

# TEST REPORT

**Reference No.**..... : WTD24D10248251W002  
**FCC ID** ..... : 2AD6G-F81  
**Applicant**..... : Rongta Technology (Xiamen) Group Co., Ltd.  
**Address**..... : No.88, Tonghui South Road, Tongan, Xiamen City, China  
**Manufacturer** ..... : Rongta Technology (Xiamen) Group Co., Ltd.  
**Address**..... : No.88, Tonghui South Road, Tongan, Xiamen City, China  
**Product**..... : A4 Portable Printer  
**Model(s)** ..... : F81, F81Plus, F81PRO, F81MAX, F81Lite, F81A, F81B, F81C, F81D, F81E, F81F, F81H, F81M, F81N, F81S, F81Z, KM81, F82, F83, F84, F8\*\*(\*=0-9 or A-Z or blank)  
**Standards**..... : FCC 47CFR Part 15.247  
**Date of Receipt sample** .... : 2024-10-30  
**Date of Test** ..... : 2024-10-30 to 2024-12-11  
**Date of Issue**..... : 2024-12-18  
**Test Result**..... : **Pass**

**Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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3 Revision History

| Test Report No.    | Date of Receipt Sample | Date of Test                   | Date of Issue | Purpose  | Comment | Approved |
|--------------------|------------------------|--------------------------------|---------------|----------|---------|----------|
| WTD24D10248251W002 | 2024-10-30             | 2024-10-30<br>to<br>2024-12-11 | 2024-12-18    | Original | -       | Valid    |

## 4 General Information

### 4.1 General Description of E.U.T.

|                    |                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product:           | A4 Portable Printer                                                                                                                                       |
| Model(s):          | F81, F81Plus, F81PRO, F81MAX, F81Lite, F81A, F81B, F81C, F81D, F81E, F81F, F81H, F81M, F81N, F81S, F81Z, KM81, F82, F83, F84, F8**(*=0-9 or A-Z or blank) |
| Model Description: | Only the model names and appearance colors are different.<br>Model F81 was tested in the report.                                                          |
| Test Sample No.:   | 1-1/1                                                                                                                                                     |
| Bluetooth Version: | V5.0                                                                                                                                                      |
| Hardware Version:  | F81_JL_BWU_V1.0_240816                                                                                                                                    |
| Software Version:  | F81_BWU_AC7916_203DPI_RT_V1.12_241121.bin                                                                                                                 |

### 4.2 Details of E.U.T.

|                       |                          |
|-----------------------|--------------------------|
| Operation Frequency:  | 2402~2480MHz             |
| Max. RF output power: | 1M: 4.23dBm, 2M: 4.43dBm |
| Type of Modulation:   | GFSK                     |
| Antenna installation: | FPC Antenna              |
| Antenna Gain:         | 1.0dBi                   |

Note:

#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTERK lab has not verified the authenticity of its information.

Ratings: DC 7.4V,2400mAh for battery

### 4.3 Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 0           | 2402            | 1           | 2404            | 2           | 2406            | 3           | 2408            |
| 4           | 2410            | 5           | 2412            | 6           | 2414            | 7           | 2416            |
| 8           | 2418            | 9           | 2420            | 10          | 2422            | 11          | 2424            |
| 12          | 2426            | 13          | 2428            | 14          | 2430            | 15          | 2432            |
| 16          | 2434            | 17          | 2436            | 18          | 2438            | 19          | 2440            |
| 20          | 2442            | 21          | 2444            | 22          | 2446            | 23          | 2448            |
| 24          | 2450            | 25          | 2452            | 26          | 2454            | 27          | 2456            |
| 28          | 2458            | 29          | 2460            | 30          | 2462            | 31          | 2464            |
| 32          | 2466            | 33          | 2468            | 34          | 2470            | 35          | 2472            |
| 36          | 2474            | 37          | 2476            | 38          | 2478            | 39          | 2480            |

#### 4.4 Test Facility

The test facility has a test site registered with the following organizations:

**ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.**

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

**FCC Designation No.: CN1201. Test Firm Registration No.: 523476.**

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

#### 4.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

#### 4.6 Abnormalities from Standard Conditions

None.

#### 4.7 Test Mode

Tests Carried Out Under FCC part 15.247

| Test Items                     | Mode   | Data Rate | Channel | TX/RX |
|--------------------------------|--------|-----------|---------|-------|
| Maximum Peak Output Power      | BT BLE | 1/2 Mbps  | 0/19/39 | TX    |
| Power Spectral Density         | BT BLE | 1/2 Mbps  | 0/19/39 | TX    |
| 6dB Bandwidth                  | BT BLE | 1/2 Mbps  | 0/19/39 | TX    |
| Band Edge                      | BT BLE | 1/2 Mbps  | 0/19/39 | TX    |
| Transmitter Spurious Emissions | BT BLE | 1/2 Mbps  | 0/19/39 | TX    |

**Note:** Parameters set by test software during channel & power tests, the software provided by the applicant was used to set the operating channels as well as the maximum output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

## 5 Test Summary

| Test Items                                                        | Test Requirement                    | Result |
|-------------------------------------------------------------------|-------------------------------------|--------|
| Radiated Spurious Emissions                                       | 15.247(d)<br>15.205(a)<br>15.209(a) | PASS   |
| Conducted Spurious Emissions                                      | 15.247(d)                           | PASS   |
| Conducted Emissions                                               | 15.207(a)                           | PASS   |
| 6dB Bandwidth                                                     | 15.247(a)(2)                        | PASS   |
| Maximum Peak Output Power                                         | 15.247(b)(3),(4)                    | PASS   |
| Power Spectral Density                                            | 15.247(e)                           | PASS   |
| Band Edge                                                         | 15.247(d)                           | PASS   |
| Antenna Requirement                                               | 15.203                              | PASS   |
| Maximum Permissible Exposure<br>(Exposure of Humans to RF Fields) | 1.1307(b)(1)                        | PASS   |

## 6 Equipment Used during Test

### 6.1 Equipments List

| Item                                                       | Equipment                 | Manufacturer | Model No.             | Serial No. | Last Cal. Date | Calibration Due Date |
|------------------------------------------------------------|---------------------------|--------------|-----------------------|------------|----------------|----------------------|
| <b>Conducted Emissions 1#</b>                              |                           |              |                       |            |                |                      |
| 1                                                          | EMI Test Receiver         | R&S          | ESCI                  | 100947     | 2024-07-18     | 2025-07-17           |
| 2                                                          | LISN                      | R&S          | ENV216                | 100115     | 2024-07-18     | 2025-07-17           |
| 3                                                          | Cable                     | Top          | TYPE16(3.5M)          | -          | 2024-07-18     | 2025-07-17           |
| <b>3m Semi-anechoic Chamber for Radiation Emissions 1#</b> |                           |              |                       |            |                |                      |
| 1                                                          | Spectrum Analyzer         | R&S          | FSP30                 | 100091     | 2024-04-22     | 2025-04-21           |
| 2                                                          | Amplifier                 | Agilent      | 8447D                 | 2944A10178 | 2024-07-18     | 2025-07-17           |
| 3                                                          | Tri-log Broadband Antenna | SCHWARZBECK  | VULB9163              | 336        | 2024-07-21     | 2025-07-20           |
| 4                                                          | Coaxial Cable             | Top          | TYPE16(13M)           | -          | 2024-04-22     | 2025-04-21           |
| 5                                                          | Broad-band Horn Antenna   | SCHWARZBECK  | BBHA 9120D            | 667        | 2024-01-23     | 2025-01-22           |
| 6                                                          | Broad-band Horn Antenna   | SCHWARZBECK  | BBHA 9170             | 335        | 2024-07-18     | 2025-07-17           |
| 7                                                          | Broadband Preamplifier    | COMPLIANCE   | PAP-1G18              | 2004       | 2024-07-18     | 2025-07-17           |
| 8                                                          | Coaxial Cable             | Top          | ZT26-NJ-NJ-8M/FA      | -          | 2024-04-22     | 2025-04-21           |
| 9                                                          | Microwave Amplifier       | SCHWARZBECK  | BBV 9721              | 100472     | 2024-07-18     | 2025-07-17           |
| 10                                                         | Coaxial Cable             | Top          | ZT40-2.92J-2.92J-2.0M | 17100919   | 2024-04-22     | 2025-04-21           |
| <b>3m Semi-anechoic Chamber for Radiation Emissions 2#</b> |                           |              |                       |            |                |                      |
| 1                                                          | Test Receiver             | R&S          | ESCI                  | 101296     | 2024-04-22     | 2025-04-21           |
| 2                                                          | Trilog Broadband Antenna  | SCHWARZBECK  | VULB9160              | 9160-3325  | 2024-11-04     | 2025-11-03           |
| 3                                                          | Active Loop Antenna       | Com-Power    | AL-130R               | 10160007   | 2024-04-27     | 2025-04-26           |
| 4                                                          | Amplifier                 | ANRITSU      | MH648A                | M43381     | 2024-04-22     | 2025-04-21           |
| 5                                                          | Cable                     | HUBER+SUHNER | CBL2                  | 525178     | 2024-04-22     | 2025-04-21           |
| <b>RF Conducted Testing</b>                                |                           |              |                       |            |                |                      |
| 1                                                          | Spectrum Analyzer         | R&S          | FSP40                 | 100501     | 2024-07-18     | 2025-07-17           |
| 2                                                          | Spectrum Analyzer         | Agilent      | N9020A                | MY49100060 | 2024-07-18     | 2025-07-17           |

#### Test Software:

| Test Item                                       | Software name | Software version  |
|-------------------------------------------------|---------------|-------------------|
| Conduction disturbance<br>Radiated Emission(3m) | EZ-EMC        | EZ-EMC(RA-03A1-1) |

## 6.2 Description of Support Units

| Equipment | Manufacturer | Model No. | Series No. |
|-----------|--------------|-----------|------------|
| /         | /            | /         | /          |

## 6.3 Measurement Uncertainty

| Parameter                                       | Uncertainty                             |
|-------------------------------------------------|-----------------------------------------|
| Conducted Emission                              | ± 3.64 dB(AC mains 150KHz~30MHz)        |
| Radiated Spurious Emissions                     | ± 5.08 dB (Bilog antenna 30M~1000MHz)   |
|                                                 | ± 5.47 dB (Horn antenna 1000M~25000MHz) |
| Radio Frequency                                 | ± 1 x 10 <sup>-7</sup> Hz               |
| RF Power                                        | ± 0.42 dB                               |
| RF Power Density                                | ± 0.7dB                                 |
| Conducted Spurious Emissions                    | ± 2.76 dB (9kHz~26500MHz)               |
| Confidence interval: 95%. Confidence factor:k=2 |                                         |

