

FCC TEST REPORT

For

Mobile Phone

Model Number: CPH2477

FCC ID: R9C-CPH2477

Report Number : WT228001828

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

TEST REPORT DECLARATION

Applicant : Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address : NO.18 Haibin Road, Wusha Village, Chang'an Town,
Dongguan City, Guangdong, China
Manufacturer : Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address : NO.18 Haibin Road, Wusha Village, Chang'an Town,
Dongguan City, Guangdong, China
EUT Description : Mobile Phone
Model No. : CPH2477
Trade mark : OPPO
Serial Number : /
FCC ID : R9C-CPH2477

Test Standards:

FCC Part 15 Subpart C 15.247 (2020)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209, 15.247.

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

Project Engineer:	 _____ (Zhou Fangai 周芳媛)	Date:	<u>Aug.18, 2022</u>
Checked by:	 _____ (Shi Changda 施昌达)	Date:	<u>Aug.18, 2022</u>
Approved by:	 _____ (Lin Yixiang 林奕翔)	Date:	<u>Aug.18, 2022</u>

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
6dB DTS bandwidth measurement	15.247 (a) (2)	Pass
Maximum Peak Conducted Power	15.247 (b) (3)	Pass
Maximum Power Spectral Density Level	15.247 (e)	Pass
Conducted Bandedge and Spurious	15.247 (d)	Pass
Radiated Bandedge and Spurious	15.247 (d) 15.209 15.205	Pass
Conducted emission test for AC power port	15.207	Pass
Antenna Requirement	15.203	Pass

Remark: "N/A" means "Not applicable."

2. GENERAL INFORMATION

2.1. Report information

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

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

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

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

2.2. Laboratory Accreditation and Relationship to Customer

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

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

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

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

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

The Laboratory is Accredited Testing Laboratory of American Association for

Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

Conducted Emission

9 kHz~150 kHz U=3.7dB k=2

150 kHz~30MHz U=3.3dB k=2

Radiated Emission

30MHz~1000MHz U=4.3dB k=2

1GHz~6GHz U=4.6 dB k=2

6GHz~40GHz U=5.1dB k=2

3. PRODUCT DESCRIPTION

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

3.1. EUT Description

Description : Mobile Phone
 Manufacturer : Guangdong OPPO Mobile Telecommunications Corp., Ltd.
 Model Number : CPH2477
 Operate Frequency : 2.412GHz~2.462GHz
 Antenna Designation : Fixed Internal Antenna 1dBi
 Operating voltage : DC3.6V (Low)/DC3.87V (Nominal)/DC4.45V (Max)
 Software Version : ColorOS V12.1
 Hardware Version : 11

Remark: 1. There are two adapters, only the worst data of OP52YAUH (1#) shown in this report.
 2. There are three batteries, only the worst data of BLP915 (1#) shown in this report.

WLAN:

Table 2 Working Frequency List (802.11b, 802.11g, 802.11n HT20, 802.11ac VHT20)

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	---	---
6	2437MHz	---	---
7	2442MHz	---	---

Table 3 Working Frequency List (802.11n HT40, 802.11ac VHT40)

Channel	Frequency	Channel	Frequency
3	2422MHz	8	2447MHz
4	2427MHz	9	2452MHz
5	2432MHz	---	---
6	2437MHz	---	---
7	2442MHz	---	---

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

This submittal(s) (test report) is intended for FCC ID: **R9C-CPH2477** filing to comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

3.3. Block Diagram of EUT Configuration

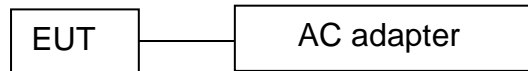


Figure 1 EUT setup

3.4. Operating Condition of EUT

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n HT20 mode: MCS0

802.11n HT40 mode: MCS0

802.11ac VHT20 mode: MCS0

802.11ac VHT40 mode: MCS0

802.11b and 802.11g operates in SISO mode. For SISO conducted measurements, the modes tested in this report will be considered as a worst case mode.

802.11n and 802.11ac operate in SISO mode. For SISO conducted measurements, the modes tested in this report will be considered as a worst case mode.

3.5. Directional Antenna Gain

The EUT does NOT support a WIFI MIMO function.

Directional gain need NOT to be considered.

3.6. Support Equipment List

Table 4 Support Equipment List

Name	Model No	S/N	Manufacturer
Adapter 1# for EUT	OP52YAUH	---	Jiangsu Chenyang Electron Co., Ltd.
Adapter 2# for EUT	OP52JAUH	---	Huizhou Golden Lake Industrial Co., Ltd.
Rechargeable Li-ion Polymer Battery 1# for EUT	BLP915	---	Chongqing CosMX Battery Co.,Ltd
Rechargeable Li-ion Polymer Battery 2# for EUT	BLP915	---	TWS Technology (Guangzhou) Limited
Rechargeable Li-ion Polymer Battery 3# for EUT	BLP915	---	Sunwoda Electronic CO.,LTD.
USB for EUT	DL122	---	---

3.7. Test Conditions

Date of test : Jul.25, 2022- Aug.16, 2022

Date of EUT Receive : Jul.20, 2022

Temperature: 23°C-25°C

Relative Humidity: 46%-58%

3.8. Special Accessories

Not available for this EUT intended for grant.

3.9. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 5 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB9058/05	Test Receiver	R&S	ESCI 3	Sep.24,2021	1 Year
SB4357	AMN	R&S	ENN216	Aug.25,2021	1 Year
SB9549	Shielded Room	Albatross	SR	Sep.24,2021	1 Year
SB17366	Test Receiver	R&S	ESR26	Jun.24,2022	1 Year
SB3955	Broadband Antenna	Schwarzbeck	VULB9163	Dec.30,2021	1 Year
SB9555/01	Semi Anechoic Chamber	Albatross	9×6×6(m)	Aug.25,2021	1 Year
SB13956	Test Receiver	R&S	ESR26	Feb.07,2022	1 Year
SB13961	Horn Antenna	R&S	HF907	Mar.22,2022	1 Year
SB8501/09	Test Receiver	R&S	ESU40	Jan.20,2022	1 Year
SB3435	Horn Antenna	R&S	HF906	Dec.03,2021	1 Year
SB9058/03	Pre-Amplifier	R&S	SCU 18	Jan.20,2022	1 Year
SB8501/10	Horn Antenna	R&S	3160-09	Mar.10,2020	3 Years
SB8501/11	Horn Antenna	R&S	3160-09	Mar.09,2020	3 Years
SB8501/12	Horn Antenna	R&S	3160-10	Mar.17,2020	3 Years
SB8501/13	Horn Antenna	R&S	3160-10	Mar.10,2020	3 Years
SB8501/14	Pre-Amplifier	R&S	SCU-03	Jan.20,2022	1 Year
SB8501/15	Pre-Amplifier	R&S	SCU-03	Jan.20,2022	1 Year
SB8501/16	Pre-Amplifier	R&S	SCU 26	Jan.20,2022	1 Year
SB8501/17	Pre-Amplifier	R&S	SCU-18	Jan.18,2022	1 Year
SB9555/02	Fully Anechoic Chamber	Albatross	10.0×5.2×5.4(m)	Aug.25,2021	1 Year
SB20321/0 1	Spectrum Analyzer	R&S	FSV3044	Dec.24, 2021	1 Year

Table 6 Test software

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

5. DUTY CYCLE

5.1. LIMITS OF DUTY CYCLE

None; for reporting purposes only

5.2. TEST PROCEDURE

1. Set span = Zero
2. RBW = 10MHz
3. VBW = 10MHz,
4. Detector = Peak

5.3. TEST SETUP

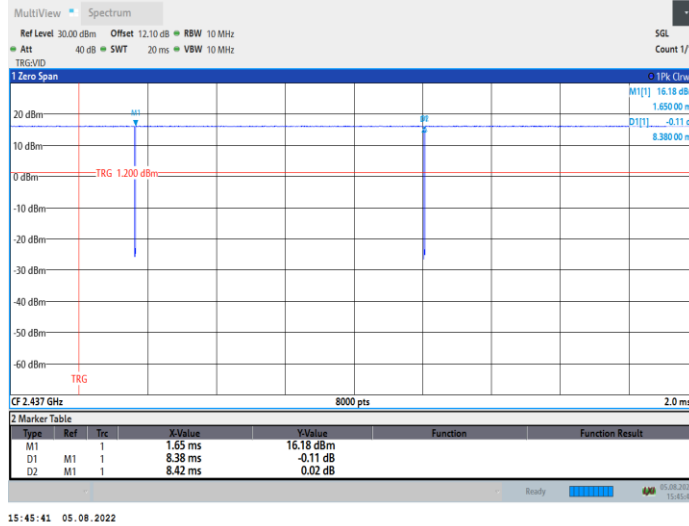


5.4. TEST DATA

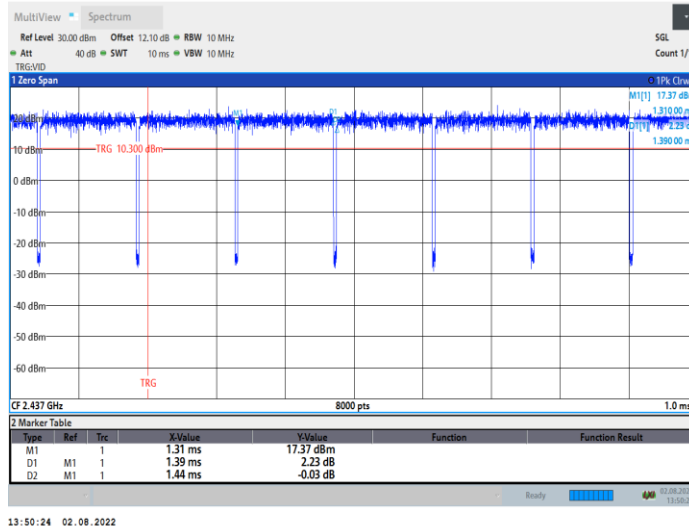
Table 7 Duty Cycle Test Data

Test Mode	On Time (ms)	Duty Cycle (%)	Duty Factor	1/T Minimum VBW (kHz)
802.11b	8.38	99.52	0.02	0.01
802.11g	1.39	96.53	0.15	0.01
802.11n HT20	1.29	96.27	0.17	0.01
802.11n HT40	0.63	92.65	0.33	0.01
802.11ac VHT20	1.31	96.32	0.16	0.01
802.11ac VHT40	0.65	92.86	0.32	0.01

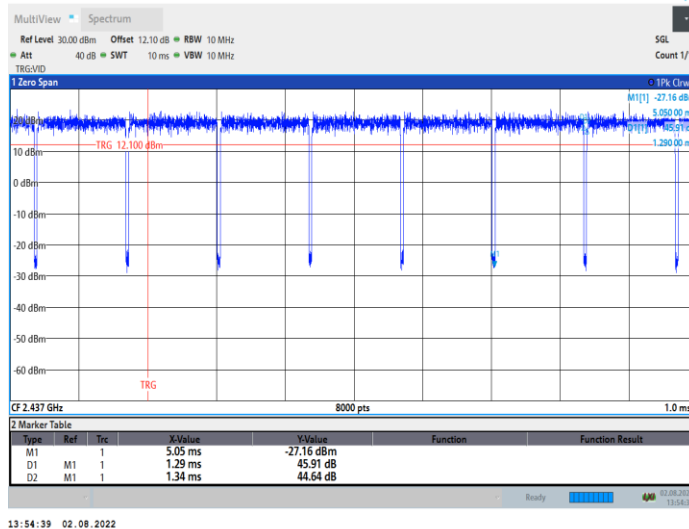
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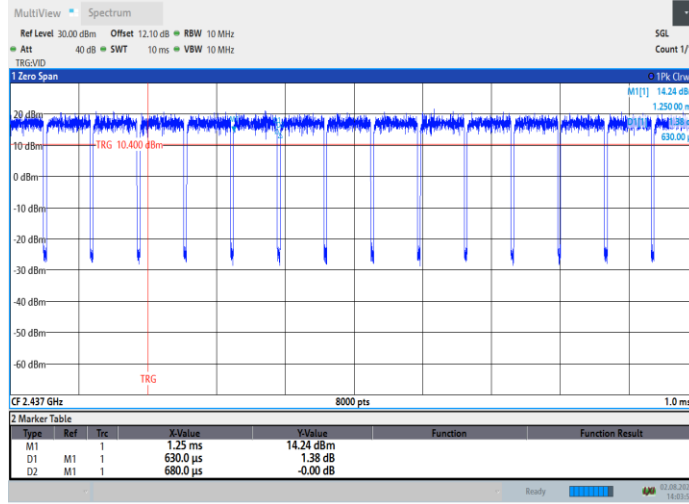
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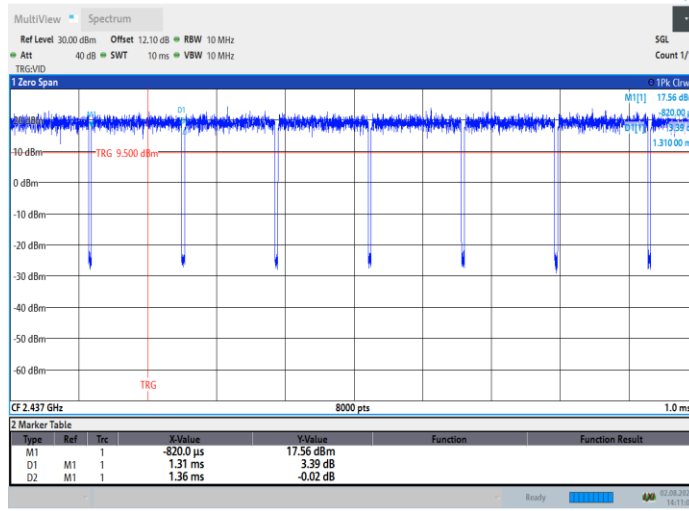
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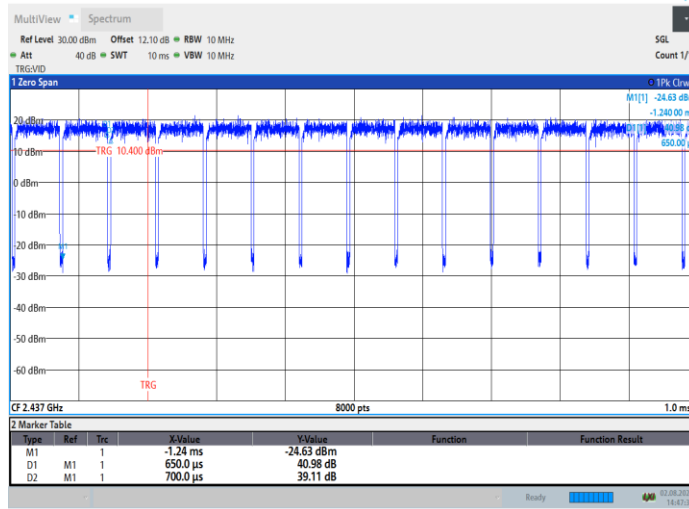
11N40SISO_Ant1_2437



11A20SISO_Ant1_2437



11A40SISO_Ant1_2437



6. 6DB BANDWIDTH MEASUREMENT

6.1.LIMITS OF 6dB BANDWIDTH MEASUREMENT

CFR 47 (FCC) part 15.247 (a) (2)

6.2.TEST PROCEDURE

ANSI C63.10-2013 Clause 11.8

The transmitter output was connected to the spectrum analyzer.

