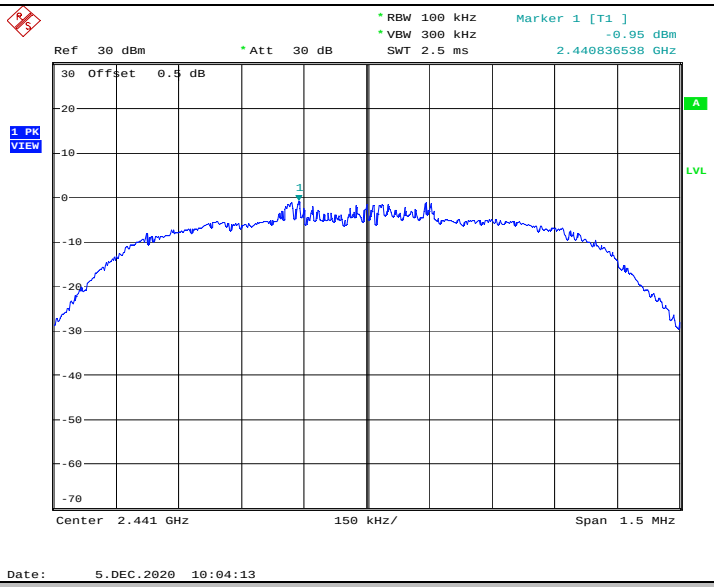
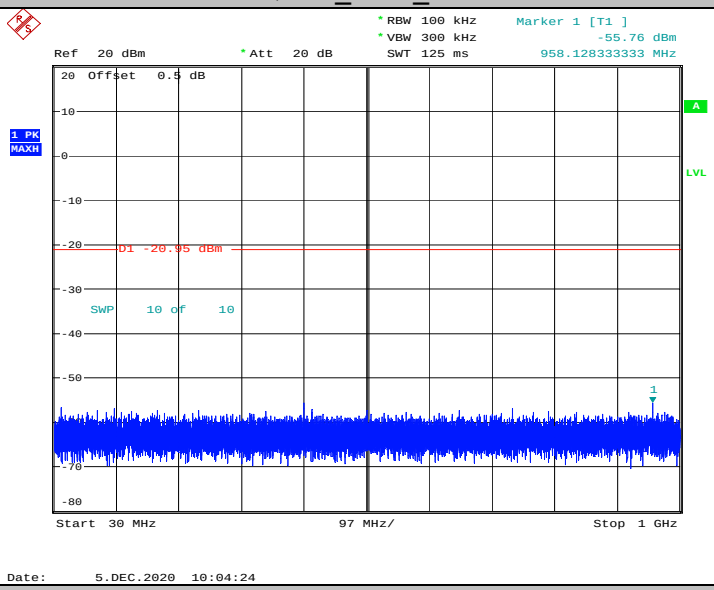
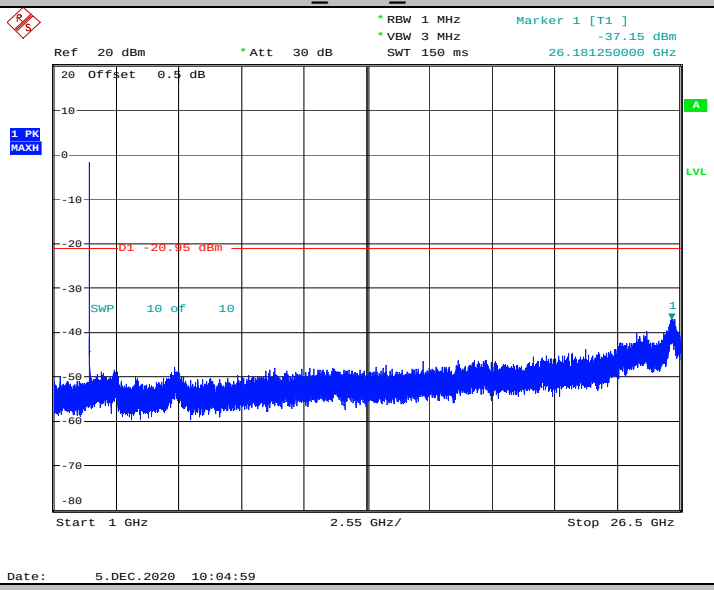