## 6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R. China.

## 7 Duty Cycle

**1M**

| Type of Modulation | On time ms | Period ms | Duty Cycle linear | Duty Cycle % | Duty Cycle Factor(dB) | Average Factor(dB) |
|--------------------|------------|-----------|-------------------|--------------|-----------------------|--------------------|
| GFSK               | 2.12       | 2.512     | 0.84              | 84.39        | 0.74                  | -1.47              |

**2M**

| Type of Modulation | On time ms | Period ms | Duty Cycle linear | Duty Cycle % | Duty Cycle Factor(dB) | Average Factor(dB) |
|--------------------|------------|-----------|-------------------|--------------|-----------------------|--------------------|
| GFSK               | 1.072      | 2.512     | 0.43              | 42.68        | 3.70                  | -7.40              |

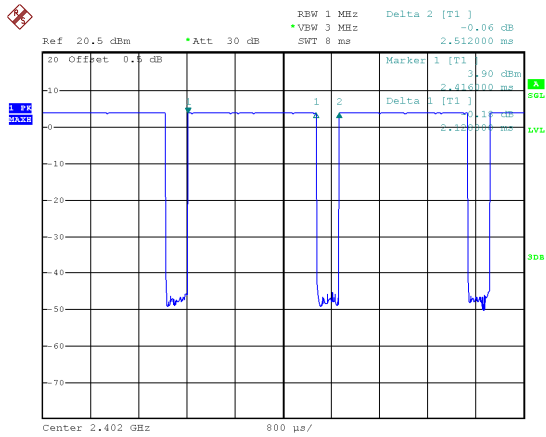
**Remark:**

Duty cycle=On Time/period;

Duty cycle factor= $10 \cdot \log(1/\text{Duty cycle})$ ;Average factor= $20 \log_{10} \text{Duty cycle}$

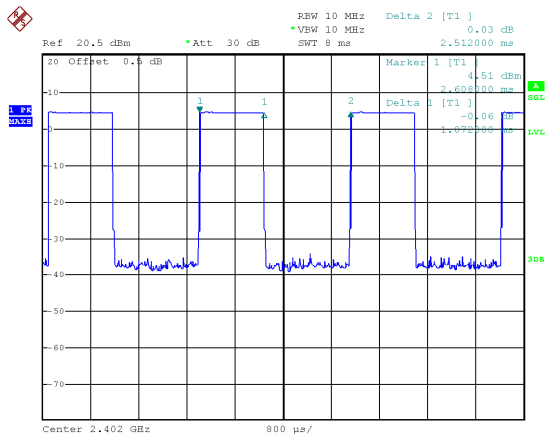
GFSK

1M



Date: 4.NOV.2024 16:46:37

2M



Date: 4.NOV.2024 17:24:06

## 8 Conducted Emission

Test Requirement: 47CFR FCC Part15 Subpart C §15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Limit:

| Frequency (MHz) | Conducted Limit (dB $\mu$ V) |           |
|-----------------|------------------------------|-----------|
|                 | Quasi-peak                   | Average   |
| 0.15 to 0.5     | 66 to 56*                    | 56 to 46* |
| 0.5 to 5.0      | 56                           | 46        |
| 5.0 to 30       | 60                           | 50        |

\*Decreases with the logarithm of the frequency.

### 8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.8°C

Humidity: 41.7% RH

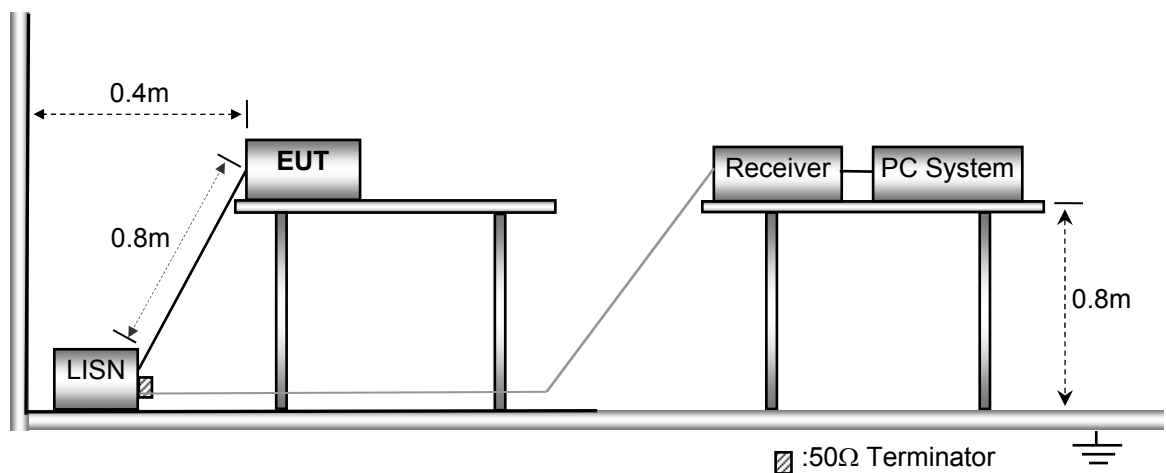
Atmospheric Pressure: 101.6kPa

EUT Operation:

The test was performed in Transmitting mode, the worst test data were shown in the report.

### 8.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



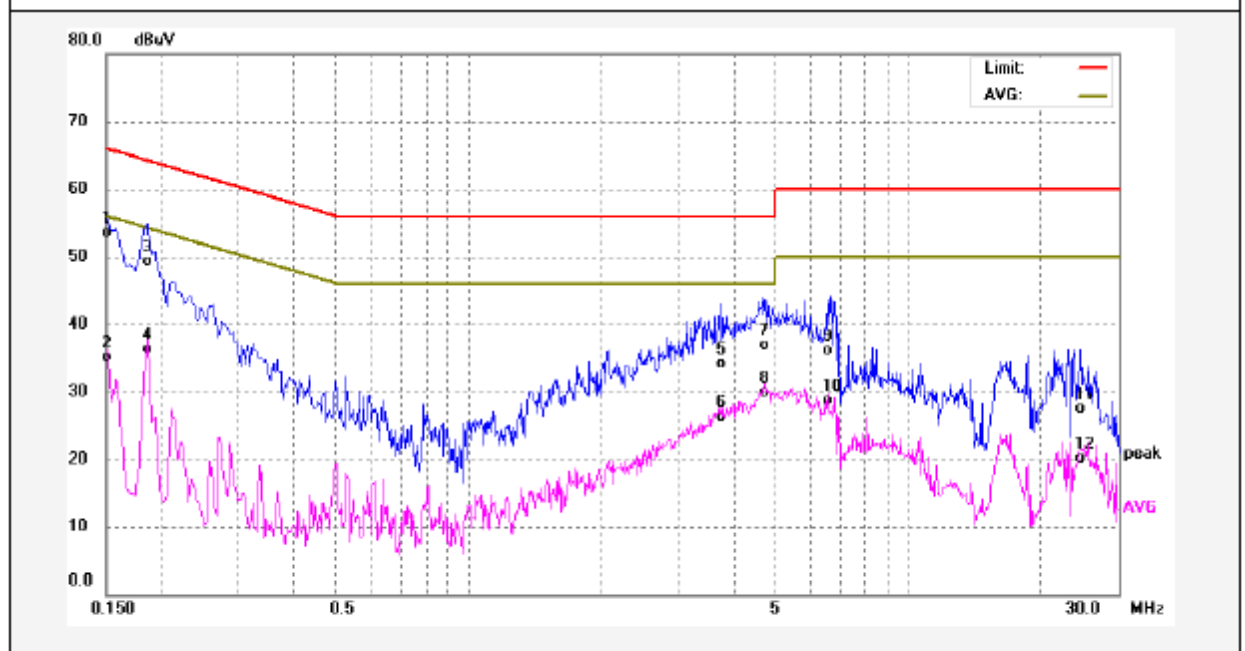
### 8.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 8.4 Conducted Emission Test Result

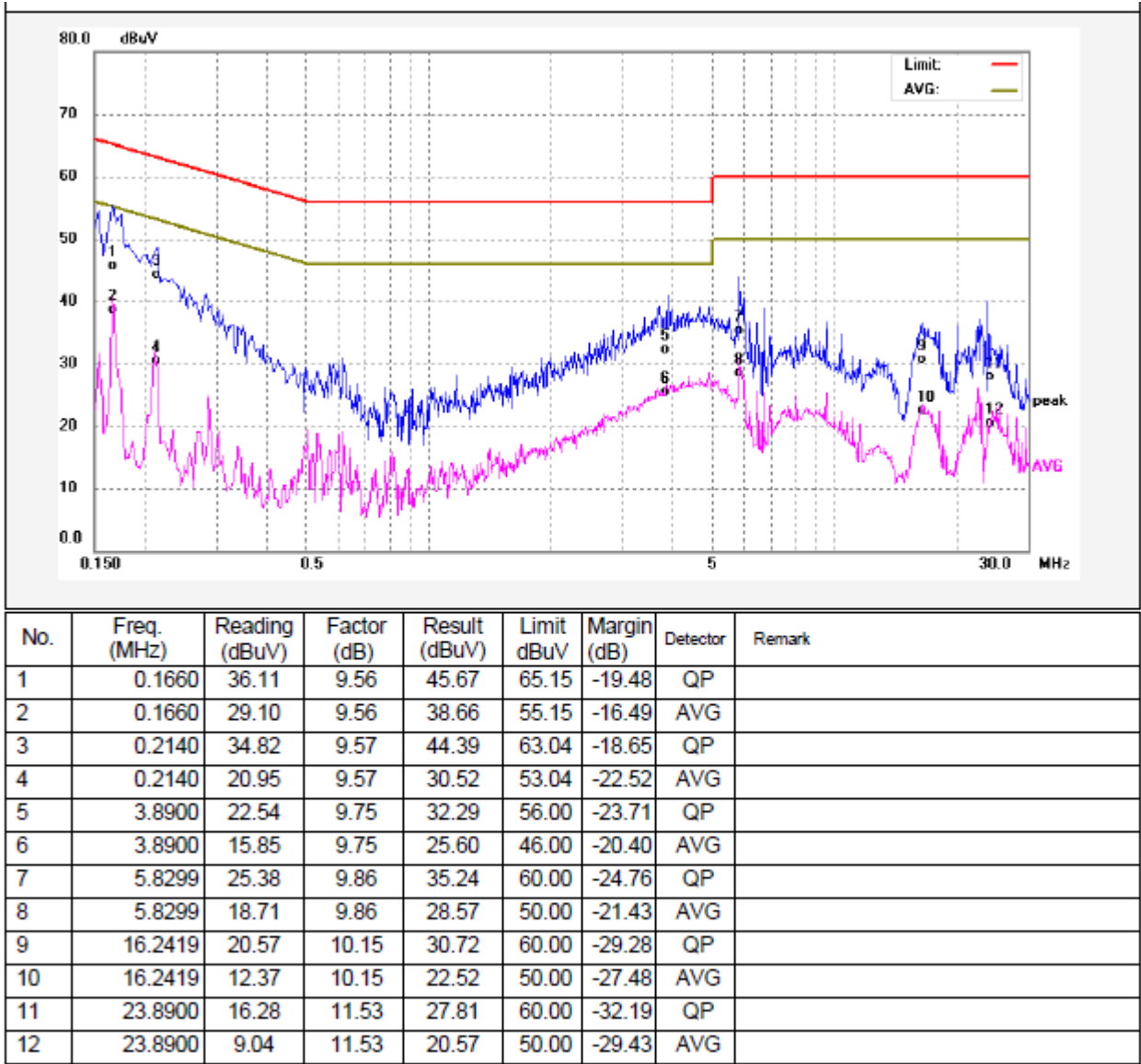
Remark: only the worst data (High channel mode) were reported

