



Report No.: E01A22020214F00101

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**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**waterproof led controller**

**Model No.: WIFI-SL2022**

**FCC ID: 2A47V-WIFI-SL2022**

**Trademark: N/A**

**Report No.: E01A22020214F00301**

**Issue Date: Mar. 07, 2022**

*Prepared for*

**Dongguan ShunLong Technology Co., Ltd.**

**No.12, Yincheng seventh Road, Xiabian village, Chang'an Town,  
Dongguan**

*Prepared by*

**Dong Guan Anci Electronic Technology Co., Ltd.**

**1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake  
Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr.,  
China.**

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Dong Guan Anci Eleaactronic Technology Co., Ltd.**

**VERIFICATION OF COMPLIANCE**

|                      |                                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------|
| Applicant:           | Dongguan ShunLong Technology Co., Ltd.<br>No.12, Yincheng seventh Road, Xiabian village, Chang'an Town,<br>Dongguan |
| Manufacturer:        | Dongguan ShunLong Technology Co., Ltd.<br>No.12, Yincheng seventh Road, Xiabian village, Chang'an Town,<br>Dongguan |
| Factory:             | Dongguan ShunLong Technology Co., Ltd.<br>No.12, Yincheng seventh Road, Xiabian village, Chang'an Town,<br>Dongguan |
| Product Description: | waterproof led controller                                                                                           |
| Trade Mark:          | N/A                                                                                                                 |
| Model Number:        | WIFI-SL2022                                                                                                         |

**We hereby certify that:**

The above equipment was tested by Dong Guan Anci Electronic Technology Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247(2020).

Date of Test : Mar. 01, 2022 to Mar. 08, 2022

Prepared by :   
Tomas Yang/Supervisor

Reviewer & Authorized  
Signer :   
Alan He/Manager

## Modified Information

| Version | Summary         | Revision Date | Report No.         |
|---------|-----------------|---------------|--------------------|
| Ver.1.0 | Original Report | /             | E01A22020214F00101 |
|         |                 |               |                    |
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APPENDIX (PHOTOS OF EUT) (3 PAGES)

## 1. General Information

### 1.1 Product Description

| Characteristics           | Description                                                                                       |
|---------------------------|---------------------------------------------------------------------------------------------------|
| Product Name              | waterproof led controller                                                                         |
| Model number              | WIFI-SL2022                                                                                       |
| Power Supply              | DC 5V-24V                                                                                         |
| Test Power Supply         | DC 5V from Adpater 120V/50Hz                                                                      |
| Modulation                | 802.11b: DSSS(DBPSK/DQPSK/CCK)<br>802.11g/n: OFDM(BPSK/QPSK/16QAM/64QAM)                          |
| Operating Frequency Range | 2412-2462MHz for 802.11b/g;<br>2412-2462MHz for 802.11n(HT20);<br>2422-2452MHz for 802.11n(HT40); |
| Number of Channels        | 11 channels for 802.11b/g;<br>11 channels for 802.11n(HT20);<br>7 channels for 802.11n(HT40);     |
| Transmit Power Max        | 802.11b: 15.58dBm<br>802.11g: 12.89dBm<br>802.11n(HT20): 11.57dBm<br>802.11n(HT40): 10.12dBm      |
| Antenna Type              | PCB antenna                                                                                       |
| Antenna Gain              | 1.3dBi                                                                                            |

**Note:** for more details, please refer to the User's manual of the EUT.

### 1.2 Test Methodology

All the test program has follow FCC new test procedure KDB 558074 D01 15.247 Meas Guidance v05r02 and in accordance with the procedures given in ANSI C63.10-2013.

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

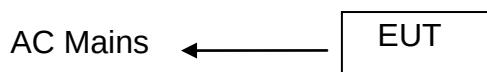
The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

### 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment                 | Trademark | Model No.   | FCC ID            | Note |
|------|---------------------------|-----------|-------------|-------------------|------|
| 1.   | waterproof led controller | N/A       | WIFI-SL2022 | 2A47V-WIFI-SL2022 | EUT  |

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.



### 3. Description of Test Modes

The EUT has been tested under its typical operating condition and Only the worst case data were reported. The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20 ): MCS0; 802.11n (HT40 ): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting mode is programmed. EUT is connected by com port, and transmit the control instruction via test software(Wifi Test Tool v1.6.0 release).

Frequency and Channel list for 802.11 b/g/n (HT20):

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

Frequency and Channel list for 802.11 n (HT40):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 3       | 2422            | 5       | 2432            | 8       | 2447            |
| 4       | 2427            | 6       | 2437            | 9       | 2452            |
|         |                 | 7       | 2442            |         |                 |

Test Frequency and Channel for 802.11 b/g/n (HT20):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 1                | 2412            | 6                | 2437            | 11                | 2462            |

Test Frequency and channel for 802.11 n (HT40):

| Lowest Frequency |                 | Middle Frequency |                 | Highest Frequency |                 |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel          | Frequency (MHz) | Channel          | Frequency (MHz) | Channel           | Frequency (MHz) |
| 3                | 2422            | 6                | 2437            | 9                 | 2452            |

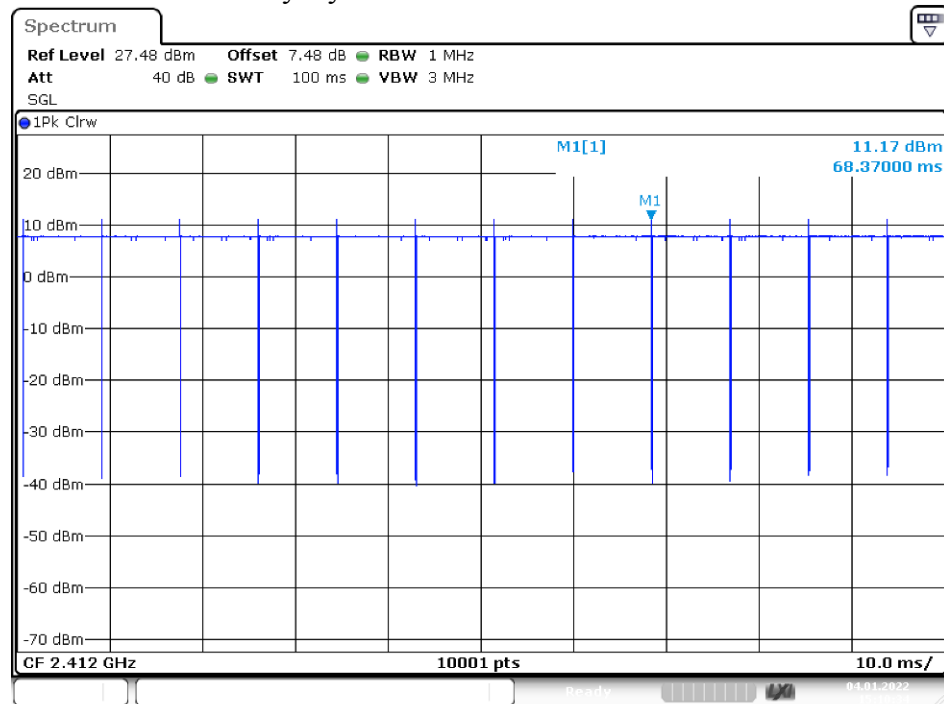
Report No.: E01A22020214F00101  
 Operated Mode for Worst Duty cycle:  
 Duty Cycle:

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| Mode          | Frequency (MHz) | Duty Cycle (%) | Correction Factor (dB) |
|---------------|-----------------|----------------|------------------------|
| 802.11b       | 2412            | 99.98          | 0                      |
| 802.11b       | 2437            | 99.97          | 0                      |
| 802.11b       | 2462            | 99.98          | 0                      |
| 802.11g       | 2412            | 99.98          | 0                      |
| 802.11g       | 2437            | 99.99          | 0                      |
| 802.11g       | 2462            | 99.98          | 0                      |
| 802.11n(HT20) | 2412            | 99.99          | 0                      |
| 802.11n(HT20) | 2437            | 99.99          | 0                      |
| 802.11n(HT20) | 2462            | 100            | 0                      |
| 802.11n(HT40) | 2422            | 100            | 0                      |
| 802.11n(HT40) | 2437            | 100            | 0                      |
| 802.11n(HT40) | 2452            | 100            | 0                      |

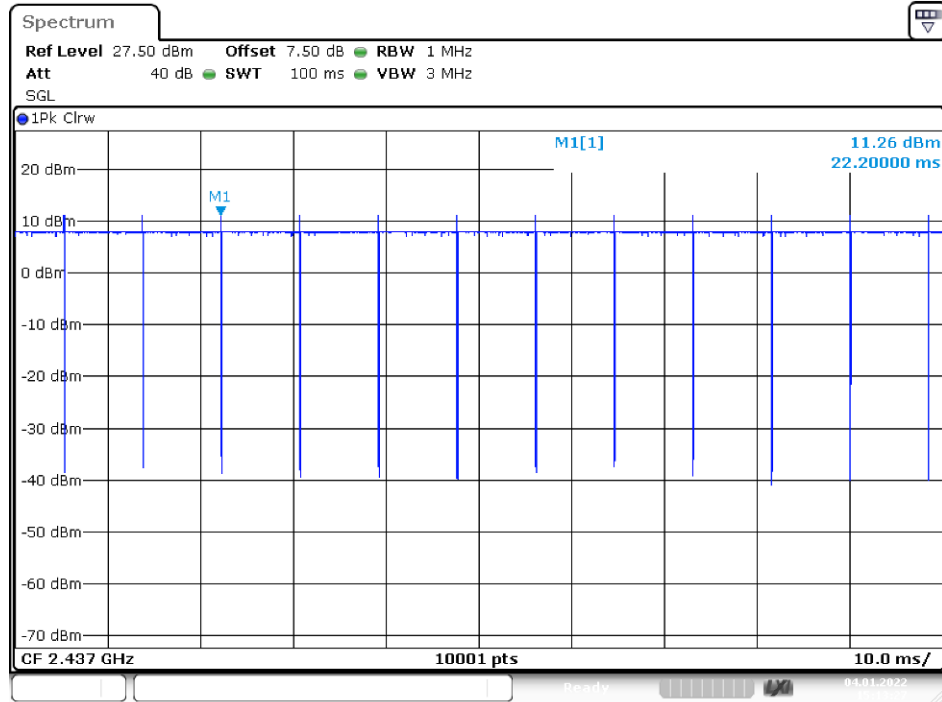
All the modulation modes were tested the data of the worst mode (TX 802.11b) are recorded in the following pages:

### Duty Cycle NVNT 802.11b 2412MHz



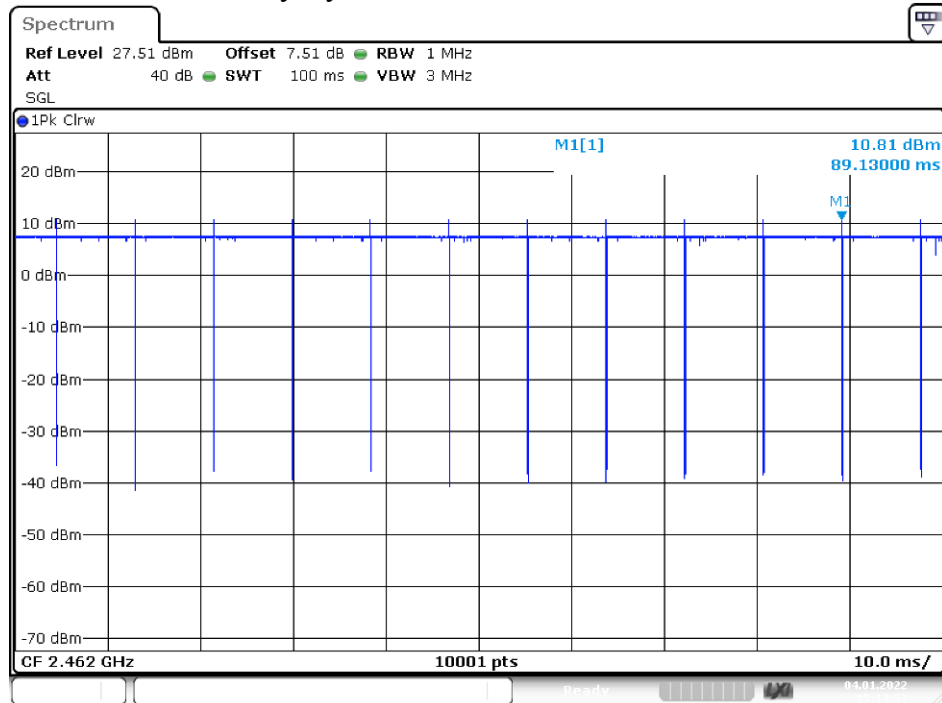
Date: 4.JAN.2022 15:10:33

## Duty Cycle NVNT 802.11b 2437MHz



Date: 4.JAN.2022 15:13:27

## Duty Cycle NVNT 802.11b 2462MHz



Date: 4.JAN.2022 15:14:52

#### 4. Summary of Test Results

| FCC Rules             | Description Of Test         | Result |
|-----------------------|-----------------------------|--------|
| §15.247(a)(2)         | 6dB bandwidth               | Pass   |
| §15.247(b)(3)         | Max Peak output Power test  | Pass   |
| §15.247(e)            | Power density               | Pass   |
| §15.247(d)            | Band edge test              | Pass   |
| §15.207               | AC Power Conducted Emission | Pass   |
| §15.247(d), §15.209   | Radiated Emission           | Pass   |
| §15.247(d)            | Antenna Port Emission       | Pass   |
| §15.247(b)&§15.203    | Antenna Application         | Pass   |
| N/A (Not Applicable). |                             |        |

## 5. Test Facility

### Site Description

EMC Lab : Accredited by CNAS, 2017.06.26  
The certificate is valid until 2022.10.28  
The Laboratory has been assessed and proved to be  
in compliance with CNAS-CL01:2006 (identical to  
ISO/IEC 17025:2005)  
The Certificate Registration Number is L6214.

Accredited by A2LA, 2018.03.15  
The Certificate Number is 4422.01.

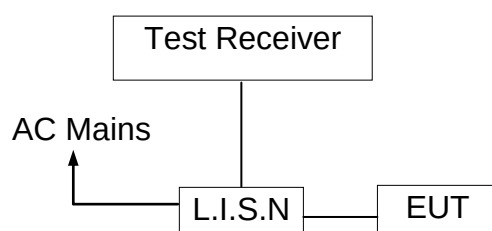
Name of Firm : Dong Guan Anci Electronic Technology Co., Ltd.  
Site Location : 1-2 Floor, Building A, No.11, Headquarters 2 Road,  
Songshan, Lake Hi-tech Industrial Development  
Zone, Dongguan City, Guangdong Pr., China.

## 6. Conducted Emissions Test

### 6.1 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

### 6.2 Test SET-UP (Block Diagram of Configuration)



### 6.3 Measurement Equipment Used:

| Conducted Emission Test Site |               |                        |               |                  |
|------------------------------|---------------|------------------------|---------------|------------------|
| EQUIPMENT TYPE               | MFR           | MODEL NUMBER           | SERIAL NUMBER | Calibrated until |
| L.I.S.N                      | SCHWARZBECK   | NSLK 8127              | 8127-669      | 2022-05-22       |
| 10 db attenuator             | JFW           | 50FP-010-H4            | 4360846-427-1 | 2022-05-22       |
| RF Cable                     | N/A           | N/A                    | 2#            | 2022-05-22       |
| EMI Test Receiver            | ROHDE&SCHWARZ | ESCI                   | 101358        | 2022-05-22       |
| Shielded Room                | chengyu       | 8m*4m*3m               | N/A           | 2022-05-22       |
| Test Software                | Farad         | EZ-EMC<br>Ver:ANCI-8A1 | N/A           | N/A              |

### 6.4 Conducted Emission Limit

#### (7) Conducted Emission

Frequency(MHz)

0.15-0.5

0.5-5.0

5.0-30.0

Quasi-peak

66-56

56

60

Average

56-46

46

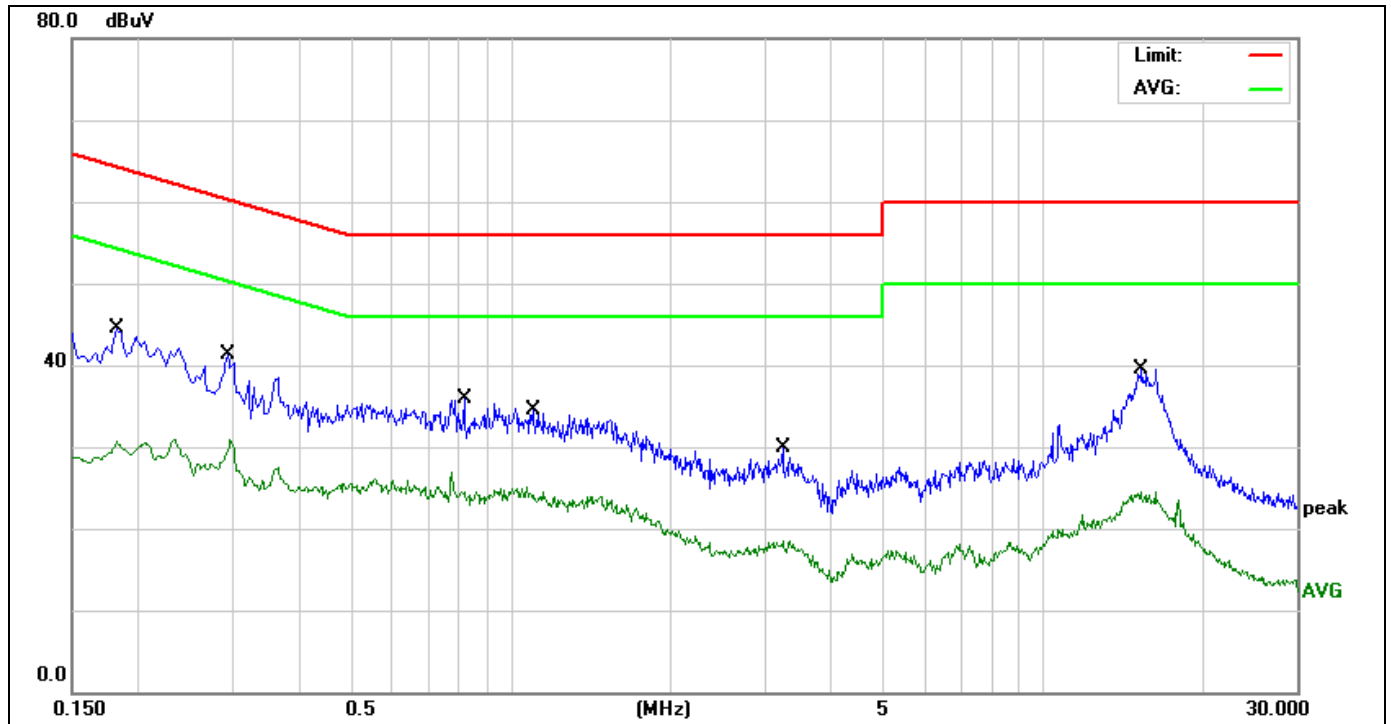
50

#### Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

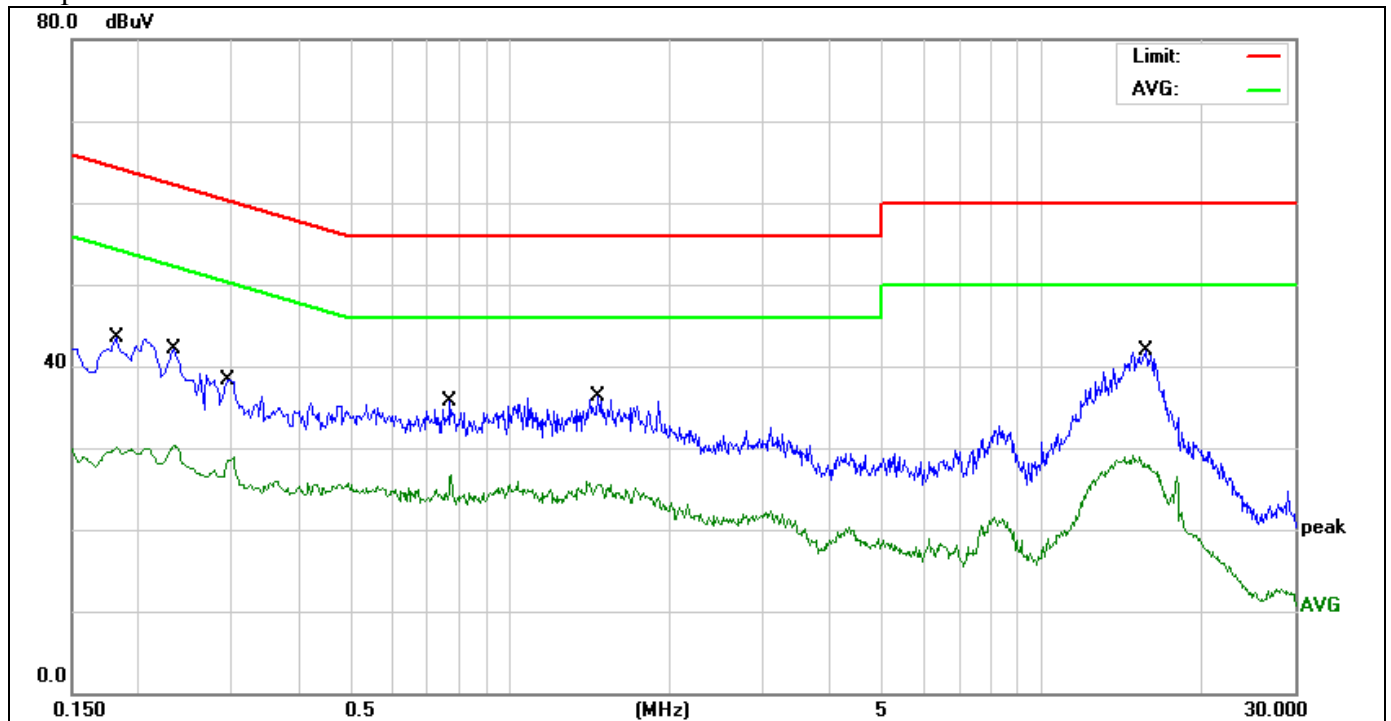
### 6.5 easurement Result:

