

**FCC TEST REPORT**  
**FCC ID:2AWDBHWG023WRF****Report Number..... : ZHT-231228028E**

Date of Test..... : Dec. 28, 2023 to Jan. 11, 2024

Date of issue..... : Jan. 11, 2024

Test Result..... : PASS

**Testing Laboratory..... : Guangdong Zhonghan Testing Technology Co., Ltd.**Address ..... : Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community,  
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**Applicant's name ..... : FUJIAN BALDR TECHNOLOGY CO.,LTD**

Address ..... : 2F Jin Shan Ya Yuan, No. 36 Jin Rong North Road Fuzhou, China

**Manufacturer's name ..... : FUJIAN BALDR TECHNOLOGY CO.,LTD**Address ..... : Floor 3-4, Building 2, No.71 Yangqi Road, Gaishan Town, Cangshan  
District, Fuzhou, 350007 Fujian, P.R. China**Test specification:**

Standard..... : FCC CFR Title 47 Part 15 Subpart C Section 15.247

Test procedure..... : KDB558074 D01 15.247 Meas Guidance v05r02  
ANSI C63.10:2013

Non-standard test method ..... : N/A

This device described above has been tested by ZHT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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**Product name..... : WiFi Gateway Hub**

Trademark ..... : /

Model/Type reference..... : HWG023WRF

TWG023WRF-V1, HWG023WBRF-V2, HWG009WB, TWG009WB,  
TWG007WRF, HWG007WRF, HWG007WRF-V2Model Difference ..... : All models use the same circuit and RF module, and the only  
difference is the model name. The model HWG023WRF is the tested  
sample.

Ratings..... : Input Type-C: DC 5V

**Testing procedure and testing location:****Testing Laboratory**.....: **Guangdong Zhonghan Testing Technology Co., Ltd.**

Address.....: Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Tested by (name + signature).....: Leon Li

Leon Li

Reviewer (name + signature).....: Baret Wu

Baret Wu

Approved (name + signature).....: Levi Lee



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1. VERSION

| Report No.     | Version | Description             | Approved      |
|----------------|---------|-------------------------|---------------|
| ZHT-231228028E | Rev.01  | Initial issue of report | Jan. 11, 2024 |
|                |         |                         |               |



## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part15 (15.247) , Subpart C |                                  |        |        |
|---------------------------------|----------------------------------|--------|--------|
| Standard Section                | Test Item                        | Result | Remark |
| FCC part 15.203/15.247 (b)(4)   | Antenna requirement              | PASS   |        |
| FCC part 15.207                 | AC Power Line Conducted Emission | PASS   |        |
| FCC part 15.247 (b)(3)          | Conducted Output Power           | PASS   |        |
| FCC part 15.247 (a)(2)          | Channel Bandwidth                | PASS   |        |
| FCC part 15.247 (e)             | Power Spectral Density           | PASS   |        |
| FCC part 15.247(d)              | Band Edge                        | PASS   |        |
| FCC part 15.205/15.209          | Spurious Emission                | PASS   |        |

NOTE:

(1) " N/A " denotes test is not applicable in this Test Report



## 2.1 TEST FACILITY

Guangdong Zhonghan Testing Technology Co., Ltd.

Add. : Room 104, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District  
Shenzhen, Guangdong, China

FCC Registration Number:255941

Designation Number: CN0325

IC Registered No.: 29832

CAB identifier: CN0143

## 2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$  , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$  , providing a level of confidence of approximately 95 % .

| No. | Item                             | Uncertainty               |
|-----|----------------------------------|---------------------------|
| 1   | Conducted Emission Test          | $\pm 1.38\text{dB}$       |
| 2   | RF powerconducted                | $\pm 0.16\text{dB}$       |
| 3   | Spurious emissionsconducted      | $\pm 0.21\text{dB}$       |
| 4   | All emissions radiated(9k-30MHz) | $\pm 4.68\text{dB}$       |
| 5   | All emissionsradiated(<1G)       | $\pm 4.68\text{dB}$       |
| 6   | All emissionsradiated(>1G)       | $\pm 4.89\text{dB}$       |
| 7   | Temperature                      | $\pm 0.5^{\circ}\text{C}$ |
| 8   | Humidity                         | $\pm 2\%$                 |
| 9   | Occupied Bandwidth               | $\pm 4.96\%$              |

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                        |                                                                                                                            |
|------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Product Name:          | WiFi Gateway Hub                                                                                                           |
| Model No.:             | HWG023WRF                                                                                                                  |
| Hardware Version:      | V1.0                                                                                                                       |
| Software Version:      | V1.0                                                                                                                       |
| Sample(s) Status:      | Engineer sample                                                                                                            |
| Channel numbers:       | 802.11b/802.11g /802.11n(HT20):11, /802.11n(HT40):7                                                                        |
| Operation Frequency:   | 802.11b/802.11g /802.11n(HT20): 2412-2462MHz/802.11n(HT40): 2422-2452MHz                                                   |
| Channel separation:    | 5MHz                                                                                                                       |
| Modulation technology: | IEEE 802.11b: DQPSK/DBPSK/DSSS/CCK<br>IEEE 802.11g: QPSK/BPSK/16QAM/64QAM/OFDM<br>IEEE 802.11n: QPSK/BPSK/16QAM/64QAM/OFDM |
| Antenna Type:          | PCB Antenna                                                                                                                |
| Antenna gain:          | 0.89dBi                                                                                                                    |
| Power supply:          | Input Type-C: DC 5V                                                                                                        |

.....

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Test channel    | Frequency (MHz)               |
|-----------------|-------------------------------|
|                 | 802.11b/802.11g/802.11n(HT20) |
| Lowest channel  | 2412MHz                       |
| Middle channel  | 2437MHz                       |
| Highest channel | 2462MHz                       |

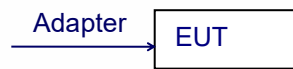
| Test channel    | Frequency (MHz) |
|-----------------|-----------------|
|                 | 802.11n(HT40)   |
| Lowest channel  | 2422MHz         |
| Middle channel  | 2437MHz         |
| Highest channel | 2452MHz         |

### 3.2 DESCRIPTION OF TEST MODES

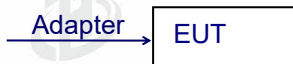
|                                                                                                                                                                                                                                                                              |                                                |         |               |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------|---------------|---------------|
| Transmitting mode                                                                                                                                                                                                                                                            | Keep the EUT in continuously transmitting mode |         |               |               |
| Remark: EUT use new battery during the test,the dutycycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data. |                                                |         |               |               |
| We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:                                                                 |                                                |         |               |               |
| Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.                                                                                                                                                                         |                                                |         |               |               |
| Mode                                                                                                                                                                                                                                                                         | 802.11b                                        | 802.11g | 802.11n(HT20) | 802.11n(HT40) |
| Data rate                                                                                                                                                                                                                                                                    | 1Mbps                                          | 6Mbps   | 6.5Mbps       | 13.5Mbps      |

### 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Emission



Conducted Spurious



### 3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Note |
|------|-----------|-----------|----------------|------------|------|
| E-1  | Adapter   | N/A       | HW-059200CHQ   | N/A        | AE   |
|      |           |           |                |            |      |
|      |           |           |                |            |      |
|      |           |           |                |            |      |
|      |           |           |                |            |      |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

### 3.5EQUIPMENTS LIST FOR ALL TEST ITEMS

#### Radiation Test equipment

| Item | Equipment                          | Manufacturer | Model        | Last Cal.     | Next Cal.     |
|------|------------------------------------|--------------|--------------|---------------|---------------|
| 1    | Receiver                           | R&S          | ESCI         | May 12, 2023  | May 11, 2024  |
| 2    | Loop antenna                       | EMCI         | LAP600       | May 12, 2023  | May 11, 2024  |
| 3    | Amplifier                          | Schwarzbeck  | BBV 9743 B   | May 12, 2023  | May 11, 2024  |
| 4    | Amplifier                          | Schwarzbeck  | BBV 9718 B   | May 12, 2023  | May 11, 2024  |
| 5    | Bilog Antenna                      | Schwarzbeck  | VULB9162     | May 17, 2023  | May 16, 2024  |
| 6    | Horn Antenna                       | Schwarzbeck  | BBHA9120D    | May 17, 2023  | May 16, 2024  |
| 7    | Horn Antenna                       | A.H.SYSTEMS  | SAS574       | May 12, 2023  | May 11, 2024  |
| 8    | Amplifier                          | AEROFLEX     | 100KHz-40GHz | May 12, 2023  | May 11, 2024  |
| 9    | Spectrum Analyzer                  | R&S          | FSV40        | May 12, 2023  | May 11, 2024  |
| 10   | 966 Anechoic Chamber               | EMToni       | 9m6m6m       | Nov. 25, 2021 | Nov. 24, 2024 |
| 11   | Spectrum Analyzer                  | KEYSIGHT     | N9020A       | May 12, 2023  | May 11, 2024  |
| 12   | WIDBAND RADIO COMMUNICATION TESTER | R&S          | CMW500       | May 12, 2023  | May 11, 2024  |
| 13   | Single Generator                   | Agilent      | N5182A       | May 12, 2023  | May 11, 2024  |
| 14   | Power Sensor                       | MWRFtest     | MW100-RFCB   | May 12, 2023  | May 11, 2024  |
| 15   | Audio analyzer                     | R&S          | UPL          | May 12, 2023  | May 11, 2024  |
| 16   | Single Generator                   | R&S          | SMB100A      | May 12, 2023  | May 11, 2024  |
| 17   | Power Amplifier Shielding Room     | EMToni       | 2m3m3m       | Nov. 25, 2021 | Nov. 24, 2024 |



## Conduction Test equipment

| Equipment                 | Manufacturer | Model      | Last Cal.     | Next Cal.     |
|---------------------------|--------------|------------|---------------|---------------|
| Receiver                  | R&S          | ESCI       | May 12, 2023  | May 11, 2024  |
| LISN                      | R&S          | ENV216     | May 12, 2023  | May 11, 2024  |
| ISN CAT 6                 | Schwarzbeck  | NTFM 8158  | May 12, 2023  | May 11, 2024  |
| ISN CAT 5                 | Schwarzbeck  | CAT5 8158  | May 12, 2023  | May 11, 2024  |
| Capacitive Voltage Probe  | Schwarzbeck  | CVP 9222 C | May 12, 2023  | May 11, 2024  |
| Current Transformer Clamp | Schwarzbeck  | SW 9605    | May 12, 2023  | May 11, 2024  |
| CE Shielding Room         | EMToni       | 9m4m3m     | Nov. 25, 2021 | Nov. 24, 2024 |

## Conducted Test equipment

| Item | Equipment         | Manufacturer | Model  | Last Cal.    | Next Cal.    |
|------|-------------------|--------------|--------|--------------|--------------|
| 1    | Spectrum Analyzer | KEYSIGHT     | N9020A | May 12, 2023 | May 11, 2024 |

#### 4. EMC EMISSION TEST

##### 4.1 CONDUCTED EMISSION MEASUREMENT

|                       |                                      |
|-----------------------|--------------------------------------|
| Test Requirement:     | FCC Part15 C Section 15.207          |
| Test Method:          | ANSI C63.10:2013                     |
| Test Frequency Range: | 150KHz to 30MHz                      |
| Receiver setup:       | RBW=9KHz, VBW=30KHz, Sweep time=auto |

##### 4.1.1 POWER LINE CONDUCTED EMISSION Limits

| FREQUENCY (MHz) | Limit (dBuV) |           | Standard |
|-----------------|--------------|-----------|----------|
|                 | Quasi-peak   | Average   |          |
| 0.15 -0.5       | 66 - 56 *    | 56 - 46 * | FCC      |
| 0.50 -5.0       | 56.00        | 46.00     | FCC      |
| 5.0 -30.0       | 60.00        | 50.00     | FCC      |

Note:

(1) \*Decreases with the logarithm of the frequency.

##### 4.1.2 TEST PROCEDURE

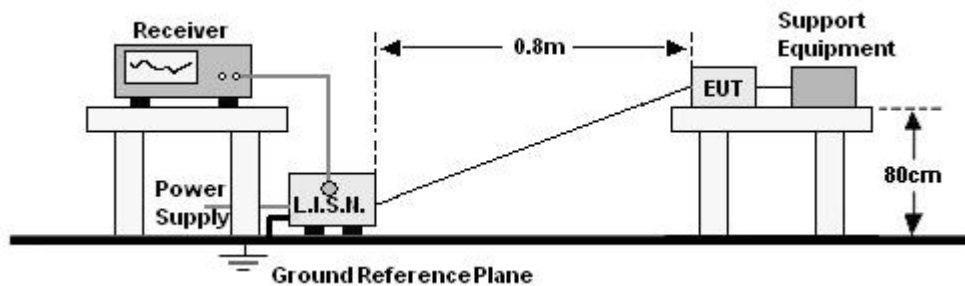
- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

##### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation



#### 4.1.4 TEST SETUP



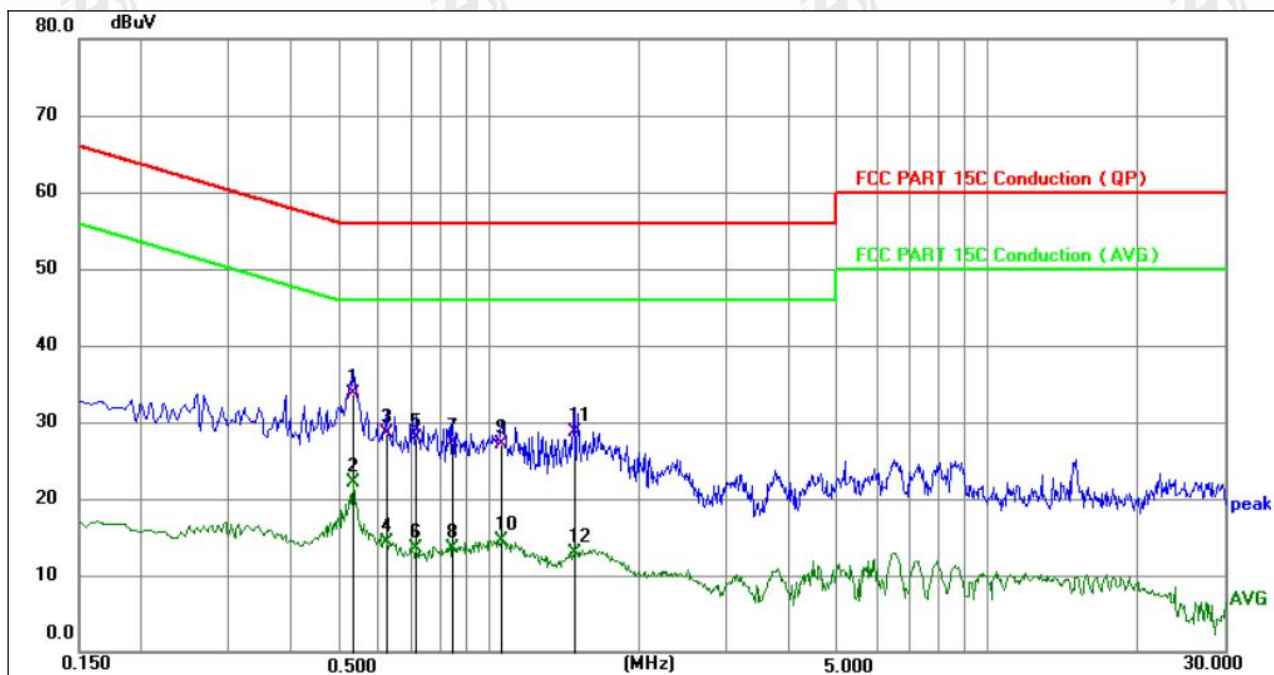
#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



## 4.1.6 test result

|               |              |                     |     |
|---------------|--------------|---------------------|-----|
| Temperature:  | 24.3℃        | Relative Humidity : | 50% |
| Pressure:     | 101kPa       | Phase :             | L   |
| Test Voltage: | AC 120V/60Hz |                     |     |



