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FCC Test Report

Applicant: ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI

Address of Applicant: No.2602,26th Floor, Block B, Dongfang Building No.198-19, Songshan South Road, Erqi District, Zhengzhou, Henan, China

Manufacturer: ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI

Address of Manufacturer: No.2602,26th Floor, Block B, Dongfang Building No.198-19, Songshan South Road, Erqi District, Zhengzhou, Henan, China

Equipment Under Test (EUT):

Product: Power supply

Model No.: HOSL03B, TLA-120-12W-1; HOSL04C, TLA-200-12W-1; HOSL05D, TLA-300-12WA2-1

Brand Name:

clewenwils

FCC ID: 2A4G9-001

Standards: 47 CFR Part 15, Subpart C

Date of Test: 2022-02-22 to 2022-03-18

Date of Issue: 2022-03-19

Report No. : D220222008-01

Test Result : **PASS***

Damon

Tested By:

(Damon Deng)

Reviewed By:

Chivas

(Chivas Zeng)

Approved By:

Victor

(Victor Meng)



* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

| Report No. | Version | Description | Issue Date |
|---------------|---------|----------------|------------|
| D220222008-01 | Rev.01 | Initial report | 2022-03-19 |

2 Test Summary

| Test Item | Test Requirement | Test method | Result |
|--|---|-------------------|--------|
| Antenna Requirement | 47 CFR Part 15, Subpart C Section 15.203/15.247 (c) | ANSI C63.10 2013 | PASS |
| AC Power Line Conducted Emission | 47 CFR Part 15, Subpart C Section 15.207 | ANSI C63.10 2013 | PASS |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C Section 15.247 (b)(3) | KDB558074 D01 V04 | PASS |
| 6dB Occupied Bandwidth | 47 CFR Part 15, Subpart C Section 15.247 (a)(2) | KDB558074 D01 V04 | PASS |
| Power Spectral Density | 47 CFR Part 15, Subpart C Section 15.247 (e) | KDB558074 D01 V04 | PASS |
| Band-edge for RF Conducted Emissions | 47 CFR Part 15, Subpart C Section 15.247(d) | KDB558074 D01 V04 | PASS |
| RF Conducted Spurious Emissions | 47 CFR Part 15, Subpart C Section 15.247(d) | KDB558074 D01 V04 | PASS |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C Section 15.205/15.209 | ANSI C63.10 2013 | PASS |
| Restricted bands around fundamental frequency (Radiated Emission) | 47 CFR Part 15, Subpart C Section 15.205/15.209 | ANSI C63.10 2013 | PASS |

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4 General Information

4.1 Client Information

| | |
|--------------------------|---|
| Applicant: | ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI |
| Address of Applicant: | No.2602,26 th Floor, Block B, Dongfang Building No.198-19, Songshan South Road, Erqi District, Zhengzhou, Henan, China |
| Manufacturer: | ZHENGZHOU DI YUN WANG LUO KE JI YOU XIAN GONG SI |
| Address of Manufacturer: | No.2602,26 th Floor, Block B, Dongfang Building No.198-19, Songshan South Road, Erqi District, Zhengzhou, Henan, China |
| Factory: | TDC Power Products Co., Ltd. |
| Factory of Manufacturer: | Dong Hang 3rd Industrial District, Dong Hang, Dong Guan City, Guang Dong Province, China |

4.2 General Description of EUT

| | |
|------------------------|--|
| Product Name: | Power supply |
| Model No.: | HOSL03B, TLA-120-12W-1; HOSL04C, TLA-200-12W-1; HOSL05D, TLA-300-12WA2-1 |
| Trade Mark: |  |
| Hardware version: | V1.0 |
| Software version: | V1.0 |
| Operation Frequency: | IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz |
| Channel Numbers: | IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels |
| Channel Separation: | 5MHz |
| Type of Modulation: | IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) |
| Sample Type: | Stationary equipment |
| Test Software of EUT: | RF test tool (manufacturer declare) |
| Antenna Type and Gain: | Type: External antenna with ipex connector Gain:3.0dBi |
| Power Supply: | Input: AC120V/60Hz 1.2A AC120V/60Hz 2A AC120V/60Hz 3A Output: 12Vac 120W max 12Vac 200W max 12Vac 300W max or 14Vac 300W Max |

| Operation Frequency each of channel(802.11b/g/n HT20) | | | | | | | |
|---|-----------|---------|-----------|---------|-----------|---------|-----------|
| 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:

For 802.11b/g/n (HT20):

| Channel | Frequency |
|---------------------|-----------|
| The Lowest channel | 2412MHz |
| The Middle channel | 2437MHz |
| The Highest channel | 2462MHz |

The output power setting of EUT is set in the factory and followed the max. peak level in below.

| | |
|---------------|-------------------|
| 802.11b | 18dBm \pm 1.5dB |
| 802.11g | 18dBm \pm 1.5dB |
| 802.11n(HT20) | 18dBm \pm 1.5dB |

Note:

1. Software (RF test tool) provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.
2. The rechargeable battery is fully-charged batter.

4.3 Test Environment and Mode

| Operating Environment: | |
|--|--|
| Temperature: | 24.0 °C |
| Humidity: | 52 % RH |
| Atmospheric Pressure: | 1008 mbar |
| Test mode: | |
| Transmitting mode: | Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate. |
| Operated Mode for Worst Duty Cycle: | |
| Test Signal Duty Cycle(x) | Average correction factor(dB) |
| 100% - IEEE802.11b | 0 |
| 100% - IEEE802.11g | 0 |
| 100% - IEEE802.11n (HT20) | 0 |

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

| Description | Manufacturer | Model No. | Remark | FCC certification |
|---------------|--------------|--------------------------|----------------|-------------------|
| Notebook | Lenovo | Lenovo ideapad 100-14IBY | Provide by lab | DOC |
| AC/DC Adapter | Lenovo | PA-1450-55LN | Provide by lab | DOC |

4.5 Test Location

All tests were performed at:

ITL Co., Ltd.,

No.8, JinQianLing street 5, Huangjiang Town, Dongguan, Guangdong, China

Tel: 0086-769-39001678, Fax: 0086-20-62824387

No tests were sub-contracted:

4.6 Test Facility

- **CNAS(Lab code: L9342)**
- **Designation Number: CN5035**
- **Test Firm Registration Number: 239076**
- **NVLAP LAB CODE 600199-0**

4.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Tongce Testing Lab** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **TCT** laboratory is reported:

| Test | Range | Uncertainty | Notes |
|-----------------------|------------|-------------|-------|
| Radiated Emission | Below 1GHz | ±3.92dB | (1) |
| Radiated Emission | Above 1GHz | ±4.28dB | (1) |
| Conducted Disturbance | 0.15~30MHz | ±2.56dB | (1) |

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

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List

| No. | Test Equipment | Manufacturer | Model | Serial No. | Last Cal. | Cal. Due |
|-----------|-------------------------------------|----------------------|--------------|------------------|------------|------------|
| DGITL-301 | Semi-Anechoic chamber | ETS•Lindgren | 9*6*6 | CT000874-1181 | 2020.08.03 | 2022.08.03 |
| DGITL-307 | EMI test receiver | SCHWARZBECK | ESVS10 | 833616 /003 | 2021.05.11 | 2022.05.11 |
| DGITL-376 | Wideband Radio Communication Tester | SCHWARZBECK | CMW500 | LR114195 | 2021.05.11 | 2022.05.11 |
| DGITL-349 | MXG Vector Signal Generator | Agilent Technologies | N5182A | MY47071034 | 2021.05.11 | 2022.05.11 |
| DGITL-306 | Spectrum Analyzer | Agilent Technologies | N9010A | MY54200334 | 2021.05.11 | 2022.05.11 |
| DGITL-352 | Pre Amplifier | Mlnl-Circuits | ZFC-1000HX | SN292801110 | 2021.05.11 | 2022.05.11 |
| DGITL-375 | Spectrum Analyzer | SCHWARZBECK | FSV40-N | 6625-01-588-5515 | 2021.05.11 | 2022.05.11 |
| DGITL-309 | Horn Antenna | ETS Lindgren | 3117 | SN00152265 | 2021.05.11 | 2022.05.11 |
| DGITL-308 | Bilog Antenna | ETS- Lindgren | 3142E | 156975 | 2020.06.20 | 2022.06.20 |
| DGITL-350 | Wideband Amplifier Super Ultra | Mlnl-Circuits | ZVA-183X-S+ | SN986401426 | 2021.05.11 | 2022.05.11 |
| DGITL-365 | Broad-band Horn Antenna | SCHWARZBECK | 9170 | 795 | 2020.07.04 | 2022.07.04 |
| DGITL-371 | Pre Amplifier | teramicrowave | TALA-0040G35 | 18081001 | 2021.05.11 | 2022.05.10 |
| DGITL-363 | Active Loop Antenna | SCHWARZBECK | FMZB 1519B | 062 | 2020.07.04 | 2022.07.03 |

5 Test results and Measurement Data

5.1 Antenna Requirement

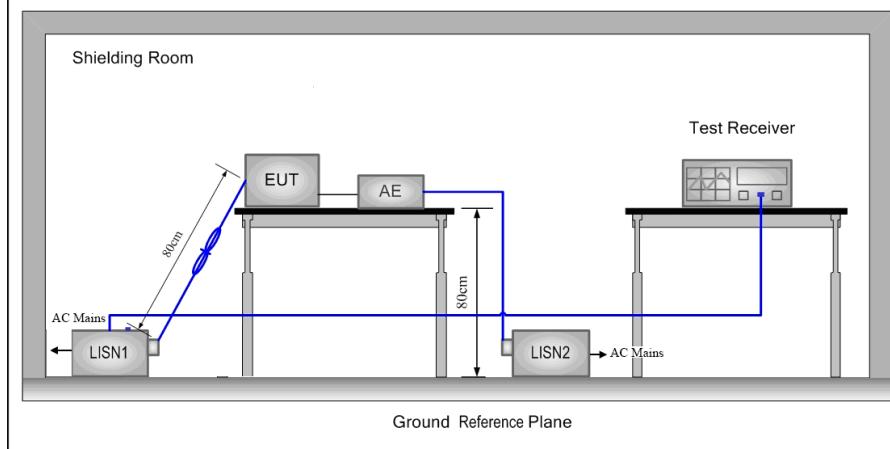
| | |
|--|---|
| Standard requirement: | 47 CFR Part 15C Section 15.203 /247(c) |
| 15.203 requirement: | <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna 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> |
| 15.247(b) (4) requirement: | <p>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> |
| EUT Antenna: |  |
| <p>The antenna is External antenna with ipex connector. The best case gain of the antenna is 3.0dBi.</p> | |

5.2 Conducted Emissions

| | | | |
|-----------------------|--------------------------------|-----------|-------------------------|
| Test Requirement: | 47 CFR Part 15C Section 15.207 | | |
| Test Method: | ANSI C63.10: 2013 | | |
| Test Frequency Range: | 150kHz to 30MHz | | |
| Limit: | Frequency range (MHz) | | Limit (dBuV) |
| | | | Quasi-peak Average |
| | 0.15-0.5 | 66 to 56* | 56 to 46* |
| | 0.5-5 | 56 | 46 |
| | 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency.

| Test Procedure: | - 1) The mains terminal disturbance voltage test was conducted in a shielded room. - 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. - 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, - 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. - 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. | | |

| | |
|-------------------------------|---|
| Test Setup: |  |
| Exploratory Test Mode: | <p>Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.</p> <p>Charge + Transmitting mode.</p> <p>Mode a: Connect the AC-DC adaptor with the charging hole on unit.</p> <p>Mode b: Connect the unit return to the charging station under transmitting mode.</p> |
| Final Test Mode: | <p>Through Pre-scan, find the 1Mbps of rate of 802.11b at lowest channel is the worst case.</p> <p>Charge + Transmitting mode.</p> <p>Mode b: Connect the unit return to the charging station under transmitting mode.</p> <p>Only the worst case is recorded in the report.</p> |
| Instruments Used: | Refer to section 5.10 for details |
| Test Voltage: | AC120V/60Hz |
| Test Results: | Pass |

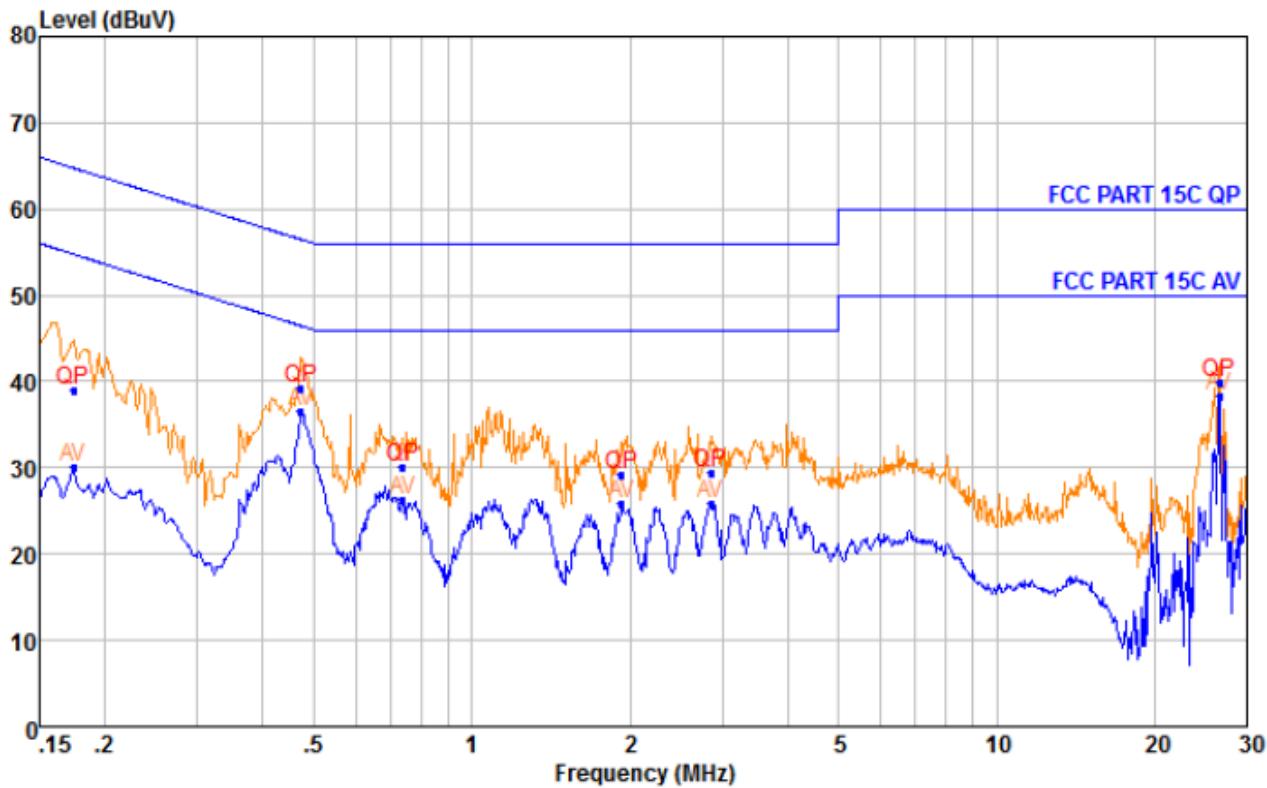
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Model No.:HOSL05D

