# 6. Conducted Maximum Output Power

## 6.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1 W(30dBm)

## 6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

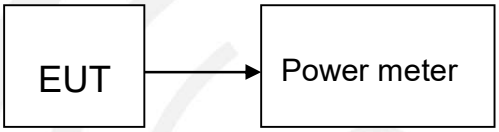
1 Place the EUT on the table and set it in transmitting mode.

2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

3 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

## 6.3. Test Setup



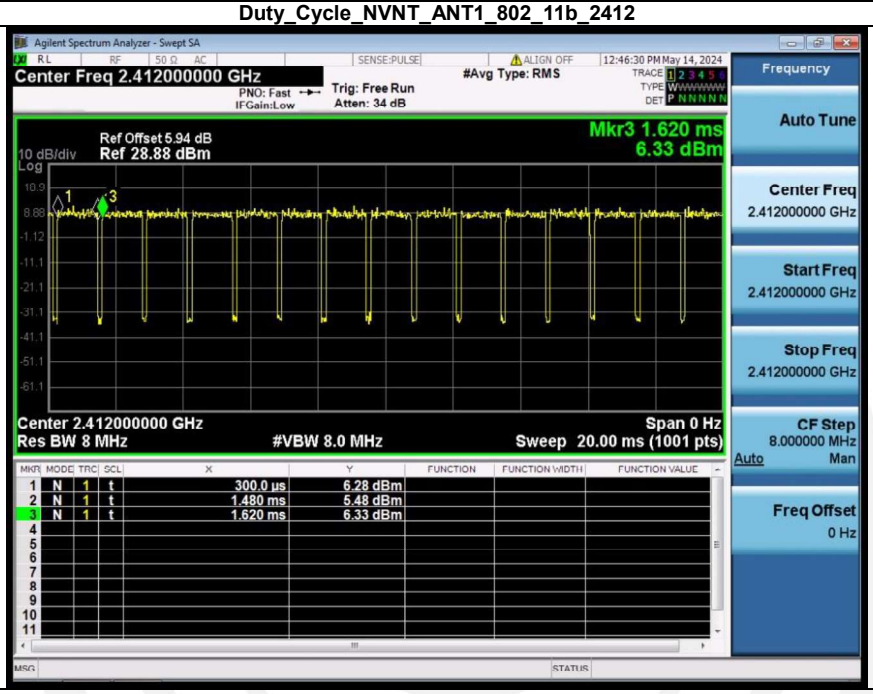

## 6.4. Test Results

Note: The duty factor is already included in the results

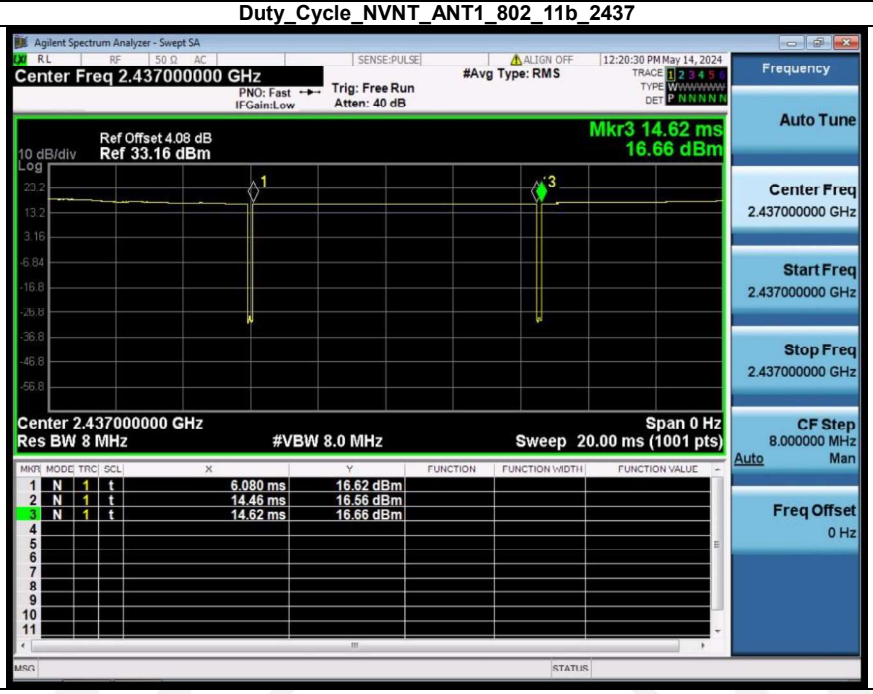
| Condition | Antenna | Modulation | Frequency (MHz) | Detector | Total Power(dBm) | limit(dBm) | Result |
|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | Peak | 11.95 | 30 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | Peak | 16.00 | 30 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | Peak | 11.85 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | Peak | 12.02 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | Peak | 16.25 | 30 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | Peak | 12.73 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | Peak | 12.36 | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | Peak | **16.47** | 30 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | Peak | 12.99 | 30 | Pass |

| Condition | Antenna | Modulation | Frequency (MHz) | Duty cycle(%) | Duty factor(dB) |
|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 90.91 | 0.41 |
| NVNT | ANT1 | 802.11b | 2437.00 | 98.36 | 0.00 |
| NVNT | ANT1 | 802.11b | 2462.00 | 98.59 | 0.00 |
| NVNT | ANT1 | 802.11g | 2412.00 | 92.21 | 0.35 |
| NVNT | ANT1 | 802.11g | 2437.00 | 92.21 | 0.35 |
| NVNT | ANT1 | 802.11g | 2462.00 | 92.11 | 0.36 |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 90.91 | 0.41 |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | 90.91 | 0.41 |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 89.39 | 0.49 |

