Report No.: DDT-R21061003-1E2

Issued Date: Jun. 15, 2021

FCC AND ISED CERTIFICATION TEST REPORT

FOR

Applicant	:	Shanghai Xiaodu Technology Limited
Address	:	4th Floor Building No.1 , No.701 Naxian Road Pilot Free Trade Zone Shanghai China
Equipment under Test	:	Du smart buds
Model No.	:	XD-SWA14-2101
Trade Mark	:	Xiaodu
FCC ID	:	2AZ7R-SWA14-2101
IC	:	27360-SWA142101
Manufacturer	:	Shanghai Xiaodu Technology Limited
Address	:	4th Floor Building No.1 , No.701 Naxian Road Pilot Free Trade Zone Shanghai 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 8
2.6. Test environment conditions.... 8
2.7. Test laboratory 9
2.8. Measurement uncertainty 9
3. Equipment Used During Test.... 10
4. Maximum Peak Output Power 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. Original test data 13
5. 20 dB Bandwidth and 99% Bandwidth 23
5.1. Block diagram of test setup 23
5.2. Limits 23
5.3. Test procedure 23
5.4. Test result.... 23
5.5. Original test data 24
6. Carrier Frequency Separation 42
6.1. Block diagram of test setup 42
6.2. Limits 42
6.3. Test procedure 42
6.4. Test result.... 42
6.5. Original test data 44
7. Number of Hopping Channel 53
7.1. Block diagram of test setup 53
7.2. Limits 53
7.3. Test procedure 53
7.4. Test result.... 53
7.5. Original test data 54

8. Dwell Time 57
8.1. Block diagram of test setup 57
8.2. Limits 57
8.3. Test procedure 57
8.4. Test result 58
8.5. Original test data 60
9. Band Edge Compliance (Conducted Method) 114
9.1. Block diagram of test setup 114
9.2. Limit 114
9.3. Test result 114
9.4. Original test data 114
10. Radiated Emission 139
10.1. Block diagram of test setup 139
10.2. Limit 140
10.3. Test Procedure 141
10.4. Test result 143
11. RF Conducted Spurious Emissions 149
11.1. Block diagram of test setup 149
11.2. Limits 149
11.3. Test procedure 149
11.4. Test result 150
11.5. Original test data 150
12. Band Edge Compliance (Radiated Method) 169
12.1. Block diagram of test setup 169
12.2. Limit 169
12.3. Test Procedure 169
12.4. Test result 169
13. Power Line Conducted Emission 194
13.1. Block diagram of test setup 194
13.2. Power line conducted emission limits 194
13.3. Test procedure 194
13.4. Test result 195
14. Antenna Requirements 198
14.1. Limit 198
14.2. Result 198
15. Test Setup Photograph 199
16. Photos of the EUT 201

Test Report Declare

Applicant	:	Shanghai Xiaodu Technology Limited
Address	:	4th Floor Building No.1 , No.701 Naxian Road Pilot Free Trade Zone Shanghai China
Equipment under Test	:	Du smart buds
Model No.	:	XD-SWA14-2101
Trade Mark	:	Xiaodu
Manufacturer	:	Shanghai Xiaodu Technology Limited
Address	:	4th Floor Building No.1 , No.701 Naxian Road Pilot Free Trade Zone Shanghai 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.

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-R21061003-1E2		
Date of Receipt:	May 15, 2021	**Date of Test:**	May 15, 2021 ~ Jun. 15, 2021

Prepared By:

Sam Li

Sam Li/Engineer

Approved By:

Damon Hu

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. 15, 2021	

1. Summary of Test Results

Description of Test Item	Standard	Verdict
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: 15.215 ANSI C63.10:2013 RSS-247 Issue 2	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	:	Du smart buds
Model Number	:	XD-SWA14-2101
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	DC 3.8V Polymer Li-ion built-in battery
Radio Specification	:	Bluetooth V5.0
Operation Frequency	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Data Rate	:	1 Mbps, 2 Mbps, 3 Mbps
Antenna Type	:	FPC antenna, maximum PK gain: 3.27 dBi
Sample Type	:	N/A

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
Charging case	Baidu	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	Lenovo Beijing Co. Ltd.	ThinkPad	FCC/CE	TP00015A

2.4. Block diagram of EUT configuration for test

EUT

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

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
GFSK hopping on Tx mode	0	CH0 to CH78	2402 to 2480
π/4-DQPSK hopping on Tx mode	0	CH0 to CH78	2402 to 2480
8DPSK hopping on Tx mode	0	CH0 to CH78	2402 to 2480
GFSK hopping off Tx mode	0	CH0	2402
	0	CH39	2441
	0	CH78	2480
π/4-DQPSK hopping off Tx mode	0	CH0	2402
	0	CH39	2441
	0	CH78	2480
8DPSK hopping off Tx mode	0	CH0	2402
	0	CH39	2441
	0	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:	21-25 ℃
Humidity range:	40-75%
Pressure range:	86-106 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 Registration No. CNAS L6451; A2LA Certificate Number: 3870.01;

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

Industry Canada Site Registration Number: 10288A-1

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 < 22 GHz)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10^{-8}
Temperature	0.4 ℃
Humidity	2 %
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.	

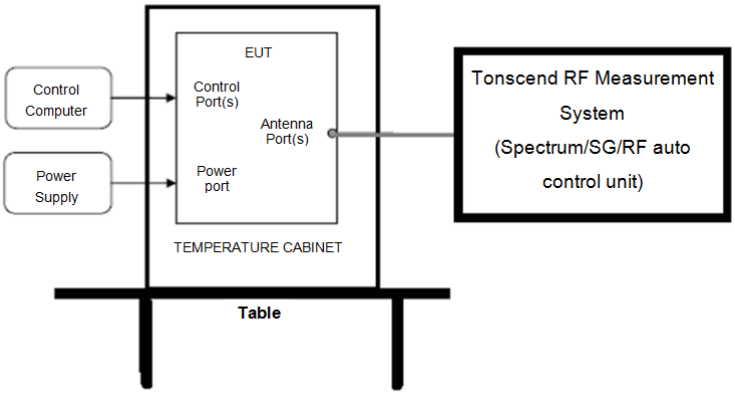
3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 24, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Jul. 01, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 29, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 14, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 14, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 14, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Sep. 28, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	101303	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year
RF Cable	N/A	5m+6m+1m	06270619	Sep. 28, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 14, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 14, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Sep. 28, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040	101303	Sep. 28, 2020	1 Year

		G35			
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test					
EMI Test Receiver	R&S	ESU8	100316	Sep. 28, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 28, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

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

(2) Measure the maximum output power of EUT by spectrum analyzer with PK detector and RBW=2 MHz (above 20 dB bandwidth of measured signal), VBW=10 MHz

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

4.4. Test result

Left side:

Mode	Antenna	Freq. (MHz)	Result (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	-0.36	21	Pass
	ANT1	2441	-1.05	21	Pass
	ANT1	2480	-1.03	21	Pass
π/4-DQPSK	ANT1	2402	-0.56	21	Pass
	ANT1	2441	-1.23	21	Pass
	ANT1	2480	-1.23	21	Pass
8DPSK	ANT1	2402	-0.19	21	Pass
	ANT1	2441	-0.88	21	Pass
	ANT1	2480	-0.91	21	Pass

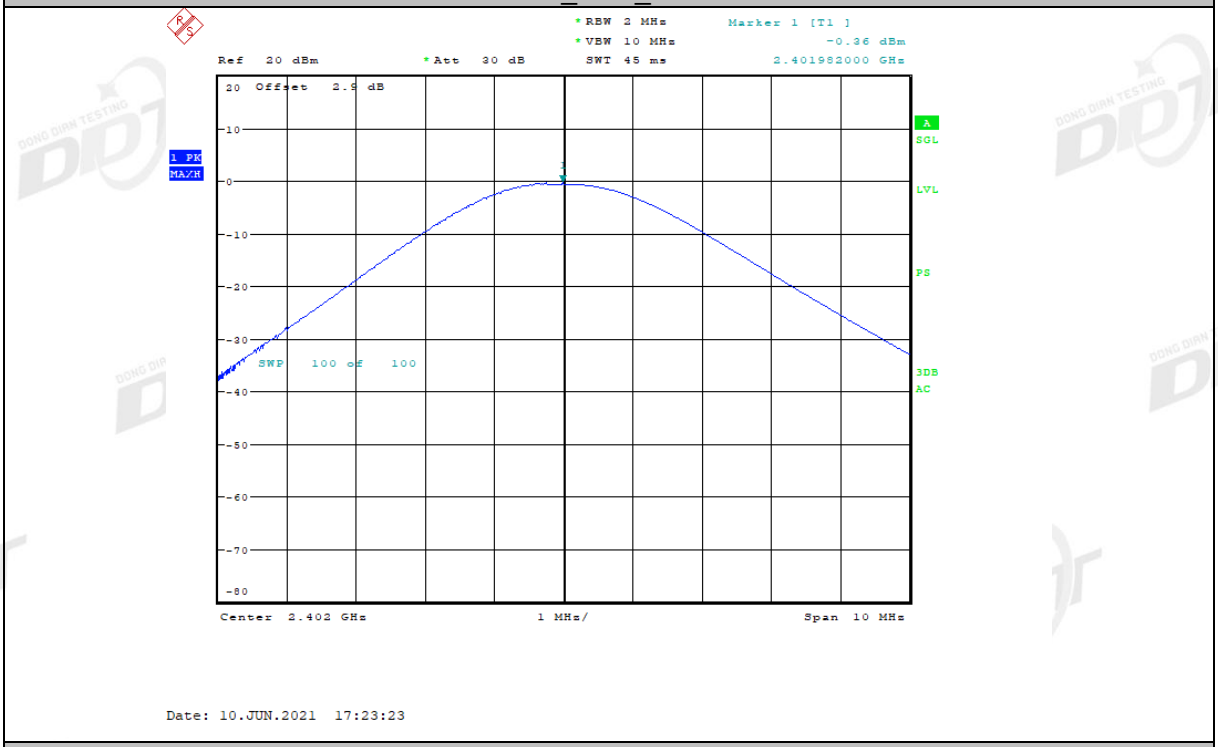
Right side:

Mode	Antenna	Freq. (MHz)	Result (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	-0.46	21	Pass
	ANT1	2441	-1.14	21	Pass
	ANT1	2480	-1.14	21	Pass
π/4-DQPSK	ANT1	2402	-0.51	21	Pass
	ANT1	2441	-1.17	21	Pass
	ANT1	2480	-1.17	21	Pass
8DPSK	ANT1	2402	-0.33	21	Pass
	ANT1	2441	-0.97	21	Pass
	ANT1	2480	-1.01	21	Pass

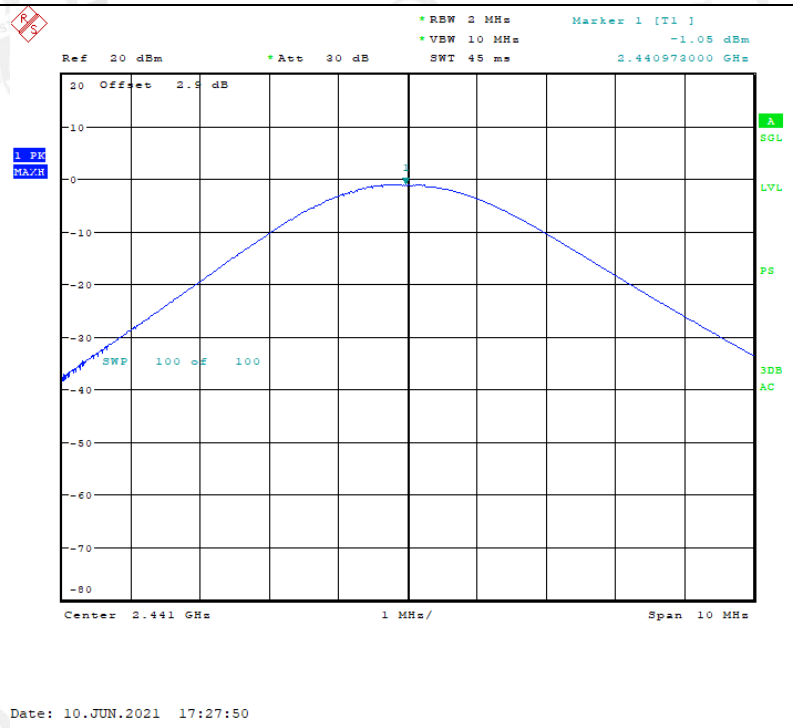
4.5. Original test data

Left side:

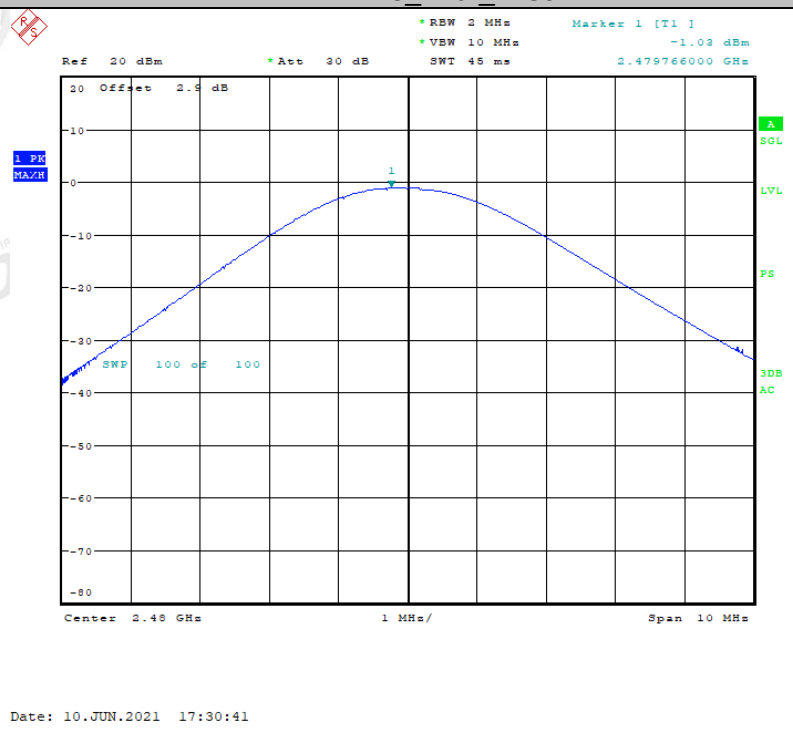
DH5_Ant1_2402



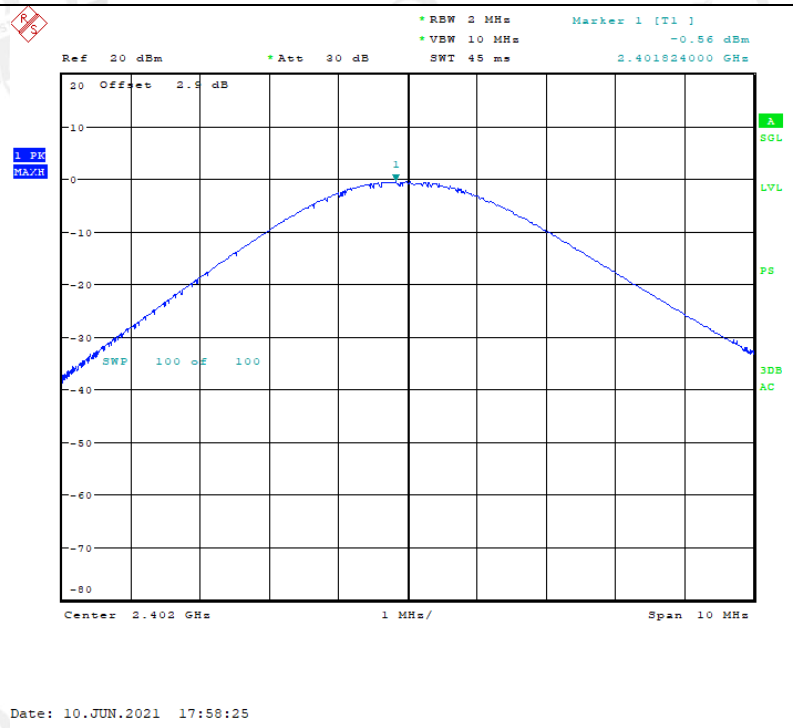
DH5_Ant1_2441



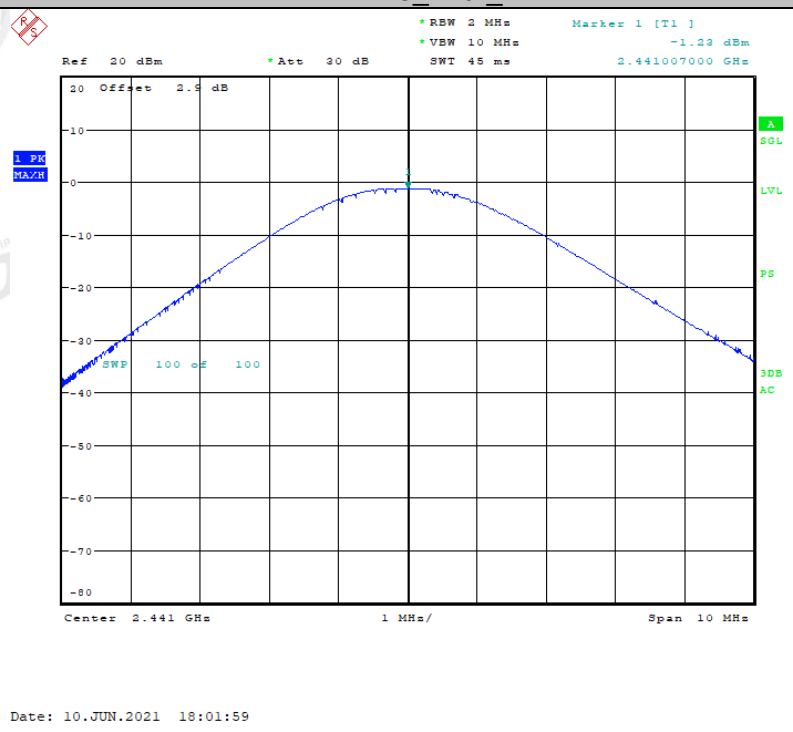
DH5_Ant1_2480



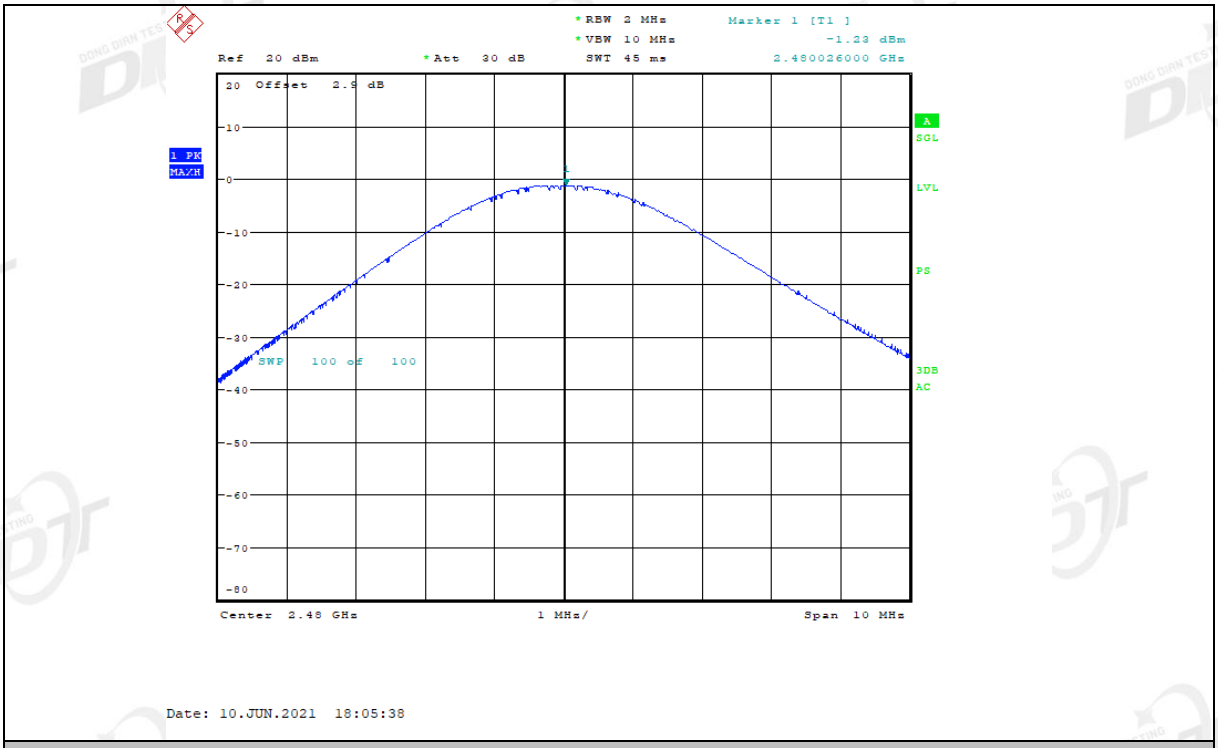
2DH5_Ant1_2402



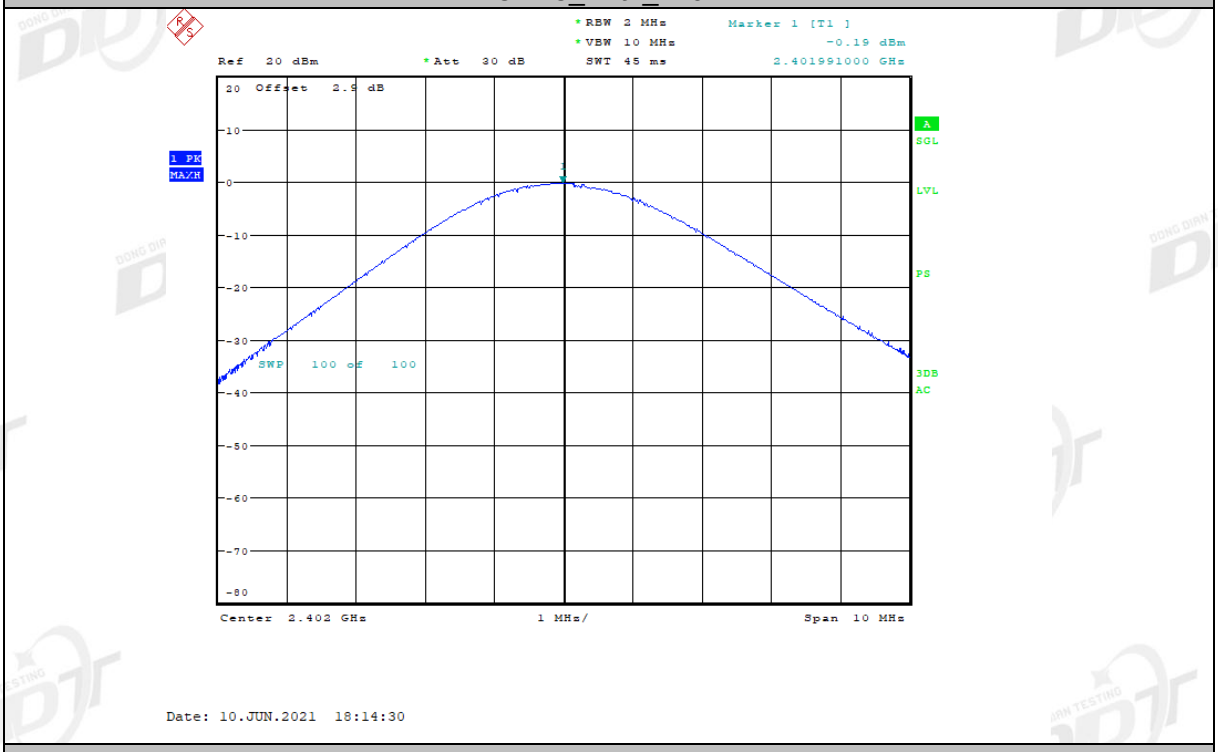
2DH5_Ant1_2441



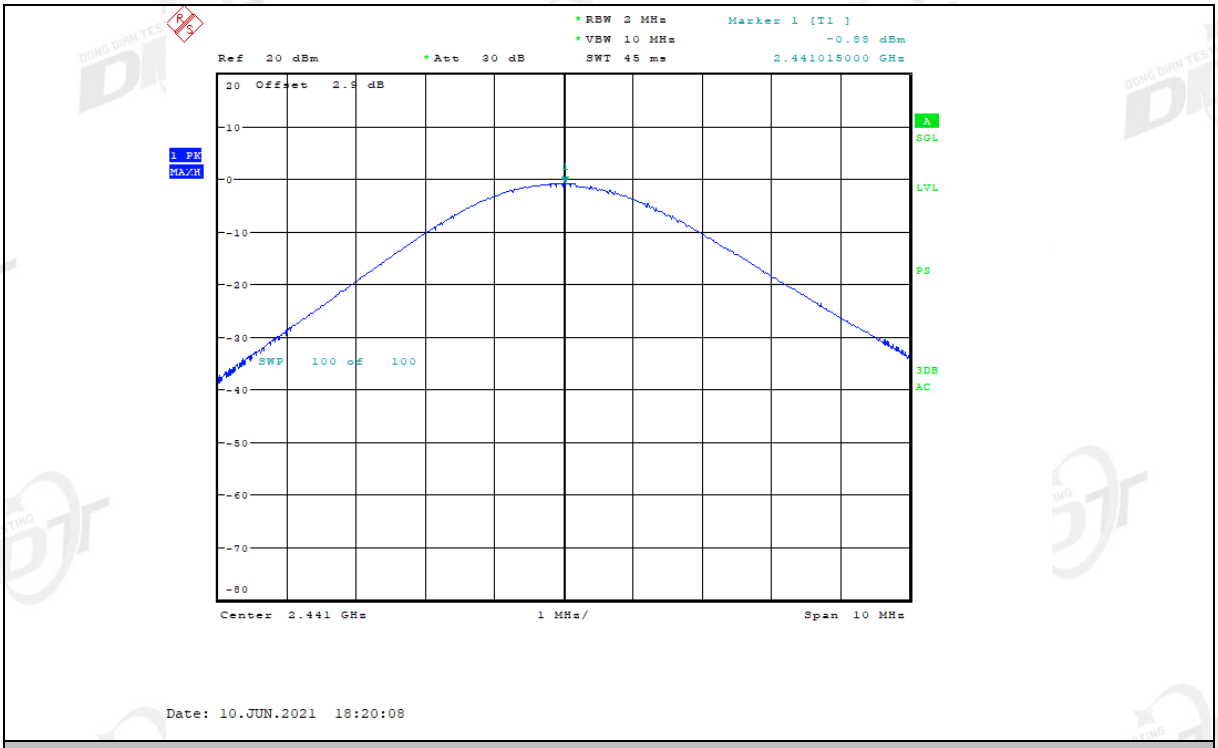
2DH5_Ant1_2480



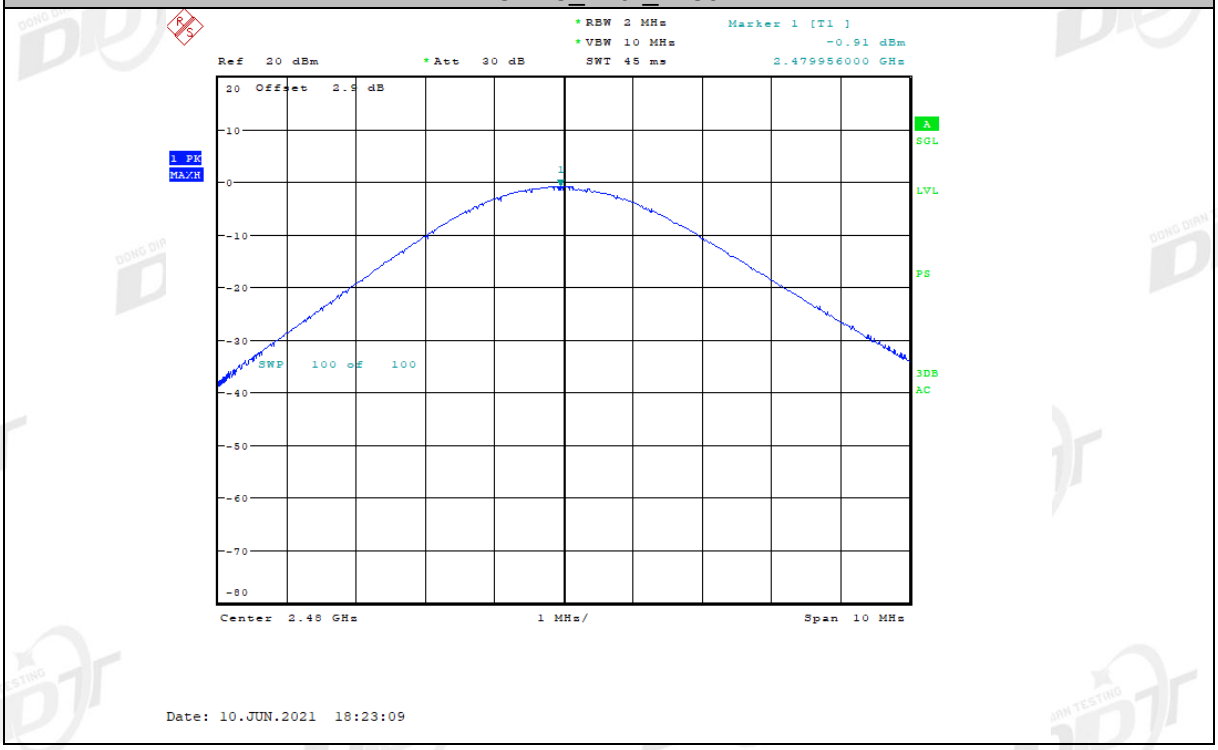
3DH5_Ant1_2402



3DH5_Ant1_2441

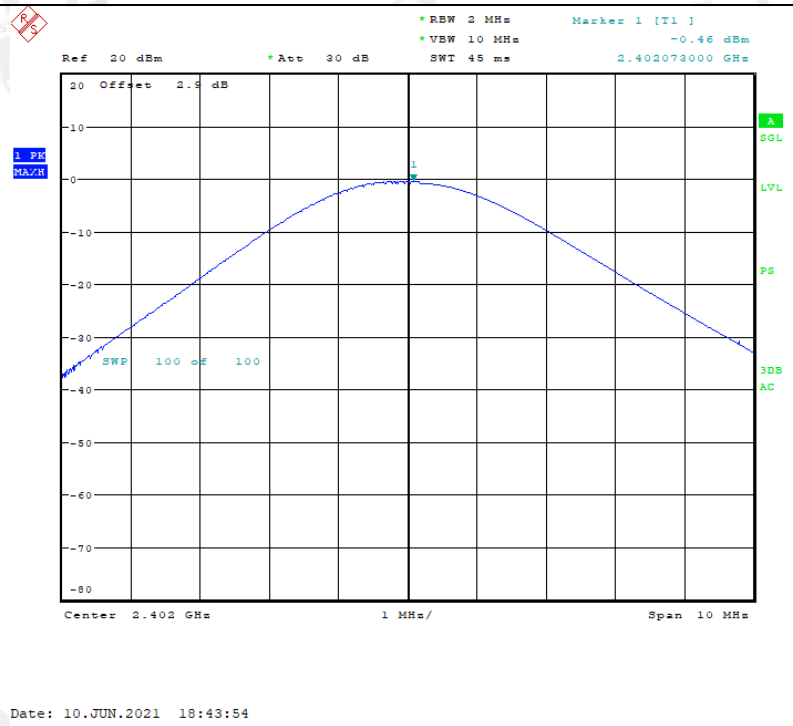


3DH5_Ant1_2480

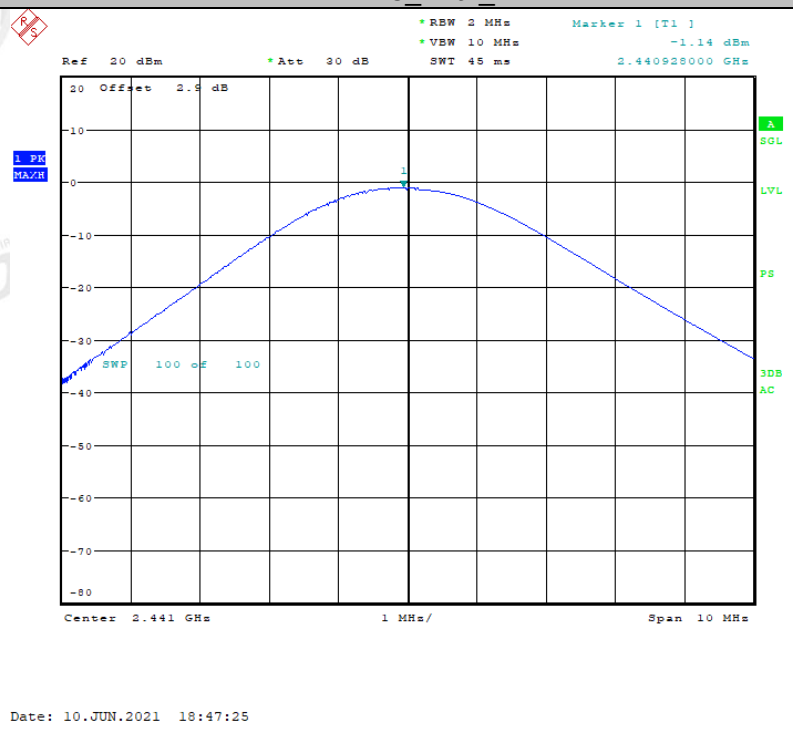


Right side:

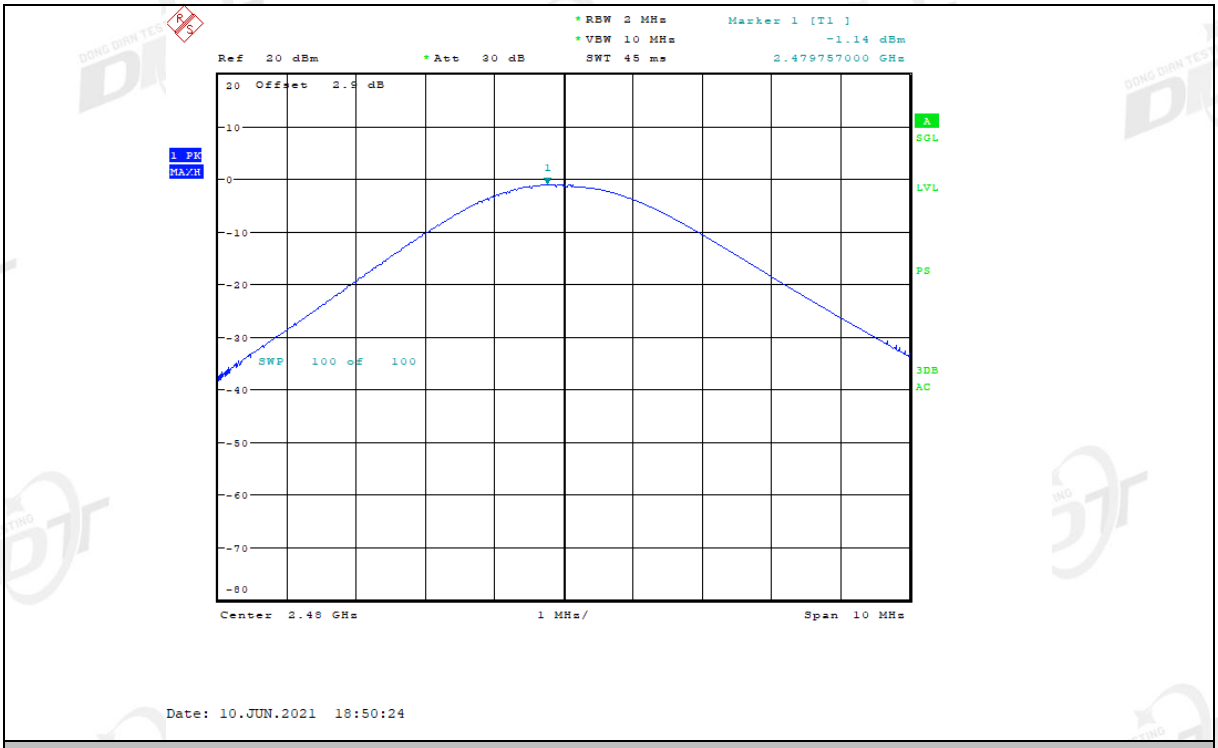
DH5_Ant1_2402



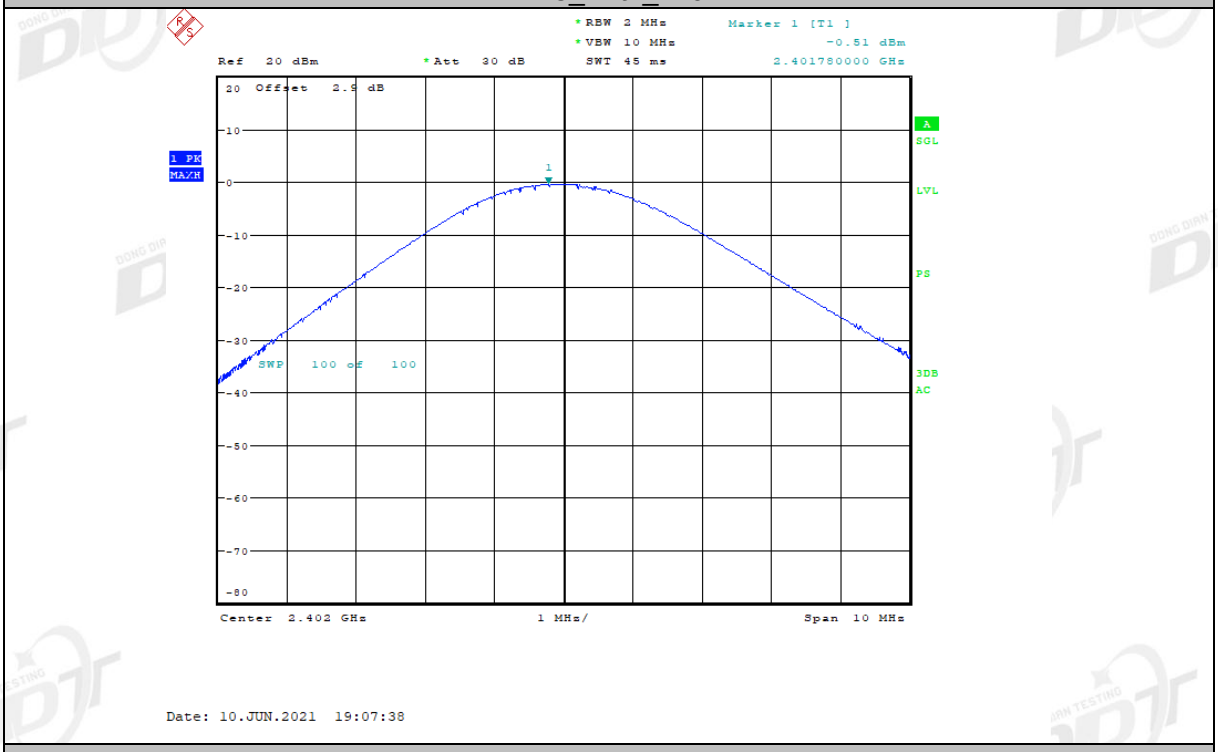
DH5_Ant1_2441



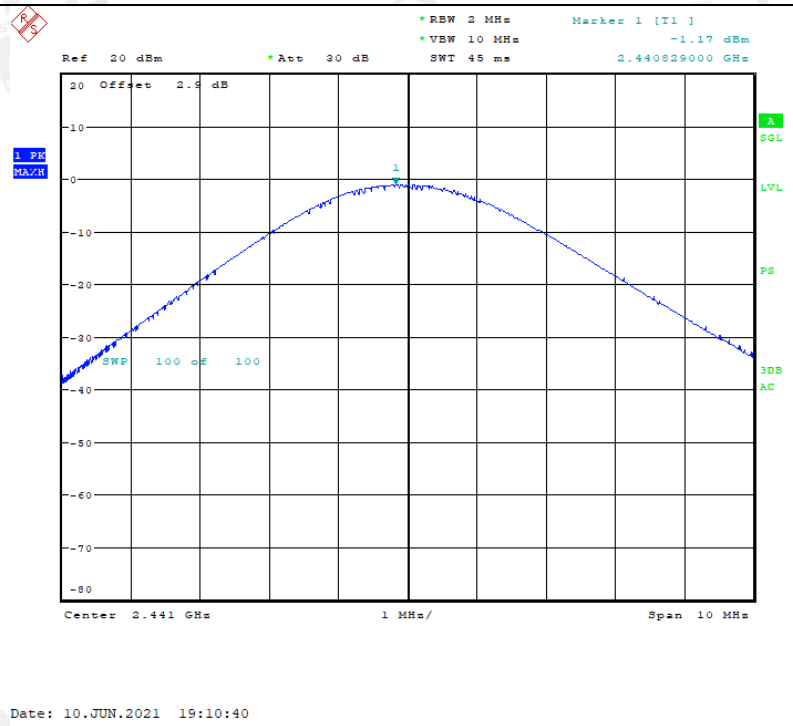
DH5_Ant1_2480



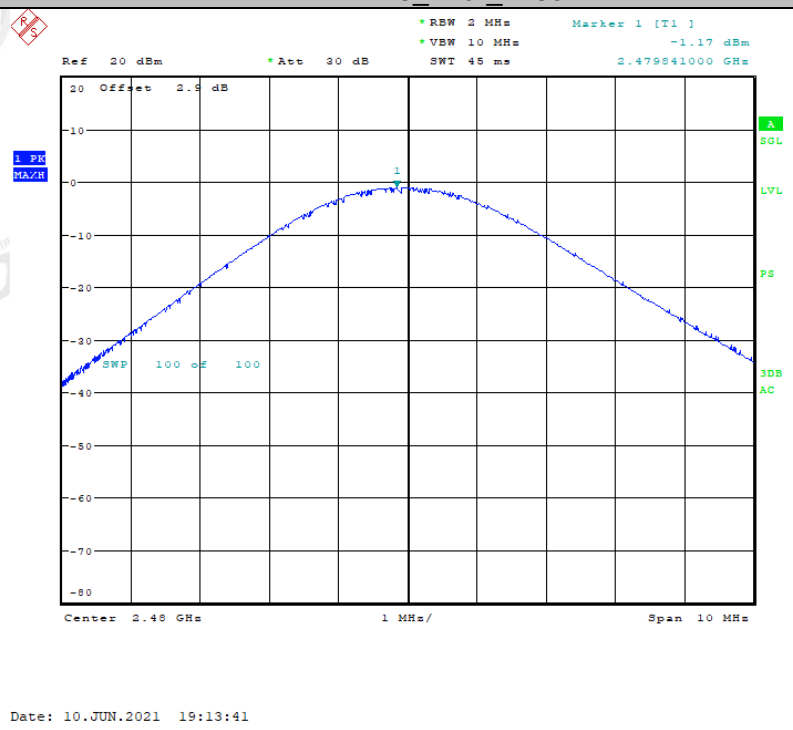
2DH5_Ant1_2402



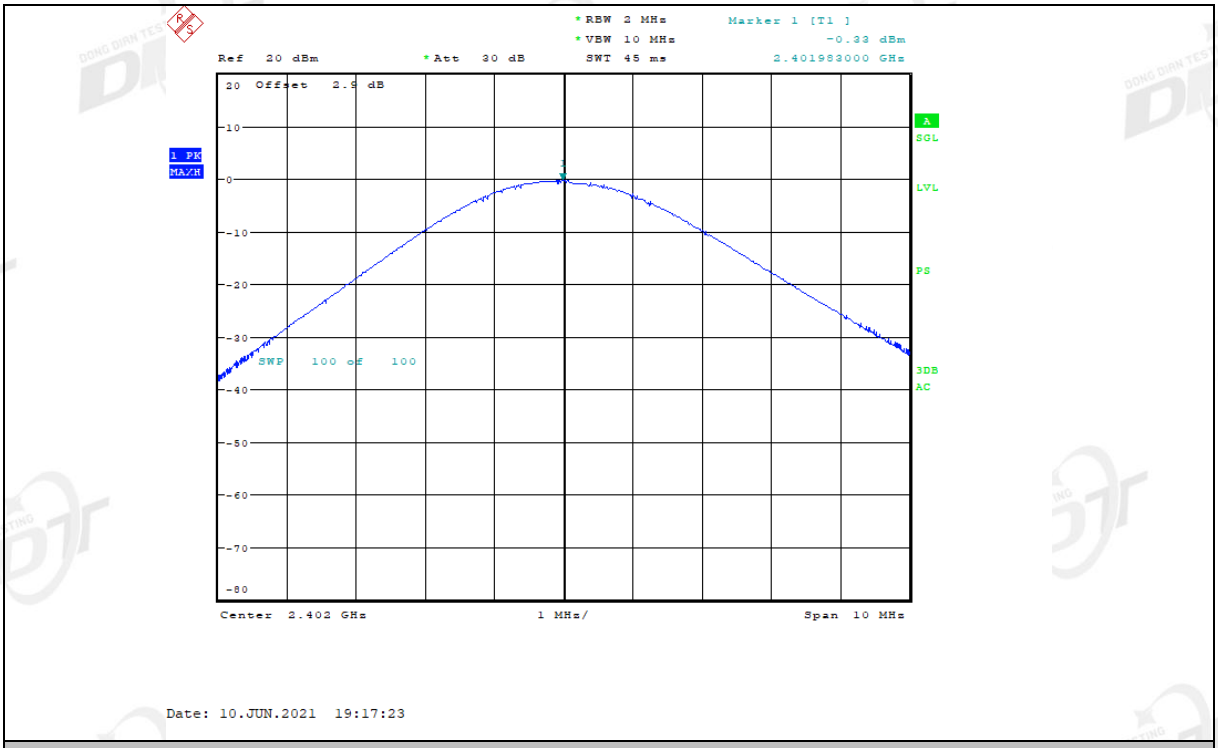
2DH5_Ant1_2441



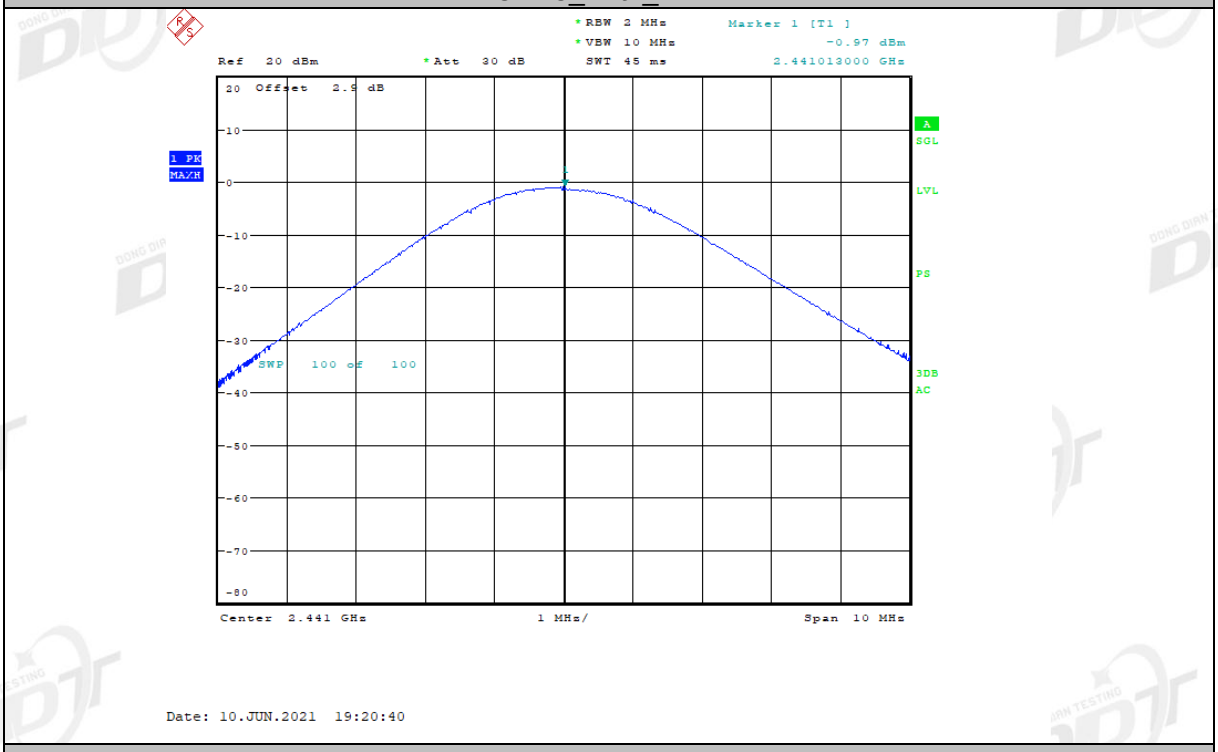
2DH5_Ant1_2480



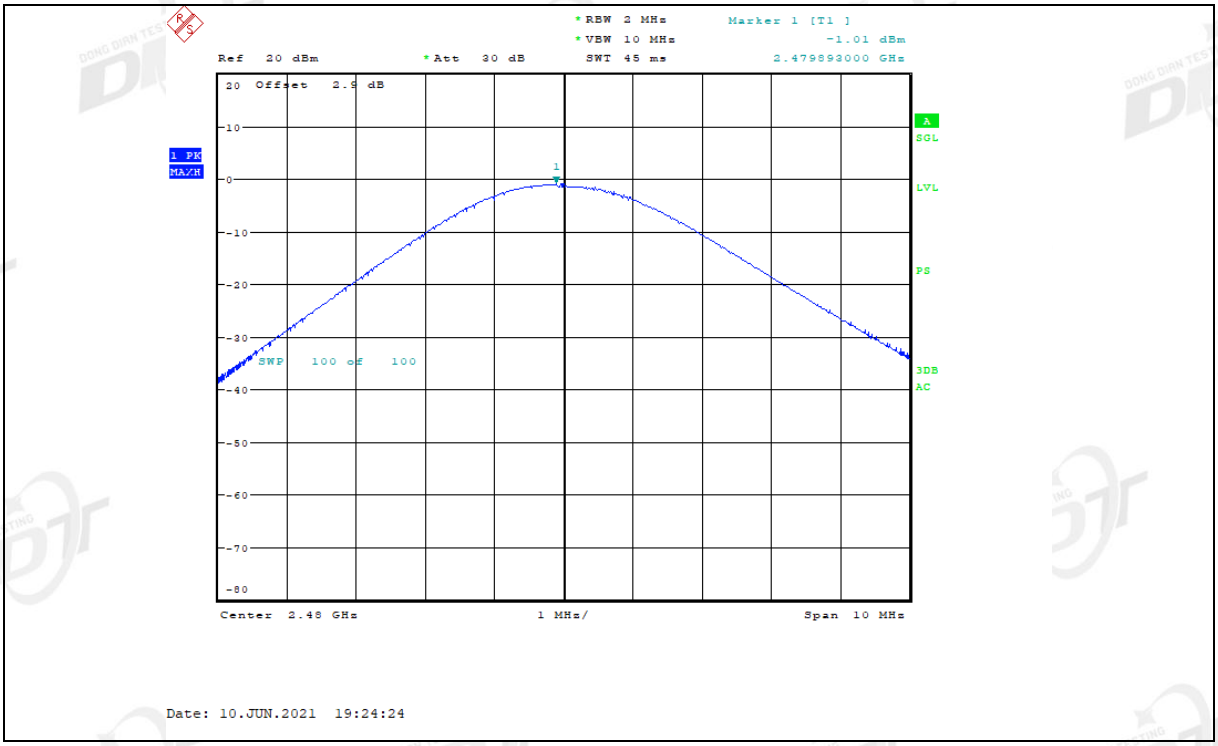
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480


RBW 2 MHz
VBW 10 MHz
SWT 45 ms
Marker 1 [T1]
-1.01 dBm
2.479892000 GHz
Ref 20 dBm
Att 30 dB
Offset 2.9 dB
1 PK
MAXH
SWP 100 of 100
A
SGL
LVL
PS
3DB
AC
Center 2.48 GHz
1 MHz/
Span 10 MHz
Date: 10.JUN.2021 19:24:24

5. 20 dB Bandwidth and 99% Bandwidth

5.1. Block diagram of test setup

Same as section 4.1

5.2. 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.

5.3. Test procedure

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

(2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 kHz RBW and 100 kHz VBW. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.4. Test result

Left side:

Mode	Freq. (MHz)	20 dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Verdict
GFSK	2402	0.945	0.894	Pass
	2441	0.943	0.898	Pass
	2480	0.946	0.896	Pass
π/4-DQPSK	2402	1.245	1.163	Pass
	2441	1.247	1.160	Pass
	2480	1.246	1.161	Pass
8DPSK	2402	1.197	1.152	Pass
	2441	1.198	1.152	Pass
	2480	1.200	1.153	Pass

Right side:

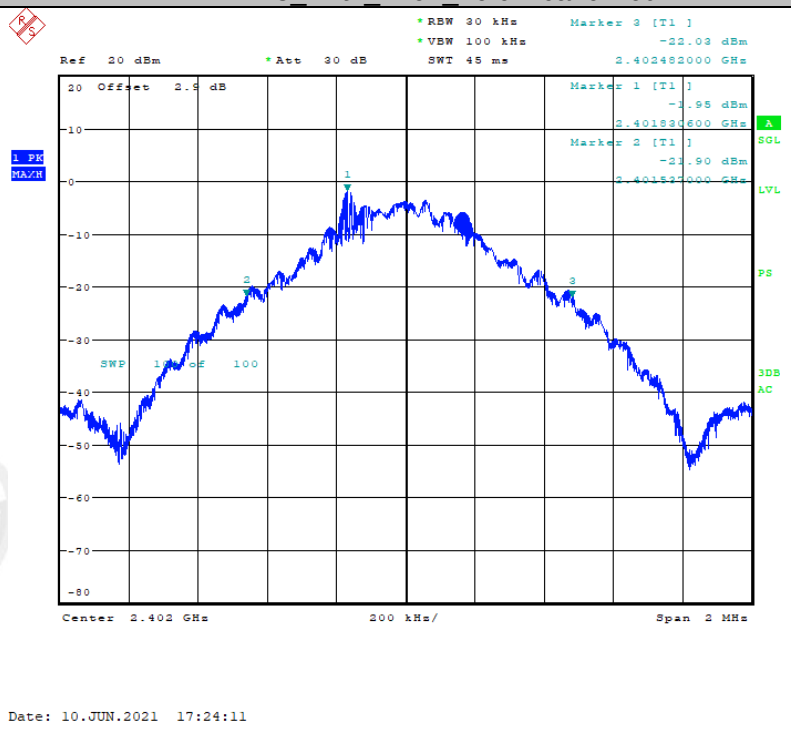
Mode	Freq. (MHz)	20 dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Verdict
GFSK	2402	0.953	0.895	Pass
	2441	0.953	0.901	Pass
	2480	0.945	0.896	Pass
π/4-DQPSK	2402	1.246	1.160	Pass
	2441	1.244	1.161	Pass
	2480	1.242	1.161	Pass
8DPSK	2402	1.197	1.153	Pass

	2441	1.199	1.154	Pass
	2480	1.198	1.154	Pass

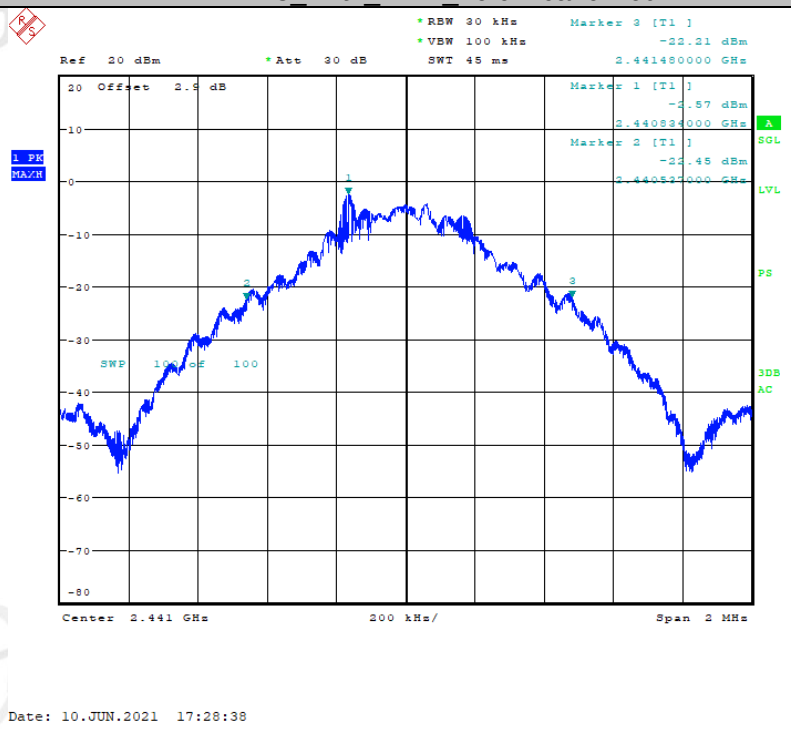
5.5. Original test data

Left side:

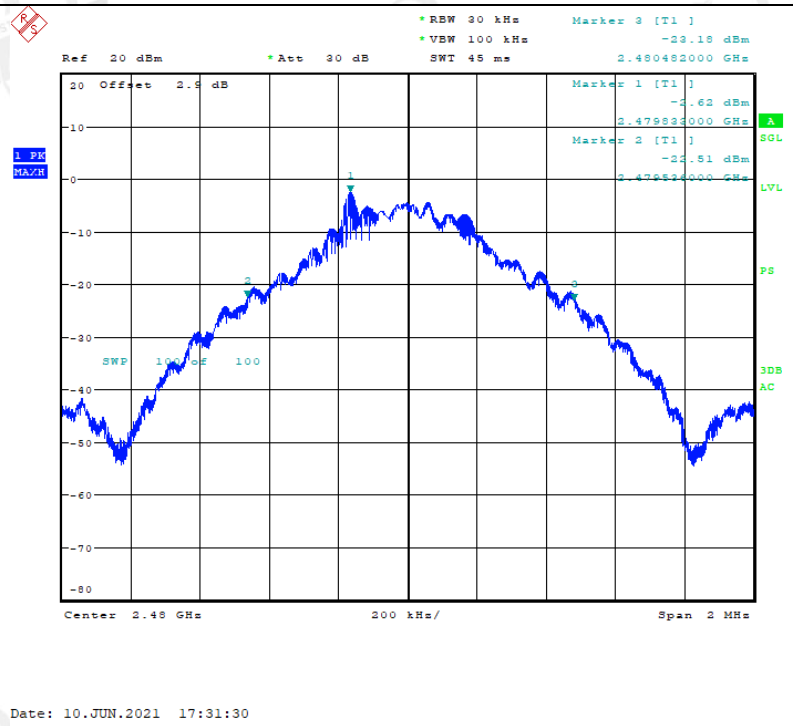
DH5_Ant1_2402_20 dB bandwidth



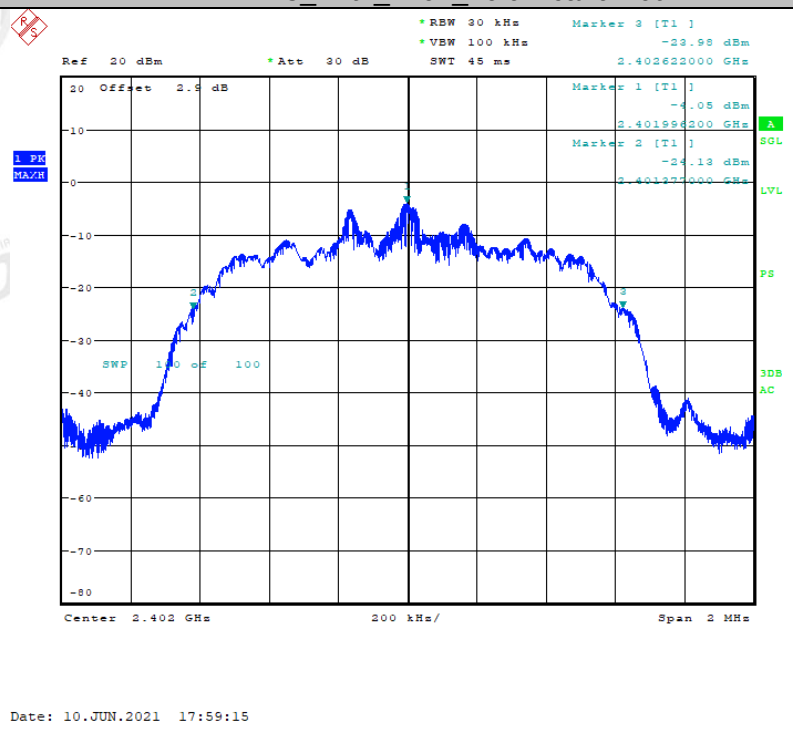
DH5_Ant1_2441_20 dB bandwidth



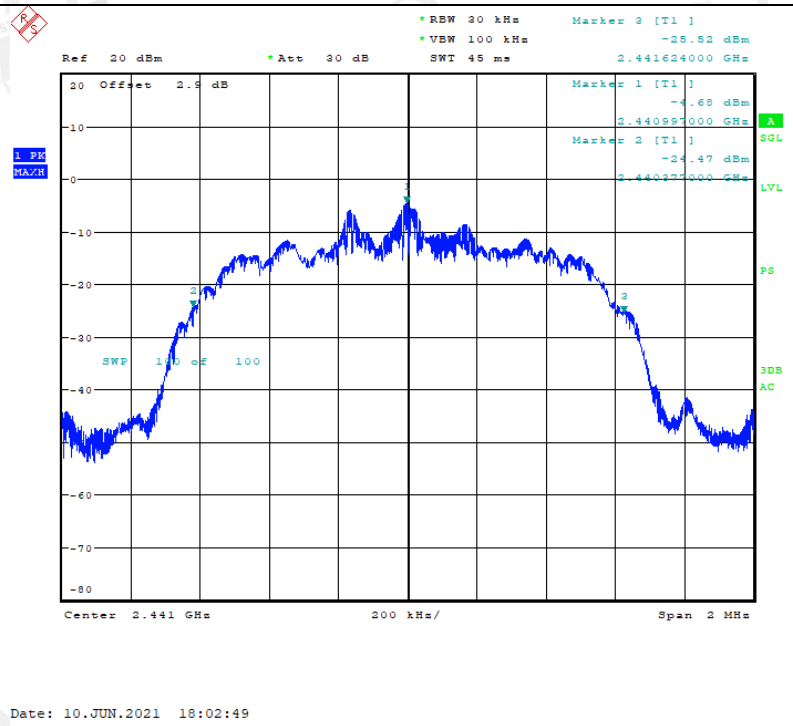
DH5_Ant1_2480_20 dB bandwidth



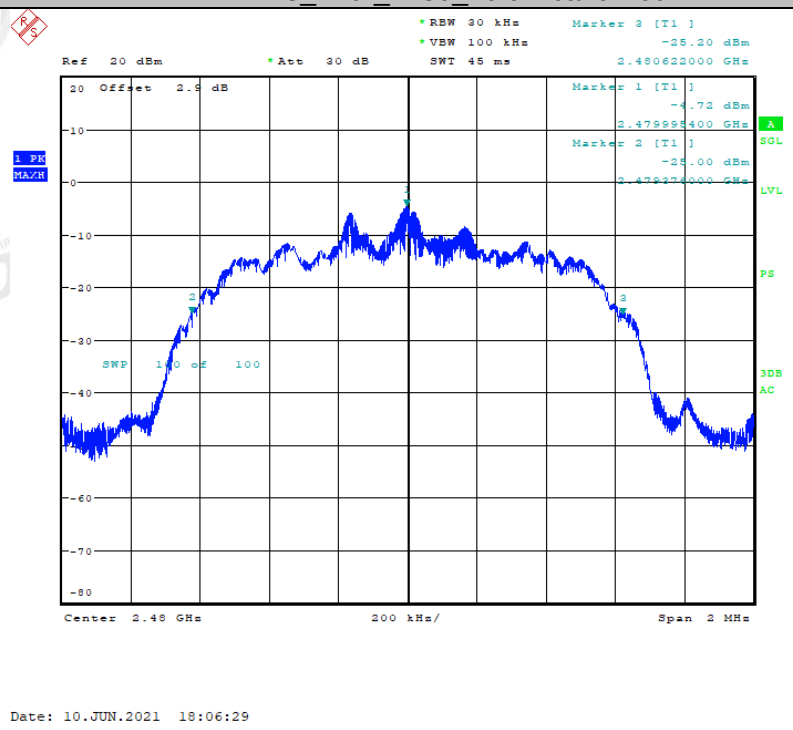
2DH5_Ant1_2402_20 dB bandwidth



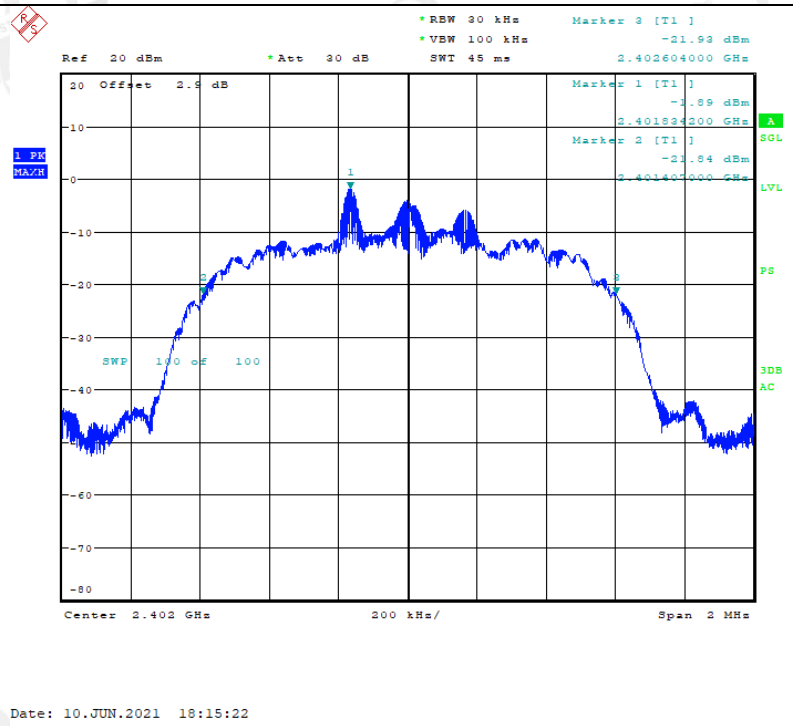
2DH5_Ant1_2441_20 dB bandwidth



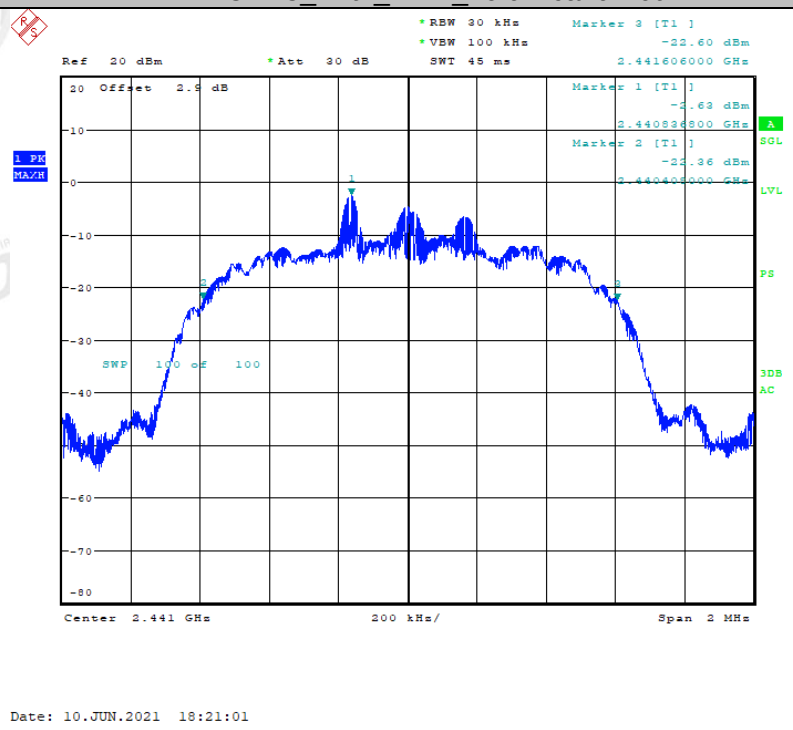
2DH5_Ant1_2480_20 dB bandwidth



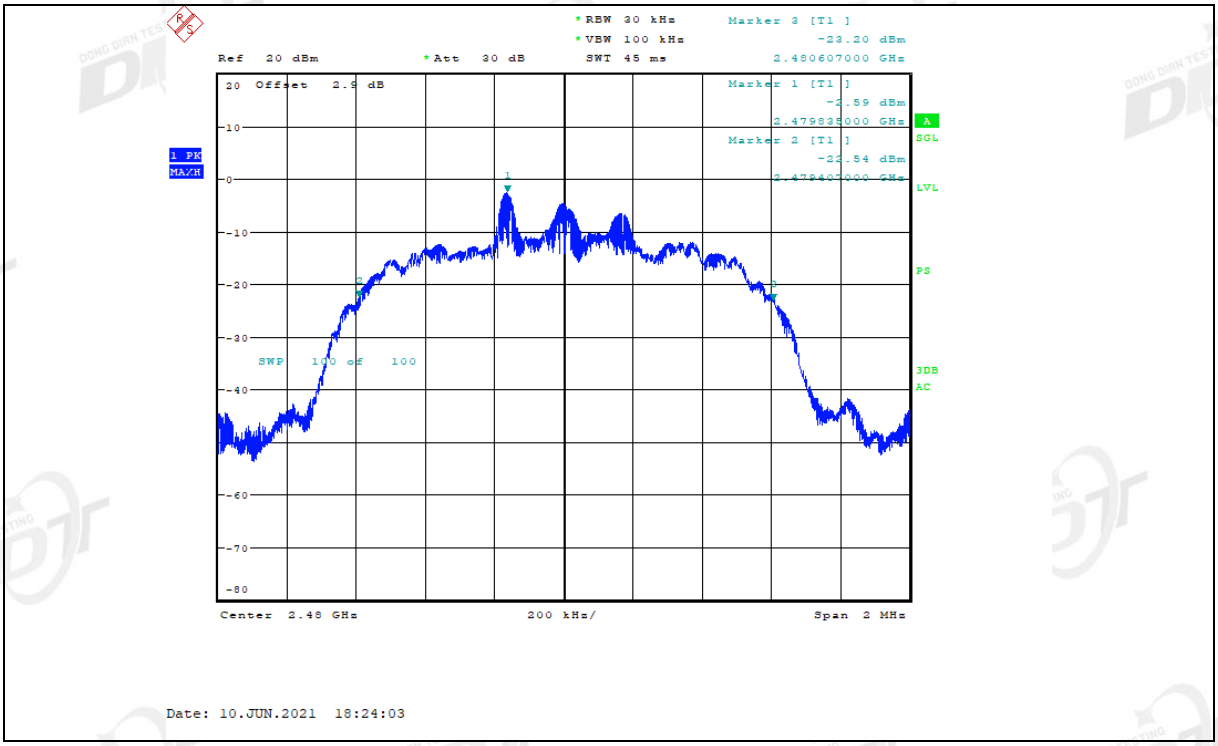
3DH5_Ant1_2402_20 dB bandwidth



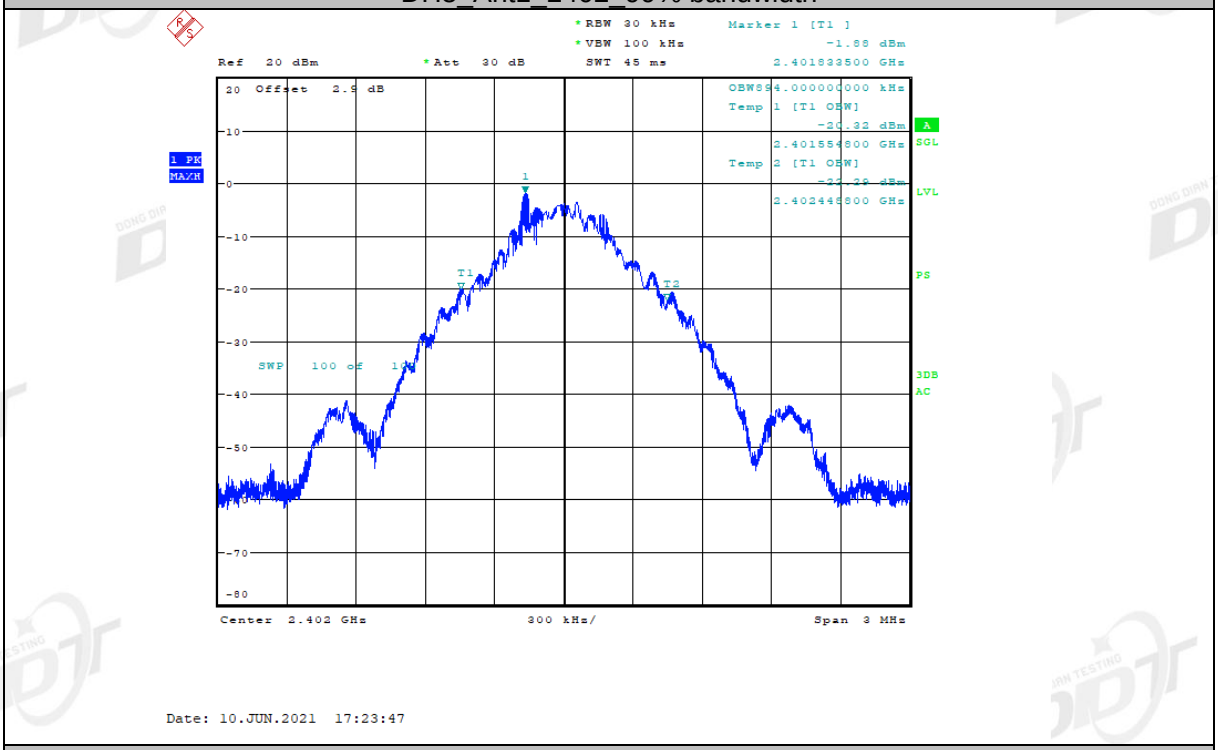
3DH5_Ant1_2441_20 dB bandwidth



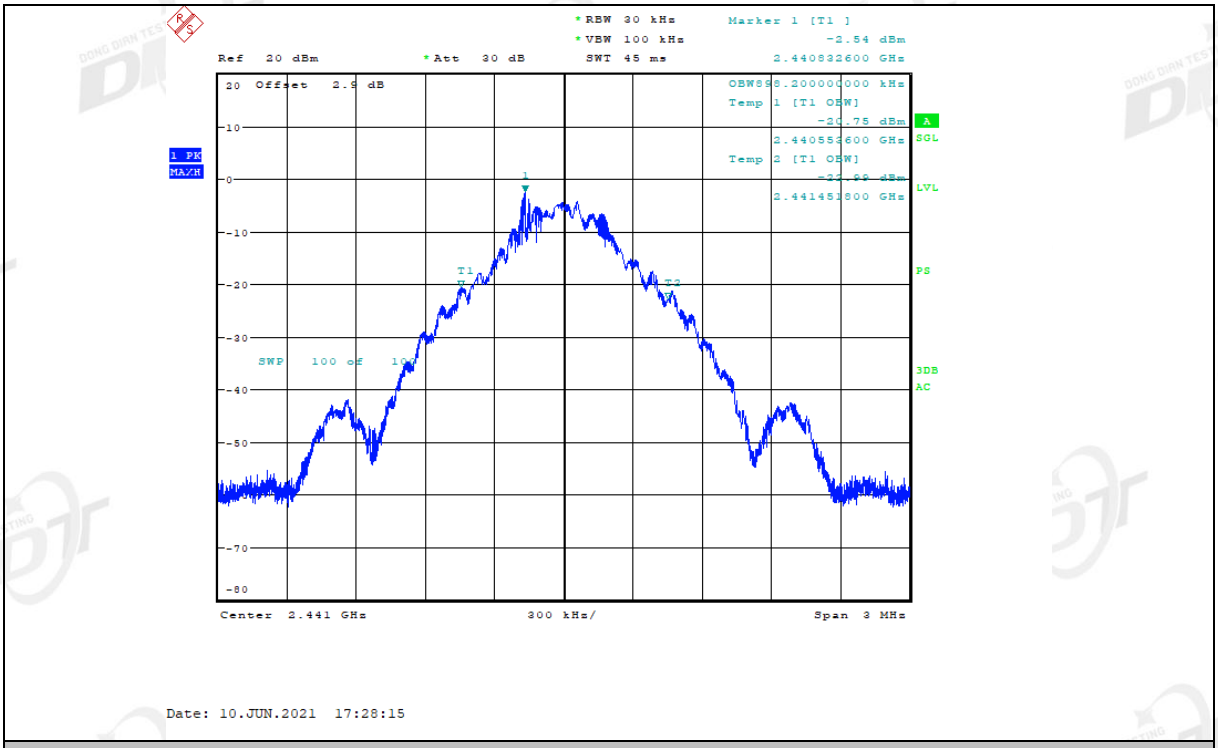
3DH5_Ant1_2480_20 dB bandwidth



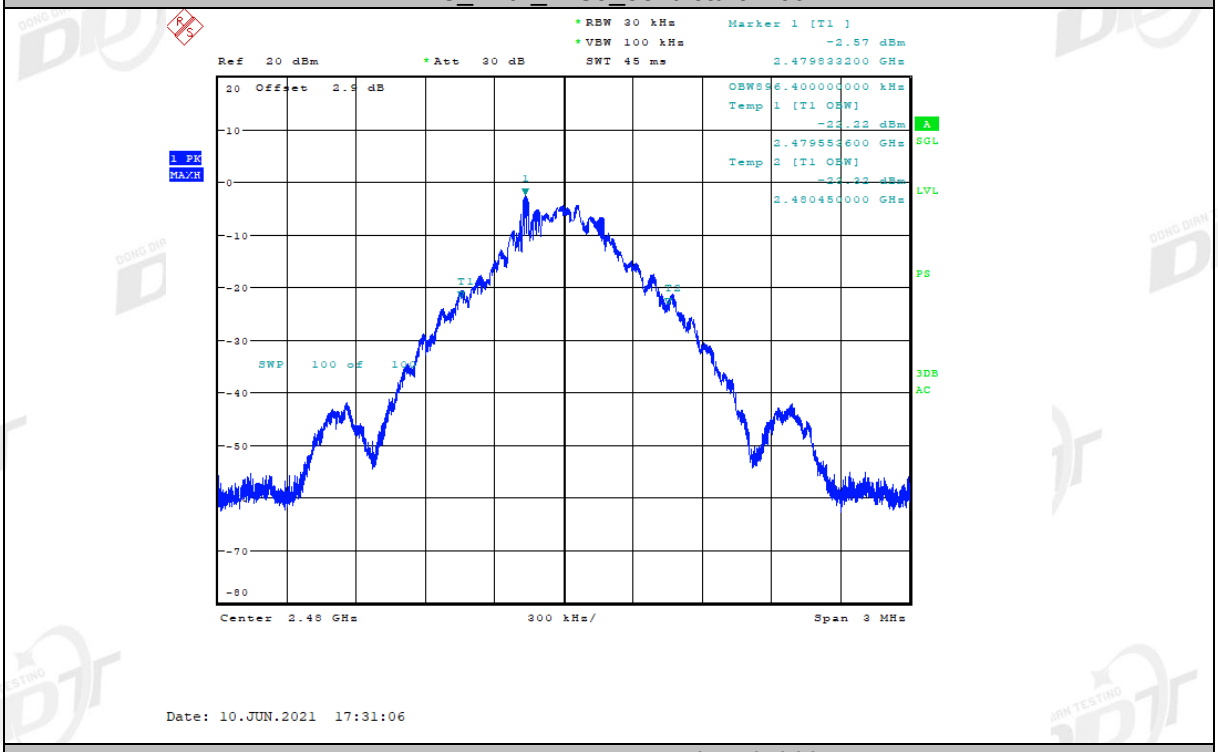
DH5_Ant1_2402_99% bandwidth



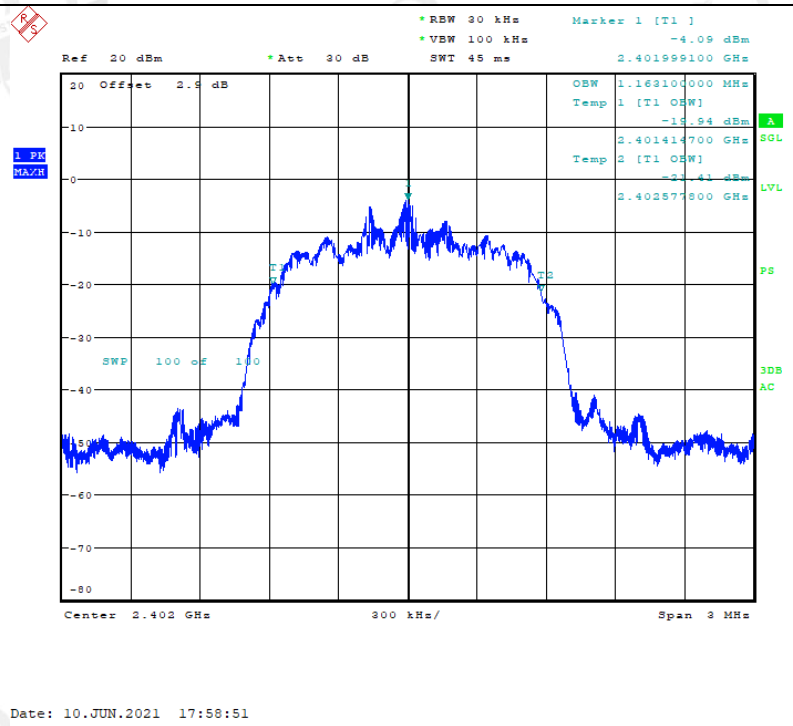
DH5_Ant1_2441_99% bandwidth



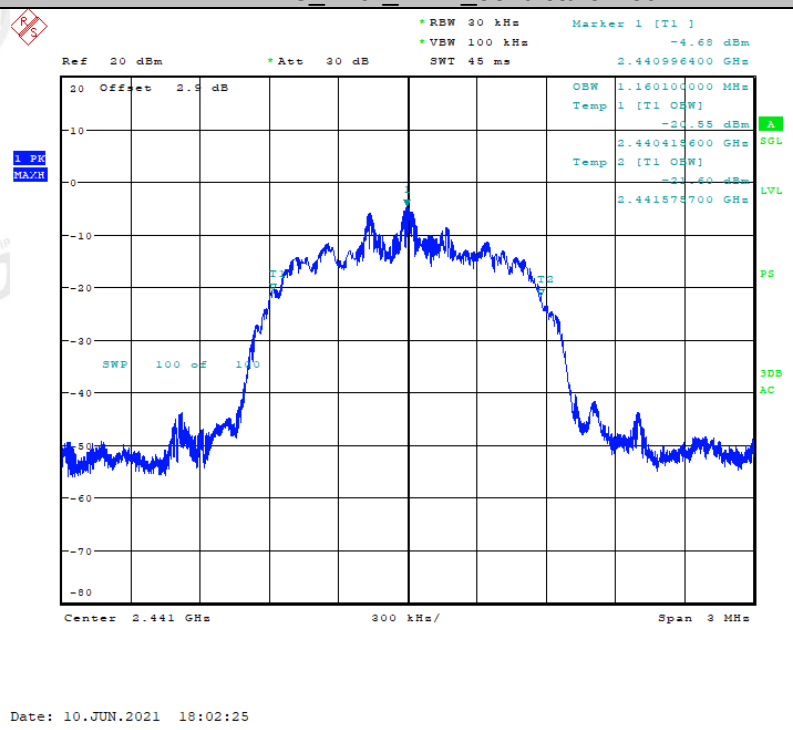
DH5_Ant1_2480_99% bandwidth



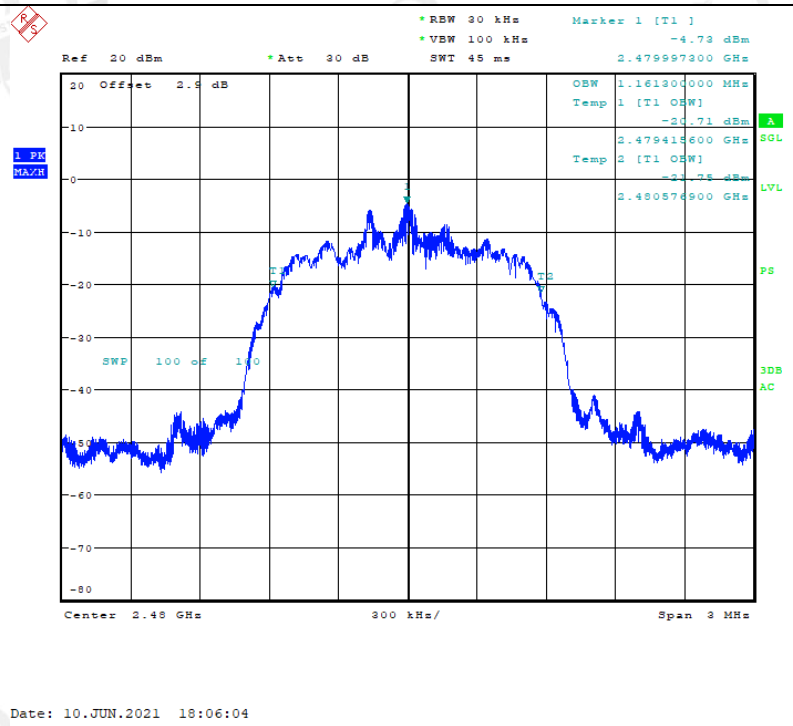
2DH5_Ant1_2402_99% bandwidth



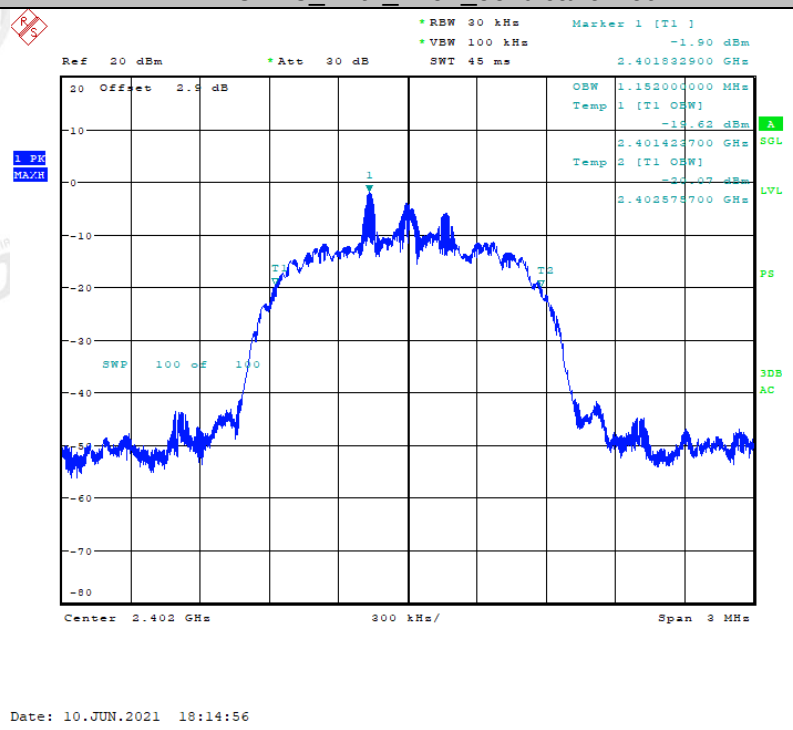
2DH5_Ant1_2441_99% bandwidth



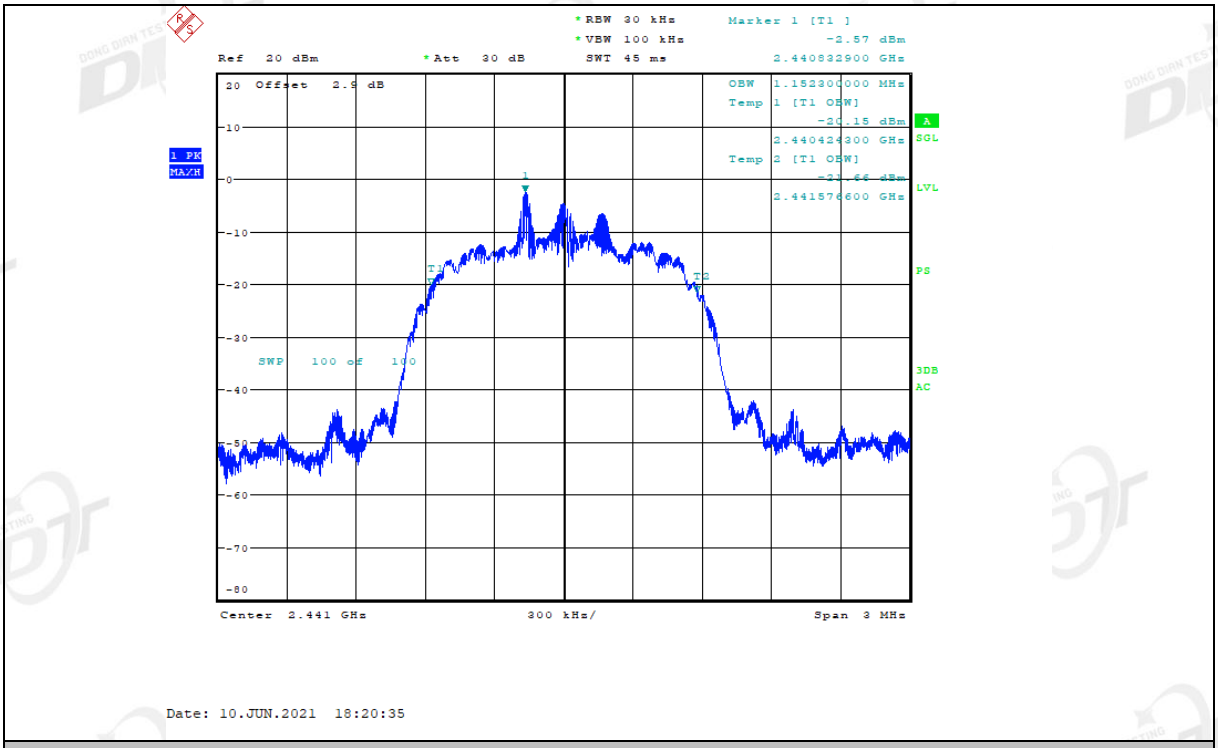
2DH5_Ant1_2480_99% bandwidth



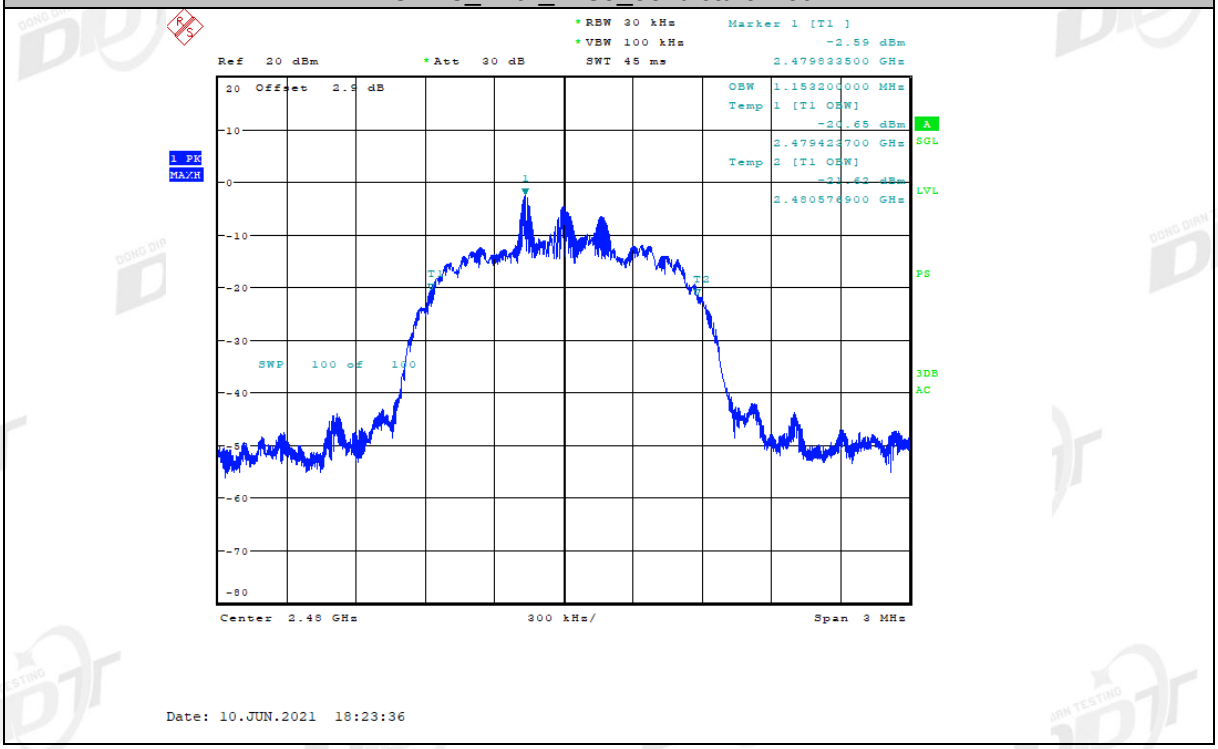
3DH5_Ant1_2402_99% bandwidth



3DH5_Ant1_2441_99% bandwidth

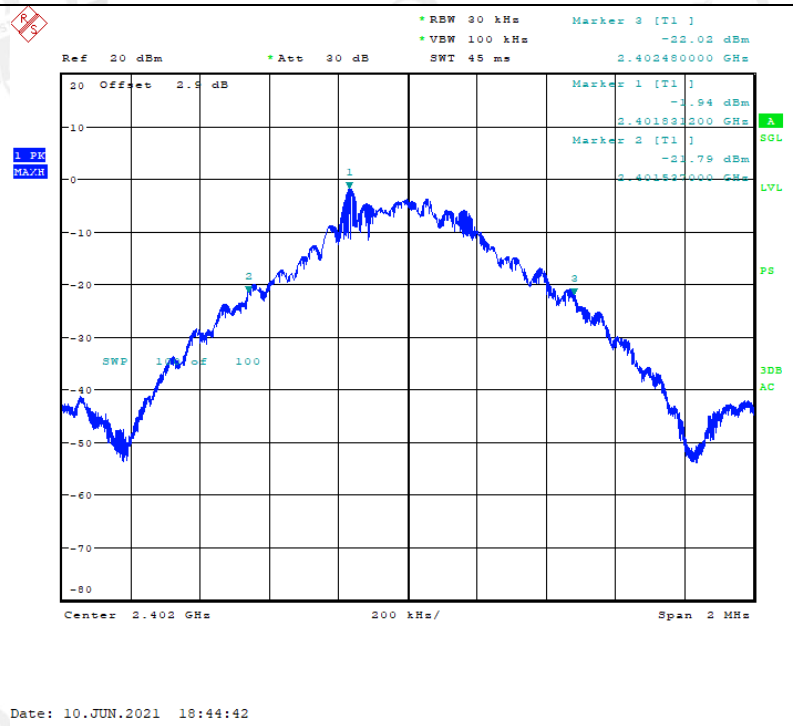


3DH5_Ant1_2480_99% bandwidth

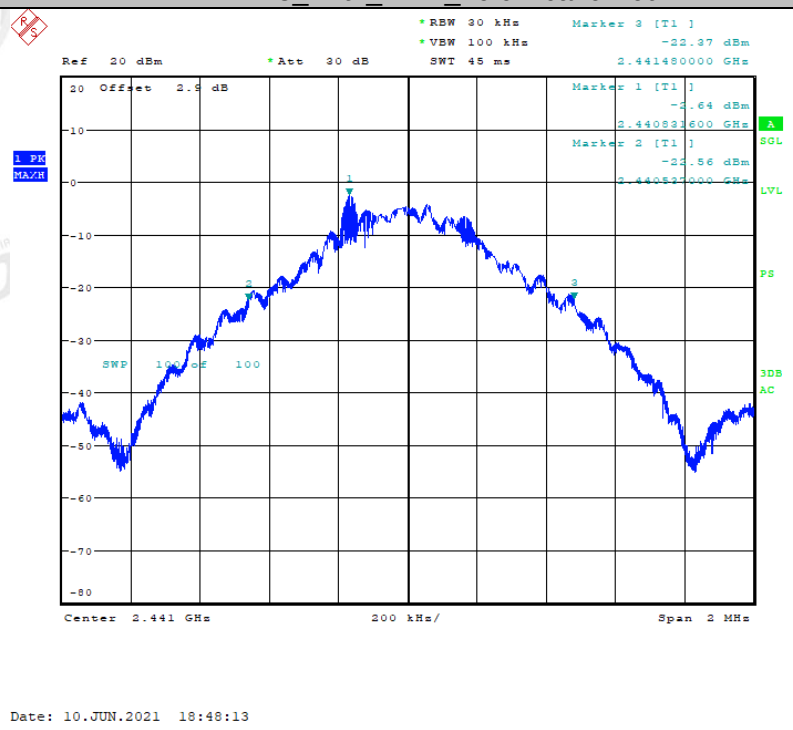


Right side:

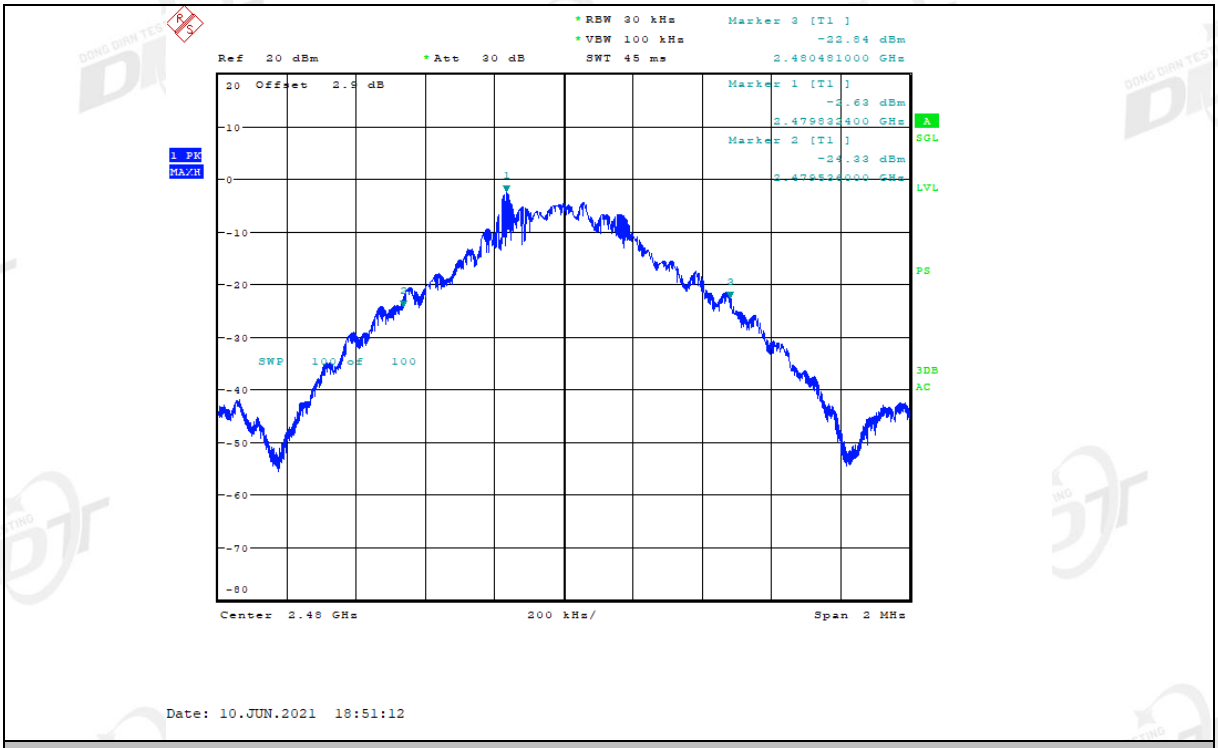
DH5_Ant1_2402_20 dB bandwidth



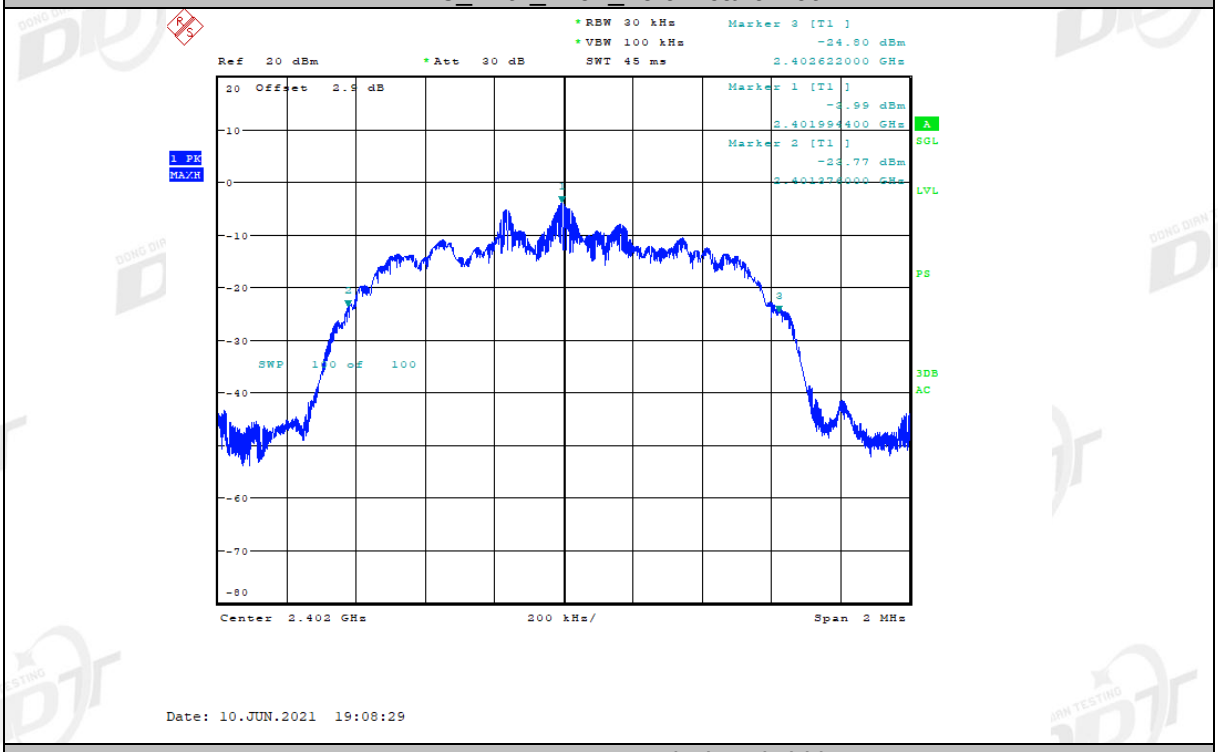
DH5_Ant1_2441_20 dB bandwidth



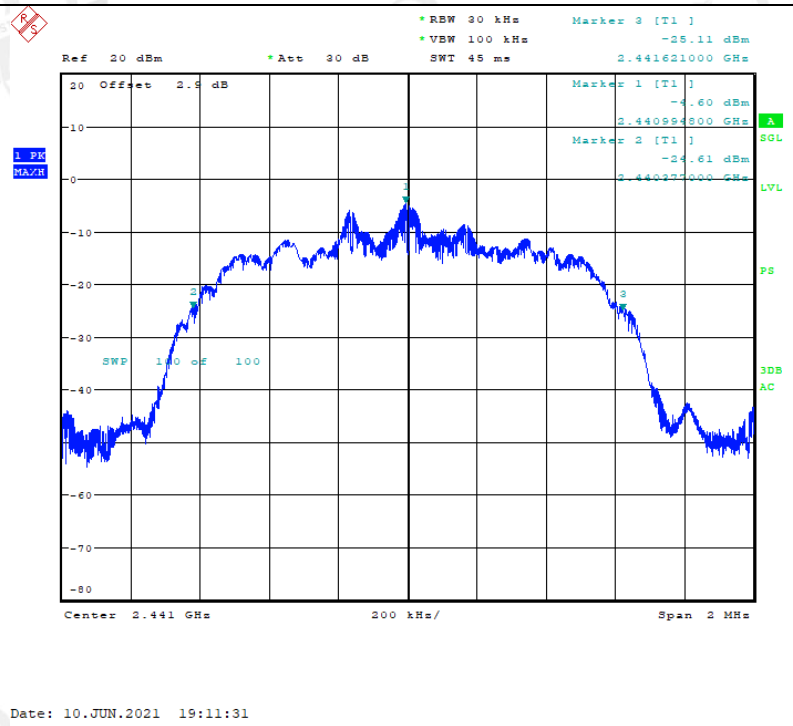
DH5_Ant1_2480_20 dB bandwidth



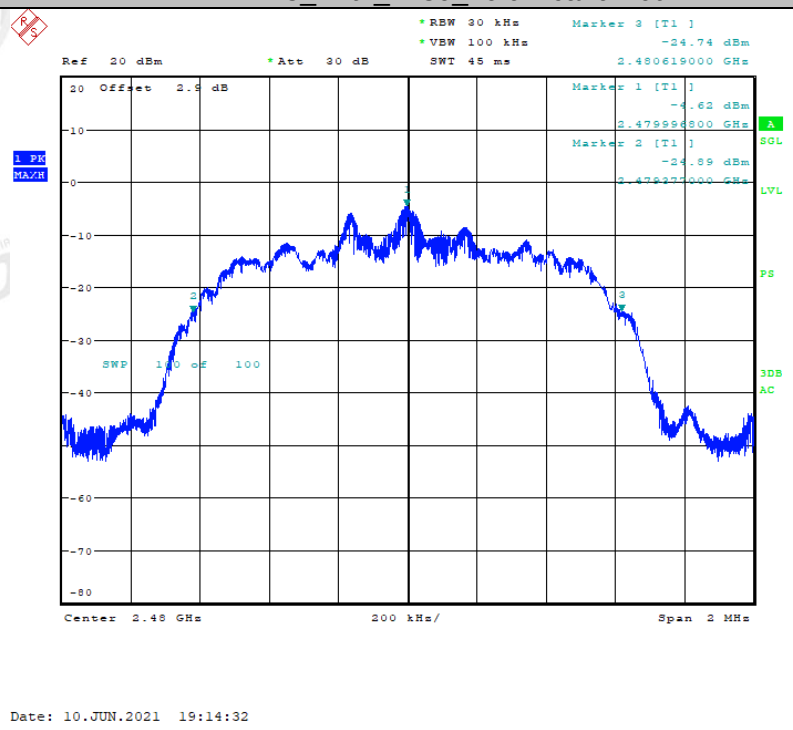
2DH5_Ant1_2402_20 dB bandwidth



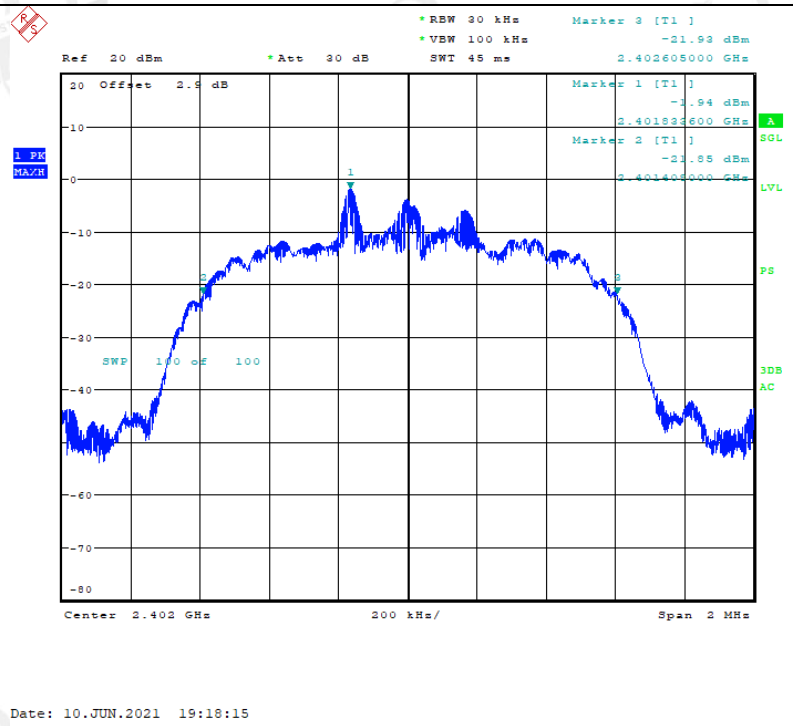
2DH5_Ant1_2441_20 dB bandwidth



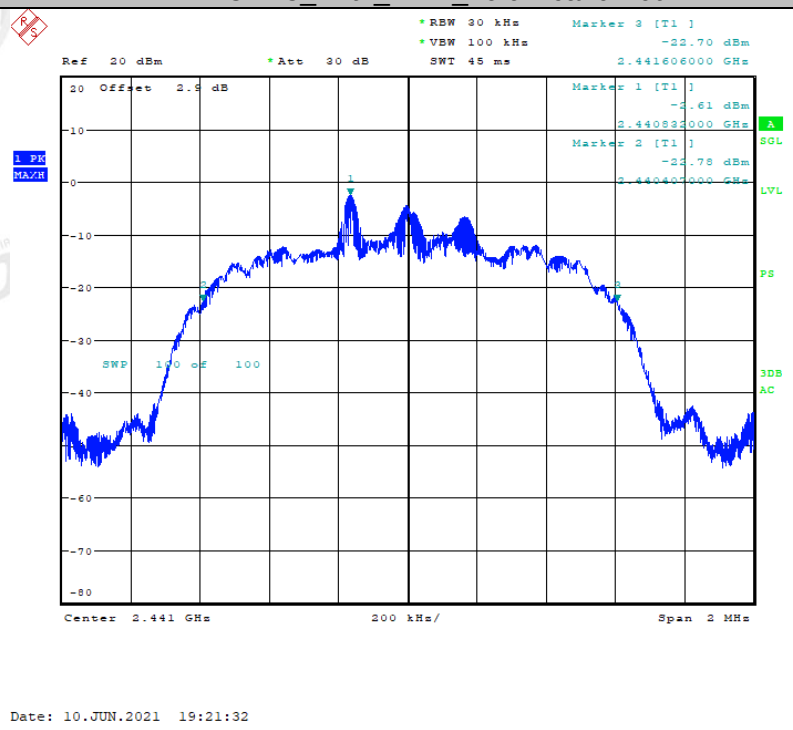
2DH5_Ant1_2480_20 dB bandwidth



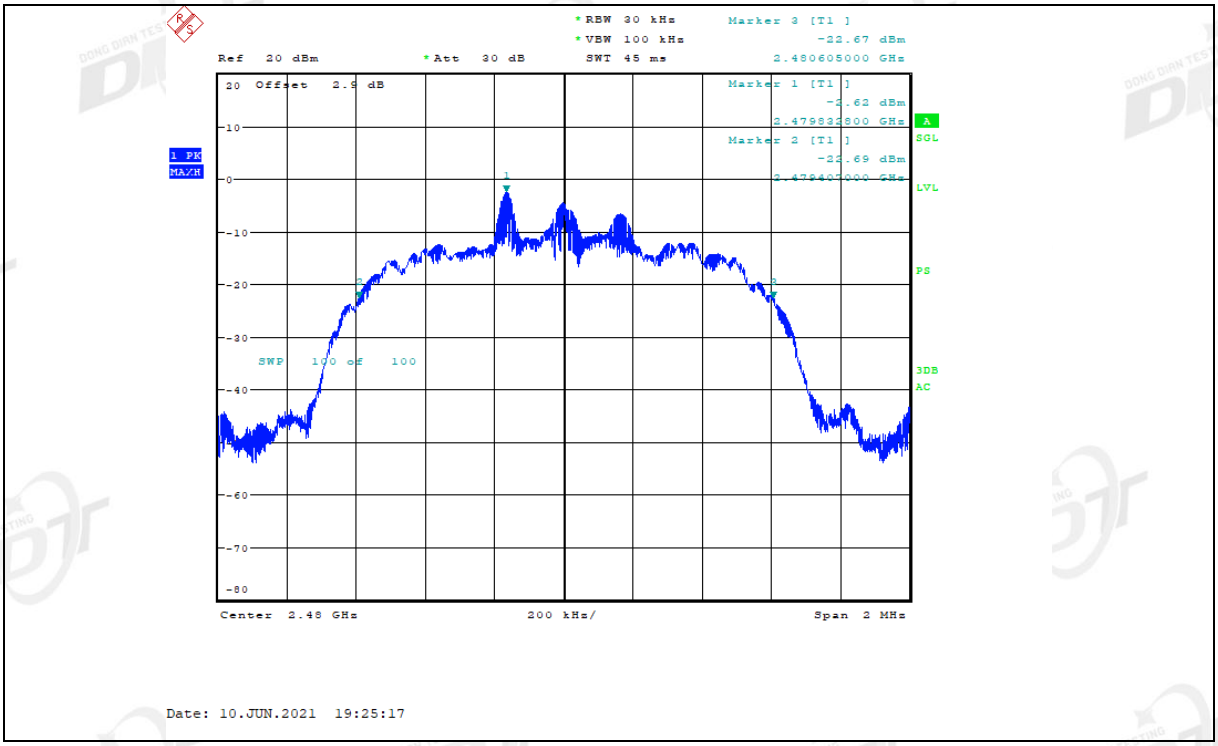
3DH5_Ant1_2402_20 dB bandwidth



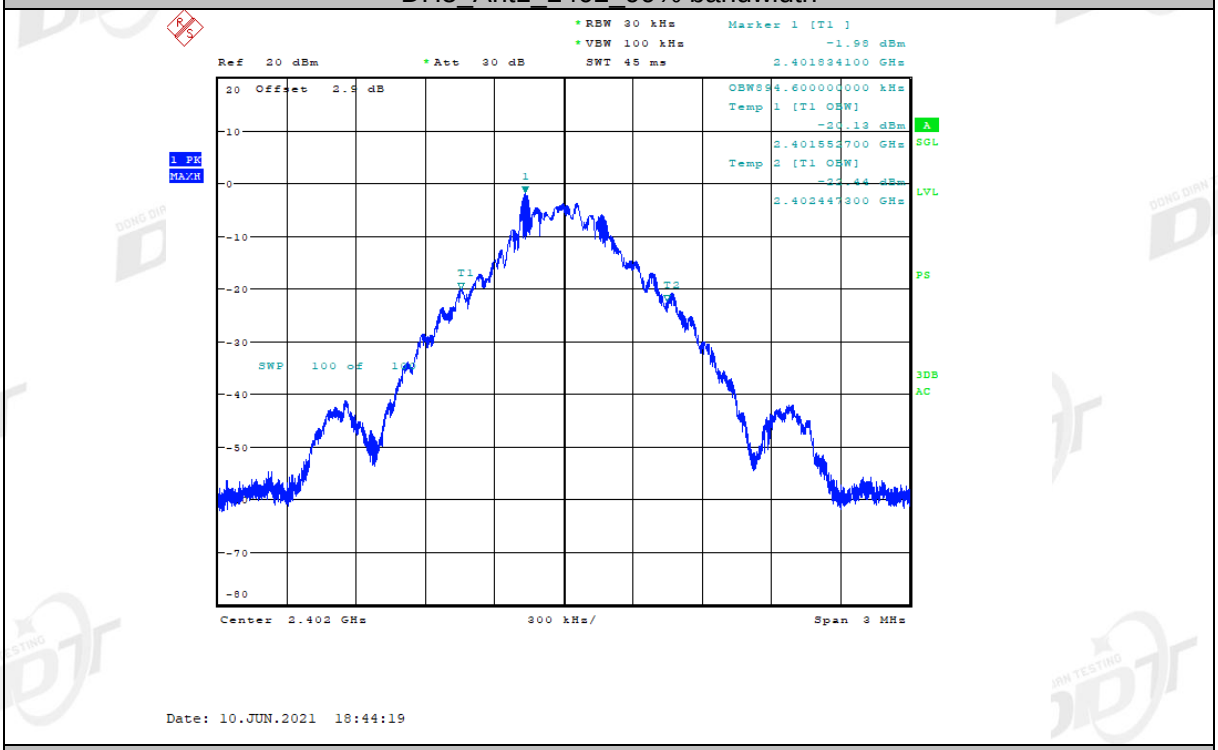
3DH5_Ant1_2441_20 dB bandwidth



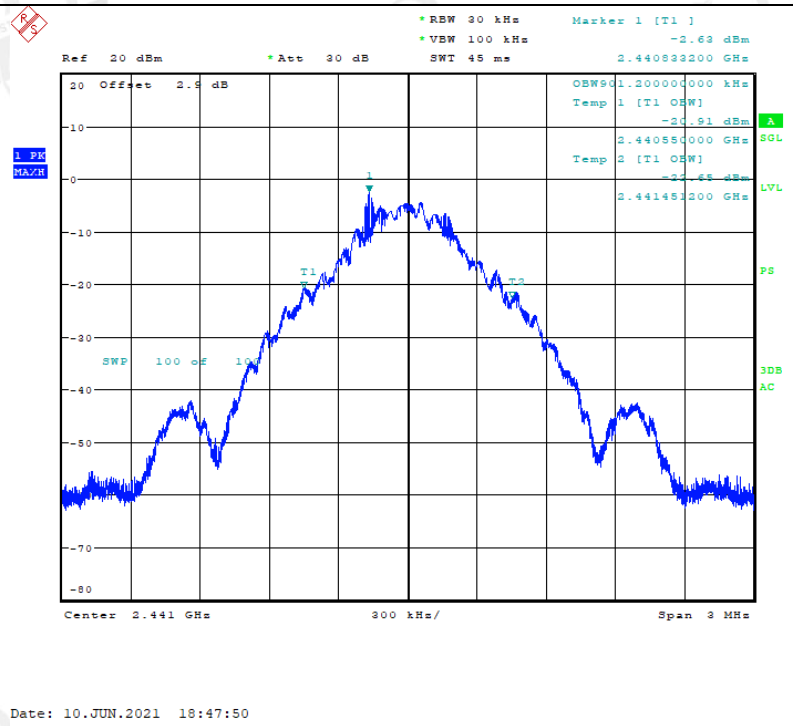
3DH5_Ant1_2480_20 dB bandwidth



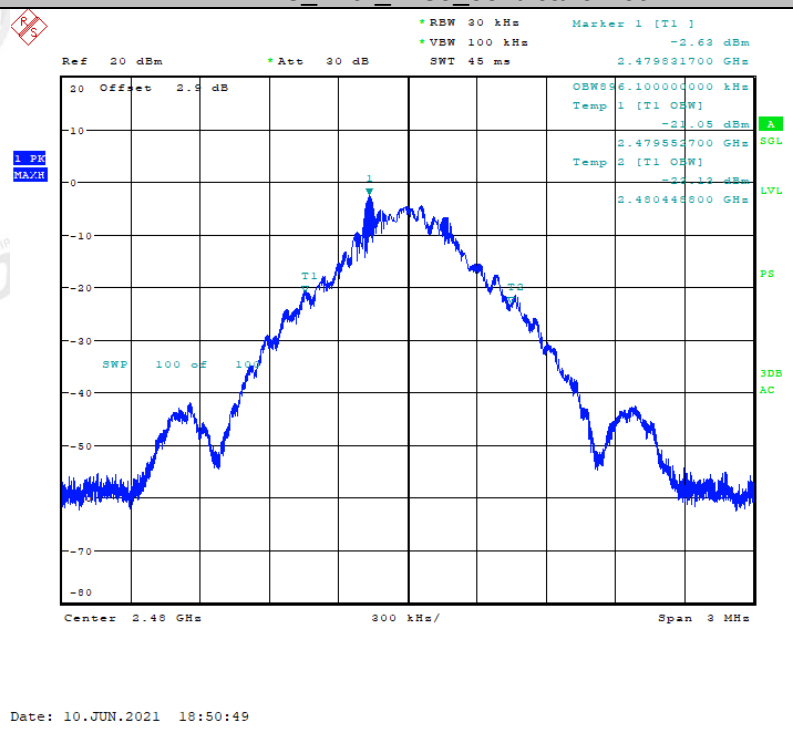
DH5_Ant1_2402_99% bandwidth



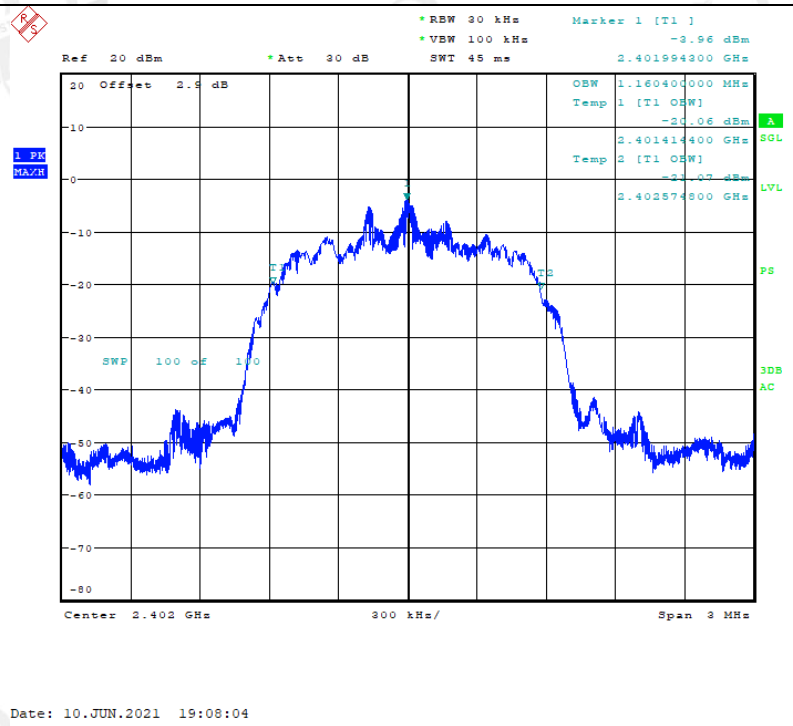
DH5_Ant1_2441_99% bandwidth



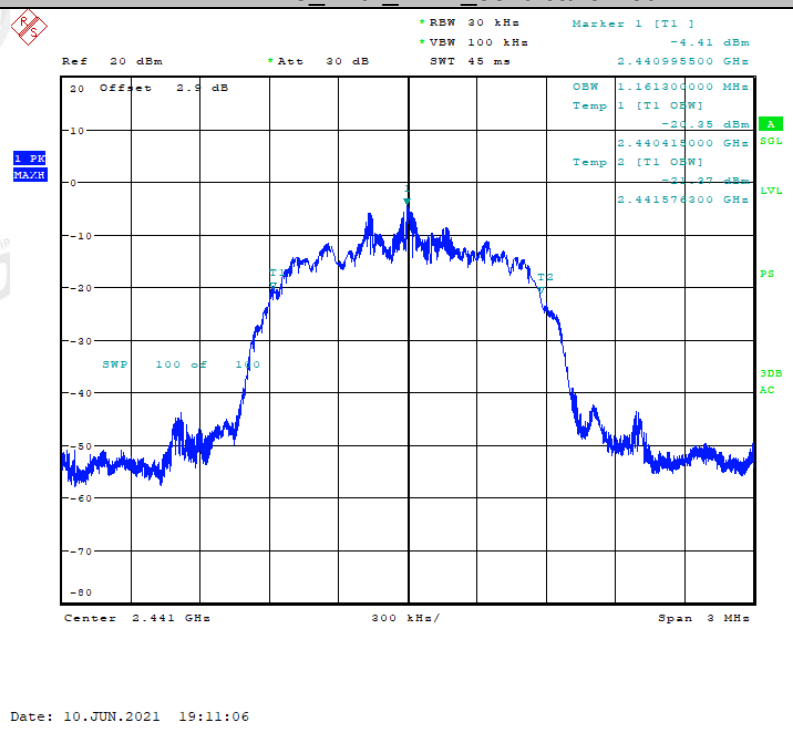
DH5_Ant1_2480_99% bandwidth



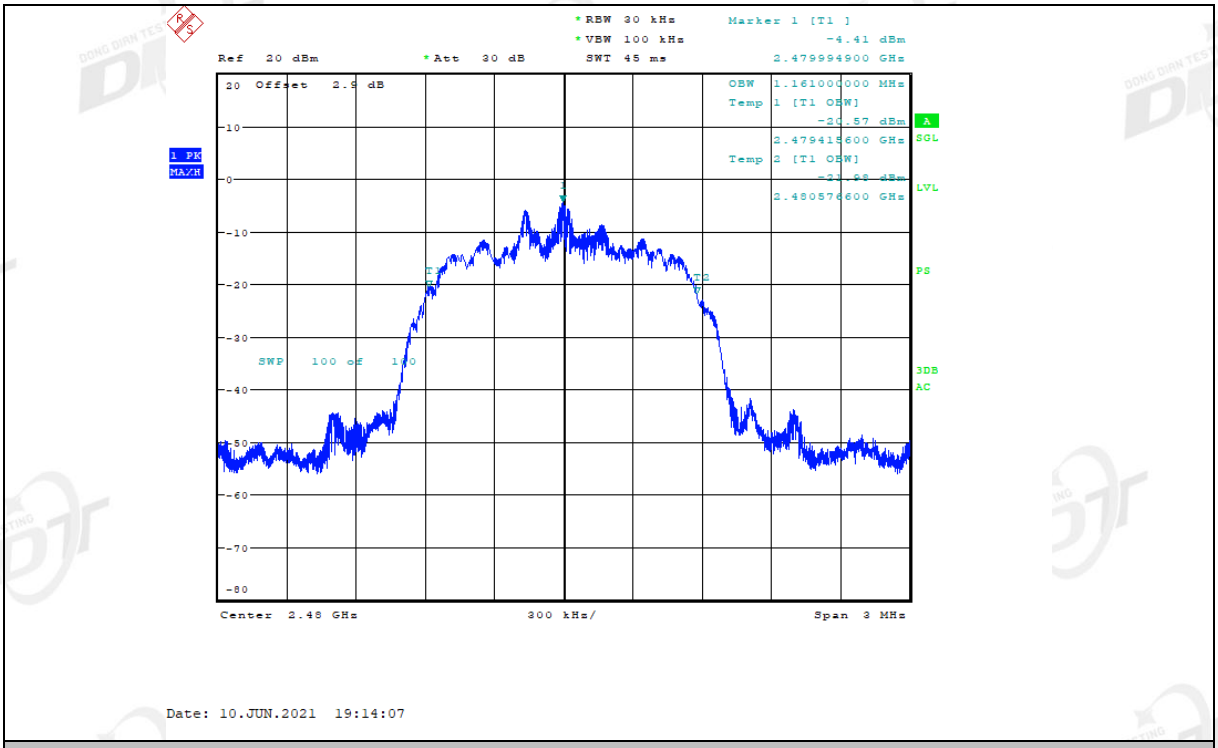
2DH5_Ant1_2402_99% bandwidth



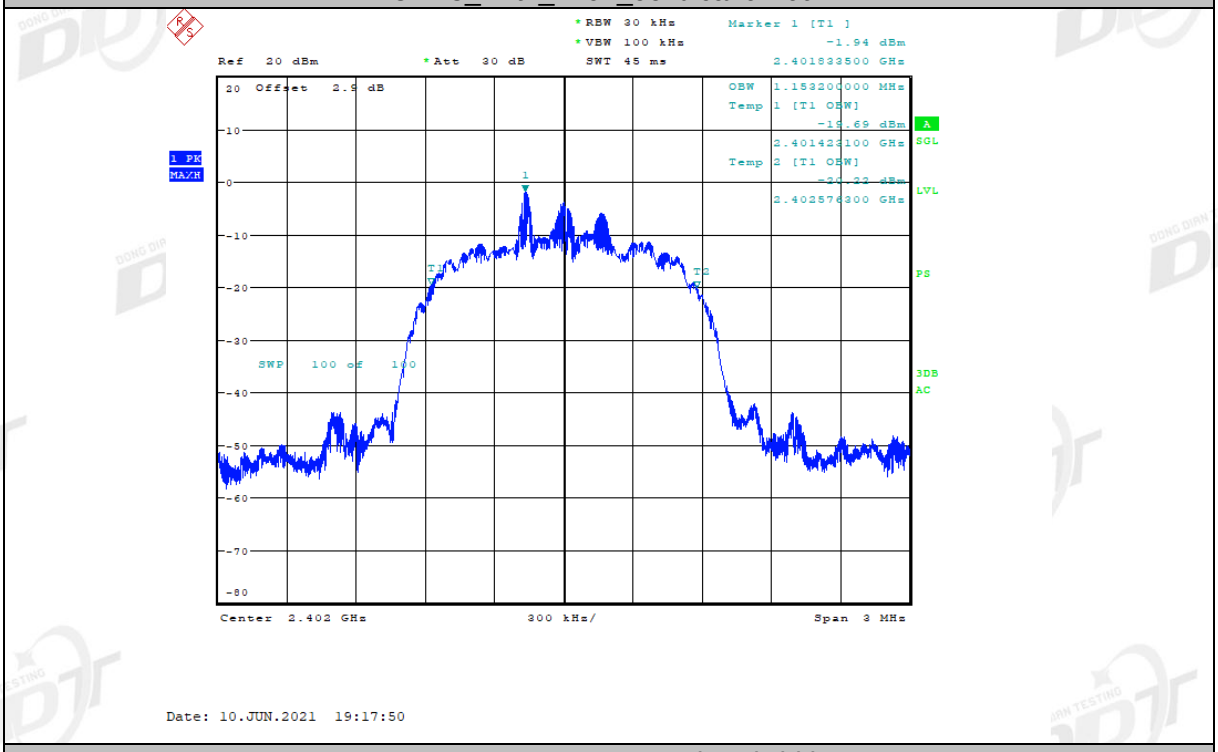
2DH5_Ant1_2441_99% bandwidth



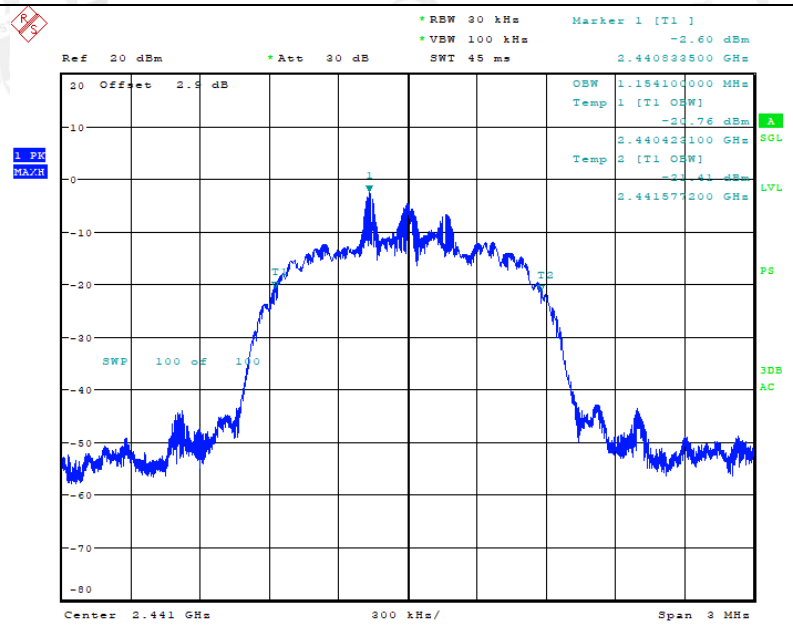
2DH5_Ant1_2480_99% bandwidth



3DH5_Ant1_2402_99% bandwidth

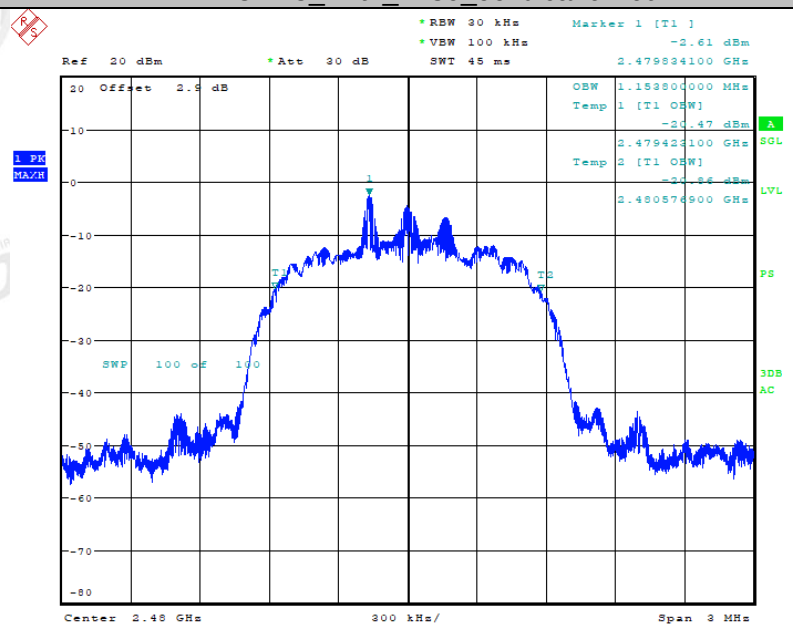


3DH5_Ant1_2441_99% bandwidth



Date: 10.JUN.2021 19:21:06

3DH5_Ant1_2480_99% bandwidth



Date: 10.JUN.2021 19:24:51

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

(2) The carrier frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW.

6.4. Test result

Left side:

Mode	Test Channel	Channel separation (MHz)	20dB bandwidth (MHz) (worse case)	Limit (MHz) ≥2/3 of 20dB bandwidth	Verdict
GFSK	2402	0.996	0.945	0.631	Pass
	2441	1.008	0.943	0.631	Pass
	2480	0.99	0.946	0.633	Pass
π/4-DQPSK	2402	1.01	1.245	0.844	Pass
	2441	0.996	1.247	0.837	Pass
	2480	0.992	1.246	0.835	Pass
8DPSK	2402	1.002	1.197	0.799	Pass
	2441	0.99	1.198	0.801	Pass
	2480	0.996	1.200	0.802	Pass

Right side:

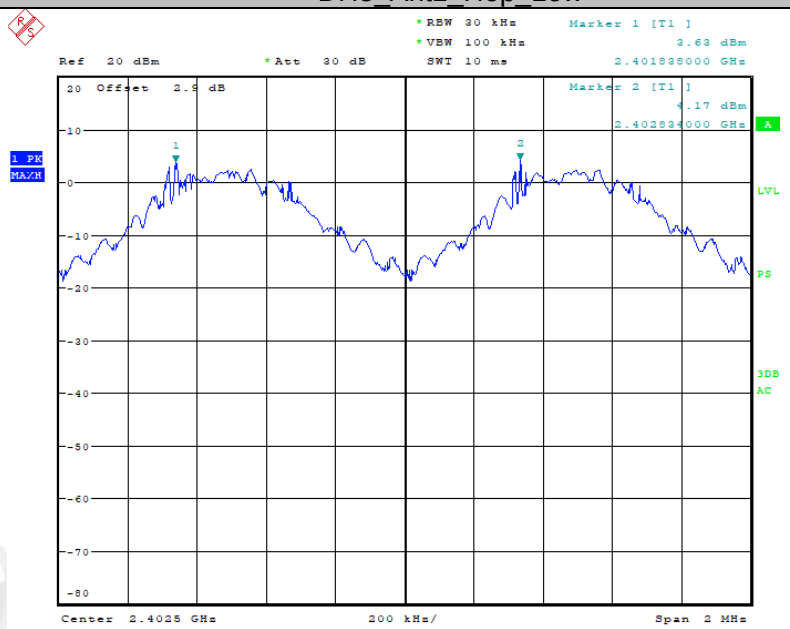
Mode	Test Channel	Channel separation (MHz)	20dB bandwidth (MHz) (worse case)	Limit (MHz) ≥2/3 of 20dB bandwidth	Verdict
GFSK	2402	1.002	0.895	0.631	Pass
	2441	1.004	0.901	0.632	Pass
	2480	0.992	0.896	0.631	Pass

π/4-DQPSK	2402	1.000	1.160	0.833	Pass
	2441	1.006	1.161	0.835	Pass
	2480	0.992	1.161	0.835	Pass
8DPSK	2402	1.002	1.153	0.769	Pass
	2441	1.002	1.154	0.769	Pass
	2480	0.996	1.154	0.769	Pass

6.5. Original test data

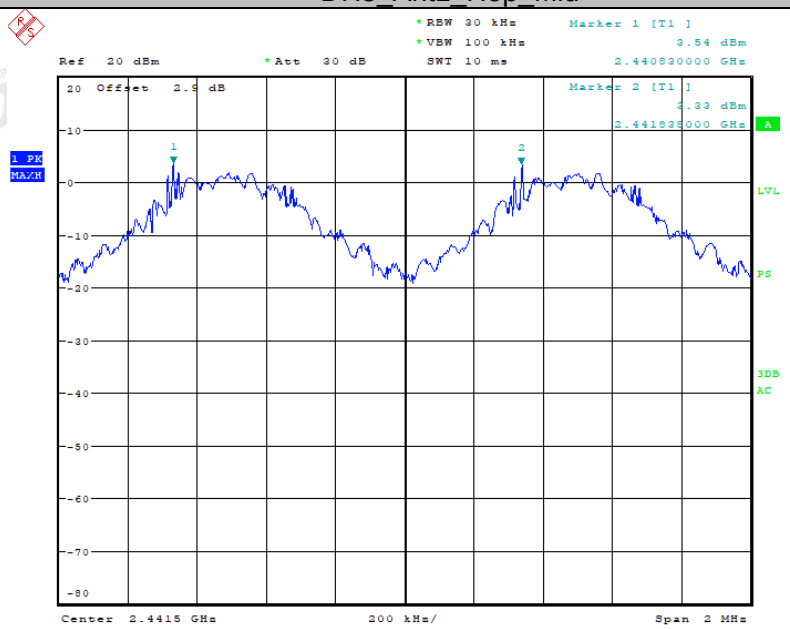
Left side:

DH5_Ant1_Hop_Low



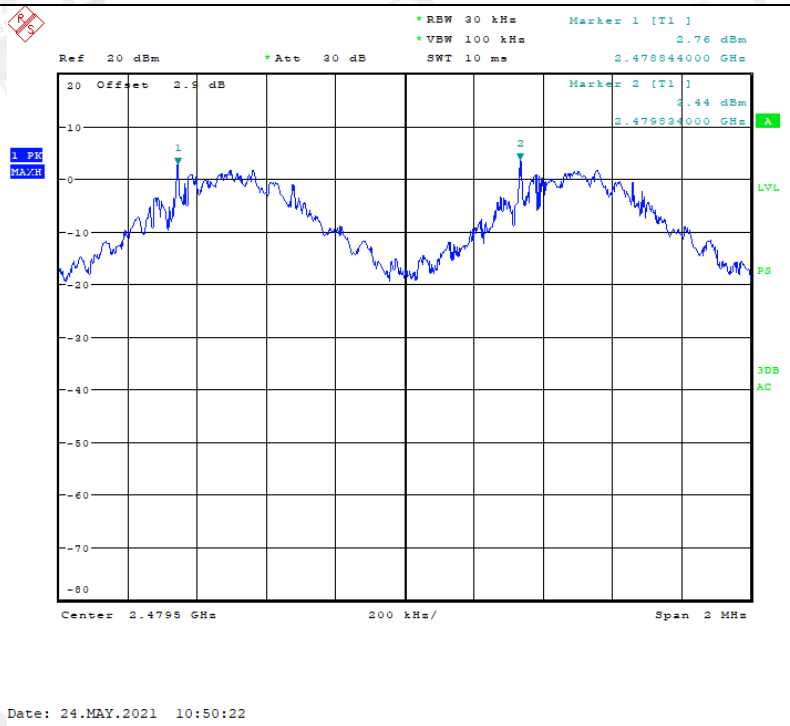
Date: 24.MAY.2021 10:32:36

DH5_Ant1_Hop_Mid

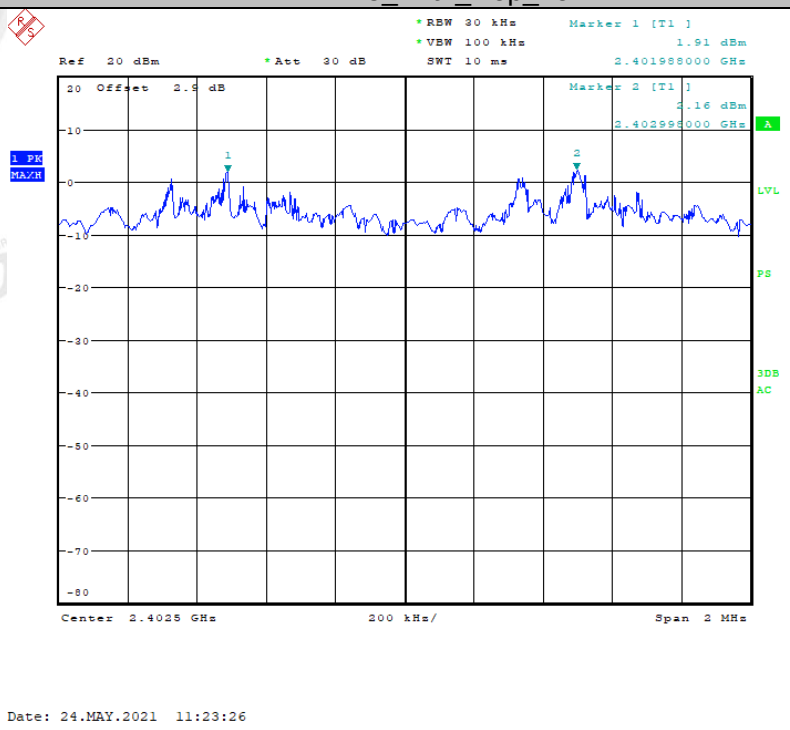


Date: 24.MAY.2021 10:45:25

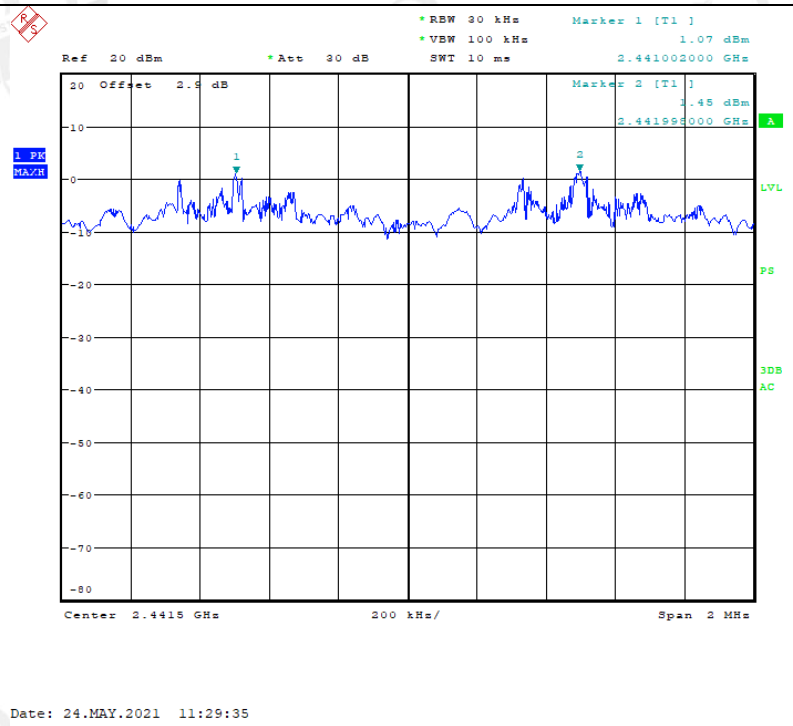
DH5_Ant1_Hop_High



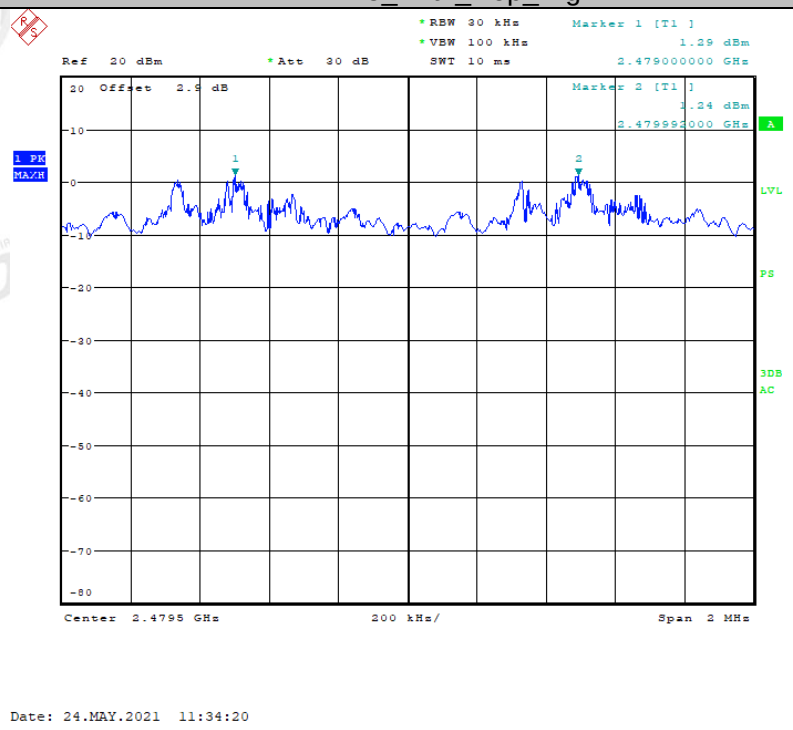
2DH5_Ant1_Hop_Low



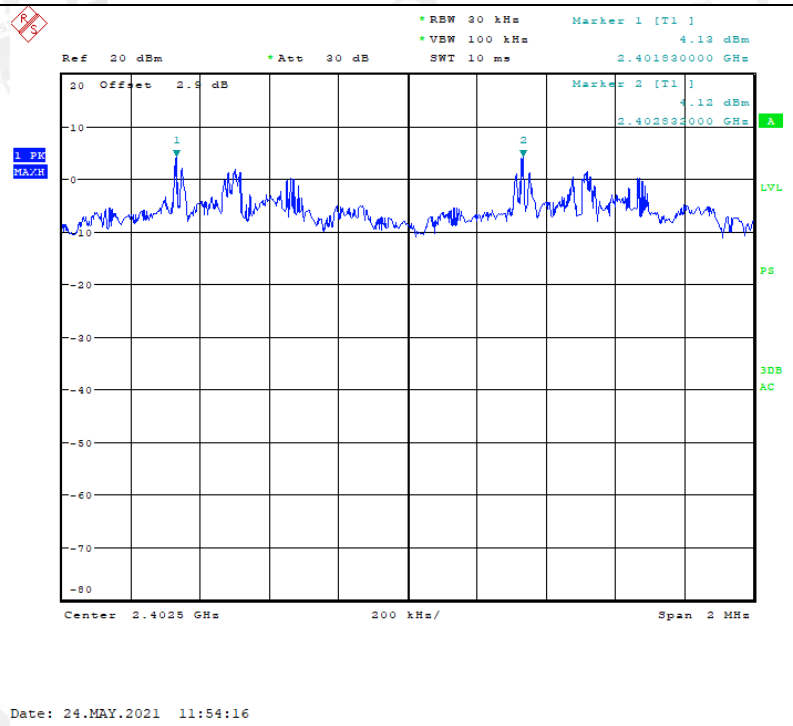
2DH5_Ant1_Hop_Mid



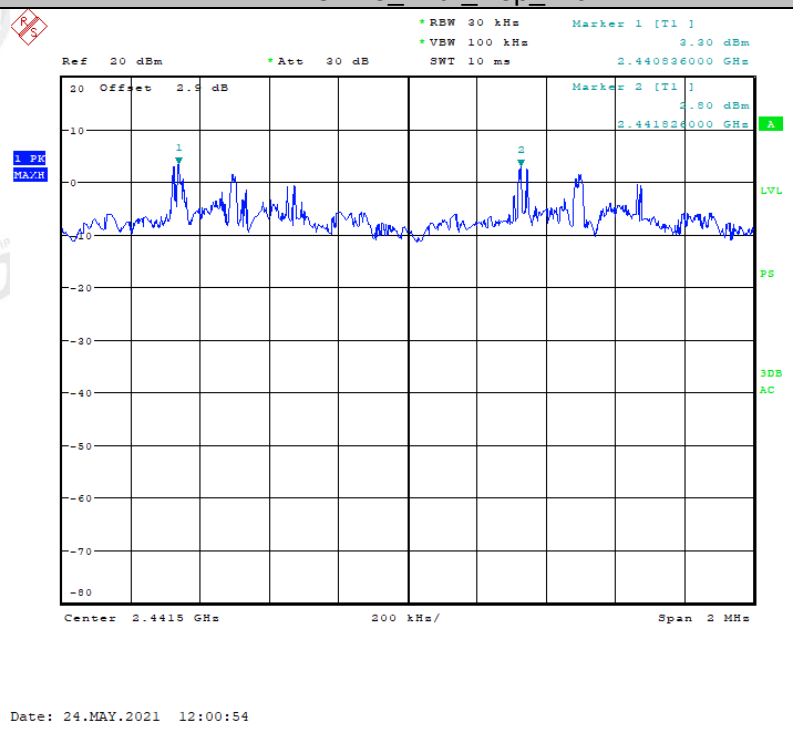
2DH5_Ant1_Hop_High



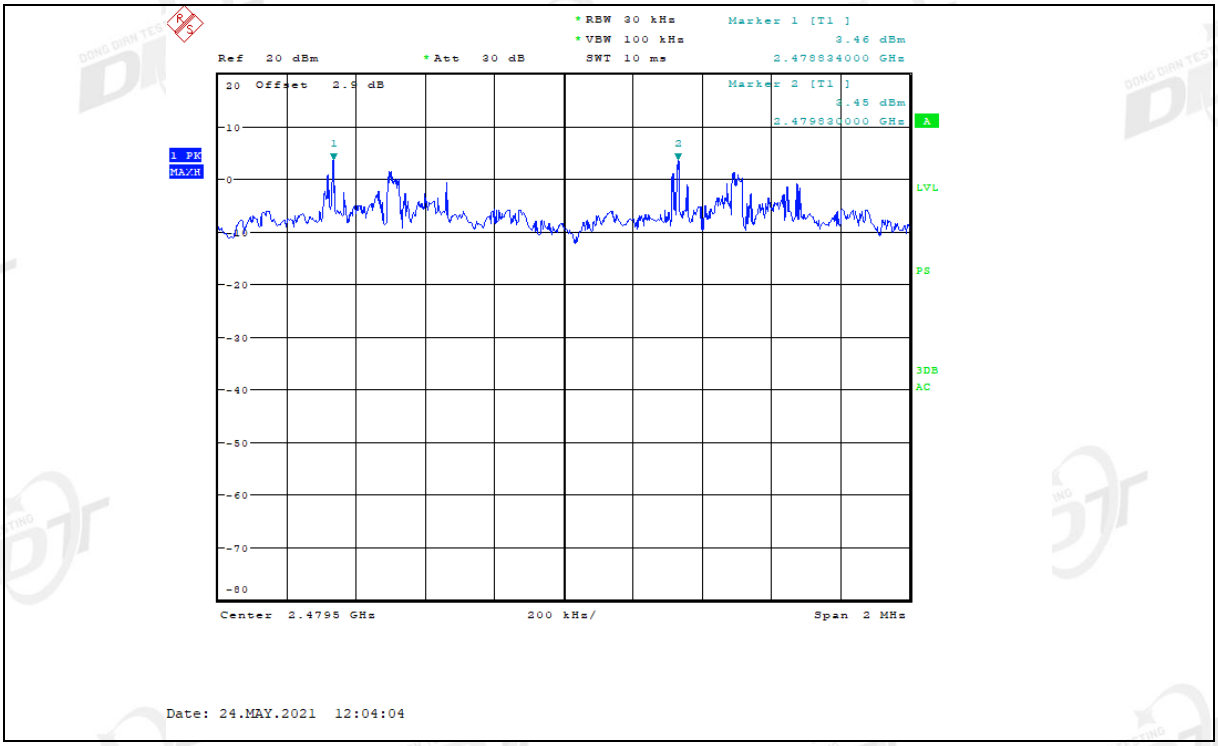
3DH5_Ant1_Hop_Low



3DH5_Ant1_Hop_Mid

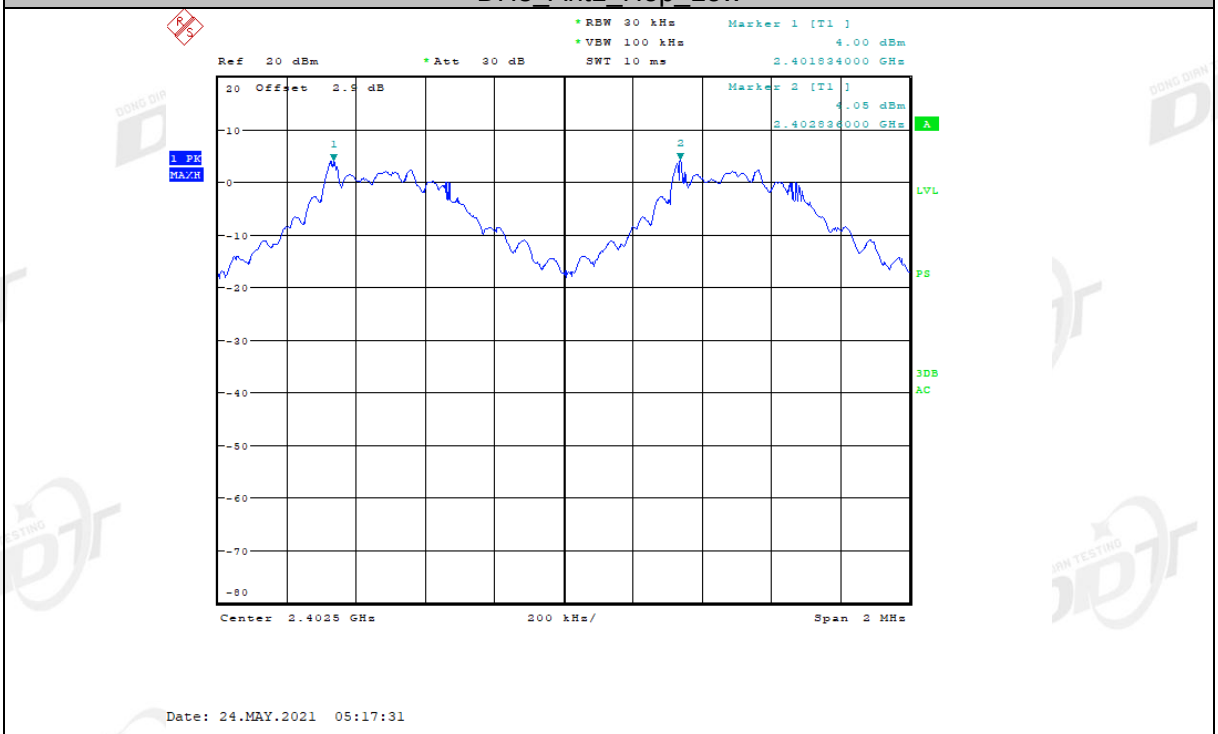


3DH5_Ant1_Hop_High

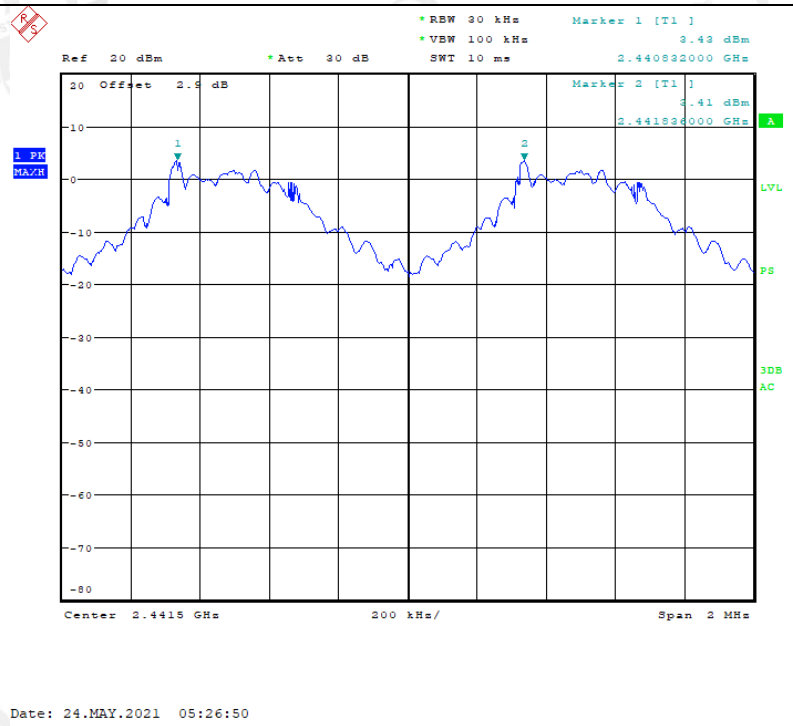


Right side:

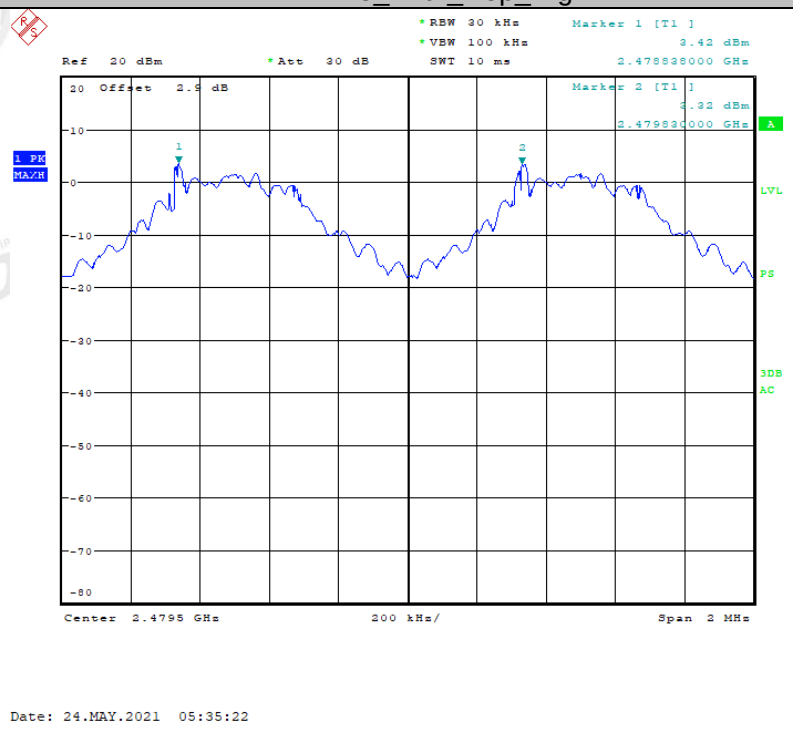
DH5_Ant1_Hop_Low



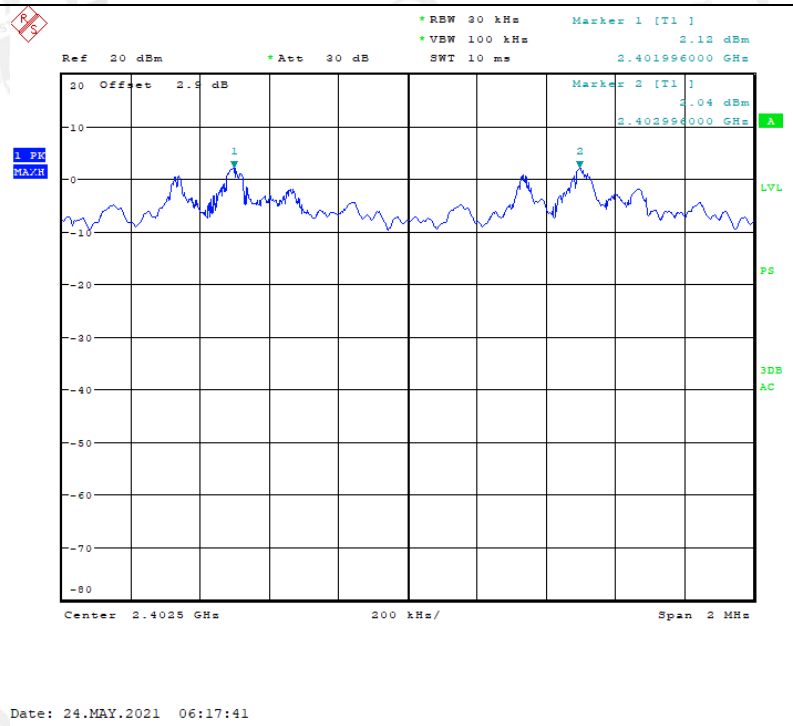
DH5_Ant1_Hop_Mid



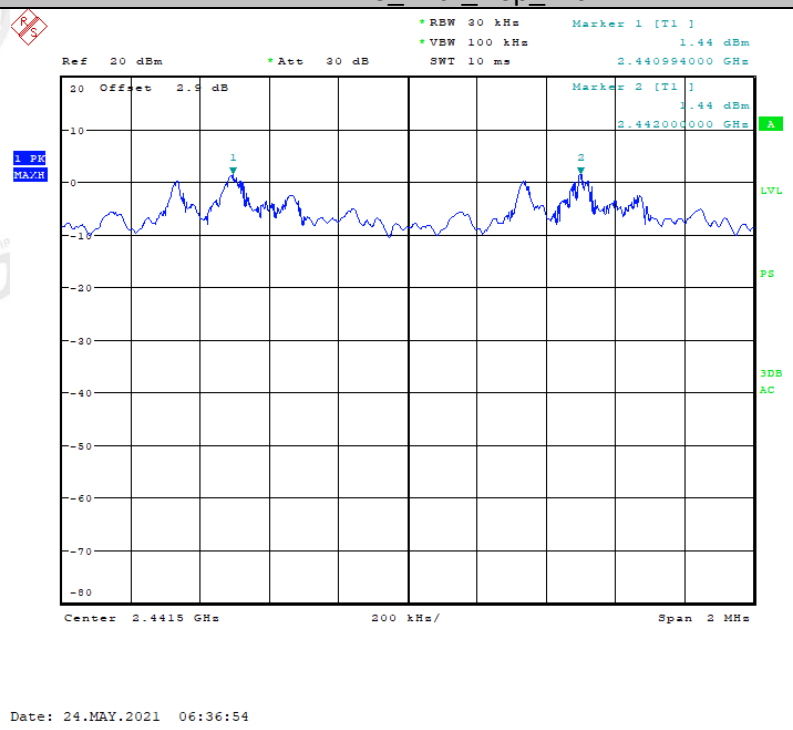
DH5_Ant1_Hop_High



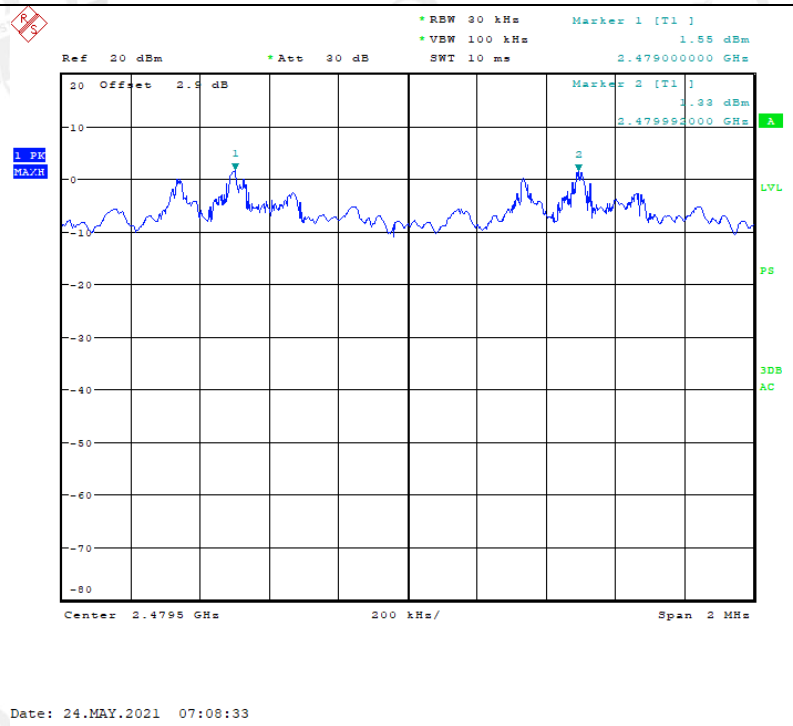
2DH5_Ant1_Hop_Low



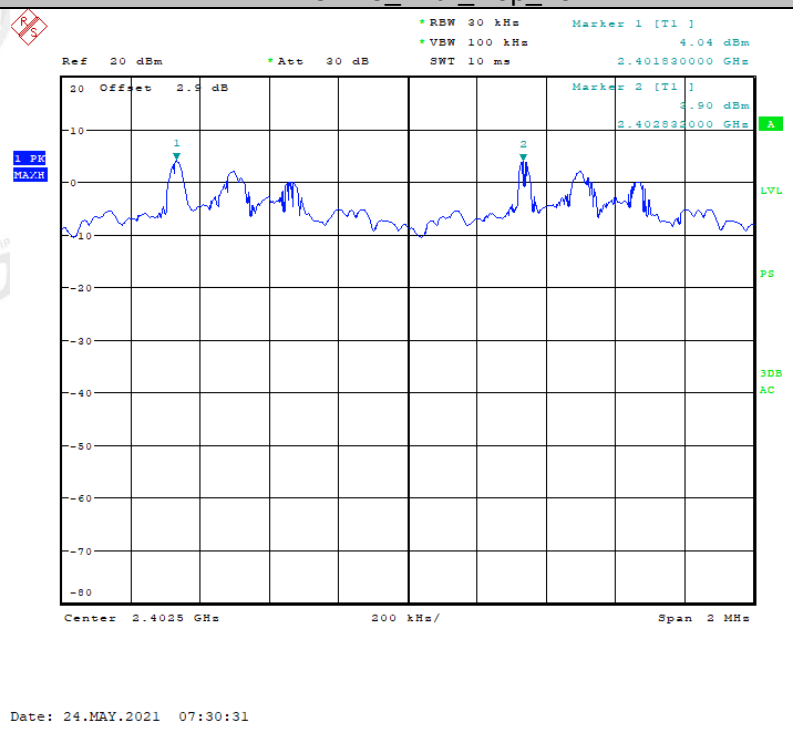
2DH5_Ant1_Hop_Mid



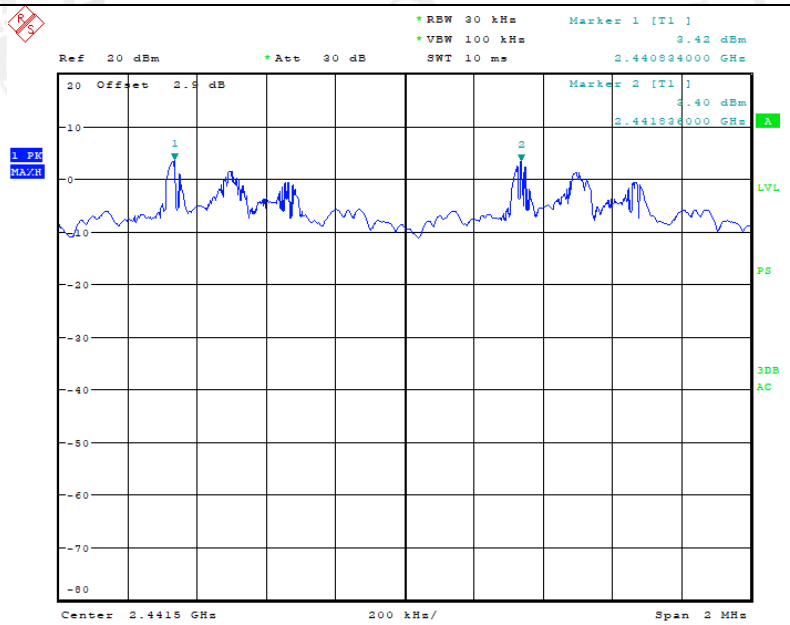
2DH5_Ant1_Hop_High



3DH5_Ant1_Hop_Low

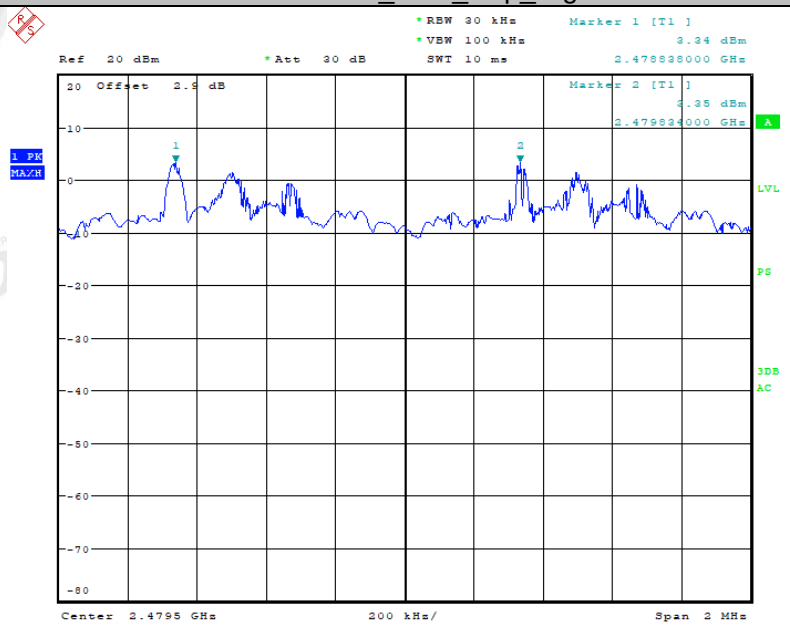


3DH5_Ant1_Hop_Mid



Date: 24.MAY.2021 07:45:28

3DH5_Ant1_Hop_High



Date: 24.MAY.2021 08:06:45

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

(2) The number of hopping channels was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW.

