# GENIUS TOY TAIWAN CO., LTD

# TEST REPORT

**SCOPE OF WORK:**
47 CFR FCC Part 15.247 – Radio Spectrum report

**Model:**
#7066-US-SAM

**REPORT NUMBER**
210600095THC-001

**ISSUE DATE**
Jul. 08, 2021

**PAGES**
45

**DOCUMENT CONTROL NUMBER**
GFT-OP-10h (28-Nov-2018)

# Radio Spectrum
## TEST REPORT

| | |
|---|---|
| **Applicant:** | **GENIUS TOY TAIWAN CO., LTD**<br>**7F-2, No. 406, Taiwan Blvd. Sec. 2, Taichung, Taiwan 403** |
| **Product:** | **Robotics Smart Machines 5-in-1 Buildable Drone with HD Camera** |
| **Brand Name** | **Thames & Kosmos** |
| **Model No.:** | **#7066-US-SAM** |
| **FCC ID:** | **2AE3D-7066-US-SAM** |
| **Test Method/ Standard:** | **47 CFR FCC Part 15.247 & ANSI C63.10 2013**<br>**KDB 558074 D01 v05r02** |
| **Test By:** | **Intertek Testing Services Taiwan Ltd.,**<br>**Hsinchu Laboratory**<br>**No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,**<br>**Shiang-Shan District, Hsinchu City, Taiwan** |

Testing Laboratory
0597

Zero Chen
Engineer

Durant Wei
Reviewer

## Revision History

| Report No. | Issue Date | Revision Summary |
|---|---|---|
| 210600095THC-001 | Jul. 08, 2021 | Original report |

# Table of Contents

## Summary of Test Data

| Test Requirement | Applicable Rule (Section 15.247) | Result |
|---|---|---|
| Minimum 6 dB Bandwidth | 15.247(a)(2) | Pass |
| Maximum Peak Conducted Output Power | 15.247(b)(3) | Pass |
| Power Spectral Density | 15.247(e) | Pass |
| Emissions In Non-Restricted Frequency Bands | 15.247(d) | Pass |
| Emissions In Restricted Frequency Bands (Radiated emission measurements) | 15.247(d), 15.205, 15.209 | Pass |
| Emission On The Band Edge | 15.247(d), 15.205 | Pass |
| AC Power Line Conducted Emission | 15.207 | N/A |
| Antenna Requirement | 15.203 | Pass |

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.
Other Testing: the specification, standard and not taking into account the measurement uncertainty.

## 1. General Information

### 1.1 Identification of the EUT

| | |
|---|---|
| **Product:** | Robotics Smart Machines 5-in-1 Buildable Drone with HD Camera |
| **Model No.:** | #7066-US-SAM |
| **Operating Frequency:** | 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20 |
| **Channel Number:** | 11 channels |
| **Frequency of Each Channel:** | 2412+5 k, k＝0 ~ 10 for 802.11b, 802.11g, 802.11n HT20 |
| **Rated Power:** | DC 3V from battery |
| **Power Cord:** | N/A |
| **Sample receiving date:** | 2021/06/15 |
| **Sample condition:** | Workable |
| **Test Date(s):** | 2021/06/18 ~ 2021/06/25 |

### 1.2 Description of the EUT

| Modulation mode | Transmit path |
|---|---|
| | Chain 0 |
| 802.11b | V |
| 802.11g | V |
| 802.11n (HT20) | V |

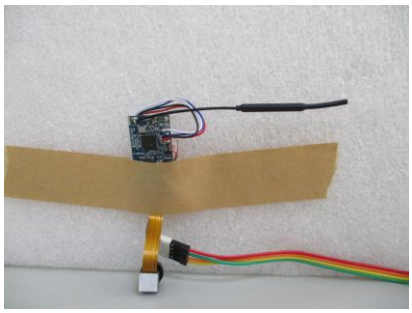
### 1.3 Antenna description

Antenna Gain : 2 dBi
Antenna Type : Monopole antenna
Connector Type : Fixed

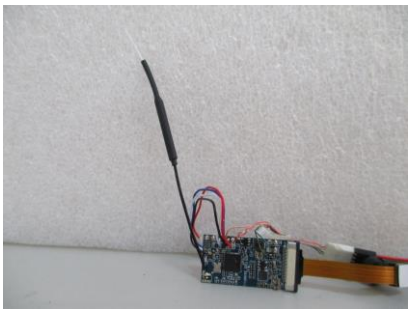
### 1.4 Operation mode

The EUT connected to Notebook PC USB port , executing “SecureCRT.exe” and select different frequency and modulation.
With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n(HT20) mode, the final tests were executed under these conditions recorded in this report individually.

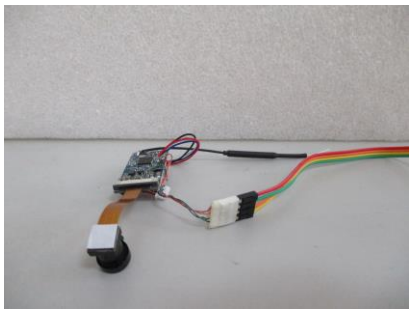
The signal is maximized through rotation and placement in the three orthogonal axes.



**X axis**



**Y axis**



**Z axis**

After verifying three axes, we found the maximum electromagnetic field was occurred at Z axis. The final test data was executed under this configuration.

| Mode | Channel | Frequency (MHz) | Data rate (Mbps) | Signal on time (ms) | Signal on+off time (ms) | Duty cycle | Duty factor (dB) | 1/T Minimum VBW (kHz) |
|---|---|---|---|---|---|---|---|---|
| 802.11b | 6 | 2437 | 1 | 8.37 | 8.40 | 0.997 | 0.013 | 8.37 |
| 802.11g | 6 | 2437 | 6 | 1.38 | 1.41 | 0.982 | 0.081 | 1.38 |
| 802.11nHT20 | 6 | 2437 | 6.5 | 5.08 | 5.10 | 0.995 | 0.024 | 5.08 |

### 1.5 Peripherals equipment

| Peripherals | Brand | Model No. | Serial No. | Data cable |
|---|---|---|---|---|
| Notebook PC | HP | HP Probook 440 G3 | 5CD8021S9H | USB to TTL Converter Cable 0.6 meter |
| Fixture | N/A | N/A | N/A | USB to TTL Converter Cable 0.6 meter |

## 2. Minimum 6 dB Bandwidth

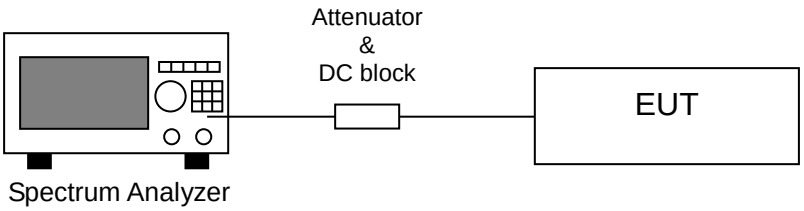
### 2.1 Instrument Setting

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| RBW | 100kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Allow the trace to stabilize. |
| Span | Between two times and five times the occupied bandwidth |
| Attenuation | Auto |

### 2.2 Test Procedure

| | |
|---|---|
| Step 1 | The transmitter output was connected to the spectrum analyzer. |
| Step 2 | Test was performed accordance with ANSI C63.10. |
| Step 3 | 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 |

### 2.3 Test Diagram




### 2.4 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

## 2.5 Test Results

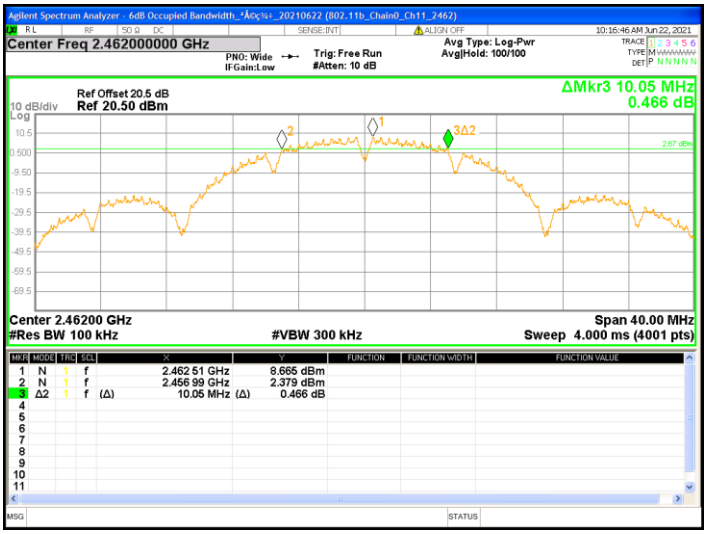
| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 57 |
| Test date : | 2021/6/22 |

| Mode | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|---|
| 802.11b | 1 | 2412 | 10.02 | >0.5 | Pass |
| | 6 | 2437 | 10.07 | >0.5 | Pass |
| | 11 | 2462 | 10.05 | >0.5 | Pass |
| 802.11g | 1 | 2412 | 16.34 | >0.5 | Pass |
| | 6 | 2437 | 16.37 | >0.5 | Pass |
| | 11 | 2462 | 16.36 | >0.5 | Pass |
| 802.11n(HT20) | 1 | 2412 | 17.61 | >0.5 | Pass |
| | 6 | 2437 | 17.59 | >0.5 | Pass |
| | 11 | 2462 | 17.61 | >0.5 | Pass |

## Chain 0: 6dB Bandwidth @ 802.11b Mode Ch 1


## Chain 0: 6dB Bandwidth @ 802.11b Mode Ch 6


## Chain 0: 6dB Bandwidth @ 802.11b Mode Ch11



## Chain 0: 6dB Bandwidth @ 802.11g Mode Ch 1


## Chain 0: 6dB Bandwidth @ 802.11g Mode Ch 6


## Chain 0: 6dB Bandwidth @ 802.11g Mode Ch11

## Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1


## Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch 6


## Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch11

## 3. Maximum Peak Conducted Output Power

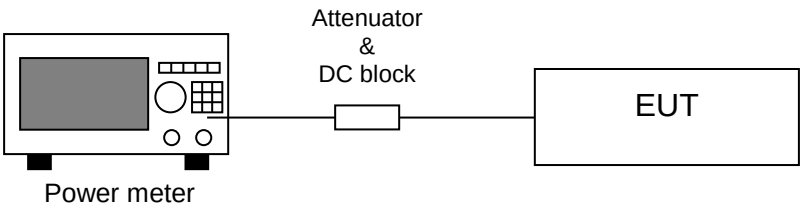
### 3.1 Instrument Setting

| Power Meter Parameter | Setting |
|---|---|
| Bandwidth | 65MHz bandwidth is greater than the EUT emission bandwidth |
| Detector | Peak & Average |

### 3.2Test Procedure

The preferred methodology is to use integrated average power measurements, as described in 11.9.2 and 11.13.3 of ANSI C63.10. The peak integrated band power methods of 11.9.1.2 and 11.13.3.2 of ANSI C63.10 are not applicable for FCC compliance testing purposes.