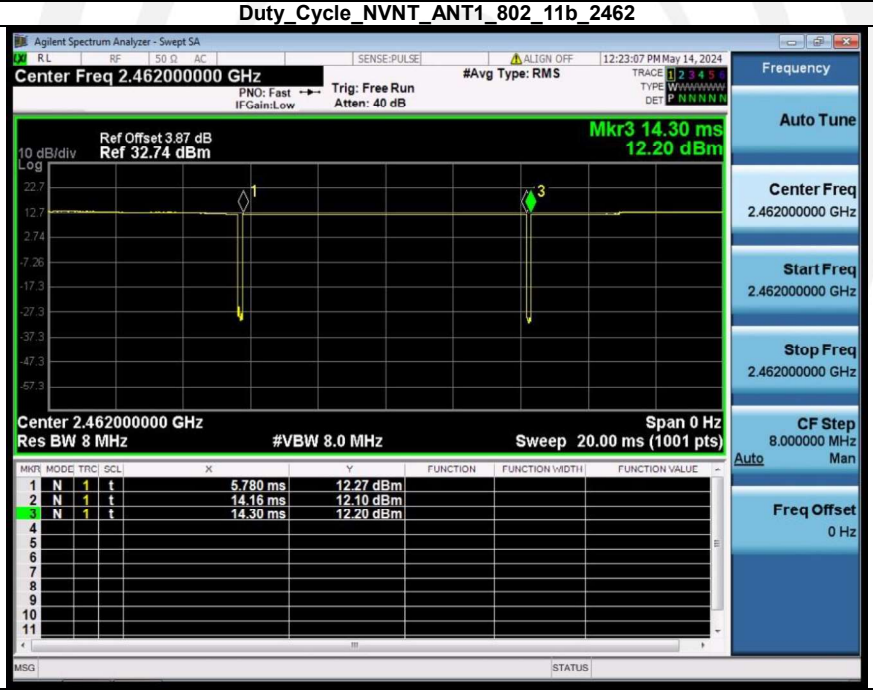
**Duty_Cycle_NVNT_ANT1_802_11b_2412**



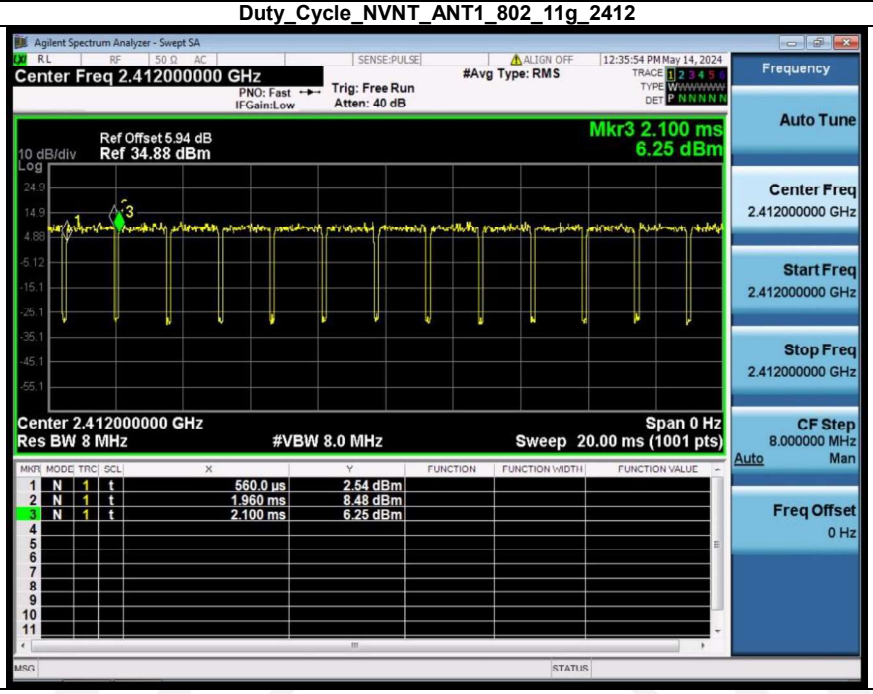
**Duty_Cycle_NVNT_ANT1_802_11b_2437**



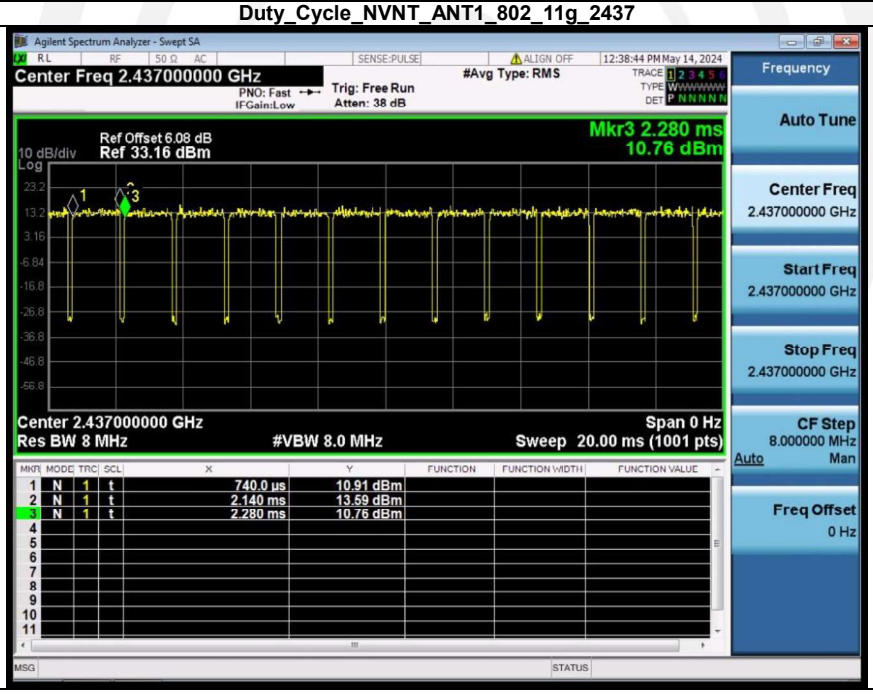

**Duty_Cycle_NVNT_ANT1_802_11b_2462**



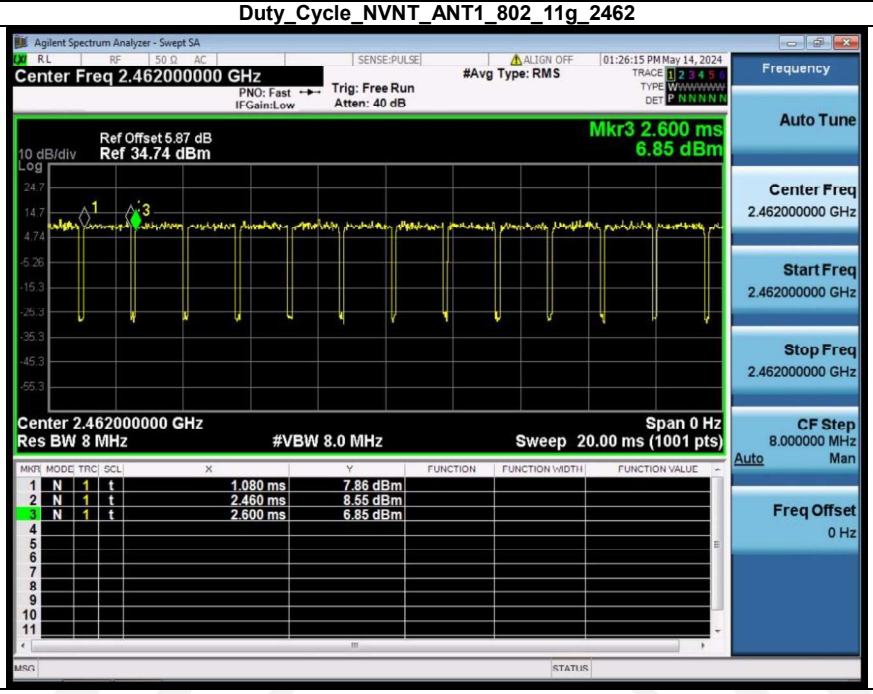
**Duty_Cycle_NVNT_ANT1_802_11g_2412**



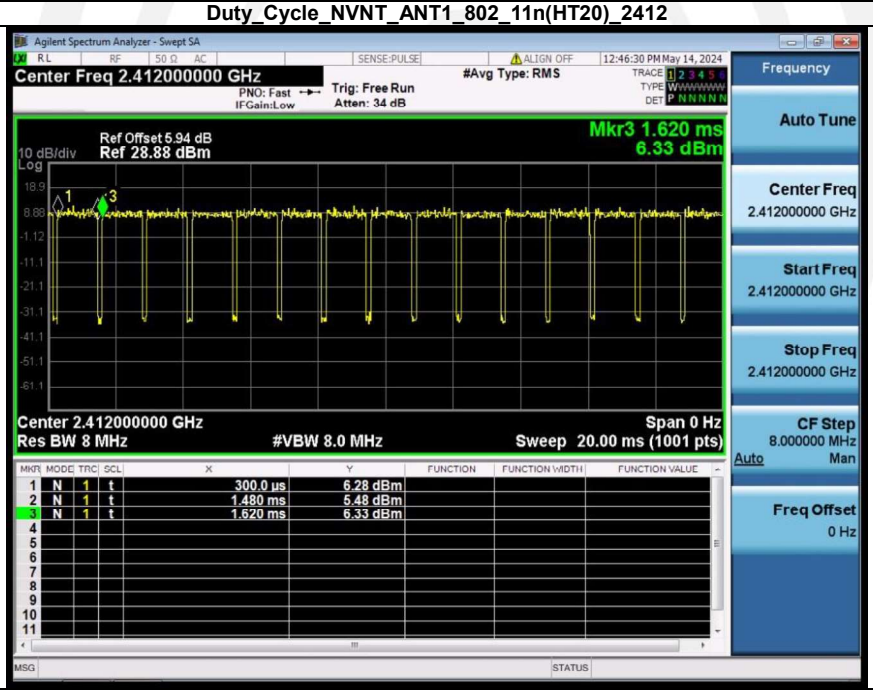

**Duty_Cycle_NVNT_ANT1_802_11g_2437**



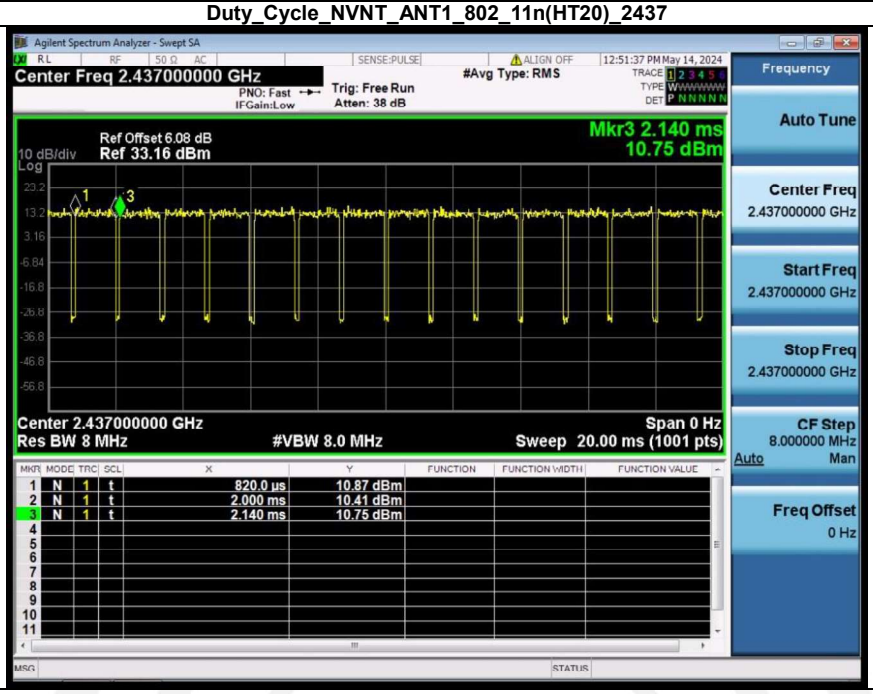
**Duty_Cycle_NVNT_ANT1_802_11g_2462**



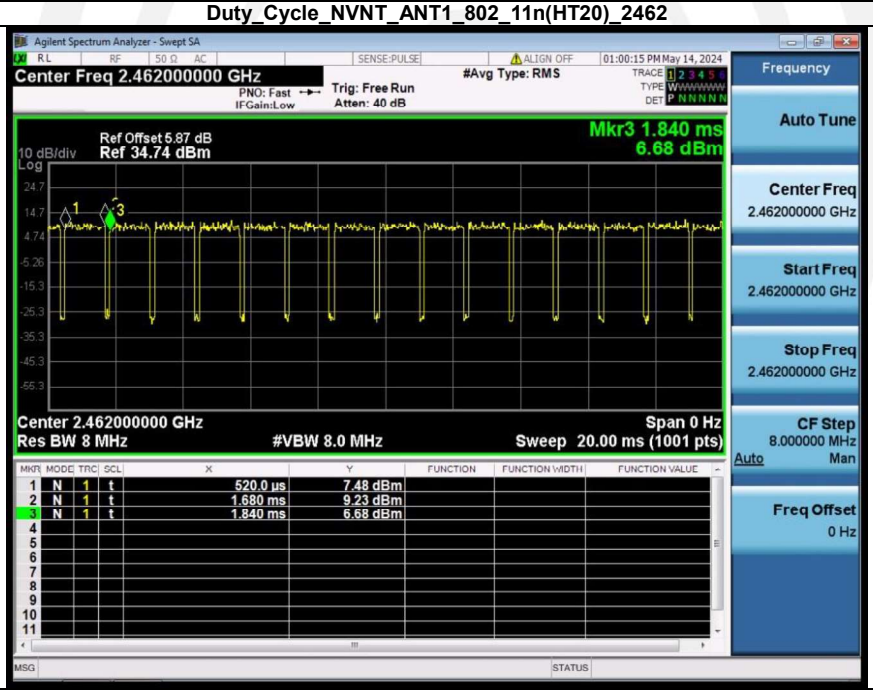

**Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2412**



**Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2437**




**Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2462**



# 7. Peak Power Spectral Density

## 7.1. Test limits

6.1.1 Please refer RSS-247 & FCC PART 15: 15.247.

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

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

## 7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

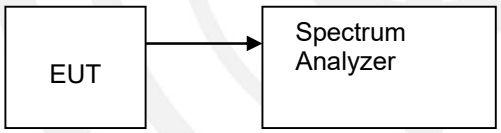
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 100kHz(Set the RBW to: 3 kHz≤RBW≤100 kHz.), VBW = 300kHz(Set the VBW≥3×RBW), span≥1.5×DTS bandwidth., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

