FCC TEST REPORT

For

Mobile Phone

Model Number: V2236

FCC ID: 2AUCY-V2236

Report Number : WT228002555

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
Site Location	:	NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China
Tel	:	0086-755-86928965
Fax	:	0086-755-86009898-31396
Web	:	www.smq.com.cn
E-mail		emcrf@smq.com.cn

Revision History

No	Date	Remark
V1.0	2022.11.17	Initial issue

TEST REPORT DECLARATION

Applicant	:	vivo Mobile Communication Co., Ltd.
Address	:	No.1, vivo Road, Chang'an, Dongguan,Guangdong,China
Manufacturer	:	vivo Mobile Communication Co., Ltd.
Address	:	No.1, vivo Road, Chang'an, Dongguan,Guangdong,China
EUT Description	:	Mobile Phone
Model No.	:	V2236
Trade mark	:	vivo
Serial Number	:	/
FCC ID	:	2AUCY-V2236

Test Standards:

FCC Part 15 Subpart C 15.247

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	陈司林 (Chen Silin 陈司林)	Date:	Nov.17, 2022
Checked by:	施昌达 (Shi Changda 施昌达)	Date:	Nov.17, 2022
Approved by:	林奕翔 (Lin Yixiang 林奕翔)	Date:	Nov.17, 2022

TABLE OF CONTENTS

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
20dB bandwidth measurement	15.247 (a) (1)	Pass
Carrier frequency separation measurement	15.247 (a) (1)	Pass
Number of hopping channel	15.247 (a) (1) III	Pass
Time of occupancy	15.247 (a) (1) III	Pass
Maximum conducted output power	15.247 (b) (1)	Pass
Band edge compliance measurement	15.247 (d)	Pass
Radiated spurious emission & Radiated restricted band measurement	15.247 (d) / 15.205 & 15.209	Pass
Conducted spurious emission	15.247 (d)	Pass
Conducted emission	15.207	Pass
Antenna requirements	15.203	Pass

Remark: “N/A” means “Not applicable.”

2. GENERAL INFORMATION

2.1. Report Information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturer.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

Conducted Emission
9 kHz~150 kHz *U*=3.7dB k=2
150 kHz~30MHz *U*=3.3dB k=2

Radiated Emission
30MHz~1000MHz *U*=4.3dB k=2
1GHz~6GHz *U*=4.6 dB k=2
6GHz~40GHz *U*=5.1dB k=2

3. PRODUCT DESCRIPTION

NOTE: The extreme test conditions for temperature and antenna gain were declared by the manufacturer.

3.1. EUT Description

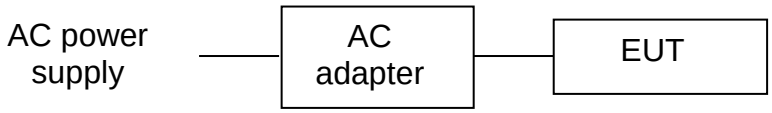
Description	:	Mobile Phone
Manufacturer	:	vivo Mobile Communication Co., Ltd.
Model Number	:	V2236
Operate Frequency	:	2.402GHz~2.480GHz
Antenna Designation	:	PIFA Antenna -2.95dBi
Operating voltage	:	DC3.6V (Low)/DC3.89V (Nominal)/DC4.45V (Max)
Software Version	:	PD2236GF_EX_A_12.0.0.8.W30.V000L1
Hardware Version	:	MP_0.1

Remark: /

3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2AUCY-V2236** filing to comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C .

3.3. Block Diagram of EUT Configuration



Setup of test

3.4. Operating Condition of EUT

The transmitter has a maximum peak conducted output power of Basic rate GFSK modulation and EDR mode 8DPSK modulation. Tests were performed with Basic rate GFSK modulation and EDR mode 8DPSK modulation.

3.5. Support Equipment List

Table 2 Support Equipment List

Name	Model No	S/N	Manufacturer
Adapter for EUT	V1020D-US	---	Dongguan Phitek Electronics Co., Ltd.
Rechargeable Li-ion Polymer Battery for EUT	B-Y1	---	Sunwoda Electronic Co., Ltd.
USB Cable for EUT	BK-C-19-B	---	vivo

3.6. Test Conditions

Date of test：Nov.03, 2022- Nov.16, 2022
Date of EUT Receive：Nov.03, 2022
Temperature: 21℃-27℃
Relative Humidity: 46%-57%

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

3.9. Equipment Requirements

The device is designed according to specifications of SIG. So, it has a full support to Medium access protocol and fully compliant with the KDB558074 standard. The device is compliant Pseudorandom hopping, Equal hopping frequency, receiver bandwidth synchronizes and have same bandwidth with transmitted signal. And the ability to have adaptive hopping when encountering other signals.

4. TEST EQUIPMENT USED

Table 3 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB9058/05	Test Receiver	R&S	ESCI 3	Sep.13,2022	1 Year
SB4357	AMN	R&S	ENN216	Aug.23,2022	1 Year
SB9548	Shielded Room	Albatross	SR	Sep.06,2022	1 Year
SB17366	Test Receiver	R&S	ESR26	Jun.22,2022	1 Year
SB3345	Loop Antenna	Schwarzbeck	FMZB1516-113	Jan.20,2022	1 Year
SB3955	Broadband Antenna	SCHWARZBECK	VULB9163	Jun.22,2022	1 Year
SB13958	Horn Antenna	R&S	HF907	Jun.07,2022	1 Year
SB9555/01	Semi Anechoic Chamber	Albatross	9×6×6(m)	Aug.16,2022	1 Year
SB8501/09	Test Receiver	R&S	ESU40	Jan.20,2022	1 Year
SB3435	Horn Antenna	R&S	HF906	Dec.03,2021	1 Year
SB9058/03	Pre-Amplifier	R&S	SCU 18	Jan.20,2022	1 Year
SB8501/11	Antenna	R&S	3160-09	Mar.09,2020	3 Years
SB8501/12	Antenna	R&S	3160-10	Mar.17,2020	3 Years
SB8501/16	Pre-Amplifier	R&S	SCU-26	Jan.20,2022	1 Year
SB9059	Pre-Amplifier	R&S	SCU-40	Aug.23,2022	1 Year
SB9555/02	Fully Anechoic Chamber	Albatross	10.0×5.2×5.4(m)	Aug.16,2022	1 Year
SB20321/01	Spectrum Analyzer	R&S	FSV3044	Dec.24, 2021	1 Year

Table 4 Test software

Name	Manufacturer	Version
Bluetooth and WiFi Test System	Shenzhen JS tonscend co.,ltd	2.6.87.0615

5. CONDUCTED EMISSION TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC Part 15 15.207

5.1.2. Test Limit

Table 5 Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line.
Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.
The bandwidth of EMI test receiver is set at 9 kHz.

5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data

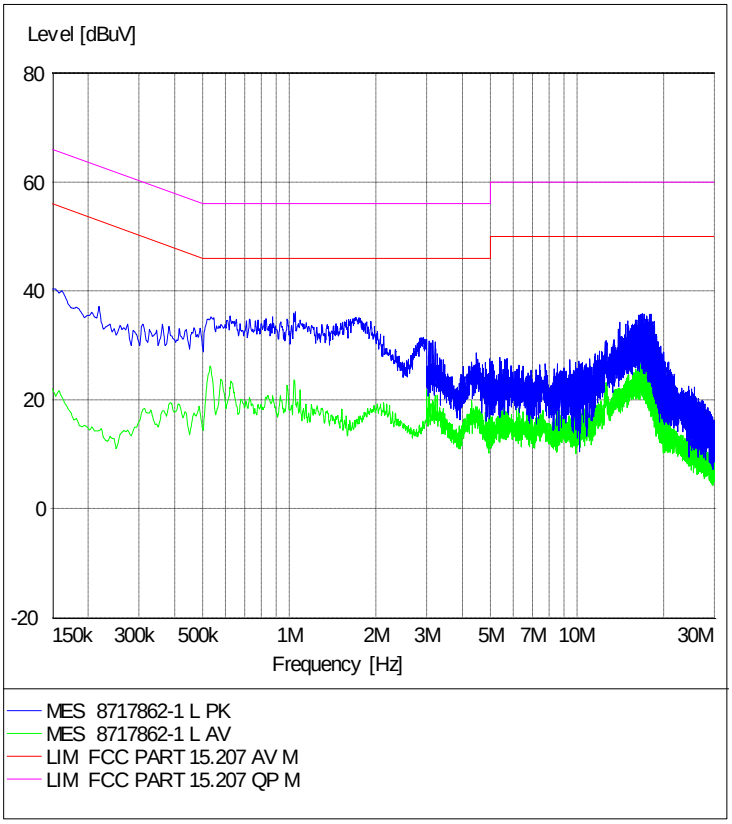
The emissions don't show in below are too low against the limits. Refer to the test curves.

Table 6 Conducted Emission Test Data

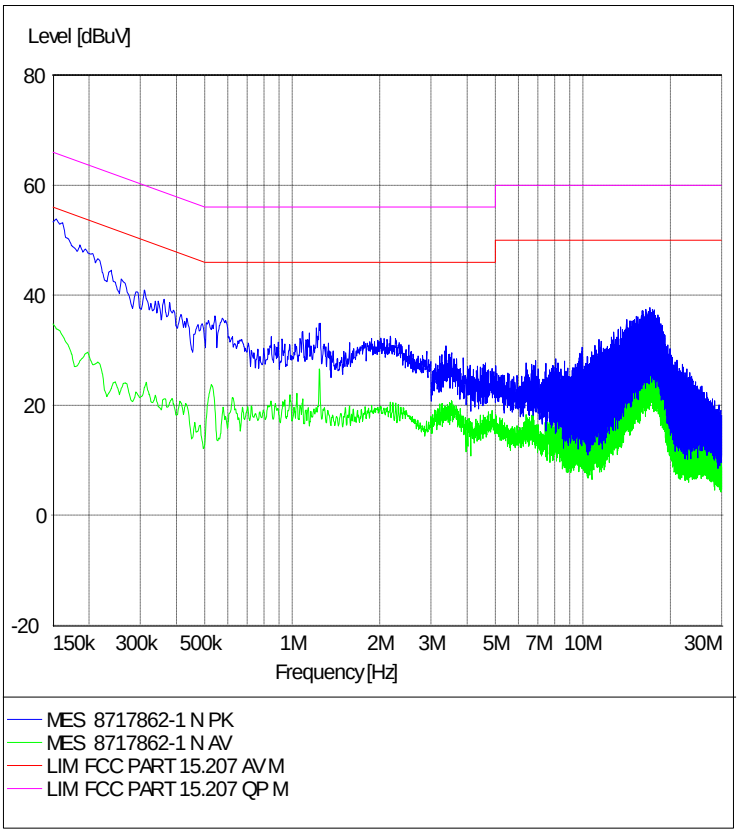
Test mode: Charging and Transmitting								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dBμV)	Emission Level (dBμV)	Limit (dBμV)	Reading (dBμV)	Emission Level (dBμV)	Limit (dBμV)
Line	0.15	9.7	28.7	38.4	66	11.5	21.2	56
	0.17	9.7	24.9	34.6	65.0	8.7	18.4	55.0
	0.542	9.8	21.8	31.6	56	15.5	25.3	46
	1.046	9.8	23.0	32.8	56	13.4	23.2	46
	1.562	9.8	21.1	30.9	56	6.6	16.4	46
	16.4	9.9	22.2	32.1	60	16.4	26.3	50
Neutral	0.15	9.7	40.4	50.1	66	25.1	34.8	56
	0.17	9.7	38.5	48.2	65.0	21.0	30.7	55.0
	0.21	9.7	33.7	43.4	63.2	17.5	27.2	53.2
	0.522	9.8	22.6	32.4	56	13.3	23.1	46
	1.242	9.8	20.3	30.1	56	16.4	26.2	46
	16.788	9.9	21.8	31.7	60	15.9	25.8	50

REMARKS: 1. Emission level (dBμV) =Read Value (dBμV) + Correction Factor (dB)
2. Correction Factor (dB) =LISN Factor (dB) + Cable Factor (dB) +Limiter Factor (dB)
3. The other emission levels were very low against the limit.

Line



Neutral



6. RADIATED EMISSION TEST

6.1. Test Standard and Limit

6.1.1.Test Standard

FCC Part 15 15.209

6.1.2.Test Limit

Table 7 Radiation Emission Test Limit for FCC (Class B) (9 kHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Table 8 Radiation Emission Test Limit for FCC (Class B) (Above 1G)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

* The lower limit shall apply at the transition frequency.
* The test distance is 3m.

6.2. Test Procedure

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10-2013.The EUT is set to transmit in a continuous mode. Radiated measurements were performed on the frequency range from 30MHz to 25GHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz, VBW≥RBW. All readings above 1 GHz are AV and PK values. RBW=1MHz and 1/T (10Hz) for AV value, RBW=1MHz and VBW≥RBW for peak value. Measurements were made at 3 meters.

6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data

The emissions don't show in following result tables are more than 20dB below the limits. Bluetooth basic rate and Bluetooth EDR mode were tested, below only shows worst case

result of Bluetooth basic rate.
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

9 kHz-30MHz
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Table 9 Radiated Emission Test Data 9k Hz-30MHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (H/V)	Limit (dBμV/m)	Margin (dB)	Note
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

30MHz-1GHz
Worst case is shown below for 30MHz-1GHz only.
The emissions don't show in following result tables are more than 20dB below the limits.

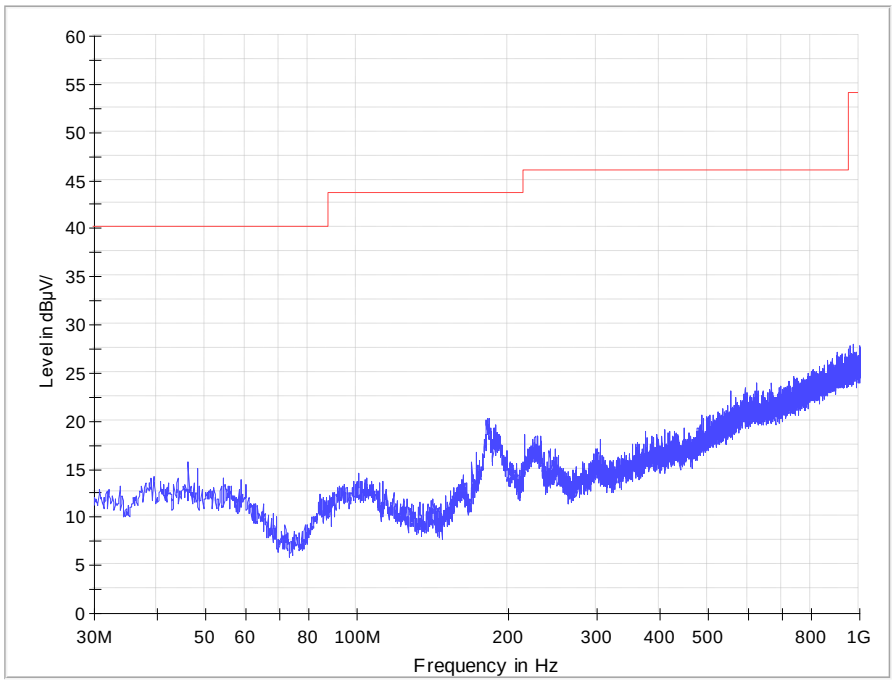
Table 10 Radiated Emission Test Data 30MHz-1GHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limit (dBμV/m)	Margin (dB)	Note
38.342	0.7	12.3	8.1	17.6	Vertical	40.0	18.9	QP
43.774	0.7	13.6	4.5	14.9	Vertical	40.0	21.2	QP
59.779	0.9	13.0	1.9	20.8	Vertical	40.0	24.2	QP
83.835	0.9	8.5	6.1	19.6	Vertical	40.0	24.5	QP
180.156	1.6	9.7	11.2	23.6	Vertical	43.5	21.0	QP
959.939	3.9	21.1	-3.8	24.8	Vertical	46.0	24.8	QP
46.102	0.8	13.6	0.5	33.5	Horizontal	40	25.1	QP
54.153	0.8	13.3	-1.3	24.5	Horizontal	40	27.2	QP
100.42	1.1	13.2	-0.8	28.6	Horizontal	43.5	30.0	QP
181.805	1.6	9.7	7.5	24.5	Horizontal	43.5	24.7	QP
215.94	1.7	10.6	5.2	27.8	Horizontal	43.5	26.0	QP
955.186	3.9	21.1	-5.8	28.1	Horizontal	46	26.8	QP

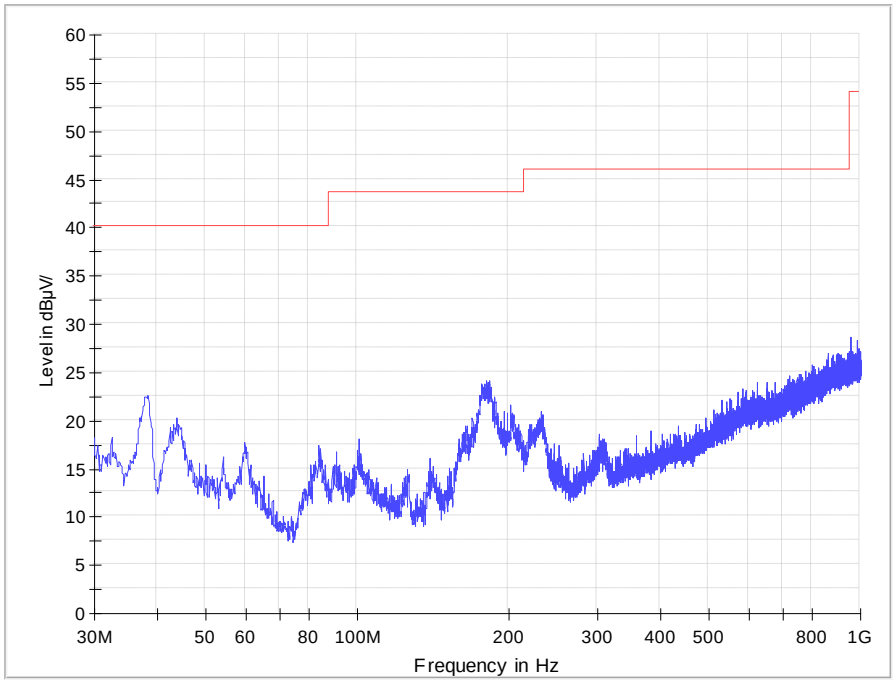
Remark: Emission level (dBμV)=Read Value(dBμV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