Live line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1   | 0.1500      | 43.89          | 9.52        | 53.41         | 65.99      | -12.58      | QP       |        |
| 2   | 0.1500      | 25.62          | 9.52        | 35.14         | 55.99      | -20.85      | AVG      |        |
| 3   | 0.1860      | 39.81          | 9.53        | 49.34         | 64.21      | -14.87      | QP       |        |
| 4   | 0.1860      | 26.77          | 9.53        | 36.30         | 54.21      | -17.91      | AVG      |        |
| 5   | 3.7580      | 24.42          | 9.73        | 34.15         | 56.00      | -21.85      | QP       |        |
| 6   | 3.7580      | 16.48          | 9.73        | 26.21         | 46.00      | -19.79      | AVG      |        |
| 7   | 4.6620      | 27.05          | 9.78        | 36.83         | 56.00      | -19.17      | QP       |        |
| 8   | 4.6620      | 20.09          | 9.78        | 29.87         | 46.00      | -16.13      | AVG      |        |
| 9   | 6.5380      | 26.17          | 9.90        | 36.07         | 60.00      | -23.93      | QP       |        |
| 10  | 6.5380      | 18.85          | 9.90        | 28.75         | 50.00      | -21.25      | AVG      |        |
| 11  | 24.6380     | 15.86          | 11.73       | 27.59         | 60.00      | -32.41      | QP       |        |
| 12  | 24.6380     | 8.41           | 11.73       | 20.14         | 50.00      | -29.86      | AVG      |        |

Neutral line:



## 9 Radiated Emissions

Test Requirement: FCC 47CFR Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency<br>(MHz) | Field Strength |                 | Field Strength Limit at 3m Measurement Dist |                                       |
|--------------------|----------------|-----------------|---------------------------------------------|---------------------------------------|
|                    | uV/m           | Distance<br>(m) | uV/m                                        | dBuV/m                                |
| 0.009 ~ 0.490      | 2400/F(kHz)    | 300             | $10000 * 2400/F(\text{kHz})$                | $20\log^{(2400/F(\text{kHz}))} + 80$  |
| 0.490 ~ 1.705      | 24000/F(kHz)   | 30              | $100 * 24000/F(\text{kHz})$                 | $20\log^{(24000/F(\text{kHz}))} + 40$ |
| 1.705 ~ 30         | 30             | 30              | $100 * 30$                                  | $20\log^{(30)} + 40$                  |
| 30 ~ 88            | 100            | 3               | 100                                         | $20\log^{(100)}$                      |
| 88 ~ 216           | 150            | 3               | 150                                         | $20\log^{(150)}$                      |
| 216 ~ 960          | 200            | 3               | 200                                         | $20\log^{(200)}$                      |
| Above 960          | 500            | 3               | 500                                         | $20\log^{(500)}$                      |

### 9.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

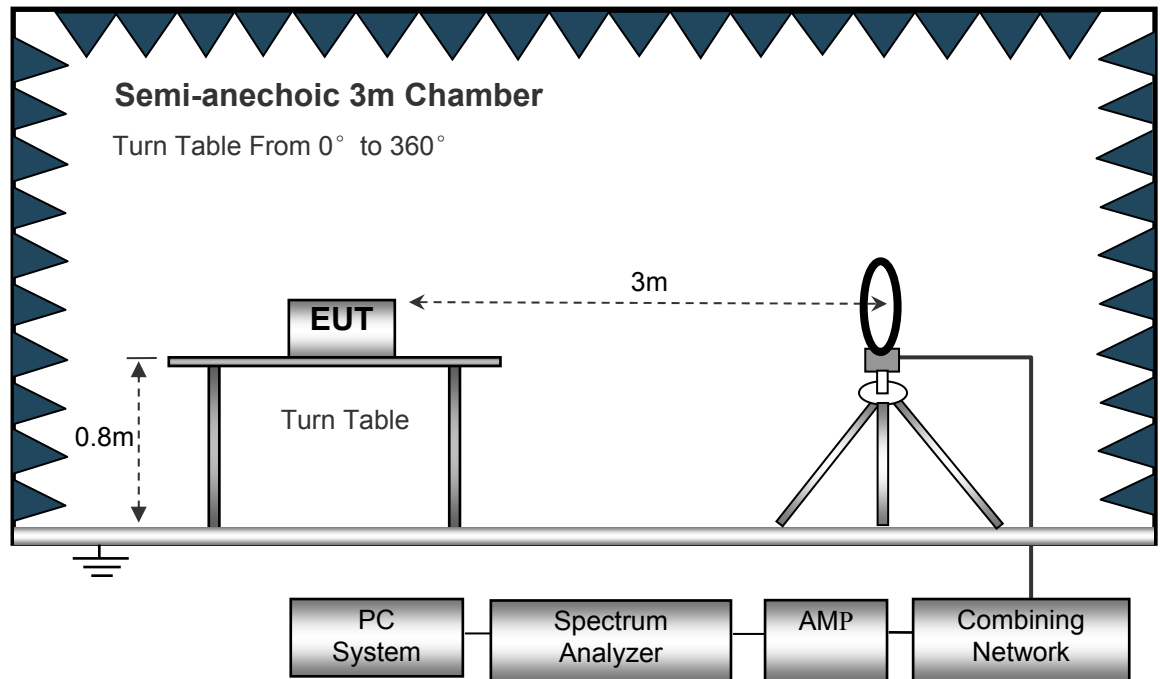
EUT Operation:

The test was performed in transmitting mode, the test data were shown in the report.

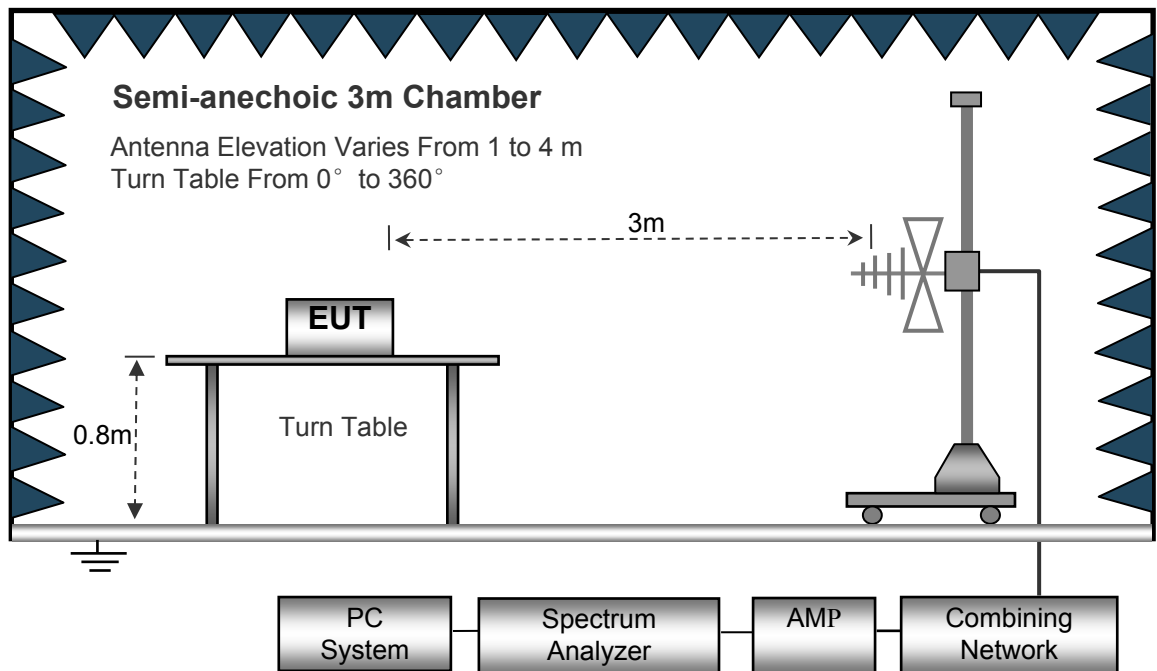
## 9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

