# TEST REPORT

of

# FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

| | |
|---|---|
| Product: | **Airvida E1 wearable air purifier with noise-cancelling earphones** |
| Brand: | **ible** |
| Model: | **Airvida E1** |
| Model Difference: | **N/A** |
| FCC ID: | **2A3NTAVE1BB001** |
| FCC Rule Part: | **§15.247, Cat: DSS** |
| Applicant: | **ible Technology Inc.** |
| Address: | **12F-1, No. 17, Sec. 1, Chengde Rd., Datong Dist., Taipei City 103, Taiwan** |

Test Performed by:

**International Standards Laboratory Corp. LT Lab.**
TEL: +886-3-263-8888 FAX: +886-3-263-8899
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

Report No.: **ISL-21LR270FCDSS**
Issue Date : **2022/01/20**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein. The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification. This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

# VERIFICATION OF COMPLIANCE

| | |
|---|---|
| **Applicant:** | ible Technology Inc. |
| **Product Description:** | Airvida E1 wearable air purifier with noise-cancelling earphones |
| **Brand Name:** | ible |
| **Model No.:** | Airvida E1 |
| **Model Difference:** | N/A |
| **FCC ID:** | 2A3NTAVE1BB001 |
| **Date of Test:** | 2021/11/04 ~ 2022/01/18 |
| **Date of EUT Received:** | 2021/11/04 |

## We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

| | | | |
|---|---|---|---|
| ***Test By:*** | Barry Lee | ***Date:*** | 2022/01/20 |
| | ***Barry Lee/ Senior Engineer*** | | |
| ***Prepared By:*** | Elisa Chen | ***Date:*** | 2022/01/20 |
| | ***Elisa Chen / Senior Engineer*** | | |
| ***Approved By:*** | Jerry Liu | ***Date:*** | 2022/01/20 |
| | ***Jerry Liu / Assistant Manager*** | | |

# Version

| Version No. | Date | Description |
|---|---|---|
| 00 | 2022/01/20 | Initial creation of document |
| | | |
| | | |

# Uncertainty of Measurement

| Description Of Test | Uncertainty |
|---|---|
| Conducted Emission (AC power line) | 2.586 dB |
| Field Strength of Spurious Radiation | <=30MHz: 2.96dB<br>30-1GHz: 4.22 dB<br>1-40 GHz: 4.08 dB |
| Conducted Power | 2.412 GHz: 1.30 dB<br>5.805 GHz: 1.55 dB |
| Power Density | 2.412 GHz:1.30 dB<br>5.805 GHz: 1.67 dB |
| Frequency | 0.0032% |

# Table of Contents


**1. General Information ..... 6**
- 1.1. Product Description ..... 6
- 1.2. Related Submittal(s) / Grant (s) ..... 7
- 1.3. Test Methodology ..... 7
- 1.4. Test Facility ..... 7
- 1.5. Special Accessories ..... 7
- 1.6. Equipment Modifications ..... 7

**2. System Test Configuration ..... 8**
- 2.1 EUT Configuration ..... 8
- 2.2 EUT Exercise ..... 8
- 2.3 Test Procedure ..... 8
- 2.4 Configuration of Tested System (RE) ..... 9

**3. Summary of Test Results ..... 10**

**4. Description of Test Modes ..... 10**

**5. Conduced Emission Test ..... 11**
- 5.1 Standard Applicable: ..... 11
- 5.2 Measurement Equipment Used: ..... 11
- 5.3 EUT Setup: ..... 11
- 5.4 Measurement Procedure: ..... 12
- 5.5 Measurement Result: ..... 12

**6. Peak Output Power Measurement ..... 15**
- 6.1 Standard Applicable: ..... 15
- 6.2 Measurement Equipment Used: ..... 15
- 6.3 Test Set-up: ..... 16
- 6.4 Measurement Procedure: ..... 16
- 6.5 Measurement Result: ..... 17

**7. Spurious Emission Test ..... 18**
- 7.1 Standard Applicable: ..... 18
- 7.2 Measurement Equipment Used: ..... 18
- 7.3 Test SET-UP: ..... 19
- 7.4 Measurement Procedure: ..... 20
- 7.5 Field Strength Calculation ..... 21
- 7.6 Measurement Result: ..... 21

**8. 100kHz Bandwidth of Band Edges Measurement ..... 28**
- 8.1 Standard Applicable: ..... 28
- 8.2 Measurement Equipment Used: ..... 28
- 8.3 Test SET-UP: ..... 28
- 8.4 Measurement Procedure: ..... 28
- 8.5 Field Strength Calculation ..... 29
- 8.6 Measurement Result: ..... 29

**9. FREQUENCY SEPARATION ..... 54**
9.1 Standard Applicable: ..... 54
9.2 Measurement Equipment Used: ..... 54
9.3 Test Set-up: ..... 54
9.4 Measurement Procedure: ..... 54
9.5 Measurement Result: ..... 54
**10. Number of Hopping Frequency ..... 57**
10.1 Standard Applicable: ..... 57
10.2 Measurement Equipment Used: ..... 57
10.3 Test Set-up: ..... 57
10.4 Measurement Procedure: ..... 57
10.5 Measurement Result: ..... 57
**11. Time of Occupancy (Dwell Time) ..... 59**
11.1 Standard Applicable: ..... 59
11.2 Measurement Equipment Used: ..... 59
11.3 Test Set-up: ..... 59
11.4 Measurement Procedure: ..... 59
11.5 Measurement Result: ..... 60
**12. 20dB Bandwidth ..... 66**
12.1 Standard Applicable: ..... 66
12.2 Measurement Equipment Used: ..... 66
12.3 Test Set-up: ..... 66
12.4 Measurement Procedure: ..... 66
12.5 Measurement Result: ..... 67
**13. Antenna Requirement ..... 73**
13.1 Standard Applicable: ..... 73
13.2 Antenna Connected Construction: ..... 73

# 1. General Information

## 1.1. Product Description

General:

| | |
|---|---|
| Product Name | Airvida E1 wearable air purifier with noise-cancelling earphones |
| Brand Name | ible |
| Model Name | Airvida E1 |
| Model Difference | N/A |
| Power Supply | 5Vdc from USB or 3.7V battery |

Bluetooth:

| | |
|---|---|
| Frequency Range: | 2402 – 2480MHz |
| Bluetooth Version: | V5.0 |
| Channel number: | 79 channels |
| Output power: | 1.95dBm peak |
| Antenna Designation: | Chip Antenna: 2.48dBi |

**Remark:** The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2A3NTAVE1BB001** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 558074 D01 15.247 Meas Guidance v05r02

## 1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of International Standards Laboratory Corp. <LT Lab.> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents . FCC Registration Number is: 487532; Designation Number is: TW0997, Canada Registration Number: 4067B-4.

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. Equipment Modifications

Not available for this EUT intended for grant.

# 2. System Test Configuration

## 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

## 2.2 EUT Exercise

The EUT (Transmitter) was tested with a test program to fix the TX/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

## 2.3 Test Procedure

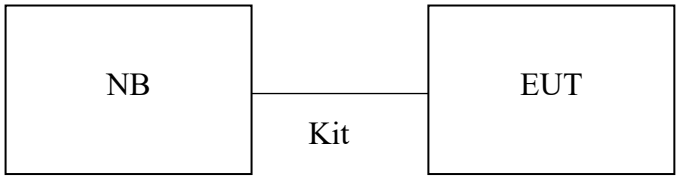
### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m/1.5m (frequency above 1GHz) above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 6 and 11 of ANSI C63.10: 2013.

## 2.4 Configuration of Tested System (RE)




**Configuration of Tested System (CE)**

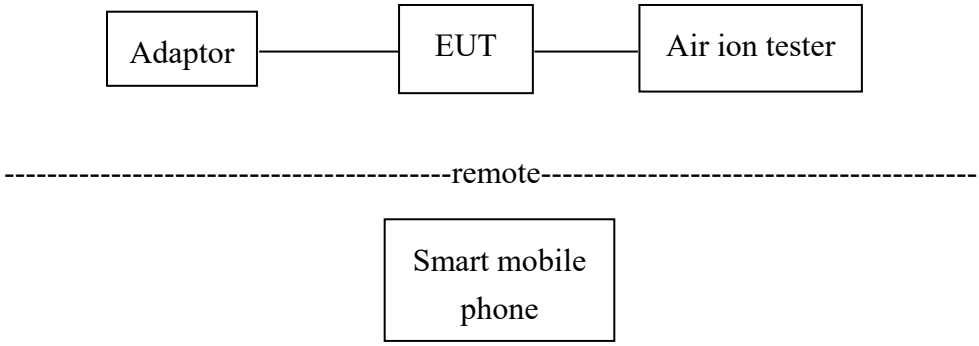



**Table 1 Equipment Used in Tested System**

| Item | Equipment | Mfr/Brand | Model/ Type No. | Series No. | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1 | NB | Lenovo | 700 | NA | N/A | N/A |
| 2 | Kit | XLink | PCB.18-009 | 2018.2.3 | 70cm | N/A |
| 3 | adaptor | Apple | A1385 | N/A | N/A | Shielded /1m |
| 4 | Air ion tester | N/A | KT-401 | PAT.20041003 4562.4 | N/A | N/A |
| 5 | Smart mobile phone | hTC | PL99110 | N/A | N/A | N/A |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

## 3. Summary of Test Results

| FCC Rules | Description Of Test | Result |
|---|---|---|
| §15.207(a) | AC Power line Conducted Emission | Compliant |
| §15.247(b)(1) | Peak Output Power | Compliant |
| §15.247(d) | 100 kHz Bandwidth Of Frequency Band Edges | Compliant |
| §15.247(c) | Spurious Emission | Compliant |
| §15.247(a)(1) | Frequency Separation | Compliant |
| §15.247(a)(1)(iii) | Number of hopping frequency | Compliant |
| §15.247(a)(1)(ii) | Time of Occupancy | Compliant |
| §15.247(a)(1) | 20dB Bandwidth | Compliant |
| §15.203, §15.247(c) | Antenna Requirement | Compliant |

## 4. Description of Test Modes

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz), mid (2441MHz) and high (2480MHz) with each modulation were chosen for full testing.

The worst case EDR 2M mode was reported for Radiated Emission.

# 5. Conduced Emission Test

## 5.1 Standard Applicable:

According to §15.207 frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

| Frequency range MHz | Limits dB(uV) | |
|---|---|---|
| | 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 |

Note
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 MHz to 0.50 MHz.

## 5.2 Measurement Equipment Used:

| Location | Equipment Name | Brand | Model | S/N | Last Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|---|
| Conduction 03 | EMI Receiver 15 | ROHDE & SCHWARZ | ESCI | 101166 | 07/07/2021 | 07/07/2022 |
| Conduction 03 | Chamber05 -1 Cable | WOKEN | CFD 300-NL | Chamber05 -1 Cable | 08/30/2021 | 08/30/2022 |
| Conduction 03 | LISN 19 | R&S | ENV216 | 101425 | 11/11/2021 | 11/11/2022 |
| Conduction 03 | LISN 22 | R&S | ENV216 | 101478 | 10/28/2021 | 10/28/2022 |
| Conduction 03 | LISN 24 | SCHWARZBECK | NNLK 8121 | 8121-829 | 07/26/2021 | 07/26/2022 |
| Conduction 03 | ISN T4 09 | Teseq GmbH | ISN T400A | 49914 | 08/02/2021 | 08/02/2022 |
| Conduction 03 | ISN T8 09 | Teseq GmbH | ISN T800 | 36190 | 09/30/2021 | 09/30/2022 |
| Conduction 03 | ISN T8 CAT6A_01 | SCHWARZBECK | NTFM 8158 | 8158 0123 | 01/17/2022 | 01/17/2023 |
| Conduction 03 | CDN ISN ST08A_1 | Teseq GmbH | CDN ISN ST08A | 43352 | 10/07/2021 | 10/07/2022 |
| Conduction 03 | Capacitive Voltage Probe 01 | SCHAFFNER | CVP 2200A | 18711 | 08/05/2021 | 08/05/2022 |
| Conduction 03 | Current Probe | SCHAFFNER | SMZ 11 | 18030 | 03/04/2021 | 03/04/2022 |

## 5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10-2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

## 5.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.
4. Both 120V & 240V have been verified, and 120V/60Hz was defined as the worst-case and record in the report.

## 5.5 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

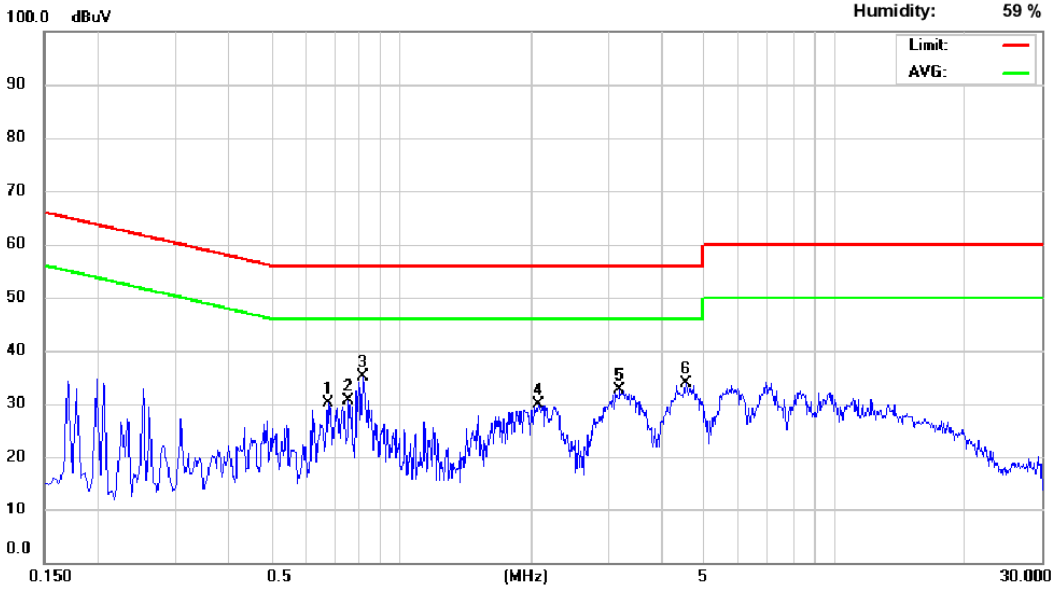
# AC POWER LINE CONDUCTED EMISSION TEST DATA

Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-2638888

Conducted Emission Measurement

Date: 2021/11/11

operator: Dan Lee
Temperature: 22 ℃
Humidity: 59 %




Site: Conduction 03 Phase: L1

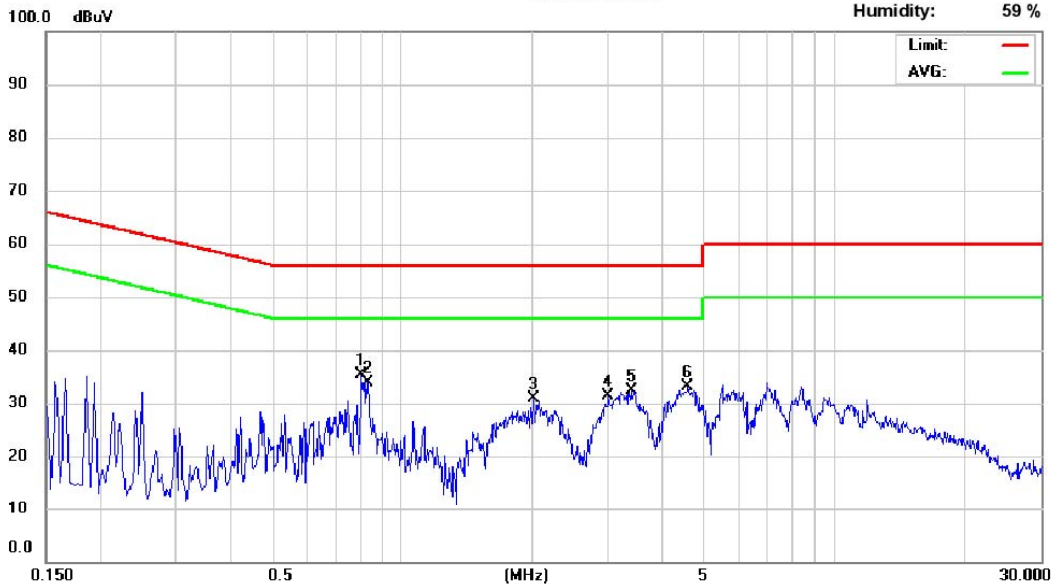
| No. | Frequency (MHz) | QP_R (dBuV) | AVG_R (dBuV) | Correct Factor (dB) | QP Emission (dBuV) | QP Limit (dBuV) | QP Margin (dB) | AVG Emission (dBuV) | AVG Limit (dBuV) | AVG Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.678 | 16.06 | 8.88 | 9.65 | 25.71 | 56.00 | -30.29 | 18.53 | 46.00 | -27.47 |
| 2 | 0.758 | 16.14 | 9.75 | 9.66 | 25.80 | 56.00 | -30.20 | 19.41 | 46.00 | -26.59 |
| 3 | 0.814 | 24.67 | 16.92 | 9.66 | 34.33 | 56.00 | -21.67 | 26.58 | 46.00 | -19.42 |
| 4 | 2.070 | 17.01 | 11.21 | 9.70 | 26.71 | 56.00 | -29.29 | 20.91 | 46.00 | -25.09 |
| 5 | 3.198 | 18.93 | 13.45 | 9.73 | 28.66 | 56.00 | -27.34 | 23.18 | 46.00 | -22.82 |
| 6 | 4.546 | 20.03 | 14.37 | 9.77 | 29.80 | 56.00 | -26.20 | 24.14 | 46.00 | -21.86 |

Address:No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel:03-2638888

Conducted Emission Measurement

Date: 2021/11/11

operator: Dan Lee
Temperature: 22 ℃
Humidity: 59 %




Site: Conduction 03 Phase: *N*

| No. | Frequency (MHz) | QP_R (dBuV) | AVG_R (dBuV) | Correct Factor (dB) | QP Emission (dBuV) | QP Limit (dBuV) | QP Margin (dB) | AVG Emission (dBuV) | AVG Limit (dBuV) | AVG Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.806 | 22.77 | 15.27 | 9.66 | 32.43 | 56.00 | -23.57 | 24.93 | 46.00 | -21.07 |
| 2 | 0.834 | 19.41 | 14.55 | 9.66 | 29.07 | 56.00 | -26.93 | 24.21 | 46.00 | -21.79 |
| 3 | 2.022 | 16.64 | 12.02 | 9.70 | 26.34 | 56.00 | -29.66 | 21.72 | 46.00 | -24.28 |
| 4 | 3.002 | 17.18 | 12.27 | 9.73 | 26.91 | 56.00 | -29.09 | 22.00 | 46.00 | -24.00 |
| 5 | 3.394 | 18.81 | 13.99 | 9.74 | 28.55 | 56.00 | -27.45 | 23.73 | 46.00 | -22.27 |
| 6 | 4.582 | 19.87 | 15.08 | 9.77 | 29.64 | 56.00 | -26.36 | 24.85 | 46.00 | -21.15 |

# 6. Peak Output Power Measurement

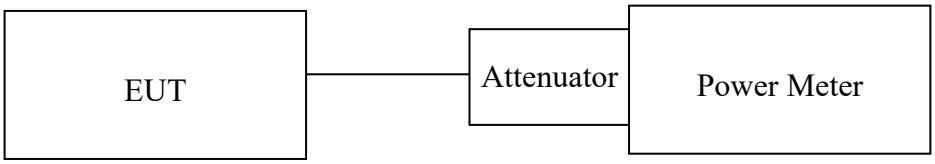
## 6.1 Standard Applicable:

According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

## 6.2 Measurement Equipment Used:

| Location Conducted | Equipment Name | Brand | Model | S/N | Last Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|---|
| Conducted | Power Meter | Anritsu | ML2495A | 1116010 | 09/30/2021 | 09/30/2022 |
| Conducted | Power Sensor | Anritsu | MA2411B | 34NKF50 | 09/30/2021 | 09/30/2022 |
| Conducted | Power Sensor | DARE | RPR3006W | 13I00030SNO33 | 01/07/2022 | 01/07/2023 |
| Conducted | Power Sensor | DARE | RPR3006W | 13I00030SNO34 | 01/07/2022 | 01/07/2023 |
| Conducted | Power Sensor | DARE | RPR3006W | 14I00889SNO35 | 06/23/2021 | 06/23/2022 |
| Conducted | Power Sensor | DARE | RPR3006W | 14I00889SNO36 | 06/23/2021 | 06/23/2022 |
| Conducted | Temperature Chamber | KSON | THS-B4H100 | 2287 | 04/26/2021 | 04/26/2022 |
| Conducted | DC Power supply | ABM | 8185D | N/A | 01/06/2022 | 01/06/2023 |
| Conducted | AC Power supply | EXTECH | CFC105W | NA | N/A | N/A |
| Conducted | Spectrum analyzer | Keysight | N9010A | MY56070257 | 09/28/2021 | 09/28/2022 |
| Conducted | Test Software | DARE | Radiation Ver:2013.1.23 | NA | NA | NA |
| Conducted | Test Software | R&S | CMUGO Ver:2.0.0 | N/A | N/A | N/A |
| Conducted | Universal Digital Radio Communication Tester | R&S | CMU200 | 111968 | 11/18/2021 | 11/18/2022 |
| Conducted | Wideband Radio Communication Tester | R&S | CMW500 | 1201.002K50108793-JG | 10/26/2021 | 10/26/2022 |
| Conducted | BT Simulator | Agilent | N4010A | MY48100200 | NA | NA |
| Conducted | GPS Simulator | Welnavigate | GS-50 | 701523 | NA | NA |
| Conducted (TS8997) | Wideband Radio Communication Tester | R&S | CMW500 | 168811 | 09/09/2021 | 09/09/2022 |
| Conducted (TS8997) | Signal Generator | R&S | SMB100B | 101085 | 09/09/2021 | 09/09/2022 |
| Conducted (TS8997) | Vector Signal Generator | R&S | SMBV100A | 263246 | 09/09/2021 | 09/09/2022 |
| Conducted (TS8997) | Signal analyzer 40GHz | R&S | FSV40 | 101884 | 09/07/2021 | 09/07/2022 |
| Conducted (TS8997) | OSP150 extension unit CAM-BUS | R&S | OSP150 | 101107 | 09/10/2021 | 09/10/2022 |
| Conducted (TS8997) | Test Software | R&S | EMC32 | NA | NA | NA |