All the modulation modes were tested the data of the worst mode (802.11 b TX2462) are recorded in the following pages and the others modulation methods do not exceed the limits. Please refer to following pages.



|        |                             |                |                      |
|--------|-----------------------------|----------------|----------------------|
| Site:  | 843                         | Phase:L1       | Temperature(C):26(C) |
| Limit: | FCC PART 15C Conduction(QP) |                | Humidity(%):60%      |
| EUT:   | waterproof led controller   | Test Time:     | 2022-03-07           |
| M/N.:  | WIFI-SL2022                 | Power Rating:  | AC 120V/60Hz         |
| Mode:  | WIFI TX2462                 | Test Engineer: | Sunshine             |
| Note:  |                             |                |                      |

| No. | Frequency (MHz) | Reading Level(dBuV) | Factor (dB) | Measure-ment(dBuV) | Limit (dBuV) | Over (dB) | Detector | Comment |
|-----|-----------------|---------------------|-------------|--------------------|--------------|-----------|----------|---------|
| 1   | 0.1819          | 29.48               | 9.46        | 38.94              | 64.39        | -25.45    | QP       |         |
| 2   | 0.1819          | 19.85               | 9.46        | 29.31              | 54.39        | -25.08    | AVG      |         |
| 3   | 0.2940          | 26.48               | 9.81        | 36.29              | 60.41        | -24.12    | QP       |         |
| 4   | 0.2940          | 19.65               | 9.81        | 29.46              | 50.41        | -20.95    | AVG      |         |
| 5   | 0.8180          | 19.32               | 9.76        | 29.08              | 56.00        | -26.92    | QP       |         |
| 6   | 0.8180          | 14.14               | 9.76        | 23.90              | 46.00        | -22.10    | AVG      |         |
| 7   | 1.1019          | 19.36               | 9.90        | 29.26              | 56.00        | -26.74    | QP       |         |
| 8   | 1.1019          | 14.11               | 9.90        | 24.01              | 46.00        | -21.99    | AVG      |         |
| 9   | 3.2420          | 13.24               | 9.94        | 23.18              | 56.00        | -32.82    | QP       |         |
| 10  | 3.2420          | 7.82                | 9.94        | 17.76              | 46.00        | -28.24    | AVG      |         |
| 11  | 15.3420         | 21.85               | 9.93        | 31.78              | 60.00        | -28.22    | QP       |         |
| 12  | 15.3420         | 12.65               | 9.93        | 22.58              | 50.00        | -27.42    | AVG      |         |



|        |                             |                |              |                 |       |
|--------|-----------------------------|----------------|--------------|-----------------|-------|
| Site:  | 843                         | Phase:         | N            | Temperature(C): | 26(C) |
| Limit: | FCC PART 15C Conduction(QP) | Test Time:     | 2022-03-07   | Humidity(%):    | 60%   |
| EUT:   | waterproof led controller   | Power Rating:  | AC 120V/60Hz |                 |       |
| M/N.:  | WIFI-SL2022                 | Test Engineer: | Sunshine     |                 |       |
| Mode:  | WIFI TX2462                 |                |              |                 |       |
| Note:  |                             |                |              |                 |       |

| No. | Frequency (MHz) | Reading Level(dBuV) | Factor (dB) | Measure-ment(dBuV) | Limit (dBuV) | Over (dB) | Detector | Comment |
|-----|-----------------|---------------------|-------------|--------------------|--------------|-----------|----------|---------|
| 1   | 0.1819          | 28.15               | 9.46        | 37.61              | 64.39        | -26.78    | QP       |         |
| 2   | 0.1819          | 19.55               | 9.46        | 29.01              | 54.39        | -25.38    | AVG      |         |
| 3   | 0.2340          | 26.43               | 9.63        | 36.06              | 62.30        | -26.24    | QP       |         |
| 4   | 0.2340          | 19.70               | 9.63        | 29.33              | 52.30        | -22.97    | AVG      |         |
| 5   | 0.2940          | 23.84               | 9.81        | 33.65              | 60.41        | -26.76    | QP       |         |
| 6   | 0.2940          | 18.02               | 9.81        | 27.83              | 50.41        | -22.58    | AVG      |         |
| 7   | 0.7740          | 21.02               | 9.70        | 30.72              | 56.00        | -25.28    | QP       |         |
| 8   | 0.7740          | 16.16               | 9.70        | 25.86              | 46.00        | -20.14    | AVG      |         |
| 9   | 1.4700          | 20.56               | 9.96        | 30.52              | 56.00        | -25.48    | QP       |         |
| 10  | 1.4700          | 15.38               | 9.96        | 25.34              | 46.00        | -20.66    | AVG      |         |
| 11  | 15.7980         | 24.58               | 9.94        | 34.52              | 60.00        | -25.48    | QP       |         |
| 12  | 15.7980         | 17.23               | 9.94        | 27.17              | 50.00        | -22.83    | AVG      |         |



**6.5 Conducted Measurement Photos:**

## 7. Radiated Emission Test

### 7.1 Measurement Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane, And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 120KHz   |
| VB                | 300KHz   |
| Detector          | QP       |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

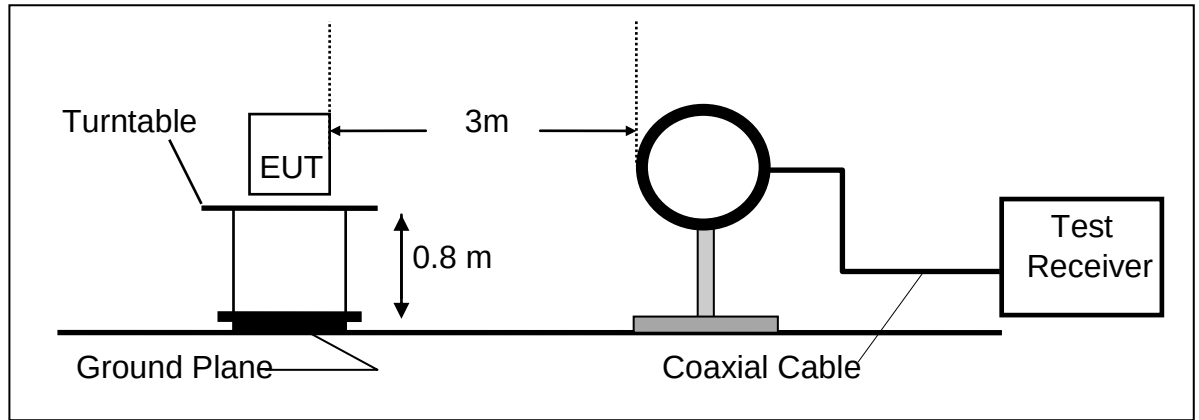
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

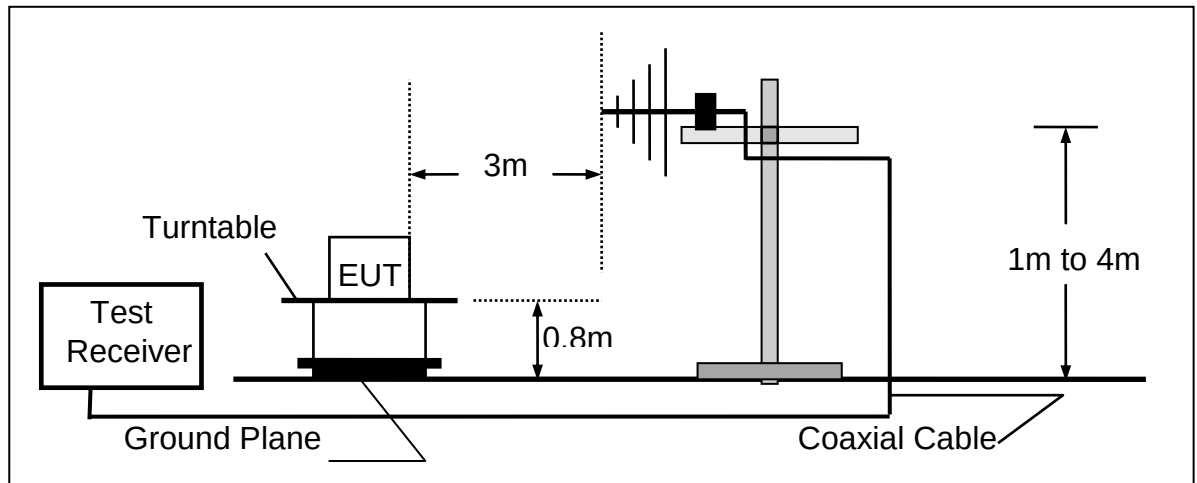
| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | AVG      |
| Trace             | Max hold |

## 7.2 Test SET-UP (Block Diagram of Configuration)

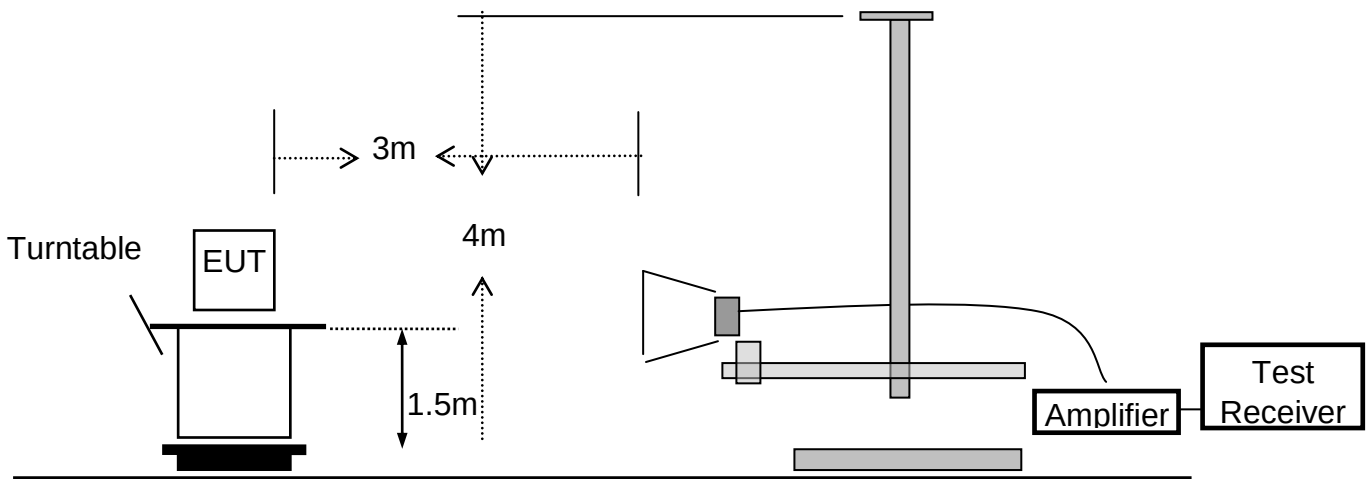
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



## (C) Radiated Emission Test Set-Up, Frequency above 1000MHz



### 7.3 Measurement Equipment Used

| Item | Equipment                    | Manufacturer       | Model No.                 | Serial No.         | Calibrated until |
|------|------------------------------|--------------------|---------------------------|--------------------|------------------|
| 1.   | EMI Test Receiver            | Rohde & Schwarz    | ESPI                      | 100502             | 2022-11-13       |
| 2.   | Pre-Amplifier                | HP                 | 8447D                     | 2727A06172         | 2022-05-22       |
| 3.   | Bilog Antenna                | Schwarzbeck        | VULB9163                  | VULB9163-588       | 2022-05-22       |
| 4.   | Loop Antenna                 | Schwarzbeck        | FMZB 1516                 | 1516-141           | 2022-11-13       |
| 5.   | Spectrum Analyzer            | Rohde & Schwarz    | FSV40                     | US40240623         | 2022-11-13       |
| 6.   | Low noise Amplifiers         | A-INFO             | LA1018N4009               | J101313052400<br>1 | 2022-05-22       |
| 7.   | Horn antenna                 | A-INFO             | LB-10180-SF               | J203109061212<br>3 | 2022-05-22       |
| 8.   | Broadband RF Power Amplifier | AEROFLEX           | AEROFLEX10<br>0KHz-40GHz  | J101313052400<br>1 | 2022-11-13       |
| 9.   | DRG Horn Antenna             | A.H.SYSTEMS        | SAS-574                   | J203109061212<br>3 | 2022-11-13       |
| 10.  | RF Cable                     | Gigalink Microwave | ZT40-2.92J-2.<br>92J-2m   | N/A                | 2022-11-13       |
| 11.  | RF Cable                     | Gigalink Microwave | ZT40-2.92J-2.<br>92J-0.3m | N/A                | 2022-11-13       |
| 12.  | RF Cable                     | N/A                | N/A                       | 6#                 | 2022-05-22       |
| 13.  | RF Cable                     | N/A                | N/A                       | 1-1#               | 2022-05-22       |
| 14.  | RF Cable                     | N/A                | N/A                       | 1-2#               | 2022-05-22       |
| 15.  | RF Cable                     | N/A                | N/A                       | 7#                 | 2022-05-22       |
| 16.  | 3m Semi-anechoic Chamber     | chengyu            | 9m*6m*6m                  | N/A                | 2022-05-22       |
| 17.  | Test Software                | Farad              | EZ-EMC<br>Ver:ANCI-3A1    | N/A                | N/A              |

#### 7.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/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                                |

#### 15.205 Restricted bands of operation

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

Remark 1. Emission level in dBuV/m=20 log (uV/m)

: 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

## 7.5 Measurement Result

### Below 30MHz:

All the modulation modes were tested the data of the test mode are recorded in the following pages.

|                    |            |               |            |
|--------------------|------------|---------------|------------|
| Operation Mode:    | TX Mode    | Test Date :   | 2022-03-07 |
| Frequency Range:   | 9KHz~30MHz | Temperature : | 26℃        |
| Test Result:       | PASS       | Humidity :    | 60 %       |
| Measured Distance: | 3m         | Test By:      | Best       |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV/m) | Limit 3m<br>(dBuV/m) | Over<br>(dB) |
|----------------|-----------------|----------------------------|----------------------|--------------|
| --             | --              | --                         | --                   | --           |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

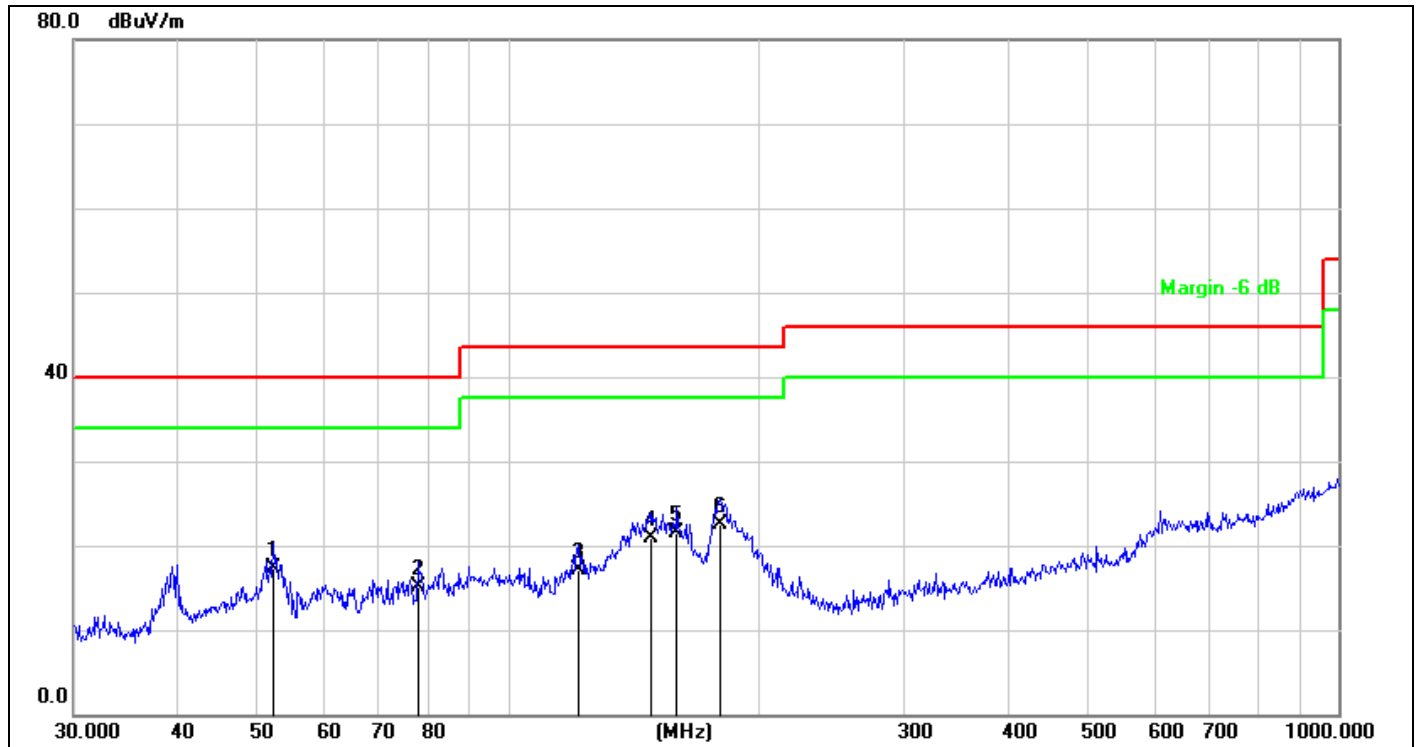
Distance extrapolation factor =  $40 \log(\text{Specific distance} / \text{test distance})$  (dB);

Limit line = Specific limits(dBuV) + distance extrapolation factor.

### Below 1000MHz:

All the modulation modes were tested the data of the worst mode (TX 802.11b 2462MHz) are recorded in the following pages and the others modulation methods do not exceed the limits.

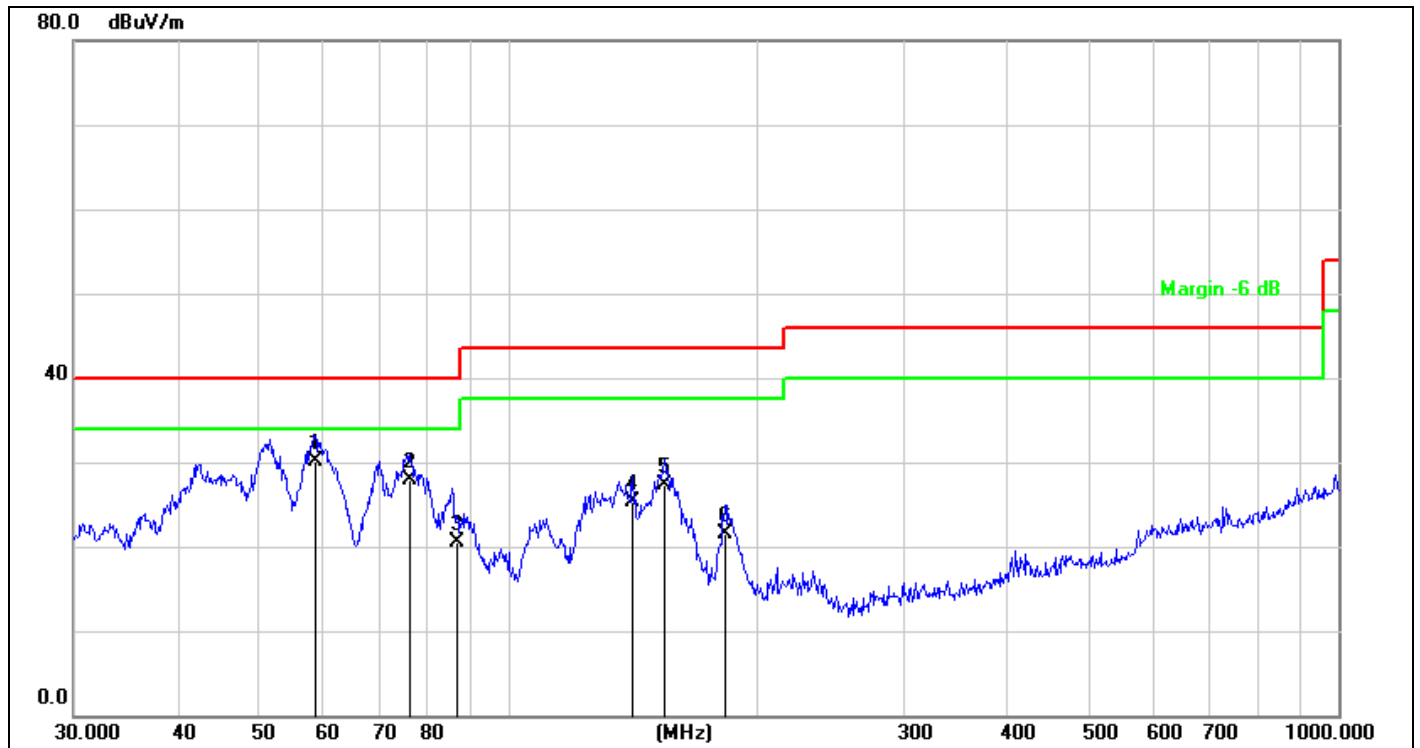
Please refer to the following test plots:



|        |                            |                     |                      |
|--------|----------------------------|---------------------|----------------------|
| Site:  | LAB                        | Antenna::Horizontal | Temperature(C):26(C) |
| Limit: | FCC Part 15 C 3m Radiation | Test Time:          | Humidity(%):60%      |
| EUT:   | waterproof led controller  | Power Rating:       | 2022-03-07           |
| M/N.:  | WIFI-SL2022                | Test Engineer:      | AC 120V/60Hz         |
| Mode:  | TX2462                     |                     | Bast                 |
| Note:  |                            |                     |                      |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|--------|
| 1   | 52.2079         | 32.69          | -15.39        | 17.30          | 40.00          | -22.70      | QP   |        |
| 2   | 77.8654         | 35.26          | -20.06        | 15.20          | 40.00          | -24.80      | QP   |        |
| 3   | 121.5486        | 34.90          | -17.85        | 17.05          | 43.50          | -26.45      | QP   |        |
| 4   | 148.9625        | 39.56          | -18.67        | 20.89          | 43.50          | -22.61      | QP   |        |
| 5   | 159.7844        | 40.29          | -18.85        | 21.44          | 43.50          | -22.06      | QP   |        |
| 6 * | 180.0165        | 40.13          | -17.58        | 22.55          | 43.50          | -20.95      | QP   |        |

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor



|               |                            |                       |          |                        |       |
|---------------|----------------------------|-----------------------|----------|------------------------|-------|
| <b>Site:</b>  | LAB                        | <b>Antenna::</b>      | Vertical | <b>Temperature(C):</b> | 26(C) |
| <b>Limit:</b> | FCC Part 15 C 3m Radiation |                       |          | <b>Humidity(%):</b>    | 60%   |
| <b>EUT:</b>   | waterproof led controller  | <b>Test Time:</b>     |          | <b>2022-03-07</b>      |       |
| <b>M/N.:</b>  | WIFI-SL2022                | <b>Power Rating:</b>  |          | <b>AC 120V/60Hz</b>    |       |
| <b>Mode:</b>  | TX2462                     | <b>Test Engineer:</b> |          | <b>Bast</b>            |       |
| <b>Note:</b>  |                            |                       |          |                        |       |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Remark |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|--------|
| 1 * | 58.6126         | 46.77          | -16.61        | 30.16          | 40.00          | -9.84       | QP   |        |
| 2   | 76.2442         | 47.83          | -19.92        | 27.91          | 40.00          | -12.09      | QP   |        |
| 3   | 86.8068         | 39.68          | -19.14        | 20.54          | 40.00          | -19.46      | QP   |        |
| 4   | 141.3298        | 44.31          | -19.05        | 25.26          | 43.50          | -18.24      | QP   |        |
| 5   | 154.2786        | 46.12          | -18.76        | 27.36          | 43.50          | -16.14      | QP   |        |
| 6   | 182.5592        | 38.86          | -17.41        | 21.45          | 43.50          | -22.05      | QP   |        |

Note: 1. Result Level = Read Level+ Antenna Factor+ Cable Loss- Amp. Factor



### Above 1GHz:

All the modulation modes were tested the data of the worst mode (TX 802.11b) are recorded in the following pages and the others modulation methods do not exceed the limits. The frequency range from 1GHz to 25GHz is investigated.