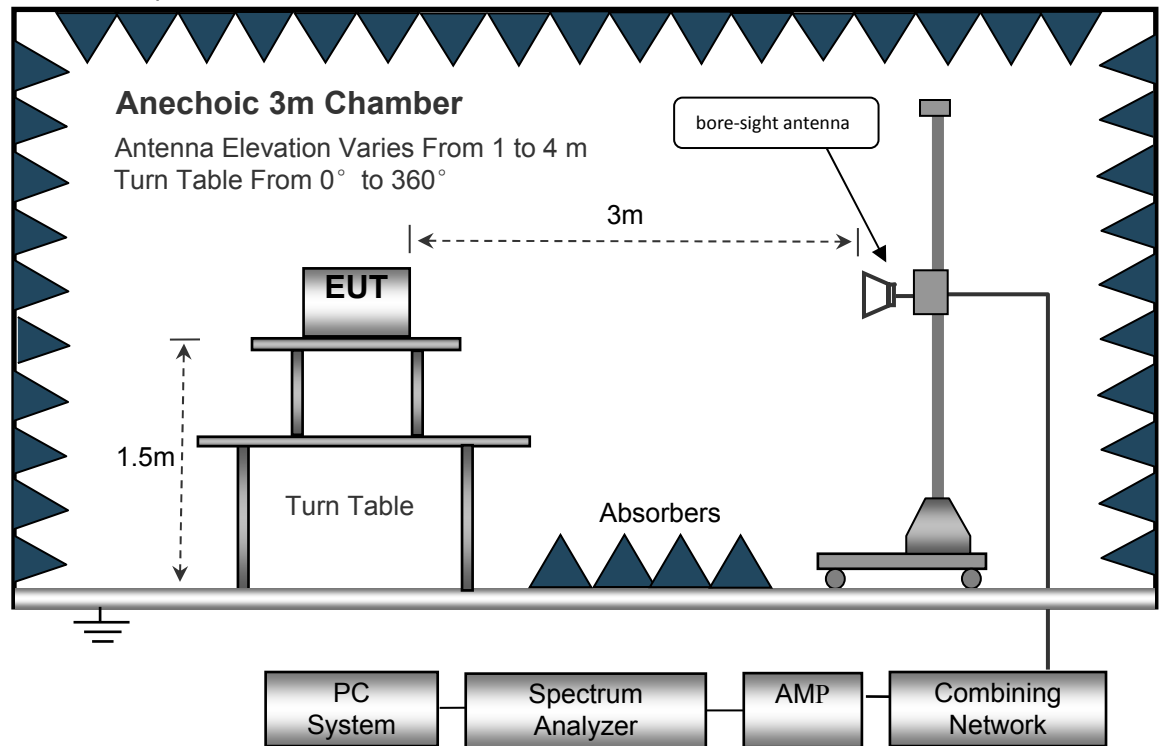
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto  
IF Bandwidth..... 10kHz  
Video Bandwidth..... 10kHz  
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto  
Detector ..... PK  
Resolution Bandwidth..... 100kHz  
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
Detector ..... PK  
Resolution Bandwidth..... 1MHz  
Video Bandwidth..... 3MHz  
Detector ..... Ave.  
Resolution Bandwidth..... 1MHz  
Video Bandwidth..... 10Hz

## 9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

## 9.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

## 9.6 Summary of Test Results

**Test Frequency: 9kHz~30MHz**

The measurements were more than 20 dB below the limit and not reported.

**Test Frequency: 30MHz ~ 8GHz**

**1M**

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Low Channel 2402MHz |                  |             |                  |            |       |                  |                     |          |        |
| 425.35                   | 38.77            | QP          | 338              | 1.7        | H     | -11.88           | 26.89               | 46.00    | -19.11 |
| 425.35                   | 45.17            | QP          | 350              | 1.9        | V     | -11.88           | 33.29               | 46.00    | -12.71 |
| 4804.00                  | 51.14            | PK          | 290              | 1.2        | V     | -1.06            | 50.08               | 74.00    | -23.92 |
| 4804.00                  | 39.23            | Ave         | 290              | 1.2        | V     | -1.06            | 38.17               | 54.00    | -15.83 |
| 7206.00                  | 51.76            | PK          | 70               | 1.4        | H     | 1.33             | 53.09               | 74.00    | -20.91 |
| 7206.00                  | 38.47            | Ave         | 70               | 1.4        | H     | 1.33             | 39.80               | 54.00    | -14.20 |

| Frequency                   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|-----------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                             |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                       | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Middle Channel 2440MHz |                  |             |                  |            |       |                  |                     |          |        |
| 425.35                      | 39.85            | QP          | 326              | 1.2        | H     | -13.35           | 26.50               | 46.00    | -19.50 |
| 425.35                      | 45.92            | QP          | 221              | 1.7        | V     | -13.35           | 32.57               | 46.00    | -13.43 |
| 4880.00                     | 51.18            | PK          | 4                | 1.4        | V     | -0.62            | 50.56               | 74.00    | -23.44 |
| 4880.00                     | 39.37            | Ave         | 4                | 1.4        | V     | -0.62            | 38.75               | 54.00    | -15.25 |
| 7320.00                     | 50.74            | PK          | 236              | 1.5        | H     | 2.21             | 52.95               | 74.00    | -21.05 |
| 7320.00                     | 38.93            | Ave         | 236              | 1.5        | H     | 2.21             | 41.14               | 54.00    | -12.86 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK High Channel 2480MHz |                  |             |                  |            |       |                  |                     |          |        |
| 425.35                    | 40.75            | QP          | 332              | 1.2        | H     | -13.35           | 27.40               | 46.00    | -18.60 |
| 425.35                    | 46.49            | QP          | 344              | 1.1        | V     | -13.35           | 33.14               | 46.00    | -12.86 |
| 4960.00                   | 52.06            | PK          | 25               | 1.7        | V     | -0.24            | 51.82               | 74.00    | -22.18 |
| 4960.00                   | 37.88            | Ave         | 25               | 1.7        | V     | -0.24            | 37.64               | 54.00    | -16.36 |
| 7440.00                   | 49.77            | PK          | 224              | 1.8        | H     | 2.84             | 52.61               | 74.00    | -21.39 |
| 7440.00                   | 38.97            | Ave         | 224              | 1.8        | H     | 2.84             | 41.81               | 54.00    | -12.19 |

**Radiated Restricted Band Emission**

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Low Channel 2402MHz |                  |             |                  |            |       |                  |                     |          |        |
| 2330.32                  | 45.43            | PK          | 214              | 1.4        | V     | -13.19           | 32.24               | 74.00    | -41.76 |
| 2330.32                  | 39.14            | Ave         | 214              | 1.4        | V     | -13.19           | 25.95               | 54.00    | -28.05 |
| 2376.87                  | 44.24            | PK          | 194              | 1.8        | H     | -13.14           | 31.10               | 74.00    | -42.90 |
| 2376.87                  | 36.42            | Ave         | 194              | 1.8        | H     | -13.14           | 23.28               | 54.00    | -30.72 |
| 2498.96                  | 44.07            | PK          | 116              | 1.5        | V     | -13.08           | 30.99               | 74.00    | -43.01 |
| 2498.96                  | 37.11            | Ave         | 116              | 1.5        | V     | -13.08           | 24.03               | 54.00    | -29.97 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK High Channel 2480MHz |                  |             |                  |            |       |                  |                     |          |        |
| 2319.61                   | 46.15            | PK          | 140              | 1.9        | V     | -13.19           | 32.96               | 74.00    | -41.04 |
| 2319.61                   | 37.99            | Ave         | 140              | 1.9        | V     | -13.19           | 24.80               | 54.00    | -29.20 |
| 2350.41                   | 44.23            | PK          | 254              | 1.1        | H     | -13.14           | 31.09               | 74.00    | -42.91 |
| 2350.41                   | 38.05            | Ave         | 254              | 1.1        | H     | -13.14           | 24.91               | 54.00    | -29.09 |
| 2494.39                   | 44.33            | PK          | 310              | 1.6        | V     | -13.08           | 31.25               | 74.00    | -42.75 |
| 2494.39                   | 37.10            | Ave         | 310              | 1.6        | V     | -13.08           | 24.02               | 54.00    | -29.98 |

**2M**

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Low Channel 2402MHz |                  |             |                  |            |       |                  |                     |          |        |
| 427.14                   | 39.22            | QP          | 162              | 1.9        | H     | -11.88           | 27.34               | 46.00    | -18.66 |
| 427.14                   | 44.56            | QP          | 352              | 1.8        | V     | -11.88           | 32.68               | 46.00    | -13.32 |
| 4804.00                  | 50.59            | PK          | 344              | 2.0        | V     | -1.06            | 49.53               | 74.00    | -24.47 |
| 4804.00                  | 40.13            | Ave         | 344              | 2.0        | V     | -1.06            | 39.07               | 54.00    | -14.93 |
| 7206.00                  | 51.24            | PK          | 159              | 1.7        | H     | 1.33             | 52.57               | 74.00    | -21.43 |
| 7206.00                  | 38.64            | Ave         | 159              | 1.7        | H     | 1.33             | 39.97               | 54.00    | -14.03 |

| Frequency                   | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|-----------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                             |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                       | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Middle Channel 2440MHz |                  |             |                  |            |       |                  |                     |          |        |
| 427.14                      | 40.25            | QP          | 185              | 1.4        | H     | -13.35           | 26.90               | 46.00    | -19.10 |
| 427.14                      | 45.55            | QP          | 142              | 2.0        | V     | -13.35           | 32.20               | 46.00    | -13.80 |
| 4880.00                     | 49.72            | PK          | 231              | 1.0        | V     | -0.62            | 49.10               | 74.00    | -24.90 |
| 4880.00                     | 40.84            | Ave         | 231              | 1.0        | V     | -0.62            | 40.22               | 54.00    | -13.78 |
| 7320.00                     | 51.97            | PK          | 13               | 1.9        | H     | 2.21             | 54.18               | 74.00    | -19.82 |
| 7320.00                     | 38.55            | Ave         | 13               | 1.9        | H     | 2.21             | 40.76               | 54.00    | -13.24 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK High Channel 2480MHz |                  |             |                  |            |       |                  |                     |          |        |
| 427.14                    | 41.65            | QP          | 58               | 1.6        | H     | -13.35           | 28.30               | 46.00    | -17.70 |
| 427.14                    | 46.23            | QP          | 244              | 1.7        | V     | -13.35           | 32.88               | 46.00    | -13.12 |
| 4960.00                   | 50.01            | PK          | 146              | 1.6        | V     | -0.24            | 49.77               | 74.00    | -24.23 |
| 4960.00                   | 41.51            | Ave         | 146              | 1.6        | V     | -0.24            | 41.27               | 54.00    | -12.73 |
| 7440.00                   | 51.41            | PK          | 147              | 1.9        | H     | 2.84             | 54.25               | 74.00    | -19.75 |
| 7440.00                   | 40.92            | Ave         | 147              | 1.9        | H     | 2.84             | 43.76               | 54.00    | -10.24 |

