

FCC AND ISED CERTIFICATION TEST REPORT

FOR

Applicant	:	Formovie (Chongqing) Innovative Technology Co., Ltd.
Address	:	4-401, #2 Longgang Road, Guojiatuo Area, Jiangbei District, Chongqing, China
Equipment under Test	:	LCD Smart Projector
Model No.	:	XMM2101, XMM21**(*=0-9)
Trade Mark	:	Xming, WEWATCH
FCC ID	:	2AZNP-XMM2101
IC	:	27267-XMM2101
Manufacturer	:	Formovie (Chongqing) Innovative Technology Co., Ltd.
Address	:	4-401, #2 Longgang Road, Guojiatuo Area, Jiangbei District, Chongqing, China

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park,
Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, **E-mail:** ddt@dgddt.com, <http://www.dgddt.com>

REPORT

Table of Contents

	Test report declares.....	4
1.	Summary of Test Results.....	6
2.	General Test Information	7
2.1.	Description of EUT	7
2.2.	Accessories of EUT.....	8
2.3.	Assistant equipment used for test.....	8
2.4.	Block diagram of EUT configuration for test	8
2.5.	Deviations of test standard.....	9
2.6.	Test environment conditions	9
2.7.	Test laboratory	9
2.8.	Measurement uncertainty.....	10
3.	Equipment Used During Test.....	11
4.	Maximum Peak Output Power	13
4.1.	Block diagram of test setup.....	13
4.2.	Limits	13
4.3.	Test procedure	13
4.4.	Test result.....	14
4.5.	Original test data	15
5.	20 dB Bandwidth and 99% Bandwidth.....	18
5.1.	Block diagram of test setup.....	18
5.2.	Limits	18
5.3.	Test procedure	18
5.4.	Test result.....	19
5.5.	Original test data	19
6.	Carrier Frequency Separation.....	26
6.1.	Block diagram of test setup.....	26
6.2.	Limits	26
6.3.	Test procedure	26
6.4.	Test result.....	26
6.5.	Original test data	27
7.	Number of Hopping Channel	28
7.1.	Block diagram of test setup.....	28
7.2.	Limits	28
7.3.	Test procedure	28
7.4.	Test result.....	28
7.5.	Original test data	29
8.	Dwell Time.....	30

8.1.	Block diagram of test setup.....	30
8.2.	Limits	30
8.3.	Test procedure	30
8.4.	Test result.....	30
8.5.	Original test data	31
9.	Band Edge Compliance (Conducted Method)	37
9.1.	Block diagram of test setup.....	37
9.2.	Limit.....	37
9.3.	Test procedure	37
9.4.	Test result.....	37
9.5.	Original test data	38
10.	Radiated Emission	42
10.1.	Block diagram of test setup.....	42
10.2.	Limit.....	43
10.3.	Test Procedure.....	45
10.4.	Test result.....	46
11.	RF Conducted Spurious Emissions	55
11.1.	Block diagram of test setup.....	55
11.2.	Limits	55
11.3.	Test procedure	55
11.4.	Test result.....	56
11.5.	Original test data	56
12.	Band Edge Compliance (Radiated Method)	66
12.1.	Block diagram of test setup.....	66
12.2.	Limit.....	66
12.3.	Test Procedure.....	66
12.4.	Test result.....	66
13.	Power Line Conducted Emission	79
13.1.	Block diagram of test setup.....	79
13.2.	Power line conducted emission limits	79
13.3.	Test procedure	79
13.4.	Test result.....	80
14.	Antenna Requirements	83
14.1.	Limit.....	83
14.2.	Result	83
15.	Test Setup Photograph	84
16.	Photos of the EUT	86

Test Report Declare

Applicant	:	Formovie (Chongqing) Innovative Technology Co., Ltd.
Address	:	4-401, #2 Longgang Road, Guojiatuo Area, Jiangbei District, Chongqing, China
Equipment under Test	:	LCD Smart Projector
Model No.	:	XMM2101, XMM21**(*=0-9)
Trade Mark	:	Xming, WEWATCH
Manufacturer	:	Formovie (Chongqing) Innovative Technology Co., Ltd.
Address	:	4-401, #2 Longgang Road, Guojiatuo Area, Jiangbei District, Chongqing, China

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-247 Issue 2 February 2017.

Test Procedure Used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018, Amendment 2 (February 2021).

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&ISED standards.

Report No.:	DDT-RE23042304-2E01		
Date of Receipt:	May 08, 2023	Date of Test:	May 10, 2023~ May 28, 2023

Prepared By:**Jacky Huang/Engineer****Approved By:****Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Jun. 02, 2023	

1. Summary of Test Results

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.10:2013 RSS-247 Issue 2	Pass
20 dB Bandwidth and 99% Bandwidth	FCC Part 15.247(a)(1) ANSI C63.10:2013 RSS-Gen 6.7	Pass
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.10:2013 RSS-247 Issue 2	Pass
Number of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10:2013 RSS-247 Issue 2	Pass
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10:2013 RSS-247 Issue 2	Pass
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10:2013 RSS-247 Issue 2 RSS-Gen Issue 5	Pass
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10:2013 RSS-247 Issue 2 RSS-Gen Issue 5	Pass
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013 RSS-Gen Issue 5	Pass
Antenna Requirement	FCC Part 15: 15.203 RSS-Gen Issue 5	Pass

2. General Test Information

2.1. Description of EUT

EUT Name	: LCD Smart Projector
Model Number	: XMM2101, XMM21**(*=0-9)
Model Differences	: The models used are the same in appearance, process material, hardware and software, just different model for different market or business purposes, therefore was tested on the model XMM2101.
EUT Function Description	: Please reference user manual of this device
Power Supply	: DC 19V from external switching power supply
Radio Specification	: Bluetooth V5.0
Operation Frequency	: 2402 MHz - 2480 MHz
Modulation	: GFSK, $\pi/4$ -DQPSK, 8DPSK
Data Rate	: 1 Mbps, 2 Mbps, 3 Mbps
Antenna Gain	: FPC antenna, maximum PK gain: 3.82 dBi
Sample Number	: S23042304-01

Note: Serial model No.: XMM21** only apply for FCC ID.

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

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model Number	Description	Remark
Switching power supply	Huizhou Golden Lake Industrial Co., Ltd.	S065ARU2000325	N/A	Input: 100-240V~, 50/60Hz, 1.8A MAX Output: 5V/3A, 9V/3A, 12V/3A, 15V/3A, 20V/3.25A
Bluetooth Remote Control	Formovie (Chongqing) Innovative Technology Co., Ltd.	RC605B	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
N/A	N/A	N/A	N/A	N/A

2.4. Block diagram of EUT configuration for test



Test software: putty.exe

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

The pathloss of external cable: 0.5dB (According to the manufacturer's claims).

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
GFSK hopping on Tx Mode	default	CH0 to CH78	2402 to 2480
$\pi/4$ -DQPSK hopping on Tx Mode	default	CH0 to CH78	2402 to 2480
8DPSK hopping on Tx Mode	default	CH0 to CH78	2402 to 2480
GFSK hopping off Tx Mode	default	CH0	2402
	default	CH39	2441
	default	CH78	2480
$\pi/4$ -DQPSK hopping off Tx Mode	default	CH0	2402
	default	CH39	2441
	default	CH78	2480
8DPSK hopping off Tx Mode	default	CH0	2402
	default	CH39	2441
	default	CH78	2480

2.5. Deviations of test standard

No deviation.

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	+15 °C to +35 °C
Humidity range:	20% to 75%
Pressure range:	86 kPa to 106 kPa

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum Analyzer)	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$);
	1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$);
	1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Frequencies Stability	6.7×10^{-8} (Antenna couple method)
	5.5×10^{-8} (Conducted method)
Conducted Spurious Emissions	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$);
	1.40 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
	1.66 dB ($8 \text{ GHz} \leq f < 26.5 \text{ GHz}$)
Uncertainty for Radio Frequency (RBW<20 KHz)	3×10^{-8}
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission Test (9kHz -30 Mhz)	3.44 dB
Uncertainty for Radiation Emission Test (30 Mhz-1 Ghz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission Test (1 Ghz-40 Ghz)	4.10 dB (1-6 GHz)
	4.40 dB (6 GHz-18 GHz)
	3.54 dB (18 GHz-26 GHz)
	4.30 dB (26 GHz-40 GHz)
Uncertainty for Power Line Conduction Emission Test	3.32 dB (150 kHz-30 MHz)

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

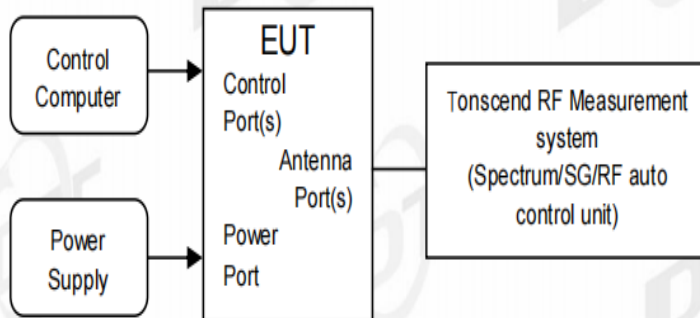
3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑RF Connected Test (Tonscend RF Measurement System 3#)					
Signal & Spectrum analyzer	R&S	FSV40	101407	Jul. 21, 2022	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Apr. 27, 2023	1 Year
EXG Analog Signal Generator	KEYSIGHT	N5173B	MY62153058	Aug. 26, 2022	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Apr. 23, 2023	1 Year
RF Control Unit	Tonscend	JS0806-2	20C8060230	Apr. 27, 2023	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	May 15, 2023	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.3.2.22	N/A	N/A
☑Radiation 3#chamber					
EMI Test Receiver	R&S	ESU26	100472	Apr. 23, 2023	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Apr. 23, 2023	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 29, 2022	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	01429	Jul. 22, 2022	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120 D	02468	Sep. 29, 2022	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 26, 2023	1 Year
Pre-amplifier	SONOMA	310N	310815	Jun. 15, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-118A	18040084	Aug.17, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-840A	461369	Apr. 27, 2023	1 Year
RE Cable	N/A	W23.02 CP1-X2 + W23.09 AP1-X8+ JCT26S-NJ-NJ-1.5M+ JCT26S-NJ-NJ-1.5M	4.5M+8M+1.5M+1.5M	Apr. 21, 2023	1 Year
RF Cable	Yuhu Technology	JCTB810-NJ-NJ-9M+ ZT26S-SMAJ-SMAJ-1M	21123964	Apr. 23, 2023	1 Year
Micro-Tronics filters	REBES	BRM50702	G555	N/A	N/A
Micro-Tronics filters	REBES	BRM50716	G392	N/A	N/A
High Pass filter	XB	XBLBQ-GTA67	210820-2-3	N/A	N/A
Test software	Tonscend	JS32-RE	V 5.0.0.1	N/A	N/A

☑Power Line Conducted Emissions Test 1#					
Test Receiver	R&S	ESCI	100551	Aug. 26, 2022	1 Year
LISN 1	R&S	ENV216	101109	Aug. 26, 2022	1 Year
LISN 2	R&S	ESH2-Z5	100309	Aug. 26, 2022	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Aug. 26, 2022	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Aug. 26, 2022	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Test Receiver	R&S	ESCI	100551	Aug. 26, 2022	1 Year

4. Maximum Peak Output Power

4.1. Block diagram of test setup



4.2. Limits

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 watts, the e.i.r.p shall not exceed 4W.

