FCC PART 15C
TEST REPORT
No.I22Z61951-IOT01

for

TCL Communication Ltd.

LINKHUB

HH63AF

With

FCC ID: 2ACCJB195

Hardware Version: PIO

Software Version: HH63A_00_02.00_03

Issued Date: 2022-11-22

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z61951-IOT01	Rev.0	1st edition	2022-11-15
I22Z61951-IOT01	Rev.1	Update maximum antenna gain.	2022-11-22

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1:CTTL(Huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

1.3. Testing Environment

Normal Temperature: 15-35℃

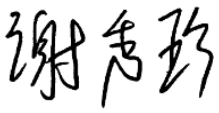
Relative Humidity: 20-75%

1.4. Project date

Testing Start Date: 2022-10-09

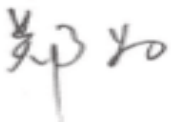
Testing End Date: 2022-11-15

1.5. Signature



Xie Xiuzhen

(Prepared this test report)



Zheng Wei

(Reviewed this test report)

Pang Shuai

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Contact:	nianxiang.jiang
Email:	nianxiang.jiang@tcl.com
Country:	China
Telephone:	+86 755 36611621
Fax:	+86 755 3661 2000-81722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Contact:	nianxiang.jiang
Email:	nianxiang.jiang@tcl.com
Country:	China
Telephone:	+86 755 36611621
Fax:	+86 755 3661 2000-81722

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LINKHUB
Model name	HH63AF
FCC ID	2ACCJB195
With WLAN Function	Yes
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	26.79dBm
Power Supply	12V

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
UT05a	358814640110054	PIO	HH63A_00_02.00_03
EUT14	358814640110237	PIO	HH63A_00_02.00_03

*EUT ID: is used to identify the test sample in the lab internally.
EUT14,UT05a is used for Conduction test, UT05a is used for Radiation test.

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Charger1	/
AE2	Charger2	/

AE1

Model	CYSE12-120100U
Manufacturer	CHENYANG
Length of cable	/

AE2

Model	1-CHUSB102-131
Manufacturer	PUAN
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment under Test (EUT) is a model of LINKHUB with integrated antenna and inbuilt battery.

It has Bluetooth (EDR) function.

It consists of normal options: travel charger, USB cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor k=2.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

3.6. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	UT05a + AE1/2	/

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2018
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 558074 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

5. Test Results

5.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247 (b)	/	P
Peak Power Spectral Density	15.247 (e)	/	P
Occupied 6dB Bandwidth	15.247 (a)	/	P
Band Edges Compliance	15.247 (d)	/	P
Transmitter Spurious Emission - Conducted	15.247 (d)	/	P
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NP	Not Perform, The test was not performed by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

5.2. Statements

The test cases as listed in section 5.1 of this report for the EUT specified in section 3 was performed by CTTL and according to the standards or reference documents listed in section 4.2

The EUT met all requirements of the standards or reference documents, and only the WLAN function was tested in this report.

5.3. Test Conditions

T nom	Normal Temperature
T min	Low Temperature
T max	High Temperature
V nom	Normal Voltage

For this report, if the test cases listed above are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	T nom	26℃
Voltage	V nom	12V
Humidity	H nom	20-75%

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2022-12-02
2	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2023-03-21
3	LISN	ENV216	101200	Rohde & Schwarz	1 year	2023-06-29
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU 26	100235	R&S	1 year	2023-03-08
2	EMI Antenna	VULB 9163	302	SCHWARZBECK	1 year	2022-12-28
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2022-12-23

7. Measurement Uncertainty

7.1. Maximum Output Power

Measurement Uncertainty: 0.387dB,k=1.96

7.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

7.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

7.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

7.5. Transmitter Spurious Emission

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 2GHz	1.22
2GHz ≤ f ≤3.6GHz	1.22
3.6GHz ≤ f ≤8GHz	1.22
8GHz ≤ f ≤12.75GHz	1.51
12.75GHz ≤ f ≤26GHz	1.51
26GHz ≤ f ≤40GHz	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
30MHz ≤ f ≤ 1GHz	5.15
1GHz ≤ f ≤18GHz	5.54
18GHz ≤ f ≤40GHz	5.26

7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.08dB,k=2

ANNEX A: Detailed Test Results

A.1. Measurement Method

A.1.1. Conducted Measurements

Connect the EUT to the test system as Fig.A.1.1.1 shows.
Set the EUT to the required work mode.
Set the EUT to the required channel.
Set the Vector Signal Analyzer and start measurement.
Record the values. Vector Signal Analyzer

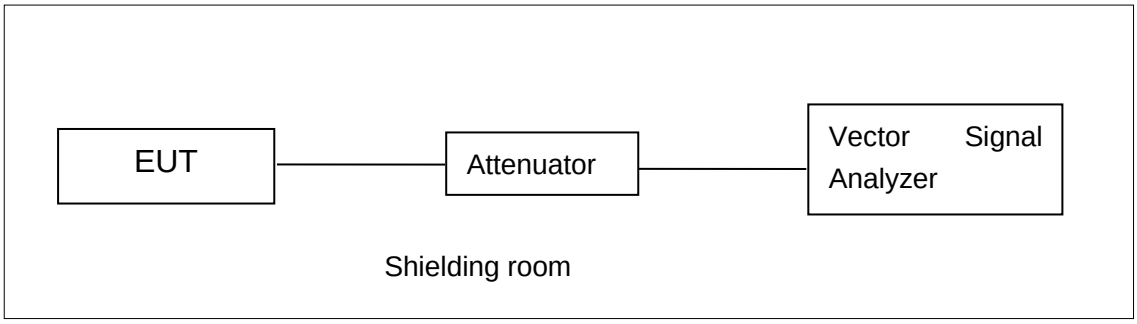


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,
Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;
Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;

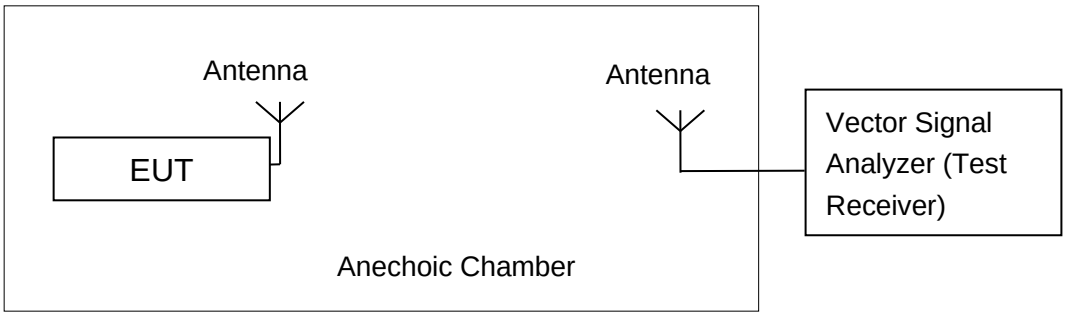


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

A.2. Maximum Output Power

Method of Measurement: See ANSI C63.10-2013-clause 11.9.1.1

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

EUT ID: EUT14,UT05a

A.2.1. Peak Output Power-conducted

Antenna Gain

ANT0	ANT1
0.58dBi	1.91dBi

Measurement Results:

SISO-ANT0

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	19.72	19.49	20.47
802.11g	6	25.04	24.88	25.48

The data rate 1Mbps and 6Mbps are selected as worst condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n(20MHz)	MCS0	24.27	24.04	23.73

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n(40MHz)	MCS0	23.94	23.85	23.91

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

SISO-ANT1

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n(20MHz)	MCS0	24.38	24.56	24.31

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n(40MHz)	MCS0	23.86	24.11	23.38

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

MIMO

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)								
		2412MHz (Ch1)			2437MHz (Ch6)			2462 MHz (Ch11)		
		Ant0	Ant1	Sum	Ant0	Ant1	Sum	Ant0	Ant1	Sum
802.11n(20MHz)	MCS0	23.58	23.97	26.79	23.26	23.96	26.63	23.17	23.82	26.52

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

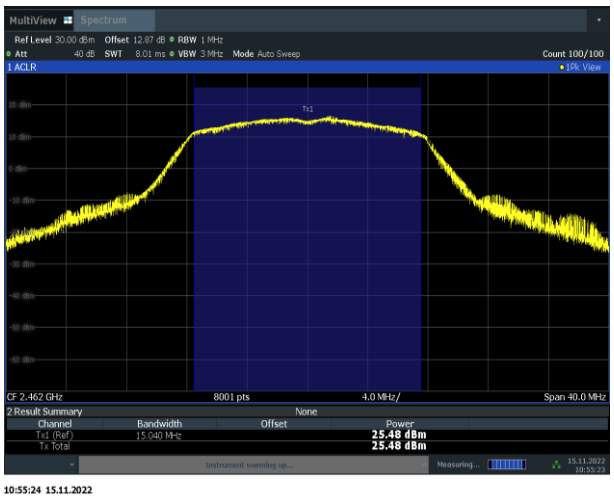
802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)								
		2422MHz (Ch3)			2437MHz (Ch6)			2452 MHz (Ch9)		
		Ant0	Ant1	Sum	Ant0	Ant1	Sum	Ant0	Ant1	Sum
802.11n(40MHz)	MCS0	23.40	23.32	26.37	23.33	23.59	26.47	23.44	22.91	26.19

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

Duty Cycle

Mode	802.11b	802.11g	802.11n20	802.11n40
Duty Cycle	94%	73%	72%	56%



802.11g-ANT0

Conclusion: Pass

A.3. Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-2013-clause 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to RBW = 3 kHz.
d) Set the VBW = 10 kHz.
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.

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

Measurement Results:

SISO-ANT0

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11b	1	Fig.A.3.1	-6.05	P
	6	Fig.A.3.2	-6.83	P
	11	Fig.A.3.3	-6.55	P
802.11g	1	Fig.A.3.4	-7.83	P
	6	Fig.A.3.5	-7.91	P
	11	Fig.A.3.6	-7.16	P

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-9.15	P
	6	Fig.A.3.8	-10.35	P
	11	Fig.A.3.9	-9.93	P

802.11n-HT40 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-13.63	P
	6	Fig.A.3.11	-11.18	P
	9	Fig.A.3.12	-12.71	P

MIMO

802.11n-HT20 mode

Mode	Power Spectral Density (dBm/3 kHz)				Conclusion
802.11n (HT20)	Ant0	2412	-10.36	/	P
	Ant1	2412	-11.71	Fig.A.3.13	P
	Total	2412	-7.97	/	P
	Ant0	2437	-11.78	/	P
	Ant1	2437	-11.30	Fig.A.3.14	P
	Total	2437	-8.52	/	P
	Ant0	2462	-11.47	/	P
	Ant1	2462	-10.74	Fig.A.3.15	P
	total	2462	-8.08	/	P

802.11n-HT40 mode

Mode	Power Spectral Density (dBm/3 kHz)				Conclusion
802.11n (HT40)	Ant0	2422	-14.62	/	P
	Ant1	2422	-13.97	Fig.A.3.16	P
	Total	2422	-11.27	/	P
	Ant0	2437	-14.04	/	P
	Ant1	2437	-14.73	Fig.A.3.17	P
	Total	2437	-11.36	/	P
	Ant0	2452	-13.67	/	P
	Ant1	2452	-15.14	Fig.A.3.18	P
	total	2452	-11.33	/	P

Note: All Antenna are tested, only the worst-case of power plot have been reported.

Conclusion: Pass

Test graphs as below:

ANT0

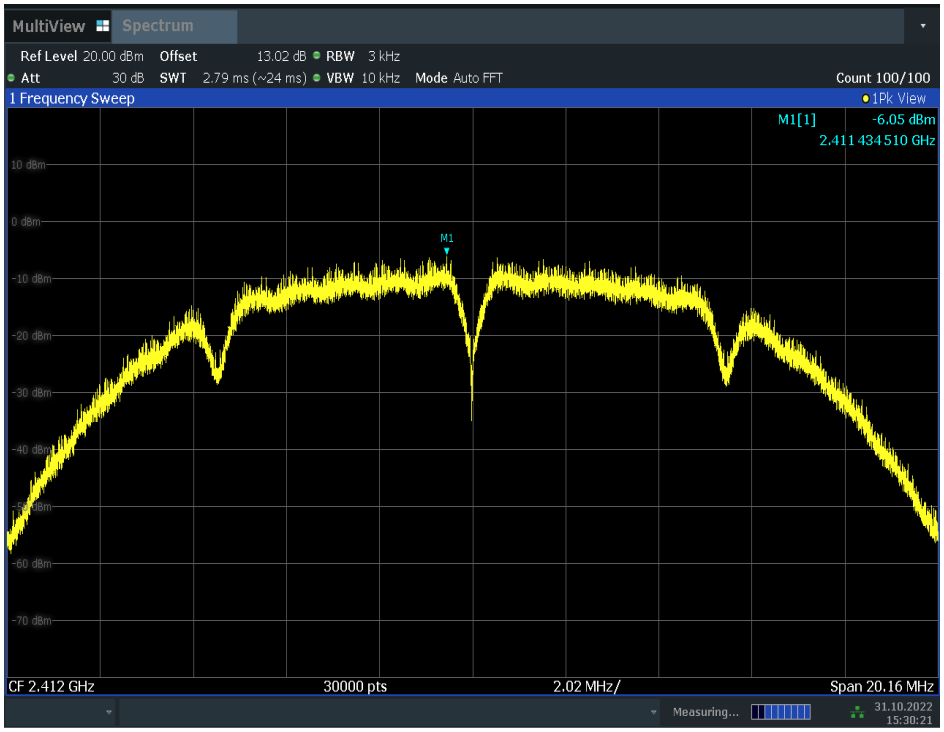


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Fig.A.3.1 Power Spectral Density(802.11b,Ch1)

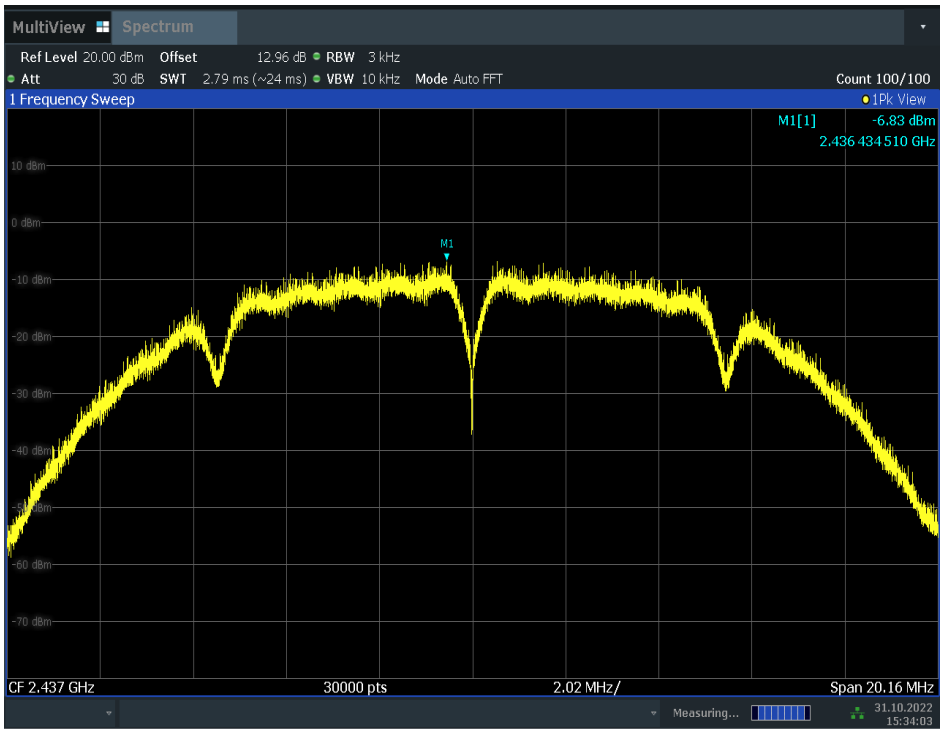

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Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)