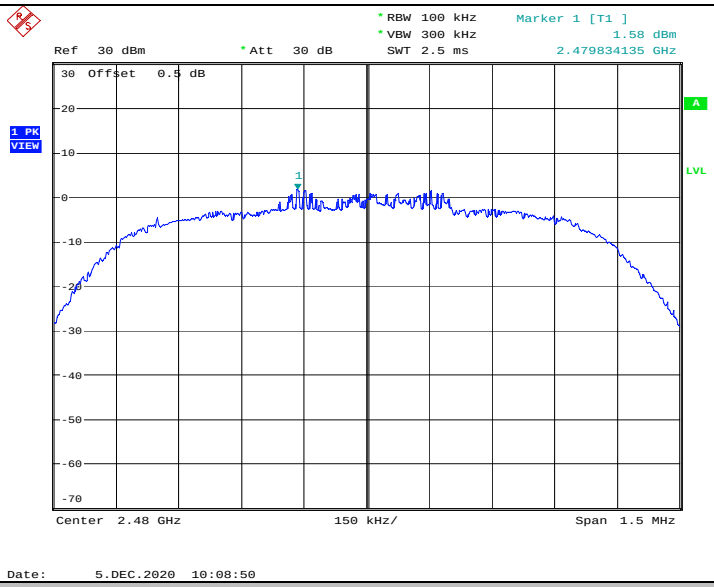
π/4-DQPSK_2441_30~1000



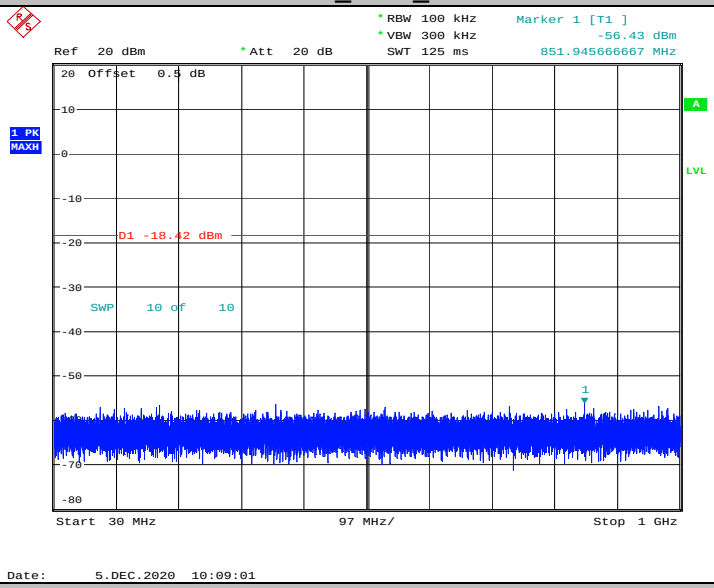
π/4-DQPSK_2441_1000~26500



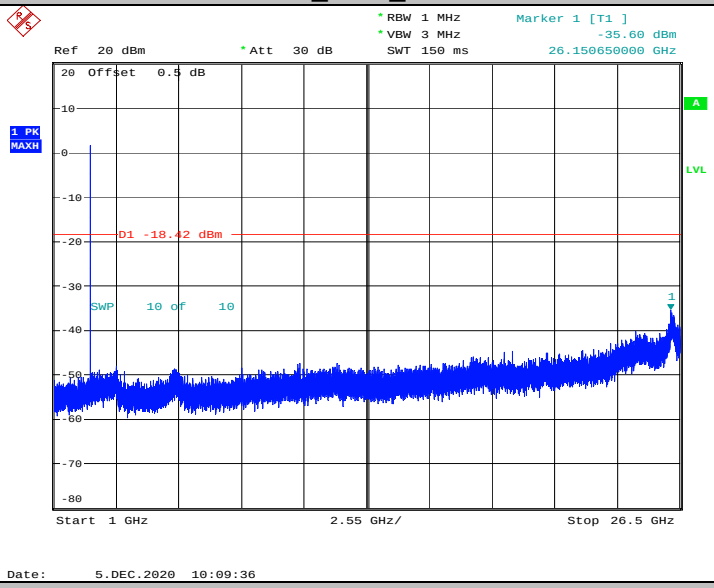
π/4-DQPSK_2480_0~Reference



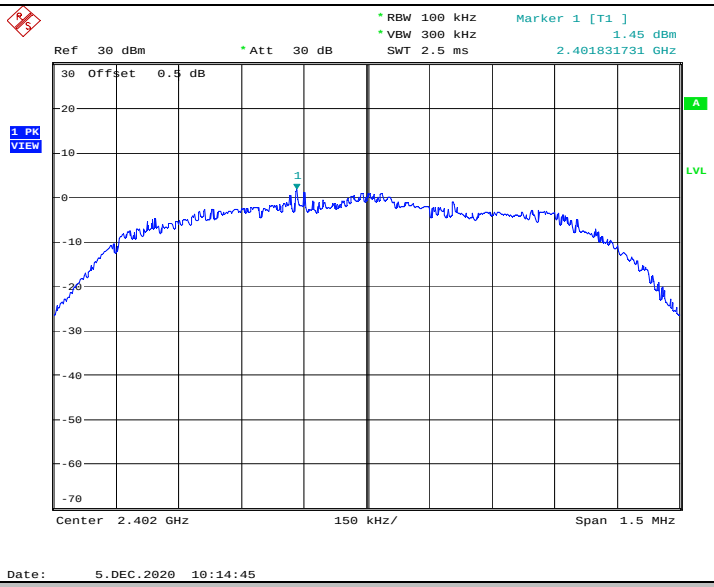
π/4-DQPSK_2480_30~1000



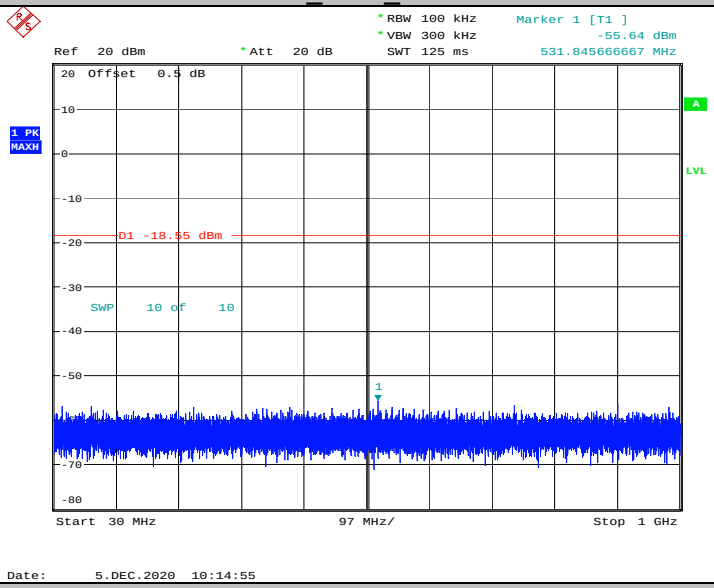
π/4-DQPSK_2480_1000~26500



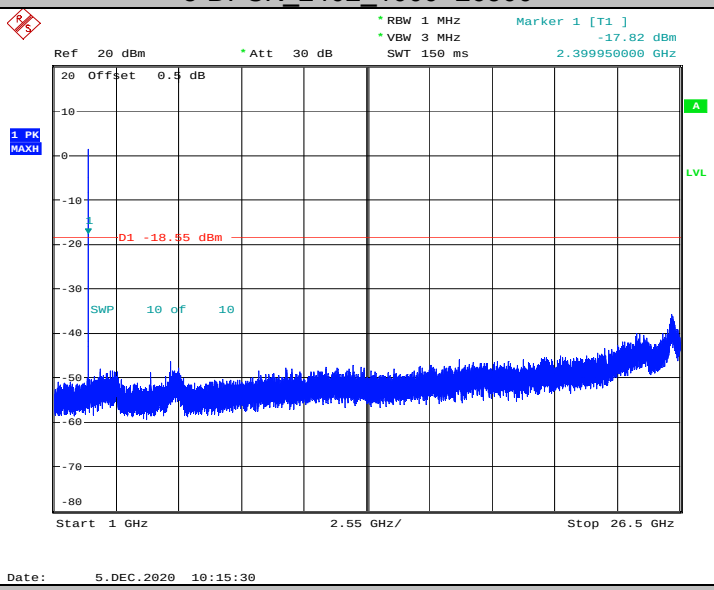
8-DPSK_2402_0~Reference



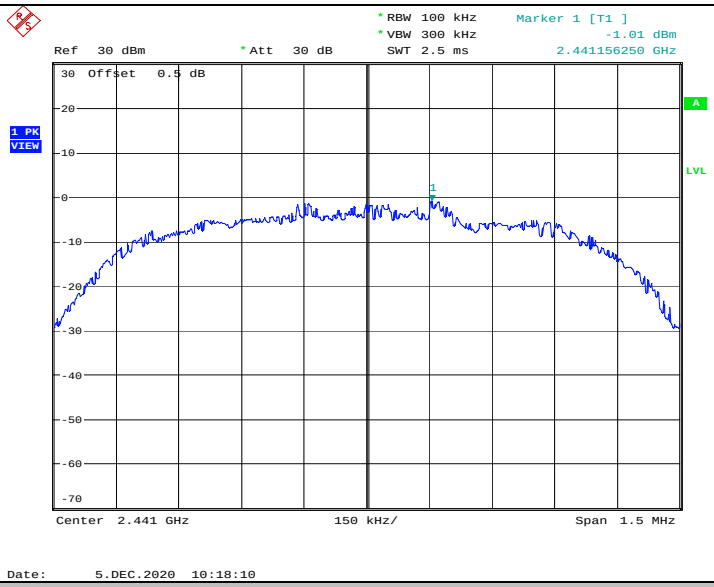
8-DPSK_2402_30~1000



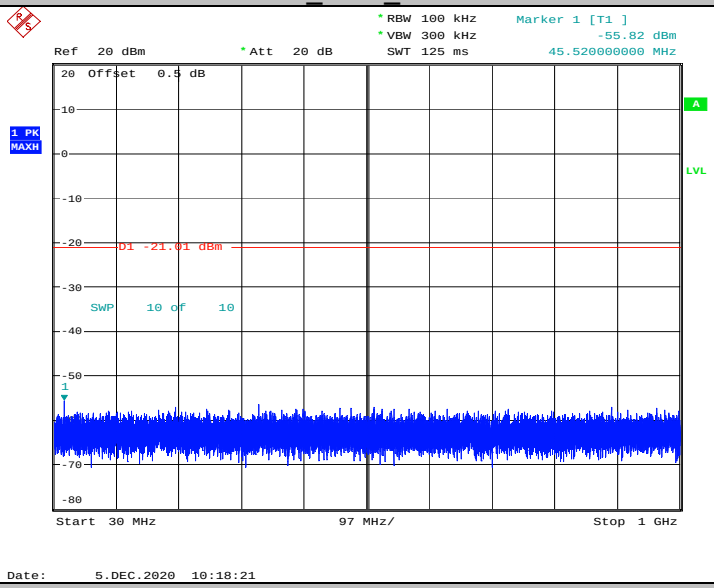
8-DPSK_2402_1000~26500



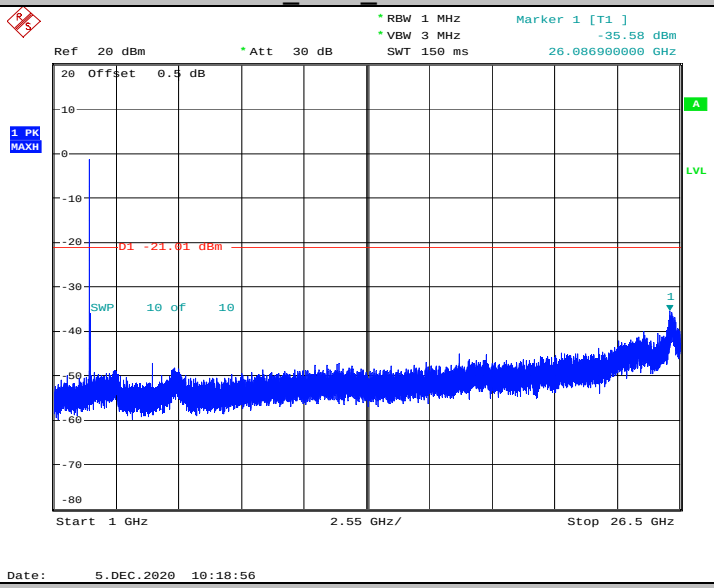
8-DPSK_2441_0~Reference



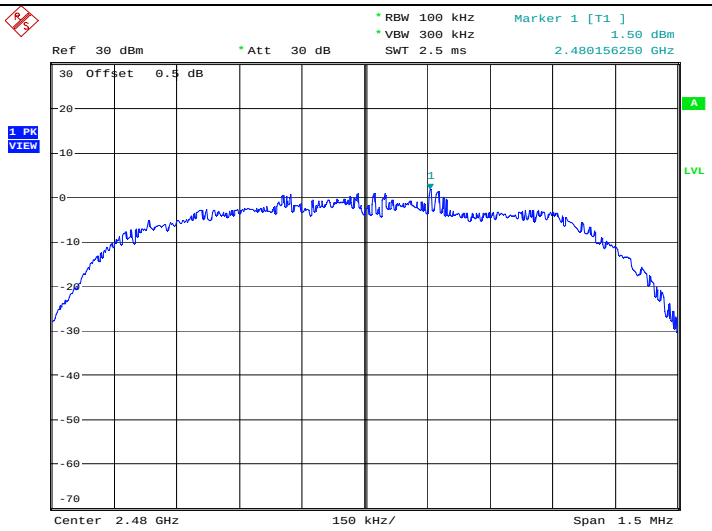
8-DPSK_2441_30~1000



8-DPSK_2441_1000~26500

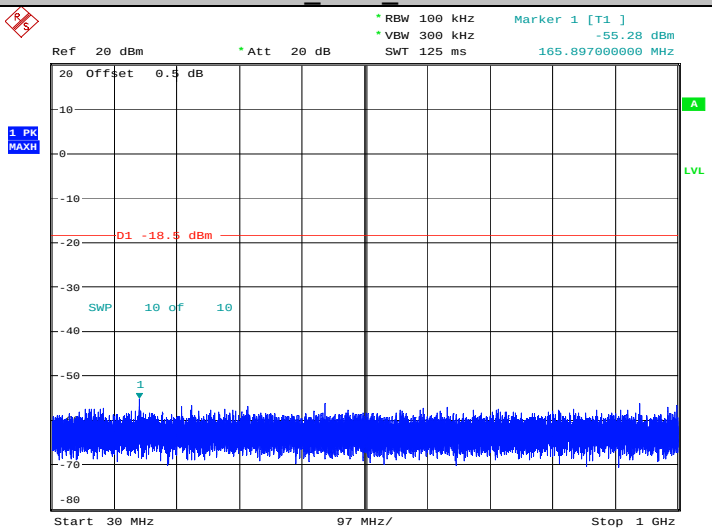


8-DPSK_2480_0~Reference



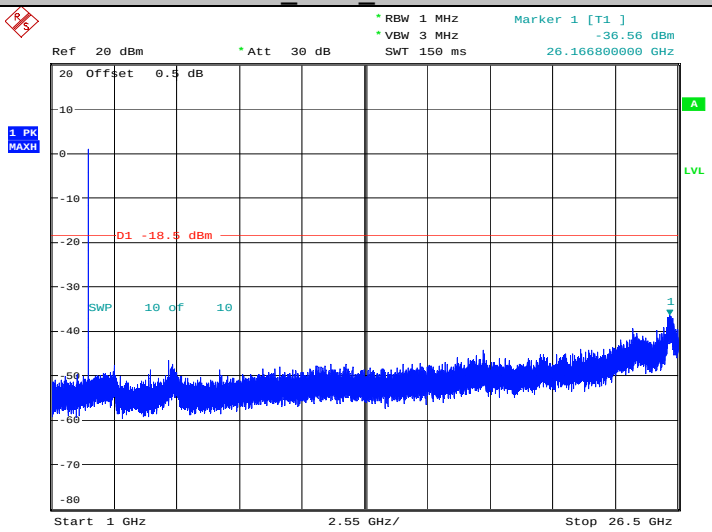
Date: 5.DEC.2020 10:22:43

8-DPSK_2480_30~1000



Date: 5.DEC.2020 10:22:54

8-DPSK_2480_1000~26500



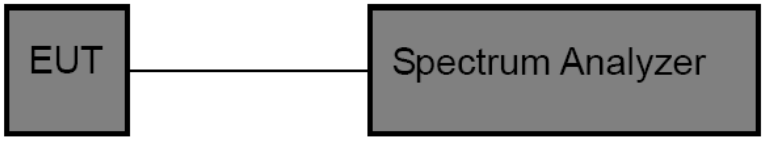
Date: 5.DEC.2020 10:23:29

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.

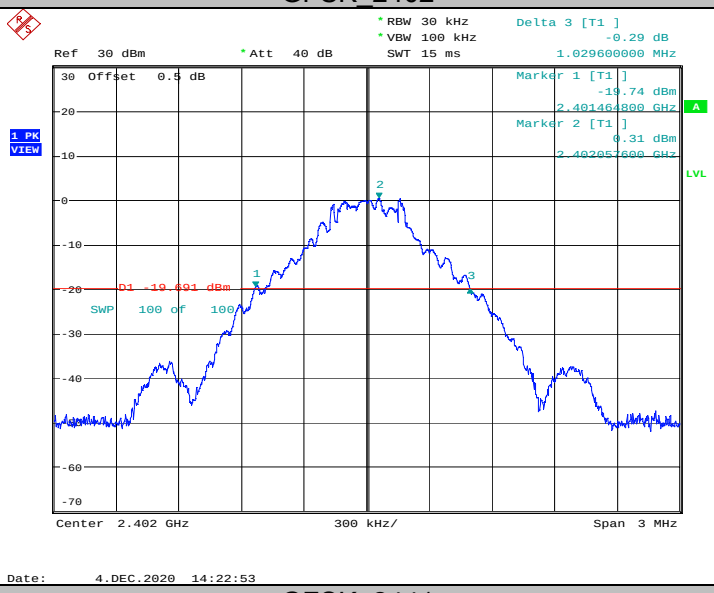
Test Mode

Please refer to the clause 2.4.

