Microtest
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# Test Report

**Report No.:** MTi240322009-01E1

**Date of issue:** 2024-04-07

**Applicant:** Dongguan Platinum Audio Systems Co., Ltd.

**Product:** DOUBLE FOUR PLUS

**Model(s):** BG-80

**FCC ID:** 2ALUS-PLD04

Shenzhen Microtest Co., Ltd.

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# Instructions

1. This test report shall not be partially reproduced without the written consent of the laboratory.

2. The test results in this test report are only responsible for the samples submitted

3. This test report is invalid without the seal and signature of the laboratory.

4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.

5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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| Test Result Certification | |
|---|---|
| **Applicant:** | Dongguan Platinum Audio Systems Co., Ltd. |
| Address: | 6/F, Section 1 Building, No. 2 East Industry Road, Songshan Lake Sci.&Tech. Industry Park, Dongguan, Guangdong 523808, P.R. China |
| **Manufacturer:** | Dongguan Platinum Audio Systems Co., Ltd. |
| Address: | 6/F, Section 1 Building, No. 2 East Industry Road, Songshan Lake Sci.&Tech. Industry Park, Dongguan, Guangdong 523808, P.R. China |
| **Product description** | |
| Product name: | DOUBLE FOUR PLUS |
| Trademark: | AIRPULSE, PHIL JONES BASS, pβ |
| Model name: | BG-80 |
| Series Model(s): | N/A |
| Standards: | 47 CFR Part 15.247 |
| Test Method: | KDB 558074 D01 15.247 Meas Guidance v05r02<br>ANSI C63.10-2020 |
| **Date of Test** | |
| Date of test: | 2024-04-02 to 2024-04-07 |
| Test result: | Pass |

| | | |
|---|---|---|
| **Test Engineer** | : | Letter. Lan. |
| | | (Letter Lan) |
| **Reviewed By** | : | David. Lee |
| | | (David Lee) |
| **Approved By** | : | Leon chen |
| | | (Leon Chen) |

# 1 General Description

## 1.1 Description of the EUT

| | |
|---|---|
| Product name: | DOUBLE FOUR PLUS |
| Model name: | BG-80 |
| Series Model(s): | N/A |
| Model difference: | N/A |
| Electrical rating: | Input:<br>DC: Type-C PD 20V/3A<br>AC100-240V~ 50/60Hz 120W |
| Accessories: | Cable:<br>1. Power cable(1.8m)*1<br>2. 3.5mm audio cable(1.7m)*1 |
| Hardware version: | V1.0 |
| Software version: | V1.0 |
| Test sample(s) number: | MTi240322009-01S1001 |
| **RF specification** | |
| Bluetooth version: | V5.1 |
| Operating frequency range: | 2402-2480MHz |
| Channel number: | 79 |
| Modulation type: | GFSK,π/4-DQPSK,8DPSK |
| Antenna(s) type: | PCB Antenna |
| Antenna(s) gain: | 2.59dBi |

## 1.2 Description of test modes

| No. | Emission test modes |
|---|---|
| Mode1 | TX-GFSK |
| Mode2 | TX-π/4-DQPSK |
| Mode3 | TX-8DPSK |

### 1.2.1 Operation channel list

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2432 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | - | - |

**Test Channel List**
**Operation Band: 2400-2483.5 MHz**

| Bandwidth (MHz) | Lowest Channel (LCH) (MHz) | Middle Channel (MCH) (MHz) | Highest Channel (HCH) (MHz) |
|---|---|---|---|
| 1 | 2402 | 2441 | 2480 |

Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

**Test Software: BlueTest3**
For power setting, refer to below table.

| Mode | 2402MHz | 2441MHz | 2480MHz |
|---|---|---|---|
| GFSK | 5 | 5 | 5 |
| π/4-DQPSK | 5 | 5 | 5 |
| 8DPSK | 5 | 5 | 5 |

### 1.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature: | 15°C ~ 35°C |
| Humidity: | 20% RH ~ 75% RH |
| Atmospheric pressure: | 98 kPa ~ 101 kPa |

### 1.4 Description of support units

| **Support equipment list** | | | |
|---|---|---|---|
| Description | Model | Serial No. | Manufacturer |
| / | / | / | / |
| **Support cable list** | | | |
| Description | Length (m) | From | To |
| / | / | / | / |

### 1.5 Measurement uncertainty

| Measurement | Uncertainty |
|---|---|
| Conducted emissions (AMN 150kHz~30MHz) | ±3.1dB |
| Occupied channel bandwidth | ±3 % |
| RF output power, conducted | ±1 dB |
| Time | ±1 % |
| Unwanted Emissions, conducted | ±1 dB |
| Radiated spurious emissions (above 1GHz) | ±5.3dB |
| Radiated spurious emissions (9kHz~30MHz) | ±4.3dB |
| Radiated spurious emissions (30MHz~1GHz) | ±4.7dB |
| Temperature | ±1 °C |
| Humidity | ± 5 % |

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

## 2 Summary of Test Result

| No. | Item | Requirement | Result |
|---|---|---|---|
| 1 | Antenna requirement | 47 CFR 15.203 | Pass |
| 2 | Conducted Emission at AC power line | 47 CFR 15.207(a) | Pass |
| 3 | Occupied Bandwidth | 47 CFR 15.247(a)(1) | Pass |
| 4 | Maximum Conducted Output Power | 47 CFR 15.247(b)(1) | Pass |
| 5 | Channel Separation | 47 CFR 15.247(a)(1) | Pass |
| 6 | Number of Hopping Frequencies | 47 CFR 15.247(a)(1)(iii) | Pass |
| 7 | Dwell Time | 47 CFR 15.247(a)(1)(iii) | Pass |
| 8 | RF conducted spurious emissions and band edge measurement | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| 9 | Band edge emissions (Radiated) | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| 10 | Radiated emissions (below 1GHz) | 47 CFR 15.247(d), 15.209, 15.205 | Pass |
| 11 | Radiated emissions (above 1GHz) | 47 CFR 15.247(d), 15.209, 15.205 | Pass |

# 3 Test Facilities and accreditations

## 3.1 Test laboratory

| | |
|---|---|
| Test laboratory: | Shenzhen Microtest Co., Ltd. |
| Test site location: | 101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| Telephone: | (86-755)88850135 |
| Fax: | (86-755)88850136 |
| CNAS Registration No.: | CNAS L5868 |
| FCC Registration No.: | 448573 |
| IC Registration No.: | 21760 |
| CABID: | CN0093 |

# 4 List of test equipment

| No. | Equipment | Manufacturer | Model | Serial No. | Cal. date | Cal. Due |
|---|---|---|---|---|---|---|
| Conducted Emission at AC power line | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI3 | 101368 | 2023-04-26 | 2024-04-25 |
| 2 | Artificial mains network | Schwarzbeck | NSLK 8127 | 183 | 2023-05-05 | 2024-05-04 |
| 3 | Artificial Mains Network | Rohde & Schwarz | ESH2-Z5 | 100263 | 2023-06-03 | 2024-06-02 |
| Emissions in non-restricted frequency bands<br>Occupied Bandwidth<br>Maximum Conducted Output Power<br>Channel Separation<br>Number of Hopping Frequencies<br>Dwell Time | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Band edge emissions (Radiated)<br>Emissions in frequency bands (above 1GHz) | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI7 | 101166 | 2023-04-26 | 2024-04-25 |
| 2 | Double Ridged Broadband Horn Antenna | schwarabeck | BBHA 9120 D | 2278 | 2023-06-17 | 2025-06-16 |
| 3 | Amplifier | Agilent | 8449B | 3008A01120 | 2023-06-26 | 2024-06-25 |
| 4 | Multi-device Controller | TuoPu | TPMDC | / | 2023-05-04 | 2024-05-03 |
| 5 | MXA signal analyzer | Agilent | N9020A | MY54440859 | 2023-06-01 | 2024-05-31 |
| 6 | Horn antenna | Schwarzbeck | BBHA 9170 | 00987 | 2023-06-17 | 2025-06-16 |
| 7 | Pre-amplifier | Space-Dtronics | EWLAN1840 G | 210405001 | 2023-05-04 | 2024-05-03 |
| 8 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| Emissions in frequency bands (below 1GHz) | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI7 | 101166 | 2023-04-26 | 2024-04-25 |
| 2 | TRILOG Broadband Antenna | schwarabeck | VULB 9163 | 9163-1338 | 2023-06-11 | 2025-06-10 |
| 3 | Active Loop Antenna | Schwarzbeck | FMZB 1519 B | 00066 | 2023-06-11 | 2025-06-10 |

| No. | Equipment | Manufacturer | Model | Serial No. | Cal. date | Cal. Due |
|---|---|---|---|---|---|---|
| 4 | Amplifier | Hewlett-Packard | 8447F | 3113A06184 | 2023-04-25 | 2024-04-24 |
| 5 | Multi-device Controller | TuoPu | TPMDC | / | 2023-05-04 | 2024-05-03 |

# 5 Evaluation Results (Evaluation)

## 5.1 Antenna requirement

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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. |

### 5.1.1 Conclusion:

The antenna of the EUT is permanently attached.
The EUT complies with the requirement of FCC PART 15.203.

# 6 Radio Spectrum Matter Test Results (RF)

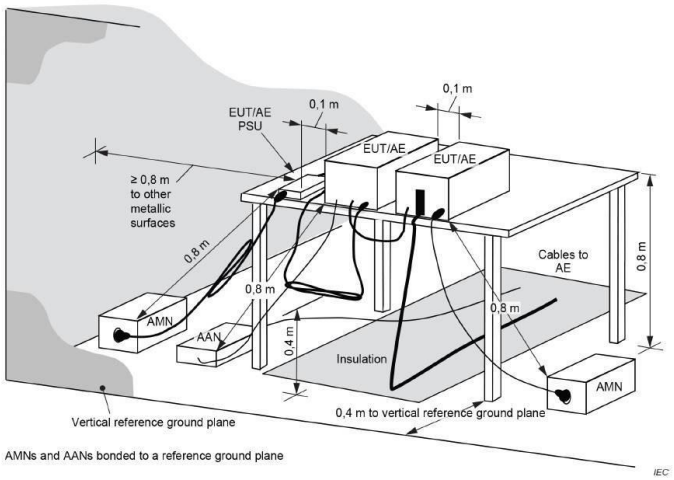
## 6.1 Conducted Emission at AC power line

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). |
| Test Limit: | Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average<br>0.15-0.5: 66 to 56* / 56 to 46*<br>0.5-5: 56 / 46<br>5-30: 60 / 50<br>*Decreases with the logarithm of the frequency. |
| Test Method: | ANSI C63.10-2020 section 6.2 |
| Procedure: | Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices |

### 6.1.1 E.U.T. Operation:

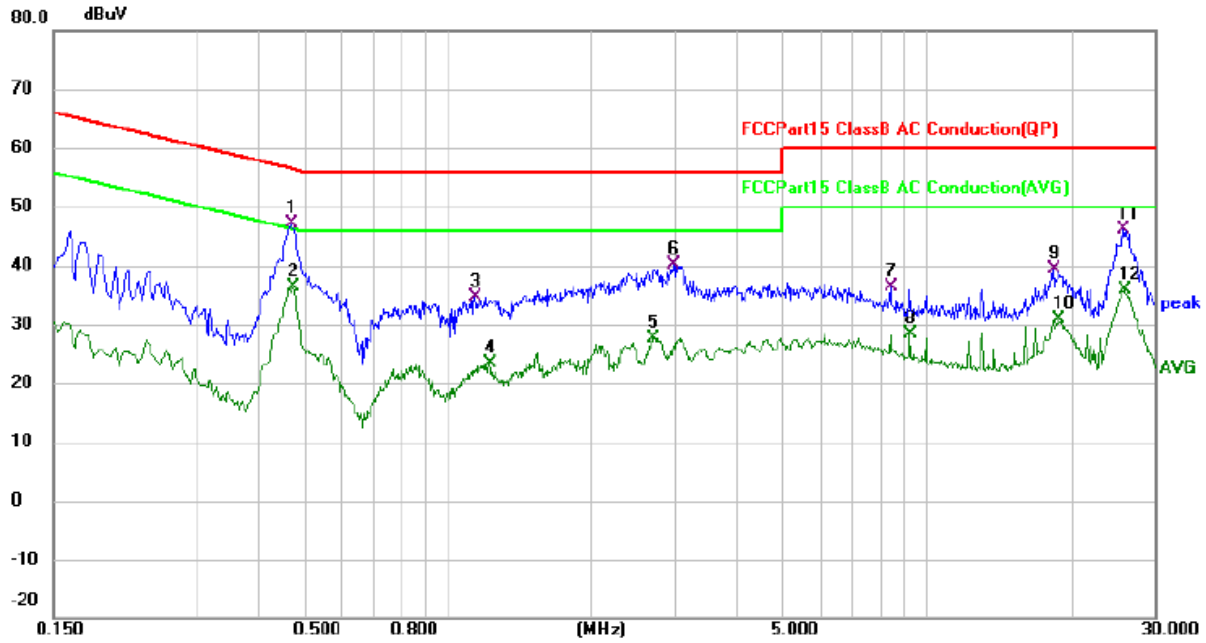
| | | | | | |
|---|---|---|---|---|---|
| Operating Environment: | | | | | |
| Temperature: | 24.2 °C | Humidity: | 58.9 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | All of the listed pre-test mode were tested, only the data of the worst mode (Mode3) is recorded in the report | | | | |

### 6.1.2 Test Setup Diagram:



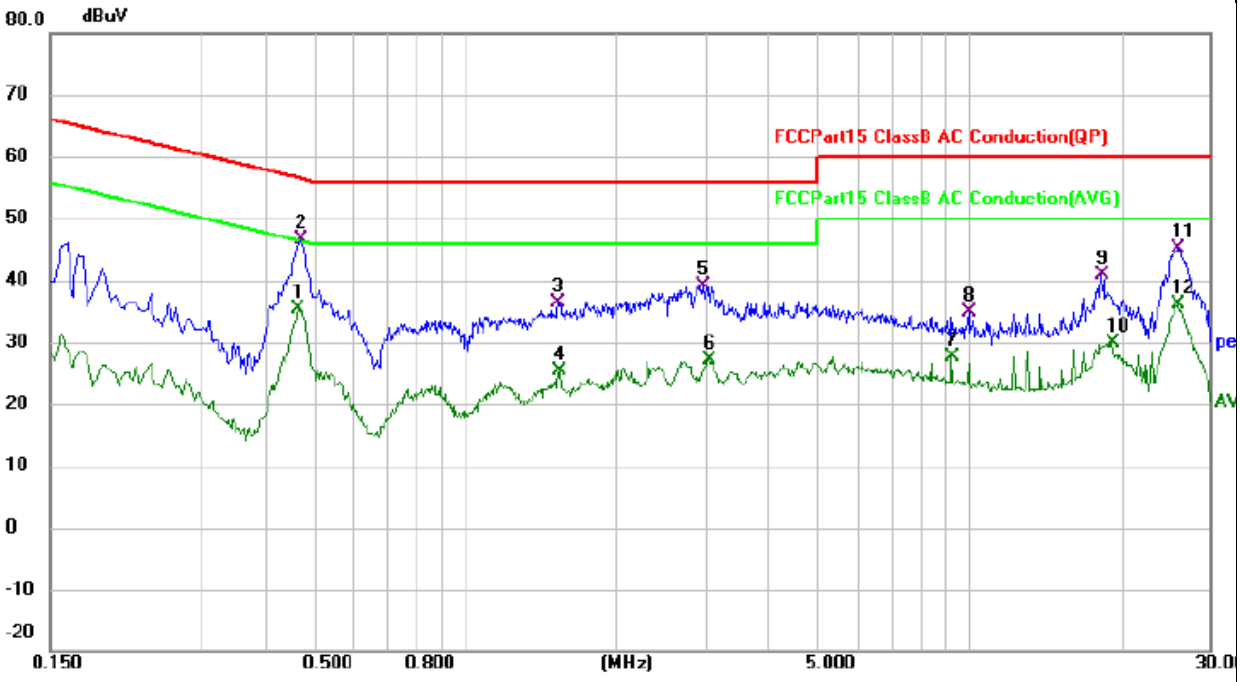
### 6.1.3 Test Data:

Mode3 / Line: Line




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.4700 | 36.34 | 10.72 | 47.06 | 56.51 | -9.45 | QP | |
| 2 | | 0.4740 | 25.57 | 10.72 | 36.29 | 46.44 | -10.15 | AVG | |
| 3 | | 1.1380 | 23.92 | 10.74 | 34.66 | 56.00 | -21.34 | QP | |
| 4 | | 1.2180 | 12.61 | 10.74 | 23.35 | 46.00 | -22.65 | AVG | |
| 5 | | 2.6860 | 16.87 | 10.79 | 27.66 | 46.00 | -18.34 | AVG | |
| 6 | | 2.9620 | 29.44 | 10.80 | 40.24 | 56.00 | -15.76 | QP | |
| 7 | | 8.4500 | 24.83 | 11.56 | 36.39 | 60.00 | -23.61 | QP | |
| 8 | | 9.2180 | 16.92 | 11.35 | 28.27 | 50.00 | -21.73 | AVG | |
| 9 | | 18.3660 | 27.88 | 11.58 | 39.46 | 60.00 | -20.54 | QP | |
| 10 | | 18.9500 | 19.38 | 11.61 | 30.99 | 50.00 | -19.01 | AVG | |
| 11 | | 25.8500 | 34.36 | 11.81 | 46.17 | 60.00 | -13.83 | QP | |
| 12 | | 25.9460 | 24.15 | 11.81 | 35.96 | 50.00 | -14.04 | AVG | |

Mode3 / Line: Neutral




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.4660 | 24.70 | 10.74 | 35.44 | 46.58 | -11.14 | AVG | |
| 2 | * | 0.4700 | 35.97 | 10.74 | 46.71 | 56.51 | -9.80 | QP | |
| 3 | | 1.5339 | 25.49 | 10.78 | 36.27 | 56.00 | -19.73 | QP | |
| 4 | | 1.5380 | 14.61 | 10.78 | 25.39 | 46.00 | -20.61 | AVG | |
| 5 | | 2.9739 | 28.36 | 10.82 | 39.18 | 56.00 | -16.82 | QP | |
| 6 | | 3.0380 | 16.27 | 10.82 | 27.09 | 46.00 | -18.91 | AVG | |
| 7 | | 9.2180 | 16.62 | 11.11 | 27.73 | 50.00 | -22.27 | AVG | |
| 8 | | 9.9860 | 23.71 | 11.15 | 34.86 | 60.00 | -25.14 | QP | |
| 9 | | 18.2420 | 29.21 | 11.56 | 40.77 | 60.00 | -19.23 | QP | |
| 10 | | 19.1580 | 18.15 | 11.61 | 29.76 | 50.00 | -20.24 | AVG | |
| 11 | | 25.9860 | 33.24 | 11.80 | 45.04 | 60.00 | -14.96 | QP | |
| 12 | | 26.0500 | 24.30 | 11.80 | 36.10 | 50.00 | -13.90 | AVG | |

## 6.2 Occupied Bandwidth

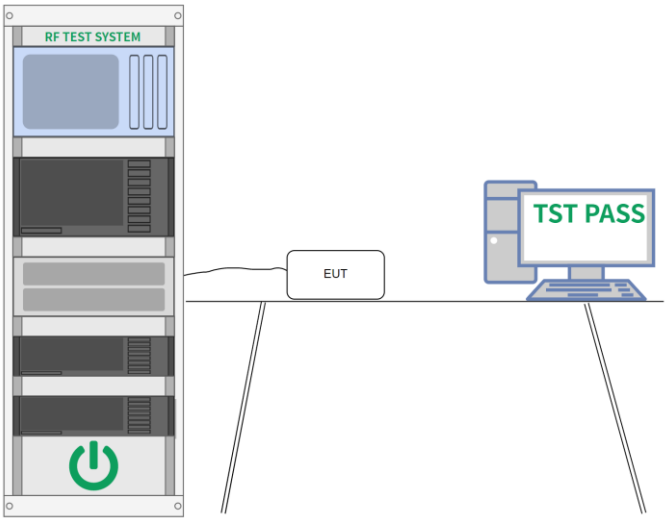
| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(a)(1) |
| Test Limit: | Refer to 47 CFR 15.247(a)(1), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. |
| Test Method: | ANSI C63.10-2020, section 7.8.6, For occupied bandwidth measurements, use the procedure in 6.9.3. Frequency hopping shall be disabled for this test. KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:<br>a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.<br>b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW, unless otherwise specified by the applicable requirement.<br>c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.6.2.<br>d) Step a) through step c) might require iteration to adjust within the specified range.<br>e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max-hold mode (until the trace stabilizes) shall be used.<br>f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.<br>g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.<br>h) The occupied bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). |

### 6.2.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.2.2 Test Setup Diagram:

| |
|---|




### 6.2.3 Test Data:

Please Refer to Appendix for Details.

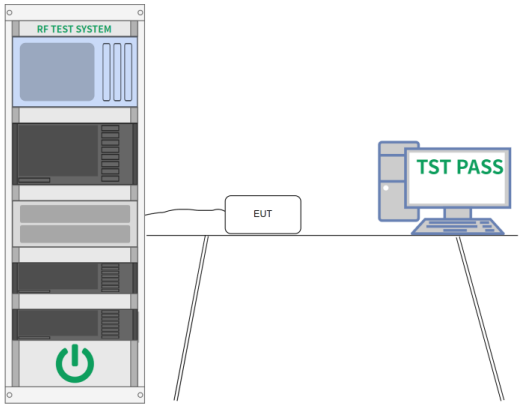
## 6.3 Maximum Conducted Output Power

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(b)(1) |
| Test Limit: | Refer to 47 CFR 15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. |
| Test Method: | ANSI C63.10-2020, section 7.8.5<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. Frequency hopping shall be disabled for this test. Use the following spectrum analyzer settings:<br>a) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.<br>b) RBW > 20 dB bandwidth of the emission being measured.<br>c) VBW ≥ RBW.<br>d) Sweep: No faster than coupled (auto) time.<br>e) Detector function: Peak.<br>f) Trace: Max-hold.<br>g) Allow trace to stabilize.<br>h) Use the marker-to-peak function to set the marker to the peak of the emission.<br>i) The indicated level is the peak output power, after any corrections for external attenuators and cables.<br>j) A spectral plot of the test results and setup description shall be included in the test report.<br>NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer. |

### 6.3.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.3.2 Test Setup Diagram:




### 6.3.3 Test Data:

Please Refer to Appendix for Details.

