

FCC Test Report

Report No.: RWAY202300018A

Applicant: Shenzhen VanTop Technology & Innovation Co., Ltd.

Address: 506, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China

Product Name: Projector

Product Model: Leisure 470Pro

Multiple Models: Leisure 470, Leisure D30T, Leisure E30WT, Leisure E30T, Leisure 630W, Leisure 495W, VT501, VT502, VT503, VT504, VT505, LS470W

Trade Mark: N/A

FCC ID: 2AQ3A-VT11

Standards: FCC CFR Title 47 Part 15E (§15.407)

Test Date: 2023-12-06 to 2024-01-09

Test Result: Complied

Issue Date: 2024-01-23

Reviewed by:

Abel chen

Abel Chen
Project Engineer

Approved by:

Jacob Kong

Jacob Kong
Manager

Prepared by:

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

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Revision History

Version No.	Issued Date	Description
00	2024-01-23	Original

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1 General Information

1.1 Client Information

Applicant:	Shenzhen VanTop Technology & Innovation Co., Ltd.
Address:	506, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen VanTop Technology & Innovation Co., Ltd.
Address:	506, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China

1.2 Product Description of EUT

The EUT is Projector that contains Classic Bluetooth, 2.4G and 5G WLAN radios, this report covers the full testing of the 5G WLAN radio.

Sample Serial number	B-1 for CE test, B-2 for RE test, B-3 for RF test conducted test (assigned by WATC)
Sample Received Date	2023-11-30
Sample Status	Good Condition
Frequency Range	5150 MHz - 5250MHz 5725 MHz - 5850MHz
Maximum Conducted Output Power	5150 MHz - 5250MHz: 12.02dBm 5725 MHz - 5850MHz: 8.28dBm
Modulation Technology	OFDM
Spatial Streams	SISO (1TX, 1RX)
Antenna Gain [#]	2.97dBi
Power Supply	AC 100-240V 50/60Hz
Operating temperature [#]	0 deg.C to +40 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 an internal antenna which cannot replace by end-user. Please see the product internal photos for details.	

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DSS, FCC ID: 2AQ3A-VT11
FCC Part 15, Subpart C, Equipment Class: DTS, FCC ID: 2AQ3A-VT11

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: ga@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 789033 D02 General UNII Test Procedures New Rules v02r01

ANSI C63.10-2020

2 Description of Measurement

2.1 Test Configuration

Operating channels: (5150-5250MHz)					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
36	5180	40	5200	46	5230
38	5190	44	5220	48	5240
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:					
802.11a, 802.11n-HT20					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
36	5180	40	5200	48	5240
802.11n-HT40					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
38	5190	/	/	46	5230

Operating channels: (5725-5850MHz)					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
149	5745	157	5785	165	5825
151	5755	159	5795	/	/
153	5765	161	5805	/	/
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:					
802.11a, 802.11n-HT20					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
149	5745	157	5785	165	5825
802.11n-HT40					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
151	5755	/	/	159	5795

Test Mode:				
Transmitting mode:		Keep the EUT in continuous transmitting with modulation		
Exercise software [#] :		SecureCRT		
5150-5250MHz				
Mode	Data rate	Powel Level Setting [#]		
		Low Channel	Middle Channel	High Channel
802.11a	6Mbps	48	48	48
802.11n-HT20	MCS0	48	48	48
802.11n-HT40	MCS0	30	/	30
The exercise software and the maximum power setting that provided by manufacturer.				
5725-5850MHz				
Mode	Data rate	Powel Level Setting [#]		
		Low Channel	Middle Channel	High Channel
802.11a	6Mbps	48	48	48
802.11n-HT20	MCS0	48	48	48
802.11n-HT40	MCS0	30	/	30
The exercise software and the maximum power setting that provided by manufacturer.				

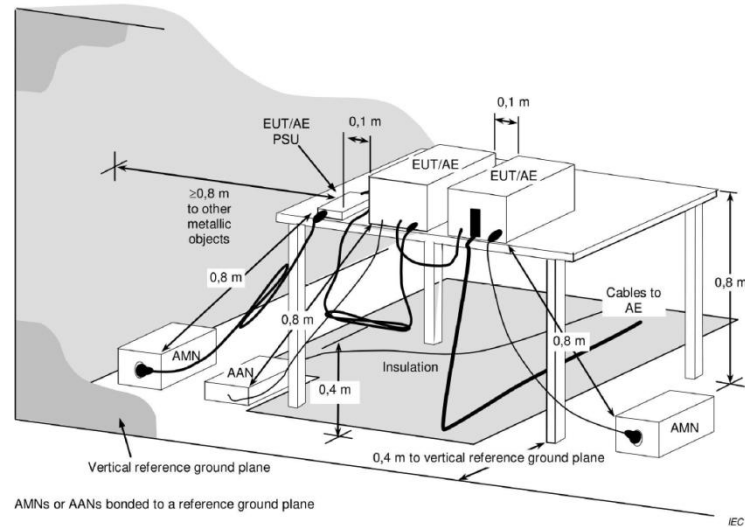
Worst-Case Configuration:
For AC power line conducted emission and radiated emission 9kHz-1GHz and above 18GHz were performed with the EUT transmits at the channel with highest output power as worst-case scenario.

2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
aigo	USB flash disk	unknown	unknown
unknown	Earphone	unknown	unknown
GIEC	DVD player	BDP-G4350	unknown
Kingston	MicroSD	SDCS2/32GB	unknown
unknown	HDMI cable*2	unknown	unknown
unknown	Audio cable	unknown	unknown

2.3 Test Setup

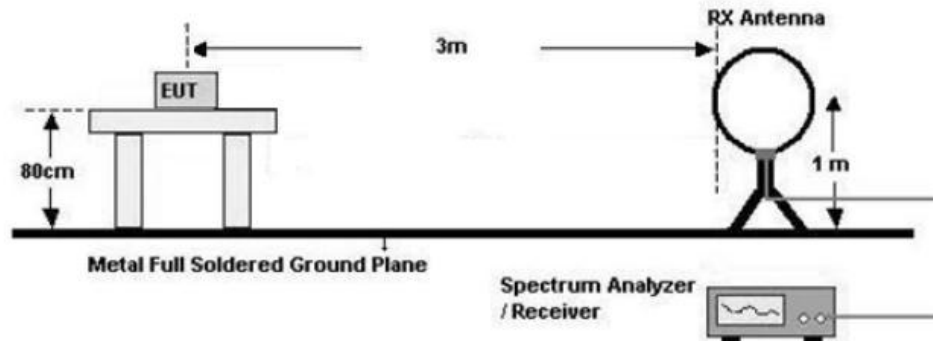
1) Conducted emission measurement:



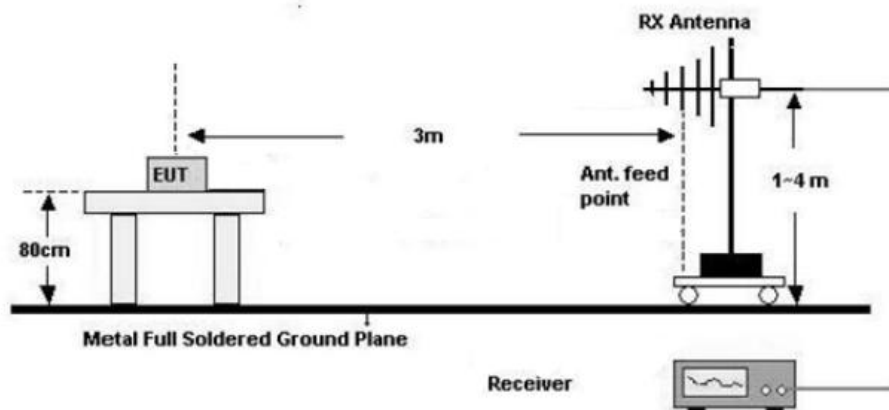
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

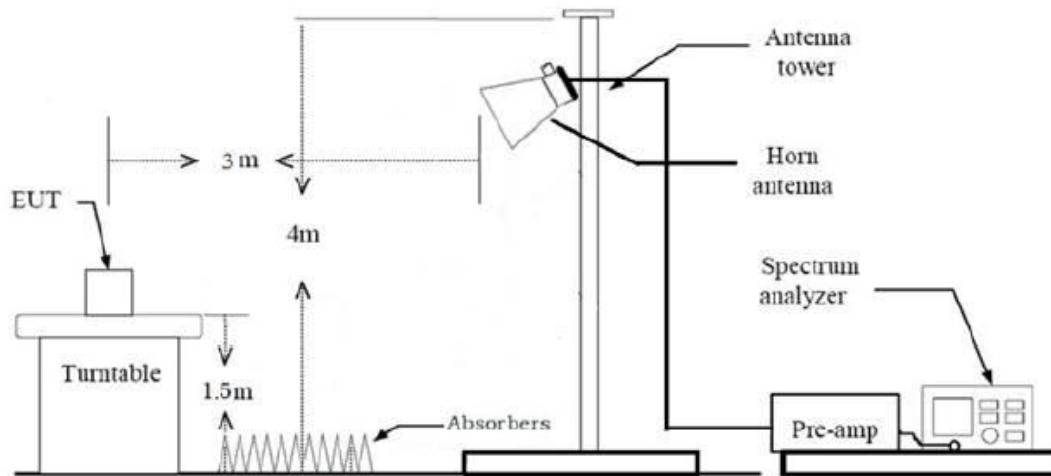
Below 30MHz (3m SAC)



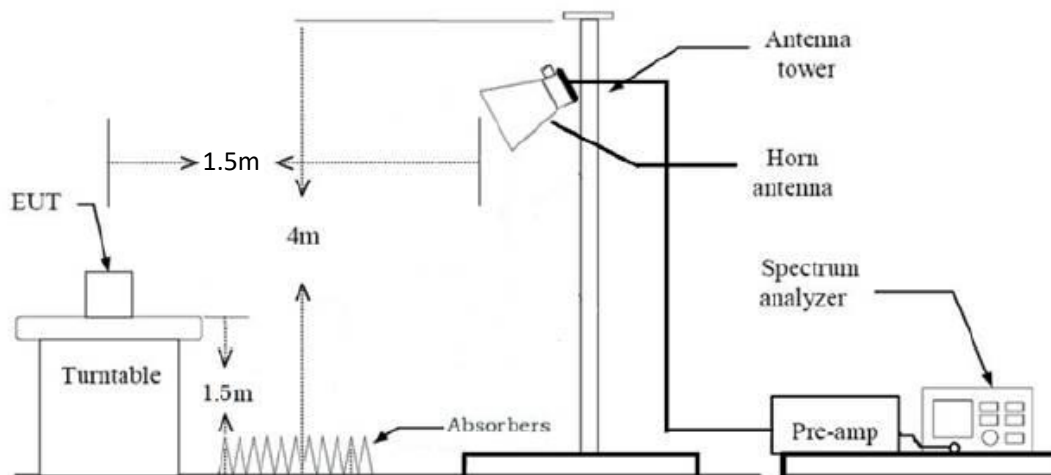
0MHz-1GHz (3m SAC)



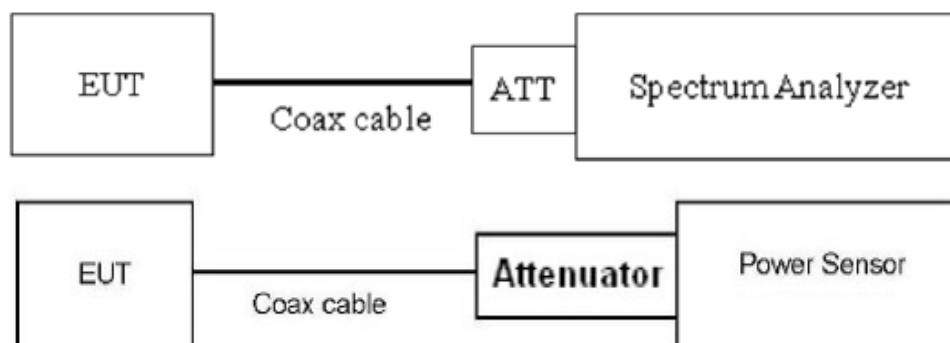
1GHz-18GHz(3m FAC)



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 6.5dB (including 6.0 dB Attenuator and 0.5dB 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 0.5dB 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	KDB 789033 D02 v02r01 section E.3. b)
Power Spectral Density	KDB 789033 D02 v02r01 section F
26 dB Emission Bandwidth	KDB 789033 D02 v02r01 section C.1
6 dB Emission Bandwidth	KDB 789033 D02 v02r01 section C.2
99% Occupied Bandwidth	KDB 789033 D02 v02r01 section D.
Unwanted Emissions	KDB 789033 D02 v02r01 section G.
Duty Cycle	KDB 789033 D02 v02r01 section B.

