TEST REPORT

Product Name : Home Server
Model Number : U130120
FCC ID : 2BA7R-U130120

Prepared for : Umbrel, Inc.
Address : 2093 Philadelphia Pike, #4269, Claymont, Delaware, US 19703

Prepared by : EMTEK (SHENZHEN) CO., LTD.
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Report Number : ENS2303140179W00502R
Date(s) of Tests : March 17, 2023 to April 23, 2023
Date of issue : Apirl 24, 2023

1 TEST RESULT CERTIFICATION

Applicant	:	Umbrel, Inc.
Address	:	2093 Philadelphia Pike, #4269, Claymont, Delaware, US 19703
Manufacturer	:	ShenZhen ZhiWei Technology Co.,Ltd
Address	:	4th~5th floor ,Bld6 and East side of 3rd floor,Bld3,LiJinCheng Industrial Park,The East of GongYe Road,LongHua Street Office,
EUT	:	Home Server
Model Name	:	U130120
Trademark	:	Umbrel

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15, Subpart E	**PASS**

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Part 15.407

The test results of this report relate only to the tested sample identified in this report.

Date of Test : March 17, 2023 to April 23, 2023

Prepared by : Una Yu /Editor

Reviewer : Joe Xia /Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

EMTEK (SHENZHEN) CO., LTD. TESTING

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2 EUT TECHNICAL DESCRIPTION

Characteristics	Description	
Product	Home Server	
Model Number	U130120	
Sample number	2#	
Wifi Type	☒ UNII-1: 5150MHz-5250MHz Band ☒ UNII-3 with 5725MHz-5850MHz Band	
WLAN Supported	☒ 802.11a ☒ 802.11n(20MHz channel bandwidth) ☒ 802.11n(40MHz channel bandwidth) ☒ 802.11ac(20MHz channel bandwidth) ☒ 802.11ac(40MHz channel bandwidth) ☒ 802.11ac(80MHz channel bandwidth)	
Data Rate	802.11a:54/48/36/24/18/12/9/6Mbps 802.11n:up to 300 Mbps 802.11ac:up to 867Mbps	
Modulation	☒ OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/n; ☒ OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11ac;	
Frequency Range	☒ UNII-1: 5150MHz-5250MHz Band	
	☒ 5180-5240MHz for 802.11a; ☒ 5180-5240MHz for 802.11n(HT20); ☒ 5180-5240MHz for 802.11ac(HT20);	☒ 5190-5230MHz for 802.11n(HT40); ☒ 5190-5230MHz for 802.11ac(HT40); ☒ 5210MHz for 802.11ac(HT80);
	☒ UNII-3 with 5725MHz-5850MHz Band	
	☒ 5745-5825MHz for 802.11a; ☒ 5745-5825MHz for 802.11n(HT20); ☒ 5745-5825MHz for 802.11ac(HT20);	☒ 5755-5795MHz for 802.11n(HT40); ☒ 5755-5795MHz for 802.11ac(HT40); ☒ 5775MHz for 802.11ac(HT80);
TPC Function	☐ Applicable	☒ Not Applicable
Antenna Type	Internal Antenna	
Antenna Gain	UNII-1: 0.8dBi UNII-3: 0.98 dBi	
Transmit Power	Output Power (Max.) for UNII-1	15.64 dBm
	Output Power (Max.) for UNII-3	14.76 dBm
Power supply	DC12V from adapter	
Temperature Range	0°C ~ 45°C	

Note: *for more details, please refer to the User's manual of the EUT.*

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407 (a)	Peak Power Spectral Density	PASS	
15.407 (b)	Radiated Spurious Emission	PASS	
15.407(g)	Frequency Stability	PASS	
15.407 (b)(6) 15.207	Power Line Conducted Emission	PASS	
15.407(a) 15.203	Antenna Application	PASS	
NOTE1: N/A (Not Applicable) Remark: The test method refers to KDB 789033 and FCC 47 CFR Part 2, Subpart J			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2BA7R-U130120 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart E

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	101384	2022/5/14	1Year
AMN	Rohde & Schwarz	ESH3-Z5	100191	2022/5/15	1Year
AMN	Schwarzbeck	NNLK 8129	8129203	2022/5/15	1Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100107	2022/5/14	1Year
Capacitive Voltage Probe	TESEQ	CVP 2200 A	47173	2022/5/15	1Year

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	101414	2022/5/14	1Year
Pre-Amplifier	HP	8447F	2944A07999	2022/5/14	1Year
Bilog Antenna	Schwarzbeck	VULB9163	712	2021/7/5	2Year
Loop Antenna	Schwarzbeck	FMZB1519	1519-012	2021/6/12	2Year
Horn Antenna	Schwarzbeck	BBHA 9170	9170-399	2021/6/12	2Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1198	2021/6/15	2Year
Cable	Schwarzbeck	AK9513	ACRX1	2022/5/14	1Year
Cable	Rosenberger	N/A	FP2RX2	2022/5/14	1Year
Cable	Schwarzbeck	AK9513	CRPX1	2022/5/14	1Year
Cable	Schwarzbeck	AK9513	CRRX2	2022/5/14	1Year

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	Cal. Interval
Wideband Radio Communication Tester	R&S	CMW500	171168	2022/11/2	1Year
Frequency Extender	R&S	CMW-Z800A	100430	2022/11/2	1Year
Spectrum Analyzer	R&S	FSV3044	MY60242456	2022/11/2	1Year
Analog Signal Generator	R&S	SMB100A	MY61252625	2022/11/2	1Year
Vector Signal Generator	R&S	SMM100A	MY61252674	2022/11/2	1Year
RF Control Unit	Tonscend	JS0806-2	22C8060567	2022/11/2	1Year
Temperature&Humidity Chamber	ESPEC	EL-02KA	12107166	2022/7/2	1 Year

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

☒ Wifi 5G with U-NII - 1
Frequency and Channel list for 802.11a/n (HT20)/802.11ac (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220		
40	5200	48	5240		

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190				
46	5230				

Frequency and Channel list for 802.11ac Wave2 (HT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210				

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	48	5240

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	N/A	N/A	46	5230

Test Frequency and channel for 802.11ac Wave2 (HT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	N/A	N/A	N/A	N/A

☒ Wifi 5G with U-NII -3

Frequency and Channel list for 802.11a/n (HT20)/802.11ac (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785	165	5825
153	5765	161	5805		

Frequency and Channel list for 802.11n (HT40)/ 802.11ac (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755				
159	5795				

Frequency and Channel list for 802.11ac (HT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				

Test Frequency and Channel for 802.11a/n (HT20)/802.11ac (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785	165	5825

Test Frequency and channel for 802.11n (HT40)/ 802.11ac (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	N/A	N/A	159	5795

Test Frequency and channel for 802.11ac (HT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : **Accredited by CNAS**
The Certificate Registration Number is L2291.
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by A2LA
The Certificate Number is 4321.01.

Accredited by Industry Canada
The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK (SHENZHEN) CO., LTD.
Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

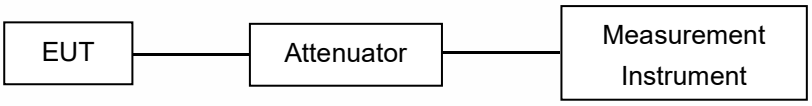
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP

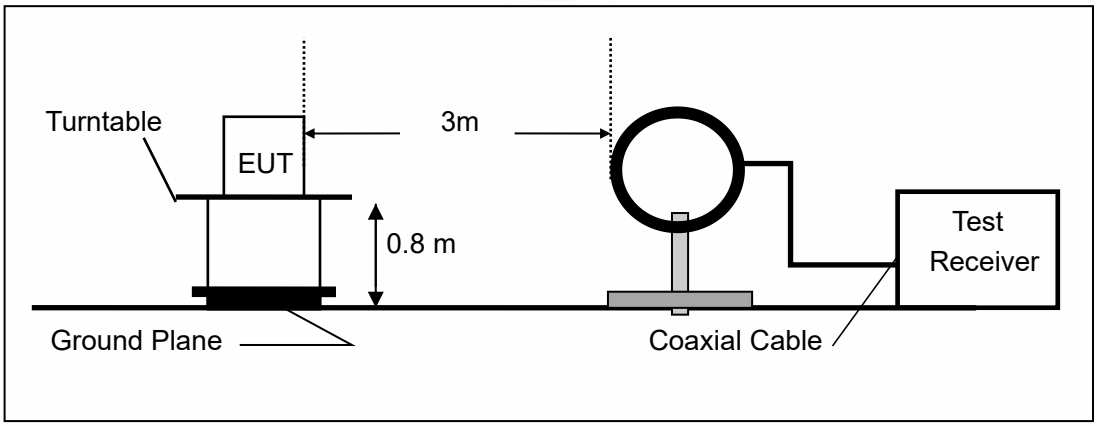
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

