FCC Test Report

Report No.:	RWAQ202400241C
Applicant:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen,Guangdong, China
Product Name:	Projector
Product Model:	D001
Multiple Models:	EAZZE D1, D002, D003,D004,D005
Trade Mark:	N/A
FCC ID:	2BEGB-YX02
Standards:	FCC CFR Title 47 Part 15C (§15.247)
Test Date:	2024-03-19 to 2024-04-10
Test Result:	Complied
Report Date:	2024-04-15

Reviewed by: Abel Chen — Project Engineer

Approved by: Jacob Kong — Manager

Prepared by:

World Alliance Testing & 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

NVLAP TESTING NVLAP LAB CODE 600335-0

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5. The information marked "#" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

Revision History

Version No.	Issued Date	Description
00	*2024-04-15*	*Original*

Contents

1 General Information

1.1 Client Information

Applicant:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen,Guangdong, China
Manufacturer:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen,Guangdong, China

1.2 Product Description of EUT

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

Sample Serial Number	*6S-1 for CE Test, 6S-2 for RE test, 6S-3 for RF test conducted test (assigned by WATC)*
Sample Received Date	*2024-03-19*
Sample Status	*Good Condition*
Frequency Range	2412MHz - 2472MHz(802.11b, g, n-HT20) 2422MHz - 2462MHz(802.11n-HT40)
Maximum Conducted Peak Output Power	11.76dBm
Modulation Technology	DSSS, OFDM
Antenna Gain#	ANT 1:4.23dBi; ANT2: 1.75dBi
Spatial Streams#	MIMO (2TX, 2RX)
Power Supply	DC 21V from adapter
Operating temperature#	0 deg.C to +35 deg.C
Adapter 1 Information	Model: JDA2102850WUS Input: AC100-240V, 50/60Hz, 1.25A Output: DC 21V/2.85A
Adapter 2 Information	Model: Z72A210285US00 Input: AC100-240V, 50/60Hz, 1.5A Output: DC 21V/2.85A
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 product internal photos for details.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DSS, FCC ID: 2BEGB-YX02

FCC Part 15, Subpart E, Equipment Class: NII, FCC ID: 2BEGB-YX02

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
Emissions, Conducted		1.75dB
Conducted Power		0.74dB
Frequency Error		150Hz
Bandwidth		0.34%
Power Spectral Density		0.74dB

Note: *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.*

1.6 Laboratory Location

World Alliance Testing & 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 C63.10-2013

2 Description of Measurement

2.1 Test Configuration

Operating channels:					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	6	2437	11	2462
2	2417	7	2442	12	2467
3	2422	8	2447	13	2472
4	2427	9	2452	/	/
5	2432	10	2457	/	/
According to ANSI C63.10-2013 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					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	7	2442	13	2472
802.11n-HT40					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
3	2422	7	2442	11	2462

Test Mode:				
Transmitting mode:	Keep the EUT in continuous transmitting with modulation			
Exercise software#:	SecureCRT			
Mode	**Worst-case Data rate**	**Power Level Setting#**		
		Low Channel	**Middle Channel**	**High Channel**
802.11b	1Mbps	2	2	2
802.11g	6Mbps	1	1	1
802.11n-HT20	6.5Mbps	0	0	0
802.11n-HT40	13.5Mbps	0	0	0
The exercise software and the maximum power setting that provided by manufacturer.				

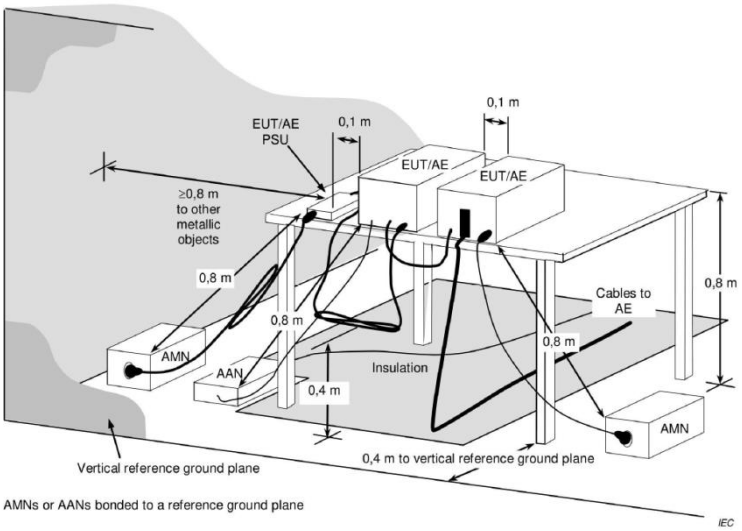
Worst-Case Configuration:
For AC power line conducted emission and radiated emission 9kHz-1GHz and above 18GHz were performed with the EUT transmits at the channel with highest output power as worst-case scenario. According to manufacturer, the device support MIMO mode, all modes share the same power level setting under the same modulation. So the worst mode MIMO was selected to test

2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
aigo	USB flash disk*2	unknown	unknown
unknown	Earphone	unknown	unknown
TMALL	magicbox	unknown	unknown
unknown	HDMI cable	unknown	unknown
unknown	Audio cable	unknown	unknown
DELL	laptop	unknown	unknown

2.3 Test Setup

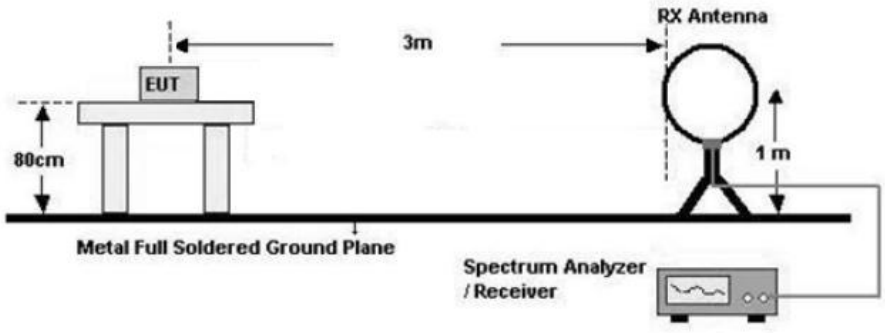
1) Conducted emission measurement:



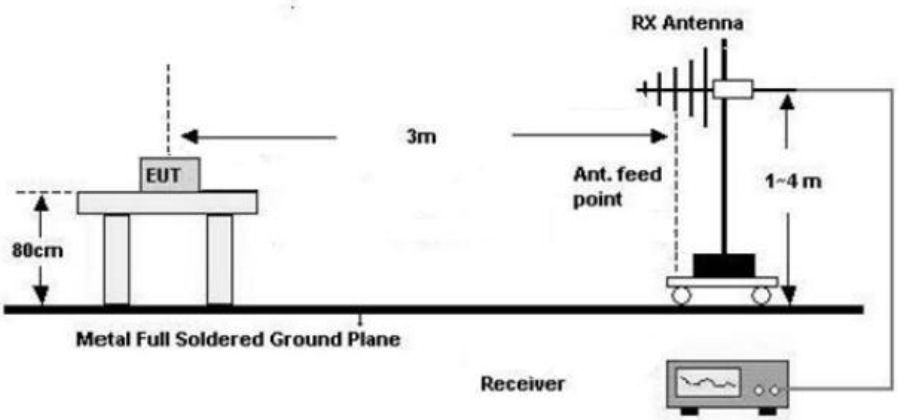
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

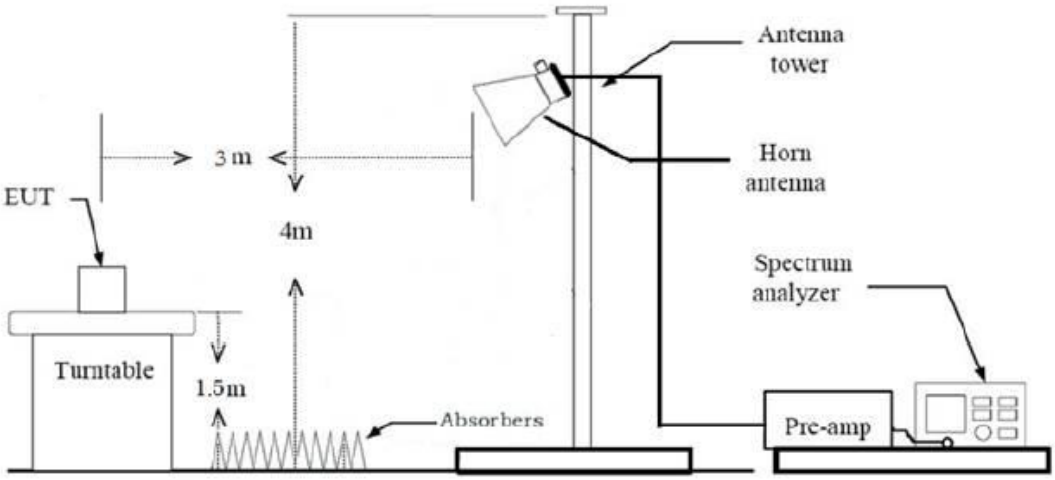
Below 30MHz (3m SAC)



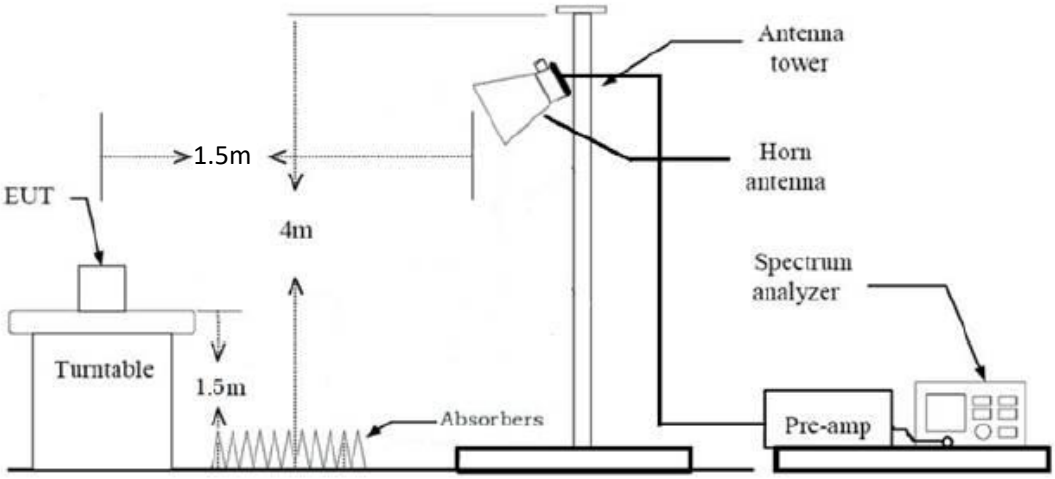
30MHz-1GHz (3m SAC)



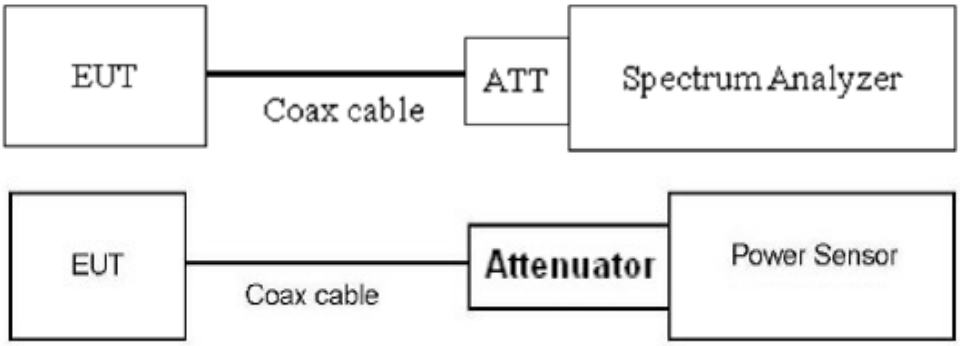
1GHz-18GHz(3m FAC)



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*Log (test distance / specification distance).
2. Loop antenna use, investigation was done on the three antenna orientations (parallel, perpendicular, gound-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 6.0dB Attenuator and 0.5dB cable) was entered as an offset in the test equipment. 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 C63.10-2013 Section 6.2
Maximum Conducted Output Power	ANSI C63.10-2013 Section 11.9.1.2 PKPM1 Peak power meter method or ANSI C63.10-2013 Section 11.9.2.3.2 Method AVGPM-G
Power Spectral Density	ANSI C63.10-2013 Section 11.10.2 Method PKPSD (peak PSD)
6 dB Emission Bandwidth	ANSI C63.10-2013 Section 11.8.1
99% Occupied Bandwidth	ANSI C63.10-2013 Section 6.9.3
100kHz Bandwidth of Frequency Band Edge	ANSI C63.10-2013 Section 6.10
Radiated emission	ANSI C63.10-2013 Section 11.11&11.12
Duty Cycle	ANSI C63.10-2013 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
BACL	Loop Antenna	1313-1A	4010611	2024/2/7	2027/2/6
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-2400-2483.5-50N	OE02103119	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)	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

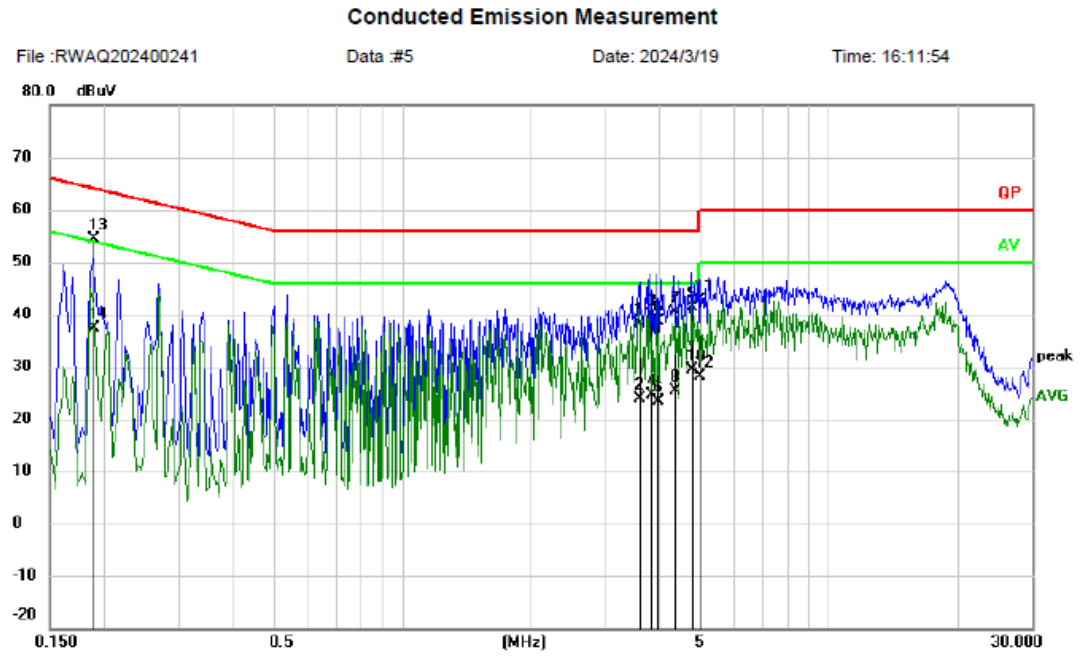
3.2 Limit

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:	2024-03-19	Test By:	Lirou Li
Environment condition:	Temperature: 25.6°C; Relative Humidity:51%; ATM Pressure: 101.1kPa		

