



■ Report No.:DDT-R23021423-2E01

■ Issued Date: Mar. 31, 2023

FCC CERTIFICATION TEST REPORT

FOR

Applicant	:	ASA Electronics Shenzhen Limited
Address	:	Room 503, 5/F., Unit A, Skyworth Building, Gaoxin Avenue.1.S., Nanshan District, Shen Zhen, China
Equipment under Test	:	AM/FM/WX/USB/BT/AUX IN Radio
Model No.	:	XMH100, RMXMH100
Trade Mark	:	N/A
FCC ID	:	2AHU2-XMH100
Manufacturer	:	ASA Electronics, LLC.
Address	:	2602 Marina Drive Elkhart, IN 46514 USA

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.....	7
2.	General Test Information	8
2.1.	Description of EUT	8
2.2.	Accessories of EUT.....	9
2.3.	Assistant equipment used for test.....	9
2.4.	Block diagram of EUT configuration for test	9
2.5.	Deviations of test standard.....	9
2.6.	Test environment conditions	10
2.7.	Test laboratory	10
2.8.	Measurement uncertainty.....	10
3.	Equipment Used During Test.....	11
4.	20 dB Bandwidth	12
4.1.	Block diagram of test setup.....	12
4.2.	Limits	12
4.3.	Test procedure	12
4.4.	test result.....	12
4.5.	Test graphs	13
5.	99% Bandwidth	17
5.1.	Block diagram of test setup.....	17
5.2.	Limits	17
5.3.	Test procedure	17
5.4.	Test Result	17
5.5.	Test Graphs.....	18
6.	Maximum Peak Output Power	22
6.1.	Block diagram of test setup.....	22
6.2.	Limits	22
6.3.	Test procedure	22
6.4.	Test Result Peak.....	23
6.5.	Test graphs	23
7.	Carrier Frequency Separation.....	27
7.1.	Block diagram of test setup.....	27
7.2.	Limits	27
7.3.	Test procedure	27
7.4.	Test result.....	28
7.5.	Test graphs	28
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.....	31
8.5.	Test graphs	31
9.	Number of Hopping Channel	38
9.1.	Block diagram of test setup.....	38
9.2.	Limits	38
9.3.	Test procedure	38
9.4.	Test result.....	39
9.5.	Test graphs	39
10.	Band Edge Compliance (Conducted Method)	41
10.1.	Block diagram of test setup.....	41
10.2.	Limit.....	41
10.3.	Test procedure	41
10.4.	Test result.....	42
10.5.	Test graphs	42
11.	RF Conducted Spurious Emissions	47
11.1.	Block diagram of test setup.....	47
11.2.	Limits	47
11.3.	Test procedure	47
11.4.	Test result.....	48
11.5.	Test graphs	48
12.	Duty cycle.....	58
12.1.	Block diagram of test setup.....	58
12.2.	Limit.....	58
12.3.	Test procedure	58
12.4.	Test result.....	59
12.5.	Test graphs	59
13.	Radiated Emission	63
13.1.	Block diagram of test setup.....	63
13.2.	Limit.....	64
13.3.	Test Procedure.....	65
13.4.	Test result.....	67
14.	Band Edge Compliance (Radiated Method)	76
14.1.	Block diagram of test setup.....	76
14.2.	Limit.....	76
14.3.	Test Procedure.....	76

14.4.	Test result.....	76
15.	Power Line Conducted Emission.....	89
15.1.	Block diagram of test setup.....	89
15.2.	Power line conducted emission limits.....	89
15.3.	Test procedure.....	89
15.4.	Test result.....	90
16.	Antenna Requirements	91
16.1.	Limit.....	91
16.2.	Result	91
17.	Test Setup Photograph	92
18.	Photos of the EUT	94

Test Report Declare

Applicant	:	ASA Electronics Shenzhen Limited
Address	:	Room 503, 5/F., Unit A, Skyworth Building, Gaoxin Avenue.1.S., Nanshan District, Shen Zhen, China
Equipment under Test	:	AM/FM/WX/USB/BT/AUX IN Radio
Model No.	:	XMH100, RMXMH100
Trade Mark	:	N/A
Manufacturer	:	ASA Electronics, LLC.
Address	:	2602 Marina Drive Elkhart, IN 46514 USA

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C

Test Procedure Used:

ANSI C63.10:2013

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 standards.

Report No.:	DDT-R23021423-2E01		
Date of Receipt:	Feb. 15, 2023	Date of Test:	Feb. 15, 2023 ~ Mar. 31, 2023

Prepared By:

Johnny Wang

Johnny Wang/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	Mar. 31, 2023	

1. Summary of Test Results

Description of Test Item	Standard	Verdict
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1)	Pass
20 dB Bandwidth & 99% Bandwidth	FCC Part 15: 15.247(a)(1)	Pass
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1)	Pass
Number of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii)	Pass
Dwell Time	FCC Part 15: 15.247(a)(1)(iii)	Pass
RF Conducted Spurious Emissions	FCC Part 15: 15.247(d)	Pass
Radiated Emission	FCC Part 15: 15.205 FCC Part 15: 15.209 FCC Part 15: 15.247(d)	Pass
Band Edge Compliance	FCC Part 15: 15.205 FCC Part 15: 15.209 FCC Part 15: 15.247(d)	Pass
Power Line Conducted Emissions	FCC Part 15: 15.207(a)	N/A
Antenna Requirement	FCC Part 15: 15.203	Pass
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.		

2. General Test Information

2.1. Description of EUT

EUT* Name	: AM/FM/WX/USB/BT/AUX IN Radio
Model Number	: XMH100, RMXMH100
Difference of models	: Above models are identical in schematic and structure, only the name is different for all the models, therefore the test performed on the model XMH100.
EUT* Function Description	: Please reference user manual of this device
Power Supply	: DC 12V
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	: PCB antenna, maximum PK gain: -0.62 dBi
Sample Number	: S23021423-02

Note: EUT is the ab. of equipment under test.

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
N/A	N/A	N/A	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: FrequencyTool_v0.3.2.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: 0.5 dB (According to the manufacturer's claims)

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

2.5. Deviations of test standard

No deviation.

2.6. Test environment conditions

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 MHz ≤ f < 3.6 GHz); 1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz); 1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies Stability	6.7 × 10 ⁻⁸ (Antenna couple method) 5.5 × 10 ⁻⁸ (Conducted method)
Conducted spurious emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz); 1.40 dB (3.6 GHz ≤ f < 8 GHz) 1.66 dB (8 GHz ≤ f < 26.5 GHz)
Uncertainty for radio frequency (RBW < 20 kHz)	3 × 10 ⁻⁸
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission test (9 kHz – 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	3.34 dB (150KHz-30MHz) 3.72 dB (9KHz-150KHz)

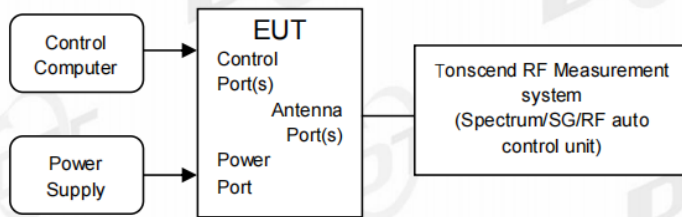
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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	May 18, 2022	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	May 18, 2022	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	May 18, 2022	1 Year
RF Control Unit	Tonscend	JS0806-2	20C8060230	May 18, 2022	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	May 26, 2022	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	May 19, 2022	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	May 17, 2022	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	May 06, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-118A	18040084	Aug.17, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-840A	461369	Apr. 11, 2022	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	Aug.17, 2022	1 Year
RF Cable	Yuhu Technology	JCTB810-NJ-NJ-9M	21123964	May. 19, 2022	1 Year
RF Cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	21073466	Aug.17, 2022	1 Year
Test software	Tonscend	JS32-RE	V 5.0.0.1	N/A	N/A
Test software	Audix	E3	V 6.1.1.1	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 Receiver	R&S	ESCI	100551	Aug. 26, 2022	1 Year

4. 20 dB Bandwidth

4.1. Block diagram of test setup



4.2. Limits

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.

4.3. 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:

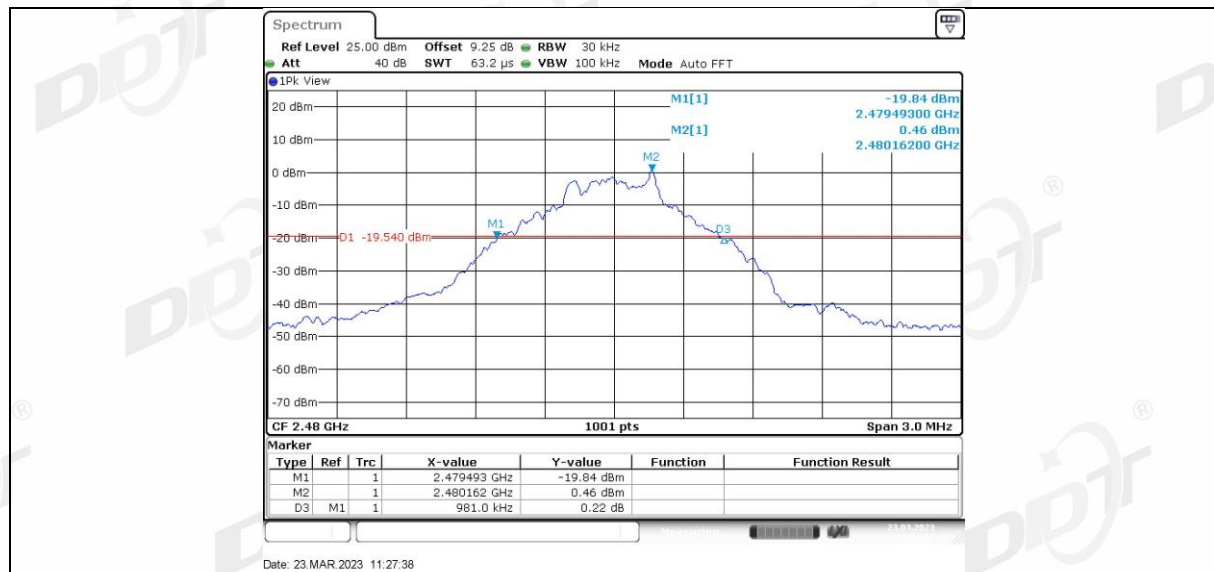
RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 2 times and 5 times the OBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold
- (5) Measure and record the results in the report.

4.4. test result

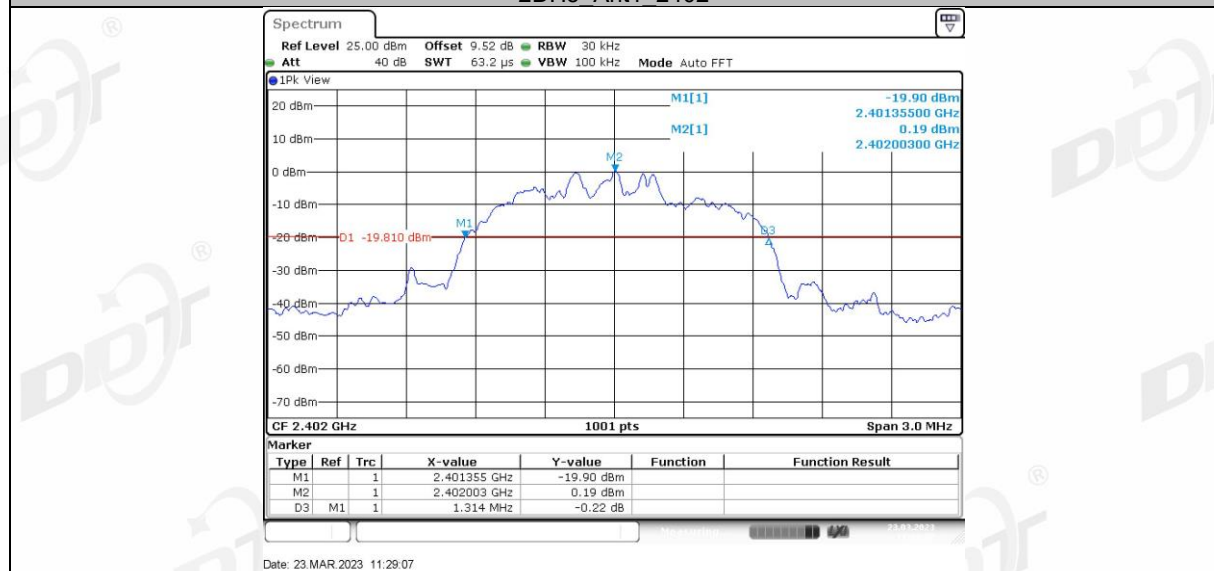
Test Mode	Antenna	Frequency [MHz]	20dB EBW[MHz]
DH5	Ant1	2402	0.98
		2441	0.99
		2480	0.98
2DH5	Ant1	2402	1.31
		2441	1.31
		2480	1.31
3DH5	Ant1	2402	1.30
		2441	1.30
		2480	1.30

