

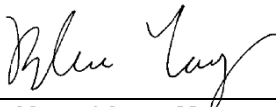
# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

**Applicant:** ASUSTeK COMPUTER INC.  
1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan  
**Product Name:** ASUS Phone (Mobile Phone)  
**Brand Name:** ASUS  
**Model No.:** ASUS\_I006D  
**Model Difference:** N/A  
**Report Number:** ER/2021/20005  
**FCC ID** MSQI006D  
**IC:** 3568A-I006D  
**FCC Rule Part:** §15.247, Cat: DSS  
**IC RSS:** RSS-247 issue 2 Feb 2017  
**Issue Date:** April 12, 2021  
**Date of Test:** January 26, 2021 - April 6, 2021  
**Date of EUT Received:** January 26, 2021

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits. The test results of this report relate only to the tested sample identified in this report.

**Approved By:**

  
**Blue Yang / Asst. Manager**



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## Revision History

| Report Number | Revision | Description | Issue Date     | Revised By |
|---------------|----------|-------------|----------------|------------|
| ER/2021/20005 | Rev.00   | Original.   | April 12, 2021 | Viola Su   |

**Note:**

## 1、Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

## 2、Test data is referenced from original report

Measurement results in the original test report ER/2021/10053 are partially leveraged in this test report with spot check to demonstrate compliance.

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## Contents

|    |                                                              |    |
|----|--------------------------------------------------------------|----|
| 1  | GENERAL INFORMATION .....                                    | 4  |
| 2  | SYSTEM TEST CONFIGURATION .....                              | 6  |
| 3  | SUMMARY OF TEST RESULTS.....                                 | 9  |
| 4  | DESCRIPTION OF TEST MODES .....                              | 10 |
| 5  | MEASUREMENT UNCERTAINTY .....                                | 12 |
| 6  | CONDUCTED EMISSION TEST .....                                | 13 |
| 7  | PEAK OUTPUT POWER MEASUREMENT .....                          | 17 |
| 8  | EMISSION BANDWIDTH MEASUREMENT .....                         | 20 |
| 9  | CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT ..... | 26 |
| 10 | RADIATED BANEDGE AND SPURIOUS EMISSION MEASUREMENT .....     | 32 |
| 11 | FREQUENCY SEPARATION .....                                   | 61 |
| 12 | NUMBER OF HOPPING FREQUENCY .....                            | 63 |
| 13 | TIME OF OCCUPANCY (DWELL TIME).....                          | 65 |
| 14 | ANTENNA REQUIREMENT .....                                    | 75 |

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## 1 GENERAL INFORMATION

### 1.1 Product description

|                   |                                                                                                |                                          |
|-------------------|------------------------------------------------------------------------------------------------|------------------------------------------|
| Product Name:     | ASUS Phone (Mobile Phone)                                                                      |                                          |
| Brand Name:       | ASUS                                                                                           |                                          |
| Model No.:        | ASUS_I006D                                                                                     |                                          |
| Model Difference: | N/A                                                                                            |                                          |
| Hardware Version: | V4                                                                                             |                                          |
| Software Version: | Android 11                                                                                     |                                          |
| EUT Series No.:   | N/A                                                                                            |                                          |
| Power Supply:     | 3.87Vdc from Rechargeable Li-polymer Battery<br>or 5 / 9 / 12 / 15 / 20 Vdc from AC/DC Adapter |                                          |
|                   | Battery                                                                                        | Model No: C11P2003<br>Brand: ASUS        |
|                   | Adapter                                                                                        | Model No: A299-200150U-US<br>Brand: ASUS |

|                   |                              |
|-------------------|------------------------------|
| Radio Technology: | Bluetooth BR+EDR             |
| Channel number:   | 79 channels                  |
| Modulation type:  | GFSK + $\pi/4$ DQPSK + 8DPSK |
| Transmit Power:   | 14.20 dBm                    |
| Frequency Range:  | 2.402GHz – 2.480GHz          |
| Dwell Time:       | $\leq 0.4s$                  |

### 1.2 Antenna Designation

| Antenna Type | Brand | Antenna Part No. | Freq. (MHz) | Peak Antenna Gain (dBi) | Worst Antenna Gain | Note  |
|--------------|-------|------------------|-------------|-------------------------|--------------------|-------|
| PIFA Antenna | ASUS  | ZS590KS          | 2.4GHz      | -0.13                   | V                  | Ant 7 |
|              |       |                  |             | -3.13                   |                    | Ant 8 |

Note: Pre-scanned was done on the above 2 antennas, the Ant 7 results higher emission at 2.4GHz. Therefore, the completed set of measurement was done on the antenna to be presented on this test report.

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### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas. Guidance v05r02

RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5, Amendment 1, March 2019

ANSI C63.10:2013

### 1.4 Test Facility

| Laboratory                                            | Test Site Address                                                                         | Test Site Name | FCC Designation number | IC CAB identifier |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------|------------------------|-------------------|
| SGS Taiwan Ltd.<br>Central RF Lab.<br>(TAF code 3702) | No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. | SAC 1          | TW0027                 | TW3702            |
|                                                       |                                                                                           | SAC 3          |                        |                   |
|                                                       |                                                                                           | Conduction 1   |                        |                   |
|                                                       |                                                                                           | Conducted 1    |                        |                   |
|                                                       |                                                                                           | Conducted 2    |                        |                   |
|                                                       |                                                                                           | Conducted 3    |                        |                   |
|                                                       |                                                                                           | Conducted 4    |                        |                   |
|                                                       |                                                                                           | Conducted 5    |                        |                   |
|                                                       |                                                                                           | Conducted 6    |                        |                   |
|                                                       | No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333                            | Conduction A   | TW0028                 |                   |
|                                                       |                                                                                           | SAC C          |                        |                   |
|                                                       |                                                                                           | SAC D          |                        |                   |
|                                                       |                                                                                           | SAC G          |                        |                   |
|                                                       |                                                                                           | Conducted A    |                        |                   |
|                                                       |                                                                                           | Conducted B    |                        |                   |
|                                                       |                                                                                           | Conducted C    |                        |                   |
|                                                       |                                                                                           | Conducted D    |                        |                   |
|                                                       |                                                                                           | Conducted E    |                        |                   |
|                                                       |                                                                                           | Conducted F    |                        |                   |
|                                                       |                                                                                           | Conducted G    |                        |                   |

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

### 1.5 Special Accessories

There is no special accessory used while test was conducted.

### 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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## 2.4 Measurement Results Explanation Example

### 2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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

### 2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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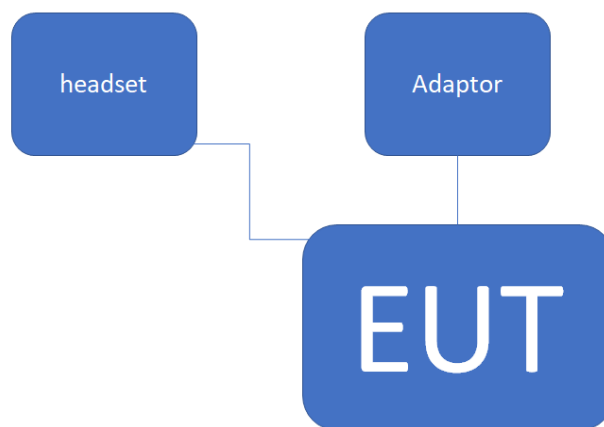
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## 2.5 Configuration of Tested System

### Conducted Setup & Radiated Setup



### Conduction Setup



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment | MFR/BRAND | Model/Type No.       | Series No. | Version     |
|------|-----------|-----------|----------------------|------------|-------------|
| 1    | QRCT      | N/A       | N/A                  | N/A        | 4.0.00161.0 |
| 2    | Notebook  | Lenovo    | L480                 | PF-1S9NT5  | N/A         |
| 3    | Adapter   | ASUS      | A299-200150U-US      | N/A        | N/A         |
| 4    | Headset   | 1MORE     | EARPHONE BLK<br>YODA | N/A        | N/A         |

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### 3 SUMMARY OF TEST RESULTS

| FCC Rules                        | IC Rules                                      | Description Of Test                                     | Result    |
|----------------------------------|-----------------------------------------------|---------------------------------------------------------|-----------|
| §15.207(a)                       | RSS-Gen §8.8                                  | AC Power Line Conducted Emission                        | Compliant |
| §15.247(b)(1)                    | RSS-247 §5.4 b                                | Peak Output Power                                       | Compliant |
| §15.247(a)(1)                    | RSS-247 §5.1 b<br>RSS-Gen §6.7                | Emission Bandwidth                                      | Compliant |
| §15.205<br>§15.209<br>§15.247(d) | RSS-247 §5.5<br>RSS-Gen §8.9<br>RSS-Gen §8.10 | Conducted & Radiated Band Edge<br>and Spurious Emission | Compliant |
| §15.247(a)(1)                    | RSS-247 §5.1 b                                | Frequency Separation                                    | Compliant |
| §15.247(a)(1)(iii)               | RSS-247 §5.1 d                                | Number of hopping frequency<br>Time of Occupancy        | Compliant |
| §15.203                          | N/A                                           | Antenna Requirement                                     | Compliant |