30MHz-1GHz

Horizontal

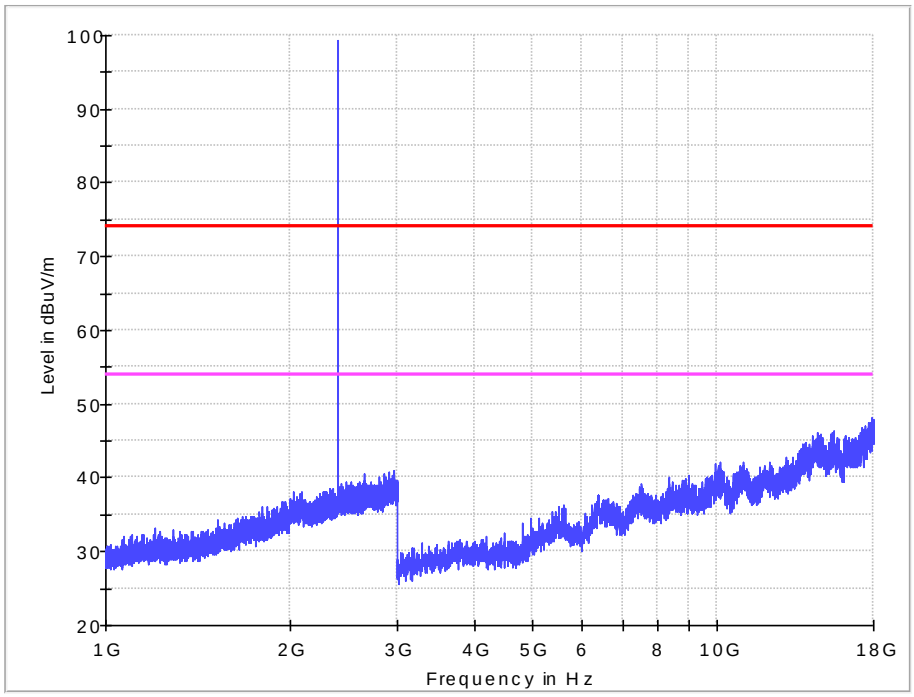


Vertical



1GHz-18GHz

GFSK CH0
Horizontal



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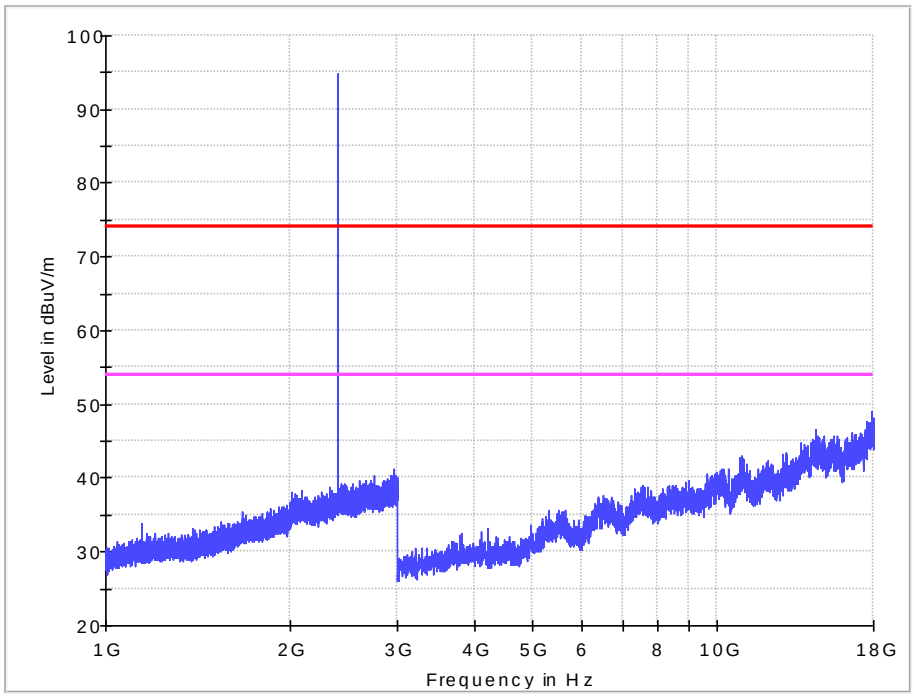
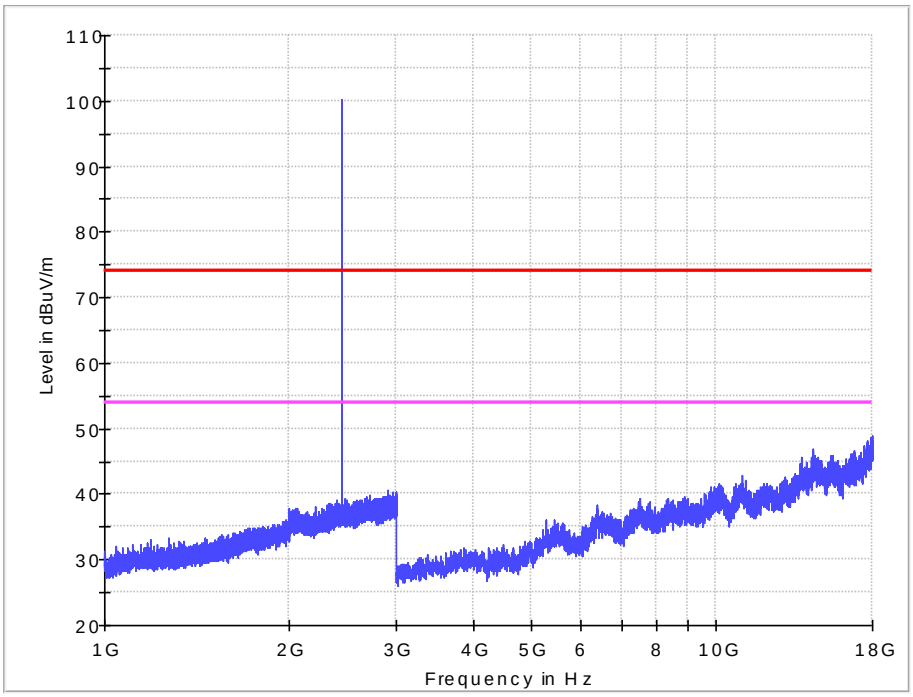


1GHz-18GHz

GFSK CH39
Horizontal



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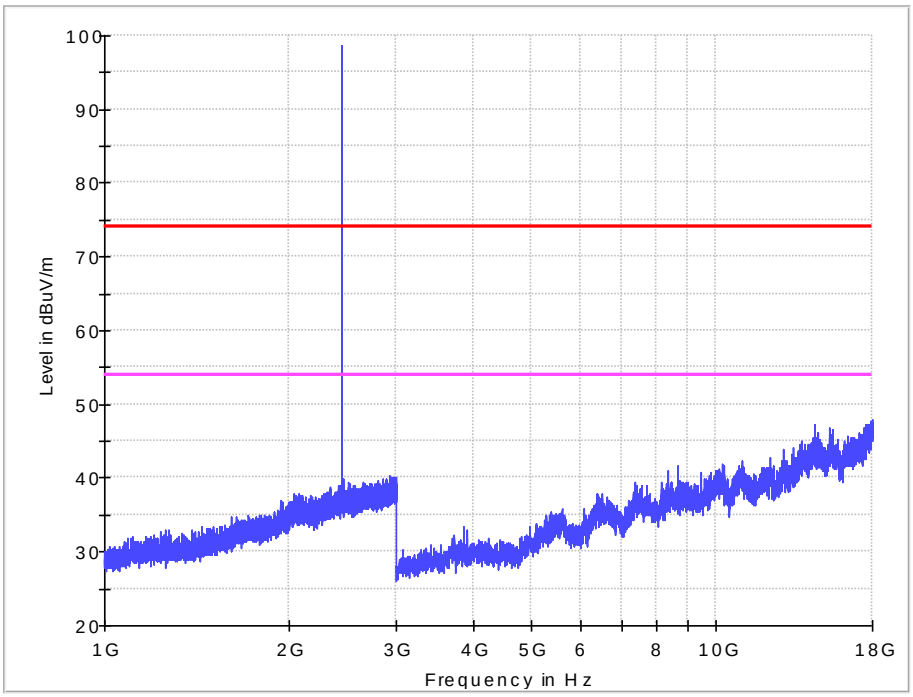
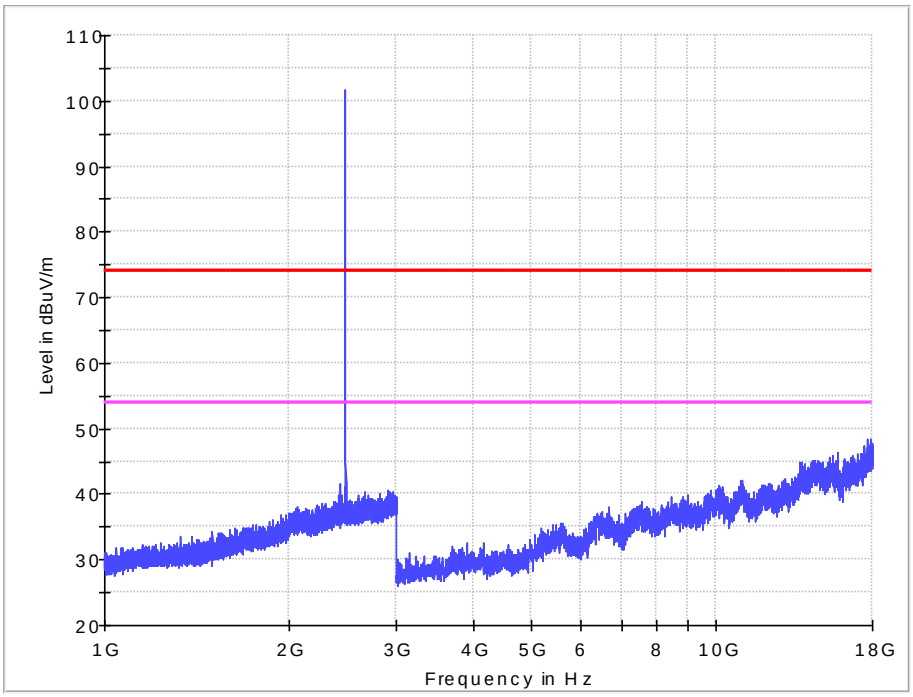


1GHz-18GHz

GFSK CH78
Horizontal



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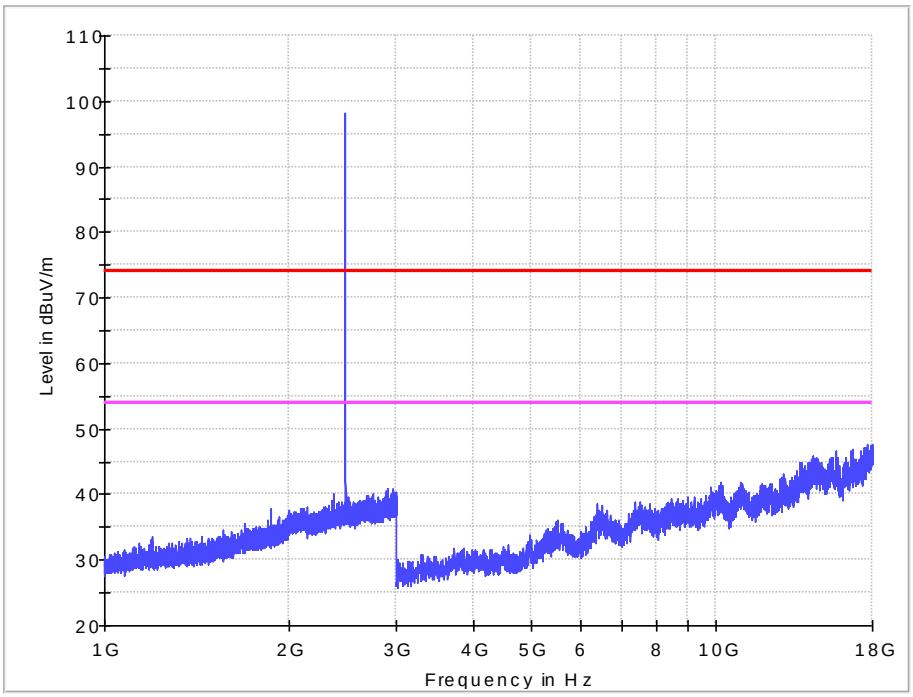
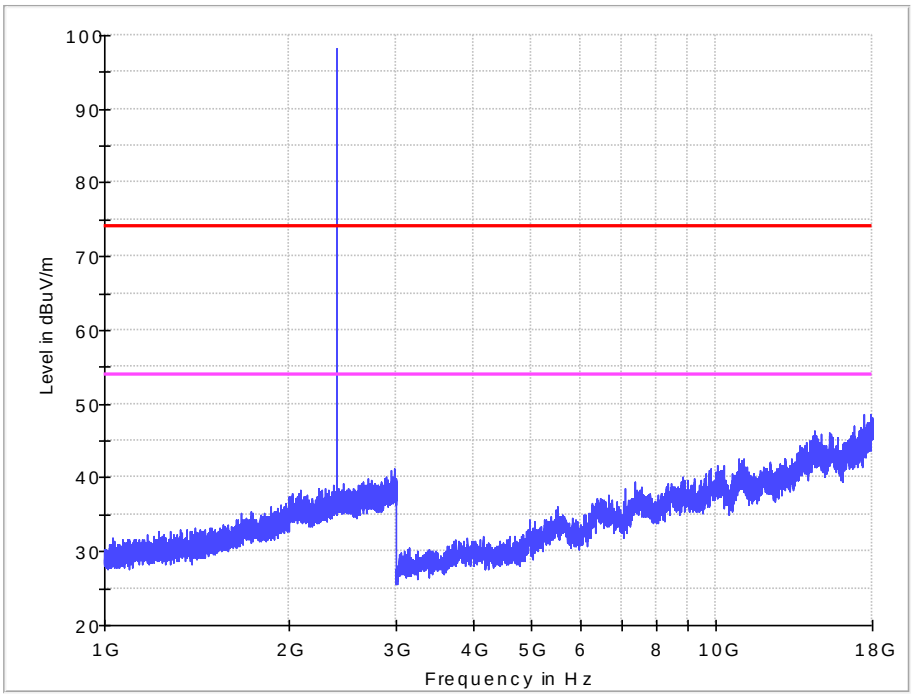
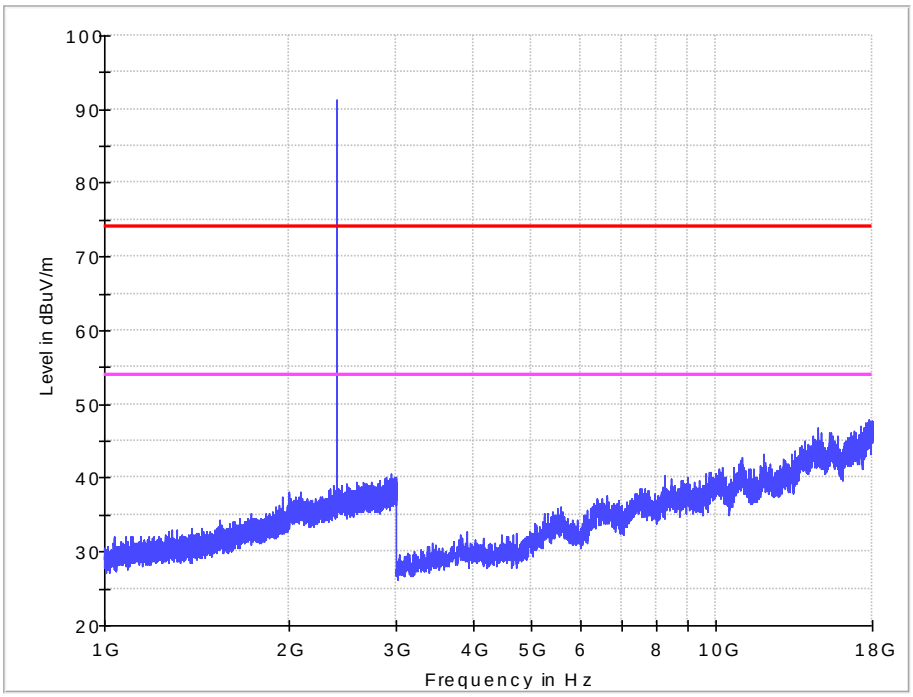