**Radiated Restricted Band Emission**

| Frequency                | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|--------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                          |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                    | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK Low Channel 2402MHz |                  |             |                  |            |       |                  |                     |          |        |
| 2312.25                  | 45.66            | PK          | 325              | 1.4        | V     | -13.19           | 32.47               | 74.00    | -41.53 |
| 2312.25                  | 38.81            | Ave         | 325              | 1.4        | V     | -13.19           | 25.62               | 54.00    | -28.38 |
| 2383.25                  | 43.34            | PK          | 51               | 1.6        | H     | -13.14           | 30.20               | 74.00    | -43.80 |
| 2383.25                  | 37.96            | Ave         | 51               | 1.6        | H     | -13.14           | 24.82               | 54.00    | -29.18 |
| 2494.70                  | 43.16            | PK          | 221              | 2.0        | V     | -13.08           | 30.08               | 74.00    | -43.92 |
| 2494.70                  | 36.39            | Ave         | 221              | 2.0        | V     | -13.08           | 23.31               | 54.00    | -30.69 |

| Frequency                 | Receiver Reading | Detector    | Turn table Angle | RX Antenna |       | Corrected Factor | Corrected Amplitude | Limit    | Margin |
|---------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------|--------|
|                           |                  |             |                  | Height     | Polar |                  |                     |          |        |
| (MHz)                     | (dBμV)           | (PK/QP/Ave) | Degree           | (m)        | (H/V) | (dB)             | (dBμV/m)            | (dBμV/m) | (dB)   |
| GFSK High Channel 2480MHz |                  |             |                  |            |       |                  |                     |          |        |
| 2346.63                   | 46.14            | PK          | 155              | 1.2        | V     | -13.19           | 32.95               | 74.00    | -41.05 |
| 2346.63                   | 37.73            | Ave         | 155              | 1.2        | V     | -13.19           | 24.54               | 54.00    | -29.46 |
| 2381.99                   | 42.28            | PK          | 285              | 1.2        | H     | -13.14           | 29.14               | 74.00    | -44.86 |
| 2381.99                   | 36.20            | Ave         | 285              | 1.2        | H     | -13.14           | 23.06               | 54.00    | -30.94 |
| 2489.19                   | 44.53            | PK          | 53               | 1.4        | V     | -13.08           | 31.45               | 74.00    | -42.55 |
| 2489.19                   | 36.37            | Ave         | 53               | 1.4        | V     | -13.08           | 23.29               | 54.00    | -30.71 |

**Test Frequency: 8GHz~25GHz**

The measurements were more than 20 dB below the limit and not reported.

## 10 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;  
ANSI C63.10:2013

Test Result: PASS

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, 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) (see Section 15.205(c)).

### 10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer:

Below 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

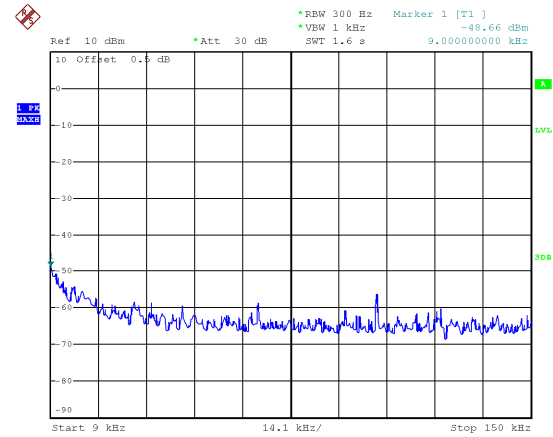
Detector function = peak, Trace = max hold

10.2 Test Result

1M

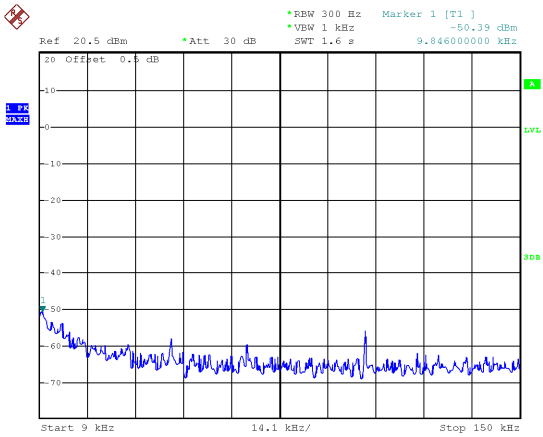
9kHz – 150kHz

Mode: channel 0



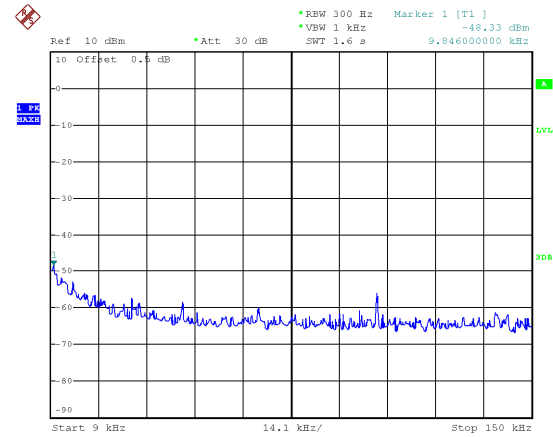
Date: 4.NOV.2024 16:51:22

Mode: channel 19



Date: 4.NOV.2024 16:54:42

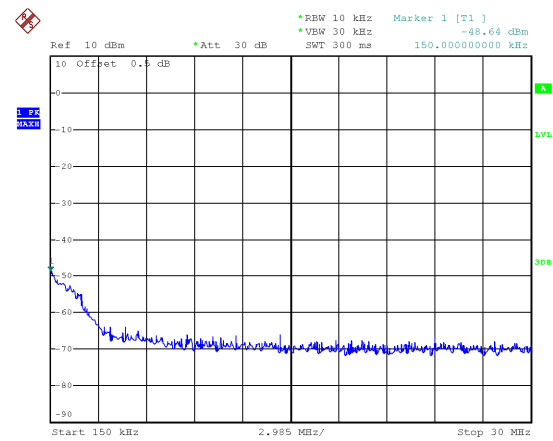
Mode: channel 39



Date: 4.NOV.2024 17:02:16

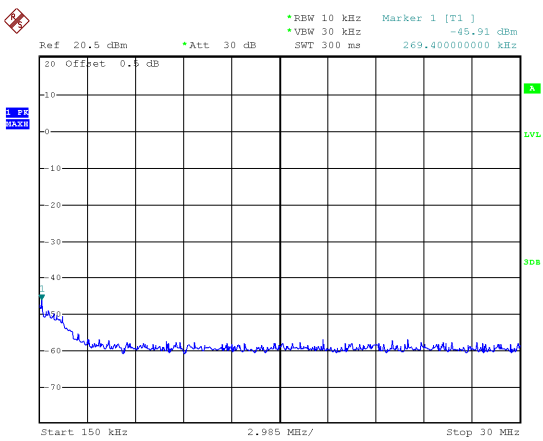
150kHz – 30MHz

Mode: channel 0



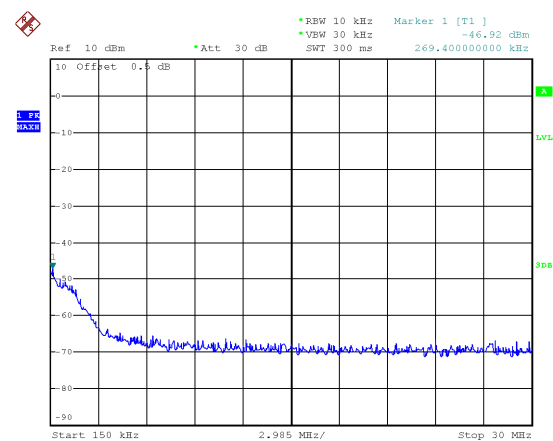
Date: 4.NOV.2024 16:51:42

Mode: channel 19



Date: 4.NOV.2024 16:55:28

Mode: channel 39

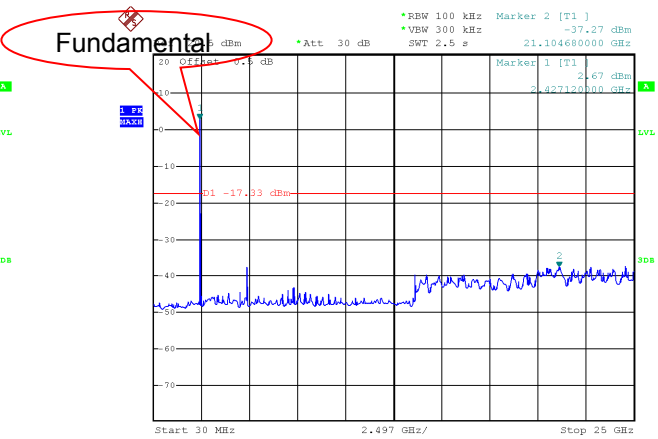
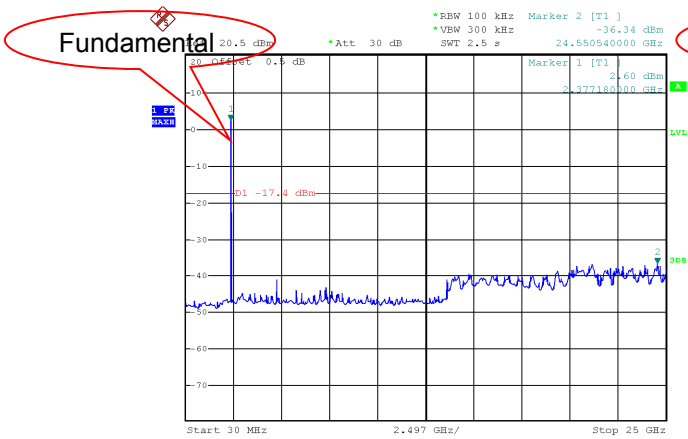