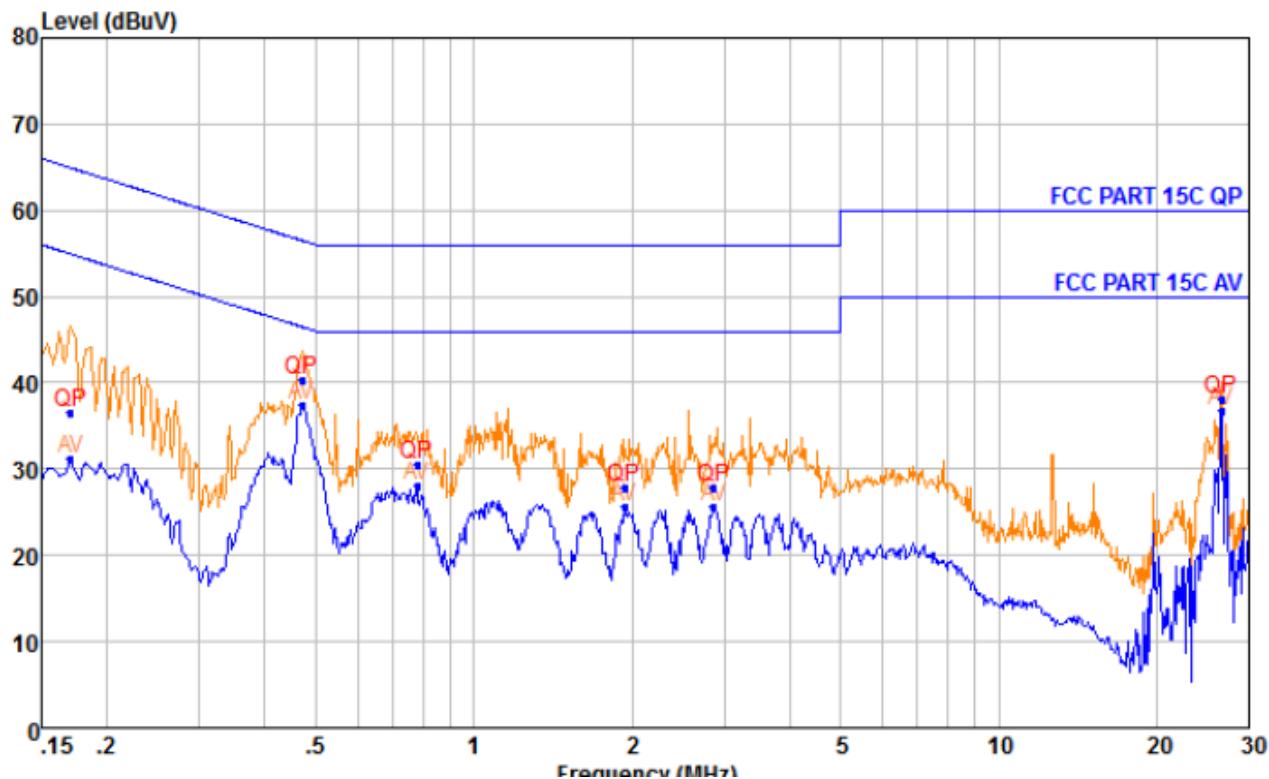
Live Line:



| NO. | Freq MHz | Reading dBuV | LISN Factor dB | Cable Loss dB | Measured dBuV | Measured Line dBuV | Over Limit dB | Remark |
|-----|-------------|-----------------|-------------------|------------------|------------------|--------------------------|------------------|---------|
| 1 | 0.174 | 19.65 | 10.31 | 0.02 | 29.98 | 54.77 | -24.79 | Average |
| 2 | 0.174 | 28.65 | 10.31 | 0.02 | 38.98 | 64.77 | -25.79 | QP |
| 3 | 0.474 | 26.04 | 10.37 | 0.03 | 36.44 | 46.45 | -10.01 | Average |
| 4 | 0.474 | 28.86 | 10.37 | 0.03 | 39.26 | 56.45 | -17.19 | QP |
| 5 | 0.739 | 16.03 | 10.33 | 0.04 | 26.40 | 46.00 | -19.60 | Average |
| 6 | 0.739 | 19.79 | 10.33 | 0.04 | 30.16 | 56.00 | -25.84 | QP |
| 7 | 1.928 | 15.30 | 10.42 | 0.07 | 25.79 | 46.00 | -20.21 | Average |
| 8 | 1.928 | 18.61 | 10.42 | 0.07 | 29.10 | 56.00 | -26.90 | QP |
| 9 | 2.854 | 15.27 | 10.41 | 0.08 | 25.76 | 46.00 | -20.24 | Average |
| 10 | 2.854 | 18.97 | 10.41 | 0.08 | 29.46 | 56.00 | -26.54 | QP |
| 11 | 26.558 | 27.27 | 10.84 | 0.22 | 38.33 | 50.00 | -11.67 | Average |
| 12 | 26.558 | 28.81 | 10.84 | 0.22 | 39.87 | 60.00 | -20.13 | QP |

1: Measured=Reading + LISN Factor + Cable Loss

Neutral Line:



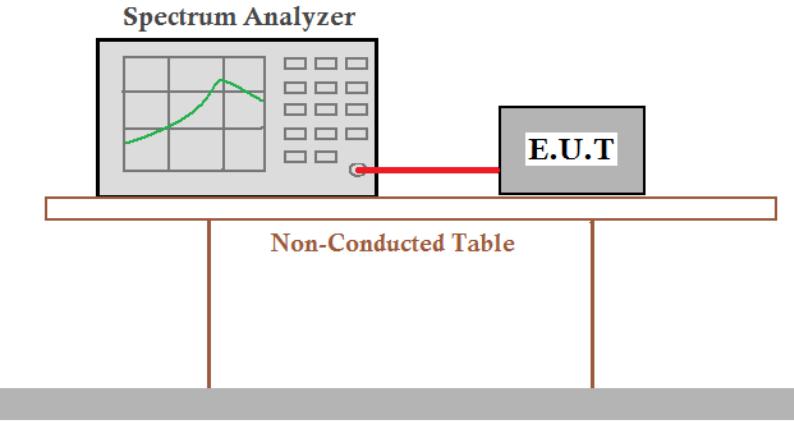
| NO. | Freq MHz | Reading dBuV | LISN Factor dB | Cable Loss dB | Measured dBuV | Limit Line dBuV | Over Limit dB | Remark |
|-----|-------------|-----------------|-------------------|------------------|------------------|--------------------|------------------|---------|
| 1 | 0.170 | 20.60 | 10.48 | 0.02 | 31.10 | 54.94 | -23.84 | Average |
| 2 | 0.170 | 25.93 | 10.48 | 0.02 | 36.43 | 64.94 | -28.51 | QP |
| 3 | 0.471 | 26.97 | 10.52 | 0.03 | 37.52 | 46.49 | -8.97 | Average |
| 4 | 0.471 | 29.72 | 10.52 | 0.03 | 40.27 | 56.49 | -16.22 | QP |
| 5 | 0.779 | 17.40 | 10.62 | 0.04 | 28.06 | 46.00 | -17.94 | Average |
| 6 | 0.779 | 19.98 | 10.62 | 0.04 | 30.64 | 56.00 | -25.36 | QP |
| 7 | 1.939 | 14.92 | 10.62 | 0.07 | 25.61 | 46.00 | -20.39 | Average |
| 8 | 1.939 | 17.17 | 10.62 | 0.07 | 27.86 | 56.00 | -28.14 | QP |
| 9 | 2.869 | 15.00 | 10.60 | 0.08 | 25.68 | 46.00 | -20.32 | Average |
| 10 | 2.869 | 17.07 | 10.60 | 0.08 | 27.75 | 56.00 | -28.25 | QP |
| 11 | 26.558 | 25.60 | 10.97 | 0.22 | 36.79 | 50.00 | -13.21 | Average |
| 12 | 26.558 | 26.83 | 10.97 | 0.22 | 38.02 | 60.00 | -21.98 | QP |

1: Measured=Reading + LISN Factor + Cable Loss

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

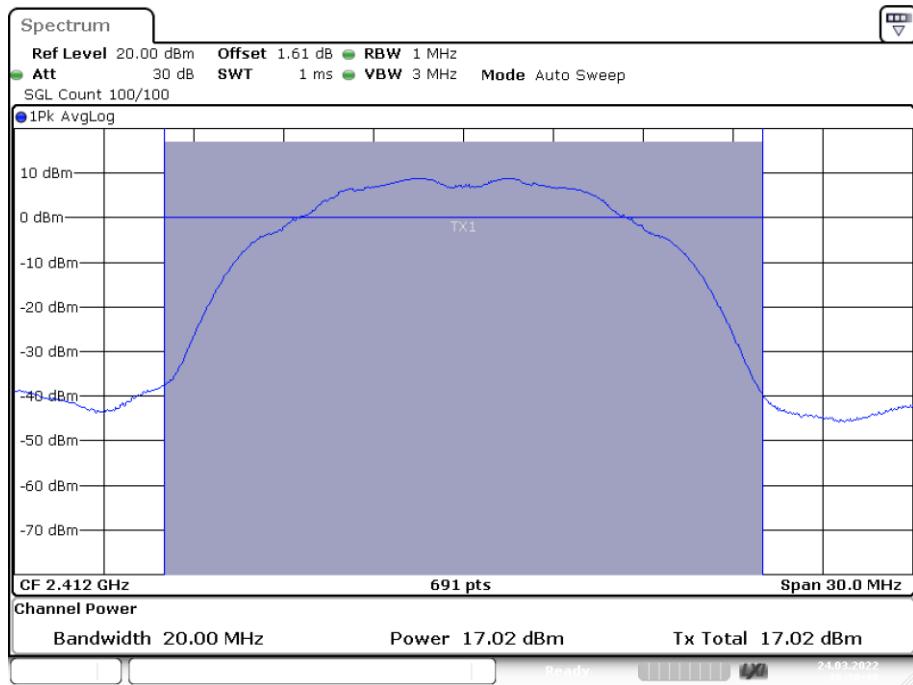
5.3 Conducted Peak Output Power

| | |
|------------------------|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (b)(3) |
| Test Method: | KDB558074 D01 V04 |
| Test Setup: | <p style="text-align: center;">Spectrum Analyzer</p>  <p style="text-align: center;">Non-Conducted Table</p> <p style="text-align: center;">Ground Reference Plane</p> |
| Test Instruments: | Refer to section 5.10 for details |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates |
| Final Test Mode: | Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) Only the worst case is recorded in the report. |
| Limit: | 30dBm |
| Test Results: | Pass |

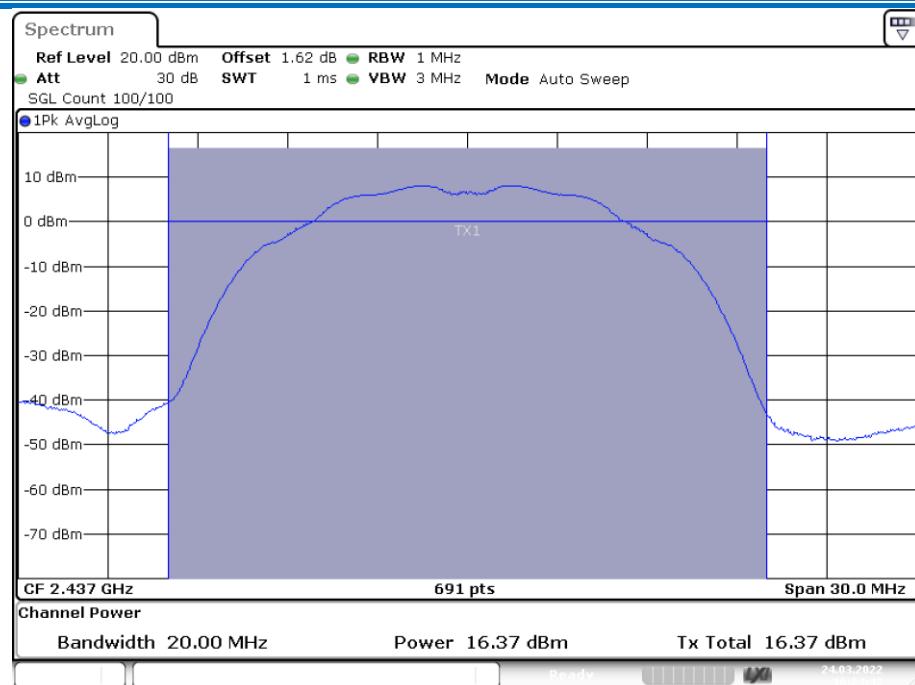
Maximum Conducted Output Power

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT | b | 2412 | Ant1 | 17.02 | 0 | 17.02 | 30 | Pass |
| NVNT | b | 2437 | Ant1 | 16.37 | 0 | 16.37 | 30 | Pass |
| NVNT | b | 2462 | Ant1 | 16.38 | 0 | 16.38 | 30 | Pass |
| NVNT | g | 2412 | Ant1 | 16.21 | 0 | 16.21 | 30 | Pass |
| NVNT | g | 2437 | Ant1 | 16.30 | 0 | 16.30 | 30 | Pass |
| NVNT | g | 2462 | Ant1 | 16.21 | 0 | 16.21 | 30 | Pass |
| NVNT | n20 | 2412 | Ant1 | 16.12 | 0 | 16.12 | 30 | Pass |
| NVNT | n20 | 2437 | Ant1 | 16.04 | 0 | 16.04 | 30 | Pass |
| NVNT | n20 | 2462 | Ant1 | 16.05 | 0 | 16.05 | 30 | Pass |

Test plot as follows:

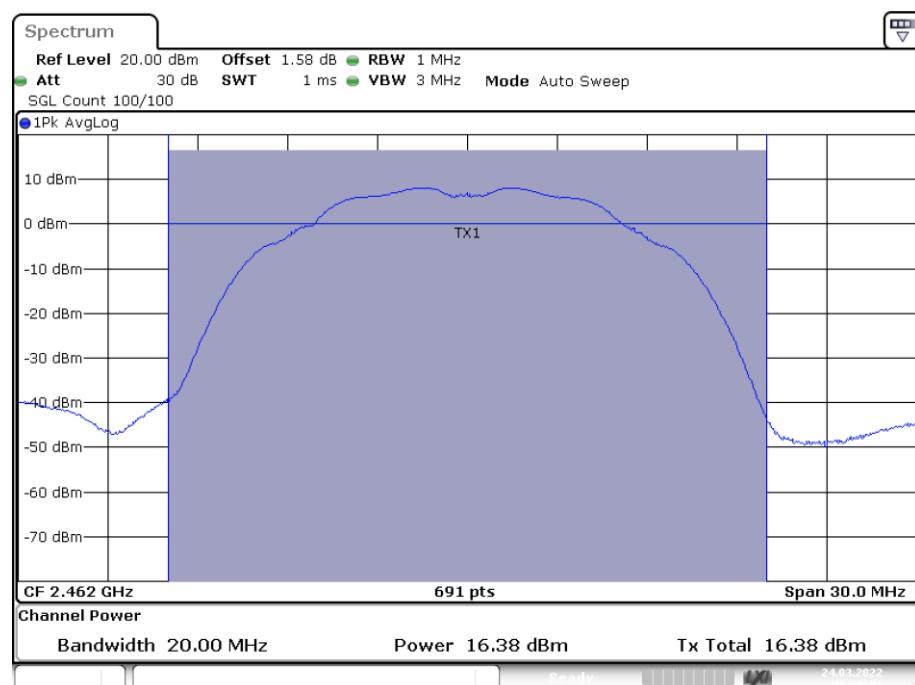


Power NVNT b 2412MHz Ant1



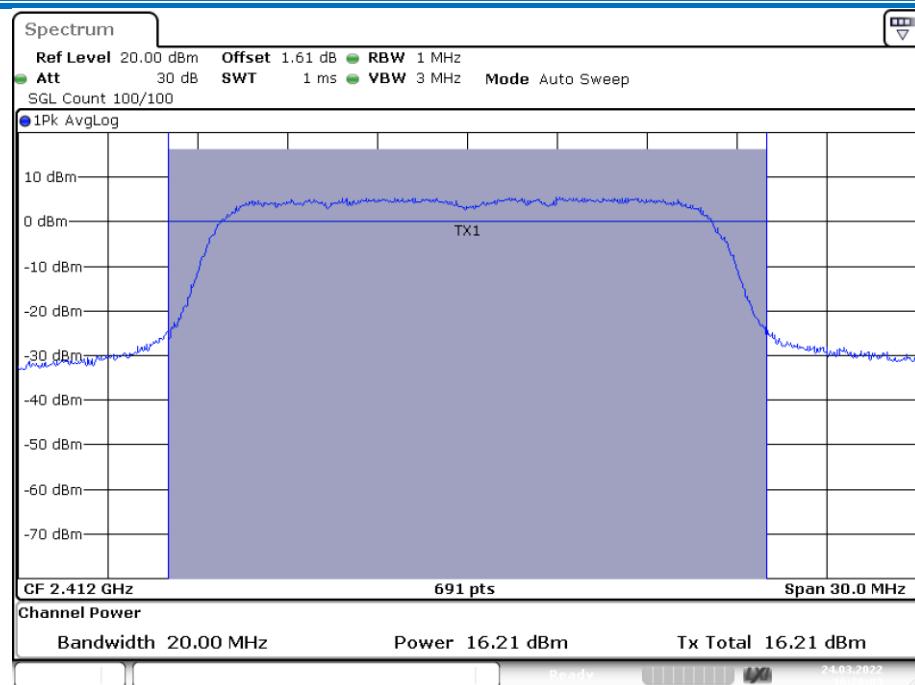
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Power NVNT b 2437MHz Ant1