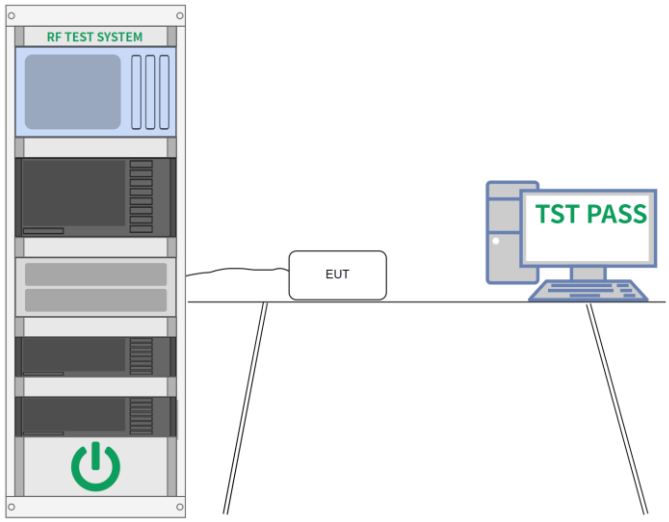
## 6.4 Channel Separation

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(a)(1) |
| Test Limit: | Refer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. |
| Test Method: | ANSI C63.10-2020, section 7.8.2<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:<br>a) Span: Wide enough to capture the peaks of two adjacent channels.<br>b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.<br>c) Video (or average) bandwidth (VBW) ≥ RBW.<br>d) Sweep: No faster than coupled (auto) time.<br>e) Detector function: Peak.<br>f) Trace: Max-hold.<br>g) Allow the trace to stabilize.<br><br>Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A spectral plot of the data shall be included in the test report. |

### 6.4.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.4.2 Test Setup Diagram:




### 6.4.3 Test Data:

Please Refer to Appendix for Details.

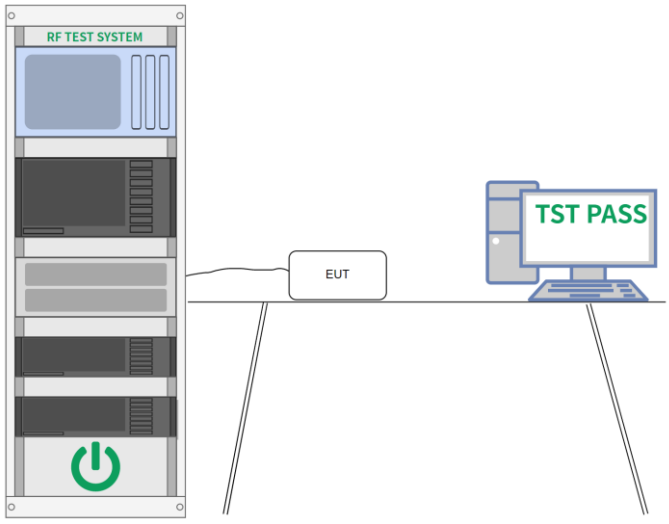
## 6.5 Number of Hopping Frequencies

| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(a)(1)(iii) |
| Test Limit: | Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Method: | ANSI C63.10-2020, section 7.8.3<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:<br>a) Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.<br>b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.<br>c) VBW ≥ RBW.<br>d) Sweep: No faster than coupled (auto) time.<br>e) Detector function: Peak.<br>f) Trace: Max-hold.<br>g) Allow the trace to stabilize.<br><br>It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A spectral plot of the data shall be included in the test report. |

### 6.5.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.5.2 Test Setup Diagram:




### 6.5.3 Test Data:

Please Refer to Appendix for Details.

## 6.6 Dwell Time

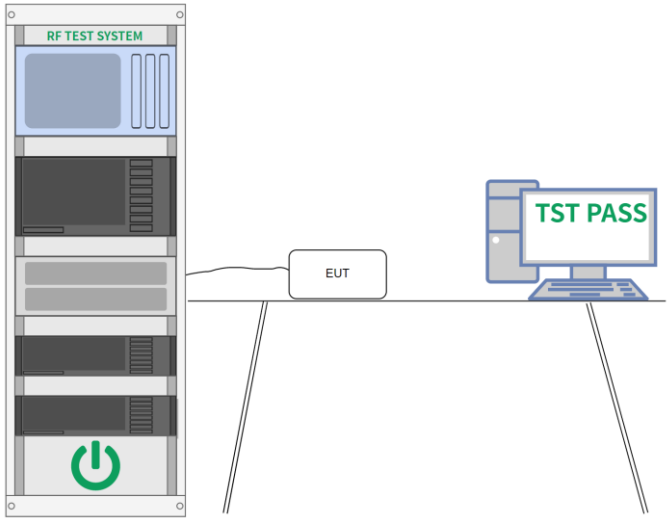
| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(a)(1)(iii) |
| Test Limit: | Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Method: | ANSI C63.10-2020, section 7.8.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | The dwell time per hop on a channel is the time from the start of the first transmission to the end of the last transmission for that hop. If the device has a single transmission per hop then the dwell time is the duration of that transmission. If the device has a multiple transmissions per hop then the dwell time is measured from the start of the first transmission to the end of the last transmission.<br><br>The time of occupancy is the total time that the device dwells on a channel over an observation period specified in the regulatory requirement. To determine the time of occupancy the spectrum analyzer will be configured to measure both the dwell time per hop and the number of times the device transmits on a specific channel in a given period.<br><br>The EUT shall have its hopping function enabled. Compliance with the requirements shall be made with the minimum and with the maximum number of channels enabled. If the dwell time per channel does not vary with the number of channels than compliance with the requirements may be based on the minimum number of channels. If the device supports different dwell times per channel (example Bluetooth devices can dwell on a channel for 1, 3 or 5 time slots) then measurements can be limited to the longest dwell time with the minimum number of channels.<br><br>Use the following spectrum analyzer settings to determine the dwell time per hop:<br><br>a) Span: Zero span, centered on a hopping channel.<br>b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected transmission time per hop.<br>c) Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = 1/hopping rate) should achieve this.<br>d) Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.<br>e) Detector function: Peak.<br>f) Trace: Clear-write, single sweep.<br>g) Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers.<br><br>To determine the number of hops on a channel in the regulatory observation period repeat the measurement using a longer sweep time. When the device uses a single hopping sequence the period of measurement should be |

| | |
|---|---|
| | sufficient to capture at least 2 hops. When the device uses a dynamic hopping sequence, or the sequence varies, the period of measurement may need to capture multiple hops to better determine the average time of occupancy. Count the number of hops on the channel across the sweep time.<br><br>The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time of 500 ms and the regulatory observation period is 10 s, then the number of hops in that ten seconds is 3 / 0.5 × 10, or 60 hops.<br><br>The average time of occupancy is calculated by multiplying the dwell time per hop by the number of hops in the observation period. |

### 6.6.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.6.2 Test Setup Diagram:




### 6.6.3 Test Data:

Please Refer to Appendix for Details.

## 6.7 RF conducted spurious emissions and band edge measurement

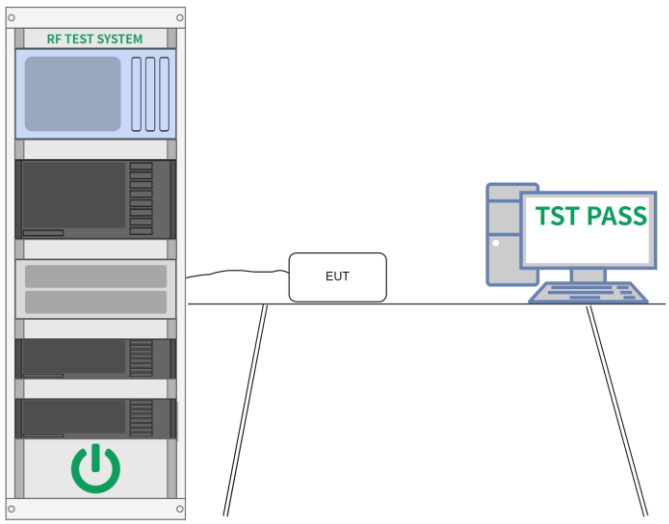
| | |
|---|---|
| Test Requirement: | 47 CFR 15.247(d), 15.209, 15.205 |
| Test Limit: | Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Method: | ANSI C63.10-2020 section 7.8.7<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | 7.8.7.1 General considerations<br>To demonstrate compliance with the relative out-of-band emissions requirements conducted spurious emissions shall be measured for the transmit frequencies, per 5.5 and 5.6, and at the maximum transmit powers. Frequency hopping shall be disabled for this test with the exception of measurements at the allocated band-edges which shall be repeated with hopping enabled.<br><br>Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The frequency range of testing shall span 30 MHz to 10 times the operating frequency and this may be done in a single sweep or, to aid resolution, across a number of sweeps. The resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector.<br><br>The limit is based on the highest in-band level across all channels measured using the same instrument settings (resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector). To help clearly demonstrate compliance a display line may be set at the required offset (typically 20 dB) below the highest in-band level. Where the highest in-band level is not clearly identified in the out-of-band measurements a separate spectral plot showing the in-band level shall be provided.<br><br>When conducted measurements cannot be made (for example a device with integrated, non-removable antenna) radiated measurements shall be used. The reference level for determining the limit shall be established by maximizing the field strength from the highest power channel and measuring using the resolution and video bandwidth settings and peak detector as described above. The field strength limit for spurious emissions outside of restricted-bands shall then be set at the required offset (typically 20 dB) below the highest in-band level. Radiated measurements will follow the standards measurement procedures described in Clause 6 with the exception that the resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector. Note that use of wider measurement bandwidths are acceptable for measuring the spurious emissions provided that the peak detector is used and that the measured value of spurious emissions are compared to the highest in-band level measured with the 100 kHz / 300 kHz bandwidth settings to determine compliance. |

| | |
|---|---|
| | 7.8.7.2 Band-edges<br>Compliance with a relative limit at the band-edges (e.g., −20 dBc) shall be made on the lowest and on the highest channels with frequency hopping disabled and repeated with frequency hopping enabled. For the latter test the hopping sequence shall include the lowest and highest channels.<br><br>For measurements with the hopping disabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of the allocated band-edge.<br><br>For measurements with the hopping enabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of both of the allocated band-edges. This could require separate spectral plots for each band-edge. |

**6.7.1 E.U.T. Operation:**

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 56 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

**6.7.2 Test Setup Diagram:**




**6.7.3 Test Data:**

Please Refer to Appendix for Details.

