MRT Technology (Taiwan) Co., Ltd
Phone: +886-3-3288388
Fax: +886-3-3288918
Web: www.mrt-cert.com

Report No.: 2211TWN803-U3
Report Version: 1.0
Issue Date: 2022-12-30

# MEASUREMENT REPORT

| | | |
|---|---|---|
| **FCC ID** | : | 2AF82-AP6275S |
| **IC** | : | 23322-AP6275S |
| **APPLICANT** | : | Qbic Technology Co., Ltd. |
| **Application Type** | : | Certification |
| **Product** | : | Module |
| **Model No.** | : | AP6275S |
| **Brand Name** | : | Qbic |
| **FCC Classification** | : | (DTS) Digital Transmission System |
| **FCC Rule Part(s)** | : | Part 15.247 |
| **ISED Standard** | : | RSS-247 Issue 2 |
| **Test Procedure(s)** | : | ANSI C63.10-2013 |
| **Received Date** | : | November 28, 2022 |
| **Test Date** | : | December 8, 2022 ~ December 16, 2022 |

**Tested By** : Fran Chen
( Fran Chen )

**Reviewed By** : Paddy Chen
( Paddy Chen )

**Approved By** : Chenz Ker
( Chenz Ker)

Testing Laboratory
3261

The test results only relate to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10. Test results reported herein relate only to the item(s) tested.

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 2211TWN803-U3 | 1.0 | Original Report | 2022-12-30 | |

# CONTENTS

## §2.1033 General Information

| | |
|---|---|
| **Applicant** | Qbic Technology Co., Ltd. |
| **Applicant Address** | 26F-12, No. 99, Sec. 1, Xintai 5th Rd, Xizhi Dist, New Taipei City, 22175 Taiwan |
| **Manufacturer** | Qbic Technology Co., Ltd. |
| **Manufacturer Address** | 26F-12, No. 99, Sec. 1, Xintai 5th Rd, Xizhi Dist, New Taipei City, 22175 Taiwan |
| **Test Site** | MRT Technology (Taiwan) Co., Ltd |
| **Test Site Address** | No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C) |
| **MRT FCC Registration No.** | 291082 |
| **MRT IC Registration No.** | 21723 |
| **FCC Rule Part(s)** | Part 15.247 |
| **ISED Standard** | RSS-247 Issue 2 |
| **Test Device Serial No.** | #1-1 ☐ Production ☒ Pre-Production ☐ Engineering |

### Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

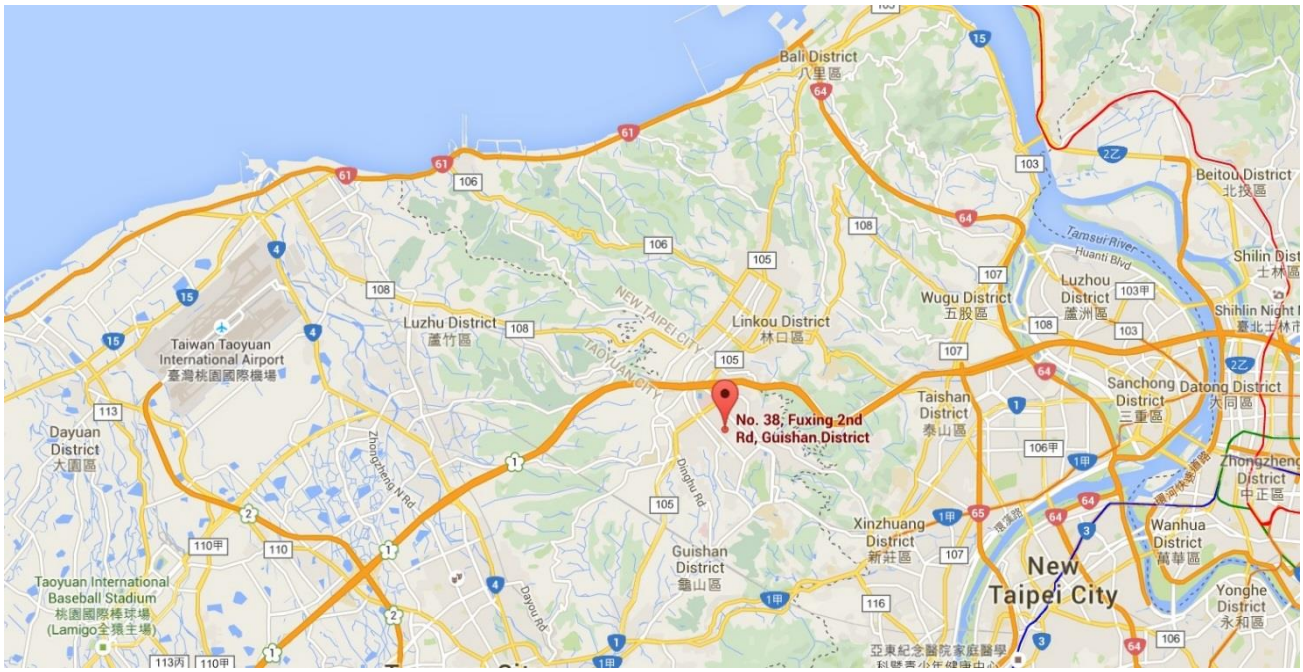
# 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



# 2. PRODUCT INFORMATION

## 2.1. Equipment Description

| | |
|---|---|
| Product Name | Module |
| Model No. | AP6275S |
| Brand Name | Qbic |
| Supports Radios Spec. | **WLAN:**<br>2.4G: 802.11b/g/n-20/ax-20;<br>5G: 802.11a/n-20/ac-20/ax-20/n-40/ac-40/ax-40/ac-80/ax-80, Band 1~4<br>**WPAN:**<br>Bluetooth Dual Mode: V5.3 |
| Wi-Fi Specification | 802.11b/g/n/ax (2TX/2RX) |
| Frequency Range | **2.4GHz:**<br>For 802.11b/g/n-HT20/ax-HE20: 2412 ~ 2462 MHz |
| Type of Modulation: | 802.11b: DSSS<br>802.11g/n: OFDM<br>802.11ax: OFDMA |
| Data Rate: | 802.11b: 1/2/5.5/11Mbps<br>802.11g: 6/9/12/18/24/36/48/54Mbps<br>802.11n: up to 300Mbps<br>802.11ax: up to 286.8Mbps |

## 2.2. Working Frequencies for this Report

802.11b/g/n-20M/ax-HE20

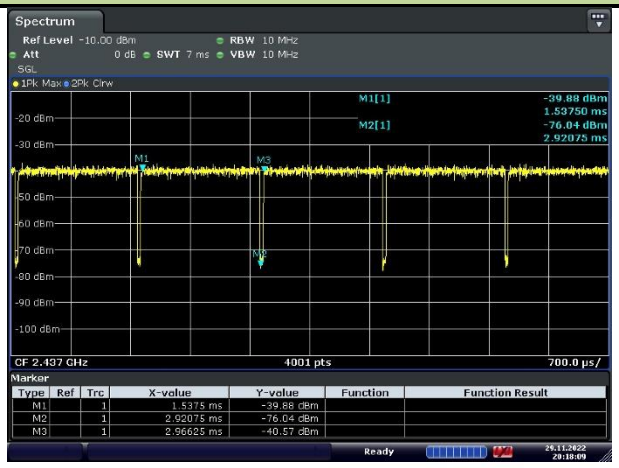
| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| 01 | 2412 MHz | 02 | 2417 MHz | 03 | 2422 MHz |
| 04 | 2427 MHz | 05 | 2432 MHz | 06 | 2437 MHz |
| 07 | 2442 MHz | 08 | 2447 MHz | 09 | 2452 MHz |
| 10 | 2457 MHz | 11 | 2462 MHz | -- | -- |

Duty Cycle

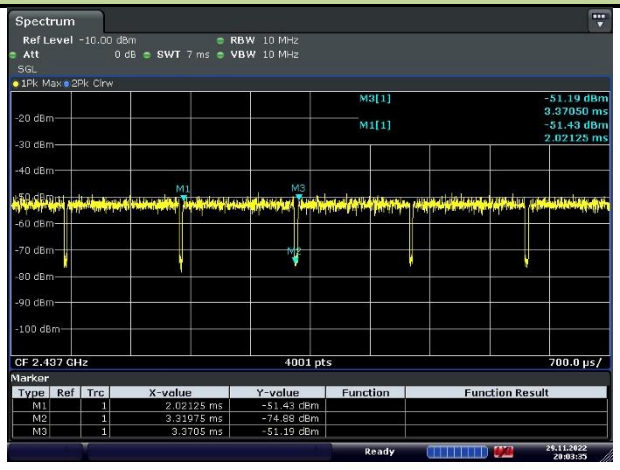
| Test Mode | Duty Cycle |
|---|---|
| 802.11b | 99.80% |
| 802.11g | 96.82% |
| 802.11 n-HT20 | 96.24% |
| 802.11 ax-HE20 | 95.60% |

**802.11 b**

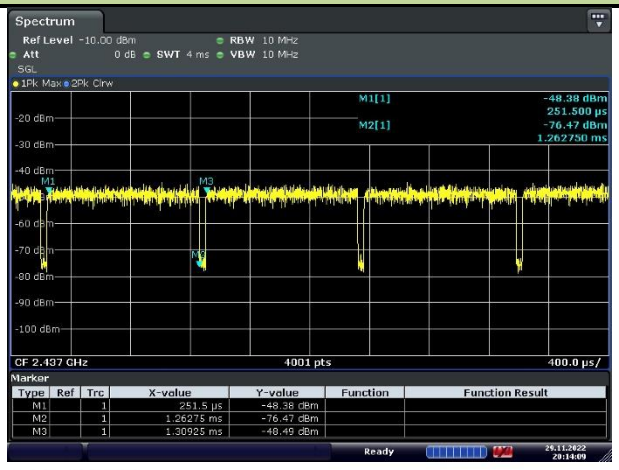

**802.11 g**




**802.11 n20**




**802.11 ax-HE20**



## 2.3. Test Mode

| | |
|---|---|
| Test Mode | Mode 1: Transmit by 802.11b (1Mbps) (CDD mode) |
| | Mode 2: Transmit by 802.11g (6Mbps) (CDD mode) |
| | Mode 3: Transmit by 802.11n-20 (MCS0) (CDD mode) |
| | Mode 4: Transmit by 802.11ax-20 (MCS0) (CDD mode) |
| | Mode 5: Receiver by 802.11n-20 (MCS0) (CDD mode) |

Note:

1. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.