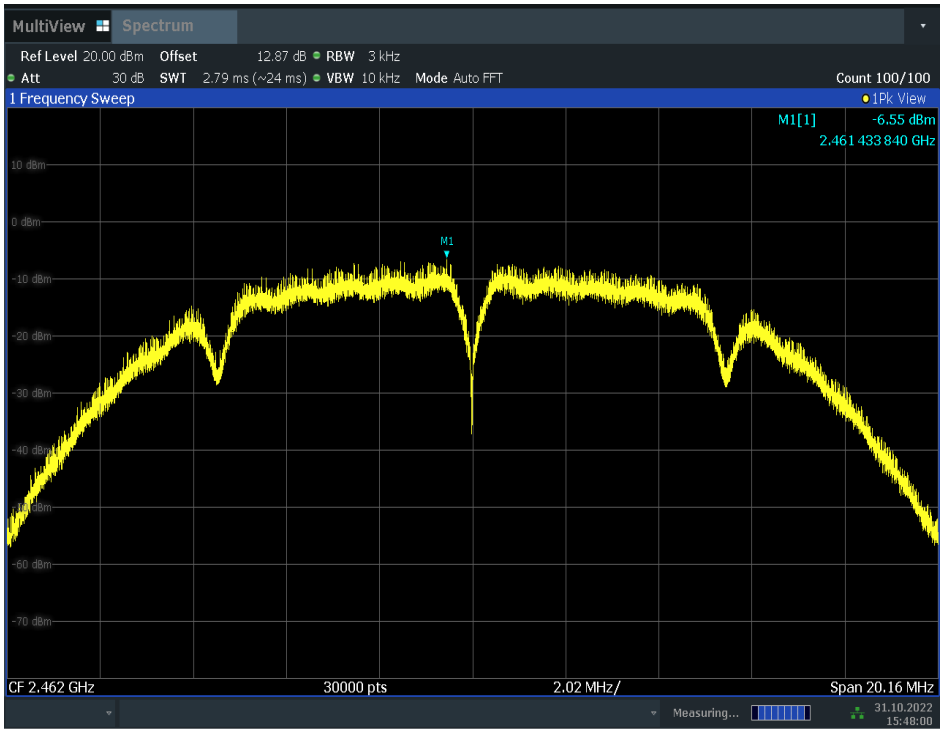

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Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

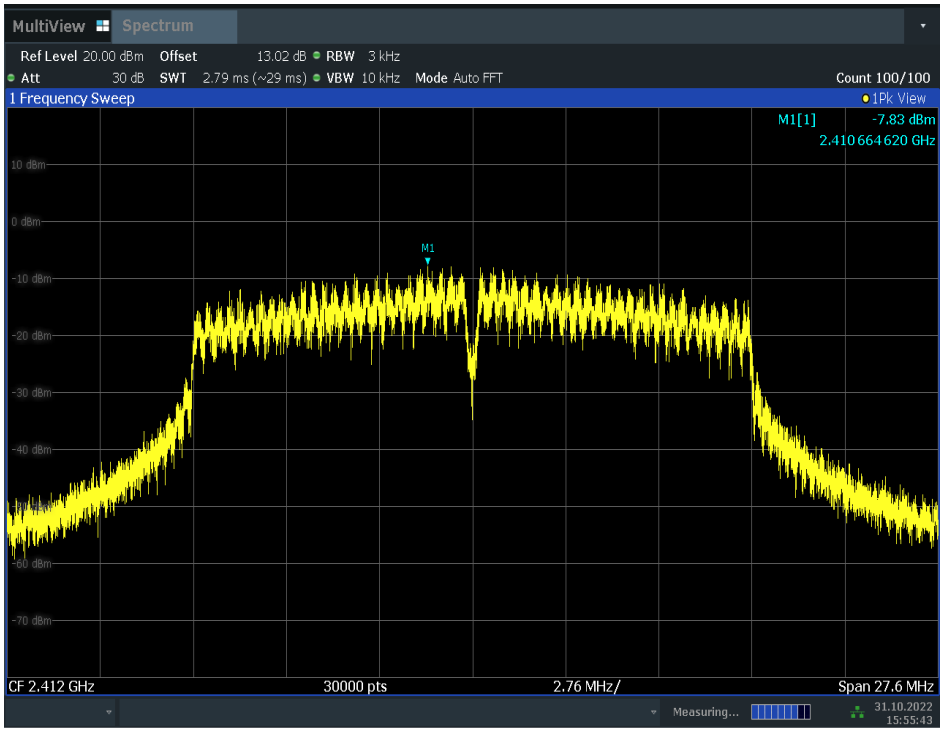

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Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)

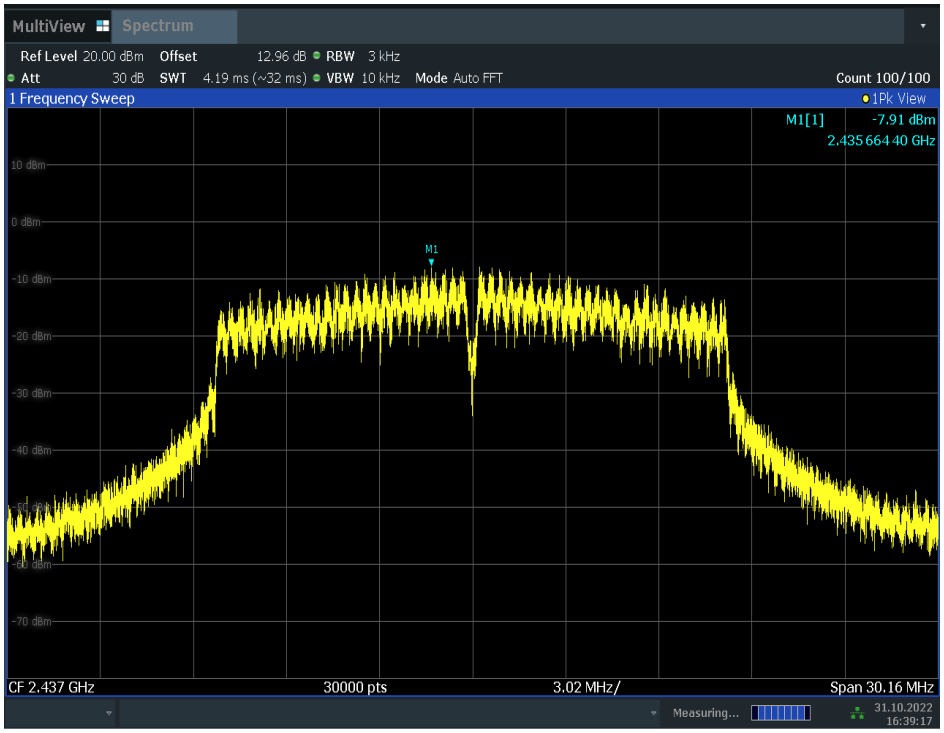

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Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

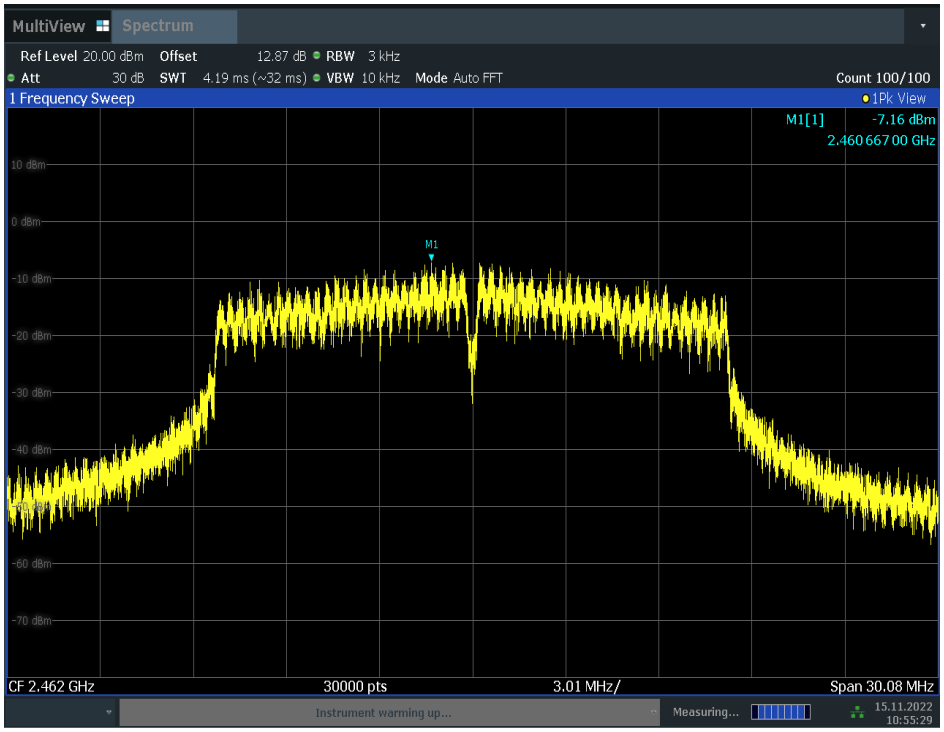

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Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)

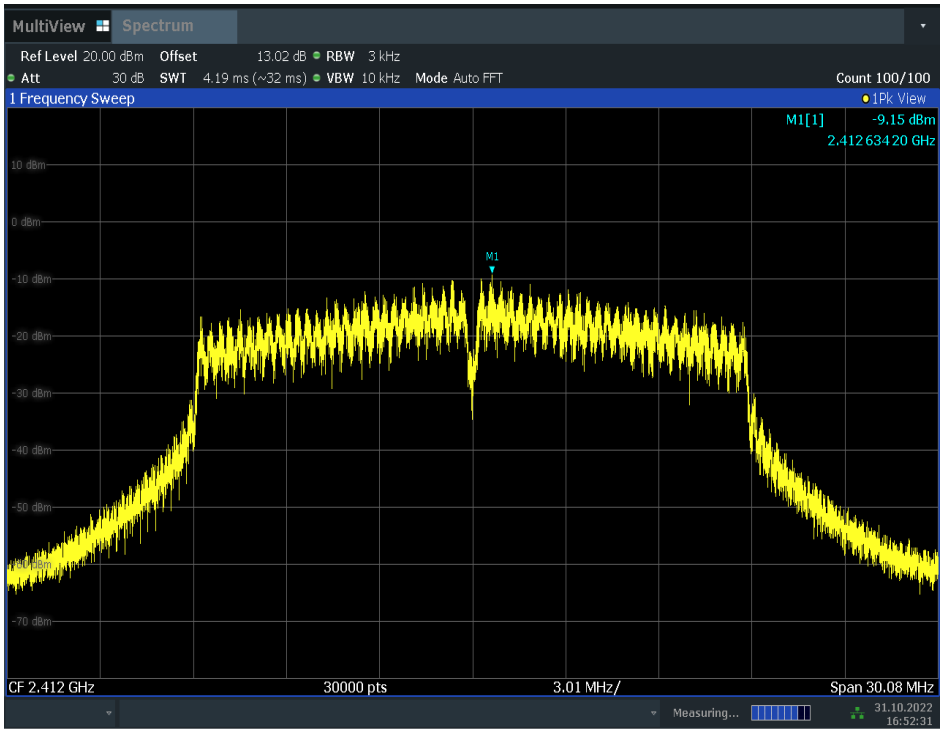

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Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)

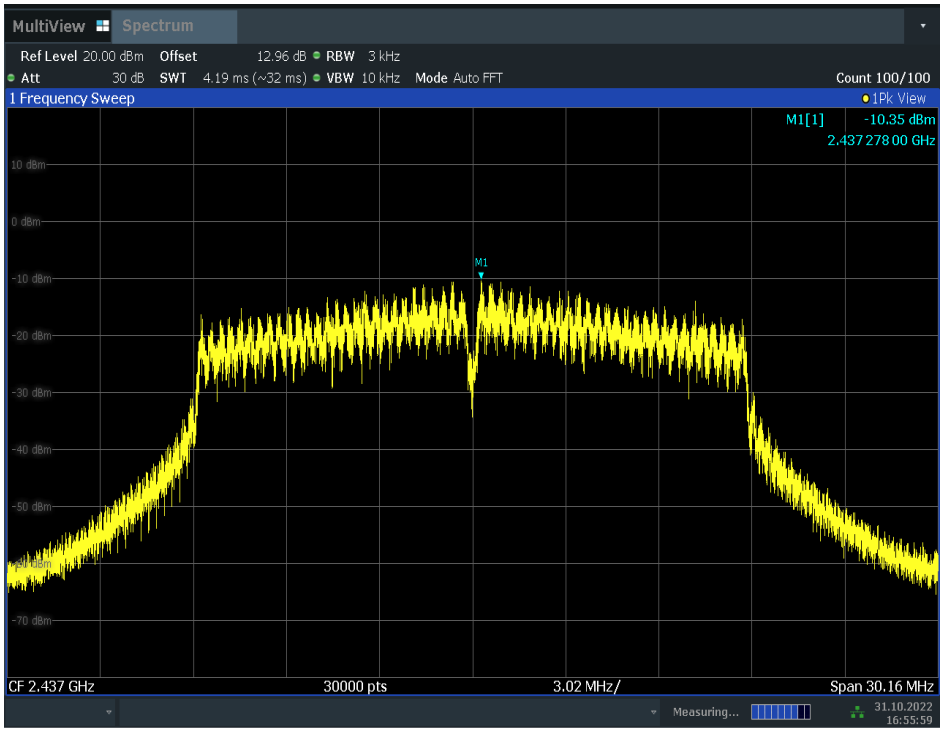

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Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)

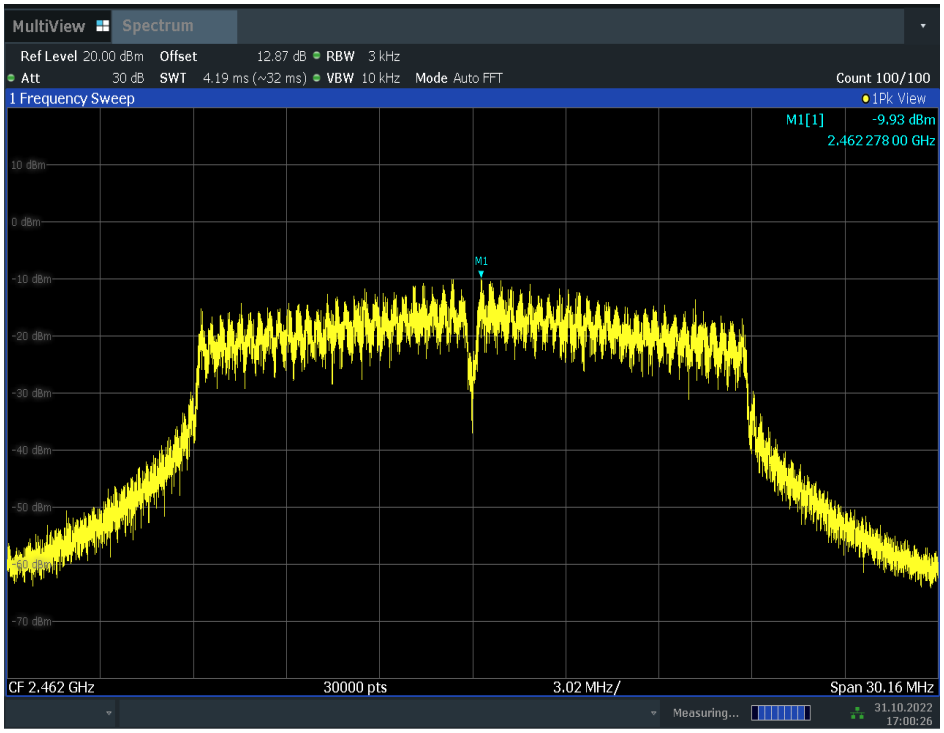

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Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)

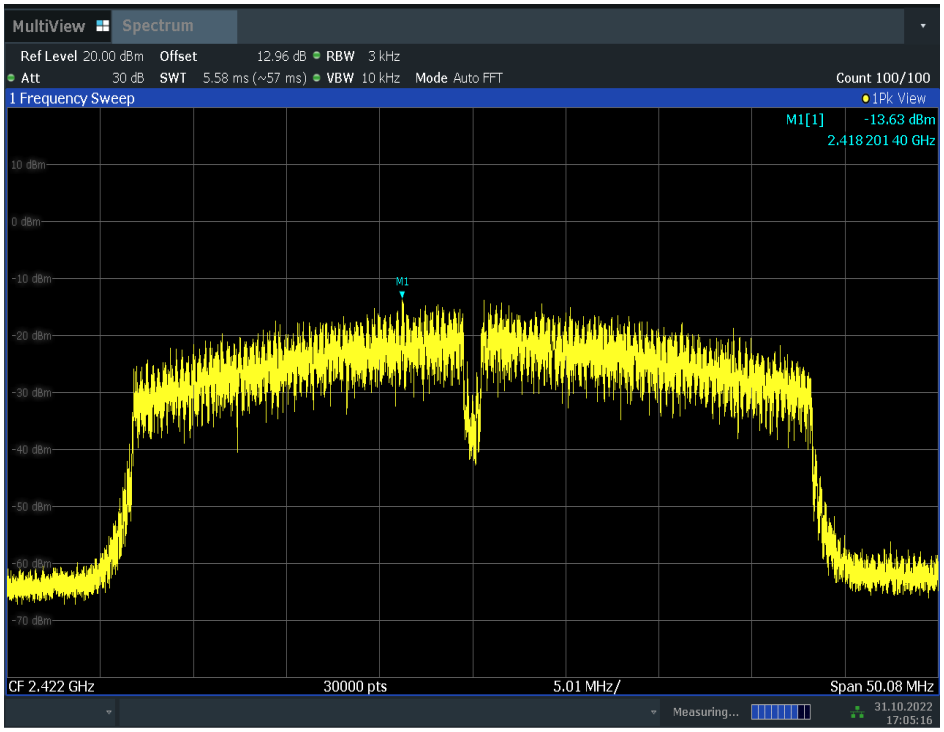

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Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)