### 3.3 Test Diagram




### 3.4 Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

### 3.5 Test Results

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 57 |
| Test date : | 2021/6/22 |

| Mode | Channel | Frequency (MHz) | Output Power (AV) (dBm) | Total Power (AV) (mW) | Maximum power (PK) (dBm) | Maximum power (PK) (mW) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 802.11b | 1 | 2412 | 19.92 | 98.17 | 20.44 | 110.66 | 30 | -9.56 |
| | 6 | 2437 | 19.14 | 82.04 | 20.68 | 116.95 | 30 | -9.32 |
| | 11 | 2462 | 19.33 | 85.70 | 20.78 | 119.67 | 30 | -9.22 |
| 802.11g | 1 | 2412 | 14.86 | 30.62 | 22.31 | 170.22 | 30 | -7.69 |
| | 6 | 2437 | 15.17 | 32.89 | 22.60 | 181.97 | 30 | -7.40 |
| | 11 | 2462 | 13.50 | 22.39 | 21.24 | 133.05 | 30 | -8.76 |
| 802.11n (HT20) | 1 | 2412 | 14.90 | 30.90 | 22.61 | 182.39 | 30 | -7.39 |
| | 6 | 2437 | 15.16 | 32.81 | 22.08 | 161.44 | 30 | -7.92 |
| | 11 | 2462 | 13.45 | 22.13 | 21.45 | 139.64 | 30 | -8.55 |

## 4. Power Spectral Density

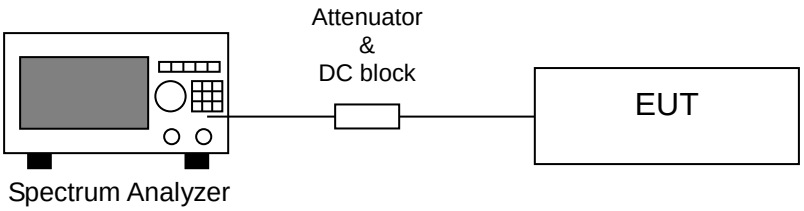
### 4.1 Instrument Setting

| Spectrum Function | Setting |
|---|---|
| Detector | Peak |
| RBW | ≧3 kHz |
| VBW | ≧3 x RBW |
| Sweep | Auto couple |
| Trace | Max hold |
| Span | 1.5 times x 6dB bandwidth |
| Attenuation | Auto |

### 4.2 Test Procedure

| | |
|---|---|
| Step 1 | Test procedure refer to subclause 11.10 of ANSI C63.10. |
| Step 2 | Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration. |
| Step 3 | Use the peak marker function to determine the maximum amplitude level within the RBW. |

### 4.3 Test Diagram




### 4.4 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 10 kHz band during any time interval of continuous transmission

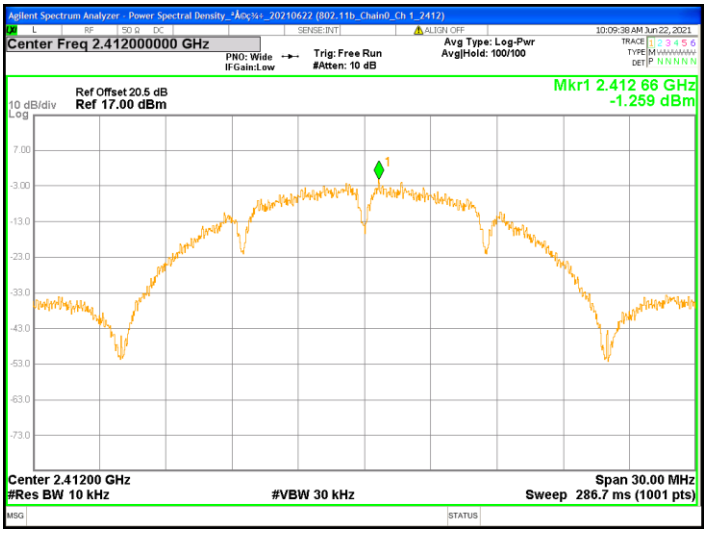
### 4.5 Test Results

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 57 |
| Test date : | 2021/6/22 |

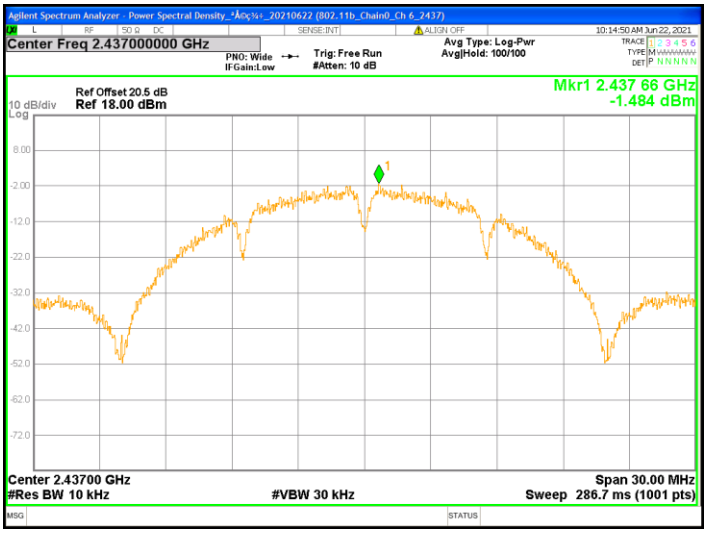
Note: Because using KDB 662911 v02r01 D01 E) 2) c), we found the peak PSD and add 10 log($N_{ANT}$) dB, where $N_{ANT}$ is the number of outputs.

| Mode | Channel | Frequency (MHz) | PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| 802.11b | 1 | 2412 | -1.26 | 8 | -9.26 |
| | 6 | 2437 | -1.48 | 8 | -9.48 |
| | 11 | 2462 | -1.02 | 8 | -9.02 |
| 802.11g | 1 | 2412 | -6.94 | 8 | -14.94 |
| | 6 | 2437 | -6.36 | 8 | -14.36 |
| | 11 | 2462 | -8.49 | 8 | -16.49 |
| 802.11n(HT20) | 1 | 2412 | -6.41 | 8 | -14.41 |
| | 6 | 2437 | -6.38 | 8 | -14.38 |
| | 11 | 2462 | -8.02 | 8 | -16.02 |

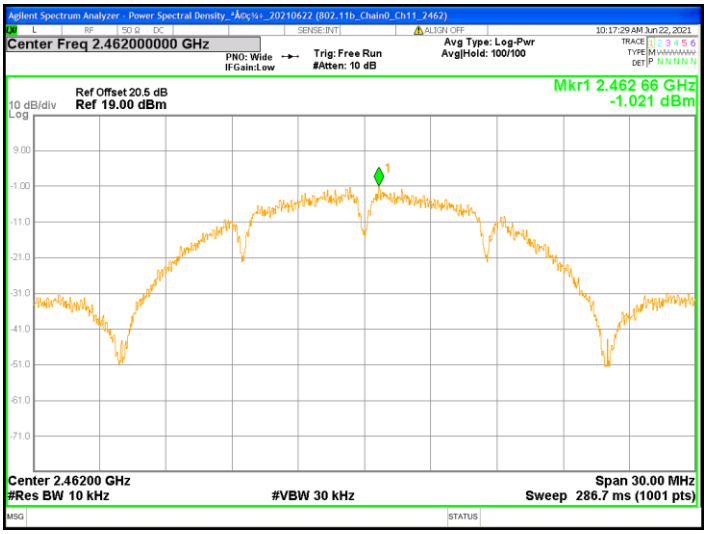
## Chain 0: Power Spectral Density @ 802.11b Mode Ch 1



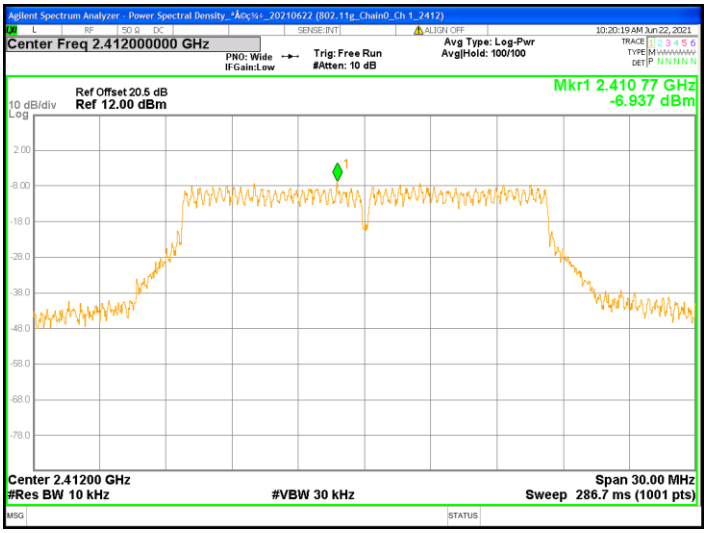

## Chain 0: Power Spectral Density @ 802.11b Mode Ch 6



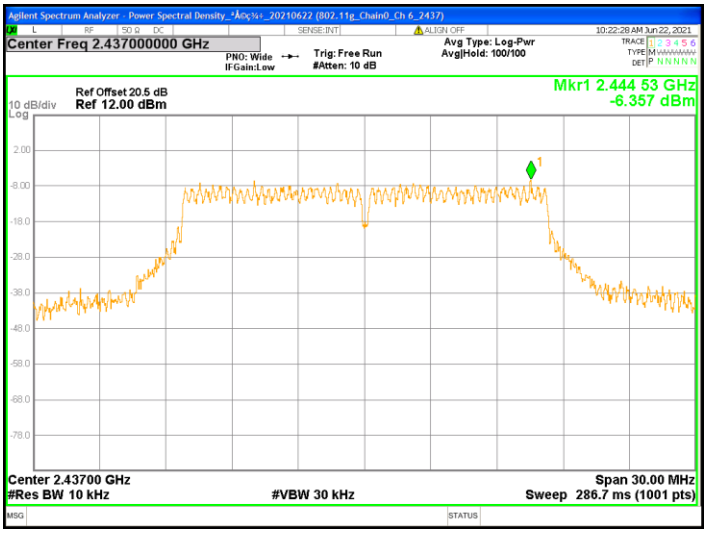

## Chain 0: Power Spectral Density @ 802.11b Mode Ch11



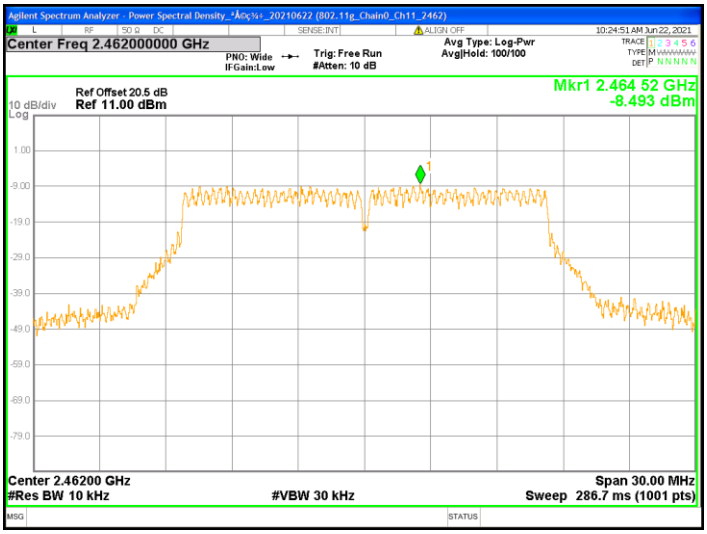
## Chain 0: Power Spectral Density @ 802.11g Mode Ch 1



