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Report Template Version: V04
Report Template Revision Date: 2018-07-06

Test Report

Report No. :	CQASZ20210100047E-01
Applicant:	KINGTA TECHNOLOGY CO., LTD
Address of Applicant:	4F, Building 2, HaoJingDa Science Park, Shangmugu, Shenzhen China
Equipment Under Test (EUT):	
EUT Name:	BLUETOOTH SPEAKER
Model No.:	B28, SP694, SP694-ASST
Test Model No.:	B28
Brand Name:	N/A
FCC ID:	N7KB28
Standards:	47 CFR Part 15, Subpart C
Date of Receipt:	2021-01-18
Date of Test:	2021-01-18 to 2021-02-05
Date of Issue:	2021-02-05
Test Result :	**PASS***

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

Tested By: Tiny You

(Tiny You)

Reviewed By: Ares Liu

(Ares Liu)

Approved By: Sheek Luo

(Sheek Luo)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210100047E-01	Rev.01	Initial report	2021-02-05

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Carrier Frequencies Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Hopping Channel Number	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Dwell Time	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Pseudorandom Frequency Hopping Sequence	47 CFR Part 15, Subpart C Section 15.247(b)(4)&TCB Exclusion List (7 July 2002)	ANSI C63.10 (2013)	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2013)	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2013)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS

N/A: When the EUT charging, BT will not work , So Not Applicable

Model No.: B28, SP694, SP694-ASST

Only the model B28 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, Only the Model number is different.

3 Contents

4 General Information

4.1 Client Information

Applicant:	KINGTA TECHNOLOGY CO., LTD
Address of Applicant:	4F, Building 2, HaoJingDa Science Park, Shangmugu, Shenzhen China
Manufacturer:	KINGTA TECHNOLOGY CO., LTD
Address of Manufacturer:	4F, Building 2, HaoJingDa Science Park, Shangmugu, Shenzhen China
Factory:	KINGTA TECHNOLOGY CO., LTD
Address of Factory:	4F, Building 2, HaoJingDa Science Park, Shangmugu, Shenzhen China

4.2 General Description of EUT

Product Name:	BLUETOOTH SPEAKER
All Model No.:	B28, SP694, SP694-ASST
Test Model No.:	B28
Trade Mark:	N/A
Hardware Version:	B28-3265-8105-FM-MAIN V1
Software Version:	e21d
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	BK32xx RF Test_V1.8 (manufacturer declare)
Antenna Type:	Monoploe antenna
Antenna Gain:	0dBi
Power Supply:	lithium battery:DC3.7V, Charge by DC5.0V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
6	2408MHz	26	2428MHz	46	2448MHz	66	2468MHz
7	2409MHz	27	2429MHz	47	2449MHz	67	2469MHz
8	2410MHz	28	2430MHz	48	2450MHz	68	2470MHz
9	2411MHz	29	2431MHz	49	2451MHz	69	2471MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
12	2414MHz	32	2434MHz	52	2454MHz	72	2474MHz
13	2415MHz	33	2435MHz	53	2455MHz	73	2475MHz
14	2416MHz	34	2436MHz	54	2456MHz	74	2476MHz
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel	2402MHz
The Middle channel	2441MHz
The Highest channel	2480MHz

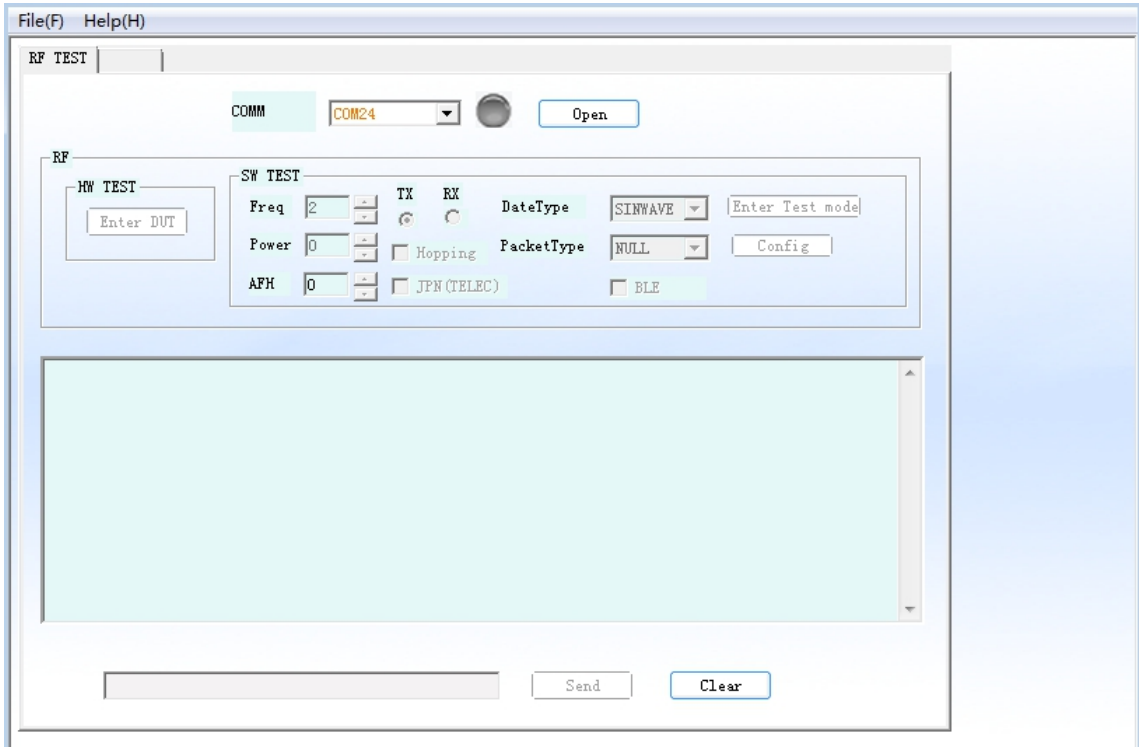
4.3 Additional Instructions

EUT Test Software Settings:	
Mode:	☒ Special software is used. ☐ Through engineering command into the engineering mode. engineering command: *#*#3646633#*#*
EUT Power level:	Class2 (Power level is built-in set parameters and cannot be changed and selected)

Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.

Mode	Channel	Frequency(MHz)
DH1/DH3/DH5	CH0	2402
	CH39	2441
	CH78	2480
2DH1/2DH3/2DH5	CH0	2402
	CH39	2441
	CH78	2480
3DH1/3DH3/3DH5	CH0	2402
	CH39	2441
	CH78	2480

Run Software:



4.4 Test Environment

Operating Environment:	
Radiated Emissions:	
Temperature:	20.5 °C
Humidity:	57 % RH
Atmospheric Pressure:	1009mbar
Conducted Emissions:	
Temperature:	25.5 °C
Humidity:	53 % RH
Atmospheric Pressure:	1009mbar
Radio conducted item test (RF Conducted test room):	
Temperature:	25.3 °C
Humidity:	54 % RH
Atmospheric Pressure:	1009mbar
Test mode:	
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1）Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
PC	Lenovo	ThinkPad E450c	-	CQA
Adaptor	HUAWEI	LPL-C010050200Z	-	CQA

4.6 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.7 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

- **A2LA (Certificate No. 4742.01)**
Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.
- **FCC Registration No.: 522263**
Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List

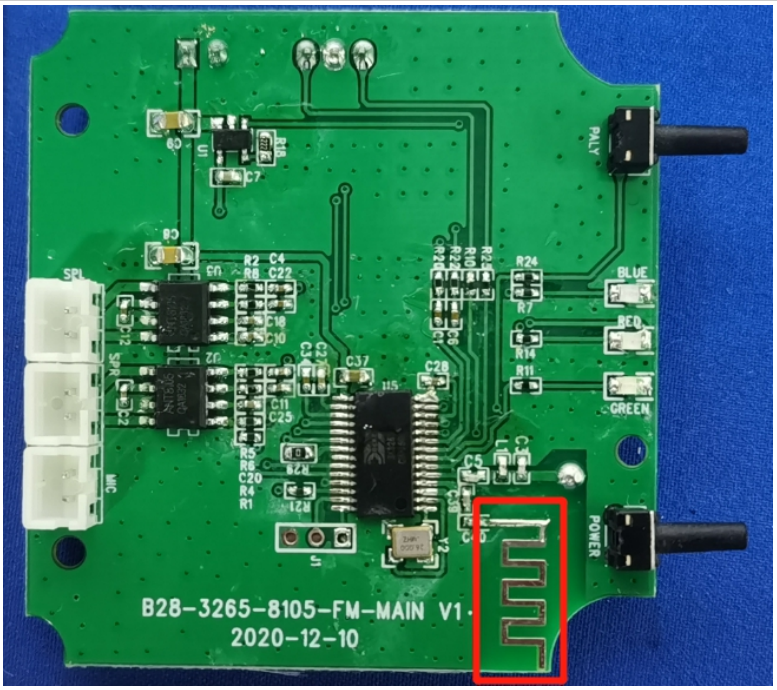
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2020/10/25	2021/10/24
Spectrum analyzer	R&S	FSU26	CQA-038	2020/10/25	2021/10/24
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2020/10/25	2021/10/24
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2020/10/21	2021/10/20
Bilog Antenna	R&S	HL562	CQA-011	2020/9/26	2021/9/25
Horn Antenna	R&S	HF906	CQA-012	2020/9/26	2021/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2020/9/25	2021/9/24
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2020/9/26	2021/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2020/9/26	2021/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2020/9/26	2021/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2020/9/26	2021/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2020/9/26	2021/9/25
LISN	R&S	ENV216	CQA-003	2020/10/23	2021/10/22
Coaxial cable	CQA	N/A	CQA-C009	2020/9/26	2021/9/25
DC power	KEYSIGHT	E3631A	CQA-028	2020/9/26	2021/9/25

Note:

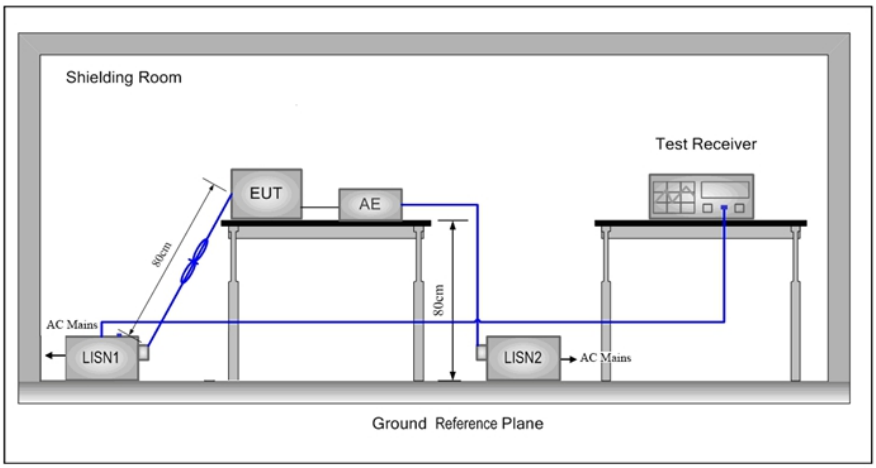
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	
The antenna is Monoploe antenna. The best case gain of the antenna is 0dBi.	

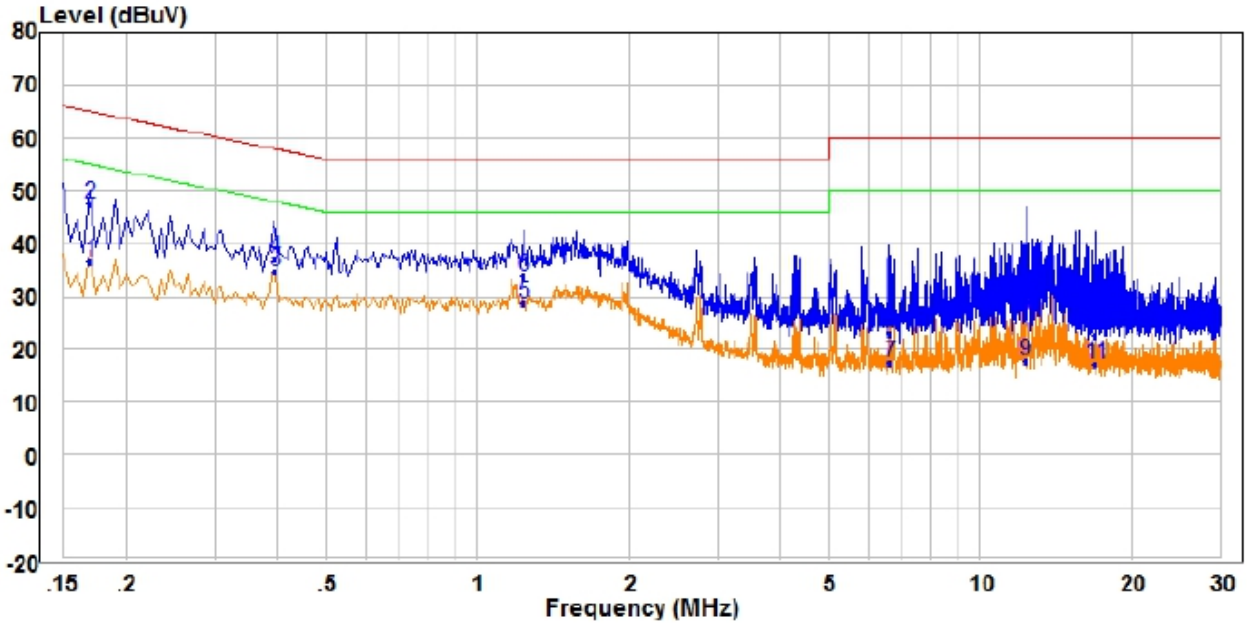
5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	150kHz to 30MHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.
Test Setup:	

Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel.
Final Test Mode:	Through Pre-scan, find the 3DH5 of data type and 8DPSK modulation at the highest channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC 120V/60Hz
Test Results:	Pass

Measurement Data

Live line:

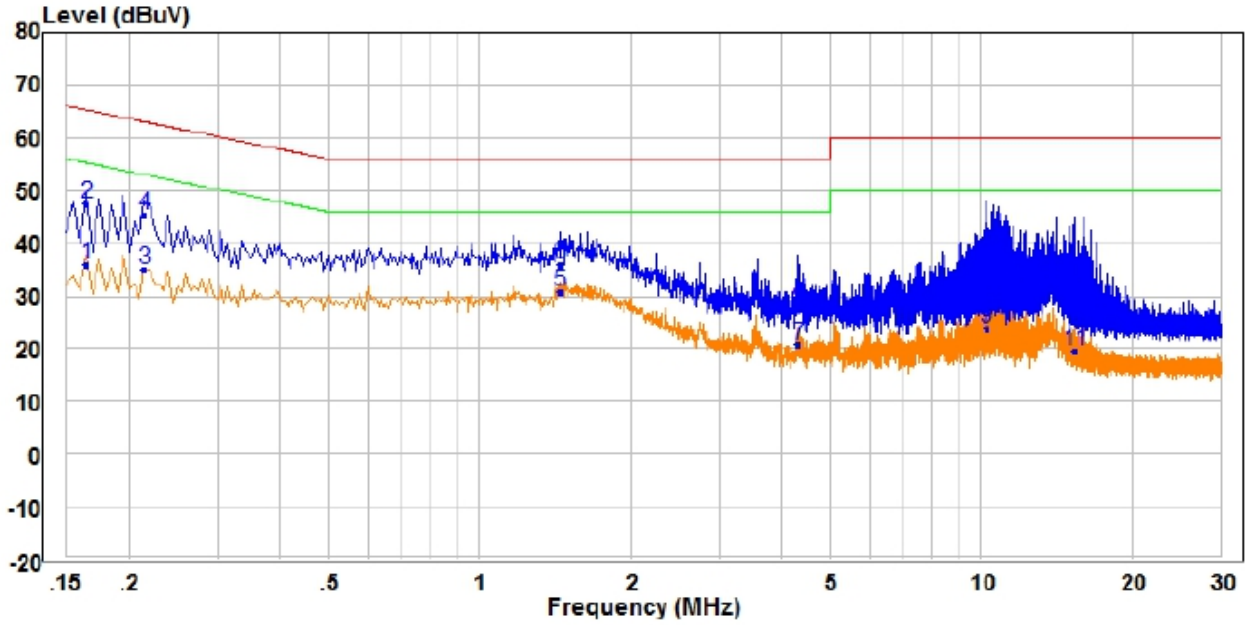


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.170	26.93	9.49	36.42	54.96	-18.54	Average	Line
2 QP	0.170	37.95	9.49	47.44	64.96	-17.52	QP	Line
3 PP	0.395	25.22	9.51	34.73	47.96	-13.23	Average	Line
4	0.395	27.78	9.51	37.29	57.96	-20.67	QP	Line
5	1.235	19.27	9.52	28.79	46.00	-17.21	Average	Line
6	1.235	24.39	9.52	33.91	56.00	-22.09	QP	Line
7	6.615	7.79	9.70	17.49	50.00	-32.51	Average	Line
8	6.615	13.06	9.70	22.76	60.00	-37.24	QP	Line
9	12.315	7.77	9.86	17.63	50.00	-32.37	Average	Line
10	12.315	16.26	9.86	26.12	60.00	-33.88	QP	Line
11	17.000	7.17	9.97	17.14	50.00	-32.86	Average	Line
12	17.000	12.53	9.97	22.50	60.00	-37.50	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.165	26.49	9.48	35.97	55.21	-19.24	Average	Neutral
2		0.165	38.12	9.48	47.60	65.21	-17.61	QP	Neutral
3		0.215	25.56	9.48	35.04	53.01	-17.97	Average	Neutral
4	QP	0.215	36.02	9.48	45.50	63.01	-17.51	QP	Neutral
5	PP	1.450	20.92	9.71	30.63	46.00	-15.37	Average	Neutral
6		1.450	26.12	9.71	35.83	56.00	-20.17	QP	Neutral
7		4.320	10.90	9.80	20.70	46.00	-25.30	Average	Neutral
8		4.320	17.72	9.80	27.52	56.00	-28.48	QP	Neutral
9		10.270	13.88	9.95	23.83	50.00	-26.17	Average	Neutral
10		10.270	26.29	9.95	36.24	60.00	-23.76	QP	Neutral
11		15.370	9.73	9.93	19.66	50.00	-30.34	Average	Neutral
12		15.370	23.83	9.93	33.76	60.00	-26.24	QP	Neutral

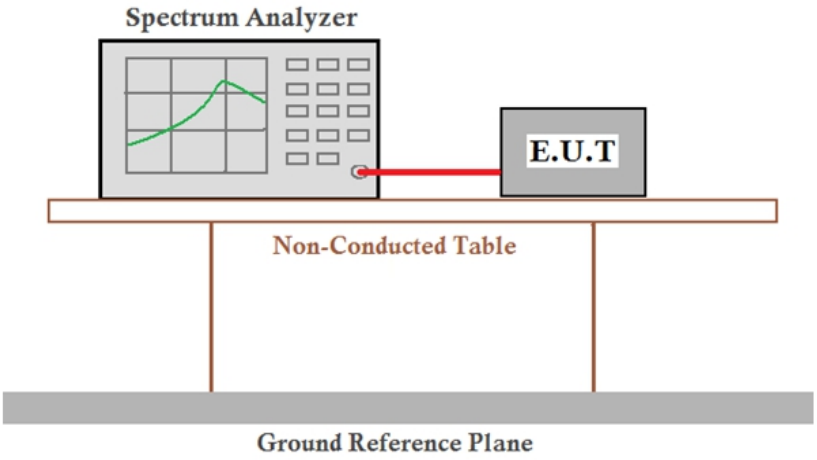
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. If the Peak value under Average limit, the Average value is not recorded in the report.

