FCC TEST REPORT

FCC ID: 2BDJ4-UL154N

On Behalf of

Shenzhen Ucalcul Technology Co., Ltd

HulkBook

Model No.: UL154N, UL154Y, UL153, UL153TY, UL156, UL157H, UL158H, UL159H

Prepared for	:	Shenzhen Ucalcul Technology Co., Ltd
Address	:	401, Building A, Jiewei Industrial City Phase III, Shangmugu, Pinghu Street, Longgang District, Shenzhen

Prepared By	:	Shenzhen PSI Testing Co., Ltd.
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TEST REPORT DECLARATION

Applicant	:	Shenzhen Ucalcul Technology Co., Ltd
Address	:	401, Building A, Jiewei Industrial City Phase III, Shangmugu, Pinghu Street, Longgang District, Shenzhen
Manufacturer	:	Shenzhen Ucalcul Technology Co., Ltd
Address	:	401, Building A, Jiewei Industrial City Phase III, Shangmugu, Pinghu Street, Longgang District, Shenzhen
EUT Description	:	HulkBook
		(A) Model No. : UL154N, UL154Y, UL153, UL153TY, UL156, UL157H, UL158H, UL159H
		(B) Trademark : N/A

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10-2013

The device described above is tested by Shenzhen PSI Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen PSI Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen PSI Testing Co., Ltd.

Tested by (name + signature).....…..:	Felix Pang Test Engineer	Felix Pang
Approved by (name + signature)…....:	Simple Guan Project Manager	Simple Guan
Date of issue……..:	May 30, 2024	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	May 30, 2024	Initial released Issue	Felix Pang

1. Summary Of Standards And Results

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.205	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d)	P
Power Line Conducted Emissions	FCC Part 15: 15.207	P
6dB Bandwidth	FCC PART 15:15.247(a)(2)	P
Output Power	FCC Part 15: 15.247(b)(3)	P
Out-of-band Emissions	FCC Part 15: 15.247(d)	P
Power Spectral Density	FCC PART 15:15.247(e)	P
Antenna Requirement	FCC Part 15: 15.203	P

Note:
1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.
4. Conclusion determination rules of this report: Unless there are clear provisions on measurement uncertainty in the standard or customer requirements, decision by actual test data without considering measurement uncertainty.

2. General Information

2.1. Description of Device (EUT)

Product Name	:	HulkBook
Model	:	UL154N, UL154Y, UL153, UL153TY, UL156, UL157H, UL158H, UL159H
Diff	:	There is no difference except the name of the model. All tests are made with the UL154N model.
Test Voltage	:	DC 5V/9V/12V/15V/20V from adapter, DC 7.7V from battery.

Radio technology	:	2.4G WiFi
Operation frequency	:	2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20, ax20 2422MHz-2452MHz for IEEE 802.11 n/HT40, ax40
Channel No.	:	802.11b/802.11g/802.11n(HT20)/ 802.11ax20: 11CH 802.11(HT40)/802.11ax40: 7CH
Modulation type	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n:OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ax: OFDMA (64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)
Antenna Type	:	FPC antenna 1, Maximum Gain is 1.04dBi. FPC antenna 2, Maximum Gain is 1.04dBi.
Software version	:	V1.0
Hardware version/FVIN	:	V1.0
Intend use environment	:	Residential, commercial and light industrial environment
Note	:	Antenna information is provided by applicant. Testing lab is not responsible for the accuracy of the information.

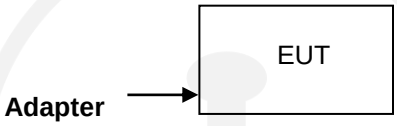
2.2. Accessories of Device (EUT)

Accessories	:	AC ADAPTER
Manufacturer	:	SHENZHEN BSY TECHNOLOGY CO., LTD
Model	:	BSY-F45AC U
Rating	:	Input: 100-240V~50/60Hz 1.5A Output: DC 5.0V/3.0A, DC 9.0V/3.0A, DC 12.0V/3.0A, DC 15.0V/3.0A, DC 20.0V/2.25A

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	N/A	N/A	N/A	N/A

2.4. Block Diagram of Connection Between EUT and Simulators



2.5. Test Mode Description

Keeping TX			
Mode	Data rate (Mbps)	Channel	Frequency(MHz)
IEEE 802.11 b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11 g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11 n/HT20	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
IEEE 802.11 n/HT40	13.5	Low :CH1	2422
	13.5	Middle:CH4	2437
	13.5	High:CH7	2452
IEEE 802.11 ax20	8	Low :CH1	2412
	8	Middle: CH7	2442
	8	High: CH13	2472
IEEE 802.11 ax40	16	Low :CH3	2422
	16	Middle: CH7	2442
	16	High: CH11	2462
Note: According exploratory test, EUT will have maximum output power in those data rate. So those data rate were used for all test.			

Channel list:					
For IEEE 802.11b, g, n/HT20, ax20					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH1	2412	CH5	2432	CH9	2452
CH2	2417	CH6	2437	CH10	2457
CH3	2422	CH7	2442	CH11	2462
CH4	2427	CH8	2447		

For IEEE 802.11 n/HT40, ax40					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH1	2422	CH5	2442		
CH2	2427	CH6	2447		
CH3	2432	CH7	2452		
CH4	2437				

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7. Test Facility

Shenzhen PSI Testing Co., Ltd.

1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

September 13, 2023 File on Federal Communication Commission
Registration Number: 916281

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	**Uncertainty**
Uncertainty for Power point Conducted Emissions Test	2.17dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	2.74dB(Polarize: V)
	2.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 18GHz)	4.29dB(Polarize: V)
	4.82dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (18GHz to 40GHz)	4.31 dB(Polarize: V)
	4.30 dB(Polarize: H)
Uncertainty for radio frequency	48.24KHz
Uncertainty for conducted RF Power	0.41dB
Uncertainty for Power Spectral Density	0.39 dB

2.9. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware Version	Last Cal.	Cal. Interval
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2022.12.20	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2023.12.19	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2023.12.19	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2023.12.19	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2023.04.03	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2022.12.26	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2023.12.19	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2022.12.26	2 Year
9.	Amplifier	SKET	LAPA_01G18G-45dB	SK2022032901	/	2023.12.19	1 Year
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2022.12.25	2 Year
11.	Amplifier	SKET	LNPA_0118G-45	SK2020010801	/	2023.12.19	1 Year
12	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-1111533-Fz	/	2023.12.19	1 Year
13	RF Sensor Unit	Tachoy	TR1029-2	20220428P008	/	2023.12.19	1 Year
14	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2023.12.19	1 Year
15	Temp. & Humid Chamber	Auchno	9606	/	/	2023.12.19	1 Year
16	Regulated DC Power Supply	Xinouhua	ADC120V10A	202211251638		2023.12.19	1 Year

For Test Software Information

Item	Software Name	Manufacturer	Version
RE	EZ_EMC	Farad	PSI-3A1
CE	EZ_EMC	Farad	PSI-3A1
RF	RTS	TACHOY	V1.0.0

3. Spurious Emission

3.1. Test Limits

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

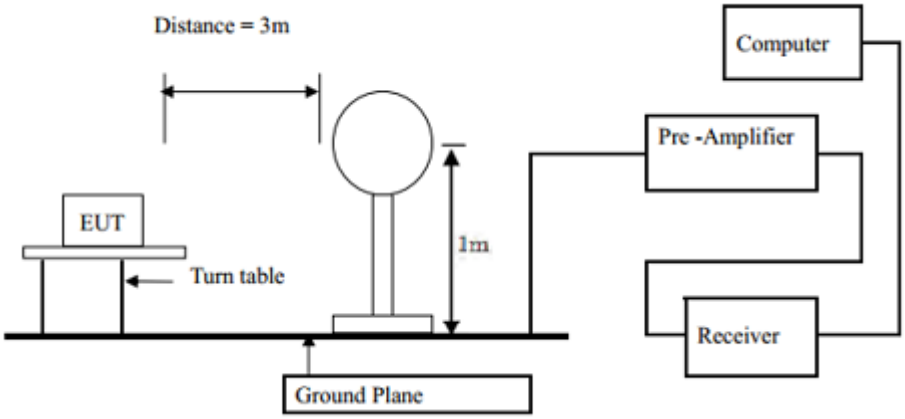
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

15.209 Limit

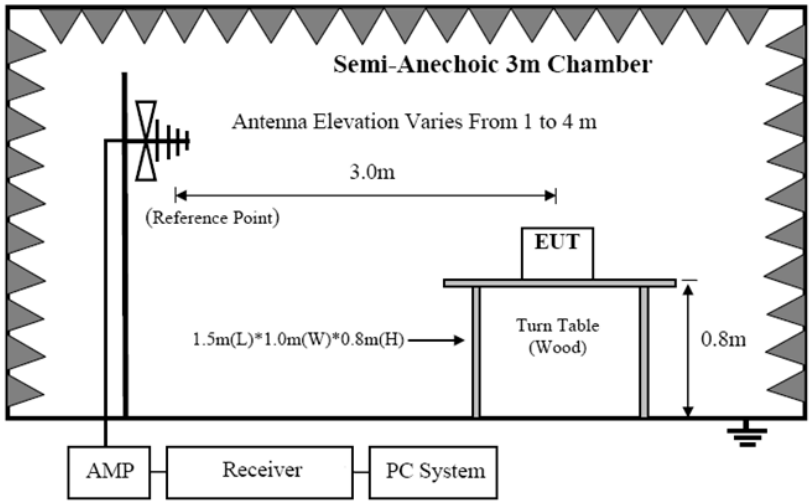
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Note 1: The peak limit is 20 dB higher than the average limit			

3.2. Block Diagram of Test setup

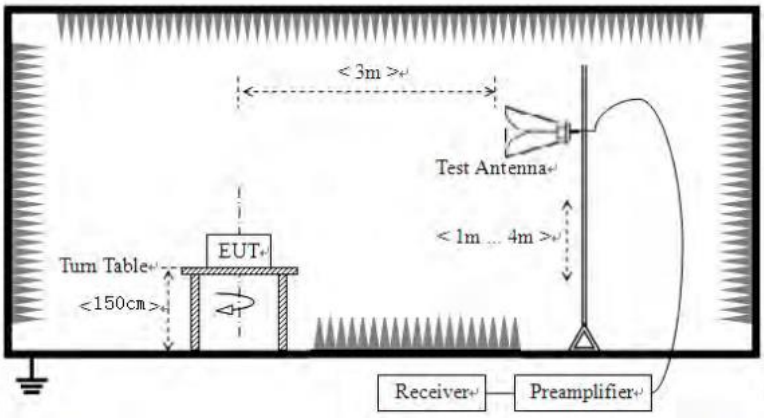
3.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



3.2.2 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



3.2.3 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



3.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and simulator

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013on Radiated Emission test.

