# FCC TEST REPORT

| | |
|---|---|
| **Product Name:** | Hyebrid Full-Touch Handheld Computer |
| **Trade Mark:** | BLUEBIRD |
| **Model No.:** | HF550X |
| **Add. Model No.:** | N/A |
| **Report Number:** | 2304244979RFC-1 |
| **Test Standards:** | FCC 47 CFR Part 15 Subpart C |
| **FCC ID:** | SS4HF550XR |
| **Test Result:** | PASS |
| **Date of Issue:** | October 7, 2023 |

Prepared for:

**Bluebird Inc.**
**3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea**

Prepared by:

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**
**Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China**
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| | | | |
|---|---|---|---|
| Prepared by: | Kieron Luo<br>Project Engineer | Reviewed by: | Henry Lu<br>Team Leader |
| Approved by: | Kevin Liang<br>Assistant Manager | Date: | October 7, 2023 |

# Version

| Version No. | Date | Description |
|---|---|---|
| V1.0 | October 7, 2023 | Original |

# CONTENTS

# 1. GENERAL INFORMATION

## 1.1 CLIENT INFORMATION

| | |
|---|---|
| **Applicant:** | Bluebird Inc. |
| **Address of Applicant:** | 3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea |
| **Manufacturer:** | Bluebird Inc. |
| **Address of Manufacturer:** | 3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea |

## 1.2 EUT INFORMATION

### 1.2.1 General Description of EUT

| | | | |
|---|---|---|---|
| **Product Name:** | Hyebrid Full-Touch Handheld Computer | | |
| **Model No.:** | HF550X | | |
| **Add. Model No.:** | N/A | | |
| **Trade Mark:** | BLUEBIRD | | |
| **DUT Stage:** | Identical Prototype | | |
| **EUT Supports Function:** (Provided by the customer) | 2.4 GHz ISM Band: | IEEE 802.11b/g/n | |
| | | Bluetooth 5.0 | |
| | 5 GHz U-NII Bands: | 5 150 MHz to 5 250 MHz | IEEE 802.11a/n/ac |
| | | 5 250 MHz to 5 350 MHz | IEEE 802.11a/n/ac |
| | | 5 470 MHz to 5 725 MHz | IEEE 802.11a/n/ac |
| | | 5 725 MHz to 5 850 MHz | IEEE 802.11a/n/ac |
| | NFC: | 13.553 MHz to 13.567 MHz | |
| | RFID: | 902 MHz to 928 MHz | |
| **Software Version:** | R1.0 (Provided by the customer) | | |
| **Hardware Version:** | REV0.8 (Provided by the customer) | | |
| **Sample Received Date:** | April 13, 2023 | | |
| **Sample Tested Date:** | April 28, 2023 to May 17, 2023 | | |
| **Remark:** The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description. | | | |

### 1.2.2 Description of Accessories

| Adapter | |
|---|---|
| **Model No.:** | KSA29B0500200D5 |
| **Input:** | 100-240 V~50/60 Hz 0.5A |
| **Output:** | 5.0 V ⎓ 2.0A |
| **AC Cable:** | N/A |
| **DC Cable:** | N/A |

| Battery | |
|---|---|
| **Model No.:** | BAT-400001 |
| **Battery Type:** | Lithium-ion Rechargeable Battery |
| **Rated Voltage:** | 3.85 Vdc |
| **Limited Charge Voltage:** | 4.4 Vdc |
| **Rated Capacity:** | 4000 mAh |

| Cable | |
|---|---|
| **Description:** | USB Type-C Plug Cable |
| **Connector:** | USB Type-C / USB 3.0 Type A |
| **Cable Type:** | Shielded without ferrite |
| **Length:** | 1 Meter |

## 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

| | |
|---|---|
| **Frequency Band:** | 2400 MHz to 2483.5 MHz |
| **Frequency Range:** | 2402 MHz to 2480 MHz |
| **Bluetooth Version:** | Bluetooth LE/2LE |
| **Type of Modulation:** | GFSK |
| **Number of Channels:** | 40 |
| **Channel Separation:** | 2 MHz |
| **Antenna Type:** (Provided by the customer) | PIFA Antenna |
| **Antenna Gain:** (Provided by the customer) | 1.137 dBi |
| **Maximum Peak Power:** | 10.42 dBm |
| **Normal Test Voltage:** | 3.85Vdc and/or 120 Vac |

## 1.4 OTHER INFORMATION

| **Operation Frequency Each of Channel** | |
|---|---|
| **f = 2402 + 2k MHz, k = 0,…,39** | |
| Note: | |
| **f** | is the operating frequency (MHz); |
| **k** | is the operating channel. |

## 1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

| Description | Manufacturer | Model No. | Serial Number | Supplied by |
|---|---|---|---|---|
| Notebook | DELL | Inspiron 5409 | N/A | UnionTrust |

2) Support Cable

| Cable No. | Description | Connector | Length | Supplied by |
|---|---|---|---|---|
| 1 | Antenna Cable | SMA | 0.3 Meter | UnionTrust |

## 1.6 TEST LOCATION

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

## 1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

**CNAS-Lab Code: L9069**
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

**A2LA-Lab Certificate No.: 4312.01**
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**ISED Wireless Device Testing Laboratories**
CAB identifier: CN0032

**FCC Accredited Lab.**
Designation Number: CN1194
Test Firm Registration Number: 259480

## 1.8 DEVIATION FROM STANDARDS

None.

## 1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

## 1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

## 1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product 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.

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Conducted emission 9kHz-150kHz | ±3.2 dB |
| 2 | Conducted emission 150kHz-30MHz | ±2.7 dB |
| 3 | Radiated emission 9kHz-30MHz | ±4.7 dB |
| 4 | Radiated emission 30MHz-1GHz | ±4.6 dB |
| 5 | Radiated emission 1GHz-18GHz | ±4.4 dB |
| 6 | Radiated emission 18GHz-40GHz | ±4.6 dB |

## 2. TEST SUMMARY

| FCC 47 CFR Part 15 Subpart C Test Cases | | | |
|---|---|---|---|
| **Test Item** | **Test Requirement** | **Test Method** | **Result** |
| **Antenna Requirement** | FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (b) | N/A | PASS |
| **AC Power Line Conducted Emission** | FCC 47 CFR Part 15 Subpart C Section 15.207 | ANSI C63.10-2013 Clause 6.2 | PASS |
| **Conducted Peak Output Power** | FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3) | ANSI C63.10-2013 Clause 11.9.1.3 | PASS |
| **6dB Bandwidth** | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2) | ANSI C63.10-2013 Clause 11.8.1 | PASS |
| **Power Spectral Density** | FCC 47 CFR Part 15 Subpart C Section 15.247 (e) | ANSI C63.10-2013 Clause 11.10.2 | PASS |
| **Conducted Out of Band Emission** | FCC 47 CFR Part 15 Subpart C Section 15.247(d) | ANSI C63.10-2013 Clause 11.11 | PASS |
| **Radiated Spurious Emissions** | FCC 47 CFR Part 15 Subpart C Section 15.205/15.209 | ANSI C63.10-2013 Clause 11.11 & Clause 11.12 | PASS |
| **Band Edge Measurements (Radiated)** | FCC 47 CFR Part 15 Subpart C Section 15.205/15.209 | ANSI C63.10-2013 Clause 11.13 | PASS |

# 3. EQUIPMENT LIST

| Radiated Emission Test Equipment List | | | | | | |
|---|---|---|---|---|---|---|
| **Used** | **Equipment** | **Manufacturer** | **Model No.** | **Serial Number** | **Cal. date** | **Cal. Due date** |
| ☒ | 3M Chamber & Accessory Equipment | ETS-LINDGREN | 3M | Euroshiedpn-CT001270-1317 | 22-Jan-2021 | 21-Jan-2024 |
| ☒ | Receiver | R&S | ESIB26 | 100114 | 3-Nov-2022 | 2-Nov-2023 |
| ☒ | Loop Antenna | ETS-LINDGREN | 6502 | 00202525 | 21-Nov-2022 | 20-Nov-2023 |
| ☒ | Broadband Antenna | ETS-LINDGREN | 3142E | 00201566 | 13-Dec-2022 | 12-Dec-2023 |
| ☒ | 6dB Attenuator | Talent | RA6A5-N-18 | 18103001 | 13-Dec-2022 | 12-Dec-2023 |
| ☒ | Preamplifier | HP | 8447F | 2805A02960 | 1-Nov-2022 | 31-Oct-2023 |
| ☒ | Horn Antenna (Pre-amplifier) | ETS-LINDGREN | 3117-PA | 00201874 | 17-Apr-2022 | 16-Apr-2024 |
| ☒ | Pre-amplifier | ETS-LINDGREN | 00118385 | 00201874 | 1-Nov-2022 | 31-Oct-2023 |
| ☒ | Horn Antenna (Pre-amplifier) | ETS-LINDGREN | 3116C-PA | 00202652 | 21-Nov-2022 | 20-Nov-2023 |
| ☒ | Pre-amplifier | ETS-LINDGREN | 00118384 | 00202652 | 21-Nov-2022 | 20-Nov-2023 |
| ☒ | Band Reject Filter (2400MHz~2500MHz) | Micro-Tronics | BRM50702 | G248 | 2-Nov-2022 | 1-Nov-2023 |
| ☒ | Multi device Controller | ETS-LINDGREN | 7006-001 | 00160105 | N/A | N/A |
| ☒ | Test Software | Audix | e3 | Software Version: 9.160323 | | |

| Conducted Emission Test Equipment List | | | | | | |
|---|---|---|---|---|---|---|
| **Used** | **Equipment** | **Manufacturer** | **Model No.** | **Serial Number** | **Cal. date** | **Cal. Due date** |
| ☒ | Receiver | R&S | ESR7 | 101181 | 1-Nov-2022 | 31-Oct-2023 |
| ☒ | Pulse Limiter | R&S | ESH3-Z2 | 0357.8810.54 | 1-Nov-2022 | 31-Oct-2023 |
| ☒ | LISN | R&S | ESH2-Z5 | 860014/024 | 1-Nov-2022 | 31-Oct-2023 |
| ☐ | LISN | ETS-Lindgren | 3816/2SH | 00201088 | 1-Nov-2022 | 31-Oct-2023 |
| ☒ | Test Software | Audix | e3 | Software Version: 9 20151119i | | |

| RF Conducted Test Equipment List | | | | | | |
|---|---|---|---|---|---|---|
| **Used** | **Equipment** | **Manufacturer** | **Model No.** | **Serial Number** | **Cal. date** | **Cal. Due date** |
| ☒ | EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY51440197 | 14-Apr-2023 | 13-Apr-2024 |
| ☒ | USB Wideband Power Sensor | KEYSIGHT | U2021XA | MY55430035 | 3-Nov-2022 | 2-Nov-2023 |

# 4. TEST CONFIGURATION

## 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

### 4.1.1 Normal or Extreme Test Conditions

| Environment Parameter | Selected Values During Tests | | |
|---|---|---|---|
| Test Condition | Ambient | | |
| | Temperature (°C) | Voltage | Relative Humidity (%) |
| NT/NV | +15 to +35 | 3.85Vdc and/or 120 Vac | 20 to 75 |
| **Remark:** 1) NV: Normal Voltage; NT: Normal Temperature | | | |

### 4.1.2 Record of Normal Environment and Test Sample

| Test Item | Temp. (°C) | Relative Humidity (%) | Pressure (kPa) | Sample No. | Tested by |
|---|---|---|---|---|---|
| AC Power Line Conducted Emission | 25.3 | 57 | 100.6 | S20234131355-ZJA03/5 | Lucas Ouyang |
| Conducted Peak Output Power | 25.4 | 58.7 | 98.9 | S20234131355-ZJA05/5 | Allen Zhou |
| 6dB Bandwidth | | | | | |
| Power Spectral Density | | | | | |
| Conducted Out of Band Emission | | | | | |
| Radiated Spurious Emissions | 24.1 | 61.3 | 99.8 | S20234131355-ZJA03/5 | Fire Huo |
| Band Edge Measurements (Radiated) | | | | | |

## 4.2 TEST CHANNELS

| Type of Modulation | Tx/Rx Frequency | Test RF Channel Lists | | |
|---|---|---|---|---|
| | | Lowest(L) | Middle(M) | Highest(H) |
| GFSK | 2402 MHz to 2480 MHz | Channel 0 | Channel 19 | Channel 39 |
| | | 2402 MHz | 2440 MHz | 2480 MHz |

## 4.3 EUT TEST STATUS

| Type of Modulation | Tx Function | Description |
|---|---|---|
| GFSK | 1Tx | 1. Keep the EUT in continuously transmitting with modulation test single. |

| Power Setting (Provided by the customer) |
|---|
| Power Setting: not applicable, test used software default power level. |

| Test Software (Provided by the customer) |
|---|
| Test software name: QRCT V4.0 |