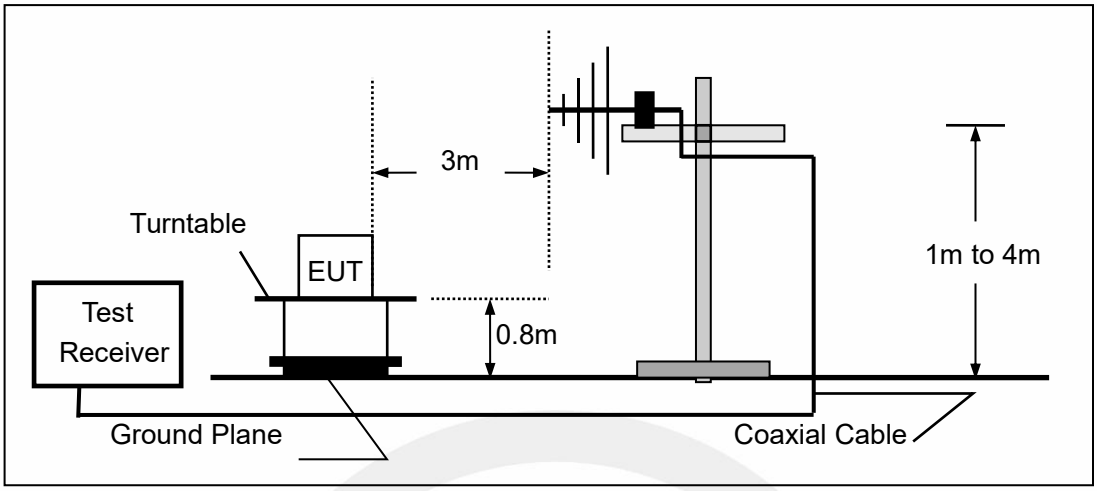
Above 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz：
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

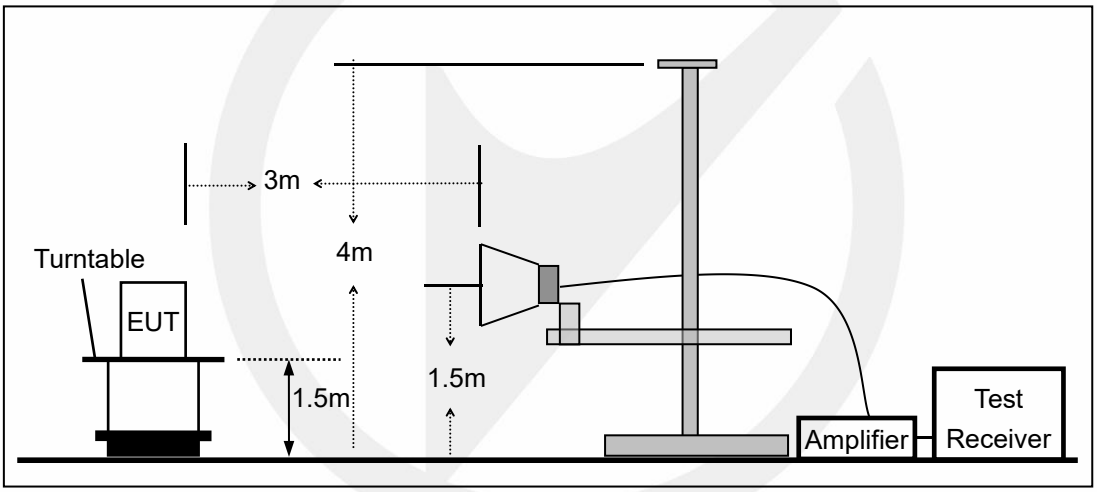
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

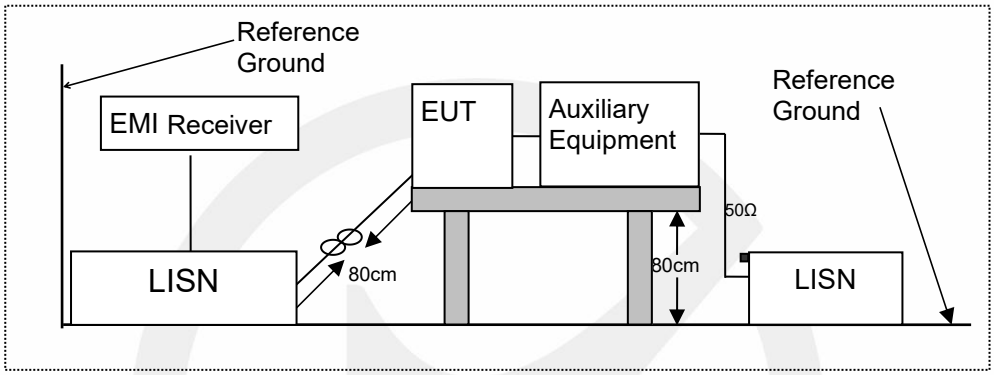


7.3 CONDUCTED EMISSION TEST SETUP

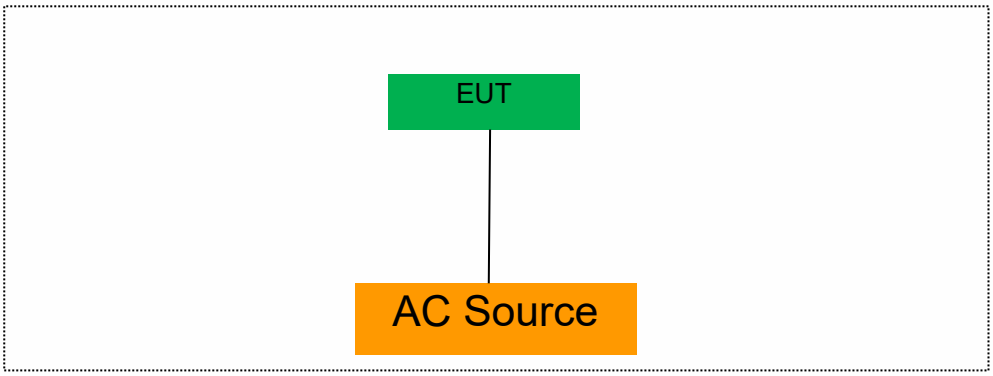
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	acer	ZR1	LXTECOCO76643158372500

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8 TEST REQUIREMENTS

8.1 BANDWIDTH MEASUREMENT

8.1.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C
According to FCC Part 15.407(a)(3) for UNII Band III
According to FCC Part 15.407(e) for UNII Band III
According to 789033 D02 Section II(C)
According to 789033 D02 Section II(D)

8.1.2 Conformance Limit

(1) For the band 5.15-5.25 GHz.
(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.1.4 Test Procedure

According to 789033 D02 v02r01 section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.

Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ⩾ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth
The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v01r02 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ⩾ 3 • RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.1.5 Test Results

Emission Bandwidth

TestMode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	24.44	5167.80	5192.24	---	---
	Ant2	5180	23.28	5168.40	5191.68	---	---
	Ant1	5200	24.00	5188.24	5212.24	---	---
	Ant2	5200	24.12	5187.84	5211.96	---	---
	Ant1	5240	24.00	5227.96	5251.96	---	---
	Ant2	5240	23.60	5228.04	5251.64	---	---
	Ant1	5745	23.80	5732.96	5756.76	---	---
	Ant2	5745	24.80	5732.20	5757.00	---	---
	Ant1	5785	23.00	5773.28	5796.28	---	---
	Ant2	5785	24.56	5772.40	5796.96	---	---
	Ant1	5825	23.60	5813.28	5836.88	---	---
	Ant2	5825	23.48	5813.56	5837.04	---	---
11N20MIMO	Ant1	5180	25.64	5167.36	5193.00	---	---
	Ant2	5180	24.84	5167.96	5192.80	---	---
	Ant1	5200	24.44	5187.92	5212.36	---	---
	Ant2	5200	23.88	5187.96	5211.84	---	---
	Ant1	5240	24.56	5227.88	5252.44	---	---
	Ant2	5240	24.00	5228.12	5252.12	---	---
	Ant1	5745	24.96	5732.40	5757.36	---	---
	Ant2	5745	24.88	5732.68	5757.56	---	---
	Ant1	5785	25.04	5772.16	5797.20	---	---
	Ant2	5785	23.76	5773.24	5797.00	---	---
	Ant1	5825	23.44	5813.28	5836.72	---	---
	Ant2	5825	24.08	5813.04	5837.12	---	---
11N40MIMO	Ant1	5190	45.76	5167.20	5212.96	---	---
	Ant2	5190	43.20	5168.64	5211.84	---	---
	Ant1	5230	49.52	5203.92	5253.44	---	---
	Ant2	5230	44.40	5207.92	5252.32	---	---
	Ant1	5755	43.76	5733.24	5777.00	---	---
	Ant2	5755	41.68	5733.96	5775.64	---	---
	Ant1	5795	44.00	5772.76	5816.76	---	---
	Ant2	5795	41.84	5774.28	5816.12	---	---
11AC20MIMO	Ant1	5180	23.56	5168.04	5191.60	---	---
	Ant2	5180	23.92	5168.08	5192.00	---	---
	Ant1	5200	23.64	5188.04	5211.68	---	---
	Ant2	5200	23.56	5188.28	5211.84	---	---
	Ant1	5240	22.88	5228.48	5251.36	---	---
	Ant2	5240	23.04	5228.40	5251.44	---	---
	Ant1	5745	23.20	5733.32	5756.52	---	---
	Ant2	5745	22.68	5733.44	5756.12	---	---
	Ant1	5785	23.12	5773.32	5796.44	---	---
	Ant2	5785	22.80	5773.52	5796.32	---	---
	Ant1	5825	23.36	5813.12	5836.48	---	---
	Ant2	5825	23.72	5813.32	5837.04	---	---
11AC40MIMO	Ant1	5190	43.60	5167.92	5211.52	---	---
	Ant2	5190	42.48	5168.80	5211.28	---	---
	Ant1	5230	44.00	5207.76	5251.76	---	---
	Ant2	5230	42.40	5208.72	5251.12	---	---
	Ant1	5755	43.36	5733.00	5776.36	---	---
	Ant2	5755	42.72	5733.80	5776.52	---	---

	Ant1	5795	42.64	5773.64	5816.28	---	---
	Ant2	5795	42.00	5774.12	5816.12	---	---
11AC80MIMO	Ant1	5210	81.92	5168.88	5250.80	---	---
	Ant2	5210	81.60	5169.20	5250.80	---	---
	Ant1	5775	82.56	5733.56	5816.12	---	---
	Ant2	5775	81.92	5734.04	5815.96	---	---

Occupied channel bandwidth

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.327	5171.3087	5188.6356	---	---
	Ant2	5180	17.332	5171.3106	5188.6431	---	---
	Ant1	5200	17.333	5191.2980	5208.6309	---	---
	Ant2	5200	17.369	5191.2901	5208.6591	---	---
	Ant1	5240	17.319	5231.3150	5248.6342	---	---
	Ant2	5240	17.341	5231.2979	5248.6389	---	---
	Ant1	5745	17.262	5736.3053	5753.5672	---	---
	Ant2	5745	17.306	5736.3255	5753.6315	---	---
	Ant1	5785	17.226	5776.3543	5793.5803	---	---
	Ant2	5785	17.325	5776.3150	5793.6403	---	---
	Ant1	5825	17.211	5816.3841	5833.5953	---	---
	Ant2	5825	17.305	5816.3288	5833.6335	---	---
11N20MIMO	Ant1	5180	18.6	5170.6833	5189.2837	---	---
	Ant2	5180	18.074	5170.9328	5189.0068	---	---
	Ant1	5200	18.352	5190.8169	5209.1687	---	---
	Ant2	5200	18.018	5190.9559	5208.9738	---	---
	Ant1	5240	18.472	5230.7592	5249.2315	---	---
	Ant2	5240	17.995	5230.9770	5248.9719	---	---
	Ant1	5745	18.343	5735.8107	5754.1536	---	---
	Ant2	5745	18.022	5735.9788	5754.0010	---	---
	Ant1	5785	18.409	5775.7693	5794.1782	---	---
	Ant2	5785	18.005	5775.9792	5793.9844	---	---
	Ant1	5825	18.395	5815.8149	5834.2103	---	---
	Ant2	5825	17.963	5816.0250	5833.9881	---	---
11N40MIMO	Ant1	5190	36.622	5171.6892	5208.3113	---	---
	Ant2	5190	36.38	5171.8022	5208.1818	---	---
	Ant1	5230	36.64	5211.6172	5248.2576	---	---
	Ant2	5230	36.504	5211.7053	5248.2090	---	---
	Ant1	5755	36.701	5736.6098	5773.3106	---	---
	Ant2	5755	36.646	5736.6726	5773.3188	---	---
	Ant1	5795	36.679	5776.6452	5813.3245	---	---
	Ant2	5795	36.546	5776.7423	5813.2878	---	---
11AC20MIMO	Ant1	5180	18.459	5170.7799	5189.2390	---	---
	Ant2	5180	18.007	5170.9849	5188.9916	---	---
	Ant1	5200	18.412	5190.7925	5209.2041	---	---
	Ant2	5200	17.983	5190.9871	5208.9700	---	---
	Ant1	5240	18.503	5230.7356	5249.2389	---	---
	Ant2	5240	17.962	5231.0090	5248.9705	---	---
	Ant1	5745	18.385	5735.8082	5754.1933	---	---
	Ant2	5745	17.981	5735.9947	5753.9761	---	---
	Ant1	5785	18.425	5775.7706	5794.1957	---	---
	Ant2	5785	17.973	5776.0064	5793.9792	---	---
	Ant1	5825	18.508	5815.7568	5834.2650	---	---
	Ant2	5825	18.01	5815.9963	5834.0060	---	---
11AC40MIMO	Ant1	5190	36.566	5171.7056	5208.2712	---	---
	Ant2	5190	36.379	5171.7976	5208.1763	---	---
	Ant1	5230	36.596	5211.6464	5248.2422	---	---
	Ant2	5230	36.526	5211.7213	5248.2477	---	---
	Ant1	5755	36.635	5736.6158	5773.2509	---	---
	Ant2	5755	36.592	5736.6564	5773.2485	---	---
	Ant1	5795	36.682	5776.5991	5813.2809	---	---
	Ant2	5795	36.531	5776.7086	5813.2396	---	---

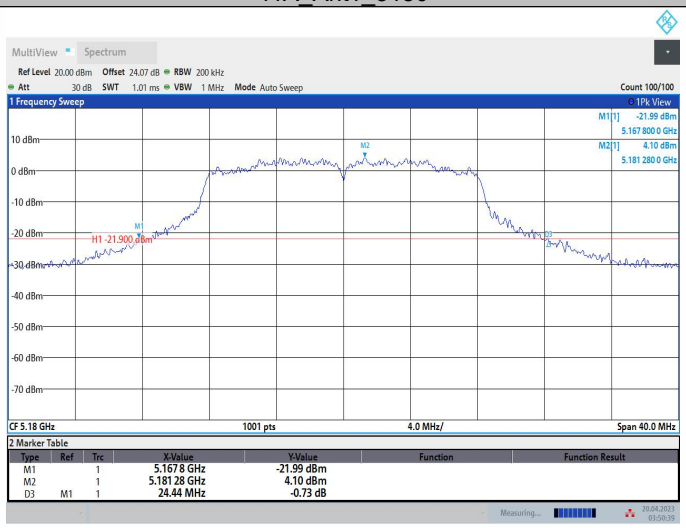
11AC80MIMO	Ant1	5210	76.063	5171.9007	5247.9633	---	---
	Ant2	5210	75.941	5171.9428	5247.8841	---	---
	Ant1	5775	76.303	5736.7389	5813.0415	---	---
	Ant2	5775	76.191	5736.9393	5813.1301	---	---