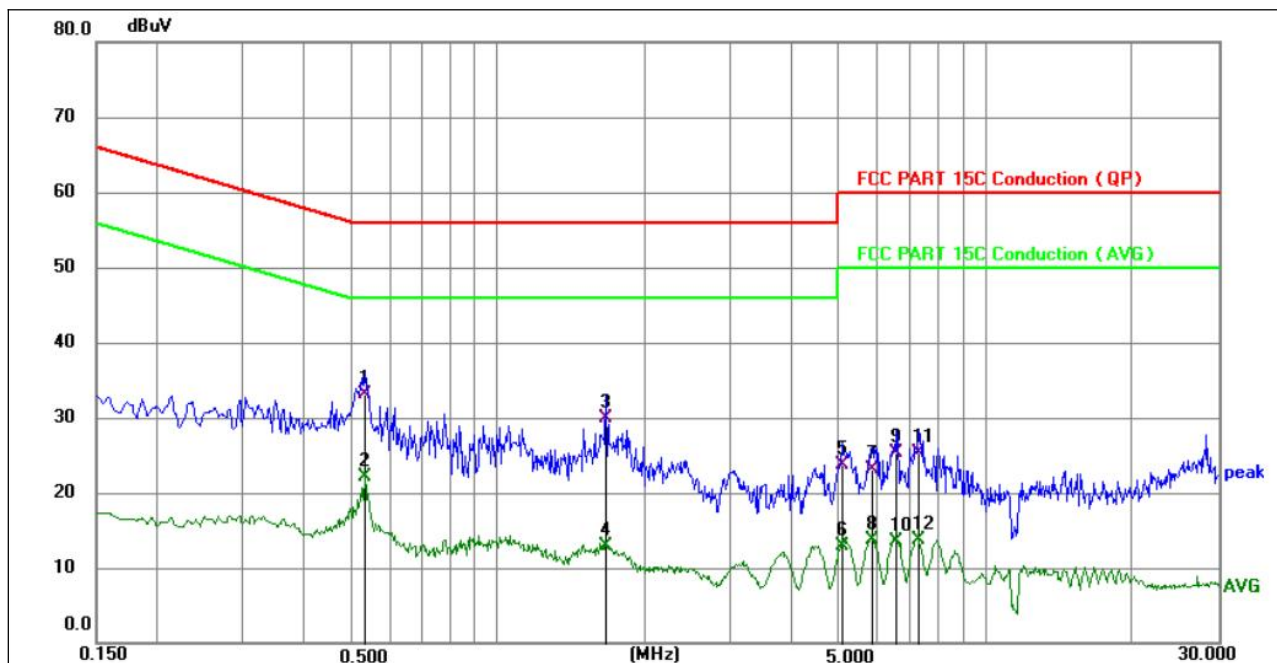
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|--------|
| 1 * | 0.5322          | 23.78          | 10.02       | 33.80        | 56.00        | -22.20      | QP       | P   |        |
| 2   | 0.5322          | 12.12          | 10.02       | 22.14        | 46.00        | -23.86      | AVG      | P   |        |
| 3   | 0.6205          | 18.44          | 10.03       | 28.47        | 56.00        | -27.53      | QP       | P   |        |
| 4   | 0.6205          | 4.22           | 10.03       | 14.25        | 46.00        | -31.75      | AVG      | P   |        |
| 5   | 0.7122          | 17.83          | 10.04       | 27.87        | 56.00        | -28.13      | QP       | P   |        |
| 6   | 0.7122          | 3.51           | 10.04       | 13.55        | 46.00        | -32.45      | AVG      | P   |        |
| 7   | 0.8438          | 17.35          | 10.05       | 27.40        | 56.00        | -28.60      | QP       | P   |        |
| 8   | 0.8438          | 3.39           | 10.05       | 13.44        | 46.00        | -32.56      | AVG      | P   |        |
| 9   | 1.0541          | 17.05          | 10.06       | 27.11        | 56.00        | -28.89      | QP       | P   |        |
| 10  | 1.0541          | 4.46           | 10.06       | 14.52        | 46.00        | -31.48      | AVG      | P   |        |
| 11  | 1.4796          | 18.68          | 10.07       | 28.75        | 56.00        | -27.25      | QP       | P   |        |
| 12  | 1.4796          | 2.86           | 10.07       | 12.93        | 46.00        | -33.07      | AVG      | P   |        |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor
4. The test data shows only the worst case 802.11b mode ( Low Channel:2412MHz ).



|               |              |                     |     |
|---------------|--------------|---------------------|-----|
| Temperature:  | 24.3℃        | Relative Humidity : | 50% |
| Pressure:     | 101kPa       | Phase :             | N   |
| Test Voltage: | AC 120V/60Hz |                     |     |



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|--------|
| 1 * | 0.5324          | 23.14          | 10.02       | 33.16        | 56.00        | -22.84      | QP       | P   |        |
| 2   | 0.5324          | 12.02          | 10.02       | 22.04        | 46.00        | -23.96      | AVG      | P   |        |
| 3   | 1.6710          | 19.84          | 10.06       | 29.90        | 56.00        | -26.10      | QP       | P   |        |
| 4   | 1.6710          | 2.89           | 10.06       | 12.95        | 46.00        | -33.05      | AVG      | P   |        |
| 5   | 5.0774          | 13.55          | 10.12       | 23.67        | 60.00        | -36.33      | QP       | P   |        |
| 6   | 5.0774          | 2.76           | 10.12       | 12.88        | 50.00        | -37.12      | AVG      | P   |        |
| 7   | 5.8514          | 13.00          | 10.11       | 23.11        | 60.00        | -36.89      | QP       | P   |        |
| 8   | 5.8514          | 3.67           | 10.11       | 13.78        | 50.00        | -36.22      | AVG      | P   |        |
| 9   | 6.5625          | 15.16          | 10.11       | 25.27        | 60.00        | -34.73      | QP       | P   |        |
| 10  | 6.5625          | 3.49           | 10.11       | 13.60        | 50.00        | -36.40      | AVG      | P   |        |
| 11  | 7.2735          | 15.23          | 10.10       | 25.33        | 60.00        | -34.67      | QP       | P   |        |
| 12  | 7.2735          | 3.64           | 10.10       | 13.74        | 50.00        | -36.26      | AVG      | P   |        |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor
4. The test data shows only the worst case 802.11b mode ( Low Channel:2412MHz).



## 4.2 RADIATED EMISSION MEASUREMENT

|                       |                             |            |        |        |            |
|-----------------------|-----------------------------|------------|--------|--------|------------|
| Test Requirement:     | FCC Part15 C Section 15.209 |            |        |        |            |
| Test Method:          | ANSI C63.10:2013            |            |        |        |            |
| Test Frequency Range: | 9kHz to 25GHz               |            |        |        |            |
| Test site:            | Measurement Distance: 3m    |            |        |        |            |
| Receiver setup:       | Frequency                   | Detector   | RBW    | VBW    | Value      |
|                       | 9KHz-150KHz                 | Quasi-peak | 200Hz  | 600Hz  | Quasi-peak |
|                       | 150KHz-30MHz                | Quasi-peak | 9KHz   | 30KHz  | Quasi-peak |
|                       | 30MHz-1GHz                  | Quasi-peak | 100KHz | 300KHz | Quasi-peak |
|                       | Above 1GHz                  | Peak       | 1MHz   | 3MHz   | Peak       |
|                       |                             | Peak       | 1MHz   | 10Hz   | Average    |

## 4.2.1 RADIATED EMISSION LIMITS

| 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                                |

## LIMITS OF RADIATED EMISSION MEASUREMENT

| FREQUENCY (MHz) | Limit (dBuV/m) (at 3M) |         |
|-----------------|------------------------|---------|
|                 | PEAK                   | AVERAGE |
| Above 1000      | 74                     | 54      |

## Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

## 4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.

- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different from above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change from table 0.8 meter to 1.5 meter (Above 18GHz the distance is 1 meter and table is 1.5 meter).
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

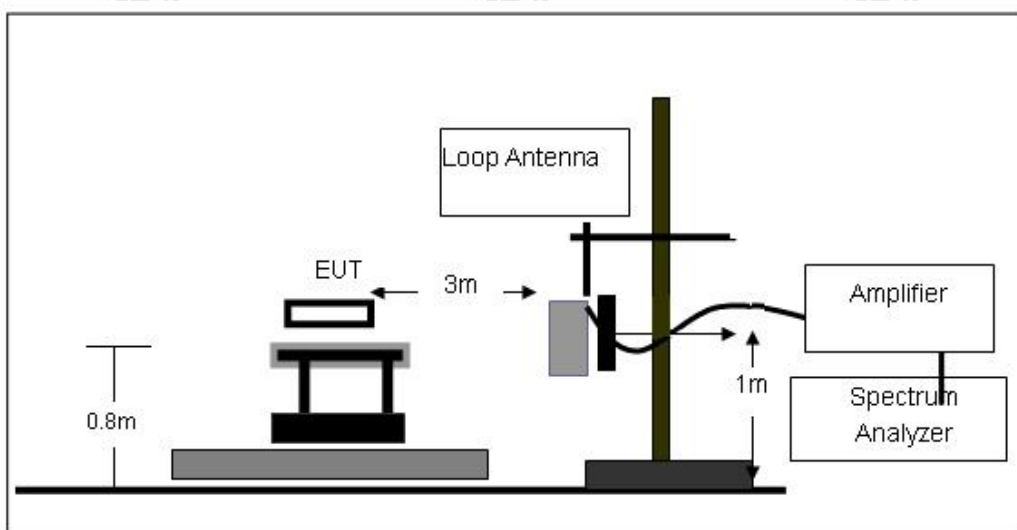
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

#### 4.2.3 DEVIATION FROM TEST STANDARD

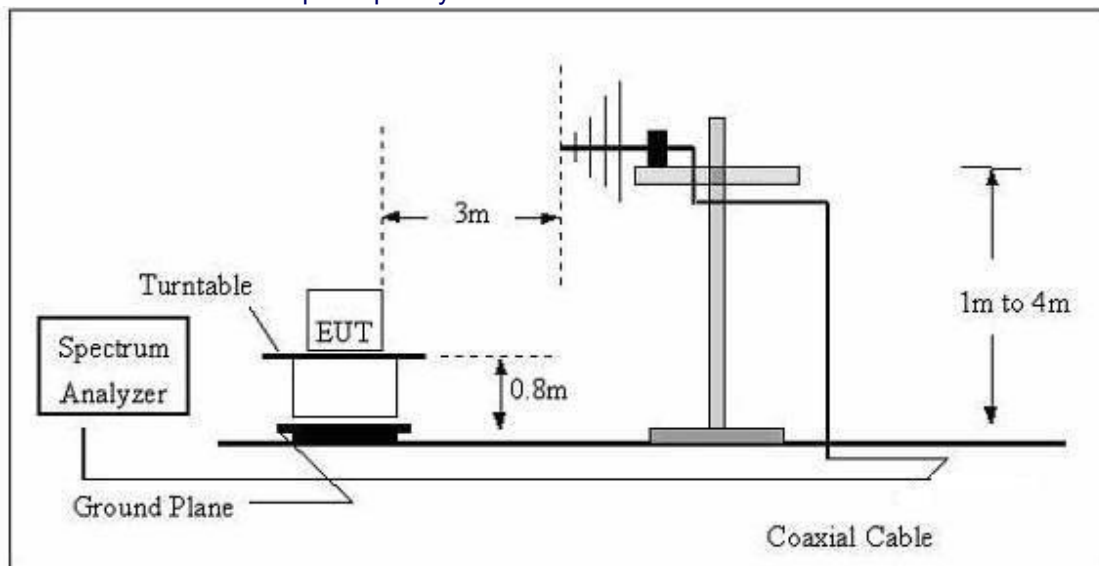
No deviation

#### 4.2.4 TEST SETUP

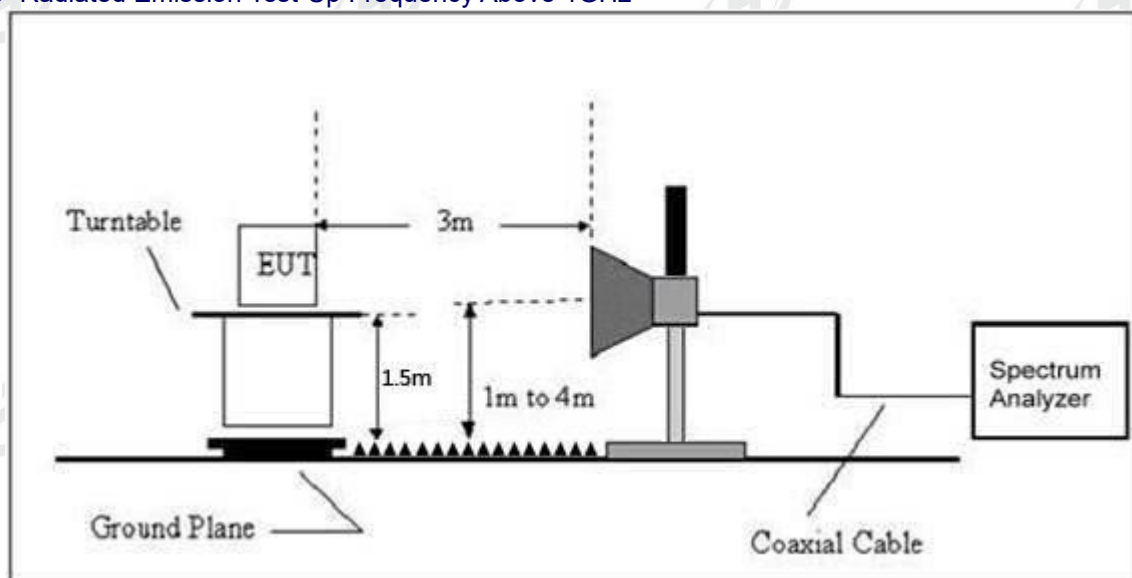
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



#### 4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

#### 4.2.6 TEST RESULTS

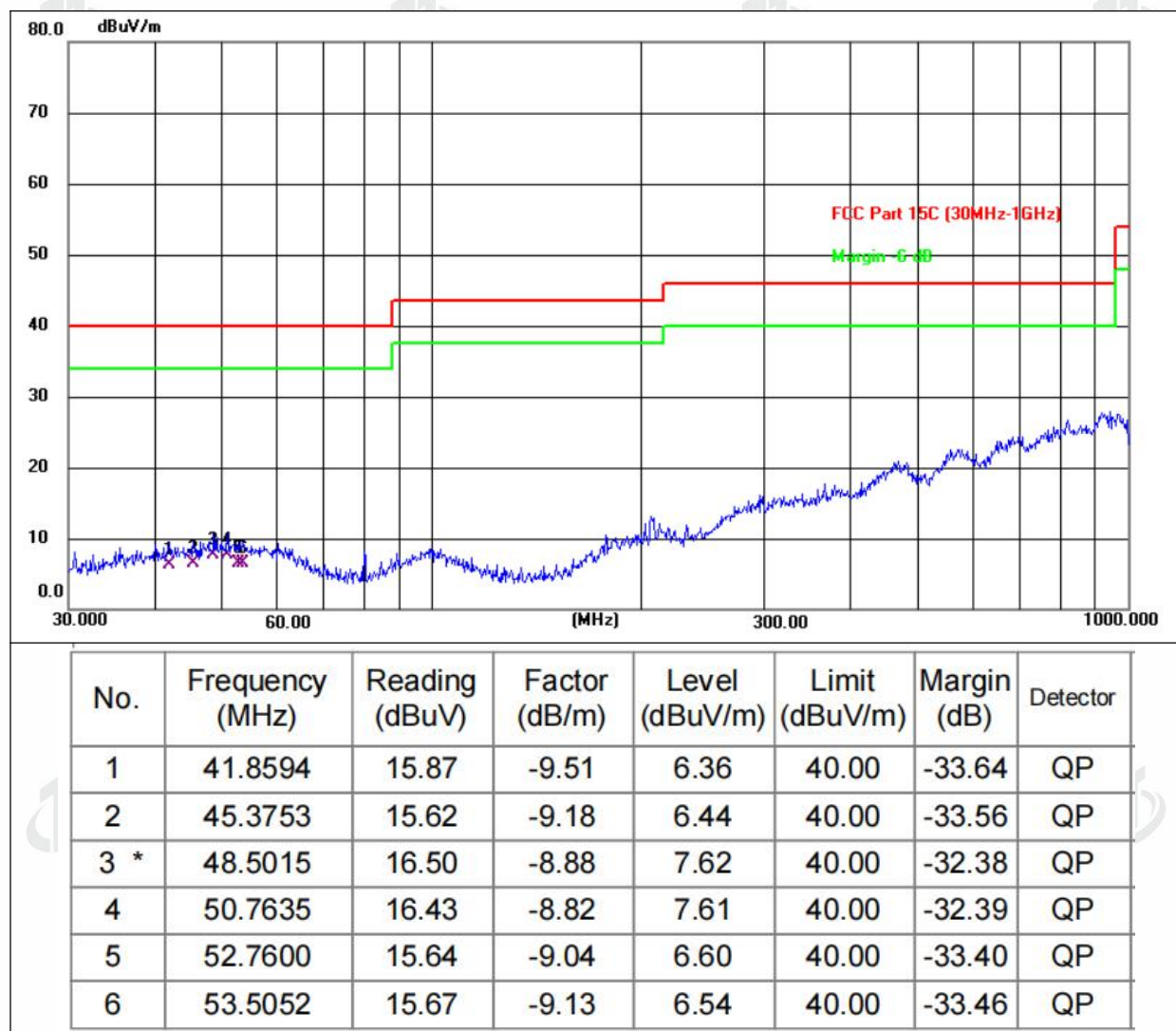
Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.