Test Results

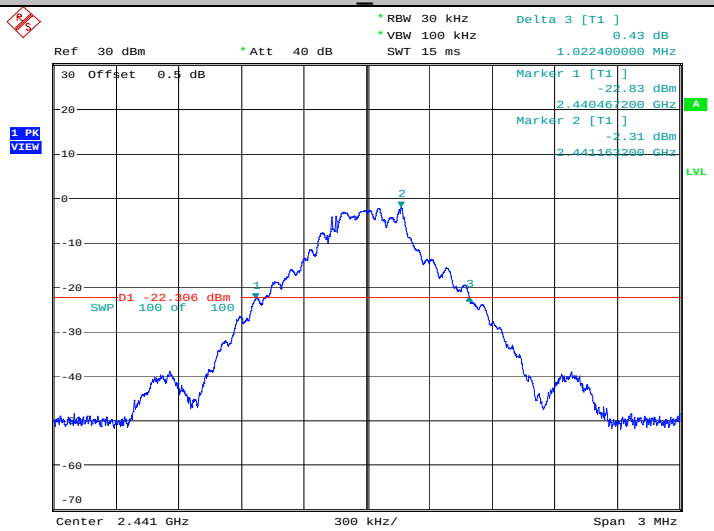
Test Mode	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	20dB Bandwidth *2/3 (kHz)	Verdict
GFSK	2402	1.030	2401.465	2402.494	686.667	PASS
	2441	1.022	2440.467	2441.490	681.333	PASS
	2480	1.027	2479.462	2480.490	684.667	PASS
π /4-DQPSK	2402	1.306	2401.347	2402.653	870.667	PASS
	2441	1.303	2440.347	2441.650	868.667	PASS
	2480	1.301	2479.350	2480.650	867.333	PASS
8-DPSK	2402	1.294	2401.347	2402.641	862.667	PASS
	2441	1.306	2440.342	2441.648	870.667	PASS
	2480	1.296	2479.345	2480.641	864.000	PASS

GFSK_2402



Date: 4.DEC.2020 14:22:53

GFSK_2441



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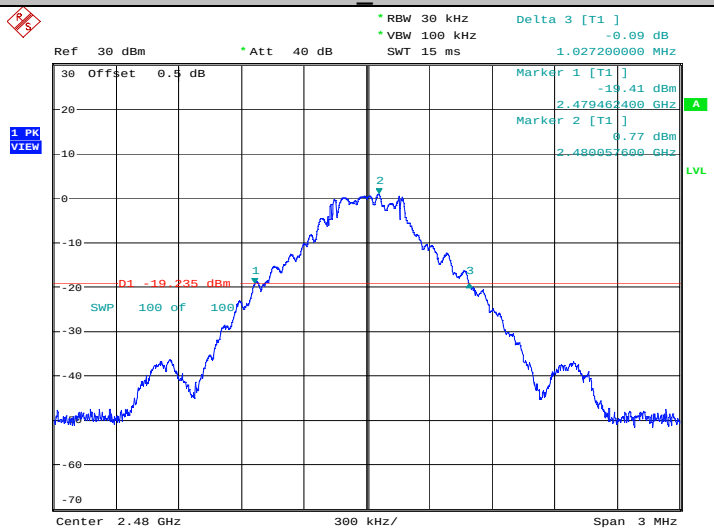
GFSK_2480



Date: 4.DEC.2020 14:57:56

π/4-DQPSK_2402

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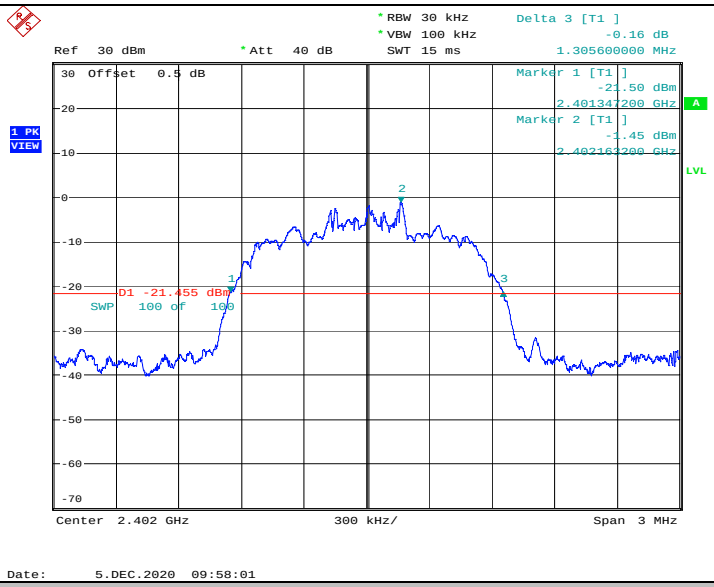
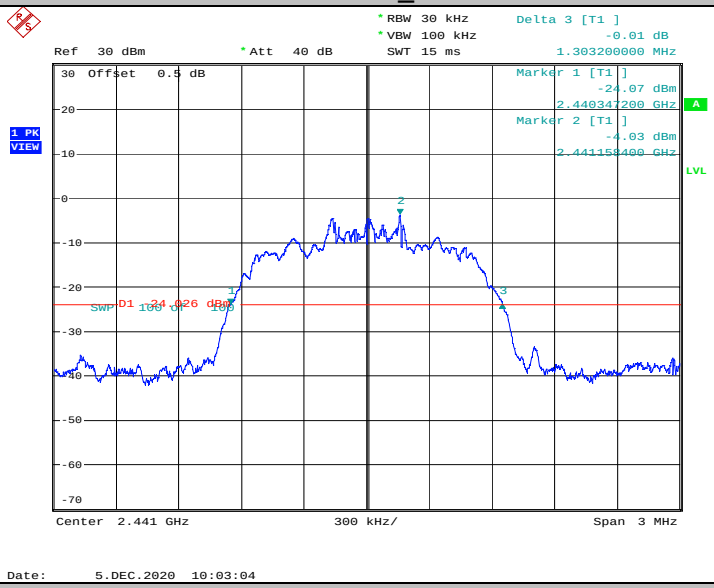
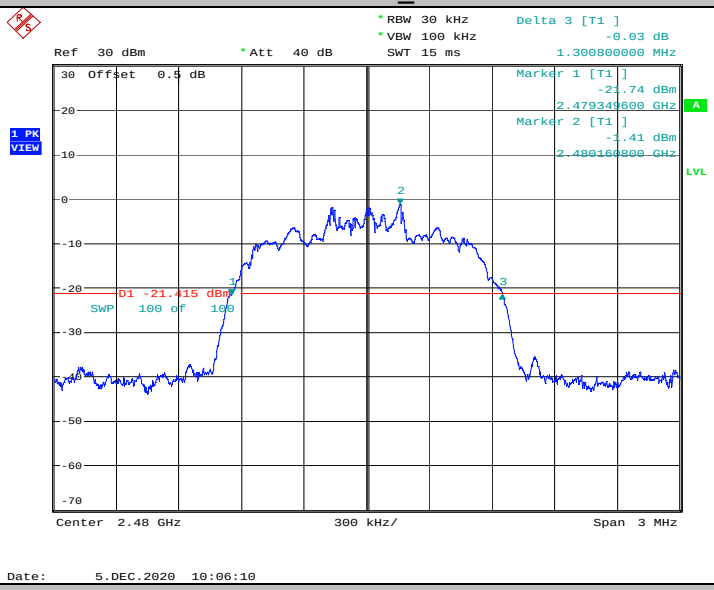


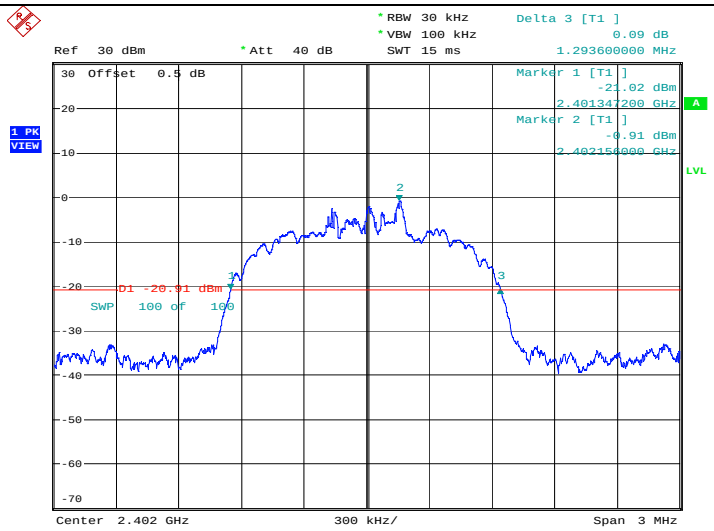
π/4-DQPSK_2441



π/4-DQPSK_2480



8-DPSK_2402



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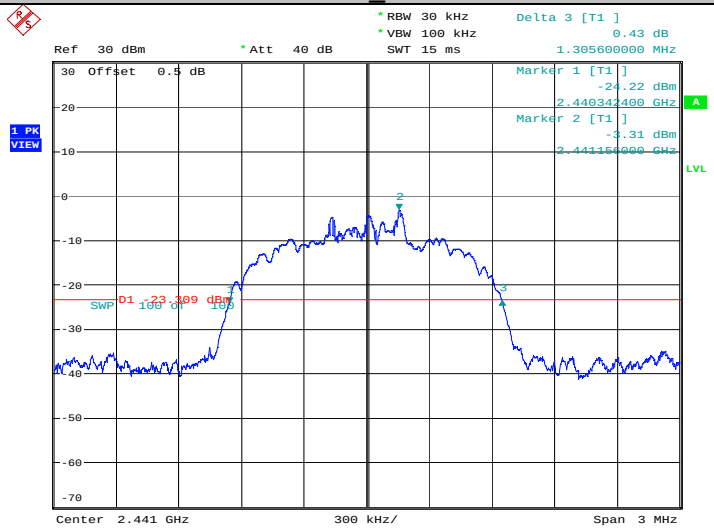
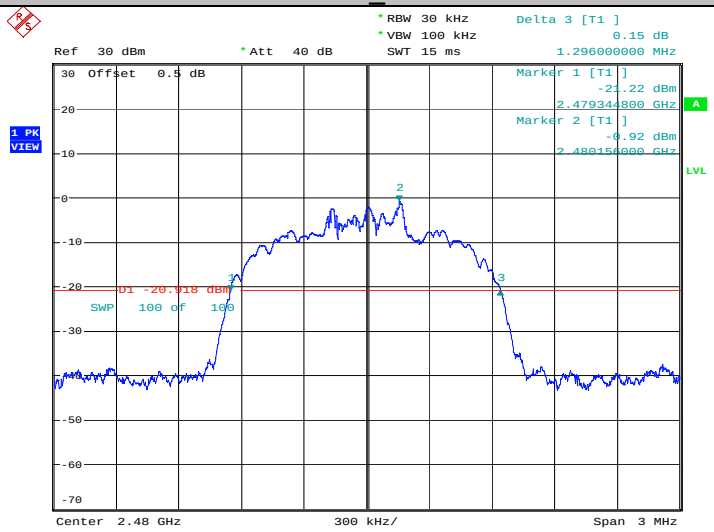
8-DPSK_2441



Date: 5.DEC.2020 10:17:01

8-DPSK_2480



Date: 5.DEC.2020 10:20:04

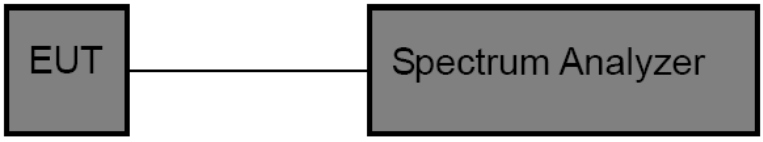
3.6. Channel Separation

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.