- a) Set RBW = 100 kHz.
- b) Set the VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

6.3.TEST SETUP

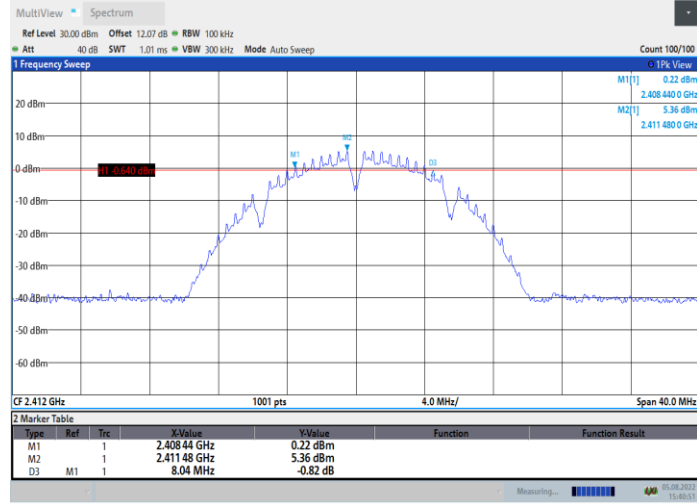


6.4. Test Data

Table 8 6dB Bandwidth Test Data

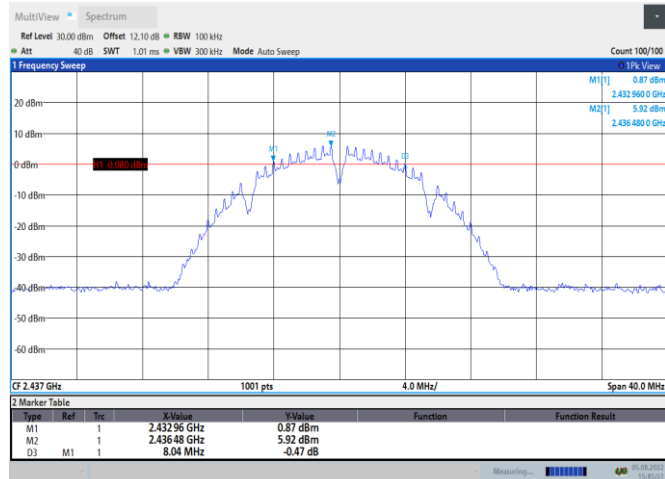
Test Mode	Channel	6dB Bandwidth [MHz]	Limit[MHz]	Verdict
802.11b	2412	8.04	0.5	PASS
	2437	8.04	0.5	PASS
	2462	8.08	0.5	PASS
802.11g	2412	15.72	0.5	PASS
	2437	15.16	0.5	PASS
	2462	15.72	0.5	PASS
802.11n HT20	2412	16.44	0.5	PASS
	2437	15.16	0.5	PASS
	2462	16.36	0.5	PASS
802.11n HT40	2422	36.16	0.5	PASS
	2437	35.92	0.5	PASS
	2452	36.32	0.5	PASS
802.11ac VHT20	2412	16.44	0.5	PASS
	2437	15.16	0.5	PASS
	2462	16.36	0.5	PASS
802.11ac VHT40	2422	36.16	0.5	PASS
	2437	35.92	0.5	PASS
	2452	36.24	0.5	PASS

11B_Ant1_2412



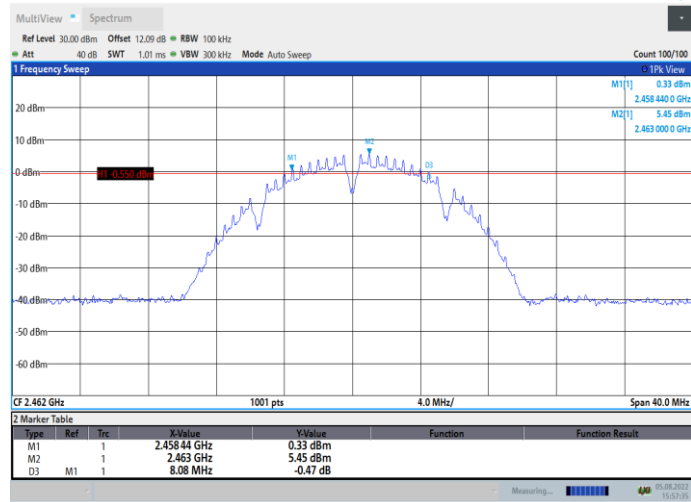
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11B_Ant1_2437



15:45:51 05.08.2022

11B_Ant1_2462

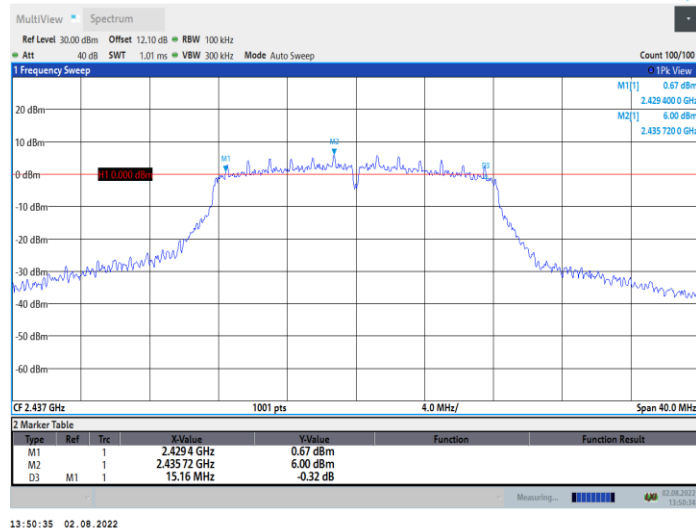


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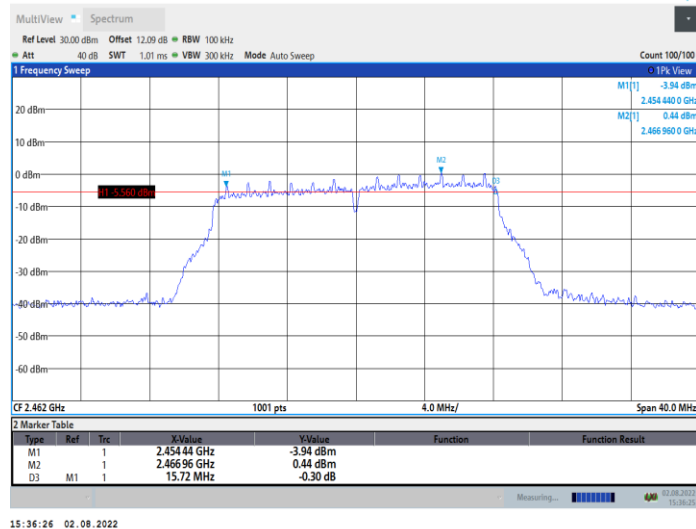
11G_Ant1_2412



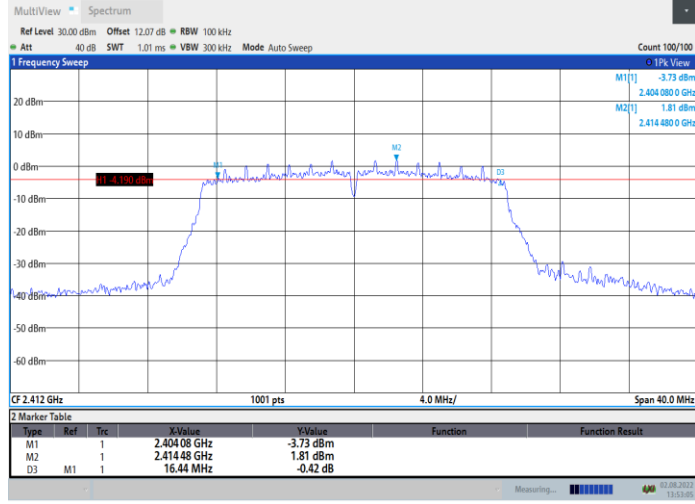
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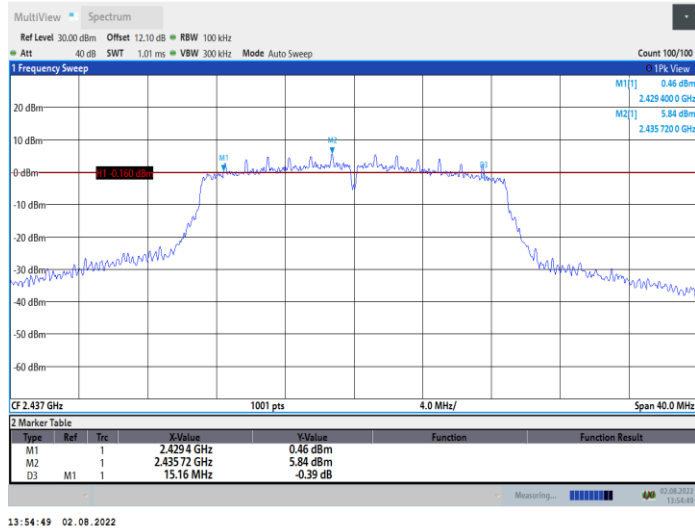
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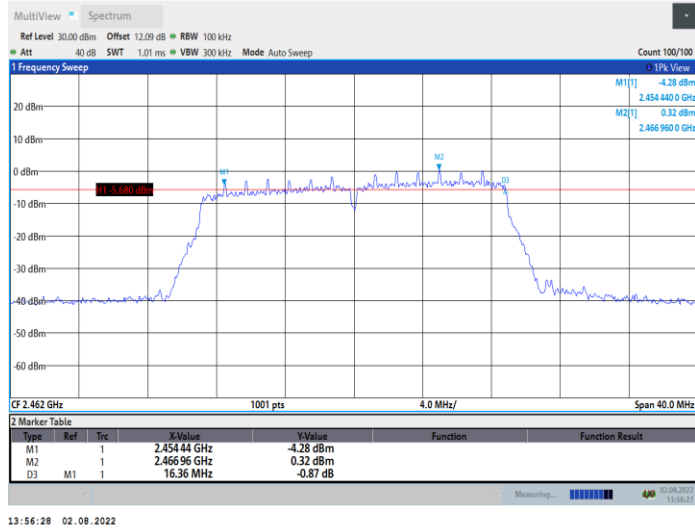
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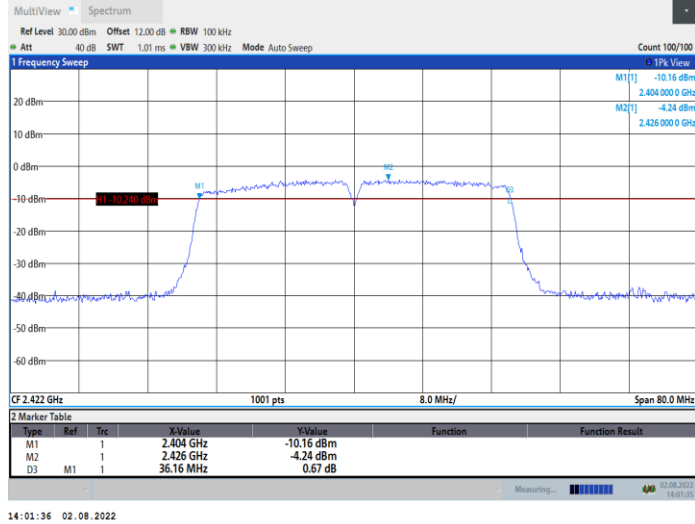
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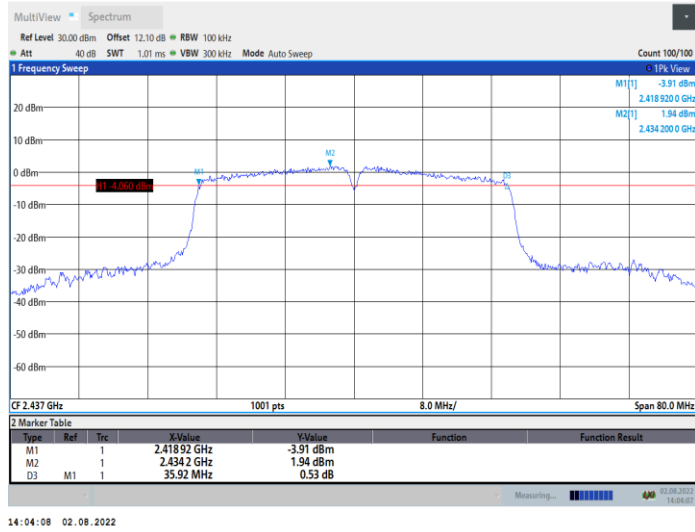
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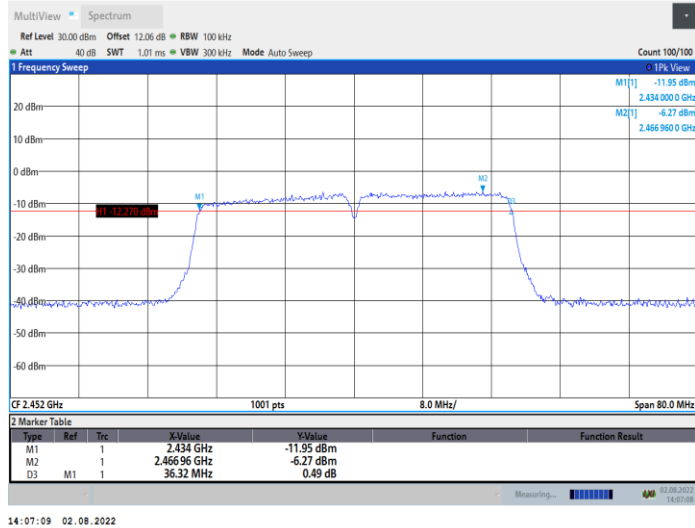
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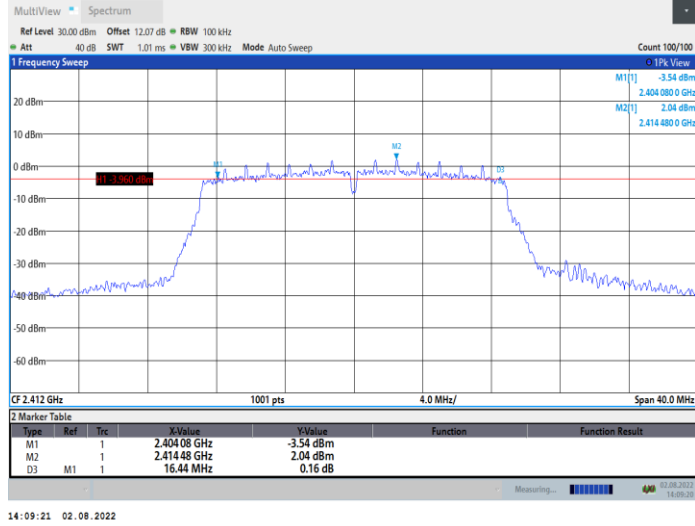
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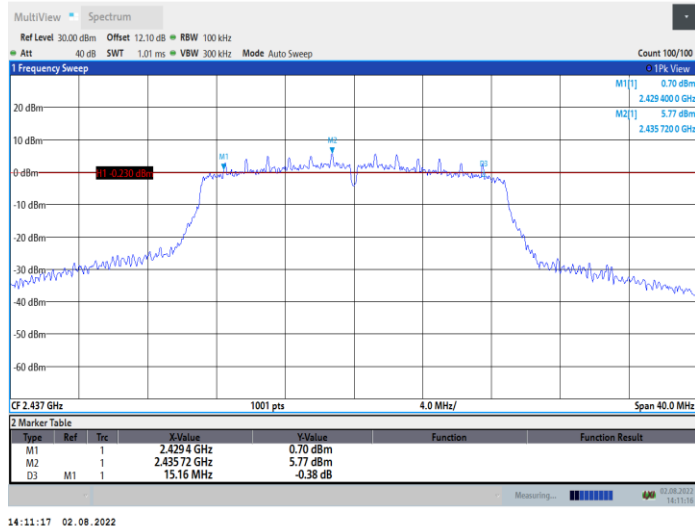
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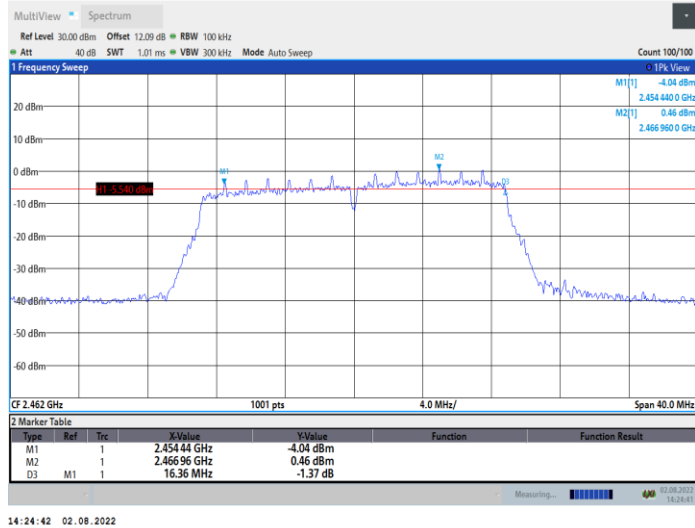
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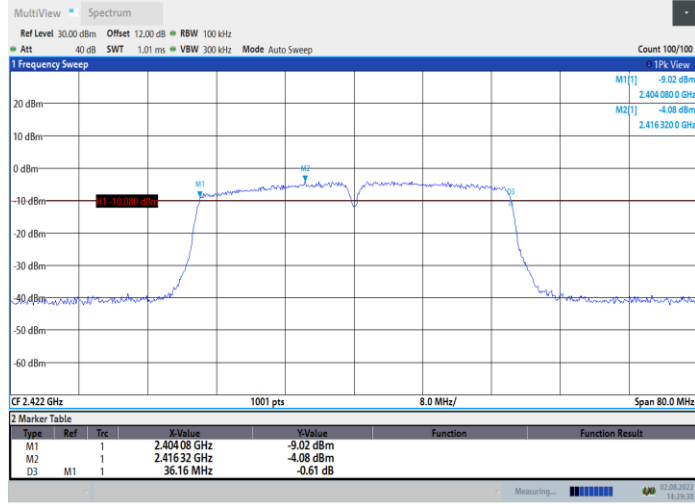
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11AC20SISO_Ant1_2462