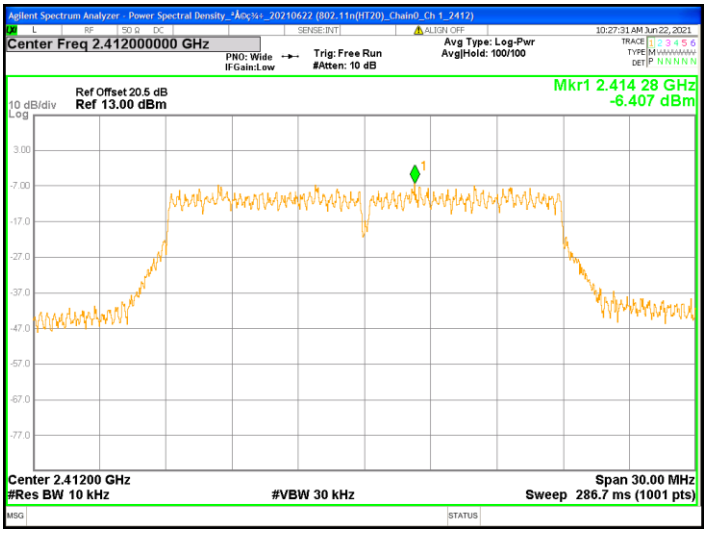

## Chain 0: Power Spectral Density @ 802.11g Mode Ch 6



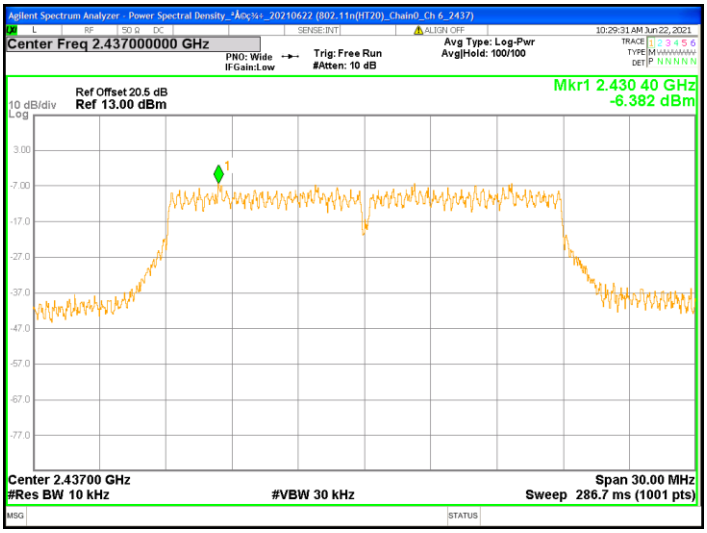

## Chain 0: Power Spectral Density @ 802.11g Mode Ch11



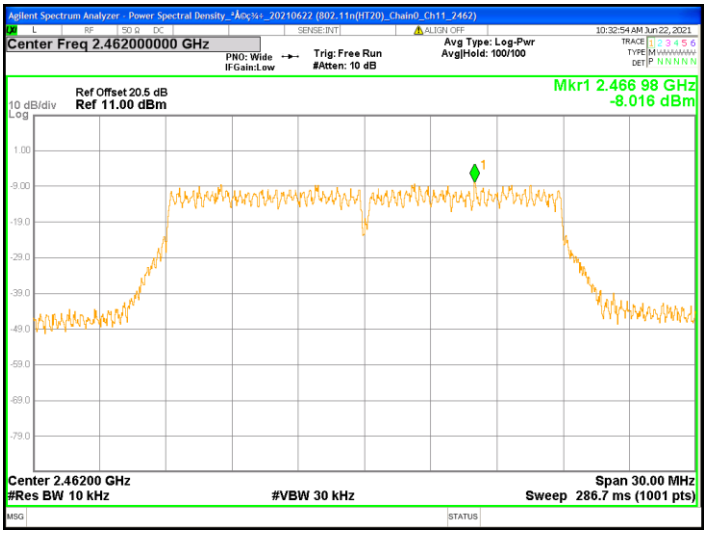
## Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch 1




## Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch 6




## Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch11



## 5. Emissions in Non-Restricted Frequency Bands

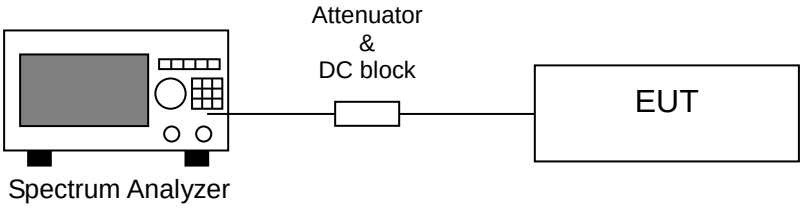
### 5.1 Instruments Setting

| Spectrum Function | Setting (Reference Level) | Setting (Emission Level) |
|---|---|---|
| Detector | Peak | Peak |
| RBW | ≧ 100 kHz | ≧ 100 kHz |
| VBW | ≧ 3 x RBW | ≧ 3 x RBW |
| Sweep | Auto couple | Auto couple |
| Trace | Max hold | Max hold |
| Span | ≧ 1.5 time 6dB bandwidth | |
| Attenuation | Auto | Auto |

### 5.2 Test Procedure

Step 1 The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
Step 2 Set instrument center frequency to center frequency.
Step 3 Use the parameter configured in subclause 11.11 of ANSI C63.10 to measure.
Step 4 Use the peak marker function to determine the maximum amplitude level.

### 5.3 Test Diagram



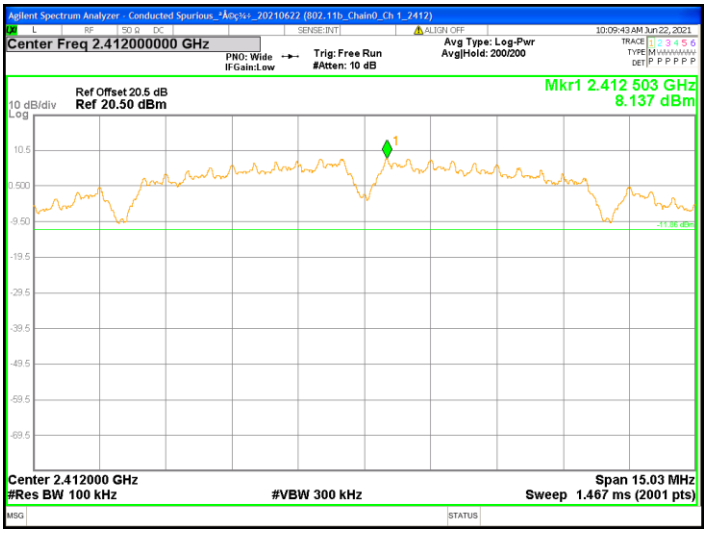

### 5.4 Limit

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

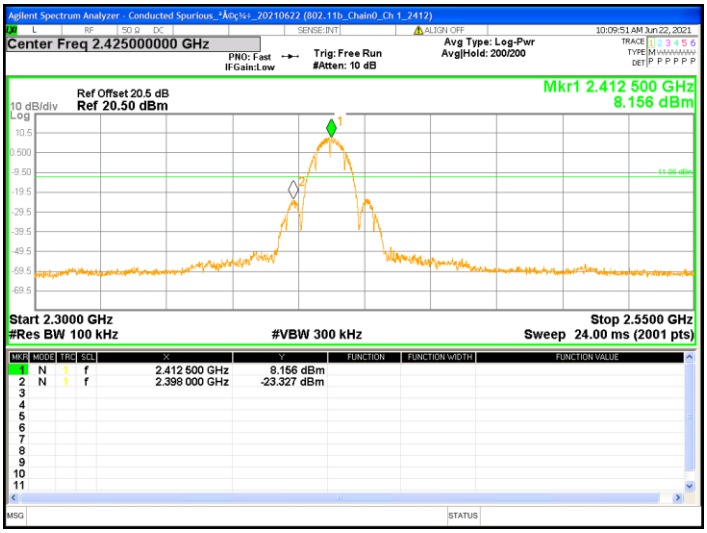
### 5.5 Test Results

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 57 |
| Test date : | 2021/6/22 |

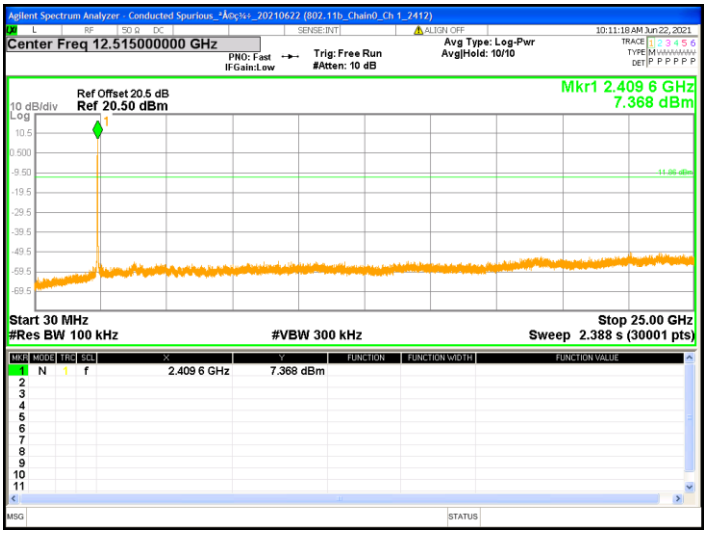
## Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



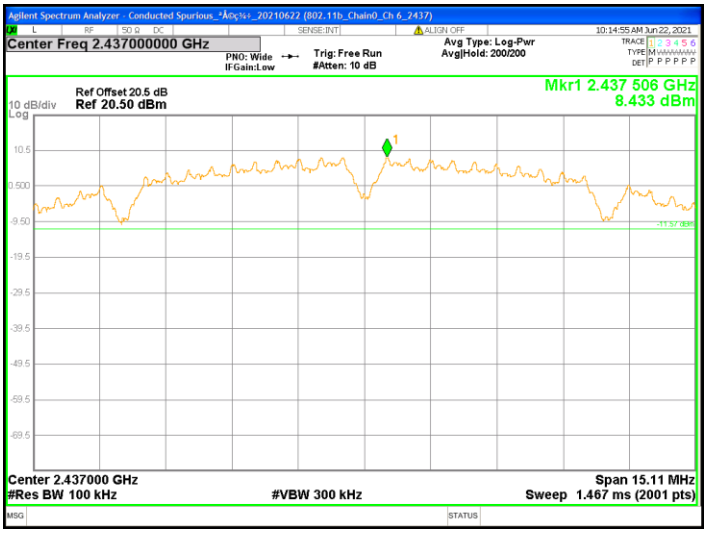

## Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



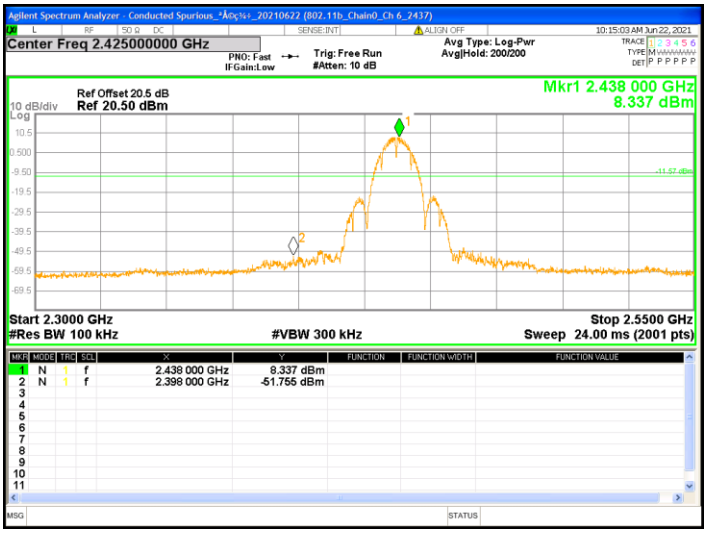

## Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



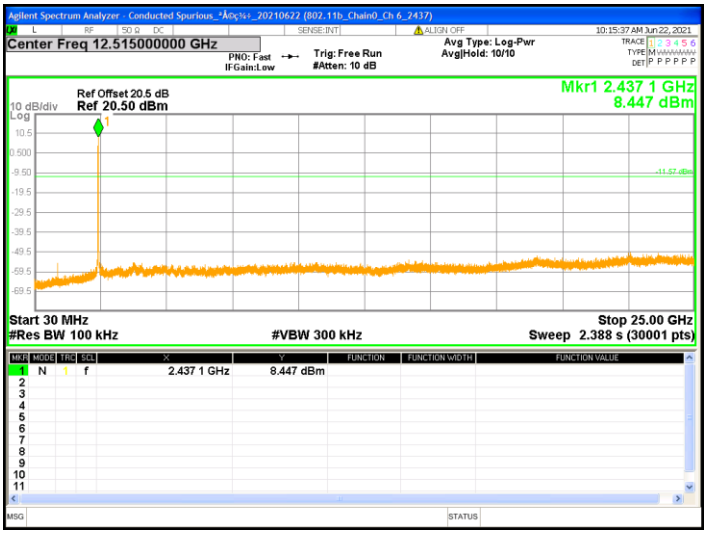
## Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