## 4.4 TEST SETUP

### 4.4.1 For Radiated Emissions test setup

**Figure 1. Below 30MHz**

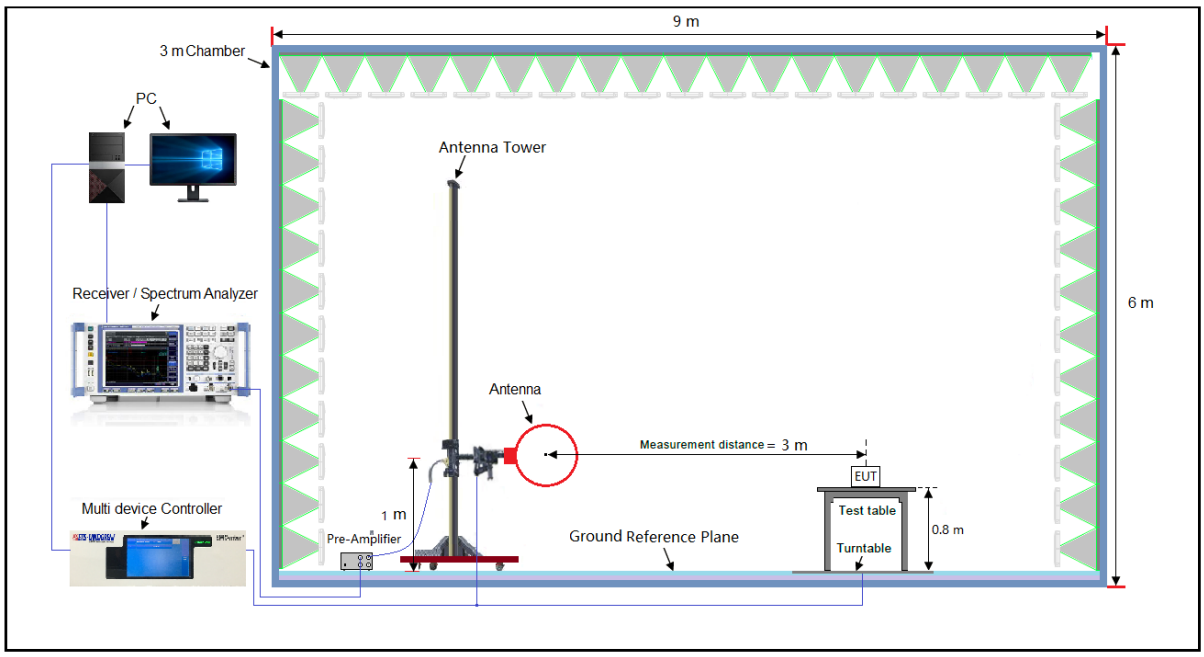



**Figure 2. 30MHz to 1GHz**

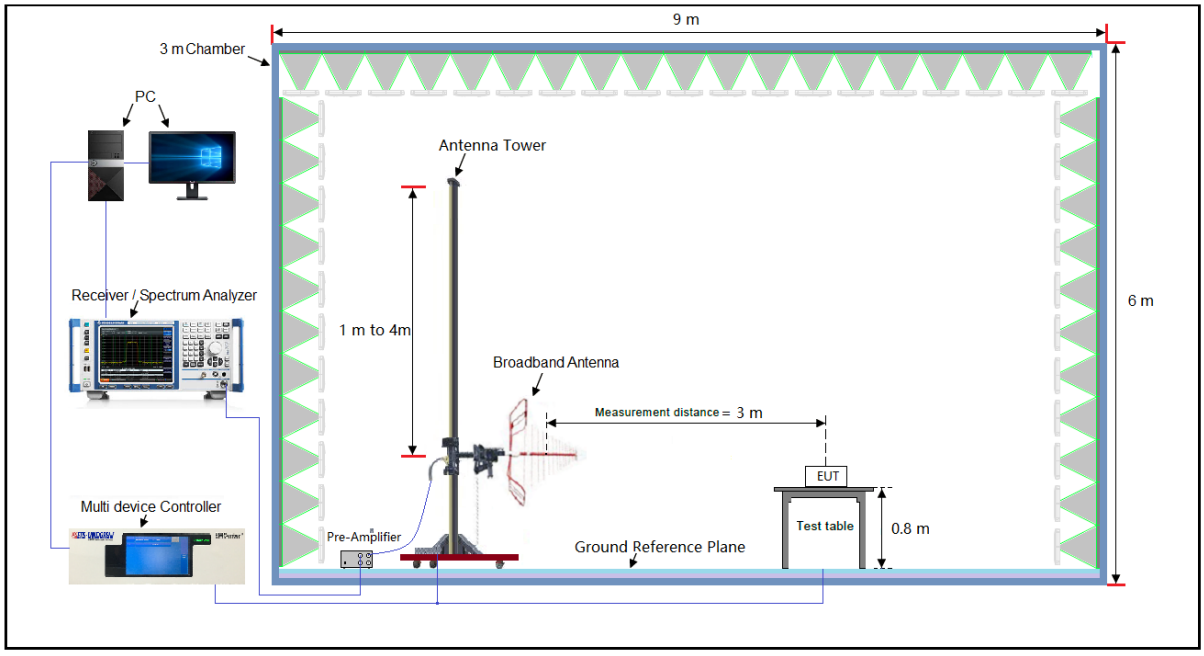
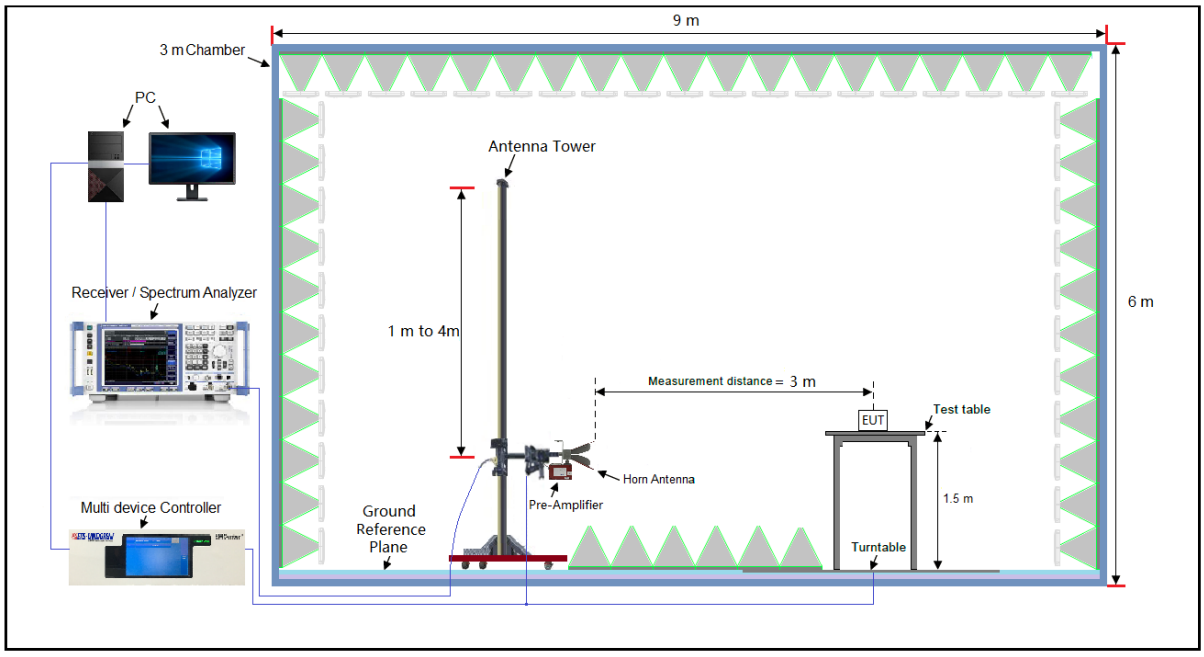
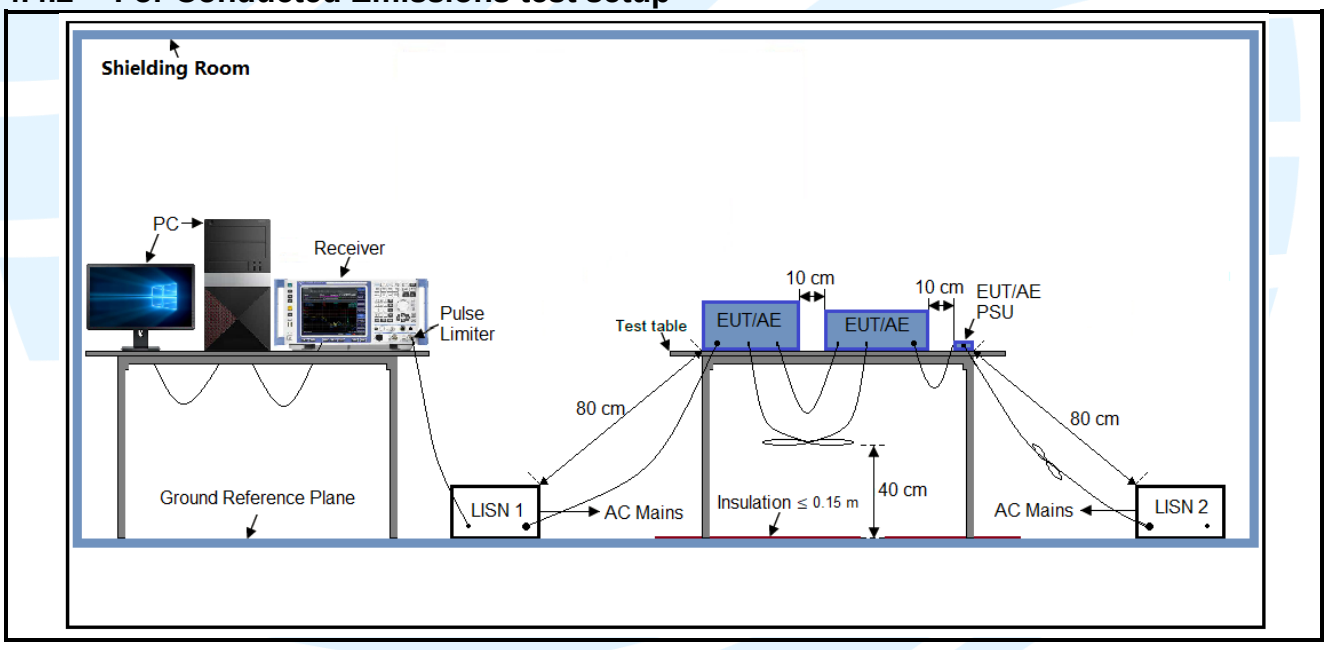


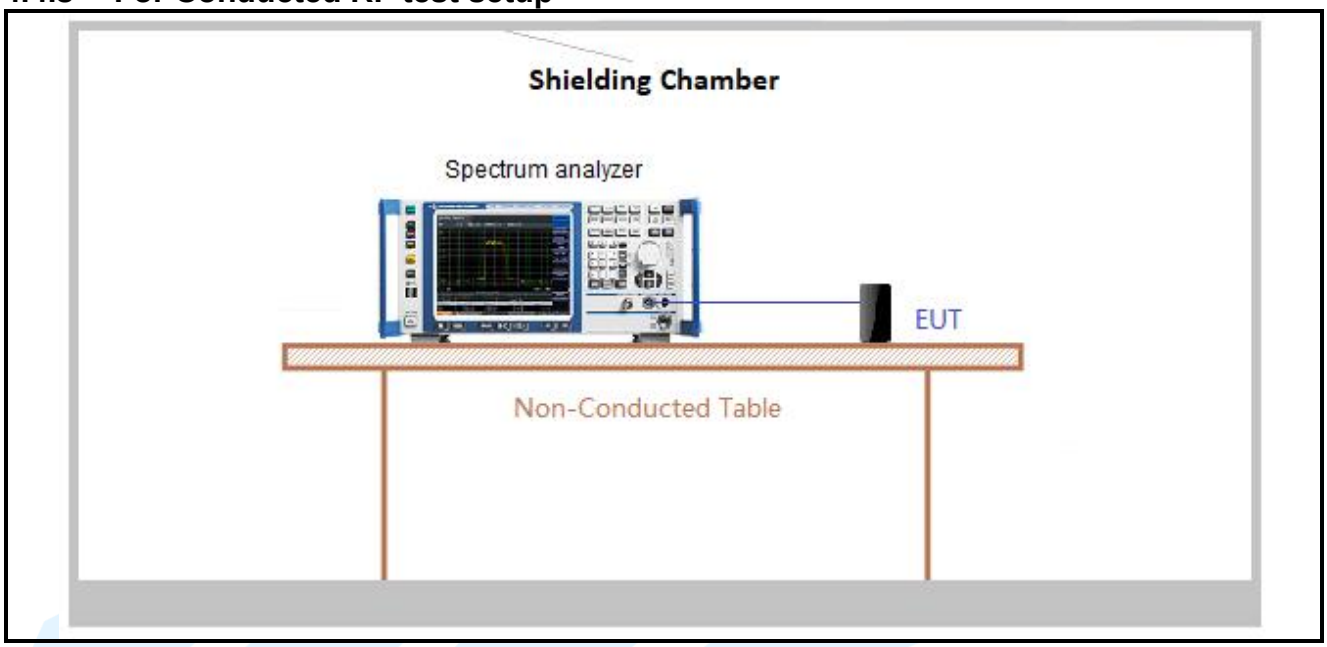
**Figure 3. Above 1GHz**




## 4.4.2 For Conducted Emissions test setup



### 4.4.3 For Conducted RF test setup




## 4.5 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by 3.85V Battery. Only the worst-case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in orientation.