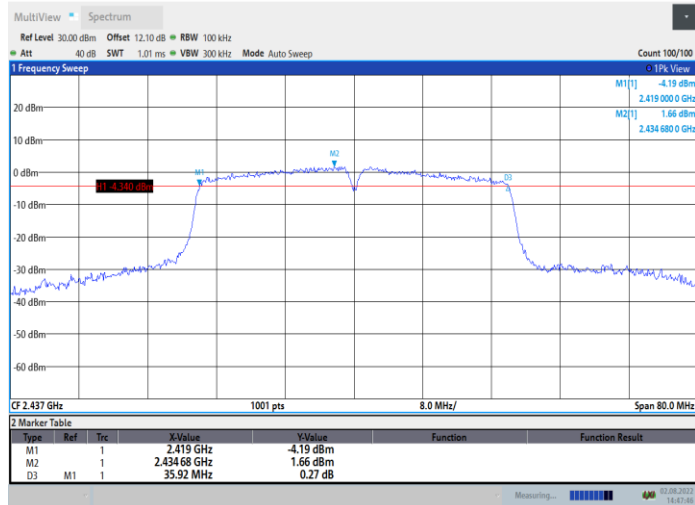


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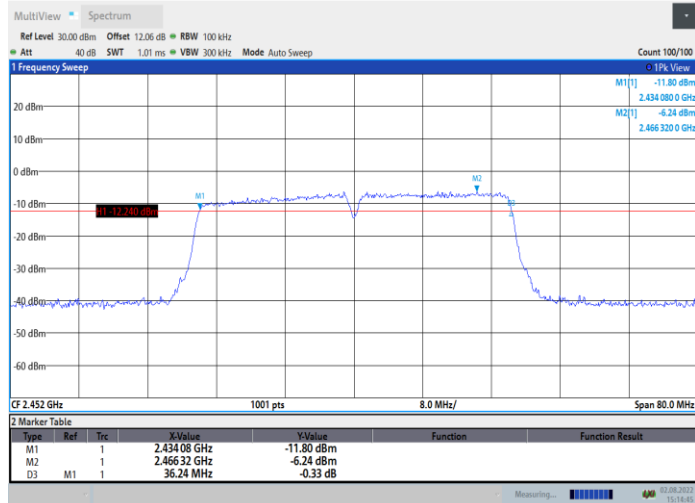
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11AC40SISO_Ant1_2437



14:47:46 02.08.2022

11AC40SISO_Ant1_2452



15:14:45 02.08.2022

7. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

7.1. LIMITS OF Maximum Conducted Output Power Measurement

CFR 47 (FCC) part 15.247 (b) (3)

7.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 11.9

The following procedure can be used when the maximum available RBW of the instrument is less than the DTS bandwidth:

DTS bandwidth:

- a) Set the RBW = 1 MHz.
- b) Set the VBW $\geq [3 \times \text{RBW}]$.
- c) Set the span $\geq [1.5 \times \text{DTS bandwidth}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

7.3. TEST SETUP

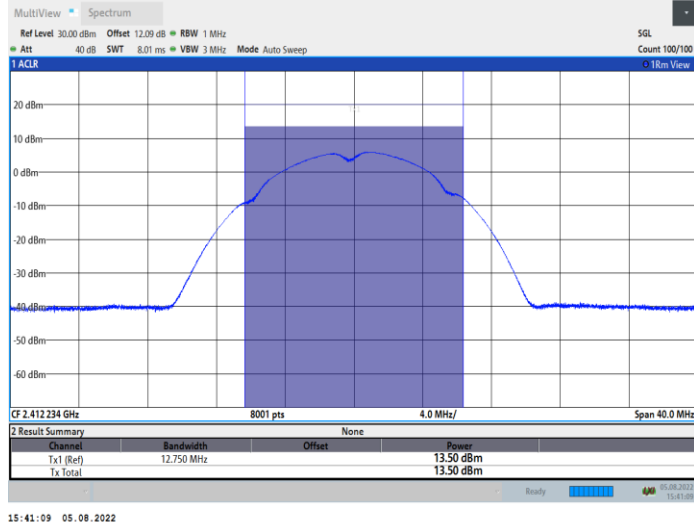


7.4. TEST DATA

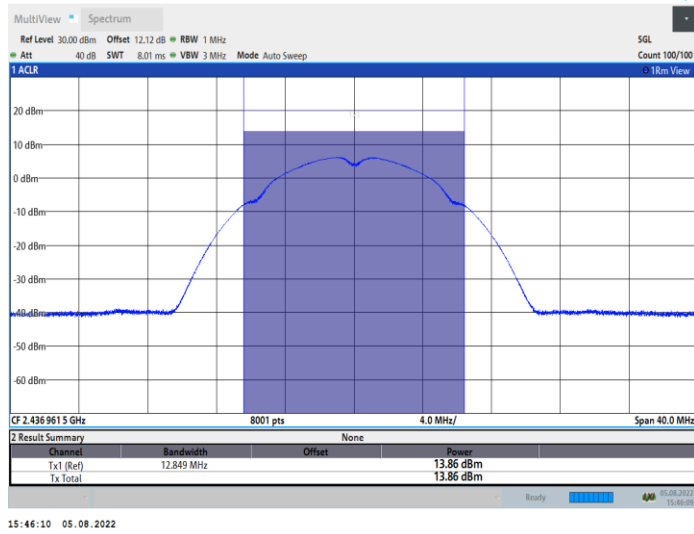
Table 9 Maximum Conducted Output Power

Test Mode	Channel	Output Power [dBm]	Limit [dBm]	Verdict
802.11b	2412	13.50	<=30	PASS
	2437	13.86	<=30	PASS
	2462	13.21	<=30	PASS
802.11g	2412	12.84	<=30	PASS
	2437	16.29	<=30	PASS
	2462	10.56	<=30	PASS
802.11n HT20	2412	12.55	<=30	PASS
	2437	16.14	<=30	PASS
	2462	10.17	<=30	PASS
802.11n HT40	2422	11.02	<=30	PASS
	2437	16.45	<=30	PASS
	2452	8.83	<=30	PASS
802.11ac VHT20	2412	12.58	<=30	PASS
	2437	16.18	<=30	PASS
	2462	10.41	<=30	PASS
802.11ac VHT40	2422	10.97	<=30	PASS
	2437	16.49	<=30	PASS
	2452	9.06	<=30	PASS