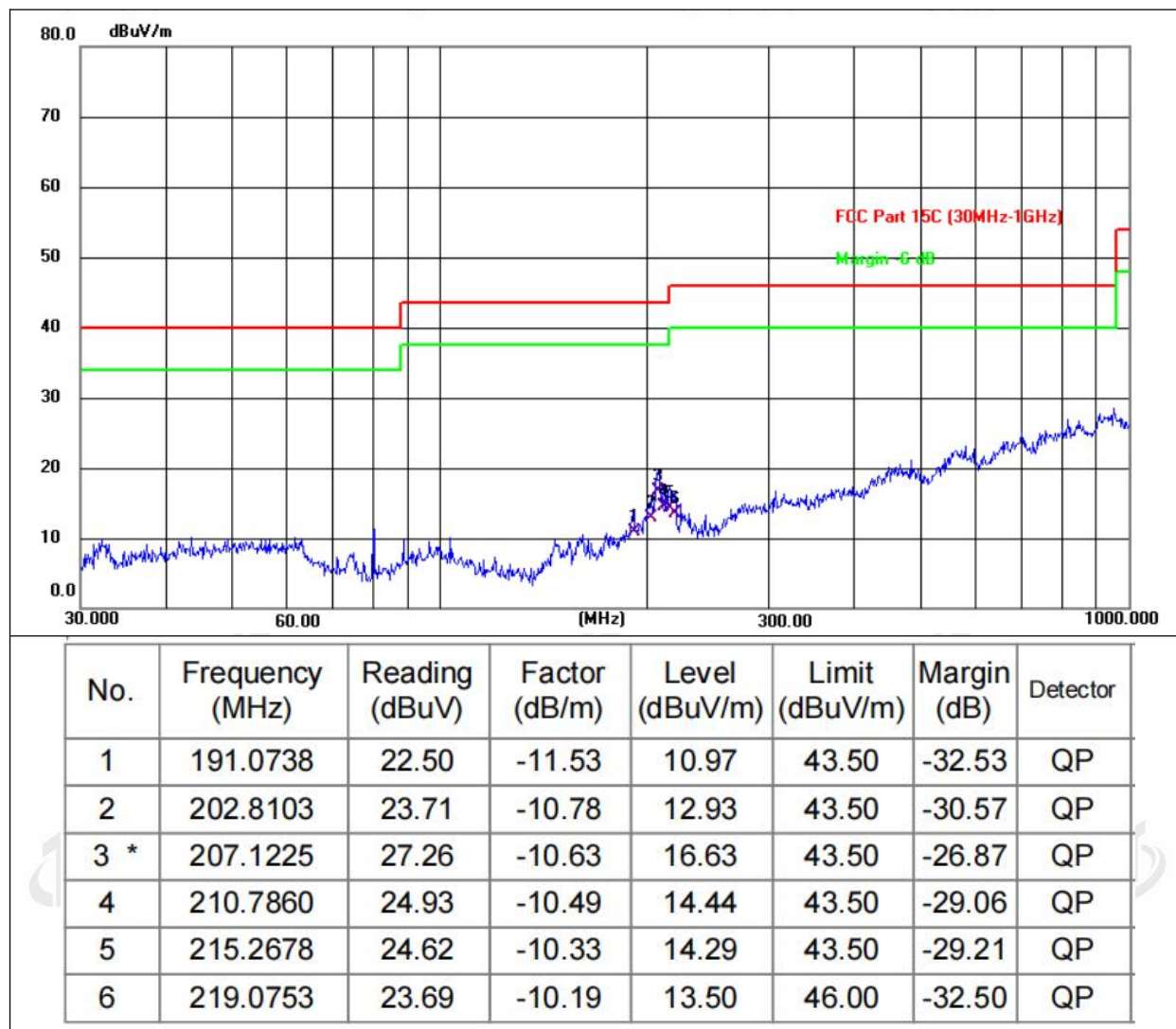
Between 30MHz – 1GHz

|                |              |                     |            |
|----------------|--------------|---------------------|------------|
| Temperature :  | 25.1℃        | Relative Humidity : | 50%        |
| Pressure :     | 101kPa       | Polarization :      | Horizontal |
| Test Voltage : | AC 120V/60Hz |                     |            |





|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Temperature :  | 25.1℃        | Relative Humidity : | 50%      |
| Pressure :     | 101kPa       | Polarization :      | Vertical |
| Test Voltage : | AC 120V/60Hz |                     |          |



## Remarks:

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.The test data shows only the worst case 802.11b mode ( Low Channel:2412MHz).



1GHz~25GHz

| Polar<br>(H/V)         | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-ampl<br>ifier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/<br>m) | Margin<br>(dB) | Detect<br>or<br>Type |
|------------------------|--------------------|----------------------------|---------------------------|-----------------------|---------------------------|-------------------------------|------------------------|----------------|----------------------|
| 802.11b                |                    |                            |                           |                       |                           |                               |                        |                |                      |
| Low Channel:2412MHz    |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4824.00            | 55.12                      | 30.55                     | 5.77                  | 24.66                     | 55                            | 74                     | -19            | Pk                   |
| V                      | 4824.00            | 41.71                      | 30.55                     | 5.77                  | 24.66                     | 41.59                         | 54                     | -12.41         | AV                   |
| H                      | 4824.00            | 59.65                      | 30.33                     | 6.32                  | 24.55                     | 60.19                         | 74                     | -13.81         | Pk                   |
| H                      | 4824.00            | 42.89                      | 30.33                     | 6.32                  | 24.55                     | 43.43                         | 54                     | -10.57         | AV                   |
| Middle Channel:2437MHz |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4874.00            | 59.37                      | 30.55                     | 5.77                  | 24.66                     | 59.25                         | 74                     | -14.75         | Pk                   |
| V                      | 4874.00            | 41.65                      | 30.55                     | 5.77                  | 24.66                     | 41.53                         | 54                     | -12.47         | AV                   |
| H                      | 4874.00            | 56.26                      | 30.33                     | 6.32                  | 24.55                     | 56.8                          | 74                     | -17.2          | Pk                   |
| H                      | 4874.00            | 42.65                      | 30.33                     | 6.32                  | 24.55                     | 43.19                         | 54                     | -10.81         | AV                   |
| High Channel:2462MHz   |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4924.00            | 55.96                      | 30.55                     | 5.77                  | 24.66                     | 55.84                         | 74                     | -18.16         | Pk                   |
| V                      | 4924.00            | 41.7                       | 30.55                     | 5.77                  | 24.66                     | 41.58                         | 54                     | -12.42         | AV                   |
| H                      | 4924.00            | 58.25                      | 30.33                     | 6.32                  | 24.55                     | 58.79                         | 74                     | -15.21         | Pk                   |
| H                      | 4924.00            | 43.31                      | 30.33                     | 6.32                  | 24.55                     | 43.85                         | 54                     | -10.15         | AV                   |
| 802.11g                |                    |                            |                           |                       |                           |                               |                        |                |                      |
| Low Channel:2412MHz    |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4824.00            | 58.26                      | 30.55                     | 5.77                  | 24.66                     | 58.14                         | 74                     | -15.86         | Pk                   |
| V                      | 4824.00            | 41.84                      | 30.55                     | 5.77                  | 24.66                     | 41.72                         | 54                     | -12.28         | AV                   |
| H                      | 4824.00            | 59.84                      | 30.33                     | 6.32                  | 24.55                     | 60.38                         | 74                     | -13.62         | Pk                   |
| H                      | 4824.00            | 44.42                      | 30.33                     | 6.32                  | 24.55                     | 44.96                         | 54                     | -9.04          | AV                   |
| Middle Channel:2437MHz |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4874.00            | 57.98                      | 30.55                     | 5.77                  | 24.66                     | 57.86                         | 74                     | -16.14         | Pk                   |
| V                      | 4874.00            | 41.14                      | 30.55                     | 5.77                  | 24.66                     | 41.02                         | 54                     | -12.98         | AV                   |
| H                      | 4874.00            | 57.72                      | 30.33                     | 6.32                  | 24.55                     | 58.26                         | 74                     | -15.74         | Pk                   |
| H                      | 4874.00            | 41.74                      | 30.33                     | 6.32                  | 24.55                     | 42.28                         | 54                     | -11.72         | AV                   |
| High Channel:2462MHz   |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4924.00            | 58.47                      | 30.55                     | 5.77                  | 24.66                     | 58.35                         | 74                     | -15.65         | Pk                   |
| V                      | 4924.00            | 41.43                      | 30.55                     | 5.77                  | 24.66                     | 41.31                         | 54                     | -12.69         | AV                   |
| H                      | 4924.00            | 57.17                      | 30.33                     | 6.32                  | 24.55                     | 57.71                         | 74                     | -16.29         | Pk                   |
| H                      | 4924.00            | 42.14                      | 30.33                     | 6.32                  | 24.55                     | 42.68                         | 54                     | -11.32         | AV                   |
| 802.11n 20             |                    |                            |                           |                       |                           |                               |                        |                |                      |
| Low Channel:2412MHz    |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4824.00            | 55.15                      | 30.55                     | 5.77                  | 24.66                     | 55.03                         | 74                     | -18.97         | Pk                   |
| V                      | 4824.00            | 43.99                      | 30.55                     | 5.77                  | 24.66                     | 43.87                         | 54                     | -10.13         | AV                   |
| H                      | 4824.00            | 57.04                      | 30.33                     | 6.32                  | 24.55                     | 57.58                         | 74                     | -16.42         | Pk                   |
| H                      | 4824.00            | 43.46                      | 30.33                     | 6.32                  | 24.55                     | 44                            | 54                     | -10            | AV                   |
| Middle Channel:2437MHz |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4874.00            | 57.96                      | 30.55                     | 5.77                  | 24.66                     | 57.84                         | 74                     | -16.16         | Pk                   |
| V                      | 4874.00            | 41.82                      | 30.55                     | 5.77                  | 24.66                     | 41.7                          | 54                     | -12.3          | AV                   |
| H                      | 4874.00            | 57.8                       | 30.33                     | 6.32                  | 24.55                     | 58.34                         | 74                     | -15.66         | Pk                   |
|                        | 4874.00            | 42.03                      | 30.33                     | 6.32                  | 24.55                     | 42.57                         | 54                     | -11.43         | AV                   |
| High Channel:2462MHz   |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4924.00            | 59.02                      | 30.55                     | 5.77                  | 24.66                     | 58.9                          | 74                     | -15.1          | Pk                   |
| V                      | 4924.00            | 41.3                       | 30.55                     | 5.77                  | 24.66                     | 41.18                         | 54                     | -12.82         | AV                   |
| H                      | 4924.00            | 56.81                      | 30.33                     | 6.32                  | 24.55                     | 57.35                         | 74                     | -16.65         | Pk                   |
| H                      | 4924.00            | 42.01                      | 30.33                     | 6.32                  | 24.55                     | 42.55                         | 54                     | -11.45         | AV                   |
| 802.11n 40             |                    |                            |                           |                       |                           |                               |                        |                |                      |
| Low Channel:2422MHz    |                    |                            |                           |                       |                           |                               |                        |                |                      |
| V                      | 4844.00            | 58.32                      | 30.55                     | 5.77                  | 24.66                     | 58.2                          | 74                     | -15.8          | Pk                   |
| V                      | 4844.00            | 44.12                      | 30.55                     | 5.77                  | 24.66                     | 44                            | 54                     | -10            | AV                   |



|                        |         |       |       |      |       |       |    |        |    |
|------------------------|---------|-------|-------|------|-------|-------|----|--------|----|
| H                      | 4844.00 | 59.08 | 30.33 | 6.32 | 24.55 | 59.62 | 74 | -14.38 | Pk |
| H                      | 4844.00 | 42.08 | 30.33 | 6.32 | 24.55 | 42.62 | 54 | -11.38 | AV |
| Middle Channel:2437MHz |         |       |       |      |       |       |    |        |    |
| V                      | 4874.00 | 59.27 | 30.55 | 5.77 | 24.66 | 59.15 | 74 | -14.85 | Pk |
| V                      | 4874.00 | 41.26 | 30.55 | 5.77 | 24.66 | 41.14 | 54 | -12.86 | AV |
| H                      | 4874.00 | 56.38 | 30.33 | 6.32 | 24.55 | 56.92 | 74 | -17.08 | Pk |
| H                      | 4874.00 | 44.65 | 30.33 | 6.32 | 24.55 | 45.19 | 54 | -8.81  | AV |
| High Channel:2452MHz   |         |       |       |      |       |       |    |        |    |
| V                      | 4904.00 | 56.09 | 30.55 | 5.77 | 24.66 | 55.97 | 74 | -18.03 | Pk |
| V                      | 4904.00 | 41.79 | 30.55 | 5.77 | 24.66 | 41.67 | 54 | -12.33 | AV |
| H                      | 4904.00 | 55.81 | 30.33 | 6.32 | 24.55 | 56.35 | 74 | -17.65 | Pk |
| H                      | 4904.00 | 44.04 | 30.33 | 6.32 | 24.55 | 44.58 | 54 | -9.42  | AV |

## Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

## 5. RADIATED BAND EMISSION MEASUREMENT

### 5.1 TEST REQUIREMENT:

|                       |                                                                                                    |          |      |      |         |
|-----------------------|----------------------------------------------------------------------------------------------------|----------|------|------|---------|
| Test Requirement:     | FCC Part15 C Section 15.209 and 15.205                                                             |          |      |      |         |
| Test Method:          | ANSI C63.10: 2013                                                                                  |          |      |      |         |
| Test Frequency Range: | All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed. |          |      |      |         |
| Test site:            | Measurement Distance: 3m                                                                           |          |      |      |         |
| Receiver setup:       | Frequency                                                                                          | Detector | RBW  | VBW  | Value   |
|                       | Above                                                                                              | Peak     | 1MHz | 3MHz | Peak    |
|                       | 1GHz                                                                                               | Average  | 1MHz | 3MHz | Average |

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Class B (dBuV/m) (at 3M) |         |
|-----------------|--------------------------|---------|
|                 | PEAK                     | AVERAGE |
| Above 1000      | 74                       | 54      |

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

### 5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could bestopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