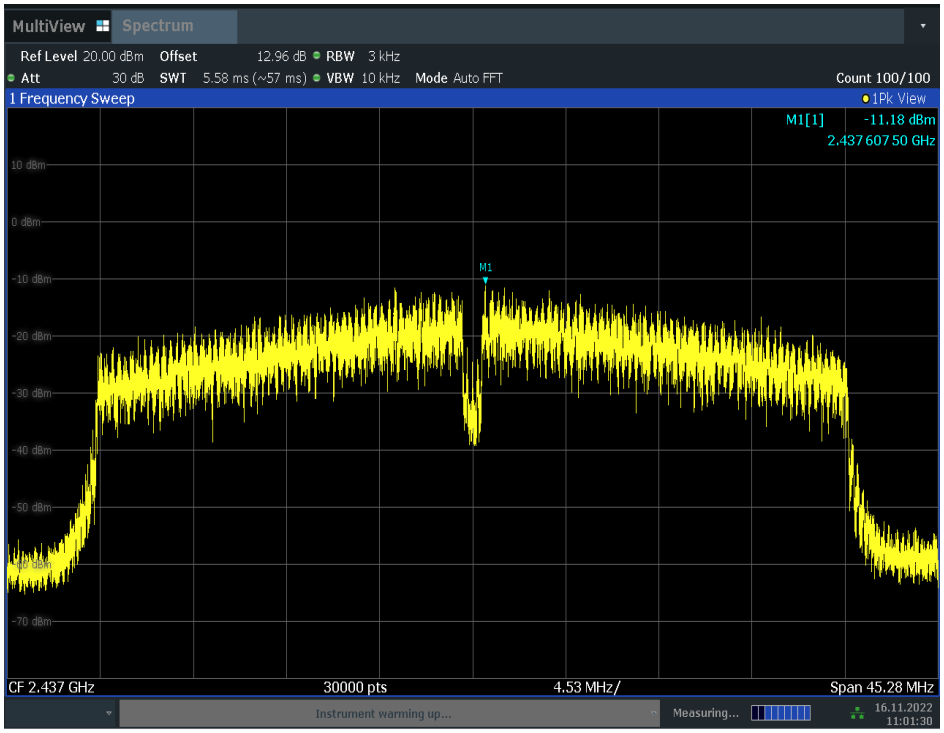

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Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)

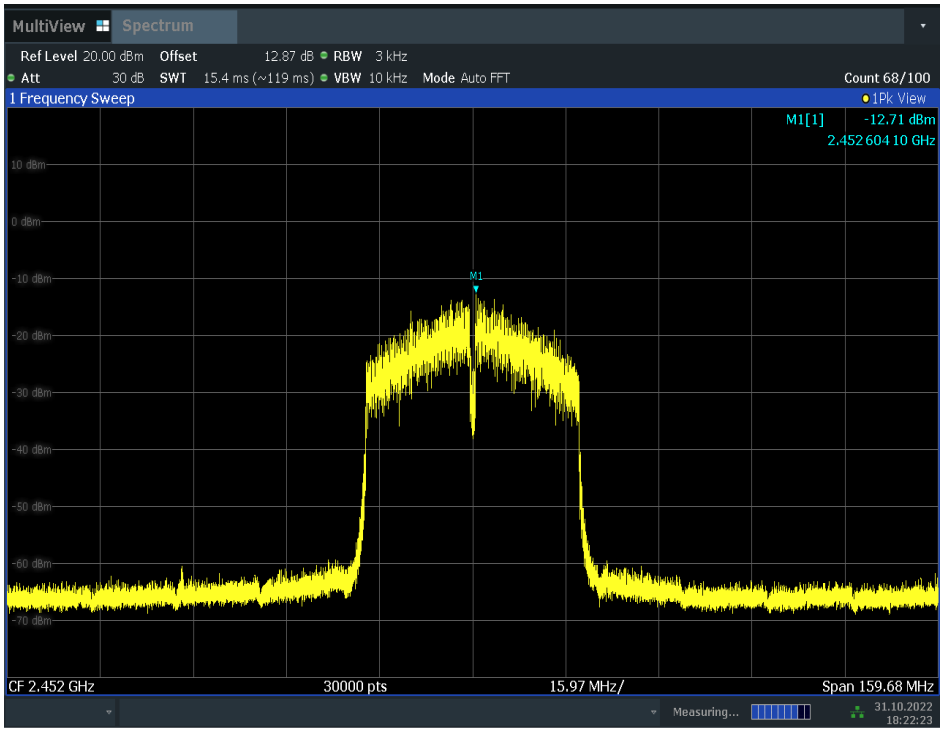

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Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)

MIMO-ANT1

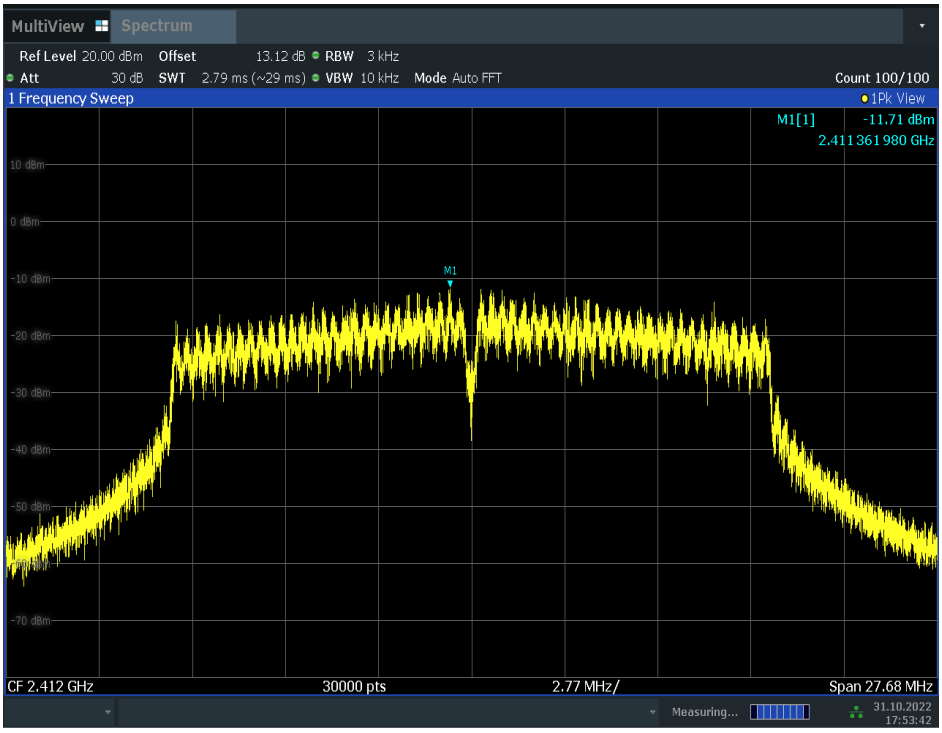

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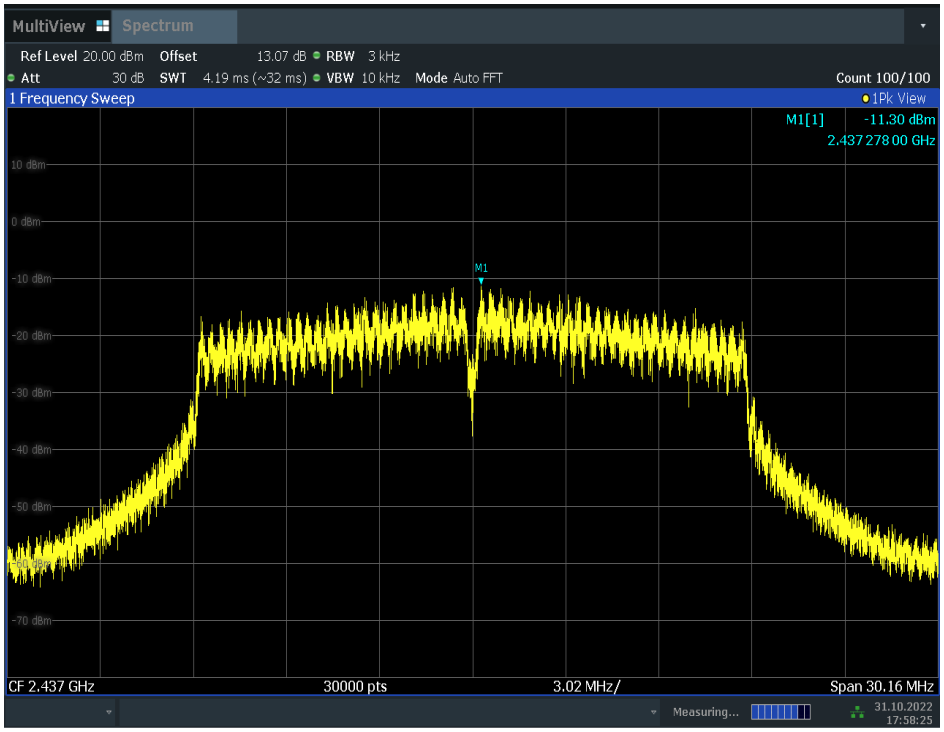
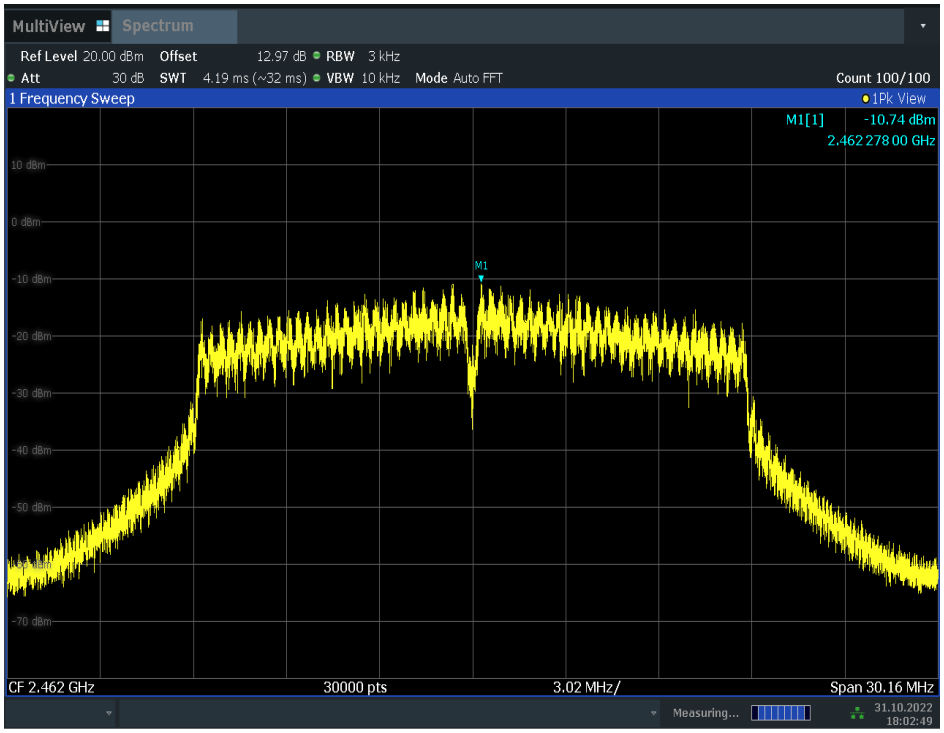
Fig.A.3.13 Power Spectral Density (802.11n-HT20, Ch 1)



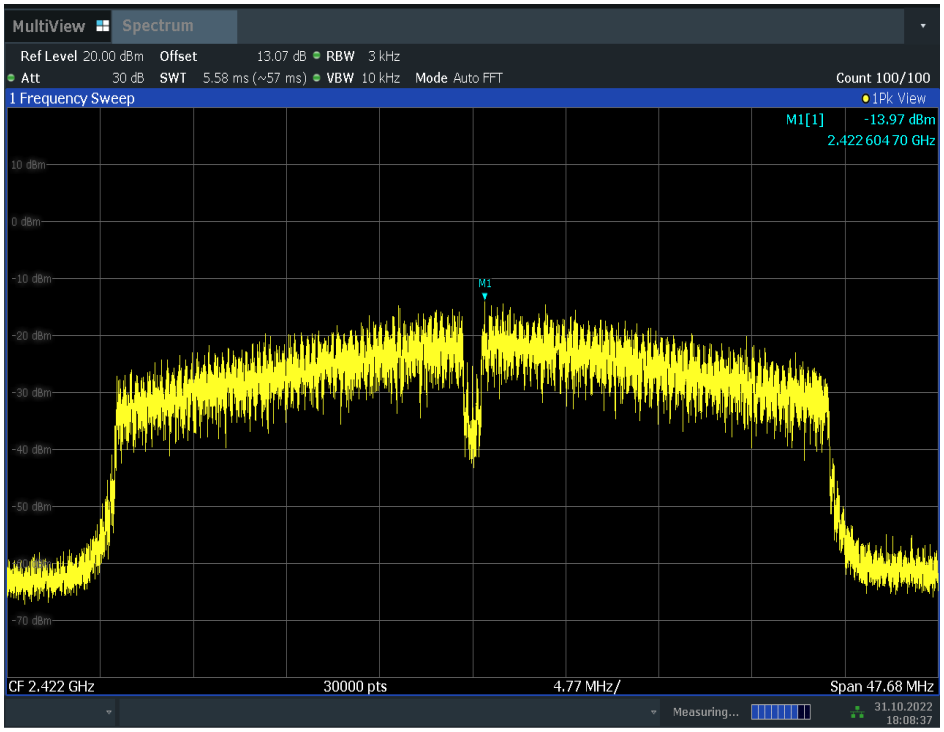
17:58:25 31.10.2022

Fig.A.3.14 Power Spectral Density (802.11n-HT20, Ch 6)



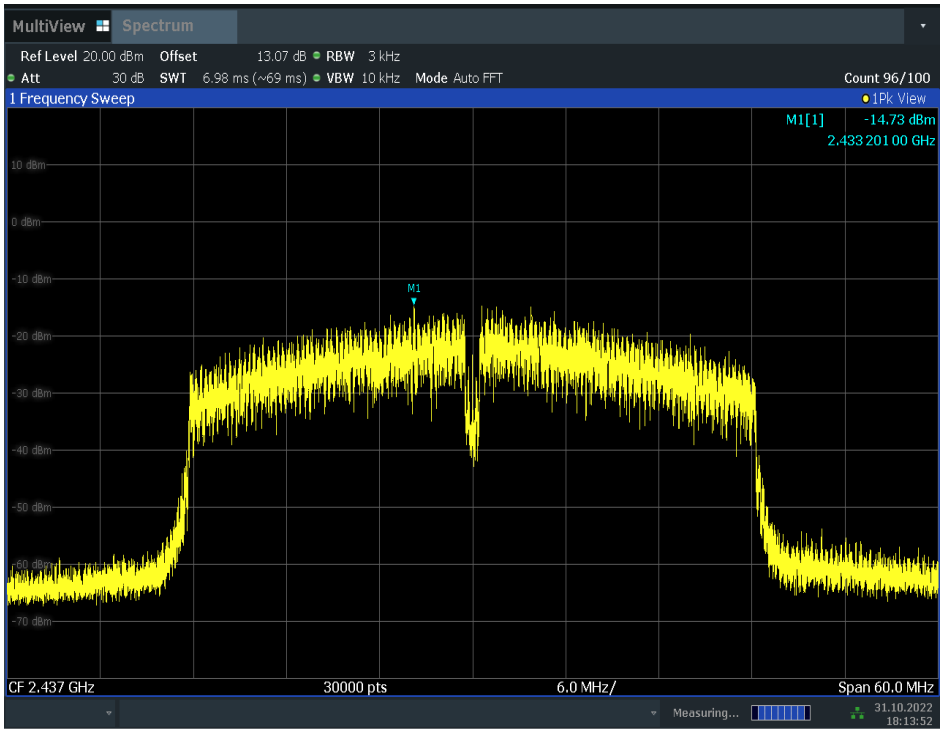
18:02:50 31.10.2022

Fig.A.3.15 Power Spectral Density (802.11n-HT20, Ch 11)