All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 4.6 DUTY CYCLE

**Test Procedure:** ANSI C63.10-2013 Clause 11.6.

**Test Results**

| Mode | On Time (msec) | Period (msec) | Duty Cycle (linear) | Duty Cycle (%) | Duty Cycle Factor (dB) | 1/T Minimum VBW (kHz) |
|---|---|---|---|---|---|---|
| LE | 0.390 | 0.625 | 0.62 | 62.40 | 2.05 | 2.56 |
| 2LE | 0.205 | 0.625 | 0.33 | 32.80 | 4.84 | 4.88 |

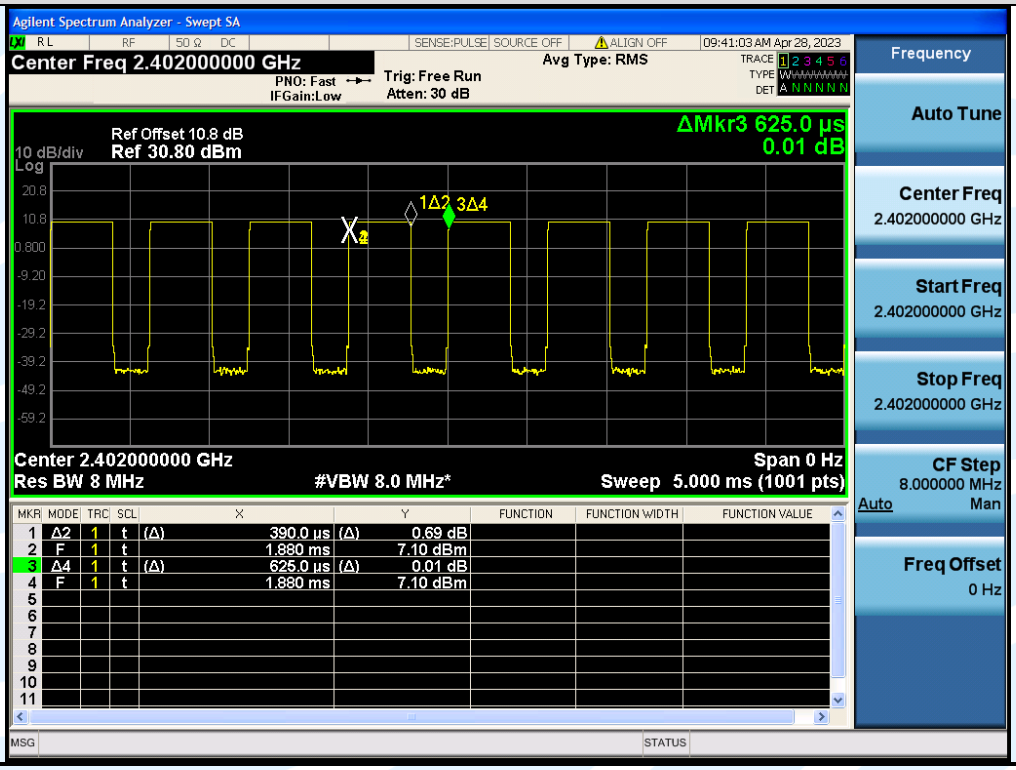
**Remark:**

1) Duty cycle= On Time/ Period;

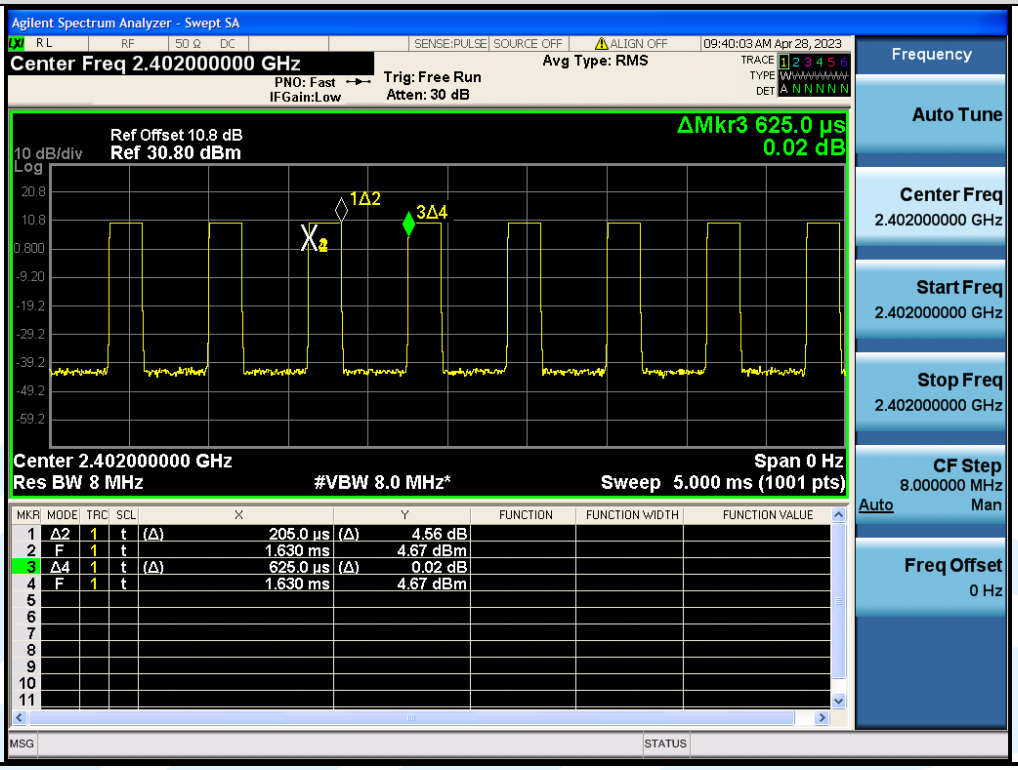
2) Duty Cycle factor = 10 * log(1/ Duty cycle)

**The test plot as follows**

**GFSK_LE**



| GFSK_2LE |
| --- |


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: RMS
09:40:03 AM Apr 28, 2023
Ref Offset 10.8 dB
10 dB/div
Log
Ref 30.80 dBm
ΔMkr3 625.0 µs
0.02 dB
1Δ2
3Δ4
Center 2.402000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz*
Span 0 Hz
Sweep 5.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.402000000 GHz
Start Freq
2.402000000 GHz
Stop Freq
2.402000000 GHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 t (Δ) 205.0 µs (Δ) 4.56 dB
2 F 1 t 1.630 ms 4.67 dBm
3 Δ4 1 t (Δ) 625.0 µs (Δ) 0.02 dB
4 F 1 t 1.630 ms 4.67 dBm
MSG
STATUS

# 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

## 5.1 REFERENCE DOCUMENTS FOR TESTING

| No. | Identity | Document Title |
|---|---|---|
| 1 | FCC 47 CFR Part 2 | Frequency allocations and radio treaty matters; general rules and regulations |
| 2 | FCC 47 CFR Part 15 | Radio Frequency Devices |
| 3 | ANSI C63.10-2013 | American National Standard for Testing Unlicesed Wireless Devices |
| 4 | KDB 558074 D01 15.247 Meas Guidance v05r02 | Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules |

## 5.2 ANTENNA REQUIREMENT

| Standard Requirement |
|---|
| **15.203 requirement:**<br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.<br>**15.247(b) (4) requirement:**<br>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. |
| **EUT Antenna:** |
| Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 1.137 dBi. |

## 5.3 CONDUCTED PEAK OUTPUT POWER

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section15.247 (b)(3)

**Test Method:** ANSI C63.10-2013 Clause 11.9.1.3

**Limit:** For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

**Test Procedure:**
1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
2. Measure out each test modes' peak or average output power, record the power level.

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

**Test Setup:** Refer to section 4.4.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Results:** Pass

| Mode | Frequency | Max. Peak Power | | Peak Power Limit | Max. Avg. Power | Result |
|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | (W) | (dBm) | (dBm) | |
| LE | 2402 | 10.03 | 0.01007 | 30 | 7.85 | Pass |
| | 2440 | 10.01 | 0.01002 | 30 | 7.79 | Pass |
| | 2480 | 10.21 | 0.01050 | 30 | **8.05** | Pass |
| 2LE | 2402 | 10.23 | 0.01054 | 30 | 5.06 | Pass |
| | 2440 | 10.22 | 0.01052 | 30 | 5.01 | Pass |
| | 2480 | **10.42** | 0.01102 | 30 | 5.29 | Pass |

Note: The antenna gain of 1.137 dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

## 5.46 DB BANDWIDTH

| | |
|---|---|
| **Test Requirement:** | FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2) |
| **Test Method:** | ANSI C63.10-2013 Clause 11.8.1 |
| **Limit:** | For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz |
| **Test Procedure:** | Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.<br>Use the following spectrum analyzer settings:<br>a) Set RBW = 100 kHz.<br>b) Set the video bandwidth (VBW) ≥ 3 x RBW.<br>c) Detector = Peak.<br>d) Trace mode = max hold.<br>e) Sweep = auto couple.<br>f) Allow the trace to stabilize.<br>g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.<br><br>Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset. |
| **Test Setup:** | Refer to section 4.4.3 for details. |
| **Instruments Used:** | Refer to section 3 for details |
| **Test Mode:** | Link mode |
| **Test Results:** | **Please refer to Appendix A** |

## 5.5 POWER SPECTRAL DENSITY

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.247 (e)

**Test Method:** ANSI C63.10-2013 Clause 11.10.2

**Limit:** For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

**Test Procedure:** Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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

**Test Setup:** Refer to section 4.4.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** **Please refer to Appendix A**

## 5.6 CONDUCTED OUT OF BAND EMISSION

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.247(d)

**Test Method:** ANSI C63.10-2013 Clause 11.11

**Limit:** In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

**Test Procedure:** Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

**Step 1: Measurement Procedure REF**

a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
j) Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

**Step 2: Measurement Procedure OOBE**

a) Set RBW = 100 kHz.
b) Set VBW ≥ 300 kHz.
c) Detector = peak.
d) Sweep = auto couple.
e) Trace Mode = max hold.
f) Allow trace to fully stabilize.
g) Use the peak marker function to determine the maximum amplitude level.

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

**Test Setup:** Refer to section 4.4.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** **Please refer to Appendix A**

## 5.7 RADIATED SPURIOUS EMISSIONS

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

**Test Method:** ANSI C63.10-2013 Clause 11.11 & Clause 11.12

**Receiver Setup:**

| Frequency | RBW |
|---|---|
| 0.009 MHz-0.150 MHz | 200/300 kHz |
| 0.150 MHz -30 MHz | 9/10 kHz |
| 30 MHz-1 GHz | 100/120 kHz |
| Above 1 GHz | 1 MHz |

**Limits:**

**Spurious Emissions**

| Frequency | Field strength (microvolt/meter) | Limit (dBμV/m) | Remark | Measurement distance (m) |
|---|---|---|---|---|
| 0.009 MHz-0.490 MHz | 2400/F(kHz) | -- | -- | 300 |
| 0.490 MHz-1.705 MHz | 24000/F(kHz) | -- | -- | 30 |
| 1.705 MHz-30 MHz | 30 | -- | -- | 30 |
| 30 MHz-88 MHz | 100 | 40.0 | Quasi-peak | 3 |
| 88 MHz-216 MHz | 150 | 43.5 | Quasi-peak | 3 |
| 216 MHz-960 MHz | 200 | 46.0 | Quasi-peak | 3 |
| 960MHz-1GHz | 500 | 54.0 | Quasi-peak | 3 |
| Above 1 GHz | 500 | 54.0 | Average | 3 |

**Remark:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

**Test Setup:** Refer to section 4.4.1 for details.

**Test Procedures:**

1. From 30 MHz to 1GHz test procedure as below:

1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

2. Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).

2) Test the EUT in the lowest channel, middle channel, the Highest channel
3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
4) Repeat above procedures until all frequencies measured was complete.

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

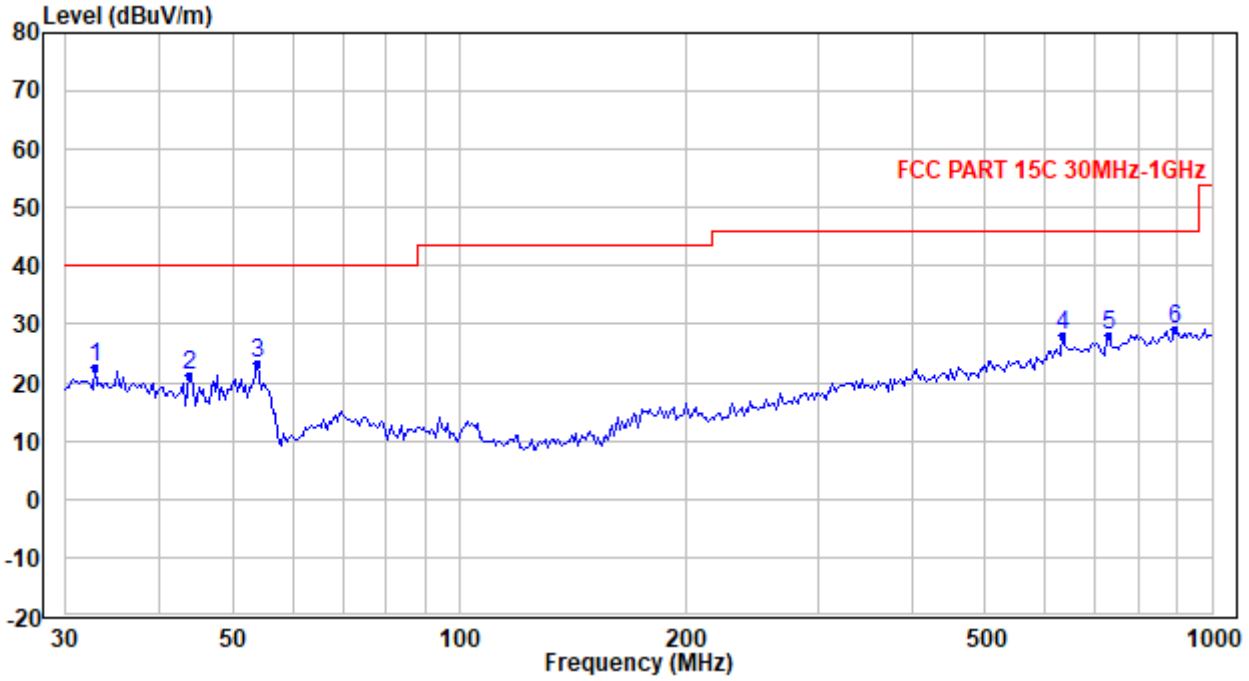
**The measurement data as follows:**

| **Radiated Emission Test Data (9 KHz ~ 30 MHz):** |
|---|
| The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report. |

