

FCC Test Report

Report No.: RWAX202300107A

Applicant: FocusAI Inc

Address: 530 Lakeside Dr, Ste 180, Sunnyvale, CA 94085, United States.

Product Name: FocusAI Dome Camera FD10

Product Model: FD10

Multiple Models: N/A

Trade Mark: N/A

FCC ID: 2BDXBFD10

Standards: FCC CFR Title 47 Part 15C (§15.247)

Test Date: 2023/11/10~2024/02/24

Test Result: Complied

Report Date: 2024/02/27

Reviewed by:

Abel Chen

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Approved by:

Jacob Kong

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Prepared by:

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Revision History

Version No.	Issued Date	Description
00	2024/02/27	Original

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1 General Information

1.1 Client Information

Applicant:	FocusAI Inc
Address:	530 Lakeside Dr, Ste 180, Sunnyvale, CA 94085, United States.
Manufacturer:	FocusAI Inc
Address:	530 Lakeside Dr, Ste 180, Sunnyvale, CA 94085, United States.

1.2 Product Description of EUT

The EUT is FocusAI Dome Camera FD10 that contains 2.4G and 5G WLAN radios, this report covers the full testing of the 2.4G WLAN radio.

Sample Serial Number	4A-2 for CE&RE test, 4A-1for RF test conducted test (assigned by WATC)
Sample Received Date	2023/11/1
Sample Status	Good Condition
Frequency Range	2412MHz - 2462MHz(802.11b, g, n-HT20, ax-HEW20) 2422MHz - 2452MHz(802.11n-HT40, ax-HEW40)
Maximum Conducted Peak Output Power	28.56dBm
Modulation Technology	DSSS, OFDM, OFDMA
Antenna Gain [#]	Ant0: 0.90dBi; Ant1: 2.50dBi
Spatial Streams [#]	MIMO (2TX, 2RX)
Power Supply	DC 48V from POE
Operating temperature [#]	-20 deg.C to +50 deg.C
Adapter Information	N/A
Modification	Sample No Modification by the test lab

1.3 Antenna information

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.	
Device Antenna information:	
The Wi-Fi antenna is two internal antennas which cannot replace by end-user. Please see product internal photos for details.	

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart E, Equipment Class: NII, FCC ID: 2BDXBF10
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1.5 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
AC Power Lines Conducted Emissions		±3.14dB
Emissions, Radiated	Below 30MHz	±2.78dB
	Below 1GHz	±4.84dB
	Above 1GHz	±5.44dB
Conducted Power		0.74dB
Frequency Error		150Hz
Bandwidth		0.34%
Power Spectral Density		0.74dB
Note 1: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. Note 2: The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)		

1.6 Laboratory Location

World Alliance Testing and Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: qa@watc.com.cn

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.7 Test Methodology

FCC CFR 47 Part 2

FCC CFR 47 Part 15

KDB 558074 D01 DTS Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2020

2 Description of Measurement

2.1 Test Configuration

Operating channels:					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447	/	/
According to ANSI C63.10-2020 chapter 5.6.1 Table 11 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:					
802.11b, 802.11g, 802.11n-HT20, 802.11ax-HEW20					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	6	2437	11	2462
802.11n-HT40, 802.11ax-HEW40					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
3	2422	6	2437	9	2452

Test Mode:				
Transmitting mode:		Keep the EUT in continuous transmitting with modulation		
Exercise software [#] :		QRCT4		
Mode	Worst-case Data rate	Power Level Setting [#]		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	21	21	21
802.11g	6Mbps	18	18	18
802.11n-HT20	MCS0	17	17	17
802.11n-HT40	MCS0	16	16	16
802.11ax-HEW20	MCS0	15	15	15
802.11 ax-HEW40	MCS0	15	15	15
The exercise software and the maximum power setting that provided by manufacturer.				

Worst-Case Configuration:

For radiated emissions, EUT was investigated in three orthogonal orientation, the worst-case orientation was recorded in report

For AC power line conducted emission and radiated emission 9kHz-1GHz and above 18GHz were performed with the EUT transmits at the channel with highest output power as worst-case scenario.

According to manufacturer, for 802.11 n/ax modes, the device support MIMO mode, all modes share the same power level setting under the same modulation. So the worst mode MIMO was selected to test.

For 802.11 b/g mode, the device only support SISO mode.

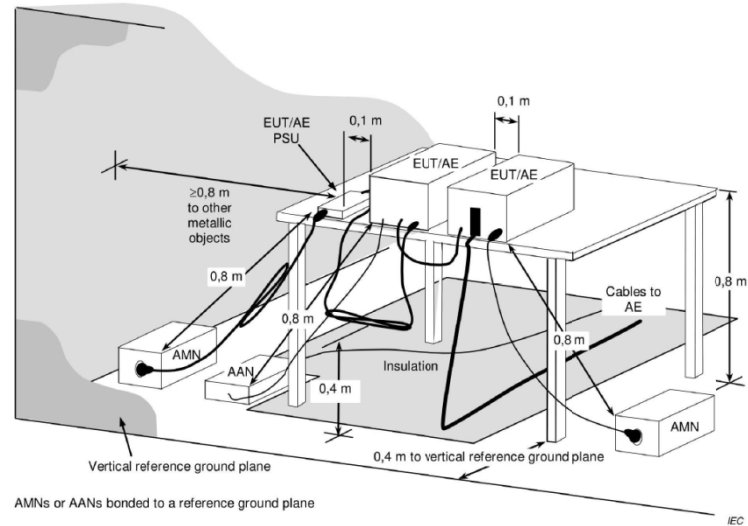
For 802.11 ax mode, the device not supports Partial RU.

2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
SHENZHEN GOSPELL DIGITAL TECHNOLOGY CO.,LTD SWITCHING GIGABIT POWER SUPPLY	POE	G0566-480-100	/

2.3 Test Setup

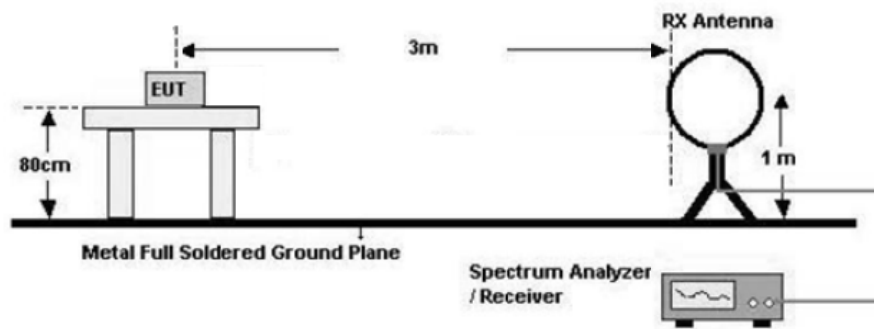
1) Conducted emission measurement:



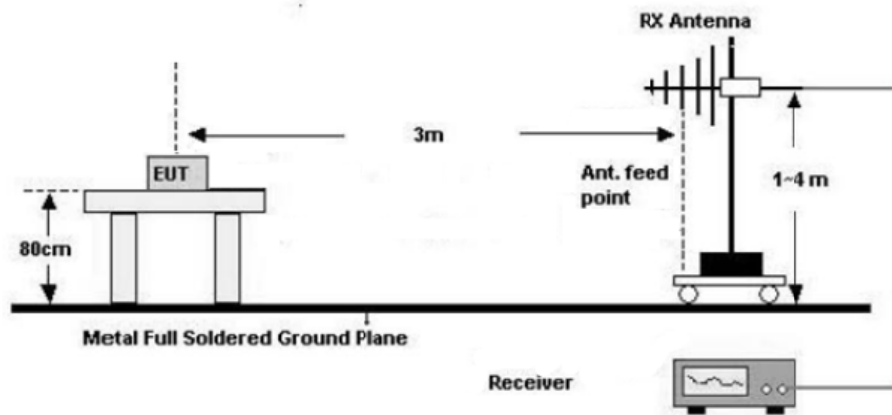
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

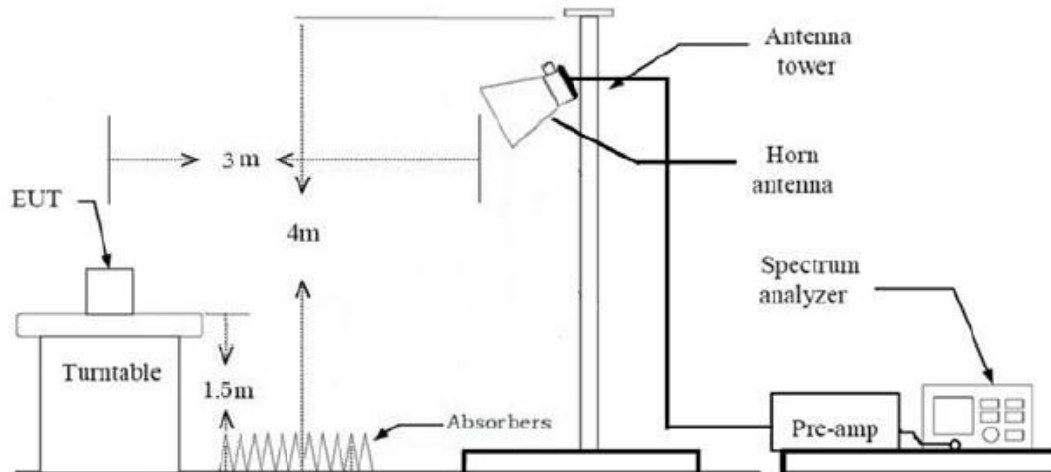
Below 30MHz (3m SAC)



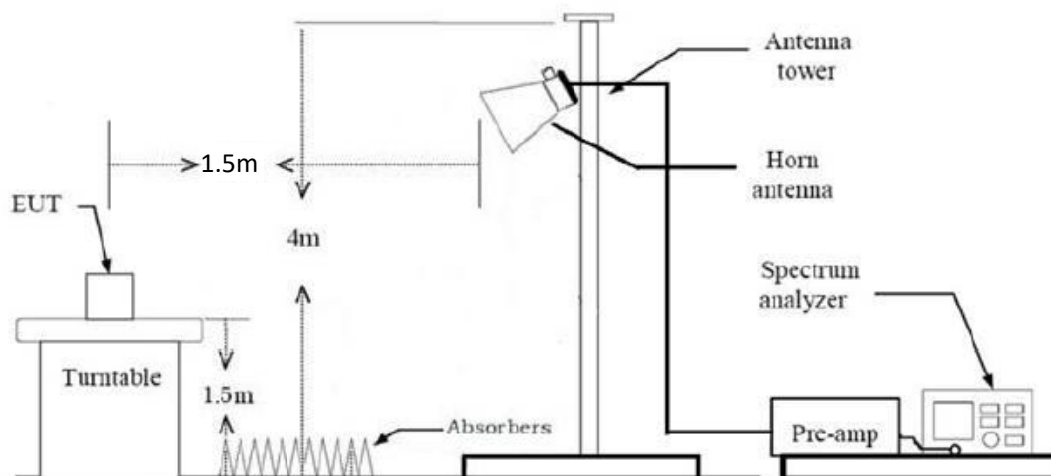
30MHz-1GHz (3m SAC)



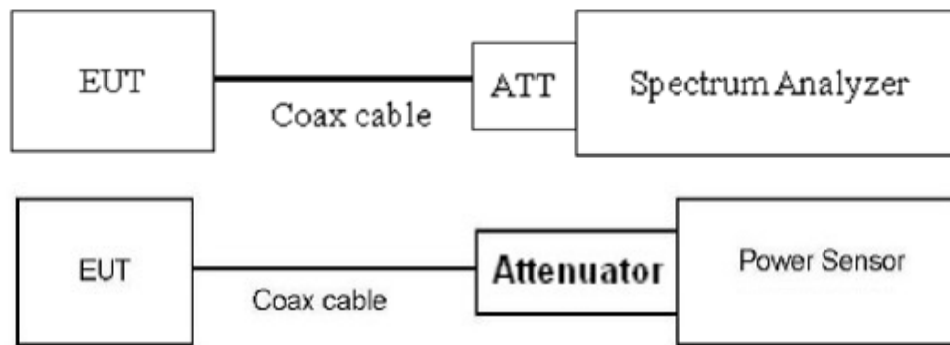
1GHz-18GHz(3m FAC)



Above 18GHz (3m FAC)



3) RF Conducted Test



2.4 Test Procedure

Conducted emission:

1. The E.U.T is placed on a non-conducting table 40cm from the vertical ground plane and 80cm above the horizontal ground plane (Please refer to the block diagram of the test setup and photographs).
2. Both sides of A.C. line are checked for maximum conducted interference. 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 on conducted measurement.
3. Line conducted data is recorded for both Line and Neutral

Radiated Emission Procedure:

a) For below 30MHz

1. All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz- 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were $40 \cdot \log(\text{test distance} / \text{specification distance})$.
2. Loop antenna use, investigation was done on the three antenna orientations (parallel, perpendicular, ground-parallel)

b) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

c) For above 1GHz:

1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m (1-18GHz) and 1.5 m (above 18GHz).

2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
4. Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

RF Conducted Test:

1. The antenna port of EUT was connected to the RF port of the test equipment (Power Meter or Spectrum analyzer) through Attenuator and RF cable.
2. The cable assembly insertion loss of 11.5dB (including 10dB Attenuator and 1.5 dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 1.5dB was assumed as worst case. This was later verified to be true by laboratory. (if the RF cable provided by client, the cable loss declared by client)
3. The EUT is keeping in continuous transmission mode and tested in all modulation modes.

2.5 Measurement Method

Description of Test	Measurement Method
AC Line Conducted Emissions	ANSI C63.10-2020 Section 6.2
Maximum Conducted Output Power	ANSI C63.10-2020 Section 11.9.1.2 PKPM1 Peak power meter method or ANSI C63.10-2020 Section 11.9.2.3.2 Method AVGPM-G
Power Spectral Density	ANSI C63.10-2020 Section 11.10.2 Method PKPSD (peak PSD)
6 dB Emission Bandwidth	ANSI C63.10-2020 Section 11.8.1
99% Occupied Bandwidth	ANSI C63.10-2020 Section 6.9.3
100kHz Bandwidth of Frequency Band Edge	ANSI C63.10-2020 Section 6.10
Radiated emission	ANSI C63.10-2020 Section 11.11&11.12
Duty Cycle	ANSI C63.10-2020 Section 11.6

2.6 Measurement Equipment

Manufacturer	Description	Model	Management No.	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
ROHDE& SCHWARZ	EMI TEST RECEIVER	ESR	101817	2023/7/3	2024/7/2
R&S	LISN	ENV216	101748	2023/8/1	2024/7/31
N/A	Coaxial Cable	NO.12	N/A	2023/7/3	2024/7/2
Farad	Test Software	EZ-EMC	Ver. EMEC-3A1	/	/
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2023/7/3	2024/7/2
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2023/7/12	2024/7/11
COM-POWER	PREAMPLIFIER	PAM-118A	18040152	2023/8/21	2024/8/20
COM-POWER	Amplifier	PAM-840A	461306	2023/8/8	2024/8/7
ETS	Passive Loop Antenna	6512	29604	2023/7/7	2024/7/6
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2024/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2023/7/10	2024/7/9
Oulitong	Band Reject Filter	OBSF-2400-248 3.5-50N	OE02103119	2023/9/15	2024/9/14
N/A	Coaxial Cable	NO.9	N/A	2023/8/8	2024/8/7
N/A	Coaxial Cable	NO.10	N/A	2023/8/8	2024/8/7
N/A	Coaxial Cable	NO.11	N/A	2023/8/8	2024/8/7
RF Conducted Test					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40	101419	2023/9/12	2024/9/11
ANRITSU	USB Power Sensor	MA24418A	12620	2023/7/12	2024/7/11
MARCONI	10dB Attenuator	1692595	2942	2023/10/25	2024/10/24

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.