## 6.3 Test Set-up:




## 6.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

## 6.5 Measurement Result:

**BDR Mode**

| Frequency (MHz) | Peak Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---|---|---|---|---|
| Low | -0.874 | -0.87 | 0.00082 | 1 |
| Mid | -0.152 | -0.15 | 0.00097 | 1 |
| High | -0.973 | -0.97 | 0.00080 | 1 |

**EDR 2M Mode**

| Frequency (MHz) | Peak Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---|---|---|---|---|
| Low | 1.948 | 1.95 | 0.00157 | 0.125 |
| Mid | 1.056 | 1.06 | 0.00128 | 0.125 |
| High | 0.401 | 0.40 | 0.00110 | 0.125 |

**EDR 3M Mode**

| Frequency (MHz) | Peak Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|---|---|---|---|---|
| Low | 1.155 | 1.16 | 0.00130 | 0.125 |
| Mid | 1.509 | 1.51 | 0.00142 | 0.125 |
| High | 0.917 | 0.92 | 0.00124 | 0.125 |

# 7. Spurious Emission Test

## 7.1 Standard Applicable:

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

## 7.2 Measurement Equipment Used:

### 7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

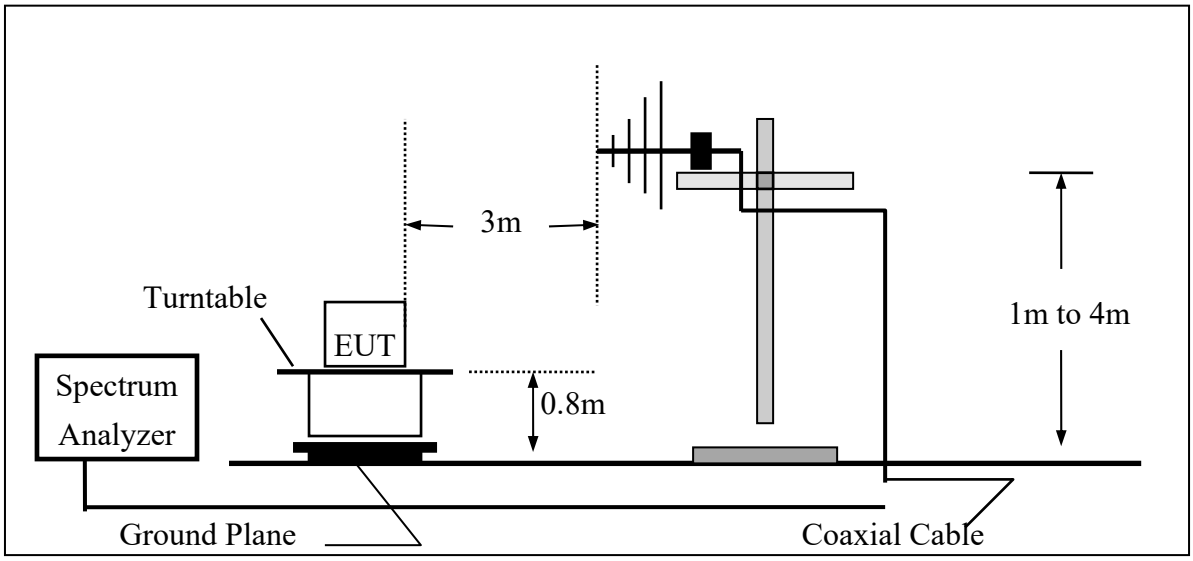
### 7.2.2. Radiated emission:

| Location Conducted | Equipment Name | Brand | Model | S/N | Last Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|---|
| Chamber 19 | Spectrum analyzer | R&S | FSV40 | 101919 | 08/18/2021 | 08/18/2022 |
| Chamber 19 | EMI Receiver | R&S | ESR3 | 102461 | 05/05/2021 | 05/05/2022 |
| Chamber 19 | Loop Antenna | EM | EM-6879 | 271 | 09/29/2021 | 09/29/2022 |
| Chamber 19 | Bilog Antenna (30MHz-1GHz) | Schwarzbeck | VULB9168 w 6dB Att. | 9168-736 | 02/22/2021 | 02/22/2022 |
| Chamber 19 | Horn antenna (1GHz-18GHz) | ETS | 3117 | 00218718 | 10/12/2021 | 10/12/2022 |
| Chamber 19 | Horn antenna (18GHz-26GHz) | Com-power | AH-826 | 081001 | 11/30/2021 | 11/30/2022 |
| Chamber 19 | Horn antenna (26GHz-40GHz) | Com-power | AH-640 | 100A | 03/11/2021 | 03/11/2022 |
| Chamber 19 | Preamplifier (9kHz-1GHz) | HP | 8447F | 3113A04621 | 06/22/2021 | 06/22/2022 |
| Chamber 19 | Preamplifier (1GHz-26GHz) | EM | EM01M26G | 060681 | 05/07/2021 | 05/07/2022 |
| Chamber 19 | Preamplifier (26GHz-40GHz) | MITEQ | JS4-26004000-27-5A | 818471 | 05/07/2021 | 05/07/2022 |
| Chamber 19 | RF Cable (100kHz-26.5GHz) | HUBER SUHNER | Sucoflex 104A | MY1394/4A & 50886/4A | 08/30/2021 | 08/30/2022 |
| Chamber 19 | RF Cable (18GHz-40GHz) | HUBER SUHNER | Sucoflex 102 | 27963/2&37421/2 | 11/17/2021 | 11/17/2022 |
| Chamber 19 | Signal Generator | Anritsu | MG3692A | 20311 | 12/28/2021 | 12/28/2022 |
| Chamber 19 | Test Software | Audix | E3 Ver:6.12023 | N/A | N/A | N/A |

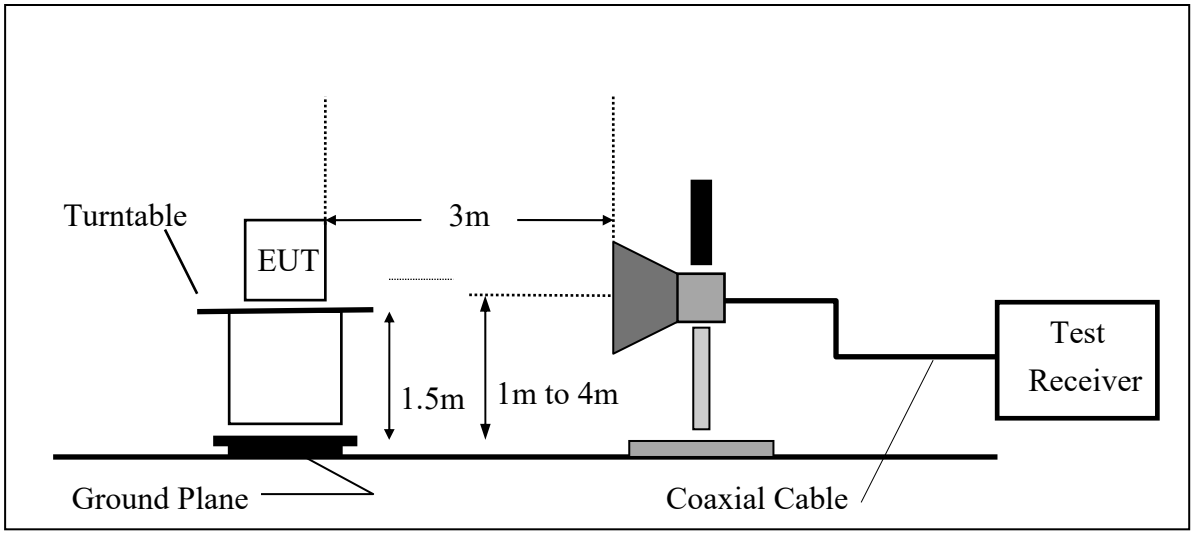
## 7.3 Test SET-UP:

The test item only performed radiated mode

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz




(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



## 7.4 Measurement Procedure:

1. According 414788 section 2, Either OATS or chamber for radiated emission below 30MHz, the test was done at 966 chamber, the test site was evaluated with OATS and the Chamber has test signals level greater than OATS's .
2. The EUT was placed on a turn table which is 0.8m/1.5m above ground plane in 966 chamber.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. Repeat above procedures until all frequency measured were complete.

| | | |
|---|---|---|
| Test receiver setting | : | Blew 1GHz |
| Detector | : | Average(9kHz – 90kHz, 110kHz – 90kHz), Quasi-Peak |
| Bandwidth | : | 9kHz, 120kHz |
| Test spectrum setting | : | Above 1GHz |
| Peak | : | RBW=1MHz, VBW=3MHz,Sweep=auto |
| Average (for BT) | : | RBW=1MHz, VBW=0.5kHz, Sweep=auto |

Average Measurement Setting (VBW)

| Mode | ON time (ms) | Total time (ms) | Duty Cycle | Duty Factor | 1/Ton(kHz) | VBW (kHz) |
|---|---|---|---|---|---|---|
| 1M | 2.88 | 3.750 | 76.8% | 1.14 | 0.347 | 0.5 |
| 2M | 2.90 | 3.750 | 77.3% | 1.13 | 0.344 | 0.5 |
| 3M | 2.88 | 3.750 | 76.8% | 1.14 | 0.347 | 0.5 |

## 7.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

## 7.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

**Radiated Spurious Emission Measurement Result: (below 1GHz) (Worst case: EDR 2M)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2022/01/14 |
| Fundamental Frequency | 2402MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 30.00 | 39.10 | -7.59 | 31.51 | 40.00 | -8.49 | Peak | VERTICAL |
| 2 | 47.46 | 40.07 | -6.01 | 34.06 | 40.00 | -5.94 | Peak | VERTICAL |
| 3 | 71.71 | 45.80 | -8.42 | 37.38 | 40.00 | -2.62 | Peak | VERTICAL |
| 4 | 95.96 | 47.06 | -11.64 | 35.42 | 43.50 | -8.08 | Peak | VERTICAL |
| 5 | 701.24 | 28.32 | 2.51 | 30.83 | 46.00 | -15.17 | Peak | VERTICAL |
| 6 | 872.93 | 27.78 | 5.31 | 33.09 | 46.00 | -12.91 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 47.46 | 33.61 | -6.01 | 27.60 | 40.00 | -12.40 | Peak | HORIZONTAL |
| 2 | 71.71 | 44.81 | -8.42 | 36.39 | 40.00 | -3.61 | Peak | HORIZONTAL |
| 3 | 95.96 | 51.66 | -11.64 | 40.02 | 43.50 | -3.48 | Peak | HORIZONTAL |
| 4 | 143.49 | 40.54 | -5.84 | 34.70 | 43.50 | -8.80 | Peak | HORIZONTAL |
| 5 | 715.79 | 28.71 | 2.74 | 31.45 | 46.00 | -14.55 | Peak | HORIZONTAL |
| 6 | 911.73 | 27.62 | 6.07 | 33.69 | 46.00 | -12.31 | Peak | HORIZONTAL |

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Mid | Test Date | 2022/01/14 |
| Fundamental Frequency | 2441MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 30.00 | 39.90 | -7.59 | 32.31 | 40.00 | -7.69 | Peak | VERTICAL |
| 2 | 47.46 | 40.38 | -6.01 | 34.37 | 40.00 | -5.63 | Peak | VERTICAL |
| 3 | 70.74 | 46.83 | -8.39 | 38.44 | 40.00 | -1.56 | Peak | VERTICAL |
| 4 | 95.96 | 47.28 | -11.64 | 35.64 | 43.50 | -7.86 | Peak | VERTICAL |
| 5 | 304.51 | 34.78 | -4.59 | 30.19 | 46.00 | -15.81 | Peak | VERTICAL |
| 6 | 492.69 | 32.76 | -1.31 | 31.45 | 46.00 | -14.55 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 47.46 | 33.70 | -6.01 | 27.69 | 40.00 | -12.31 | Peak | HORIZONTAL |
| 2 | 71.71 | 44.79 | -8.42 | 36.37 | 40.00 | -3.63 | Peak | HORIZONTAL |
| 3 | 95.96 | 51.62 | -11.64 | 39.98 | 43.50 | -3.52 | Peak | HORIZONTAL |
| 4 | 119.24 | 38.82 | -8.04 | 30.78 | 43.50 | -12.72 | Peak | HORIZONTAL |
| 5 | 143.49 | 40.17 | -5.84 | 34.33 | 43.50 | -9.17 | Peak | HORIZONTAL |
| 6 | 494.63 | 29.87 | -1.26 | 28.61 | 46.00 | -17.39 | Peak | HORIZONTAL |

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

**Radiated Spurious Emission Measurement Result (below 1GHz)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2022/01/14 |
| Fundamental Frequency | 2480MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 30.00 | 39.63 | -7.59 | 32.04 | 40.00 | -7.96 | Peak | VERTICAL |
| 2 | 47.46 | 39.90 | -6.01 | 33.89 | 40.00 | -6.11 | Peak | VERTICAL |
| 3 | 70.74 | 47.22 | -8.39 | 38.83 | 40.00 | -1.17 | Peak | VERTICAL |
| 4 | 94.99 | 47.13 | -11.64 | 35.49 | 43.50 | -8.01 | Peak | VERTICAL |
| 5 | 300.63 | 34.01 | -4.65 | 29.36 | 46.00 | -16.64 | Peak | VERTICAL |
| 6 | 775.93 | 28.48 | 4.14 | 32.62 | 46.00 | -13.38 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 47.46 | 33.33 | -6.01 | 27.32 | 40.00 | -12.68 | Peak | HORIZONTAL |
| 2 | 70.74 | 44.66 | -8.39 | 36.27 | 40.00 | -3.73 | Peak | HORIZONTAL |
| 3 | 94.99 | 51.74 | -11.64 | 40.10 | 43.50 | -3.40 | Peak | HORIZONTAL |
| 4 | 119.24 | 38.61 | -8.04 | 30.57 | 43.50 | -12.93 | Peak | HORIZONTAL |
| 5 | 143.49 | 40.11 | -5.84 | 34.27 | 43.50 | -9.23 | Peak | HORIZONTAL |
| 6 | 798.24 | 28.91 | 4.21 | 33.12 | 46.00 | -12.88 | Peak | HORIZONTAL |

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

**Radiated Spurious Emission Measurement Result (above 1GHz)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2022/01/14 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 4804.00 | 47.25 | -6.92 | 40.33 | 74.00 | -33.67 | Peak | VERTICAL |
| 2 | 7206.00 | 47.02 | -3.12 | 43.90 | 74.00 | -30.10 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 4804.00 | 47.29 | -6.92 | 40.37 | 74.00 | -33.63 | Peak | HORIZONTAL |
| 2 | 7206.00 | 46.41 | -3.12 | 43.29 | 74.00 | -30.71 | Peak | HORIZONTAL |

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

**Radiated Spurious Emission Measurement Result (above 1GHz)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Mid | Test Date | 2022/01/14 |
| Fundamental Frequency | 2441 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 4882.00 | 47.34 | -6.83 | 40.51 | 74.00 | -33.49 | Peak | VERTICAL |
| 2 | 7323.00 | 47.77 | -3.17 | 44.60 | 74.00 | -29.40 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 4882.00 | 47.52 | -6.83 | 40.69 | 74.00 | -33.31 | Peak | HORIZONTAL |
| 2 | 7323.00 | 46.75 | -3.17 | 43.58 | 74.00 | -30.42 | Peak | HORIZONTAL |

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

**Radiated Spurious Emission Measurement Result (above 1GHz)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2022/01/14 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

| No | Freq MHz | Reading dBuV | Factor dB | Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 4960.00 | 47.06 | -6.62 | 40.44 | 74.00 | -33.56 | Peak | VERTICAL |
| 2 | 7440.00 | 46.57 | -3.02 | 43.55 | 74.00 | -30.45 | Peak | VERTICAL |
| | | | | | | | | |
| 1 | 4960.00 | 46.61 | -6.62 | 39.99 | 74.00 | -34.01 | Peak | HORIZONTAL |
| 2 | 7440.00 | 45.63 | -3.02 | 42.61 | 74.00 | -31.39 | Peak | HORIZONTAL |

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

# 8. 100kHz Bandwidth of Band Edges Measurement

## 8.1 Standard Applicable:

According to §15.247(d), in any 100 kHz 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, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in15.209(a).

## 8.2 Measurement Equipment Used:

### 8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

### 8.2.2. Radiated emission:

Refer to section 7.2 for details.

## 8.3 Test SET-UP:

Refer to section 7.3 for details.

## 8.4 Measurement Procedure:

1 The EUT was placed on a turn table which is 0.8m above ground plane.

2 The turn table shall rotate 360 degrees to determine the position of maximum emission level.

3 EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.

4 When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

5 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

6 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

7 Repeat above procedures until all frequency measured were complete.

## 8.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

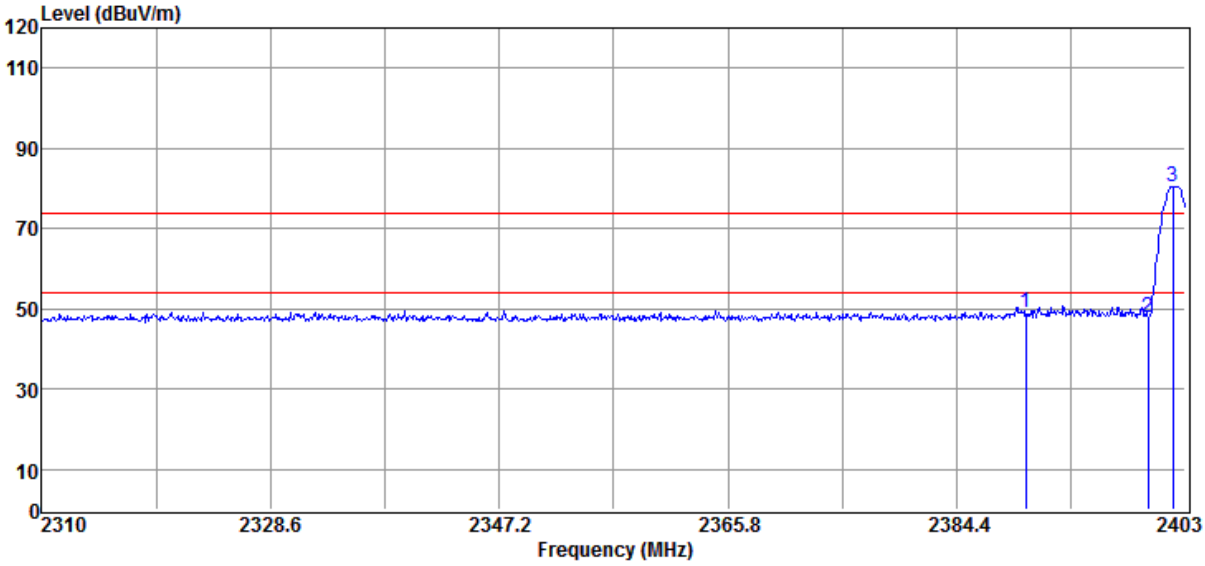
## 8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

**Non-hopping mode:**

**Radiated Emission: (BDR mode)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2022/01/14 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 59.91 | -10.86 | 49.05 | 74.00 | -24.95 | Peak | VERTICAL |
| 2 | 2400.00 | 58.74 | -10.77 | 47.97 | 60.59 | -12.62 | Peak | VERTICAL |
| 3 | 2401.98 | 91.36 | -10.77 | 80.59 | F | -- | Peak | VERTICAL |

Remark:

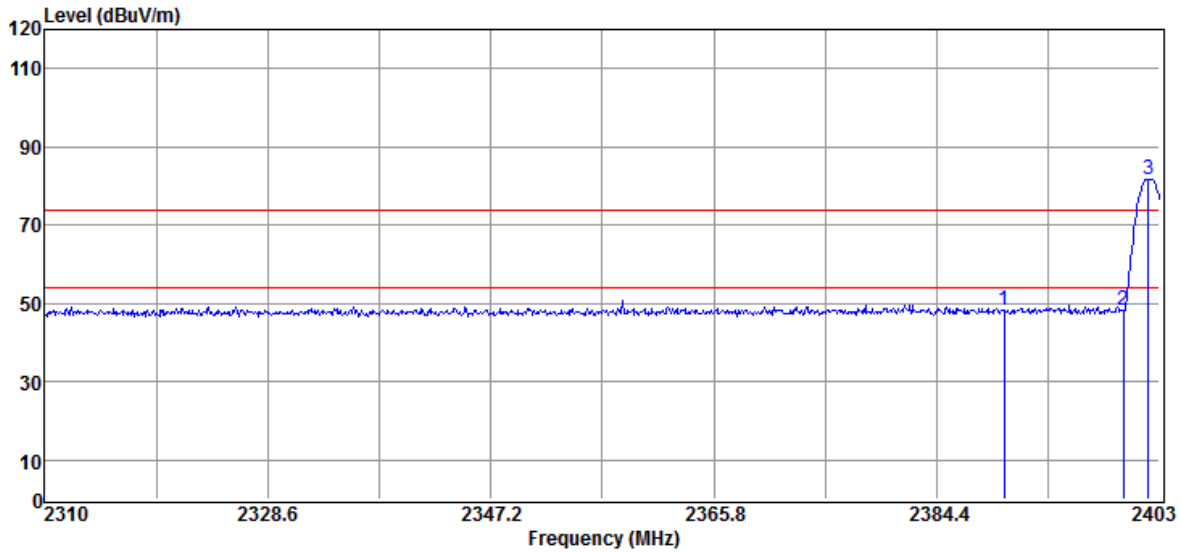
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 59.01 | -10.86 | 48.15 | 74.00 | -25.85 | Peak | HORIZONTAL |
| 2 | 2400.00 | 58.92 | -10.77 | 48.15 | 61.8 | -13.65 | Peak | HORIZONTAL |
| 3 | 2402.07 | 92.57 | -10.77 | 81.80 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

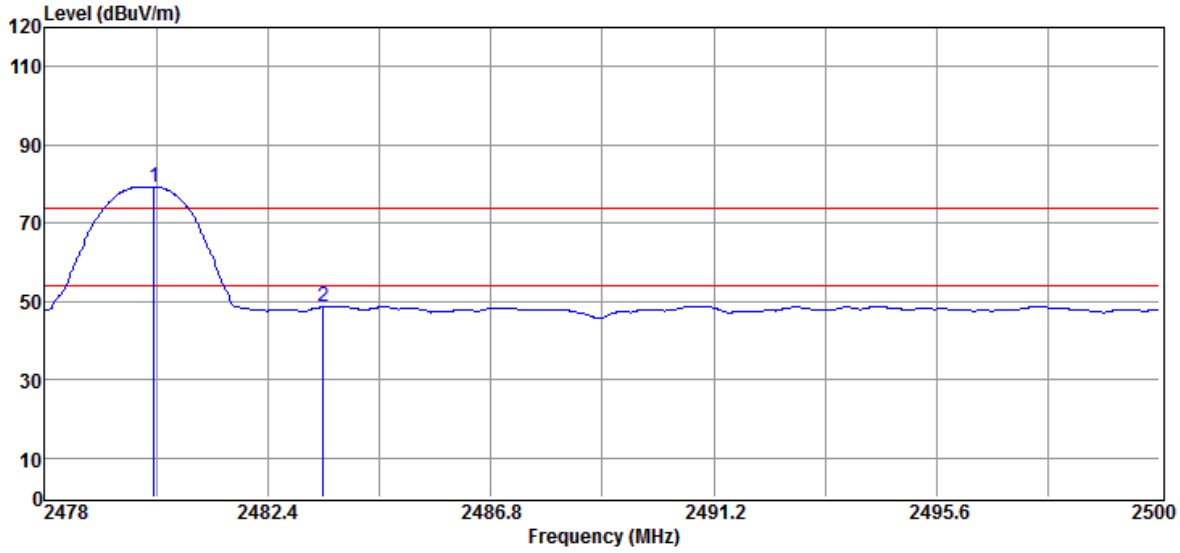
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2022/01/14 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2480.16 | 90.70 | -11.44 | 79.26 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 60.03 | -11.43 | 48.60 | 74.00 | -25.40 | Peak | VERTICAL |

Remark:

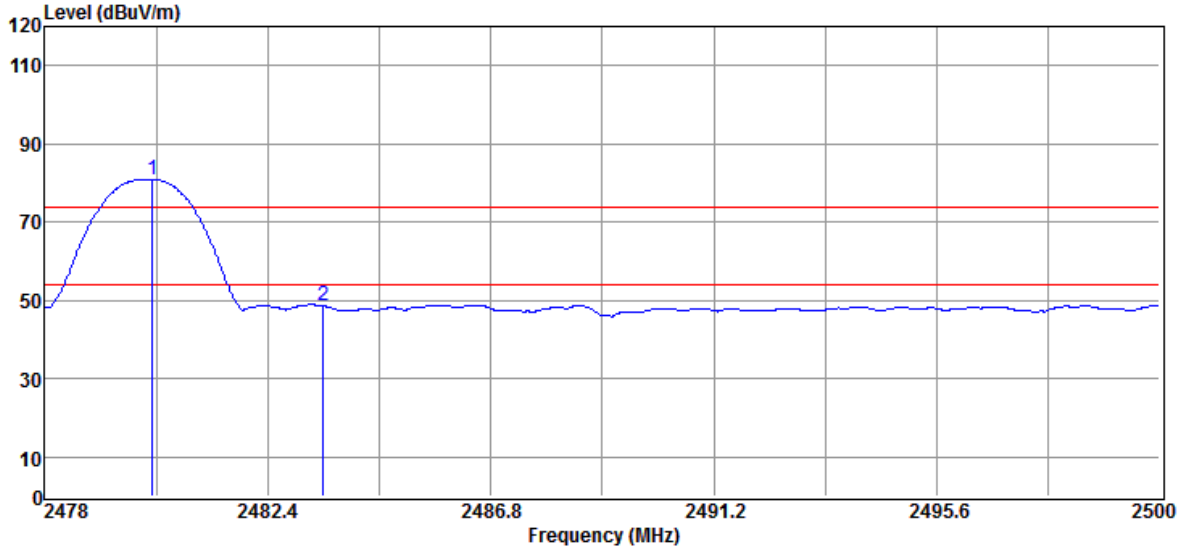
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2480.13 | 92.29 | -11.44 | 80.85 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 60.03 | -11.43 | 48.60 | 74.00 | -25.40 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

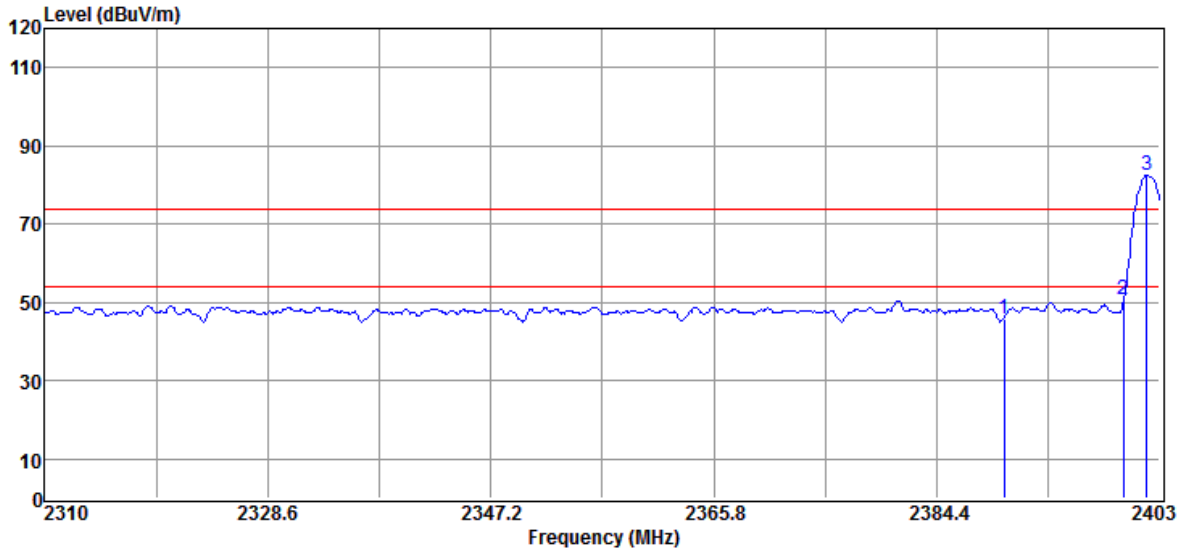
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

**Radiated Emission (EDR 2M mode):**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2022/01/14 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

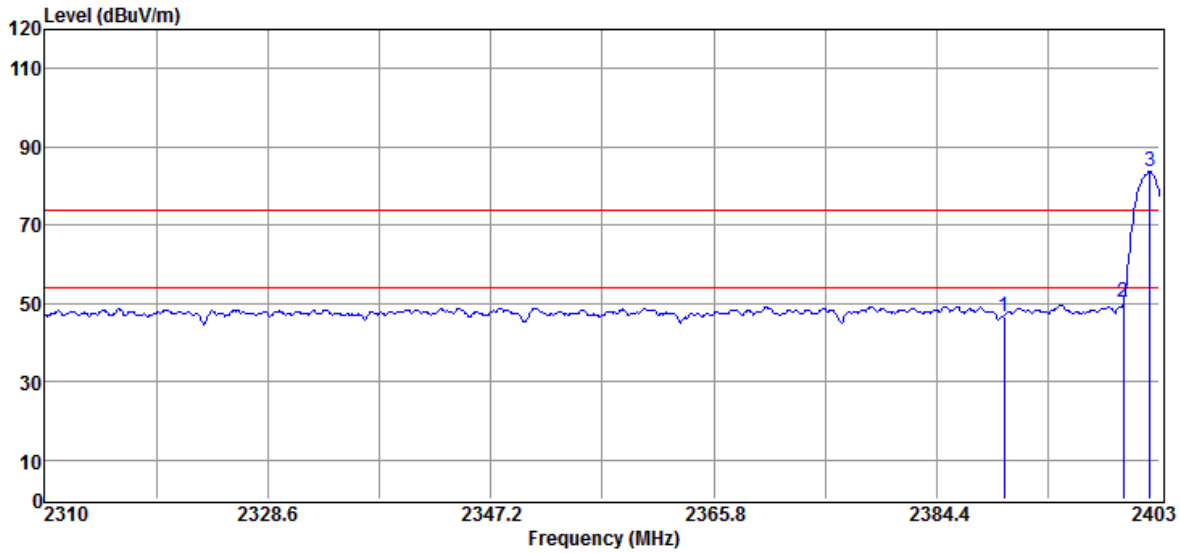



| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 57.57 | -11.64 | 45.93 | 74.00 | -28.07 | Peak | VERTICAL |
| 2 | 2400.00 | 62.21 | -11.55 | 50.66 | 62.58 | -11.92 | Peak | VERTICAL |
| 3 | 2401.88 | 94.13 | -11.55 | 82.58 | F | -- | Peak | VERTICAL |

Remark:

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
4. Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 58.30 | -11.64 | 46.66 | 74.00 | -27.34 | Peak | HORIZONTAL |
| 2 | 2400.00 | 62.01 | -11.55 | 50.46 | 63.68 | -13.22 | Peak | HORIZONTAL |
| 3 | 2402.16 | 95.23 | -11.55 | 83.68 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

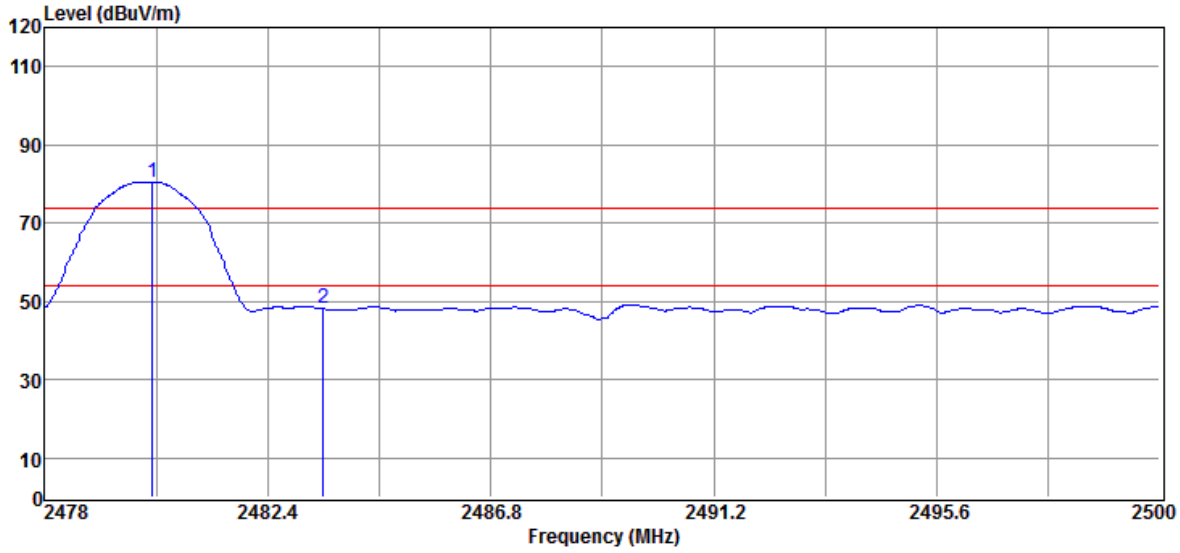
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2022/01/14 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2480.13 | 91.99 | -11.44 | 80.55 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 59.56 | -11.43 | 48.13 | 74.00 | -25.87 | Peak | VERTICAL |

Remark:

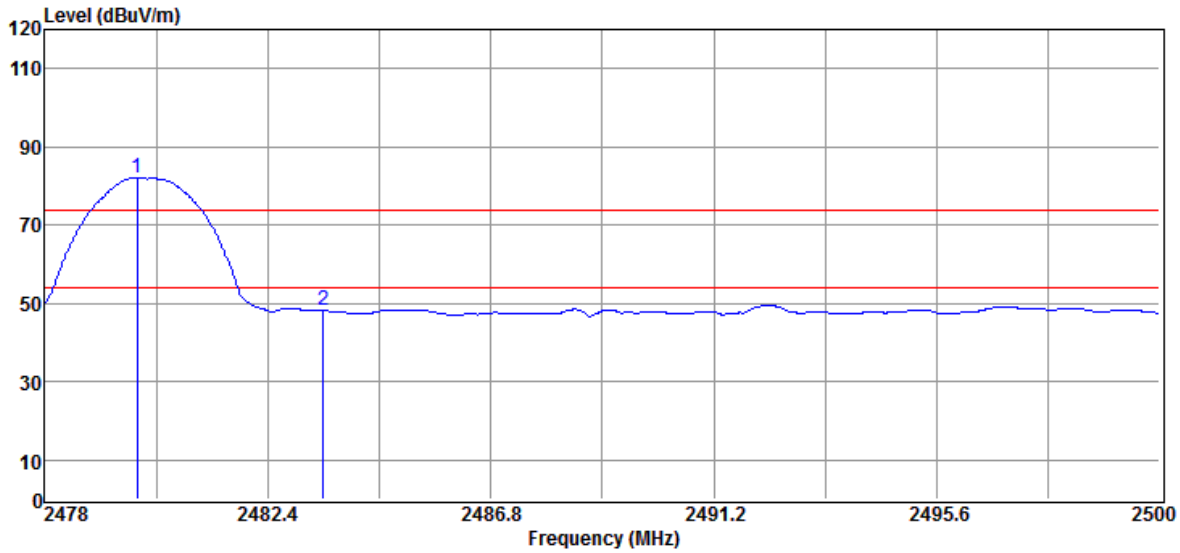
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.83 | 93.64 | -11.44 | 82.20 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 59.65 | -11.43 | 48.22 | 74.00 | -25.78 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

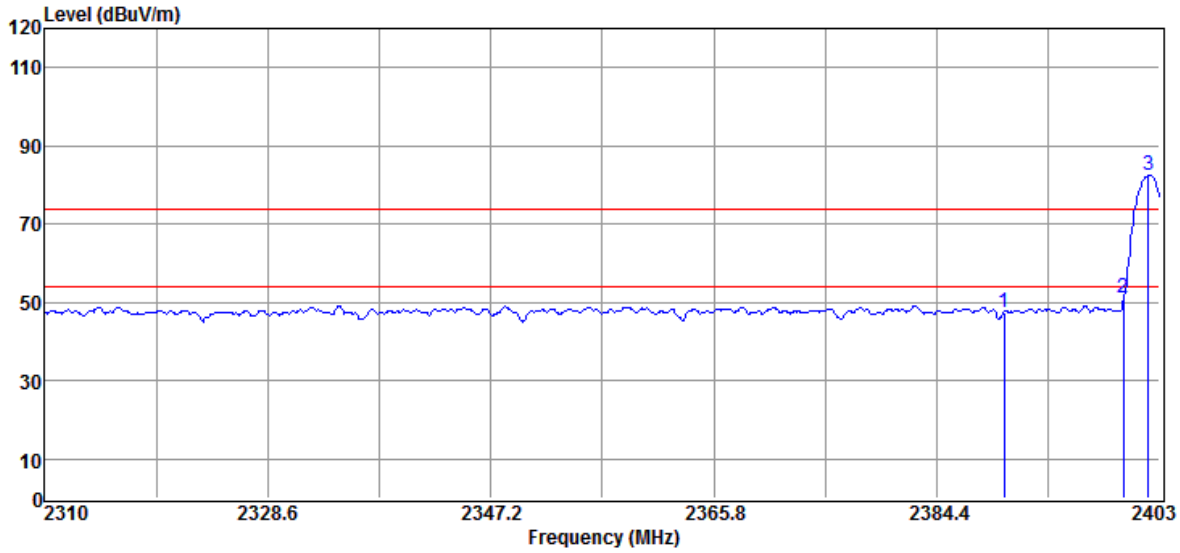
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

**Radiated Emission (EDR 3M mode):**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2022/01/14 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

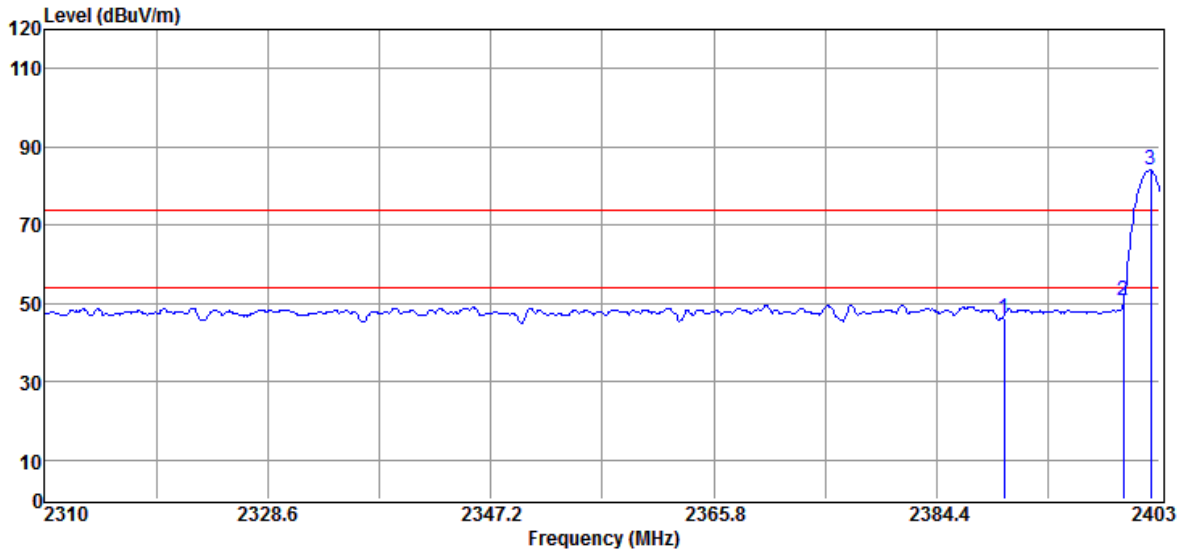



| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 59.18 | -11.64 | 47.54 | 74.00 | -26.46 | Peak | VERTICAL |
| 2 | 2400.00 | 62.67 | -11.55 | 51.12 | 62.49 | -11.37 | Peak | VERTICAL |
| 3 | 2402.07 | 94.04 | -11.55 | 82.49 | F | -- | Peak | VERTICAL |

Remark:

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
4. Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 57.94 | -11.64 | 46.30 | 74.00 | -27.70 | Peak | HORIZONTAL |
| 2 | 2400.00 | 62.29 | -11.55 | 50.74 | 64.09 | -13.35 | Peak | HORIZONTAL |
| 3 | 2402.26 | 95.64 | -11.55 | 84.09 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