**Radiated Emission Test Data (30 MHz ~ 1 GHz):**

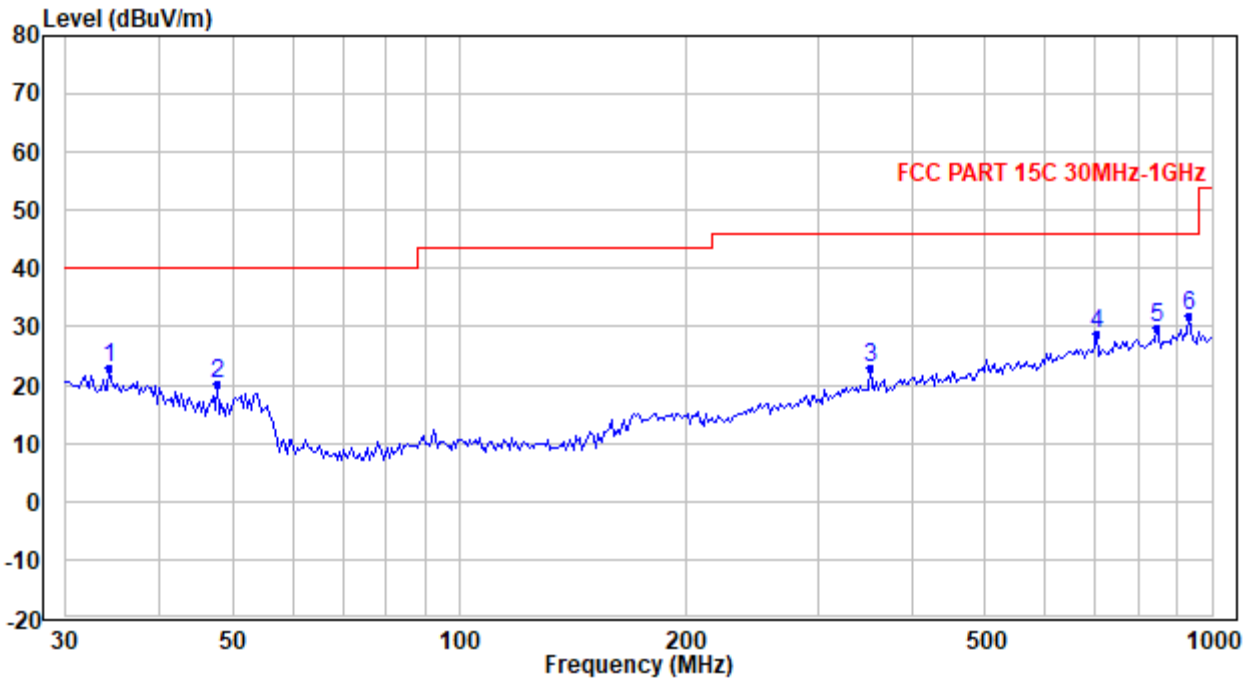
**Worst-Case Configuration**

**Horizontal**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 32.87 | 28.0 | -5.3 | 22.7 | 40.0 | -17.3 | QP |
| 2 | 43.845 | 31.9 | -10.5 | 21.3 | 40.0 | -18.7 | QP |
| 3 | 53.756 | 39.7 | -16.2 | 23.4 | 40.0 | -16.6 | QP |
| 4 | 633.328 | 27.8 | 0.3 | 28.1 | 46.0 | -18.0 | QP |
| 5 | 728.897 | 26.6 | 1.4 | 28.0 | 46.0 | -18.0 | QP |
| 6 | 893.656 | 25.0 | 4.2 | 29.2 | 46.0 | -16.8 | QP |

**Vertical**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 34.285 | 28.3 | -5.4 | 22.8 | 40.0 | -17.2 | QP |
| 2 | 47.703 | 33.6 | -13.3 | 20.3 | 40.0 | -19.7 | QP |
| 3 | 350.972 | 28.3 | -5.2 | 23.1 | 46.0 | -22.9 | QP |
| 4 | 703.731 | 27.1 | 1.8 | 28.9 | 46.0 | -17.2 | QP |
| 5 | 844.803 | 26.7 | 3.2 | 29.9 | 46.0 | -16.1 | QP |
| 6 | 932.141 | 27.0 | 4.9 | 32.0 | 46.0 | -14.0 | QP |

| Radiated Emission Test Data (Above 1GHz): | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **LE_ Lowest Channel:** | | | | | | | | |
| **No.** | **Frequency (MHz)** | **Reading (dBμV)** | **Correction factor (dB/m)** | **Result (dBμV/m)** | **Limit (dBμV/m)** | **Margin (dB)** | **Detector** | **Antenna Polaxis** |
| 1 | 4804 | 42.0 | -2.4 | 39.6 | 74 | -34.4 | Peak | Horizontal |
| 2 | 4804 | 27.9 | -2.4 | 25.5 | 54 | -28.5 | Average | Horizontal |
| 3 | 7206 | 41.7 | 1.6 | 43.3 | 74 | -30.7 | Peak | Horizontal |
| 4 | 7206 | 29.2 | 1.6 | 30.8 | 54 | -23.2 | Average | Horizontal |
| 5 | 4804 | 39.9 | -2.4 | 37.5 | 74 | -36.5 | Peak | Vertical |
| 6 | 4804 | 28.0 | -2.4 | 25.5 | 54 | -28.5 | Average | Vertical |
| 7 | 7206 | 41.3 | 1.6 | 42.9 | 74 | -31.1 | Peak | Vertical |
| 8 | 7206 | 29.1 | 1.6 | 30.7 | 54 | -23.3 | Average | Vertical |
| **LE_ Middle Channel:** | | | | | | | | |
| 1 | 4880 | 41.4 | -2.4 | 39.1 | 74 | -34.9 | Peak | Horizontal |
| 2 | 4880 | 27.1 | -2.4 | 24.8 | 54 | -29.2 | Average | Horizontal |
| 3 | 7320 | 41.7 | 1.7 | 43.4 | 74 | -30.6 | Peak | Horizontal |
| 4 | 7320 | 29.0 | 1.7 | 30.7 | 54 | -23.3 | Average | Horizontal |
| 5 | 4880 | 41.6 | -2.4 | 39.2 | 74 | -34.8 | Peak | Vertical |
| 6 | 4880 | 29.2 | -2.4 | 26.8 | 54 | -27.2 | Average | Vertical |
| 7 | 7320 | 41.4 | 1.7 | 43.1 | 74 | -30.9 | Peak | Vertical |
| 8 | 7320 | 29.1 | 1.7 | 30.8 | 54 | -23.2 | Average | Vertical |
| **LE_ Highest Channel:** | | | | | | | | |
| 1 | 4960 | 41.5 | -2.3 | 39.2 | 74 | -34.8 | Peak | Horizontal |
| 2 | 4960 | 30.2 | -2.3 | 27.9 | 54 | -26.1 | Average | Horizontal |
| 3 | 7440 | 40.1 | 1.8 | 41.9 | 74 | -32.1 | Peak | Horizontal |
| 4 | 7440 | 29.0 | 1.8 | 30.8 | 54 | -23.2 | Average | Horizontal |
| 5 | 4960 | 41.0 | -2.3 | 38.7 | 74 | -35.3 | Peak | Vertical |
| 6 | 4960 | 29.9 | -2.3 | 27.7 | 54 | -26.3 | Average | Vertical |
| 7 | 7440 | 38.7 | 1.8 | 40.5 | 74 | -33.5 | Peak | Vertical |
| 8 | 7440 | 28.8 | 1.8 | 30.6 | 54 | -23.4 | Average | Vertical |

| 2LE_ Lowest Channel: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No.** | **Frequency (MHz)** | **Reading (dBμV)** | **Correction factor (dB/m)** | **Result (dBμV/m)** | **Limit (dBμV/m)** | **Margin (dB)** | **Detector** | **Antenna Polaxis** |
| 1 | 4804 | 39.7 | -2.4 | 37.2 | 74 | -36.8 | Peak | Horizontal |
| 2 | 4804 | 27.7 | -2.4 | 25.3 | 54 | -28.7 | Average | Horizontal |
| 3 | 7206 | 40.3 | 1.6 | 41.9 | 74 | -32.1 | Peak | Horizontal |
| 4 | 7206 | 28.9 | 1.6 | 30.5 | 54 | -23.5 | Average | Horizontal |
| 5 | 4804 | 40.2 | -2.4 | 37.8 | 74 | -36.2 | Peak | Vertical |
| 6 | 4804 | 27.7 | -2.4 | 25.3 | 54 | -28.7 | Average | Vertical |
| 7 | 7206 | 40.3 | 1.6 | 41.9 | 74 | -32.1 | Peak | Vertical |
| 8 | 7206 | 27.9 | 1.6 | 29.6 | 54 | -24.4 | Average | Vertical |
| 2LE_ Middle Channel: | | | | | | | | |
| 1 | 4880 | 40.8 | -2.4 | 38.5 | 74 | -35.5 | Peak | Horizontal |
| 2 | 4880 | 29.1 | -2.4 | 26.7 | 54 | -27.3 | Average | Horizontal |
| 3 | 7320 | 41.1 | 1.7 | 42.8 | 74 | -31.2 | Peak | Horizontal |
| 4 | 7320 | 28.9 | 1.7 | 30.6 | 54 | -23.4 | Average | Horizontal |
| 5 | 4880 | 39.7 | -2.4 | 37.4 | 74 | -36.6 | Peak | Vertical |
| 6 | 4880 | 29.2 | -2.4 | 26.8 | 54 | -27.2 | Average | Vertical |
| 7 | 7320 | 40.8 | 1.7 | 42.5 | 74 | -31.5 | Peak | Vertical |
| 8 | 7320 | 28.9 | 1.7 | 30.6 | 54 | -23.4 | Average | Vertical |
| 2LE_ Highest Channel: | | | | | | | | |
| 1 | 4960 | 41.1 | -2.3 | 38.8 | 74 | -35.2 | Peak | Horizontal |
| 2 | 4960 | 29.0 | -2.3 | 26.7 | 54 | -27.3 | Average | Horizontal |
| 3 | 7440 | 40.9 | 1.8 | 42.7 | 74 | -31.3 | Peak | Horizontal |
| 4 | 7440 | 26.8 | 1.8 | 28.6 | 54 | -25.4 | Average | Horizontal |
| 5 | 4960 | 41.4 | -2.3 | 39.1 | 74 | -34.9 | Peak | Vertical |
| 6 | 4960 | 29.8 | -2.3 | 26.8 | 54 | -27.2 | Average | Vertical |
| 7 | 7440 | 40.0 | 1.8 | 41.8 | 74 | -32.2 | Peak | Vertical |
| 8 | 7440 | 28.9 | 1.8 | 30.7 | 54 | -23.3 | Average | Vertical |

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

## 5.8 BAND EDGE MEASUREMENTS (RADIATED)

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

**Test Method:** ANSI C63.10-2013 Clause 11.13

**Limits:**

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

| Frequency | Limit (dBμV/m @3m) | Remark |
|---|---|---|
| 30 MHz-88 MHz | 40.0 | Quasi-peak Value |
| 88 MHz-216 MHz | 43.5 | Quasi-peak Value |
| 216 MHz-960 MHz | 46.0 | Quasi-peak Value |
| 960 MHz-1 GHz | 54.0 | Quasi-peak Value |
| Above 1 GHz | 54.0 | Average Value |
| | 74.0 | Peak Value |

**Test Setup:** Refer to section 4.4.1 for details.

**Test Procedures:**

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK and AV limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

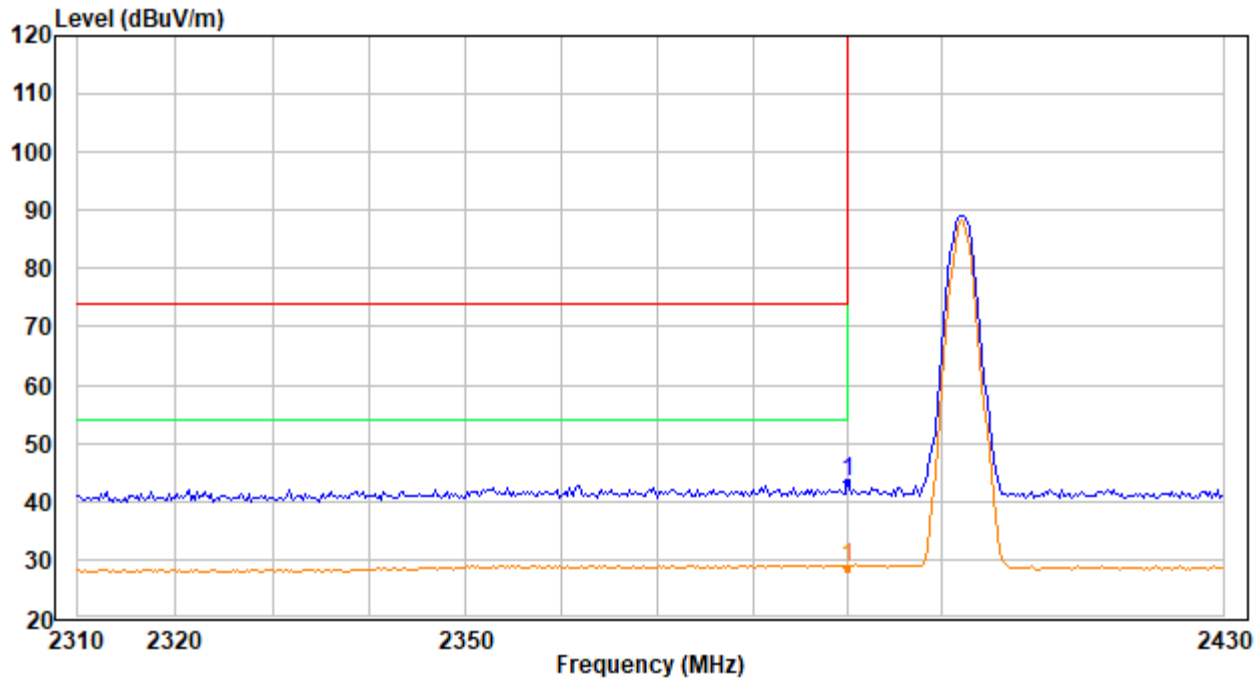
**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