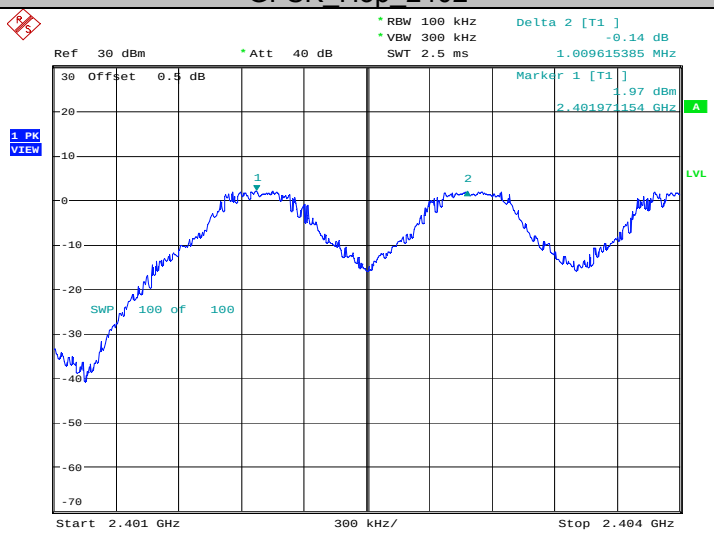
Test Mode

Please refer to the clause 2.4.

Test Results

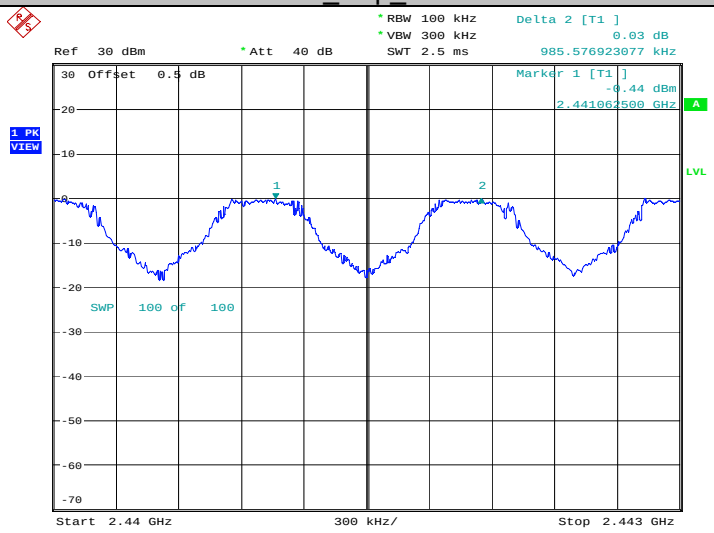
Test Mode	Channel	Result[MHz]	Limit[MHz]	Verdict
GFSK	Hop_2402	1.010	>686.667	PASS
	Hop_2441	0.986	>681.333	PASS
	Hop_2480	1.034	>684.667	PASS
π/4-DQPSK	Hop_2402	1.024	>870.667	PASS
	Hop_2441	0.995	>868.667	PASS
	Hop_2480	0.978	>867.333	PASS
8-DPSK	Hop_2402	1.005	>862.667	PASS
	Hop_2441	0.981	>870.667	PASS
	Hop_2480	1.018	>864.000	PASS

