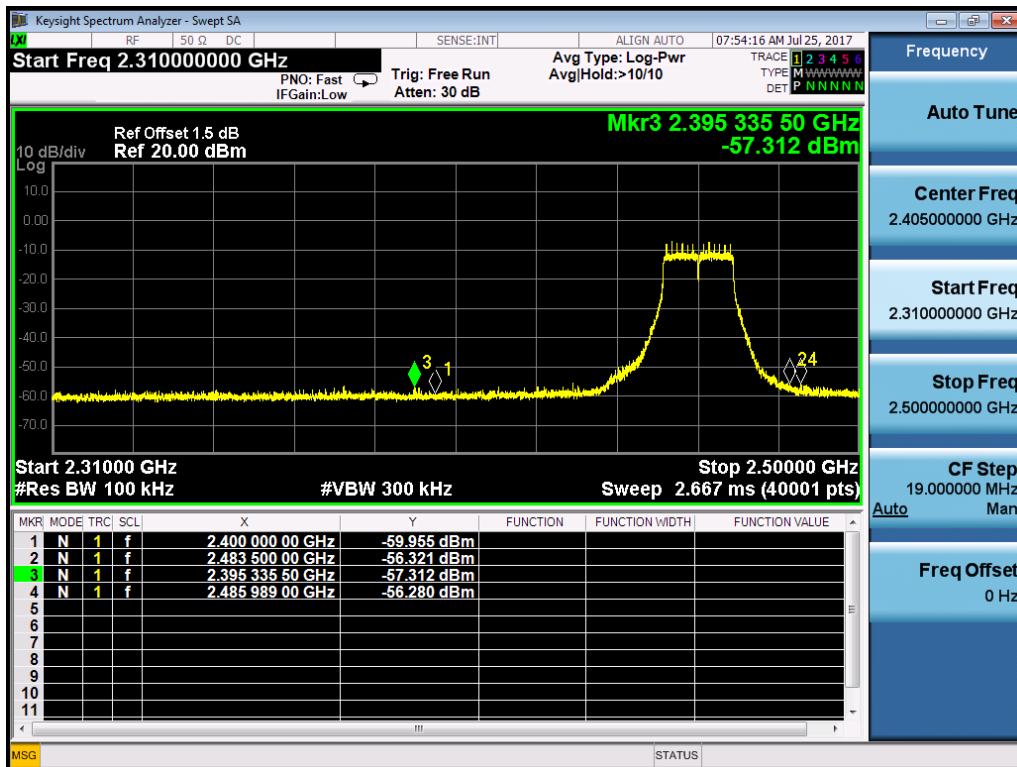


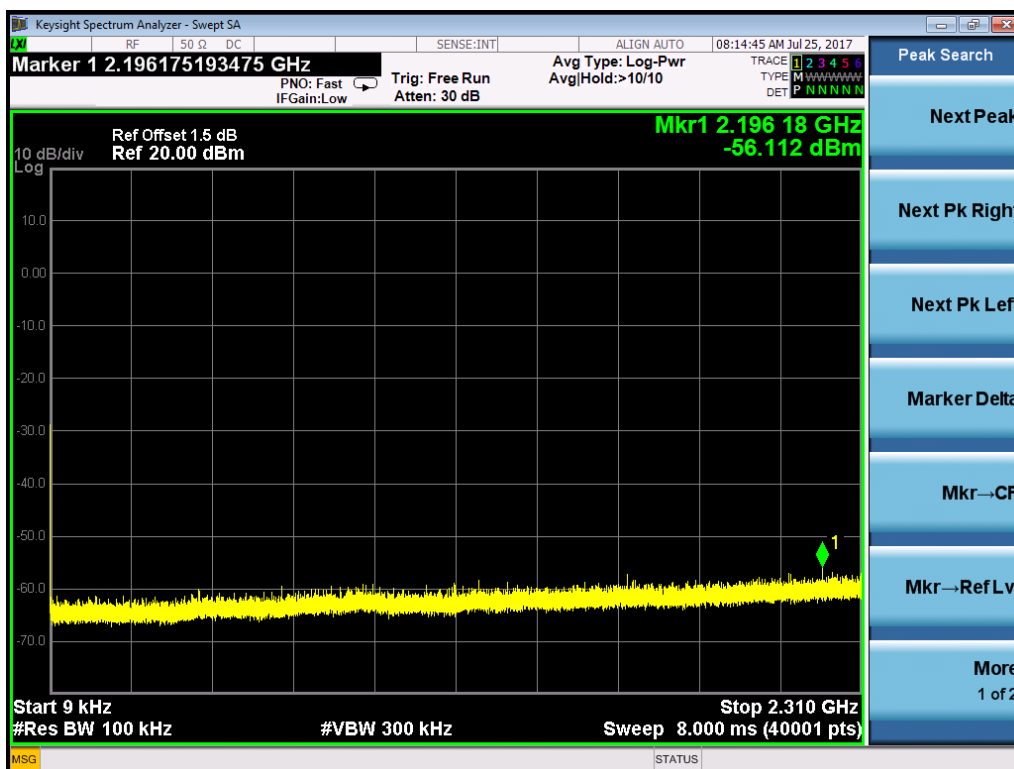
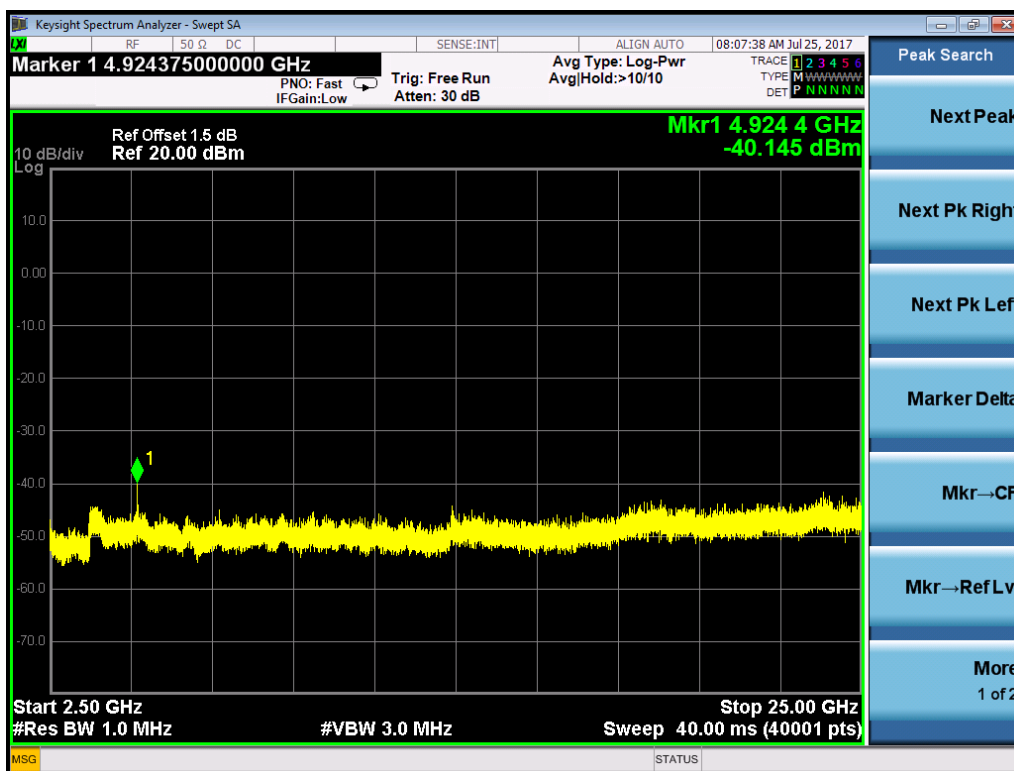
### Channel M





