

Withings

TEST REPORT

Model:
WPA02

REPORT NUMBER
241200290THC-001

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Mar. 05, 2025

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Radio Spectrum TEST REPORT

Applicant:	Withings 2 Rue Maurice Hartmann Issy-les-Moulineaux 92130 France
Product:	Withings U-Scan Reader
Model No.:	WPA02
FCC ID:	XNAWPA02
Test Method/ Standard:	47 CFR FCC Part 15.247 & ANSI C63.10 2013 KDB 558074 D01 v05r02
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 17, Ln. 246, Niupu S. Rd., Xiangshan Dist, Hsinchu City 300075, Taiwan



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TEST REPORT

Revision History

Report No.	Issue Date	Revision Summary
241200290THC-001	Mar. 05, 2025	Original report

Table of Contents

1. General Information	6
1.1 Identification of the EUT	6
1.2 Antenna description	6
1.3 Operation mode	7
1.4 Peripherals equipment	7
2. Minimum 6 dB Bandwidth	8
2.1 Instrument Setting.....	8
2.2 Test Procedure	8
2.3 Test Diagram	8
2.4 Limit	8
2.5 Test Results	9
3. Maximum Peak Conducted Output Power	13
3.1 Instrument Setting.....	13
3.2 Test Procedure	13
3.3 Test Diagram	13
3.4 Limit	13
3.5 Test Results	14
4. Power Spectral Density.....	15
4.1 Instrument Setting.....	15
4.2 Test Procedure	15
4.3 Test Diagram	15
4.4 Limit	15
4.5 Test Results	16
5. Emissions in Non-Restricted Frequency Bands	20
5.1 Instruments Setting	20
5.2 Test Procedure	20
5.3 Test Diagram	20
5.4 Limit	20
5.5 Test Results	21
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)	31
6.1 Instrument Setting.....	31
6.2 Test setup & procedure	31
6.3 Limit	33
6.4 Test Result.....	34
7. Emission on Band Edge.....	40
7.1 Instrument Setting.....	40
7.2 Test Procedure	40
7.2 Test Results	41

8. AC Power Line Conducted Emission	48
8.1 Measuring instrument setting.....	48
8.2 Test Procedure	48
8.3 Test Diagram	48
8.4 Limit	49
8.5 Test Results	50
Appendix A: Test equipment list.....	52
Appendix B: Measurement Uncertainty.....	54

Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Minimum 6 Db Bandwidth	15.247(a)(2)	Pass
Maximum Peak Conducted Output Power	15.247(b)(3)	Pass
Power Spectral Density	15.247€	Pass
Emissions In Non-Restricted Frequency Bands	15.247(d)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Withings U-Scan Reader
Model No.:	WPA02
Operating Frequency:	2412 MHz ~ 2462 MHz
Frequency of Each Channel:	2412+5 k, k=0 ~ 10
Rating:	1. DC 5V 2. DC 3.8V
Power Cord:	N/A
Sample receiving date:	2025/01/13
Sample condition:	Workable
Test Date(s):	2025/02/03 ~ 2025/02/07

SOP file name and version
RF_EMI_STM32WB_test_procedure_v7

	Mac
Wi-Fi	A47EFA3CCAAC

1.2 Antenna description

Antenna Gain	: 4.1 dBi
Antenna Type	: FCB moment
Connector Type	: Fixed

1.3 Operation mode

Connected to Notebook, executing “Tera term” to select different frequency.

With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n(HT20) mode, mode the final tests were executed under these conditions recorded in this report individually.