4.5. Test graphs

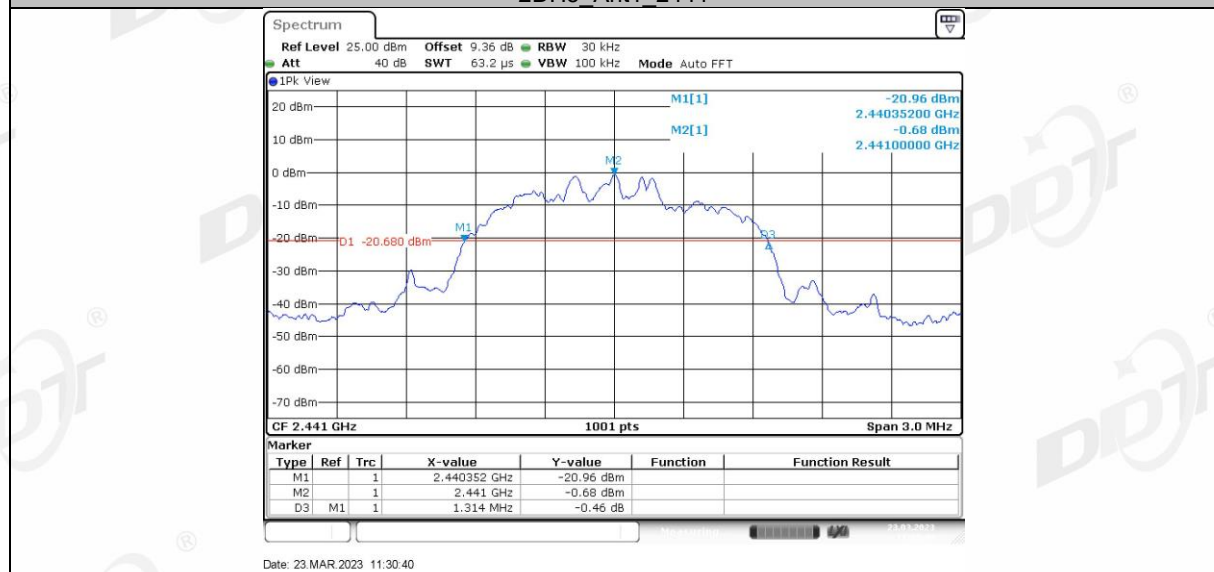




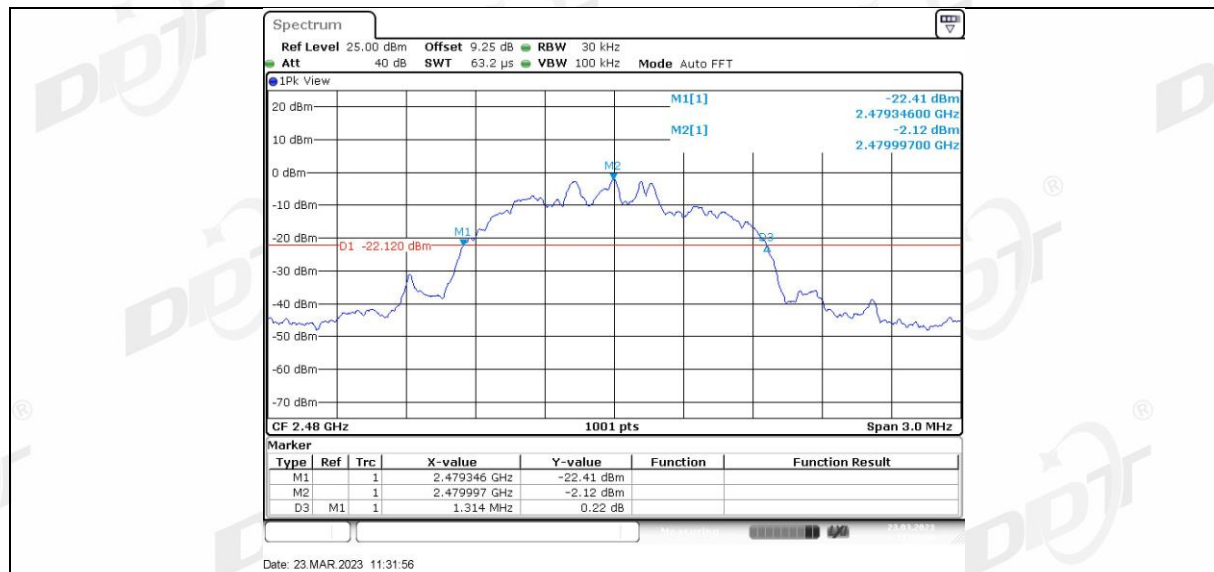
2DH5 Ant1 2402



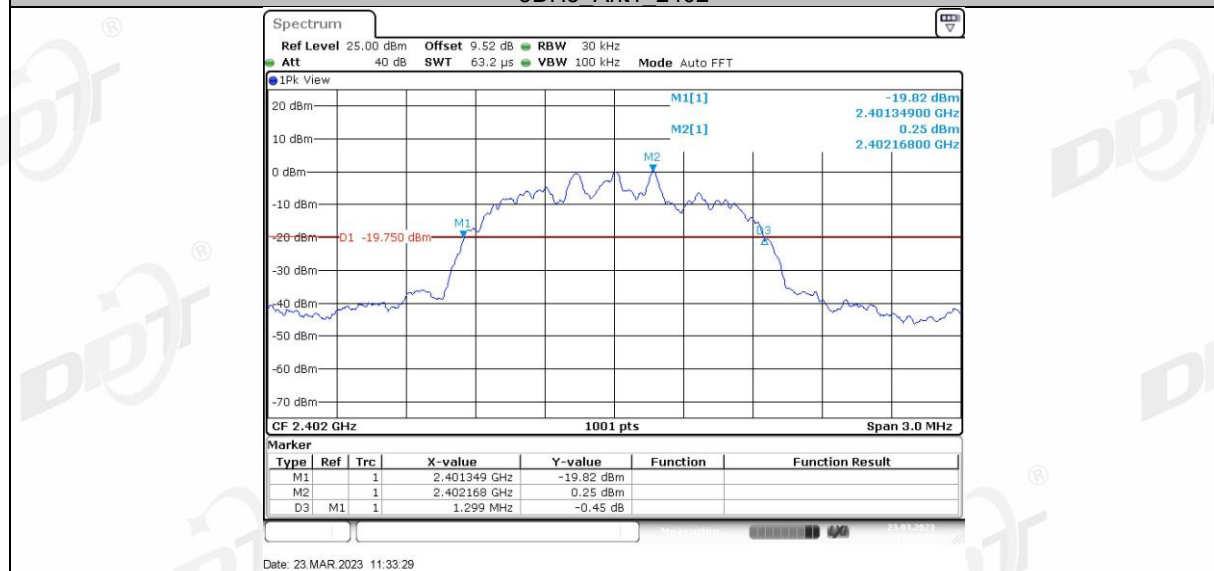
2DH5 Ant1 2441



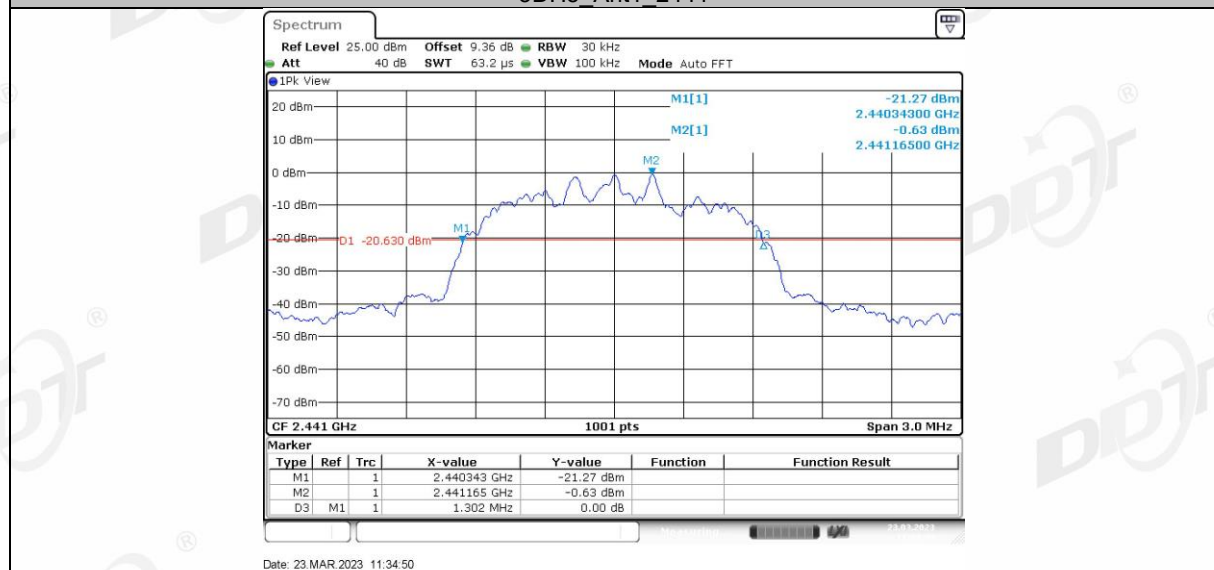
2DH5 Ant1 2480



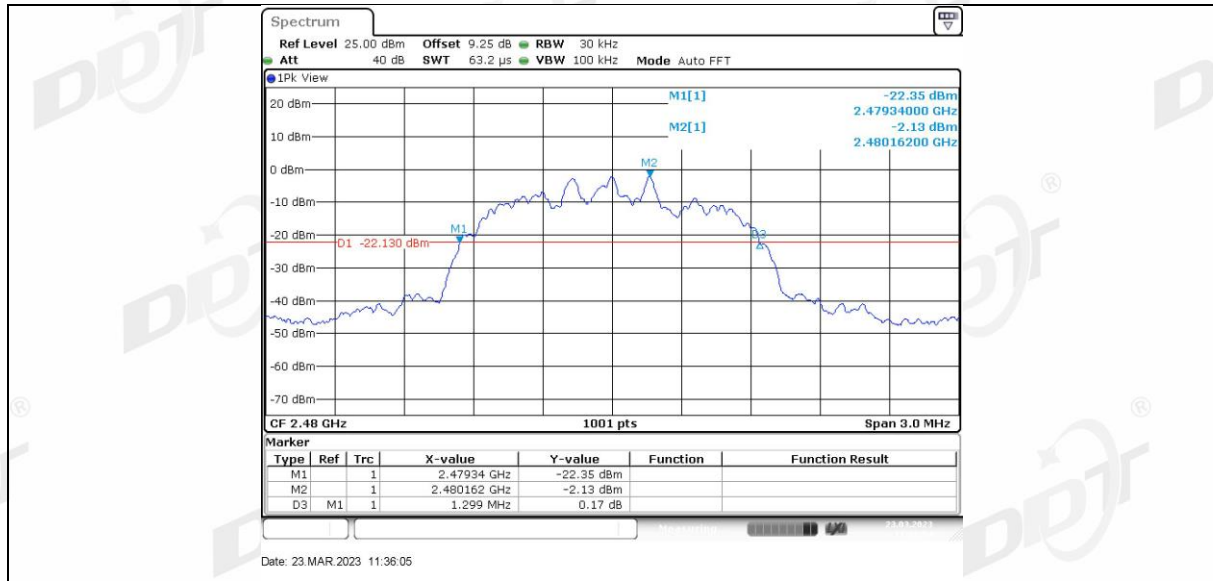
3DH5 Ant1 2402



3DH5 Ant1 2441

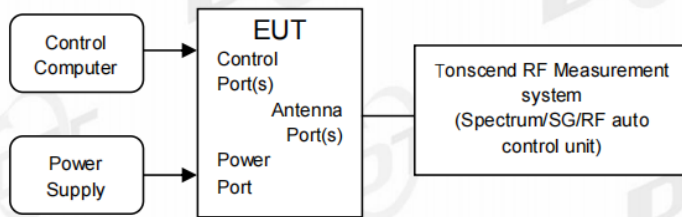


3DH5 Ant1 2480



5. 99% Bandwidth

5.1. Block diagram of test setup



5.2. Limits

Just for Report.

5.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 6.9.3.
- (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 99% bandwidth measurement:

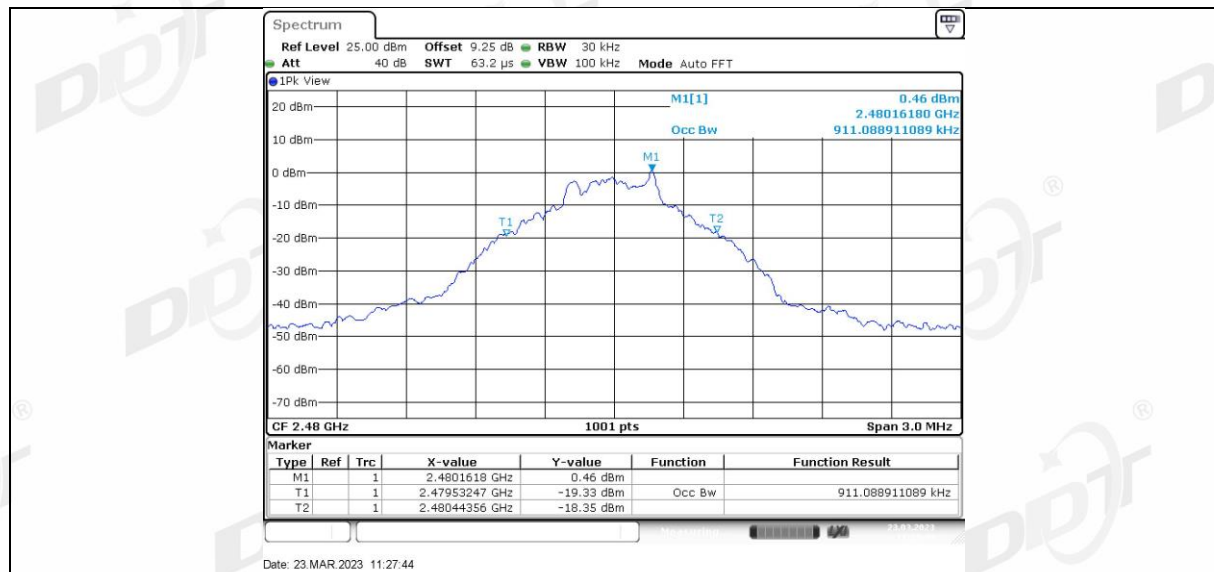
RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 1.5 times and 5.0 times the OBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold
- (5) Measure and record the results in the report.

