

Report No.: SEWM2208000155RG03
Rev.: 01
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TEST REPORT

Application No.: SEWM2208000155RG
Applicant: NCXX Inc.
Address of Applicant: 2-32-1, Kunuginome, Hanamaki, Iwate-Pref 025-0323, Japan
Manufacturer: NCXX Inc.
Address of Manufacturer: 2-32-1, Kunuginome, Hanamaki, Iwate-Pref 025-0323, Japan
EUT Description: 5G Portable Modem
Model No.: UNX-05G
Trade Mark: NCXX
FCC ID: SLKUNX-05G
Standards: FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart C
Date of Receipt: 2022/08/30
Date of Test: 2022/09/06 to 2022/10/22
Date of Issue: 2022/10/27

Test Result :	PASS *
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* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Panta Sun
Wireless Laboratory Manager



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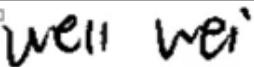
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1 Version

Revision Record

Version	Chapter	Date	Modifier	Remark
01		2022/10/27		Original

Prepared By	 (Tizzy Song) / Test Engineer
Checked By	 (Well Wei) / Reviewer

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2 Test Summary

Test Item	FCC Rule No.	Test Method	Test Result	Result
Antenna Requirement	15.203/15.247(b)	--	Clause 4.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013 Section 6.2	Clause 4.2	PASS
Duty Cycle	--	--	Clause 4.3	Reporting only
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013 Section11.9.2.3	Clause 4.4	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013 Section 11.8 Option 2 / 6.9.3	Clause 4.5	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013 Section 11.10.2	Clause 4.6	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013 Section 11.11	Clause 4.7	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013 Section 11.11	Clause 4.8	PASS
Radiated Spurious Emissions	15.247(d);15.205/15.209	ANSI C63.10 2013 Section 11.12	Clause 4.9	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.247(d);15.205/15.209	ANSI C63.10 2013 Section 11.12	Clause 4.10	PASS

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3 General Information

3.1 Details of Client

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Manufacturer:	NCXX Inc.
Address of Manufacturer:	2-32-1, Kunuginome, Hanamaki, Iwate-Pref 025-0323, Japan

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Tizzy Song, Ives Cheng

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

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3.4 General Description of EUT

EUT Description:	5G Portable Modem	
Model No.:	UNX-05G	
Trade Mark:	NCXX	
Hardware Version:	SRT851N_V1.02	
Software Version:	UNX-05G_8.0.7_EQ100	
IMEI:	RF Conducted	354942230001013
	RSE & AC power line	354942230001435
Operation Frequency:	802.11b/g/n(HT20)/ax(HE20):	2412MHz to 2462MHz
	802.11n(HT40)/ax(HE40):	2422MHz to 2452MHz
Modulation Type:	802.11b:	DSSS (DBPSK, DQPSK, CCK)
	802.11g/n:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11ax:	OFDM /OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Number of Channels:	802.11b/g/n(HT20)/ax(HE20): 11 802.11n(HT40)/ax(HE40): 7	
Channel Spacing:	5MHz	
Smart System:	<input checked="" type="checkbox"/> SISO	802.11b/g/n/ax
	<input checked="" type="checkbox"/> MIMO	802.11n/ax: 2Tx & 2Rx
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated	
Antenna Gain:	1.6dBi(Wifi0); 1.4dBi(Wifi1)	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.	
RF Cable:	1dB	
Remark:	As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.	



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Operation Frequency of each channel (802.11b/g/n HT20/ax HE20)

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

Operation Frequency of each channel (802.11n HT40/ax HE40)

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

Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency for 802.11 b/g/n (HT20) /ax (HE20)	Frequency for 802.11n (HT40)/ax(HE40)
The Lowest channel	2412MHz	2422MHz
The Middle channel	2437MHz	2437MHz
The Highest channel	2462MHz	2452MHz

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3.5 Test Environment and Mode

Environment Parameter	101 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	5
Remark: NV: Normal Voltage NT: Normal Temperature		

3.6 Description of Support Units

The EUT has been tested as an independent unit.

3.7 Worst-case configuration and mode

Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. Following are the worst-case data rates set for test:

Modulation Type	SISO - Data Rate	MIMO - Data Rate
802.11b	1 Mbps	2 Mbps
802.11g	6 Mbps	12 Mbps
802.11n (HT 20)	MCS0 (6.5 Mbps)	MCS0 (13 Mbps)
802.11n (HT 40)	MCS0 (13.5 Mbps)	MCS0 (27 Mbps)
802.11ax (HE 20)	MCS0 (8 Mbps)	MCS0 (16 Mbps)
802.11ax (HE 40)	MCS0 (16 Mbps)	MCS0 (32 Mbps)

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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(b)
15.203 requirement:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
15.247(b) (4) requirement:	The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
The antenna is integrated and no consideration of replacement. The best case gain of the antenna are 1.6dBi(Wifi0) and 1.4dBi(Wifi1) *	
*Note: <i>The antenna gain are derived from the gain information report provided by the manufacturer.</i> <i>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i>	



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Cyclic Delay Diversity (CDD) System:

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS}=1)$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi

- If transmit signals are correlated, then

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

- If all transmit signals are completely uncorrelated, then

Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}]$ dBi

The Power and PSD limit should be modified if the directional gain of eut is over 6dB.

The EUT supports CDD System.

ANT Gain1 (dBi)	ANT Gain2 (dBi)	Power DG (dBi)	PSD DG (dBi)	Power Limit Reduction(dB)	PSD Limit Reduction(dB)
1.6	1.4	1.5	4.51	0	0



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4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013 Section 6.2		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)		Limit (dBuV)
			Quasi-peak Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"> 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. 		

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Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.
Final Test Mode:	Refer to section 3.7 for details. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass



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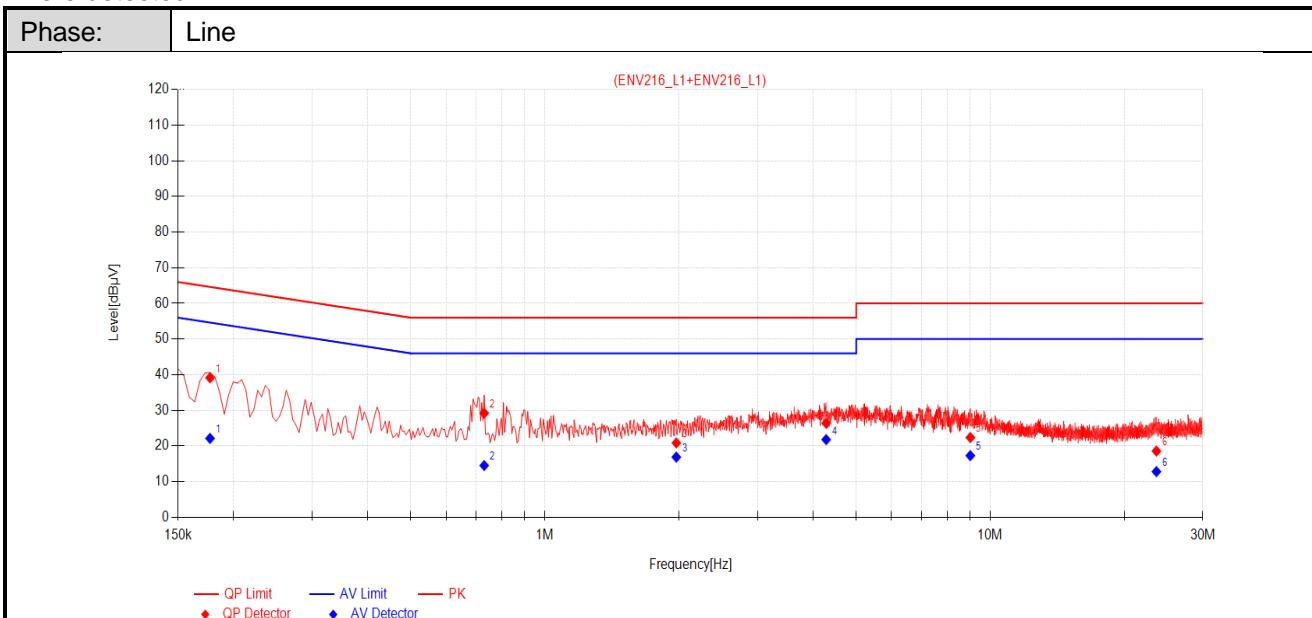
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Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.1770	10.75	28.39	39.14	64.63	25.49	11.39	22.14	54.63	32.49	PASS
2	0.7305	10.56	18.64	29.20	56.00	26.80	3.97	14.53	46.00	31.47	PASS
3	1.9725	10.69	10.18	20.87	56.00	35.13	6.20	16.89	46.00	29.11	PASS
4	4.2810	10.70	15.68	26.38	56.00	29.62	11.10	21.80	46.00	24.20	PASS
5	9.0195	10.66	11.74	22.40	60.00	37.60	6.64	17.30	50.00	32.70	PASS
6	23.6130	10.32	8.27	18.59	60.00	41.41	2.50	12.82	50.00	37.18	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value =Reading[dBμV] + Factor(List factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]



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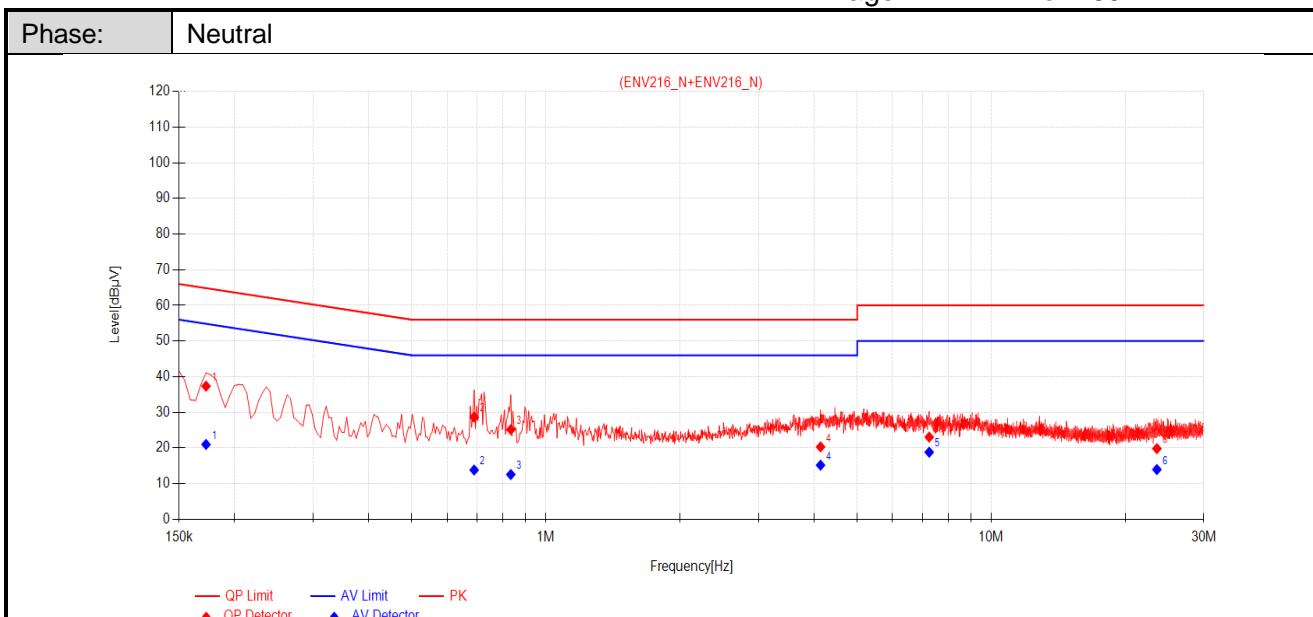
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Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dB μ V]	QP Value [dB μ V]	QP Limit [dB μ V]	QP Margin [dB]	AV Reading [dB μ V]	AV Value [dB μ V]	AV Limit [dB μ V]	AV Margin [dB]	Verdict
1	0.1725	10.71	26.64	37.35	64.84	27.49	10.29	21.00	54.84	33.84	PASS
2	0.6900	10.80	17.85	28.65	56.00	27.35	3.04	13.84	46.00	32.16	PASS
3	0.8340	10.79	14.38	25.17	56.00	30.83	1.78	12.57	46.00	33.43	PASS
4	4.1370	10.74	9.57	20.31	56.00	35.69	4.44	15.18	46.00	30.82	PASS
5	7.2555	10.53	12.52	23.05	60.00	36.95	8.29	18.82	50.00	31.18	PASS
6	23.5455	10.49	9.34	19.83	60.00	40.17	3.48	13.97	50.00	36.03	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value =Reading[dB μ V] + Factor(Lisn factor[dB] + cable loss[dB]).
3. Margin = Limit[dB μ V] – Value[dB μ V]

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4.3 Duty Cycle

The detailed test data see: **Appendix**

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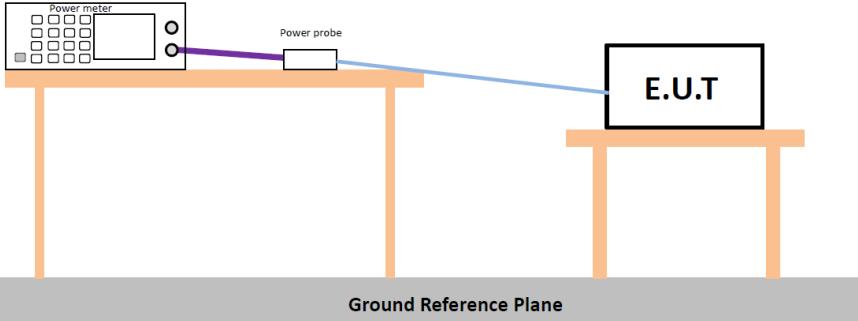
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4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section11.9.2.3
Test Setup:	 <p>* Test with power meter (Detector function: Peak)</p>
Test Instruments:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	30dBm
Test Results:	Pass
The detailed test data see: Appendix	

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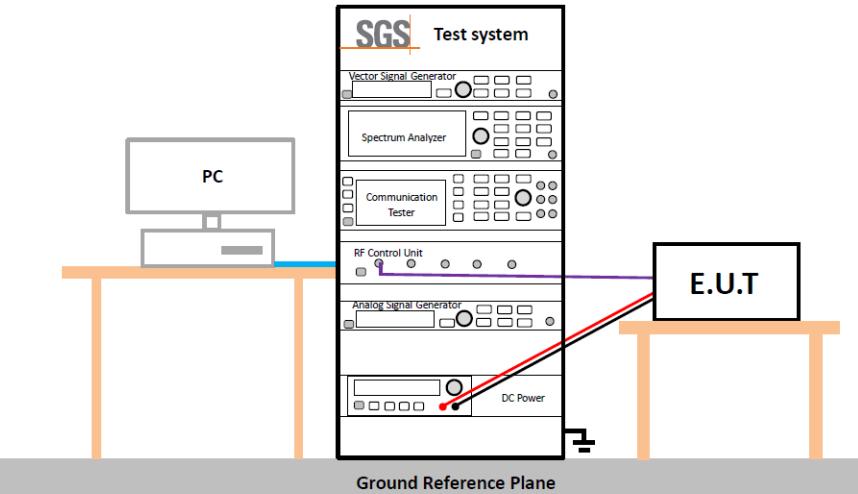


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4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8 Option 2 / 6.9.3
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	≥ 500 kHz
Test Results:	Pass
The detailed test data see: Appendix	

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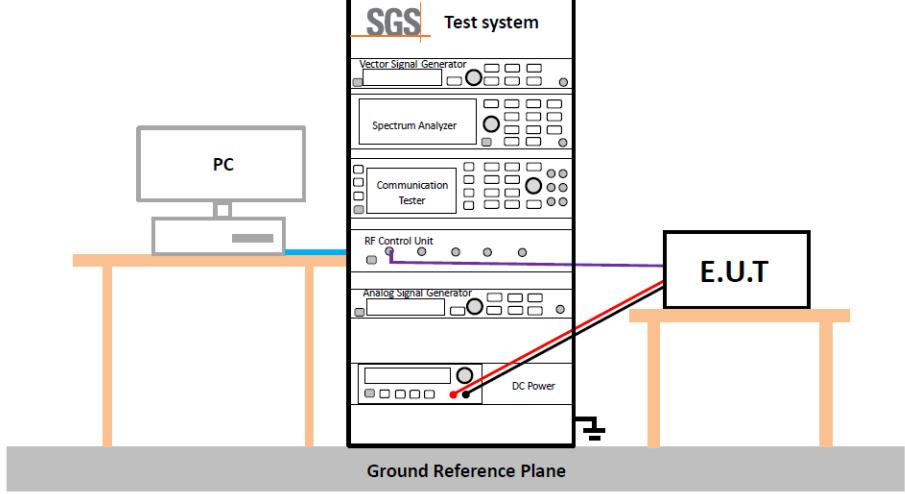
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4.6 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10 :2013 Section 11.10.2
Test Setup:	 <p>The diagram illustrates the test setup. A central vertical stack of equipment is labeled 'Test system'. From top to bottom, it includes: Vector Signal Generator, Spectrum Analyzer, Communication Tester, RF Control Unit, Analog Signal Generator, and DC Power. A horizontal blue line connects the Vector Signal Generator and the E.U.T. A red line connects the Spectrum Analyzer, Communication Tester, RF Control Unit, Analog Signal Generator, and DC Power. All these components are connected to a horizontal grey bar at the bottom labeled 'Ground Reference Plane'. A PC is connected to the Vector Signal Generator and the E.U.T. The E.U.T is a rectangular box labeled 'E.U.T'.</p>
Test Instruments:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	$\leq 8.00 \text{ dBm}/3\text{kHz}$
Test Results:	Pass
The detailed test data see: Appendix	