GFSK_Hop_2402



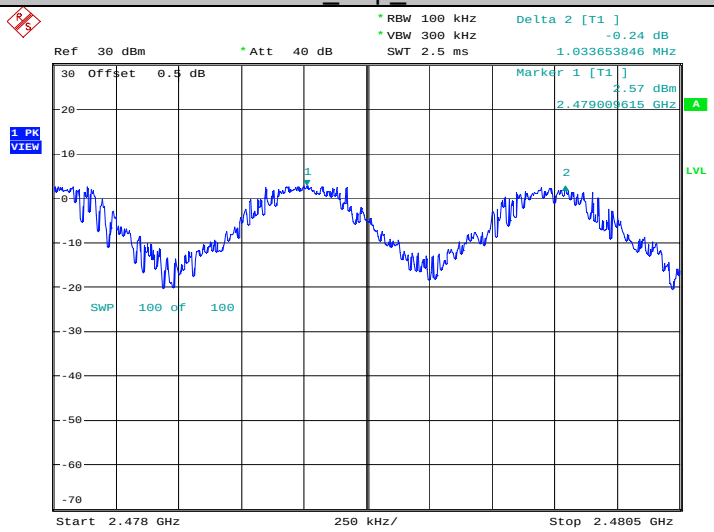
Date: 5.DEC.2020 10:30:46

GFSK_Hop_2441



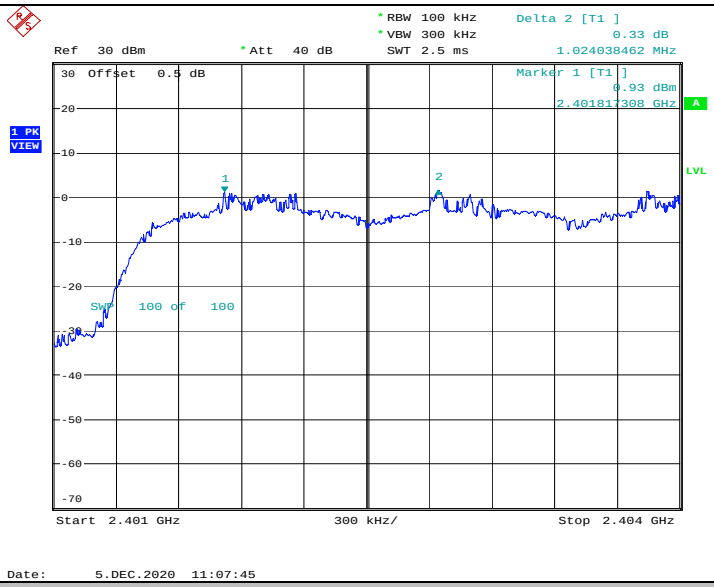
Date: 5.DEC.2020 10:33:32

GFSK_Hop_2480

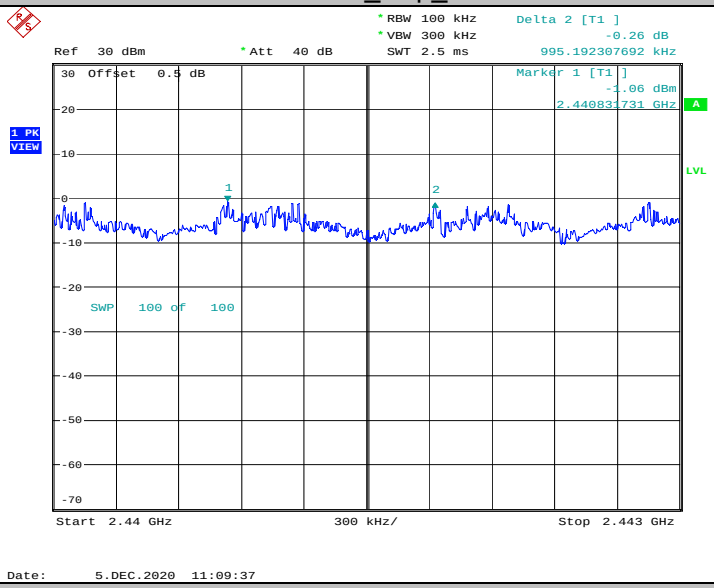


Date: 5.DEC.2020 10:49:01

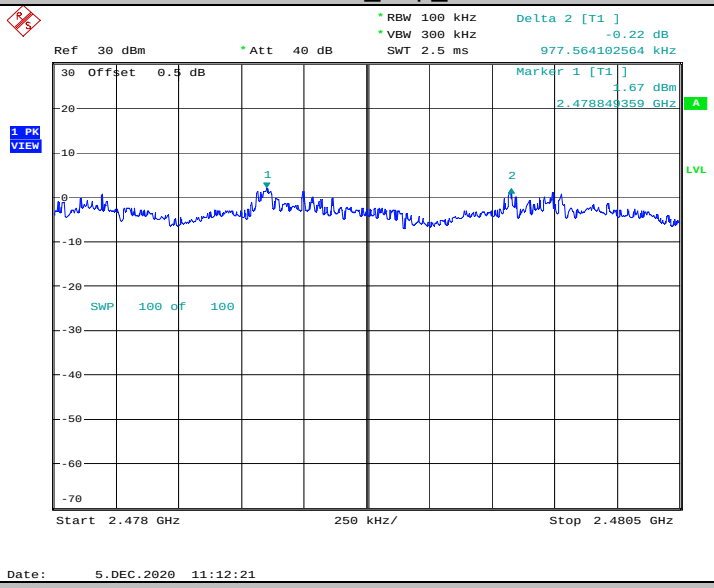
π/4-DQPSK_Hop_2402



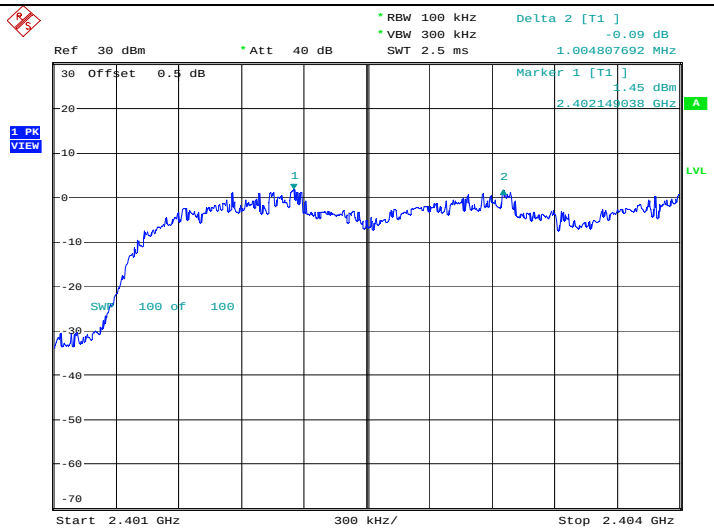
π/4-DQPSK_Hop_2441



π/4-DQPSK_Hop_2480

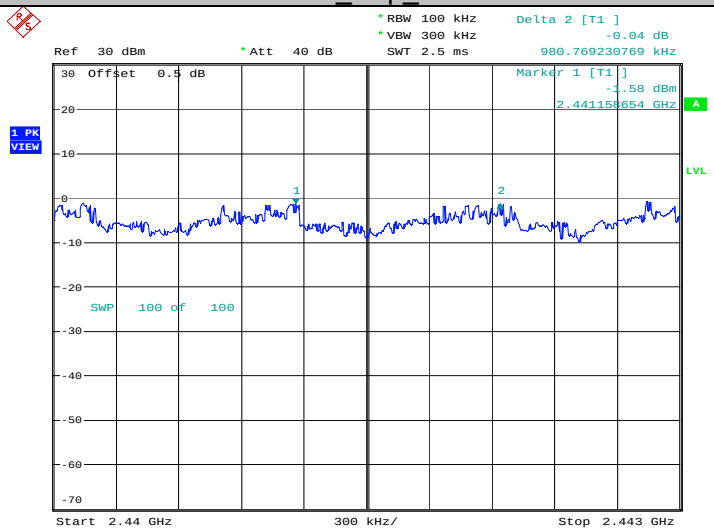


8-DPSK_Hop_2402



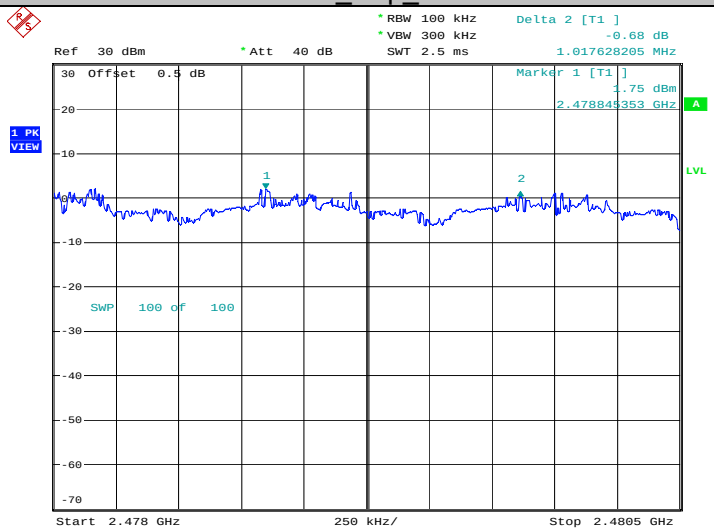
Date: 5.DEC.2020 13:06:26

8-DPSK_Hop_2441



Date: 5.DEC.2020 13:20:53

8-DPSK_Hop_2480



Date: 5.DEC.2020 13:27:10

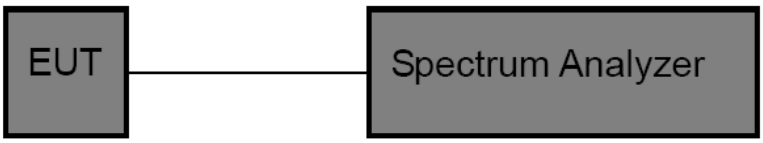
3.7. Number of Hopping Channel

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

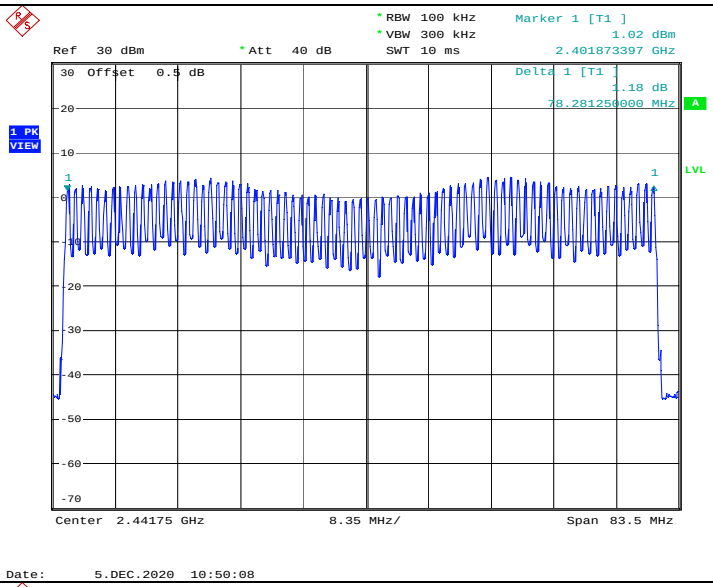
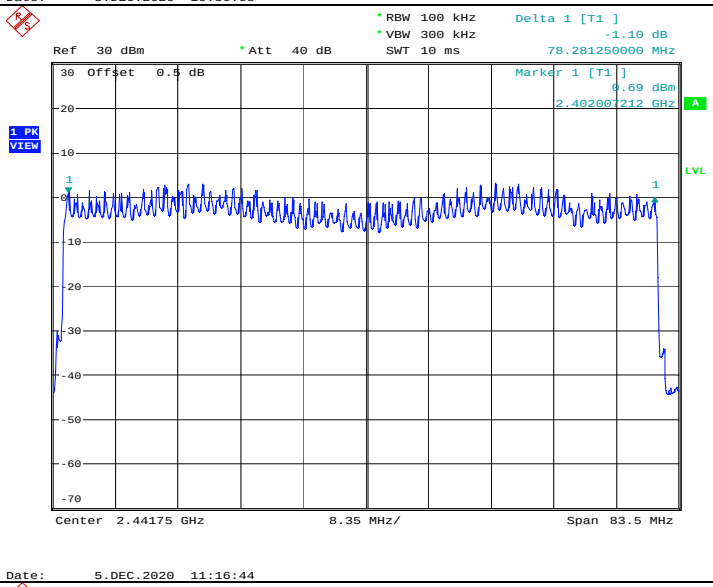
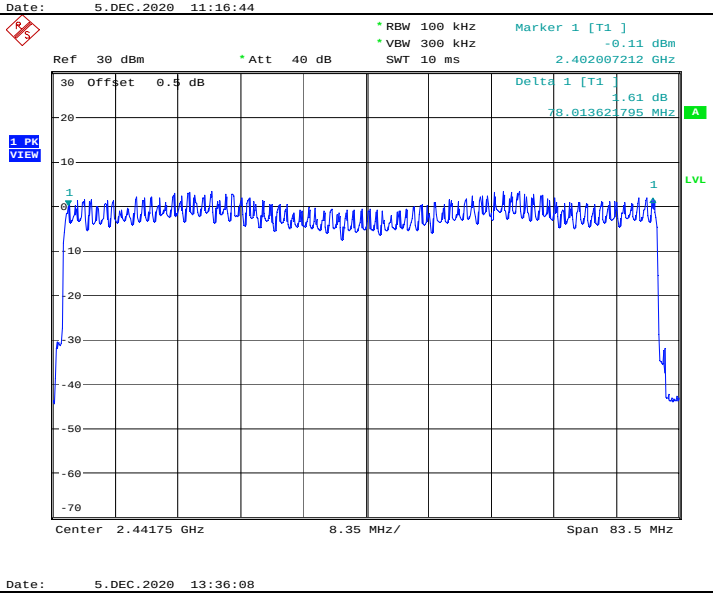
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

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		

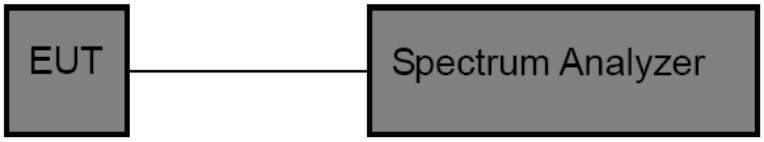
GFSK	
π/4-DQPSK	
8-DPSK	

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.

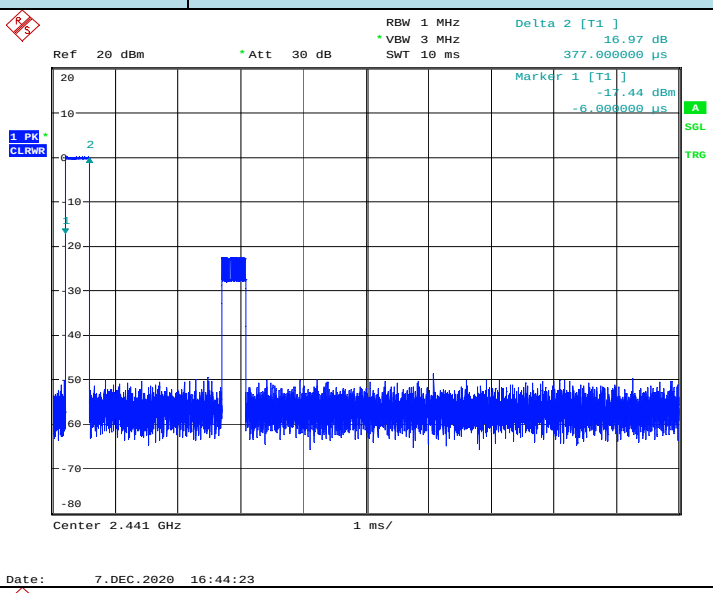
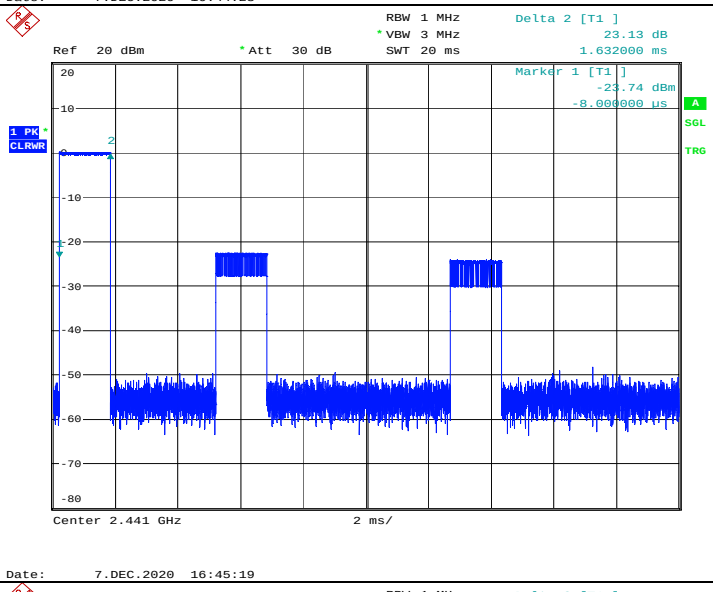
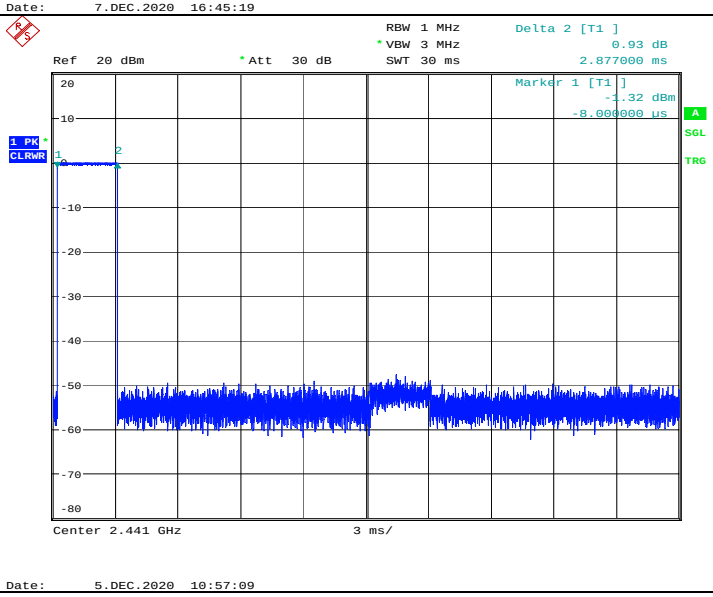
Test Mode