**The measurement data as follows:**

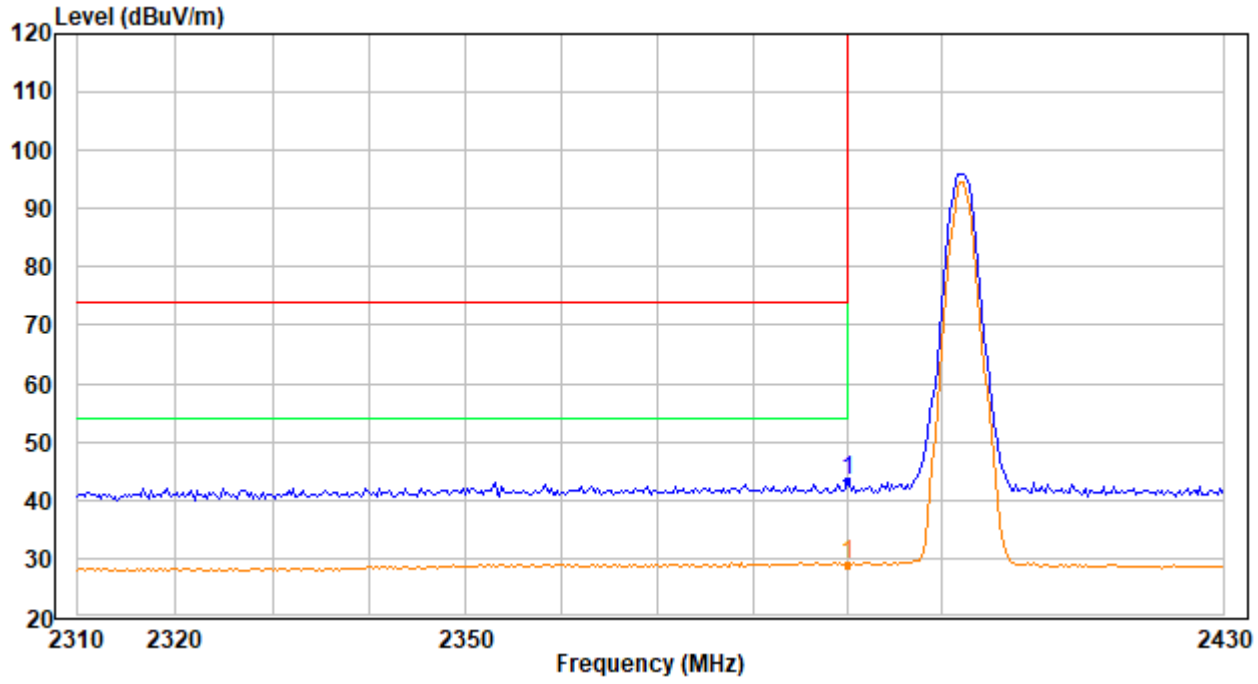
**LE Mode:**

| Test Channel: | Lowest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|



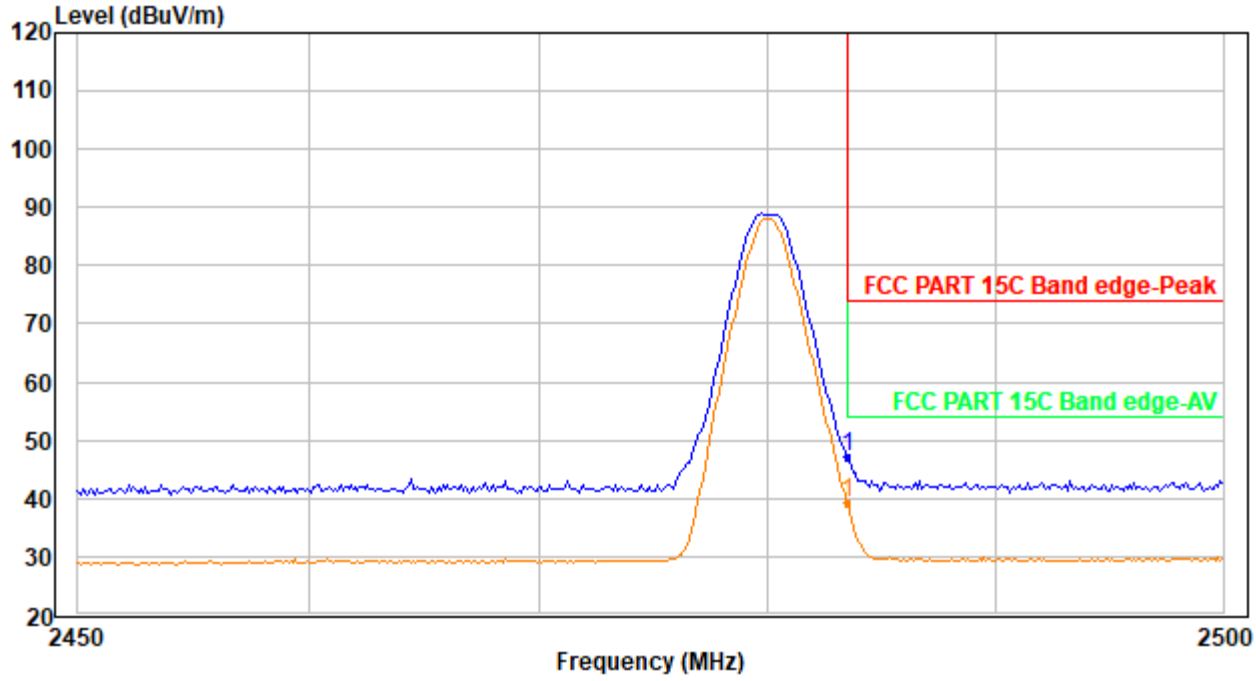

| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 43.47 | 74.00 | 28.74 | 54.00 | Pass |

| Test Channel: | Lowest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|



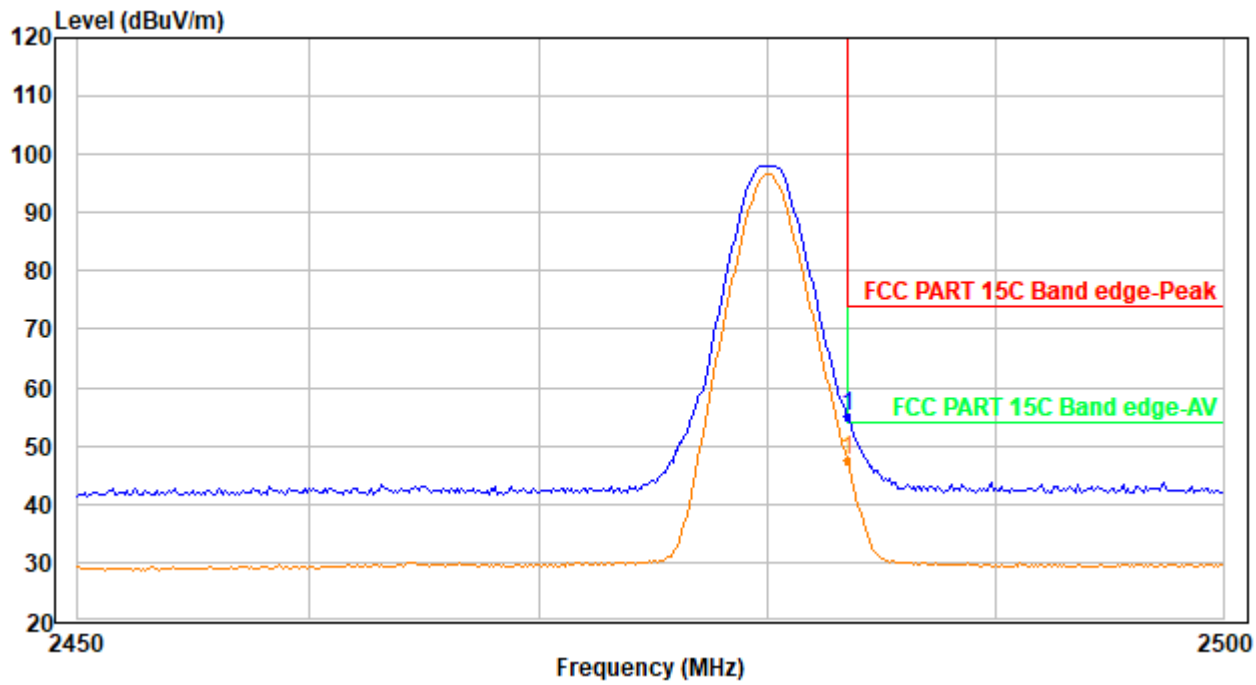

| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 43.51 | 74.00 | 28.95 | 54.00 | Pass |

| Test Channel: | Highest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 47.13 | 74.00 | 39.22 | 54.00 | Pass |

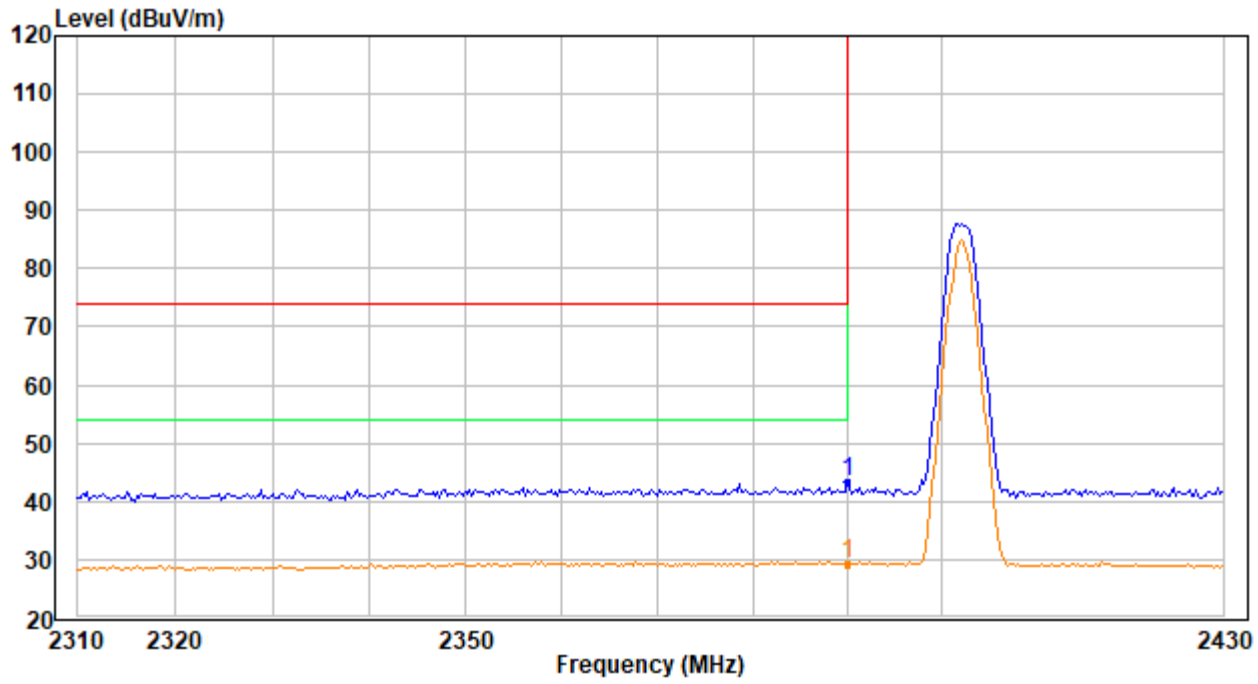
| Test Channel: | Highest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 55.16 | 74.00 | 47.59 | 54.00 | Pass |

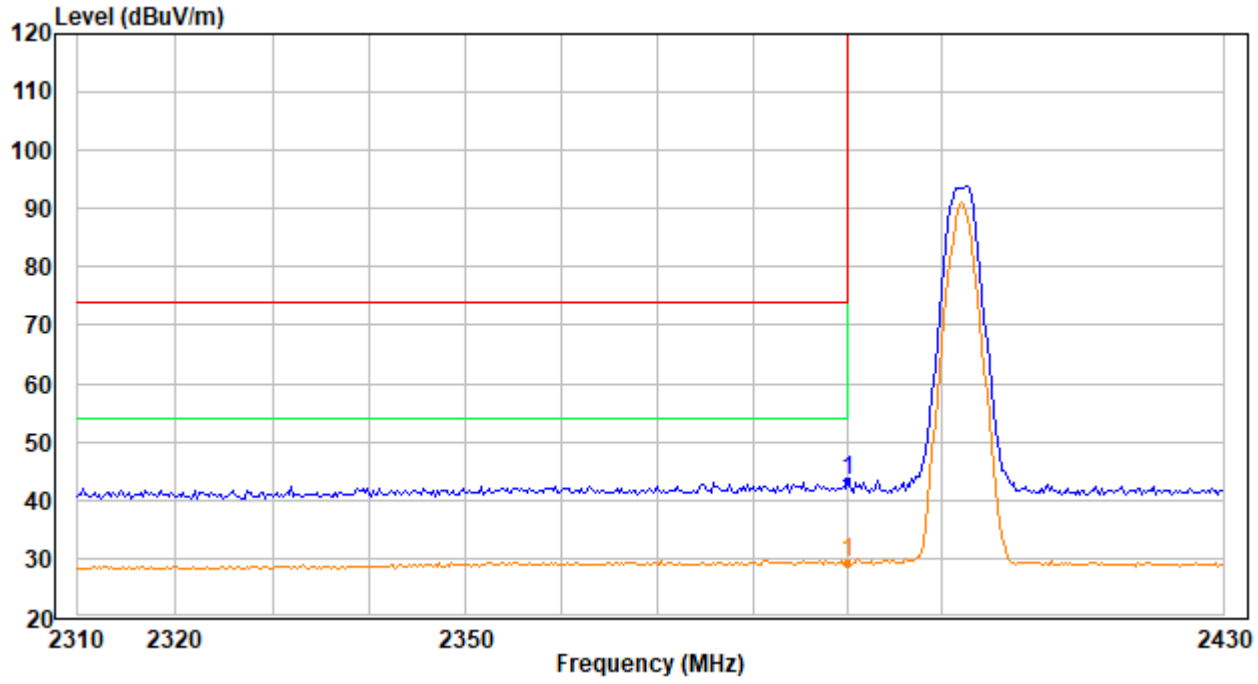
**2LE Mode:**

| Test Channel: | Lowest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|



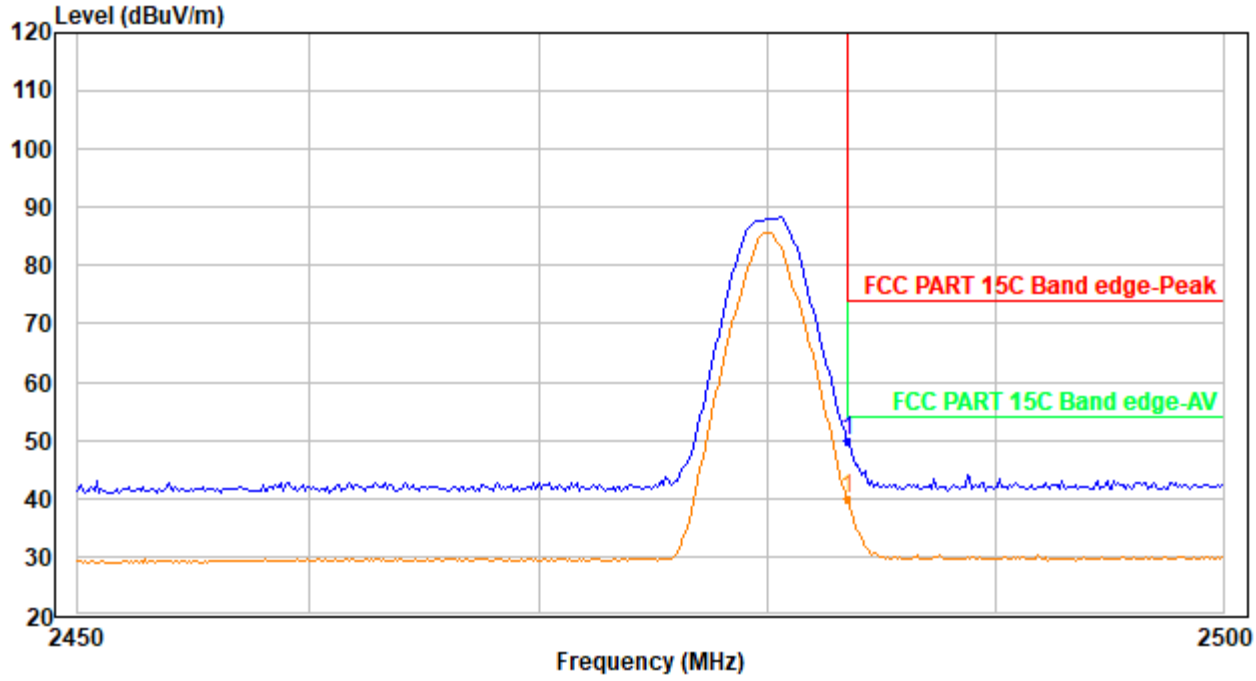

| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 43.44 | 74.00 | 29.35 | 54.00 | Pass |