(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

Test setup information:

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHZ~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

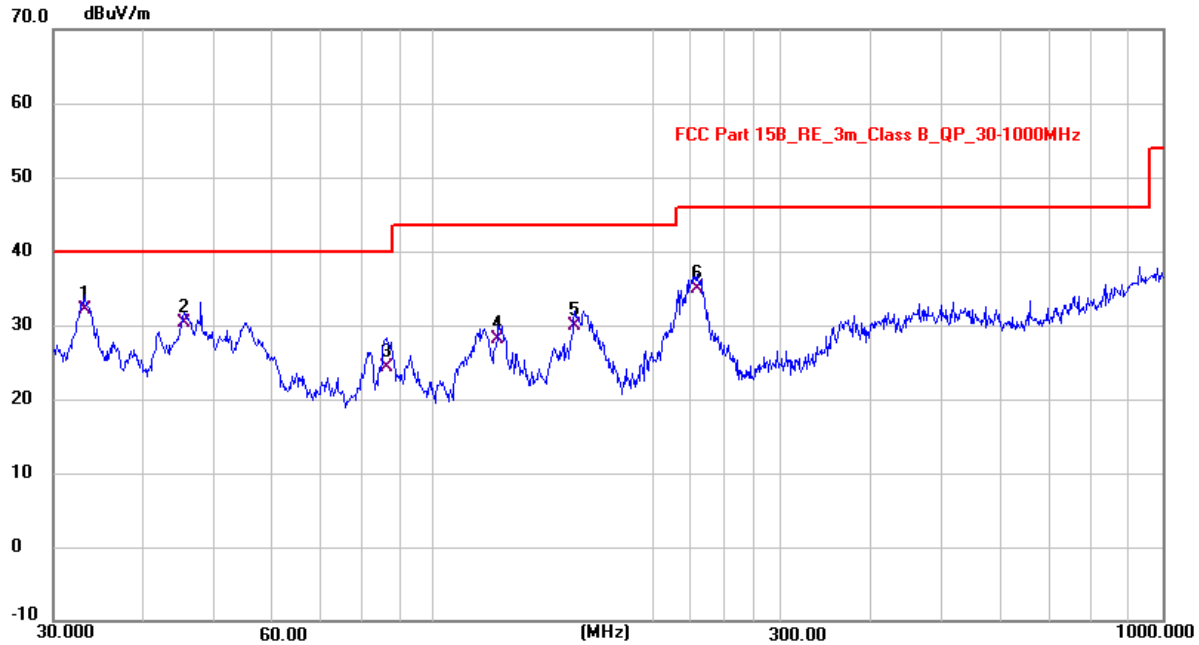
3.4. Test Results

We have scanned from 9kHz to the 10th harmonic of the EUT's highest frequency.
Detailed information please see the following page.

From 9KHz to 30MHz:					
Test Date	:	2024.05.29	Temperature	:	26℃
Test Engineer	:	Felix Pang	Humidity	:	54%
Test Mode	:	IEEE 802.11b mode			
Test Results	:	**PASS**			
Note:	The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.				

From 30MHz to 1000MHz:					
Test Date	:	2024.05.29	Temperature	:	26℃
Test Engineer	:	Felix Pang	Humidity	:	54%
Test Mode	:	IEEE 802.11b mode			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. All modes have been tested, and only worst data of IEEE 802.11b mode, Channel 2412MHz was listed in this report.				

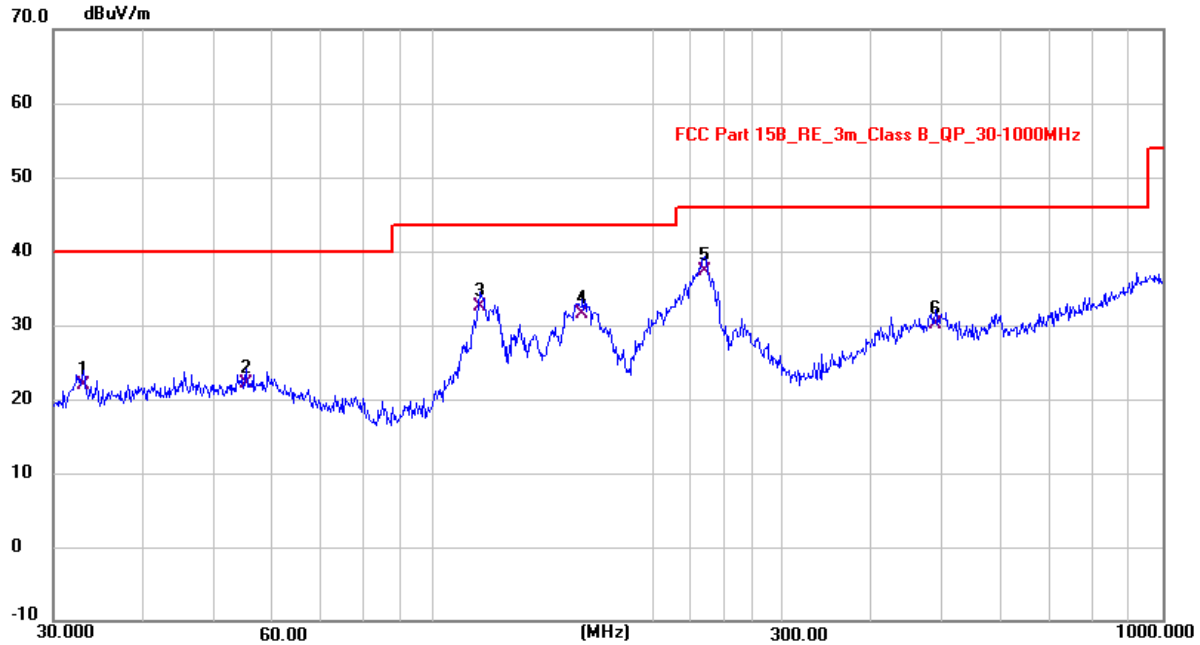
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	33.1385	19.42	12.61	32.03	40.00	-7.97	QP
2	45.4352	16.85	13.40	30.25	40.00	-9.75	QP
3	86.0114	15.67	8.59	24.26	40.00	-15.74	QP
4	122.5114	16.46	11.65	28.11	43.50	-15.39	QP
5	156.3892	16.65	13.18	29.83	43.50	-13.67	QP
6	229.7961	23.50	11.35	34.85	46.00	-11.15	QP

Level = Reading + Factor Margin = Level - Limit

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	33.0080	9.26	12.59	21.85	40.00	-18.15	QP
2	55.2692	9.40	12.65	22.05	40.00	-17.95	QP
3	116.0304	21.47	11.09	32.56	43.50	-10.94	QP
4	160.2754	18.32	13.23	31.55	43.50	-11.95	QP
5 *	235.3001	25.56	11.69	37.25	46.00	-8.75	QP
6	487.7425	12.08	18.03	30.11	46.00	-15.89	QP

Level = Reading + Factor Margin = Level - Limit

From 1GHz to 25GHz:					
Test Date	:	2024.05.29	Temperature	:	26℃
Test Engineer	:	Felix Pang	Humidity	:	54%
Test Mode	:	WIFI mode			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out. 4 Except for mode b/g, other modes test the MIMO status. The test result of SISO mode reflects the worst data between antenna 1 and antenna 2.				

Test Mode : IEEE 802.11b TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4824	V	85.27	-27.27	58.00	74.00	-16.00	Peak
2	4824	V	64.78	-27.27	37.51	54.00	-16.49	Avg
3	7236	--	--	--	--	--	--	--
4	9648	--	--	--	--	--	--	--
5	4824	H	81.21	-27.27	53.94	74.00	-20.06	Peak
6	4824	H	71.00	-27.27	43.73	54.00	-10.27	Avg
7	7236	--	--	--	--	--	--	--
8	9648	--	--	--	--	--	--	--
Test Mode : IEEE 802.11b TX Mid								
1	4874	V	87.85	-27.79	60.06	74.00	-13.94	Peak
2	4874	V	63.81	-27.79	36.02	54.00	-17.98	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	81.22	-27.79	53.43	74.00	-20.57	Peak
6	4874	H	72.65	-27.79	44.86	54.00	-9.14	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11b TX High								
1	4924	V	85.74	-28.30	57.44	74.00	-16.56	Peak
2	4924	V	69.47	-28.30	41.17	54.00	-12.83	Avg
3	7386	--	--	--	--	--	--	--
4	9848	--	--	--	--	--	--	--
5	4924	H	80.42	-28.30	52.12	74.00	-21.88	Peak
6	4924	H	71.24	-28.30	42.94	54.00	-11.06	Avg
7	7386	--	--	--	--	--	--	--
8	9848	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : IEEE 802.11g TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4824	V	83.99	-27.27	56.72	74.00	-17.28	Peak
2	4824	V	65.43	-27.27	38.16	54.00	-15.84	Avg
3	7236	--	--	--	--	--	--	--
4	9648	--	--	--	--	--	--	--
5	4824	H	82.00	-27.27	54.73	74.00	-19.27	Peak
6	4824	H	74.77	-27.27	47.50	54.00	-6.50	Avg
7	7236	--	--	--	--	--	--	--
8	9648	--	--	--	--	--	--	--
Test Mode : IEEE 802.11g TX Mid								
1	4874	V	87.45	-27.79	59.66	74.00	-14.34	Peak
2	4874	V	64.36	-27.79	36.57	54.00	-17.43	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	83.61	-27.79	55.82	74.00	-18.18	Peak
6	4874	H	72.81	-27.79	45.02	54.00	-8.98	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11g TX High								
1	4924	V	85.76	-28.30	57.46	74.00	-16.54	Peak
2	4924	V	68.77	-28.30	40.47	54.00	-13.53	Avg
3	7386	--	--	--	--	--	--	--
4	9848	--	--	--	--	--	--	--
5	4924	H	80.60	-28.30	52.30	74.00	-21.70	Peak
6	4924	H	71.32	-28.30	43.02	54.00	-10.98	Avg
7	7386	--	--	--	--	--	--	--
8	9848	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : IEEE 802.11n/HT20 TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4824	V	86.11	-27.27	58.84	74.00	-15.16	Peak
2	4824	V	64.80	-27.27	37.53	54.00	-16.47	Avg
3	7236	--	--	--	--	--	--	--
4	9648	--	--	--	--	--	--	--
5	4824	H	80.00	-27.27	52.73	74.00	-21.27	Peak
6	4824	H	71.40	-27.27	44.13	54.00	-9.87	Avg
7	7236	--	--	--	--	--	--	--
8	9648	--	--	--	--	--	--	--
Test Mode : IEEE 802.11n/HT20 TX Mid								
1	4874	V	86.93	-27.79	59.14	74.00	-14.86	Peak
2	4874	V	67.40	-27.79	39.61	54.00	-14.39	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	81.98	-27.79	54.19	74.00	-19.81	Peak
6	4874	H	70.33	-27.79	42.54	54.00	-11.46	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11n/HT20 TX High								
1	4924	V	84.92	-28.30	56.62	74.00	-17.38	Peak
2	4924	V	67.45	-28.30	39.15	54.00	-14.85	Avg
3	7386	--	--	--	--	--	--	--
4	9848	--	--	--	--	--	--	--
5	4924	H	80.23	-28.30	51.93	74.00	-22.07	Peak
6	4924	H	72.30	-28.30	44.00	54.00	-10.00	Avg
7	7386	--	--	--	--	--	--	--
8	9848	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : IEEE 802.11n/HT40 TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4844	V	84.07	-27.27	56.80	74.00	-17.20	Peak
2	4844	V	63.68	-27.27	36.41	54.00	-17.59	Avg
3	7266	--	--	--	--	--	--	--
4	9688	--	--	--	--	--	--	--
5	4844	H	81.98	-27.27	54.71	74.00	-19.29	Peak
6	4844	H	71.24	-27.27	43.97	54.00	-10.03	Avg
7	7266	--	--	--	--	--	--	--
8	9688	--	--	--	--	--	--	--
Test Mode : IEEE 802.11n/HT40 TX Mid								
1	4874	V	84.93	-27.79	57.14	74.00	-16.86	Peak
2	4874	V	66.67	-27.79	38.88	54.00	-15.12	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	82.12	-27.79	54.33	74.00	-19.67	Peak
6	4874	H	70.72	-27.79	42.93	54.00	-11.07	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11n/HT40 TX High								
1	4904	V	82.99	-28.30	54.69	74.00	-19.31	Peak
2	4904	V	69.24	-28.30	40.94	54.00	-13.06	Avg
3	7356	--	--	--	--	--	--	--
4	9808	--	--	--	--	--	--	--
5	4904	H	83.41	-28.30	55.11	74.00	-18.89	Peak
6	4904	H	72.80	-28.30	44.50	54.00	-9.50	Avg
7	7356	--	--	--	--	--	--	--
8	9808	--	--	--	--	--	--	--

Note: 1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor. Margin= Result-Limit.