## 2.4. Test Software

The test utility software used during testing was “Ampak RFTestTool ver:7.3”.

## 2.5. Test Configuration

This device was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

## 2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.7. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

# 3. DESCRIPTION of TEST

## 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v05 were used in the measurement of the device.

**Deviation from measurement procedure…….....None**

## 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x3' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment which determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.8.

## 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, which produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

Radiated emissions test results are shown in Section 7.6 & 7.7 .

# 4. ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **Module,** is permanently attached.
- There are no provisions for connection to an external antenna.

**Conclusion:**

The EUT unit complies with the requirement of §15.203.

| Antenna Type | Frequency Band (MHz) | $T_X$ Paths | Max Antenna Gain (dBi) | CDD Directional Gain (dBi) | |
|---|---|---|---|---|---|
| | | | | For Power | For PSD |
| Chip Antenna | 2412 ~ 2462 | 2 | 3.0 | 3.0 | 6.01 |
| | 5150 ~ 5850 | 2 | 3.3 | 3.3 | 6.31 |

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

   If all antennas have the same gain, $G_{ANT}$, Directional gain = $G_{ANT}$ + Array Gain, where Array Gain is as follows.

   • For power spectral density (PSD) measurements on all devices,

   Array Gain = 10 log ($N_{ANT}$/ $N_{SS}$) dB;

   • For power measurements on IEEE 802.11 devices,

   Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. All messages of antenna were declared by manufacturer.

# 5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR2

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Two-Line V-Network | R&S | ENV216 | MRTTWA00019 | 1 year | 2023/3/7 |
| Cable | Rosnol | N1C50-RG400-B1C50-500CM | MRTTWE00013 | 1 year | 2023/6/19 |
| EMI Test Receiver | R&S | ESR3 | MRTTWA00009 | 1 year | 2023/3/9 |

Radiated Emissions – AC2

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Broadband TRILOG Antenna | SCHWARZBECK | VULB 9162 | MRTTWA00001 | 1 year | 2022/12/30 |
| Acitve Loop Antenna | SCHWARZBECK | FMZB 1519B | MRTTWA00002 | 1 year | 2023/5/24 |
| Broadband Hornantenna | RFSPIN | DRH18-E | MRTTWA00087 | 1 year | 2023/5/10 |
| Breitband Hornantenna | SCHWARZBECK | BBHA 9170 | MRTTWA00004 | 1 year | 2023/3/29 |
| Broadband Preamplifier | EMC Instruments corporation | EMC118A45SE | MRTTWA00088 | 1 year | 2023/5/9 |
| Broadband Amplifier | SCHWARZBECK | BBV 9721 | MRTTWA00006 | 1 year | 2023/3/30 |
| Signal Analyzer | R&S | FSV40 | MRTTWA00007 | 1 year | 2023/3/16 |
| EMI Test Receiver | R&S | ESR3 | MRTTWA00009 | 1 year | 2023/3/9 |
| EXA Signal Analyzer | KEYSIGHT | N9010A | MRTTWA00012 | 1 year | 2023/10/5 |
| EXA Signal Analyzer | KEYSIGHT | N9010B | MRTTWA00074 | 1 year | 2023/7/19 |
| Antenna Cable | HUBERSUHNER | SF106 | MRTTWE00034 | 1 year | 2023/6/27 |
| Cable | HUBERSUHNER | EMC105-NM-NM-3000 | MRTTWE00035 | 1 year | 2023/6/27 |

Conducted Test Equipment – SR5

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| EXA Signal Analyzer | KEYSIGHT | N9010A | MRTTWA00012 | 1 year | 2023/10/5 |
| EXA Signal Analyzer | KEYSIGHT | N9010B | MRTTWA00074 | 1 year | 2023/7/19 |
| USB Wideband Power Sensor | KEYSIGHT | U2021XA | MRTTWA00015 | 1 year | 2023/3/16 |

Test Software

| Software | Version | Function |
|---|---|---|
| e3 | 9.160520a | EMI Test Software |
| EMI | V3 | EMI Test Software |

# 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

| |
|---|
| Conducted Emission- Power Line |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>0.15MHz~30MHz: ± 2.53dB |
| Radiated Spurious Emission |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>9kHz~30MHz: ± 3.92dB<br>30MHz~1GHz: ± 4.25dB<br>1GHz~18GHz: ± 4.40dB<br>18GHz~40GHz: ± 4.45dB |
| Frequency Error |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz |
| Conducted Power |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB |
| Conducted Spurious Emission |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):± 2.65 dB |
| Occupied Bandwidth |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±3.3% |
| Temp. / Humidity |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3% |
| DC Voltage |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.3% |

# 7. TEST RESULT

## 7.1. Summary

**Product Name:** **Module**

**FCC Classification:** **(DTS) Digital Transmission System**

| FCC Part Section(s) | IC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|---|
| 15.247(a)(2) | RSS-247 5.2 (a) | 6dB Bandwidth | ≥ 500kHz | Conducted | Pass | Section 7.2 |
| 15.247(b)(3) | RSS-247 5.4 (d) | Output Power | ≤ 30.00dBm | | Pass | Section 7.3 |
| 15.247(e) | RSS-247 5.2 (b) | Power Spectral Density | ≤ 8.00dBm/3kHz | | Pass | Section 7.4 |
| 15.247(d) | RSS-247 5.5 | Out-of-Band Emissions | Conducted ≥ 20dBc | | Pass | Section 7.5 |
| 15.205 15.209 | RSS-247 5.5 | Spurious Emission | < FCC 15.209 limits | Radiated | Pass | Section 7.6 |
| 15.205 15.209 | RSS-247 5.5 | Band Edge Measurement | ≦ 74dBuV/m(Peak) ≦ 54dBuV/m(Average) | | Pass | Section 7.7 |
| 15.207 | RSS-Gen 8.8 | AC Conducted Emissions 150kHz - 30MHz | < FCC 15.207 limits | Line Conducted | Pass | Section 7.8 |

**Notes:**

1) Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
2) For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
3) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
4) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

## 7.2. 6dB Bandwidth Measurement

### 7.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

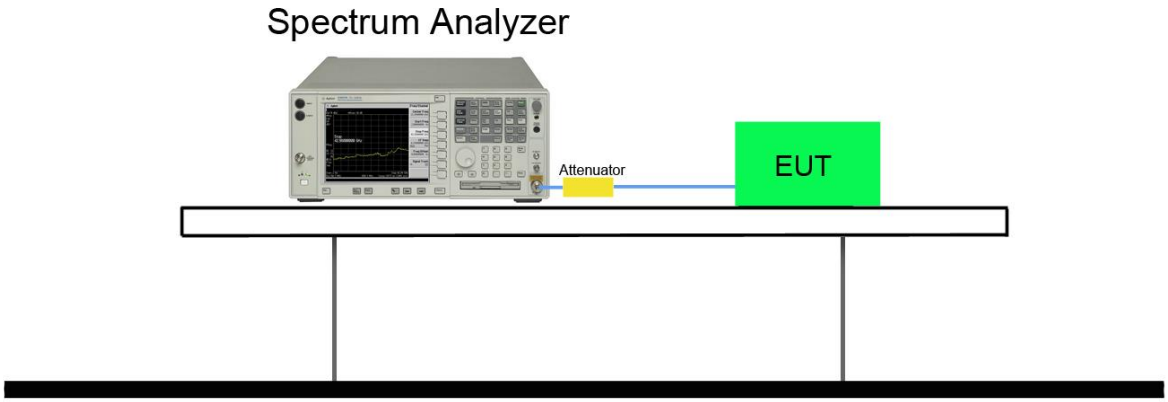
### 7.2.2. Test Procedure used

ANSI C63.10 - 2013 - Section 6.9.3, 11.8 / RSS-Gen 6.7

### 7.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

### 7.2.4. Test Setup

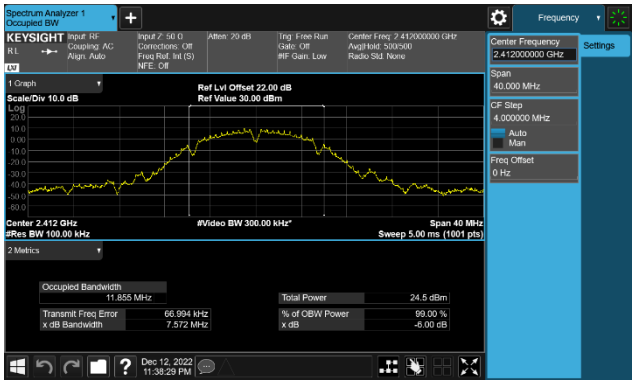
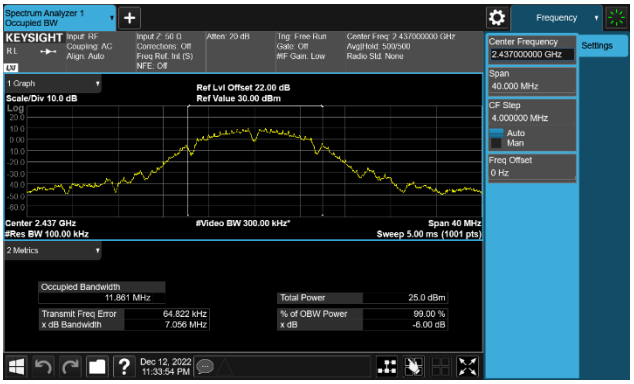
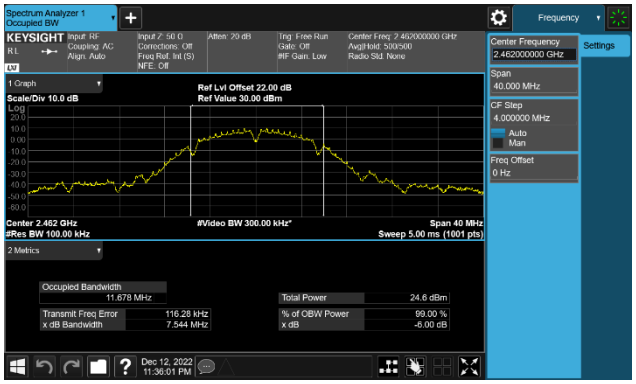
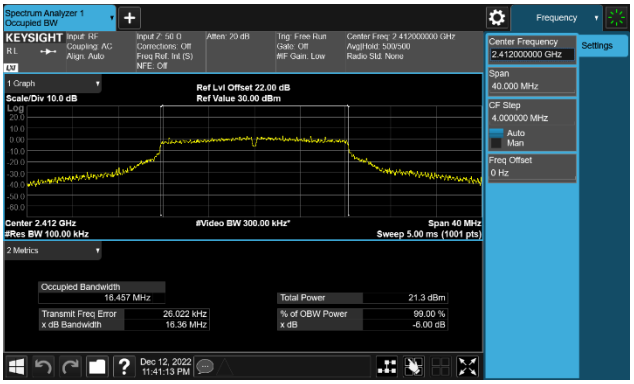