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
Ducommun technologies	Horn Antenna	ARH-2823-02	1007726-03	2023/7/10	2024/7/9
Oulitong	Band Reject Filter	OBSF-5150-585 0-S	OE02104371	2023/9/15	2024/9/14
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.11	2023/8/8	2024/8/7
Audix	Test Software	E3	191218 V9	/	/
RF Conducted Test					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSU-26	200680/026	2023/7/12	2024/7/11
ANRITSU	USB Power Sensor	MA24418A	12620	2023/7/12	2024/7/11
narda	6dB attenuator	603-06-1	N/A	2023/7/26	2024/7/25

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) §15.407 (b)(9)	AC Line Conducted Emissions	Compliance
§15.407 (a)(1)(iv),(3)(i)	Conducted Peak Output Power Power Spectral Density	Compliance
§15.407 (a)(12)	99% Occupied Bandwidth	Compliance
§15.407 (a)	26 dB Emission Bandwidth	Compliance
§15.407 (e)	6 dB Emission Bandwidth	Compliance
§15.205, §15.209, §15.407 (b)(1), (4), (9), (10)	Unwanted Emissions	Compliance
/	Duty Cycle	Report only

3.2 Limit

Test items	Limit
AC Power Line Conducted Emission	See details §15.207 (a)
Conducted Peak Output Power	For the band 5.150-5.250 GHz Band: For 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. For the band 5.725-5.895 GHz Band: For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W. 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.
Power Spectral Density	
26dB Emission Bandwidth 99% Occupied Bandwidth	N/A
6dB Emission Bandwidth	Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Unwanted Emissions	For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz. For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz. For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz. For transmitters operating solely in the 5.725–5.850 GHz band: All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. The provisions of § 15.205 apply to intentional radiators operating under this section.
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3.3 AC Line Conducted Emissions Test Data

Test Date:	2023-12-22	Test By:	Lirou Li
Environment condition:	Temperature: 20.5°C; Relative Humidity:27%; ATM Pressure: 101.1kPa		

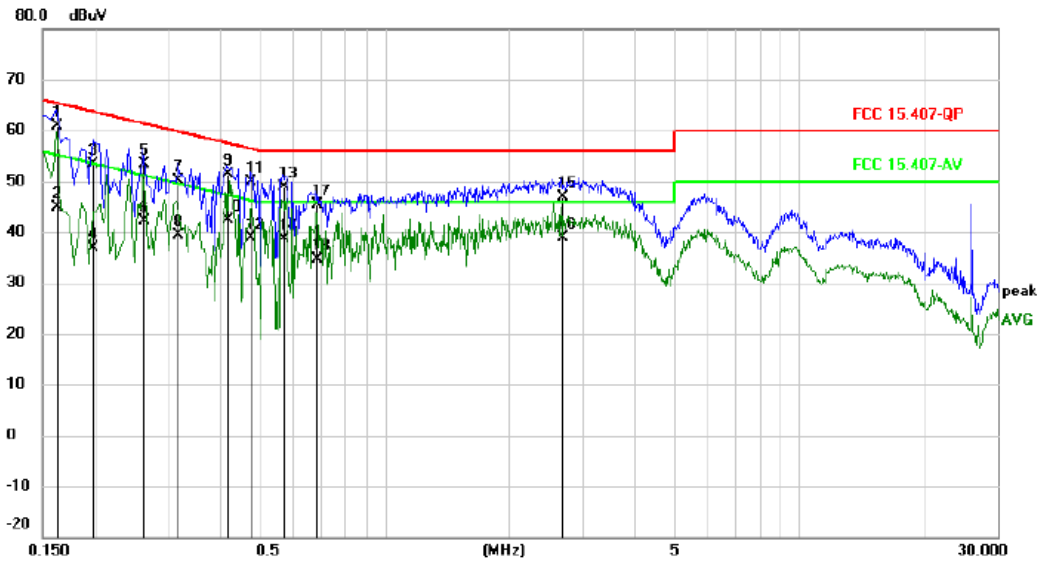
Conducted Emission Measurement

File :RWAY202300018

Data :#7

Date: 2023/12/22

Time: 9:52:20



Limit: FCC 15.407-QP

Phase: **L1**

Temperature: 20.5

Mode:transmit

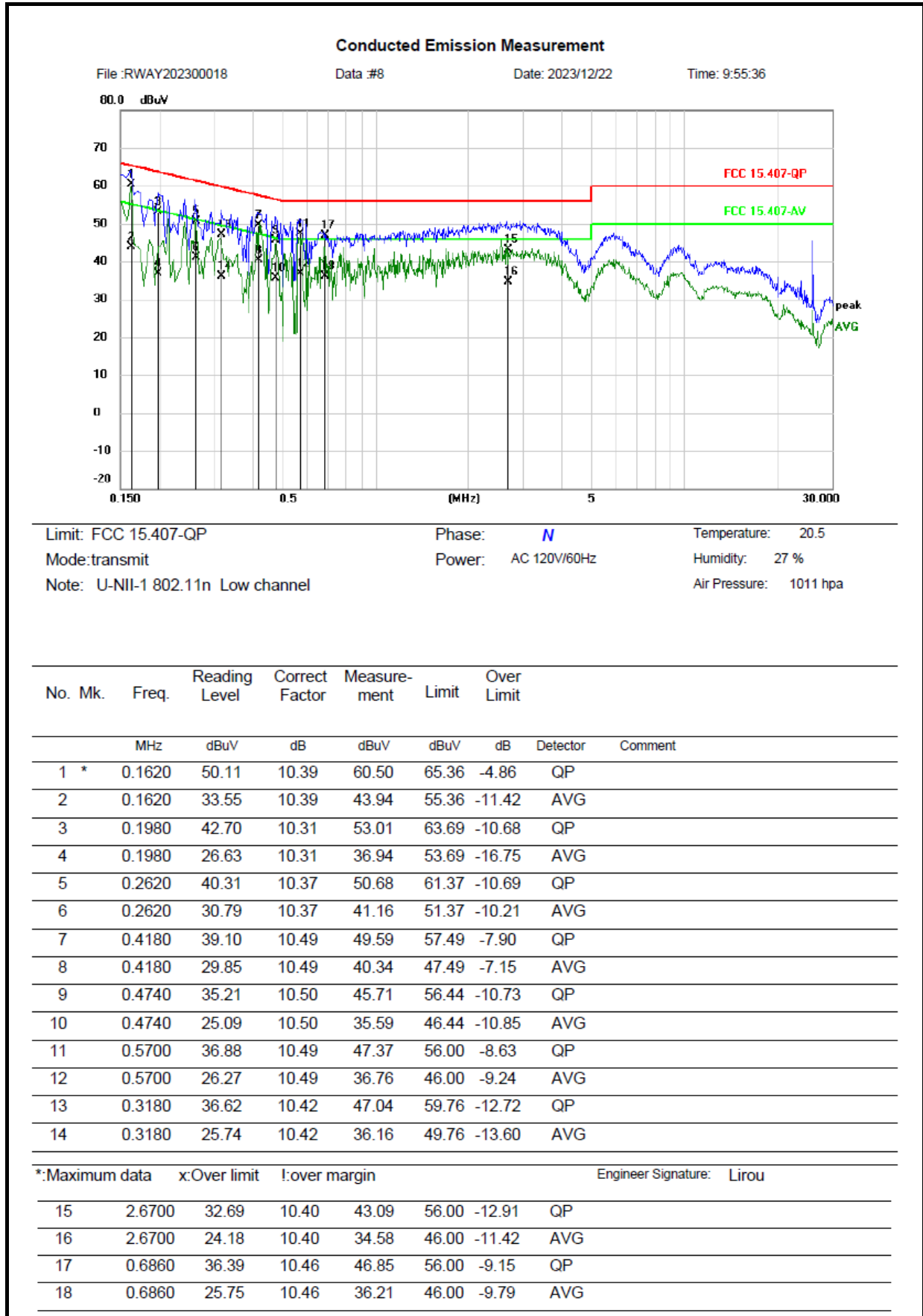
Power: AC 120V/60Hz

Humidity: 27 %

Note: U-NII-1 802.11n Low channel

Air Pressure: 1011 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector Comment
1	*	0.1620	50.47	10.46	60.93	65.36	-4.43	QP
2		0.1620	34.52	10.46	44.98	55.36	-10.38	AVG
3		0.1980	43.15	10.32	53.47	63.69	-10.22	QP
4		0.1980	26.67	10.32	36.99	53.69	-16.70	AVG
5		0.2620	43.08	10.33	53.41	61.37	-7.96	QP
6		0.2620	31.85	10.33	42.18	51.37	-9.19	AVG
7		0.3180	39.75	10.34	50.09	59.76	-9.67	QP
8		0.3180	29.13	10.34	39.47	49.76	-10.29	AVG
9		0.4180	40.99	10.34	51.33	57.49	-6.16	QP
10		0.4180	32.12	10.34	42.46	47.49	-5.03	AVG
11		0.4740	39.64	10.32	49.96	56.44	-6.48	QP
12		0.4740	28.68	10.32	39.00	46.44	-7.44	AVG
13		0.5700	38.56	10.40	48.96	56.00	-7.04	QP
14		0.5700	28.35	10.40	38.75	46.00	-7.25	AVG
*:Maximum data		x:Over limit	! :over margin		Engineer Signature: Lirou			
15		2.6700	36.58	10.40	46.98	56.00	-9.02	QP
16		2.6700	28.51	10.40	38.91	46.00	-7.09	AVG
17		0.6860	34.84	10.54	45.38	56.00	-10.62	QP
18		0.6860	24.08	10.54	34.62	46.00	-11.38	AVG



Remark:

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

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

Over Limit = Measurement – Limit

3.4 Radiated emission Test Data

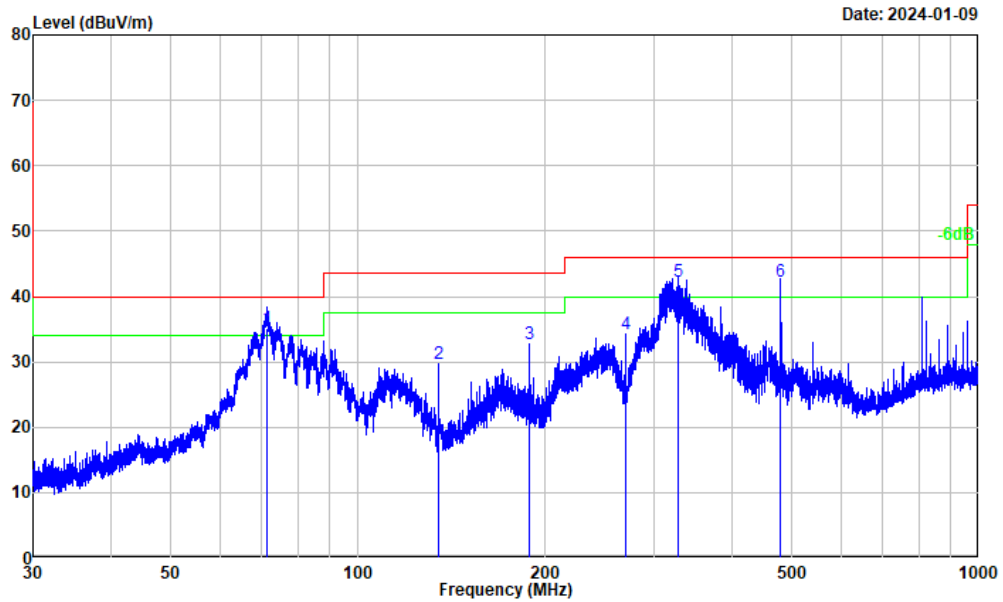
9 kHz-30MHz:

Test Date:	2024-01-09	Test By:	Luke Li
Environment condition:	Temperature: 25.7°C; Relative Humidity:51%; ATM Pressure: 101.0kPa		

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

30MHz-1GHz:

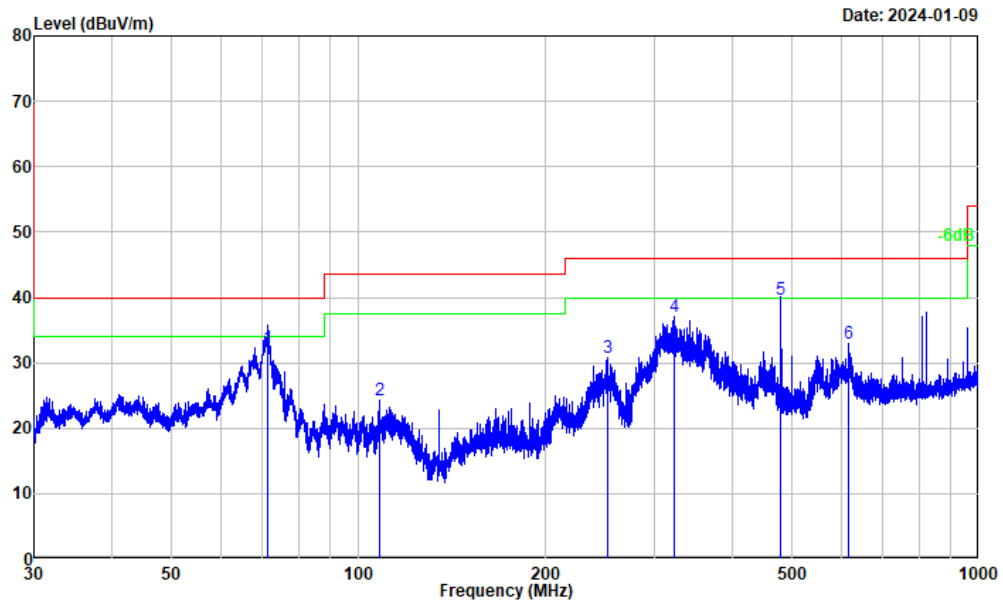
Test Date:	2024-01-09	Test By:	Luke Li
Environment condition:	Temperature: 25.7°C; Relative Humidity:51%; ATM Pressure: 101.0kPa		



Project No. : RWAY202300018
 Test Mode : Transmitting
 Test Voltage : AC 120V/60Hz
 Environment : 25.7°C/51%R.H./101.0kPa
 Tested by : Luke Li
 Polarization : horizontal
 Remark : U-NII-1 802.11n Low channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	71.361	51.90	-16.86	35.04	40.00	-4.96	QP
2	134.973	47.24	-17.46	29.78	43.50	-13.72	Peak
3	188.992	47.46	-14.75	32.71	43.50	-10.79	Peak
4	270.020	46.19	-12.03	34.16	46.00	-11.84	Peak
5	328.607	52.71	-10.50	42.21	46.00	-3.79	QP
6	480.107	50.10	-7.79	42.31	46.00	-3.69	QP

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



Project No. : RWAY202300018
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 25.7°C/51%R.H./101.0kPa
Tested by : Luke Li
Polarization : vertical
Remark : U-NII-1 802.11n Low channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	71.393	49.21	-16.88	32.33	40.00	-7.67	QP
2	108.030	38.37	-14.04	24.33	43.50	-19.17	Peak
3	252.284	43.08	-12.38	30.70	46.00	-15.30	Peak
4	323.604	47.75	-10.69	37.06	46.00	-8.94	Peak
5	480.107	47.50	-7.79	39.71	46.00	-6.29	QP
6	617.183	37.56	-4.66	32.90	46.00	-13.10	Peak

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

Remark:

Level = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Level – Limit

Above 1GHz:

Test Date:	2023-12-06	Test By:	Luke Li
Environment condition:	Temperature: 23.5°C; Relative Humidity:51%; ATM Pressure: 101.1kPa		

5150-5250MHz Band:

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11a							
Low Channel							
5150.000	39.83	horizontal	10.98	50.81	54.00	-3.19	Average
5150.000	54.32	horizontal	10.98	65.30	74.00	-8.70	Peak
5150.000	36.72	vertical	10.98	47.70	54.00	-6.30	Average
5150.000	48.79	vertical	10.98	59.77	74.00	-14.23	Peak
10360.000	45.86	horizontal	6.65	52.51	68.20	-15.69	Peak
10360.000	44.65	vertical	6.65	51.30	68.20	-16.90	Peak
Middle Channel							
10400.000	45.70	horizontal	6.76	52.46	68.20	-15.74	Peak
10400.000	46.75	vertical	6.76	53.51	68.20	-14.69	Peak
High Channel							
5350.000	34.90	horizontal	11.00	45.90	54.00	-8.10	Average
5350.000	47.02	horizontal	11.00	58.02	74.00	-15.98	Peak
5350.000	34.74	vertical	11.00	45.74	54.00	-8.26	Average
5350.000	47.01	vertical	11.00	58.01	74.00	-15.99	Peak
10480.000	43.78	horizontal	6.82	50.60	68.20	-17.60	Peak
10480.000	43.39	vertical	6.82	50.21	68.20	-17.99	Peak
802.11n20							
Low Channel							
5150.000	38.06	horizontal	10.98	49.04	54.00	-4.96	Average
5150.000	54.08	horizontal	10.98	65.06	74.00	-8.94	Peak
5150.000	38.03	vertical	10.98	49.01	54.00	-4.99	Average
5150.000	50.81	vertical	10.98	61.79	74.00	-12.21	Peak
10360.000	44.73	horizontal	6.65	51.38	68.20	-16.82	Peak
10360.000	44.91	vertical	6.65	51.56	68.20	-16.64	Peak
Middle Channel							
10400.000	45.91	horizontal	6.76	52.67	68.20	-15.53	Peak
10400.000	46.67	vertical	6.76	53.43	68.20	-14.77	Peak
High Channel							

5350.000	34.72	horizontal	11.00	45.72	54.00	-8.28	Average
5350.000	47.06	horizontal	11.00	58.06	74.00	-15.94	Peak
5350.000	34.63	vertical	11.00	45.63	54.00	-8.37	Average
5350.000	47.24	vertical	11.00	58.24	74.00	-15.76	Peak
10480.000	43.73	horizontal	6.82	50.55	68.20	-17.65	Peak
10480.000	45.59	vertical	6.82	52.41	68.20	-15.79	Peak
802.11n40							
Low Channel							
5150.000	38.66	horizontal	10.98	49.64	54.00	-4.36	Average
5150.000	50.53	horizontal	10.98	61.51	74.00	-12.49	Peak
5150.000	36.27	vertical	10.98	47.25	54.00	-6.75	Average
5150.000	48.45	vertical	10.98	59.43	74.00	-14.57	Peak
10380.000	45.49	horizontal	6.71	52.20	68.20	-16.00	Peak
10380.000	45.46	vertical	6.71	52.17	68.20	-16.03	Peak
High Channel							
5350.000	36.15	horizontal	11.00	47.15	54.00	-6.85	Average
5350.000	47.65	horizontal	11.00	58.65	74.00	-15.35	Peak
5350.000	35.03	vertical	11.00	46.03	54.00	-7.97	Average
5350.000	46.89	vertical	11.00	57.89	74.00	-16.11	Peak
10460.000	47.49	horizontal	6.81	54.30	68.20	-13.90	Peak
10460.000	46.13	vertical	6.81	52.94	68.20	-15.26	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

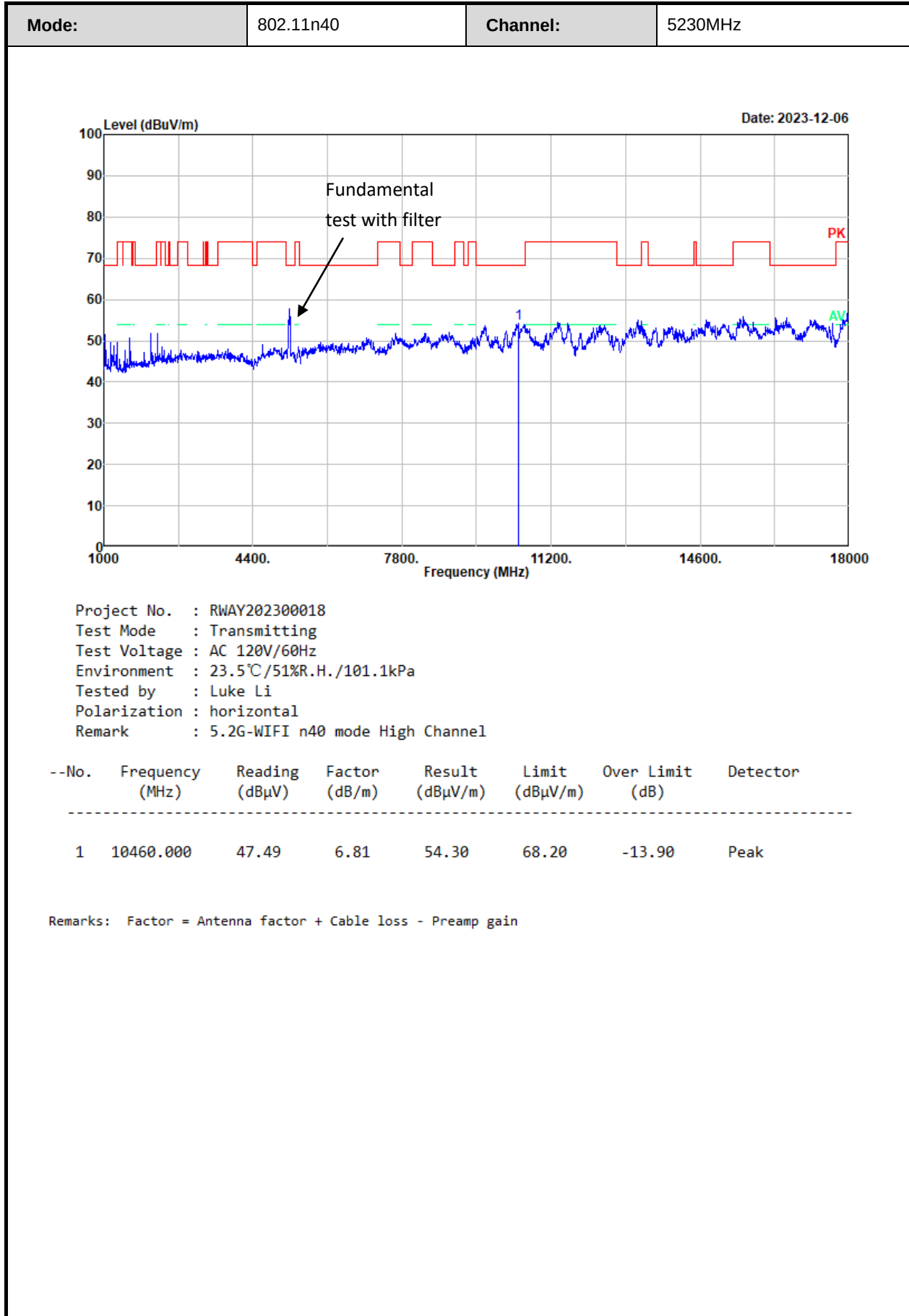
Margin = Corrected Amplitude – Limit

For the test result of Peak below the Peak limit more than 20dB, which can compliance with the average limit, just the Peak level was recorded.