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

| ITEM | FREQUENCY | ITEM | FREQUENCY | ITEM | FREQUENCY | ITEM | FREQUENCY |
|------|-----------|------|-----------|------|-----------|------|-----------|
| 1    | 2402 MHz  | 21   | 2422 MHz  | 41   | 2442 MHz  | 71   | 2462 MHz  |
| 2    | 2403 MHz  | 22   | 2423 MHz  | 42   | 2443 MHz  | 72   | 2463 MHz  |
| 3    | 2404 MHz  | 23   | 2424 MHz  | 43   | 2444 MHz  | 73   | 2464 MHz  |
| 4    | 2405 MHz  | 24   | 2425 MHz  | 44   | 2445 MHz  | 74   | 2465 MHz  |
| 5    | 2406 MHz  | 25   | 2426 MHz  | 45   | 2446 MHz  | 75   | 2466 MHz  |
| 6    | 2407 MHz  | 26   | 2427 MHz  | 46   | 2447 MHz  | 76   | 2467 MHz  |
| 7    | 2408 MHz  | 27   | 2428 MHz  | 47   | 2448 MHz  | 77   | 2468 MHz  |
| 8    | 2409 MHz  | 28   | 2429 MHz  | 48   | 2449 MHz  | 78   | 2469 MHz  |
| 9    | 2410 MHz  | 29   | 2430 MHz  | 49   | 2450 MHz  | 79   | 2470 MHz  |
| 10   | 2411 MHz  | 30   | 2431 MHz  | 50   | 2451 MHz  | 70   | 2471 MHz  |
| 11   | 2412 MHz  | 31   | 2432 MHz  | 51   | 2452 MHz  | 71   | 2472 MHz  |
| 12   | 2413 MHz  | 32   | 2433 MHz  | 52   | 2453 MHz  | 72   | 2473 MHz  |
| 13   | 2414 MHz  | 33   | 2434 MHz  | 53   | 2454 MHz  | 73   | 2474 MHz  |
| 14   | 2415 MHz  | 34   | 2435 MHz  | 54   | 2455 MHz  | 74   | 2475 MHz  |
| 15   | 2416 MHz  | 35   | 2436 MHz  | 55   | 2456 MHz  | 75   | 2476 MHz  |
| 16   | 2417 MHz  | 36   | 2437 MHz  | 56   | 2457 MHz  | 76   | 2477 MHz  |
| 17   | 2418 MHz  | 37   | 2438 MHz  | 57   | 2458 MHz  | 77   | 2478 MHz  |
| 18   | 2419 MHz  | 38   | 2439 MHz  | 58   | 2459 MHz  | 78   | 2479 MHz  |
| 19   | 2420 MHz  | 39   | 2440 MHz  | 59   | 2460 MHz  | 79   | 2480 MHz  |
| 20   | 2421 MHz  | 40   | 2441 MHz  | 60   | 2461 MHz  |      |           |

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#### 4.2 The Worst Test Modes and Channel Details

- 1 The EUT has been tested under operating condition.
- 2 Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3 Investigation has been done on all the possible configurations for searching the worst case.

| RADIATED EMISSION TEST (BELOW 1 GHz) |                   |                |                |                |
|--------------------------------------|-------------------|----------------|----------------|----------------|
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION     | PACKET TYPE    |
| Bluetooth                            | 0 to 78           | 39             | GFSK           | DH5            |
| RADIATED EMISSION TEST (ABOVE 1 GHz) |                   |                |                |                |
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION     | PACKET TYPE    |
| Bluetooth                            | 0 to 78           | 0,39,78        | GFSK           | DH5            |
| CONDUCTED TEST                       |                   |                |                |                |
| Peak Output Power, 20dB Band Width   |                   |                |                |                |
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION     | PACKET TYPE    |
| Bluetooth                            | 0 to 78           | 0,39,78        | GFSK           | DH5            |
|                                      | 0 to 78           | 0,39,78        | $\pi/4$ -DQPSK | 2DH5           |
|                                      | 0 to 78           | 0,39,78        | 8-DPSK         | 3DH5           |
| Band Edge                            |                   |                |                |                |
| Bluetooth                            | 0 to 78           | 0,78           | GFSK/8-DPSK    | DH5/3DH5       |
| Frequency Separation                 |                   |                |                |                |
| Bluetooth                            | 0 to 78           | 0,1,2          | GFSK           | DH5            |
| Number of hopping frequency          |                   |                |                |                |
| Bluetooth                            | 0 to 78           | 0 to 78        | GFSK           | DH5            |
| Time of Occupancy(Dwell time)        |                   |                |                |                |
| Bluetooth                            | 0 to 78           | 0,39,78        | GFSK           | DH1/DH3/DH5    |
|                                      |                   |                | $\pi/4$ -DQPSK | 2DH1/2DH3/2DH5 |
|                                      |                   |                | 8-DPSK         | 3DH1/3DH3/3DH5 |

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## 5 MEASUREMENT UNCERTAINTY

| Test Items                                | Uncertainty            |
|-------------------------------------------|------------------------|
| AC Power Line Conducted Emission          | +/- 2.34 dB            |
| Peak Output Power                         | +/- 1 dB               |
| 20dB Bandwidth                            | +/- 1.54 Hz            |
| 100 KHz Bandwidth Of Frequency Band Edges | +/- 1.69 dB            |
| Frequency Separation                      | +/- 1.54 Hz            |
| Number of hopping frequency               | +/- 1.54 Hz            |
| Time of Occupancy                         | +/- 1.54 Hz            |
| Temperature                               | +/- 0.4 °C             |
| Humidity                                  | +/- 3.5 %              |
| DC / AC Power Source                      | DC= +/- 1%, AC= +/- 1% |

| Radiated Spurious Emission Measurement Uncertainty |             |                             |  |
|----------------------------------------------------|-------------|-----------------------------|--|
| Polarization: Vertical                             | +/- 2.64 dB | 9kHz~30MHz: +/-2.3dB        |  |
|                                                    | +/- 4.93 dB | 30MHz - 1000MHz: +/- 3.37dB |  |
|                                                    | +/- 4.81 dB | 1GHz - 18GHz: +/- 4.04dB    |  |
|                                                    | +/- 4.52 dB | 18GHz - 40GHz: +/- 4.04dB   |  |
| Polarization: Horizontal                           | +/- 2.64 dB | 9kHz~30MHz: +/-2.3dB        |  |
|                                                    | +/- 4.45 dB | 30MHz - 1000MHz: +/- 4.22dB |  |
|                                                    | +/- 4.81 dB | 1GHz - 18GHz: +/- 4.08dB    |  |
|                                                    | +/- 4.52 dB | 18GHz - 40GHz: +/- 4.08dB   |  |

### Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

Frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

| Frequency range<br>MHz | Limits<br>dB(uV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0.15 to 0.50           | 66 to 56         | 56 to 46 |
| 0.50 to 5              | 56               | 46       |
| 5 to 30                | 60               | 50       |

Note

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

### 6.2 Measurement Equipment Used

| EQUIPMENT TYPE    | MFR         | MODEL NUMBER  | SERIAL NUMBER      | LAST CAL.  | CAL DUE.   |
|-------------------|-------------|---------------|--------------------|------------|------------|
| LISN              | SCHWARZBECK | NSLK 8127     | 8127-465           | 04/09/2020 | 04/08/2021 |
| Coaxial Cables    | N/A         | Coaxial Cable | 161207             | 12/07/2020 | 12/06/2021 |
| Test Software     | audix       | e3            | Ver. 6.11-20180413 | 01/01/2021 | 12/31/2021 |
| EMI Test Receiver | R&S         | ESCI 7        | 100759             | 07/13/2020 | 07/12/2021 |

