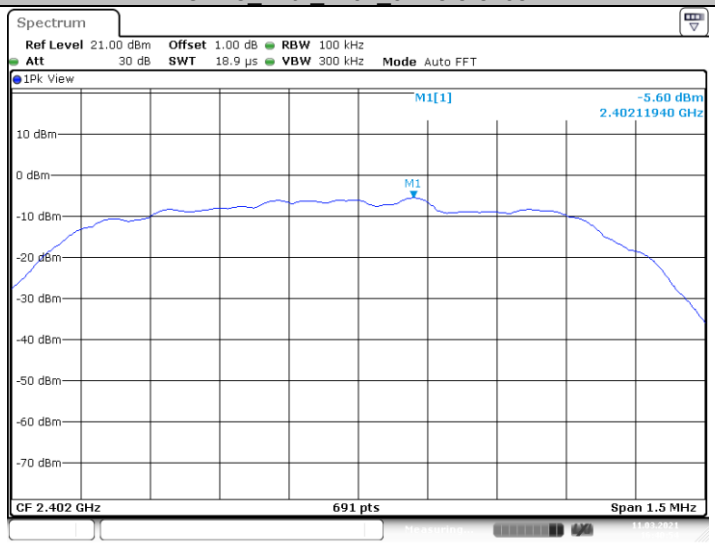
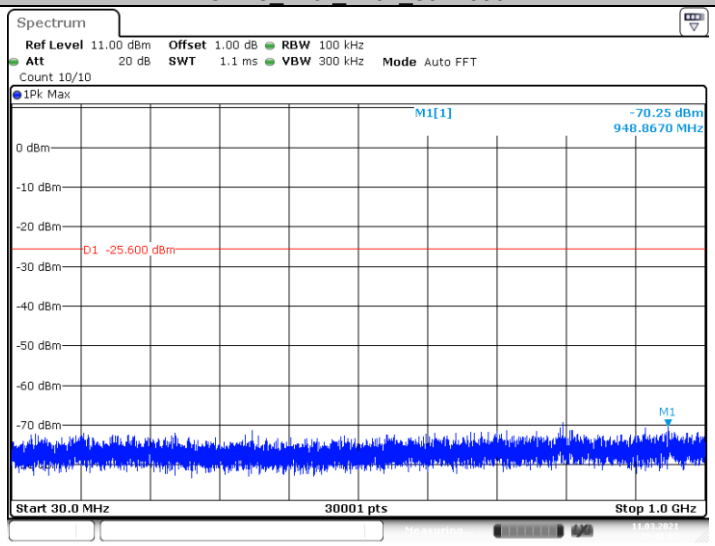
3DH5_Ant1_2402_0~Reference