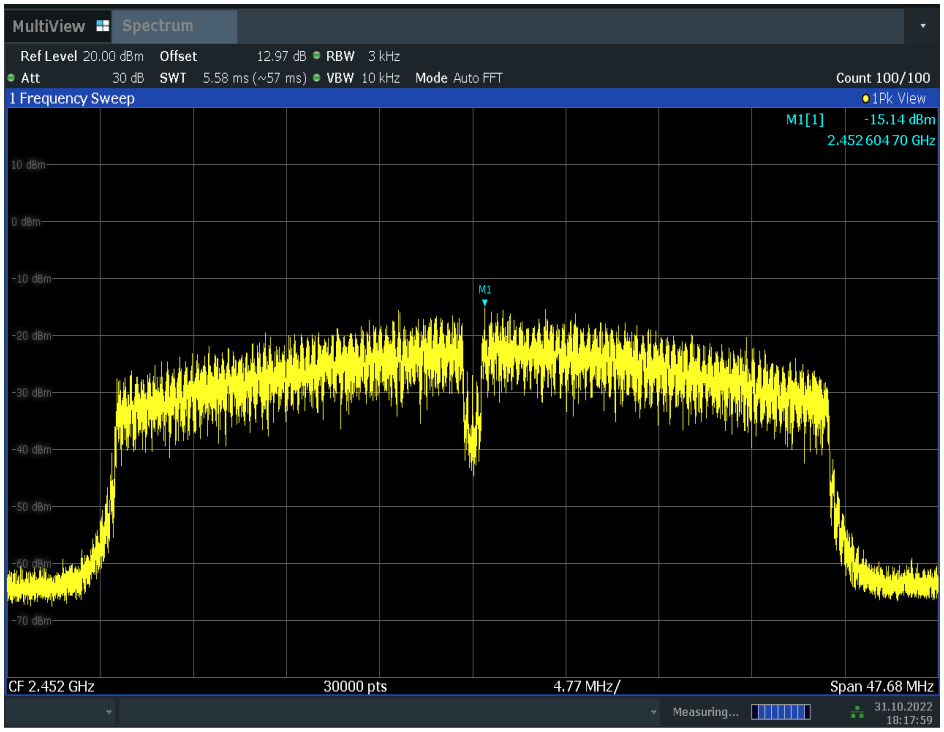
18:08:38 31.10.2022

Fig.A.3.16 Power Spectral Density (802.11n-HT40, Ch 3)



18:13:52 31.10.2022

Fig.A.3.17 Power Spectral Density (802.11n-HT40, Ch 6)



18:17:59 31.10.2022

Fig.A.3.18 Power Spectral Density (802.11n-HT40, Ch 9)

A.4. DTS 6-dB Signal Bandwidth

Method of Measurement: See ANSI C63.10-2013 section 11.8.1.

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) = 300 kHz.
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.

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

EUT ID: EUT14/05a

Measurement Result:

802.11b/g mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11b	1	Fig.A.4.1	10.08	P
	6	Fig.A.4.2	10.08	P
	11	Fig.A.4.3	10.08	P
802.11g	1	Fig.A.4.4	13.80	P
	6	Fig.A.4.5	15.08	P
	11	Fig.A.4.6	15.04	P

802.11n-HT20 mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	15.04	P
	6	Fig.A.4.8	15.08	P
	11	Fig.A.4.9	15.08	P

802.11n-HT40 mode

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	25.04	P
	6	Fig.A.4.11	26.32	P
	9	Fig.A.4.12	25.12	P

Conclusion: Pass

Test graphs as below:

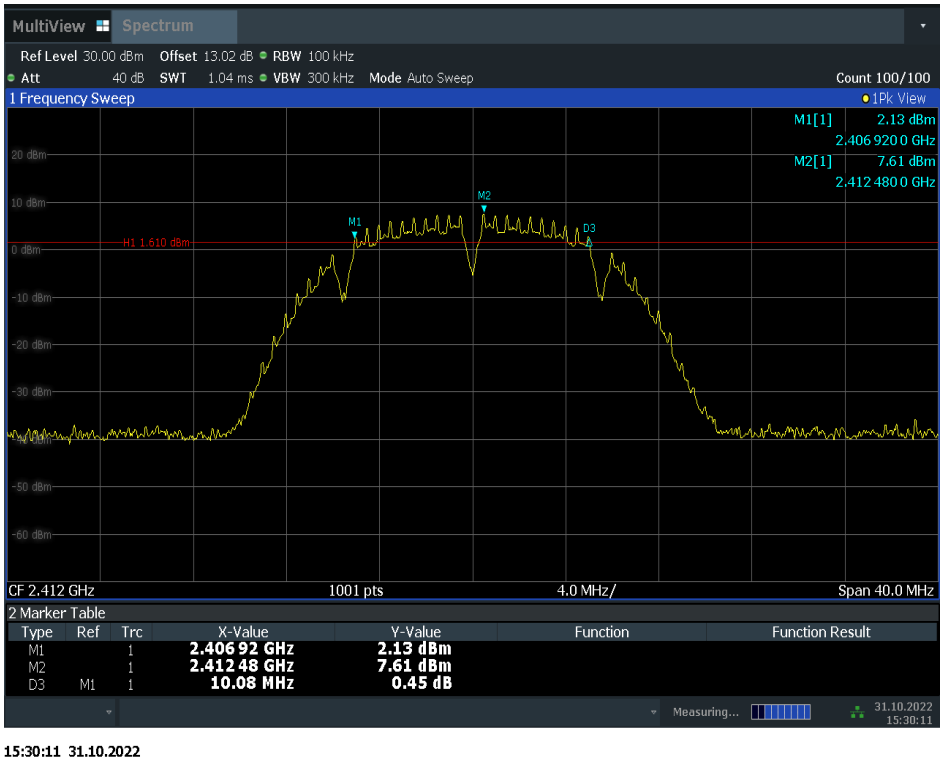
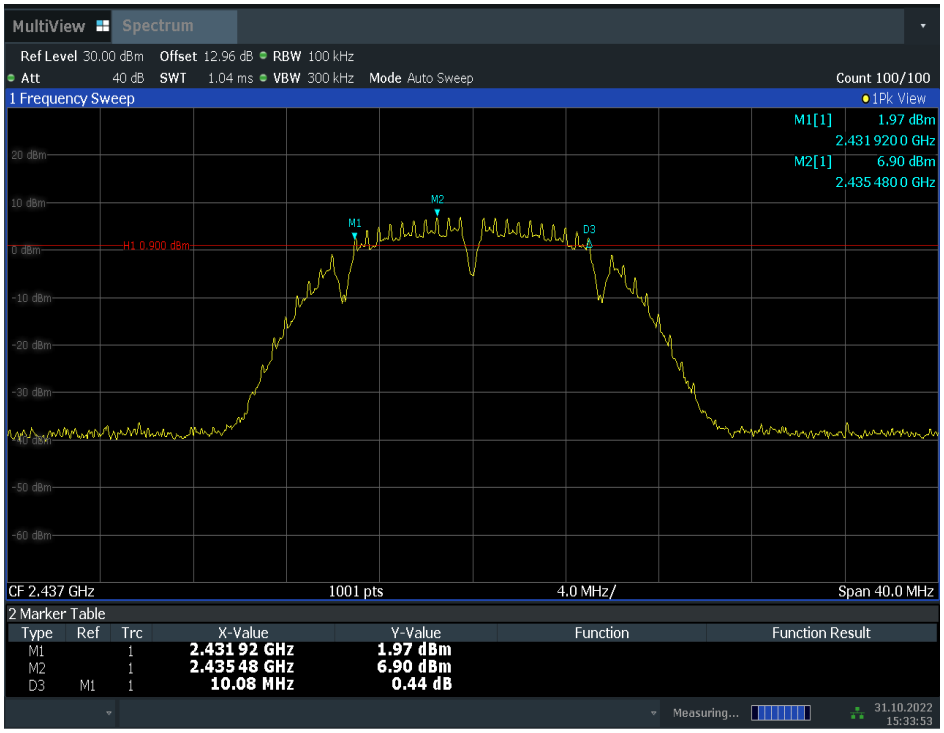
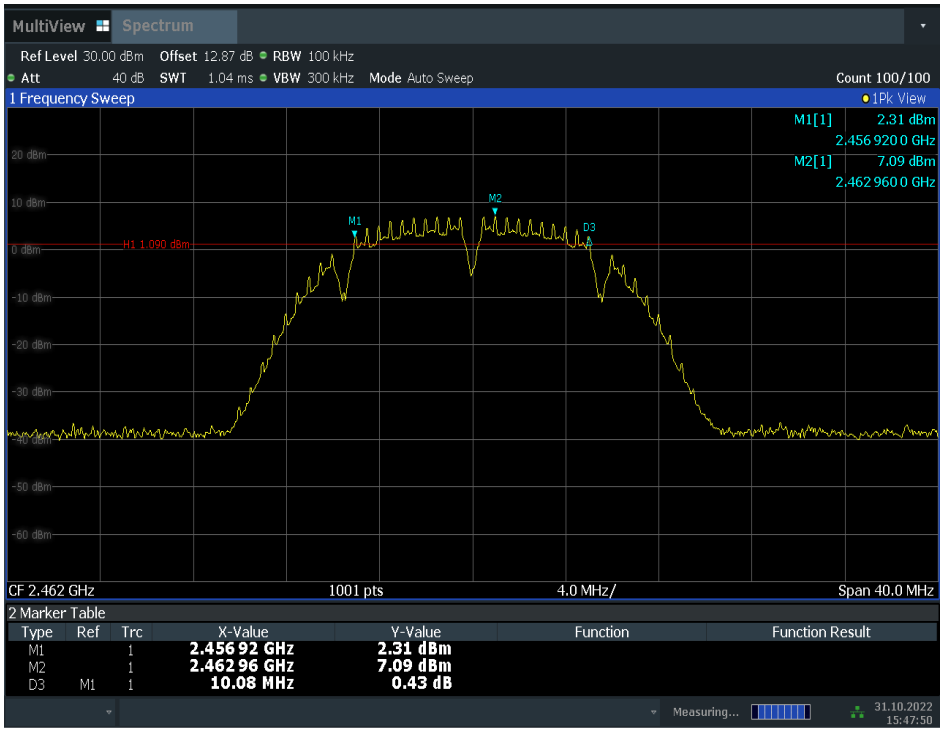


Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)



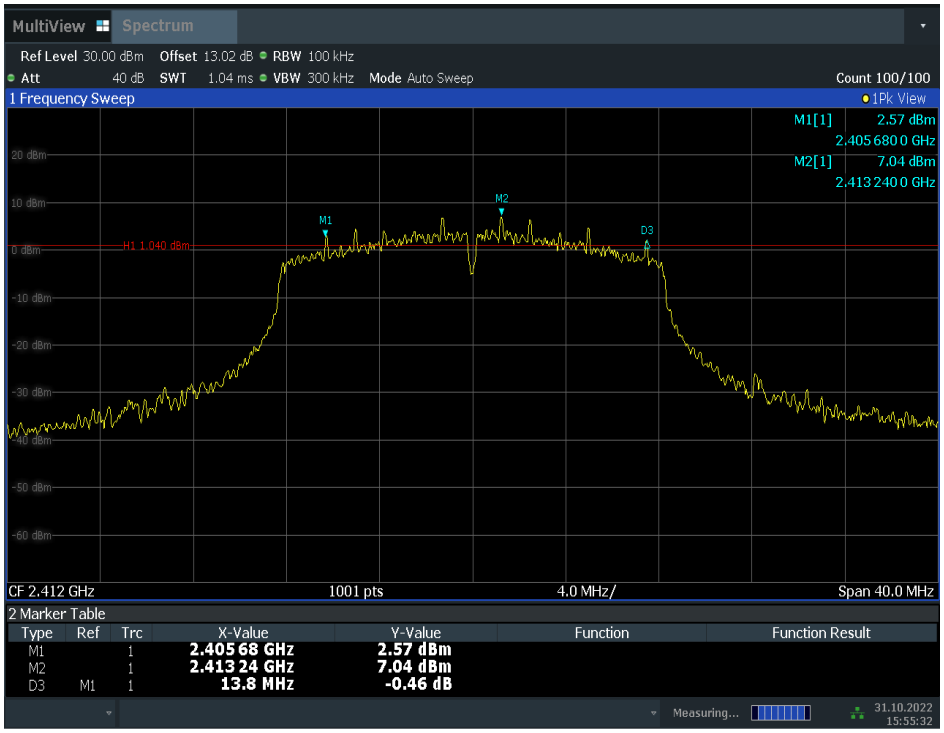
15:33:54 31.10.2022

Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)



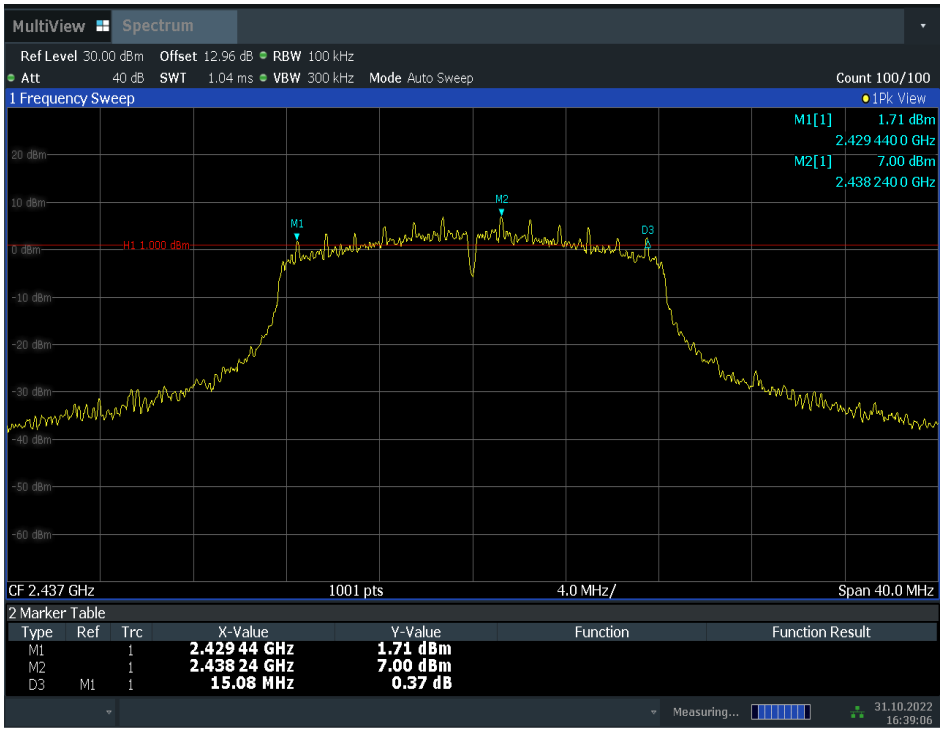
15:47:50 31.10.2022

Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)



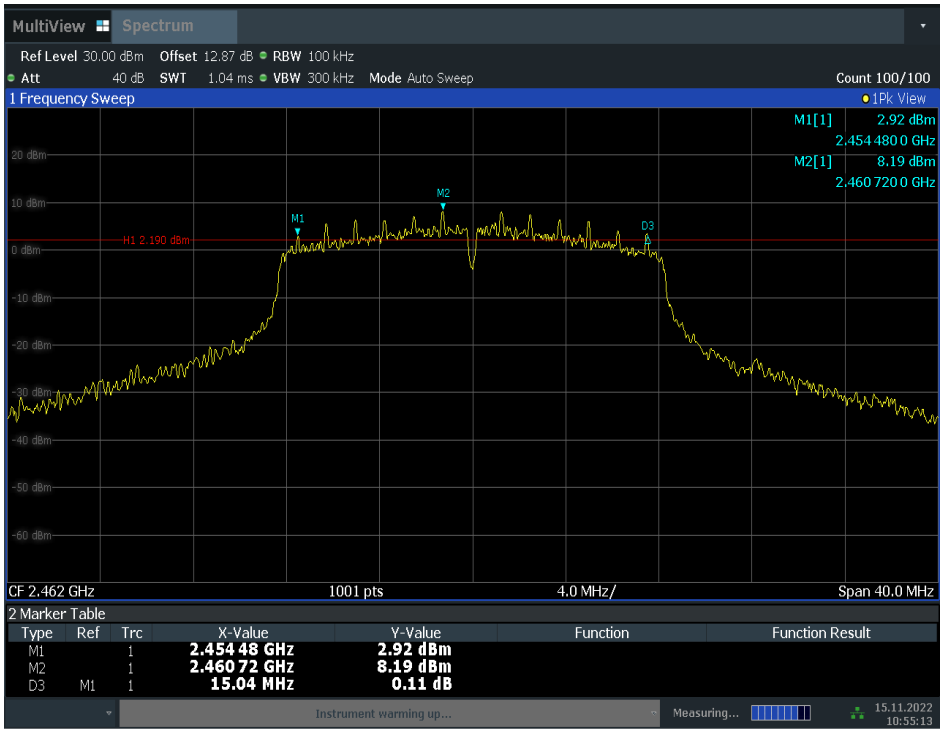
15:55:32 31.10.2022

Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)