## 6.8 Band edge emissions (Radiated)

| | |
|---|---|
| Test Requirement: | Refer to 47 CFR 15.247(d), 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 in § 15.209(a)(see § 15.205(c)).` |
| Test Limit: | |

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (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 |

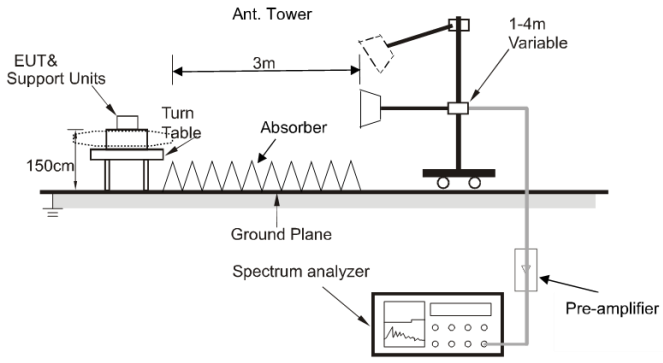
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

| | |
|---|---|
| Test Method: | ANSI C63.10-2020 section 6.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020 section 6.10.5.2 |

### 6.8.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 24 °C | Humidity: | 54 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | All of the listed pre-test mode were tested, only the data of the worst mode (Mode3) is recorded in the report | | | | |
| Note:<br>The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported. | | | | | |

### 6.8.2 Test Setup Diagram:



### 6.8.3 Test Data:

Mode3 / Polarization: Horizontal CH: L

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 52.49 | -12.83 | 39.66 | 74.00 | -34.34 | peak |
| 2 | | 2310.000 | 43.00 | -12.83 | 30.17 | 54.00 | -23.83 | AVG |
| 3 | | 2390.000 | 54.58 | -12.42 | 42.16 | 74.00 | -31.84 | peak |
| 4 | * | 2390.000 | 44.58 | -12.42 | 32.16 | 54.00 | -21.84 | AVG |

Mode3 / Polarization: Vertical / CH: L

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 51.85 | -12.83 | 39.02 | 74.00 | -34.98 | peak |
| 2 | | 2310.000 | 42.53 | -12.83 | 29.70 | 54.00 | -24.30 | AVG |
| 3 | | 2390.000 | 53.72 | -12.42 | 41.30 | 74.00 | -32.70 | peak |
| 4 | * | 2390.000 | 44.35 | -12.42 | 31.93 | 54.00 | -22.07 | AVG |

Mode3 / Polarization: Horizontal / CH: H

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 60.25 | -12.44 | 47.81 | 74.00 | -26.19 | peak |
| 2 | * | 2483.500 | 49.32 | -12.44 | 36.88 | 54.00 | -17.12 | AVG |
| 3 | | 2500.000 | 51.93 | -12.35 | 39.58 | 74.00 | -34.42 | peak |
| 4 | | 2500.000 | 42.81 | -12.35 | 30.46 | 54.00 | -23.54 | AVG |

Mode3 / Polarization: Vertical / CH: H

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 62.42 | -12.44 | 49.98 | 74.00 | -24.02 | peak |
| 2 | * | 2483.500 | 51.25 | -12.44 | 38.81 | 54.00 | -15.19 | AVG |
| 3 | | 2500.000 | 52.23 | -12.35 | 39.88 | 74.00 | -34.12 | peak |
| 4 | | 2500.000 | 42.75 | -12.35 | 30.40 | 54.00 | -23.60 | AVG |

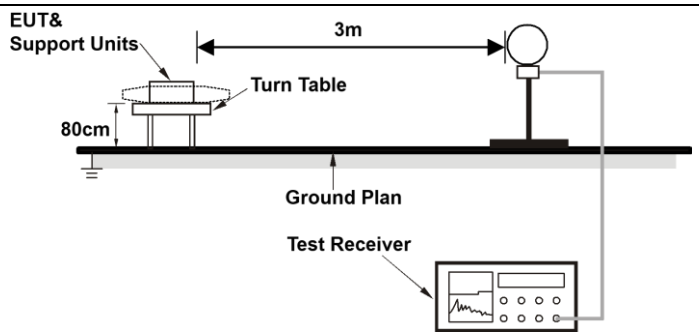
## 6.9 Radiated emissions (below 1GHz)

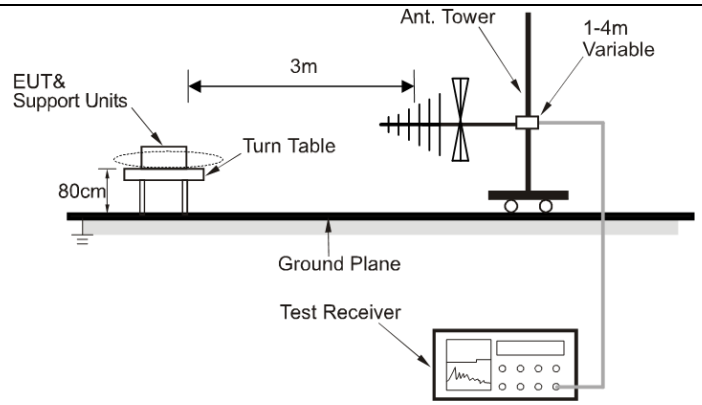
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.<br>In the emission table above, the tighter limit applies at the band edges.<br>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
</table>

### 6.9.1 E.U.T. Operation:

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>24 °C</td><td>Humidity:</td><td>54 %</td><td>Atmospheric Pressure:</td><td>101 kPa</td></tr>
<tr><td>Pre test mode:</td><td colspan="5">Mode1, Mode2, Mode3</td></tr>
<tr><td>Final test mode:</td><td colspan="5">All of the listed pre-test mode were tested, only the data of the worst mode (Mode3) is recorded in the report</td></tr>
<tr><td colspan="6">Note:<br>The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.<br>All modes of operation of the EUT were investigated, and only the worst-case results are reported.<br>There were no emissions found below 30MHz within 20dB of the limit.</td></tr>
</table>

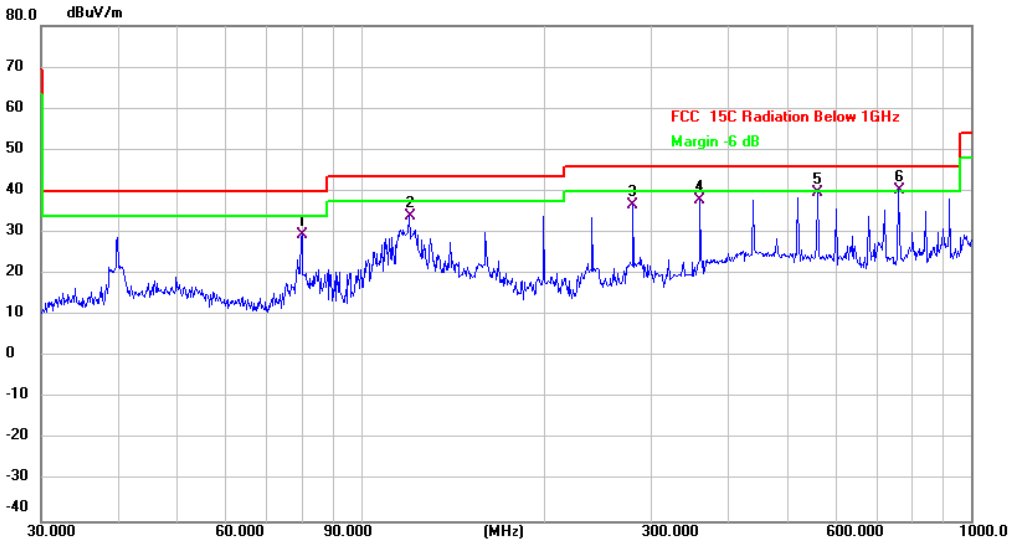
### 6.9.2 Test Setup Diagram:




Ant. Tower
1-4m
Variable
3m
EUT&
Support Units
Turn Table
80cm
Ground Plane
Test Receiver

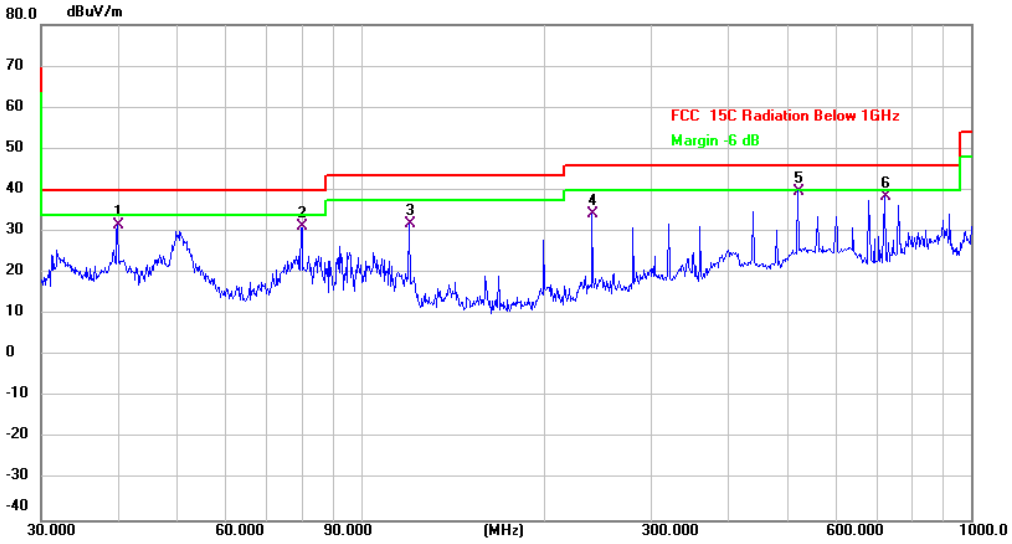
### 6.9.3 Test Data:

Mode3 / Polarization: Horizontal / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 80.0805 | 42.31 | -13.00 | 29.31 | 40.00 | -10.69 | QP | |
| 2 | | 119.8556 | 43.24 | -9.22 | 34.02 | 43.50 | -9.48 | QP | |
| 3 | | 280.0237 | 43.53 | -6.83 | 36.70 | 46.00 | -9.30 | QP | |
| 4 | | 360.4476 | 43.48 | -5.61 | 37.87 | 46.00 | -8.13 | QP | |
| 5 | | 560.6928 | 41.04 | -1.44 | 39.60 | 46.00 | -6.40 | QP | |
| 6 | * | 760.7035 | 40.44 | -0.25 | 40.19 | 46.00 | -5.81 | QP | |

Mode3 / Polarization: Vertical / CH: H




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 39.9942 | 40.06 | -8.65 | 31.41 | 40.00 | -8.59 | QP | |
| 2 | | 80.0806 | 44.10 | -13.00 | 31.10 | 40.00 | -8.90 | QP | |
| 3 | | 119.8556 | 40.99 | -9.22 | 31.77 | 43.50 | -11.73 | QP | |
| 4 | | 239.9874 | 41.14 | -6.89 | 34.25 | 46.00 | -11.75 | QP | |
| 5 | * | 520.8882 | 43.48 | -3.68 | 39.80 | 46.00 | -6.20 | QP | |
| 6 | | 721.7259 | 38.06 | 0.47 | 38.53 | 46.00 | -7.47 | QP | |

## 6.10 Radiated emissions (above 1GHz)

| | |
|---|---|
| Test Requirement: | 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 in § 15.209(a)(see § 15.205(c)).` |
| Test Limit: | |

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (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 |