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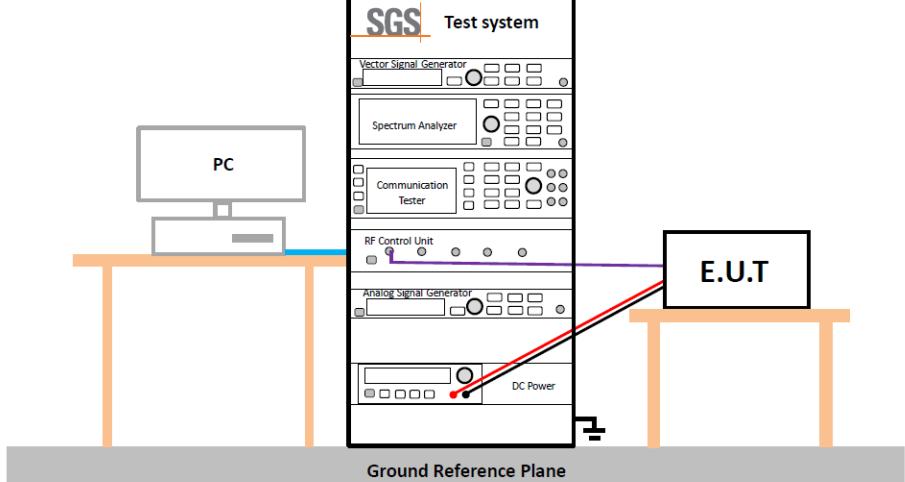
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4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass
The detailed test data see: Appendix	



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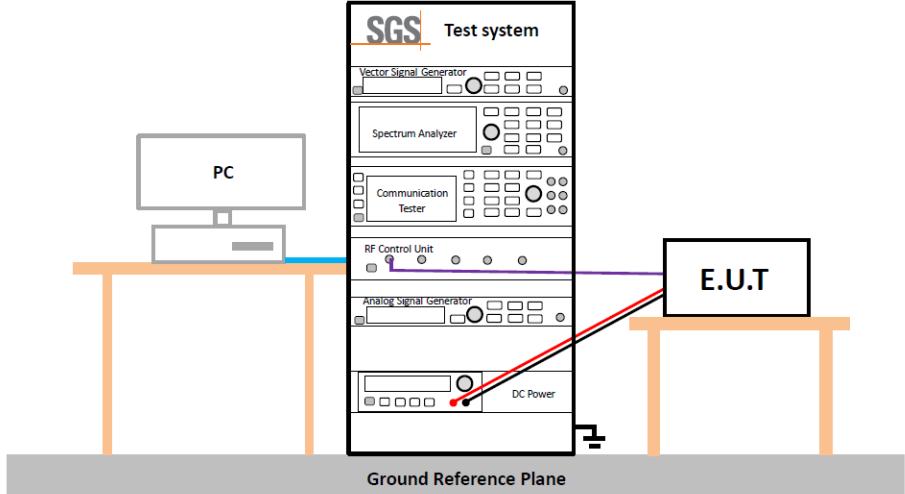
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4.8 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Results:	Pass
The detailed test data see: Appendix	

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4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Test Frequency:	9kHz ~ 25GHz				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	3MHz	Peak
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

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Test Setup:

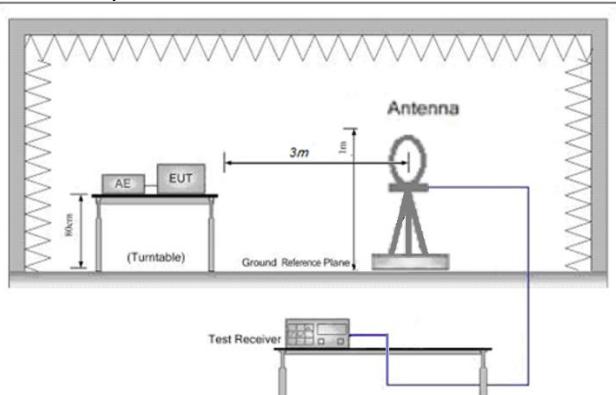


Figure 1. Below 30MHz

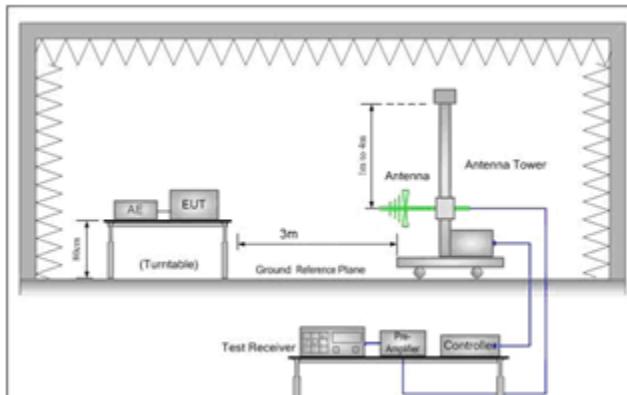


Figure 2. 30MHz to 1GHz

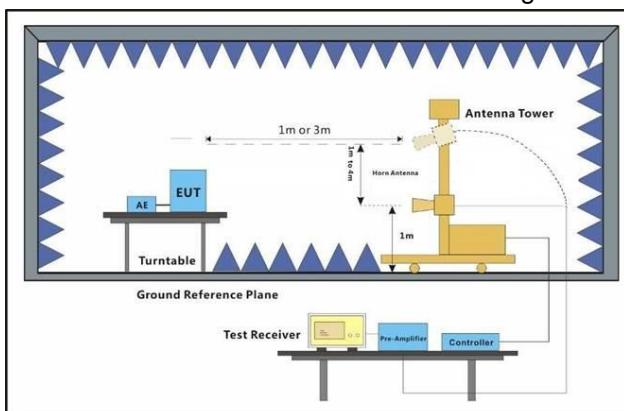


Figure 3. Above 1 GHz

Test Procedure:

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Distance from antenna to EUT is 1m for measurements >18GHz).
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the

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	<p>maximum reading.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. Test the EUT in the lowest channel, the middle channel ,the Highest channel.</p> <p>h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p> <p>j. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported</p> <p>k. The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.</p> <p>l. At a measurement distance of 1 meter the limit line was increased by $20 \times \log(3/1) = 9.54$ dB.</p>
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> • RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW \geq 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW \geq [3 *RBW] • Detector = RMS (power averaging), if span / (# of points in sweep) \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak. • Sweep time = auto • Perform a trace average of at least 100 traces.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Refer to section 3.7 for details.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: Appendix	

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4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test Setup:

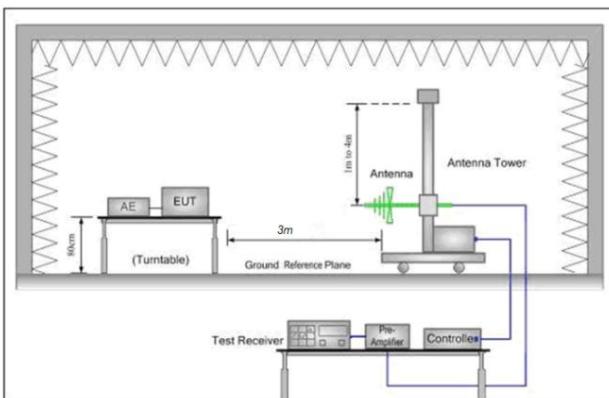


Figure 1. 30MHz to 1GHz

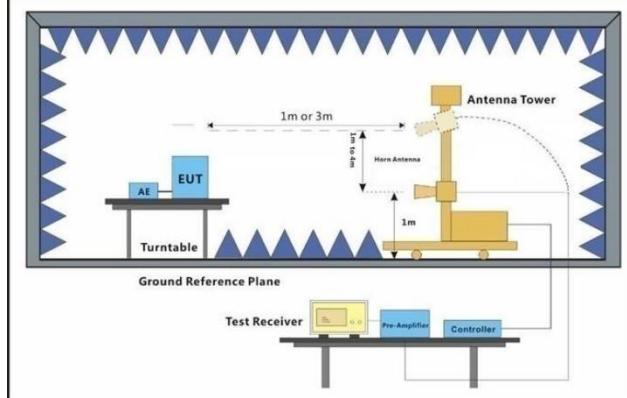


Figure 2. Above 1 GHz

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Test Procedure:	<ol style="list-style-type: none"> For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel Test the EUT in the lowest channel , the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> RBW = 120 kHz VBW = 300 kHz Detector = Peak Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> RBW = 1 MHz VBW \geq 3 MHz Detector = Peak Sweep time = auto Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> RBW = 1 MHz VBW \geq [3 *RBW] Detector = RMS (power averaging), if span / (# of points in sweep) \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak. Sweep time = auto Perform a trace average of at least 100 traces.
Exploratory Test Mode:	<p>Transmitting with all kind of modulations, data rates.</p> <p>Charge + Transmitting mode.</p>

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Final Test Mode:	Refer to section 3.7 for details.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: Appendix	



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5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	±1.0 %
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	±1.0 %
7	Conduction Emission	± 2.90dB (150kHz to 30MHz)
8	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.80dB (30M -1GHz)
		± 4.80dB (1GHz to 18GHz)
		± 4.80dB (Above 18GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{cisp/ETSI}$ (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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6 Equipment List

RF Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2022/02/16	2023/02/15
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2022/05/17	2023/05/16
Measurement Software	Tonscend	JS1120-3 Test System V3.1.55	SUWI-02-09-09	NCR	NCR
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2022/05/28	2023/05/27
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2022/02/15	2023/02/14
Power meter	Anritsu	ML2495A	SUWI-01-31-01	2021/12/04	2022/12/03
Pulse power sensor	Anritsu	MA2411b	SUWI-01-32-01	2021/12/04	2022/12/03
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2022/02/15	2023/02/14

CE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	2021/05/08	2024/05/07
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/02/19	2023/02/18
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2022/02/16	2023/02/15
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-01	2022/02/19	2023/02/18
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-02	2022/02/19	2023/02/18
Measurement Software	Tonscend	JS32-CE 4.0.0.2	SUWI-02-09-05	NCR	NCR

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RSE Test System

Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2022/02/16	2023/02/15
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2022/05/28	2023/05/27
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/02/19	2023/02/18
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-01	2021/05/16	2023/05/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2021/05/16	2023/05/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/05/14	2023/05/13
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2022/02/14	2023/02/13
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2022/02/14	2023/02/13
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2022/02/19	2023/02/18
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2021/06/10	2023/06/09
Measurement Software	Tonscend	JS32-RSE 4.0.0.1	SUWI-02-09-06	NCR	NCR

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7 Photographs - Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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Appendix



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DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11b	Wifi0	2412	7.64	2408.44	2416.08	≥ 0.5	PASS
	Wifi1	2412	8.16	2407.96	2416.12	≥ 0.5	PASS
	Wifi0	2437	8.16	2432.96	2441.12	≥ 0.5	PASS
	Wifi1	2437	8.16	2432.96	2441.12	≥ 0.5	PASS
	Wifi0	2462	8.60	2457.48	2466.08	≥ 0.5	PASS
	Wifi1	2462	8.12	2457.96	2466.08	≥ 0.5	PASS
11g	Wifi0	2412	16.04	2404.20	2420.24	≥ 0.5	PASS
	Wifi1	2412	16.44	2403.80	2420.24	≥ 0.5	PASS
	Wifi0	2437	16.40	2428.84	2445.24	≥ 0.5	PASS
	Wifi1	2437	16.40	2428.84	2445.24	≥ 0.5	PASS
	Wifi0	2462	16.00	2453.84	2469.84	≥ 0.5	PASS
	Wifi1	2462	16.40	2453.84	2470.24	≥ 0.5	PASS
11n20MIMO	Wifi0	2412	17.40	2403.44	2420.84	≥ 0.5	PASS
	Wifi1	2412	17.04	2403.48	2420.52	≥ 0.5	PASS
	Wifi0	2437	17.28	2428.52	2445.80	≥ 0.5	PASS
	Wifi1	2437	17.40	2428.40	2445.80	≥ 0.5	PASS
	Wifi0	2462	17.64	2453.16	2470.80	≥ 0.5	PASS
	Wifi1	2462	17.64	2453.16	2470.80	≥ 0.5	PASS
11n40MIMO	Wifi0	2422	36.48	2403.76	2440.24	≥ 0.5	PASS
	Wifi1	2422	36.24	2404.00	2440.24	≥ 0.5	PASS
	Wifi0	2437	36.08	2418.76	2454.84	≥ 0.5	PASS
	Wifi1	2437	35.76	2419.08	2454.84	≥ 0.5	PASS
	Wifi0	2452	36.08	2433.76	2469.84	≥ 0.5	PASS
	Wifi1	2452	34.16	2434.40	2468.56	≥ 0.5	PASS
11ax20MIMO	Wifi0	2412	18.64	2402.72	2421.36	≥ 0.5	PASS
	Wifi1	2412	18.44	2402.80	2421.24	≥ 0.5	PASS
	Wifi0	2437	18.80	2427.68	2446.48	≥ 0.5	PASS
	Wifi1	2437	18.80	2427.72	2446.52	≥ 0.5	PASS
	Wifi0	2462	18.80	2452.56	2471.36	≥ 0.5	PASS
	Wifi1	2462	18.64	2452.52	2471.16	≥ 0.5	PASS
11ax40MIMO	Wifi0	2422	37.76	2403.20	2440.96	≥ 0.5	PASS
	Wifi1	2422	38.16	2402.88	2441.04	≥ 0.5	PASS
	Wifi0	2437	38.00	2418.04	2456.04	≥ 0.5	PASS
	Wifi1	2437	35.52	2419.40	2454.92	≥ 0.5	PASS
	Wifi0	2452	38.00	2432.88	2470.88	≥ 0.5	PASS
	Wifi1	2452	37.52	2433.04	2470.56	≥ 0.5	PASS

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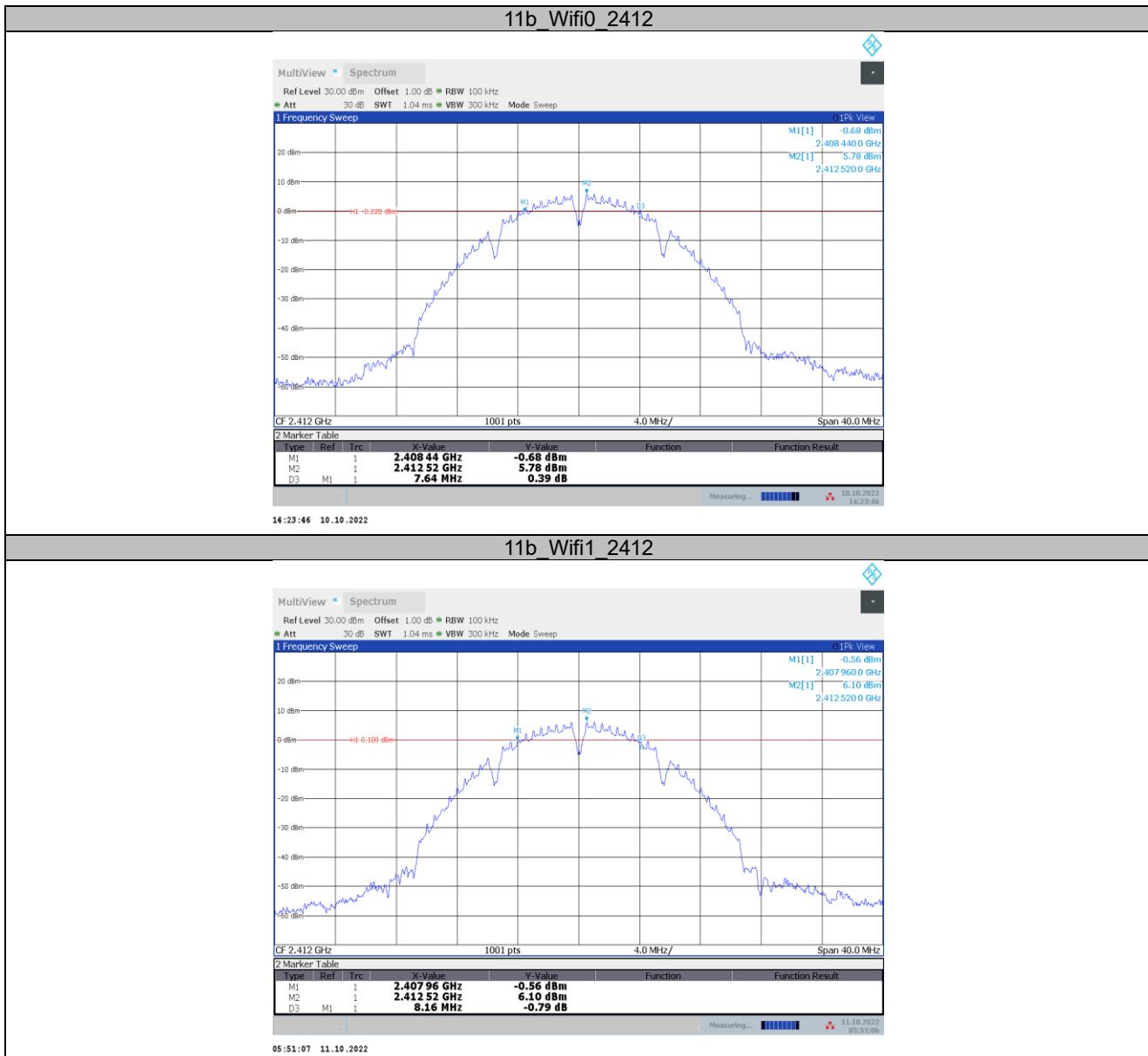
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Test Graphs