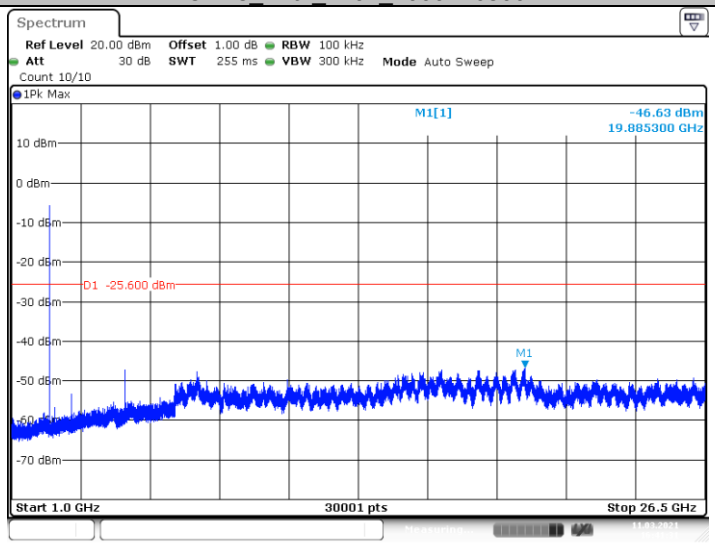

Date: 11.MAR.2021 16:40:54

3DH5_Ant1_2402_30~1000



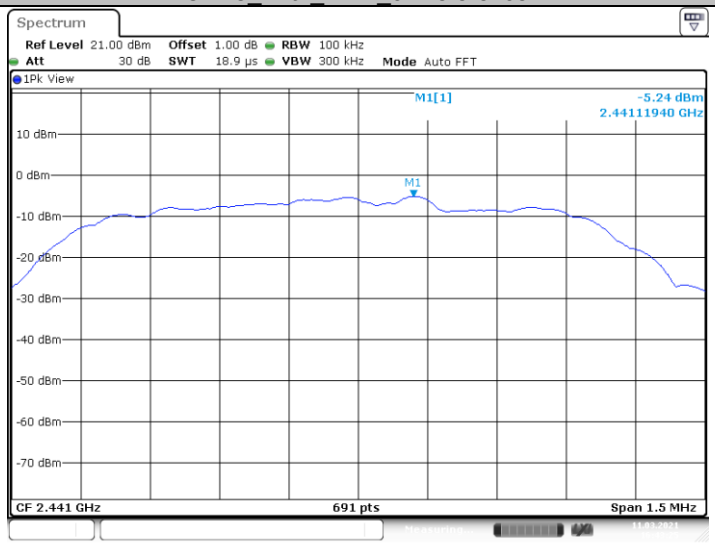

Date: 11.MAR.2021 16:41:03

3DH5_Ant1_2402_1000~26500



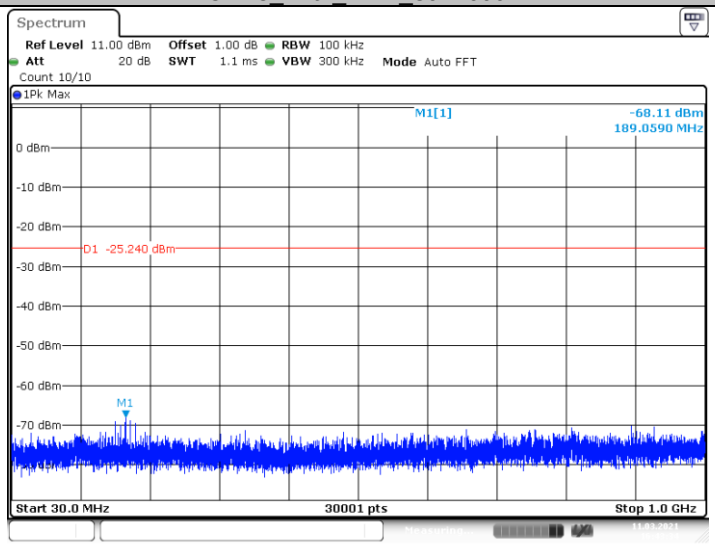

Date: 11.MAR.2021 16:41:31

3DH5_Ant1_2441_0~Reference



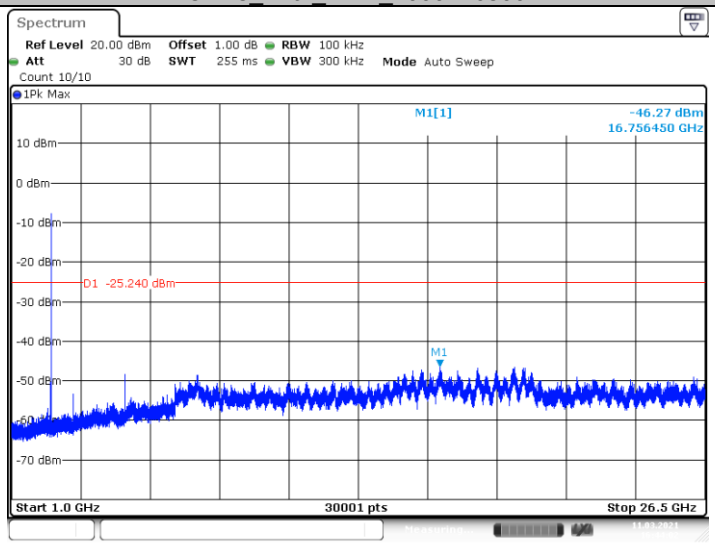

Date: 11.MAR.2021 16:43:25

3DH5_Ant1_2441_30~1000



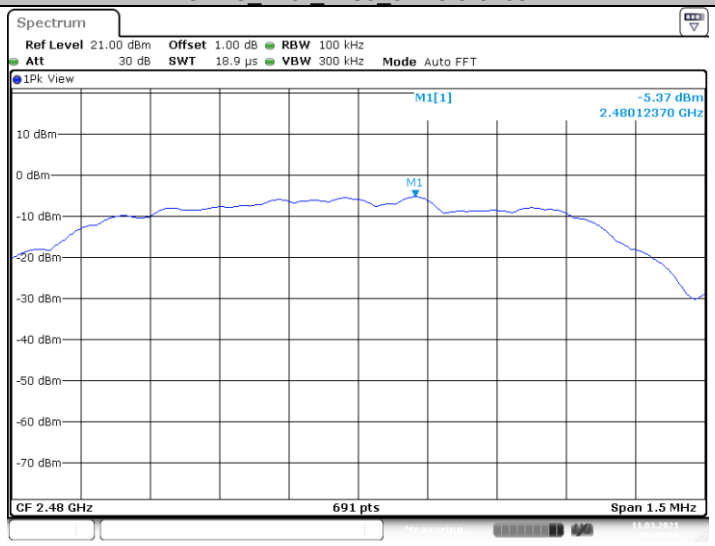

Date: 11.MAR.2021 16:43:34

3DH5_Ant1_2441_1000~26500



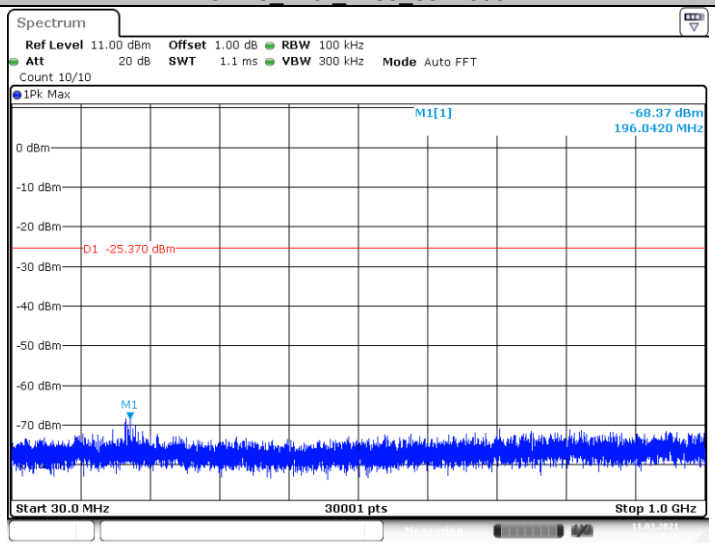

Date: 11.MAR.2021 16:44:02

3DH5_Ant1_2480_0~Reference



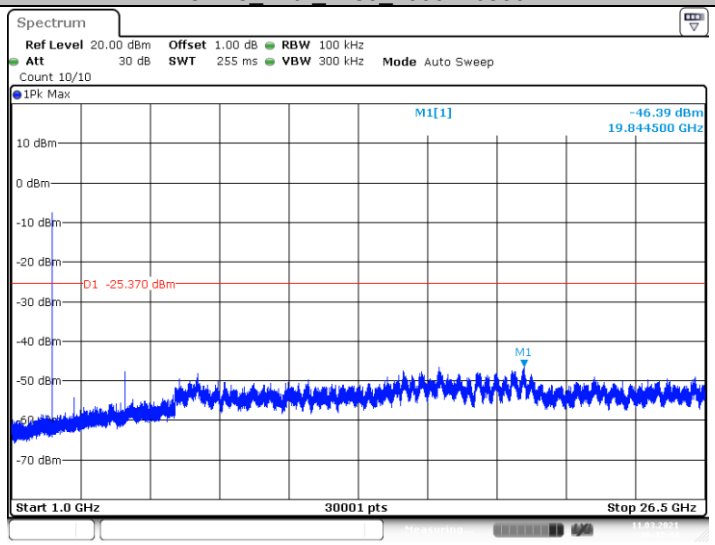

Date: 11.MAR.2021 16:47:07

3DH5_Ant1_2480_30~1000




Date: 11.MAR.2021 16:47:16

3DH5_Ant1_2480_1000~26500



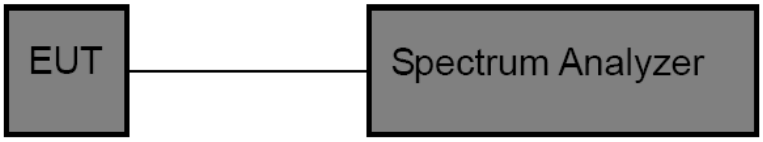

Date: 11.MAR.2021 16:47:43

## 3.5. 20DB Bandwidth

**Limit**

N/A

**Test Configuration**




**Test Procedure**

5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
6. OCB and 20dB Spectrum Setting:
   (1) Set RBW = 1% ~ 5% occupied bandwidth.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

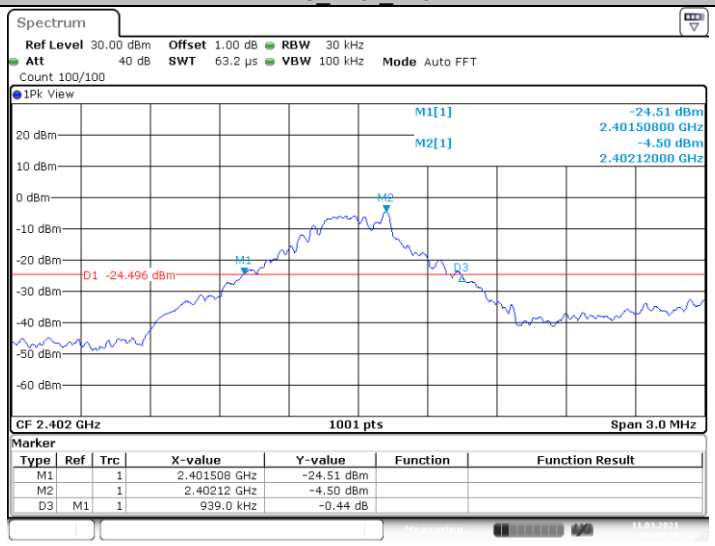
**Test Mode**

Please refer to the clause 2.4.

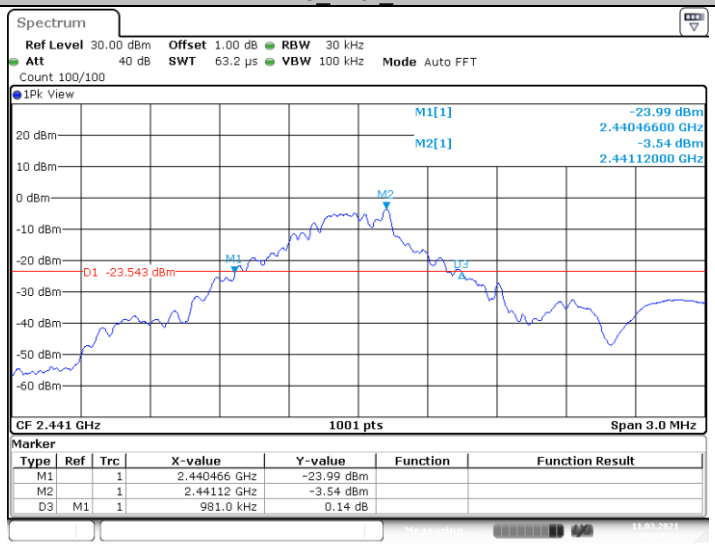
**Test Results**

| Test Mode | Frequency (MHz) | 20db EBW[MHz] | FL[MHz] | FH[MHz] | 20dB Bandwidth *2/3 (kHz) | Verdict |
|---|---|---|---|---|---|---|
| GFSK | 2402 | 0.939 | 2401.508 | 2402.447 | 626.00 | PASS |
| | 2441 | 0.981 | 2440.466 | 2441.447 | 654.00 | PASS |
| | 2480 | 0.933 | 2479.514 | 2480.447 | 622.00 | PASS |
| π/4-DQPSK | 2402 | 1.353 | 2401.295 | 2402.648 | 902.00 | PASS |
| | 2441 | 1.353 | 2440.295 | 2441.648 | 902.00 | PASS |
| | 2480 | 1.353 | 2479.295 | 2480.648 | 902.00 | PASS |
| 8-DPSK | 2402 | 1.341 | 2401.295 | 2402.636 | 894.00 | PASS |
| | 2441 | 1.308 | 2440.322 | 2441.630 | 872.00 | PASS |
| | 2480 | 1.311 | 2479.322 | 2480.633 | 874.00 | PASS |