Test Mode : IEEE 802.11ax20 TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4824	V	85.59	-27.27	58.32	74.00	-15.68	Peak
2	4824	V	66.06	-27.27	38.79	54.00	-15.21	Avg
3	7236	--	--	--	--	--	--	--
4	9648	--	--	--	--	--	--	--
5	4824	H	83.56	-27.27	56.29	74.00	-17.71	Peak
6	4824	H	71.48	-27.27	44.21	54.00	-9.79	Avg
7	7236	--	--	--	--	--	--	--
8	9648	--	--	--	--	--	--	--
Test Mode : IEEE 802.11n/HTax20 TX Mid								
1	4874	V	88.01	-27.79	60.22	74.00	-13.78	Peak
2	4874	V	63.86	-27.79	36.07	54.00	-17.93	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	83.19	-27.79	55.40	74.00	-18.60	Peak
6	4874	H	71.38	-27.79	43.59	54.00	-10.41	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11ax20 TX High								
1	4924	V	85.84	-28.30	57.54	74.00	-16.46	Peak
2	4924	V	67.81	-28.30	39.51	54.00	-14.49	Avg
3	7386	--	--	--	--	--	--	--
4	9848	--	--	--	--	--	--	--
5	4924	H	83.49	-28.30	55.19	74.00	-18.81	Peak
6	4924	H	71.66	-28.30	43.36	54.00	-10.64	Avg
7	7386	--	--	--	--	--	--	--
8	9848	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : IEEE 802.11ax40 TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4844	V	83.50	-27.27	56.23	74.00	-17.77	Peak
2	4844	V	64.72	-27.27	37.45	54.00	-16.55	Avg
3	7266	--	--	--	--	--	--	--
4	9688	--	--	--	--	--	--	--
5	4844	H	82.65	-27.27	55.38	74.00	-18.62	Peak
6	4844	H	74.85	-27.27	47.58	54.00	-6.42	Avg
7	7266	--	--	--	--	--	--	--
8	9688	--	--	--	--	--	--	--
Test Mode : IEEE 802.11ax40 TX Mid								
1	4874	V	86.81	-27.79	59.02	74.00	-14.98	Peak
2	4874	V	66.92	-27.79	39.13	54.00	-14.87	Avg
3	7311	--	--	--	--	--	--	--
4	9748	--	--	--	--	--	--	--
5	4874	H	82.98	-27.79	55.19	74.00	-18.81	Peak
6	4874	H	73.54	-27.79	45.75	54.00	-8.25	Avg
7	7311	--	--	--	--	--	--	--
8	9748	--	--	--	--	--	--	--
Test Mode : IEEE 802.11ax40 TX High								
1	4904	V	84.11	-28.30	55.81	74.00	-18.19	Peak
2	4904	V	67.45	-28.30	39.15	54.00	-14.85	Avg
3	7356	--	--	--	--	--	--	--
4	9808	--	--	--	--	--	--	--
5	4904	H	80.60	-28.30	52.30	74.00	-21.70	Peak
6	4904	H	72.18	-28.30	43.88	54.00	-10.12	Avg
7	7356	--	--	--	--	--	--	--
8	9808	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

4. Power Line Conducted Emission

4.1. Test Limits

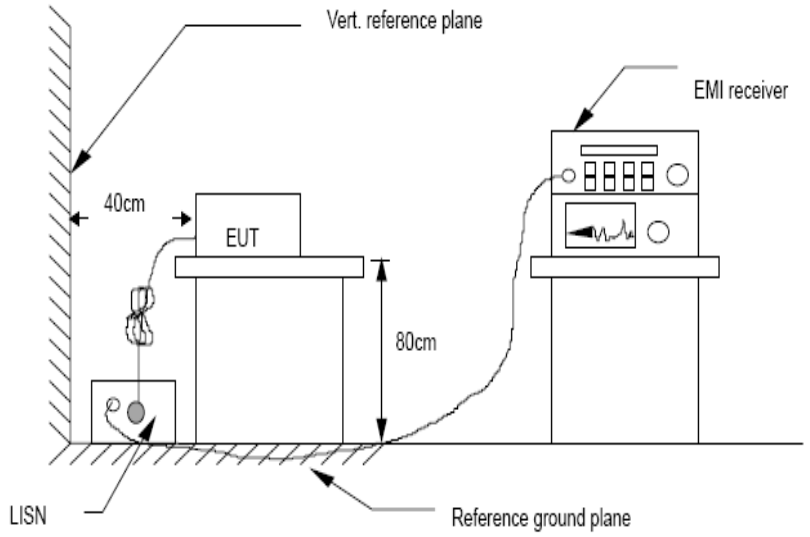
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.
3.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs.
Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.
The bandwidth of test receiver is set at 9 kHz.

4.3. Test Setup



4.4. Test Results

Test Date	:	2024.05.23	Temperature	:	26℃
Test Engineer	:	Felix Pang	Humidity	:	54%
Test Mode	:	WIFI mode			
Test Results	:	**PASS**			

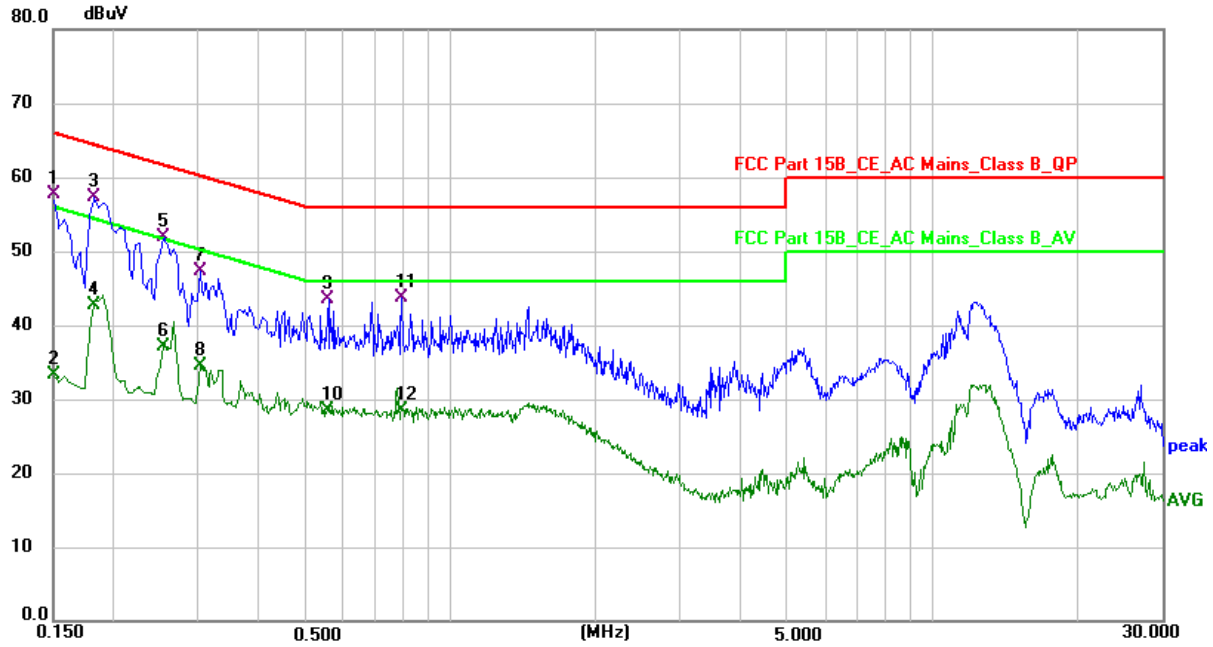
Note: 1. The test results are listed in next pages.

2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out.

3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

4. All modes have been tested, and only worst data of b mode, Channel 2412MHz (AC 120V/ 60Hz) was listed in this report.

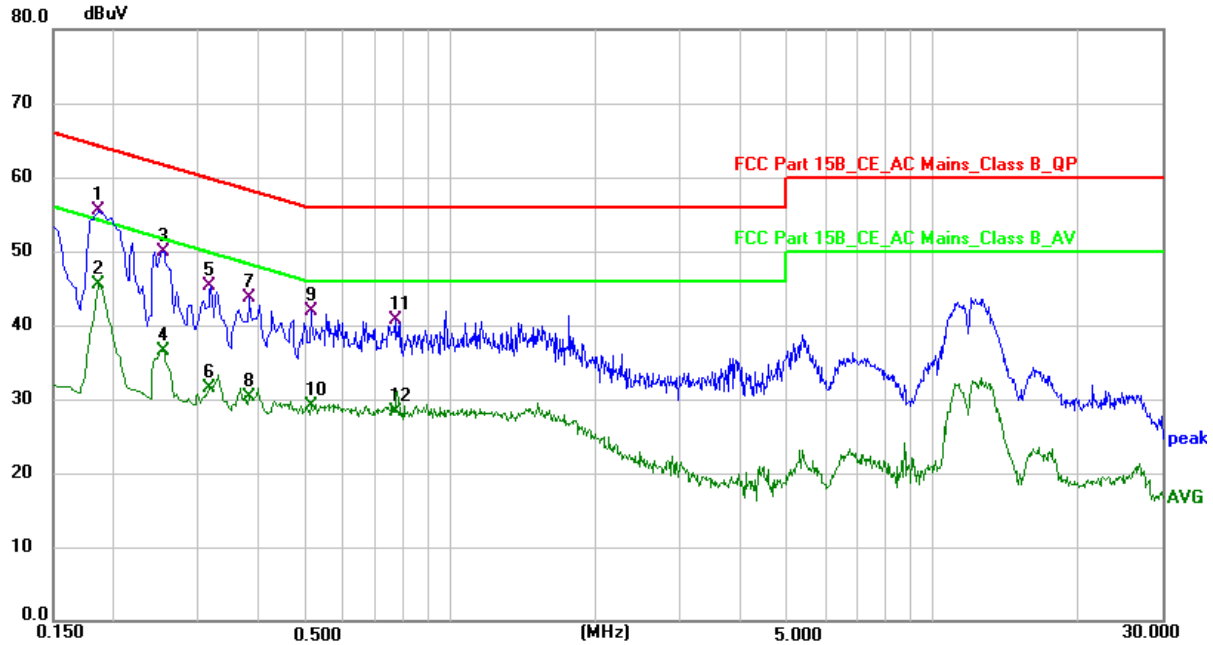
Polarization: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1500	47.81	9.94	57.75	66.00	-8.25	QP	P
2	0.1500	23.35	9.94	33.29	56.00	-22.71	AVG	P
3 *	0.1819	47.28	9.95	57.23	64.40	-7.17	QP	P
4	0.1819	32.66	9.95	42.61	54.40	-11.79	AVG	P
5	0.2540	41.92	9.97	51.89	61.63	-9.74	QP	P
6	0.2540	27.04	9.97	37.01	51.63	-14.62	AVG	P
7	0.3020	37.31	9.98	47.29	60.19	-12.90	QP	P
8	0.3020	24.52	9.98	34.50	50.19	-15.69	AVG	P
9	0.5580	33.74	9.77	43.51	56.00	-12.49	QP	P
10	0.5580	18.72	9.77	28.49	46.00	-17.51	AVG	P
11	0.7940	34.23	9.42	43.65	56.00	-12.35	QP	P
12	0.7940	19.01	9.42	28.43	46.00	-17.57	AVG	P

Note: Level = Reading + Factor Margin = Level - Limit

Polarization: N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1 *	0.1860	45.53	9.97	55.50	64.21	-8.71	QP	P
2	0.1860	35.44	9.97	45.41	54.21	-8.80	AVG	P
3	0.2540	40.06	9.90	49.96	61.63	-11.67	QP	P
4	0.2540	26.66	9.90	36.56	51.63	-15.07	AVG	P
5	0.3180	35.66	9.74	45.40	59.76	-14.36	QP	P
6	0.3180	21.78	9.74	31.52	49.76	-18.24	AVG	P
7	0.3820	34.14	9.59	43.73	58.24	-14.51	QP	P
8	0.3820	20.76	9.59	30.35	48.24	-17.89	AVG	P
9	0.5140	32.05	9.78	41.83	56.00	-14.17	QP	P
10	0.5140	19.33	9.78	29.11	46.00	-16.89	AVG	P
11	0.7700	31.01	9.72	40.73	56.00	-15.27	QP	P
12	0.7700	18.66	9.72	28.38	46.00	-17.62	AVG	P

Note: Level = Reading + Factor Margin = Level - Limit

5. Out-of-band Emissions

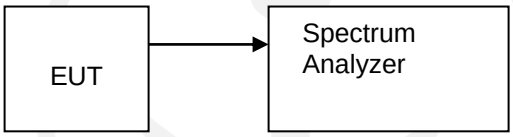
5.1. Test Limits

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 FCC Part 15.209(a) is not required.