3 Test Results

3.1 Test Summary

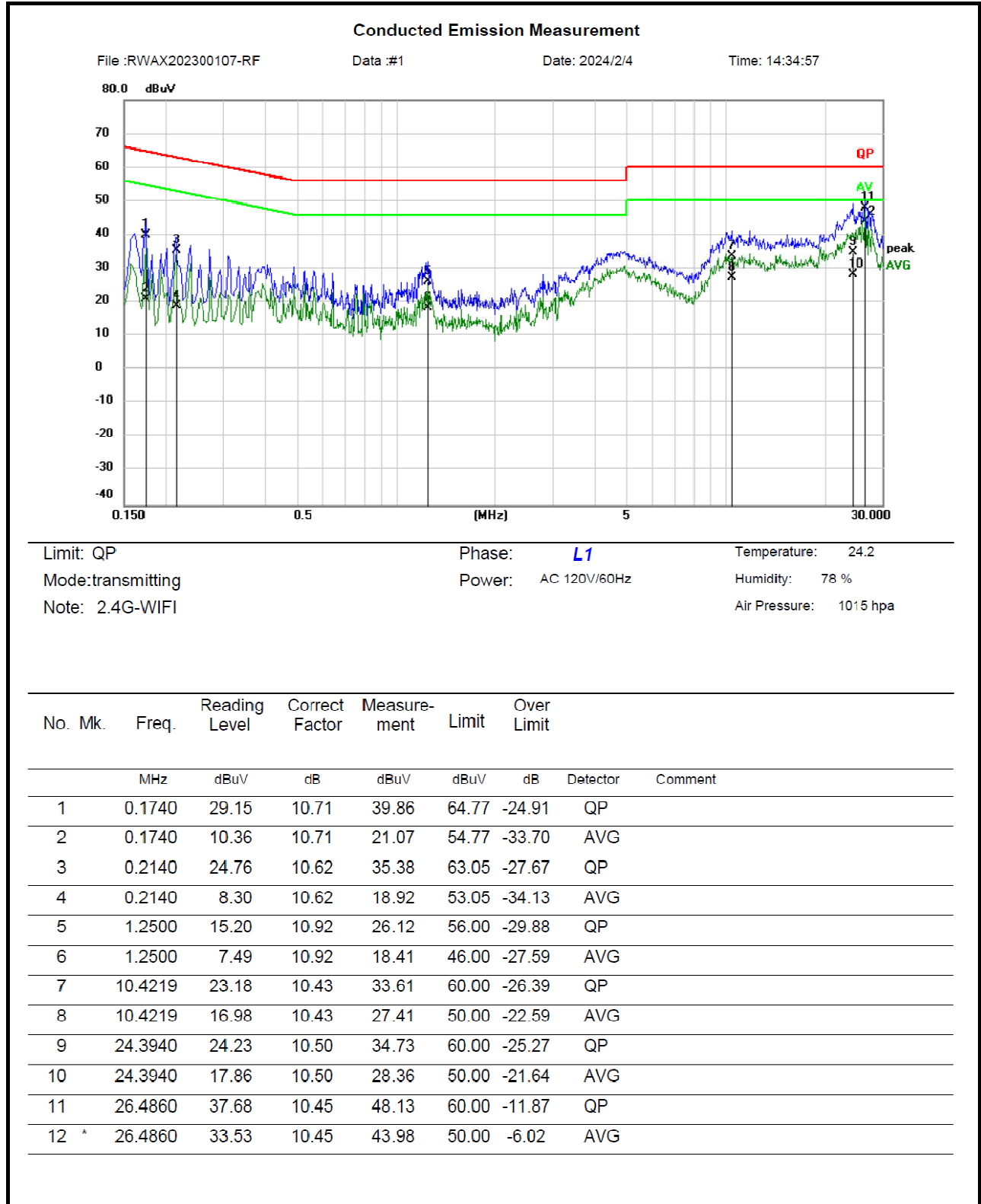
FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
-	99% Occupied Bandwidth	Report only
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliance
§15.205, §15.209, §15.247(d)	Radiated emission	Compliance
-	Duty Cycle	Report only

3.2 Limit

Test items	Limit
AC Line Conducted Emissions	See details §15.207 (a)
Conducted Output Power	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.
6dB Emission Bandwidth	The minimum 6 dB bandwidth shall be at least 500 kHz.
Power Spectral Density	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
Spurious Emissions, 100kHz Bandwidth of Frequency Band Edge	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

3.3 AC Line Conducted Emissions Test Data

Test Date:	2024-02-04	Test By:	Lirou Li
Environment condition:	Temperature: 24.2°C; Relative Humidity:78%; ATM Pressure: 101.5kPa		



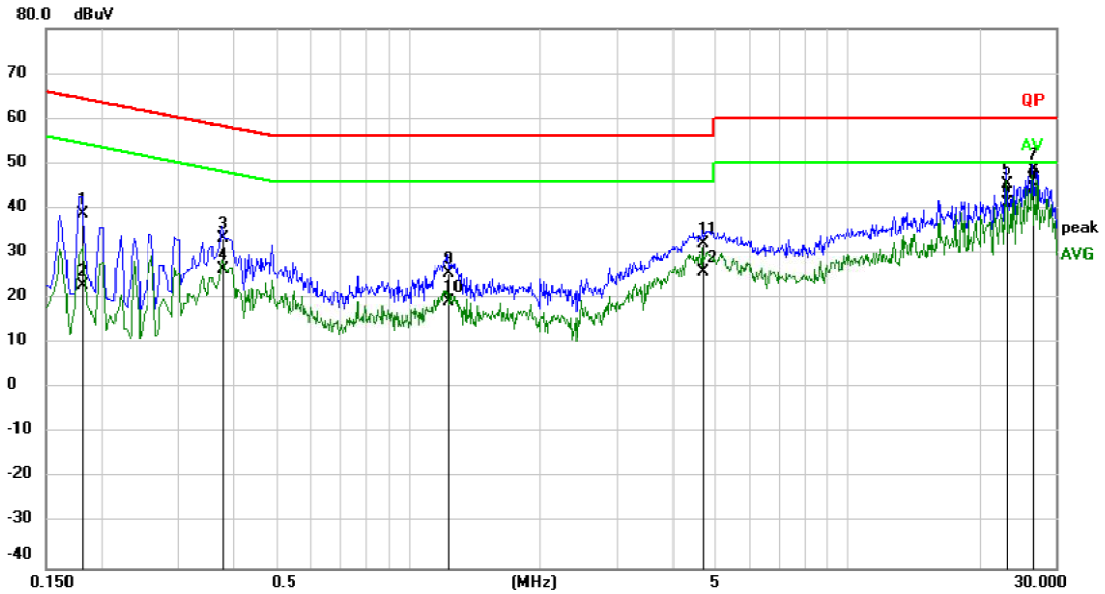
Conducted Emission Measurement

File :RWAX202300107-RF

Data :#2

Date: 2024/2/4

Time: 14:37:00



Limit: QP
Mode:transmitting
Note: 2.4G-WIFI

Phase: **N**
Power: AC 120V/60Hz

Temperature: 24.2
Humidity: 78 %
Air Pressure: 1015 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1819	28.15	10.48	38.63	64.40	-25.77	QP	
2		0.1819	12.23	10.48	22.71	54.40	-31.69	AVG	
3		0.3780	22.86	10.63	33.49	58.32	-24.83	QP	
4		0.3780	15.80	10.63	26.43	48.32	-21.89	AVG	
5		23.1259	34.58	10.71	45.29	60.00	-14.71	QP	
6		23.1259	30.45	10.71	41.16	50.00	-8.84	AVG	
7		26.6100	37.94	10.75	48.69	60.00	-11.31	QP	
8	*	26.6100	33.78	10.75	44.53	50.00	-5.47	AVG	
9		1.2420	14.93	10.67	25.60	56.00	-30.40	QP	
10		1.2420	8.61	10.67	19.28	46.00	-26.72	AVG	
11		4.6820	21.60	10.50	32.10	56.00	-23.90	QP	
12		4.6820	15.46	10.50	25.96	46.00	-20.04	AVG	

Remark:

Measurement (dBuV)= Reading Level (dBuV) + Correct Factor(dB)

Correct Factor (dB)= LISN Voltage Division Factor (dB)+ Cable loss(dB)

Over = Measurement – Limit

3.4 Radiated emission Test Data

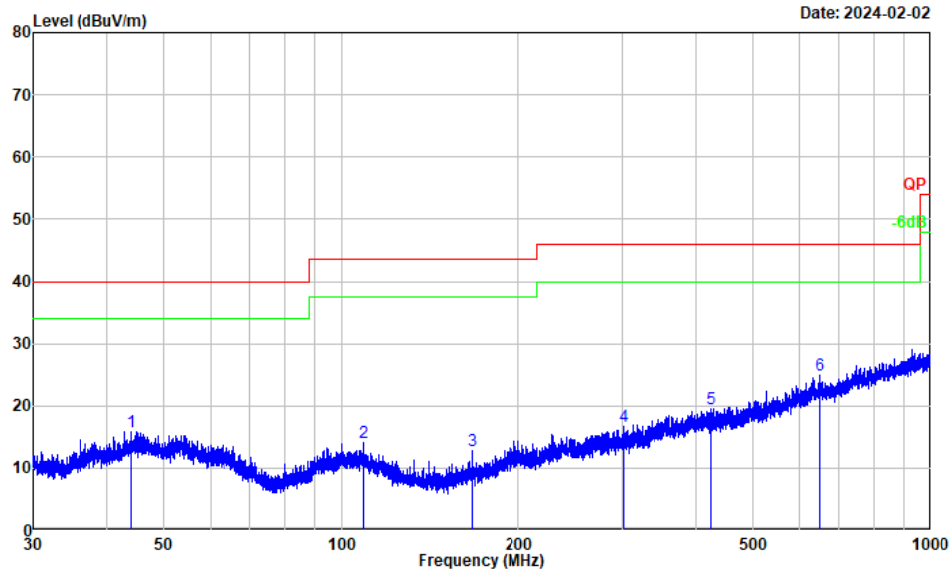
9 kHz-30MHz:

Test Date:	2024-02-02	Test By:	Luke Li
Environment condition:	Temperature: 23.6°C; Relative Humidity:64%; ATM Pressure: 101.2kPa		

For radiated emissions below 30MHz, there were no emissions found within 20dB of limit.

30MHz-1GHz:

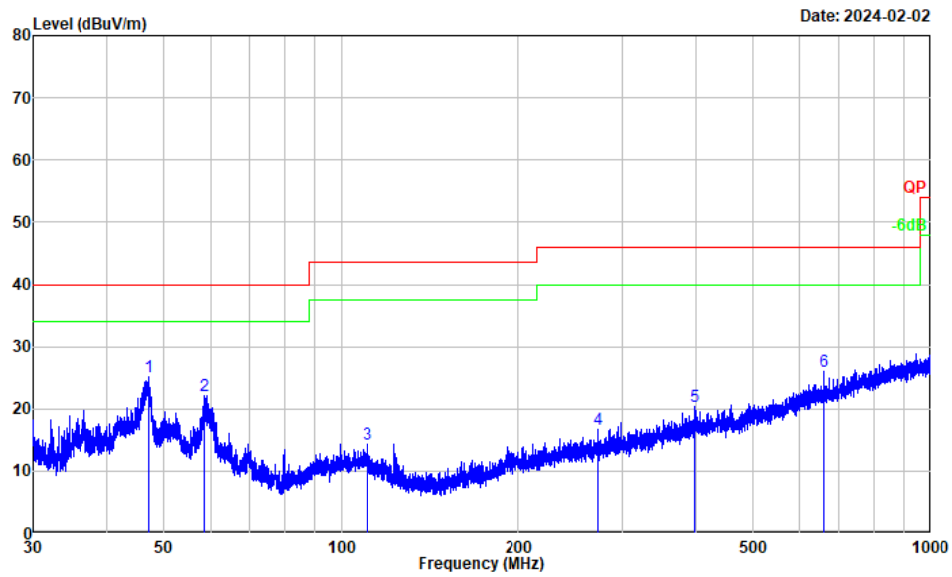
Test Date:	2024-02-02	Test By:	Luke Li
Environment condition:	Temperature: 23.6°C; Relative Humidity:64%; ATM Pressure: 101.2kPa		



Project No. :
Test Mode : Transmitting
Test Voltage : DC 48V From POE
Environment : 23.6°C/64%R.H./101.2kPa
Tested by : Luke Li
Polarization : horizontal
Remark : 802.11b Low Channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	44.062	28.10	-12.29	15.81	40.00	-24.19	Peak
2	108.885	28.20	-14.12	14.08	43.50	-29.42	Peak
3	166.725	29.30	-16.50	12.80	43.50	-30.70	Peak
4	301.026	28.07	-11.33	16.74	46.00	-29.26	Peak
5	423.726	27.86	-8.29	19.57	46.00	-26.43	Peak
6	650.229	28.97	-4.11	24.86	46.00	-21.14	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain



Project No. :
Test Mode : Transmitting
Test Voltage : DC 48V From POE
Environment : 23.6°C/64%R.H./101.2kPa
Tested by : Luke Li
Polarization : vertical
Remark : 802.11b Low Channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector

1	47.057	37.28	-12.18	25.10	40.00	-14.90	Peak
2	58.613	35.57	-13.49	22.08	40.00	-17.92	Peak
3	110.472	28.64	-14.31	14.33	43.50	-29.17	Peak
4	273.594	28.68	-11.96	16.72	46.00	-29.28	Peak
5	397.808	29.03	-8.63	20.40	46.00	-25.60	Peak
6	659.125	30.05	-4.06	25.99	46.00	-20.01	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain

Remark:

Level = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Over Limit = Level – Limit

Above 1GHz:

Test Date:	2024-01-25	Test By:	Luke Li
Environment condition:	Temperature: 22.1°C; Relative Humidity:27%; ATM Pressure: 102.3kPa		