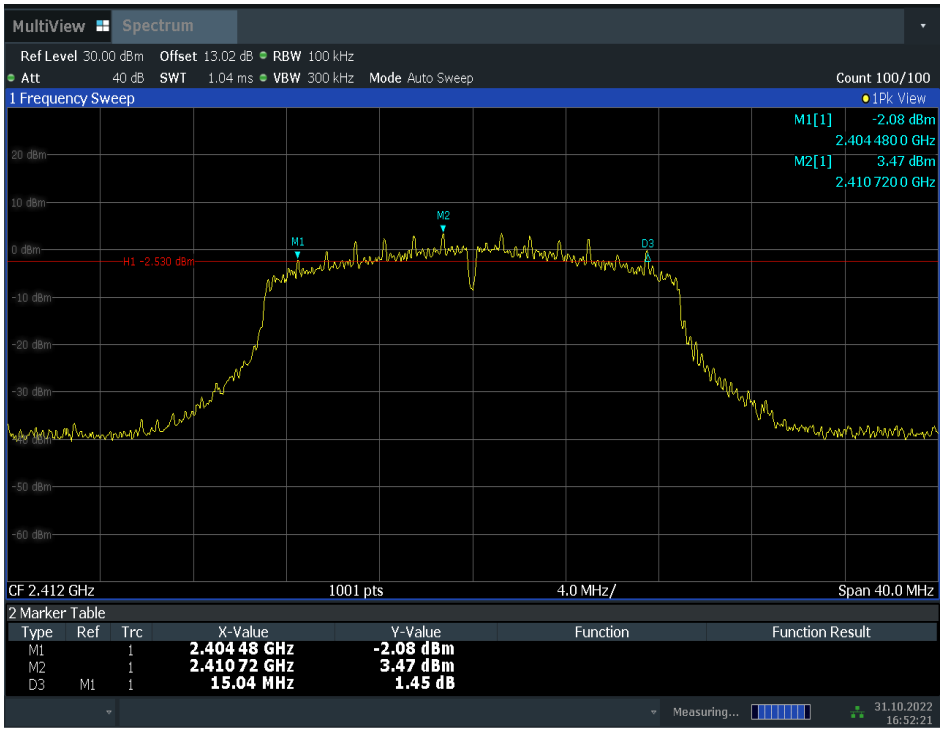
16:39:07 31.10.2022

Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)



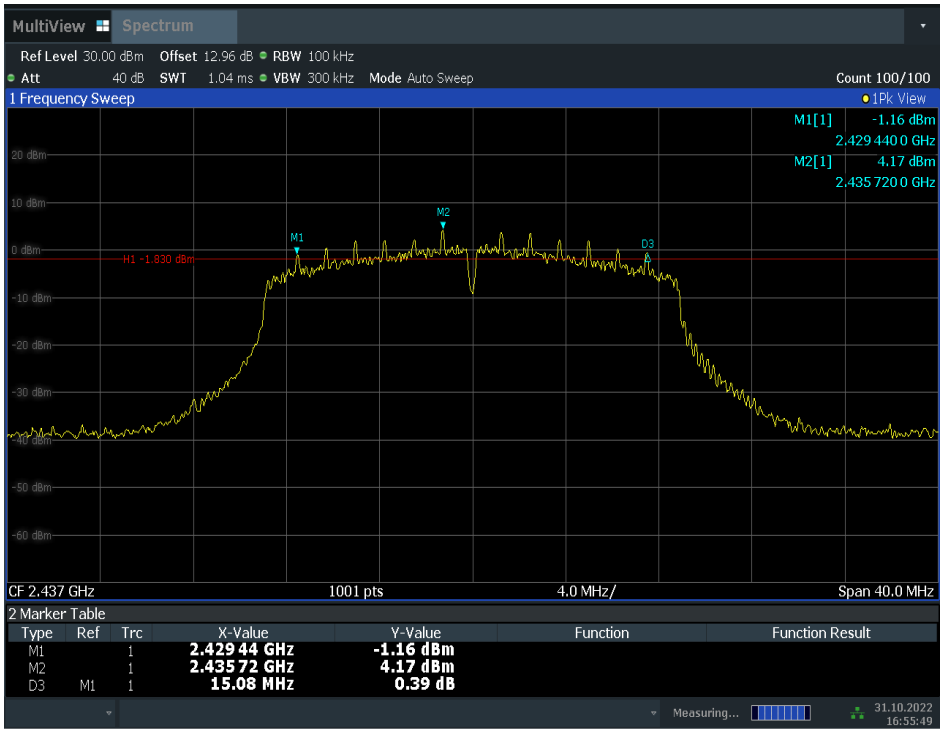
10:55:13 15.11.2022

Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)



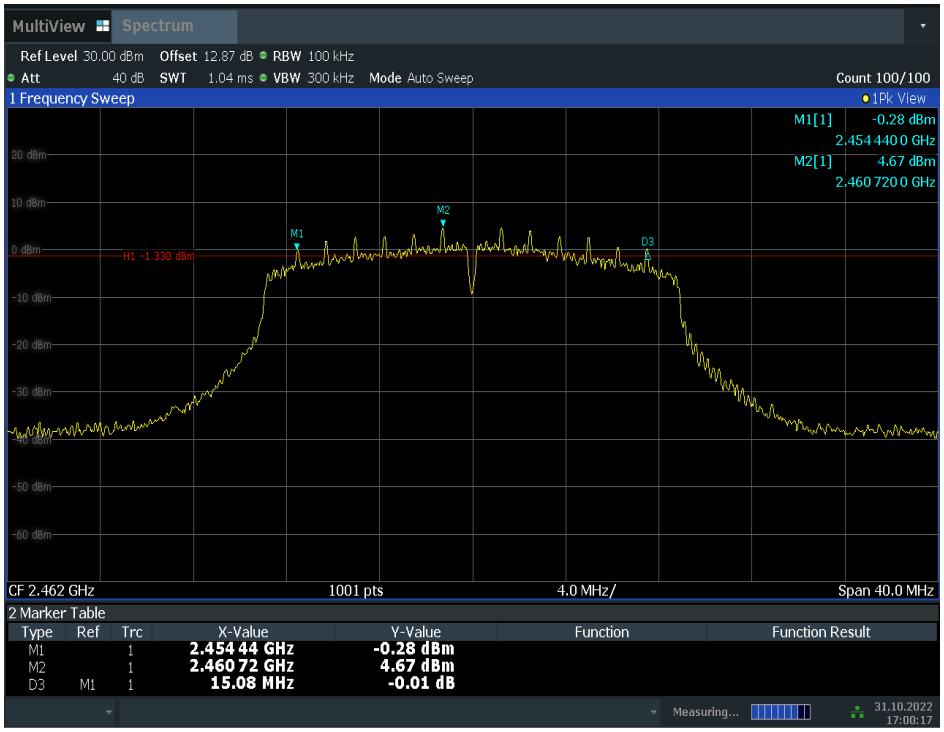
16:52:22 31.10.2022

Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)



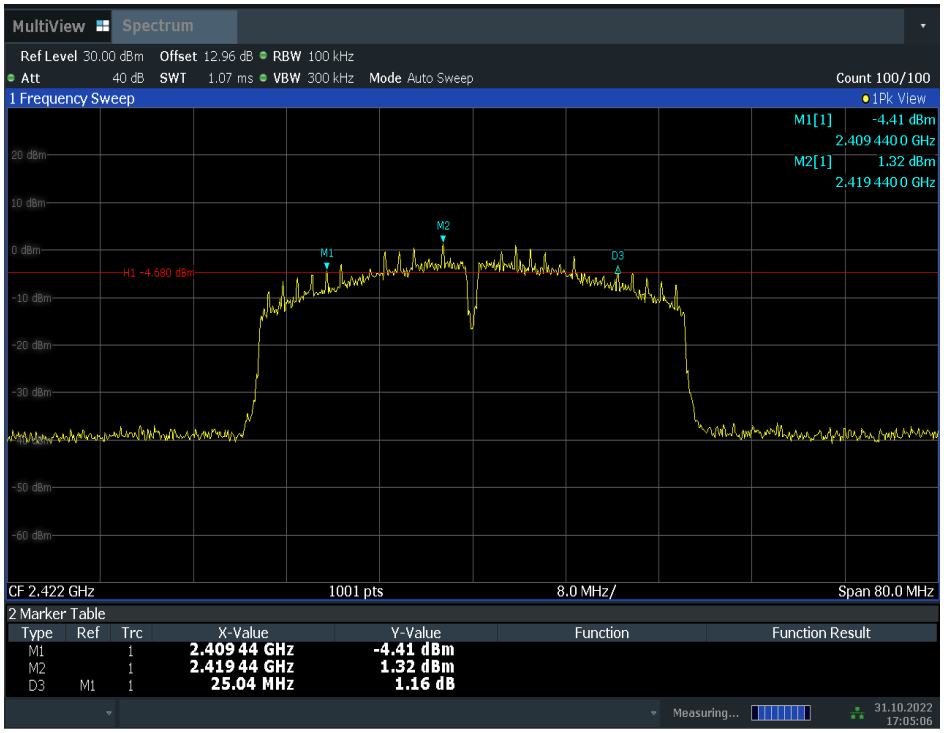
16:55:50 31.10.2022

Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)



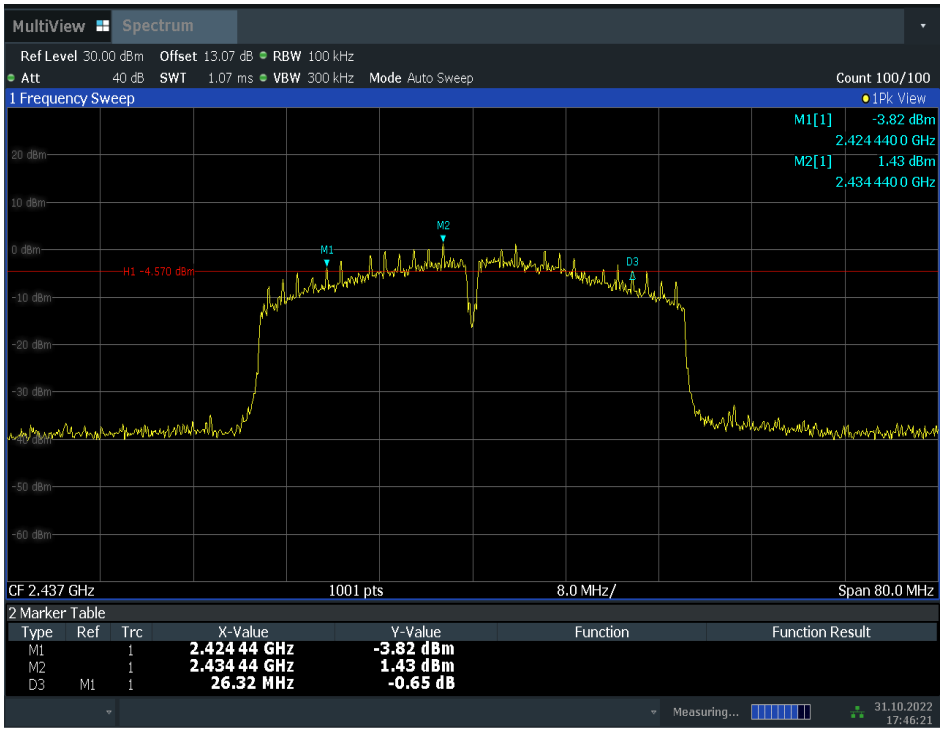
17:00:17 31.10.2022

Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)



17:05:07 31.10.2022

Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)



17:46:21 31.10.2022

Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)

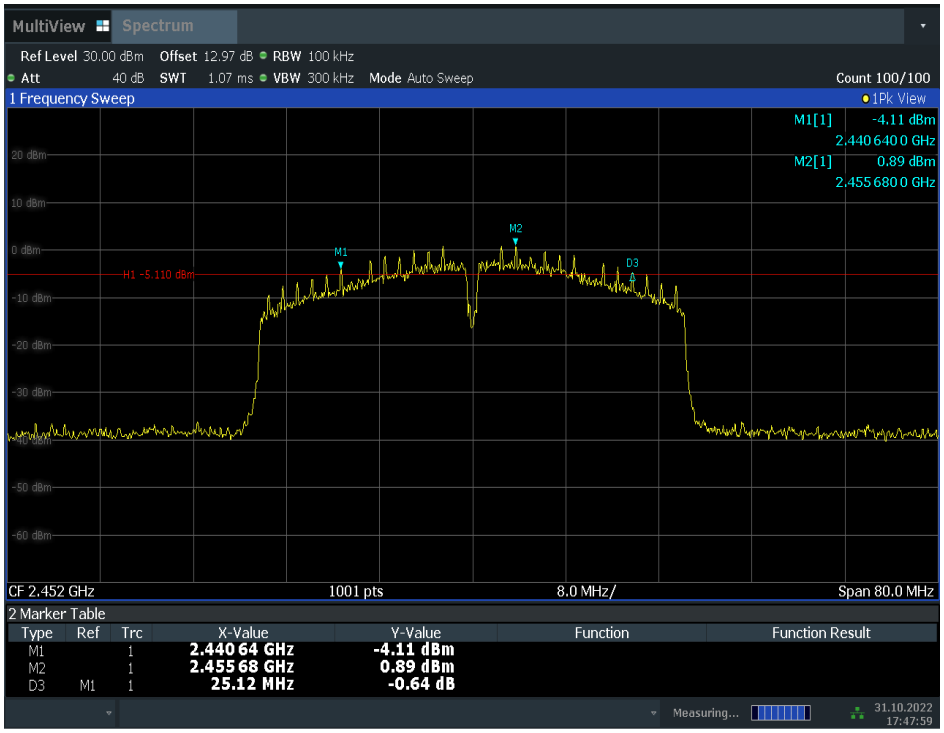


Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)

A.5. Band Edges Compliance

Method of Measurement: See ANSI C63.10-2013-clause 6.10.4

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below.

a) Set Span = 100MHz
b) Sweep Time: coupled
c) Set the RBW= 100 kHz
c) Set the VBW= 300 kHz
d) Detector: Peak
e) Trace: Max hold

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

EUT ID: EUT14

Measurement Result:

SISO-ANT0

802.11b/g mode

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.A.5.1	**P**
	11	Fig.A.5.2	**P**
802.11g	1	Fig.A.5.3	**P**
	11	Fig.A.5.4	**P**

802.11n-HT20 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.5	**P**
	11	Fig.A.5.6	**P**

802.11n-HT40 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT40)	3	Fig.A.5.7	**P**
	9	Fig.A.5.8	**P**

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802.11n-HT20 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.9	**P**
	11	Fig.A.5.10	**P**

802.11n-HT40 mode

Mode	Channel	Test Results	Conclusion

802.11n (HT40)	3	Fig.A.5.11	**P**
	9	Fig.A.5.12	**P**

Note: All Antenna are tested, only the worst-case emissions have been reported.