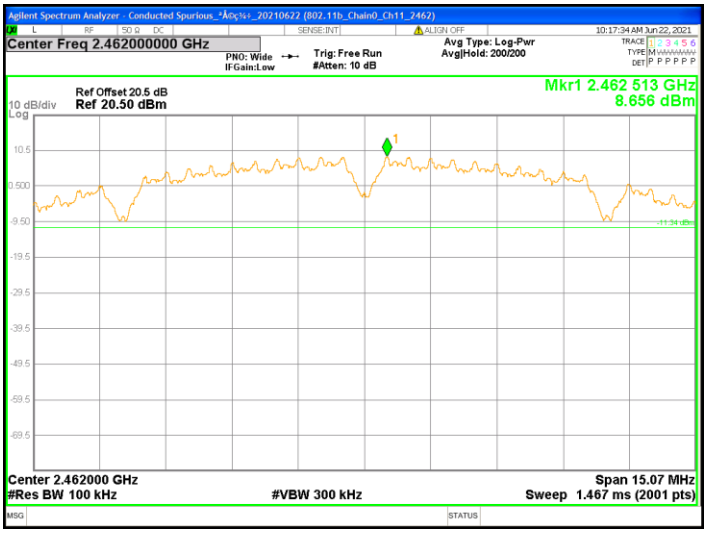

## Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



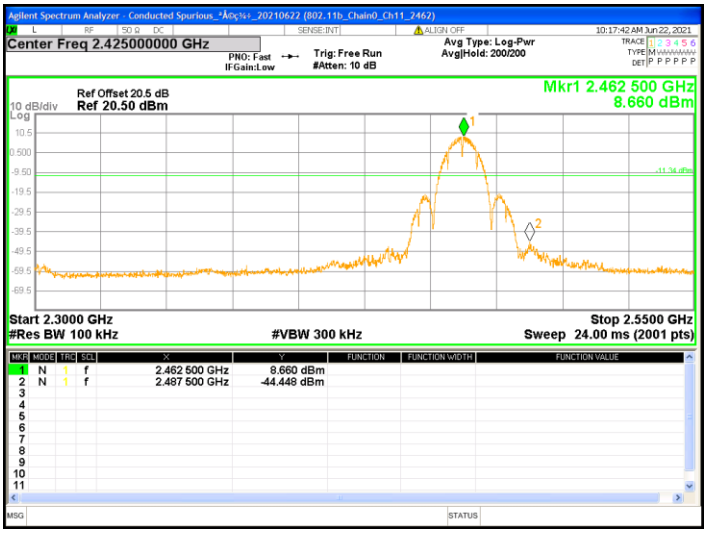

## Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



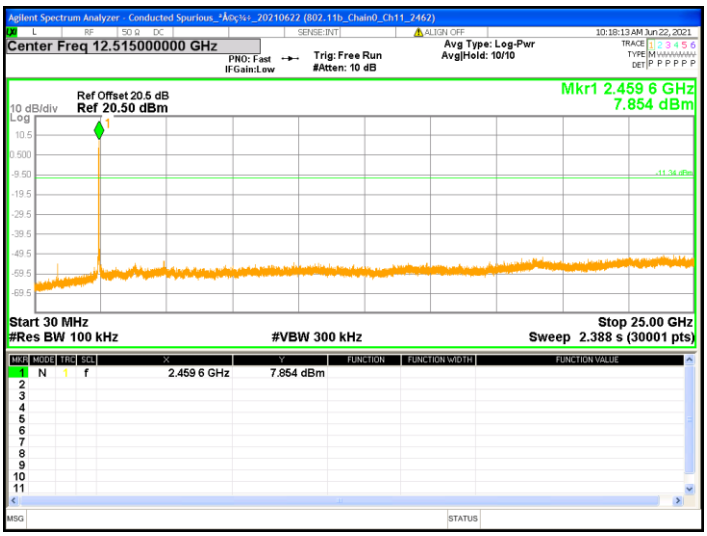
## Chain 0: Conducted Spurious @ 802.11b Mode Ch11



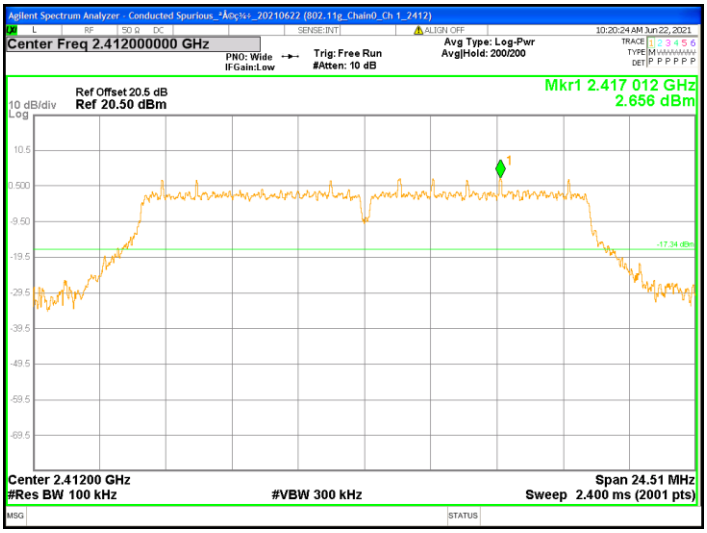

## Chain 0: Conducted Spurious @ 802.11b Mode Ch11



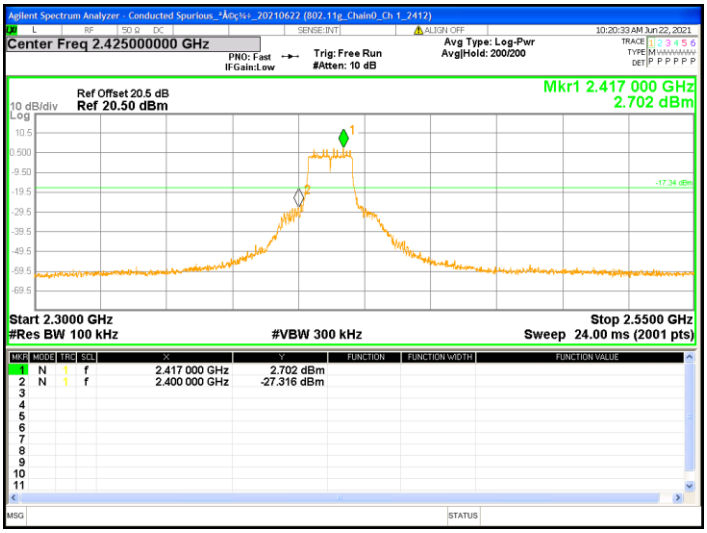

## Chain 0: Conducted Spurious @ 802.11b Mode Ch11



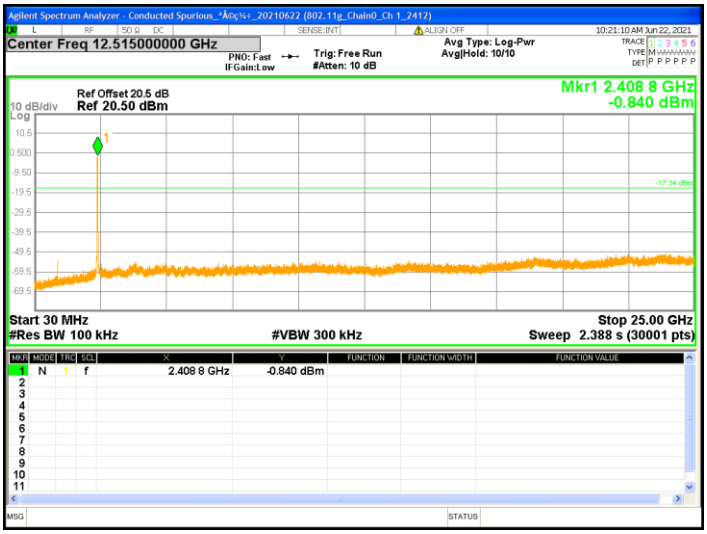
## Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



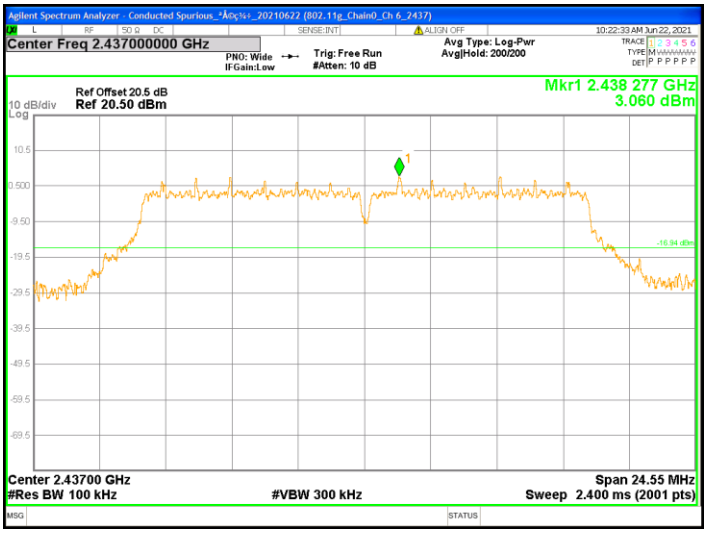

## Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



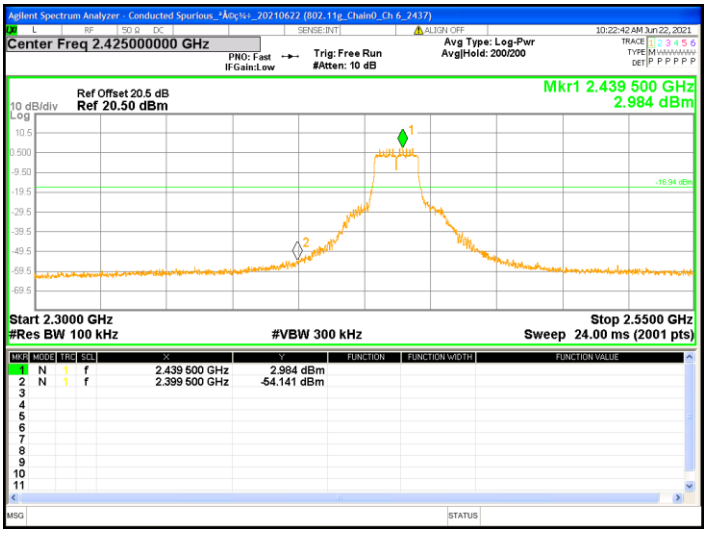

## Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



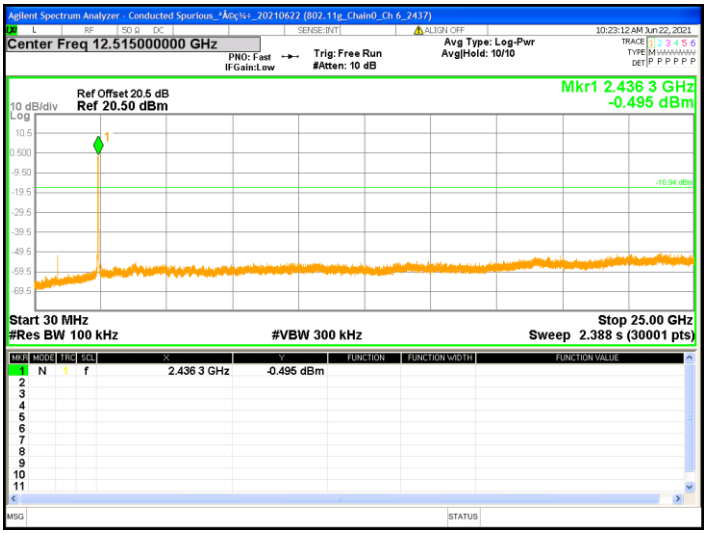
## Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