Operation Mode: 802.11b Lowest Test Date : 2022-03-07  
Test Voltage: AC 120V/60Hz Test by: Best

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|----------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK       | AV     |
| 4824           | V                | 65.3                   | 45.69 | 74               | 54 | -8.7     | -8.31  |
| 7236           | V                | 60.32                  | 41.36 | 74               | 54 | -13.68   | -12.64 |
| 9648           | V                | 58.6                   | 40.66 | 74               | 54 | -15.4    | -13.34 |
| 12060          | V                | 55.69                  | 41.25 | 74               | 54 | -18.31   | -12.75 |
| 14472          | V                | 55.32                  | 40.25 | 74               | 54 | -18.68   | -13.75 |
| 16884          | V                | 55.69                  | 39.58 | 74               | 54 | -18.31   | -14.42 |
| 4824           | H                | 65.8                   | 45.96 | 74               | 54 | -8.2     | -8.04  |
| 7236           | H                | 60.35                  | 41.58 | 74               | 54 | -13.65   | -12.42 |
| 9648           | H                | 58.47                  | 40.23 | 74               | 54 | -15.53   | -13.77 |
| 12060          | H                | 57.69                  | 38.71 | 74               | 54 | -16.31   | -15.29 |
| 14472          | H                | 55.32                  | 36.48 | 74               | 54 | -18.68   | -17.52 |
| 16884          | H                | 56.32                  | 38.69 | 74               | 54 | -17.68   | -15.31 |

Operation Mode: 802.11b Middle Test Date : 2022-03-07  
Test Voltage: AC 120V/60Hz Test by: Best

| Freq.<br>(MHz) | Ant. Pol.<br>H/V | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|------------------|------------------------|-------|------------------|----|----------|--------|
|                |                  | PK                     | AV    | PK               | AV | PK       | AV     |
| 4874           | V                | 64.32                  | 44.99 | 74               | 54 | -9.68    | -9.01  |
| 7311           | V                | 61.02                  | 42.52 | 74               | 54 | -12.98   | -11.48 |
| 9688           | V                | 59.63                  | 40.69 | 74               | 54 | -14.37   | -13.31 |
| 12185          | V                | 58.63                  | 40.36 | 74               | 54 | -15.37   | -13.64 |
| 14622          | V                | 58.47                  | 40.69 | 74               | 54 | -15.53   | -13.31 |
| 17059          | V                | 57.63                  | 38.96 | 74               | 54 | -16.37   | -15.04 |
| 4874           | H                | 63.14                  | 64.32 | 74               | 54 | -10.86   | 10.32  |
| 7311           | H                | 61.23                  | 42.58 | 74               | 54 | -12.77   | -11.42 |
| 9688           | H                | 59.65                  | 41.32 | 74               | 54 | -14.35   | -12.68 |
| 12185          | H                | 58.47                  | 40.02 | 74               | 54 | -15.53   | -13.98 |
| 14622          | H                | 58.78                  | 39.47 | 74               | 54 | -15.22   | -14.53 |
| 17059          | H                | 58.18                  | 39.65 | 74               | 54 | -15.82   | -14.35 |

Operation Mode: 802.11b Highest

Test Date : 2022-03-07

Test Voltage: AC 120V/60Hz

Test by: Best

| Freq.<br>(MHz) | Ant. Pol. | Emission Level(dBuV/m) |       | Limit 3m(dBuV/m) |    | Over(dB) |        |
|----------------|-----------|------------------------|-------|------------------|----|----------|--------|
|                |           | PK                     | AV    | PK               | AV | PK       | AV     |
| 4924           | V         | 63.02                  | 43.19 | 74               | 54 | -10.98   | -10.81 |
| 7386           | V         | 60.36                  | 41.38 | 74               | 54 | -13.64   | -12.62 |
| 9848           | V         | 58.69                  | 40.25 | 74               | 54 | -15.31   | -13.75 |
| 12310          | V         | 59.3                   | 40.36 | 74               | 54 | -14.7    | -13.64 |
| 14772          | V         | 58.47                  | 39.85 | 74               | 54 | -15.53   | -14.15 |
| 17234          | V         | 58.31                  | 39.69 | 74               | 54 | -15.69   | -14.31 |
| 4924           | H         | 62.96                  | 43.69 | 74               | 54 | -11.04   | -10.31 |
| 7386           | H         | 61.35                  | 42.47 | 74               | 54 | -12.65   | -11.53 |
| 9848           | H         | 59.03                  | 40.36 | 74               | 54 | -14.97   | -13.64 |
| 12310          | H         | 58.14                  | 39.02 | 74               | 54 | -15.86   | -14.98 |
| 14772          | H         | 58.63                  | 39.47 | 74               | 54 | -15.37   | -14.53 |
| 17234          | H         | 58.19                  | 39.6  | 74               | 54 | -15.81   | -14.4  |

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

**No others harmonics emissions are higher than 20 dB below the limits of 47 CFR Part 15.247.**

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
  - (3) Data of measurement within this frequency range shown “ – ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## 7.6 Radiated Measurement Photos:



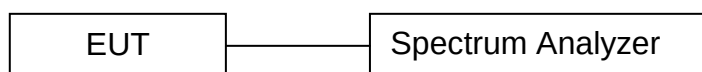
## 8. 6dB Bandwidth Test

### 8.1 Measurement Procedure

The EUT was operating in IEEE 802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40) mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function. The testing follows the Measurement Procedure of FCC KDB No. 558074 D01 15.247 Meas Guidance v05r02 .

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

### 8.2 Test SET-UP (Block Diagram of Configuration)



### 8.3 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR                | MODEL NUMBER | SERIAL NUMBER | CALIBRATED UNTIL |
|-------------------|--------------------|--------------|---------------|------------------|
| Spectrum Analyzer | Rohde & Schwarz    | FSV40        | US40240623    | 2022-11-13       |
| Coaxial Cable     | Gigalink Microwave | ZT40         | 19022092      | 2022-11-13       |
| Antenna Connector | ARTHUR-YANG        | 2244-N1TG1   | N/A           | 2022-11-13       |

**Remark:** The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 8.4 Measurement Results

6db Bandwidth Test Data Chart:

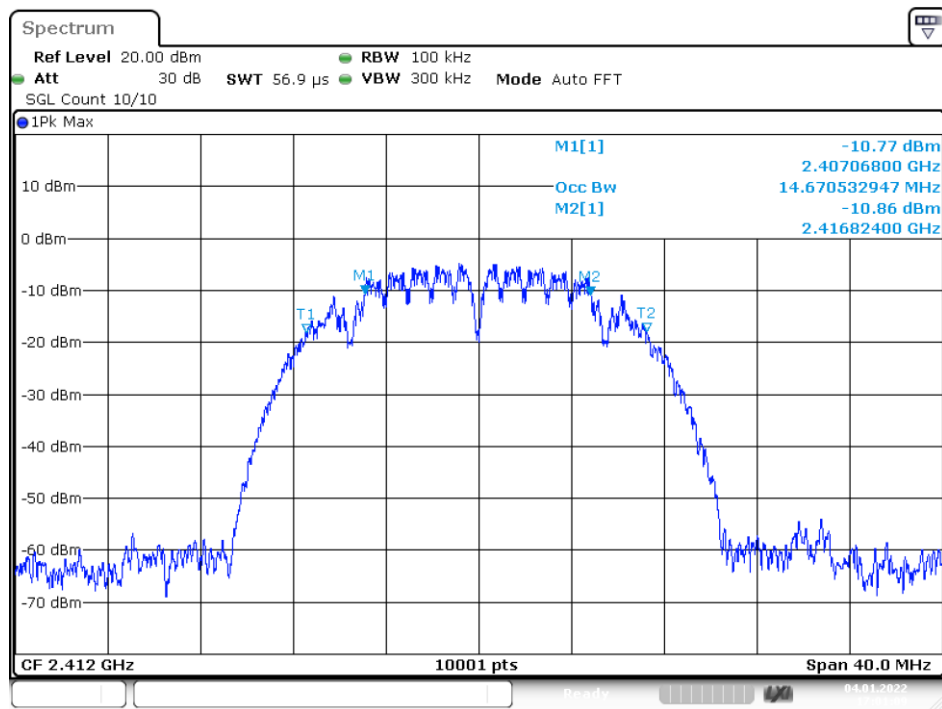
Refer to attached data chart.

Spectrum Detector: PK  
Test By: Best  
Humidity : 60%

Test Date : 2022-03-07  
Temperature : 26°C

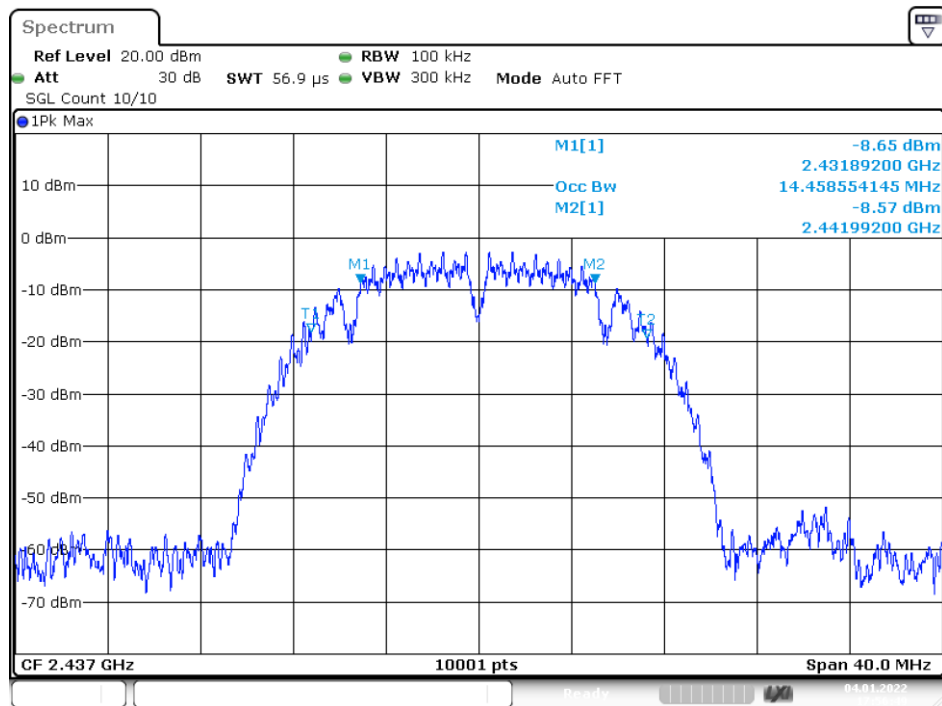
| IEEE 802.11b            |                         |                      |        |
|-------------------------|-------------------------|----------------------|--------|
| Channel frequency (MHz) | Measurement level (MHz) | Required Limit (KHz) | Result |
| 2412                    | 9.756                   | >500                 | Pass   |
| 2437                    | 10.1                    | >500                 |        |
| 2462                    | 9.82                    | >500                 |        |

6dB NVNT 802.11b 2412MHz Ant1



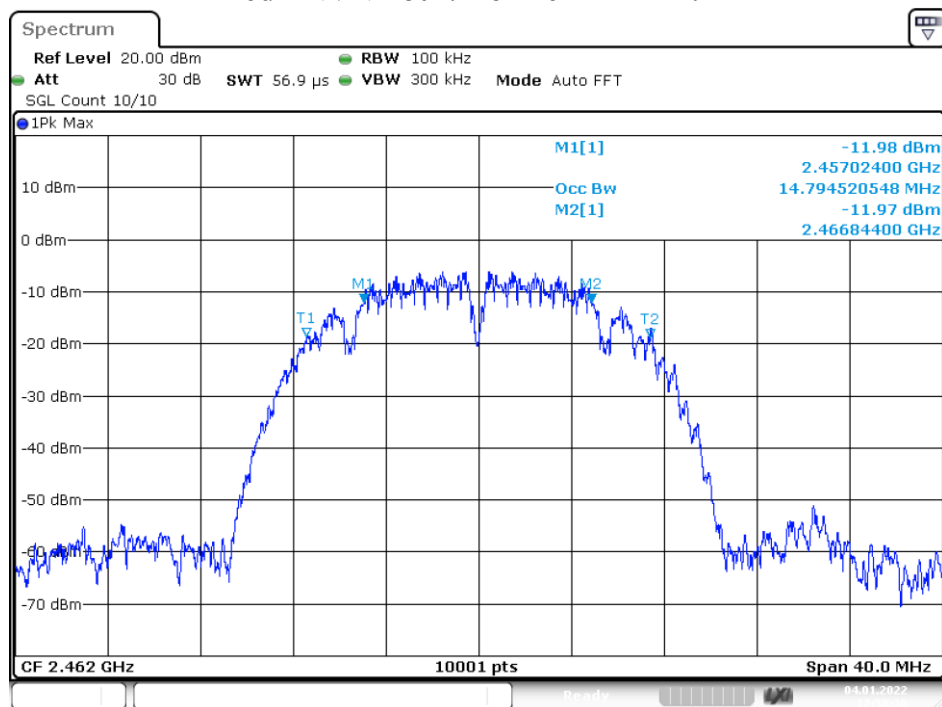
Date: 4.JAN.2022 17:01:09

6dB NVNT 802.11b 2437MHz Ant1



Date: 4.JAN.2022 17:56:48

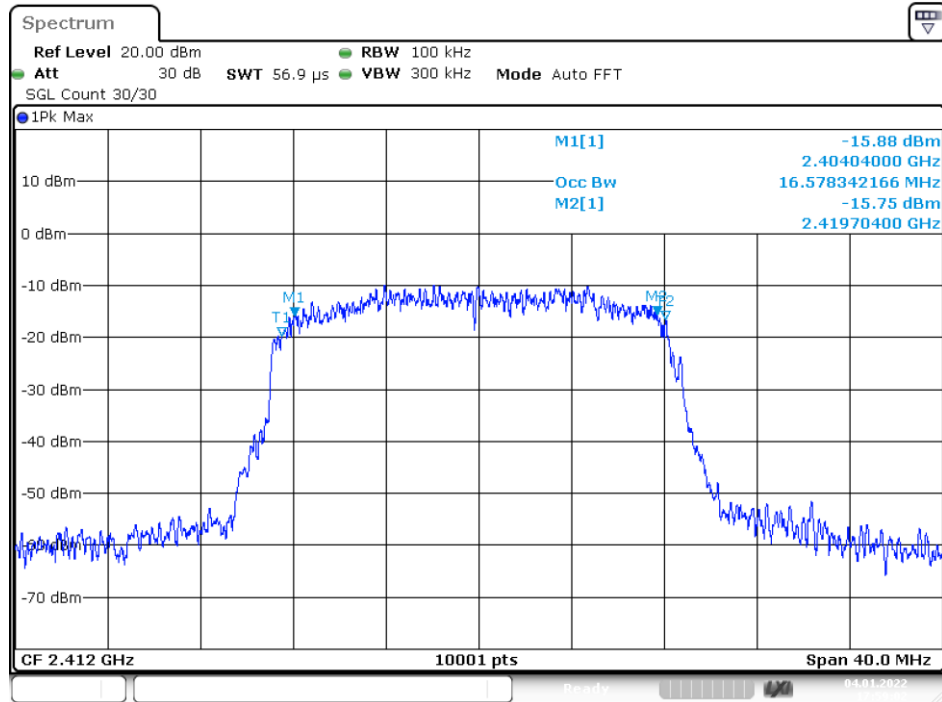
## 6dB NVNT 802.11b 2462MHz Ant1



Date: 4.JAN.2022 17:58:35

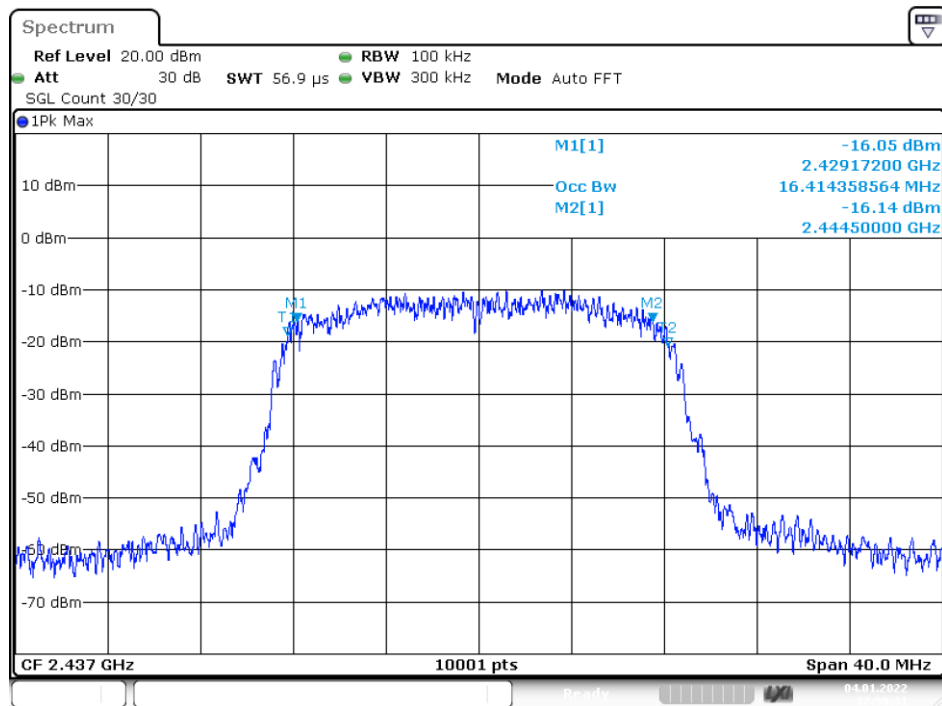
| IEEE 802.11g            |                         |                      |        |
|-------------------------|-------------------------|----------------------|--------|
| Channel frequency (MHz) | Measurement level (MHz) | Required Limit (KHz) | Result |
| 2412                    | 15.664                  | >500                 | Pass   |
| 2437                    | 15.328                  | >500                 |        |
| 2462                    | 13.192                  | >500                 |        |