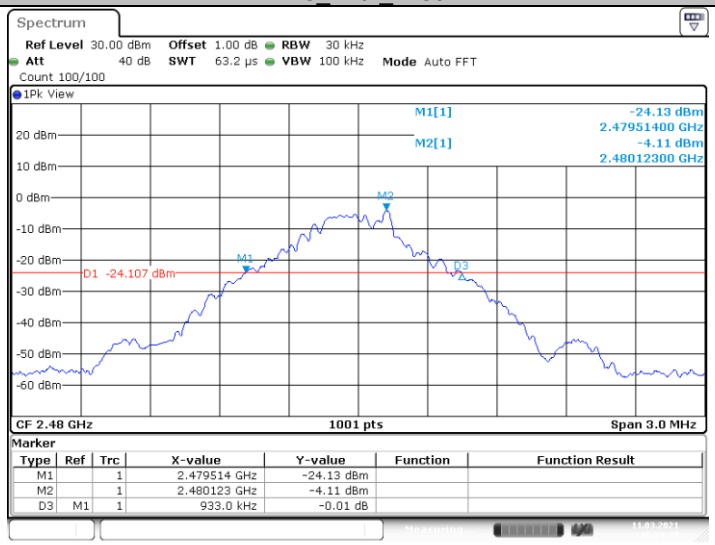
DH5_Ant1_2402



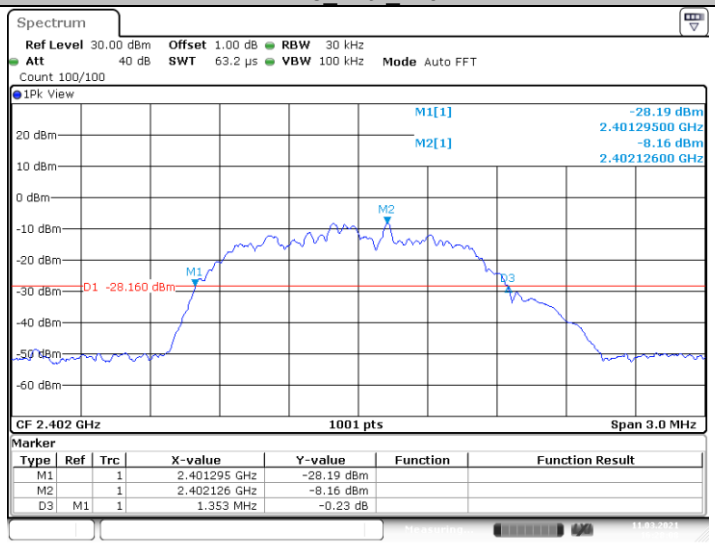

DH5_Ant1_2441



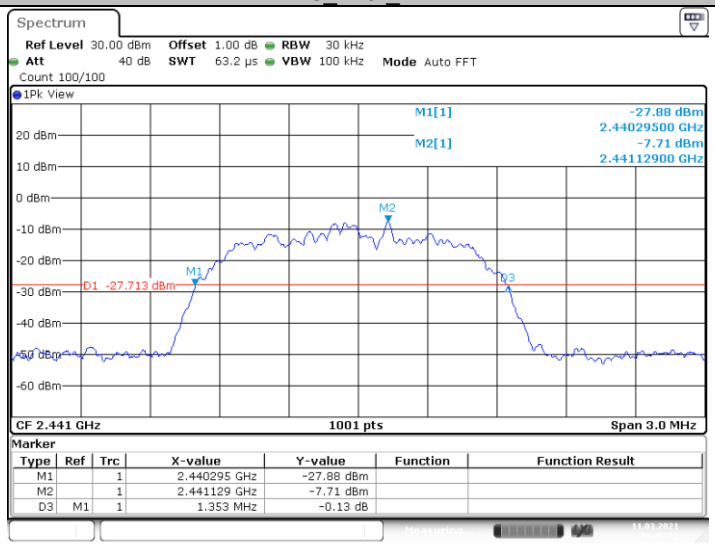

DH5_Ant1_2480



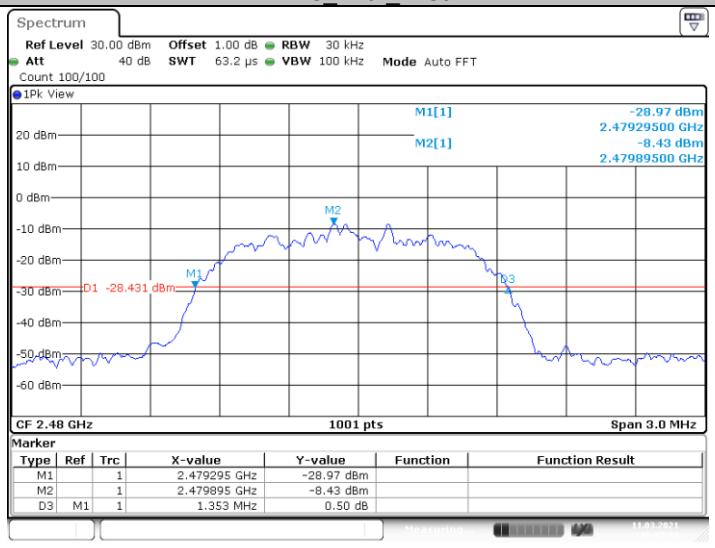
## 2DH5_Ant1_2402



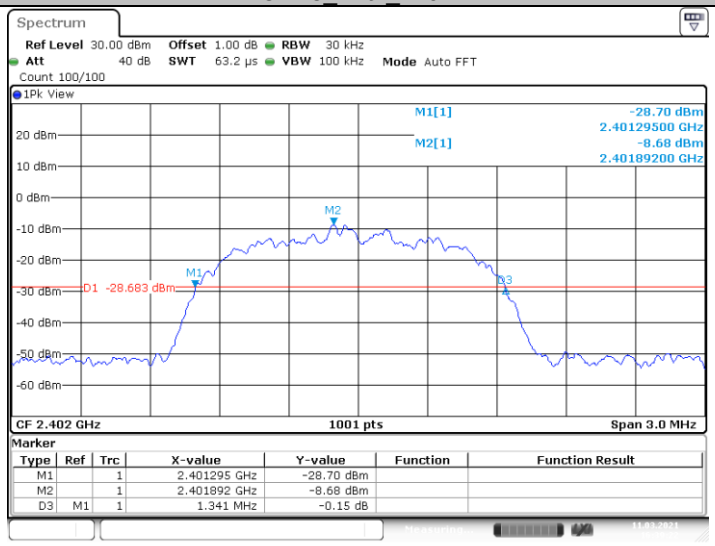

## 2DH5_Ant1_2441




## 2DH5_Ant1_2480

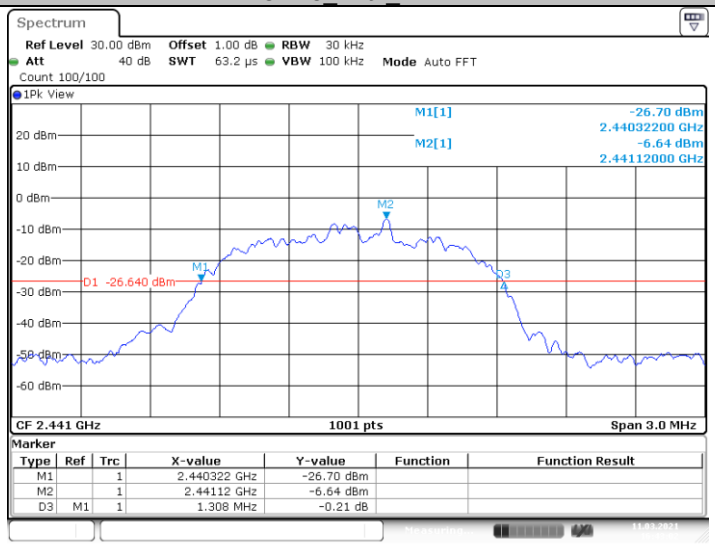


3DH5_Ant1_2402



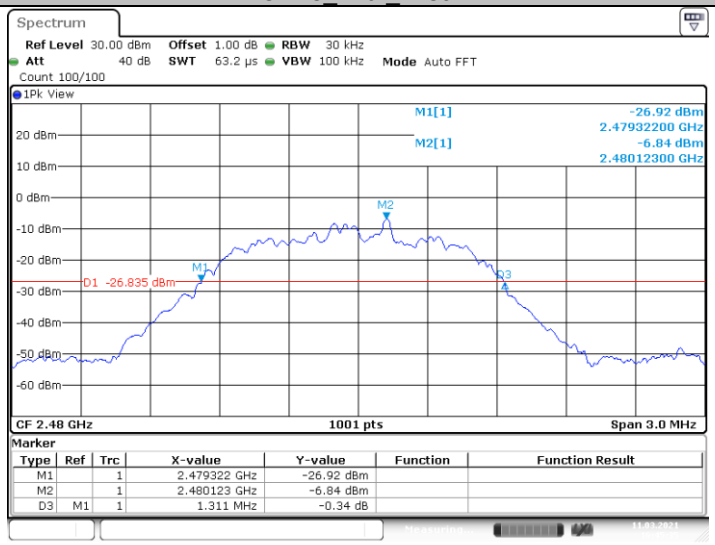

Date: 11.MAR.2021 16:39:22

3DH5_Ant1_2441




Date: 11.MAR.2021 16:43:01

3DH5_Ant1_2480




Date: 11.MAR.2021 16:45:35

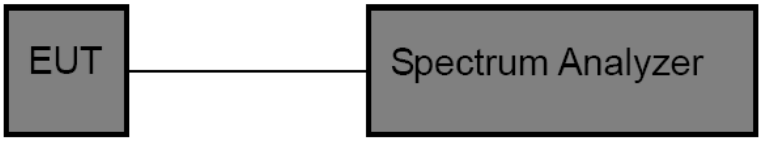
## 3.6. Channel Separation

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :**

| Test Item | Limit | Frequency Range(MHz) |
|---|---|---|
| Channel Separation | >25KHz or >two-thirds of the 20 dB bandwidth Which is greater | 2400~2483.5 |

**Test Configuration**




**Test Procedure**

7. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
8. Spectrum Setting:
   (1) Set RBW = 100 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

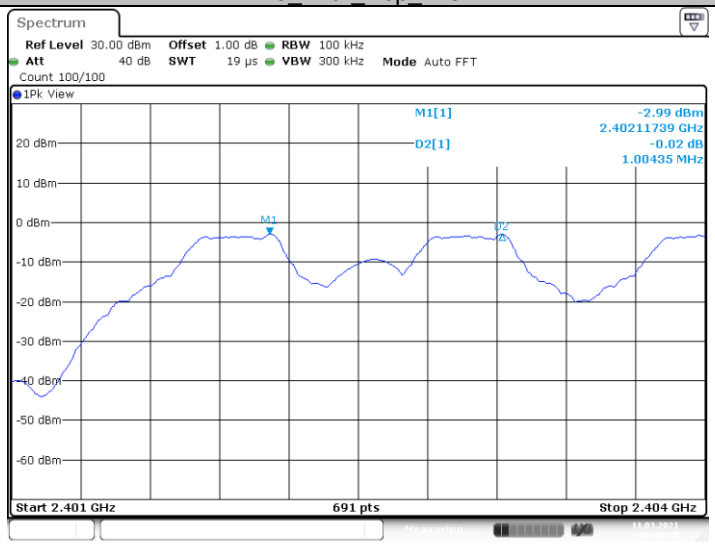
**Test Mode**

Please refer to the clause 2.4.

**Test Results**

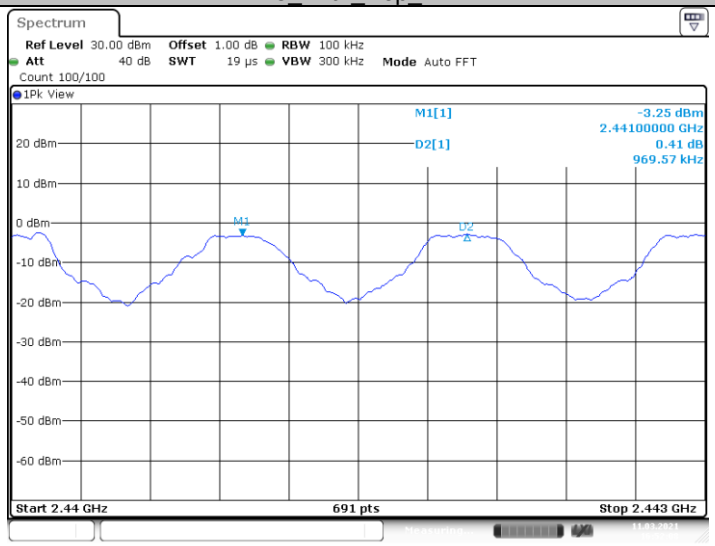
| Test Mode | Frequency(MHz) | Result[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|
| GFSK | Hop_2402 | 1.004 | >=0.981 | PASS |
| | Hop_2441 | 0.970 | >=0.654 | PASS |
| | Hop_2480 | 1.029 | >=0.981 | PASS |
| π/4-DQPSK | Hop_2402 | 1.000 | >=0.902 | PASS |
| | Hop_2441 | 1.091 | >=0.902 | PASS |
| | Hop_2480 | 0.989 | >=0.902 | PASS |
| 8-DPSK | Hop_2402 | 1.004 | >=0.894 | PASS |
| | Hop_2441 | 1.000 | >=0.894 | PASS |
| | Hop_2480 | 1.000 | >=0.894 | PASS |