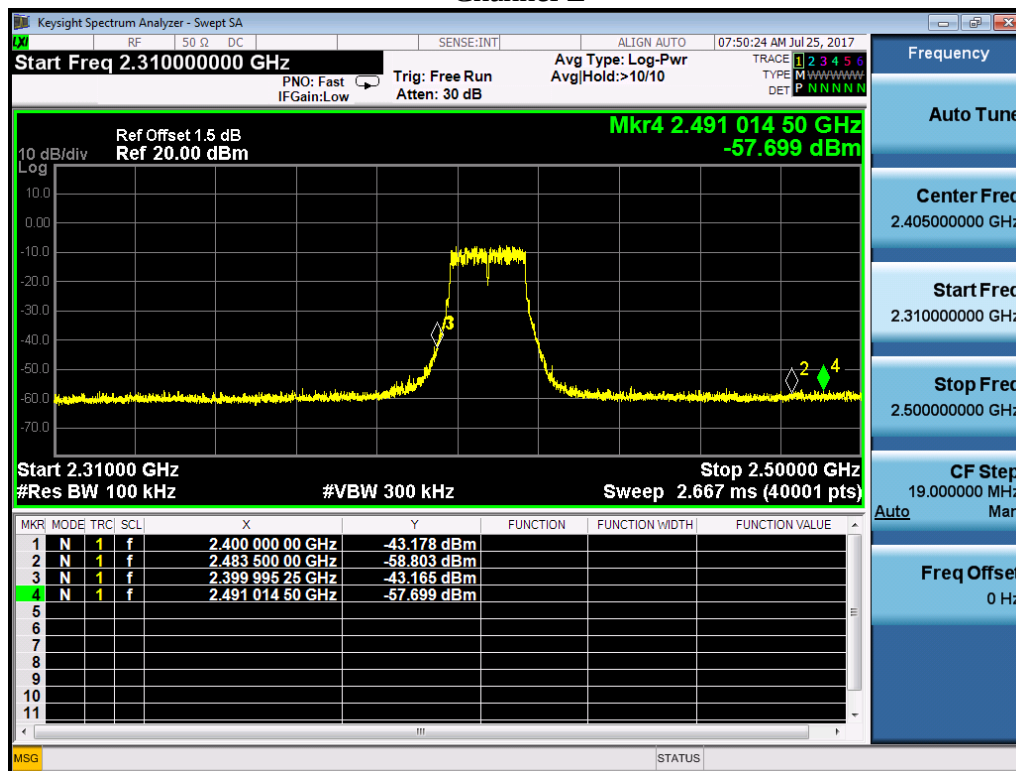
### Channel H

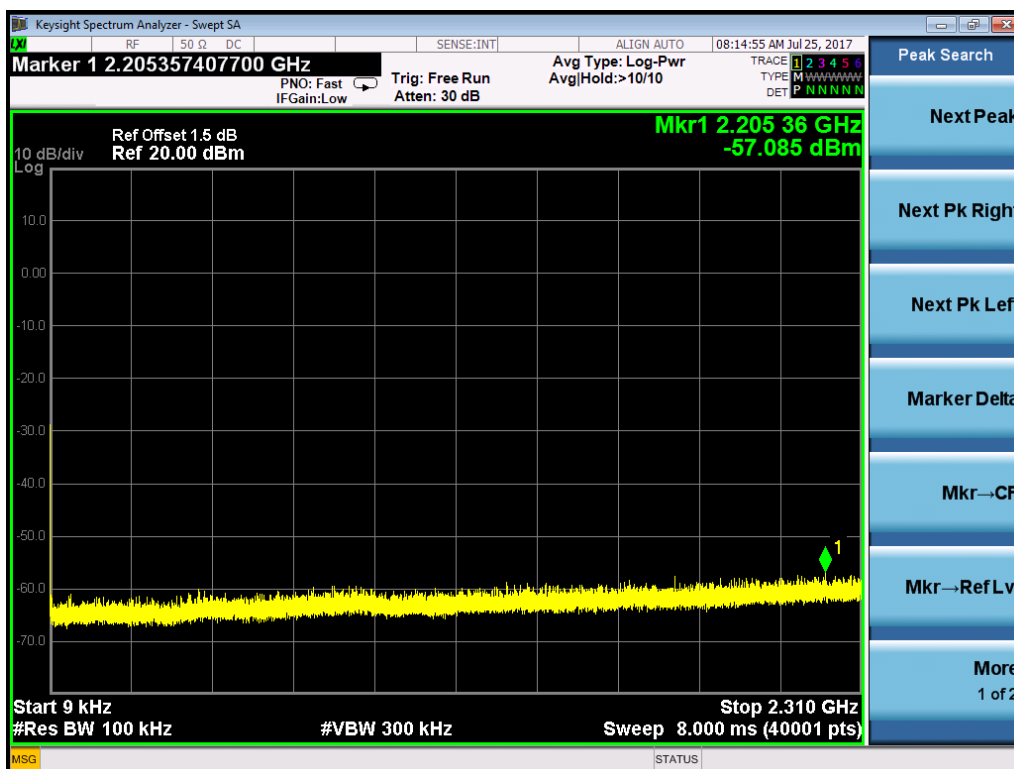
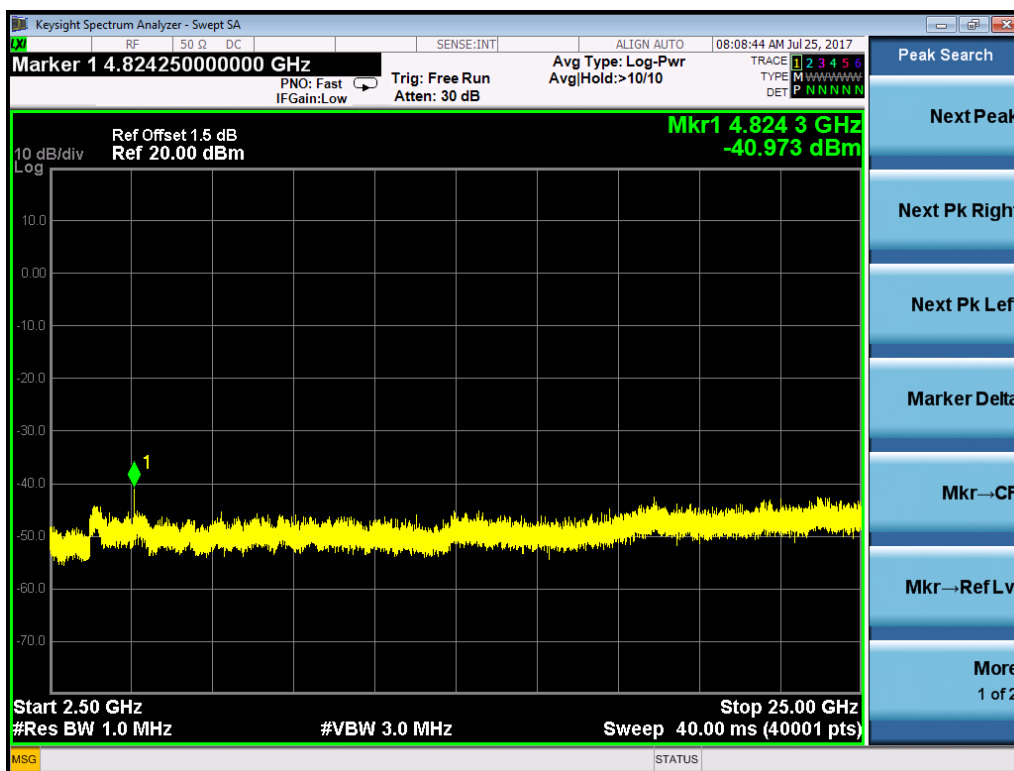




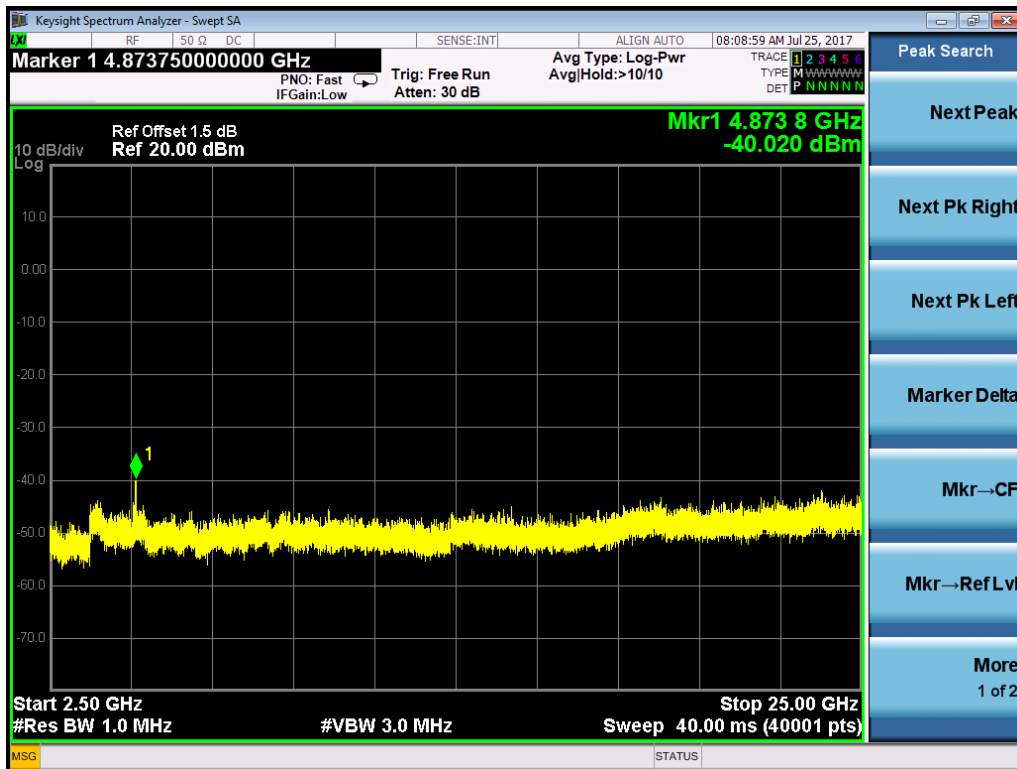
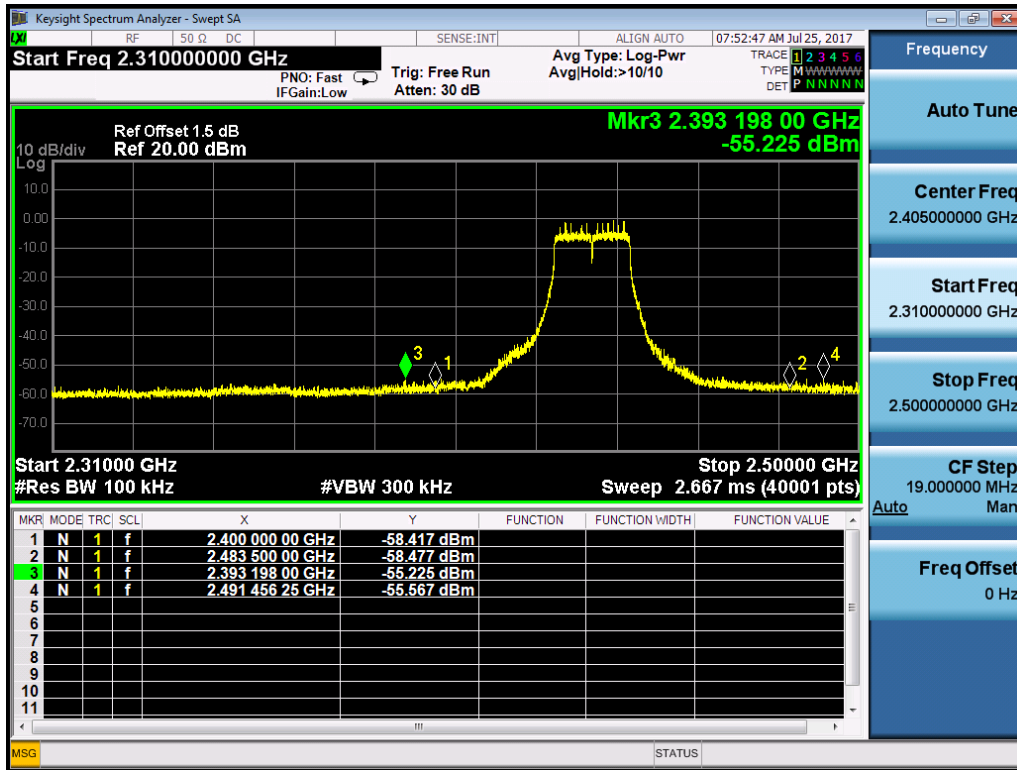
| Mode           | Channel | Result |   |   | Limits (dB) |
|----------------|---------|--------|---|---|-------------|
|                |         | Port0  | - | - |             |
| 802.11n (HT20) | L       | Pass   | - | - | $\geq 20$   |
|                | M       | Pass   | - | - | $\geq 20$   |
|                | H       | Pass   | - | - | $\geq 20$   |