7.4. Test result

Left side:

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

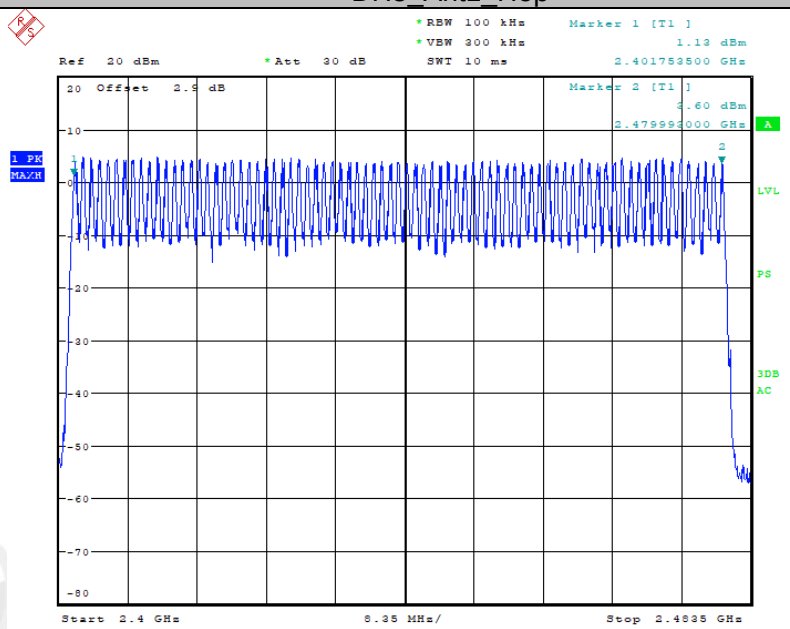
Right side:

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

7.5. Original test data

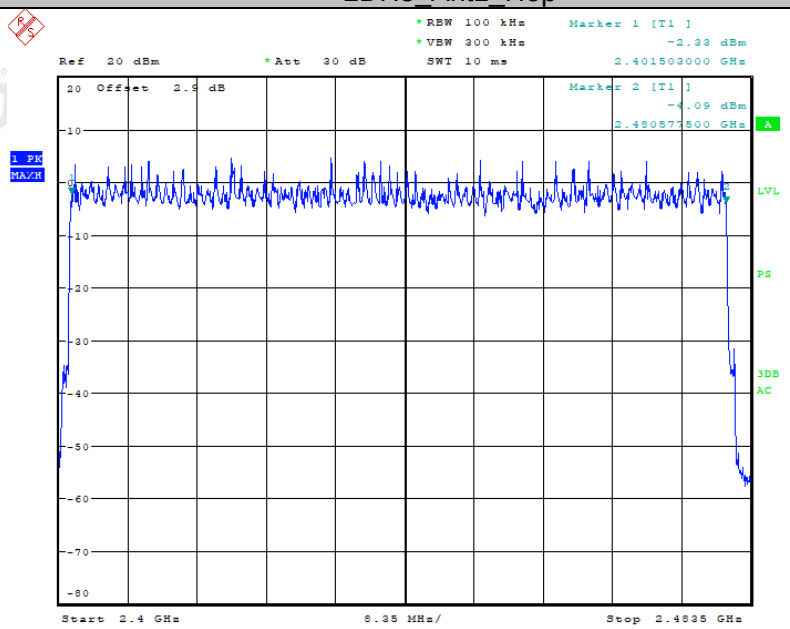
Left side:

DH5_Ant1_Hop



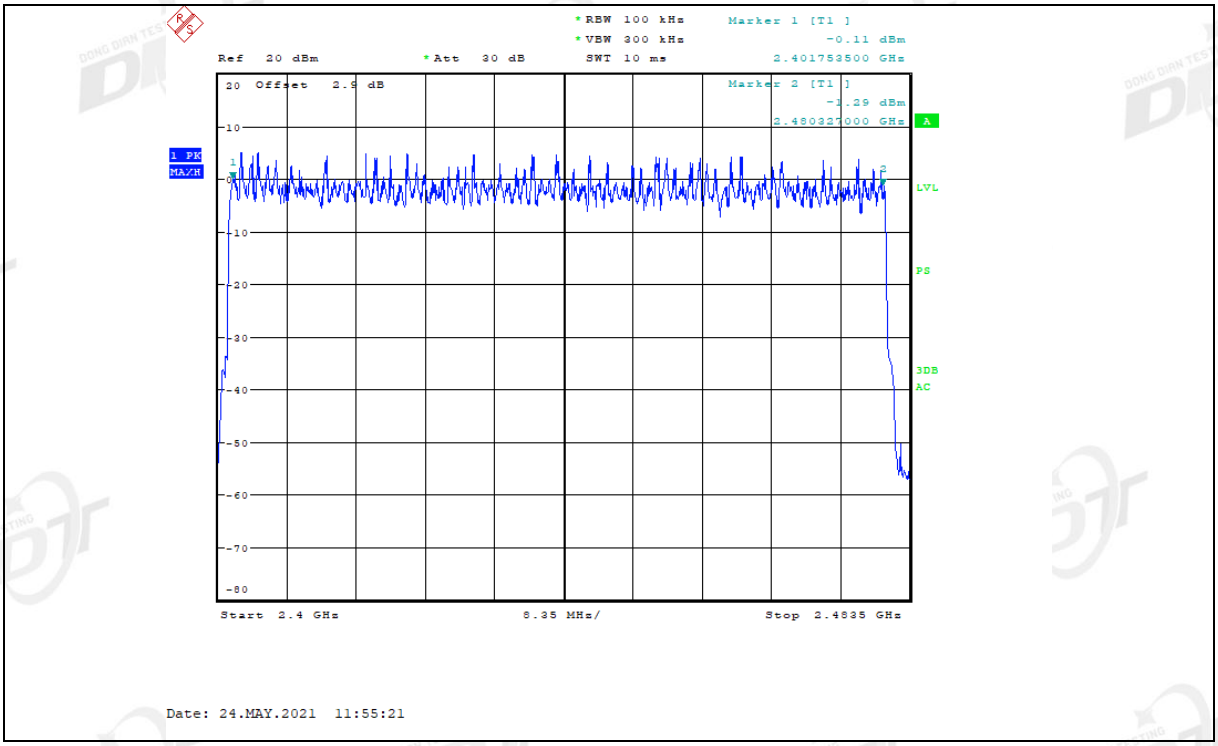
Date: 24.MAY.2021 10:33:18

2DH5_Ant1_Hop



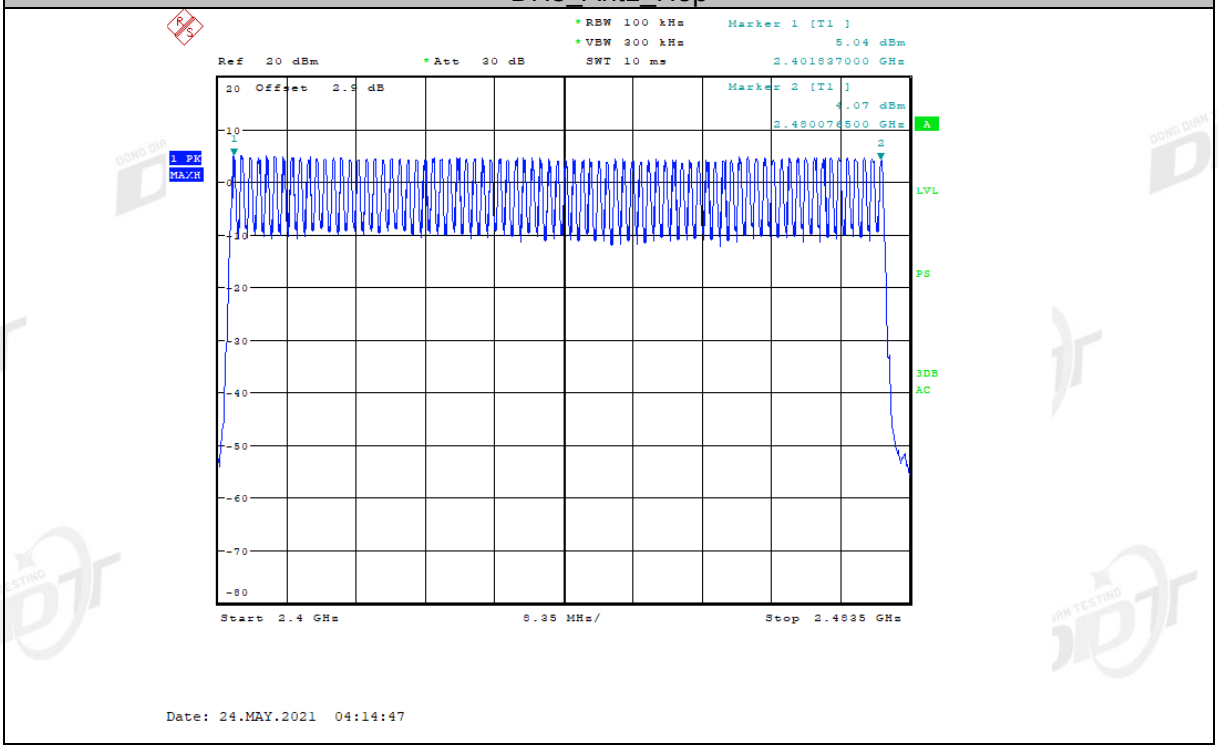
Date: 24.MAY.2021 11:24:13

3DH5_Ant1_Hop

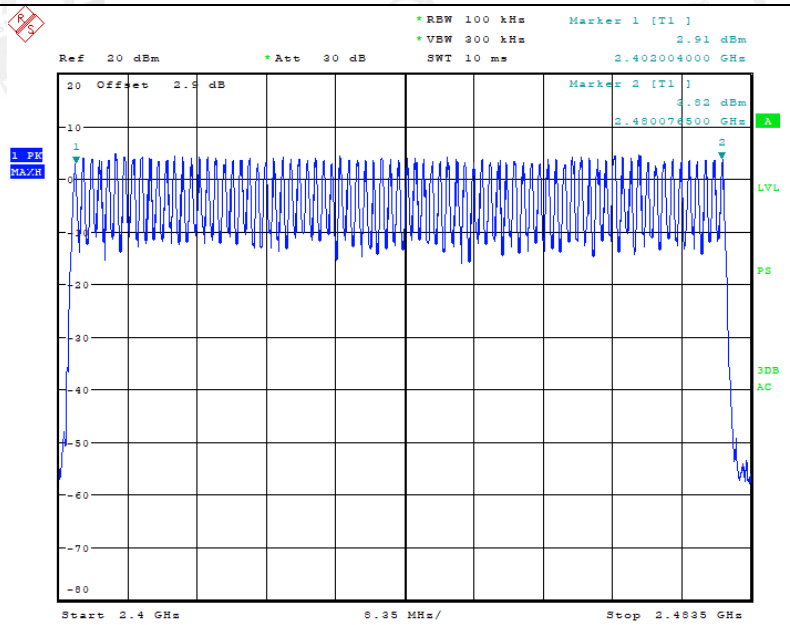


Right side:

DH5_Ant1_Hop

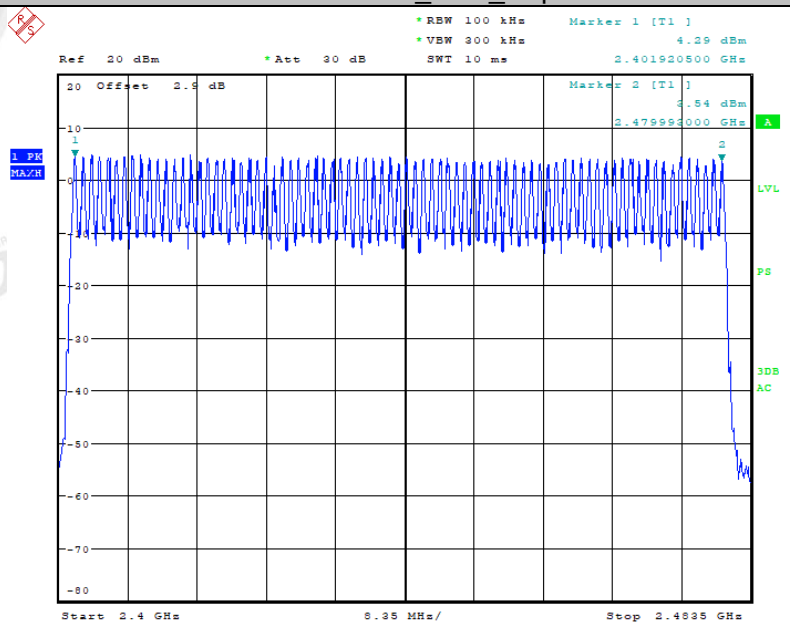


2DH5_Ant1_Hop



Date: 24.MAY.2021 04:31:50

3DH5_Ant1_Hop



Date: 24.MAY.2021 04:33:38

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

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

(3) 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

Left side:

Mode	Test Channel	Dwell time (ms)	Pulse's on time (ms)	Total hops	Limit	Verdict
DH1	2402	119.040	0.372	320	<400ms	Pass
	2441	118.668	0.372	319	<400ms	Pass
	2480	118.296	0.372	318	<400ms	Pass
DH3	2402	257.580	1.620	159	<400ms	Pass
	2441	259.200	1.620	160	<400ms	Pass
	2480	259.200	1.620	160	<400ms	Pass
DH5	2402	306.876	2.868	107	<400ms	Pass
	2441	304.114	2.869	106	<400ms	Pass
	2480	304.008	2.868	106	<400ms	Pass
2DH1	2402	121.220	0.380	319	<400ms	Pass
	2441	121.220	0.380	319	<400ms	Pass
	2480	120.840	0.380	318	<400ms	Pass
2DH3	2402	261.120	1.632	160	<400ms	Pass
	2441	261.120	1.632	160	<400ms	Pass
	2480	257.698	1.631	158	<400ms	Pass
2DH5	2402	305.280	2.880	106	<400ms	Pass
	2441	302.505	2.881	105	<400ms	Pass
	2480	308.053	2.879	107	<400ms	Pass
3DH1	2402	120.840	0.380	318	<400ms	Pass
	2441	120.901	0.379	319	<400ms	Pass
	2480	121.220	0.380	319	<400ms	Pass
3DH3	2402	260.800	1.630	160	<400ms	Pass
	2441	260.800	1.630	160	<400ms	Pass
	2480	260.800	1.630	160	<400ms	Pass
3DH5	2402	308.267	2.881	107	<400ms	Pass
	2441	308.267	2.881	107	<400ms	Pass
	2480	305.386	2.881	106	<400ms	Pass
Note: Dwell time = total hops *pulse's on time.						

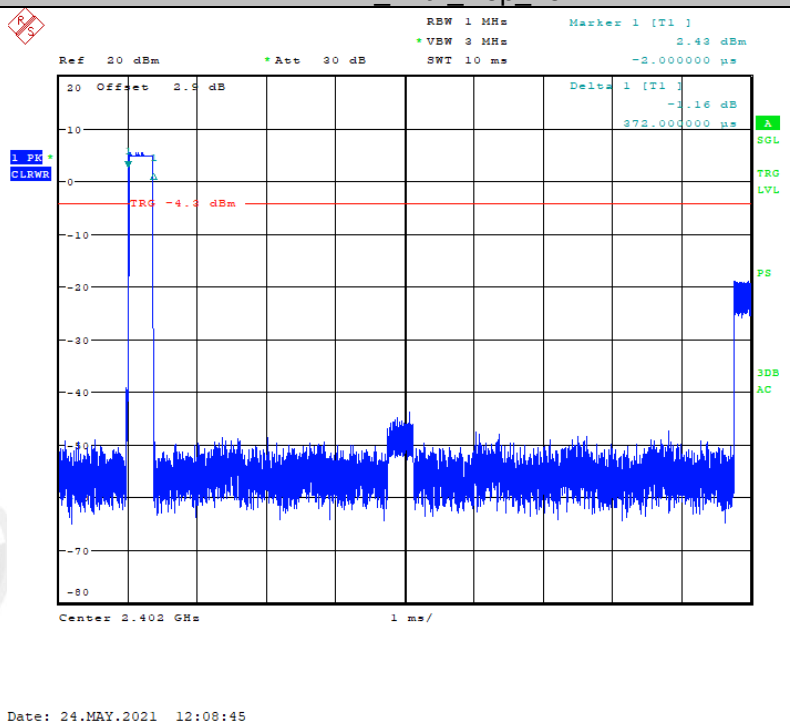
Right side:

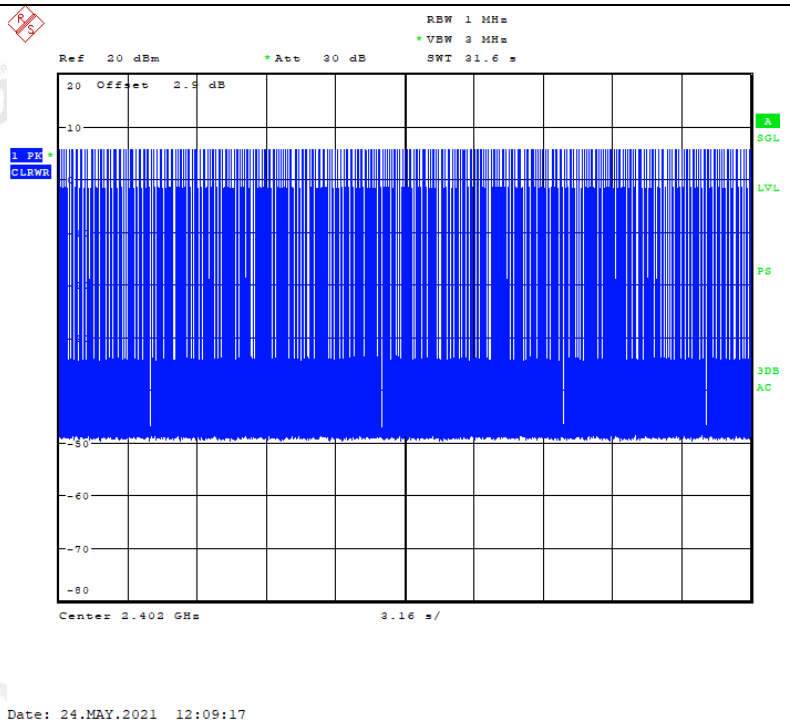
Mode	Test Channel	Dwell time (s)	Pulse's on time (ms)	Total hops	Limit	Verdict
DH1	2402	118.987	0.373	319	<400ms	Pass
	2441	118.668	0.372	319	<400ms	Pass
	2480	118.614	0.373	318	<400ms	Pass
DH3	2402	256.118	1.621	158	<400ms	Pass
	2441	257.739	1.621	159	<400ms	Pass
	2480	259.20	1.620	160	<400ms	Pass
DH5	2402	304.008	2.868	106	<400ms	Pass
	2441	306.876	2.868	107	<400ms	Pass
	2480	306.876	2.868	107	<400ms	Pass
2DH1	2402	120.840	0.380	318	<400ms	Pass
	2441	121.280	0.379	320	<400ms	Pass
	2480	120.460	0.380	317	<400ms	Pass
2DH3	2402	259.488	1.632	159	<400ms	Pass
	2441	259.488	1.632	159	<400ms	Pass
	2480	259.647	1.633	159	<400ms	Pass
2DH5	2402	308.160	2.880	107	<400ms	Pass
	2441	302.295	2.879	105	<400ms	Pass
	2480	305.280	2.880	106	<400ms	Pass
3DH1	2402	121.220	0.380	319	<400ms	Pass
	2441	121.220	0.380	319	<400ms	Pass
	2480	120.460	0.380	317	<400ms	Pass
3DH3	2402	259.170	1.630	159	<400ms	Pass
	2441	257.540	1.630	158	<400ms	Pass
	2480	257.540	1.630	158	<400ms	Pass
3DH5	2402	308.267	2.881	107	<400ms	Pass
	2441	308.160	2.88	107	<400ms	Pass
	2480	308.267	2.881	107	<400ms	Pass
Note: Dwell time = total hops *pulse's on time.						

8.5. Original test data

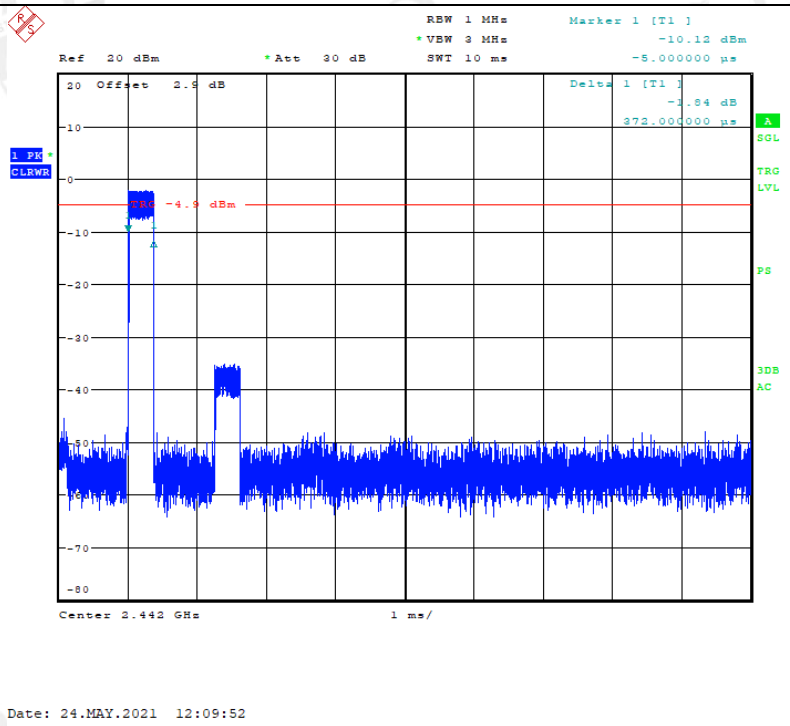
Left side:

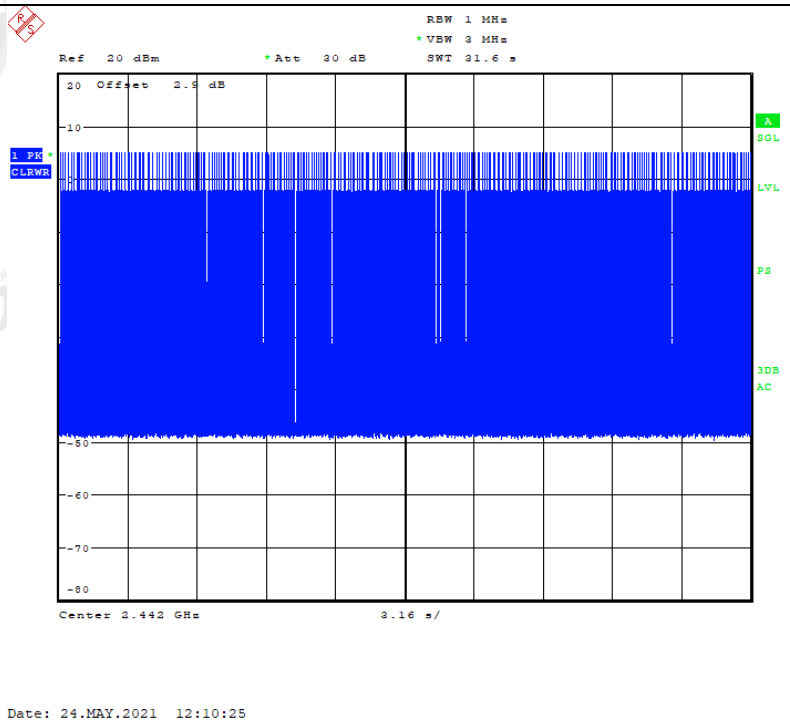
DH1_Ant1_Hop_Low



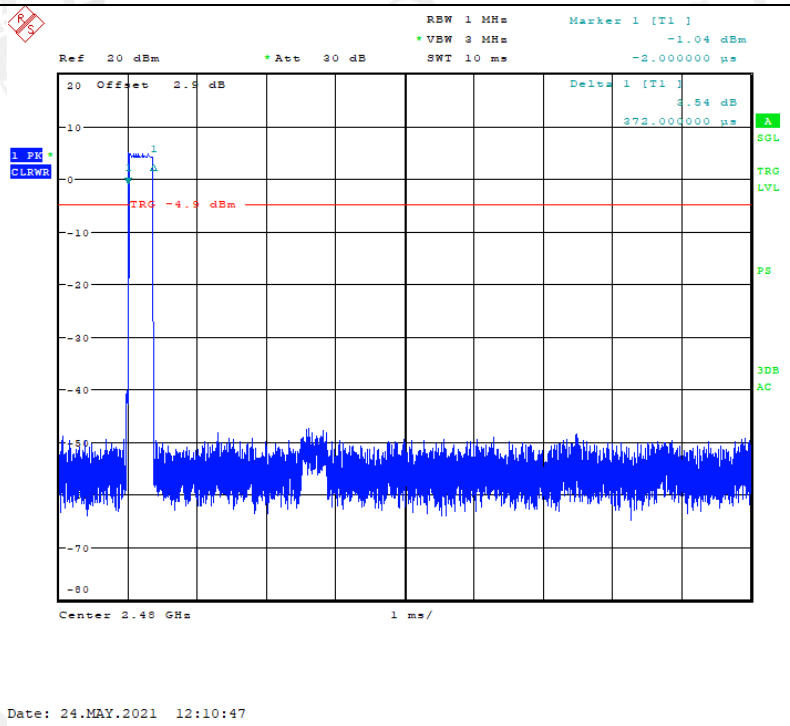


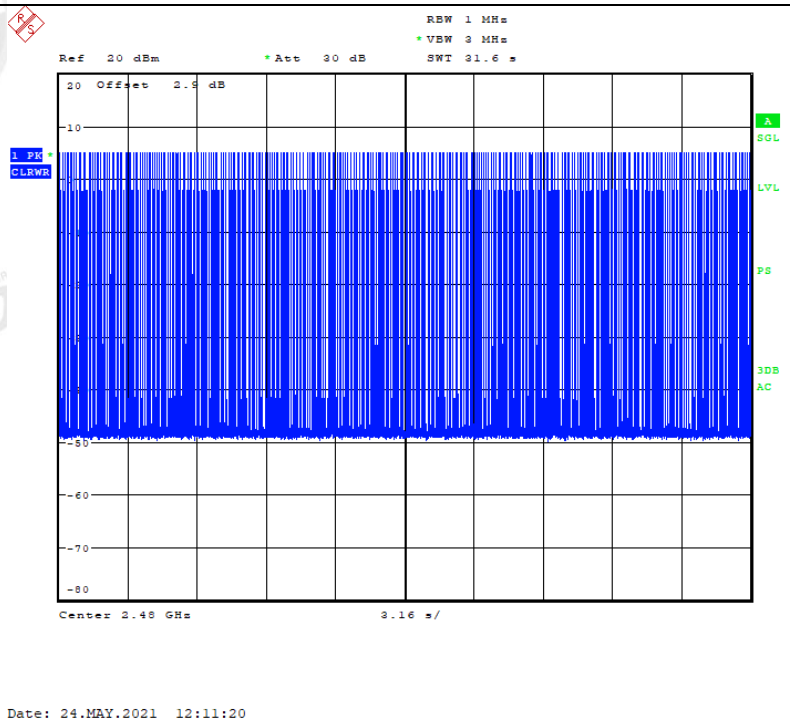
DH1_Ant1_Hop_Mid



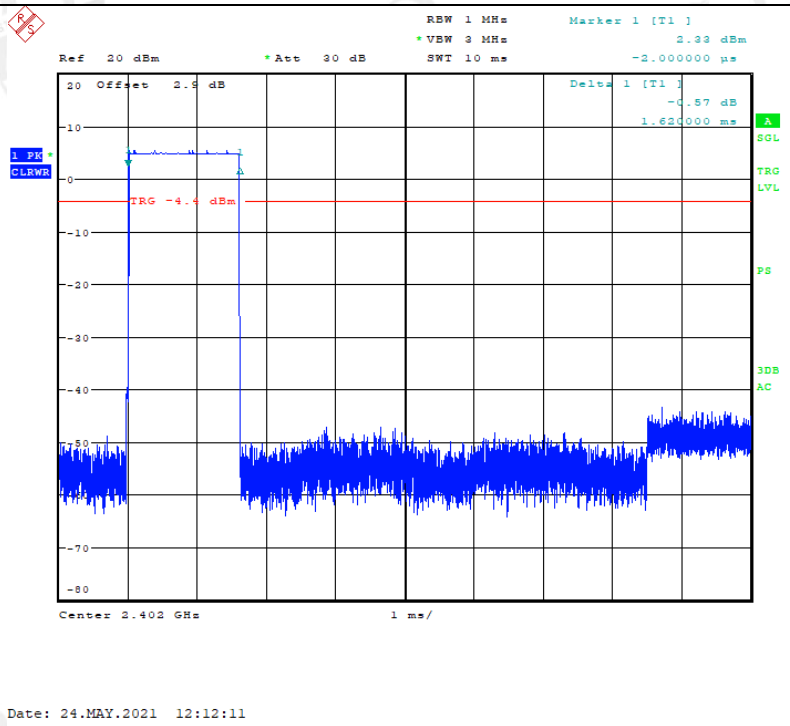


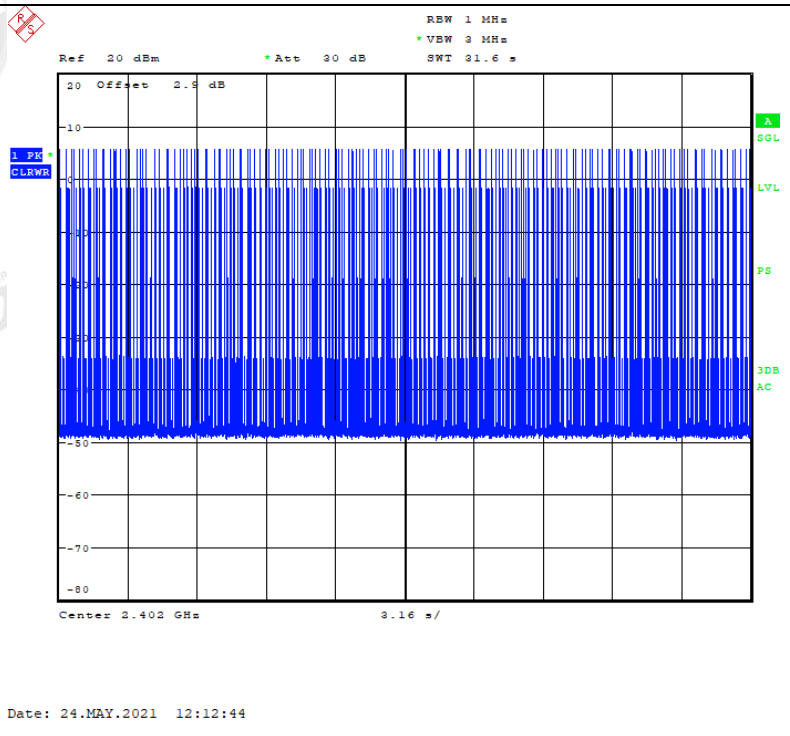
DH1_Ant1_Hop_High



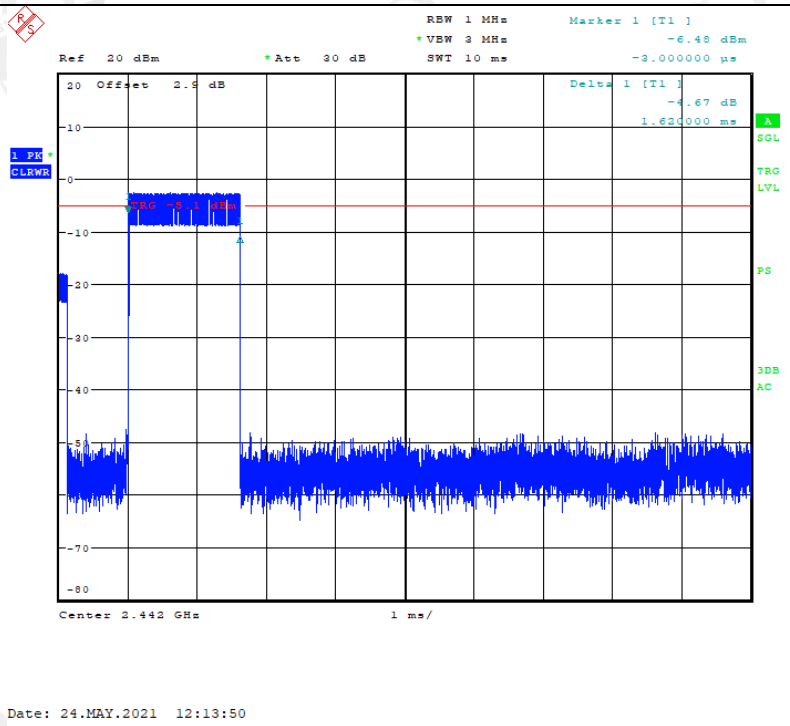


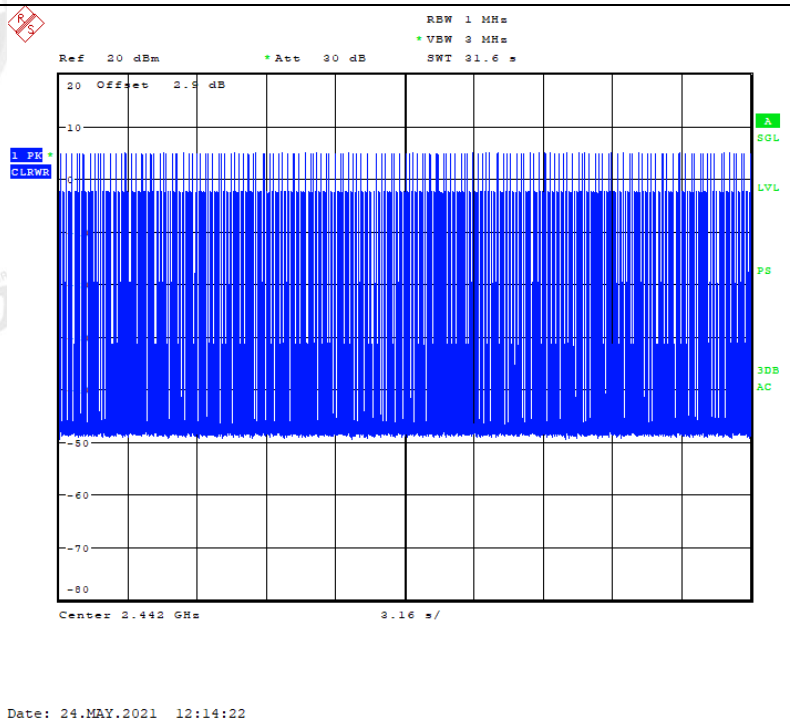
DH3_Ant1_Hop_Low



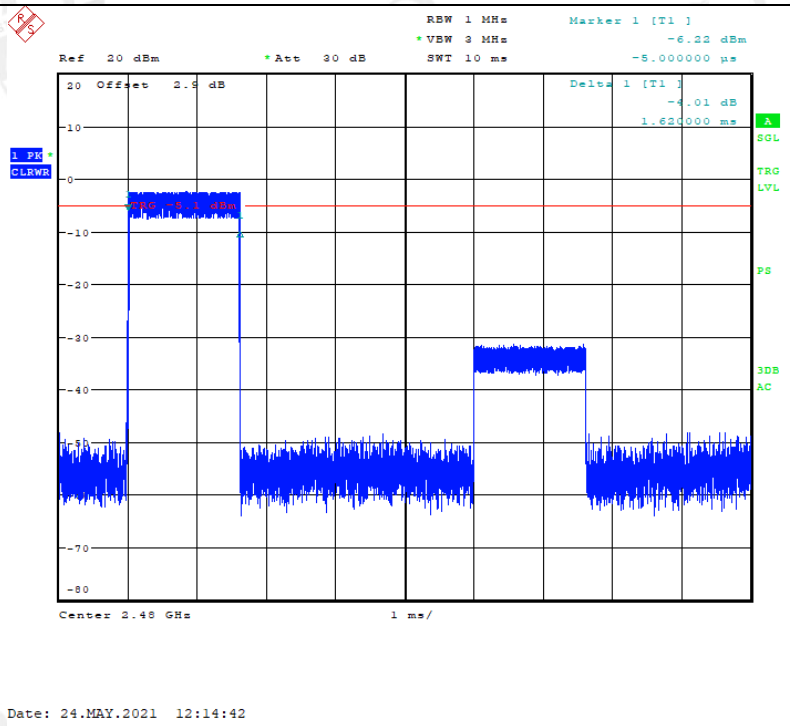


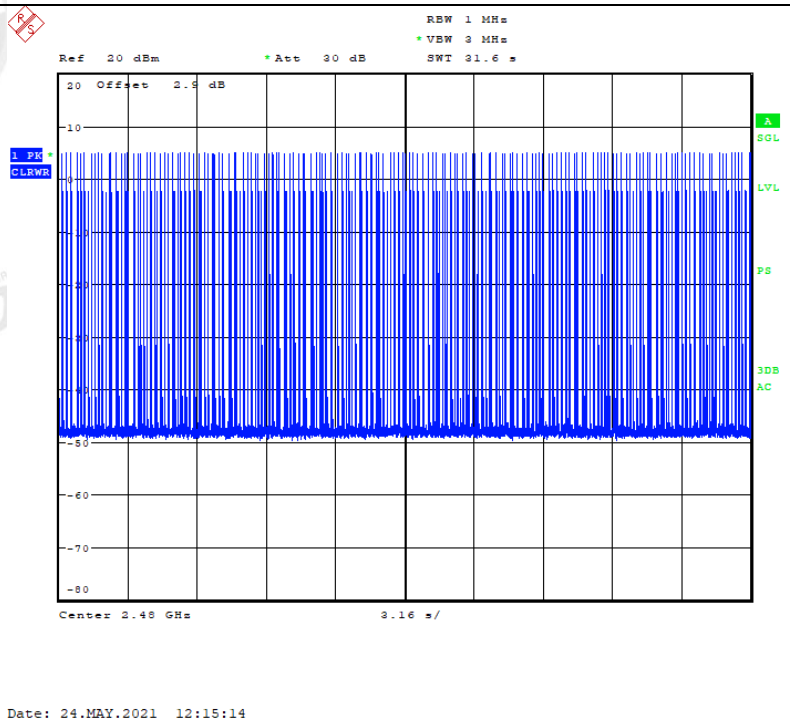
DH3_Ant1_Hop_Mid



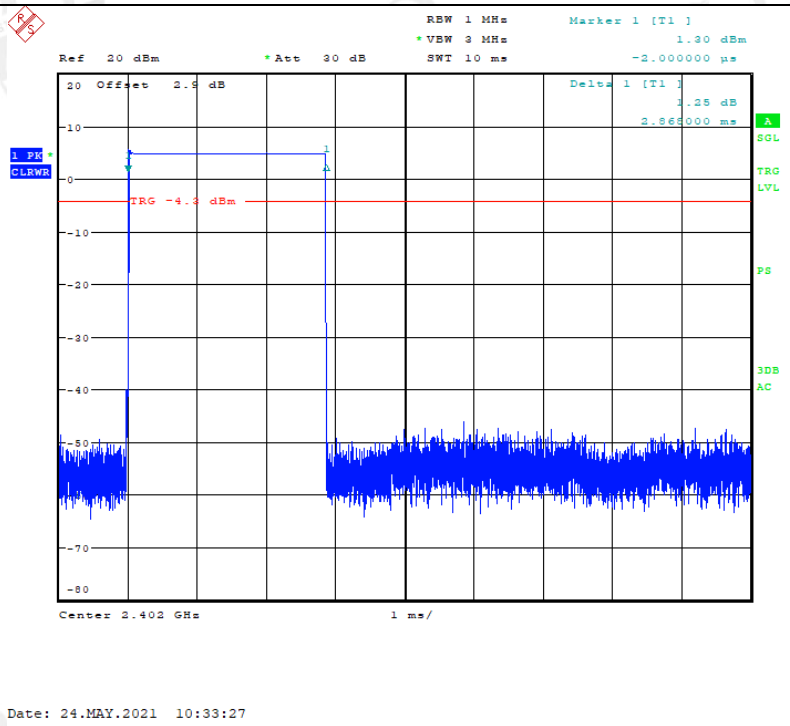


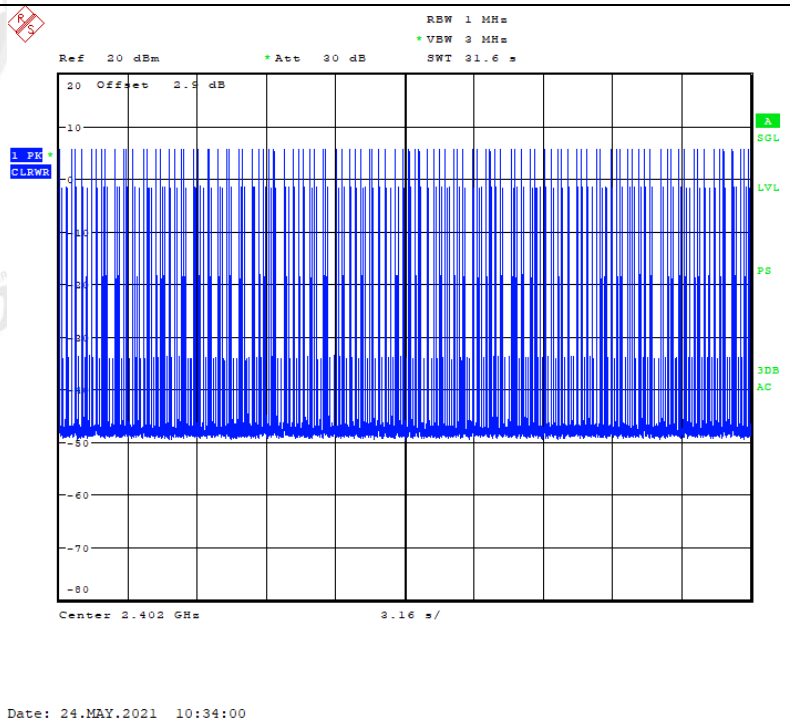
DH3_Ant1_Hop_High



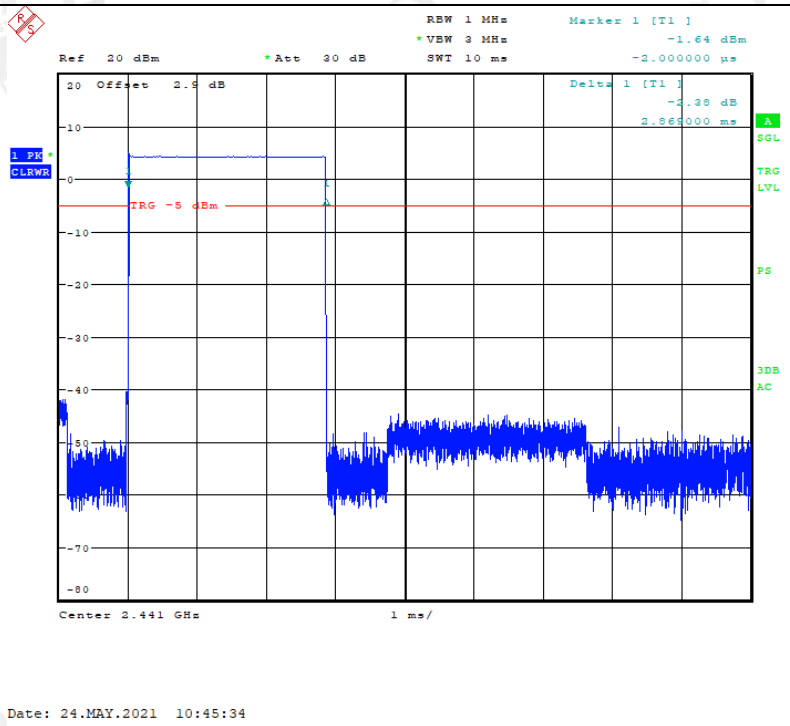


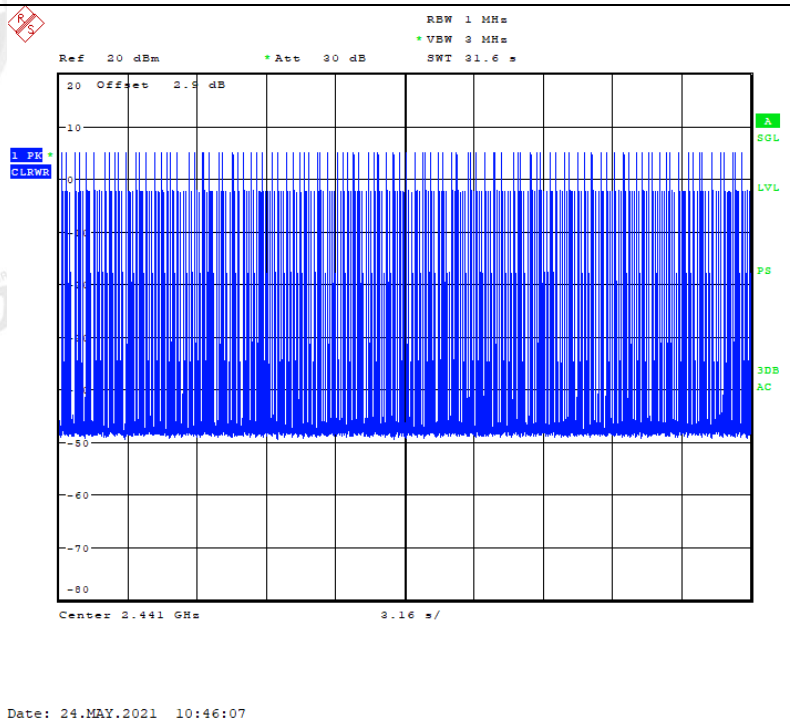
DH5_Ant1_Hop_Low



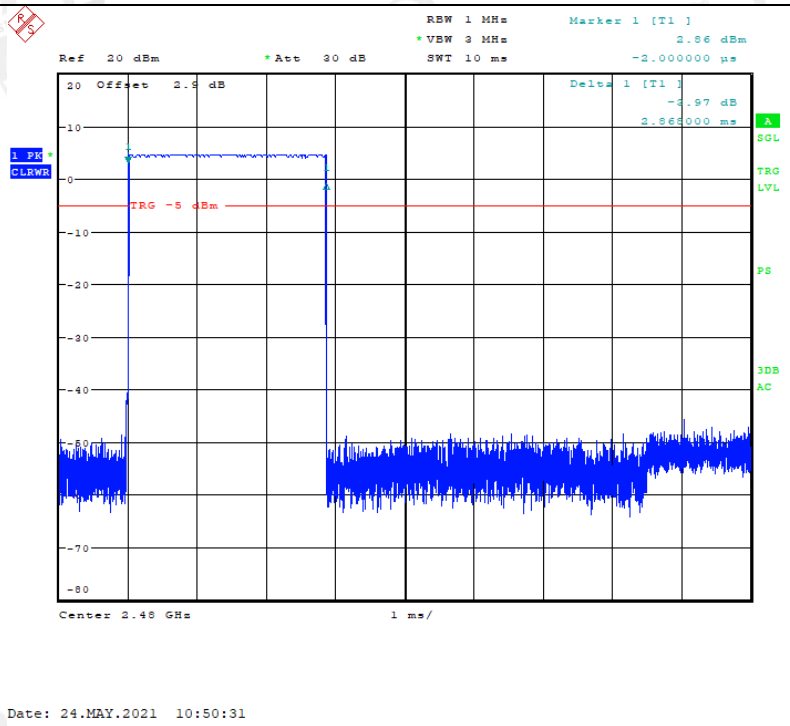


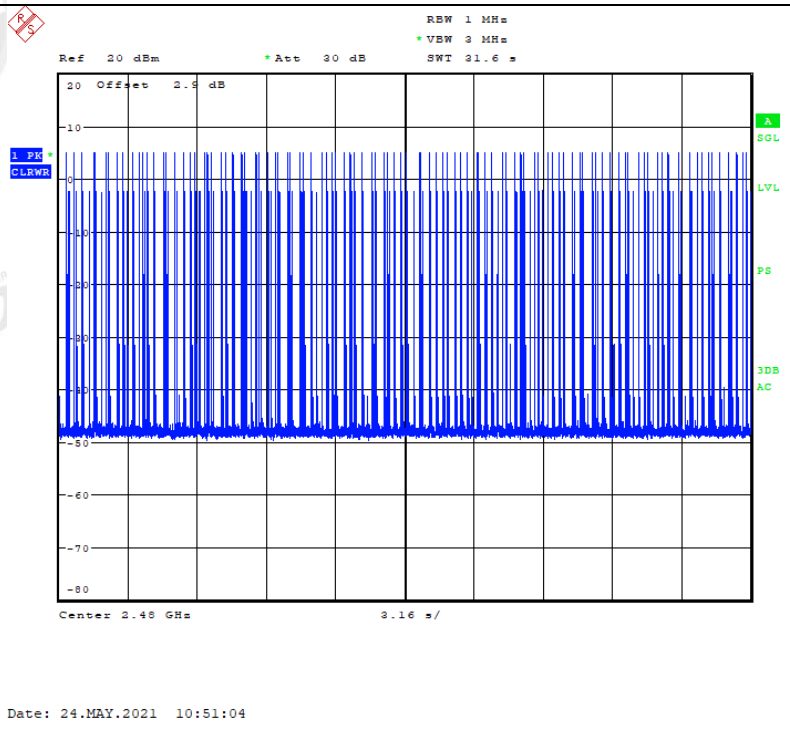
DH5_Ant1_Hop_Mid



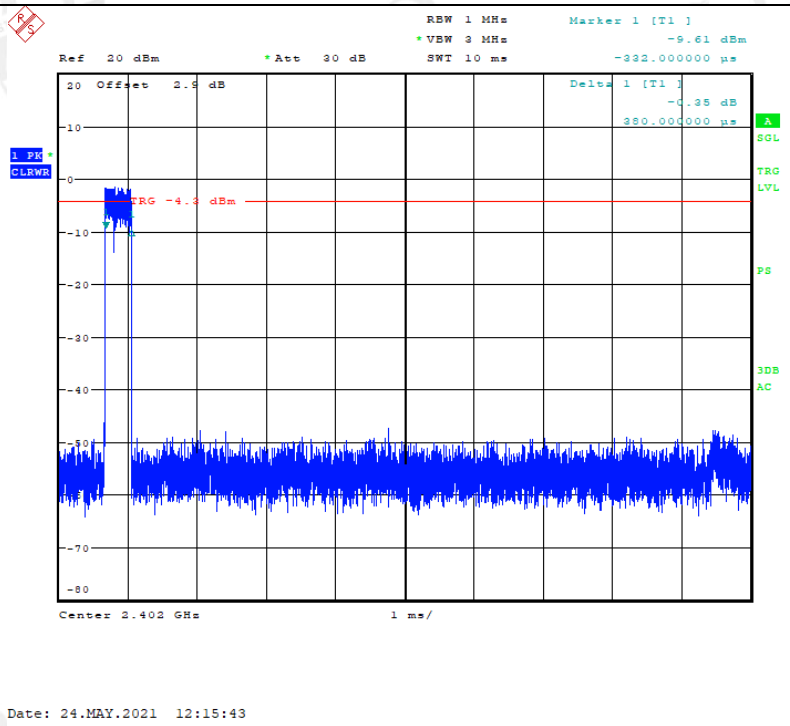


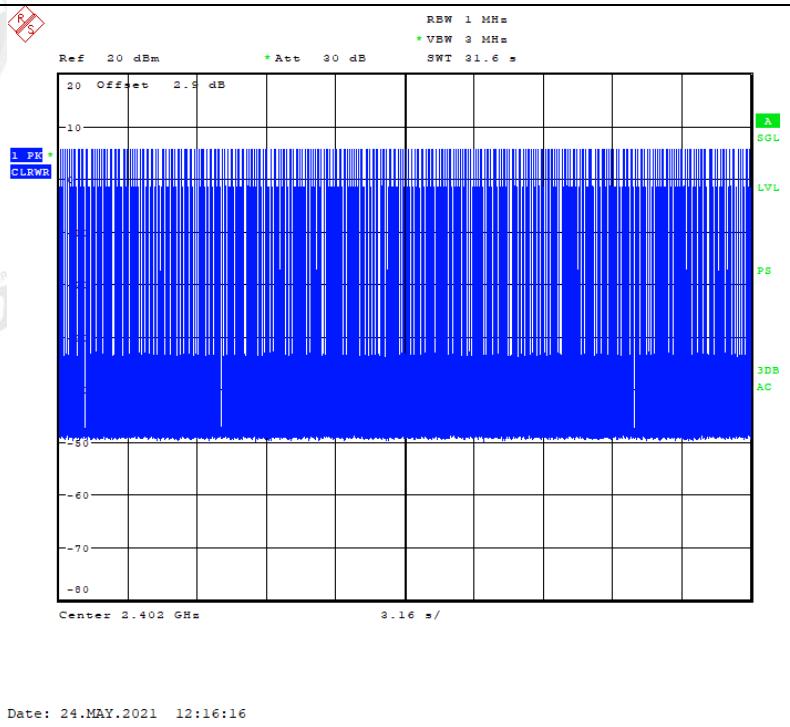
DH5_Ant1_Hop_High



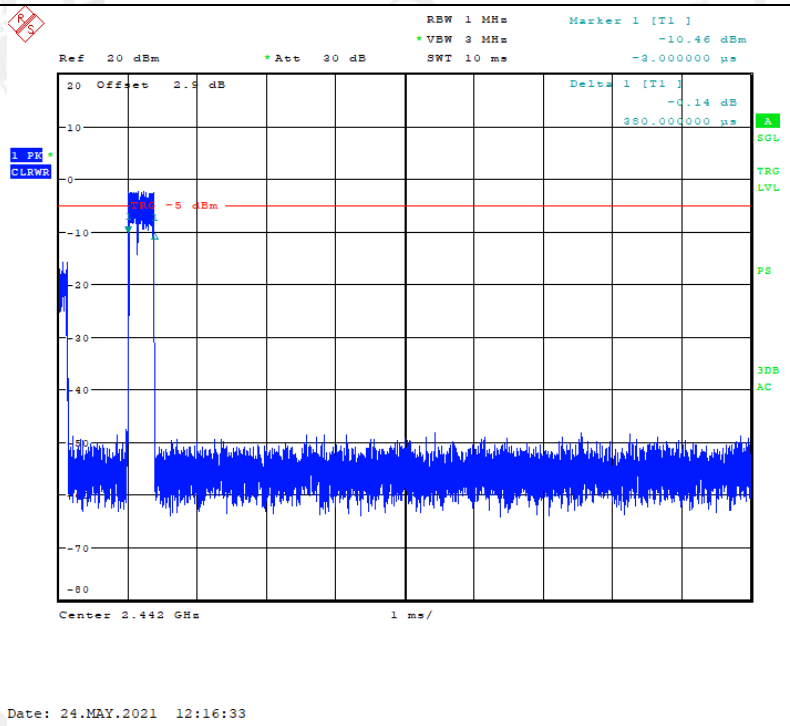


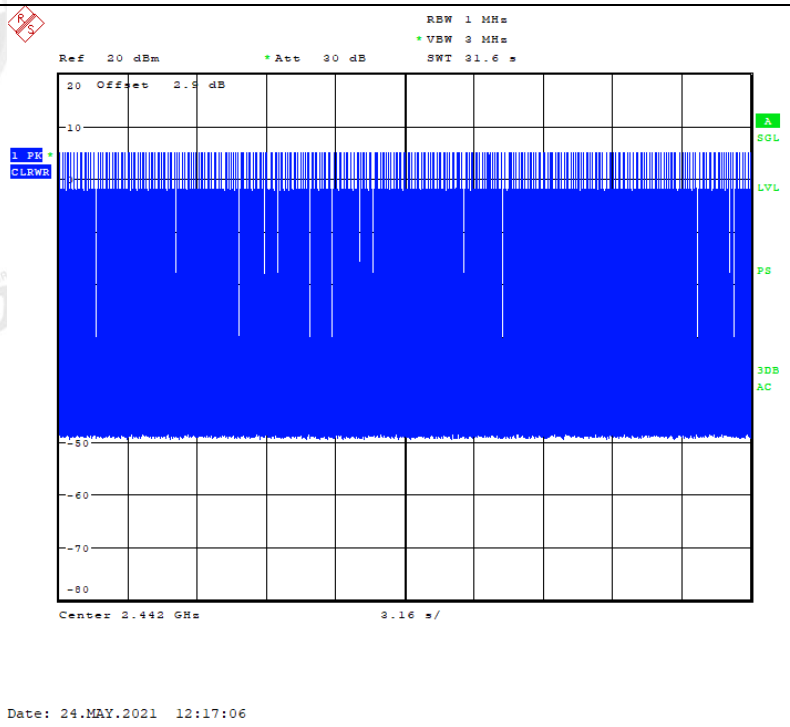
2DH1_Ant1_Hop_Low



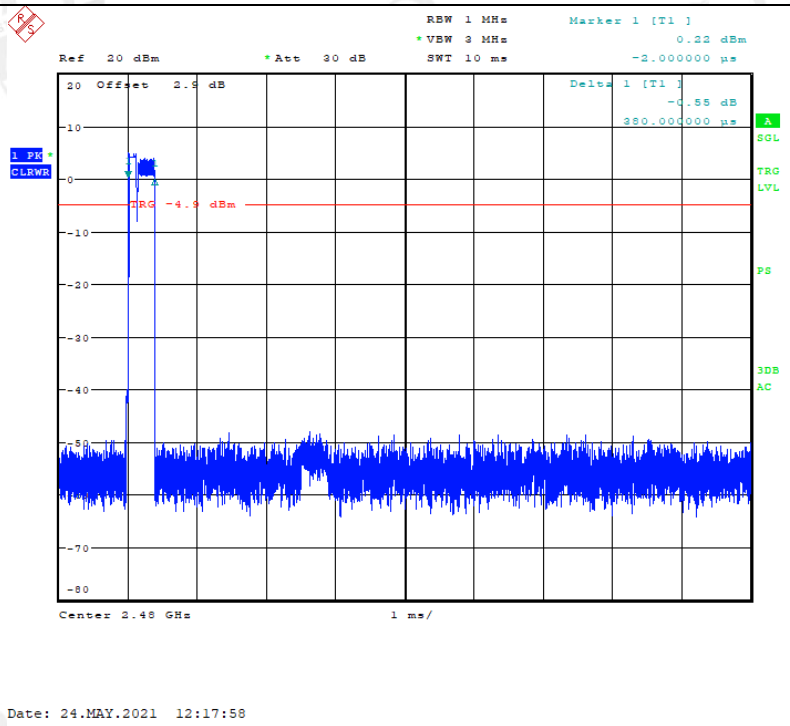


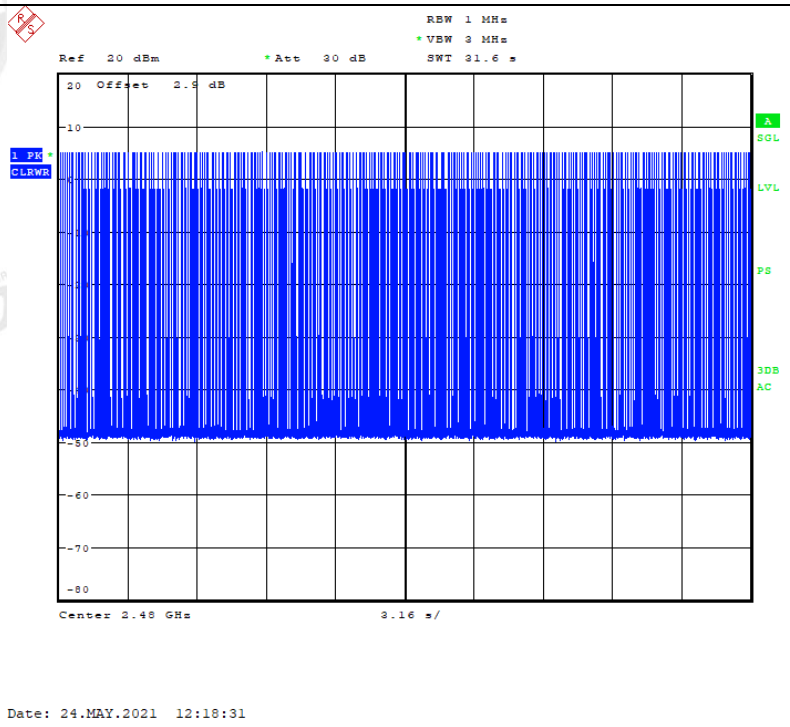
2DH1_Ant1_Hop_Mid



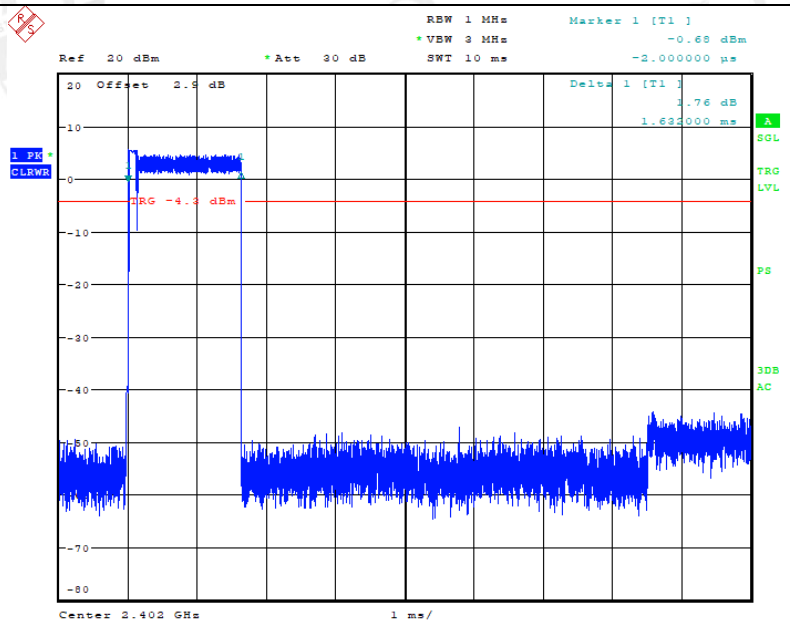


2DH1_Ant1_Hop_High

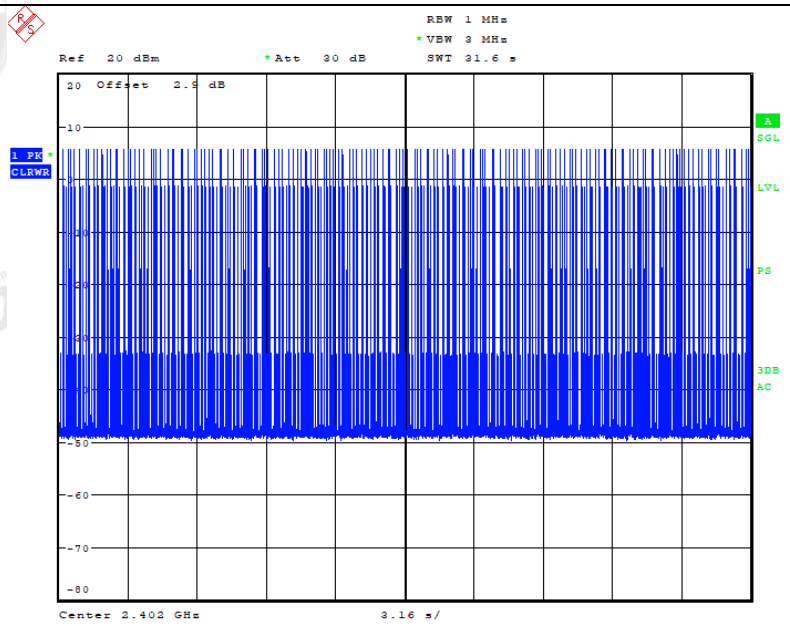




2DH3_Ant1_Hop_Low

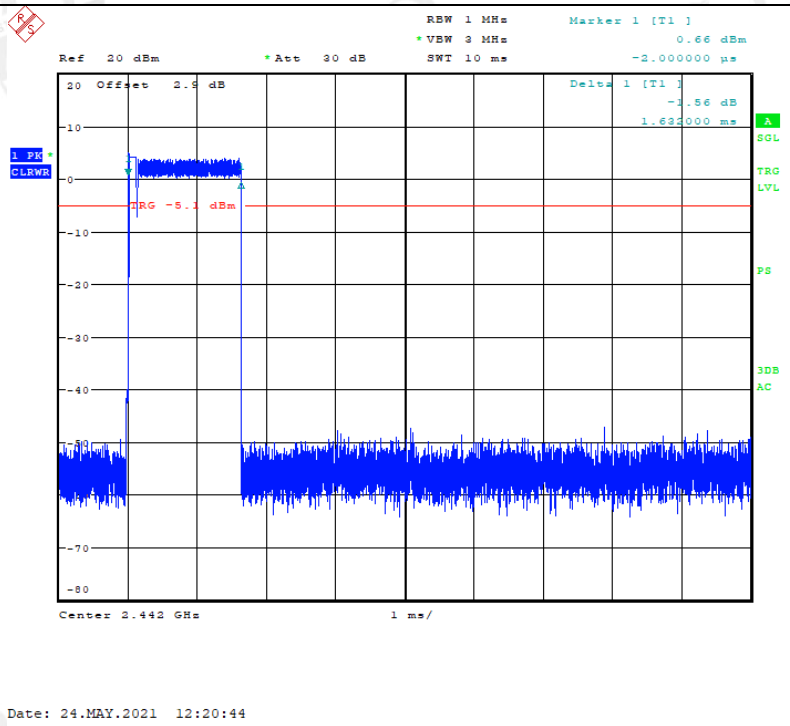


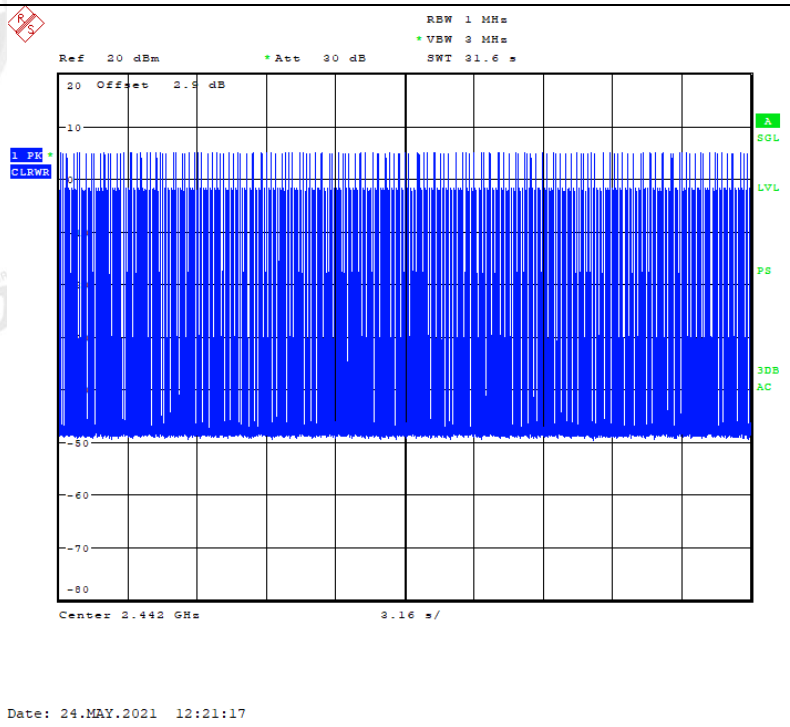
Date: 24.MAY.2021 12:19:47



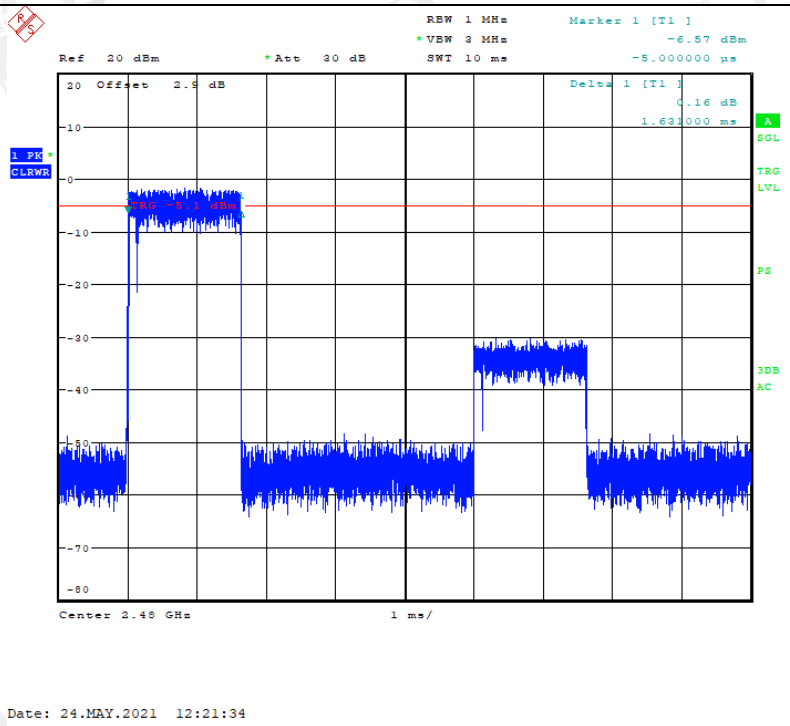
Date: 24.MAY.2021 12:20:20

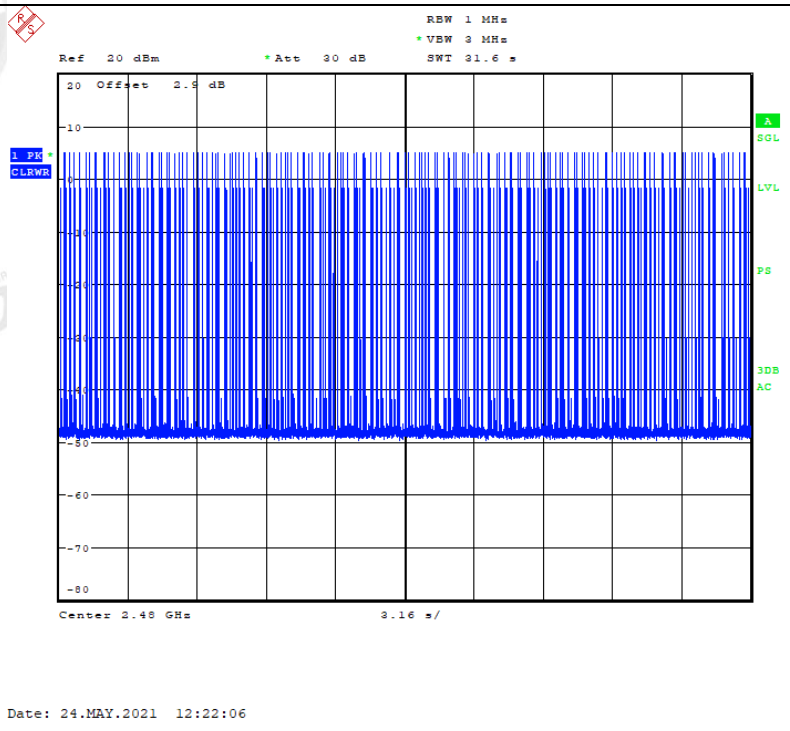
2DH3_Ant1_Hop_Mid