DH5_Ant1_Hop_2402



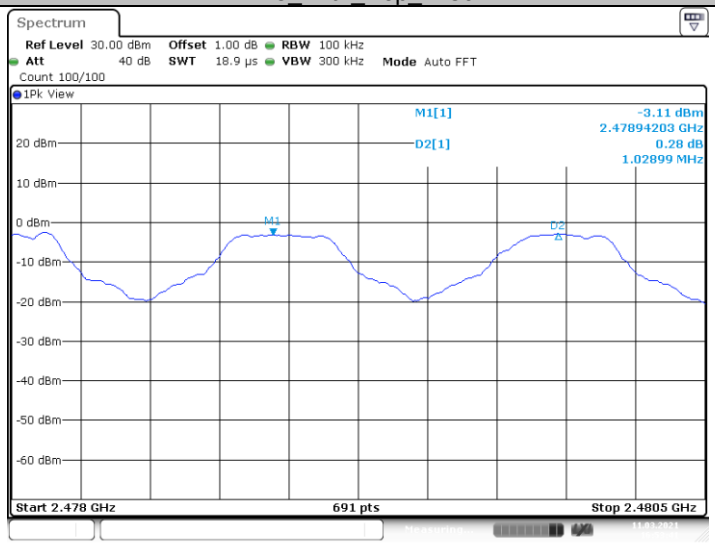

Date: 11.MAR.2021 16:50:45

DH5_Ant1_Hop_2441



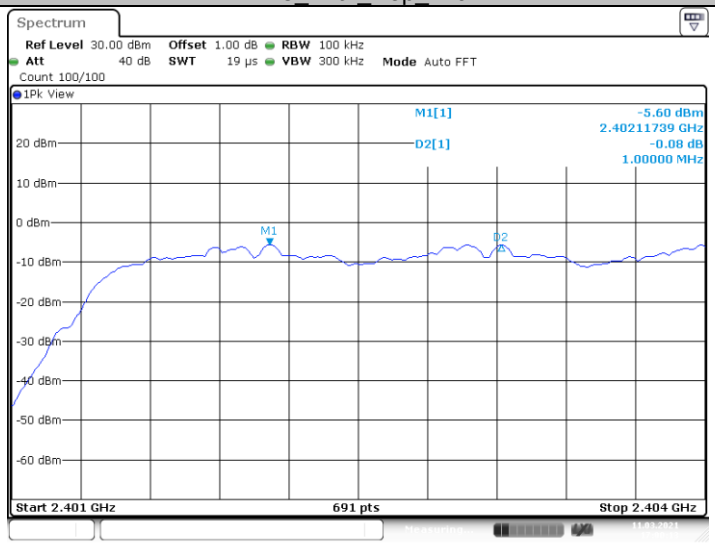

Date: 11.MAR.2021 16:52:09

DH5_Ant1_Hop_2480



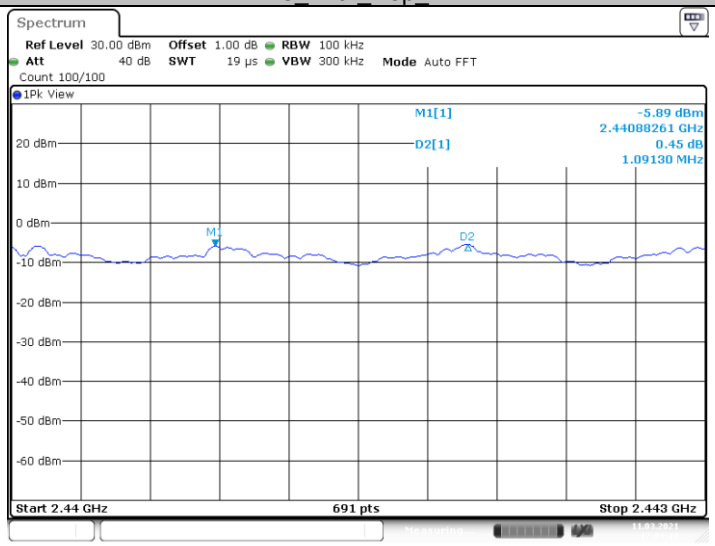

Date: 11.MAR.2021 16:53:41

2DH5_Ant1_Hop_2402



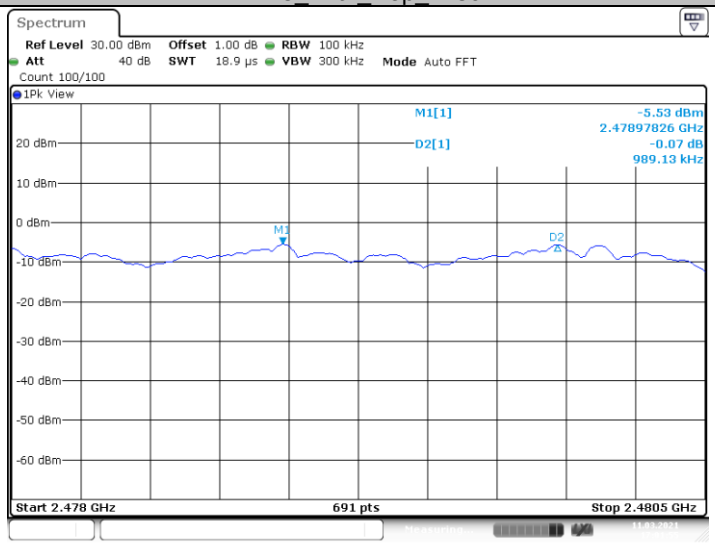

Date: 11.MAR.2021 17:00:13

2DH5_Ant1_Hop_2441



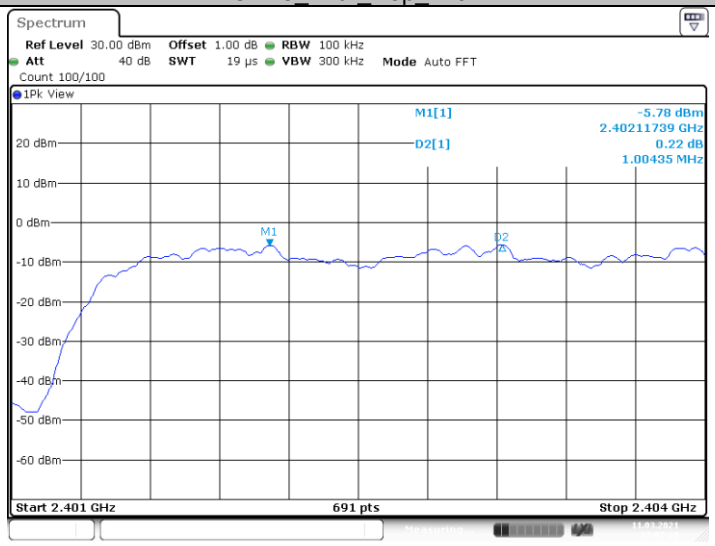

Date: 11.MAR.2021 17:01:18

2DH5_Ant1_Hop_2480



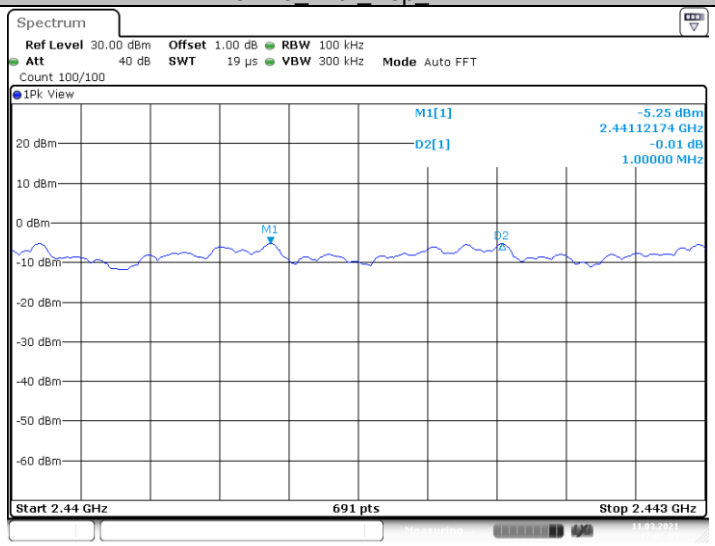

Date: 11.MAR.2021 17:01:55

3DH5_Ant1_Hop_2402



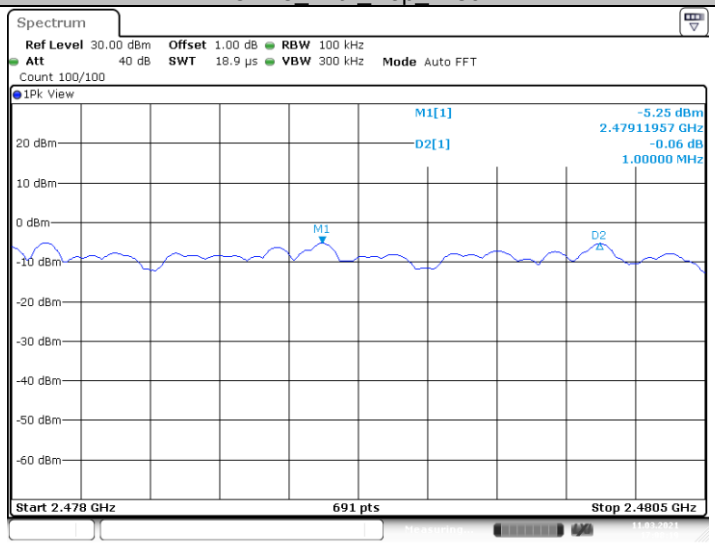

Date: 11.MAR.2021 17:07:10

3DH5_Ant1_Hop_2441




Date: 11.MAR.2021 17:07:53

3DH5_Ant1_Hop_2480




Date: 11.MAR.2021 17:08:18

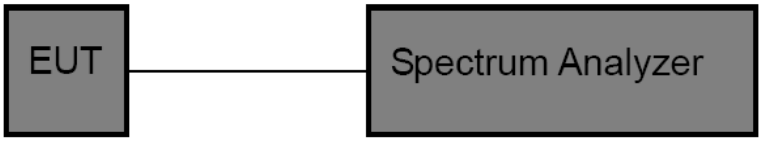
## 3.7. Number of Hopping Channel

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:**

| Section | Test Item | Limit |
|---|---|---|
| 15.247 (a)(iii)/ RSS-247 5.1 d: | Number of Hopping Channel | >15 |

**Test Configuration**




**Test Procedure**

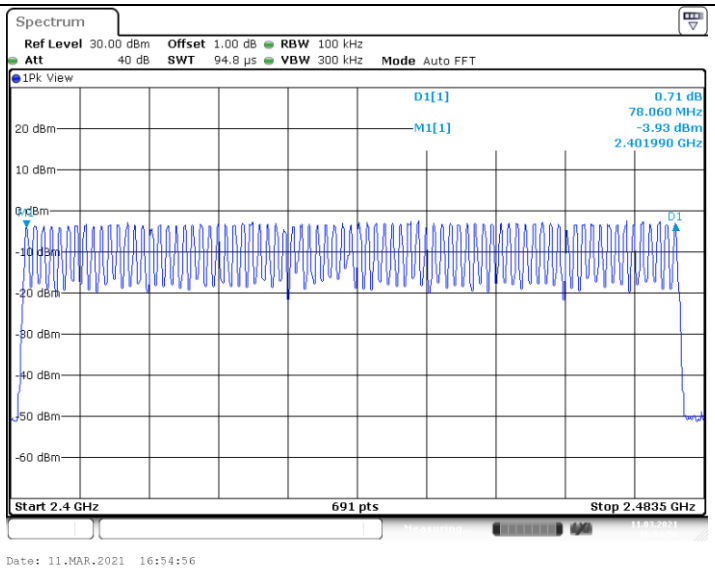
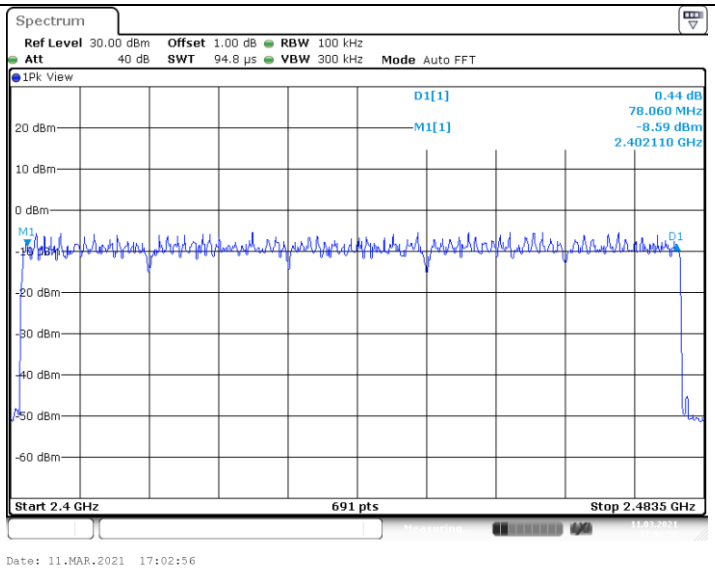
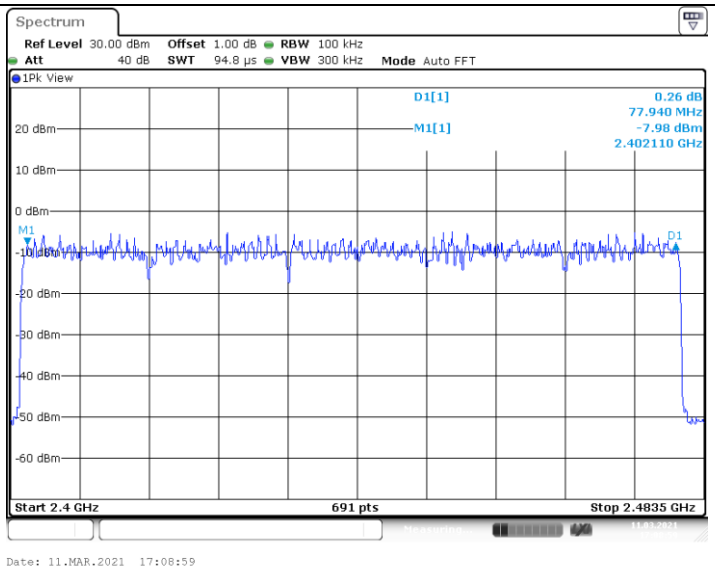
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW⩾RBW, Sweep time= Auto.

