

# **FCC REPORT**

## **(Bluetooth)**

**Applicant:** 8Devices

**Address of Applicant:** Gedimino 47, Kaunas, LT-44242, Lithuania

**Equipment Under Test (EUT)**

**Product Name:** Komikan

**Model No.:** Komikan

**FCC ID:** Z9W-KOM

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247

**Date of sample receipt:** 24 Mar., 2020

**Date of Test:** 24 Mar., to 06 May, 2020

**Date of report issued:** 06 May, 2020

**Test Result:** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## 2 Version

| Version No. | Date         | Description |
|-------------|--------------|-------------|
| 00          | 06 May, 2020 | Original    |
|             |              |             |
|             |              |             |
|             |              |             |
|             |              |             |

Tested by:

*Mike.ou*

Test Engineer

Date:

06 May, 2020

Reviewed by:

*Winner Zhang*

Project Engineer

Date:

06 May, 2020

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## 4 Test Summary

| Test Items                                                                                                                                                                                                                                                                                                             | Section in CFR 47                                                                 | Result |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|
| Antenna Requirement                                                                                                                                                                                                                                                                                                    | 15.203 & 15.247 (b)                                                               | Pass   |
| AC Power Line Conducted Emission                                                                                                                                                                                                                                                                                       | 15.207                                                                            | Pass   |
| Conducted Peak Output Power                                                                                                                                                                                                                                                                                            | 15.247 (b)(1)                                                                     | Pass   |
| 20dB Occupied Bandwidth                                                                                                                                                                                                                                                                                                | 15.247 (a)(1)                                                                     | Pass   |
| Carrier Frequencies Separation                                                                                                                                                                                                                                                                                         | 15.247 (a)(1)                                                                     | Pass   |
| Hopping Channel Number                                                                                                                                                                                                                                                                                                 | 15.247 (a)(1)                                                                     | Pass   |
| Dwell Time                                                                                                                                                                                                                                                                                                             | 15.247 (a)(1)                                                                     | Pass   |
| Spurious Emission                                                                                                                                                                                                                                                                                                      | 15.205 & 15.209                                                                   | Pass   |
| Band Edge                                                                                                                                                                                                                                                                                                              | 15.247(d)                                                                         | Pass   |
| <b>Remark:</b><br><ol style="list-style-type: none"><li>1. Pass: The EUT complies with the essential requirements in the standard.</li><li>2. N/A: Not Applicable.</li><li>3. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 1.0dB (provided by the customer).</li></ol> |                                                                                   |        |
| <b>Test Method:</b>                                                                                                                                                                                                                                                                                                    | ANSI C63.4-2014<br>ANSI C63.10-2013<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |        |

## 5 General Information

### 5.1 Client Information

|                        |                                          |
|------------------------|------------------------------------------|
| Applicant:             | 8Devices                                 |
| Address:               | Gedimino 47, Kaunas, LT-44242, Lithuania |
| Manufacturer/ Factory: | 8Devices                                 |
| Address:               | Gedimino 47, Kaunas, LT-44242, Lithuania |

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

|                        |                                                                               |
|------------------------|-------------------------------------------------------------------------------|
| Product Name:          | Komikan                                                                       |
| Model No.:             | Komikan                                                                       |
| Operation Frequency:   | 2402MHz~2480MHz                                                               |
| Transfer rate:         | 1/2/3 Mbits/s                                                                 |
| Number of channel:     | 79                                                                            |
| Modulation type:       | GFSK, $\pi/4$ -DQPSK, 8DPSK                                                   |
| Modulation technology: | FHSS                                                                          |
| Antenna Type:          | Ceramic Antenna, Whip Antenna, Flex Antenna                                   |
| Antenna gain:          | Ceramic Antenna: 2.09 dBi<br>Flex Antenna: 3.20 dBi<br>Whip Antenna: 4.00 dBi |
| Power supply:          | DC 3.3V                                                                       |
| Test Sample Condition: | The test samples were provided in good working order with no visible defects. |

| Operation Frequency each of channel for GFSK, $\pi/4$ -DQPSK, 8DPSK     |           |         |           |         |           |         |           |
|-------------------------------------------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                                                                 | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0                                                                       | 2402MHz   | 20      | 2422MHz   | 40      | 2442MHz   | 60      | 2462MHz   |
| 1                                                                       | 2403MHz   | 21      | 2423MHz   | 41      | 2443MHz   | 61      | 2463MHz   |
| 2                                                                       | 2404MHz   | 22      | 2424MHz   | 42      | 2444MHz   | 62      | 2464MHz   |
| 3                                                                       | 2405MHz   | 23      | 2425MHz   | 43      | 2445MHz   | 63      | 2465MHz   |
| 4                                                                       | 2406MHz   | 24      | 2426MHz   | 44      | 2446MHz   | 64      | 2466MHz   |
| 5                                                                       | 2407MHz   | 25      | 2427MHz   | 45      | 2447MHz   | 65      | 2467MHz   |
| ...                                                                     | ...       | ...     | ...       | ...     | ...       | ...     | ...       |
| 15                                                                      | 2417MHz   | 35      | 2437MHz   | 55      | 2457MHz   | 75      | 2477MHz   |
| 16                                                                      | 2418MHz   | 36      | 2438MHz   | 56      | 2458MHz   | 76      | 2478MHz   |
| 17                                                                      | 2419MHz   | 37      | 2439MHz   | 57      | 2459MHz   | 77      | 2479MHz   |
| 18                                                                      | 2420MHz   | 38      | 2440MHz   | 58      | 2460MHz   | 78      | 2480MHz   |
| 19                                                                      | 2421MHz   | 39      | 2441MHz   | 59      | 2461MHz   |         |           |
| Remark: Channel 0, 39 & 78 selected for GFSK, $\pi/4$ -DQPSK and 8DPSK. |           |         |           |         |           |         |           |

### 5.3 Test environment and test mode

| Operating Environment:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Temperature:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 24.0 °C                                                                 |
| Humidity:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 54 % RH                                                                 |
| Atmospheric Pressure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1010 mbar                                                               |
| Test Modes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                         |
| Non-hopping mode:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Keep the EUT in continuous transmitting mode with worst case data rate. |
| Hopping mode:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Keep the EUT in hopping mode.                                           |
| <b>Remark:</b> <ol style="list-style-type: none"> <li>1. GFSK (1 Mbps) is the worst case mode.</li> <li>2. Conducted Emission and Radiated Emission below 1GHz pre-scan Ceramic Antenna and Flex Antenna and Whip Antenna, found Whip Antenna was worse case mode, the report only reflects the worst mode.</li> </ol>                                                                                                                                                                                                                                                                                                                             |                                                                         |
| Radiated Emission: The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. |                                                                         |

### 5.4 Description of Support Units

| Manufacturer | Description | Model        | Serial Number | FCC ID/DoC |
|--------------|-------------|--------------|---------------|------------|
| DELL         | PC          | OPTIPLEX7070 | 2J8XSZ2       | DoC        |
| DELL         | MONITOR     | SE2018HR     | 3M7QPY2       | DoC        |
| DELL         | KEYBOARD    | KB216d       | N/A           | DoC        |
| DELL         | MOUSE       | MS116t1      | N/A           | DoC        |

### 5.5 Measurement Uncertainty

| Parameters                          | Expanded Uncertainty |
|-------------------------------------|----------------------|
| Conducted Emission (9kHz ~ 30MHz)   | ±1.60 dB (k=2)       |
| Radiated Emission (9kHz ~ 30MHz)    | ±3.12 dB (k=2)       |
| Radiated Emission (30MHz ~ 1000MHz) | ±4.32 dB (k=2)       |
| Radiated Emission (1GHz ~ 18GHz)    | ±5.38 dB (k=2)       |
| Radiated Emission (18GHz ~ 40GHz)   | ±3.36 dB (k=2)       |

### 5.6 Additions to, deviations, or exclusions from the method

|    |
|----|
| No |
|----|

## 5.7 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

## 5.8 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No.110~116, Building B, Jinyuan Business Building, Xixiang Road,  
Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: [info@ccis-cb.com](mailto:info@ccis-cb.com), Website: <http://www.ccis-cb.com>

## 5.9 Test Instruments list

| Radiated Emission: |                 |               |                    |                      |                          |
|--------------------|-----------------|---------------|--------------------|----------------------|--------------------------|
| Test Equipment     | Manufacturer    | Model No.     | Serial No.         | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| 3m SAC             | SAEMC           | 9m*6m*6m      | 966                | 07-22-2017           | 07-21-2020               |
| Loop Antenna       | SCHWARZBECK     | FMZB1519B     | 044                | 03-07-2020           | 03-06-2021               |
| BiConiLog Antenna  | SCHWARZBECK     | VULB9163      | 497                | 03-07-2020           | 03-06-2021               |
| Horn Antenna       | SCHWARZBECK     | BBHA9120D     | 916                | 03-07-2020           | 03-06-2021               |
| Horn Antenna       | SCHWARZBECK     | BBHA9120D     | 1805               | 06-22-2017           | 06-21-2020               |
| Horn Antenna       | SCHWARZBECK     | BBHA 9170     | BBHA9170582        | 11-18-2019           | 11-17-2020               |
| EMI Test Software  | AUDIX           | E3            | Version: 6.110919b |                      |                          |
| Pre-amplifier      | HP              | 8447D         | 2944A09358         | 03-07-2020           | 03-06-2021               |
| Pre-amplifier      | CD              | PAP-1G18      | 11804              | 03-07-2020           | 03-06-2021               |
| Spectrum analyzer  | Rohde & Schwarz | FSP30         | 101454             | 03-05-2020           | 03-04-2021               |
| Spectrum analyzer  | Rohde & Schwarz | FSP40         | 100363             | 11-18-2019           | 11-17-2020               |
| EMI Test Receiver  | Rohde & Schwarz | ESRP7         | 101070             | 03-05-2020           | 03-04-2021               |
| Cable              | ZDECL           | Z108-NJ-NJ-81 | 1608458            | 03-07-2020           | 03-06-2021               |
| Cable              | MICRO-COAX      | MFR64639      | K10742-5           | 03-07-2020           | 03-06-2021               |
| Cable              | SUHNER          | SUCOFLEX100   | 58193/4PE          | 03-07-2020           | 03-06-2021               |
| RF Switch Unit     | MWRFTTEST       | MW200         | N/A                | N/A                  | N/A                      |
| Test Software      | MWRFTTEST       | MTS8200       | Version: 2.0.0.0   |                      |                          |

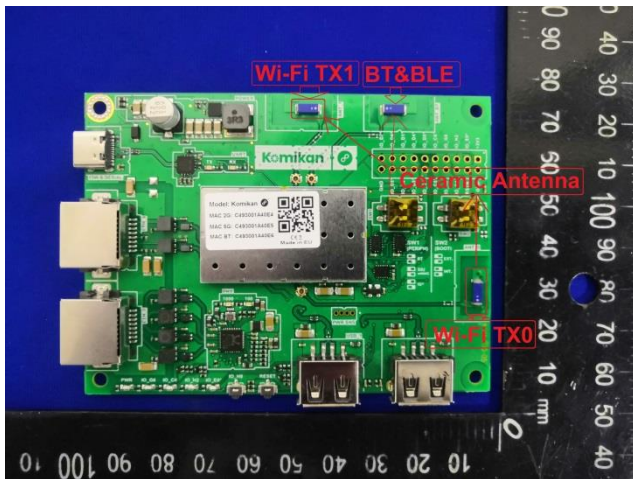
| Conducted Emission: |                 |            |                    |                      |                          |
|---------------------|-----------------|------------|--------------------|----------------------|--------------------------|
| Test Equipment      | Manufacturer    | Model No.  | Serial No.         | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
| EMI Test Receiver   | Rohde & Schwarz | ESCI       | 101189             | 03-05-2020           | 03-04-2021               |
| Pulse Limiter       | SCHWARZBECK     | OSRAM 2306 | 9731               | 03-05-2020           | 03-04-2021               |
| LISN                | CHASE           | MN2050D    | 1447               | 03-05-2020           | 03-04-2021               |
| LISN                | Rohde & Schwarz | ESH3-Z5    | 8438621/010        | 07-21-2017           | 07-20-2020               |
| Cable               | HP              | 10503A     | N/A                | 03-05-2020           | 03-04-2021               |
| EMI Test Software   | AUDIX           | E3         | Version: 6.110919b |                      |                          |