## 7.3. Test Setup



## 7.4. Test Results

Note: The duty factor is already included in the results

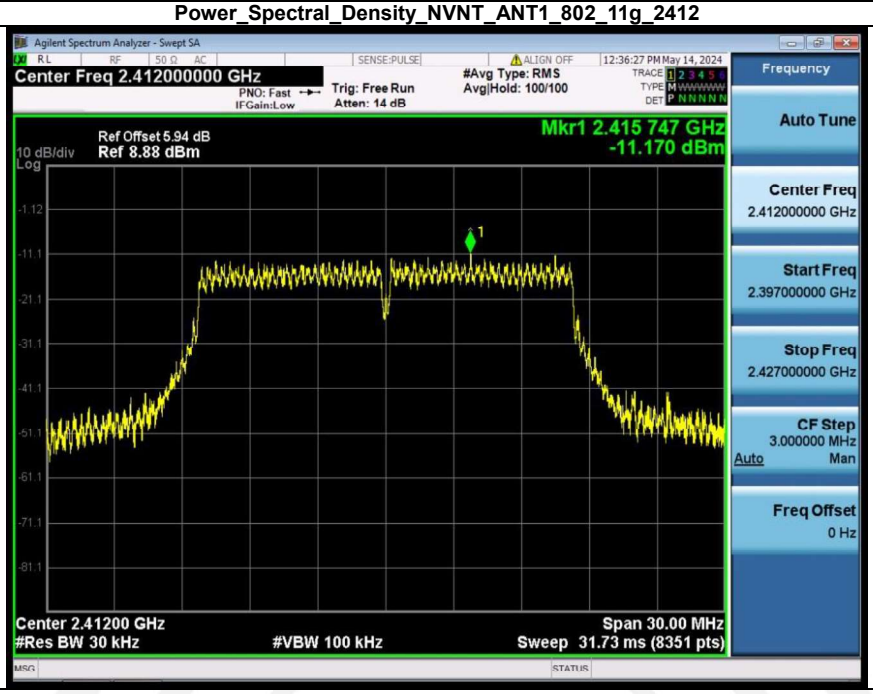
| Condition | Antenna | Modulation | Frequency (MHz) | PSD(dBm/30kHz) | RB factor(dB) | PSD(dBm/3kHz) | limit(dBm/3kHz) | Result |
|---|---|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | -4.24 | -10.00 | -14.24 | 8 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | 1.08 | -10.00 | -8.92 | 8 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | -0.45 | -10.00 | -10.45 | 8 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | -11.17 | -10.00 | -21.17 | 8 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | -7.07 | -10.00 | -17.07 | 8 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | -10.71 | -10.00 | -20.71 | 8 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | -11.47 | -10.00 | -21.47 | 8 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | -6.72 | -10.00 | -16.72 | 8 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | -10.90 | -10.00 | -20.90 | 8 | Pass |

**Power_Spectral_Density_NVNT_ANT1_802_11b_2412**

**Power_Spectral_Density_NVNT_ANT1_802_11b_2437**

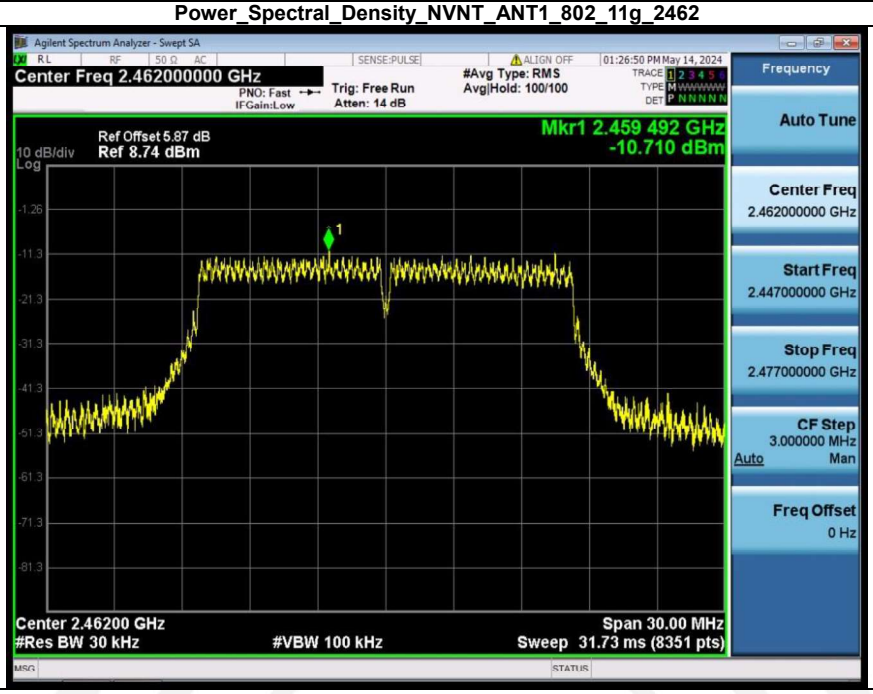
**Power_Spectral_Density_NVNT_ANT1_802_11b_2462**