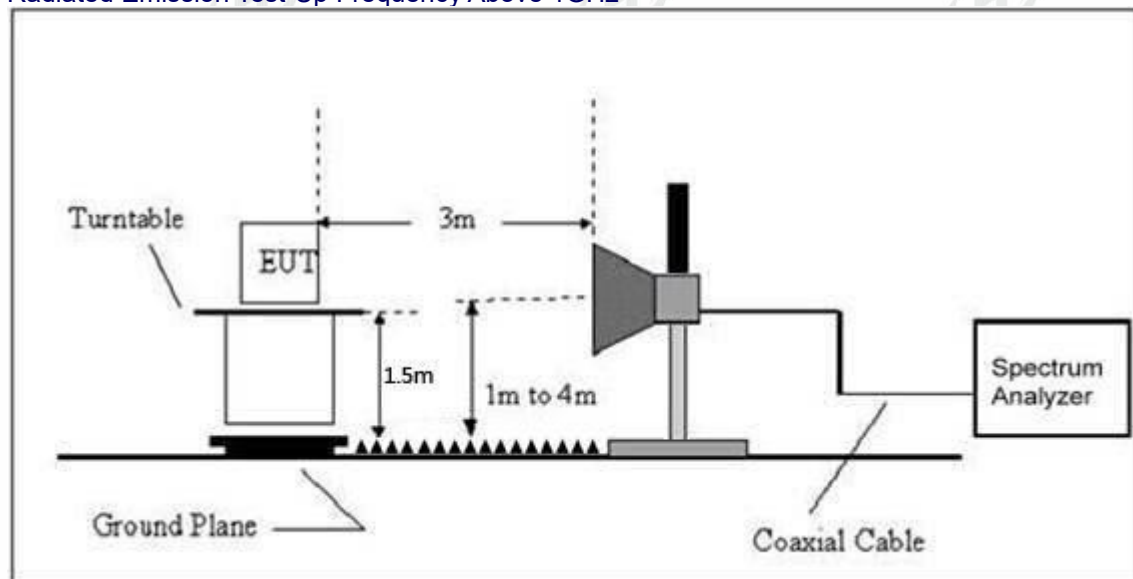
### 5.3 DEVIATION FROM TEST STANDARD

No deviation



## 5.4 TEST SETUP

### Radiated Emission Test-Up Frequency Above 1GHz



## 5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



## 5.6 TEST RESULT

|           | Polar<br>(H/V)       | Frequency<br>(MHz) | Meter<br>Reading<br>(dBuV) | Pre-<br>amplifier<br>(dB) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Emission<br>level<br>(dBuV/m) | Limit<br>(dBuV<br>/m) | Margi<br>n<br>(dB) | Detect<br>or<br>Type | Result |
|-----------|----------------------|--------------------|----------------------------|---------------------------|-----------------------|-----------------------------|-------------------------------|-----------------------|--------------------|----------------------|--------|
| 802.11b   | LowChannel 2412MHz   |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2390.00            | 61.22                      | 30.22                     | 4.85                  | 23.98                       | 59.83                         | 74.00                 | -14.17             | PK                   | PASS   |
|           | H                    | 2390.00            | 47.92                      | 30.22                     | 4.85                  | 23.98                       | 46.53                         | 54.00                 | -7.47              | AV                   | PASS   |
|           | H                    | 2400.00            | 60.27                      | 30.22                     | 4.85                  | 23.98                       | 58.88                         | 74.00                 | -15.12             | PK                   | PASS   |
|           | H                    | 2400.00            | 47.48                      | 30.22                     | 4.85                  | 23.98                       | 46.09                         | 54.00                 | -7.91              | AV                   | PASS   |
|           | V                    | 2390.00            | 61.26                      | 30.22                     | 4.85                  | 23.98                       | 59.87                         | 74.00                 | -14.13             | PK                   | PASS   |
|           | V                    | 2390.00            | 48.27                      | 30.22                     | 4.85                  | 23.98                       | 46.88                         | 54.00                 | -7.12              | AV                   | PASS   |
|           | V                    | 2400.00            | 61.99                      | 30.22                     | 4.85                  | 23.98                       | 60.60                         | 74.00                 | -13.40             | PK                   | PASS   |
|           | V                    | 2400.00            | 47.23                      | 30.22                     | 4.85                  | 23.98                       | 45.84                         | 54.00                 | -8.16              | AV                   | PASS   |
|           | High Channel 2462MHz |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2483.50            | 62.22                      | 30.22                     | 4.85                  | 23.98                       | 60.83                         | 74.00                 | -13.17             | AV                   | PASS   |
|           | H                    | 2483.50            | 46.71                      | 30.22                     | 4.85                  | 23.98                       | 45.32                         | 54.00                 | -8.68              | PK                   | PASS   |
|           | H                    | 2500.00            | 61.34                      | 30.22                     | 4.85                  | 23.98                       | 59.95                         | 74.00                 | -14.05             | AV                   | PASS   |
|           | H                    | 2500.00            | 48.69                      | 30.22                     | 4.85                  | 23.98                       | 47.30                         | 54.00                 | -6.70              | PK                   | PASS   |
|           | V                    | 2483.50            | 62.62                      | 30.22                     | 4.85                  | 23.98                       | 61.23                         | 74.00                 | -12.77             | AV                   | PASS   |
|           | V                    | 2483.50            | 48.55                      | 30.22                     | 4.85                  | 23.98                       | 47.16                         | 54.00                 | -6.84              | PK                   | PASS   |
|           | V                    | 2500.00            | 59.43                      | 30.22                     | 4.85                  | 23.98                       | 58.04                         | 74.00                 | -15.96             | AV                   | PASS   |
|           | V                    | 2500.00            | 46.36                      | 30.22                     | 4.85                  | 23.98                       | 44.97                         | 54.00                 | -9.03              | AV                   | PASS   |
| 802.11g   | Low Channel 2412MHz  |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2390.00            | 62.67                      | 30.22                     | 4.85                  | 23.98                       | 61.28                         | 74.00                 | -12.72             | PK                   | PASS   |
|           | H                    | 2390.00            | 48.49                      | 30.22                     | 4.85                  | 23.98                       | 47.10                         | 54.00                 | -6.90              | AV                   | PASS   |
|           | H                    | 2400.00            | 59.41                      | 30.22                     | 4.85                  | 23.98                       | 58.02                         | 74.00                 | -15.98             | PK                   | PASS   |
|           | H                    | 2400.00            | 47.87                      | 30.22                     | 4.85                  | 23.98                       | 46.48                         | 54.00                 | -7.52              | AV                   | PASS   |
|           | V                    | 2390.00            | 62.69                      | 30.22                     | 4.85                  | 23.98                       | 61.30                         | 74.00                 | -12.70             | PK                   | PASS   |
|           | V                    | 2390.00            | 48.89                      | 30.22                     | 4.85                  | 23.98                       | 47.50                         | 54.00                 | -6.50              | AV                   | PASS   |
|           | V                    | 2400.00            | 62.00                      | 30.22                     | 4.85                  | 23.98                       | 60.61                         | 74.00                 | -13.39             | PK                   | PASS   |
|           | V                    | 2400.00            | 48.74                      | 30.22                     | 4.85                  | 23.98                       | 47.35                         | 54.00                 | -6.65              | AV                   | PASS   |
|           | High Channel 2462MHz |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2483.50            | 61.77                      | 30.22                     | 4.85                  | 23.98                       | 60.38                         | 74.00                 | -13.62             | PK                   | PASS   |
|           | H                    | 2483.50            | 48.56                      | 30.22                     | 4.85                  | 23.98                       | 47.17                         | 54.00                 | -6.83              | AV                   | PASS   |
|           | H                    | 2500.00            | 60.68                      | 30.22                     | 4.85                  | 23.98                       | 59.29                         | 74.00                 | -14.71             | PK                   | PASS   |
|           | H                    | 2500.00            | 46.15                      | 30.22                     | 4.85                  | 23.98                       | 44.76                         | 54.00                 | -9.24              | AV                   | PASS   |
|           | V                    | 2483.50            | 59.15                      | 30.22                     | 4.85                  | 23.98                       | 57.76                         | 74.00                 | -16.24             | PK                   | PASS   |
|           | V                    | 2483.50            | 47.18                      | 30.22                     | 4.85                  | 23.98                       | 45.79                         | 54.00                 | -8.21              | AV                   | PASS   |
|           | V                    | 2500.00            | 60.29                      | 30.22                     | 4.85                  | 23.98                       | 58.90                         | 74.00                 | -15.10             | PK                   | PASS   |
|           | V                    | 2500.00            | 48.38                      | 30.22                     | 4.85                  | 23.98                       | 46.99                         | 54.00                 | -7.01              | AV                   | PASS   |
| 802.11n20 | Low Channel 2412MHz  |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2390.00            | 62.56                      | 30.22                     | 4.85                  | 23.98                       | 61.17                         | 74.00                 | -12.83             | PK                   | PASS   |
|           | H                    | 2390.00            | 46.17                      | 30.22                     | 4.85                  | 23.98                       | 44.78                         | 54.00                 | -9.22              | AV                   | PASS   |
|           | H                    | 2400.00            | 60.17                      | 30.22                     | 4.85                  | 23.98                       | 58.78                         | 74.00                 | -15.22             | PK                   | PASS   |
|           | H                    | 2400.00            | 47.32                      | 30.22                     | 4.85                  | 23.98                       | 45.93                         | 54.00                 | -8.07              | AV                   | PASS   |
|           | V                    | 2390.00            | 61.47                      | 30.22                     | 4.85                  | 23.98                       | 60.08                         | 74.00                 | -13.92             | PK                   | PASS   |
|           | V                    | 2390.00            | 48.15                      | 30.22                     | 4.85                  | 23.98                       | 46.76                         | 54.00                 | -7.24              | AV                   | PASS   |
|           | V                    | 2400.00            | 59.25                      | 30.22                     | 4.85                  | 23.98                       | 57.86                         | 74.00                 | -16.14             | PK                   | PASS   |
|           | V                    | 2400.00            | 46.96                      | 30.22                     | 4.85                  | 23.98                       | 45.57                         | 54.00                 | -8.43              | AV                   | PASS   |
|           | High Channel 2462MHz |                    |                            |                           |                       |                             |                               |                       |                    |                      |        |
|           | H                    | 2483.50            | 61.08                      | 30.22                     | 4.85                  | 23.98                       | 59.69                         | 74.00                 | -14.31             | PK                   | PASS   |
|           | H                    | 2483.50            | 46.12                      | 30.22                     | 4.85                  | 23.98                       | 44.73                         | 54.00                 | -9.27              | AV                   | PASS   |
|           | H                    | 2500.00            | 61.07                      | 30.22                     | 4.85                  | 23.98                       | 59.68                         | 74.00                 | -14.32             | PK                   | PASS   |
|           | H                    | 2500.00            | 47.57                      | 30.22                     | 4.85                  | 23.98                       | 46.18                         | 54.00                 | -7.82              | AV                   | PASS   |
|           | V                    | 2483.50            | 59.21                      | 30.22                     | 4.85                  | 23.98                       | 57.82                         | 74.00                 | -16.18             | PK                   | PASS   |



|               |                      |         |       |       |      |       |       |       |        |    |      |
|---------------|----------------------|---------|-------|-------|------|-------|-------|-------|--------|----|------|
| 802.11n<br>40 | V                    | 2483.50 | 48.69 | 30.22 | 4.85 | 23.98 | 47.30 | 54.00 | -6.70  | AV | PASS |
|               | V                    | 2500.00 | 60.18 | 30.22 | 4.85 | 23.98 | 58.79 | 74.00 | -15.21 | PK | PASS |
|               | V                    | 2500.00 | 47.29 | 30.22 | 4.85 | 23.98 | 45.90 | 54.00 | -8.10  | AV | PASS |
|               | Low Channel 2422MHz  |         |       |       |      |       |       |       |        |    |      |
|               | H                    | 2390.00 | 59.83 | 30.22 | 4.85 | 23.98 | 58.44 | 74.00 | -15.56 | PK | PASS |
|               | H                    | 2390.00 | 46.05 | 30.22 | 4.85 | 23.98 | 44.66 | 54.00 | -9.34  | AV | PASS |
|               | H                    | 2400.00 | 59.55 | 30.22 | 4.85 | 23.98 | 58.16 | 74.00 | -15.84 | PK | PASS |
|               | H                    | 2400.00 | 46.04 | 30.22 | 4.85 | 23.98 | 44.65 | 54.00 | -9.35  | AV | PASS |
|               | V                    | 2390.00 | 60.64 | 30.22 | 4.85 | 23.98 | 59.25 | 74.00 | -14.75 | PK | PASS |
|               | V                    | 2390.00 | 46.69 | 30.22 | 4.85 | 23.98 | 45.30 | 54.00 | -8.70  | AV | PASS |
|               | V                    | 2400.00 | 59.32 | 30.22 | 4.85 | 23.98 | 57.93 | 74.00 | -16.07 | PK | PASS |
|               | V                    | 2400.00 | 48.74 | 30.22 | 4.85 | 23.98 | 47.35 | 54.00 | -6.65  | AV | PASS |
|               | High Channel 2452MHz |         |       |       |      |       |       |       |        |    |      |
|               | H                    | 2483.50 | 61.01 | 30.22 | 4.85 | 23.98 | 59.62 | 74.00 | -14.38 | PK | PASS |
|               | H                    | 2483.50 | 48.99 | 30.22 | 4.85 | 23.98 | 47.60 | 54.00 | -6.40  | AV | PASS |
|               | H                    | 2500.00 | 61.02 | 30.22 | 4.85 | 23.98 | 59.63 | 74.00 | -14.37 | PK | PASS |
|               | H                    | 2500.00 | 47.17 | 30.22 | 4.85 | 23.98 | 45.78 | 54.00 | -8.22  | AV | PASS |
|               | V                    | 2483.50 | 60.17 | 30.22 | 4.85 | 23.98 | 58.78 | 74.00 | -15.22 | PK | PASS |
|               | V                    | 2483.50 | 48.22 | 30.22 | 4.85 | 23.98 | 46.83 | 54.00 | -7.17  | AV | PASS |
|               | V                    | 2500.00 | 62.82 | 30.22 | 4.85 | 23.98 | 61.43 | 74.00 | -12.57 | PK | PASS |
|               | V                    | 2500.00 | 47.72 | 30.22 | 4.85 | 23.98 | 46.33 | 54.00 | -7.67  | AV | PASS |

**Remark:**

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

## 6. POWER SPECTRAL DENSITY TEST

|                   |                                         |
|-------------------|-----------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (e)         |
| Test Method:      | KDB558074 D0115.247 Meas Guidancev05r02 |

### 6.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C |                        |           |                       |        |
|---------------------------------|------------------------|-----------|-----------------------|--------|
| Section                         | Test Item              | Limit     | Frequency Range (MHz) | Result |
| 15.247                          | Power Spectral Density | 8dBm/3kHz | 2400-2483.5           | PASS   |

### 6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.



6.6 TEST RESULT

|               |        |                     |              |
|---------------|--------|---------------------|--------------|
| Temperature : | 25.9℃  | Relative Humidity : | 52%          |
| Pressure :    | 101kPa | Test Voltage :      | AC 120V/60Hz |

Please refer to APPENDIX WIFI

## 7. CHANNEL BANDWIDTH

|                   |                                         |
|-------------------|-----------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(2)      |
| Test Method:      | KDB558074 D0115.247 Meas Guidancev05r02 |

### 7.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C |           |                                         |                       |        |
|---------------------------------|-----------|-----------------------------------------|-----------------------|--------|
| Section                         | Test Item | Limit                                   | Frequency Range (MHz) | Result |
| 15.247(a)(2)                    | Bandwidth | $\geq 500\text{KHz}$<br>(6dB bandwidth) | 2400-2483.5           | PASS   |

### 7.2 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times \text{RBW}$ .
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 frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



7.6 TEST RESULT

|               |         |                     |              |
|---------------|---------|---------------------|--------------|
| Temperature : | 25.8℃   | Relative Humidity : | 52%          |
| Pressure :    | 101kPa  | Test Voltage :      | AC 120V/60Hz |
| Test Mode :   | TX Mode |                     |              |

Please refer to APPENDIX WIFI

## 8. CONDUCTED OUTPUT POWER TEST

|                   |                                         |
|-------------------|-----------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (b)(3)      |
| Test Method:      | KDB558074 D0115.247 Meas Guidancev05r02 |

### 8.1 APPLIED PROCEDURES/LIMIT

| FCC Part15 (15.247) , Subpart C |                        |                 |                       |        |
|---------------------------------|------------------------|-----------------|-----------------------|--------|
| Section                         | Test Item              | Limit           | Frequency Range (MHz) | Result |
| 15.247(b)(3)                    | Conducted Output Power | 1 watt or 30dBm | 2400-2483.5           | PASS   |

### 8.2 TEST PROCEDURE

- a. 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 2MHz. VBW =6MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

### 8.3 DEVIATION FROM STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 8.6 TEST RESULT

|               |        |                     |              |
|---------------|--------|---------------------|--------------|
| Temperature : | 25.3℃  | Relative Humidity : | 55%          |
| Pressure :    | 101kPa | Test Voltage :      | AC 120V/60Hz |

Please refer to APPENDIX WIFI



## 9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

|                   |                                         |
|-------------------|-----------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.247 (d)         |
| Test Method:      | KDB558074 D0115.247 Meas Guidancev05r02 |

### 9.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in15.209(a).

### 9.2 TEST PROCEDURE

Using the following spectrum analyzer setting:

- A) Set the RBW = 100KHz.
- B) Set the VBW = 300KHz.
- C) Sweep time = auto couple.
- D) Detector function = peak.
- E) Trace mode = max hold.
- F) Allow trace to fully stabilize.