Min emission bandwidth

TestMode	Antenna	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	15.32	5737.20	5752.52	0.5	PASS
	Ant2	5745	13.44	5739.08	5752.52	0.5	PASS
	Ant1	5785	15.08	5777.40	5792.48	0.5	PASS
	Ant2	5785	15.08	5777.40	5792.48	0.5	PASS
	Ant1	5825	13.44	5818.64	5832.08	0.5	PASS
	Ant2	5825	15.12	5817.40	5832.52	0.5	PASS
11N20MIMO	Ant1	5745	13.88	5738.64	5752.52	0.5	PASS
	Ant2	5745	15.72	5737.40	5753.12	0.5	PASS
	Ant1	5785	15.12	5777.40	5792.52	0.5	PASS
	Ant2	5785	15.68	5776.84	5792.52	0.5	PASS
	Ant1	5825	15.08	5817.40	5832.48	0.5	PASS
	Ant2	5825	16.32	5816.80	5833.12	0.5	PASS
11N40MIMO	Ant1	5755	35.20	5737.40	5772.60	0.5	PASS
	Ant2	5755	35.20	5737.40	5772.60	0.5	PASS
	Ant1	5795	33.92	5778.68	5812.60	0.5	PASS
	Ant2	5795	35.20	5777.40	5812.60	0.5	PASS
11AC20MIMO	Ant1	5745	15.12	5737.40	5752.52	0.5	PASS
	Ant2	5745	15.72	5737.40	5753.12	0.5	PASS
	Ant1	5785	15.12	5777.40	5792.52	0.5	PASS
	Ant2	5785	15.12	5777.40	5792.52	0.5	PASS
	Ant1	5825	15.12	5817.40	5832.52	0.5	PASS
	Ant2	5825	16.32	5816.80	5833.12	0.5	PASS
11AC40MIMO	Ant1	5755	35.20	5737.40	5772.60	0.5	PASS
	Ant2	5755	35.12	5737.48	5772.60	0.5	PASS
	Ant1	5795	35.20	5777.40	5812.60	0.5	PASS
	Ant2	5795	35.20	5777.40	5812.60	0.5	PASS
11AC80MIMO	Ant1	5775	75.20	5737.40	5812.60	0.5	PASS
	Ant2	5775	75.20	5737.40	5812.60	0.5	PASS

Emission Bandwidth

11A_Ant1_5180



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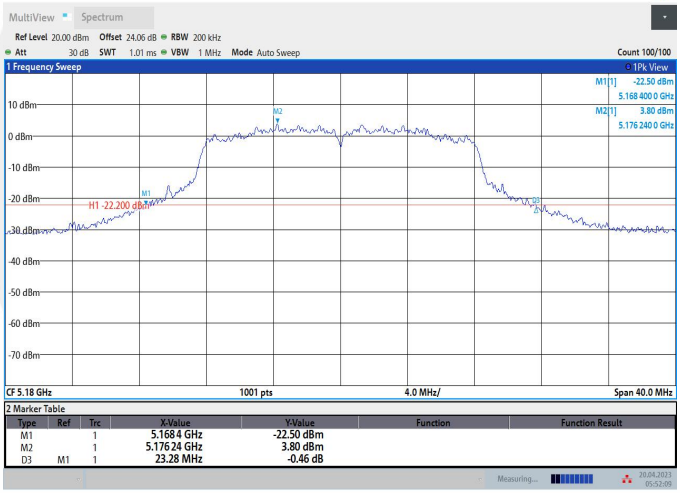
11A_Ant2_5180



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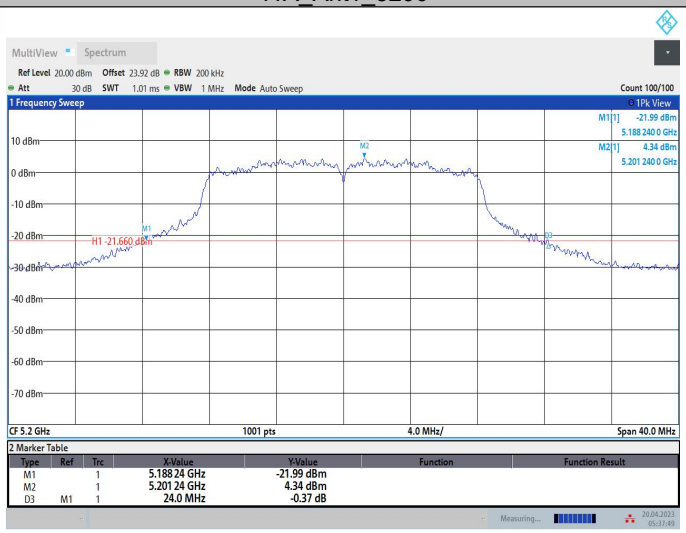
11A_Ant1_5200



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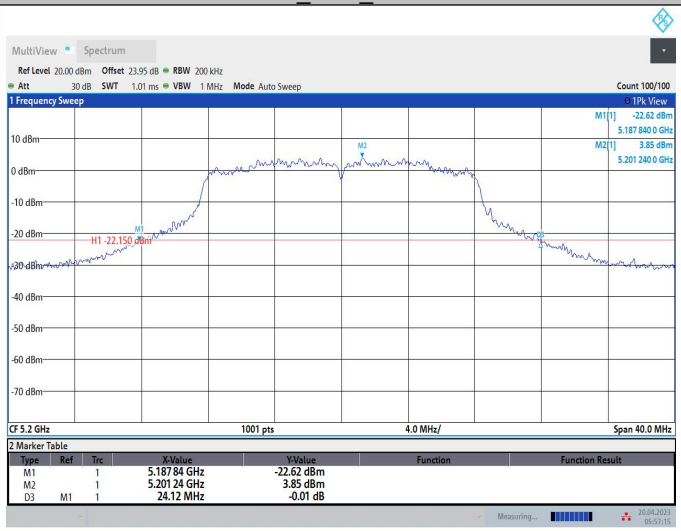
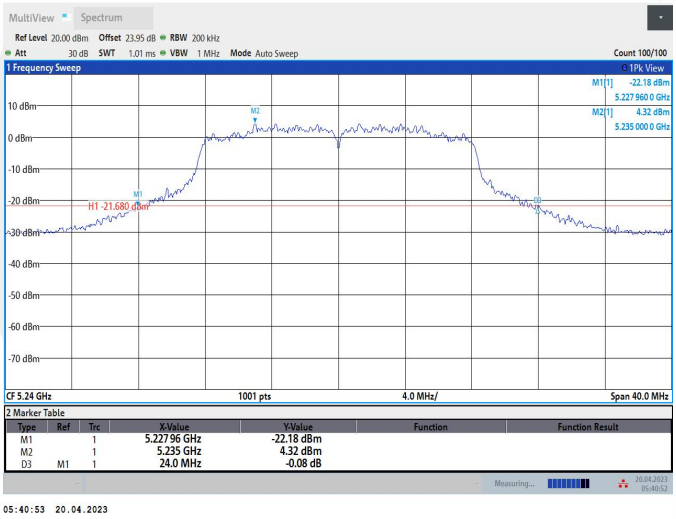
11A_Ant2_5200