Conclusion: Pass

Test graphs as below:

ANT0

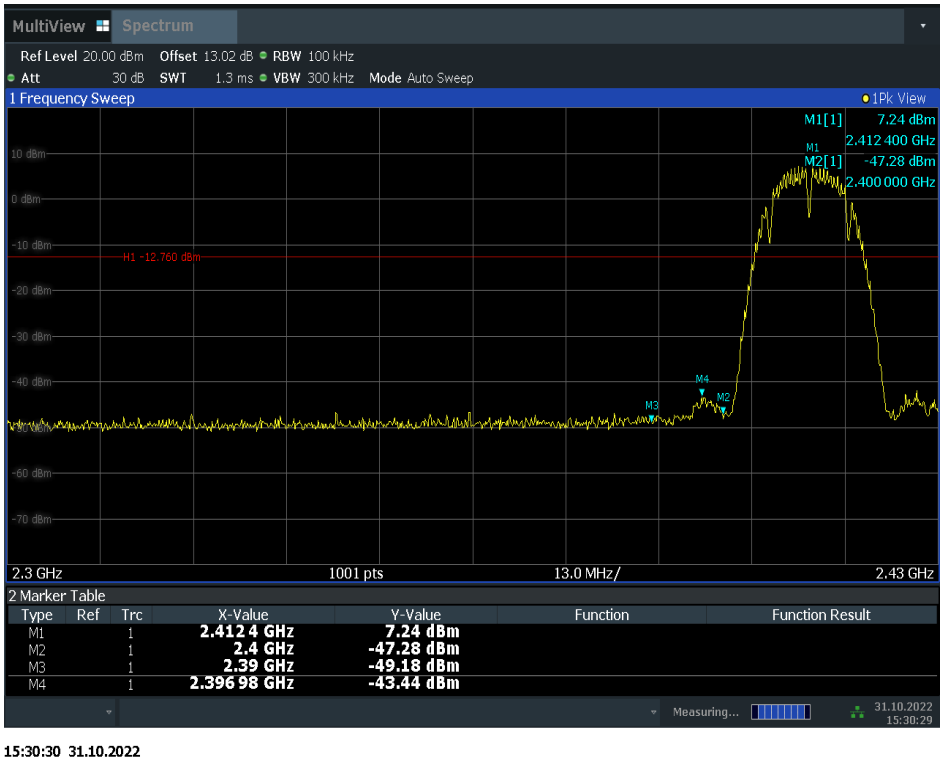
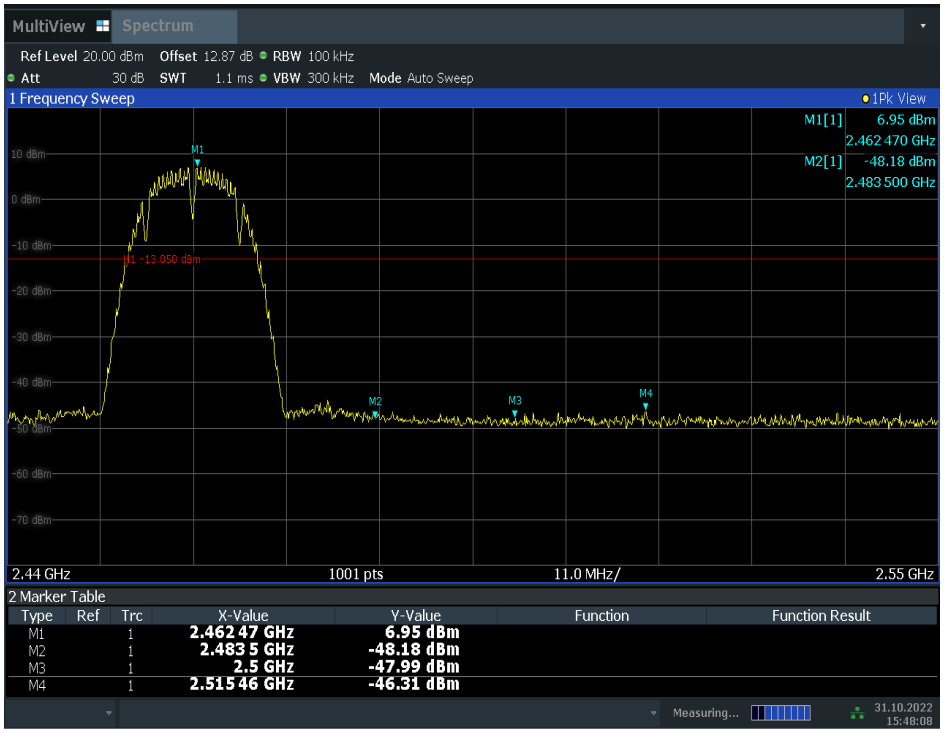
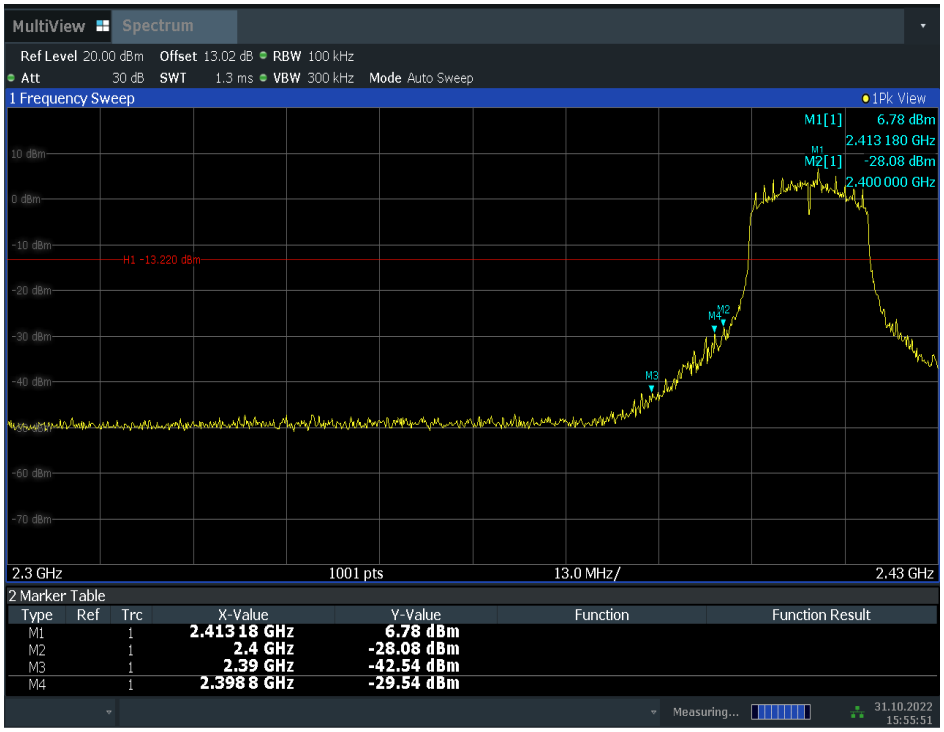


Fig.A.5.1 Band Edges (802.11b, Ch 1)



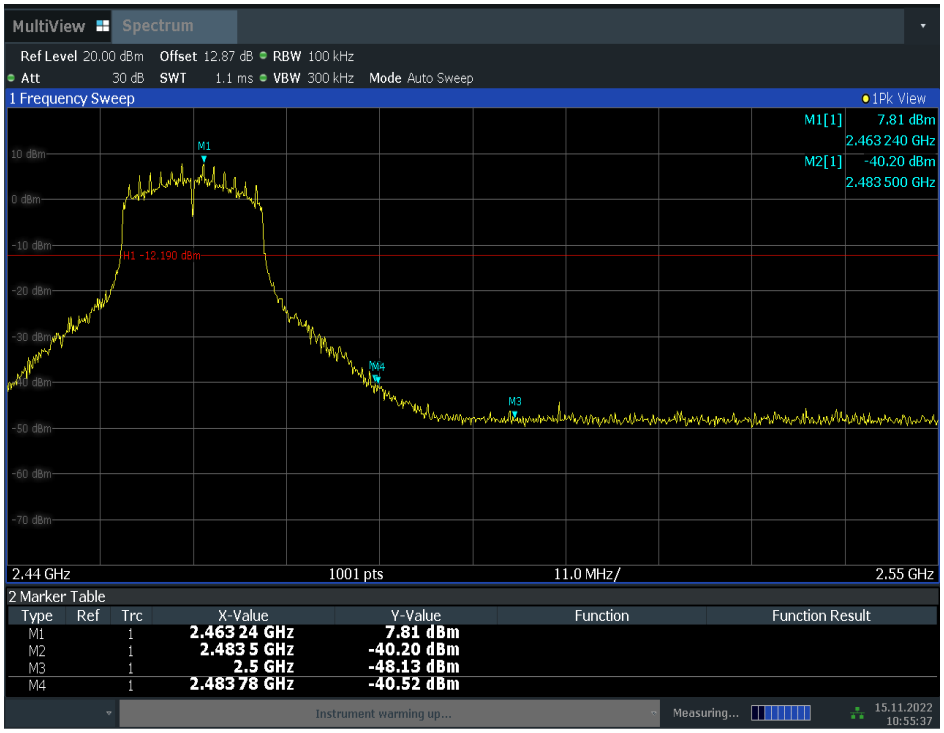
15:48:09 31.10.2022

Fig.A.5.2 Band Edges (802.11b, Ch 11)



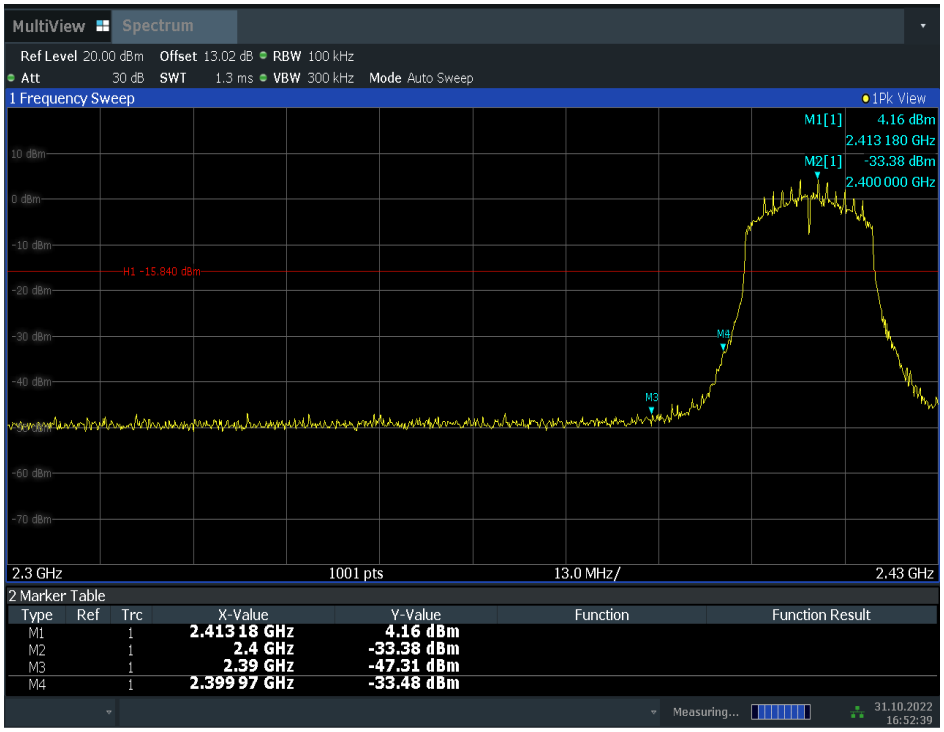
15:55:52 31.10.2022

Fig.A.5.3 Band Edges (802.11g, Ch 1)



10:55:38 15.11.2022

Fig.A.5.4 Band Edges (802.11g, Ch 11)



16:52:40 31.10.2022

Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)

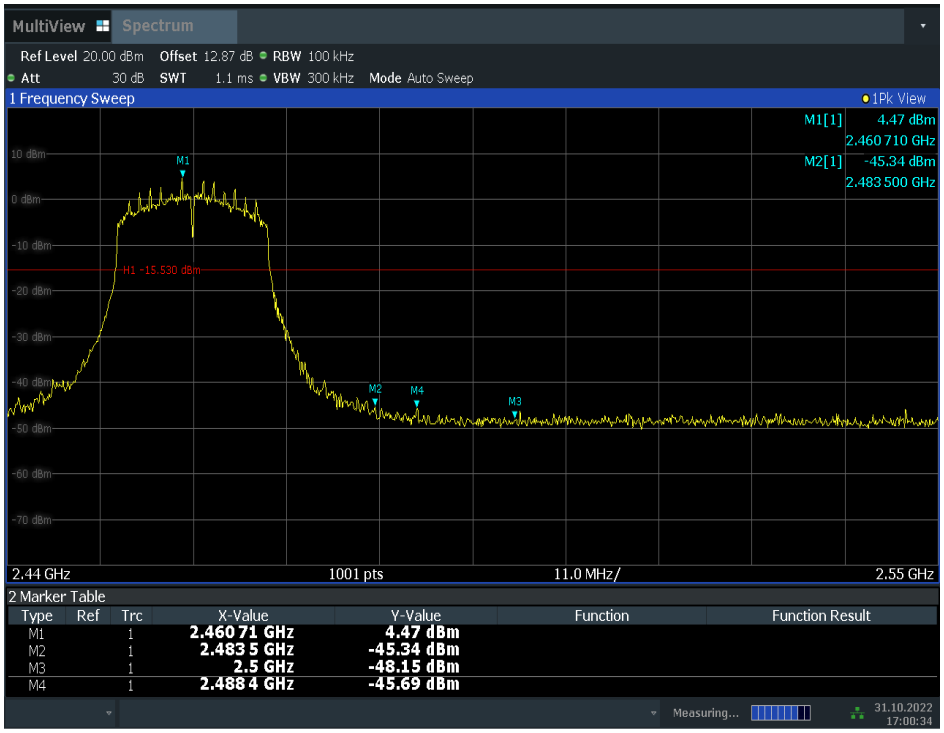


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Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)

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Fig.A.5.7 Band Edges (802.11n-HT40, Ch 3)

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Fig.A.5.8 Band Edges (802.11n-HT40, Ch 9)

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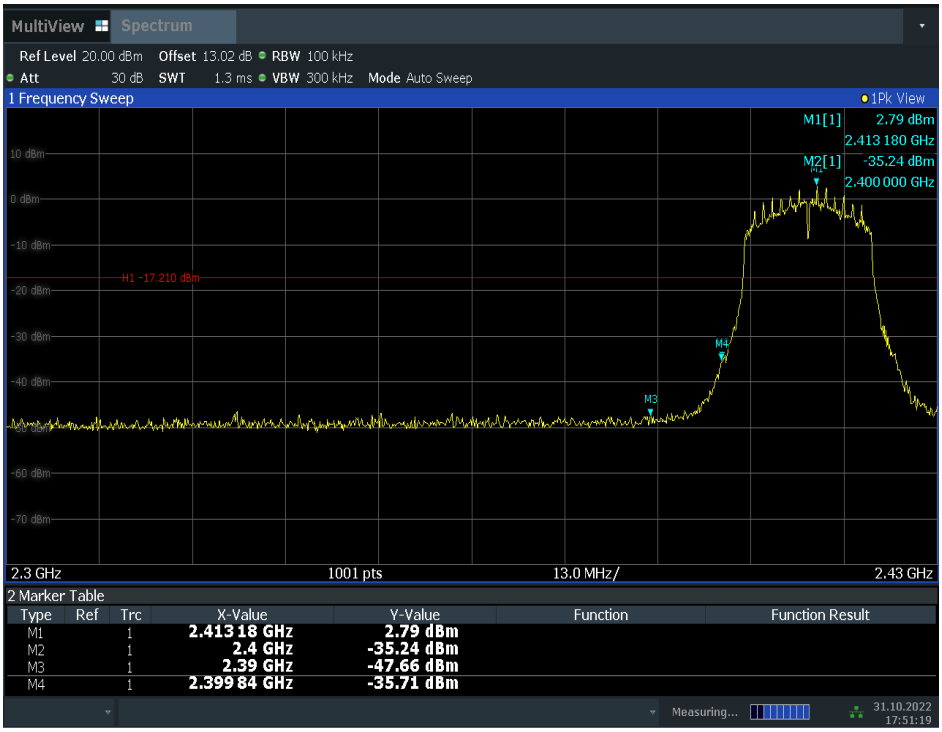
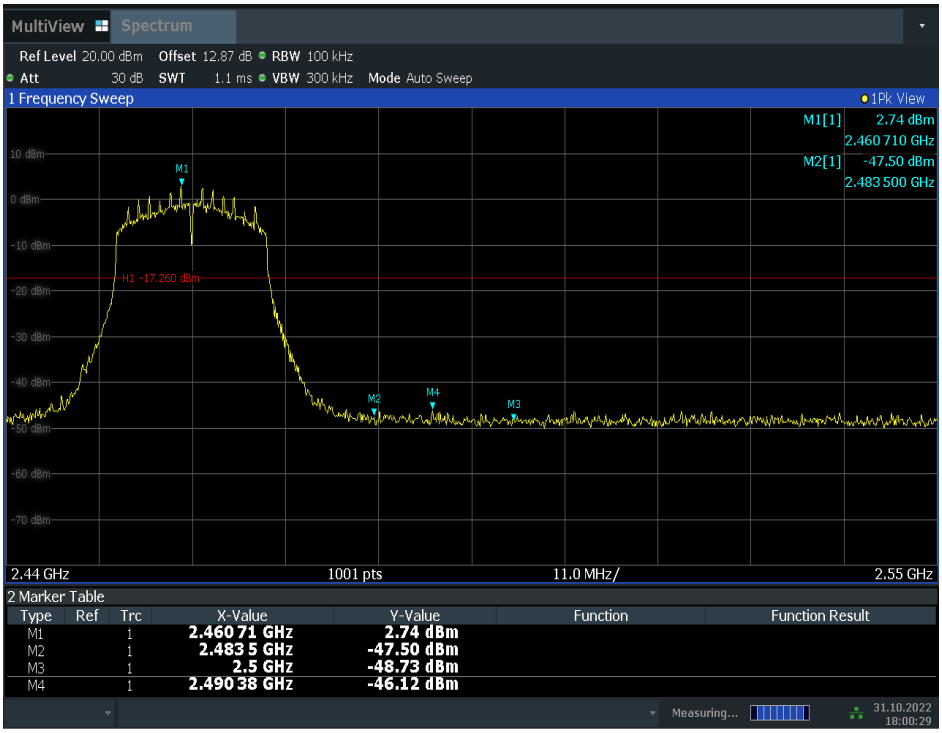