4.3. Test procedure

- (1) The test according to ANSI C63.10-2020 clause 7.8.5.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW:	> 20 dB bandwidth of the emission being measured.
VBW:	$VBW \geq RBW$.
Span:	5 times the 20 dB bandwidth, centered on a hopping channel.
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold

- (5) Use the marker-to-peak function to set the marker to the peak of the emission and record the results in the report.

Note: The attenuator loss was inputted into spectrum analyzer as amplitude offset.

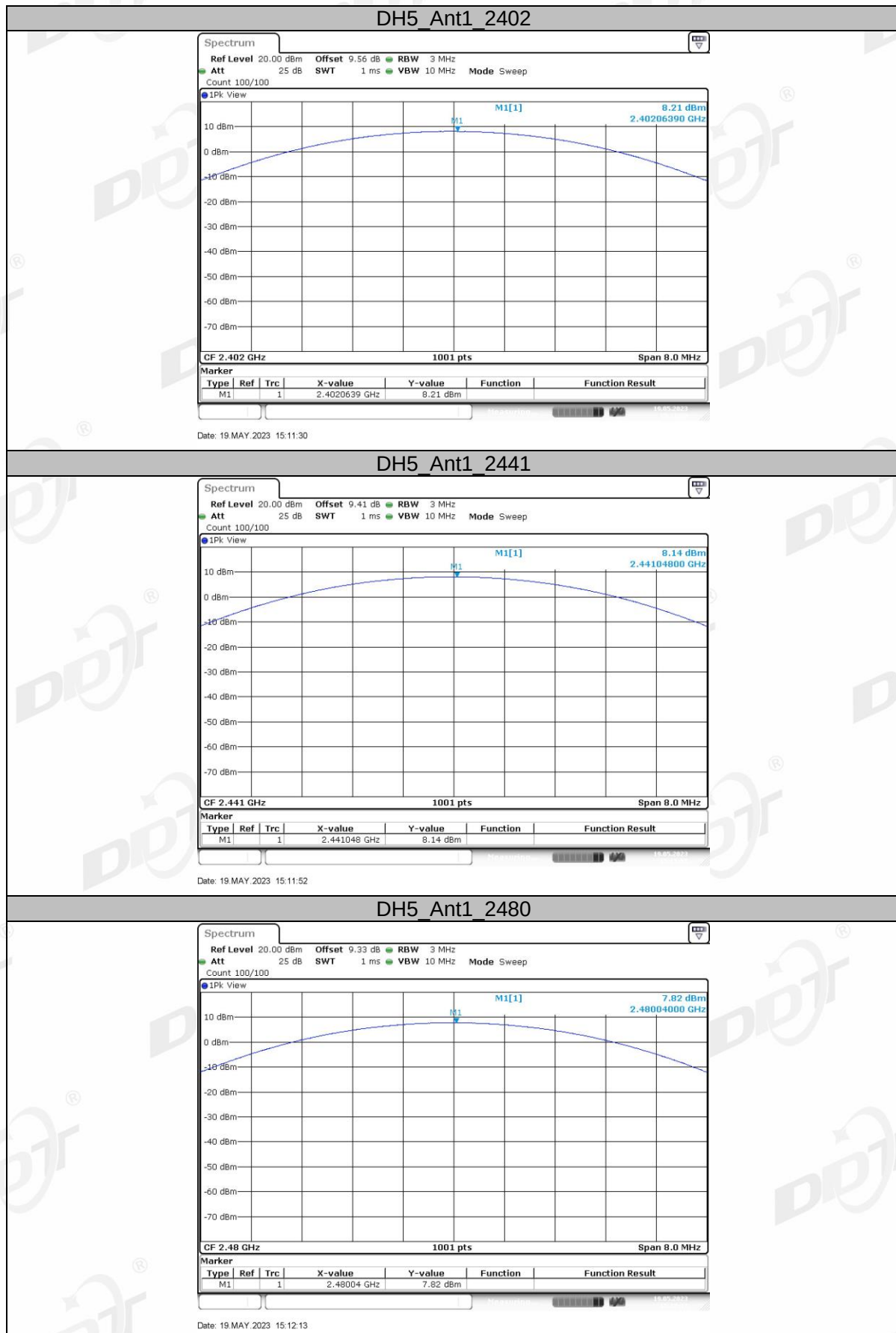
4.4. Test result

Mode	Antenna	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	8.21	21	Pass
	ANT1	2441	8.14	21	Pass
	ANT1	2480	7.82	21	Pass
$\pi/4$ -DQPSK	ANT1	2402	8.03	21	Pass
	ANT1	2441	7.98	21	Pass
	ANT1	2480	7.61	21	Pass
8DPSK	ANT1	2402	8.20	21	Pass
	ANT1	2441	8.11	21	Pass
	ANT1	2480	7.72	21	Pass

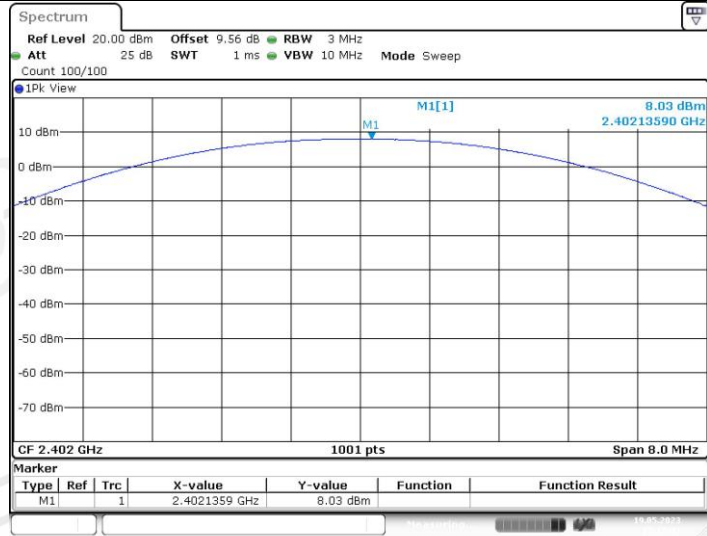
Mode	Antenna	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	12.03	36	Pass
	ANT1	2441	11.96	36	Pass
	ANT1	2480	11.64	36	Pass
$\pi/4$ -DQPSK	ANT1	2402	11.85	36	Pass
	ANT1	2441	11.80	36	Pass
	ANT1	2480	11.43	36	Pass
8DPSK	ANT1	2402	12.02	36	Pass
	ANT1	2441	11.93	36	Pass
	ANT1	2480	11.54	36	Pass

Note: EIRP (dBm)=Conducted Output Power (dBm)+ Antenna Gain (dBi)