5.2. Test Procedure

Connect the transmitter ouput to spectrum analvzer using a low loss RF cable, and set the spectrum analvzerto RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these setting aremade of the in-band reference level, bandedge and out-of-band emissions.

5.3. Test Setup



5.4. Test Results

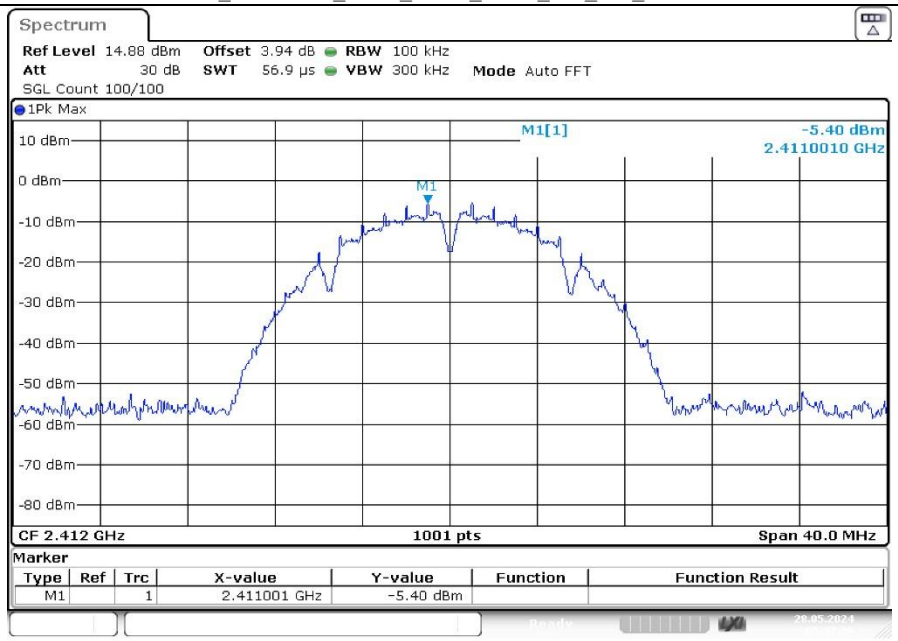
PASS.

The test results are listed in next pages.

Band Edge: Pass

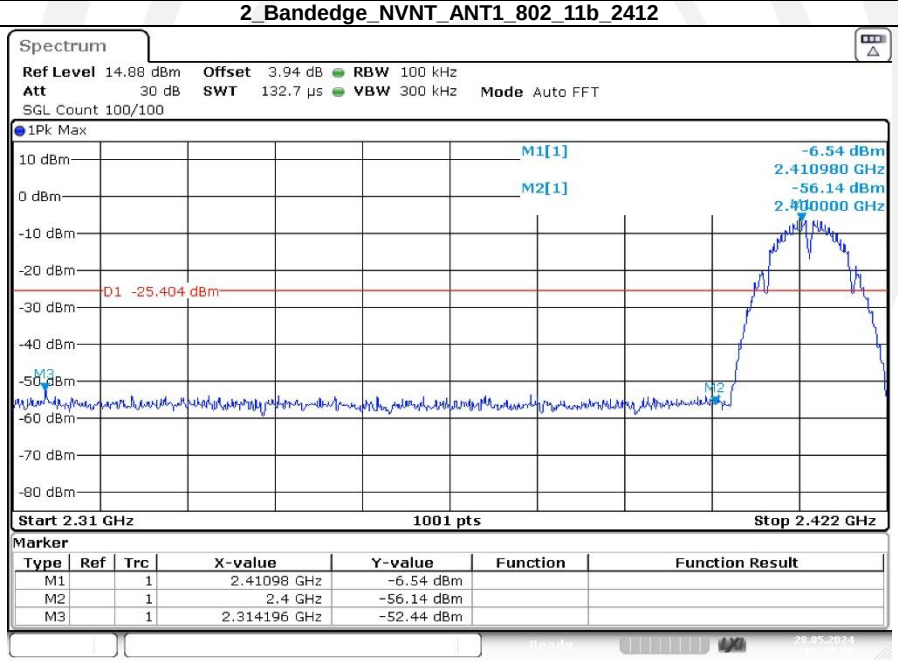
Note: Both antennas have been tested and only the worst data of antenna 1 is shown.

