

|                                 |                               |
|---------------------------------|-------------------------------|
| Product Name: Notebook Computer | Report No: FCC022023-0679RF6  |
| Product Model: IPASON P3        | Security Classification: Open |
| Version: V1.0                   | Total Page: 74                |

# TIRT Testing Report



| Prepared By: | Checked By: | Approved By: |  |
|--------------|-------------|--------------|---------------------------------------------------------------------------------------|
| Stone Tang   | Randy Lv    | Daniel Chen  |                                                                                       |
| Stone Tang   | Randy Lv    | Daniel Chen  |                                                                                       |

# FCC Radio Test Report

## FCC ID: 2ATY8-IPASONP3

This report concerns: Original Grant

**Equipment** : Notebook Computer  
**Brand Name** : **IPASON**  
**Test Model** : IPASON P3  
**Series Model** : N/A  
**Applicant** : Wuhan Iason Technology Co., Ltd  
**Address** : 5th Floor, Multifunctional Building, No. 1, Iason Avenue, Shekou Street, Huangpi District, Wuhan City, Hubei Province, China  
**Manufacturer** : Wuhan Iason Technology Co., Ltd  
**Address** : 5th Floor, Multifunctional Building, No. 1, Iason Avenue, Shekou Street, Huangpi District, Wuhan City, Hubei Province, China  
**Date of Receipt** : Mar. 01, 2023  
**Date of Test** : Mar. 01, 2023~ Mar. 16, 2023  
**Issued Date** : Apr. 06, 2023  
**Report Version** : V1.0  
**Test Sample** : Engineering Sample No.: 20230227002812  
**Standard(s)** : FCC CFR Title 47, Part 15, Subpart C  
FCC KDB 558074 D01 15.247 Meas Guidance v05r02  
ANSI C63.10-2013

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen

Add: 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan

District, Shenzhen, China

TEL: +86-0755-27087573

| <b>Table of Contents</b>                                     | <b>Page</b> |
|--------------------------------------------------------------|-------------|
| <b>REPORT ISSUED HISTORY</b>                                 | <b>6</b>    |
| <b>1 . SUMMARY OF TEST RESULTS</b>                           | <b>7</b>    |
| 1.1 TEST FACILITY                                            | 8           |
| 1.2 MEASUREMENT UNCERTAINTY                                  | 8           |
| 1.3 TEST ENVIRONMENT CONDITIONS                              | 9           |
| <b>2 . GENERAL INFORMATION</b>                               | <b>10</b>   |
| 2.1 GENERAL DESCRIPTION OF EUT                               | 10          |
| 2.2 DESCRIPTION OF TEST MODES                                | 12          |
| 2.3 PARAMETERS OF TEST SOFTWARE                              | 13          |
| 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED | 14          |
| 2.5 SUPPORT UNITS                                            | 14          |
| <b>3 . AC POWER LINE CONDUCTED EMISSIONS</b>                 | <b>15</b>   |
| 3.1 LIMIT                                                    | 15          |
| 3.2 TEST PROCEDURE                                           | 15          |
| 3.3 DEVIATION FROM TEST STANDARD                             | 15          |
| 3.4 TEST SETUP                                               | 16          |
| 3.5 EUT OPERATING CONDITIONS                                 | 16          |
| 3.6 TEST RESULTS                                             | 16          |
| <b>4 . RADIATED EMISSIONS</b>                                | <b>17</b>   |
| 4.1 LIMIT                                                    | 17          |
| 4.2 TEST PROCEDURE                                           | 18          |
| 4.3 DEVIATION FROM TEST STANDARD                             | 19          |
| 4.4 TEST SETUP                                               | 19          |
| 4.5 EUT OPERATING CONDITIONS                                 | 21          |
| 4.6 TEST RESULTS - 9 KHZ TO 30 MHZ                           | 21          |
| 4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ                        | 21          |
| 4.8 TEST RESULTS - ABOVE 1000 MHZ                            | 21          |
| <b>5 . NUMBER OF HOPPING FREQUENCY</b>                       | <b>22</b>   |
| 5.1 LIMIT                                                    | 22          |
| 5.2 TEST PROCEDURE                                           | 22          |
| 5.3 DEVIATION FROM STANDARD                                  | 22          |
| 5.4 TEST SETUP                                               | 22          |
| 5.5 EUT OPERATION CONDITIONS                                 | 22          |

| <b>Table of Contents</b>                | <b>Page</b> |
|-----------------------------------------|-------------|
| 5.6 TEST RESULTS                        | 22          |
| <b>6 . AVERAGE TIME OF OCCUPANCY</b>    | <b>23</b>   |
| 6.1 LIMIT                               | 23          |
| 6.2 TEST PROCEDURE                      | 23          |
| 6.3 DEVIATION FROM STANDARD             | 23          |
| 6.4 TEST SETUP                          | 23          |
| 6.5 EUT OPERATION CONDITIONS            | 23          |
| 6.6 TEST RESULTS                        | 23          |
| <b>7 . HOPPING CHANNEL SEPARATION</b>   | <b>24</b>   |
| 7.1 LIMIT                               | 24          |
| 7.2 TEST PROCEDURE                      | 24          |
| 7.3 DEVIATION FROM STANDARD             | 24          |
| 7.4 TEST SETUP                          | 24          |
| 7.5 EUT OPERATION CONDITIONS            | 24          |
| 7.6 TEST RESULTS                        | 24          |
| <b>8 . BANDWIDTH</b>                    | <b>25</b>   |
| 8.1 LIMIT                               | 25          |
| 8.2 TEST PROCEDURE                      | 25          |
| 8.3 DEVIATION FROM STANDARD             | 25          |
| 8.4 TEST SETUP                          | 25          |
| 8.5 EUT OPERATION CONDITIONS            | 25          |
| 8.6 TEST RESULTS                        | 25          |
| <b>9 . MAXIMUM OUTPUT POWER</b>         | <b>26</b>   |
| 9.1 LIMIT                               | 26          |
| 9.2 TEST PROCEDURE                      | 26          |
| 9.3 DEVIATION FROM STANDARD             | 26          |
| 9.4 TEST SETUP                          | 26          |
| 9.5 EUT OPERATION CONDITIONS            | 26          |
| 9.6 TEST RESULTS                        | 26          |
| <b>10 . CONDUCTED SPURIOUS EMISSION</b> | <b>27</b>   |
| 10.1 LIMIT                              | 27          |
| 10.2 TEST PROCEDURE                     | 27          |
| 10.3 DEVIATION FROM STANDARD            | 27          |
| 10.4 TEST SETUP                         | 27          |

| <b>Table of Contents</b>                            | <b>Page</b> |
|-----------------------------------------------------|-------------|
| 10.5 EUT OPERATION CONDITIONS                       | 27          |
| 10.6 TEST RESULTS                                   | 27          |
| 11 . MEASUREMENT INSTRUMENTS LIST                   | 28          |
| 12 . EUT TEST PHOTO                                 | 30          |
| APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS      | 32          |
| APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ    | 34          |
| APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ | 35          |
| APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ     | 37          |
| APPENDIX E - NUMBER OF HOPPING FREQUENCY            | 46          |
| APPENDIX F - AVERAGE TIME OF OCCUPANCY              | 48          |
| APPENDIX G - HOPPING CHANNEL SEPARATION             | 52          |
| APPENDIX H - BANDWIDTH                              | 54          |
| APPENDIX I - MAXIMUM OUTPUT POWER                   | 62          |
| APPENDIX J - CONDUCTED SPURIOUS EMISSION            | 66          |
| APPENDIX K - DECLARATION FOR BLUETOOTH DEVICE       | 73          |

**REPORT ISSUED HISTORY**

| Report No.        | Version | Description      | Issued Date   | Note  |
|-------------------|---------|------------------|---------------|-------|
| FCC022023-0679RF6 | V1.0    | Original Report. | Apr. 06, 2023 | Valid |

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC CFR Title 47, Part 15, Subpart C |                                   |                                        |          |         |
|--------------------------------------|-----------------------------------|----------------------------------------|----------|---------|
| Standard(s) Section                  | Test Item                         | Test Result                            | Judgment | Remark  |
| 15.207                               | AC Power Line Conducted Emissions | APPENDIX A                             | PASS     | -----   |
| 15.247(d)<br>15.205(a)<br>15.209(a)  | Radiated Emission                 | APPENDIX B<br>APPENDIX C<br>APPENDIX D | PASS     | -----   |
| 15.247<br>(a)(1)(iii)                | Number of Hopping Frequency       | APPENDIX E                             | PASS     | -----   |
| 15.247<br>(a)(1)(iii)                | Average Time of Occupancy         | APPENDIX F                             | PASS     | -----   |
| 15.247(a)(1)                         | Hopping Channel Separation        | APPENDIX G                             | PASS     | -----   |
| 15.247(a)(1)                         | Bandwidth                         | APPENDIX H                             | PASS     | -----   |
| 15.247(a)(1)                         | Maximum Output Power              | APPENDIX I                             | PASS     | -----   |
| 15.247(d)                            | Conducted Spurious Emission       | APPENDIX J                             | PASS     | -----   |
| 15.203                               | Antenna Requirement               | -----                                  | PASS     | Note(2) |

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

## 1.1 TEST FACILITY

|                                         |                                                                                                                    |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Company:                                | Beijing TIRT Technology Service Co.,Ltd Shenzhen                                                                   |
| Address:                                | 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China |
| CNAS Registration Number:               | CNAS L14158                                                                                                        |
| A2LA Registration Number:               | 6049.01                                                                                                            |
| FCC Accredited Lab. Designation Number: | CN1309                                                                                                             |
| FCC Test Firm Registration Number:      | 825524                                                                                                             |
| Telephone:                              | +86-0755-27087573                                                                                                  |

## 1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))  
The BTL measurement uncertainty as below table:

| Uncertainty                                 |             |
|---------------------------------------------|-------------|
| Parameter                                   | Uncertainty |
| Occupied Channel Bandwidth                  | ±142.12 KHz |
| RF power conducted                          | ±0.74 dB    |
| RF power radiated                           | ±3.25dB     |
| Spurious emissions, conducted               | ±1.78dB     |
| Spurious emissions, radiated (30MHz~1GHz)   | ±4.6dB      |
| Spurious emissions, radiated (1GHz ~ 18GHz) | ±4.9dB      |
| Conduction Emissions(150kHz~30MHz)          | ±3.1 dB     |
| Humidity                                    | ±4.6%       |
| Temperature                                 | ±0.7°C      |
| Time                                        | ±1.25%      |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

### 1.3 TEST ENVIRONMENT CONDITIONS

| Test Item                             | Temperature | Humidity | Test Voltage    | Tested By  |
|---------------------------------------|-------------|----------|-----------------|------------|
| AC Power Line Conducted Emissions     | 25°C        | 53%      | AC<br>120V/60Hz | Stone Tang |
| Radiated Emissions-9 kHz to 30 MHz    | 24°C        | 51%      | AC<br>120V/60Hz | Stone Tang |
| Radiated Emissions-30 MHz to 1000 MHz | 24°C        | 51%      | AC<br>120V/60Hz | Stone Tang |
| Radiated Emissions-Above 1000 MHz     | 24°C        | 51%      | AC<br>120V/60Hz | Stone Tang |
| Bandwidth                             | 25°C        | 65%      | AC<br>120V/60Hz | Stone Tang |
| Maximum Output Power                  | 23°C        | 60%      | AC<br>120V/60Hz | Stone Tang |
| Conducted Spurious Emission           | 24.5°C      | 58%      | AC<br>120V/60Hz | Stone Tang |
| Power Spectral Density                | 26°C        | 52%      | AC<br>120V/60Hz | Stone Tang |

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                         |                                         |
|-------------------------|-----------------------------------------|
| Equipment               | Notebook Computer                       |
| Brand Name              | <b>IPASON</b>                           |
| Test Model              | IPASON P3                               |
| Series Model            | N/A                                     |
| Model Difference(s)     | N/A                                     |
| Software Version        | 22H2                                    |
| Hardware Version        | 1F943C06                                |
| Power Source            | DC voltage supplied from AC/DC adapter. |
| Power Rating            | DC 20V-2.25A from Adapter               |
| Operation Frequency     | 2402 MHz ~ 2480 MHz                     |
| Modulation Type         | GFSK, $\pi/4$ -DQPSK, 8-DPSK            |
| Bit Rate of Transmitter | 1Mbps, 2Mbps, 3Mbps                     |
| Max. Output Power       | 3Mbps: 6.85 dBm (0.0048W)               |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

## 2. Channel List:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 00      | 2402            | 27      | 2429            | 54      | 2456            |
| 01      | 2403            | 28      | 2430            | 55      | 2457            |
| 02      | 2404            | 29      | 2431            | 56      | 2458            |
| 03      | 2405            | 30      | 2432            | 57      | 2459            |
| 04      | 2406            | 31      | 2433            | 58      | 2460            |
| 05      | 2407            | 32      | 2434            | 59      | 2461            |
| 06      | 2408            | 33      | 2435            | 60      | 2462            |
| 07      | 2409            | 34      | 2436            | 61      | 2463            |
| 08      | 2410            | 35      | 2437            | 62      | 2464            |
| 09      | 2411            | 36      | 2438            | 63      | 2465            |
| 10      | 2412            | 37      | 2439            | 64      | 2466            |
| 11      | 2413            | 38      | 2440            | 65      | 2467            |
| 12      | 2414            | 39      | 2441            | 66      | 2468            |
| 13      | 2415            | 40      | 2442            | 67      | 2469            |
| 14      | 2416            | 41      | 2443            | 68      | 2470            |
| 15      | 2417            | 42      | 2444            | 69      | 2471            |
| 16      | 2418            | 43      | 2445            | 70      | 2472            |
| 17      | 2419            | 44      | 2446            | 71      | 2473            |
| 18      | 2420            | 45      | 2447            | 72      | 2474            |
| 19      | 2421            | 46      | 2448            | 73      | 2475            |
| 20      | 2422            | 47      | 2449            | 74      | 2476            |
| 21      | 2423            | 48      | 2450            | 75      | 2477            |
| 22      | 2424            | 49      | 2451            | 76      | 2478            |
| 23      | 2425            | 50      | 2452            | 77      | 2479            |
| 24      | 2426            | 51      | 2453            | 78      | 2480            |
| 25      | 2427            | 52      | 2454            |         |                 |
| 26      | 2428            | 53      | 2455            |         |                 |

## 3. Table for Filed Antenna:

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|-------|------------|--------------|-----------|------------|
| 1    | N/A   | N/A        | PIFA         | N/A       | 2.7        |

Note:

1. The antenna gain is provided by the manufacturer.
2. The antenna is for testing purposes only.

## 2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

| Pretest Mode | Description                    |
|--------------|--------------------------------|
| Mode 1       | TX Mode_1Mbps Channel 00/39/78 |
| Mode 2       | TX Mode_2Mbps Channel 00/39/78 |
| Mode 3       | TX Mode_3Mbps Channel 00/39/78 |

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

| AC power line conducted emissions test |                          |
|----------------------------------------|--------------------------|
| Final Test Mode                        | Description              |
| Mode 3                                 | TX Mode_3Mbps Channel 00 |

| Radiated emissions test - Below 1GHz |                          |
|--------------------------------------|--------------------------|
| Final Test Mode                      | Description              |
| Mode 3                               | TX Mode_3Mbps Channel 00 |

| Radiated emissions test - Above 1GHz |                                |
|--------------------------------------|--------------------------------|
| Final Test Mode                      | Description                    |
| Mode 1                               | TX Mode_1Mbps Channel 00/39/78 |
| Mode 3                               | TX Mode_3Mbps Channel 00/39/78 |

| Maximum Output Power |                                |
|----------------------|--------------------------------|
| Final Test Mode      | Description                    |
| Mode 1               | TX Mode_1Mbps Channel 00/39/78 |
| Mode 2               | TX Mode_2Mbps Channel 00/39/78 |
| Mode 3               | TX Mode_3Mbps Channel 00/39/78 |

| Other Conducted test |                                |
|----------------------|--------------------------------|
| Final Test Mode      | Description                    |
| Mode 1               | TX Mode_1Mbps Channel 00/39/78 |
| Mode 3               | TX Mode_3Mbps Channel 00/39/78 |

Note:

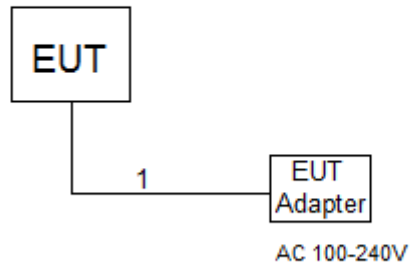
- (1) The measurements for Output Power were tested with DH1/3/5 during 1Mbps, 2Mbps and 3Mbps, the worst case were 1Mbps (DH5) and 3Mbps (DH5), only worst case were documented for other test items except Average Time of Occupancy.
- (2) For radiated emission above 1 GHz test, the spurious points of 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
- (3) This product has the mode of BT AFH, which was considered during testing. 800/20/X(X = 2 of DH1, X = 4 of DH3 or X = 6 of DH5) with 20, 10 or 6.67 hops per second in a channel, and then multiply 0.4\*20 (20 # of hopping). But this mode is not the worst case mode as duration of the packet is same, and this report only shows the worst case mode.
- (4) For AC power line conducted emissions and radiated spurious emissions below 1 GHz test, the 1Mbps Channel 78 are found to be the worst case and recorded.