## 6dB NVNT 802.11g 2412MHz Ant1



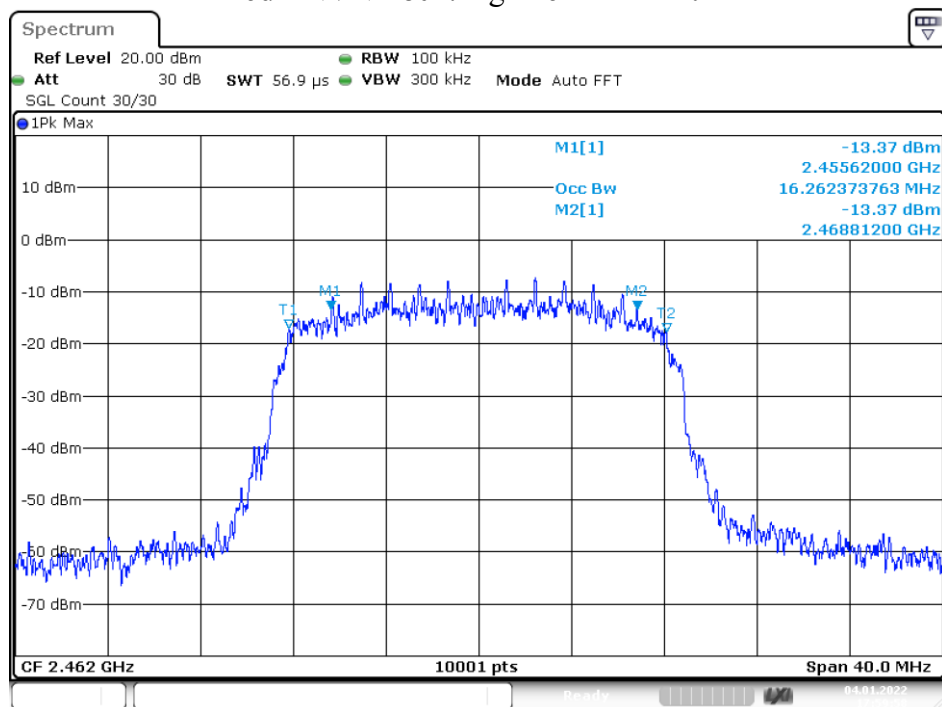
Date: 4.JAN.2022 17:59:02

## 6dB NVNT 802.11g 2437MHz Ant1



Date: 4.JAN.2022 17:59:31

## 6dB NVNT 802.11g 2462MHz Ant1



Date: 4.JAN.2022 17:59:58

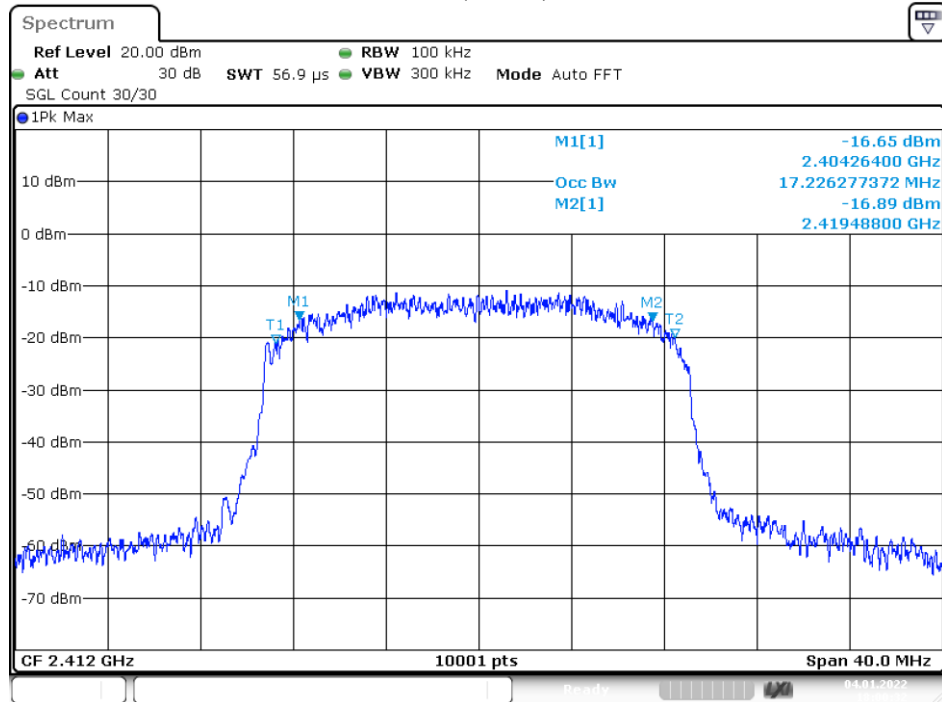
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IEEE 802.11n(HT20)



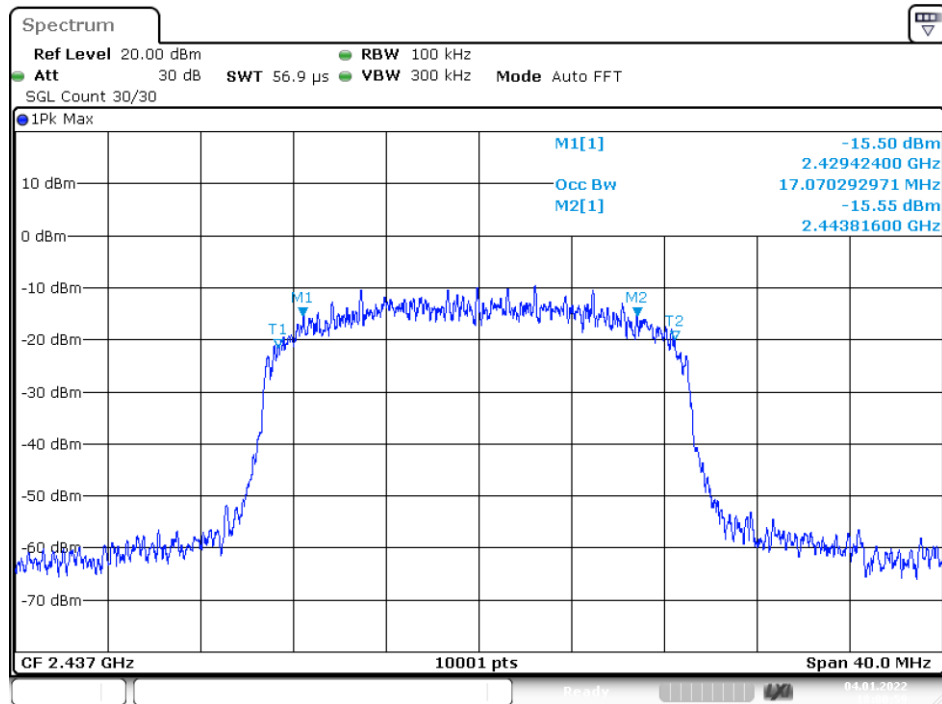
| Channel frequency (MHz) | Measurement level (MHz) | Required Limit (KHz) | Result |
|-------------------------|-------------------------|----------------------|--------|
| 2412                    | 15.224                  | >500                 | Pass   |
| 2437                    | 14.392                  | >500                 |        |
| 2462                    | 15.472                  | >500                 |        |

6dB NVNT 802.11n(HT20) 2412MHz Ant1



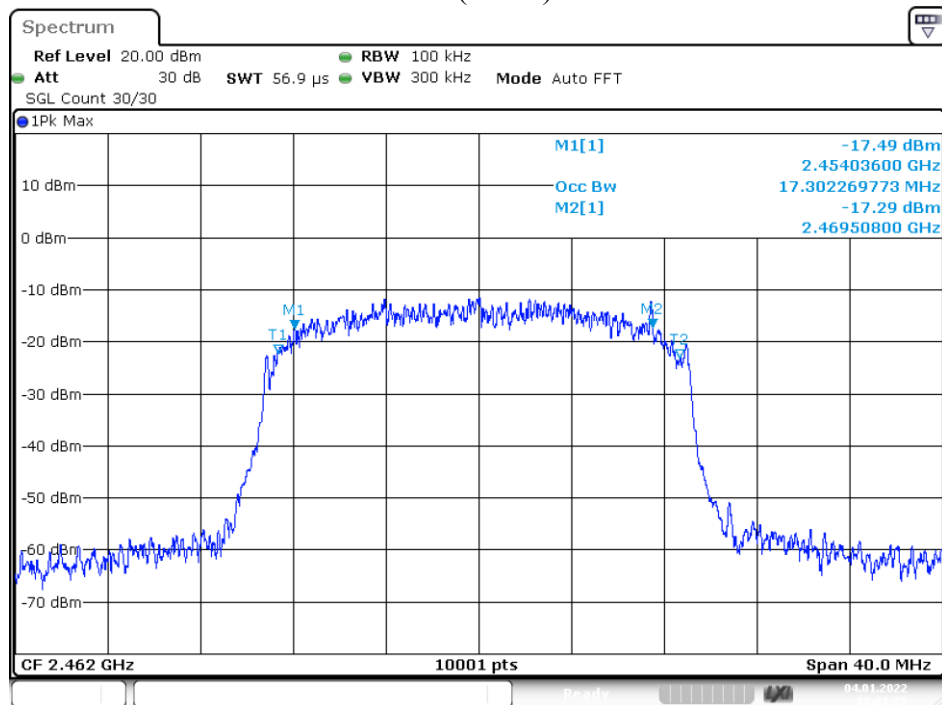
Date: 4.JAN.2022 18:00:32

6dB NVNT 802.11n(HT20) 2437MHz Ant1



Date: 4.JAN.2022 18:00:59

## 6dB NVNT 802.11n(HT20) 2462MHz Ant1



Date: 4.JAN.2022 18:01:25

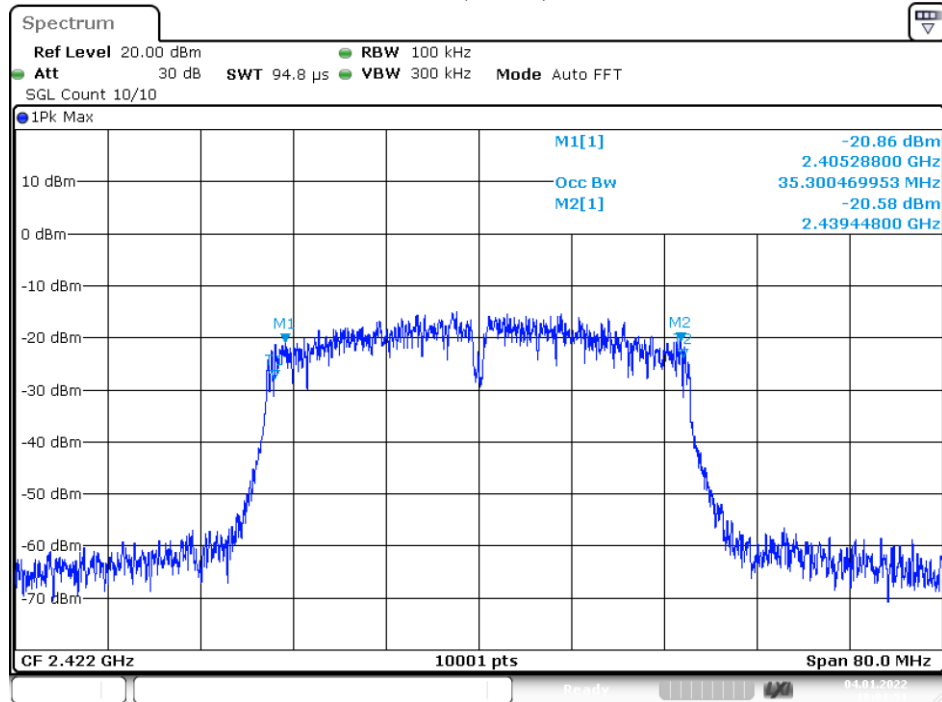
IEEE 802.11n(HT40)

Report No.: E01A22020214F00101

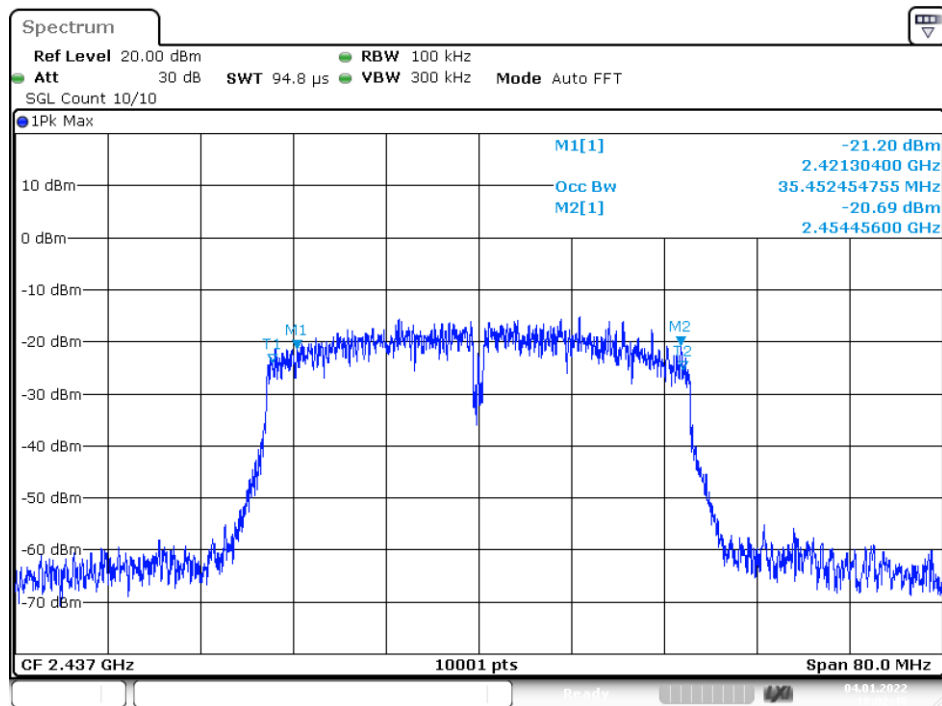
35 of 64

| Channel frequency (MHz) | Measurement level (MHz) | Required Limit (KHz) | Result |
|-------------------------|-------------------------|----------------------|--------|
| 2422                    | 34.16                   | >500                 | Pass   |
| 2437                    | 33.152                  | >500                 |        |
| 2452                    | 30.28                   | >500                 |        |

6dB NVNT 802.11n(HT40) 2422MHz Ant1

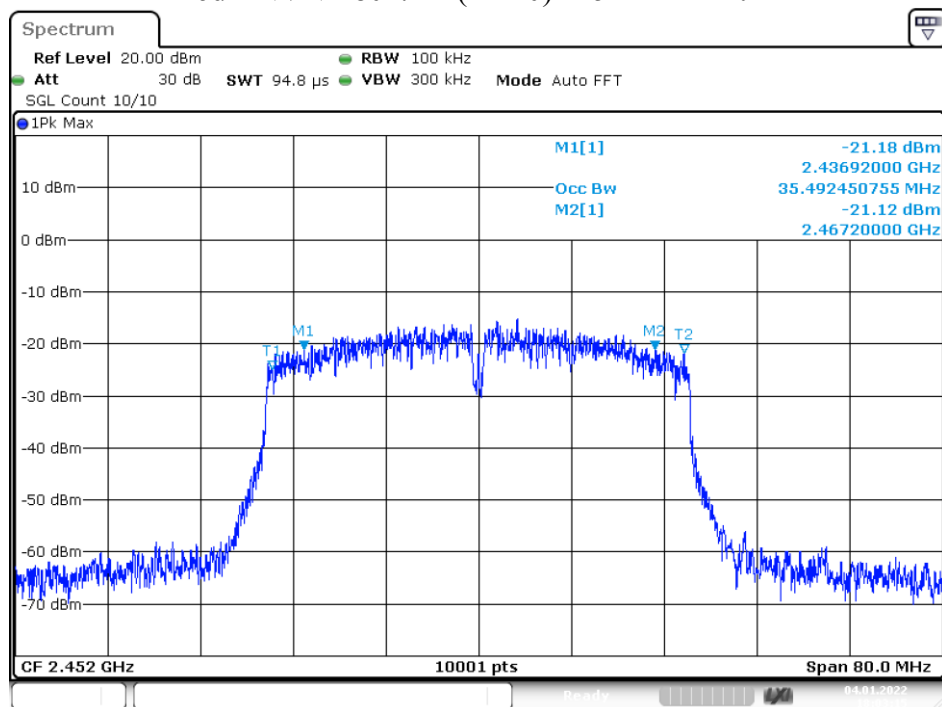


6dB NVNT 802.11n(HT40) 2437MHz Ant1



Date: 4.JAN.2022 18:02:45

## 6dB NVNT 802.11n(HT40) 2452MHz Ant1



Date: 4.JAN.2022 18:03:15

## 9. Maximum Peak Output Power Test

### 9.1 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 D01 15.247 Meas Guidance v05r02. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power and record the results in the test report.

### 9.2 Test SET-UP (Block Diagram of Configuration)



### 9.3 Measurement Equipment Used

| EQUIPMENT TYPE      | Manufacturer | Model No. | Serial Number | Calibrated until. |
|---------------------|--------------|-----------|---------------|-------------------|
| USB RF Power sensor | RadiPower    | RPR3006W  | 17I00015SNO88 | 2022-11-13        |
| RF Test Software    | MAIWEI       | MTS 8310  | N/A           | N/A               |

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 9.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

### 9.5 Measurement Results

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 2022-03-07 |
| Test By:           | Best | Temperature : | 26°C       |
| Test Result:       | PASS | Humidity :    | 60%        |

| Test Channel | Peak Output Power (dBm) |         |               |               | Limit(dBm) | Result |
|--------------|-------------------------|---------|---------------|---------------|------------|--------|
|              | 802.11b                 | 802.11g | 802.11n(HT20) | 802.11n(HT40) |            |        |
| Lowest       | 15.58                   | 12.89   | 11.57         | 10.12         | 30         | Pass   |
| Middle       | 15.5                    | 12.52   | 11.25         | 9.76          |            |        |
| Highest      | 15.08                   | 12.14   | 10.89         | 9.34          |            |        |

## 10. Band Edge Test

### 10.1 Measurement Procedure

#### For Conducted Test

1. The testing follows FCC KDB Publication No. 5558074 D01 15.247 Meas Guidance v05r02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions 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 when maximum peak conducted output power procedure is used. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

#### For Radiated emission Test

1. The testing follows FCC KDB Publication No. 5558074 D01 15.247 Meas Guidance v05r02.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Repeat above procedures until all frequency measured were complete.

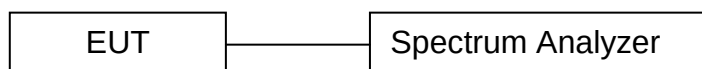
When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

| EMI Test Receiver | Setting  |
|-------------------|----------|
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 3MHz     |
| Detector          | Peak     |
| Trace             | Max hold |

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

|                   |          |
|-------------------|----------|
| EMI Test Receiver | Setting  |
| Attenuation       | Auto     |
| RB                | 1MHz     |
| VB                | 10Hz     |
| Detector          | AVG      |
| Trace             | Max hold |

## 10.2 Test SET-UP (Block Diagram of Configuration)



## 10.3 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR                | MODEL NUMBER | SERIAL NUMBER | CALIBRATED UNTIL |
|-------------------|--------------------|--------------|---------------|------------------|
| Spectrum Analyzer | Rohde & Schwarz    | FSV40        | US40240623    | 2022-11-13       |
| Coaxial Cable     | Gigalink Microwave | ZT40         | 19022092      | 2022-11-13       |
| Antenna Connector | ARTHUR-YANG        | 2244-N1TG1   | N/A           | 2022-11-13       |

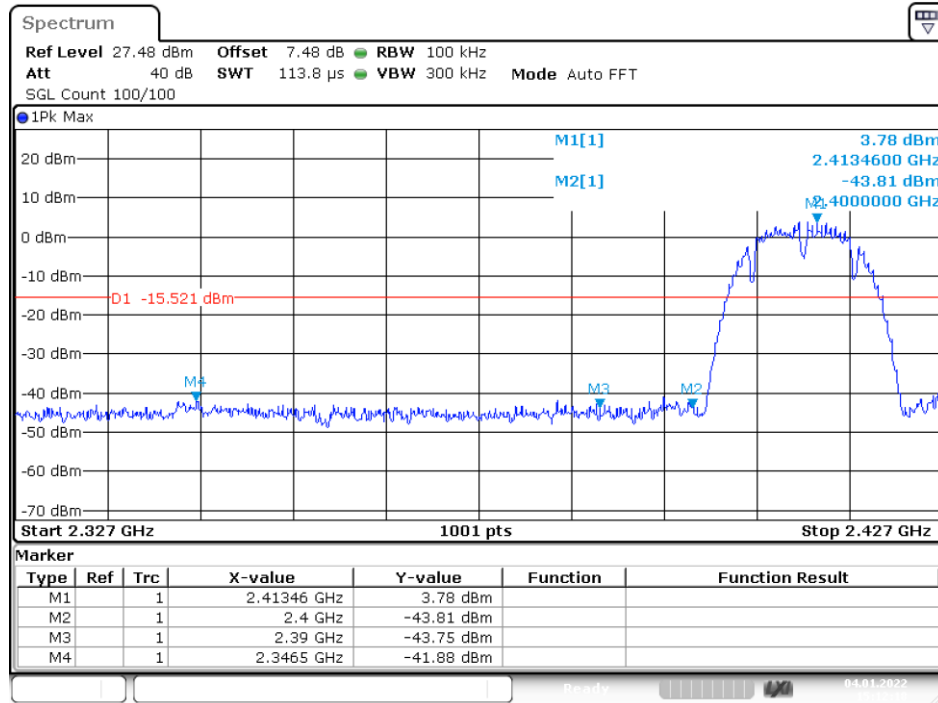
**Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.**

## 10.4 Measurement Results

### 1. Conducted Test

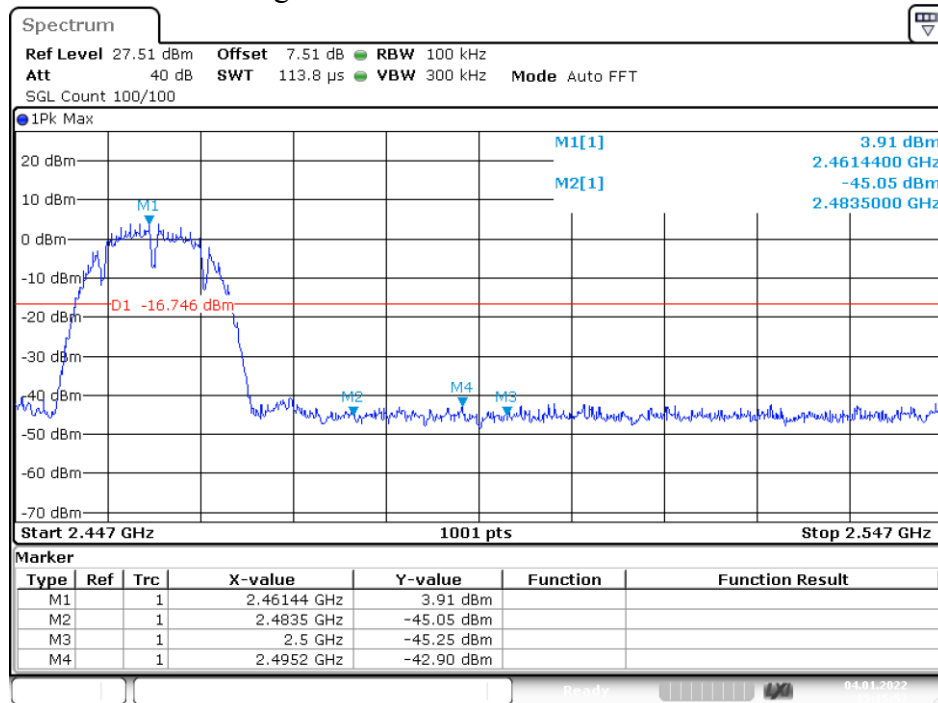
Please refer to the following pages.