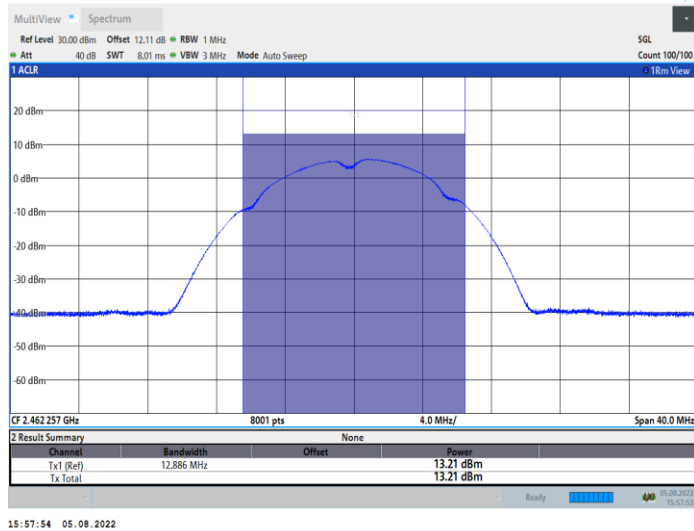
11B_Ant1_2412



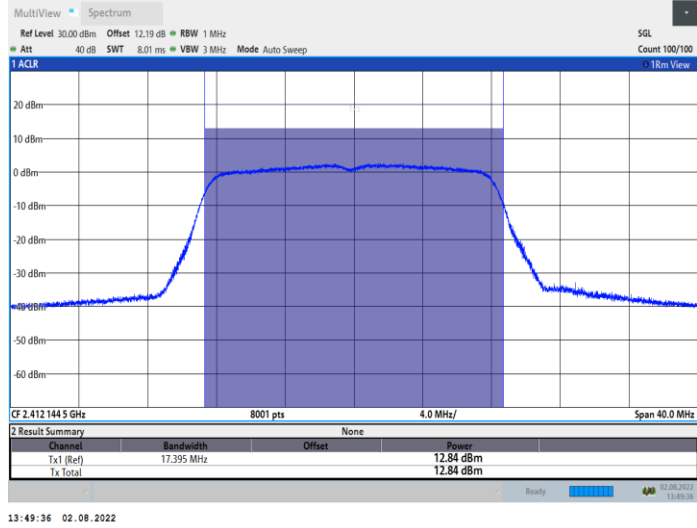
11B_Ant1_2437



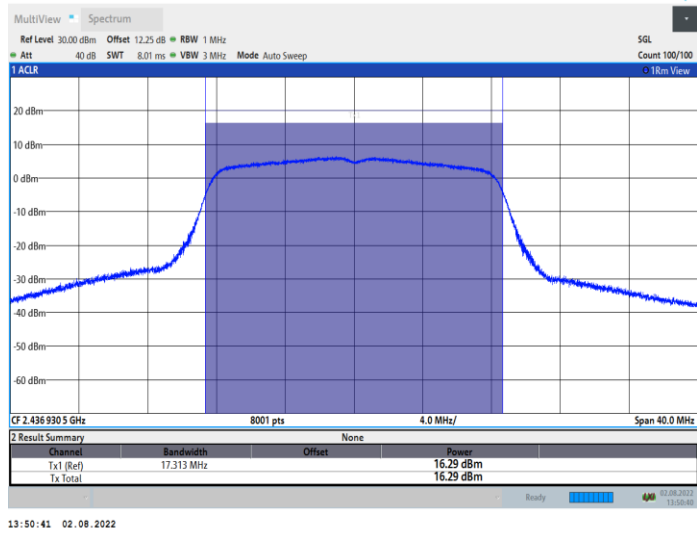
11B_Ant1_2462



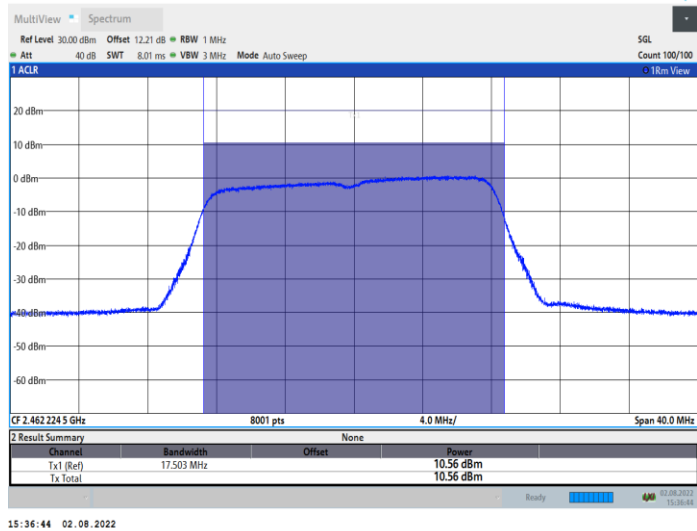
11G_Ant1_2412



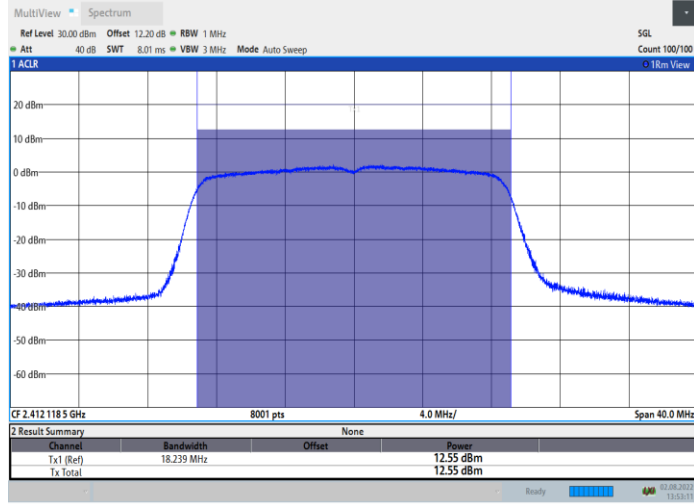
11G_Ant1_2437



11G_Ant1_2462

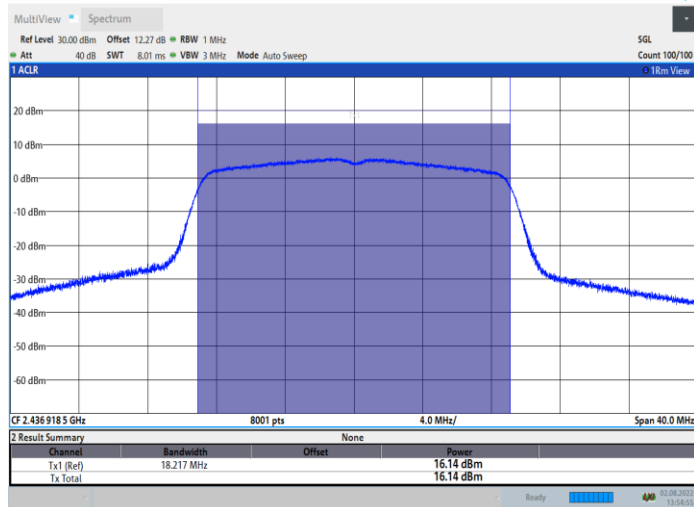


11N20SISO_Ant1_2412



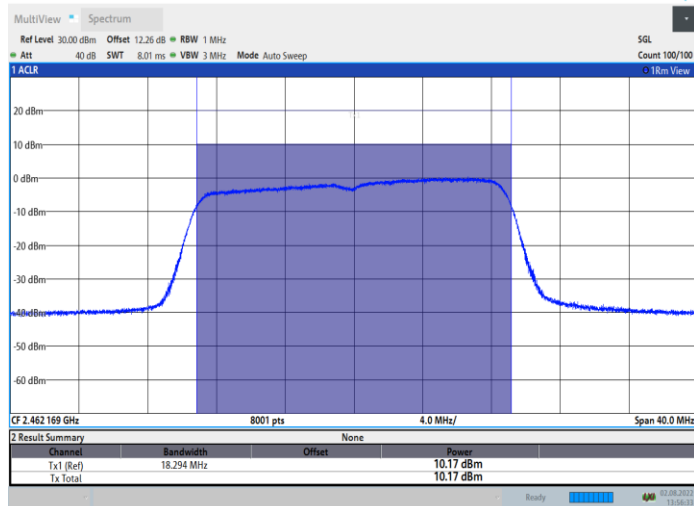
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11N20SISO_Ant1_2437



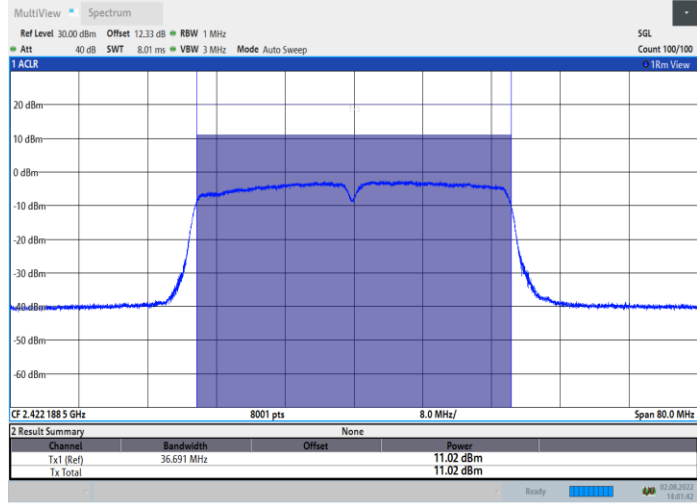
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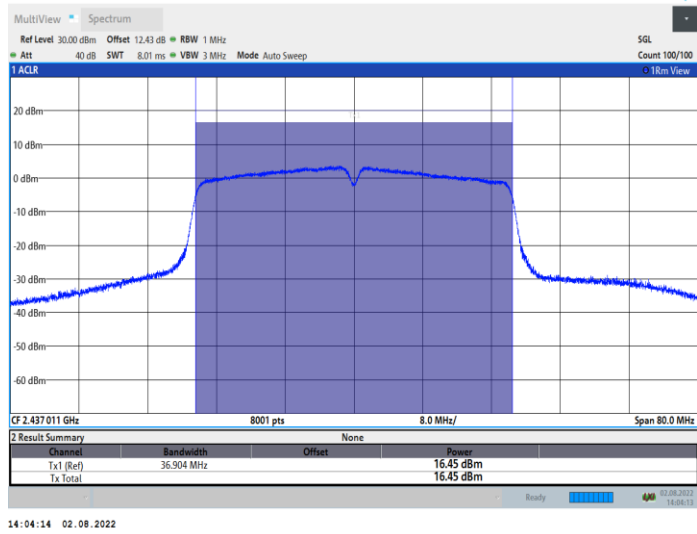


13:56:34 02.08.2022

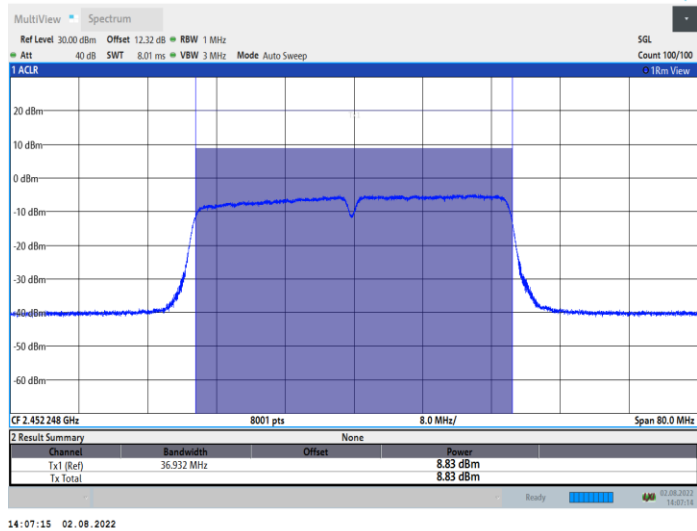
11N40SISO_Ant1_2422



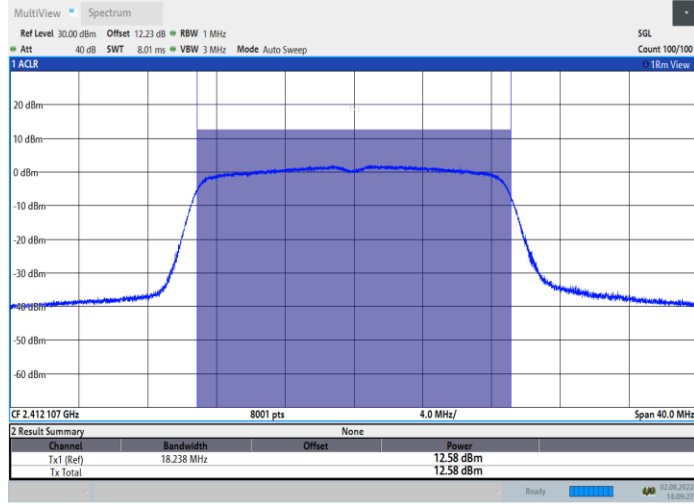
11N40SISO_Ant1_2437



11N40SISO_Ant1_2452

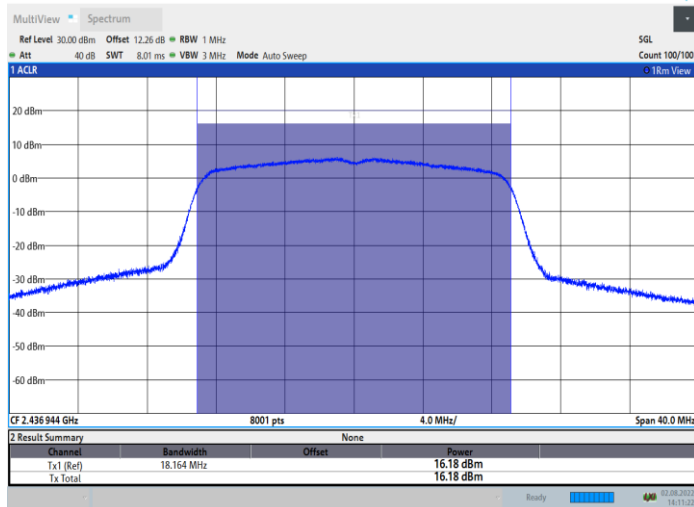


11AC20SISO_Ant1_2412



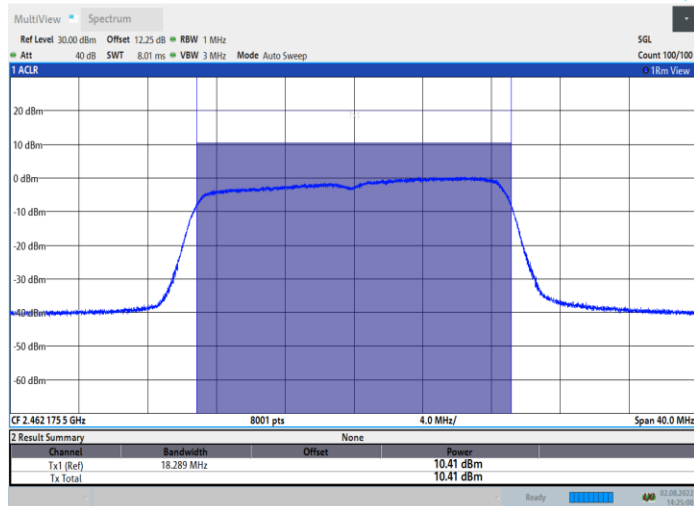
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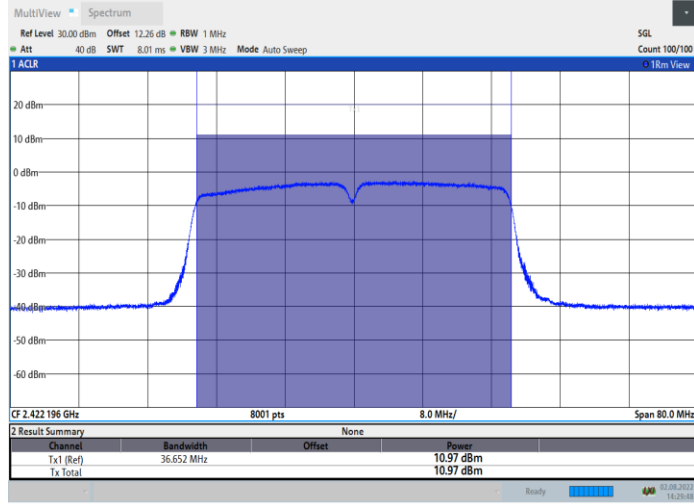
14:11:23 02.08.2022