| Test Channel: | Lowest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|



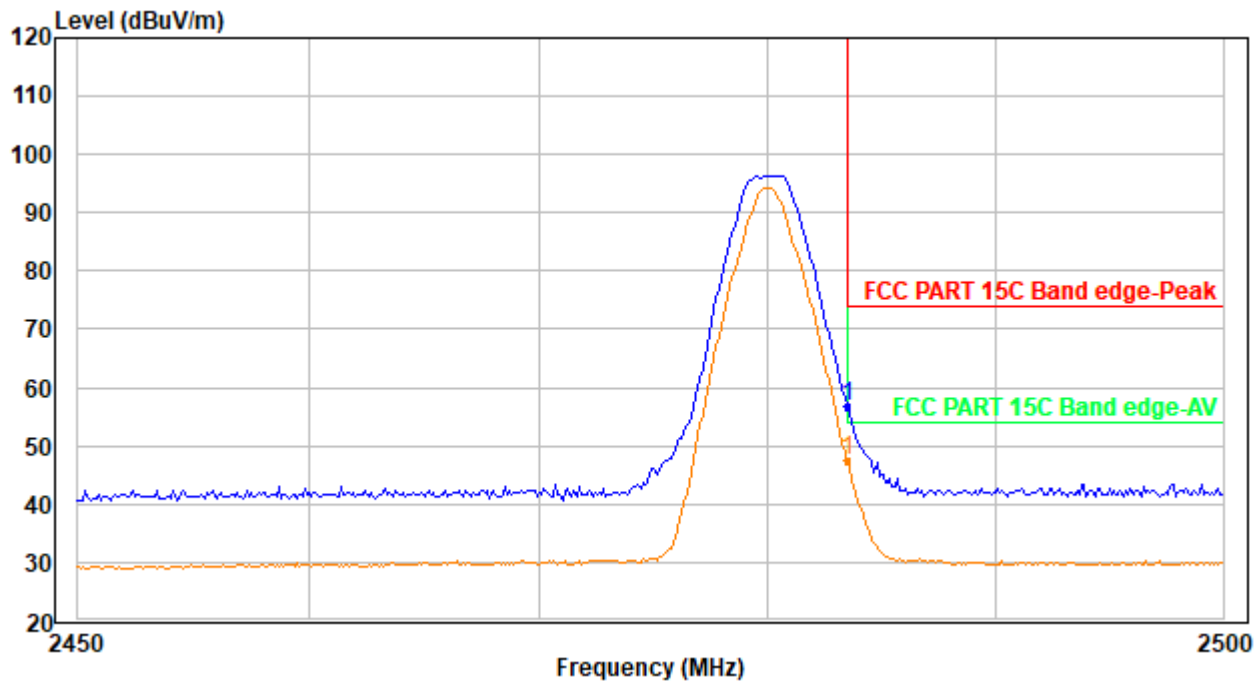

| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 43.42 | 74.00 | 29.21 | 54.00 | Pass |

| Test Channel: | Highest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 49.95 | 74.00 | 39.94 | 54.00 | Pass |

| Test Channel: | Highest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 56.83 | 74.00 | 47.54 | 54.00 | Pass |

## 5.9 CONDUCTED EMISSION

**Test Requirement:** 47 CFR Part 15C Section 15.207

**Test Method:** ANSI C63.10-2013 Section 6.2

**Limits:**

| Frequency range (MHz) | Limits (dB(μV)) | |
|---|---|---|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 66 to 56 | 56 to 46 |
| 0,50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

**Remark:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

**Test Setup:** Refer to section 4.4.2 for details.

**Test Procedures:**

Test frequency range :150KHz-30MHz

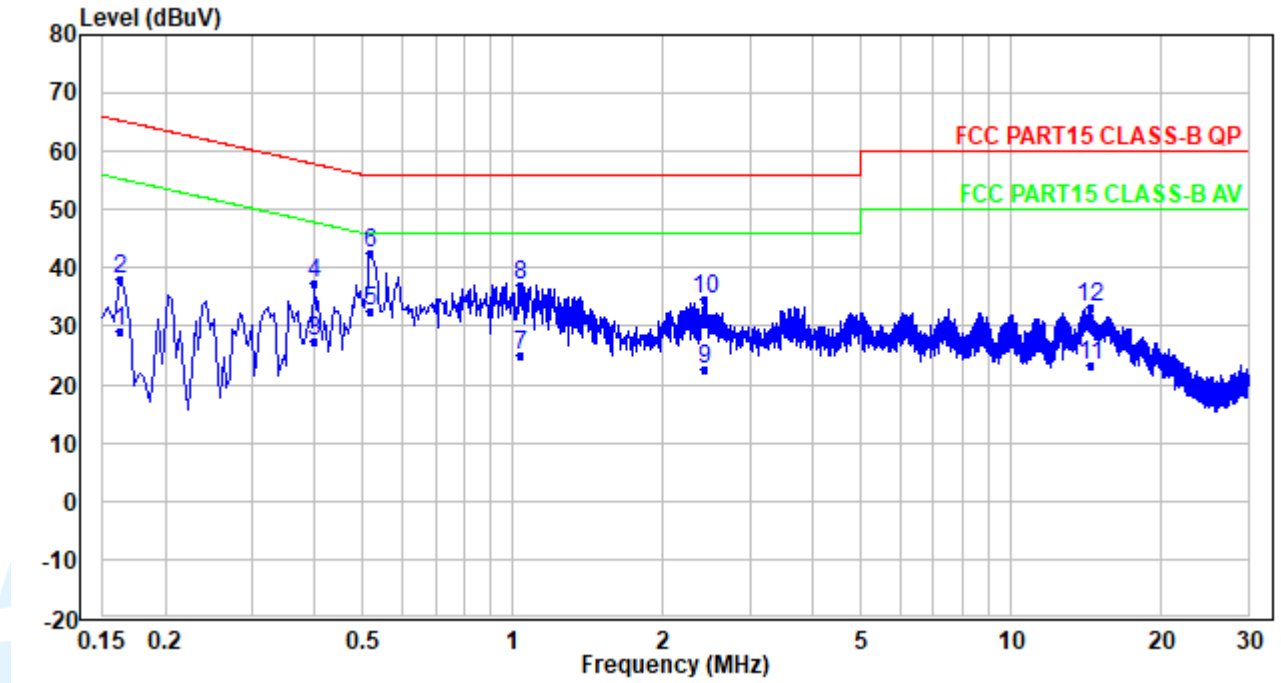
1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second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

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

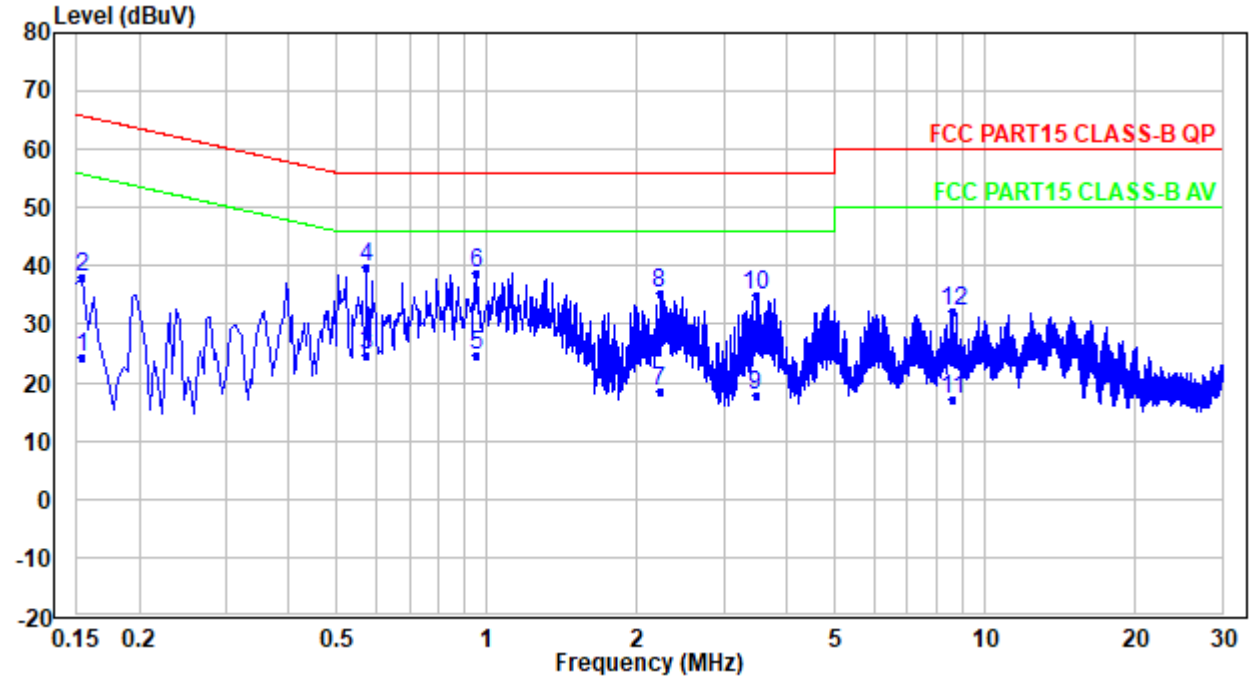
**The measurement data as follows:**
**Quasi Peak and Average:**
**Mode: BT Link**

**Live Line**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.162 | 19.04 | 10.03 | 29.07 | 55.36 | -26.29 | Average |
| 2 | 0.162 | 28.04 | 10.03 | 38.07 | 65.36 | -27.29 | QP |
| 3 | 0.398 | 17.49 | 10.04 | 27.53 | 47.90 | -20.37 | Average |
| 4 | 0.398 | 27.49 | 10.04 | 37.53 | 57.90 | -20.37 | QP |
| 5 | 0.518 | 22.44 | 10.04 | 32.48 | 46.00 | -13.52 | Average |
| 6 | 0.518 | 32.44 | 10.04 | 42.48 | 56.00 | -13.52 | QP |
| 7 | 1.038 | 14.94 | 10.06 | 25.00 | 46.00 | -21.00 | Average |
| 8 | 1.038 | 26.94 | 10.06 | 37.00 | 56.00 | -19.00 | QP |
| 9 | 2.422 | 12.37 | 10.16 | 22.53 | 46.00 | -23.47 | Average |
| 10 | 2.422 | 24.37 | 10.16 | 34.53 | 56.00 | -21.47 | QP |
| 11 | 14.433 | 12.34 | 10.79 | 23.13 | 50.00 | -26.87 | Average |
| 12 | 14.433 | 22.34 | 10.79 | 33.13 | 60.00 | -26.87 | QP |

**Neutral Line**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.154 | 14.14 | 10.02 | 24.16 | 55.78 | -31.62 | Average |
| 2 | 0.154 | 28.14 | 10.02 | 38.16 | 65.78 | -27.62 | QP |
| 3 | 0.574 | 14.77 | 10.03 | 24.80 | 46.00 | -21.20 | Average |
| 4 | 0.574 | 29.77 | 10.03 | 39.80 | 56.00 | -16.20 | QP |
| 5 | 0.954 | 14.68 | 10.05 | 24.73 | 46.00 | -21.27 | Average |
| 6 | 0.954 | 28.68 | 10.05 | 38.73 | 56.00 | -17.27 | QP |
| 7 | 2.222 | 8.35 | 10.11 | 18.46 | 46.00 | -27.54 | Average |
| 8 | 2.222 | 25.35 | 10.11 | 35.46 | 56.00 | -20.54 | QP |
| 9 | 3.466 | 7.61 | 10.22 | 17.83 | 46.00 | -28.17 | Average |
| 10 | 3.466 | 24.61 | 10.22 | 34.83 | 56.00 | -21.17 | QP |
| 11 | 8.625 | 6.82 | 10.45 | 17.27 | 50.00 | -32.73 | Average |
| 12 | 8.625 | 21.82 | 10.45 | 32.27 | 60.00 | -27.73 | QP |

Remark:

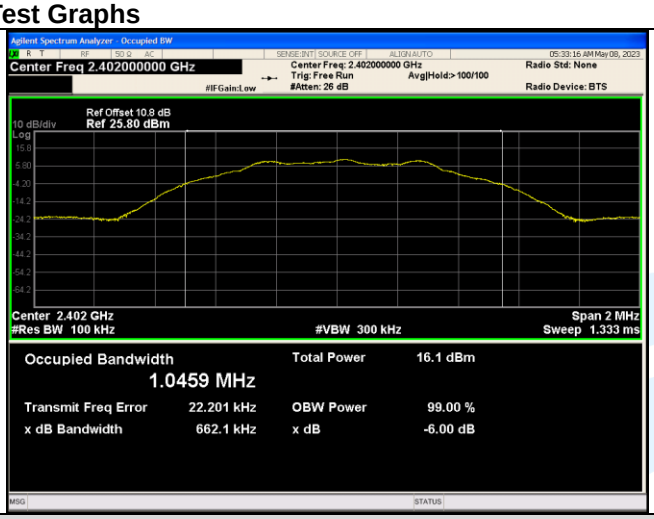
1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

