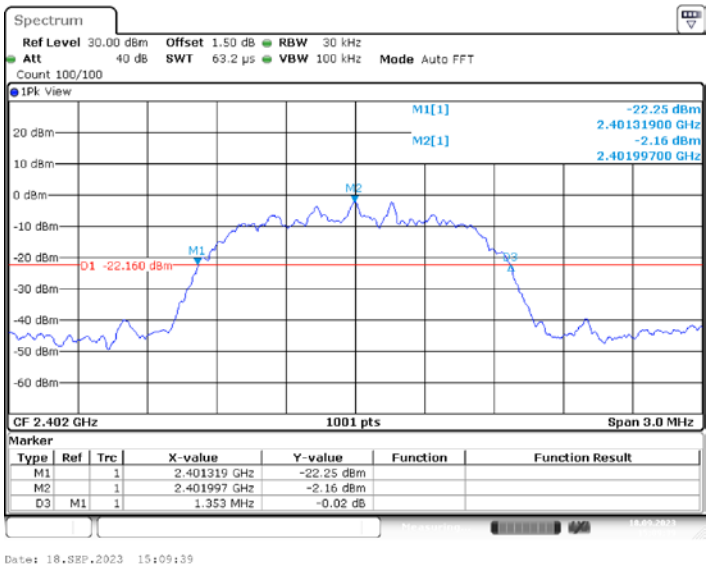
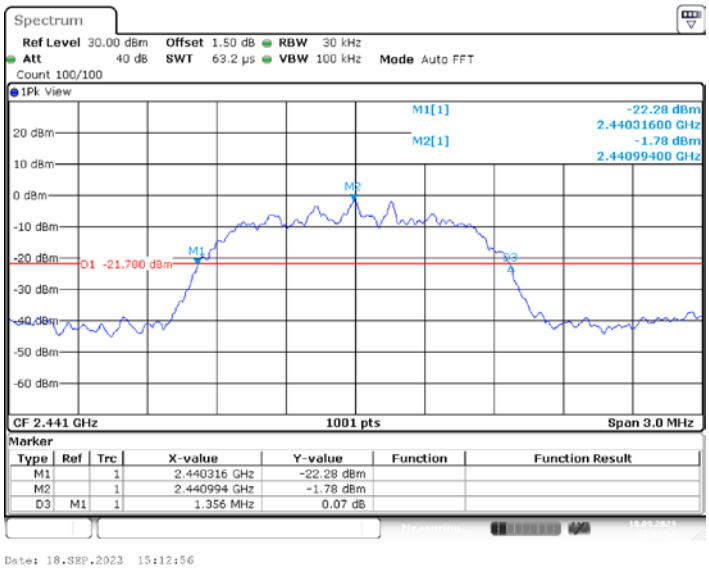
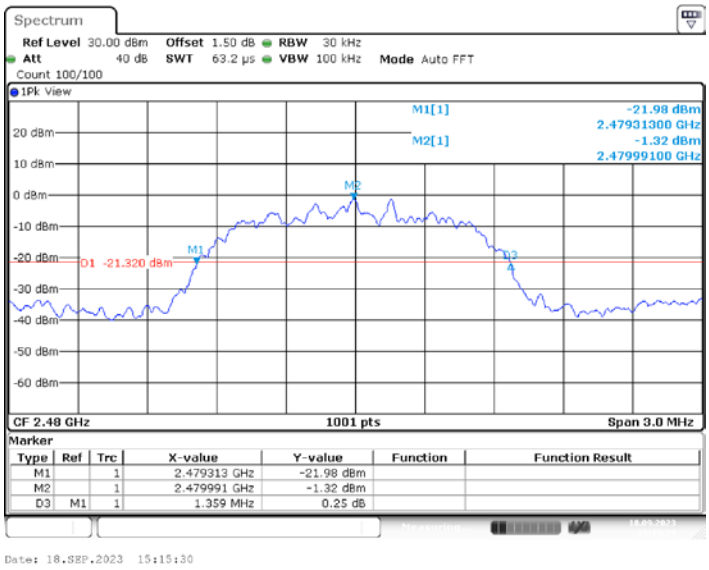
π/4-DQPSK_2402