### 9.3 DEVIATION FROM STANDARD

No deviation.

### 9.4 TEST SETUP



### 9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 9.6 TEST RESULTS

Please refer to APPENDIX WIFI

**10. ANTENNA REQUIREMENT**

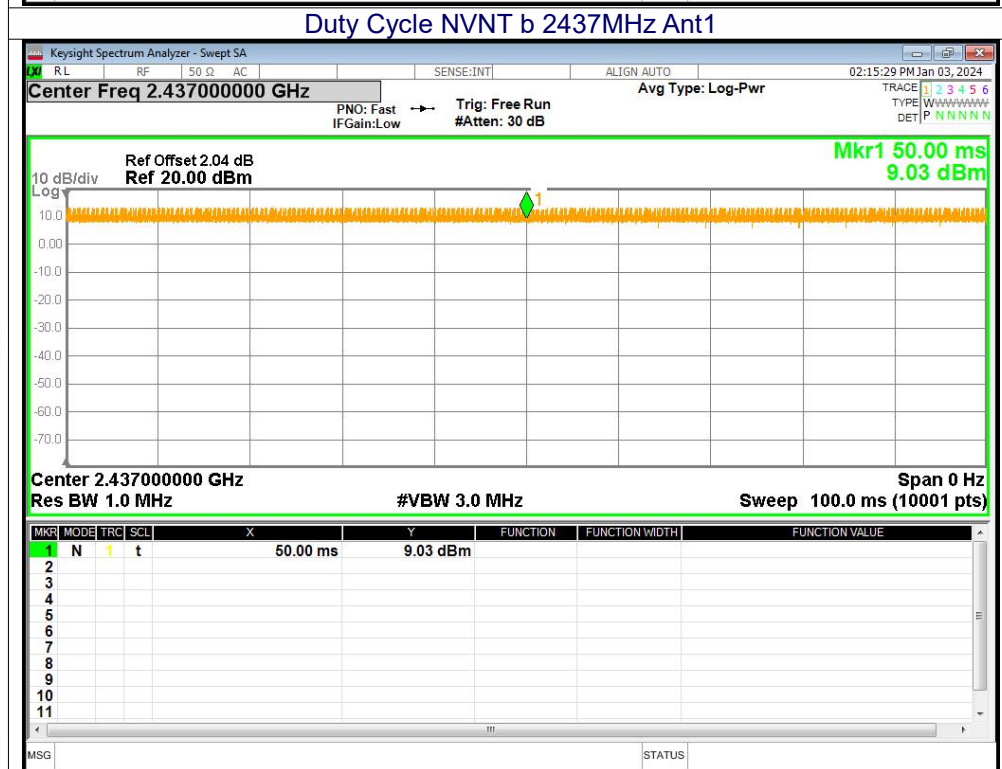
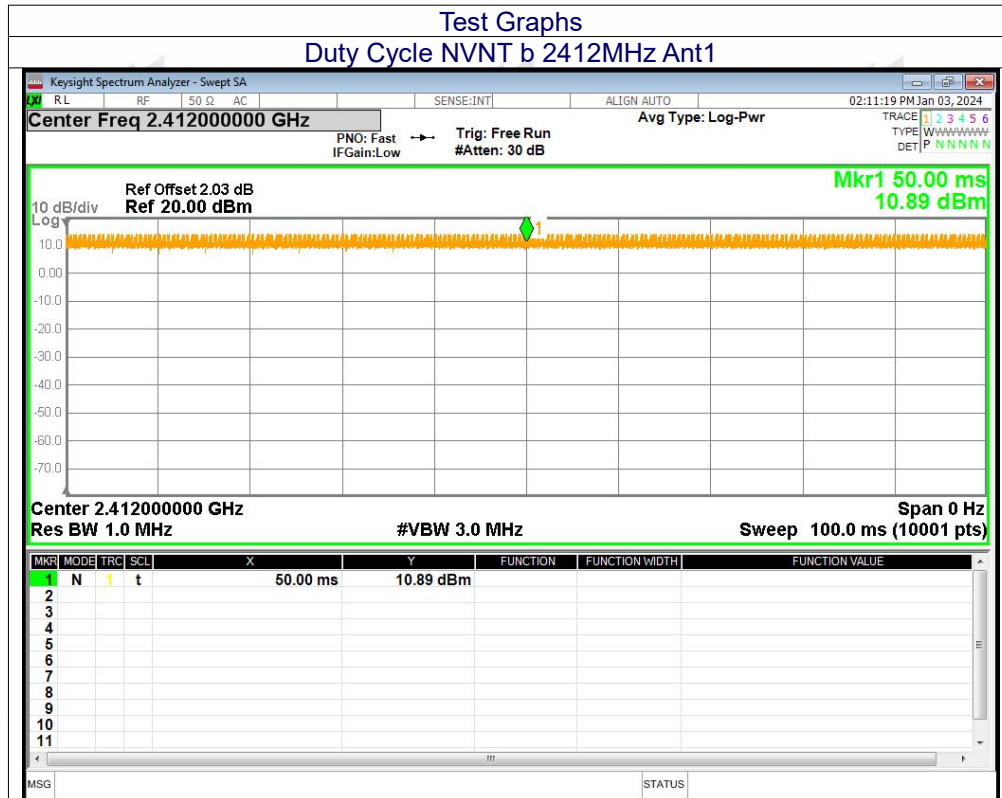
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Standard requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FCC Part15 C Section 15.203 /247(b)(4) |
| <p>15.203 requirement:<br/>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement:<br/>(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> |                                        |
| <b>EUT Antenna:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        |
| The antenna is PCB Antenna, the best case gain of the antenna is 0.89dBi, reference to the appendix II for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                        |

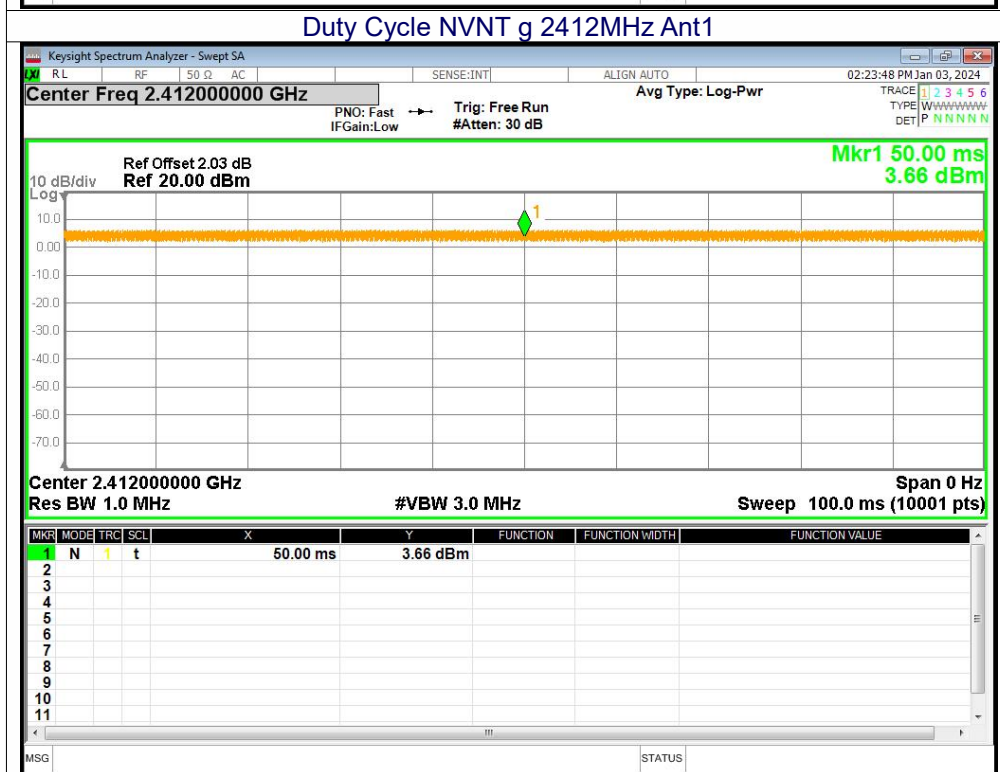
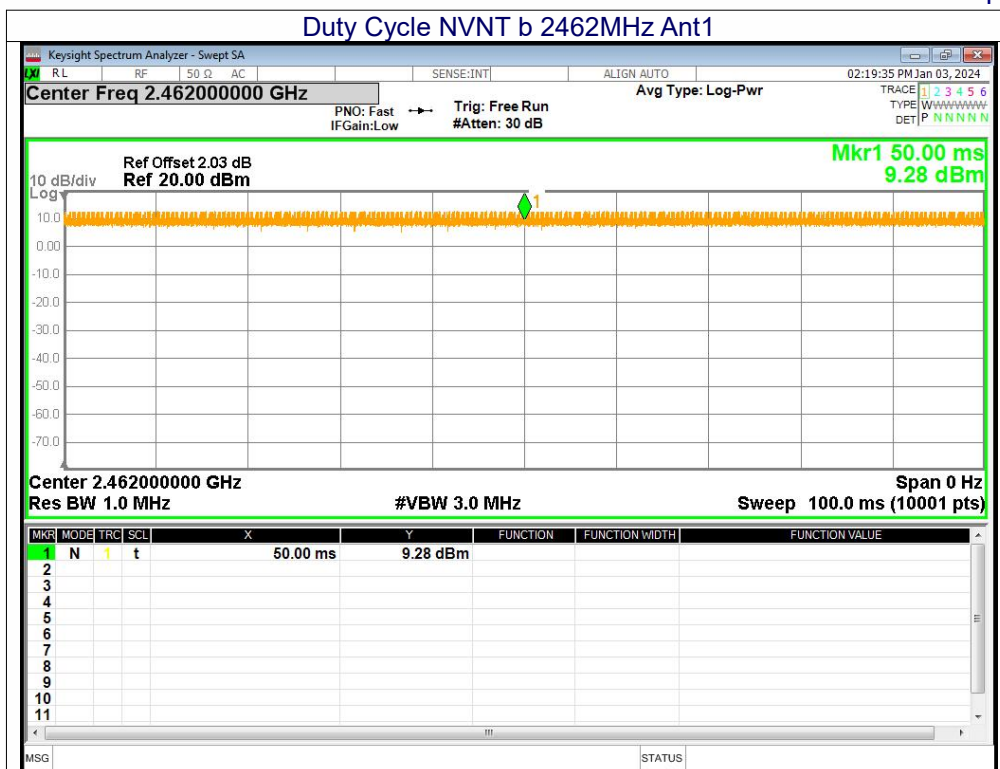


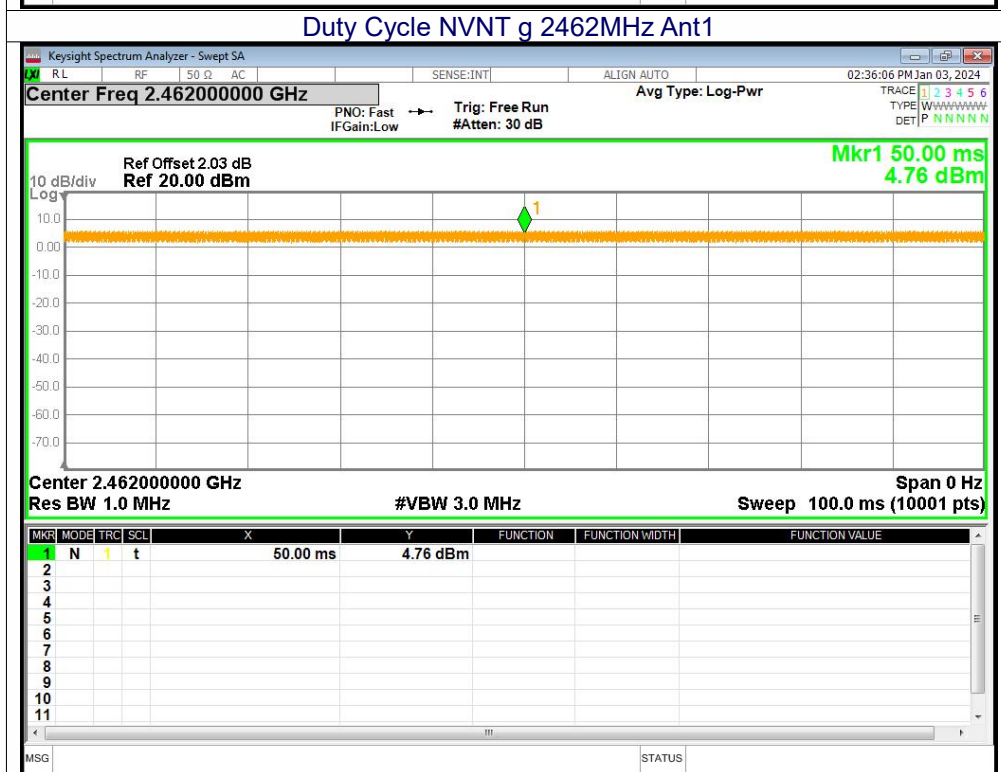
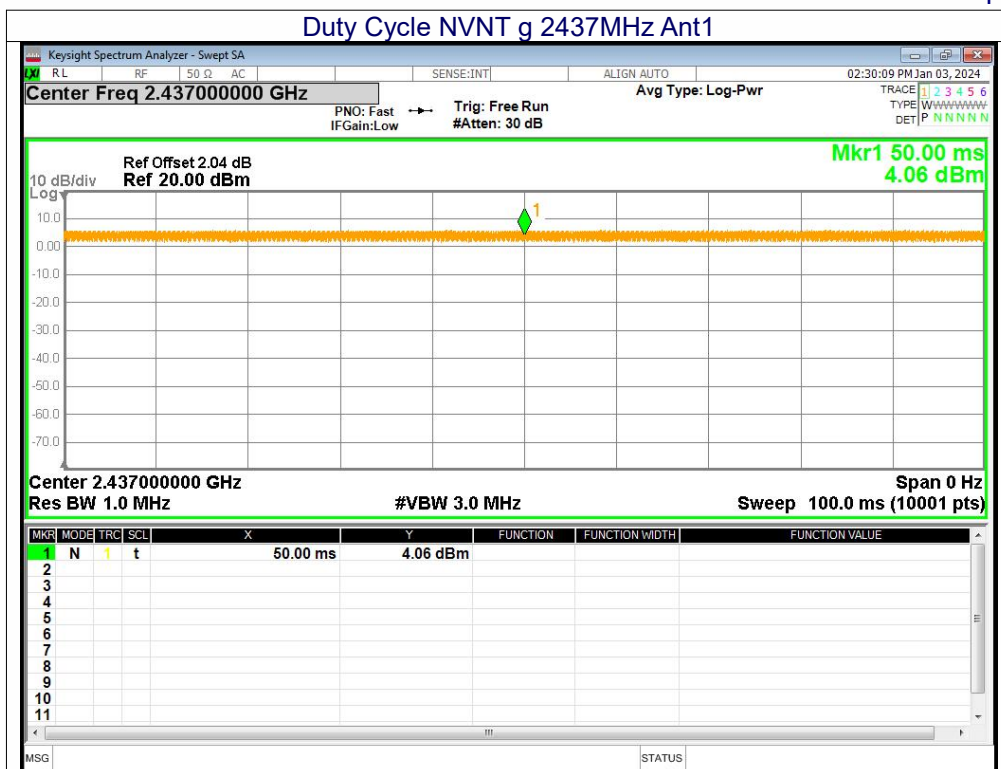
## 11. APPENDIX WIFI