# APPENDIX A RF TEST DATA

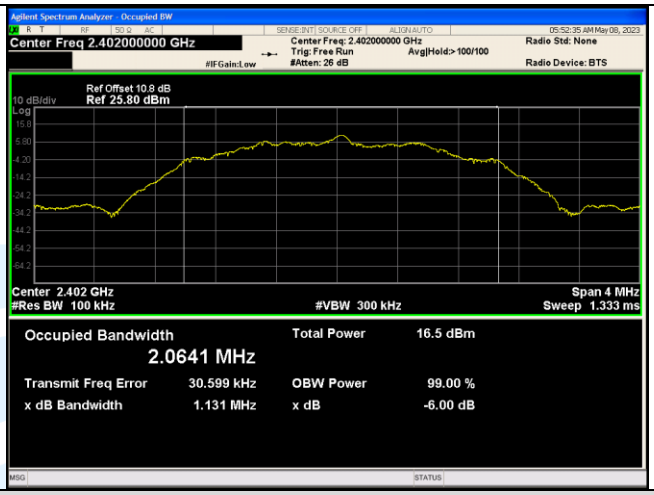
## A.1 6DB BANDWIDTH

| Mode | Test Channel | Test Frequency (MHz) | 6 dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|---|
| LE | 0 | 2402 | 0.6621 | 0.5 | PASS |
| | 19 | 2440 | 0.6608 | | PASS |
| | 39 | 2480 | 0.6618 | | PASS |
| 2LE | 0 | 2402 | 1.131 | | PASS |
| | 19 | 2440 | 1.128 | | PASS |
| | 39 | 2480 | 1.133 | | PASS |

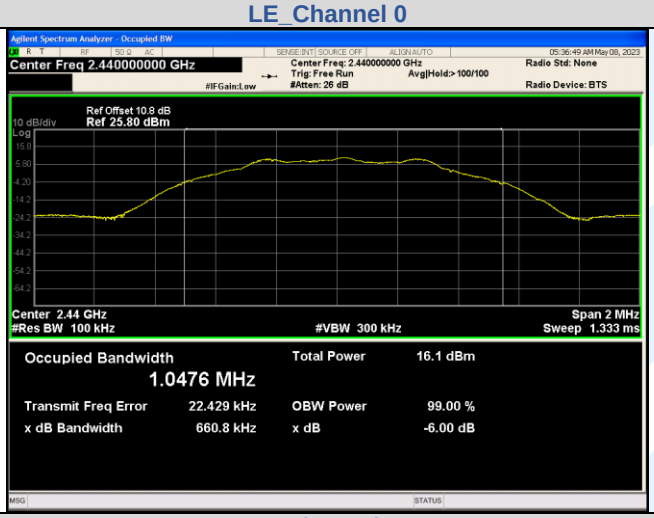
## Test Graphs




LE_Channel 0

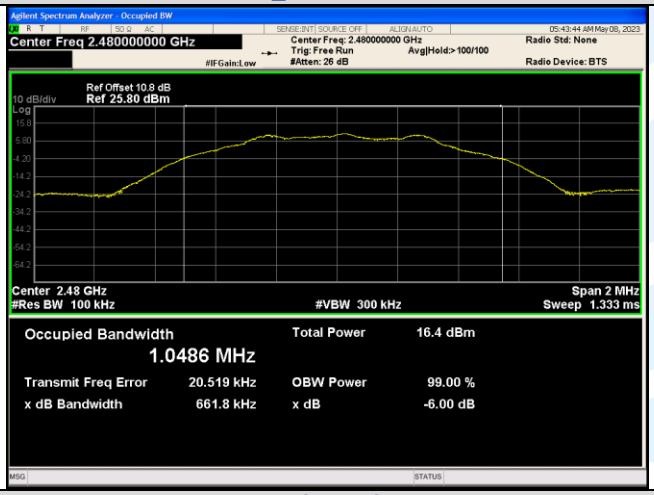



2LE_Channel 0

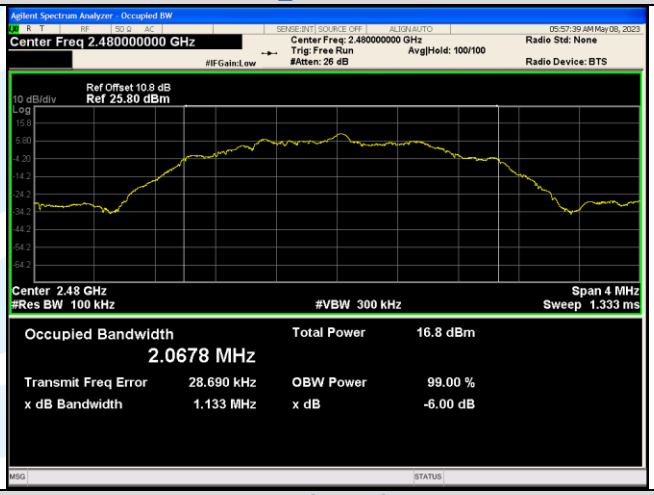



LE_Channel 19


2LE_Channel 19




LE_Channel 39

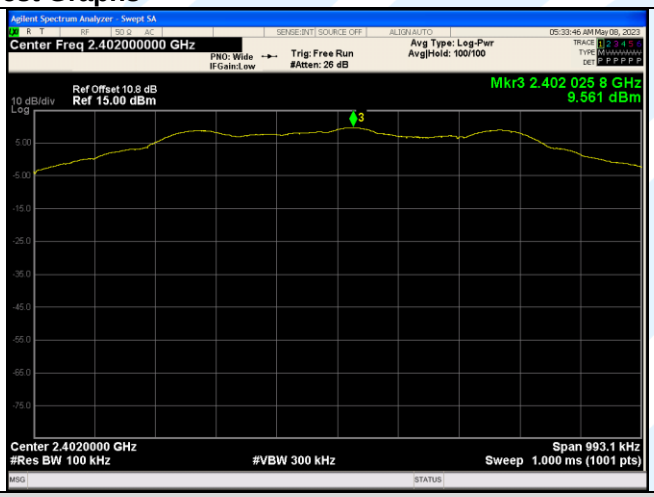



2LE_Channel 39

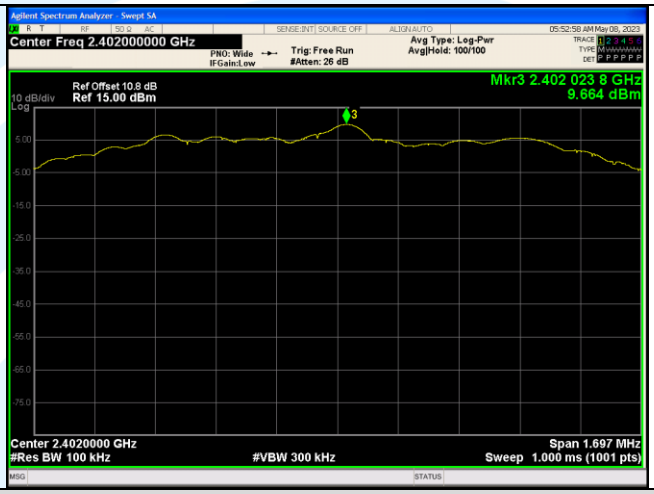
## A.2 CONDUCTED OUT OF BAND EMISSION

| Mode | Channel | OOB Emission Frequency (MHz) | OOB Emission Level (dBm) | Limit (dBm) | Over Limit (dB) | Result |
|---|---|---|---|---|---|---|
| LE | 0 | 2400.00 | -44.376 | -10.44 | -34 | PASS |
| | | 9606.86 | -40.540 | -10.44 | -30.100 | PASS |
| | 19 | 9759.18 | -42.890 | -10.38 | -32.510 | PASS |
| | 39 | 2483.50 | -53.764 | -10.05 | -44 | PASS |
| | | 9920.86 | -39.641 | -10.05 | -29.591 | PASS |
| 2LE | 0 | 2400.00 | -30.010 | -10.34 | -20 | PASS |
| | | 9609.98 | -41.178 | -10.34 | -30.838 | PASS |
| | 19 | 9757.93 | -44.657 | -10.31 | -34.347 | PASS |
| | 39 | 2483.50 | -51.831 | -10.03 | -42 | PASS |
| | | 9918.37 | -42.232 | -10.03 | -32.202 | PASS |