11AC20SISO_Ant1_2462



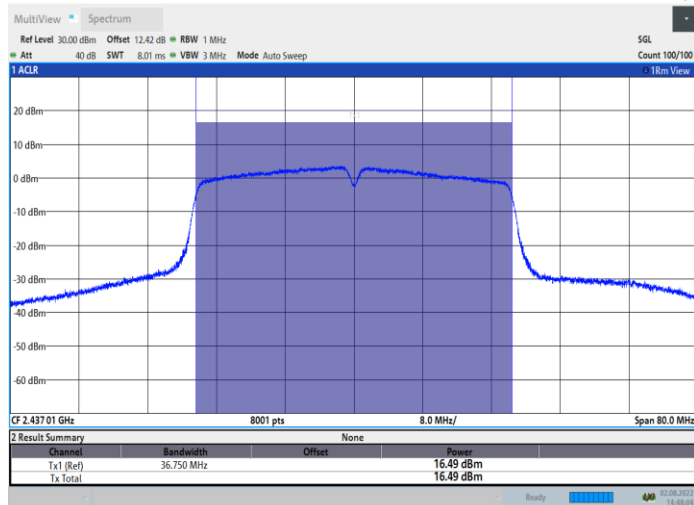
14:25:00 02.08.2022

11AC40SISO_Ant1_2422



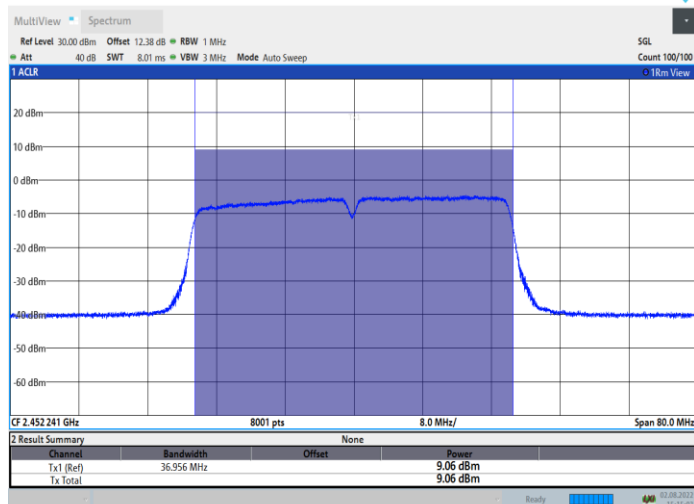
14:29:49 02.08.2022

11AC40SISO_Ant1_2437



14:48:05 02.08.2022

11AC40SISO_Ant1_2452



15:15:03 02.08.2022

8. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

8.1. LIMITS OF Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.247 (e)

8.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 11.10

The transmitter output was connected to the spectrum analyzer.

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.

d) Set VBW $\geq 3 \times \text{RBW}$.

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

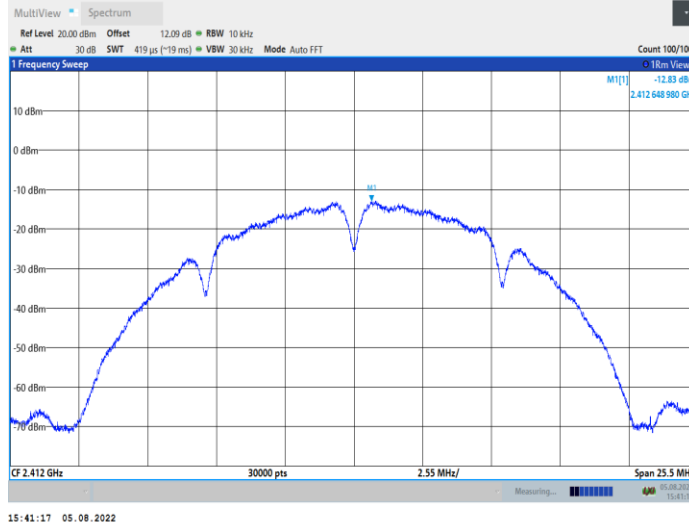
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.3. TEST DATA

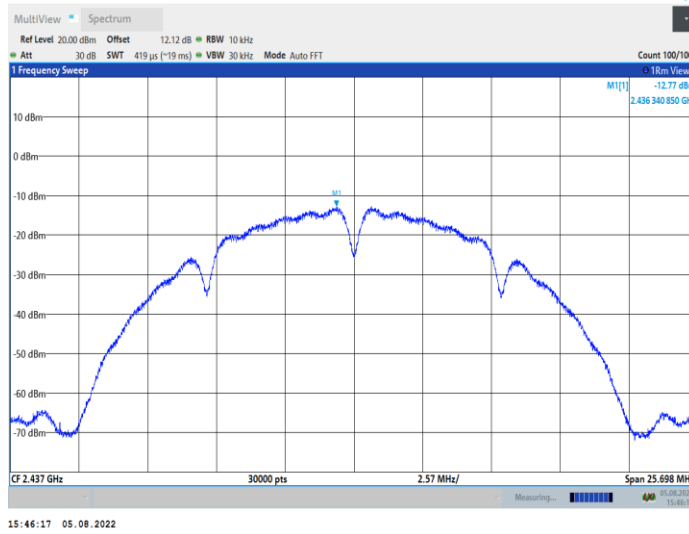
Table 10 Maximum Power Spectral Density Level

Test Mode	Channel	Maximum Power Spectral Density Level [dBm]	Limit [dBm]	Verdict
802.11b	2412	-12.83	≤ -8	PASS
	2437	-12.77	≤ -8	PASS
	2462	-13.29	≤ -8	PASS
802.11g	2412	-16.11	≤ -8	PASS
	2437	-12.44	≤ -8	PASS
	2462	-18.23	≤ -8	PASS
802.11n HT20	2412	-15.82	≤ -8	PASS
	2437	-12.36	≤ -8	PASS
	2462	-17.42	≤ -8	PASS
802.11n HT40	2422	-20.35	≤ -8	PASS
	2437	-14.34	≤ -8	PASS
	2452	-23.4	≤ -8	PASS
802.11ac VHT20	2412	-15.69	≤ -8	PASS
	2437	-11.97	≤ -8	PASS
	2462	-17.34	≤ -8	PASS
802.11ac VHT40	2422	-20.14	≤ -8	PASS
	2437	-14.36	≤ -8	PASS
	2452	-22.98	≤ -8	PASS