1GHz-18GHz

8PDSK CH0
Horizontal

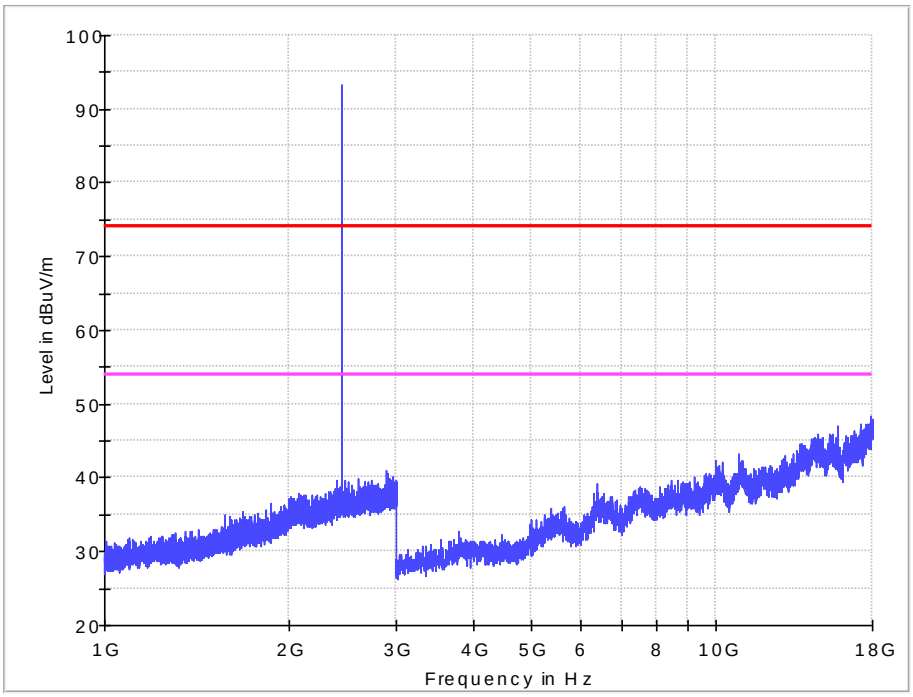


Vertical



1GHz-18GHz

8PDSK CH39
Horizontal



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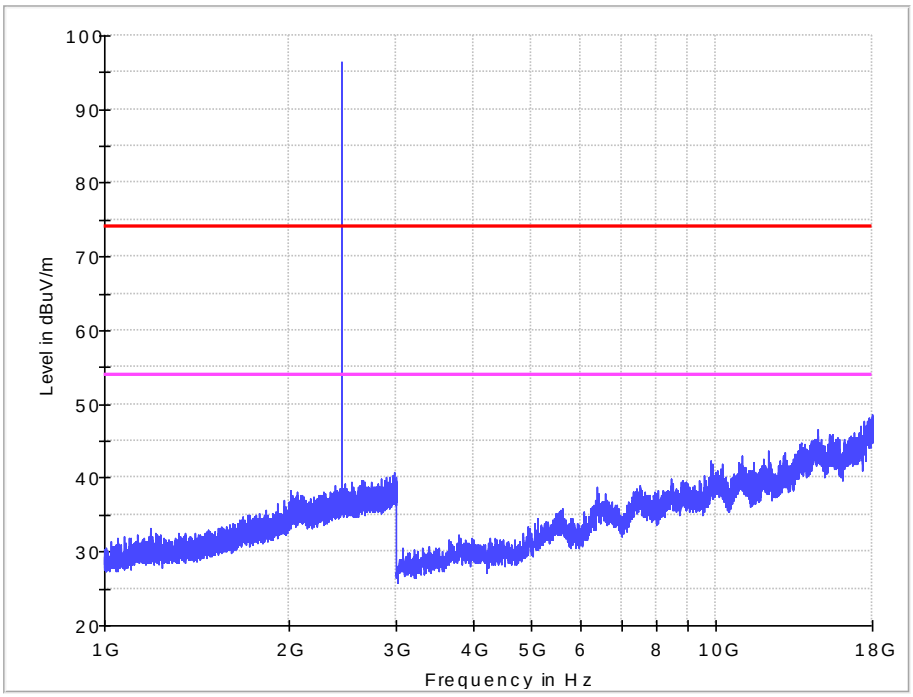
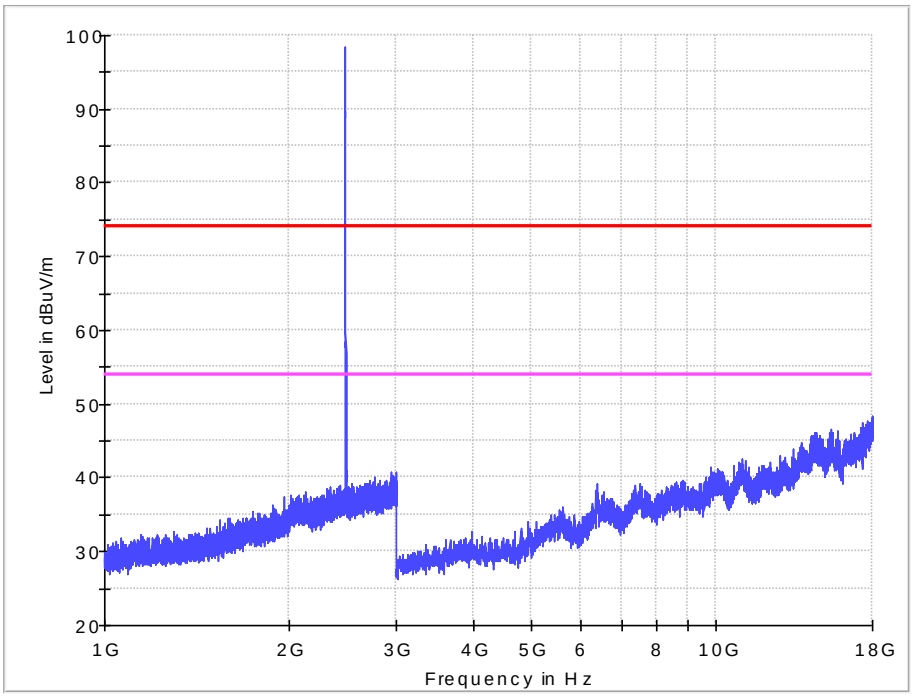
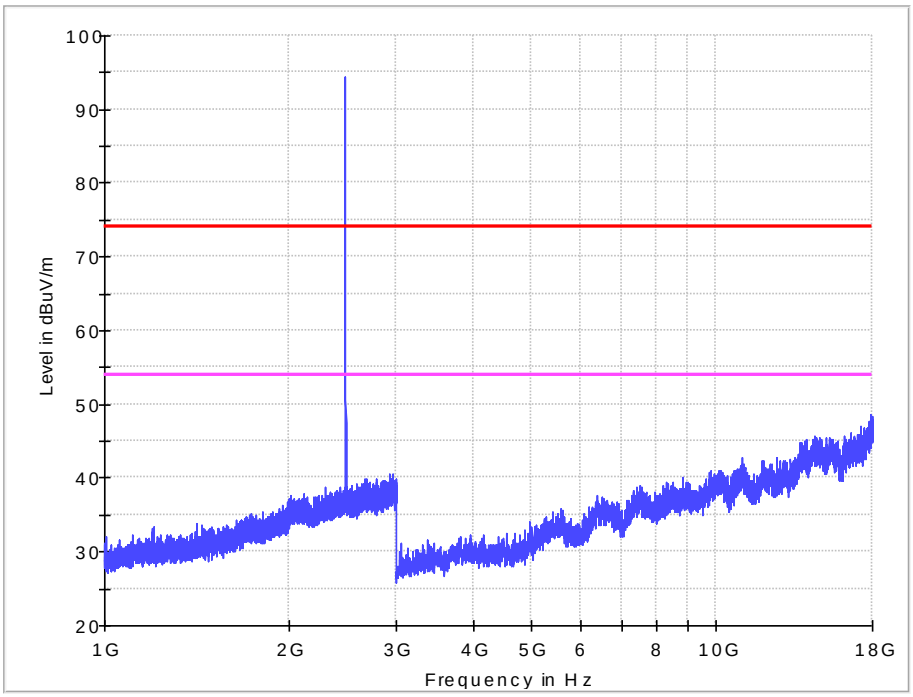


1GHz-18GHz

8PDSK CH78
Horizontal

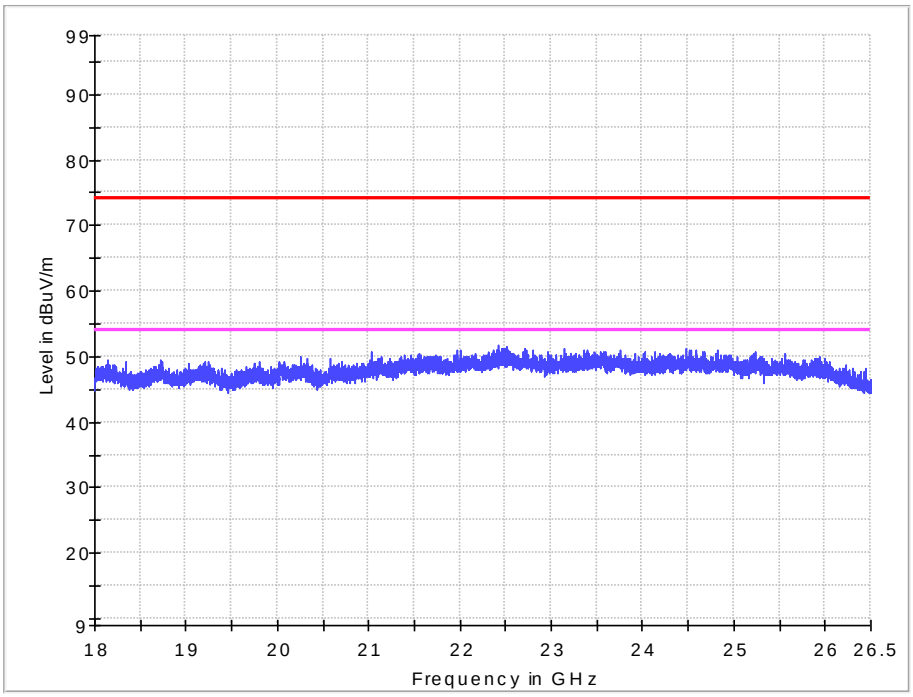


Vertical



18-26.5GHz

No Peak found in pre-scan, only worst case result is listed in this report.
Horizontal



Vertical

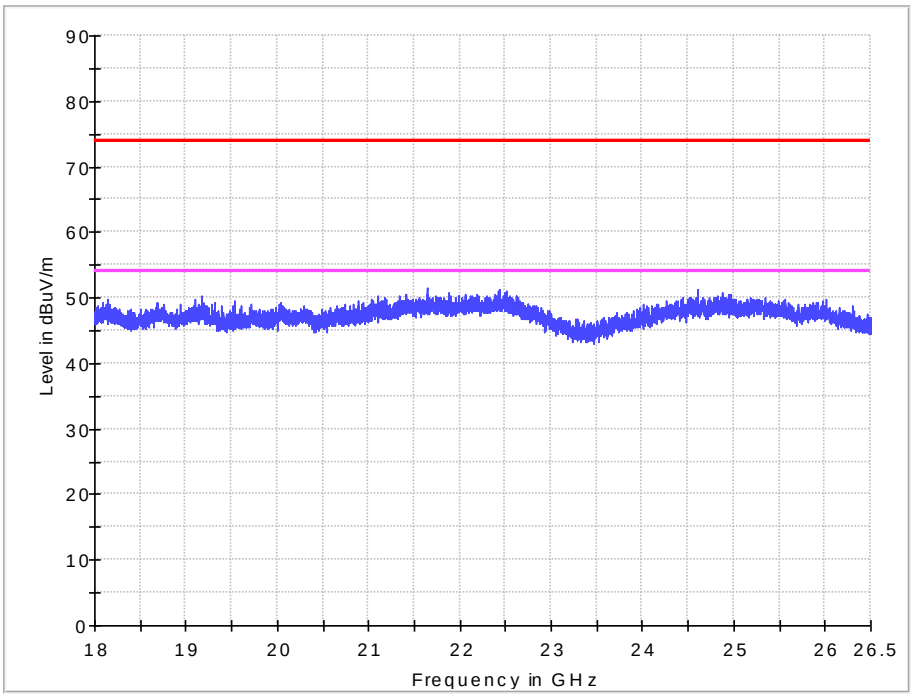


Table 11 Restricted Band Radiated Emission Data

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	
6.31175 - 6.31225	123 - 138	2200 - 2300	
8.291 - 8.294	149.9 - 150.05	2310 - 2390	
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	
12.29 - 12.293	167.72 - 173.2	3332 - 3339	
12.51975 - 12.52025	240 - 285	3345.8 - 3358	
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

Except as shown in table 9 to table 15, all other emission of the above band were less than the limit 20dB.

7. 20DB BANDWIDTH MEASUREMENT

7.1. Limits of 20dB Bandwidth Measurement

CFR 47 (FCC) part 15.247 (a) (1) and DA 00-705

7.2. Test Procedure

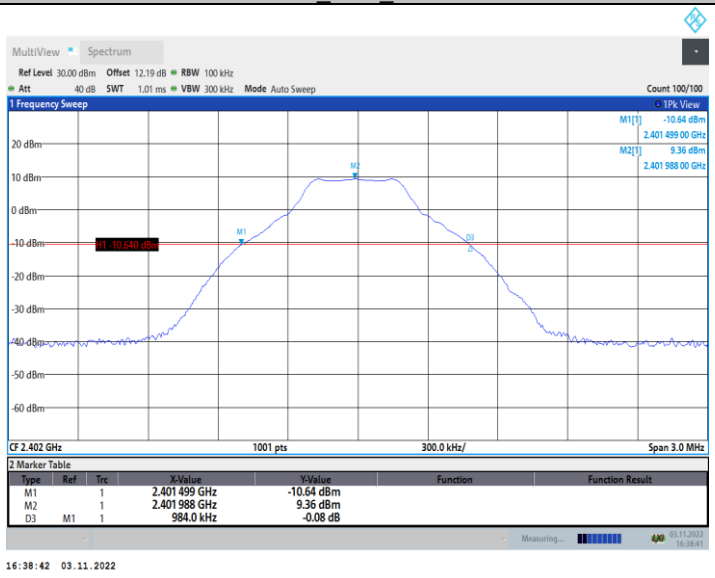
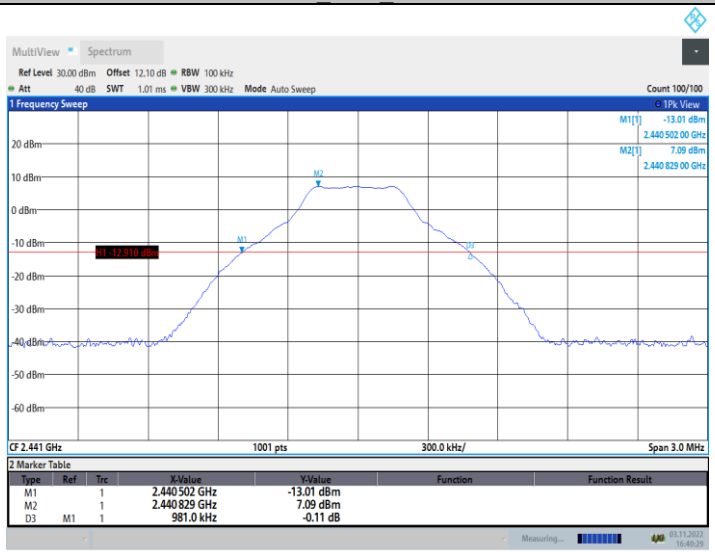
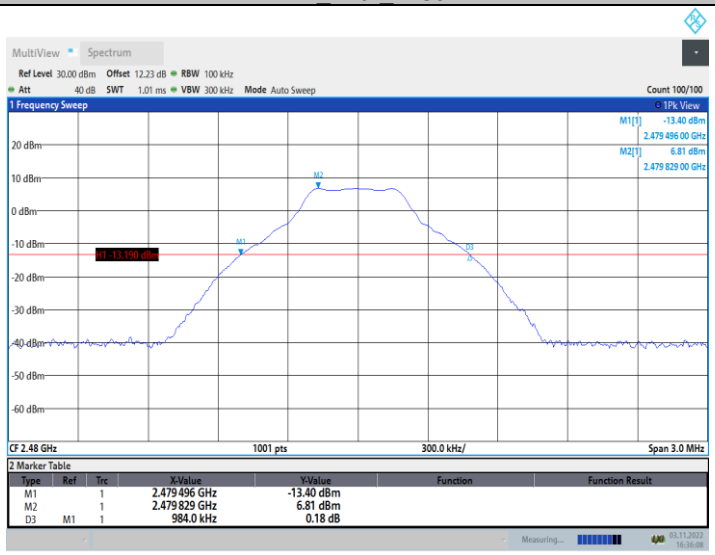
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and VBW≥RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

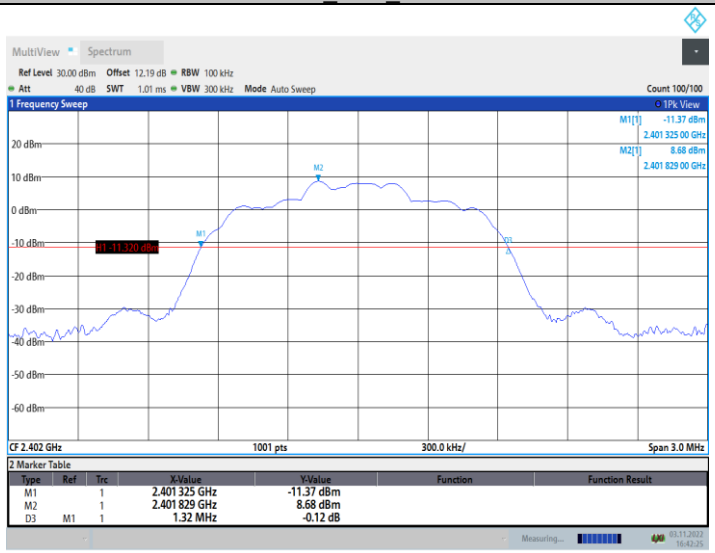
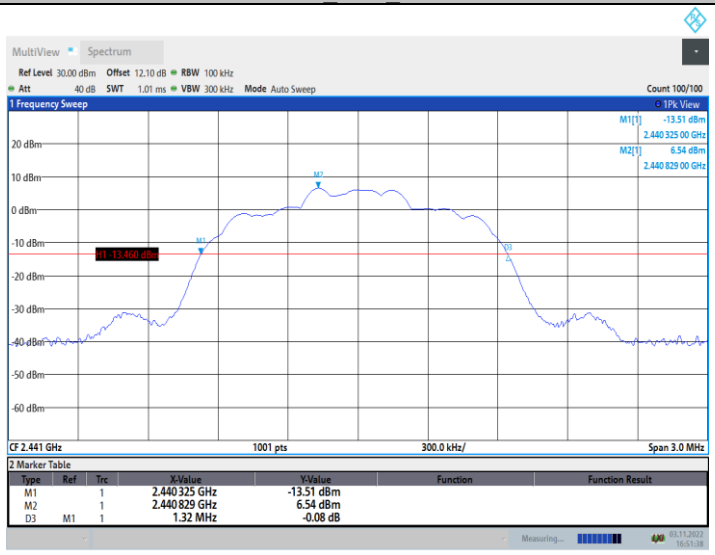
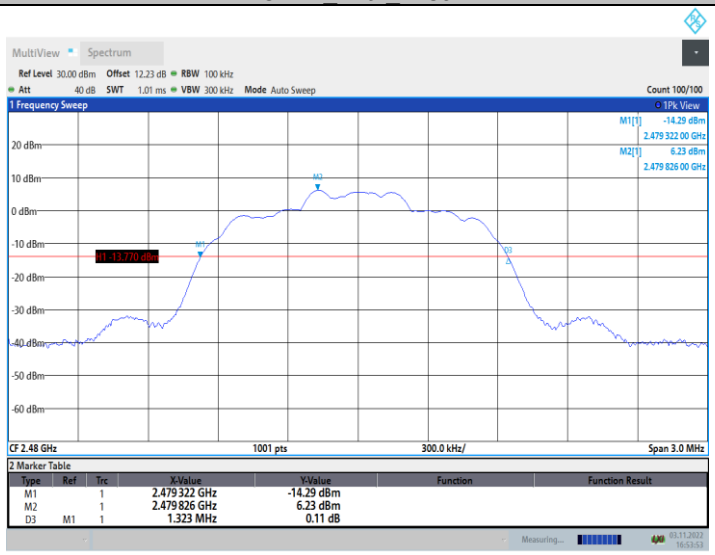
7.3. Test Setup

7.4. Test Data

Table 12 20dB Bandwidth Test Data

Test Mode	CHANNEL FREQUENCY (MHz)	Modulation	20dB BANDWIDTH (MHz)	Result
DH1	2402	GFSK	0.98	Pass
	2441		0.98	Pass
	2480		0.98	Pass
3DH1	2402	8DPSK	1.32	Pass
	2441		1.32	Pass
	2480		1.32	Pass

DH1_Ant1_2402
 16:38:42 03.11.2022
DH1_Ant1_2441
 16:40:30 03.11.2022
DH1_Ant1_2480
 16:36:09 03.11.2022

3DH1_Ant1_2402

3DH1_Ant1_2441

3DH1_Ant1_2480


8. CARRIER FREQUENCY SEPARATION MEASUREMENT

8.1. Limits of Carrier Frequency Separation Measurement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

8.2. Test Procedure

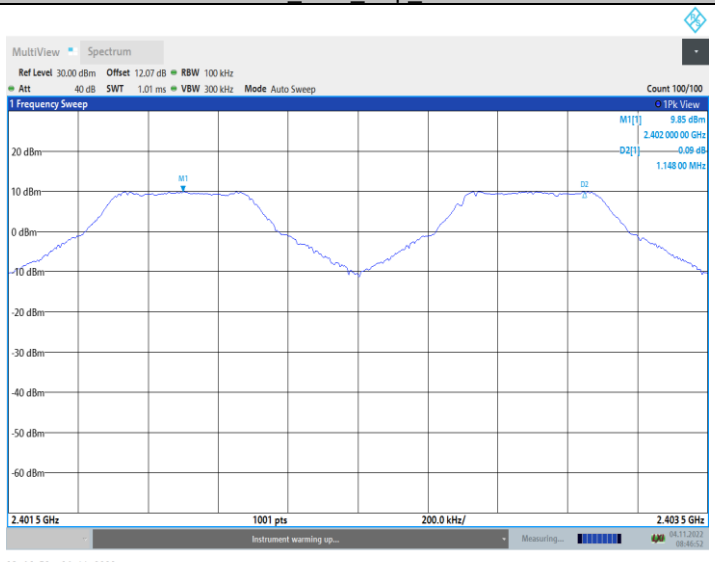
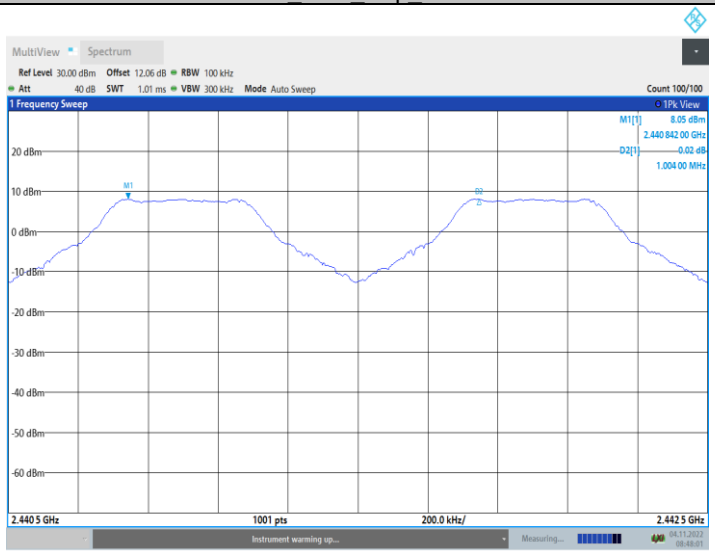
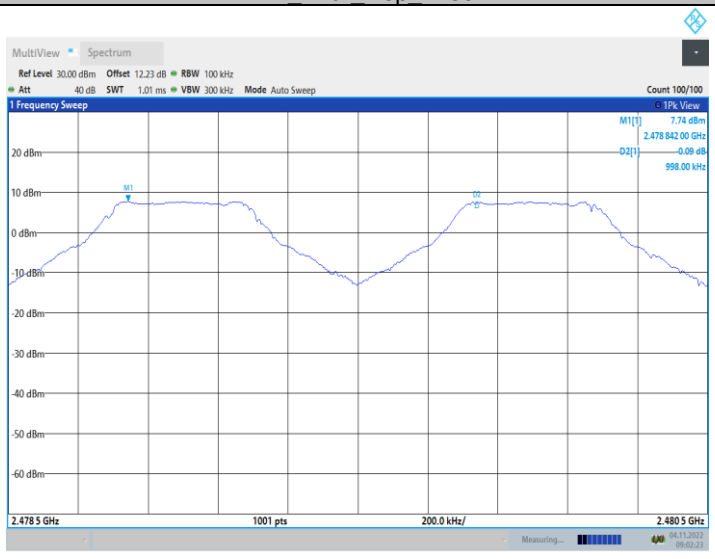
(a) Connect test port of EUT to spectrum analyzer and universal communication tester.
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function, then set the measured frequency number to two adjacent channels separately and test the carrier frequency separation with spectrum analyzer.