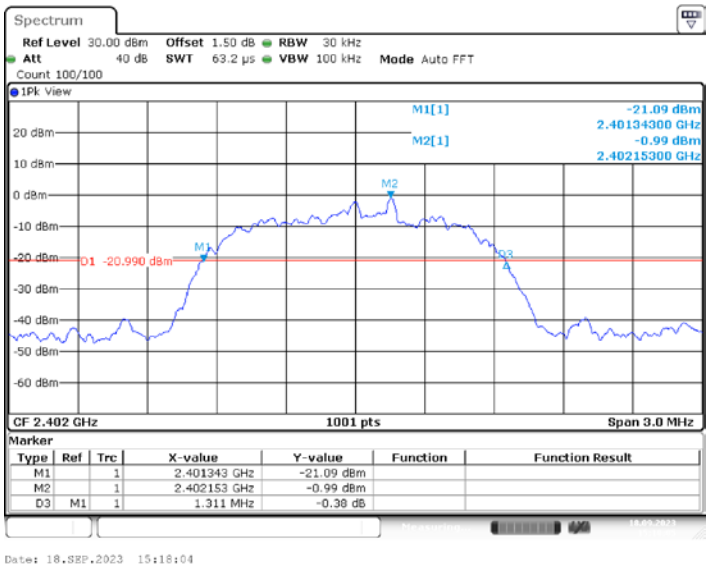
π/4-DQPSK_2441



π/4-DQPSK_2480

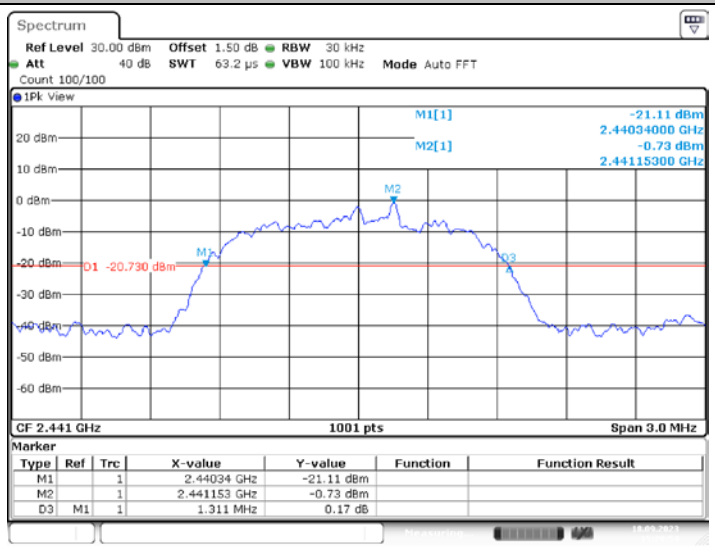


8-DPSK_2402



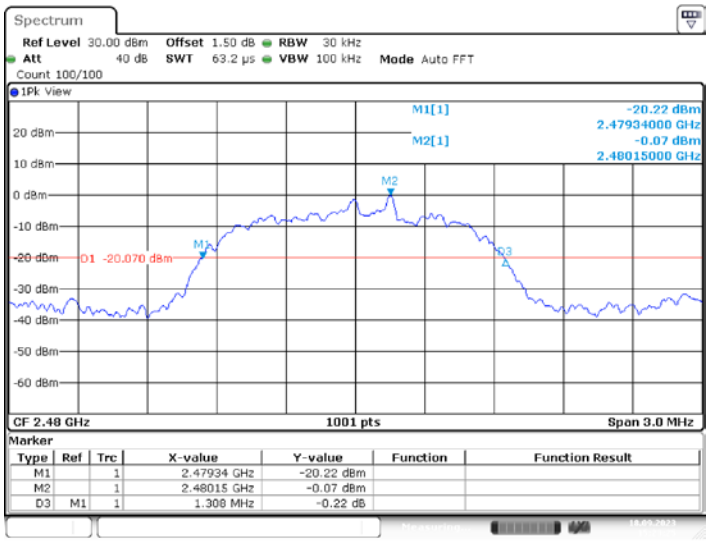
Date: 18.SEP.2023 15:18:04

8-DPSK_2441



Date: 18.SEP.2023 15:20:53

8-DPSK_2480



Date: 18.SEP.2023 15:23:25

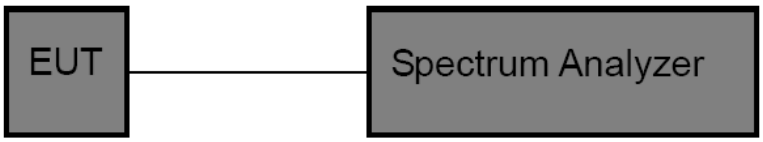
3.6. Channel Separation

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.

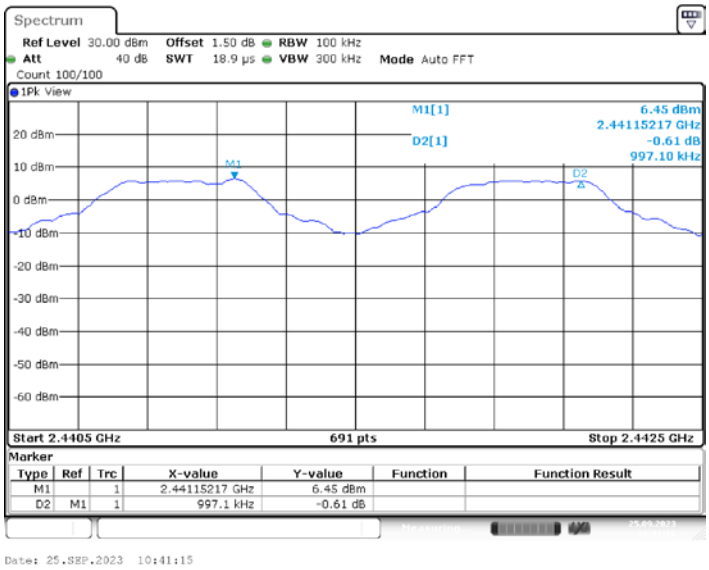
Test Mode

Please refer to the clause 2.4.

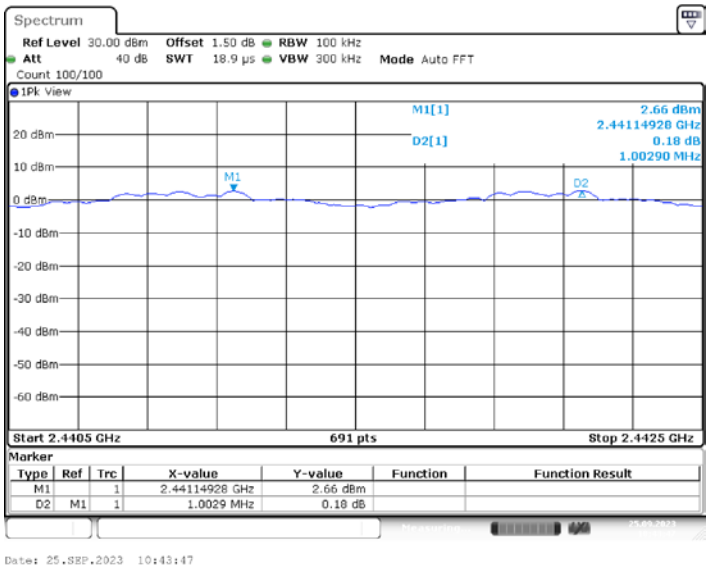
Test Results

Test Mode	Frequency[MHz]	Result[MHz]	Limit[kHz]	Verdict
GFSK	Hop_2441	0.997	>694	PASS
π/4-DQPSK	Hop_2441	1.003	>904	PASS
8-DPSK	Hop_2441	1.003	>874	PASS

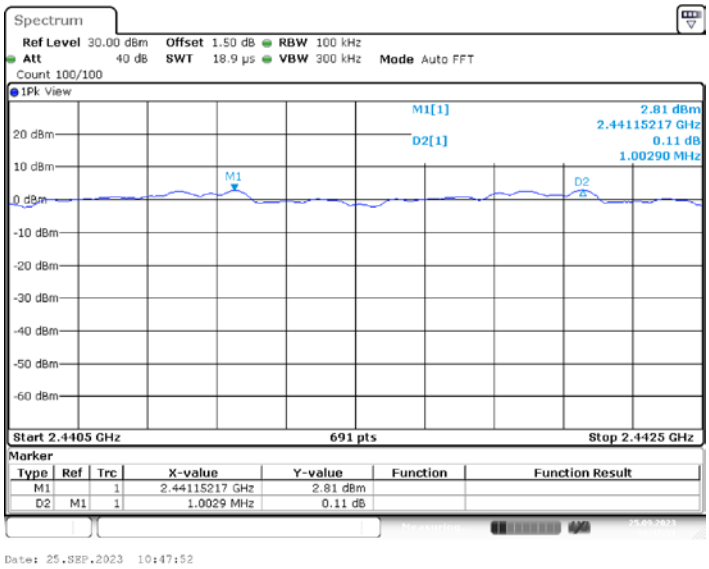
GFSK_Hop_2441



π/4-DQPSK_Hop_2441



8-DPSK_Hop_2441


Spectrum
Ref Level 30.00 dBm Offset 1.50 dB RBW 100 kHz
Att 40 dB SWT 18.9 µs VBW 300 kHz Mode Auto FFT
Count 100/100
1Pk View
M1[1] 2.81 dBm
2.44115217 GHz
D2[1] 0.11 dB
1.00290 MHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
M1
D2
Start 2.4405 GHz
691 pts
Stop 2.4425 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.44115217 GHz 2.81 dBm
D2 M1 1 1.0029 MHz 0.11 dB
Date: 25.SEP.2023 10:47:52

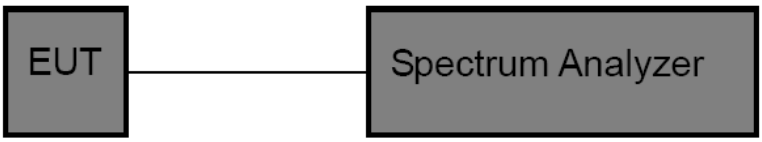
3.7. Number of Hopping Channel

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.