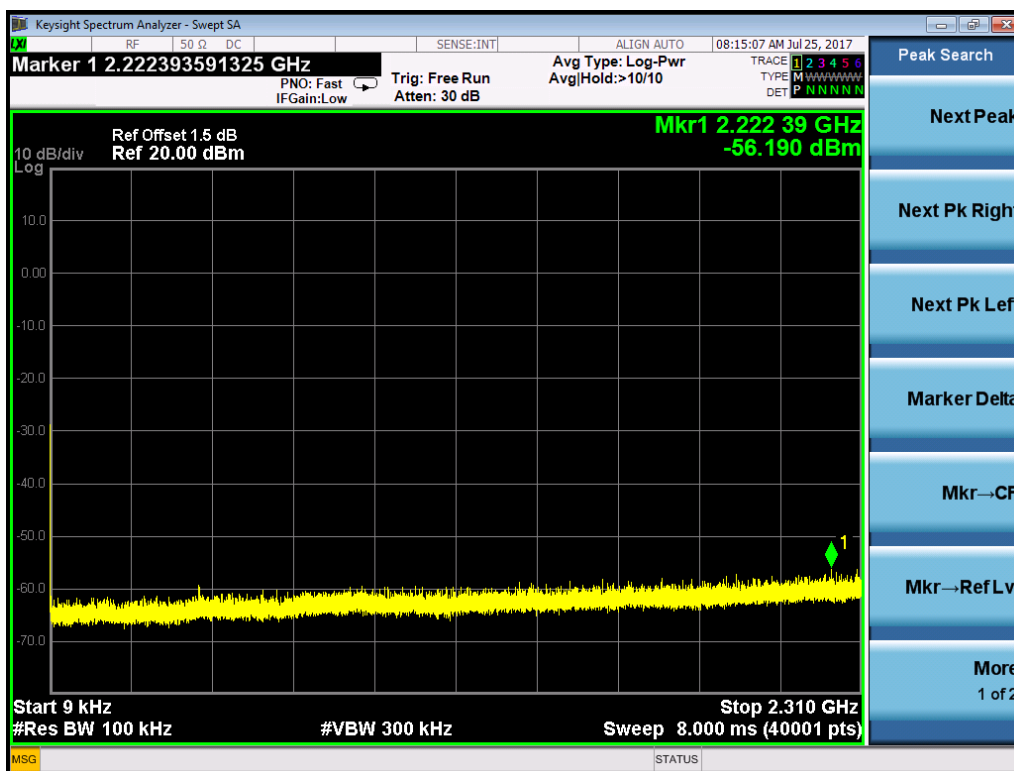
### Channel L



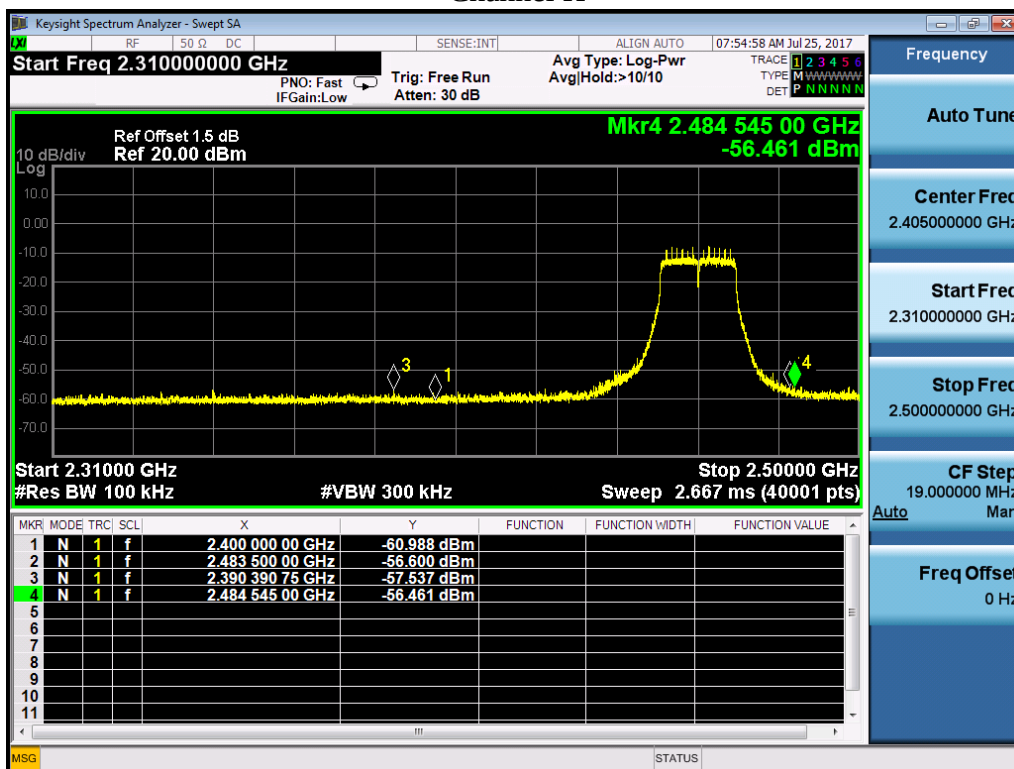


Channel M

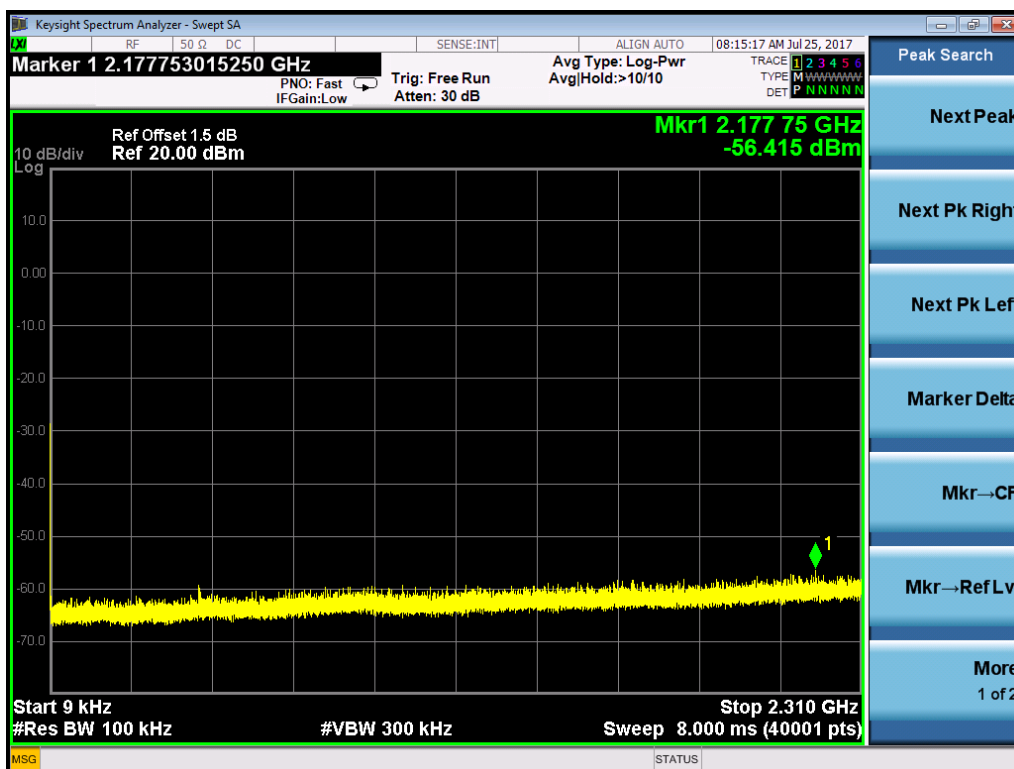
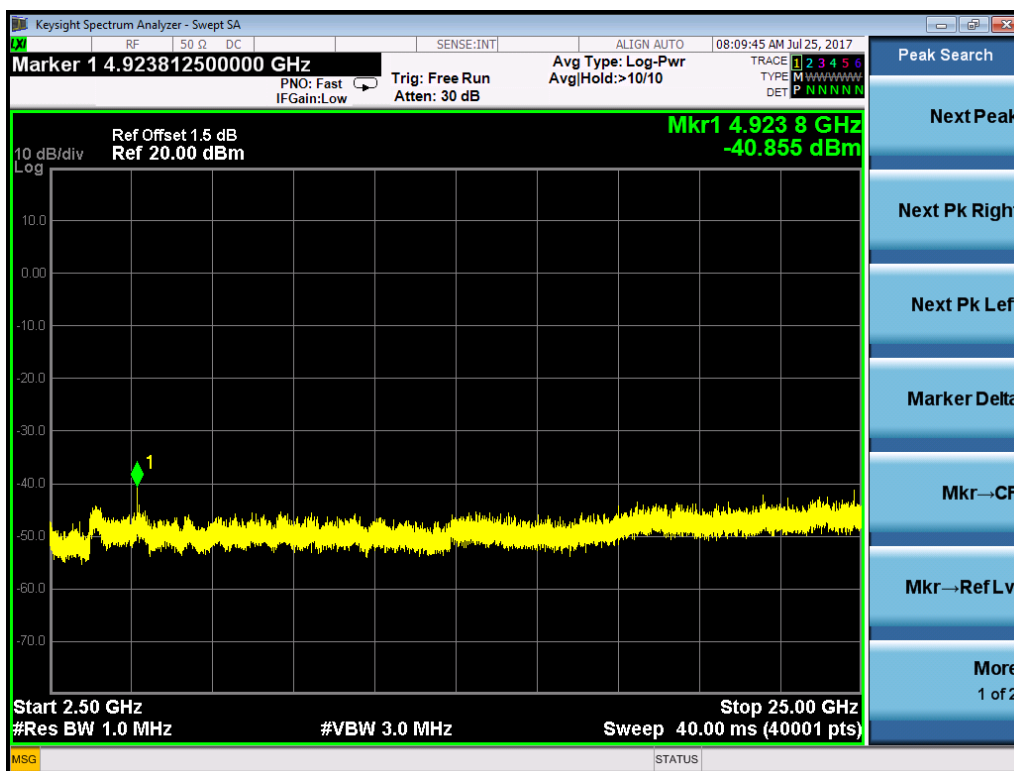