Date: 4.NOV.2024 17:02:38

Above 30MHz

Mode: channel 0

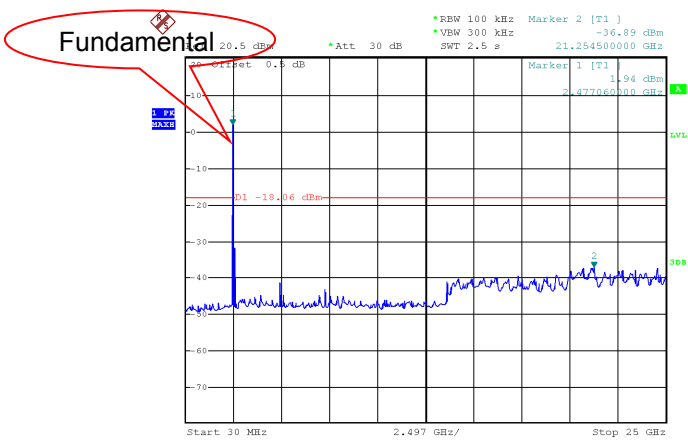
Mode: channel 19



Date: 4.NOV.2024 16:53:22

Date: 4.NOV.2024 16:59:30

Mode: channel 39

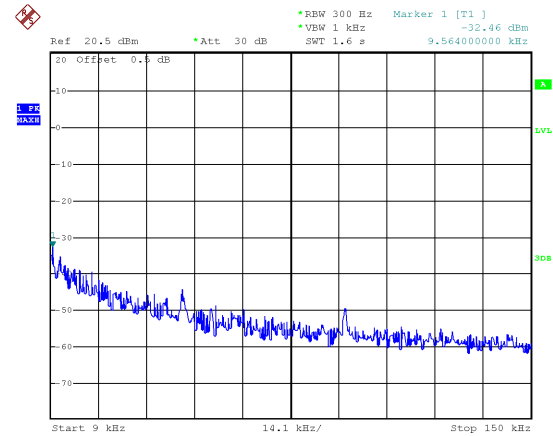


Date: 4.NOV.2024 17:03:29

2M

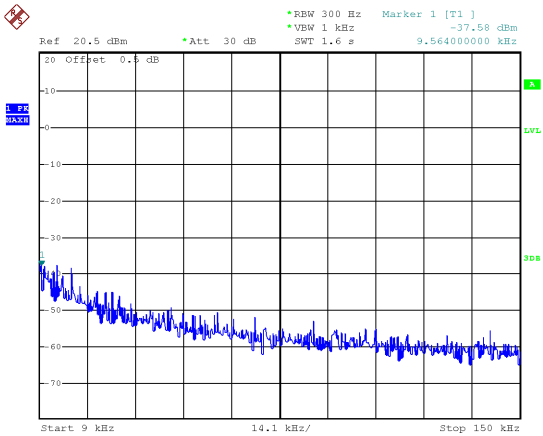
9kHz – 150kHz

Mode: channel 0



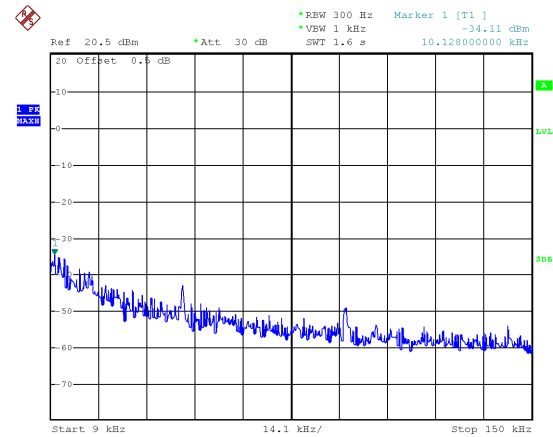
Date: 5.NOV.2024 08:51:26

Mode: channel 19



Date: 5.NOV.2024 08:53:53

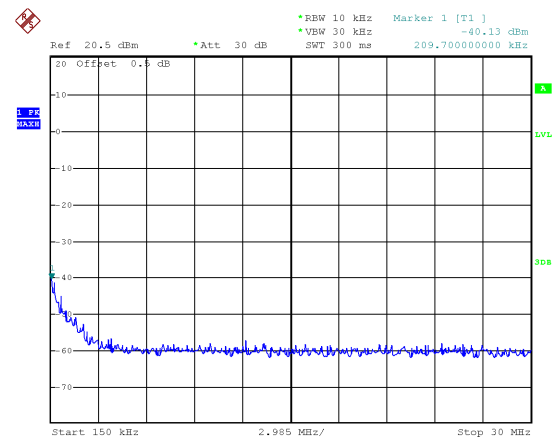
Mode: channel 39



Date: 5.NOV.2024 08:57:42

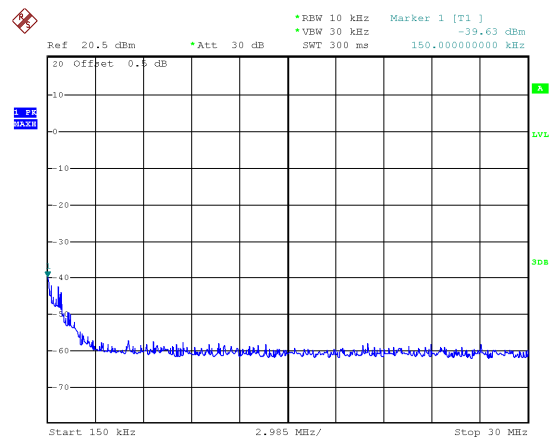
150kHz – 30MHz

Mode: channel 0



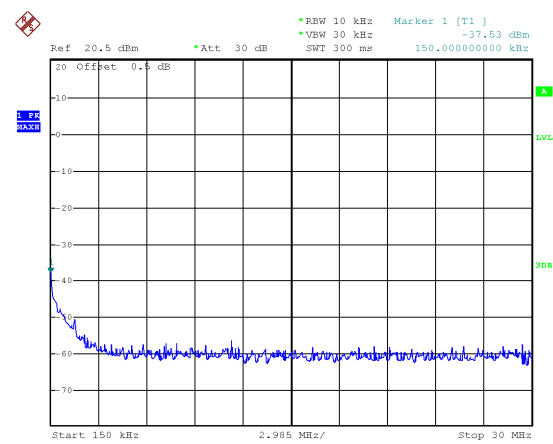
Date: 5.NOV.2024 08:51:46

Mode: channel 19



Date: 5.NOV.2024 08:54:11

Mode: channel 39

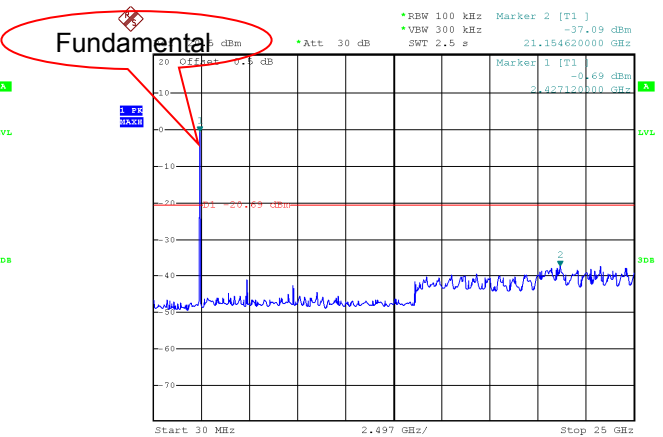
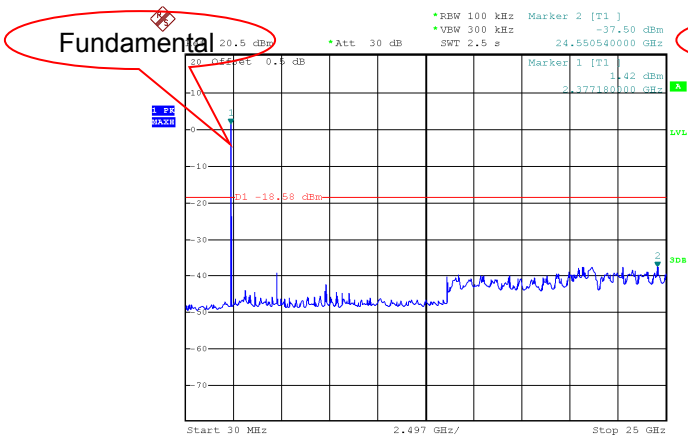


Date: 5.NOV.2024 08:58:00

Above 30MHz

Mode: channel 0

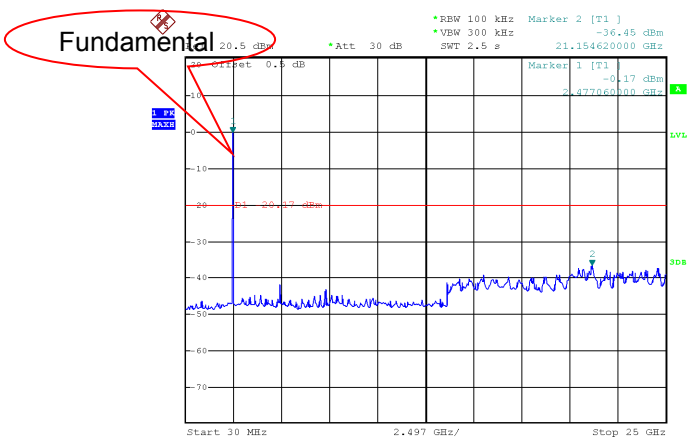
Mode: channel 19



Date: 5.NOV.2024 08:52:23

Date: 5.NOV.2024 08:54:49

Mode: channel 39



Date: 5.NOV.2024 08:59:03

## 11 Band Edge Measurement

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Test Method:      | KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019<br>Regulation 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the |
| Test Limit:       | transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).                                                                        |
| Test Mode:        | Transmitting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### 11.1 Test Produce

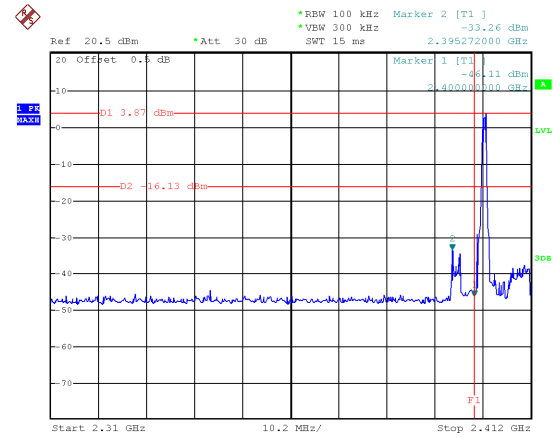
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.2 Test Result

Test result plots shown as follows:

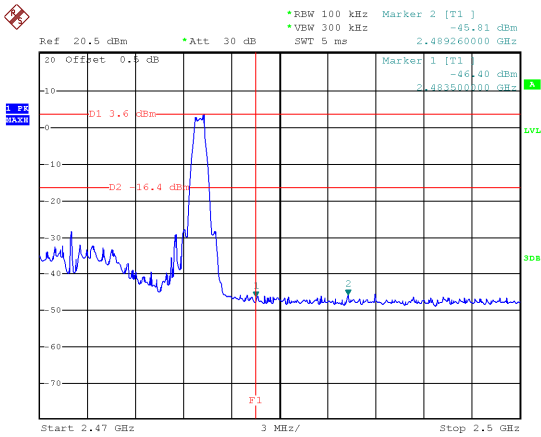
1M

BLE: Band edge-left side



Date: 4.NOV.2024 16:45:23

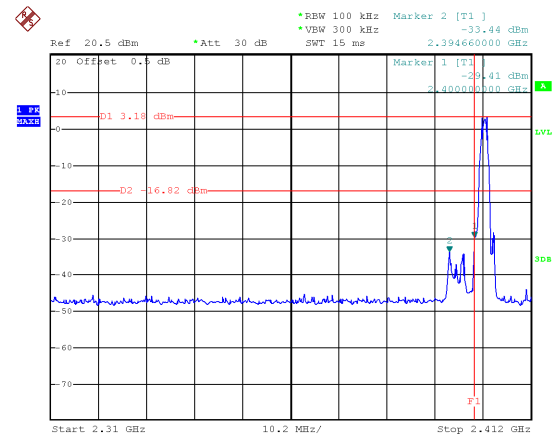
BLE: Band edge-right side



Date: 4.NOV.2024 16:43:15

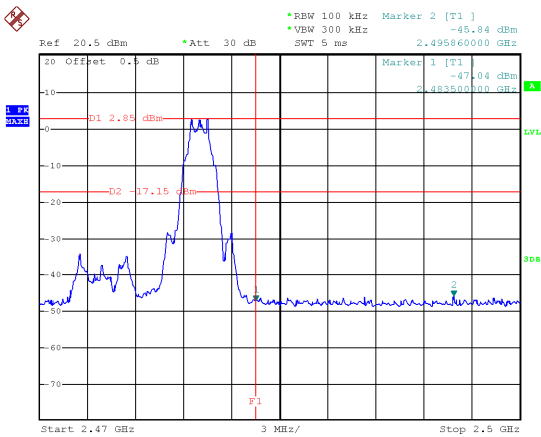
2M

BLE: Band edge-left side



Date: 4.NOV.2024 17:25:43

BLE: Band edge-right side



Date: 4.NOV.2024 17:27:17

## 12 6 dB Bandwidth Measurement

Test Requirement: FCC 47CFR Part 15 Section 15.247  
 Test Method: ANSI C63.10:2013  
 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019  
 Test Limit: §15.247(a)(2)  
 Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.  
 Test Mode: Transmitting

### 12.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

### 12.2 Test Result

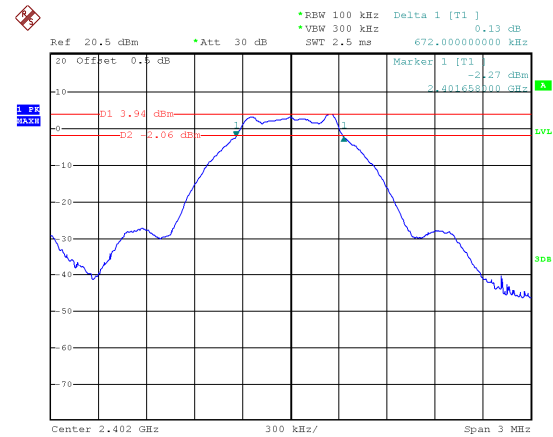
| Operation mode | Test Channel | 6dB Bandwidth (MHz) |
|----------------|--------------|---------------------|
| BLE 1M         | Channel 0    | 0.672               |
|                | Channel 19   | 0.660               |
|                | Channel 39   | 0.660               |
| BLE 2M         | Channel 0    | 1.188               |
|                | Channel 19   | 1.236               |
|                | Channel 39   | 1.188               |

Note: please refer to next page for test plot.

Test result plot:

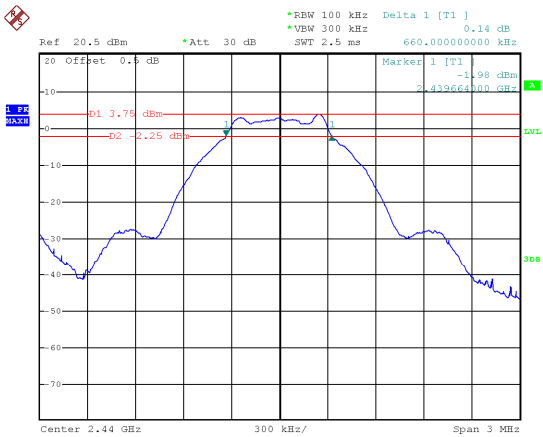
1M

Mode: TX GFSK channel 0



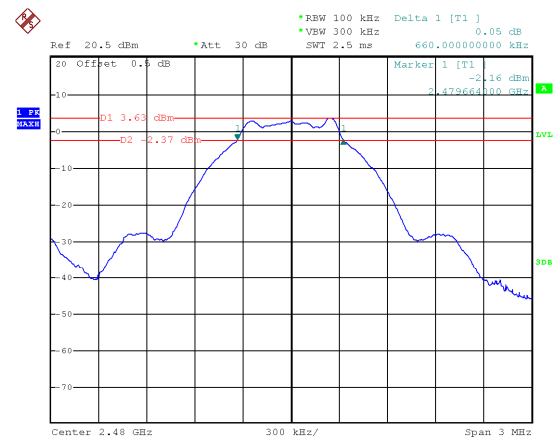
Date: 4.NOV.2024 16:37:59

Mode: TX GFSK channel 19



Date: 4.NOV.2024 16:39:05

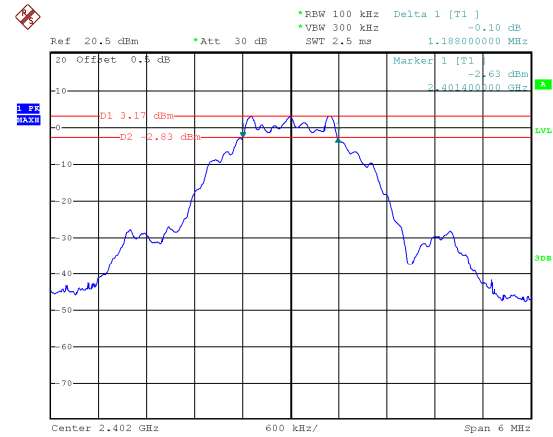
Mode: TX GFSK channel 39



Date: 4.NOV.2024 16:41:44

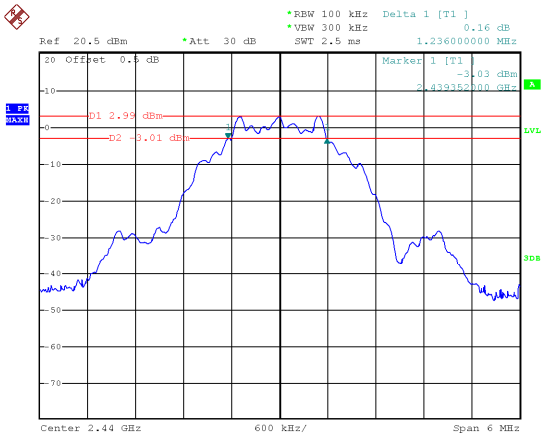
2M

Mode: TX GFSK channel 0



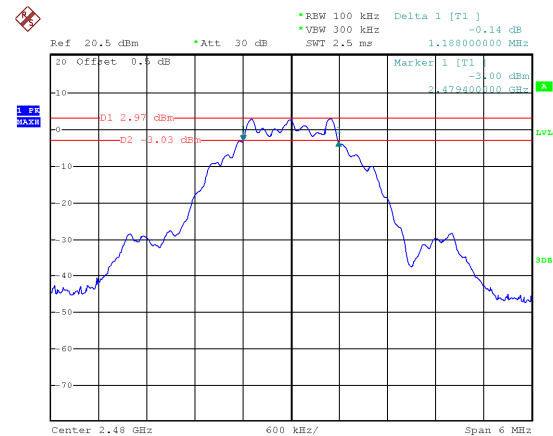
Date: 4.NOV.2024 17:15:13

Mode: TX GFSK channel 19



Date: 4.NOV.2024 17:16:40

Mode: TX GFSK channel 39



Date: 4.NOV.2024 17:19:31

## 13 Maximum Peak Output Power

|                   |                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247                                                                       |
| Test Method:      | ANSI C63.10:2013<br>KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019                          |
| Test Limit:       | §15.247(b)<br>The maximum peak conducted output power of the intentional radiator shall not exceed 1W. |
| Test Mode:        | Transmitting                                                                                           |

### 13.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

#### Section 8.3.1.1 RBW $\geq$ DTS bandwidth

Subclause 11.9.1.1 of ANSI C63.10 is applicable.

#### Section 8.3.1.2 Integrated band power method

For measuring the output power of a device transmitting a wide-band noise-like signal where the peak power amplitude is a statistical parameter, the preferred methodology is to use an integrated average power measurement, as described in 8.3.2. The peak integrated band power method of 11.9.1 in ANSI C63.10 is not applicable.

Subclause 11.9.2 of ANSI C63.10 is applicable.

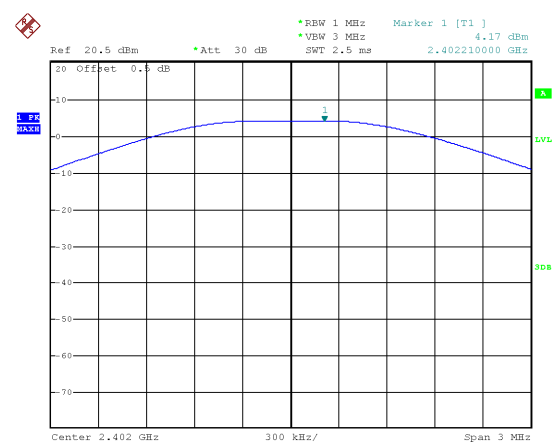
### 13.2 Test Result

| Operation mode | Channel Frequency (MHz) | Maximum Peak Output Power (dBm) | Limit    |
|----------------|-------------------------|---------------------------------|----------|
| BLE 1M         | Low-2402                | 4.17                            | 1W/30dBm |
|                | Middle-2440             | <b>4.23</b>                     | 1W/30dBm |
|                | High-2480               | 3.82                            | 1W/30dBm |
| BLE 2M         | Low-2402                | <b>4.43</b>                     | 1W/30dBm |
|                | Middle-2440             | 4.40                            | 1W/30dBm |
|                | High-2480               | 4.18                            | 1W/30dBm |