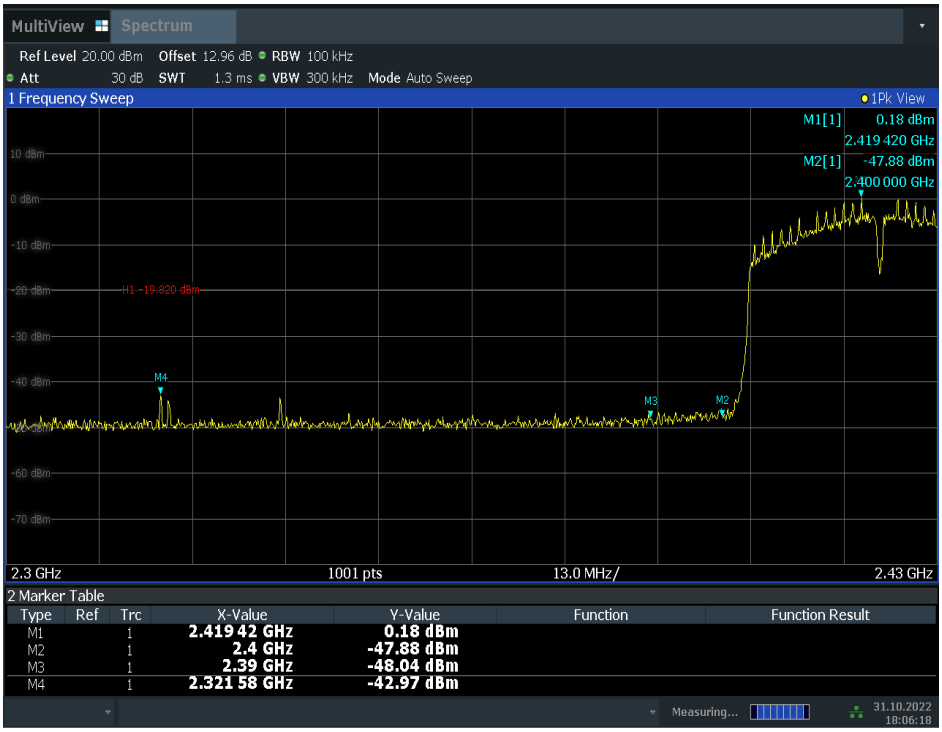
17:51:19 31.10.2022

Fig.A.5.9 Band Edges (802.11n-HT20, Ch 1)



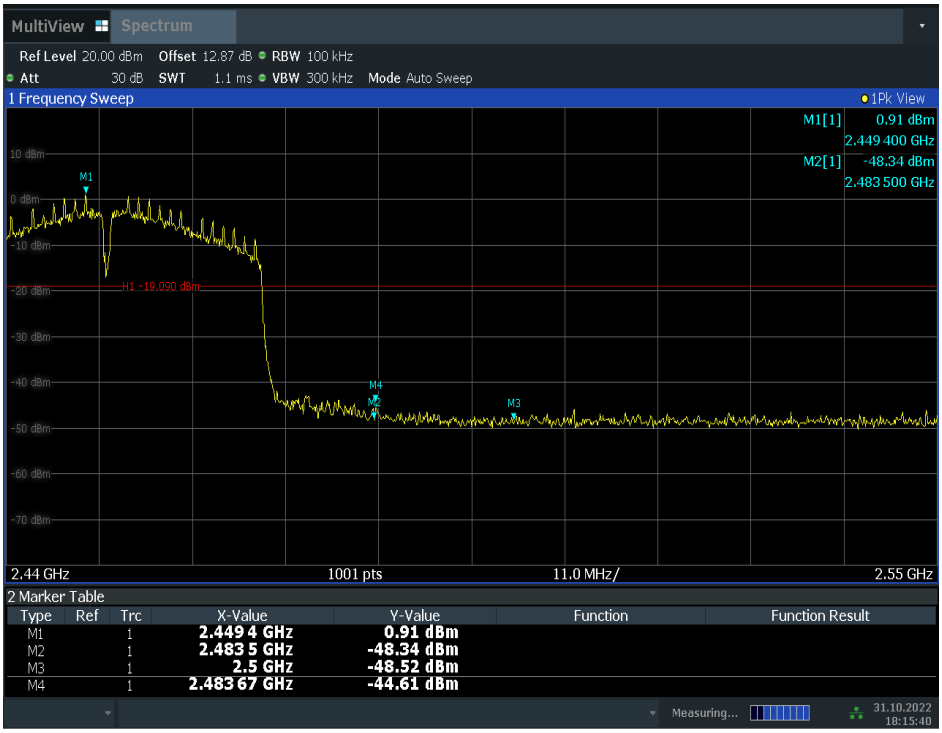
18:00:29 31.10.2022

Fig.A.5.10 Band Edges (802.11n-HT20, Ch 11)



18:06:19 31.10.2022

Fig.A.5.11 Band Edges (802.11n-HT40, Ch 3)



18:15:41 31.10.2022

Fig.A.5.12 Band Edges (802.11n-HT40, Ch 9)

A.6. Transmitter Spurious Emission

A.6.1 Transmitter Spurious Emission – Conducted

Method of Measurement: See ANSI C63.10-2013-clause 11.11

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= 300 kHz

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

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

a) Set the center frequency and span to encompass frequency range to be measured.

b) Set the RBW = 100 kHz.

c) Set the VBW = 300 kHz.

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.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

EUT ID: EUT14,UT05a

Measurement Results:

SISO-ANT0

802.11b mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.412 GHz	Fig.A.6.1.1	P
		30 MHz ~ 1 GHz	Fig.A.6.1.2	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.3	P
	6	2.437 GHz	Fig.A.6.1.4	P
		30 MHz ~ 1 GHz	Fig.A.6.1.5	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.6	P
	11	2.462 GHz	Fig.A.6.1.7	P
		30 MHz ~ 1 GHz	Fig.A.6.1.8	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.9	P

802.11g mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.412 GHz	Fig.A.6.1.10	P
		30 MHz ~ 1 GHz	Fig.A.6.1.11	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.12	P
	6	2.437 GHz	Fig.A.6.1.13	P
		30 MHz ~ 1 GHz	Fig.A.6.1.14	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.15	P
	11	2.462 GHz	Fig.A.6.1.16	P
		30 MHz ~ 1 GHz	Fig.A.6.1.17	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.18	P

802.11n-HT20 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.412 GHz	Fig.A.6.1.19	P
		30 MHz ~ 1 GHz	Fig.A.6.1.20	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.21	P
	6	2.437 GHz	Fig.A.6.1.22	P
		30 MHz ~ 1 GHz	Fig.A.6.1.23	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.24	P
	11	2.462 GHz	Fig.A.6.1.25	P
		30 MHz ~ 1 GHz	Fig.A.6.1.26	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.27	P

802.11n-HT40 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	3	2.422 GHz	Fig.A.6.1.28	P
		30 MHz ~ 1 GHz	Fig.A.6.1.29	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.30	P
	6	2.437 GHz	Fig.A.6.1.31	P
		30 MHz ~ 1 GHz	Fig.A.6.1.32	P
		1 GHz ~ 26.5 GHz	Fig.A.6.1.33	P

	9	2.452 GHz	Fig.A.6.1.34	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.35	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.36	**P**

MIMO-ANT0

802.11n-HT20 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.412 GHz	Fig.A.6.1.37	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.38	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.39	**P**
	6	2.437 GHz	Fig.A.6.1.40	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.41	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.42	**P**
	11	2.462 GHz	Fig.A.6.1.43	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.44	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.45	**P**

802.11n-HT40 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	3	2.422 GHz	Fig.A.6.1.46	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.47	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.48	**P**
	6	2.437 GHz	Fig.A.6.1.49	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.50	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.51	**P**
	9	2.452 GHz	Fig.A.6.1.52	**P**
		30 MHz ~ 1 GHz	Fig.A.6.1.53	**P**
		1 GHz ~ 26.5 GHz	Fig.A.6.1.54	**P**

Conclusion: Pass

Test graphs as below:

ANT0

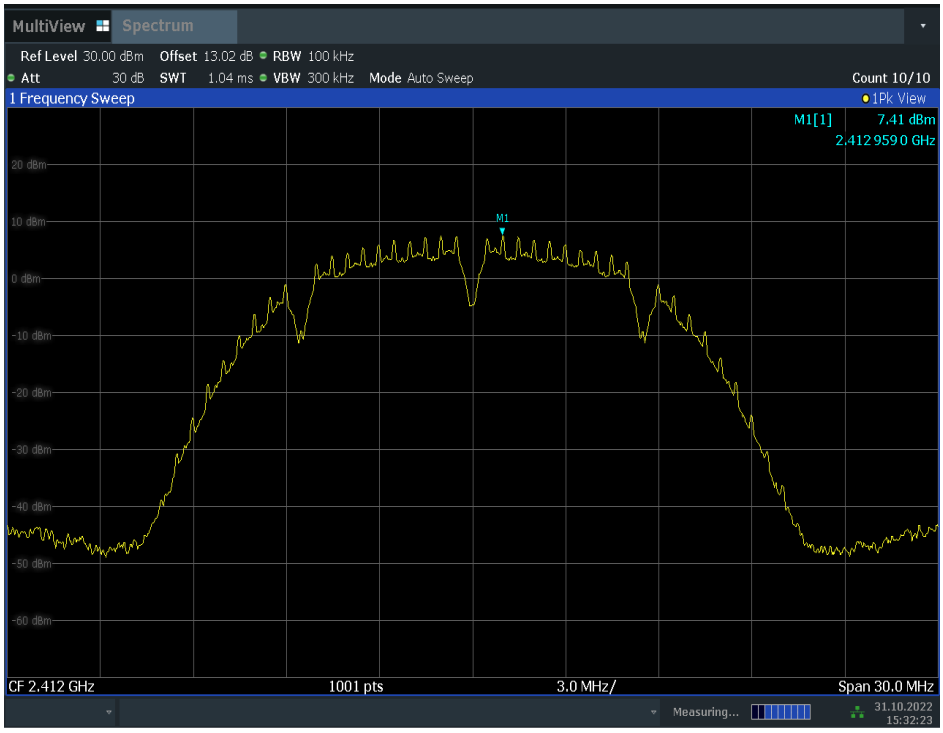


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Fig.A.6.1.1 Transmitter Spurious Emission - Conducted (802.11b, Ch1, Center Frequency)

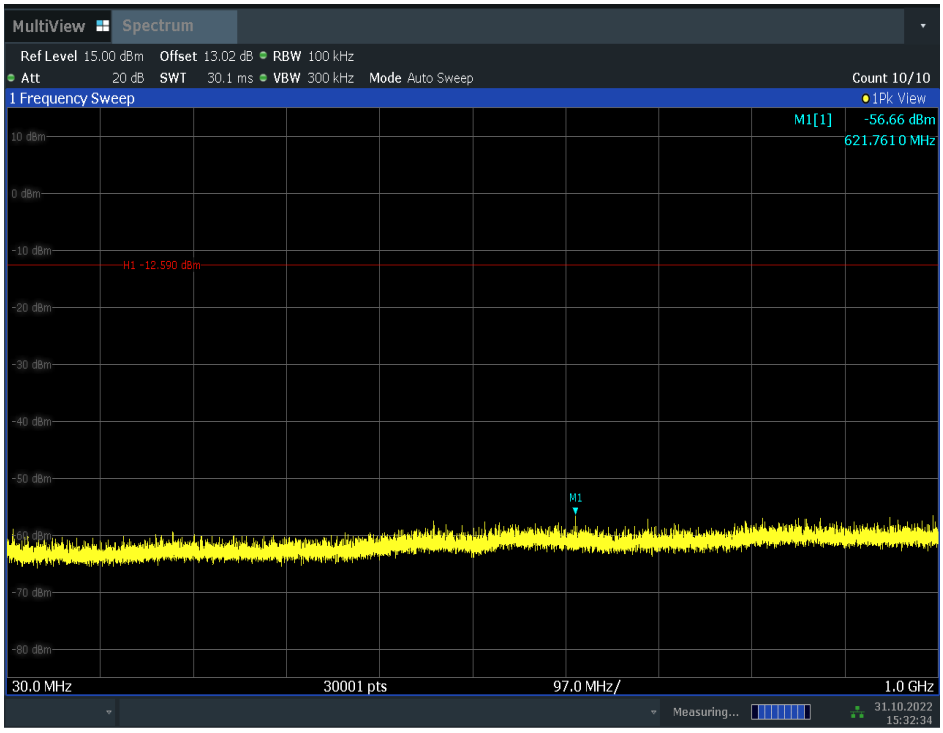

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Fig.A.6.1.2 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 30 MHz-1 GHz)

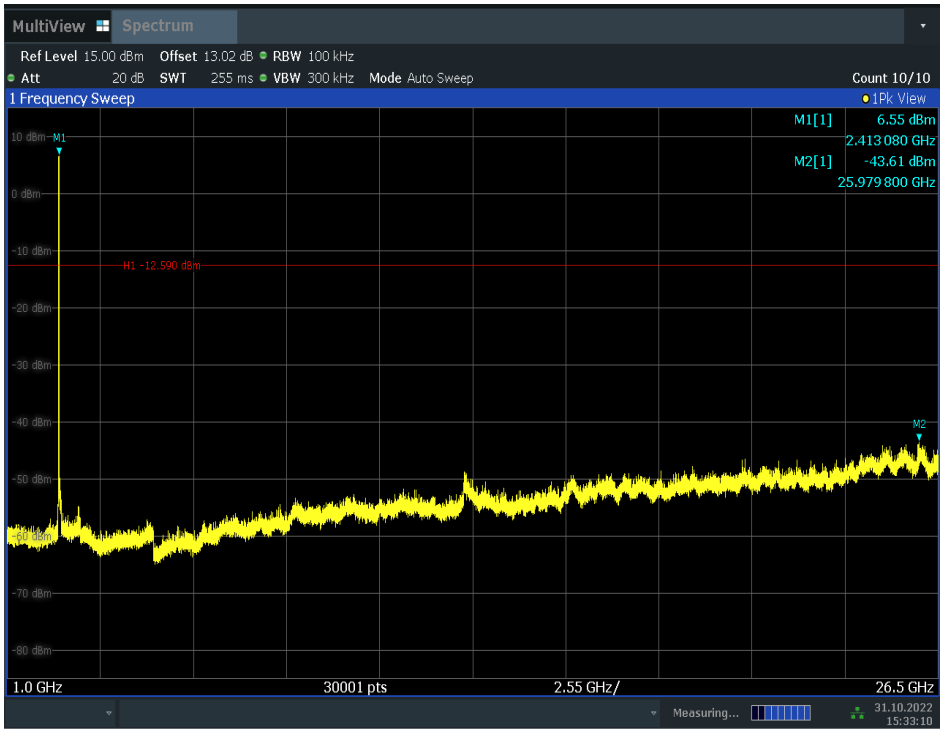

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Fig.A.6.1.3 Transmitter Spurious Emission - Conducted (802.11b, Ch1, 1 GHz-26.5 GHz)