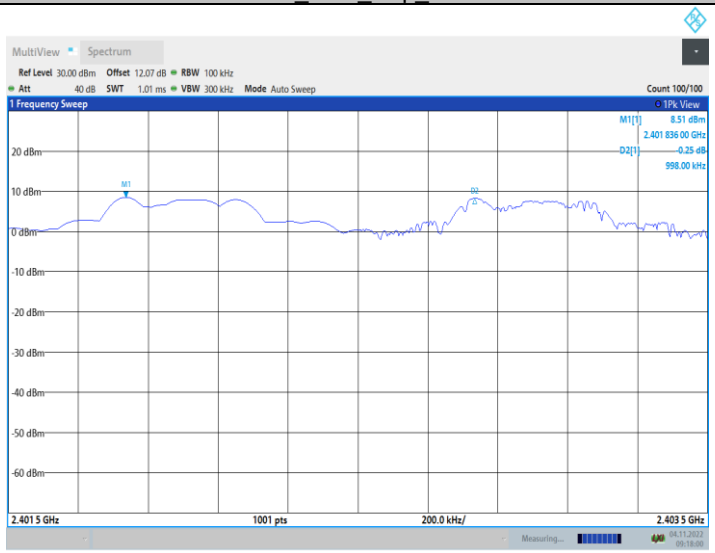
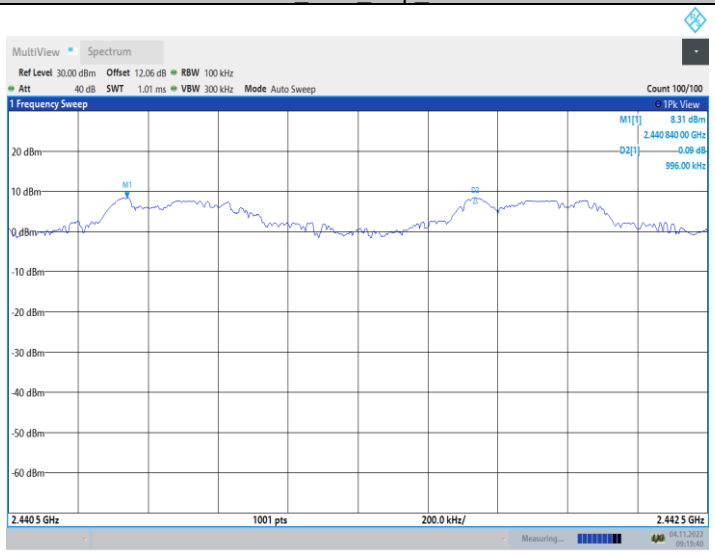
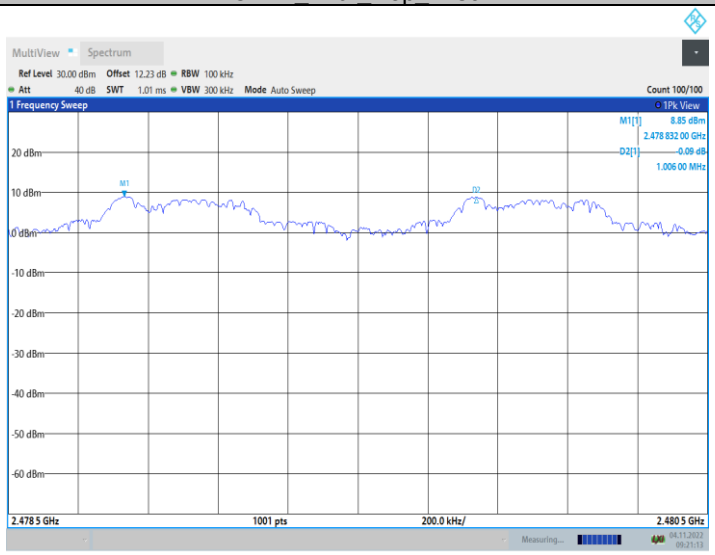
8.3. Test Setup

8.4. Test Data

Table 13 Carrier Frequencies Separation

Test Mode	Frequency [MHz]	Frequency [MHz]	Modulation	Frequency separation [MHz]	Limit [MHz]	Result
DH1	2402	2403	GFSK	1.148	≥0.980	Pass
	2441	2442		1.004	≥0.980	Pass
	2479	2480		0.998	≥0.980	Pass
3DH1	2402	2403	8DPSK	0.998	≥0.880	Pass
	2441	2442		0.996	≥0.880	Pass
	2479	2480		1.006	≥0.880	Pass

DH1_Ant1_Hop_2402
 08:46:52 04.11.2022
DH1_Ant1_Hop_2441
 08:48:02 04.11.2022
DH1_Ant1_Hop_2480
 09:02:24 04.11.2022

3DH1_Ant1_Hop_2402

3DH1_Ant1_Hop_2441

3DH1_Ant1_Hop_2480


9. NUMBER OF HOPPING CHANNEL

9.1. Limits of Number of Hopping Channel

Number of hopping channel should be compliance with the requirements in part15.247 (a) (1) III.

9.2. Test Procedure

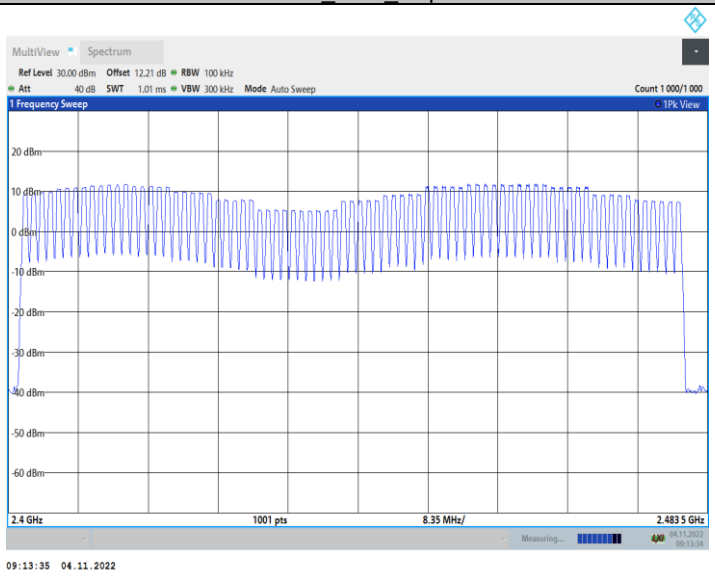
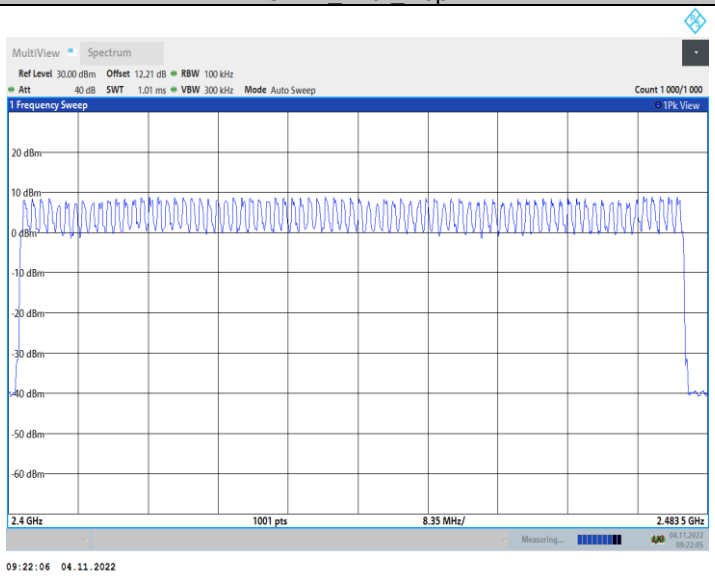
(a) Connect test port of EUT to spectrum analyzer.
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch on. Frequency hopping function, then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.
(c) Count the quantity of peaks to get the number of hopping channels.

9.3. Test Setup

9.4. Test Data

Table 14 Hopping Channel Number Test Data

Test Mode	Hopping Numbers	Modulation	Limit	Result
DH1	79	GFSK	>15	Pass
3DH1	79	8DPSK	>15	Pass

DH1_Ant1_Hop

3DH1_Ant1_Hop


10. TIME OF OCCUPANCY

10.1. Limits of Time Occupancy

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2. Test Procedure

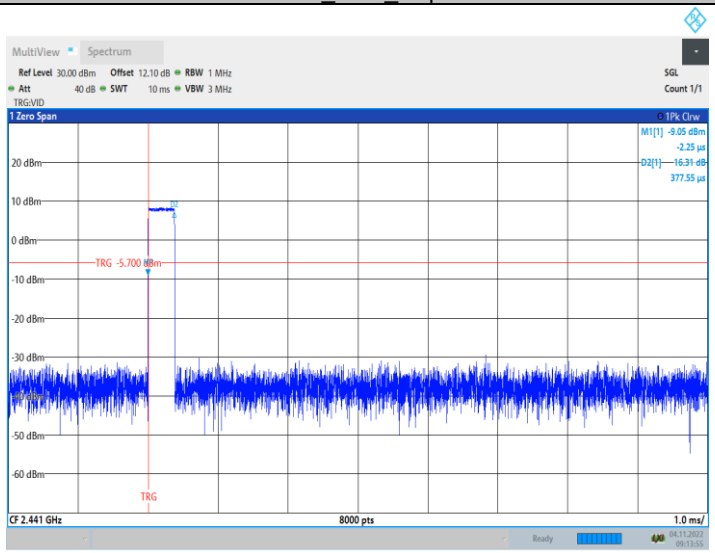
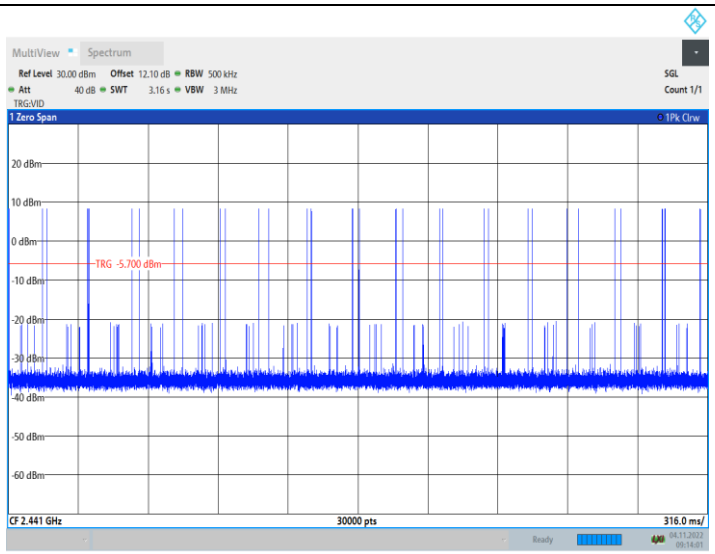
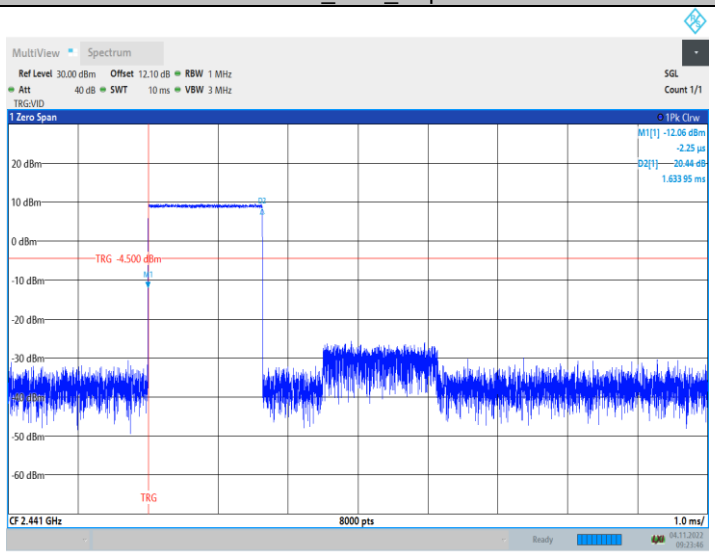
(a) Connect test port of EUT to spectrum analyzer and universal communication tester.
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch on frequency hopping function.
(c) Set the span of spectrum analyzer to 0 Hz, and set the resolution bandwidth to1 MHz and the video bandwidth to 1 MHz, then get the time domain measured diagram. and set sweep time to 2 times of one burst occupancy time, and measure the time of occupancy of one burst.
(d) Set the resolution bandwidth to1 MHz and the video bandwidth to 3 MHz, and set the sweep time to a period (0.4 seconds multiplied by the number of hopping channels employed), and count the number of the bursts.
(e) Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

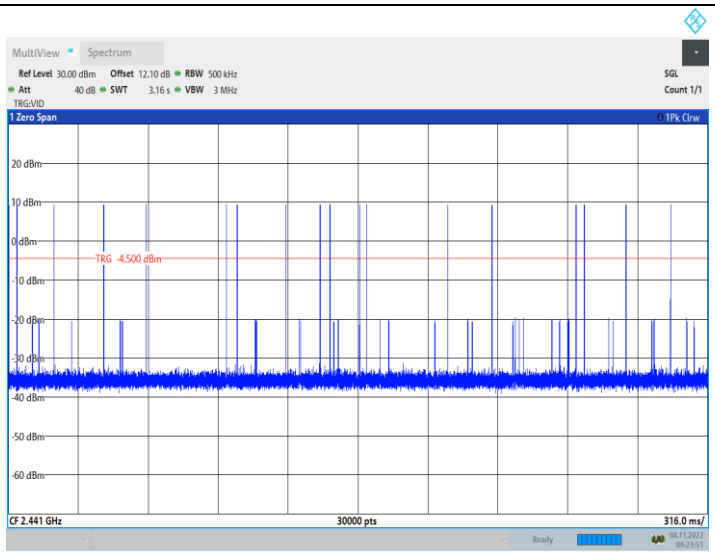
DH1: Dwell time equal to Pluse time (ms)*(1600/2/79)*31.6ms
DH3: Dwell time equal to Pluse time (ms)*(1600/4/79)*31.6ms
DH5: Dwell time equal to Pluse time (ms)*(1600/6/79)*31.6ms
AFH Mode:
DH1: Dwell time equal to Pluse time (ms)*(800/2/20)* (0.4*20) ms
DH3: Dwell time equal to Pluse time (ms)*(800/4/20)* (0.4*20) ms
DH5: Dwell time equal to Pluse time (ms)*(800/6/20)* (0.4*20) ms

10.3. Test Data

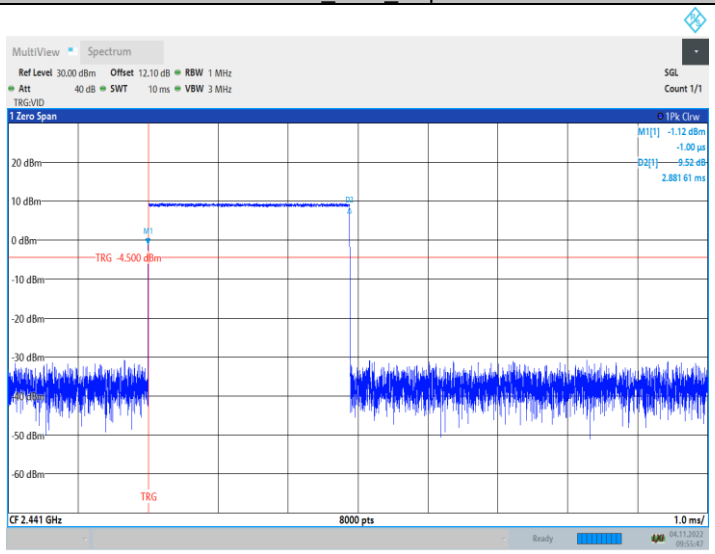
Table 15 Time of Occupancy

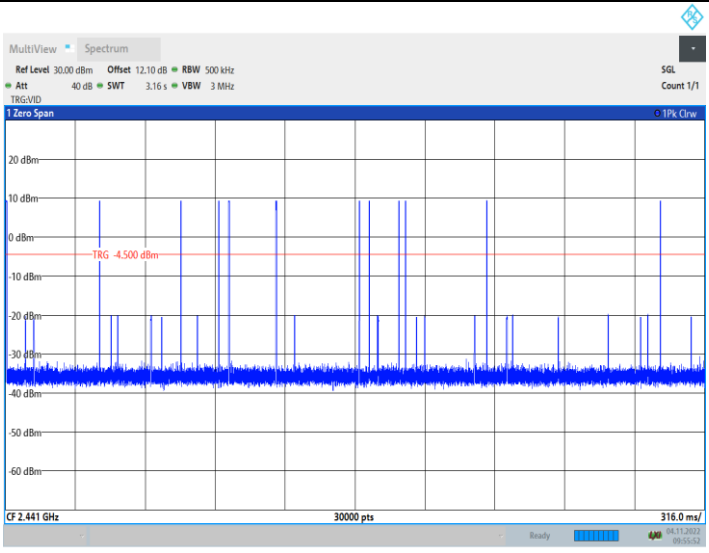
Data Packet	Time of Single Slot [ms]	Numbers of Slots in a period	Time of Occupied in a period [s]	AFH Mode Time of occupied in a period [s]	Limit [s]	Results
DH1	0.38	330	0.125	0.0625	<= 0.40	Pass
DH3	1.63	180	0.294	0.147	<= 0.40	Pass
DH5	2.88	130	0.375	0.0865	<= 0.40	Pass
3DH1	0.39	320	0.123	0.063	<= 0.40	Pass
3DH3	1.64	150	0.245	0.1145	<= 0.40	Pass
3DH5	2.89	80	0.231	0.1875	<= 0.40	Pass