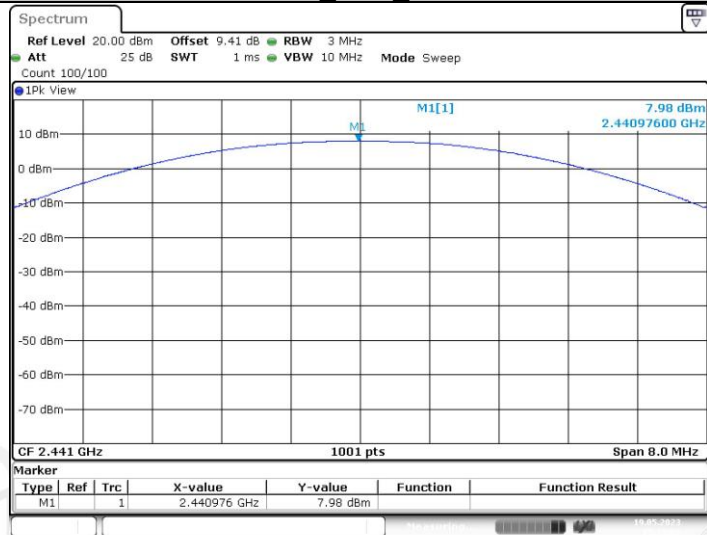
4.5. Original test data



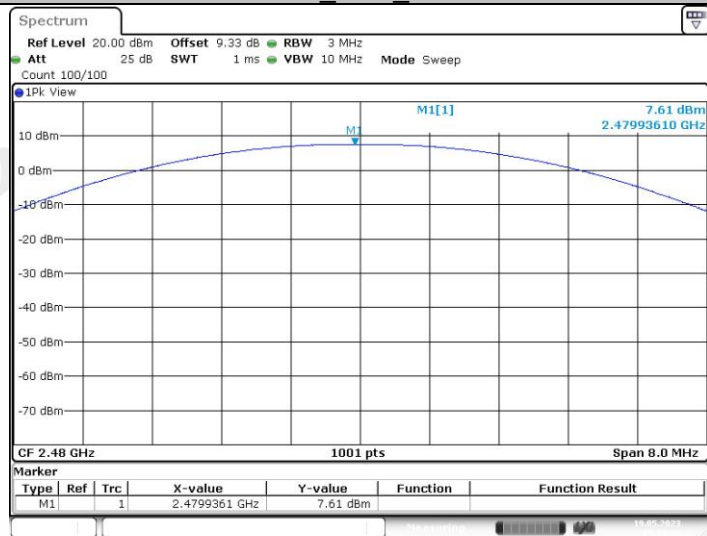
2DH5_Ant1_2402



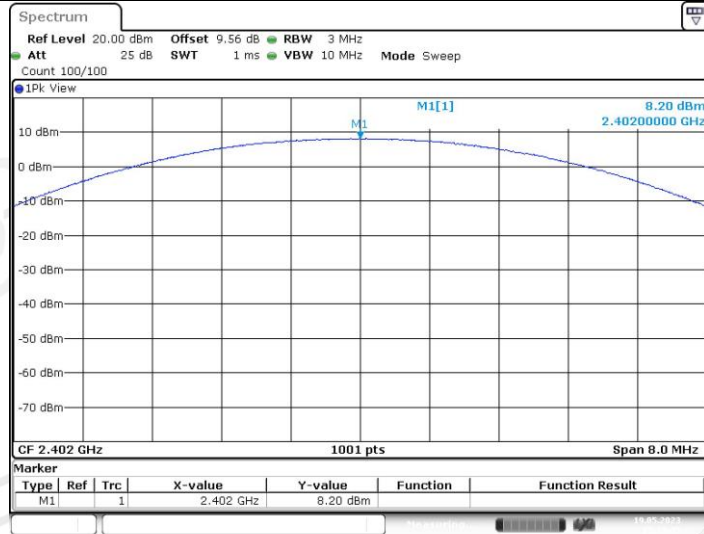
2DH5_Ant1_2441



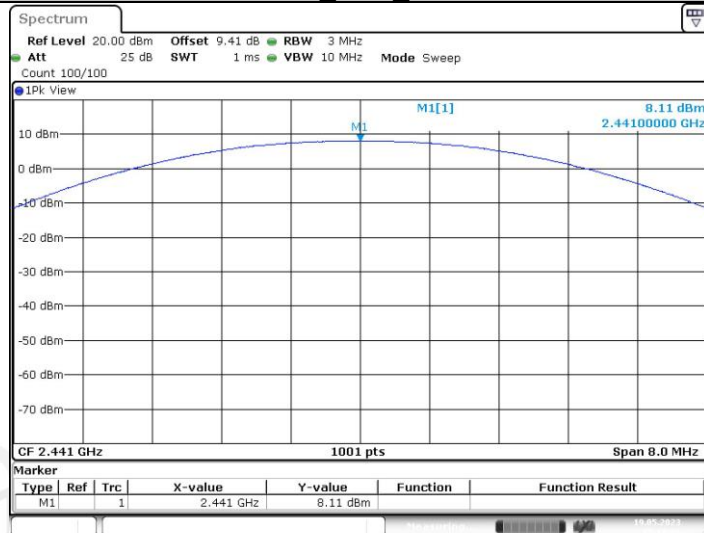
2DH5_Ant1_2480



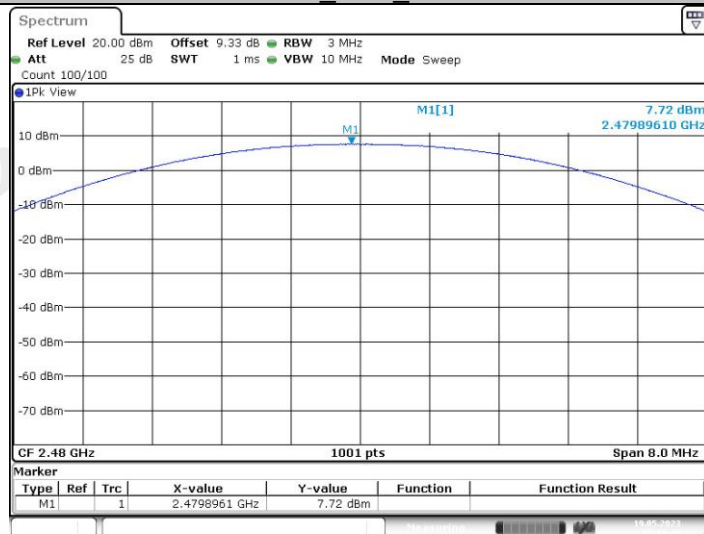
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



5. 20 dB Bandwidth and 99% Bandwidth

5.1. Block diagram of test setup

Same as section 4.1

5.2. Limits

20dB Bandwidth:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

99% Bandwidth:

Just for Report.

5.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 6.9.2.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously
- (4) Use the following spectrum analyzer settings for the 20 dB bandwidth measurement:

RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 2 times and 5 times the OBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold

- (5) Use the following spectrum analyzer settings for the 99% bandwidth measurement:

RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 1.5 times and 5.0 times the OBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold

- (6) Measure and record the results in the report.

5.4. Test result

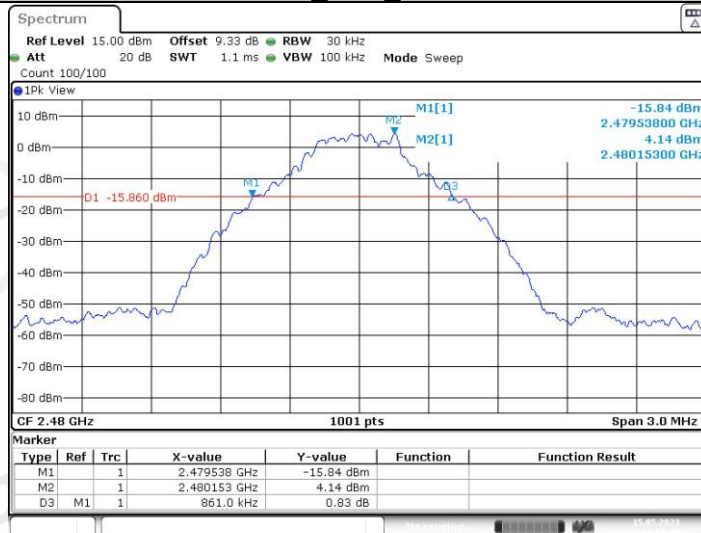
Mode	Frequency (MHz)	20 dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Verdict
GFSK	2402	0.855	0.752	Pass
	2441	0.861	0.752	Pass
	2480	0.861	0.752	Pass
$\pi/4$ -DQPSK	2402	1.248	1.142	Pass
	2441	1.251	1.142	Pass
	2480	1.251	1.142	Pass
8DPSK	2402	1.248	1.142	Pass
	2441	1.251	1.142	Pass
	2480	1.254	1.142	Pass

5.5. Original test data

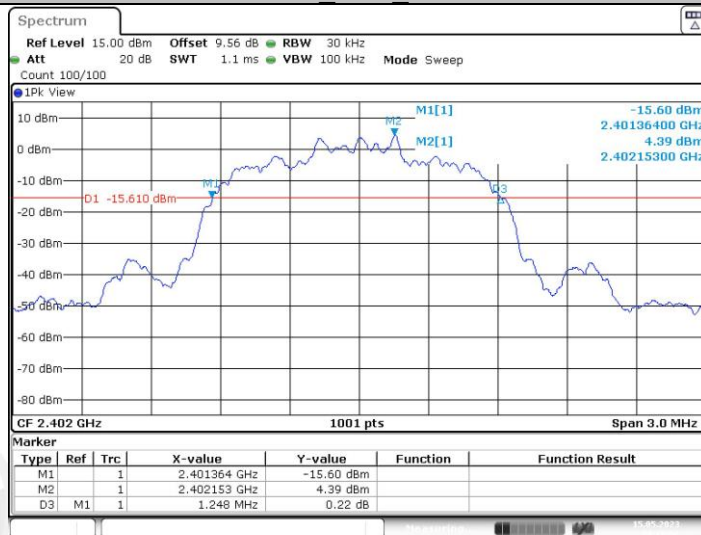
20dB bandwidth:



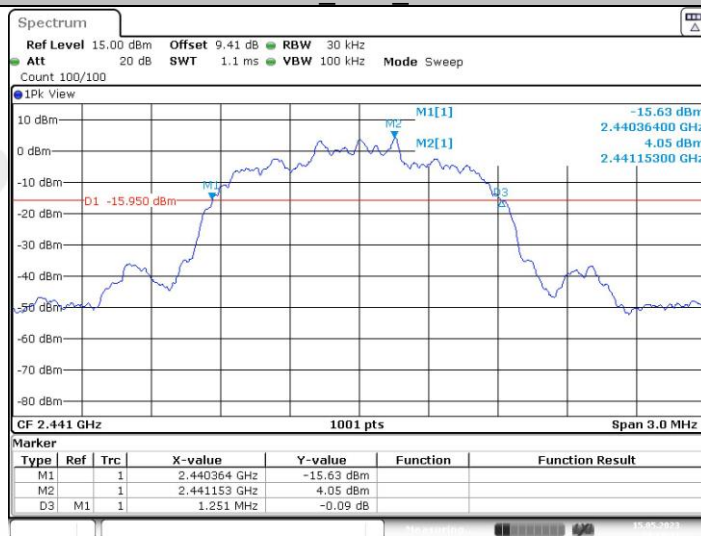
DH5_Ant1_2480



2DH5_Ant1_2402



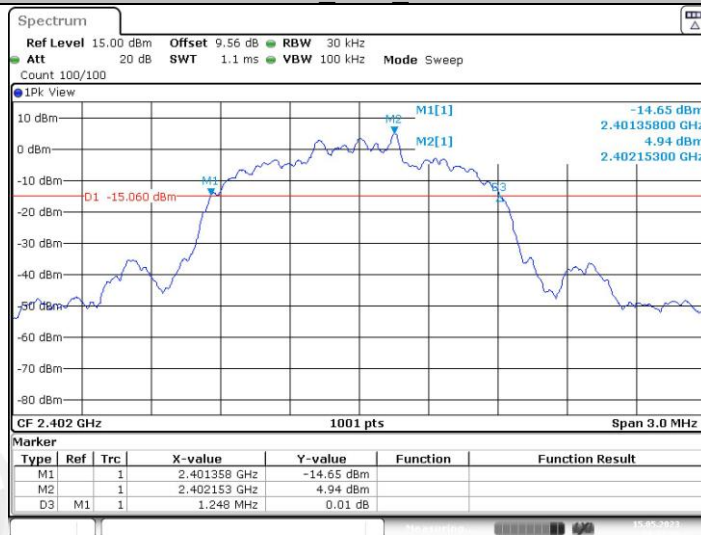
2DH5_Ant1_2441



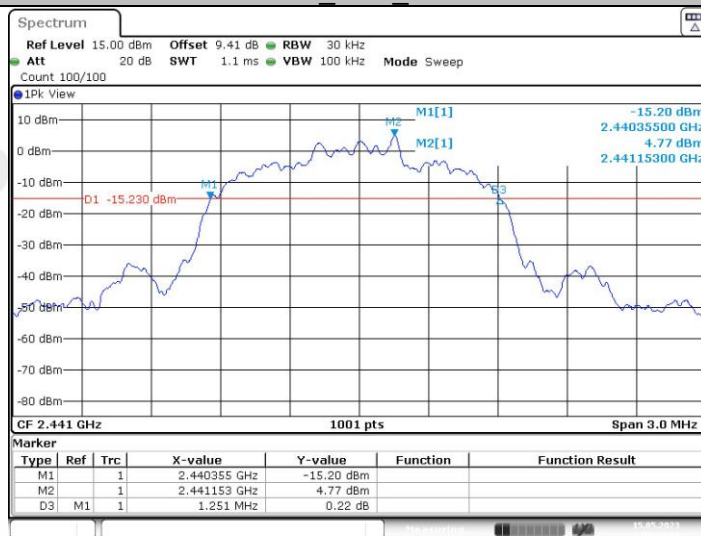
2DH5_Ant1_2480

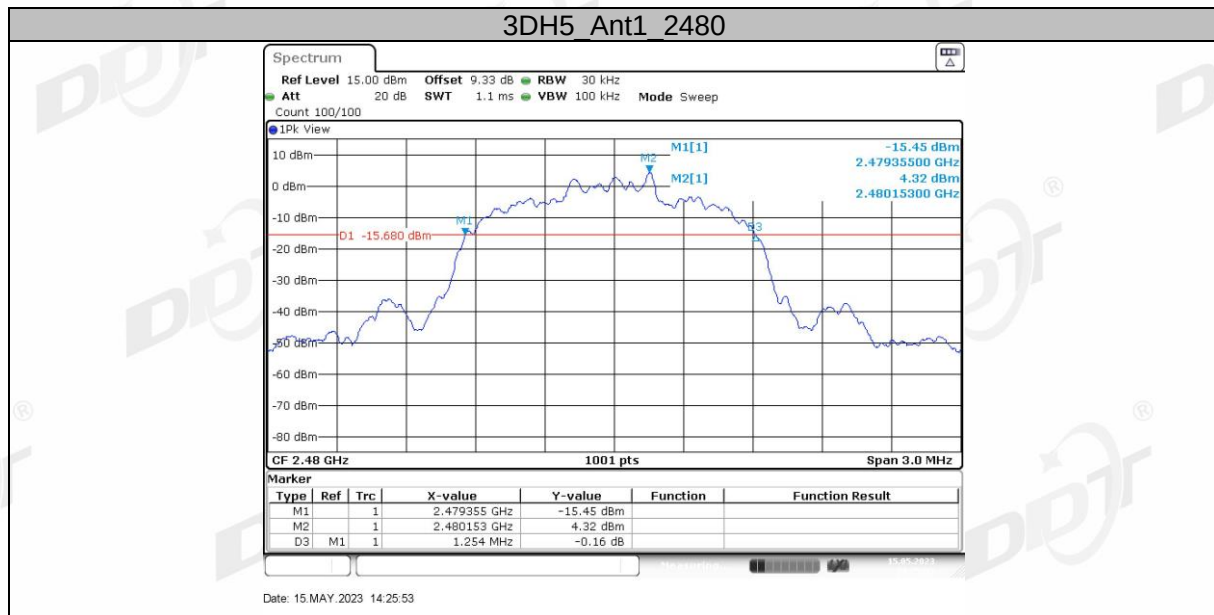


3DH5_Ant1_2402

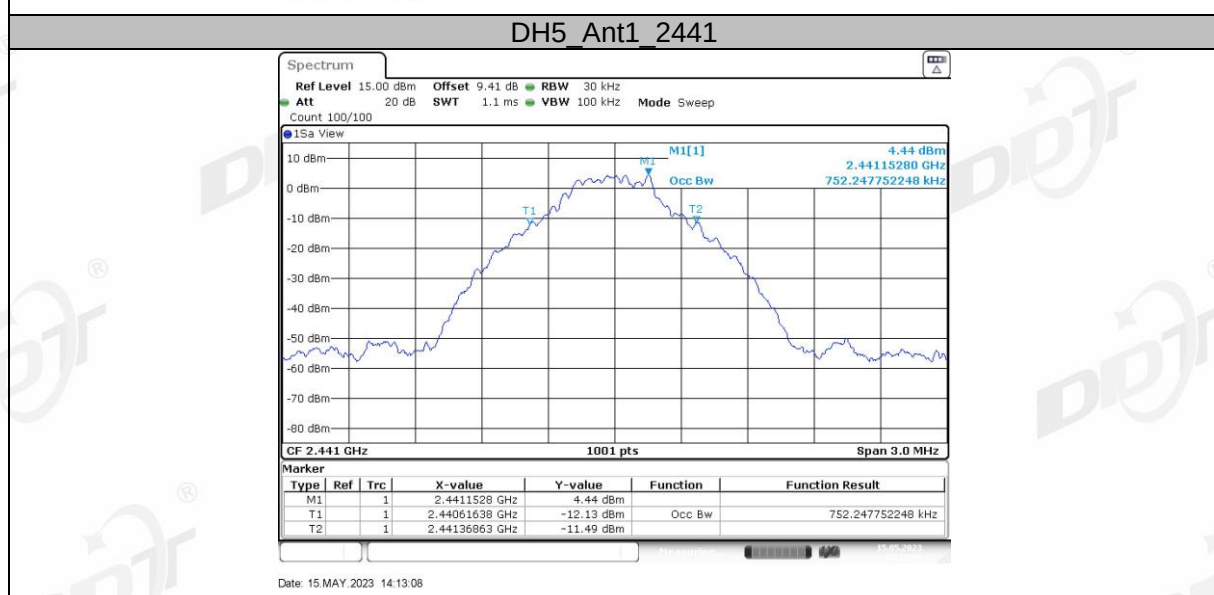
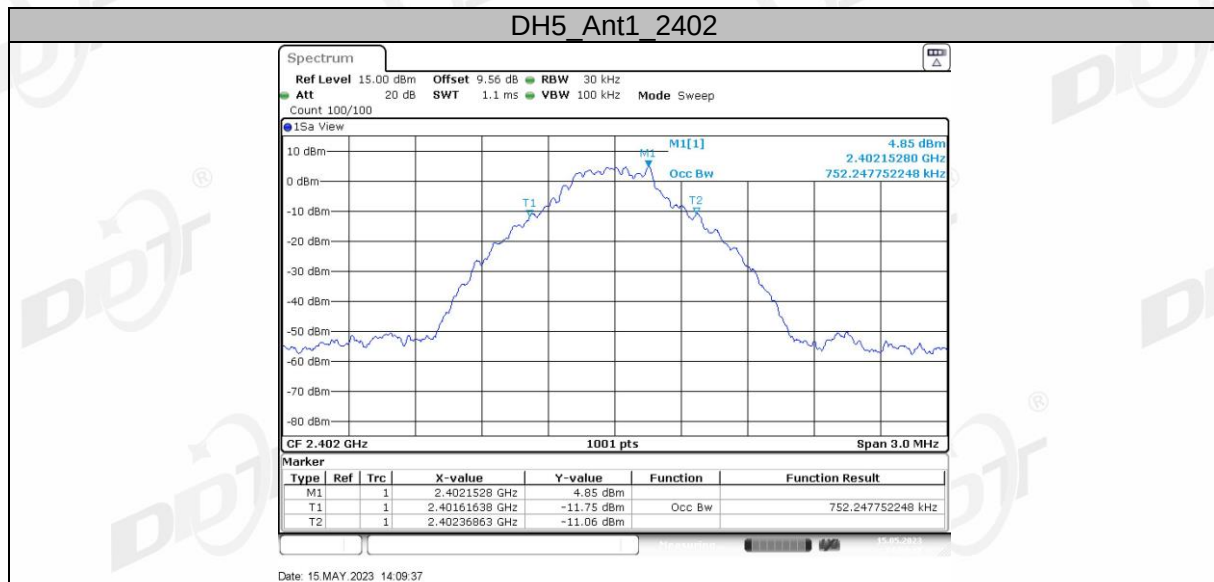


3DH5_Ant1_2441

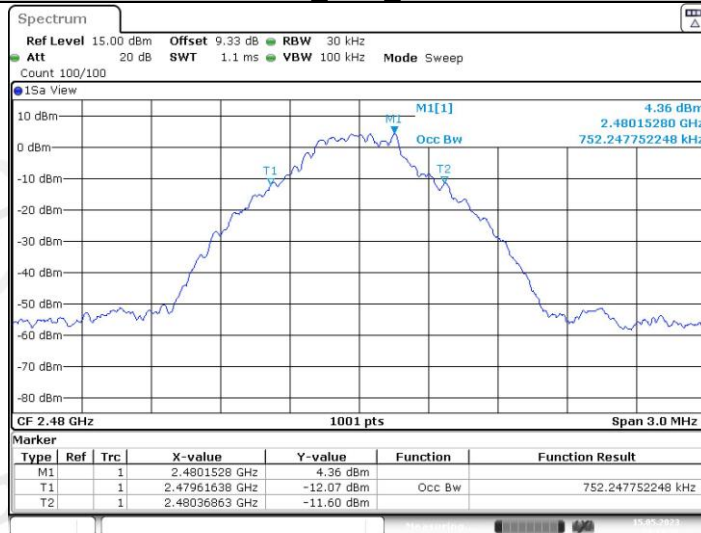




99% bandwidth:

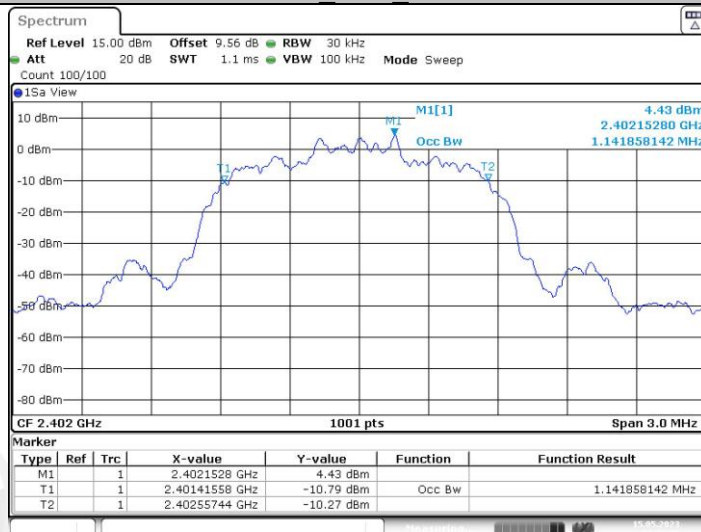


DH5_Ant1_2480



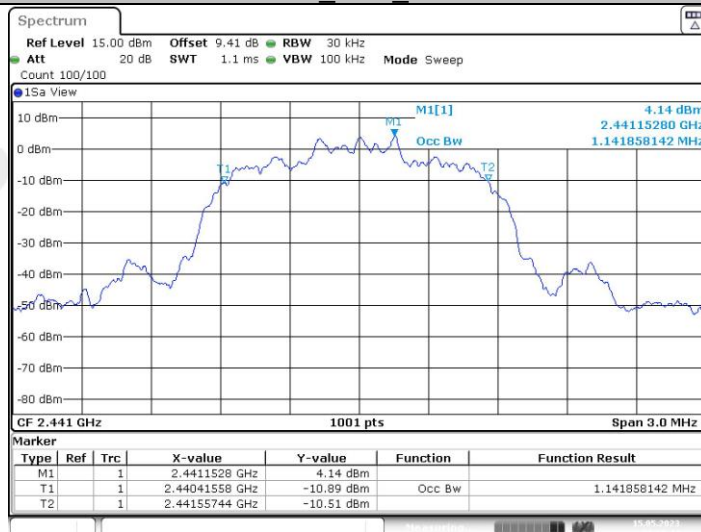
Date: 15 MAY 2023 14:14:32

2DH5_Ant1_2402



Date: 15 MAY 2023 14:17:05

2DH5_Ant1_2441



Date: 15 MAY 2023 14:18:44

2DH5_Ant1_2480



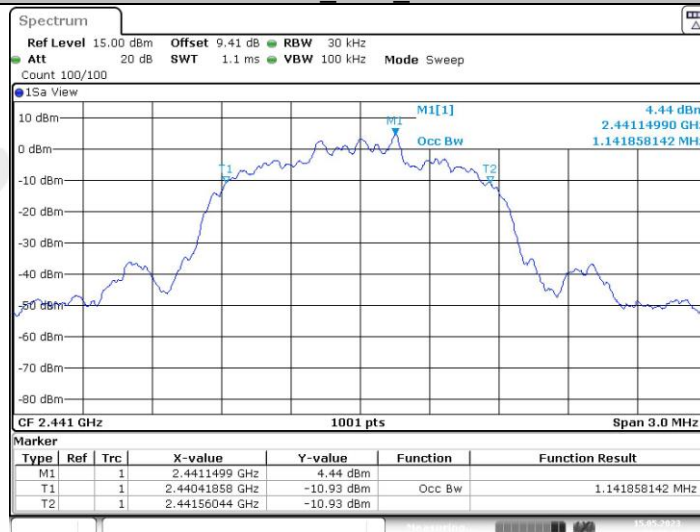
Date: 15 MAY 2023 14:20:26

3DH5_Ant1_2402

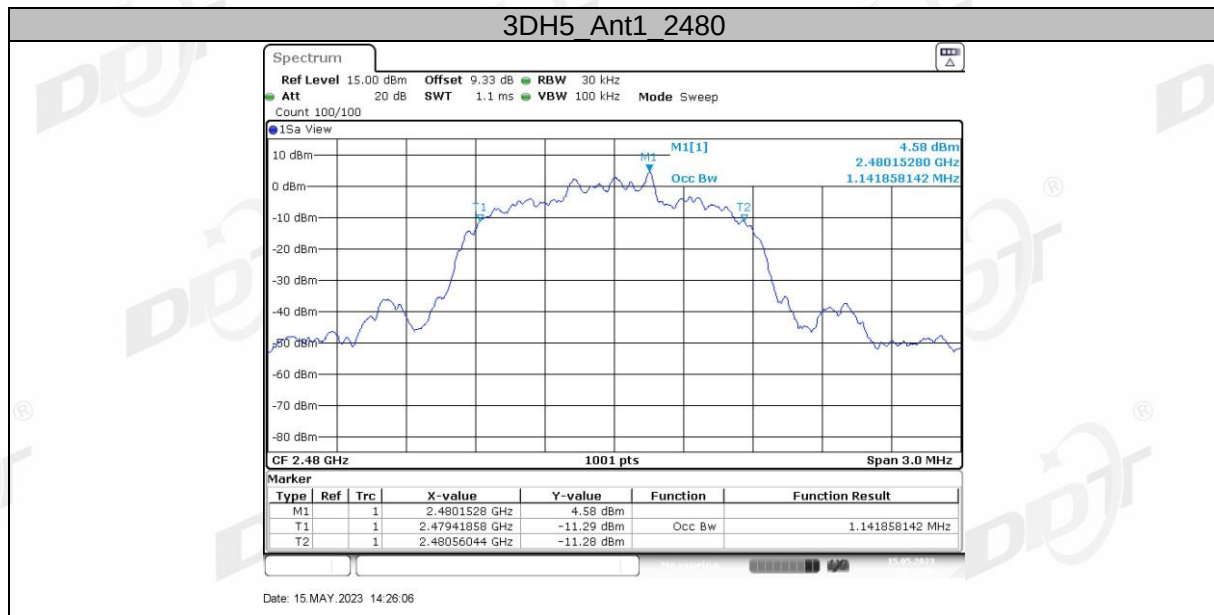


Date: 15 MAY 2023 14:22:52

3DH5_Ant1_2441



Date: 15 MAY 2023 14:24:42



6. Carrier Frequency Separation

6.1. Block diagram of test setup

Same as section 4.1

6.2. Limits

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, provided the systems operate with an output power no greater than 125 mW.

6.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 7.8.2.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW:	approximately 30% of the channel spacing
VBW:	$VBW \geq RBW$.
Span:	Wide enough to capture the peaks of two adjacent channels.
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold
- (5) Use the marker-delta function to determine the separation between the peaks of the adjacent channels and record the results in the report.

6.4. Test result

Mode	Channel separation (MHz)	20dB bandwidth (MHz) (worse case)	Limit (MHz) 2/3 of 20dB bandwidth	Verdict
GFSK	0.997	0.861	≥ 0.574	Pass
$\pi/4$ -DQPSK	1.006	1.251	≥ 0.834	Pass
8DPSK	1.003	1.251	≥ 0.834	Pass

6.5. Original test data



7. Number of Hopping Channel

7.1. Block diagram of test setup

Same as section 4.1

7.2. Limits

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 7.8.3.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

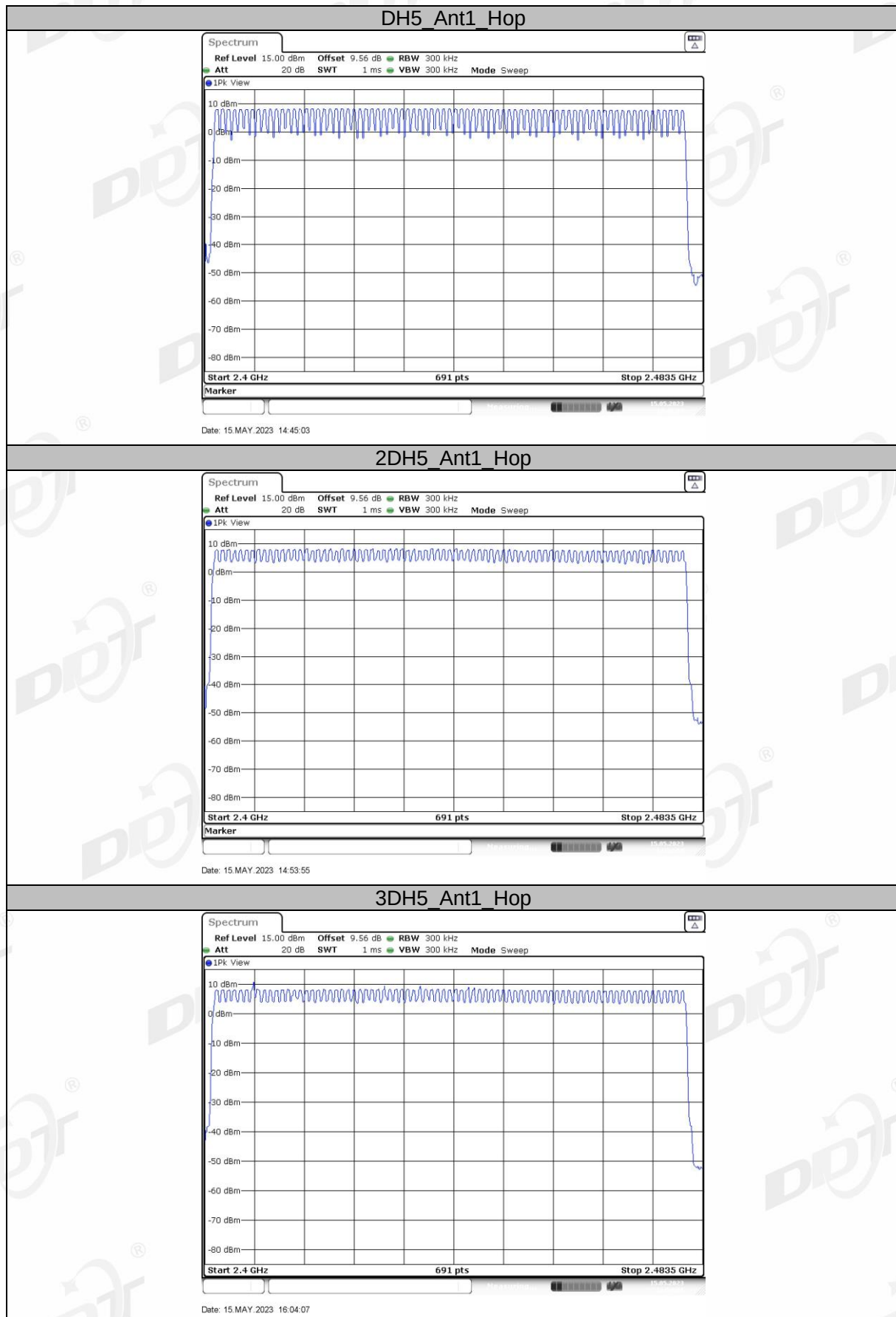
RBW:	RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW:	VBW $\geq$ RBW.
Span:	The frequency band of operation
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold

- (5) Measure the hopping number and record the results in the report.

7.4. Test result

Mode	Number of hopping channels	Limit	Verdict
GFSK	79	>15	Pass
$\pi/4$ -DQPSK	79	>15	Pass
8DPSK	79	>15	Pass

7.5. Original test data



8. Dwell Time

8.1. Block diagram of test setup

Same as section 4.1

8.2. Limits

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.

8.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 7.8.4.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW: $\leq$ channel spacing and where possible RBW should be set $\gg 1$ / T

VBW: $VBW \geq RBW$.

Span: Zero span, centered on a hopping channel.