### 6.3 EUT Setup

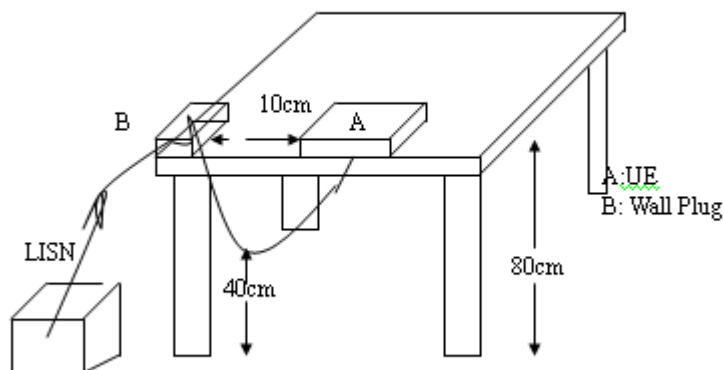
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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## 6.4 Test SET-UP (Block Diagram of Configuration)



## 6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plan.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## 6.6 Measurement Result

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

Note2: The \* reveals the worst-case results that closet to the limit.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number :ER-2021-20005

Test Site :Conduction 6F

Test Mode :BT

Test Date :2021-02-20

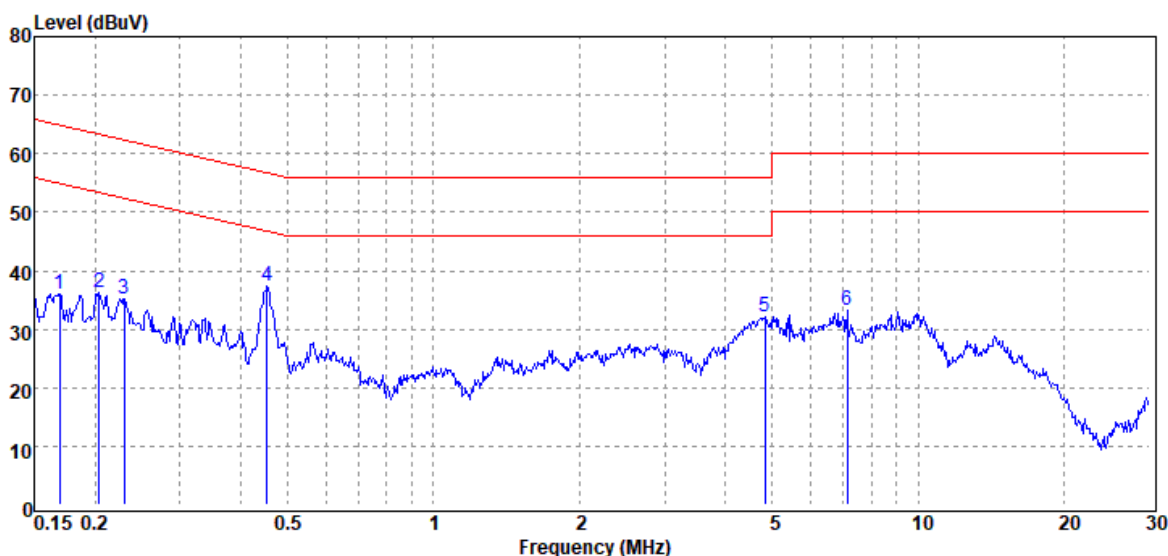
Power :AC 120V/60Hz

Temp./Humi. :22.5/47

Probe :L

Engineer :Neo Tsai

Note :



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.17         | Peak                         | 36.05                             | 0.04         | 36.09                | 64.99         | -28.90       |
| 0.20         | Peak                         | 36.09                             | 0.04         | 36.13                | 63.45         | -27.32       |
| 0.23         | Peak                         | 35.16                             | 0.04         | 35.20                | 62.44         | -27.24       |
| 0.45         | Peak                         | 37.29                             | 0.13         | 37.42                | 56.80         | -19.38       |
| 4.82         | Peak                         | 31.64                             | 0.53         | 32.17                | 56.00         | -23.83       |
| 7.14         | Peak                         | 32.50                             | 0.69         | 33.19                | 60.00         | -26.81       |

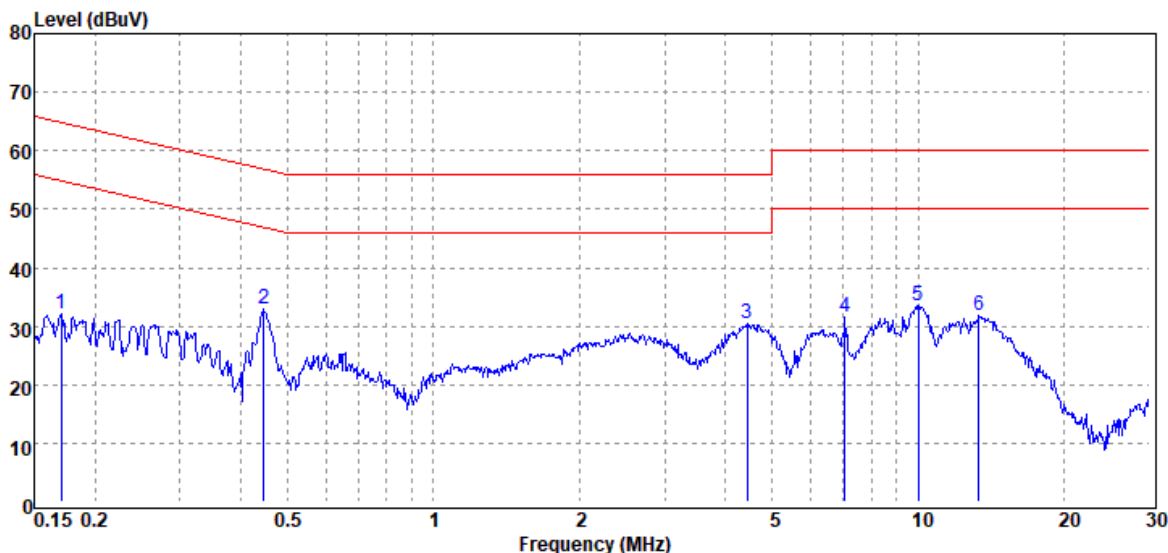
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Report Number :ER-2021-20005  
 Test Mode :BT  
 Power :AC 120V/60Hz  
 Probe :N  
 Note: :

Test Site :Conduction 6F  
 Test Date :2021-02-20  
 Temp./Humi. :22.5/47  
 Engineer :Neo Tsai



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.17         | Peak                         | 32.07                             | 0.11         | 32.18                | 64.94         | -32.76       |
| 0.45         | Peak                         | 32.83                             | 0.19         | 33.02                | 56.93         | -23.91       |
| 4.43         | Peak                         | 30.03                             | 0.43         | 30.46                | 56.00         | -25.54       |
| 7.06         | Peak                         | 30.96                             | 0.59         | 31.55                | 60.00         | -28.45       |
| 10.02        | Peak                         | 32.90                             | 0.70         | 33.60                | 60.00         | -26.40       |
| 13.34        | Peak                         | 31.01                             | 0.89         | 31.90                | 60.00         | -28.10       |

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## 7 PEAK OUTPUT POWER MEASUREMENT

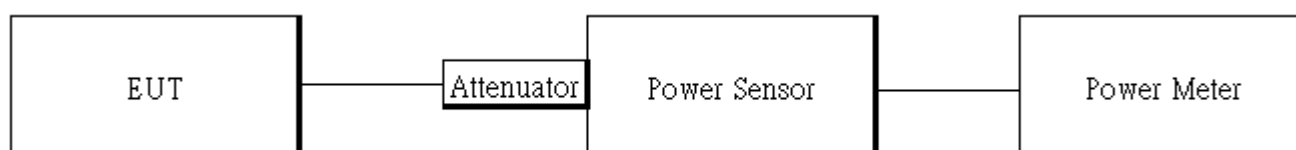
### 7.1 Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, The Limit: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

### 7.2 Measurement Equipment Used

| Conducted Emission Test Site: Conducted 2 |           |              |               |            |            |
|-------------------------------------------|-----------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                            | MFR/BRAND | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Power Meter                               | Anritsu   | ML2496A      | 1242004       | 11/06/2020 | 11/05/2021 |
| Power Sensor                              | Anritsu   | MA2411B      | 1207365       | 11/06/2020 | 11/05/2021 |
| Power Sensor                              | Anritsu   | MA2411B      | 1207368       | 11/06/2020 | 11/05/2021 |

### 7.3 Test Set-up:



### 7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth)
4. Record the max. reading.
5. Repeat above procedures until all default test channel is completed.