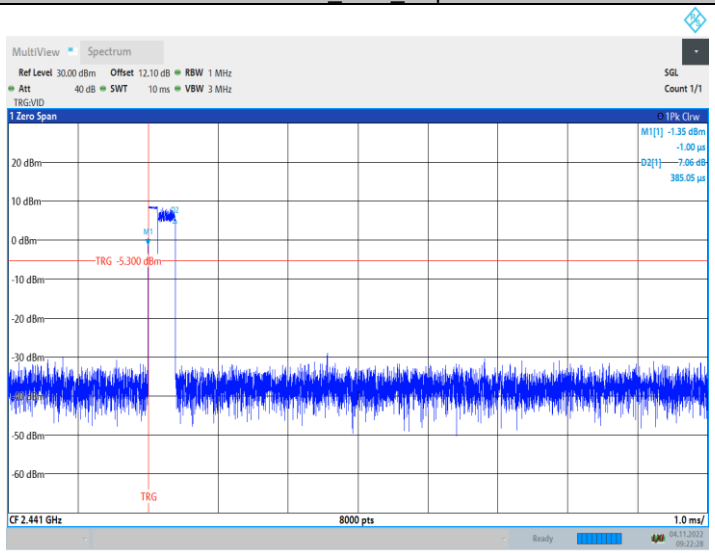
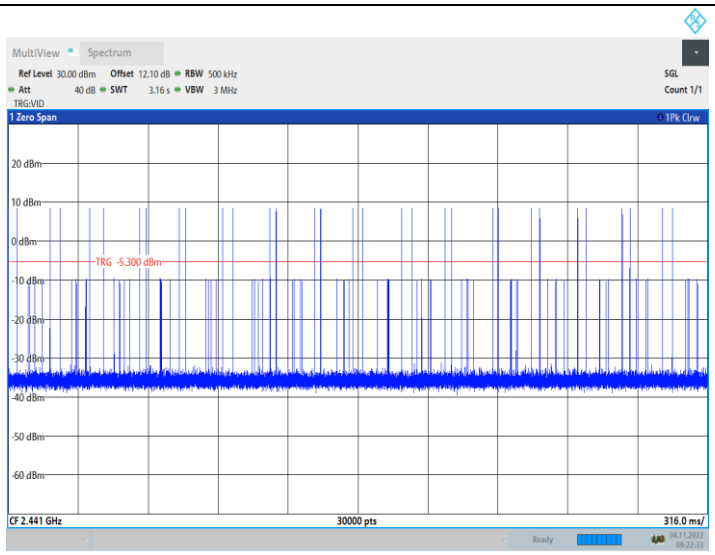
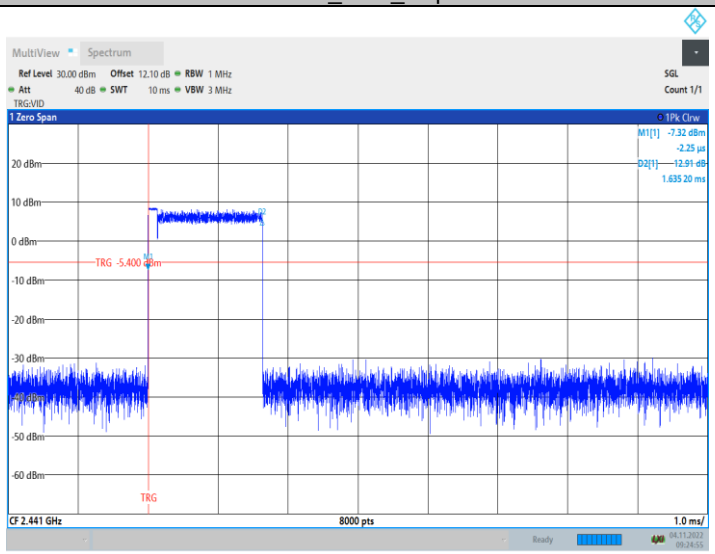
DH1_Ant1_Hop
 09:13:56 04.11.2022
 09:14:01 04.11.2022
DH3_Ant1_Hop
 09:23:46 04.11.2022

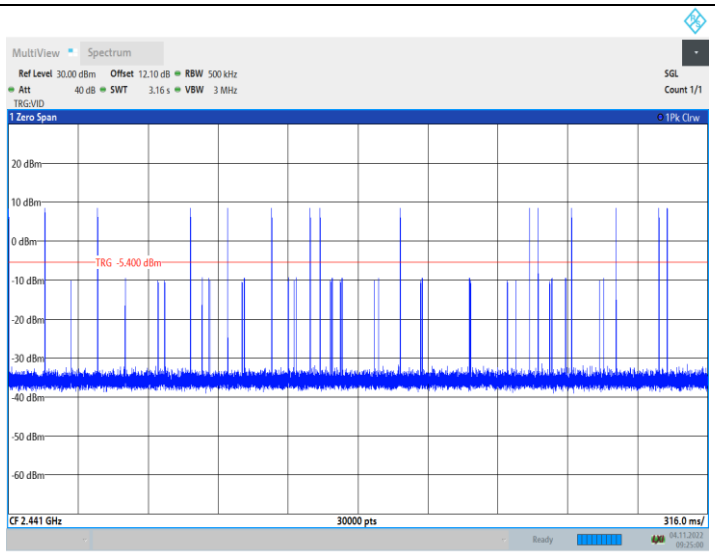

MultiView
Spectrum
Ref Level 30.00 dBm Offset 12.10 dB RBW 500 kHz
Att 40 dB SWT 3.16 s VBW 3 MHz
SGL
Count 1/1
TRG:VID
1 Zero Span
1Pk Clrw
20 dBm
10 dBm
0 dBm
TRG -4.500 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.441 GHz
30000 pts
316.0 ms/
Ready
09:23:52 04.11.2022

DH5_Ant1_Hop

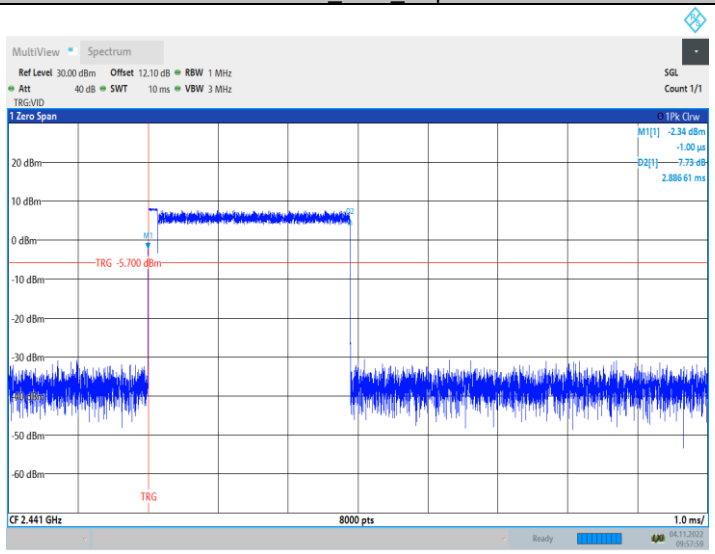

MultiView
Spectrum
Ref Level 30.00 dBm Offset 12.10 dB RBW 1 MHz
Att 40 dB SWT 10 ms VBW 3 MHz
SGL
Count 1/1
TRG:VID
1 Zero Span
1Pk Clrw
M1[1] -1.12 dBm
-1.00 µs
D2[1] -9.52 dB
2.881 61 ms
20 dBm
10 dBm
0 dBm
M1
D2
TRG -4.500 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
TRG
CF 2.441 GHz
8000 pts
1.0 ms/
Ready
09:55:47 04.11.2022

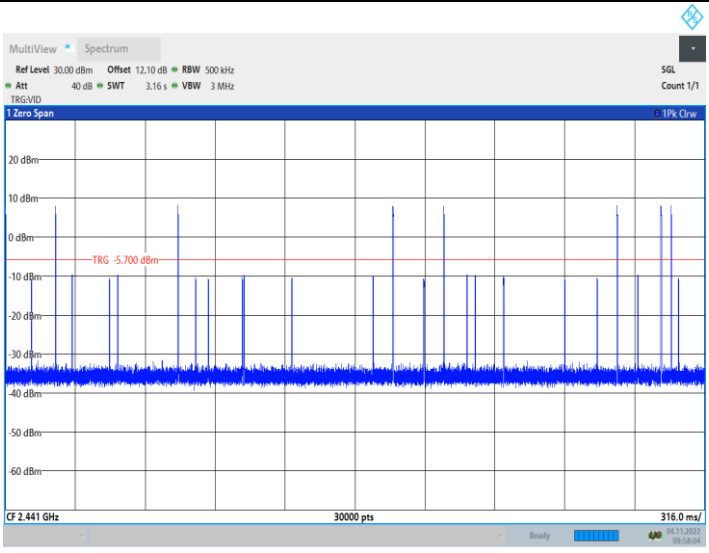

MultiView
Spectrum
Ref Level 30.00 dBm Offset 12.10 dB RBW 500 kHz
Att 40 dB SWT 3.16 s VBW 3 MHz
SGL
Count 1/1
TRG:VID
1 Zero Span
1Pk Clrw
20 dBm
10 dBm
0 dBm
TRG -4.500 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.441 GHz
30000 pts
316.0 ms/
Ready
09:55:53 04.11.2022

3DH1_Ant1_Hop


3DH3_Ant1_Hop




3DH5_Ant1_Hop





11. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

11.1. Limits of Maximum Conducted Output Power Measurement

Compliance with part 15.247 (b) (1) & RSS-247Clause 5.4(2), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watt.

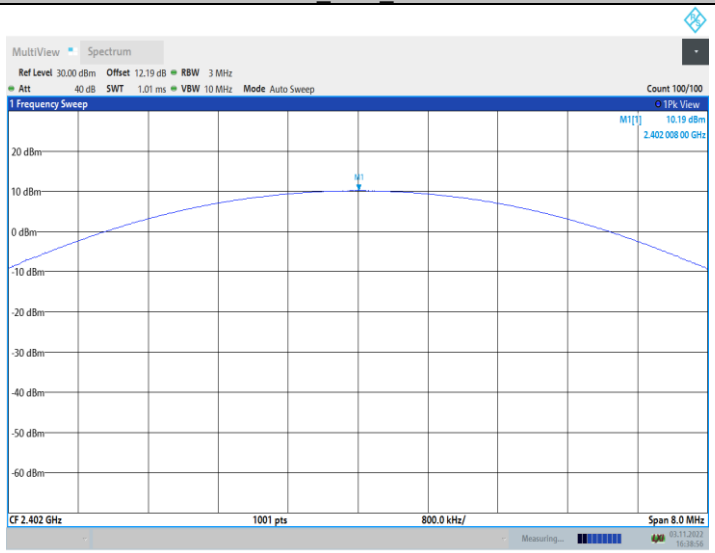
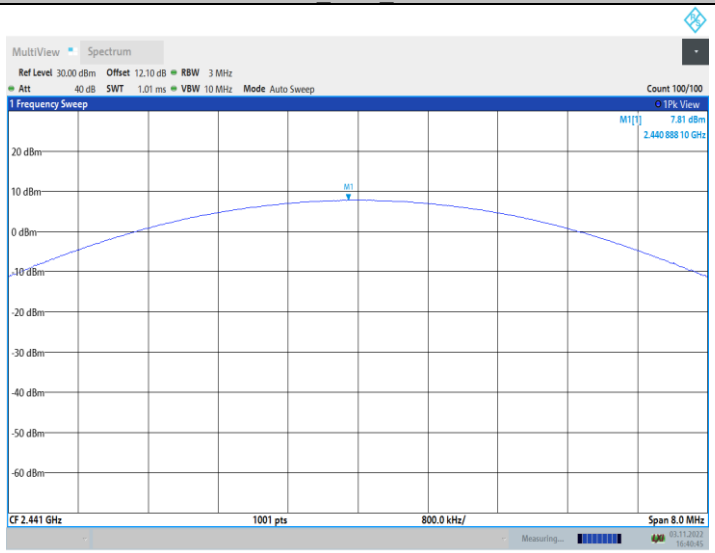
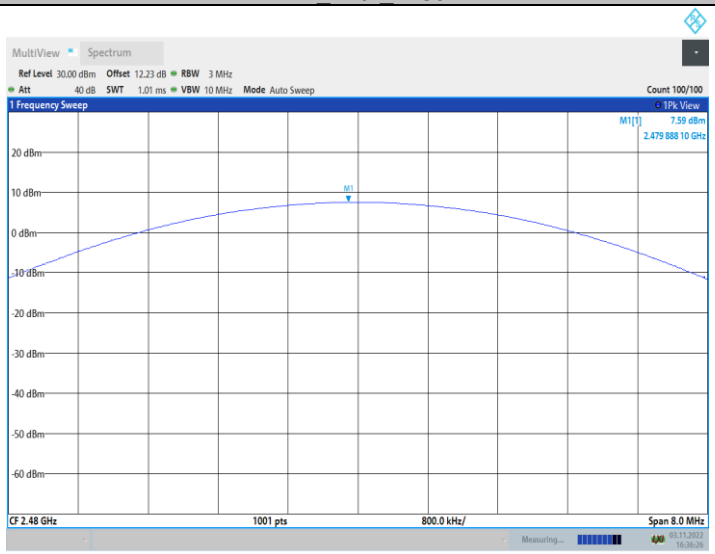
11.2. Test Procedure

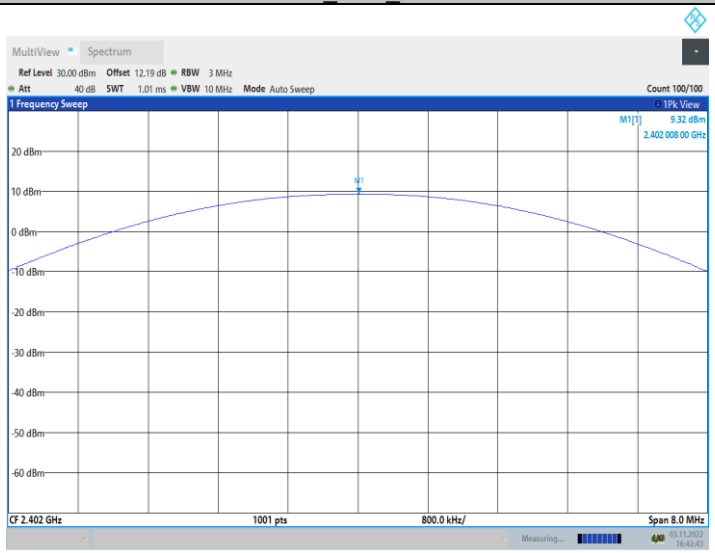
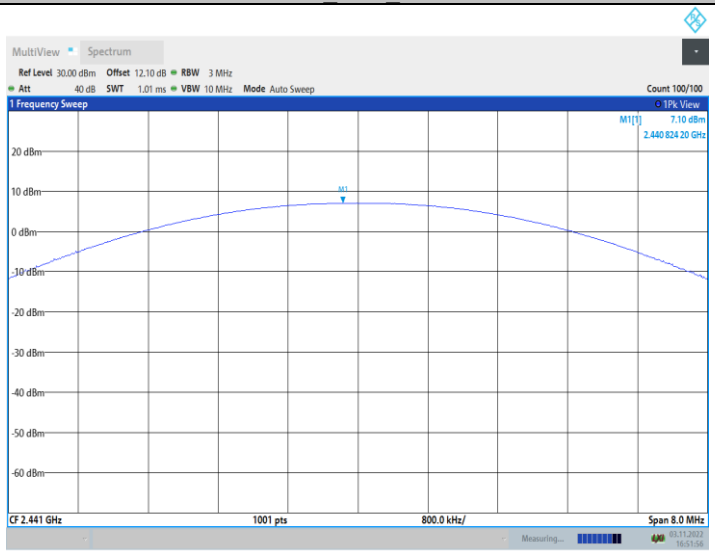
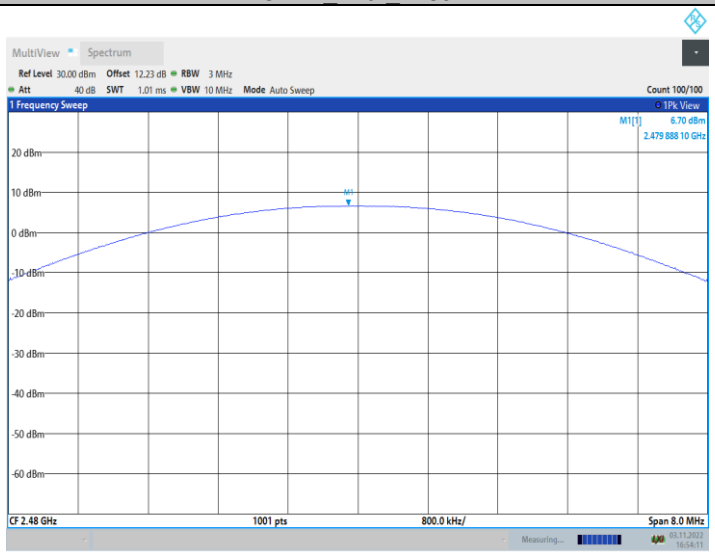
(a) Connect test port of EUT to universal communication tester.
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
(c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted output power separately.

11.3. Test Data

Table 16 Maximum Conducted Output Power Test Data

Test Mode	Center Freq. [MHz]	Modulation	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
DH1	2402	GFSK	10.19	≤20.97	Pass
	2441		7.81	≤20.97	Pass
	2480		7.59	≤20.97	Pass
3DH1	2402	8DPSK	9.32	≤20.97	Pass
	2441		7.1	≤20.97	Pass
	2480		6.7	≤20.97	Pass

DH1_Ant1_2402
 16:38:57 03.11.2022
DH1_Ant1_2441
 16:40:46 03.11.2022
DH1_Ant1_2480
 16:36:27 03.11.2022

3DH1_Ant1_2402
 16:42:44 03.11.2022
3DH1_Ant1_2441
 16:51:56 03.11.2022
3DH1_Ant1_2480
 16:54:11 03.11.2022

12. BAND EDGES MEASUREMENT

12.1. Limits of Band Edges Measurement

Below –20dB of the highest emission level of operating band (in 100kHz resolution bandwidth).