Adapter 1



Limit: QP
Mode:transmitting
Note: 802.11n20 High channel

Phase: L1
Power: AC 120V/60Hz

Temperature: 25.6
Humidity: 51 %
Air Pressure: 1011 hpa

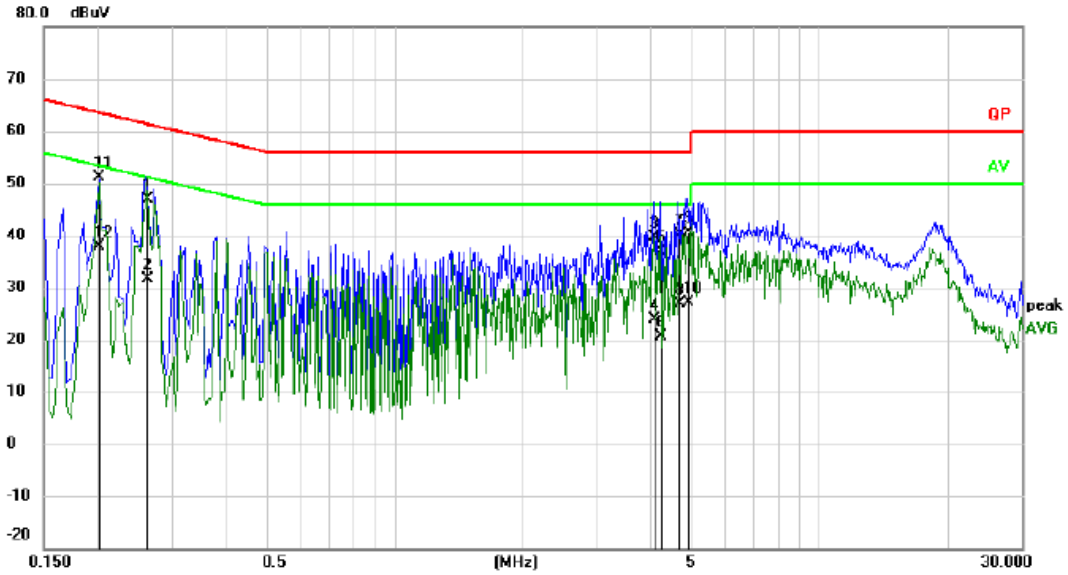
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		3.6180	27.21	11.00	38.21	56.00	-17.79	QP	
2		3.6180	12.86	11.00	23.86	46.00	-22.14	AVG	
3		3.8380	28.71	11.06	39.77	56.00	-16.23	QP	
4		3.8380	13.68	11.06	24.74	46.00	-21.26	AVG	
5		3.9820	27.52	11.10	38.62	56.00	-17.38	QP	
6		3.9820	12.19	11.10	23.29	46.00	-22.71	AVG	
7		4.3420	29.38	11.12	40.50	56.00	-15.50	QP	
8		4.3420	14.24	11.12	25.36	46.00	-20.64	AVG	
9		4.7900	30.26	11.13	41.39	56.00	-14.61	QP	
10		4.7900	18.31	11.13	29.44	46.00	-16.56	AVG	
11		4.9980	31.38	11.14	42.52	56.00	-13.48	QP	
12		4.9980	16.89	11.14	28.03	46.00	-17.97	AVG	
13	*	0.1900	43.80	10.65	54.45	64.04	-9.59	QP	
14		0.1900	26.72	10.65	37.37	54.04	-16.67	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

Conducted Emission Measurement

File :RWAQ202400241 Data :#6 Date: 2024/3/19 Time: 16:13:39



Limit: QP Phase: N Temperature: 25.6

Mode:transmitting Power: AC 120V/60Hz Humidity: 51 %

Note: 802.11n20 High 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		0.2620	36.32	10.49	46.81	61.37	-14.56	QP	
2		0.2620	21.21	10.49	31.70	51.37	-19.67	AVG	
3		4.0860	29.09	10.42	39.51	56.00	-16.49	QP	
4		4.0860	13.52	10.42	23.94	46.00	-22.06	AVG	
5		4.2380	26.46	10.44	36.90	56.00	-19.10	QP	
6		4.2380	10.28	10.44	20.72	46.00	-25.28	AVG	
7		4.6779	29.61	10.50	40.11	56.00	-15.89	QP	
8		4.6779	16.45	10.50	26.95	46.00	-19.05	AVG	
9		4.9180	30.16	10.53	40.69	56.00	-15.31	QP	
10		4.9180	16.72	10.53	27.25	46.00	-18.75	AVG	
11	*	0.2020	40.67	10.41	51.08	63.53	-12.45	QP	
12		0.2020	27.52	10.41	37.93	53.53	-15.60	AVG	

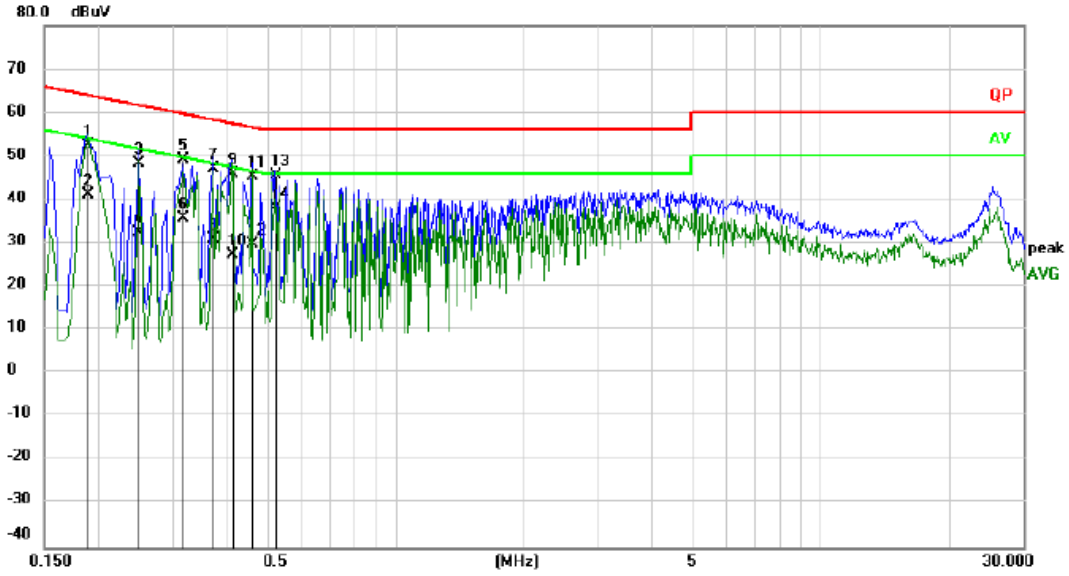
*:Maximum data x:Over limit !:over margin Engineer Signature: Lirou

Test Date:	2024-04-09	Test By:	Lirou Li
Environment condition:	Temperature: 23.1°C; Relative Humidity:56%; ATM Pressure: 101.4kPa		

Adapter 2

Conducted Emission Measurement

File :RWAQ202400241 Data :#5 Date: 2024/4/9 Time: 17:27:52



Limit: QP Phase: L1 Temperature: 23.1

Mode:transmitting Power: AC 120V/60Hz Humidity: 56 %

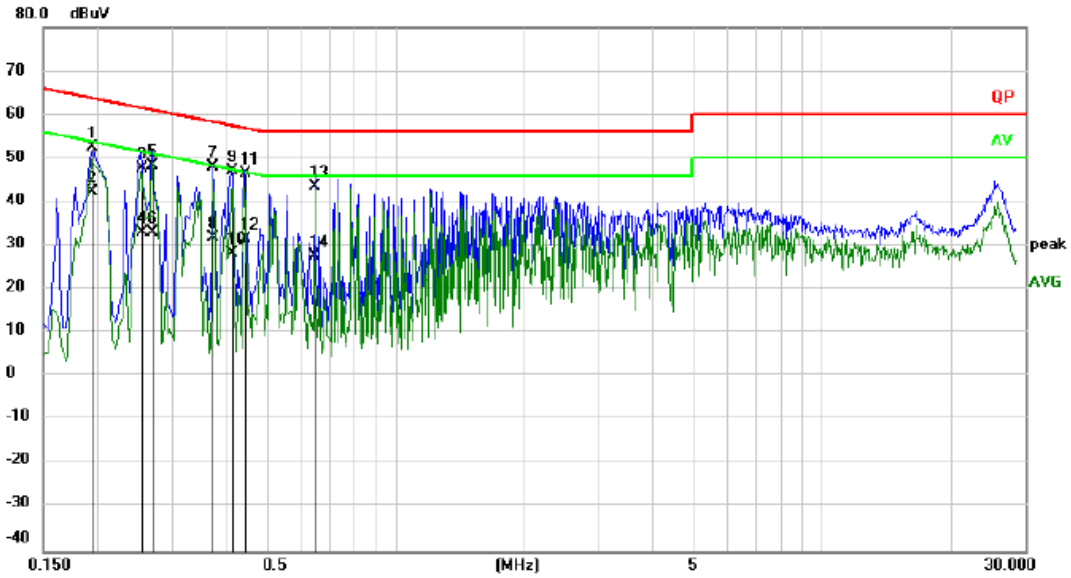
Note: 802.11n20 High channel Air Pressure: 1014 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1900	41.84	10.65	52.49	64.04	-11.55	QP	
2		0.1900	30.59	10.65	41.24	54.04	-12.80	AVG	
3		0.2500	37.79	10.66	48.45	61.76	-13.31	QP	
4		0.2500	21.88	10.66	32.54	51.76	-19.22	AVG	
5		0.3180	38.53	10.72	49.25	59.76	-10.51	QP	
6		0.3180	25.11	10.72	35.83	49.76	-13.93	AVG	
7		0.3740	36.25	10.77	47.02	58.41	-11.39	QP	
8		0.3740	20.28	10.77	31.05	48.41	-17.36	AVG	
9		0.4140	35.13	10.78	45.91	57.57	-11.66	QP	
10		0.4140	16.61	10.78	27.39	47.57	-20.18	AVG	
11		0.4620	34.65	10.80	45.45	56.66	-11.21	QP	
12		0.4620	19.08	10.80	29.88	46.66	-16.78	AVG	
13		0.5220	34.98	10.82	45.80	56.00	-10.20	QP	
14	*	0.5220	27.27	10.82	38.09	46.00	-7.91	AVG	

*:Maximum data x:Over limit !:over margin Engineer Signature: Lirou

Conducted Emission Measurement

File :RWAQ202400241 Data :#6 Date: 2024/4/9 Time: 17:31:02



Limit: QP
Mode:transmitting
Note: 802.11n20 High channel

Phase: N
Power: AC 120V/60Hz

Temperature: 23.1
Humidity: 56 %
Air Pressure: 1014 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1955	42.05	10.43	52.48	63.80	-11.32	QP	
2		0.1955	32.00	10.43	42.43	53.80	-11.37	AVG	
3		0.2540	37.22	10.48	47.70	61.63	-13.93	QP	
4		0.2540	22.56	10.48	33.04	51.63	-18.59	AVG	
5		0.2700	37.72	10.50	48.22	61.12	-12.90	QP	
6		0.2700	22.64	10.50	33.14	51.12	-17.98	AVG	
7		0.3740	37.39	10.62	48.01	58.41	-10.40	QP	
8		0.3740	21.14	10.62	31.76	48.41	-16.65	AVG	
9		0.4140	36.37	10.65	47.02	57.57	-10.55	QP	
10		0.4140	17.74	10.65	28.39	47.57	-19.18	AVG	
11	*	0.4460	36.00	10.68	46.68	56.95	-10.27	QP	
12		0.4460	20.96	10.68	31.64	46.95	-15.31	AVG	
13		0.6500	33.05	10.60	43.65	56.00	-12.35	QP	
14		0.6500	16.96	10.60	27.56	46.00	-18.44	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

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:

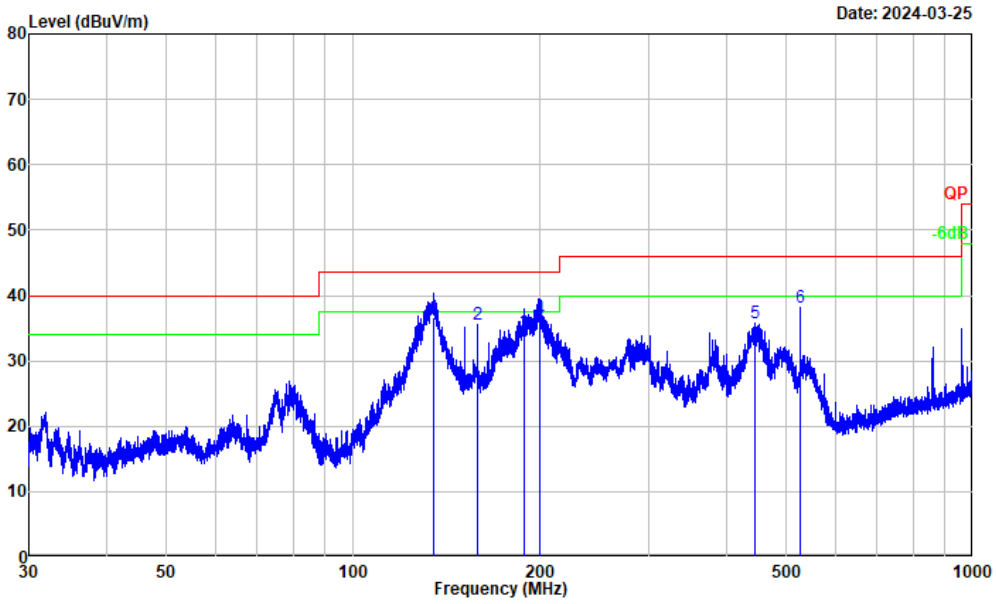
Test Date:	2024-03-25	**Test By:**	Luke Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:69%; ATM Pressure: 100.8kPa		