**Test Mode**

Please refer to the clause 2.4.

**Test Result**

| Modulation type | Channel number | Limit | Result |
|---|---|---|---|
| GFSK | 79 | ≥15.00 | Pass |
| π/4-DQPSK | 79 | | |
| 8DPSK | 79 | | |

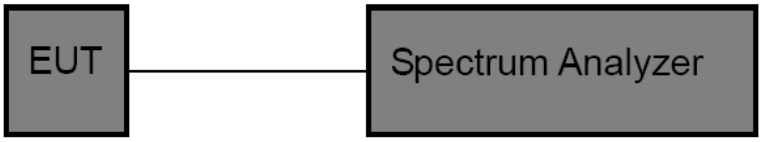
| | |
|---|---|
| GFSK |  |
| π/4-DQPSK |  |
| 8-DPSK |  |

## 3.8. Dwell Time

**Limit**

| Section | Test Item | Limit |
|---|---|---|
| 15.247(a)(iii)/ RSS-247 5.1 d | Average Time of Occupancy | 0.4 sec |

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

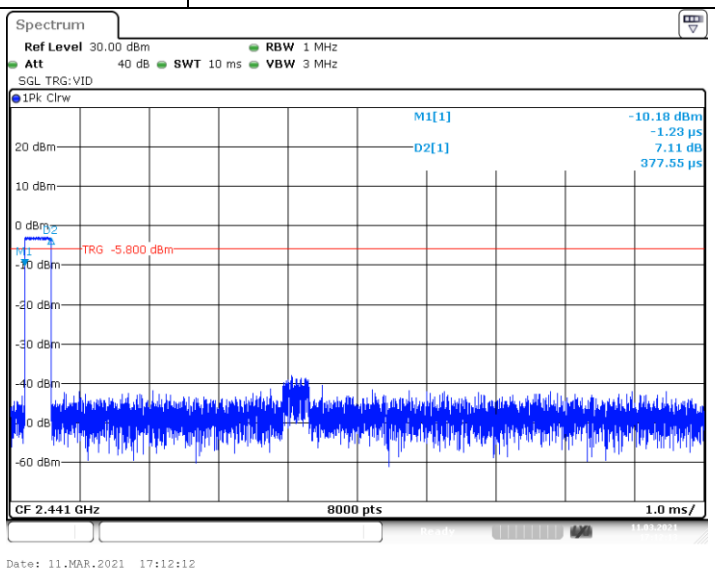
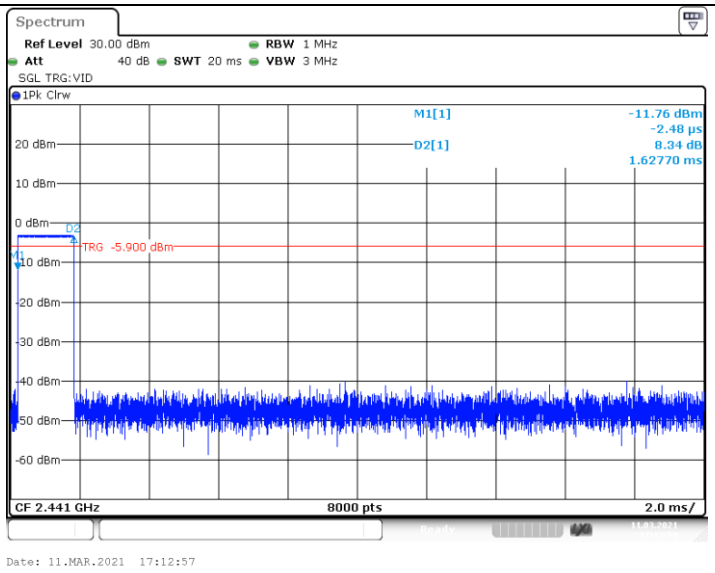
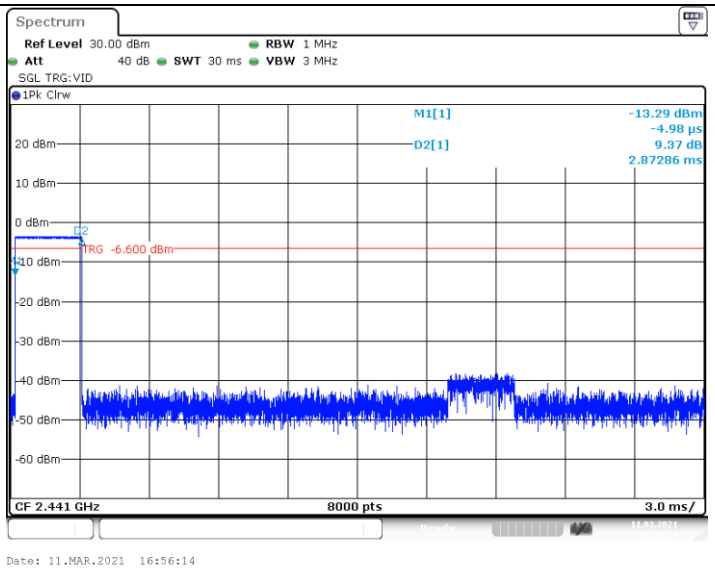
**Test Mode**

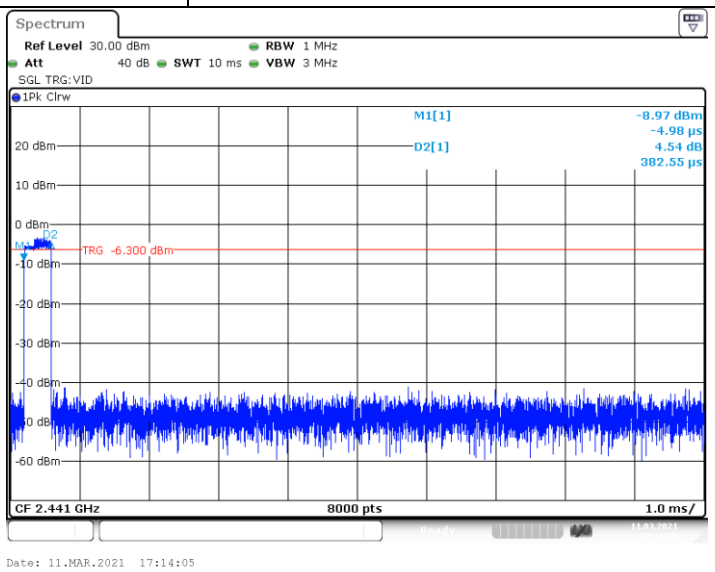
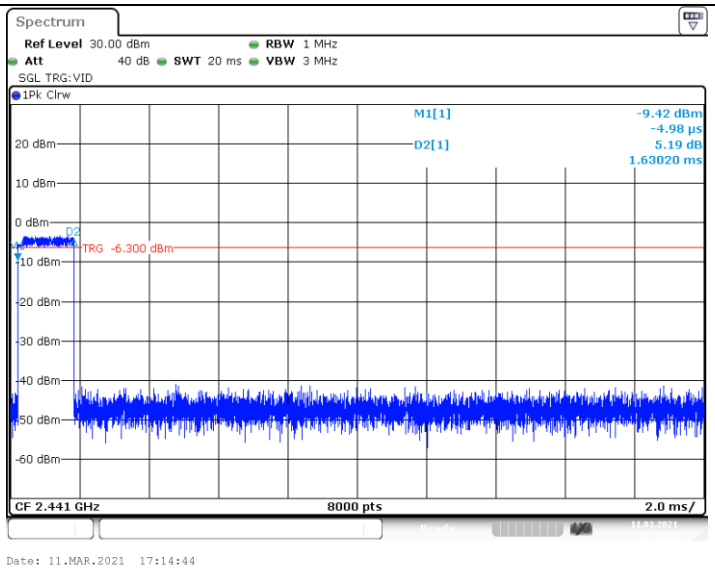
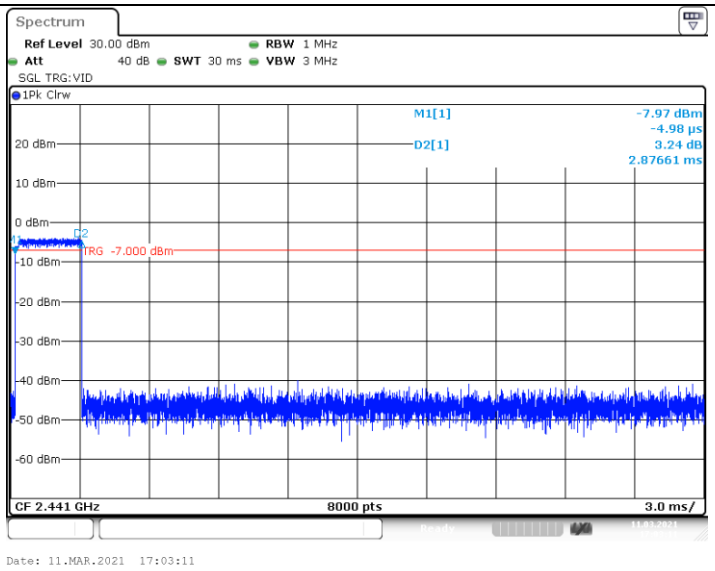
Please refer to the clause 2.4.