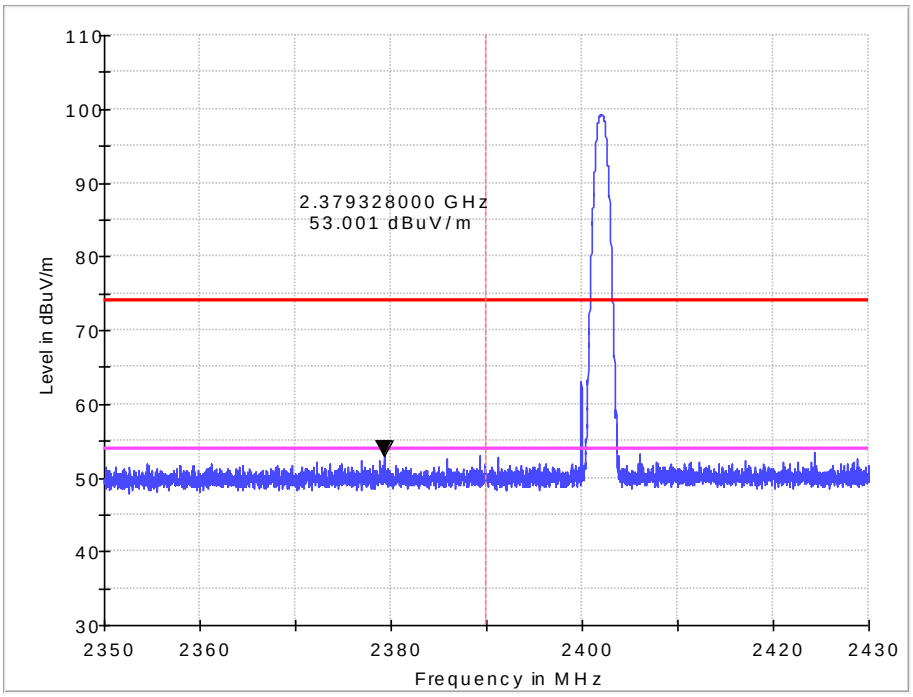
12.2. Test Procedure

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
(a) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
(b) PEAK: RBW=VBW=1MHz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

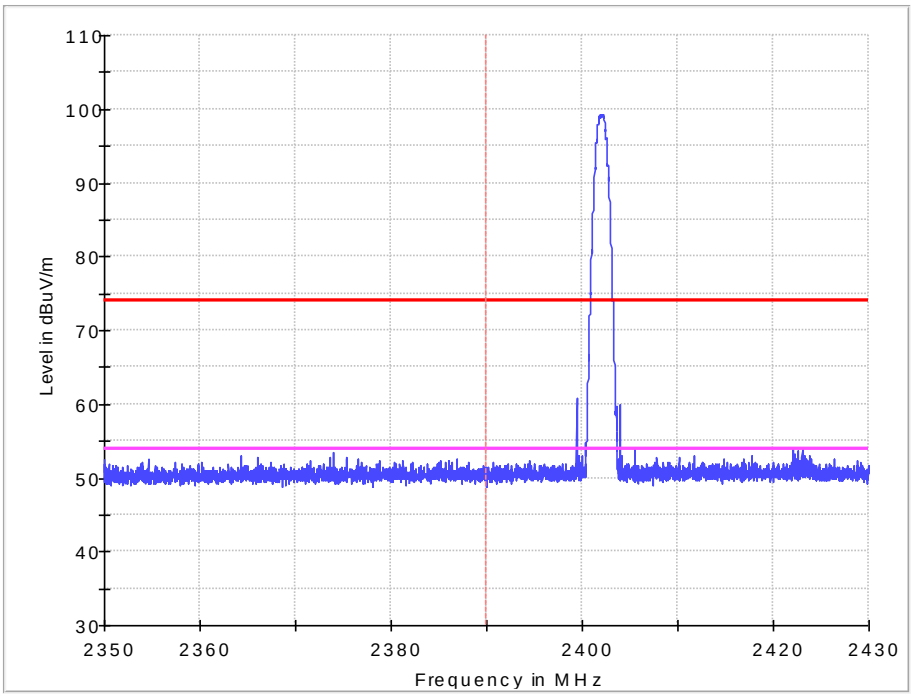
12.3. Test Data

The measured plots are attached on the following. Test data shows compliance with the band edge requirement in part 15.247(d).