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

30MHz-1GHz:

Test Date:	2024-03-25	Test By:	Luke Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:69%; ATM Pressure: 100.8kPa		

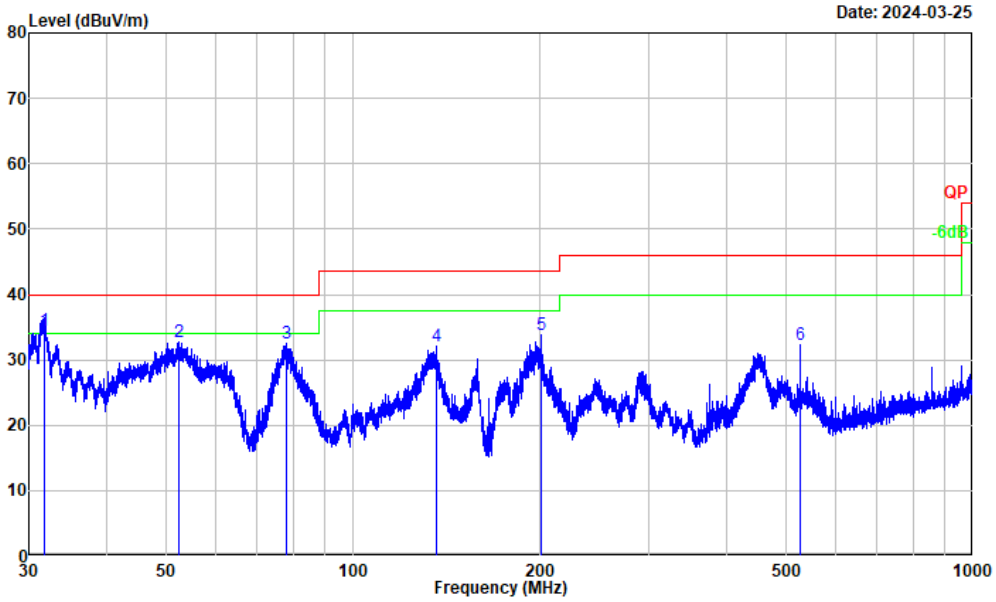
Adapter 1



Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 23.8℃/69%R.H./100.8kPa
Tested by : Luke Li
Polarization : horizontal
Remark : 802.11n20 High channel

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	135.117	54.90	-18.29	36.61	43.50	-6.89	QP
2	158.770	53.37	-17.83	35.54	43.50	-7.96	Peak
3	188.538	50.01	-15.79	34.22	43.50	-9.28	QP
4	199.770	51.30	-14.81	36.49	43.50	-7.01	QP
5	445.978	45.72	-9.85	35.87	46.00	-10.13	Peak
6	526.816	46.74	-8.52	38.22	46.00	-7.78	Peak

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



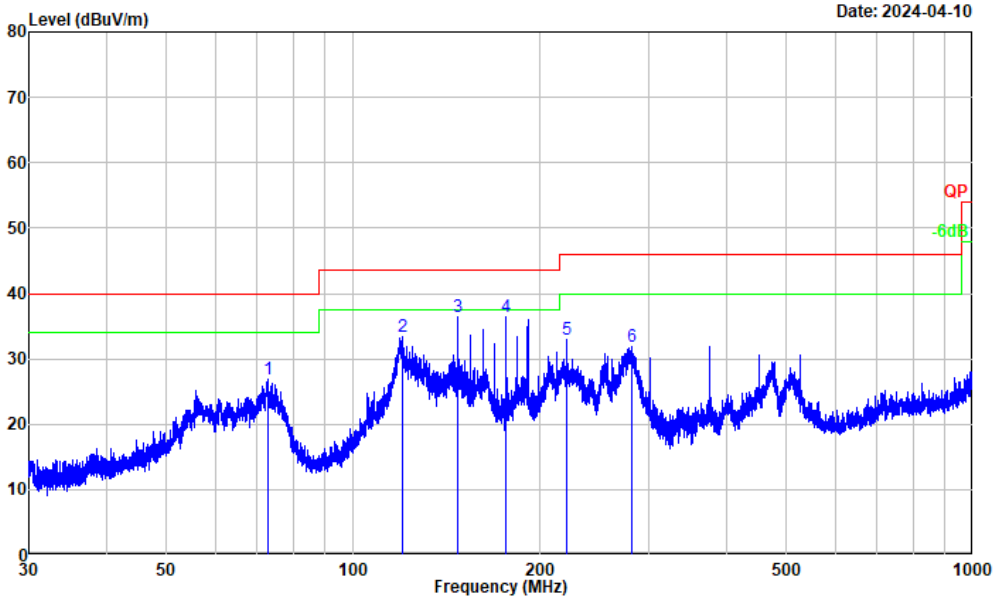
Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 23.8℃/69%R.H./100.8kPa
Tested by : Luke Li
Polarization : vertical
Remark : 802.11n20 High channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	31.745	50.10	-15.73	34.37	40.00	-5.63	QP
2	52.464	45.51	-12.81	32.70	40.00	-7.30	Peak
3	78.114	51.29	-18.85	32.44	40.00	-7.56	Peak
4	136.247	50.37	-18.38	31.99	43.50	-11.51	Peak
5	201.088	48.64	-14.81	33.83	43.50	-9.67	Peak
6	526.816	40.78	-8.52	32.26	46.00	-13.74	Peak

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

Test Date:	2024-04-10	Test By:	Luke Li
Environment condition:	Temperature: 22.2°C; Relative Humidity:64%; ATM Pressure: 101.2kPa		

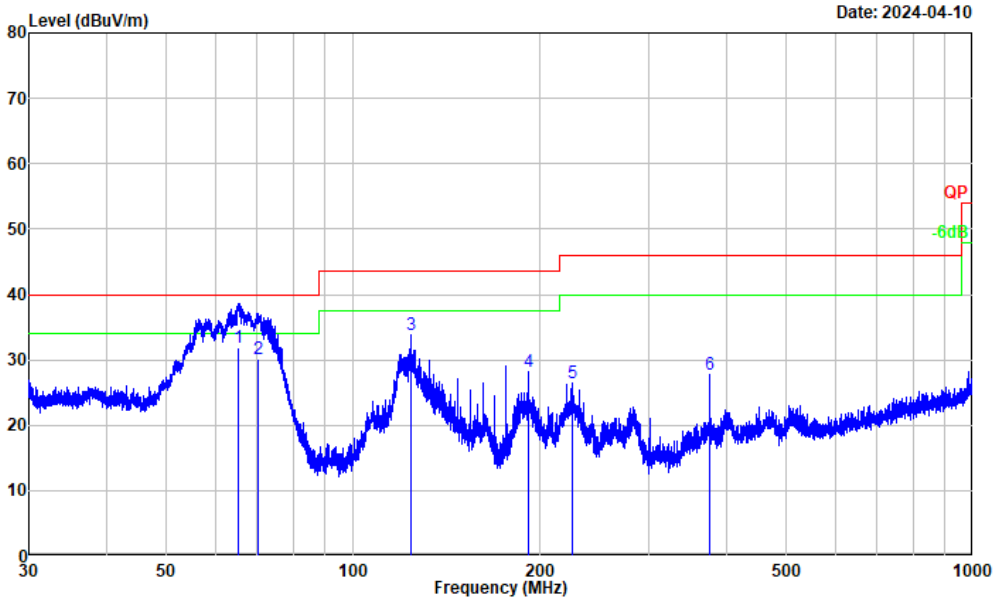
Adapter 2



Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 22.2℃/64%R.H./101.2kPa
Tested by : Luke Li
Polarization : horizontal
Remark : 802.11n20 High channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	73.079	44.95	-18.08	26.87	40.00	-13.13	Peak
2	119.929	49.95	-16.62	33.33	43.50	-10.17	Peak
3	147.304	54.85	-18.44	36.41	43.50	-7.09	Peak
4	176.772	53.40	-16.89	36.51	43.50	-6.99	Peak
5	220.866	47.59	-14.64	32.95	46.00	-13.05	Peak
6	282.321	44.86	-12.98	31.88	46.00	-14.12	Peak

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



Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 22.2℃/64%R.H./101.2kPa
Tested by : Luke Li
Polarization : vertical
Remark : 802.11n20 High channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	65.350	46.90	-15.11	31.79	40.00	-8.21	QP
2	70.221	47.10	-17.05	30.05	40.00	-9.95	Peak
3	124.209	51.28	-17.46	33.82	43.50	-9.68	Peak
4	191.454	43.73	-15.48	28.25	43.50	-15.25	Peak
5	225.661	40.89	-14.37	26.52	46.00	-19.48	Peak
6	376.057	38.58	-10.77	27.81	46.00	-18.19	Peak

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

Remark:

Result = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Over Limit = Result – Limit

Above 1GHz:

Test Date:	2024-03-25	Test By:	Bard Huang
Environment condition:	Temperature: 23.8°C; Relative Humidity:69%; ATM Pressure: 100.8kPa		

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
802.11b							
Low Channel							
2390.000	37.15	horizontal	8.25	45.40	54.00	-8.60	Average
2390.000	47.90	horizontal	8.25	56.15	74.00	-17.85	Peak
2390.000	37.11	vertical	8.25	45.36	54.00	-8.64	Average
2390.000	49.78	vertical	8.25	58.03	74.00	-15.97	Peak
4824.000	47.94	horizontal	0.26	48.20	74.00	-25.80	Peak
4824.000	47.91	vertical	0.26	48.17	74.00	-25.83	Peak
Middle Channel							
4884.000	47.93	horizontal	0.46	48.39	74.00	-25.61	Peak
4884.000	48.64	vertical	0.46	49.10	74.00	-24.90	Peak
High Channel							
2483.500	38.98	horizontal	8.25	47.23	54.00	-6.77	Average
2483.500	50.03	horizontal	8.25	58.28	74.00	-15.72	Peak
2483.792	42.71	vertical	8.25	50.96	54.00	-3.04	Average
2483.792	52.62	vertical	8.25	60.87	74.00	-13.13	Peak
4944.000	48.52	horizontal	0.83	49.35	74.00	-24.65	Peak
4944.000	48.47	vertical	0.83	49.30	74.00	-24.70	Peak
802.11g							
Low Channel							
2390.000	38.20	horizontal	8.25	46.45	54.00	-7.55	Average
2390.000	48.77	horizontal	8.25	57.02	74.00	-16.98	Peak
2390.000	38.52	vertical	8.25	46.77	54.00	-7.23	Average
2390.000	48.97	vertical	8.25	57.22	74.00	-16.78	Peak
4824.000	48.80	horizontal	0.26	49.06	74.00	-24.94	Peak
4824.000	48.68	vertical	0.26	48.94	74.00	-25.06	Peak
Middle Channel							
4884.000	47.54	horizontal	0.46	48.00	74.00	-26.00	Peak
4884.000	47.33	vertical	0.46	47.79	74.00	-26.21	Peak
High Channel							
2483.872	39.57	horizontal	8.25	47.82	54.00	-6.18	Average

2483.872	51.54	horizontal	8.25	59.79	74.00	-14.21	Peak
2484.132	42.02	vertical	8.25	50.27	54.00	-3.73	Average
2484.132	54.24	vertical	8.25	62.49	74.00	-11.51	Peak
4944.000	47.96	horizontal	0.83	48.79	74.00	-25.21	Peak
4944.000	47.94	vertical	0.83	48.77	74.00	-25.23	Peak
802.11n20							
Low Channel							
2390.000	38.58	horizontal	8.25	46.83	54.00	-7.17	Average
2390.000	49.62	horizontal	8.25	57.87	74.00	-16.13	Peak
2390.000	38.81	vertical	8.25	47.06	54.00	-6.94	Average
2390.000	49.09	vertical	8.25	57.34	74.00	-16.66	Peak
4824.000	48.90	horizontal	0.26	49.16	74.00	-24.84	Peak
4824.000	48.02	vertical	0.26	48.28	74.00	-25.72	Peak
Middle Channel							
4884.000	48.36	horizontal	0.46	48.82	74.00	-25.18	Peak
4884.000	48.00	vertical	0.46	48.46	74.00	-25.54	Peak
High Channel							
2484.572	39.45	horizontal	8.25	47.70	54.00	-6.30	Average
2484.572	51.85	horizontal	8.25	60.10	74.00	-13.90	Peak
2483.812	42.74	vertical	8.25	50.99	54.00	-3.01	Average
2483.812	53.41	vertical	8.25	61.66	74.00	-12.34	Peak
4944.000	47.73	horizontal	0.83	48.56	74.00	-25.44	Peak
4944.000	48.40	vertical	0.83	49.23	74.00	-24.77	Peak
802.11n40							
Low Channel							
2388.929	39.85	horizontal	8.25	48.10	54.00	-5.90	Average
2388.929	50.95	horizontal	8.25	59.20	74.00	-14.80	Peak
2389.980	39.30	vertical	8.25	47.55	54.00	-6.45	Average
2389.980	50.29	vertical	8.25	58.54	74.00	-15.46	Peak
4844.000	48.75	horizontal	0.30	49.05	74.00	-24.95	Peak
4844.000	48.18	vertical	0.30	48.48	74.00	-25.52	Peak
Middle Channel							
4884.000	48.46	horizontal	0.46	48.92	74.00	-25.08	Peak
4884.000	48.04	vertical	0.46	48.50	74.00	-25.50	Peak
High Channel							
2483.500	41.32	horizontal	8.25	49.57	54.00	-4.43	Average
2483.500	53.53	horizontal	8.25	61.78	74.00	-12.22	Peak
2483.500	42.53	vertical	8.25	50.78	54.00	-3.22	Average