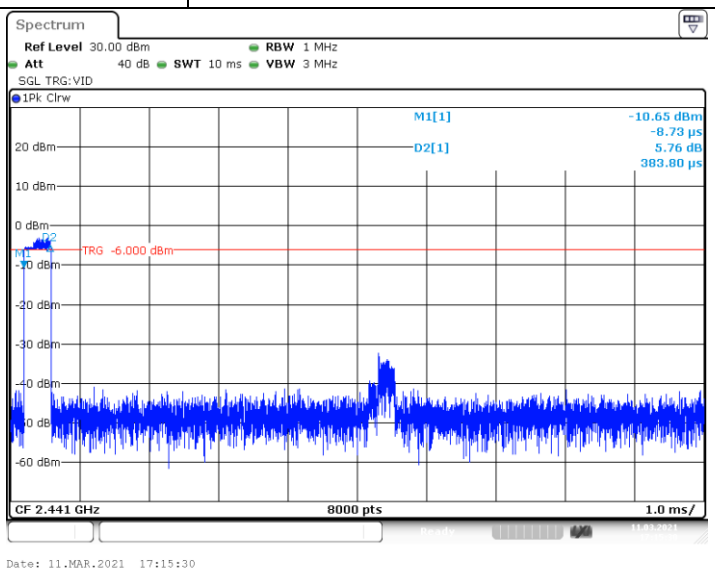
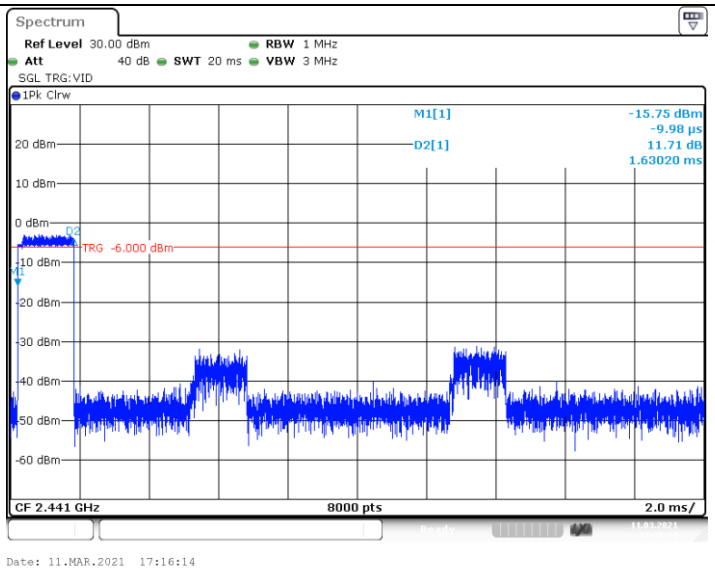
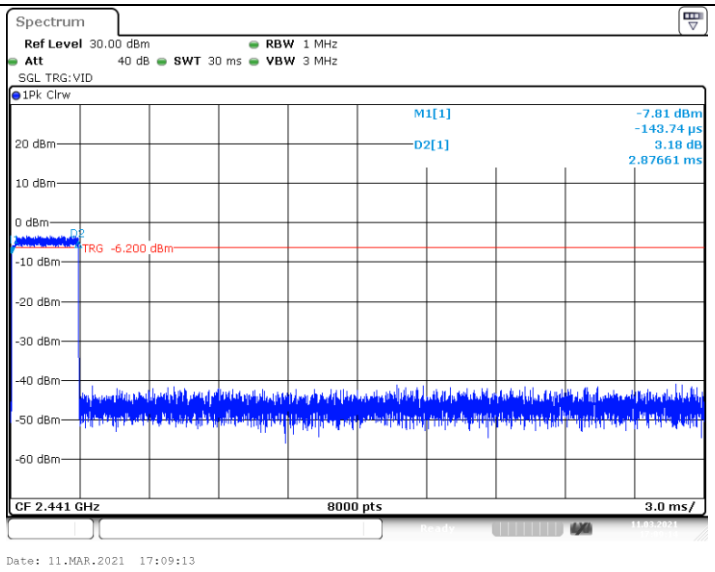
**Test Result**

| Modulation type | Channel | Frequency (MHz) | Pulse Time (ms) | Total of Dwell (ms) | Period Time (ms) | Limit (Second) | Result |
|---|---|---|---|---|---|---|---|
| GFSK | DH1 | 2441 | 0.38 | 121.60 | 31.60 | ≤ 0.40 | Pass |
| | DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | DH5 | 2441 | 2.87 | 306.13 | 31.60 | | |
| π/4-DQPSK | 2DH1 | 2441 | 0.38 | 121.60 | 31.60 | ≤ 0.40 | Pass |
| | 2DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | 2DH5 | 2441 | 2.88 | 307.20 | 31.60 | | |
| 8-DPSK | 3DH1 | 2441 | 0.38 | 121.60 | 31.60 | ≤ 0.40 | Pass |
| | 3DH3 | 2441 | 1.63 | 260.80 | 31.60 | | |
| | 3DH5 | 2441 | 2.88 | 307.20 | 31.60 | | |

*Note: 1DH1/2DH1/3DH1 Total of Dwell= Pulse Time*(1600/2)*31.6/79*
*1DH3/2DH3/3DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79*
*1DH5/2DH5/3DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79*

| Modulation Type: | GFSK |
|---|---|
| DH1 |  |
| DH3 |  |
| DH5 |  |

| Modulation Type: | π/4-DQPSK |
|---|---|
| 2DH1 |  |
| 2DH3 |  |
| 2DH5 |  |

| Modulation Type: | 8-DPSK |
|---|---|
| 3DH1 |  |
| 3DH3 |  |
| 3DH5 |  |

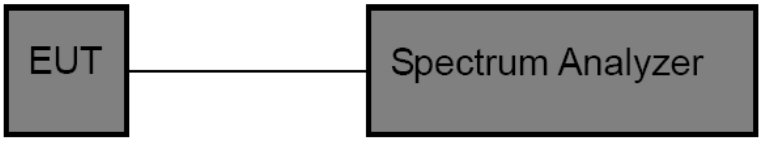
## 3.9. Peak Output Power

**Limit**

**FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:**

| Test Item | Limit | Frequency Range(MHz) |
|---|---|---|
| Peak Output Power | Hopping Channels>75 Power<1W(30dBm)<br>Other <125mW(21dBm) | 2400~2483.5 |

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Set RBW> 20DB Bandwidth.
   (2) Set the video bandwidth (VBW) ≥ RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

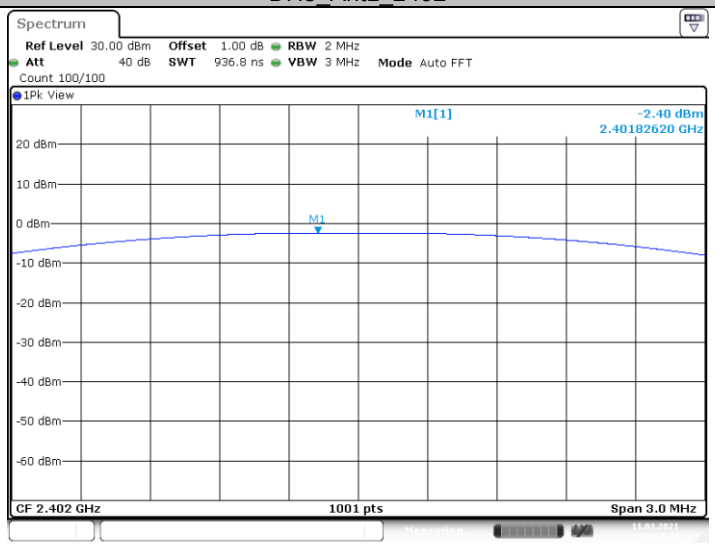
**Test Mode**

Please refer to the clause 2.4.

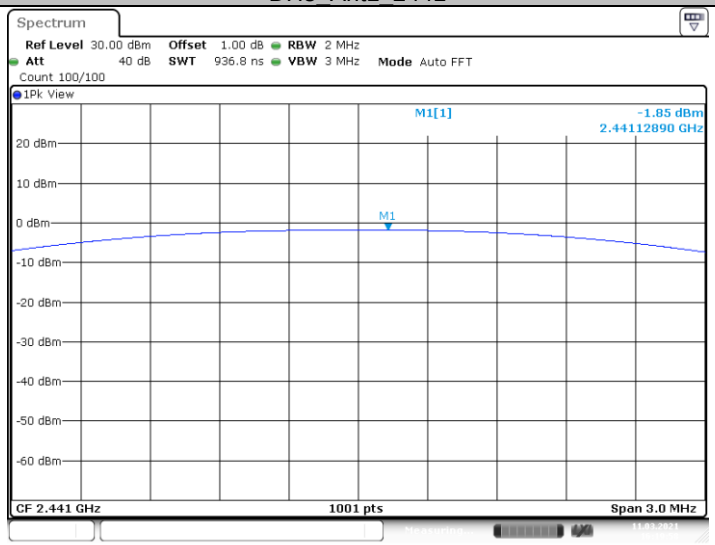
**Test Result**

| Test Mode | Frequency (MHz) | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|
| GFSK | 2402 | -2.40 | <=30 | PASS |
| | 2441 | -1.85 | <=30 | PASS |
| | 2480 | -2.01 | <=30 | PASS |
| π/4-DQPSK | 2402 | -2.73 | <=30 | PASS |
| | 2441 | -2.06 | <=30 | PASS |
| | 2480 | -2.64 | <=30 | PASS |
| 8-DPSK | 2402 | -2.66 | <=30 | PASS |
| | 2441 | -2.22 | <=30 | PASS |
| | 2480 | -1.80 | <=30 | PASS |