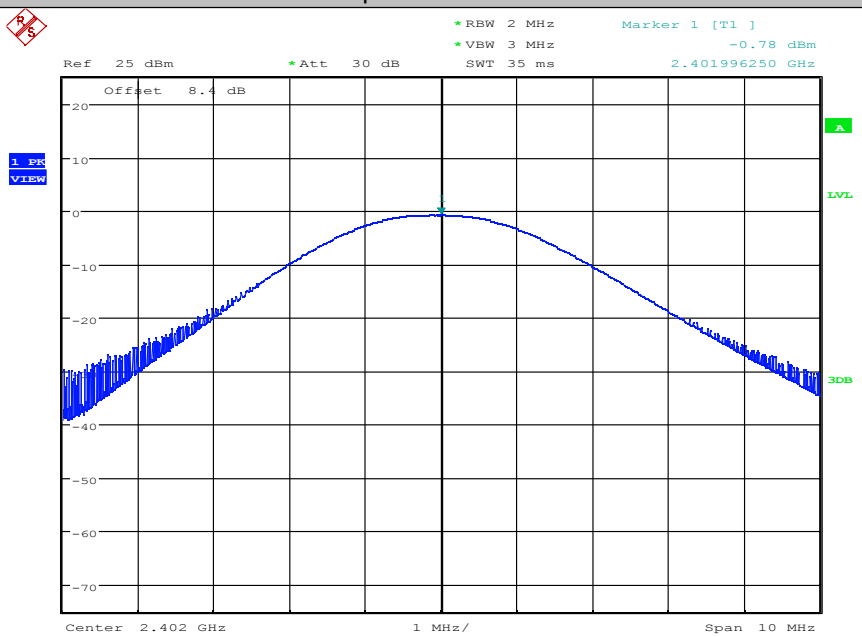
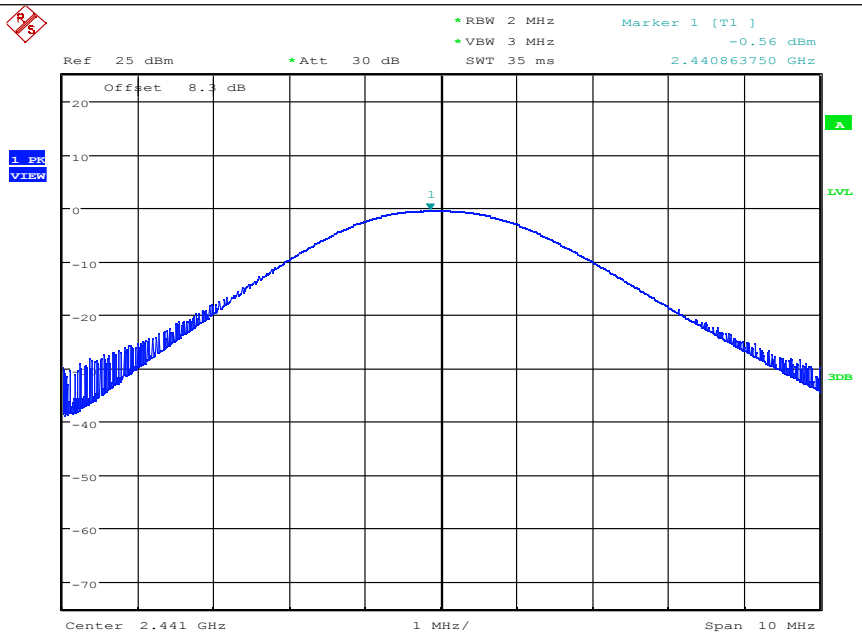
5.3 Conducted Peak Output Power

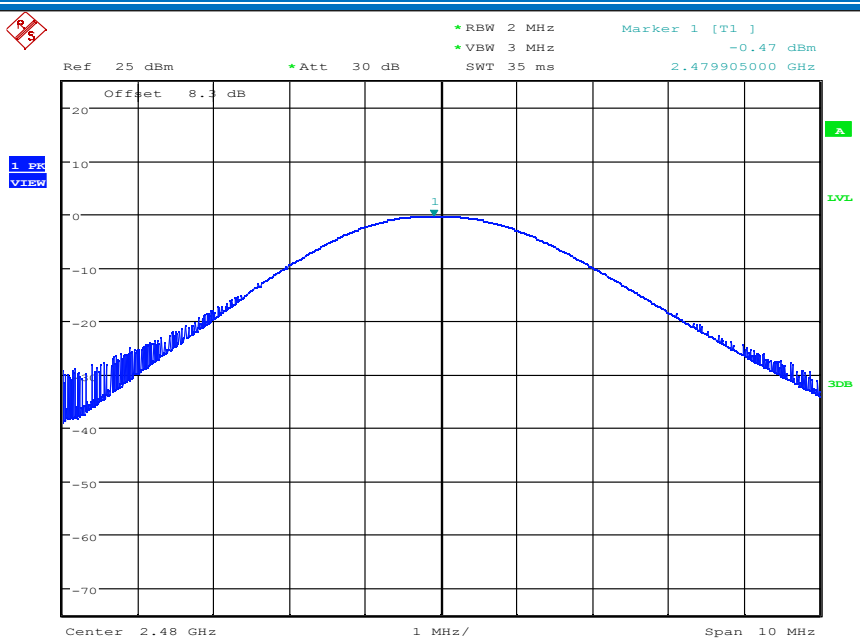
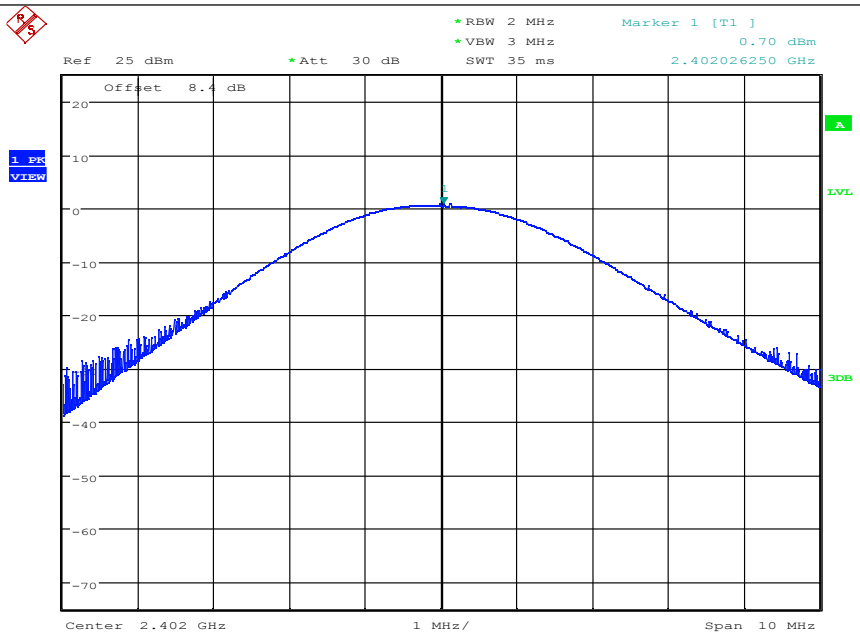
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 *Remark: Offset=Cable loss+ attenuation factor.*
Limit:	21dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

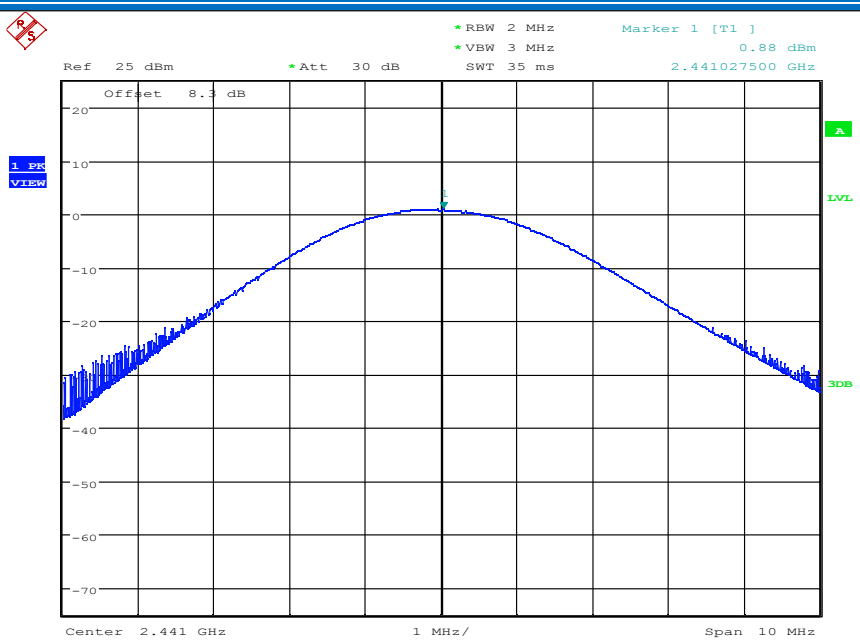
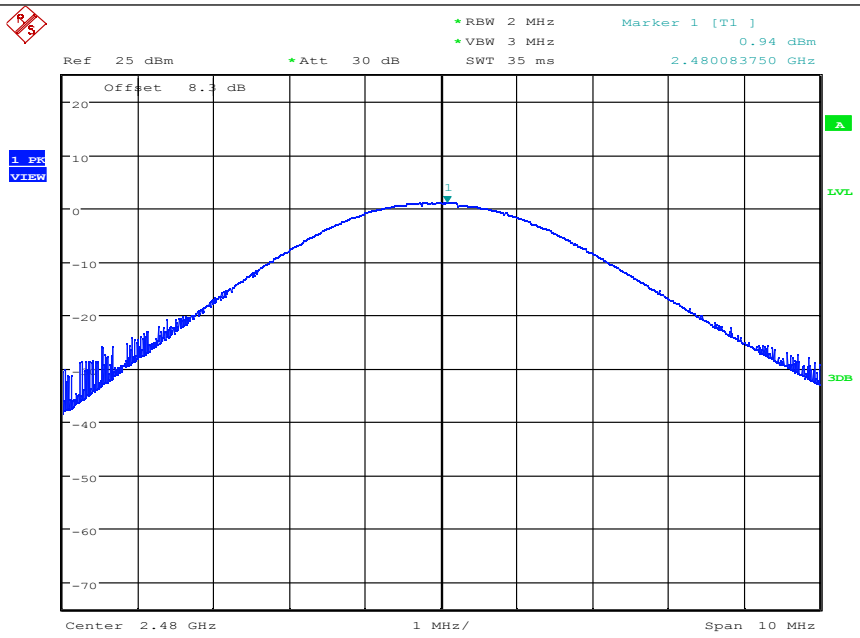
Measurement Data

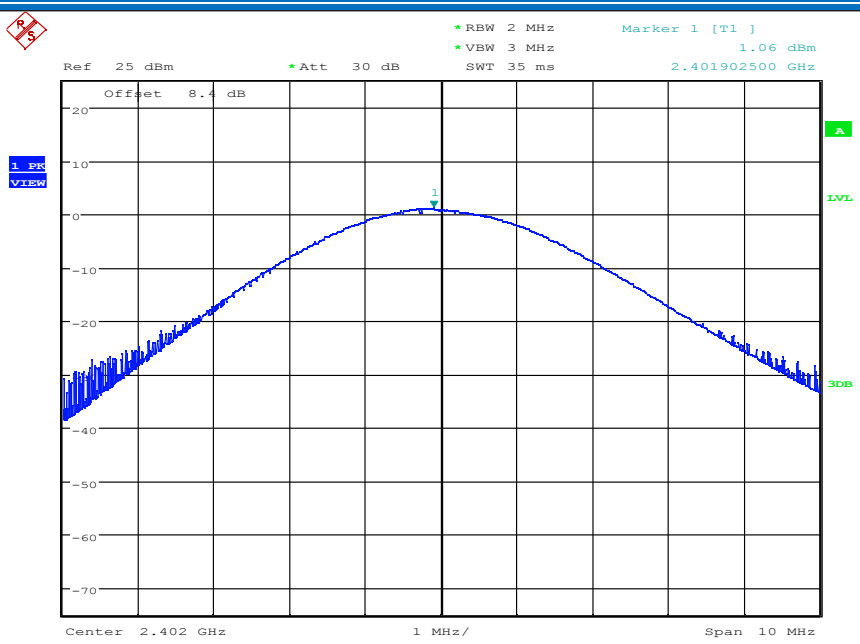
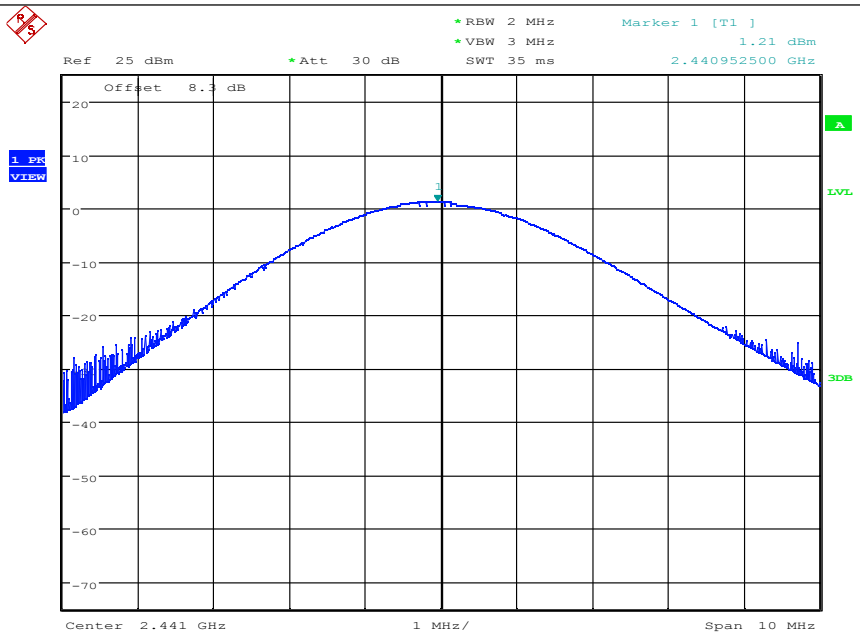
GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-0.780	21.00	Pass
Middle	-0.560	21.00	Pass
Highest	-0.470	21.00	Pass
π/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.700	21.00	Pass
Middle	0.880	21.00	Pass
Highest	0.940	21.00	Pass
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.060	21.00	Pass
Middle	1.210	21.00	Pass
Highest	1.270	21.00	Pass

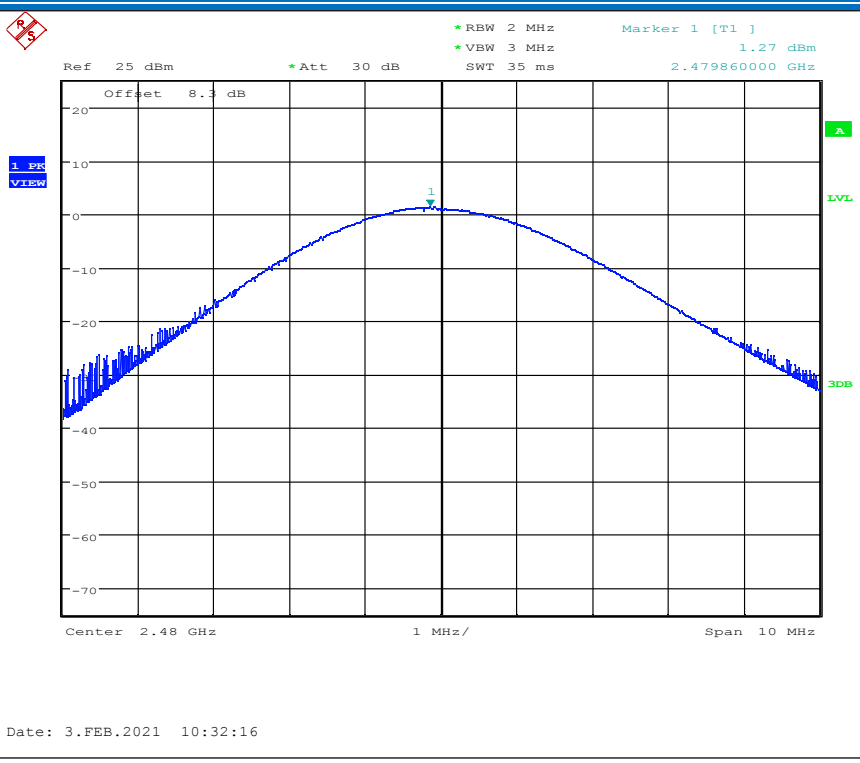
Test plot as follows:

Graphs	
GFSK/LCH	 Date: 3.FEB.2021 10:05:09
GFSK/MCH	 Date: 3.FEB.2021 10:09:07

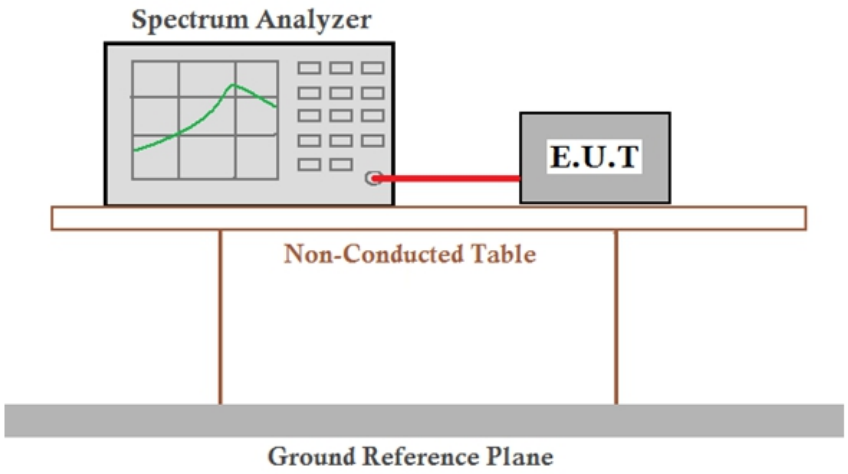
GFSK/HCH	 Date: 3.FEB.2021 10:12:06
π/4DQPSK/LCH	 Date: 3.FEB.2021 10:15:52

π/4DQPSK/MCH	 Date: 3.FEB.2021 10:19:14
π/4DQPSK/HCH	 Date: 3.FEB.2021 10:22:07

8DPSK/LCH	 Date: 3.FEB.2021 10:26:03
8DPSK/MCH	 Date: 3.FEB.2021 10:29:30

8DPSK/HCH	 RBW 2 MHz VBW 3 MHz SWT 35 ms Marker 1 [T1] 1.27 dBm 2.479860000 GHz Ref 25 dBm Att 30 dB Offset 8.3 dB 1 PK VIEW A LVL 3DB 20 10 0 -10 -20 -40 -50 -60 -70 Center 2.48 GHz 1 MHz/ Span 10 MHz Date: 3.FEB.2021 10:32:16