## Band Edge 802.11b 2412MHz Ant1 Emission



Date: 4.JAN.2022 15:12:18

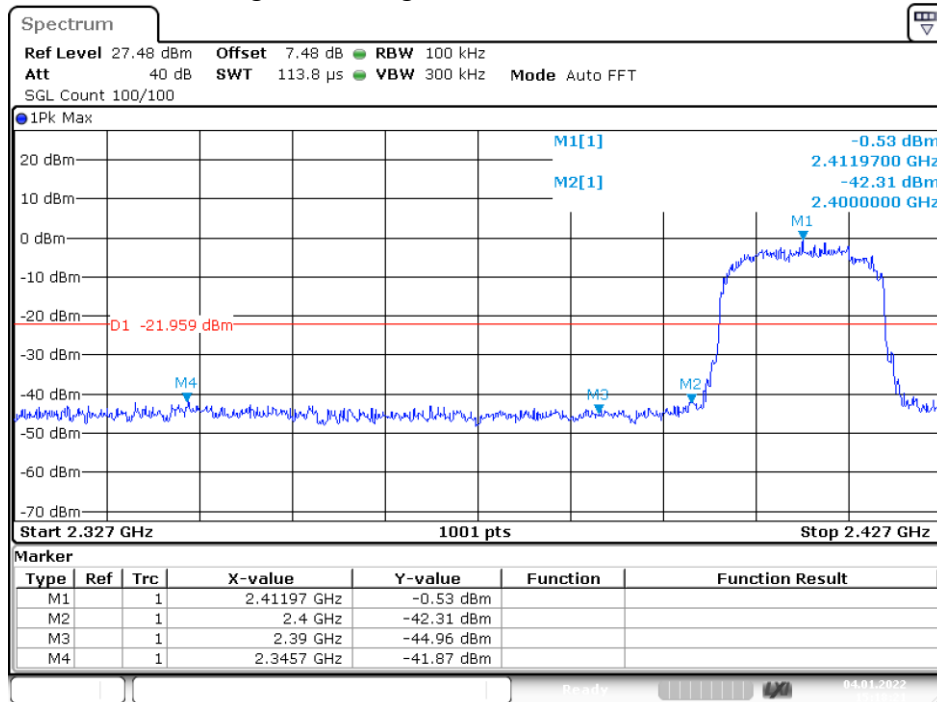
## Band Edge 802.11b 2462MHz Ant1 Emission



Date: 4.JAN.2022 15:15:53

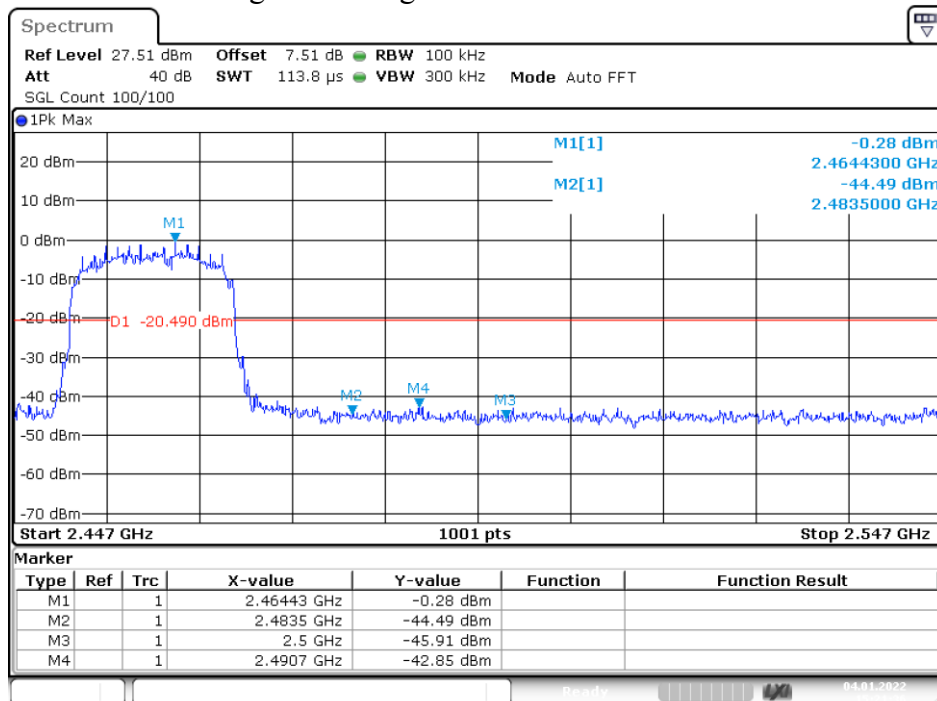


## Band Edge 802.11g 2412MHz Ant1 Emission



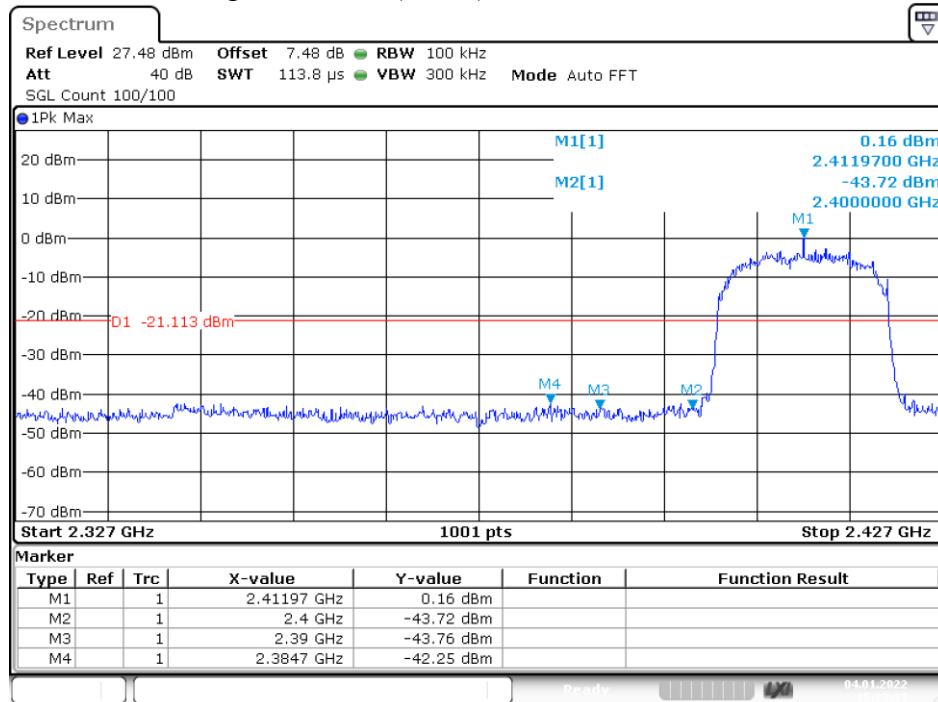
Date: 4.JAN.2022 15:18:21

## Band Edge 802.11g 2462MHz Ant1 Emission



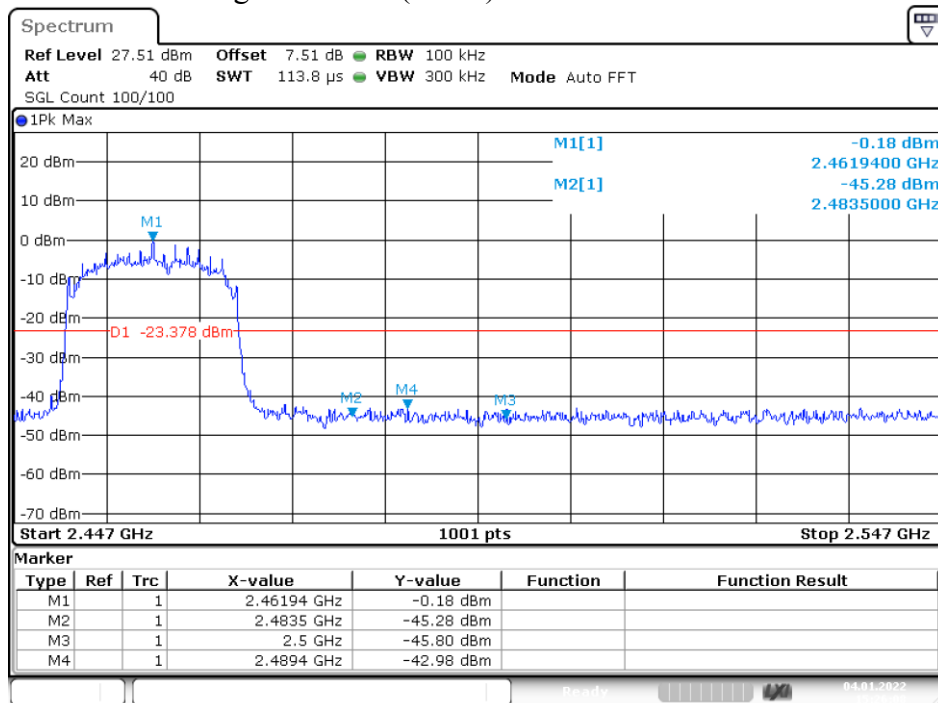
Date: 4.JAN.2022 15:21:35

## Band Edge 802.11n(HT20) 2412MHz Ant1 Emission



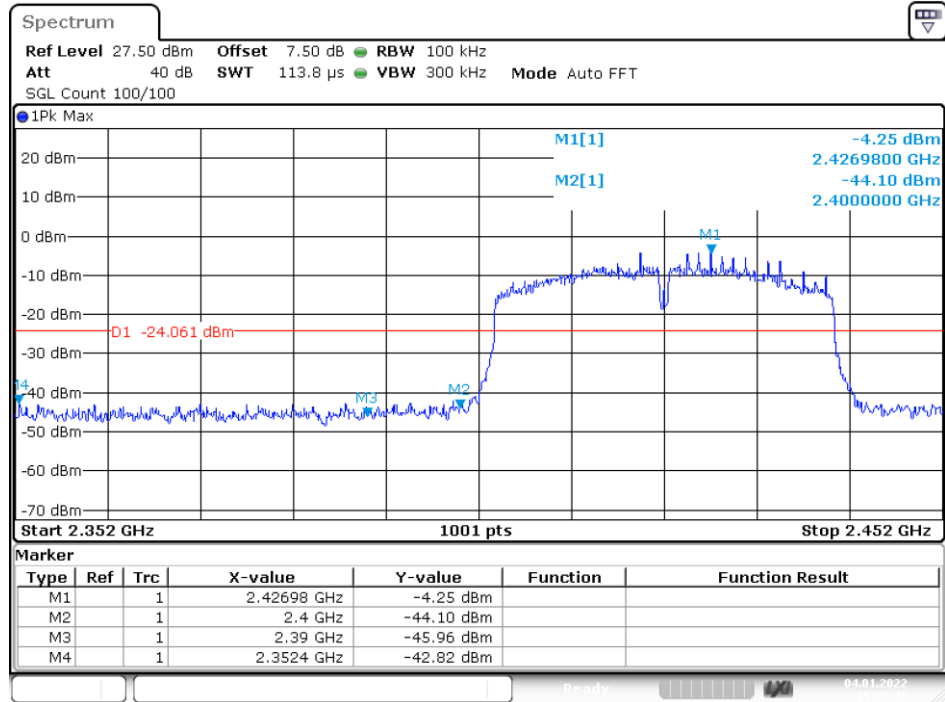
Date: 4.JAN.2022 15:23:15

## Band Edge 802.11n(HT20) 2462MHz Ant1 Emission

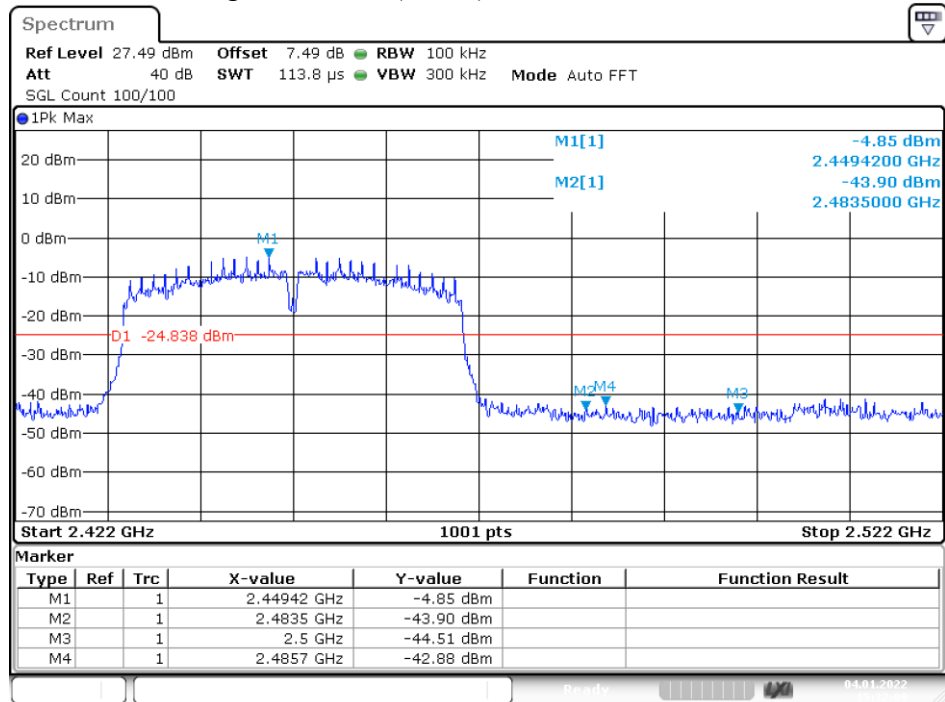


Date: 4.JAN.2022 15:26:07

## Band Edge 802.11n(HT40) 2422MHz Ant1 Emission



## Band Edge 802.11n(HT40) 2452MHz Ant1 Emission





Report No.: E01A22020214F00101

44 of 64

## 2. Radiated emission Test

Spectrum Detector:

PK/AV

Test Date :

2022-03-07

Test By:

Best

Temperature :

28 °C

Humidity :

65 %

| IEEE 802.11b SISO Ant1 |           |                       |       |                |                        |       |          |    |            |        |
|------------------------|-----------|-----------------------|-------|----------------|------------------------|-------|----------|----|------------|--------|
| Freq.                  | Ant. Pol. | Reading Level(dBuV/m) |       | Correct Factor | Emission Level(dBuV/m) |       | Limit 3m |    | Margin(dB) |        |
| (MHz)                  | H/V       | PK                    | AV    | dB             | PK                     | AV    | PK       | AV | PK         | AV     |
| <2400                  | H         | 85.32                 | 66.3  | -26.3          | 59.02                  | 40    | 74       | 54 | -14.98     | -14    |
| <2400                  | V         | 84.32                 | 65.02 | -26.1          | 58.22                  | 38.92 | 74       | 54 | -15.78     | -15.08 |
| >2483.5                | H         | 84.36                 | 65.55 | -26.3          | 58.06                  | 39.25 | 74       | 54 | -15.94     | -14.75 |
| >2483.5                | V         | 85.13                 | 65.03 | -26.1          | 59.03                  | 38.93 | 74       | 54 | -14.97     | -15.07 |

| IEEE 802.11g SISO Ant1 |           |                       |       |                |                        |       |          |    |            |        |
|------------------------|-----------|-----------------------|-------|----------------|------------------------|-------|----------|----|------------|--------|
| Freq.                  | Ant. Pol. | Reading Level(dBuV/m) |       | Correct Factor | Emission Level(dBuV/m) |       | Limit 3m |    | Margin(dB) |        |
| (MHz)                  | H/V       | PK                    | AV    | dB             | PK                     | AV    | PK       | AV | PK         | AV     |
| <2400                  | H         | 83.25                 | 64.98 | -26.3          | 56.95                  | 38.68 | 74       | 54 | -17.05     | -15.32 |
| <2400                  | V         | 84.12                 | 64.25 | -26.1          | 58.02                  | 38.15 | 74       | 54 | -15.98     | -15.85 |
| >2483.5                | H         | 84.03                 | 64.25 | -26.3          | 57.73                  | 37.95 | 74       | 54 | -16.27     | -16.05 |
| >2483.5                | V         | 84.36                 | 64.52 | -26.1          | 58.26                  | 38.42 | 74       | 54 | -15.74     | -15.58 |

| IEEE 802.11n(HT20) SISO |           |                       |       |                |                        |       |          |    |            |        |
|-------------------------|-----------|-----------------------|-------|----------------|------------------------|-------|----------|----|------------|--------|
| Freq.                   | Ant. Pol. | Reading Level(dBuV/m) |       | Correct Factor | Emission Level(dBuV/m) |       | Limit 3m |    | Margin(dB) |        |
| (MHz)                   | H/V       | PK                    | AV    | dB             | PK                     | AV    | PK       | AV | PK         | AV     |
| <2400                   | H         | 83.02                 | 63.25 | -26.3          | 56.72                  | 36.95 | 74       | 54 | -17.28     | -17.05 |
| <2400                   | V         | 83.12                 | 64.28 | -26.1          | 57.02                  | 38.18 | 74       | 54 | -16.98     | -15.82 |
| >2483.5                 | H         | 83.23                 | 64.02 | -26.3          | 56.93                  | 37.72 | 74       | 54 | -17.07     | -16.28 |
| >2483.5                 | V         | 83.26                 | 64.23 | -26.1          | 57.16                  | 38.13 | 74       | 54 | -16.84     | -15.87 |

| IEEE 802.11n(H40) SISO |           |                       |       |                |                        |       |          |    |            |        |
|------------------------|-----------|-----------------------|-------|----------------|------------------------|-------|----------|----|------------|--------|
| Freq.                  | Ant. Pol. | Reading Level(dBuV/m) |       | Correct Factor | Emission Level(dBuV/m) |       | Limit 3m |    | Margin(dB) |        |
| (MHz)                  | H/V       | PK                    | AV    | dB             | PK                     | AV    | PK       | AV | PK         | AV     |
| <2400                  | H         | 80.36                 | 61.14 | -26.3          | 54.06                  | 34.84 | 74       | 54 | -19.94     | -19.16 |
| <2400                  | V         | 80.96                 | 61.25 | -26.1          | 54.86                  | 35.15 | 74       | 54 | -19.14     | -18.85 |
| >2483.5                | H         | 78.32                 | 60.28 | -26.3          | 52.02                  | 33.98 | 74       | 54 | -21.98     | -20.02 |
| >2483.5                | V         | 78.36                 | 60.14 | -26.1          | 52.26                  | 34.04 | 74       | 54 | -21.74     | -19.96 |

## 11. Power Density

### 11.1 Test Equipment

| EQUIPMENT TYPE    | MFR                | MODEL NUMBER | SERIAL NUMBER | CALIBRATED UNTIL |
|-------------------|--------------------|--------------|---------------|------------------|
| Spectrum Analyzer | Rohde & Schwarz    | FSV40        | US40240623    | 2022-11-13       |
| Coaxial Cable     | Gigalink Microwave | ZT40         | 19022092      | 2022-11-13       |
| Antenna Connector | ARTHUR-YANG        | 2244-N1TG1   | N/A           | 2022-11-13       |

**Remark:** The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 11.2 Measuring Instruments and Setting

The following table is the setting of spectrum analyzer.

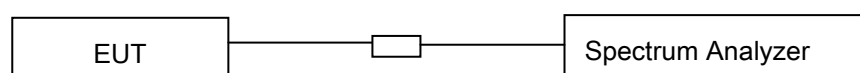
|                   |                                              |
|-------------------|----------------------------------------------|
| Spectrum analyzer | Setting                                      |
| Attenuation       | Auto                                         |
| Span Frequency    | Set the span to 1.5 times the DTS bandwidth. |
| RB                | 3kHz                                         |
| VB                | 10KHz                                        |
| Detector          | Peak                                         |
| Trace             | Max hold                                     |
| Sweep Time        | Automatic                                    |

### 11.3 Test Procedures

The testing follows the Measurement Procedure of FCC KDB No. 558074 D01 15.247 Meas Guidance v05r02.