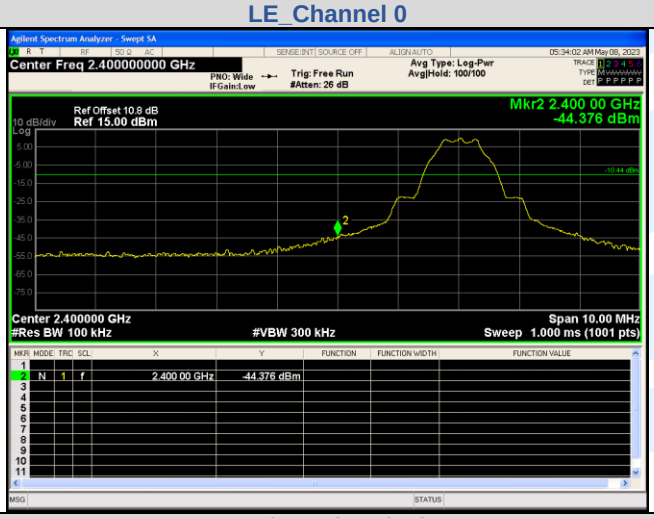
**Test Graphs**



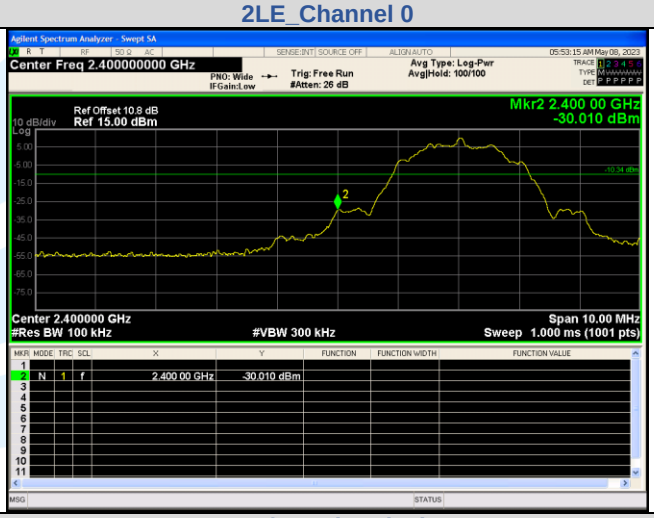

In-Band Reference Level
LE_Channel 0



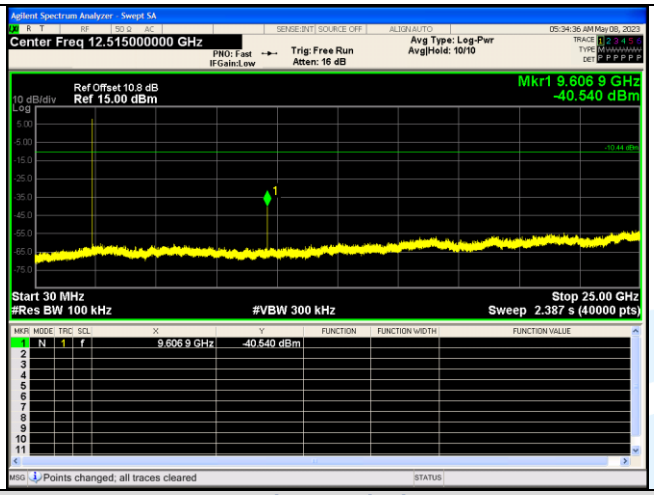

In-Band Reference Level
2LE_Channel 0



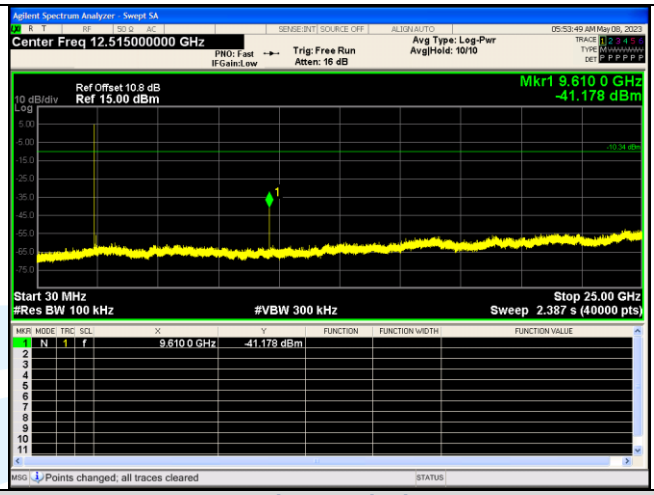

Out Of Band Emission
LE_Channel 0




Out Of Band Emission
2LE_Channel 0



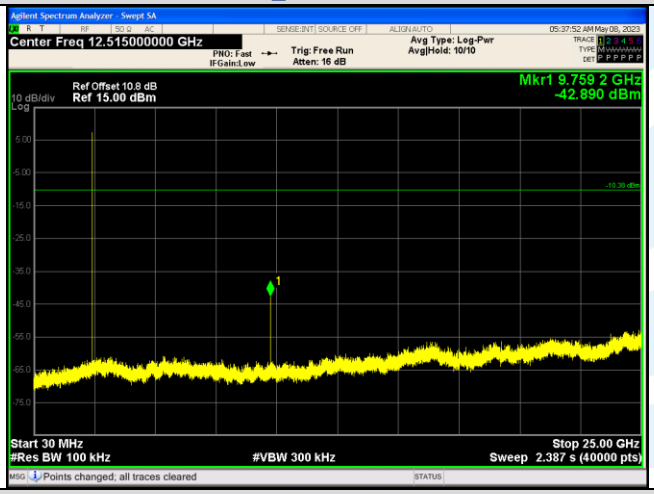

Spurious Emission
LE_Channel 0



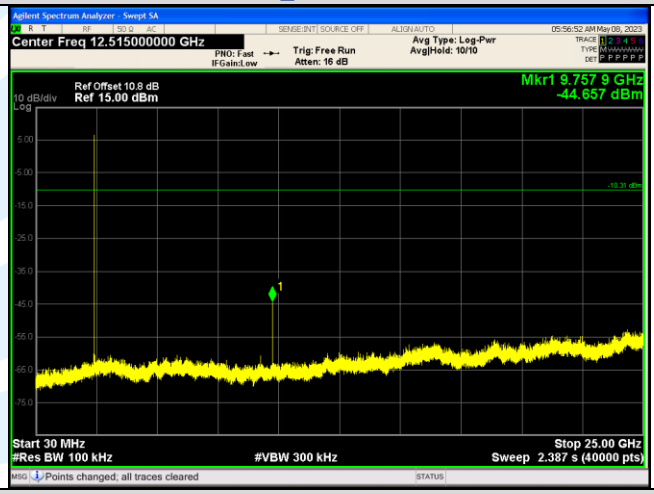

Spurious Emission
2LE_Channel 0


In-Band Reference Level
LE_Channel 19

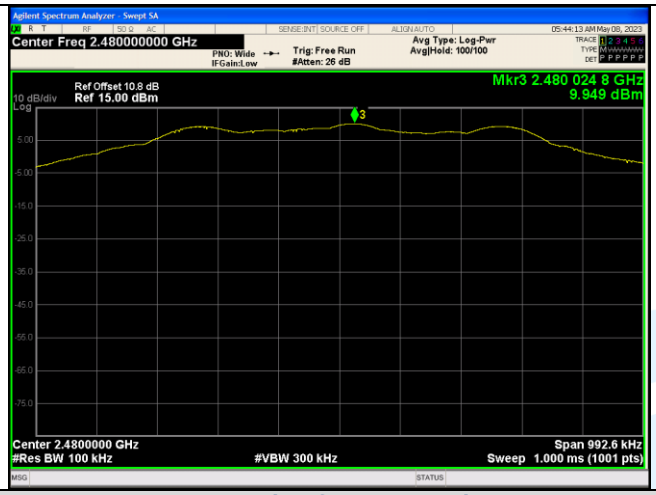

In-Band Reference Level
2LE_Channel 19




Spurious Emissions
LE_Channel 19

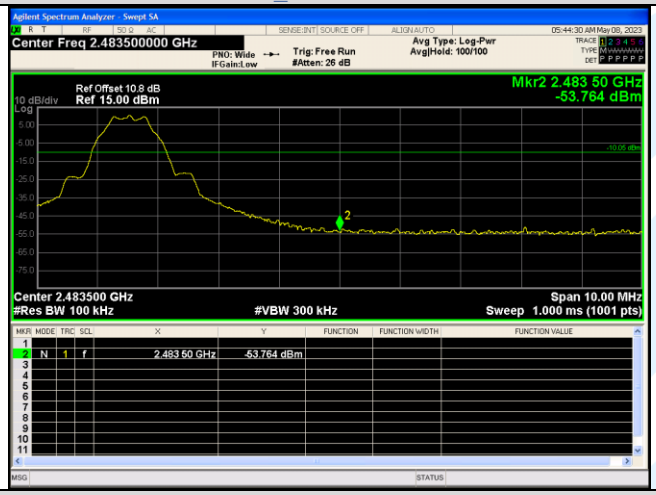



Spurious Emissions
2LE_Channel 19

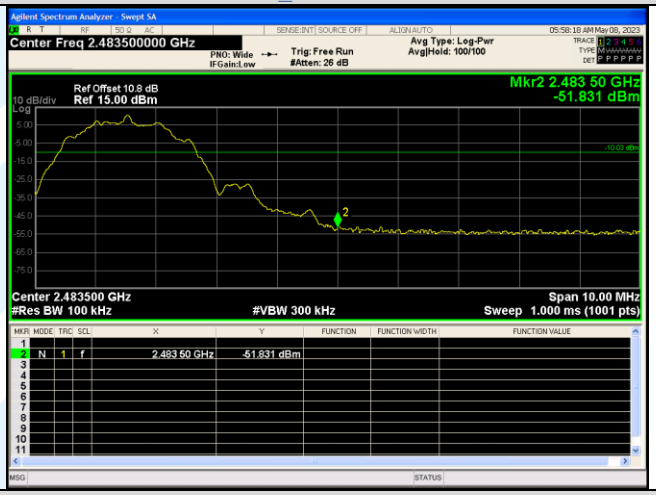



In-Band Reference Level
LE_Channel 39

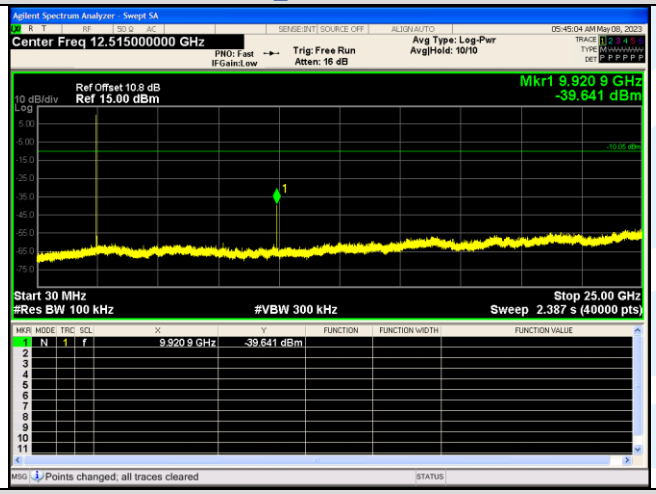

In-Band Reference Level
2LE_Channel 39



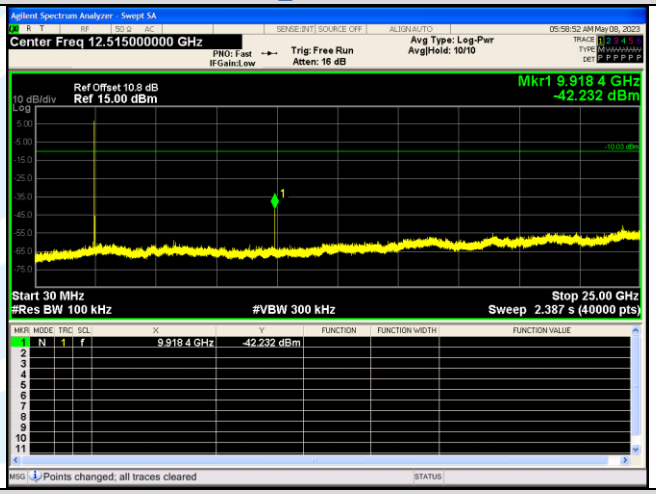

Out Of Band Emission
LE_Channel 39




Out Of Band Emission
2LE_Channel 39




Spurious Emission
LE_Channel 39

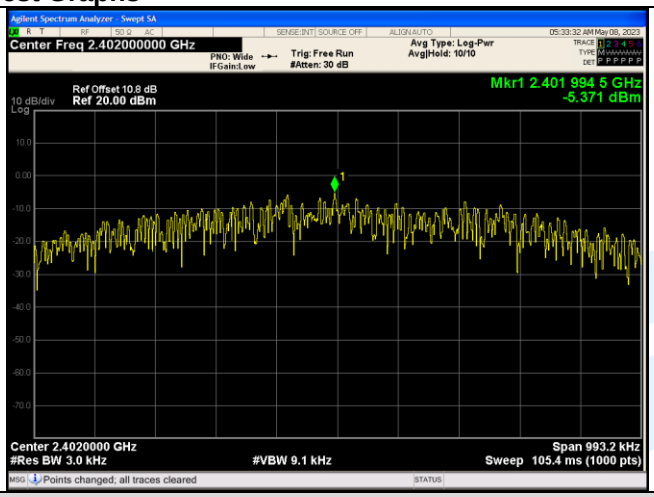



Spurious Emission
2LE_Channel 39

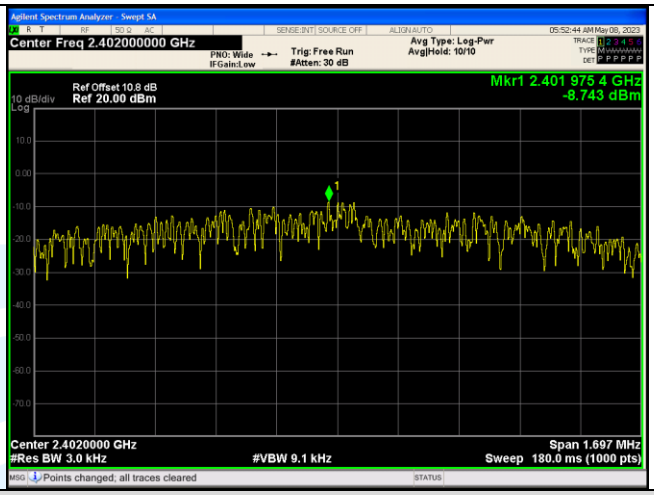
## A.3 POWER SPECTRAL DENSITY

| Mode | Test Channel | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|---|
| LE | 0 | -5.371 | 8 | PASS |
| LE | 19 | -5.130 | 8 | PASS |
| LE | 39 | -4.742 | 8 | PASS |
| 2LE | 0 | -8.743 | 8 | PASS |
| 2LE | 19 | -8.618 | 8 | PASS |
| 2LE | 39 | -8.195 | 8 | PASS |

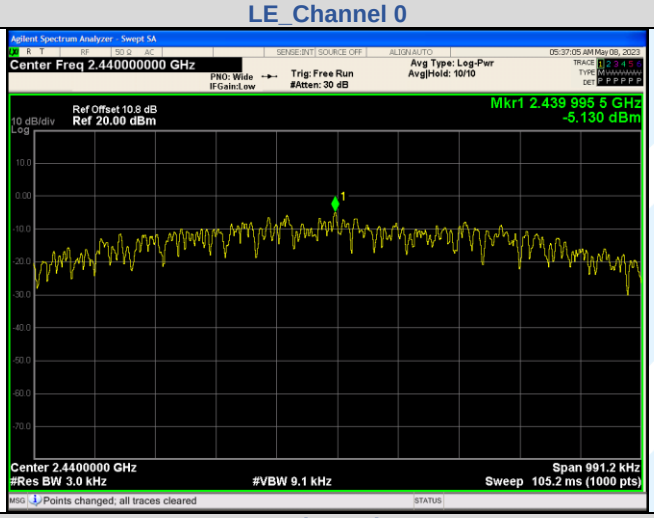
## Test Graphs



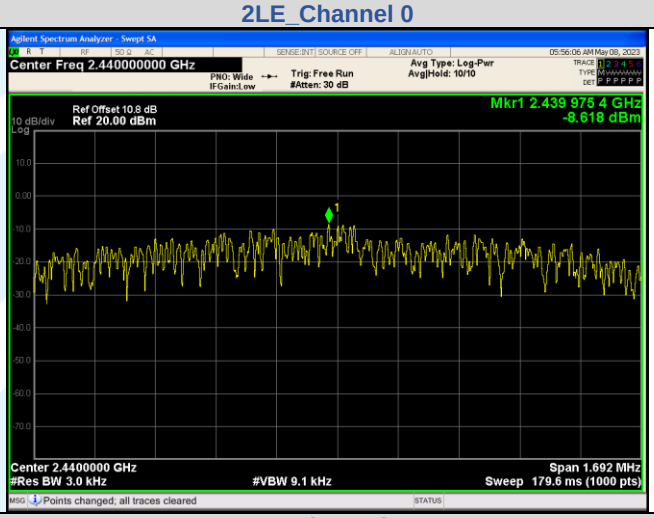

LE_Channel 0



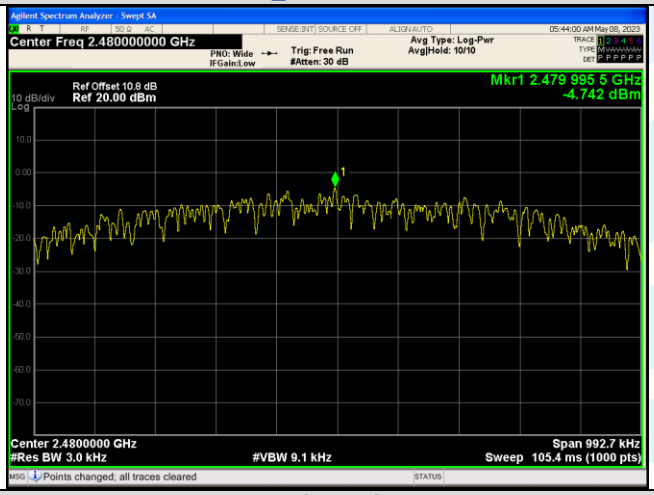

2LE_Channel 0



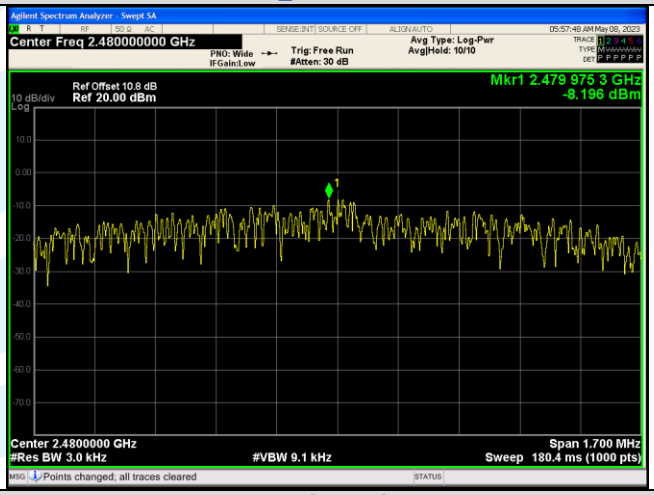

LE_Channel 19




2LE_Channel 19




LE_Channel 39




2LE_Channel 39

# APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

# APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***