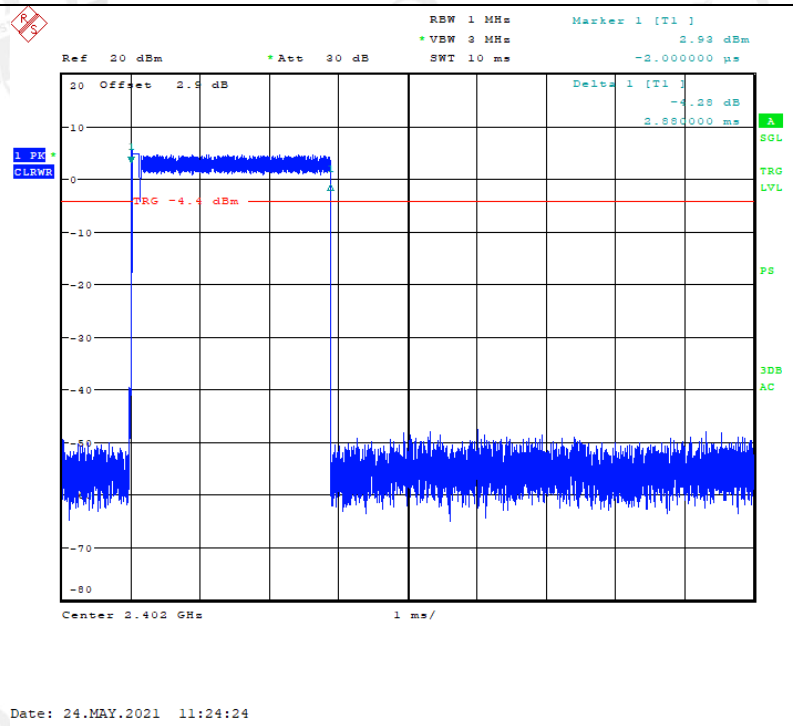


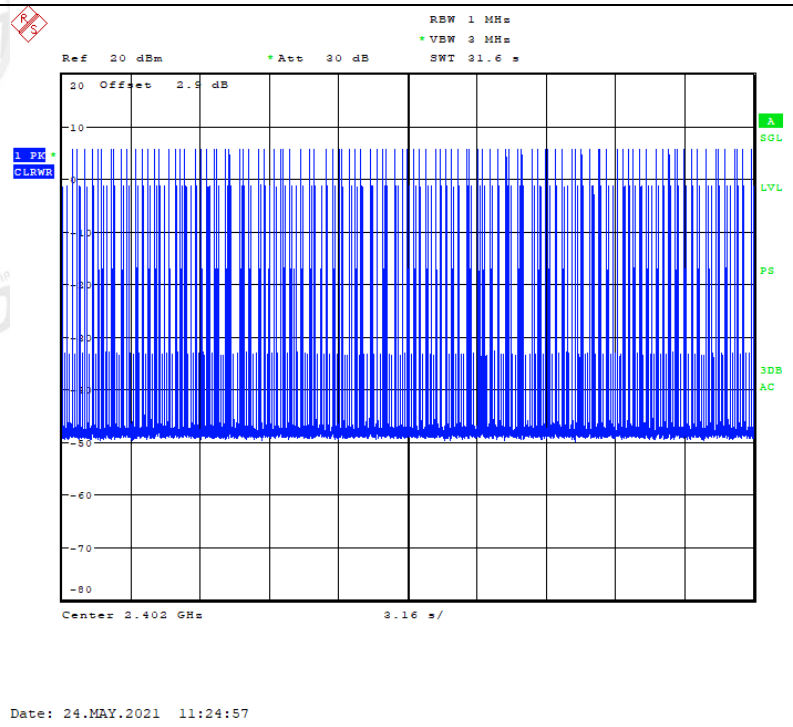
2DH3_Ant1_Hop_High



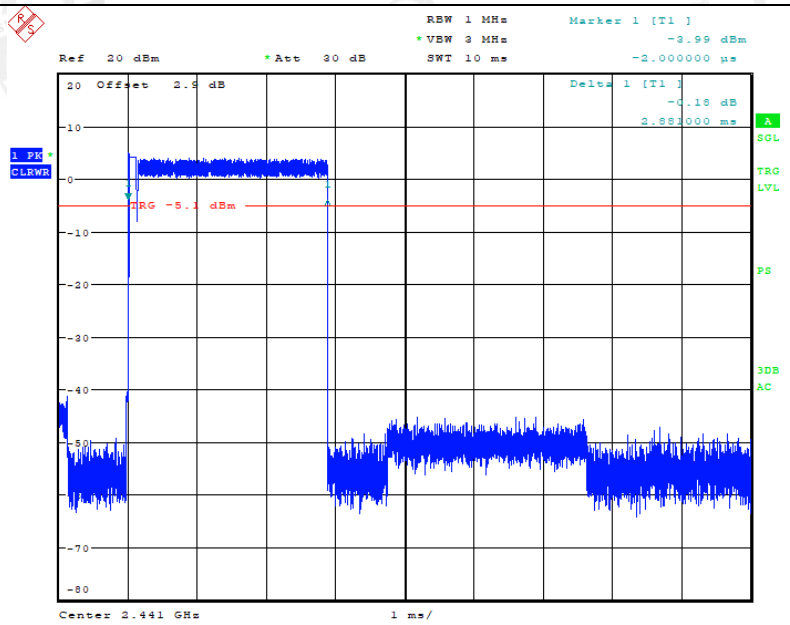


2DH5_Ant1_Hop_Low

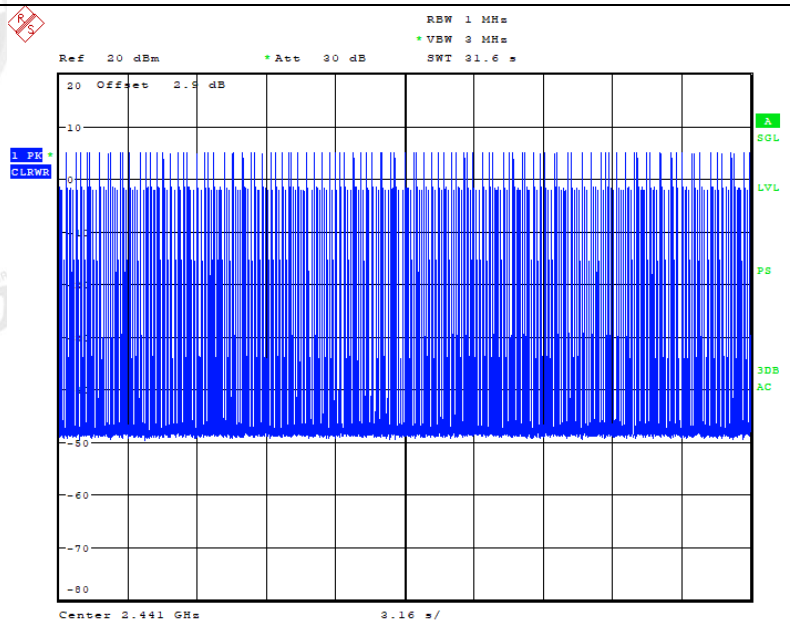




2DH5_Ant1_Hop_Mid

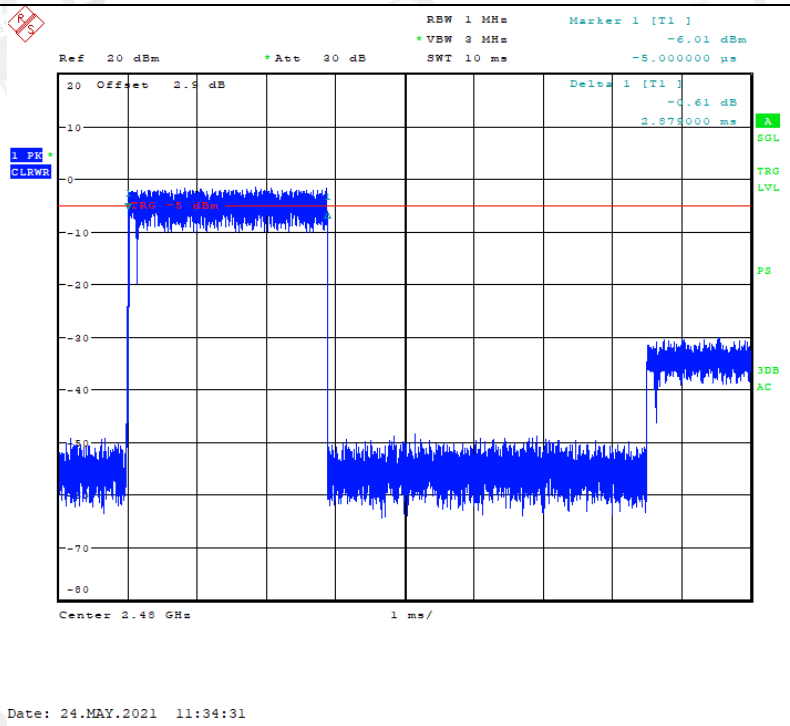


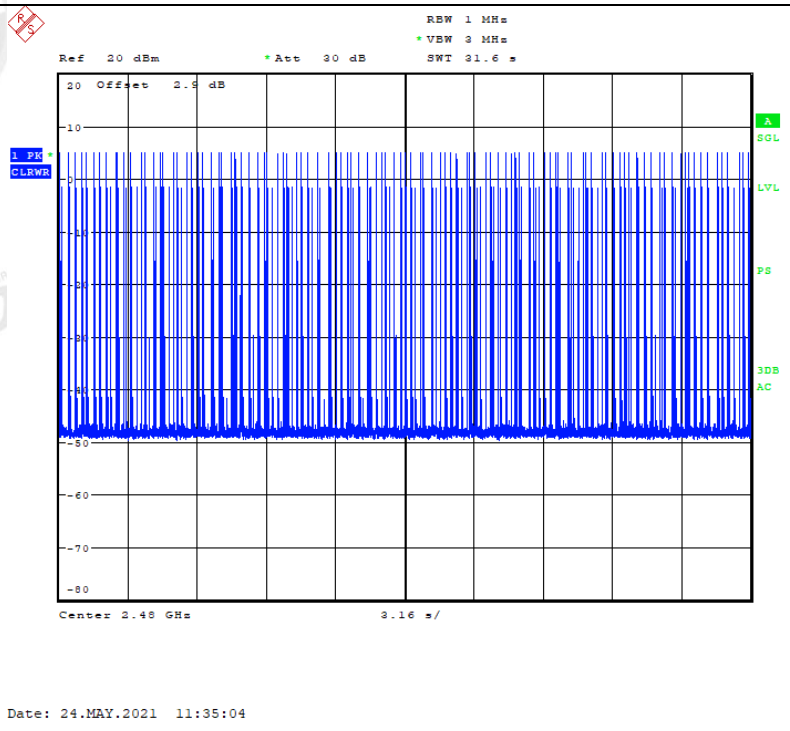
Date: 24.MAY.2021 11:29:46



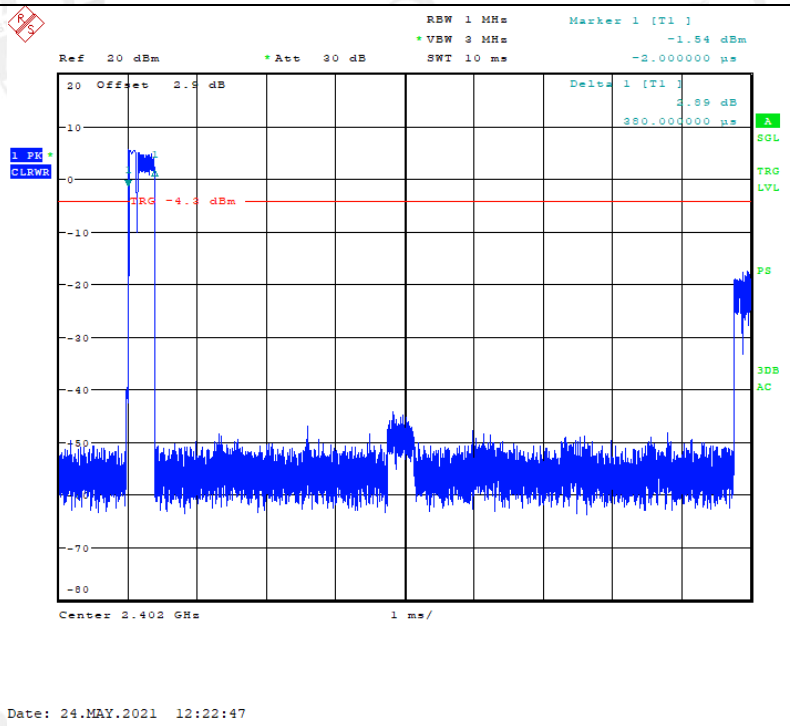
Date: 24.MAY.2021 11:30:18

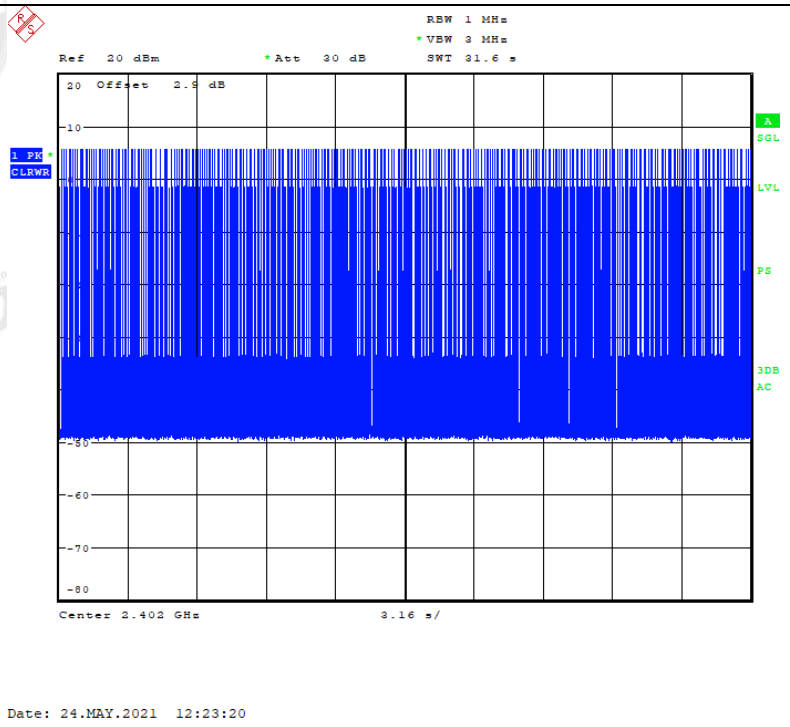
2DH5_Ant1_Hop_High



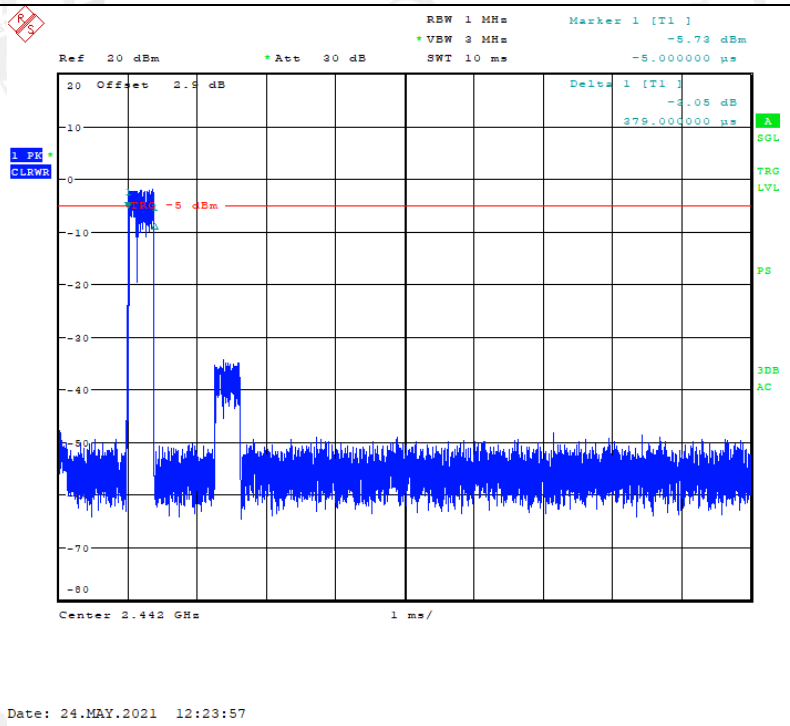


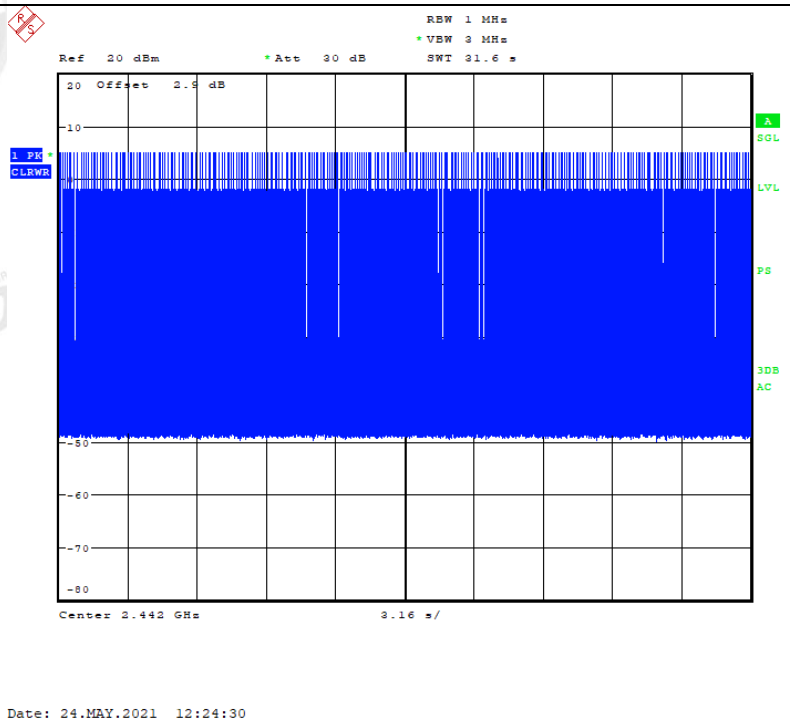
3DH1_Ant1_Hop_Low



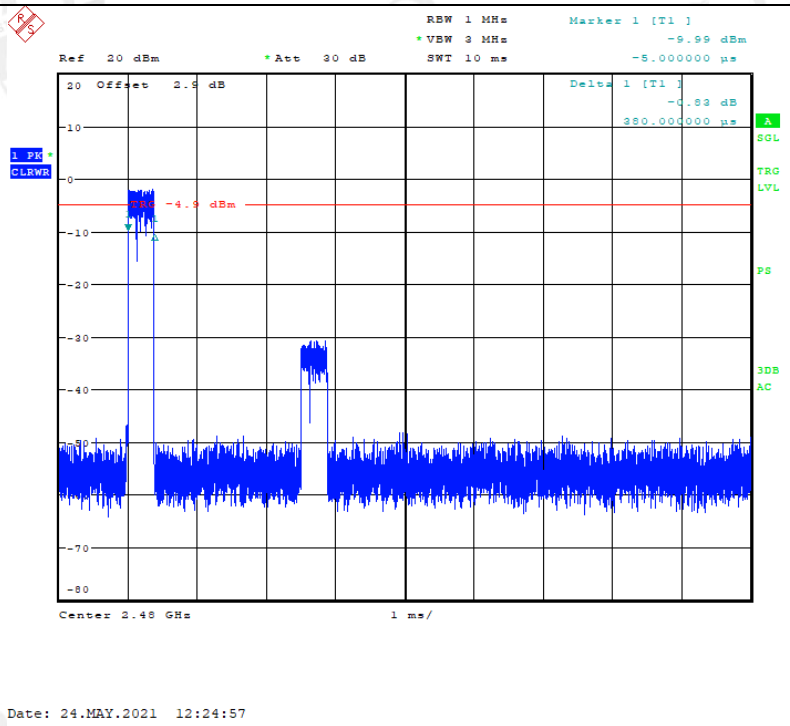


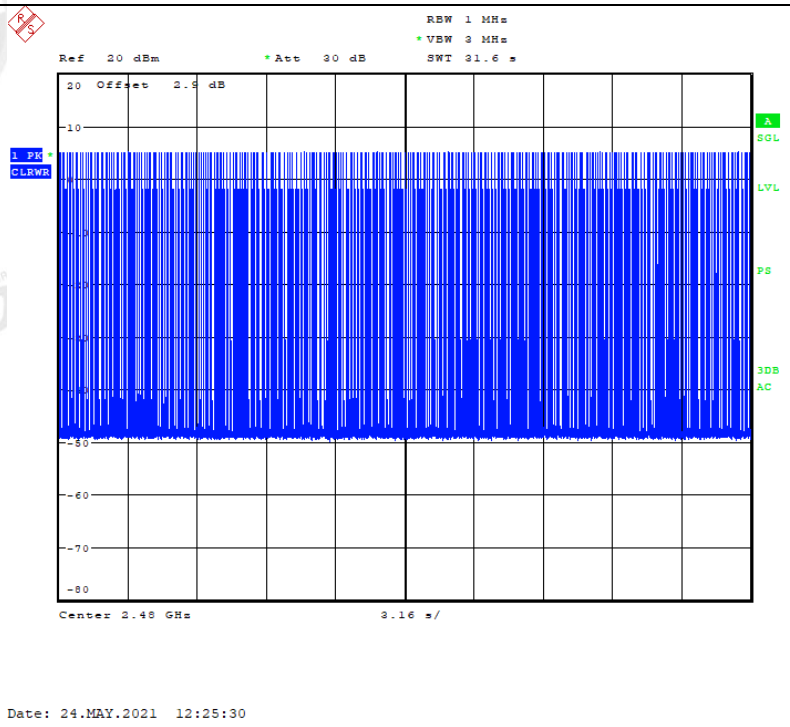
3DH1_Ant1_Hop_Mid



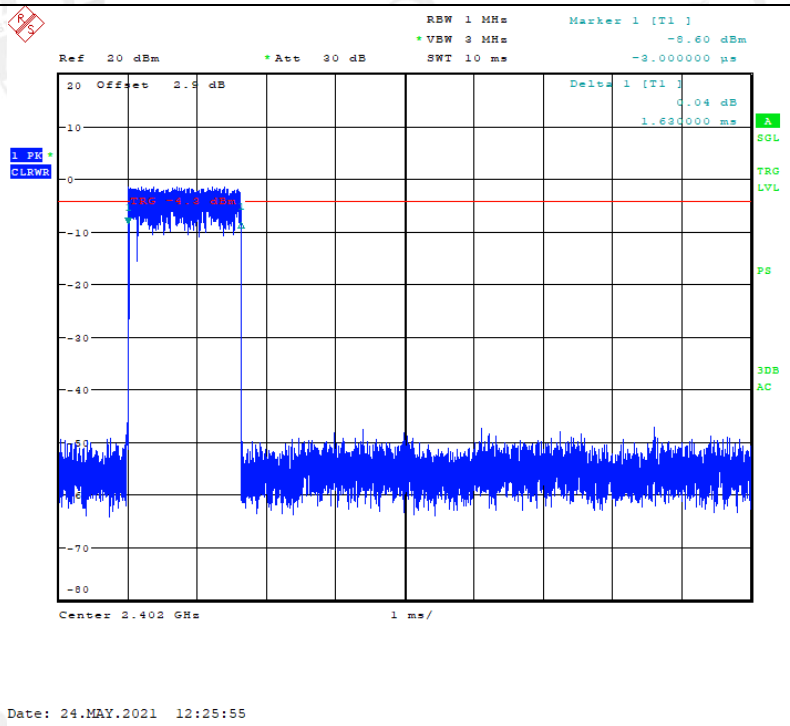


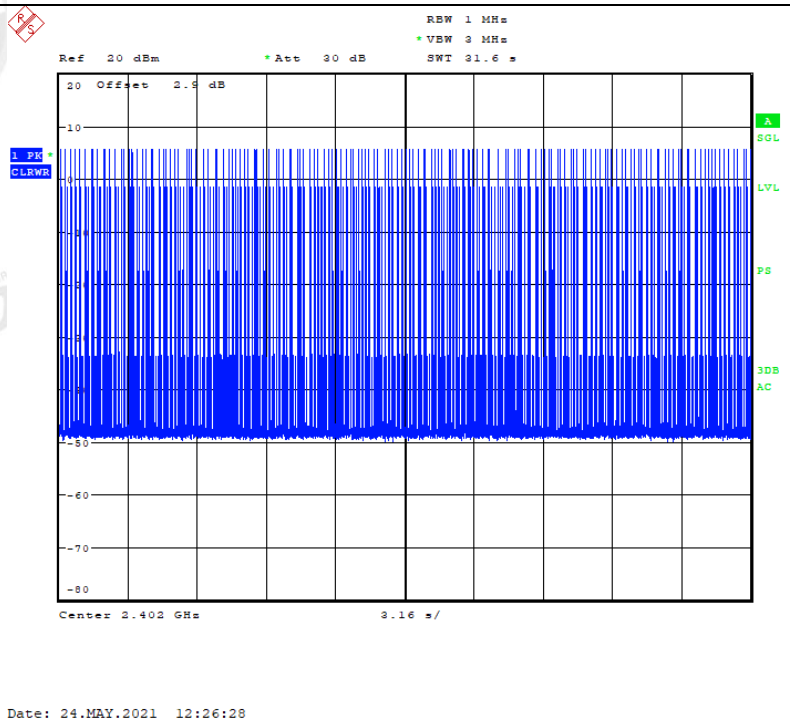
3DH1_Ant1_Hop_High



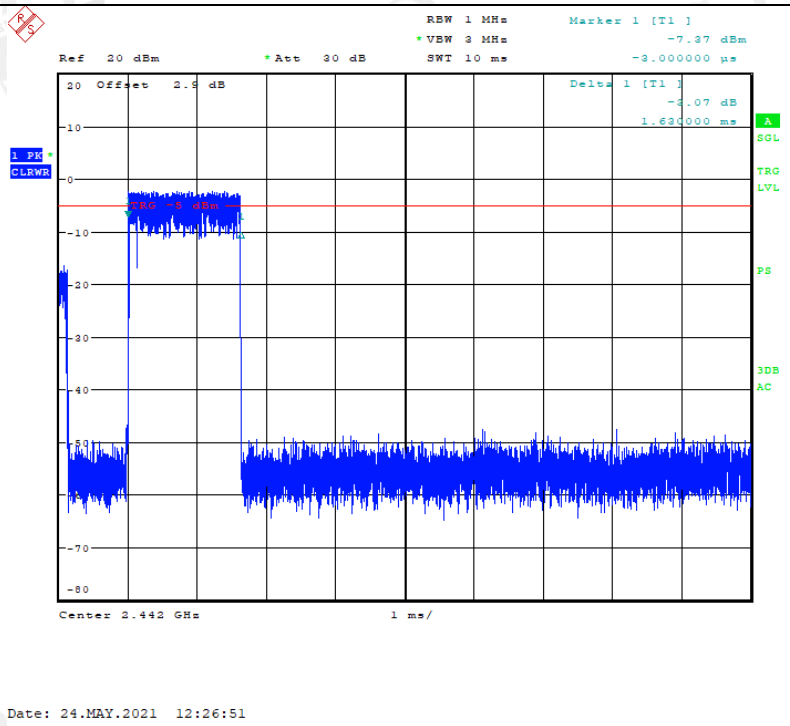


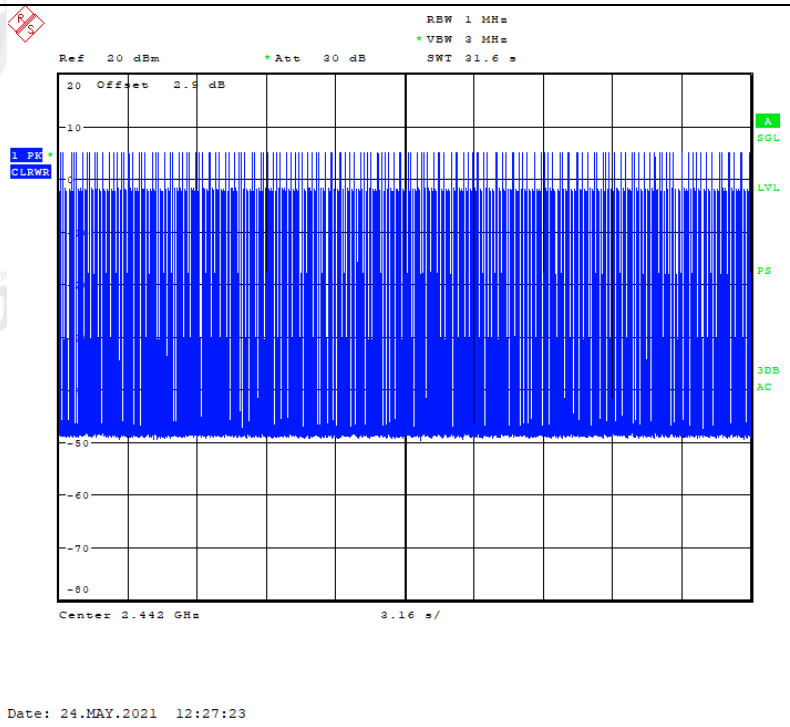
3DH3_Ant1_Hop_Low



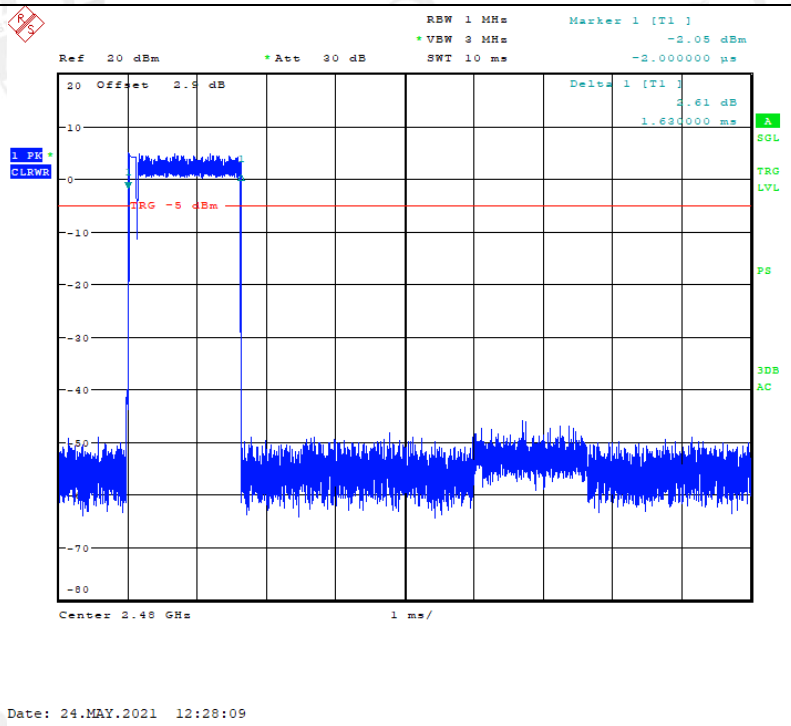


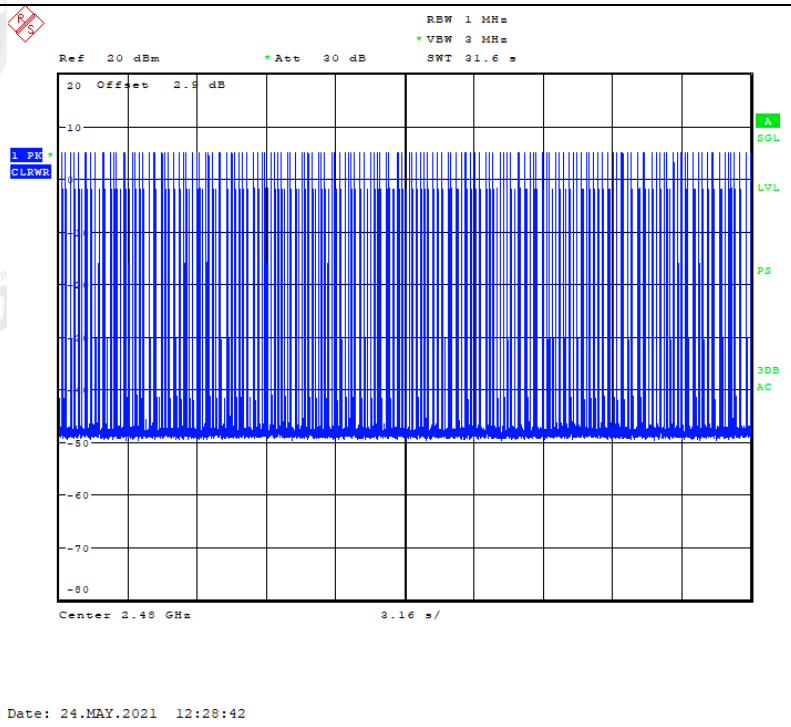
3DH3_Ant1_Hop_Mid



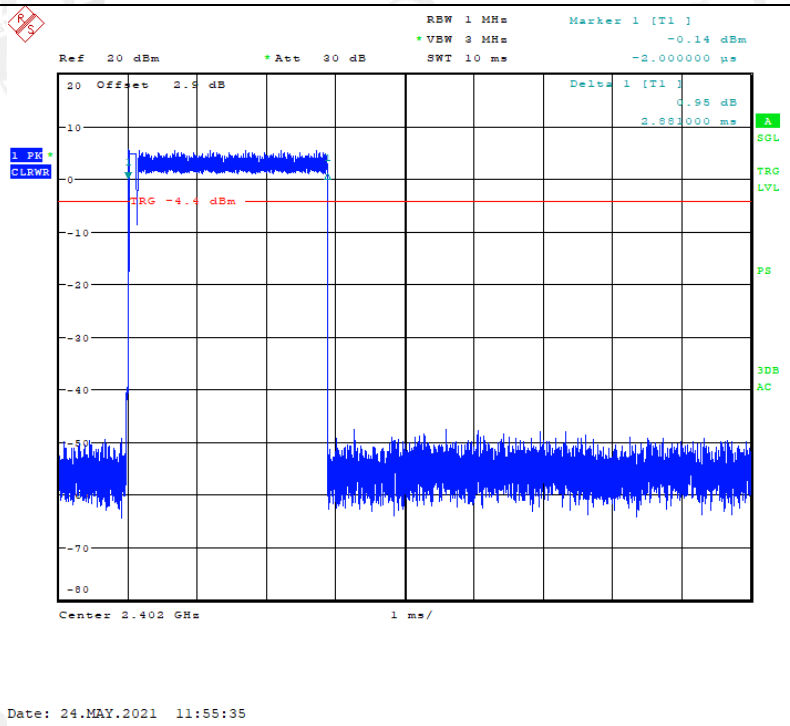


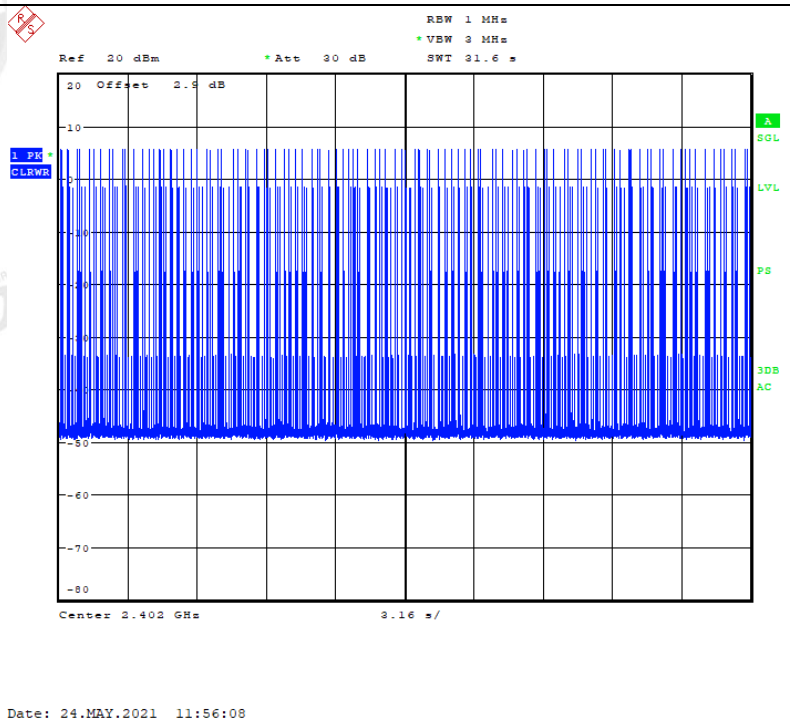
3DH3_Ant1_Hop_High



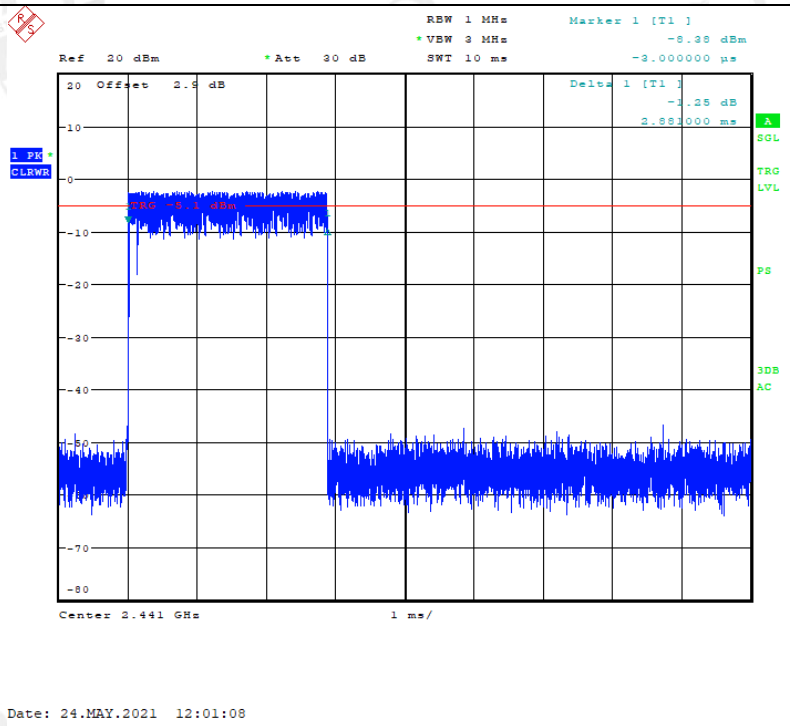


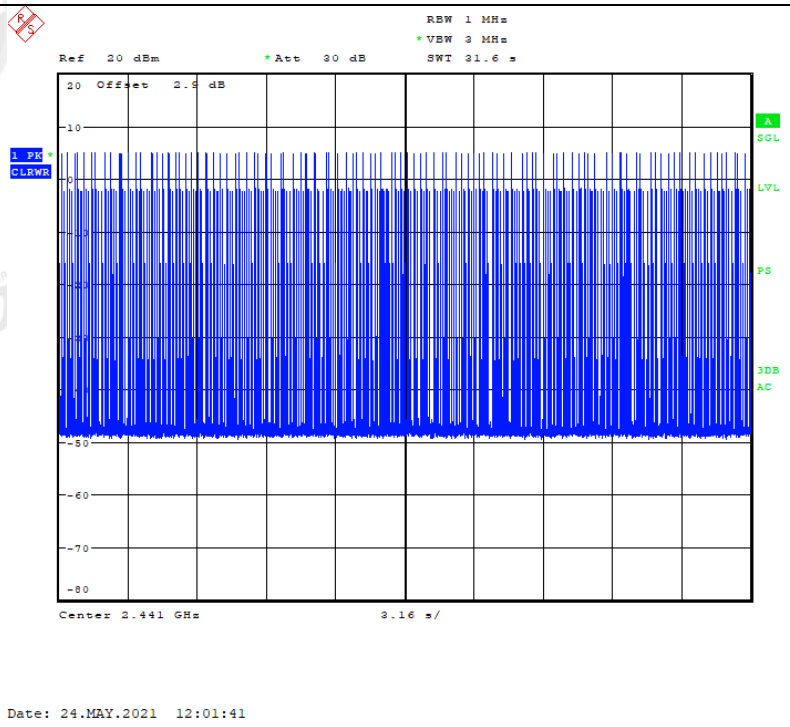
3DH5_Ant1_Hop_Low



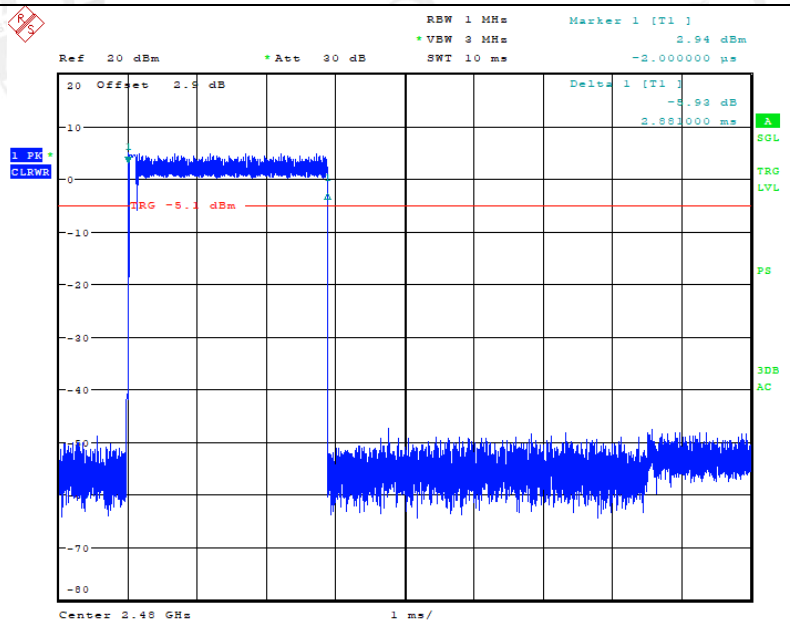


3DH5_Ant1_Hop_Mid

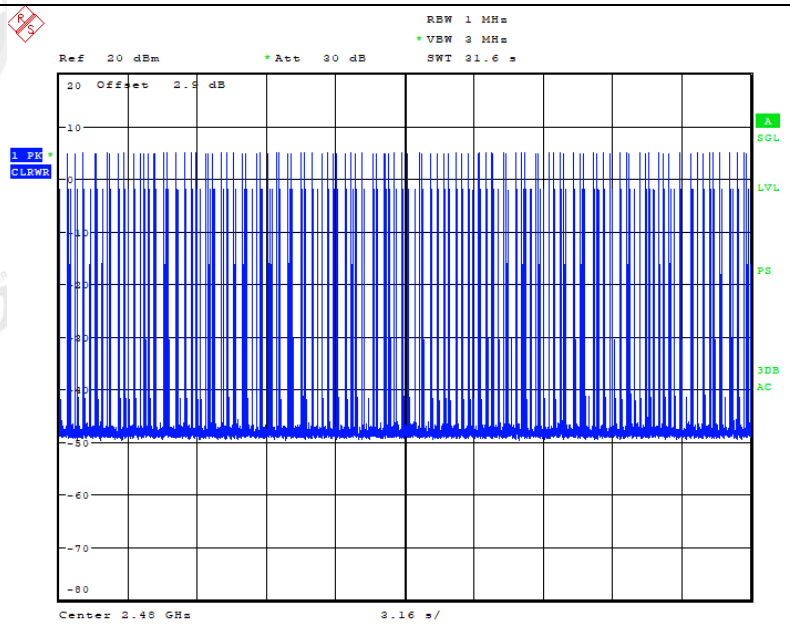




3DH5_Ant1_Hop_High



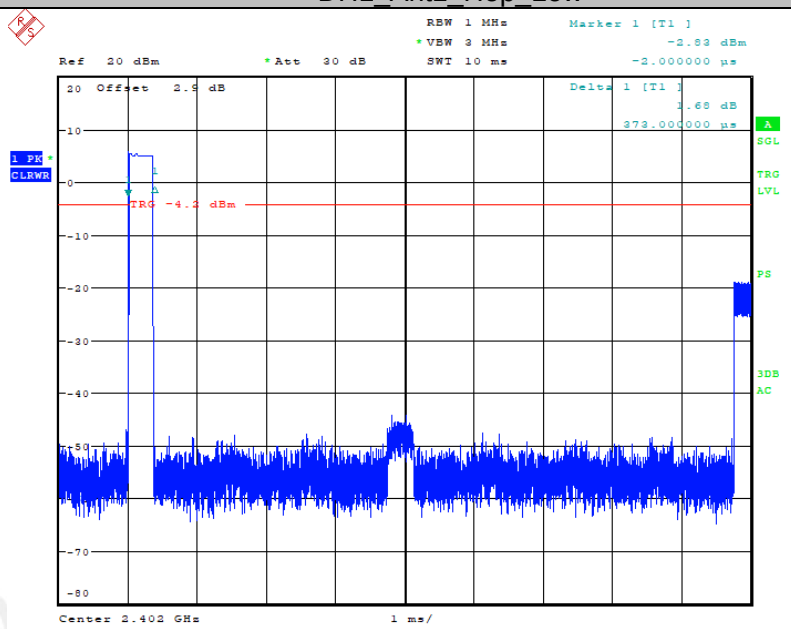
Date: 24.MAY.2021 12:04:17



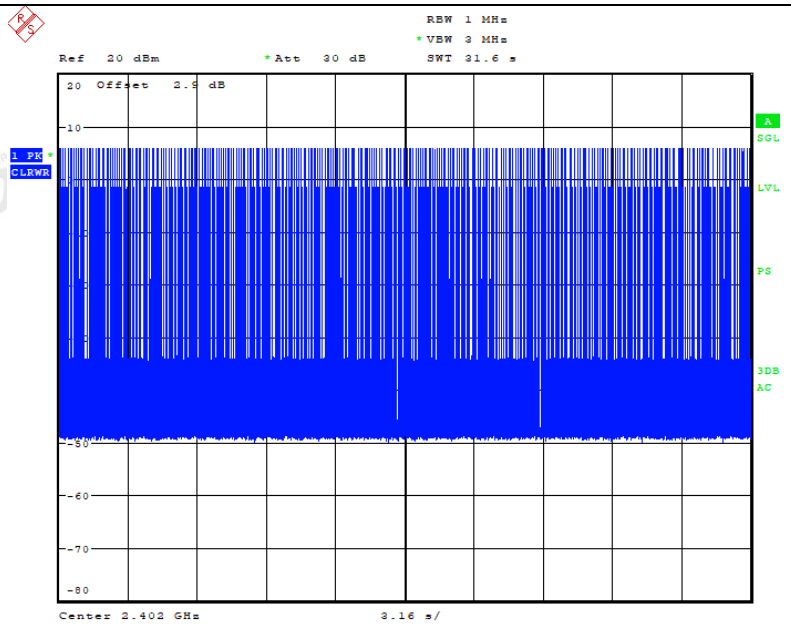
Date: 24.MAY.2021 12:04:50

Right side:

DH1_Ant1_Hop_Low

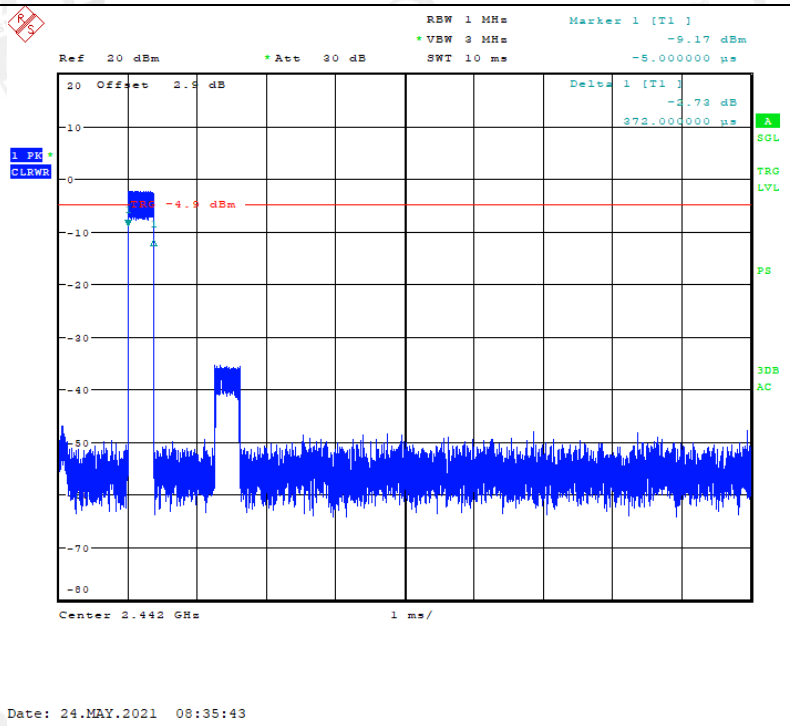


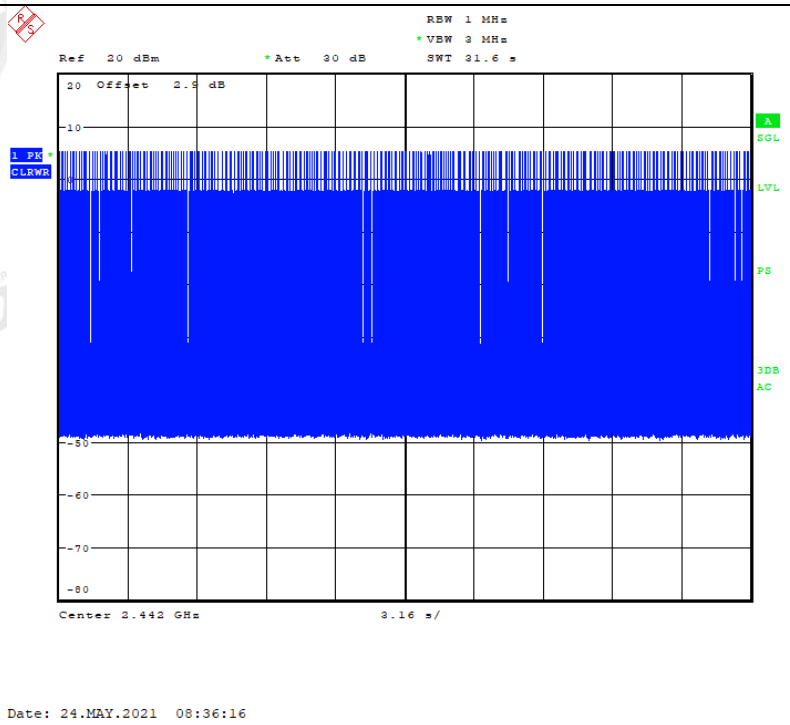
Date: 24.MAY.2021 08:34:28



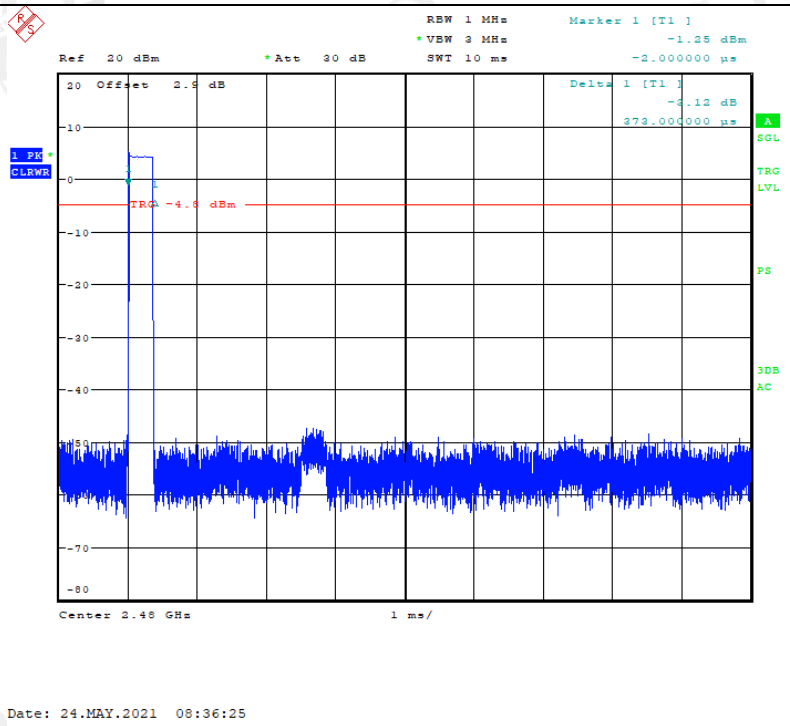
Date: 24.MAY.2021 08:35:01

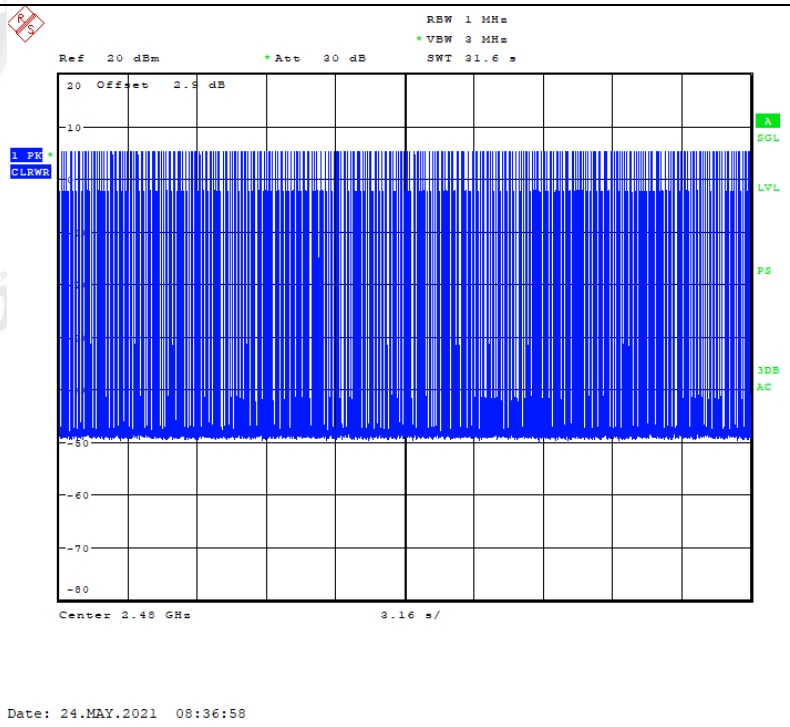
DH1_Ant1_Hop_Mid



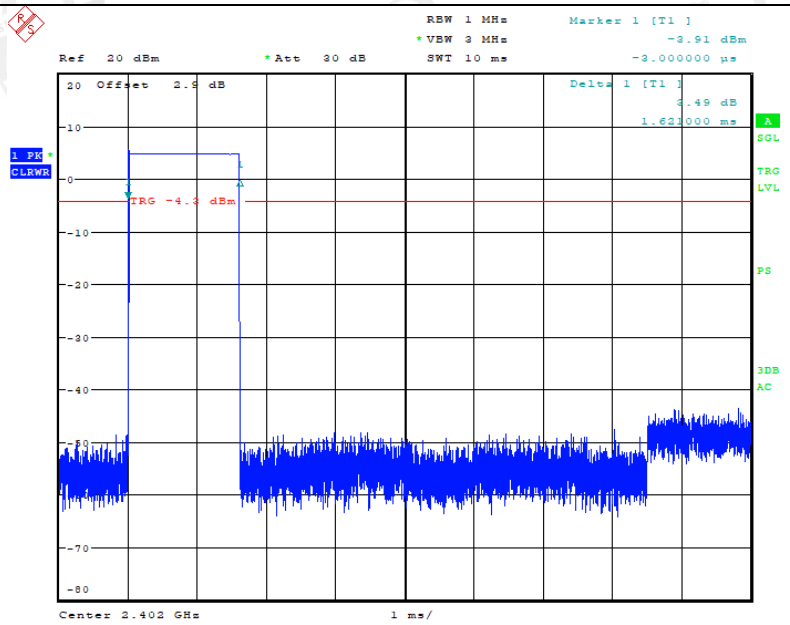


DH1_Ant1_Hop_High

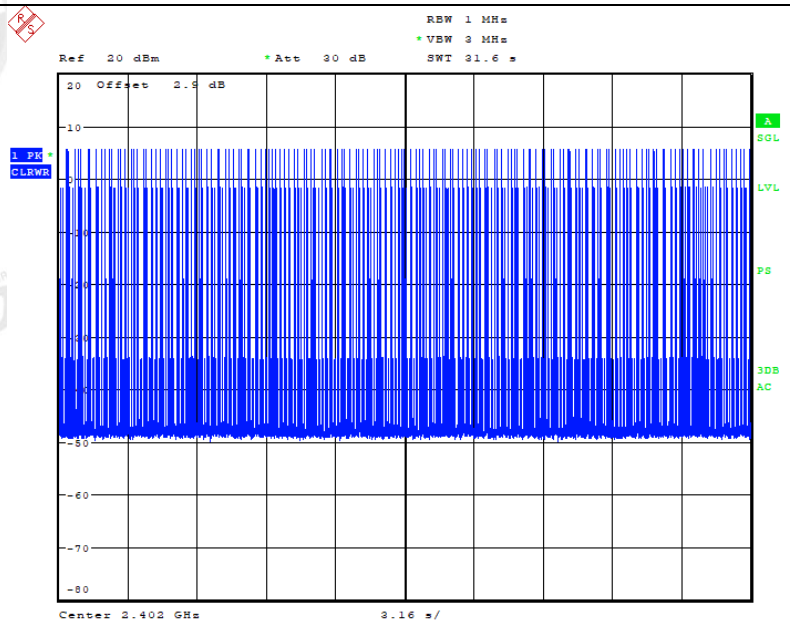




DH3_Ant1_Hop_Low

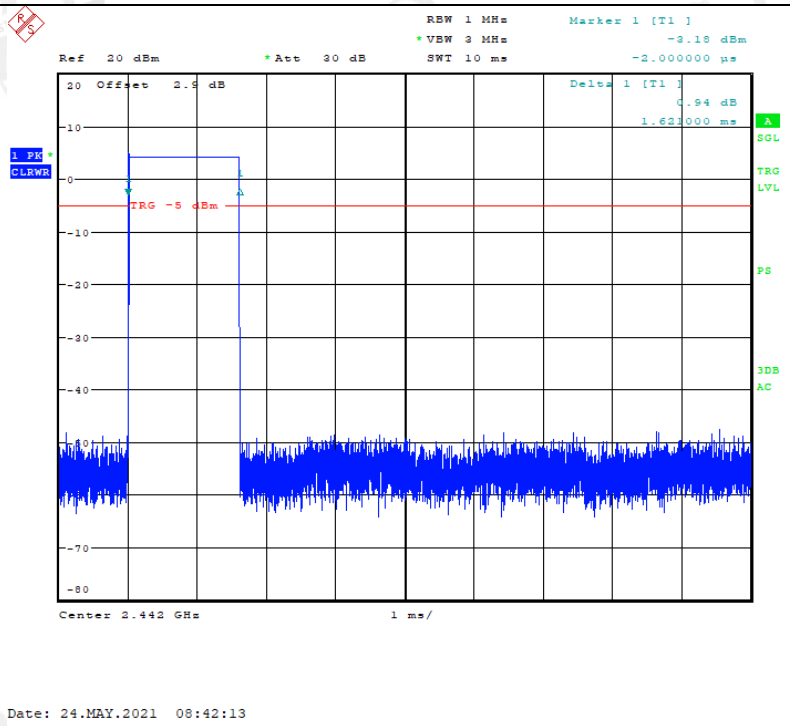


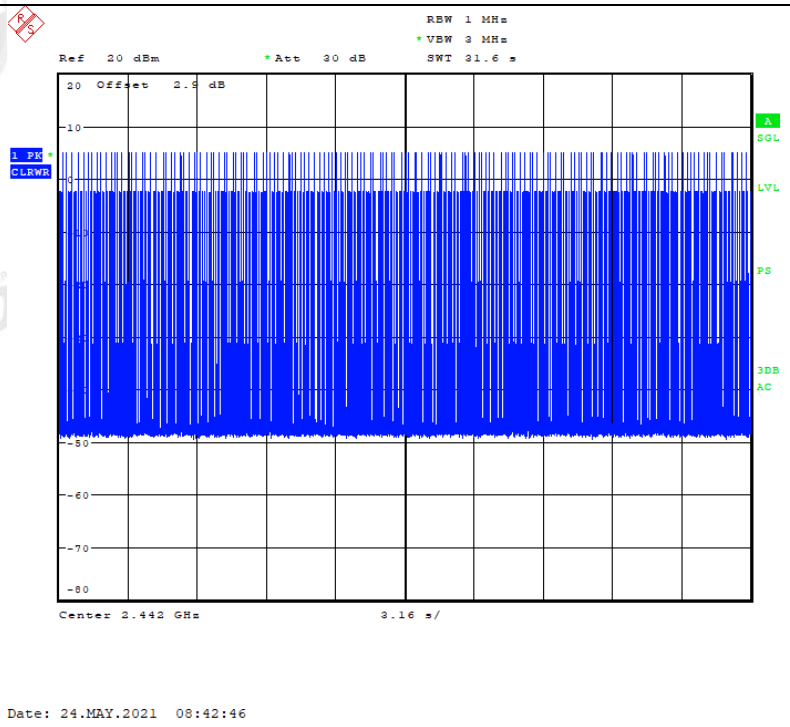
Date: 24.MAY.2021 08:40:31



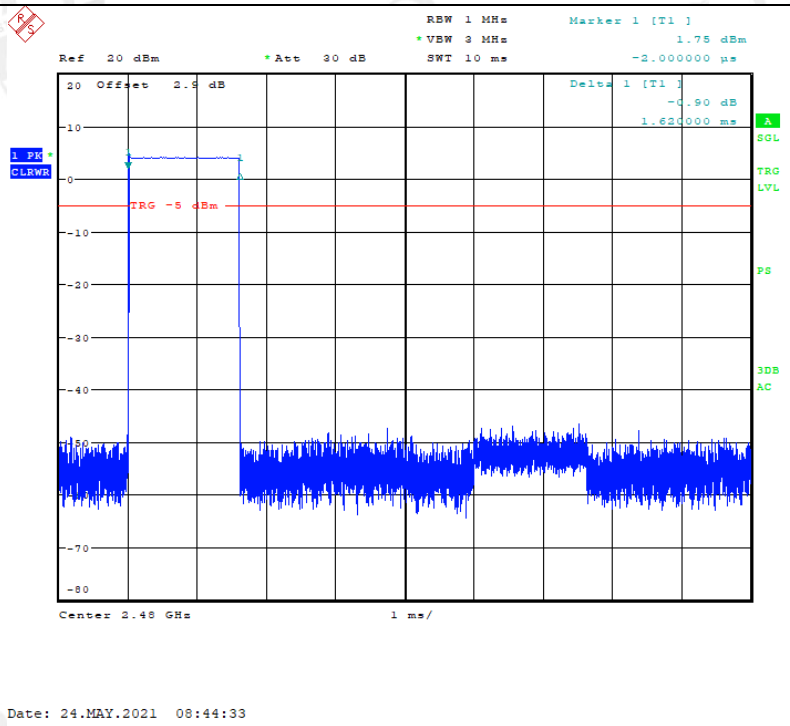
Date: 24.MAY.2021 08:41:04

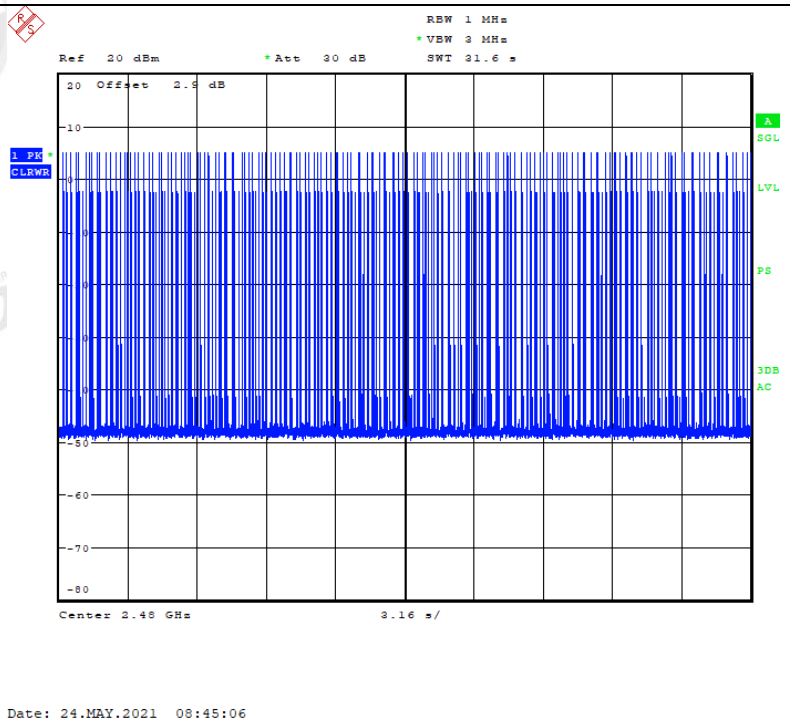
DH3_Ant1_Hop_Mid



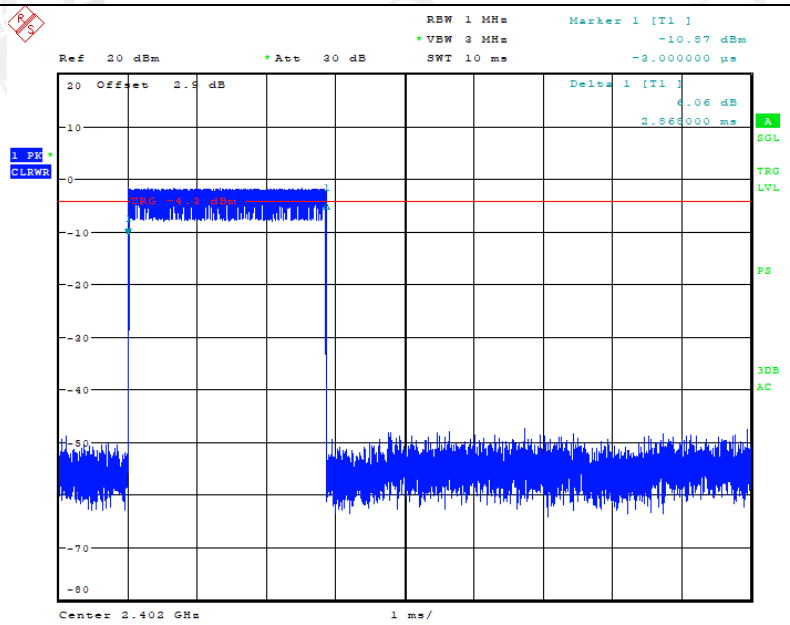


DH3_Ant1_Hop_High

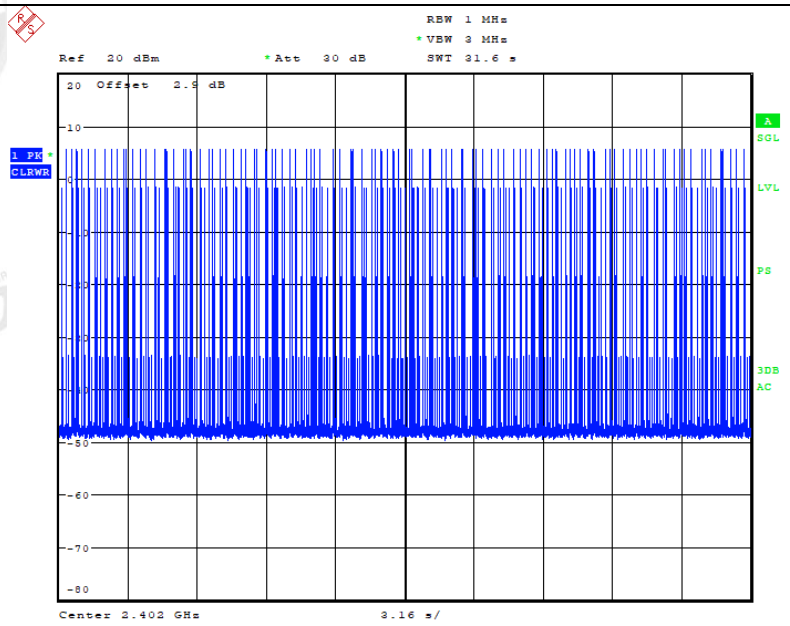




DH5_Ant1_Hop_Low

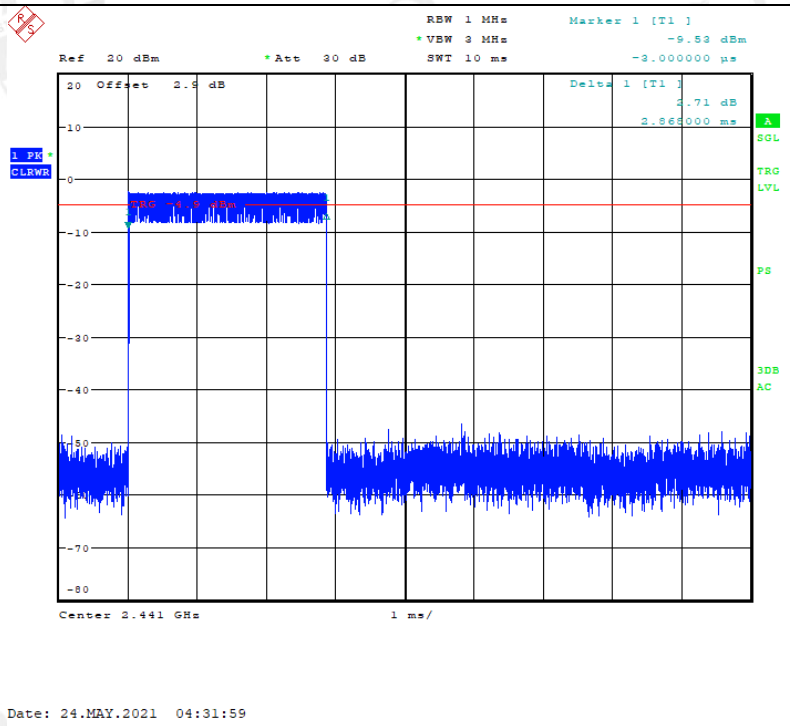


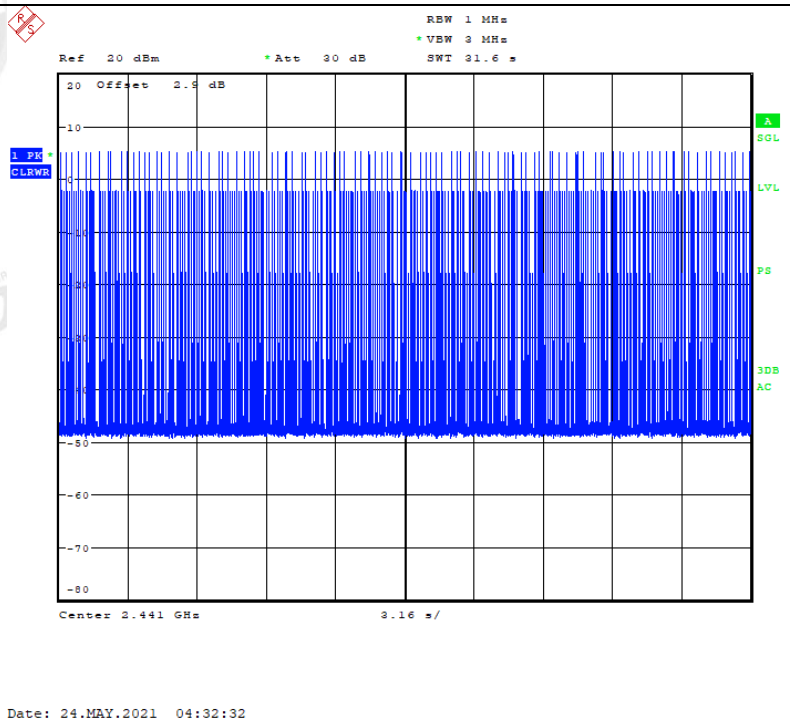
Date: 24.MAY.2021 04:14:55



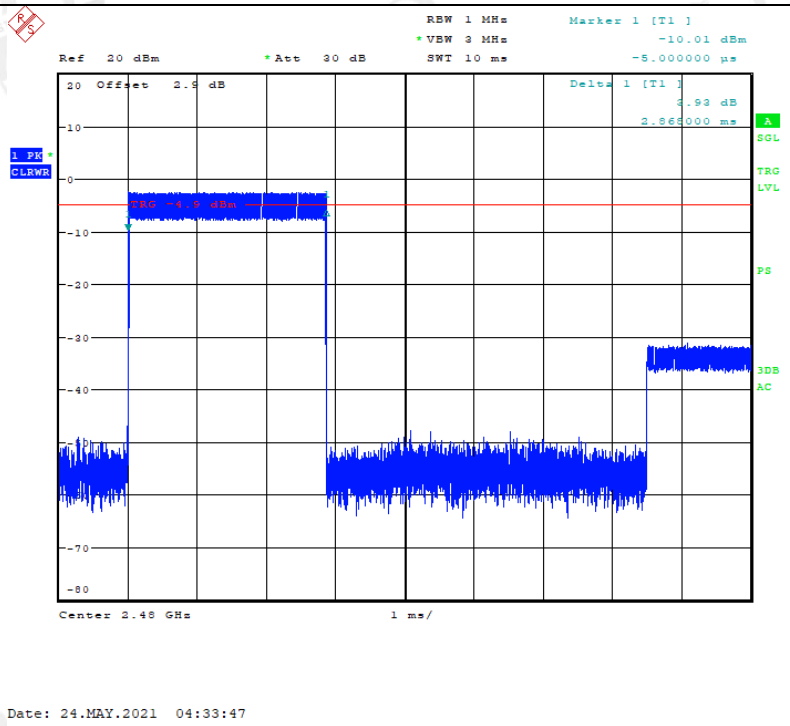
Date: 24.MAY.2021 04:15:28

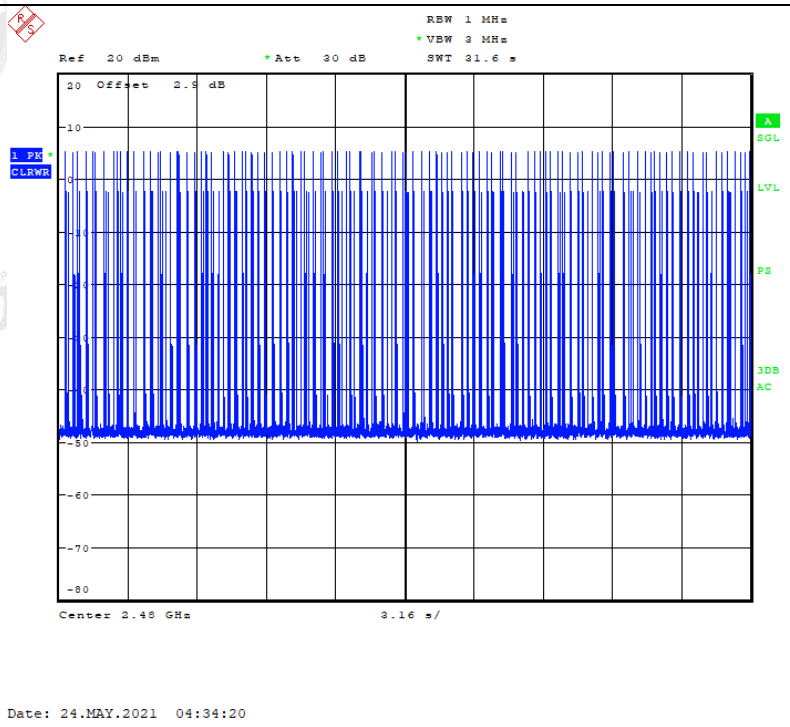
DH5_Ant1_Hop_Mid



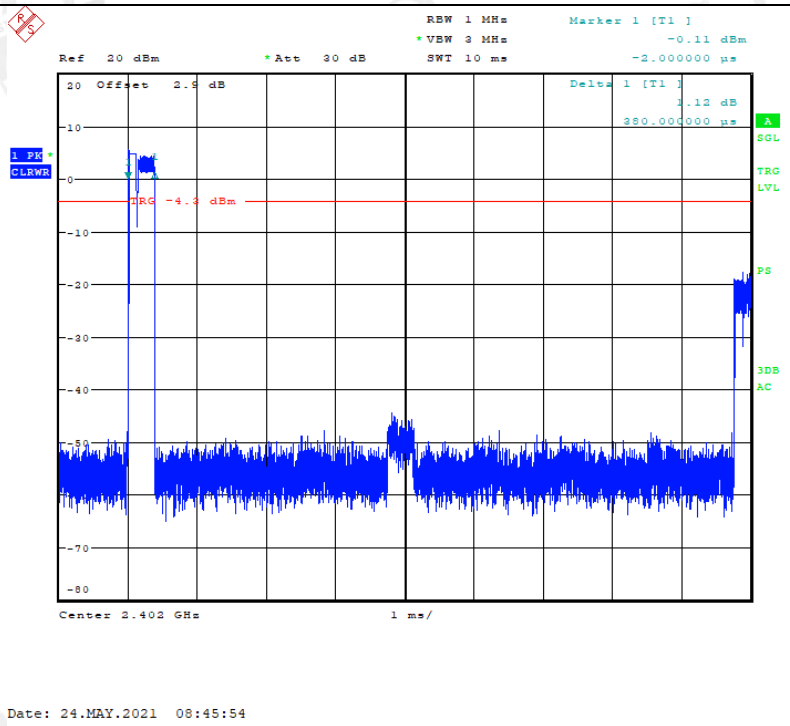


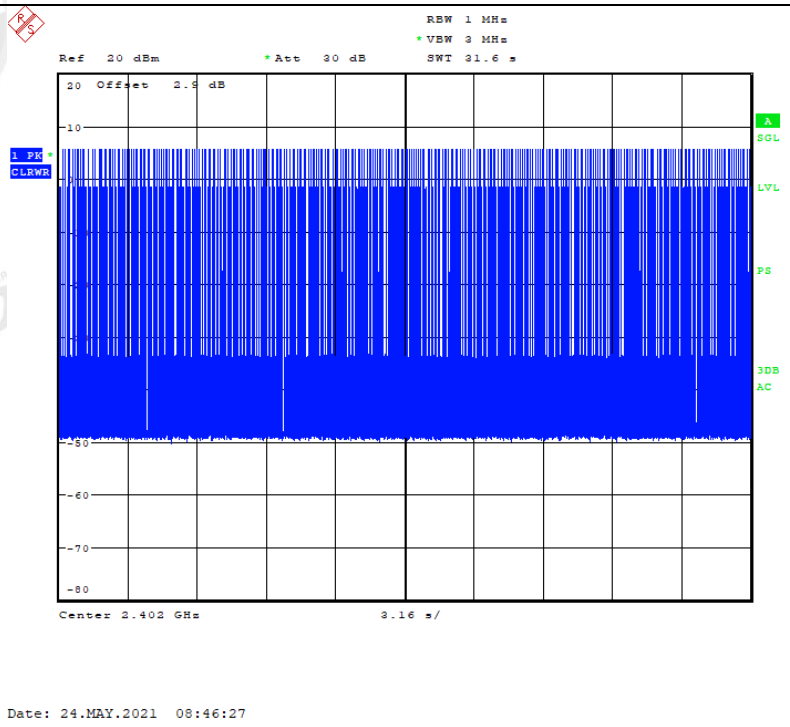
DH5_Ant1_Hop_High



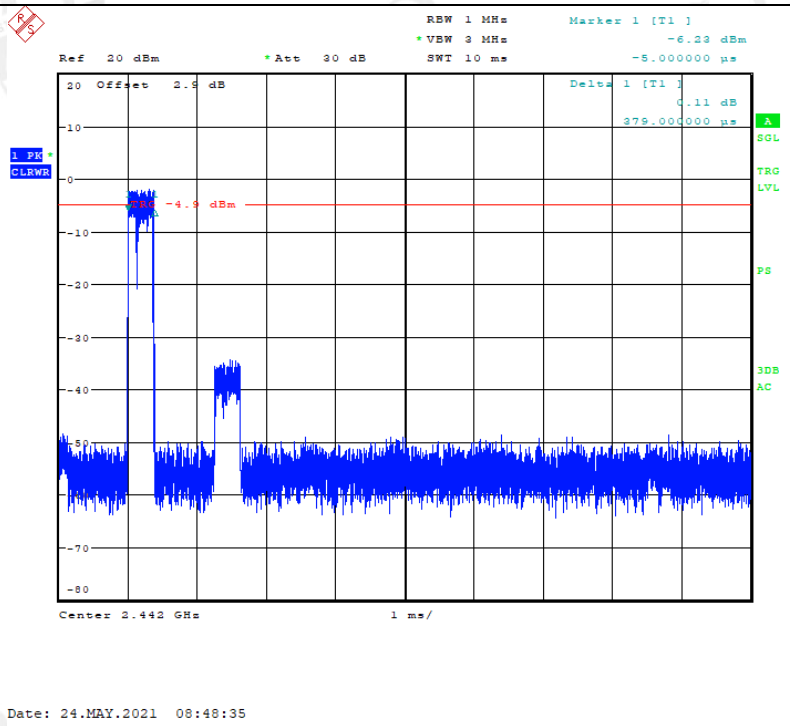


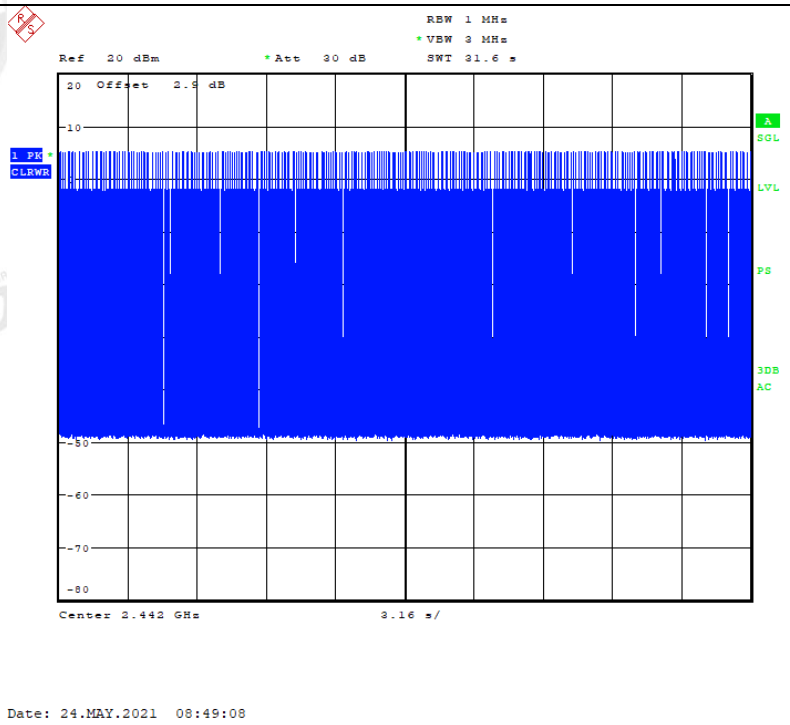
2DH1_Ant1_Hop_Low



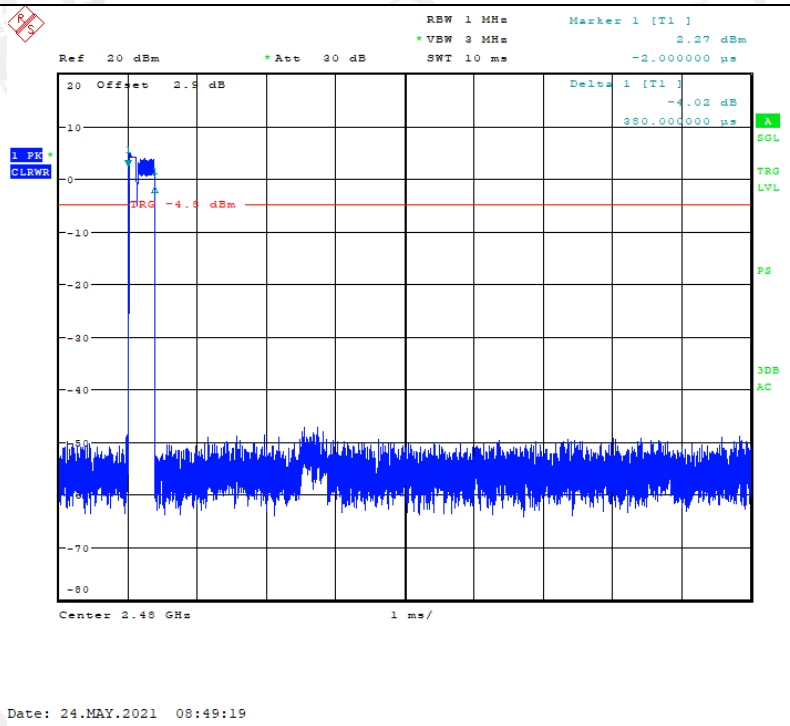


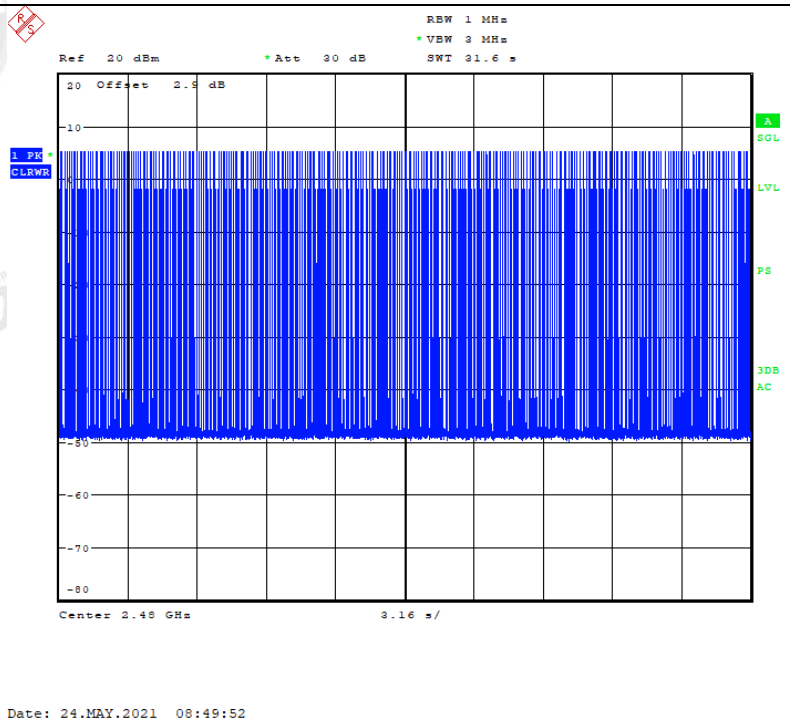
2DH1_Ant1_Hop_Mid



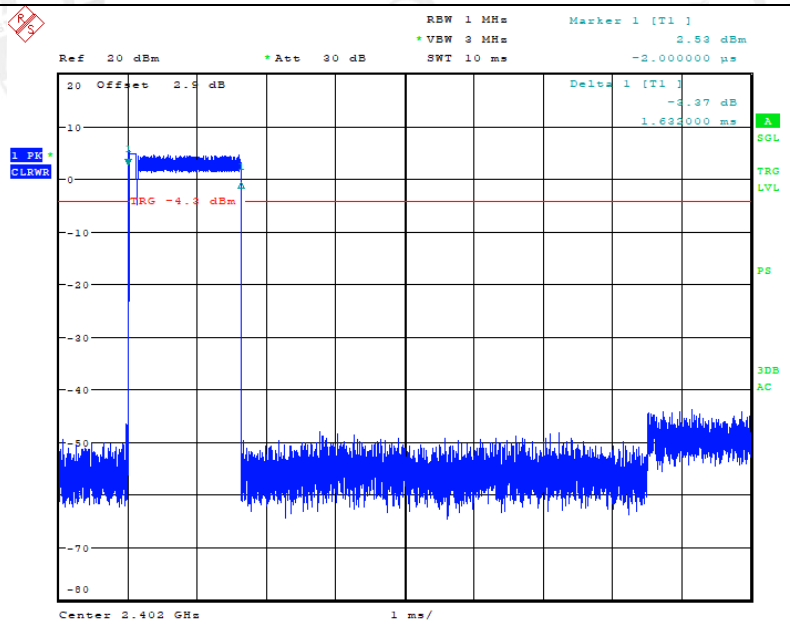


2DH1_Ant1_Hop_High

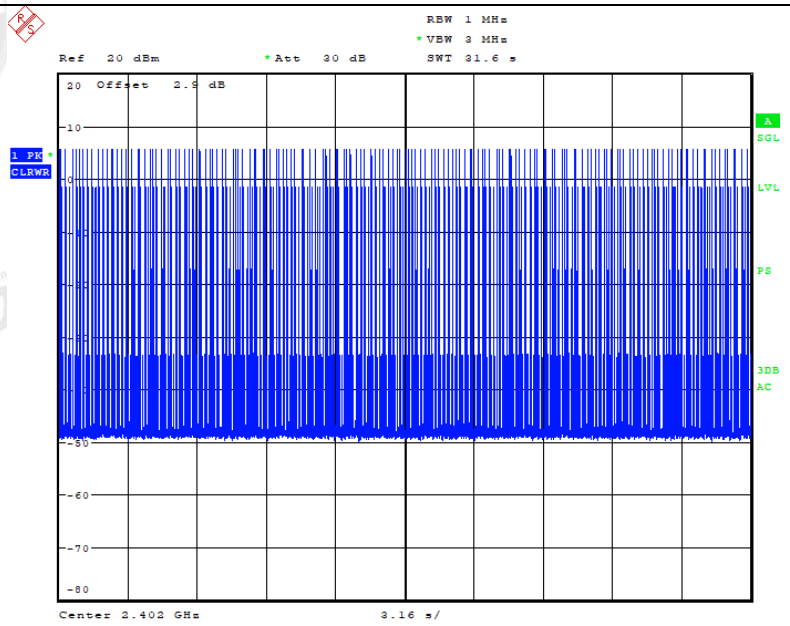




2DH3_Ant1_Hop_Low

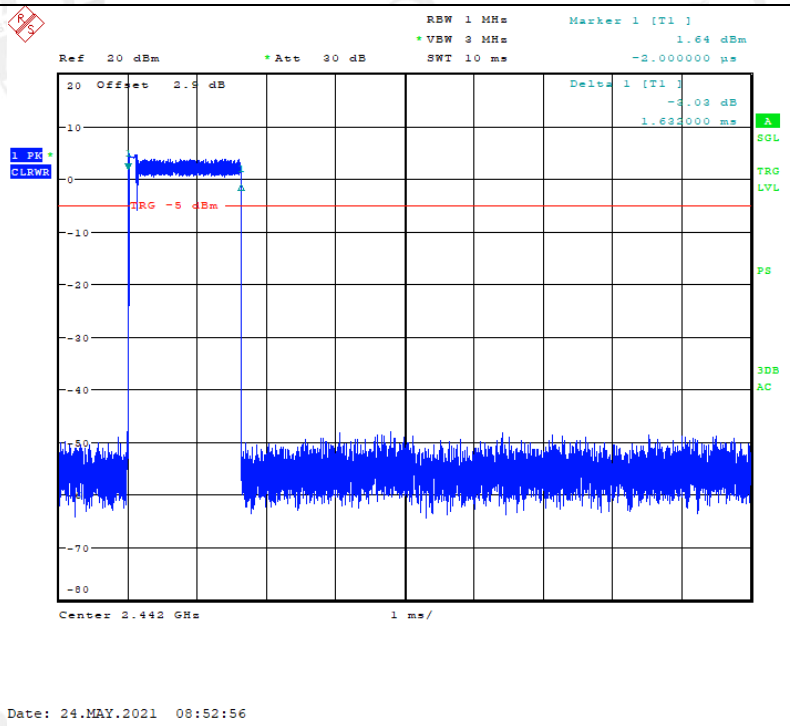


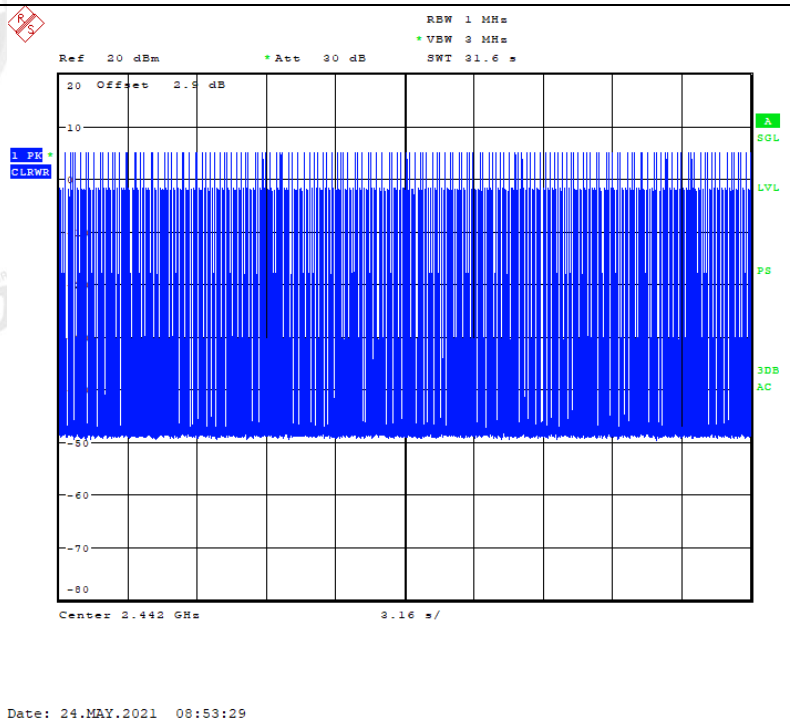
Date: 24.MAY.2021 08:51:02



Date: 24.MAY.2021 08:51:35

2DH3_Ant1_Hop_Mid





2DH3_Ant1_Hop_High