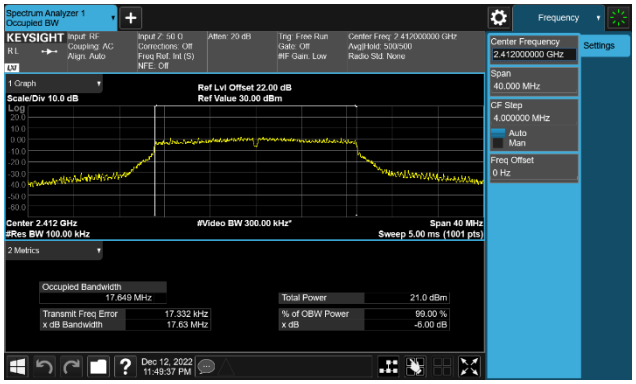
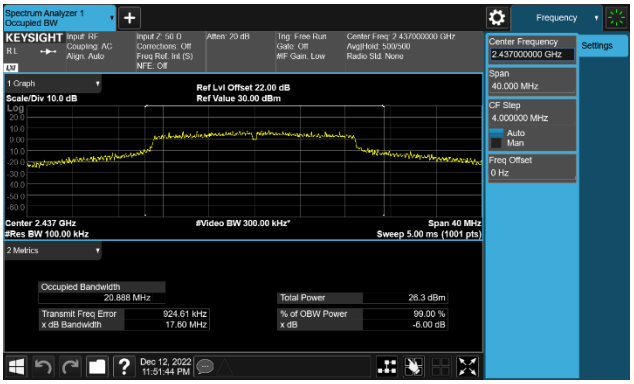
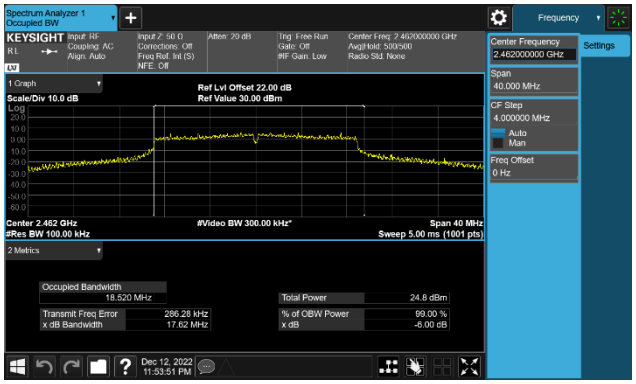
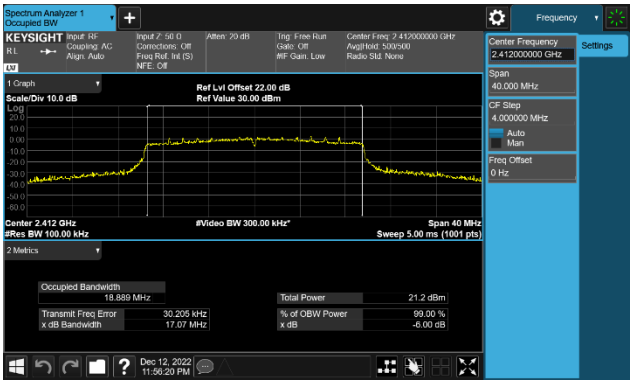
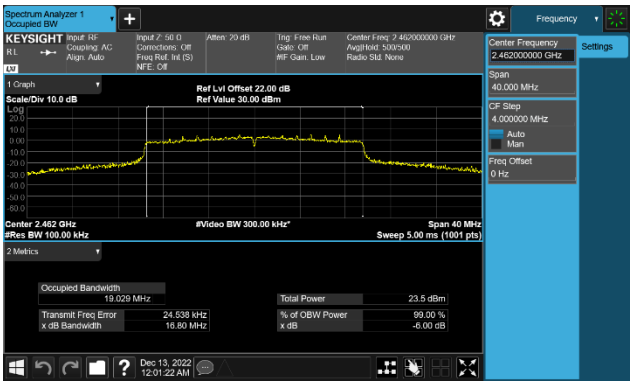
### 7.2.5. Test Result

| Product | Module | Temperature | 25°C |
|---|---|---|---|
| Test Engineer | Jay | Relative Humidity | 54% |
| Test Site | SR5 | Test Date | 2022/12/12~2022/12/13 |

**6dB Bandwidth**

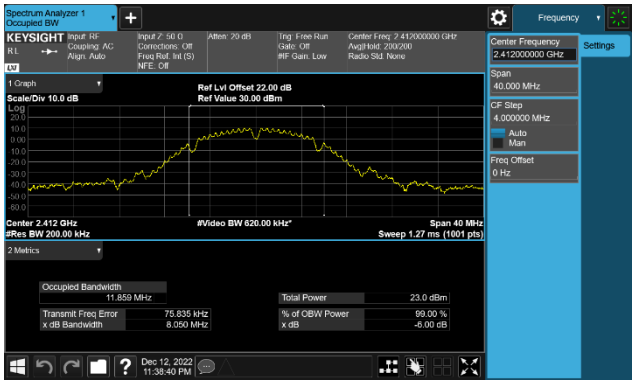
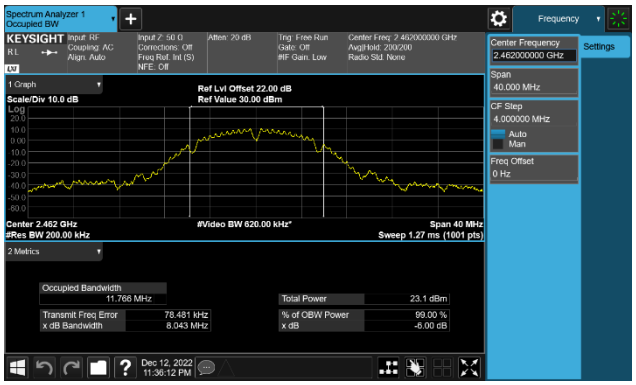
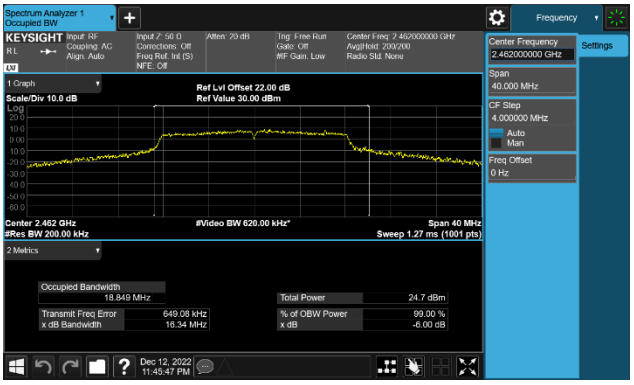
| Test Mode | Channel No. | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|---|
| Ant 1 / Ant 0+1 | | | | | |
| 802.11b | 01 | 2412 | 7.572 | ≥ 0.5 | Pass |
| 802.11b | 06 | 2437 | 7.056 | ≥ 0.5 | Pass |
| 802.11b | 11 | 2462 | 7.544 | ≥ 0.5 | Pass |
| 802.11g | 01 | 2412 | 16.360 | ≥ 0.5 | Pass |
| 802.11g | 06 | 2437 | 16.330 | ≥ 0.5 | Pass |
| 802.11g | 11 | 2462 | 16.370 | ≥ 0.5 | Pass |
| 802.11n-20M | 01 | 2412 | 17.630 | ≥ 0.5 | Pass |
| 802.11n-20M | 06 | 2437 | 17.600 | ≥ 0.5 | Pass |
| 802.11n-20M | 11 | 2462 | 17.620 | ≥ 0.5 | Pass |
| 802.11ax-20M | 01 | 2412 | 17.070 | ≥ 0.5 | Pass |
| 802.11ax-20M | 06 | 2437 | 17.630 | ≥ 0.5 | Pass |
| 802.11ax-20M | 11 | 2462 | 16.800 | ≥ 0.5 | Pass |