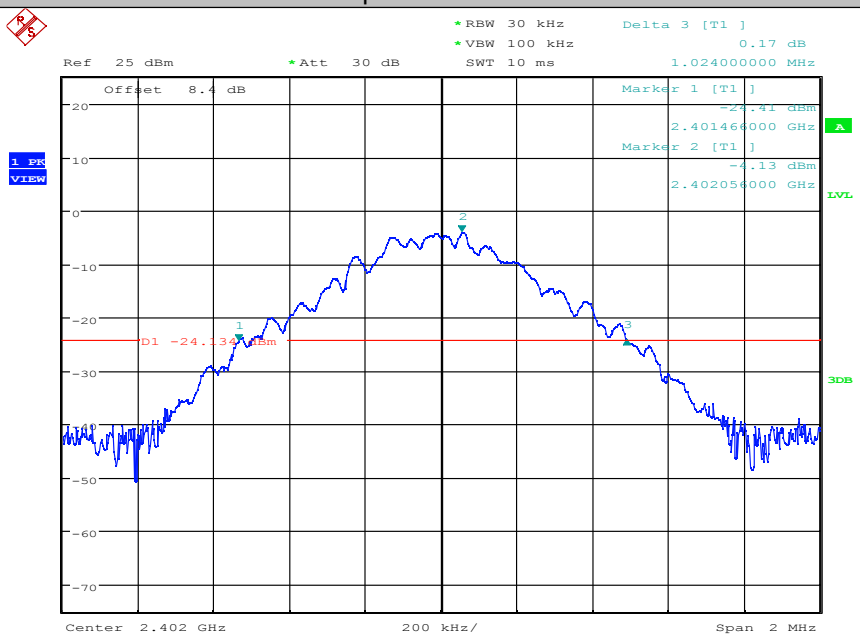
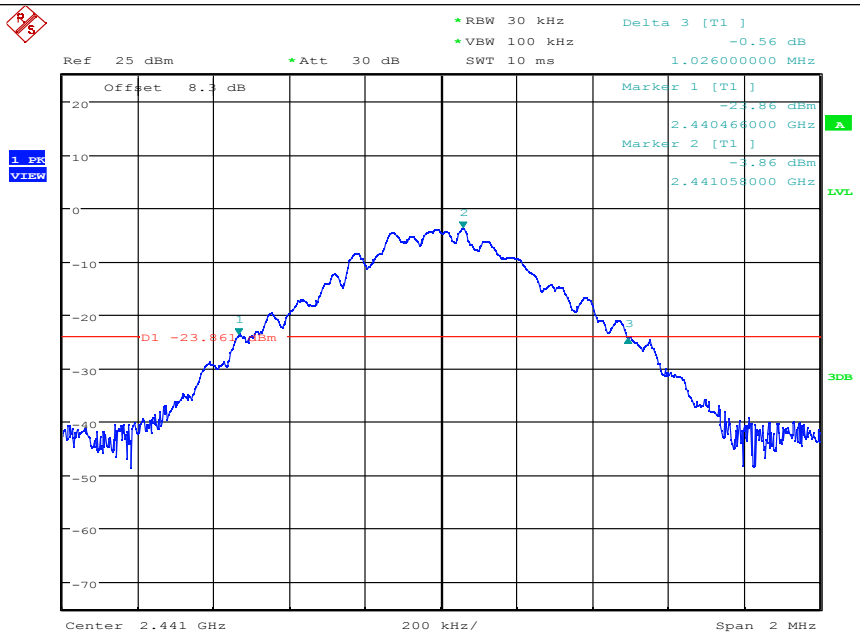
5.4 20dB Occupy Bandwidth

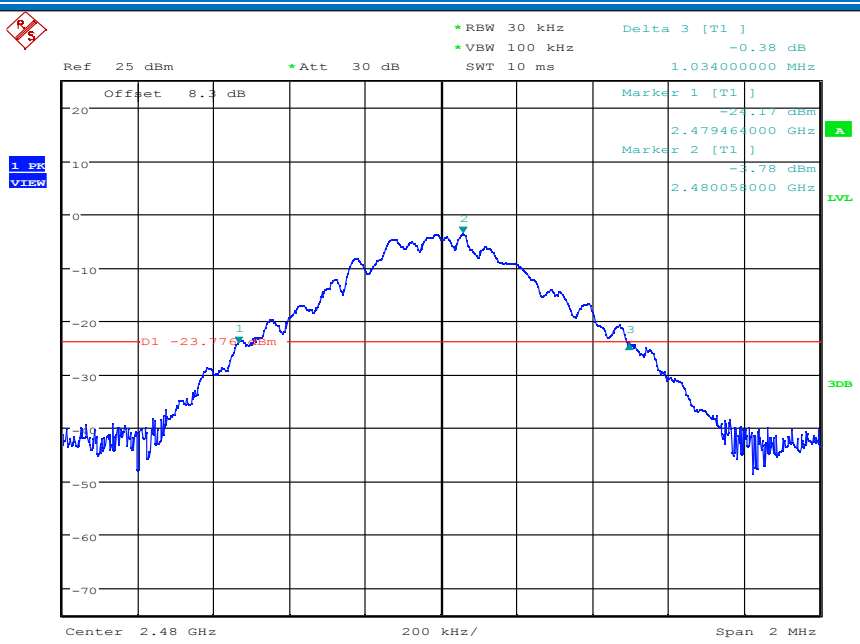
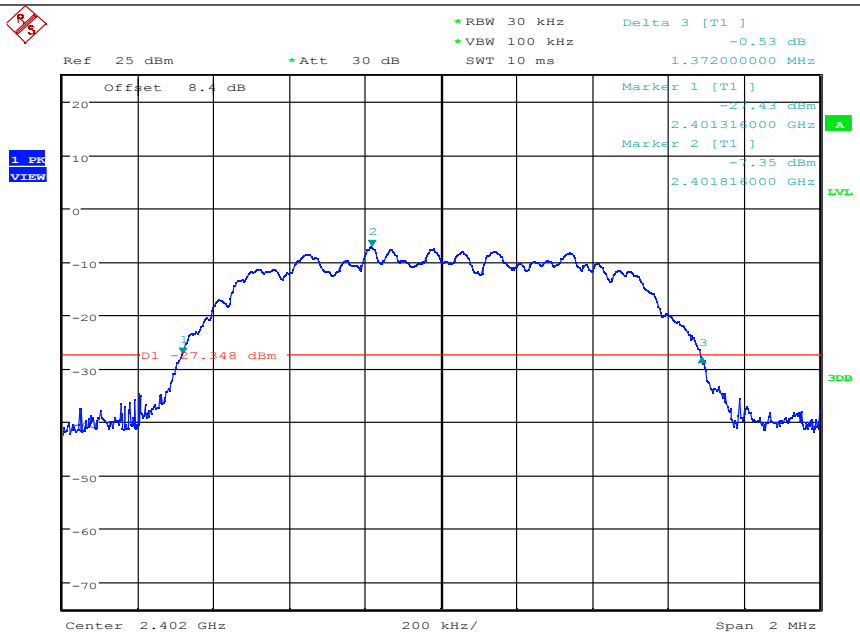
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	NA
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

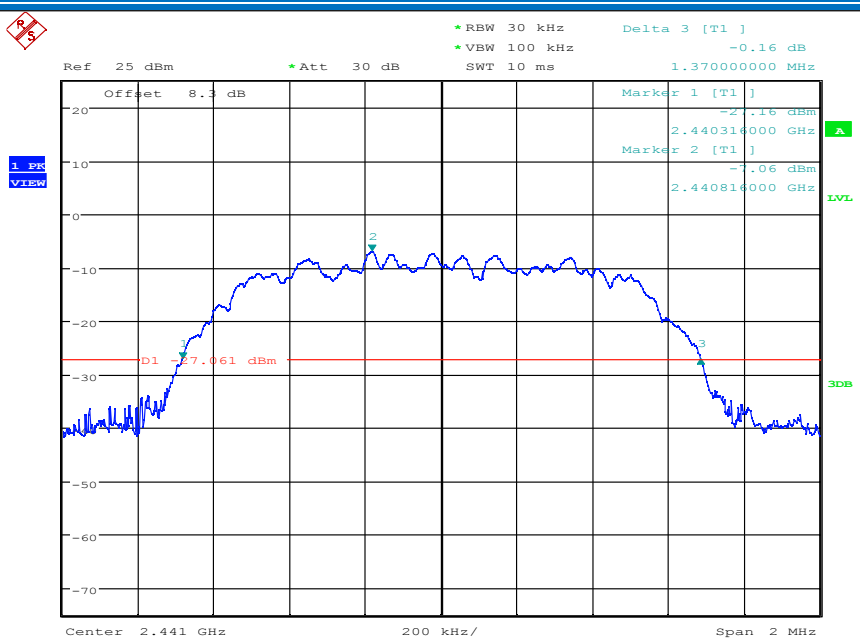
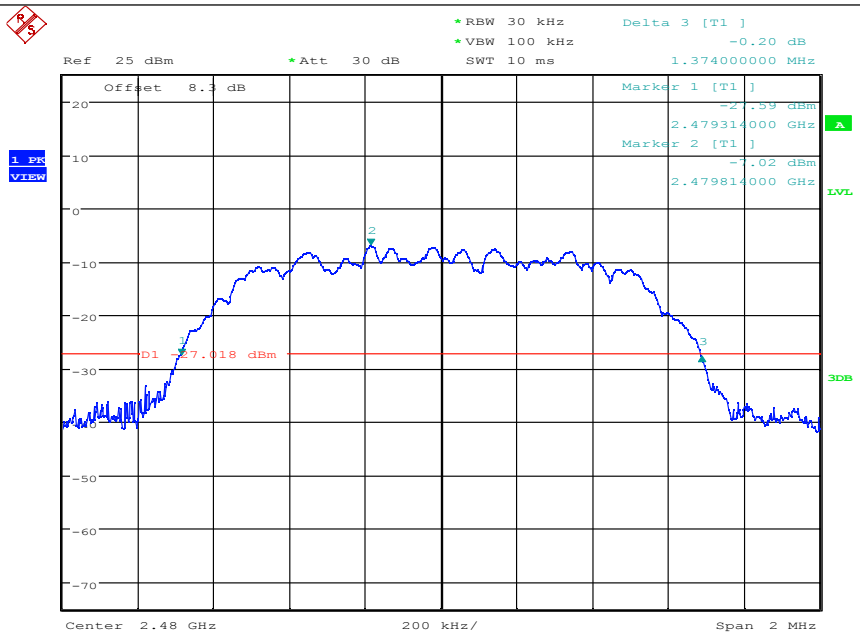
Measurement Data

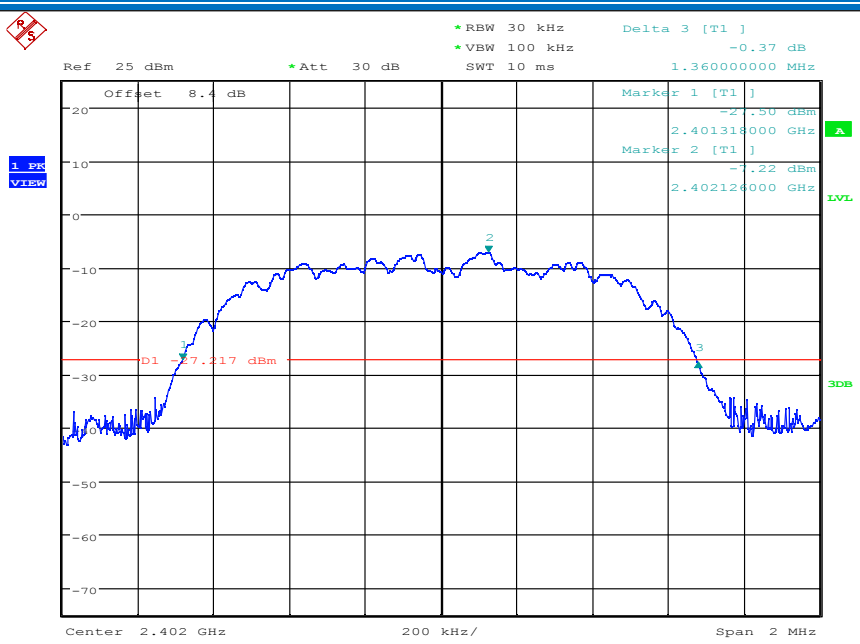
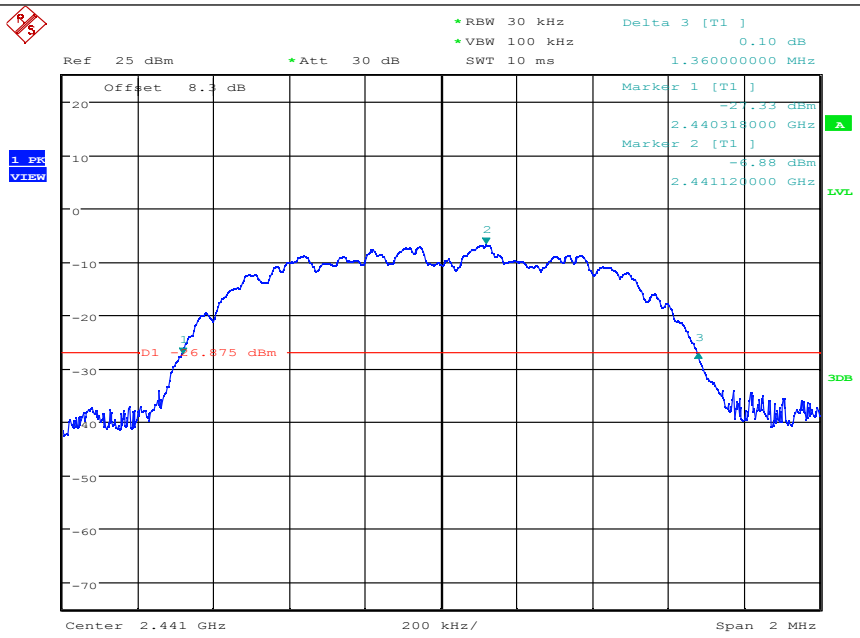
Test channel	20dB Occupy Bandwidth (MHz)		
	GFSK	π/4DQPSK	8DPSK
Lowest	1.024	1.372	1.360
Middle	1.026	1.370	1.360
Highest	1.034	1.374	1.362

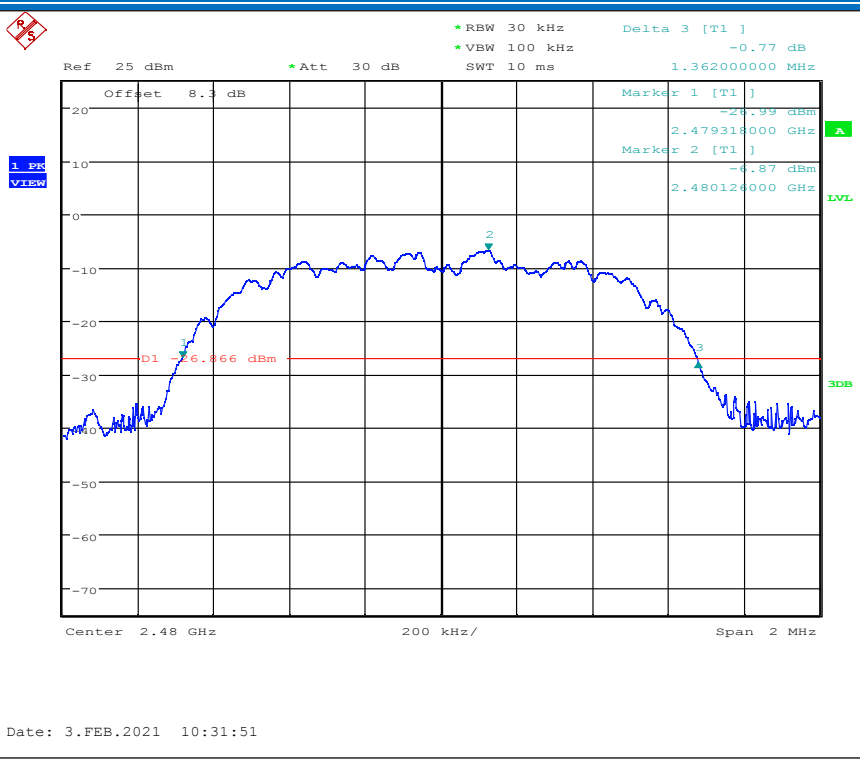
Test plot as follows:

Graphs	
GFSK/LCH	 Date: 3.FEB.2021 10:04:44
GFSK/MCH	 Date: 3.FEB.2021 10:08:41

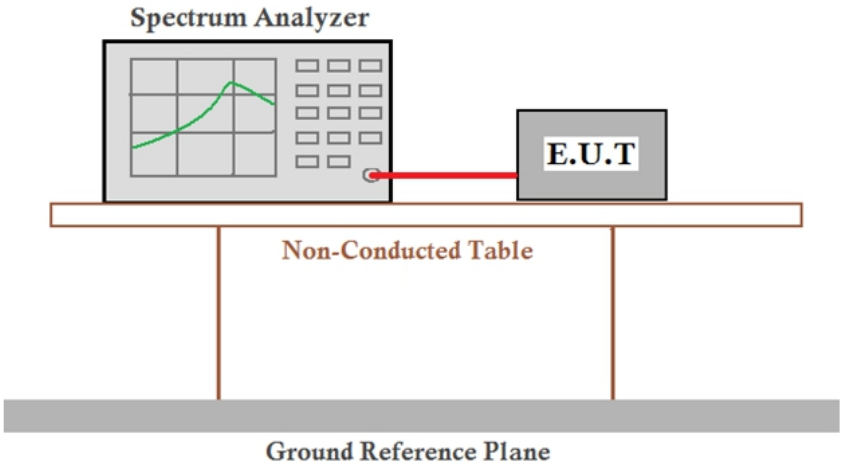
GFSK/HCH	 Date: 3.FEB.2021 10:11:40
π/4DQPSK/LCH	 Date: 3.FEB.2021 10:15:28

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	 Date: 3.FEB.2021 10:25:38
8DPSK/MCH	 Date: 3.FEB.2021 10:29:05

8DPSK/HCH	 RBW 30 kHz VBW 100 kHz SWT 10 ms Delta 3 [T1] -0.77 dB 1.362000000 MHz Ref 25 dBm Att 30 dB Offset 8.3 dB Marker 1 [T1] -26.99 dBm 2.479318000 GHz Marker 2 [T1] -6.87 dBm 2.480126000 GHz 1 PK VIEW A LVL 3DB D1 -26.866 dBm Center 2.48 GHz 200 kHz/ Span 2 MHz Date: 3.FEB.2021 10:31:51

5.5 Carrier Frequencies Separation

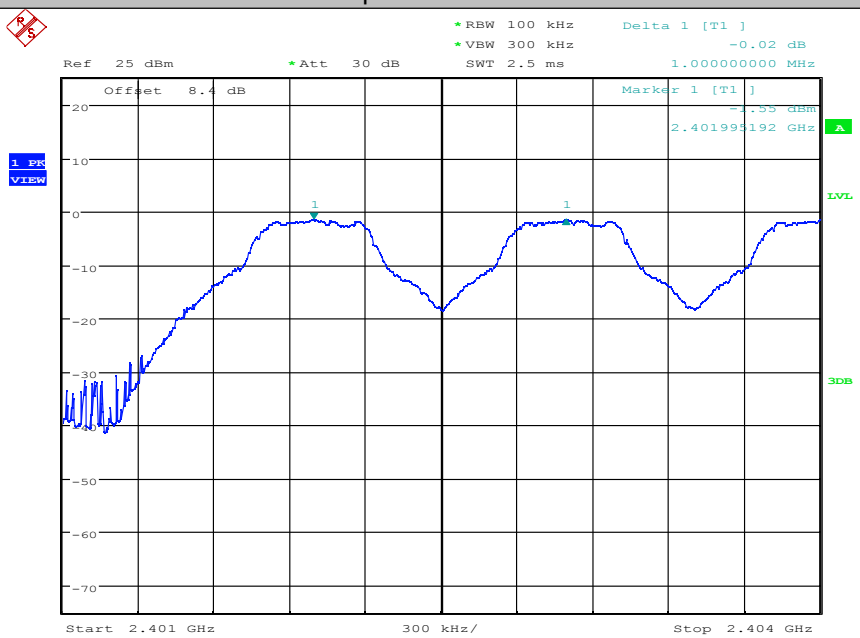
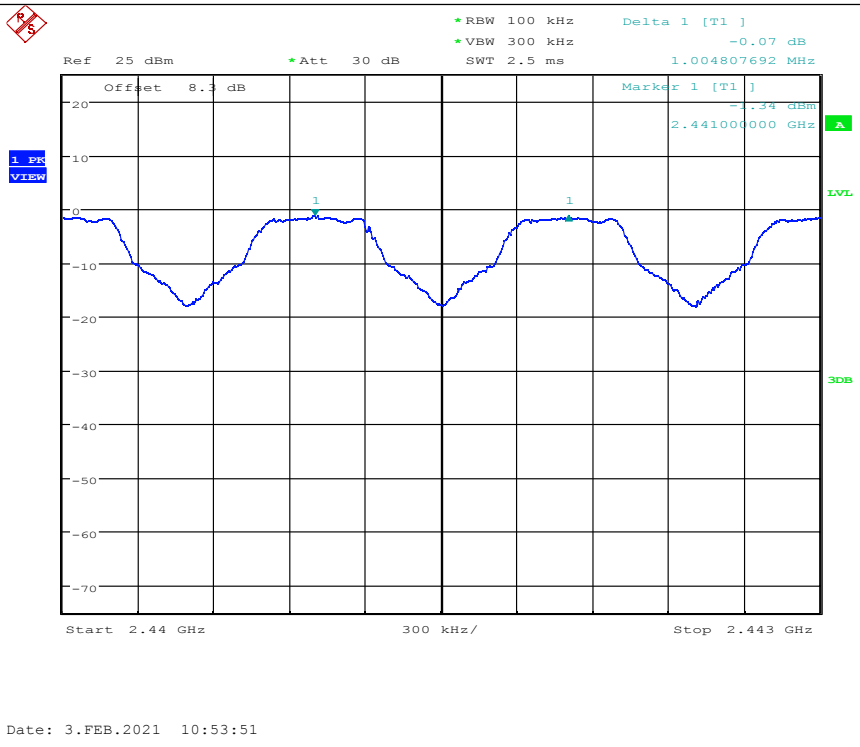
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	2/3 of the 20dB bandwidth
	Remark: the transmission power is less than 0.125W.
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