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## 7.5 Peak & Average Power Measurement Result

1M BR mode (Peak):

| CH   | Freq. (MHz) | Power set | Peak Output Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|-------------------------|-------------------|------------|
| Low  | 2402        | 10        | 12.45                   | 17.579            | 1000       |
| Mid  | 2441        | 10        | <b>14.20</b>            | 26.303            | 1000       |
| High | 2480        | 10        | 13.98                   | 25.003            | 1000       |

1M BR mode (Average):

| CH   | Freq. (MHz) | Power set | Max. Output include tune up tolerance Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|---------------------------------------------------|-------------------|------------|
| Low  | 2402        | 10        | 12.37                                             | 17.244            | 1000       |
| Mid  | 2441        | 10        | 13.52                                             | 22.472            | 1000       |
| High | 2480        | 10        | 13.81                                             | 24.024            | 1000       |

2M EDR mode (Peak):

| CH   | Freq. (MHz) | Power set | Peak Output Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|-------------------------|-------------------|------------|
| Low  | 2402        | 10        | 11.85                   | 15.311            | 125        |
| Mid  | 2441        | 10        | <b>13.63</b>            | 23.067            | 125        |
| High | 2480        | 10        | 13.43                   | 22.029            | 125        |

2M EDR mode (Average):

| CH   | Freq. (MHz) | Power set | Max. Avg. Output include tune up tolerance Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|--------------------------------------------------------|-------------------|------------|
| Low  | 2402        | 10        | 9.47                                                   | 8.844             | 125        |
| Mid  | 2441        | 10        | 11.27                                                  | 13.386            | 125        |
| High | 2480        | 10        | 11.05                                                  | 12.724            | 125        |

3M EDR mode (Peak):

| CH   | Freq. (MHz) | Power set | Peak Output Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|-------------------------|-------------------|------------|
| Low  | 2402        | 10        | 12.28                   | 16.904            | 125        |
| Mid  | 2441        | 10        | <b>14.02</b>            | 25.235            | 125        |
| High | 2480        | 10        | 13.82                   | 24.099            | 125        |

3M EDR mode (Average):

| CH   | Freq. (MHz) | Power set | Max. Avg. Output include tune up tolerance Power (dBm) | Output Power (mW) | Limit (mW) |
|------|-------------|-----------|--------------------------------------------------------|-------------------|------------|
| Low  | 2402        | 10        | 9.45                                                   | 8.803             | 125        |
| Mid  | 2441        | 10        | 11.28                                                  | 13.416            | 125        |
| High | 2480        | 10        | 11.04                                                  | 12.695            | 125        |

NOTE: cable loss as 1.1dB that offsets in the spectrum

\*Note: Max. Output include tune up tolerance Power measured by using average detector.

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## 7.6 EIRP Measurement Result

### 1M BR mode EIRP

| Channel | Frequency (MHz) | Power set | Max. Output include tune up tolerance Power (dBm) | Antenna Gain (dBi) | EIRP (mW) | Limit (mW) |
|---------|-----------------|-----------|---------------------------------------------------|--------------------|-----------|------------|
| Low     | 2402            | 10        | 12.37                                             | -0.13              | 16.736    | 4000       |
| Mid     | 2441            | 10        | 13.52                                             | -0.13              | 21.809    | 4000       |
| High    | 2480            | 10        | 13.81                                             | -0.13              | 23.315    | 4000       |

### 2M EDR mode EIRP

| Channel | Frequency (MHz) | Power set | Max. Avg. Output include tune up tolerance Power (dBm) | Antenna Gain (dBi) | EIRP (mW) | Limit (mW) |
|---------|-----------------|-----------|--------------------------------------------------------|--------------------|-----------|------------|
| Low     | 2402            | 10        | 9.47                                                   | -0.13              | 8.583     | 4000       |
| Mid     | 2441            | 10        | 11.27                                                  | -0.13              | 12.991    | 4000       |
| High    | 2480            | 10        | 11.05                                                  | -0.13              | 12.349    | 4000       |

### 3M EDR mode EIRP

| Channel | Frequency (MHz) | Power set | Max. Avg. Output include tune up tolerance Power (dBm) | Antenna Gain (dBi) | EIRP (mW) | Limit (mW) |
|---------|-----------------|-----------|--------------------------------------------------------|--------------------|-----------|------------|
| Low     | 2402            | 10        | 9.45                                                   | -0.13              | 8.544     | 4000       |
| Mid     | 2441            | 10        | 11.28                                                  | -0.13              | 13.021    | 4000       |
| High    | 2480            | 10        | 11.04                                                  | -0.13              | 12.321    | 4000       |

\* **Note:** EIRP = Average Power + Gain

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## 8 EMISSION BANDWIDTH MEASUREMENT

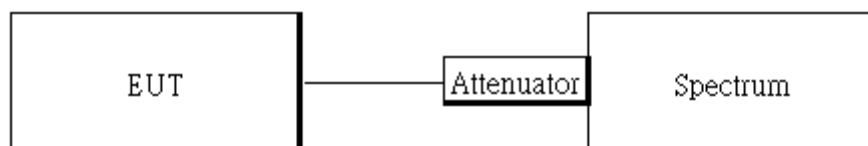
### 8.1 Standard Applicable

For frequency hopping systems operating in the 2400 MHz-2483.5 MHz no limit for 20dB bandwidth.

### 8.2 Measurement Equipment Used

| Conducted Emission Test Site: Conducted 2 |               |              |               |            |            |
|-------------------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                            | MFR/BRAND     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EXA Spectrum Analyzer                     | KEYSIGHT      | N9010B       | MY59071571    | 06/27/2020 | 06/26/2021 |
| DC Block                                  | Mini-Circuits | BLK-18-S+    | 1             | 12/16/2020 | 12/15/2021 |

### 8.3 Test Set-up



### 8.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10:2013.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set the spectrum analyzer as  
 RBW= 1 % to 5% of OBW ,  
 VBW = 3 X RBW,  
 Span= 2 to 5 times of the OBW,  
 Sweep=auto,  
 Detector = Peak, and Max hold for 20dB Bandwidth test.
5. Mark the peak frequency and -20dB (upper and lower) frequency
6. Set the spectrum analyzer as  
 RBW= 1 % to 5% of 99% Bandwidth ,  
 VBW  $\geq$  3 X RBW,  
 Span= large enough to capture all products of the modulation process,  
 Sweep=auto,  
 Detector = Peak, and Max hold for 99% Bandwidth test.
7. Mark the peak frequency and 99%dB (upper and lower) frequency
8. Repeat above procedures until all test default channel is completed

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## 8.5 20dB Bandwidth

### GFSK

| CH   | 20 dB BW (MHz) | 2/3 BW (MHz) |
|------|----------------|--------------|
| Low  | 0.8801         | 0.59         |
| Mid  | 0.8801         | 0.59         |
| High | 0.8791         | 0.59         |

### $\pi/4$ -DQPSK

| CH   | 20 dB BW (MHz) | 2/3 BW (MHz) |
|------|----------------|--------------|
| Low  | 1.281          | 0.85         |
| Mid  | 1.255          | 0.84         |
| High | 1.254          | 0.84         |

### 8-DPSK

| CH   | 20 dB BW (MHz) | 2/3 BW (MHz) |
|------|----------------|--------------|
| Low  | 1.255          | 0.84         |
| Mid  | 1.255          | 0.84         |
| High | 1.255          | 0.84         |

## 8.6 99% Bandwidth

### GFSK

| CH   | 99% BW (MHz) |
|------|--------------|
| Low  | 0.79867      |
| Mid  | 0.79835      |
| High | 0.79896      |

### $\pi/4$ -DQPSK

| CH   | 99% BW (MHz) |
|------|--------------|
| Low  | 1.1819       |
| Mid  | 1.1808       |
| High | 1.1798       |

### 8-DPSK

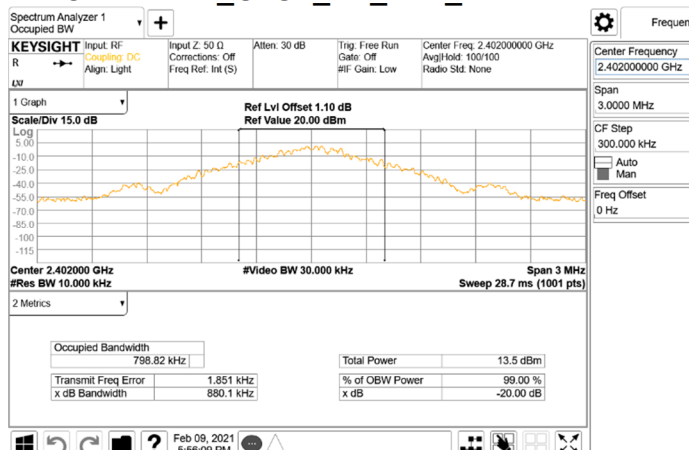
| CH   | 99% BW (MHz) |
|------|--------------|
| Low  | 1.1846       |
| Mid  | 1.1850       |
| High | 1.1829       |