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set analyzer center frequency to DTS channel center frequency.
- Set the analyzer span to a minimum of 1.5 times the DTS bandwidth.
- Set the RBW  $\geq 3$  kHz. Set the VBW  $\geq 3 \times$  RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

### 11.4 Block Diagram of Test Setup



### 11.5 Limit

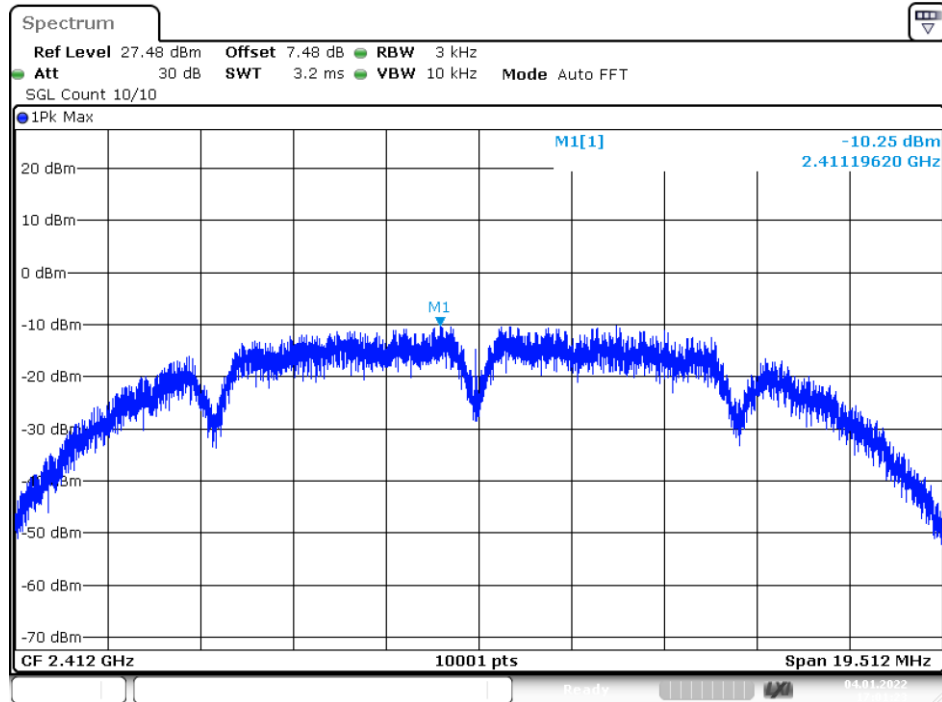
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

### 11.6 Test Result

|                    |      |               |            |
|--------------------|------|---------------|------------|
| Spectrum Detector: | PK   | Test Date :   | 2022-03-07 |
| Test By:           | Best | Temperature : | 26°C       |
| Test Result:       | PASS | Humidity :    | 60%        |

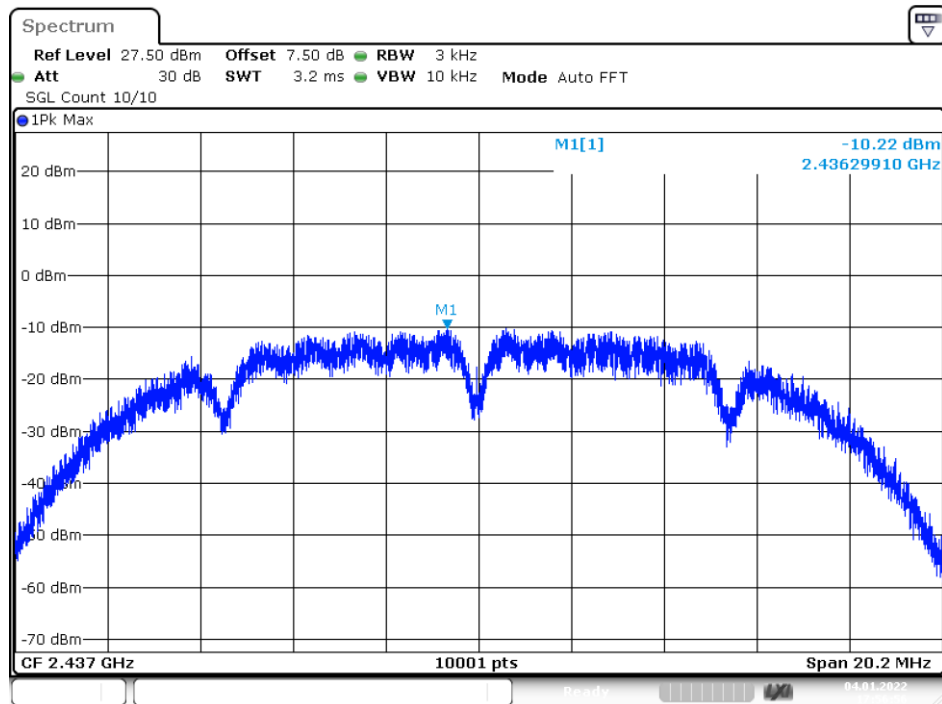
| IEEE 802.11b            |                         |            |        |
|-------------------------|-------------------------|------------|--------|
| Channel frequency (MHz) | Measurement level (dBm) | Limit(dBm) | Result |
| 2412                    | -10.25                  | 8          | Pass   |
| 2437                    | -10.22                  |            |        |
| 2462                    | -10.74                  |            |        |

PSD NVNT 802.11b 2412MHz Ant1



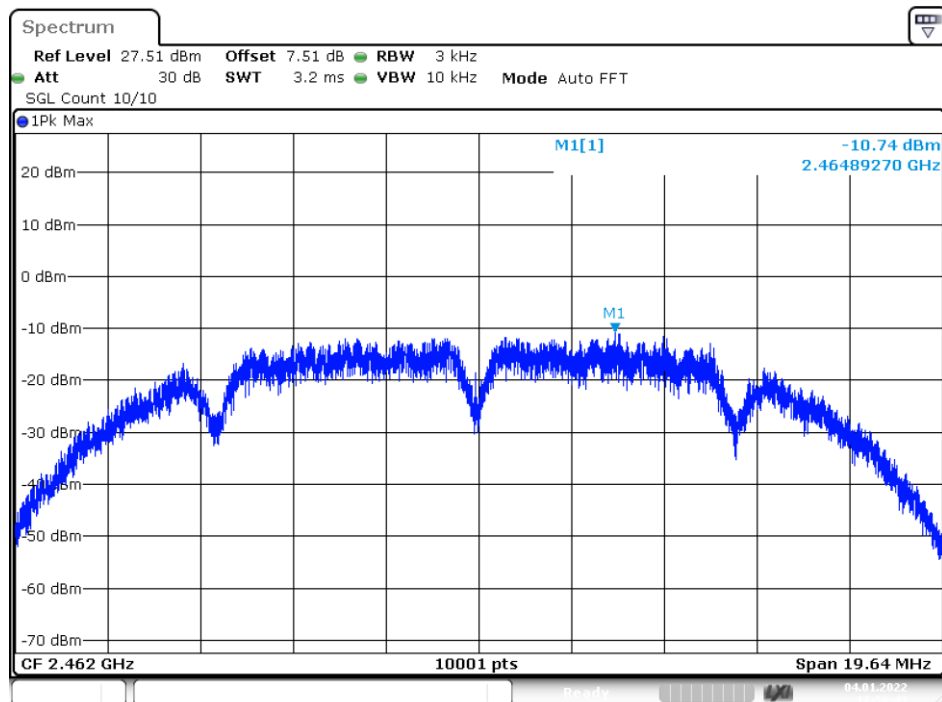
Date: 4.JAN.2022 17:01:22

## PSD NVNT 802.11b 2437MHz Ant1



Date: 4.JAN.2022 17:56:56

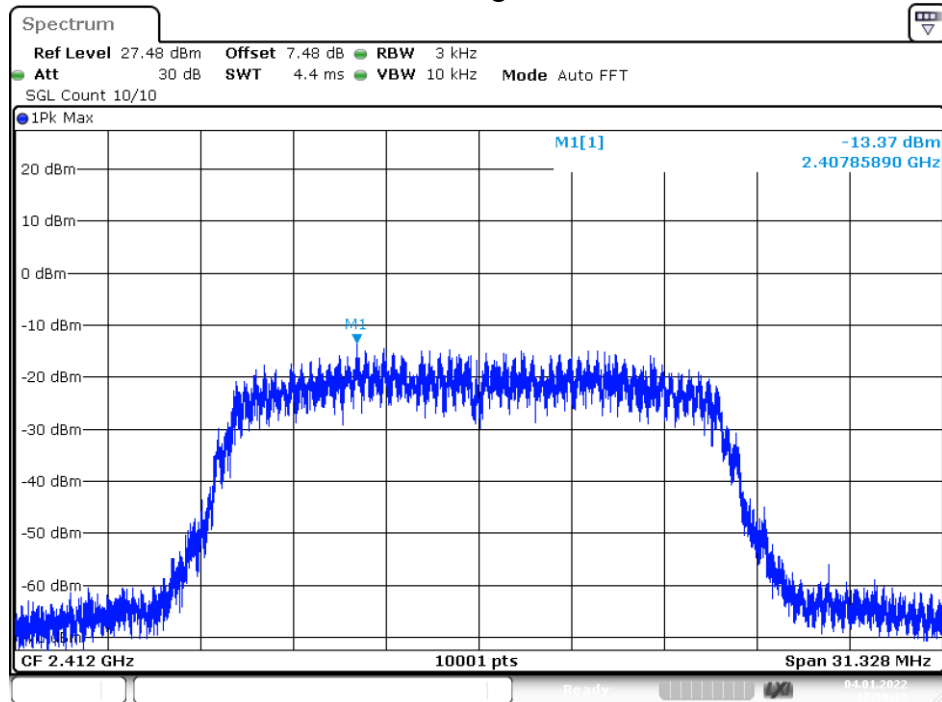
## PSD NVNT 802.11b 2462MHz Ant1



Date: 4.JAN.2022 17:58:43

| IEEE 802.11g            |                         |            |        |
|-------------------------|-------------------------|------------|--------|
| Channel frequency (MHz) | Measurement level (dBm) | Limit(dBm) | Result |
| 2412                    | -13.37                  | 8          | Pass   |
| 2437                    | -13.39                  |            |        |
| 2462                    | -14.32                  |            |        |

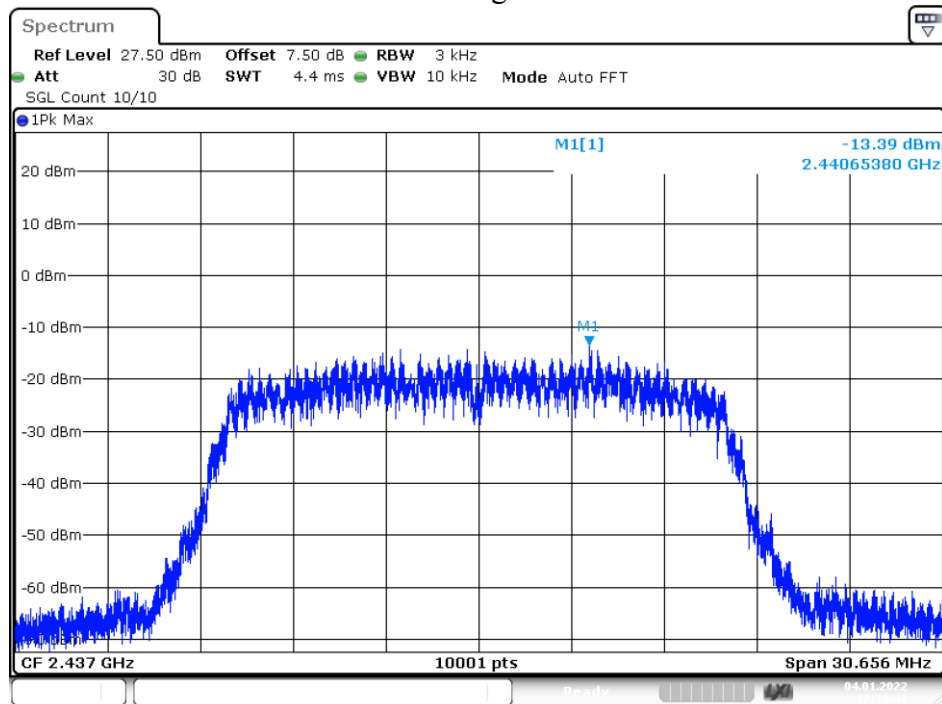
PSD NVNT 802.11g 2412MHz Ant1



Date: 4.JAN.2022 17:59:14

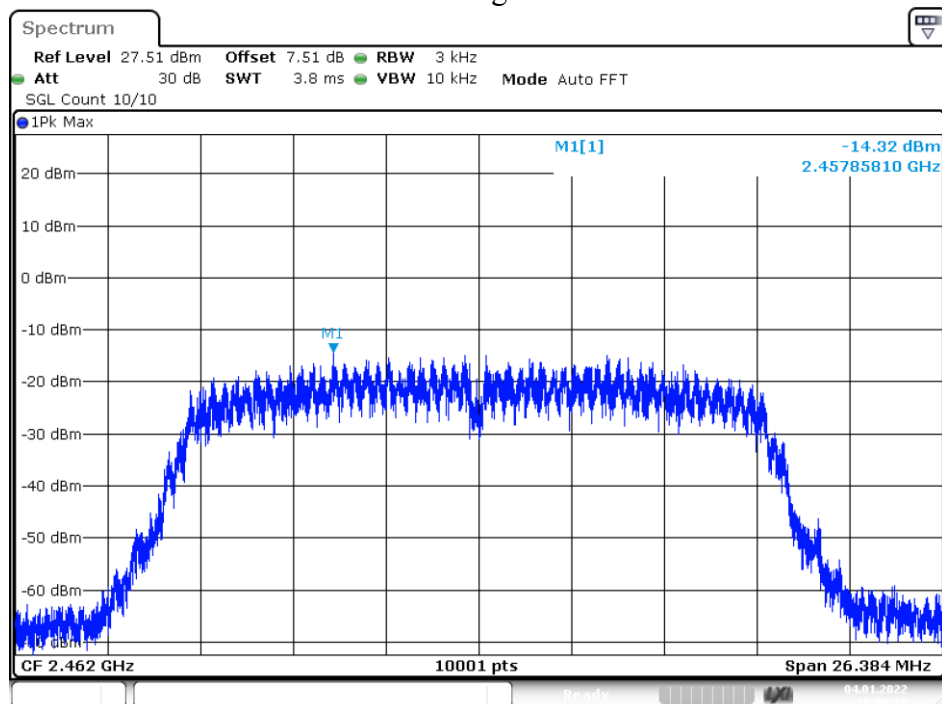


## PSD NVNT 802.11g 2437MHz Ant1



Date: 4.JAN.2022 17:59:40

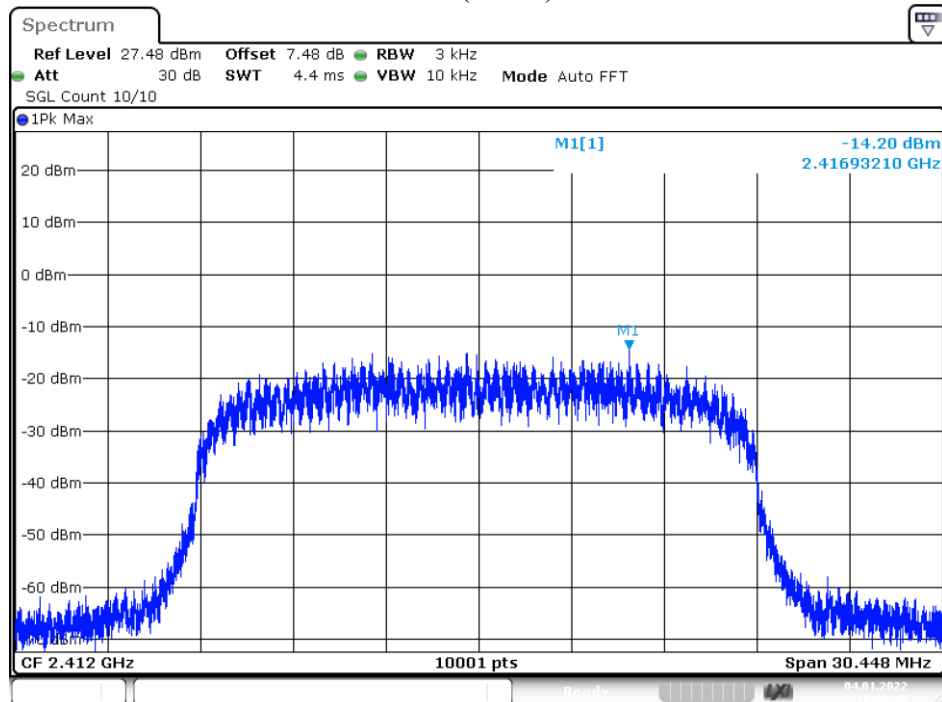
## PSD NVNT 802.11g 2462MHz Ant1



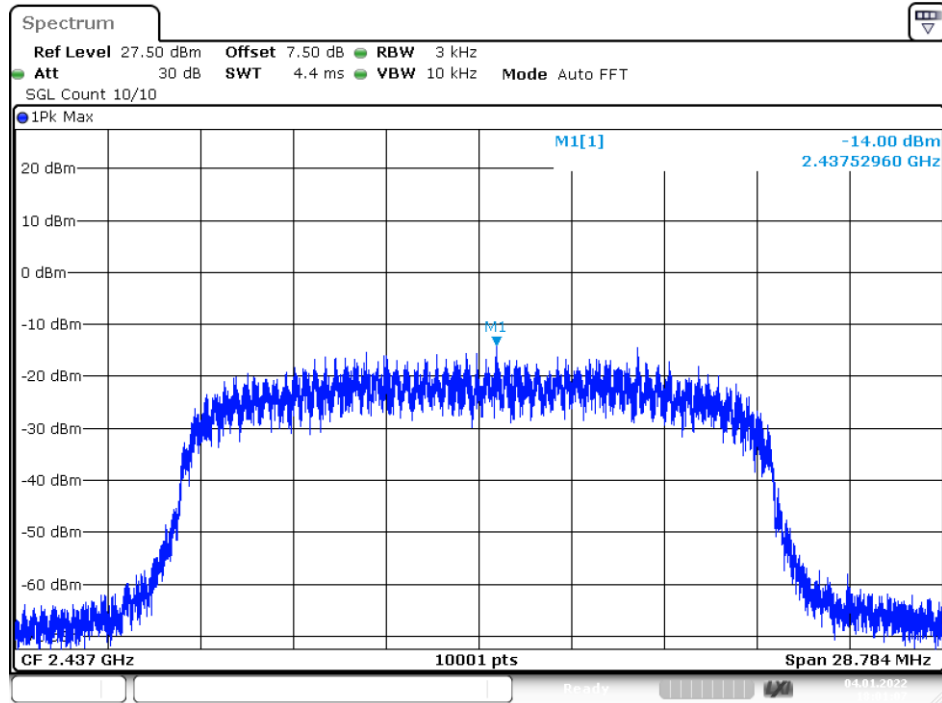
Date: 4.JAN.2022 18:00:12

| IEEE 802.11n(HT20)      |                         |            |        |
|-------------------------|-------------------------|------------|--------|
| Channel frequency (MHz) | Measurement level (dBm) | Limit(dBm) | Result |
| 2412                    | -14.20                  | 8          | Pass   |
| 2437                    | -14.00                  |            |        |
| 2462                    | -14.05                  |            |        |

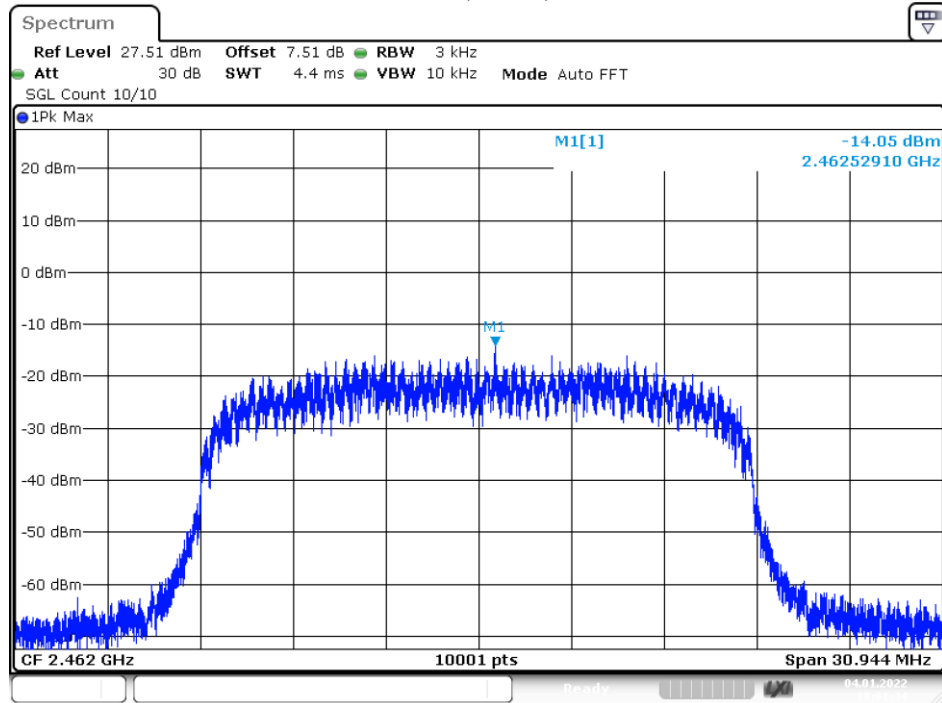
PSD NVNT 802.11n(HT20) 2412MHz Ant1



## PSD NVNT 802.11n(HT20) 2437MHz Ant1

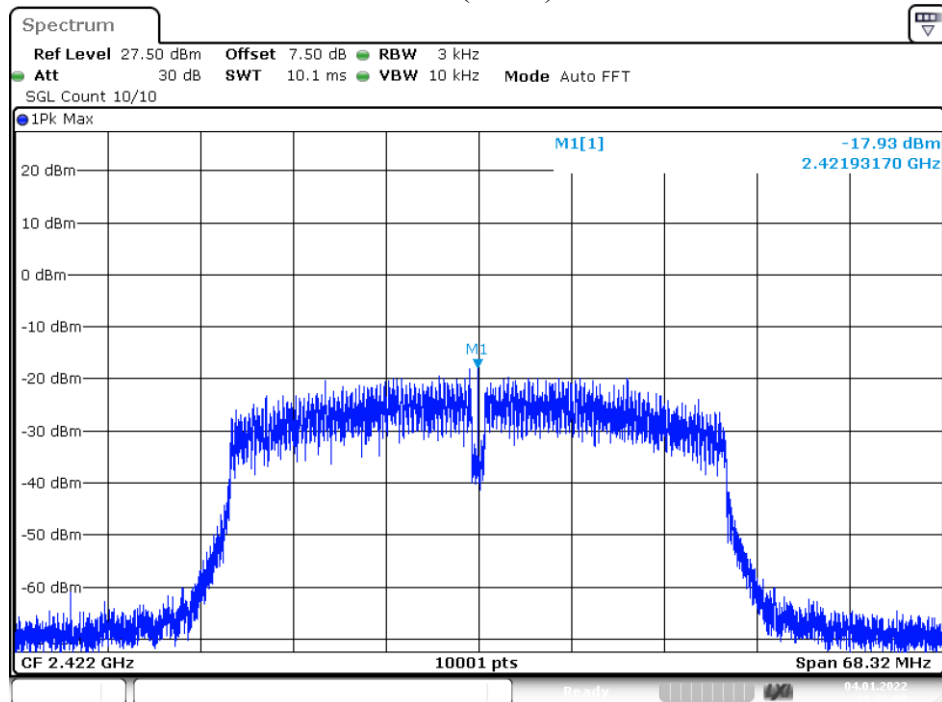


## PSD NVNT 802.11n(HT20) 2462MHz Ant1



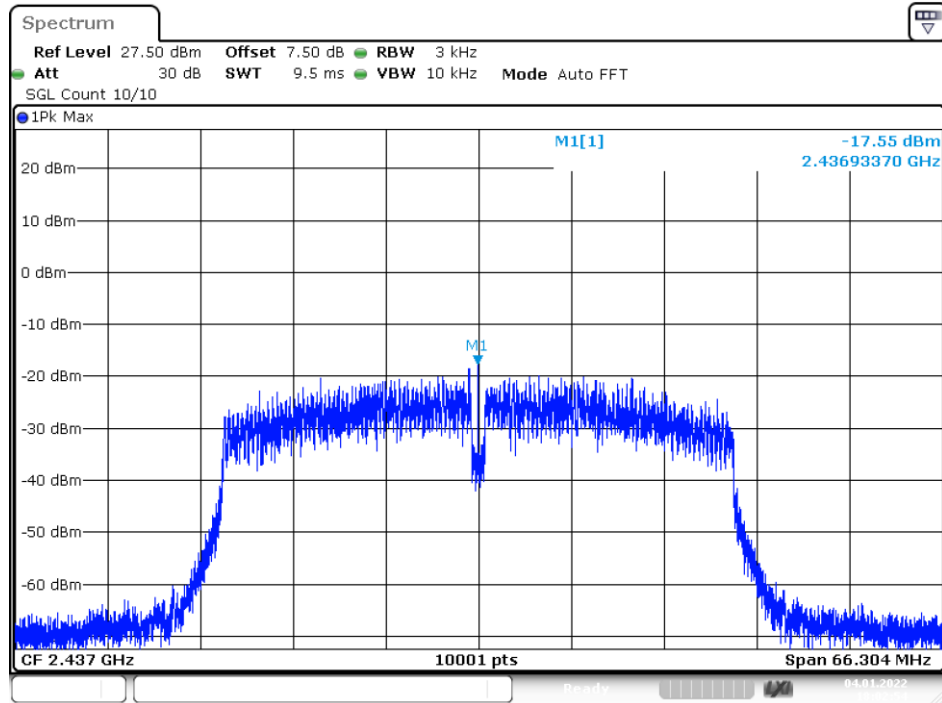
| IEEE 802.11n(HT40)      |                         |            |        |
|-------------------------|-------------------------|------------|--------|
| Channel frequency (MHz) | Measurement level (dBm) | Limit(dBm) | Result |
| 2422                    | -17.93                  | 8          | Pass   |
| 2437                    | -17.55                  |            |        |
| 2452                    | -18.07                  |            |        |