Detector Mode: Peak

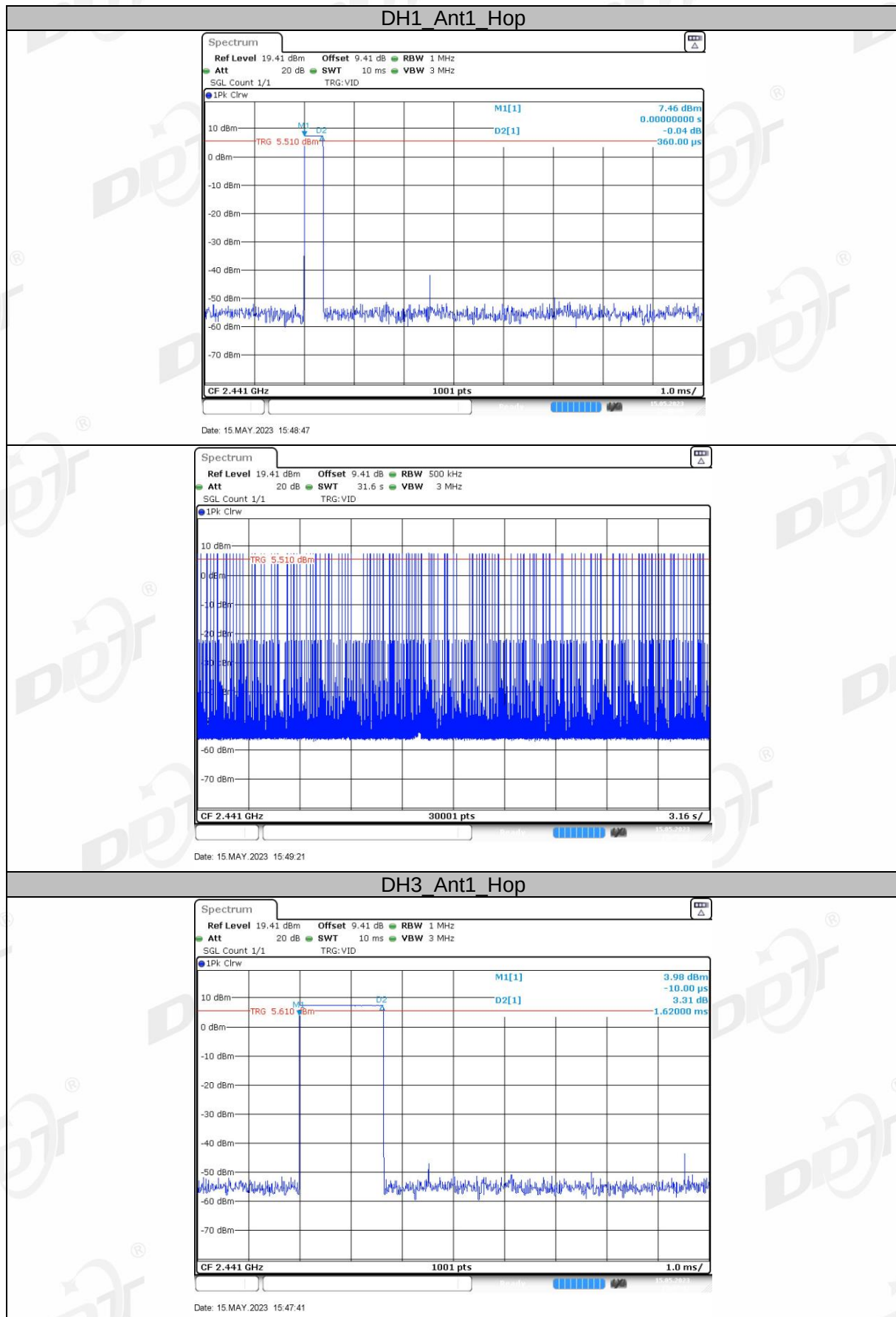
Sweep time: Auto

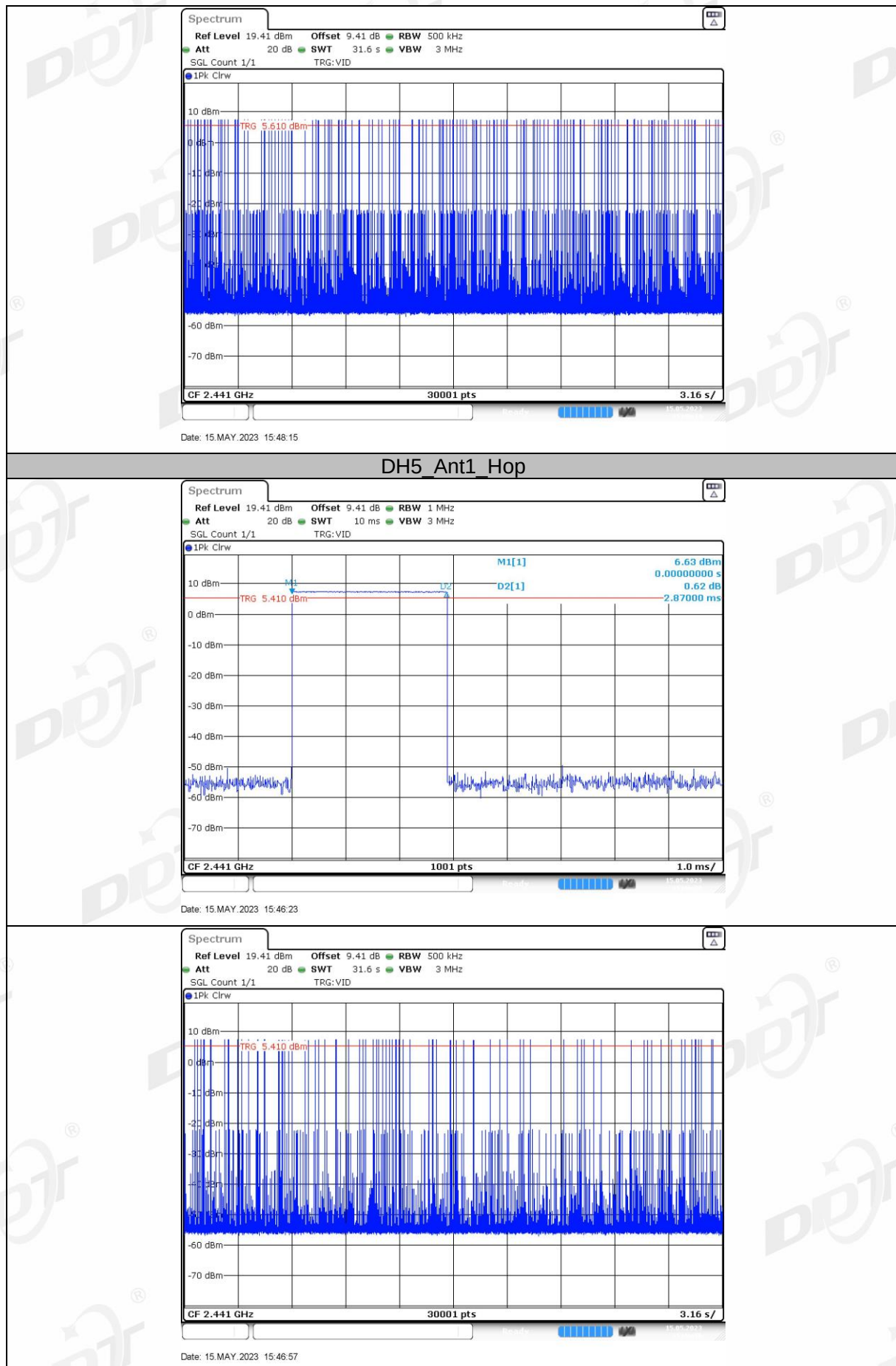
Trace mode: Max hold
- (5) The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$
- (6) Measure the hopping number and on time of each pulse with spectrum analyzer in zero span set, and calculate dwell time with formula Dwell time = total hops * pulse's on time.

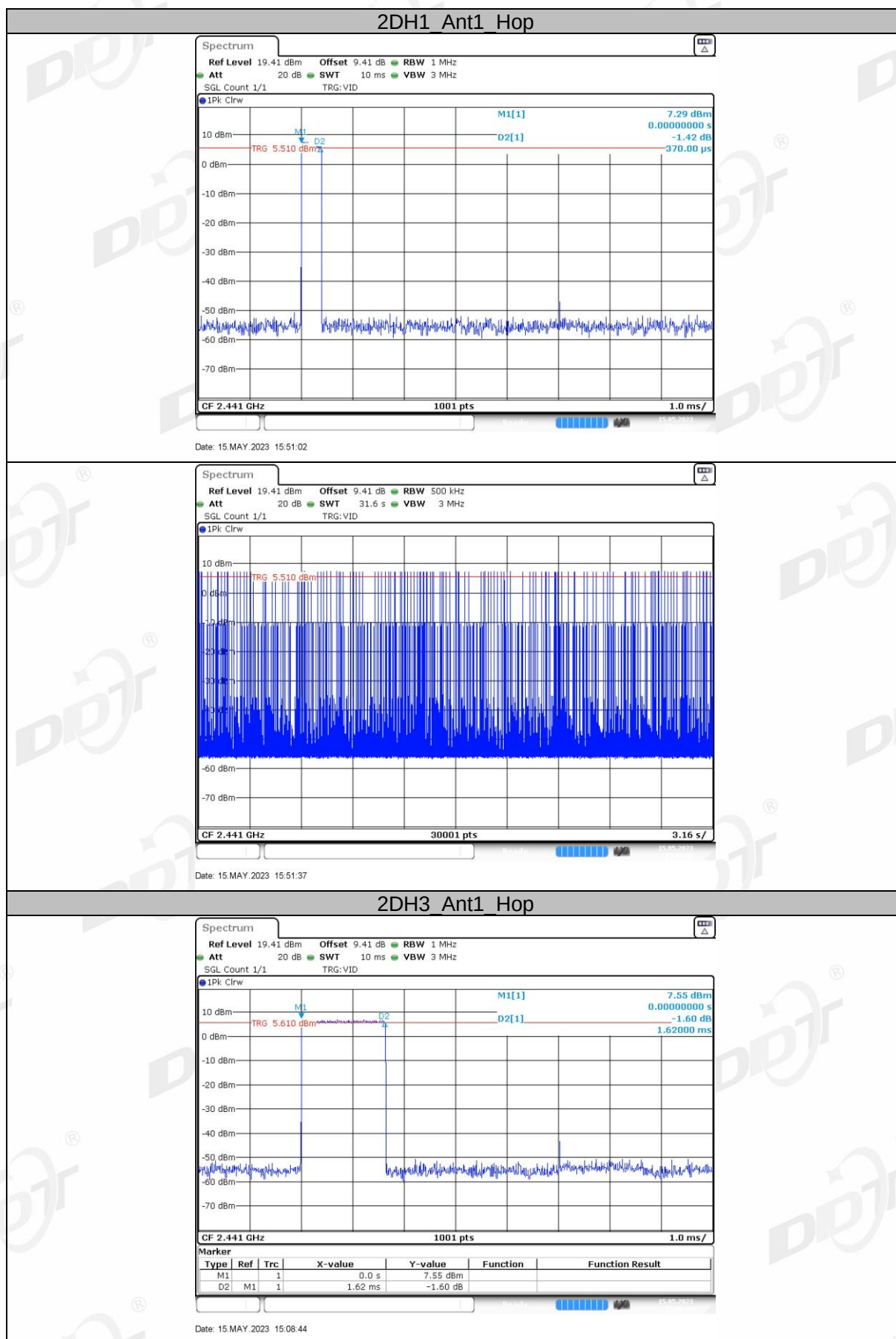
8.4. Test result

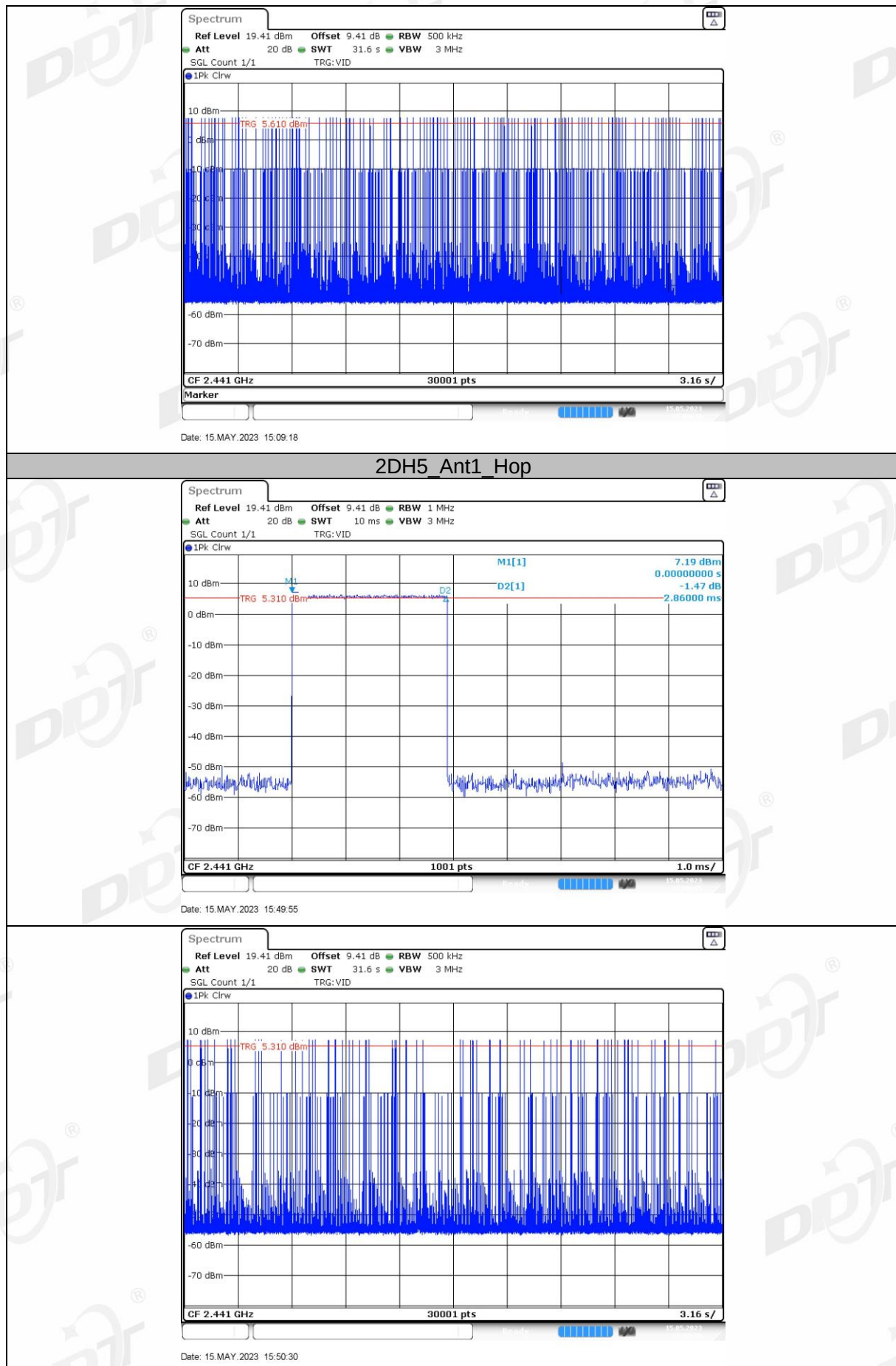
Test Mode	Antenna	Frequency [MHz]	Burst Width [ms]	Total Hops [Num]	Result [s]	Limit [s]	Verdict
DH1	Ant1	Hop	0.360	163	0.059	≤ 0.4	Pass
DH3	Ant1	Hop	1.620	166	0.269	≤ 0.4	Pass
DH5	Ant1	Hop	2.870	82	0.235	≤ 0.4	Pass
2DH1	Ant1	Hop	0.370	164	0.061	≤ 0.4	Pass
2DH3	Ant1	Hop	1.620	155	0.251	≤ 0.4	Pass
2DH5	Ant1	Hop	2.860	83	0.237	≤ 0.4	Pass
3DH1	Ant1	Hop	0.370	163	0.06	≤ 0.4	Pass
3DH3	Ant1	Hop	1.620	163	0.264	≤ 0.4	Pass
3DH5	Ant1	Hop	2.870	82	0.235	≤ 0.4	Pass

