Report No.:DDT-R22050910-2E01

Issued Date: May 20, 2022

FCC AND ISED CERTIFICATION TEST REPORT

FOR

Applicant	**:**	Harman International Industries, Inc.
Address	**:**	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	**:**	BLUETOOTH HEADSET
Model No.	**:**	WAVE BUDS, VIBE BUDS
Trade Mark	**:**	JBL
FCC ID	**:**	APIJBLVIBEBUDS
IC	**:**	6132A-JBLVIBEBUDS
Manufacturer	**:**	Harman International Industries, Inc.
Address	**:**	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

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

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Test Report Declare

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Manufacturer	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Test Standard Used:

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

Test Procedure Used:

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

We Declare:

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

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

Report No.:	DDT-R22050910-2E01		
Date of Receipt:	May 13, 2022	**Date of Test:**	May 13, 2022 ~ May 20, 2022

Prepared By: ***Approved By:***

Bobo Chen

Bobo Chen/Engineer ***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	May 20, 2022	

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	:	BLUETOOTH HEADSET
Model Number	:	WAVE BUDS, VIBE BUDS
Difference of model number	:	WAVE BUDS and VIBE BUDS are only different in model name, the circuit principle and PCB layout are the same. Therefore, we selected WAVE BUDS as the main test model.
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	CHARGING CASE: DC 5V from external USB cable EARBUDS: DC 5V from external charging case CHARGING CASE: DC 3.8V Polymer Li-ion built-in battery EARBUDS: DC 3.8V Polymer Li-ion built-in battery
Radio Specification	:	Bluetooth V5.2
Operation Frequency	:	2402MHz-2480MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Data Rate	:	1Mbps, 2Mbps, 3Mbps
Antenna Gain	:	Left side: -1.90 dBi Right side: -1.60 dBi
Sample Type	:	Series production
Sample Number	:	S22050910-20 for conductive S22050910-21 for radiation

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		

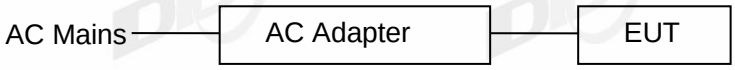
2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
Type-C Cable	Harman	N/A	Length: 20cm	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Adapter	SUMSUNG	EP-TA200	Input: 100-240~, 50/60Hz, 0.5A; Output: 9V/1.67A or 5V/2A	N/A

2.4. Block diagram of EUT configuration for test



Test software: BQB.exe
The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.
The pathloss of external cable: 0.5dB (According to the manufacturer's claims)

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
GFSK hopping on Tx mode	/	CH0 to CH78	2402 to 2480
π/4-DQPSK hopping on Tx mode	/	CH0 to CH78	2402 to 2480
8DPSK hopping on Tx mode	/	CH0 to CH78	2402 to 2480
GFSK hopping off Tx mode	/	CH0	2402
	/	CH39	2441
	/	CH78	2480
π/4-DQPSK hopping off Tx mode	/	CH0	2402
	/	CH39	2441
	/	CH78	2480
8DPSK hopping off Tx mode	/	CH0	2402
	/	CH39	2441
	/	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 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, G-20118

2.8. Measurement uncertainty

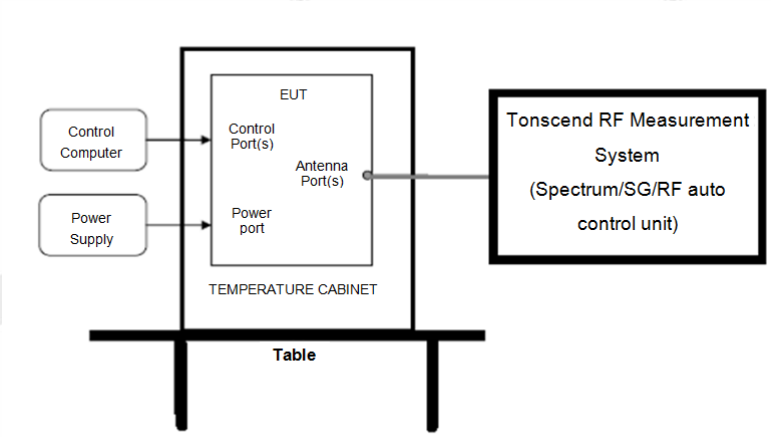
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies 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 < 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	3.72 dB (9 kHz-150 kHz)
	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 4#)					
Signal &Spectrum analyzer	R&S	FSV3044	101173	Apr. 13, 2022	1 Year
Wideband Radio Communication tester	R&S	CMW500	120259	May 18, 2022	1 Year
MXG Vector Signal Generator	Agilent	N5182B	MY59100192	May 18, 2022	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Oct. 15, 2021	1 Year
RF Control Unit	Tonsend	JS0806-2	21I8060485	Oct. 18, 2021	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	May 16, 2022	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.6.88.0346	N/A	N/A
☒Radiation 3#chamber					
EMI Test Receiver	R&S	ESU	100472	Jun. 01, 2021	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 01, 2021	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 19, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	01429	Aug. 07, 2021	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02468	Nov. 17, 2021	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 06, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-118A	18040084	Sep. 02, 2021	1 Year
Pre-amplifier	COM-POWER	PAM-840A	461369	Apr. 11, 2022	1 Year
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	Sep. 02, 2021	1 Year
LISN 1	R&S	ENV216	101109	Sep. 02, 2021	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 02, 2021	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 02, 2021	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 02, 2021	1 Year
LISN 3	SCHWARZBECK	NSLK 8163	00017	Sep. 02, 2021	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 conducted output power of EUT by spectrum analyzer with PK detector and RBW=3 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)	Conducted Output Power (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	8.54	21	Pass
	ANT1	2441	8.67	21	Pass
	ANT1	2480	9.45	21	Pass
π/4-DQPSK	ANT1	2402	8.60	21	Pass
	ANT1	2441	8.67	21	Pass
	ANT1	2480	**9.48**	21	Pass
8DPSK	ANT1	2402	8.59	21	Pass
	ANT1	2441	8.73	21	Pass
	ANT1	2480	9.47	21	Pass

Mode	Antenna	Freq. (MHz)	EIRP (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	6.64	36	Pass
	ANT1	2441	6.77	36	Pass
	ANT1	2480	7.55	36	Pass
π/4-DQPSK	ANT1	2402	6.70	36	Pass
	ANT1	2441	6.77	36	Pass
	ANT1	2480	**7.58**	36	Pass
8DPSK	ANT1	2402	6.69	36	Pass
	ANT1	2441	6.83	36	Pass
	ANT1	2480	7.57	36	Pass
Note: EIRP (dBm)=Conducted Output Power (dBm)+ Antenna Gain (dBi)					

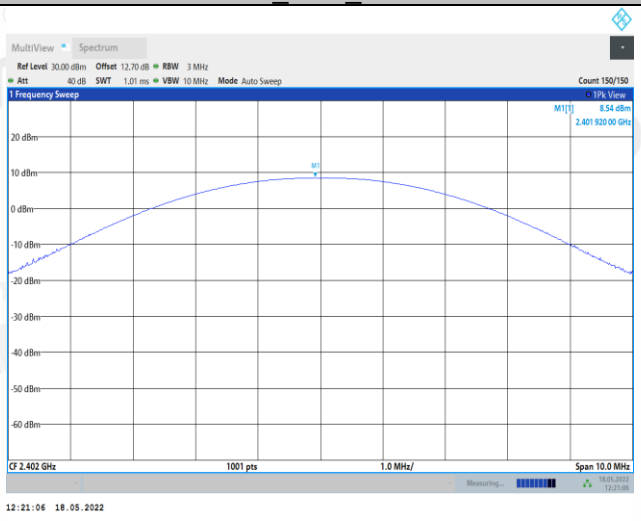
Right side:

Mode	Antenna	Freq. (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	8.71	21	Pass
	ANT1	2441	8.80	21	Pass
	ANT1	2480	**9.62**	21	Pass
π/4-DQPSK	ANT1	2402	8.62	21	Pass
	ANT1	2441	8.74	21	Pass
	ANT1	2480	9.62	21	Pass
8DPSK	ANT1	2402	8.63	21	Pass
	ANT1	2441	8.70	21	Pass
	ANT1	2480	9.55	21	Pass

Mode	Antenna	Freq. (MHz)	EIRP (dBm)	Limit (dBm)	Verdict
GFSK	ANT1	2402	7.11	36	Pass
	ANT1	2441	7.20	36	Pass
	ANT1	2480	**8.02**	36	Pass
π/4-DQPSK	ANT1	2402	7.02	36	Pass
	ANT1	2441	7.14	36	Pass
	ANT1	2480	8.02	36	Pass
8DPSK	ANT1	2402	7.03	36	Pass
	ANT1	2441	7.10	36	Pass
	ANT1	2480	7.95	36	Pass
Note: EIRP (dBm)=Conducted Output Power (dBm)+ Antenna Gain (dBi)					

4.5. Original test data

Left side:

DH5_Ant1_2402

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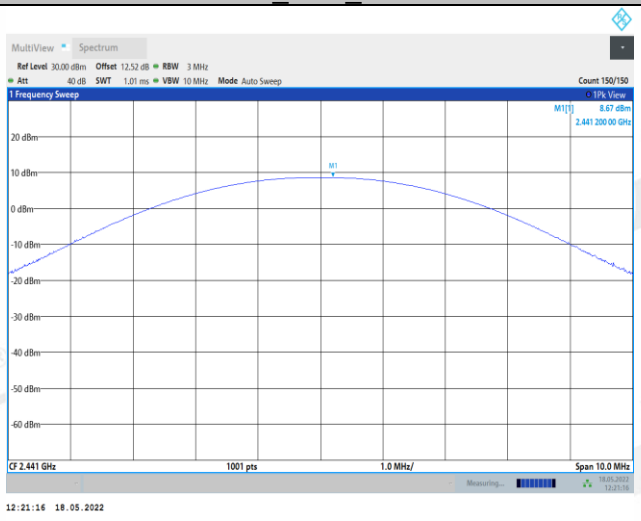
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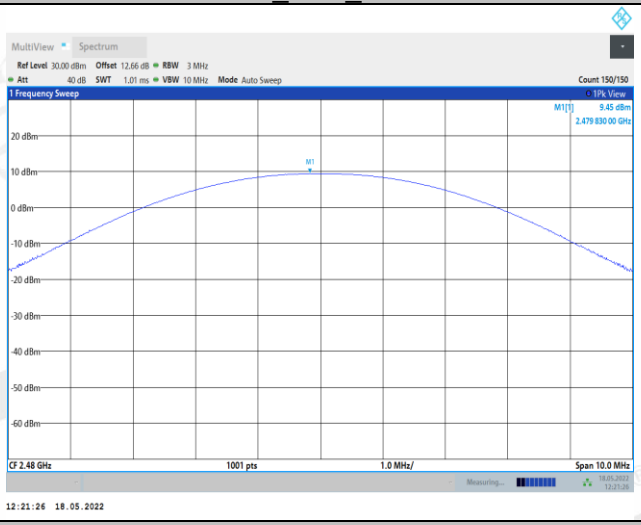
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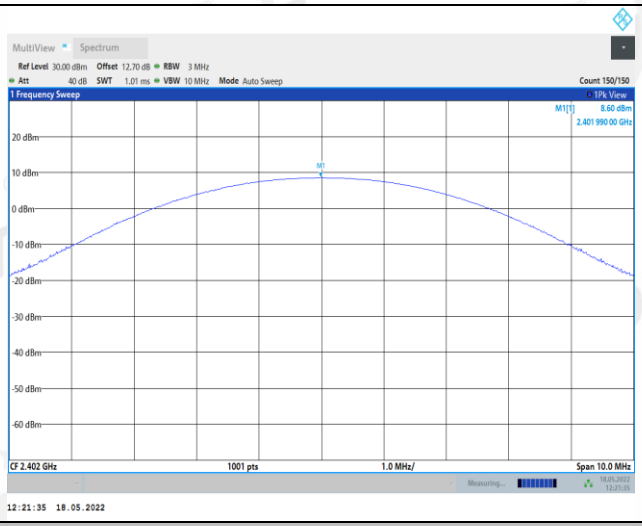