11A_Ant1_5240



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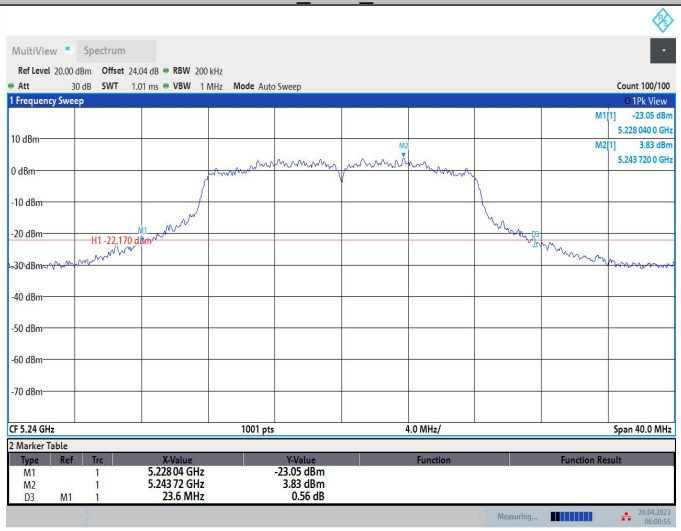
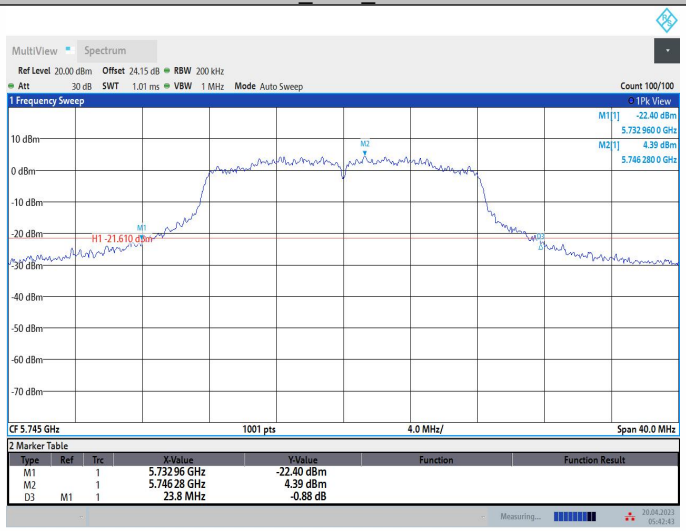
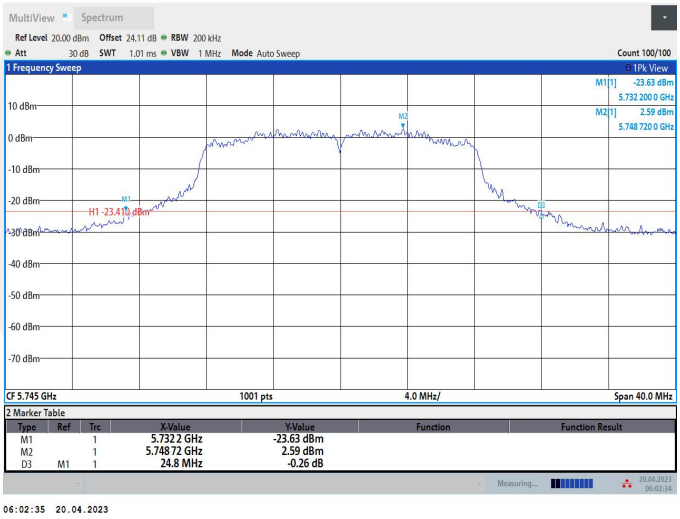


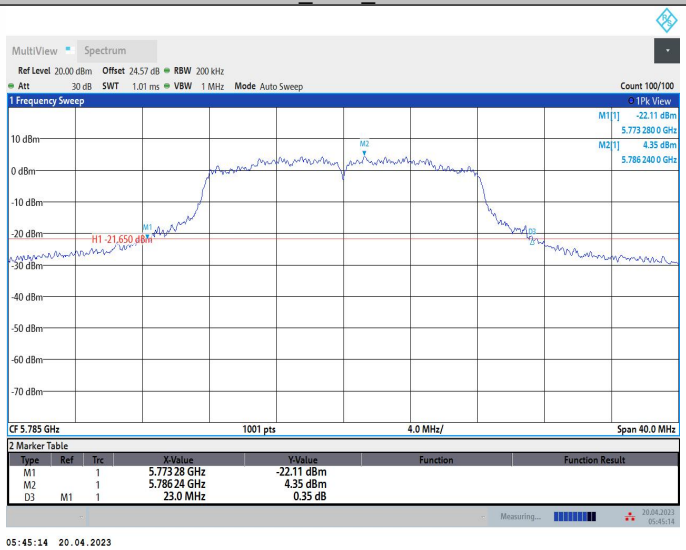
11A_Ant1_5745



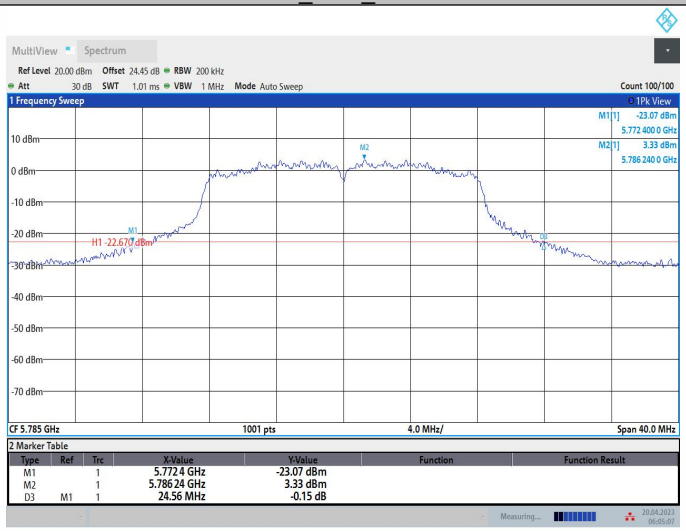
11A_Ant2_5745



11A_Ant1_5785



11A_Ant2_5785



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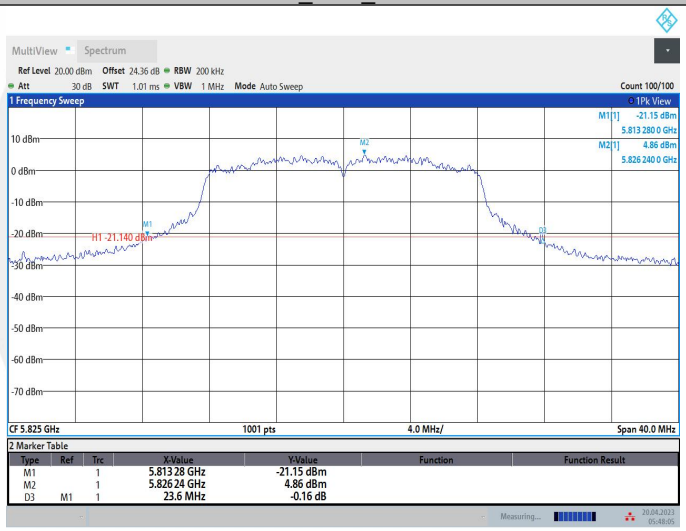
11A_Ant1_5825



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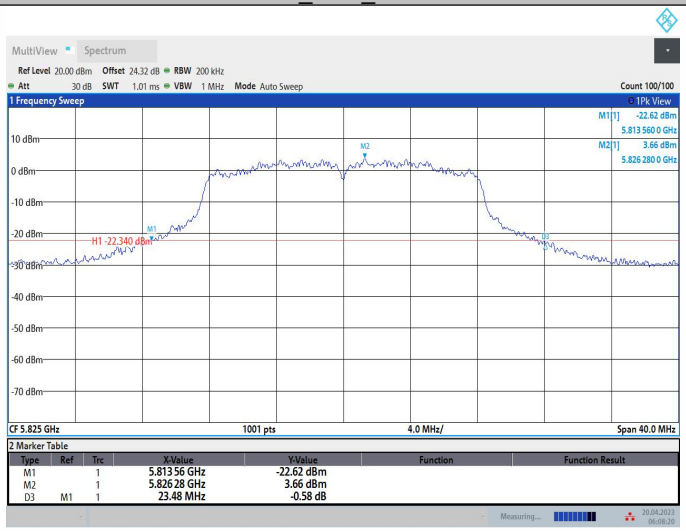
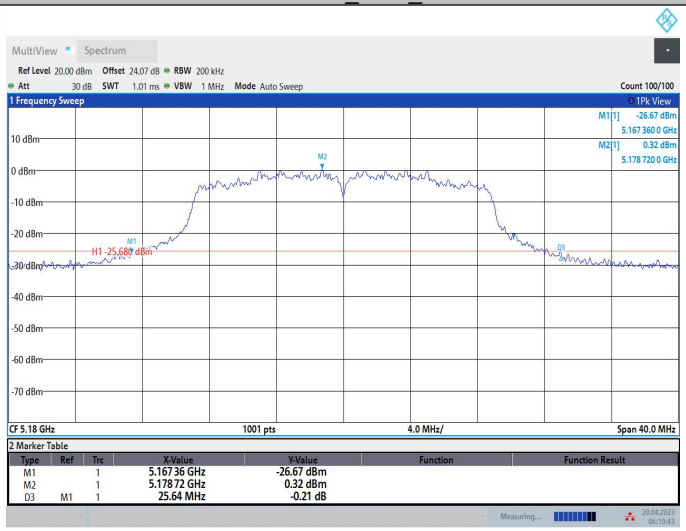
11A_Ant2_5825