Test Plot

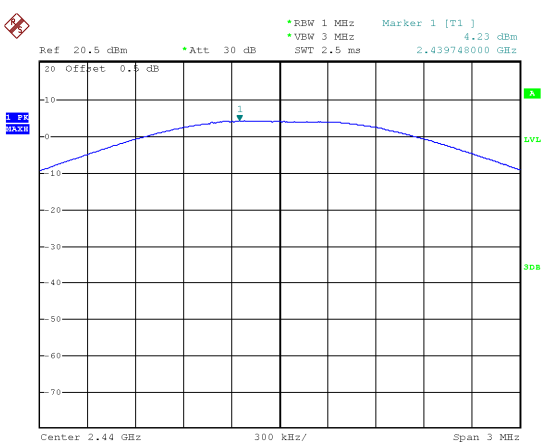
1M

Mode: TX GFSK channel 0



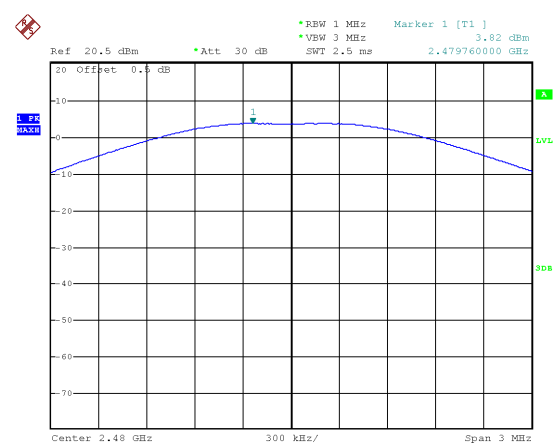
Date: 4.NOV.2024 16:32:07

Mode: TX GFSK channel 19



Date: 4.NOV.2024 16:32:38

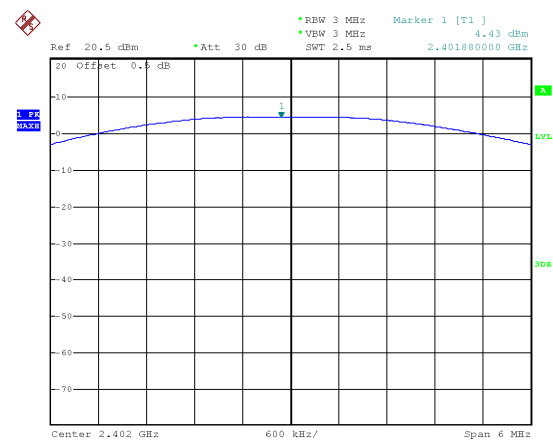
Mode: TX GFSK channel 39



Date: 4.NOV.2024 16:33:02

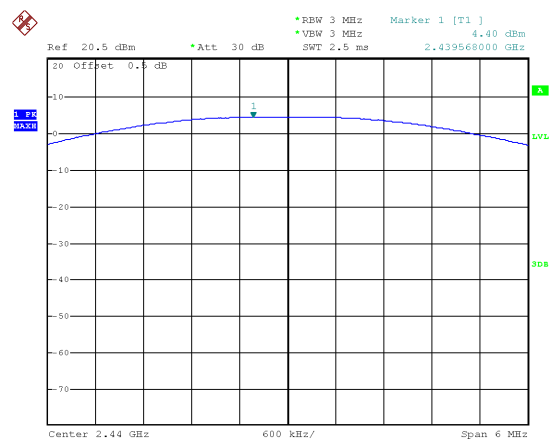
2M

Mode: TX GFSK channel 0



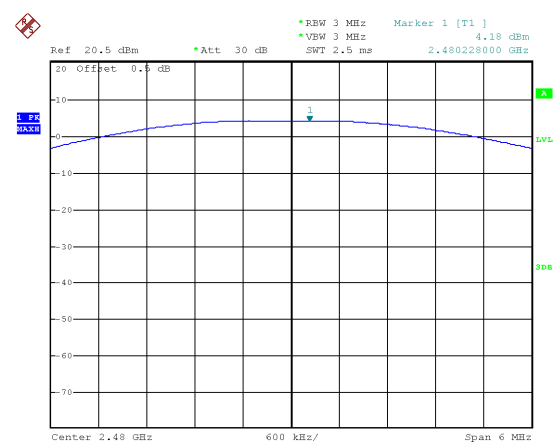
Date: 4.NOV.2024 17:04:37

Mode: TX GFSK channel 19



Date: 4.NOV.2024 17:07:32

Mode: TX GFSK channel 39



Date: 4.NOV.2024 17:07:55

## 14 Power Spectral density

|                   |                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247                                                                                                                                                                                                        |
| Test Method:      | ANSI C63.10:2013<br>KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019                                                                                                                                                           |
| Test Limit:       | §15.247(e)<br>For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. |
| Test Mode:        | Transmitting                                                                                                                                                                                                                            |

### 14.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 8.4

**Subclause 11.10 of ANSI C63.10 is applicable.**

Choose the test procedure according to the product type

#### Peak PSD

Subclause 11.10.2 of ANSI C63.10 is applicable.

#### AVG PSD

Subclause 11.10.3/4/5/6/7/8 of ANSI C63.10 is applicable.

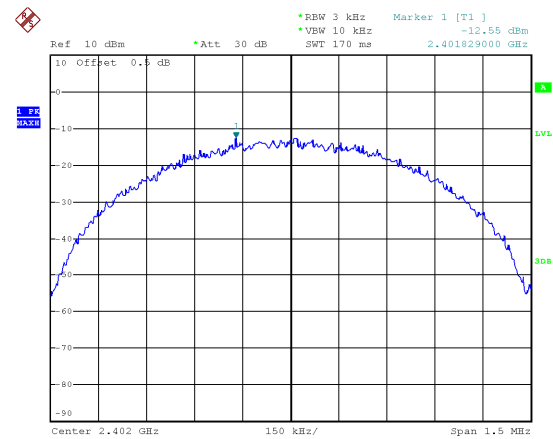
### 14.2 Test Result

| Operation mode | Channel Frequency (MHz) | Power Spectral (dBm per 3kHz) | Limit         |
|----------------|-------------------------|-------------------------------|---------------|
| BLE 1M         | Low-2402                | -12.55                        | 8dBm per 3kHz |
|                | Middle-2440             | -12.67                        | 8dBm per 3kHz |
|                | High-2480               | -13.04                        | 8dBm per 3kHz |
| BLE 2M         | Low-2402                | -15.48                        | 8dBm per 3kHz |
|                | Middle-2440             | -15.66                        | 8dBm per 3kHz |
|                | High-2480               | -15.75                        | 8dBm per 3kHz |

Test Plot

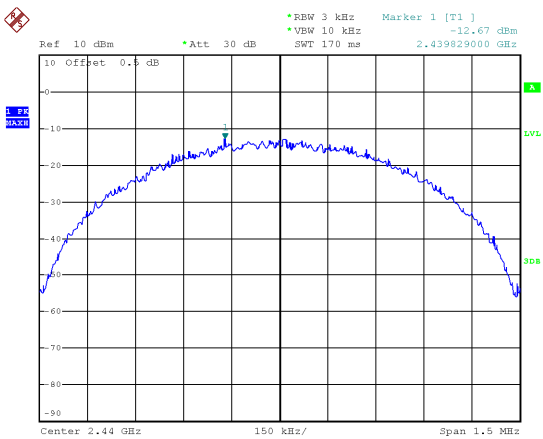
1M

Mode: TX GFSK channel 0



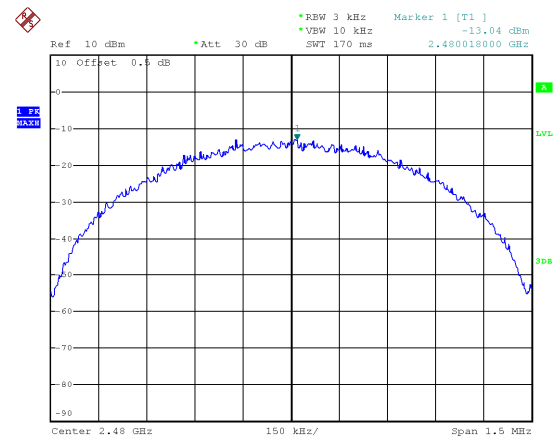
Date: 4.NOV.2024 16:48:08

Mode: TX GFSK channel 19



Date: 4.NOV.2024 16:48:46

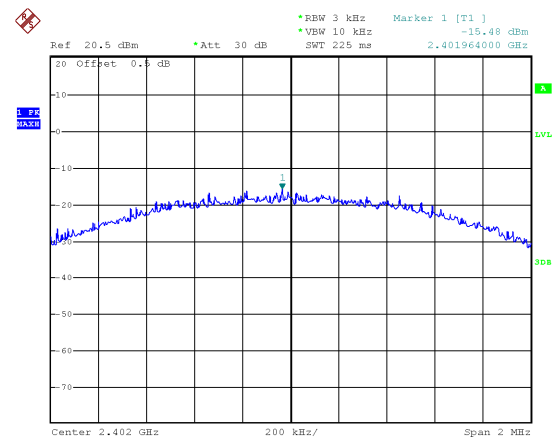
Mode: TX GFSK channel 39



Date: 4.NOV.2024 16:49:16

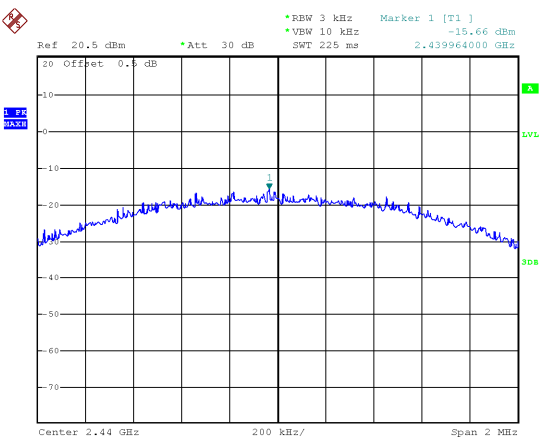
2M

Mode: TX GFSK channel 0



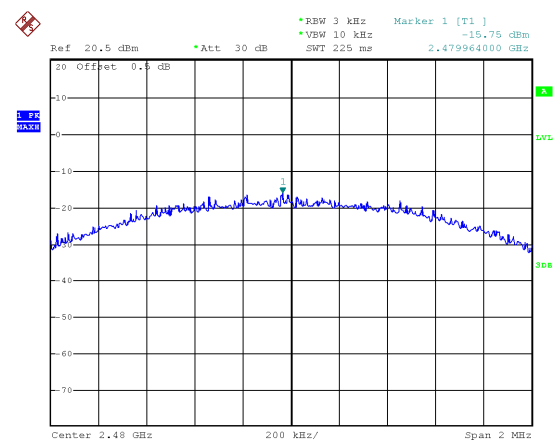
Date: 4.NOV.2024 17:21:16

Mode: TX GFSK channel 19



Date: 4.NOV.2024 17:20:49

Mode: TX GFSK channel 39



Date: 4.NOV.2024 17:20:25

## **15 Antenna Requirement**

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has an integrated antenna fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

## **16 RF Exposure**

Remark: Please refer to SAR test report: WTD24D10248251W005.

## **17 Photographs of test setup and EUT.**

Note: Please refer to appendix: Appendix-F81-Photos.

=====End of Report=====