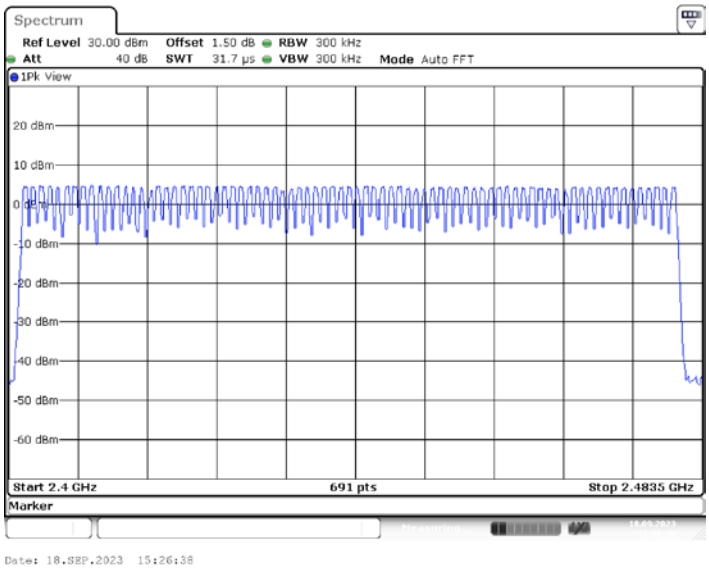
Test Mode

Please refer to the clause 2.4.

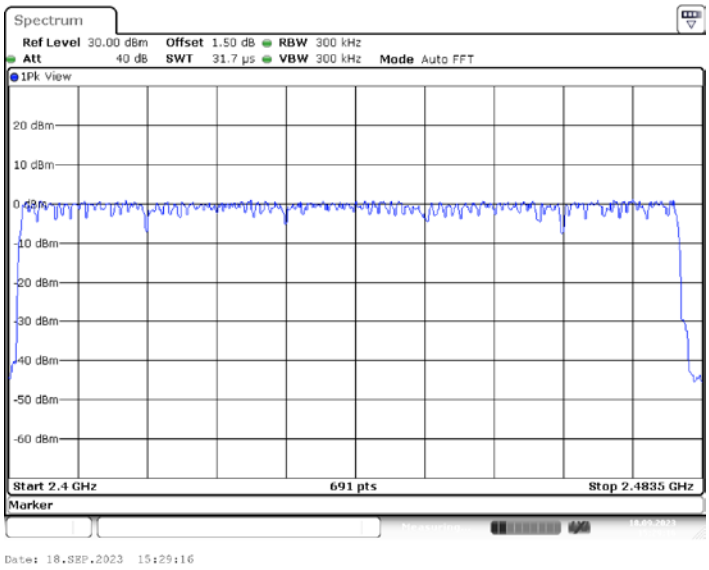
Test Result

Test Mode	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
GFSK	Hop	79	≥15	PASS
π/4-DQPSK	Hop	79	≥15	PASS
8-DPSK	Hop	79	≥15	PASS

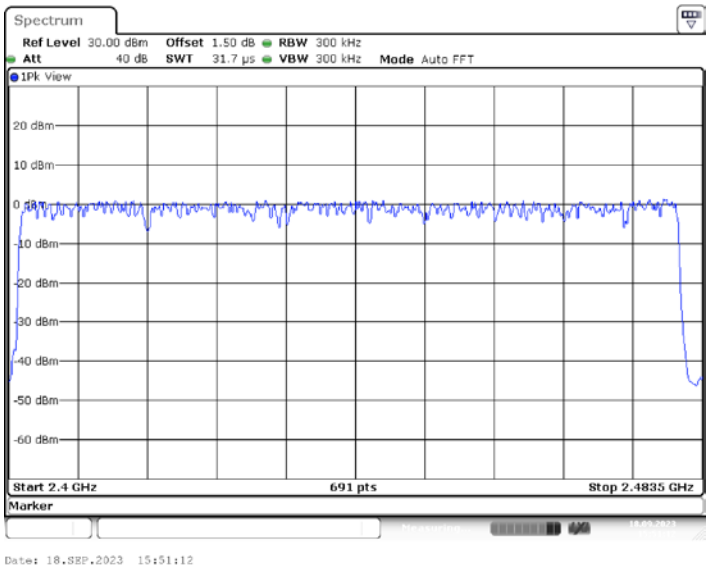
GFSK



π/4-DQPSK



8-DPSK

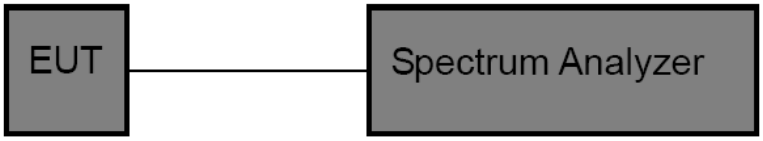


3.8. Dwell Time

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

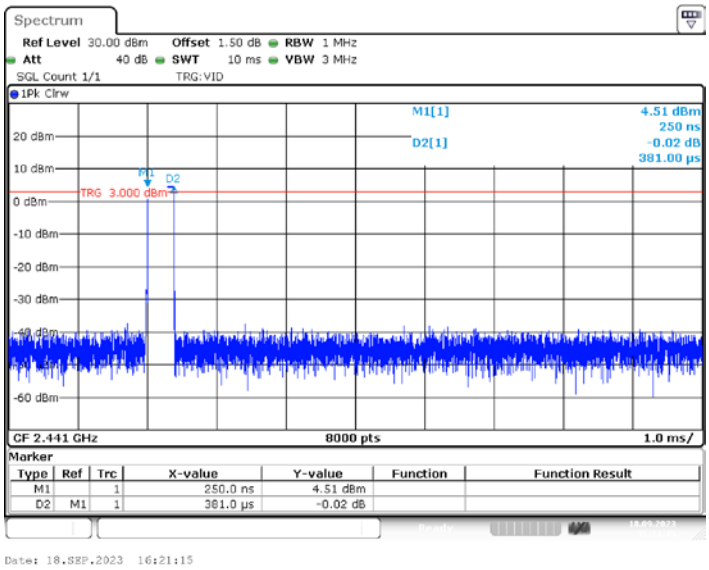
Please refer to the clause 2.4.

Test Result

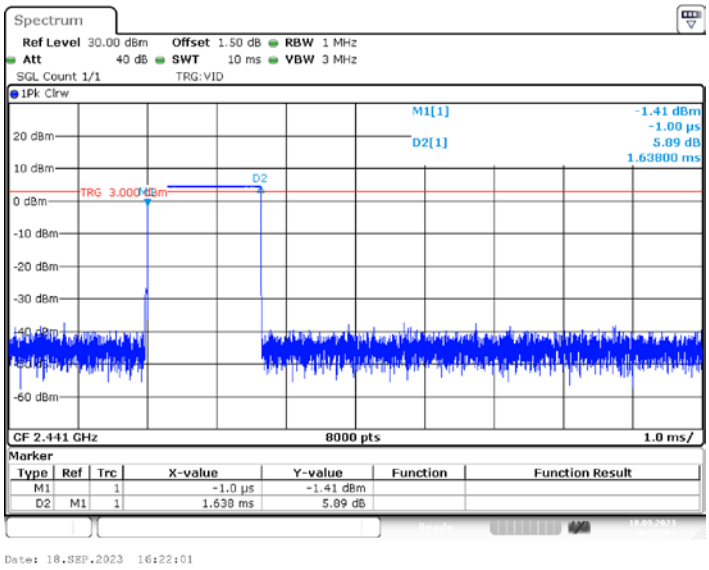
Modulation type	Channel	Frequency [MHz]	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
GFSK	DH1	2441	0.381	121.920	31.60	≤ 0.40	Pass
	DH3	2441	1.638	262.080	31.60		
	DH5	2441	2.887	307.947	31.60		
π/4-DQPSK	2DH1	2441	0.389	124.480	31.60	≤ 0.40	Pass
	2DH3	2441	1.640	262.400	31.60		
	2DH5	2441	2.888	308.053	31.60		
8-DPSK	3DH1	2441	0.388	124.160	31.60	≤ 0.40	Pass
	3DH3	2441	1.640	262.400	31.60		
	3DH5	2441	2.890	308.267	31.60		