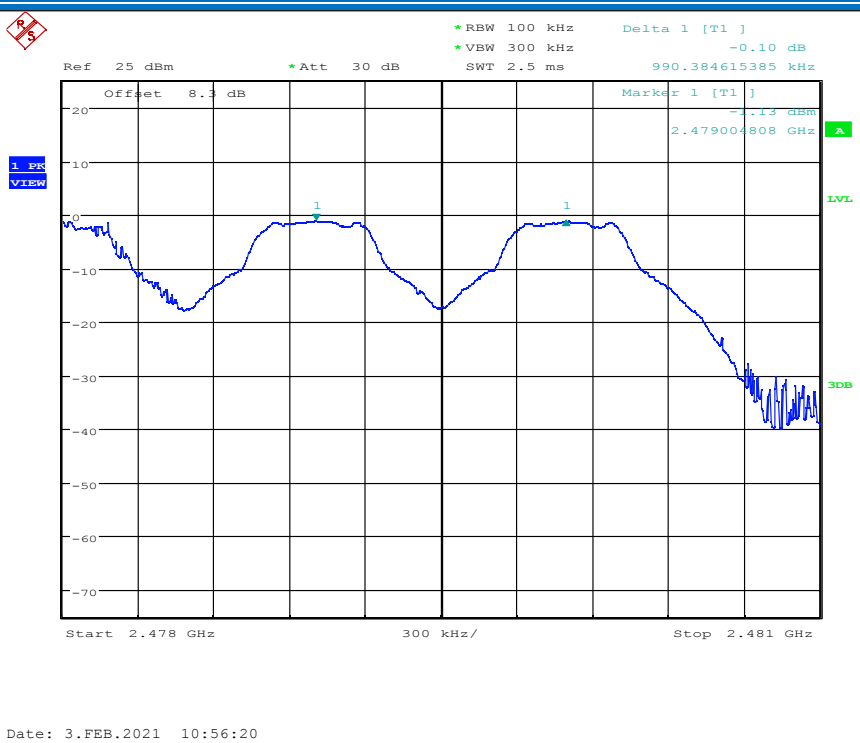
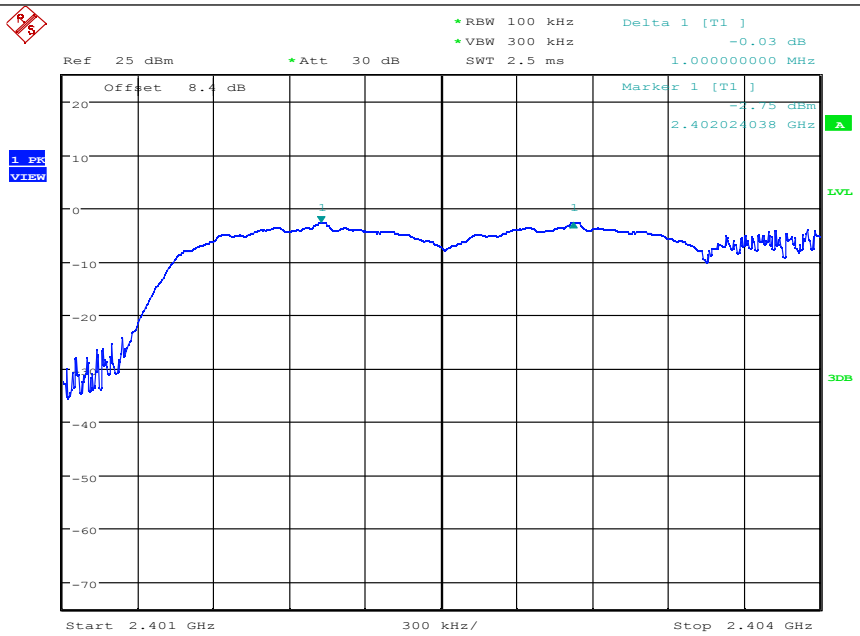
Measurement Data

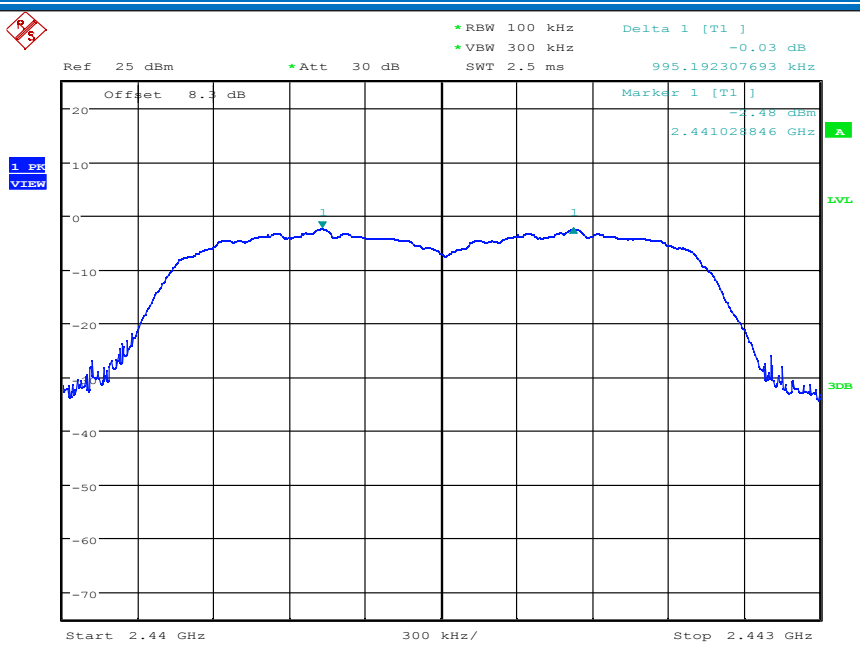
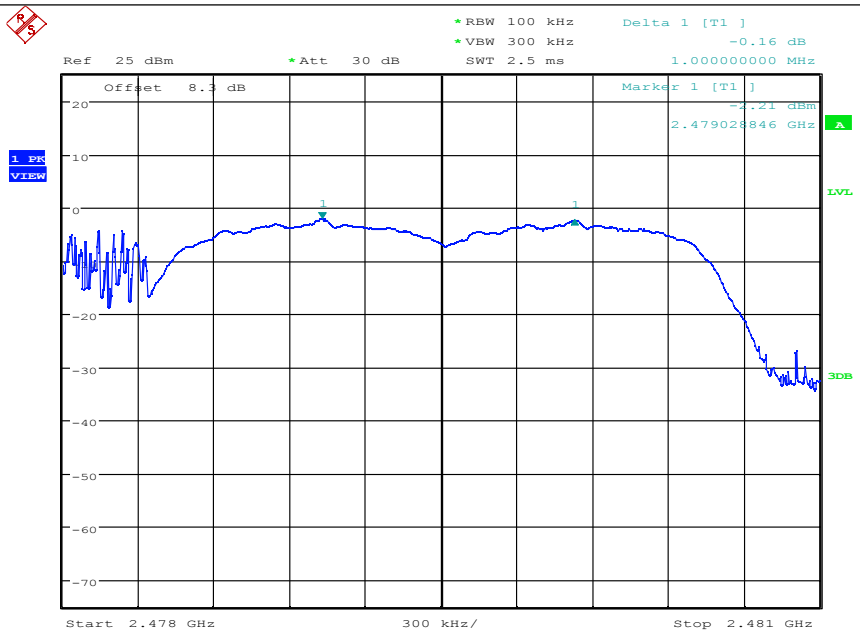
GFSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	1.000	≥0.689	Pass
Middle	1.005	≥0.689	Pass
Highest	0.990	≥0.689	Pass
π/4DQPSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	1.000	≥0.916	Pass
Middle	0.995	≥0.916	Pass
Highest	1.000	≥0.916	Pass
8DPSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	0.995	≥0.908	Pass
Middle	1.010	≥0.908	Pass
Highest	1.000	≥0.908	Pass

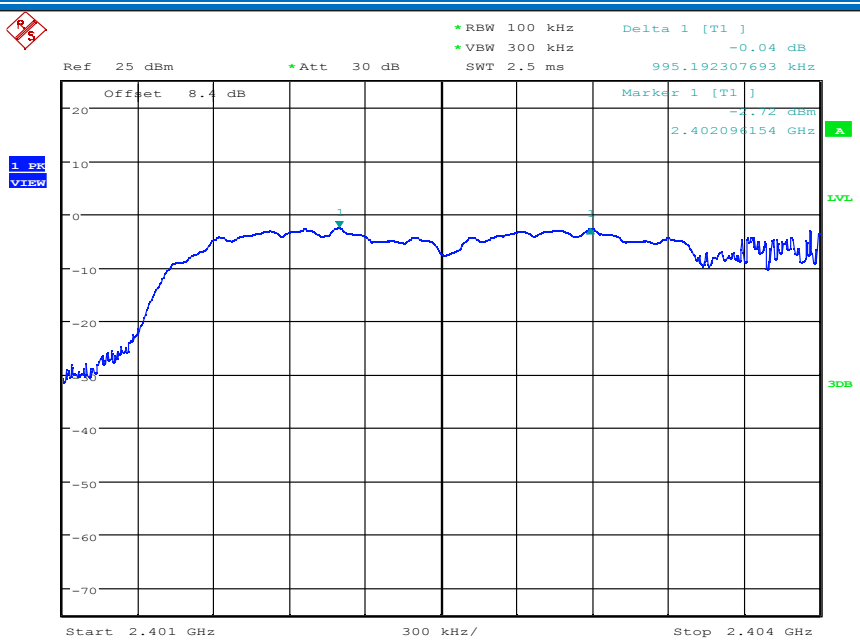
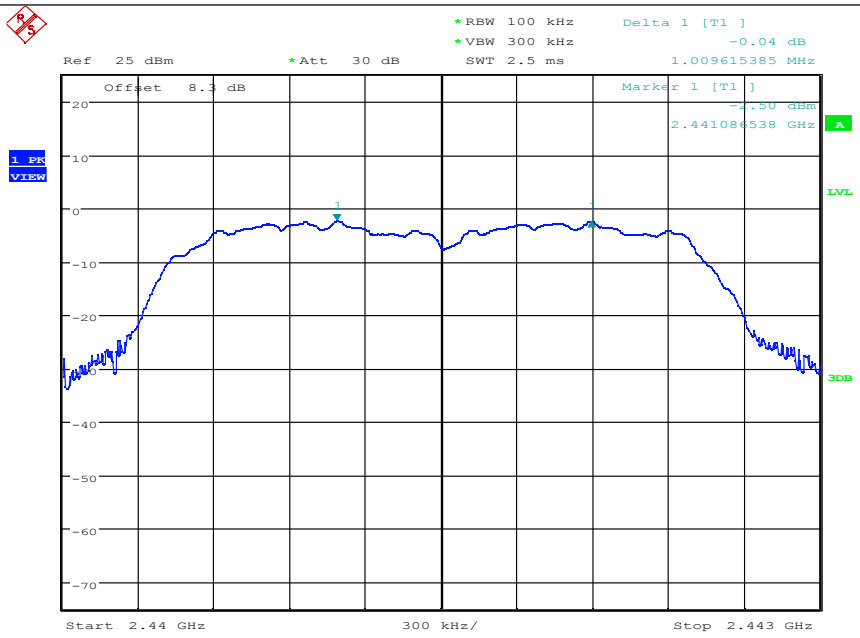
Mode	20dB bandwidth (MHz) (worse case)	Limit (MHz) (Carrier Frequencies Separation)
GFSK	1.034	0.689
π/4DQPSK	1.374	0.916
8DPSK	1.362	0.908

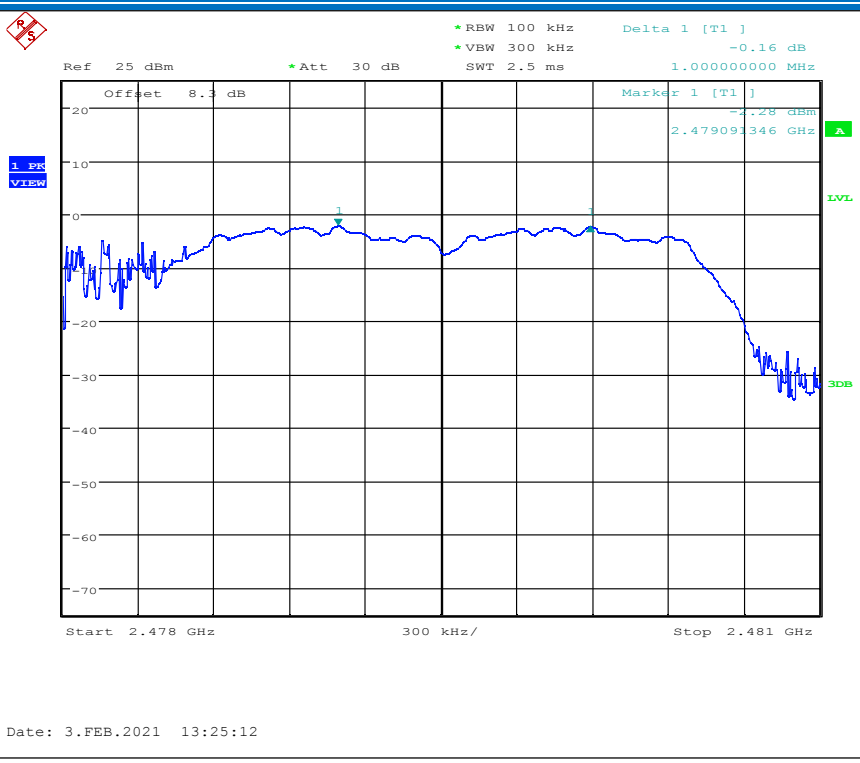
Test plot as follows:

Graphs	
GFSK/LCH	
GFSK/MCH	

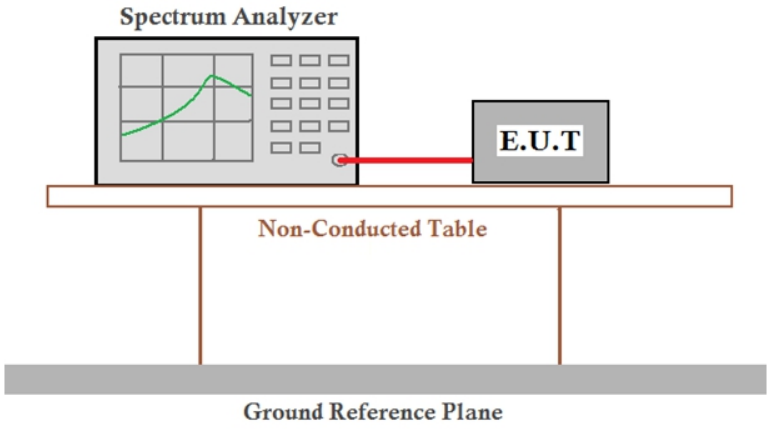
GFSK/HCH	 Date: 3.FEB.2021 10:56:20
π/4DQPSK/LCH	 Date: 3.FEB.2021 12:58:04

π/4DQPSK/MCH	 Date: 3.FEB.2021 13:00:28
π/4DQPSK/HCH	 Date: 3.FEB.2021 13:03:52

8DPSK/LCH	 Date: 3.FEB.2021 13:18:53
8DPSK/MCH	 Date: 3.FEB.2021 13:23:37

8DPSK/HCH	 RBW 100 kHz VBW 300 kHz SWT 2.5 ms Delta 1 [T1] -0.16 dB 1.000000000 MHz Ref 25 dBm Att 30 dB Offset 8.3 dB Marker 1 [T1] -2.28 dBm 2.479091346 GHz 1 PK VIEW LVL 3DB Start 2.478 GHz 300 kHz/ Stop 2.481 GHz Date: 3.FEB.2021 13:25:12

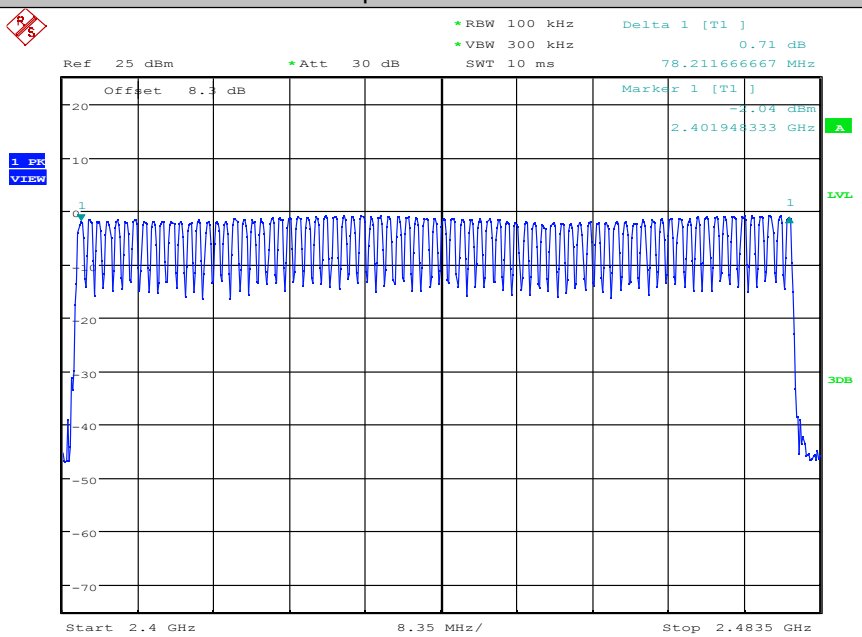
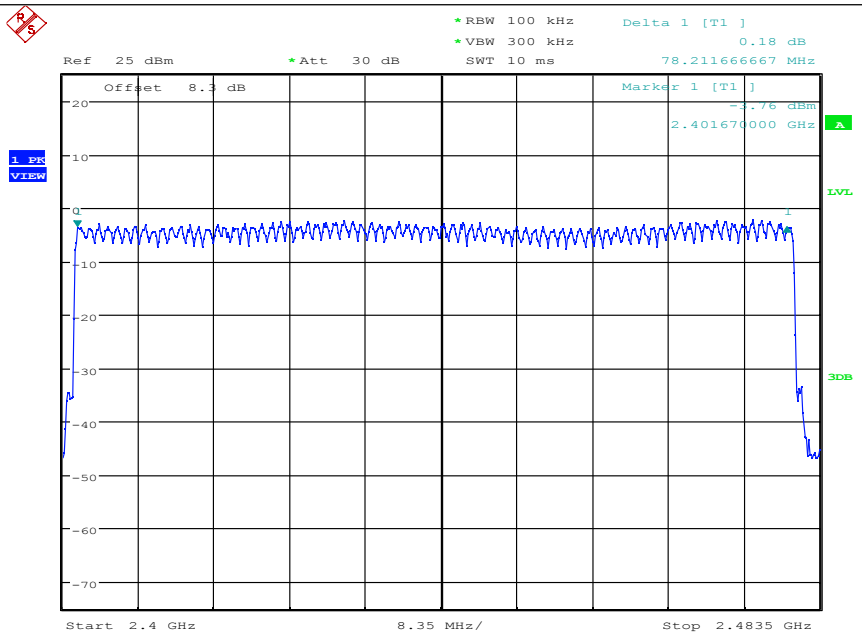
5.6 Hopping Channel Number