### Channel H

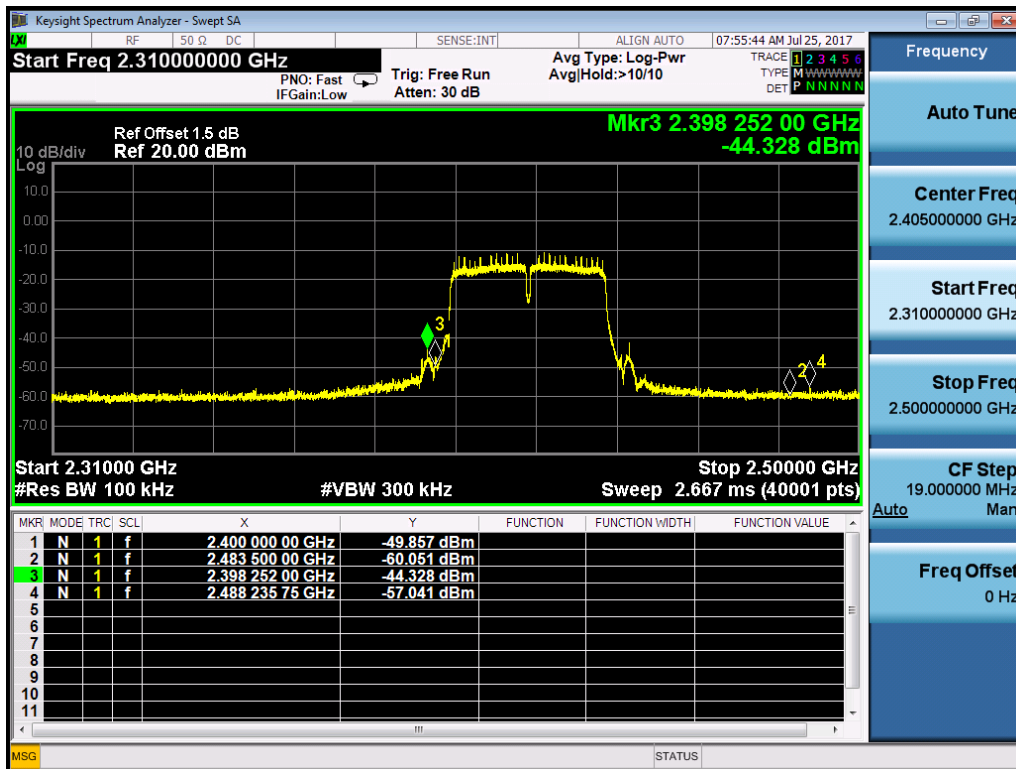


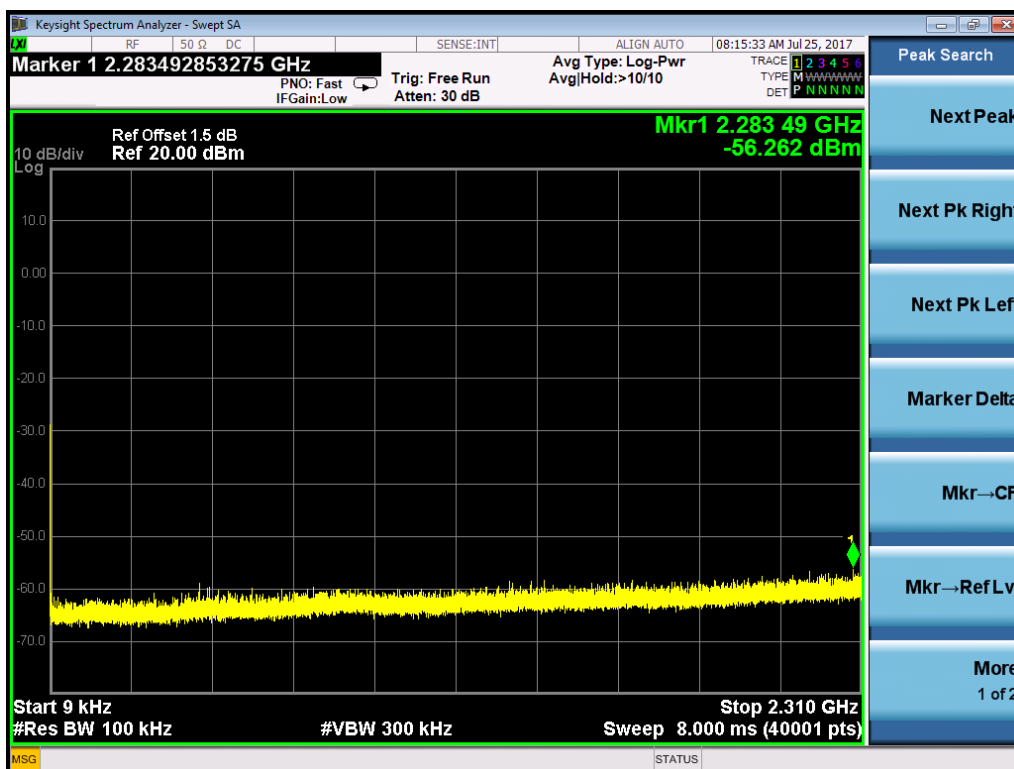




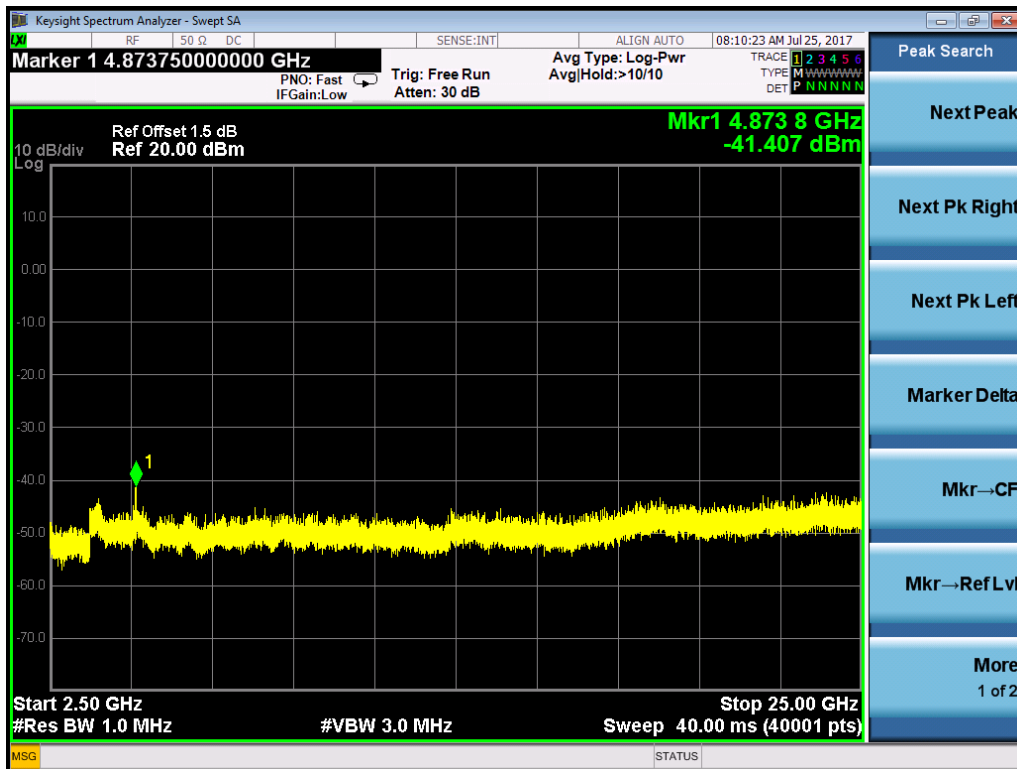
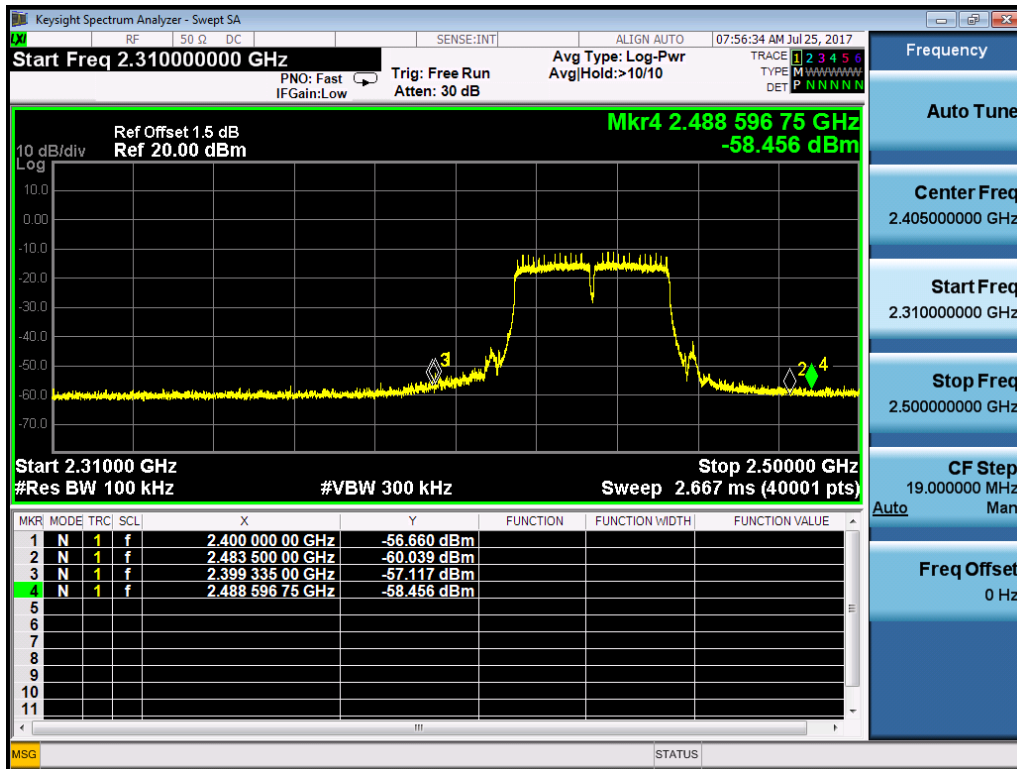
| Mode           | Channel | Result |   |   | Limits (dB) |
|----------------|---------|--------|---|---|-------------|
|                |         | Port0  | - | - |             |
| 802.11n (HT40) | L       | Pass   | - | - | $\geq 20$   |
|                | M       | Pass   | - | - | $\geq 20$   |
|                | H       | Pass   | - | - | $\geq 20$   |