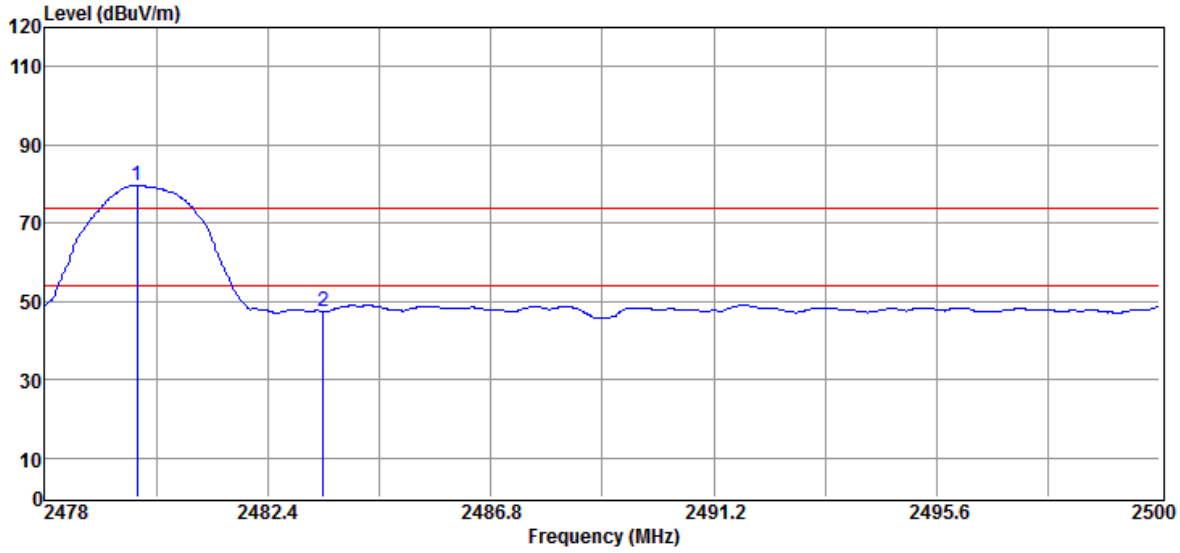
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2022/01/14 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.83 | 91.12 | -11.44 | 79.68 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 58.92 | -11.43 | 47.49 | 74.00 | -26.51 | Peak | VERTICAL |

Remark:

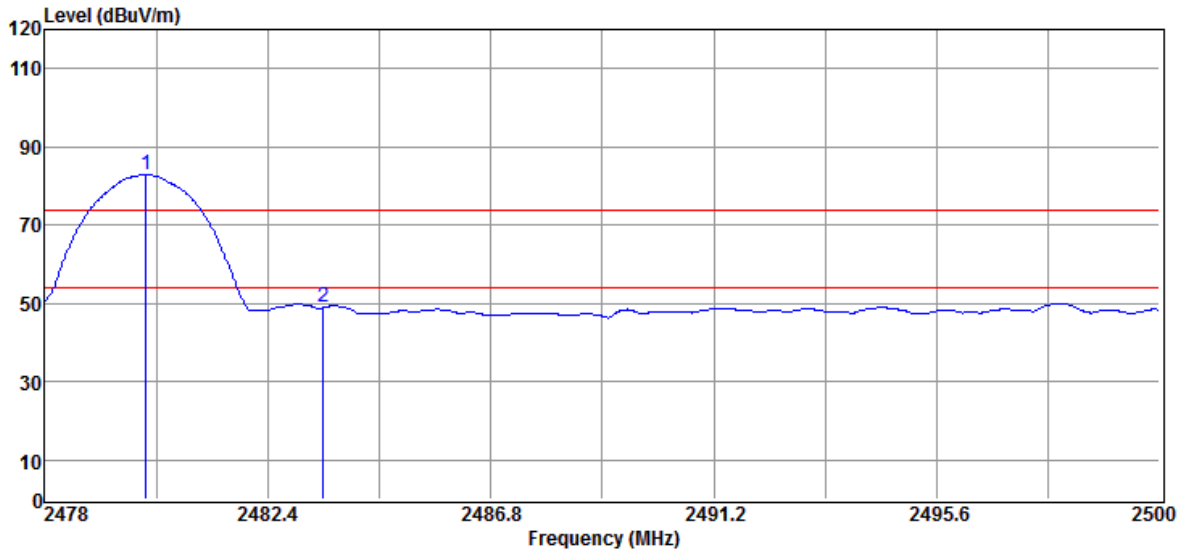
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2480.00 | 94.34 | -11.44 | 82.90 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 60.41 | -11.43 | 48.98 | 74.00 | -25.02 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

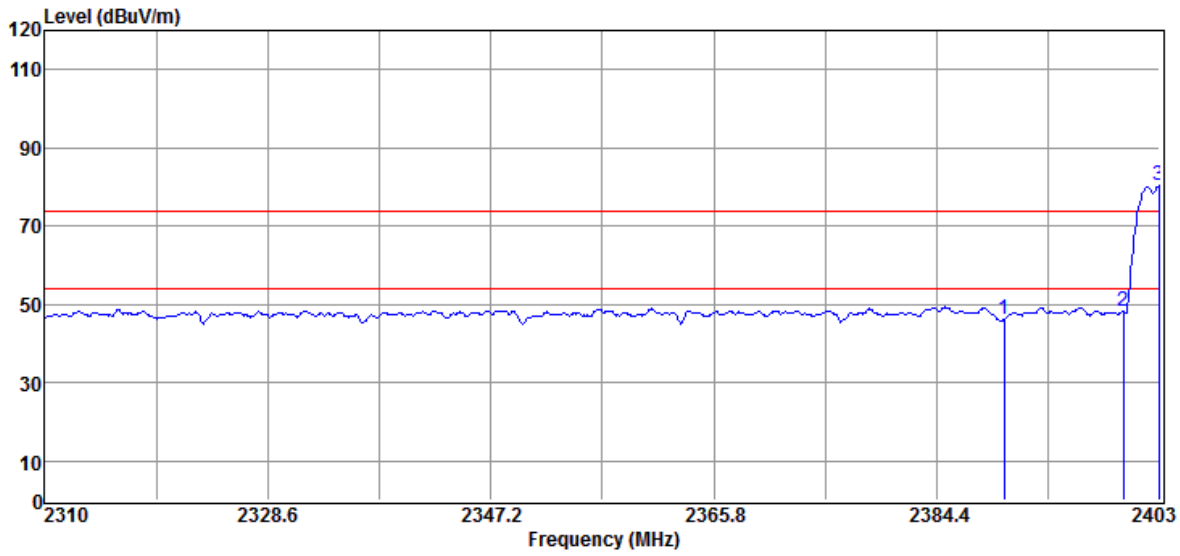
4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

**Hopping mode:**

**Radiated Emission: (BDR mode)**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2020/11/12 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 57.71 | -11.64 | 46.07 | 74.00 | -27.93 | Peak | VERTICAL |
| 2 | 2400.00 | 59.65 | -11.55 | 48.10 | 60.25 | -12.15 | Peak | VERTICAL |
| 3 | 2402.91 | 91.80 | -11.55 | 80.25 | F | -- | Peak | VERTICAL |

Remark:

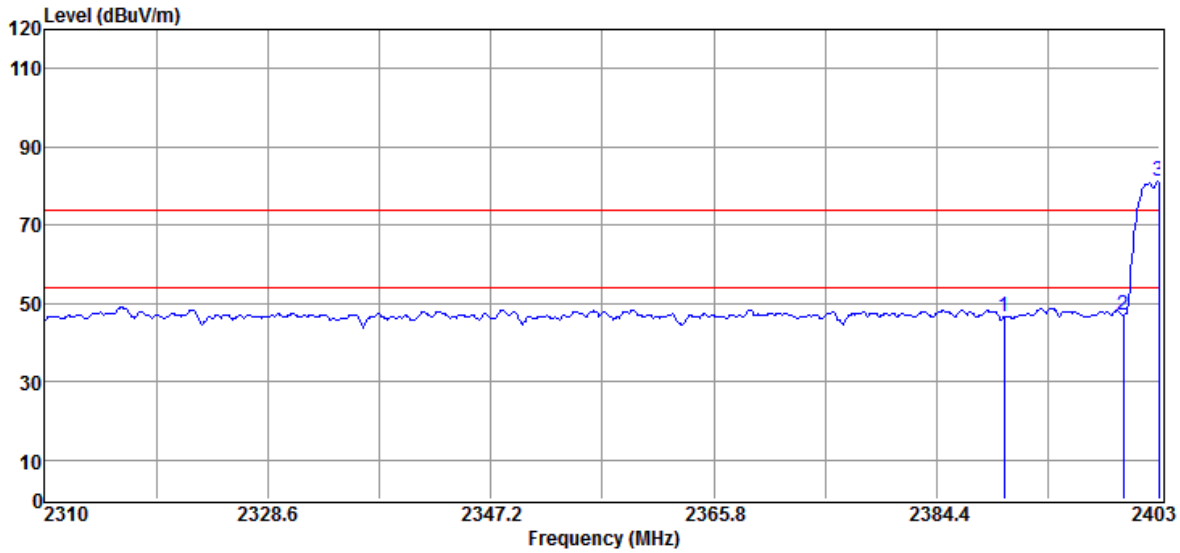
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 58.03 | -11.64 | 46.39 | 74.00 | -27.61 | Peak | HORIZONTAL |
| 2 | 2400.00 | 58.69 | -11.55 | 47.14 | 61.15 | -14.01 | Peak | HORIZONTAL |
| 3 | 2402.91 | 92.70 | -11.55 | 81.15 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

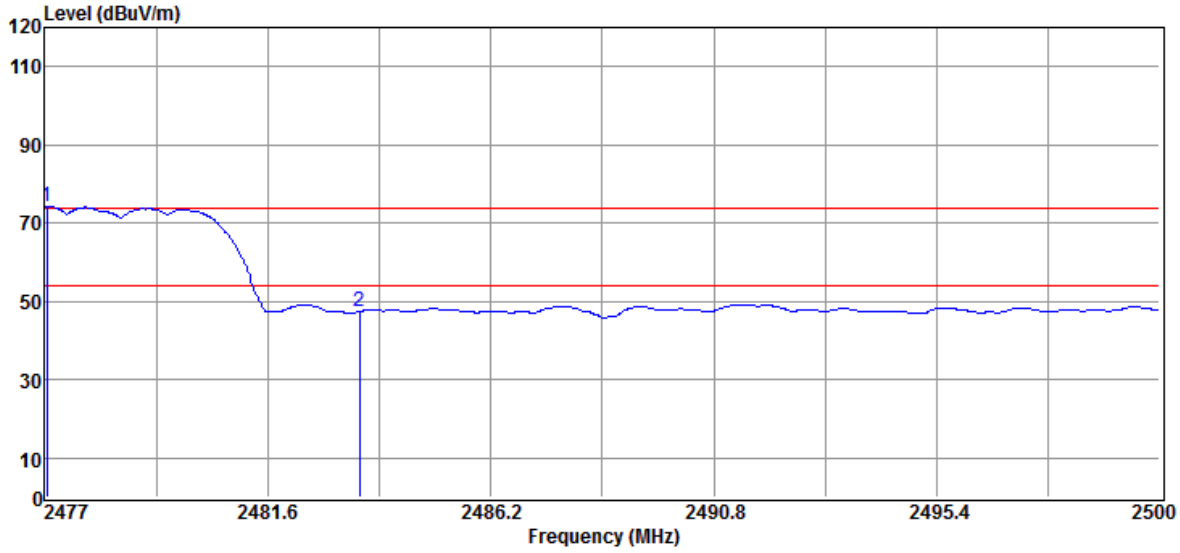
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2020/11/12 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2477.05 | 85.72 | -11.45 | 74.27 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 58.90 | -11.43 | 47.47 | 74.00 | -26.53 | Peak | VERTICAL |

Remark:

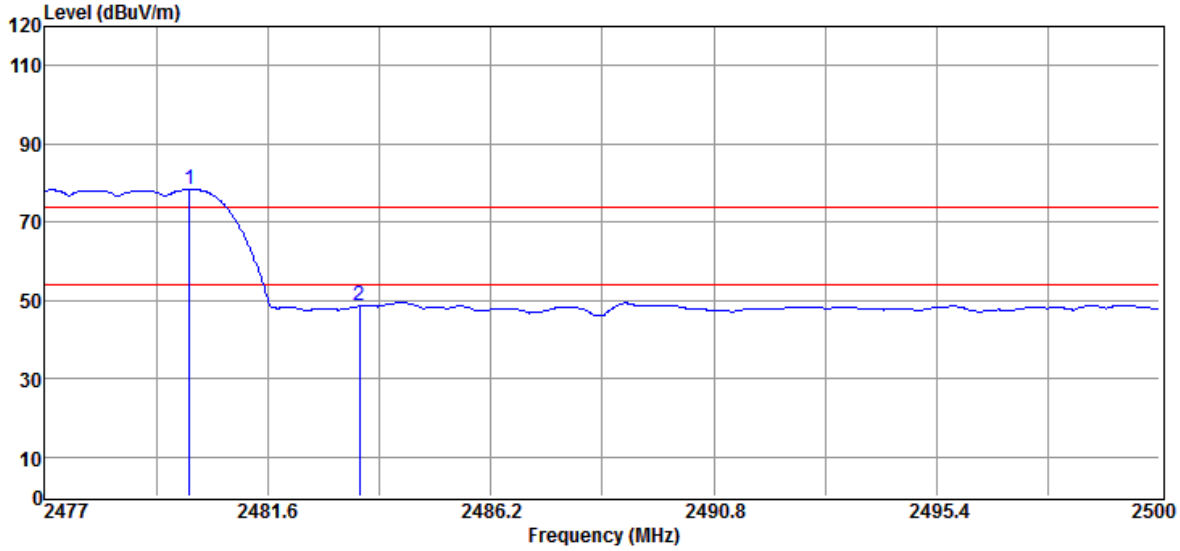
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.99 | 89.73 | -11.44 | 78.29 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 59.97 | -11.43 | 48.54 | 74.00 | -25.46 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

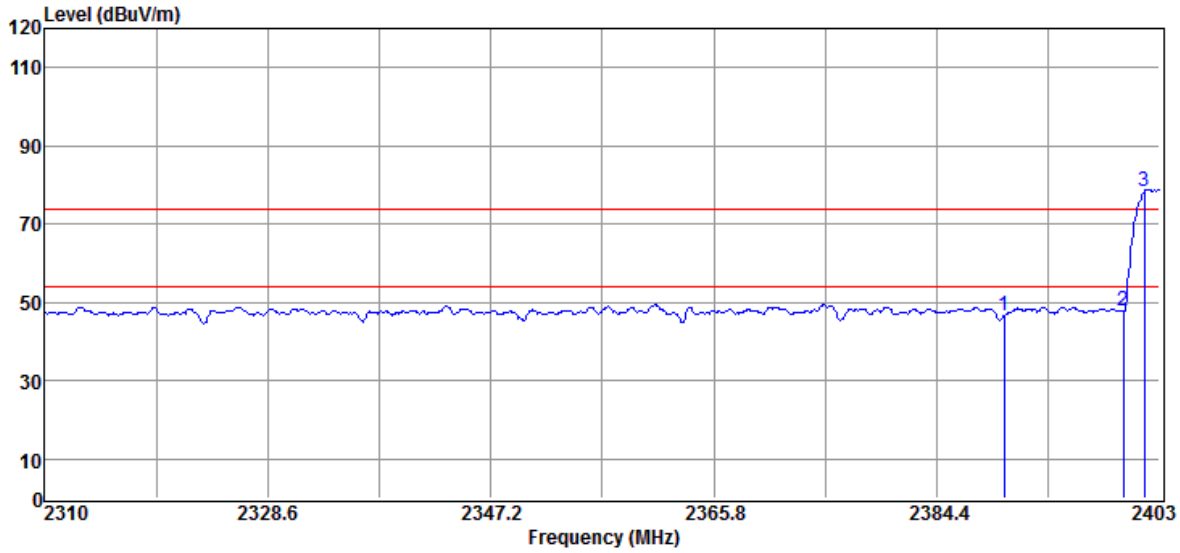
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

**Radiated Emission (EDR 2M mode):**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2020/11/12 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

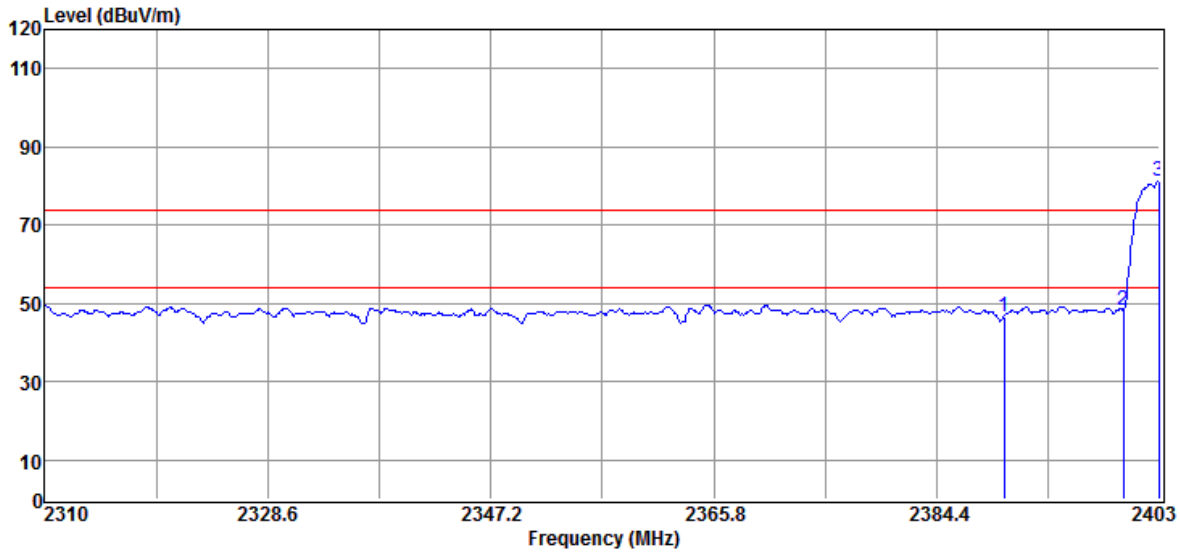



| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 58.12 | -11.64 | 46.48 | 74.00 | -27.52 | Peak | VERTICAL |
| 2 | 2400.00 | 59.34 | -11.55 | 47.79 | 58.29 | -10.5 | Peak | VERTICAL |
| 3 | 2401.70 | 89.84 | -11.55 | 78.29 | F | -- | Peak | VERTICAL |

Remark:

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
4. Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 58.27 | -11.64 | 46.63 | 74.00 | -27.37 | Peak | HORIZONTAL |
| 2 | 2400.00 | 59.73 | -11.55 | 48.18 | 61.27 | -13.09 | Peak | HORIZONTAL |
| 3 | 2402.91 | 92.82 | -11.55 | 81.27 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

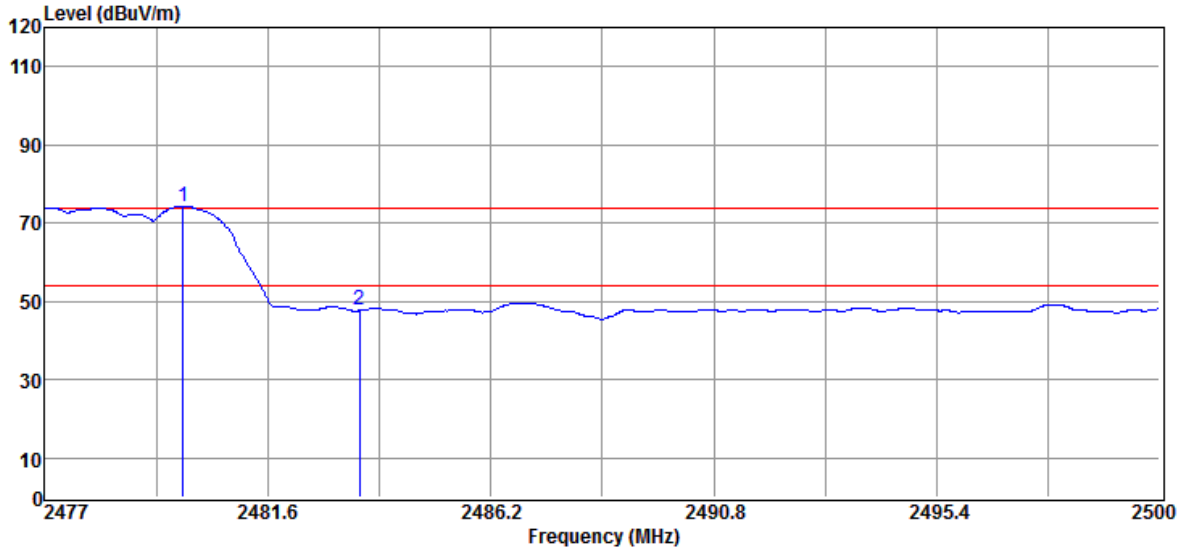
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2020/11/12 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.85 | 85.85 | -11.44 | 74.41 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 59.10 | -11.43 | 47.67 | 74.00 | -26.33 | Peak | VERTICAL |

Remark:

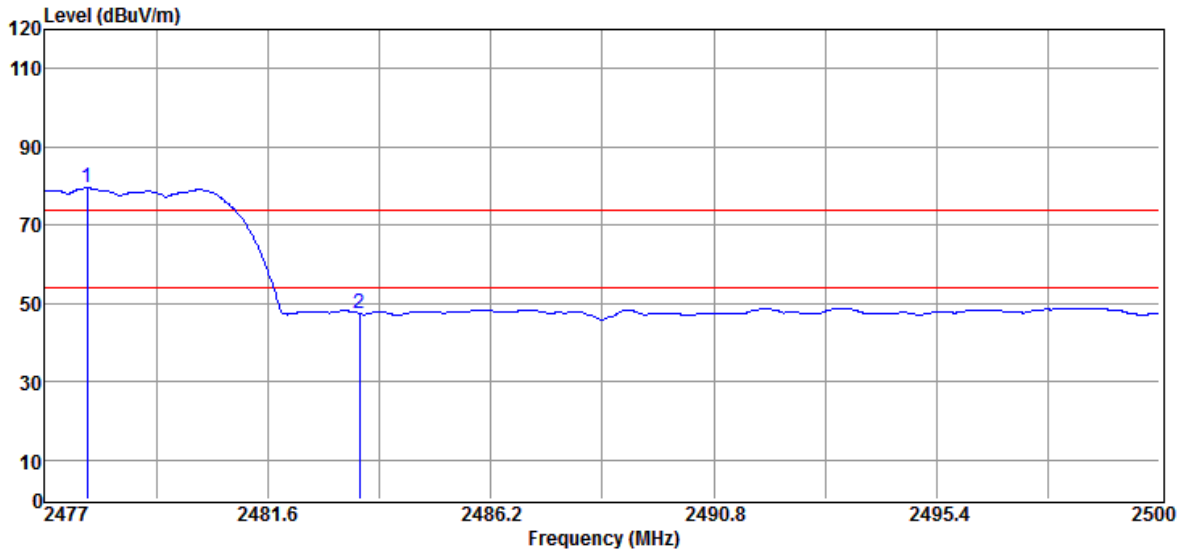
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2477.87 | 90.89 | -11.44 | 79.45 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 58.81 | -11.43 | 47.38 | 74.00 | -26.62 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

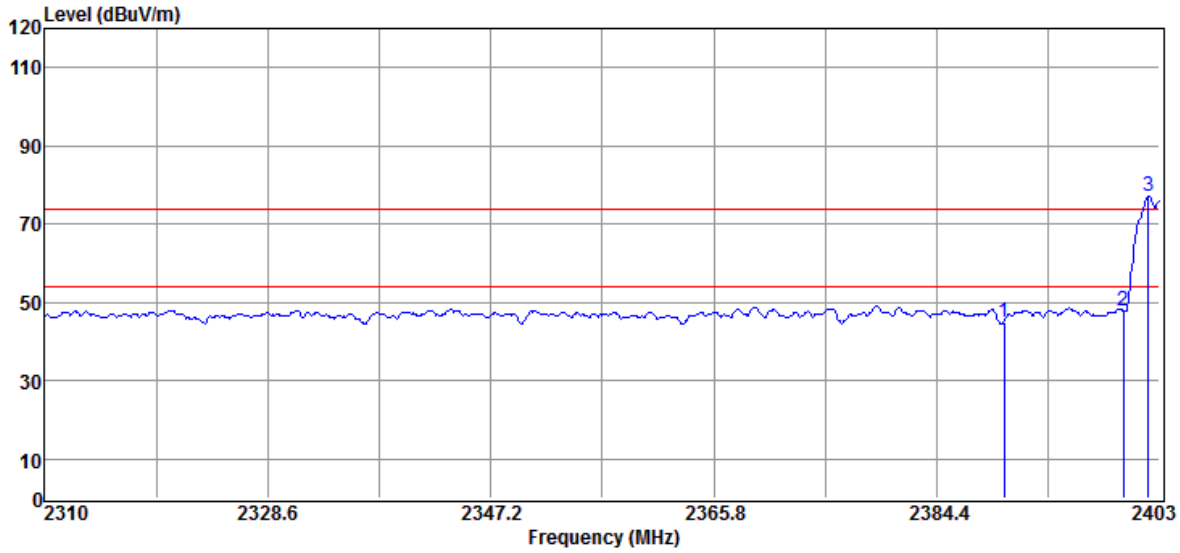
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

**Radiated Emission (EDR 3M mode):**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH Low | Test Date | 2020/11/12 |
| Fundamental Frequency | 2402 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |

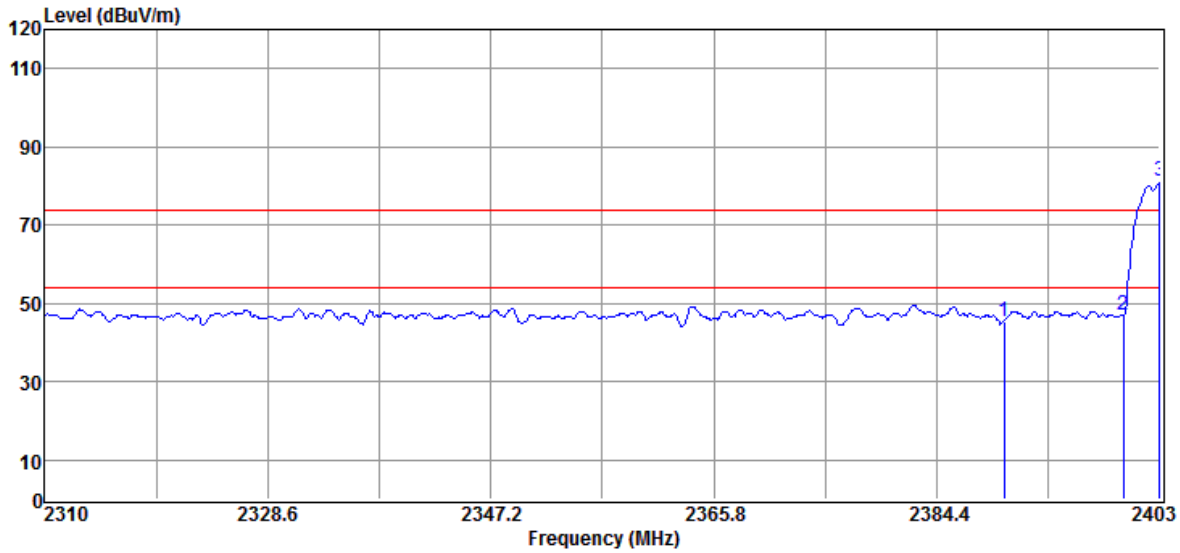



| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 56.38 | -11.64 | 44.74 | 74.00 | -29.26 | Peak | VERTICAL |
| 2 | 2400.00 | 59.38 | -11.55 | 47.83 | 57.16 | -9.33 | Peak | VERTICAL |
| 3 | 2402.07 | 88.71 | -11.55 | 77.16 | F | -- | Peak | VERTICAL |

Remark:

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
4. Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2390.00 | 57.07 | -11.64 | 45.43 | 74.00 | -28.57 | Peak | HORIZONTAL |
| 2 | 2400.00 | 58.52 | -11.55 | 46.97 | 61.22 | -14.25 | Peak | HORIZONTAL |
| 3 | 2403.00 | 92.77 | -11.55 | 81.22 | F | -- | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

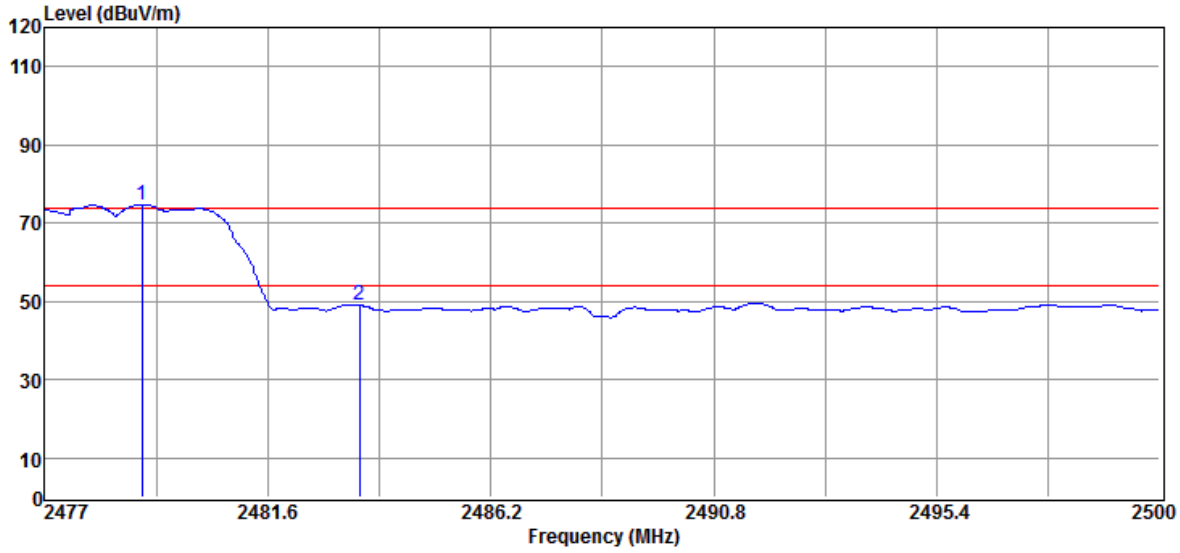
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

| | | | |
|---|---|---|---|
| Operation Mode | TX CH High | Test Date | 2020/11/12 |
| Fundamental Frequency | 2480 MHz | Test By | Barry |
| Temperature | 21℃ | Humidity | 66% |




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.00 | 86.21 | -11.44 | 74.77 | F | -- | Peak | VERTICAL |
| 2 | 2483.50 | 60.46 | -11.43 | 49.03 | 74.00 | -24.97 | Peak | VERTICAL |

Remark:

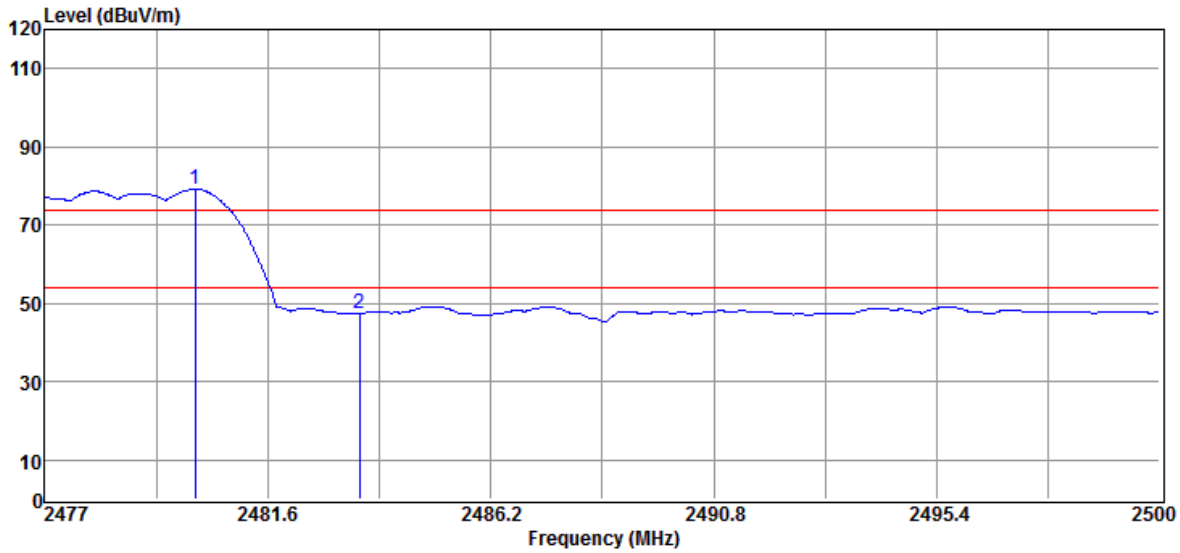
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**




| No | Freq MHz | Reading dBuV | Factor dB/m | Level dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol V/H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2480.11 | 90.66 | -11.44 | 79.22 | F | -- | Peak | HORIZONTAL |
| 2 | 2483.50 | 58.91 | -11.43 | 47.48 | 74.00 | -26.52 | Peak | HORIZONTAL |

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW ≥1/Ton, Sweep time= 200 ms.

**Note: "F" denotes fundamental frequency**

# 9. FREQUENCY SEPARATION

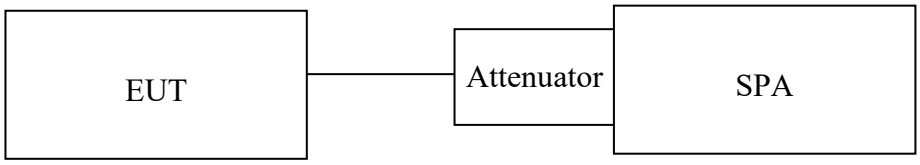
## 9.1 Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

## 9.2 Measurement Equipment Used:

Refer to section 6.2 for details.

## 9.3 Test Set-up:




## 9.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100kHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

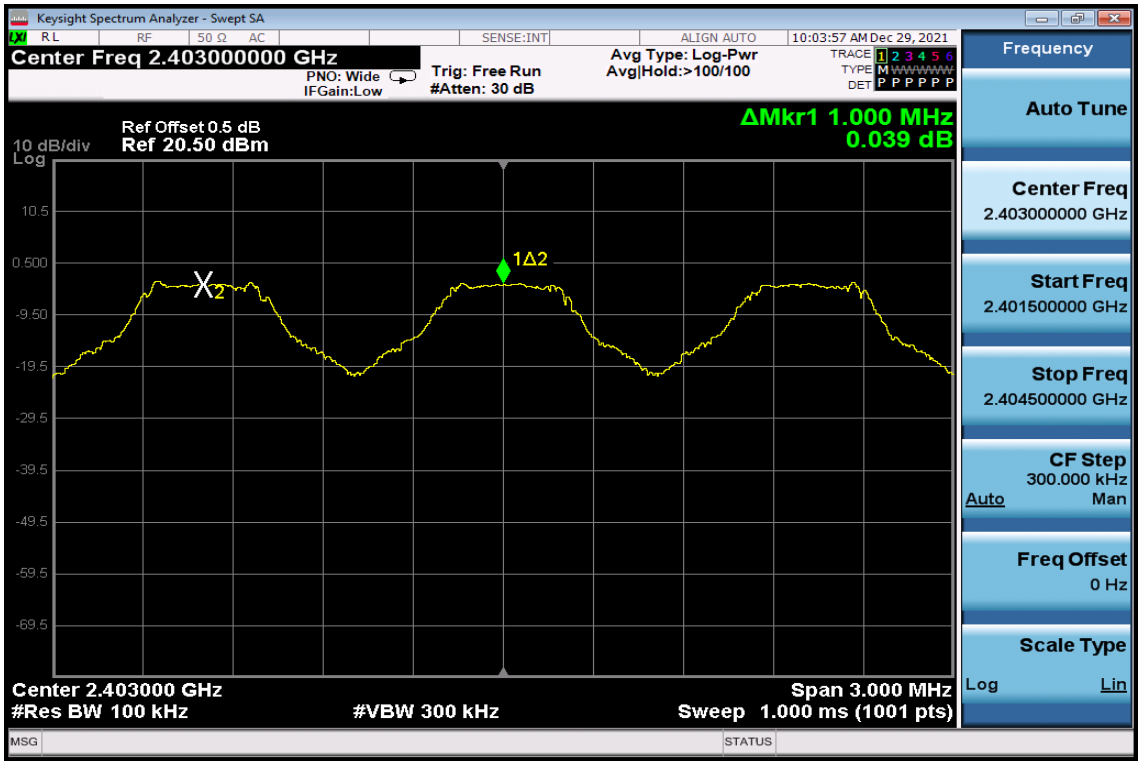
## 9.5 Measurement Result:

| Channel separation (MHz) | Limit | Result |
|---|---|---|
| 1 | ≧25kHz or 2/3 times 20dB bandwidth | PASS |

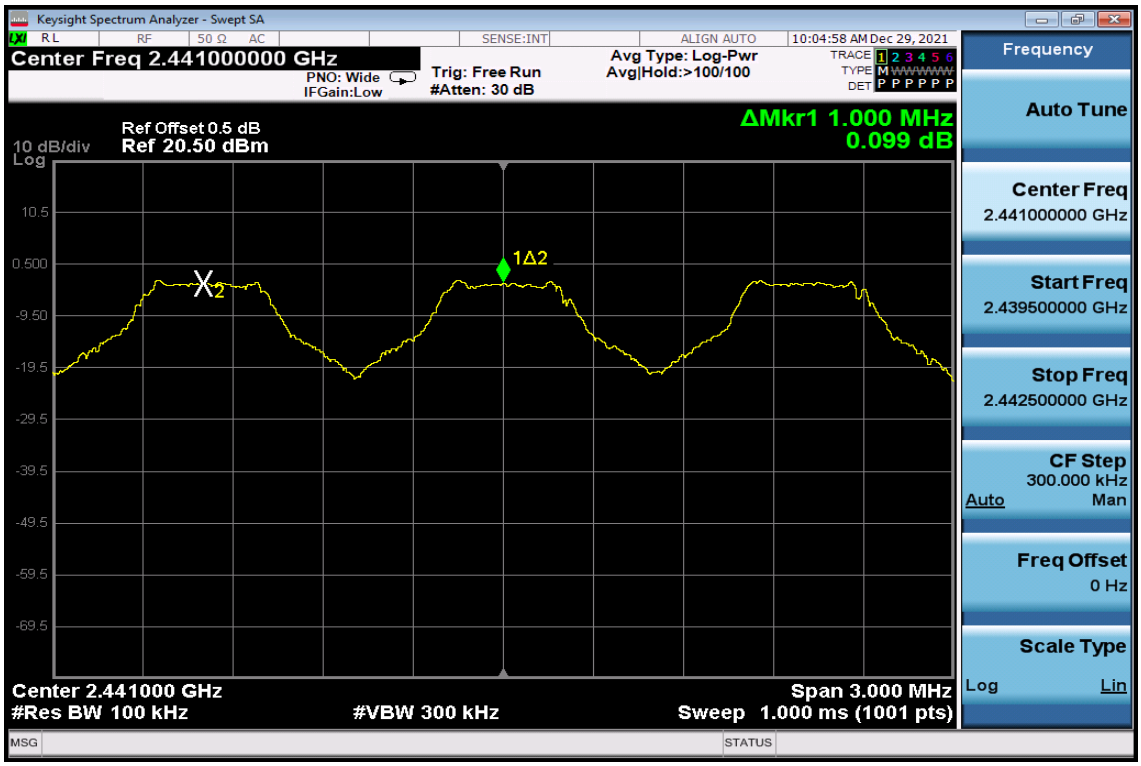
Note: Refer to next page for plots.

## *Frequency Separation Test Data*

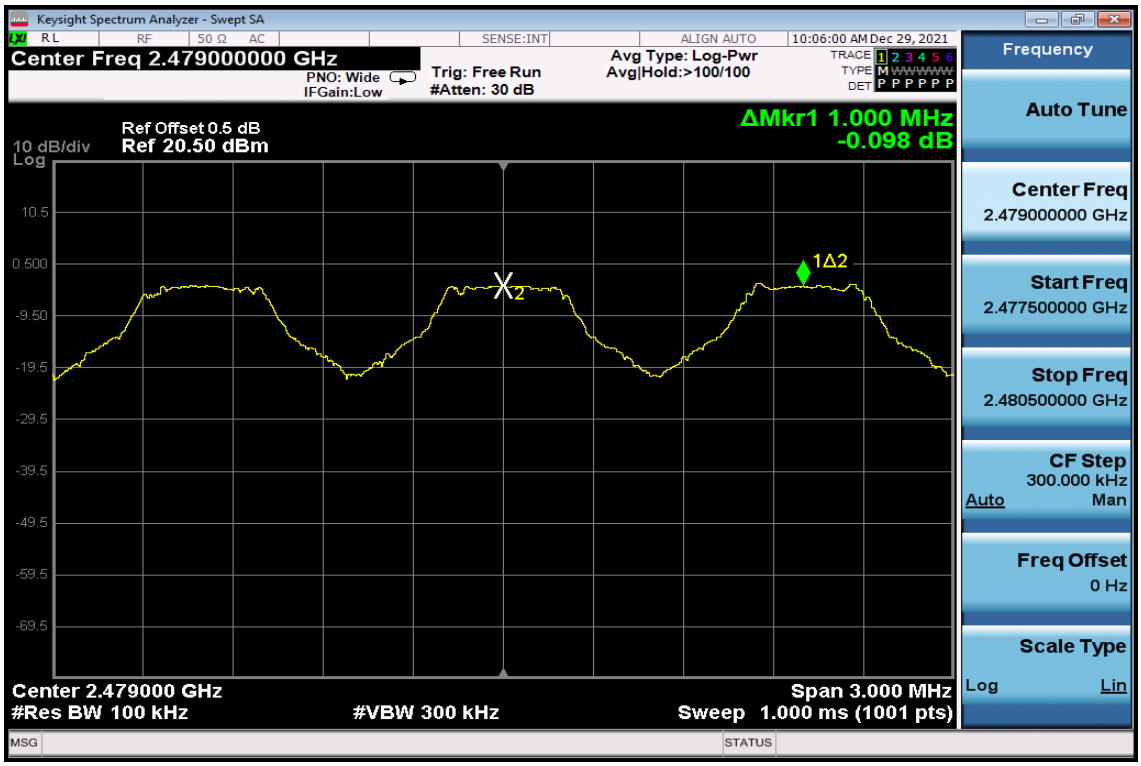
### *Low*




### *Mid*



***High***


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.479000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:06:00 AM Dec 29, 2021
Ref Offset 0.5 dB
10 dB/div
Ref 20.50 dBm
Log
ΔMkr1 1.000 MHz
-0.098 dB
1Δ2
Center 2.479000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.479000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.480500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

# 10. Number of Hopping Frequency

## 10.1 Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

## 10.2 Measurement Equipment Used:

Refer to section 6.2 for details.