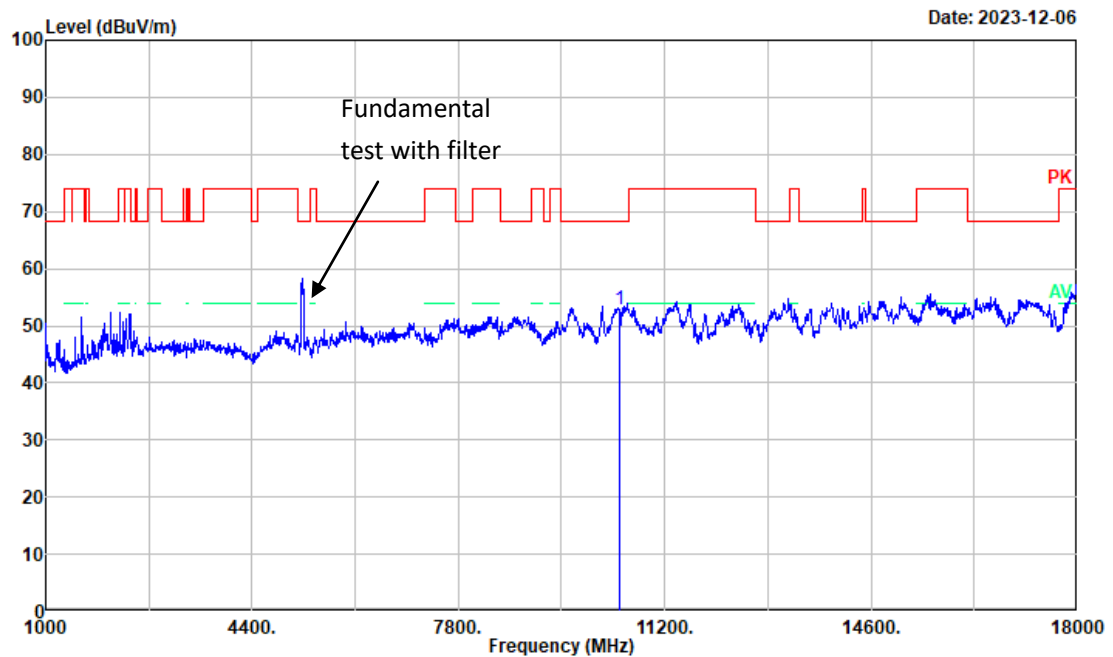
The emission levels of other frequencies that were lower than the limit 20dB, not show in test report.

For emissions in 18GHz-40GHz range, all emissions were investigated and in the noise floor level.

Test plot for example as below:



Mode:	802.11n40	Channel:	5250MHz
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Project No. : RWAY202300018
 Test Mode : Transmitting
 Test Voltage : AC 120V/60Hz
 Environment : 23.5°C/51%R.H./101.1kPa
 Tested by : Luke Li
 Polarization : vertical
 Remark : 5.2G-WIFI n40 mode High Channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	10460.000	46.13	6.81	52.94	68.20	-15.26	Peak

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

5725-5850MHz:

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11a							
Low Channel							
5631.216	48.35	horizontal	11.32	59.67	68.20	-8.53	Peak
5661.230	48.87	horizontal	11.37	60.24	76.54	-16.30	Peak
5718.559	48.98	horizontal	11.55	60.53	110.40	-49.87	Peak
5724.762	55.82	horizontal	11.56	67.38	121.66	-54.28	Peak
5632.479	48.37	vertical	11.32	59.69	68.20	-8.51	Peak
5677.213	48.58	vertical	11.42	60.00	88.38	-28.38	Peak
5718.184	48.51	vertical	11.55	60.06	110.29	-50.23	Peak
5724.925	54.86	vertical	11.56	66.42	122.03	-55.61	Peak
11490.000	42.22	horizontal	7.10	49.32	74.00	-24.68	Peak
11490.000	42.74	vertical	7.10	49.84	74.00	-24.16	Peak
Middle Channel							
11570.000	45.81	horizontal	7.15	52.96	74.00	-21.04	Peak
11570.000	45.42	vertical	7.15	52.57	74.00	-21.43	Peak
High Channel							
5852.264	50.27	horizontal	11.79	62.06	117.04	-54.98	Peak
5861.281	49.47	horizontal	11.79	61.26	109.04	-47.78	Peak
5918.097	48.57	horizontal	11.83	60.40	73.29	-12.89	Peak
5934.555	48.41	horizontal	11.85	60.26	68.20	-7.94	Peak
5850.863	49.12	vertical	11.79	60.91	120.23	-59.32	Peak
5871.436	48.74	vertical	11.79	60.53	106.20	-45.67	Peak
5905.578	48.69	vertical	11.81	60.50	82.54	-22.04	Peak
5939.808	48.97	vertical	11.87	60.84	68.20	-7.36	Peak
11650.000	44.08	horizontal	7.17	51.25	74.00	-22.75	Peak
11650.000	43.37	vertical	7.17	50.54	74.00	-23.46	Peak
802.11n20							
Low Channel							
5633.967	48.56	horizontal	11.32	59.88	68.20	-8.32	Peak
5668.284	49.59	horizontal	11.40	60.99	81.77	-20.78	Peak
5719.147	58.74	horizontal	11.55	70.29	110.56	-40.27	Peak
5724.925	62.48	horizontal	11.56	74.04	122.03	-47.99	Peak
5607.179	48.48	vertical	11.30	59.78	68.20	-8.42	Peak
5667.496	49.69	vertical	11.39	61.08	81.18	-20.10	Peak
5718.009	56.99	vertical	11.55	68.54	110.24	-41.70	Peak
5722.999	63.34	vertical	11.56	74.90	117.64	-42.74	Peak

11490.000	42.18	horizontal	7.10	49.28	74.00	-24.72	Peak
11490.000	41.67	vertical	7.10	48.77	74.00	-25.23	Peak
Middle Channel							
11570.000	46.38	horizontal	7.15	53.53	74.00	-20.47	Peak
11570.000	44.51	vertical	7.15	51.66	74.00	-22.34	Peak
High Channel							
5852.176	50.63	horizontal	11.79	62.42	117.24	-54.82	Peak
5859.617	49.68	horizontal	11.79	61.47	109.51	-48.04	Peak
5918.009	49.24	horizontal	11.83	61.07	73.35	-12.28	Peak
5940.158	48.38	horizontal	11.87	60.25	68.20	-7.95	Peak
5850.775	49.34	vertical	11.79	61.13	120.43	-59.30	Peak
5860.143	49.63	vertical	11.79	61.42	109.36	-47.94	Peak
5899.712	48.78	vertical	11.79	60.57	86.87	-26.30	Peak
5959.155	48.54	vertical	11.89	60.43	68.20	-7.77	Peak
11650.000	43.77	horizontal	7.17	50.94	74.00	-23.06	Peak
11650.000	44.71	vertical	7.17	51.88	74.00	-22.12	Peak
802.11n40							
Low Channel							
5644.067	49.62	horizontal	11.33	60.95	68.20	-7.25	Peak
5672.371	49.25	horizontal	11.40	60.65	84.79	-24.14	Peak
5717.014	52.43	horizontal	11.54	63.97	109.97	-46.00	Peak
5724.722	55.38	horizontal	11.56	66.94	121.57	-54.63	Peak
5625.543	48.66	vertical	11.32	59.98	68.20	-8.22	Peak
5683.647	48.97	vertical	11.44	60.41	93.13	-32.72	Peak
5719.314	52.18	vertical	11.55	63.73	110.61	-46.88	Peak
5724.377	54.16	vertical	11.56	65.72	120.78	-55.06	Peak
11510.000	42.48	horizontal	7.10	49.58	74.00	-24.42	Peak
11510.000	42.73	vertical	7.10	49.83	74.00	-24.17	Peak
High Channel							
5853.249	48.87	horizontal	11.78	60.65	114.79	-54.14	Peak
5871.103	48.54	horizontal	11.79	60.33	106.29	-45.96	Peak
5900.788	49.69	horizontal	11.79	61.48	86.08	-24.60	Peak
5961.018	48.67	horizontal	11.89	60.56	68.20	-7.64	Peak
5853.895	48.47	vertical	11.78	60.25	113.32	-53.07	Peak
5867.016	48.28	vertical	11.80	60.08	107.43	-47.35	Peak
5919.287	48.82	vertical	11.83	60.65	72.41	-11.76	Peak
5932.731	49.01	vertical	11.85	60.86	68.20	-7.34	Peak
11590.000	45.42	horizontal	7.17	52.59	74.00	-21.41	Peak
11590.000	34.85	vertical	7.17	42.02	54.00	-11.98	Average

11590.000	46.88	vertical	7.17	54.05	74.00	-19.95	Peak
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Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