5.4. Test Result

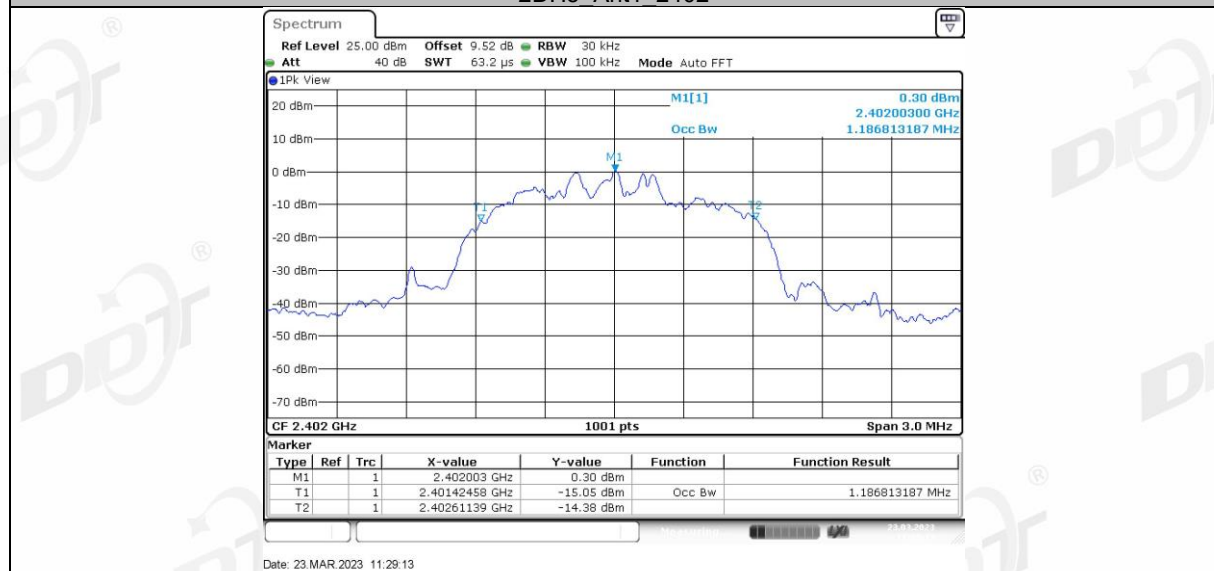
Test Mode	Antenna	Frequency [MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
DH5	Ant1	2402	0.908	2401.5415	2402.4496
		2441	0.908	2440.5385	2441.4466
		2480	0.911	2479.5325	2480.4436
2DH5	Ant1	2402	1.187	2401.4246	2402.6114
		2441	1.187	2440.4186	2441.6054
		2480	1.187	2479.4156	2480.6024
3DH5	Ant1	2402	1.181	2401.4246	2402.6054
		2441	1.181	2440.4186	2441.5994
		2480	1.181	2479.4156	2480.5964

5.5. Test Graphs

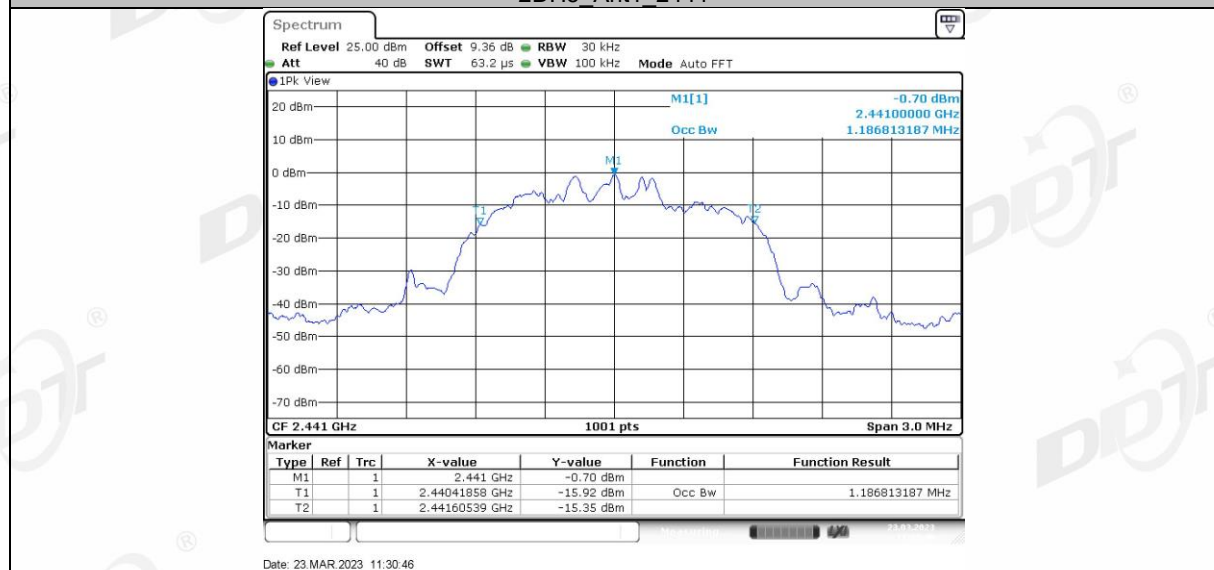




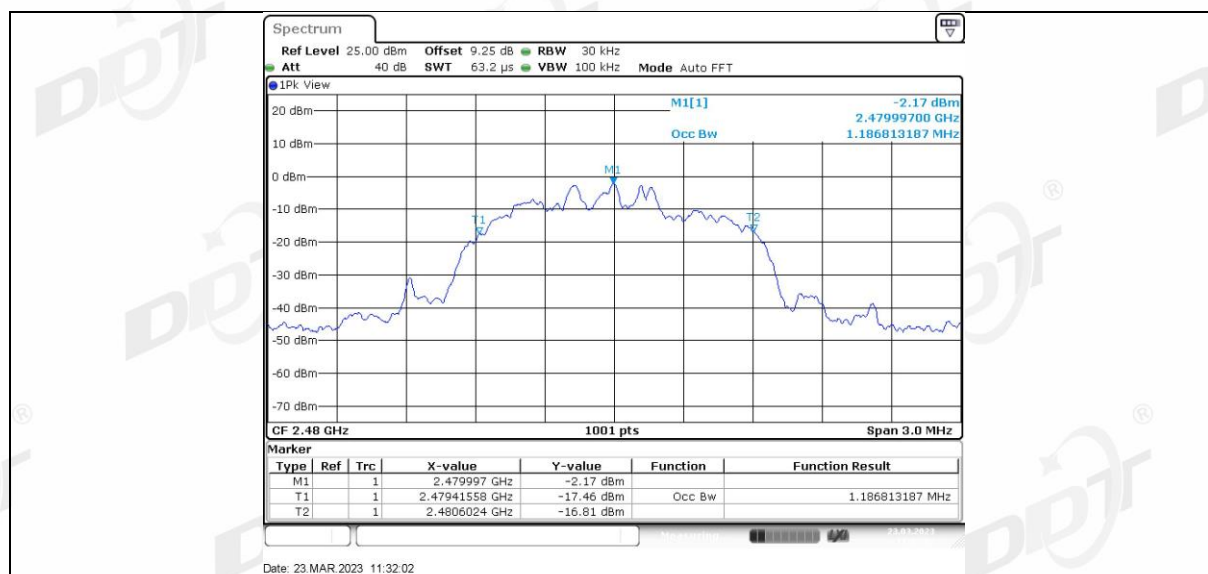
2DH5 Ant1_2402



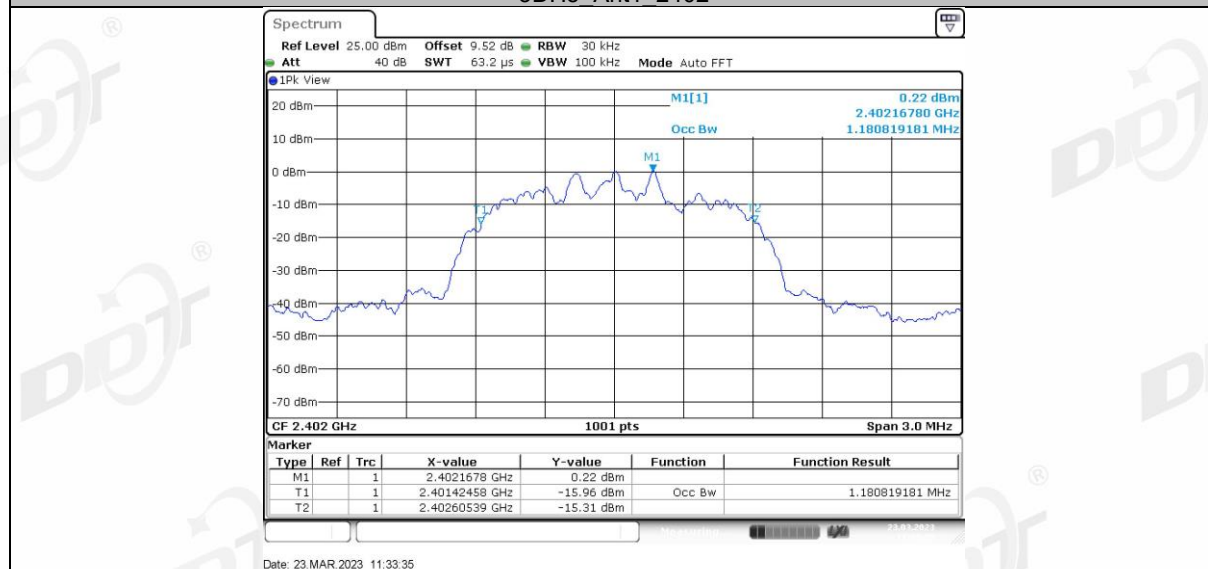
2DH5 Ant1_2441



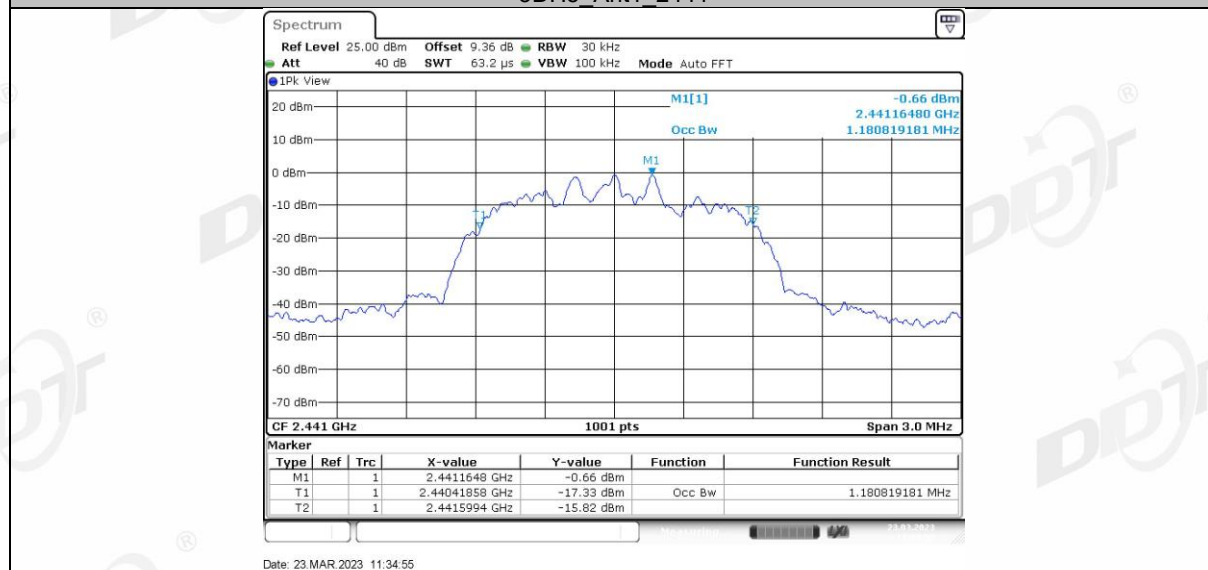
2DH5 Ant1_2480



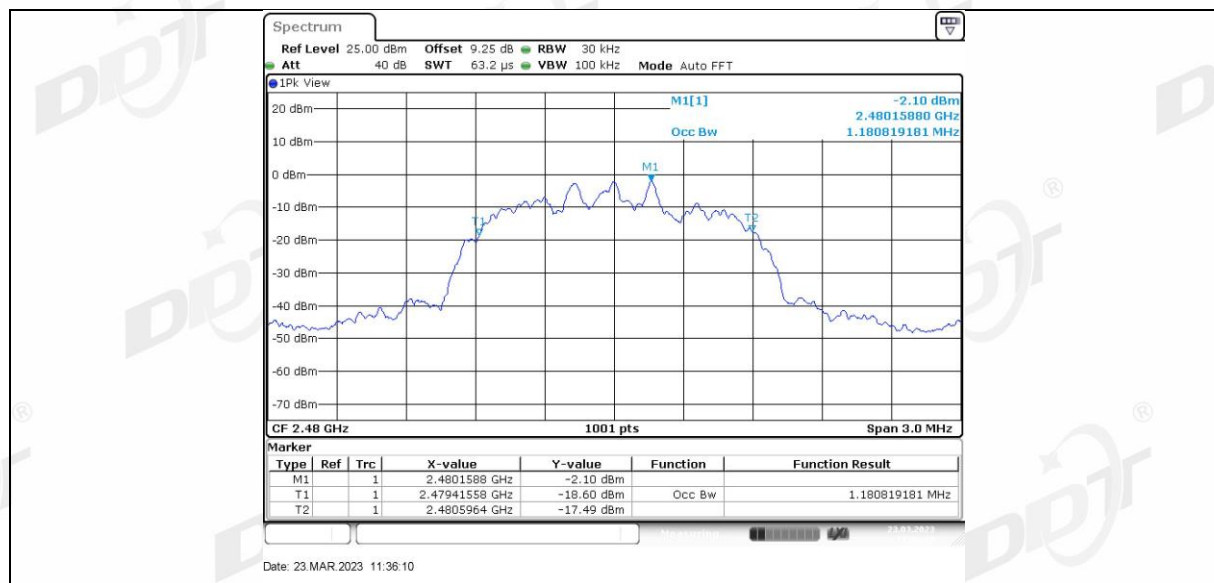
3DH5 Ant1_2402



3DH5 Ant1_2441

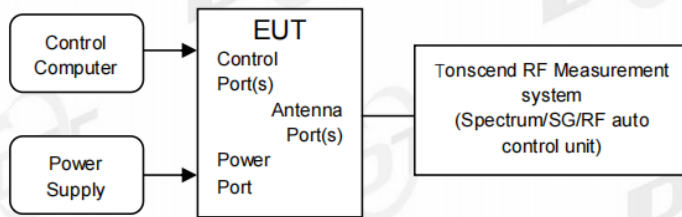


3DH5 Ant1_2480



6. Maximum Peak Output Power

6.1. Block diagram of test setup



6.2. 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.