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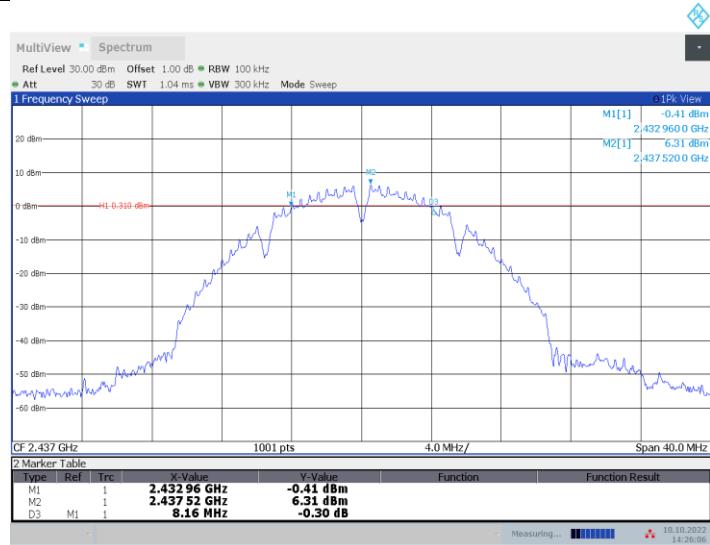
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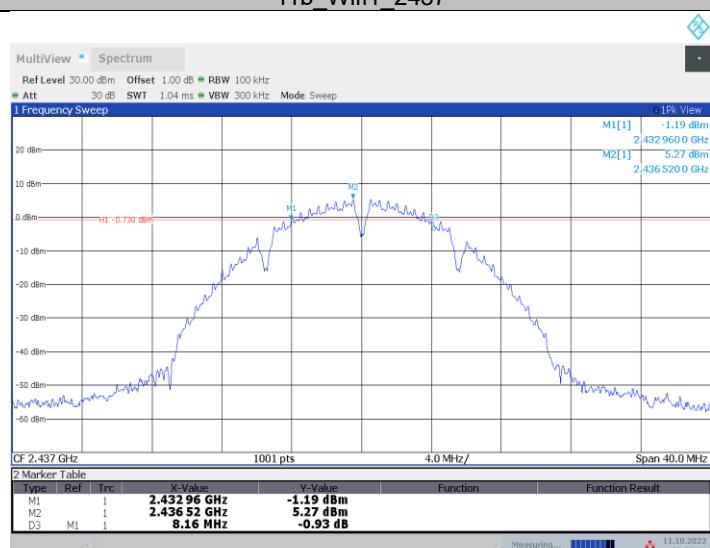
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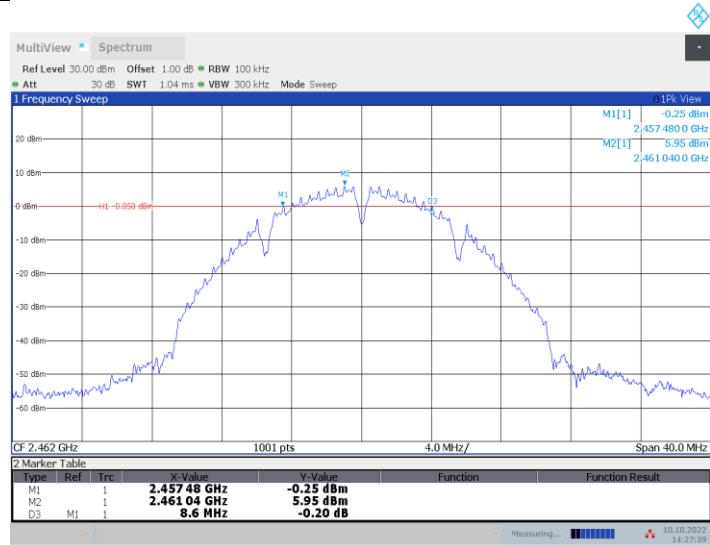
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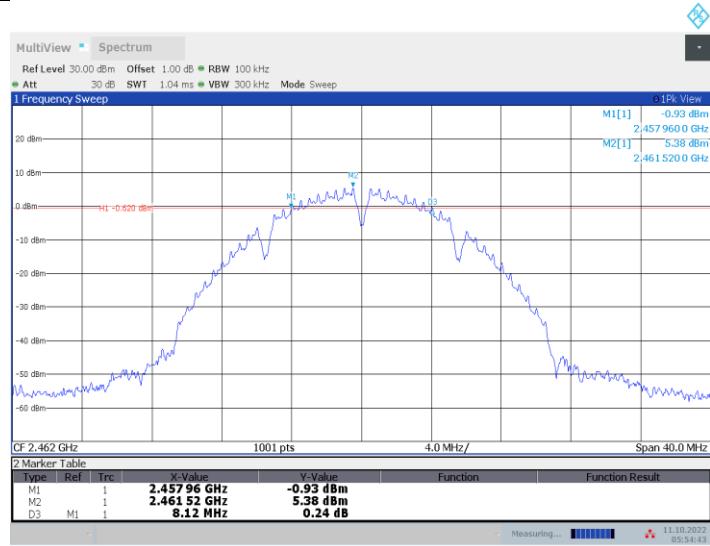
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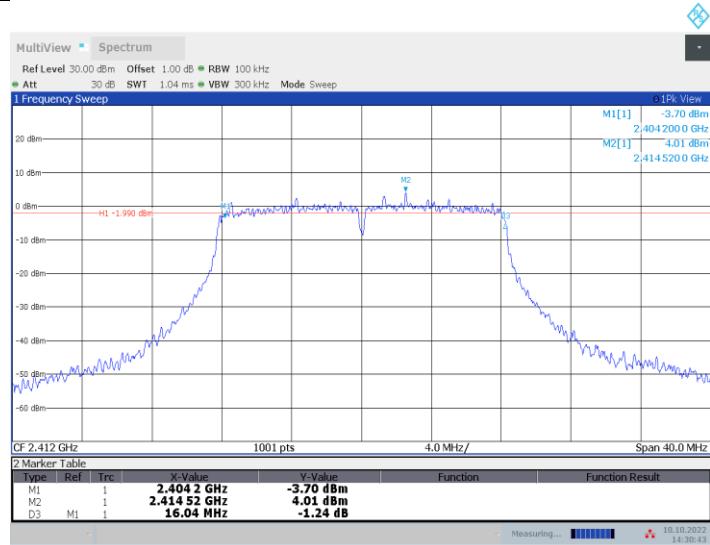
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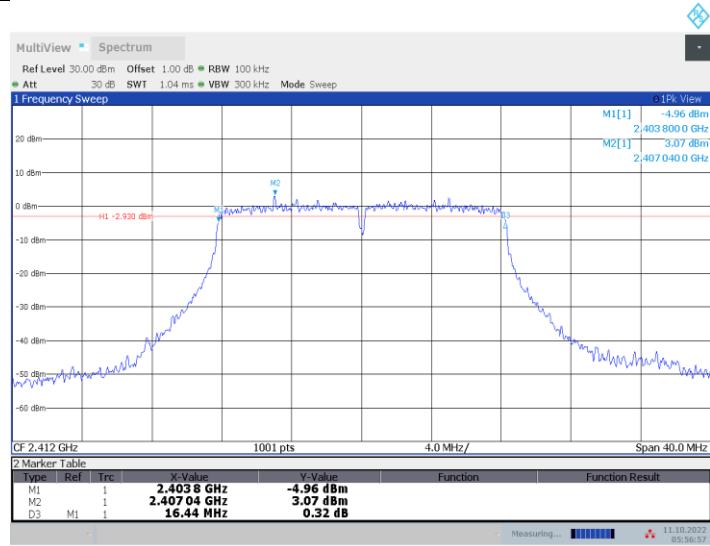
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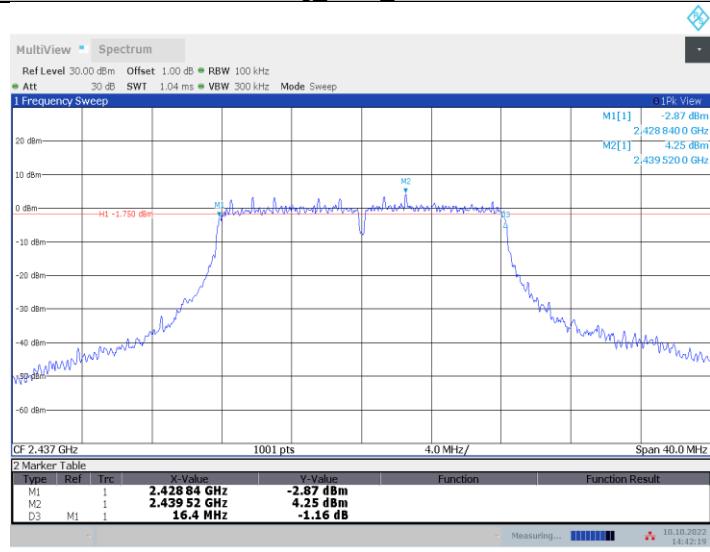
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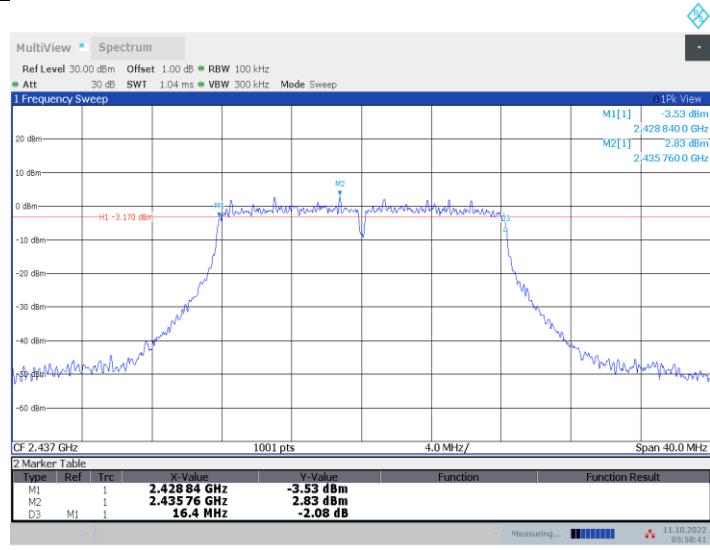
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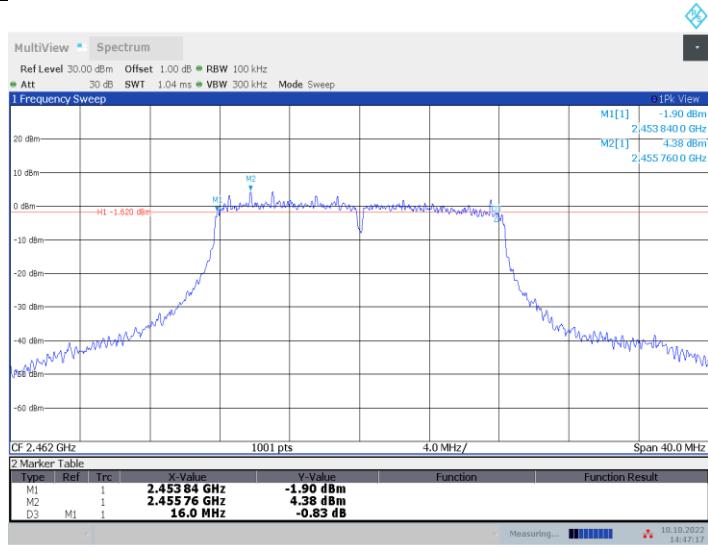
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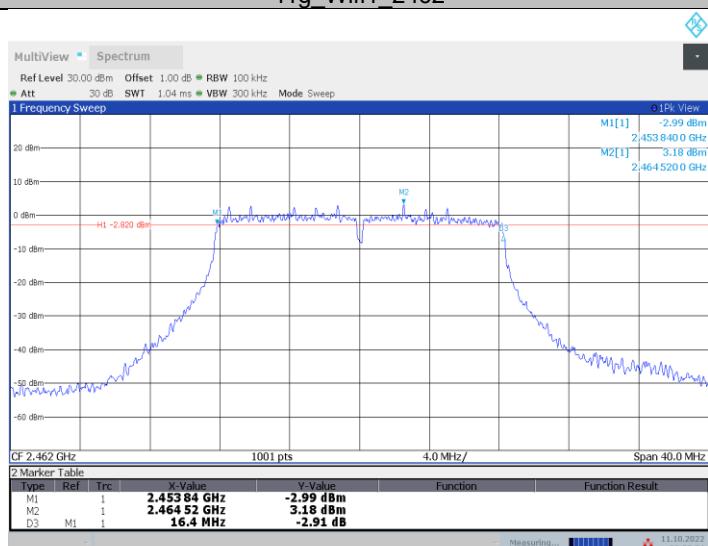
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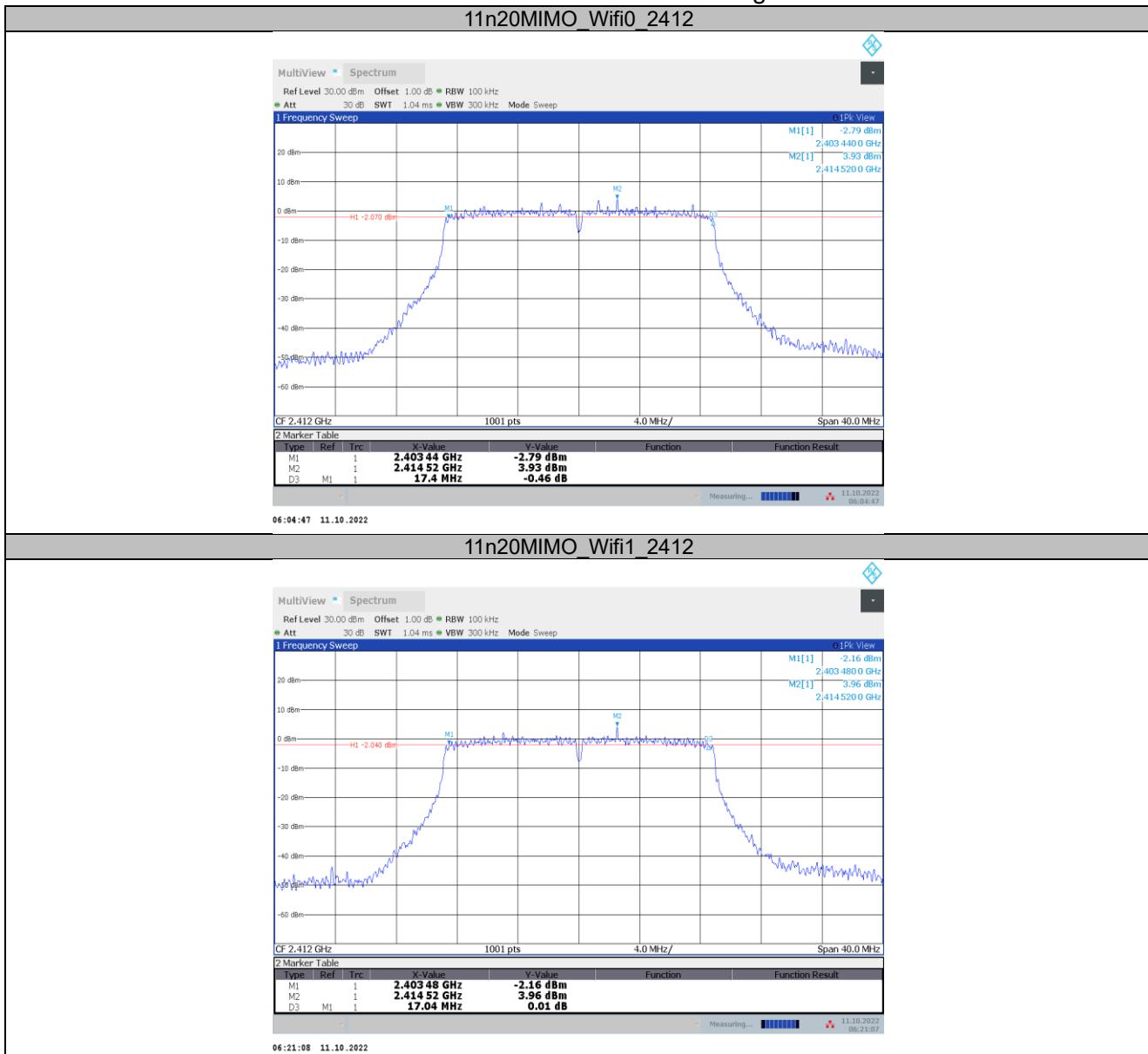