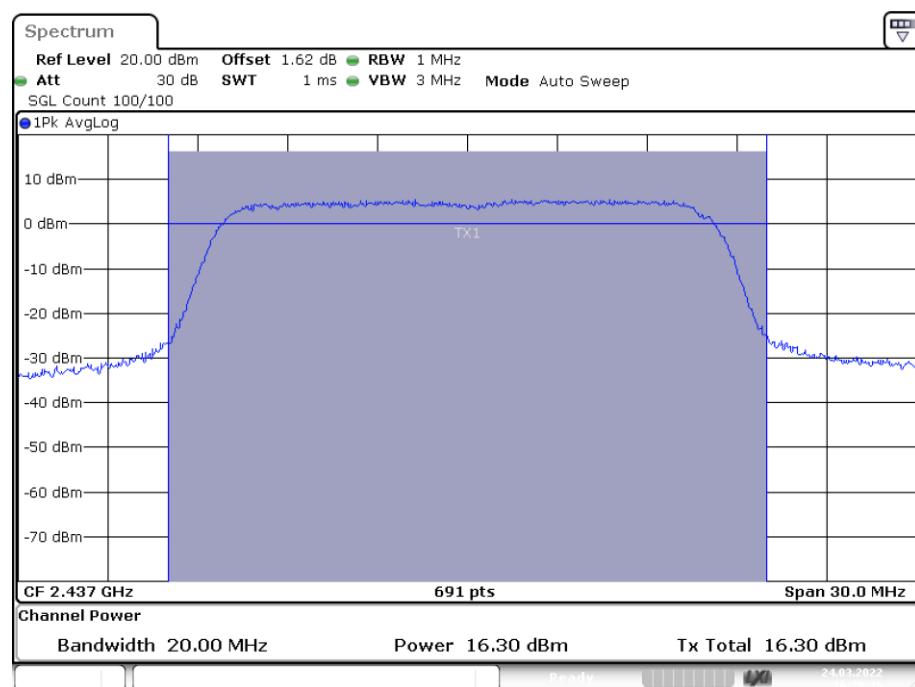
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Power NVNT b 2462MHz Ant1



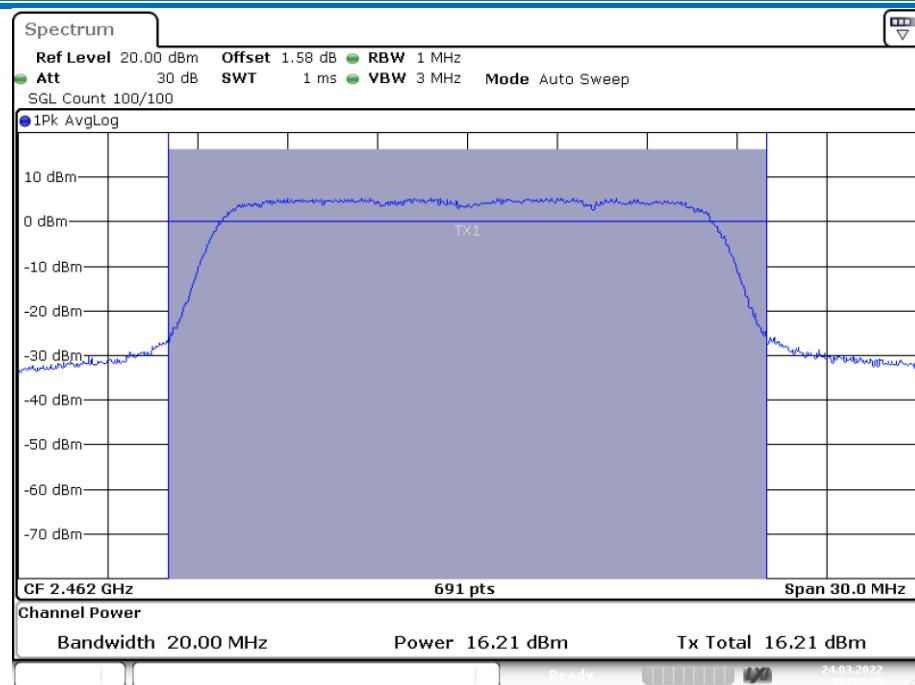
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Power NVNT g 2412MHz Ant1



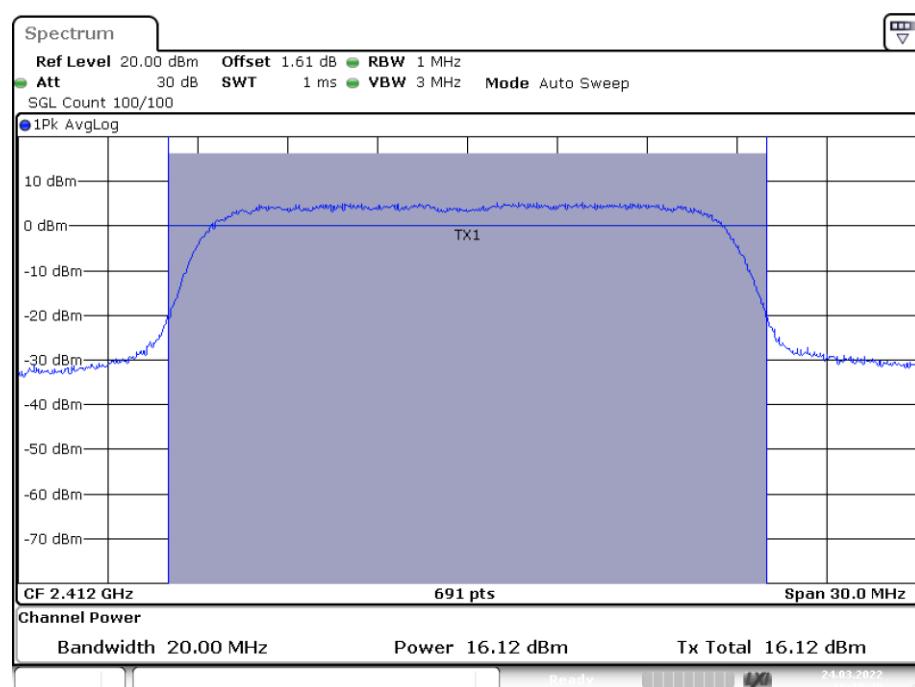
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Power NVNT g 2437MHz Ant1



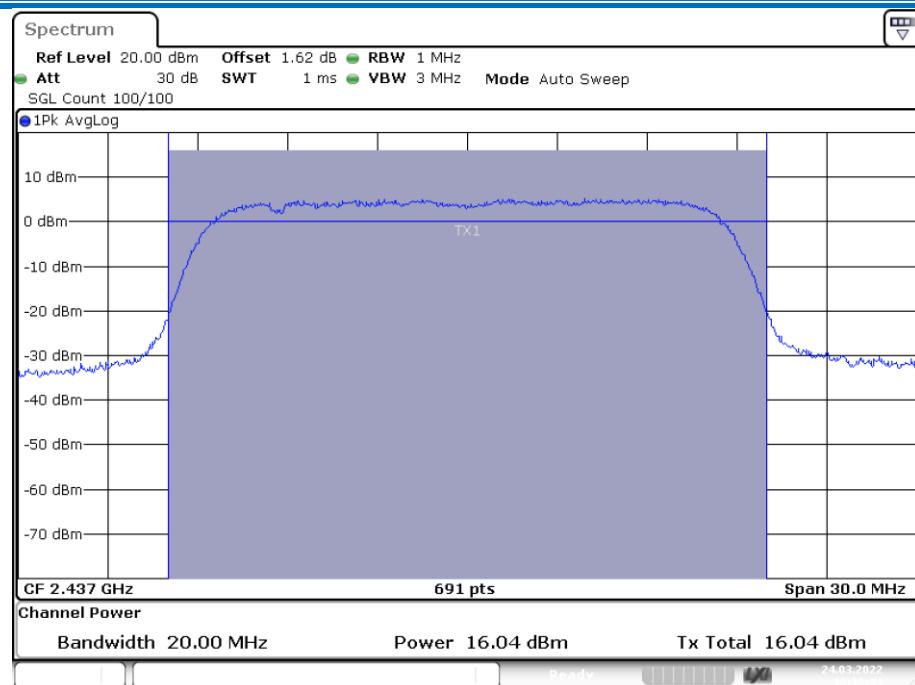
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Power NVNT g 2462MHz Ant1



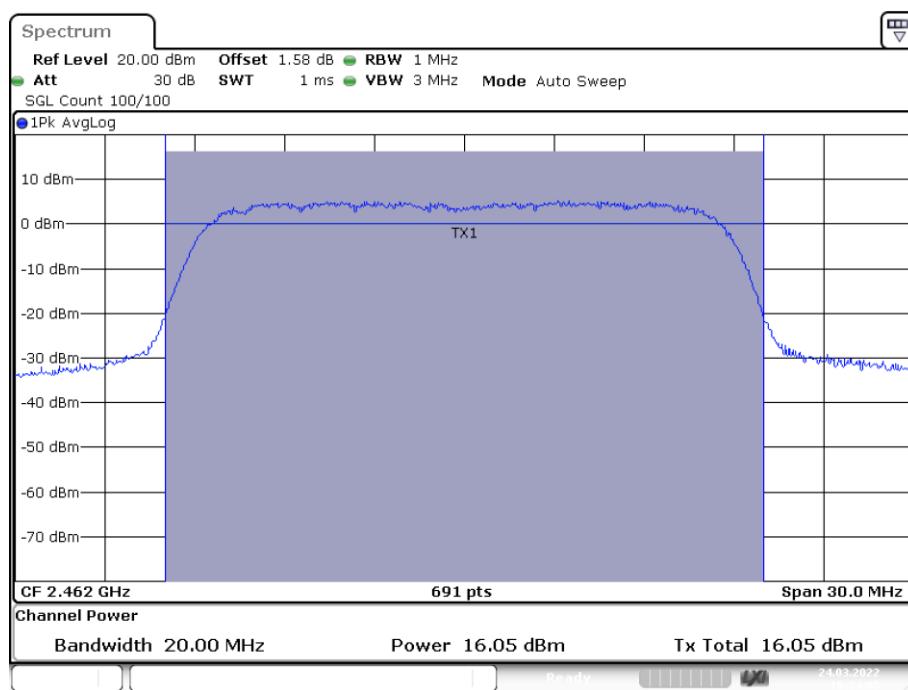
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Power NVNT n20 2412MHz Ant1



Date: 24.MAR.2022 16:36:34

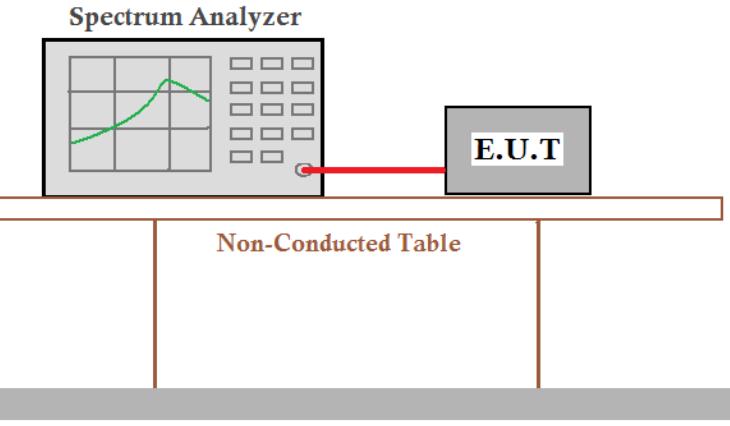
Power NVNT n20 2437MHz Ant1



Date: 24.MAR.2022 16:34:05

Power NVNT n20 2462MHz Ant1

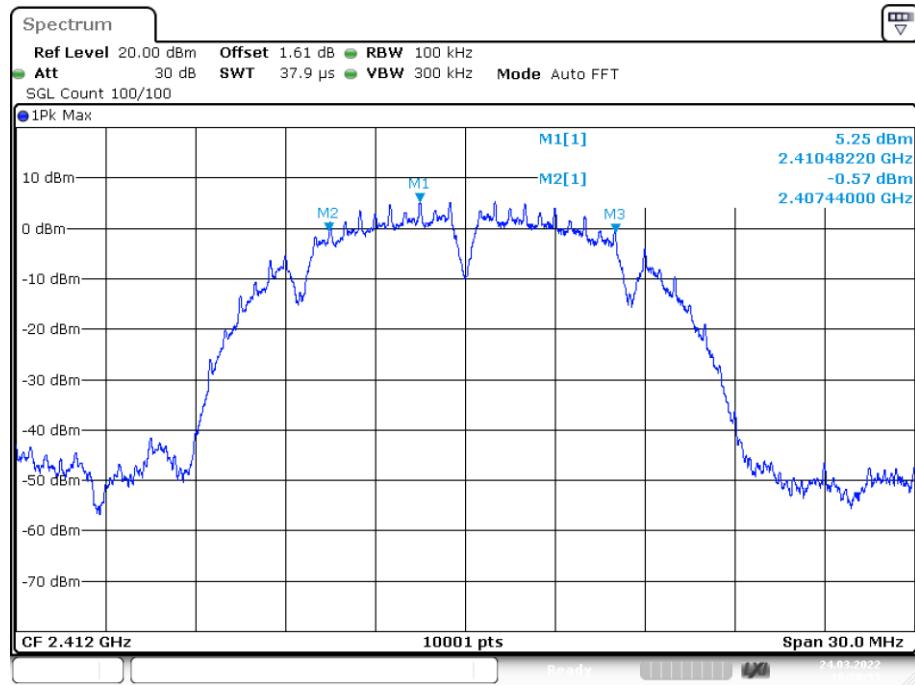
5.4 6dB Occupy Bandwidth

| | |
|------------------------|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (a)(2) |
| Test Method: | KDB558074 D01 V04 |
| Test Setup: | <p style="text-align: center;">Spectrum Analyzer</p>  <p style="text-align: center;">Non-Conducted Table</p> <p style="text-align: center;">Ground Reference Plane</p> |
| Instruments Used: | Refer to section 5.10 for details |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates |
| Final Test Mode: | Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; |
| Limit: | ≥ 500 kHz |
| Test Results: | Pass |

6dB Bandwidth

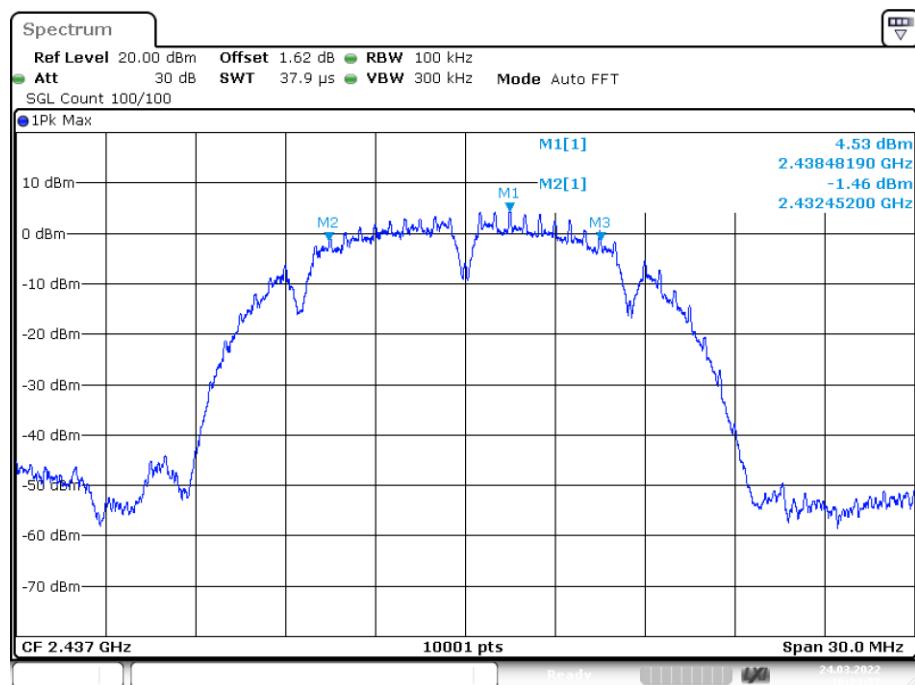
| Condition | Mode | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT | b | 2412 | Ant1 | 9.567 | 0.5 | Pass |
| NVNT | b | 2437 | Ant1 | 9.075 | 0.5 | Pass |
| NVNT | b | 2462 | Ant1 | 9.069 | 0.5 | Pass |
| NVNT | g | 2412 | Ant1 | 16.353 | 0.5 | Pass |
| NVNT | g | 2437 | Ant1 | 16.359 | 0.5 | Pass |
| NVNT | g | 2462 | Ant1 | 16.377 | 0.5 | Pass |
| NVNT | n20 | 2412 | Ant1 | 17.211 | 0.5 | Pass |
| NVNT | n20 | 2437 | Ant1 | 17.037 | 0.5 | Pass |
| NVNT | n20 | 2462 | Ant1 | 17.043 | 0.5 | Pass |

Test plot as follows:



Date: 24.MAR.2022 16:20:53

-6dB Bandwidth NVNT b 2412MHz Ant1



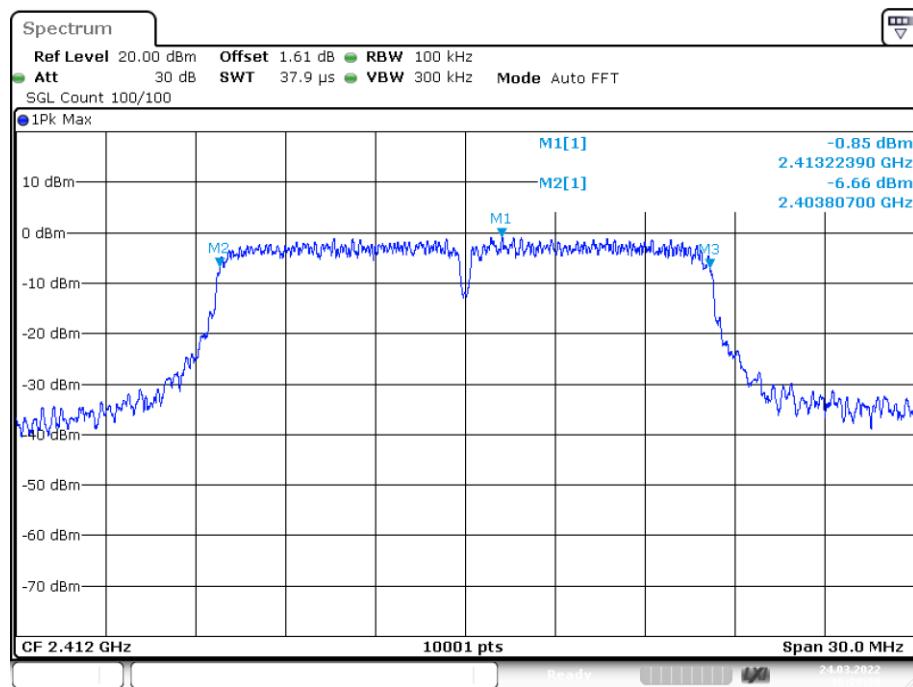
Date: 24.MAR.2022 16:24:58

-6dB Bandwidth NVNT b 2437MHz Ant1



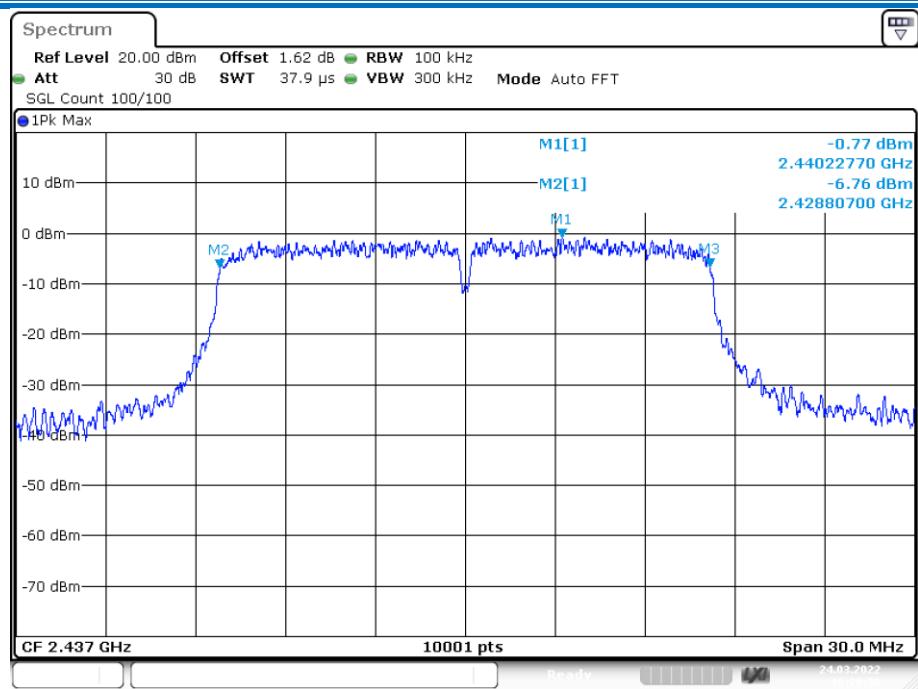
Date: 24.MAR.2022 16:26:19

-6dB Bandwidth NVNT b 2462MHz Ant1



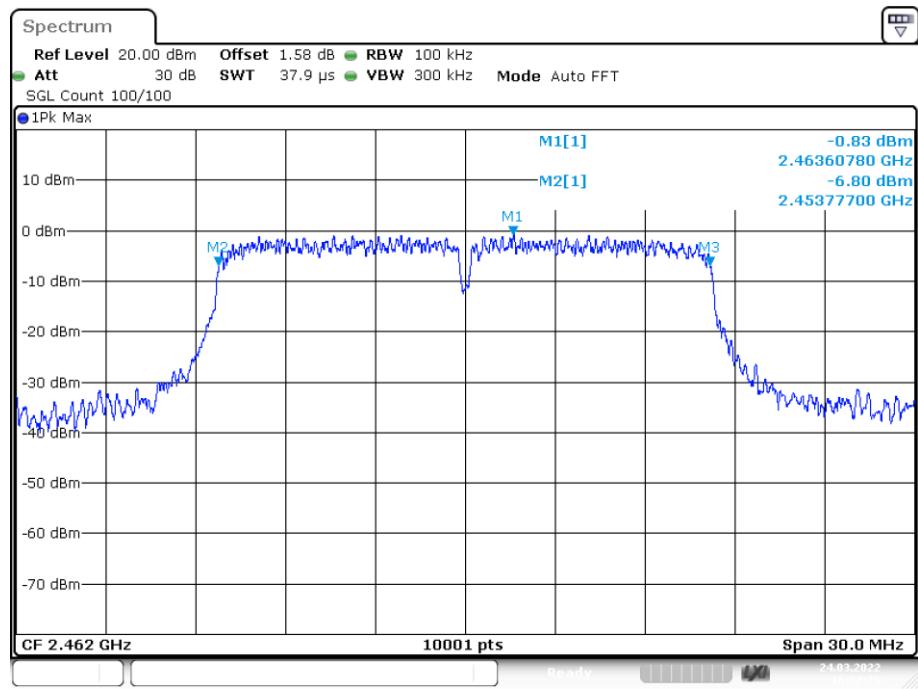
Date: 24.MAR.2022 16:28:20

-6dB Bandwidth NVNT g 2412MHz Ant1



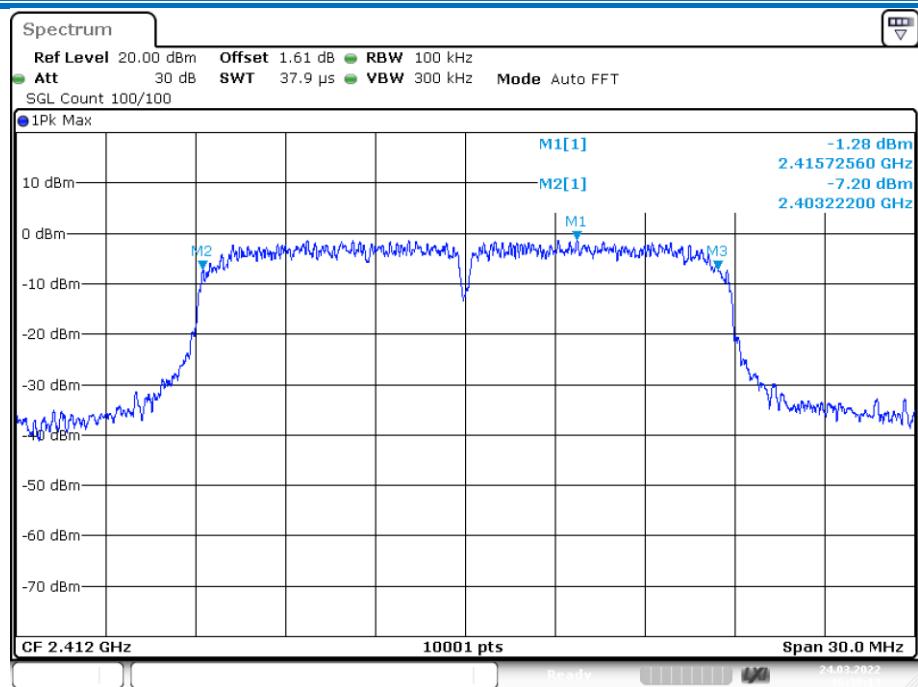
Date: 24.MAR.2022 16:29:55

-6dB Bandwidth NVNT g 2437MHz Ant1



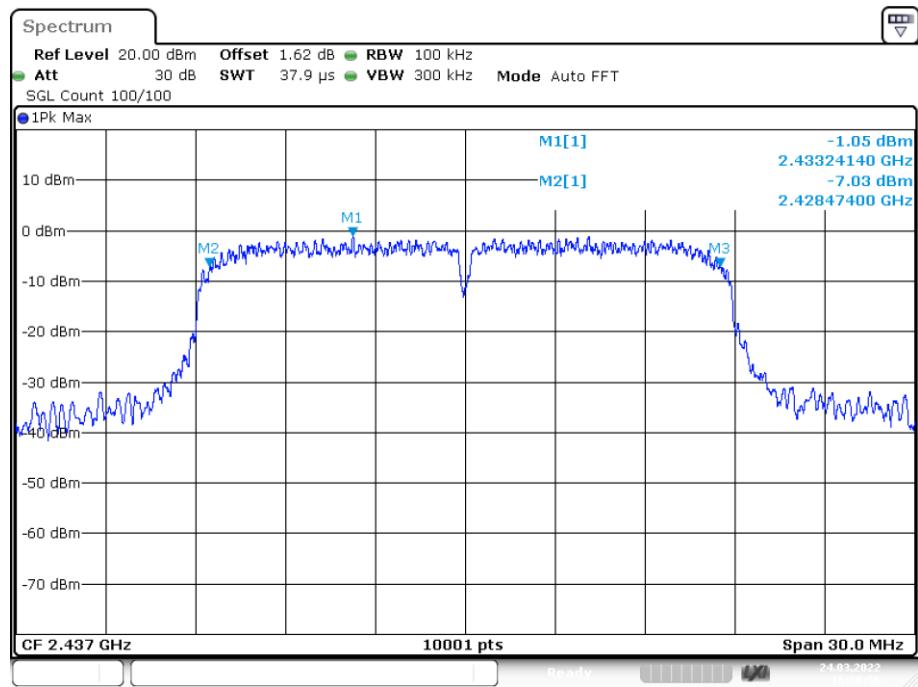
Date: 24.MAR.2022 16:32:25

-6dB Bandwidth NVNT g 2462MHz Ant1



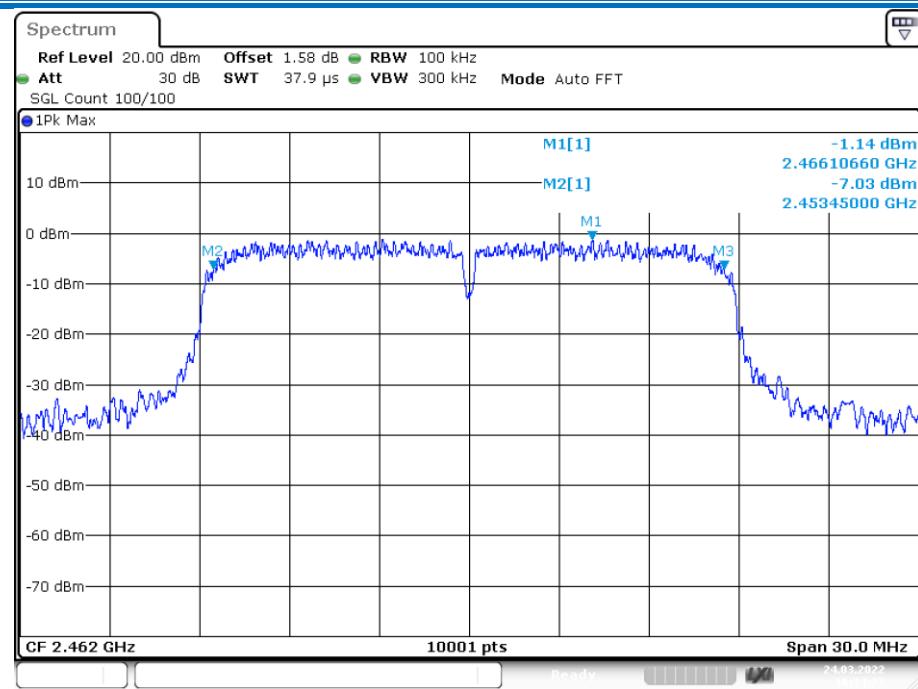
Date: 24.MAR.2022 16:39:13

-6dB Bandwidth NVNT n20 2412MHz Ant1



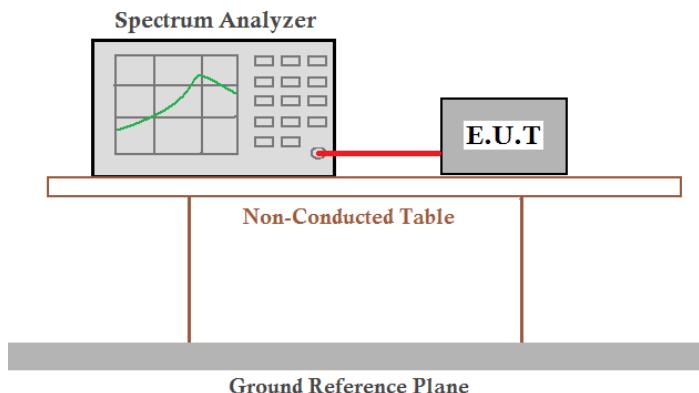
Date: 24.MAR.2022 16:36:56

-6dB Bandwidth NVNT n20 2437MHz Ant1



-6dB Bandwidth NVNT n20 2462MHz Ant1

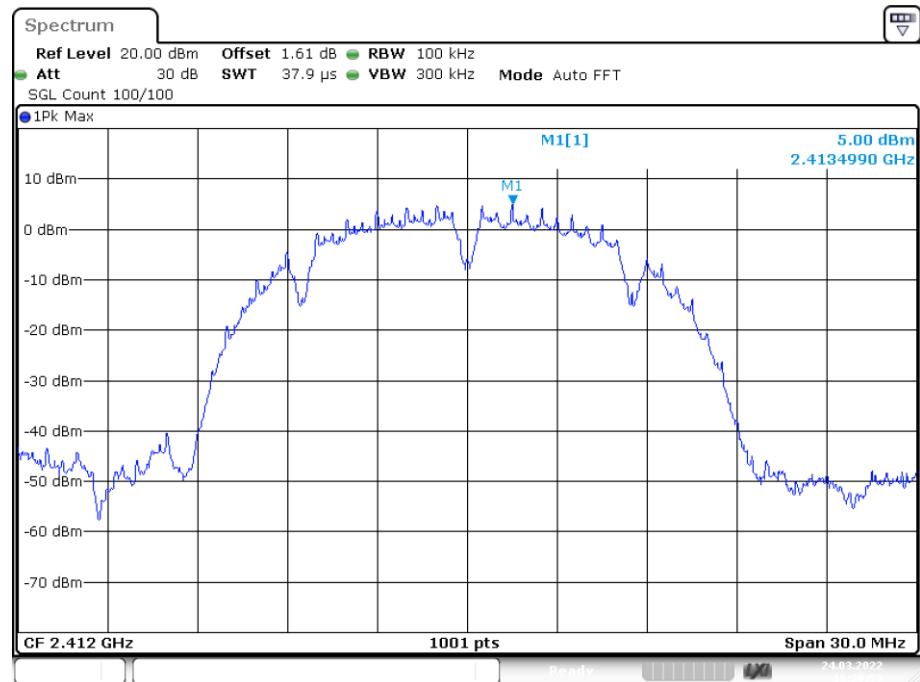
5.5 Power Spectral Density

| | |
|------------------------|--|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (e) |
| Test Method: | KDB558074 D01 V04 |
| Test Setup: |  <p style="text-align: center;">Spectrum Analyzer</p> <p style="text-align: center;">Non-Conducted Table</p> <p style="text-align: center;">Ground Reference Plane</p> |
| | <p><i>Remark:</i></p> <p><i>Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</i></p> |
| Test Instruments: | Refer to section 5.10 for details |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates |
| Final Test Mode: | Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; |
| Limit: | $\leq 8.00 \text{dBm}/3\text{kHz}$ |
| Test Results: | Pass |