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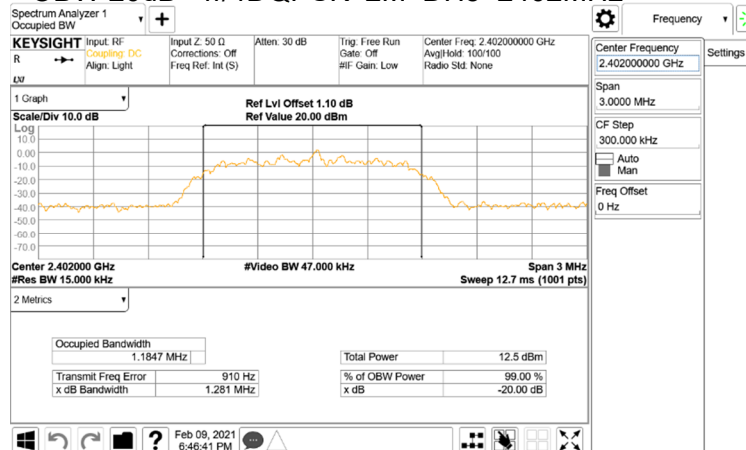
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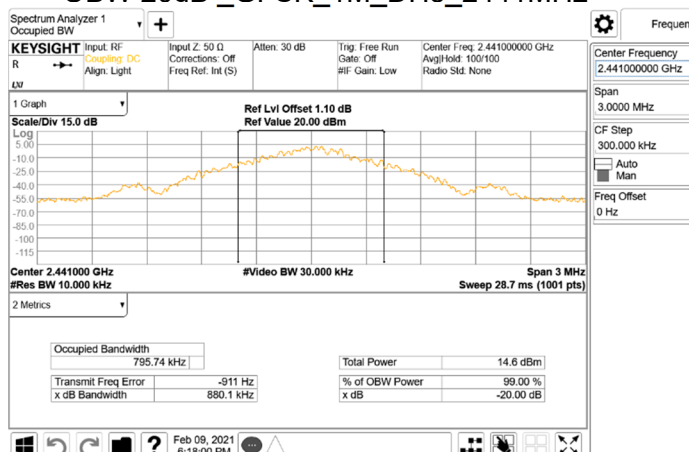
## OBW 20dB \_GFSK\_1M\_DH5\_2402MHz



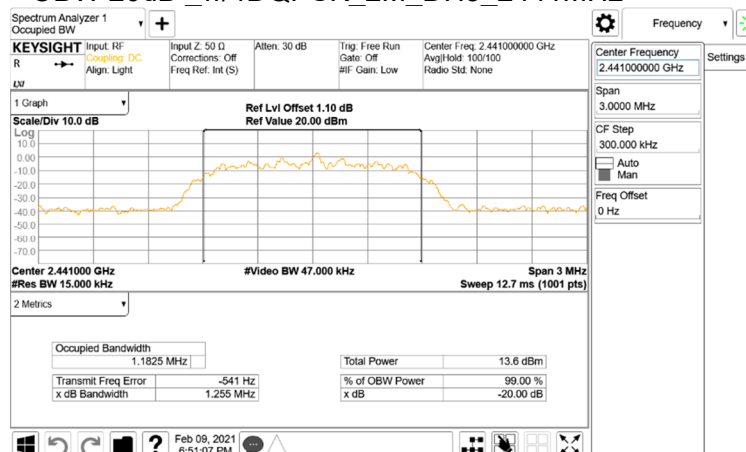
## OBW 20dB $\pi/4$ DQPSK 2M DH5 2402MHz



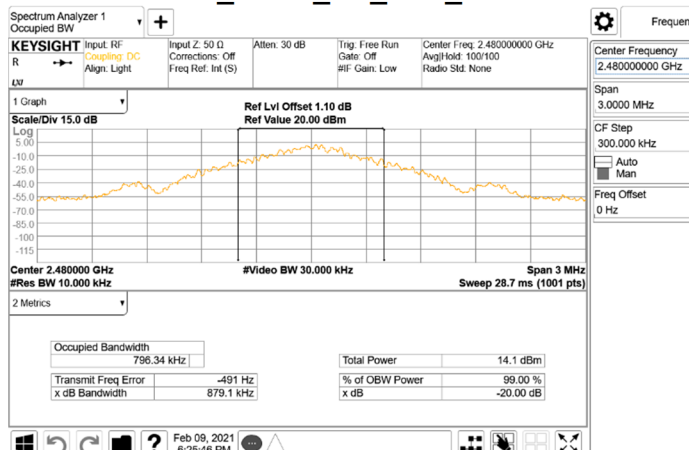
## OBW 20dB \_GFSK\_1M\_DH5\_2441MHz



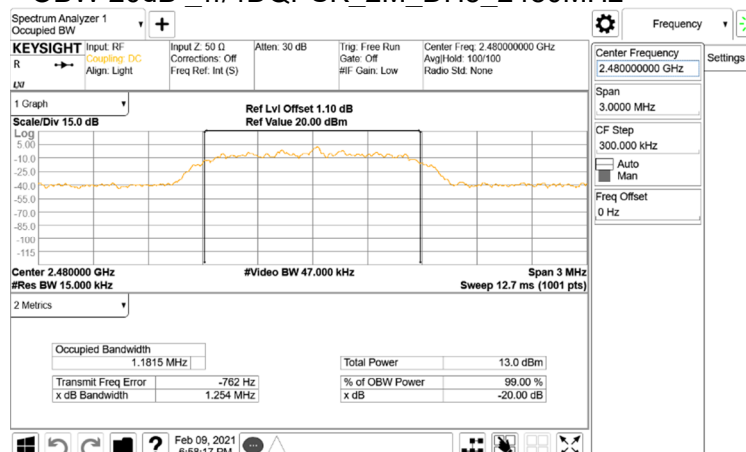
## OBW 20dB $\pi/4$ DQPSK 2M DH5 2441MHz



## OBW 20dB \_GFSK\_1M\_DH5\_2480MHz



## OBW 20dB $\pi/4$ DQPSK 2M DH5 2480MHz



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No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

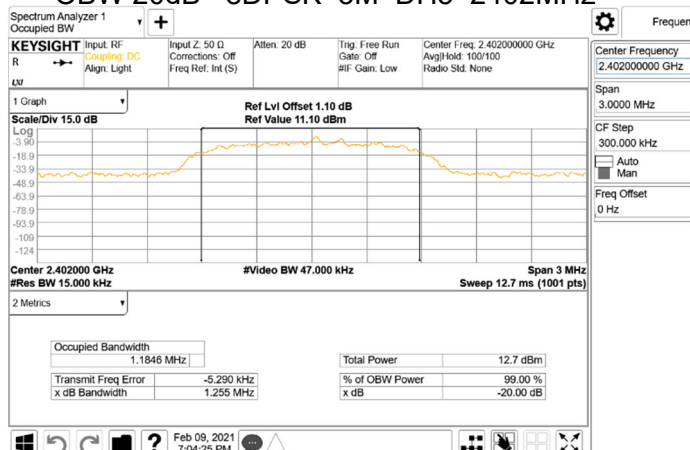
台灣檢驗科技股份有限公司 t (886-2) 2299-3279

f (886-2) 2298-0488

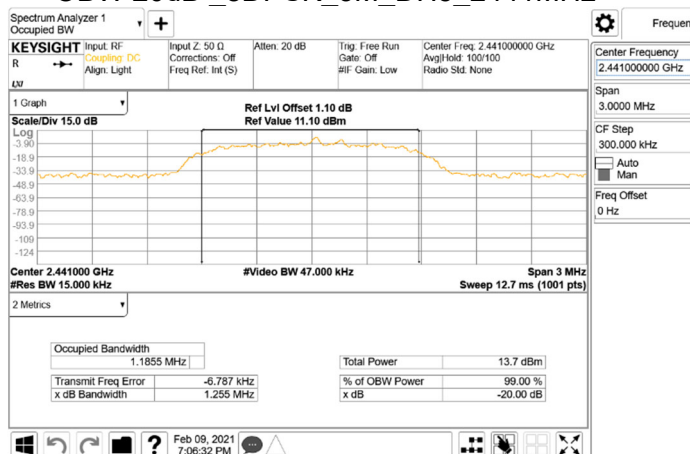
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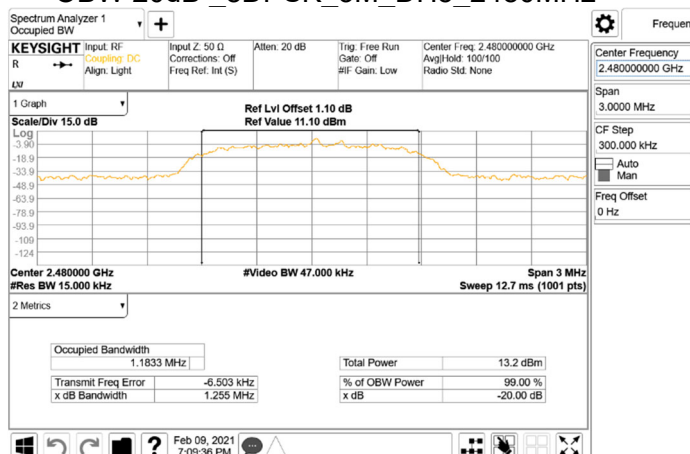
## OBW 20dB 8DPSK 3M DH5 2402MHz