**Power_Spectral_Density_NVNT_ANT1_802_11g_2412**

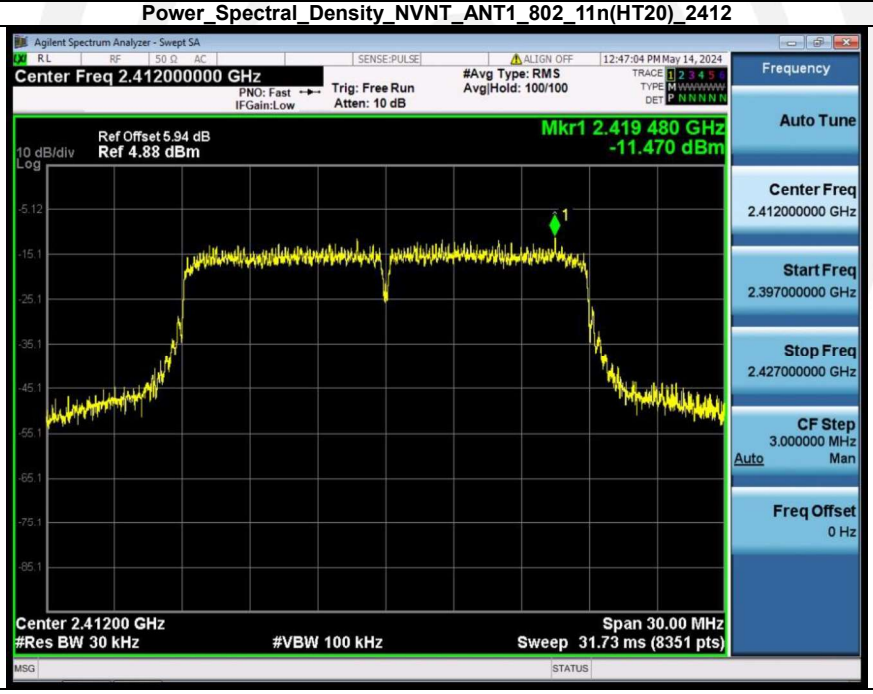



**Power_Spectral_Density_NVNT_ANT1_802_11g_2437**

**Power_Spectral_Density_NVNT_ANT1_802_11g_2462**




**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2412**



**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2437**

**Power_Spectral_Density_NVNT_ANT1_802_11n(HT20)_2462**

# 8. Bandwidth

## 8.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

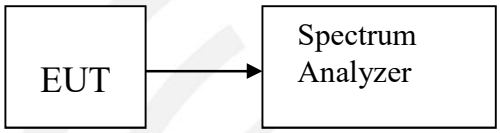
## 8.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b) The test receiver set RBW = 100kHz, VBW≥3*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

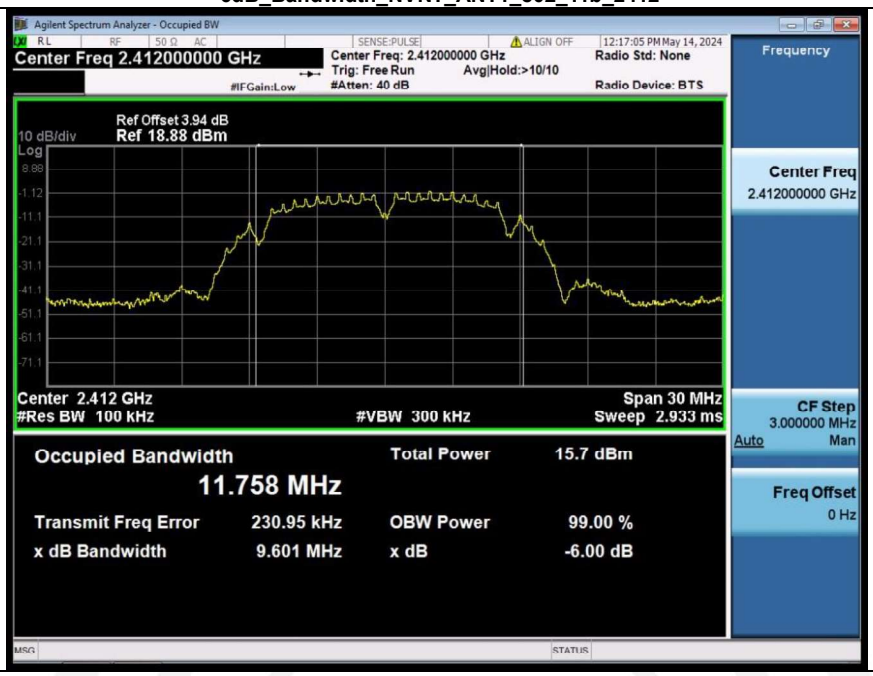
## 8.3. Test Setup



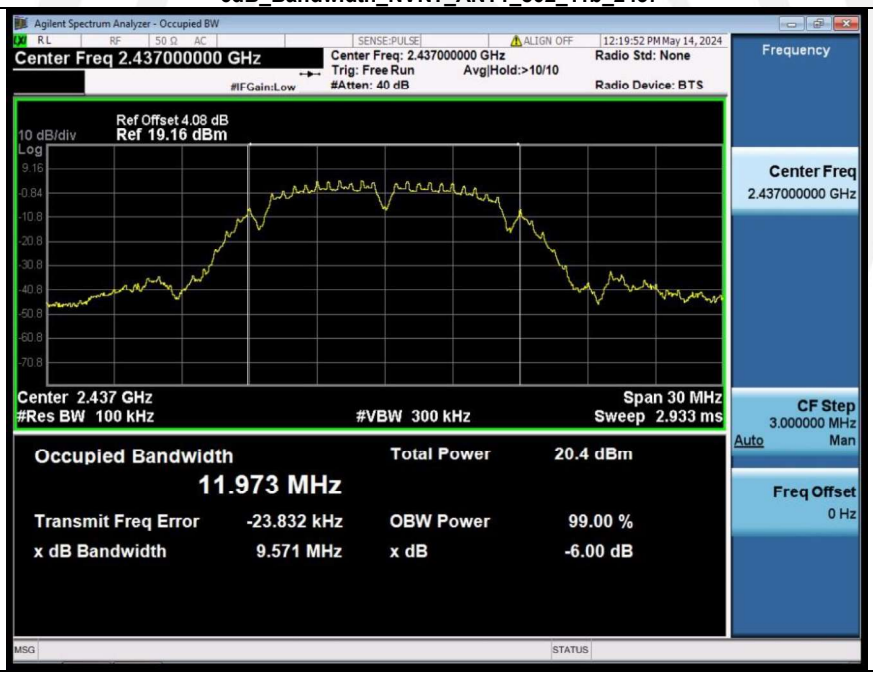

## 8.4. Test Results

| Condition | Antenna | Modulation | Frequency (MHz) | -6dB BW(MHz) | limit(kHz) | Result |
|---|---|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 9.60 | 500 | Pass |
| NVNT | ANT1 | 802.11b | 2437.00 | 9.57 | 500 | Pass |
| NVNT | ANT1 | 802.11b | 2462.00 | 9.61 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2412.00 | 16.36 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2437.00 | 15.74 | 500 | Pass |
| NVNT | ANT1 | 802.11g | 2462.00 | 16.36 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 17.29 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | 16.46 | 500 | Pass |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 17.17 | 500 | Pass |