### 2.3 PARAMETERS OF TEST SOFTWARE

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

| Test Software Version | DRTU_3.0 |         |         |
|-----------------------|----------|---------|---------|
| Frequency (MHz)       | 2402     | 2441    | 2480    |
| 1Mbps                 | default  | default | default |
| 2Mbps                 | default  | default | default |
| 3Mbps                 | default  | default | default |

## 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



## 2.5 SUPPORT UNITS

| Item | Cable Type | Shielded Type | Ferrite Core | Length |
|------|------------|---------------|--------------|--------|
| 1    | N/A        | N/A           | N/A          | N/A    |

### 3. AC POWER LINE CONDUCTED EMISSIONS

#### 3.1 LIMIT

| Frequency of Emission (MHz) | Limit (dBμV) |           |
|-----------------------------|--------------|-----------|
|                             | Quasi-peak   | Average   |
| 0.15 - 0.5                  | 66 to 56*    | 56 to 46* |
| 0.5 - 5.0                   | 56           | 46        |
| 5.0 - 30.0                  | 60           | 50        |

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

#### 3.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

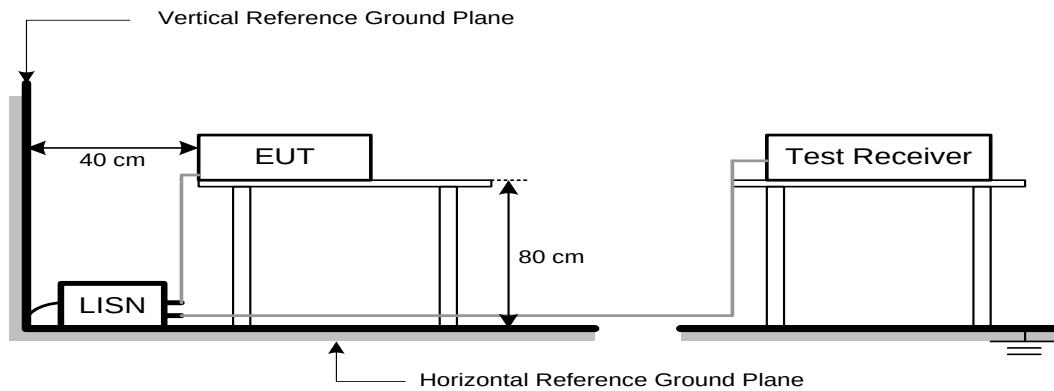
The following table is the setting of the receiver:

| Receiver Parameters | Setting  |
|---------------------|----------|
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

#### 3.3 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4 TEST SETUP



### 3.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting data or hopping on mode.

### 3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a “\*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.

## 4. RADIATED EMISSIONS

### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 0.009-0.490     | 2400/F(kHz)                       | 300                           |
| 0.490-1.705     | 24000/F(kHz)                      | 30                            |
| 1.705-30.0      | 30                                | 30                            |
| 30-88           | 100                               | 3                             |
| 88-216          | 150                               | 3                             |
| 216-960         | 200                               | 3                             |
| Above 960       | 500                               | 3                             |

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

| Frequency (MHz) | (dBuV/m at 3 m) |         |
|-----------------|-----------------|---------|
|                 | Peak            | Average |
| Above 1000      | 74              | 54      |

Note:

- (1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

## 4.2 TEST PROCEDURE

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1 GHz)
- The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.  
(below 1 GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

The following table is the setting of the receiver:

| Spectrum Parameters    | Setting                         |
|------------------------|---------------------------------|
| Start ~ Stop Frequency | 9 kHz~150 kHz for RBW 200 Hz    |
| Start ~ Stop Frequency | 0.15 MHz~30 MHz for RBW 9 kHz   |
| Start ~ Stop Frequency | 30 MHz~1000 MHz for RBW 100 kHz |

| Spectrum Parameters                        | Setting                                                    |
|--------------------------------------------|------------------------------------------------------------|
| Start Frequency                            | 1000 MHz                                                   |
| Stop Frequency                             | 10th carrier harmonic                                      |
| RBW / VBW<br>(Emission in restricted band) | 1 MHz / 3 MHz for PK value<br>1 MHz / 1/T Hz for AVG value |

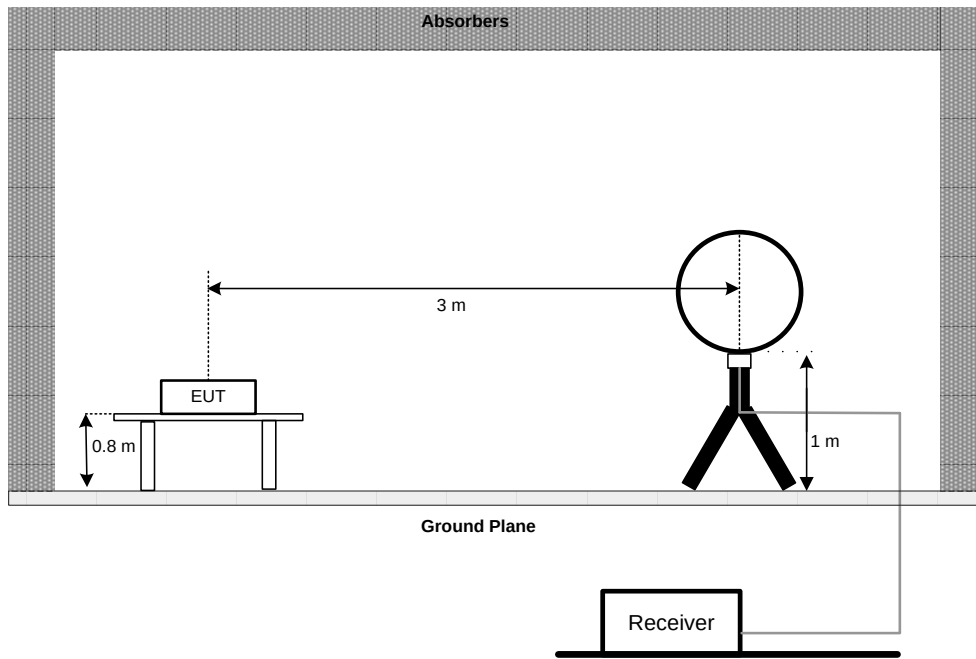
| Spectrum Parameters    | Setting                             |
|------------------------|-------------------------------------|
| Start ~ Stop Frequency | 9 kHz~90 kHz for PK/AVG detector    |
| Start ~ Stop Frequency | 90 kHz~110 kHz for QP detector      |
| Start ~ Stop Frequency | 110 kHz~490 kHz for PK/AVG detector |
| Start ~ Stop Frequency | 490 kHz~30 MHz for QP detector      |
| Start ~ Stop Frequency | 30 MHz~1000 MHz for QP detector     |
| Start ~ Stop Frequency | 1 GHz~26.5 GHz for PK/AVG detector  |

### 4.3 DEVIATION FROM TEST STANDARD

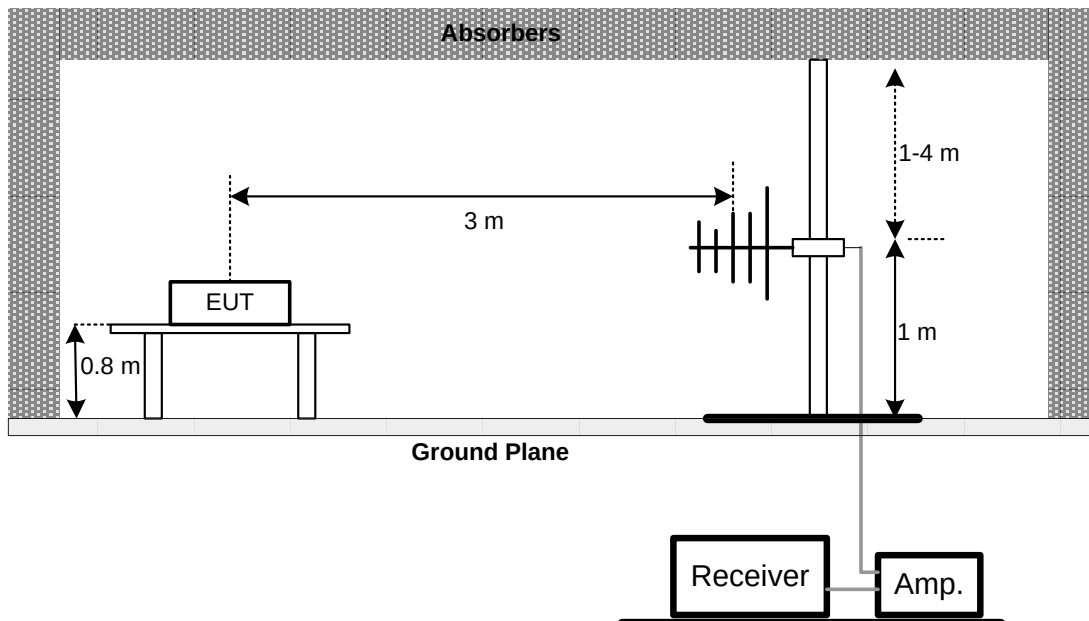
No deviation.

### 4.4 TEST SETUP

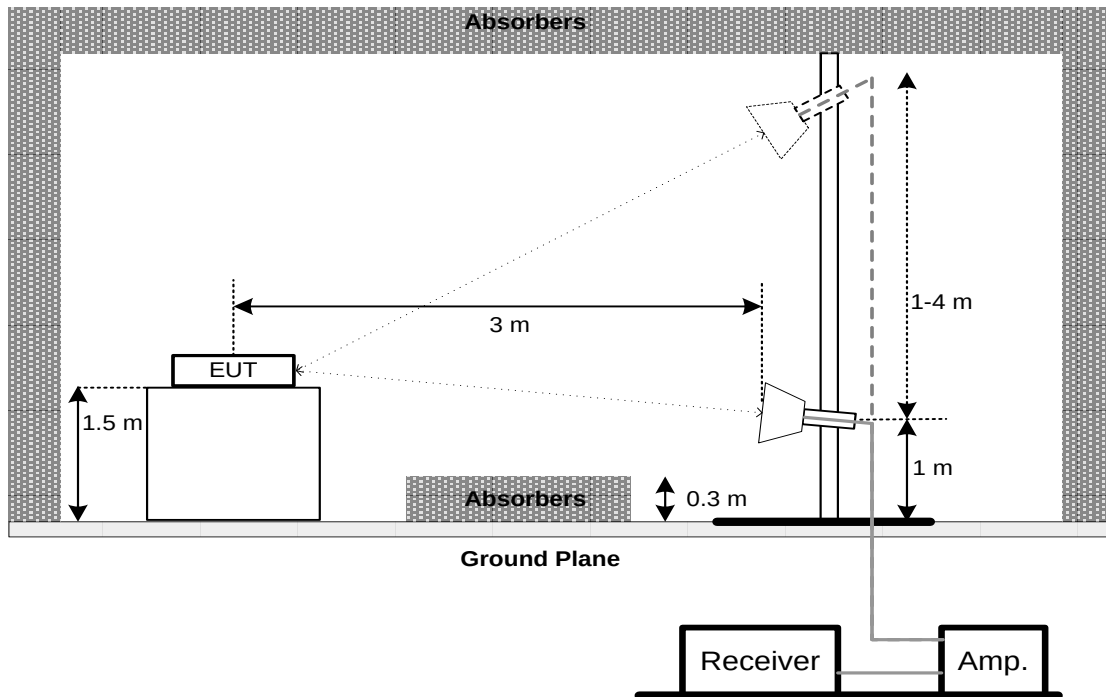
#### 9 kHz to 30 MHz



#### 30 MHz to 1 GHz



# Above 1 GHz



#### 4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 4.6 TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX B.

Remark:

- (1) Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

#### 4.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

#### 4.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. NUMBER OF HOPPING FREQUENCY

### 5.1 LIMIT

| Section               | Test Item                   | Limit |
|-----------------------|-----------------------------|-------|
| FCC 15.247(a)(1)(iii) | Number of Hopping Frequency | 15    |

### 5.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting                     |
|---------------------|-----------------------------|
| Span Frequency      | > Operating Frequency Range |
| RBW                 | 100 kHz                     |
| VBW                 | 100 kHz                     |
| Detector            | Peak                        |
| Trace               | Max Hold                    |
| Sweep Time          | Auto                        |

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 5.6 TEST RESULTS

Please refer to the APPENDIX E.

## 6. AVERAGE TIME OF OCCUPANCY

### 6.1 LIMIT

| Section               | Test Item                 | Limit  |
|-----------------------|---------------------------|--------|
| FCC 15.247(a)(1)(iii) | Average Time of Occupancy | 0.4sec |

### 6.2 TEST PROCEDURE

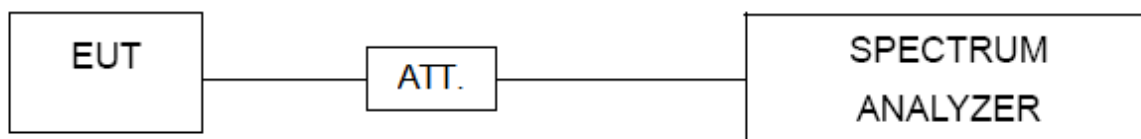
- Set the EUT for DH1, DH3 and DH5 packet transmitting.
- Measure the maximum time duration of one single pulse.
- DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.
- DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.
- DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds.
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting                                                           |
|---------------------|-------------------------------------------------------------------|
| Span Frequency      | 0 MHz                                                             |
| RBW                 | 1 MHz                                                             |
| VBW                 | 1 MHz                                                             |
| Detector            | Peak                                                              |
| Trace               | Max Hold                                                          |
| Sweep Time          | As necessary to capture the entire dwell time per hopping channel |

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 6.6 TEST RESULTS

Please refer to the APPENDIX F.

## 7. HOPPING CHANNEL SEPARATION

### 7.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 7.2 TEST PROCEDURE

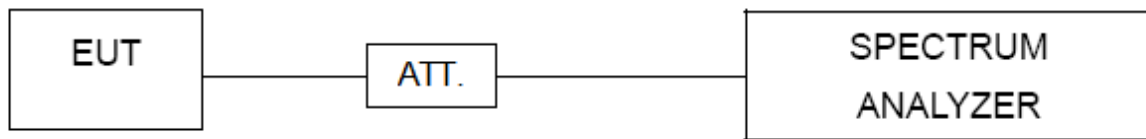
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting                                                   |
|---------------------|-----------------------------------------------------------|
| Span Frequency      | Wide enough to capture the peaks of two adjacent channels |
| RBW                 | 30 kHz                                                    |
| VBW                 | 100 kHz                                                   |
| Detector            | Peak                                                      |
| Trace               | Max Hold                                                  |
| Sweep Time          | Auto                                                      |

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



### 7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 7.6 TEST RESULTS

Please refer to the APPENDIX G.

## 8. BANDWIDTH

### 8.1 LIMIT

| Section          | Test Item |
|------------------|-----------|
| FCC 15.247(a)(1) | Bandwidth |

### 8.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting                 |
|---------------------|-------------------------|
| Span Frequency      | > Measurement Bandwidth |
| RBW                 | 30 kHz                  |
| VBW                 | 100 kHz                 |
| Detector            | Peak                    |
| Trace               | Max Hold                |
| Sweep Time          | Auto                    |

### 8.3 DEVIATION FROM STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 8.6 TEST RESULTS

Please refer to the APPENDIX H.

## 9. MAXIMUM OUTPUT POWER

### 9.1 LIMIT

| Section          | Test Item            | Limit                    |
|------------------|----------------------|--------------------------|
| FCC 15.247(a)(1) | Maximum Output Power | 0.1250 Watt or 20.97 dBm |

Note: Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 9.2 TEST PROCEDURE

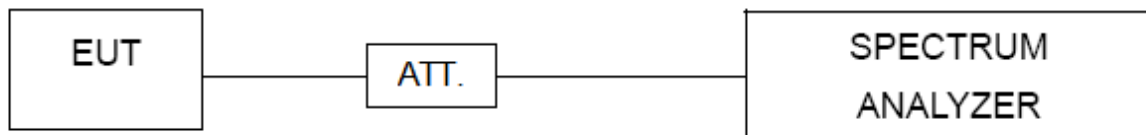
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting                                                                      |
|---------------------|------------------------------------------------------------------------------|
| Span Frequency      | Approximately five times the 20 dB bandwidth, centered on a hopping channel. |
| RBW                 | 3 MHz                                                                        |
| VBW                 | 3 MHz                                                                        |
| Detector            | Peak                                                                         |
| Trace               | Max Hold                                                                     |
| Sweep Time          | Auto                                                                         |

### 9.3 DEVIATION FROM STANDARD

No deviation.

### 9.4 TEST SETUP



### 9.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 9.6 TEST RESULTS

Please refer to the APPENDIX I.

## 10. CONDUCTED SPURIOUS EMISSION

### 10.1 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 Output Power limits. If the transmitter complies with the Output 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.

### 10.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

| Spectrum Parameters | Setting  |
|---------------------|----------|
| Start Frequency     | 30 MHz   |
| Stop Frequency      | 26.5 GHz |
| RBW                 | 100 kHz  |
| VBW                 | 100 kHz  |
| Detector            | Peak     |
| Trace               | Max Hold |
| Sweep Time          | Auto     |

### 10.3 DEVIATION FROM STANDARD

No deviation.

### 10.4 TEST SETUP



### 10.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 10.6 TEST RESULTS

Please refer to the APPENDIX J.

# 11. MEASUREMENT INSTRUMENTS LIST

| Name of Equipment             | Manufacturer    | Model Number         | Serial Number            | Last Calibration | Due Calibration |
|-------------------------------|-----------------|----------------------|--------------------------|------------------|-----------------|
| EMI Receiver                  | Rohde&Schwarz   | ESIB 40              | YH-TIRT-SAC-966-20220911 | 2023/01/05       | 2024/01/06      |
| Integral Antenna              | Schwarzbeck     | VULB 9163            | 01314                    | 2022.12.11       | 2024.12.10      |
| Integral Antenna              | Rohde&Schwarz   | HF907                | RSM2991424               | 2022.12.11       | 2024.12.10      |
| Preamplifier                  | Emtrace         | RP01A                | '02017                   | 2023/01/05       | 2024/01/06      |
| Preamplifier                  | Schwarzbeck     | BBV9744              | 00143                    | 2023/01/05       | 2024/01/06      |
| Loop Antenna                  | ZHINAN          | ZN30900A             | 12024                    | 2023/01/05       | 2024/01/06      |
| Exposure Level Tester         | narda           | ELT-400              | N-0925                   | 2023/01/05       | 2024/01/06      |
| Horn Antenna                  | Schwarzbeck     | BBHA9170             | 00956                    | 2023/01/05       | 2024/01/06      |
| RF Cable                      | /               | LMR400UF-NMNM-7.0M   | /                        | 2023/01/05       | 2024/01/06      |
| RF Cable                      | /               | SFT2050PUR-NMNM-7.0M | /                        | 2023/01/05       | 2024/01/06      |
| EMI Receiver                  | Rohde&Schwarz   | ESR7                 | 1316.3003K07-102611-mk   | 2022/11/02       | 2023/11/01      |
| LISN                          | Rohde&Schwarz   | ENV216               | 3560.655.12-102915-Bp    | 2022/11/02       | 2023/11/01      |
| ISN                           | Schwarzbeck     | ENY81                | 1309.8510.03             | 2023/01/05       | 2024/01/06      |
| ISN                           | Schwarzbeck     | ENY81-CAT6           | 1309.8526.03-101976-kh   | 2023/01/05       | 2024/01/06      |
| RF Cable                      | \               | SFT2050PUR-NMNM-2.0M | \                        | 2023/01/05       | 2024/01/06      |
| CMW500                        | ROHDE&SCHWARZ   | CMW500               | 120434                   | 2023/01/05       | 2024/01/06      |
| Spectrum analyzer             | ROHDE&SCHWARZ   | FSU26                | 200732                   | 2023/01/05       | 2024/01/06      |
| Spectrum analyzer             | ROHDE&SCHWARZ   | FSV40-N              | 101722                   | 2023/01/05       | 2024/01/06      |
| vector Signal Generator       | KEYSIGHT        | N5182B               | MY56200458               | 2023/01/05       | 2024/01/06      |
| vector Signal Generator       | HEWLETT PACKARD | 83752A               | 3610A02458               | 2023/01/05       | 2024/01/06      |
| Filter                        | HEWLETT PACKARD | JS0806-F             | 19K8060209               | 2023/01/05       | 2024/01/06      |
| Wireless comprehensive tester | ANRISTU         | MT8821C              | SN6262170409             | 2023/01/05       | 2024/01/06      |



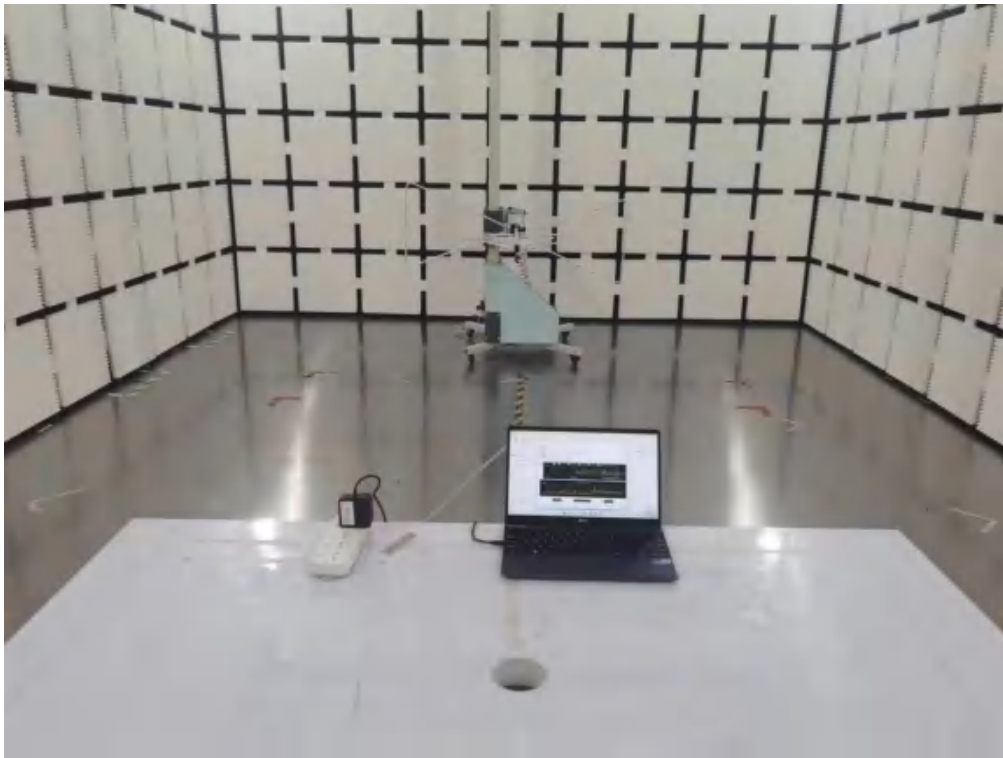
|                                     |         |         |              |            |            |
|-------------------------------------|---------|---------|--------------|------------|------------|
| Wireless<br>comprehensive<br>tester | ANRISTU | MT8000A | SN6262166782 | 2023/01/05 | 2024/01/06 |
|-------------------------------------|---------|---------|--------------|------------|------------|

Remark: "N/A" denotes no model name, serial no. or calibration specified.