## OBW 20dB 8DPSK 3M DH5 2441MHz



## OBW 20dB 8DPSK 3M DH5 2480MHz

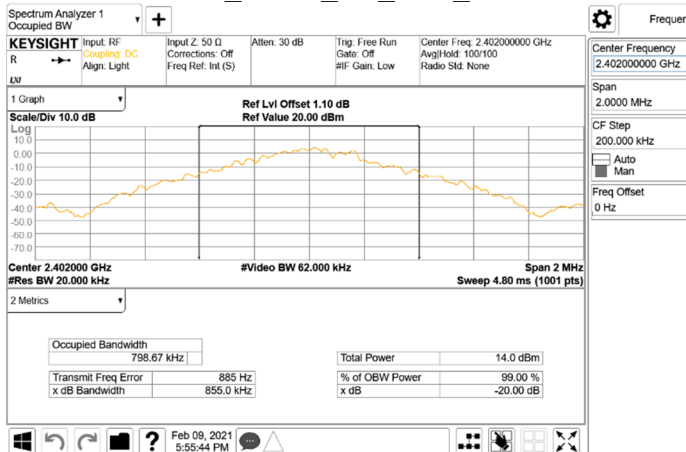


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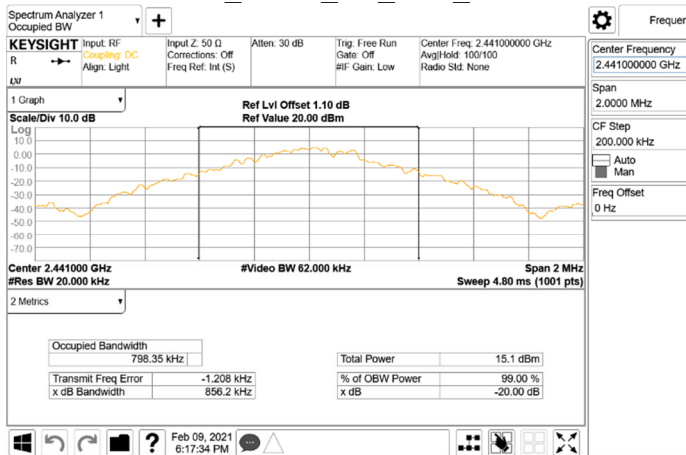
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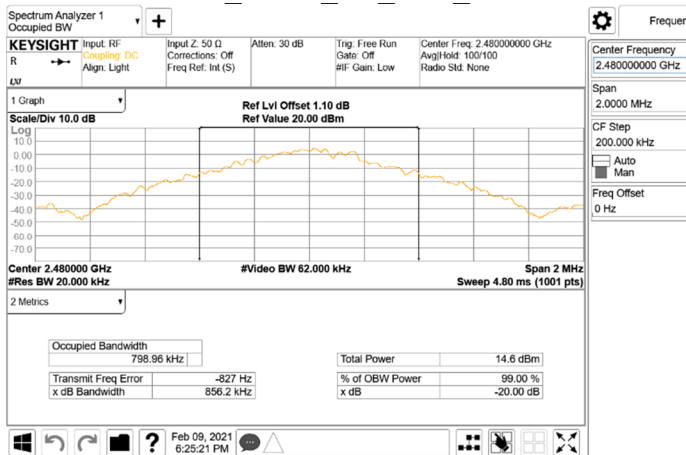
## IC OBW 99%\_GFSK\_1M\_DH5\_2402MHz



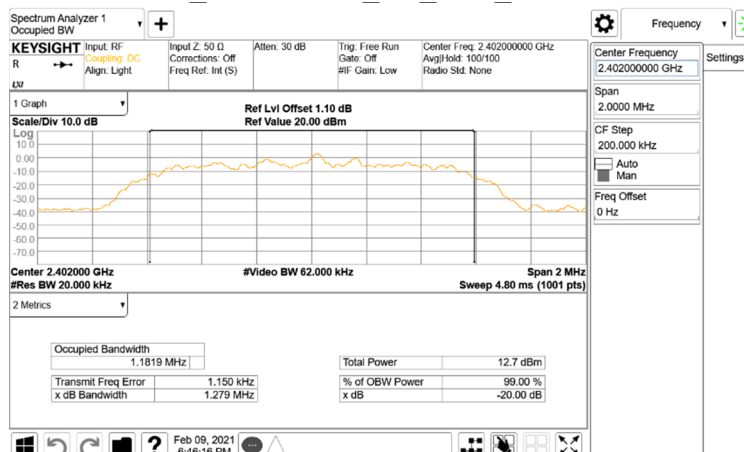
## IC OBW 99%\_GFSK\_1M\_DH5\_2441MHz



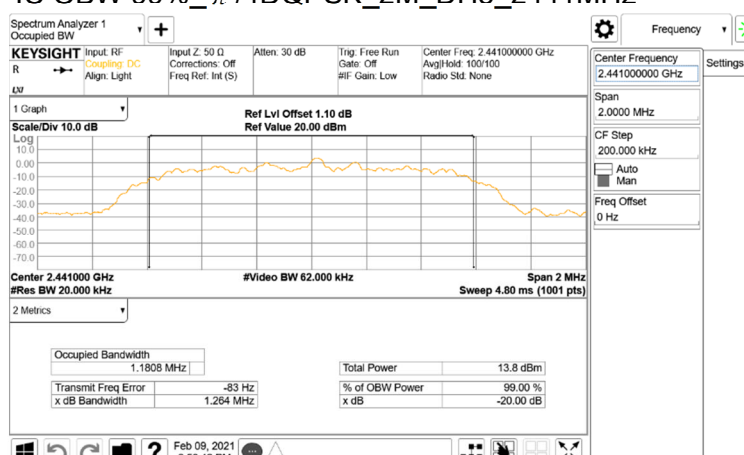
## IC OBW 99%\_GFSK\_1M\_DH5\_2480MHz



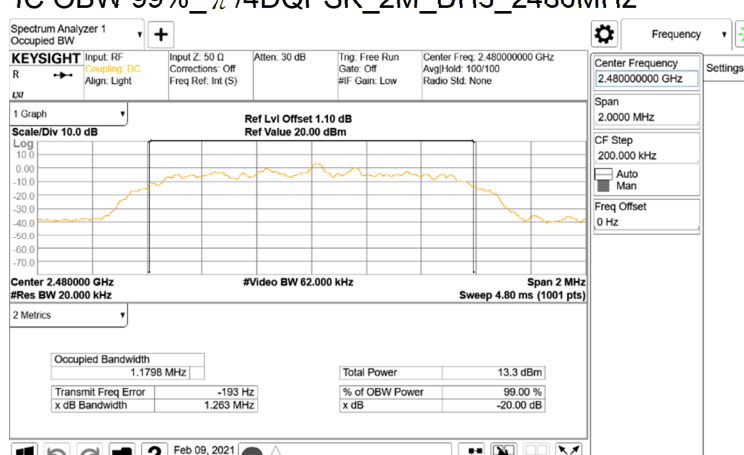
## IC OBW 99%\_π/4DQPSK\_2M\_DH5\_2402MHz