06:08:20 20.04.2023

11N20MIMO_Ant1_5180



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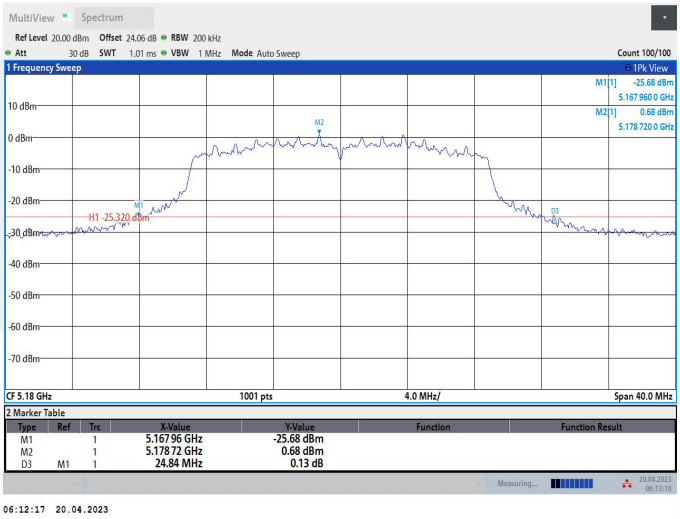
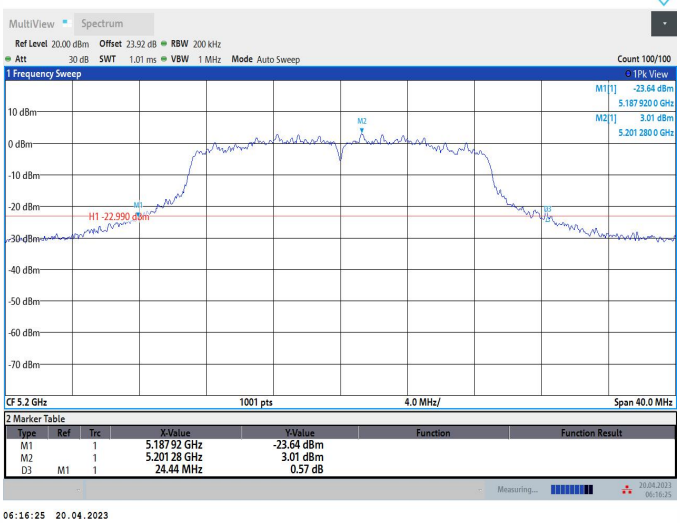


11N20MIMO_Ant1_5200



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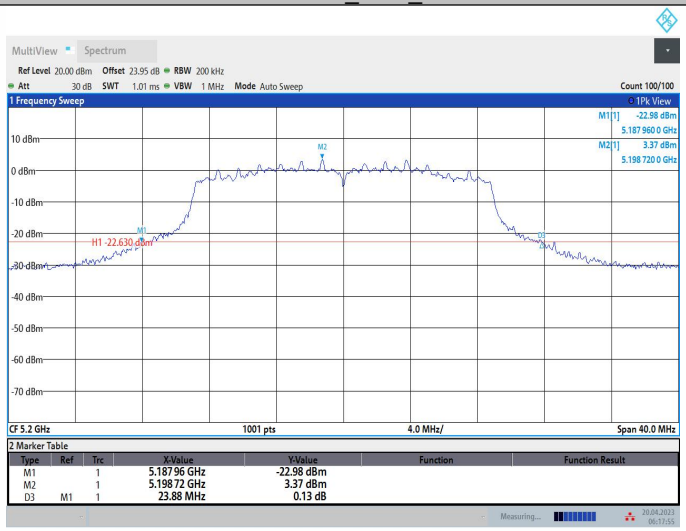

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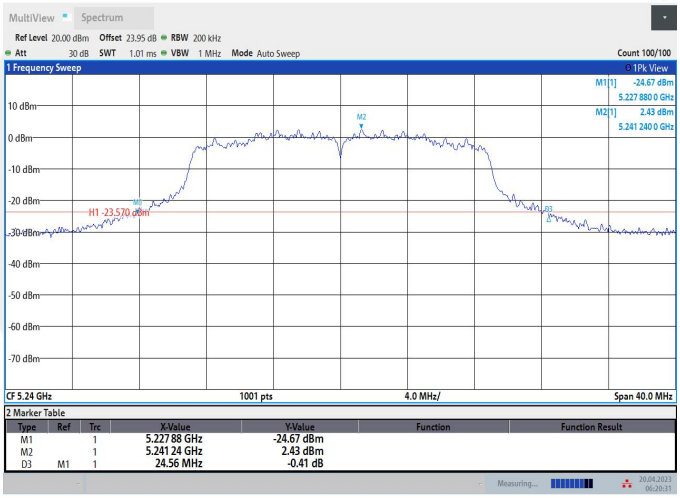
11N20MIMO_Ant1_5240



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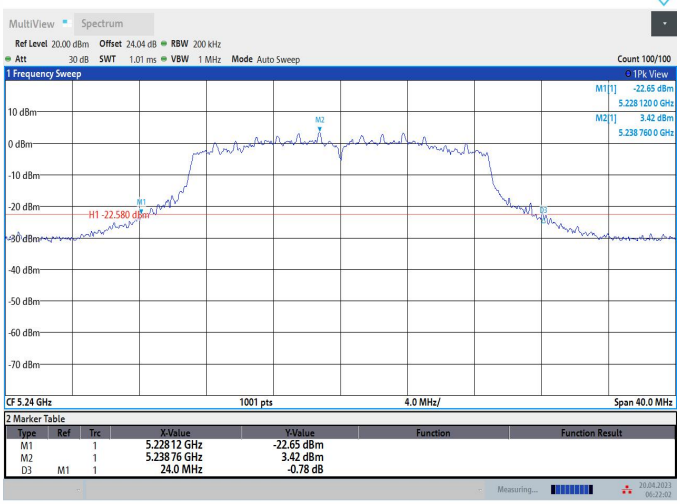
11N20MIMO_Ant2_5240



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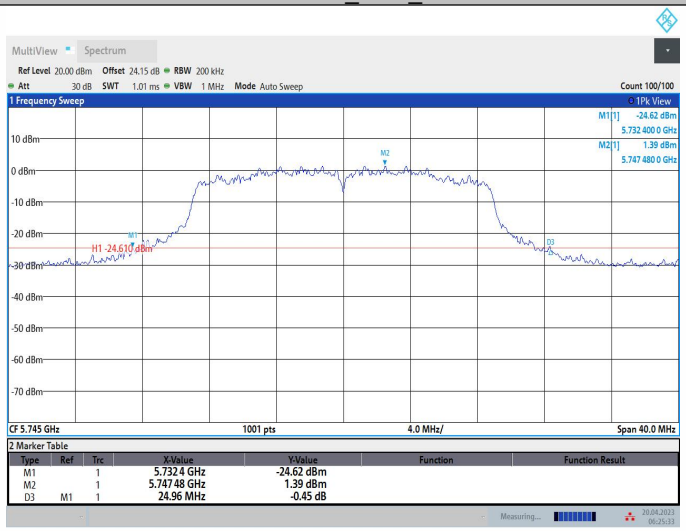
11N20MIMO_Ant1_5745