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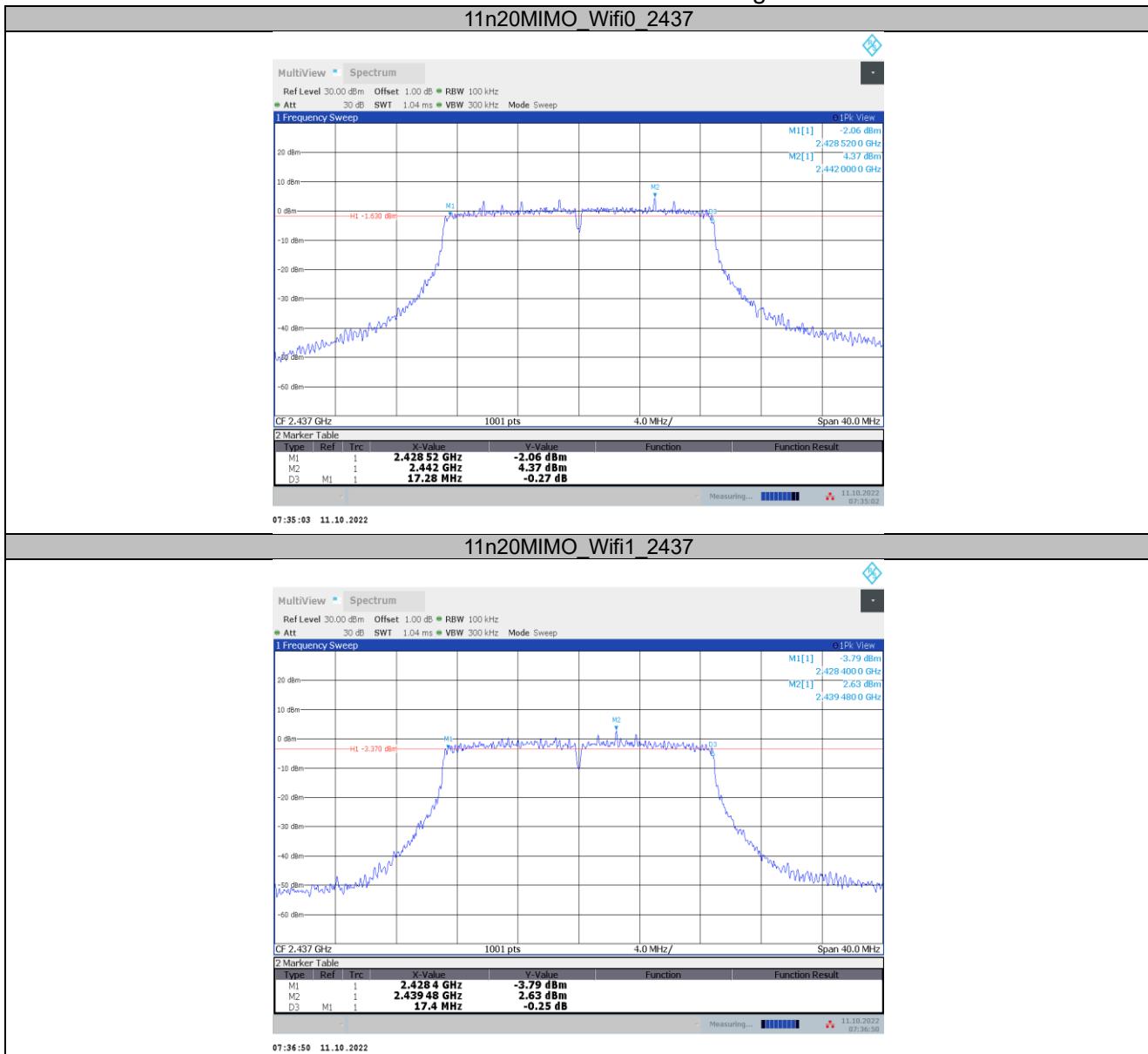


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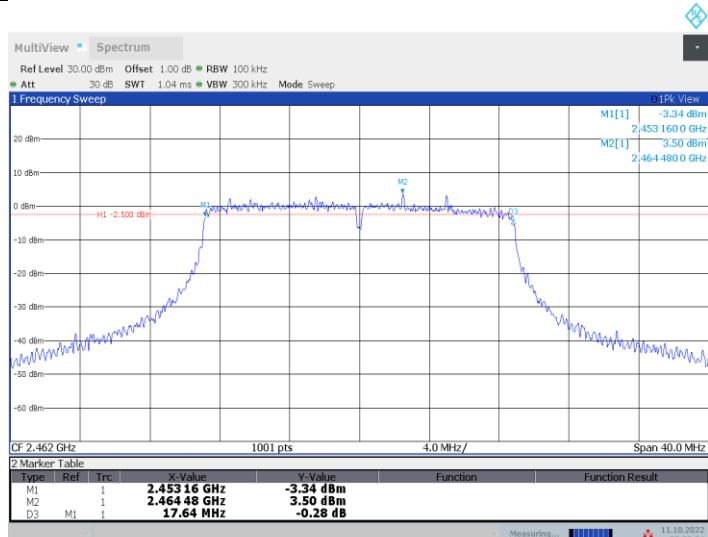
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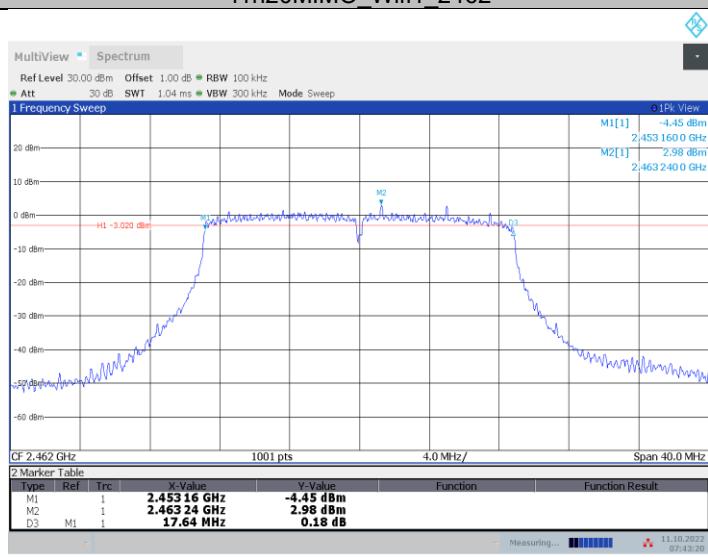
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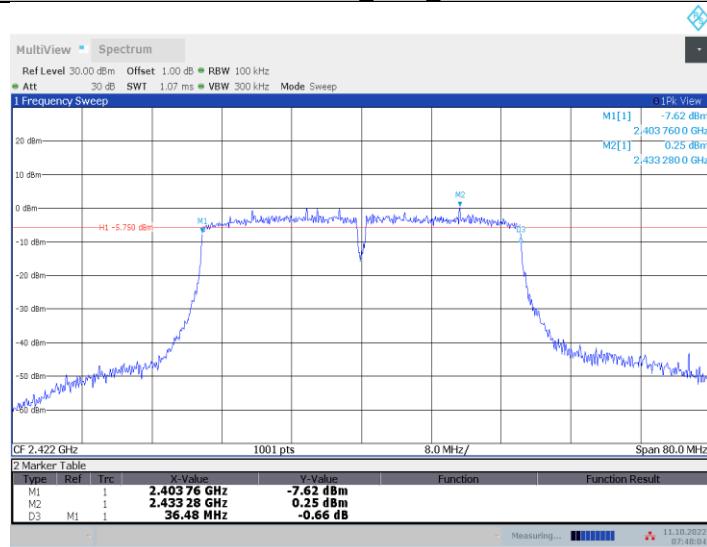
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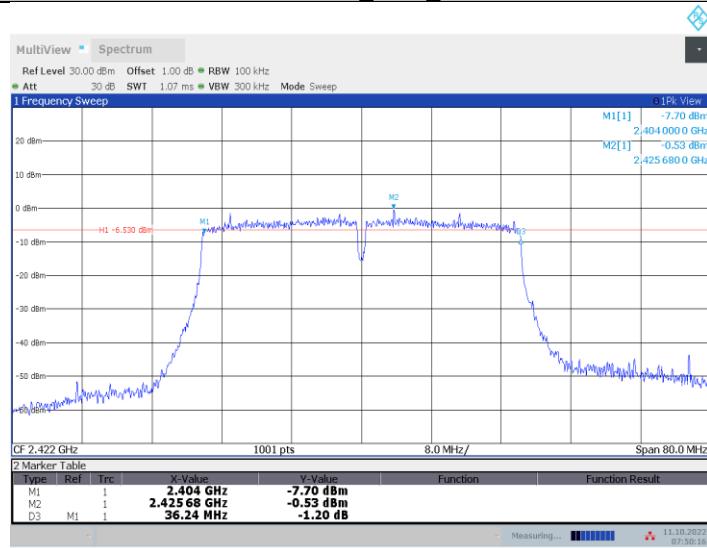
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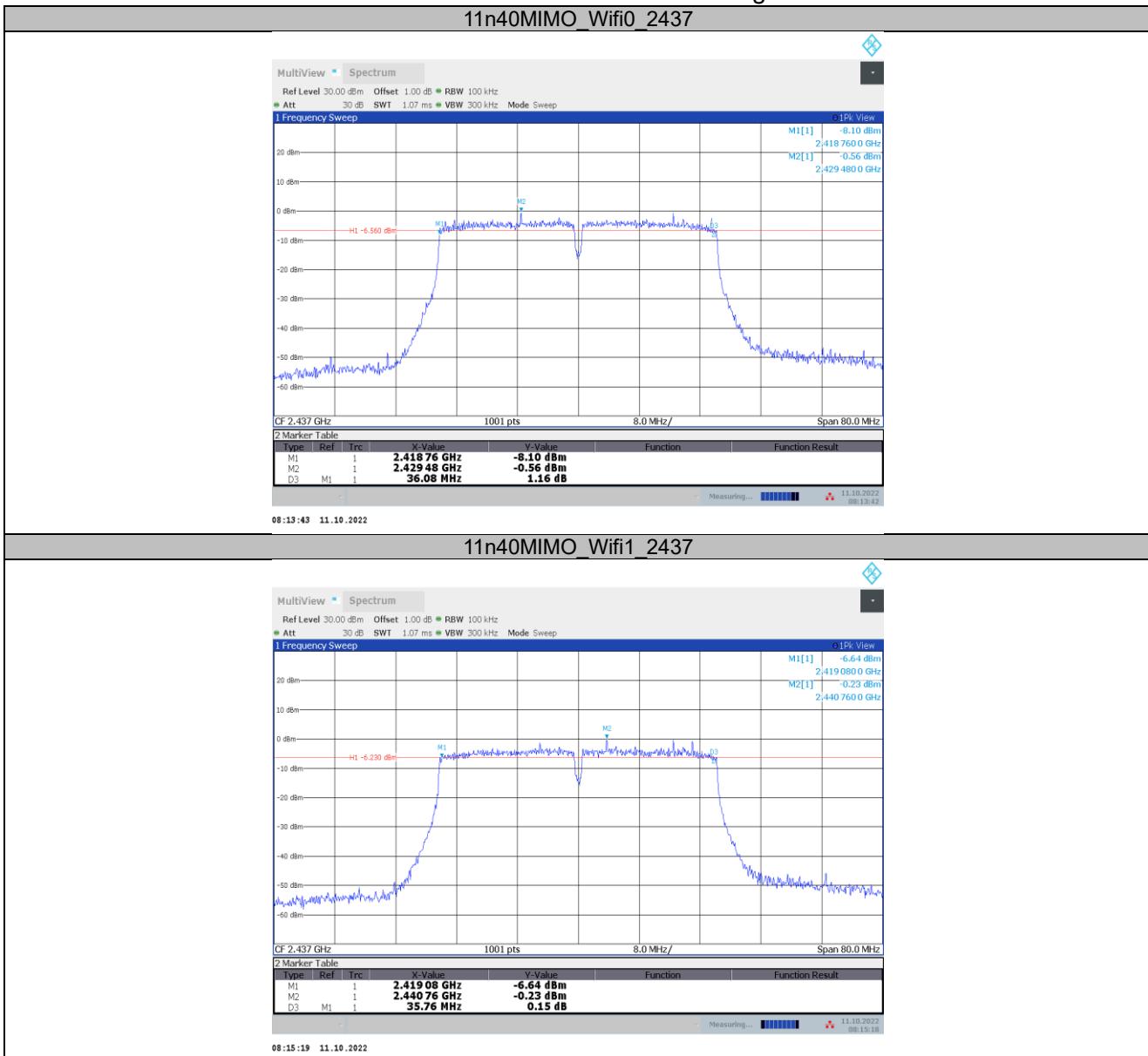