6.3. Test procedure

- (1) The test according to ANSI C63.10-2013 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: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

Detector Mode: Peak

Sweep time: Auto

Trace mode: Max hold

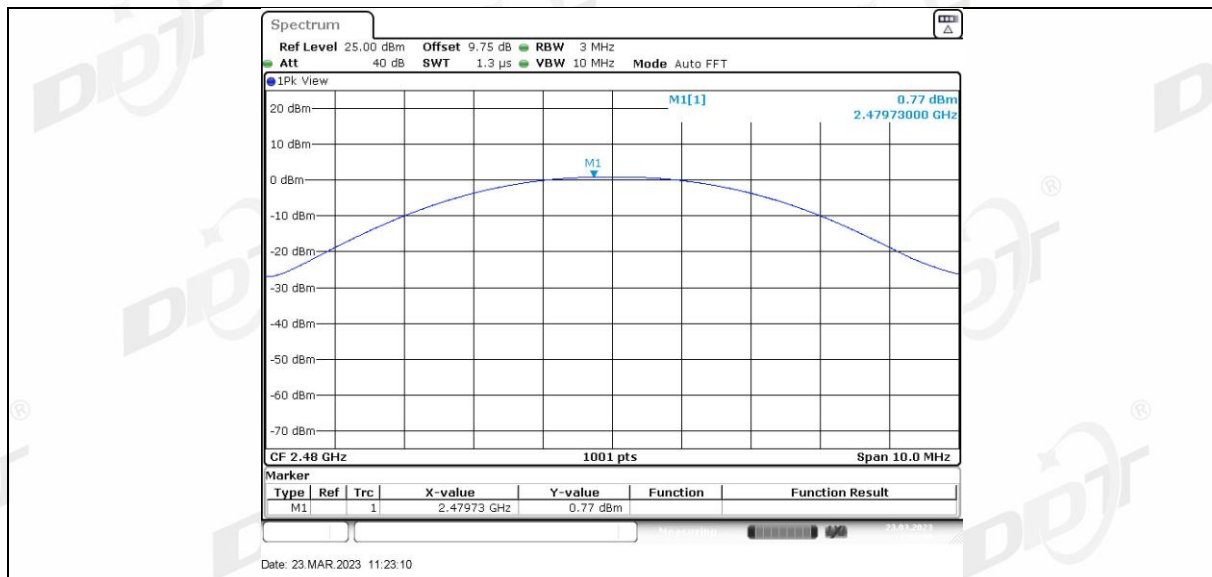
- (5) Use the marker-to-peak function to set the marker to the peak of the emission and record the results in the report.

6.4. Test Result Peak

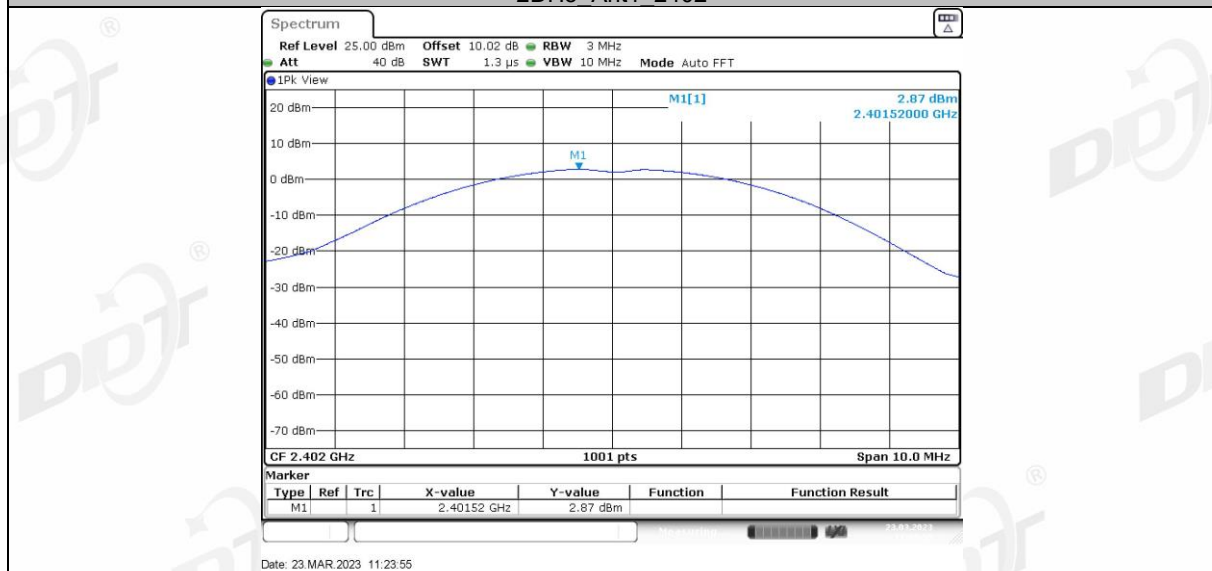
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
DH5	Ant1	2402	2.99	≤20.97	2.37	≤36	PASS
		2441	2.56	≤20.97	1.94	≤36	PASS
		2480	0.77	≤20.97	0.15	≤36	PASS
2DH5	Ant1	2402	2.87	≤20.97	2.25	≤36	PASS
		2441	2.34	≤20.97	1.72	≤36	PASS
		2480	0.59	≤20.97	-0.03	≤36	PASS
3DH5	Ant1	2402	2.74	≤20.97	2.12	≤36	PASS
		2441	2.32	≤20.97	1.70	≤36	PASS
		2480	0.44	≤20.97	-0.18	≤36	PASS