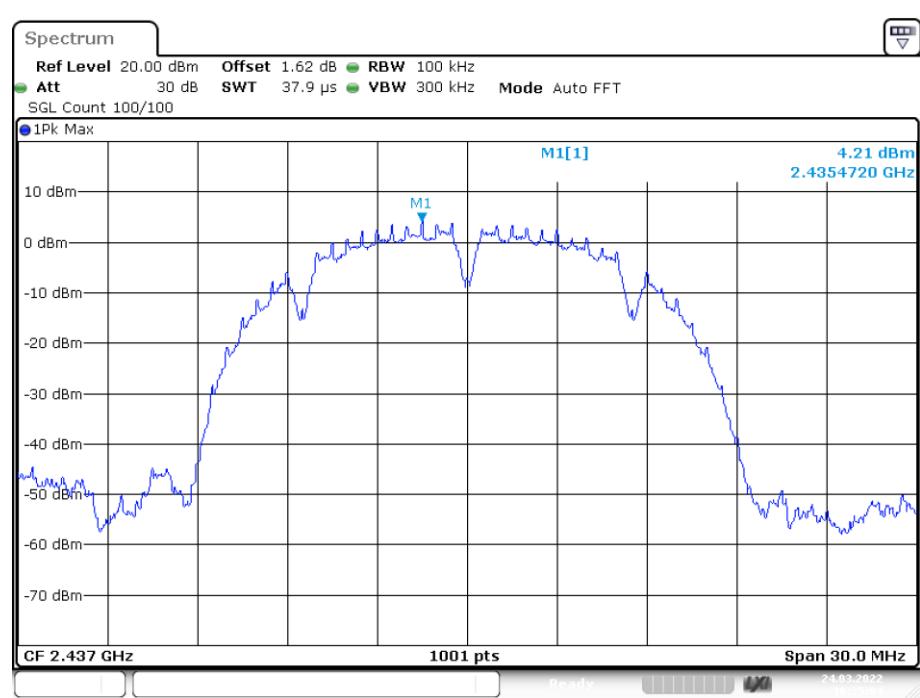
Maximum Power Spectral Density Level

| Condition | Mode | Frequency (MHz) | Antenna | Max PSD (dBm) | Limit (dBm/3KHz) | Verdict |
|-----------|------|-----------------|---------|---------------|------------------|---------|
| NVNT | b | 2412 | Ant1 | 5.003 | 8 | Pass |
| NVNT | b | 2437 | Ant1 | 4.207 | 8 | Pass |
| NVNT | b | 2462 | Ant1 | 4.415 | 8 | Pass |
| NVNT | g | 2412 | Ant1 | -0.844 | 8 | Pass |
| NVNT | g | 2437 | Ant1 | -0.564 | 8 | Pass |
| NVNT | g | 2462 | Ant1 | -0.736 | 8 | Pass |
| NVNT | n20 | 2412 | Ant1 | -1.172 | 8 | Pass |
| NVNT | n20 | 2437 | Ant1 | 1.982 | 8 | Pass |
| NVNT | n20 | 2462 | Ant1 | -0.34 | 8 | Pass |

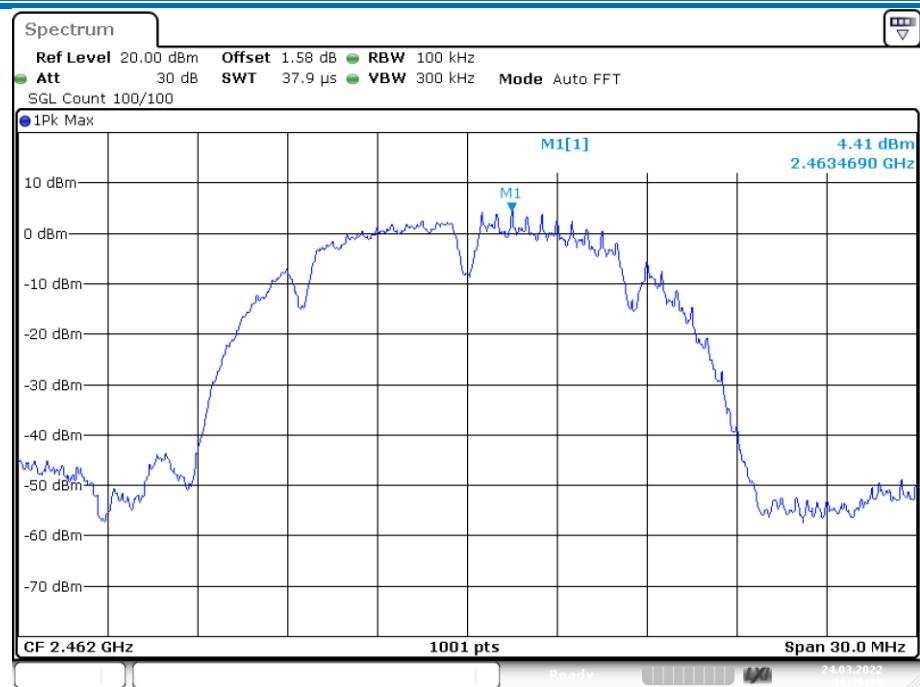
Test plot as follows:



PSD NVNT b 2412MHz Ant1

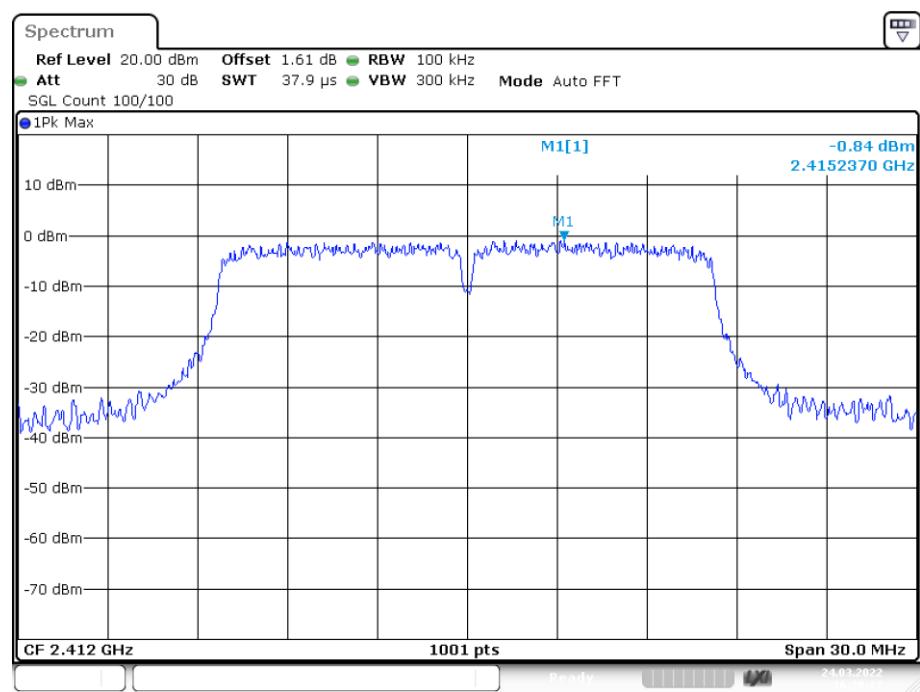


PSD NVNT b 2437MHz Ant1



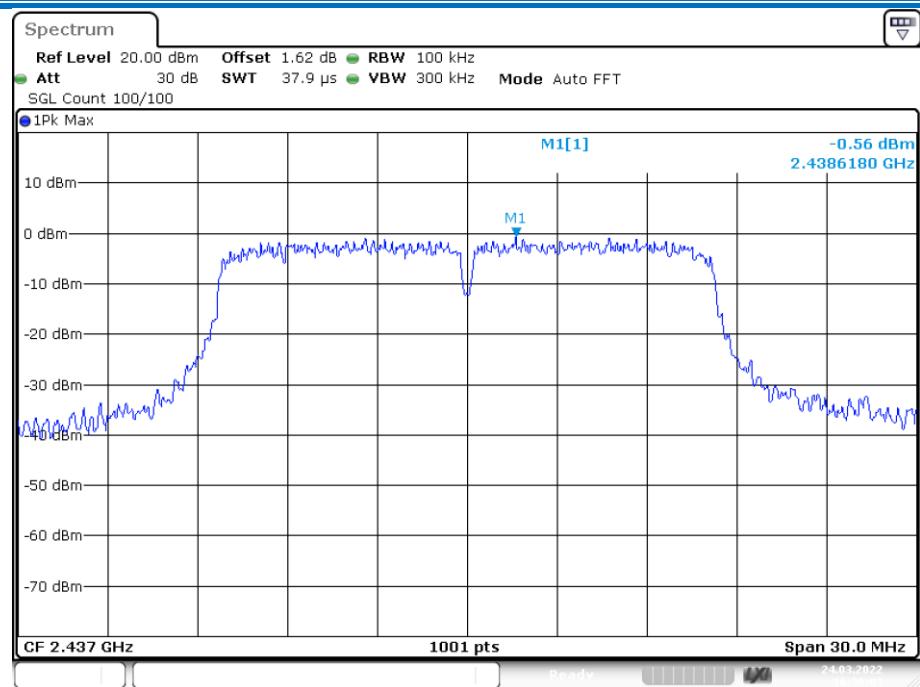
Date: 24.MAR.2022 16:26:26

PSD NVNT b 2462MHz Ant1



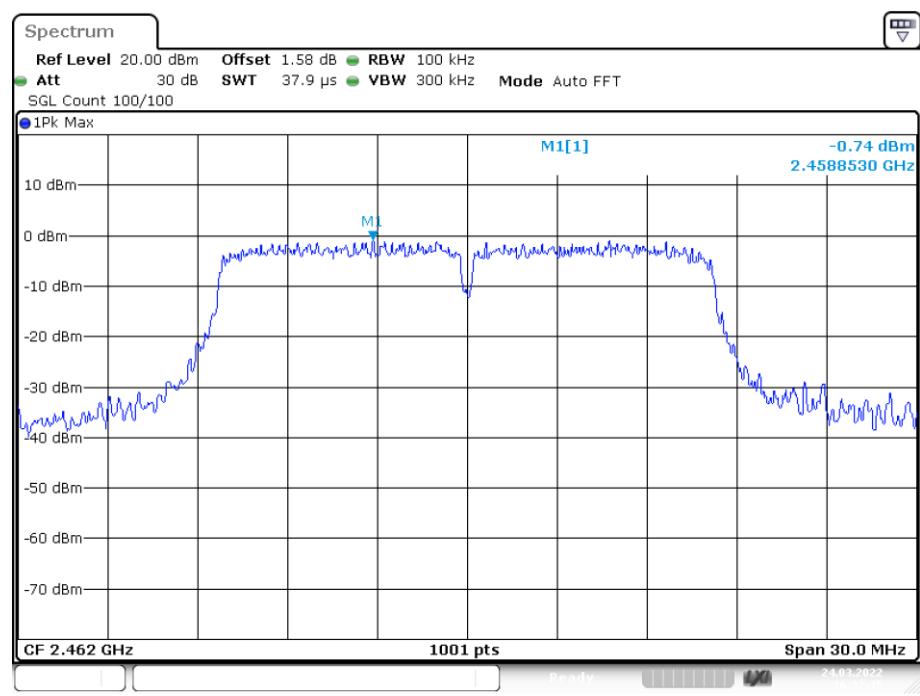
Date: 24.MAR.2022 16:28:27

PSD NVNT g 2412MHz Ant1



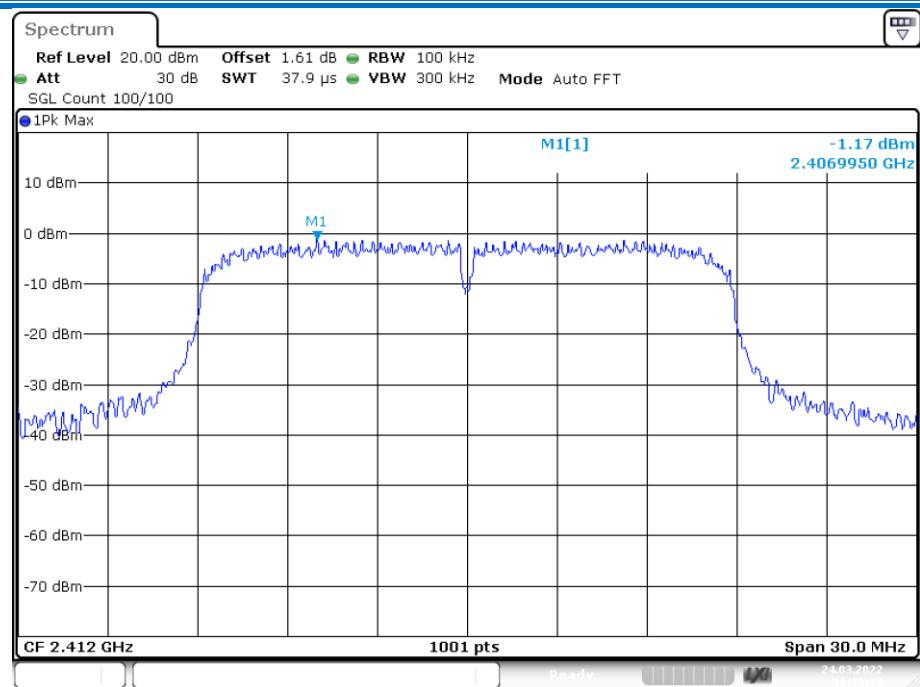
Date: 24.MAR.2022 16:30:03

PSD NVNT g 2437MHz Ant1



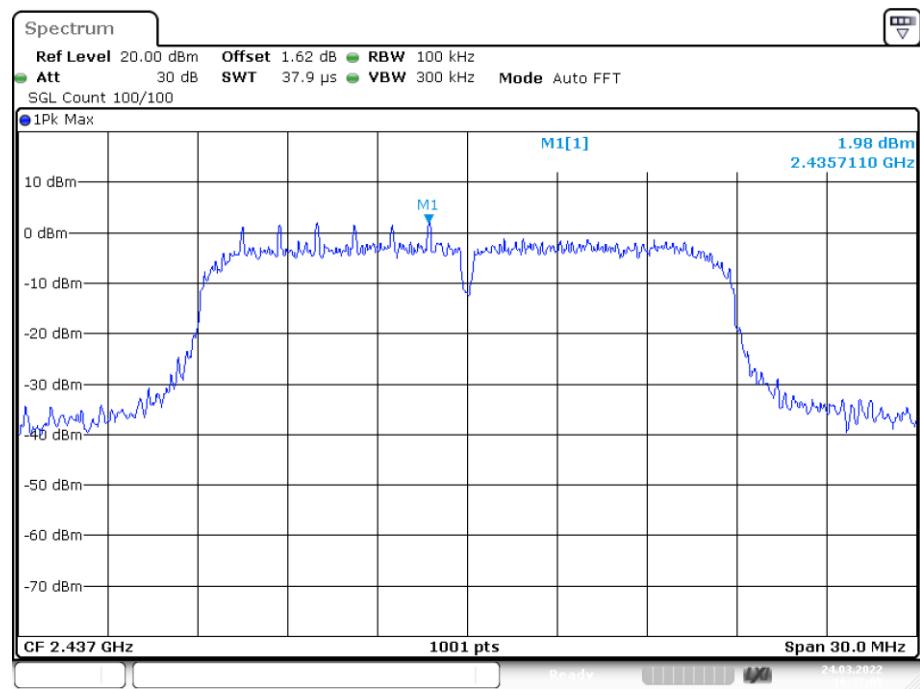
Date: 24.MAR.2022 16:32:34

PSD NVNT g 2462MHz Ant1



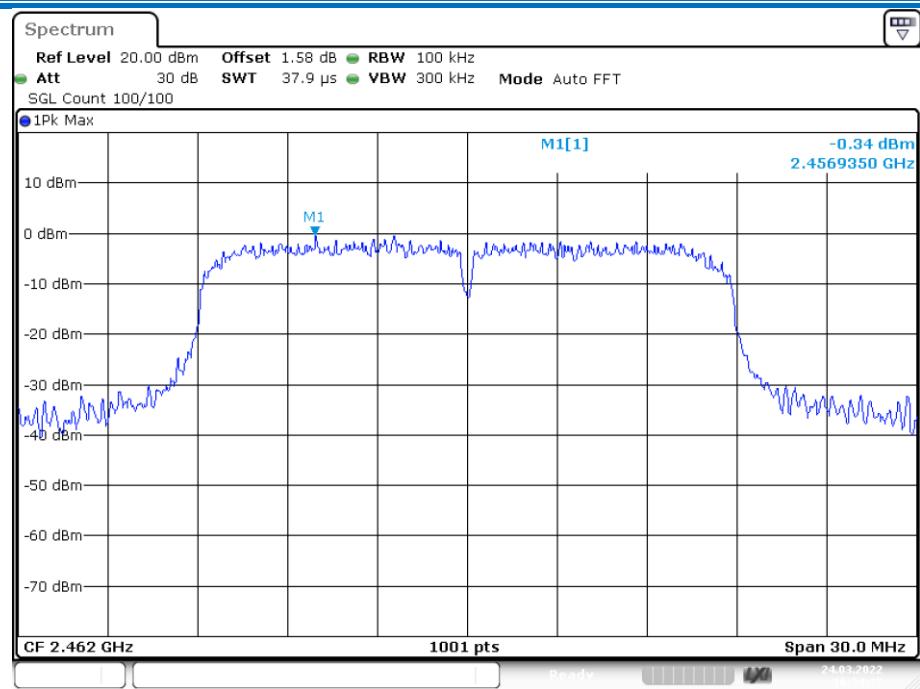
Date: 24.MAR.2022 16:39:25

PSD NVNT n20 2412MHz Ant1



Date: 24.MAR.2022 16:37:05

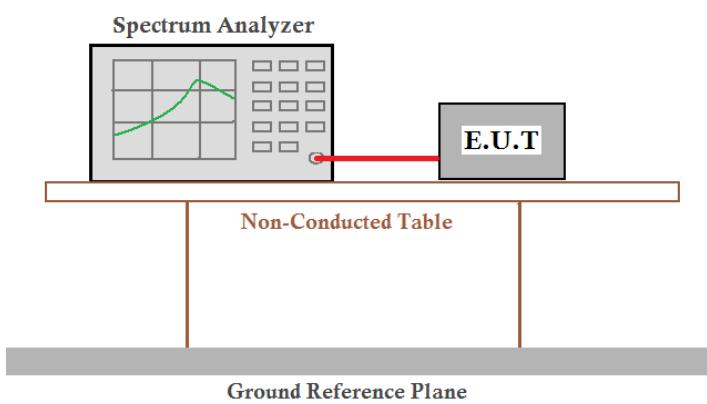
PSD NVNT n20 2437MHz Ant1



Date: 24.MAR.2022 16:34:38

PSD NVNT n20 2462MHz Ant1

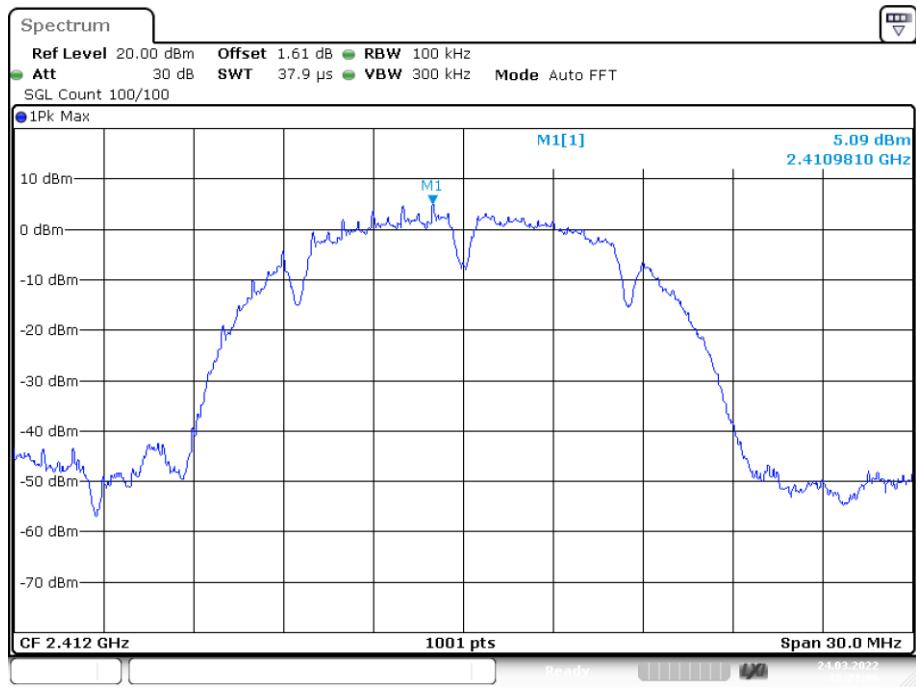
5.6 Band-edge for RF Conducted Emissions

| | |
|------------------------|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) |
| Test Method: | KDB558074 D01 V04 |
| Test Setup: | <p style="text-align: center;">  Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane </p> <p><i>Remark:</i> <i>Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</i></p> |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates |
| Final Test Mode: | Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Instruments Used: | Refer to section 5.10 for details |
| Test Results: | Pass |

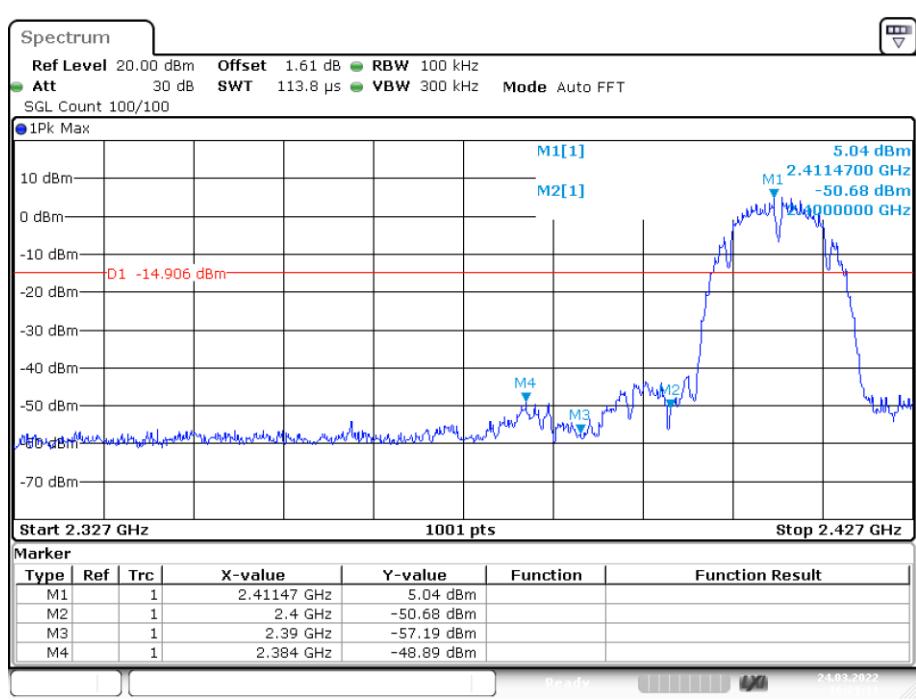
Band Edge

| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|---------|-----------------|-------------|---------|
| NVNT | b | 2412 | Ant1 | -53.98 | -20 | Pass |
| NVNT | b | 2462 | Ant1 | -56.62 | -20 | Pass |
| NVNT | g | 2412 | Ant1 | -41.57 | -20 | Pass |
| NVNT | g | 2462 | Ant1 | -42.43 | -20 | Pass |
| NVNT | n20 | 2412 | Ant1 | -41.39 | -20 | Pass |
| NVNT | n20 | 2462 | Ant1 | -38.35 | -20 | Pass |

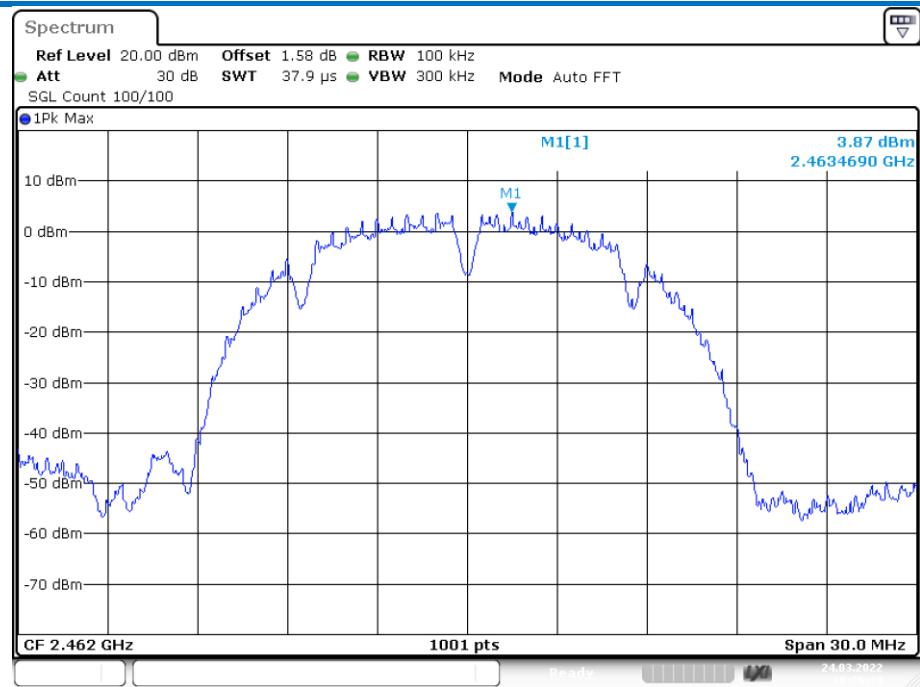
Test plot as follows:



Band Edge NVNT b 2412MHz Ant1 Ref

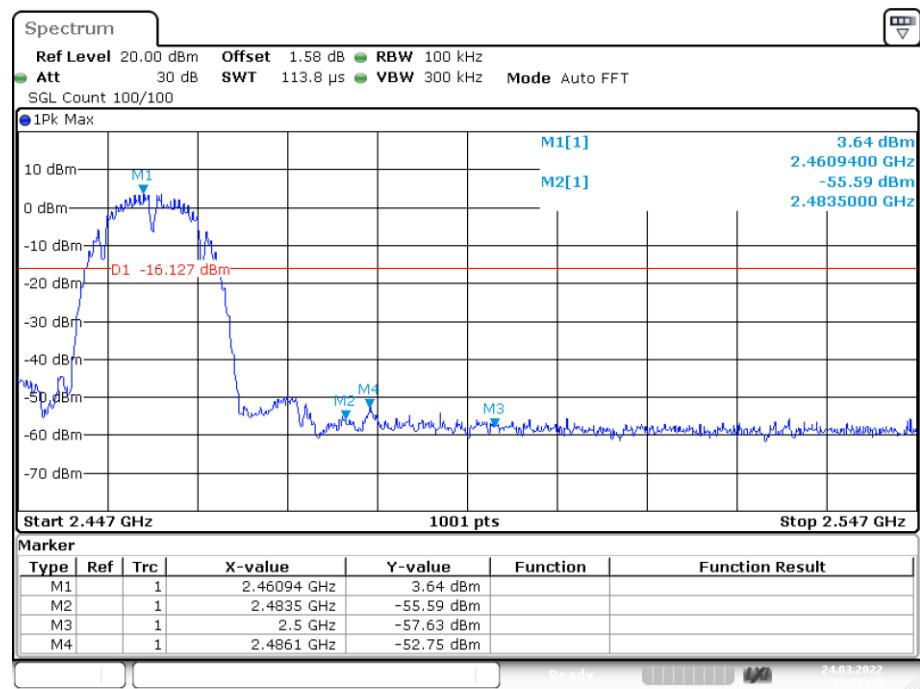


Band Edge NVNT b 2412MHz Ant1 Emission



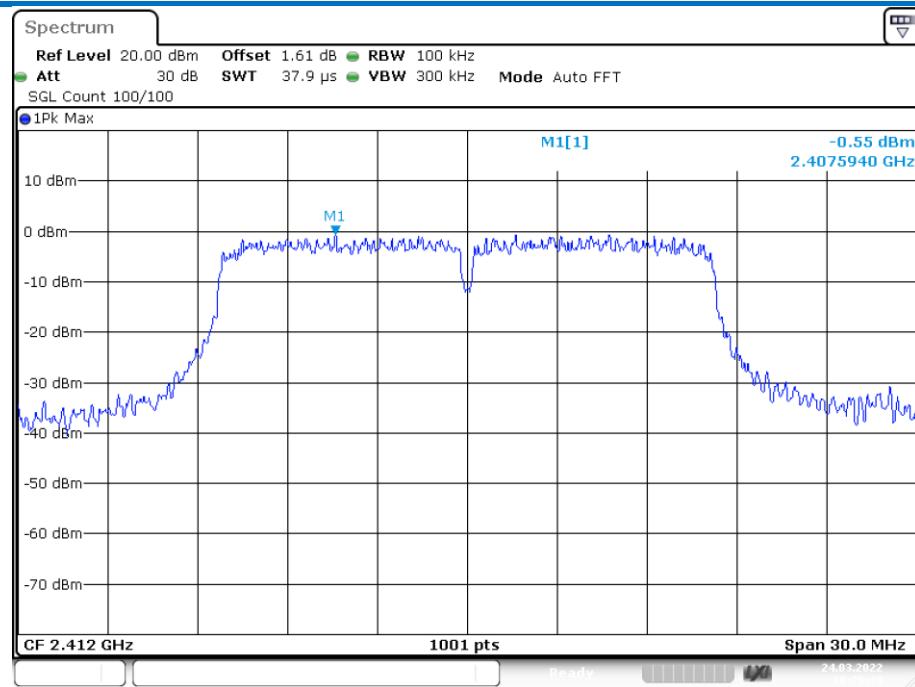
Date: 24.MAR.2022 16:26:33

Band Edge NVNT b 2462MHz Ant1 Ref



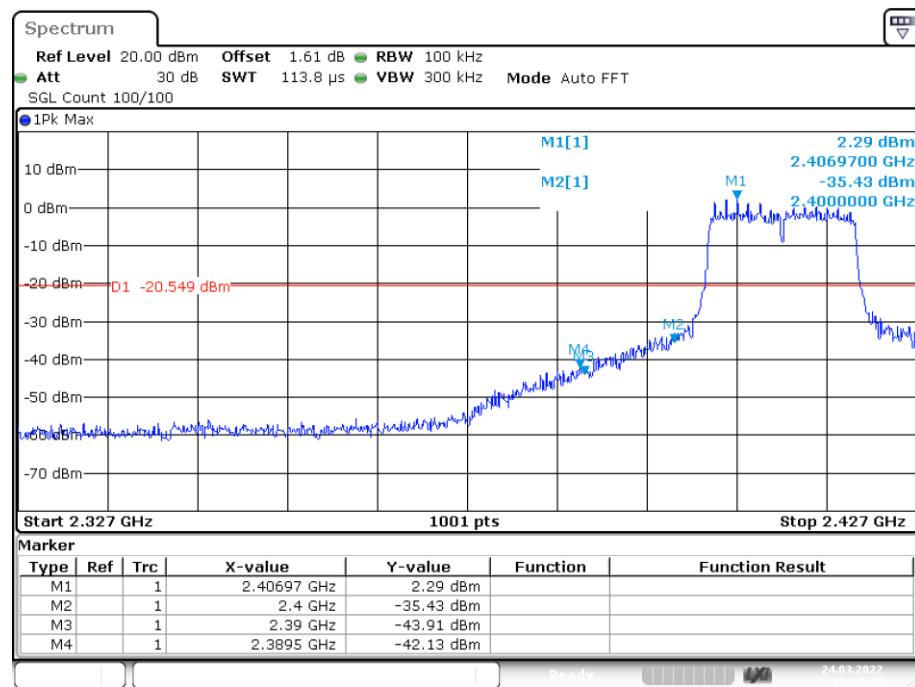
Date: 24.MAR.2022 16:26:38

Band Edge NVNT b 2462MHz Ant1 Emission



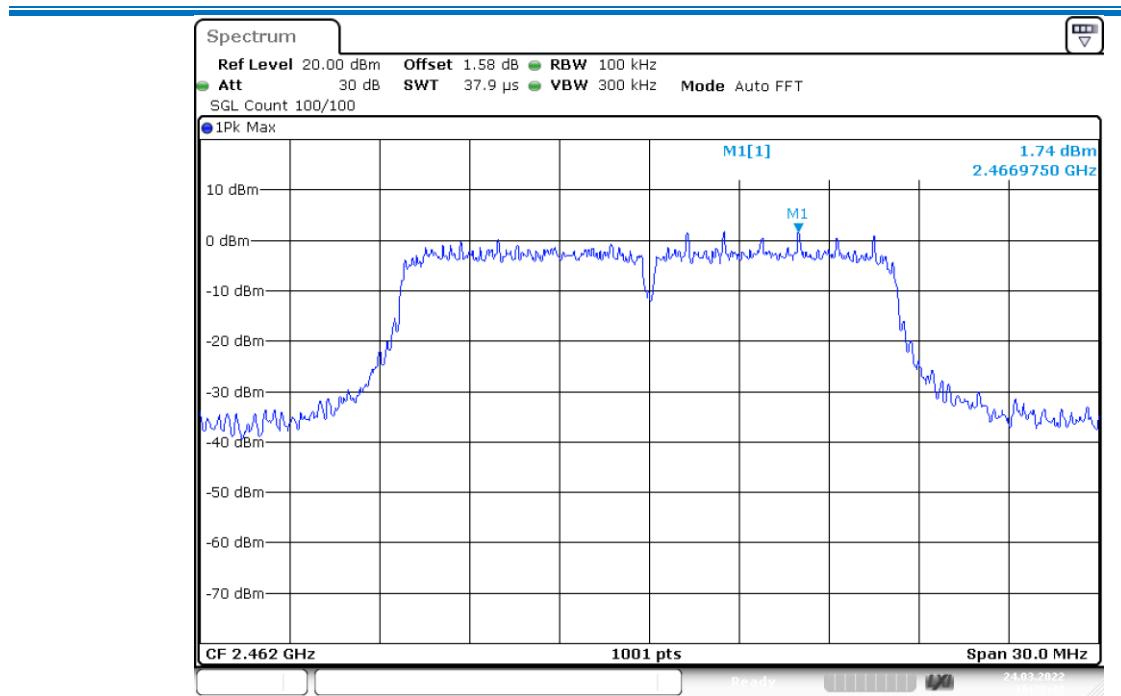
Date: 24.MAR.2022 16:28:34

Band Edge NVNT g 2412MHz Ant1 Ref



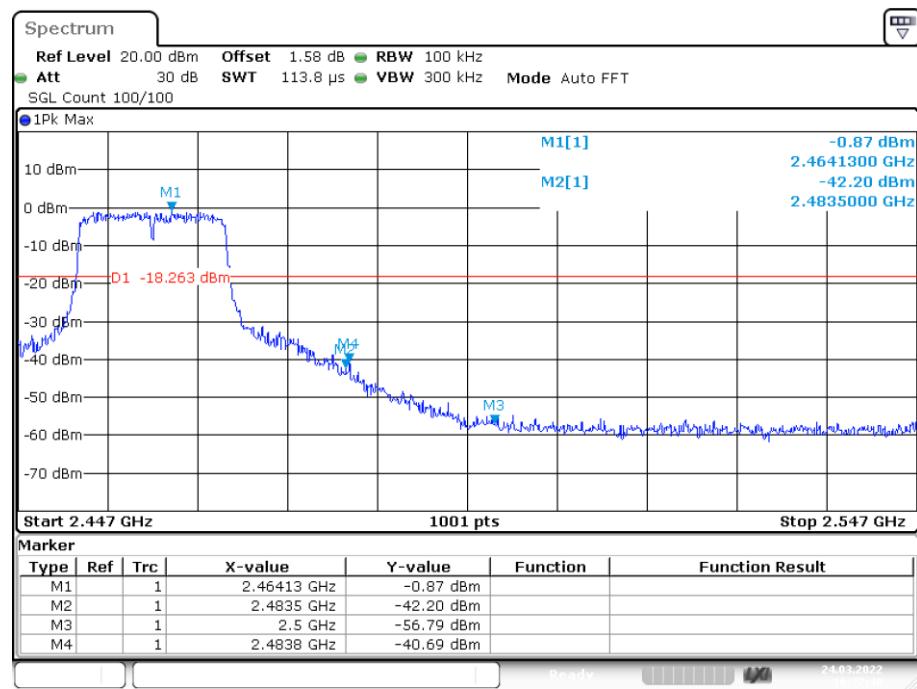
Date: 24.MAR.2022 16:28:39

Band Edge NVNT g 2412MHz Ant1 Emission



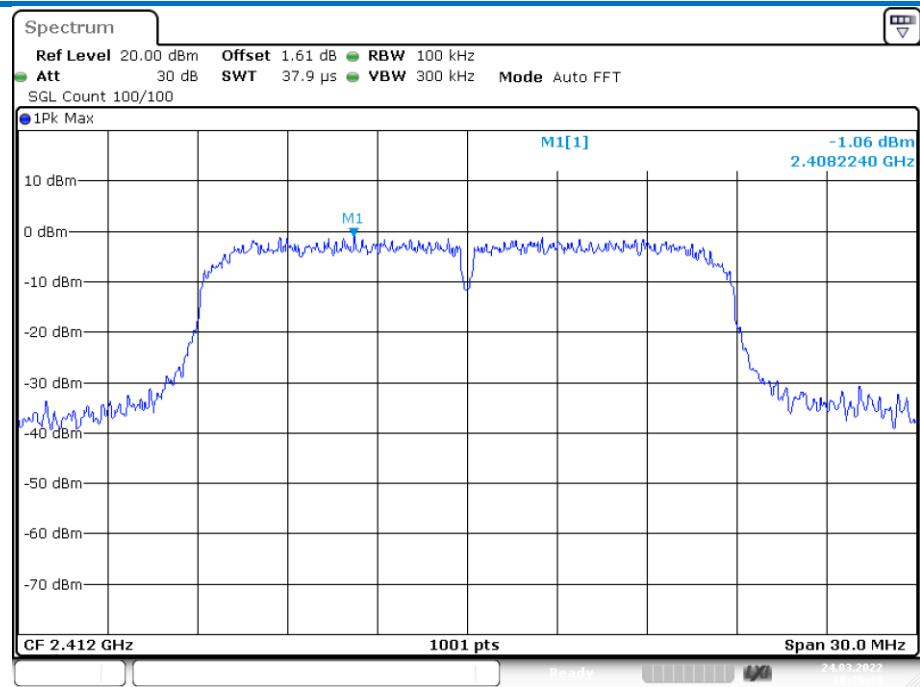
Date: 24.MAR.2022 16:32:42

Band Edge NVNT g 2462MHz Ant1 Ref



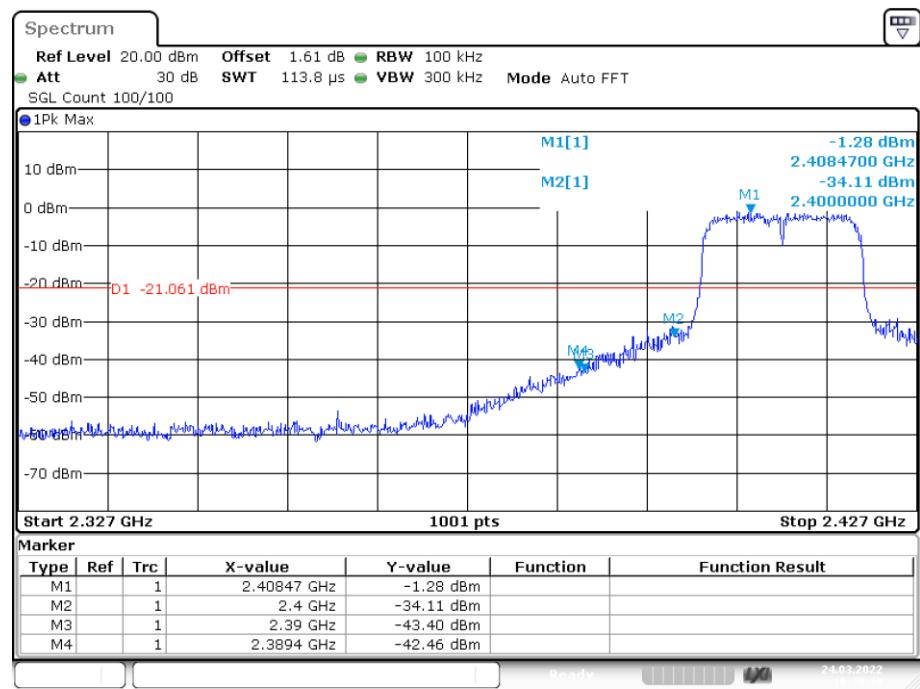
Date: 24.MAR.2022 16:32:47

Band Edge NVNT g 2462MHz Ant1 Emission



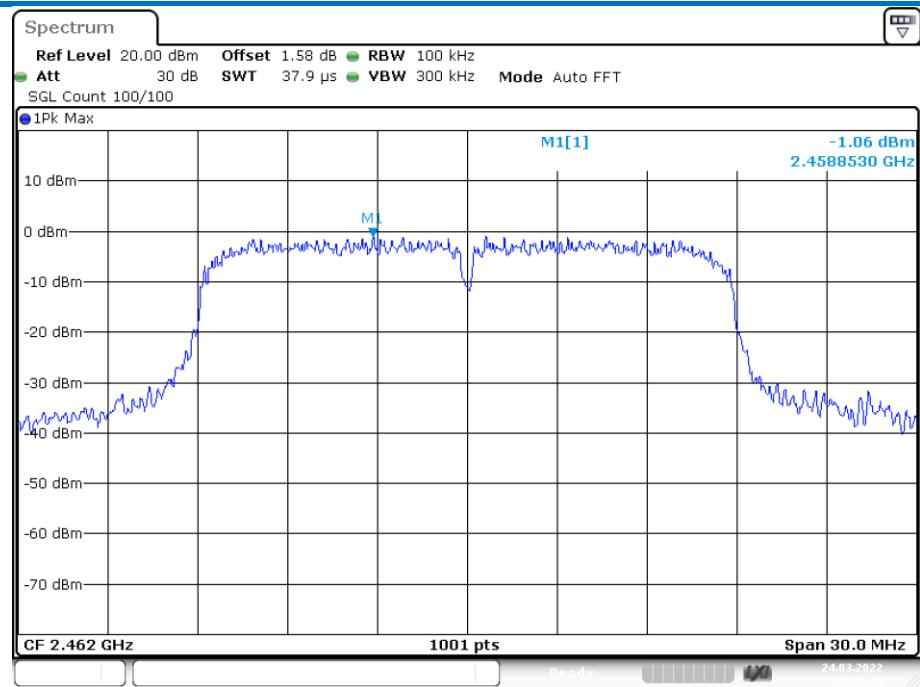
Date: 24.MAR.2022 16:39:34

Band Edge NVNT n20 2412MHz Ant1 Ref



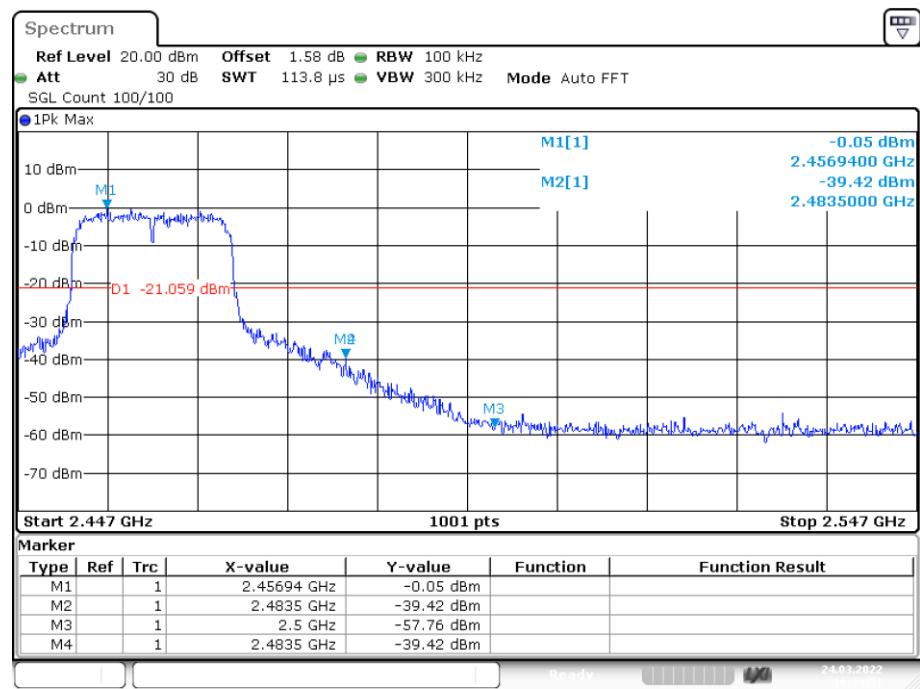
Date: 24.MAR.2022 16:39:39

Band Edge NVNT n20 2412MHz Ant1 Emission



Date: 24.MAR.2022 16:34:46

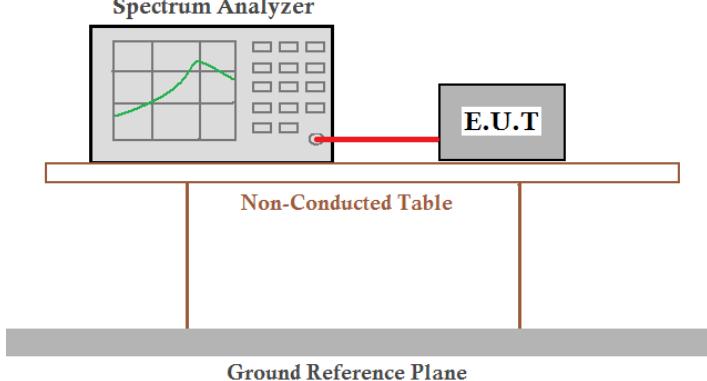
Band Edge NVNT n20 2462MHz Ant1 Ref



Date: 24.MAR.2022 16:34:51

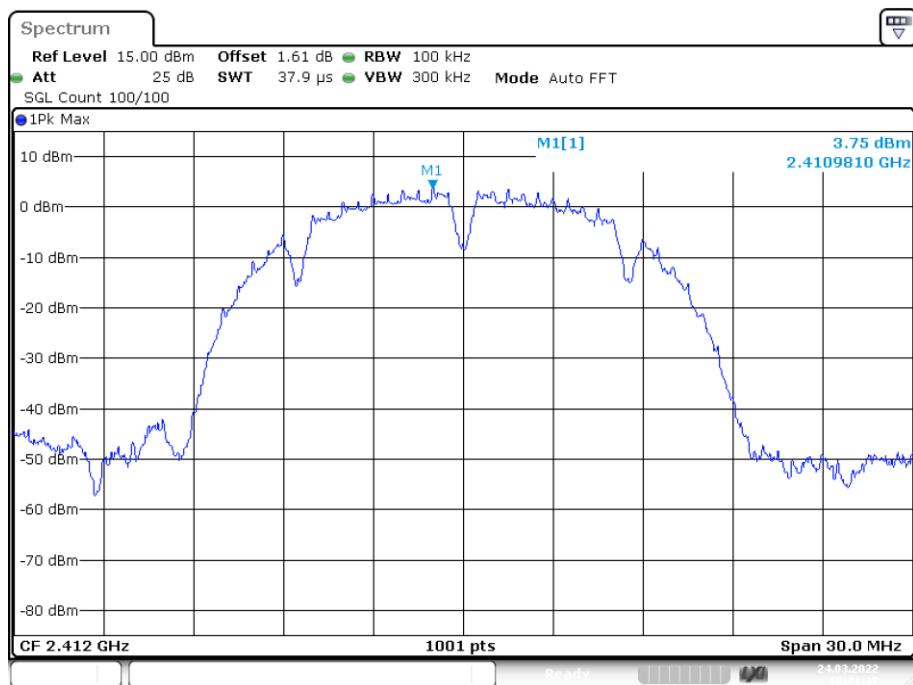
Band Edge NVNT n20 2462MHz Ant1 Emission

5.7 RF Conducted Spurious Emissions

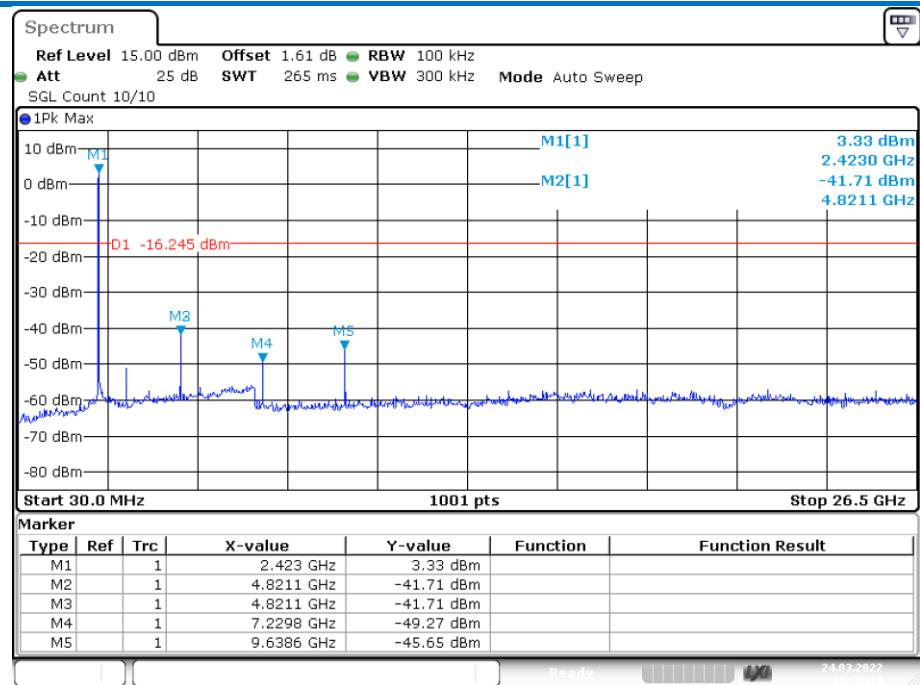
| | |
|------------------------|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) |
| Test Method: | KDB558074 D01 V04 |
| Test Setup: |  <p>Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane</p> <p><i>Remark:</i> <i>Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.</i></p> |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates |
| Final Test Mode: | Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Instruments Used: | Refer to section 5.10 for details |
| Test Results: | Pass |