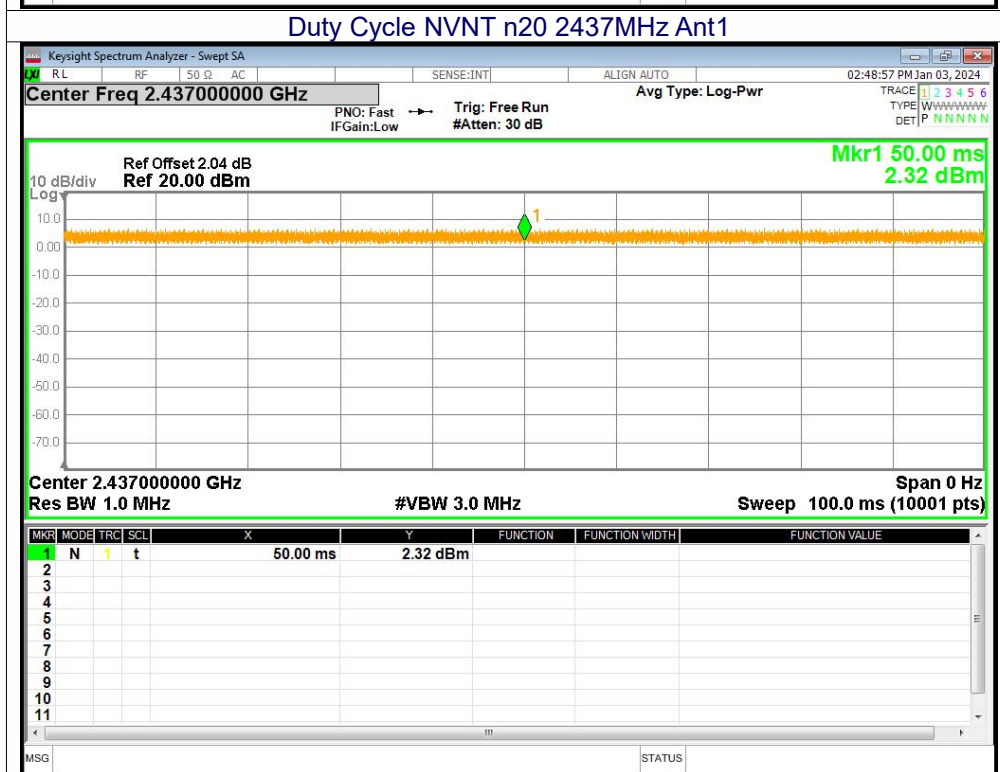
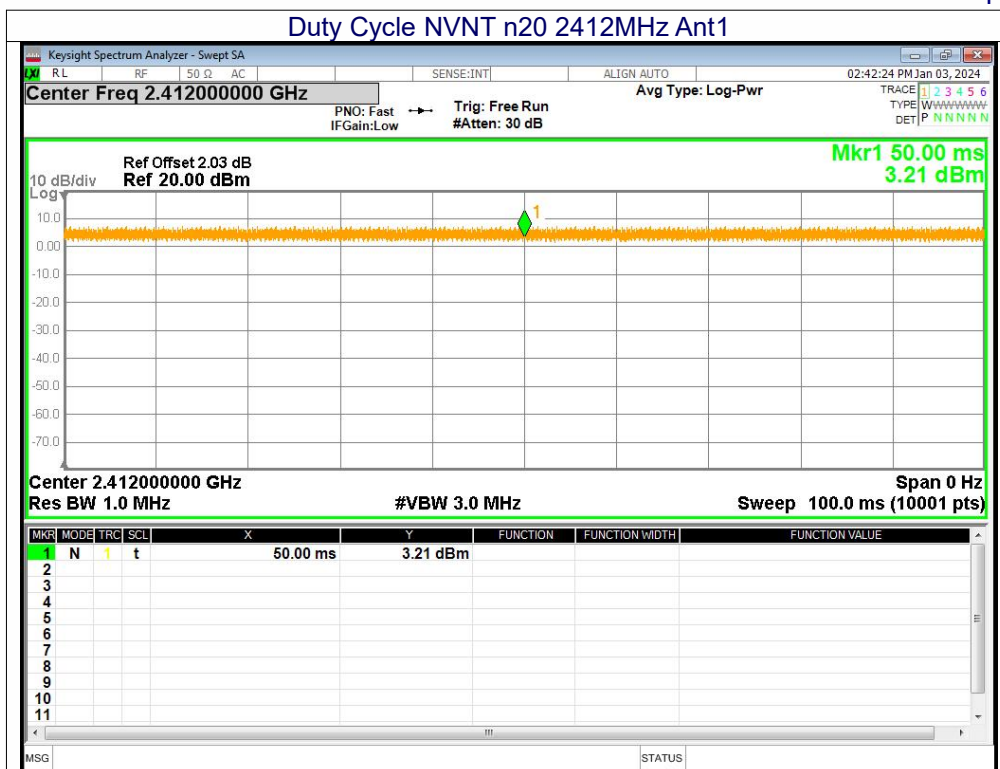
### 11.1 DUTY CYCLE

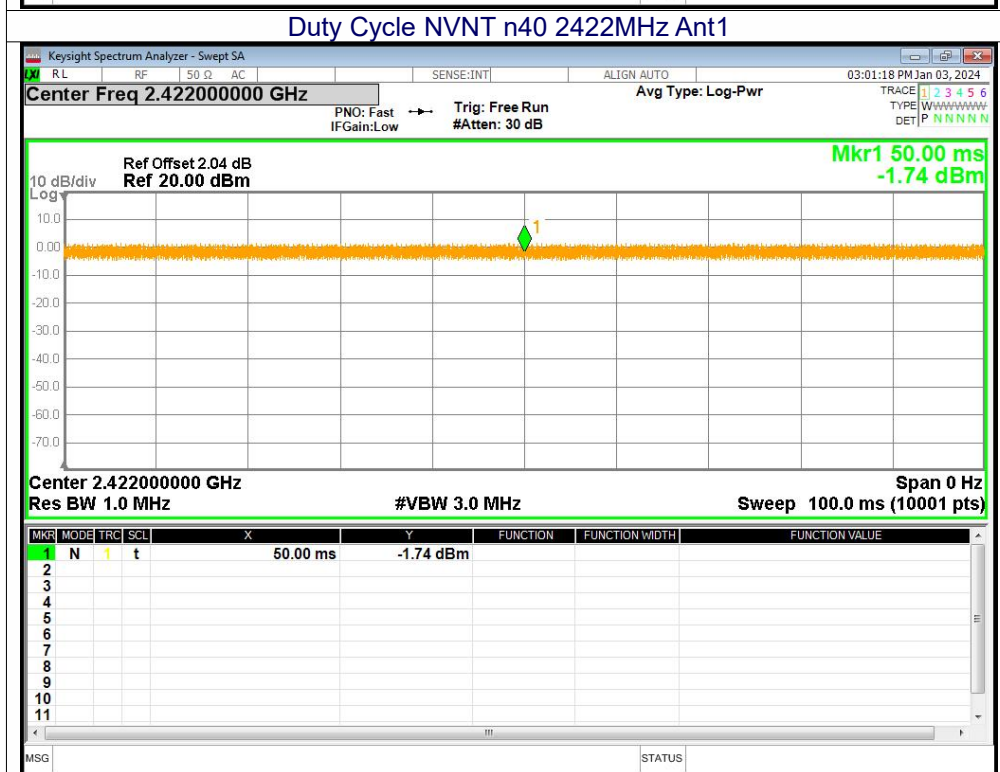
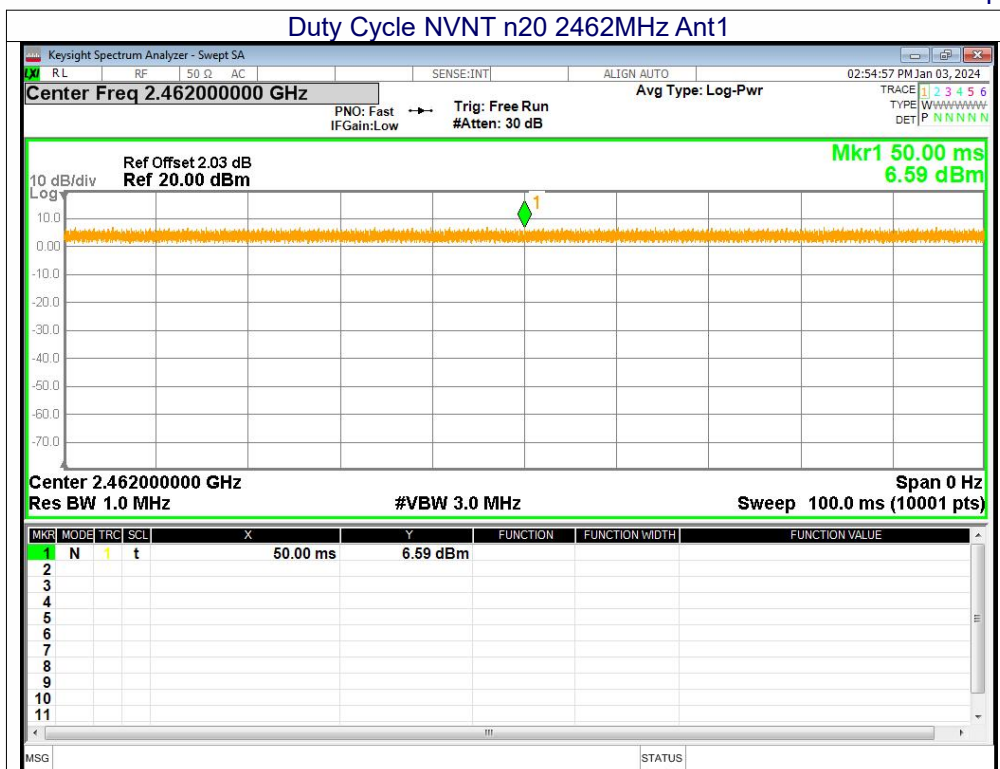
| Mode | Frequency (MHz) | Duty Cycle (%) | Correction Factor (dB) | 1/T (kHz) |
|------|-----------------|----------------|------------------------|-----------|
| b    | 2412            | 100            | 0                      | 0         |
| b    | 2437            | 100            | 0                      | 0         |
| b    | 2462            | 100            | 0                      | 0         |
| g    | 2412            | 100            | 0                      | 0         |
| g    | 2437            | 100            | 0                      | 0         |
| g    | 2462            | 100            | 0                      | 0         |
| n20  | 2412            | 100            | 0                      | 0         |
| n20  | 2437            | 100            | 0                      | 0         |
| n20  | 2462            | 100            | 0                      | 0         |
| n40  | 2422            | 100            | 0                      | 0         |
| n40  | 2437            | 100            | 0                      | 0         |
| n40  | 2452            | 100            | 0                      | 0         |

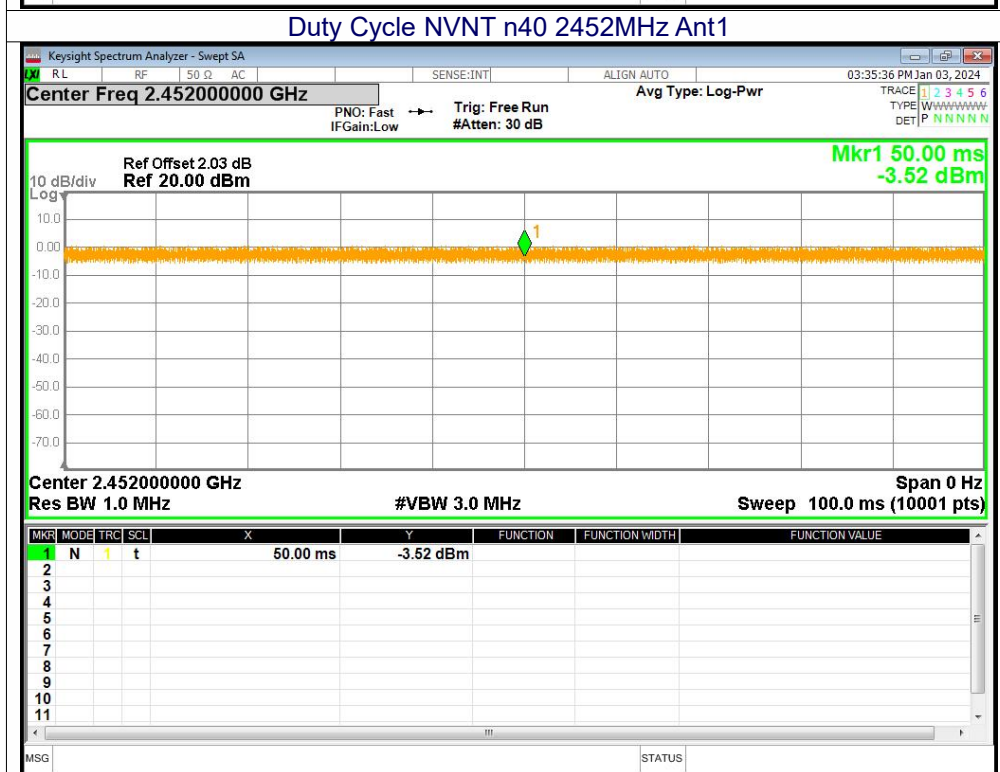
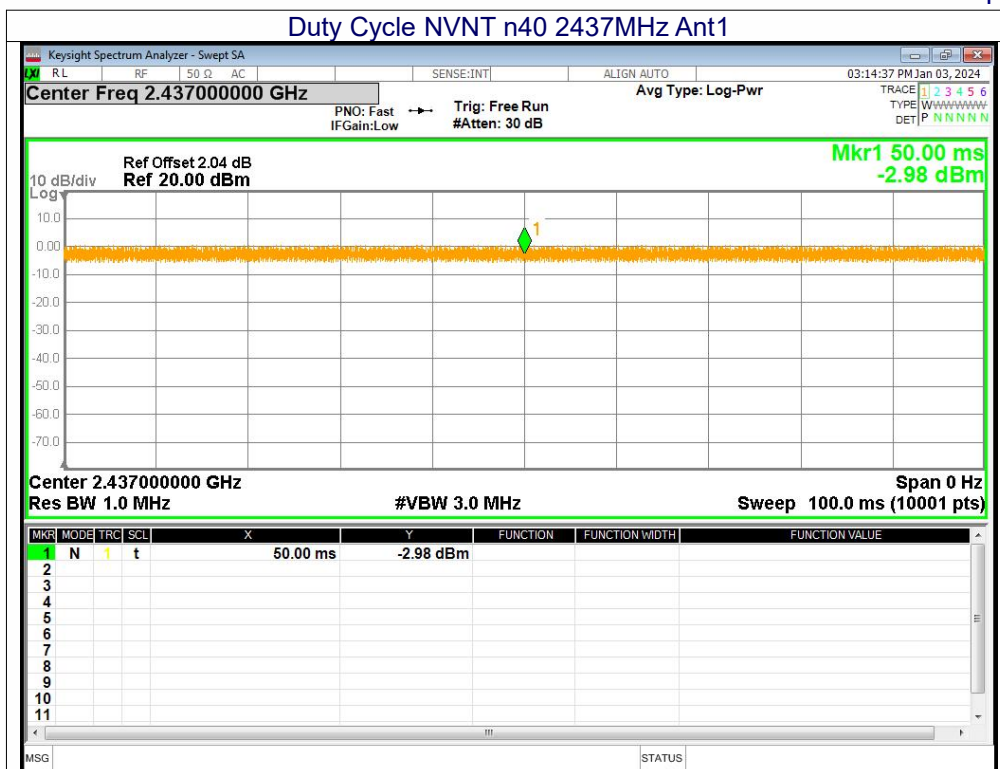