## 6 Test results and measurement data

### 6.1 Antenna Requirement

| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | FCC Part 15 C Section 15.203 /247(b) |              |                    |                 |      |              |      |              |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------|--------------------|-----------------|------|--------------|------|--------------|------|
| <p>15.203 requirement:<br/>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(b) (4) requirement:<br/>(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> |                                      |              |                    |                 |      |              |      |              |      |
| <b>E.U.T Antenna:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |              |                    |                 |      |              |      |              |      |
| <p><i>The product is a professionally installed device which has two types of antennas for the application. The antennas information as below table:</i></p> <table border="1"> <thead> <tr> <th>Antenna Type</th><th>Antenna Gain (dBi)</th></tr> </thead> <tbody> <tr> <td>Ceramic Antenna</td><td>2.09</td></tr> <tr> <td>Flex Antenna</td><td>3.20</td></tr> <tr> <td>Whip Antenna</td><td>4.00</td></tr> </tbody> </table> <p><i>According to above information, the antennas meet the requirements of this section</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      | Antenna Type | Antenna Gain (dBi) | Ceramic Antenna | 2.09 | Flex Antenna | 3.20 | Whip Antenna | 4.00 |
| Antenna Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Antenna Gain (dBi)                   |              |                    |                 |      |              |      |              |      |
| Ceramic Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.09                                 |              |                    |                 |      |              |      |              |      |
| Flex Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3.20                                 |              |                    |                 |      |              |      |              |      |
| Whip Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4.00                                 |              |                    |                 |      |              |      |              |      |

Ceramic Antenna



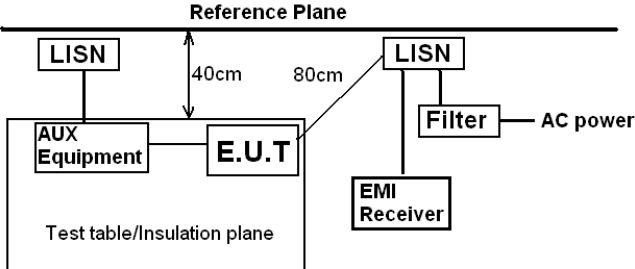
Flex Antenna



Whip Antenna

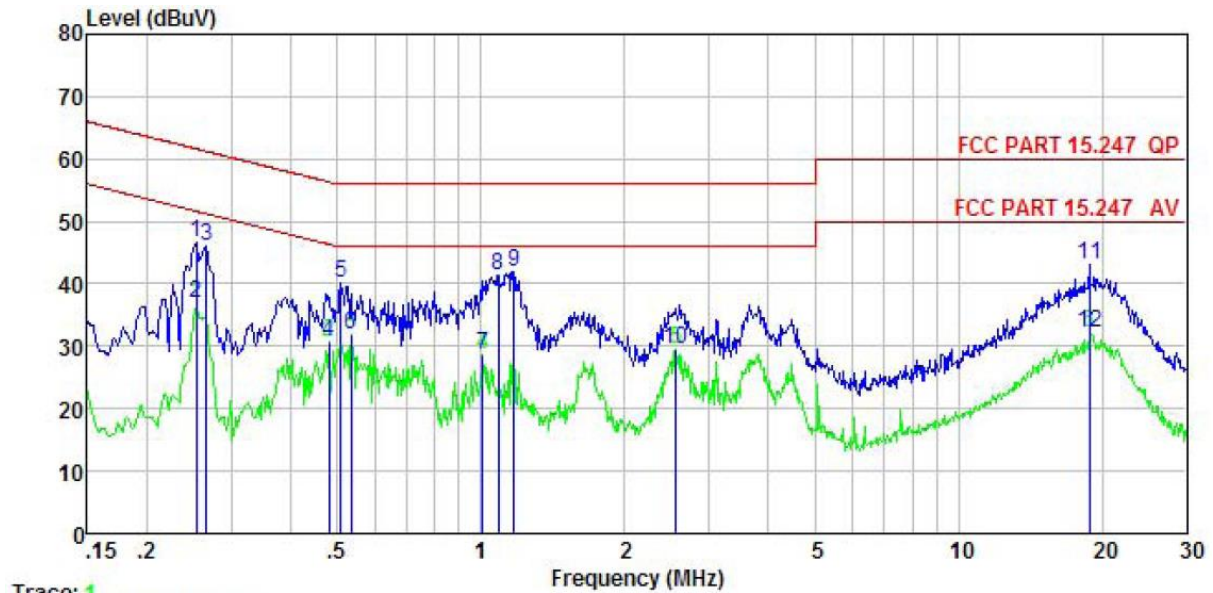


## 6.2 Conducted Emissions

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |           |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|
| Test Requirement:                                | FCC Part 15 C Section 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |           |
| Test Frequency Range:                            | 150 kHz to 30 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |           |
| Class / Severity:                                | Class B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |           |
| Receiver setup:                                  | RBW=9 kHz, VBW=30 kHz, Sweep time=auto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |
| Limit:                                           | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Limit (dBuV) |           |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Quasi-peak   | Average   |
|                                                  | 0.15-0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 66 to 56*    | 56 to 46* |
|                                                  | 0.5-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 56           | 46        |
|                                                  | 5-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 60           | 50        |
| * Decreases with the logarithm of the frequency. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |           |
| Test setup:                                      |  <p>Remark<br/> E.U.T: Equipment Under Test<br/> LISN: Line Impedance Stabilization Network<br/> Test table height=0.8m</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |           |
| Test procedure:                                  | <ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10(latest version) on conducted measurement.</li> </ol> |              |           |
| Test Instruments:                                | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |           |
| Test mode:                                       | Hopping mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |           |
| Test results:                                    | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |

## Measurement Data:

|                 |                  |                |                        |
|-----------------|------------------|----------------|------------------------|
| Product name:   | Komikan          | Product model: | Komikan                |
| Test by:        | Mike             | Test mode:     | BT Tx mode             |
| Test frequency: | 150 kHz ~ 30 MHz | Phase:         | Line                   |
| Test voltage:   | AC 120 V/60 Hz   | Environment:   | Temp: 22.5°C Humi: 55% |

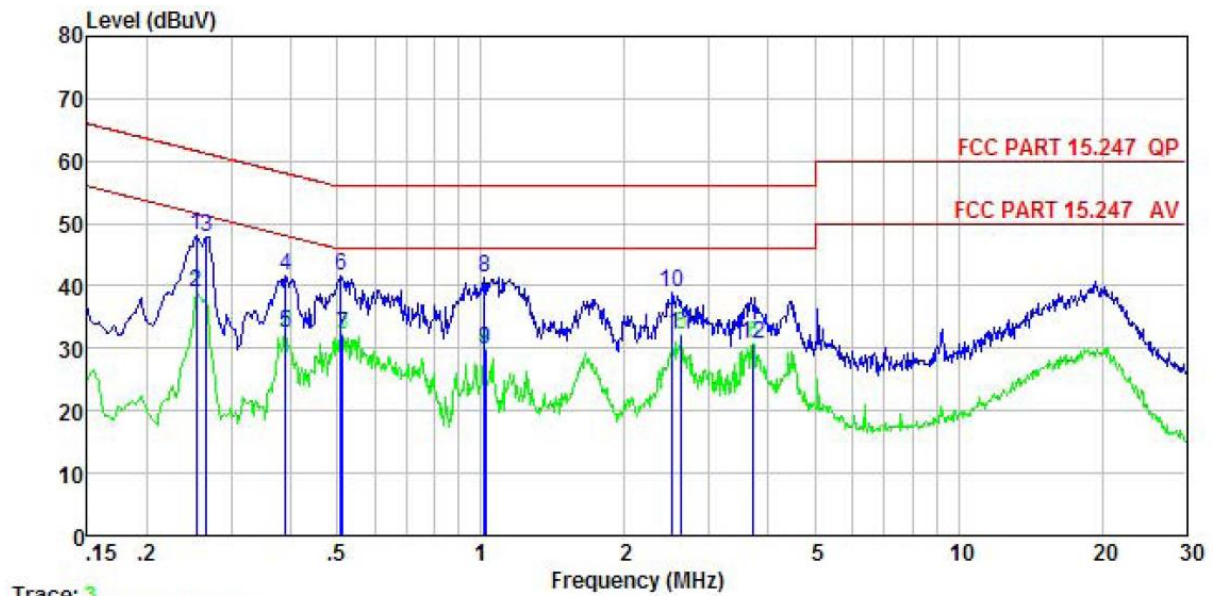


|    | Freq   | Read Level | LISN Factor | Aux Factor | Cable Loss | Level | Limit Line | Over Limit | Remark  |
|----|--------|------------|-------------|------------|------------|-------|------------|------------|---------|
|    | MHz    | dBuV       | dB          | dB         | dB         | dBuV  | dBuV       | dB         |         |
| 1  | 0.253  | 36.40      | -0.40       | -0.22      | 10.75      | 46.53 | 61.64      | -15.11     | QP      |
| 2  | 0.253  | 26.70      | -0.40       | -0.22      | 10.75      | 36.83 | 51.64      | -14.81     | Average |
| 3  | 0.266  | 36.06      | -0.39       | -0.23      | 10.75      | 46.19 | 61.25      | -15.06     | QP      |
| 4  | 0.481  | 20.63      | -0.39       | -0.24      | 10.75      | 30.75 | 46.32      | -15.57     | Average |
| 5  | 0.510  | 30.25      | -0.39       | -0.35      | 10.76      | 40.27 | 56.00      | -15.73     | QP      |
| 6  | 0.535  | 21.90      | -0.39       | -0.36      | 10.76      | 31.91 | 46.00      | -14.09     | Average |
| 7  | 1.010  | 17.60      | -0.38       | 0.45       | 10.87      | 28.54 | 46.00      | -17.46     | Average |
| 8  | 1.088  | 30.36      | -0.38       | 0.37       | 10.88      | 41.23 | 56.00      | -14.77     | QP      |
| 9  | 1.172  | 31.21      | -0.39       | 0.29       | 10.89      | 42.00 | 56.00      | -14.00     | QP      |
| 10 | 2.567  | 19.11      | -0.43       | -0.25      | 10.94      | 29.37 | 46.00      | -16.63     | Average |
| 11 | 18.820 | 31.69      | -0.91       | 1.43       | 10.92      | 43.13 | 60.00      | -16.87     | QP      |
| 12 | 18.820 | 20.81      | -0.91       | 1.43       | 10.92      | 32.25 | 50.00      | -17.75     | Average |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.

|                 |                  |                |                             |
|-----------------|------------------|----------------|-----------------------------|
| Product name:   | Komikan          | Product model: | Komikan                     |
| Test by:        | Mike             | Test mode:     | BT Tx mode                  |
| Test frequency: | 150 kHz ~ 30 MHz | Phase:         | Neutral                     |
| Test voltage:   | AC 120 V/60 Hz   | Environment:   | Temp: 22.5°C      Humi: 55% |

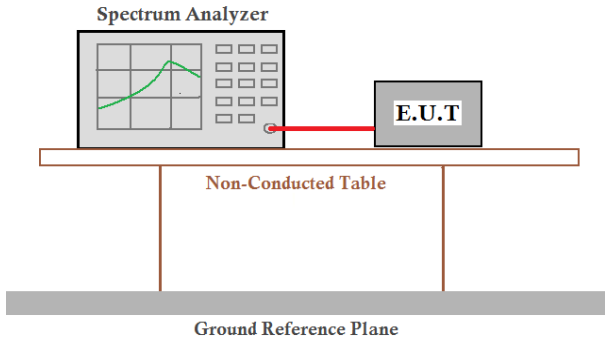


|    | Freq  | Read Level | LISN Factor | Aux Factor | Cable Loss | Level | Limit Line | Over Limit | Remark  |
|----|-------|------------|-------------|------------|------------|-------|------------|------------|---------|
|    | MHz   | dBuV       | dB          | dB         | dB         | dBuV  | dBuV       | dB         |         |
| 1  | 0.253 | 38.10      | -0.65       | 0.01       | 10.75      | 48.21 | 61.64      | -13.43     | QP      |
| 2  | 0.253 | 28.86      | -0.65       | 0.01       | 10.75      | 38.97 | 51.64      | -12.67     | Average |
| 3  | 0.266 | 37.73      | -0.65       | 0.01       | 10.75      | 47.84 | 61.25      | -13.41     | QP      |
| 4  | 0.389 | 31.58      | -0.64       | -0.05      | 10.72      | 41.61 | 58.08      | -16.47     | QP      |
| 5  | 0.389 | 22.33      | -0.64       | -0.05      | 10.72      | 32.36 | 48.08      | -15.72     | Average |
| 6  | 0.510 | 31.46      | -0.65       | 0.03       | 10.76      | 41.60 | 56.00      | -14.40     | QP      |
| 7  | 0.513 | 22.00      | -0.65       | 0.03       | 10.76      | 32.14 | 46.00      | -13.86     | Average |
| 8  | 1.016 | 31.08      | -0.63       | 0.08       | 10.87      | 41.40 | 56.00      | -14.60     | QP      |
| 9  | 1.021 | 19.63      | -0.63       | 0.08       | 10.87      | 29.95 | 46.00      | -16.05     | Average |
| 10 | 2.513 | 28.51      | -0.67       | 0.25       | 10.94      | 39.03 | 56.00      | -16.97     | QP      |
| 11 | 2.636 | 21.67      | -0.67       | 0.27       | 10.93      | 32.20 | 46.00      | -13.80     | Average |
| 12 | 3.720 | 20.00      | -0.69       | 0.46       | 10.90      | 30.67 | 46.00      | -15.33     | Average |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.