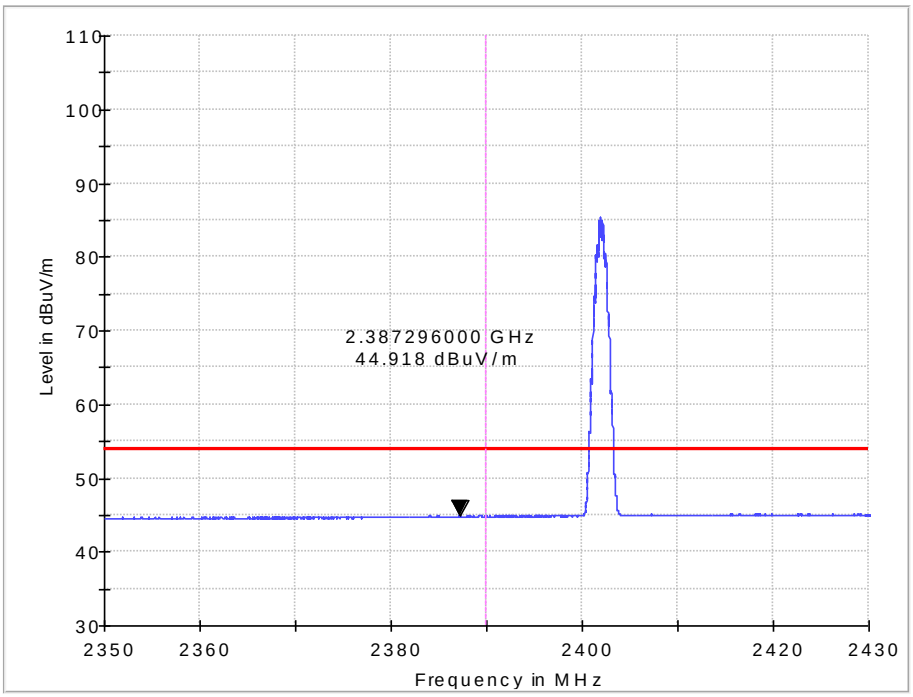
GFSK
Low edge
PK
Horizontal



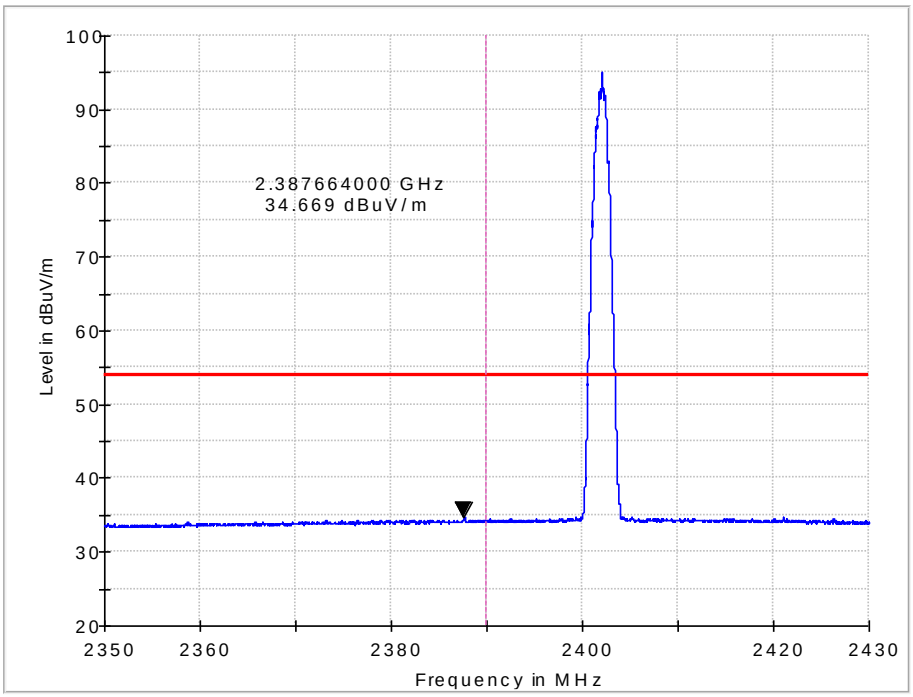
Vertical



AV
Horizontal

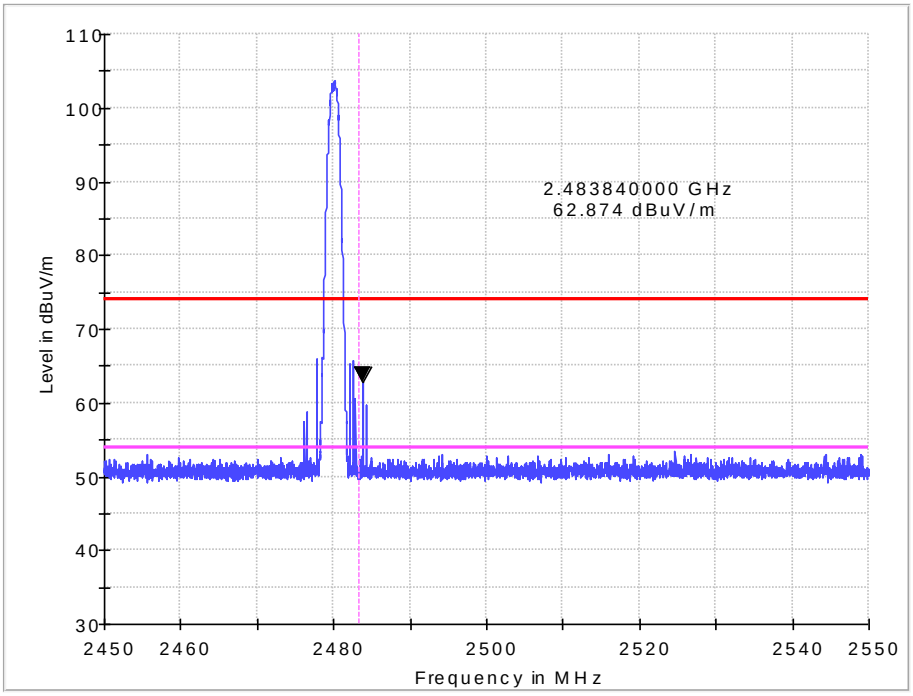


Vertical

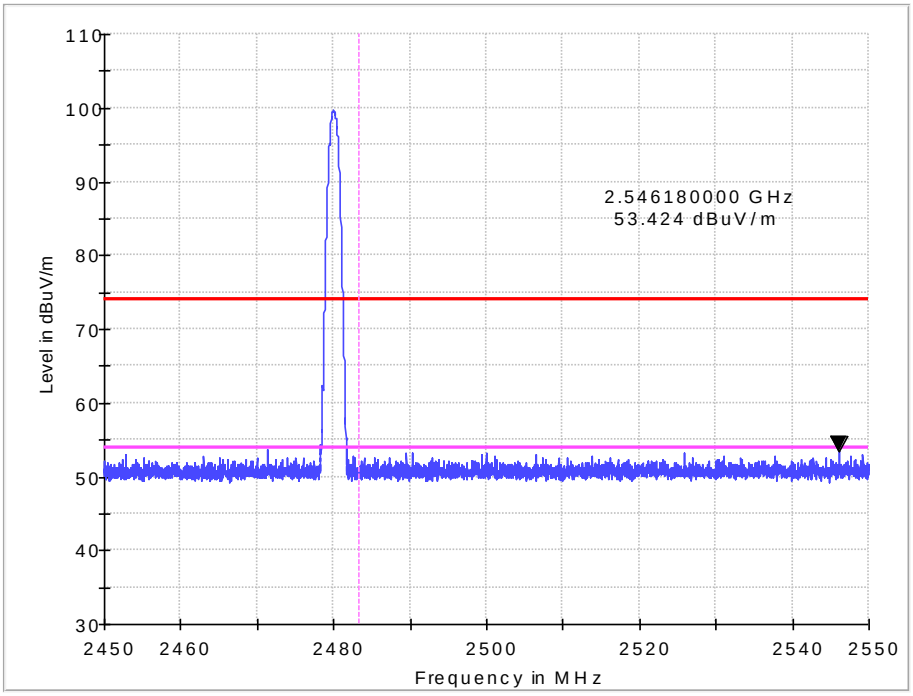


GFSK

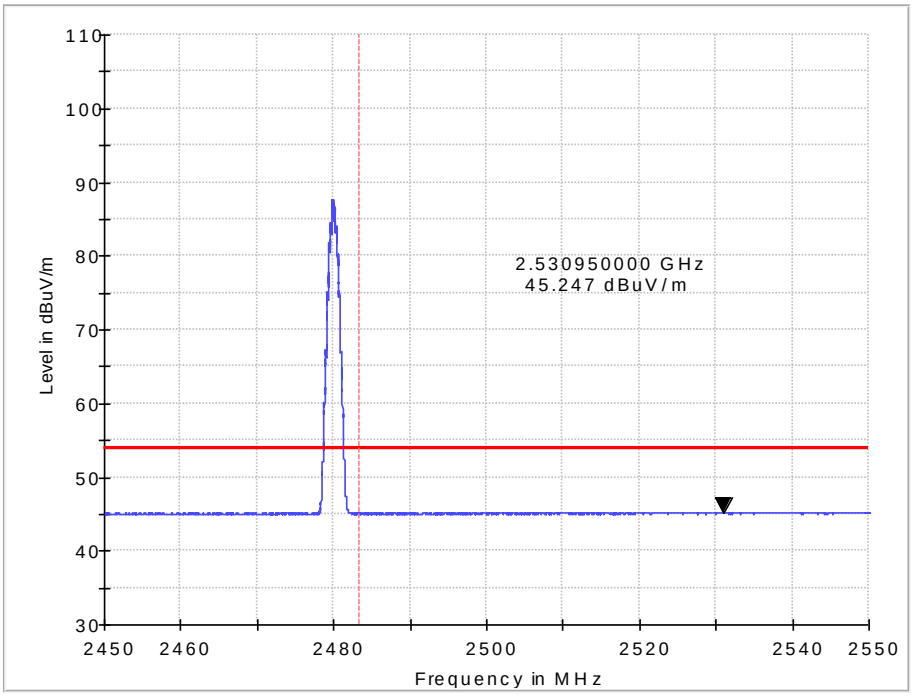
Upper edge
PK
Horizontal



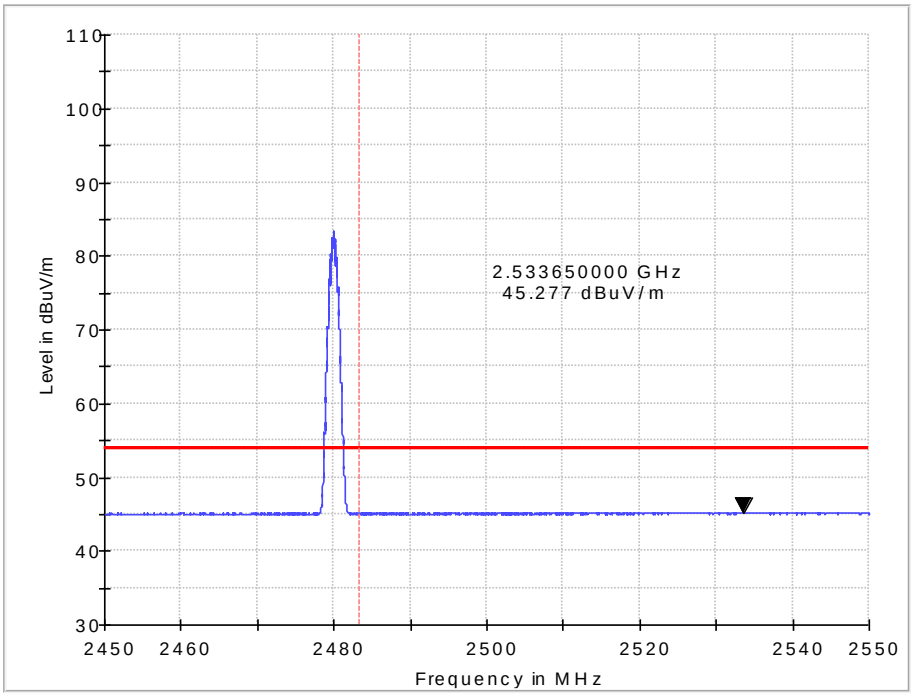
Vertical



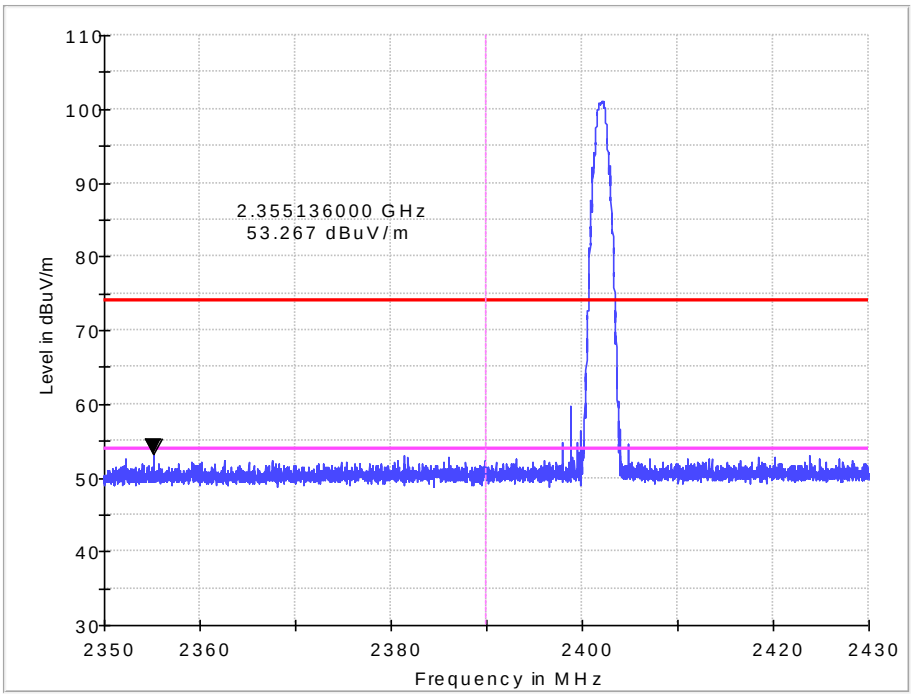
AV
Horizontal



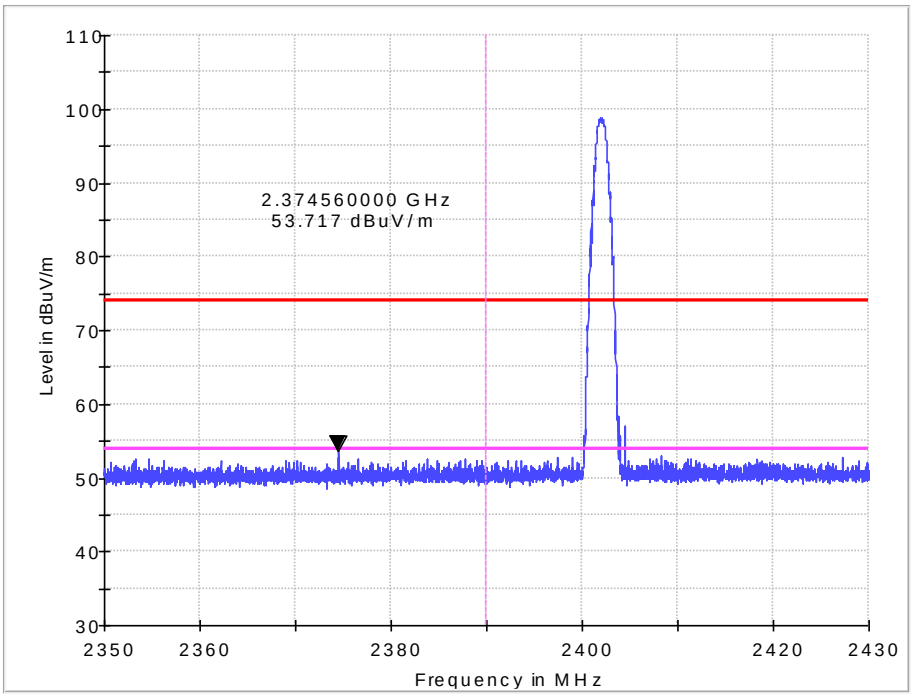
Vertical



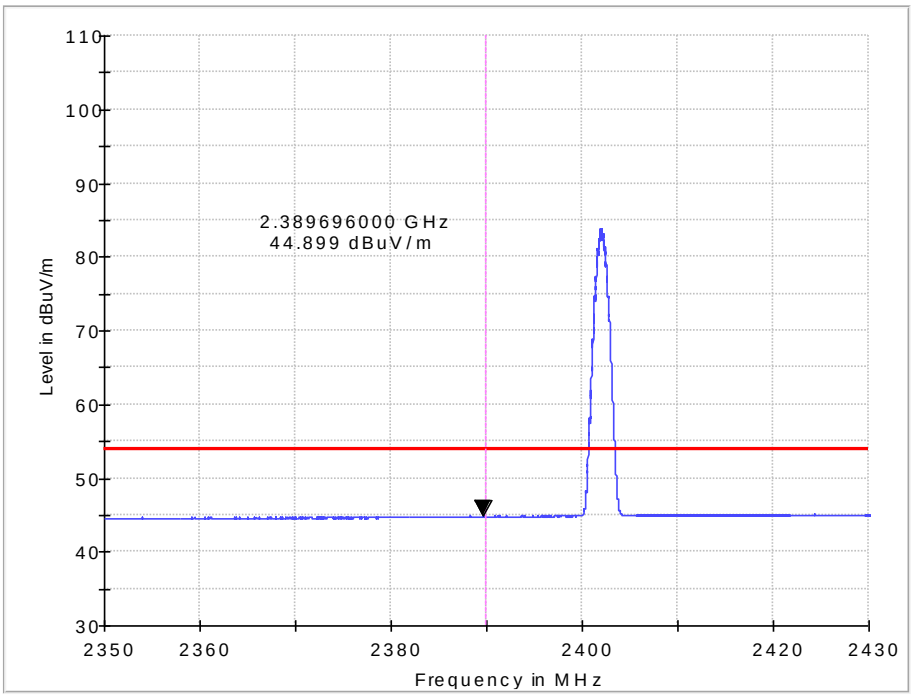
8DPSK
Low edge
PK
Horizontal



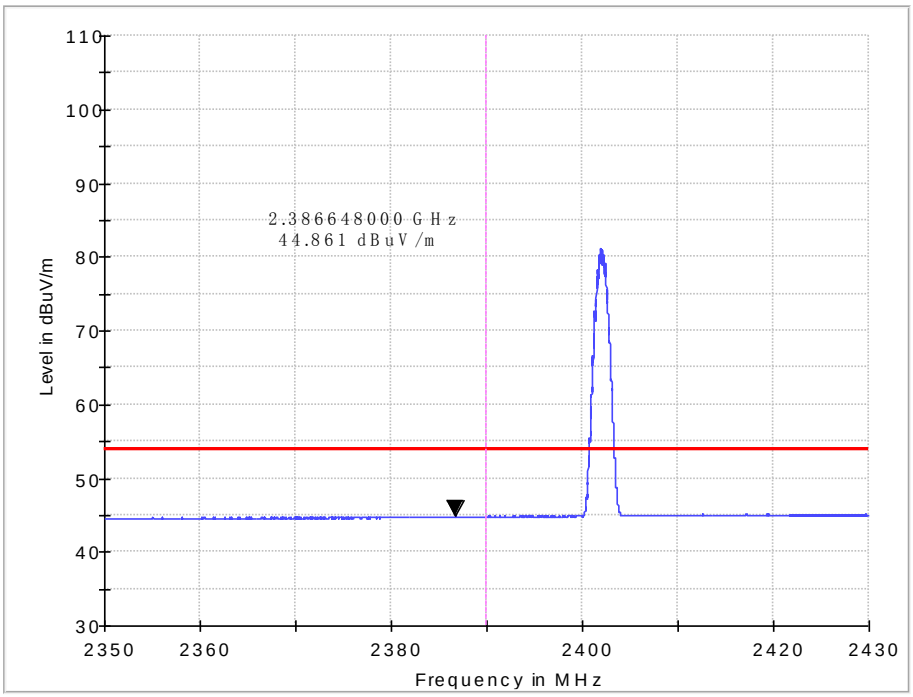
Vertical



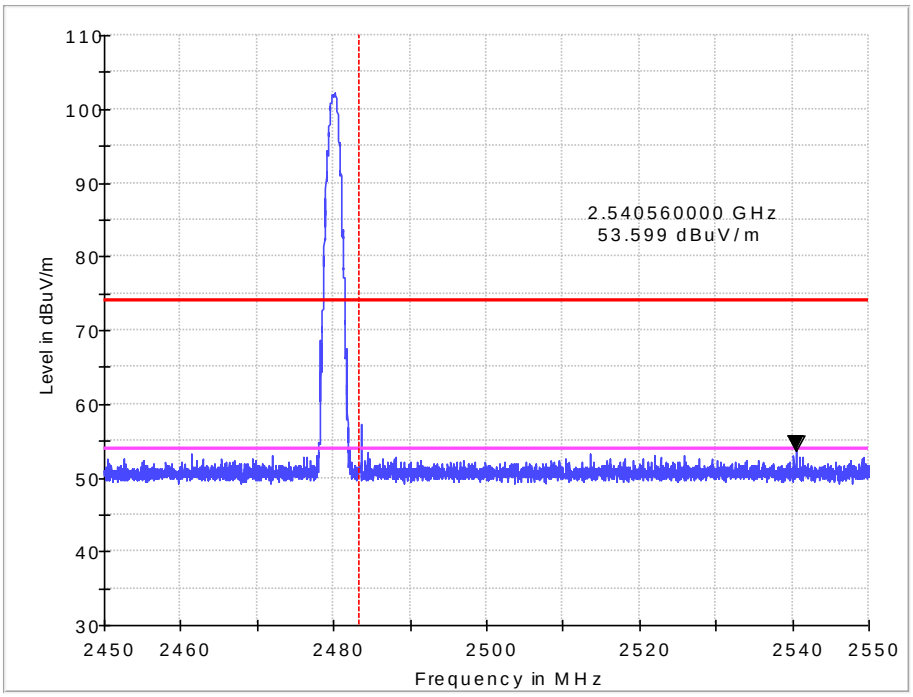
AV
Horizontal



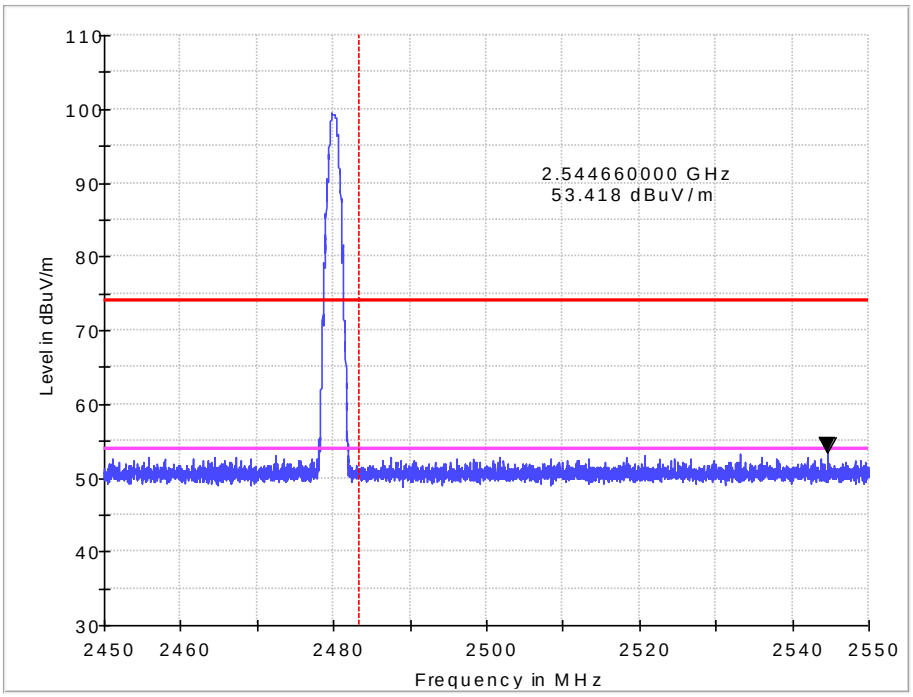
Vertical



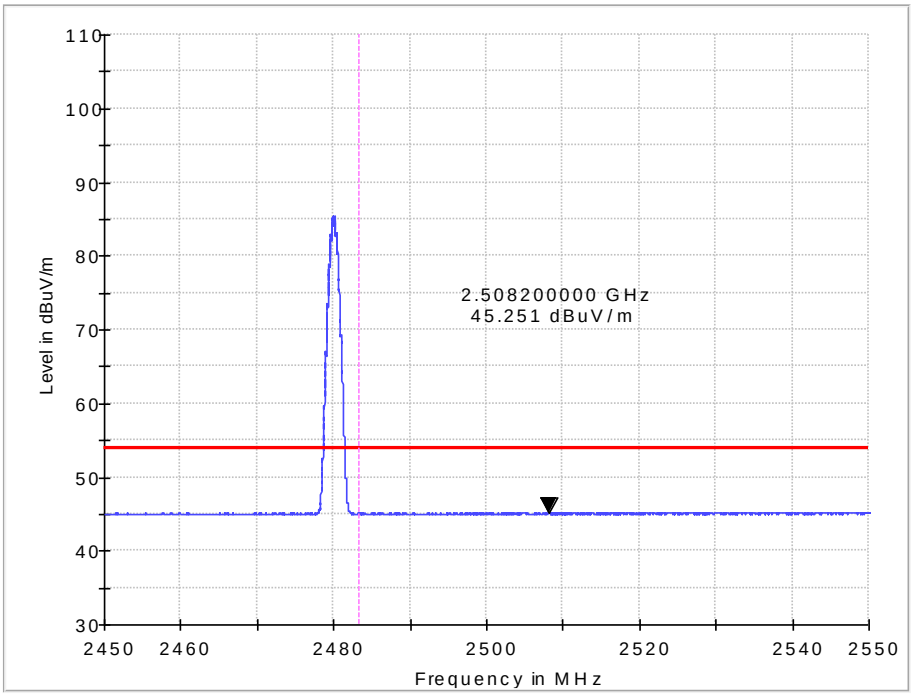
8DPSK
Upper Edge
PK
Horizontal



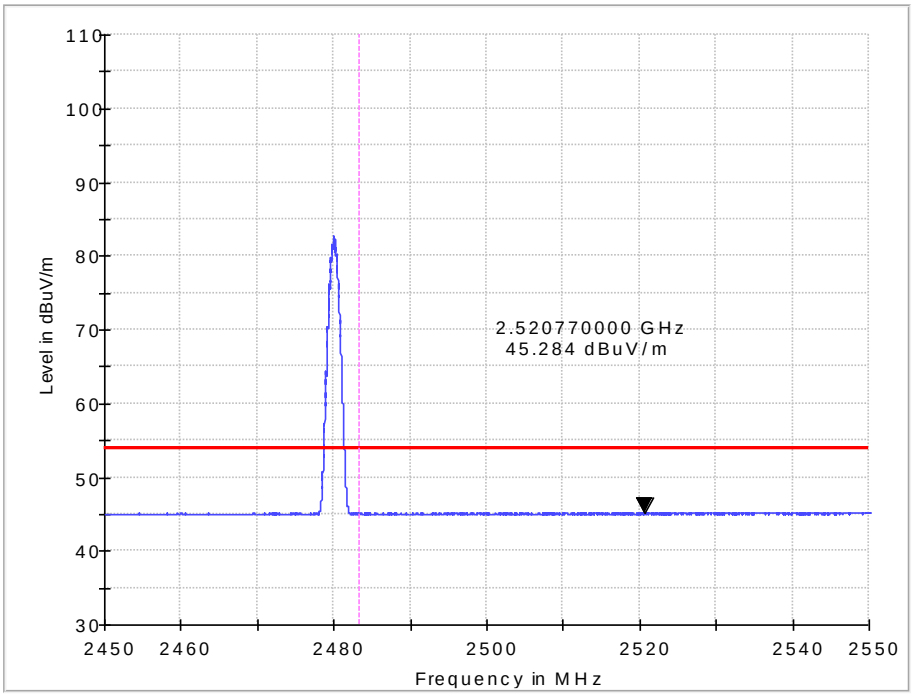
Vertical



AV
Horizontal



Vertical



13. CONDUCTED SPURIOUS EMISSION

13.1. Limits of Band Edges Measurement

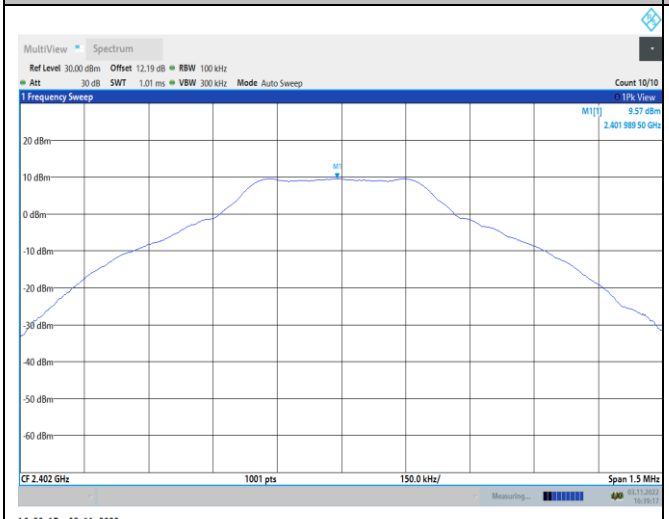
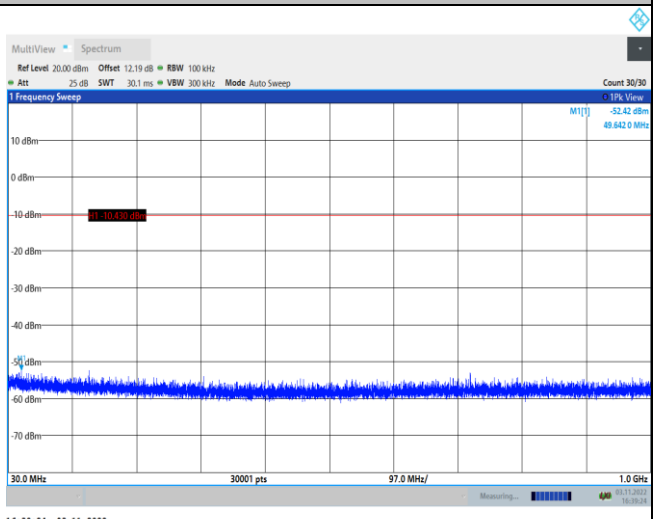
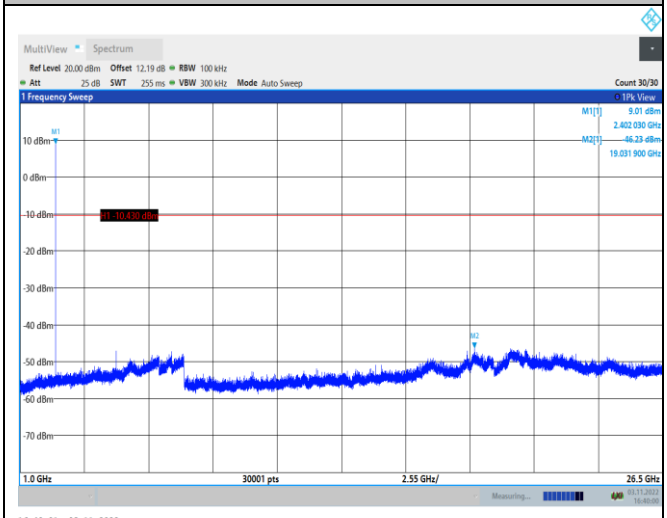
Below –20dB of the highest emission level of operating band (in 100 kHz resolution bandwidth).

13.2. Test Procedure

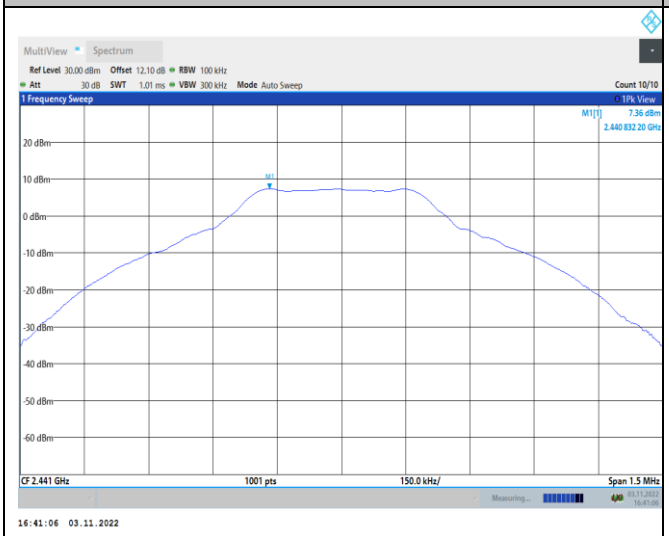
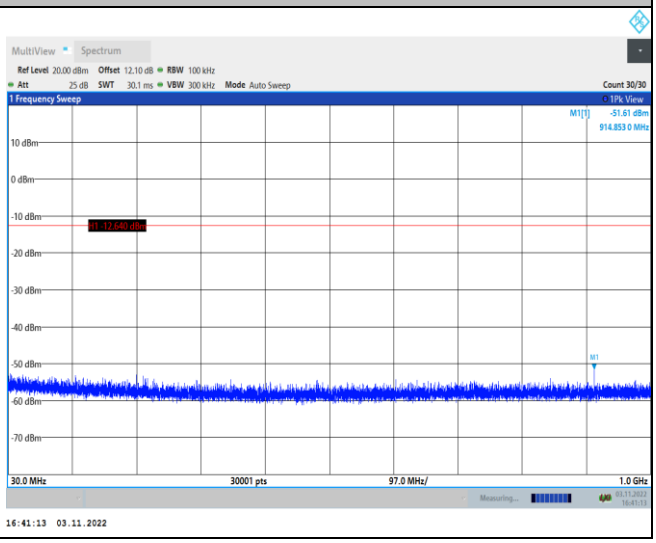
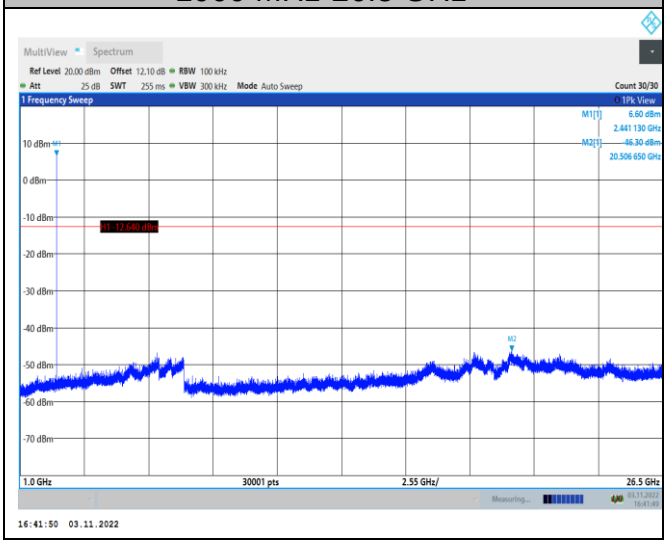
The transmitter output was connected to the spectrum analyzer.
The resolution bandwidth is set to100 kHz. The video bandwidth is set to 300 kHz.
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal