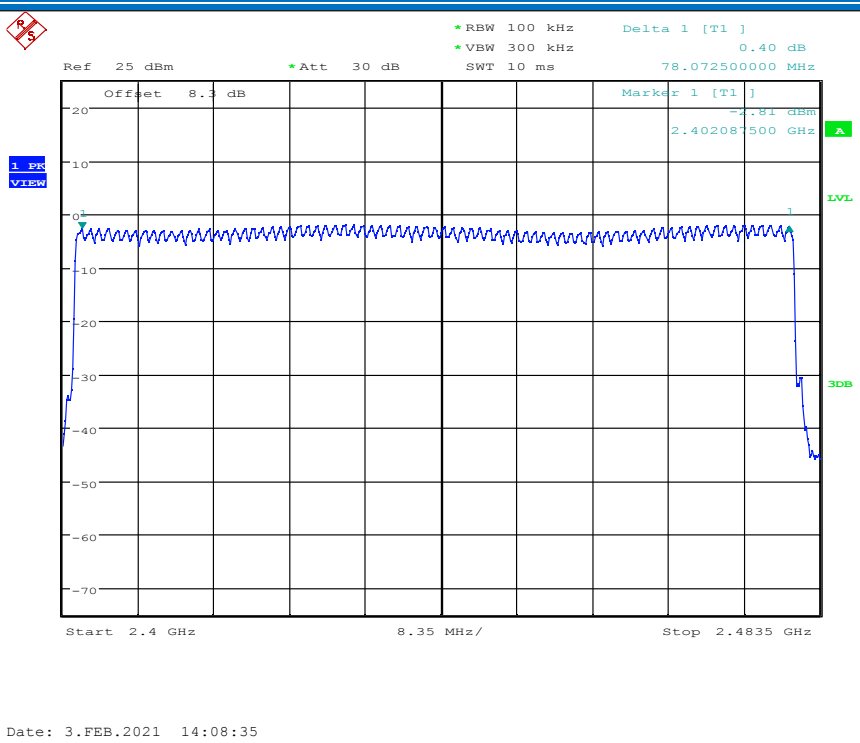
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 *Remark: Offset=Cable loss+ attenuation factor.*
Limit:	At least 15 channels
Exploratory Test Mode:	hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

Measurement Data

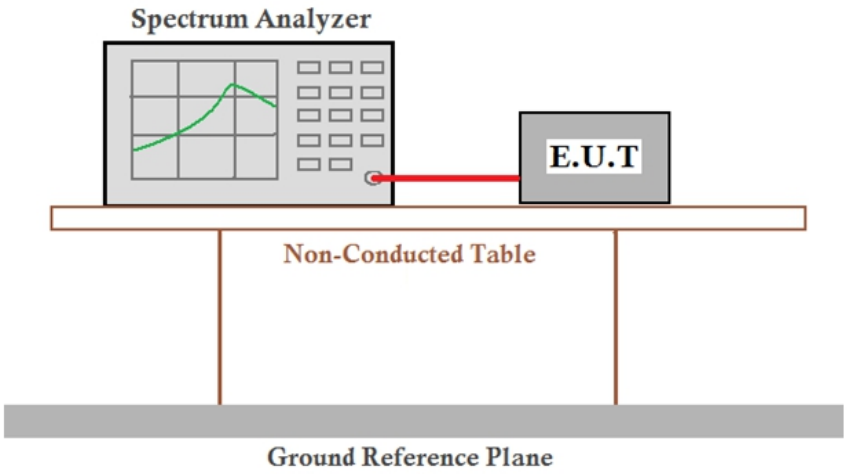
Mode	Hopping channel numbers	Limit
GFSK	79	≥15
π/4DQPSK	79	≥15
8DPSK	79	≥15

Test plot as follows:

Graphs	
GFSK/Hop	 Date: 3.FEB.2021 11:00:55
π/4DQPSK/Hop	 Date: 3.FEB.2021 13:08:26

8DPSK/Hop	 RBW 100 kHz VBW 300 kHz SWT 10 ms Delta 1 [T1] 0.40 dB 78.072500000 MHz Ref 25 dBm Att 30 dB Offset 8.3 dB Marker 1 [T1] -2.81 dBm 2.402087500 GHz 1 PK VIEW A LVL 3DB 20 10 0 -10 -20 -30 -40 -50 -60 -70 Start 2.4 GHz 8.35 MHz/ Stop 2.4835 GHz Date: 3.FEB.2021 14:08:35

5.7 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 *Remark: Offset=Cable loss+ attenuation factor.*
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Limit:	0.4 Second
Test Results:	Pass

Measurement Data

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Dwell Time[s]	Limit (second)
GFSK	DH1	LCH	0.39	0.125	≤0.4
GFSK	DH1	MCH	0.38	0.122	≤0.4
GFSK	DH1	HCH	0.38	0.122	≤0.4
π/4DQPSK	2DH1	LCH	0.39	0.125	≤0.4
π/4DQPSK	2DH1	MCH	0.38	0.122	≤0.4
π/4DQPSK	2DH1	HCH	0.38	0.122	≤0.4
8DPSK	3DH1	LCH	0.39	0.125	≤0.4
8DPSK	3DH1	MCH	0.38	0.122	≤0.4
8DPSK	3DH1	HCH	0.38	0.122	≤0.4
GFSK	DH3	LCH	1.65	0.264	≤0.4
GFSK	DH3	MCH	1.66	0.266	≤0.4
GFSK	DH3	HCH	1.65	0.264	≤0.4
π/4DQPSK	2DH3	LCH	1.65	0.264	≤0.4
π/4DQPSK	2DH3	MCH	1.67	0.267	≤0.4
π/4DQPSK	2DH3	HCH	1.67	0.267	≤0.4
8DPSK	3DH3	LCH	1.67	0.267	≤0.4
8DPSK	3DH3	MCH	1.65	0.264	≤0.4
8DPSK	3DH3	HCH	1.67	0.267	≤0.4
GFSK	DH5	LCH	2.93	0.313	≤0.4
GFSK	DH5	MCH	2.93	0.313	≤0.4
GFSK	DH5	HCH	2.92	0.312	≤0.4
π/4DQPSK	2DH5	LCH	2.92	0.312	≤0.4
π/4DQPSK	2DH5	MCH	2.93	0.313	≤0.4
π/4DQPSK	2DH5	HCH	2.93	0.313	≤0.4
8DPSK	3DH5	LCH	2.93	0.313	≤0.4
8DPSK	3DH5	MCH	2.93	0.313	≤0.4
8DPSK	3DH5	HCH	2.93	0.313	≤0.4

Remark:

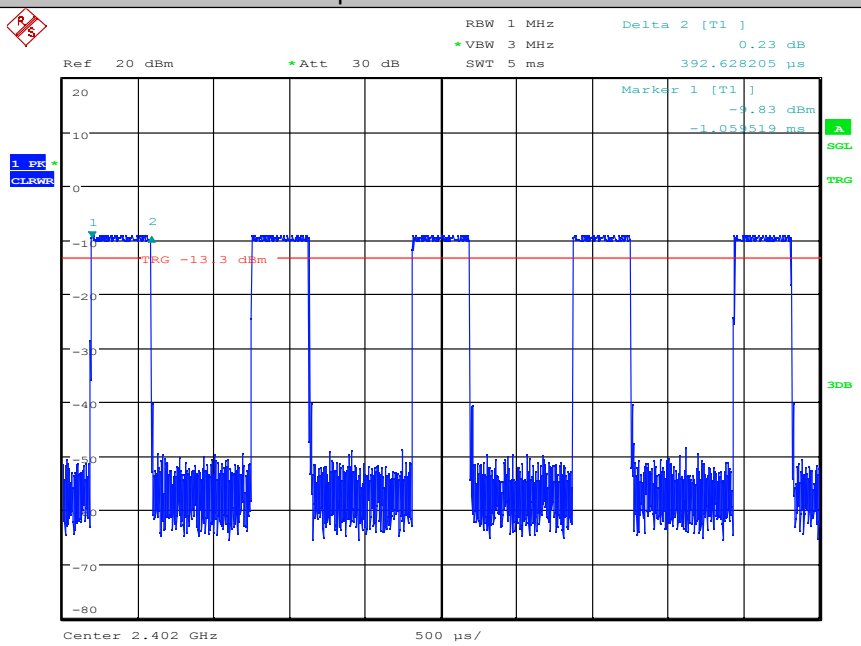
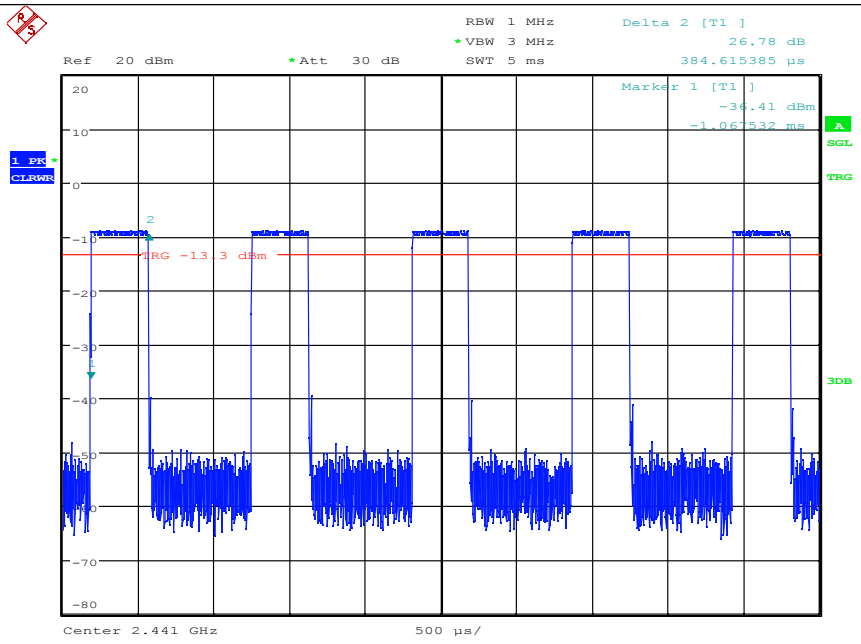
The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

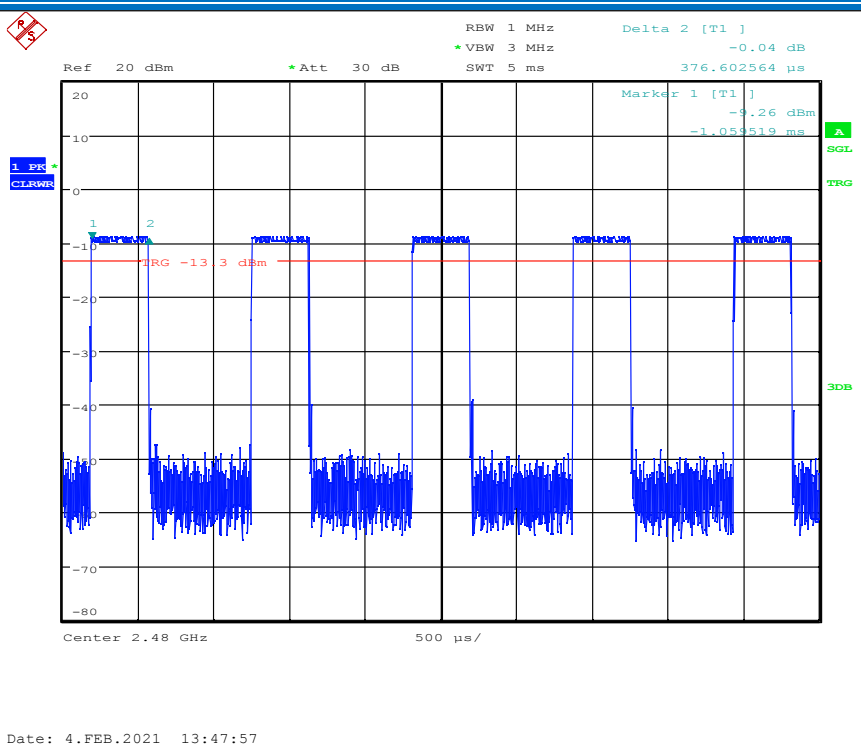
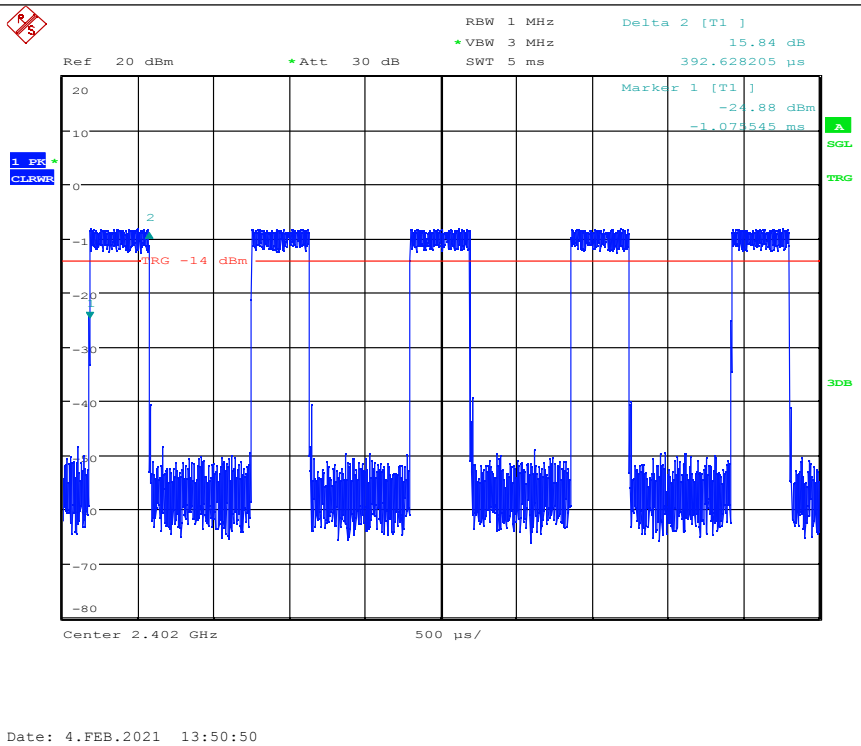
DH1/2DH1/3DH1 Dwell time = Burst Width(ms)*(1600/ (2*79))*31.6

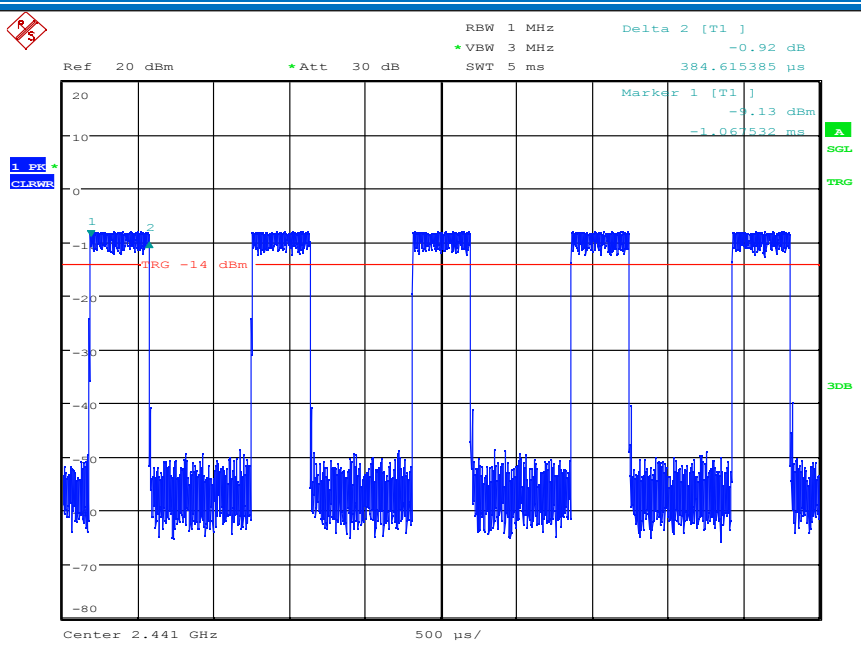
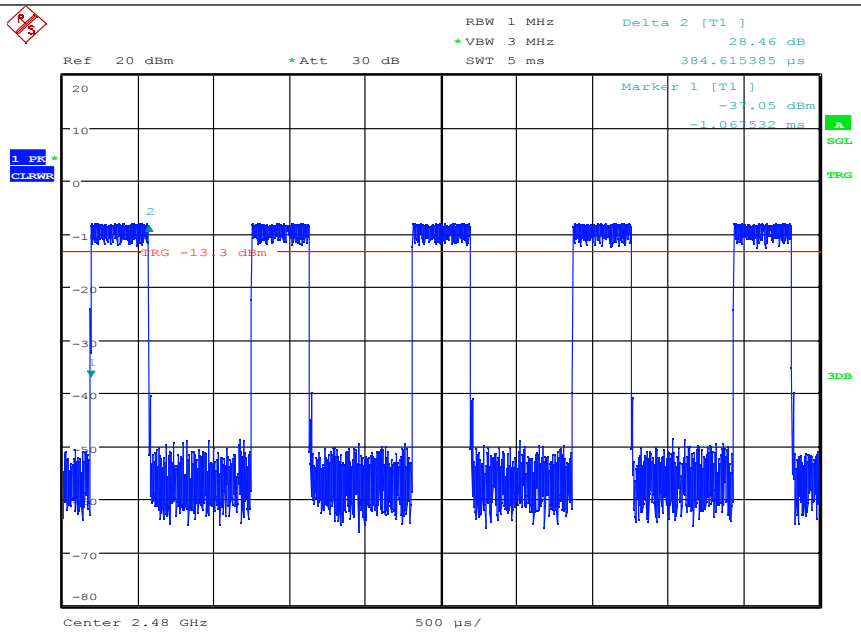
DH3/2DH3/3DH3 Dwell time = Burst Width (ms)*(1600/ (4*79))*31.6