6.5. Test graphs

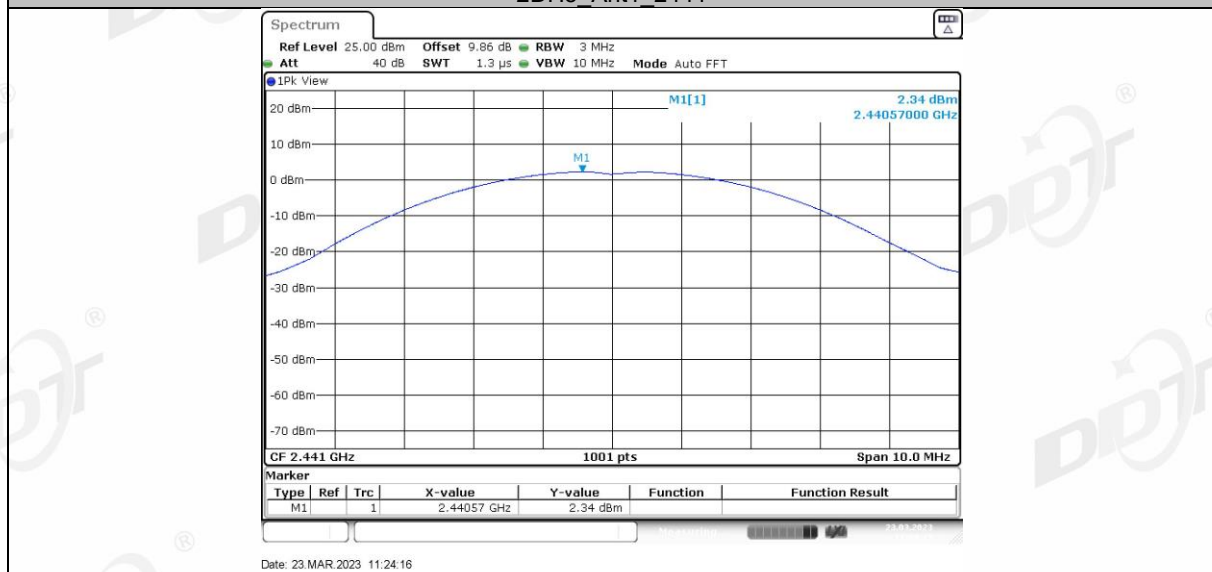




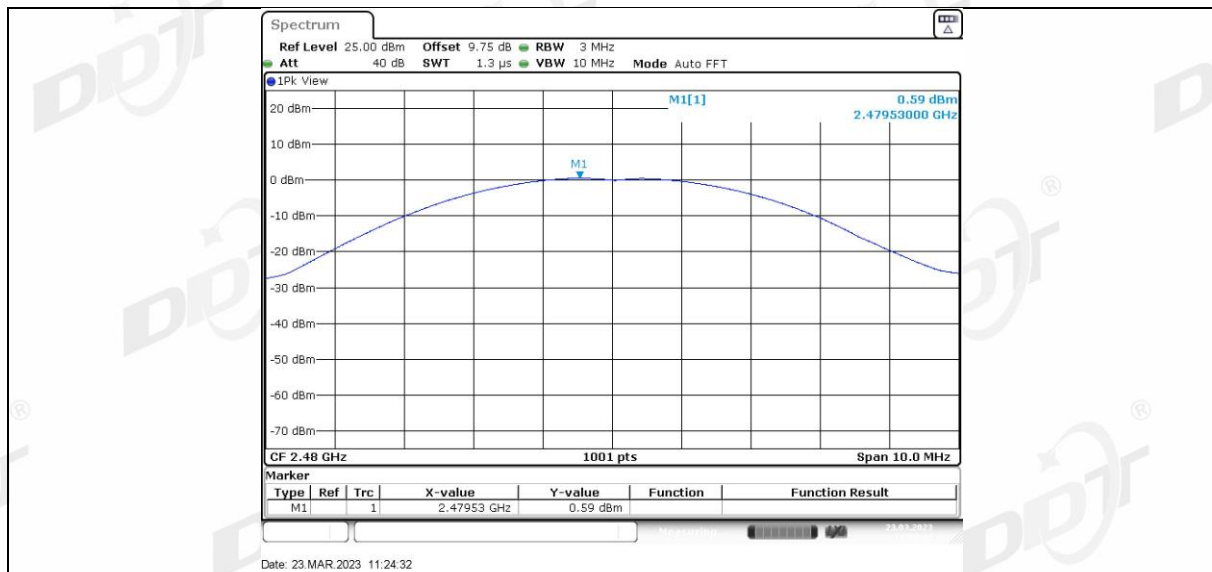
2DH5_Ant1_2402



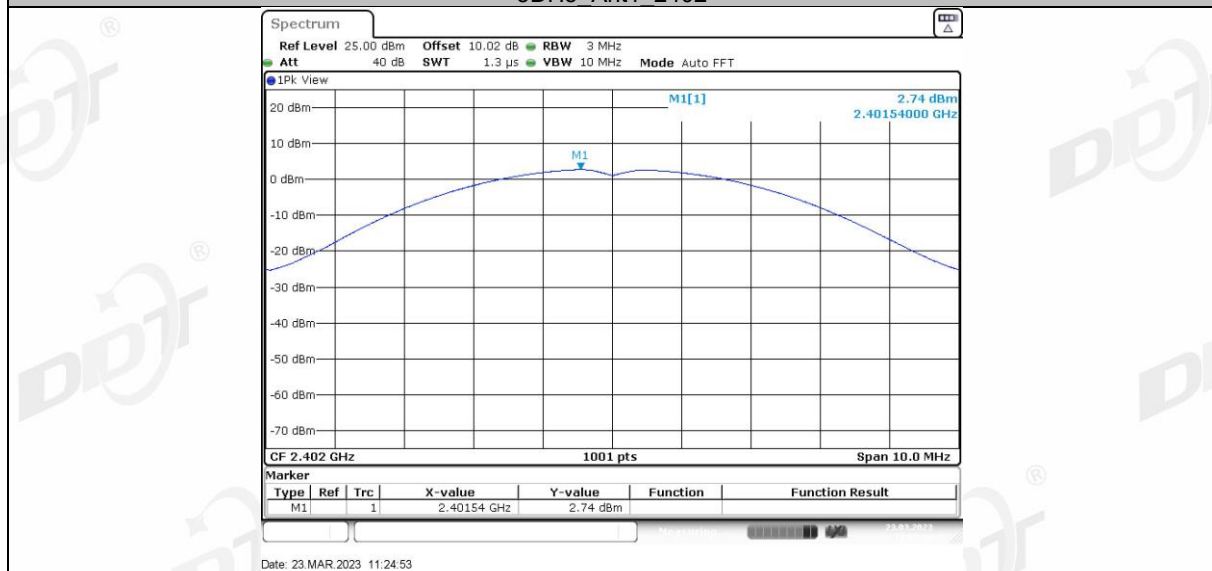
2DH5_Ant1_2441



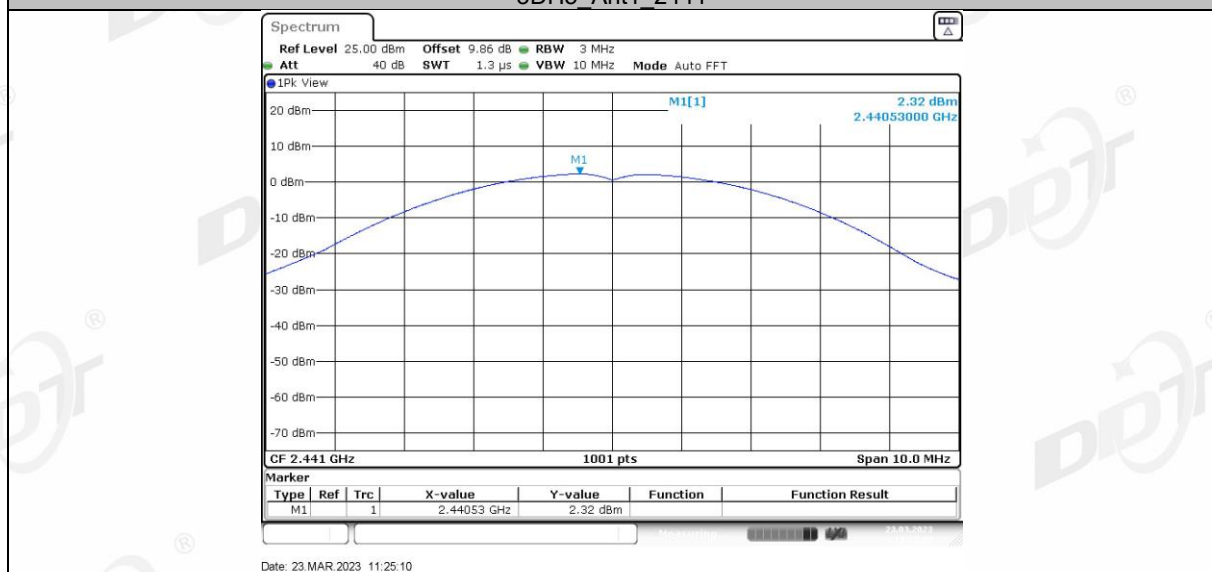
2DH5_Ant1_2480



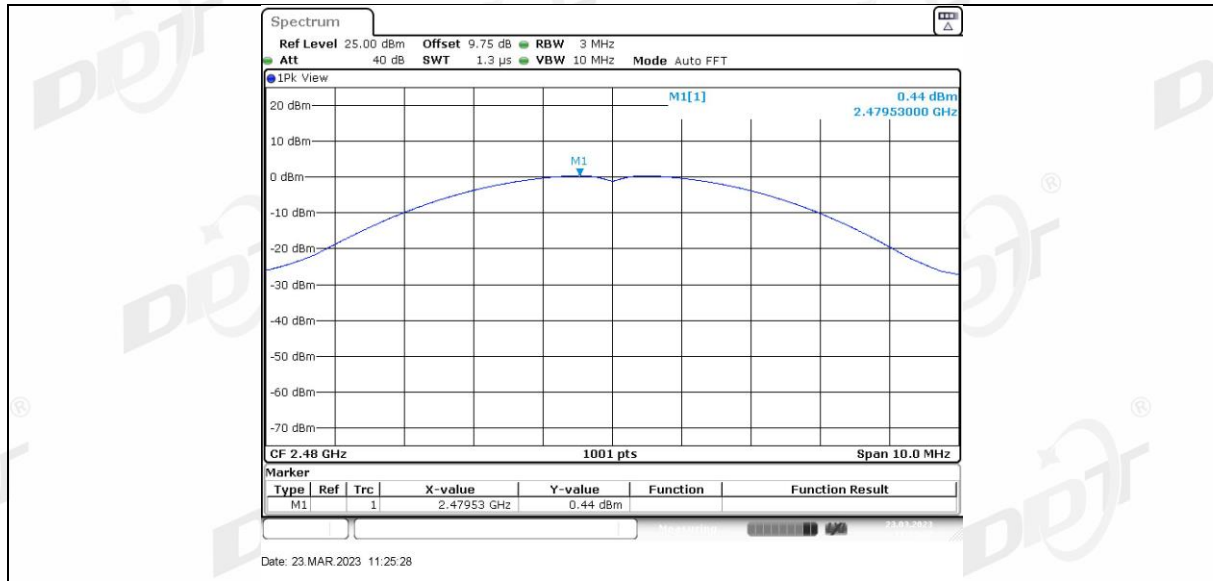
3DH5 Ant1_2402



3DH5 Ant1_2441

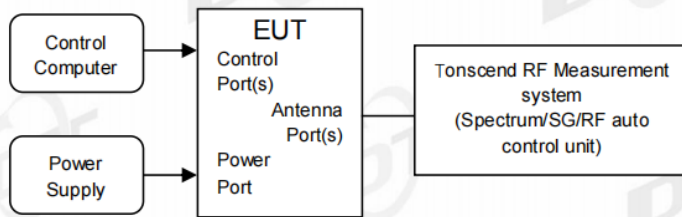


3DH5 Ant1_2480



7. Carrier Frequency Separation

7.1. Block diagram of test setup



7.2. 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.

7.3. 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

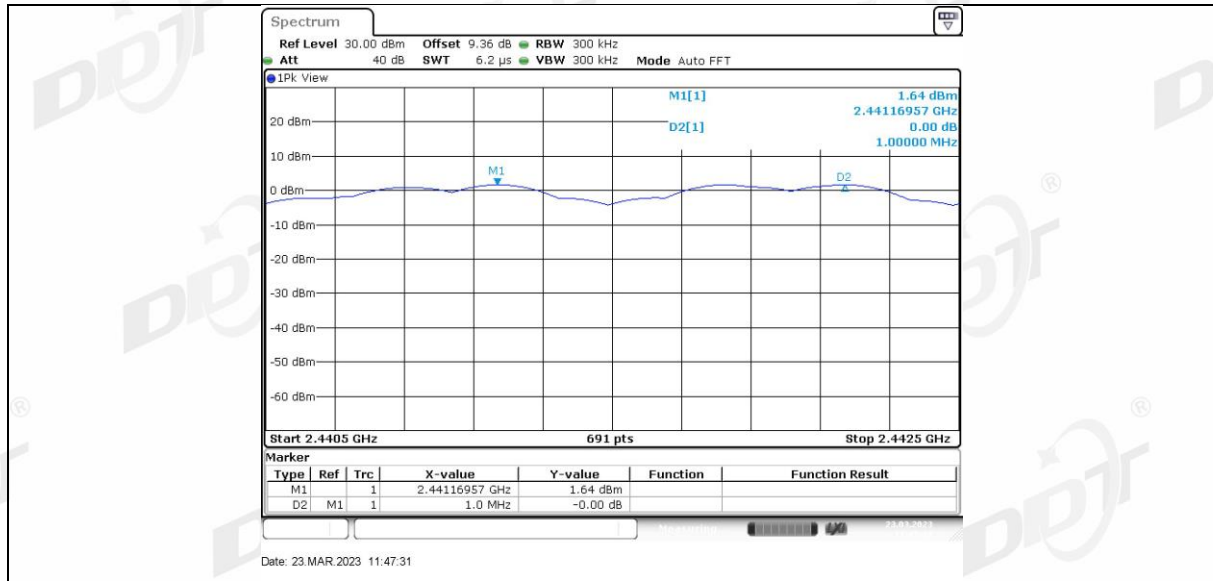
- (5) Use the marker-delta function to determine the separation between the peaks of the adjacent channels and record the results in the report.

7.4. Test result

Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Limit [MHz]	Verdict
DH5	Ant1	Hop	1.000	≥ 0.653	PASS
2DH5	Ant1	Hop	1.003	≥ 0.873	PASS
3DH5	Ant1	Hop	1.000	≥ 0.867	PASS

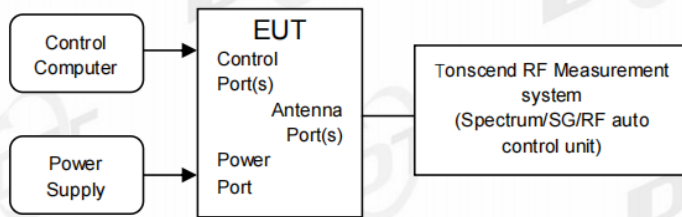
7.5. Test graphs





8. Dwell Time

8.1. Block diagram of test setup



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

Measure and record the results in the report.

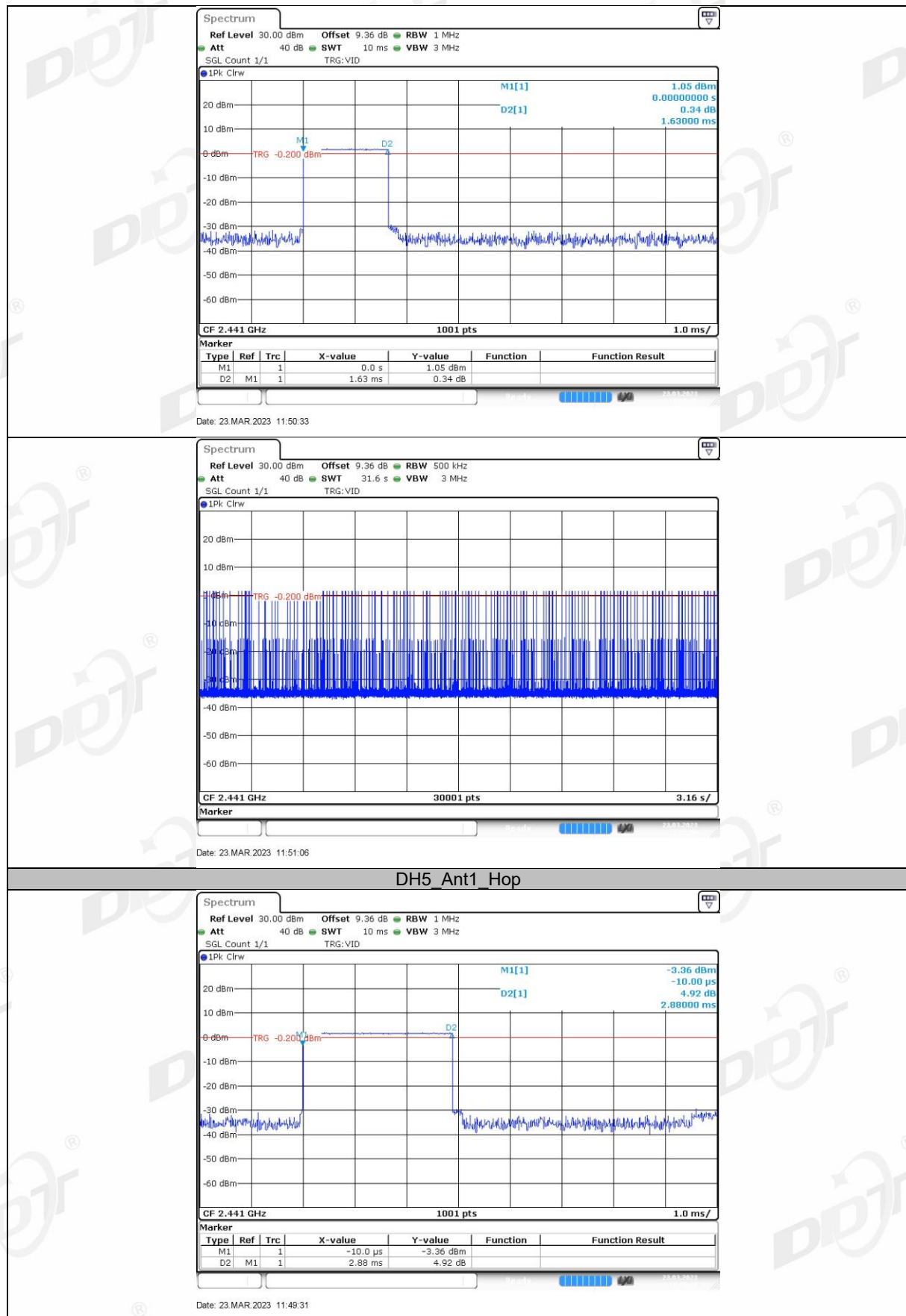
- (5) The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$
- (6) Measure the hopping number and on time of each pulse with spectrum analyzer in zero span set, and calculate dwell time with formula Dwell time = total hops * pulse's on time.