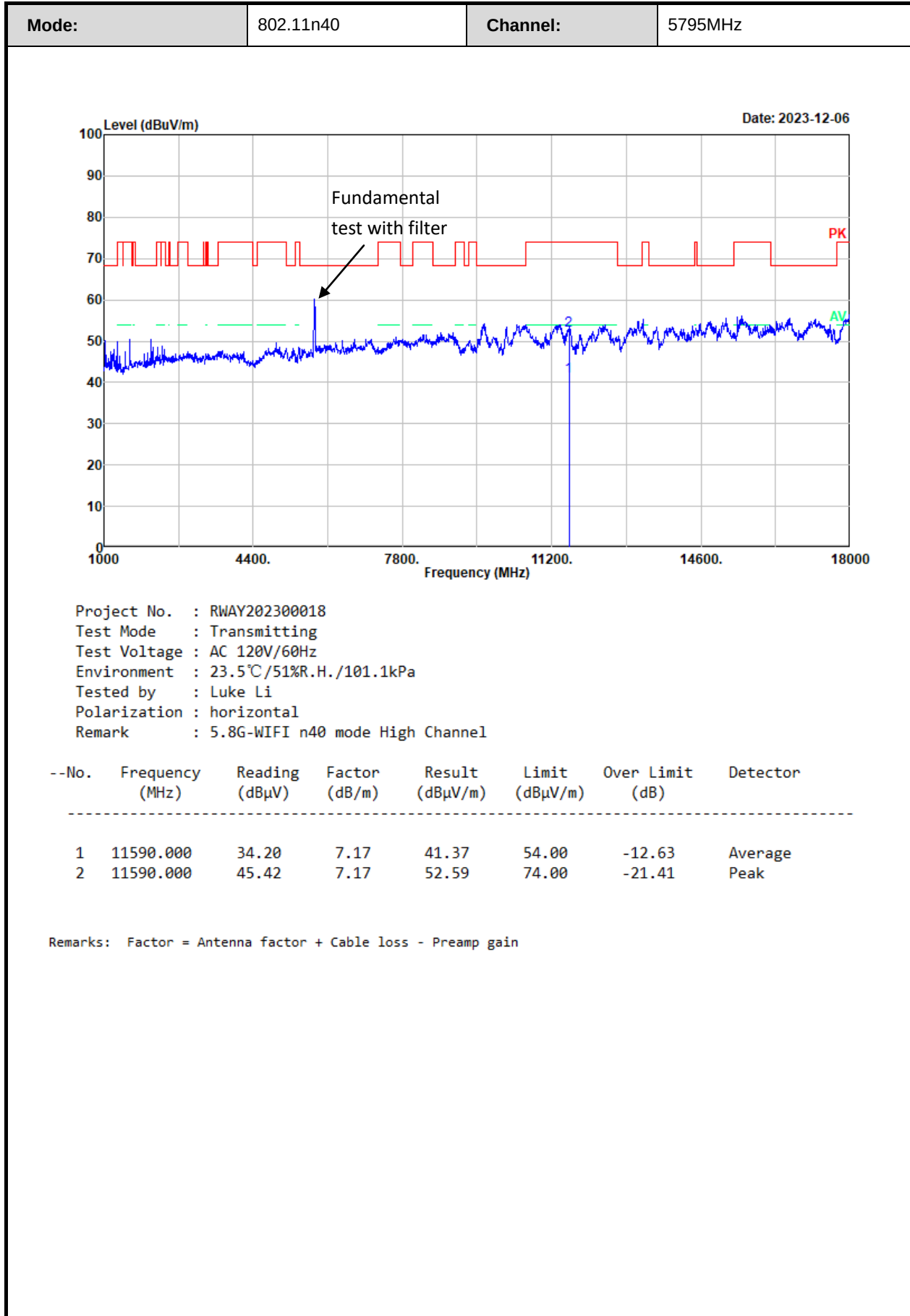
Margin = Corrected Amplitude – Limit

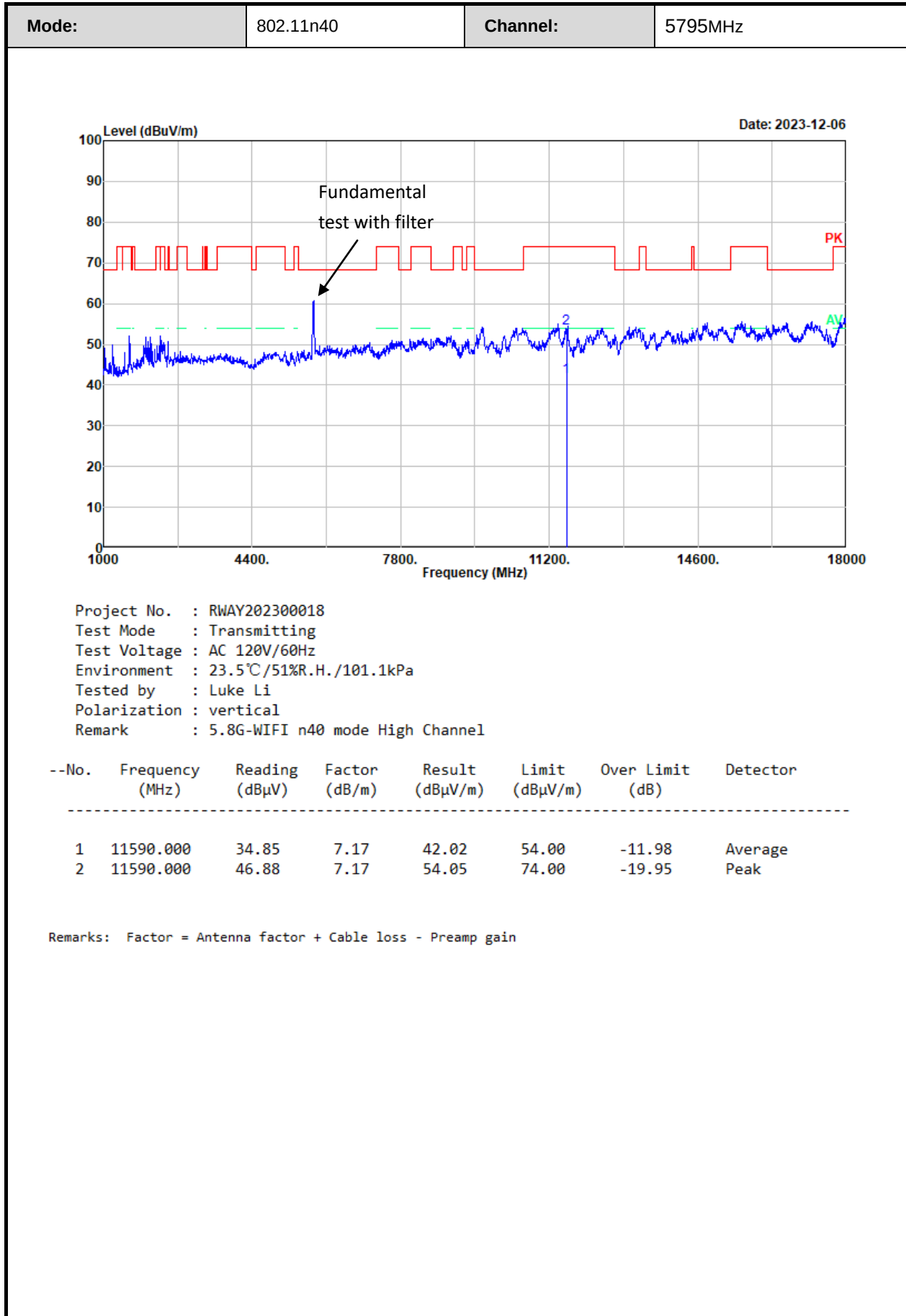
For the test result of Peak below the Peak limit more than 20dB, which can compliance with the average limit, just the Peak level was recorded.

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

For emissions in 18GHz-40GHz 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:	2023-12-07~2023-12-08	Test By:	Ryan Zhang
Environment condition:	Temperature: 23.9~24.01°C; Relative Humidity: 58~59%; ATM Pressure: 101.3~102.3kPa		

3.5.1 26dB/6dB Emission Bandwidth and 99% Occupied Bandwidth

Test Mode	Antenna	Channel	26dB BW [MHz]	99% OBW [MHz]
802.11a	Ant1	5180	31.058	17.500
		5200	31.090	17.500
		5240	31.170	17.500
802.11n HT20	Ant1	5180	21.154	18.077
		5200	21.026	18.077
		5240	20.987	18.077
802.11n HT40	Ant1	5190	41.154	36.667
		5230	41.410	36.667

Test Mode	Antenna	Channel	6dB BW [MHz]	99% OBW [MHz]	6dB BW Limit [MHz]	Verdict
802.11a	Ant1	5745	16.410	17.308	0.5	pass
		5785	16.423	17.372	0.5	pass
		5825	16.385	17.372	0.5	pass
802.11n HT20	Ant1	5745	16.385	17.308	0.5	pass
		5785	16.385	17.372	0.5	pass
		5825	16.385	17.372	0.5	pass
802.11n HT40	Ant1	5755	36.026	36.667	0.5	pass
		5795	35.769	36.667	0.5	pass

3.5.2 Maximum conducted output power

5150-5250MHz:

Test Mode	Antenna	Channel [MHz]	Result [dBm]	Limit [dBm]	Verdict
802.11a	Ant1	5180	12.00	24	Pass
		5200	11.92	24	Pass
		5240	11.41	24	Pass
802.11n HT20	Ant1	5180	12.02	24	Pass
		5200	11.90	24	Pass
		5240	11.45	24	Pass
802.11n HT40	Ant1	5190	9.33	24	Pass
		5230	8.94	24	Pass

5725-5850MHz:

Test Mode	Antenna	Channel [MHz]	Result [dBm]	Limit [dBm]	Verdict
802.11a	Ant1	5745	7.81	30	Pass
		5785	8.16	30	Pass
		5825	8.22	30	Pass
802.11n HT20	Ant1	5745	7.86	30	Pass
		5785	8.21	30	Pass
		5825	8.28	30	Pass
802.11n HT40	Ant1	5755	5.37	30	Pass
		5795	5.65	30	Pass

3.5.3 Power Spectral Density

5150-5250MHz:

Test Modes	Antenna	Test Frequency(MHz)	Reading (dBm/MHz)	Duty Cycle Factor(dB)	Maximum Power Spectral Density (dBm/MHz)	
					Result	Limit
802.11a	Ant1	5180	-1.12	0.21	-0.91	11
		5200	-0.42	0.21	-0.21	11
		5240	-1.42	0.21	-1.21	11
802.11n HT20	Ant1	5180	-0.03	/	-0.03	11
		5200	-0.04	/	-0.04	11

		5240	-0.62	/	-0.62	11
802.11n HT40	Ant1	5190	-5.71	0.23	-5.48	11
		5230	-6.01	0.23	-5.78	11

5725-5850MHz:

Test Modes	Antenna	Test Frequency(MHz)	Reading (dBm/500kHz)	Duty Cycle Factor(dB)	Maximum Power Spectral Density (dBm/500kHz)	
					Result	Limit
802.11a	Ant1	5745	-6.05	0.21	-5.84	30
		5785	-5.52	0.21	-5.31	30
		5825	-5.15	0.21	-4.94	30
802.11n HT20	Ant1	5745	-5.82	/	-5.82	30
		5785	-5.56	/	-5.56	30
		5825	-5.47	/	-5.47	30
802.11n HT40	Ant1	5755	-12.23	0.23	-12.00	30
		5795	-12.18	0.23	-11.95	30