Note: 1DH1/2DH1/3DH1Total 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*

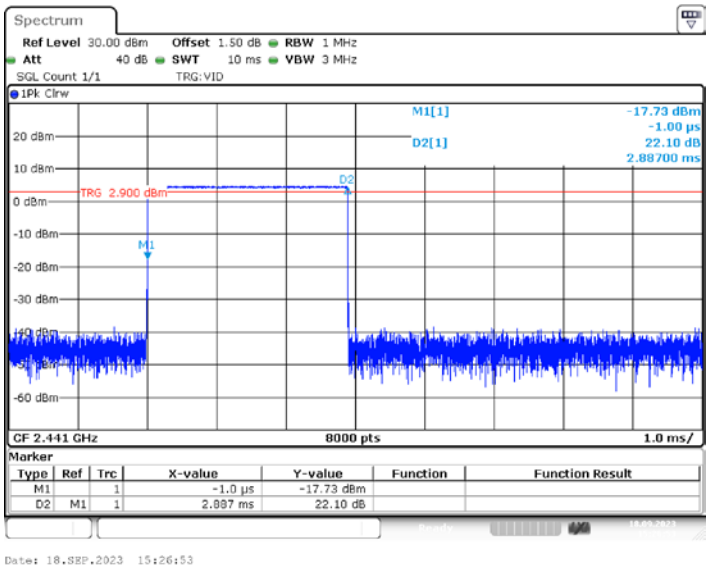
GFSK_DH1_2441



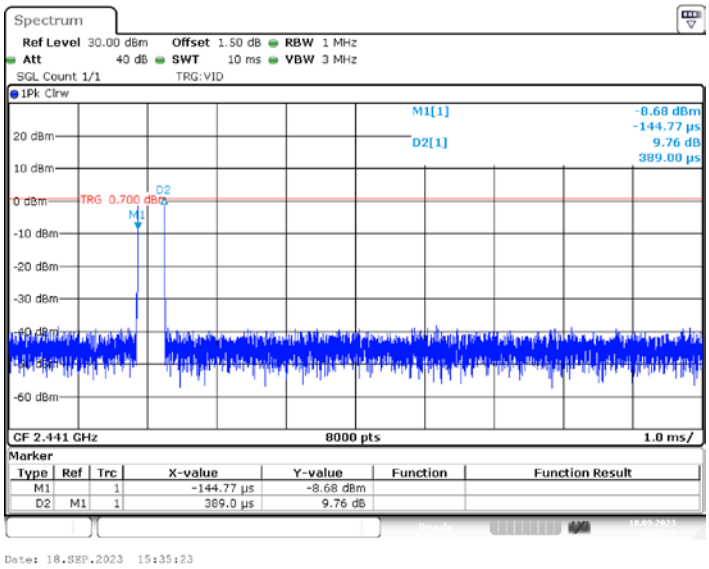
GFSK_DH3_2441



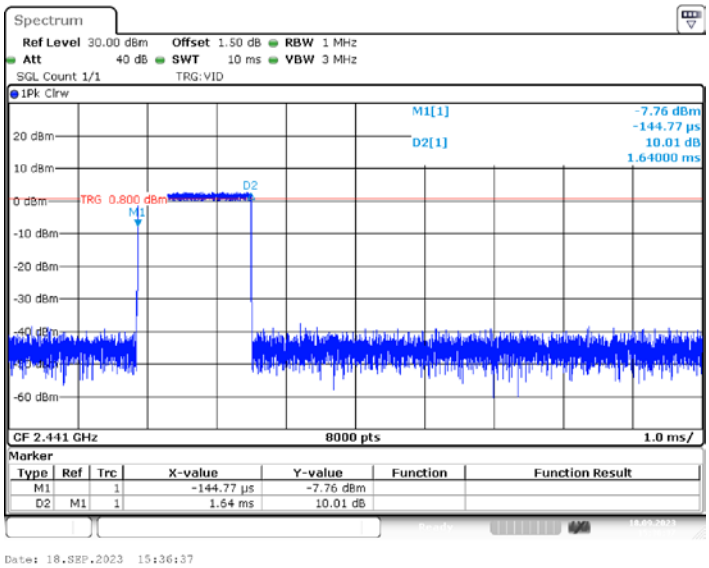
GFSK_DH5_2441



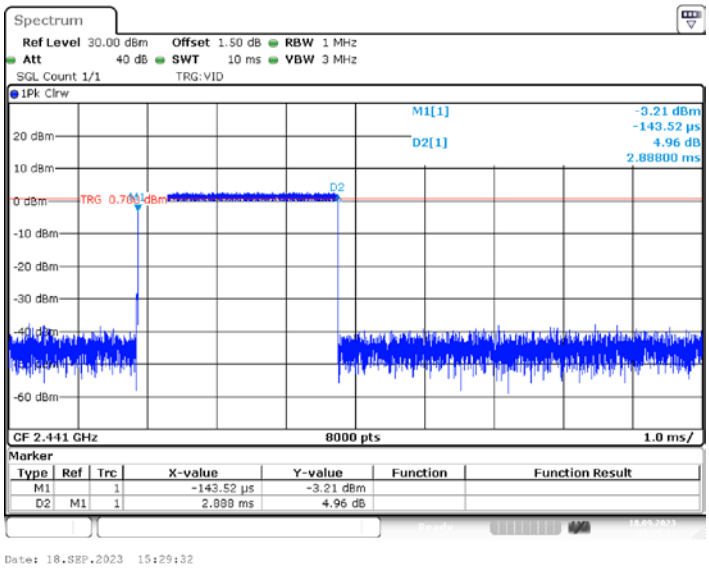
π/4-DQPSK_2DH1_2441



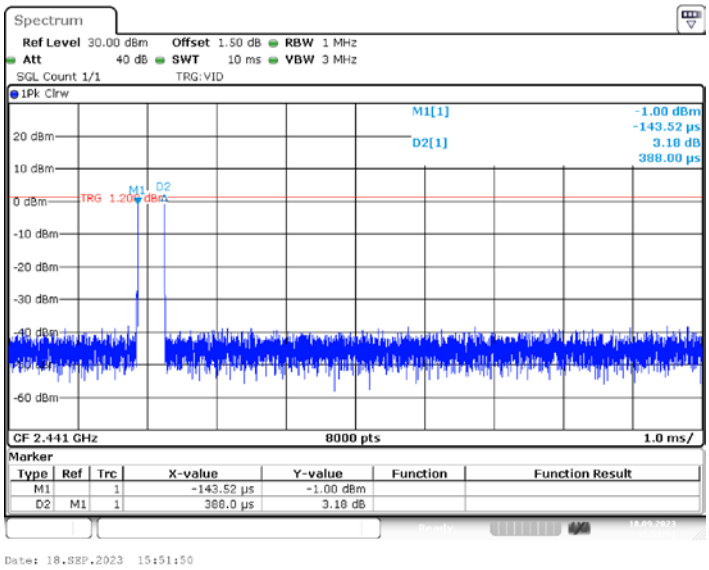
π/4-DQPSK_2DH3_2441



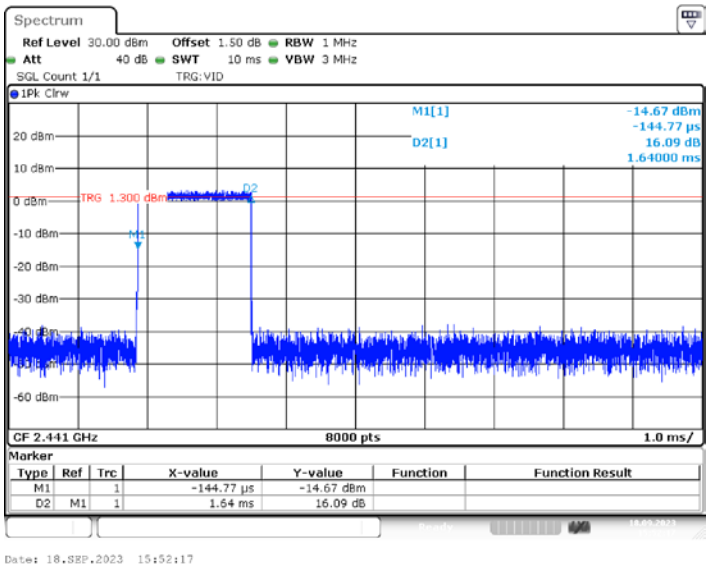
π/4-DQPSK_2DH5_2441



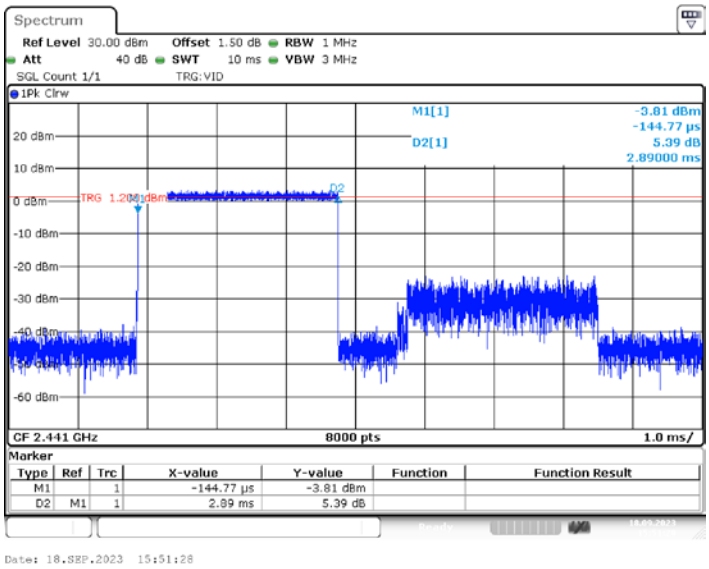
8-DPSK_3DH1_2441



8-DPSK_3DH3_2441



8-DPSK_3DH5_2441


Spectrum
Ref Level 30.00 dBm Offset 1.50 dB RBW 1 MHz
Att 40 dB SWT 10 ms VBW 3 MHz
SGL Count 1/1 TRG:VID
1Pk Clrw
M1[1] -3.81 dBm
-144.77 µs
D2[1] 5.39 dB
2.89000 ms
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
TRG 1.20 dBm
D2