## 10.3 Test Set-up:

Refer to section 9.3 for details.

## 10.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2441.5MHz and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=100kHz, VBW=300kHz
5. Max hold, view and count how many channel in the band.

## 10.5 Measurement Result:

Temperature: 19°C Humidity: 72%

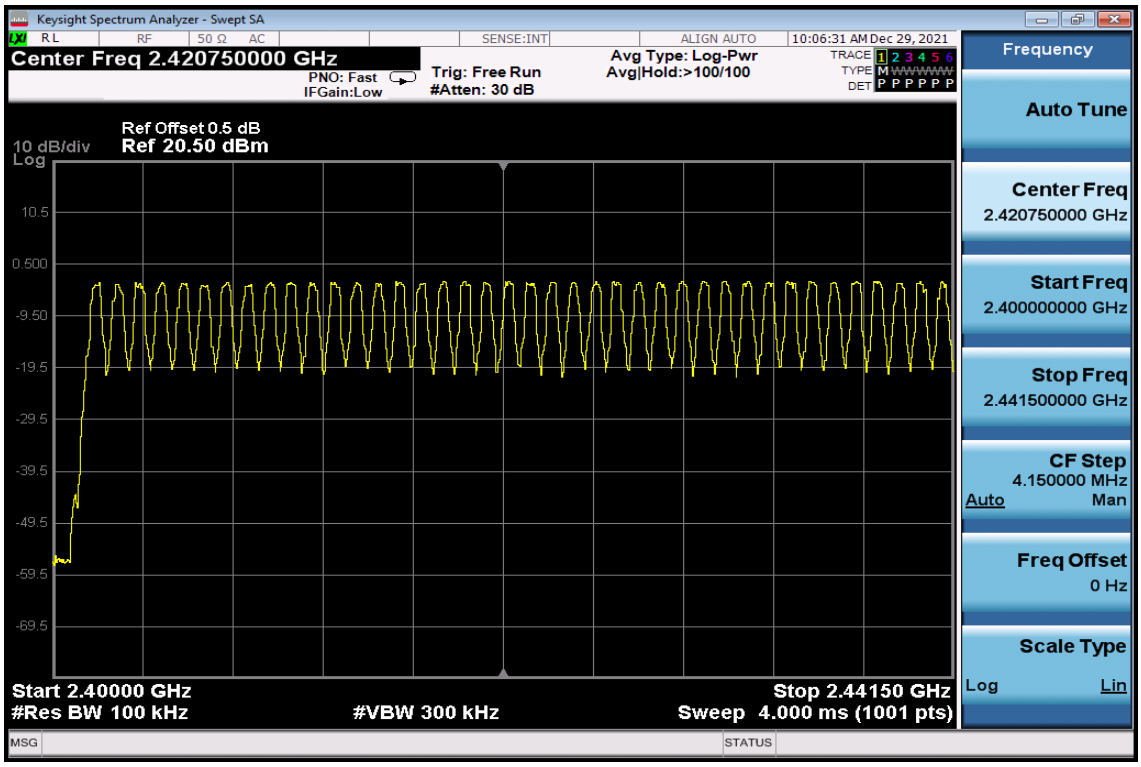
| Channel Number | Limit (CH) | Measurement (CH) | Result |
|---|---|---|---|
| | 15 Channel | 79 Channel | Pass |

AFH mode

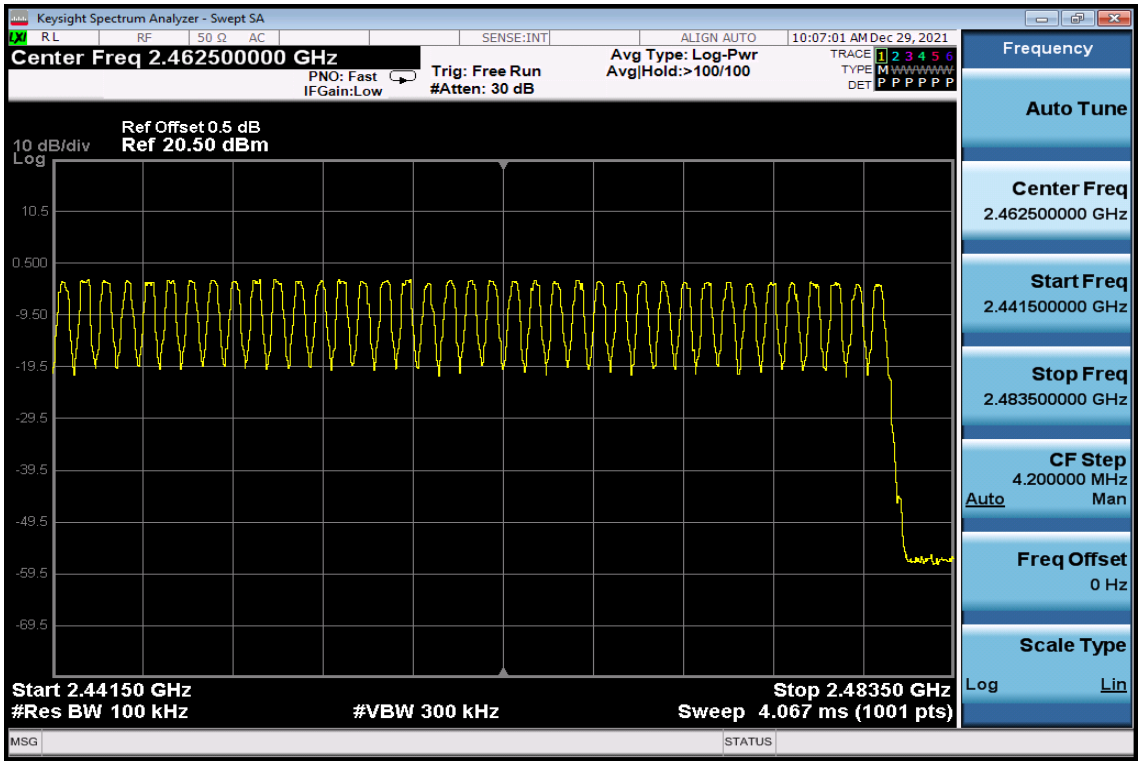
| Channel Number | Limit (CH) | Measurement (CH) | Result |
|---|---|---|---|
| | 15 Channel | 20 Channel | Pass |

*Channel Number*

*2.4 GHz – 2.441.5GHz*




*2.441.5 GHz – 2.4835GHz*



# 11. Time of Occupancy (Dwell Time)

## 11.1 Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

## 11.2 Measurement Equipment Used:

Refer to section 6.2 for details.

## 11.3 Test Set-up:

Refer to section 9.3 for details.

## 11.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW / VBW =1MHz, Span = 0Hz ,
5. Repeat above procedures until all frequency measured were complete.

## 11.5 Measurement Result:

A period time = 0.4 (ms) * 79 = 31.6 (s)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH Low | DH1 time slot | = | 0.384 (ms) | * | (1600/2/79) | * 31.6 = | 122.88 | (ms) |
| | DH3 time slot | = | 1.640 (ms) | * | (1600/4/79) | * 31.6 = | 262.40 | (ms) |
| | DH5 time slot | = | 2.880 (ms) | * | (1600/6/79) | * 31.6 = | 307.20 | (ms) |
| CH Mid | DH1 time slot | = | 0.380 (ms) | * | (1600/2/79) | * 31.6 = | 121.60 | (ms) |
| | DH3 time slot | = | 1.630 (ms) | * | (1600/4/79) | * 31.6 = | 260.80 | (ms) |
| | DH5 time slot | = | 2.900 (ms) | * | (1600/6/79) | * 31.6 = | 309.33 | (ms) |
| CH High | DH1 time slot | = | 0.380 (ms) | * | (1600/2/79) | * 31.6 = | 121.60 | (ms) |
| | DH3 time slot | = | 1.630 (ms) | * | (1600/4/79) | * 31.6 = | 260.80 | (ms) |
| | DH5 time slot | = | 2.880 (ms) | * | (1600/6/79) | * 31.6 = | 307.20 | (ms) |

AFH Mode

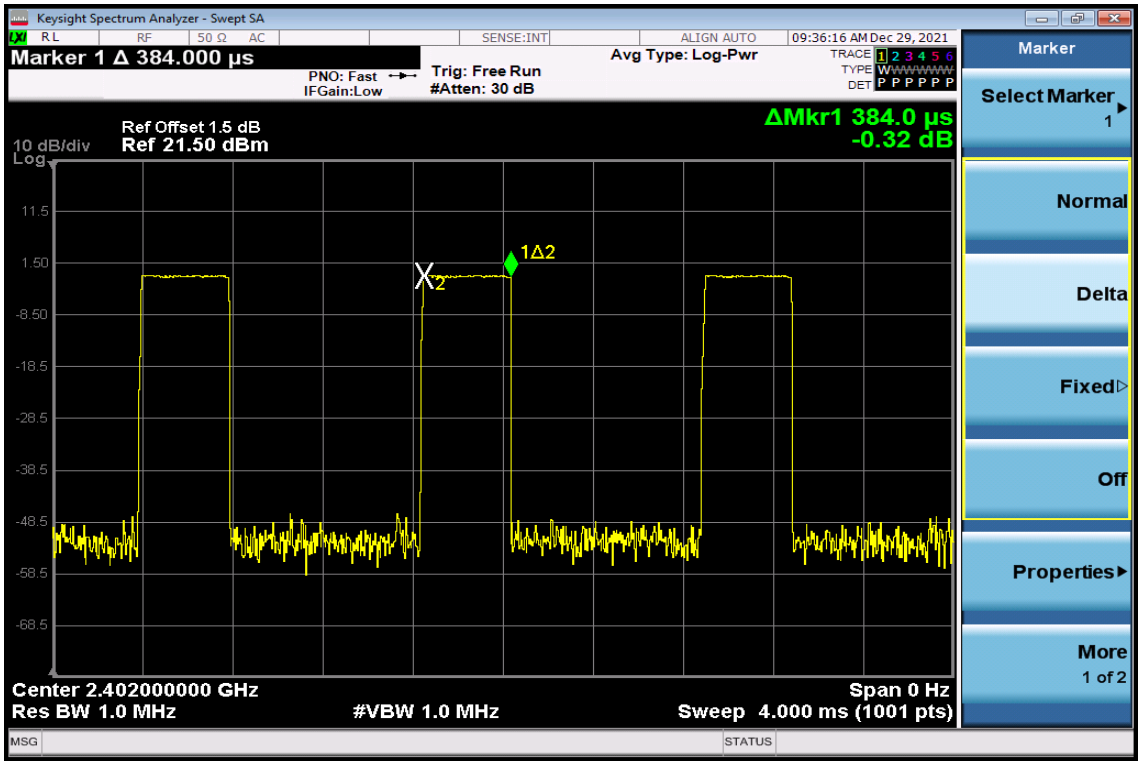
A period time = 0.4 (ms) * 20 = 8 (s)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH Low | DH1 time slot | = | 0.384 (ms) | * | (800/2/20) | * 8 = | 61.44 | (ms) |
| | DH3 time slot | = | 1.640 (ms) | * | (800/4/20) | * 8 = | 131.20 | (ms) |
| | DH5 time slot | = | 2.880 (ms) | * | (800/6/20) | * 8 = | 153.60 | (ms) |
| CH Mid | DH1 time slot | = | 0.380 (ms) | * | (800/2/20) | * 8 = | 60.80 | (ms) |
| | DH3 time slot | = | 1.630 (ms) | * | (800/4/20) | * 8 = | 130.40 | (ms) |
| | DH5 time slot | = | 2.900 (ms) | * | (800/6/20) | * 8 = | 154.67 | (ms) |
| CH High | DH1 time slot | = | 0.380 (ms) | * | (800/2/20) | * 8 = | 60.80 | (ms) |
| | DH3 time slot | = | 1.630 (ms) | * | (800/4/20) | * 8 = | 130.40 | (ms) |
| | DH5 time slot | = | 2.880 (ms) | * | (800/6/20) | * 8 = | 153.60 | (ms) |

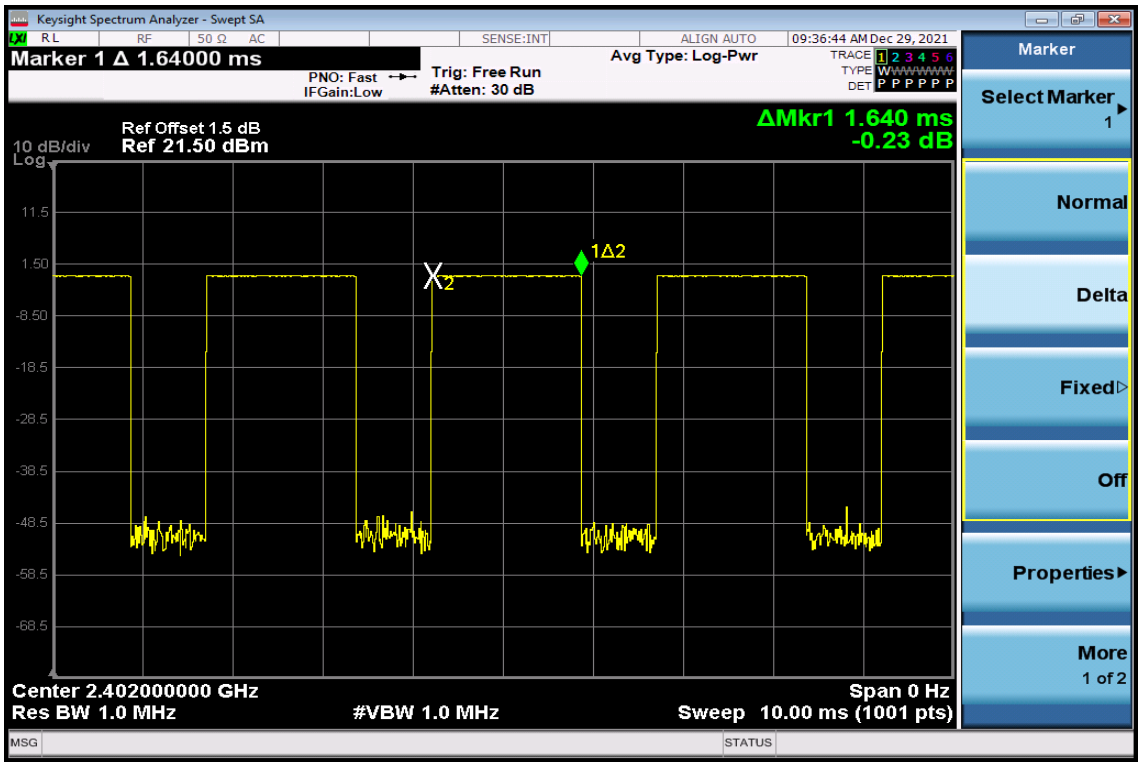
Note: Refer to next page for plots.