1_Reference_Level_NVNT_ANT1_802_11b_2412



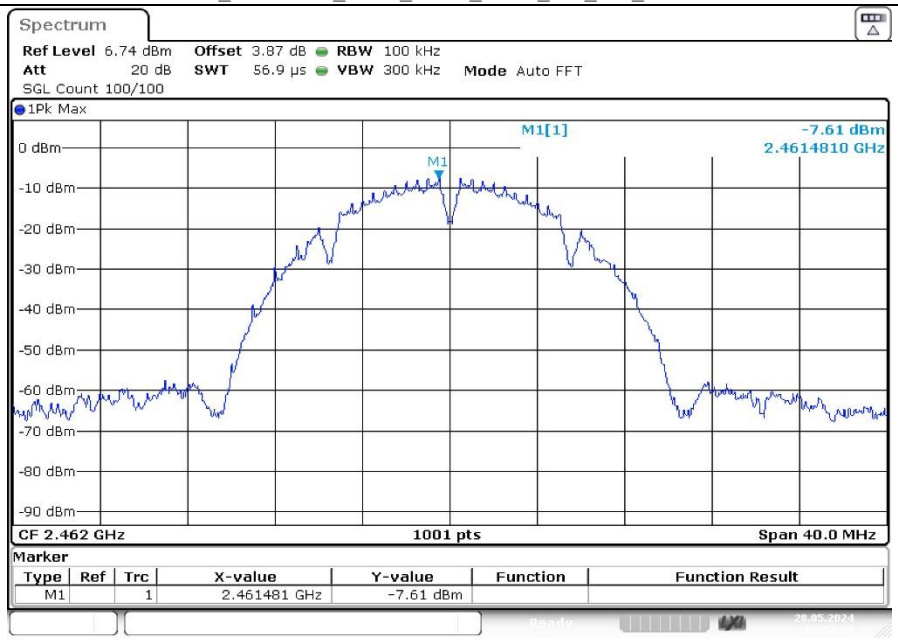
Date: 28.MAY.2024 06:42:26

2_Bandedge_NVNT_ANT1_802_11b_2412



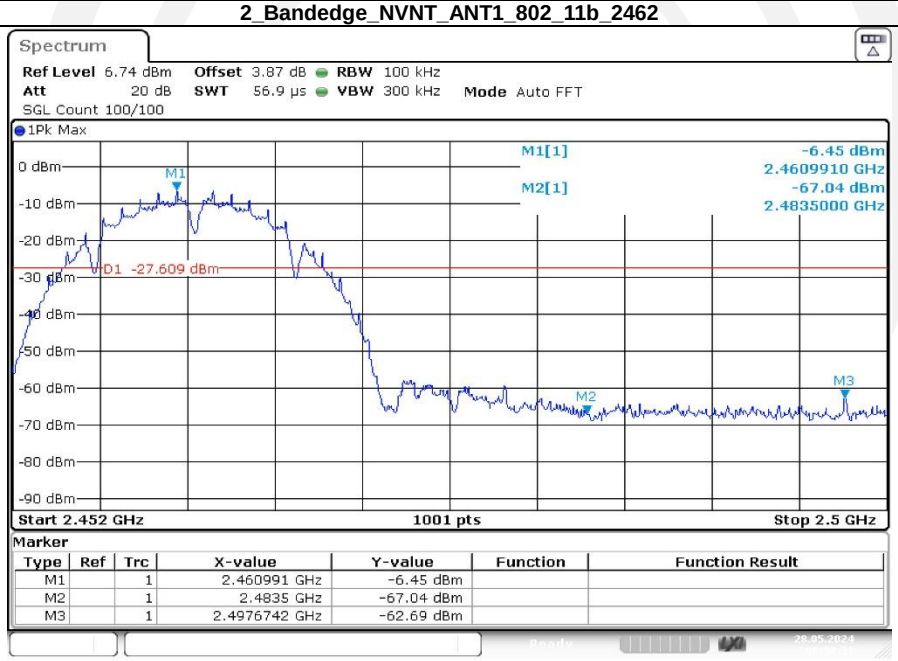
Date: 28.MAY.2024 06:42:39

1_Reference_Level_NVNT_ANT1_802_11b_2462



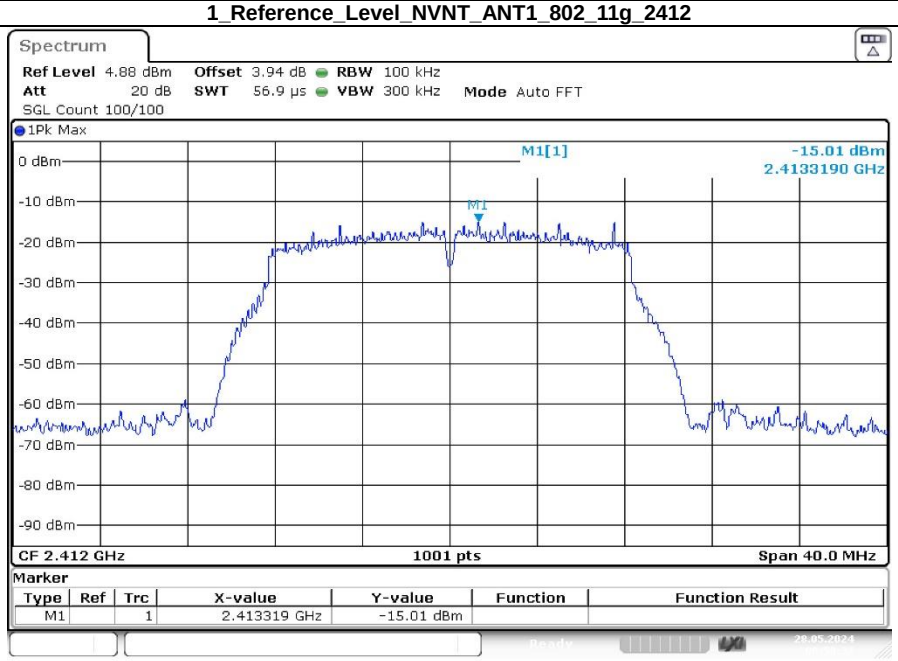
Date: 28.MAY.2024 06:52:20

2_Bandedge_NVNT_ANT1_802_11b_2462



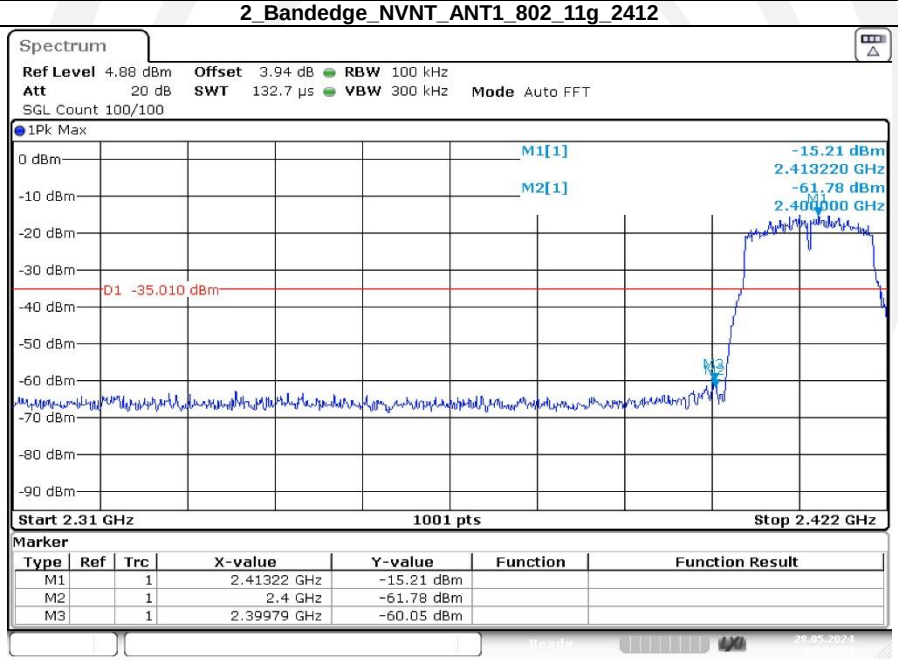
Date: 28.MAY.2024 06:52:31

1_Reference_Level_NVNT_ANT1_802_11g_2412



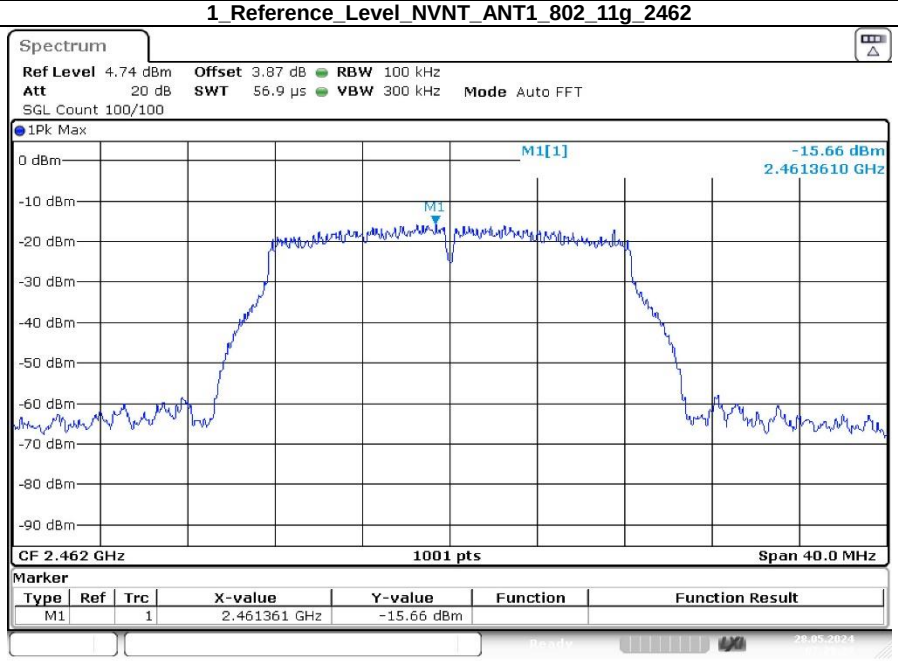
Date: 28.MAY.2024 06:58:31

2_Bandedge_NVNT_ANT1_802_11g_2412



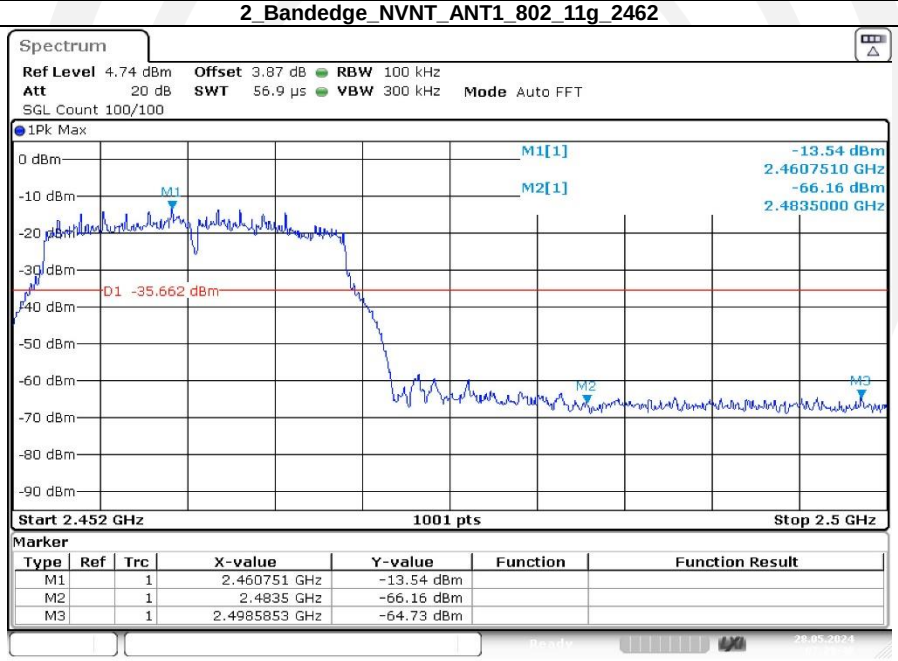
Date: 28.MAY.2024 06:58:44

1_Reference_Level_NVNT_ANT1_802_11g_2462



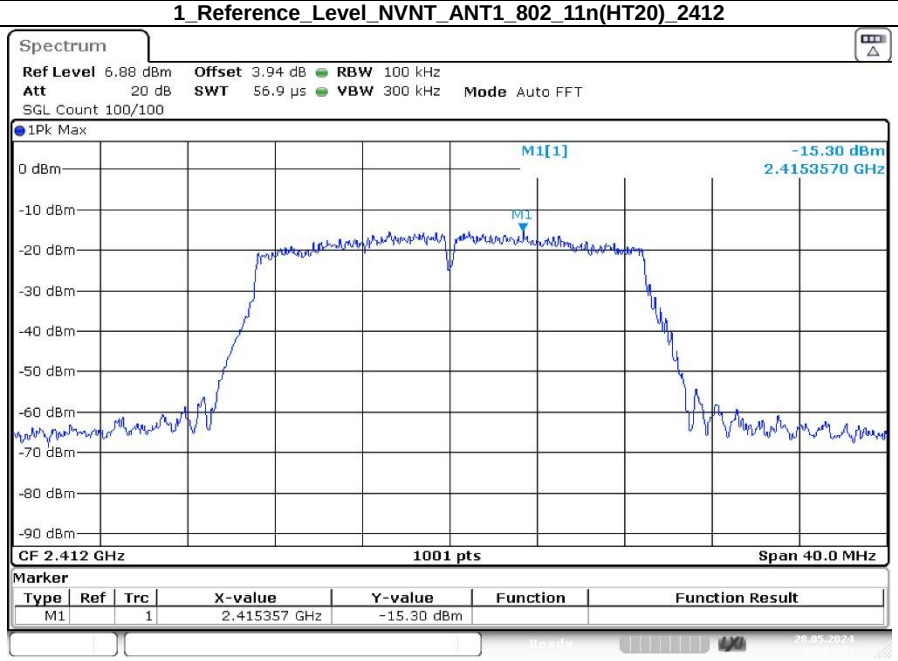
Date: 28.MAY.2024 07:29:29

2_Bandedge_NVNT_ANT1_802_11g_2462



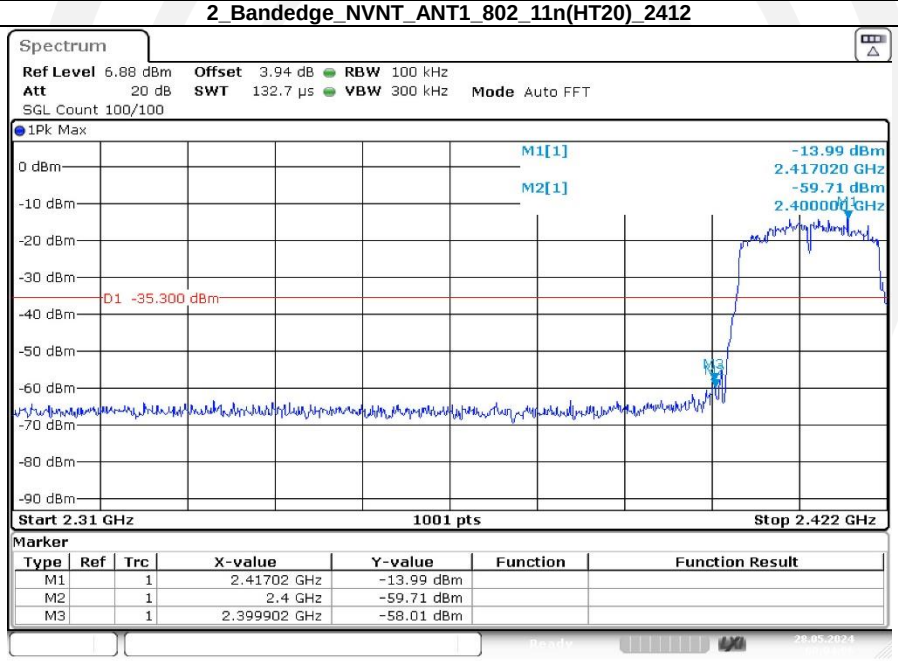
Date: 28.MAY.2024 07:29:40

1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2412



Date: 28.MAY.2024 08:03:54

2_Bandedge_NVNT_ANT1_802_11n(HT20)_2412



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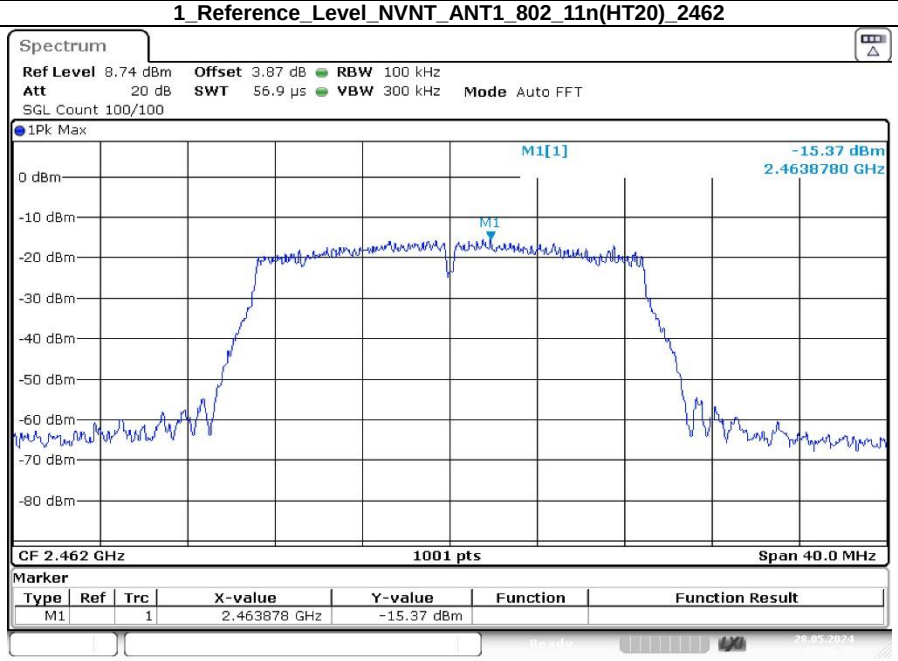
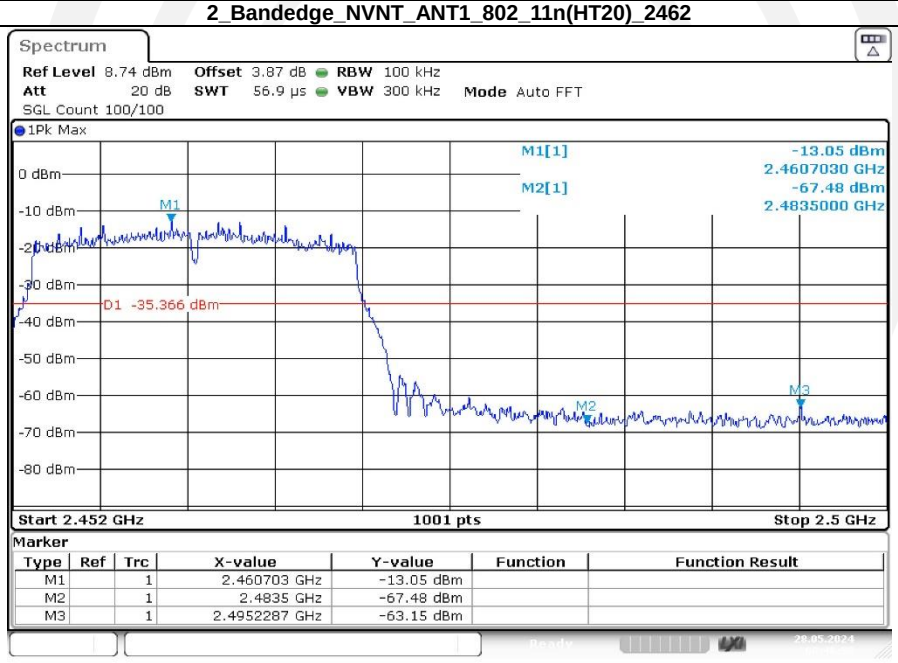
1_Reference_Level_NVNT_ANT1_802_11n(HT20)_2462