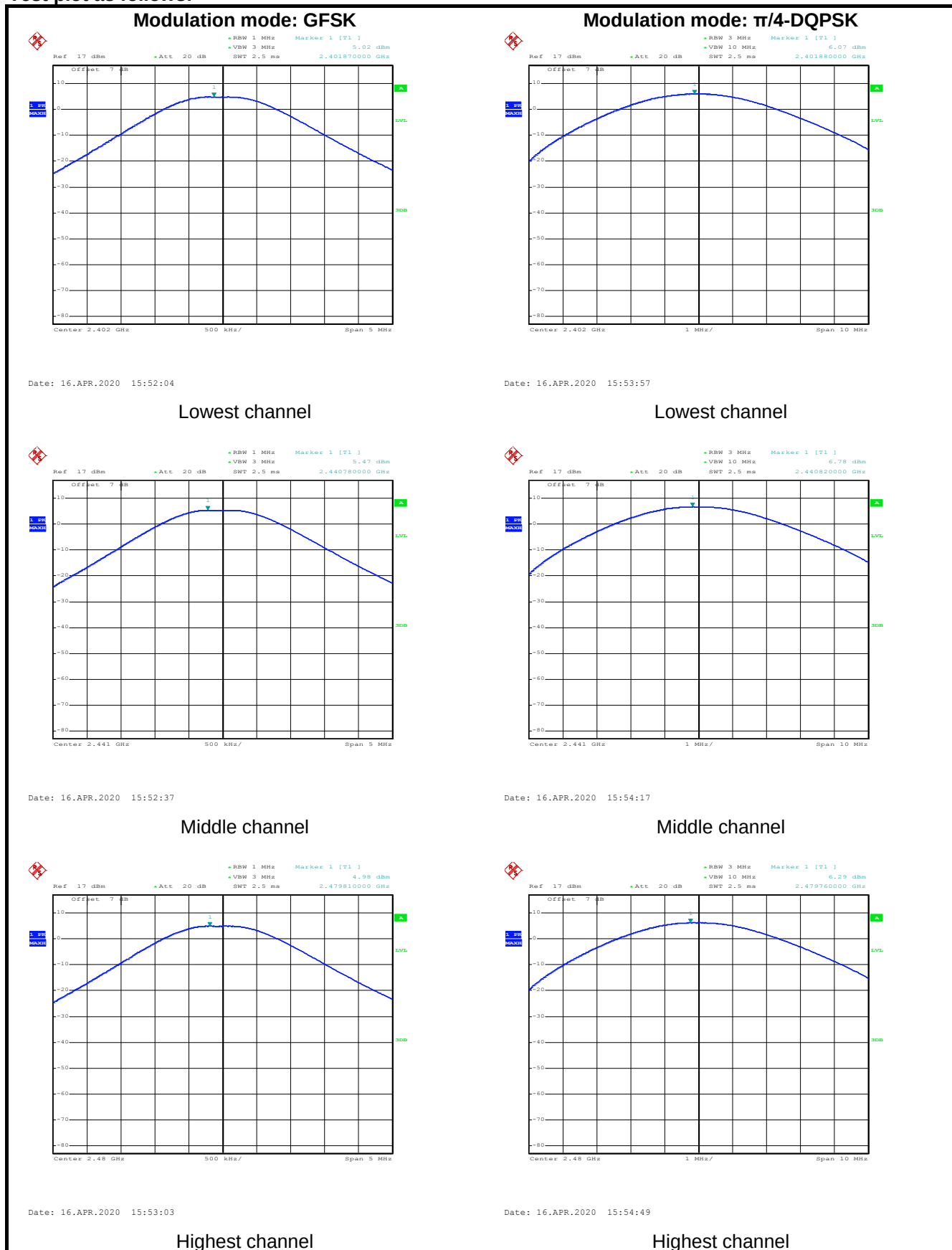
### 6.3 Conducted Output Power

|                   |                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (b)(1)                                                                                                                                                                                                                                                                                                                        |
| Receiver setup:   | RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW $\leq$ 1 MHz)<br>RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)                                                                                                                                                                                                                          |
| Limit:            | For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.                                                                                                                                      |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                           |
| Test mode:        | Non-hopping mode                                                                                                                                                                                                                                                                                                                                           |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                       |

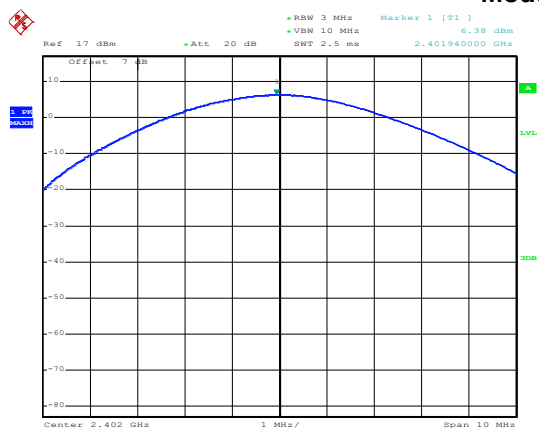
#### Measurement Data:

| Test channel        | Peak Output Power (dBm) | Limit (dBm) | Result |
|---------------------|-------------------------|-------------|--------|
| GFSK mode           |                         |             |        |
| Lowest channel      | 5.02                    | 30.00       | Pass   |
| Middle channel      | 5.47                    | 30.00       | Pass   |
| Highest channel     | 4.98                    | 30.00       | Pass   |
| $\pi/4$ -DQPSK mode |                         |             |        |
| Lowest channel      | 6.07                    | 21.00       | Pass   |
| Middle channel      | 6.78                    | 21.00       | Pass   |
| Highest channel     | 6.29                    | 21.00       | Pass   |
| 8DPSK mode          |                         |             |        |
| Lowest channel      | 6.38                    | 21.00       | Pass   |
| Middle channel      | 7.14                    | 21.00       | Pass   |
| Highest channel     | 6.68                    | 21.00       | Pass   |

Test plot as follows:

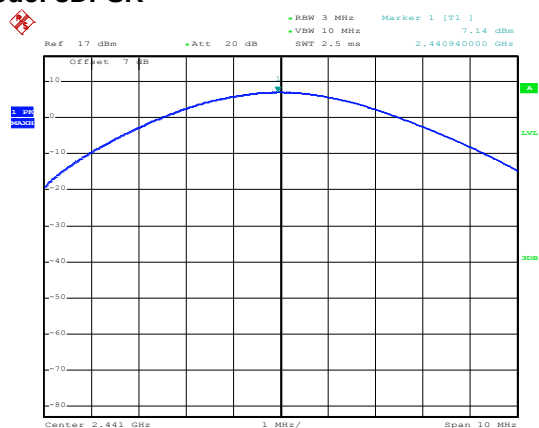


## Modulation mode: 8DPSK



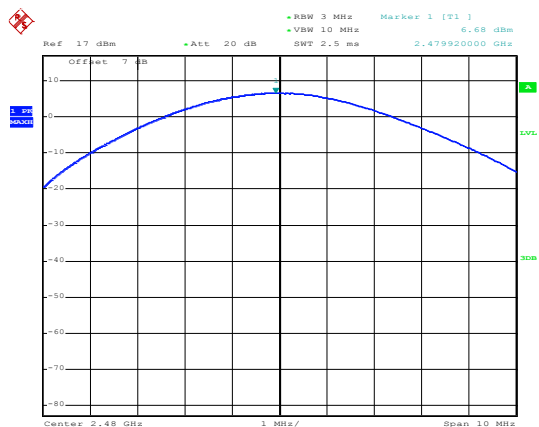
Date: 16.APR.2020 15:56:15

Lowest channel



Date: 16.APR.2020 15:55:51

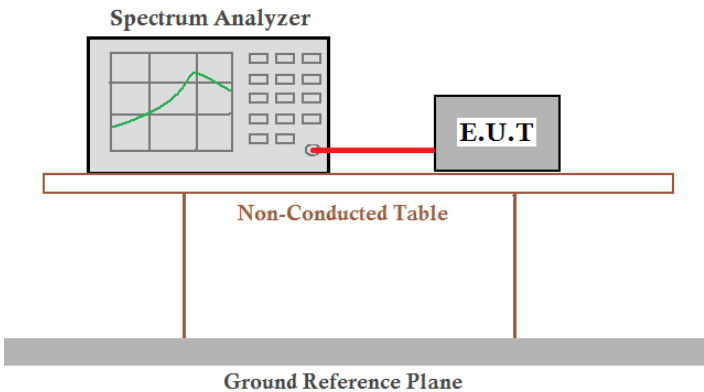
Middle channel



Date: 16.APR.2020 15:55:22

Highest channel

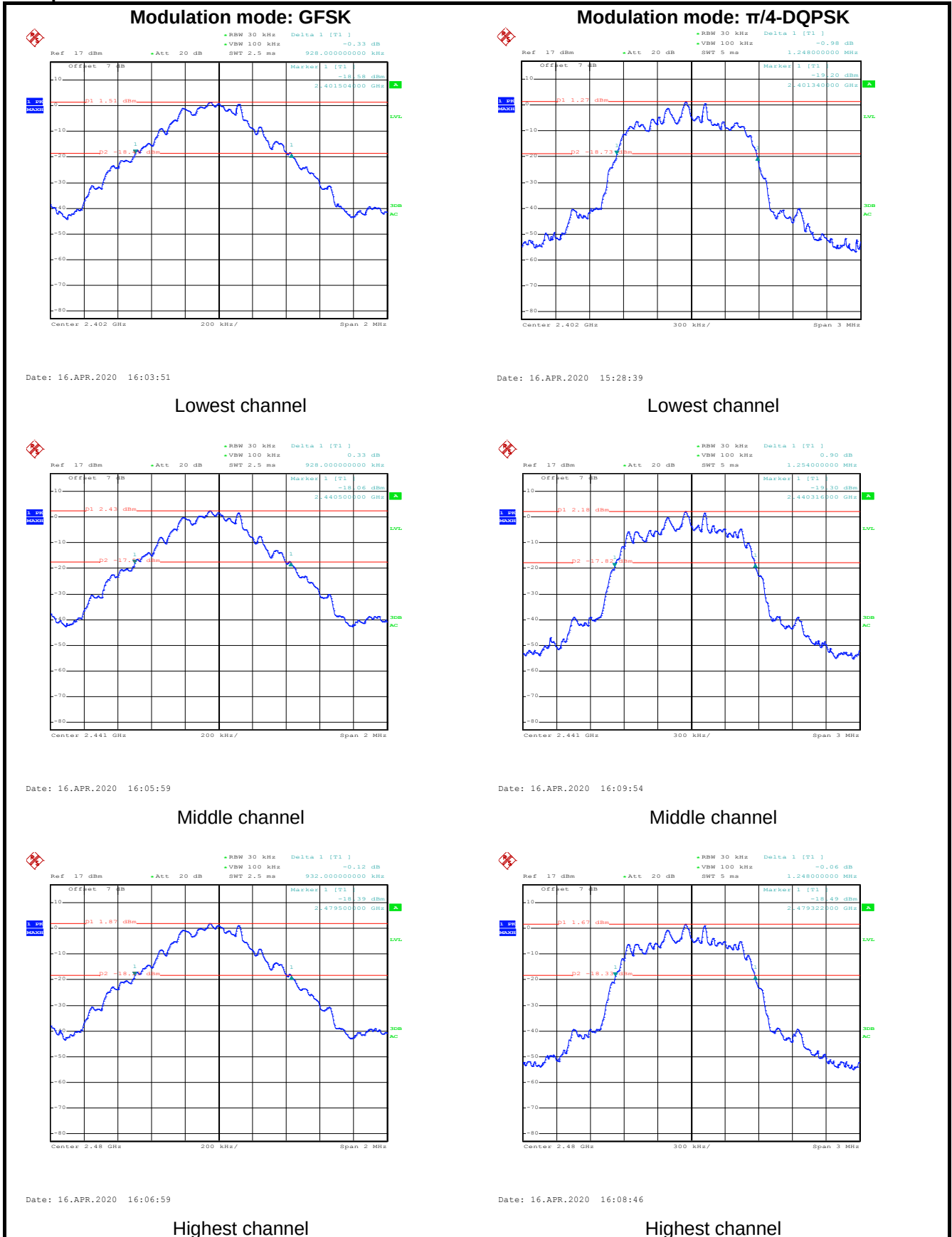
## 6.4 20dB Occupy Bandwidth

|                   |                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1)                                                                                                                                                                                                                                                                                                                        |
| Receiver setup:   | RBW=30 kHz, VBW=100 kHz, detector=Peak                                                                                                                                                                                                                                                                                                                     |
| Limit:            | N/A                                                                                                                                                                                                                                                                                                                                                        |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                           |
| Test mode:        | Non-hopping mode                                                                                                                                                                                                                                                                                                                                           |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                       |