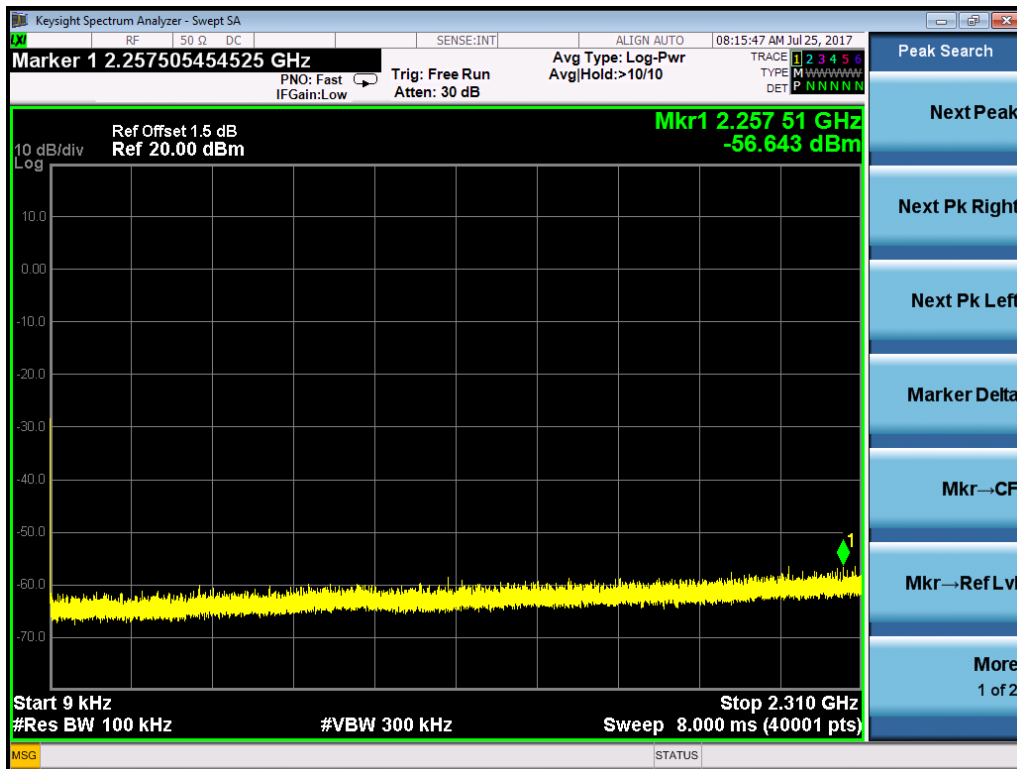
### Channel L



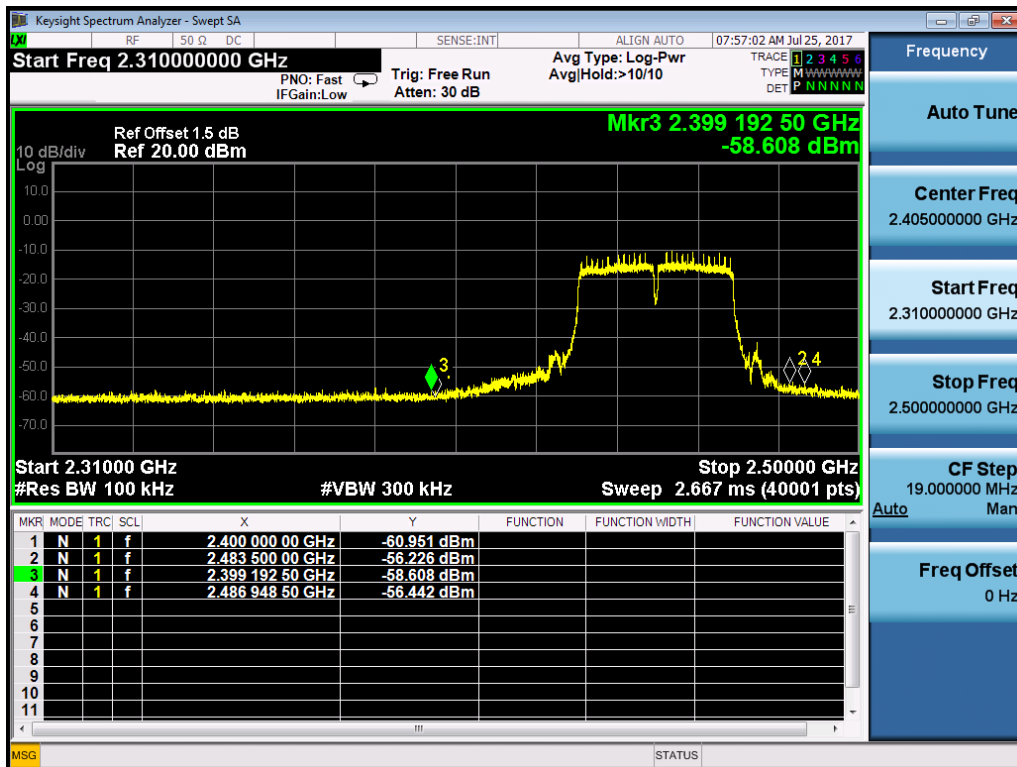


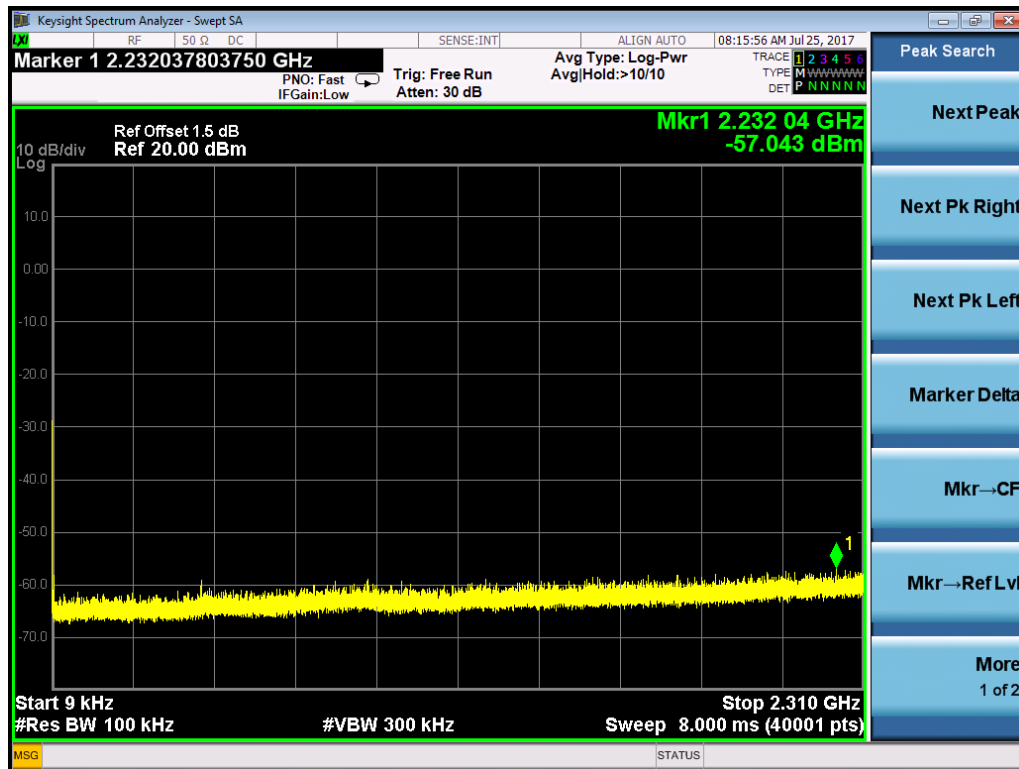
### Channel M





### Channel H





## 7 Radiated Emissions in restricted frequency bands

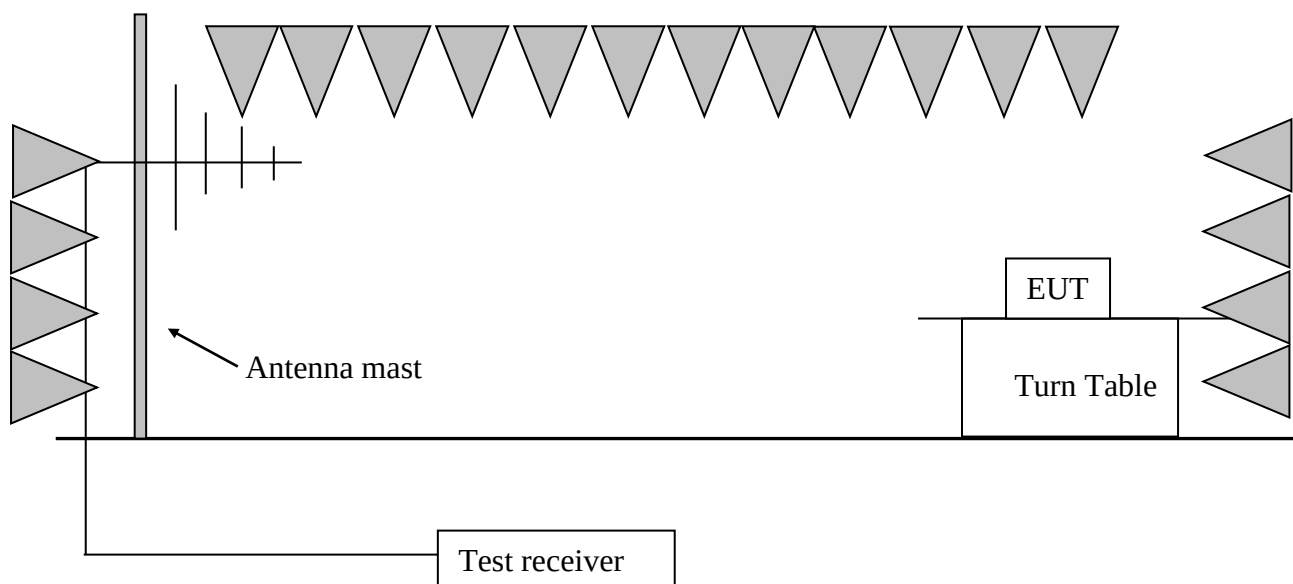
**Test result:** Pass

### 7.1 Test limit

The 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) showed as below:

| Frequencies<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009 ~ 0.490        | 2400/F(kHz)                          | 300                              |
| 0.490 ~ 1.705        | 24000/F(kHz)                         | 30                               |
| 1.705 ~ 30.0         | 30                                   | 30                               |
| 30 ~ 88              | 100                                  | 3                                |
| 88 ~ 216             | 150                                  | 3                                |
| 216 ~ 960            | 200                                  | 3                                |
| Above 960            | 500                                  | 3                                |

### 7.2 Test Configuration



### 7.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The EUT was tested according to DTS test procedure of KDB558074 D01 DTS “Meas Guidance v04” for compliance to FCC 47CFR 15.247 requirements.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);  
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);  
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)  
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);  
RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. If the PK measured level is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,  
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.  
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;  
Measured level = 10dBuV + 0.20dB/m = 10.20dBuV/m  
Assuming limit = 54dBuV/m,  
Measured level = 10.20dBuV/m, then Margin = 54 - 10.20 = 43.80dBuV/m.



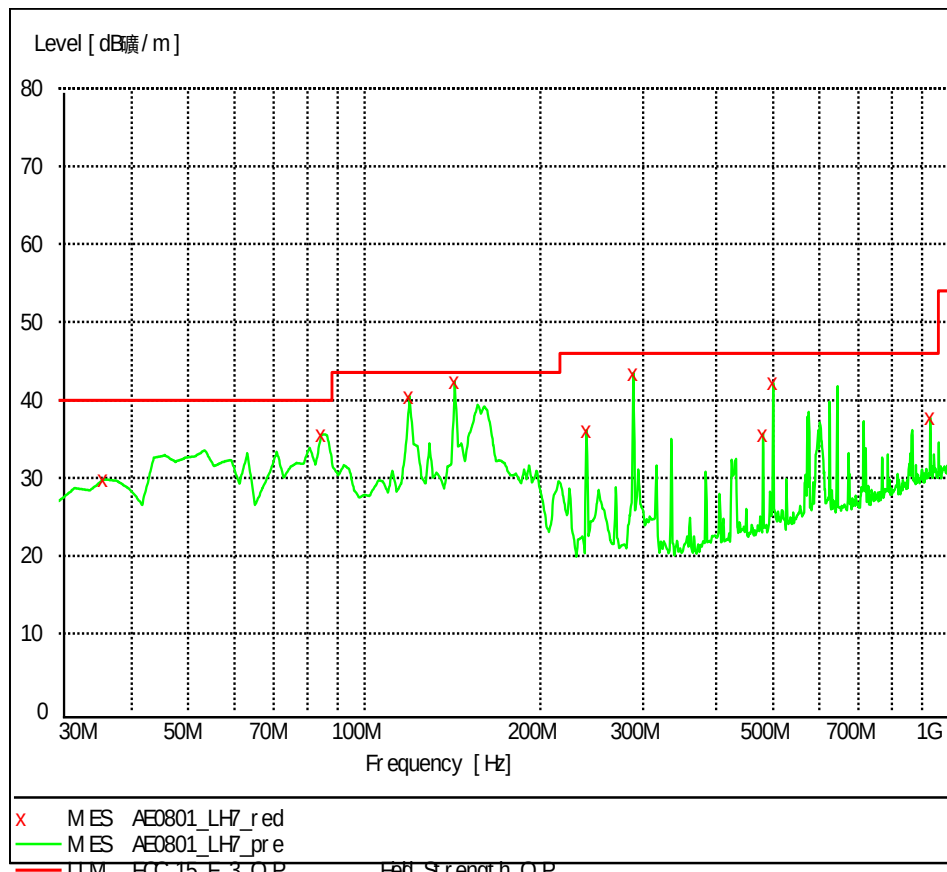
## 7.4 Test Protocol

Temperature: 25 °C  
Relative Humidity: 55 %

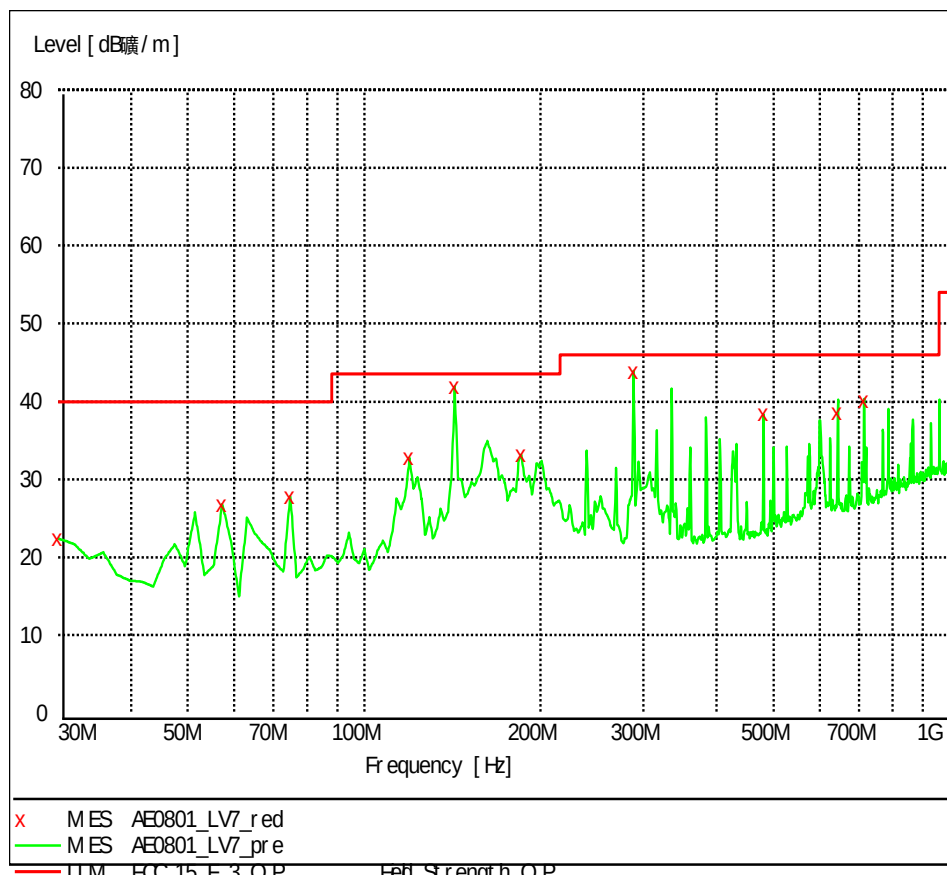
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:

Horizontal



## Vertical



### Test result below 1GHz:

| Antenna | Frequency (MHz) | Corrected Reading (dBuV/m) | Correct Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---------|-----------------|----------------------------|-----------------------|----------------|-------------|----------|
| H       | 35.83           | 29.80                      | 16.6                  | 40.00          | 10.20       | PK       |
| H       | 84.43           | 35.60                      | 9.3                   | 40.00          | 4.40        | PK       |
| H       | 119.42          | 40.50                      | 14.0                  | 43.50          | 3.00        | PK       |
| H       | 142.75          | 42.40                      | 12.8                  | 43.50          | 1.10        | PK       |
| H       | 239.94          | 36.10                      | 13.7                  | 46.00          | 9.90        | PK       |
| H       | 288.54          | 43.40                      | 15.3                  | 46.00          | 2.60        | PK       |
| H       | 480.98          | 35.70                      | 19.9                  | 46.00          | 10.30       | PK       |
| H       | 500.42          | 42.30                      | 20.2                  | 46.00          | 3.70        | PK       |
| H       | 930.02          | 37.80                      | 25.2                  | 46.00          | 8.20        | PK       |
| V       | 30.00           | 22.40                      | 21.0                  | 40.00          | 17.60       | PK       |

|   |        |       |      |       |       |    |
|---|--------|-------|------|-------|-------|----|
| V | 57.21  | 26.80 | 7.9  | 40.00 | 13.20 | PK |
| V | 74.71  | 27.80 | 8.6  | 40.00 | 12.20 | PK |
| V | 119.42 | 32.80 | 14.0 | 43.50 | 10.70 | PK |
| V | 142.75 | 41.90 | 12.8 | 43.50 | 1.60  | PK |
| V | 185.51 | 33.20 | 11.6 | 43.50 | 10.30 | PK |
| V | 288.54 | 43.90 | 15.3 | 46.00 | 2.10  | PK |
| V | 480.98 | 38.40 | 19.9 | 46.00 | 7.60  | PK |
| V | 644.27 | 38.60 | 22.0 | 46.00 | 7.40  | PK |
| V | 714.75 | 40.20 | 22.6 | 46.00 | 5.80  | PK |

**Test result above 1GHz (The WiFi was tested with and without Bluetooth connected, and the worst data was listed as below):**

The emission was conducted from 1GHz to 25GHz

#### 802.11b

| CH | Antenna | Frequency (MHz) | Corrected Reading (dBuV/m) | Correct Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|----------------------------|-----------------------|----------------|-------------|----------|
| L  | V       | 2412.60         | 102.90                     | 34.10                 | Fundamental    | /           | PK       |
|    | V       | 2387.29         | 49.86                      | 34.20                 | 74.00          | 24.14       | PK       |
|    | V       | 4824.16         | 52.50                      | -3.60                 | 74.00          | 21.50       | PK       |
| M  | V       | 2437.55         | 102.70                     | 34.20                 | Fundamental    | /           | PK       |
| H  | V       | 2462.60         | 102.40                     | 34.40                 | Fundamental    | /           | PK       |
|    | V       | 2487.29         | 51.65                      | 34.80                 | 74.00          | 22.35       | PK       |