CF 2.441 GHz 8000 pts 1.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 -144.77 µs -3.81 dBm
D2 M1 1 2.89 ms 5.39 dB
Date: 18.SEP.2023 15:51:28

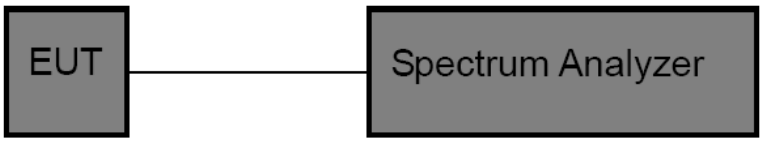
3.9. Peak Output Power

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)
Maximum Conducted Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5
E.I.R.P	4 Watt or 36dBm	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.

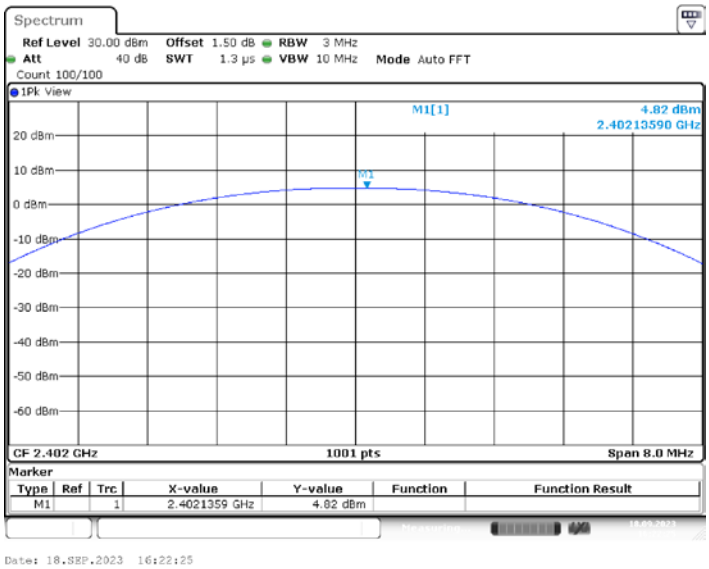
Test Mode

Please refer to the clause 2.4.

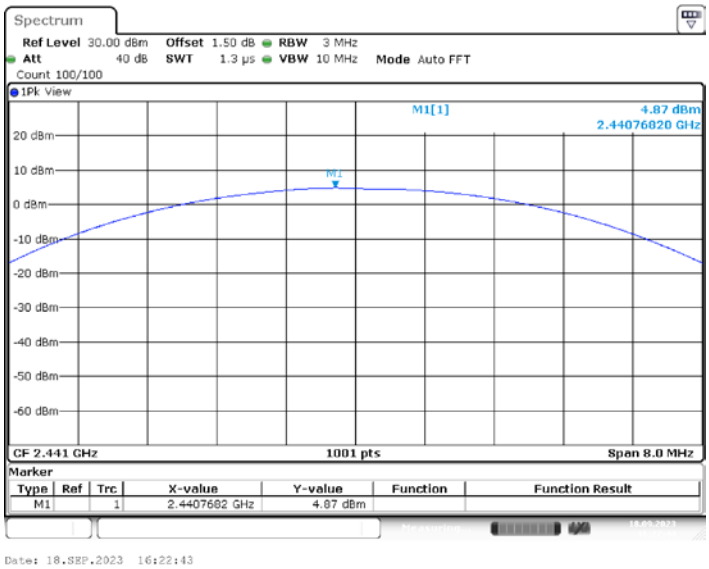
Test Result

Test Mode	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
GFSK	2402	4.82	<=30	PASS
	2441	4.87	<=30	PASS
	2480	4.64	<=30	PASS
π/4-DQPSK	2402	2.62	<=30	PASS
	2441	2.98	<=30	PASS
	2480	3.14	<=30	PASS
8-DPSK	2402	2.64	<=30	PASS
	2441	3.19	<=30	PASS
	2480	3.53	<=30	PASS