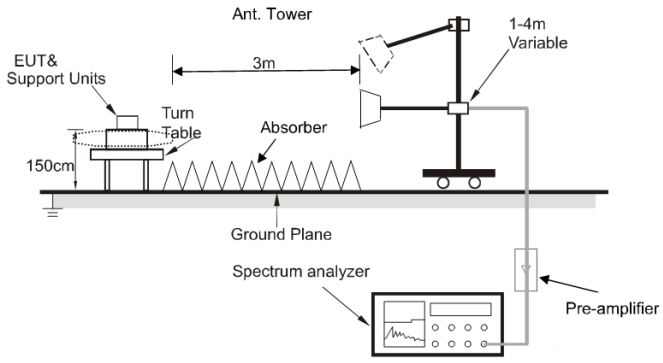
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

| | |
|---|---|
| Test Method: | ANSI C63.10-2020 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| Procedure: | ANSI C63.10-2020 section 6.6.4 |

### 6.10.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 24 °C | Humidity: | 54 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | All of the listed pre-test mode were tested, only the data of the worst mode (Mode3) is recorded in the report | | | | |
| Note: Test frequency are from 1GHz to 25GHz, the amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.<br>All modes of operation of the EUT were investigated, and only the worst-case results are reported. | | | | | |

### 6.10.2 Test Setup Diagram:



### 6.10.3 Test Data:

Mode3 / Polarization: Horizontal / CH: L

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 53.00 | -7.40 | 45.60 | 74.00 | -28.40 | peak |
| 2 | | 4804.000 | 47.02 | -7.40 | 39.62 | 54.00 | -14.38 | AVG |
| 3 | | 7206.000 | 46.20 | 0.96 | 47.16 | 74.00 | -26.84 | peak |
| 4 | | 7206.000 | 40.39 | 0.96 | 41.35 | 54.00 | -12.65 | AVG |
| 5 | | 9608.000 | 48.56 | 2.16 | 50.72 | 74.00 | -23.28 | peak |
| 6 | * | 9608.000 | 42.46 | 2.16 | 44.62 | 54.00 | -9.38 | AVG |

Mode3 / Polarization: Vertical / CH: L

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 52.05 | -7.40 | 44.65 | 74.00 | -29.35 | peak |
| 2 | | 4804.000 | 45.75 | -7.40 | 38.35 | 54.00 | -15.65 | AVG |
| 3 | | 7206.000 | 46.24 | 0.96 | 47.20 | 74.00 | -26.80 | peak |
| 4 | | 7206.000 | 40.40 | 0.96 | 41.36 | 54.00 | -12.64 | AVG |
| 5 | | 9608.000 | 48.46 | 2.16 | 50.62 | 74.00 | -23.38 | peak |
| 6 | * | 9608.000 | 42.29 | 2.16 | 44.45 | 54.00 | -9.55 | AVG |

Mode3 / Polarization: Horizontal / CH: M

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 50.08 | -7.44 | 42.64 | 74.00 | -31.36 | peak |
| 2 | | 4882.000 | 43.98 | -7.44 | 36.54 | 54.00 | -17.46 | AVG |
| 3 | | 7323.000 | 46.96 | 0.79 | 47.75 | 74.00 | -26.25 | peak |
| 4 | | 7323.000 | 41.57 | 0.79 | 42.36 | 54.00 | -11.64 | AVG |
| 5 | | 9764.000 | 48.75 | 3.14 | 51.89 | 74.00 | -22.11 | peak |
| 6 | * | 9764.000 | 42.54 | 3.14 | 45.68 | 54.00 | -8.32 | AVG |

Mode3 / Polarization: Vertical / CH: M

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 48.99 | -7.44 | 41.55 | 74.00 | -32.45 | peak |
| 2 | | 4882.000 | 43.79 | -7.44 | 36.35 | 54.00 | -17.65 | AVG |
| 3 | | 7323.000 | 46.68 | 0.79 | 47.47 | 74.00 | -26.53 | peak |
| 4 | | 7323.000 | 40.56 | 0.79 | 41.35 | 54.00 | -12.65 | AVG |
| 5 | | 9764.000 | 48.66 | 3.14 | 51.80 | 74.00 | -22.20 | peak |
| 6 | * | 9764.000 | 42.55 | 3.14 | 45.69 | 54.00 | -8.31 | AVG |

Mode3 / Polarization: Horizontal / CH: H

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 50.23 | -7.20 | 43.03 | 74.00 | -30.97 | peak |
| 2 | | 4960.000 | 44.46 | -7.20 | 37.26 | 54.00 | -16.74 | AVG |
| 3 | | 7440.000 | 47.62 | 0.98 | 48.60 | 74.00 | -25.40 | peak |
| 4 | | 7440.000 | 41.38 | 0.98 | 42.36 | 54.00 | -11.64 | AVG |
| 5 | | 9920.000 | 47.84 | 3.02 | 50.86 | 74.00 | -23.14 | peak |
| 6 | * | 9920.000 | 41.93 | 3.02 | 44.95 | 54.00 | -9.05 | AVG |

Mode3 / Polarization: Vertical / CH: H

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 50.73 | -7.20 | 43.53 | 74.00 | -30.47 | peak |
| 2 | | 4960.000 | 44.74 | -7.20 | 37.54 | 54.00 | -16.46 | AVG |
| 3 | | 7440.000 | 46.50 | 0.98 | 47.48 | 74.00 | -26.52 | peak |
| 4 | | 7440.000 | 40.38 | 0.98 | 41.36 | 54.00 | -12.64 | AVG |
| 5 | | 9920.000 | 47.41 | 3.02 | 50.43 | 74.00 | -23.57 | peak |
| 6 | * | 9920.000 | 41.24 | 3.02 | 44.26 | 54.00 | -9.74 | AVG |

## Photographs of the test setup

Refer to Appendix - Test Setup Photos

## Photographs of the EUT

Refer to Appendix - EUT Photos

# Appendix

## Appendix A: 20dB Emission Bandwidth

Test Result

| Test Mode | Antenna | Frequency [MHz] | 20db EBW [MHz] |
|---|---|---|---|
| DH5 | Ant1 | 2402 | 0.960 |
| | | 2441 | 0.966 |
| | | 2480 | 0.957 |
| 2DH5 | Ant1 | 2402 | 1.359 |
| | | 2441 | 1.338 |
| | | 2480 | 1.338 |
| 3DH5 | Ant1 | 2402 | 1.314 |
| | | 2441 | 1.308 |
| | | 2480 | 1.326 |

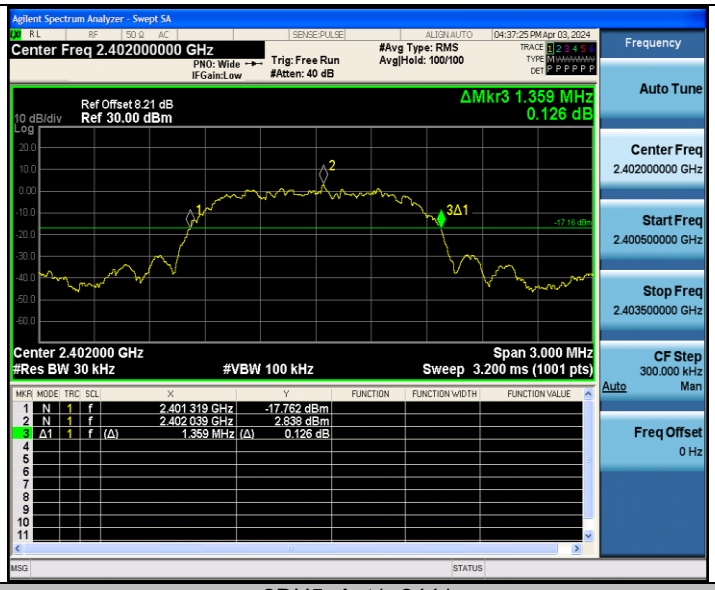
Test Graphs

DH5_Ant1_2402


DH5_Ant1_2441


DH5_Ant1_2480


2DH5_Ant1_2402




2DH5_Ant1_2441


2DH5_Ant1_2480


3DH5_Ant1_2402


3DH5_Ant1_2441


3DH5_Ant1_2480

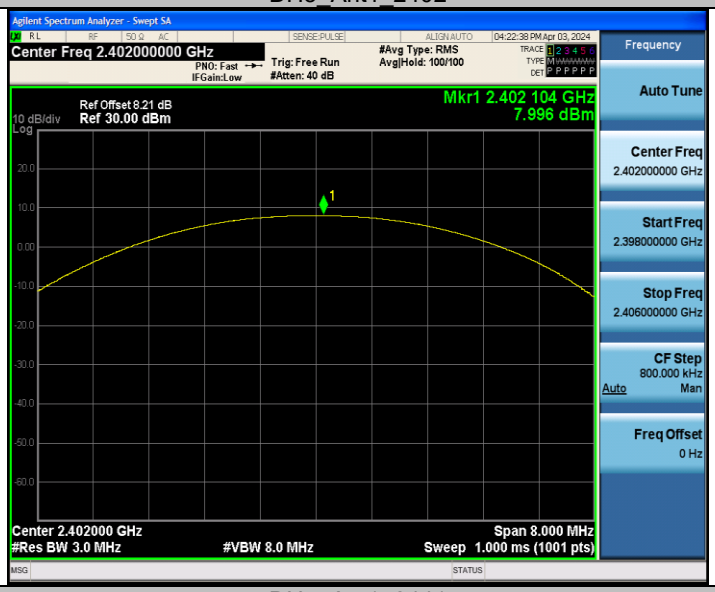
# Appendix B: Maximum conducted output power

Test Result Peak

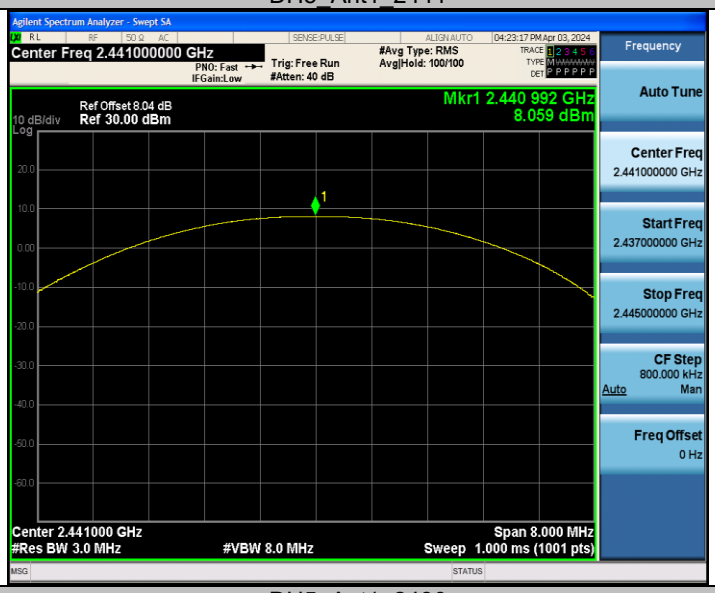
| Test Mode | Antenna | Frequency [MHz] | Conducted Peak Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| DH5 | Ant1 | 2402 | 8.00 | ≤20.97 | PASS |
| | | 2441 | 8.06 | ≤20.97 | PASS |
| | | 2480 | 8.87 | ≤20.97 | PASS |
| 2DH5 | Ant1 | 2402 | 10.33 | ≤20.97 | PASS |
| | | 2441 | 10.28 | ≤20.97 | PASS |
| | | 2480 | 10.91 | ≤20.97 | PASS |
| 3DH5 | Ant1 | 2402 | 10.84 | ≤20.97 | PASS |
| | | 2441 | 10.88 | ≤20.97 | PASS |
| | | 2480 | 11.44 | ≤20.97 | PASS |