## 12. EUT TEST PHOTO

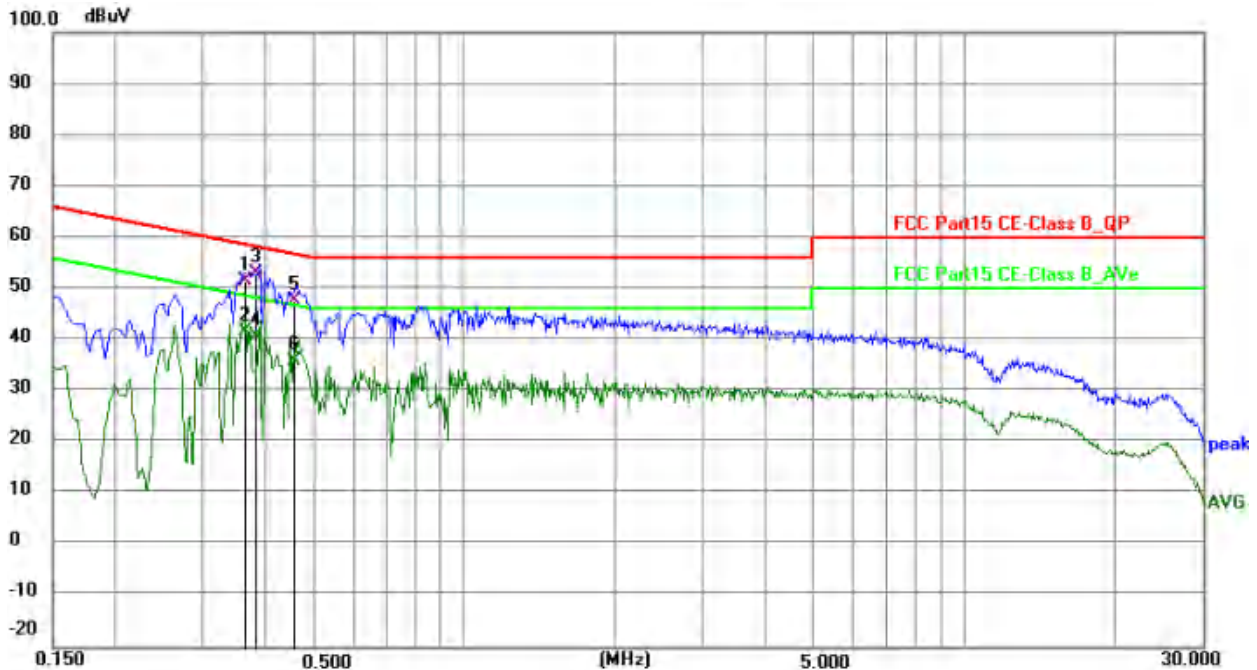
### AC Power Line Conducted Emissions Test Photos



**Radiated Emissions Test Photos****30 MHz to 1000 MHz****Radiated Emissions Test Photos****Above 1 GHz**

## APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

|           |                          |       |      |
|-----------|--------------------------|-------|------|
| Test Mode | TX Mode_3Mbps Channel 00 | Phase | Line |
|-----------|--------------------------|-------|------|

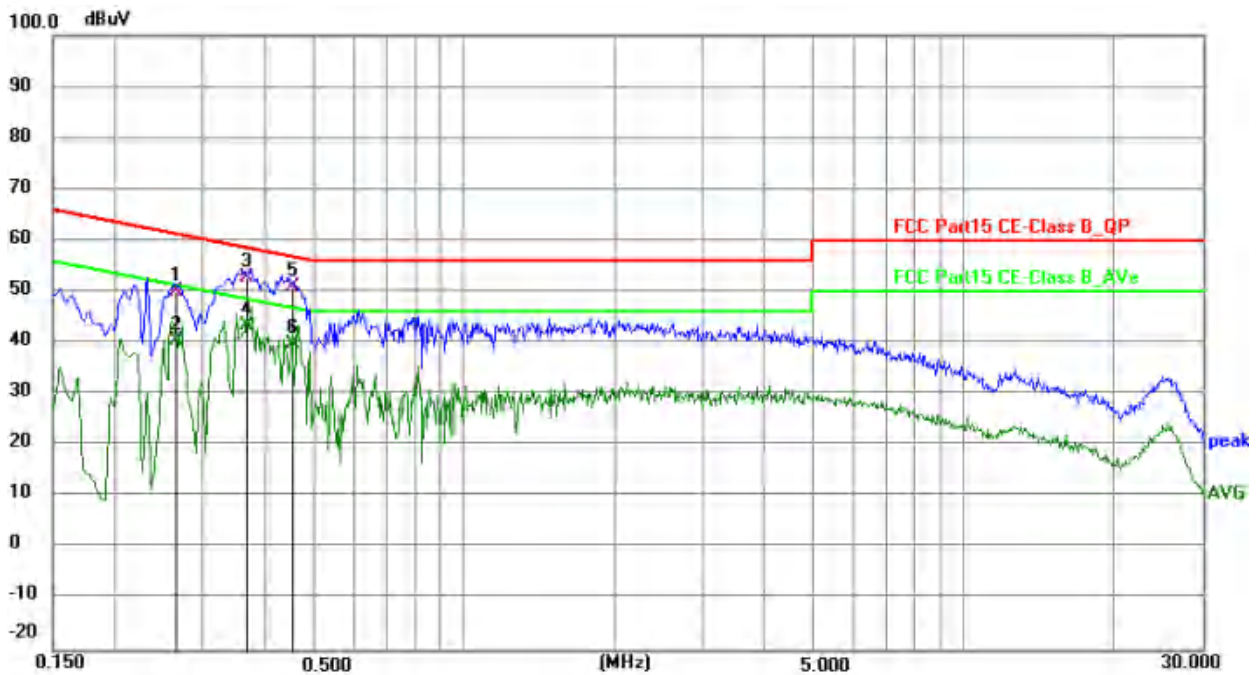


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.3642          | 41.95          | 9.63        | 51.58        | 58.63        | -7.05       | QP       | P   |
| 2   | 0.3642          | 32.14          | 9.63        | 41.77        | 48.63        | -6.86       | AVG      | P   |
| 3 * | 0.3832          | 43.28          | 9.63        | 52.91        | 58.21        | -5.30       | QP       | P   |
| 4   | 0.3832          | 31.12          | 9.63        | 40.75        | 48.21        | -7.46       | AVG      | P   |
| 5   | 0.4572          | 38.17          | 9.62        | 47.79        | 56.74        | -8.95       | QP       | P   |
| 6   | 0.4572          | 26.28          | 9.62        | 35.90        | 46.74        | -10.84      | AVG      | P   |

### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

|           |                          |       |         |
|-----------|--------------------------|-------|---------|
| Test Mode | TX Mode_3Mbps Channel 00 | Phase | Neutral |
|-----------|--------------------------|-------|---------|



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.2647          | 40.36          | 9.62        | 49.98        | 61.28        | -11.30      | QP       | P   |
| 2   | 0.2647          | 30.94          | 9.62        | 40.56        | 51.28        | -10.72      | AVG      | P   |
| 3   | 0.3684          | 43.23          | 9.62        | 52.85        | 58.54        | -5.69       | QP       | P   |
| 4 * | 0.3684          | 33.76          | 9.62        | 43.38        | 48.54        | -5.16       | AVG      | P   |
| 5   | 0.4534          | 41.23          | 9.62        | 50.85        | 56.81        | -5.96       | QP       | P   |
| 6   | 0.4534          | 30.32          | 9.62        | 39.94        | 46.81        | -6.87       | AVG      | P   |

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

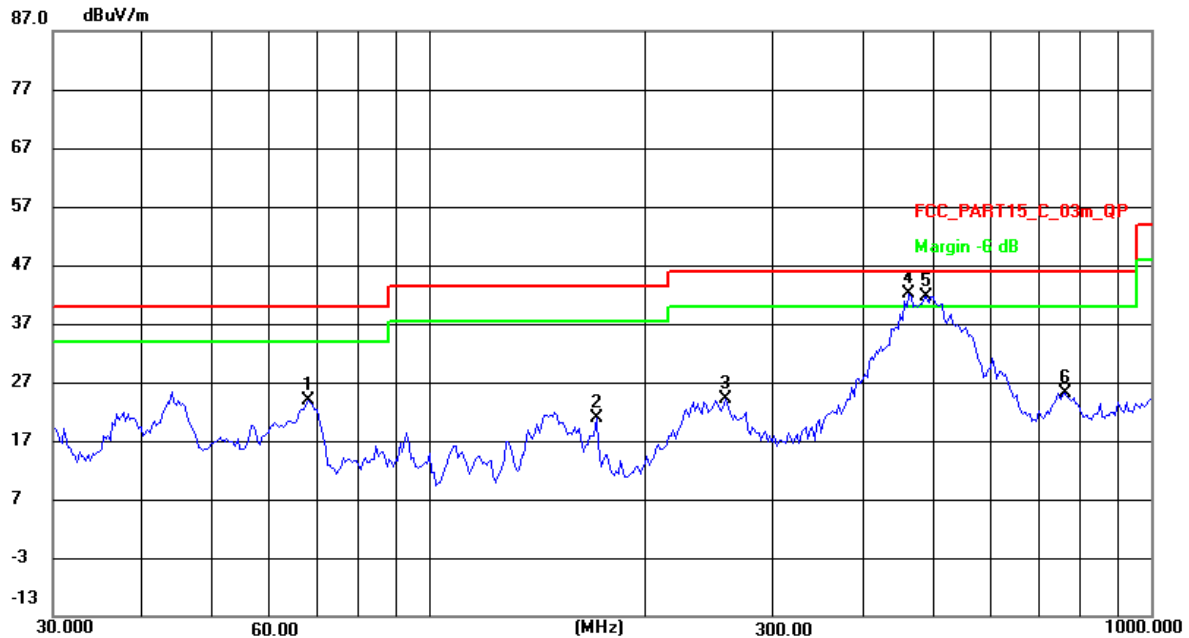
## **APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

## APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

|           |                          |              |          |
|-----------|--------------------------|--------------|----------|
| Test Mode | TX Mode_3Mbps Channel 00 | Polarization | Vertical |
|-----------|--------------------------|--------------|----------|

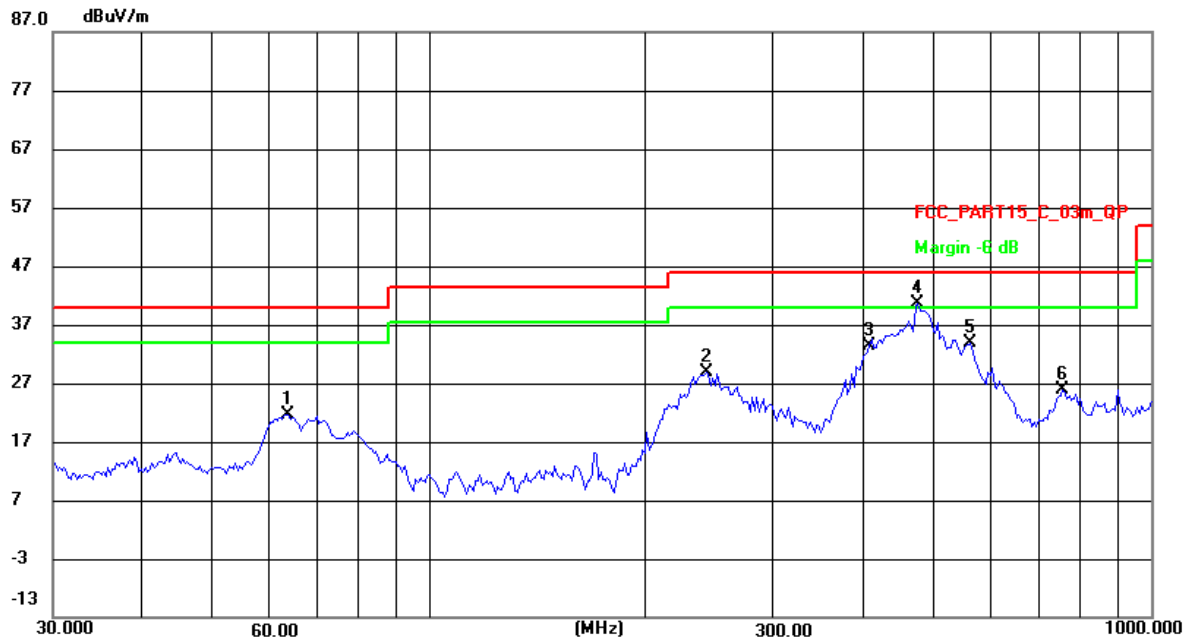


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1   | 67.7853         | 45.46          | -21.68        | 23.78          | 40.00          | -16.22      | peak     |
| 2   | 170.1887        | 42.01          | -21.21        | 20.80          | 43.50          | -22.70      | peak     |
| 3   | 257.6265        | 47.73          | -23.49        | 24.24          | 46.00          | -21.76      | peak     |
| 4 * | 461.6313        | 60.04          | -17.84        | 42.20          | 46.00          | -3.80       | peak     |
| 5 ! | 488.3263        | 59.05          | -17.30        | 41.75          | 46.00          | -4.25       | peak     |
| 6   | 760.2866        | 35.88          | -10.67        | 25.21          | 46.00          | -20.79      | peak     |

### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

|           |                          |              |            |
|-----------|--------------------------|--------------|------------|
| Test Mode | TX Mode_3Mbps Channel 00 | Polarization | Horizontal |
|-----------|--------------------------|--------------|------------|



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1   | 63.6311         | 42.62          | -20.94        | 21.68          | 40.00          | -18.32      | peak     |
| 2   | 241.8377        | 52.96          | -24.16        | 28.80          | 46.00          | -17.20      | peak     |
| 3   | 406.7820        | 52.54          | -19.26        | 33.28          | 46.00          | -12.72      | peak     |
| 4 * | 474.7912        | 58.28          | -17.57        | 40.71          | 46.00          | -5.29       | peak     |
| 5   | 562.0143        | 49.37          | -15.37        | 34.00          | 46.00          | -12.00      | peak     |
| 6   | 754.9627        | 36.72          | -10.80        | 25.92          | 46.00          | -20.08      | peak     |

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

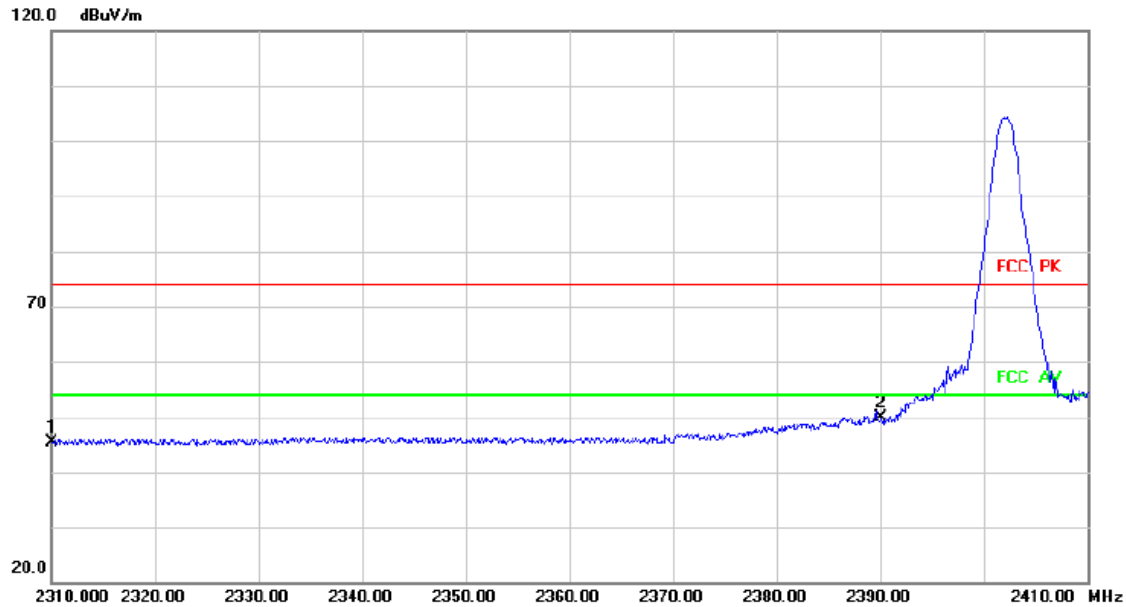
(2) Margin Level = Measurement Value - Limit Value.

## APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ

Test Result of Radiated Spurious at Band edges

|           |                         |              |          |
|-----------|-------------------------|--------------|----------|
| Test Mode | TX 2402 MHz _CH00_1Mbps | Polarization | Vertical |
|-----------|-------------------------|--------------|----------|

### Radiated Emission



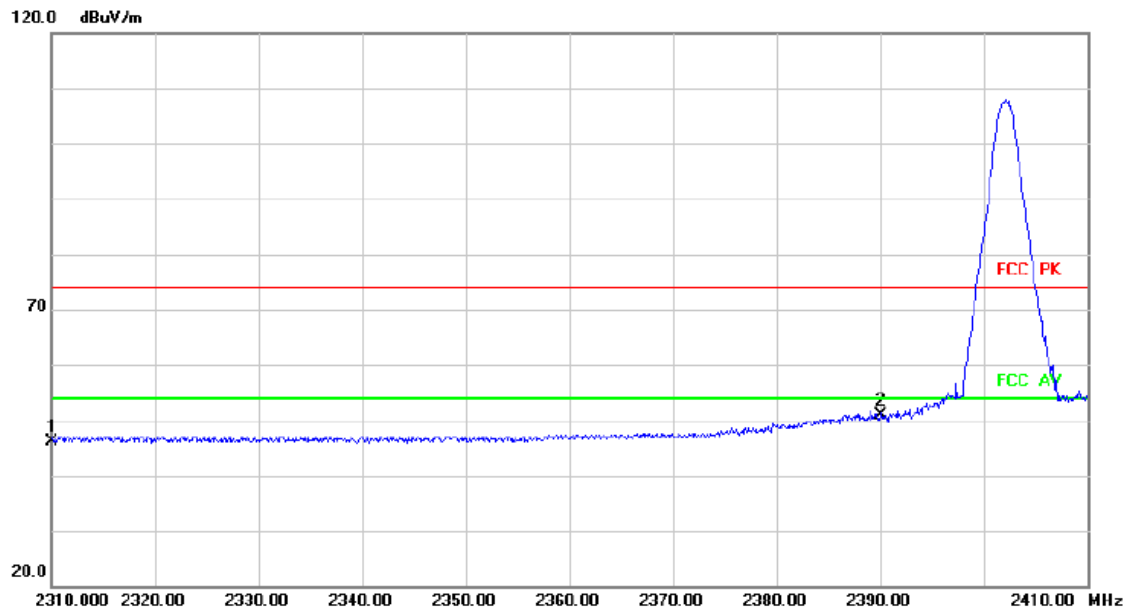
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | Detector | Comment |
| 1   |     | 2310.000 | 47.31         | -1.92          | 45.39       | 74.00  | -28.61 | peak     |         |
| 2 * |     | 2390.000 | 51.56         | -1.67          | 49.89       | 74.00  | -24.11 | peak     |         |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |            |
|-----------|-------------------------|--------------|------------|
| Test Mode | TX 2402 MHz _CH00_1Mbps | Polarization | Horizontal |
|-----------|-------------------------|--------------|------------|