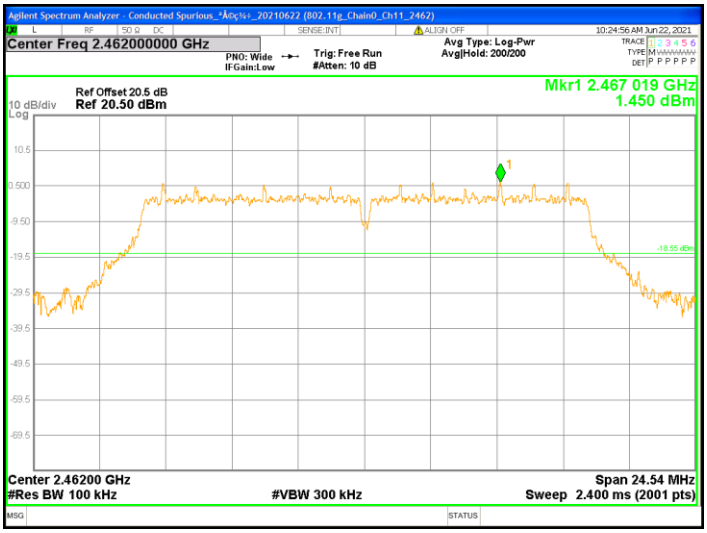

## Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



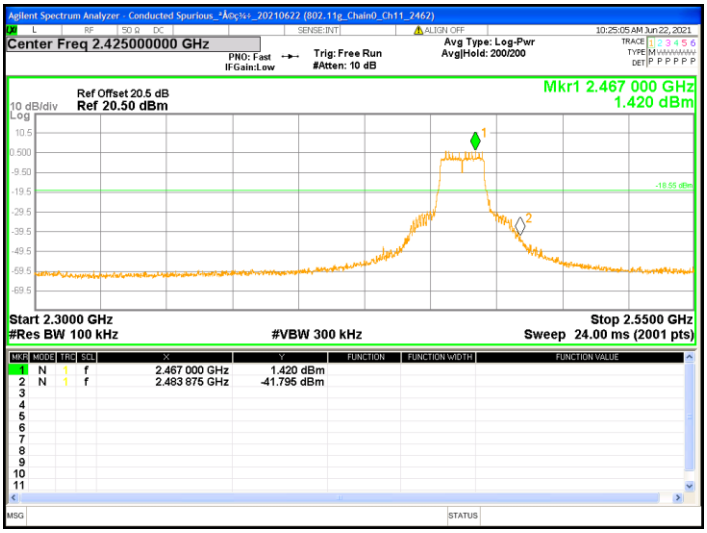

## Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



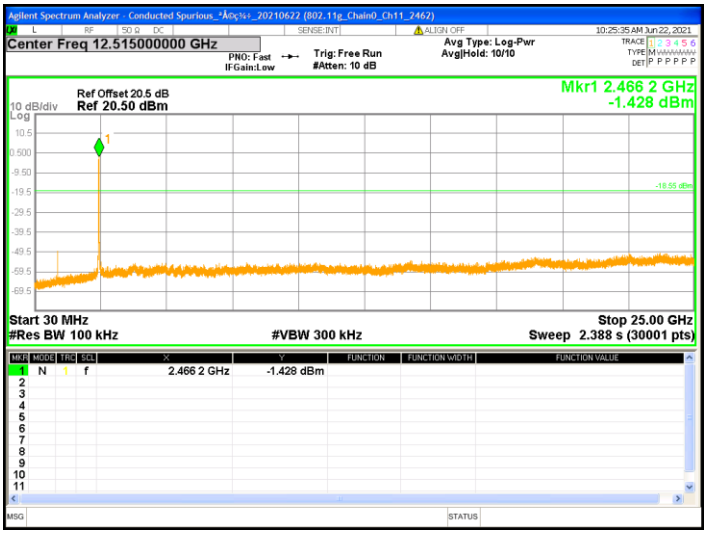
## Chain 0: Conducted Spurious @ 802.11g Mode Ch11



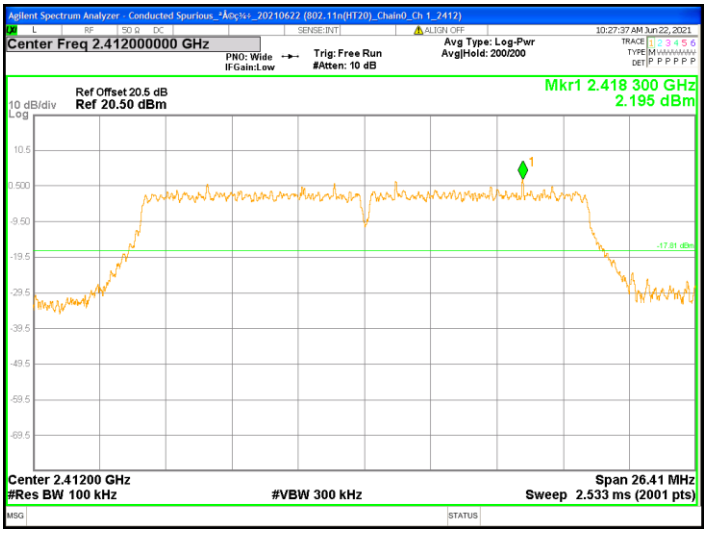

## Chain 0: Conducted Spurious @ 802.11g Mode Ch11



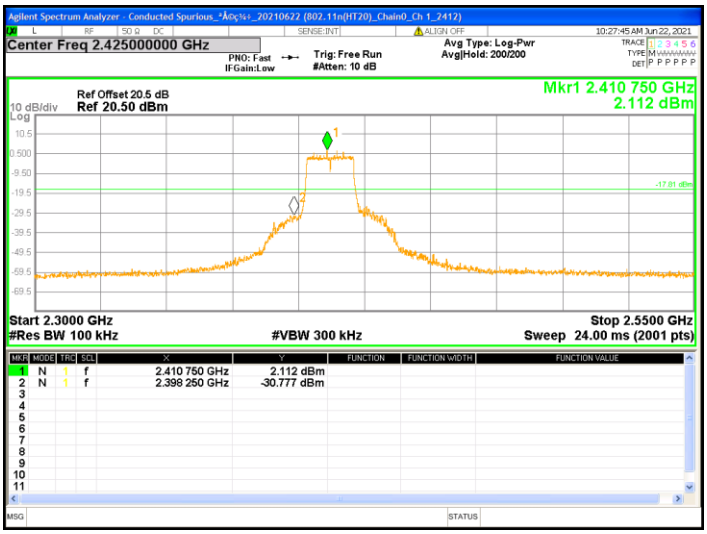

## Chain 0: Conducted Spurious @ 802.11g Mode Ch11



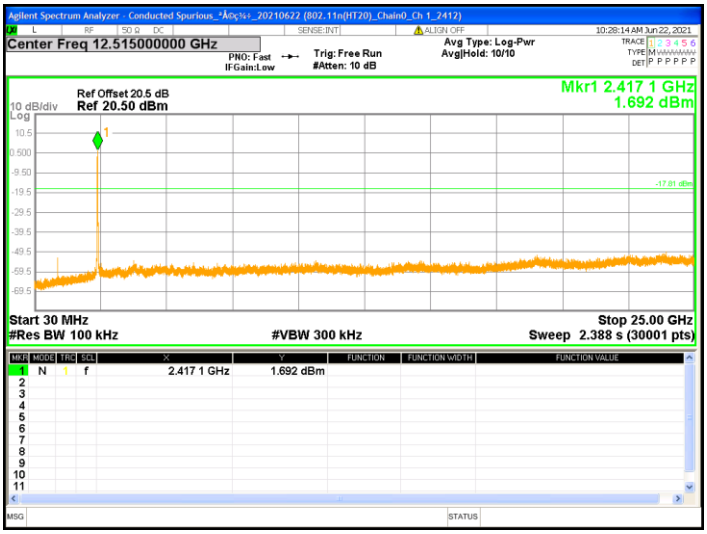
## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 1



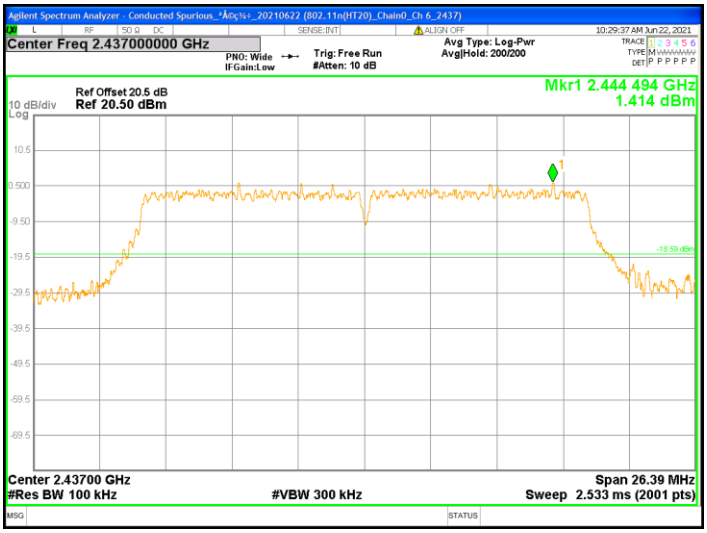

## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 1



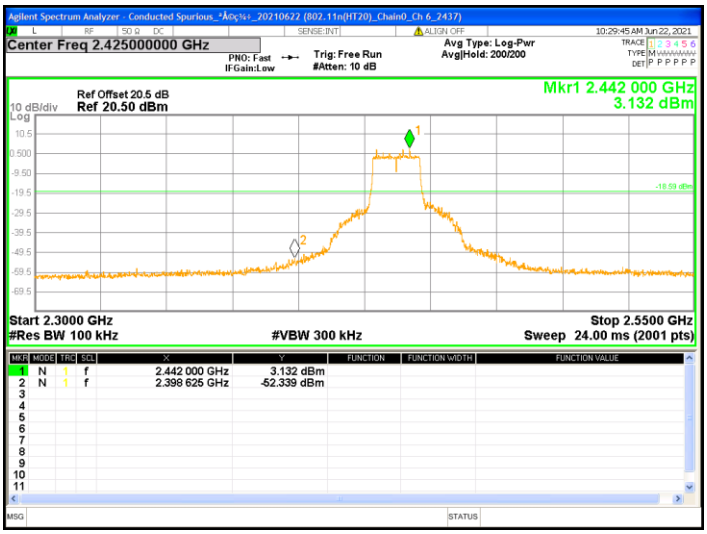

## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 1



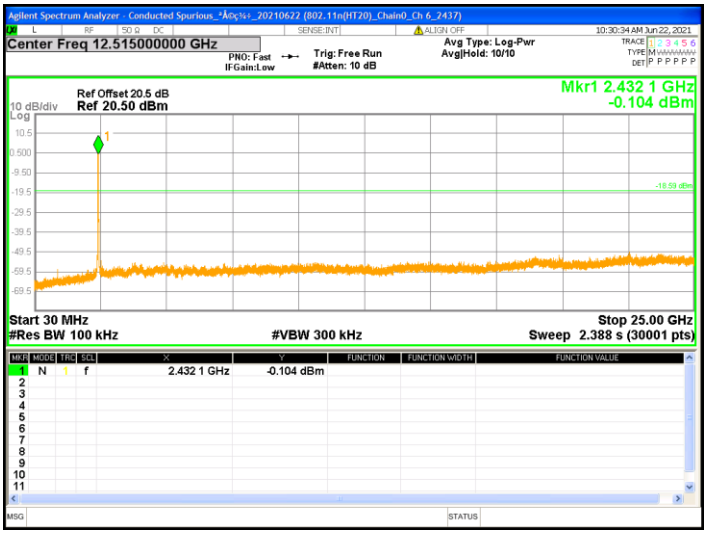
## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