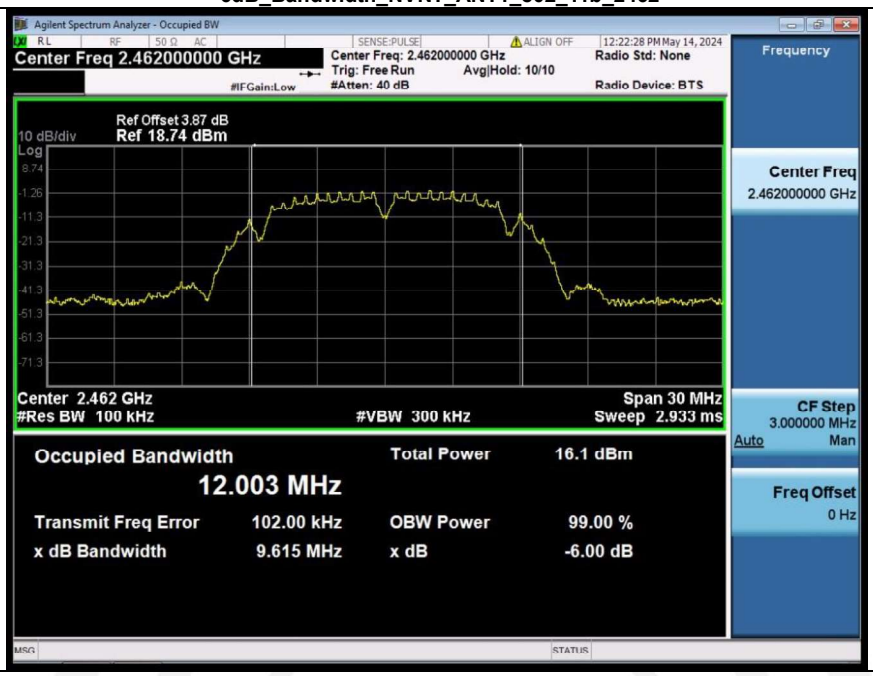
**-6dB_Bandwidth_NVNT_ANT1_802_11b_2412**




**-6dB_Bandwidth_NVNT_ANT1_802_11b_2437**



**-6dB_Bandwidth_NVNT_ANT1_802_11b_2462**




**-6dB_Bandwidth_NVNT_ANT1_802_11g_2412**

**-6dB_Bandwidth_NVNT_ANT1_802_11g_2437**

**-6dB_Bandwidth_NVNT_ANT1_802_11g_2462**

**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2412**

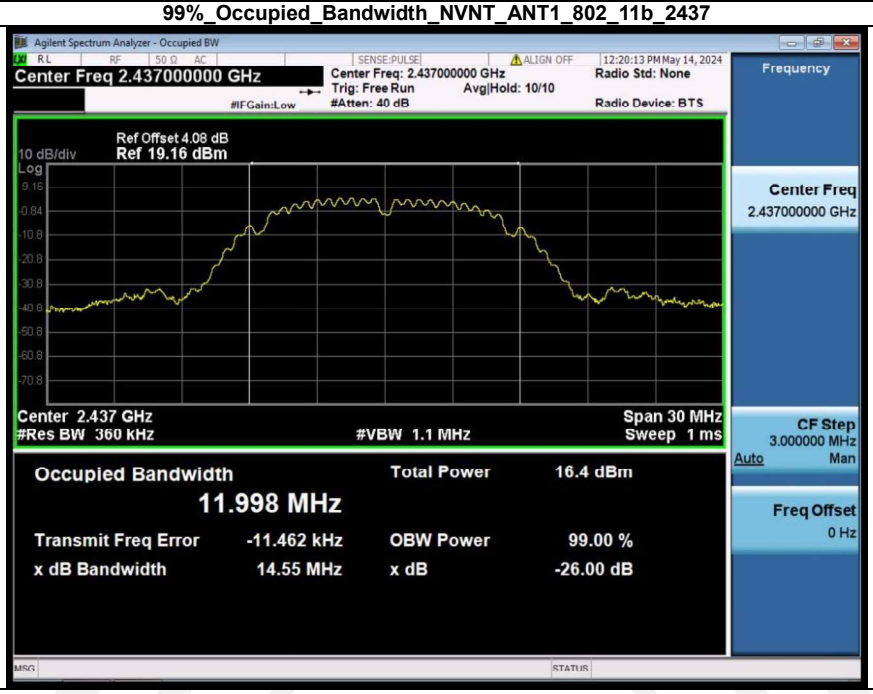
**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2437**

**-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2462**

| Condition | Antenna | Modulation | Frequency (MHz) | 99%%BW(MHz) |
|---|---|---|---|---|
| NVNT | ANT1 | 802.11b | 2412.00 | 11.913 |
| NVNT | ANT1 | 802.11b | 2437.00 | 11.998 |
| NVNT | ANT1 | 802.11b | 2462.00 | 12.070 |
| NVNT | ANT1 | 802.11g | 2412.00 | 17.163 |
| NVNT | ANT1 | 802.11g | 2437.00 | 16.851 |
| NVNT | ANT1 | 802.11g | 2462.00 | 17.188 |
| NVNT | ANT1 | 802.11n(HT20) | 2412.00 | 18.027 |
| NVNT | ANT1 | 802.11n(HT20) | 2437.00 | 17.728 |
| NVNT | ANT1 | 802.11n(HT20) | 2462.00 | 18.113 |

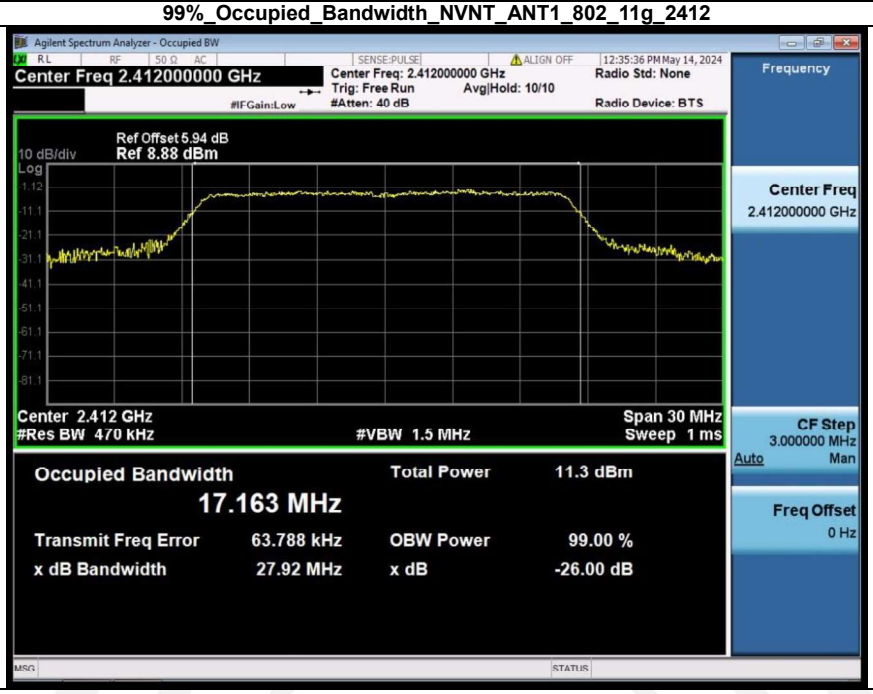
**99%_Occupied_Bandwidth_NVNT_ANT1_802_11b_2412**