### Radiated Emission



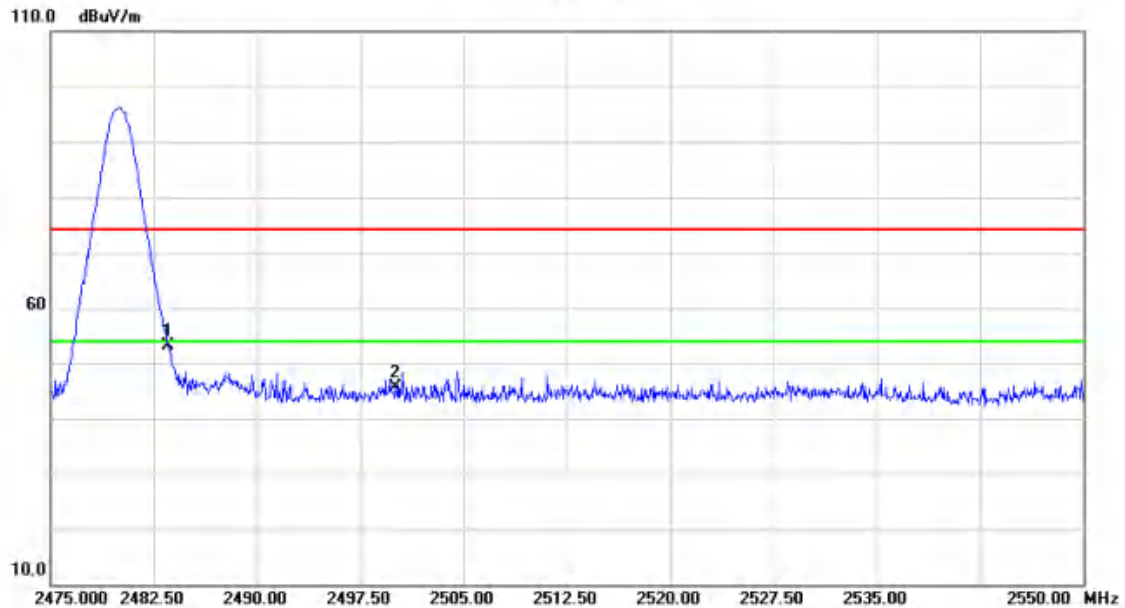
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m       | dBuV/m | dB     | Detector | Comment |
| 1   |     | 2310.000 | 48.08         | -1.92          | 46.16        | 74.00  | -27.84 | peak     |         |
| 2 * |     | 2390.000 | 52.45         | -1.67          | 50.78        | 74.00  | -23.22 | peak     |         |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |          |
|-----------|-------------------------|--------------|----------|
| Test Mode | TX 2480 MHz _CH78_1Mbps | Polarization | Vertical |
|-----------|-------------------------|--------------|----------|

### Radiated Emission



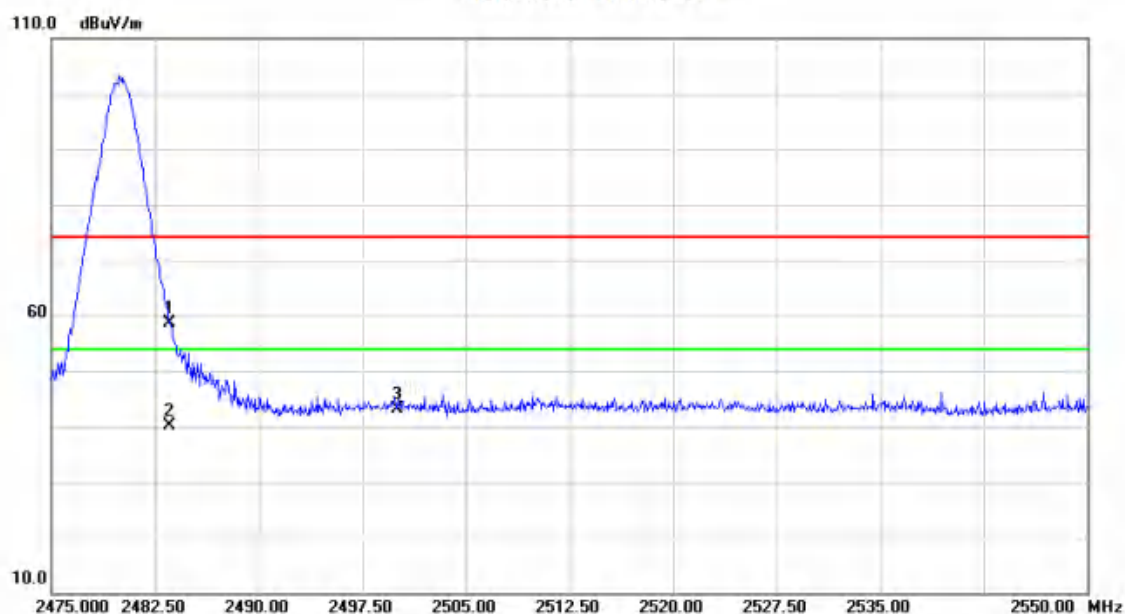
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   | *   | 2483.500 | 64.41         | -11.28         | 53.13       | 74.00  | -20.87 | peak           |              |         |
| 2   |     | 2500.000 | 56.87         | -11.21         | 45.66       | 74.00  | -28.34 | peak           |              |         |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |            |
|-----------|-------------------------|--------------|------------|
| Test Mode | TX 2480 MHz _CH78_1Mbps | Polarization | Horizontal |
|-----------|-------------------------|--------------|------------|

### Radiated Emission



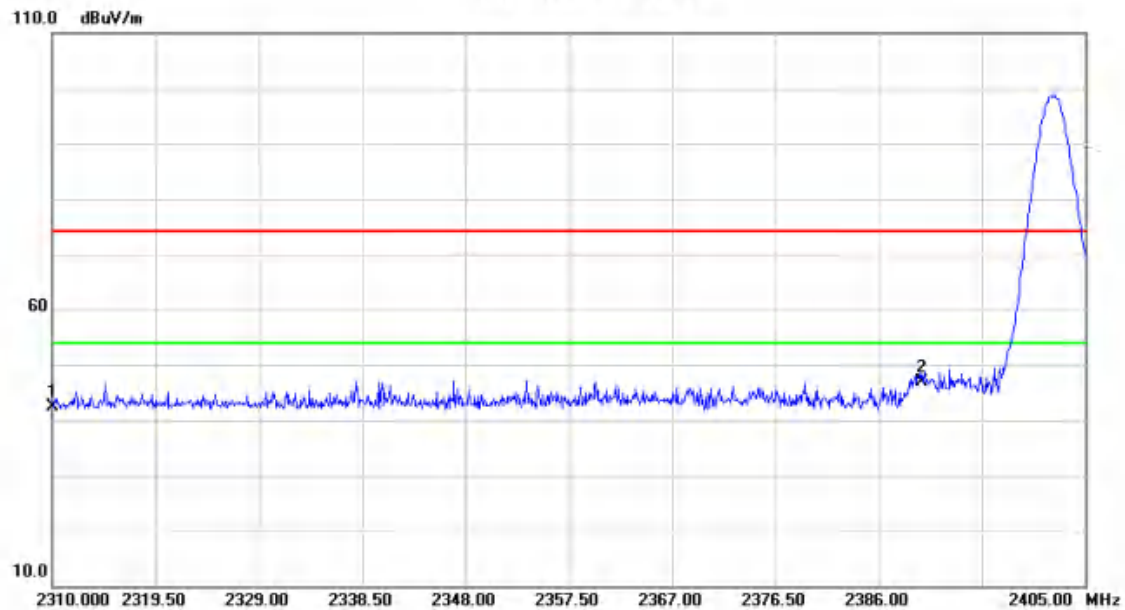
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | Detector       | cm           | degree |
| 1   |     | 2483.500 | 69.85         | -11.28         | 58.57       | 74.00  | -15.43 | peak           |              |        |
| 2   | *   | 2483.500 | 51.41         | -11.28         | 40.13       | 54.00  | -13.87 | AVG            |              |        |
| 3   |     | 2500.000 | 54.29         | -11.21         | 43.08       | 74.00  | -30.92 | peak           |              |        |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |          |
|-----------|-------------------------|--------------|----------|
| Test Mode | TX 2402 MHz _CH00_3Mbps | Polarization | Vertical |
|-----------|-------------------------|--------------|----------|

### Radiated Emission

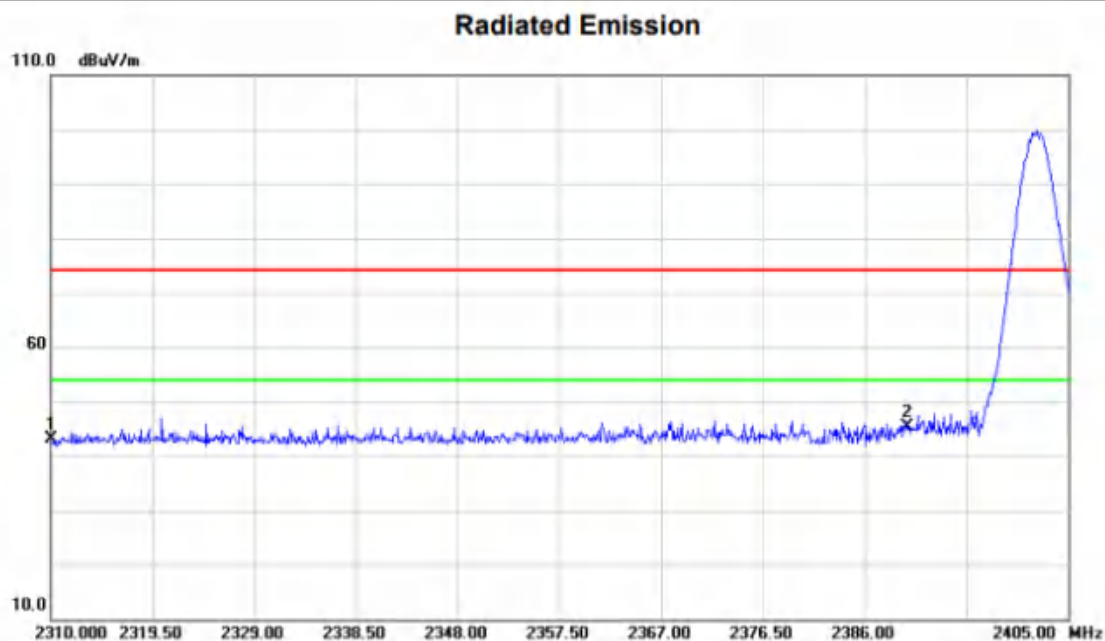


| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 2310.000 | 54.39         | -11.92         | 42.47       | 74.00  | -31.53 | peak           |              |         |
| 2 * |     | 2390.000 | 58.55         | -11.67         | 46.88       | 74.00  | -27.12 | peak           |              |         |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |            |
|-----------|-------------------------|--------------|------------|
| Test Mode | TX 2402 MHz _CH00_3Mbps | Polarization | Horizontal |
|-----------|-------------------------|--------------|------------|



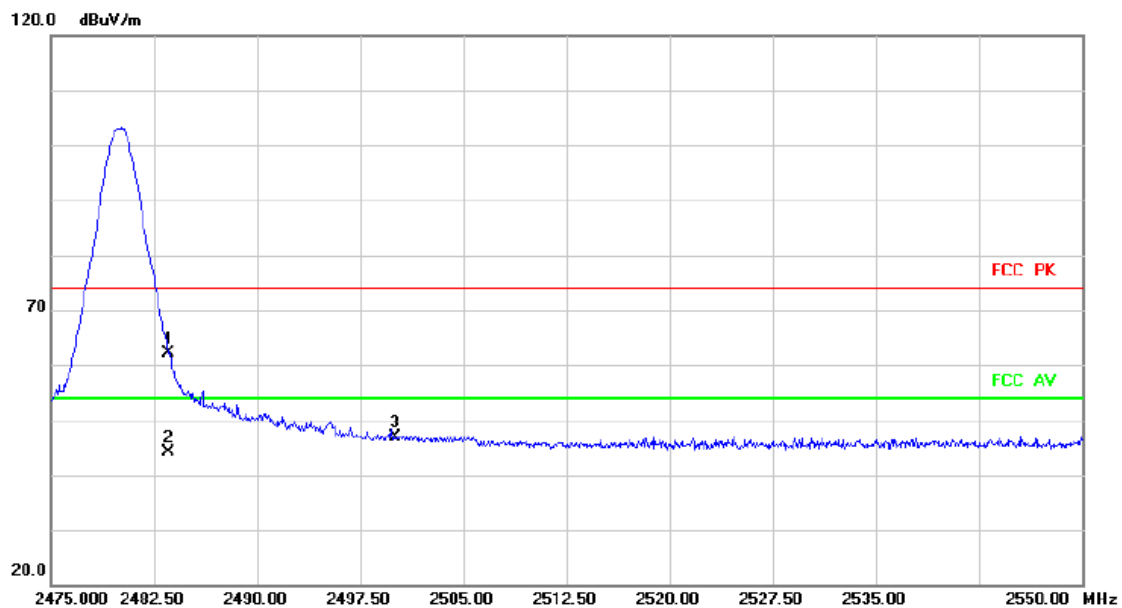
| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 2310.000 | 55.08         | -11.92         | 43.16       | 74.00  | -30.84 |                |              | peak    |
| 2 * |     | 2390.000 | 57.15         | -11.67         | 45.48       | 74.00  | -28.52 |                |              | peak    |

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |          |
|-----------|-------------------------|--------------|----------|
| Test Mode | TX 2480 MHz _CH78_3Mbps | Polarization | Vertical |
|-----------|-------------------------|--------------|----------|

### Radiated Emission



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | Detector | Comment |
| 1   |     | 2483.500 | 63.48         | -1.28          | 62.20       | 74.00  | -11.80 | peak     |         |
| 2 * |     | 2483.500 | 45.38         | -1.28          | 44.10       | 54.00  | -9.90  | AVG      |         |
| 3   |     | 2500.000 | 48.16         | -1.21          | 46.95       | 74.00  | -27.05 | peak     |         |

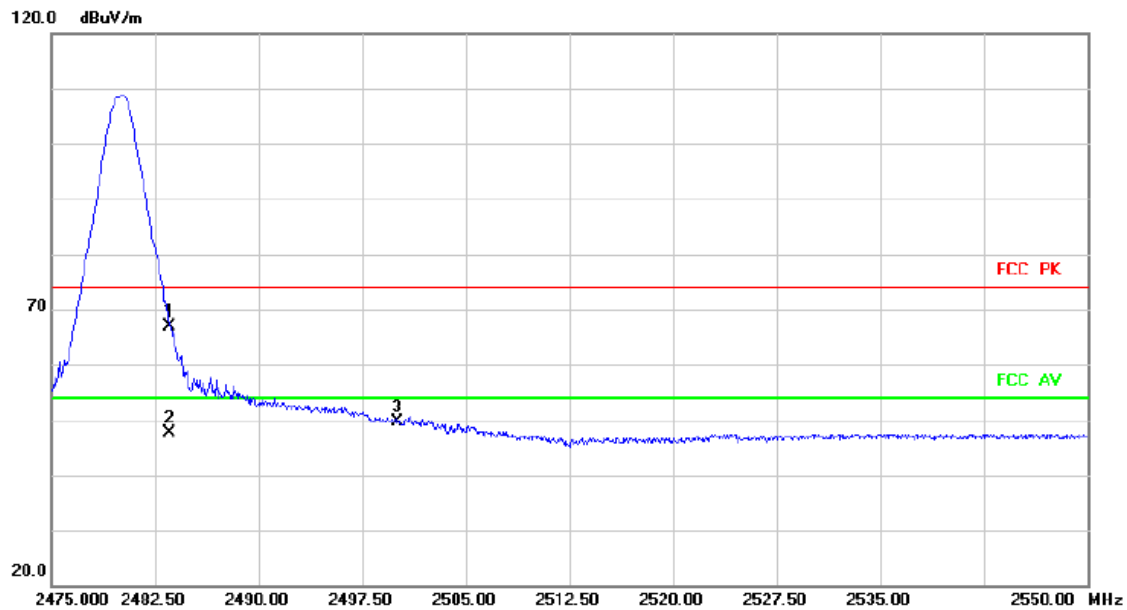
#### REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

|           |                         |              |            |
|-----------|-------------------------|--------------|------------|
| Test Mode | TX 2480 MHz _CH78_3Mbps | Polarization | Horizontal |
|-----------|-------------------------|--------------|------------|

### Radiated Emission



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over   |          |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m      | dBuV/m | dB     | Detector | Comment |
| 1   |     | 2483.500 | 68.14         | -1.28          | 66.86       | 74.00  | -7.14  | peak     |         |
| 2 * |     | 2483.500 | 48.93         | -1.28          | 47.65       | 54.00  | -6.35  | AVG      |         |
| 3   |     | 2500.000 | 50.84         | -1.21          | 49.63       | 74.00  | -24.37 | peak     |         |

#### REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.  
(2) Margin Level = Measurement Value - Limit Value.

ABOVE 1000 MHz  
Modulation Type: DH5(GFSK)

*Note: All the modes have been tested and recorded worst mode in the report.*

| Low channel:2402 |                 |                        |                      |                   |                  |                |                        |                      |                |
|------------------|-----------------|------------------------|----------------------|-------------------|------------------|----------------|------------------------|----------------------|----------------|
| Frequency        | Ant.Pol.<br>H/V | Peak reading<br>(dBuV) | AV reading<br>(dBuV) | Correction Factor | Emission Level   |                | Peak Limit<br>(dBuV/m) | AV Limit<br>(dBuV/m) | Margin<br>(dB) |
|                  |                 |                        |                      |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                        |                      |                |
| 4804.11          | H               | 54.44                  |                      | -1.99             | 52.45            | ---            | 74                     | 54                   | -21.55         |
| 7206.00          | H               | 40.50                  | ---                  | 7.14              | 47.64            | ---            | 75                     | 55                   | -27.36         |
| ---              | H               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |
| 4804.11          | V               | 56.96                  | 42.82                | -1.99             | 54.97            | 40.83          | 74                     | 54                   | -13.17         |
| 7206.00          | V               | 39.45                  | ---                  | 7.14              | 46.60            | ---            | 74                     | 54                   | -27.40         |
| ---              | V               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |

| Low channel:2441 |                 |                        |                      |                   |                  |                |                        |                      |                |
|------------------|-----------------|------------------------|----------------------|-------------------|------------------|----------------|------------------------|----------------------|----------------|
| Frequency        | Ant.Pol.<br>H/V | Peak reading<br>(dBuV) | AV reading<br>(dBuV) | Correction Factor | Emission Level   |                | Peak Limit<br>(dBuV/m) | AV Limit<br>(dBuV/m) | Margin<br>(dB) |
|                  |                 |                        |                      |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                        |                      |                |
| 4882.00          | H               | 61.60                  | 48.13                | -1.55             | 60.05            | ---            | 74                     | 54                   | -13.95         |
| 7323.00          | H               | 42.47                  | ---                  | 8.83              | 51.3             | ---            | 75                     | 55                   | -23.70         |
| ---              | H               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |
| 4882.00          | V               | 53.80                  | ---                  | -1.55             | 52.25            | ---            | 74                     | 54                   | -21.75         |
| 7323.00          | V               | 43.54                  | ---                  | 8.83              | 52.37            | ---            | 75                     | 55                   | -22.63         |
| ---              | V               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |

| Low channel:2480 |                 |                        |                      |                   |                  |                |                        |                      |                |
|------------------|-----------------|------------------------|----------------------|-------------------|------------------|----------------|------------------------|----------------------|----------------|
| Frequency        | Ant.Pol.<br>H/V | Peak reading<br>(dBuV) | AV reading<br>(dBuV) | Correction Factor | Emission Level   |                | Peak Limit<br>(dBuV/m) | AV Limit<br>(dBuV/m) | Margin<br>(dB) |
|                  |                 |                        |                      |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                        |                      |                |
| 4959.307         | H               | 54.40                  | ---                  | -1.11             | 53.29            | ---            | 74                     | 54                   | -20.71         |
| 7440.00          | H               | 42.60                  | ---                  | 9.11              | 51.71            | ---            | 75                     | 55                   | -23.29         |
| ---              | H               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |
| 4959.307         | V               | 53.50                  | ---                  | -1.11             | 52.39            | ---            | 74                     | 54                   | -21.61         |
| 7440.00          | V               | 40.66                  | ---                  | 9.11              | 49.77            | ---            | 75                     | 55                   | -25.23         |
| ---              | V               | ---                    | ---                  | ---               | ---              | ---            | ---                    | ---                  | ---            |