Test Graphs

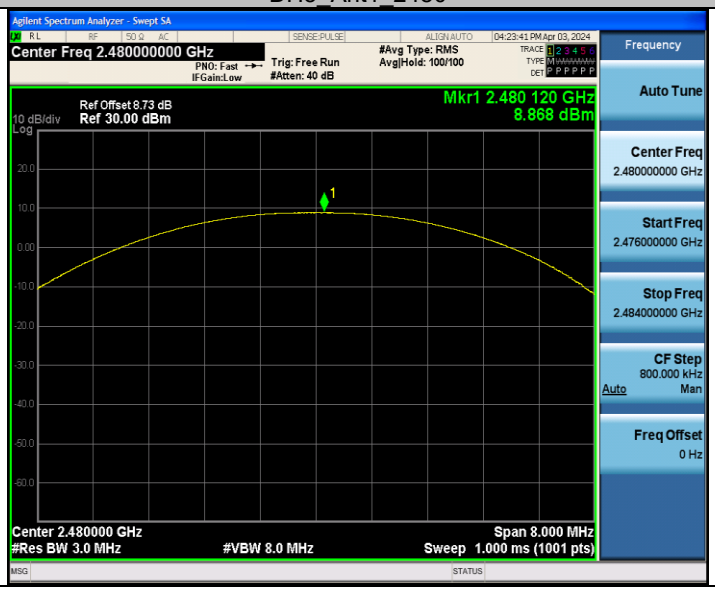
DH5_Ant1_2402



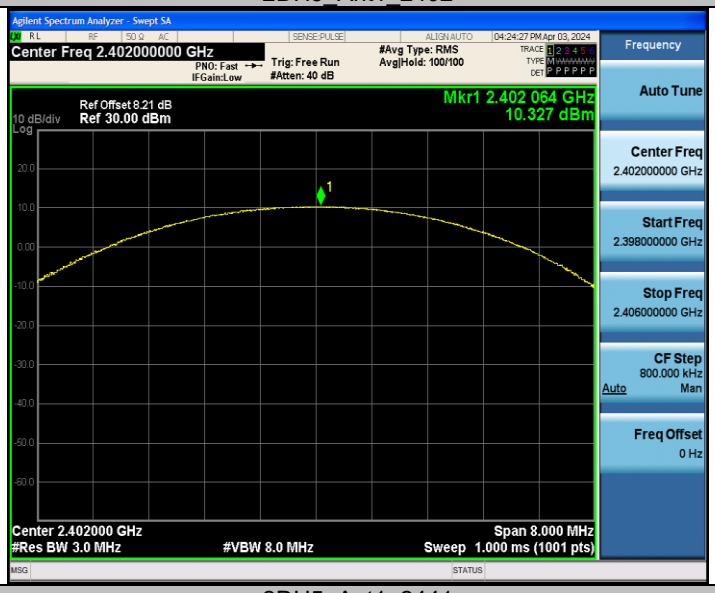

DH5_Ant1_2441



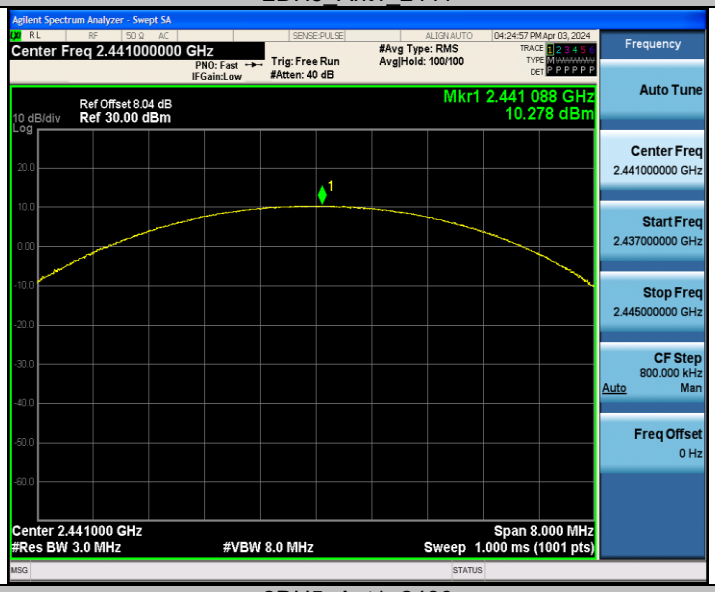

DH5_Ant1_2480



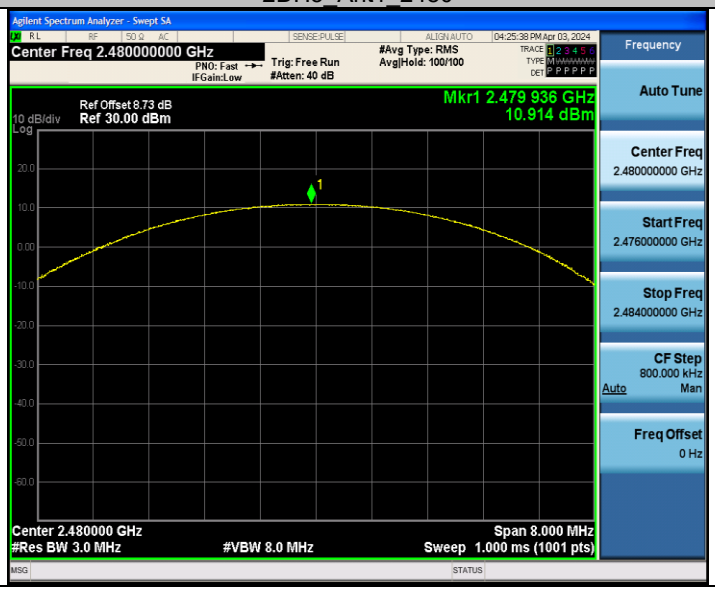
2DH5_Ant1_2402



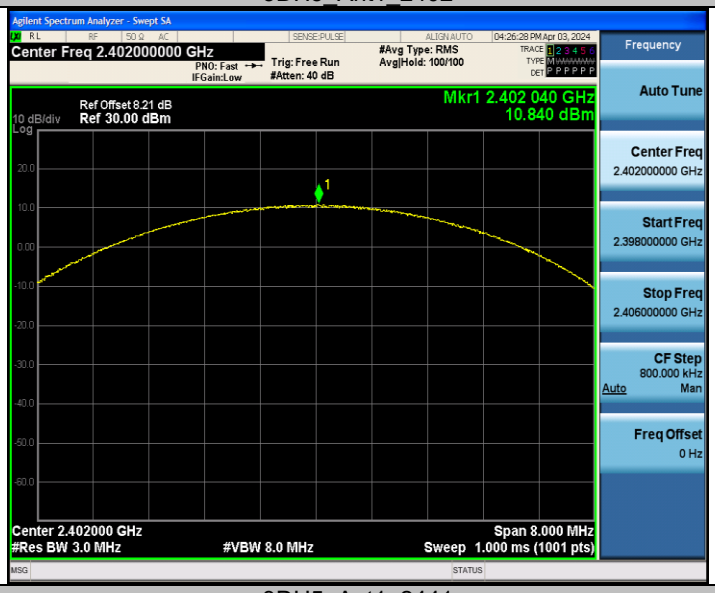

2DH5_Ant1_2441



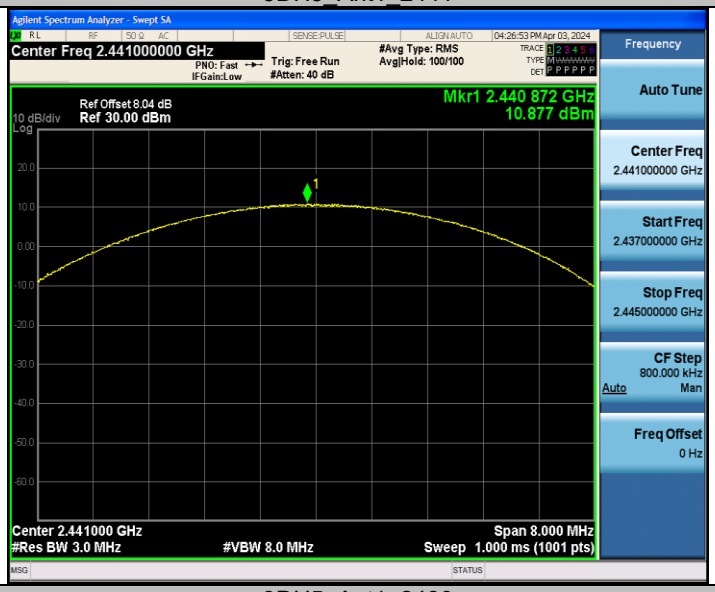

2DH5_Ant1_2480



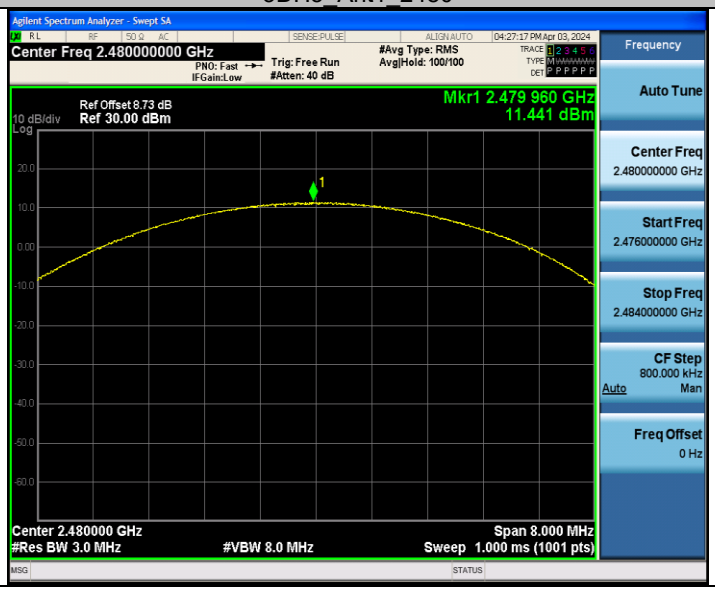
3DH5_Ant1_2402




3DH5_Ant1_2441




3DH5_Ant1_2480



# Appendix C: Carrier frequency separation

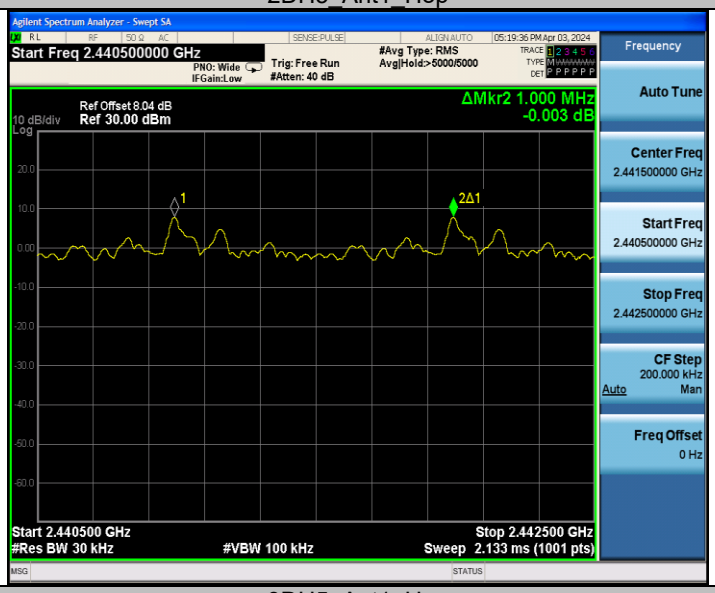
Test Result

| Test Mode | Antenna | Frequency [MHz] | Result [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|---|
| DH5 | Ant1 | Hop | 1 | ≥0.966 | PASS |
| 2DH5 | Ant1 | Hop | 1 | ≥0.906 | PASS |
| 3DH5 | Ant1 | Hop | 1 | ≥0.884 | PASS |