8.5. Original test data

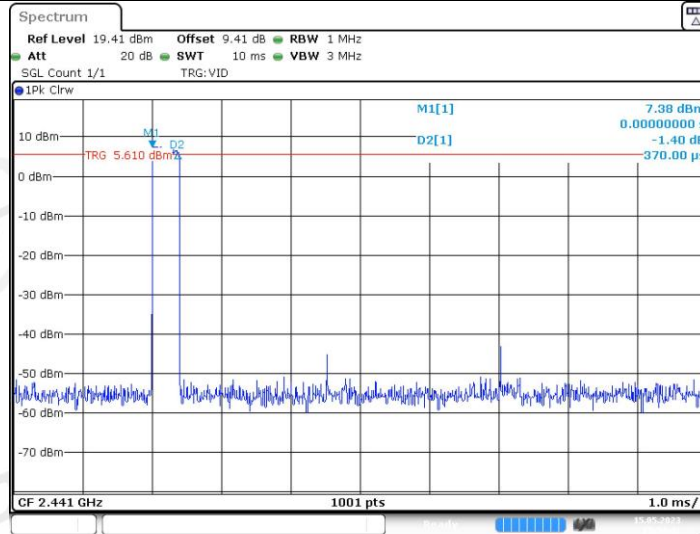




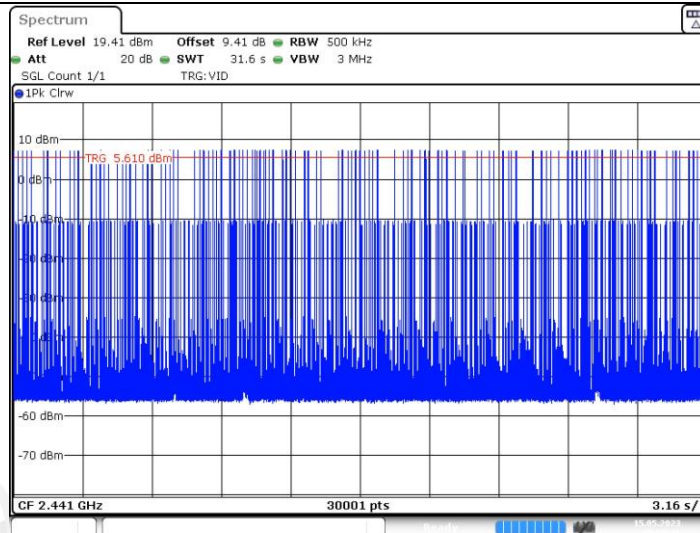




3DH1_Ant1_Hop

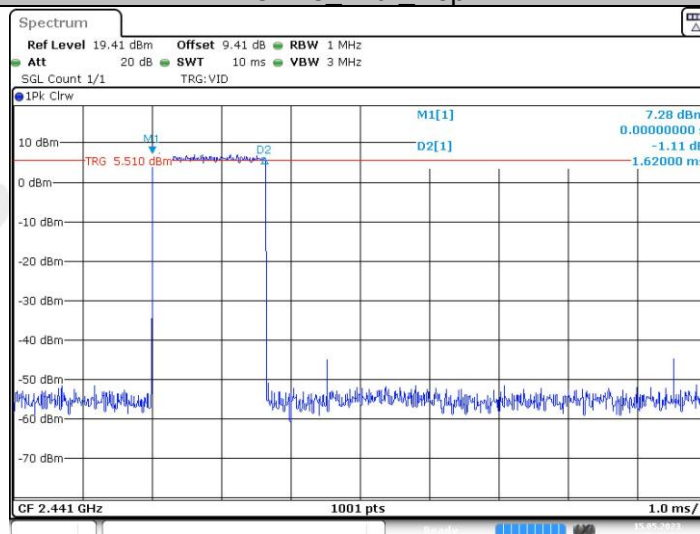


Date: 15 MAY 2023 15:54:42

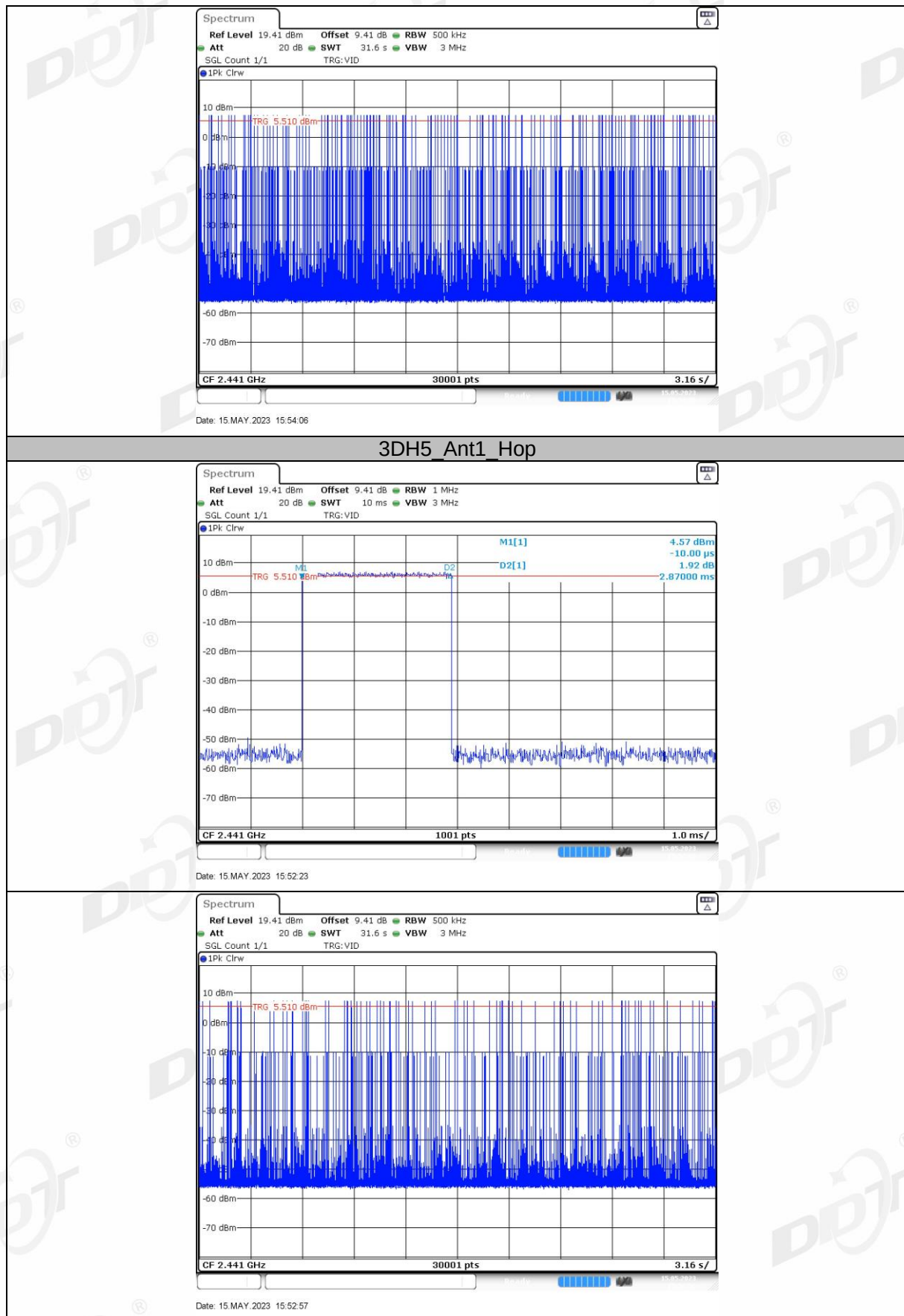


Date: 15 MAY 2023 15:55:17

3DH3_Ant1_Hop



Date: 15 MAY 2023 15:53:32



9. Band Edge Compliance (Conducted Method)

9.1. Block diagram of test setup

Same as section 4.1

9.2. Limit

All restriction band should comply with 15.209, other emission should be at least 20dB below the fundamental.

9.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

RBW: 100 kHz

VBW: 300 kHz

Span Encompass frequency range to be measured

Detector Mode: Peak

Sweep time: auto

Trace mode Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Then mark the maximum amplitude of all unwanted emissions outside of the authorized frequency band.