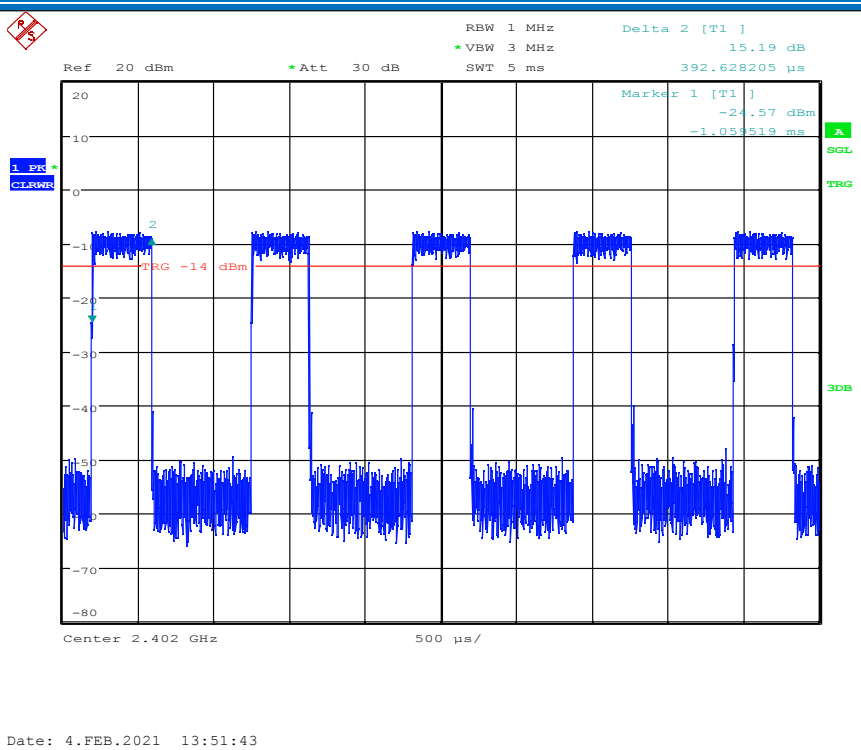
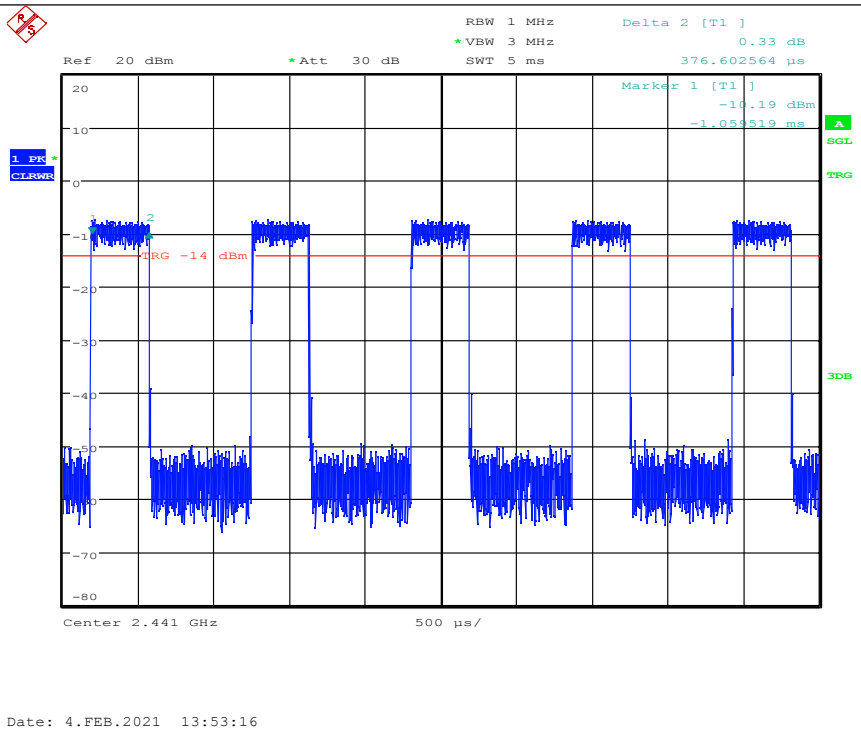
DH5/2DH5/3DH5 Dwell time = Burst Width (ms)*(1600/ (6*79))*31.6

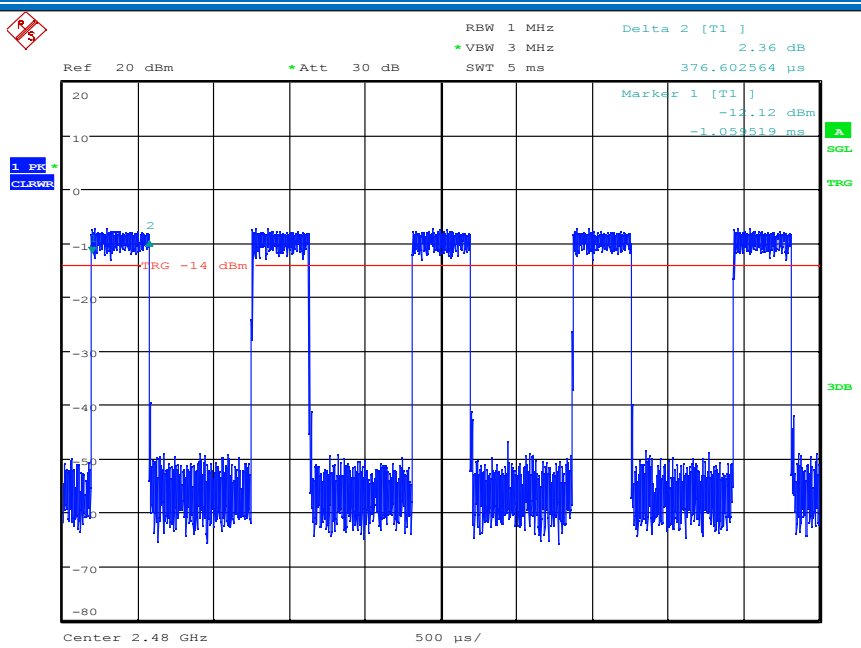
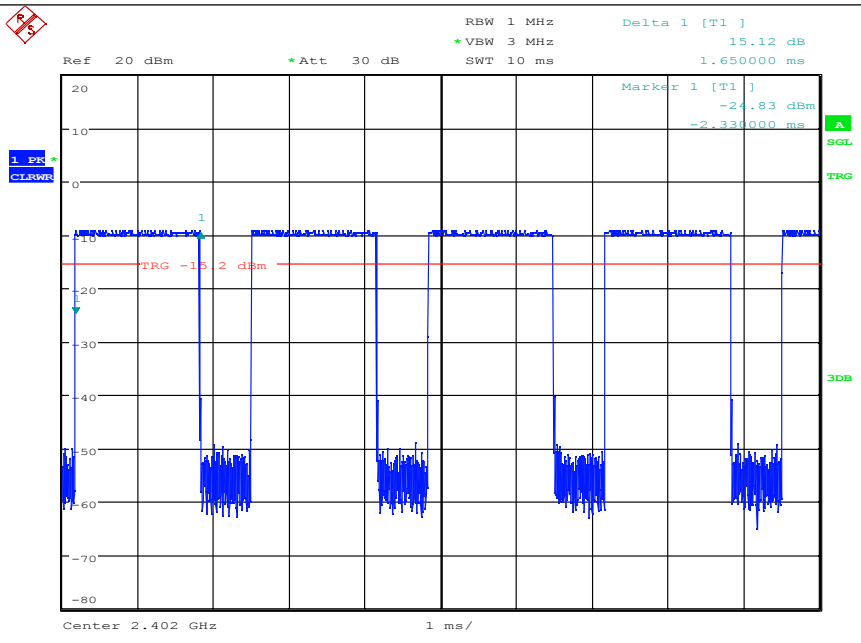
Test plot as follows:

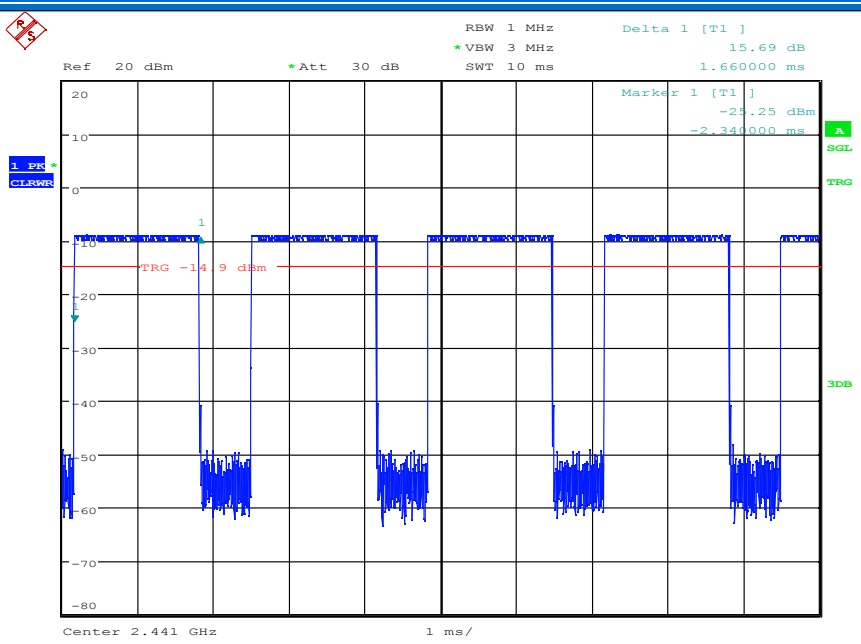
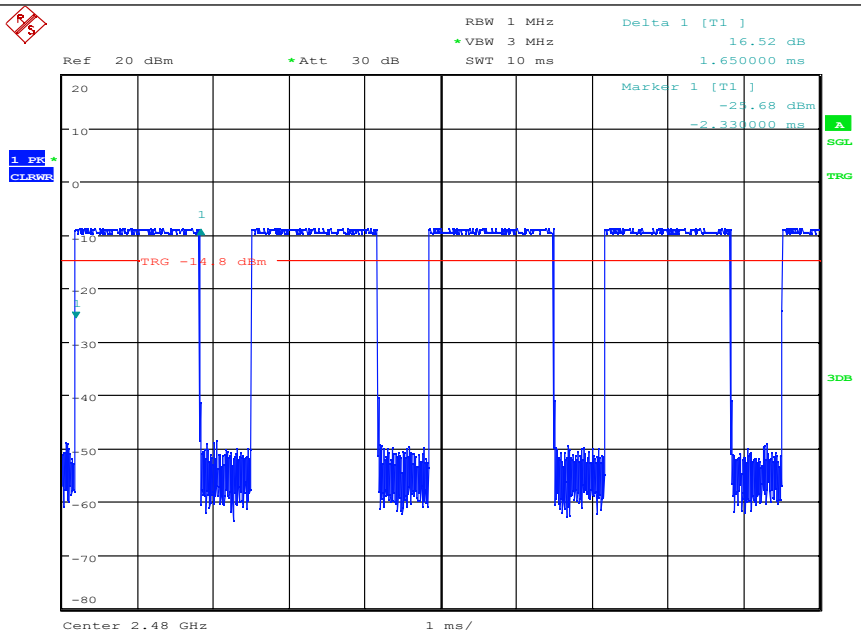
Graphs	
GFSK_DH1/LCH	
GFSK_DH1/MCH	

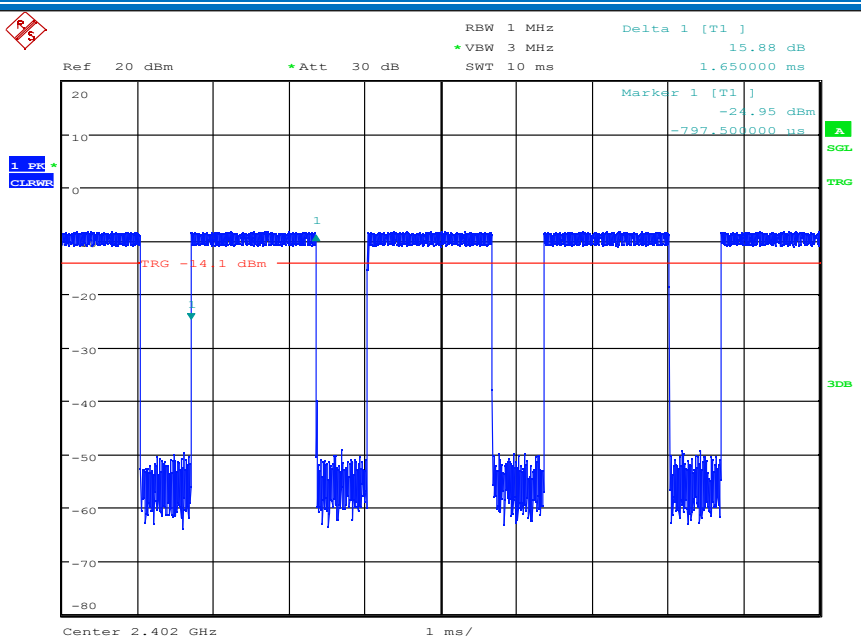
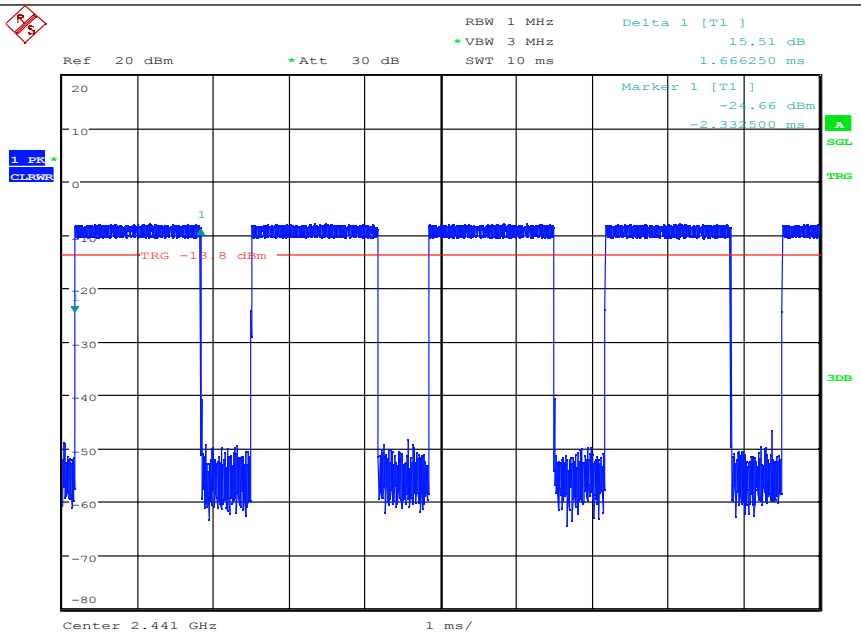
GFSK_DH1/HCH	
π/4DQPSK _2DH1/LCH	

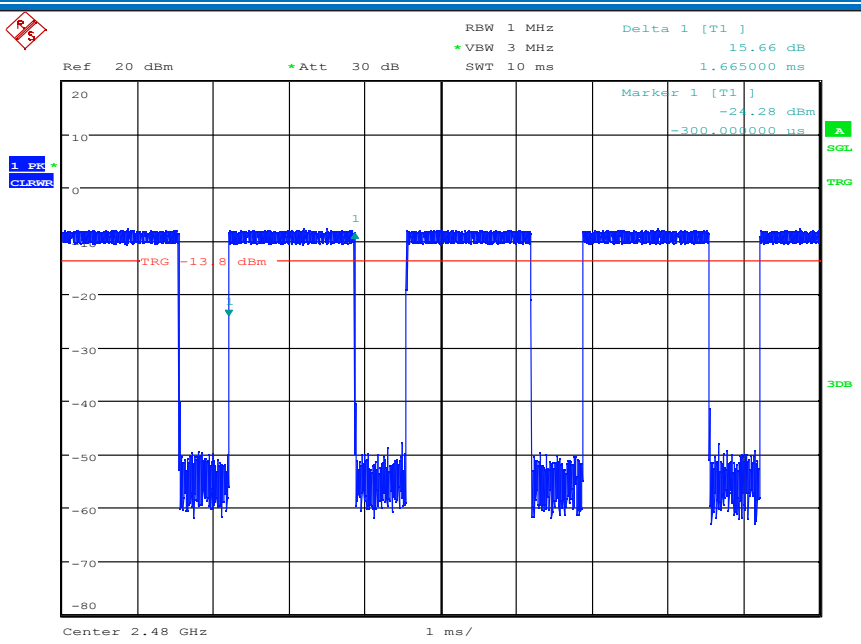
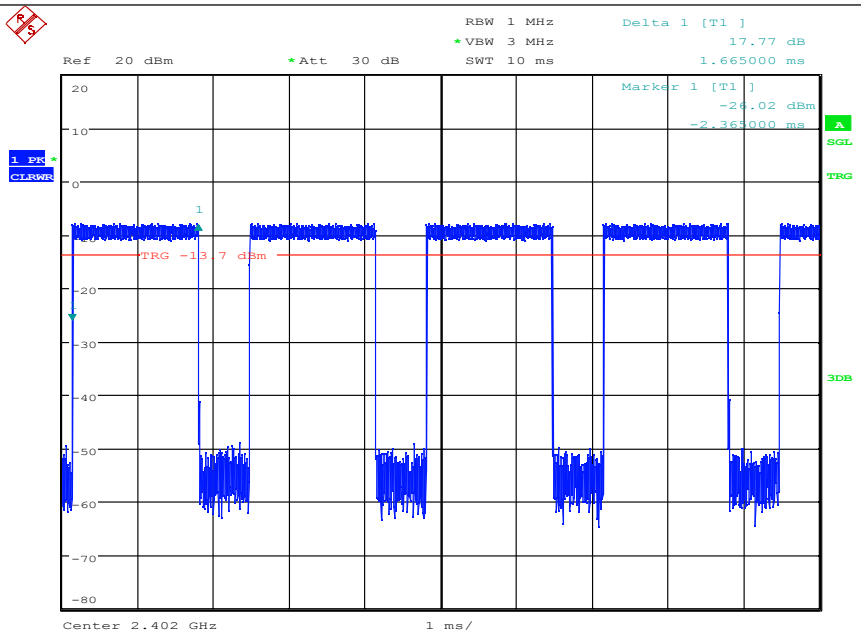
π/4DQPSK _2DH1/MCH	
π/4DQPSK _2DH1/HCH	

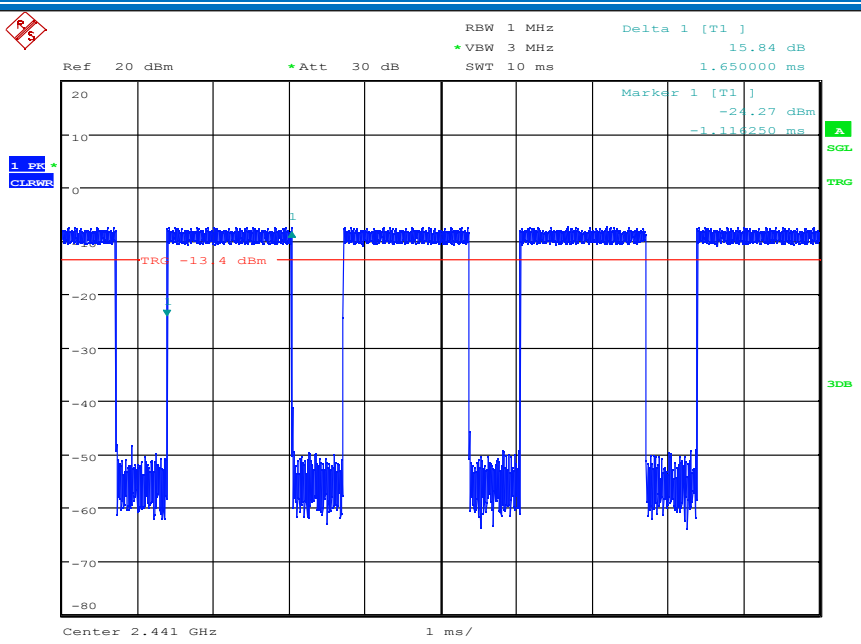
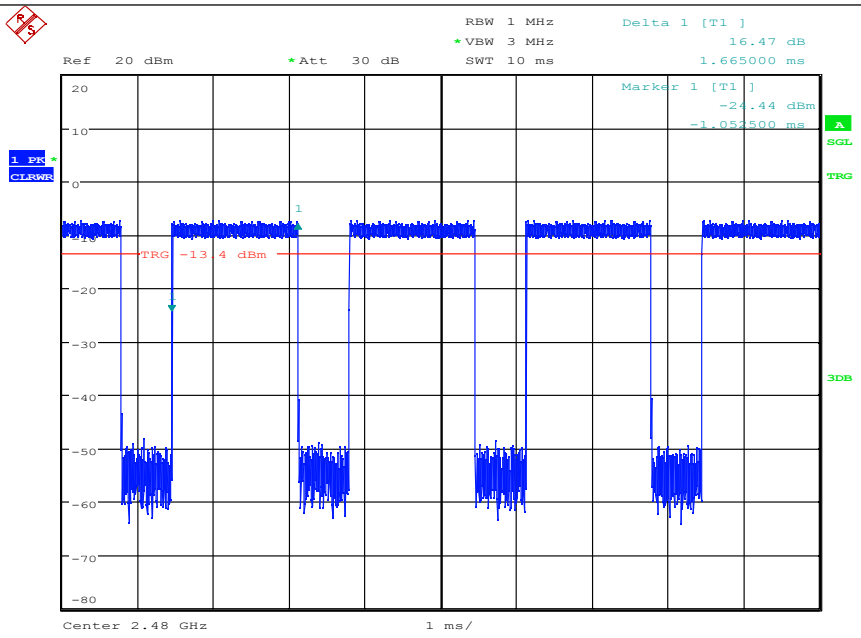
8DPSK _3DH1/LCH	
8DPSK _3DH1/MCH	