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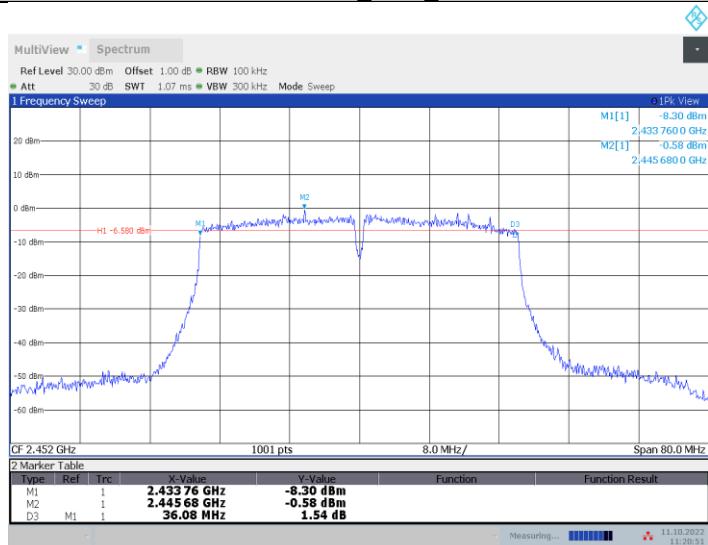
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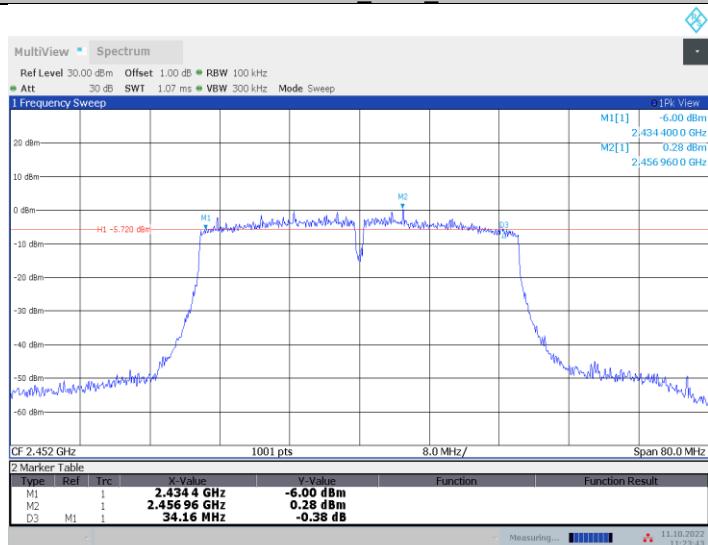
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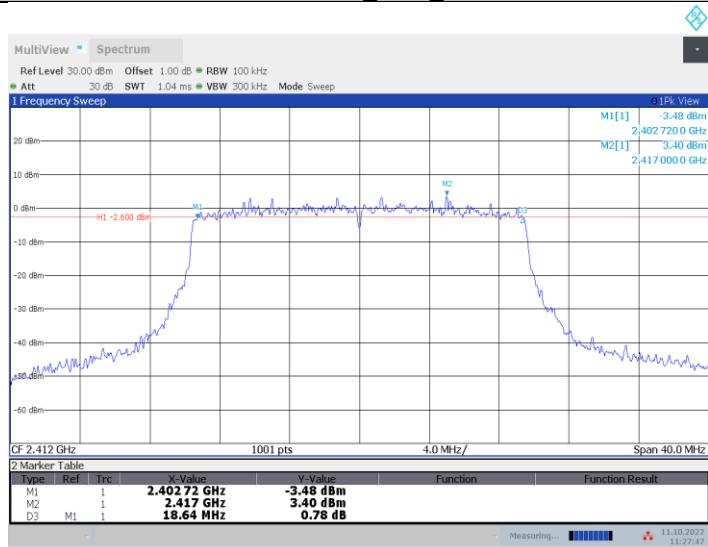
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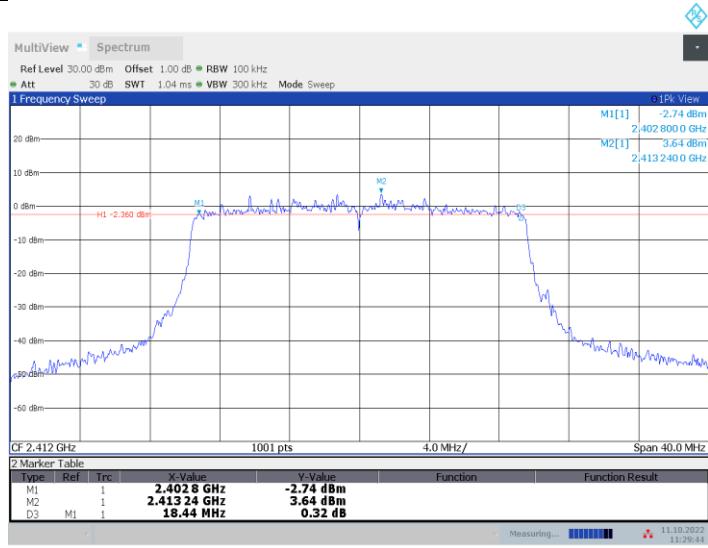
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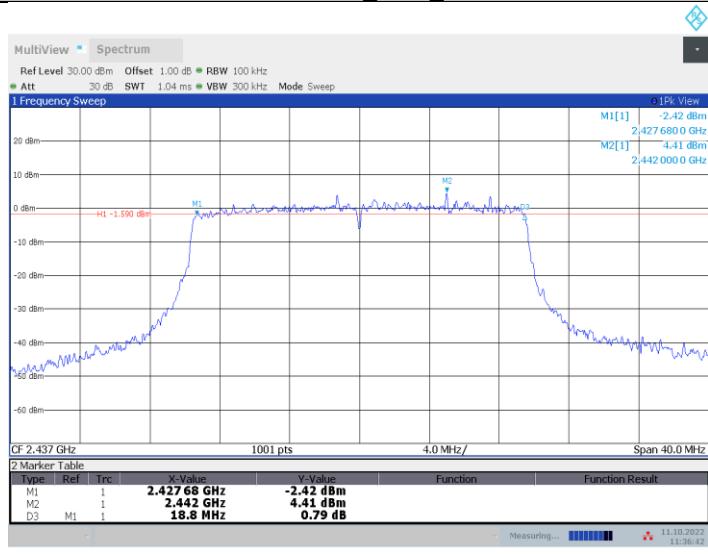
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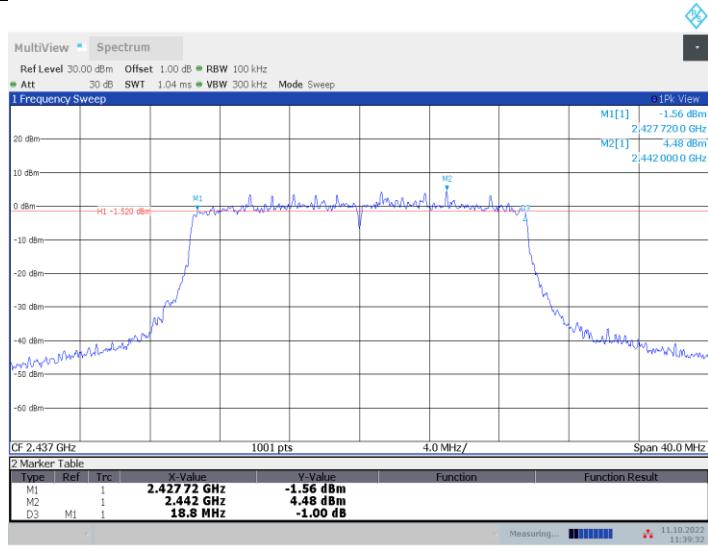
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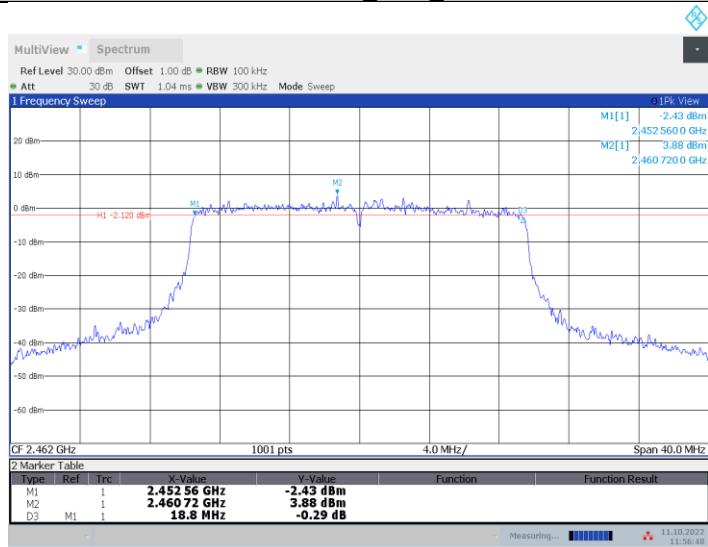
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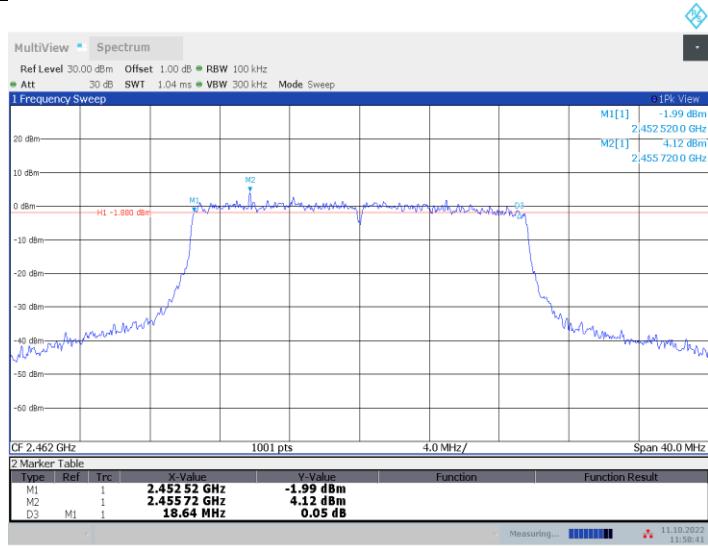
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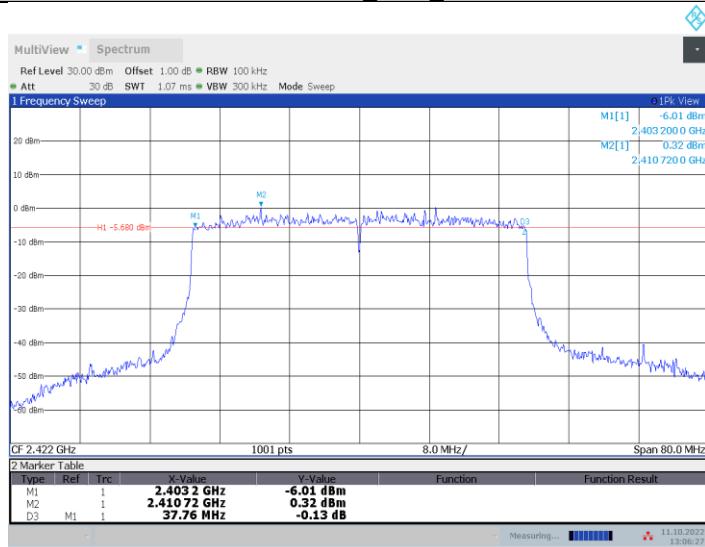
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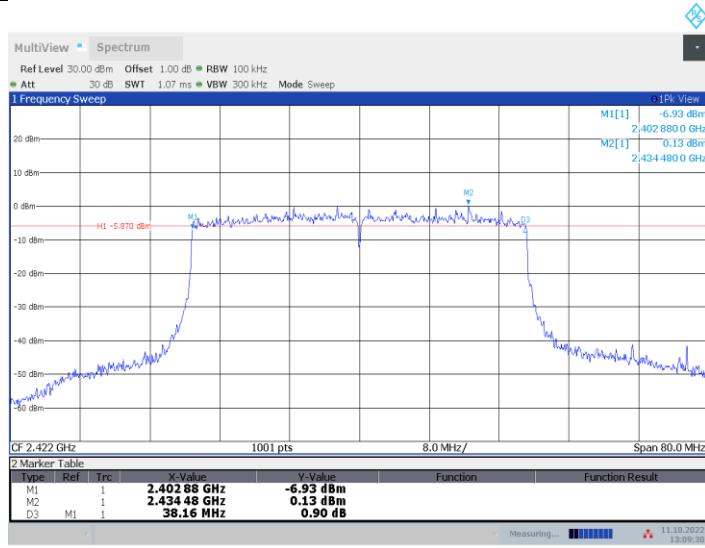
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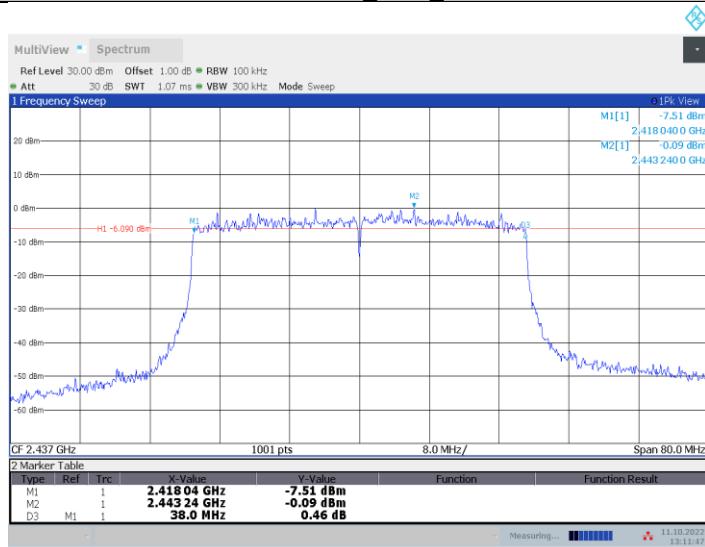
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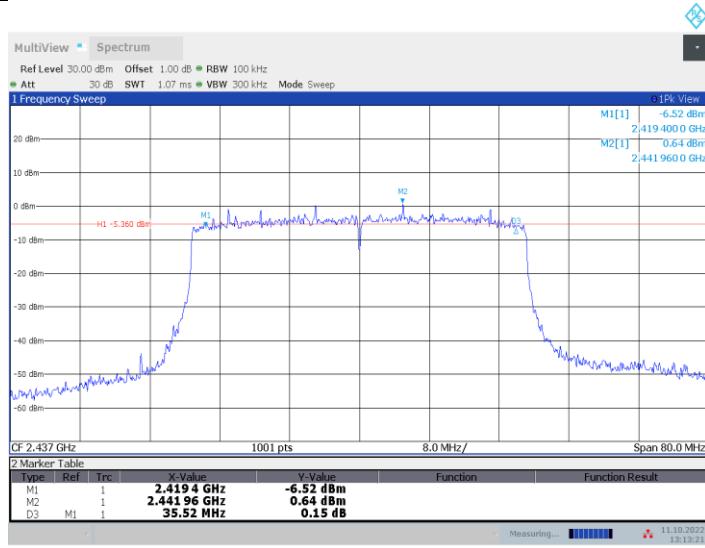
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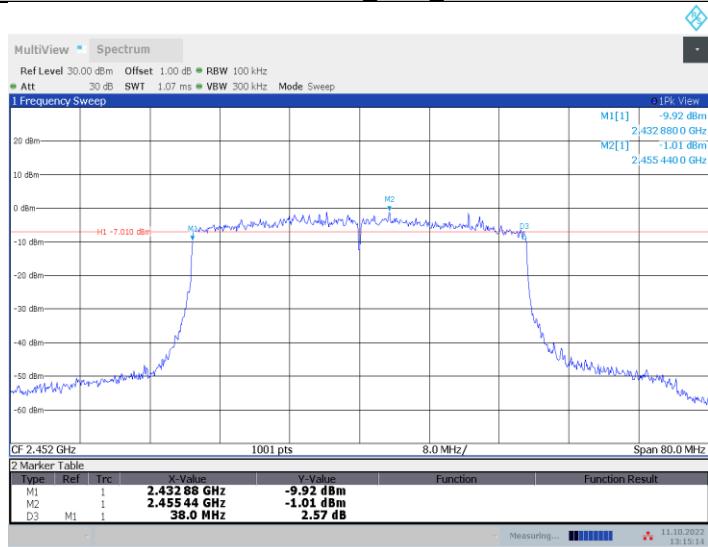
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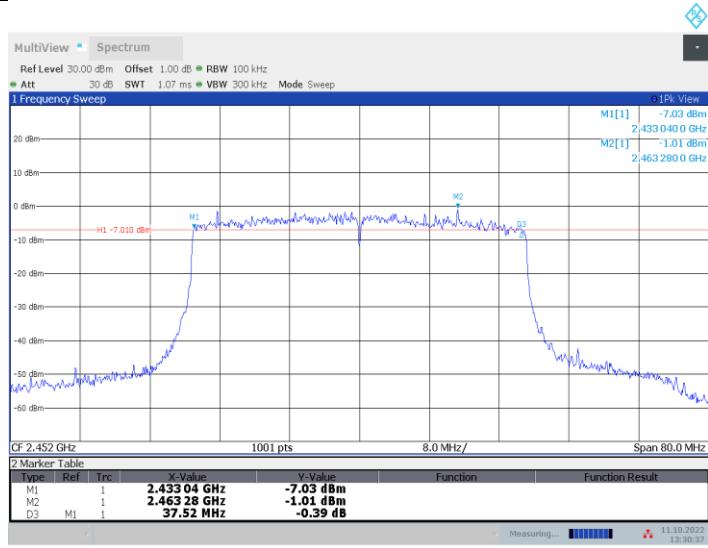
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11ax40MIMO_Wifi0_2452



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11ax40MIMO_Wifi1_2452



13:30:37 11.10.2022

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Occupied Channel Bandwidth Test Result

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11b	Wifi0	2412	12.862	2405.660	2418.523	---	---
	Wifi1	2412	12.949	2405.544	2418.494	---	---
	Wifi0	2437	13.115	2430.518	2443.633	---	---
	Wifi1	2437	12.99	2430.506	2443.496	---	---
	Wifi0	2462	13.004	2455.349	2468.353	---	---
	Wifi1	2462	13.028	2455.413	2468.441	---	---
11g	Wifi0	2412	16.541	2403.770	2420.311	---	---
	Wifi1	2412	16.579	2403.712	2420.290	---	---
	Wifi0	2437	16.606	2428.737	2445.344	---	---
	Wifi1	2437	16.598	2428.683	2445.280	---	---
	Wifi0	2462	16.655	2453.580	2470.235	---	---
	Wifi1	2462	16.631	2453.645	2470.276	---	---
11n20MIMO	Wifi0	2412	17.706	2403.185	2420.891	---	---
	Wifi1	2412	17.733	2403.148	2420.880	---	---
	Wifi0	2437	17.778	2428.134	2445.912	---	---
	Wifi1	2437	17.736	2428.110	2445.845	---	---
	Wifi0	2462	17.795	2453.019	2470.814	---	---
	Wifi1	2462	17.728	2453.083	2470.812	---	---
11n40MIMO	Wifi0	2422	36.148	2403.942	2440.090	---	---
	Wifi1	2422	36.136	2403.945	2440.081	---	---
	Wifi0	2437	36.13	2418.933	2455.063	---	---
	Wifi1	2437	36.116	2418.931	2455.046	---	---
	Wifi0	2452	35.951	2433.962	2469.913	---	---
	Wifi1	2452	35.968	2433.957	2469.925	---	---
11ax20MIMO	Wifi0	2412	19.017	2402.464	2421.481	---	---
	Wifi1	2412	18.996	2402.487	2421.483	---	---
	Wifi0	2437	19.01	2427.502	2446.512	---	---
	Wifi1	2437	18.961	2427.538	2446.499	---	---
	Wifi0	2462	19.023	2452.429	2471.451	---	---
	Wifi1	2462	19.014	2452.442	2471.456	---	---
11ax40MIMO	Wifi0	2422	37.866	2403.120	2440.986	---	---
	Wifi1	2422	37.931	2403.083	2441.014	---	---
	Wifi0	2437	37.894	2418.064	2455.958	---	---
	Wifi1	2437	37.89	2418.026	2455.916	---	---
	Wifi0	2452	37.778	2433.083	2470.860	---	---
	Wifi1	2452	37.734	2433.089	2470.823	---	---

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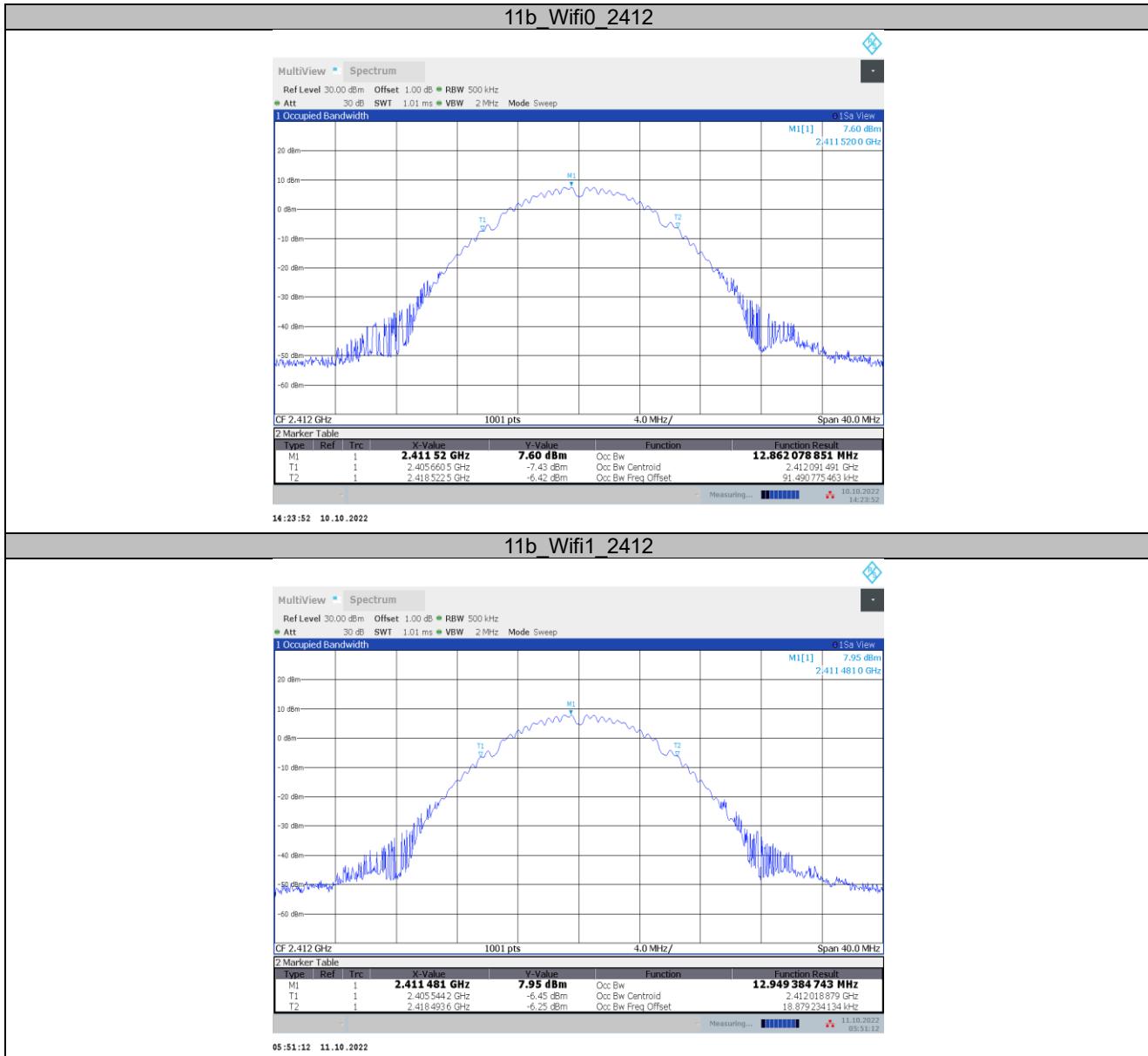