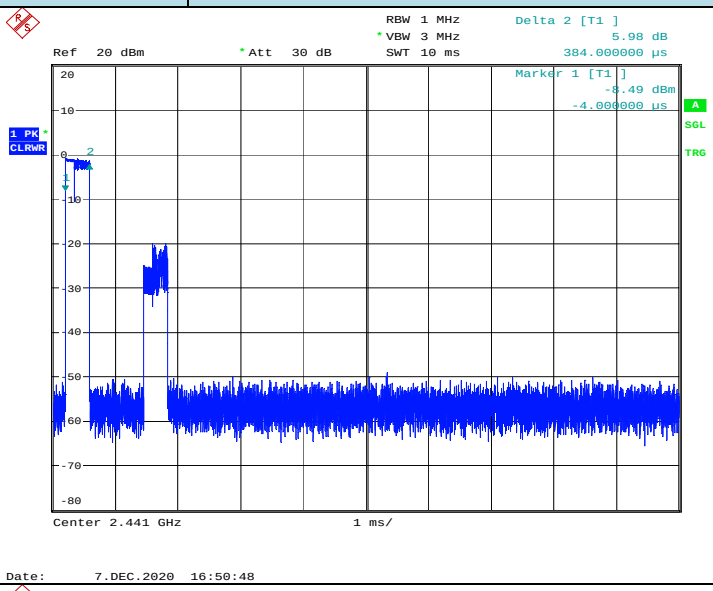
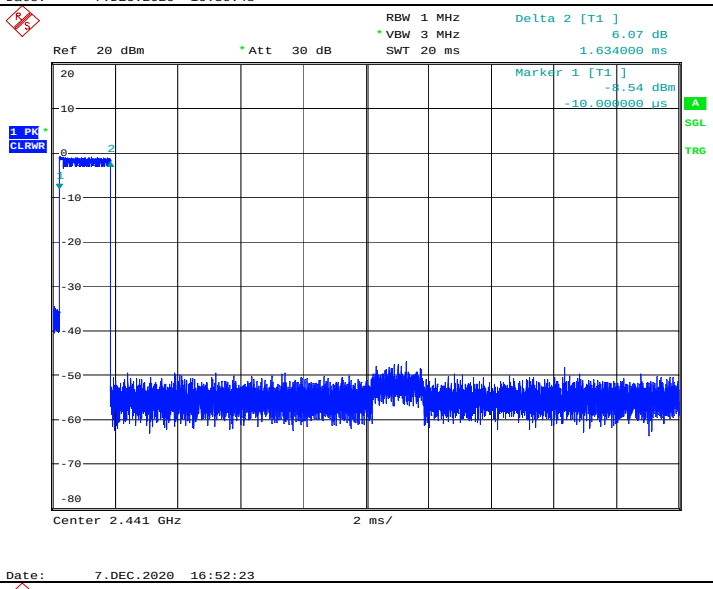
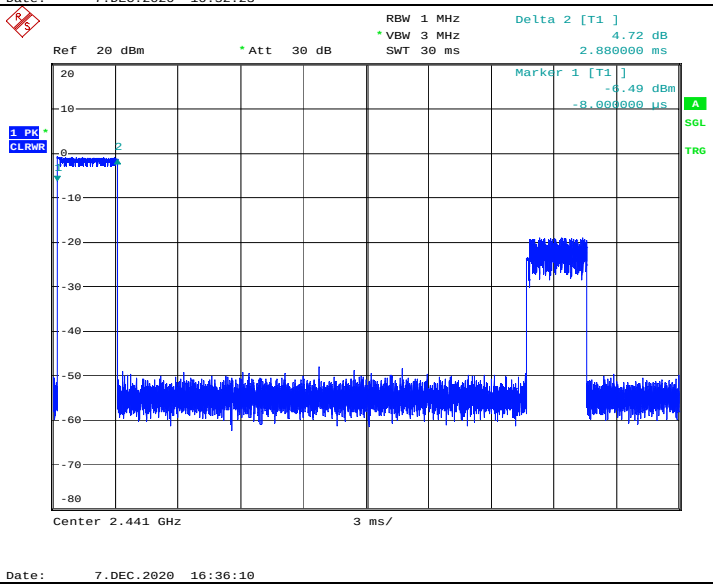
Please refer to the clause 2.4.

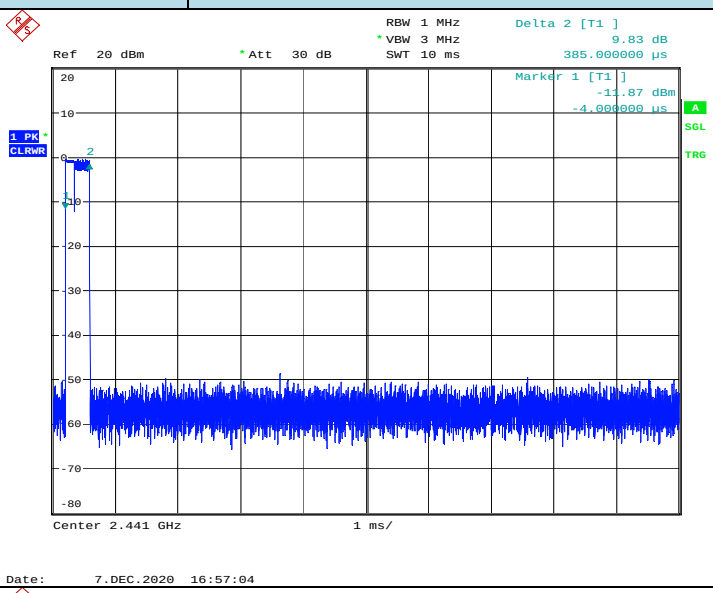
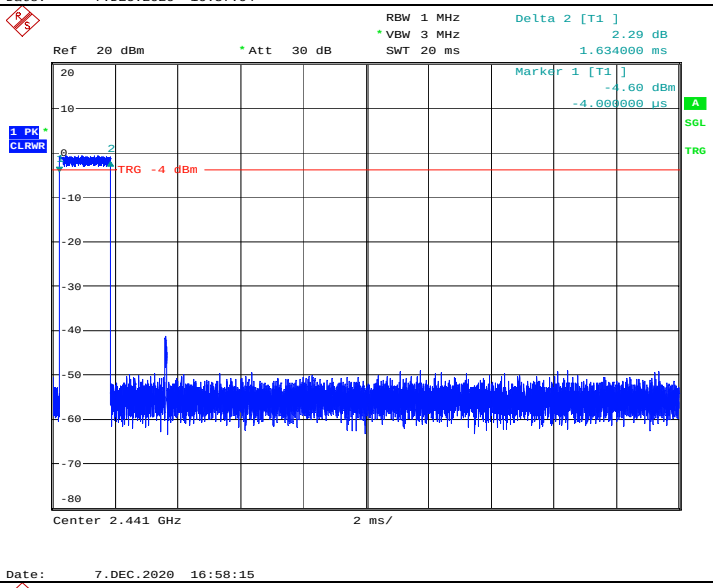
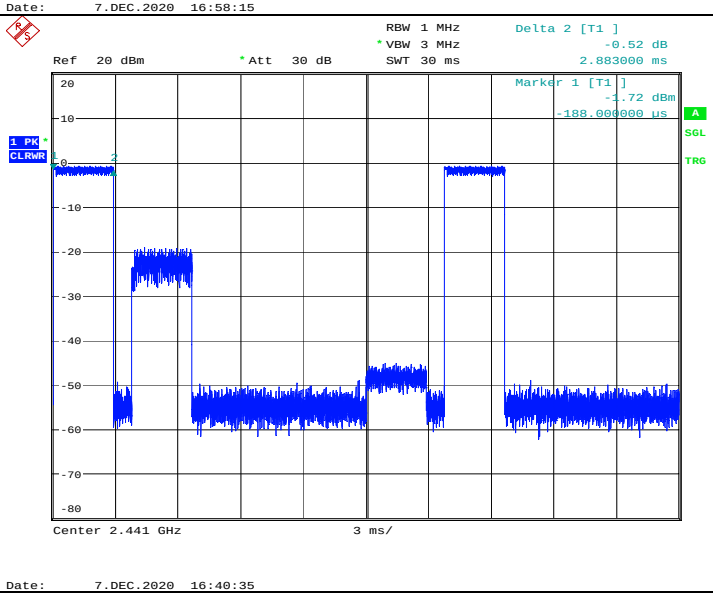
Test Result

Modulation type	Channel	Channel (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	2.88	307.20	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: 1DH1/2DH1/3DH1Total 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*

Modulation Type:	GFSK
DH1	
DH3	
DH5	

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

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

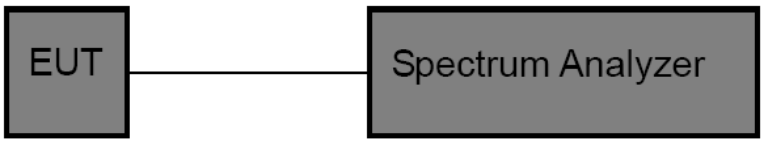
3.9. Peak Output Power

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) 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.

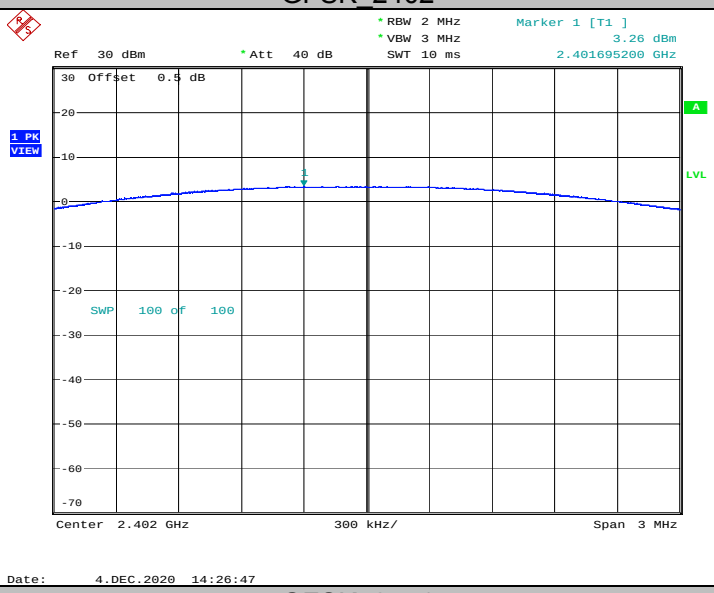
Test Mode

Please refer to the clause 2.4.

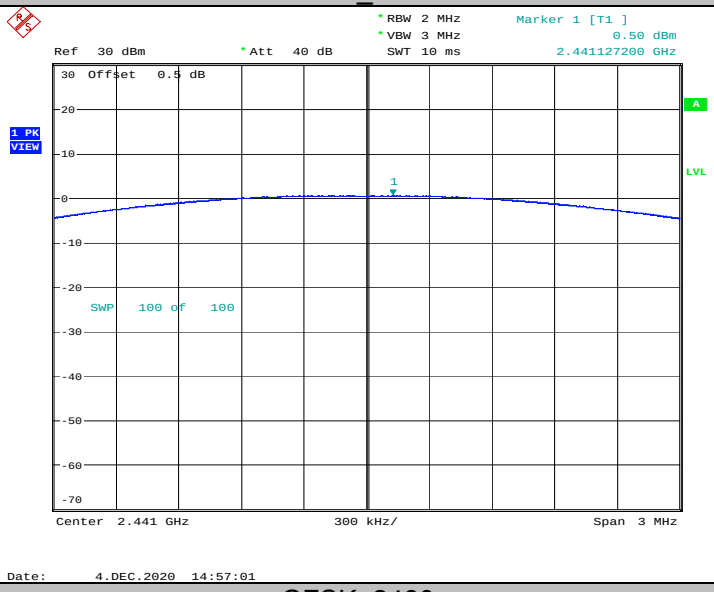
Test Result

Test Mode	Channel	Result[dBm]	Limit[dBm]	Verdict
GFSK	2402	3.26	<=30	PASS
	2441	0.50	<=30	PASS
	2480	3.71	<=30	PASS
π/4-DQPSK	2402	2.10	<=30	PASS
	2441	-0.44	<=30	PASS
	2480	2.40	<=30	PASS
8-DPSK	2402	2.36	<=30	PASS
	2441	-0.29	<=30	PASS
	2480	2.56	<=30	PASS