**99%_Occupied_Bandwidth_NVNT_ANT1_802_11b_2437**

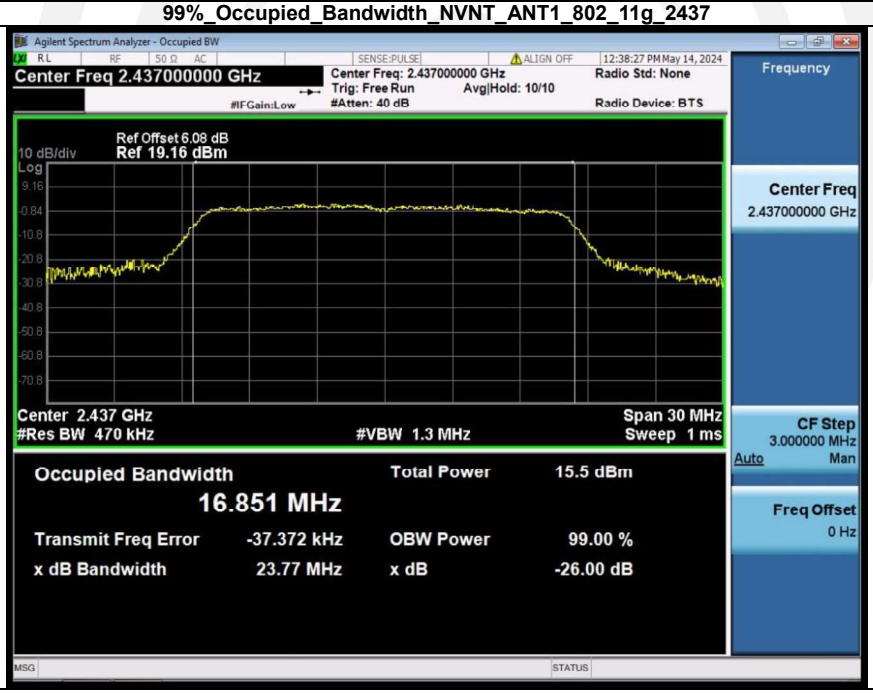



**99%_Occupied_Bandwidth_NVNT_ANT1_802_11b_2462**

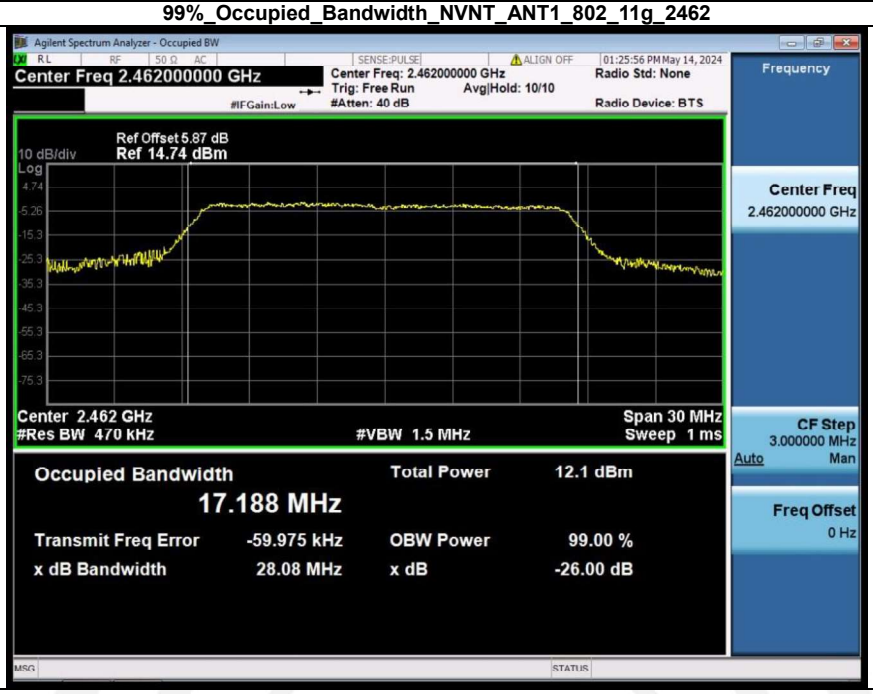
**99%_Occupied_Bandwidth_NVNT_ANT1_802_11g_2412**