2483.500	57.95	vertical	8.25	66.20	74.00	-7.80	Peak
4924.000	48.31	horizontal	0.69	49.00	74.00	-25.00	Peak
4924.000	48.59	vertical	0.69	49.28	74.00	-24.72	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Corrected Amplitude – Limit

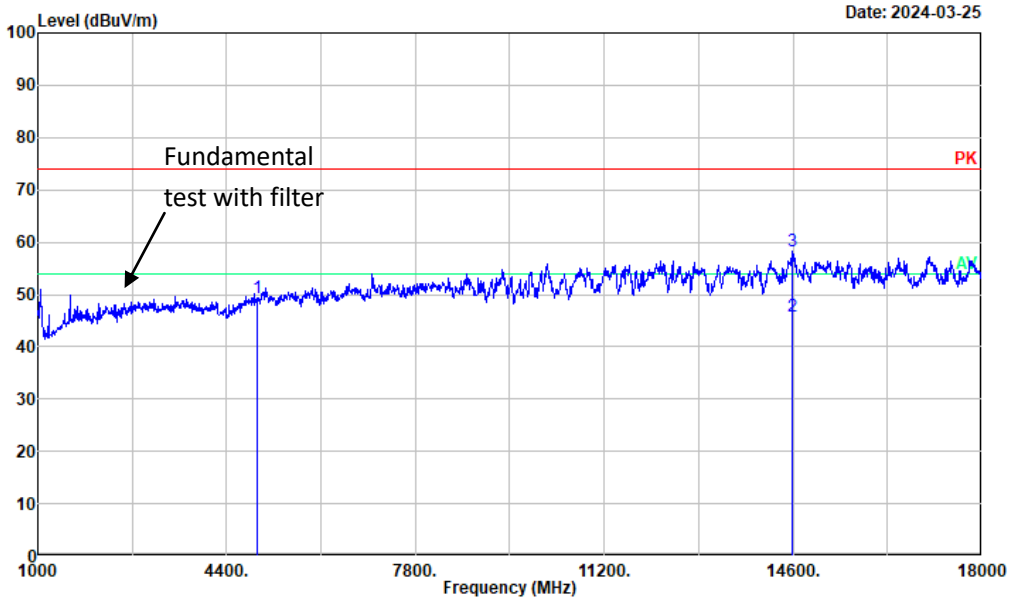
For the test result of Peak below the Peak limit more than 20dB, which can compliance with the average limit, just the Peak level was recorded.

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

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

Test plot for example as below:

Mode:	802.11b	Channel:	2472MHz

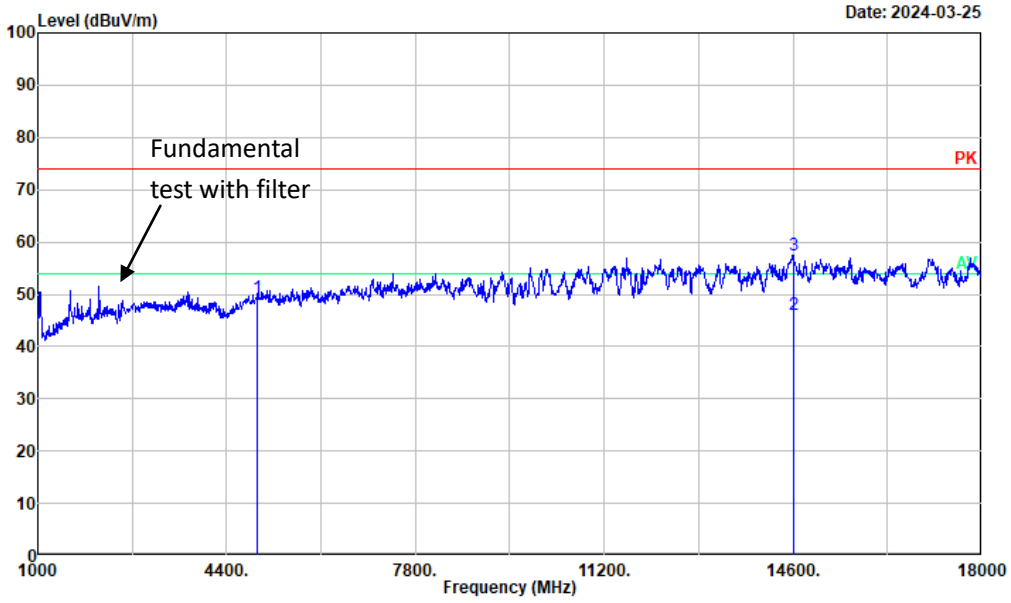


Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 23.8℃/69%R.H./100.8kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 802.11b High Channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	4944.000	48.52	0.83	49.35	74.00	-24.65	Peak
2	14581.290	36.22	9.45	45.67	54.00	-8.33	Average
3	14581.290	48.70	9.45	58.15	74.00	-15.85	Peak

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

Mode:	802.11b	Channel:	2472MHz



Project No. : RWAQ202400241
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 23.8℃/69%R.H./100.8kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 802.11b High Channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	4944.000	48.47	0.83	49.30	74.00	-24.70	Peak
2	14606.800	36.55	9.42	45.97	54.00	-8.03	Average
3	14606.800	48.05	9.42	57.47	74.00	-16.53	Peak

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

3.5 RF Conducted Test Data

Test Date:	2024-03-27~2024-03-28	Test By:	Ryan Zhang
Environment condition:	Temperature: 25.6~25.7°C;RelativeHumidity:54~66%; ATM Pressure: 101.4~101.6kPa		

3.5.1 6dB Emission Bandwidth and 99% Occupied Bandwidth

Test Mode	Antenna	Channel	6dB BW [MHz]	99% OBW[MHz]	6dB BW Limit[MHz]	Verdict
11B	Ant1	2412	9.108	13.280	0.5	pass
		2442	9.167	13.360	0.5	pass
		2472	9.090	13.360	0.5	pass
11G	Ant1	2412	15.231	16.800	0.5	pass
		2442	15.231	16.800	0.5	pass
		2472	15.231	16.800	0.5	pass
11N20MIMO	Ant1	2412	15.231	17.760	0.5	pass
		2442	15.205	17.760	0.5	pass
		2472	15.205	17.760	0.5	pass
11N40MIMO	Ant1	2422	35.325	36.160	0.5	pass
		2442	35.385	36.160	0.5	pass
		2462	35.385	36.160	0.5	pass

Note: test only performed on antenna 1.

3.5.2 Maximum Conducted Peak Output Power

Test Mode	Antenna	Channel [MHz]	Result [dBm]	Limit [dBm]	Verdict
11B MIMO	Ant1	2412	7.15	30	Pass
		2442	7.35	30	Pass
		2472	7.09	30	Pass
	Ant2	2412	7.19	30	Pass
		2442	7.46	30	Pass
		2472	7.17	30	Pass
	Total	2412	10.18	30	Pass
		2442	10.42	30	Pass
		2472	10.14	30	Pass
11G MIMO	Ant1	2412	8.50	30	Pass
		2442	8.47	30	Pass
		2472	8.54	30	Pass
	Ant2	2412	8.59	30	Pass

		2442	8.59	30	Pass
		2472	8.61	30	Pass
	Total	2412	11.56	30	Pass
		2442	11.54	30	Pass
		2472	11.59	30	Pass
11N20 MIMO	Ant1	2412	8.41	30	Pass
		2442	8.44	30	Pass
		2472	8.49	30	Pass
	Ant2	2412	8.99	30	Pass
		2442	8.96	30	Pass
		2472	8.99	30	Pass
	Total	2412	11.72	30	Pass
		2442	11.72	30	Pass
		2472	11.76	30	Pass
11N40 MIMO	Ant1	2422	7.35	30	Pass
		2437	7.58	30	Pass
		2462	7.46	30	Pass
	Ant2	2422	7.65	30	Pass
		2437	7.74	30	Pass
		2462	7.95	30	Pass
	Total	2422	10.51	30	Pass
		2437	10.67	30	Pass
		2462	10.72	30	Pass

Note:

The device employ CDD for MIMO mode, according to KDB 662911 D01 Multiple Transmitter Output v02r01, Directional gain = G_{ANT} + Array Gain

For power measurements on IEEE 802.11 devices:

Array Gain = 0 dB, for $N_{ANT} \leqslant 4$;

$G_{ANT\,1}$*=4.23dBi,* $G_{ANT\,2}$*=1.75dBi, use the higher antenna gain for calculate*

Directional gain=4.23+0=4.23dBi<6dBi

3.5.3 Power Spectral Density

Test Mode	Antenna	Channel [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B MIMO	Ant1	2412	-7.55	6.77	Pass
		2442	-6.31	6.77	Pass
		2472	-8.88	6.77	Pass
	Ant2	2412	-8.85	6.77	Pass
		2442	-10.74	6.77	Pass
		2472	-7.52	6.77	Pass
	Total	2412	-5.14	6.77	Pass

		2442	-4.97	6.77	Pass
		2472	-5.14	6.77	Pass
11G MIMO	Ant1	2412	-26.87	6.77	Pass
		2442	-26.46	6.77	Pass
		2472	-27.07	6.77	Pass
	Ant2	2412	-25.74	6.77	Pass
		2442	-27.58	6.77	Pass
		2472	-27.28	6.77	Pass
	Total	2412	-23.26	6.77	Pass
		2442	-23.97	6.77	Pass
		2472	-24.16	6.77	Pass
11N20 MIMO	Ant1	2412	-26.07	6.77	Pass
		2442	-26.38	6.77	Pass
		2472	-26.30	6.77	Pass
	Ant2	2412	-25.75	6.77	Pass
		2442	-25.20	6.77	Pass
		2472	-24.95	6.77	Pass
	Total	2412	-22.90	6.77	Pass
		2442	-22.74	6.77	Pass
		2472	-22.56	6.77	Pass
11N40 MIMO	Ant1	2422	-30.86	6.77	Pass
		2437	-29.23	6.77	Pass
		2462	-29.51	6.77	Pass
	Ant2	2422	-30.12	6.77	Pass
		2437	-29.40	6.77	Pass
		2462	-29.04	6.77	Pass
	Total	2422	-27.46	6.77	Pass
		2437	-26.30	6.77	Pass
		2462	-26.26	6.77	Pass

Note:

The device employ CDD for MIMO mode, according to KDB 662911 D01 Multiple Transmitter Output v02r01, Directional gain = G_{ANT} + Array Gain

For power spectral density (PSD) measurements:

Array Gain = 10 log(N_{ANT}/N_{SS}) dB;

$G_{ANT\,1}$=4.23dBi, $G_{ANT\,2}$=1.75dBi, use the higher antenna gain for calculate

Directional gain=4.23+10*log(2)=7.23dBi>6dBi

So the limit need reduce 1.23dB

3.5.4 100 kHz Bandwidth of Frequency Band Edge

Test Mode	Antenna	Channel	Result	Limit	Verdict
11B MIMO	Ant1	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
	Ant2	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
11G MIMO	Ant1	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
	Ant2	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
11N20 MIMO	Ant1	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
	Ant2	2412	Refer test plot	Refer test plot	Pass
		2472	Refer test plot	Refer test plot	Pass
11N40 MIMO	Ant1	2422	Refer test plot	Refer test plot	Pass
		2462	Refer test plot	Refer test plot	Pass
	Ant2	2422	Refer test plot	Refer test plot	Pass
		2462	Refer test plot	Refer test plot	Pass

3.5.5 Duty Cycle

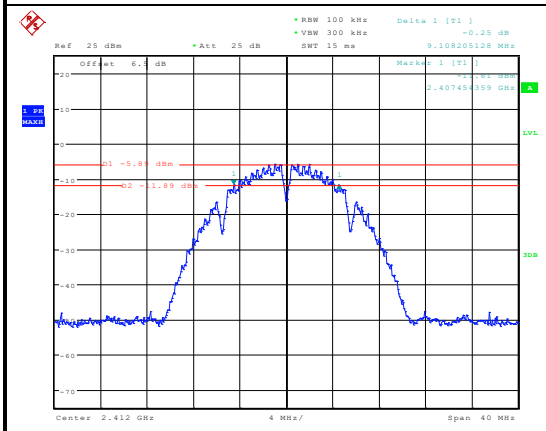
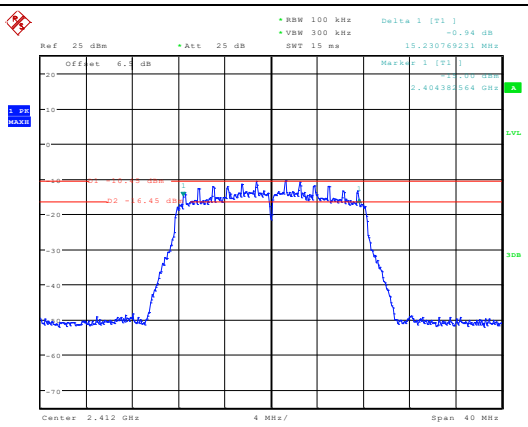
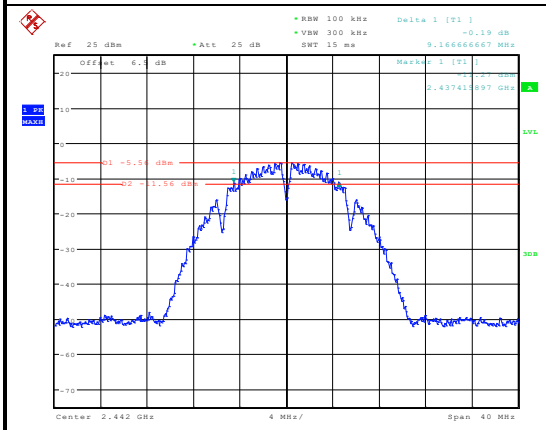
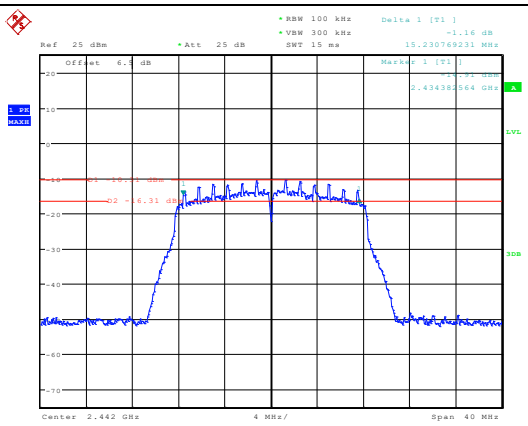
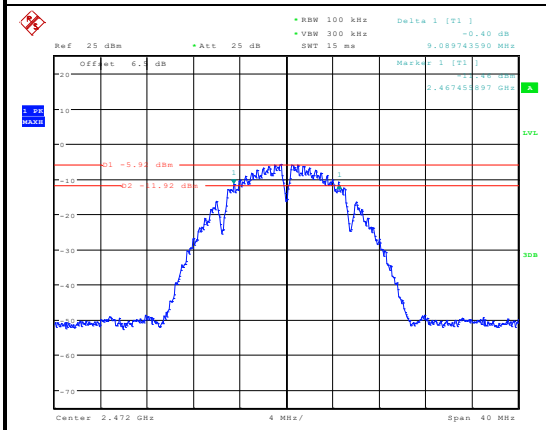
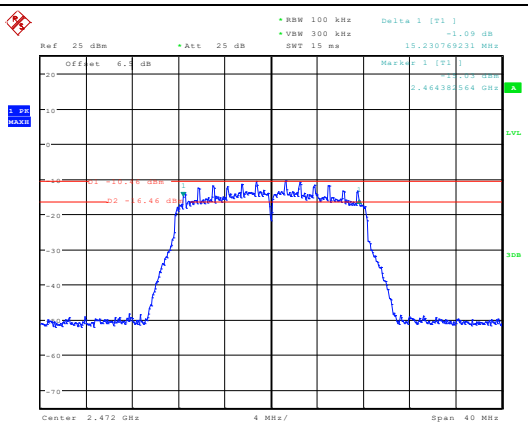
Test Mode	Antenna	Channel	Ton (ms)	Ton+off (ms)	Duty Cycle [%]	1/T[kHz]	VBW setting* [Hz]
11B	Ant1	2442	100	100	100	/	10
11G	Ant1	2442	1.404	1.439	97.57	0.712	1000
11N20	Ant1	2442	1.320	1.354	97.49	0.758	1000
11N40	Ant1	2442	0.665	0.701	94.86	1.503	2000