Mode	Channel	Frequency (MHz)	Data rate	Signal on time(ms)	Signal on & off time(ms)	Duty cycle	Duty Cycle factor
802.11b	6	2437	1	8.41	8.52	0.987	0.056
802.11g	6	2437	6	1.38	1.49	0.926	0.333
802.11n(HT20)	6	2437	6.5	1.30	1.41	0.922	0.353

1.4 Peripherals equipment

Peripherals name	Brand	Model No.	Serial No.
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H
Fixture	Yahorng	PC23H019	N/A

Peripherals name	Length	Shielded(Y/N)	Brand	Model No.
USB Cable	3m	Y	UGREEN	USB Cable

2. Minimum 6 dB Bandwidth

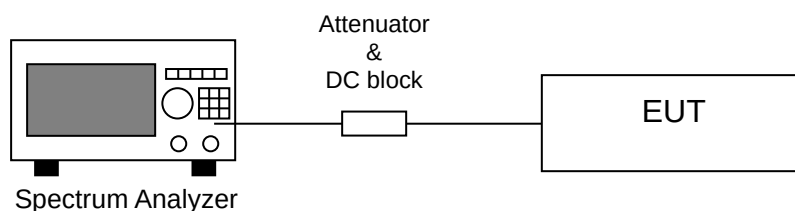
2.1 Instrument Setting

Spectrum Parameter	Setting
Detector	Peak
RBW	100kHz
VBW	$\geq 3 \times \text{RBW}$
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

2.2 Test Procedure

Step 1	The transmitter output was connected to the spectrum analyzer.
Step 2	Test was performed accordance with ANSI C63.10.
Step 3	Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

2.3 Test Diagram



2.4 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

2.5 Test Results

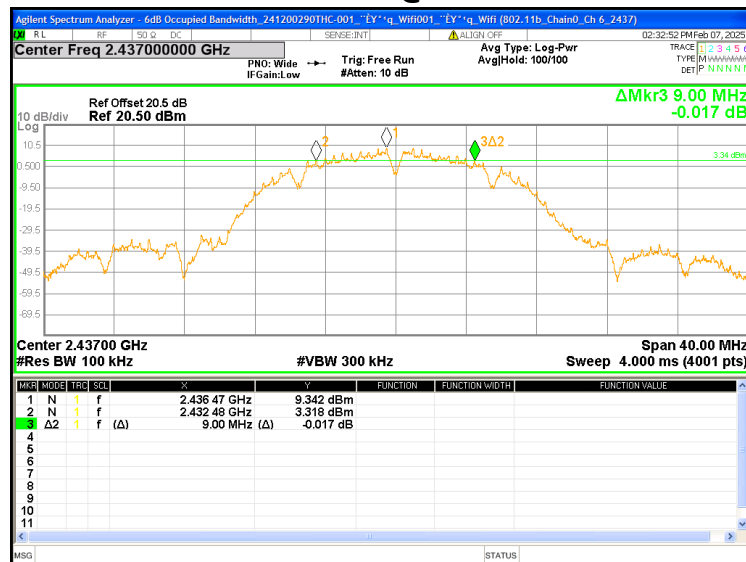
Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1	2412	8.09	>0.5	Pass
	6	2437	8.99	>0.5	Pass
	11	2462	8.59	>0.5	Pass
802.11g	1	2412	13.16	>0.5	Pass
	6	2437	15.12	>0.5	Pass
	11	2462	14.01	>0.5	Pass
802.11n(HT20)	1	2412	13.82	>0.5	Pass
	6	2437	12.87	>0.5	Pass
	11	2462	15.01	>0.5	Pass

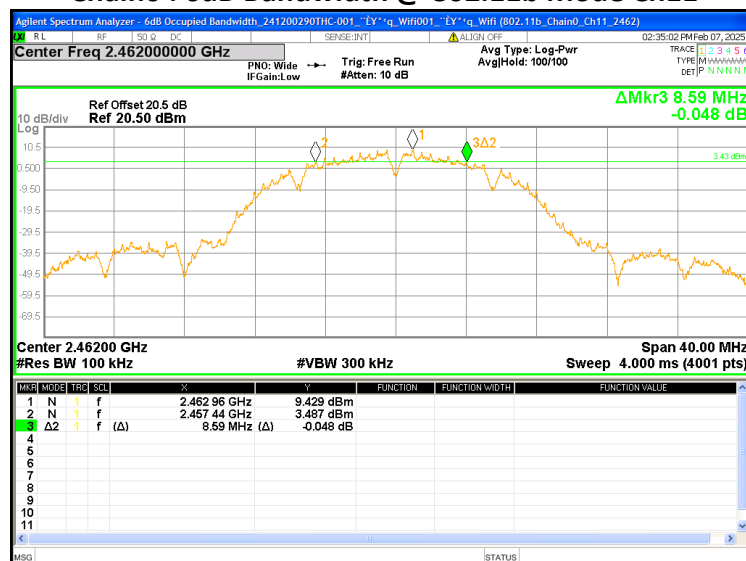
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 1