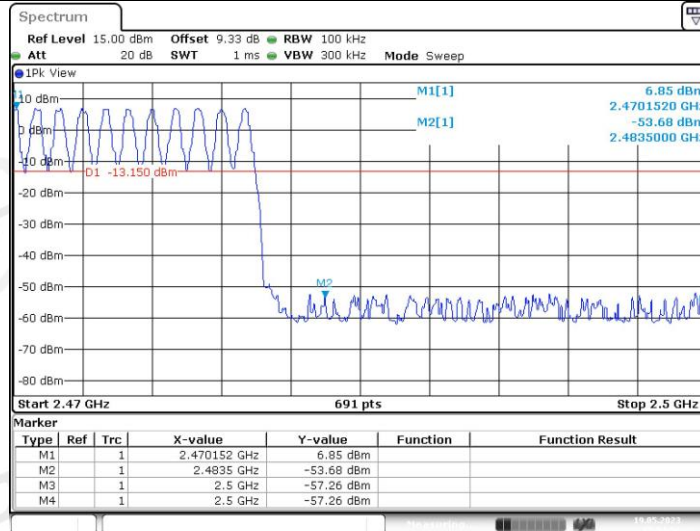
9.4. Test result

Mode	Frequency (MHz)	Verdict
GFSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
$\pi/4$ -DQPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
8DPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass

9.5. Original test data

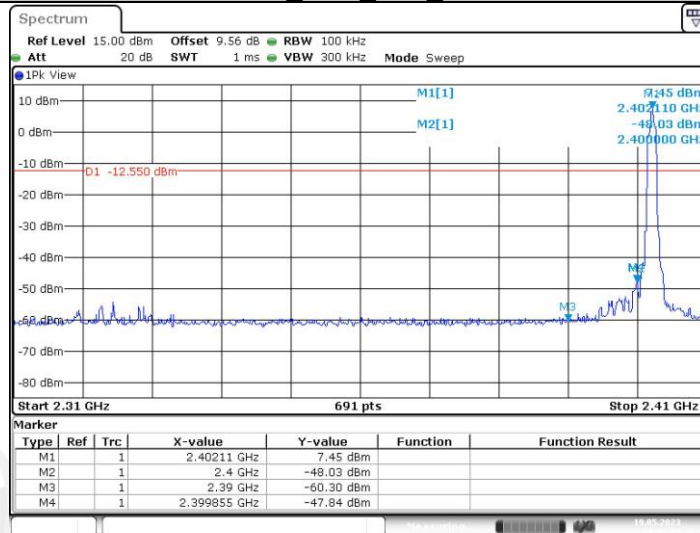


DH5_Ant1_High_Hop_2480



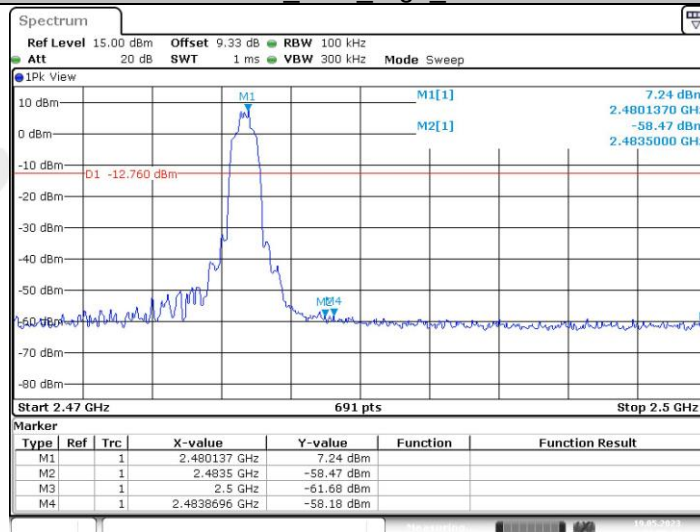
Date: 19.MAY.2023 15:04:57

2DH5_Ant1_Low_2402



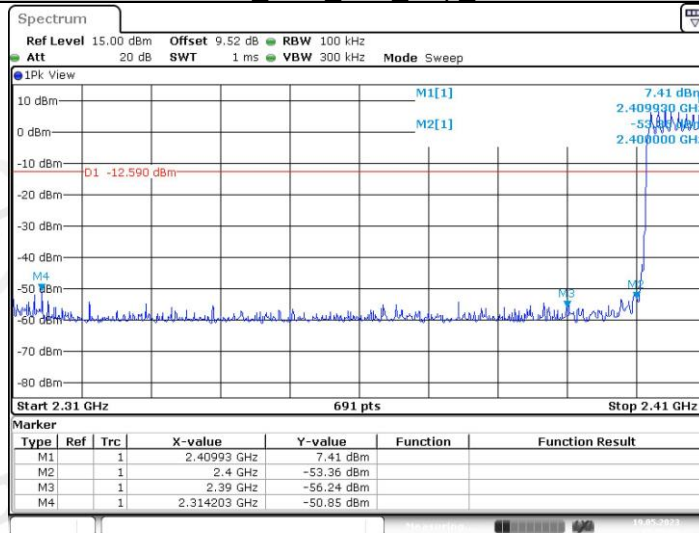
Date: 19.MAY.2023 14:52:15

2DH5_Ant1_High_2480



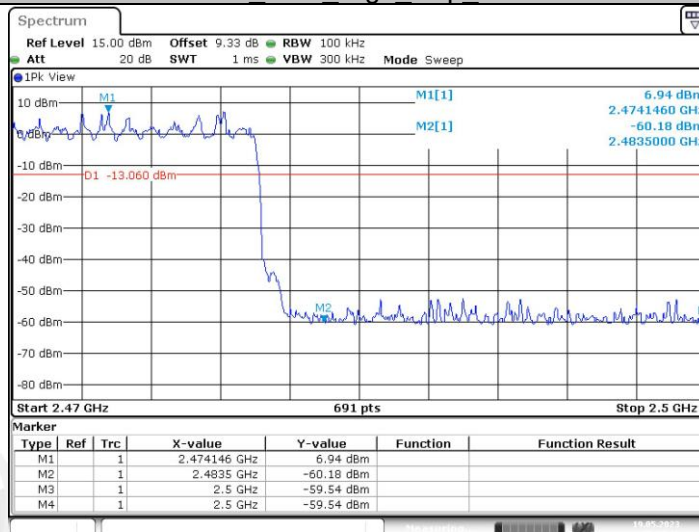
Date: 19.MAY.2023 14:59:48

2DH5_Ant1_Low_Hop_2402



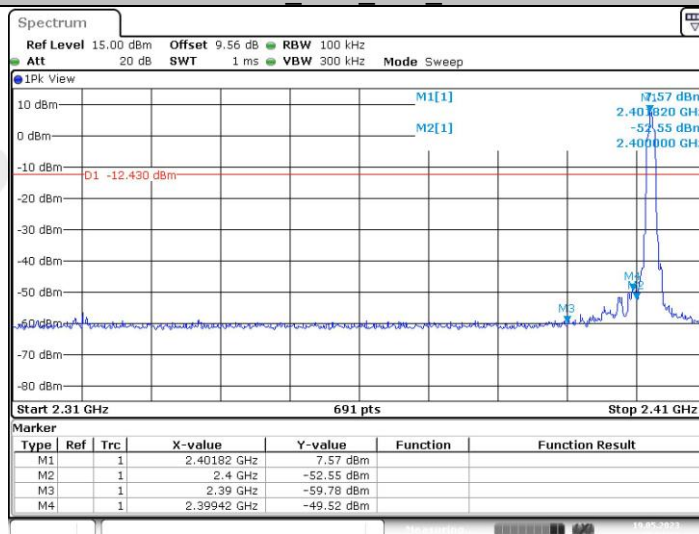
Date: 19 MAY 2023 15:05:59

2DH5_Ant1_High_Hop_2480



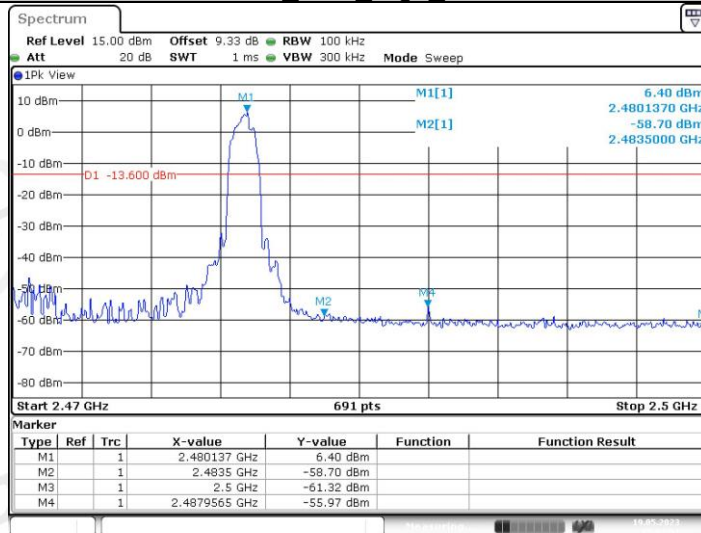
Date: 19 MAY 2023 15:07:19

3DH5_Ant1_Low_2402



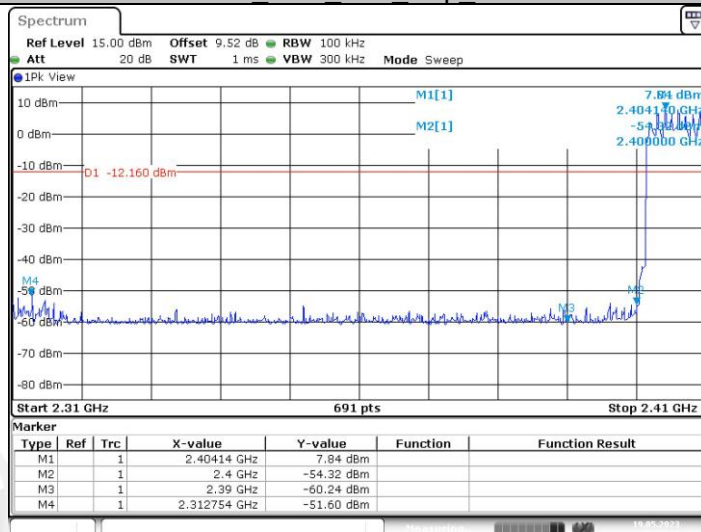
Date: 19 MAY 2023 15:01:13

3DH5_Ant1_High_2480



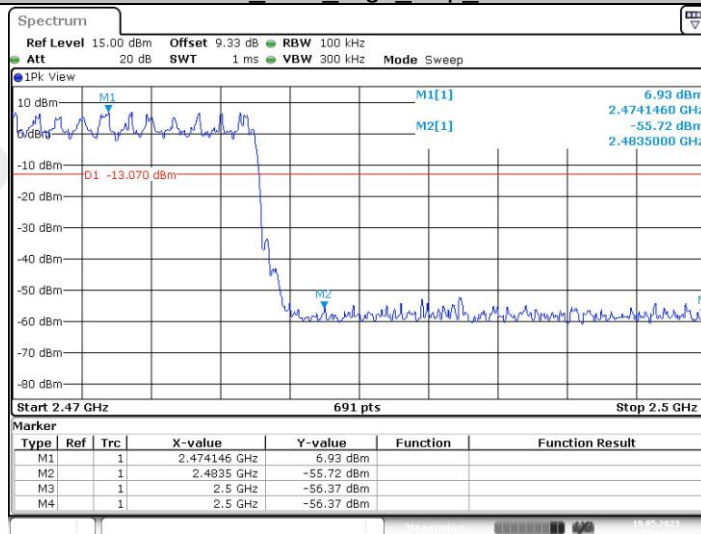
Date: 19 MAY 2023 15:02:51

3DH5_Ant1_Low_Hop_2402



Date: 19 MAY 2023 15:08:16

3DH5_Ant1_High_Hop_2480



Date: 19 MAY 2023 15:10:23