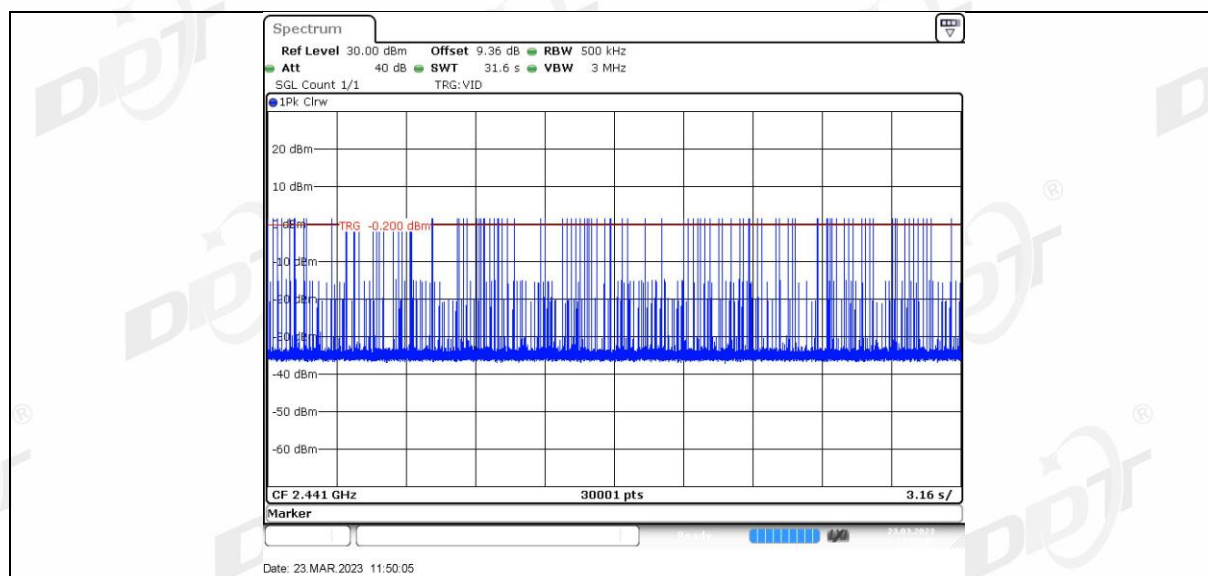
8.4. Test result

Test Mode	Antenna	Frequency [MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.37	312	0.115	≤0.4	PASS
DH3	Ant1	Hop	1.63	173	0.282	≤0.4	PASS
DH5	Ant1	Hop	2.88	103	0.297	≤0.4	PASS
2DH1	Ant1	Hop	0.37	311	0.115	≤0.4	PASS
2DH3	Ant1	Hop	1.63	172	0.280	≤0.4	PASS
2DH5	Ant1	Hop	2.87	107	0.307	≤0.4	PASS
3DH1	Ant1	Hop	0.37	312	0.115	≤0.4	PASS
3DH3	Ant1	Hop	1.62	173	0.280	≤0.4	PASS
3DH5	Ant1	Hop	2.87	104	0.298	≤0.4	PASS

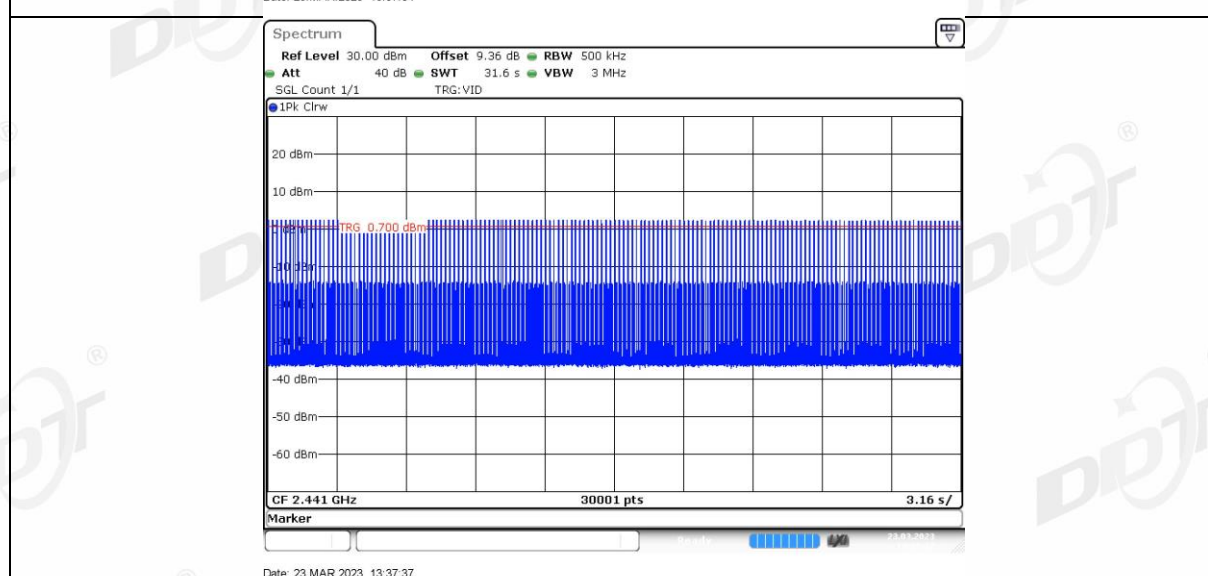
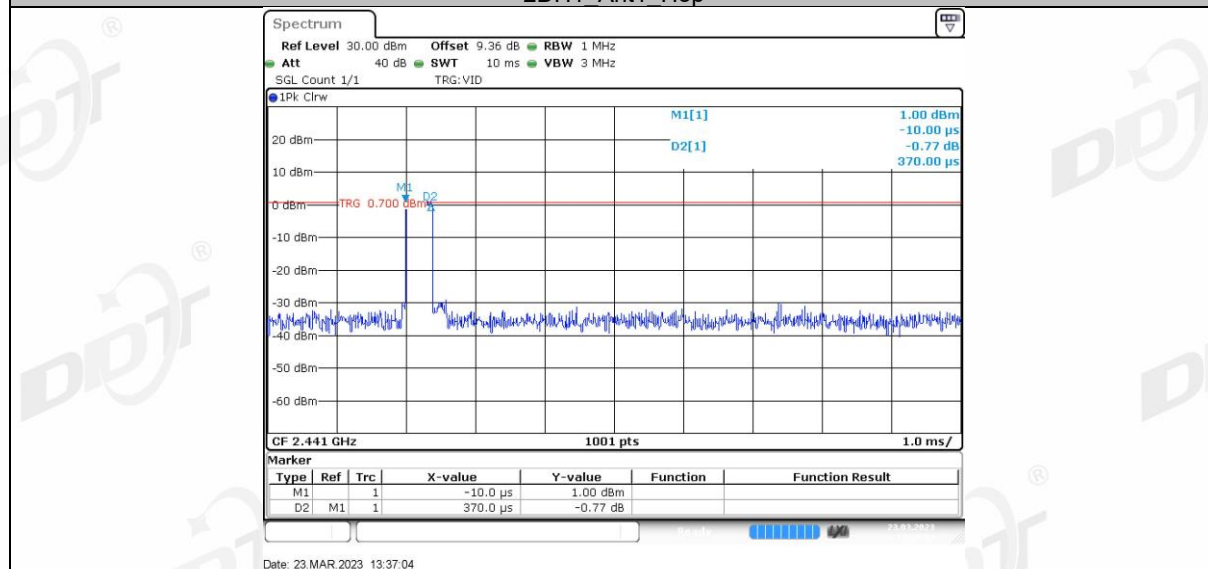
8.5. Test graphs





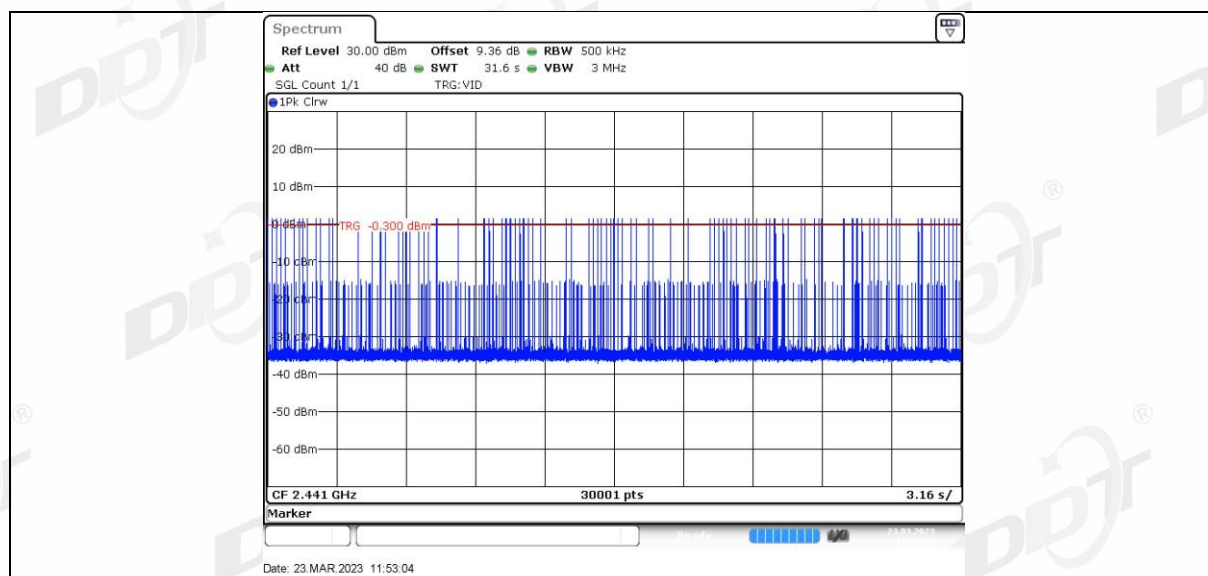


2DH1_Ant1_Hop

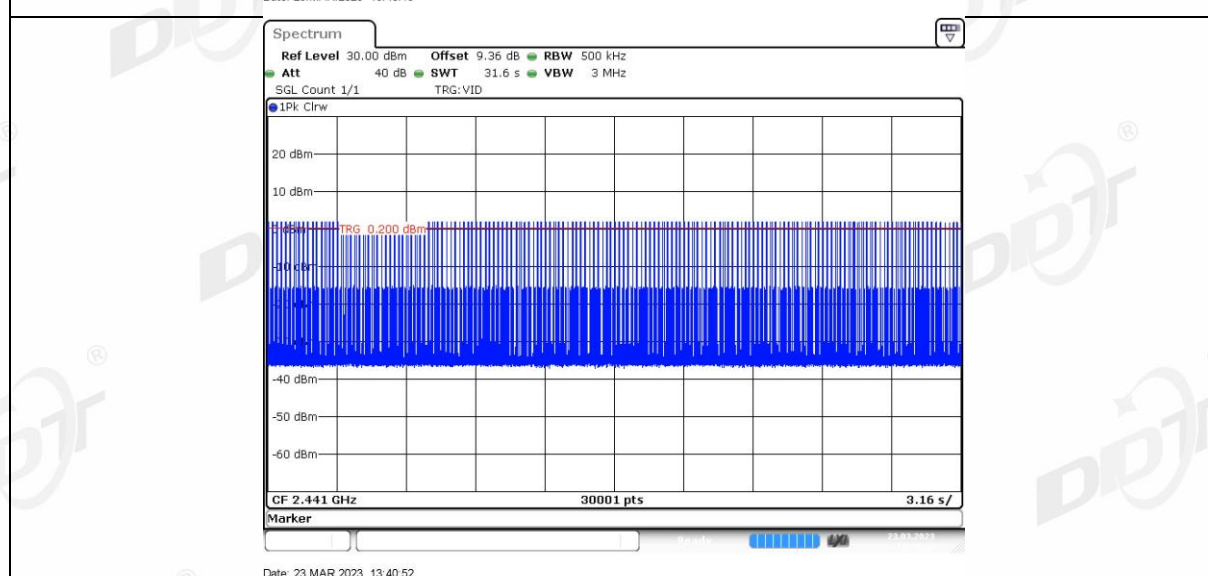
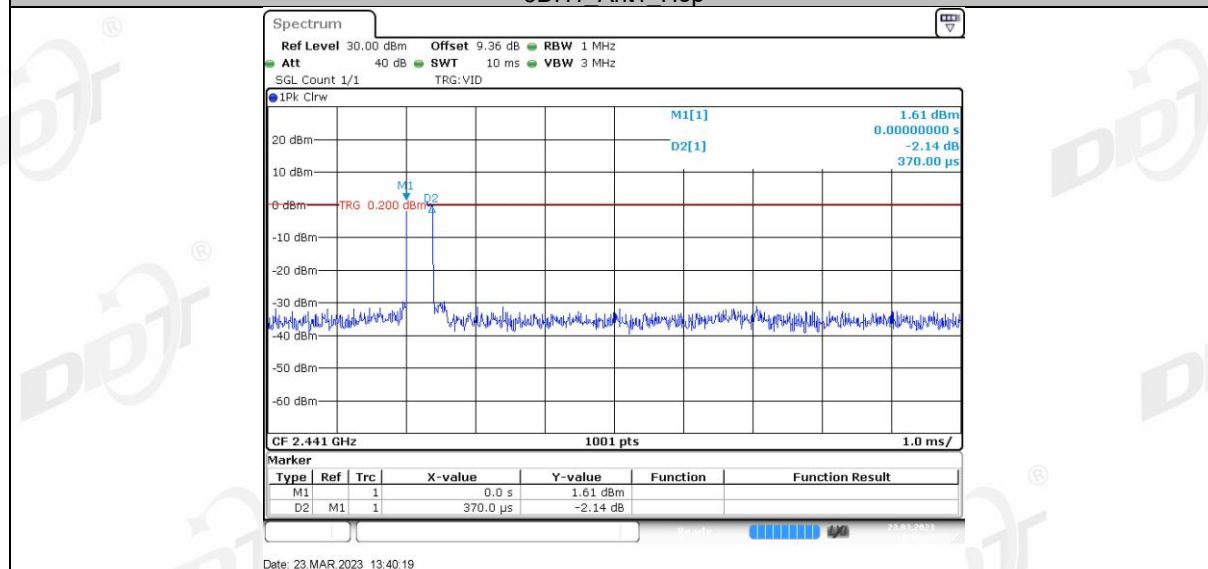