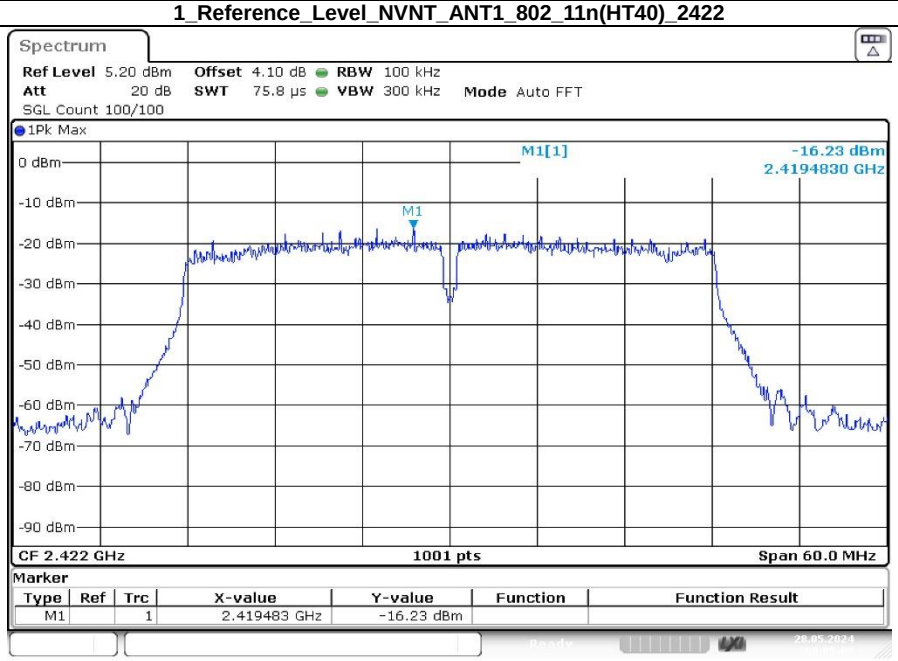
Date: 28.MAY.2024 08:46:46

2_Bandedge_NVNT_ANT1_802_11n(HT20)_2462



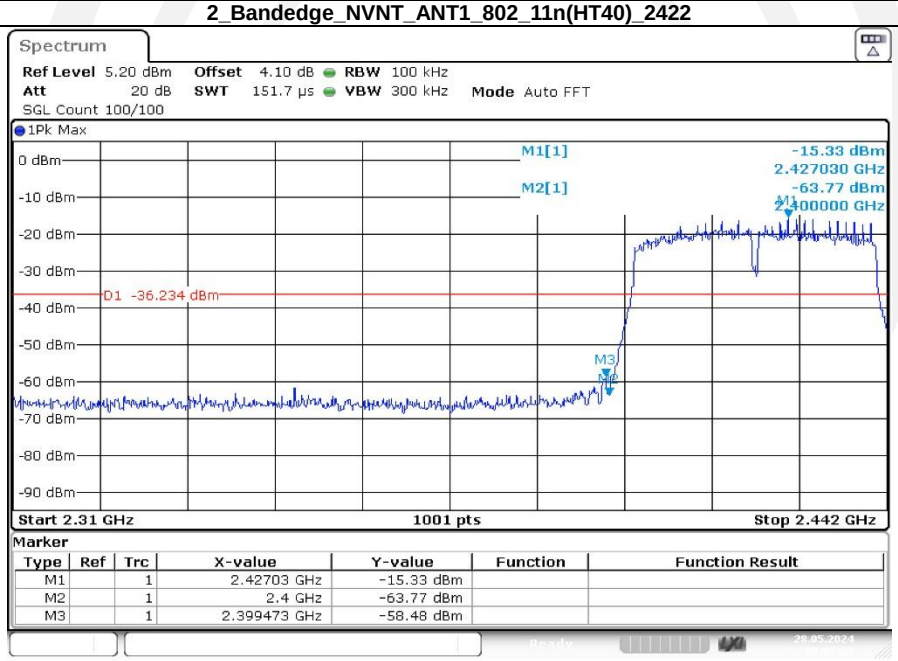
Date: 28.MAY.2024 08:46:57

1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2422



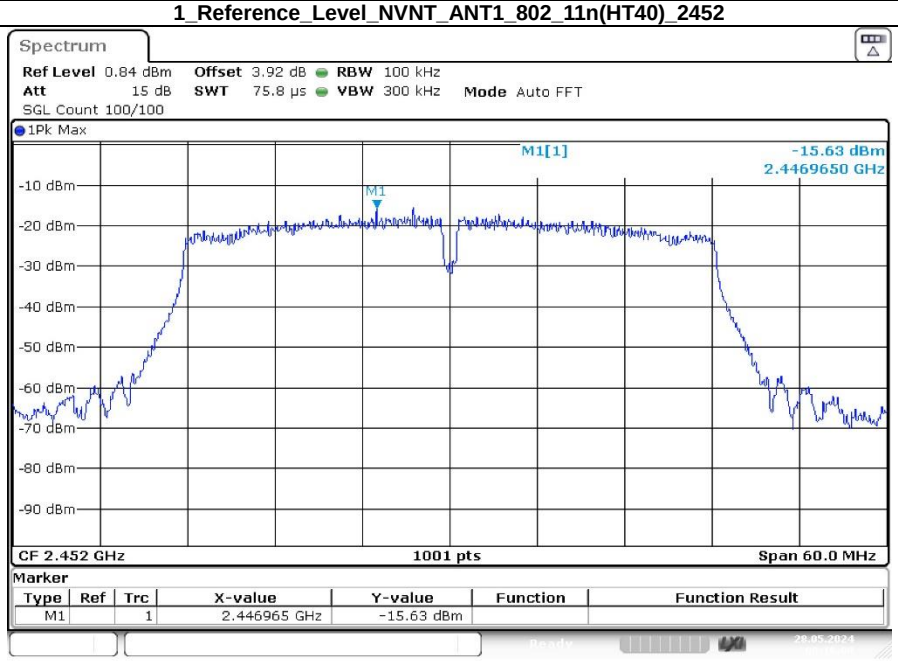
Date: 28.MAY.2024 09:05:09

2_Bandedge_NVNT_ANT1_802_11n(HT40)_2422



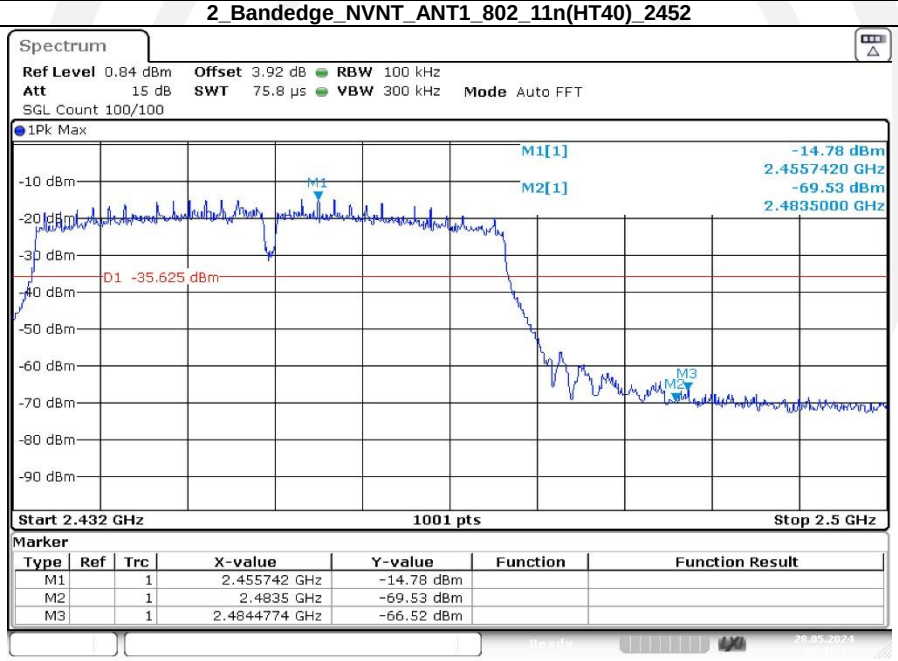
Date: 28.MAY.2024 09:05:22

1_Reference_Level_NVNT_ANT1_802_11n(HT40)_2452



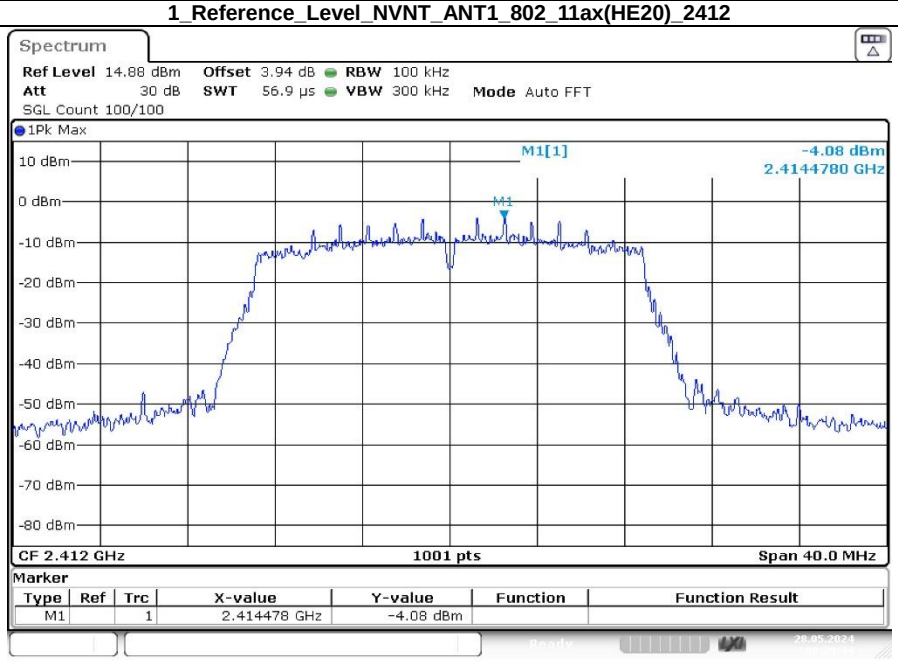
Date: 28.MAY.2024 09:16:00

2_Bandedge_NVNT_ANT1_802_11n(HT40)_2452



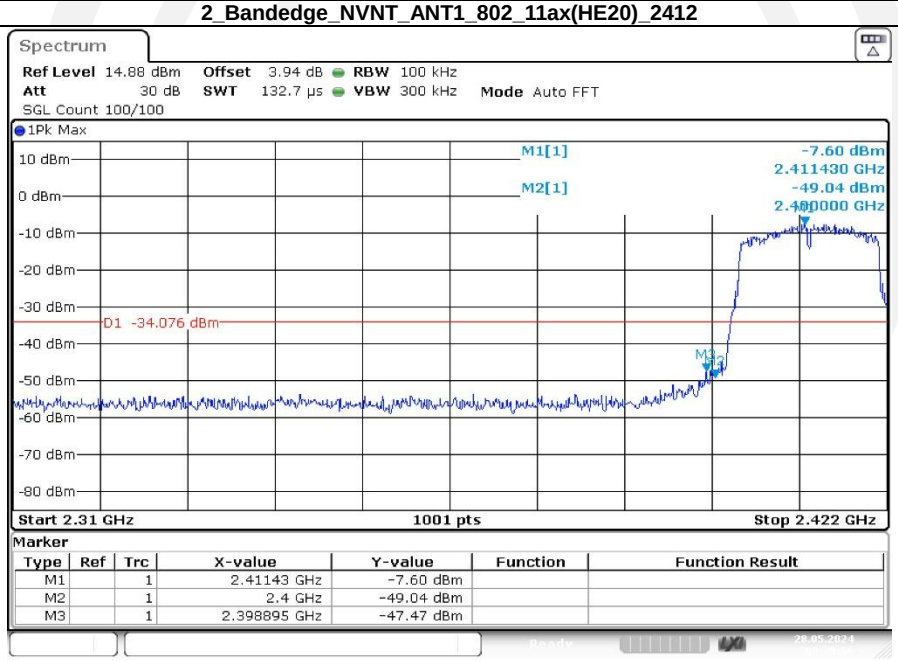
Date: 28.MAY.2024 09:16:11