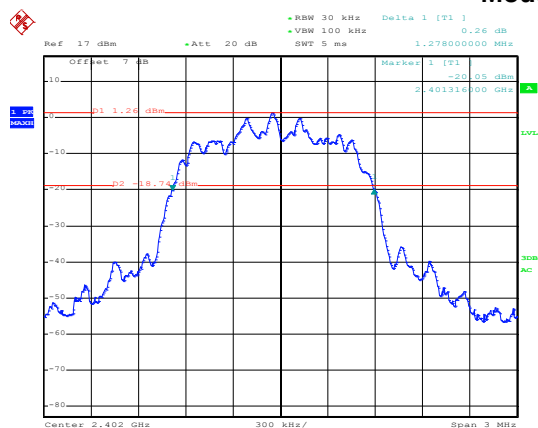
### Measurement Data:

| Test channel | 20dB Occupy Bandwidth (kHz) |                |       |
|--------------|-----------------------------|----------------|-------|
|              | GFSK                        | $\pi/4$ -DQPSK | 8DPSK |
| Lowest       | 928                         | 1248           | 1278  |
| Middle       | 928                         | 1254           | 1272  |
| Highest      | 932                         | 1248           | 1272  |

Test plot as follows:

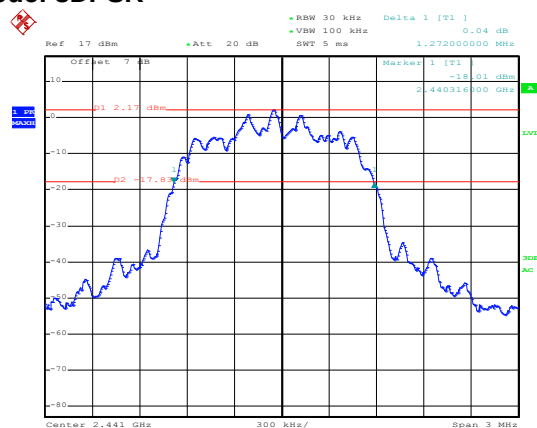


## Modulation mode: 8DPSK



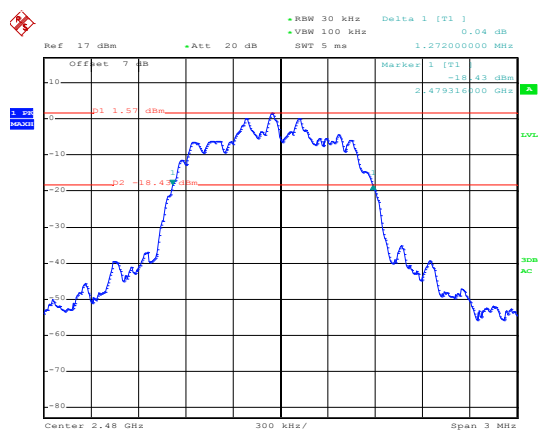
Date: 16.APR.2020 16:12:13

Lowest channel



Date: 16.APR.2020 16:13:21

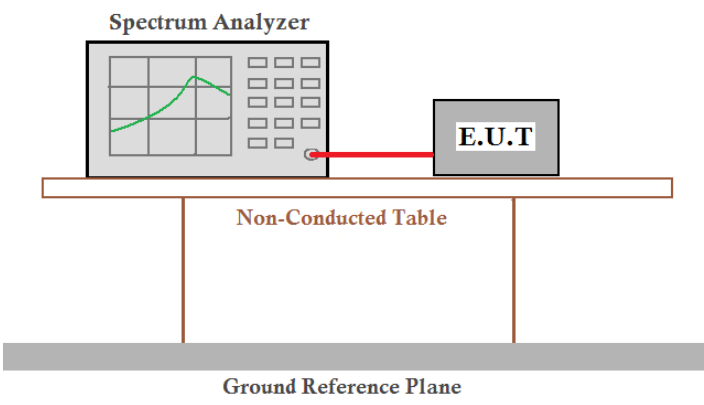
Middle channel



Date: 16.APR.2020 16:14:39

Highest channel

## 6.5 Carrier Frequencies Separation

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1)                                                                                                                                                                                                                                                                                                                                                                                                             |
| Receiver setup:   | RBW=100 kHz, VBW=300 kHz, detector=Peak                                                                                                                                                                                                                                                                                                                                                                                                         |
| Limit:            | a) 0.025MHz or the 20dB bandwidth (whichever is greater)<br>b) 0.025MHz or two-thirds of the 20dB bandwidth (whichever is greater)                                                                                                                                                                                                                                                                                                              |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer, shown with a grid and a green curve, is connected to an E.U.T. (Equipment Under Test) box by a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a table labeled 'Non-Conducted Table'. Below this table is a thick grey bar representing the 'Ground Reference Plane'.</p> |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                                                                                                                |
| Test mode:        | Hopping mode                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                            |

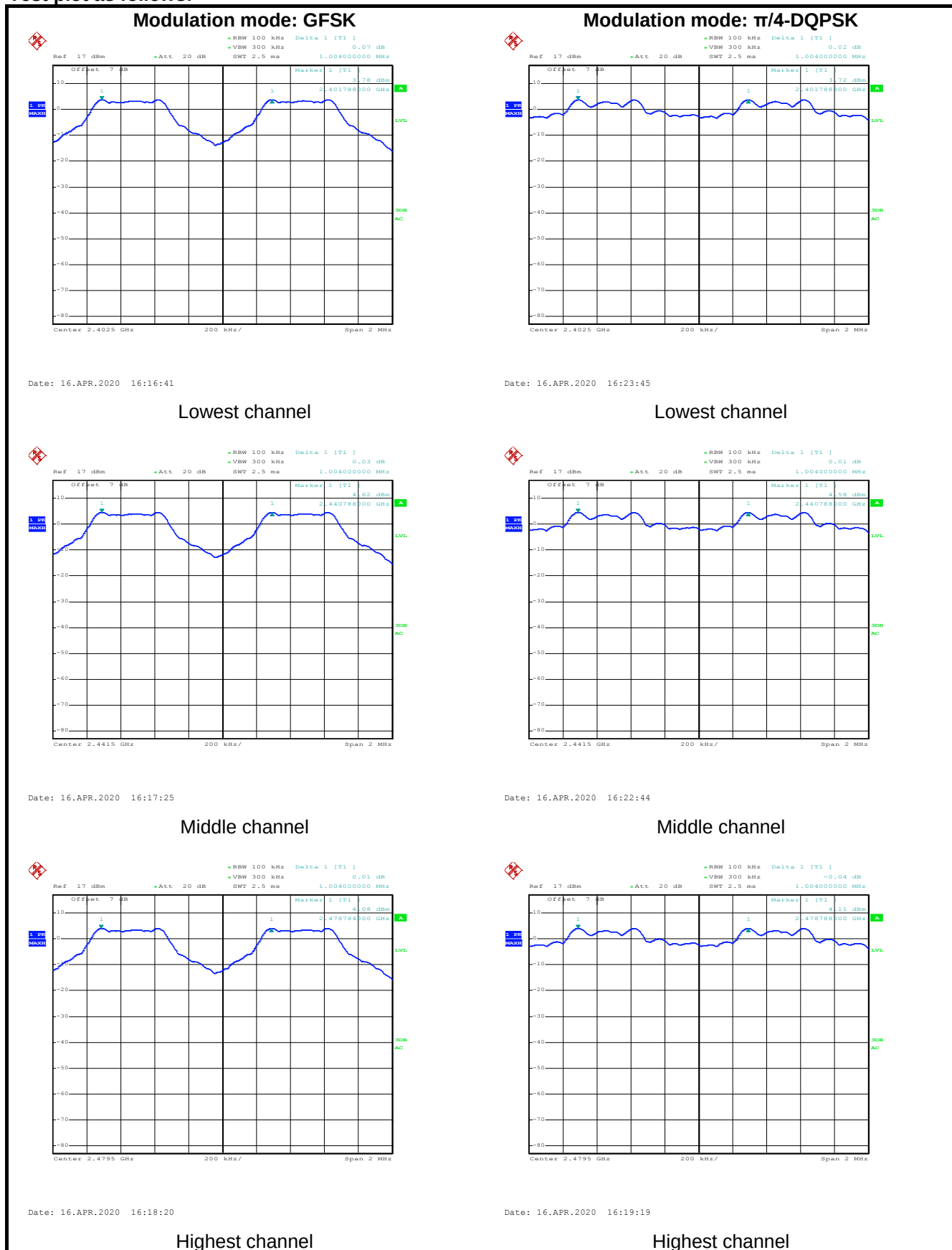
## Measurement Data:

| Test channel        | Carrier Frequencies Separation (kHz) | Limit (kHz) | Result |
|---------------------|--------------------------------------|-------------|--------|
| GFSK                |                                      |             |        |
| Lowest              | 1004                                 | 932.00      | Pass   |
| Middle              | 1004                                 | 932.00      | Pass   |
| Highest             | 1004                                 | 932.00      | Pass   |
| $\pi/4$ -DQPSK mode |                                      |             |        |
| Lowest              | 1004                                 | 832.00      | Pass   |
| Middle              | 1004                                 | 832.00      | Pass   |
| Highest             | 1004                                 | 832.00      | Pass   |
| 8DPSK mode          |                                      |             |        |
| Lowest              | 1004                                 | 852.00      | Pass   |
| Middle              | 1008                                 | 852.00      | Pass   |
| Highest             | 1004                                 | 852.00      | Pass   |

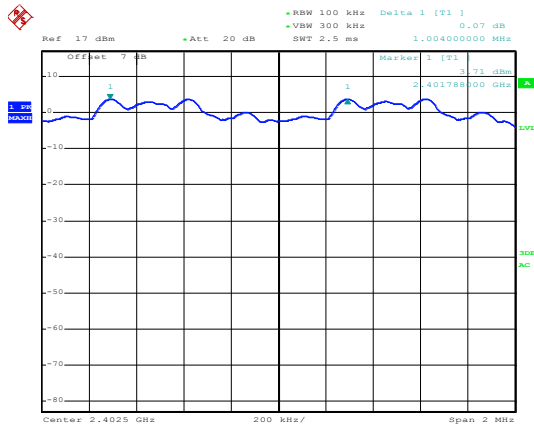
Note: According to section 6.4

| Mode           | 20dB bandwidth (kHz)<br>(worse case) | Limit (kHz)<br>(Carrier Frequencies Separation) |
|----------------|--------------------------------------|-------------------------------------------------|
| GFSK           | 932                                  | 932.00                                          |
| $\pi/4$ -DQPSK | 1248                                 | 832.00                                          |
| 8DPSK          | 1278                                 | 852.00                                          |

Test plot as follows:

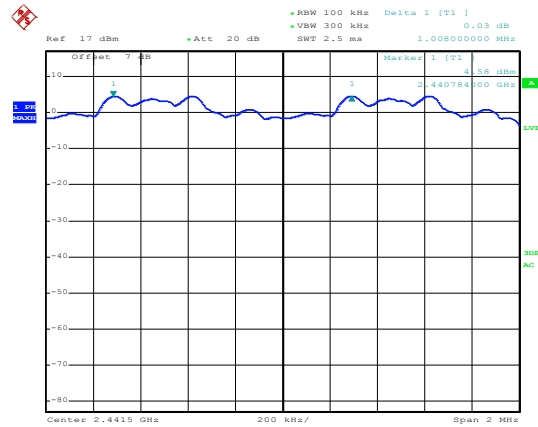


## Modulation mode: 8DPSK



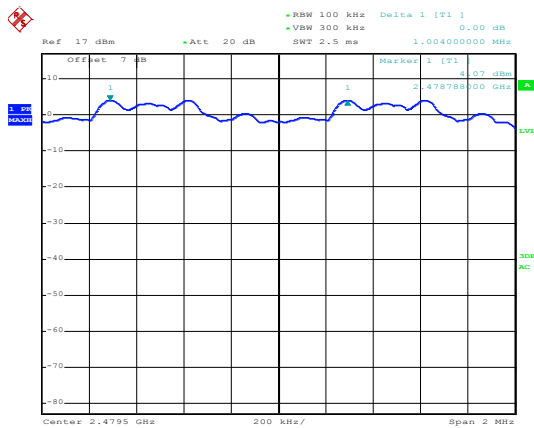
Date: 16.APR.2020 16:24:53

Lowest channel



Date: 16.APR.2020 16:21:16

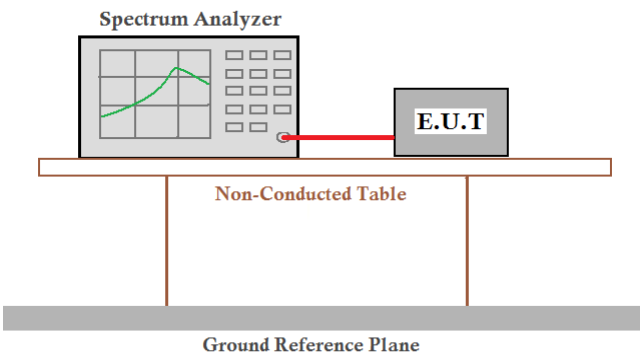
Middle channel



Date: 16.APR.2020 16:20:25

Highest channel

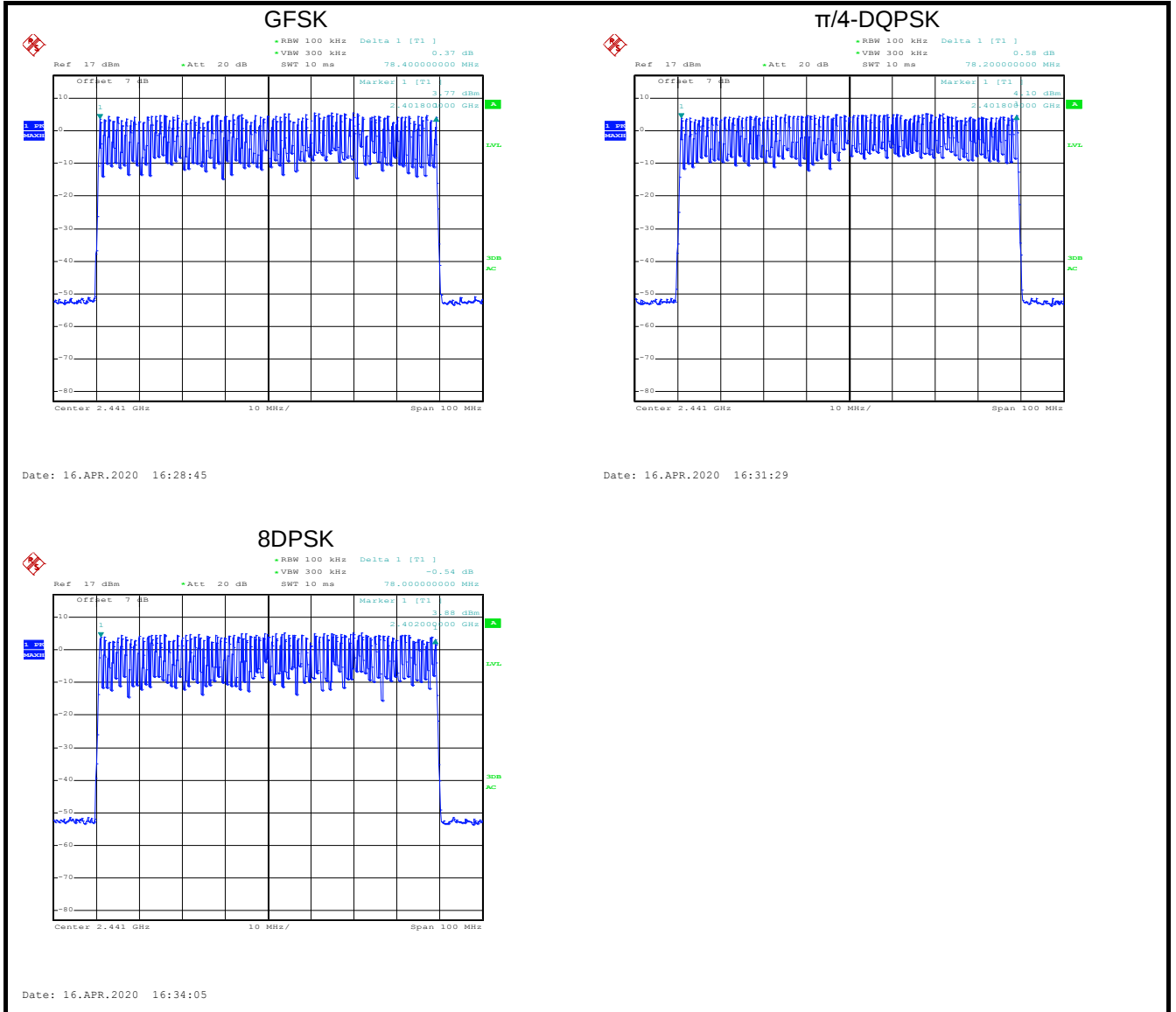
## 6.6 Hopping Channel Number

|                   |                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1)                                                                                                                                                                                                                                                                               |
| Receiver setup:   | RBW=100 kHz, VBW=300 kHz, Center Frequency=2441MHz, Span= 100MHz, Detector=Peak                                                                                                                                                                                                                                   |
| Limit:            | 15 channels                                                                                                                                                                                                                                                                                                       |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                  |
| Test mode:        | Hopping mode                                                                                                                                                                                                                                                                                                      |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                              |

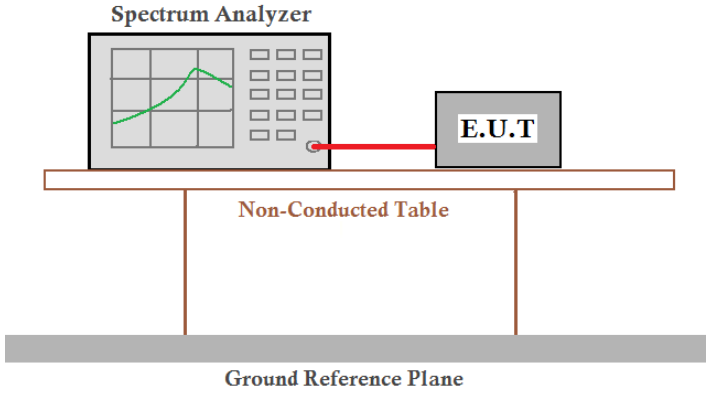
### Measurement Data:

| Mode                        | Hopping channel numbers | Limit | Result |
|-----------------------------|-------------------------|-------|--------|
| GFSK, $\pi/4$ -DQPSK, 8DPSK | 79                      | 15    | Pass   |

Test plot as follows:



## 6.7 Dwell Time

|                   |                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(1)                                                                                                                                                                                                                                                                        |
| Receiver setup:   | RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak                                                                                                                                                                                                                                                             |
| Limit:            | 0.4 Second                                                                                                                                                                                                                                                                                                 |
| Test setup:       |  <p>The diagram shows a Spectrum Analyzer and an E.U.T (Equipment Under Test) connected by a red cable. They are positioned on a table labeled 'Non-Conducted Table'. Below the table is a 'Ground Reference Plane'.</p> |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                           |
| Test mode:        | Hopping mode                                                                                                                                                                                                                                                                                               |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                       |

### Measurement Data (Worse case):

| Mode      | Packet | Dwell time (second) | Limit (second) | Result |
|-----------|--------|---------------------|----------------|--------|
| GFSK      | DH1    | 0.12800             | 0.4            | Pass   |
|           | DH3    | 0.26880             |                |        |
|           | DH5    | 0.31168             |                |        |
| π/4-DQPSK | 2-DH1  | 0.13120             | 0.4            | Pass   |
|           | 2-DH3  | 0.26976             |                |        |
|           | 2-DH5  | 0.31253             |                |        |
| 8DPSK     | 3-DH1  | 0.13120             | 0.4            | Pass   |
|           | 3-DH3  | 0.26784             |                |        |
|           | 3-DH5  | 0.31253             |                |        |

Note:

The test period = 0.4 Second/Channel x 79 Channel = 31.6 s

Calculation Formula: Dwell time = Ton time per hop \* Hopping numbers \* Period

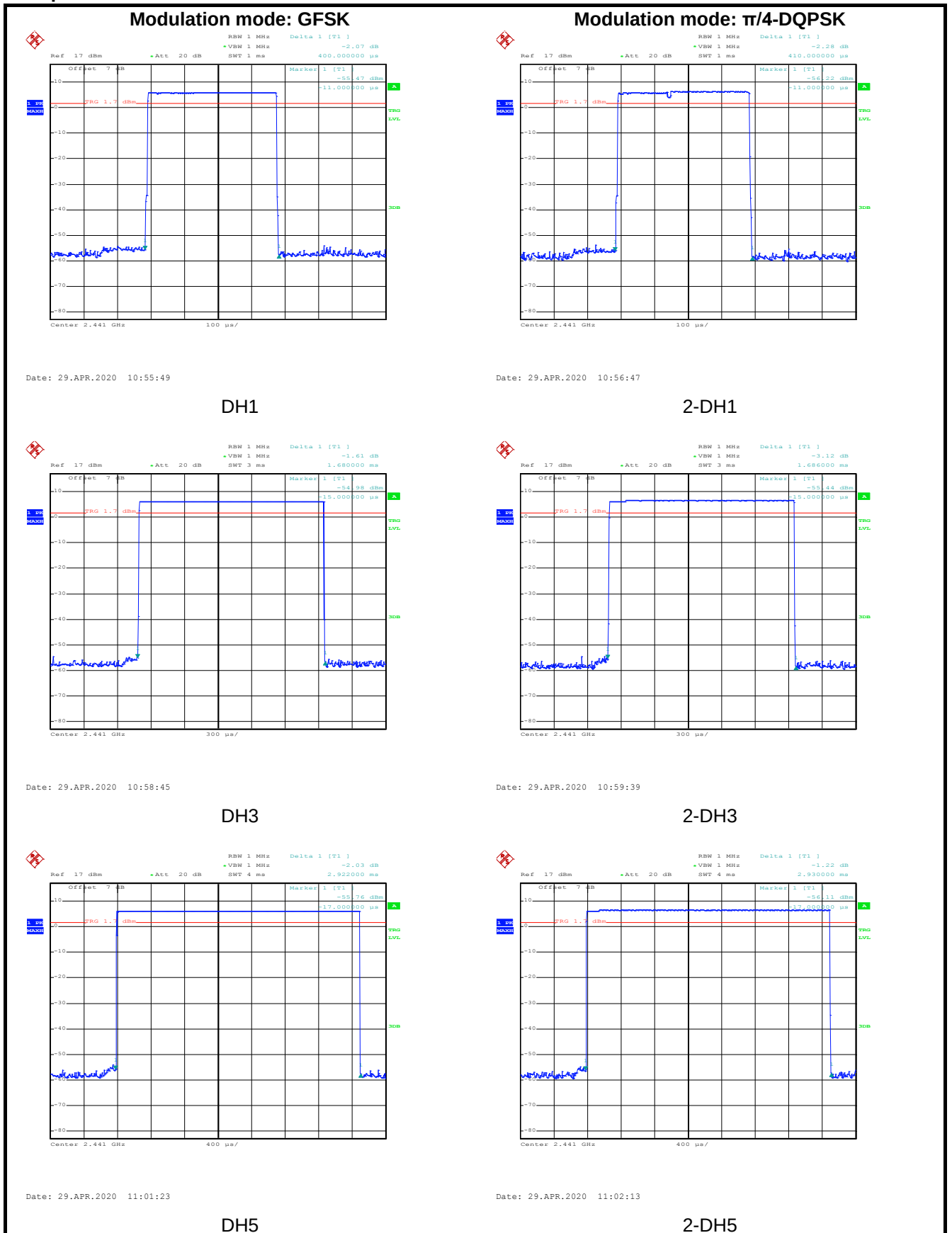
For example:

DH1 time slot =  $0.416 * (1600 / (2 * 79)) * 31.6 = 128.00 \text{ ms}$

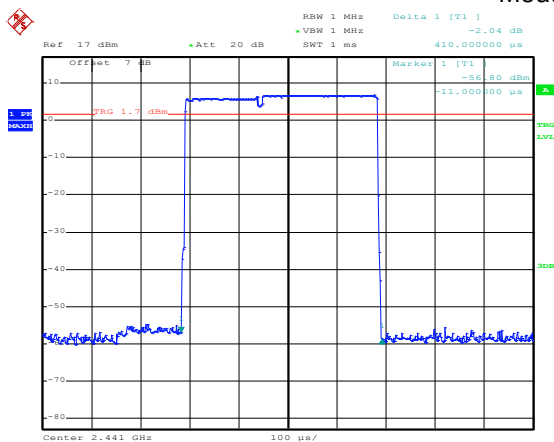
DH3 time slot =  $1.686 * (1600 / (4 * 79)) * 31.6 = 268.80 \text{ ms}$