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11b							
ANT 0							
Low Channel							
2390	50.07	Horizontal	8.25	58.32	74	-15.68	Peak
2390	41.11	Horizontal	8.25	49.36	54	-4.64	Average
2390	50.95	Vertical	8.25	59.2	74	-14.8	Peak
2390	41.9	Vertical	8.25	50.15	54	-3.85	Average
4824	48.7	Horizontal	0.26	48.96	74	-25.04	Peak
4824	36.42	Horizontal	0.26	36.68	54	-17.32	Average
4824	48.48	Vertical	0.26	48.74	74	-25.26	Peak
4824	36.07	Vertical	0.26	36.33	54	-17.67	Average
Middle Channel							
4874	48.63	Horizontal	0.41	49.04	74	-24.96	Peak
4874	36.2	Horizontal	0.41	36.61	54	-17.39	Average
4874	48.73	Vertical	0.41	49.14	74	-24.86	Peak
4874	38.08	Vertical	0.41	38.49	54	-15.51	Average
High Channel							
2483.5	48.94	Horizontal	8.25	57.19	74	-16.81	Peak
2483.5	38.94	Horizontal	8.25	47.19	54	-6.81	Average
2483.5	48.06	Vertical	8.25	56.31	74	-17.69	Peak
2483.5	38.25	Vertical	8.25	46.5	54	-7.5	Average
4924	47.82	Horizontal	0.69	48.51	74	-25.49	Peak
4924	36.26	Horizontal	0.69	36.95	54	-17.05	Average
4924	47.94	Vertical	0.69	48.63	74	-25.37	Peak
4924	36.54	Vertical	0.69	37.23	54	-16.77	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11b							
ANT 1							
Low Channel							
2390	49.34	Horizontal	8.25	57.59	74	-16.41	Peak
2390	40.18	Horizontal	8.25	48.43	54	-5.57	Average
2390	49.9	Vertical	8.25	58.15	74	-15.85	Peak
2390	41.04	Vertical	8.25	49.29	54	-4.71	Average
4824	52.31	Horizontal	0.26	52.57	74	-21.43	Peak
4824	48.48	Horizontal	0.26	48.74	54	-5.26	Average
4824	53.19	Vertical	0.26	53.45	74	-20.55	Peak
4824	49.36	Vertical	0.26	49.62	54	-4.38	Average
Middle Channel							
4874	47.6	Horizontal	0.41	48.01	74	-25.99	Peak
4874	40.35	Horizontal	0.41	40.76	54	-13.24	Average
4874	47.48	Vertical	0.41	47.89	74	-26.11	Peak
4874	40.2	Vertical	0.41	40.61	54	-13.39	Average
High Channel							
2483.5	50.12	Horizontal	8.25	58.37	74	-15.63	Peak
2483.5	40.14	Horizontal	8.25	48.39	54	-5.61	Average
2483.5	49.95	Vertical	8.25	58.2	74	-15.8	Peak
2483.5	39.6	Vertical	8.25	47.85	54	-6.15	Average
4924	47.46	Horizontal	0.69	48.15	74	-25.85	Peak
4924	40.21	Horizontal	0.69	40.9	54	-13.1	Average
4924	47.34	Vertical	0.69	48.03	74	-25.97	Peak
4924	36.05	Vertical	0.69	36.74	54	-17.26	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11g							
ANT 0							
Low Channel							
2390	59.83	Horizontal	8.25	68.08	74	-5.92	Peak
2390	41.21	Horizontal	8.25	49.46	54	-4.54	Average
2390	60.71	Vertical	8.25	68.96	74	-5.04	Peak
2390	42.03	Vertical	8.25	50.28	54	-3.72	Average
4824	47.71	Horizontal	0.26	47.97	74	-26.03	Peak
4824	36.42	Horizontal	0.26	36.68	54	-17.32	Average
4824	47.89	Vertical	0.26	48.15	74	-25.85	Peak
4824	36.27	Vertical	0.26	36.53	54	-17.47	Average
Middle Channel							
4874	48.23	Horizontal	0.41	48.64	74	-25.36	Peak
4874	36.75	Horizontal	0.41	37.16	54	-16.84	Average
4874	48.35	Vertical	0.41	48.76	74	-25.24	Peak
4874	36.58	Vertical	0.41	36.99	54	-17.01	Average
High Channel							
2483.5	51.75	Horizontal	8.25	60	74	-14	Peak
2483.5	40.18	Horizontal	8.25	48.43	54	-5.57	Average
2483.5	50.87	Vertical	8.25	59.12	74	-14.88	Peak
2483.5	38.22	Vertical	8.25	46.47	54	-7.53	Average
4924	48.72	Horizontal	0.69	49.41	74	-24.59	Peak
4924	36.24	Horizontal	0.69	36.93	54	-17.07	Average
4924	48.84	Vertical	0.69	49.53	74	-24.47	Peak
4924	36.2	Vertical	0.69	36.89	54	-17.11	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11g							
ANT 1							
Low Channel							
2390	57.96	Horizontal	8.25	66.21	74	-7.79	Peak
2390	41.01	Horizontal	8.25	49.26	54	-4.74	Average
2390	58.84	Vertical	8.25	67.09	74	-6.91	Peak
2390	41.98	Vertical	8.25	50.23	54	-3.77	Average
4824	48.6	Horizontal	0.26	48.86	74	-25.14	Peak
4824	36.67	Horizontal	0.26	36.93	54	-17.07	Average
4824	49.48	Vertical	0.26	49.74	74	-24.26	Peak
4824	36.55	Vertical	0.26	36.81	54	-17.19	Average
Middle Channel							
4874	47.31	Horizontal	0.41	47.72	74	-26.28	Peak
4874	36.9	Horizontal	0.41	37.31	54	-16.69	Average
4874	48.19	Vertical	0.41	48.6	74	-25.4	Peak
4874	36.62	Vertical	0.41	37.03	54	-16.97	Average
High Channel							
2483.5	54.11	Horizontal	8.25	62.36	74	-11.64	Peak
2483.5	39.62	Horizontal	8.25	47.87	54	-6.13	Average
2483.5	53.52	Vertical	8.25	61.77	74	-12.23	Peak
2483.5	40.56	Vertical	8.25	48.81	54	-5.19	Average
4924	47.41	Horizontal	0.69	48.1	74	-25.9	Peak
4924	36.02	Horizontal	0.69	36.71	54	-17.29	Average
4924	47.88	Vertical	0.69	48.57	74	-25.43	Peak
4924	36.85	Vertical	0.69	37.54	54	-16.46	Average

For the 802.11n20/n40/ax20/ax40 mode, two antennas transmit simultaneously were the worst case.

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11n20							
Low Channel							
2390	55.19	Horizontal	8.25	63.44	74	-10.56	Peak
2390	41.46	Horizontal	8.25	49.71	54	-4.29	Average
2390	56.07	Vertical	8.25	64.32	74	-9.68	Peak
2390	42.25	Vertical	8.25	50.5	54	-3.5	Average
4824	47.59	Horizontal	0.26	47.85	74	-26.15	Peak
4824	36.06	Horizontal	0.26	36.32	54	-17.68	Average
4824	48.47	Vertical	0.26	48.73	74	-25.27	Peak
4824	36.87	Vertical	0.26	37.13	54	-16.87	Average
Middle Channel							
4874	48.15	Horizontal	0.41	48.56	74	-25.44	Peak
4874	36.52	Horizontal	0.41	36.93	54	-17.07	Average
4874	47.58	Vertical	0.41	47.99	74	-26.01	Peak
4874	36.32	Vertical	0.41	36.73	54	-17.27	Average
High Channel							
2483.5	52.06	Horizontal	8.25	60.31	74	-13.69	Peak
2483.5	39.09	Horizontal	8.25	47.34	54	-6.66	Average
2483.5	51.74	Vertical	8.25	59.99	74	-14.01	Peak
2483.5	39.91	Vertical	8.25	48.16	54	-5.84	Average
4924	48.64	Horizontal	0.69	49.33	74	-24.67	Peak
4924	36.01	Horizontal	0.69	36.7	54	-17.3	Average
4924	48.52	Vertical	0.69	49.21	74	-24.79	Peak
4924	36.85	Vertical	0.69	37.54	54	-16.46	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11n40							
Low Channel							
2390	53.01	Horizontal	8.25	61.26	74	-12.74	Peak
2390	39.92	Horizontal	8.25	48.17	54	-5.83	Average
2390	53.88	Vertical	8.25	62.13	74	-11.87	Peak
2390	41.72	Vertical	8.25	49.97	54	-4.03	Average
4844	47.62	Horizontal	0.3	47.92	74	-26.08	Peak
4844	36.68	Horizontal	0.3	36.98	54	-17.02	Average
4844	47.88	Vertical	0.3	48.18	74	-25.82	Peak
4844	36.48	Vertical	0.3	36.78	54	-17.22	Average
Middle Channel							
4874	48.98	Horizontal	0.41	49.39	74	-24.61	Peak
4874	36.27	Horizontal	0.41	36.68	54	-17.32	Average
4874	47.86	Vertical	0.41	48.27	74	-25.73	Peak
4874	36.11	Vertical	0.41	36.52	54	-17.48	Average
High Channel							
2483.5	54.7	Horizontal	8.25	62.95	74	-11.05	Peak
2483.5	39.68	Horizontal	8.25	47.93	54	-6.07	Average
2483.5	55.58	Vertical	8.25	63.83	74	-10.17	Peak
2483.5	40.52	Vertical	8.25	48.77	54	-5.23	Average
4904	47.62	Horizontal	0.55	48.17	74	-25.83	Peak
4904	36.31	Horizontal	0.55	36.86	54	-17.14	Average
4904	47.5	Vertical	0.55	48.05	74	-25.95	Peak
4904	36.76	Vertical	0.55	37.31	54	-16.69	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11ax20							
Low Channel							
2390	58.16	Horizontal	8.25	66.41	74	-7.59	Peak
2390	41.56	Horizontal	8.25	49.81	54	-4.19	Average
2390	59.04	Vertical	8.25	67.29	74	-6.71	Peak
2390	42.35	Vertical	8.25	50.6	54	-3.4	Average
4824	48.63	Horizontal	0.26	48.89	74	-25.11	Peak
4824	36.58	Horizontal	0.26	36.84	54	-17.16	Average
4824	49.51	Vertical	0.26	49.77	74	-24.23	Peak
4824	36.42	Vertical	0.26	36.68	54	-17.32	Average
Middle Channel							
4874	46.89	Horizontal	0.41	47.3	74	-26.7	Peak
4874	36.51	Horizontal	0.41	36.92	54	-17.08	Average
4874	47.77	Vertical	0.41	48.18	74	-25.82	Peak
4874	36.32	Vertical	0.41	36.73	54	-17.27	Average
High Channel							
2483.5	54.57	Horizontal	8.25	62.82	74	-11.18	Peak
2483.5	40.76	Horizontal	8.25	49.01	54	-4.99	Average
2483.5	51.45	Vertical	8.25	59.7	74	-14.3	Peak
2483.5	38.62	Vertical	8.25	46.87	54	-7.13	Average
4924	47.38	Horizontal	0.69	48.07	74	-25.93	Peak
4924	36.82	Horizontal	0.69	37.51	54	-16.49	Average
4924	47.26	Vertical	0.69	47.95	74	-26.05	Peak
4924	36.83	Vertical	0.69	37.52	54	-16.48	Average

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11ax40							
Low Channel							
2390	54.63	Horizontal	8.25	62.88	74	-11.12	Peak
2390	41.2	Horizontal	8.25	49.45	54	-4.55	Average
2390	55.51	Vertical	8.25	63.76	74	-10.24	Peak
2390	42.03	Vertical	8.25	50.28	54	-3.72	Average
4844	47.84	Horizontal	0.3	48.14	74	-25.86	Peak
4844	36.42	Horizontal	0.3	36.72	54	-17.28	Average
4844	47.72	Vertical	0.3	48.02	74	-25.98	Peak
4844	36.75	Vertical	0.3	37.05	54	-16.95	Average
Middle Channel							
4874	48.53	Horizontal	0.41	48.94	74	-25.06	Peak
4874	36.15	Horizontal	0.41	36.56	54	-17.44	Average
4874	47.41	Vertical	0.41	47.82	74	-26.18	Peak
4874	36.28	Vertical	0.41	36.69	54	-17.31	Average
High Channel							
2483.5	58.18	Horizontal	8.25	66.43	74	-7.57	Peak
2483.5	39.97	Horizontal	8.25	48.22	54	-5.78	Average
2483.5	59.06	Vertical	8.25	67.31	74	-6.69	Peak
2483.5	39.01	Vertical	8.25	47.26	54	-6.74	Average
4904	48.26	Horizontal	0.55	48.81	74	-25.19	Peak
4904	36.88	Horizontal	0.55	37.43	54	-16.57	Average
4904	47.14	Vertical	0.55	47.69	74	-26.31	Peak
4904	36.69	Vertical	0.55	37.24	54	-16.76	Average

Remark:

Corrected Amplitude= Reading level + corrected Factor

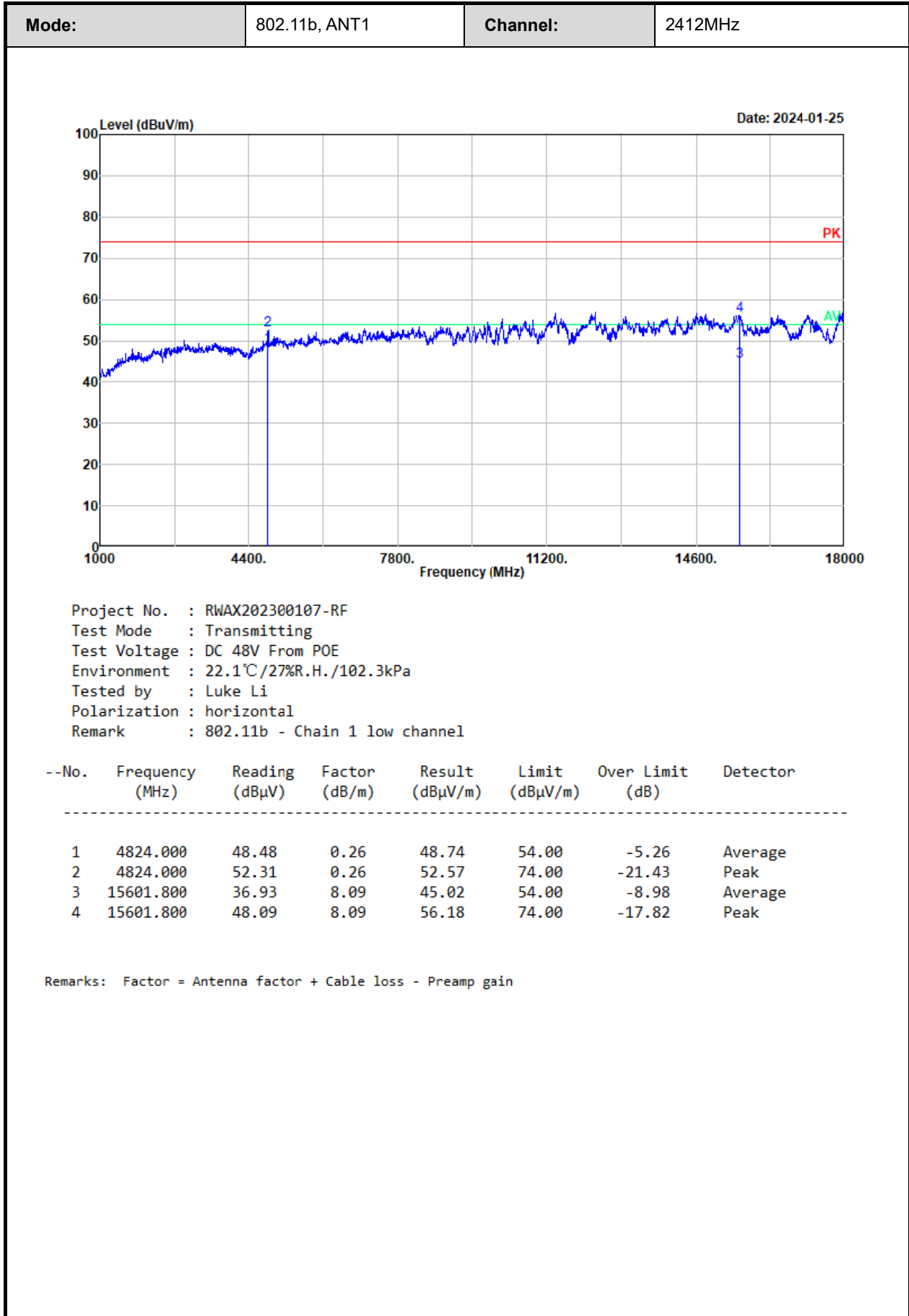
Corrected Factor = Antenna factor + Cable loss – Amplifier gain

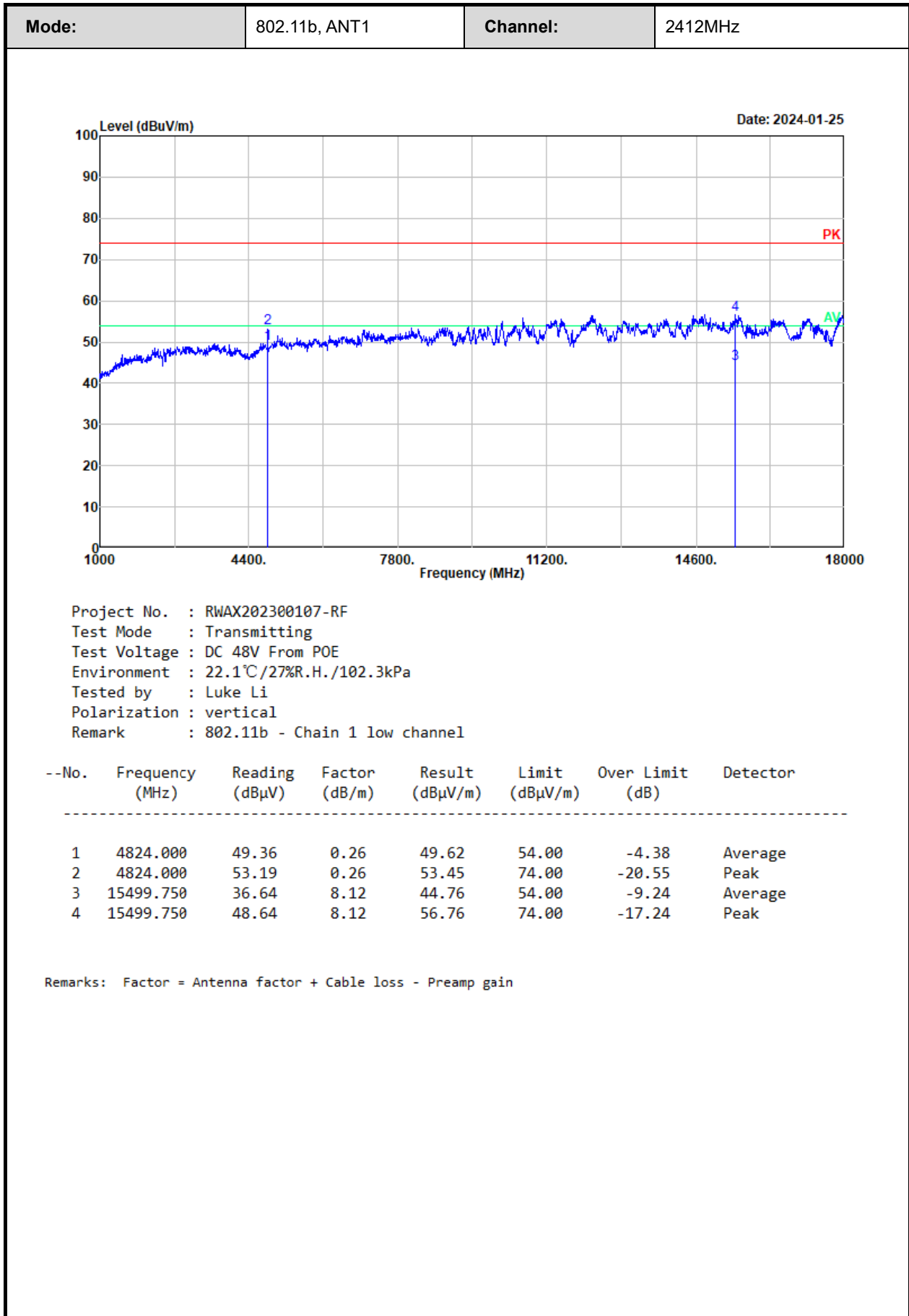
Margin = Corrected Amplitude – Limit

The emission levels of other frequencies that were lower than the limit 20dB not show in test report.