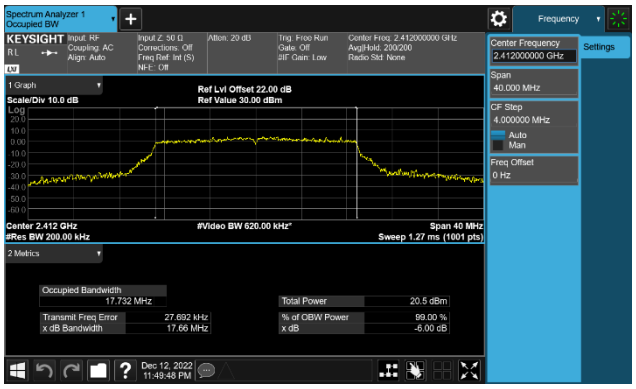
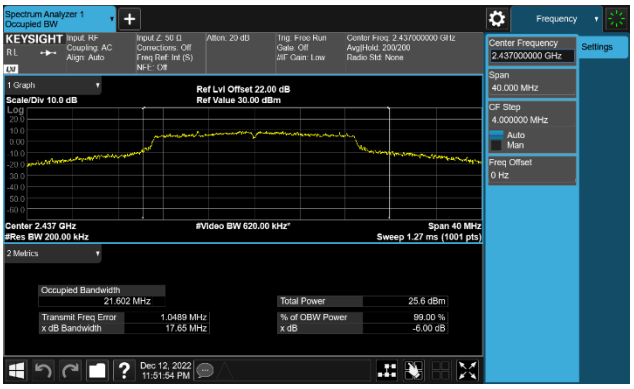
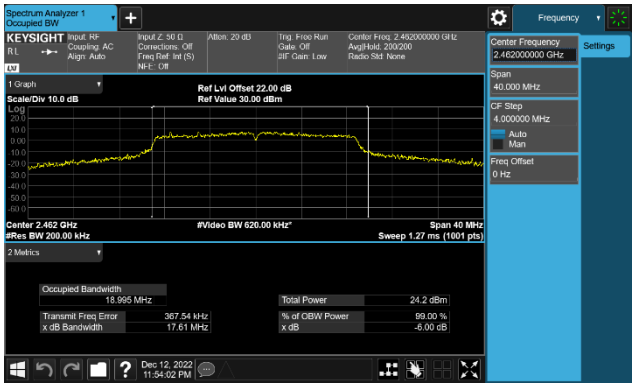
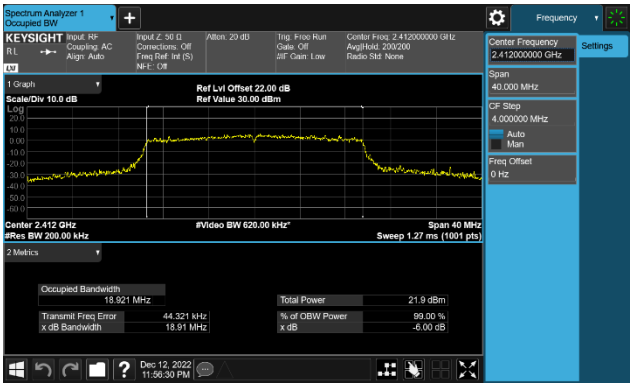
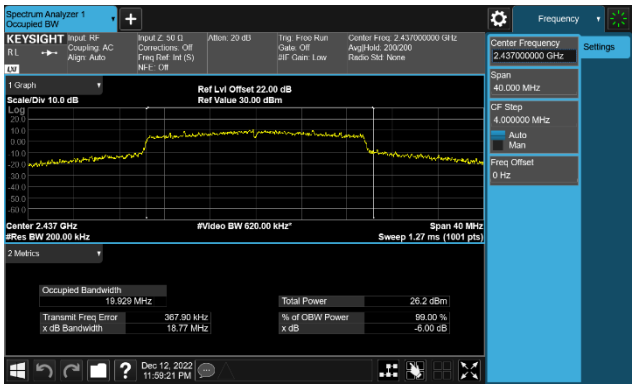
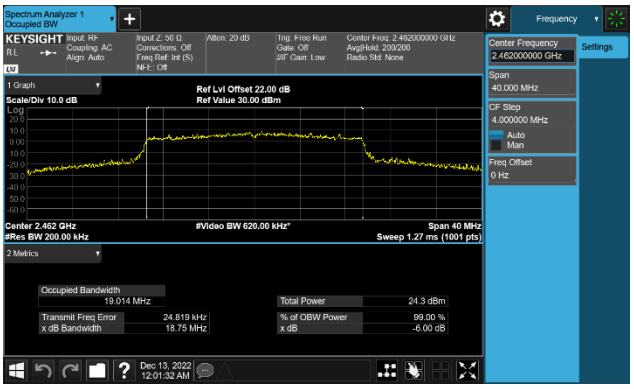
| 802.11 b CH01 (2412MHz) | 802.11 b CH06 (2437MHz) |
|---|---|
|  |  |
| **802.11 b CH11 (2462MHz)** | **802.11 g CH01 (2412MHz)** |
|  |  |
| **802.11 g CH06 (2437MHz)** | **802.11 g CH11 (2462MHz)** |
|  |  |

| 802.11 n-20M CH01 (2412MHz) | 802.11 n-20M CH06 (2437MHz) |
|---|---|
|  |  |
| **802.11 n-20M CH11 (2462MHz)** | **802.11 ax-20M CH01 (2412MHz)** |
|  |  |
| **802.11 ax-20M CH06 (2437MHz)** | **802.11 ax-20M CH11 (2462MHz)** |
|  |  |

**99% Bandwidth**

| Test Mode | Channel No. | Frequency (MHz) | 99% Bandwidth (MHz) | Result |
|---|---|---|---|---|
| Ant 1 / Ant 0+1 | | | | |
| 802.11b | 01 | 2412 | 11.859 | Pass |
| 802.11b | 06 | 2437 | 11.935 | Pass |
| 802.11b | 11 | 2462 | 11.766 | Pass |
| 802.11g | 01 | 2412 | 16.577 | Pass |
| 802.11g | 06 | 2437 | 20.229 | Pass |
| 802.11g | 11 | 2462 | 18.849 | Pass |
| 802.11n-20M | 01 | 2412 | 17.732 | Pass |
| 802.11n-20M | 06 | 2437 | 21.602 | Pass |
| 802.11n-20M | 11 | 2462 | 18.995 | Pass |
| 802.11ax-20M | 01 | 2412 | 18.921 | Pass |
| 802.11ax-20M | 06 | 2437 | 19.929 | Pass |
| 802.11ax-20M | 11 | 2462 | 18.750 | Pass |

| 802.11 b CH01 (2412MHz) | 802.11 b CH06 (2437MHz) |
|---|---|
|  |  |
| **802.11 b CH11 (2462MHz)** | **802.11 g CH01 (2412MHz)** |
|  |  |
| **802.11 g CH06 (2437MHz)** | **802.11 g CH11 (2462MHz)** |
|  |  |

| 802.11 n-20M CH01 (2412MHz) | 802.11 n-20M CH06 (2437MHz) |
|---|---|
|  |  |
| **802.11 n-20M CH06 (2462MHz)** | **802.11 ax-20M CH01 (2412MHz)** |
|  |  |
| **802.11 ax-20M CH06 (2437MHz)** | **802.11 ax-20M CH11 (2462MHz)** |
|  |  |

## 7.3. Output Power Measurement

### 7.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm).

### 7.3.2. Test Procedure Used

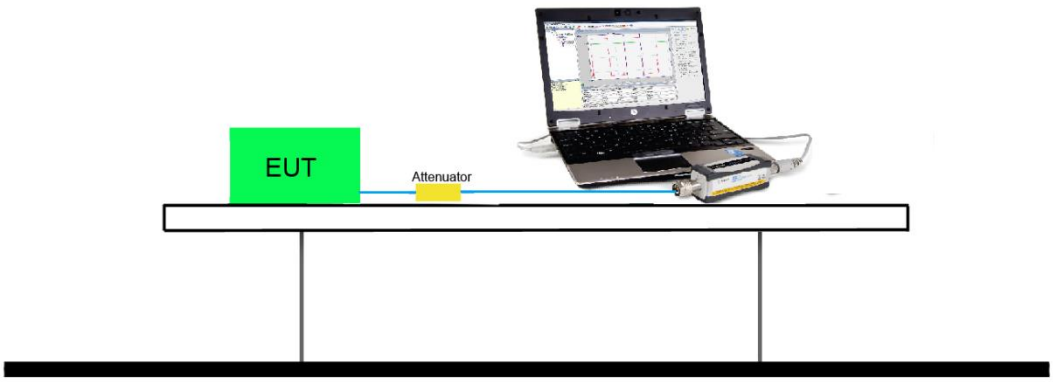
ANSI C63.10 - 2013 - Section 11.9.2.3.2

### 7.3.3. Test Setting

**Average Power Measurement**

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

### 7.3.4. Test Setup



### 7.3.5. Test Result of Output Power

| Product | Module | Temperature | 25°C |
|---|---|---|---|
| Test Engineer | Jay | Relative Humidity | 54% |
| Test Site | SR5 | Test Date | 2022/12/12 |

| Test Mode | Data Rate/ MCS | Channel No. | Freq. (MHz) | Ant 0 Average Power (dBm) | Ant 1 Average Power (dBm) | Total Average Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| CDD Mode | | | | | | | | |
| 802.11b | 1Mbps | 01 | 2412 | 20.57 | 20.92 | 23.76 | ≤ 30.00 | Pass |
| 802.11b | 1Mbps | 06 | 2437 | 20.32 | 20.88 | 23.62 | ≤ 30.00 | Pass |
| 802.11b | 1Mbps | 11 | 2462 | 20.44 | 20.68 | 23.57 | ≤ 30.00 | Pass |
| 802.11g | 6Mbps | 01 | 2412 | 15.36 | 15.61 | 18.50 | ≤ 30.00 | Pass |
| 802.11g | 6Mbps | 06 | 2437 | 18.22 | 18.73 | 21.49 | ≤ 30.00 | Pass |
| 802.11g | 6Mbps | 11 | 2462 | 18.12 | 18.67 | 21.41 | ≤ 30.00 | Pass |
| 802.11n-HT20 | MCS0 | 01 | 2412 | 14.99 | 15.57 | 18.30 | ≤ 30.00 | Pass |
| 802.11n-HT20 | MCS0 | 06 | 2437 | 18.81 | 18.98 | 21.91 | ≤ 30.00 | Pass |
| 802.11n-HT20 | MCS0 | 11 | 2462 | 18.72 | 18.97 | 21.86 | ≤ 30.00 | Pass |
| 802.11ax-HE20 | MCS0 | 01 | 2412 | 15.36 | 15.83 | 18.61 | ≤ 30.00 | Pass |
| 802.11ax-HE20 | MCS0 | 06 | 2437 | 18.22 | 18.19 | 21.22 | ≤ 30.00 | Pass |
| 802.11ax-HE20 | MCS0 | 11 | 2462 | 18.16 | 18.08 | 21.13 | ≤ 30.00 | Pass |

Note: Output power =Reading value on power meter + cable loss。

## 7.4. Power Spectral Density Measurement

### 7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

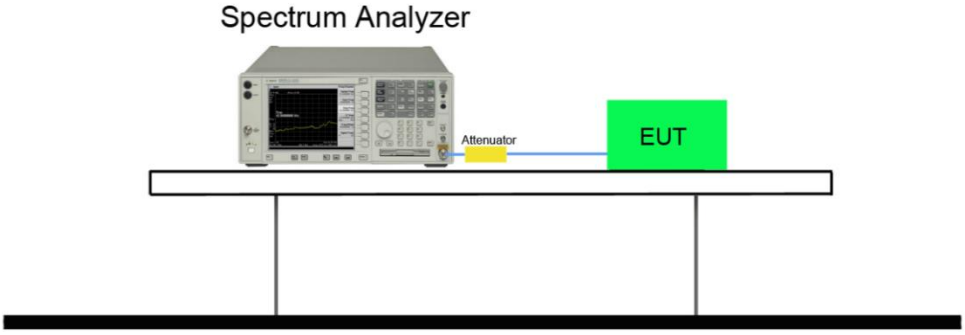
### 7.4.2. Test Procedure Used

ANSI C63.10 - 2013 - Section 11.10.5

### 7.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
8. Sweep time = auto couple.
9. Don’t use sweep triggering. Allow sweep to “free run”.
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced.