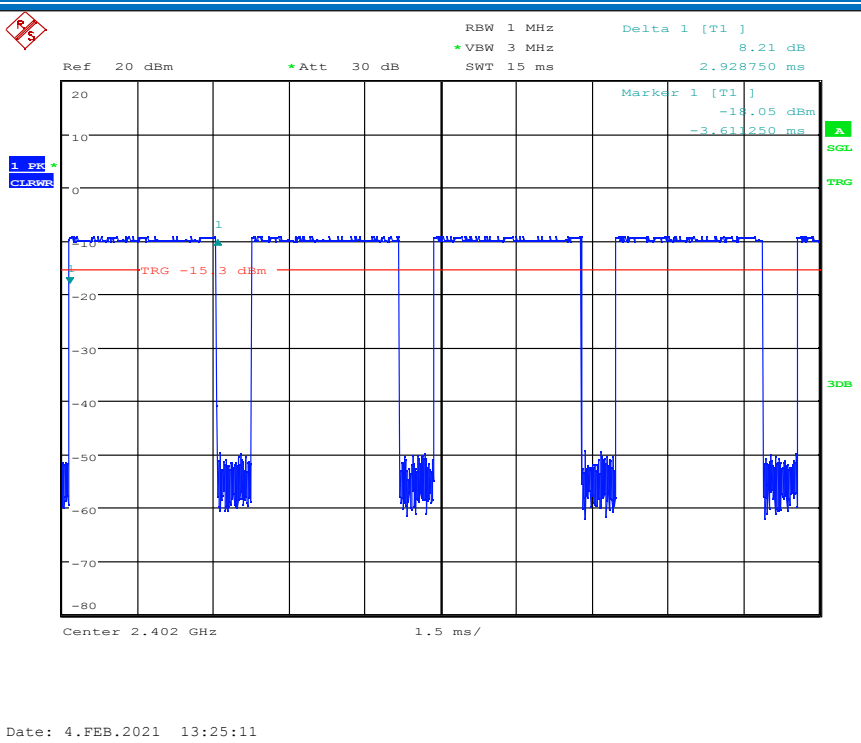
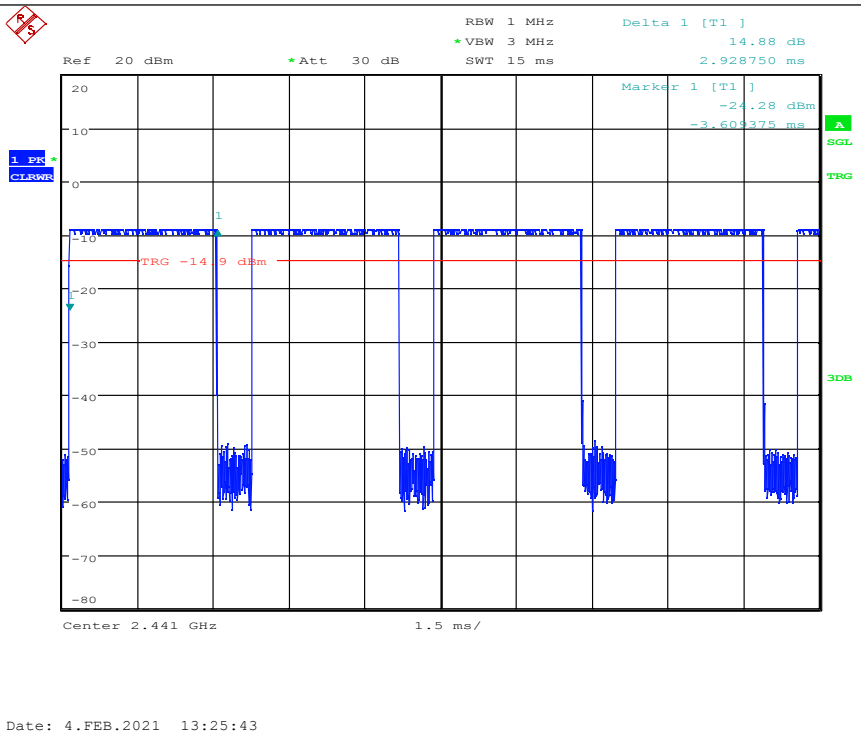
8DPSK _3DH1/HCH	 Date: 4.FEB.2021 13:53:51
GFSK_DH3/LCH	 Date: 4.FEB.2021 13:23:16

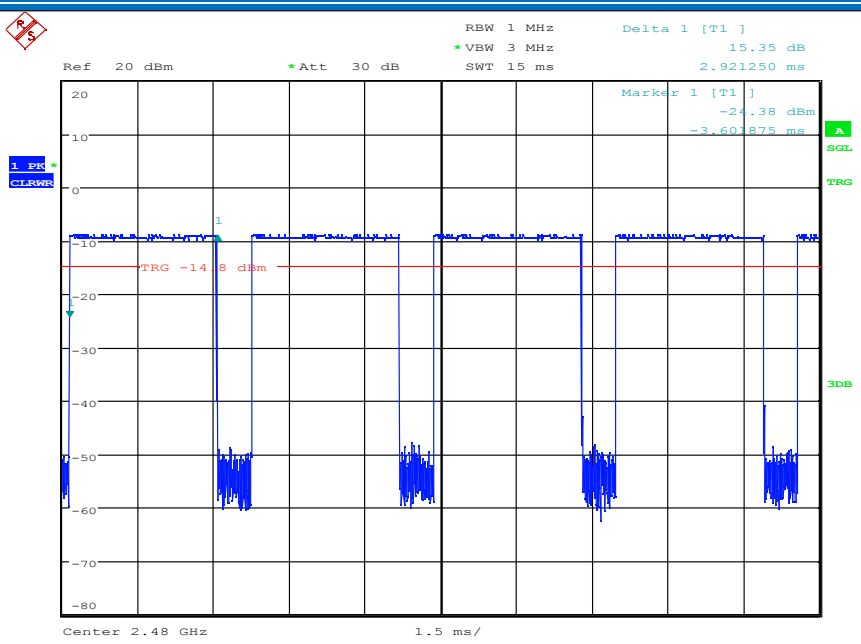
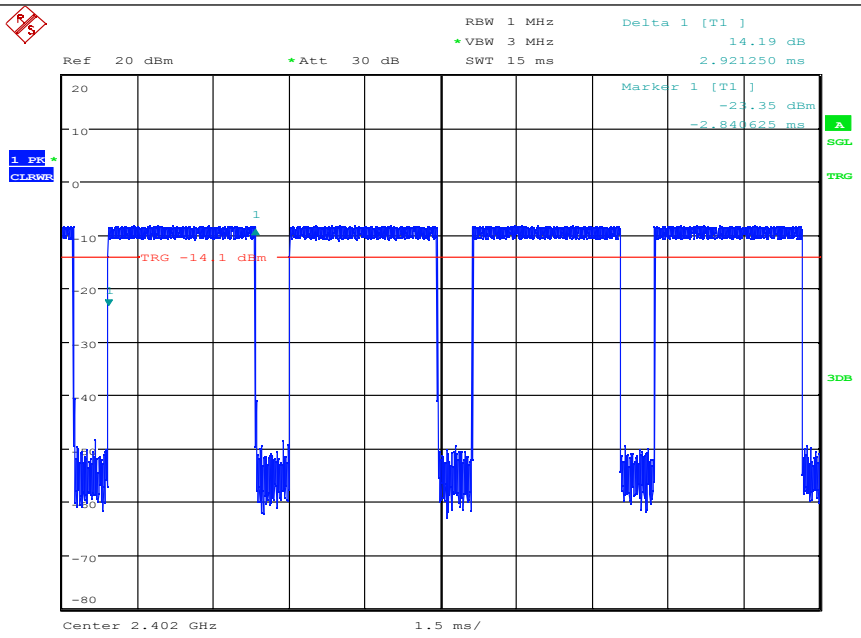
GFSK_DH3/MCH	 Date: 4.FEB.2021 13:23:59
GFSK_DH3/HCH	 Date: 4.FEB.2021 13:24:32

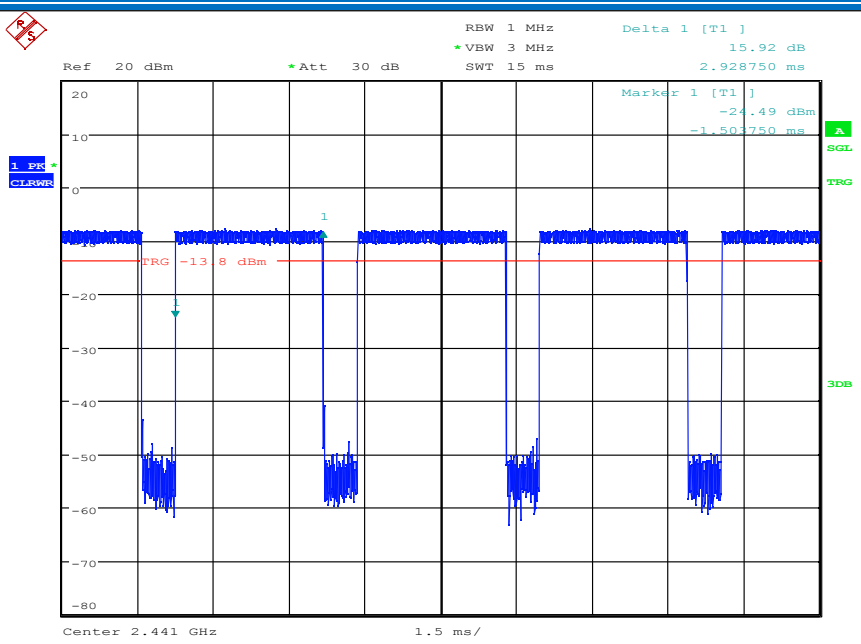
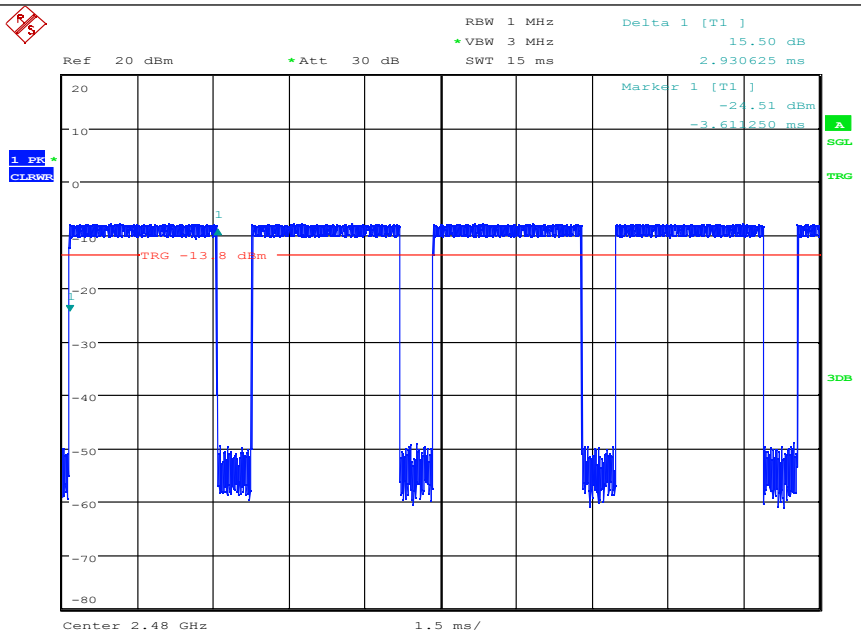
π/4DQPSK _2DH3/LCH	 Date: 4.FEB.2021 13:27:12
π/4DQPSK _2DH3/MCH	 Date: 4.FEB.2021 13:28:27

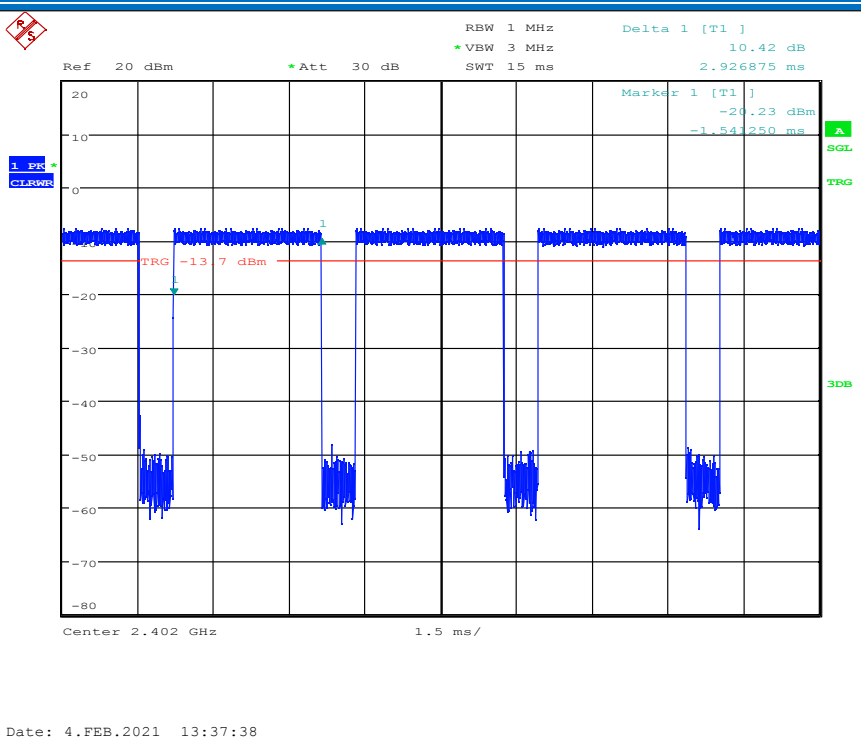
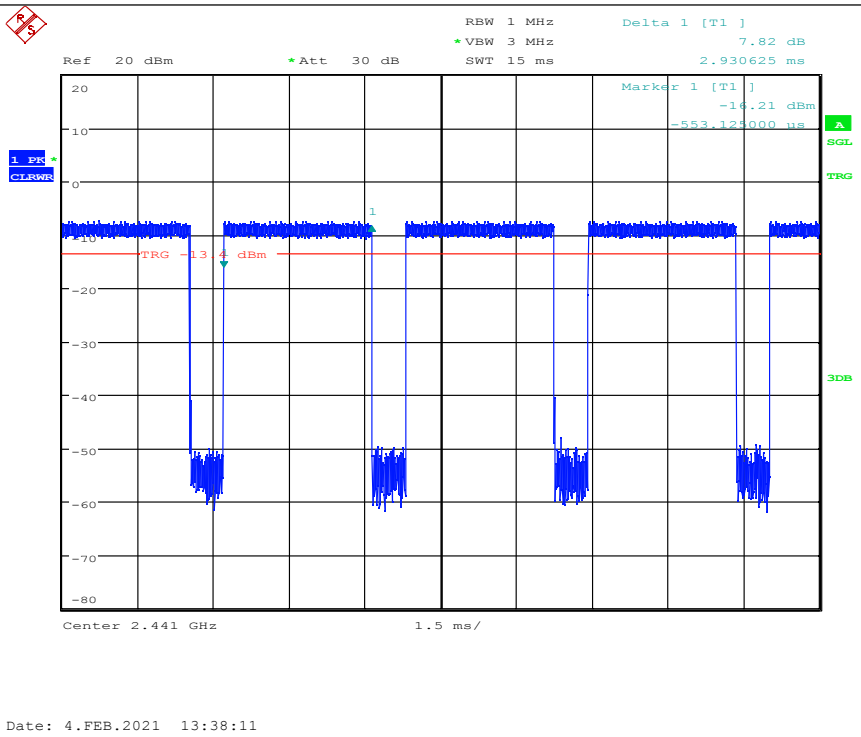
π/4DQPSK _2DH3/HCH	 Date: 4.FEB.2021 13:29:25
8DPSK _3DH3/LCH	 Date: 4.FEB.2021 13:36:01

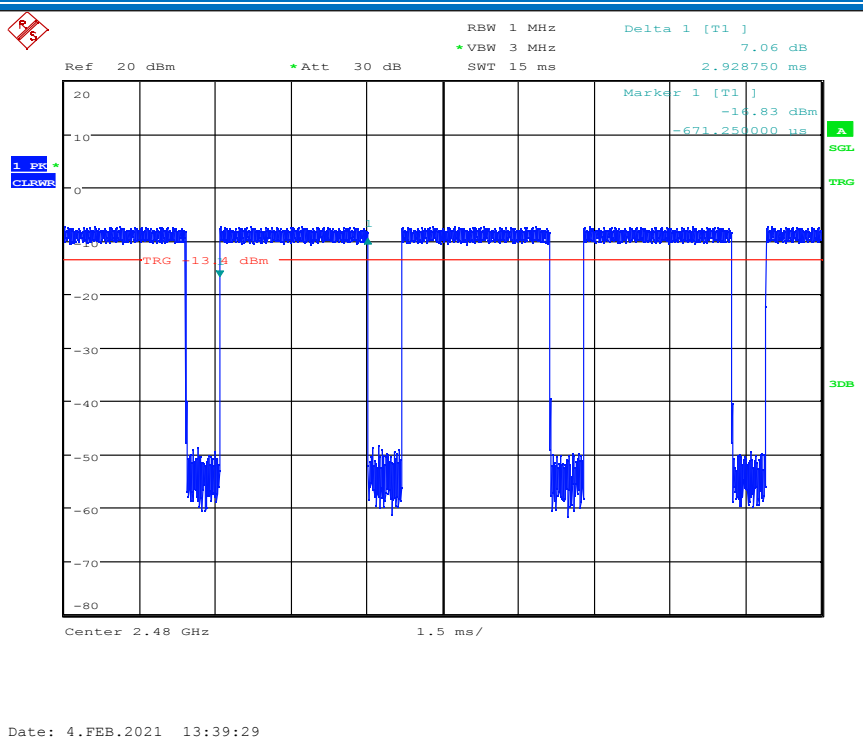
8DPSK _3DH3/MCH	 Date: 4.FEB.2021 13:36:30
8DPSK _3DH3/HCH	 Date: 4.FEB.2021 13:37:03

GFSK_DH5/LCH	
GFSK_DH5/MCH	

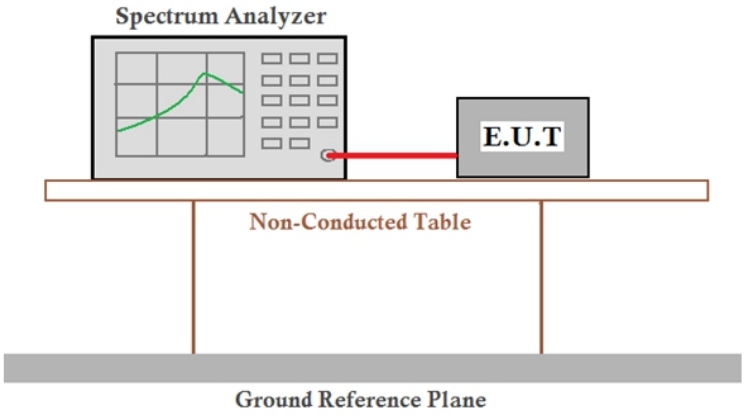
GFSK_DH5/HCH	
π/4DQPSK _2DH5/LCH	

π/4DQPSK _2DH5/MCH	 Date: 4.FEB.2021 13:30:42
π/4DQPSK _2DH5/HCH	 Date: 4.FEB.2021 13:32:08