#### 802.11g

| CH | Antenna | Frequency (MHz) | Corrected Reading (dBuV/m) | Correct Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|----------------------------|-----------------------|----------------|-------------|----------|
| L  | V       | 2412.60         | 98.60                      | 34.10                 | Fundamental    | /           | PK       |
|    | V       | 2383.49         | 50.71                      | 34.20                 | 74.00          | 23.29       | PK       |
|    | V       | 4824.40         | 50.71                      | -3.60                 | 74.00          | 23.29       | PK       |
| M  | V       | 2437.58         | 97.99                      | 34.20                 | Fundamental    | /           | PK       |

|   |   |         |       |       |             |       |    |
|---|---|---------|-------|-------|-------------|-------|----|
| H | V | 2462.90 | 97.54 | 34.40 | Fundamental | /     | PK |
|   | V | 2487.96 | 51.68 | 34.80 | 74.00       | 22.32 | PK |
|   | V | 4924.68 | 51.68 | -3.30 | 74.00       | 22.32 | PK |

## 802.11n(HT20)

| CH | Antenna | Frequency (MHz) | Corrected Reading (dBuV/m) | Correct Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|----------------------------|-----------------------|----------------|-------------|----------|
| L  | V       | 2412.80         | 100.90                     | 34.10                 | Fundamental    | /           | PK       |
|    | V       | 2388.82         | 50.66                      | 34.20                 | 74.00          | 23.34       | PK       |
|    | V       | 4824.47         | 49.50                      | -3.60                 | 74.00          | 24.50       | PK       |
| M  | V       | 2437.35         | 100.60                     | 34.20                 | Fundamental    | /           | PK       |
| H  | V       | 2462.58         | 100.20                     | 34.40                 | Fundamental    | /           | PK       |
|    | V       | 2487.43         | 51.53                      | 34.80                 | 74.00          | 22.47       | PK       |
|    | V       | 4924.69         | 49.20                      | -3.30                 | 74.00          | 24.80       | PK       |

## 802.11n(HT40)

| CH | Antenna | Frequency (MHz) | Corrected Reading (dBuV/m) | Correct Factor (dB/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|----------------------------|-----------------------|----------------|-------------|----------|
| L  | V       | 2422.68         | 96.10                      | 34.10                 | Fundamental    | /           | PK       |
|    | V       | 2388.44         | 52.54                      | 34.20                 | 74.00          | 21.46       | PK       |
|    | V       | 4844.31         | 46.80                      | -3.60                 | 74.00          | 27.20       | PK       |
| M  | V       | 2437.89         | 97.50                      | 34.20                 | Fundamental    | /           | PK       |
| H  | V       | 2452.90         | 98.00                      | 34.30                 | Fundamental    | /           | PK       |
|    | V       | 2483.63         | 51.65                      | 34.80                 | 74.00          | 22.35       | PK       |
|    | V       | 4905.26         | 46.60                      | -3.30                 | 74.00          | 27.40       | PK       |

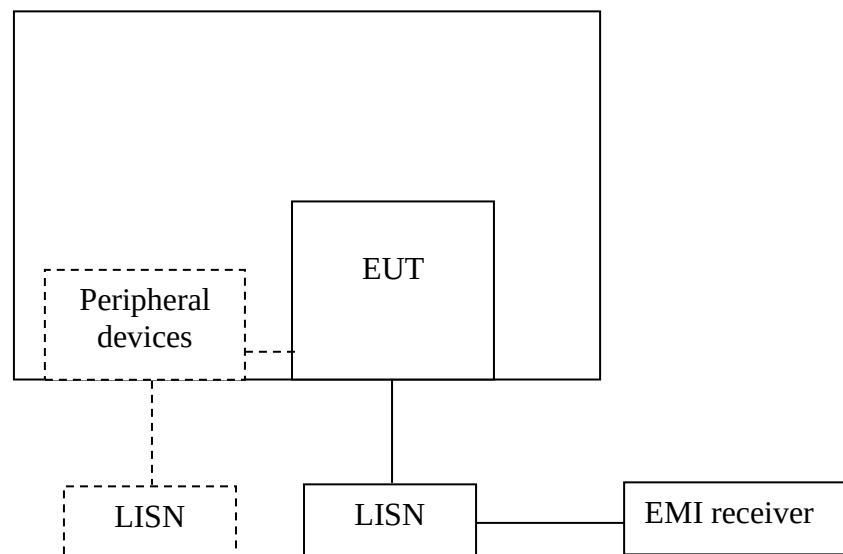
## 8 Power line conducted emission

**Test result:** NA

### 8.1 Limit

| Frequency of Emission (MHz)                      | Conducted Limit (dBuV) |            |
|--------------------------------------------------|------------------------|------------|
|                                                  | QP                     | AV         |
| 0.15-0.5                                         | 66 to 56*              | 56 to 46 * |
| 0.5-5                                            | 56                     | 46         |
| 5-30                                             | 60                     | 50         |
| * Decreases with the logarithm of the frequency. |                        |            |

### 8.2 Test configuration



- ☐ For table top equipment, wooden support is 0.8m height table
- ☐ For floor standing equipment, wooden support is 0.1m height rack.

### 8.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50  $\Omega$  LISN port (to which the EUT is connected), where permitted, terminated into a 50  $\Omega$  measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50  $\Omega$  measuring port is terminated by a measuring instrument having 50  $\Omega$  input impedance. All other ports are terminated in 50  $\Omega$  loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

## 8.4 Test protocol

Temperature: °C  
Relative Humidity: %

L Line

### Test Data:

| Frequency<br>(MHz) | Quasi-peak      |                 |                | Average         |                 |                |
|--------------------|-----------------|-----------------|----------------|-----------------|-----------------|----------------|
|                    | level<br>dB(μV) | Limit<br>dB(μV) | Margin<br>(dB) | level<br>dB(μV) | limit<br>dB(μV) | Margin<br>(dB) |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |

N Line

### Test Data:

| Frequency<br>(MHz) | Quasi-peak      |                 |                | Average         |                 |                |
|--------------------|-----------------|-----------------|----------------|-----------------|-----------------|----------------|
|                    | level<br>dB(μV) | Limit<br>dB(μV) | Margin<br>(dB) | level<br>dB(μV) | limit<br>dB(μV) | Margin<br>(dB) |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |
|                    |                 |                 |                |                 |                 |                |

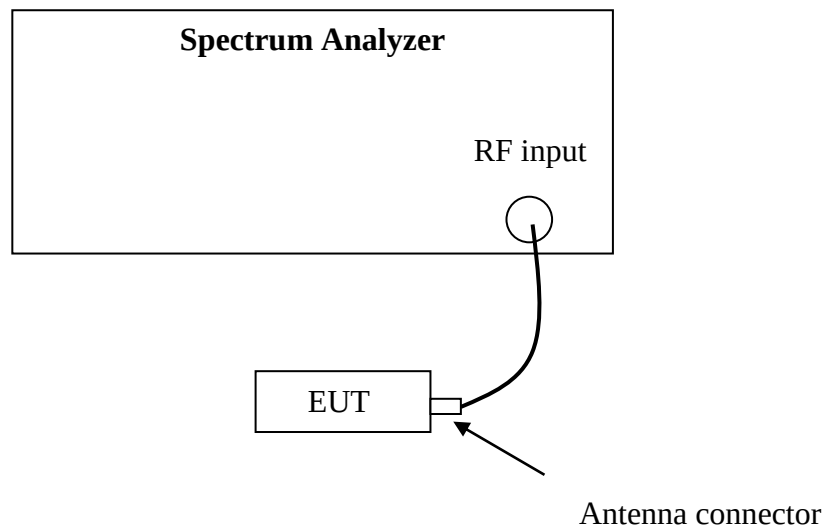
## 9 Occupied Bandwidth

**Test Status: Tested**

### 9.1 Test limit

None

### 9.2 Test Configuration



### 9.3 Test procedure and test setup

The occupied bandwidth per RSS-Gen Issue 4 Clause 6.6 was measured using the Spectrum Analyzer.

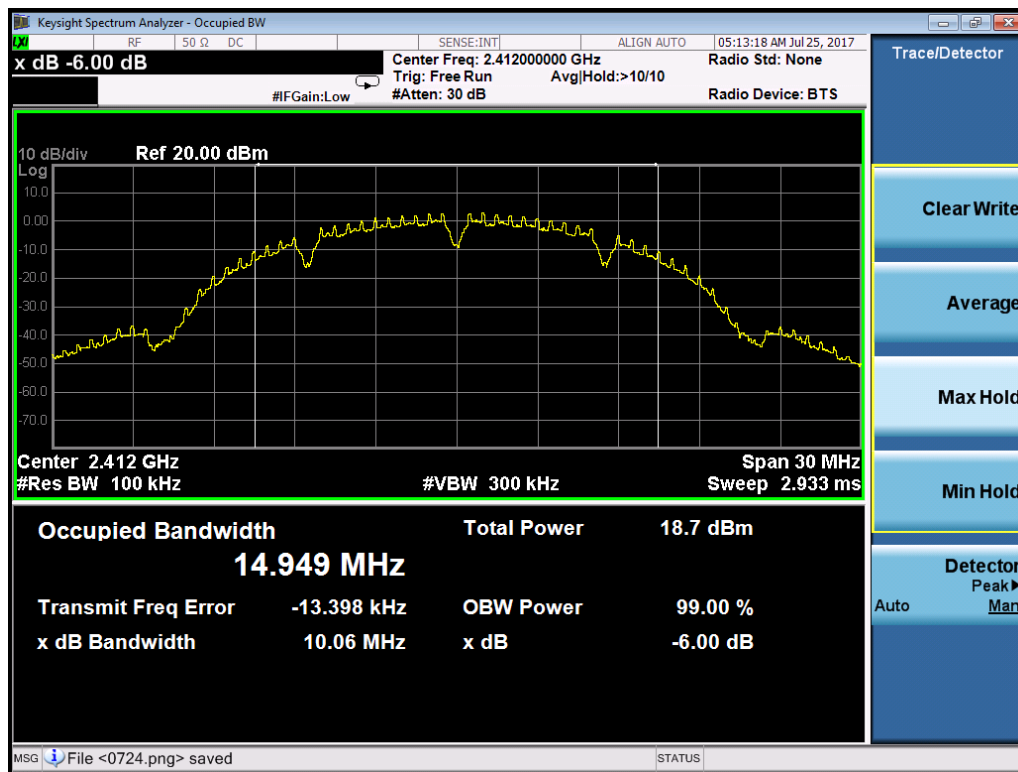


## 9.4 Test protocol

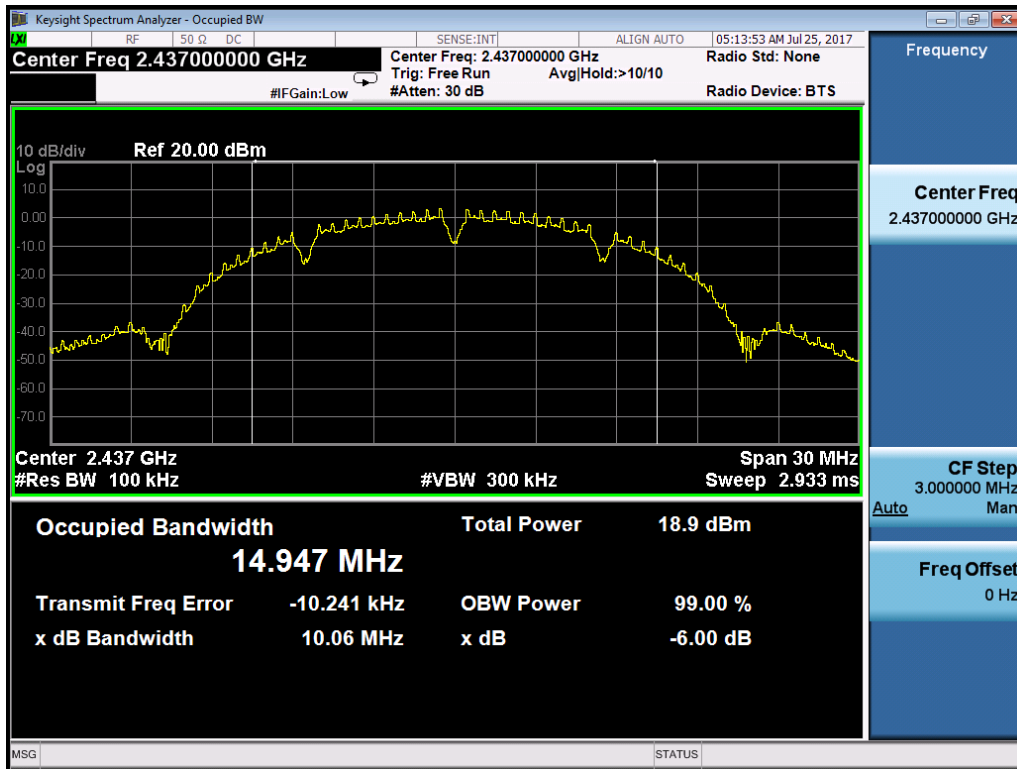
Temperature : 25 °C  
Relative Humidity : 55 %

| Mode    | Mode | 99% Bandwidth (MHz) |   |   |
|---------|------|---------------------|---|---|
|         |      | Port0               | - | - |
| 802.11b | L    | 14.949              | - | - |
|         | M    | 14.947              | - | - |
|         | H    | 14.955              | - | - |