### 7.4.4. Test Setup



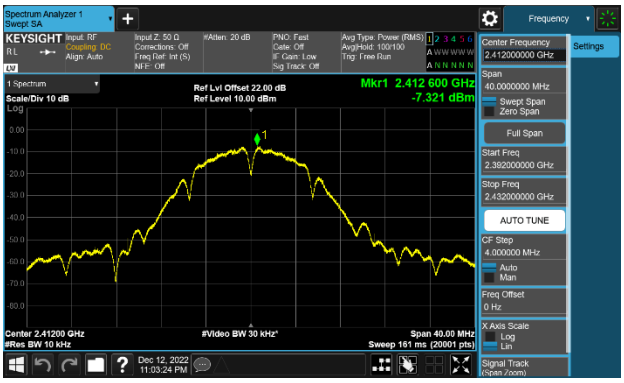
### 7.4.5. Test Result

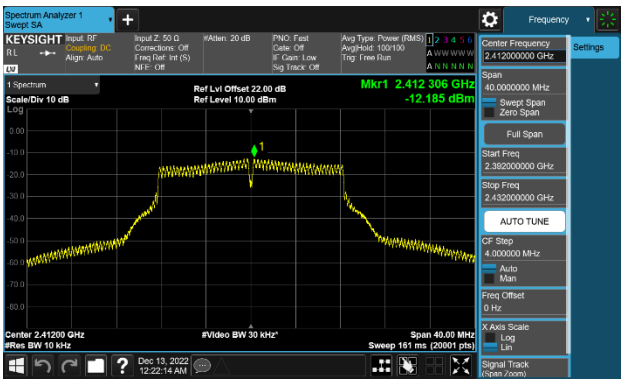
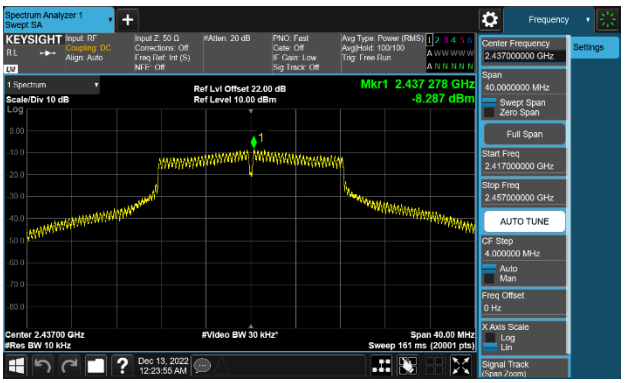
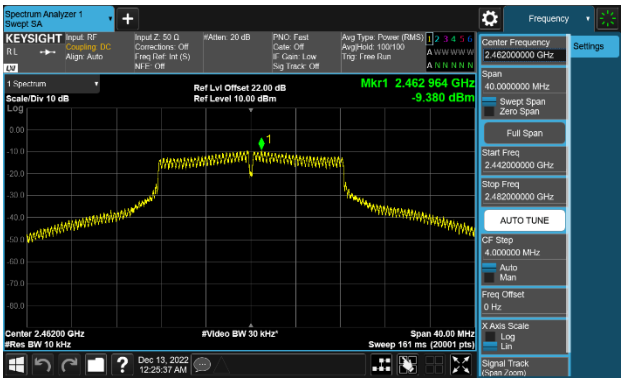
| Product | Module | Temperature | 25°C |
|---|---|---|---|
| Test Engineer | Jay | Relative Humidity | 54% |
| Test Site | SR5 | Test Date | 2022/12/12 |

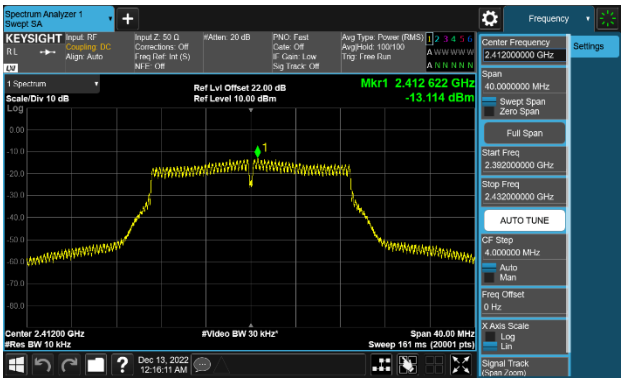
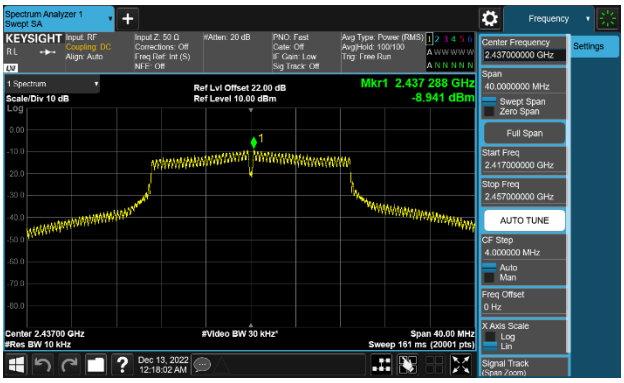
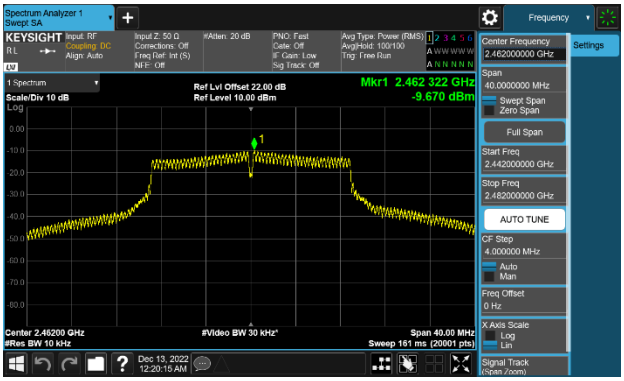
| Test Mode | Data Rate/ MCS | Channel No. | Freq. (MHz) | Ant 0 PSD (dBm/ 10kHz) | Ant 1 PSD (dBm/ 10kHz) | Duty Cycle (%) | Total PSD (dBm/ 10kHz) | Limit (dBm/ 3kHz) | Result |
|---|---|---|---|---|---|---|---|---|---|
| CDD Mode | | | | | | | | | |
| 802.11b | 1Mbps | 01 | 2412 | -7.321 | -7.137 | 99.80% | -4.209 | ≤ 7.99 | Pass |
| 802.11b | 1Mbps | 06 | 2437 | -7.648 | -7.048 | 99.80% | -4.319 | ≤ 7.99 | Pass |
| 802.11b | 1Mbps | 11 | 2462 | -7.789 | -7.083 | 99.80% | -4.403 | ≤ 7.99 | Pass |
| 802.11g | 6Mbps | 01 | 2412 | -12.185 | -12.204 | 96.82% | -9.044 | ≤ 7.99 | Pass |
| 802.11g | 6Mbps | 06 | 2437 | -8.287 | -7.817 | 96.82% | -4.895 | ≤ 7.99 | Pass |
| 802.11g | 6Mbps | 11 | 2462 | -9.380 | -8.526 | 96.82% | -5.781 | ≤ 7.99 | Pass |
| 802.11n-HT20 | MCS0 | 01 | 2412 | -13.114 | -12.490 | 96.24% | -9.614 | ≤ 7.99 | Pass |
| 802.11n-HT20 | MCS0 | 06 | 2437 | -8.941 | -7.517 | 96.24% | -4.994 | ≤ 7.99 | Pass |
| 802.11n-HT20 | MCS0 | 11 | 2462 | -9.670 | -9.013 | 96.24% | -6.152 | ≤ 7.99 | Pass |
| 802.11ax-HE20 | MCS0 | 01 | 2412 | -13.933 | -13.677 | 95.60% | -10.597 | ≤ 7.99 | Pass |
| 802.11ax-HE20 | MCS0 | 06 | 2437 | -10.150 | -9.368 | 95.60% | -6.536 | ≤ 7.99 | Pass |
| 802.11ax-HE20 | MCS0 | 11 | 2462 | -11.541 | -11.012 | 95.60% | -8.063 | ≤ 7.99 | Pass |

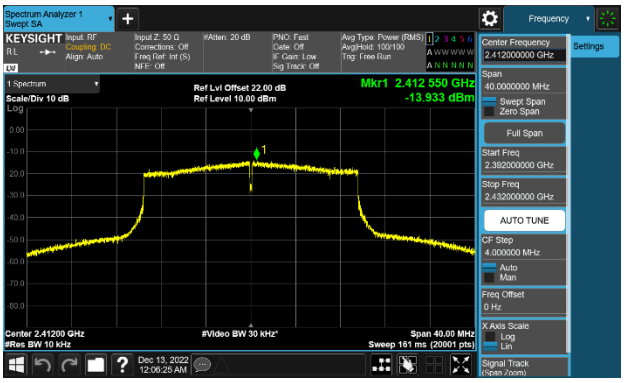
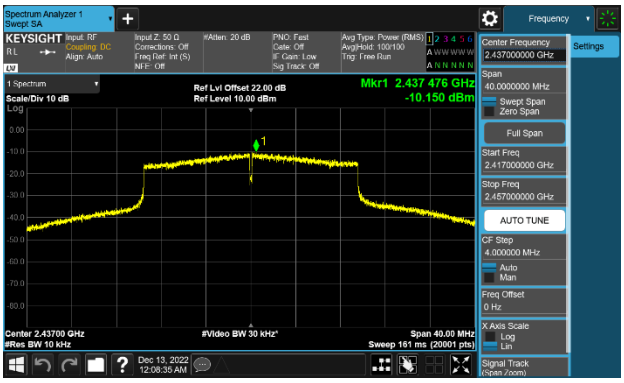
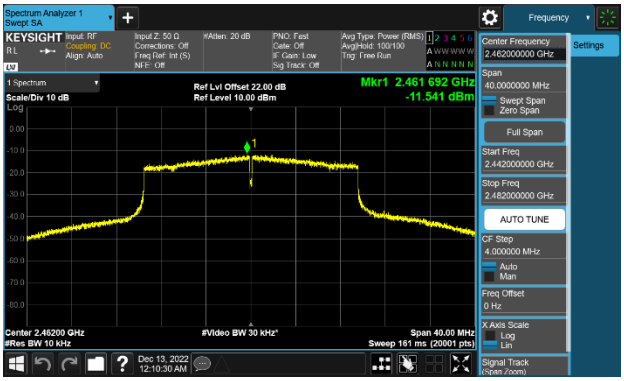
Note 1: For 802.11b/g/n/ax, When EUT duty cycle ≤ 98%, Total AVGPSD = 10*log {$10^{(\text{Ant 0 AVGPSD}/10)}$ + $10^{(\text{Ant 1 AVGPSD}/10)}$} + 10*log (1/Duty Cycle).