8DPSK _3DH5/LCH	
8DPSK _3DH5/MCH	

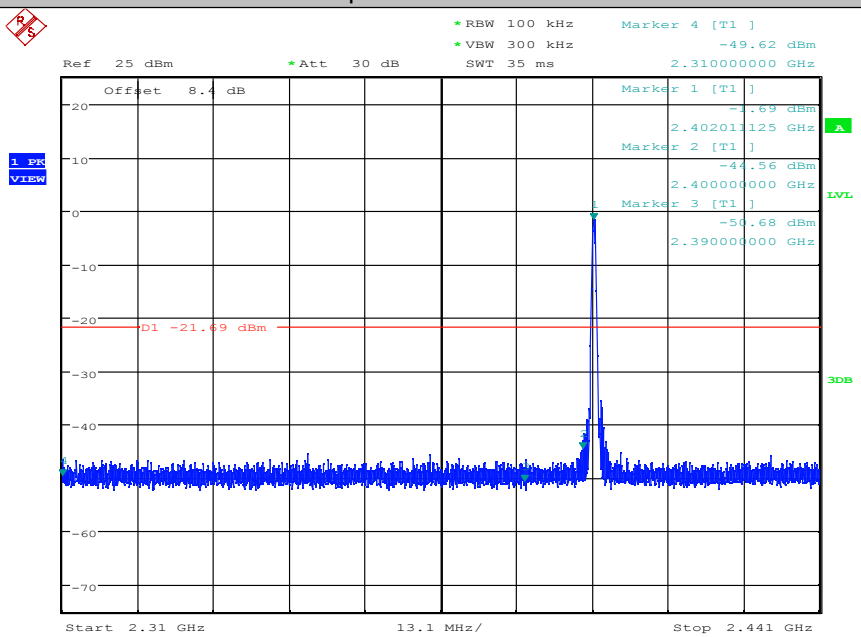
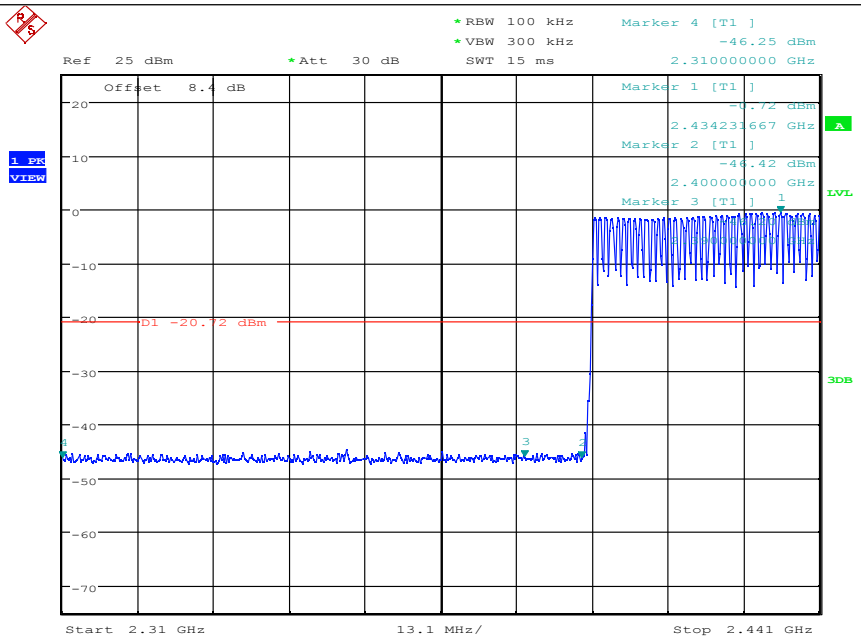
8DPSK _3DH5/HCH	

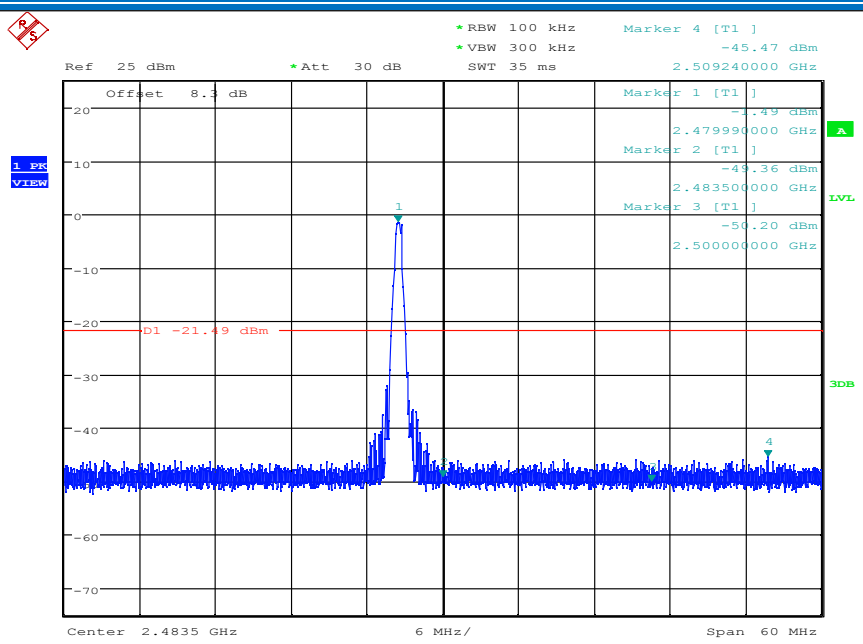
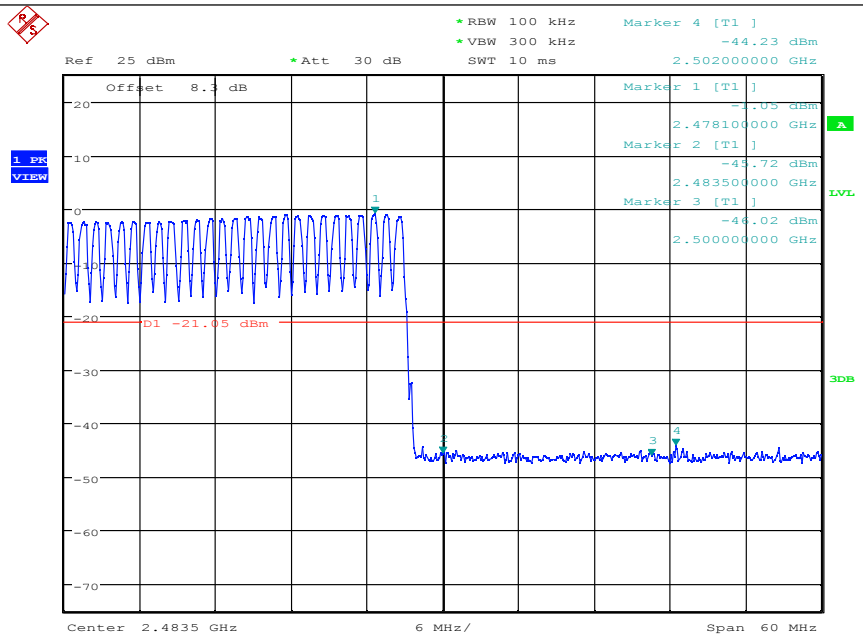
5.8 Band-edge for RF Conducted Emissions

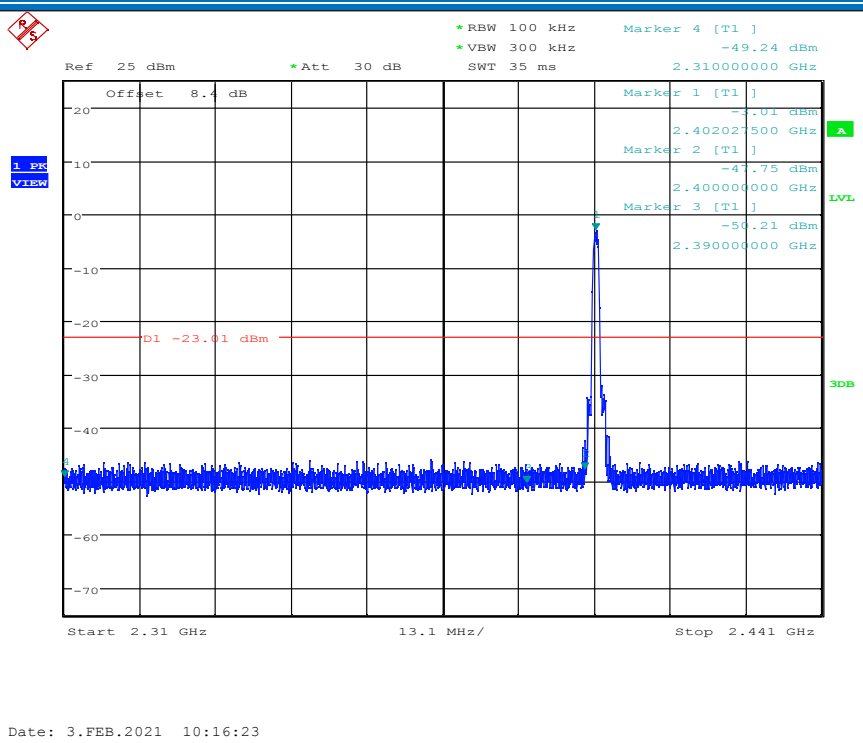
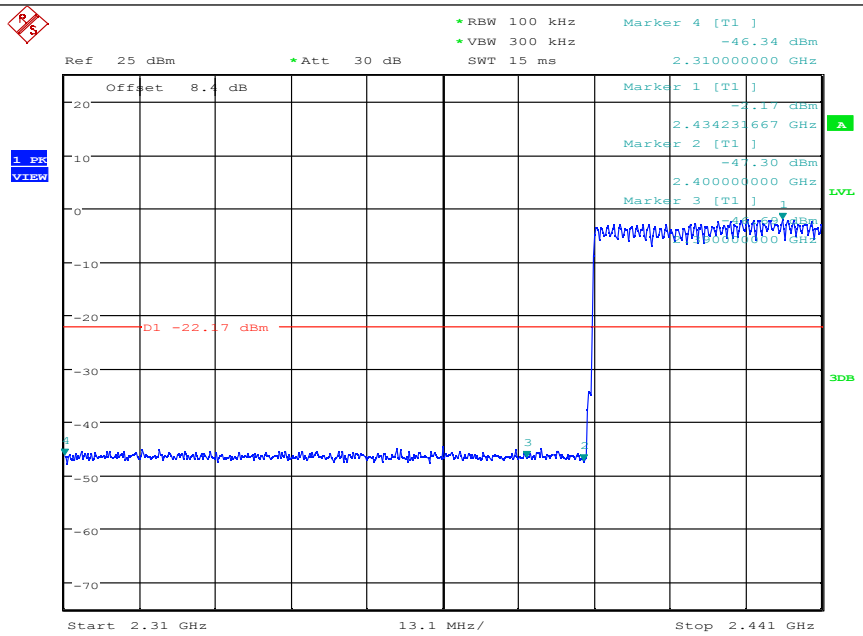
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Test Setup:	 *Remark: Offset=cable loss+ attenuation factor.*
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Exploratory Test Mode:	Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

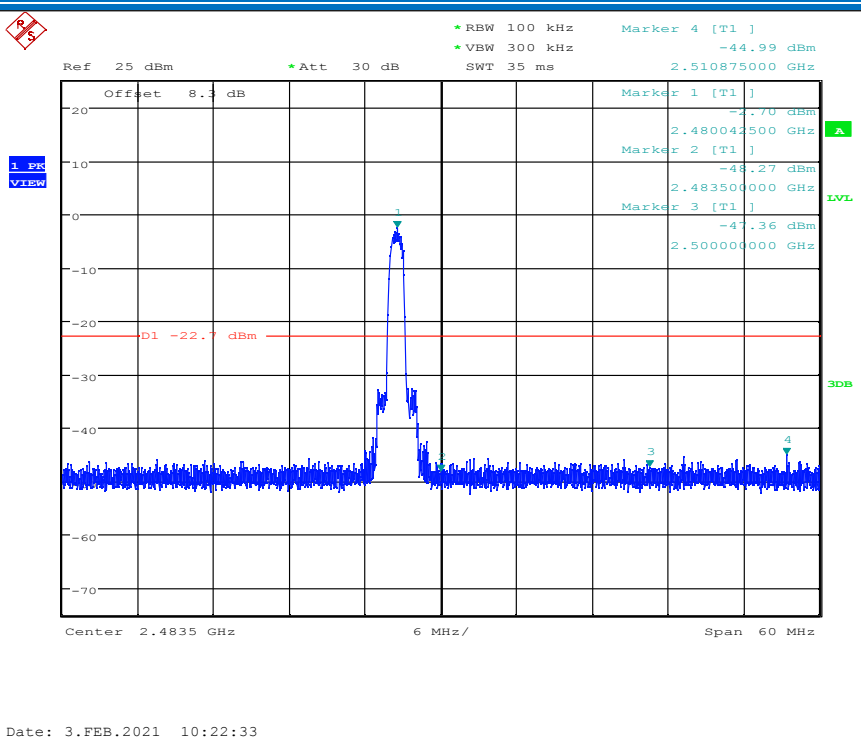
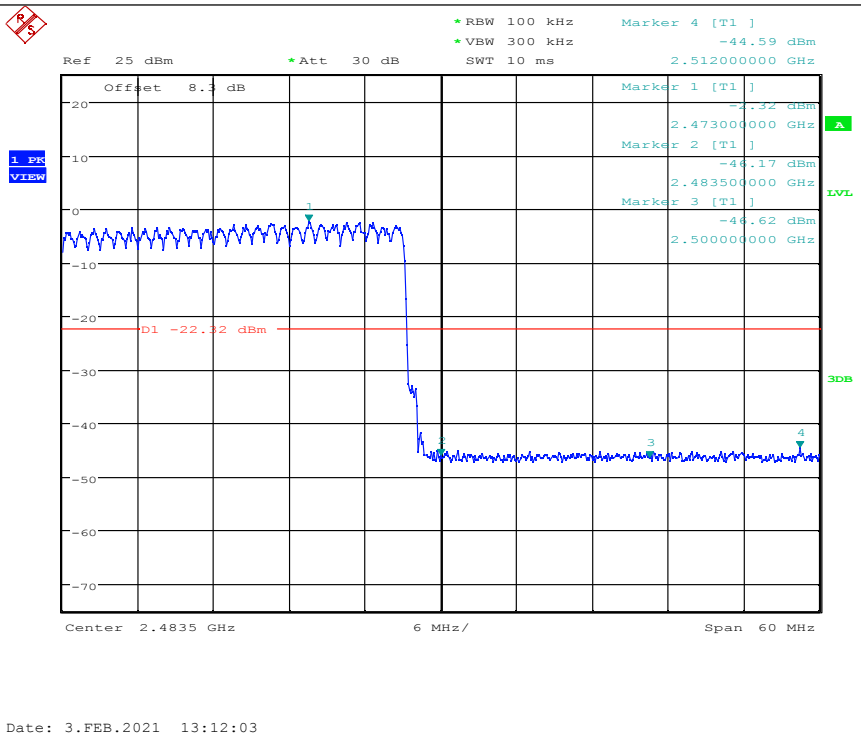
Mode	Test Channel	Frequency [MHz]	Frequency Hopping	Emission Level [dBm]	Limit [dBm]	Result
GFSK	LCH	2400	Off	-44.560	-21.69	PASS
			On	-46.20	-20.72	PASS
GFSK	HCH	2483.5	Off	-49.360	-21.49	PASS
			On	-45.72	-21.05	PASS
π/4DQPSK	LCH	2400	Off	-47.750	-23.01	PASS
			On	-46.34	-22.17	PASS
π/4DQPSK	HCH	2483.5	Off	-48.270	-22.7	PASS
			On	-46.17	-22.32	PASS
8DPSK	LCH	2400	Off	-46.740	-23.02	PASS
			On	-47.49	-21.99	PASS
8DPSK	HCH	2483.5	Off	-47.510	-22.49	PASS
			On	-46.14	-22.18	PASS

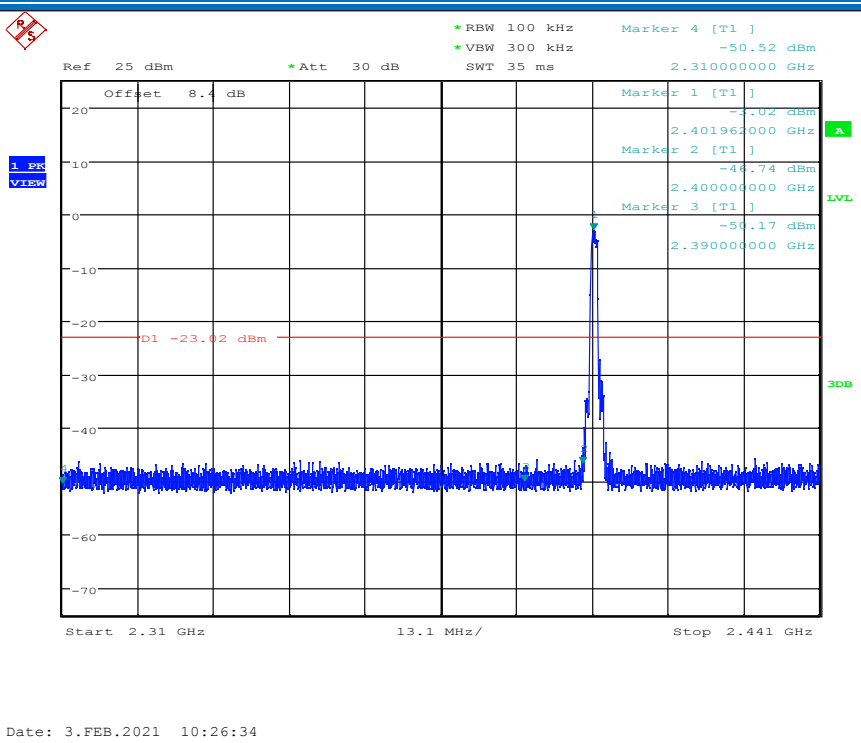
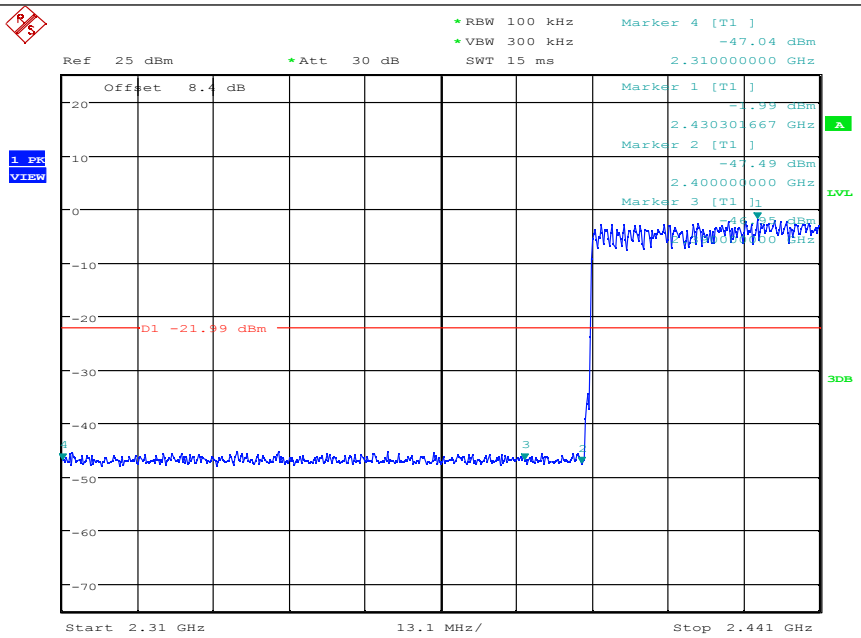
Test plot as follows:

Graphs	
GFSK/LCH/No Hop	 Date: 3.FEB.2021 10:05:39
GFSK/LCH/Hop	 Date: 3.FEB.2021 10:40:18

GFSK/HCH/No Hop	 Date: 3.FEB.2021 10:12:32
GFSK/HCH/Hop	 Date: 3.FEB.2021 11:04:07

π/4DQPSK/LCH/No Hop	 Date: 3.FEB.2021 10:16:23
π/4DQPSK/LCH/Hop	 Date: 3.FEB.2021 11:09:32

π/4DQPSK/HCH/No Hop	
π/4DQPSK/HCH/Hop	

8DPSK/LCH/No Hop	 Date: 3.FEB.2021 10:26:34
8DPSK/LCH/Hop	 Date: 3.FEB.2021 13:14:42