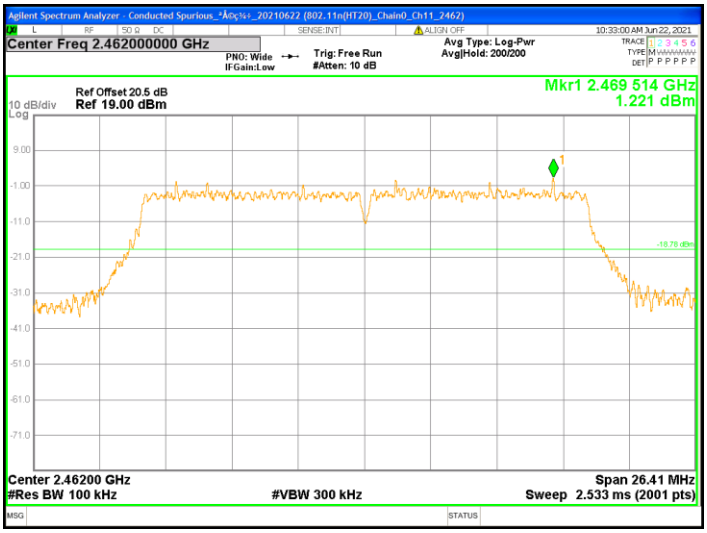

## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



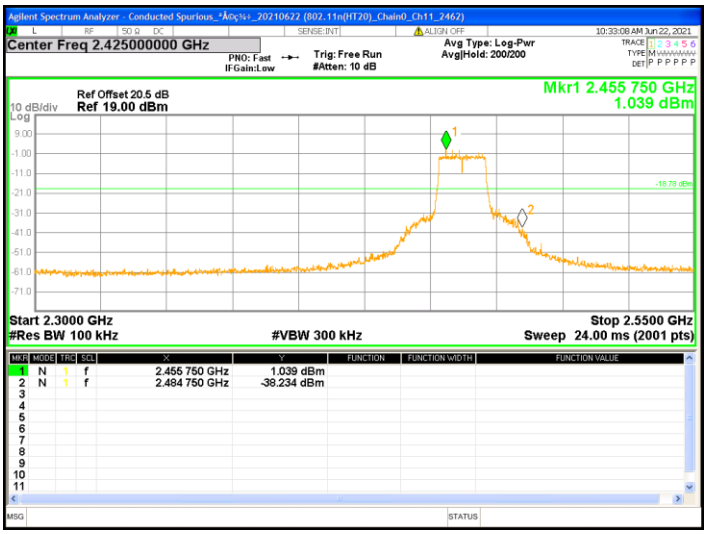

## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



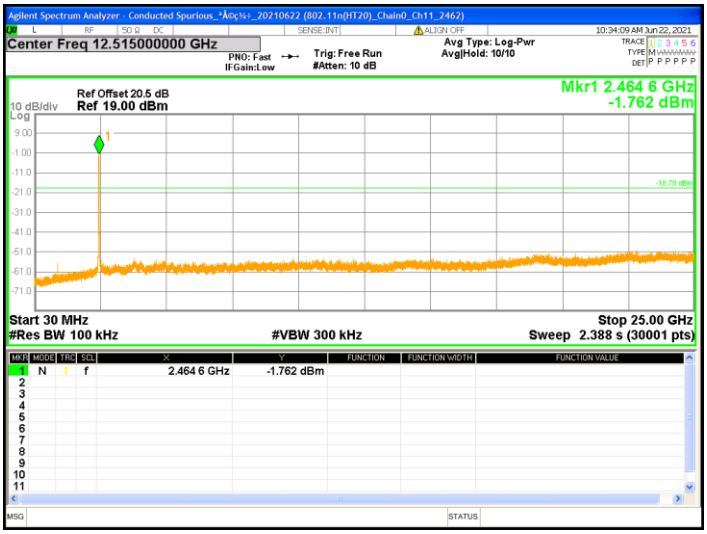
## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11




## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11




## Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11



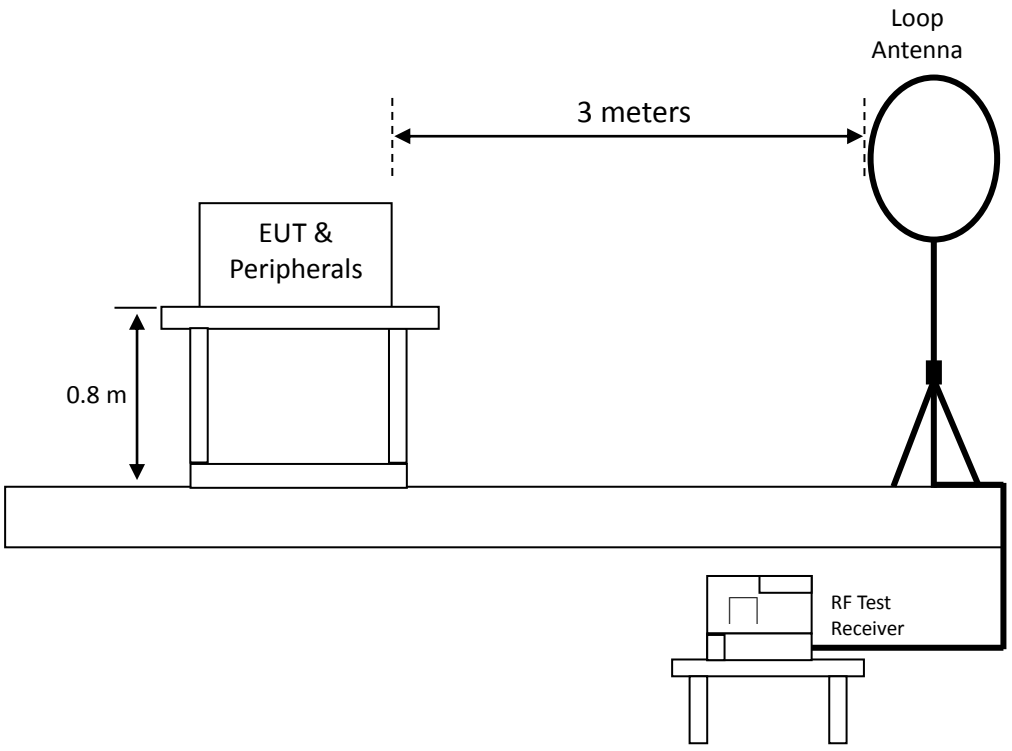
## 6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

### 6.1 Instrument Setting

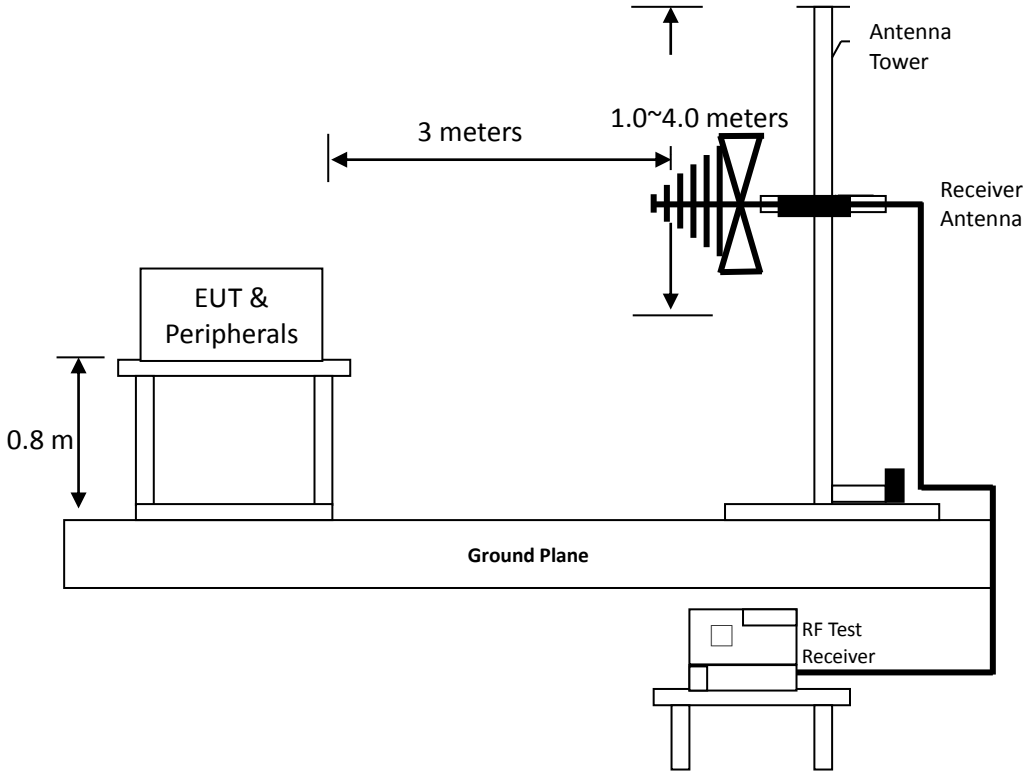
| Receiver Function | Setting (Below 1GHz) | Setting (Above 1GHz) |
|---|---|---|
| Detector | QP | Peak and Average |
| RBW | 9-150 kHz ; 200-300 Hz<br>0.15-30 MHz; 9-10 kHz<br>30-1000 MHz; 100-120 kHz | 1MHz |
| VBW | ≧3 x RBW | 3MHz & 1/T minimum kHz |
| Sweep | Auto couple | Auto couple |
| Start Frequency | 9 kHz | 1GHz |
| Stop Frequency | 1 GHz | Tenth harmonic |
| Attenuation | Auto | Auto |

### 6.2 Test setup & procedure

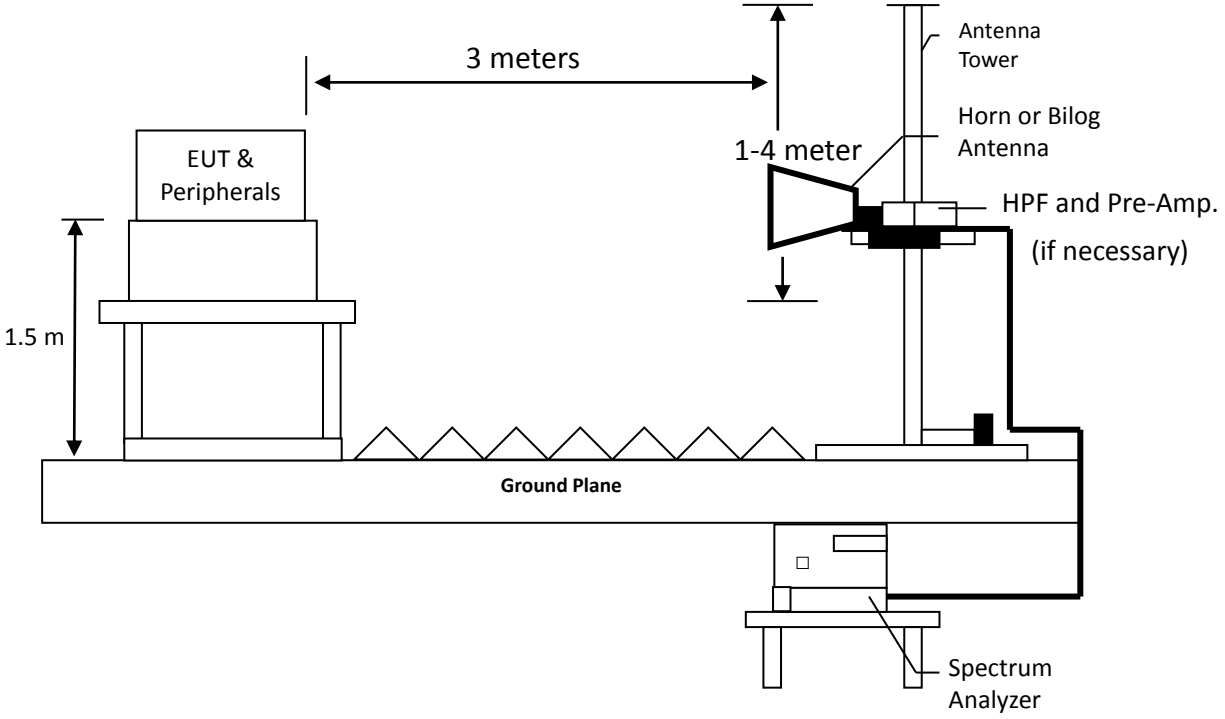
**Radiated emission from 9kHz to 30MHz uses Loop Antenna:**



**Radiated emission below 1GHz using Bilog Antenna**




**Radiated emission above 1GHz using Horn Antenna**



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.
The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

**6.3 Limit**

| Frequency(MHz) | Field Strength(uV/m) | Measurement distance(m) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

### 6.4 Test Result

#### 6.4.1 Measurement results: frequencies 9kHz to 30MHz

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 63 |
| Test date : | 2021/6/25 |

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11b Ch1.