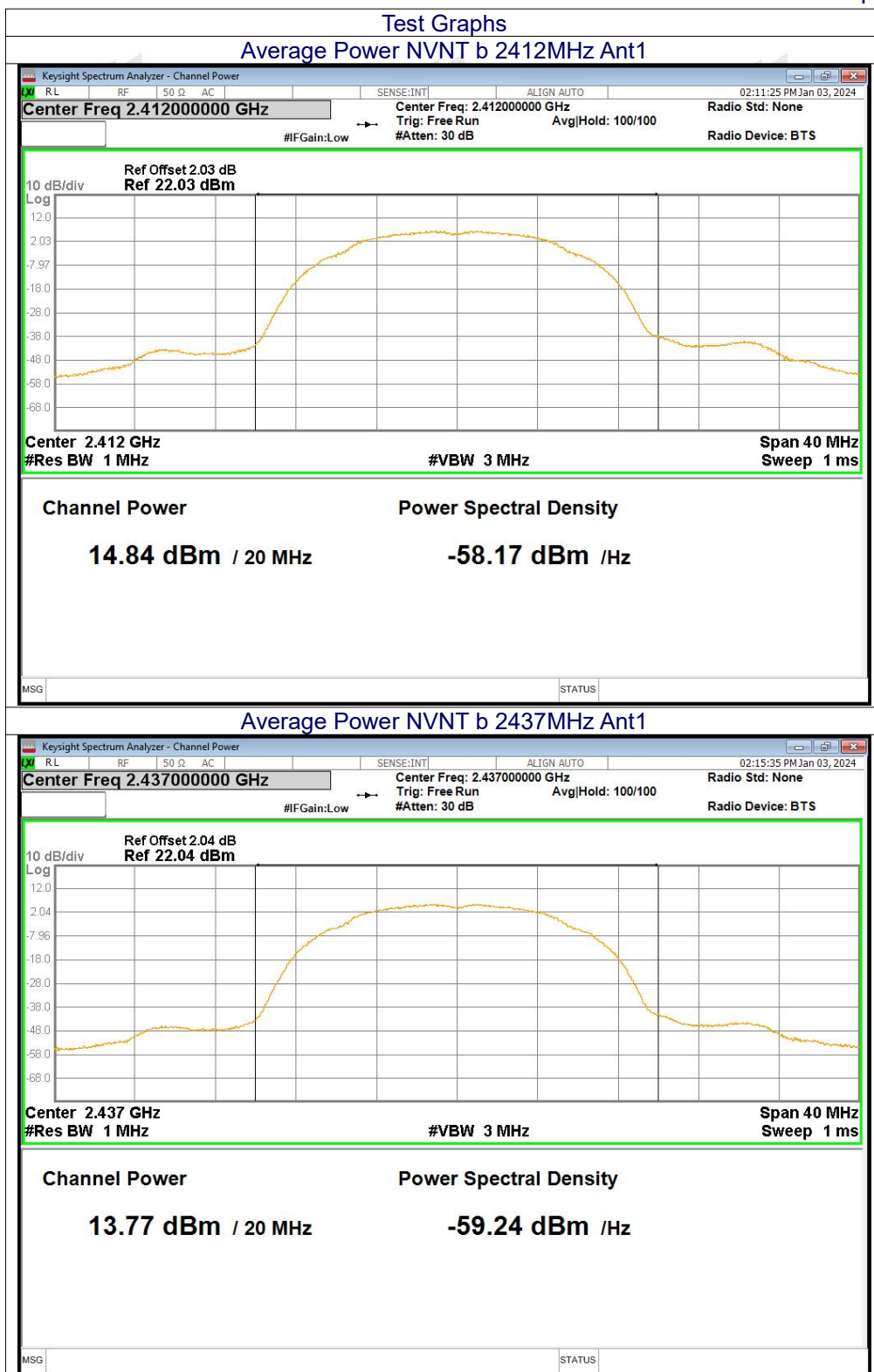


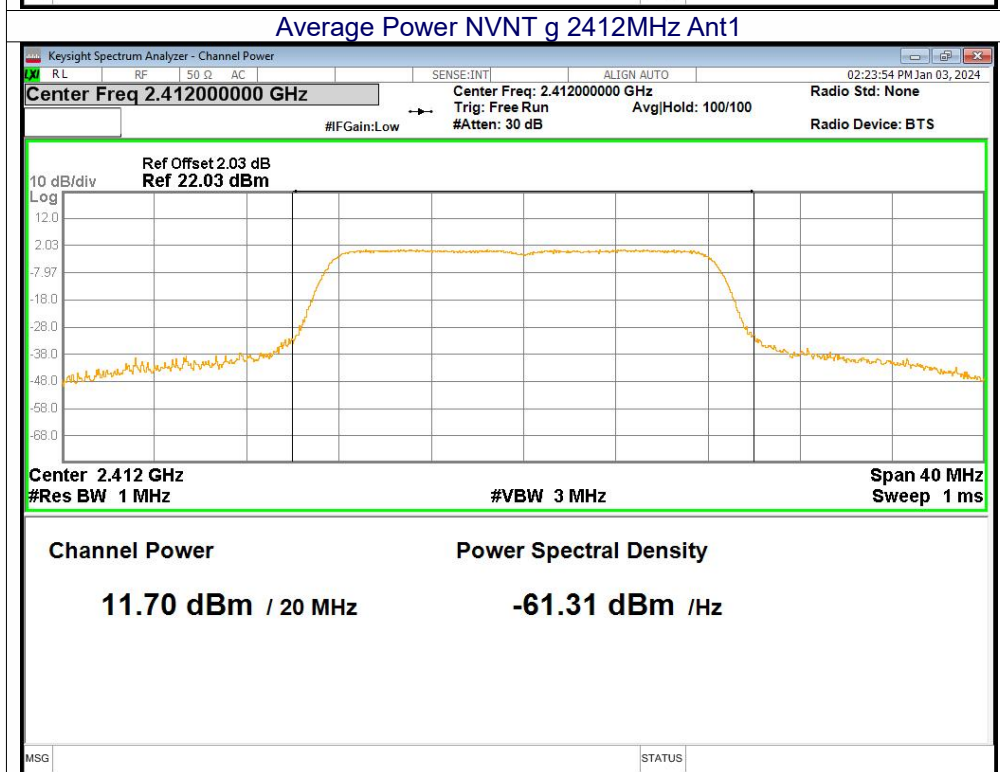
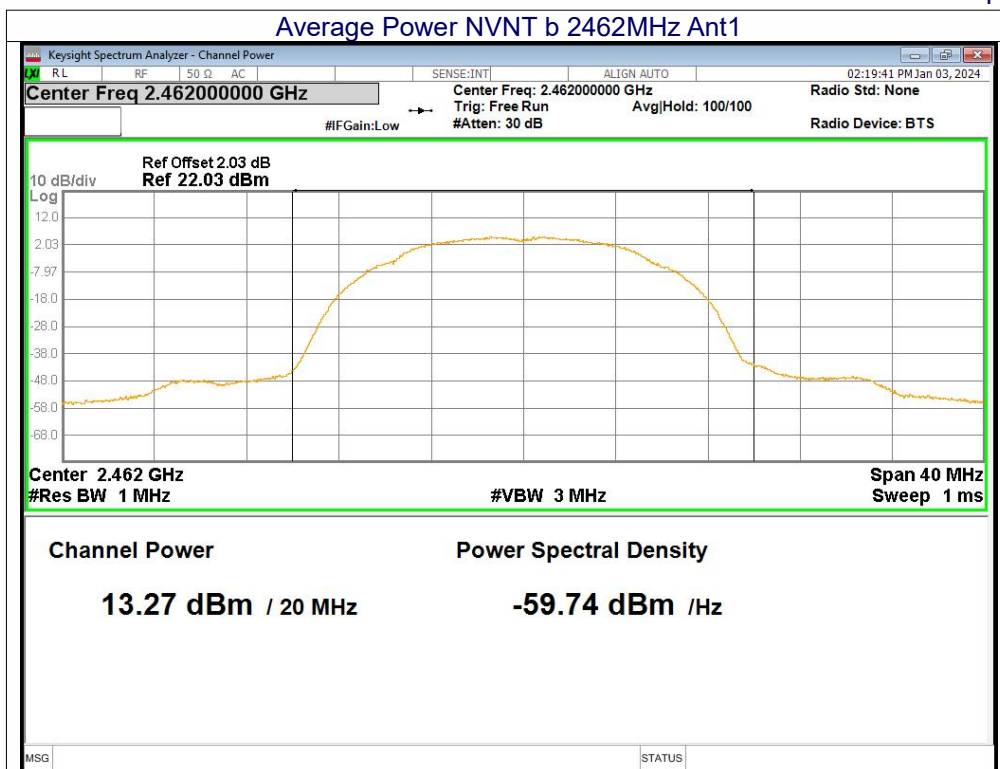


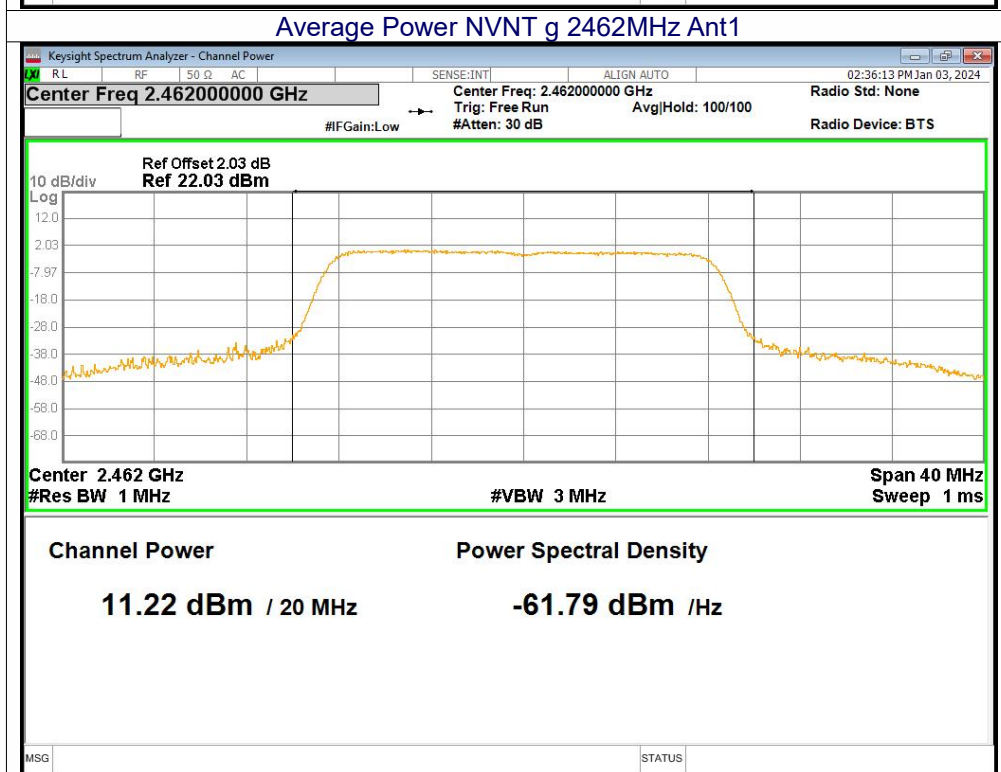
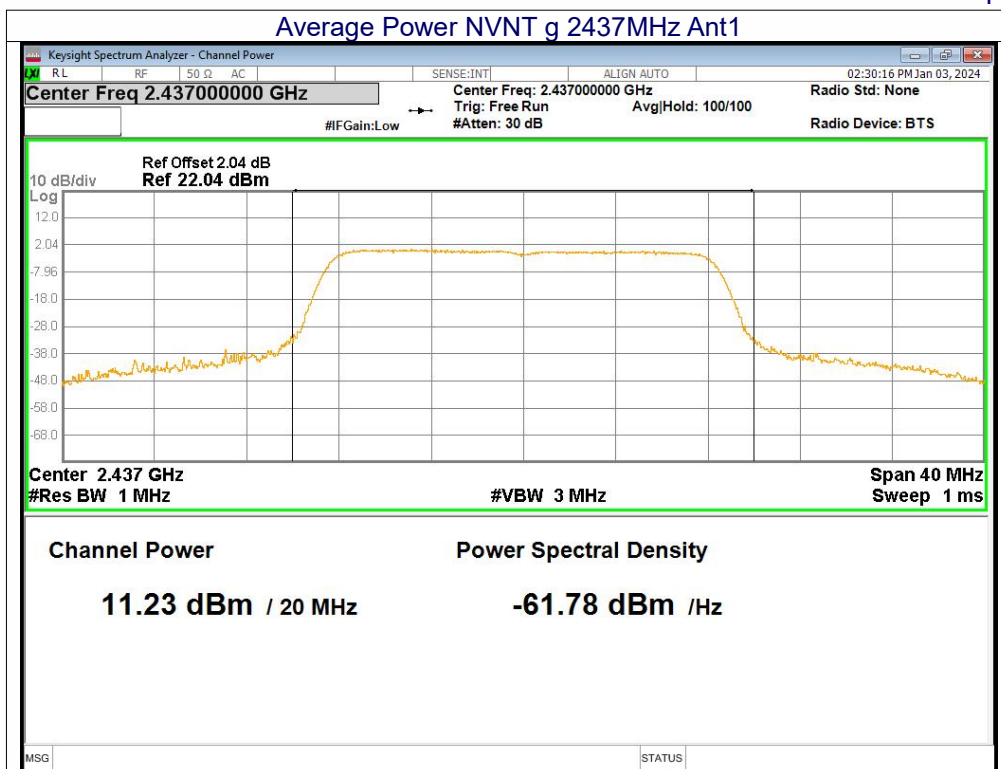


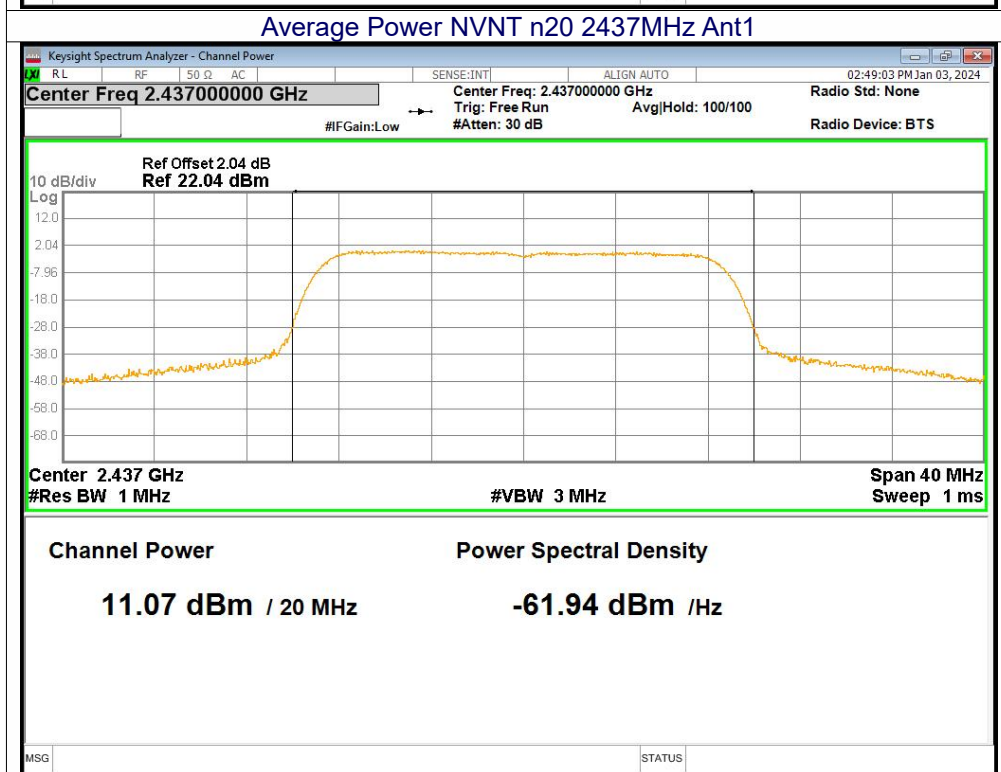
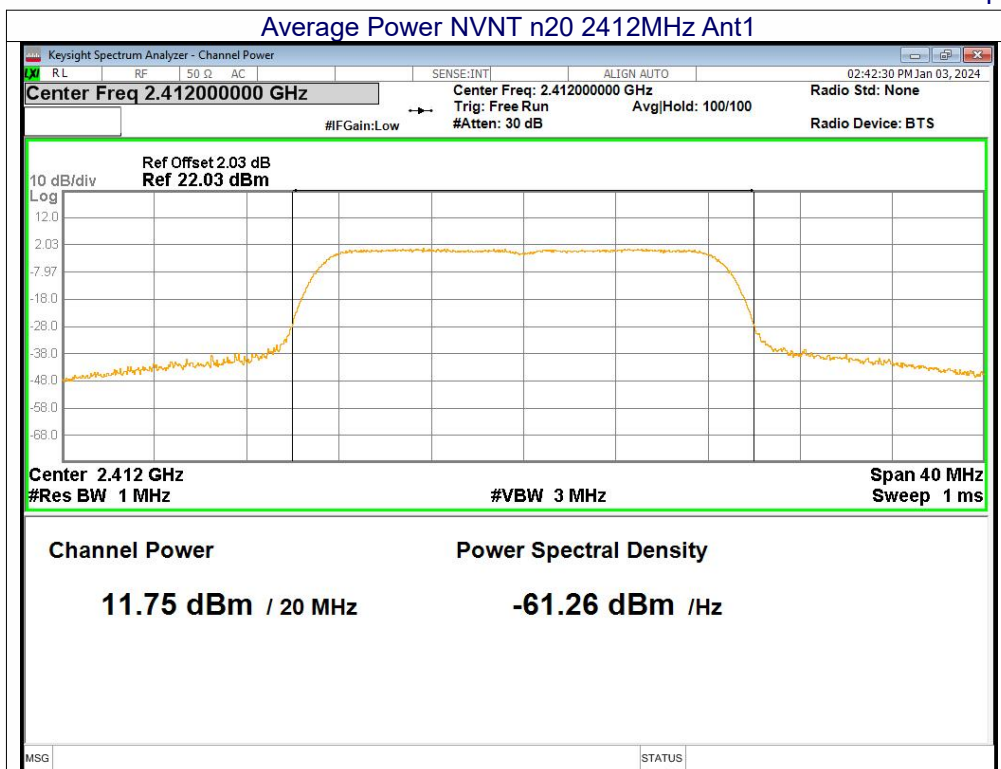
## 11.2 MAXIMUM CONDUCTED OUTPUT POWER