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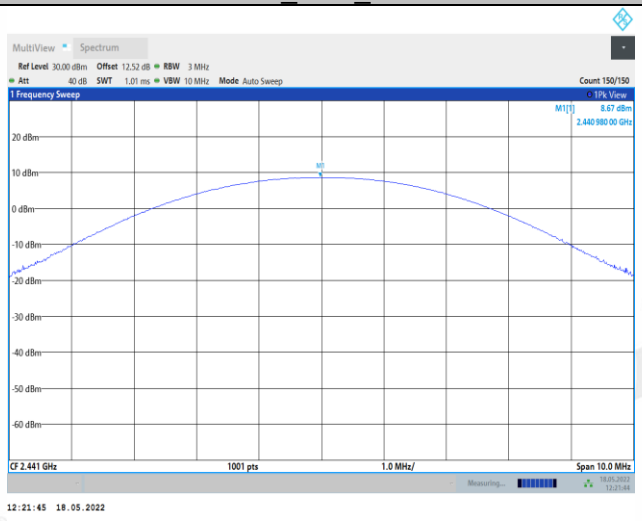

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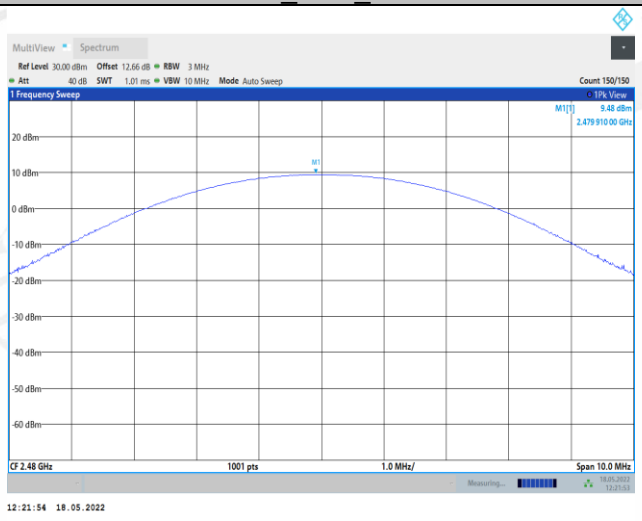
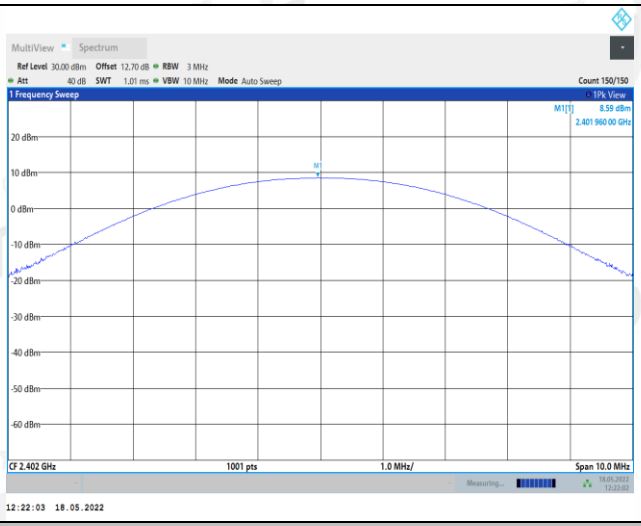


3DH5_Ant1_2402



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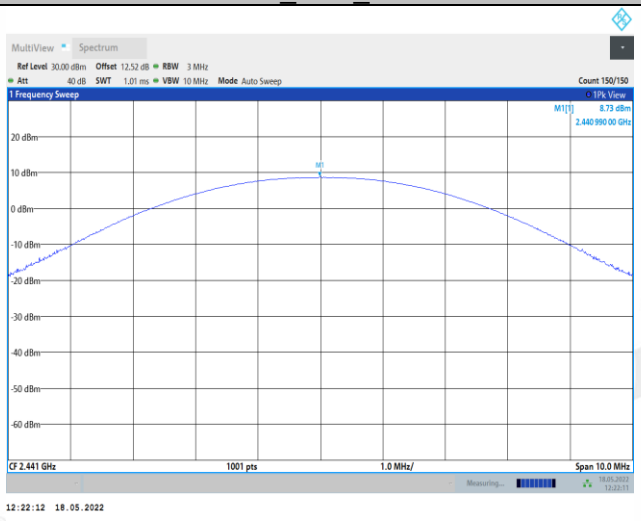

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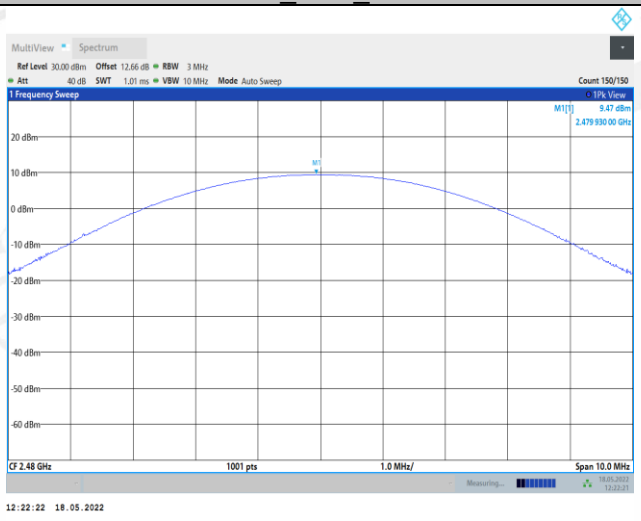

Right side:

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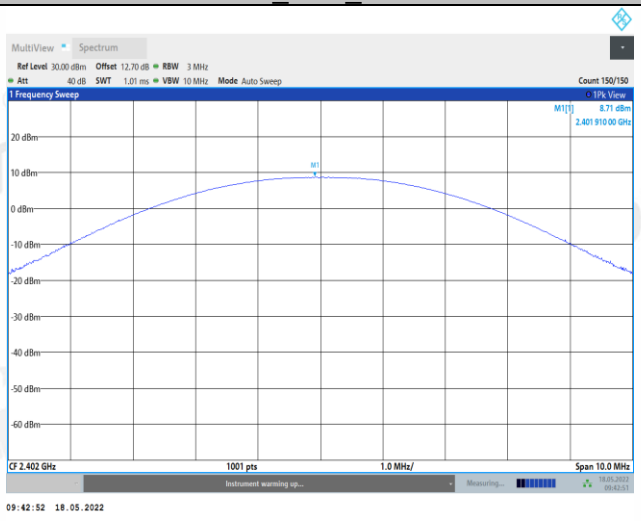
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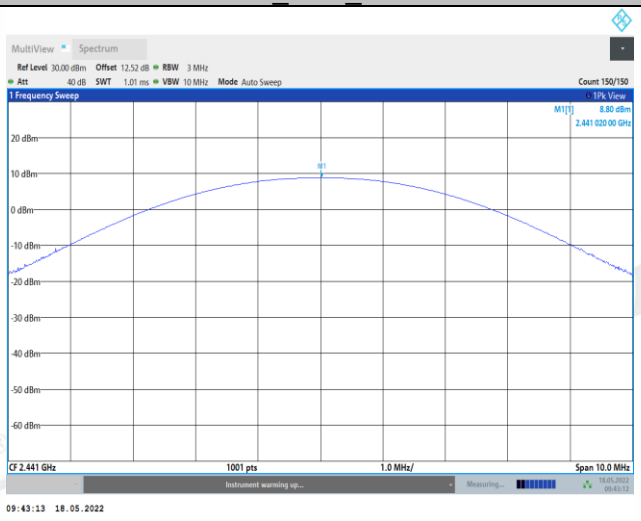
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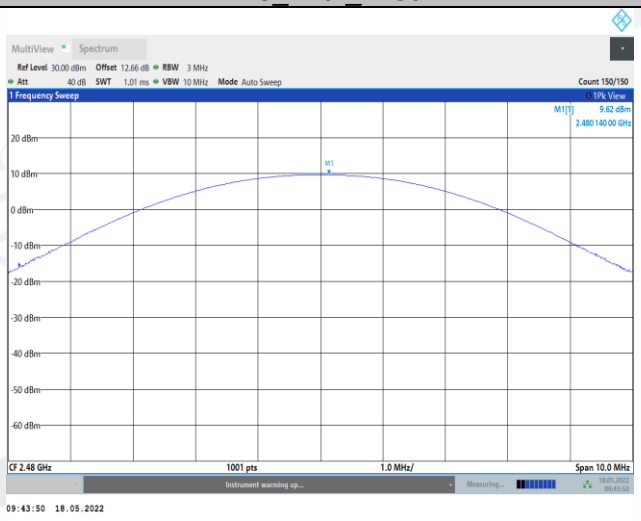
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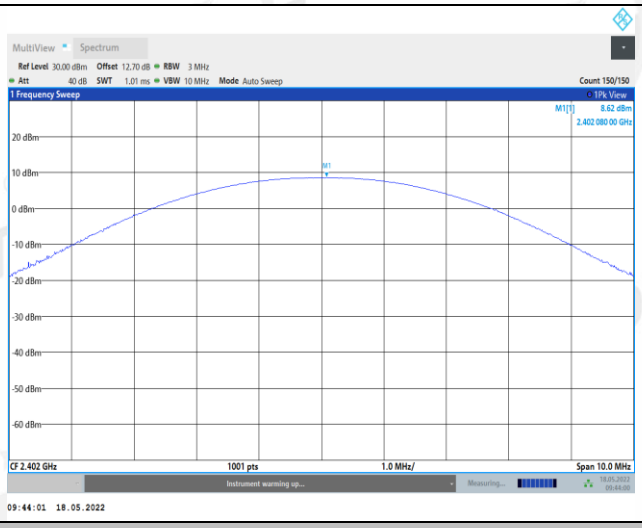