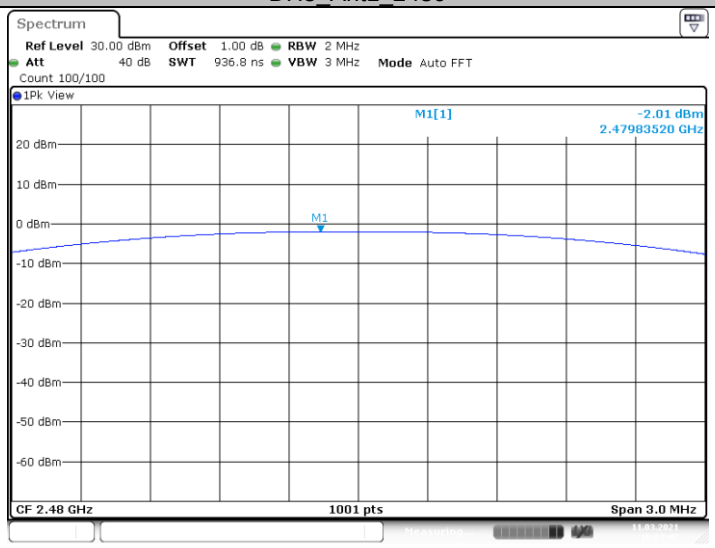
DH5_Ant1_2402



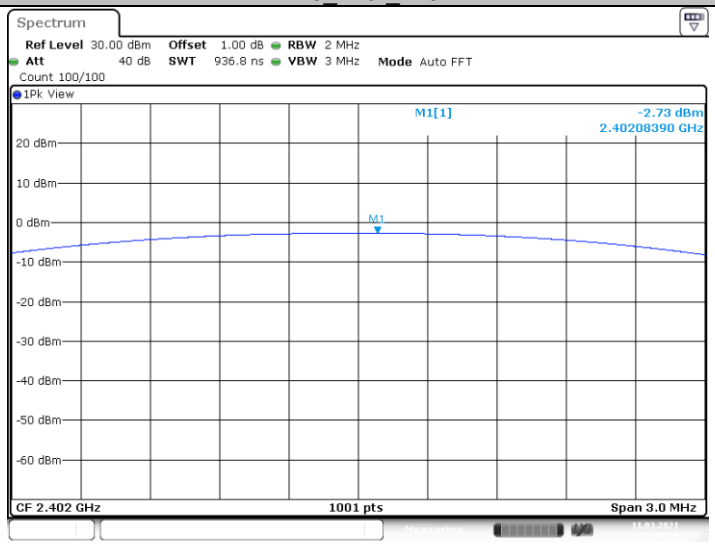

DH5_Ant1_2441




DH5_Ant1_2480

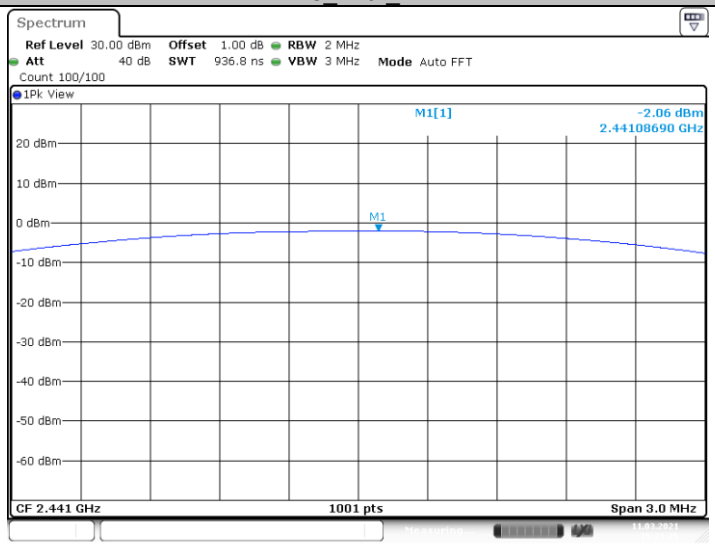


2DH5_Ant1_2402



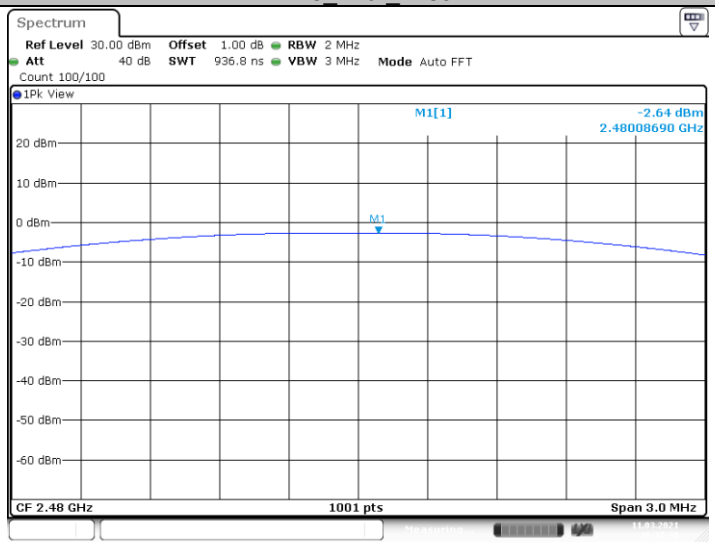

Date: 11.MAR.2021 16:30:55

2DH5_Ant1_2441



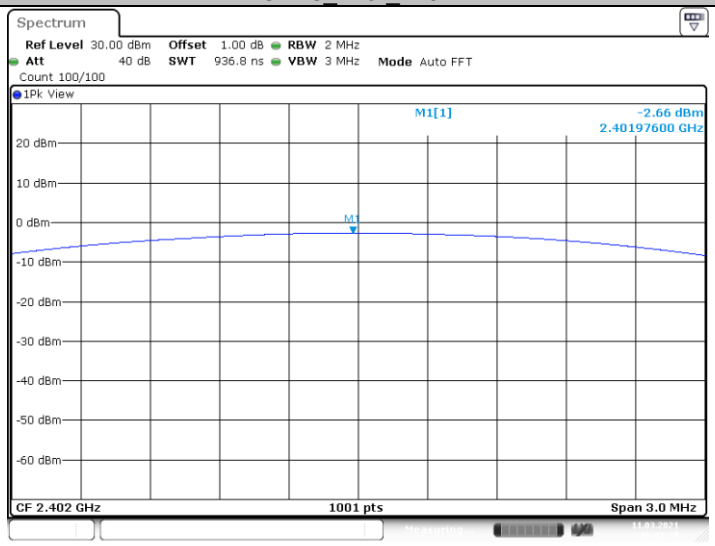

Date: 11.MAR.2021 16:33:25

2DH5_Ant1_2480



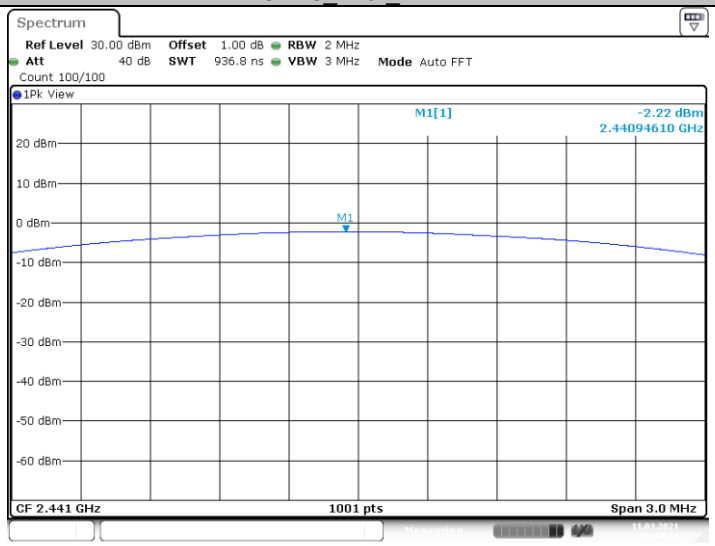

Date: 11.MAR.2021 16:37:31

3DH5_Ant1_2402



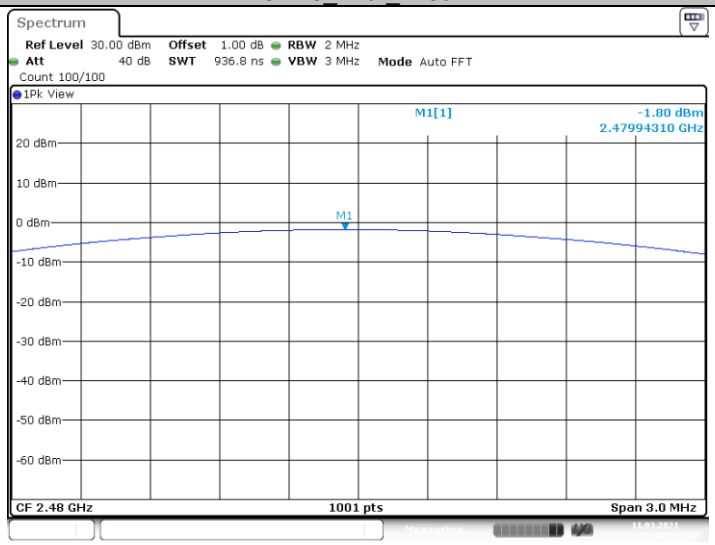

Date: 11.MAR.2021 16:41:39

3DH5_Ant1_2441




Date: 11.MAR.2021 16:44:11

3DH5_Ant1_2480



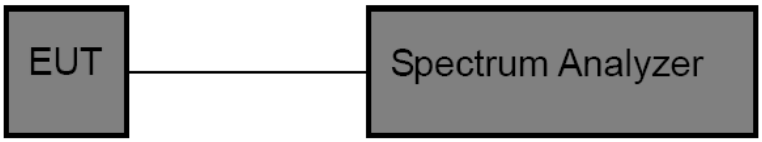

Date: 11.MAR.2021 16:47:52

## 3.10. Duty Cycle

**Limit**

None, for report purposes only.

**Test Configuration**




**Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:

Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 10MHz
Set the VBW to 10MHz
Detector: Peak
Sweep time: Auto
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

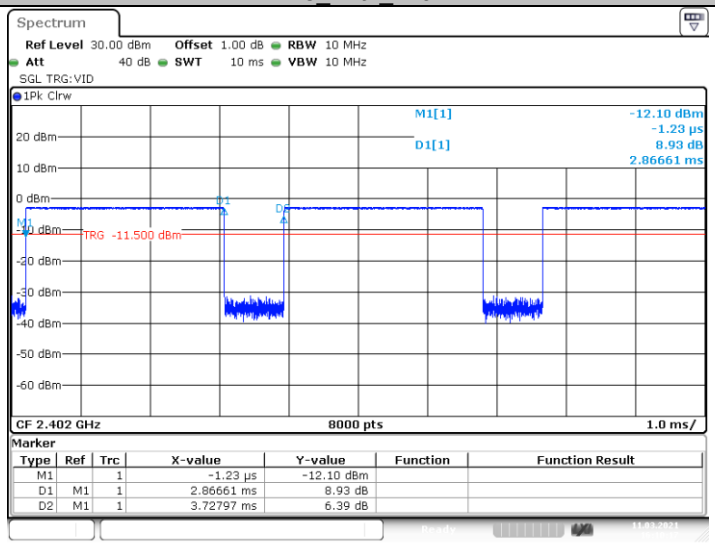
**Test Mode**

Please refer to the clause 2.4.