| Antenna Polarity | Frequency (MHz) | Spectrum Analyzer Detector | Correction Factor (dB/m) | Reading (dBµV) | Corrected Reading (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Perpendicular | 0.22 | AV | 18.75 | 34.41 | 53.16 | 100.85 | -47.69 |
| Perpendicular | 0.31 | AV | 18.72 | 29.58 | 48.30 | 97.82 | -49.52 |
| Perpendicular | 0.49 | AV | 19.34 | 30.39 | 49.73 | 93.82 | -44.09 |
| Perpendicular | 0.55 | QP | 19.37 | 27.32 | 46.69 | 72.86 | -26.17 |
| Perpendicular | 0.73 | QP | 19.54 | 22.32 | 41.86 | 70.43 | -28.57 |
| Perpendicular | 0.82 | QP | 19.65 | 25.70 | 45.35 | 69.36 | -24.01 |

| Antenna Polarity | Frequency (MHz) | Spectrum Analyzer Detector | Correction Factor (dB/m) | Reading (dBµV) | Corrected Reading (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Parallel | 0.16 | AV | 18.57 | 34.02 | 52.59 | 103.63 | -51.04 |
| Parallel | 0.22 | AV | 18.75 | 30.83 | 49.58 | 100.85 | -51.27 |
| Parallel | 0.31 | AV | 18.72 | 29.70 | 48.42 | 97.82 | -49.40 |
| Parallel | 0.46 | AV | 19.17 | 30.30 | 49.47 | 94.38 | -44.91 |
| Parallel | 0.49 | AV | 19.34 | 29.64 | 48.98 | 93.82 | -44.84 |
| Parallel | 0.82 | QP | 19.65 | 23.99 | 43.64 | 69.36 | -25.72 |

| Antenna Polarity | Frequency (MHz) | Spectrum Analyzer Detector | Correction Factor (dB/m) | Reading (dBµV) | Corrected Reading (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Ground-parallel | 0.16 | AV | 18.57 | 34.30 | 52.87 | 103.63 | -50.76 |
| Ground-parallel | 0.22 | AV | 18.75 | 33.88 | 52.63 | 100.85 | -48.22 |
| Ground-parallel | 0.34 | AV | 18.76 | 29.64 | 48.40 | 97.02 | -48.62 |
| Ground-parallel | 0.49 | AV | 19.34 | 29.46 | 48.80 | 93.82 | -45.02 |
| Ground-parallel | 0.79 | QP | 19.64 | 23.23 | 42.87 | 69.68 | -26.81 |
| Ground-parallel | 0.82 | QP | 19.65 | 24.46 | 44.11 | 69.36 | -25.25 |

### 6.5.2 Measurement results: frequencies below 1 GHz

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 63 |
| Test date : | 2021/6/25 |

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11b Ch1.

| Antenna Polarity | Frequency (MHz) | Spectrum Analyzer Detector | Correction Factor (dB/m) | Reading (dBµV) | Corrected Reading (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Vertical | 431.58 | QP | 25.72 | 8.99 | 34.71 | 46.00 | -11.29 |
| Vertical | 468.44 | QP | 26.37 | 9.71 | 36.08 | 46.00 | -9.92 |
| Vertical | 480.08 | QP | 26.55 | 8.85 | 35.40 | 46.00 | -10.60 |
| Vertical | 518.88 | QP | 27.49 | 11.84 | 39.33 | 46.00 | -6.67 |
| Vertical | 527.61 | QP | 27.62 | 7.04 | 34.66 | 46.00 | -11.34 |
| Vertical | 624.61 | QP | 29.85 | 5.76 | 35.61 | 46.00 | -10.39 |

| Antenna Polarity | Frequency (MHz) | Spectrum Analyzer Detector | Correction Factor (dB/m) | Reading (dBµV) | Corrected Reading (dBµV/m) | Limit @ 3 m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | 389.87 | QP | 24.15 | 13.64 | 37.79 | 46.00 | -8.21 |
| Horizontal | 431.58 | QP | 25.72 | 15.48 | 41.20 | 46.00 | -4.80 |
| Horizontal | 468.44 | QP | 26.37 | 15.42 | 41.79 | 46.00 | -4.21 |
| Horizontal | 480.08 | QP | 26.55 | 13.87 | 40.42 | 46.00 | -5.58 |
| Horizontal | 527.61 | QP | 27.62 | 12.08 | 39.70 | 46.00 | -6.30 |
| Horizontal | 623.64 | QP | 29.84 | 9.81 | 39.65 | 46.00 | -6.35 |

Remark: Corr. Factor = Antenna Factor + Cable Loss

### 6.5.3 Measurement results: frequency above 1GHz to 25GHz

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 65 |
| Test date : | 2021/6/18 |

| Mode | Frequency (MHz) | Spectrum Analyzer Detector | Ant. Pol. (H/V) | Correction Factor (dB/m) | Reading (dBμV) | Corrected Reading (dBμV/m) | Limit @ 3 m (dBμV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 802.11b_Ch1 | 4824 | PK | V | 7.95 | 40.09 | 48.04 | 74.00 | -25.96 |
| | 4824 | PK | H | 7.95 | 38.22 | 46.17 | 74.00 | -27.83 |
| 802.11b_Ch6 | 4874 | PK | V | 8.04 | 41.65 | 49.69 | 74.00 | -24.31 |
| | 4874 | PK | H | 8.04 | 42.67 | 50.71 | 74.00 | -23.29 |
| 802.11b_Ch11 | 4924 | PK | V | 8.18 | 36.31 | 44.49 | 74.00 | -29.51 |
| | 4924 | PK | H | 8.18 | 39.94 | 48.12 | 74.00 | -25.88 |
| 802.11g_Ch1 | 4824 | PK | V | 7.95 | 36.00 | 43.95 | 74.00 | -30.05 |
| | 4824 | PK | H | 7.95 | 35.85 | 43.80 | 74.00 | -30.20 |
| 802.11g_Ch6 | 4874 | PK | V | 8.04 | 34.56 | 42.60 | 74.00 | -31.40 |
| | 4874 | PK | H | 8.04 | 36.09 | 44.13 | 74.00 | -29.87 |
| 802.11g_Ch11 | 4924 | PK | V | 8.18 | 31.48 | 39.66 | 74.00 | -34.34 |
| | 4924 | PK | H | 8.18 | 34.76 | 42.94 | 74.00 | -31.06 |
| 802.11n(HT20) Ch1 | 4824 | PK | V | 7.95 | 34.48 | 42.43 | 74.00 | -31.57 |
| | 4824 | PK | H | 7.95 | 36.58 | 44.53 | 74.00 | -29.47 |
| 802.11n(HT20) Ch6 | 4874 | PK | V | 8.04 | 35.80 | 43.84 | 74.00 | -30.16 |
| | 4874 | PK | H | 8.04 | 37.83 | 45.87 | 74.00 | -28.13 |
| 802.11n(HT20) Ch11 | 4924 | PK | V | 8.18 | 32.80 | 40.98 | 74.00 | -33.02 |
| | 4924 | PK | H | 8.18 | 34.81 | 42.99 | 74.00 | -31.01 |

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

## 7. Emission on Band Edge

### 7.1 Instrument Setting

| Spectrum Function | Setting |
|---|---|
| Detector | Peak and Average |
| RBW | 1MHz |
| VBW | 3MHz & 1/T minimum kHz |
| Sweep | Auto couple |
| Restrict bands | 2310 MHz ~ 2390 MHz<br>2483.5 MHz ~ 2500 MHz |
| Attenuation | Auto |

### 7.2 Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

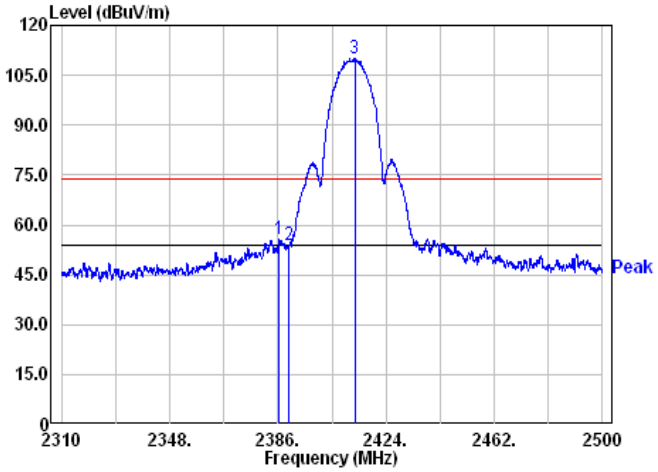
### 7.3 Test Results

| | |
|---|---|
| Temperature (℃) : | 27 |
| Relative Humidity (%) : | 65 |
| Test date : | 2021/6/18 |

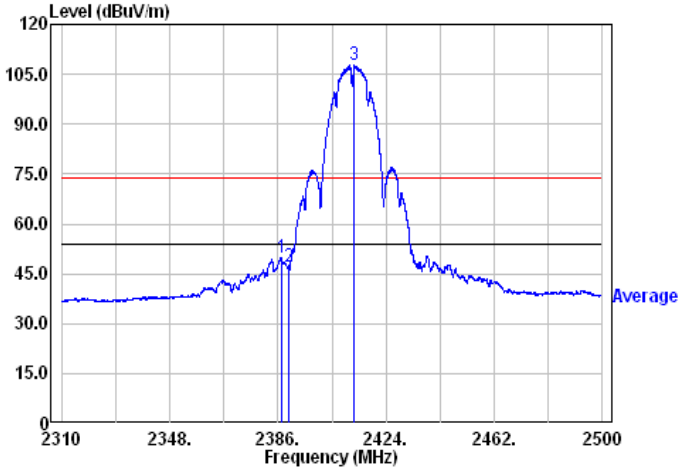
| Mode | Frequency (MHz) | Spectrum Analyzer Detector | Ant. Pol. (H/V) | Correction Factor (dB/m) | Reading (dBμV) | Corrected Reading (dBμV/m) | Limit @ 3 m (dBμV/m) | Margin (dB) | Restricted band (MHz) |
|---|---|---|---|---|---|---|---|---|---|
| 802.11b | 2386.48 | PK | H | 34.86 | 20.84 | 55.70 | 74 | -18.30 | 2310~2390 |
| | 2387.33 | AV | H | 34.86 | 14.98 | 49.84 | 54 | -4.16 | |
| | 2483.57 | PK | H | 34.80 | 21.47 | 56.27 | 74 | -17.73 | 2483.5~2500 |
| | 2484.18 | AV | H | 34.81 | 13.58 | 48.39 | 54 | -5.61 | |
| 802.11g | 2389.99 | PK | H | 34.86 | 33.85 | 68.71 | 74 | -5.29 | 2310~2390 |
| | 2389.99 | AV | H | 34.86 | 17.40 | 52.26 | 54 | -1.74 | |
| | 2483.52 | PK | H | 34.80 | 26.89 | 61.69 | 74 | -12.31 | 2483.5~2500 |
| | 2483.52 | AV | H | 34.80 | 16.03 | 50.83 | 54 | -3.17 | |
| 802.11n(HT20) | 2389.99 | PK | H | 34.86 | 28.27 | 63.13 | 74 | -10.87 | 2310~2390 |
| | 2389.99 | AV | H | 34.86 | 17.64 | 52.50 | 54 | -1.50 | |
| | 2483.52 | PK | H | 34.80 | 31.47 | 66.27 | 74 | -7.73 | 2483.5~2500 |
| | 2483.52 | AV | H | 34.80 | 17.52 | 52.32 | 54 | -1.68 | |

Remark: Correction Factor = Antenna Factor + Cable Loss

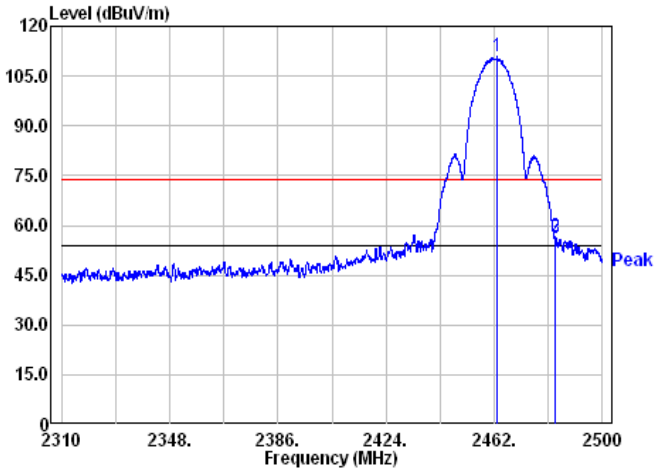
**Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch1 PK**