## IC OBW 99%\_π/4DQPSK\_2M\_DH5\_2441MHz



## IC OBW 99%\_π/4DQPSK\_2M\_DH5\_2480MHz

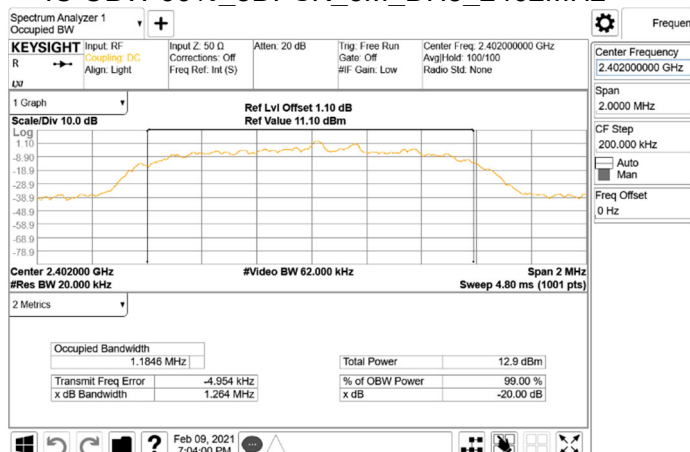


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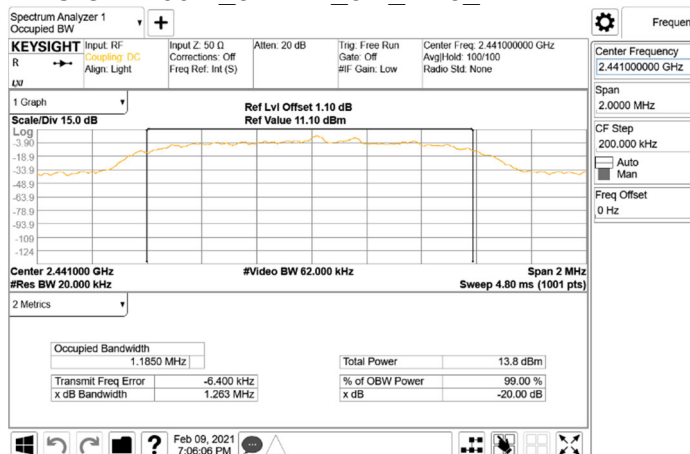
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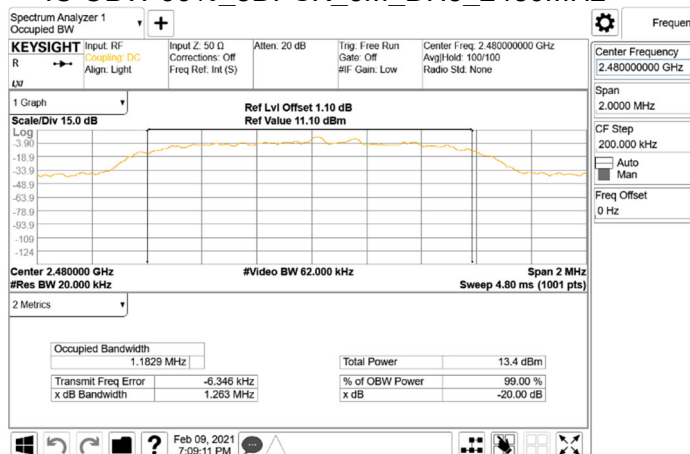
## IC OBW 99%\_8DPSK\_3M\_DH5\_2402MHz



## IC OBW 99%\_8DPSK\_3M\_DH5\_2441MHz



## IC OBW 99%\_8DPSK\_3M\_DH5\_2480MHz



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## 9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

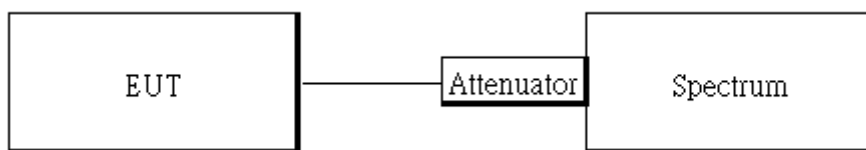
### 9.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

### 9.2 Measurement Equipment Used

| Conducted Emission Test Site: Conducted 2 |               |              |               |            |            |
|-------------------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                            | MFR/BRAND     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EXA Spectrum Analyzer                     | KEYSIGHT      | N9010B       | MY59071571    | 06/27/2020 | 06/26/2021 |
| DC Block                                  | Mini-Circuits | BLK-18-S+    | 1             | 12/16/2020 | 12/15/2021 |

### 9.3 Test SET-UP



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## 9.4 Measurement Procedure

### 9.4.1 Conducted Band Edge:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10:2013.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = operating frequency.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto
6. Mark Peak, 2.3999GHz and 2.4836GHz and record the max. level.
7. Repeat above procedures until all frequency measured were complete.

### 9.4.2 Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows ANSI C63.10:2013.
3. Set RBW = 100 kHz & VBW = 300 kHz, Detector =Peak, Sweep = Auto
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

## 9.5 Measurement Result

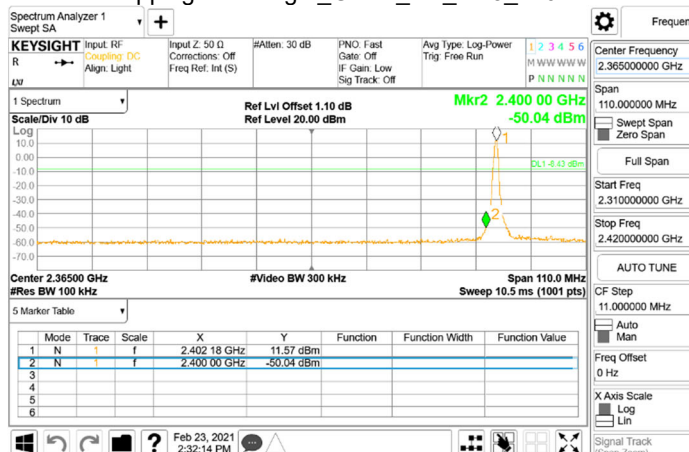
See next page for test plots.

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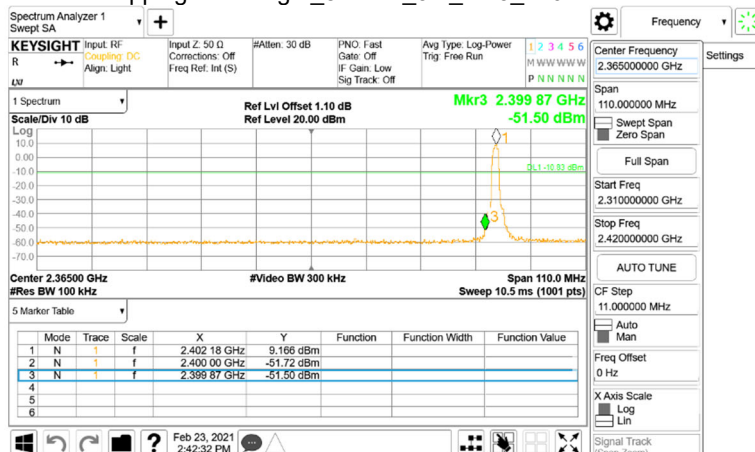
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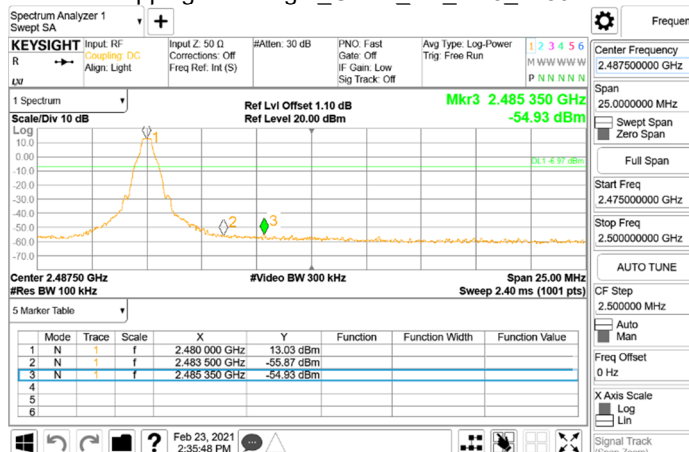
## Non-hopping Bandedge \_GFSK\_1M\_DH5\_2402MHz



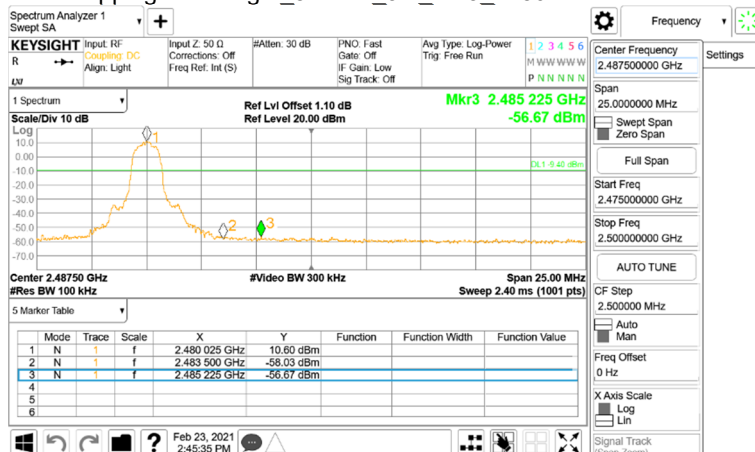
## Non-hopping Bandedge \_8DPSK\_3M\_DH5\_2402MHz