1_Reference_Level_NVNT_ANT1_802_11ax(HE20)_2412



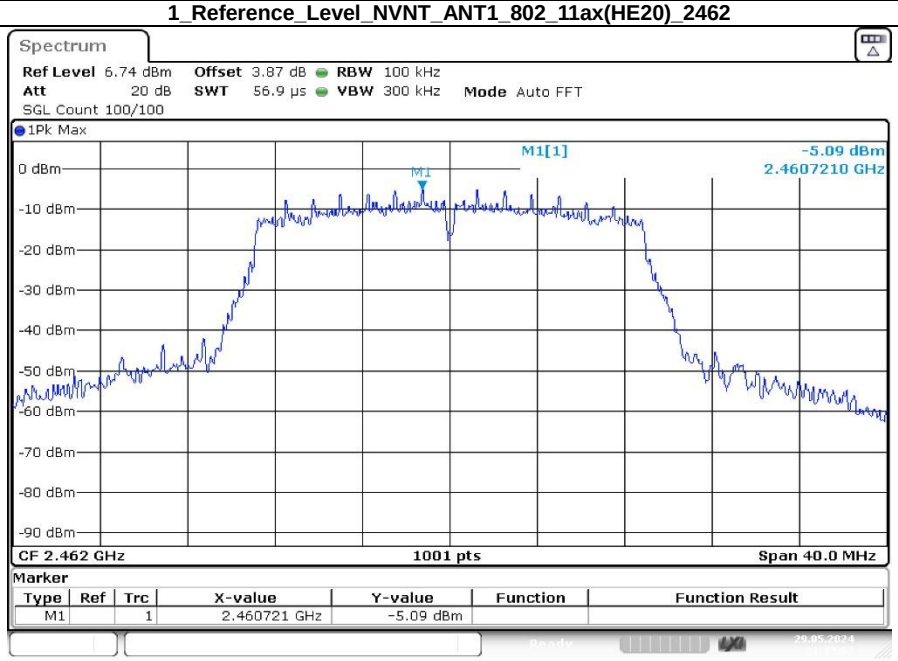
Date: 28.MAY.2024 09:28:43

2_Bandedge_NVNT_ANT1_802_11ax(HE20)_2412



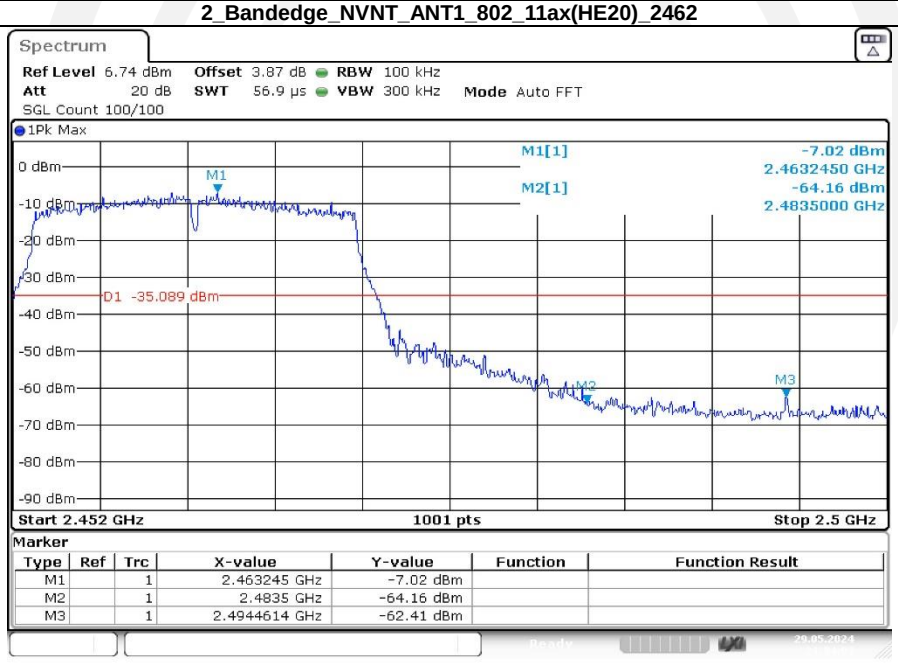
Date: 28.MAY.2024 09:28:56

1_Reference_Level_NVNT_ANT1_802_11ax(HE20)_2462



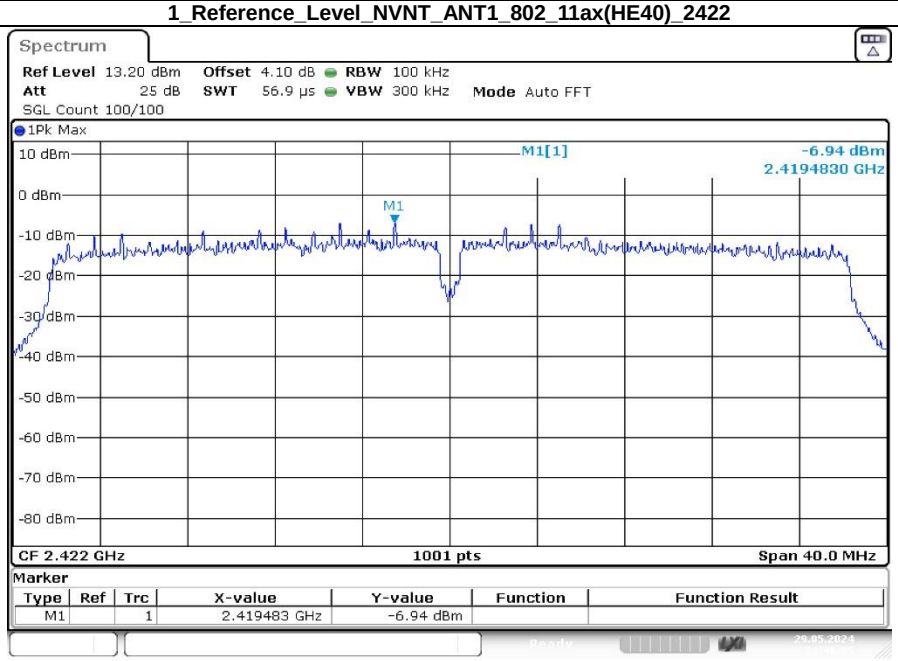
Date: 29.MAY.2024 21:33:52

2_Bandedge_NVNT_ANT1_802_11ax(HE20)_2462



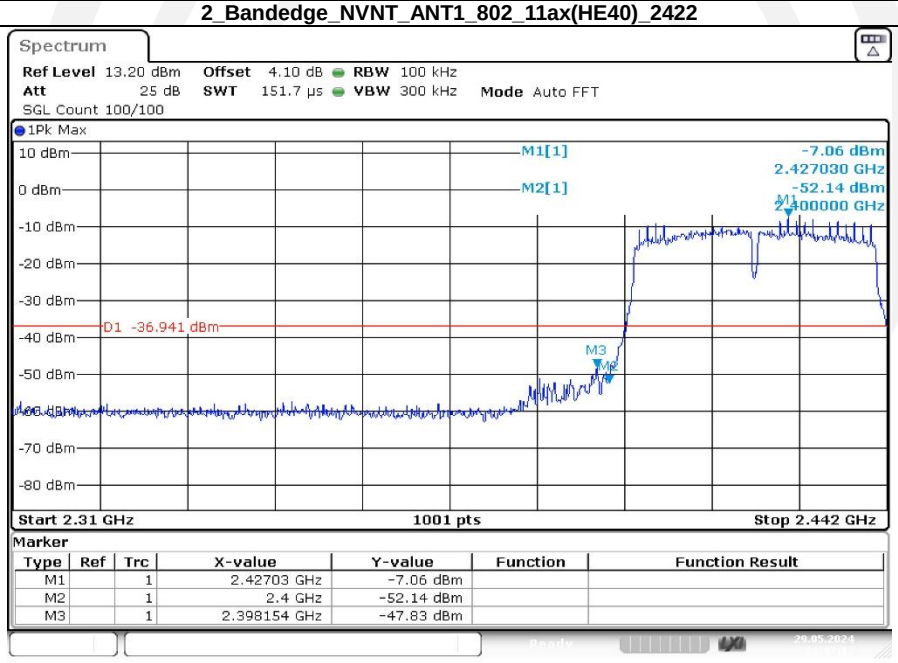
Date: 29.MAY.2024 21:34:03

1_Reference_Level_NVNT_ANT1_802_11ax(HE40)_2422



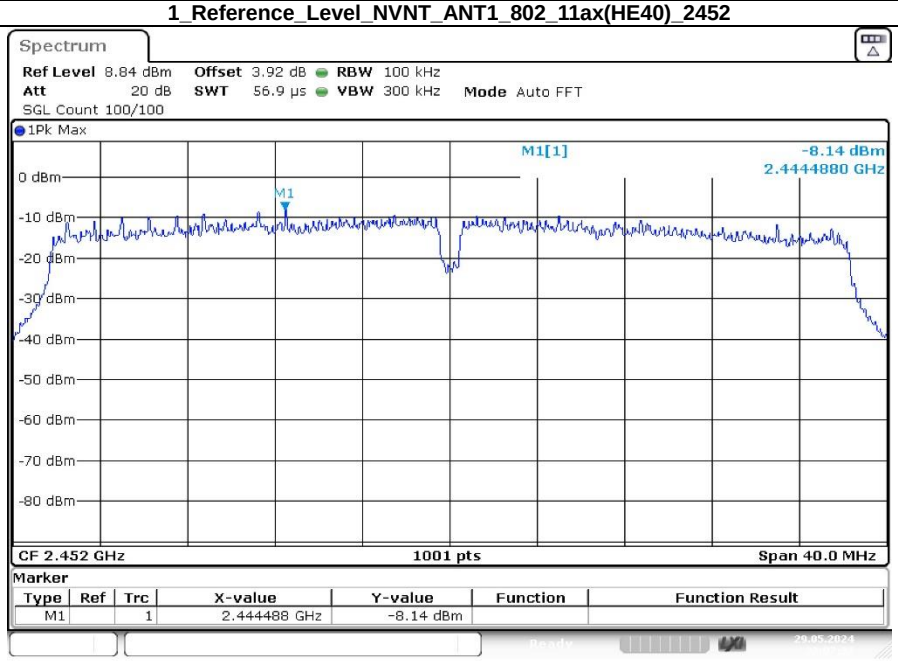
Date: 29.MAY.2024 21:46:59

2_Bandedge_NVNT_ANT1_802_11ax(HE40)_2422



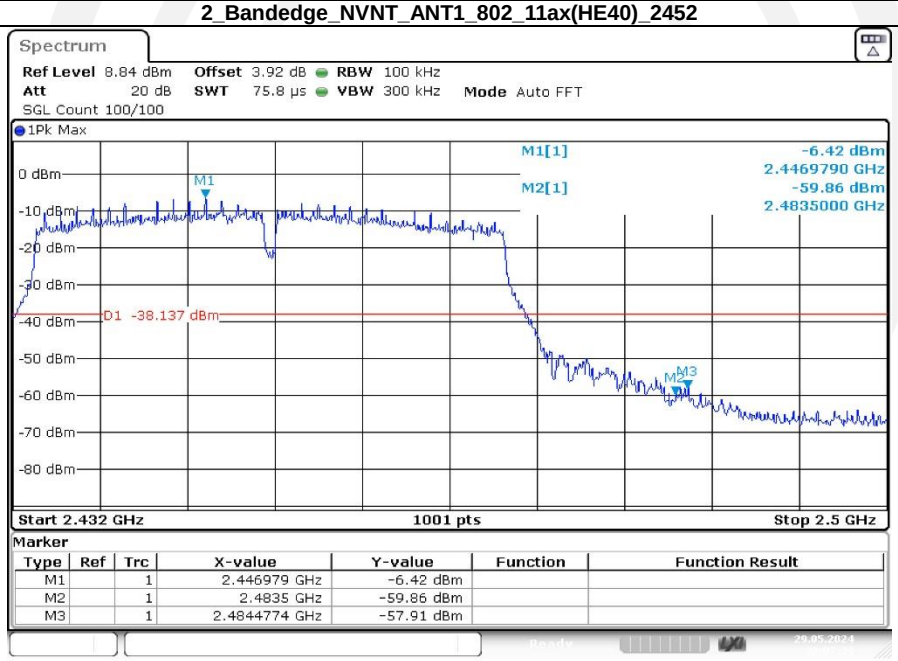
Date: 29.MAY.2024 21:47:13