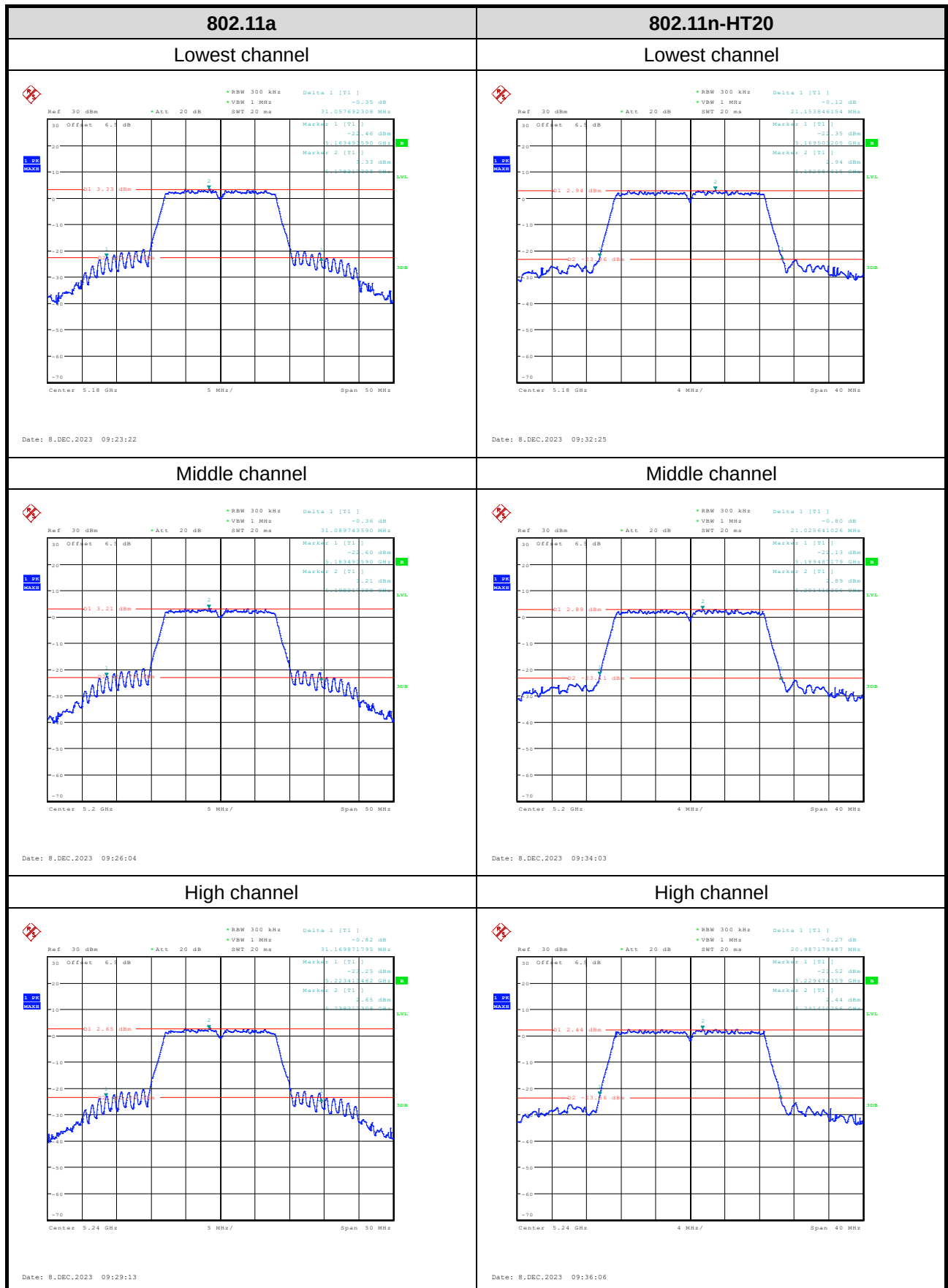
3.5.4 Duty Cycle

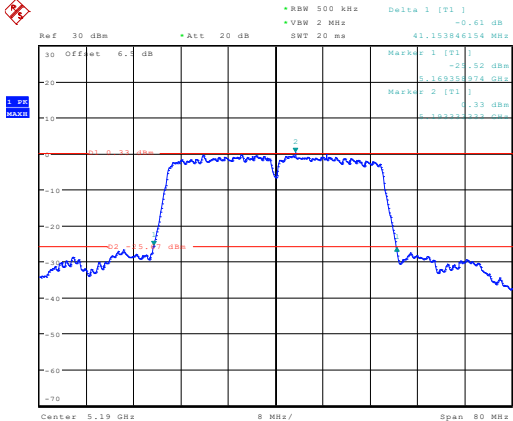
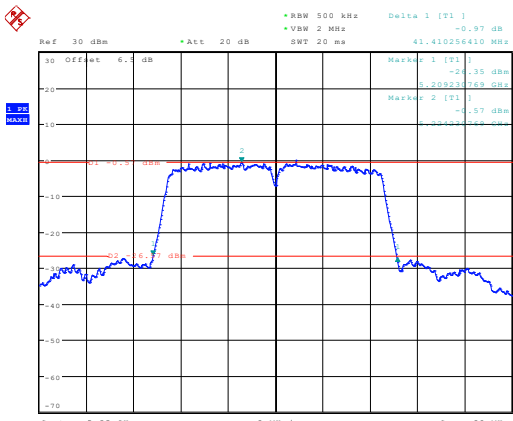
Test Modes	Antenna	Ton (ms)	Ton+off (ms)	Duty cycle (%)	Duty Cycle Factor (dB)	1/T (KHz)	VBW Setting (Hz)
802.11a	Ant1	1.385	1.454	95.25	0.21	0.722	1000
802.11n HT20	Ant1	5.065	5.168	98.01	/	/	10
802.11n HT40	Ant1	2.433	2.565	94.85	0.23	0.411	500

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

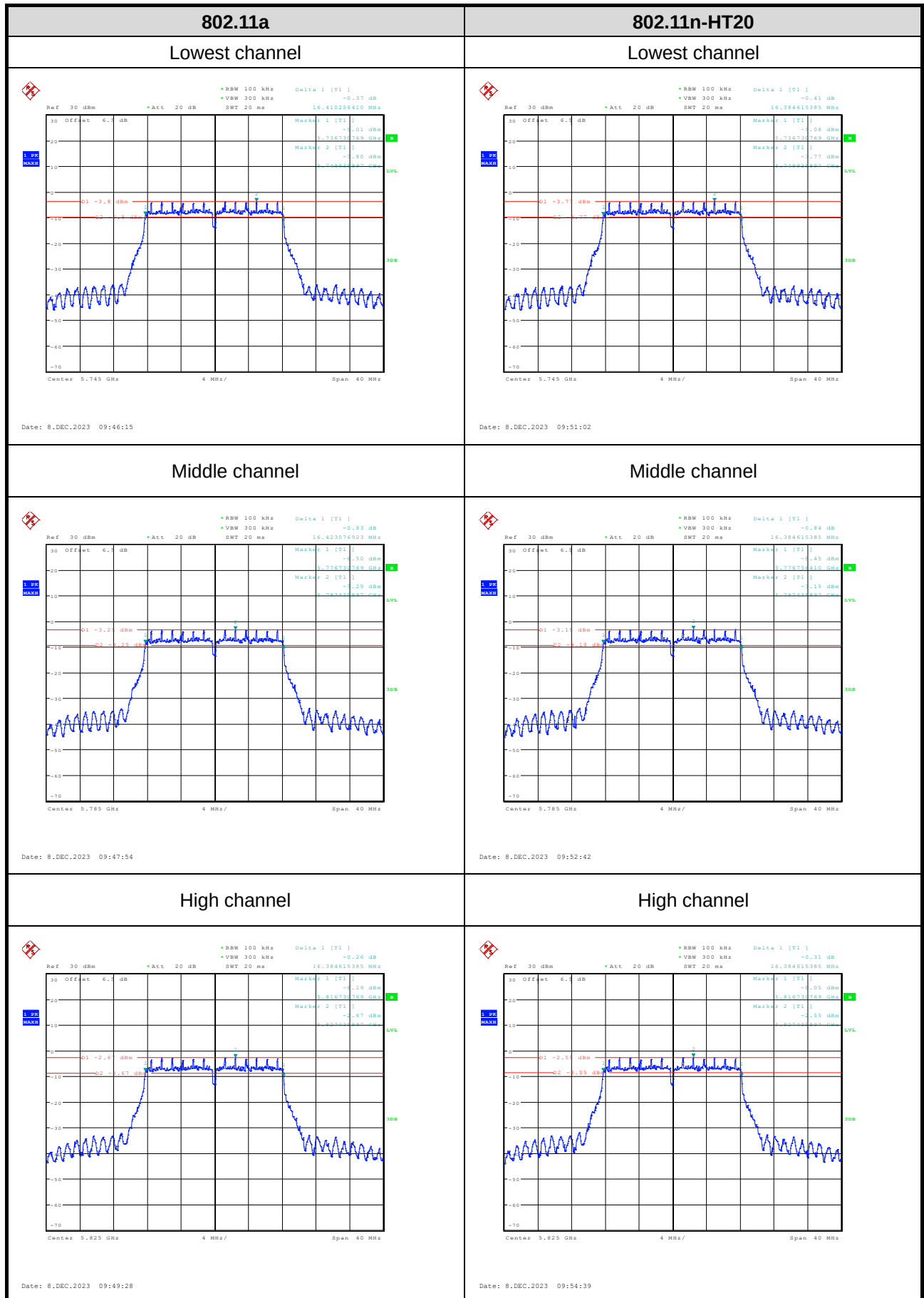
Test Plots:

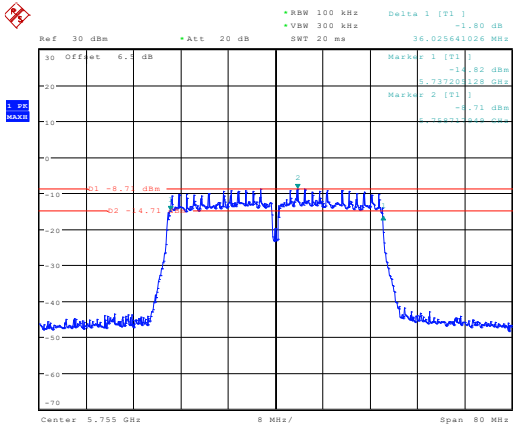
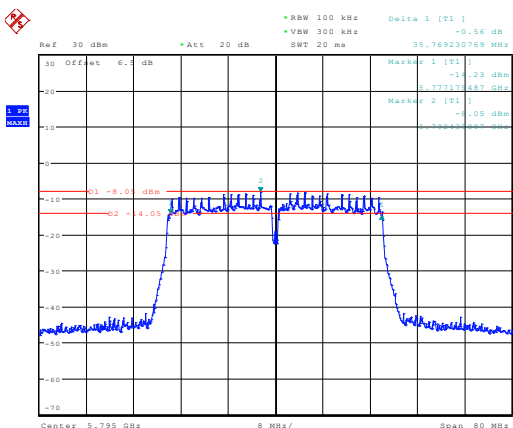
26dB Emission Bandwidth



802.11n-HT40	/
Lowest channel	/
 Date: 8.DEC.2023 09:38:20	/
High channel	/
 Date: 8.DEC.2023 09:40:03	/