13.3. Test Data

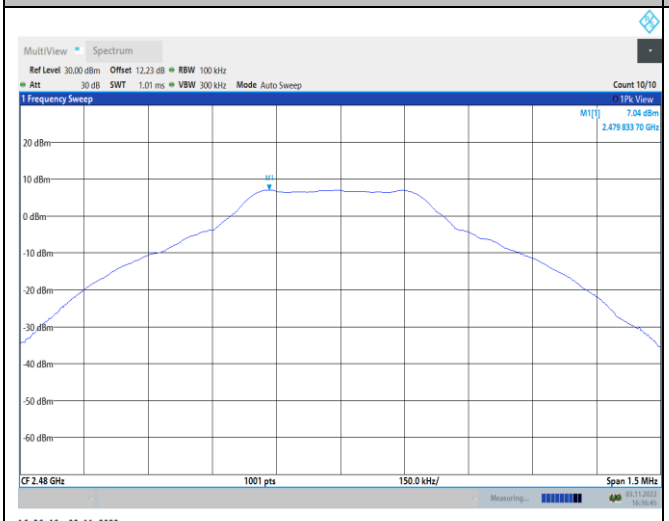
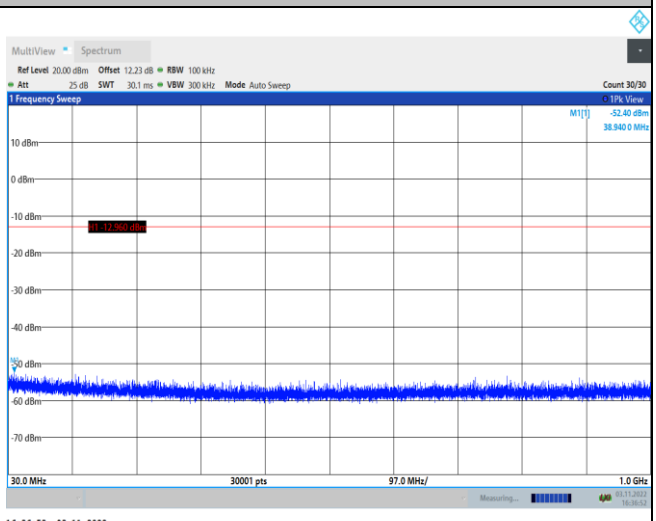
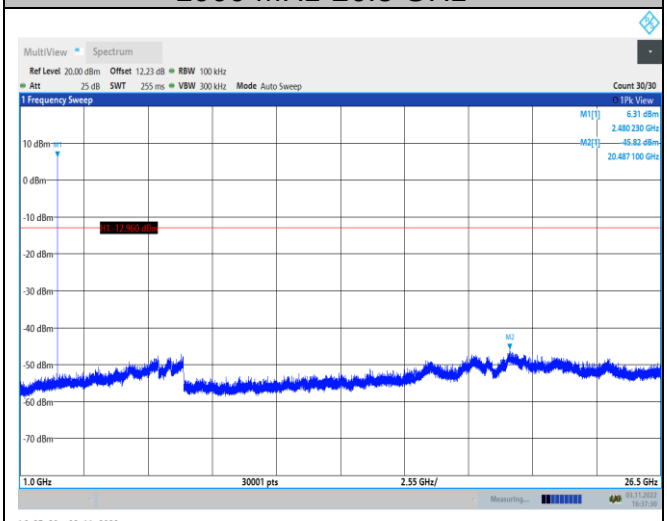
GFSK
Low Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

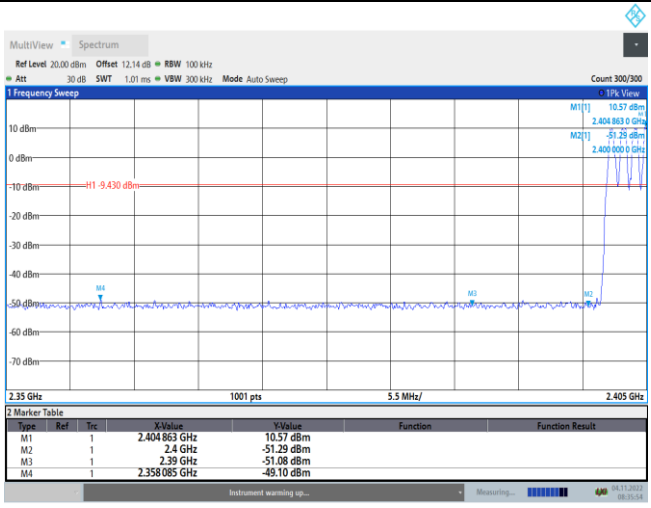
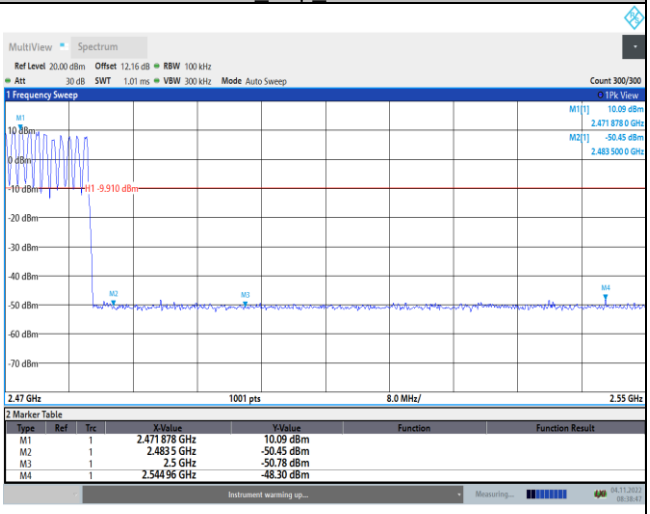
GFSK
Mid Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

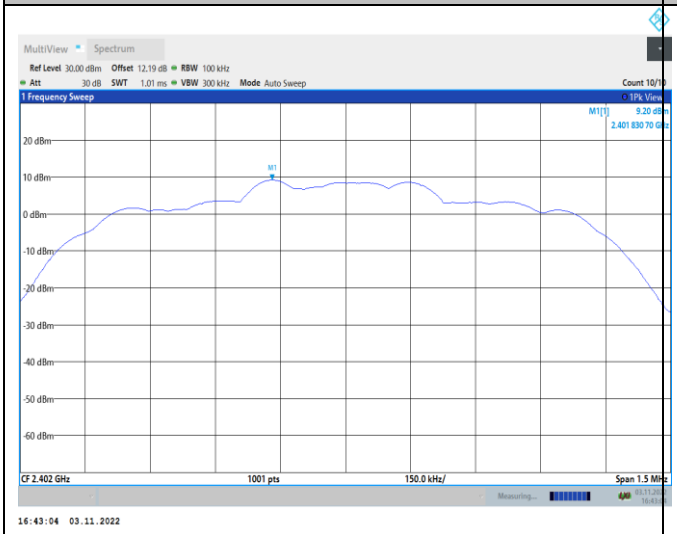
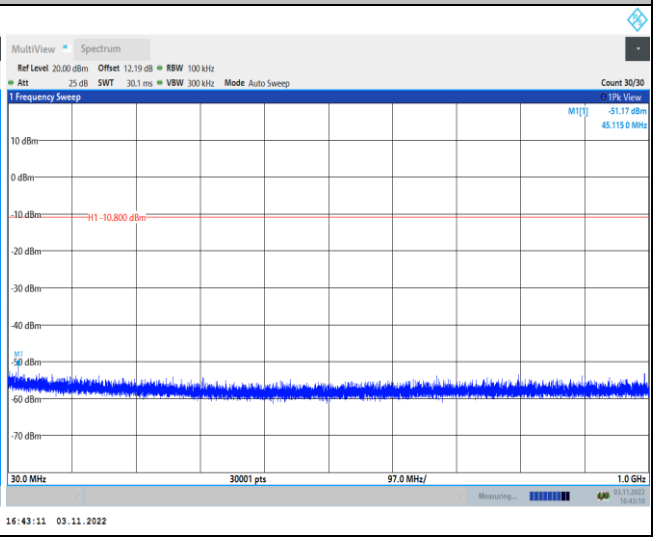
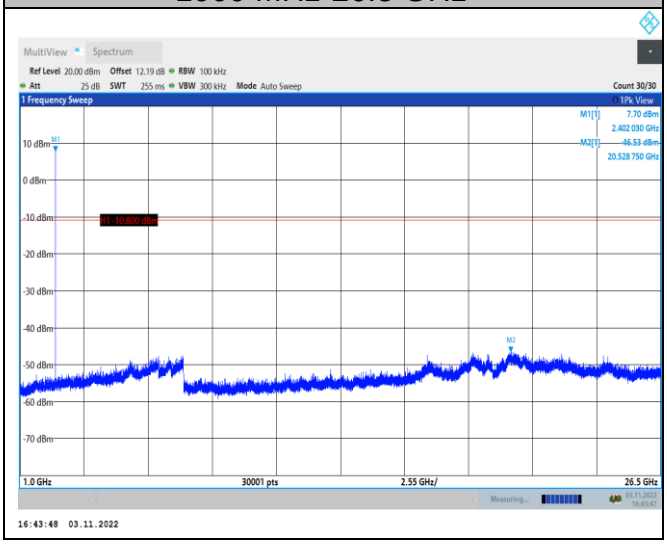
GFSK
High Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

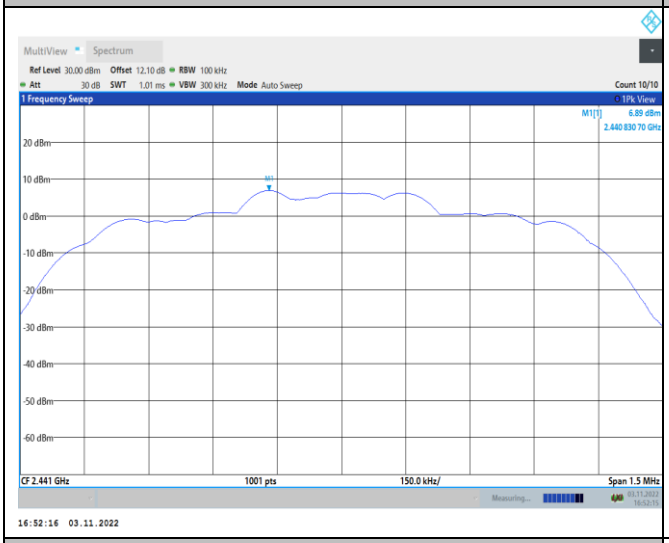
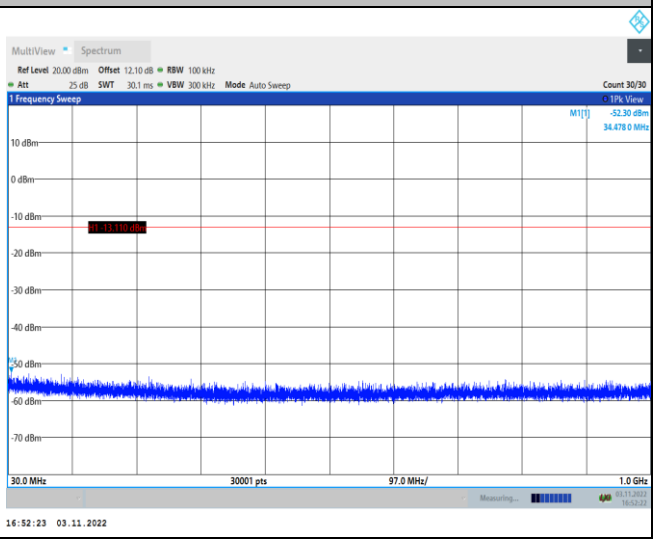
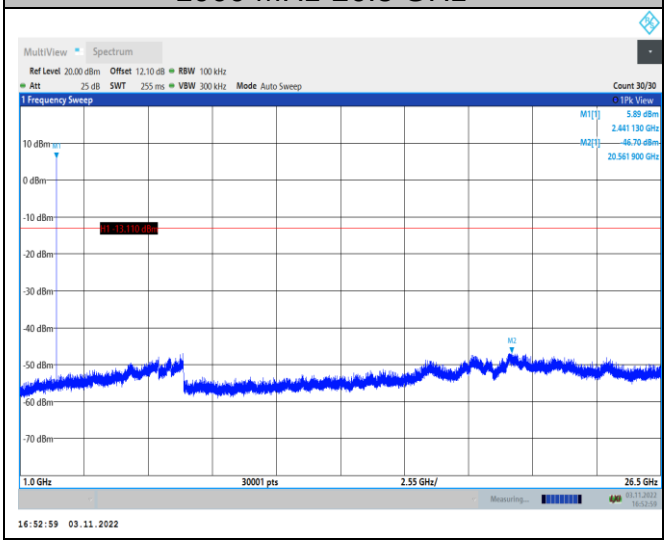
GFSK
Band Edge Hopping on

GFSK _Hop_2402 MHz	GFSK _Hop_2480 MHz
	

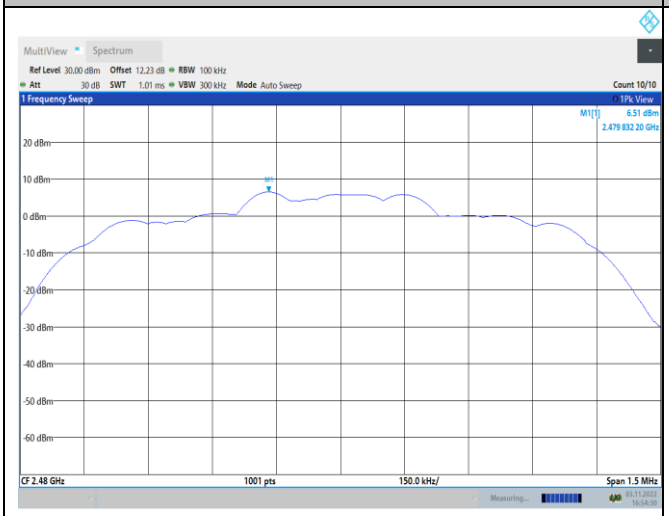
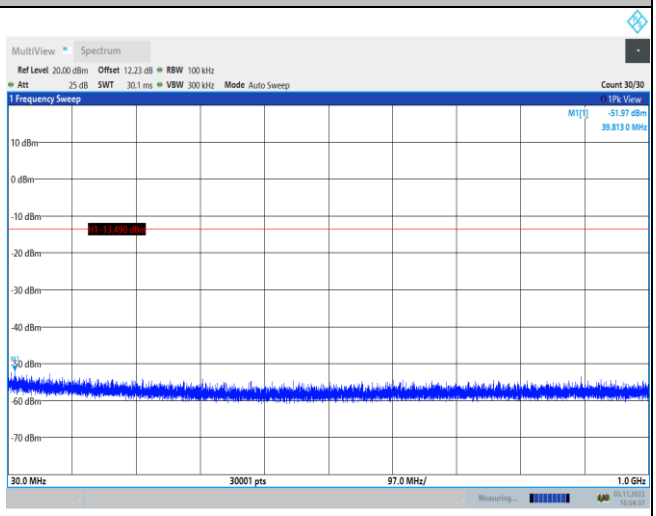
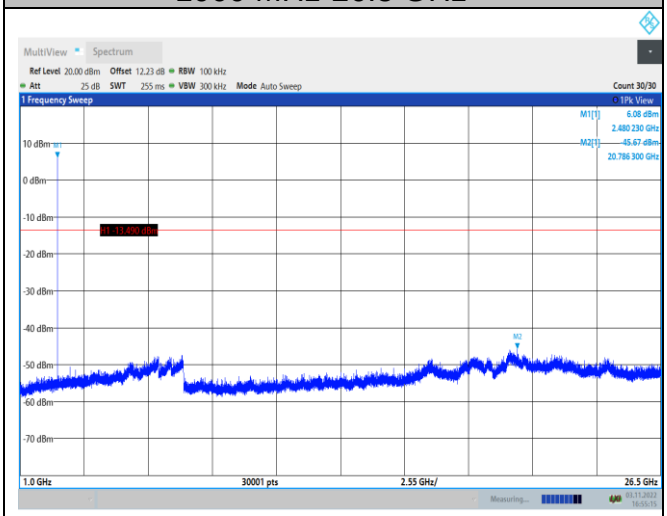
8DPSK
Low Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

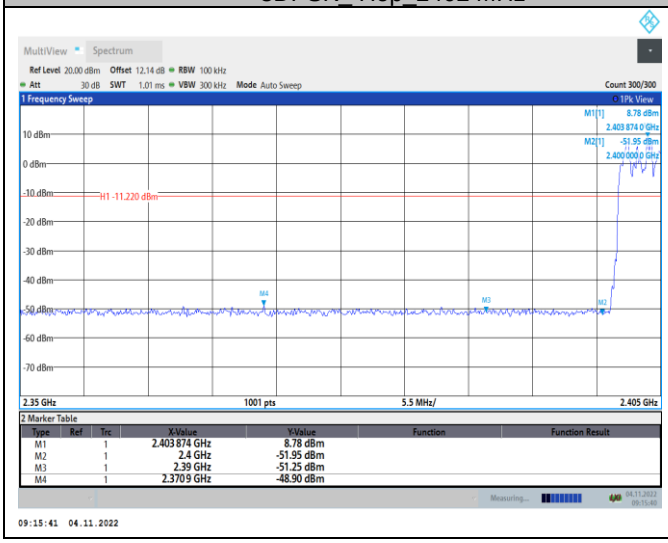
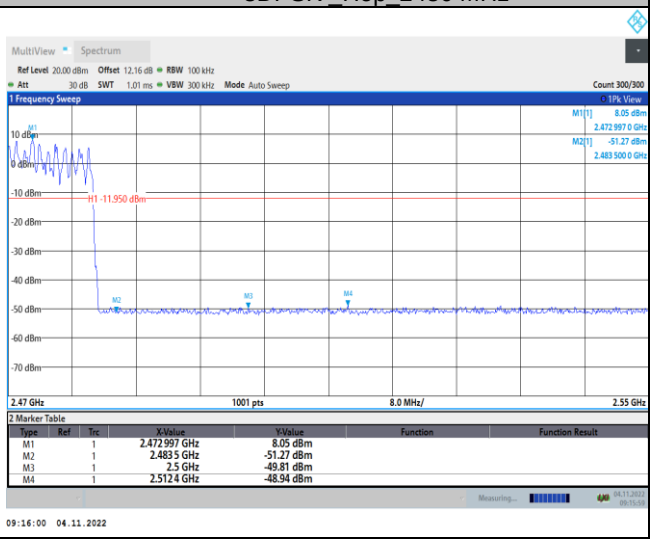
8DPSK
Mid Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

8DPSK
High Channel

Pref.	30 MHz-1000 MHz
	
1000 MHz-26.5 GHz	
	

8DPSK
Band Edge Hopping on

8DPSK_ Hop_2402 MHz	8DPSK _Hop_2480 MHz
	

14. ANTENNA REQUIREMENTS

15.203 requirements:
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 shall be considered sufficient to comply with the provisions of this section. 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) requirements:
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.

14.1. Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.

14.2. Antenna Gain

The antenna gain of EUT is less than 6 dBi.

End of Report