**99%_Occupied_Bandwidth_NVNT_ANT1_802_11g_2437**



**99%_Occupied_Bandwidth_NVNT_ANT1_802_11g_2462**



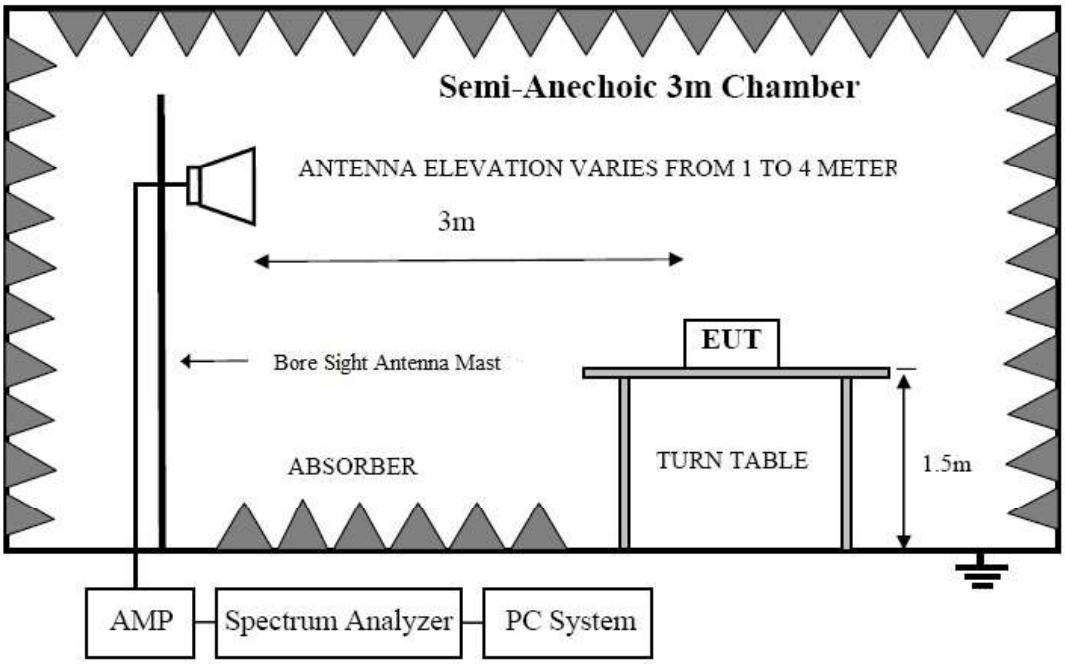

**99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT20)_2412**

**99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT20)_2437**

**99%_Occupied_Bandwidth_NVNT_ANT1_802_11n(HT20)_2462**

# 9. Band Edge Test

## 9.1. Block Diagram of Test Setup




## 9.2. Test Limit

Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

## 9.3. Test Procedure

Refer to ANSI C 63.10, Clause 6.10.
All restriction band and non- restriction band have been tested, only worse case is reported.
Details see the KDB558074 D01 Meas Guidance v05r02

9.2.1 Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission
9.2.2 Check the spurious emissions out of band.
9.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value, RBW 1MHz, VBW 10Hz, RMS detector for AV value.

## 9.4. Test Results

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Test Date | : | 2024.05.21 | | | Temperature | : | 26℃ | |
| Test Engineer | : | Felix Pang | | | Humidity | : | 54% | |
| Test Results | : | **PASS** | | | | | | |
| Frequency Range | : | **2310MHz~2410MHz** | | | | | | |
| Test Mode | : | IEEE 802.11b TX 2412MHz | | | | | | |
| No. | Freq MHz | Polarity | Reading (dBuV/m) | Correct Factor | Result (dBuV/m) | Limit (dBuV/m) | Margin | Remark |
| 1 | 2390 | H | 71.34 | -21.62 | 49.72 | 74.00 | -24.28 | Peak |
| 2 | 2390 | H | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | H | 75.57 | -26.08 | 49.49 | 74.00 | -24.51 | Peak |
| 4 | 2400 | H | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2390 | V | 69.50 | -21.62 | 47.88 | 74.00 | -26.12 | Peak |
| 2 | 2390 | V | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | V | 77.48 | -26.08 | 51.40 | 74.00 | -22.60 | Peak |
| 4 | 2400 | V | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| Frequency Range | : | **2450MHz~2550MHz** | | | | | | |
| Test Mode | : | IEEE 802.11b TX 2462MHz | | | | | | |
| 1 | 2483.5 | H | 74.37 | -25.84 | 48.53 | 74.00 | -25.47 | Peak |
| 2 | 2483.5 | H | -- | -25.84 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2483.5 | V | 73.21 | -25.84 | 47.37 | 74.00 | -26.63 | Peak |
| 2 | 2483.5 | V | -- | -25.84 | -- | 54.00 | -- | Avg |

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

| Frequency Range : **2310MHz~2410MHz** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Test Mode : IEEE 802.11g TX 2412MHz | | | | | | | | |
| No. | Freq MHz | Polarity | Reading (dBuV/m) | Correct Factor | Result (dBuV/m) | Limit (dBuV/m) | Margin | Remark |
| 1 | 2390 | H | 72.94 | -21.62 | 51.32 | 74.00 | -22.68 | Peak |
| 2 | 2390 | H | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | H | 76.30 | -26.08 | 50.22 | 74.00 | -23.78 | Peak |
| 4 | 2400 | H | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2390 | V | 69.66 | -21.62 | 48.04 | 74.00 | -25.96 | Peak |
| 2 | 2390 | V | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | V | 77.17 | -26.08 | 51.09 | 74.00 | -22.91 | Peak |
| 4 | 2400 | V | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| Frequency Range : **2450MHz~2550MHz** | | | | | | | | |
| Test Mode : IEEE 802.11g TX 2462MHz | | | | | | | | |
| 1 | 2483.5 | H | 74.97 | -25.84 | 49.13 | 74.00 | -24.87 | Peak |
| 2 | 2483.5 | H | -- | -25.84 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2483.5 | V | 74.53 | -25.84 | 48.69 | 74.00 | -25.31 | Peak |
| 2 | 2483.5 | V | -- | -25.84 | -- | 54.00 | -- | Avg |

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

| Frequency Range : **2310MHz~2410MHz** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Test Mode : IEEE 802.11n/HT20 TX 2412MHz | | | | | | | | |
| No. | Freq MHz | Polarity | Reading (dBuV/m) | Correct Factor | Result (dBuV/m) | Limit (dBuV/m) | Margin | Remark |
| 1 | 2390 | H | 70.07 | -21.62 | 48.45 | 74.00 | -25.55 | Peak |
| 2 | 2390 | H | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | H | 78.63 | -26.08 | 52.55 | 74.00 | -21.45 | Peak |
| 4 | 2400 | H | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2390 | V | 69.81 | -21.62 | 48.19 | 74.00 | -25.81 | Peak |
| 2 | 2390 | V | -- | -21.62 | -- | 54.00 | -- | Avg |
| 3 | 2400 | V | 76.00 | -26.08 | 49.92 | 74.00 | -24.08 | Peak |
| 4 | 2400 | V | -- | -26.08 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| Frequency Range : **2450MHz~2550MHz** | | | | | | | | |
| Test Mode : IEEE 802.11n/HT20 TX 2462MHz | | | | | | | | |
| 1 | 2483.5 | H | 76.89 | -25.84 | 51.05 | 74.00 | -22.95 | Peak |
| 2 | 2483.5 | H | -- | -25.84 | -- | 54.00 | -- | Avg |
| | | | | | | | | |
| 1 | 2483.5 | V | 74.48 | -25.84 | 48.64 | 74.00 | -25.36 | Peak |
| 2 | 2483.5 | V | -- | -25.84 | -- | 54.00 | -- | Avg |

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

# 10. Antenna Requirement

## 10.1.Standard Requirement

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 shall be considered sufficient to comply with the provisions of this Section. 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.

## 10.2.Antenna Connected Construction

The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

## 10.3.Results

The EUT antenna is external antenna. It complies with the standard requirement.

# 11. Photos of test setup

Reference to the **appendix I Test Setup Photo** for details.

# 12. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

**------ END OF REPORT------**