**Notes:**

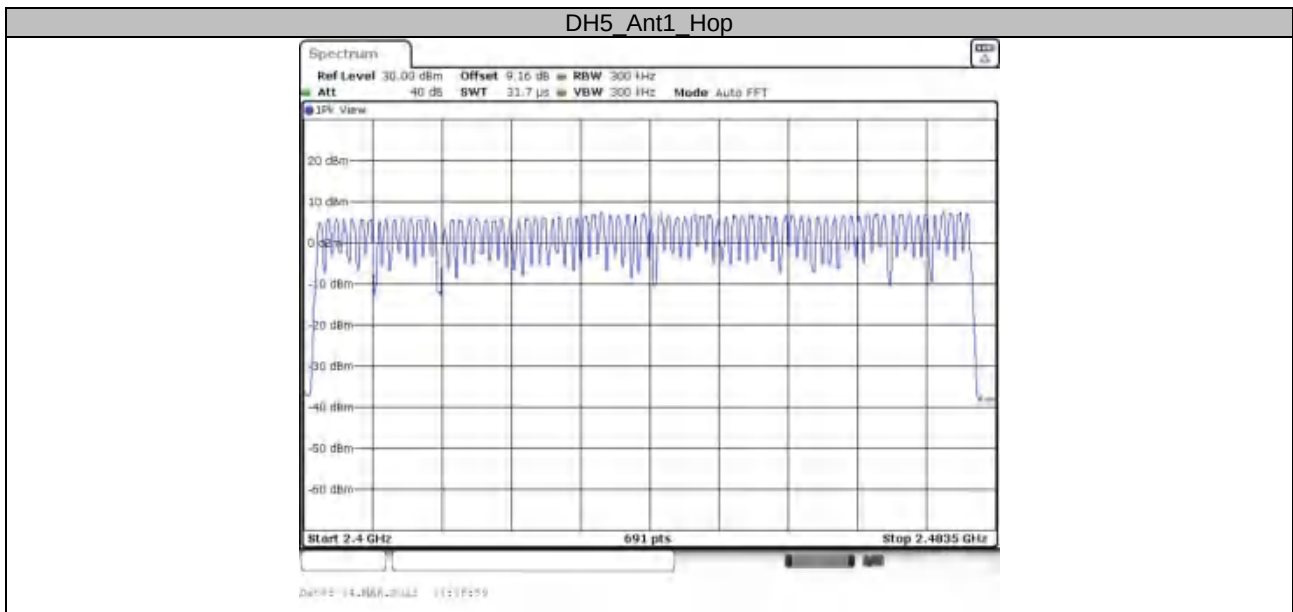
- 1). Radiated emissions measured in frequency range from 9 KHz~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
- 2). Data of measurement within this frequency range shown "—" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3). Measured Level = Reading Level + Correction Factor, Margin = Measured Level – Limit
- 4). Worst case data at 1Mbps at DH5(GFSK).

## APPENDIX E - NUMBER OF HOPPING FREQUENCY

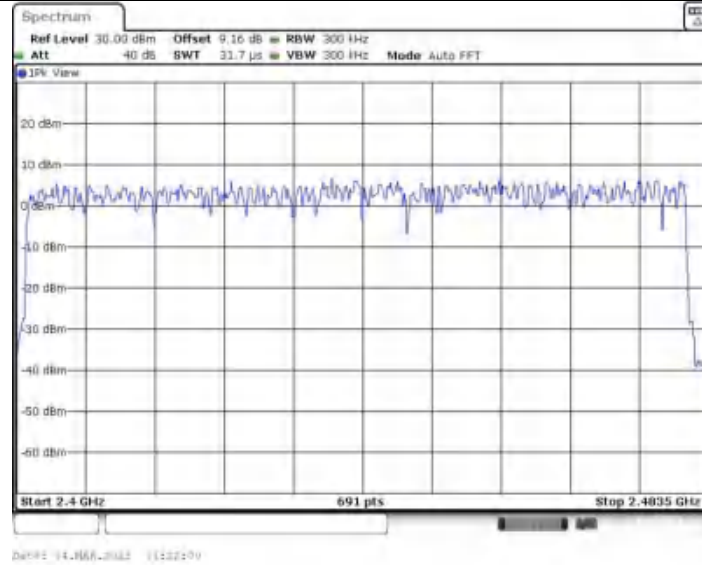
Test Mode: TX Mode\_1Mbps

| TestMode | Antenna | Channel | Result[Num] | Limit[Num] | Verdict |
|----------|---------|---------|-------------|------------|---------|
| DH5      | Ant1    | Hop     | 79          | $\geq 15$  | PASS    |
| 2DH5     | Ant1    | Hop     | 79          | $\geq 15$  | PASS    |
| 3DH5     | Ant1    | Hop     | 79          | $\geq 15$  | PASS    |

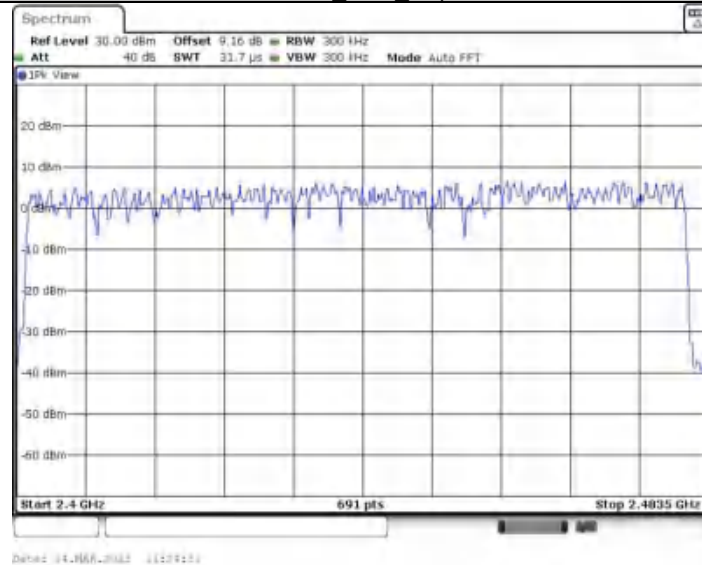
### Test Graphs



### 2DH5\_Ant1\_Hop



### 3DH5\_Ant1\_Hop

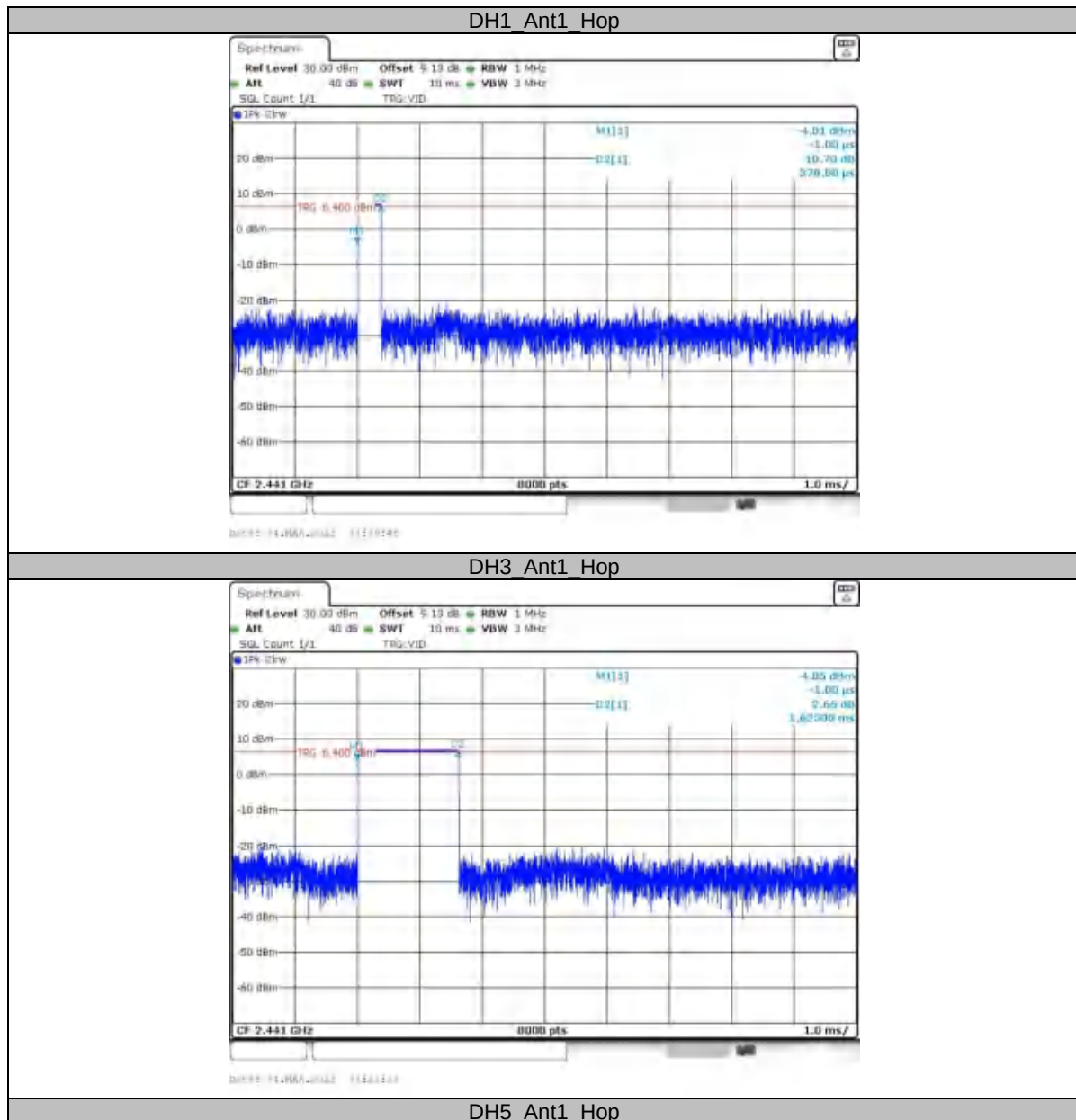


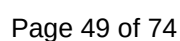
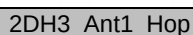
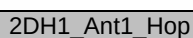
## APPENDIX F - AVERAGE TIME OF OCCUPANCY

|           |                    |
|-----------|--------------------|
| Test Mode | Hopping Mode_1Mbps |
|-----------|--------------------|

| TestMode | Antenna | Channel | BurstWidth [ms] | TotalHops [Num] | Result[s] | Limit[s] | Verdict |
|----------|---------|---------|-----------------|-----------------|-----------|----------|---------|
| DH1      | Ant1    | Hop     | 0.378           | 320             | 0.121     | ≤0.4     | PASS    |
| DH3      | Ant1    | Hop     | 1.625           | 160             | 0.26      | ≤0.4     | PASS    |
| DH5      | Ant1    | Hop     | 2.865           | 106.67          | 0.306     | ≤0.4     | PASS    |
| 2DH1     | Ant1    | Hop     | 0.385           | 320             | 0.123     | ≤0.4     | PASS    |
| 2DH3     | Ant1    | Hop     | 1.629           | 160             | 0.261     | ≤0.4     | PASS    |
| 2DH5     | Ant1    | Hop     | 2.869           | 106.67          | 0.306     | ≤0.4     | PASS    |
| 3DH1     | Ant1    | Hop     | 0.385           | 320             | 0.123     | ≤0.4     | PASS    |
| 3DH3     | Ant1    | Hop     | 1.629           | 160             | 0.261     | ≤0.4     | PASS    |
| 3DH5     | Ant1    | Hop     | 2.872           | 106.67          | 0.306     | ≤0.4     | PASS    |

### Test Graphs





[illegible]

The screenshot displays a Spectrum Analyzer interface. The title bar reads "3DH1\_Ant1\_Hop". The main window is titled "Spectrum". The plot shows a signal at 2.441 GHz. The y-axis represents power in dBm, ranging from -60 to 20. The x-axis represents frequency in GHz, ranging from 2.440 to 2.442. A red horizontal line is drawn at 0 dBm. A blue signal trace is visible, showing a peak at 2.441 GHz. The signal level is approximately 0 dBm. The noise floor is around -40 dBm. The plot includes parameters: Ref Level 30.00 dBm, Offset 5.13 dB, RBW 1 MHz, Att 40 dB, SWR 10 ms, VBW 3 MHz, SQL Count 1/1, and TRG-VID. The plot is titled "1PK 10W". The x-axis is labeled "CF 2.441 GHz" and "8000 pts". The y-axis is labeled "1.0 ms/".

3DH3\_Ant1\_Hop

Spectrum

Ref Level 30.00 dBm Offset 5.13 dB RBW 1 MHz

Att 40 dB SWI 10 ms VBW 3 MHz

SGL Count 1/1 TRG:VID

1P6: 1P6

M[1]: 2.21 dBm

D[1]: -142.27 μs

2.49 dB

1.62900 rms

20 dBm

10 dBm

0 dBm

-10 dBm

-20 dBm

-30 dBm

-40 dBm

-50 dBm

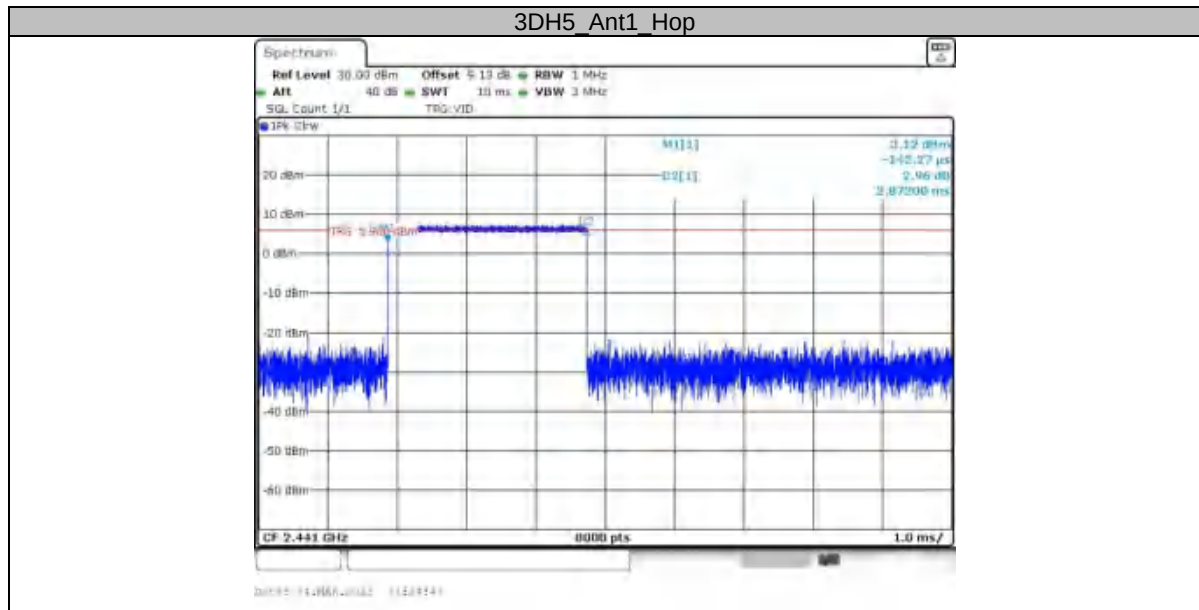
-60 dBm

CF 2.441 GHz

8000 pts

1.0 ms/

2023-04-20 10:10:10

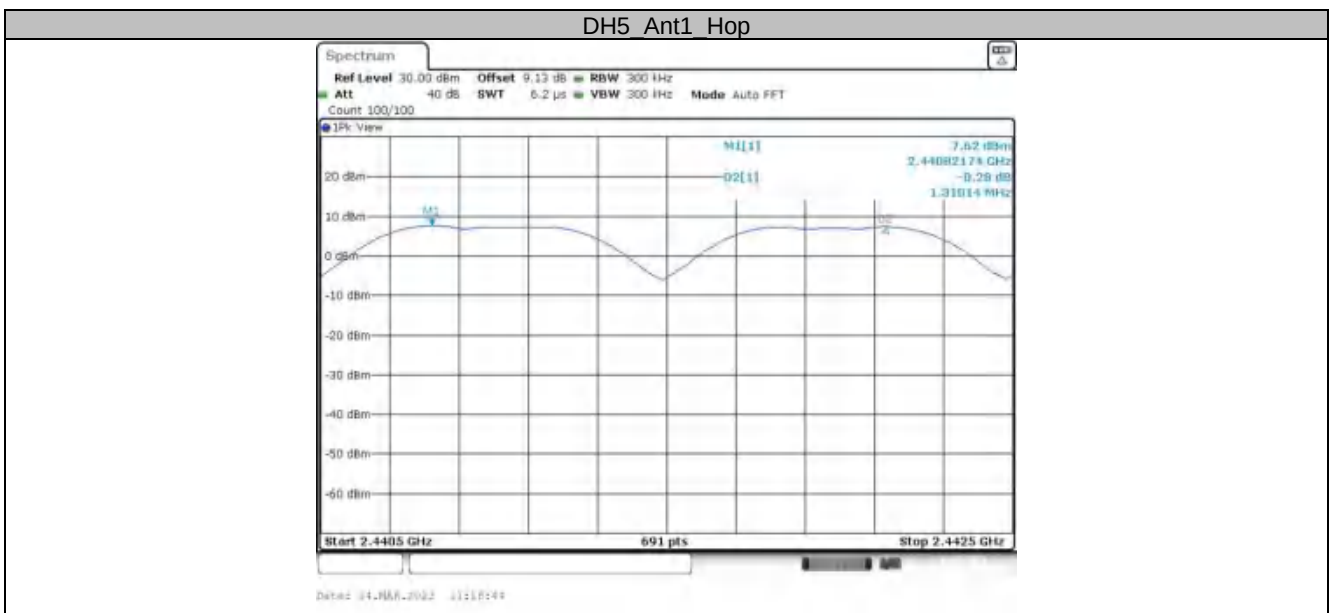


## APPENDIX G - HOPPING CHANNEL SEPARATION

|           |                    |
|-----------|--------------------|
| Test Mode | Hopping Mode_1Mbps |
|-----------|--------------------|

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm]   | Verdict |
|----------|---------|---------|-------------|--------------|---------|
| DH5      | Ant1    | Hop     | 1.31        | $\geq 0.981$ | PASS    |
| 2DH5     | Ant1    | Hop     | 1           | $\geq 0.914$ | PASS    |
| 3DH5     | Ant1    | Hop     | 1.009       | $\geq 0.902$ | PASS    |