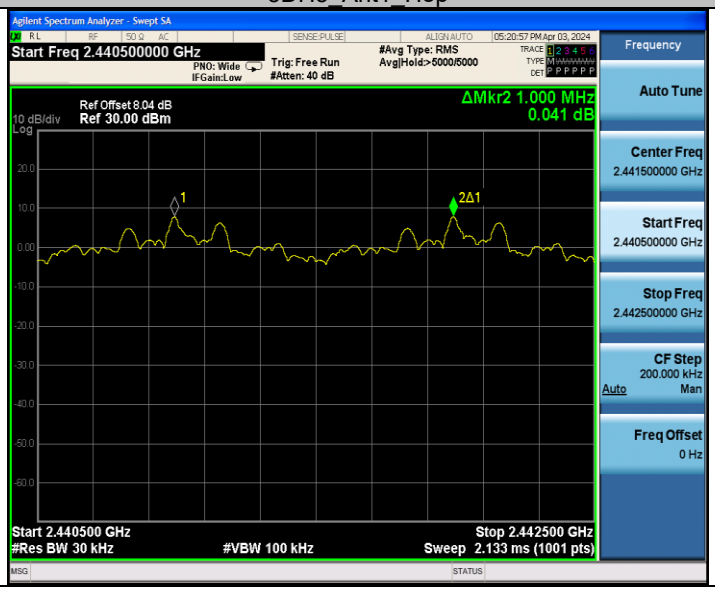
## Test Graphs

DH5_Ant1_Hop


2DH5_Ant1_Hop




3DH5_Ant1_Hop



# Appendix D: Time of occupancy

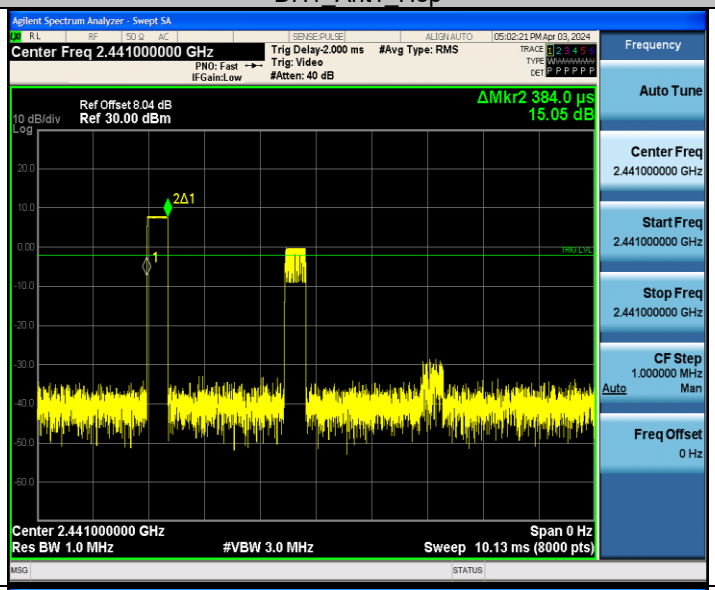
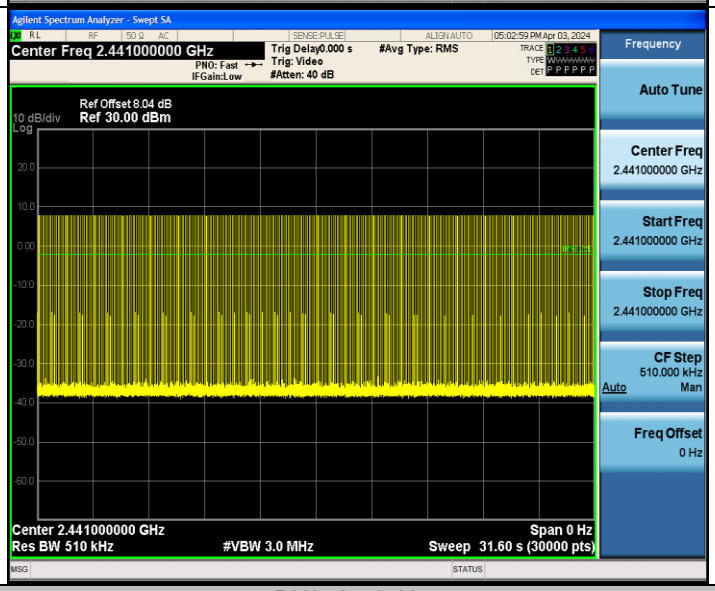
Test Result

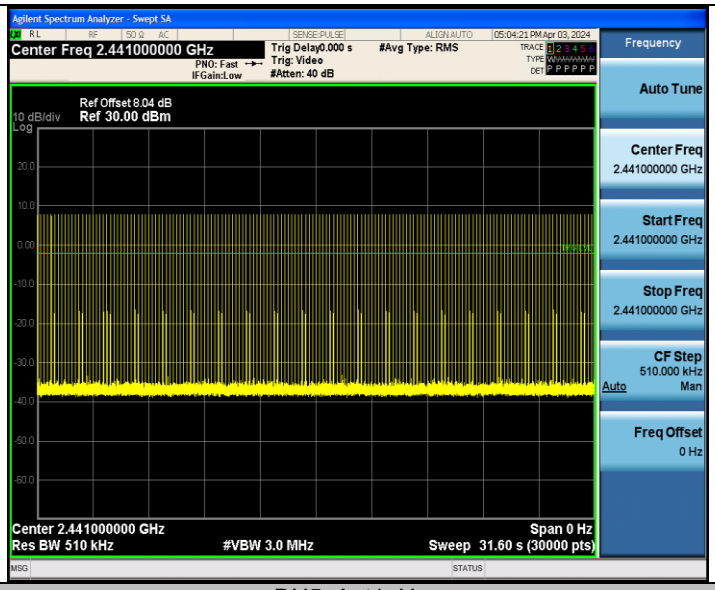
| Test Mode | Antenna | Frequency [MHz] | BurstWidth [ms] | Hops in 31.6s [Num] | Result [s] | Limit [s] | Verdict |
|---|---|---|---|---|---|---|---|
| DH1 | Ant1 | Hop | 0.384 | 319 | 0.122 | ≤0.4 | PASS |
| DH3 | Ant1 | Hop | 1.640 | 160 | 0.262 | ≤0.4 | PASS |
| DH5 | Ant1 | Hop | 2.889 | 107 | 0.309 | ≤0.4 | PASS |
| 2DH1 | Ant1 | Hop | 0.395 | 319 | 0.126 | ≤0.4 | PASS |
| 2DH3 | Ant1 | Hop | 1.647 | 160 | 0.264 | ≤0.4 | PASS |
| 2DH5 | Ant1 | Hop | 2.896 | 107 | 0.31 | ≤0.4 | PASS |
| 3DH1 | Ant1 | Hop | 0.395 | 319 | 0.126 | ≤0.4 | PASS |
| 3DH3 | Ant1 | Hop | 1.644 | 160 | 0.263 | ≤0.4 | PASS |
| 3DH5 | Ant1 | Hop | 2.897 | 107 | 0.31 | ≤0.4 | PASS |

**Notes:**

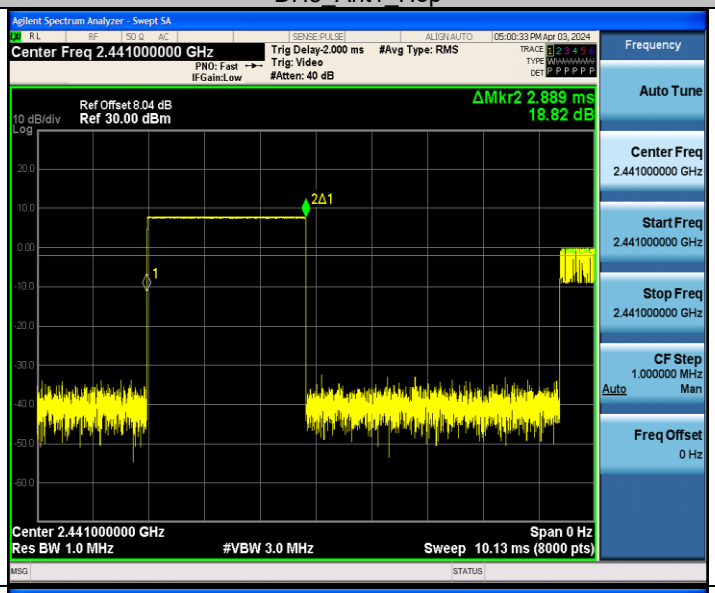
1. Period time = 0.4s * 79 = 31.6s
2. Result (Time of occupancy) = BurstWidth[ms] * Hops in 31.6s [Num]