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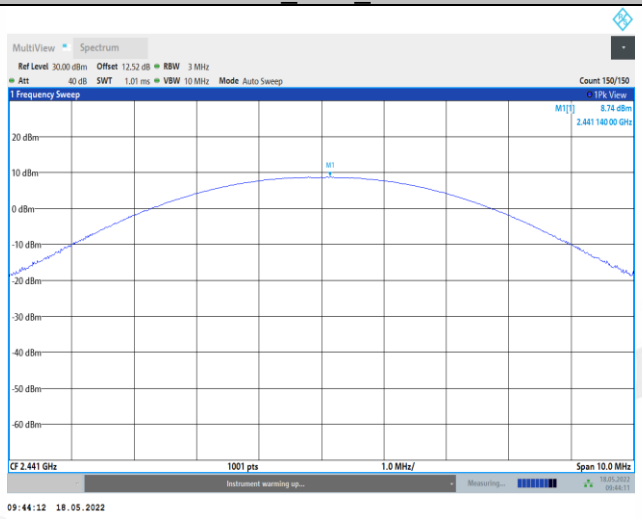

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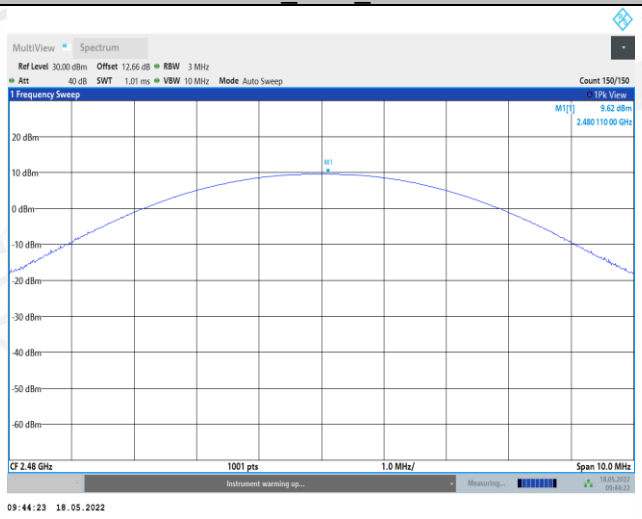

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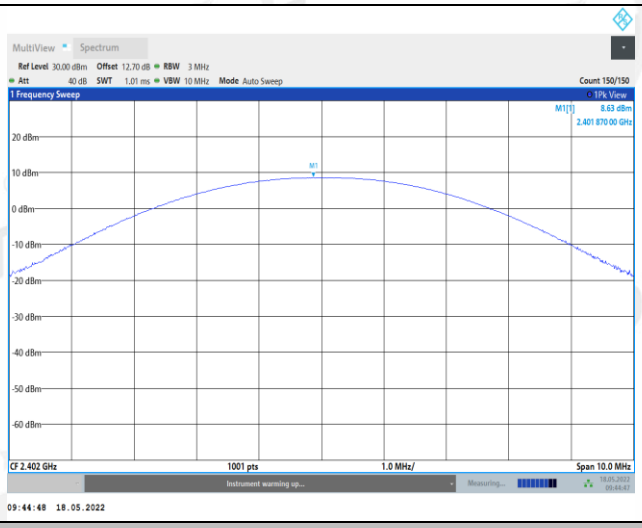

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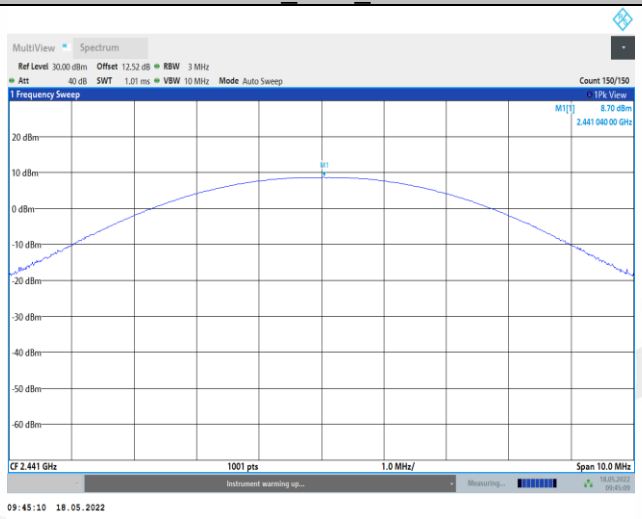

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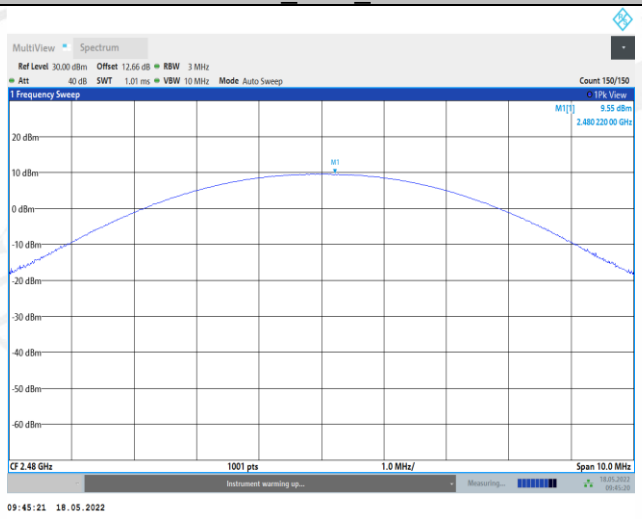


5. 20 dB Bandwidth and 99% Bandwidth

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	1.026	0.885	Pass
	2441	0.975	0.892	Pass
	2480	0.975	0.859	Pass
π/4-DQPSK	2402	1.242	1.152	Pass
	2441	1.284	1.149	Pass
	2480	1.332	1.142	Pass
8DPSK	2402	1.272	1.146	Pass
	2441	1.266	1.153	Pass
	2480	1.266	1.147	Pass

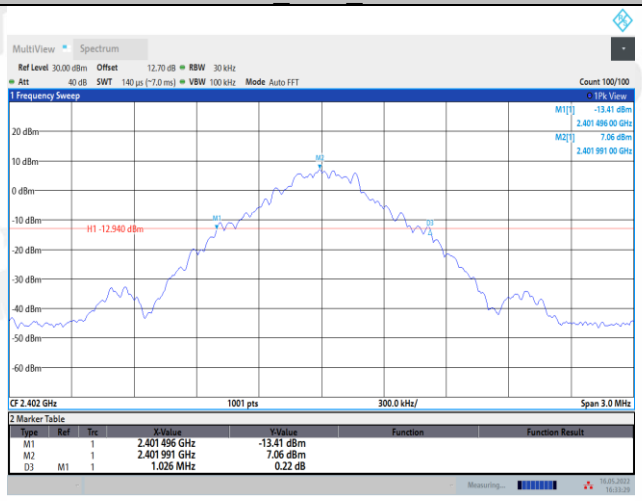
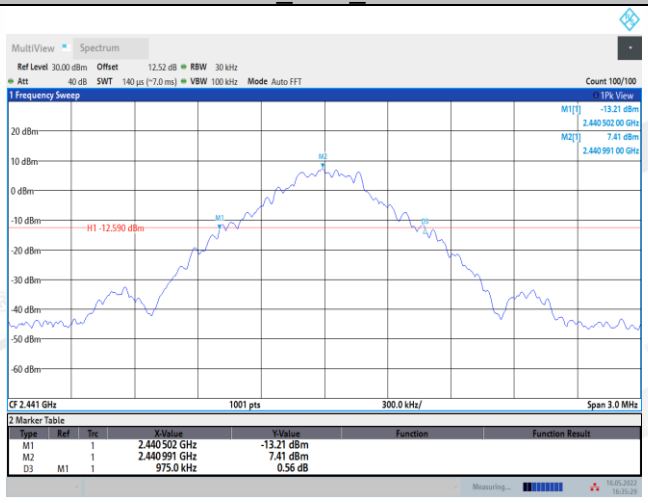
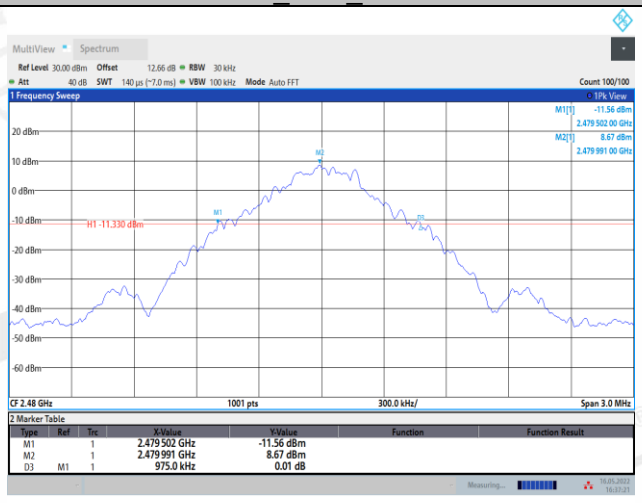
Right side:

Mode	Freq. (MHz)	20 dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Verdict
GFSK	2402	1.020	0.876	Pass
	2441	1.038	0.909	Pass
	2480	0.993	0.846	Pass
π/4-DQPSK	2402	1.230	1.151	Pass
	2441	1.287	1.141	Pass
	2480	1.284	1.149	Pass
8DPSK	2402	1.251	1.145	Pass
	2441	1.281	1.152	Pass
	2480	1.272	1.148	Pass

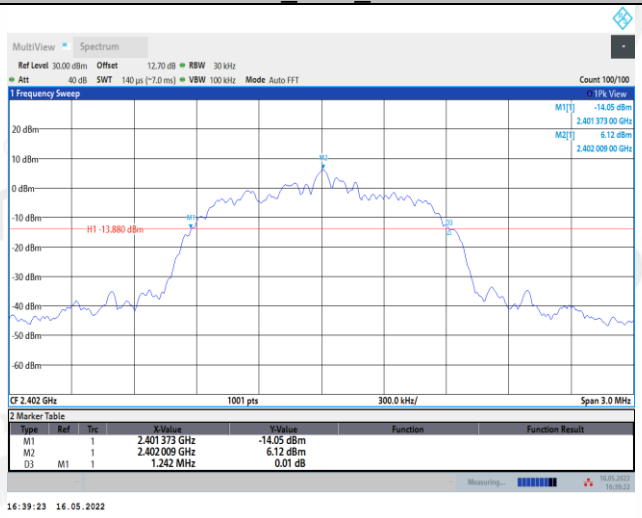
5.5. Original test data

20dB bandwidth：

Left side:

DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480


2DH5_Ant1_2402

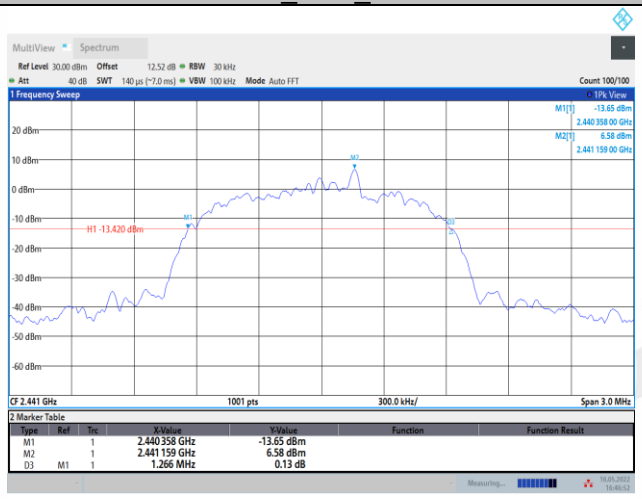


2DH5_Ant1_2441

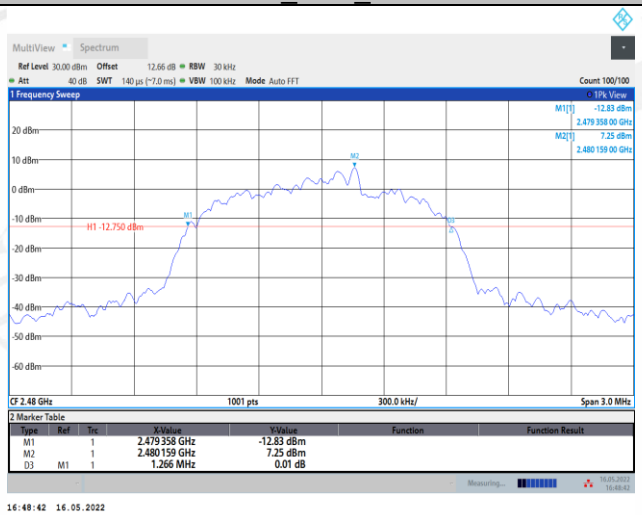
2DH5_Ant1_2480

3DH5_Ant1_2402

3DH5_Ant1_2441

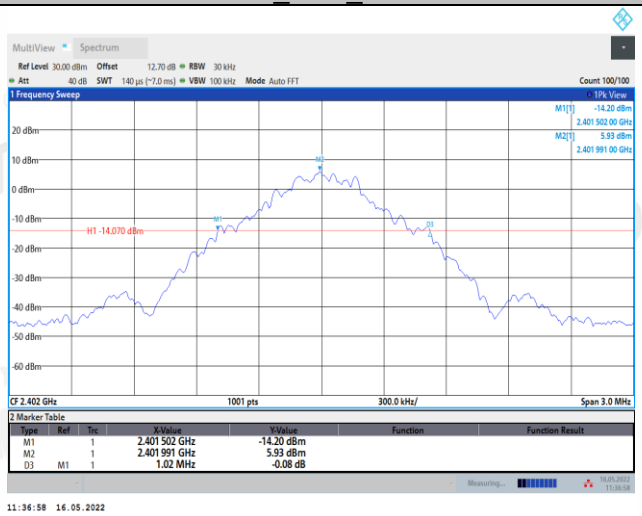


3DH5_Ant1_2480

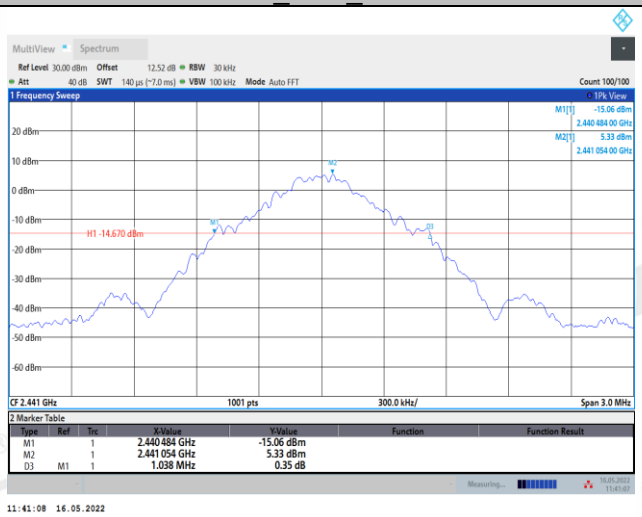


Right side:

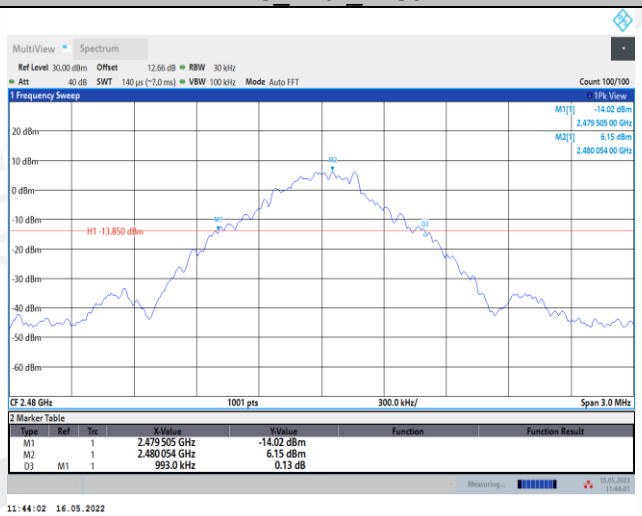
DH5_Ant1_2402



DH5_Ant1_2441

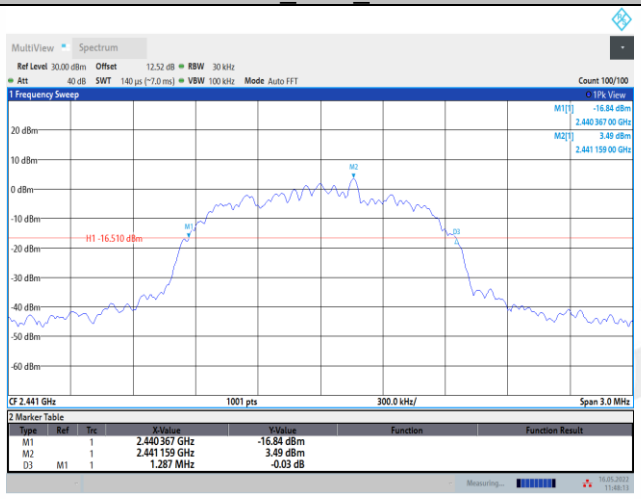


DH5_Ant1_2480

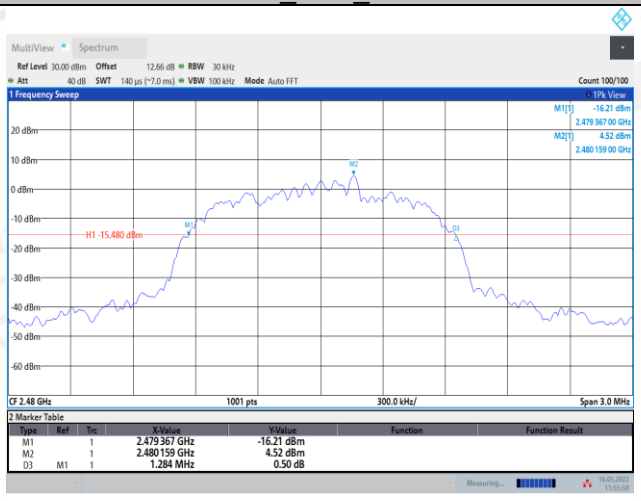


2DH5_Ant1_2402

2DH5_Ant1_2441

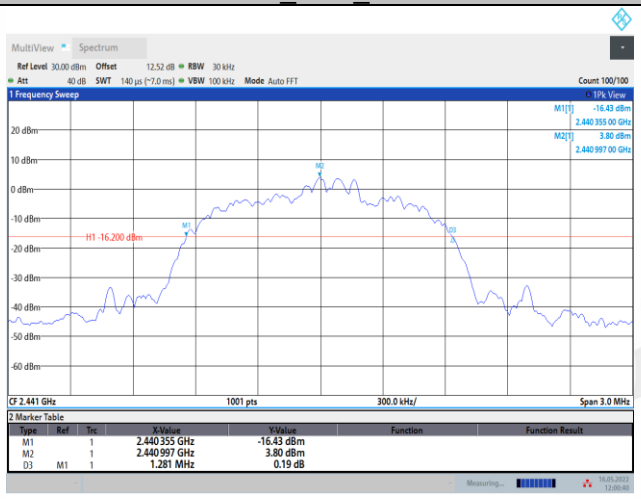


2DH5_Ant1_2480



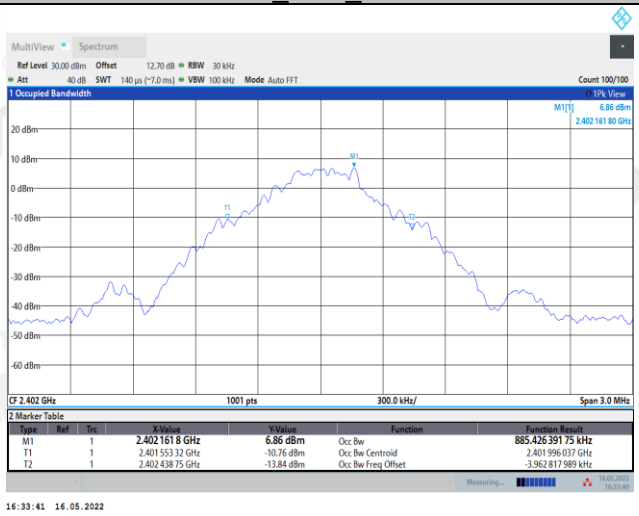
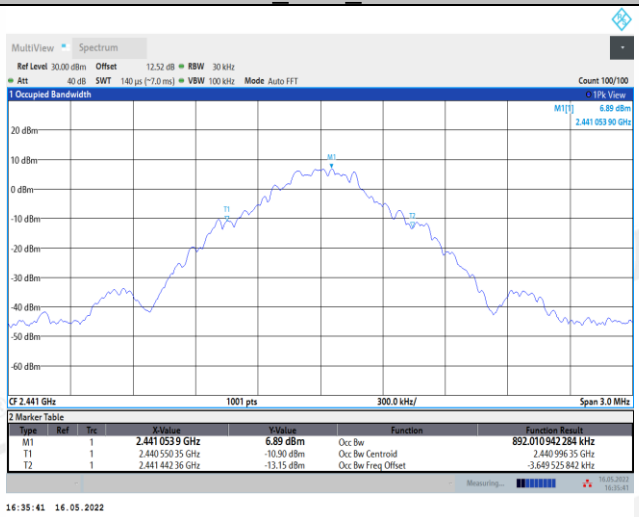
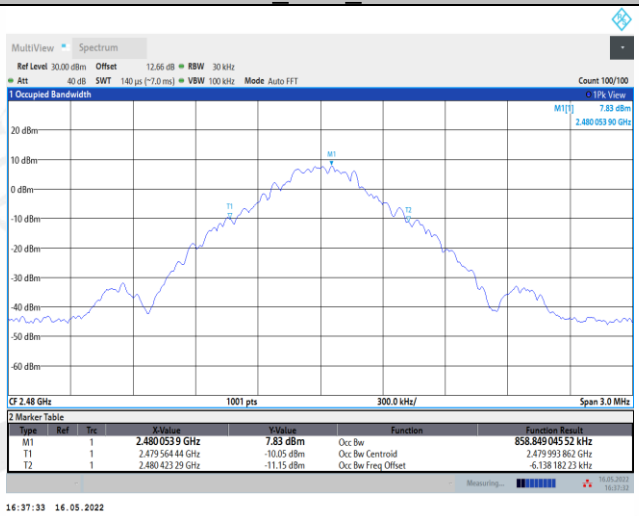
3DH5_Ant1_2402