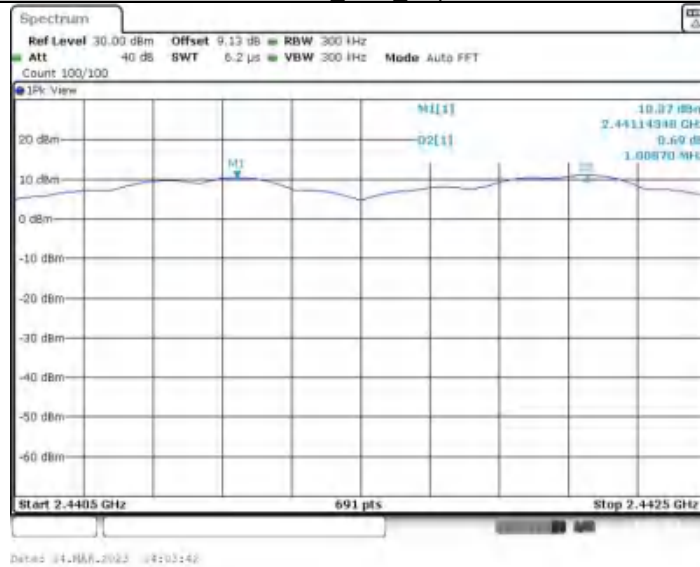
### Test Graphs



### 2DH5\_Ant1\_Hop



### 3DH5\_Ant1\_Hop



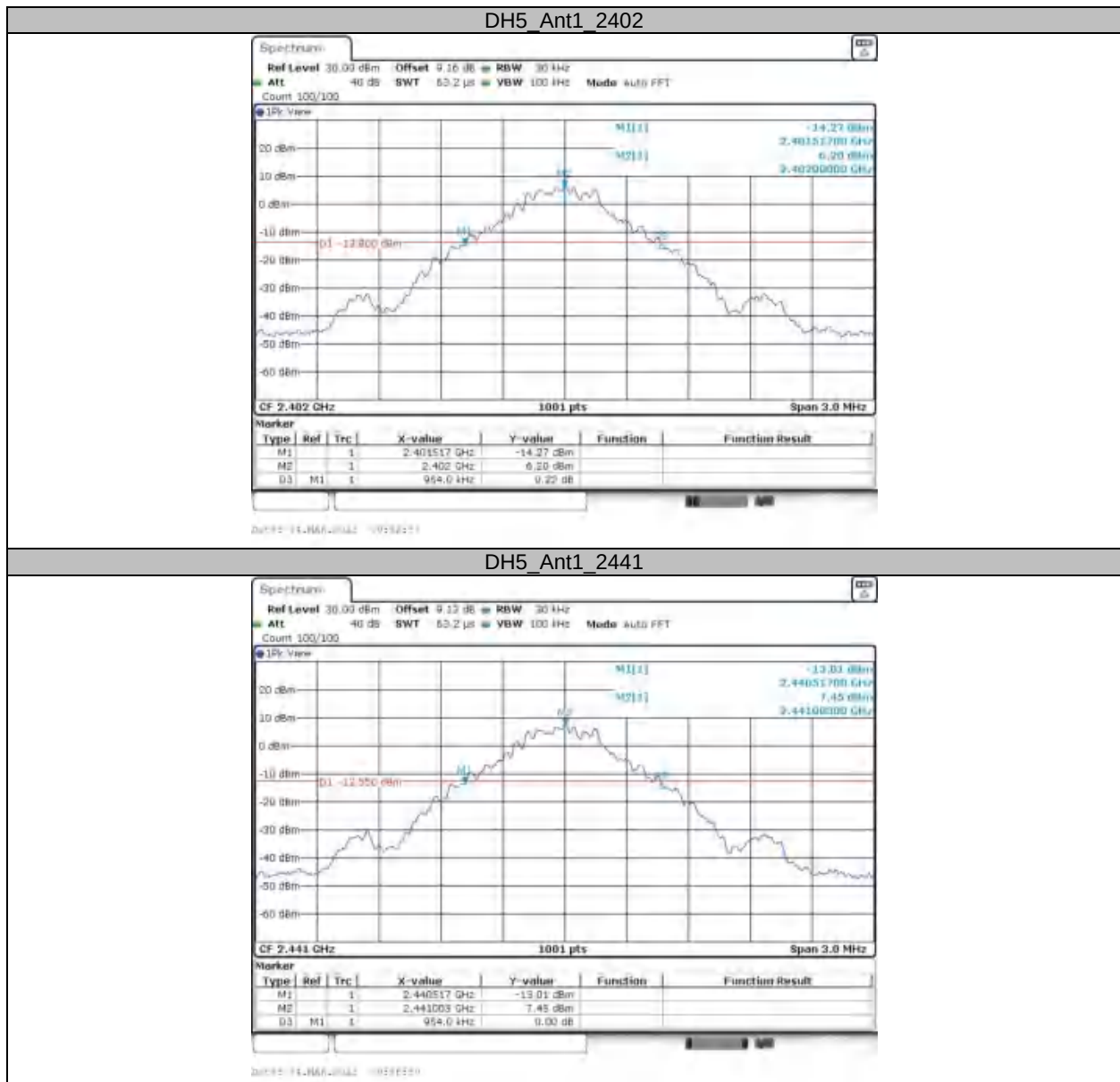
## APPENDIX H - BANDWIDTH

|           |                |
|-----------|----------------|
| Test Mode | TX Mode _1Mbps |
|-----------|----------------|

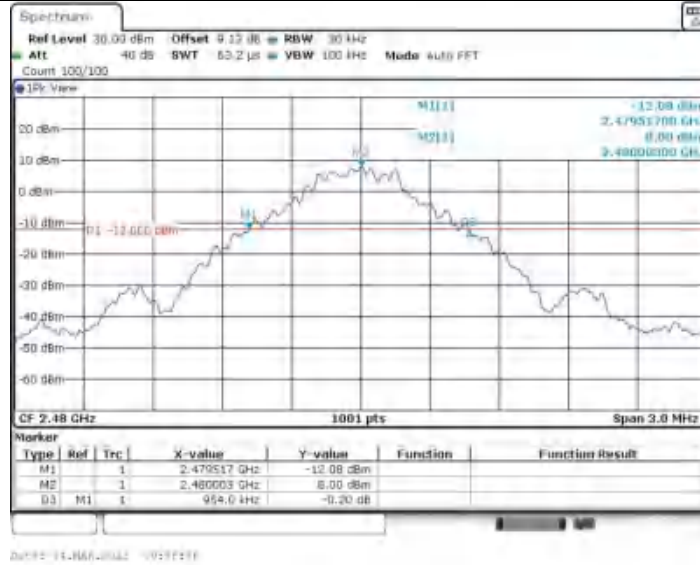
### 1. 20dB Emission Bandwidth

| TestMode | Antenna | Channel | 20db EBW[MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|---------|---------------|---------|---------|------------|---------|
| DH5      | Ant1    | 2402    | 0.95          | 2401.52 | 2402.47 | ---        | ---     |
|          |         | 2441    | 0.95          | 2440.52 | 2441.47 | ---        | ---     |
|          |         | 2480    | 0.95          | 2479.52 | 2480.47 | ---        | ---     |
| 2DH5     | Ant1    | 2402    | 1.44          | 2401.26 | 2402.70 | ---        | ---     |
|          |         | 2441    | 1.44          | 2440.26 | 2441.69 | ---        | ---     |
|          |         | 2480    | 1.44          | 2479.25 | 2480.70 | ---        | ---     |
| 3DH5     | Ant1    | 2402    | 1.49          | 2401.26 | 2402.75 | ---        | ---     |
|          |         | 2441    | 1.44          | 2440.26 | 2441.71 | ---        | ---     |
|          |         | 2480    | 1.45          | 2479.26 | 2480.71 | ---        | ---     |

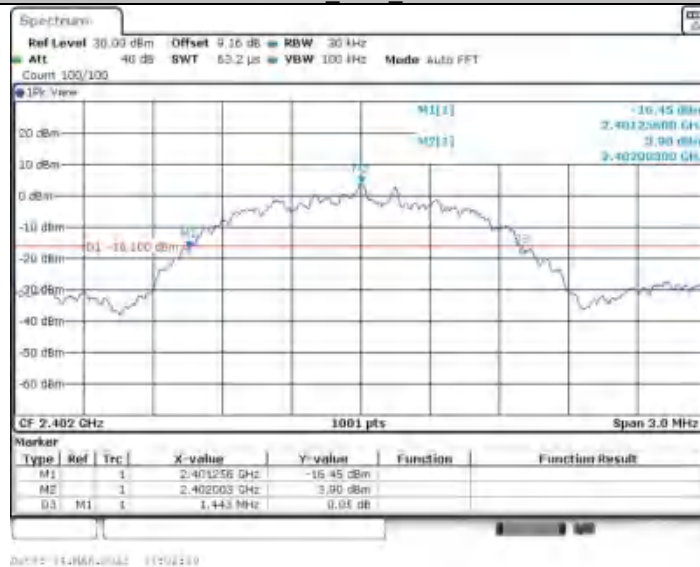
### Test Graphs



### DH5\_Ant1\_2480



### 2DH5\_Ant1\_2402



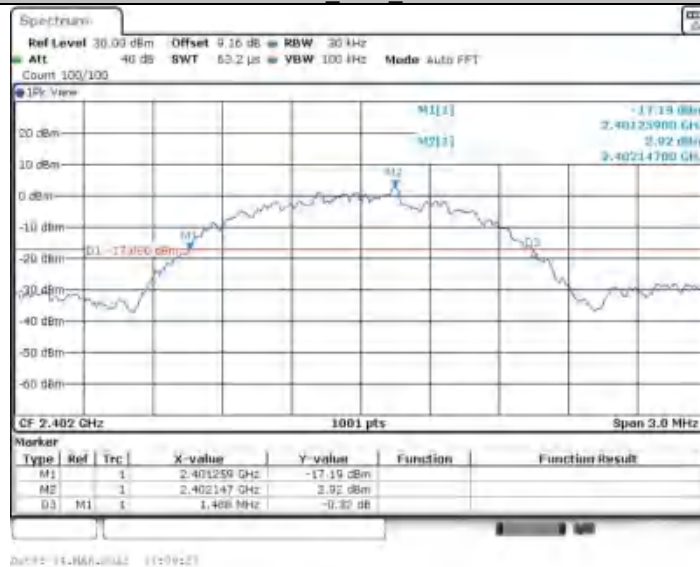
### 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



## 3DH5\_Ant1\_2402



## 3DH5\_Ant1\_2441



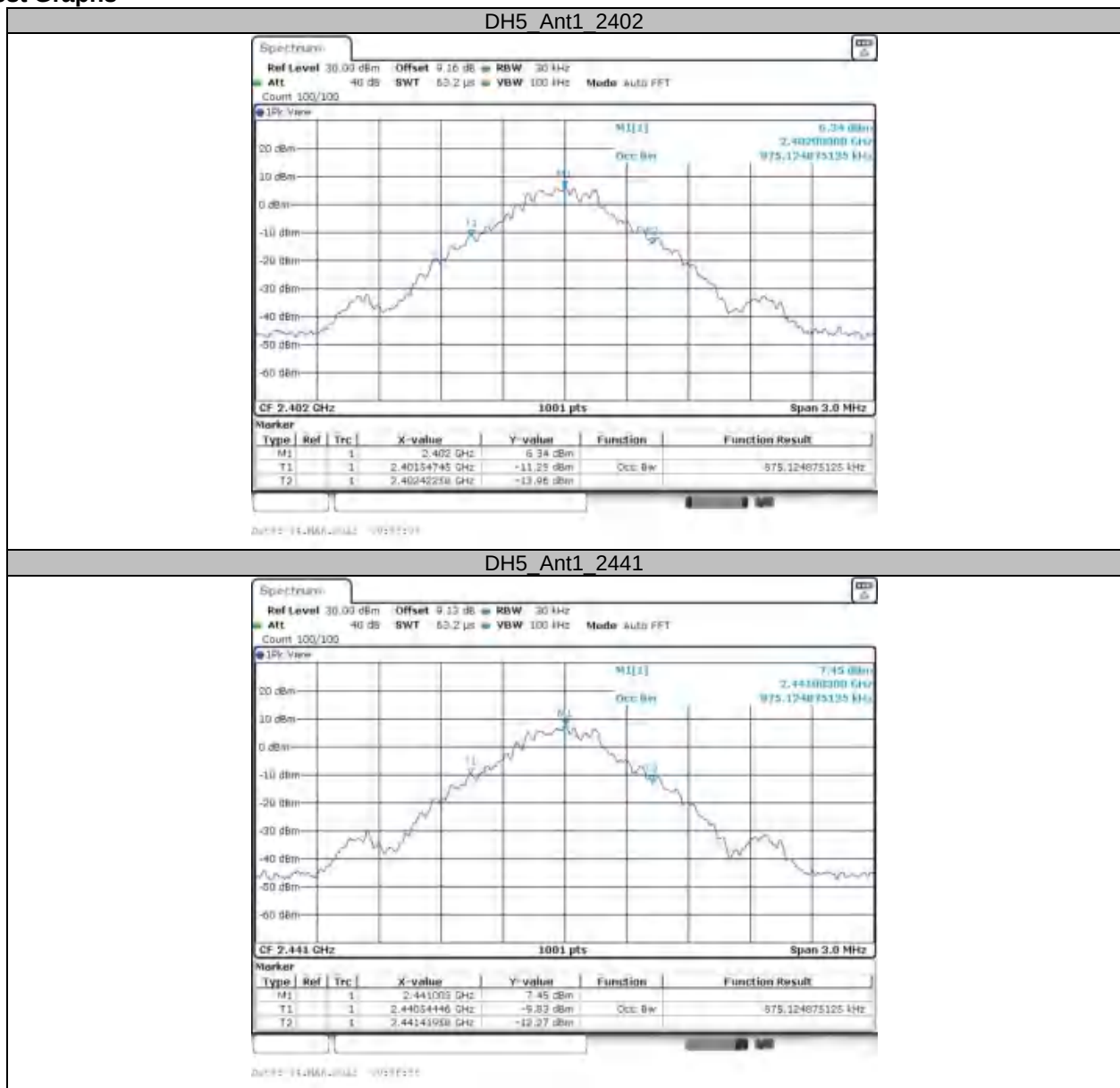


|           |                |
|-----------|----------------|
| Test Mode | TX Mode _1Mbps |
|-----------|----------------|

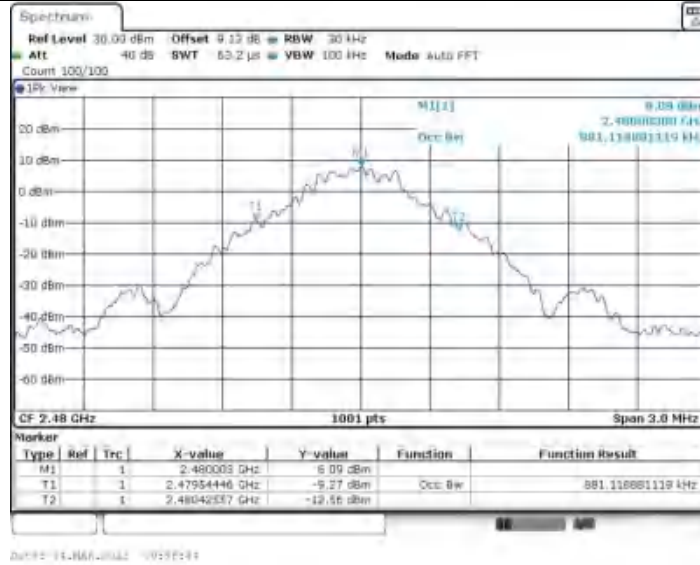
## 2. Occupied Channel Bandwidth

| TestMode | Antenna | Channel | OCB [MHz] | FL[MHz]   | FH[MHz]   | Limit[MHz] | Verdict |
|----------|---------|---------|-----------|-----------|-----------|------------|---------|
| DH5      | Ant1    | 2402    | 0.875     | 2401.5475 | 2402.4226 | ---        | ---     |
|          |         | 2441    | 0.875     | 2440.5445 | 2441.4196 | ---        | ---     |
|          |         | 2480    | 0.881     | 2479.5445 | 2480.4256 | ---        | ---     |
| 2DH5     | Ant1    | 2402    | 1.361     | 2401.3047 | 2402.6653 | ---        | ---     |
|          |         | 2441    | 1.355     | 2440.3047 | 2441.6593 | ---        | ---     |
|          |         | 2480    | 1.355     | 2479.3047 | 2480.6593 | ---        | ---     |
| 3DH5     | Ant1    | 2402    | 1.361     | 2401.3077 | 2402.6683 | ---        | ---     |
|          |         | 2441    | 1.361     | 2440.3047 | 2441.6653 | ---        | ---     |
|          |         | 2480    | 1.352     | 2479.3047 | 2480.6563 | ---        | ---     |