## Non-hopping Bandedge \_GFSK\_1M\_DH5\_2480MHz



## Non-hopping Bandedge \_8DPSK\_3M\_DH5\_2480MHz

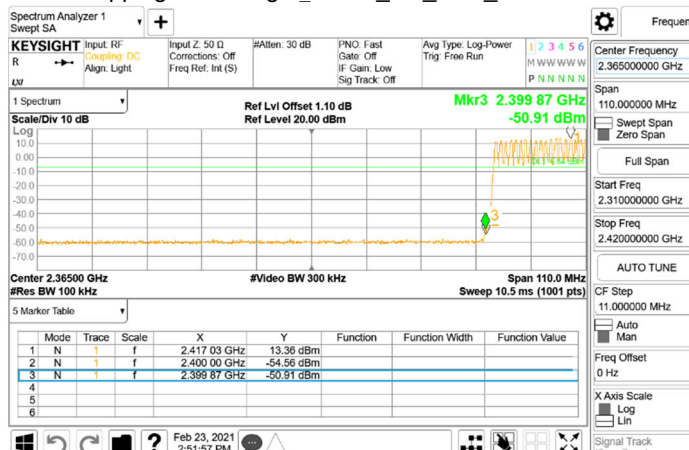


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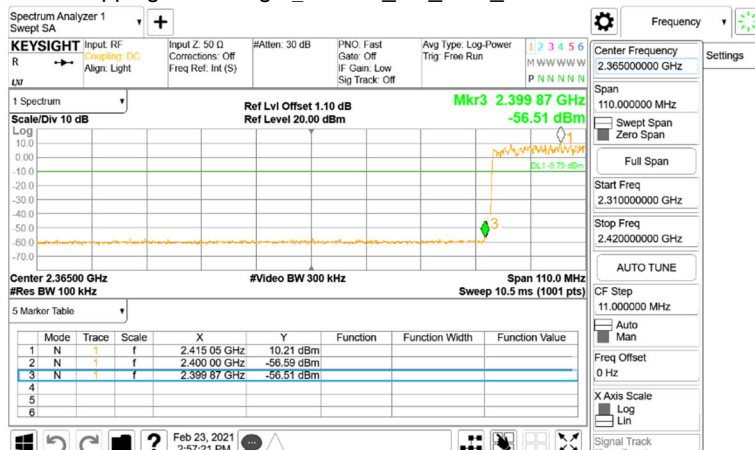
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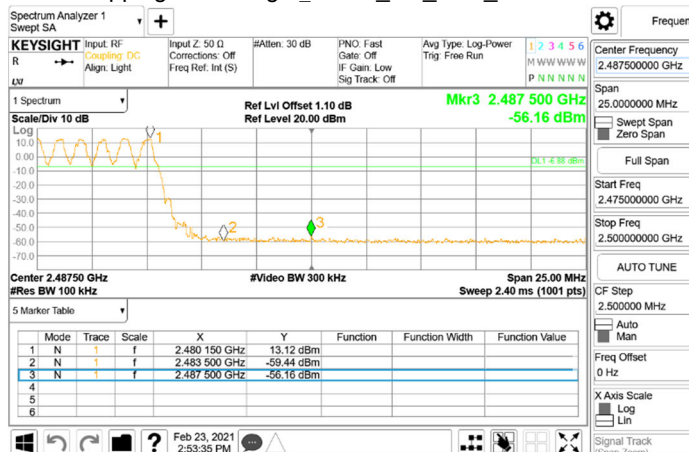
## Hopping Band Edge \_GFSK\_1M\_DH5\_2402MHz



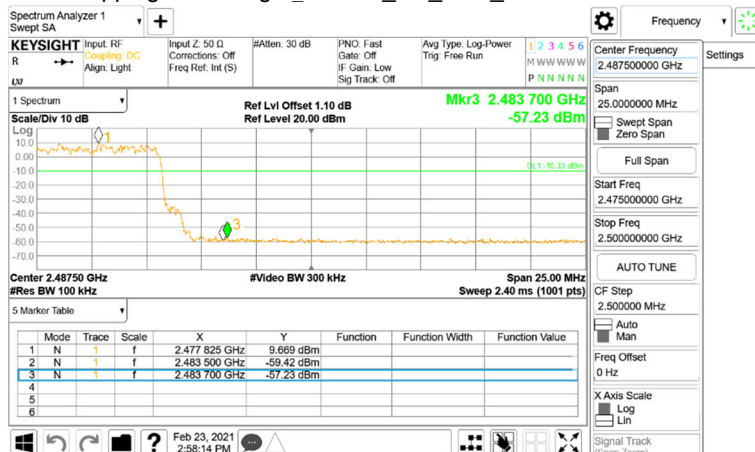
## Hopping Band Edge \_8DPSK\_3M\_DH5\_2402MHz



## Hopping Band Edge \_GFSK\_1M\_DH5\_2480MHz



## Hopping Band Edge \_8DPSK\_3M\_DH5\_2480MHz

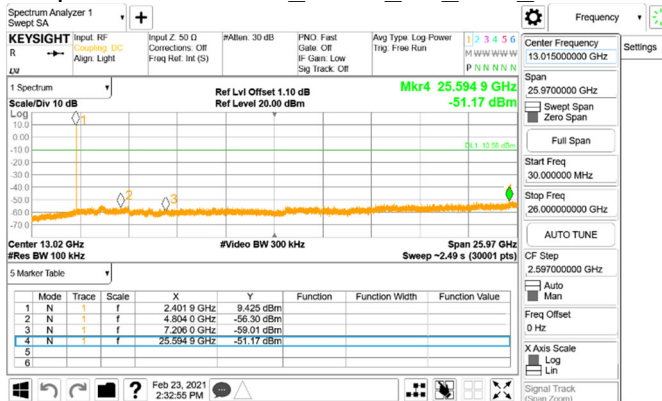


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## Spurious Emission \_GFSK\_1M\_DH5\_2402MHz



## Spurious Emission \_π/4DQPSK\_2M\_DH5\_2402MHz



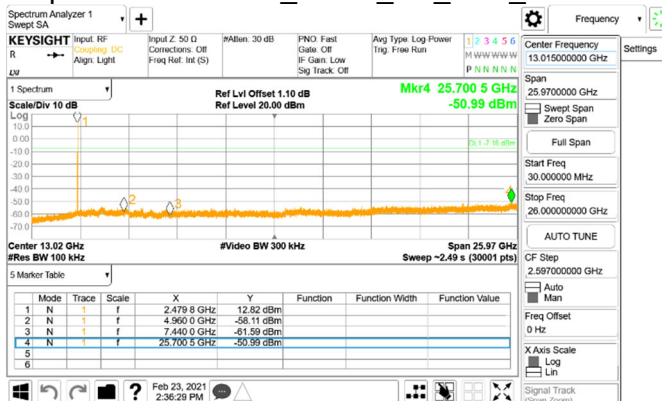
## Spurious Emission \_GFSK\_1M\_DH5\_2441MHz



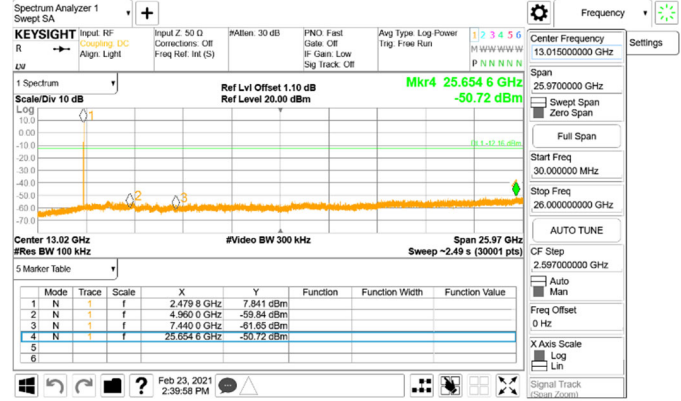
## Spurious Emission \_π/4DQPSK\_2M\_DH5\_2441MHz



## Spurious Emission \_GFSK\_1M\_DH5\_2480MHz



## Spurious Emission \_π/4DQPSK\_2M\_DH5\_2480MHz



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