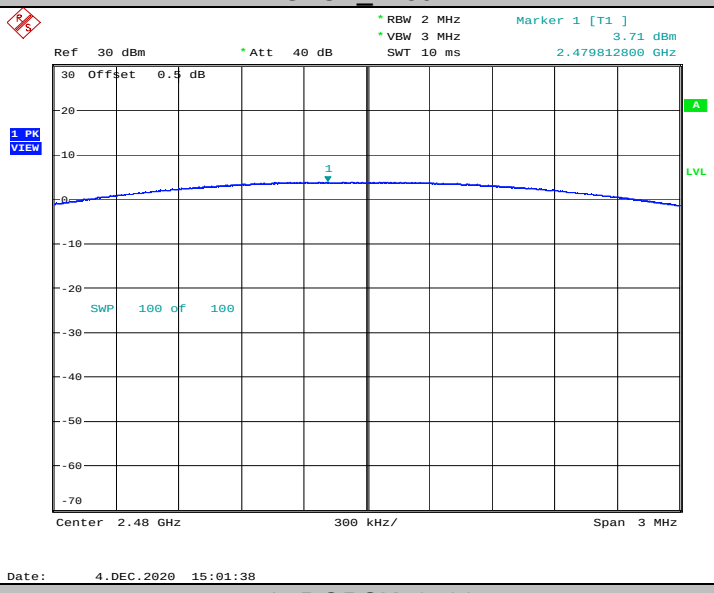
GFSK_2402



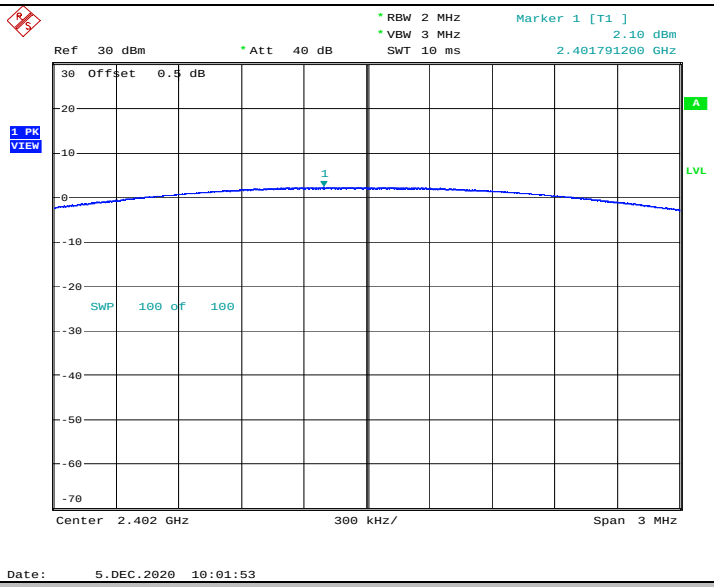
GFSK_2441



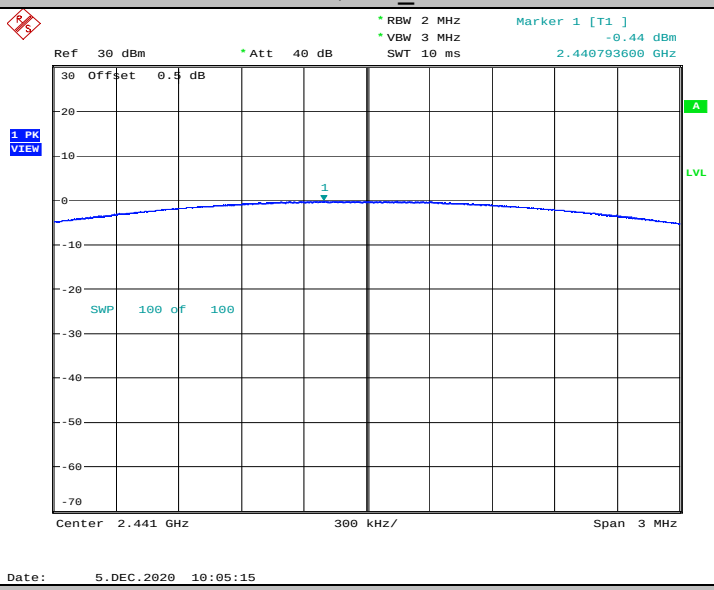
GFSK_2480



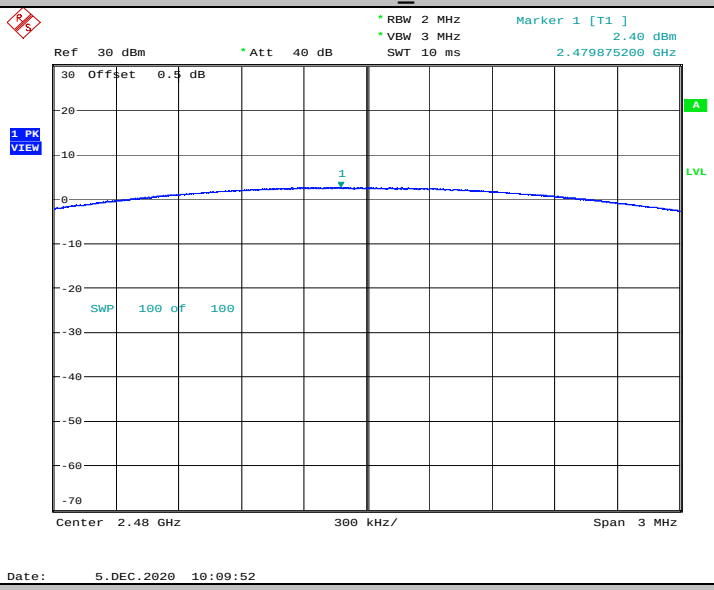
π/4-DQPSK_2402



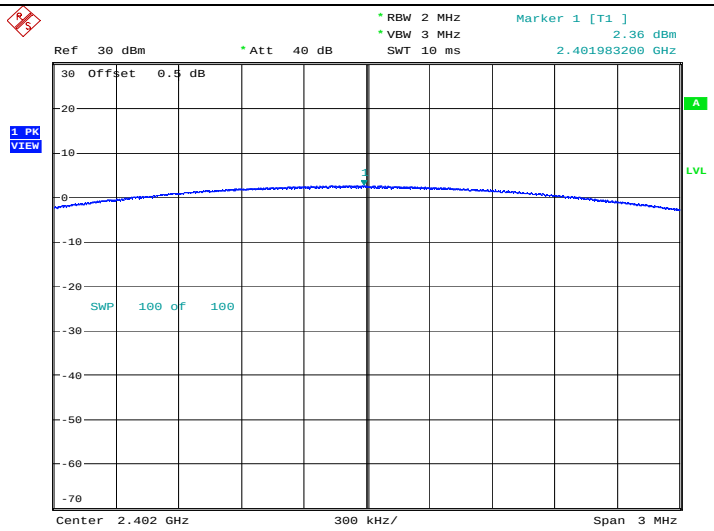
π/4-DQPSK_2441



π/4-DQPSK_2480

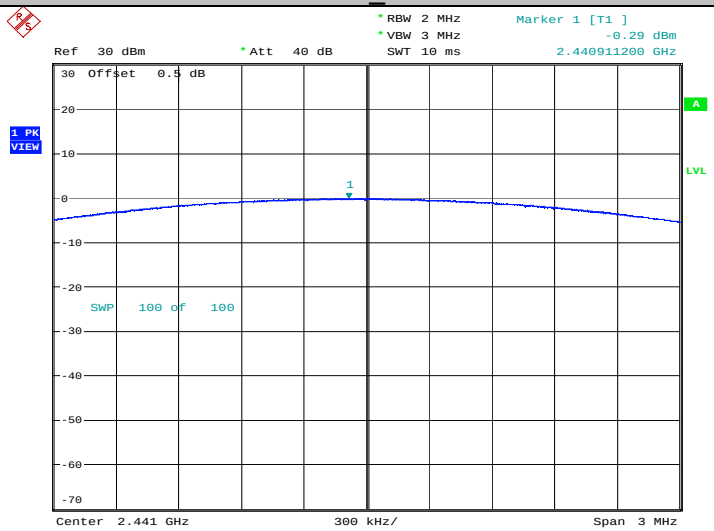


8-DPSK_2402



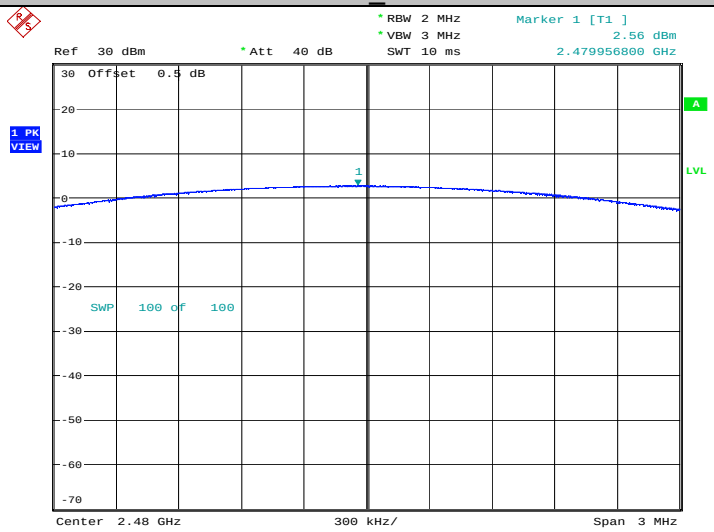
Date: 5.DEC.2020 10:15:46

8-DPSK_2441



Date: 5.DEC.2020 10:19:12

8-DPSK_2480



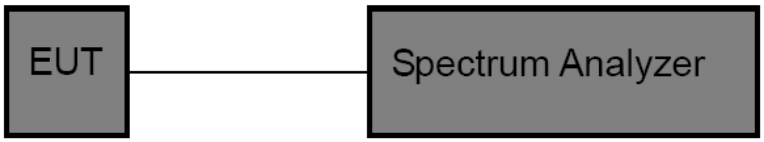
Date: 5.DEC.2020 10:23:45

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.

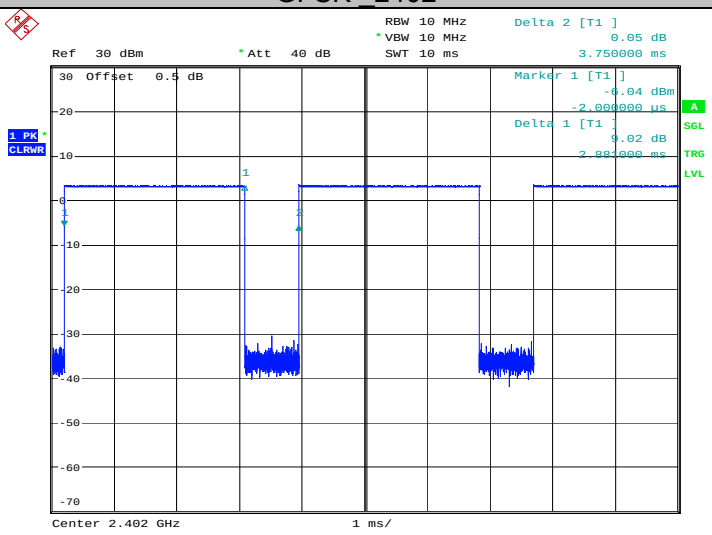
Test Mode

Please refer to the clause 2.4.