**Test Result**

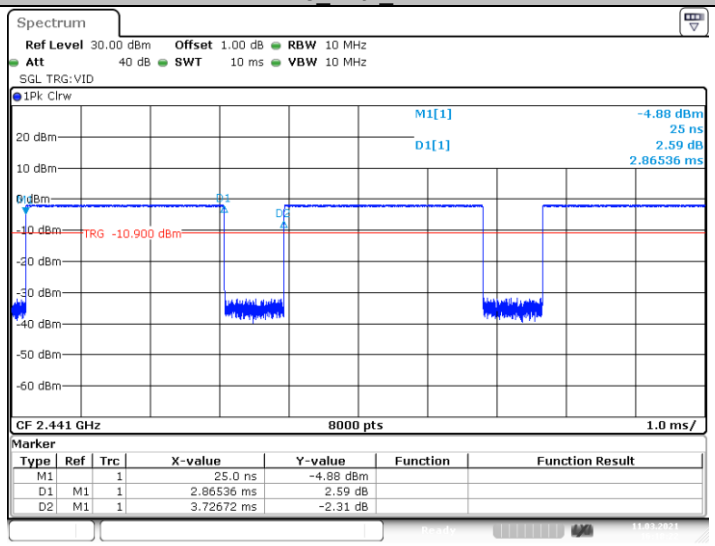
| Test Mode | Frequency (MHz) | Transmission Duration [ms] | Transmission Period [ms] | Duty Cycle [%] | 1/T Minimum VBW (kHz) | Final setting For VBW (kHz) |
|---|---|---|---|---|---|---|
| GFSK | 2402 | 2.87 | 3.73 | 76.89 | 0.35 | 1 |
| | 2441 | 2.87 | 3.73 | 76.89 | 0.35 | 1 |
| | 2480 | 2.87 | 3.73 | 76.92 | 0.35 | 1 |
| π/4-DQPSK | 2402 | 2.87 | 3.73 | 76.95 | 0.35 | 1 |
| | 2441 | 2.87 | 3.73 | 76.95 | 0.35 | 1 |
| | 2480 | 2.87 | 3.73 | 76.95 | 0.35 | 1 |
| 8-DPSK | 2402 | 2.87 | 3.73 | 77.03 | 0.35 | 1 |
| | 2441 | 2.87 | 3.73 | 77.00 | 0.35 | 1 |
| | 2480 | 2.87 | 3.73 | 77.02 | 0.35 | 1 |

DH5_Ant1_2402



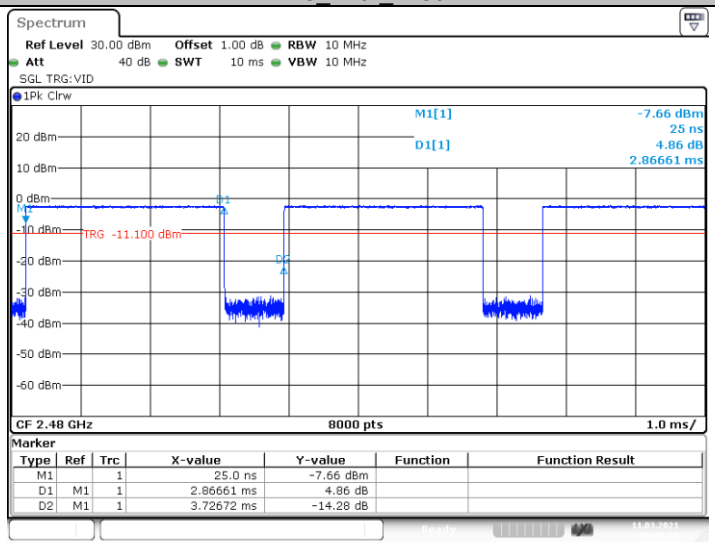

Date: 11.MAR.2021 16:10:17

DH5_Ant1_2441



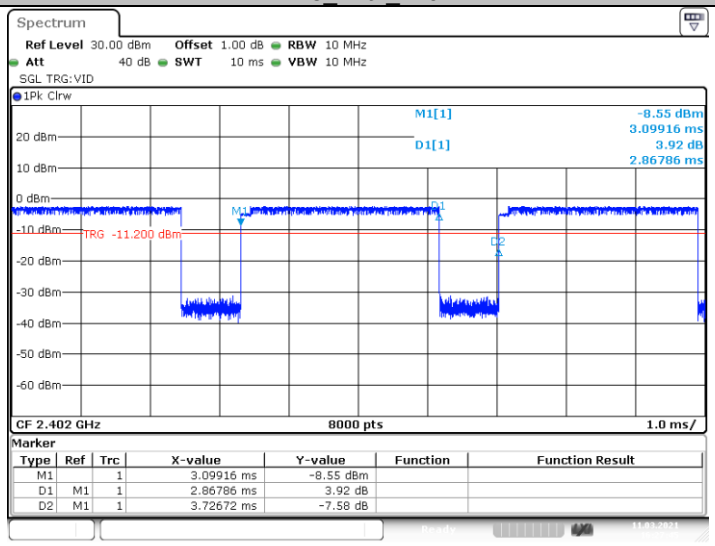

Date: 11.MAR.2021 16:18:22

DH5_Ant1_2480

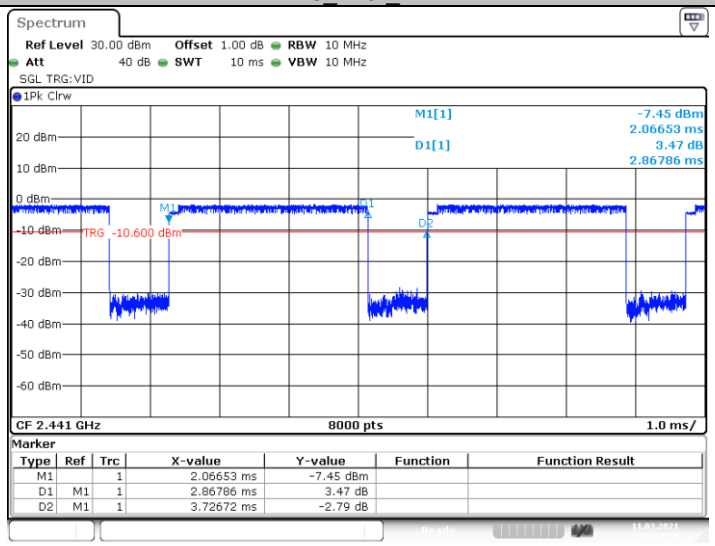



Date: 11.MAR.2021 16:20:59

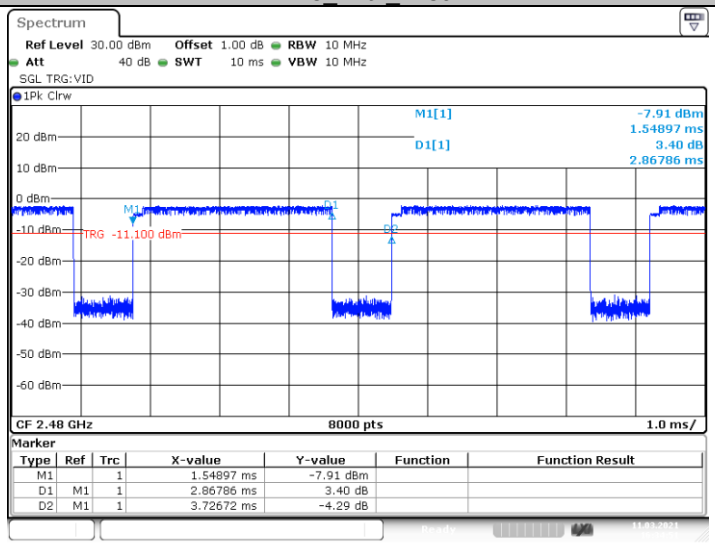
## 2DH5_Ant1_2402



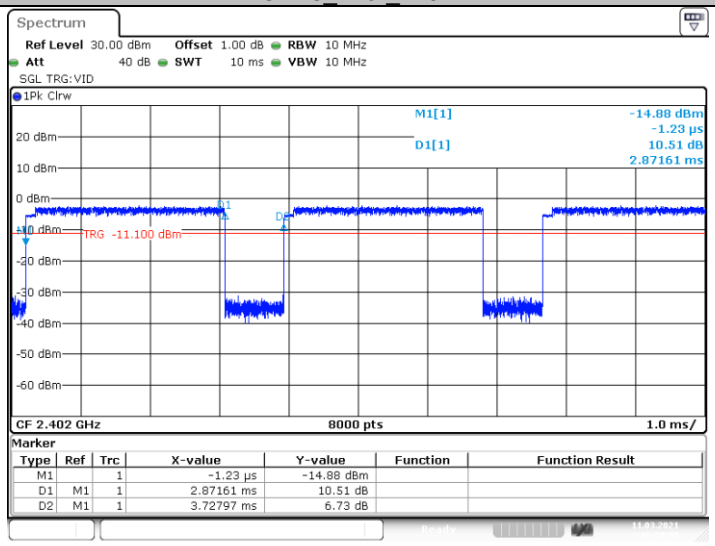

## 2DH5_Ant1_2441




## 2DH5_Ant1_2480

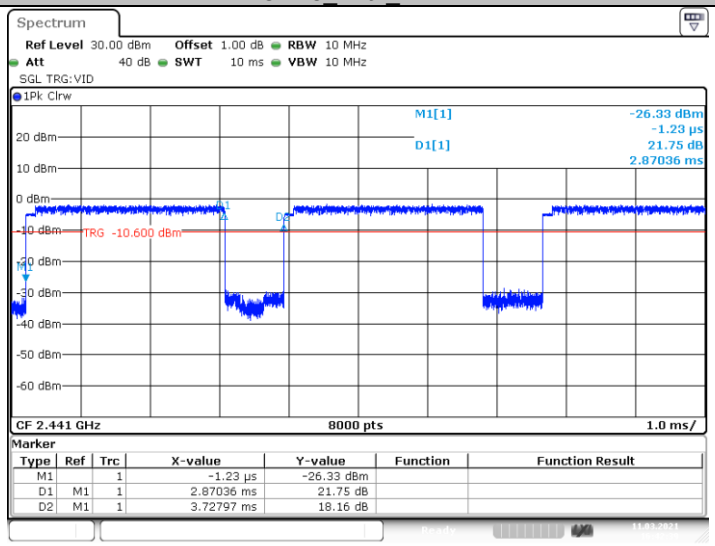


3DH5_Ant1_2402



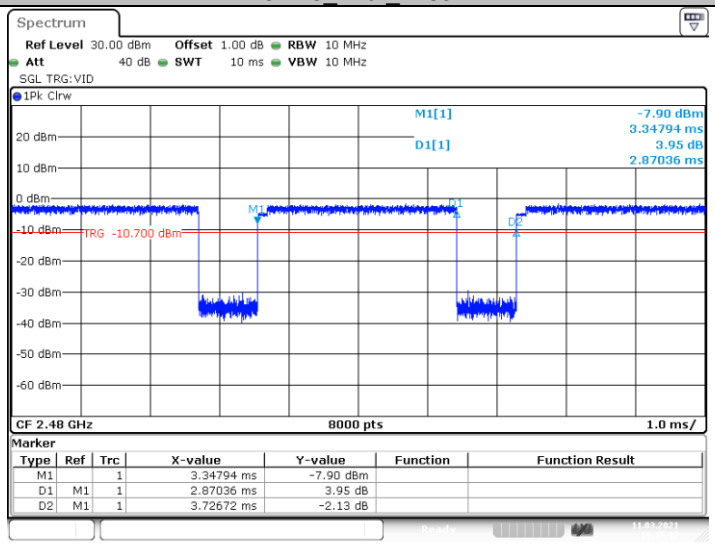

Date: 11.MAR.2021 16:38:55

3DH5_Ant1_2441




Date: 11.MAR.2021 16:42:39

3DH5_Ant1_2480




Date: 11.MAR.2021 16:45:12

## 3.11. Antenna Requirement

**Requirement**

**FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of 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.

**FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):**

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

**Test Result**

The test result is PASS, because the directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

**********THE END**********