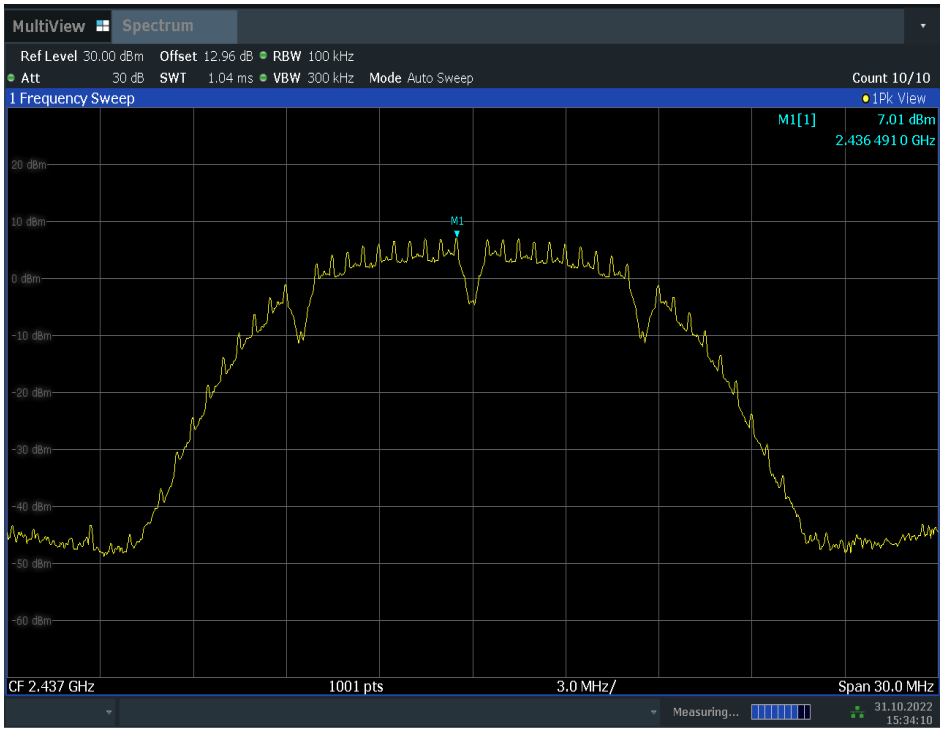

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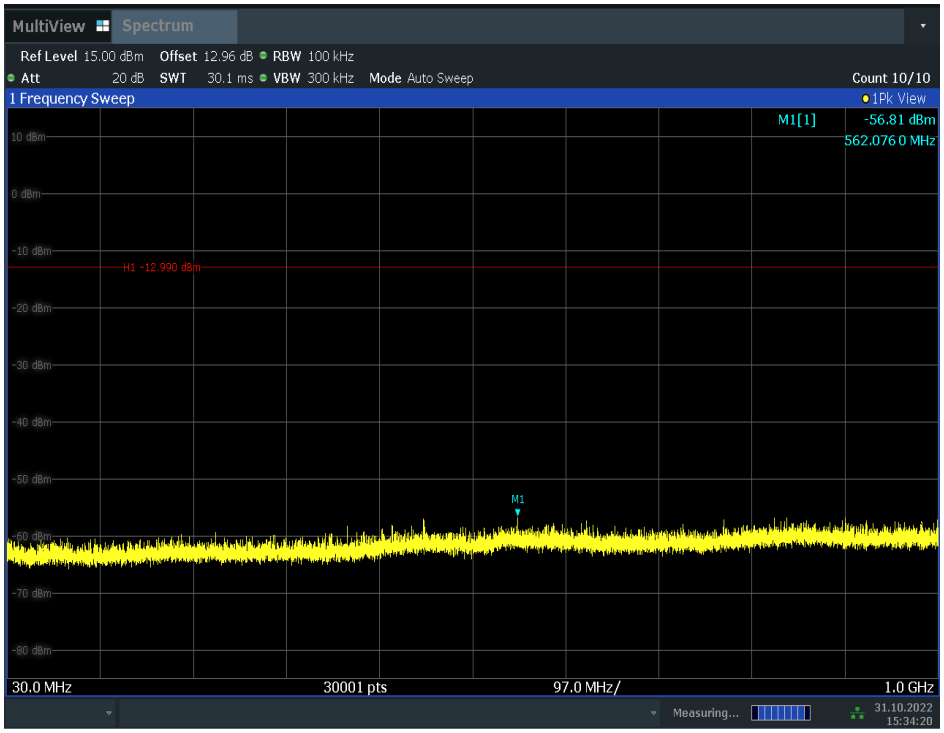
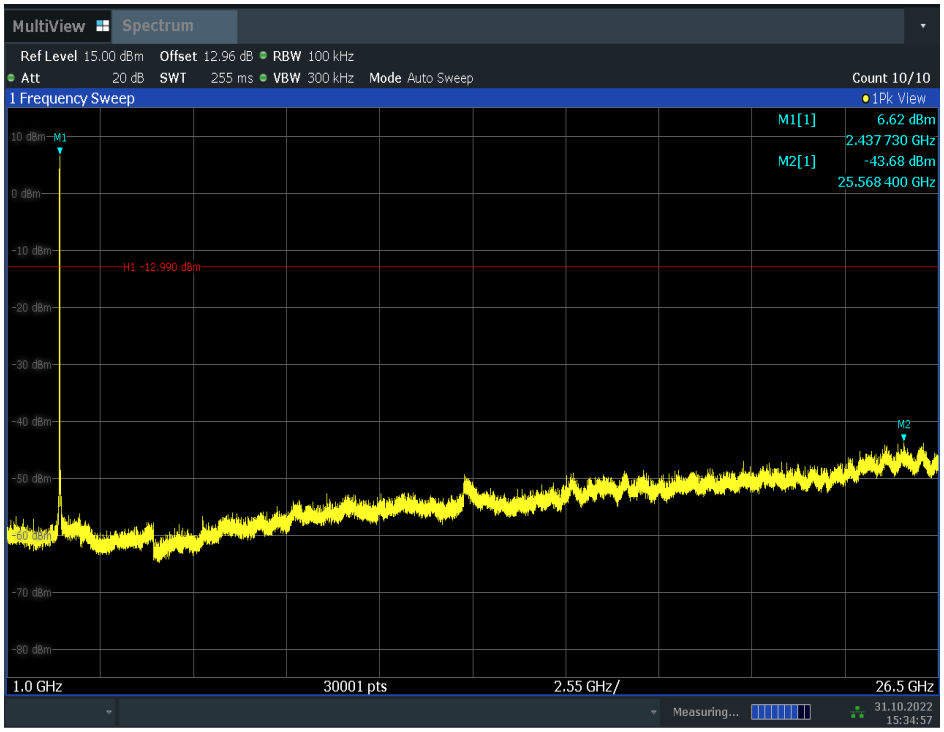
Fig.A.6.1.4 Transmitter Spurious Emission - Conducted (802.11b, Ch6, Center Frequency)



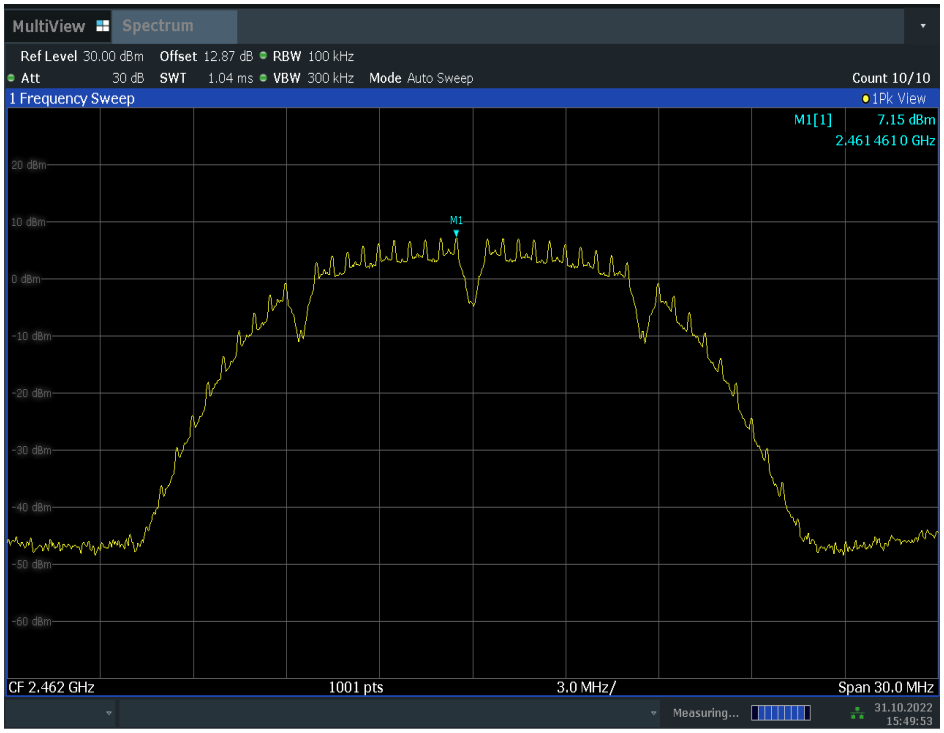
15:34:21 31.10.2022

Fig.A.6.1.5 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 30 MHz-1 GHz)



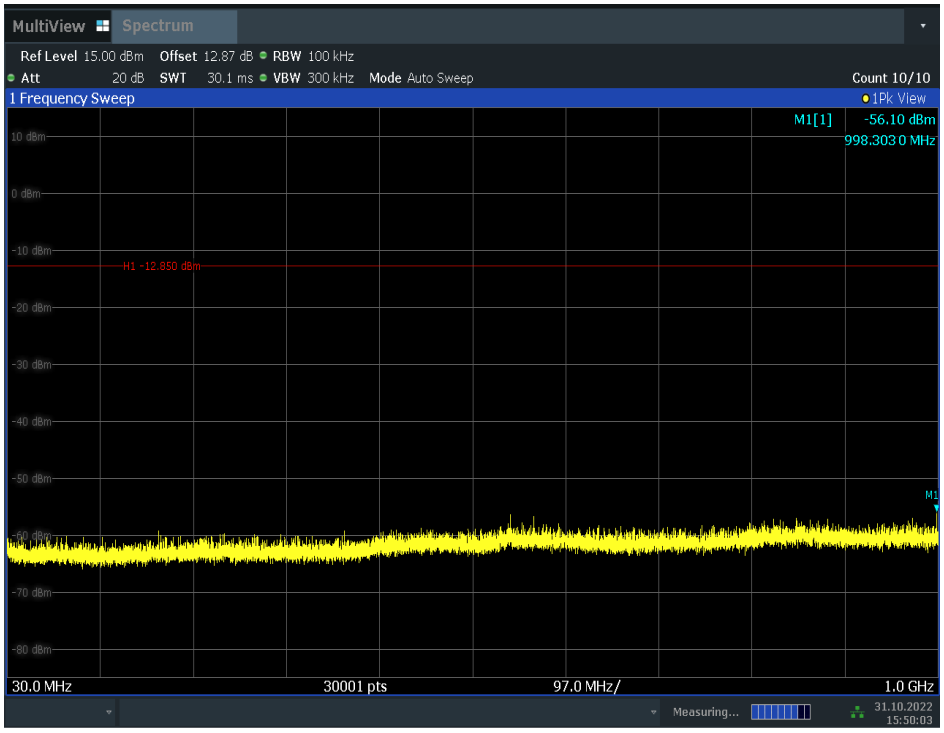
15:34:57 31.10.2022

Fig.A.6.1.6 Transmitter Spurious Emission - Conducted (802.11b, Ch6, 1 GHz-26.5 GHz)



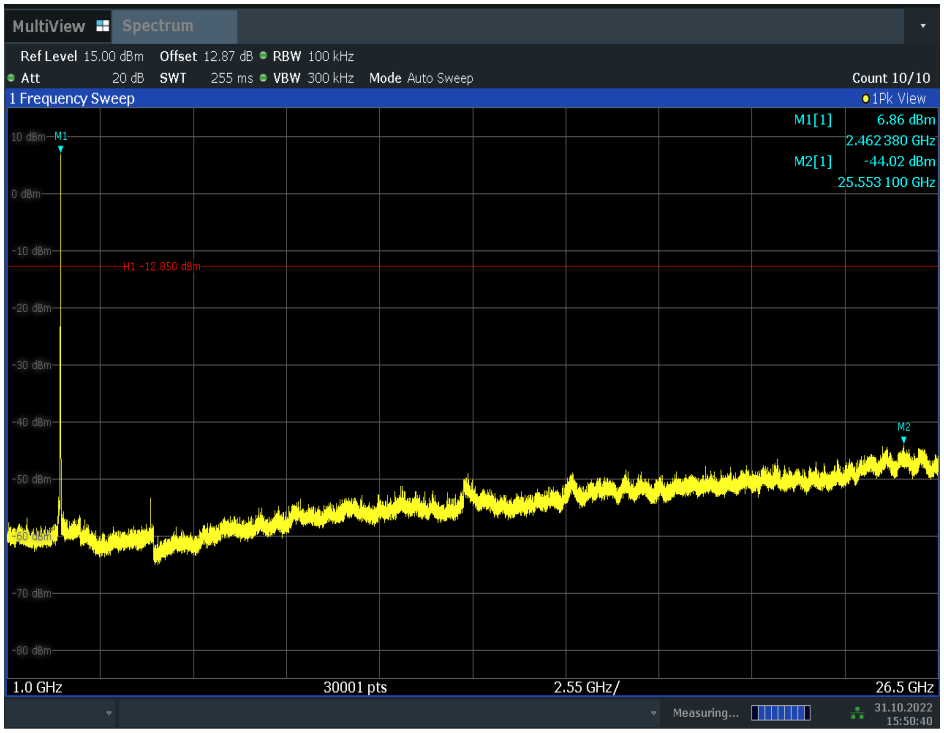
15:49:53 31.10.2022

Fig.A.6.1.7 Transmitter Spurious Emission - Conducted (802.11b, Ch11, Center Frequency)



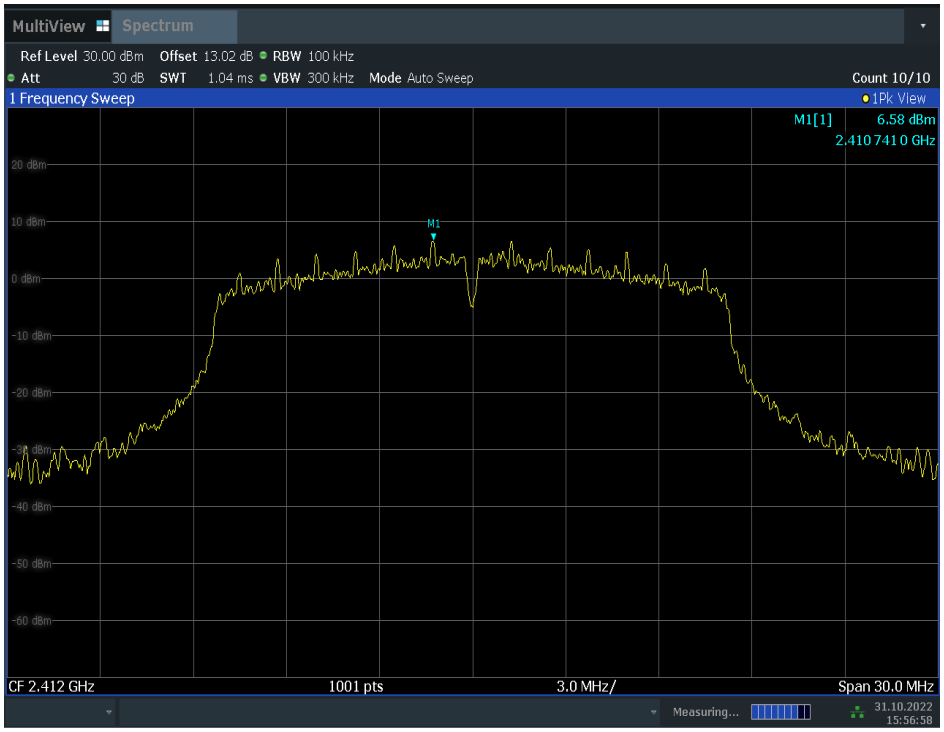
15:50:04 31.10.2022

Fig.A.6.1.8 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 30 MHz-1 GHz)



15:50:40 31.10.2022

Fig.A.6.1.9 Transmitter Spurious Emission - Conducted (802.11b, Ch11, 1 GHz-26.5 GHz)



15:56:58 31.10.2022

Fig.A.6.1.10 Transmitter Spurious Emission - Conducted (802.11g, Ch1, Center Frequency)