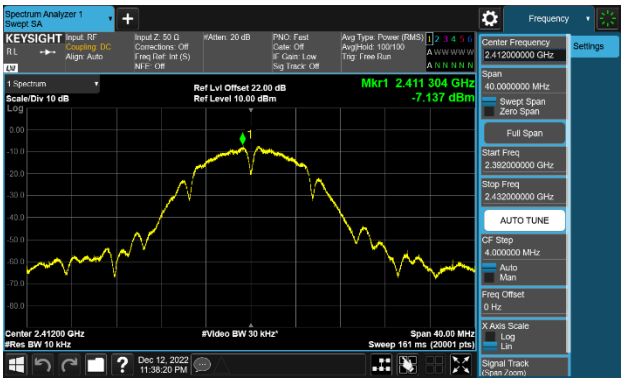
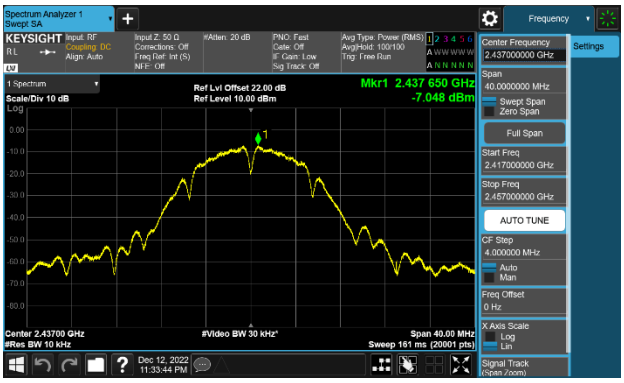
Note 2: The power setting of Beamforming mode is not greater than CDD mode, so only CDD mode result was shown in this section.

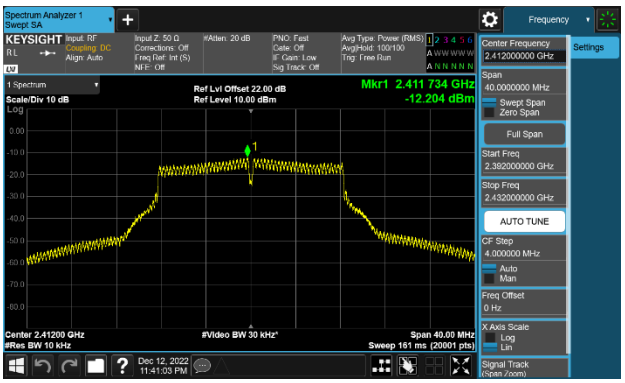
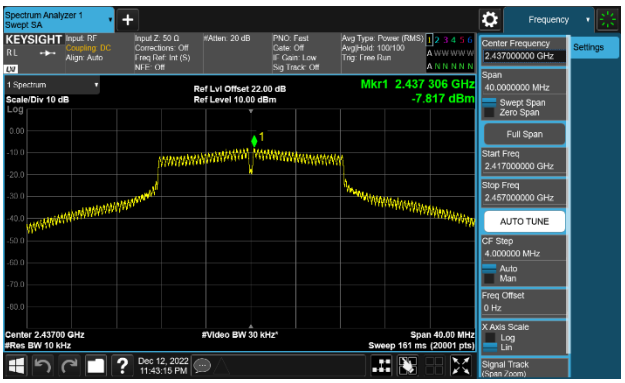
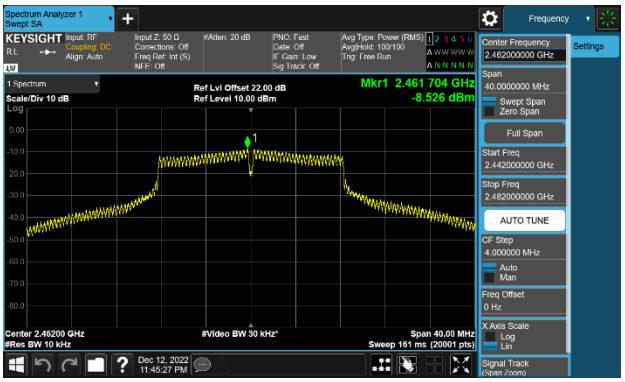
| 802.11b AVGPSD - Ant 0 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

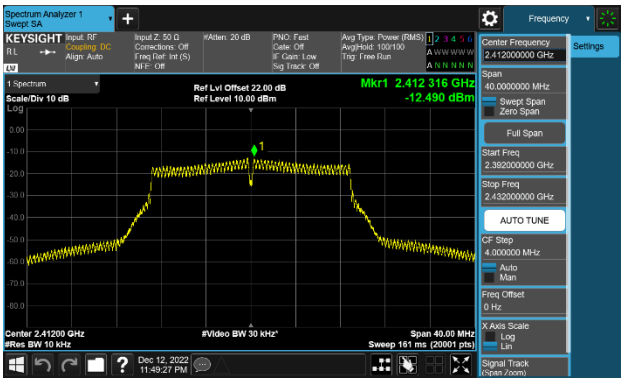
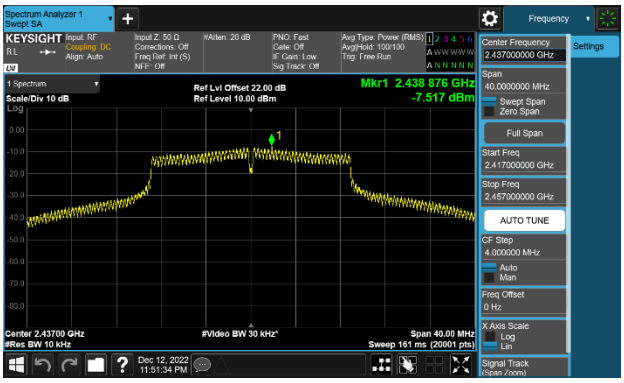
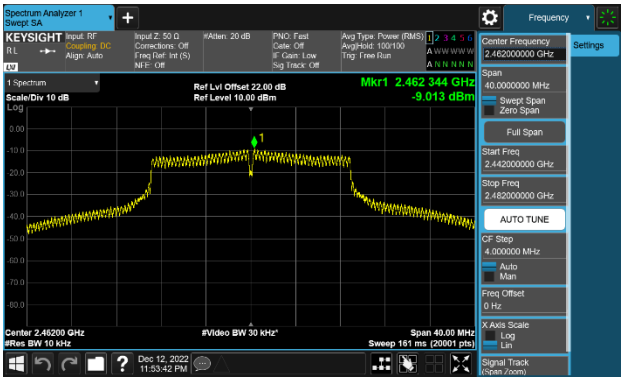
| 802.11g AVGPSD - Ant 0 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

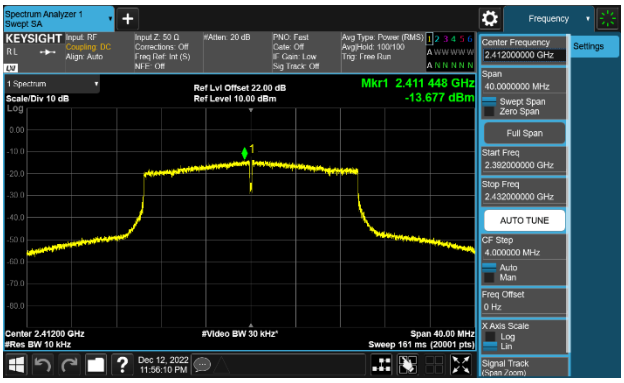
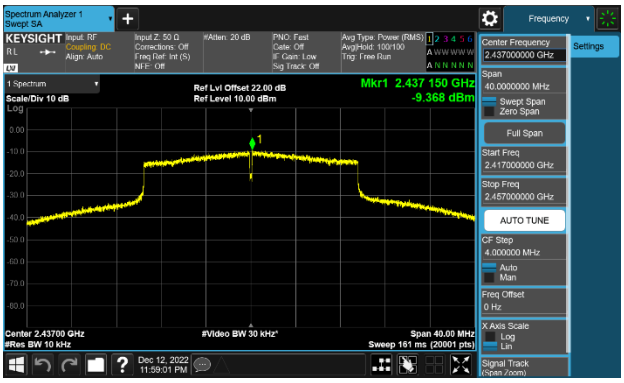
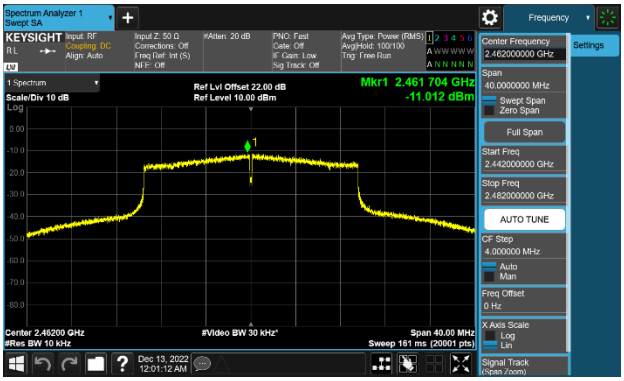
| 802.11n-HT20 AVGPSD - Ant 0 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

| 802.11ax-HE20 AVGPSD - Ant 0 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

| 802.11b AVGPSD - Ant 1 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

| 802.11g AVGPSD - Ant 1- CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

| 802.11n-HT20 AVGPSD - Ant 1 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

| 802.11ax-HE20 AVGPSD - Ant 1 - CDD Mode | |
|---|---|
| Channel 01 (2412MHz) | Channel 06 (2437MHz) |
|  |  |
| Channel 11 (2462MHz) | |
|  | |