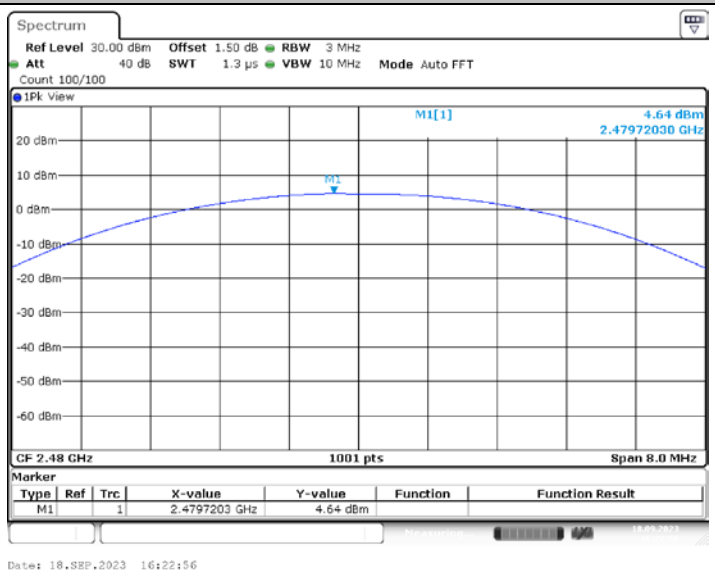
GFSK_2402



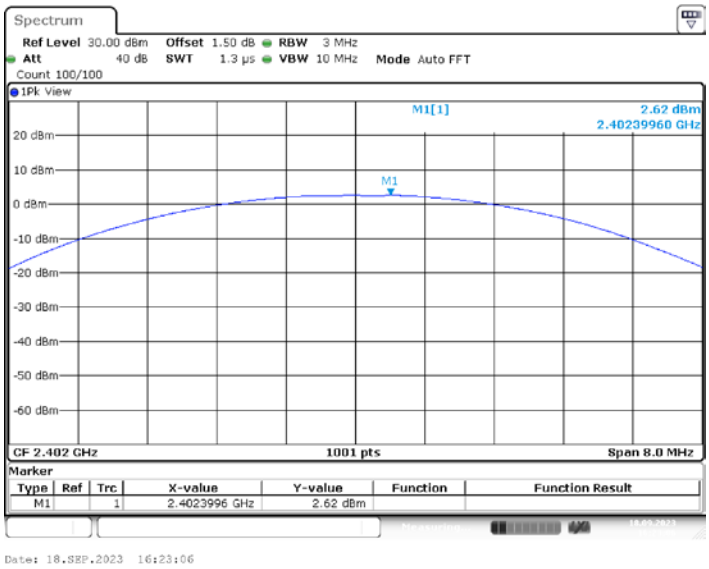
GFSK_2441



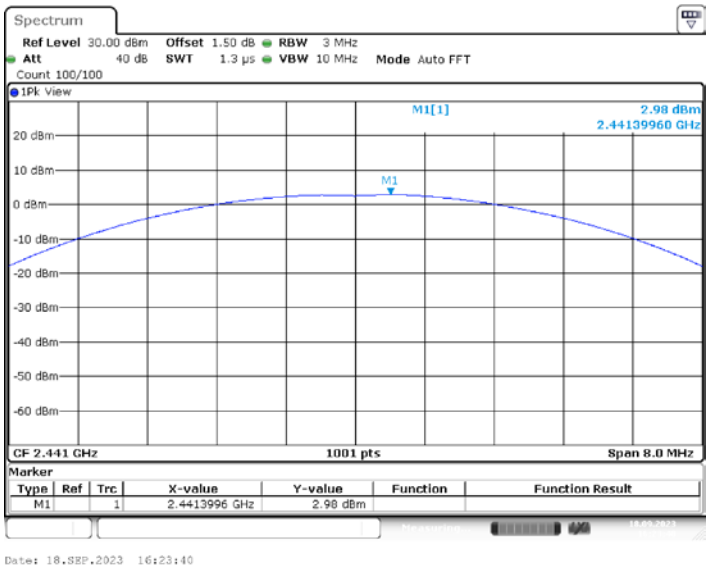
GFSK_2480



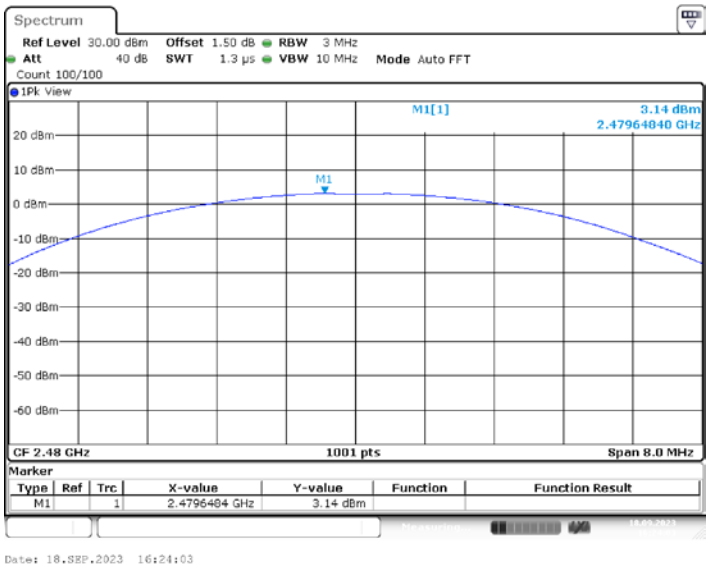
π/4-DQPSK_2402



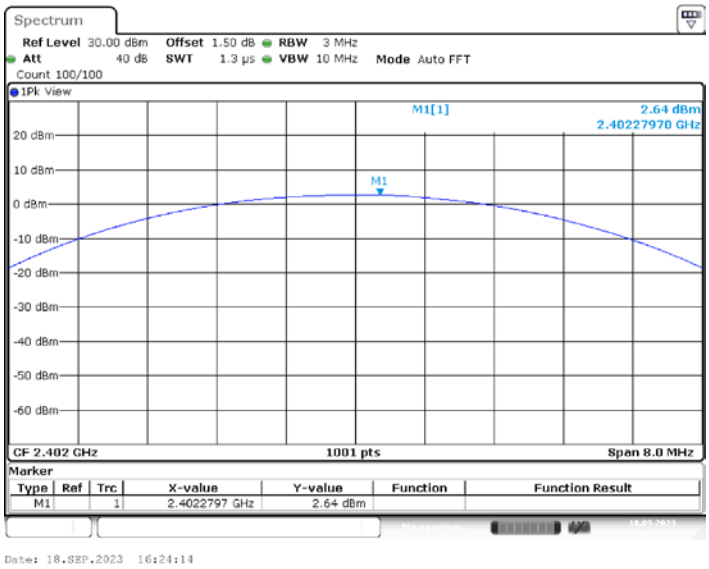
π/4-DQPSK_2441



π/4-DQPSK_2480

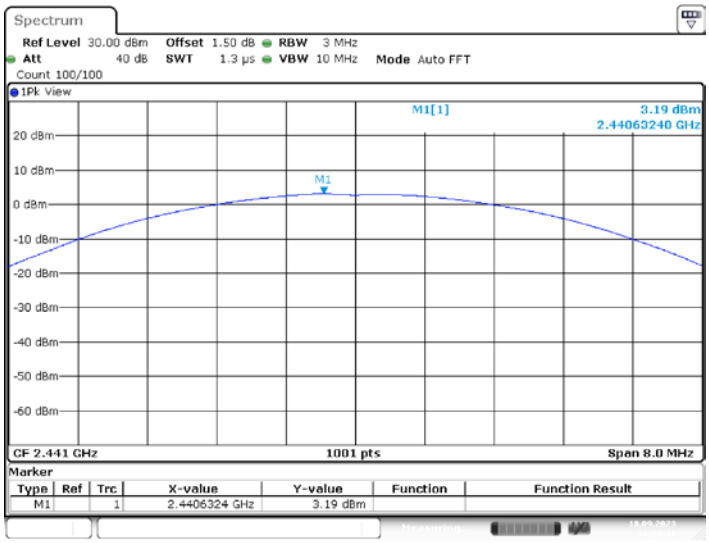


8-DPSK_2402



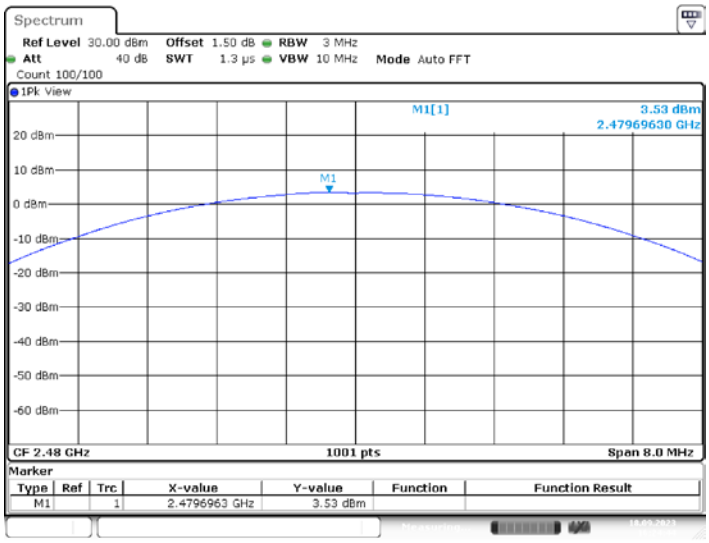
Date: 18.SEP.2023 16:24:14

8-DPSK_2441



Date: 18.SEP.2023 16:24:30

8-DPSK_2480



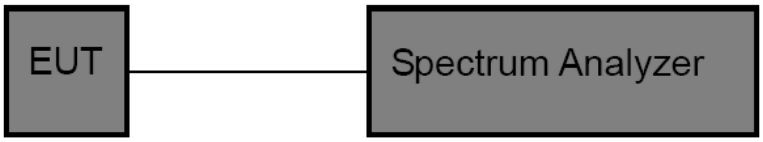
Date: 18.SEP.2023 16:24:44

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.

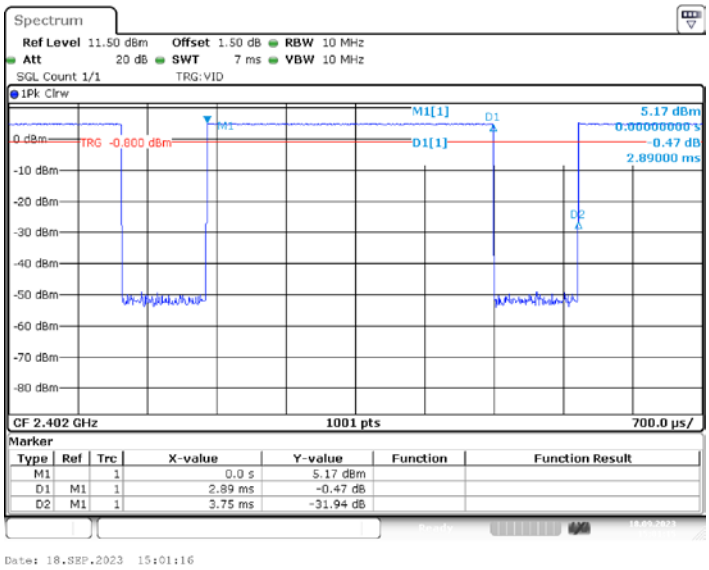
Test Mode