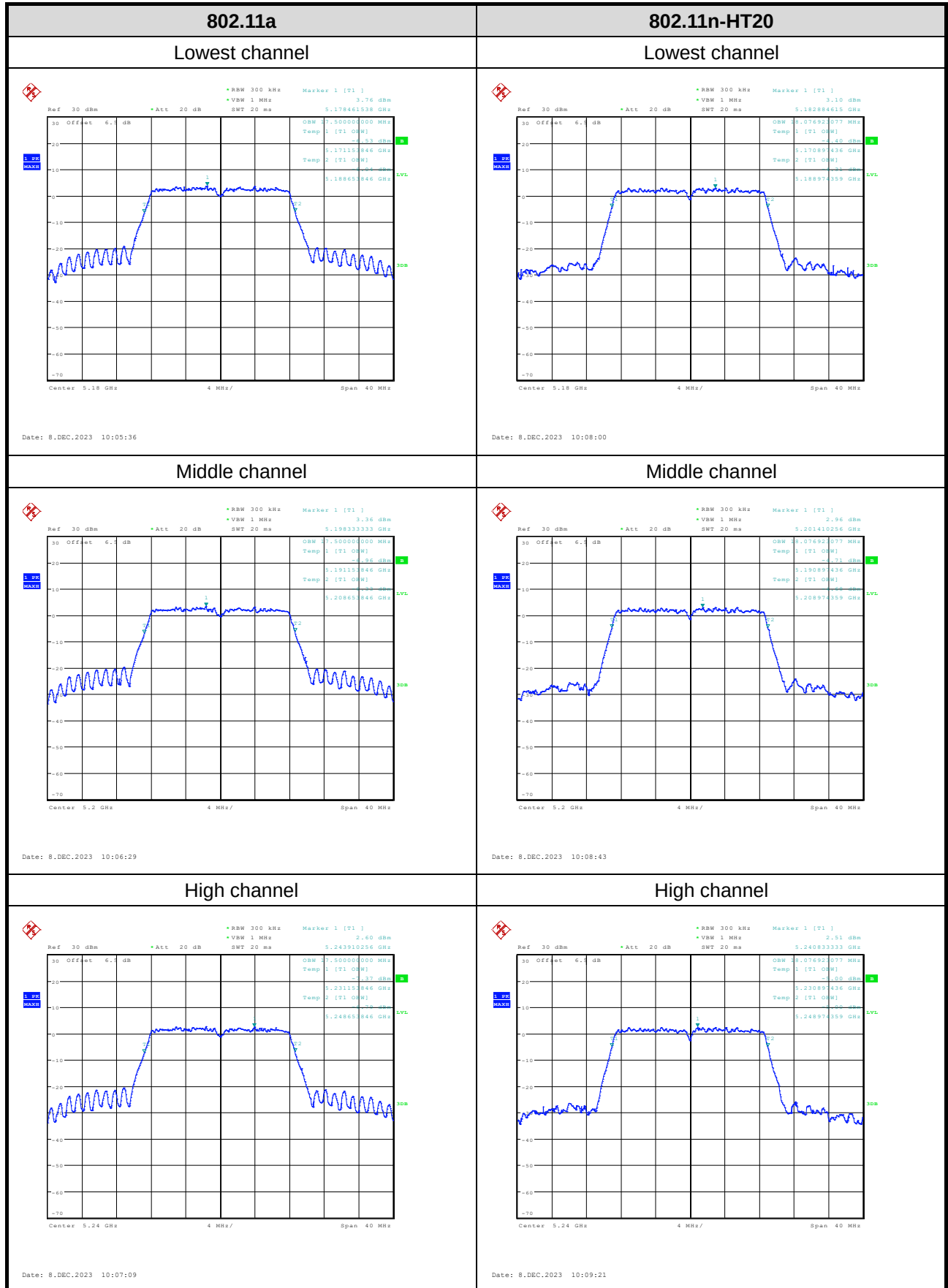
6dB Emission Bandwidth

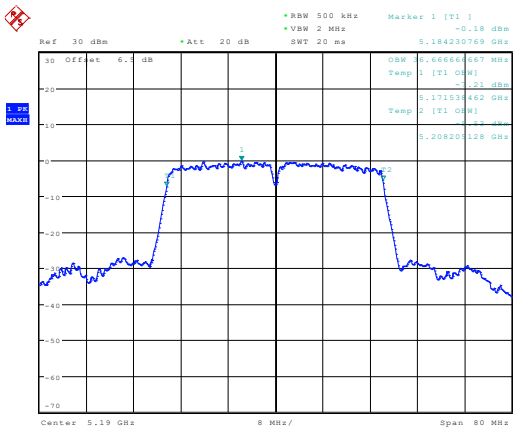
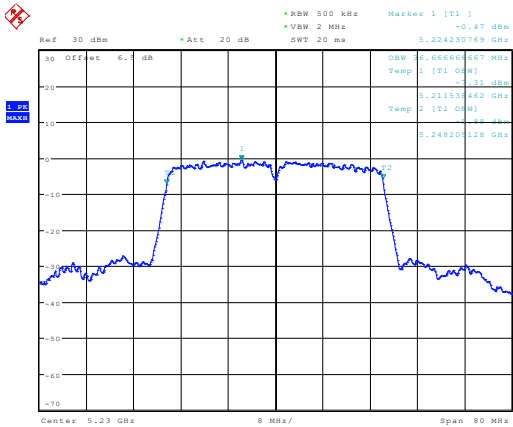


802.11n-HT40	/
Lowest channel	/
 Ref: 30 dBm *Att: 20 dB SWT: 20 ms Delta 1 [F1] -1.50 dB Marker 1 [F1] -14.82 dBm Marker 2 [F1] -14.71 dBm Center: 5.755 GHz Span: 80 MHz Date: 8 DEC 2023 09:59:05	/
High channel	/
 Ref: 30 dBm *Att: 20 dB SWT: 20 ms Delta 1 [F1] -0.56 dB Marker 1 [F1] -14.13 dBm Marker 2 [F1] -14.05 dBm Center: 5.795 GHz Span: 80 MHz Date: 8 DEC 2023 10:02:58	/

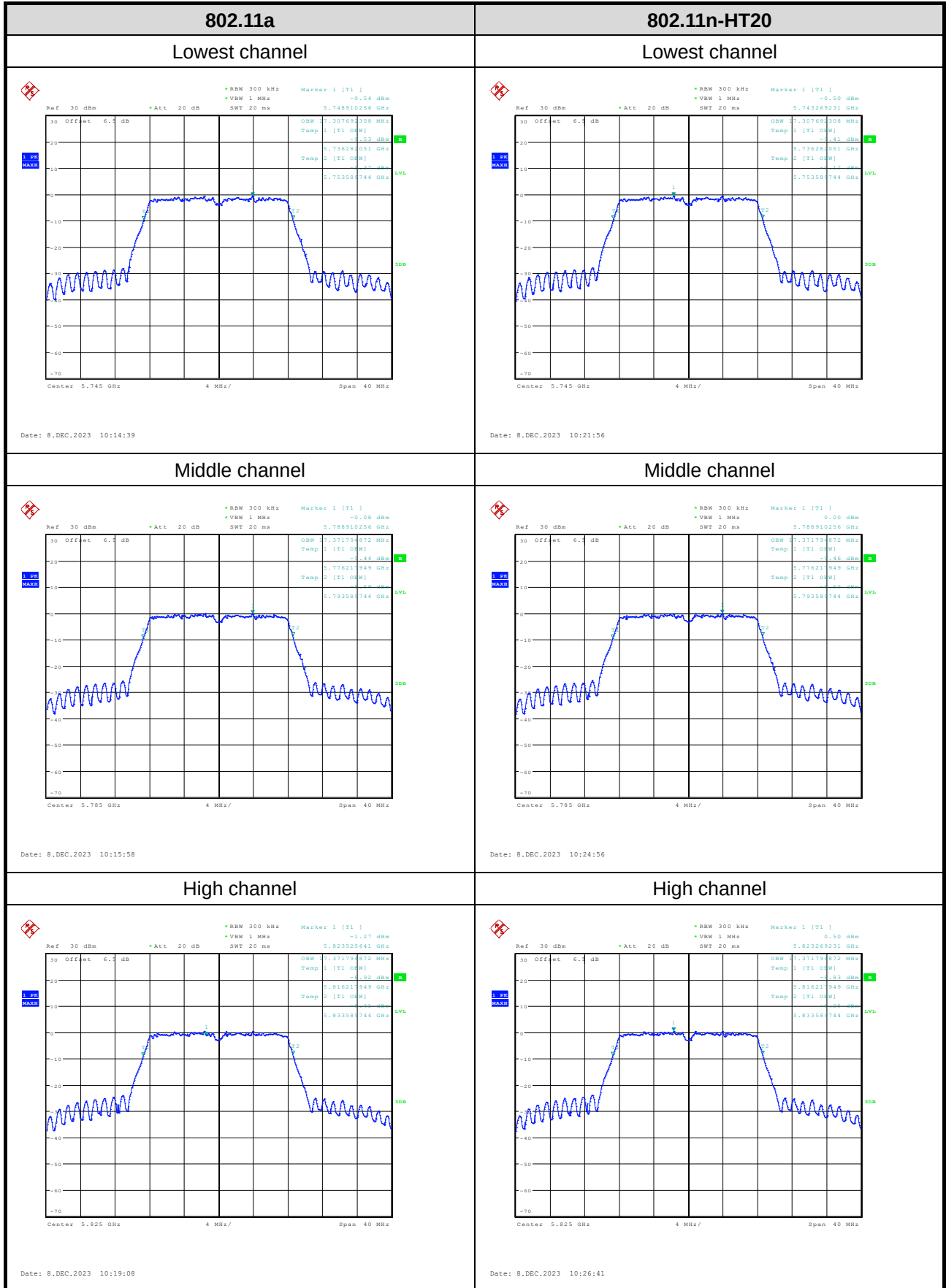
99% Occupied Bandwidth

5150-5250MHz



802.11n-HT40	/
Lowest channel	/
 Ref: 30 dBm *Att: 20 dB SWF: 20 ms Marker 1 [T1] -0.18 dBm 5.184230769 GHz OBW: 36.66666667 MHz Temp 1 [T1] 0 dBm Temp 2 [T1] 0 dBm Temp 3 [T1] 0 dBm Temp 4 [T1] 0 dBm Temp 5 [T1] 0 dBm Temp 6 [T1] 0 dBm Temp 7 [T1] 0 dBm Temp 8 [T1] 0 dBm Temp 9 [T1] 0 dBm Temp 10 [T1] 0 dBm Temp 11 [T1] 0 dBm Temp 12 [T1] 0 dBm Temp 13 [T1] 0 dBm Temp 14 [T1] 0 dBm Temp 15 [T1] 0 dBm Temp 16 [T1] 0 dBm Temp 17 [T1] 0 dBm Temp 18 [T1] 0 dBm Temp 19 [T1] 0 dBm Temp 20 [T1] 0 dBm Center: 5.19 GHz Span: 80 MHz Date: 8.DEC.2023 10:10:43	/
High channel	/
 Ref: 30 dBm *Att: 20 dB SWF: 20 ms Marker 1 [T1] -0.47 dBm 5.224230769 GHz OBW: 36.66666667 MHz Temp 1 [T1] 0 dBm Temp 2 [T1] 0 dBm Temp 3 [T1] 0 dBm Temp 4 [T1] 0 dBm Temp 5 [T1] 0 dBm Temp 6 [T1] 0 dBm Temp 7 [T1] 0 dBm Temp 8 [T1] 0 dBm Temp 9 [T1] 0 dBm Temp 10 [T1] 0 dBm Temp 11 [T1] 0 dBm Temp 12 [T1] 0 dBm Temp 13 [T1] 0 dBm Temp 14 [T1] 0 dBm Temp 15 [T1] 0 dBm Temp 16 [T1] 0 dBm Temp 17 [T1] 0 dBm Temp 18 [T1] 0 dBm Temp 19 [T1] 0 dBm Temp 20 [T1] 0 dBm Center: 5.23 GHz Span: 80 MHz Date: 8.DEC.2023 10:11:48	/

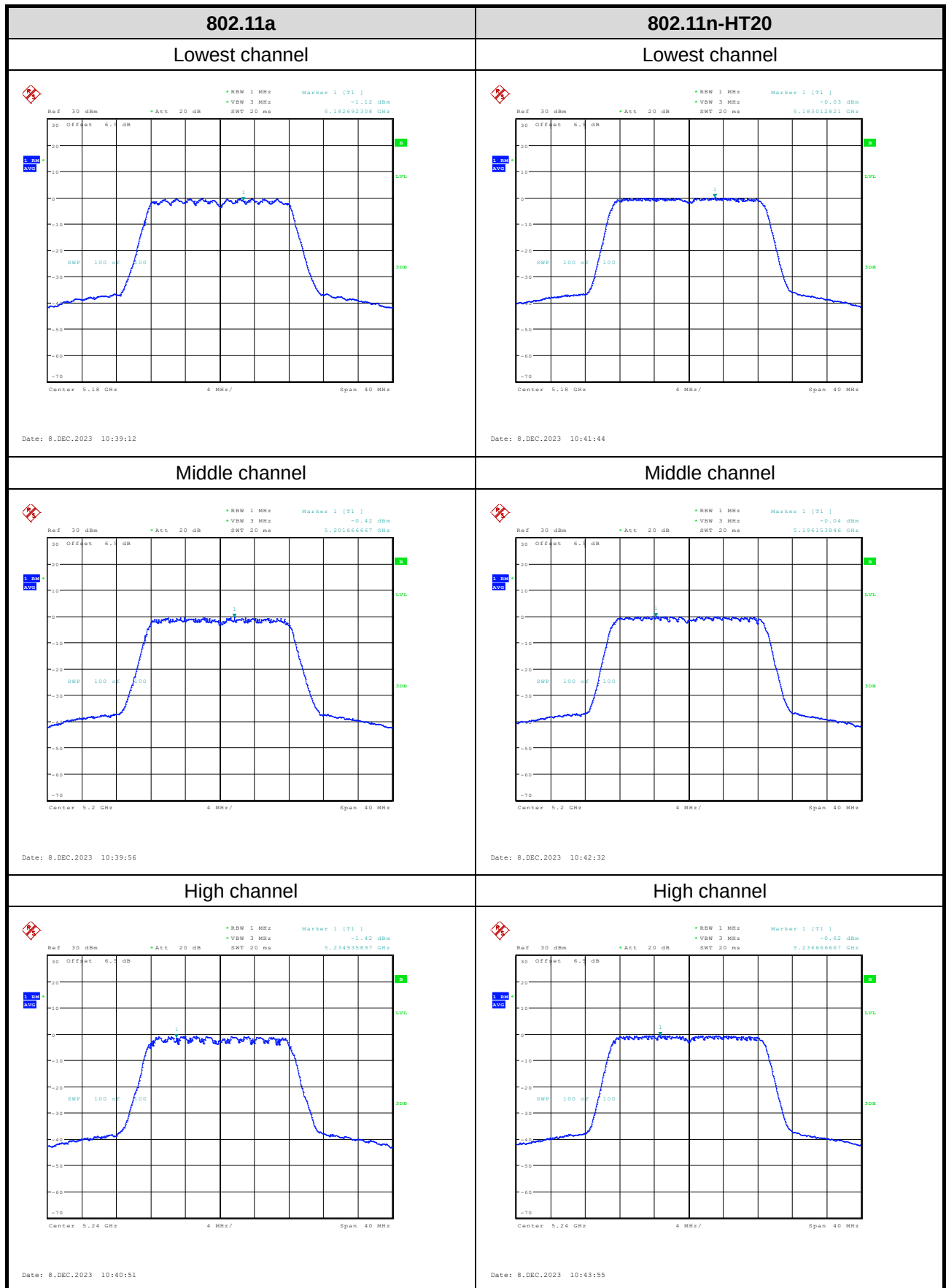
5725-5850MHz:



802.11n-HT40	/
Lowest channel	/
Ref: 30 dBm *Att: 20 dB RBW 500 kHz Marker 1 [T1] -2.94 dBm VBW 2 MHz SWT 20 ms 5.75533333 GHz 30 Offset 6.3 dB DBW 5.66666667 MHz Temp 1 [T1 Off] -2.92 dBm 1.95 5.75666667 GHz Temp 2 [T1 Off] -2.92 dBm 5.77333333 GHz 5.77333333 GHz Center 5.755 GHz 8 MHz/ Span 80 MHz	/
High channel	/
Ref: 30 dBm *Att: 20 dB RBW 500 kHz Marker 1 [T1] -3.24 dBm VBW 2 MHz SWT 20 ms 5.80311784 GHz 30 Offset 6.3 dB DBW 5.66666667 MHz Temp 1 [T1 Off] -3.02 dBm 1.95 5.77666667 GHz Temp 2 [T1 Off] -3.02 dBm 5.81333333 GHz 5.81333333 GHz Center 5.795 GHz 8 MHz/ Span 80 MHz	/

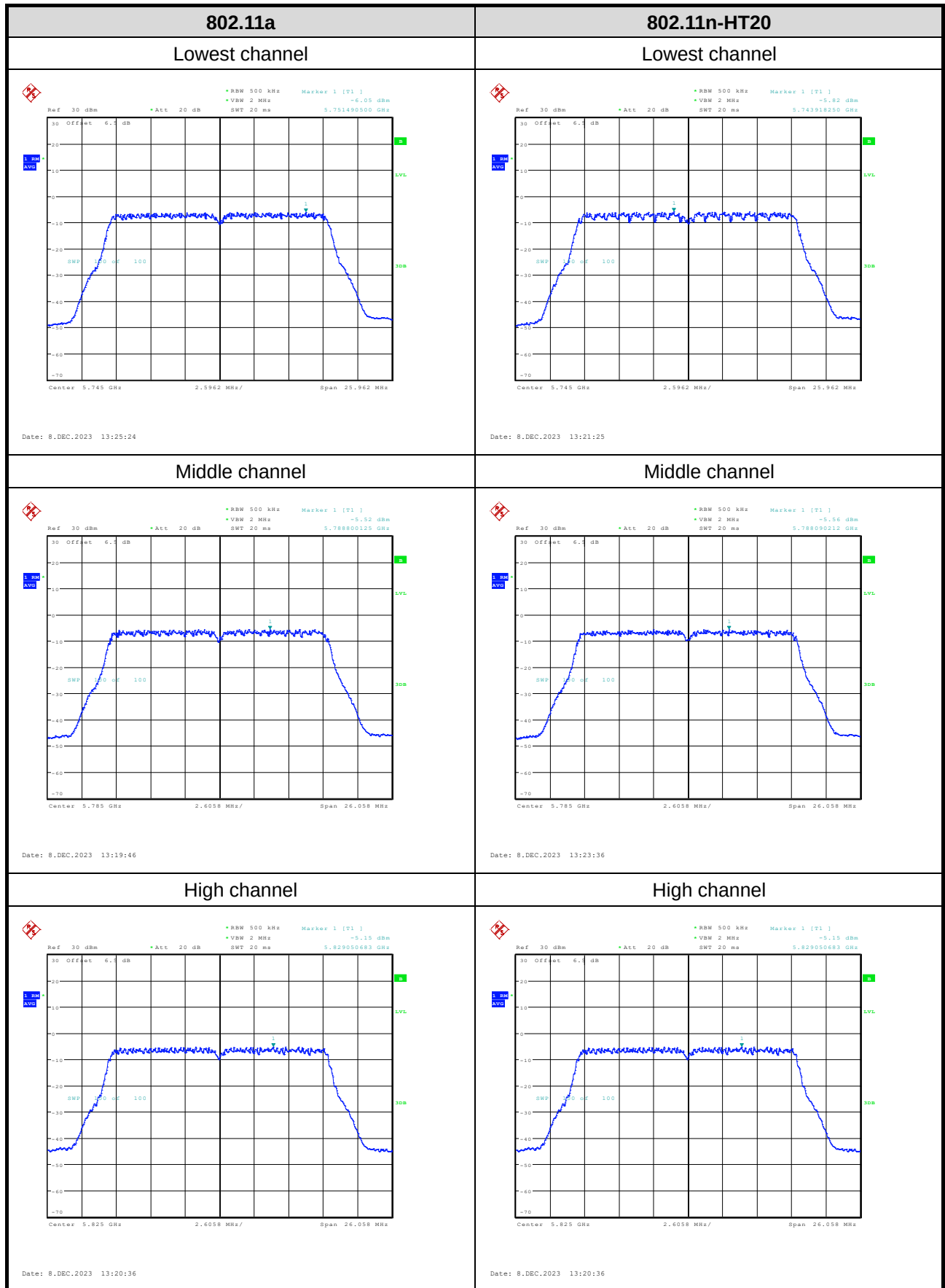
Power Spectral Density

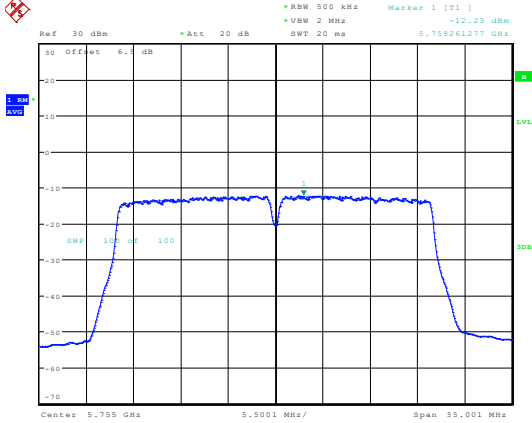
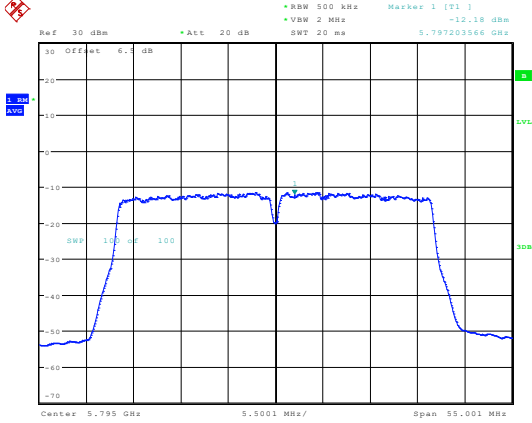
5150-5250MHz:



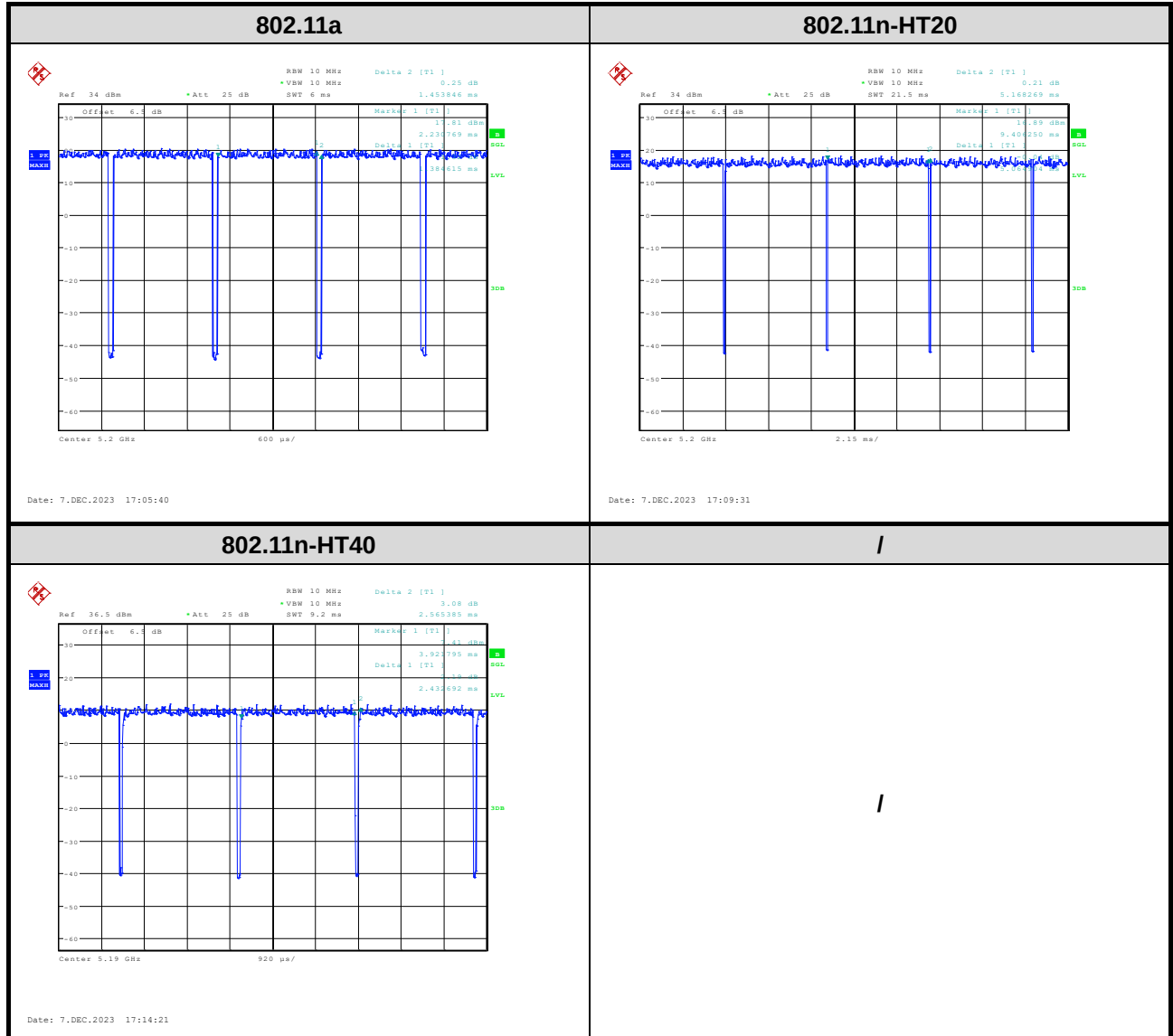
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5725-5850MHz:



802.11n-HT40	/
Lowest channel	/
 Ref: 30 dBm *Att: 20 dB *RBW: 500 kHz Marker 1 [T1] -12.23 dBm *VSW: 2 MHz SWR: 20 ms 5.75501277 GHz Center: 5.755 GHz 5.5001 MHz/ Span: 55.001 MHz Date: 8.DEC.2023 10:56:38	
High channel	/
 Ref: 30 dBm *Att: 20 dB *RBW: 500 kHz Marker 1 [T1] -12.18 dBm *VSW: 2 MHz SWR: 20 ms 5.797203566 GHz Center: 5.795 GHz 5.5001 MHz/ Span: 55.001 MHz Date: 8.DEC.2023 10:57:20	/

Duty Cycle



4 Test Setup Photo

Please refer to the attachment RWAY202300018 Test Setup photo.

5 E.U.T Photo

Please refer to the attachment RWAY202300018 External photo and RWAY202300018 Internal photo.

---End of Report---