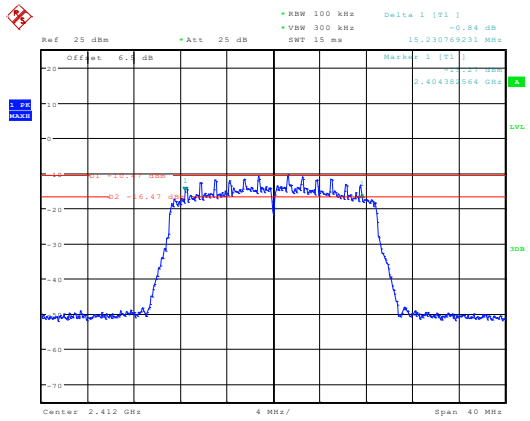
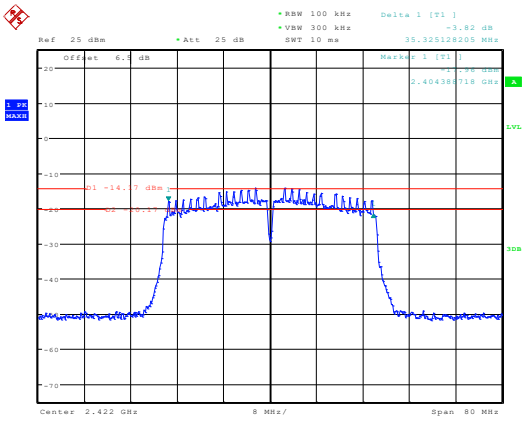
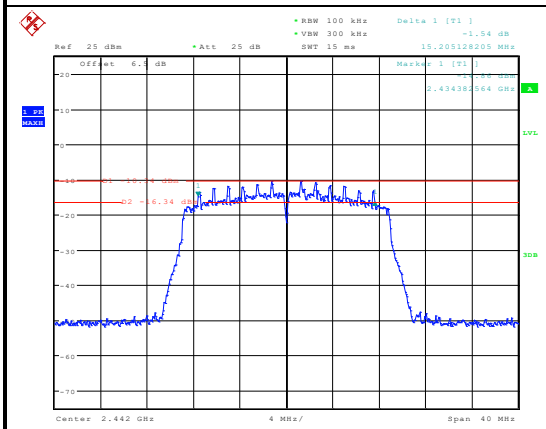
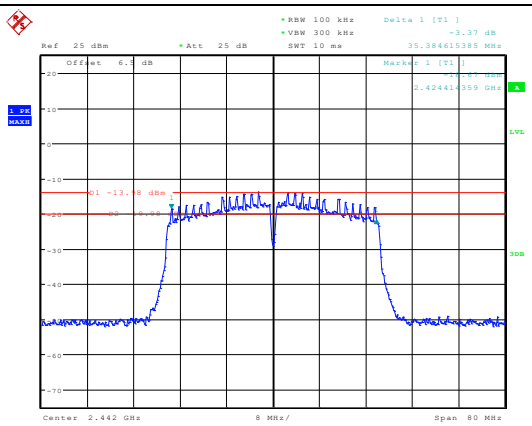
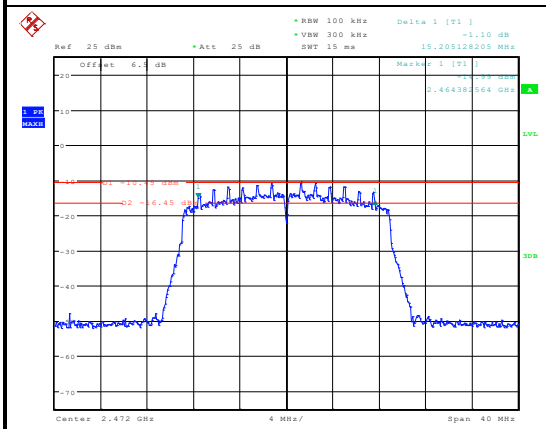
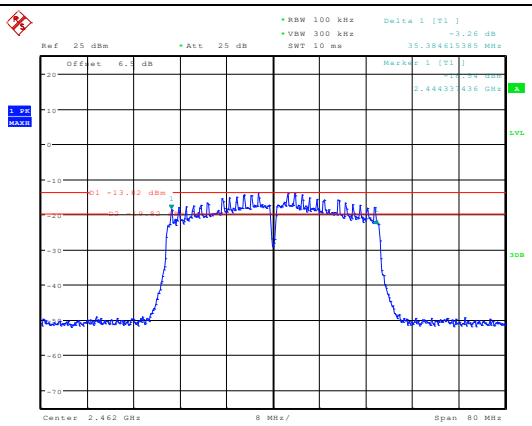
Note: test only performed on antenna 1.

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

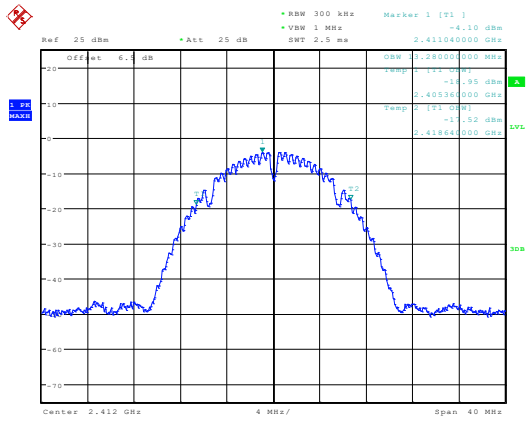
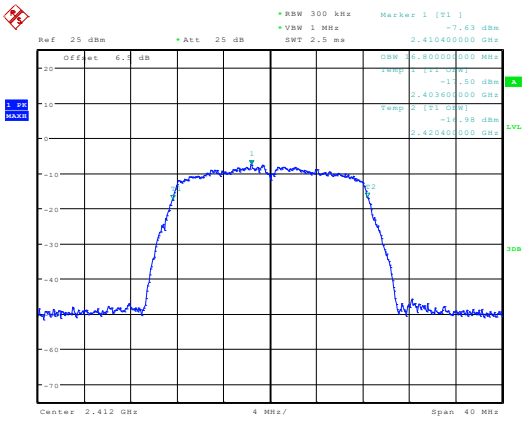
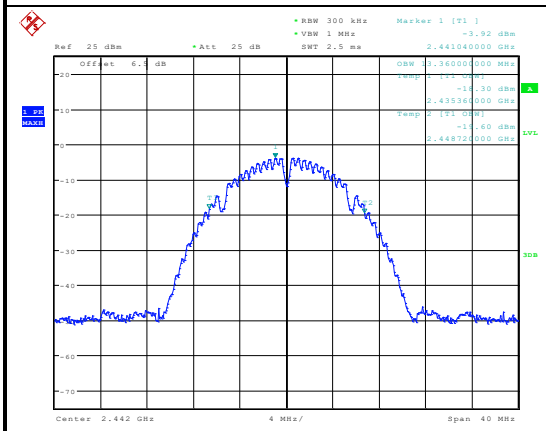
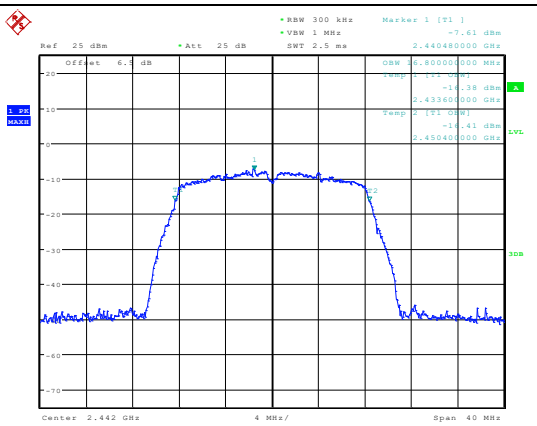
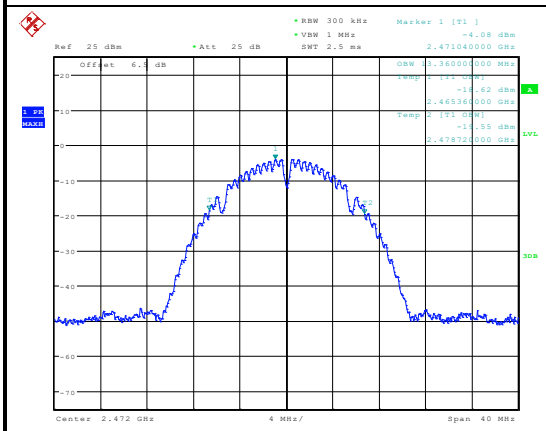
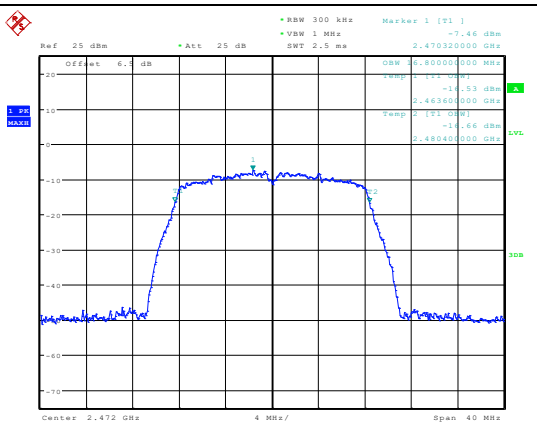
Test Plots:

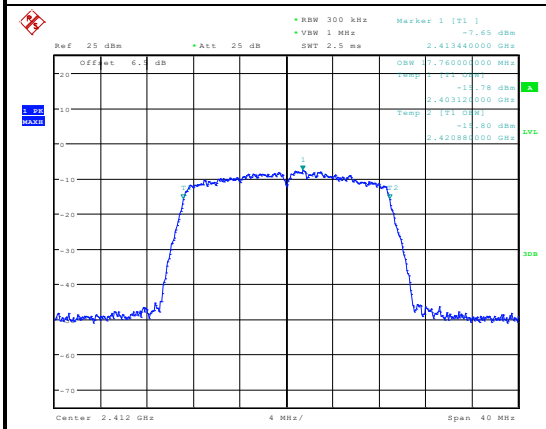
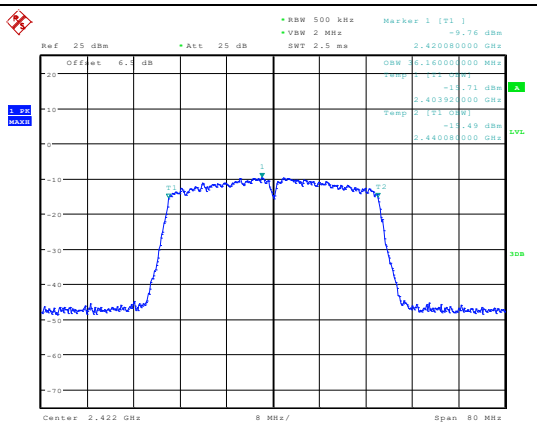
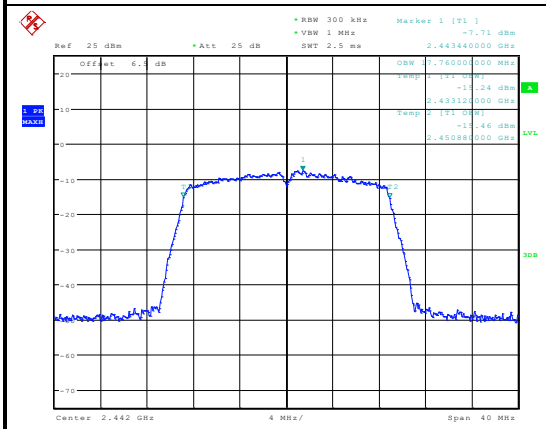
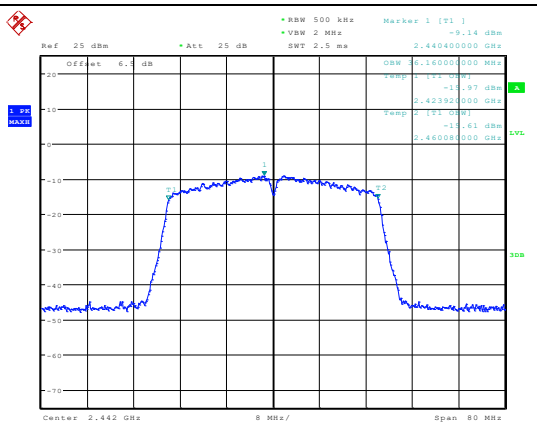
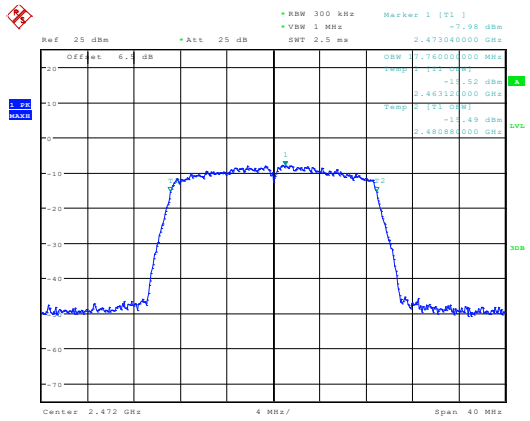
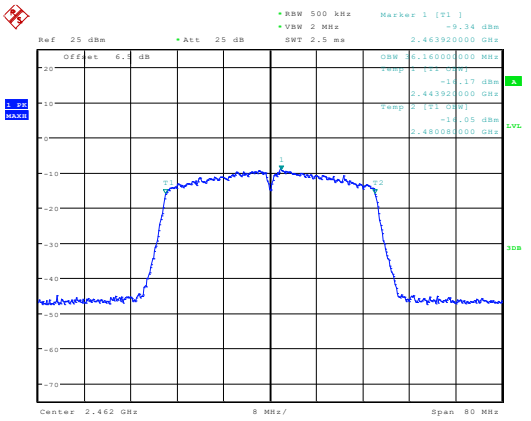
6 dB Emission Bandwidth:

802.11b	802.11g
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
High channel	High channel
	

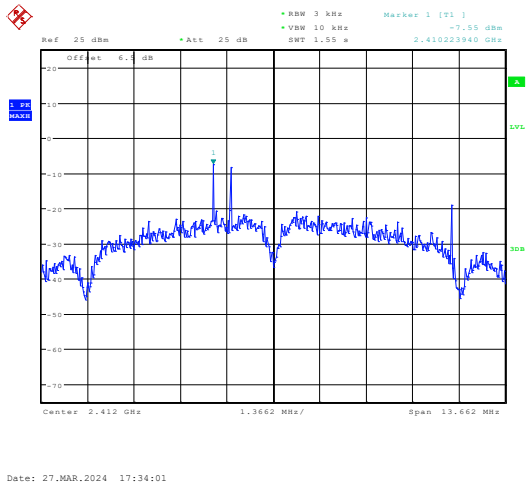
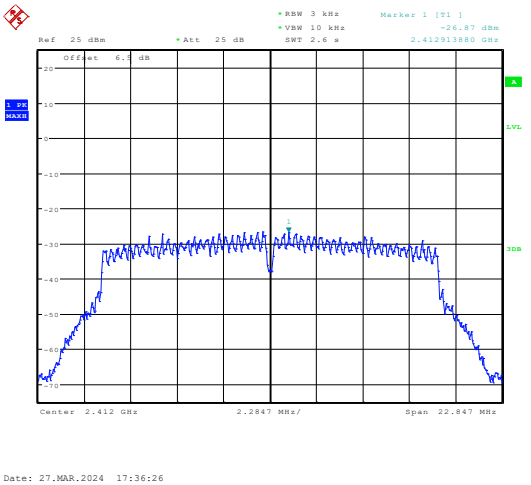
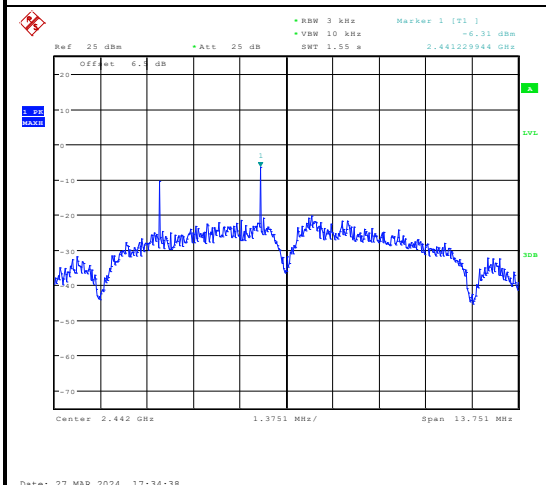
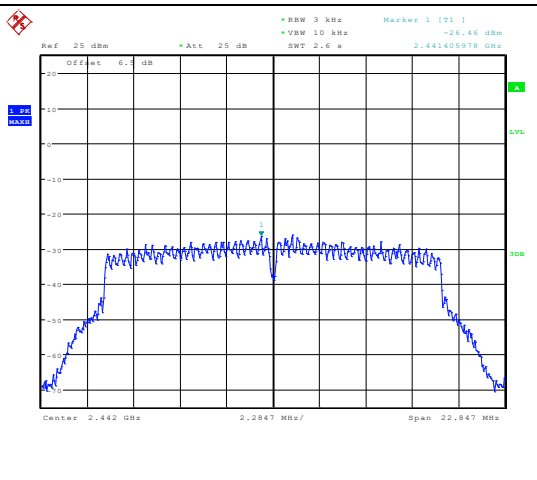
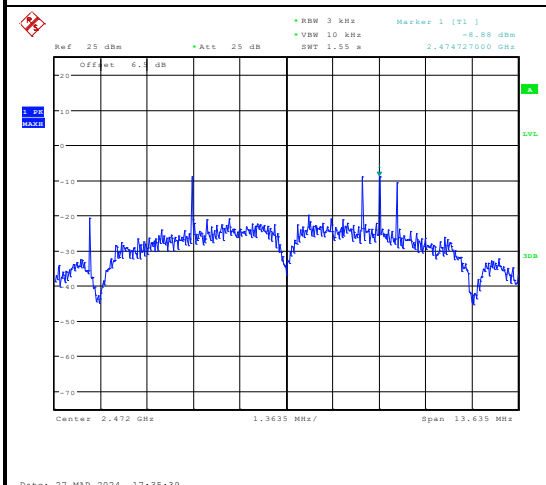
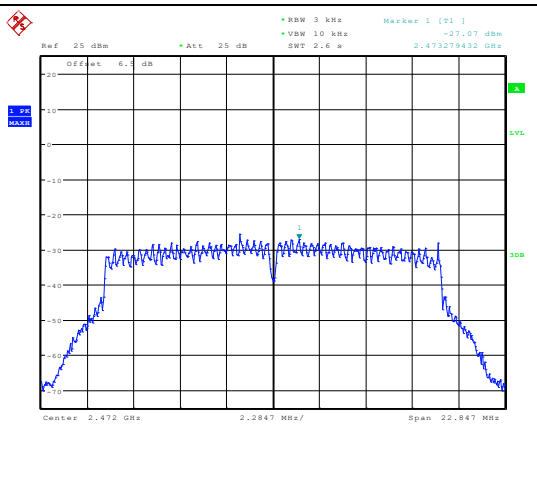
802.11n20	802.11n40
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
High channel	High channel
	

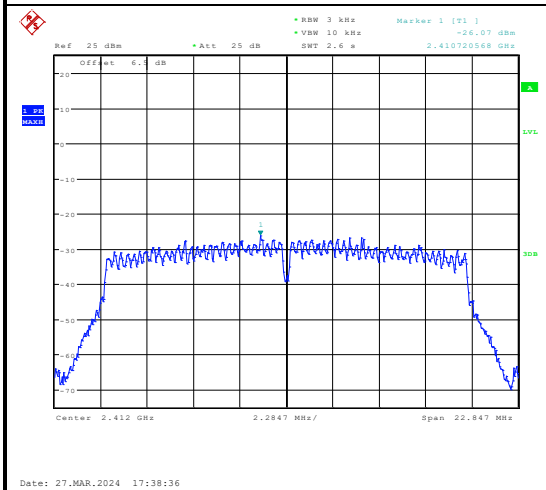
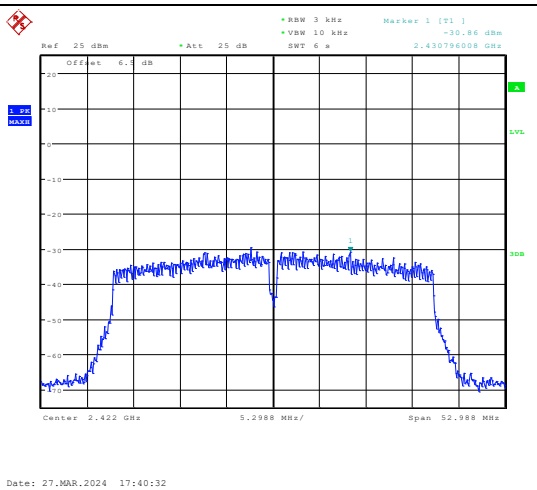
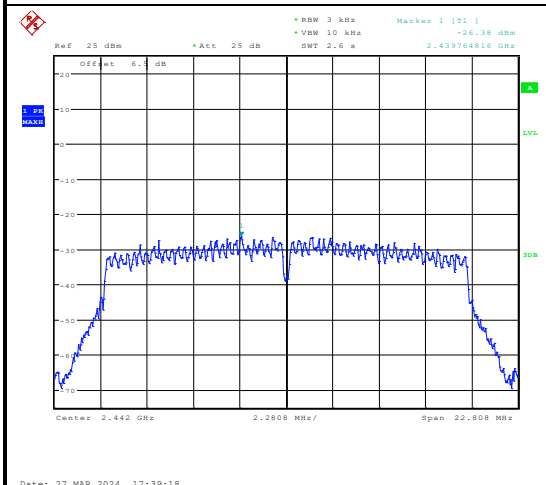
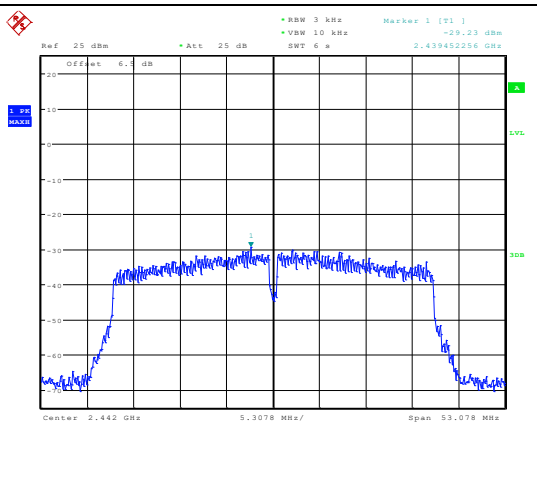
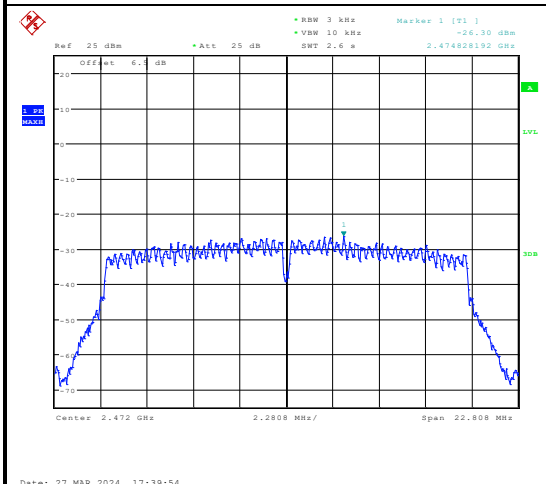
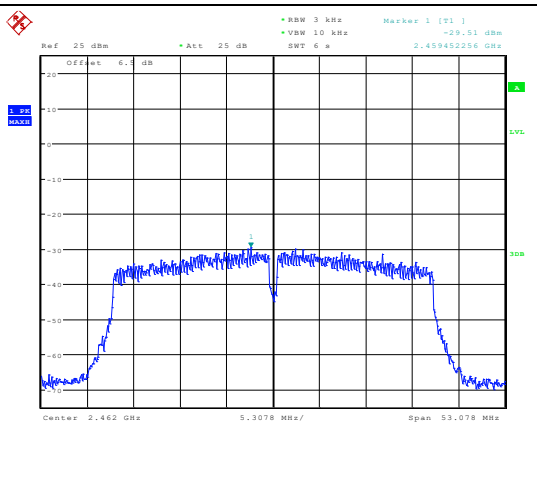
99% Occupied Bandwidth:

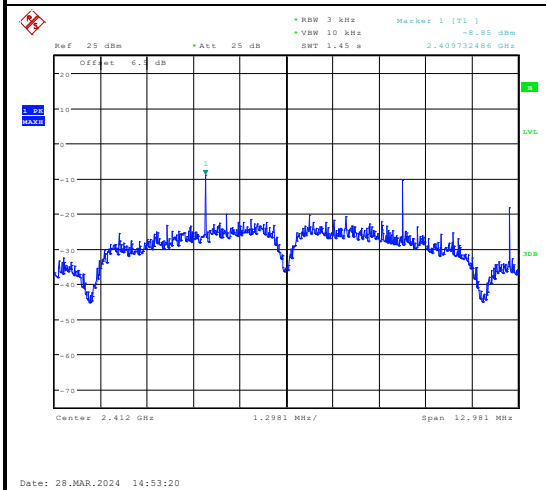
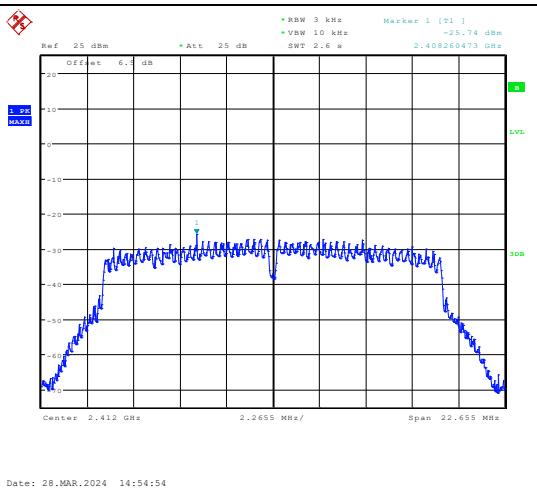
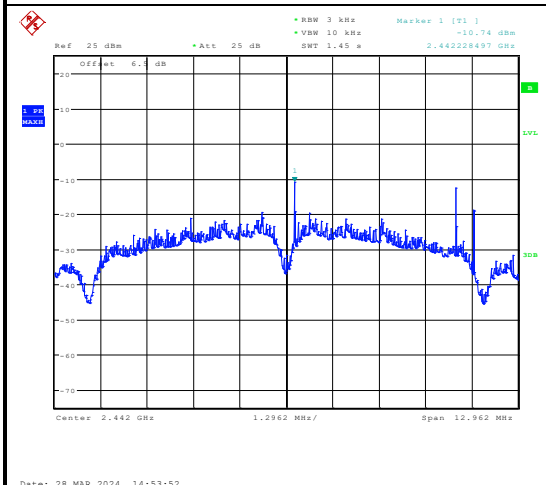
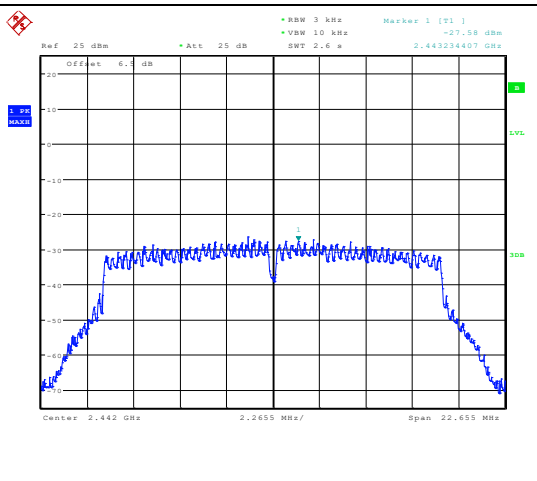
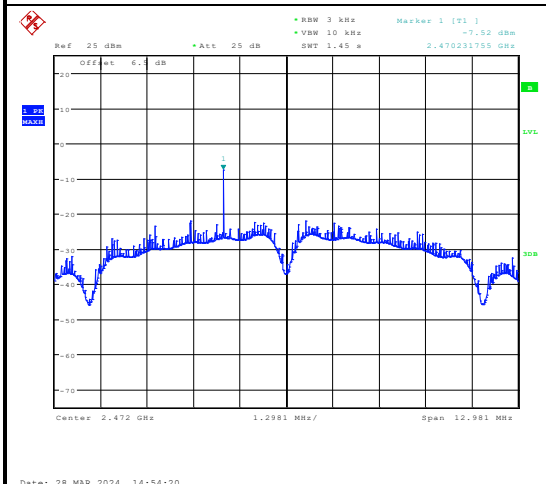
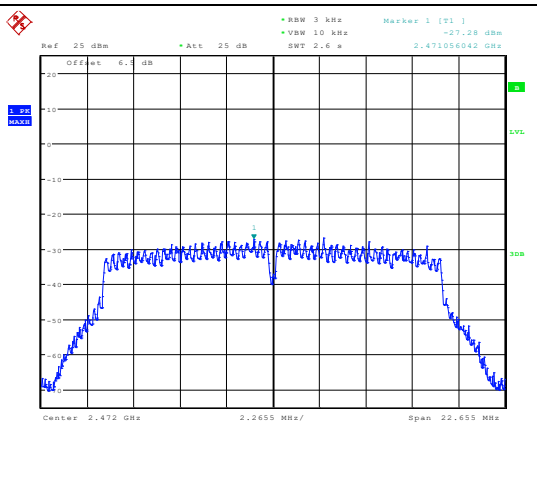
802.11b	802.11g
Lowest channel	Lowest channel
	
Date: 27.MAR.2024 16:57:44	Date: 27.MAR.2024 16:58:42
Middle channel	Middle channel
	
Date: 27.MAR.2024 16:58:03	Date: 27.MAR.2024 16:59:25
High channel	High channel
	
Date: 27.MAR.2024 16:58:23	Date: 27.MAR.2024 16:59:46

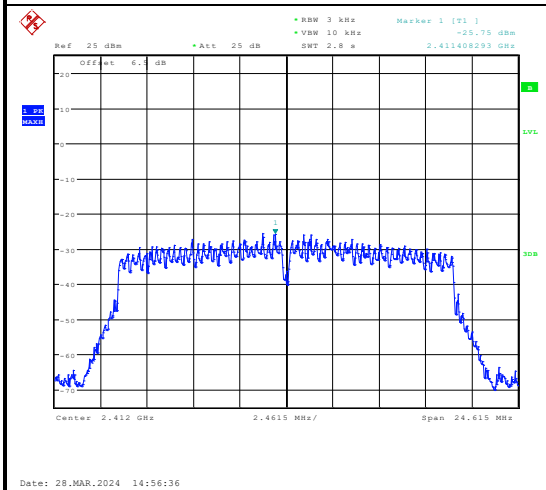
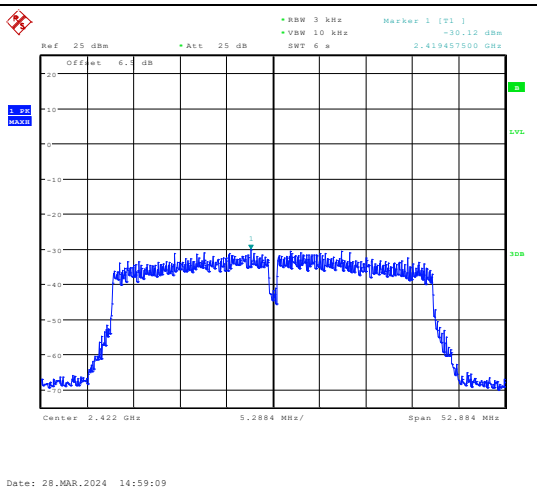
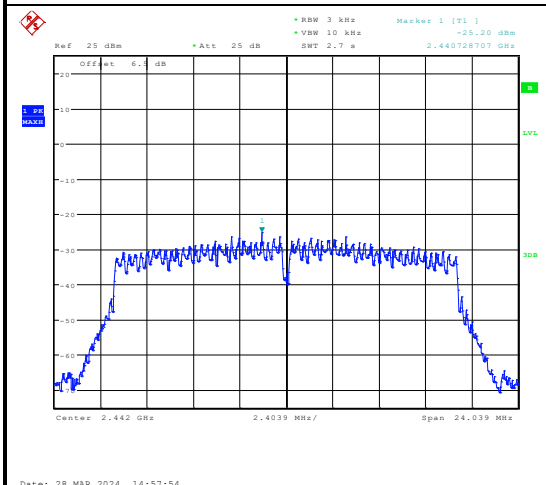
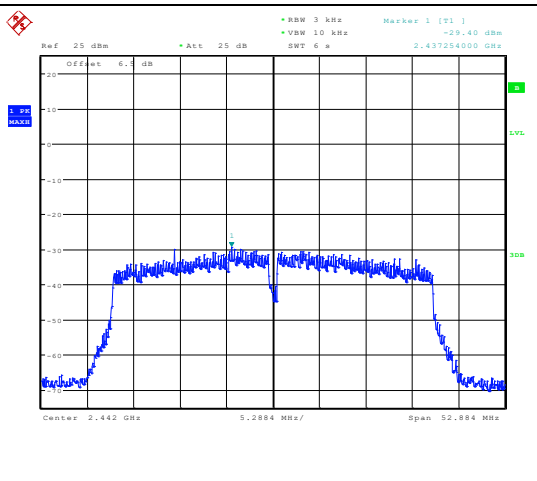
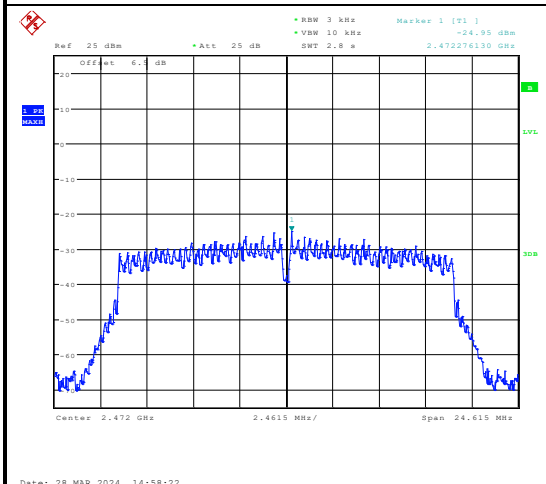
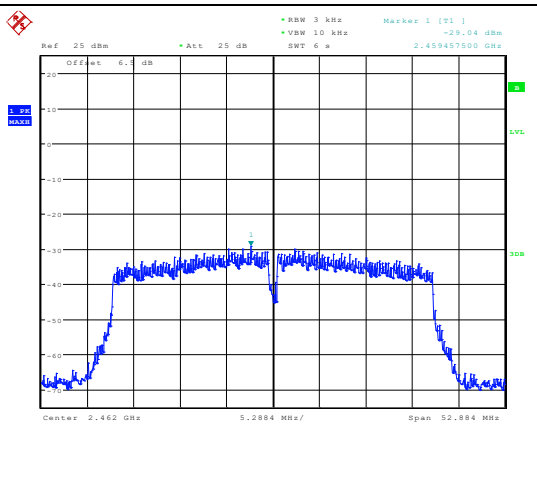
802.11n20	802.11n40
Lowest channel	Lowest channel
	
Date: 27.MAR.2024 17:00:14	Date: 27.MAR.2024 16:56:48
Middle channel	Middle channel
	
Date: 27.MAR.2024 17:00:38	Date: 27.MAR.2024 16:56:26
High channel	High channel
	
Date: 27.MAR.2024 17:01:01	Date: 27.MAR.2024 16:55:45

Power Spectral Density:

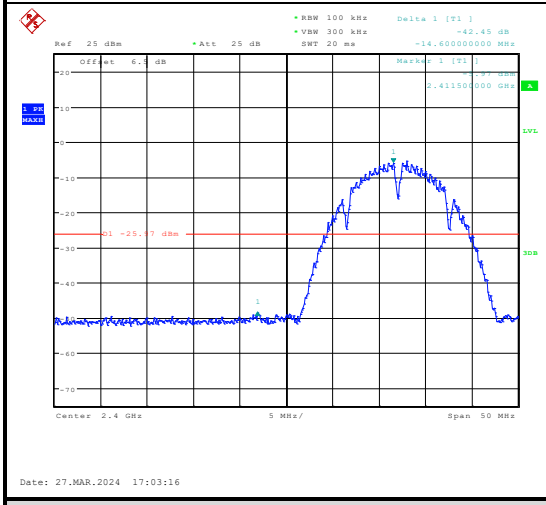
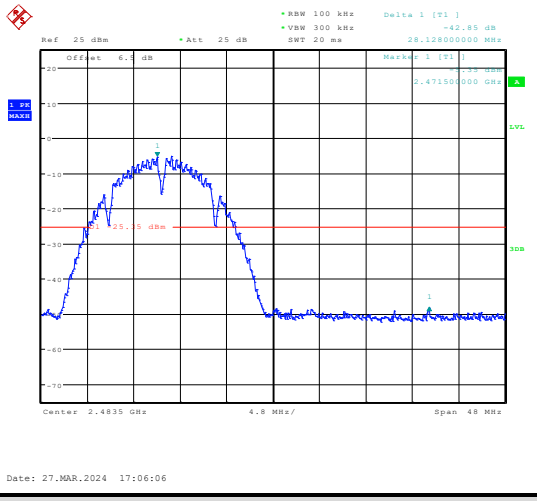
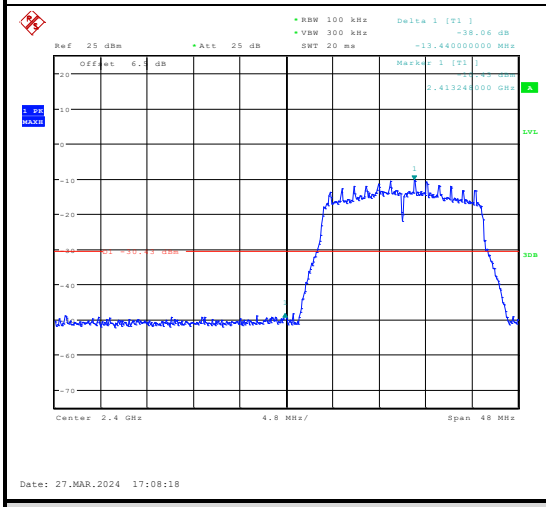
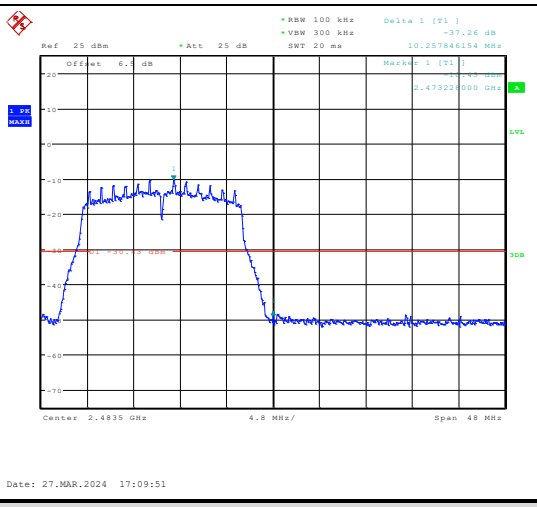
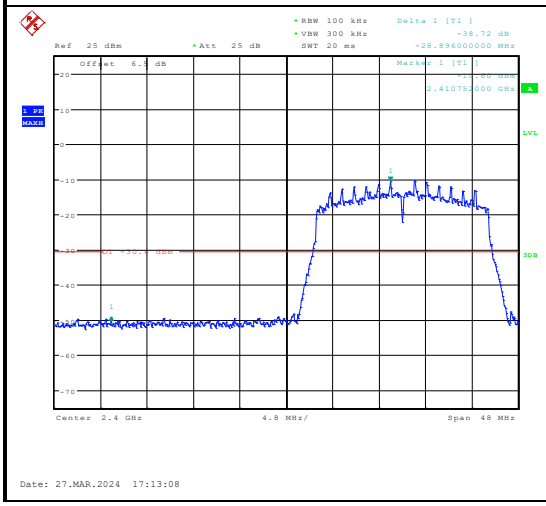
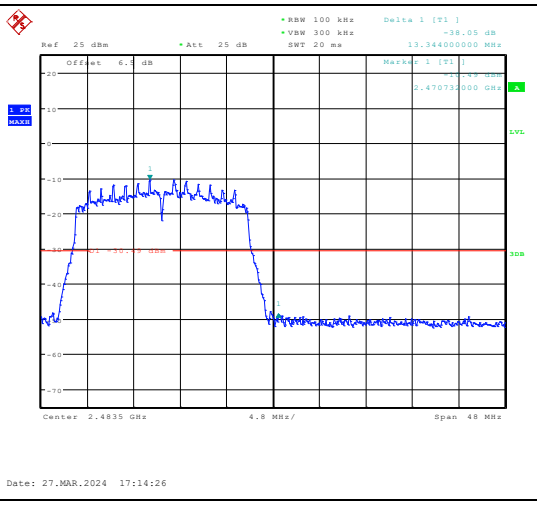
802.11b ANT1	802.11g ANT1
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
High channel	High channel
	