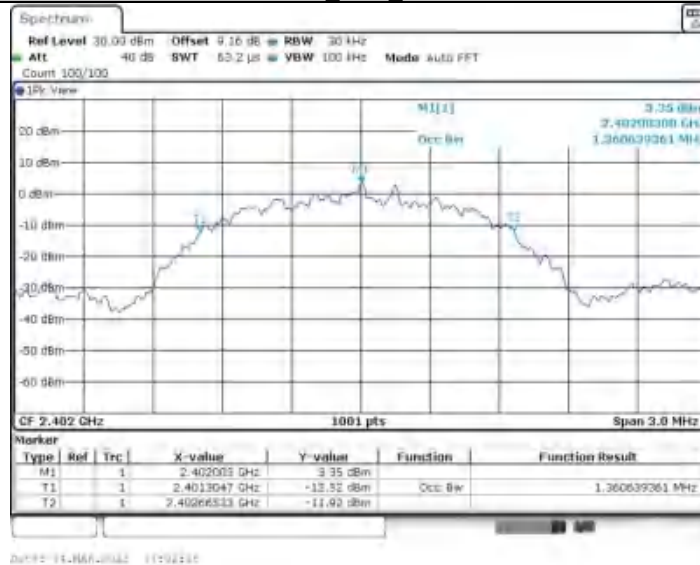
## Test Graphs



### DH5\_Ant1\_2480



### 2DH5\_Ant1\_2402



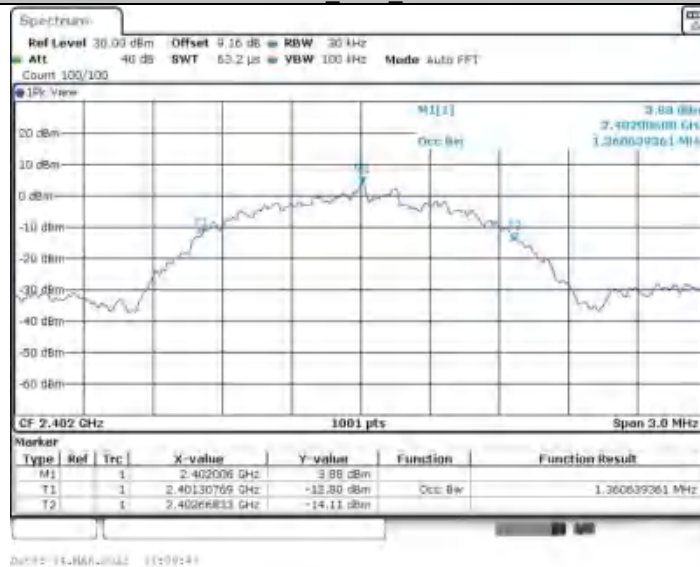
### 2DH5\_Ant1\_2441



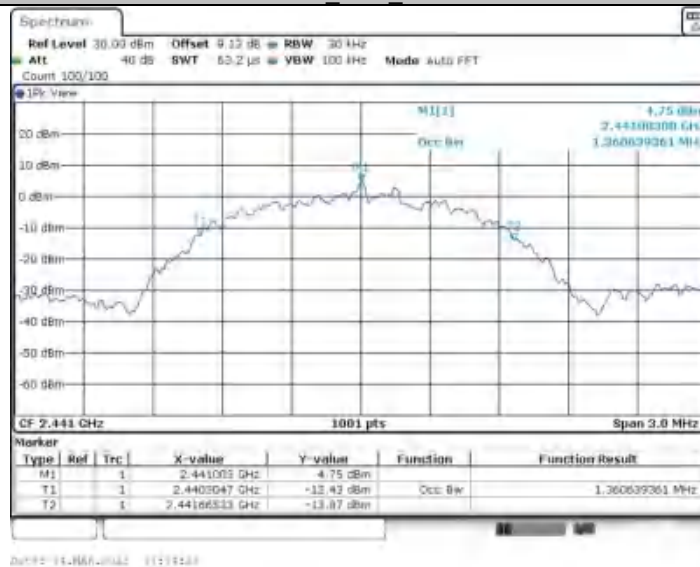
### 2DH5\_Ant1\_2480



### 3DH5\_Ant1\_2402



### 3DH5\_Ant1\_2441



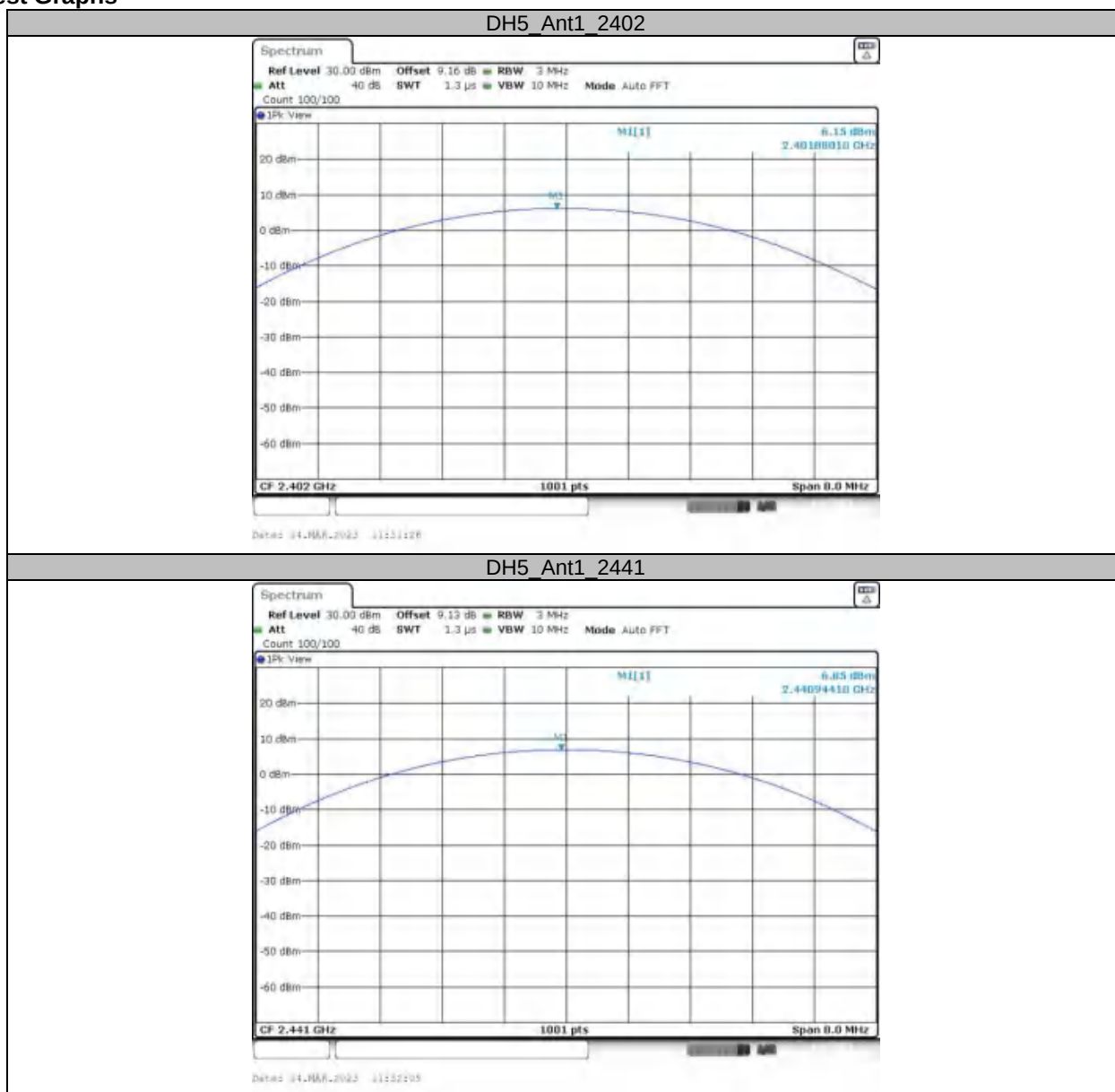


## APPENDIX I - MAXIMUM OUTPUT POWER

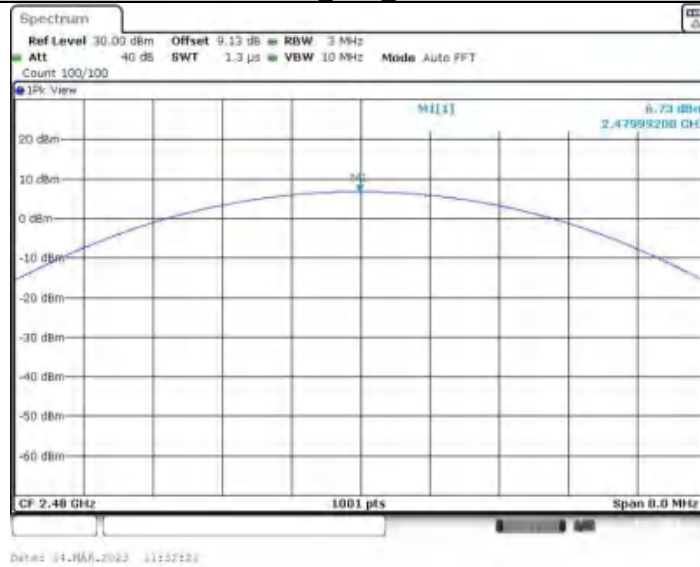
|           |                |
|-----------|----------------|
| Test Mode | TX Mode _1Mbps |
|-----------|----------------|

| Test Mode | Antenna | Channel | Conducted Peak Power[dBm] | Conducted Limit[dBm] | Verdict |
|-----------|---------|---------|---------------------------|----------------------|---------|
| DH5       | Ant1    | 2402    | 6.15                      | ≤20.97               | PASS    |
|           |         | 2441    | 6.85                      | ≤20.97               | PASS    |
|           |         | 2480    | 6.73                      | ≤20.97               | PASS    |
| 2DH5      | Ant1    | 2402    | 6.13                      | ≤20.97               | PASS    |
|           |         | 2441    | 6.85                      | ≤20.97               | PASS    |
|           |         | 2480    | 6.74                      | ≤20.97               | PASS    |
| 3DH5      | Ant1    | 2402    | 6.14                      | ≤20.97               | PASS    |
|           |         | 2441    | 6.83                      | ≤20.97               | PASS    |
|           |         | 2480    | 6.72                      | ≤20.97               | PASS    |

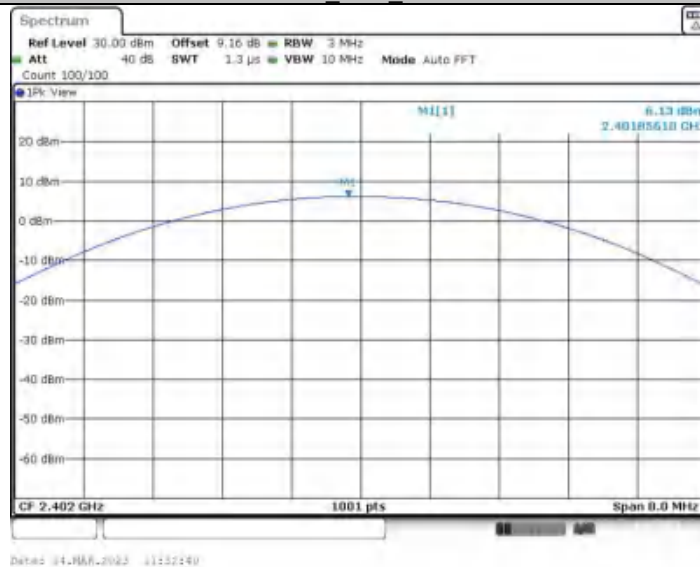
### Test Graphs



### DH5\_Ant1\_2480



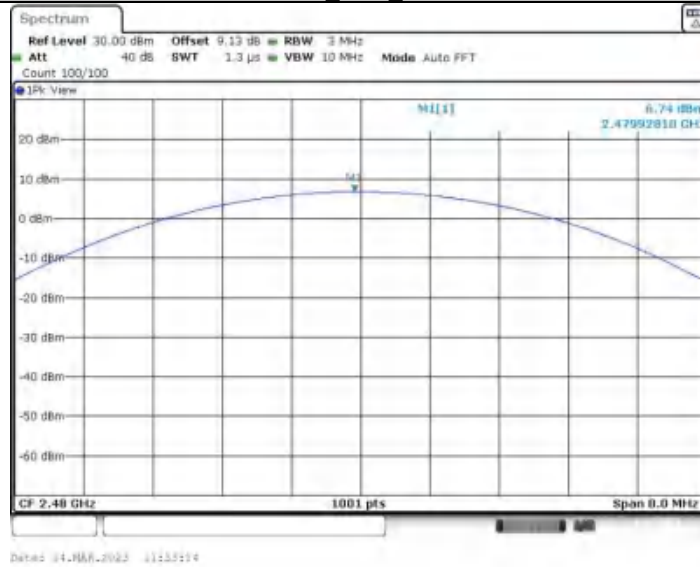
### 2DH5\_Ant1\_2402



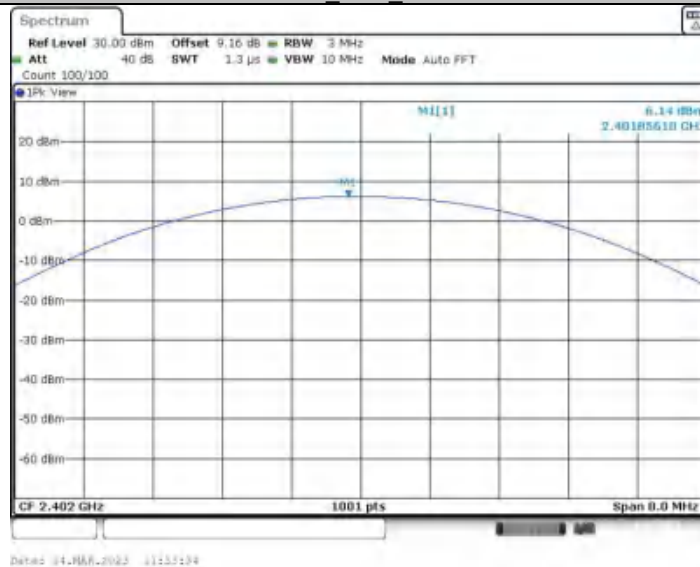
### 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



## 3DH5\_Ant1\_2402



## 3DH5\_Ant1\_2441



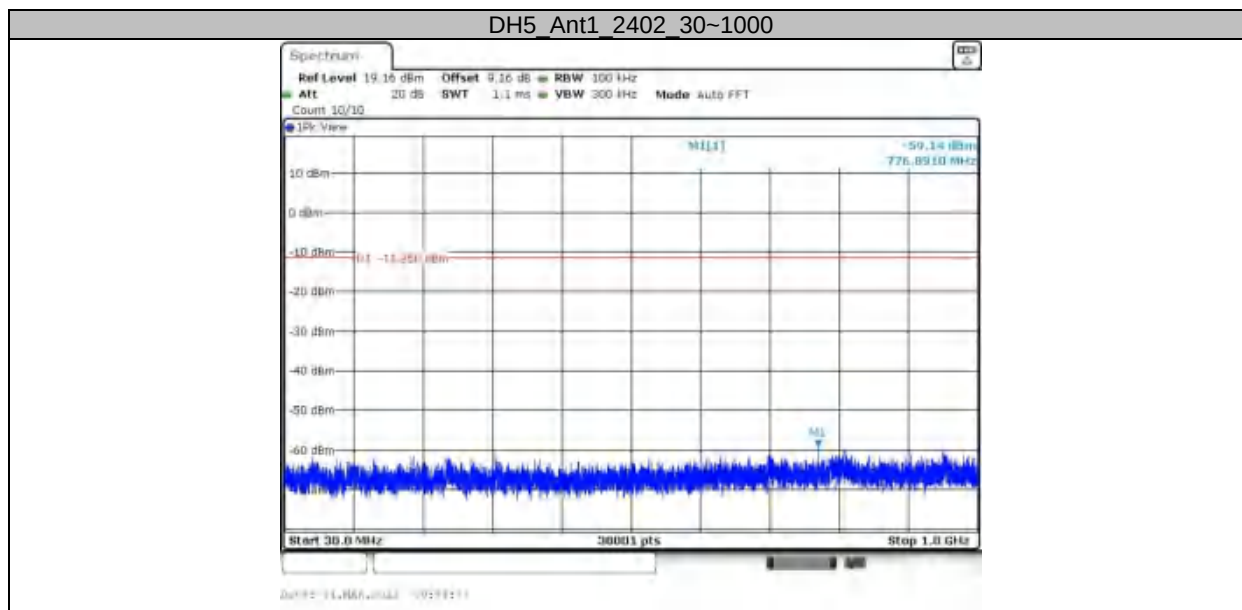


## APPENDIX J - CONDUCTED SPURIOUS EMISSION

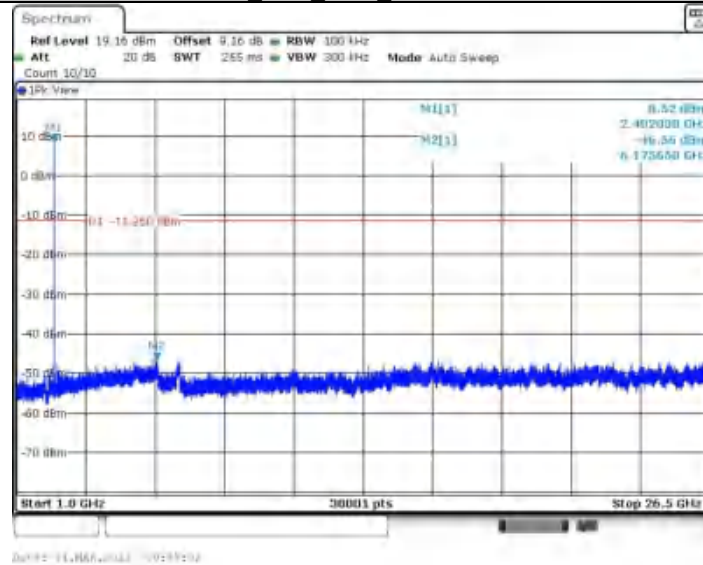
|           |                |
|-----------|----------------|
| Test Mode | TX Mode _1Mbps |
|-----------|----------------|

| TestMode | Antenna | Freq(MHz) | FreqRange [MHz] | RefLevel [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|----------|---------|-----------|-----------------|----------------|--------------|-------------|---------|
| DH5      | Ant1    | 2402      | 30~1000         | 8.75           | -59.14       | ≤-11.25     | PASS    |
|          |         |           | 1000~26500      | 8.75           | -46.56       | ≤-11.25     | PASS    |
|          |         | 2441      | 30~1000         | 9.64           | -60.39       | ≤-10.36     | PASS    |
|          |         |           | 1000~26500      | 9.64           | -46.41       | ≤-10.36     | PASS    |
|          |         | 2480      | 30~1000         | 10.21          | -59.88       | ≤-9.79      | PASS    |
|          |         |           | 1000~26500      | 10.21          | -46.01       | ≤-9.79      | PASS    |
| 2DH5     | Ant1    | 2402      | 30~1000         | 6.06           | -60.65       | ≤-13.94     | PASS    |
|          |         |           | 1000~26500      | 6.06           | -45.81       | ≤-13.94     | PASS    |
|          |         | 2441      | 30~1000         | 6.83           | -59.65       | ≤-13.17     | PASS    |
|          |         |           | 1000~26500      | 6.83           | -46.67       | ≤-13.17     | PASS    |
|          |         | 2480      | 30~1000         | 6.68           | -60.97       | ≤-13.32     | PASS    |
|          |         |           | 1000~26500      | 6.68           | -45.72       | ≤-13.32     | PASS    |
| 3DH5     | Ant1    | 2402      | 30~1000         | 6.06           | -59.47       | ≤-13.94     | PASS    |
|          |         |           | 1000~26500      | 6.06           | -46.9        | ≤-13.94     | PASS    |
|          |         | 2441      | 30~1000         | 6.80           | -59.37       | ≤-13.2      | PASS    |
|          |         |           | 1000~26500      | 6.80           | -46.38       | ≤-13.2      | PASS    |
|          |         | 2480      | 30~1000         | 6.71           | -60.25       | ≤-13.29     | PASS    |
|          |         |           | 1000~26500      | 6.71           | -46.4        | ≤-13.29     | PASS    |