2DH3_Ant1_Hop



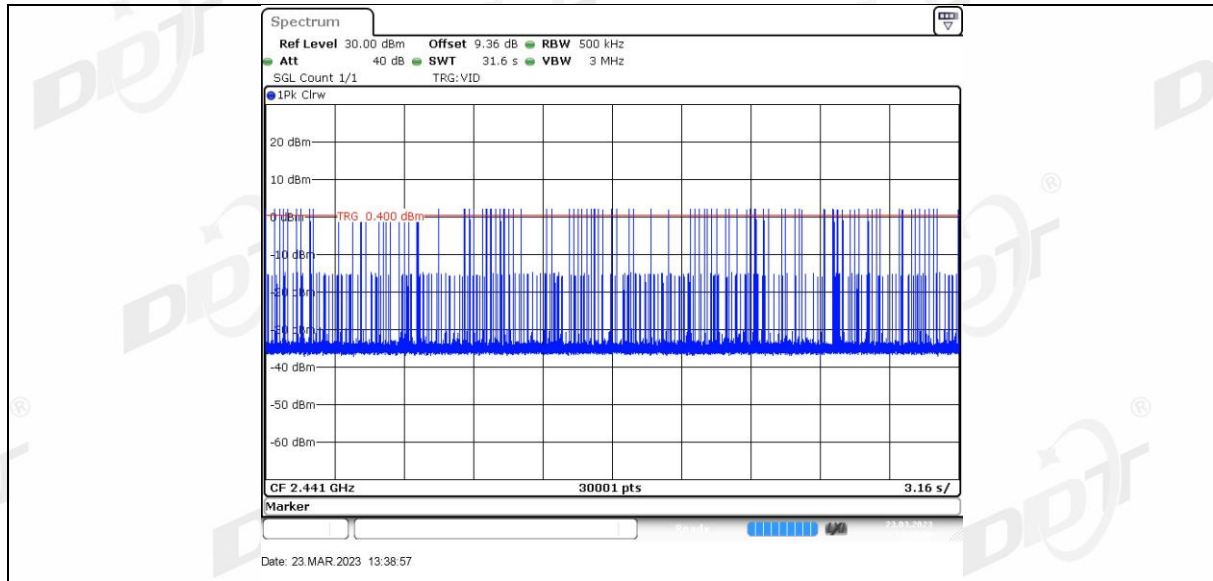


3DH1_Ant1_Hop



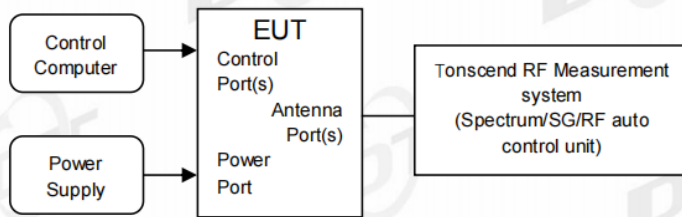
3DH3_Ant1_Hop





9. Number of Hopping Channel

9.1. Block diagram of test setup



9.2. Limits

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

9.3. 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

Measure and record the results in the report.

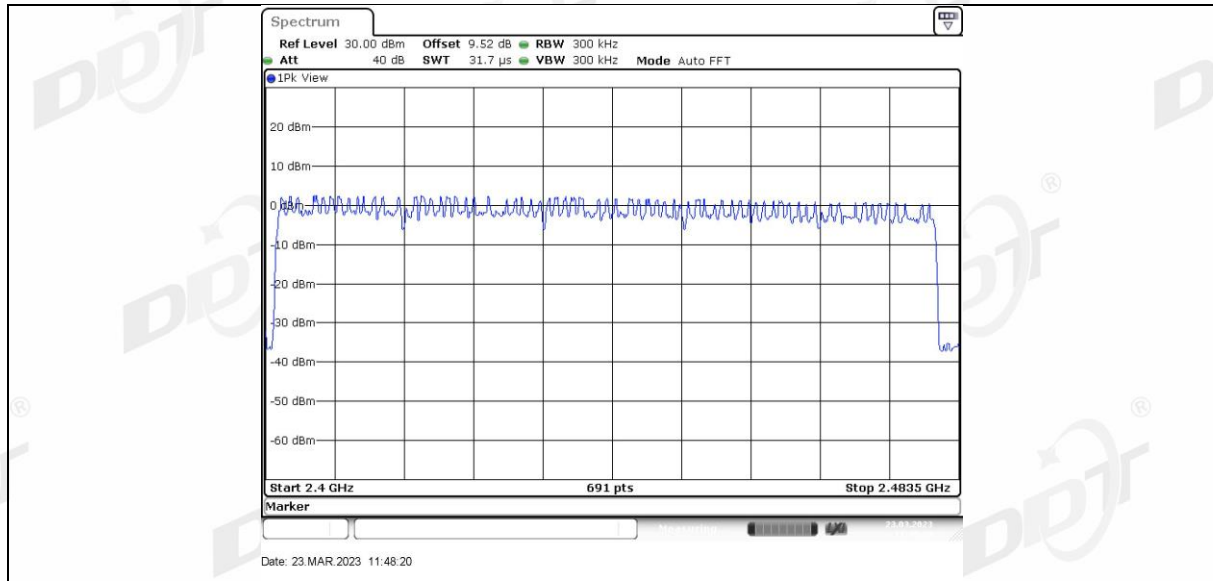
- (5) Measure the hopping number and record the results in the report.

9.4. Test result

Test Mode	Antenna	Frequency [MHz]	Result [Num]	Limit [Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

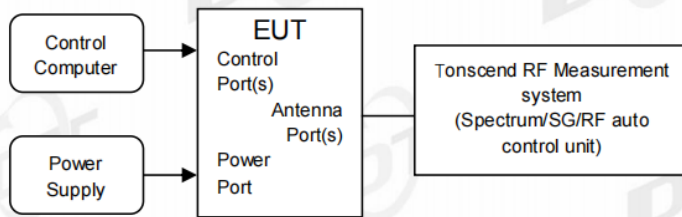
9.5. Test graphs





10. Band Edge Compliance (Conducted Method)

10.1. Block diagram of test setup



10.2. Limit

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

10.3. 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.

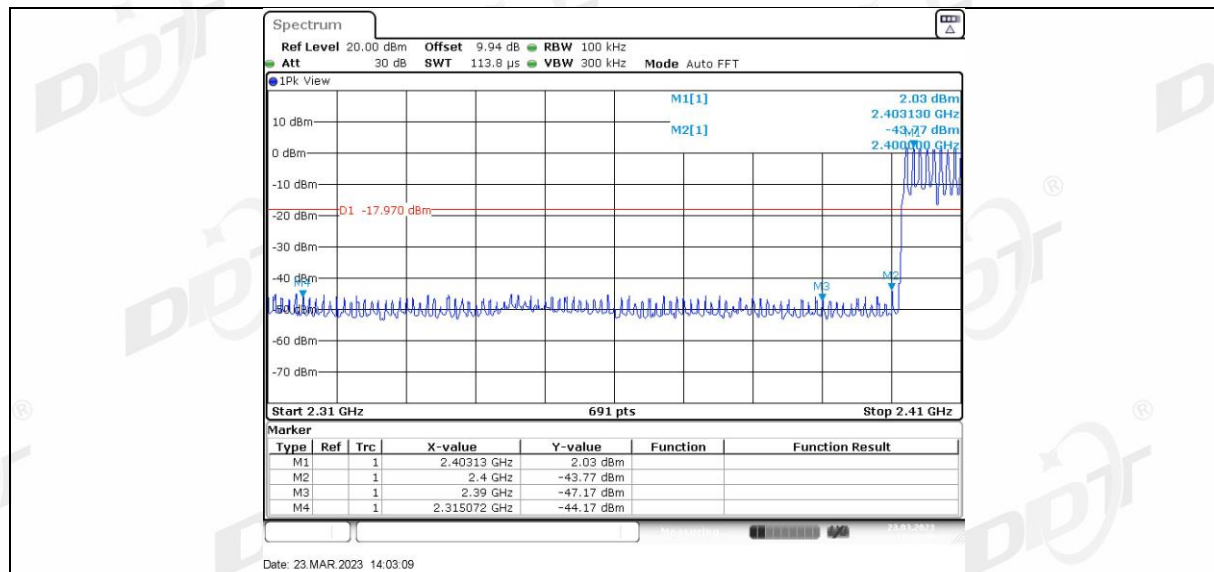
(4) Then mark the maximum amplitude of all unwanted emissions outside of the authorized frequency band.

10.4. Test result

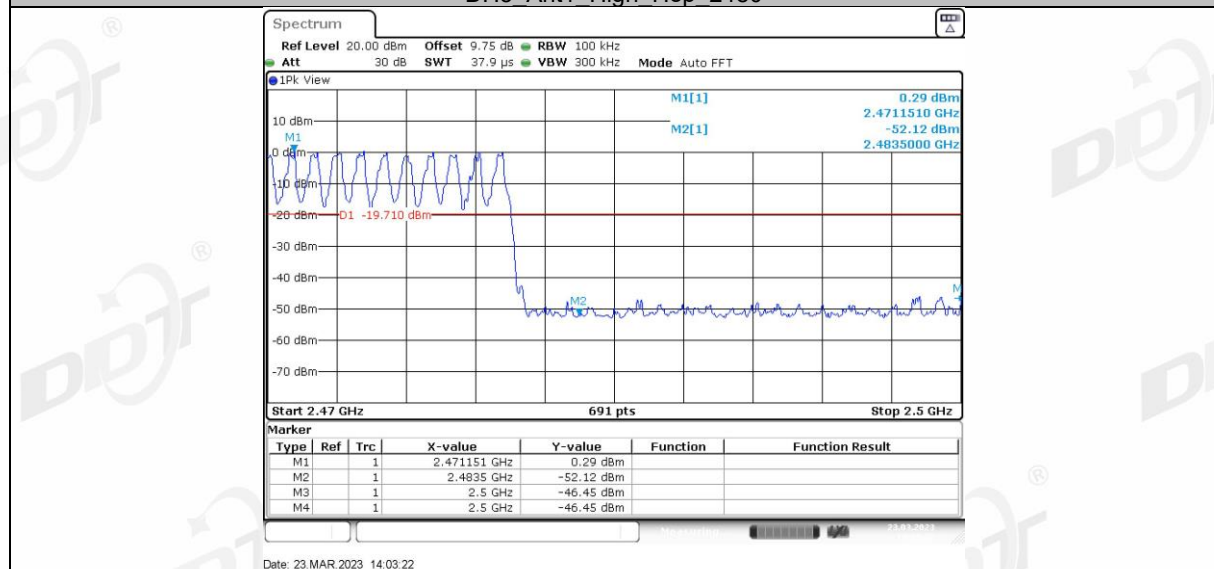
Mode	Freq. (MHz)	Verdict
GFSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
$\pi/4$ -DQPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
8DPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass

10.5. Test graphs

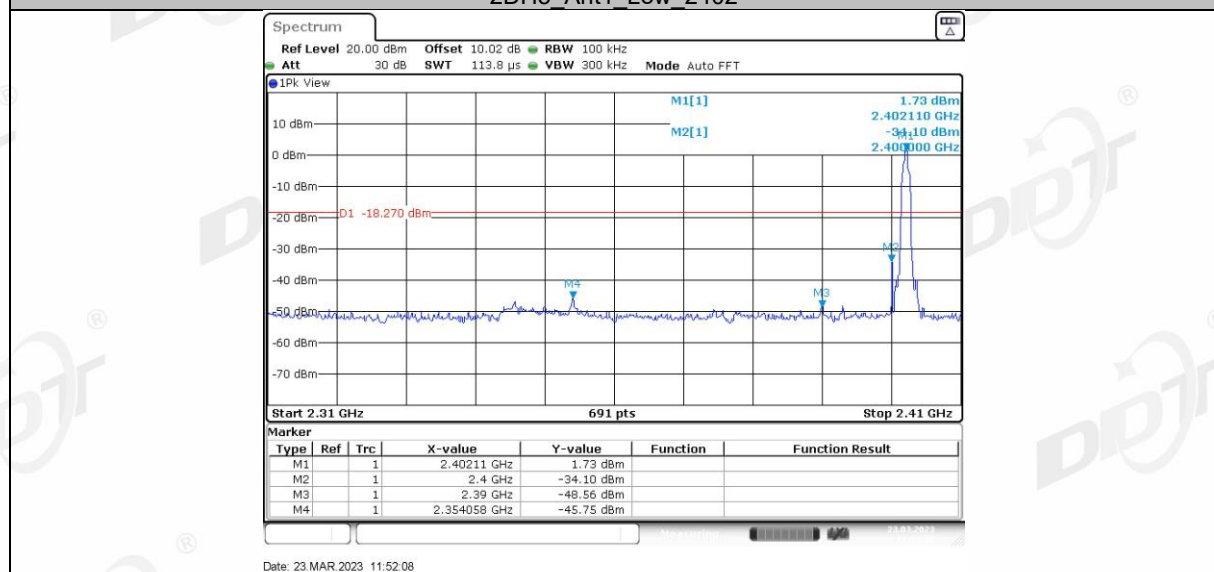




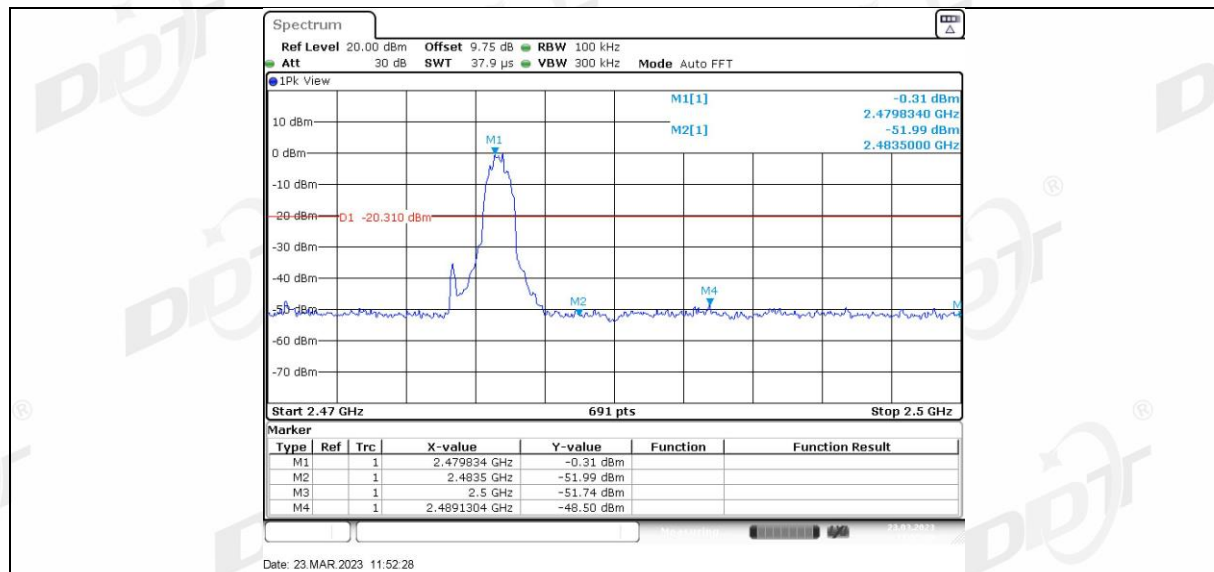
DH5 Ant1 High Hop 2480



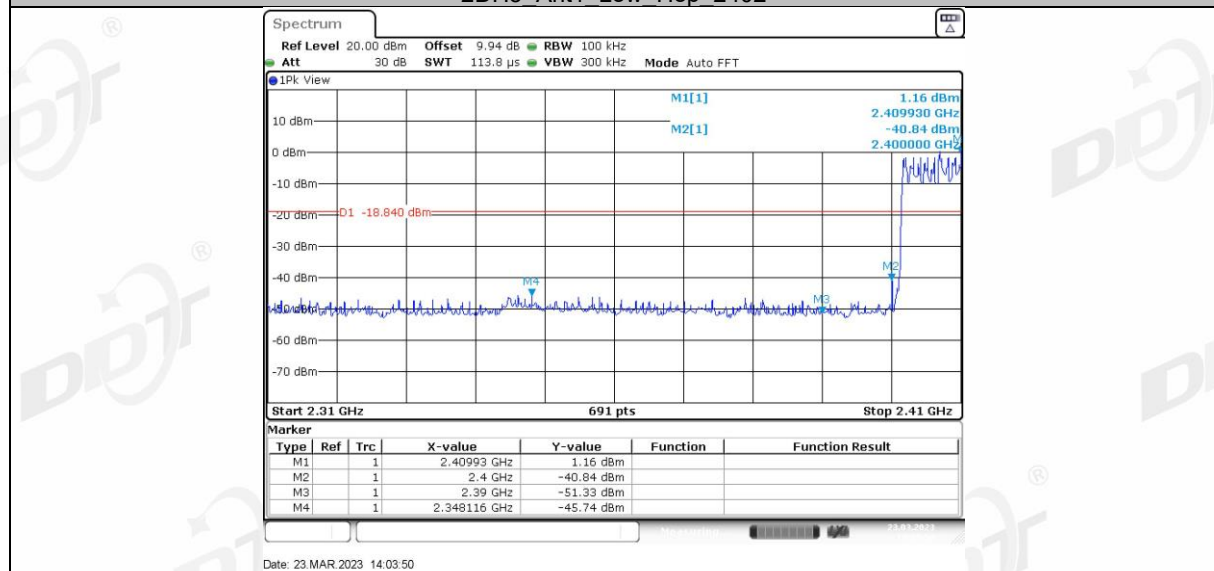
2DH5 Ant1 Low 2402



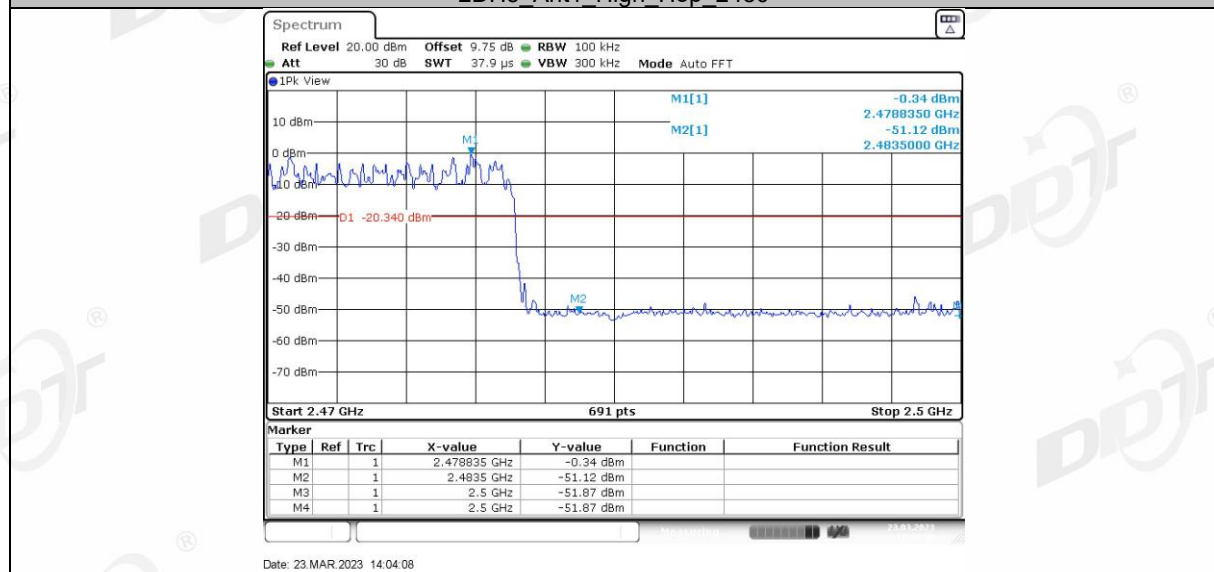
2DH5 Ant1 High 2480



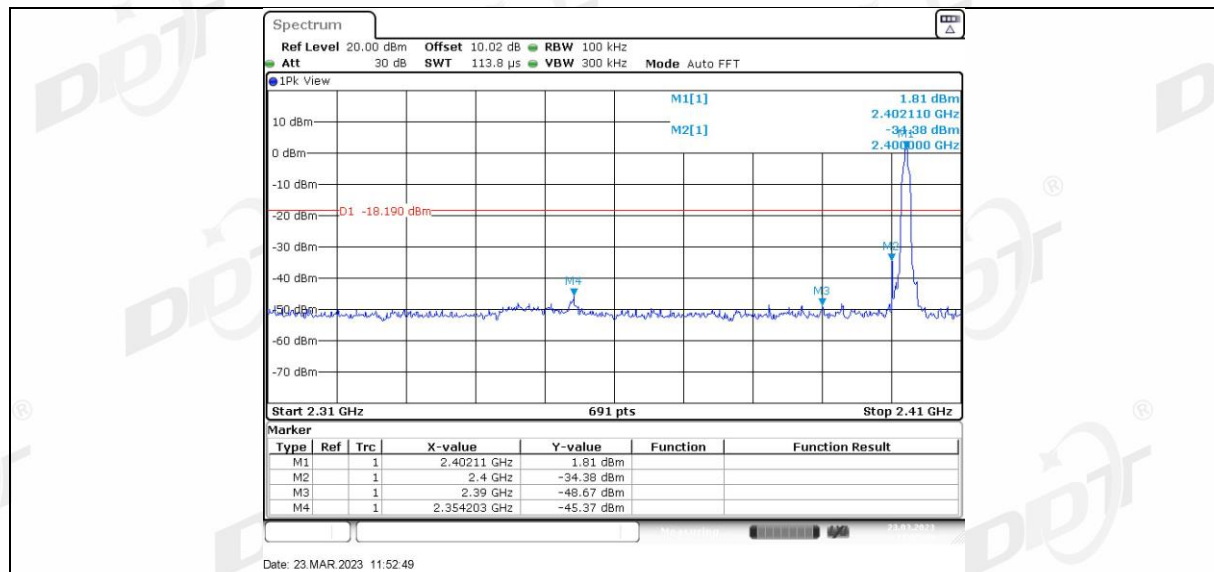
2DH5 Ant1 Low Hop 2402



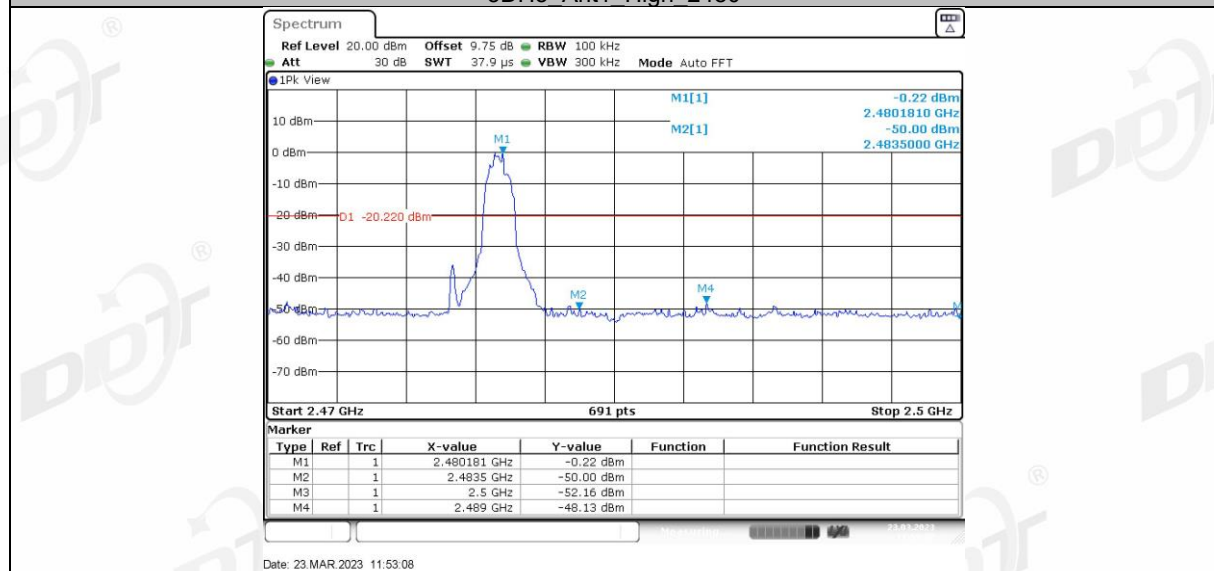
2DH5 Ant1 High Hop 2480



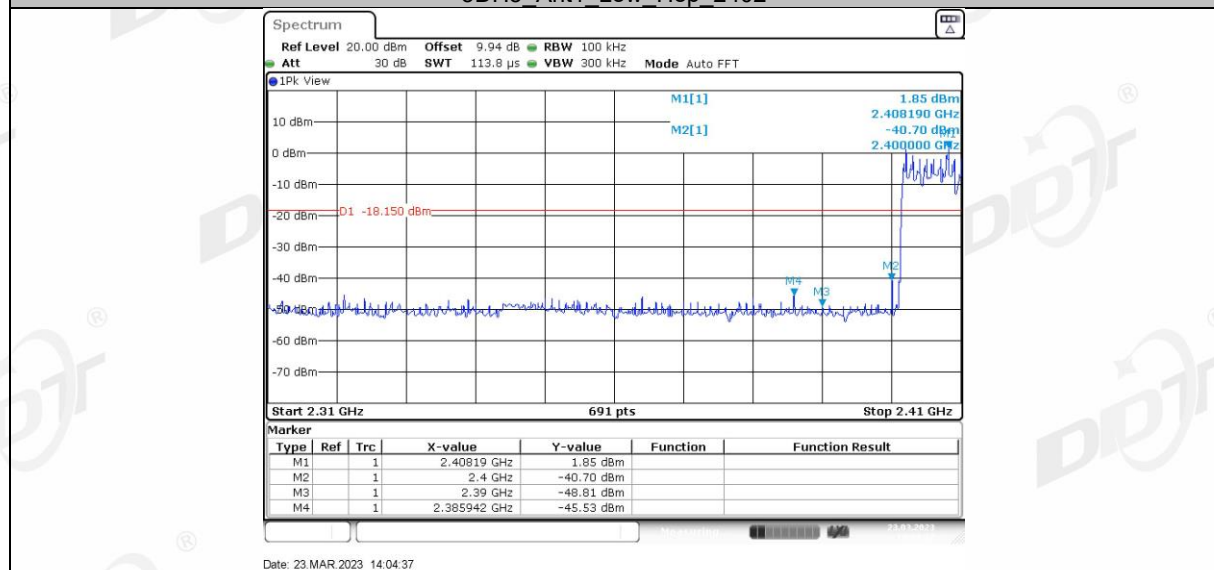
3DH5 Ant1 Low 2402



3DH5 Ant1 High 2480



3DH5 Ant1 Low Hop 2402



3DH5 Ant1 High Hop 2480