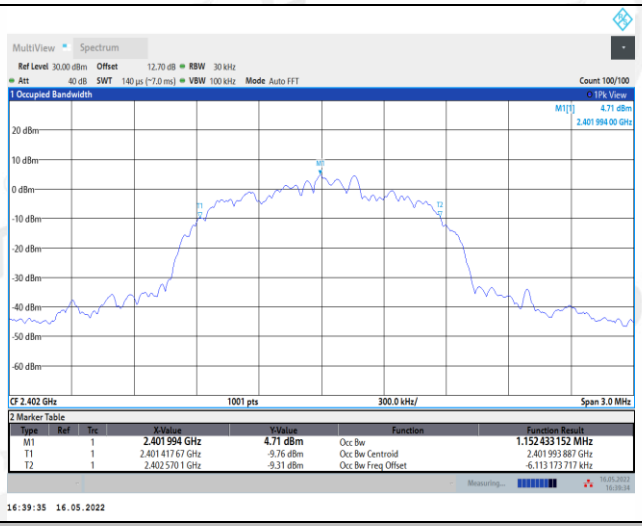
3DH5_Ant1_2441



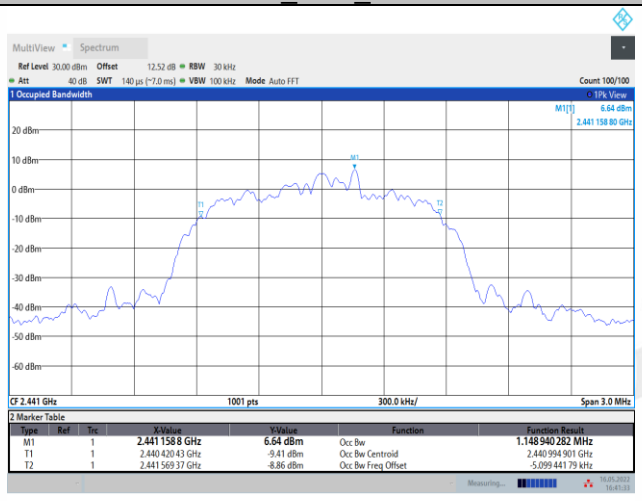
3DH5_Ant1_2480

99% bandwidth:
Left side:

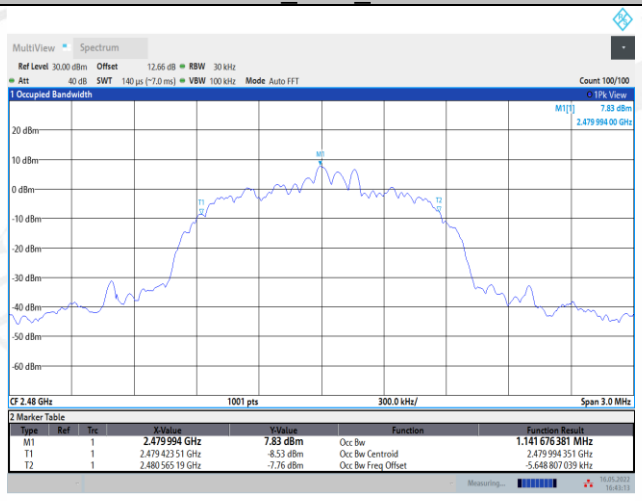
DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480

2DH5_Ant1_2402



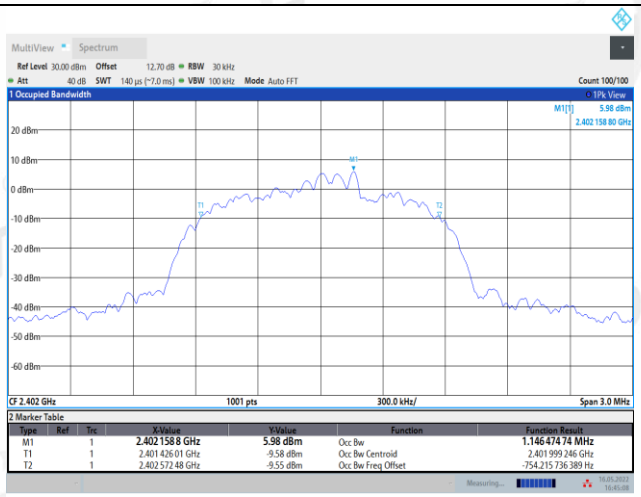
2DH5_Ant1_2441



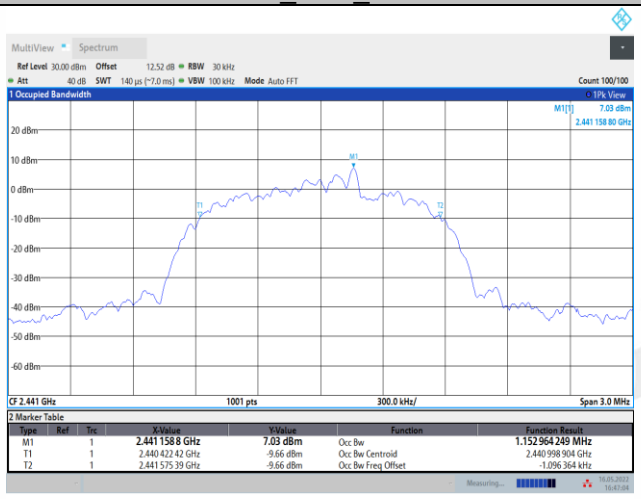
2DH5_Ant1_2480



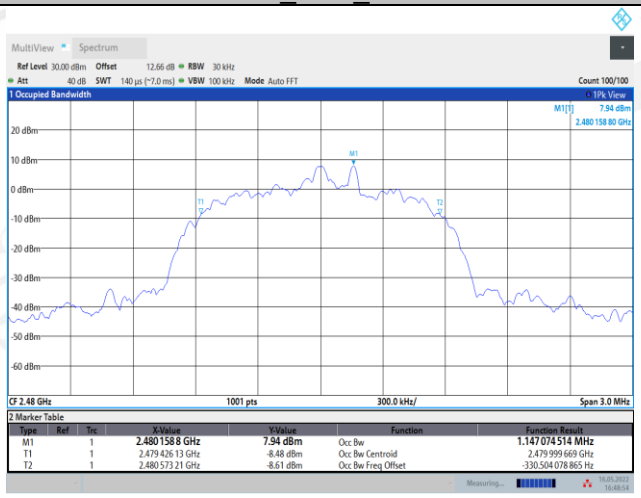
3DH5_Ant1_2402



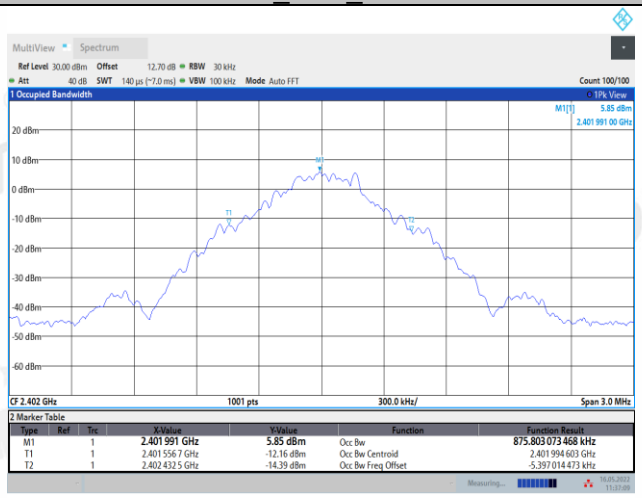
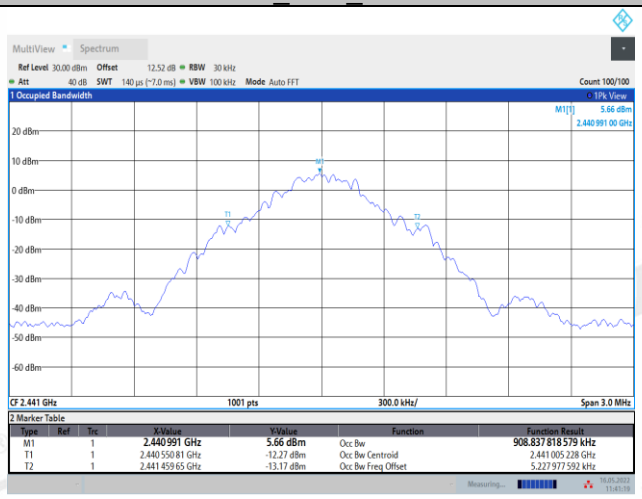
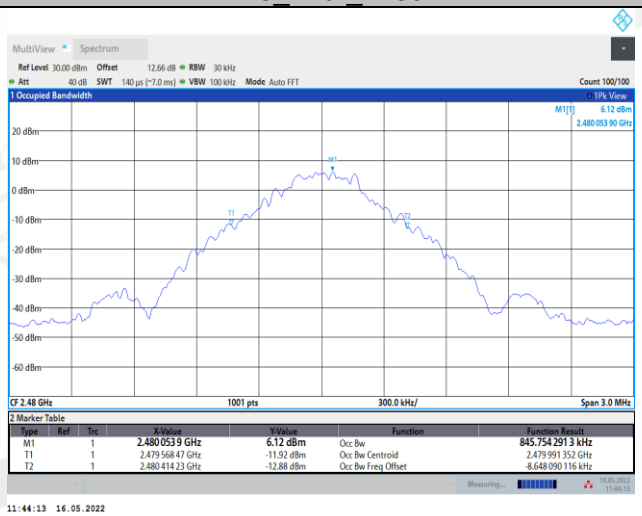
3DH5_Ant1_2441

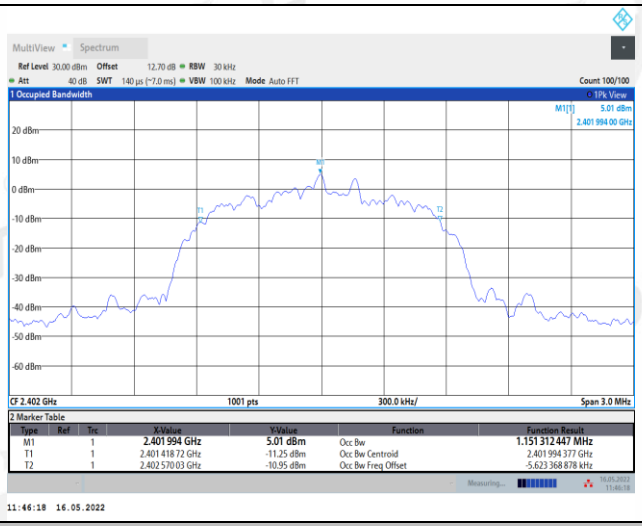


3DH5_Ant1_2480

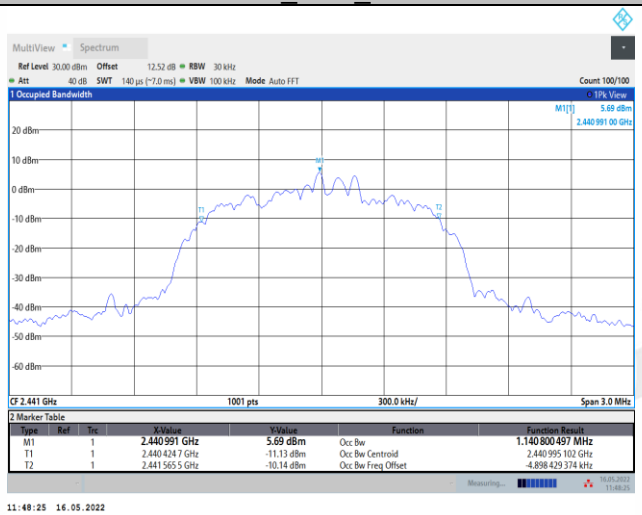


Right side:

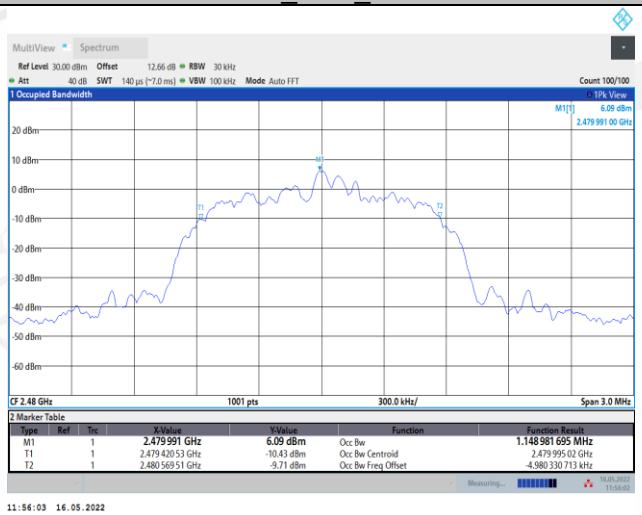
DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480

2DH5_Ant1_2402



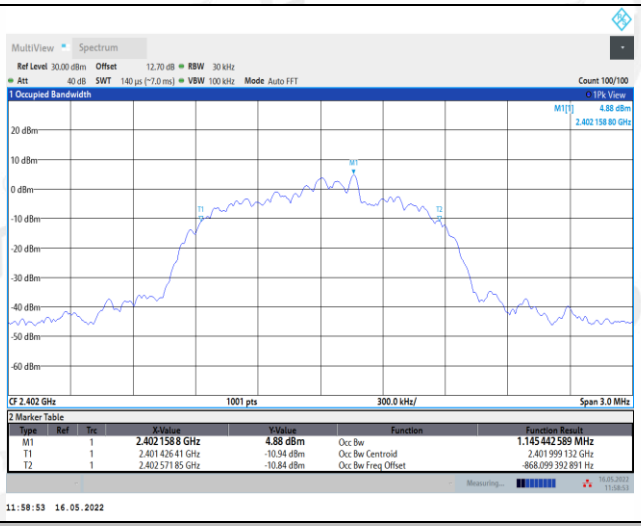
2DH5_Ant1_2441



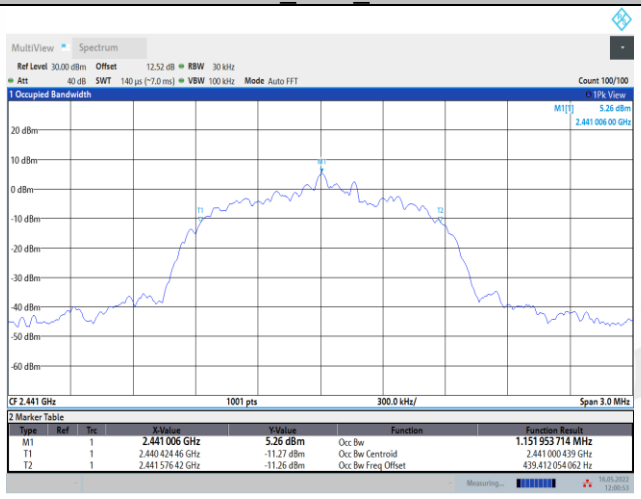
2DH5_Ant1_2480



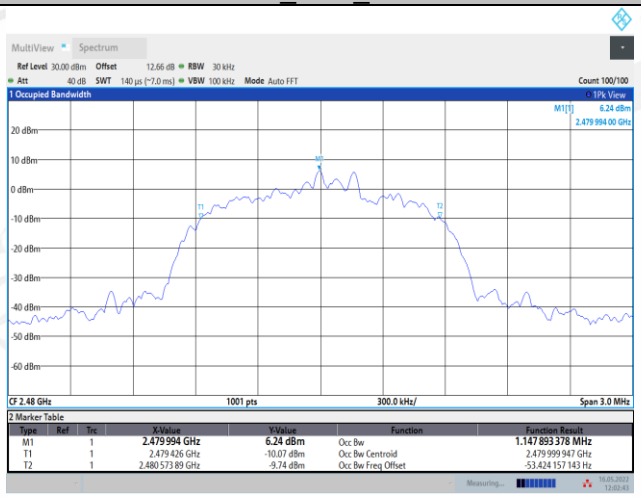
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



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:

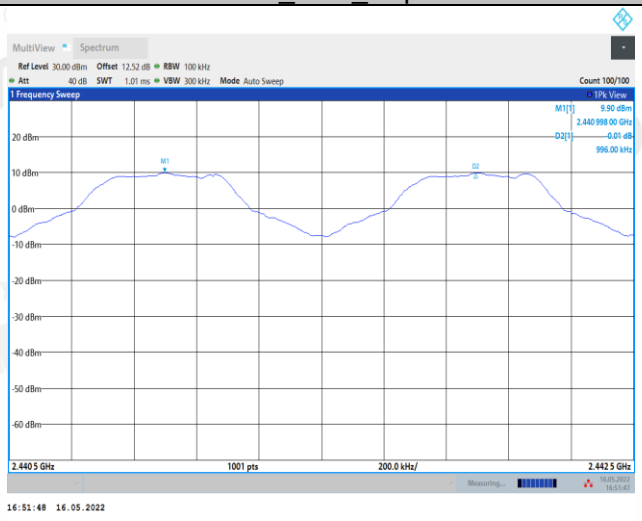
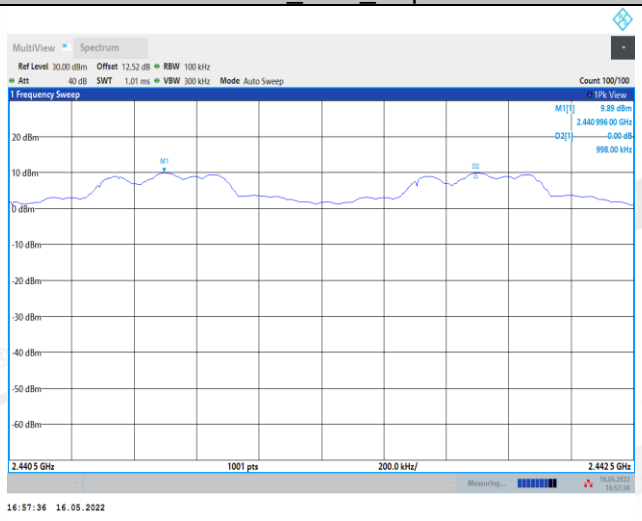
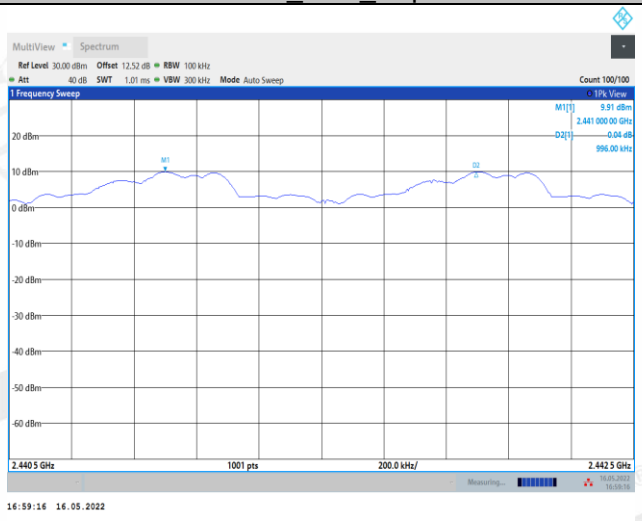
Mode	Channel separation (MHz)	20dB bandwidth (MHz) (worse case)	Limit (MHz) 2/3 of 20dB bandwidth	Verdict
GFSK	0.996	1.026	≥0.684	Pass
π/4-DQPSK	0.998	1.332	≥0.888	Pass
8DPSK	0.996	1.272	≥0.848	Pass

Right side:

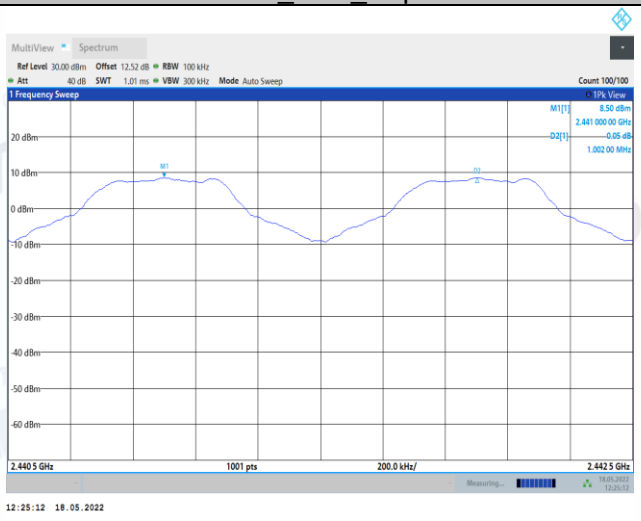
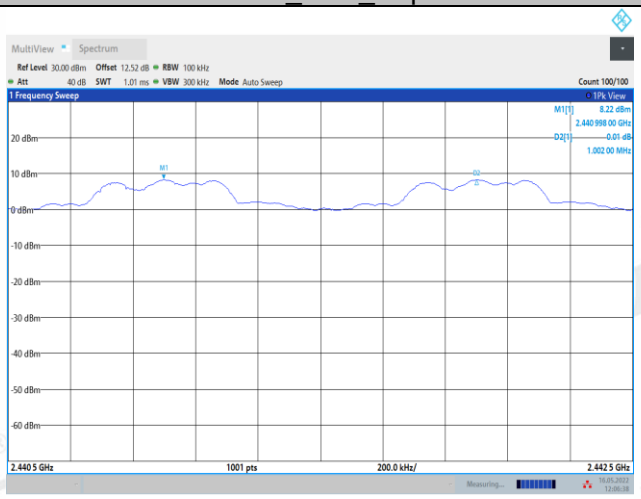
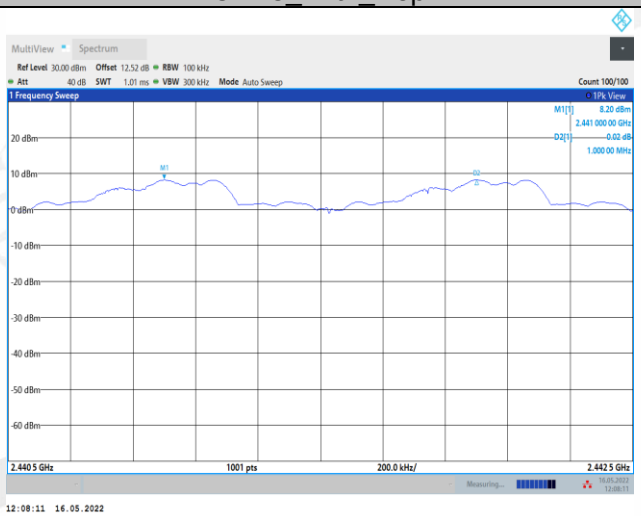
Mode	Channel separation (MHz)	20dB bandwidth (MHz) (worse case)	Limit (MHz) 2/3 of 20dB bandwidth	Verdict
GFSK	1.002	1.038	≥0.692	Pass
π/4-DQPSK	1.002	1.287	≥0.858	Pass
8DPSK	1.000	1.281	≥0.854	Pass