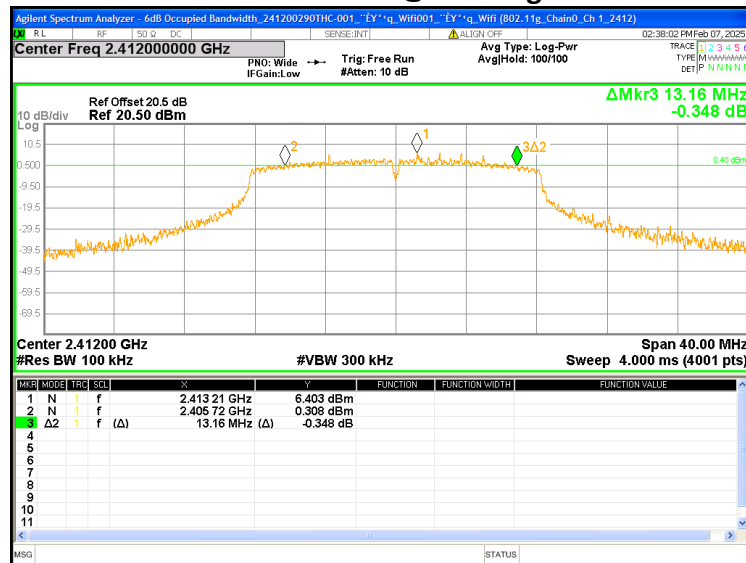
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 6



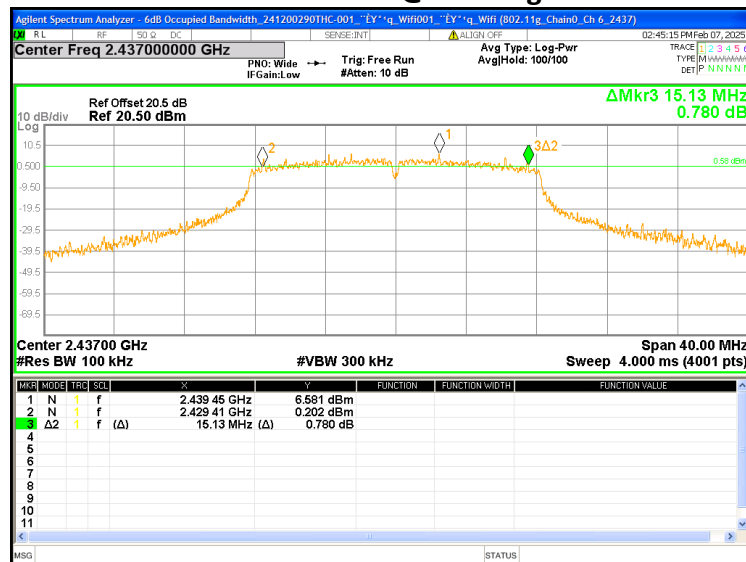
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch11