Please refer to the clause 2.4.

Test Result

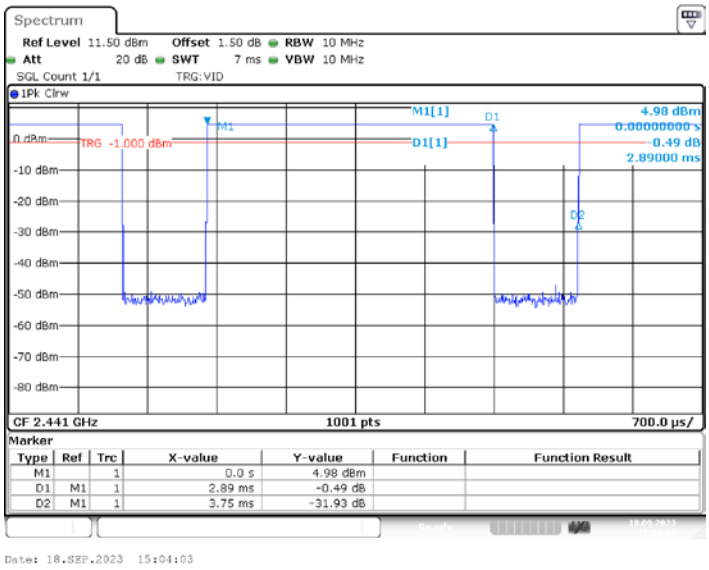
Test Mode	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2402	2.89	3.75	77.07	1.13	2
	2441	2.89	3.75	77.07	1.13	2
	2480	2.89	3.76	76.86	1.14	2
π/4-DQPSK	2402	2.89	3.75	77.07	1.13	2
	2441	2.89	3.75	77.07	1.13	2
	2480	2.89	3.75	77.07	1.13	2
8-DPSK	2402	2.90	3.75	77.33	1.12	2
	2441	2.90	3.75	77.33	1.12	2
	2480	2.90	3.76	77.13	1.13	2

GFSK_2402



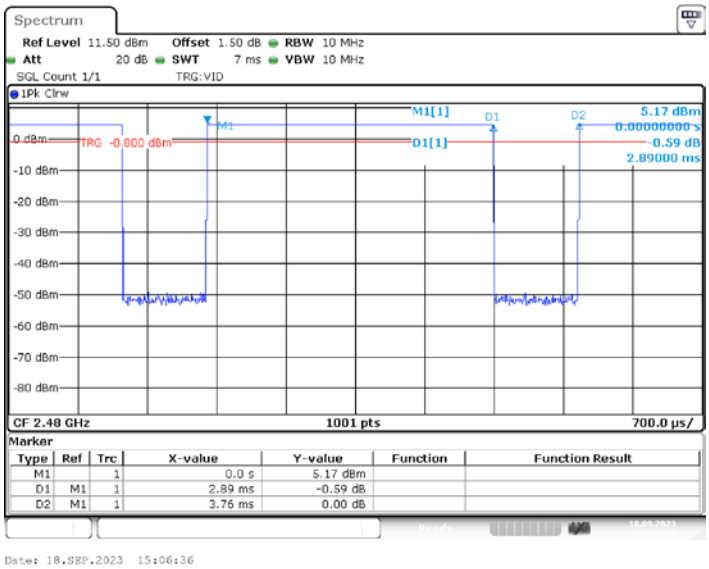
Date: 18.SEP.2023 15:01:16

GFSK_2441



Date: 18.SEP.2023 15:04:03

GFSK_2480



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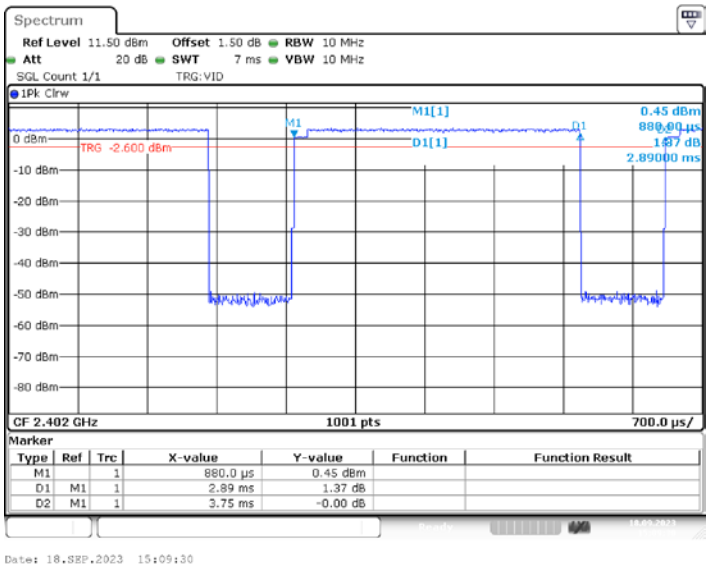