6.5. Original test data

Left side:

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop


Right side:

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop


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:

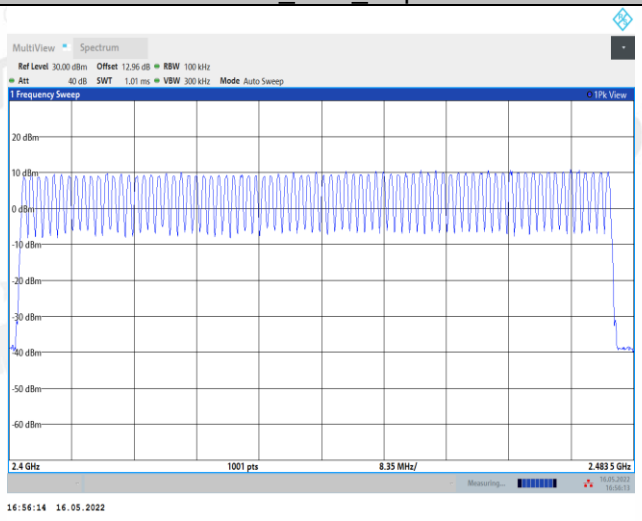
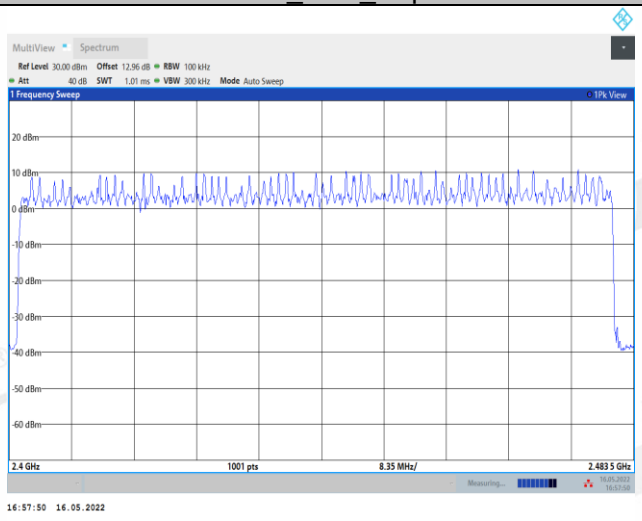
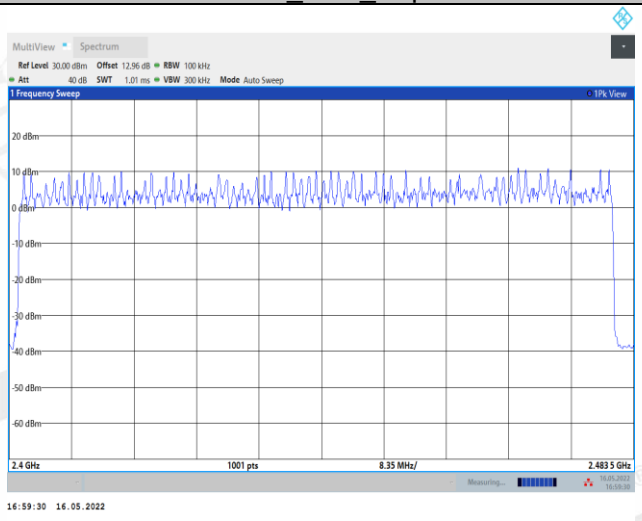
Mode	Number of hopping channels	Limit	Verdict
GFSK	79	>15	Pass
π/4-DQPSK	79	>15	Pass
8DPSK	79	>15	Pass

Right side:

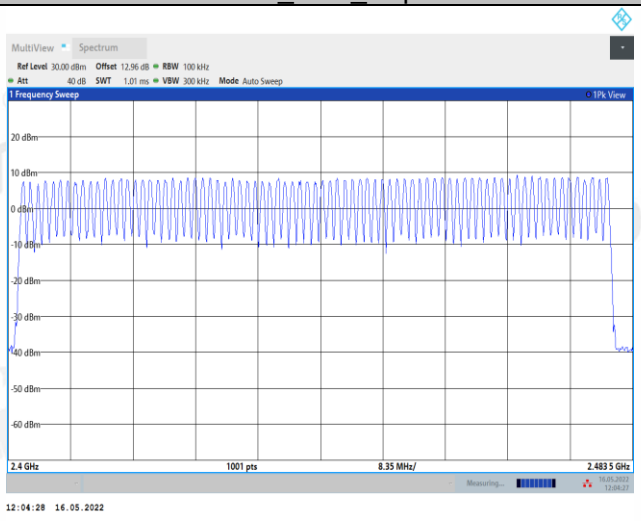
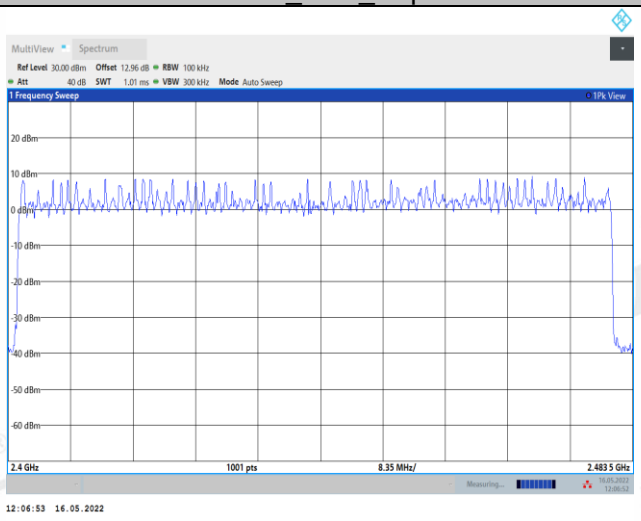
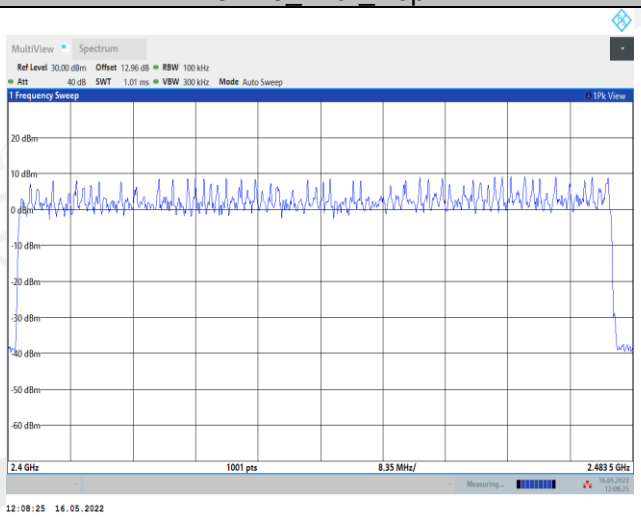
Mode	Number of hopping channels	Limit	Verdict
GFSK	79	>15	Pass
π/4-DQPSK	79	>15	Pass
8DPSK	79	>15	Pass

7.5. Original test data

Left side:

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop


Right side:

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop


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:

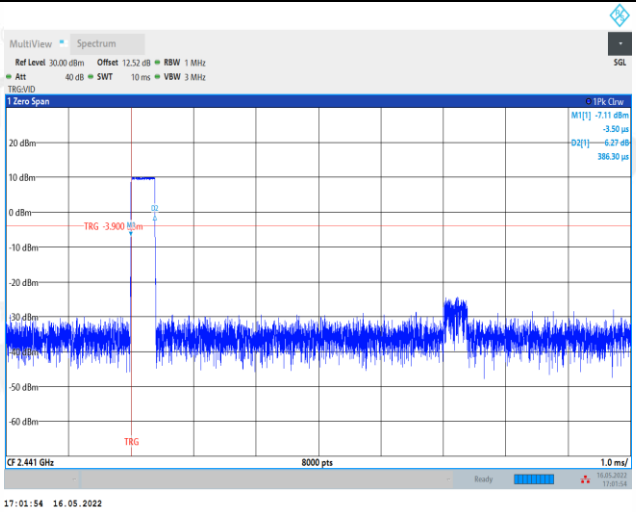
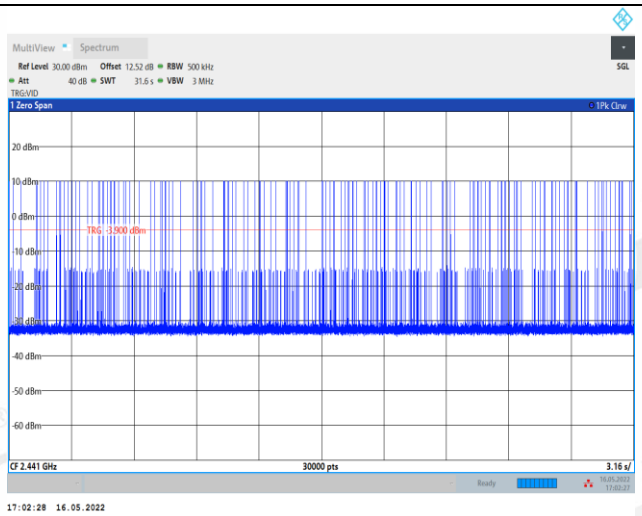
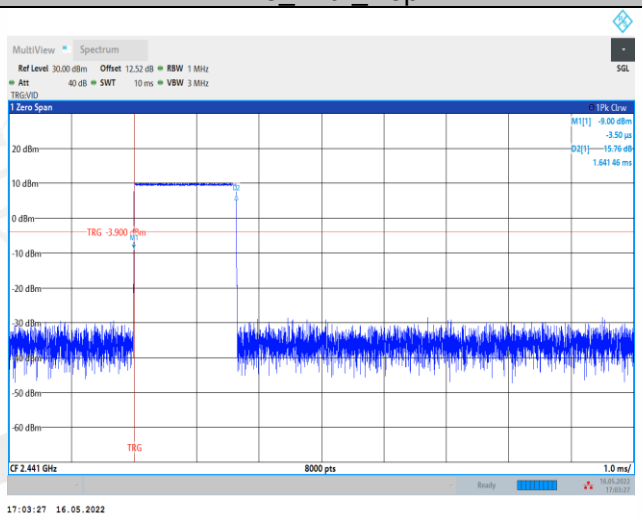
Mode	Dwell time (s)	Pulse's on time (ms)	Total hops	Limit	Verdict
DH1	0.058	0.39	151	<400ms	Pass
DH3	0.167	1.64	102	<400ms	Pass
DH5	0.269	2.89	93	<400ms	Pass
2DH1	0.068	0.40	171	<400ms	Pass
2DH3	0.168	1.65	102	<400ms	Pass
2DH5	0.211	2.90	73	<400ms	Pass
3DH1	0.060	0.40	151	<400ms	Pass
3DH3	0.176	1.65	107	<400ms	Pass
3DH5	0.220	2.90	76	<400ms	Pass
Note: Dwell time = total hops *pulse's on time.					