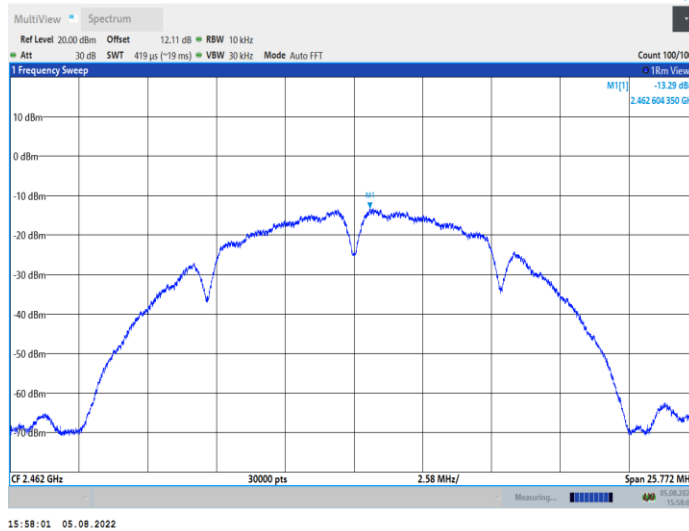
11B_Ant1_2412



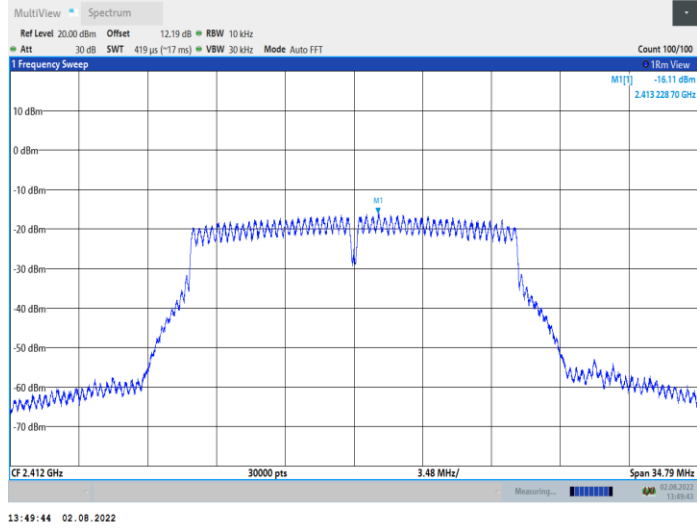
11B_Ant1_2437



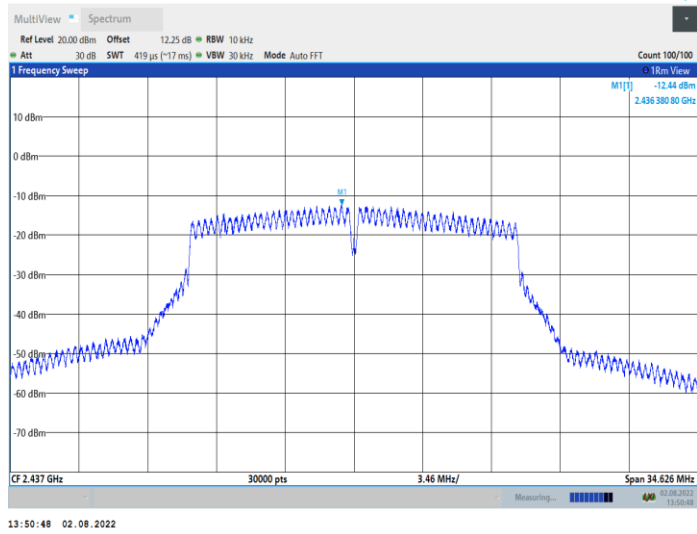
11B_Ant1_2462



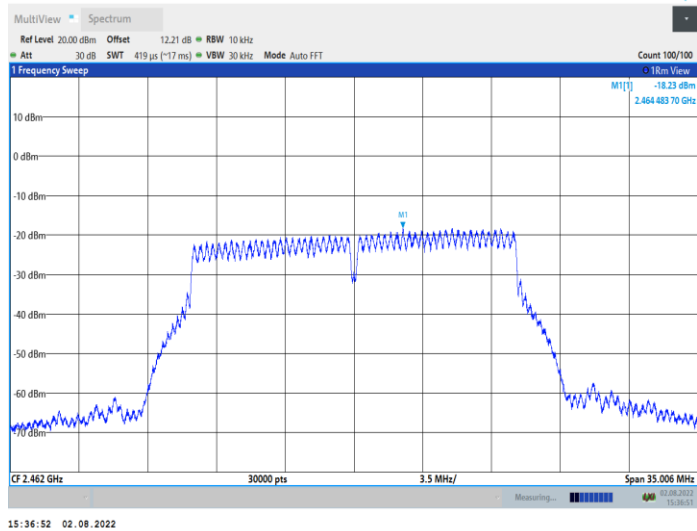
11G_Ant1_2412



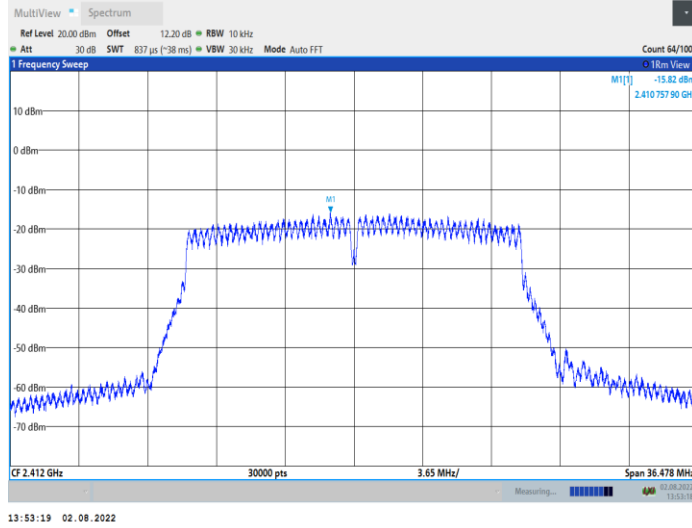
11G_Ant1_2437



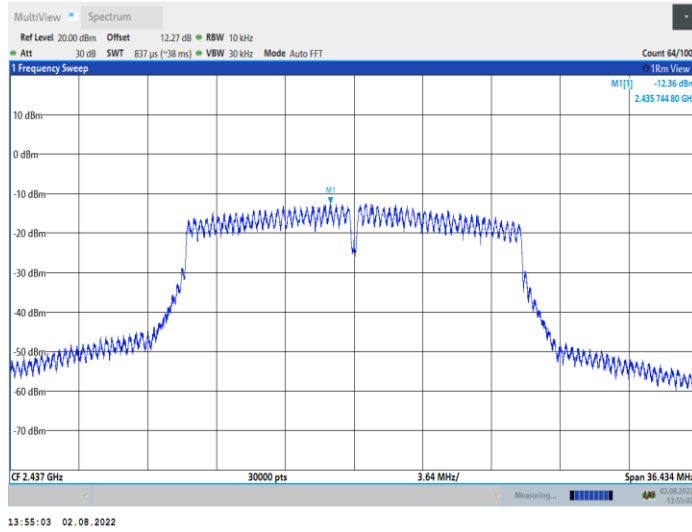
11G_Ant1_2462



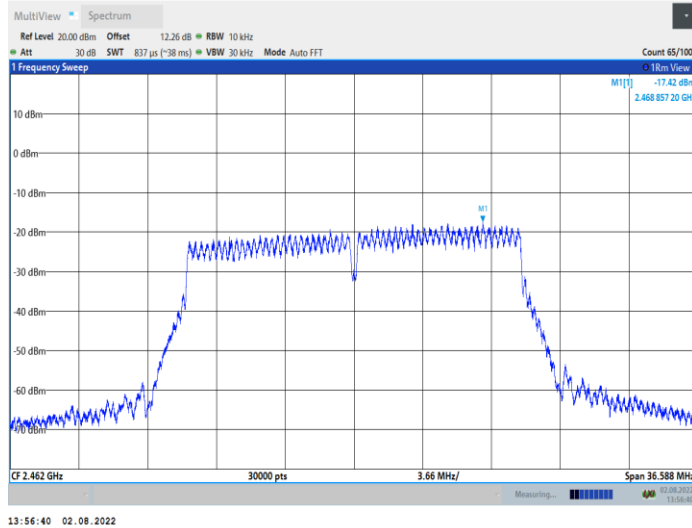
11N20SISO_Ant1_2412



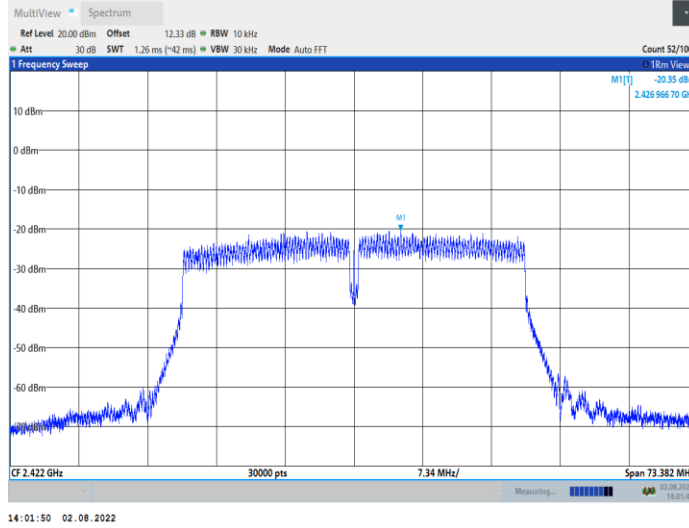
11N20SISO_Ant1_2437



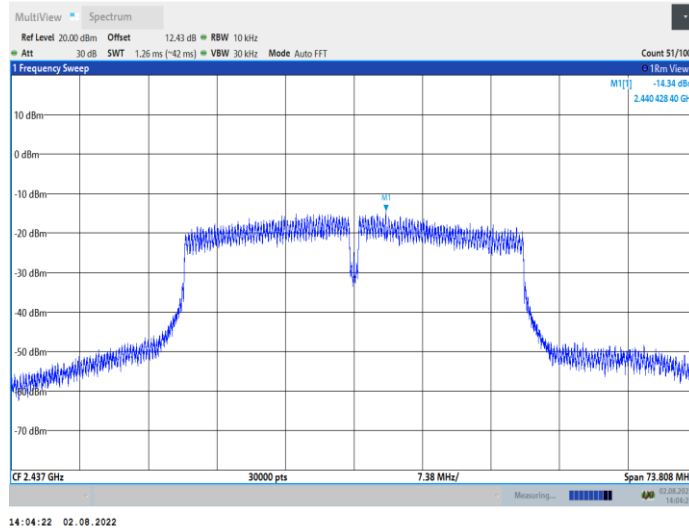
11N20SISO_Ant1_2462



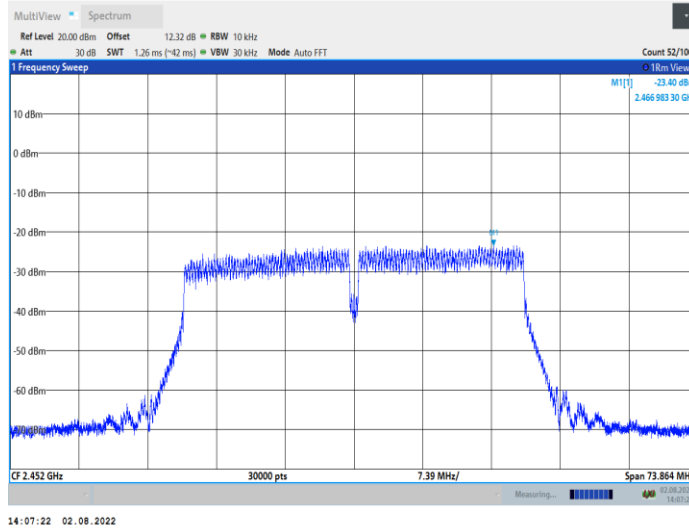
11N40SISO_Ant1_2422



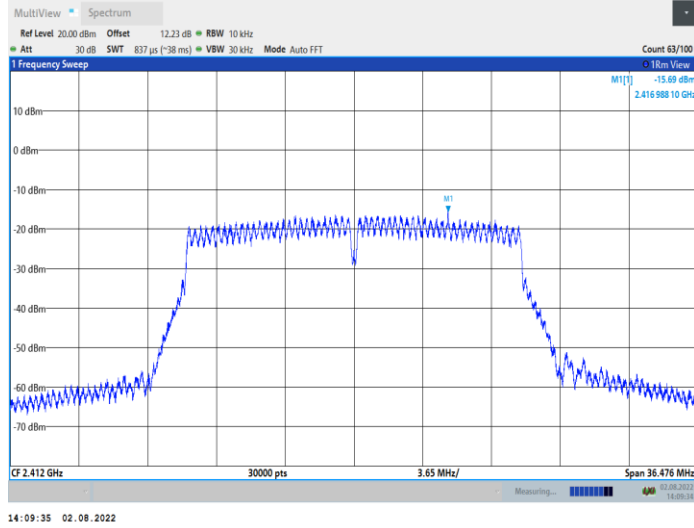
11N40SISO_Ant1_2437



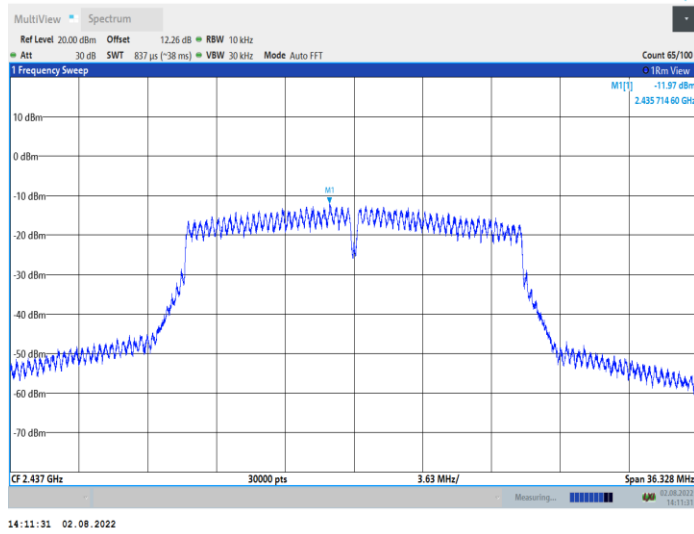
11N40SISO_Ant1_2452



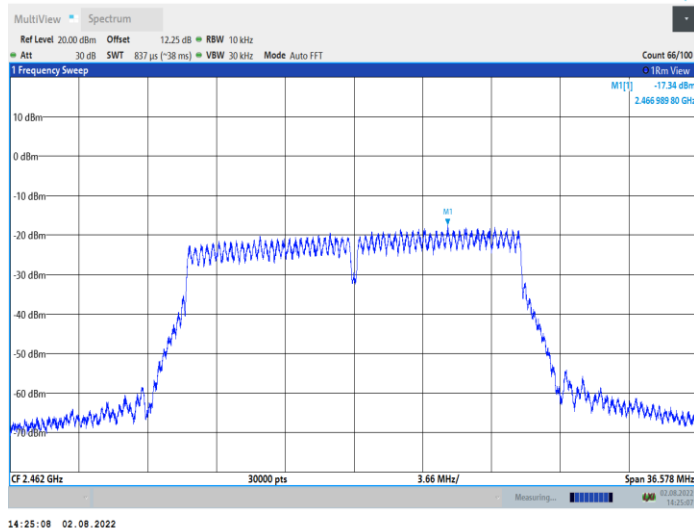
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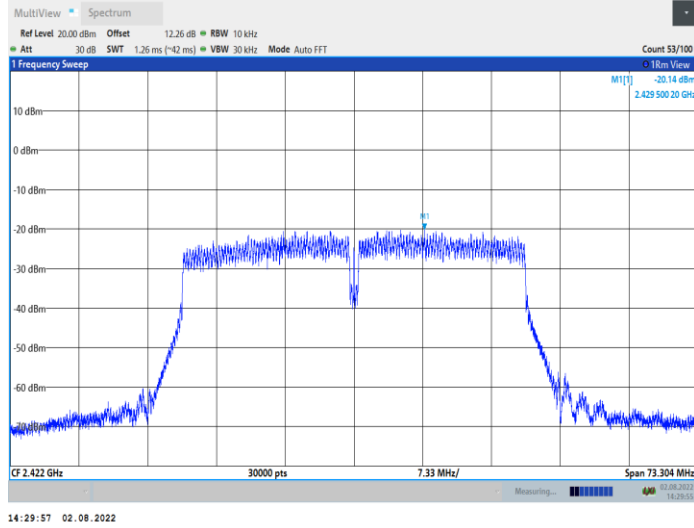
11AC20SISO_Ant1_2437



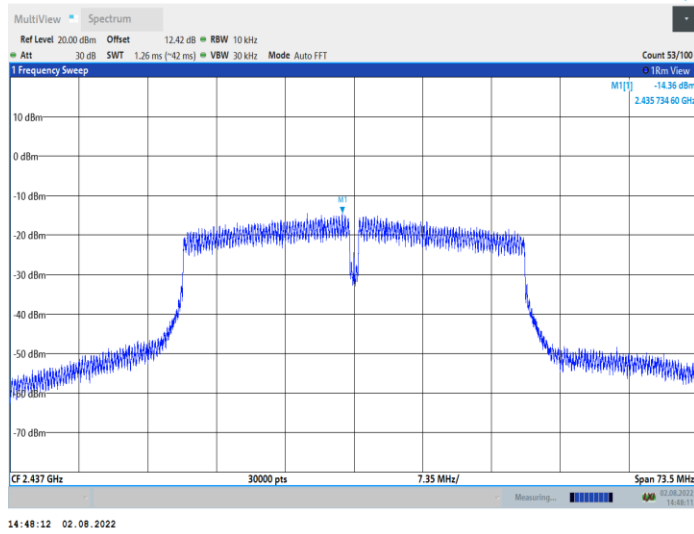
11AC20SISO_Ant1_2462



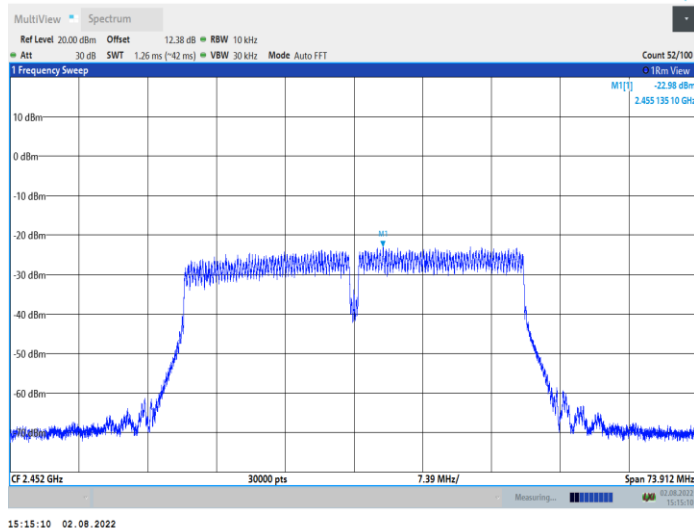
11AC40SISO_Ant1_2422



11AC40SISO_Ant1_2437



11AC40SISO_Ant1_2452



9. CONDUCTED BANDEDGE AND SPURIOUS MEASUREMENT

9.1. LIMITS OF Conducted Bandedge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d)

9.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 11.11

The transmitter output was connected to the spectrum analyzer.

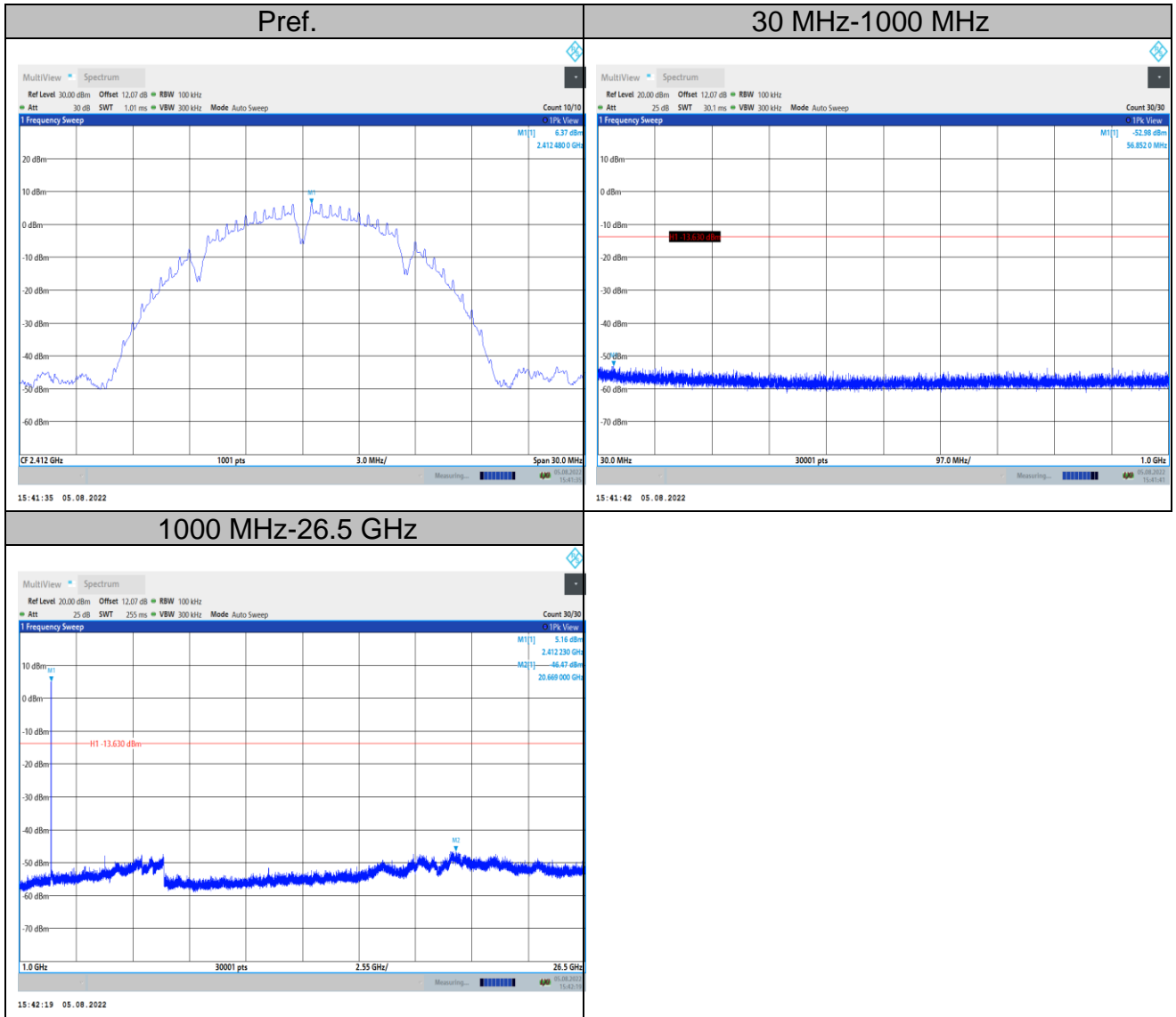
Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to ≥ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW $\geq 3 \times$ RBW.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.
- Emission level measurement
- a) Set the center frequency and span to encompass frequency range to be measured.
 - b) Set the RBW = 100 kHz.
 - c) Set the VBW $\geq 3 \times$ RBW.
 - d) Detector = peak.
 - e) Sweep time = auto couple.
 - f) Trace mode = max hold.
 - g) Allow trace to fully stabilize.
 - h) Use the peak marker function to determine the maximum amplitude level.