1_Reference_Level_NVNT_ANT1_802_11ax(HE40)_2452



Date: 29.MAY.2024 22:07:21

2_Bandedge_NVNT_ANT1_802_11ax(HE40)_2452

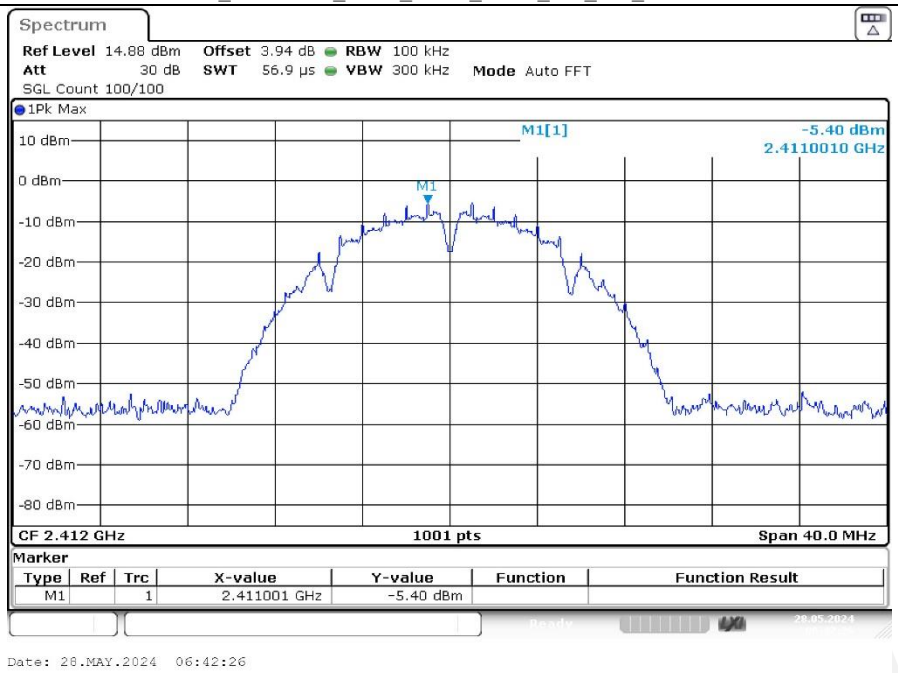


Date: 29.MAY.2024 22:07:33

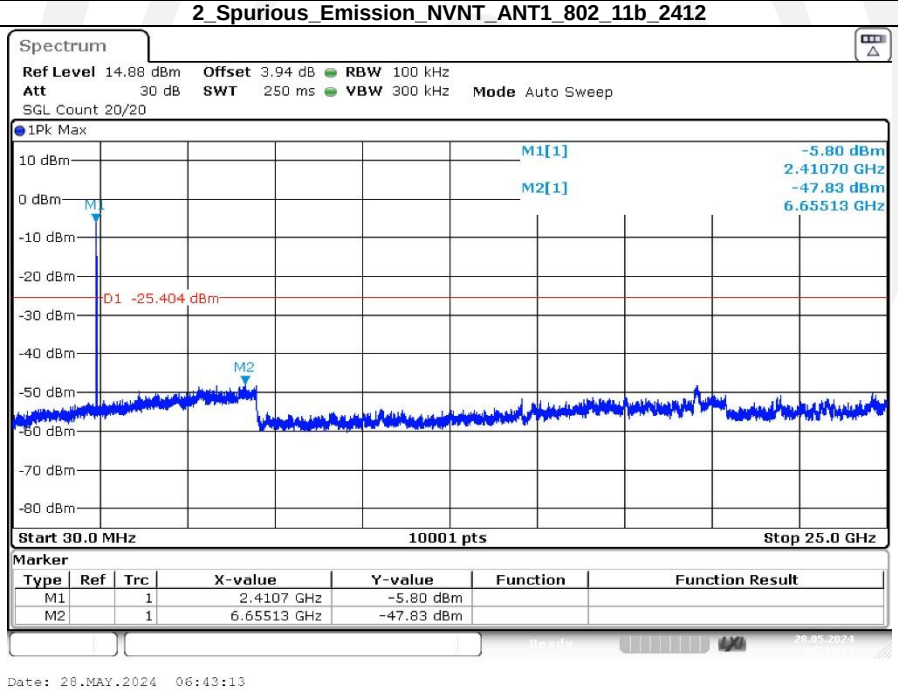
Conducted spurious emission: Pass

Note: Both antennas have been tested and only the worst data of antenna 1 is shown.

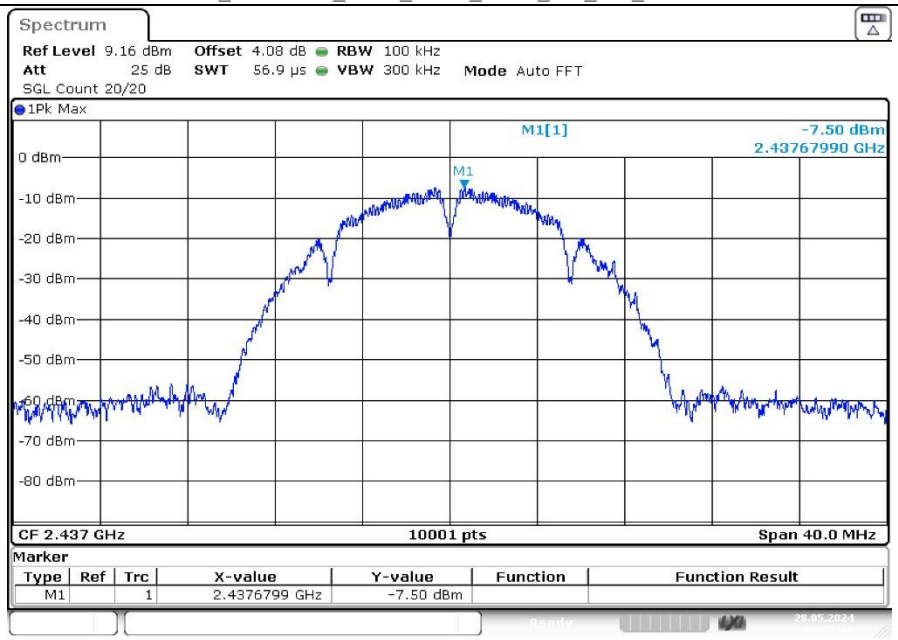
1_Reference_Level_NVNT_ANT1_802_11b_2412



2_Spurious_Emission_NVNT_ANT1_802_11b_2412

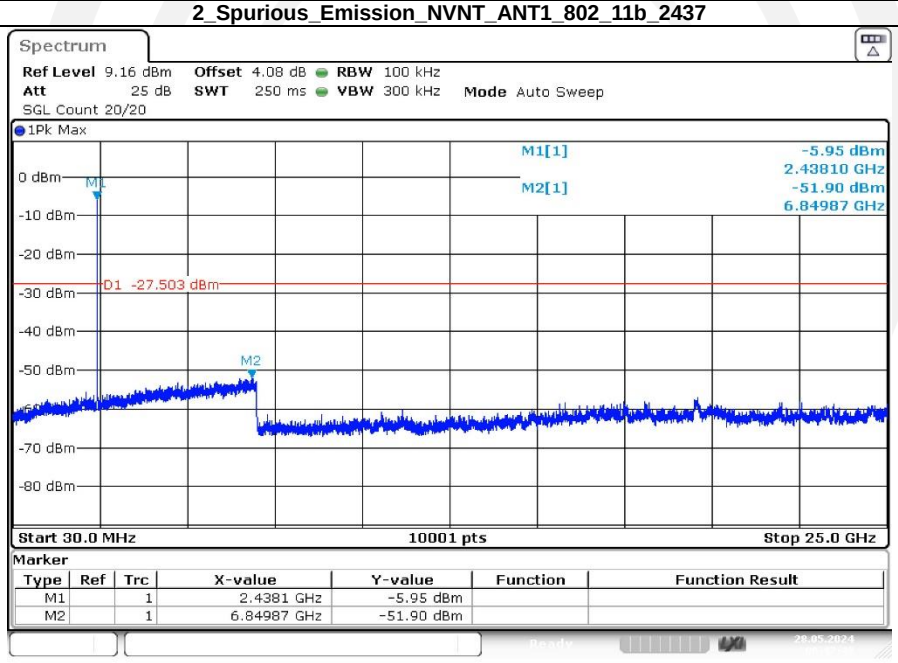


1_Reference_Level_NVNT_ANT1_802_11b_2437



Date: 28.MAY.2024 06:47:16

2_Spurious_Emission_NVNT_ANT1_802_11b_2437



Date: 28.MAY.2024 06:47:49