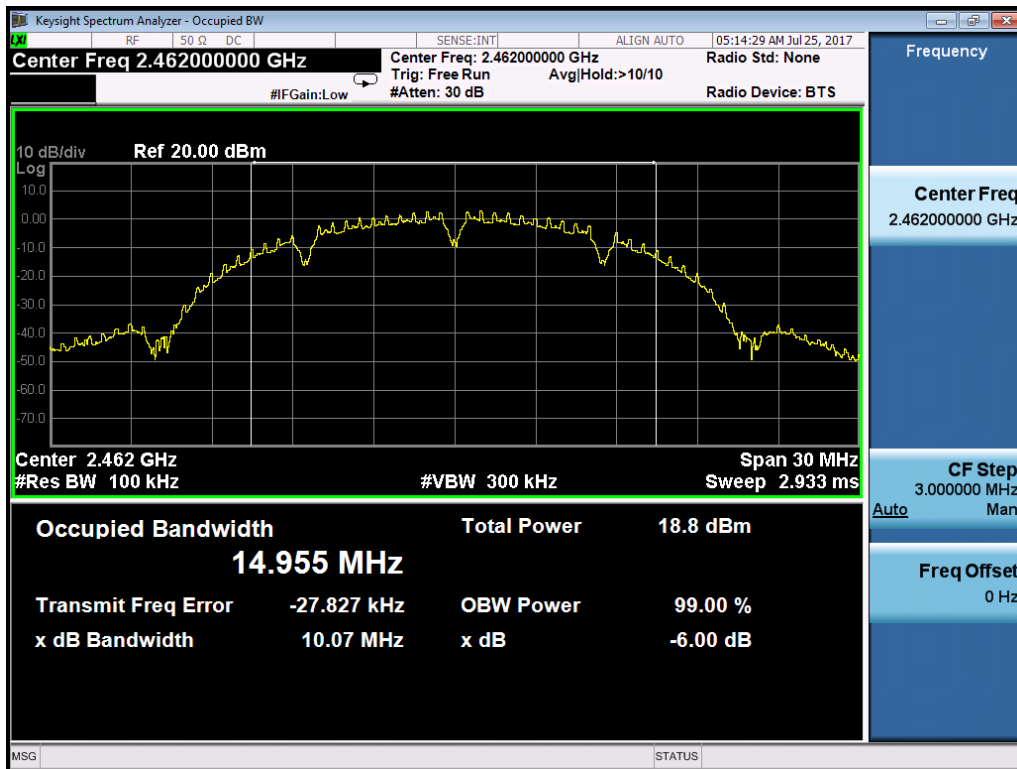
### Channel L



### Channel M

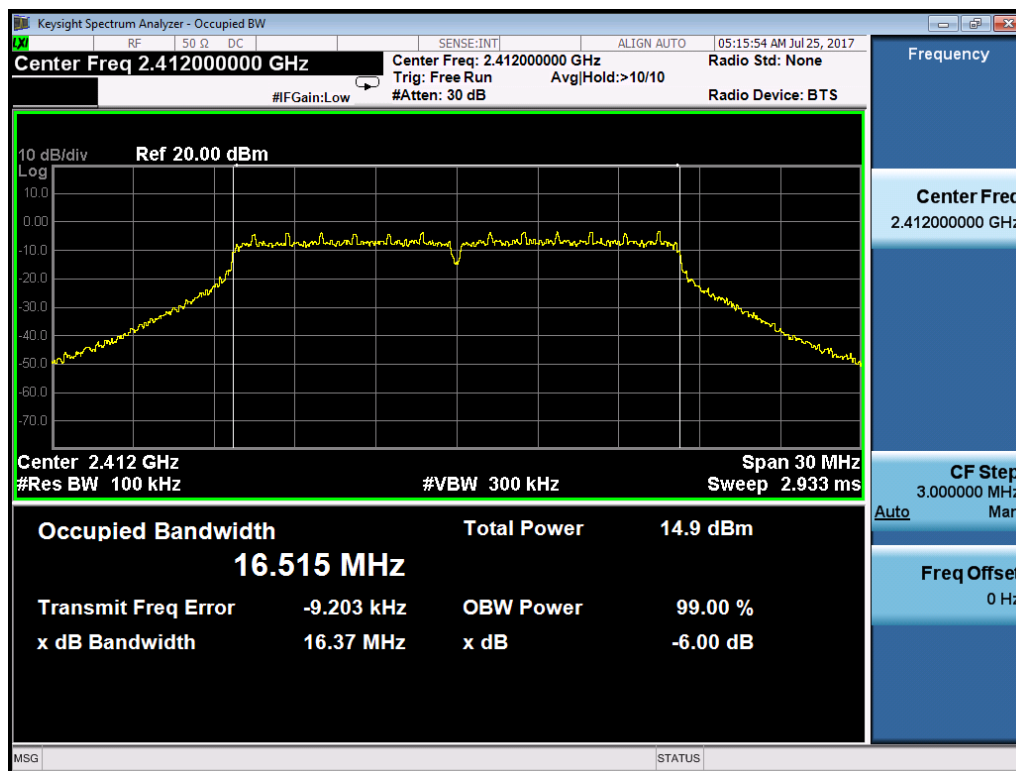


### Channel H

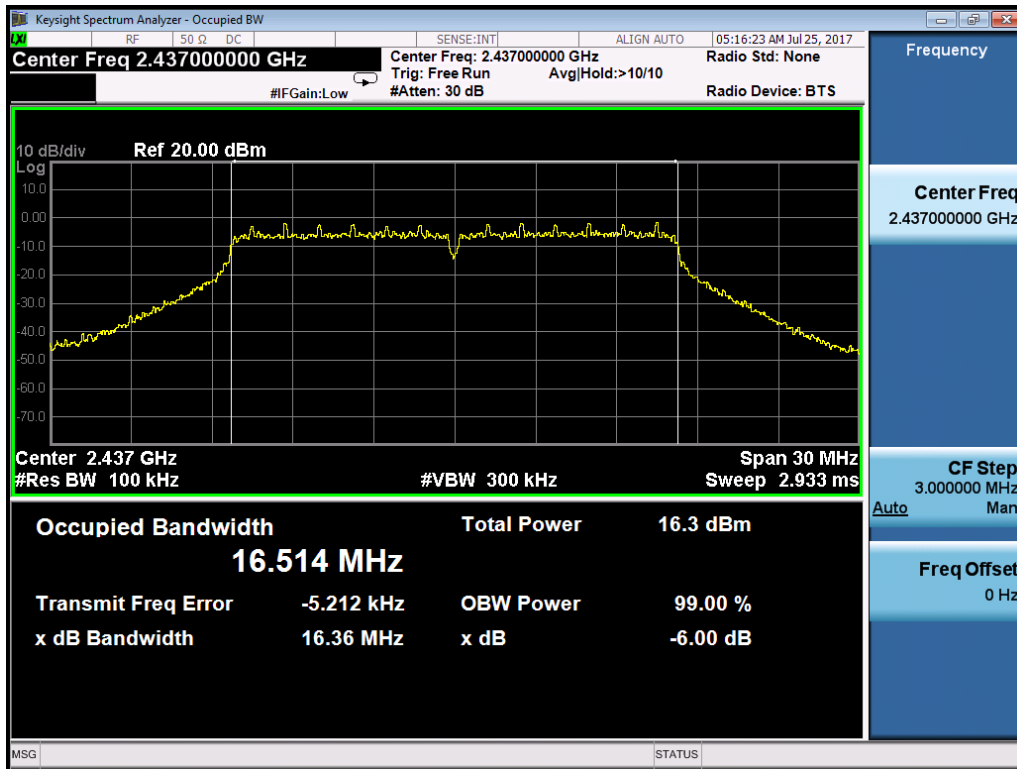


| Mode    | Mode | 99% Bandwidth (MHz) |        |        |
|---------|------|---------------------|--------|--------|
|         |      | Port0               | Port 1 | Port 2 |
| 802.11g | L    | 16.515              | -      | -      |
|         | M    | 16.514              | -      | -      |
|         | H    | 16.517              | -      | -      |