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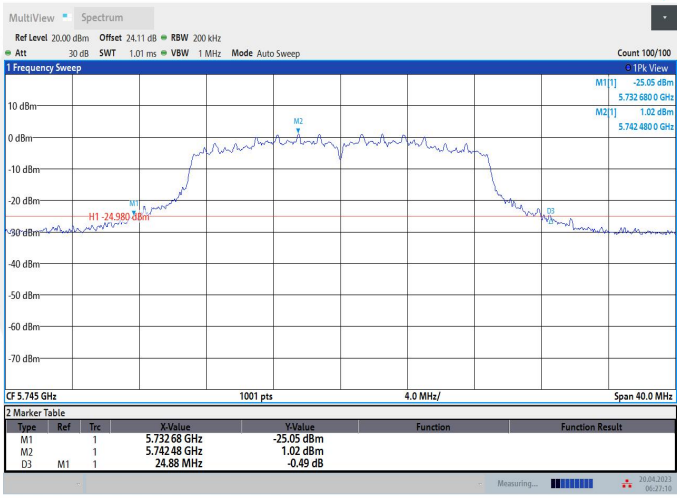
11N20MIMO_Ant2_5745



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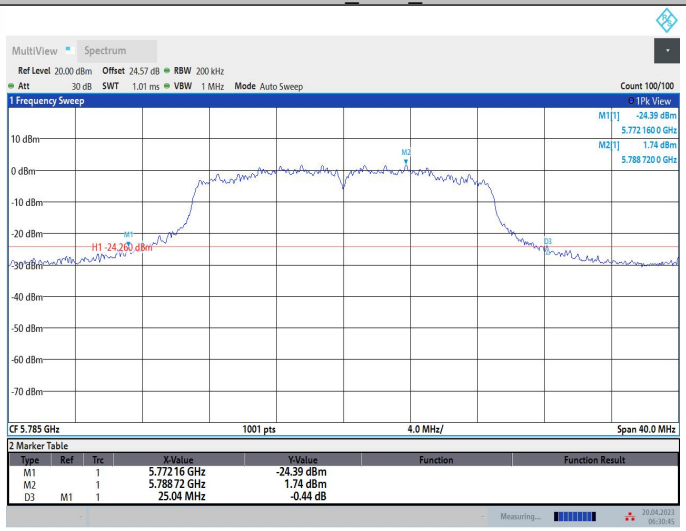
11N20MIMO_Ant1_5785



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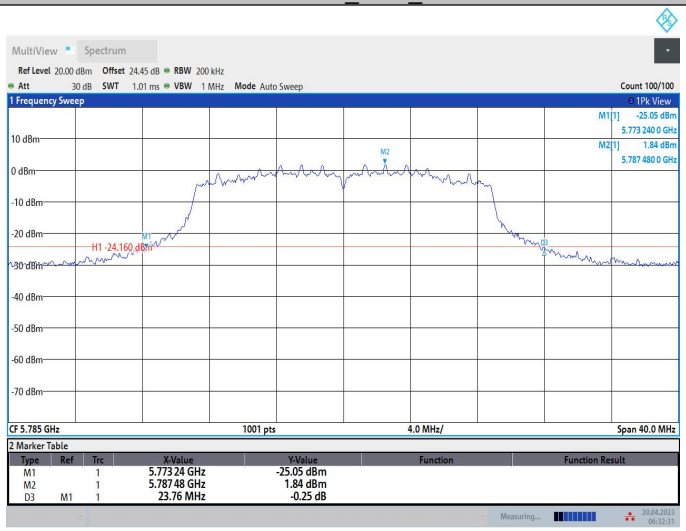
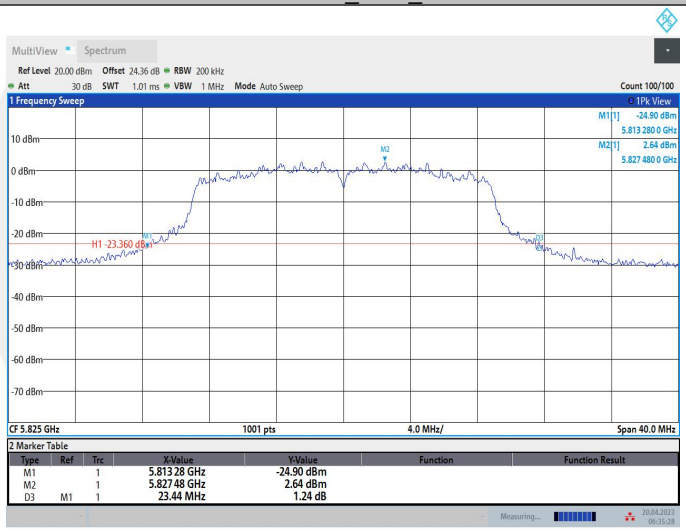


11N20MIMO_Ant1_5825



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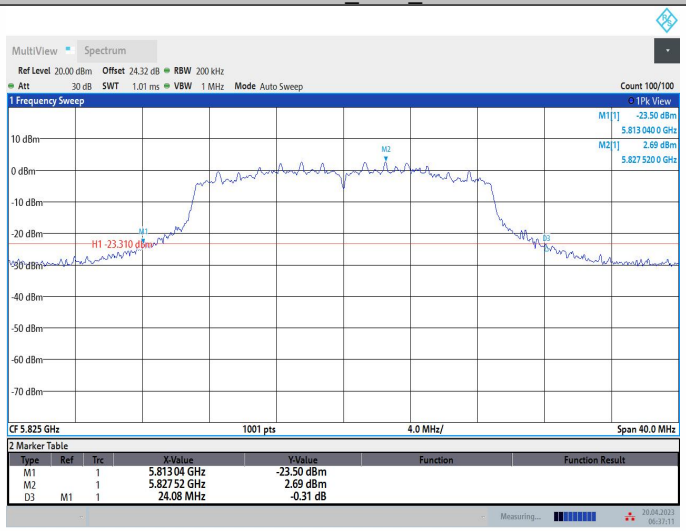
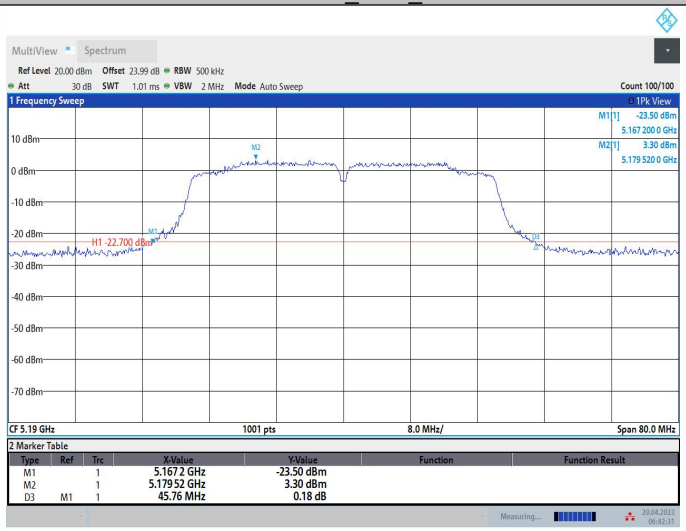
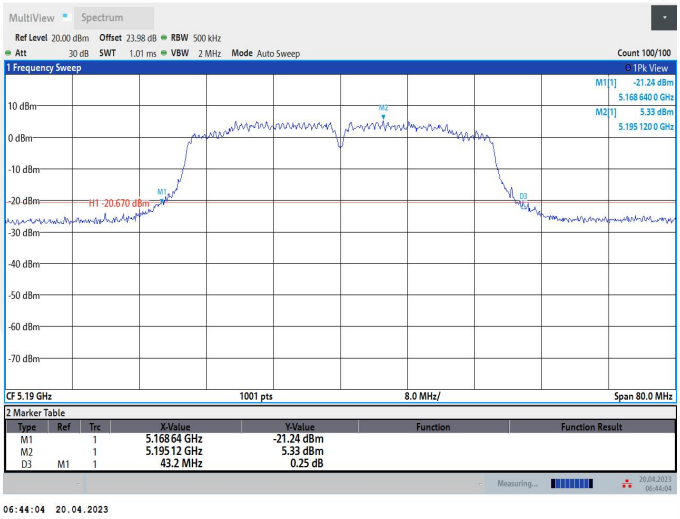