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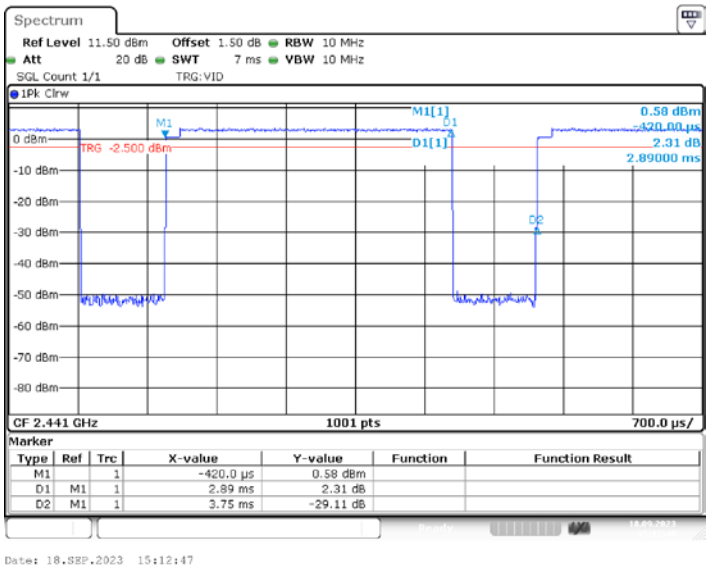

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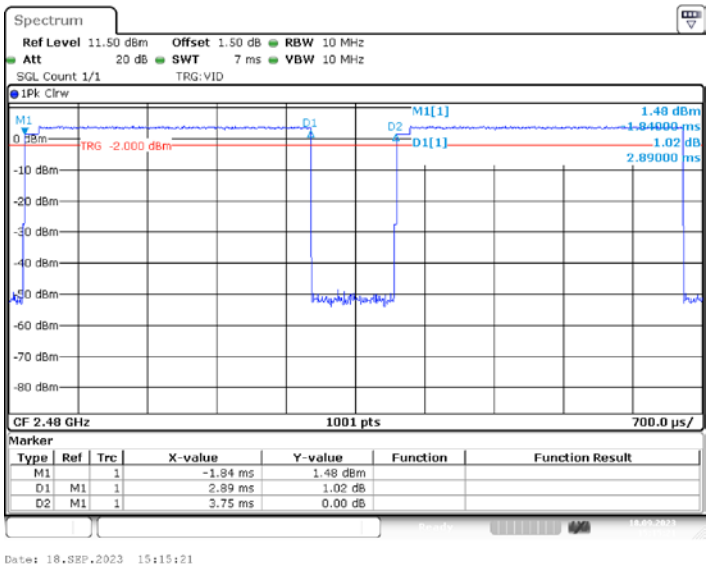

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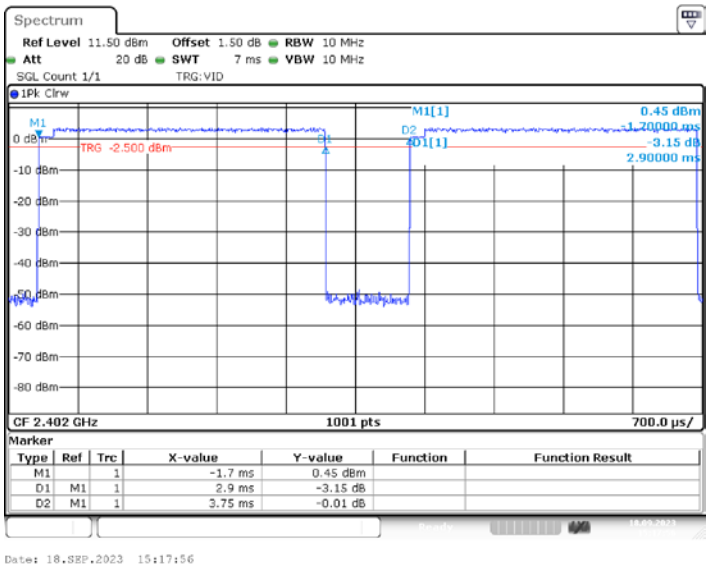

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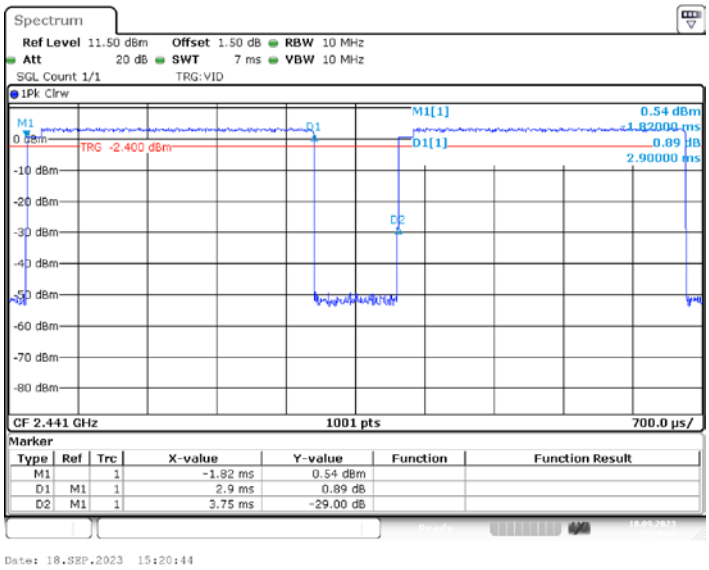

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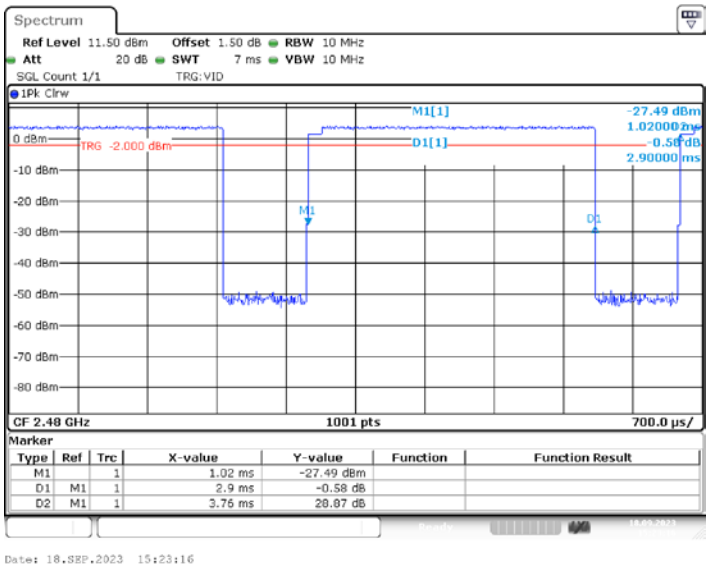

3.11. Antenna requirement

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 directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

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