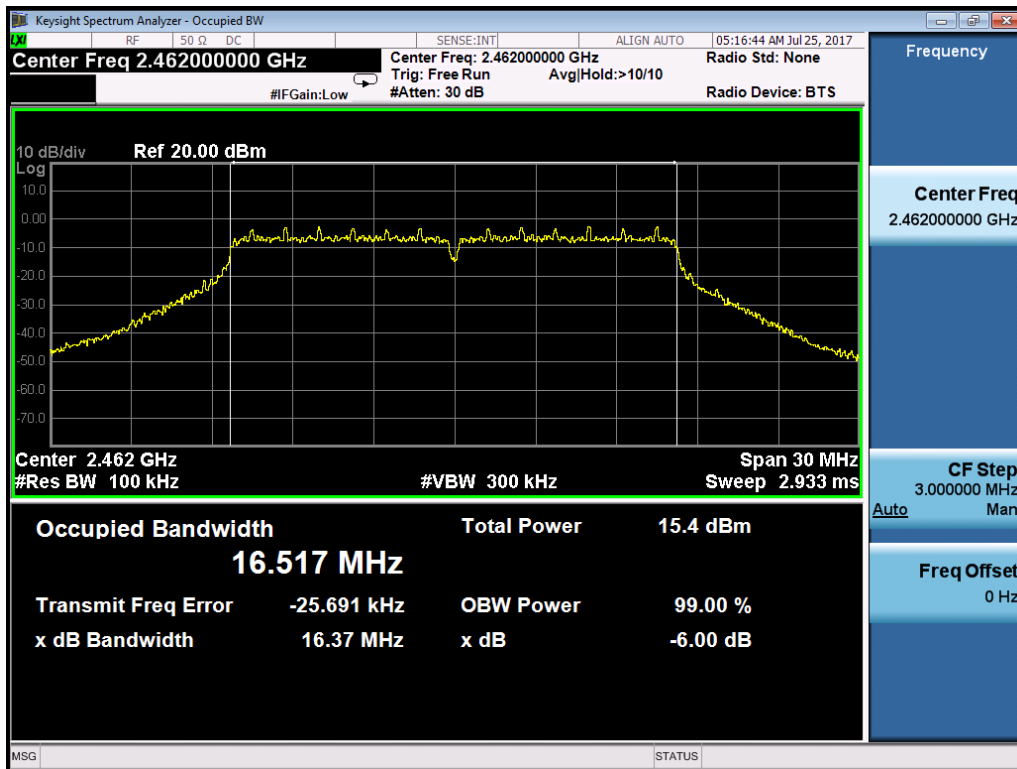
### Channel L



### Channel M

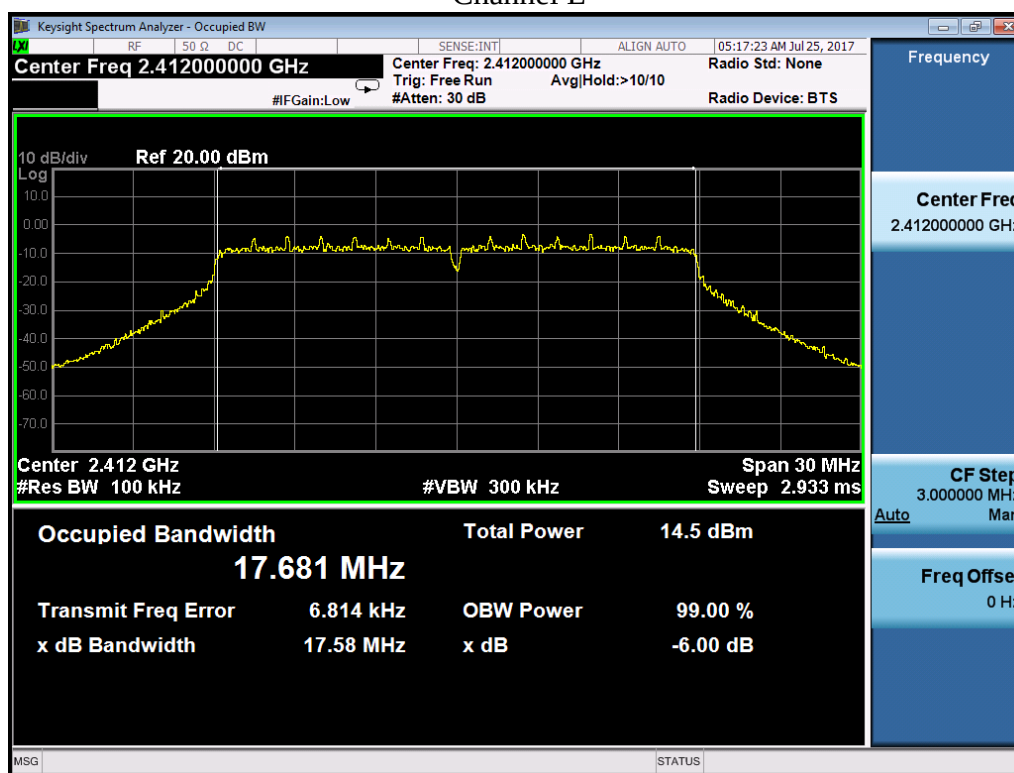


### Channel H

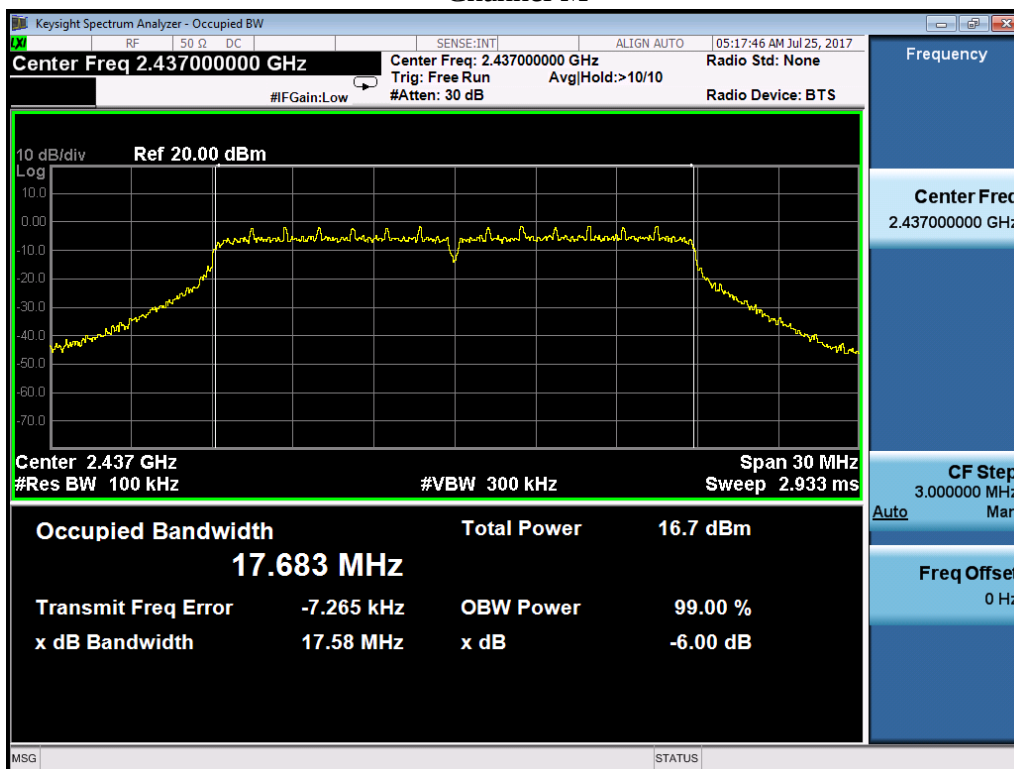


| Mode           | Mode | 99% Bandwidth (MHz) |        |        |
|----------------|------|---------------------|--------|--------|
|                |      | Port0               | Port 1 | Port 2 |
| 802.11n (HT20) | L    | 17.681              | -      | -      |
|                | M    | 17.683              | -      | -      |
|                | H    | 17.682              | -      | -      |

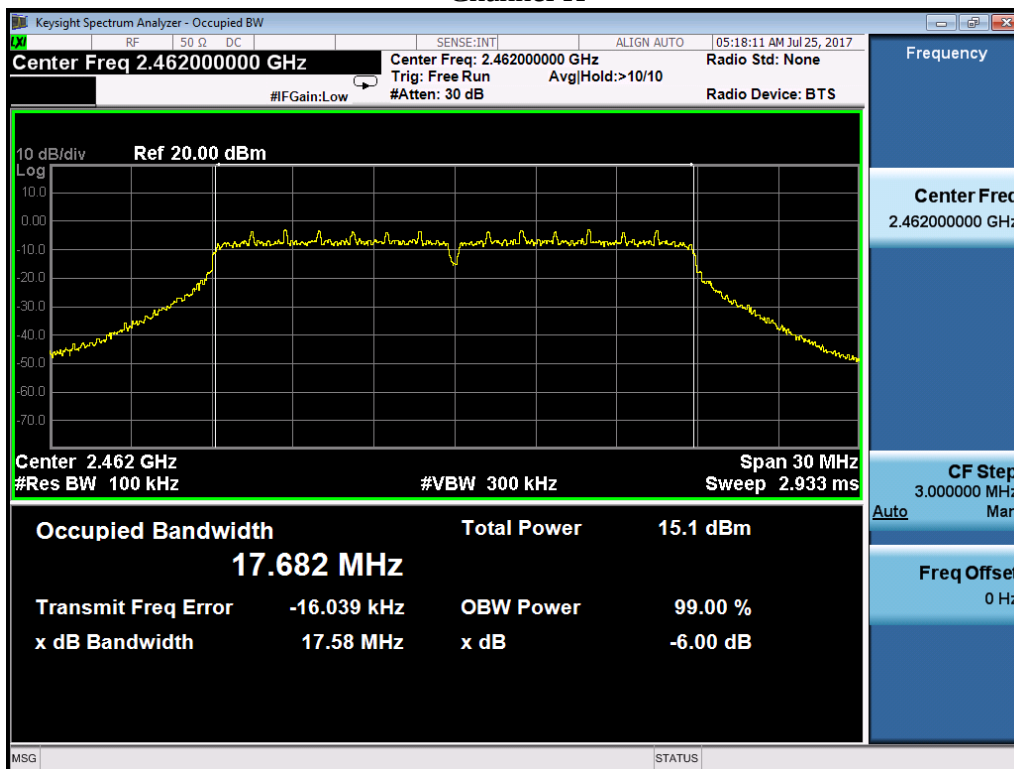
Channel L



### Channel M

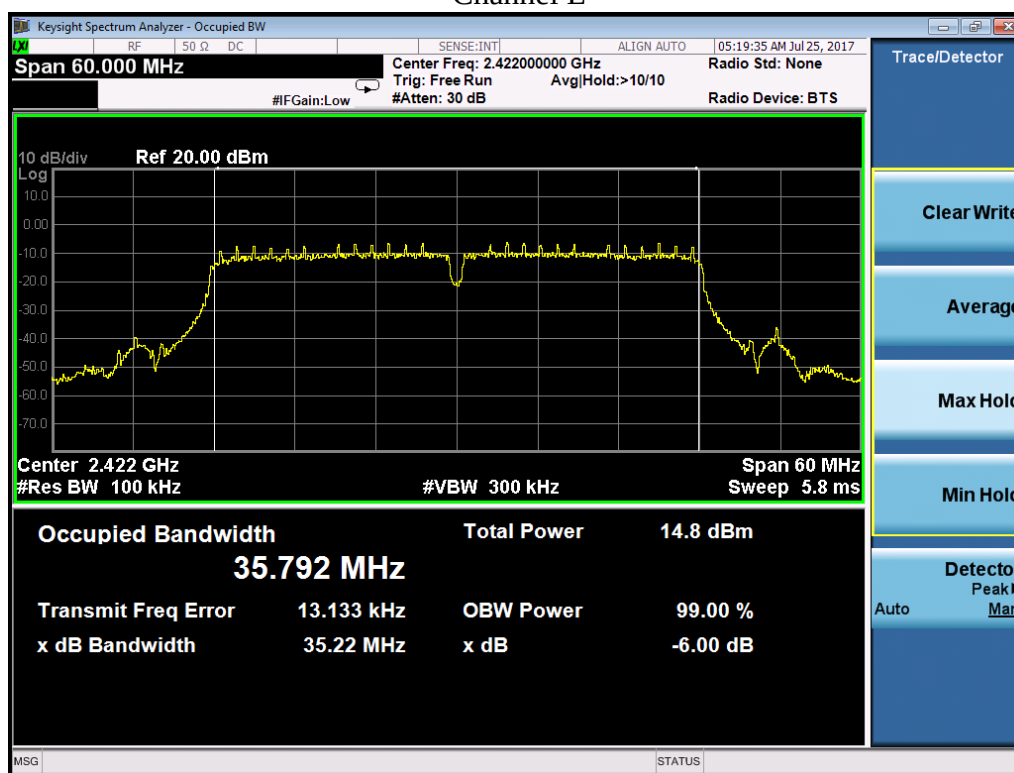


### Channel H

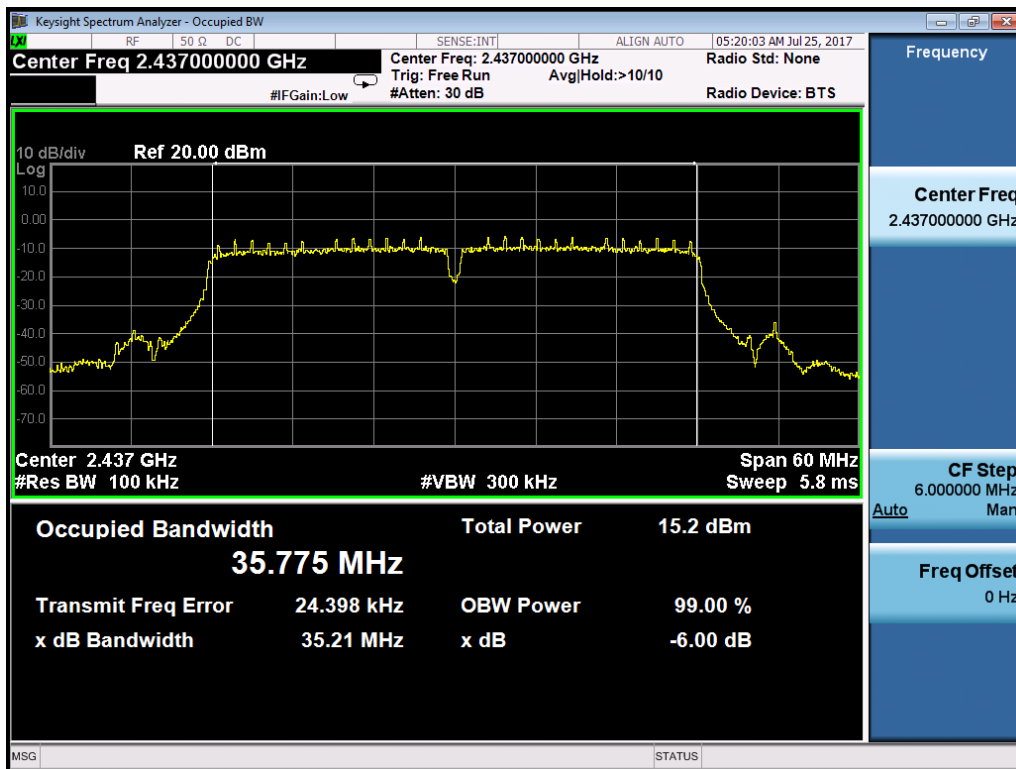


| Mode           | Mode | 99% Bandwidth (MHz) |        |        |
|----------------|------|---------------------|--------|--------|
|                |      | Port0               | Port 1 | Port 2 |
| 802.11n (HT40) | L    | 35.792              | -      | -      |
|                | M    | 35.775              | -      | -      |
|                | H    | 35.793              | -      | -      |

### Channel L



### Channel M



### Channel H