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Test Graphs



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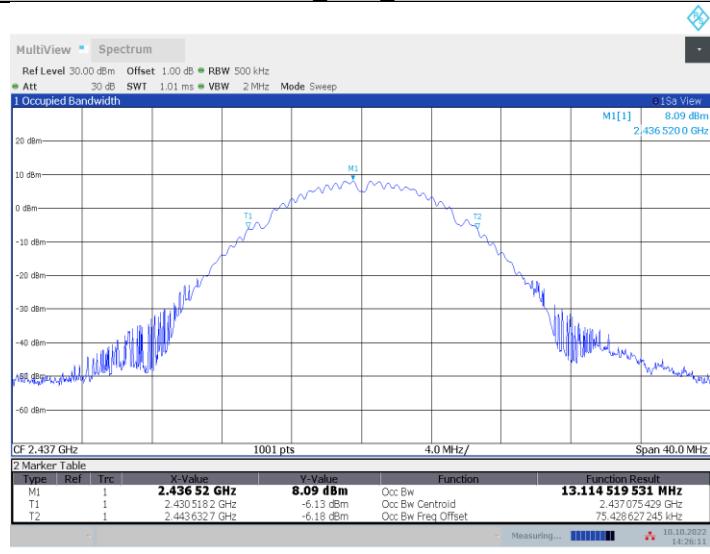
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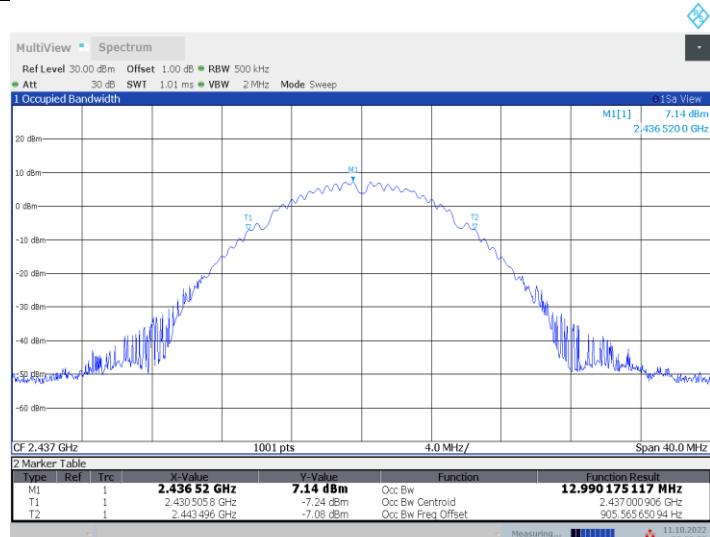
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11b_Wifi0_2437



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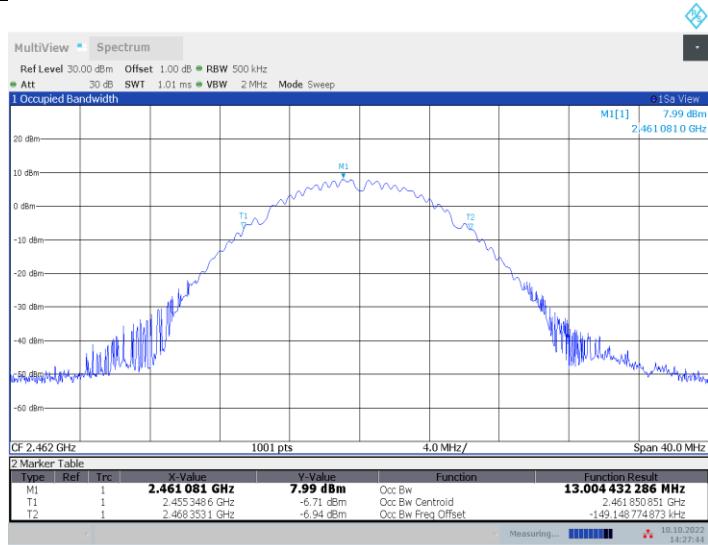
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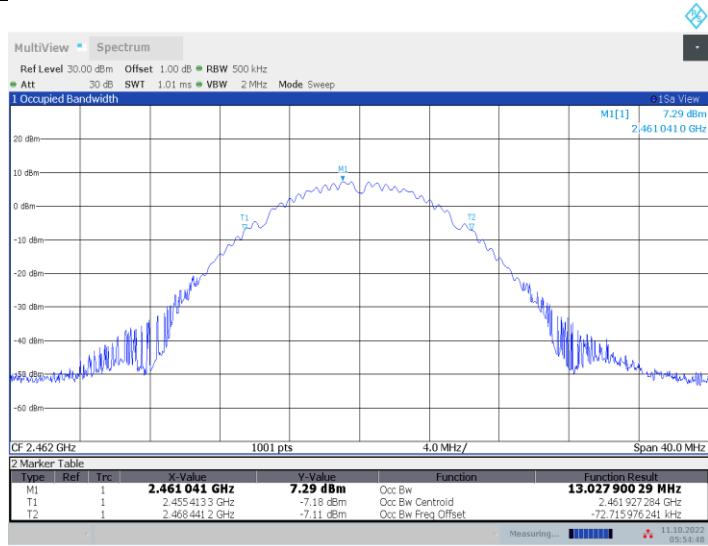
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11b_Wifi0_2462



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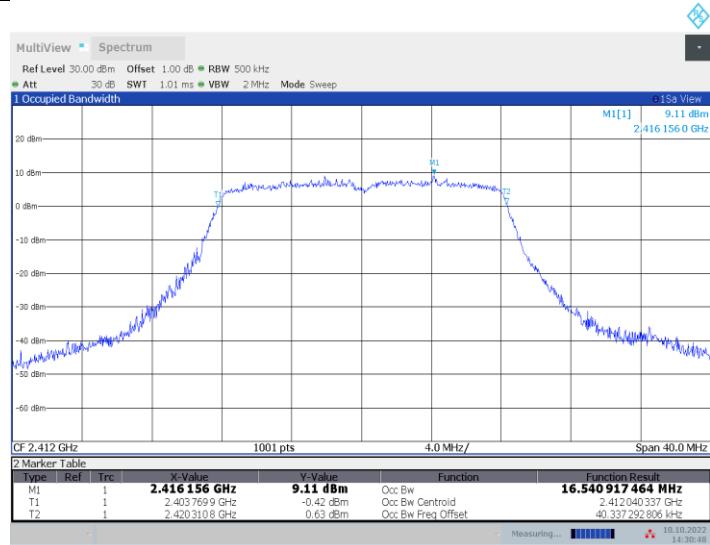
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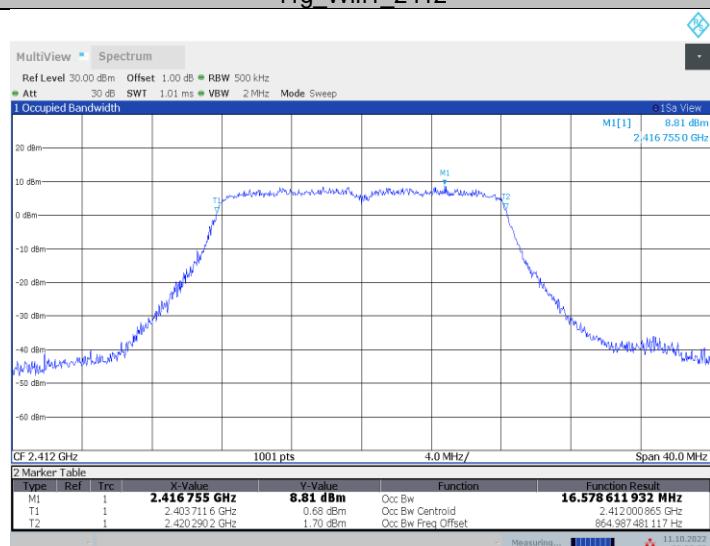
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11g_Wifi0_2412



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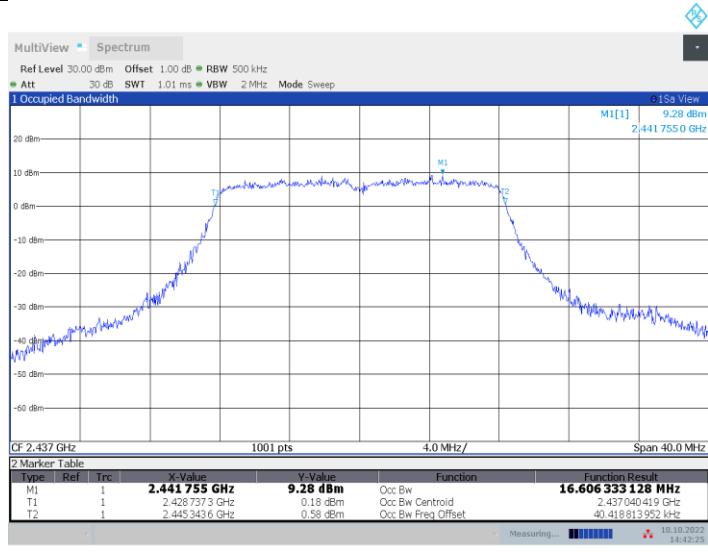
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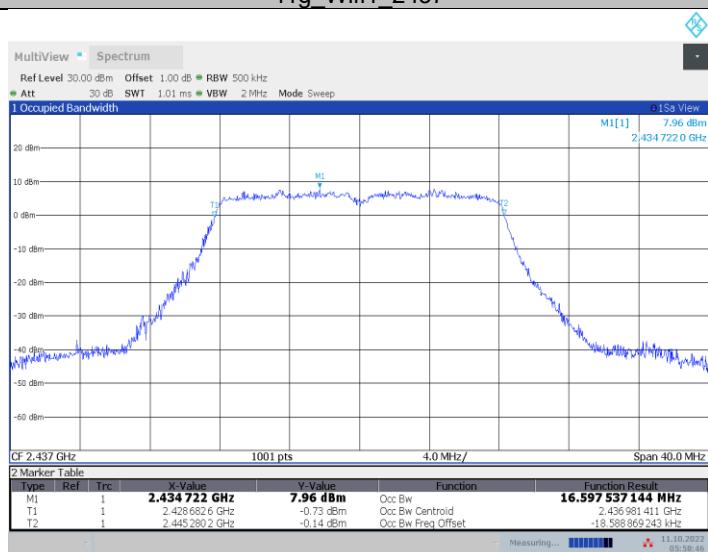
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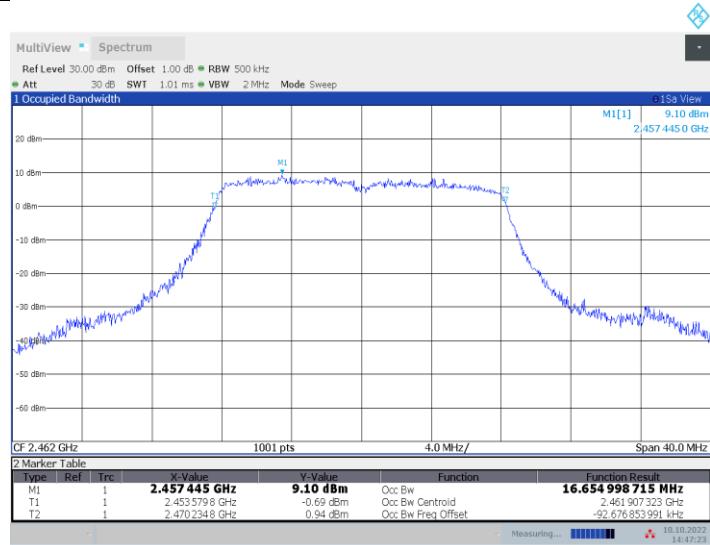
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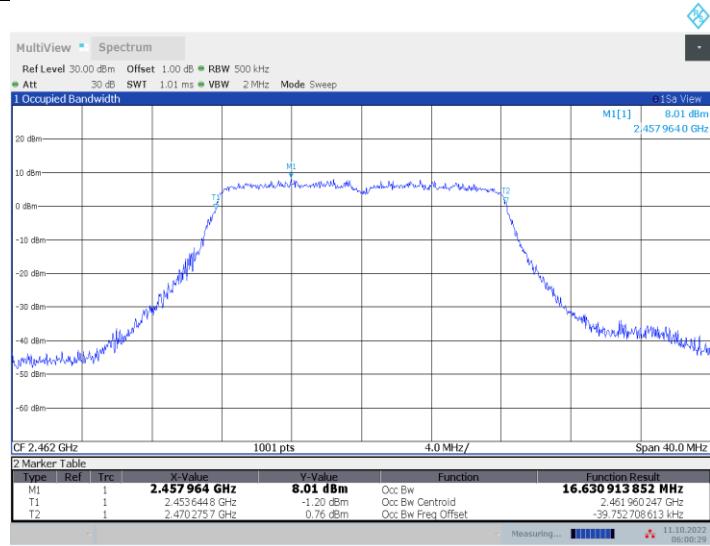
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11g_Wifi0_2462



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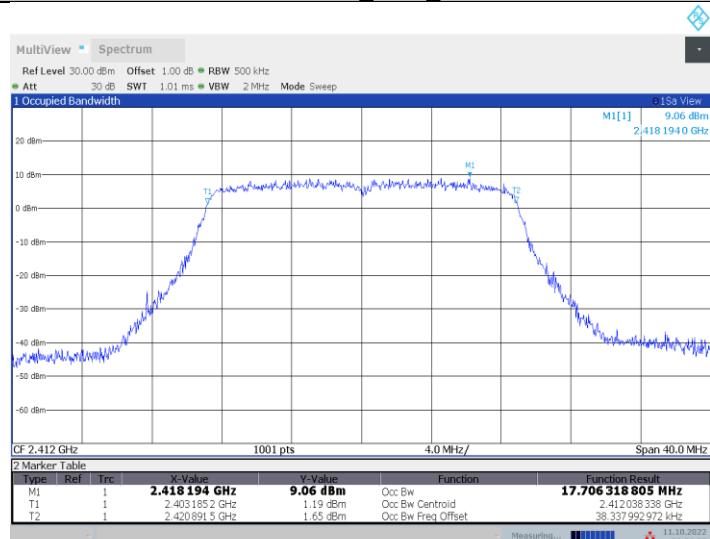
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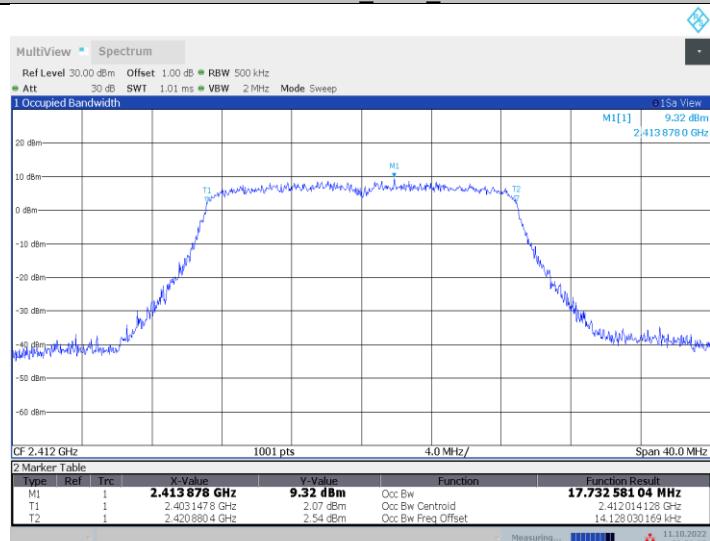
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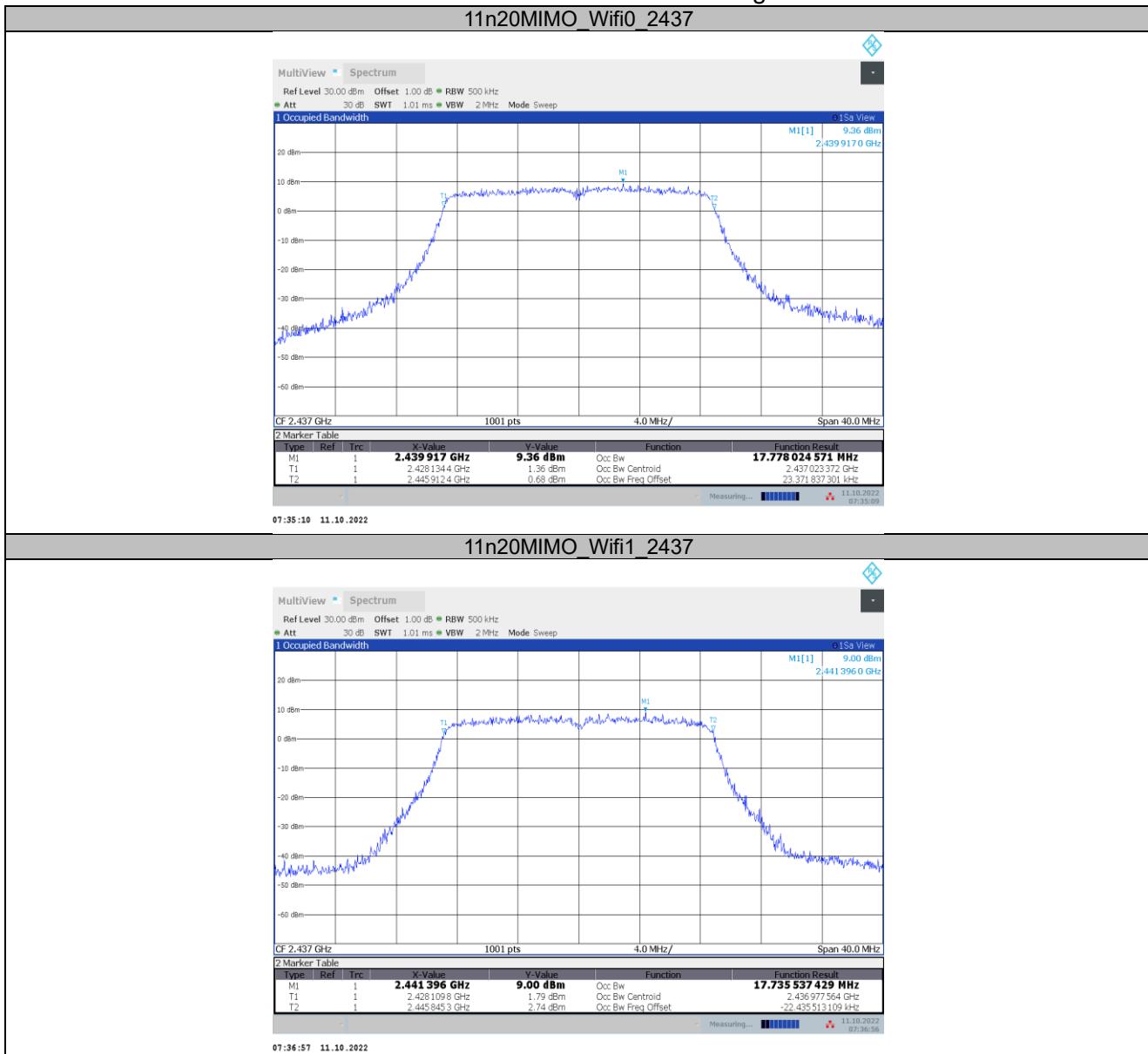