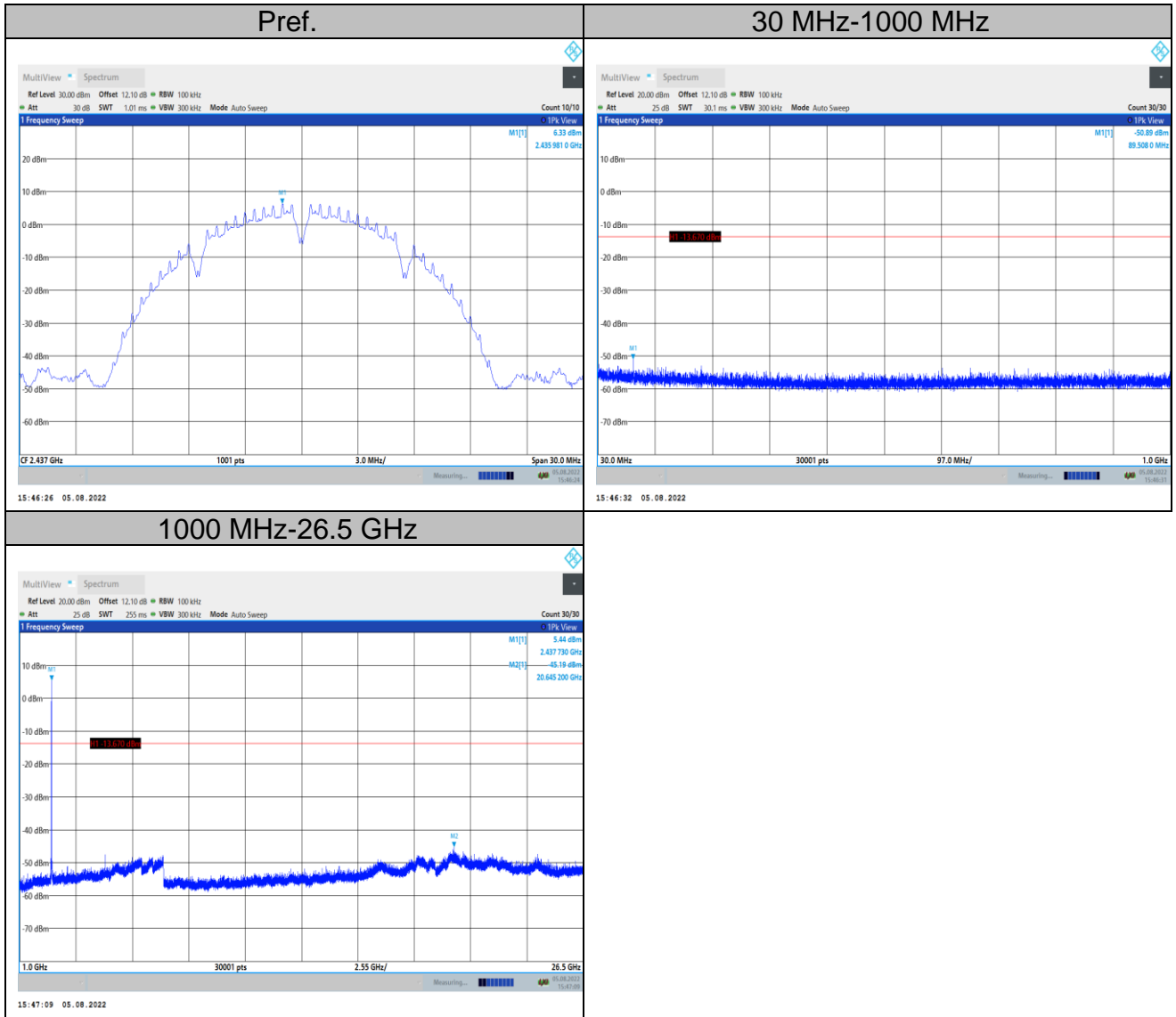
Test Result : All emission outside of 2400-2483.5 are lower at least 20dB than fundamental frequency.