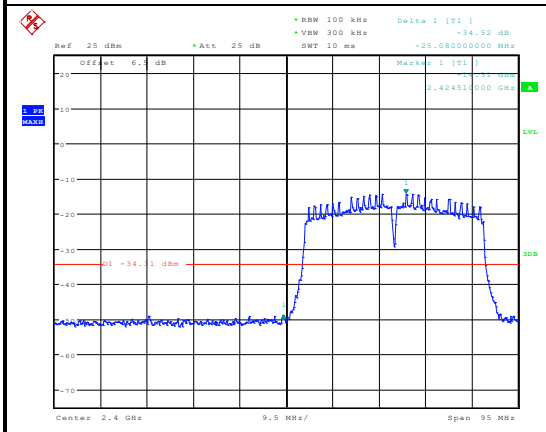
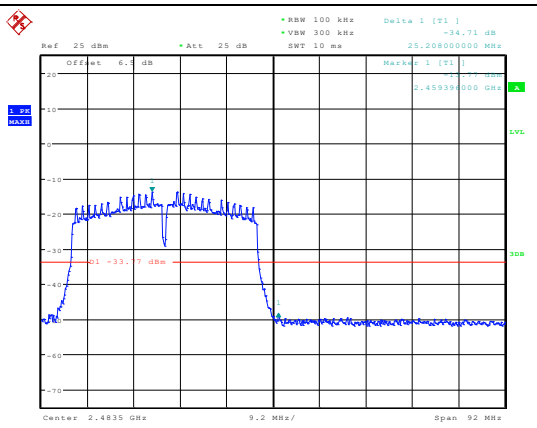
802.11n20 ANT1	802.11n40 ANT1
Lowest channel	Lowest channel
 Date: 27.MAR.2024 17:38:36	 Date: 27.MAR.2024 17:40:32
Middle channel	Middle channel
 Date: 27.MAR.2024 17:39:18	 Date: 27.MAR.2024 17:42:28
High channel	High channel
 Date: 27.MAR.2024 17:39:54	 Date: 27.MAR.2024 17:41:53

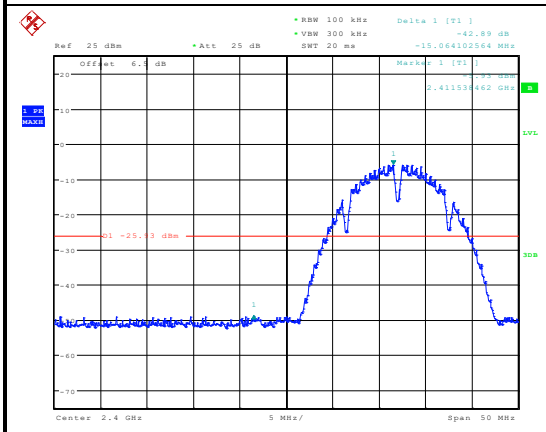
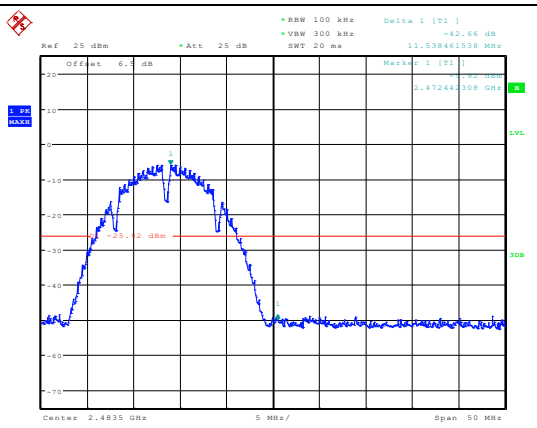
802.11b ANT2	802.11g ANT2
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
High channel	High channel
	

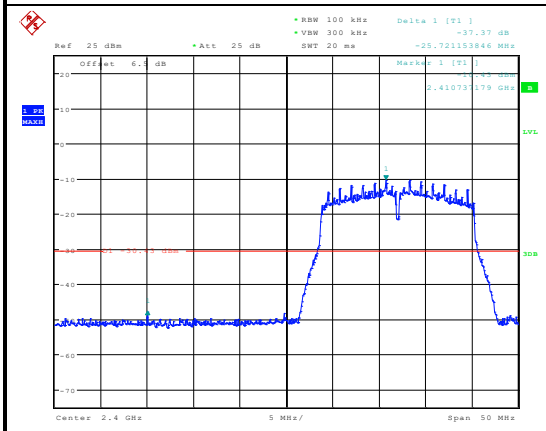
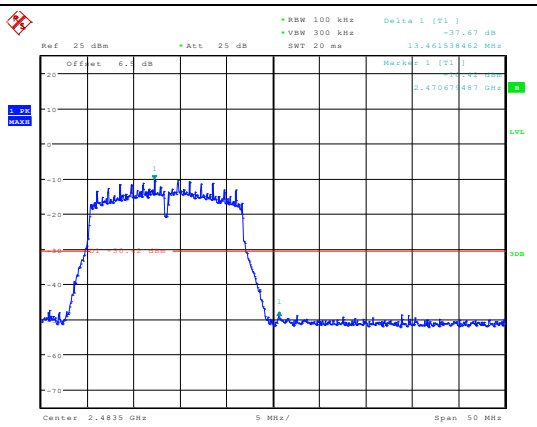
802.11n20 ANT2	802.11n40 ANT2
Lowest channel	Lowest channel
 Date: 28.MAR.2024 14:56:36	 Date: 28.MAR.2024 14:59:09
Middle channel	Middle channel
 Date: 28.MAR.2024 14:57:54	 Date: 28.MAR.2024 14:59:58
High channel	High channel
 Date: 28.MAR.2024 14:58:22	 Date: 28.MAR.2024 15:00:33

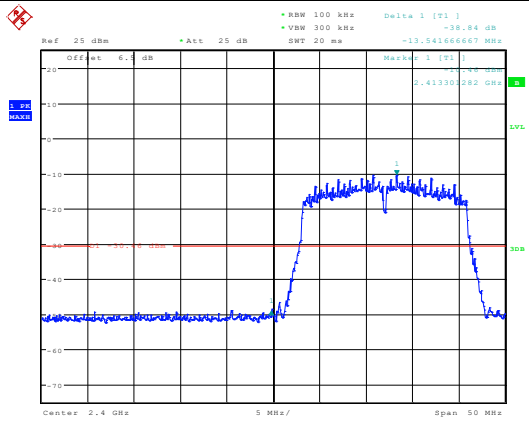
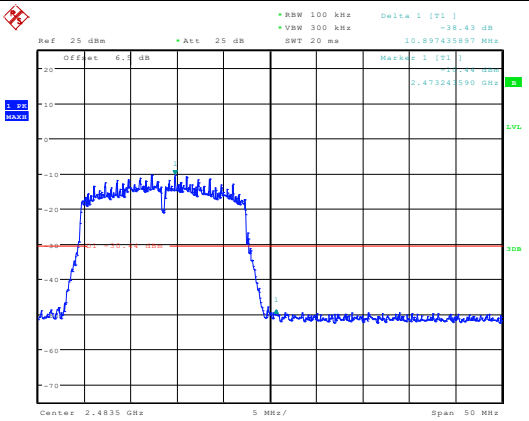
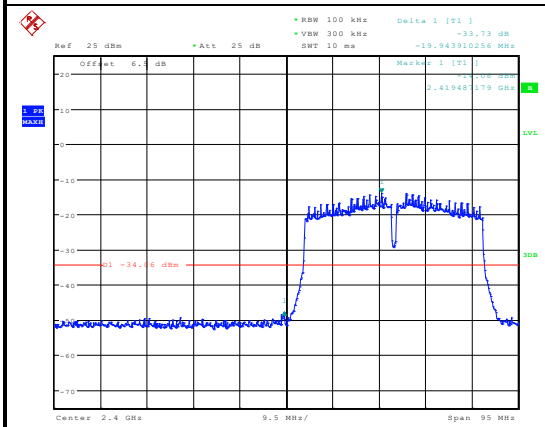
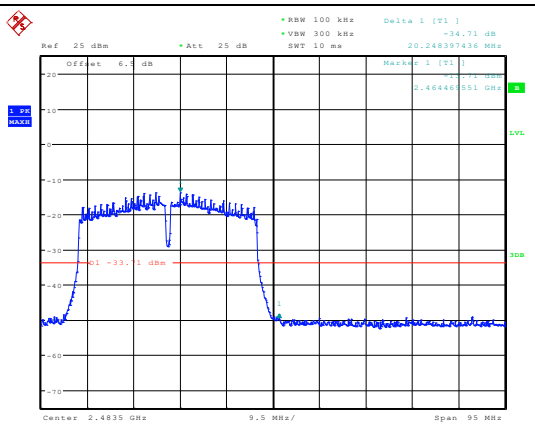
100kHz Bandwidth of Frequency Band Edge:

802.11b ANT1	
Lowest channel	High channel
	
Date: 27.MAR.2024 17:03:16	Date: 27.MAR.2024 17:06:06
802.11g ANT1	
Lowest channel	High channel
	
Date: 27.MAR.2024 17:08:18	Date: 27.MAR.2024 17:09:51
802.11n20 ANT1	
Lowest channel	High channel
	
Date: 27.MAR.2024 17:13:08	Date: 27.MAR.2024 17:14:26

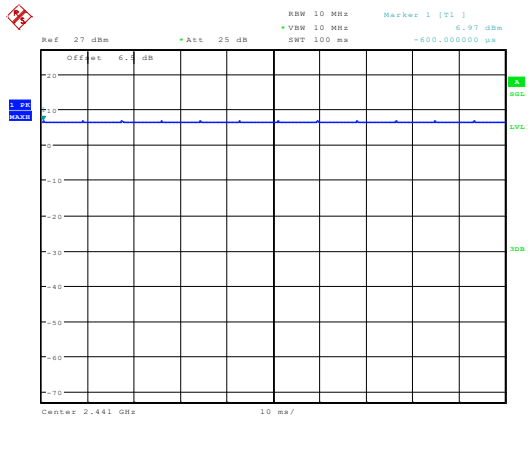
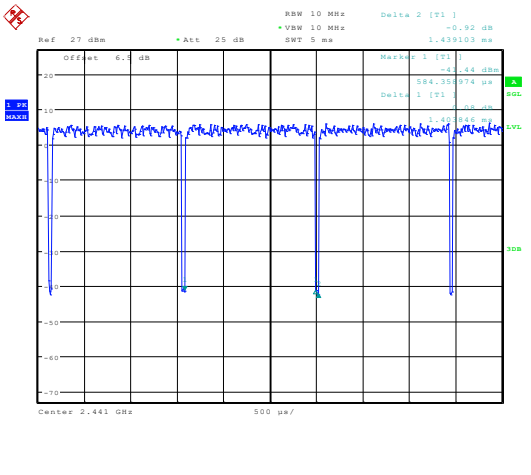
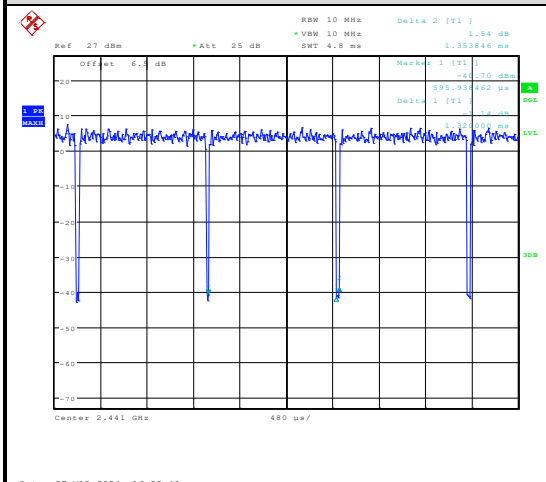
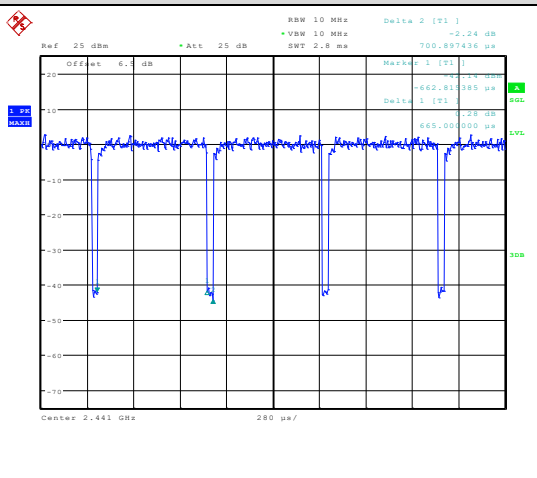
802.11n40 ANT1	
Lowest channel	High channel
	
Date: 27.MAR.2024 17:16:28	Date: 27.MAR.2024 17:17:50

802.11b ANT2	
Lowest channel	High channel
	
Date: 28.MAR.2024 14:48:18	Date: 28.MAR.2024 14:49:07

802.11g ANT2	
Lowest channel	High channel
	
Date: 28.MAR.2024 14:43:19	Date: 28.MAR.2024 14:44:25

802.11n20 ANT2	
Lowest channel	High channel
	
802.11n40 ANT2	
Lowest channel	High channel
	

Duty Cycle:

802.11b	802.11g
	
802.11n20	802.11n40
	

4 Test Setup Photo

Please refer to the attachment RWAQ202400241 Test Setup photo.

5 E.U.T Photo

Please refer to the attachment RWAQ202400241 External photo and RWAQ202400241 Internal photo.

---End of Report---