## *Low Channel*

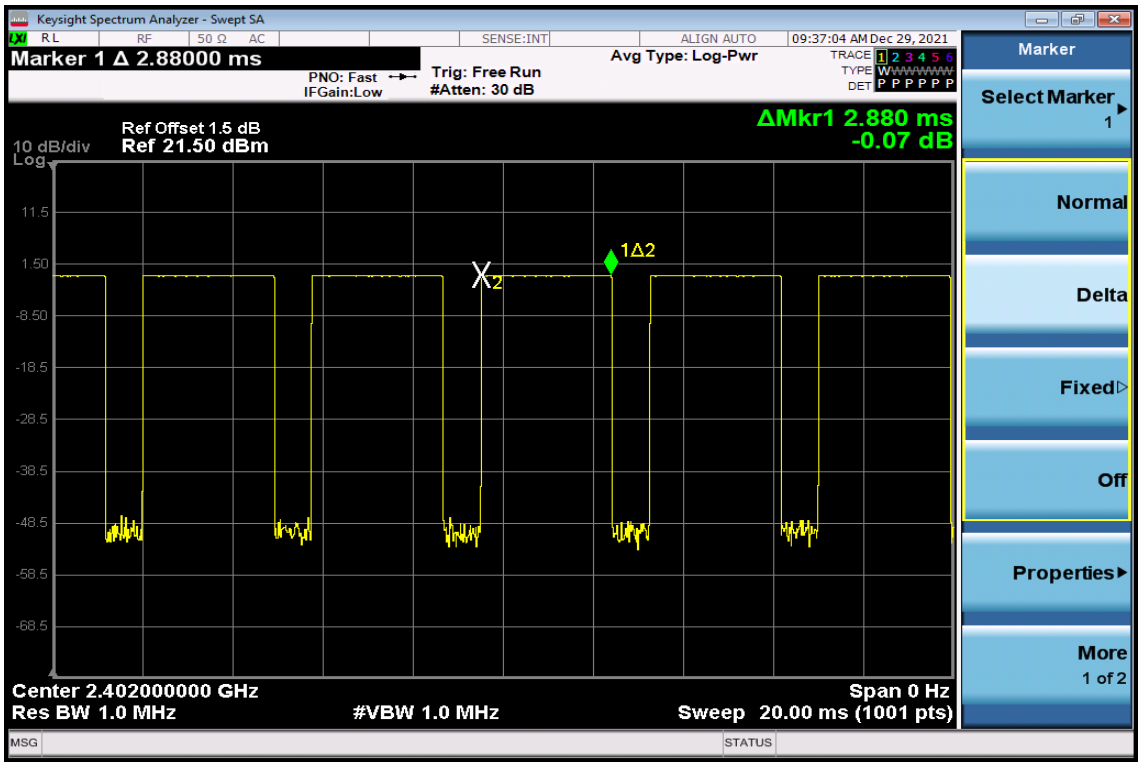
### *DH1*




### *DH3*

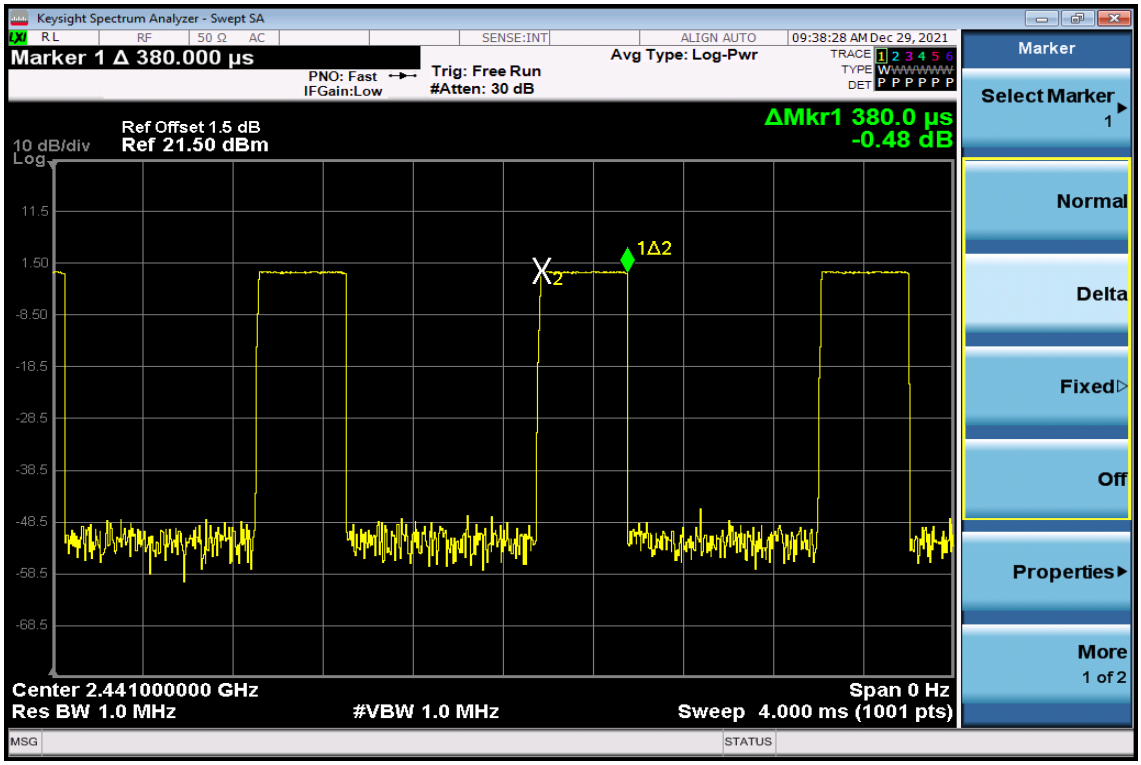


## *DH5*

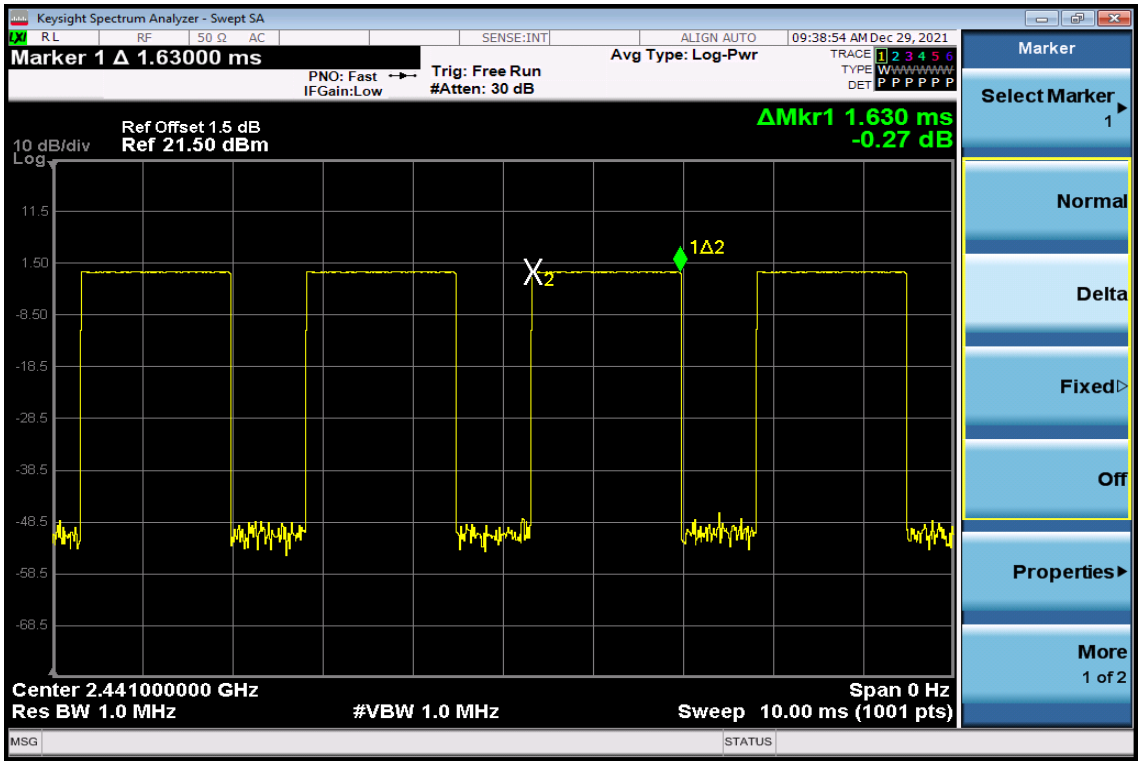



## *Mid Channel*

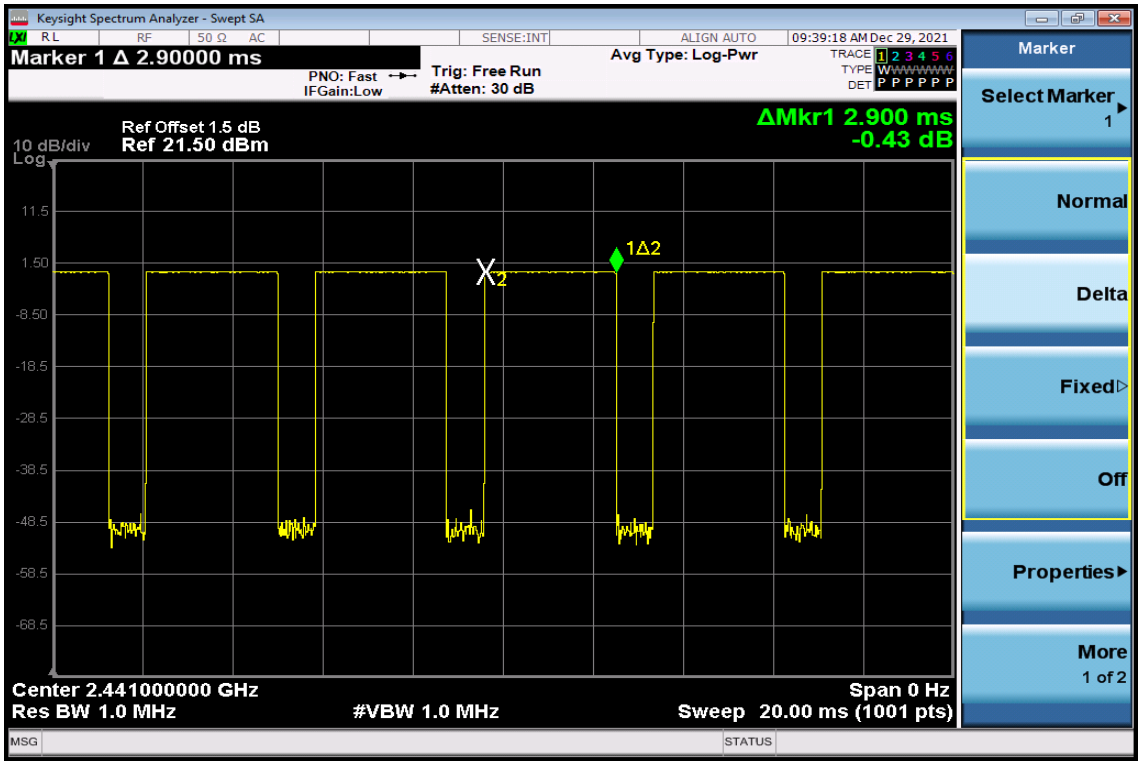
## *DH1*



## *DH3*

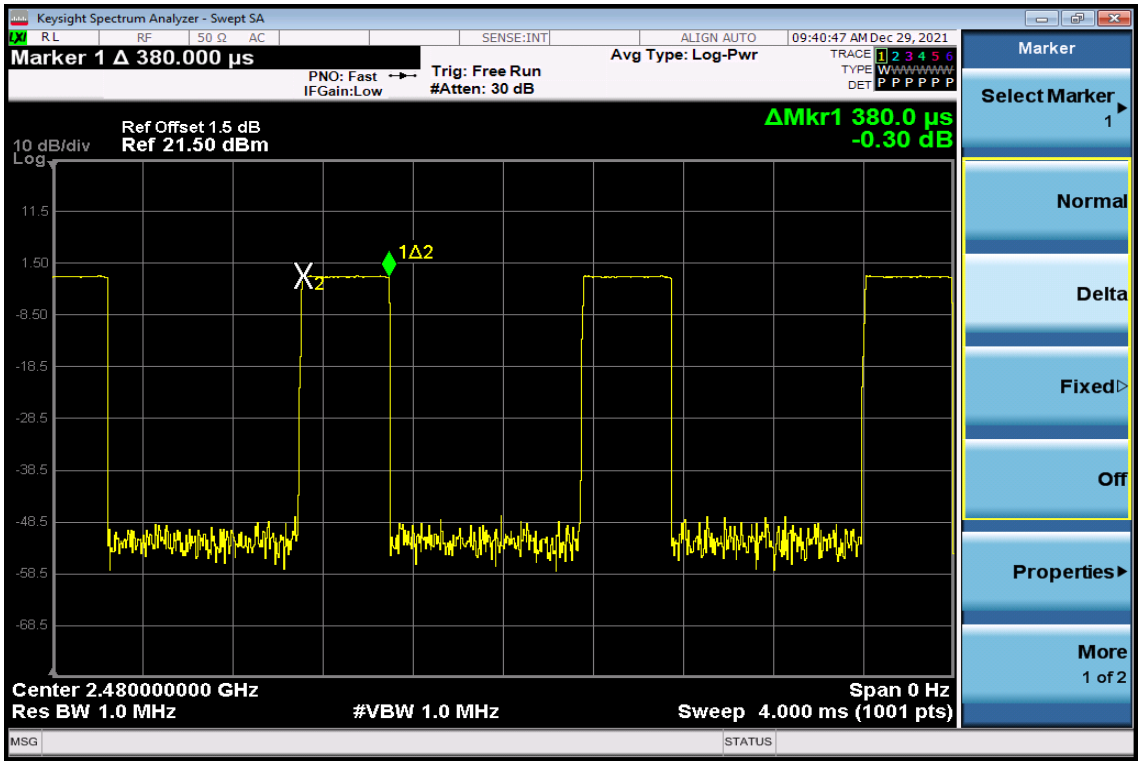

Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 1.63000 ms
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
09:38:54 AM Dec 29, 2021
Ref Offset 1.5 dB
10 dB/div
Ref 21.50 dBm
ΔMkr1 1.630 ms
-0.27 dB
1Δ2
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

## *DH5*

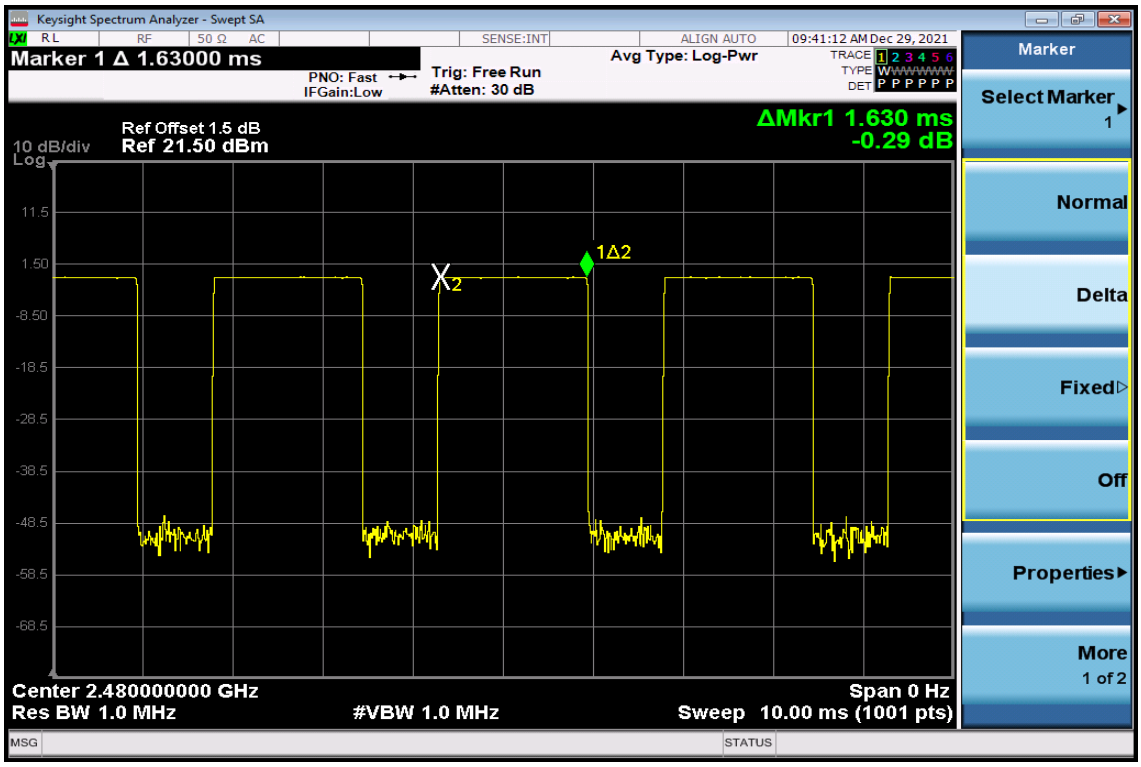

Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 2.90000 ms
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
09:39:18 AM Dec 29, 2021
Ref Offset 1.5 dB
10 dB/div
Ref 21.50 dBm
ΔMkr1 2.900 ms
-0.43 dB
1Δ2
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

## *High Channel*

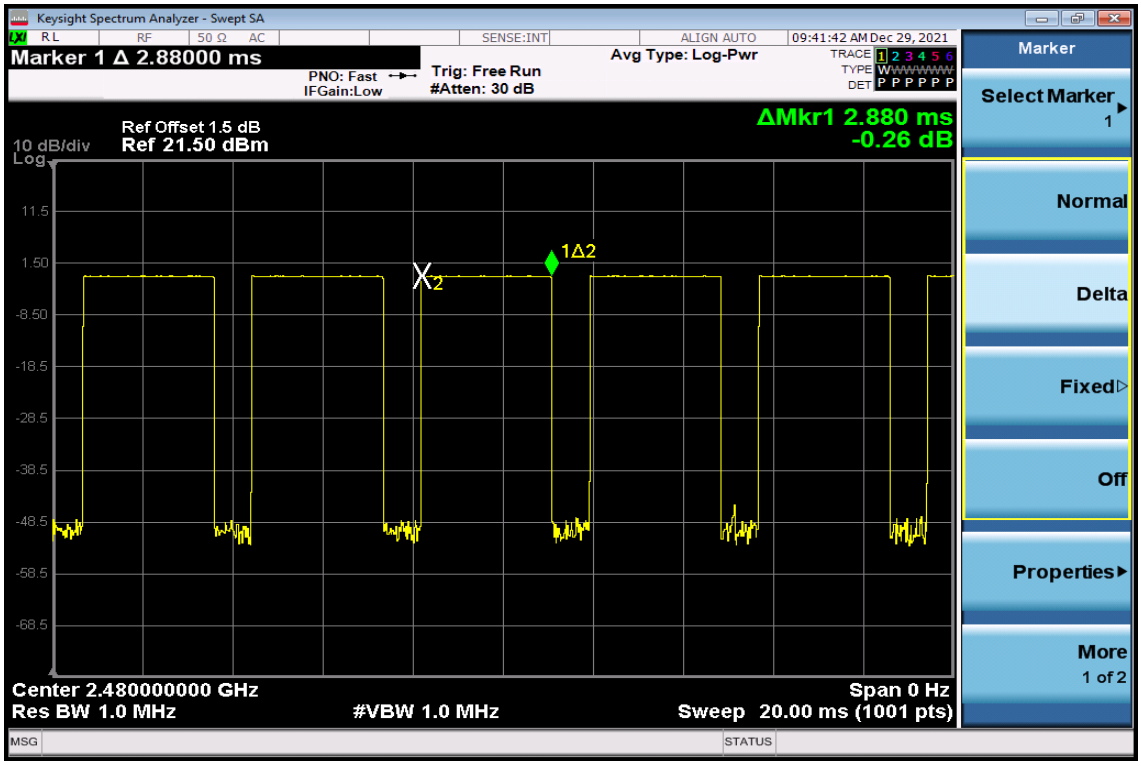
### *DH1*




### *DH3*



***DH5***


Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 2.88000 ms
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
09:41:42 AM Dec 29, 2021
Ref Offset 1.5 dB
10 dB/div
Ref 21.50 dBm
Log
ΔMkr1 2.880 ms
-0.26 dB
1Δ2
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2

# 12. 20dB Bandwidth

## 12.1 Standard Applicable:

According to §15.247(a)(1),and RSS210 A8.1(b) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

## 12.2 Measurement Equipment Used:

Refer to section 6.2 for details.

## 12.3 Test Set-up:

Refer to section 9.3 for details.

## 12.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW= 1 % - 5% of Bandwidth., Span= 3MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

## 12.5 Measurement Result:

**BDR Mode**

| CH | 20dB Bandwidth (MHz) |
|---|---|
| Low | 0.883 |
| Mid | 0.884 |
| High | 0.884 |

**EDR 2M Mode**

| CH | 20dB Bandwidth (MHz) | 2/3* 20dB Bandwidth (MHz) |
|---|---|---|
| Lower | 1.326 | 0.884 |
| Mid | 1.321 | 0.881 |
| Higher | 1.323 | 0.882 |

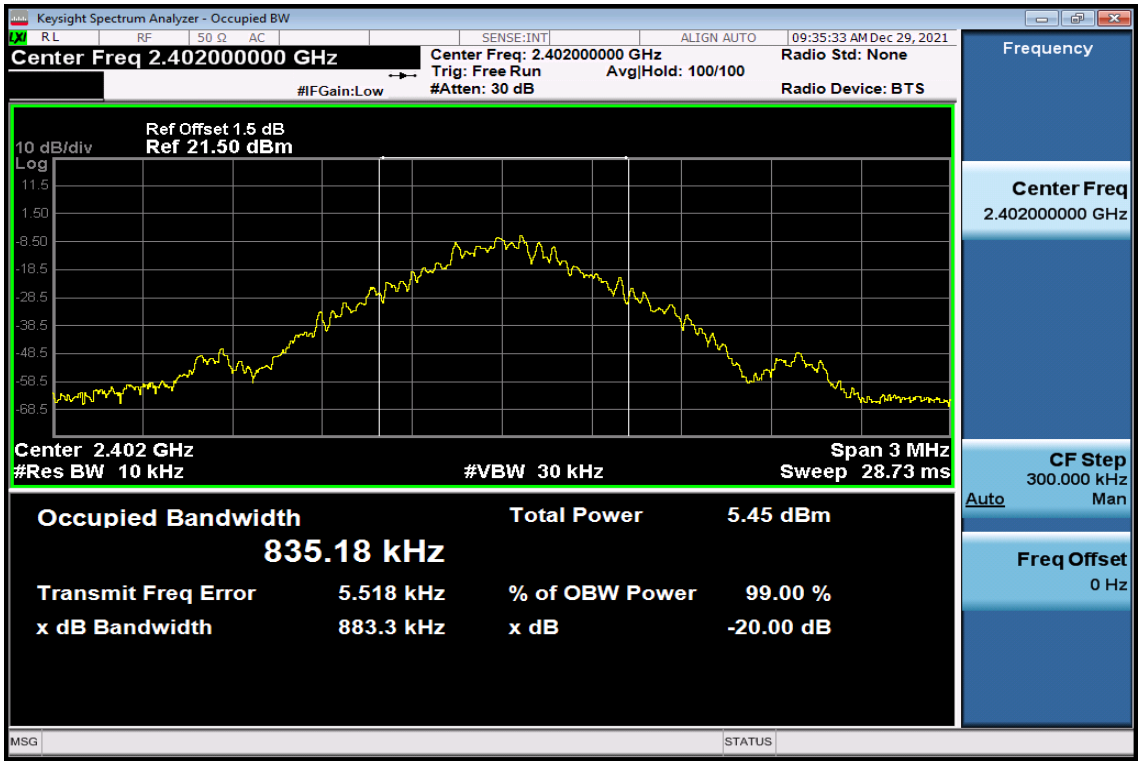
**EDR 3M Mode**

| CH | 20dB Bandwidth (MHz) | 2/3* 20dB Bandwidth (MHz) |
|---|---|---|
| Lower | 1.266 | 0.844 |
| Mid | 1.269 | 0.846 |
| Higher | 1.268 | 0.845 |

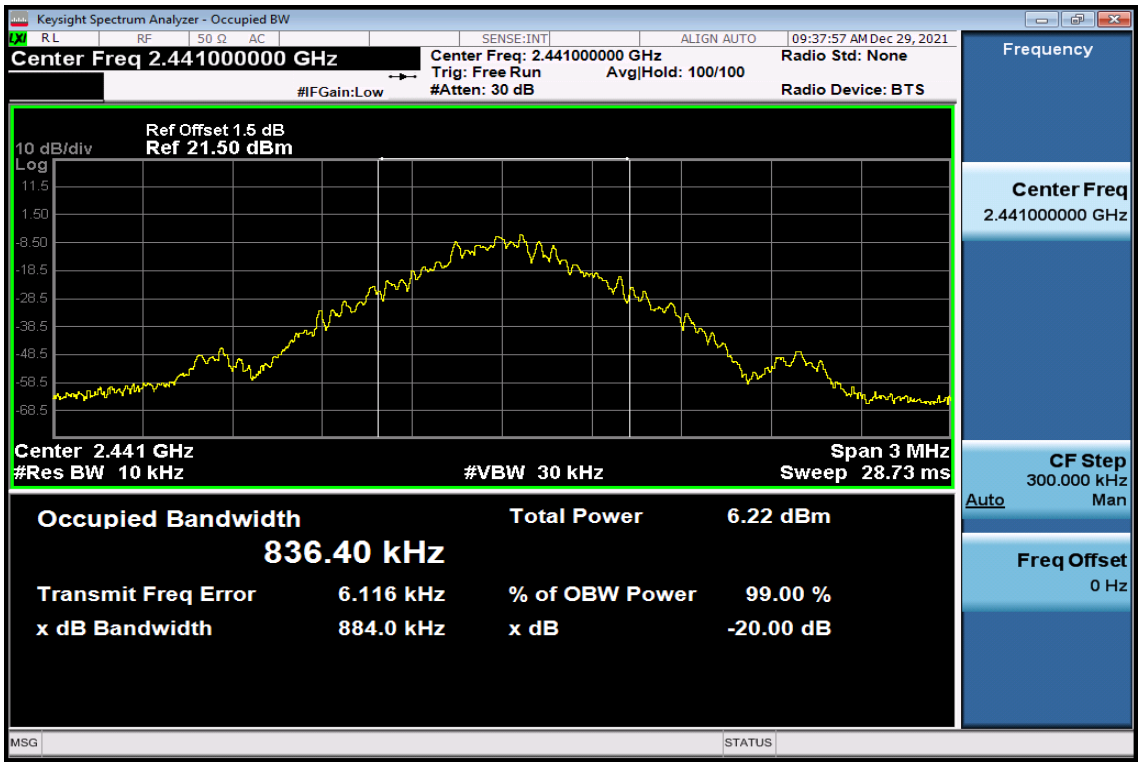
Note: Refer to next page for plots.