For emissions in 18GHz-25GHz range, all emissions were investigated and in the noise floor level.

Test plot for example as below:





3.5 RF Conducted Test Data

Test Date:	2023-11-10~2023-12-22	Test By:	Ryan Zhang
Environment condition:	Temperature:23.9~24.5°C; Relative Humidity:55~68%; ATM Pressure: 99~102.1kPa		

3.5.1 6 dB Emission Bandwidth and 99% Occupied Bandwidth

Test Mode	Antenna	Channel	6dB BW [MHz]	99% OBW[MHz]	6dB BW Limit[MHz]	Verdict
11B	Ant1	2412	9.12	13.67	0.5	pass
		2437	8.10	13.19	0.5	pass
		2462	8.16	13.39	0.5	pass
11G	Ant1	2412	16.38	16.46	0.5	pass
		2437	16.38	16.42	0.5	pass
		2462	16.38	16.46	0.5	pass
802.11n ht20	Ant1	2412	17.34	17.54	0.5	pass
		2437	17.58	17.58	0.5	pass
		2462	17.37	17.54	0.5	pass
802.11n ht40	Ant1	2422	35.94	36.04	0.5	pass
		2437	36.00	36.04	0.5	pass
		2452	35.88	36.04	0.5	pass
802.11ax hew20	Ant1	2412	18.96	18.90	0.5	pass
		2437	18.96	18.90	0.5	pass
		2462	18.96	18.90	0.5	pass
802.11 ax hew40	Ant1	2422	37.98	37.64	0.5	pass
		2437	37.98	37.64	0.5	pass
		2452	38.04	37.64	0.5	pass

Note: test only performed on antenna 1.

3.5.2 Maximum Conducted Peak Output Power

Test Mode	Channel	Maximum Peak Conducted Output Power [dBm]			Limit [dBm]	Verdict
		ANT0	ANT1	Total		
802.11b	2412	24.52	23.03	/	30	Pass
	2437	24.46	22.91	/	30	Pass
	2462	24.62	23.78	/	30	Pass
802.11g	2412	27.10	25.65	/	30	Pass
	2437	26.96	25.63	/	30	Pass
	2462	26.58	25.66	/	30	Pass
802.11n ht20	2412	25.88	24.72	28.35	30	Pass
	2437	25.75	24.64	28.24	30	Pass
	2462	25.7	24.5	28.15	30	Pass
802.11n ht40	2422	25.82	24.26	28.12	30	Pass
	2437	25.84	24.28	28.14	30	Pass
	2452	25.12	24.08	27.64	30	Pass
802.11ax hew20	2412	26.21	24.78	28.56	30	Pass
	2437	25.48	24.44	28.00	30	Pass
	2462	25.95	24.37	28.24	30	Pass
802.11 ax hew40	2422	25.89	24.49	28.26	30	Pass
	2437	25.74	24.86	28.33	30	Pass
	2452	26.3	24.43	28.48	30	Pass

Note: The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4
So, Directional gain = 2.5dBi+0= 2.5 < 6dBi.

3.5.3 Power Spectral Density

Test Mode	Channel	Result[dBm/3kHz]			Limit [dBm/3kHz]	Verdict
		ANT0	ANT1	Total		
802.11b	2412	-1.96	-2.47	/	8	Pass
	2437	-2.76	-3.13	/	8	Pass
	2462	-3.00	-2.38	/	8	Pass
802.11g	2412	-6.22	-7.45	/	8	Pass
	2437	-6.40	-7.30	/	8	Pass
	2462	-6.73	-7.43	/	8	Pass
802.11n ht20	2412	-7.46	-8.85	-5.09	8	Pass
	2437	-7.11	-8.46	-4.72	8	Pass
	2462	-8.13	-9.33	-5.68	8	Pass
802.11n ht40	2422	-12.36	-12.52	-9.43	8	Pass
	2437	-11.30	-12.64	-8.91	8	Pass
	2452	-11.05	-12.24	-8.59	8	Pass
802.11ax hew20	2412	-10.54	-11.70	-8.07	8	Pass
	2437	-10.89	-12.39	-8.57	8	Pass
	2462	-11.24	-11.81	-8.51	8	Pass
802.11 ax hew40	2422	-13.18	-14.05	-10.58	8	Pass
	2437	-12.88	-13.78	-10.30	8	Pass
	2452	-13.18	-14.03	-10.57	8	Pass

Note:

The maximum Power Spectral Density was calculated the result of the maximum chain for SISO mode, and Total chains for MIMO mode.

The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

$$\text{Array Gain} = 10 \log(N_{\text{ANT}}/N_{\text{SS}}) \text{ dB} = 10 \cdot \log(2/1) = 3$$

So, Directional gain = 2.5dBi+3= 5.5dBi < 6dBi.

3.5.4 100 kHz Bandwidth of Frequency Band Edge

Test Mode	Channel	Result	Limit	Verdict
802.11b	2412	Refer test plot	Refer test plot	Pass
	2462	Refer test plot	Refer test plot	Pass
802.11g	2412	Refer test plot	Refer test plot	Pass
	2462	Refer test plot	Refer test plot	Pass
802.11n20	2412	Refer test plot	Refer test plot	Pass
	2462	Refer test plot	Refer test plot	Pass
802.11n40	2422	Refer test plot	Refer test plot	Pass
	2452	Refer test plot	Refer test plot	Pass

3.5.5 Duty Cycle

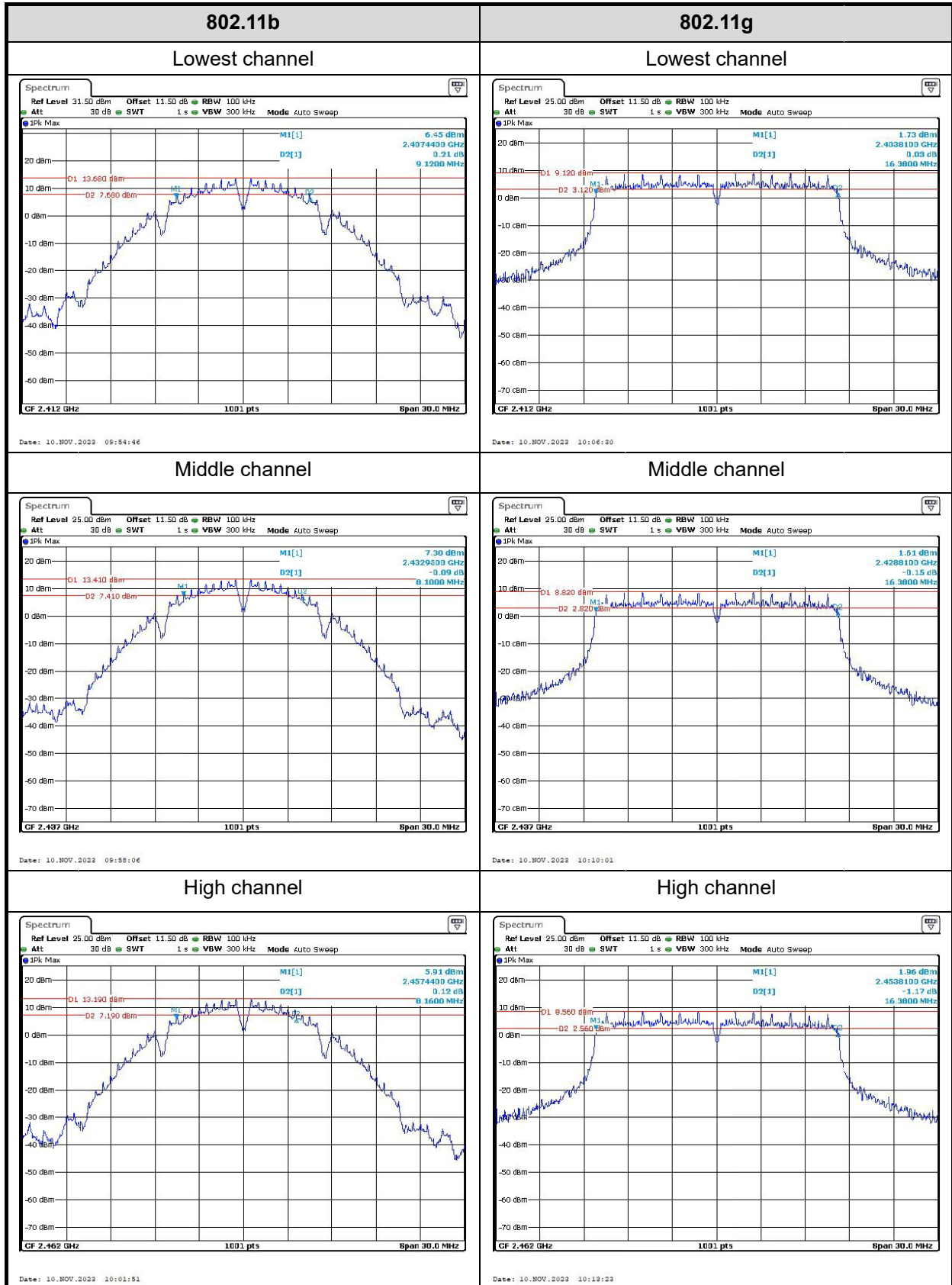
Test Mode	Antenna	Channel	Ton (ms)	Ton+off (ms)	Duty Cycle [%]	1/T	VBW setting* [Hz]
11B	Ant1	2412	0.664	0.683	97.22	1506	2000
11G	Ant1	2412	1.975	1.995	99.00	/	10
11N20	Ant1	2412	5.43	5.448	99.67	/	10
11N40	Ant1	2422	5.428	5.445	99.69	/	10
11AX20	Ant1	2412	5.445	5.464	99.65	/	10
11AX40	Ant1	2422	5.445	5.464	99.65	/	10

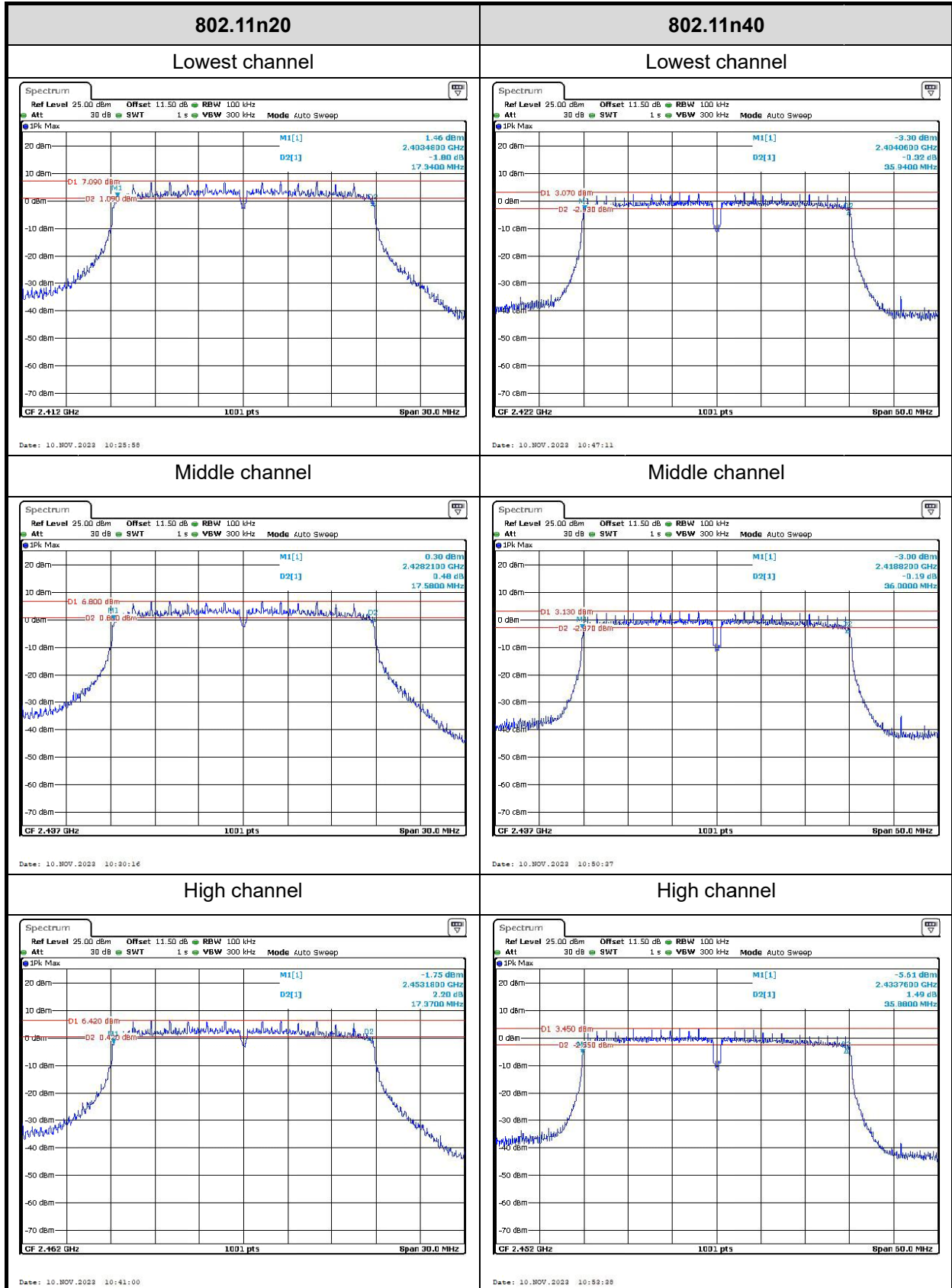
Note: test only performed on antenna 1.