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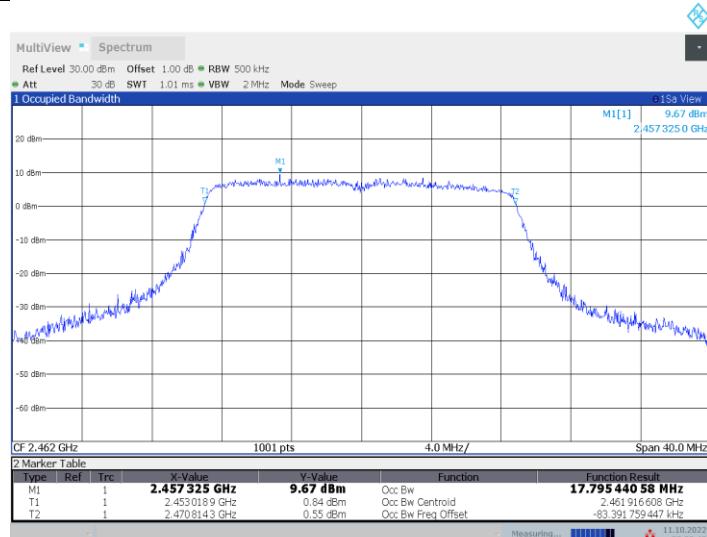
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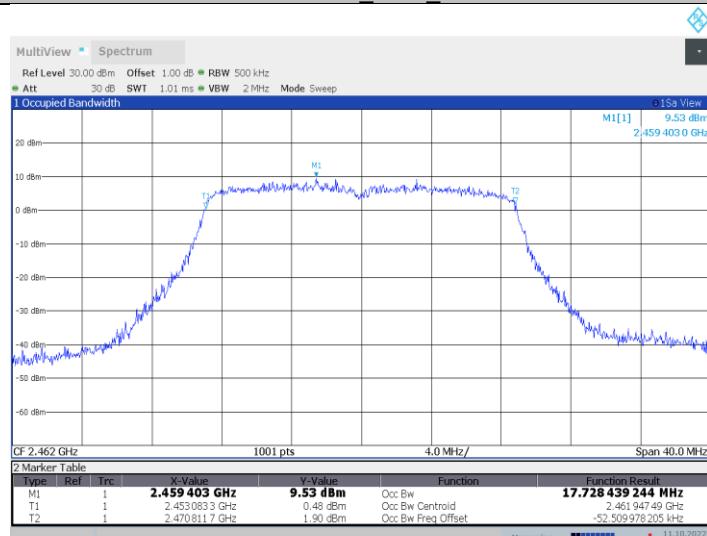
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11n20MIMO_Wifi0_2462



07:38:41 11.10.2022

11n20MIMO_Wifi1_2462



07:44:30 11.10.2022

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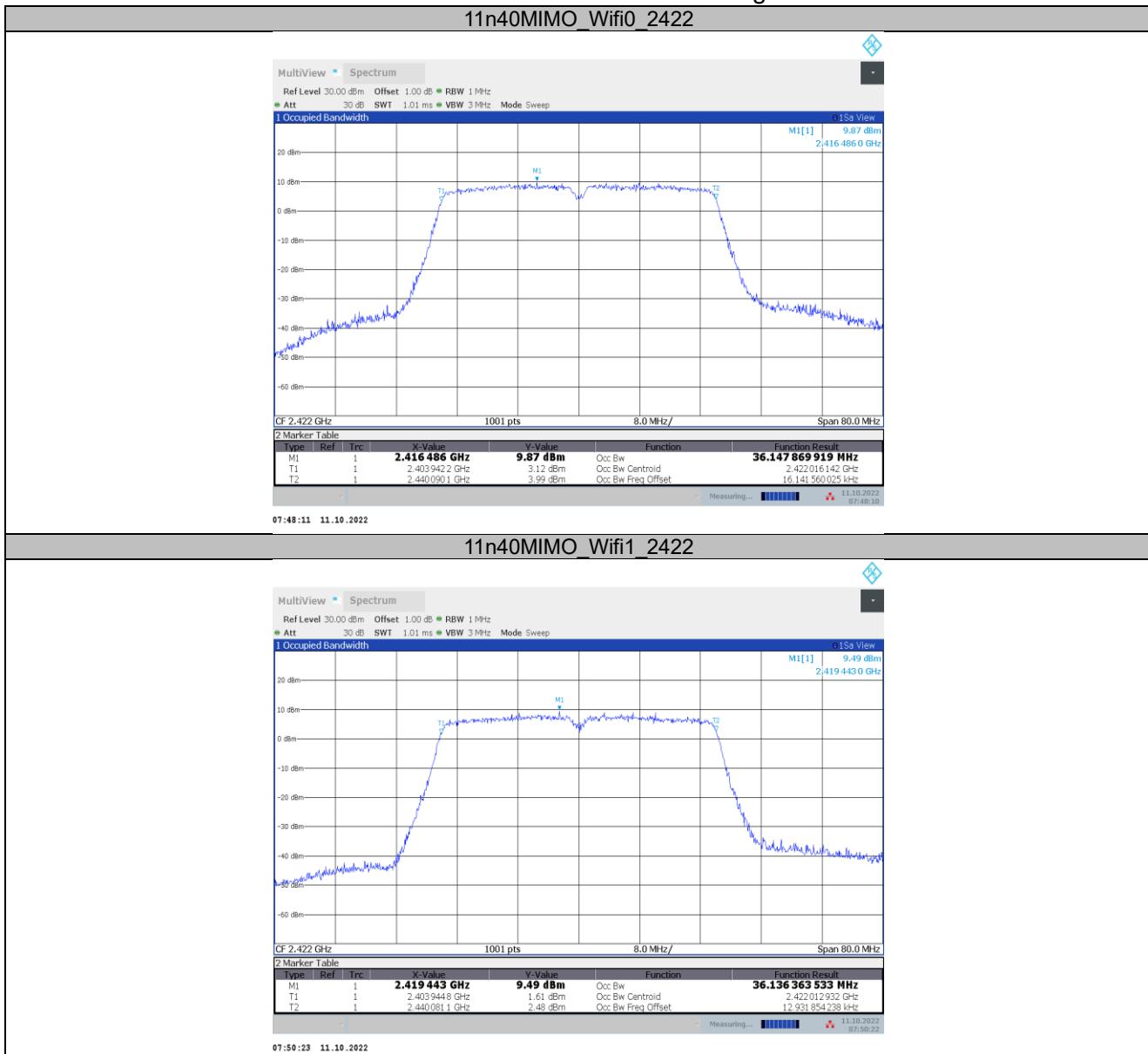
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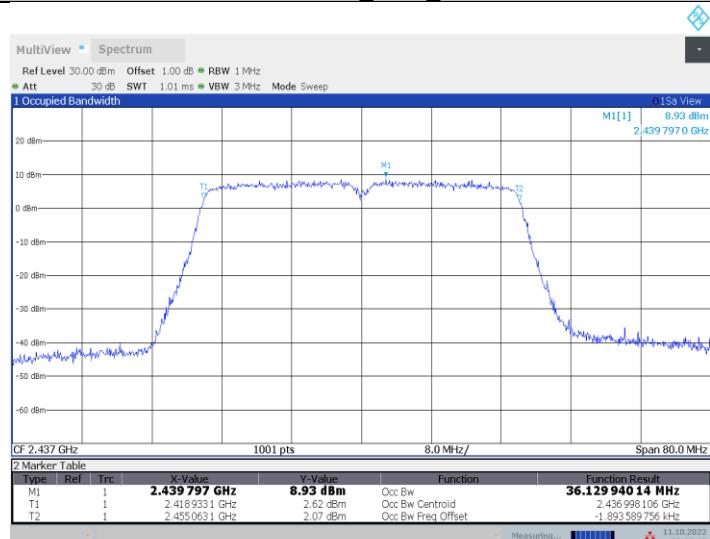
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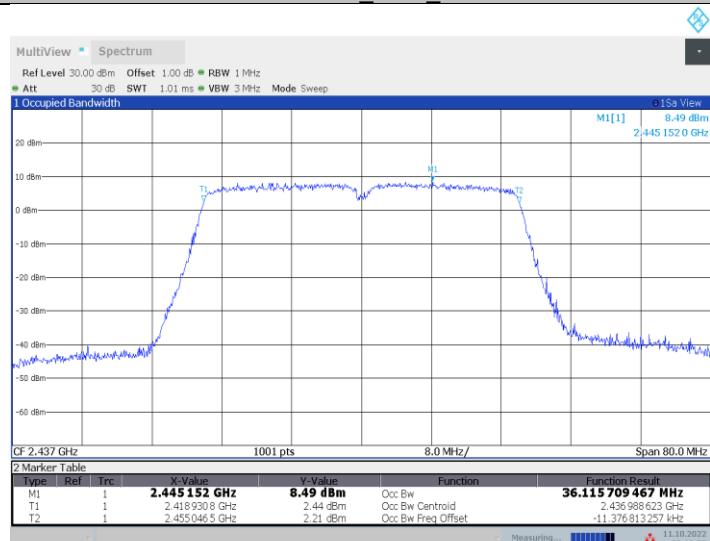
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11n40MIMO_Wifi0_2437



08:13:49 11.10.2022

11n40MIMO_Wifi1_2437



08:15:26 11.10.2022

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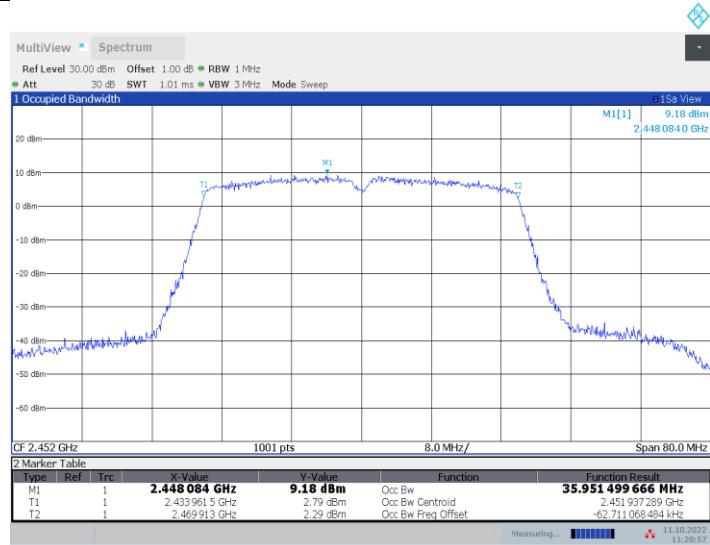
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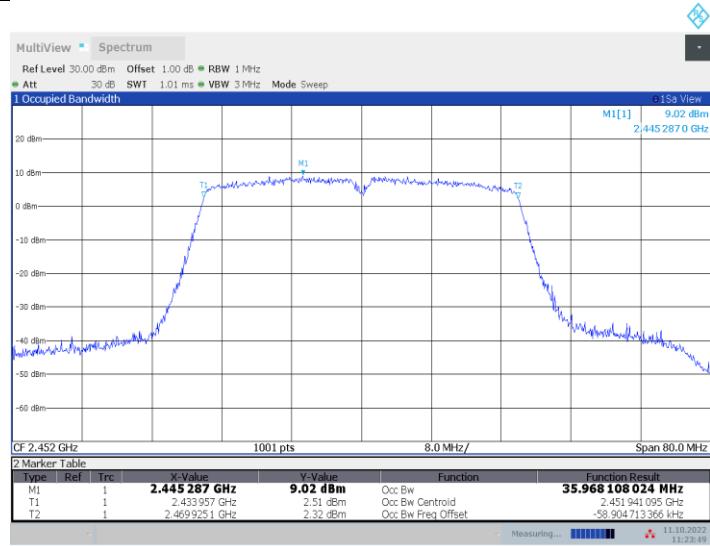
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11n40MIMO_Wifi0_2452



11:20:58 11.10.2022

11n40MIMO_Wifi1_2452



11:23:50 11.10.2022

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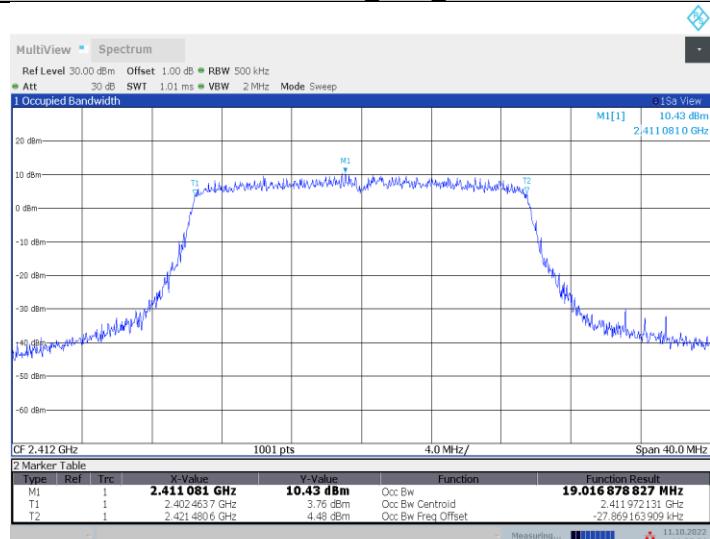
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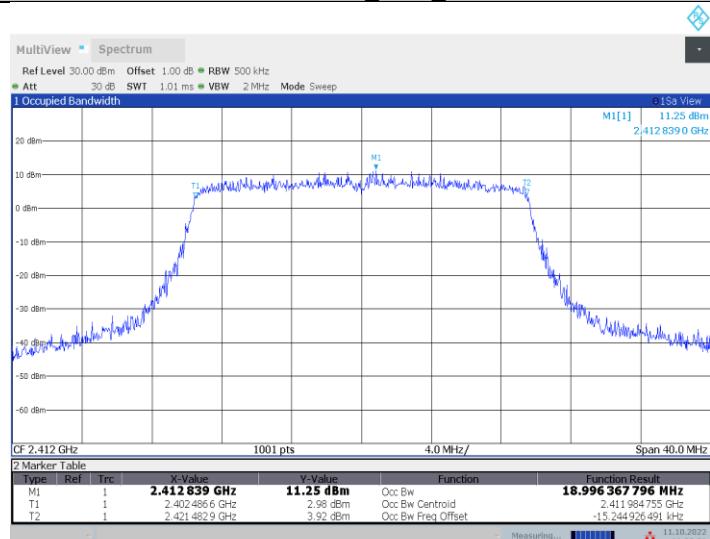
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11ax20MIMO_Wifi0_2412