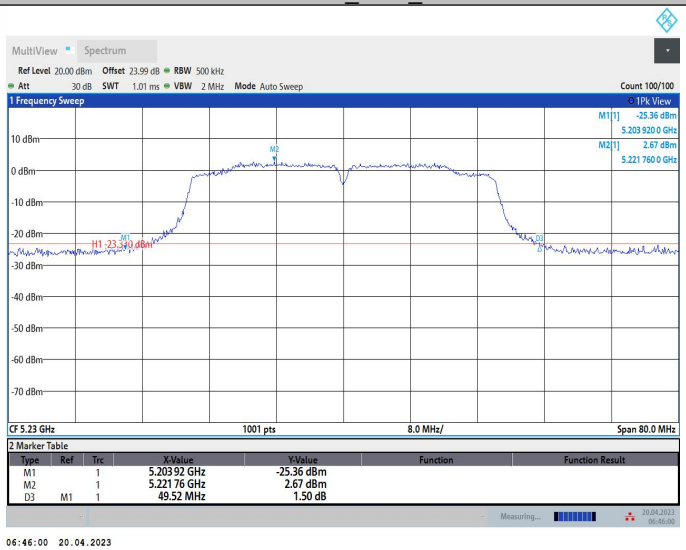
11N40MIMO_Ant1_5190



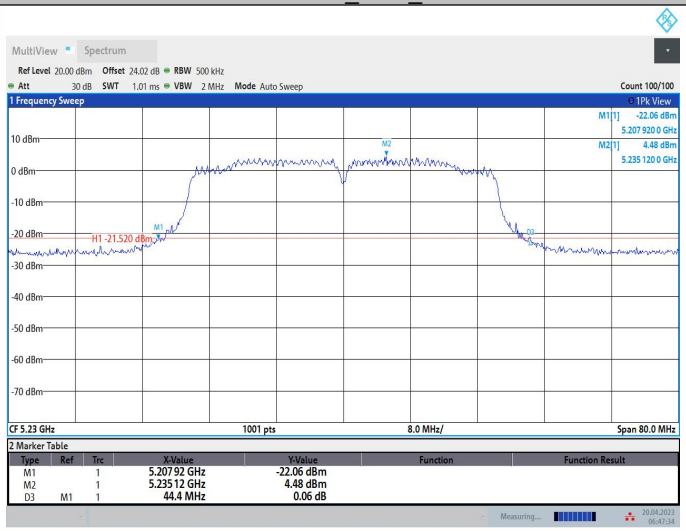
11N40MIMO_Ant2_5190



11N40MIMO_Ant1_5230



11N40MIMO_Ant2_5230



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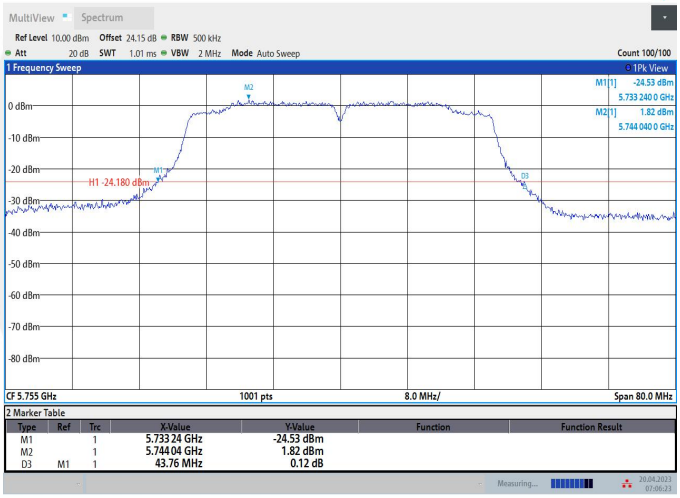
11N40MIMO_Ant1_5755



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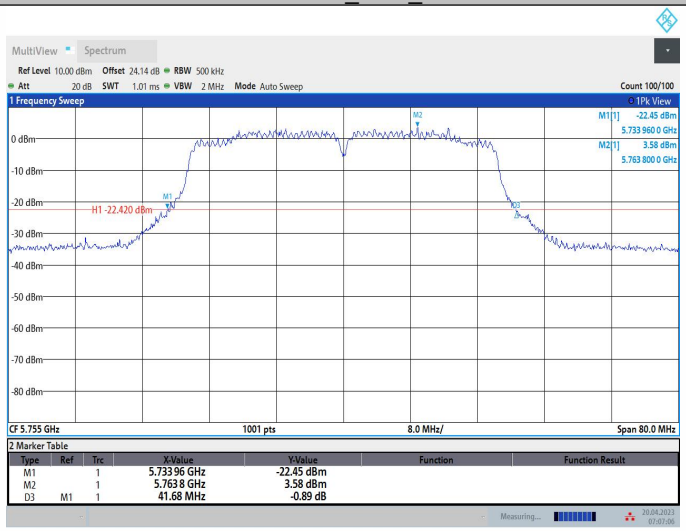
11N40MIMO_Ant2_5755



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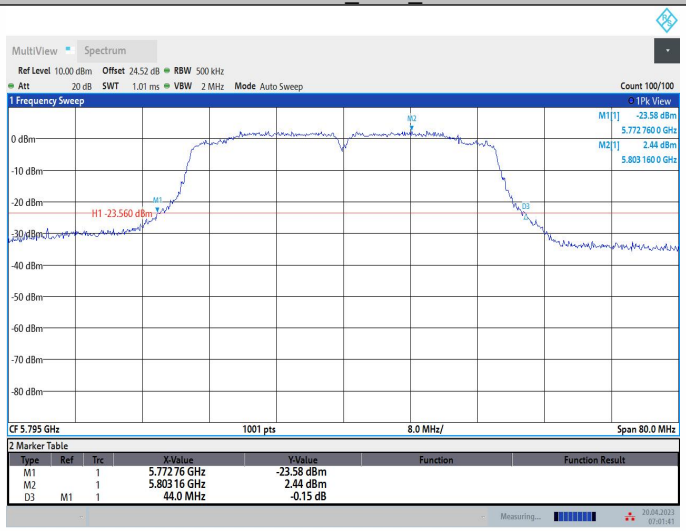

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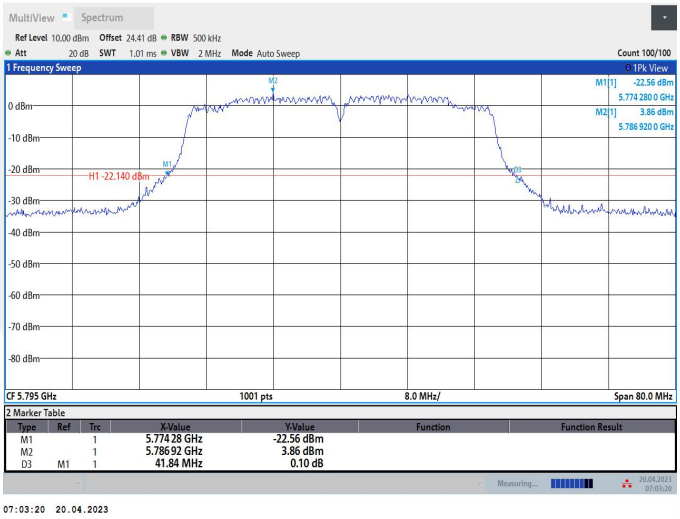
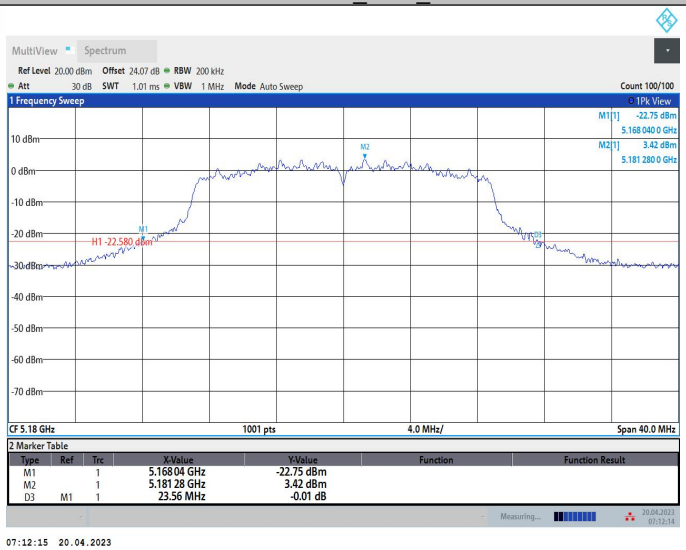
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