Test plot as follows:

| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|---------|-----------------|-------------|---------|
| NVNT | b | 2412 | Ant1 | -45.46 | -20 | Pass |
| NVNT | b | 2437 | Ant1 | -45.51 | -20 | Pass |
| NVNT | b | 2462 | Ant1 | -48.73 | -20 | Pass |
| NVNT | g | 2412 | Ant1 | -50.49 | -20 | Pass |
| NVNT | g | 2437 | Ant1 | -48.5 | -20 | Pass |
| NVNT | g | 2462 | Ant1 | -48.28 | -20 | Pass |
| NVNT | n20 | 2412 | Ant1 | -49.58 | -20 | Pass |
| NVNT | n20 | 2437 | Ant1 | -51.29 | -20 | Pass |
| NVNT | n20 | 2462 | Ant1 | -48.57 | -20 | Pass |

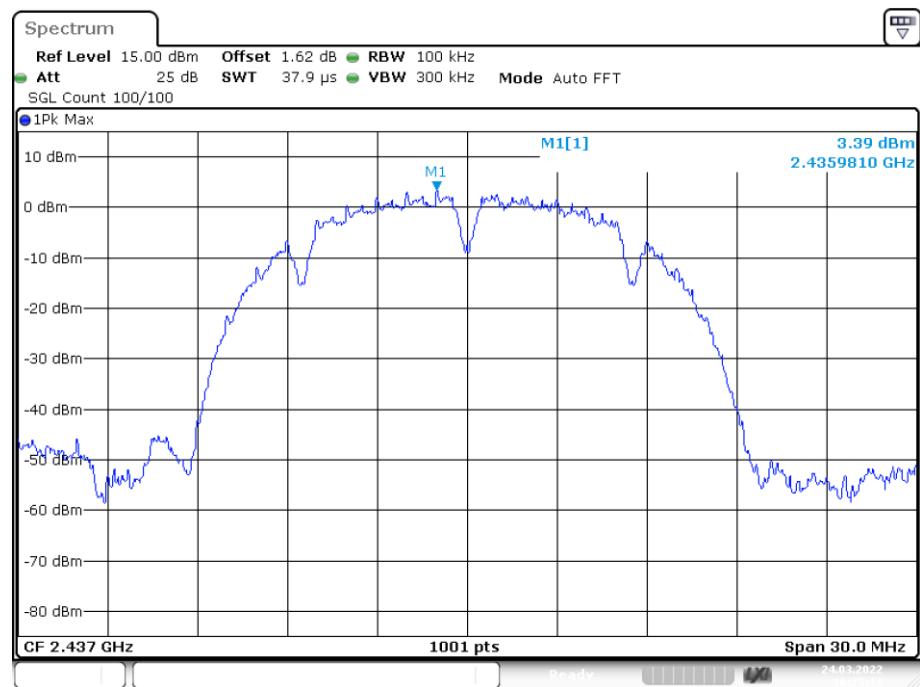


Tx. Spurious NVNT b 2412MHz Ant1 Ref



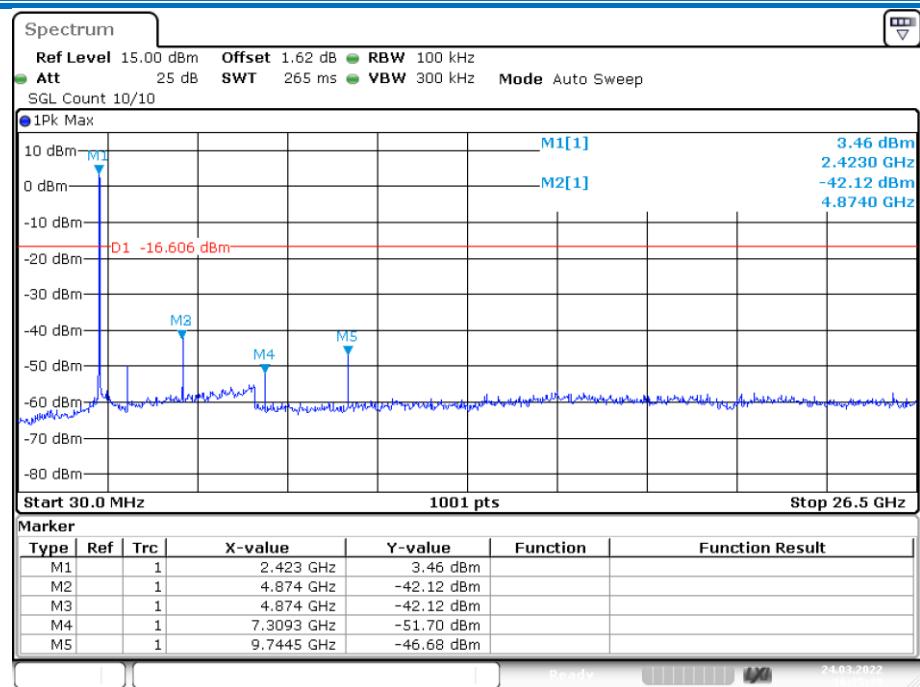
Date: 24.MAR.2022 16:21:35

Tx. Spurious NVNT b 2412MHz Ant1 Emission



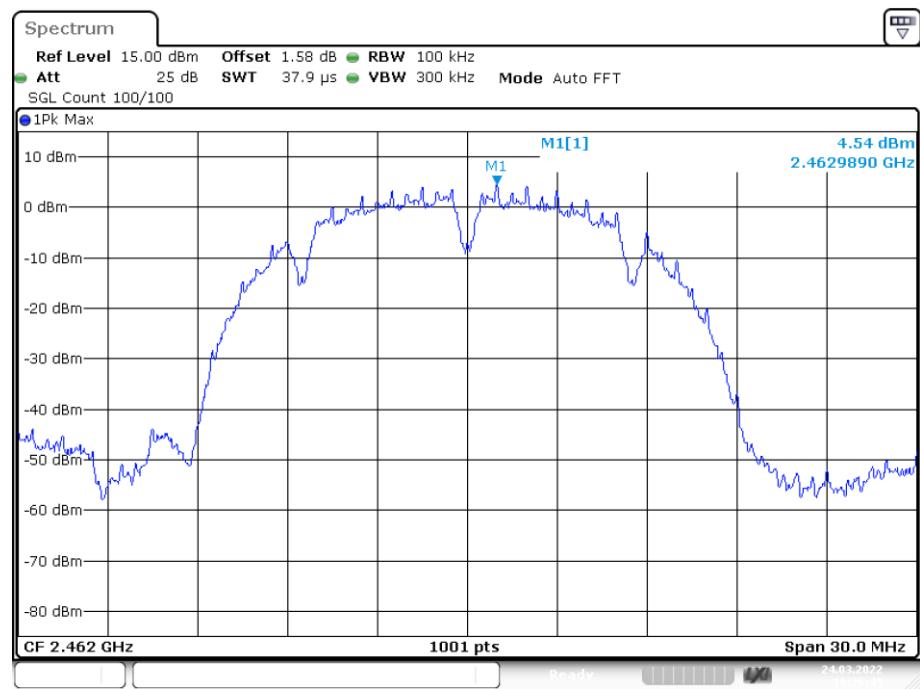
Date: 24.MAR.2022 16:25:11

Tx. Spurious NVNT b 2437MHz Ant1 Ref



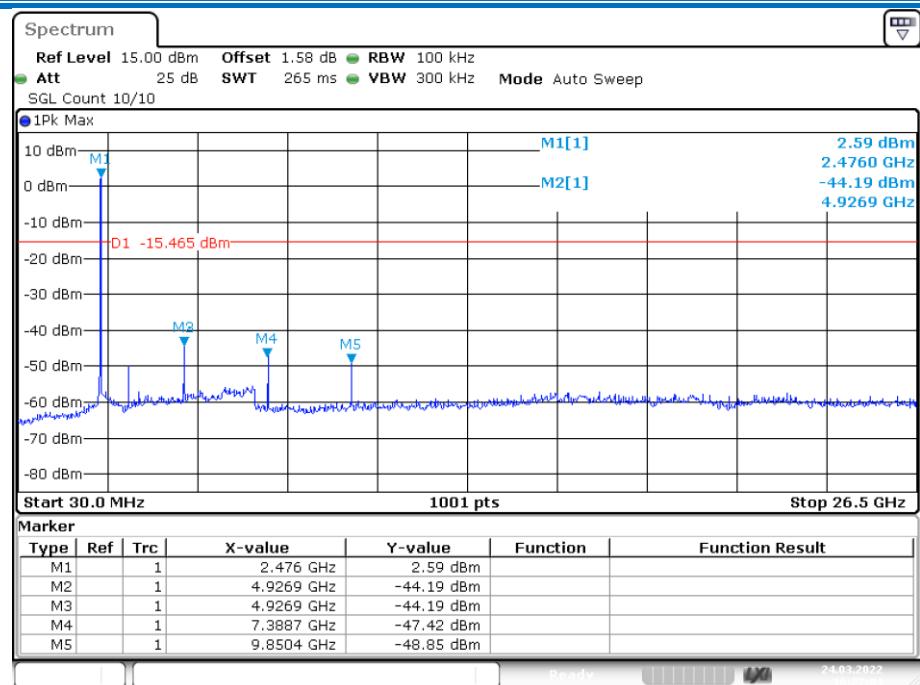
Date: 24.MAR.2022 16:25:29

Tx. Spurious NVNT b 2437MHz Ant1 Emission



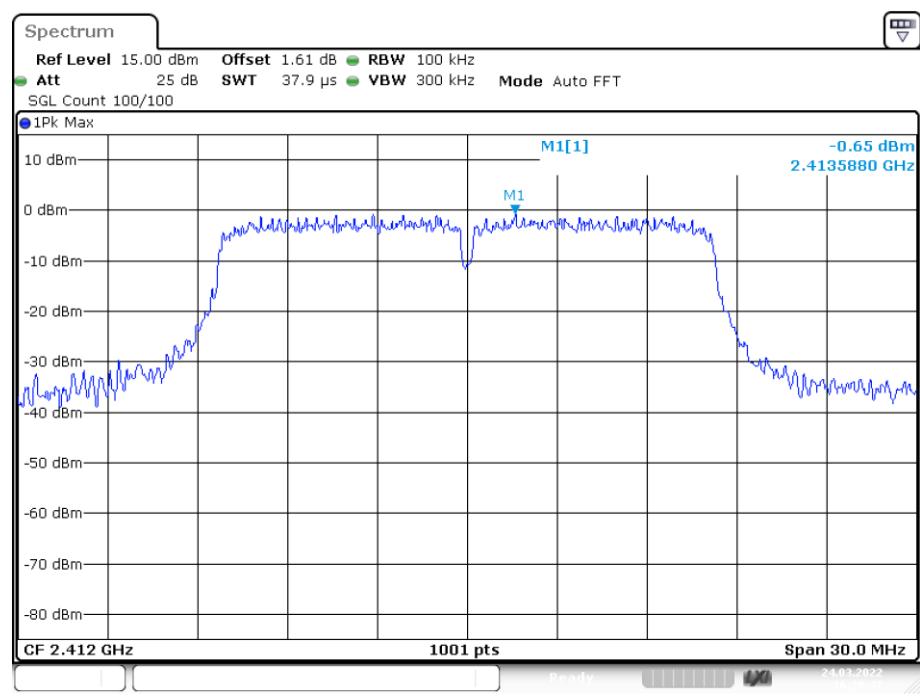
Date: 24.MAR.2022 16:26:45

Tx. Spurious NVNT b 2462MHz Ant1 Ref



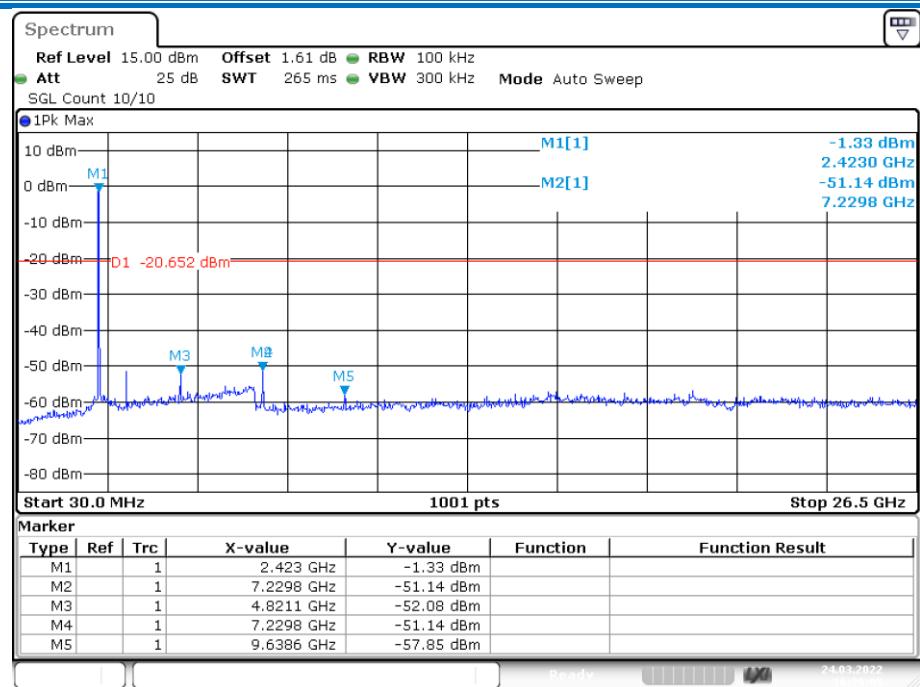
Date: 24.MAR.2022 16:27:03

Tx. Spurious NVNT b 2462MHz Ant1 Emission



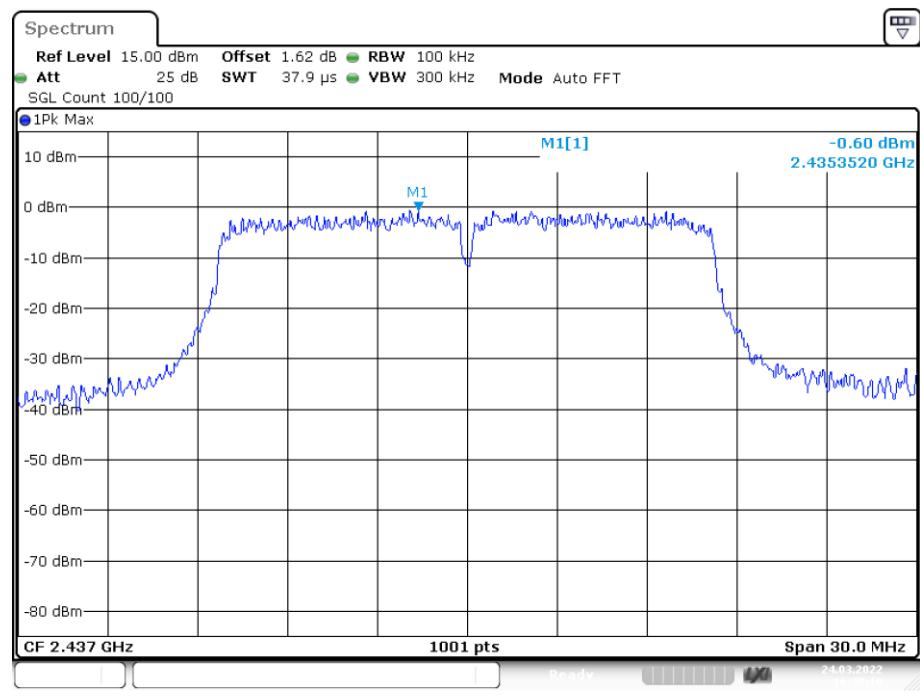
Date: 24.MAR.2022 16:28:47

Tx. Spurious NVNT g 2412MHz Ant1 Ref



Date: 24.MAR.2022 16:29:05

Tx. Spurious NVNT g 2412MHz Ant1 Emission



Date: 24.MAR.2022 16:30:10

Tx. Spurious NVNT g 2437MHz Ant1 Ref