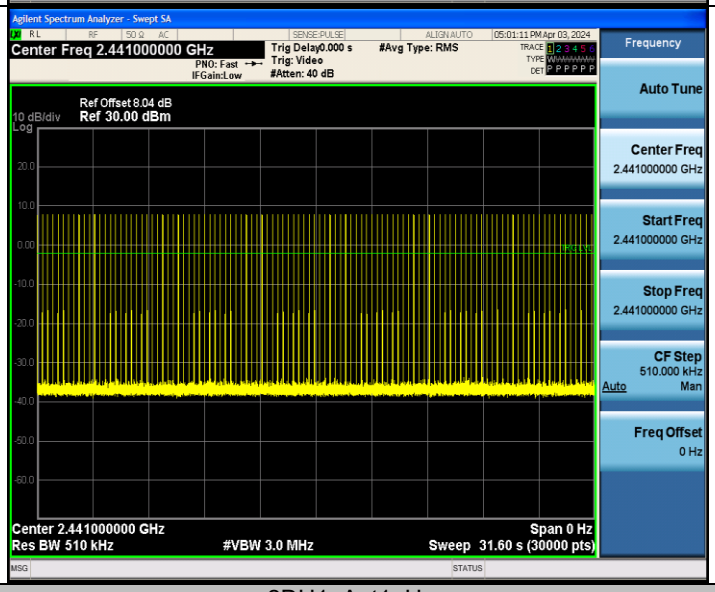
## Test Graphs

| DH1_Ant1_Hop |
| --- |
|  |
|  |
| DH3_Ant1_Hop |
|  |

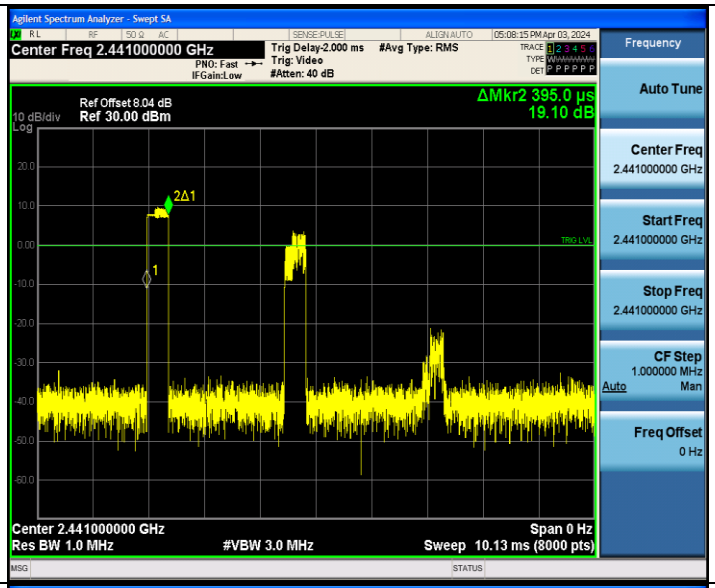


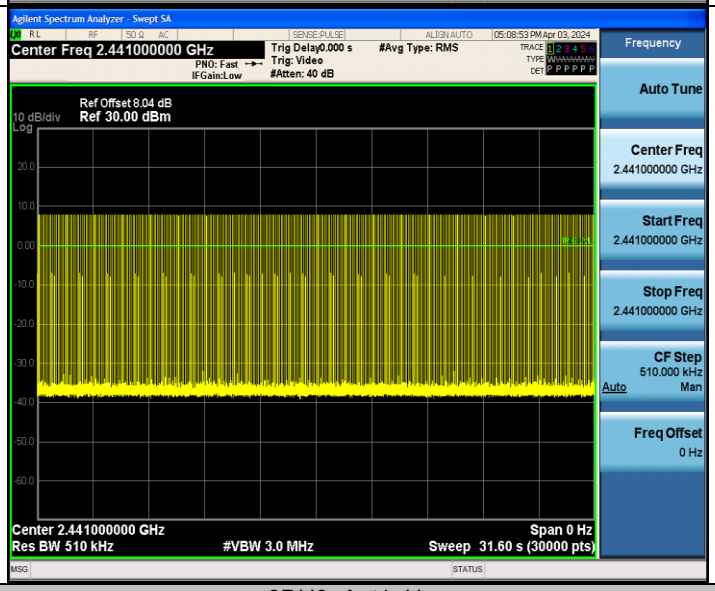

DH5_Ant1_Hop



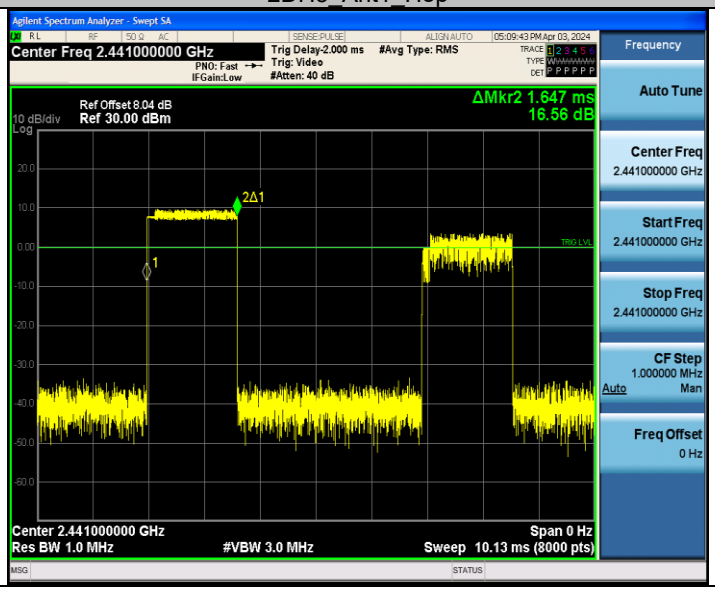



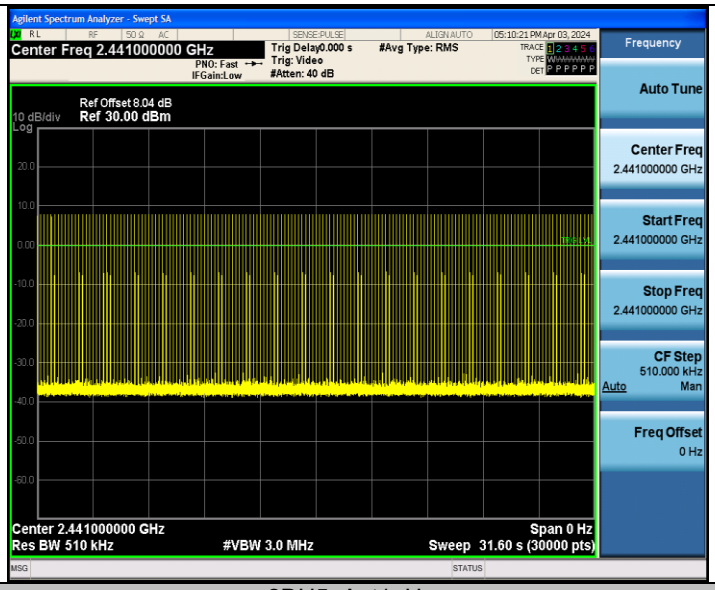

2DH1_Ant1_Hop



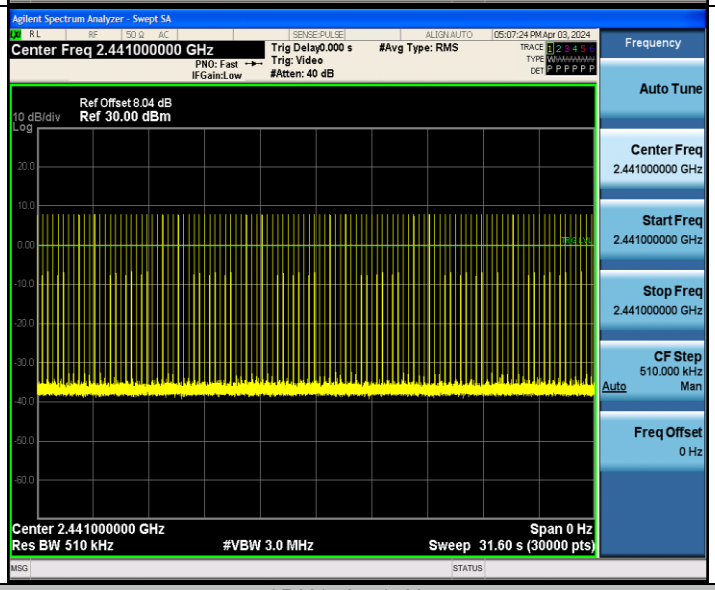




2DH3_Ant1_Hop

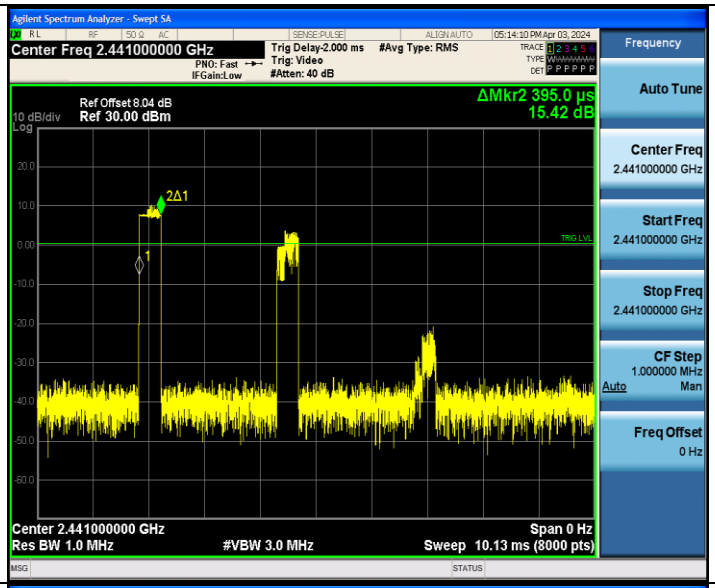


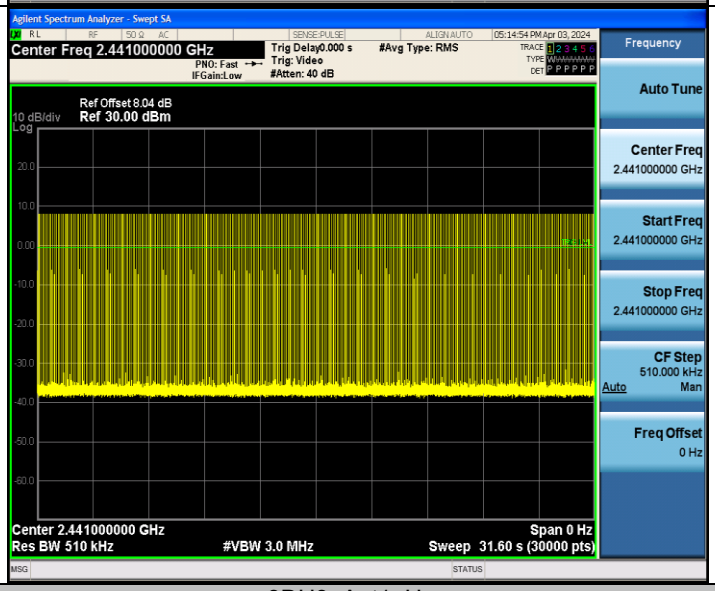



2DH5_Ant1_Hop

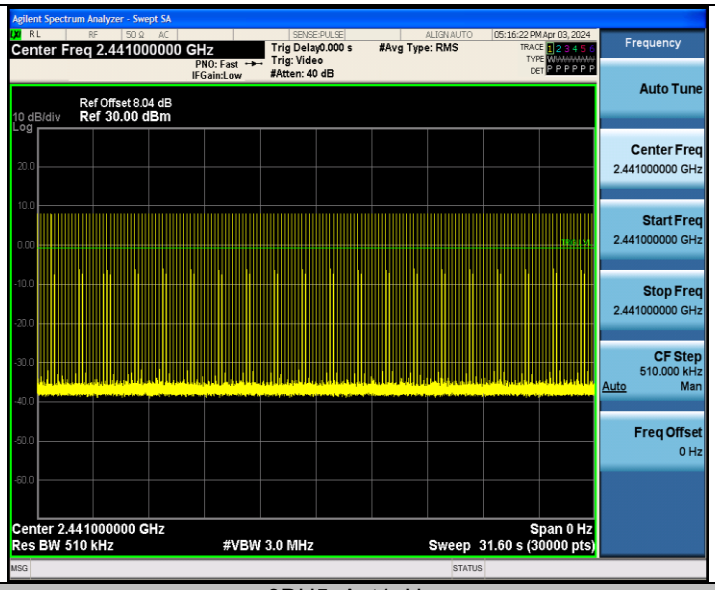




3DH1_Ant1_Hop




3DH3_Ant1_Hop




3DH5_Ant1_Hop