PSD NVNT 802.11n(HT40) 2422MHz Ant1



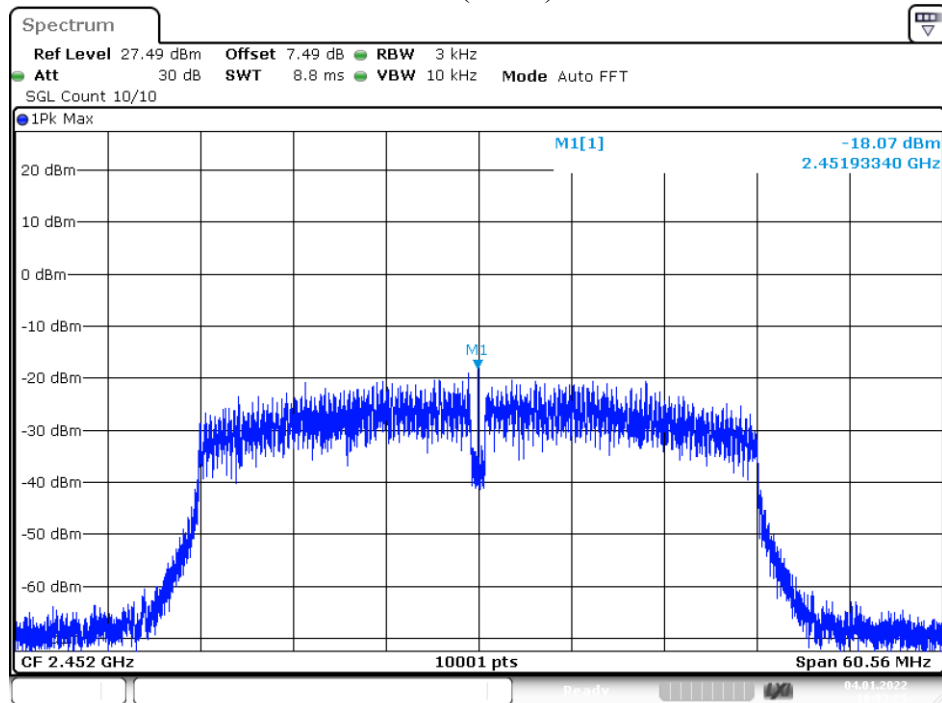
Date: 4.JAN.2022 18:02:00

## **PSD NVNT 802.11n(HT40) 2437MHz Ant1**



Date: 4.JAN.2022 18:02:54

## **PSD NVNT 802.11n(HT40) 2452MHz Ant1**



Date: 4.JAN.2022 18:03:25

## 12. Antenna Port Emission

### 12.1 Test Equipment

| EQUIPMENT TYPE    | MFR                | MODEL NUMBER | SERIAL NUMBER | CALIBRATED UNTIL |
|-------------------|--------------------|--------------|---------------|------------------|
| Spectrum Analyzer | Rohde & Schwarz    | FSV40        | US40240623    | 2022-11-13       |
| Coaxial Cable     | Gigalink Microwave | ZT40         | 19022092      | 2022-11-13       |
| Antenna Connector | ARTHUR-YANG        | 2244-N1TG1   | N/A           | 2022-11-13       |

**Remark:** The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 12.2 Measuring Instruments and Setting

The following table is the setting of spectrum analyzer.

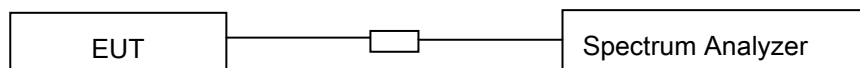
|                   |          |
|-------------------|----------|
| Spectrum analyzer | Setting  |
| Attenuation       | Auto     |
| RB                | 100kHz   |
| VB                | 300kHz   |
| Detector          | Peak     |
| Trace             | Max hold |

### 12.3 Test Procedures

The testing follows the Measurement Procedure of FCC KDB No. 558074 D01 15.247 Meas Guidance v05r02 .

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, Middle, and high channels, the limit was determined by attenuation 20dB of the RF peak power output.

### 12.4 Block Diagram of Test setup

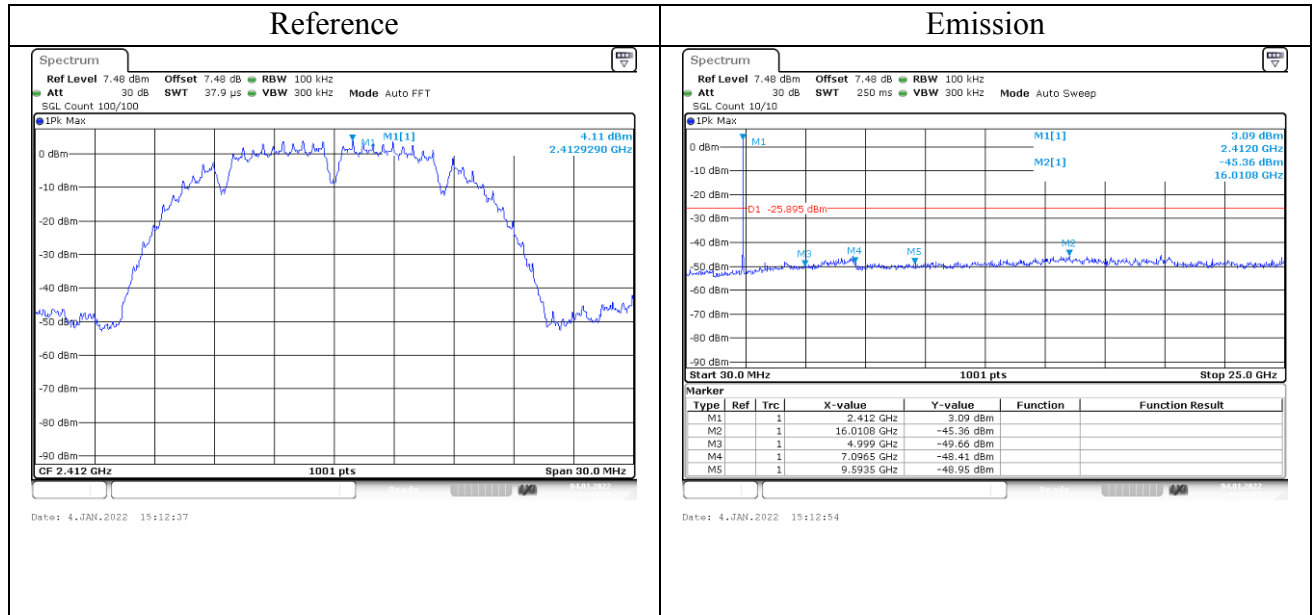


### 12.5 Test Result

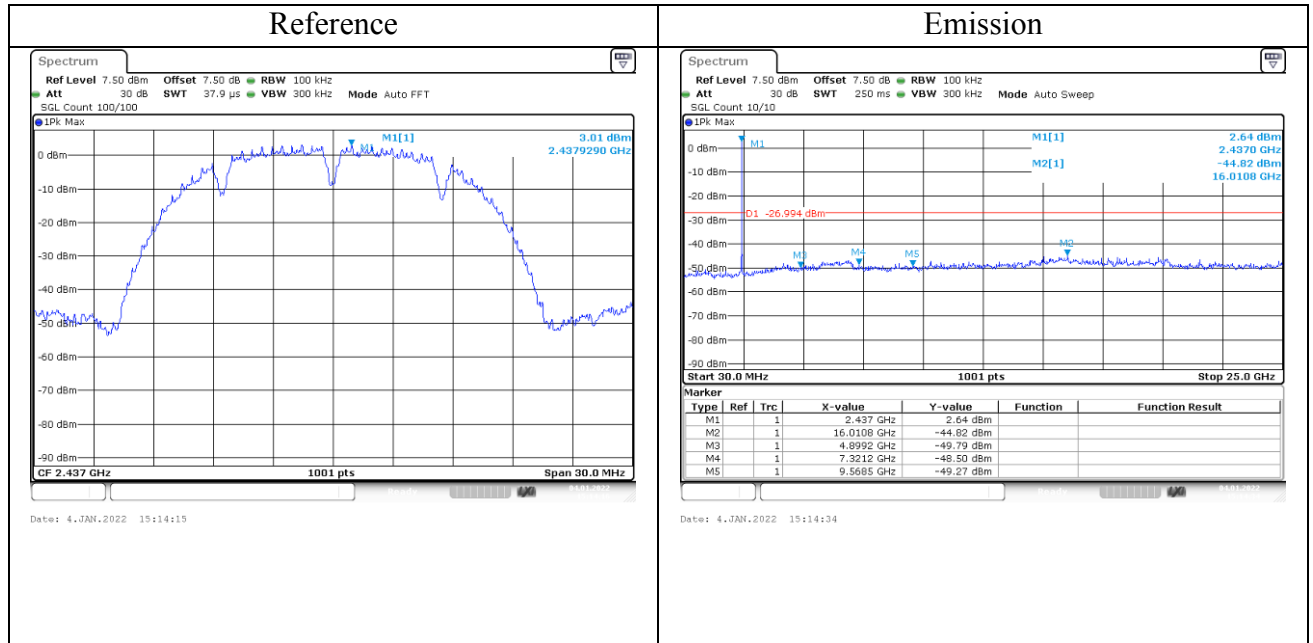
**PASS.**

Please refer to following pages.

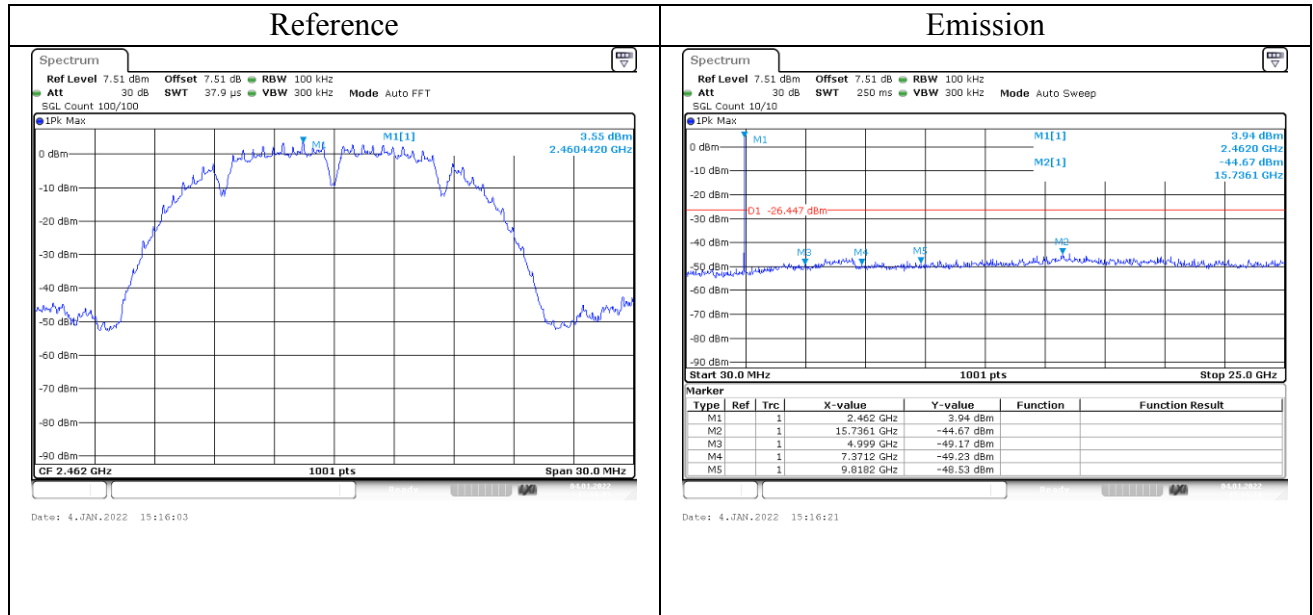
## Tx. Spurious 802.11b 2412MHz Ant1 Emission



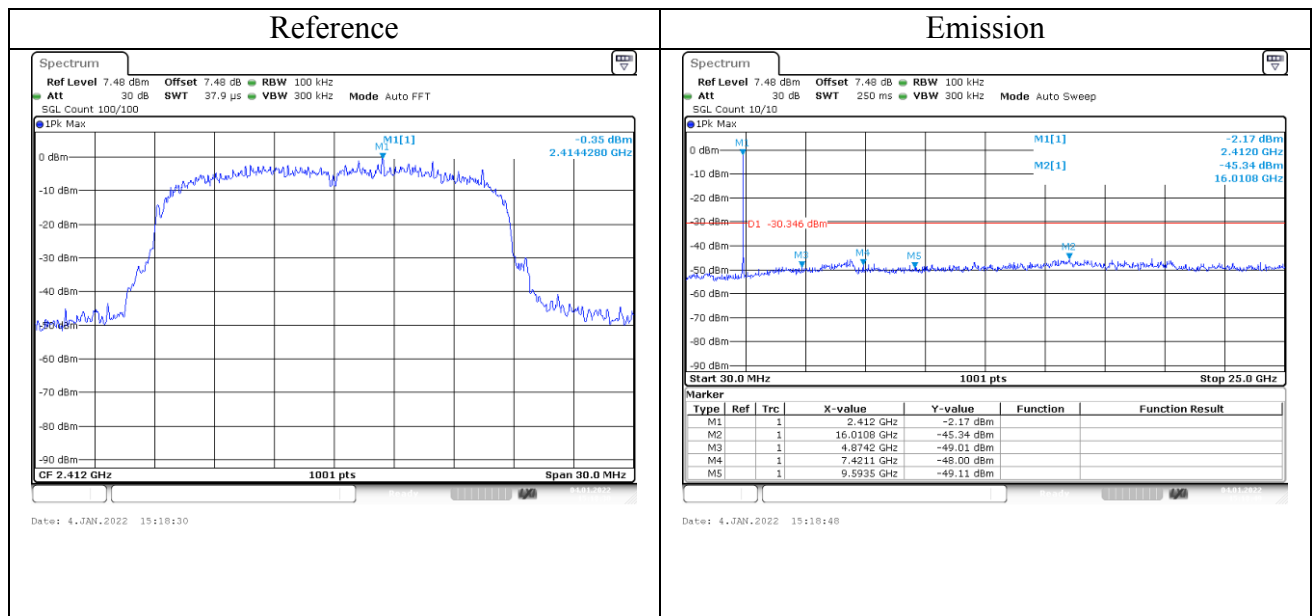
## Tx. Spurious 802.11b 2437MHz Ant1 Emission