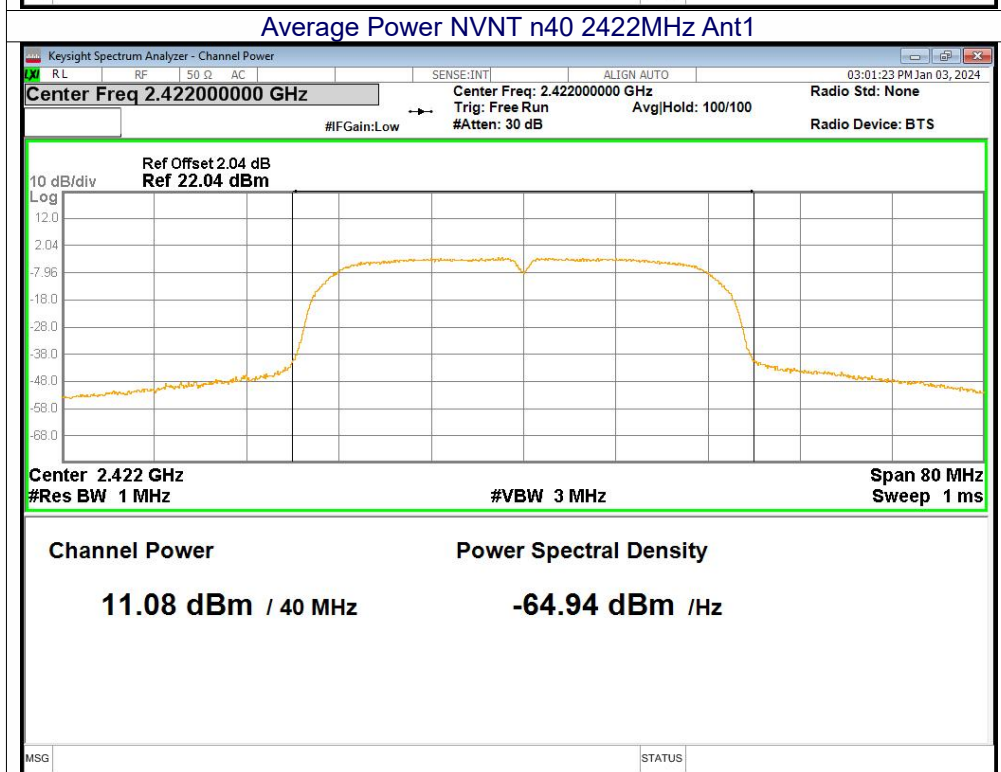
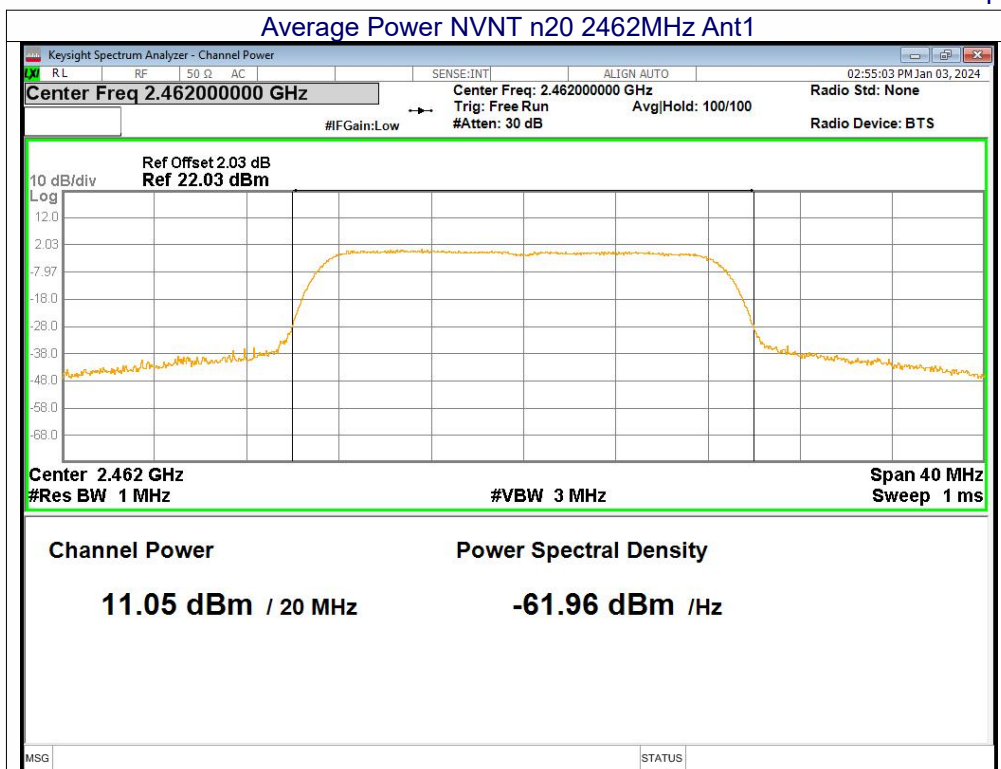
| Mode | Frequency (MHz) | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|------|-----------------|-----------------------|------------------|-------------------|-------------|---------|
| b    | 2412            | 14.84                 | 0                | 14.84             | 30          | Pass    |
| b    | 2437            | 13.77                 | 0                | 13.77             | 30          | Pass    |
| b    | 2462            | 13.27                 | 0                | 13.27             | 30          | Pass    |
| g    | 2412            | 11.70                 | 0                | 11.70             | 30          | Pass    |
| g    | 2437            | 11.23                 | 0                | 11.23             | 30          | Pass    |
| g    | 2462            | 11.22                 | 0                | 11.22             | 30          | Pass    |
| n20  | 2412            | 11.75                 | 0                | 11.75             | 30          | Pass    |
| n20  | 2437            | 11.07                 | 0                | 11.07             | 30          | Pass    |
| n20  | 2462            | 11.05                 | 0                | 11.05             | 30          | Pass    |
| n40  | 2422            | 11.08                 | 0                | 11.08             | 30          | Pass    |
| n40  | 2437            | 10.37                 | 0                | 10.37             | 30          | Pass    |
| n40  | 2452            | 10.29                 | 0                | 10.29             | 30          | Pass    |

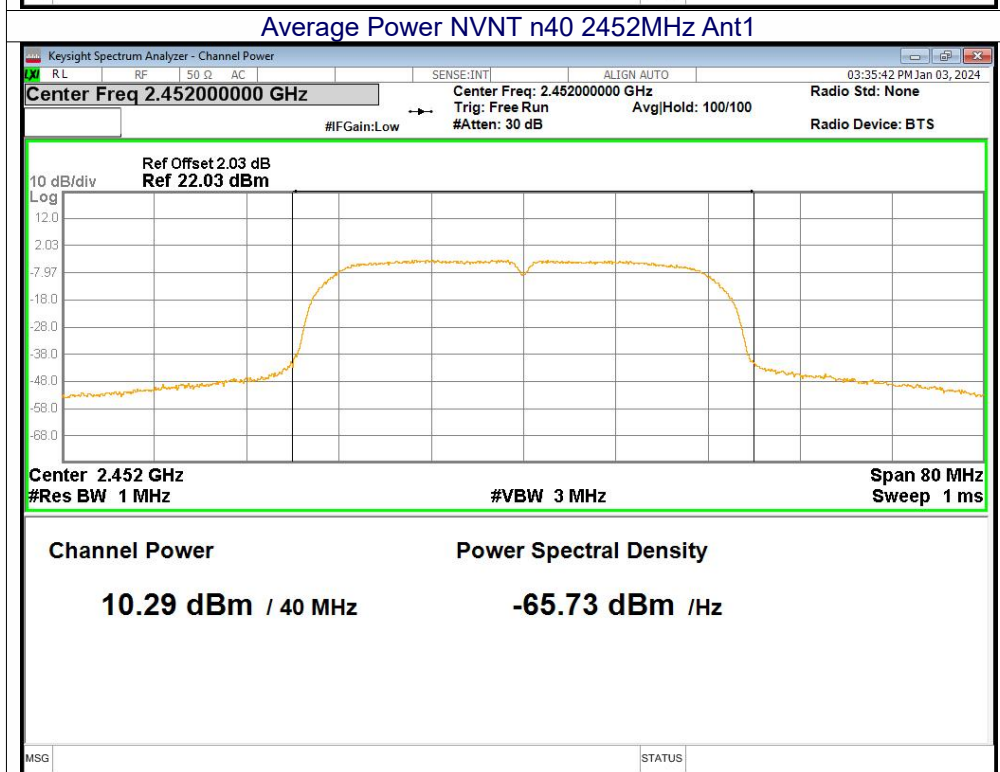
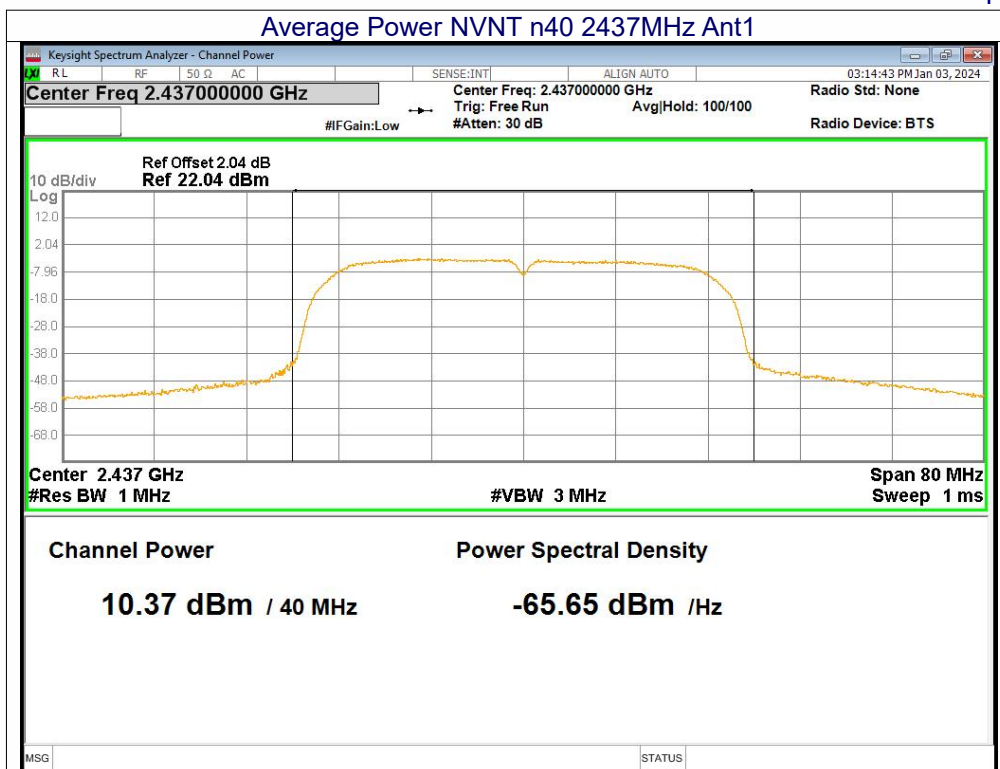












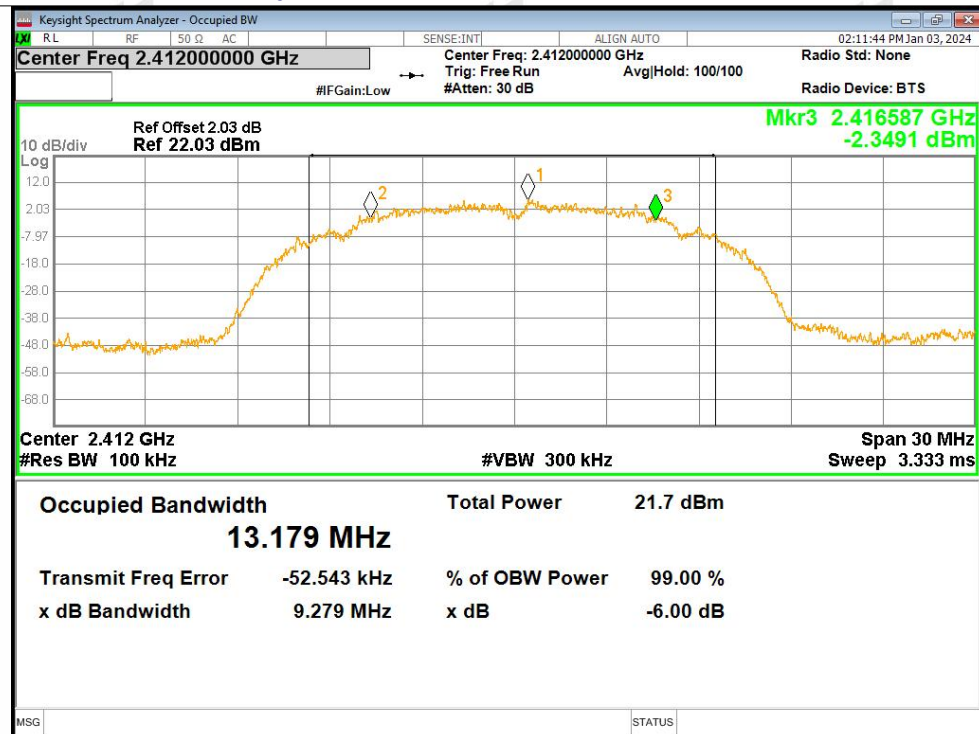


## 11.3 -6DB BANDWIDTH

| Mode | Frequency (MHz) | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|------|-----------------|-----------------------|-----------------------------|---------|
| b    | 2412            | 9.279                 | 0.5                         | Pass    |
| b    | 2437            | 9.089                 | 0.5                         | Pass    |
| b    | 2462            | 9.094                 | 0.5                         | Pass    |
| g    | 2412            | 16.416                | 0.5                         | Pass    |
| g    | 2437            | 16.39                 | 0.5                         | Pass    |
| g    | 2462            | 16.386                | 0.5                         | Pass    |
| n20  | 2412            | 17.058                | 0.5                         | Pass    |
| n20  | 2437            | 16.877                | 0.5                         | Pass    |
| n20  | 2462            | 16.923                | 0.5                         | Pass    |
| n40  | 2422            | 31.849                | 0.5                         | Pass    |
| n40  | 2437            | 32.292                | 0.5                         | Pass    |
| n40  | 2452            | 31.897                | 0.5                         | Pass    |

### Test Graphs

#### -6dB Bandwidth NVNT b 2412MHz Ant1



#### -6dB Bandwidth NVNT b 2437MHz Ant1