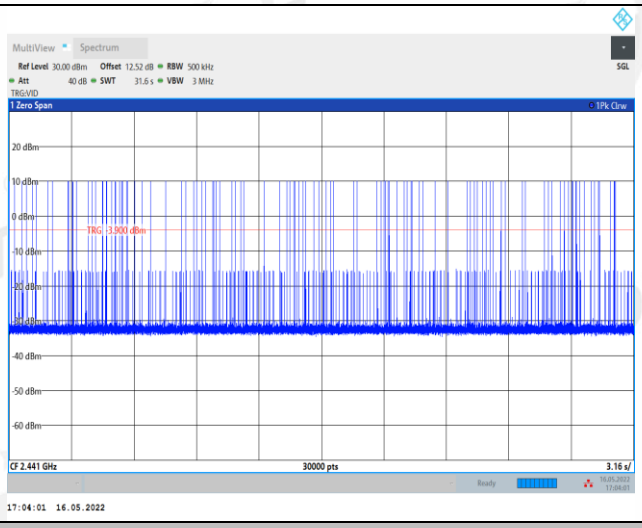
Right side:

Mode	Dwell time (s)	Pulse's on time (ms)	Total hops	Limit	Verdict
DH1	0.058	0.39	149	<400ms	Pass
DH3	0.179	1.64	109	<400ms	Pass
DH5	0.237	2.89	82	<400ms	Pass
2DH1	0.067	0.40	169	<400ms	Pass
2DH3	0.168	1.65	102	<400ms	Pass
2DH5	0.284	2.90	98	<400ms	Pass
3DH1	0.059	0.40	149	<400ms	Pass
3DH3	0.179	1.65	109	<400ms	Pass
3DH5	0.197	2.90	68	<400ms	Pass
Note: Dwell time = total hops *pulse's on time.					

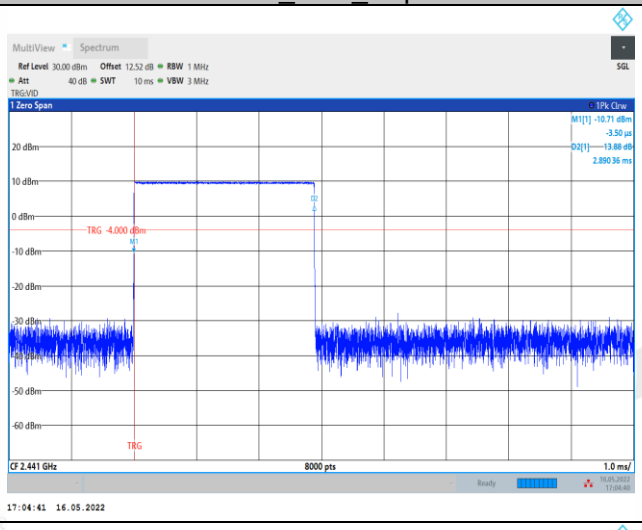
8.5. Original test data

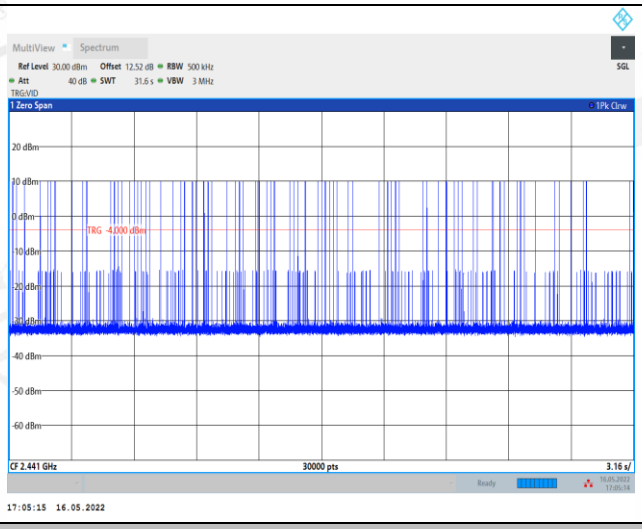
Left side:

DH1_Ant1_Hop


DH3_Ant1_Hop


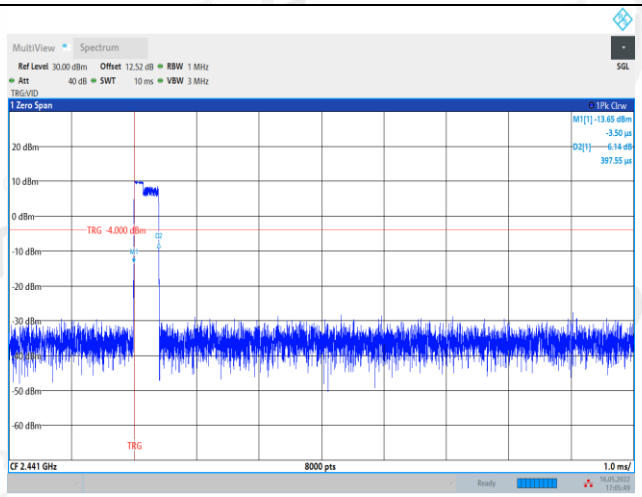


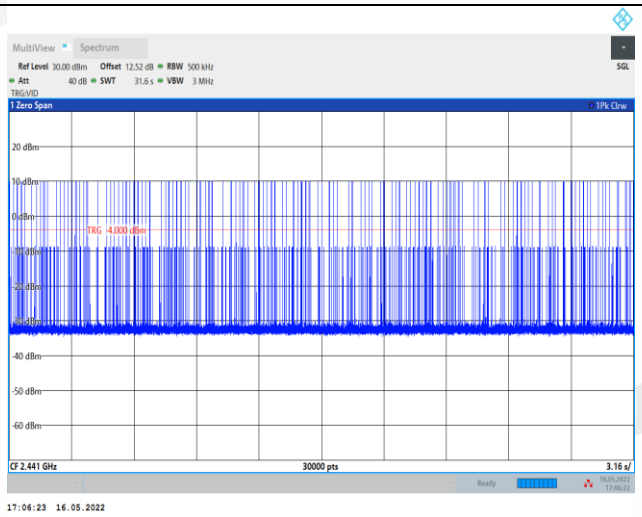
DH5_Ant1_Hop



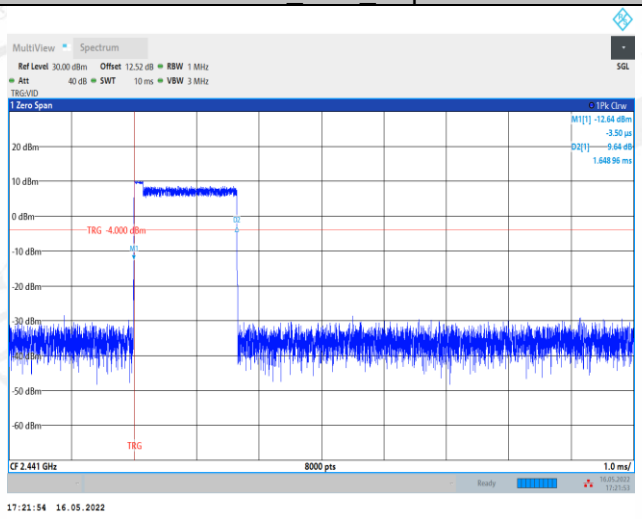


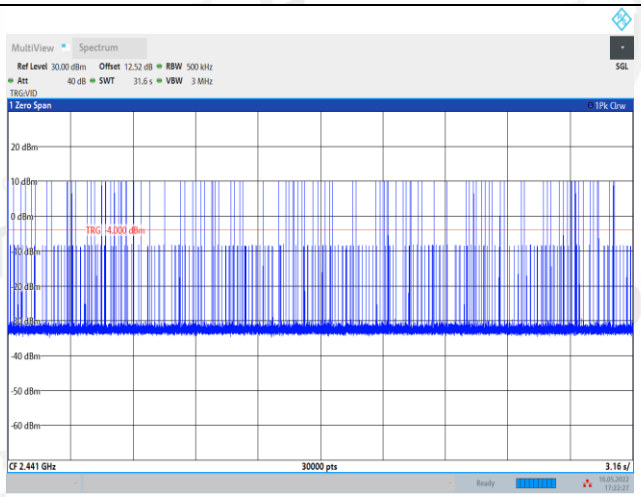
2DH1_Ant1_Hop



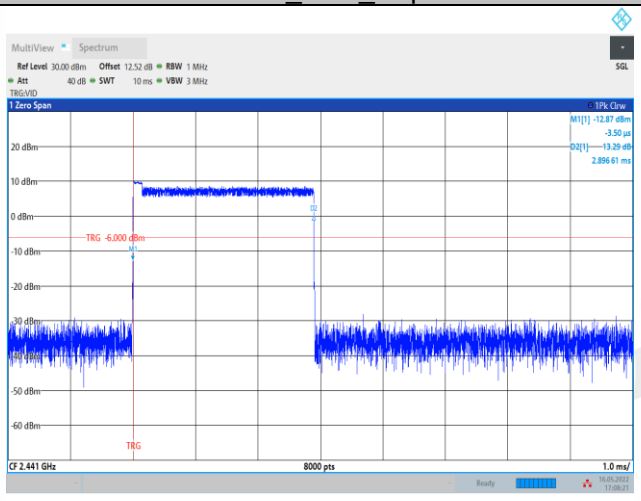


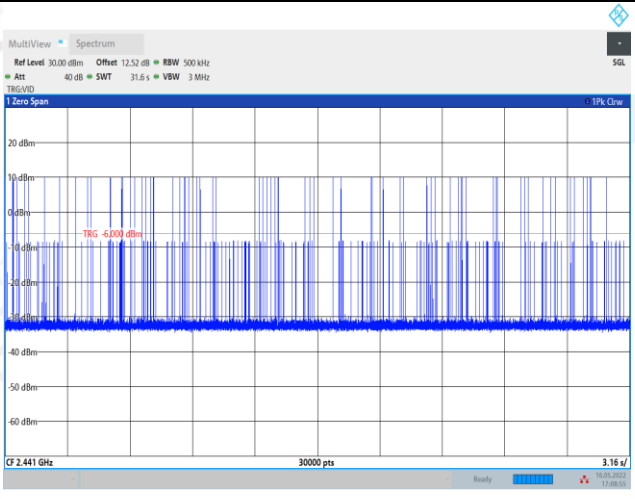
2DH3_Ant1_Hop





2DH5_Ant1_Hop





3DH1_Ant1_Hop