DH5 time slot =  $2.952 * (1600 / (6 * 79)) * 31.6 = 311.68 \text{ ms}$

Test plot as follows:

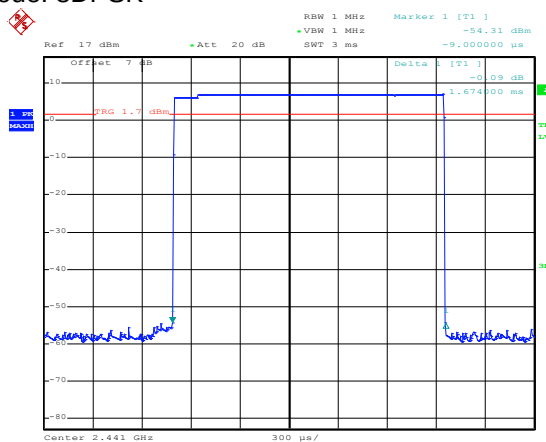


## Modulation mode: 8DPSK



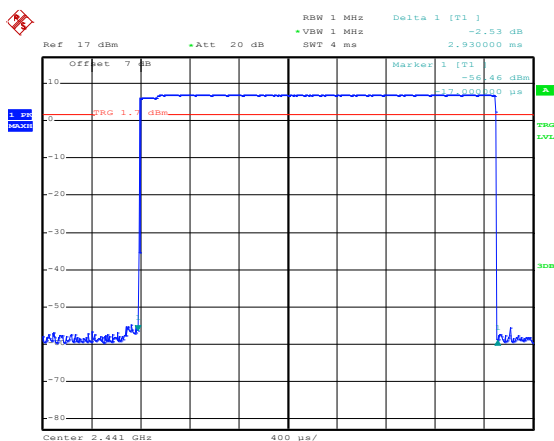
Date: 29.APR.2020 10:57:42

3-DH1



Date: 29.APR.2020 11:00:40

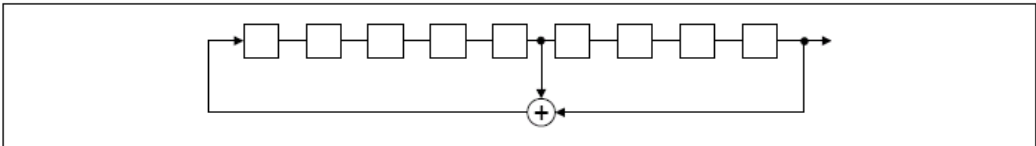
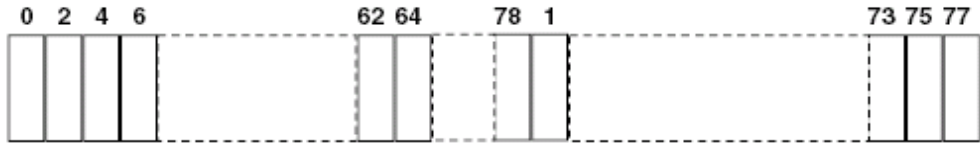
3-DH3



Date: 29.APR.2020 11:02:56

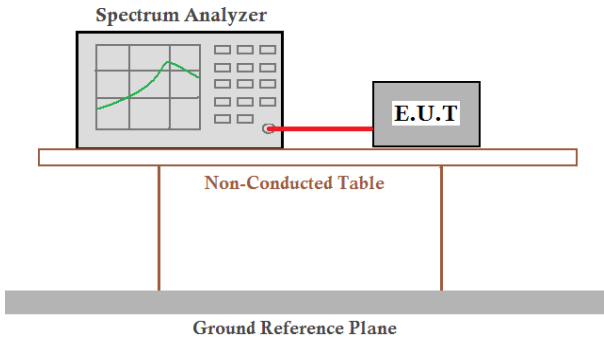
3-DH5

## 6.8 Pseudorandom Frequency Hopping Sequence

| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FCC Part 15 C Section 15.247 (a)(1) requirement: |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <p>Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.</p> <p>Alternatively. 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.</p>                                                                                                                                                                                                                                                                 |                                                  |
| EUT Pseudorandom Frequency Hopping Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                  |
| <p>The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.</p> <ul style="list-style-type: none"> <li>• Number of shift register stages: 9</li> <li>• Length of pseudo-random sequence: <math>2^9 - 1 = 511</math> bits</li> <li>• Longest sequence of zeros: 8 (non-inverted signal)</li> </ul>  <p style="text-align: center;"><i>Linear Feedback Shift Register for Generation of the PRBS sequence</i></p> <p>An example of Pseudorandom Frequency Hopping Sequence as follow:</p>  <p>Each frequency used equally on the average by each transmitter.</p> <p>The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.</p> |                                                  |

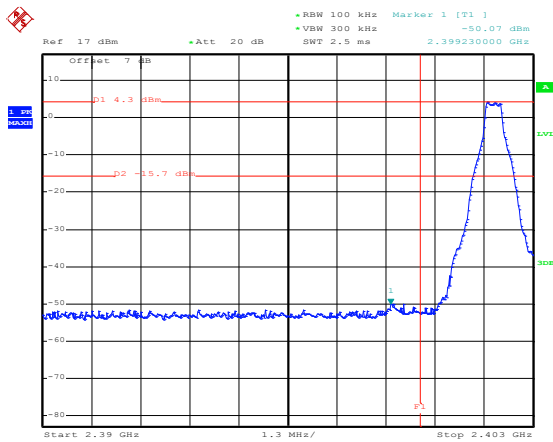
## 6.9 Band Edge

### 6.9.1 Conducted Emission Method

|                   |                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part 15 C Section 15.247 (d)                                                                                                                                                                                                                                                                                                                                                        |
| Receiver setup:   | RBW=100 kHz, VBW=300 kHz, Detector=Peak                                                                                                                                                                                                                                                                                                                                                 |
| Limit:            | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. |
| Test setup:       |  <p>The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two legs. Below the table is a Ground Reference Plane.</p>        |
| Test Instruments: | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                                                        |
| Test mode:        | Non-hopping mode and hopping mode                                                                                                                                                                                                                                                                                                                                                       |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                                                    |

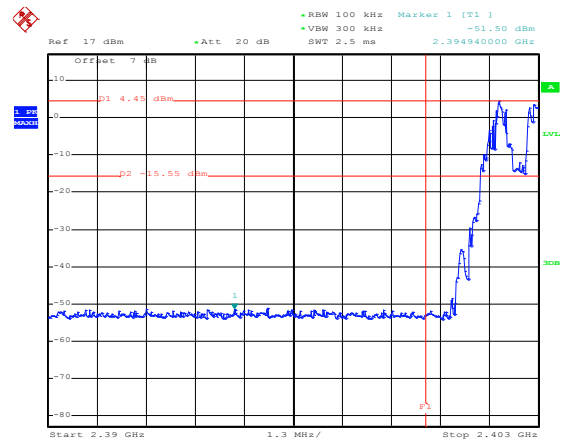
Test plot as follows:

## GFSK Lowest Channel



Date: 16.APR.2020 15:30:30

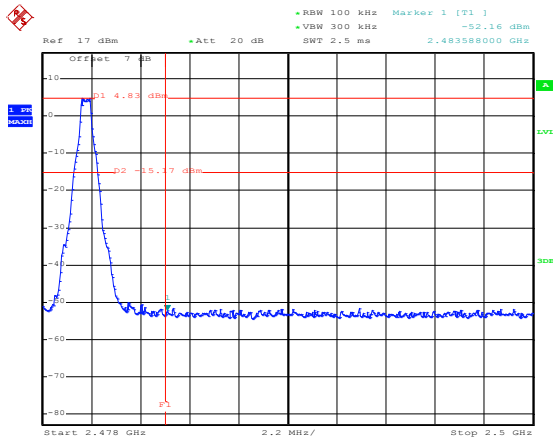
No-hopping mode



Date: 16.APR.2020 15:32:21

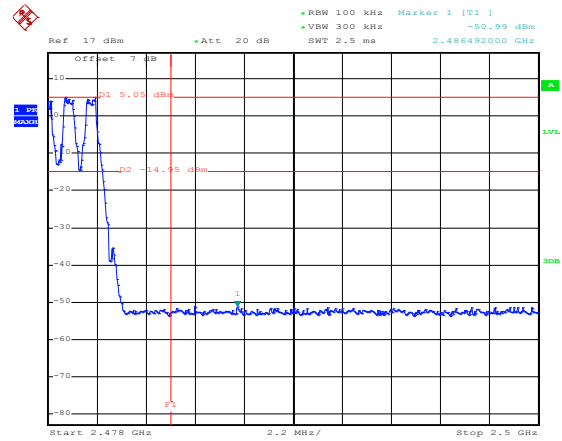
Hopping mode

## Highest Channel



Date: 16.APR.2020 15:39:53

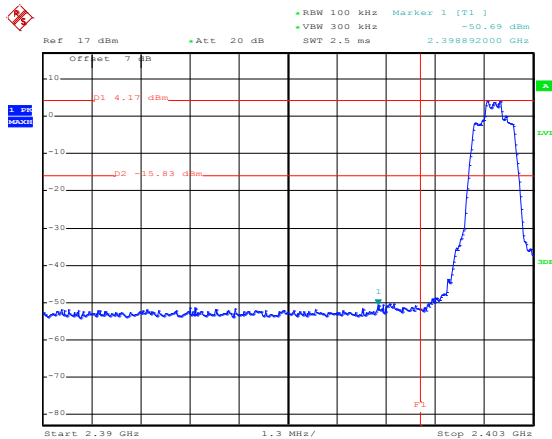
No-hopping mode



Date: 16.APR.2020 15:44:41

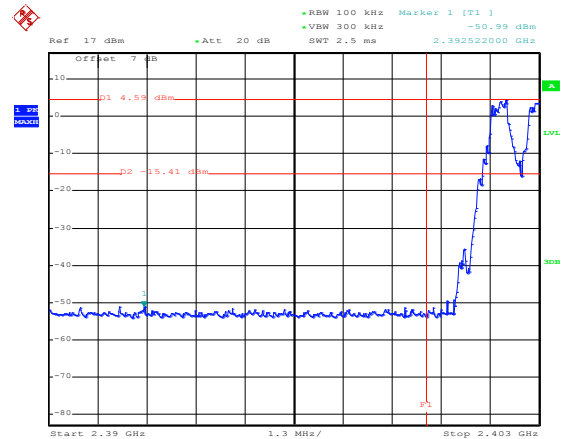
Hopping mode

## $\pi/4$ -DQPSK Lowest Channel



Date: 16.APR.2020 15:35:11

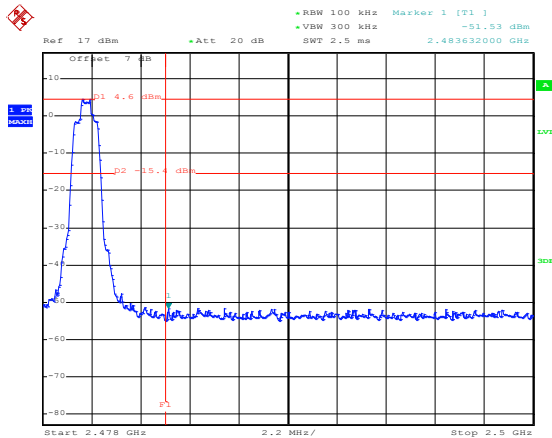
No-hopping mode



Date: 16.APR.2020 15:33:40

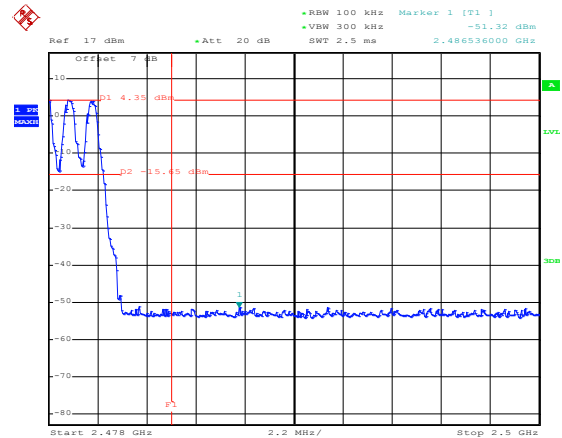
Hopping mode

## Highest Channel



Date: 16.APR.2020 15:47:23

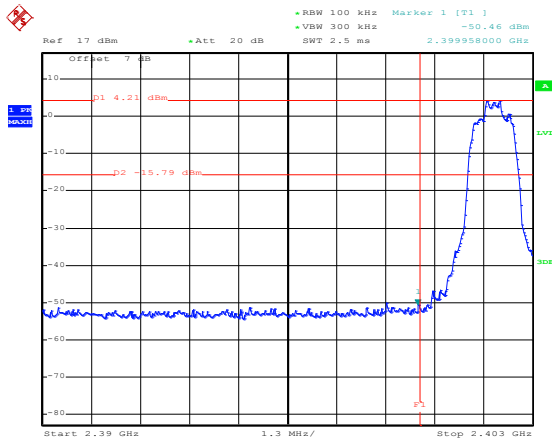
No-hopping mode



Date: 16.APR.2020 15:46:33

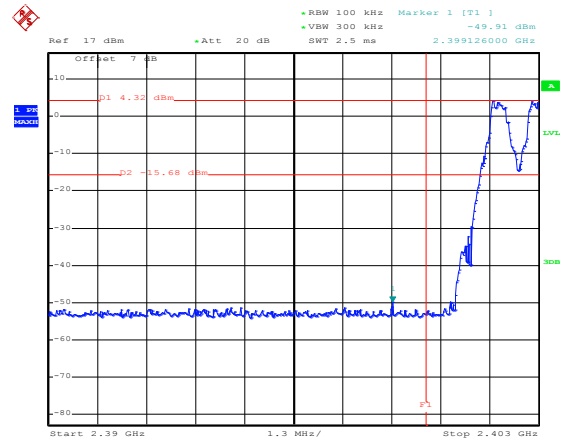
Hopping mode

## 8DPSK Lowest Channel



Date: 16.APR.2020 15:36:56

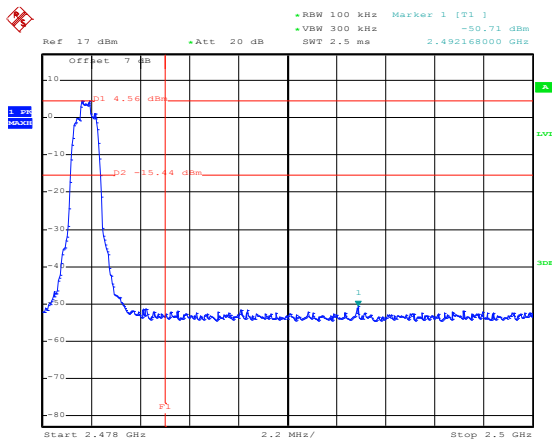
No-hopping mode



Date: 16.APR.2020 15:38:30

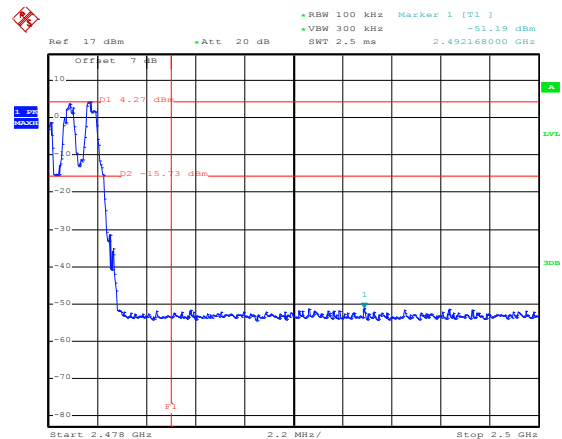
Hopping mode

## Highest Channel



Date: 16.APR.2020 15:48:16

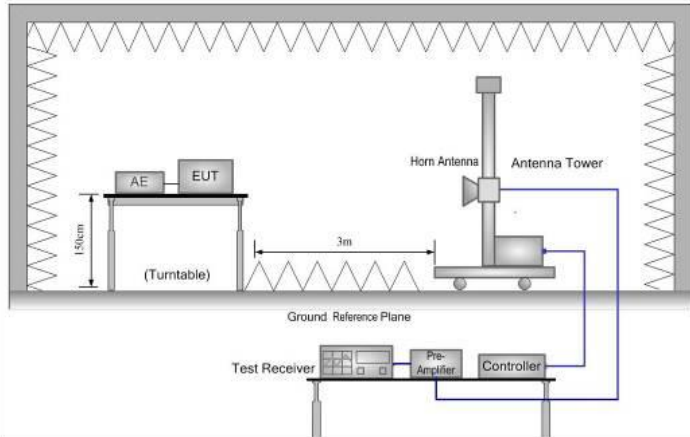
No-hopping mode



Date: 16.APR.2020 15:49:42

Hopping mode

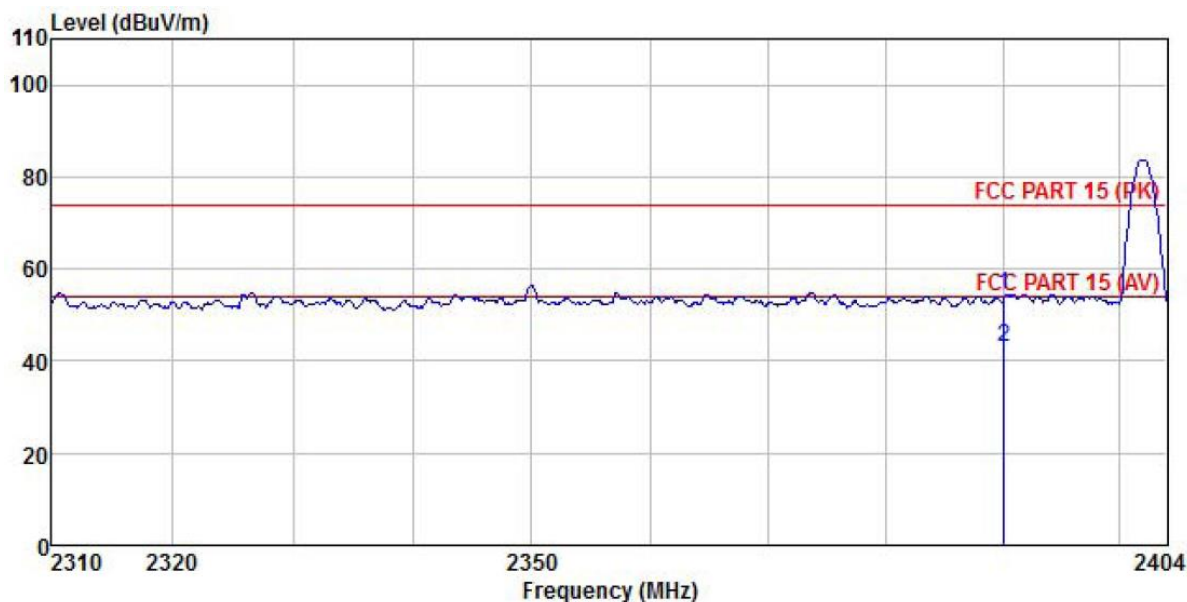
## 6.9.2 Radiated Emission Method

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |      |      |               |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|------|---------------|
| Test Requirement:     | FCC Part 15 C Section 15.209 and 15.205                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |      |      |               |
| Test Frequency Range: | 2310 MHz to 2390 MHz and 2483.5 MHz to 2500 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |      |      |               |
| Test Distance:        | 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |      |      |               |
| Receiver setup:       | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Detector           | RBW  | VBW  | Remark        |
|                       | Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Peak               | 1MHz | 3MHz | Peak Value    |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RMS                | 1MHz | 3MHz | Average Value |
| Limit:                | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Limit (dBuV/m @3m) |      |      | Remark        |
|                       | Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 54.00              |      |      | Average Value |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 74.00              |      |      | Peak Value    |
| Test setup:           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |      |      |               |
| Test Procedure:       | <div>1. The EUT was placed on the top of a rotating table 1.5meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div> |                    |      |      |               |
| Test Instruments:     | Refer to section 5.9 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |      |      |               |
| Test mode:            | Non-hopping mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |      |      |               |
| Test results:         | Passed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |      |      |               |

## Ceramic Antenna:

## GFSK Mode:

|               |                |                |                      |
|---------------|----------------|----------------|----------------------|
| Product Name: | Komikan        | Product Model: | Komikan              |
| Test By:      | Mike           | Test mode:     | DH1 Tx mode          |
| Test Channel: | Lowest channel | Polarization:  | Vertical             |
| Test Voltage: | AC 120/60Hz    | Environment:   | Temp: 24°C Humi: 57% |

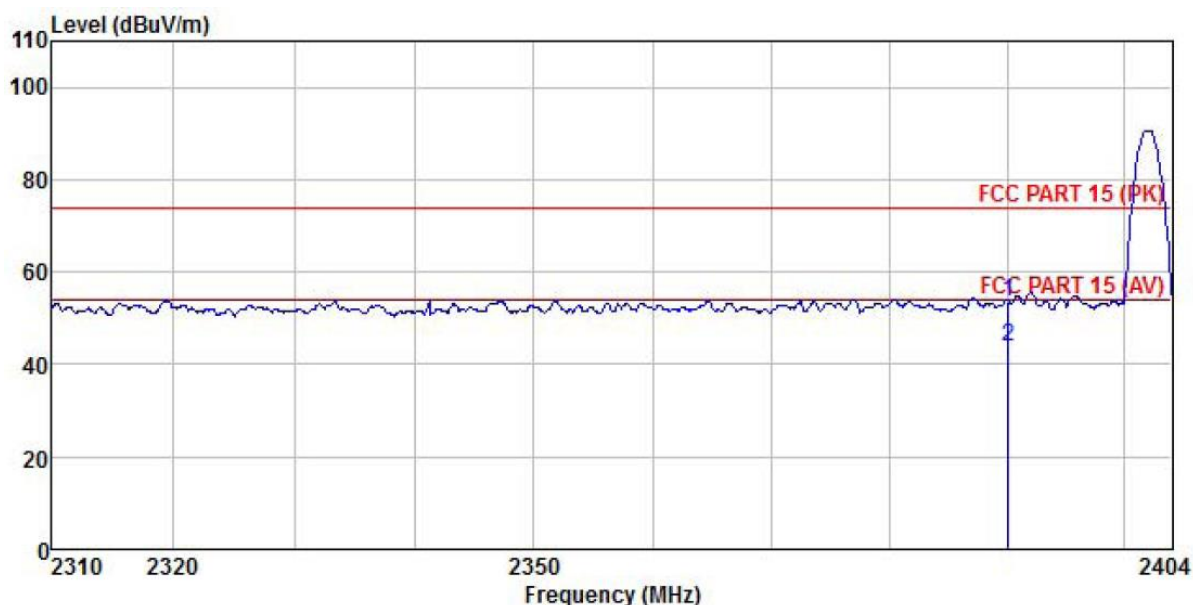


|   | Freq     | Read<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Level  | Limit  | Over<br>Limit | Remark  |
|---|----------|---------------|-------------------|---------------|------------------|--------|--------|---------------|---------|
|   | MHz      | dBuV          | dB/m              | dB            | dB               | dBuV/m | dBuV/m | dB            |         |
| 1 | 2390.000 | 22.48         | 27.07             | 4.69          | 0.00             | 54.24  | 74.00  | -19.76        | Peak    |
| 2 | 2390.000 | 11.16         | 27.07             | 4.69          | 0.00             | 42.92  | 54.00  | -11.08        | Average |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

|               |                |                |                     |
|---------------|----------------|----------------|---------------------|
| Product Name: | Komikan        | Product Model: | Komikan             |
| Test By:      | Mike           | Test mode:     | DH1 Tx mode         |
| Test Channel: | Lowest channel | Polarization:  | Horizontal          |
| Test Voltage: | AC 120/60Hz    | Environment:   | Temp: 24℃ Humi: 57% |