Test Result

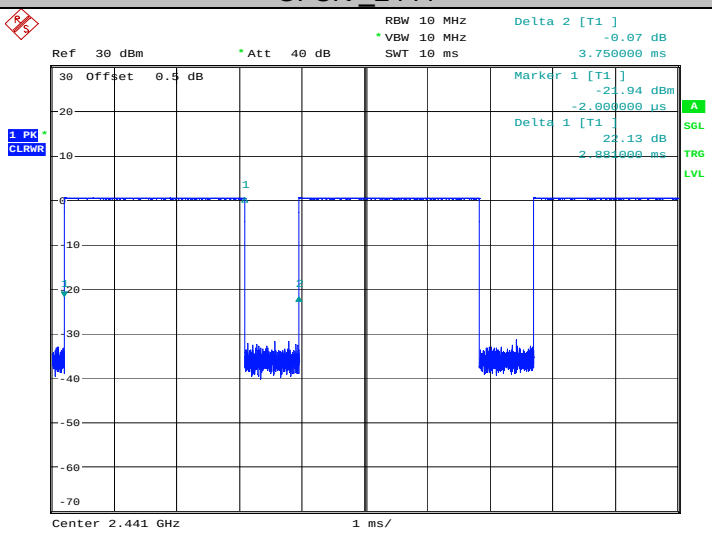
Test Mode	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2402	2.88	3.75	76.83	0.35	1
	2441	2.88	3.75	76.83	0.35	1
	2480	2.88	3.75	76.83	0.35	1
π/4-DQPSK	2402	2.88	3.75	76.91	0.35	1
	2441	2.89	3.75	76.93	0.35	1
	2480	2.89	3.75	76.93	0.35	1
8-DPSK	2402	2.89	3.75	76.96	0.35	1
	2441	2.89	3.75	76.99	0.35	1
	2480	2.89	3.75	76.96	0.35	1

GFSK _2402



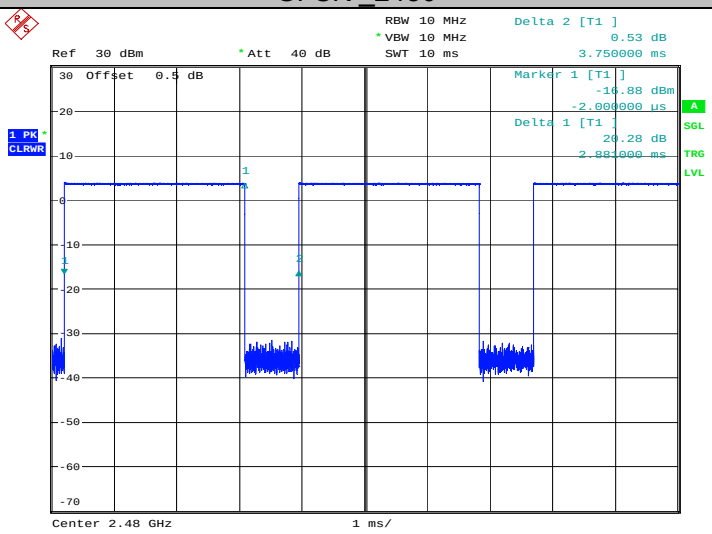
Date: 4.DEC.2020 14:22:27

GFSK _2441



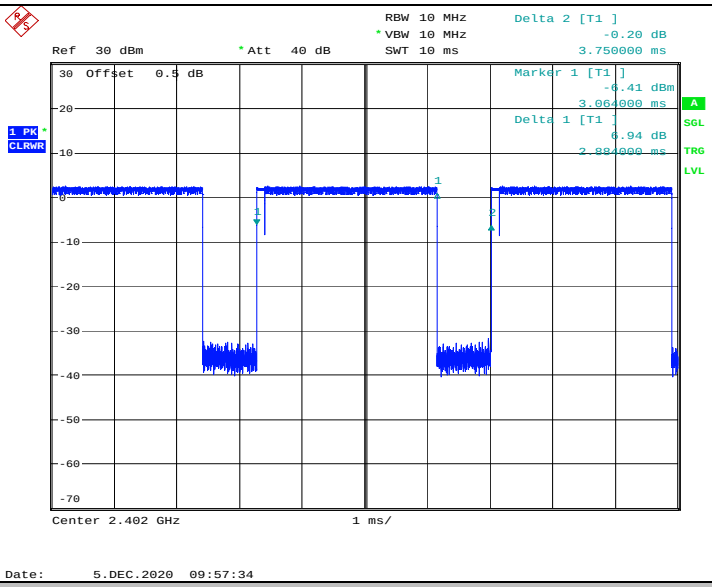
Date: 4.DEC.2020 14:54:20

GFSK _2480

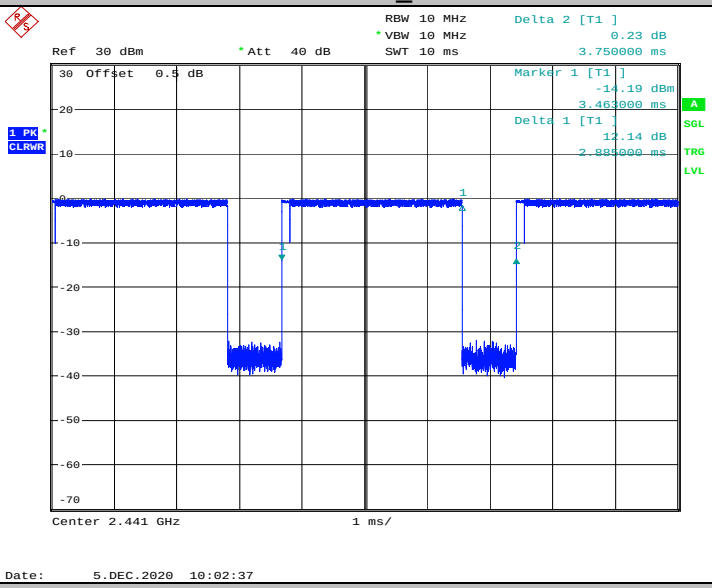


Date: 4.DEC.2020 14:57:30

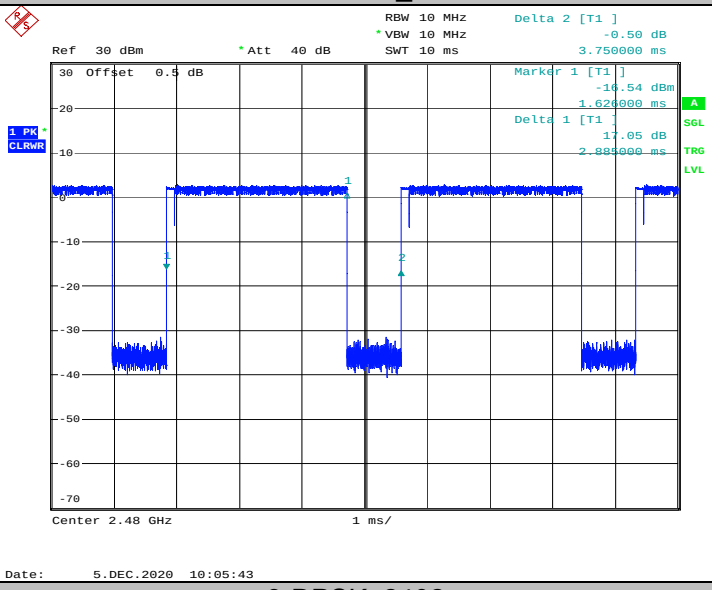
π/4-DQPSK_2402



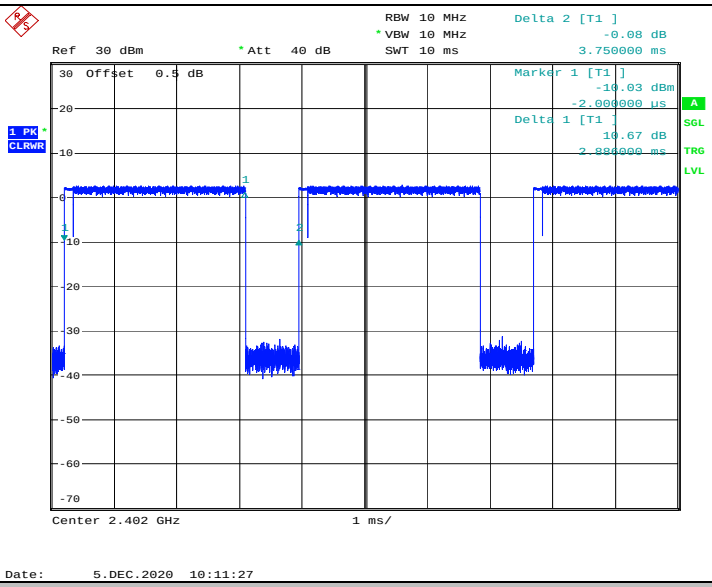
π/4-DQPSK_2441



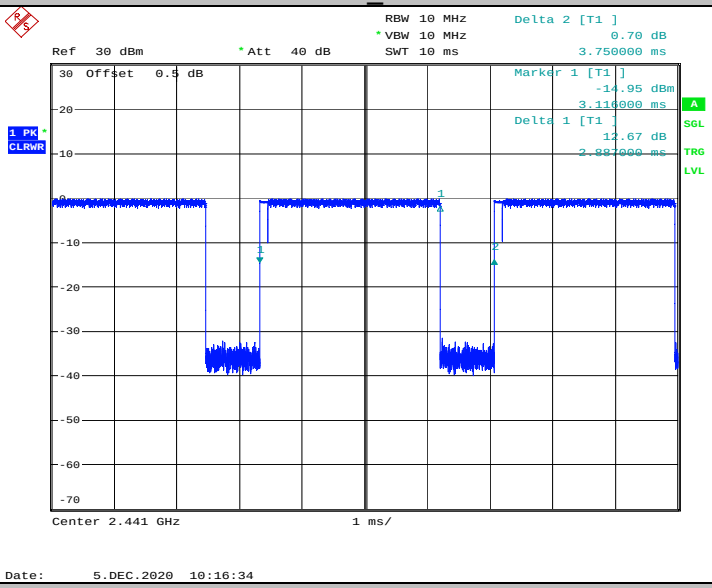
π/4-DQPSK_2480



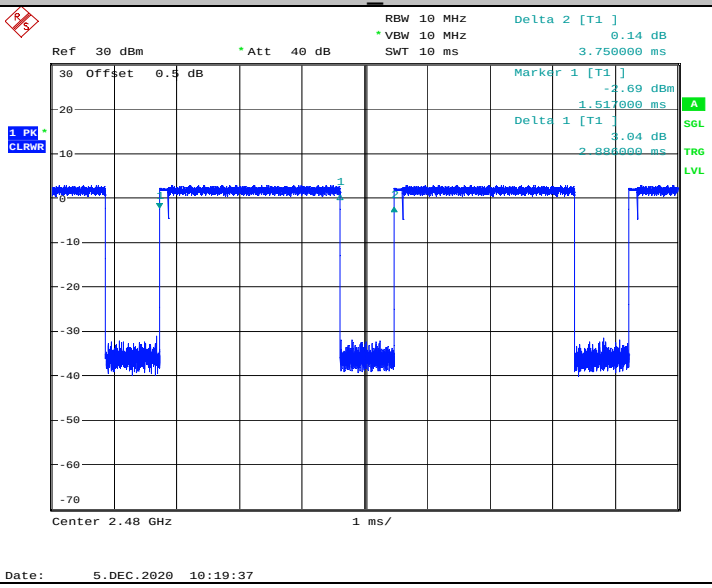
8-DPSK_2402



8-DPSK_2441



8-DPSK_2480



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**********