11:27:55 11.10.2022

11ax20MIMO_Wifi1_2412



11:29:51 11.10.2022

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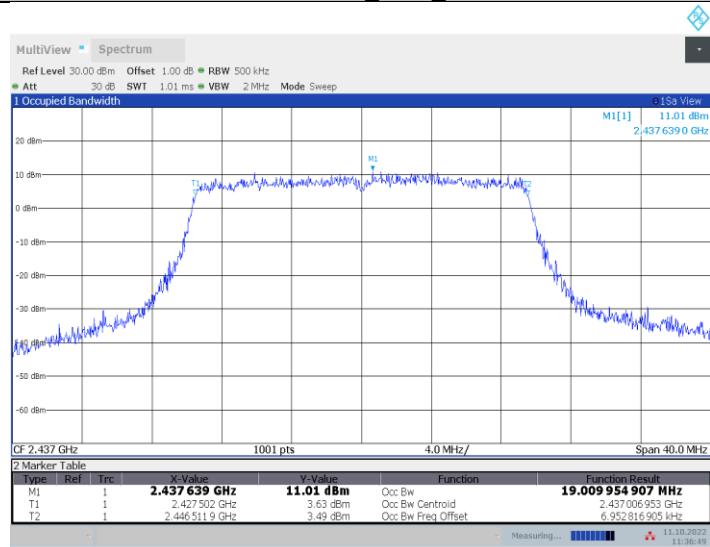
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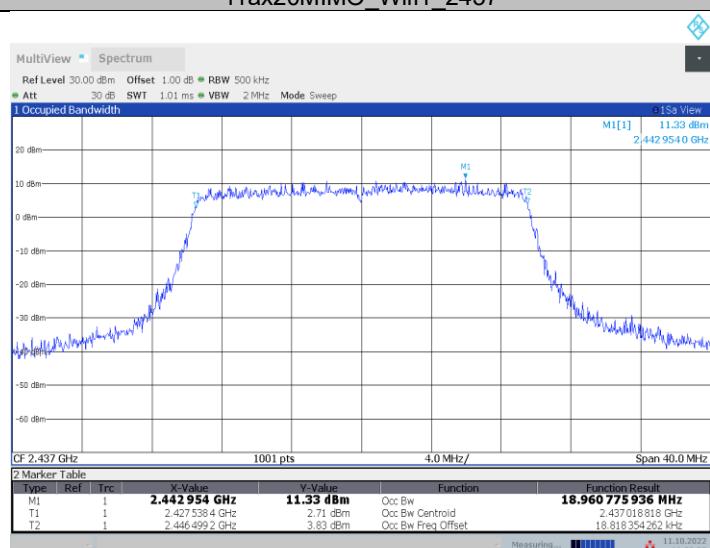
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11ax20MIMO_Wifi0_2437



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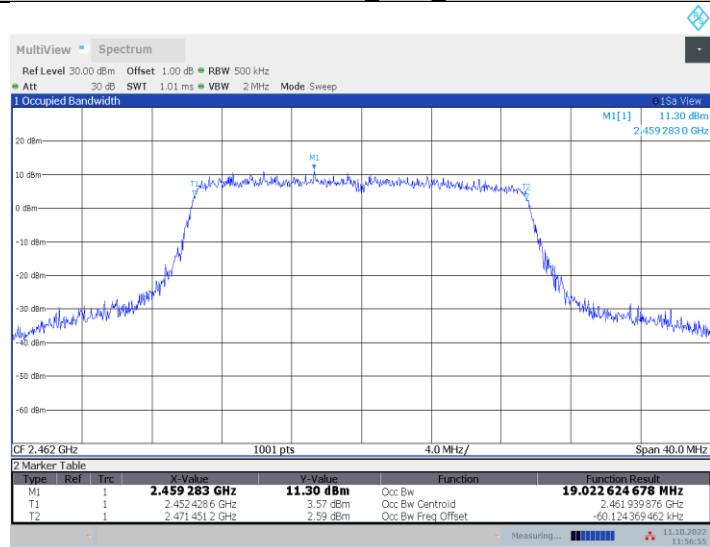
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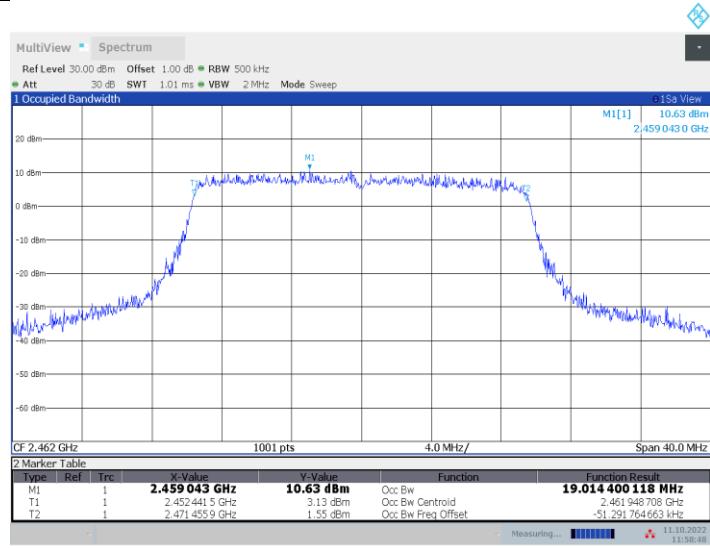
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11ax20MIMO_Wifi0_2462



11:56:56 11.10.2022

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11:58:48 11.10.2022

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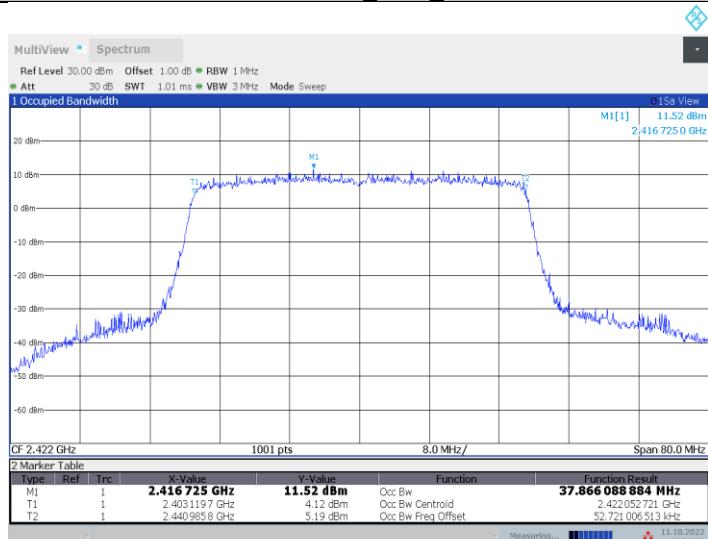
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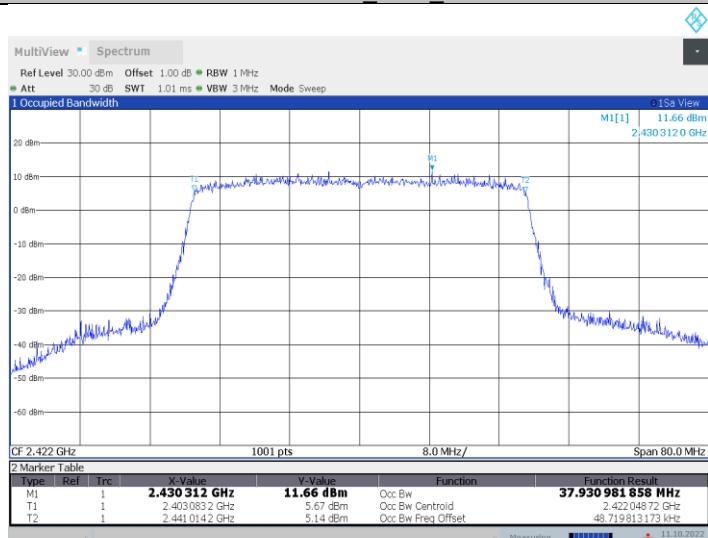
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13:06:34 11.10.2022

11ax40MIMO_Wifi1_2422



13:09:37 11.10.2022

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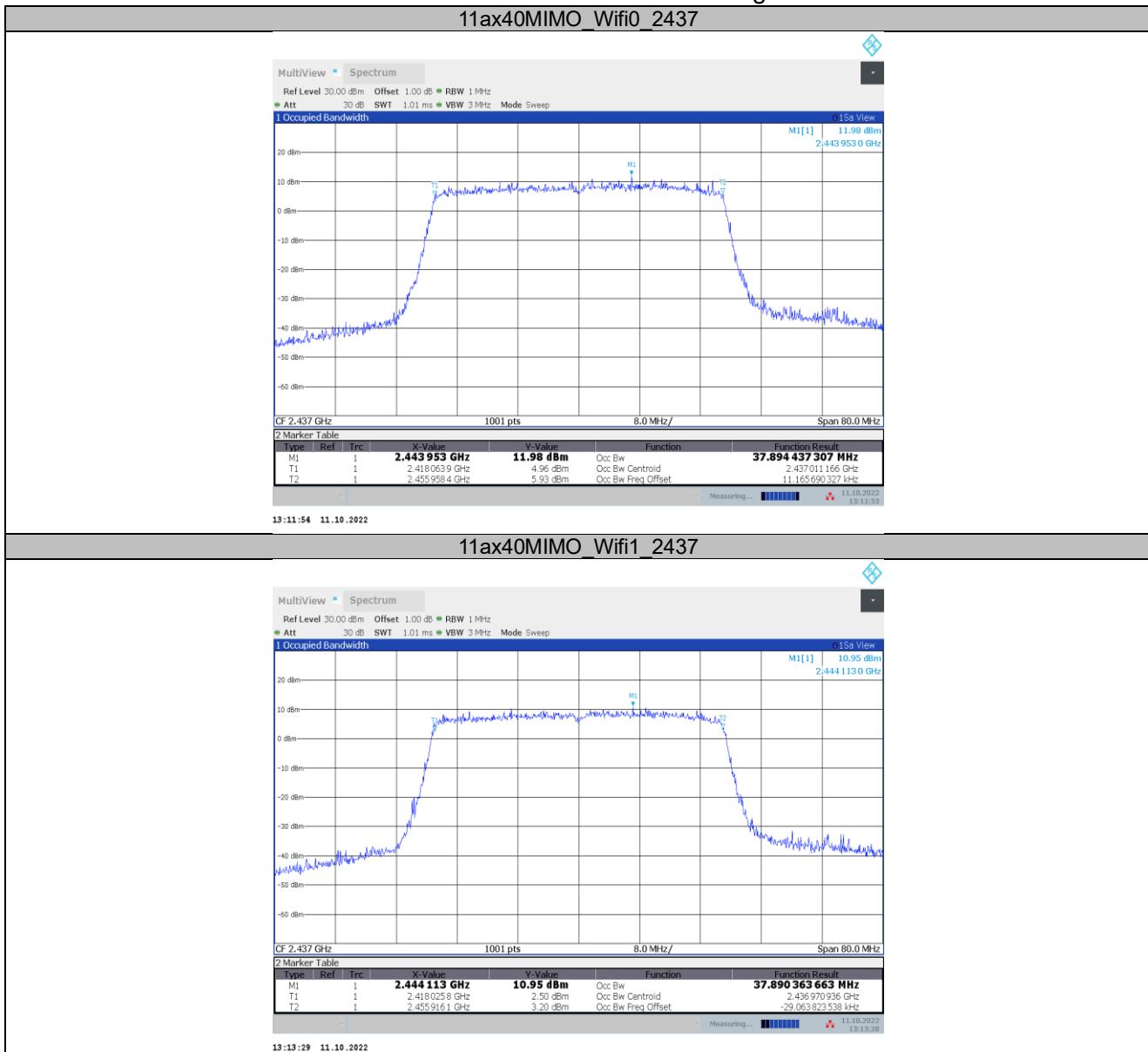


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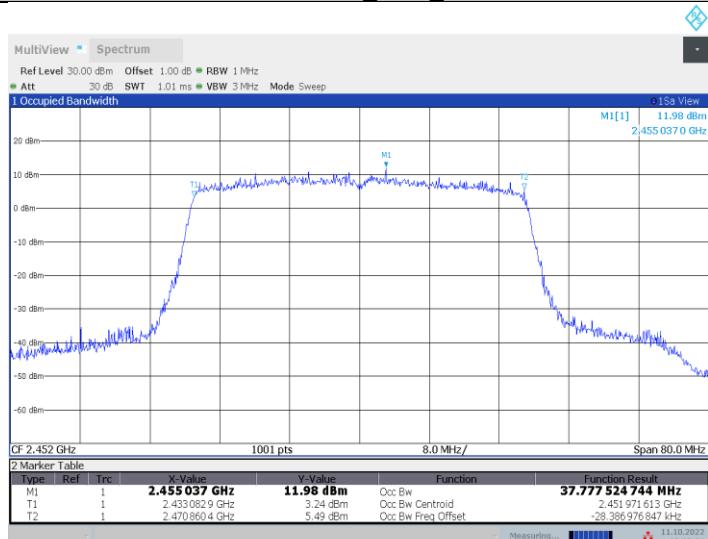
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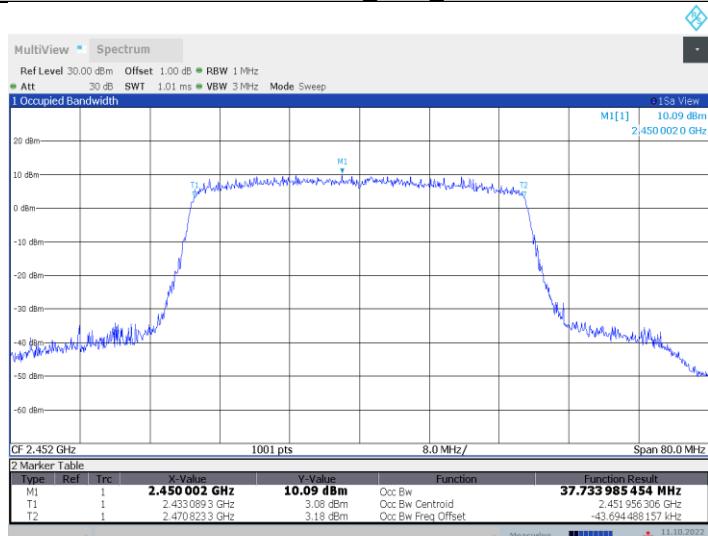
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11ax40MIMO_Wifi0_2452



13:15:22 11.10.2022

11ax40MIMO_Wifi1_2452



13:30:44 11.10.2022

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Maximum conducted output power

Test Result Peak

TestMode	Antenna	Frequency[MHz]	Peak Power[dBm]	Conducted Limit[dBm]	Verdict
11b	Wifi0	2412	17.32	≤30.00	PASS
	Wifi1	2412	17.68	≤30.00	PASS
	Wifi0	2437	17.89	≤30.00	PASS
	Wifi1	2437	17.11	≤30.00	PASS
	Wifi0	2462	17.61	≤30.00	PASS
	Wifi1	2462	17.71	≤30.00	PASS
11g	Wifi0	2412	17.39	≤30.00	PASS
	Wifi1	2412	17.67	≤30.00	PASS
	Wifi0	2437	17.98	≤30.00	PASS
	Wifi1	2437	17.13	≤30.00	PASS
	Wifi0	2462	17.68	≤30.00	PASS
	Wifi1	2462	17.77	≤30.00	PASS
11n20MIMO	Wifi0	2412	21.65	≤30.00	PASS
	Wifi1	2412	22.22	≤30.00	PASS
	total	2412	24.95	≤30.00	PASS
	Wifi0	2437	22.30	≤30.00	PASS
	Wifi1	2437	21.92	≤30.00	PASS
	total	2437	25.12	≤30.00	PASS
	Wifi0	2462	21.73	≤30.00	PASS
	Wifi1	2462	21.99	≤30.00	PASS
	total	2462	24.87	≤30.00	PASS
	Wifi0	2422	21.00	≤30.00	PASS
11n40MIMO	Wifi1	2422	21.21	≤30.00	PASS
	total	2422	24.12	≤30.00	PASS
	Wifi0	2437	21.23	≤30.00	PASS
	Wifi1	2437	20.89	≤30.00	PASS
	total	2437	24.07	≤30.00	PASS
	Wifi0	2452	21.11	≤30.00	PASS
	Wifi1	2452	21.03	≤30.00	PASS
	total	2452	24.08	≤30.00	PASS
	Wifi0	2412	21.69	≤30.00	PASS
11ax20MIMO	Wifi1	2412	22.29	≤30.00	PASS
	total	2412	25.01	≤30.00	PASS
	Wifi0	2437	22.45	≤30.00	PASS
	Wifi1	2437	22.09	≤30.00	PASS
	total	2437	25.28	≤30.00	PASS
	Wifi0	2462	21.98	≤30.00	PASS
	Wifi1	2462	22.21	≤30.00	PASS
	total	2462	25.11	≤30.00	PASS
	Wifi0	2422	21.34	≤30.00	PASS
11ax40MIMO	Wifi1	2422	21.29	≤30.00	PASS
	total	2422	24.33	≤30.00	PASS
	Wifi0	2437	21.54	≤30.00	PASS
	Wifi1	2437	21.54	≤30.00	PASS
	total	2437	24.55	≤30.00	PASS
	Wifi0	2452	21.32	≤30.00	PASS
	Wifi1	2452	21.23	≤30.00	PASS
	total	2452	24.29	≤30.00	PASS

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