9.3. TEST DATA

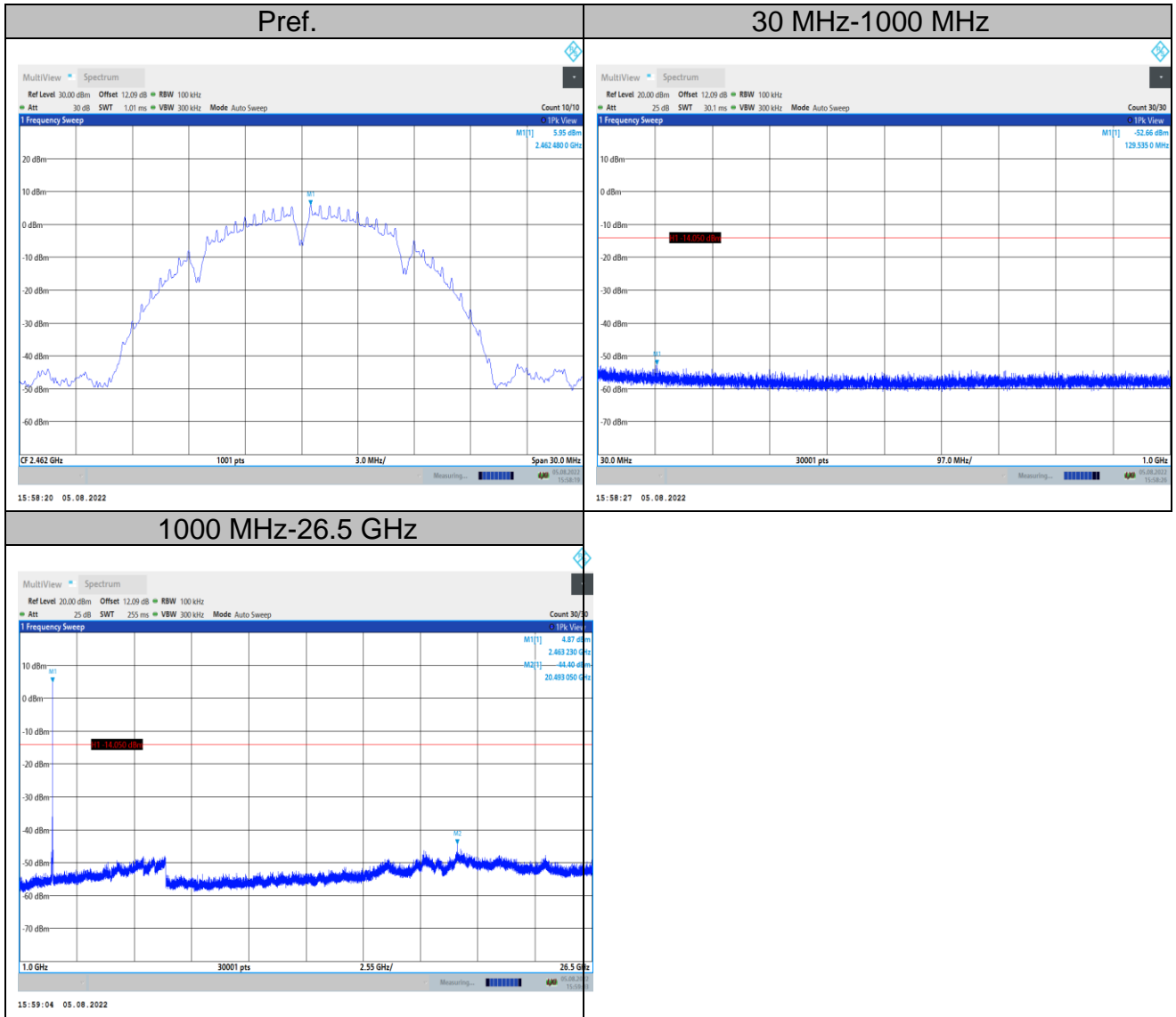
802.11b Low Channel



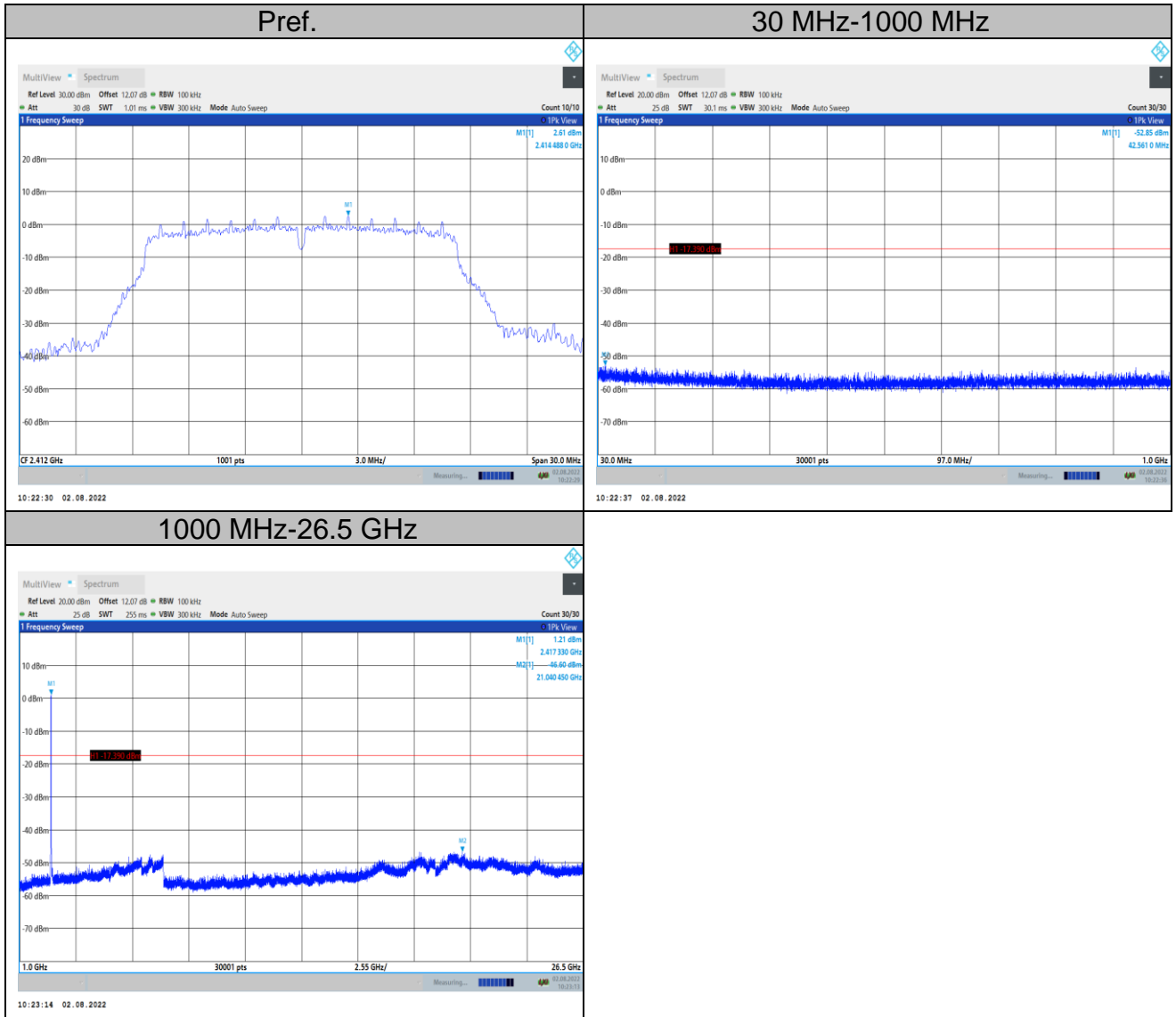
802.11b Mid Channel



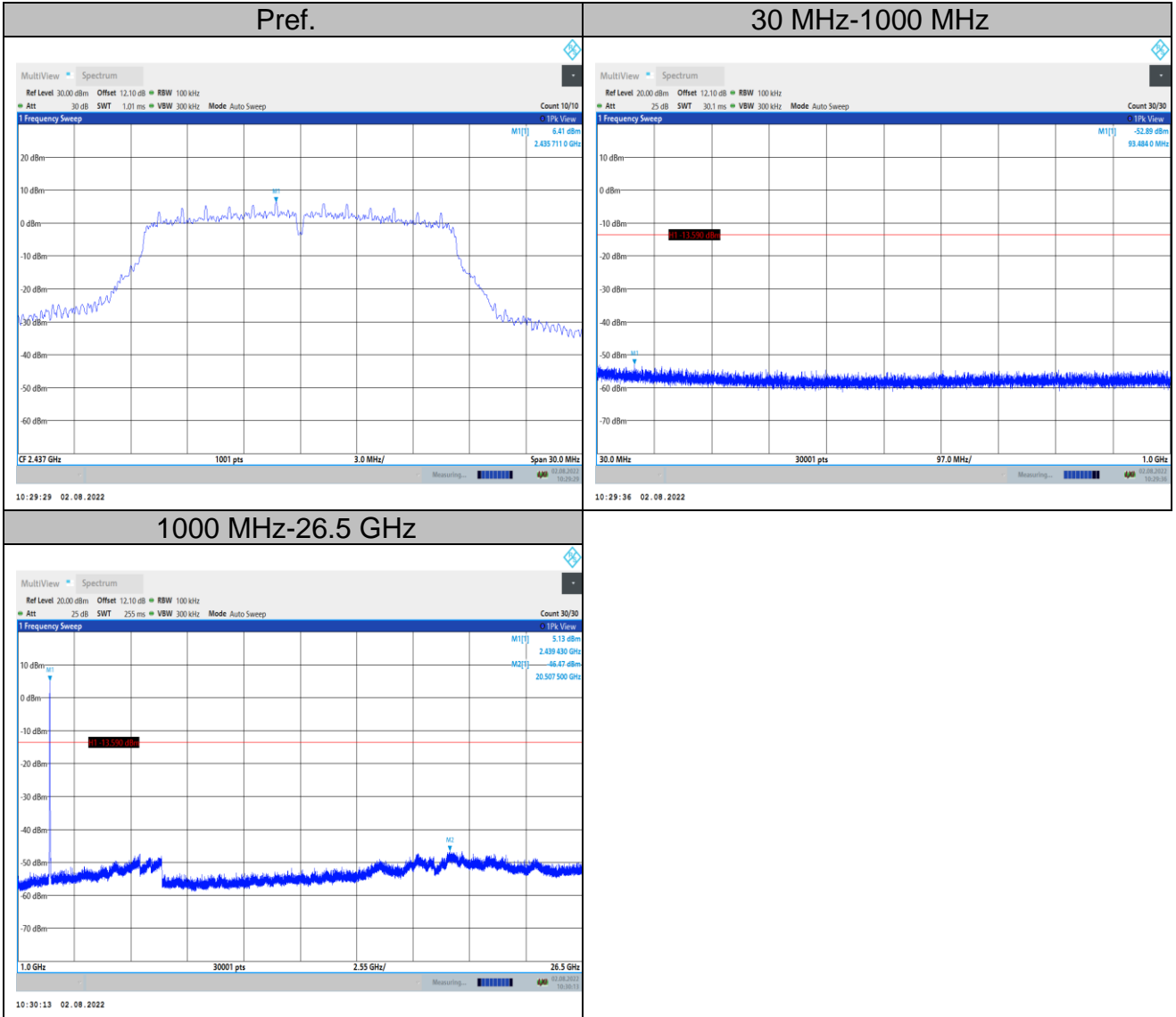
802.11b High Channel



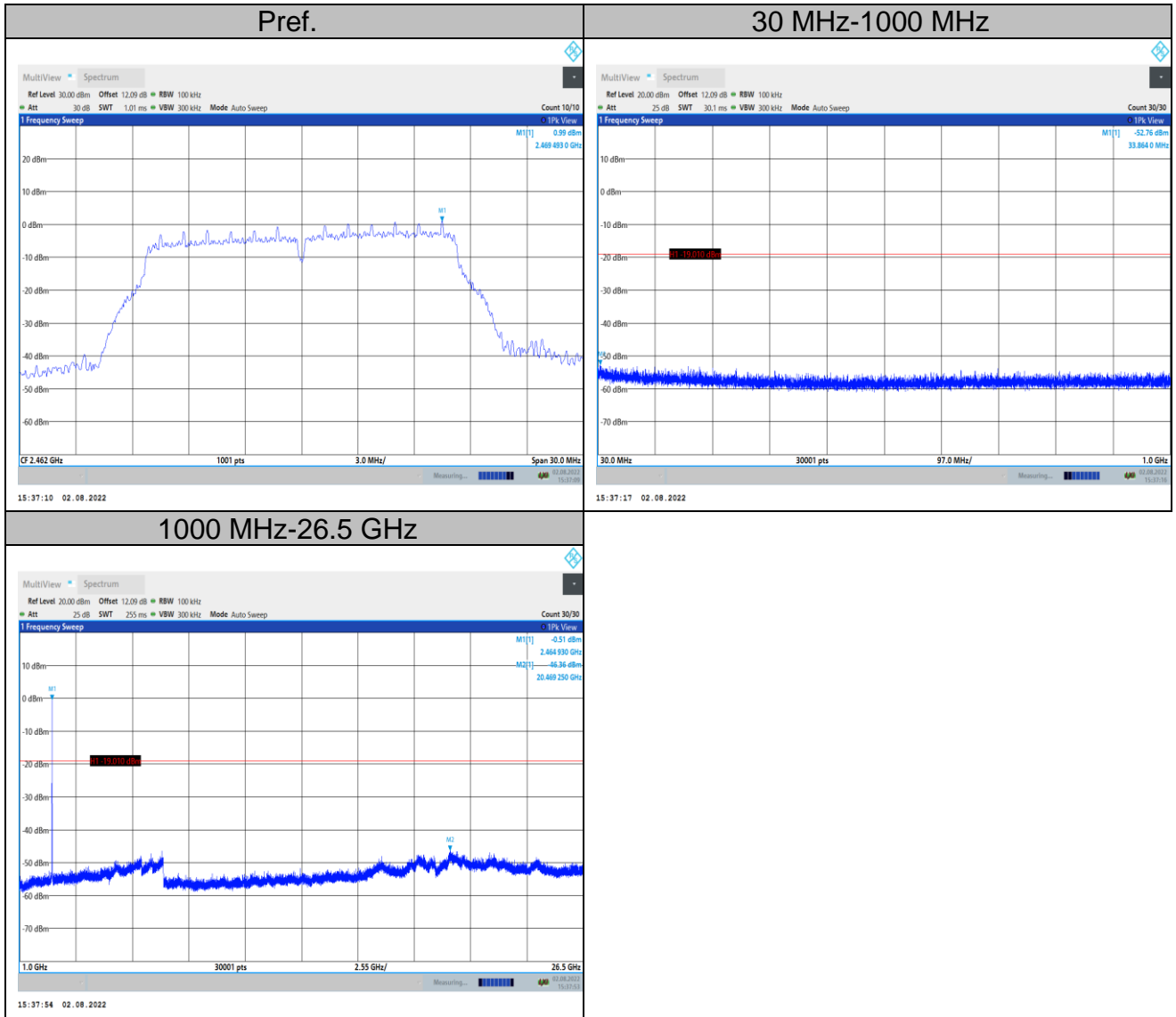
802.11g Low Channel



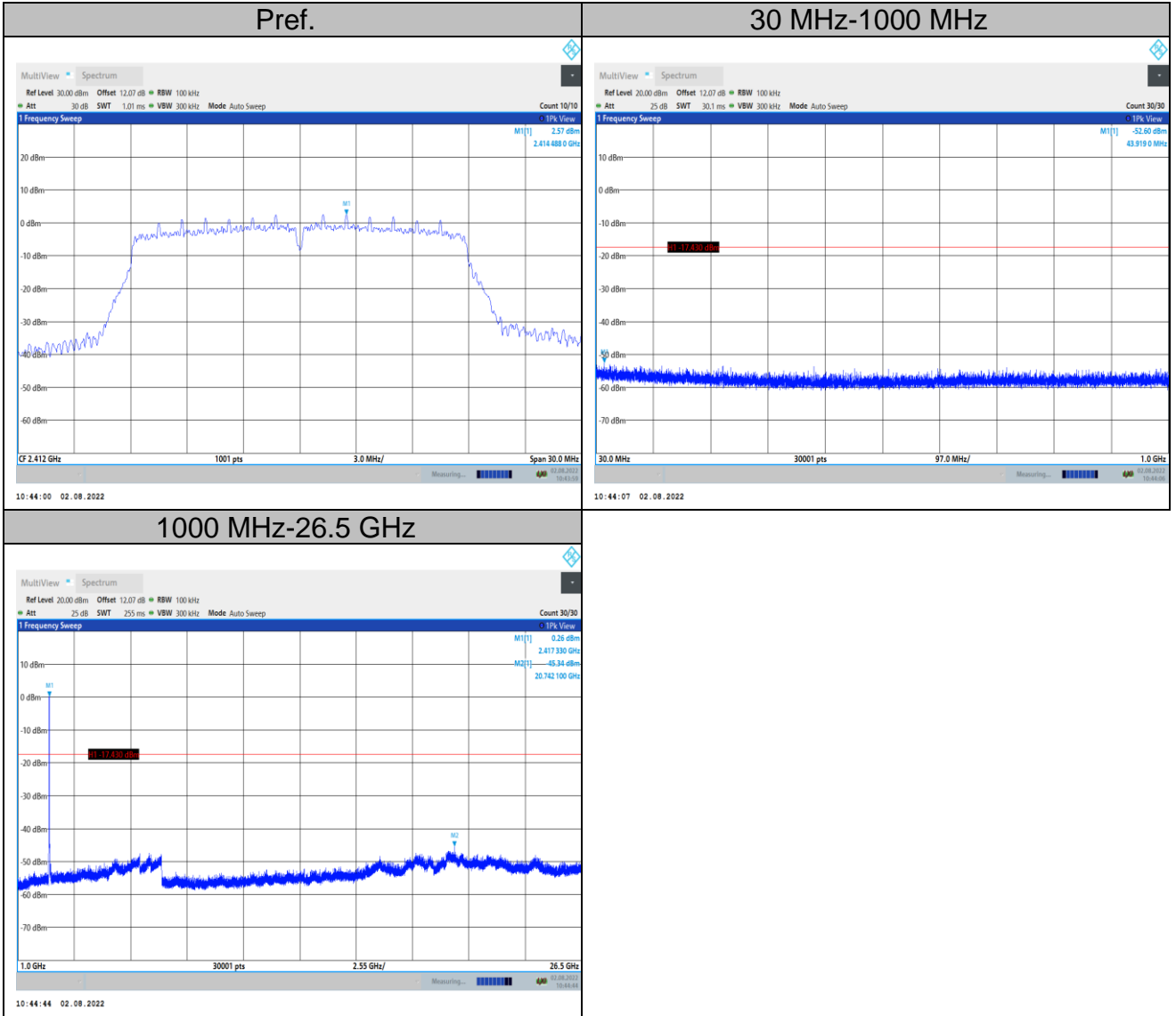
802.11g Mid Channel



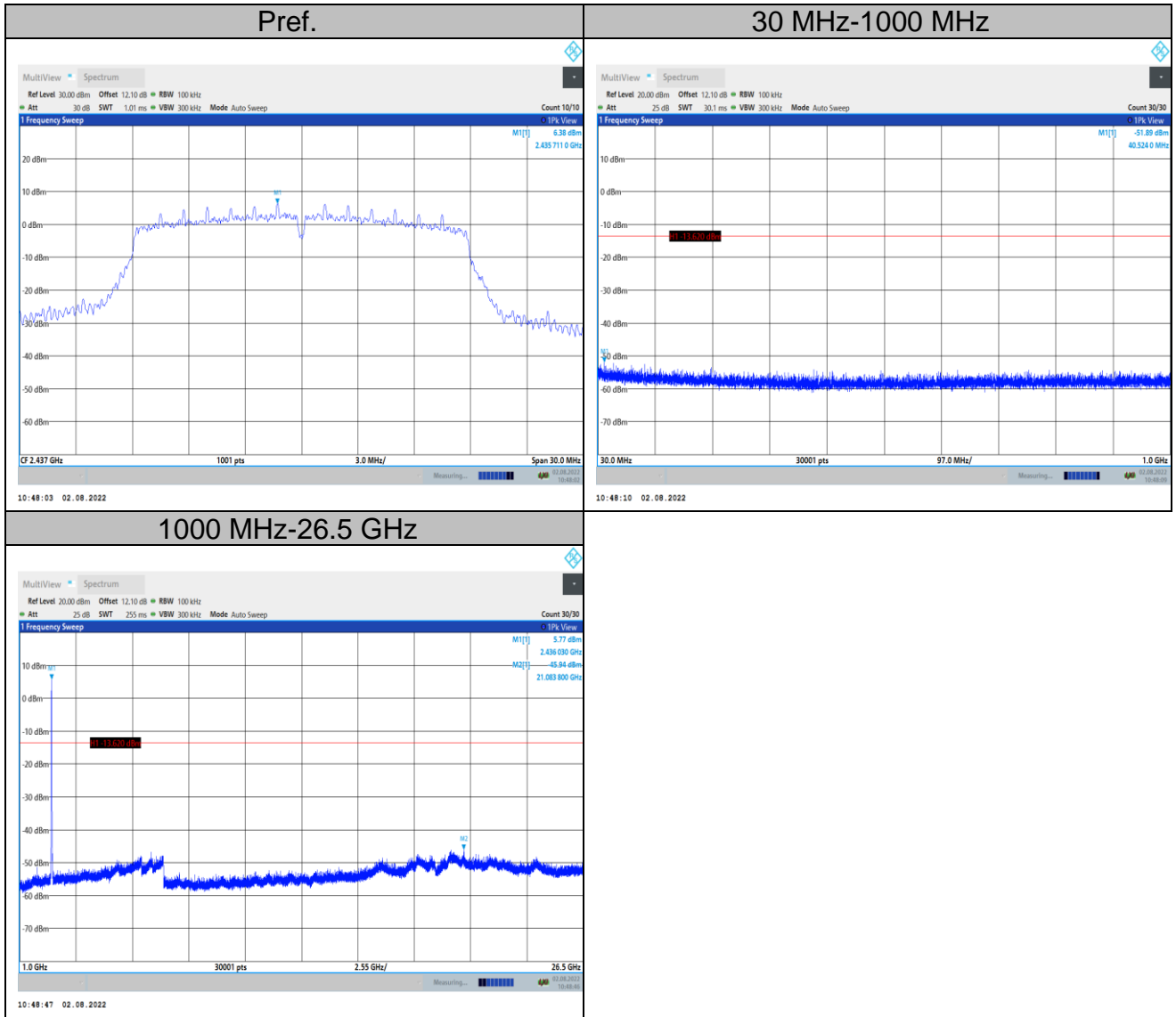
802.11g High Channel



802.11n-HT20 Low Channel



802.11n-HT20 Mid Channel



802.11n-HT20 High Channel