# 7.5. Out-of-Band Spurious Emissions Emissions Measurement

## 7.5.1. Test Limit

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 RF conducted measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

## 7.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.11

## 7.5.3. Test Settitng

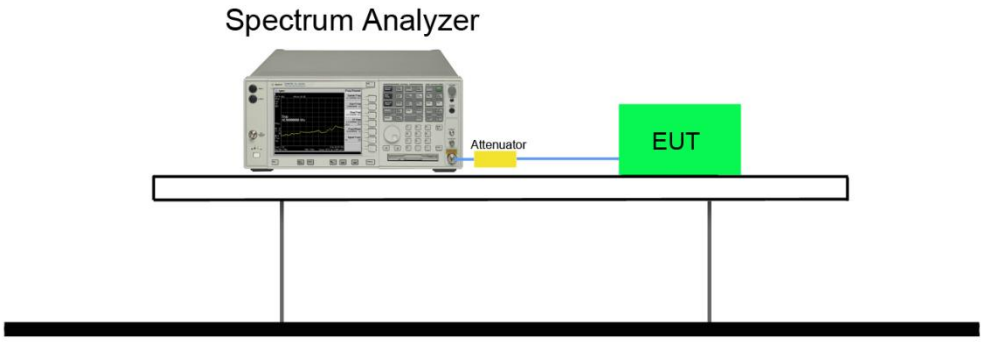
**Reference level measurement**

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

**Emission level measurement**

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

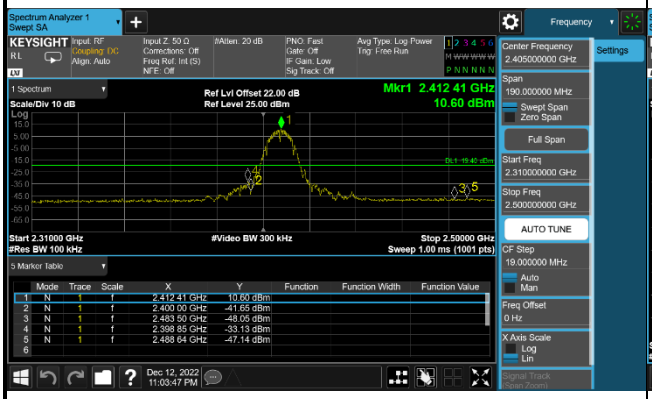
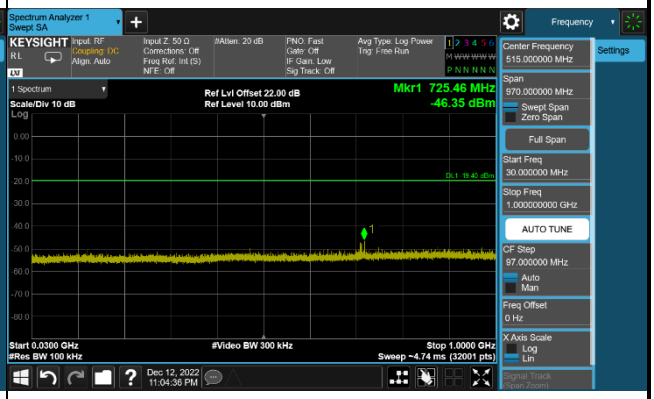
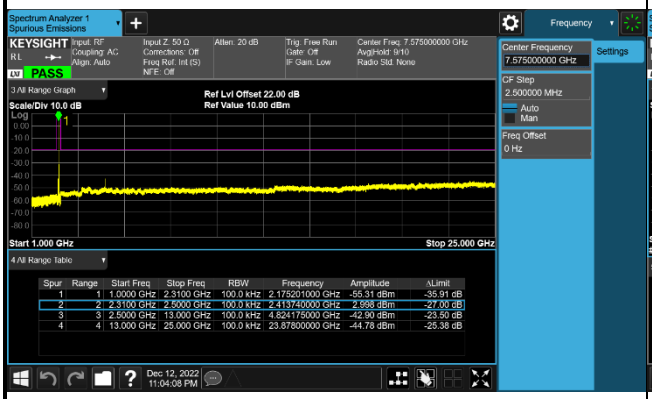
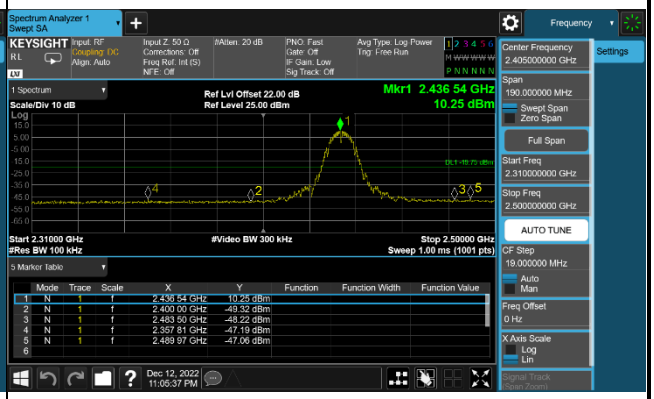
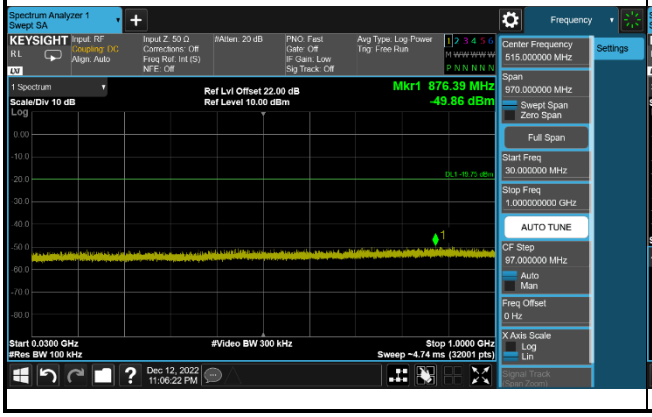
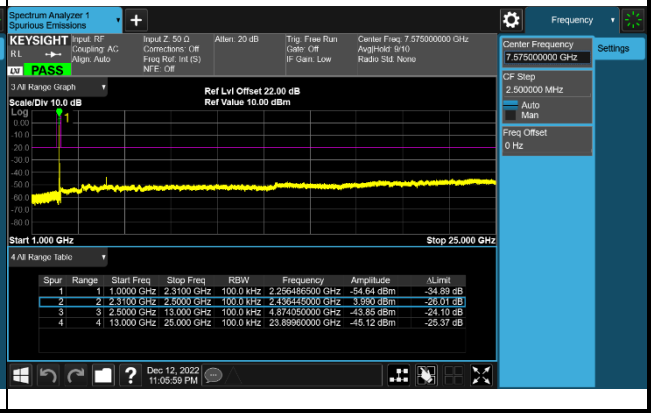
### 7.5.4. Test Setup

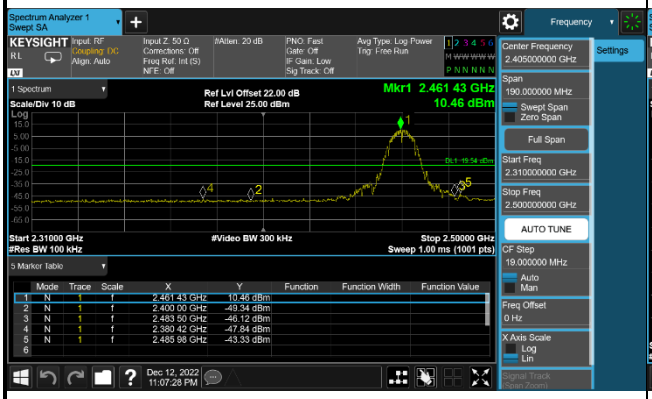
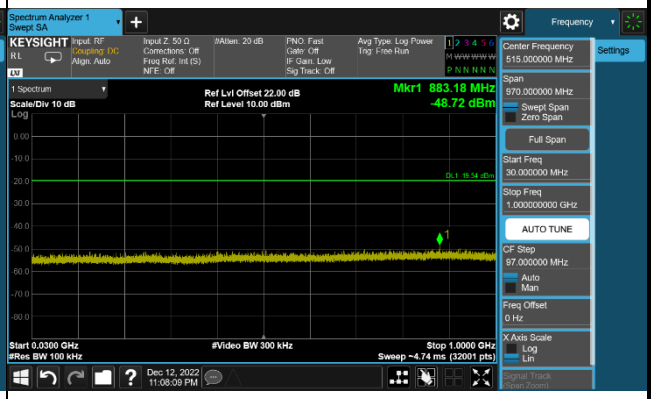
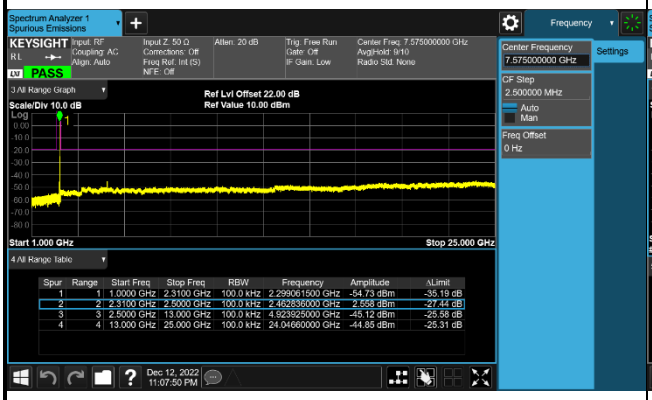
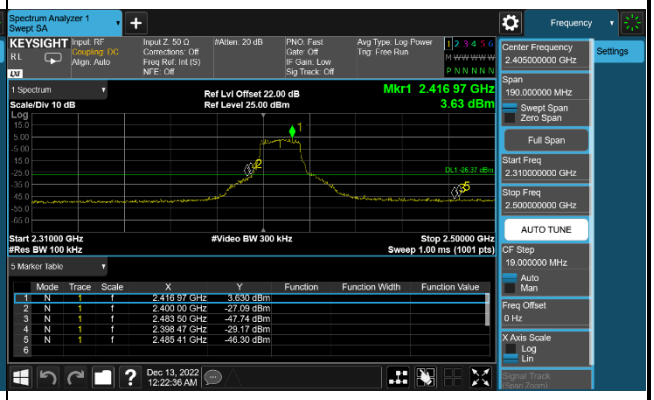
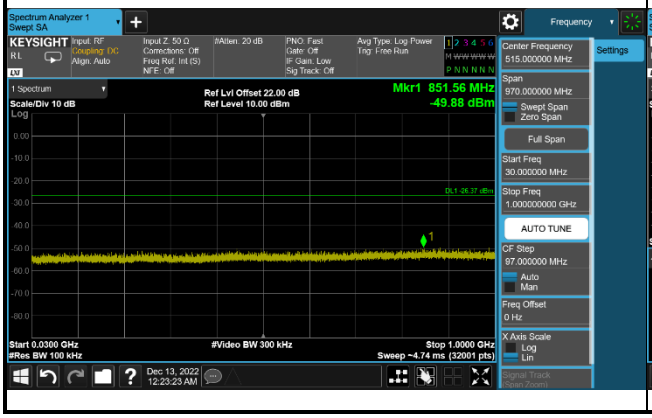
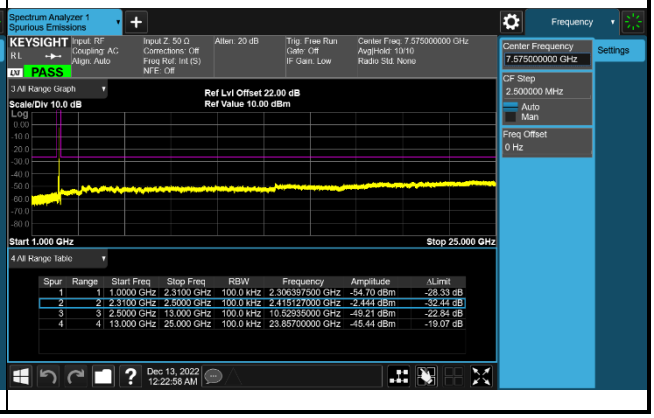