## *BDR Mode*

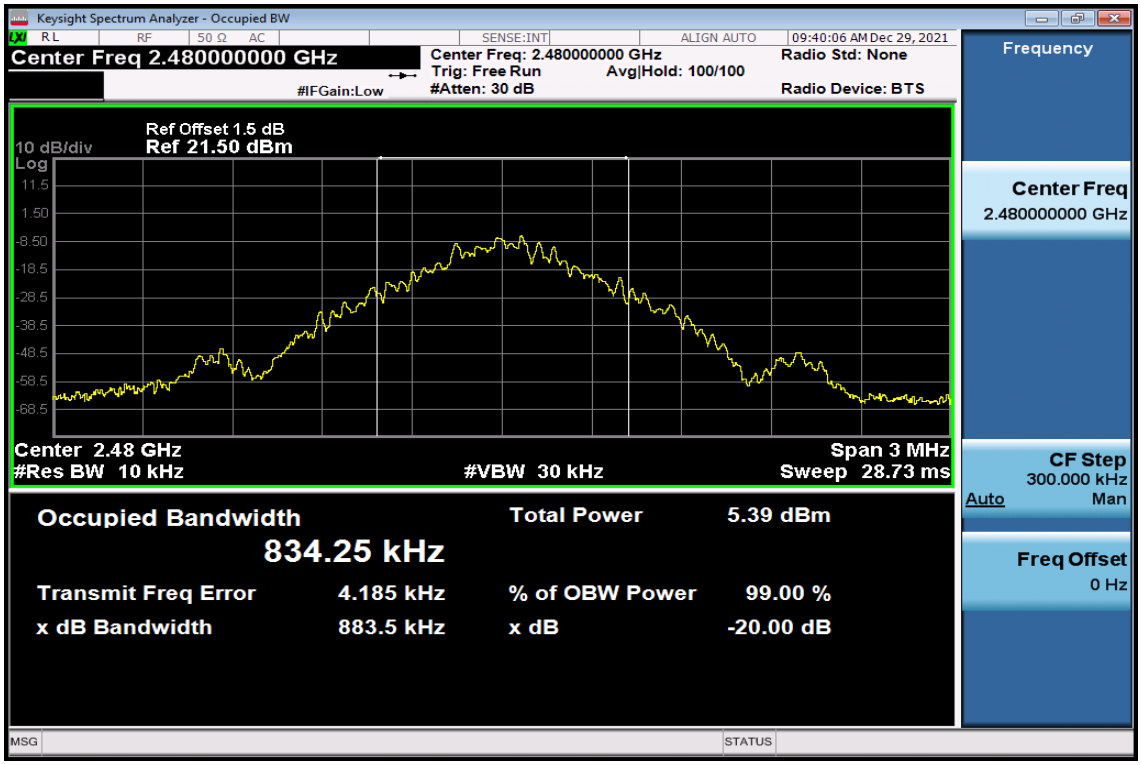
## *20dB Bandwidth Test Data CH-Low*




## *20dB Bandwidth Test Data CH-Mid*

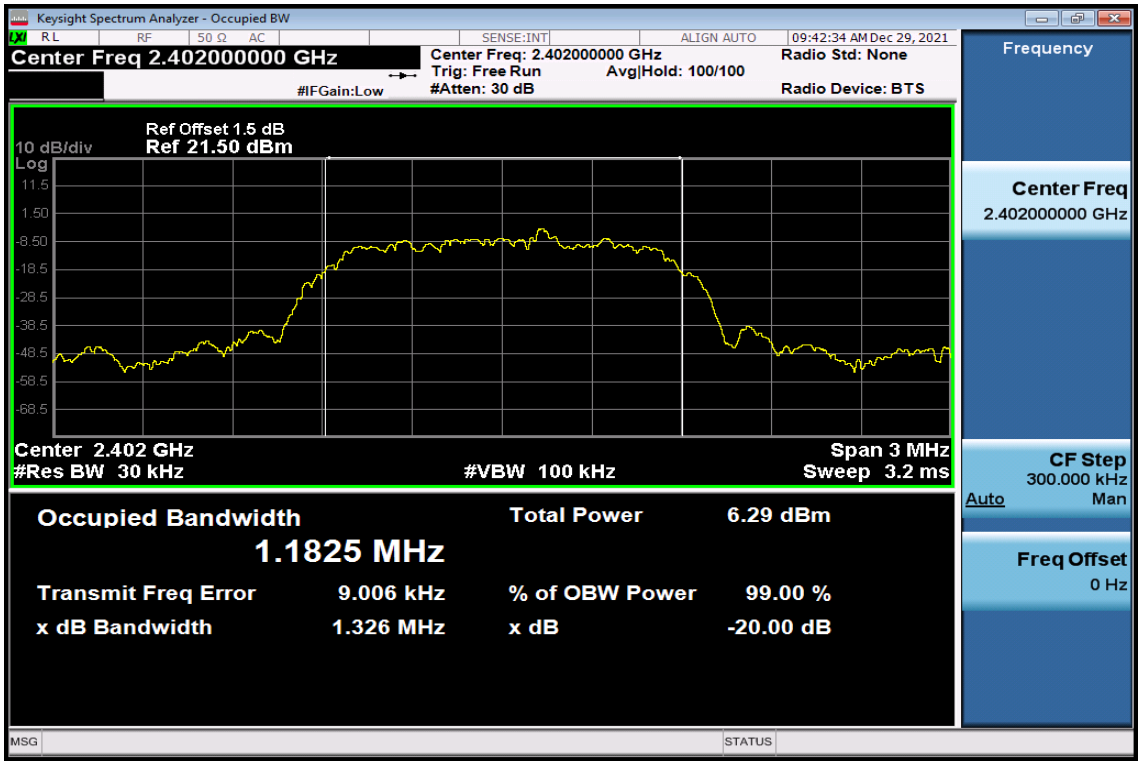


## *20dB Bandwidth Test Data CH-High*

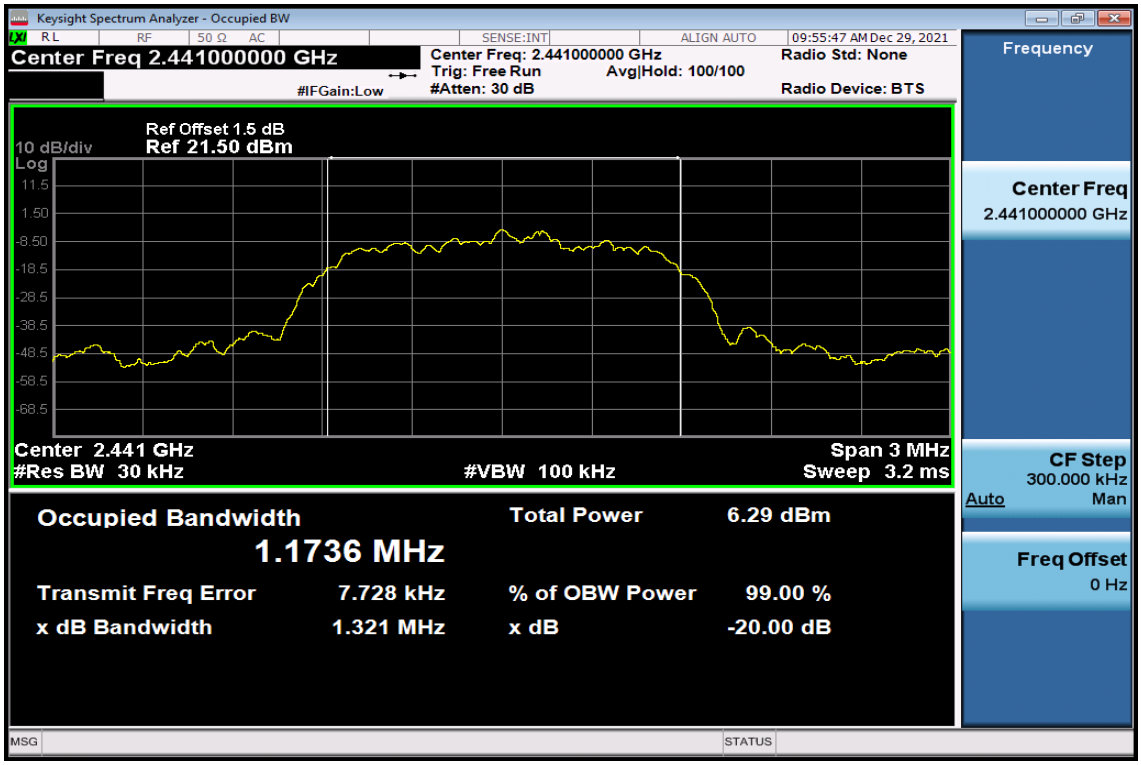



## *EDR 2M Mode*

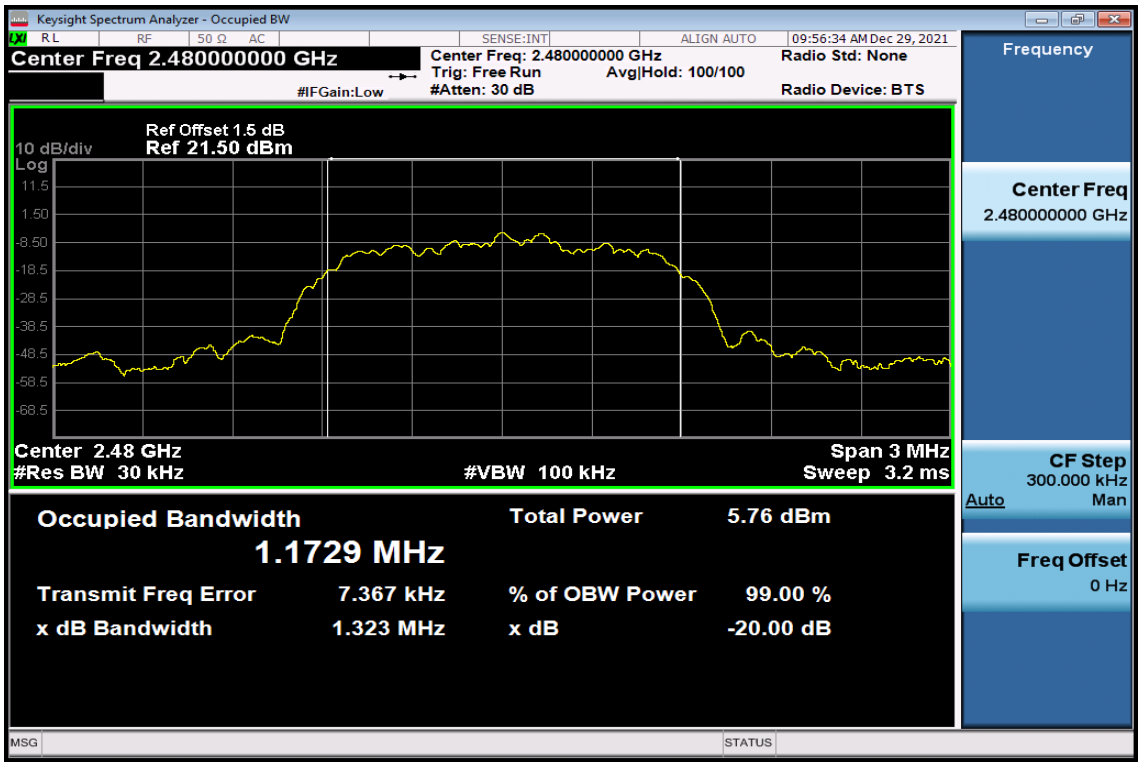
## *20dB Bandwidth Test Data CH-Low*



## *20dB Bandwidth Test Data CH-Mid*

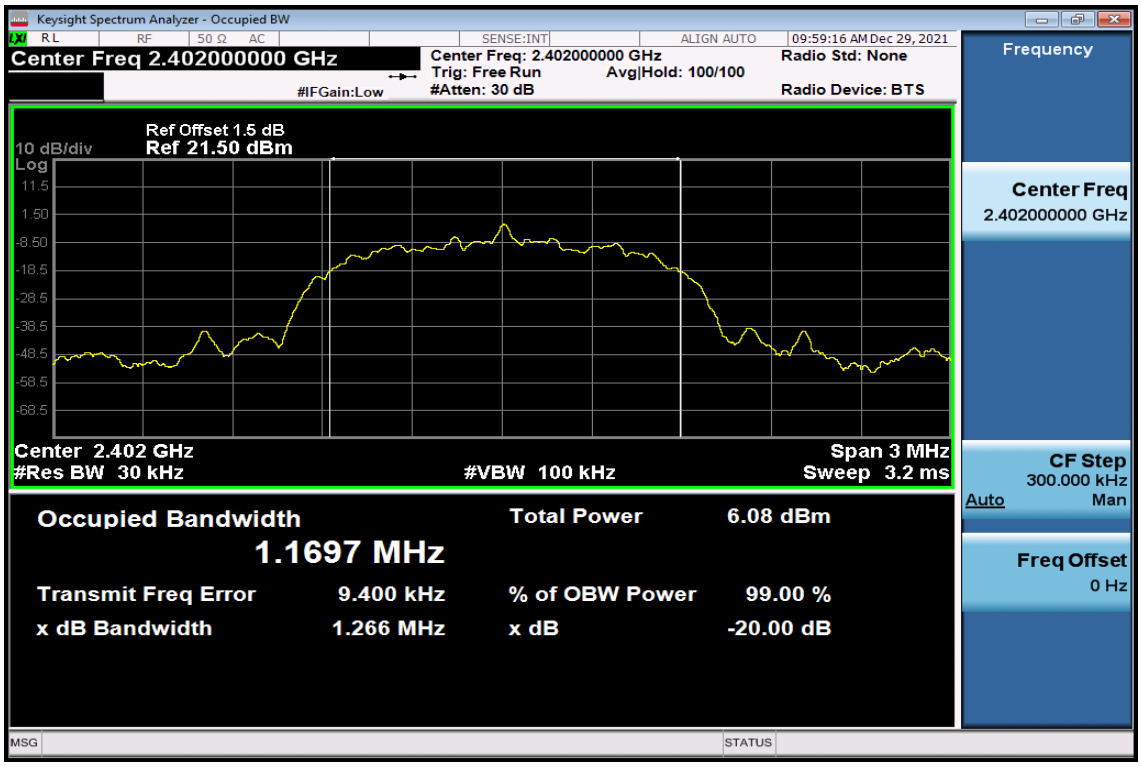



## *20dB Bandwidth Test Data CH-High*

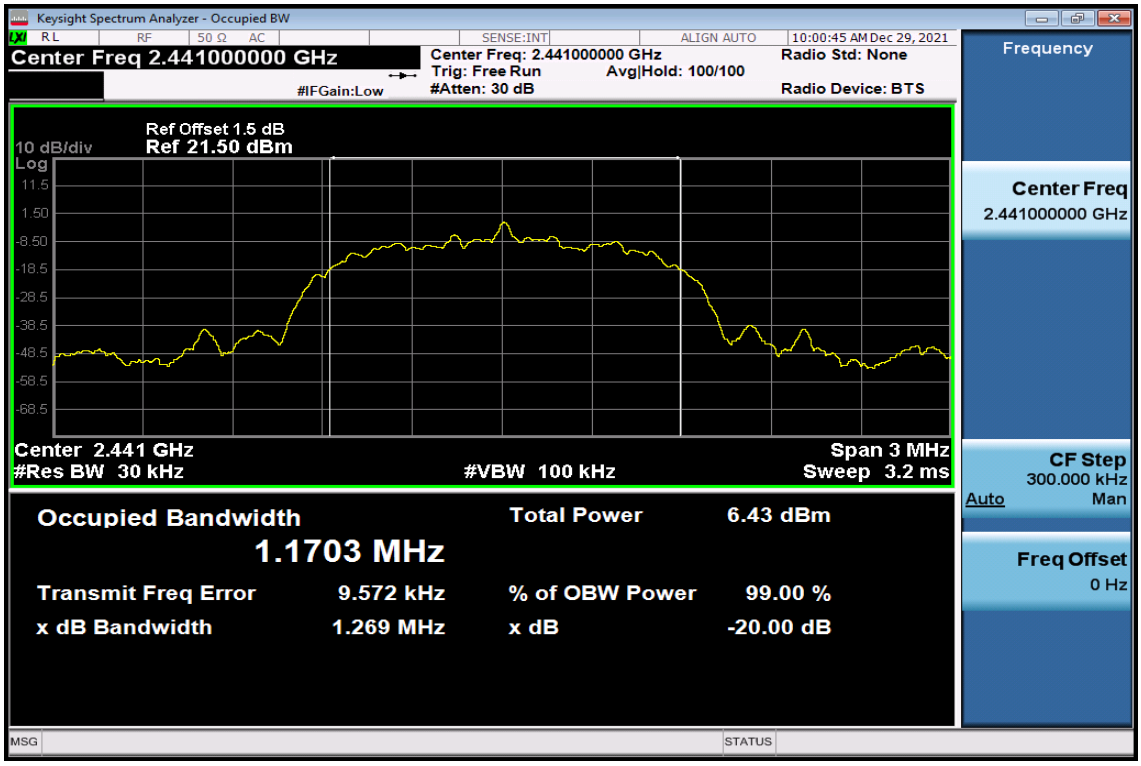


## *EDR 3M Mode*

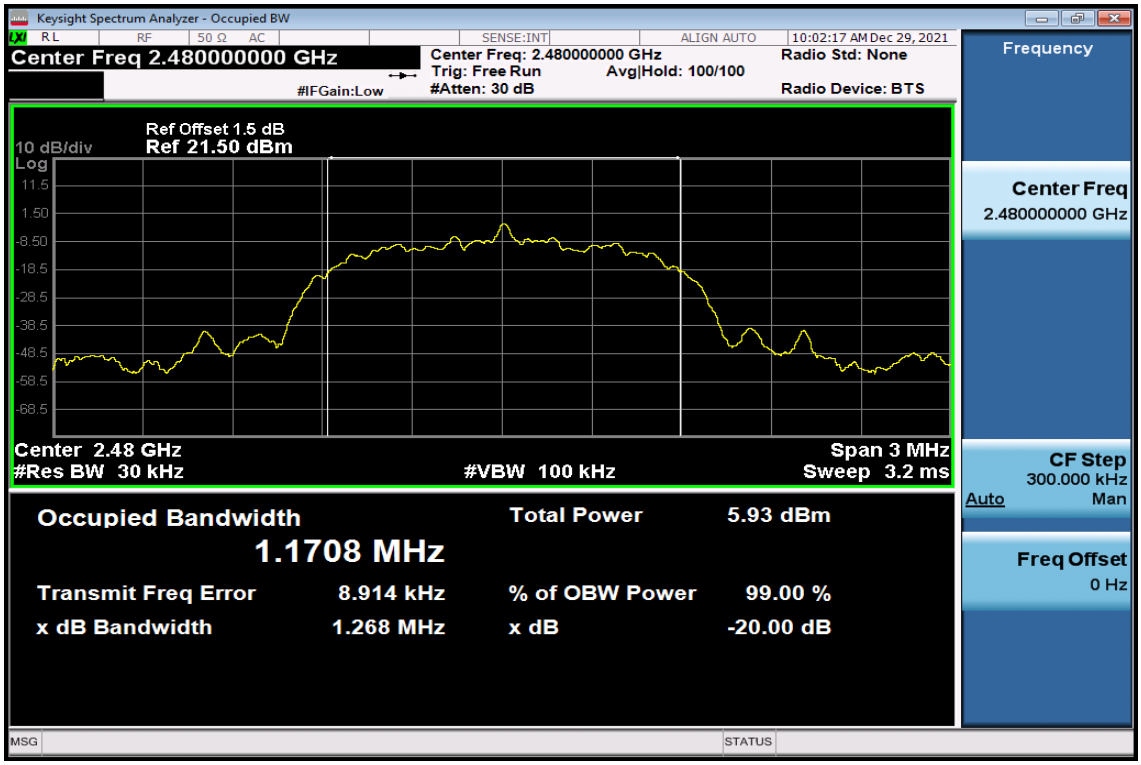
## *20dB Bandwidth Test Data CH-Low*




## *20dB Bandwidth Test Data CH-Mid*



## *20dB Bandwidth Test Data CH-High*



# 13. Antenna Requirement

## 13.1 Standard Applicable:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.247(c), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## 13.2 Antenna Connected Construction:

The directional gins of antenna used for transmitting is below table, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

Antenna Designation:

| | Antenna Type | Brand | Model | Peak Gain | Frequency Range | Connector Type |
|---|---|---|---|---|---|---|
| 1 | Chip | Percsson Communication Equipment Co.,Ltd | HMAN20L2450-D002CS | 2.48dBi | 2400-2500MHz | N/A |

.