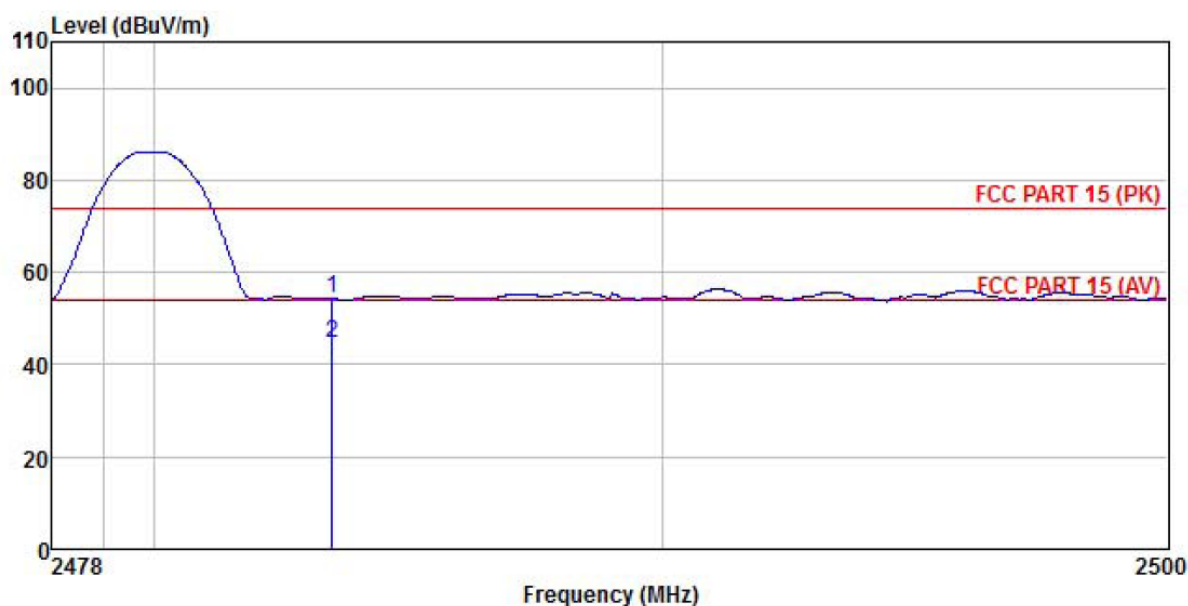


|   | Freq     | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level  | Limit Line | Over Limit | Remark  |
|---|----------|------------|----------------|------------|---------------|--------|------------|------------|---------|
|   | MHz      | dBuV       | dB/m           | dB         | dB            | dBuV/m | dBuV/m     | dB         |         |
| 1 | 2390.000 | 21.70      | 27.08          | 4.69       | 0.00          | 53.47  | 74.00      | -20.53     | Peak    |
| 2 | 2390.000 | 12.14      | 27.08          | 4.69       | 0.00          | 43.91  | 54.00      | -10.09     | Average |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

|               |                 |                |                     |
|---------------|-----------------|----------------|---------------------|
| Product Name: | Komikan         | Product Model: | Komikan             |
| Test By:      | Mike            | Test mode:     | DH1 Tx mode         |
| Test Channel: | Highest channel | Polarization:  | Vertical            |
| Test Voltage: | AC 120/60Hz     | Environment:   | Temp: 24℃ Huni: 57% |

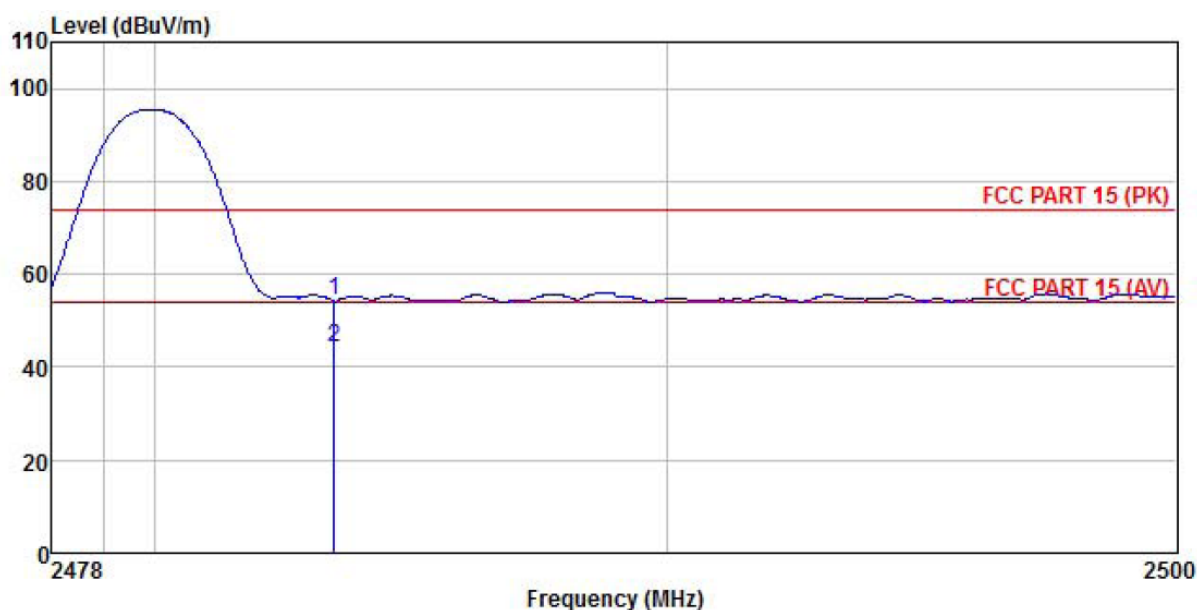


|   | Freq     | Read  | Antenna | Cable | Preamp | Level  | Limit  | Over   |         |
|---|----------|-------|---------|-------|--------|--------|--------|--------|---------|
|   | MHz      | Level | Factor  | Loss  | Factor | Level  | Line   | Limit  | Remark  |
|   |          | dBuV  | dB/m    | dB    | dB     | dBuV/m | dBuV/m | dB     |         |
| 1 | 2483.500 | 22.27 | 27.36   | 4.81  | 0.00   | 54.44  | 74.00  | -19.56 | Peak    |
| 2 | 2483.500 | 12.40 | 27.36   | 4.81  | 0.00   | 44.57  | 54.00  | -9.43  | Average |

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

|               |                 |                |                     |
|---------------|-----------------|----------------|---------------------|
| Product Name: | Komikan         | Product Model: | Komikan             |
| Test By:      | Mike            | Test mode:     | DH1 Tx mode         |
| Test Channel: | Highest channel | Polarization:  | Horizontal          |
| Test Voltage: | AC 120/60Hz     | Environment:   | Temp: 24℃ Humi: 57% |



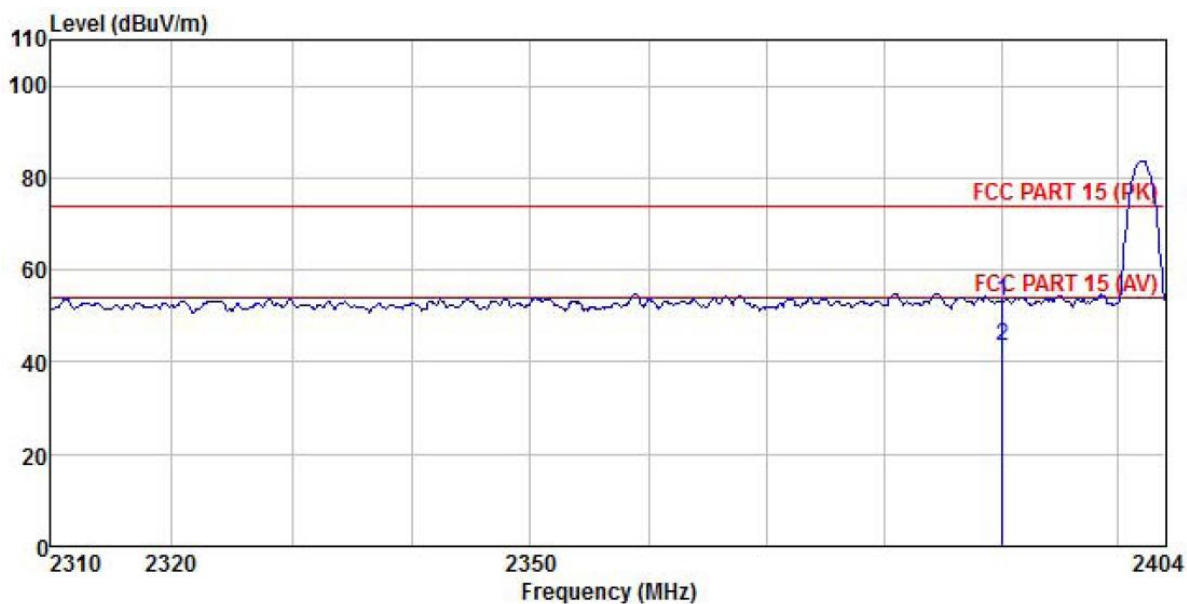
|   | Freq     | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level  | Limit Line | Over Limit | Remark  |
|---|----------|------------|----------------|------------|---------------|--------|------------|------------|---------|
|   | MHz      | dBuV       | dB/m           | dB         | dB            | dBuV/m | dBuV/m     | dB         |         |
| 1 | 2483.500 | 22.06      | 27.35          | 4.81       | 0.00          | 54.22  | 74.00      | -19.78     | Peak    |
| 2 | 2483.500 | 12.08      | 27.35          | 4.81       | 0.00          | 44.24  | 54.00      | -9.76      | Average |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

$\pi/4$ -DQPSK mode

|               |                |                |                      |
|---------------|----------------|----------------|----------------------|
| Product Name: | Komikan        | Product Model: | Komikan              |
| Test By:      | Mike           | Test mode:     | 2DH1 Tx mode         |
| Test Channel: | Lowest channel | Polarization:  | Vertical             |
| Test Voltage: | AC 120/60Hz    | Environment:   | Temp: 24°C Humi: 57% |

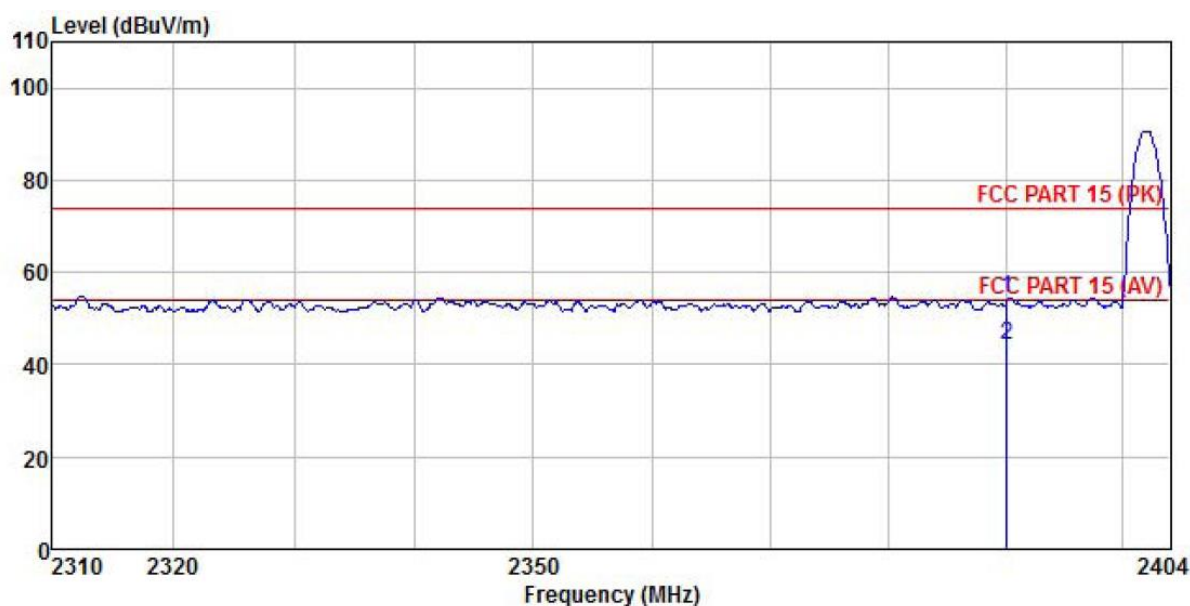


|          | Read      | Antenna   | Cable   | Preamp  |             | Limit       | Over    |                |
|----------|-----------|-----------|---------|---------|-------------|-------------|---------|----------------|
| Freq     | Level     | Factor    | Loss    | Factor  | Level       | Line        | Limit   | Remark         |
| -----MHz | -----dBuV | -----dB/m | -----dB | -----dB | -----dBuV/m | -----dBuV/m | -----dB | -----          |
| 1        | 2390.000  | 21.46     | 27.07   | 4.69    | 0.00        | 53.22       | 74.00   | -20.78 Peak    |
| 2        | 2390.000  | 11.63     | 27.07   | 4.69    | 0.00        | 43.39       | 54.00   | -10.61 Average |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

|               |                |                |                         |
|---------------|----------------|----------------|-------------------------|
| Product Name: | Komikan        | Product Model: | Komikan                 |
| Test By:      | Mike           | Test mode:     | 2DH1 Tx mode            |
| Test Channel: | Lowest channel | Polarization:  | Horizontal              |
| Test Voltage: | AC 120/60Hz    | Environment:   | Temp: 24°C    Humi: 57% |



|   | Freq     | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level  | Limit Line | Over Limit | Remark  |
|---|----------|------------|----------------|------------|---------------|--------|------------|------------|---------|
|   | MHz      | dBuV       | dB/m           | dB         | dB            | dBuV/m | dBuV/m     | dB         |         |
| 1 | 2390.000 | 22.49      | 27.08          | 4.69       | 0.00          | 54.26  | 74.00      | -19.74     | Peak    |
| 2 | 2390.000 | 12.32      | 27.08          | 4.69       | 0.00          | 44.09  | 54.00      | -9.91      | Average |

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.