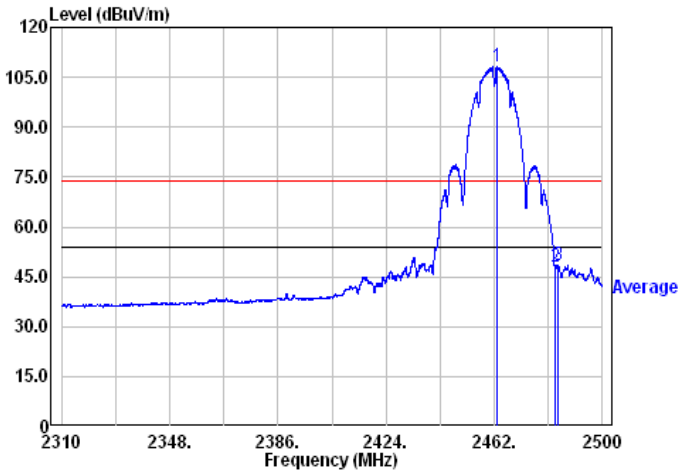

**Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch1 AV**



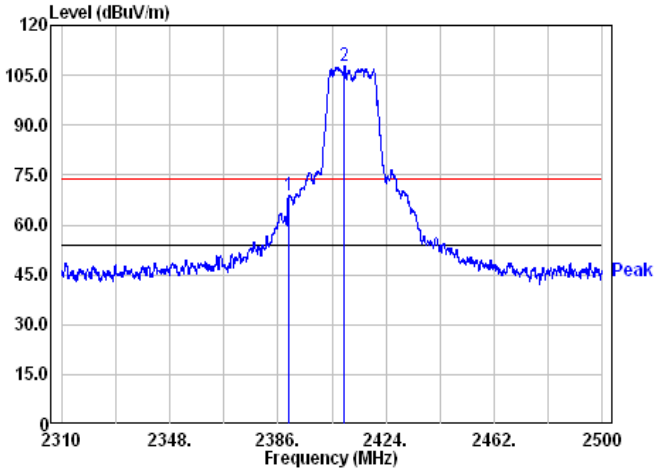

**Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch11 PK**



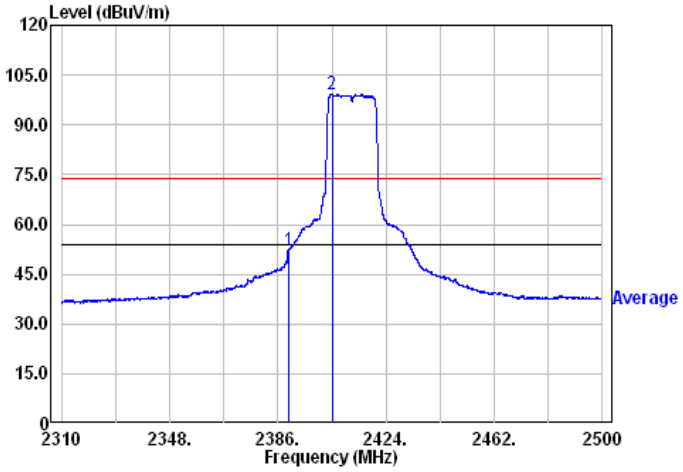
**Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch11 AV**



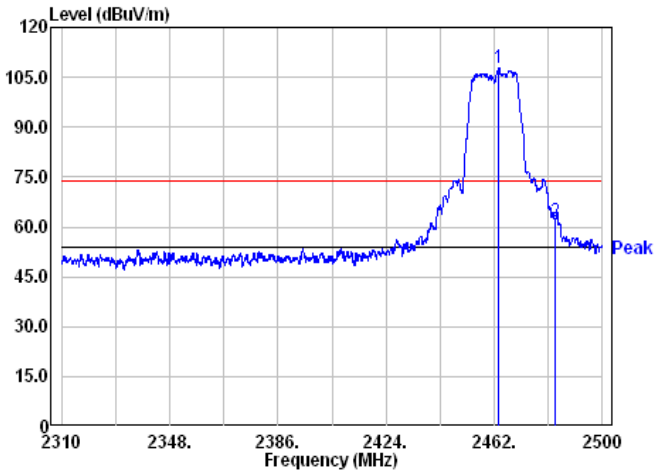

**Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch1 PK**



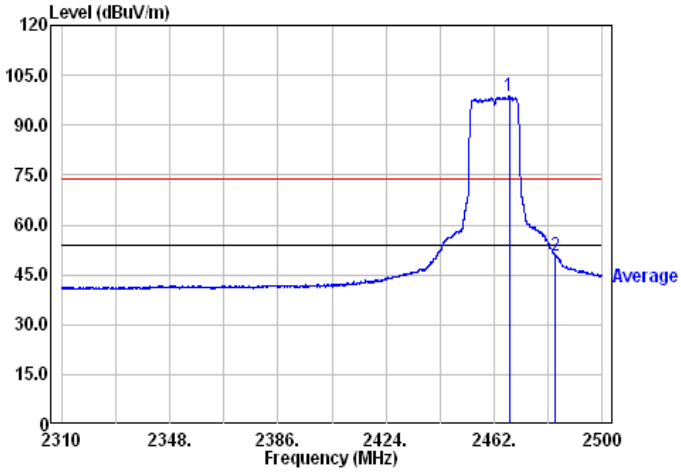

**Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch1 AV**



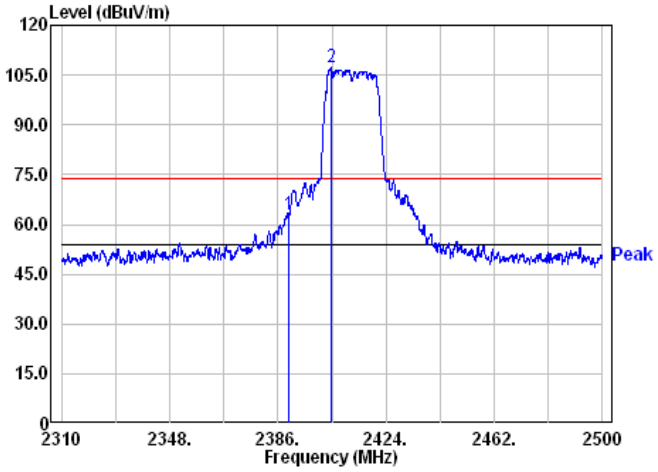
**Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch11 PK**



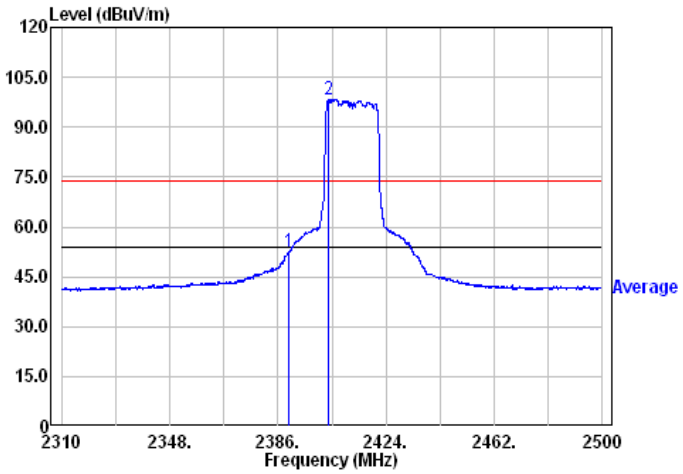

**Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch11 AV**



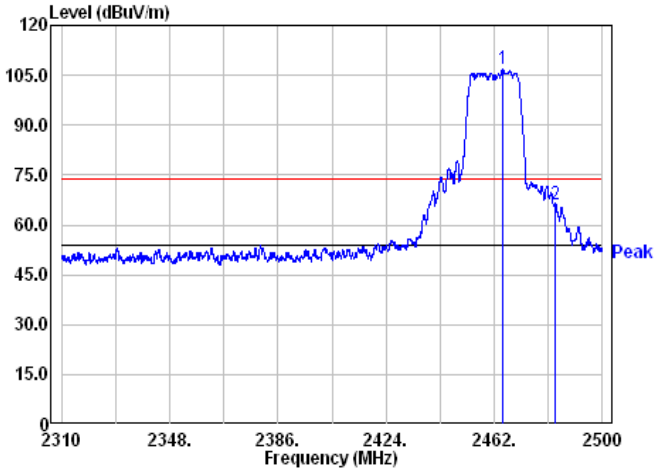

**Chain 0: Restricted Band Bandedge @ 802.11n20 Mode Ch1 PK**



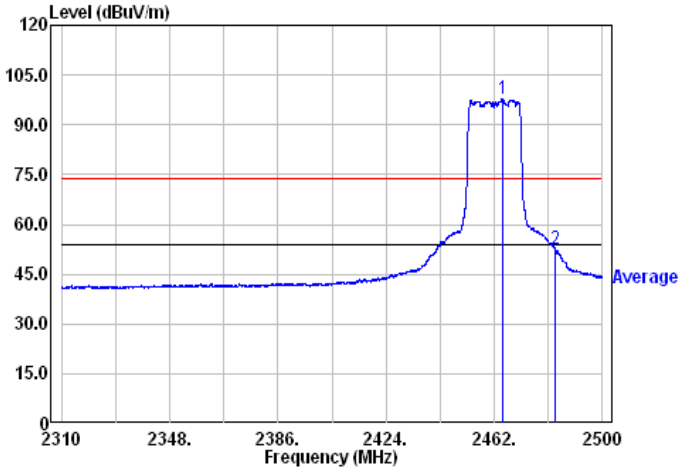
**Chain 0: Restricted Band Bandedge @ 802.11n20 Mode Ch1 AV**




**Chain 0: Restricted Band Bandedge @ 802.11n20 Mode Ch11 PK**




**Chain 0: Restricted Band Bandedge @ 802.11n20 Mode Ch11 AV**



## 8. AC Power Line Conducted Emission

Since the EUT is not connected to AC source, therefore, the test can be waived.

**Appendix A: Test equipment list**

| Test Equipment/ Test site | Brand | Model No. | Serial No. | Calibration Date | Next Calibration Date |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR7 | 101822 | 2020/08/18 | 2021/08/17 |
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | 100137 | 2020/08/25 | 2021/08/24 |
| Signal Analyzer | Agilent | N9030A | MY51380492 | 2020/08/17 | 2021/08/16 |
| Active Loop Antenna | SCHWARZBECK MESS-ELEKTRONIC | FMZB1519 | 1519-067 | 2021/04/14 | 2022/04/13 |
| Broadband Antenna | SHWARZBECK | VULB 9168 | 9168-172 | 2021/01/29 | 2022/01/28 |
| Horn Antenna | SHWARZBECK | BBHA 9120 D | 9120D-456 | 2021/01/11 | 2022/01/10 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170159 | 2020/08/20 | 2023/08/19 |
| Pre-Amplifier | EMC Co. | EMC12635SE | 980205 | 2021/01/13 | 2022/01/12 |
| Pre-amplifier | SGH | SGH184 | 20201124-1 | 2020/12/16 | 2021/12/15 |
| Power Meter | Anritsu | ML2495A | 0844001 | 2020/10/28 | 2021/10/27 |
| Power Sensor | Anritsu | MA2411B | 0738452 | 2020/10/28 | 2021/10/27 |
| 966-2(A) Cable | SUHNER | SUCOLEX 104 | 295105/4 | 2021/03/08 | 2022/03/07 |
| 966-2(B) Cable | SUHNER | SUCOFLEX 104P | CB0005 | 2021/03/08 | 2022/03/07 |
| RF Cable | SUHNER | SUCOFLEX 104P | CB0006 | 2021/04/29 | 2022/04/28 |
| 966-2_3m Semi-Anechoic Chamber | 966_2 | CEM-966_2 | N/A | 2021/01/15 | 2022/01/14 |
| Hight Pass Filter | Reactel | 7HS-3G/18G-S11 | N/A | 2021/05/26 | 2022/05/25 |
| 20dB Attenuator | Mini-Circuits | BW-S20W5+ | N/A | 2021/05/26 | 2022/05/25 |
| Test software | Audix | e3 | V9 | NCR | NCR |

Note: No Calibration Required (NCR).

**Appendix B: Measurement Uncertainty**

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

| Item | Uncertainty |
|---|---|
| Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m | 5.16 dB |
| Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m | 5.02 dB |
| Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m | 5.17 dB |
| Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m | 2.39 dB |
| Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m | 2.39 dB |
| Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m | 3.70 dB |
| Emission on the Band Edge Test | 4.32 dB |
| RF Antenna Conducted Spurious Test | 1.27 dB |
| Maximum Output Power Test | 0.44 dB |
| Occupied Bandwidth Test | 7.78 % |
| Carrier Frequency Separation Test | 1.27 dB |
| Number of Hopping Frequencies Test | 1.27 dB |
| Time of Occupancy (Dwell Time) Test | 1.27 dB |
| AC Power Line Conducted Emission | 3.08 dB |