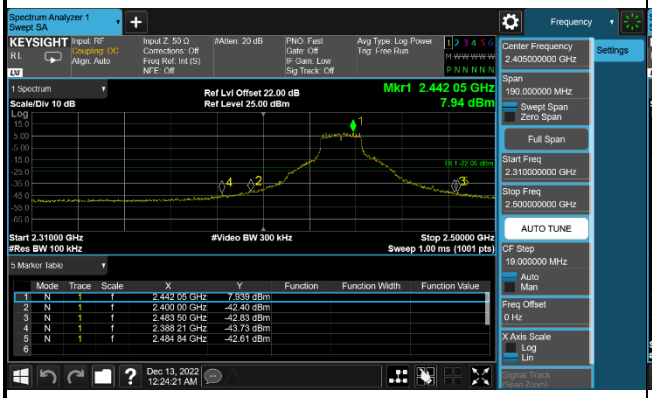
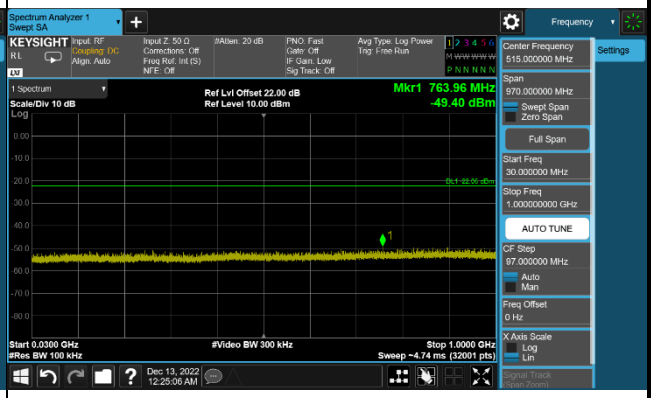
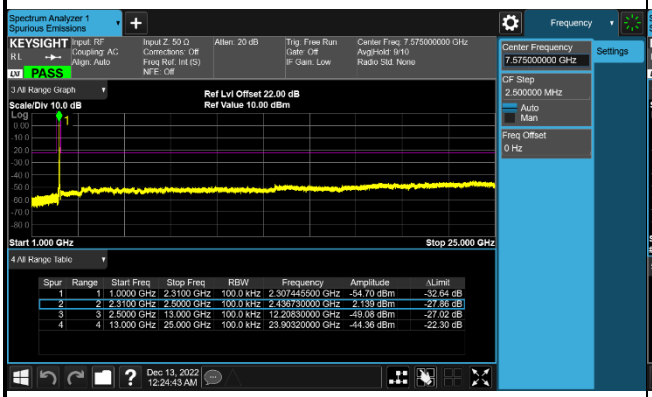
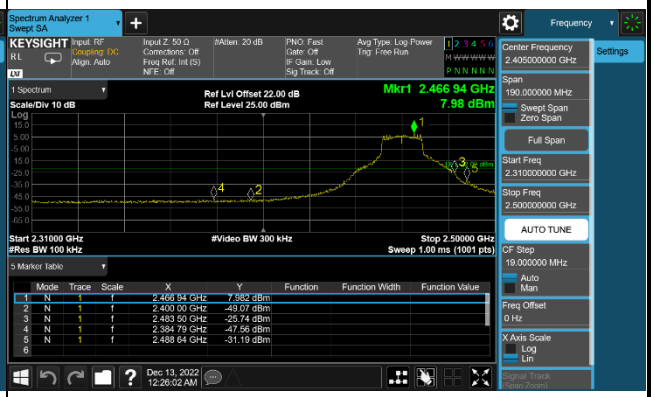
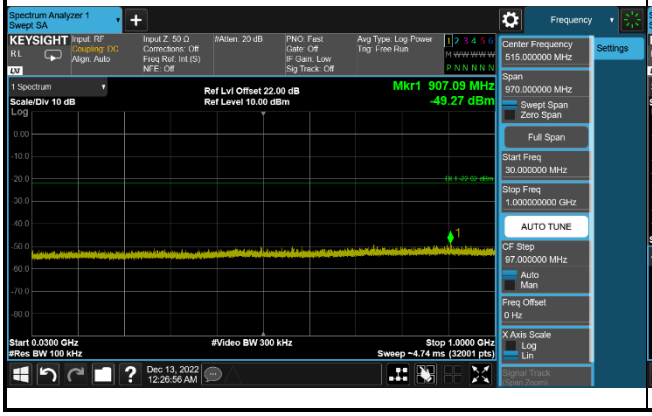
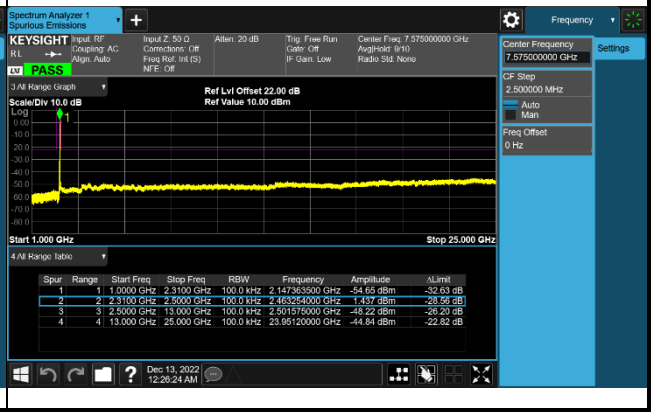
### 7.5.5. Test Result

| Product | Module | Temperature | 25°C |
|---|---|---|---|
| Test Engineer | Jay | Relative Humidity | 54% |
| Test Site | SR5 | Test Date | 2022/12/13 |

| Test Mode | Channel No. | Frequency (MHz) | Limit | Result |
|---|---|---|---|---|
| 802.11b | 01 | 2412 | 30dBc | Pass |
| 802.11b | 06 | 2437 | 30dBc | Pass |
| 802.11b | 11 | 2462 | 30dBc | Pass |
| 802.11g | 01 | 2412 | 30dBc | Pass |
| 802.11g | 06 | 2437 | 30dBc | Pass |
| 802.11g | 11 | 2462 | 30dBc | Pass |
| 802.11n-20M | 01 | 2412 | 30dBc | Pass |
| 802.11n-20M | 06 | 2437 | 30dBc | Pass |
| 802.11n-20M | 11 | 2462 | 30dBc | Pass |
| 802.11ax-20M | 01 | 2412 | 30dBc | Pass |
| 802.11ax-20M | 06 | 2437 | 30dBc | Pass |
| 802.11ax-20M | 11 | 2462 | 30dBc | Pass |

| Antenna 0 | |
|---|---|
| 802.11 b CH01 (2412MHz) | 802.11 b CH01 (2412MHz) |
|  |  |
| 802.11 b CH01 (2412MHz) | 802.11 b CH06 (2437MHz) |
|  |  |
| 802.11 b CH06 (2437MHz) | 802.11 b CH06 (2437MHz) |
|  |  |

| 802.11 b CH11 (2462MHz) | 802.11 b CH11 (2462MHz) |
|---|---|
|  |  |
| **802.11 b CH11 (2462MHz)** | **802.11 g CH01 (2412MHz)** |
|  |  |
| **802.11 g CH01 (2412MHz)** | **802.11 g CH01 (2412MHz)** |
|  |  |

| 802.11 g CH06 (2437MHz) | 802.11 g CH06 (2437MHz) |
|---|---|
|  |  |
| **802.11 g CH06 (2437MHz)** | **802.11 g CH11 (2462MHz)** |
|  |  |
| **802.11 g CH11 (2462MHz)** | **802.11 g CH11 (2462MHz)** |
|  |  |