## Tx. Spurious 802.11b 2462MHz Ant1 Emission

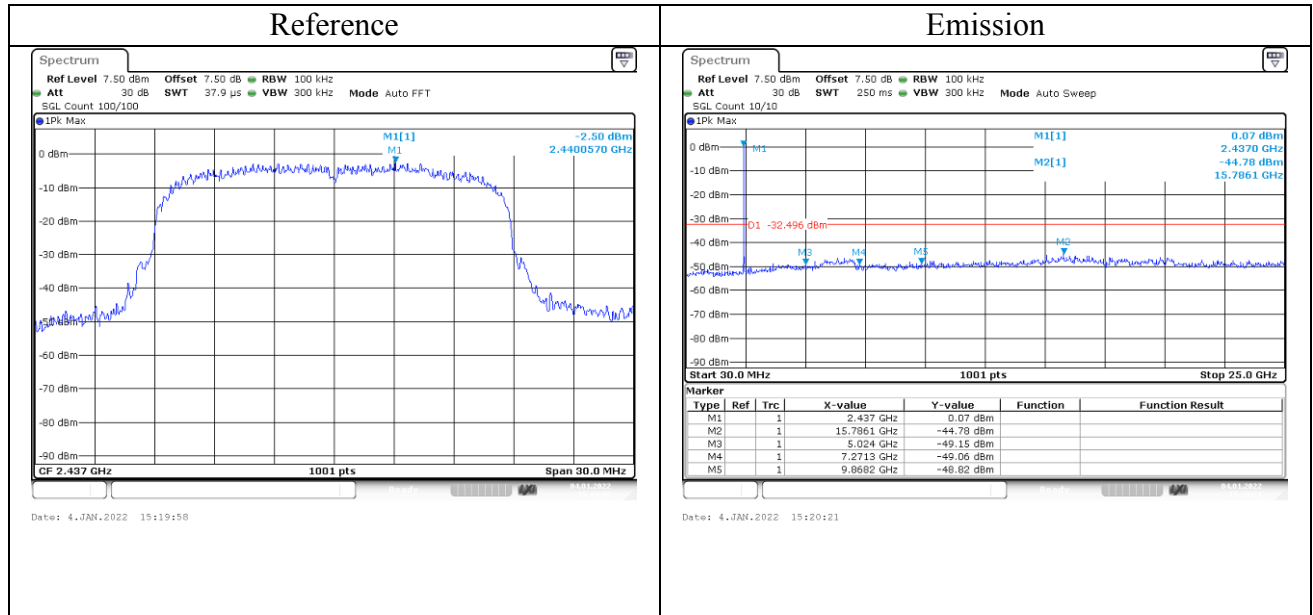


## Tx. Spurious 802.11g 2412MHz Ant1 Emission

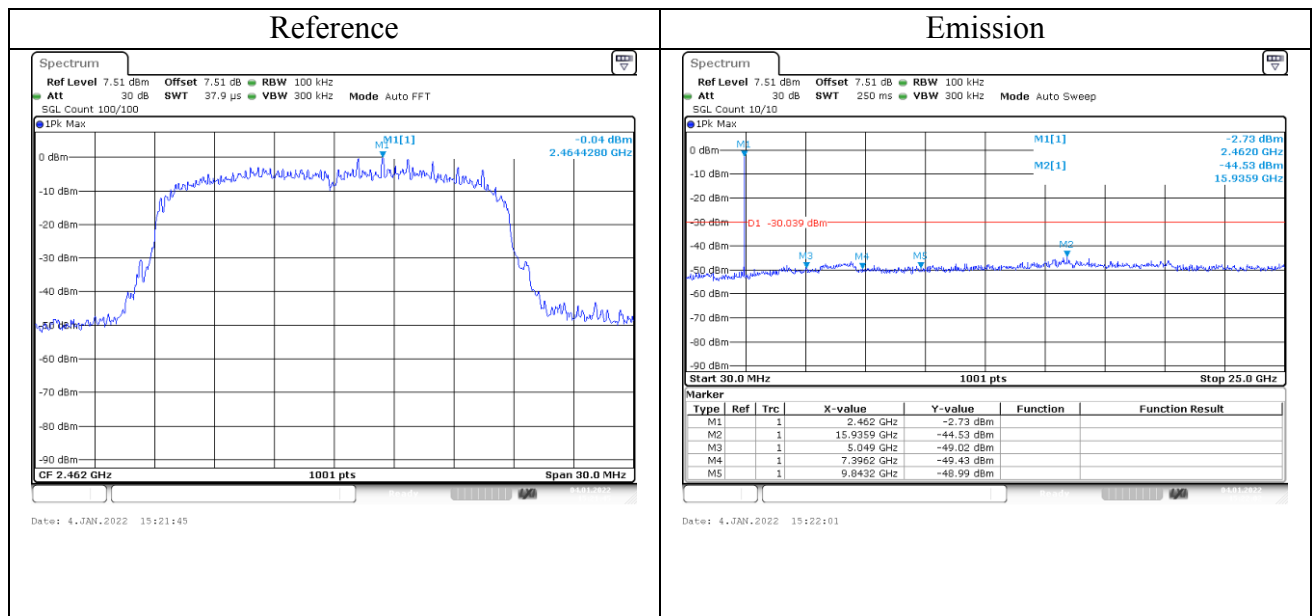




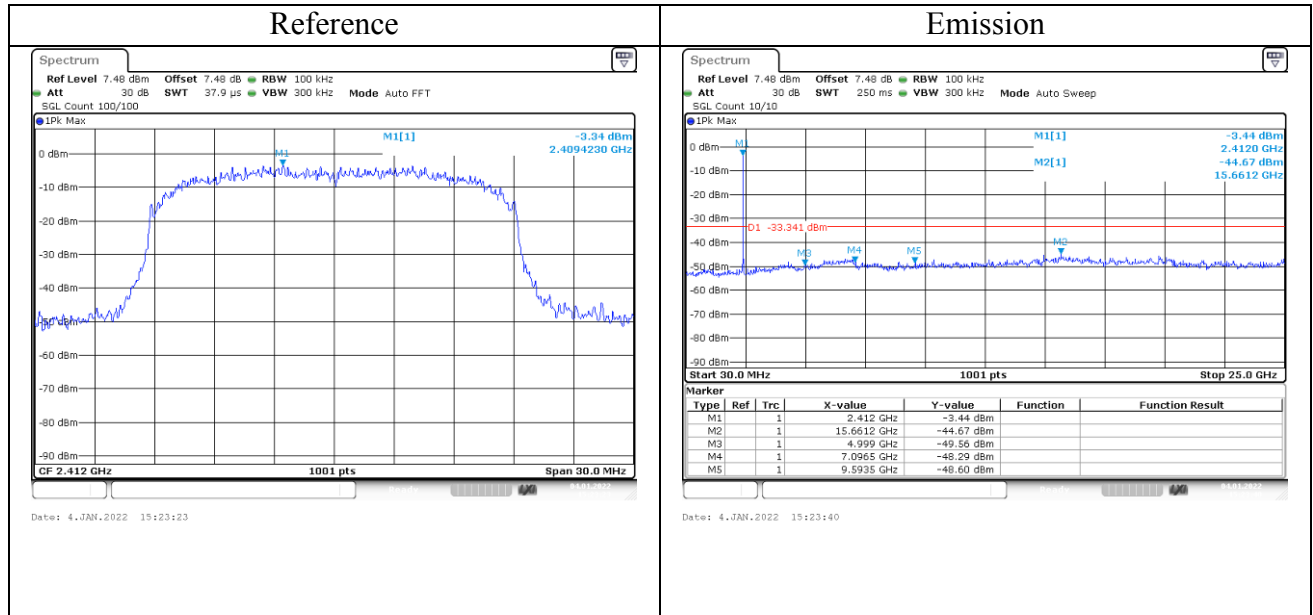
## Tx. Spurious 802.11g 2437MHz Ant1 Emission



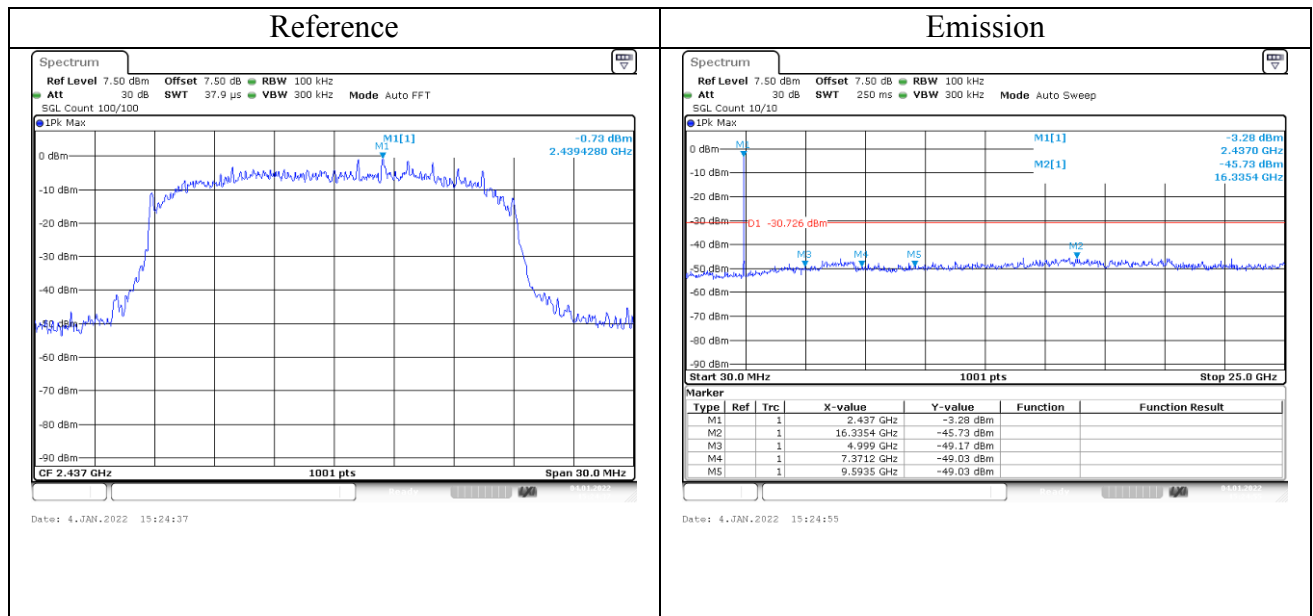
## Tx. Spurious 802.11g 2462MHz Ant1 Emission



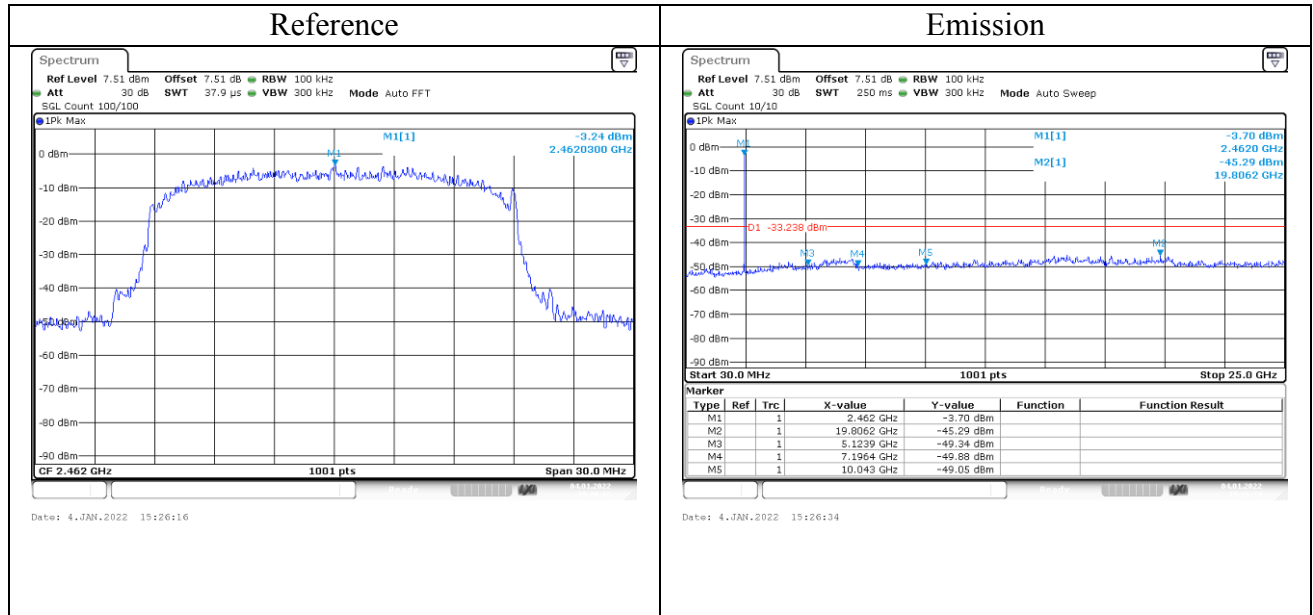
## Tx. Spurious 802.11n(HT20) 2412MHz Ant1 Emission



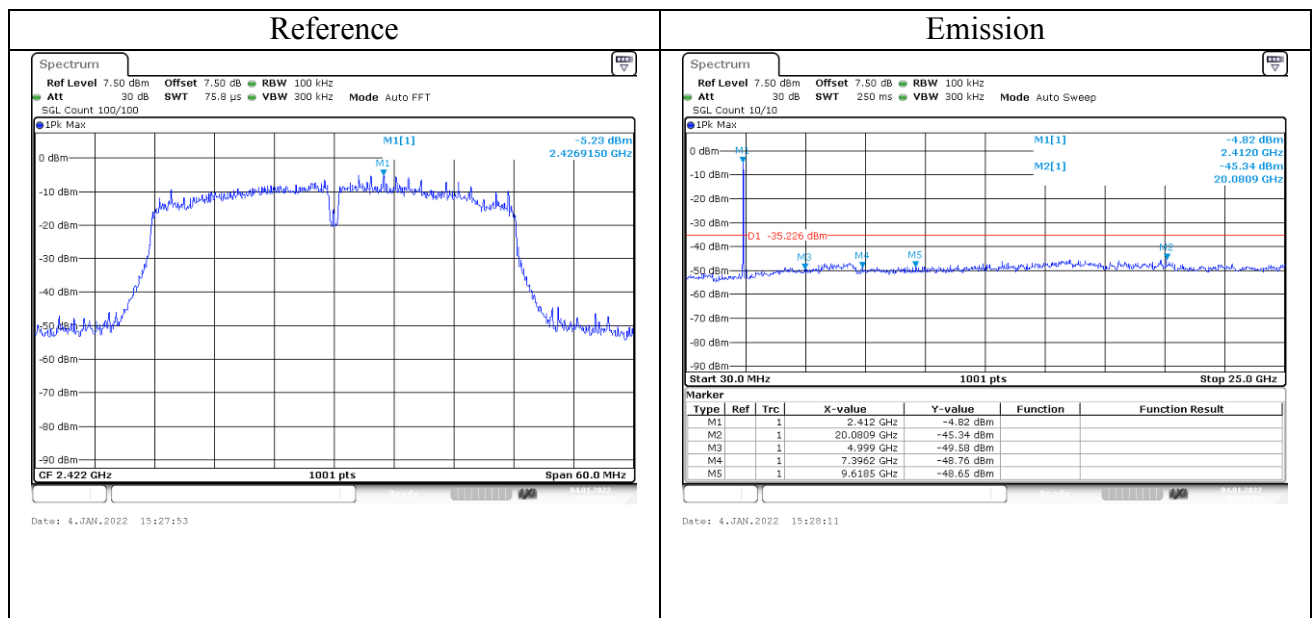
## Tx. Spurious 802.11n(HT20) 2437MHz Ant1 Emission



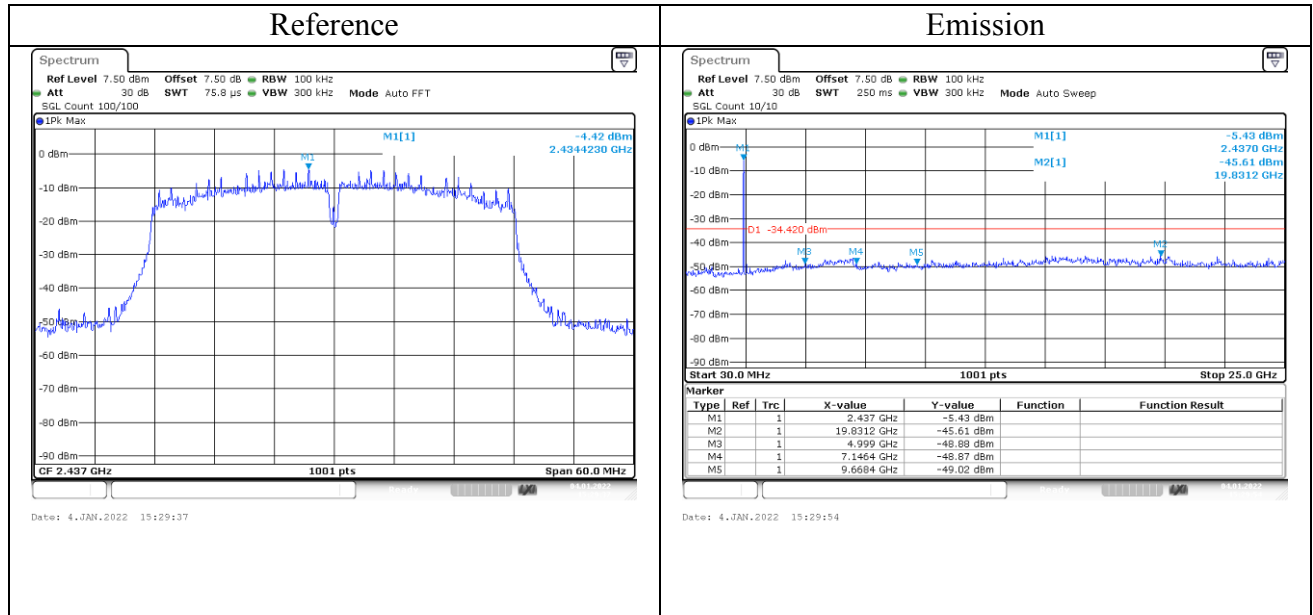
## Tx. Spurious 802.11n(HT20) 2462MHz Ant1 Emission



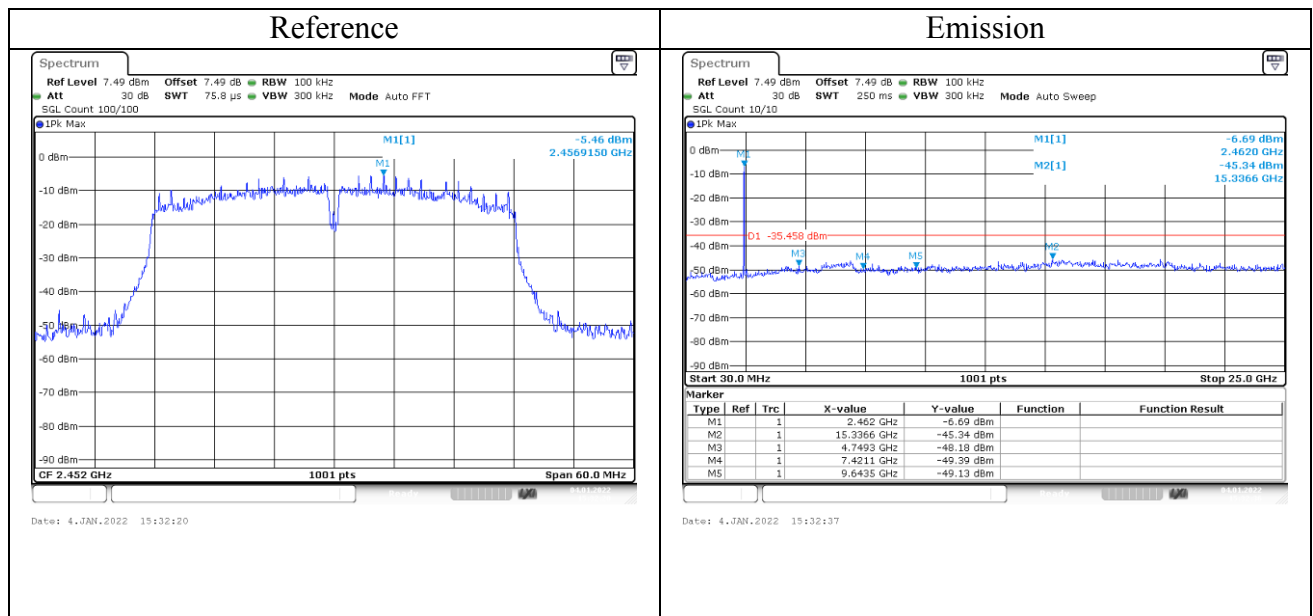
## Tx. Spurious 802.11n(HT40) 2422MHz Ant1 Emission



## Tx. Spurious 802.11n(HT40) 2437MHz Ant1 Emission



## Tx. Spurious 802.11n(HT40) 2452MHz Ant1 Emission



## **13. Antenna Application**

### **13.1 Antenna Requirement**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **13.2 Result**

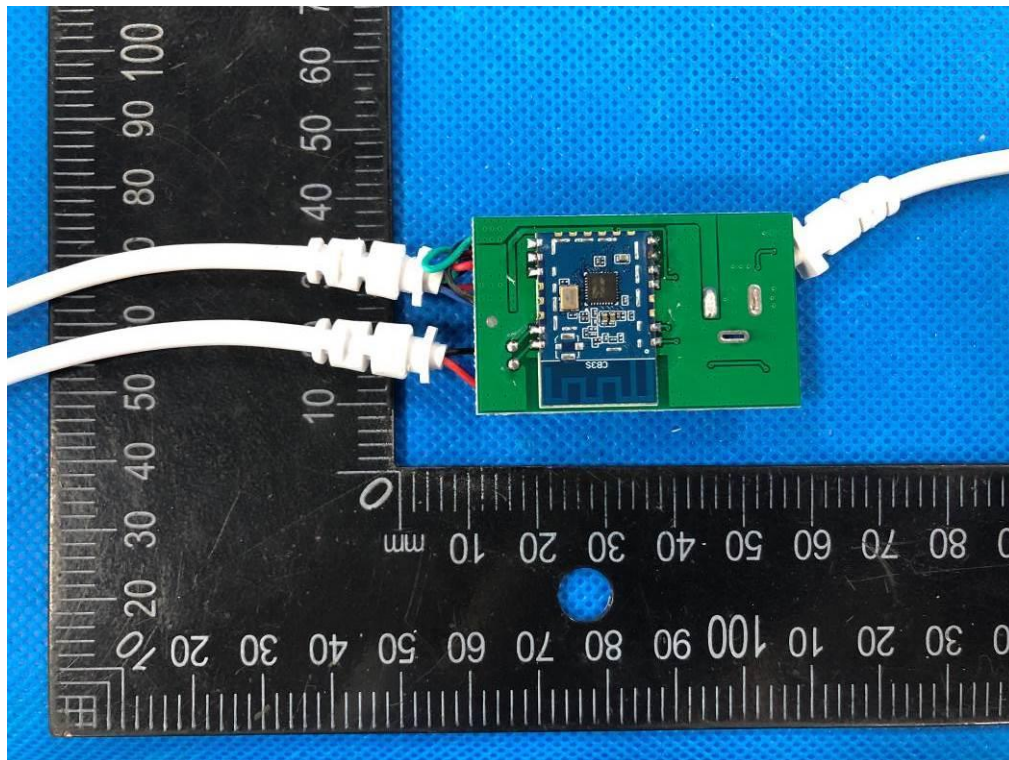
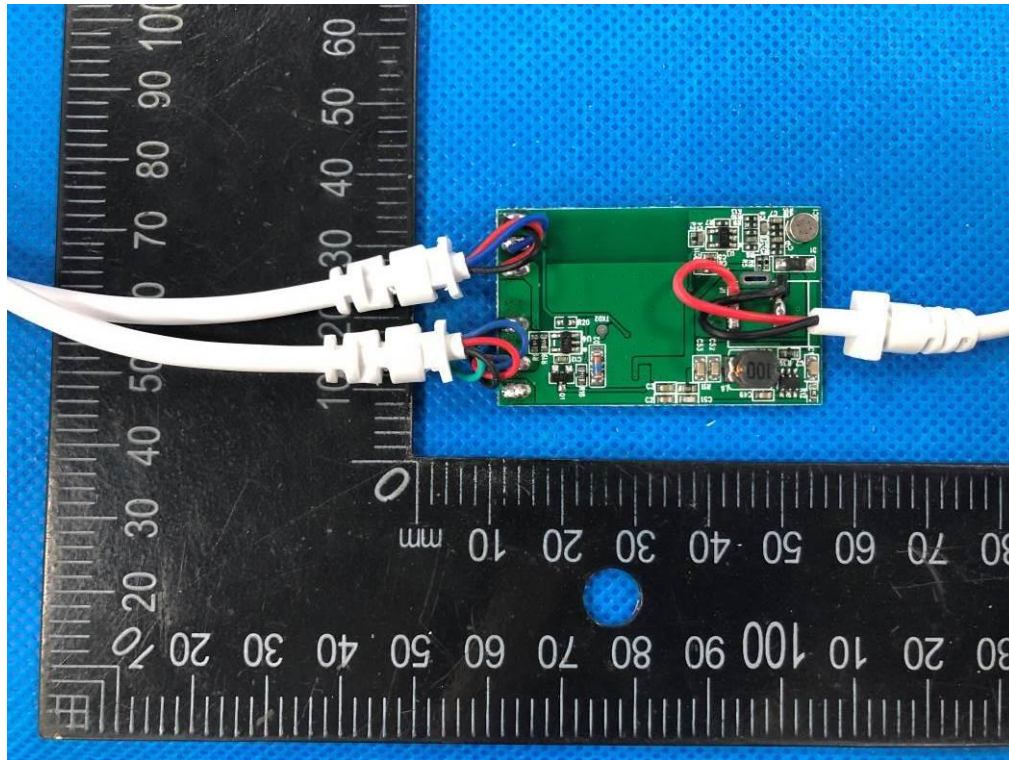
The EUT'S antenna is an PCB antenna. The antenna's gain is 1.3dBi and meets the requirement.

# APPENDIX I

## (Photos of EUT)







-----The end of report-----