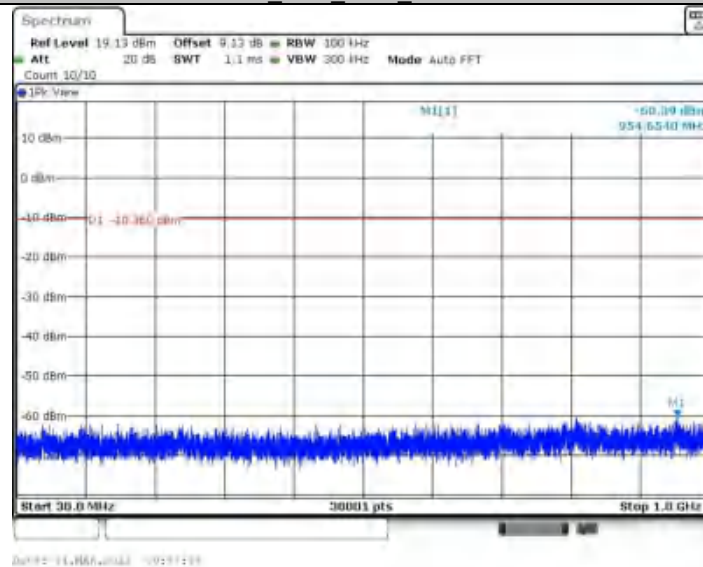
### Test Graphs



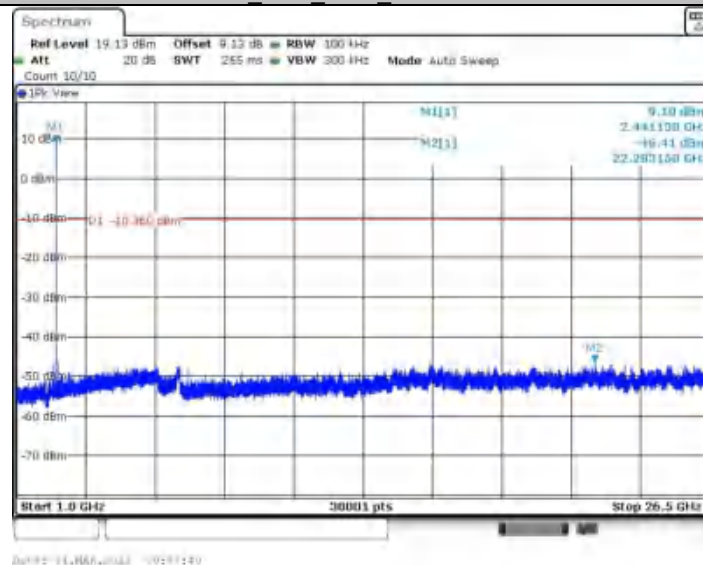
### DH5\_Ant1\_2402\_1000~26500



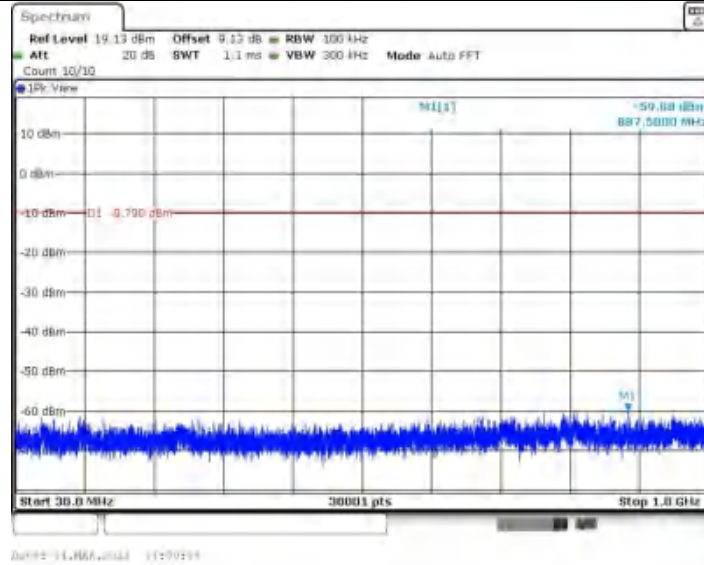
### DH5\_Ant1\_2441\_30~1000



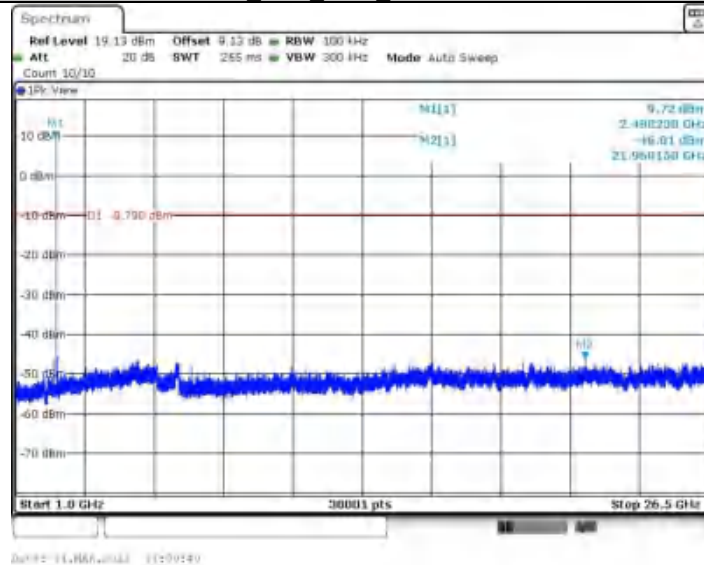
### DH5\_Ant1\_2441\_1000~26500



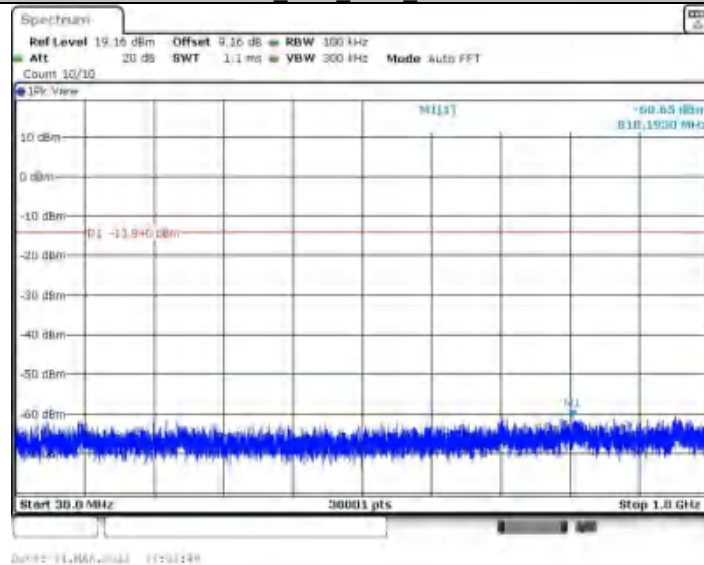
### DH5\_Ant1\_2480\_30~1000



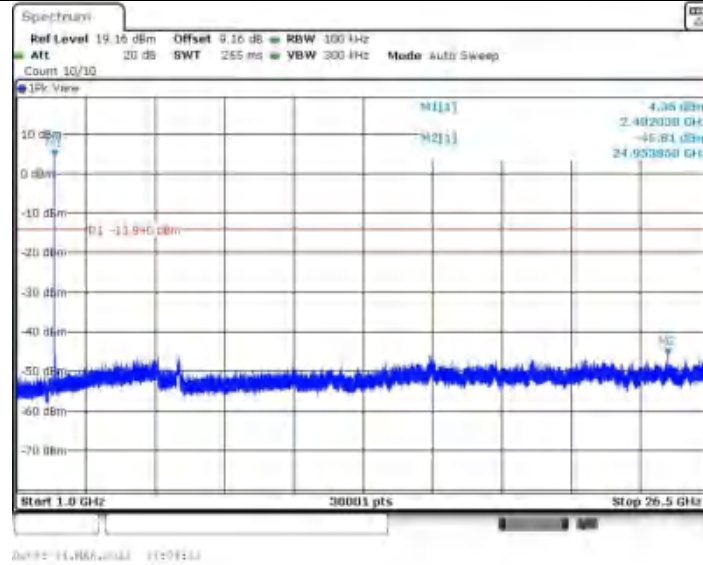
### DH5\_Ant1\_2480\_1000~26500



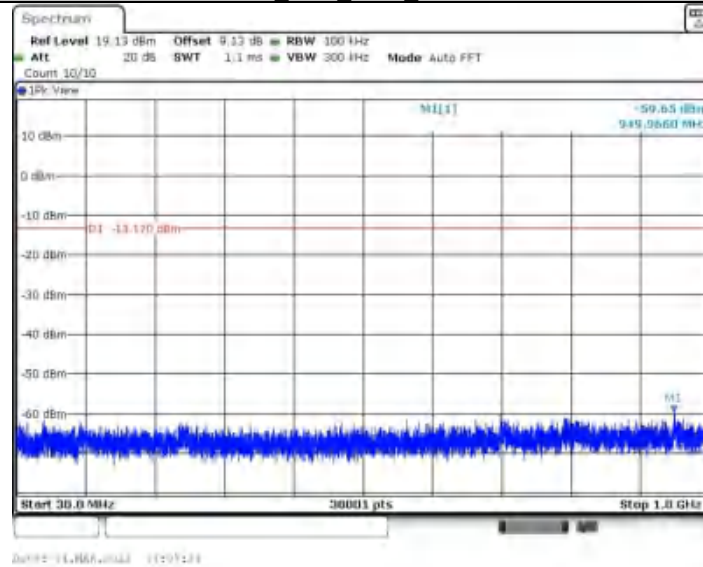
### 2DH5\_Ant1\_2402\_30~1000



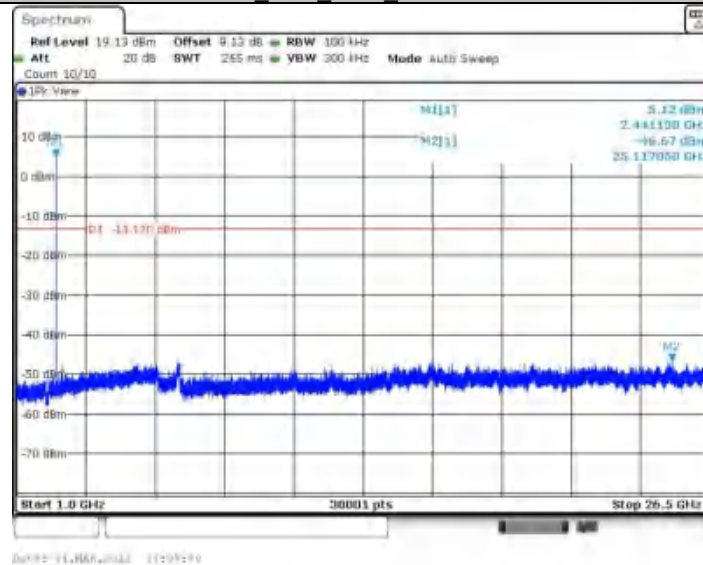
## 2DH5\_Ant1\_2402\_1000~26500



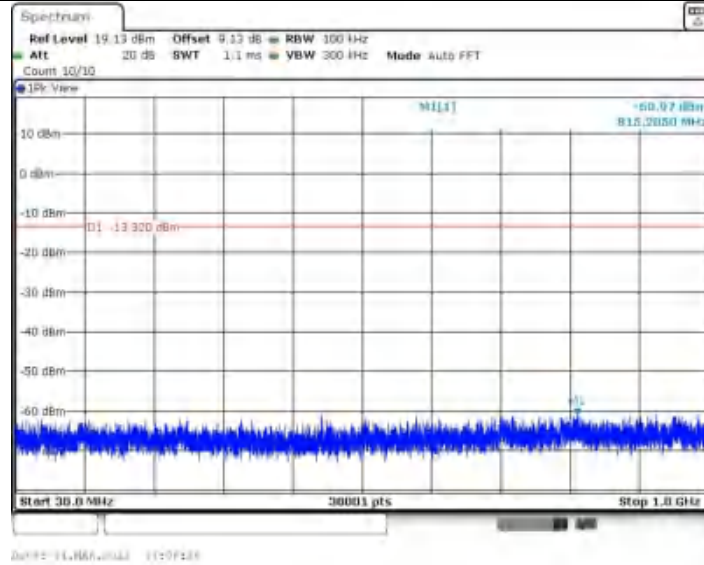
## 2DH5\_Ant1\_2441\_30~1000



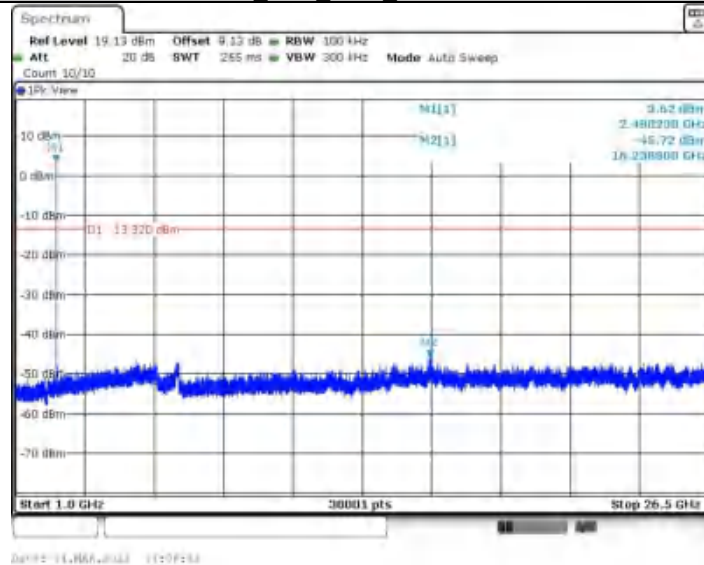
## 2DH5\_Ant1\_2441\_1000~26500



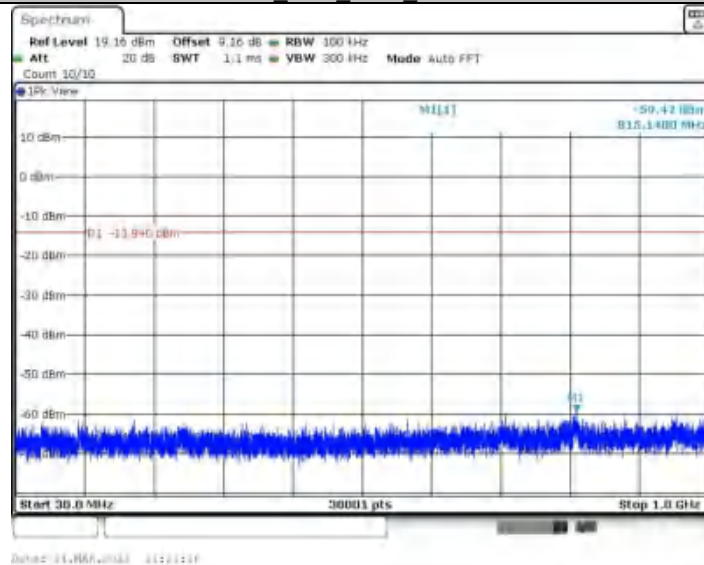
## 2DH5\_Ant1\_2480\_30~1000



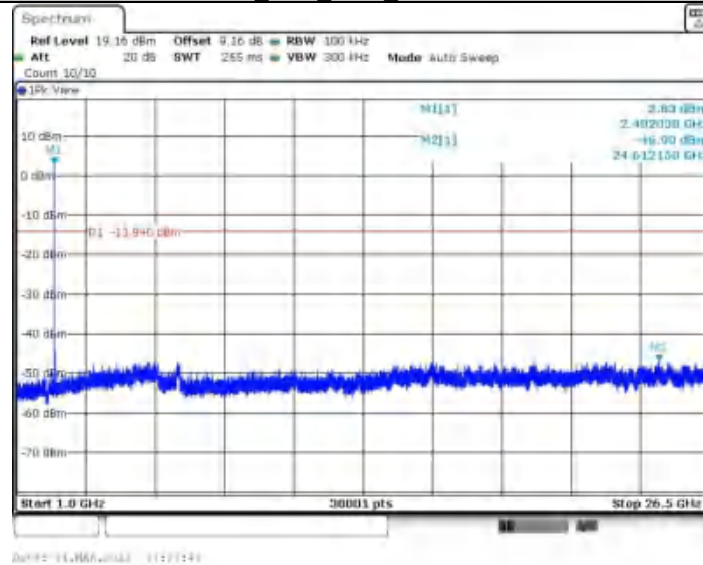
## 2DH5\_Ant1\_2480\_1000~26500



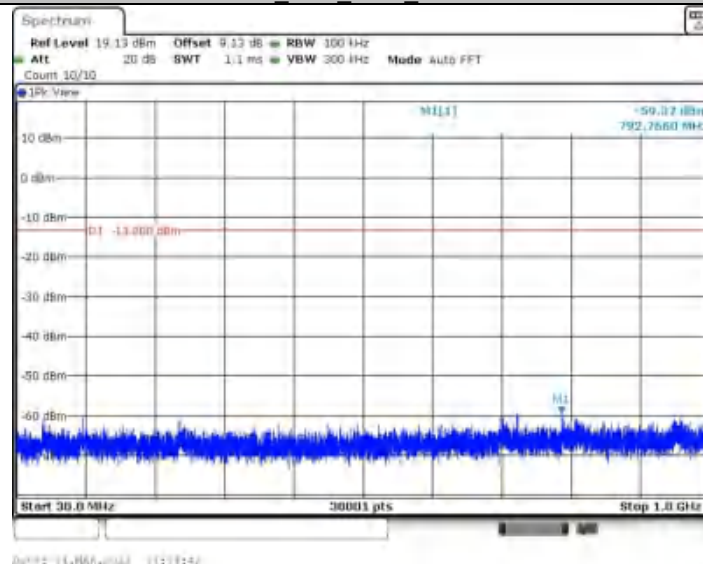
## 3DH5\_Ant1\_2402\_30~1000



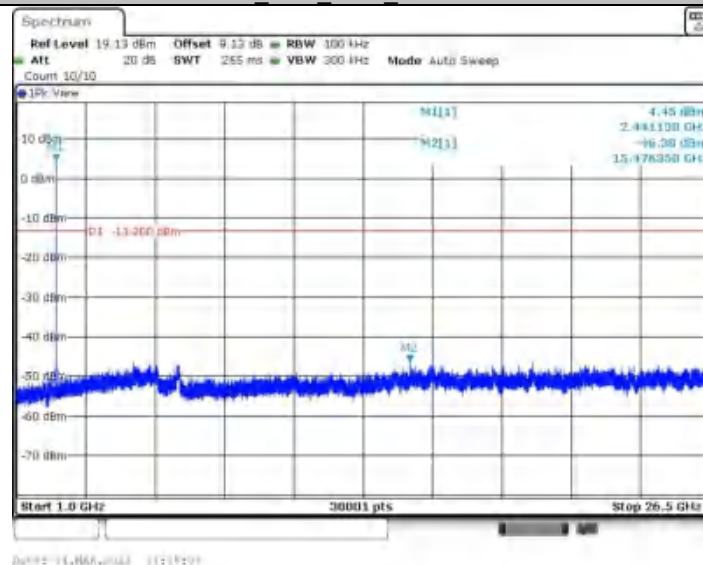
## 3DH5\_Ant1\_2402\_1000~26500

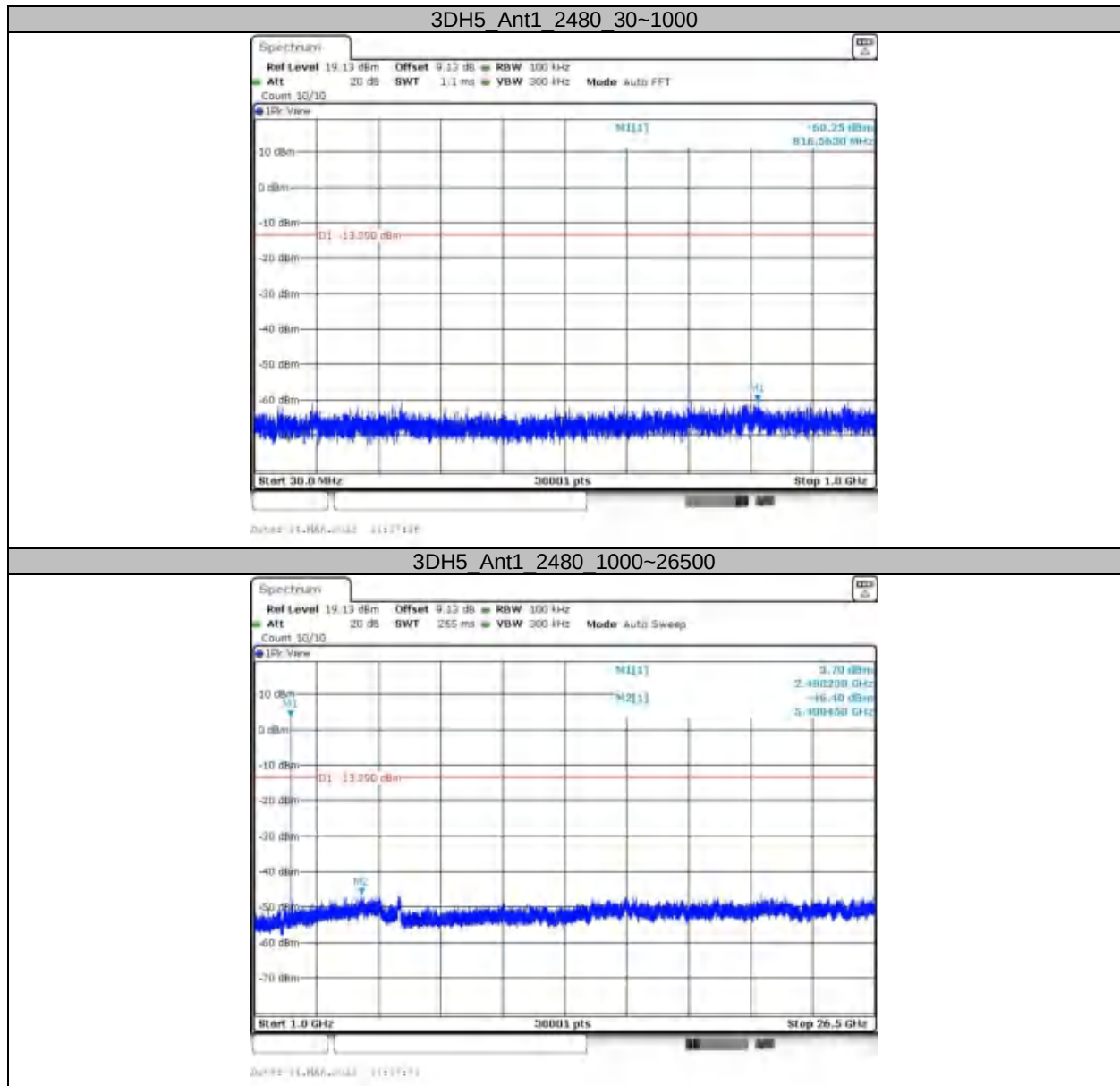


## 3DH5\_Ant1\_2441\_30~1000



## 3DH5\_Ant1\_2441\_1000~26500





## APPENDIX K - DECLARATION FOR BLUETOOTH DEVICE

### 3. Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device has no influence on the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason the check of these RF parameters in one op-mode is sufficient.

### 4. Frequency range of a Bluetooth device:

Hereby we declare that the maximum frequency of this device is: 2402 - 2480MHz. This is according to the Bluetooth Core Specification (+ critical errata) for devices which will be operated in the USA.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E). Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification are not supported by this device.

### 5. Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organised in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from its BD address which is unique for each Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

### 6. Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67, 56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59, 72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75, 09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06, 01, 51, 03, 55, 05, 04

### 7. Equally average use of frequencies in data mode and behaviour for short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

- LAP/UAP of the master of the connection.
- Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD\_ADDRESS. The BD\_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD\_ADDRESS.

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronisation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5  $\mu$ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire.

LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR- operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behaviour:

The first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5  $\mu$ s). The hopping sequence will always differ from the first one.

**8. Receiver input bandwidth and behaviour for repeated single or multiple packets:**

The input bandwidth of the receiver is 1 MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master.

Additionally the type of connection (e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

**End of Test Report**