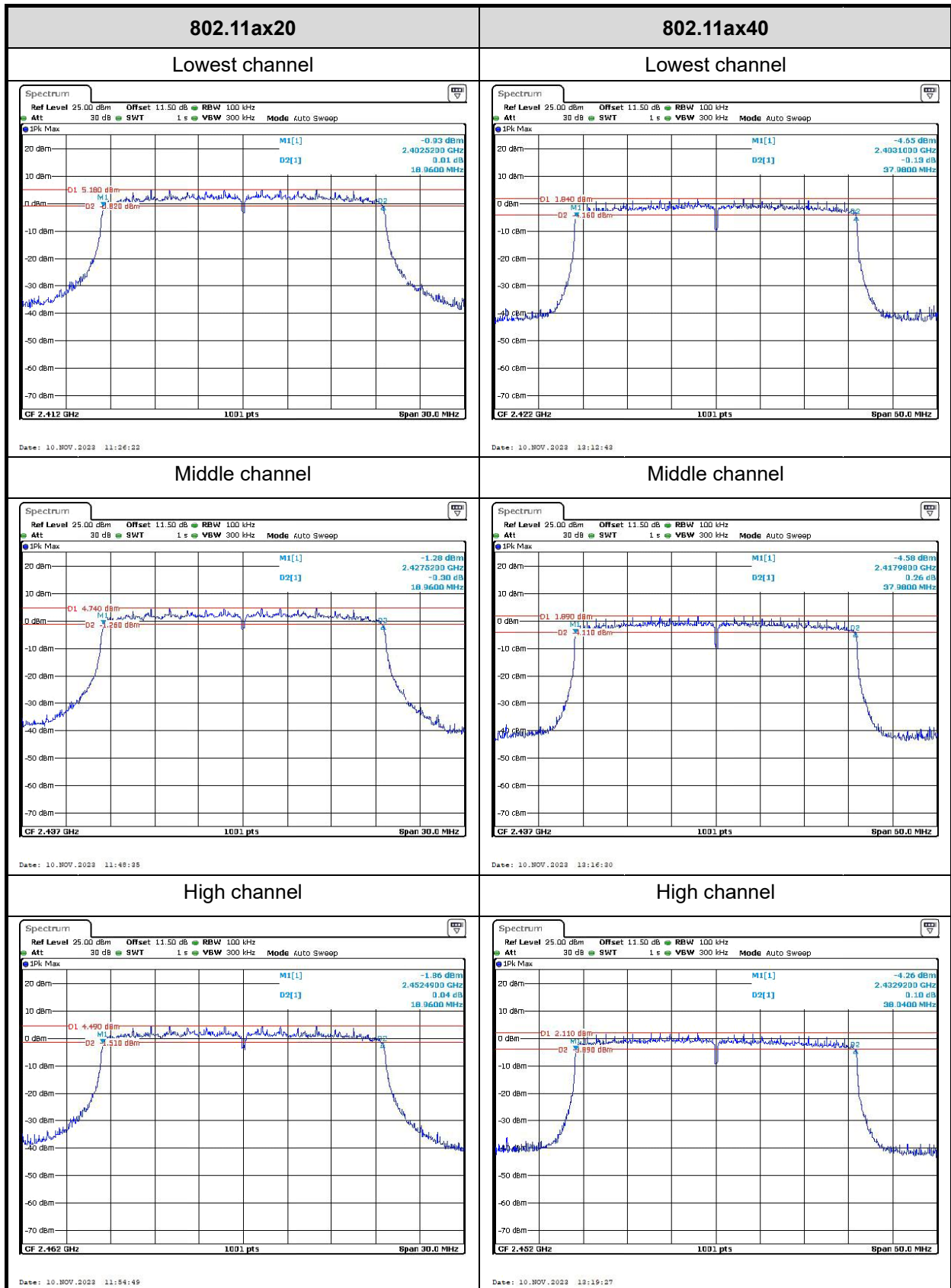
Note*: Radiated emission test with average value, the Spectrum analyzer VBW setting information.

Test Plots:

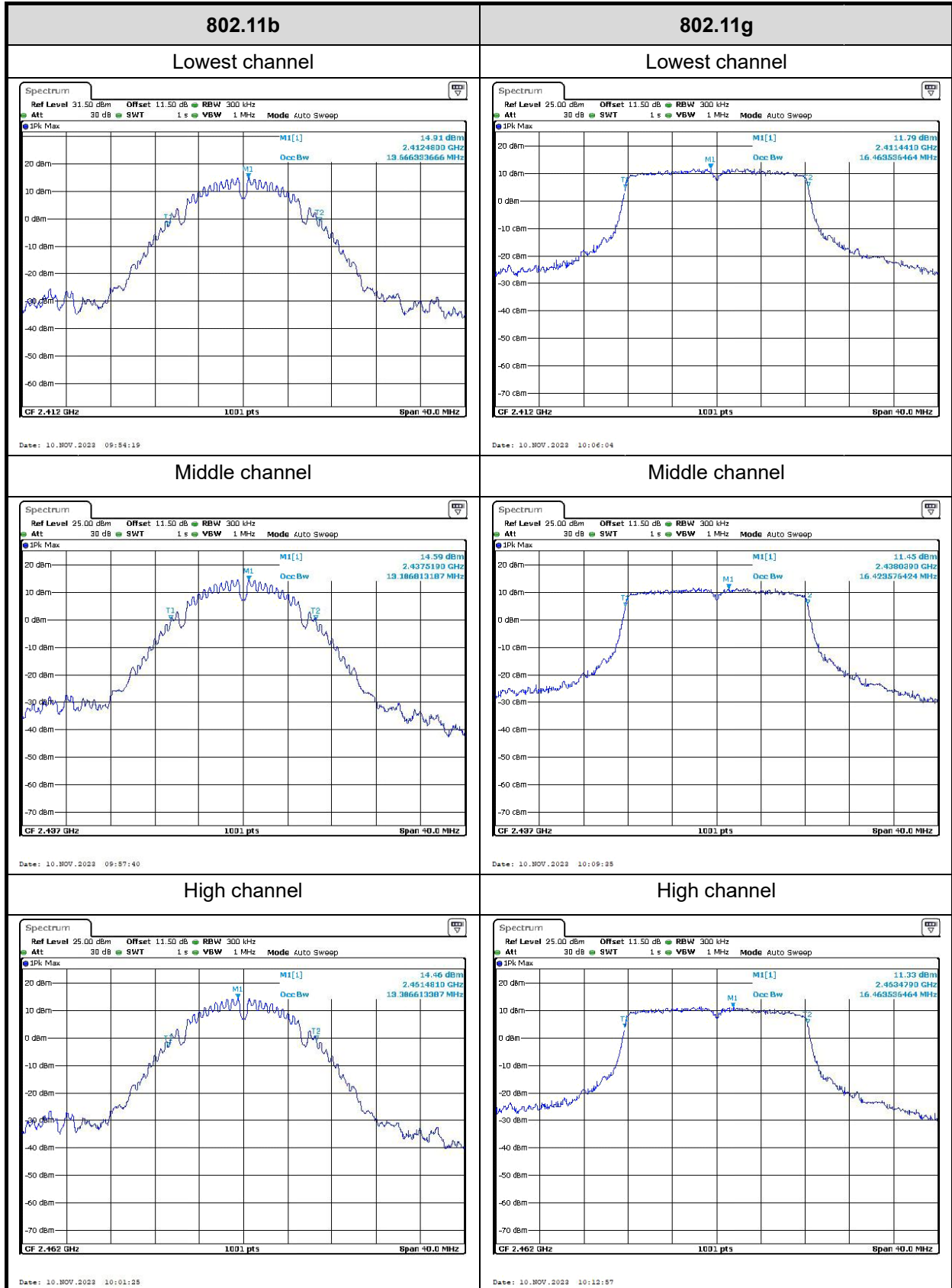
6 dB Emission Bandwidth:

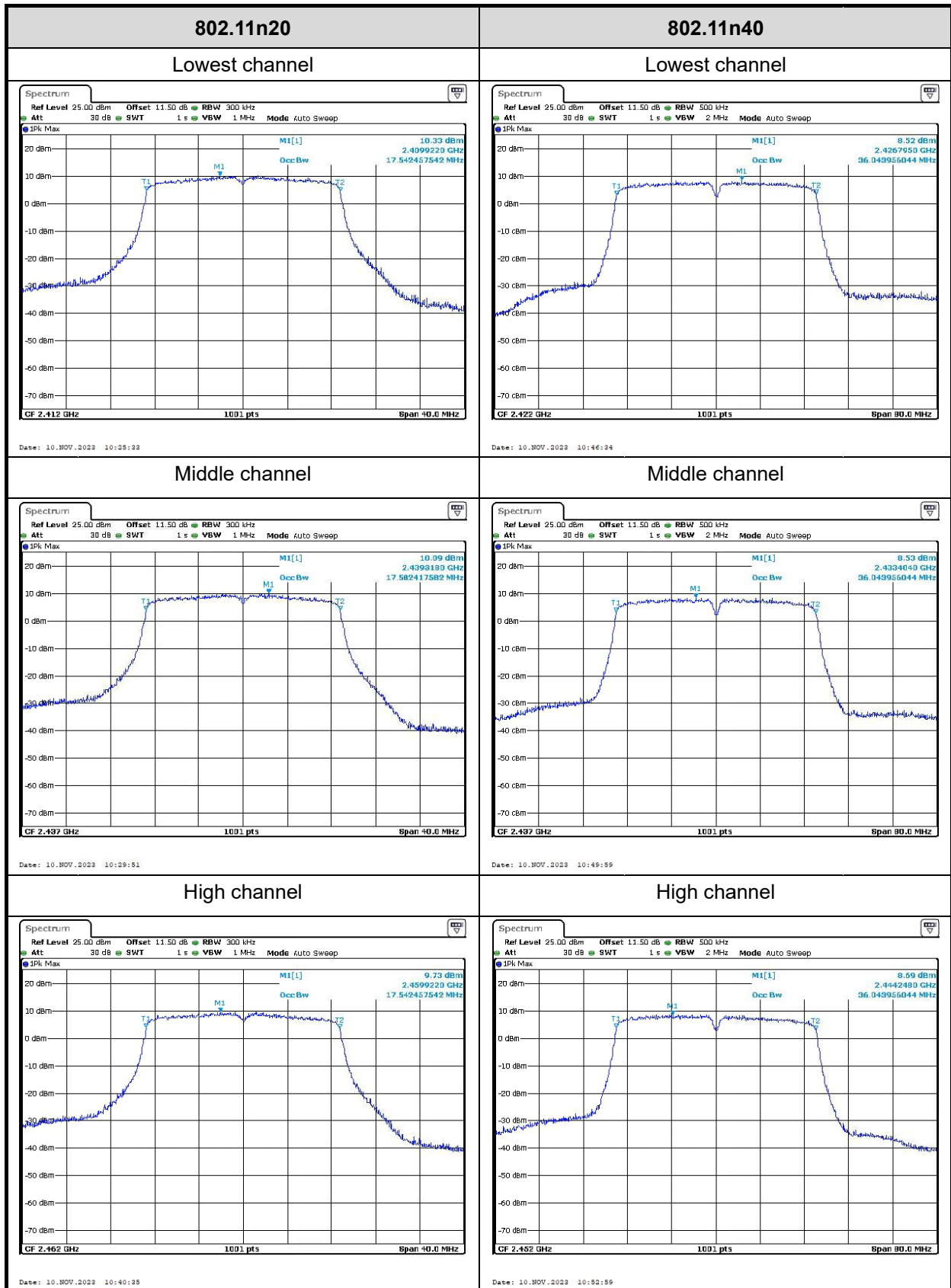


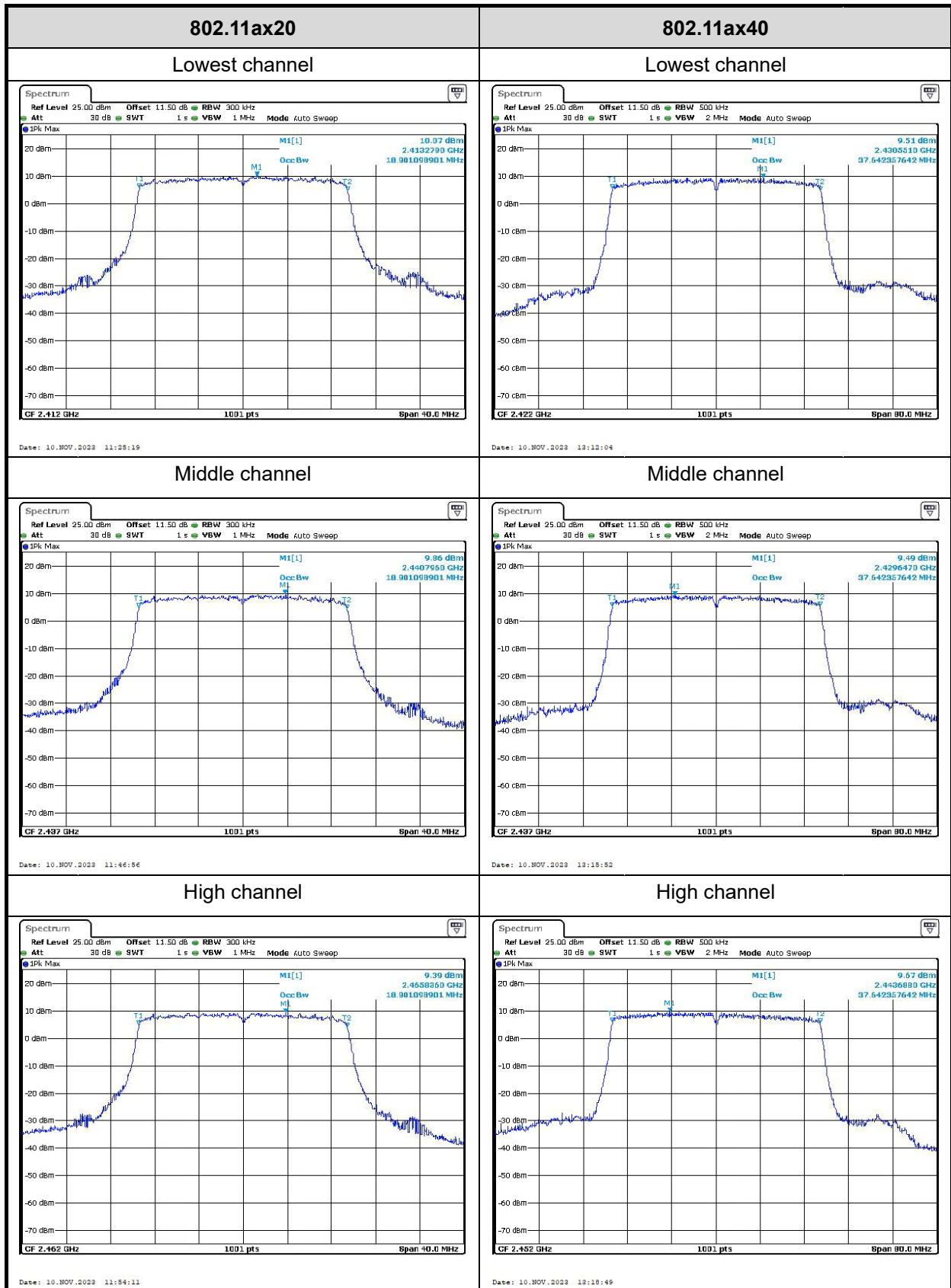




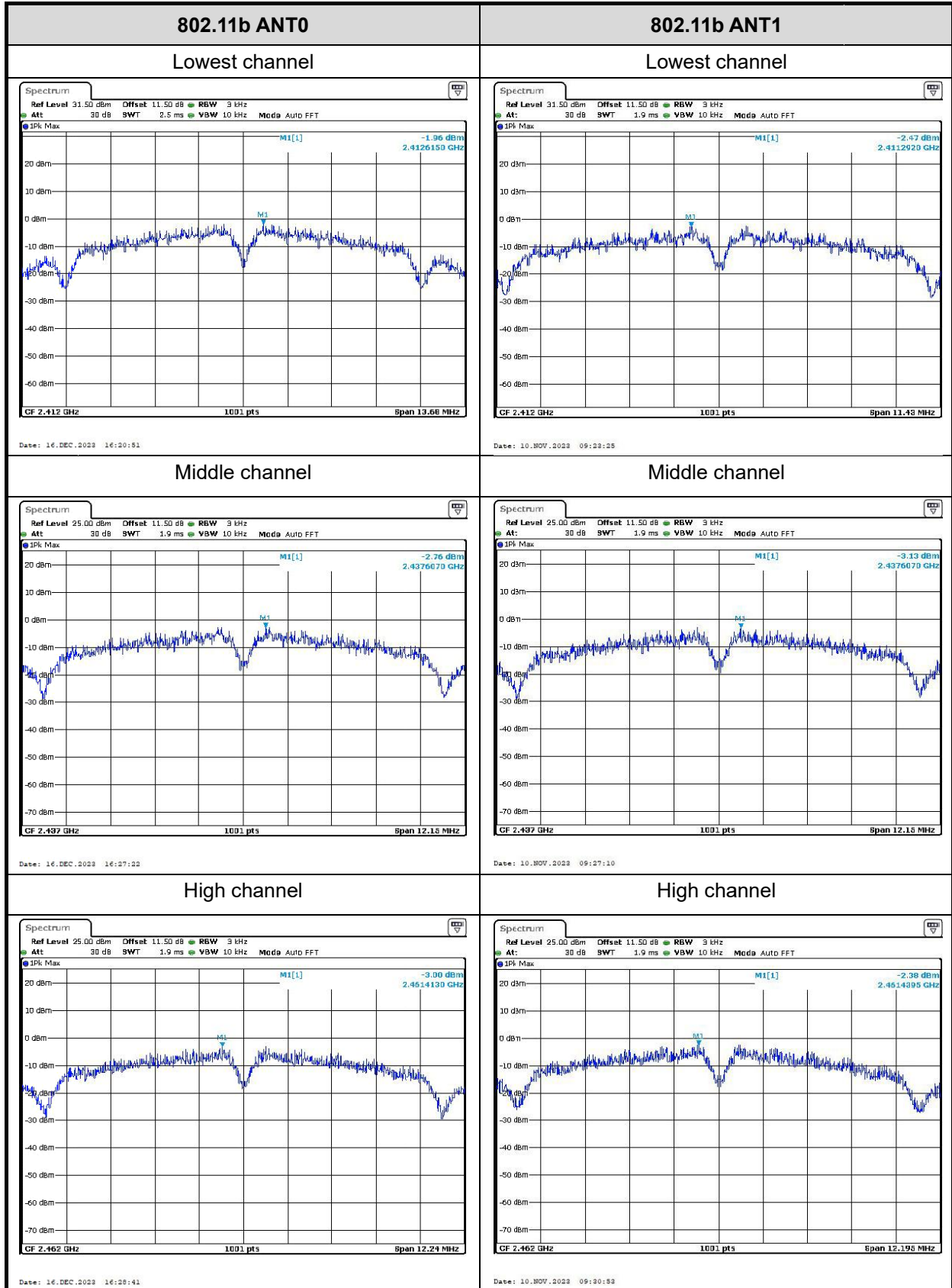
99% Occupied Bandwidth:

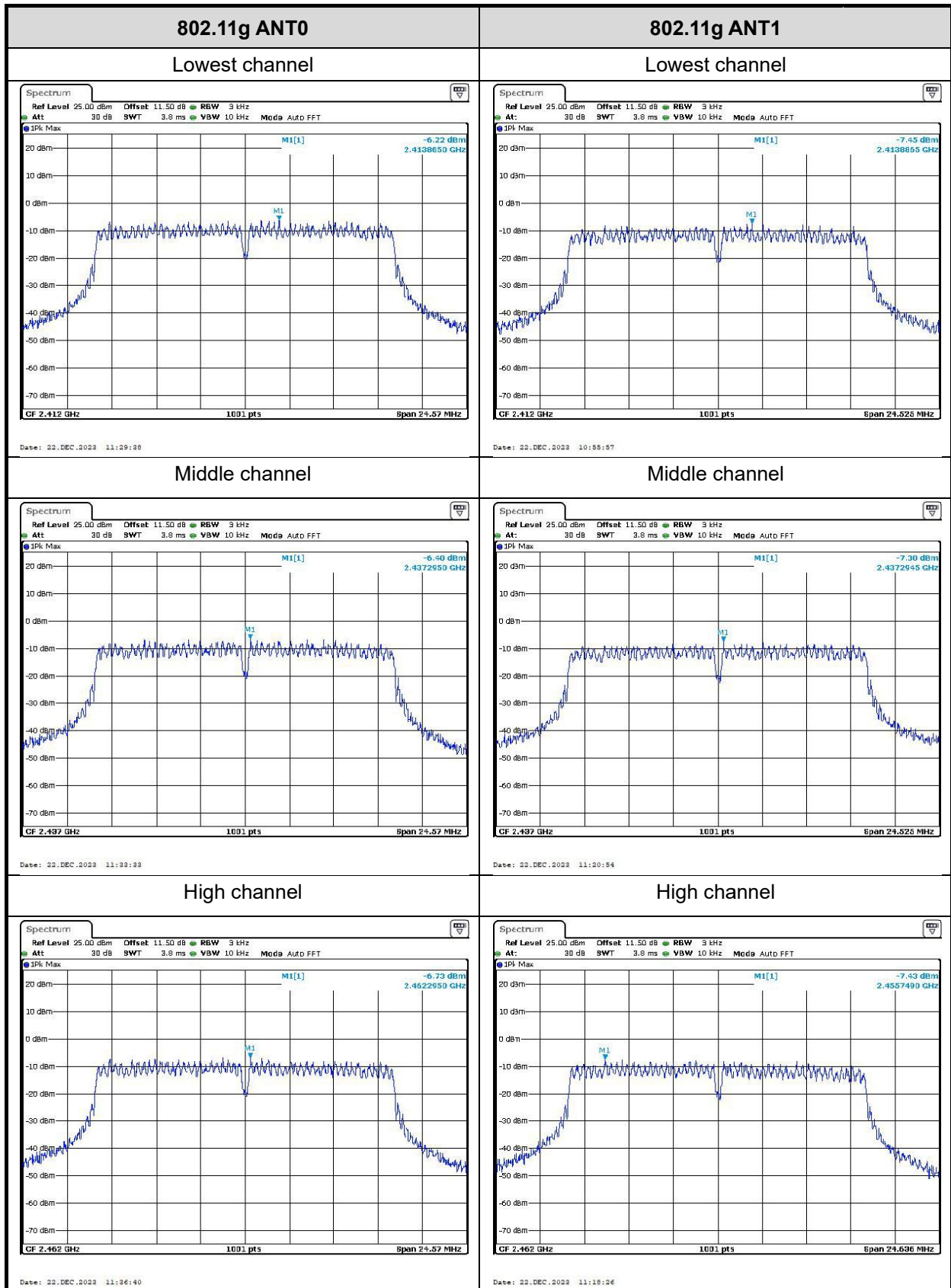


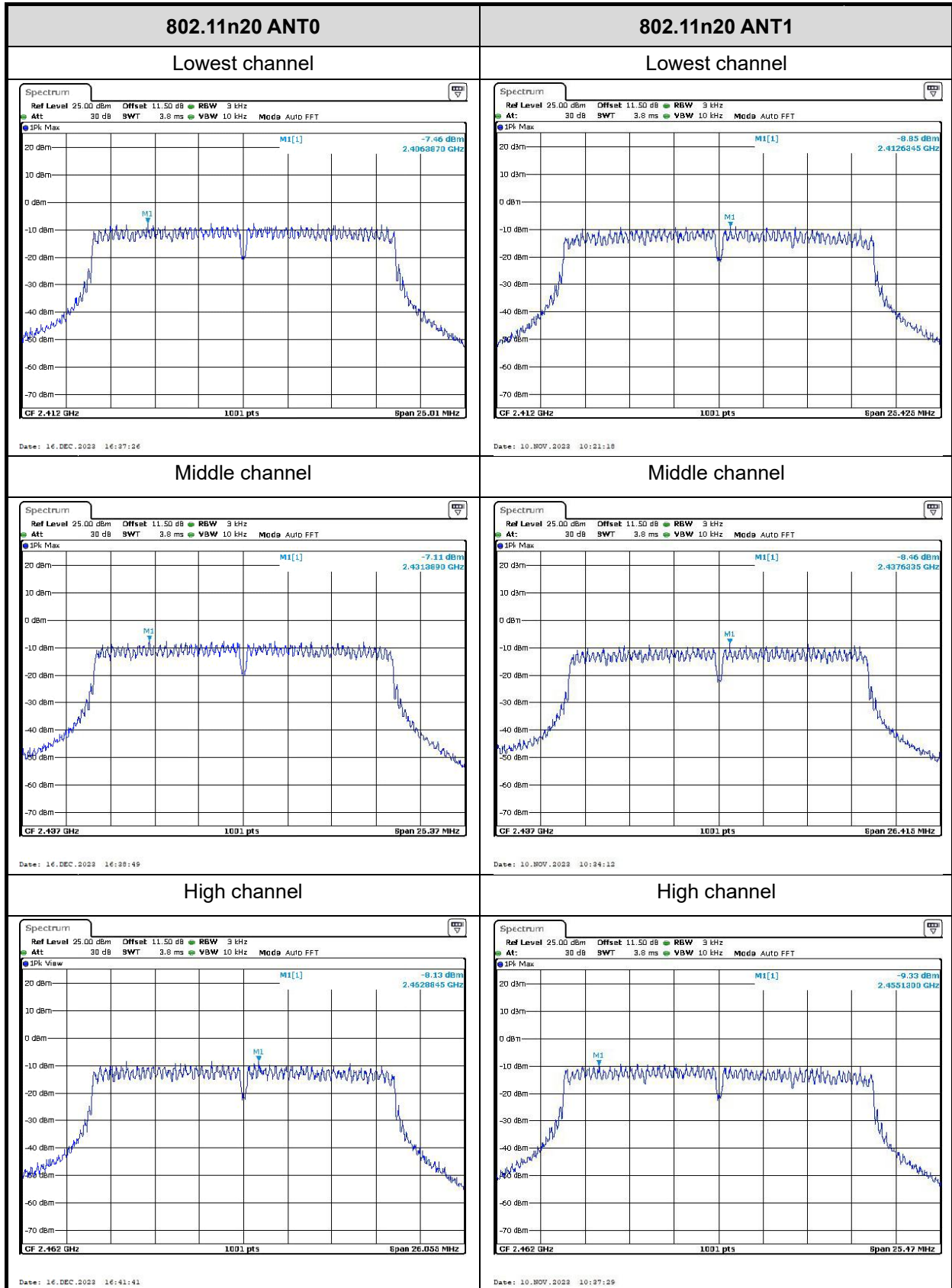


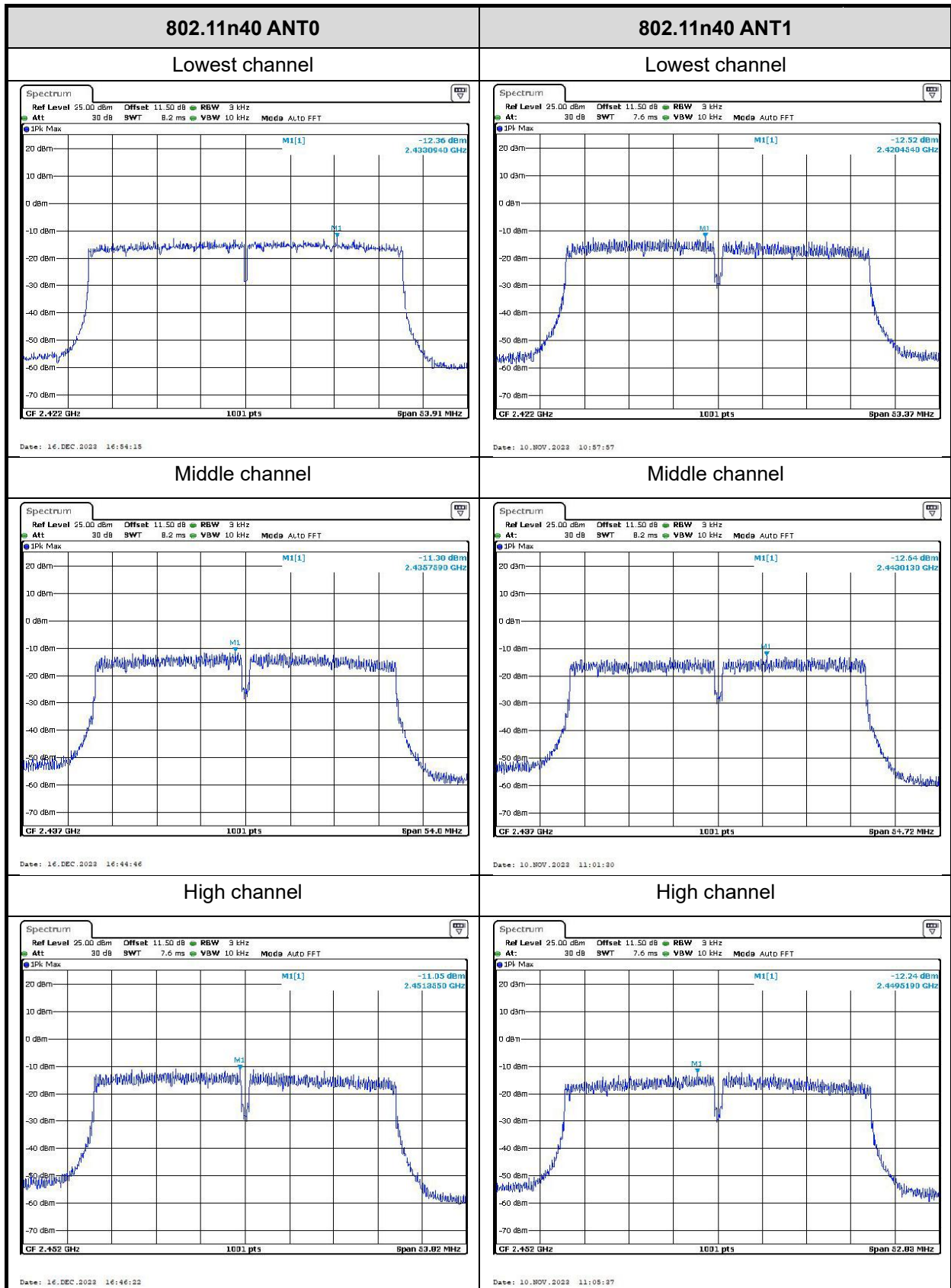


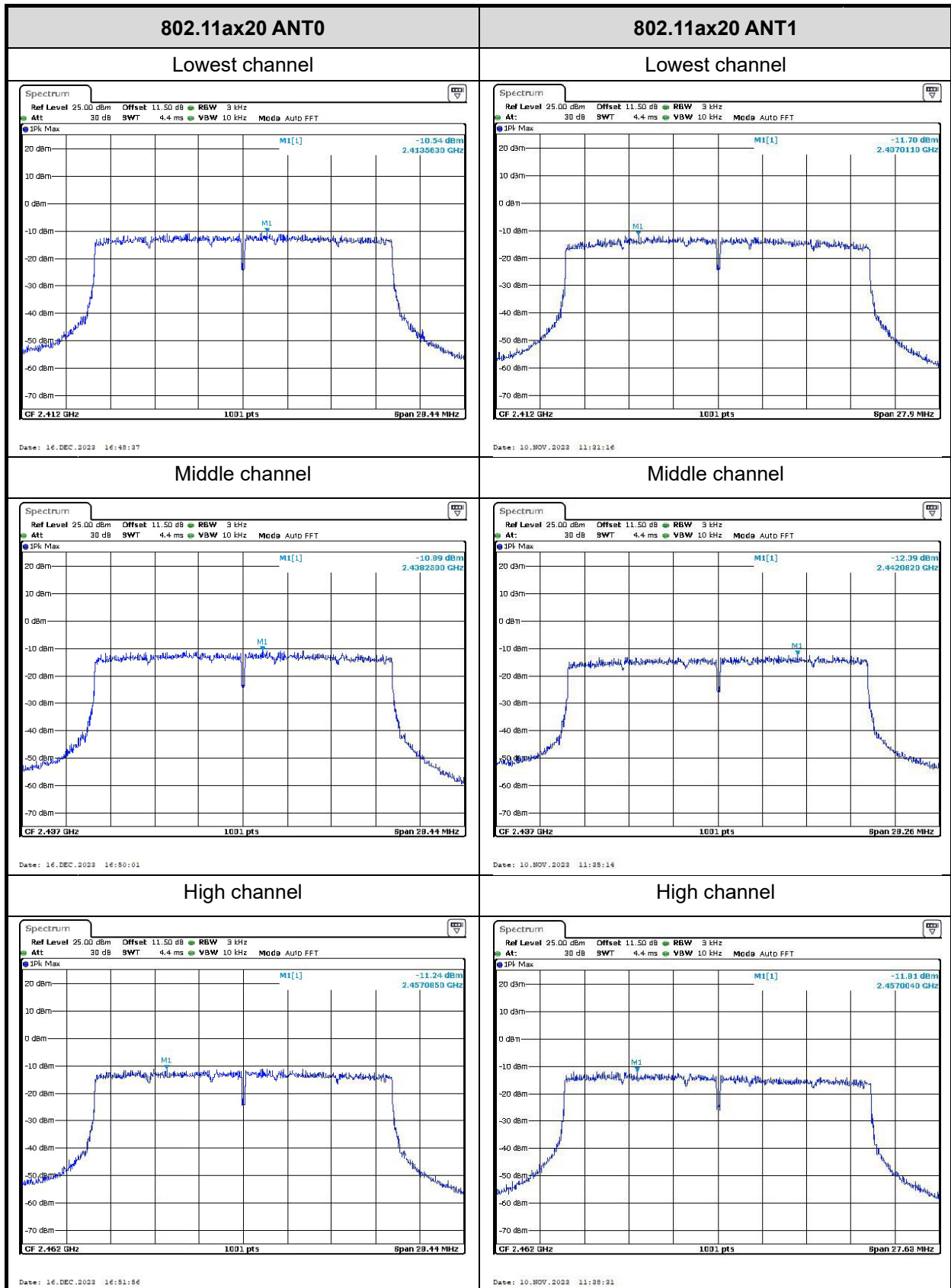
Power Spectral Density:

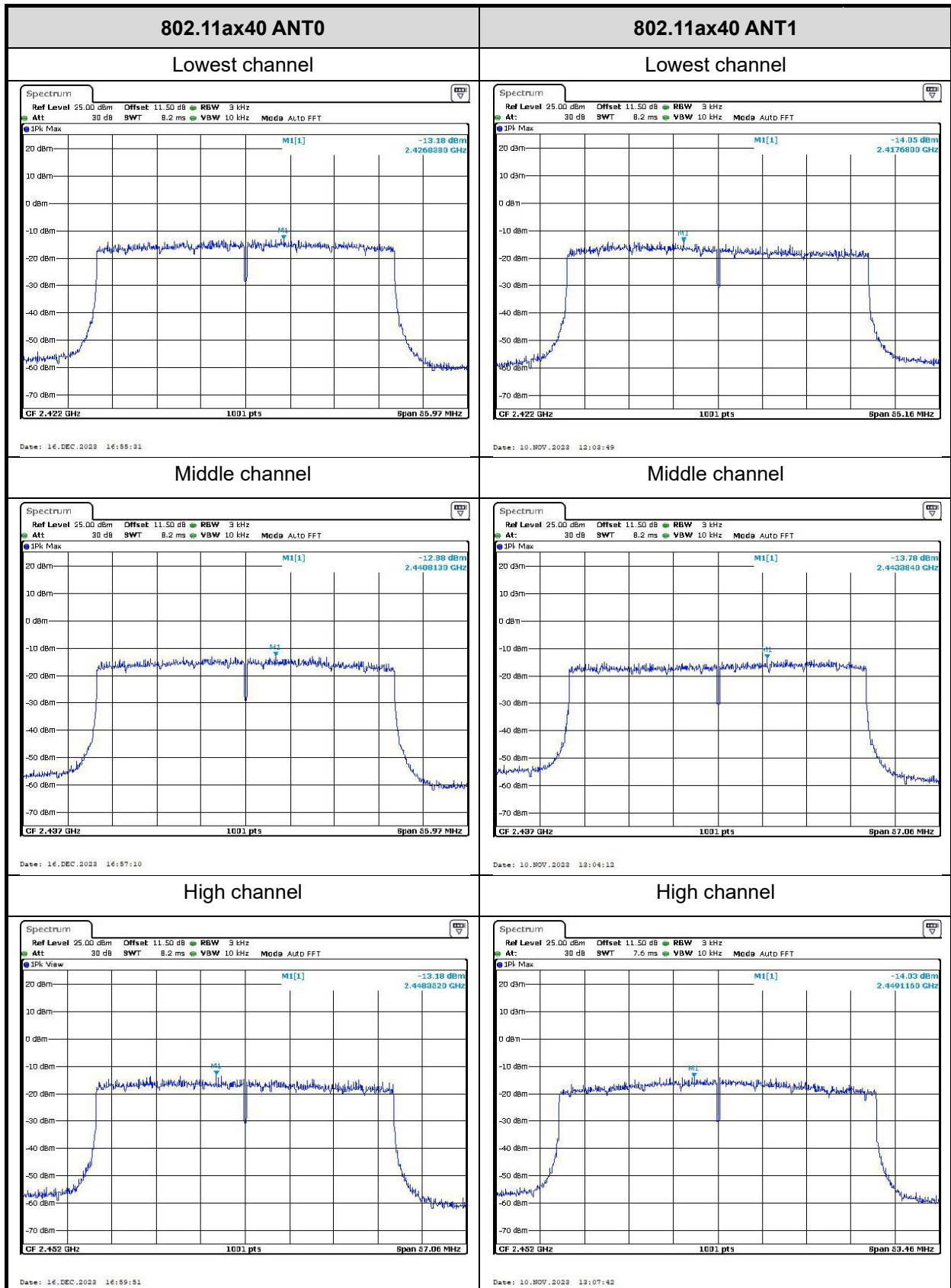








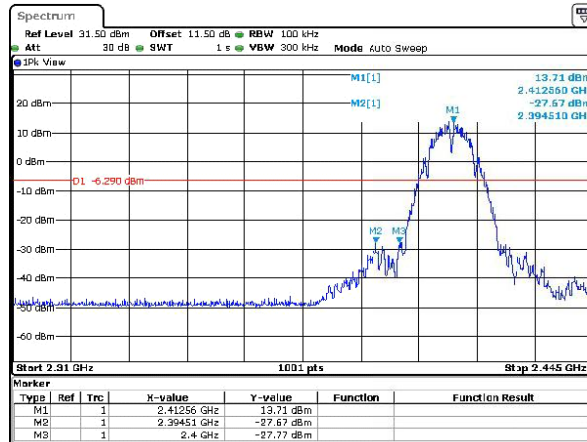




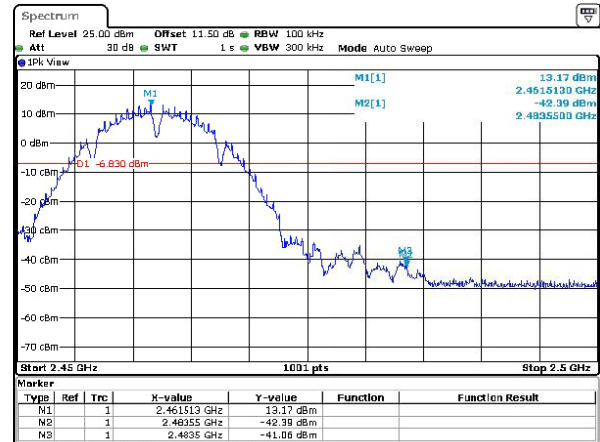
100kHz Bandwidth of Frequency Band Edge:

802.11b ANT0

Lowest channel

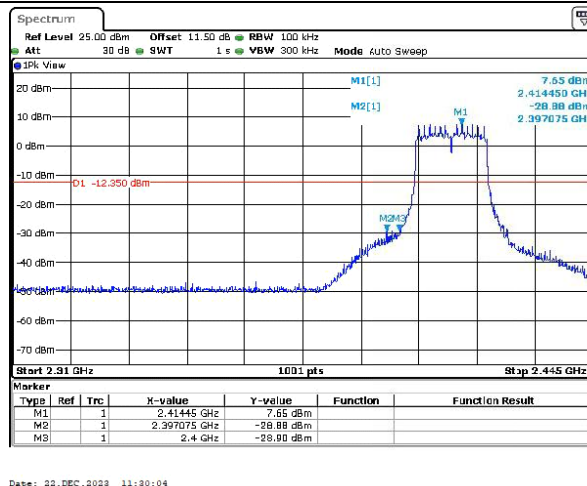


High channel

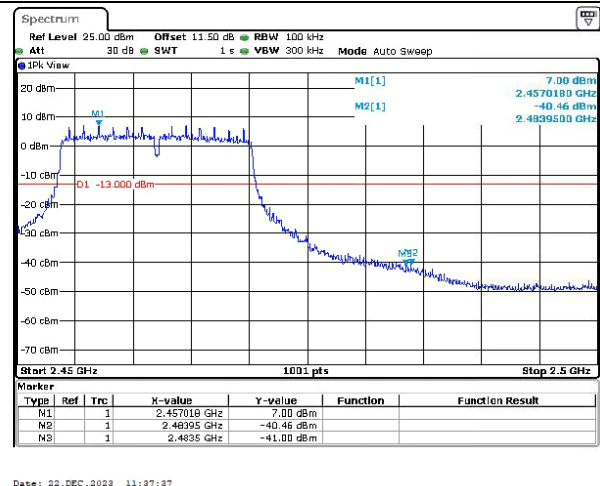


802.11g ANT0

Lowest channel

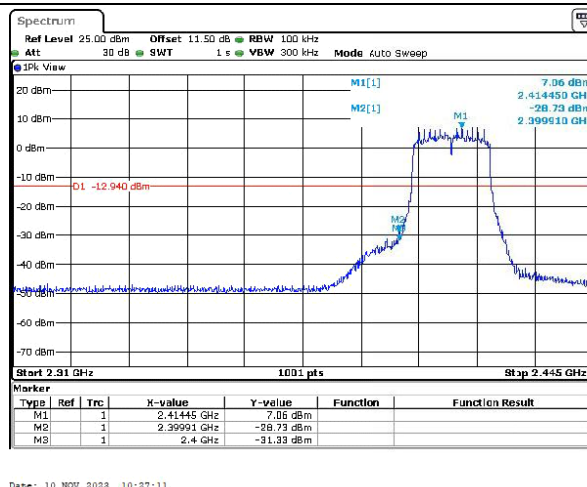


High channel

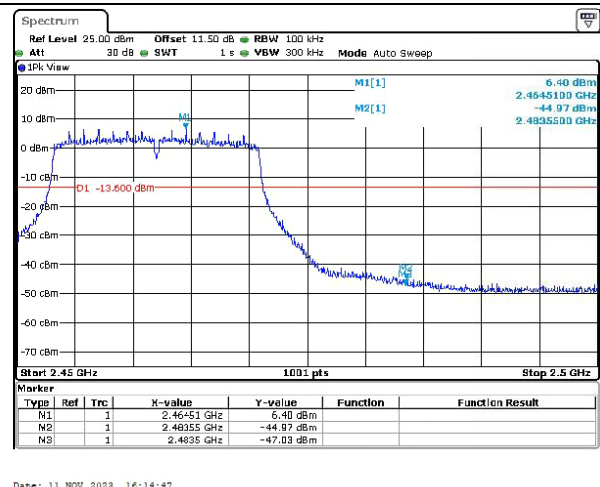


802.11n20 ANT0

Lowest channel

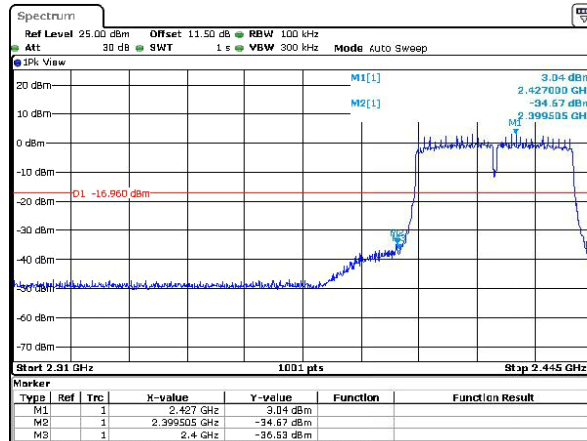


High channel

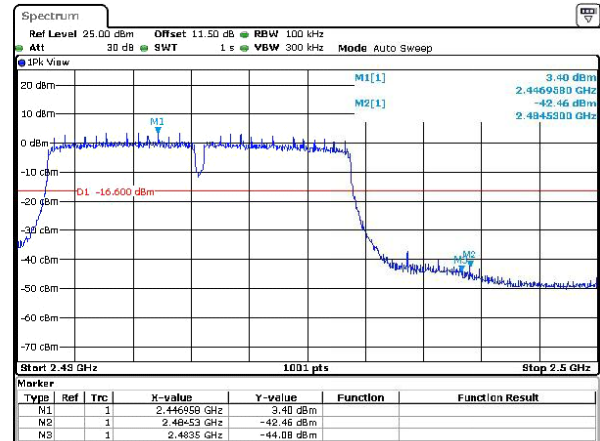


802.11n40 ANT0

Lowest channel

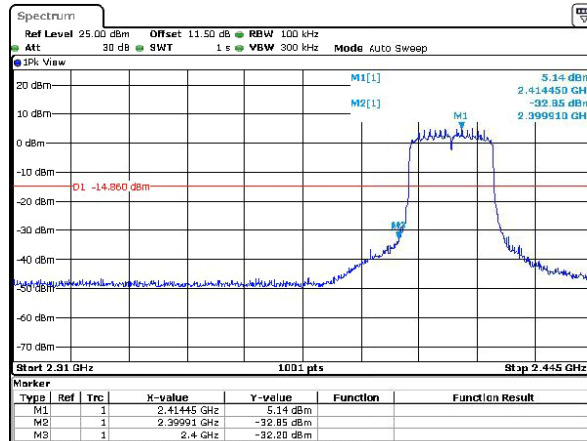


High channel

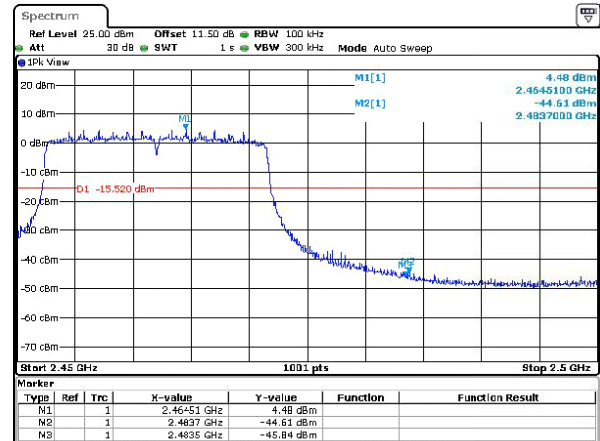


802.11ax20 ANT0

Lowest channel

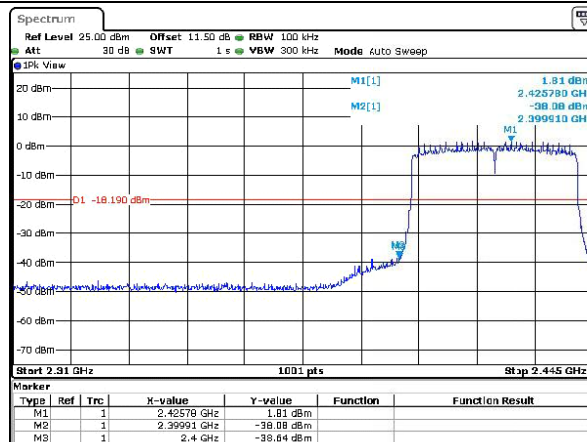


High channel

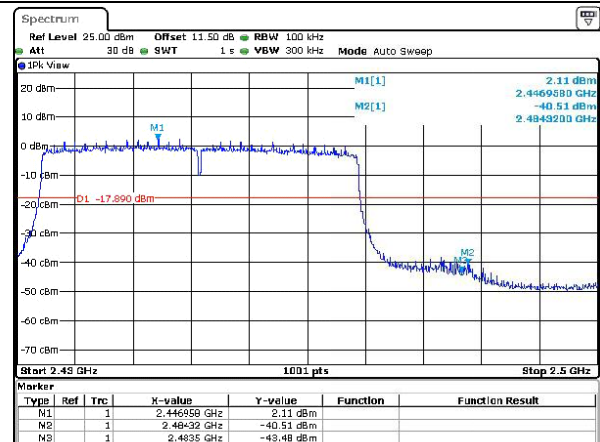


802.11ax40 ANT0

Lowest channel

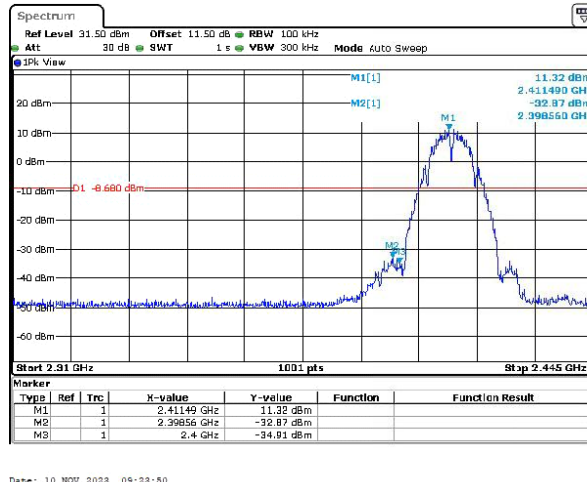


High channel

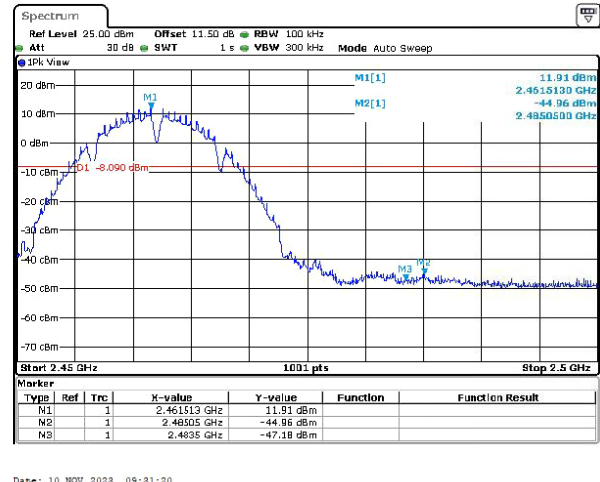


802.11b ANT1

Lowest channel

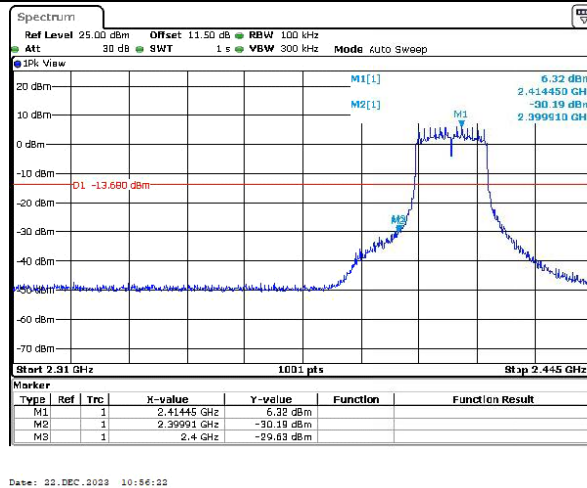


High channel

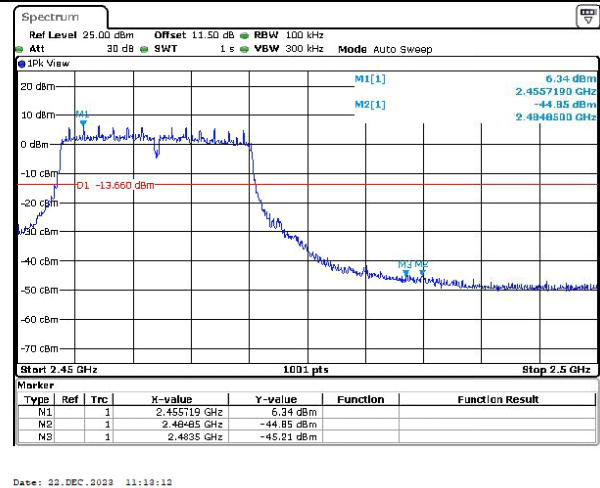


802.11g ANT1

Lowest channel

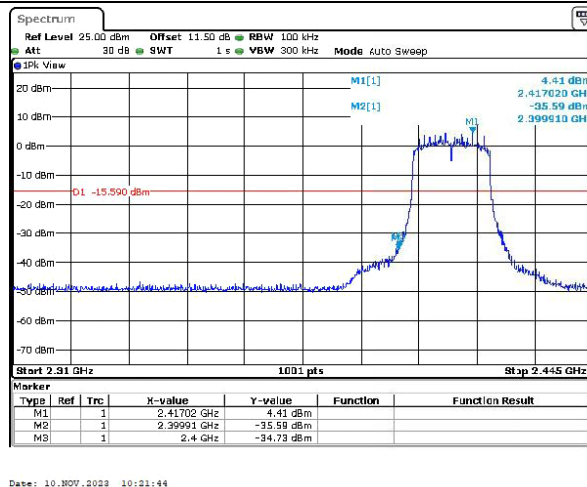


High channel

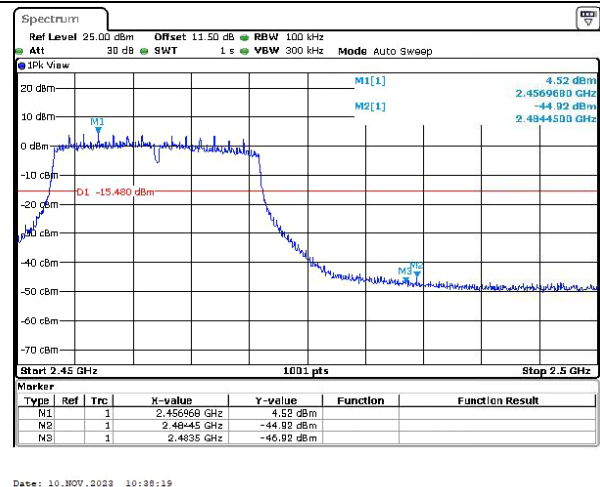


802.11n20 ANT1

Lowest channel

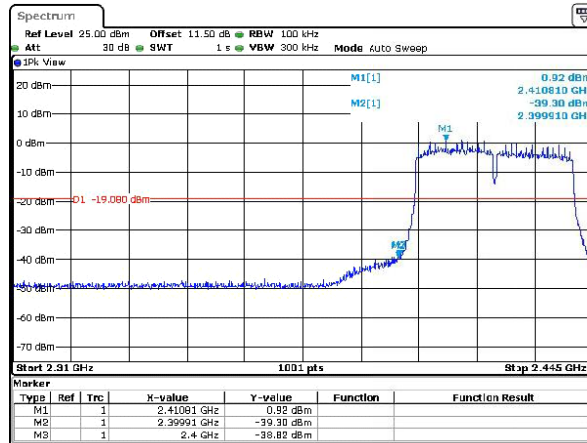


High channel



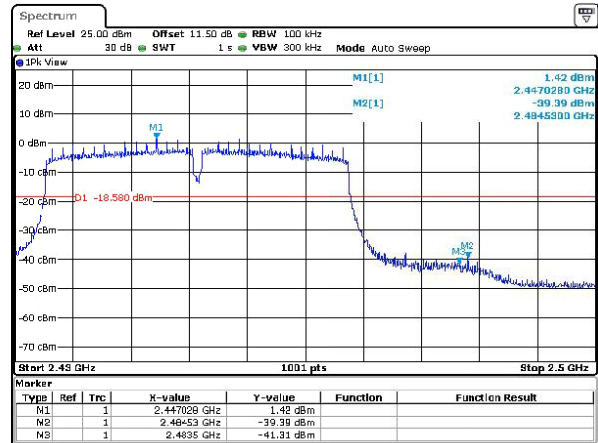
802.11n40 ANT1

Lowest channel



Date: 10.NOV.2023 10:55:24

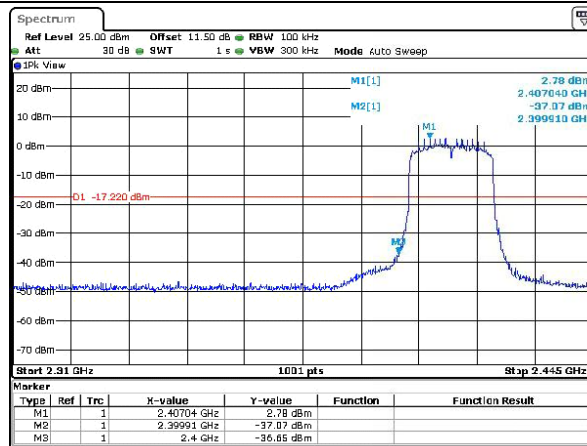
High channel



Date: 10.NOV.2023 11:06:10

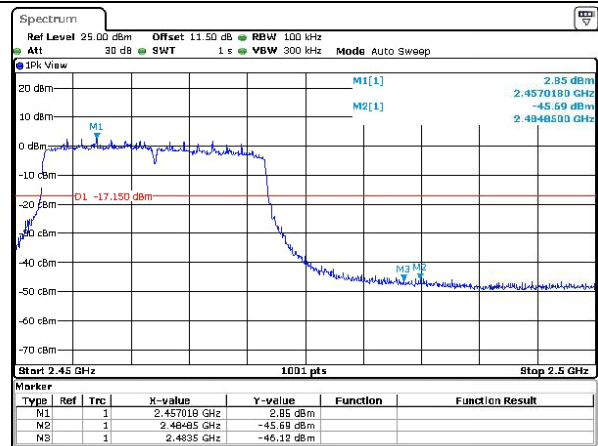
802.11ax20 ANT1

Lowest channel



Date: 10.NOV.2023 11:21:54

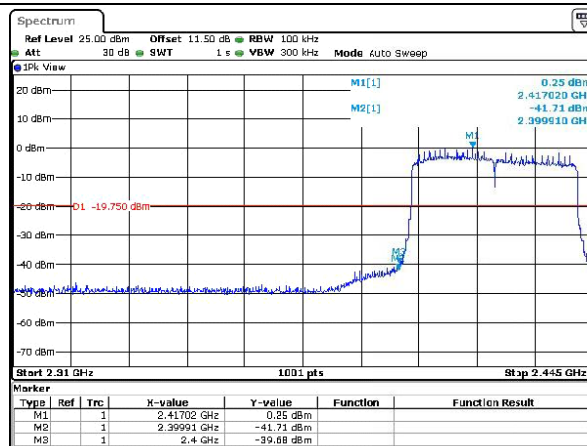
High channel



Date: 10.NOV.2023 11:29:58

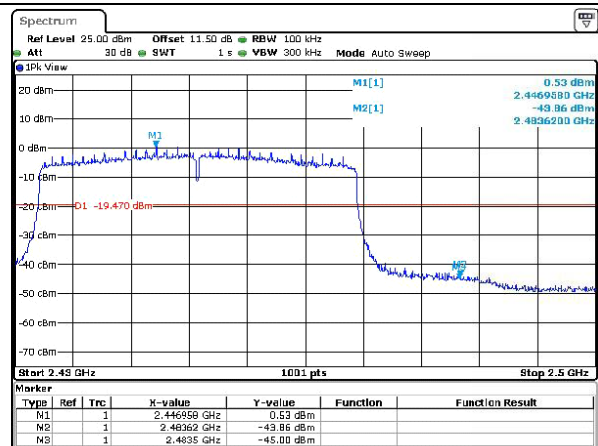
802.11ax40 ANT1

Lowest channel



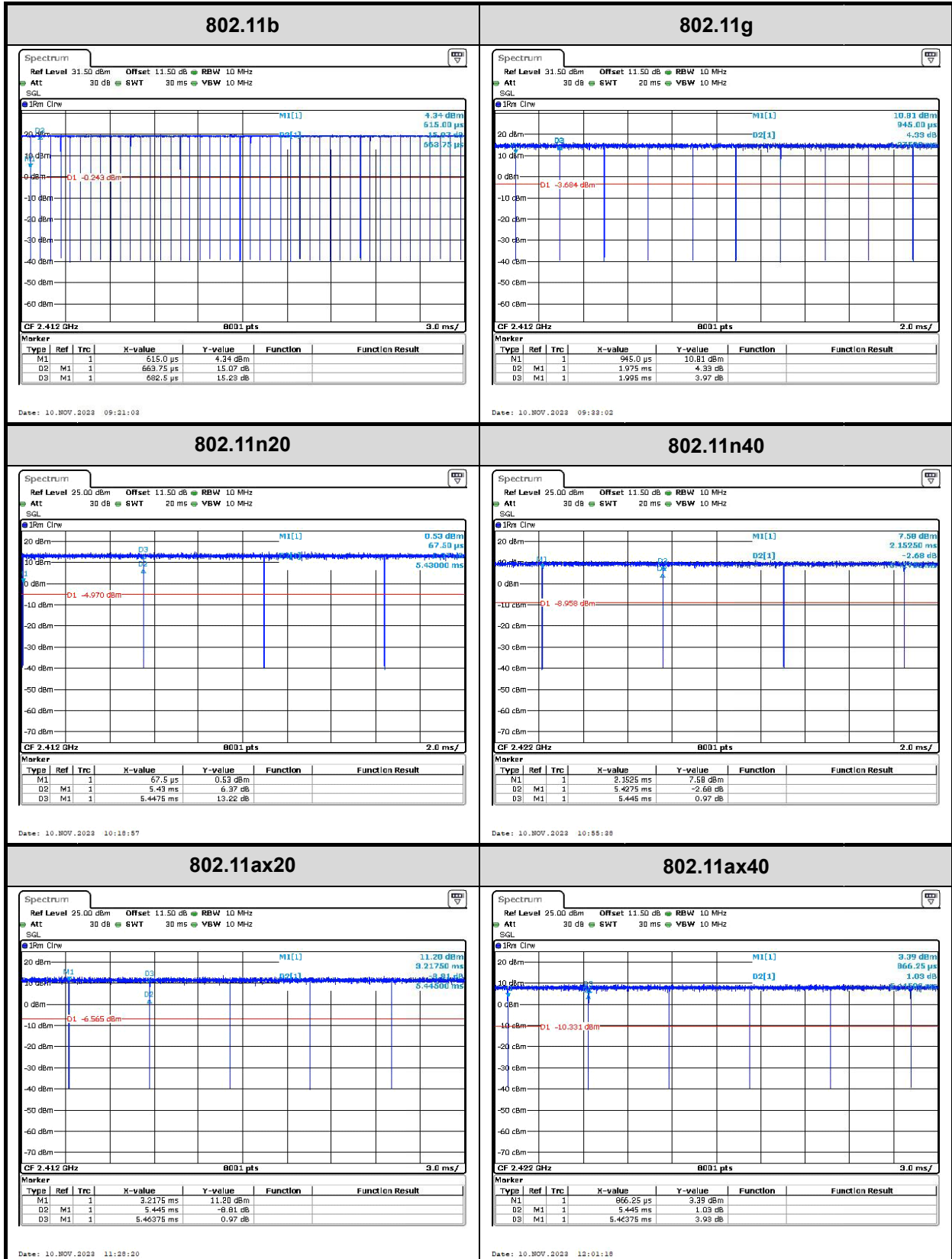
Date: 10.NOV.2023 12:10:17

High channel



Date: 10.NOV.2023 12:08:50

Duty Cycle:



4 Test Setup Photo

Please refer to the attachment RWAX202300107 Test Setup photo.

5 E.U.T Photo

Please refer to the attachment RWAX202300107 External Photo and RWAX202300107 Internal Photo.

---End of Report---