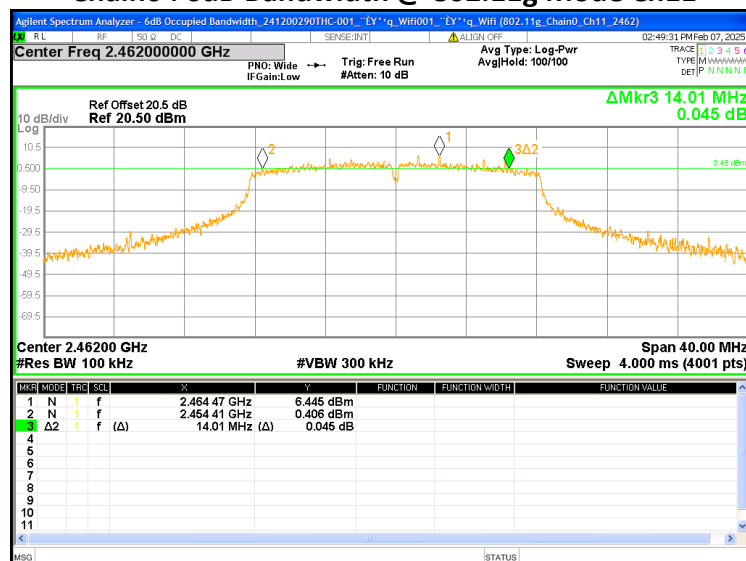
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 1



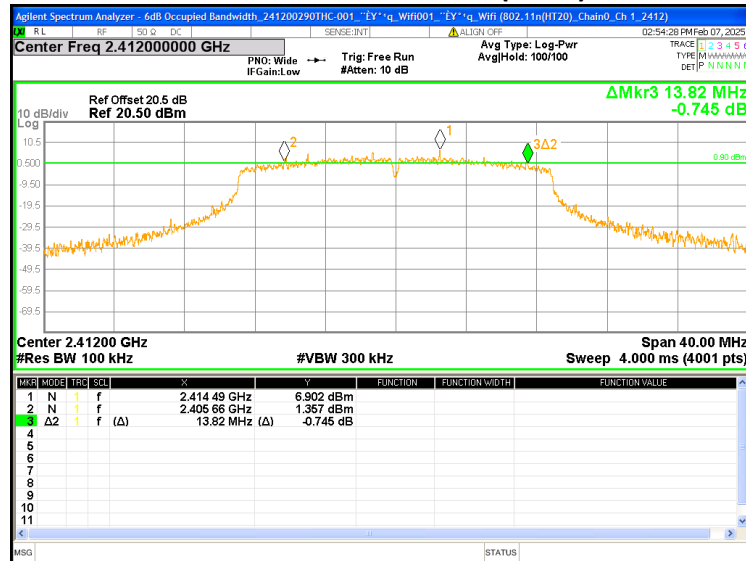
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 6



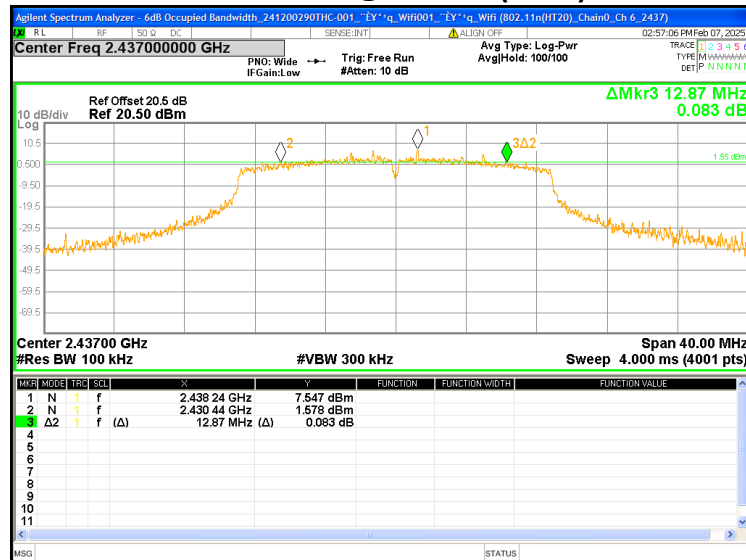
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch11



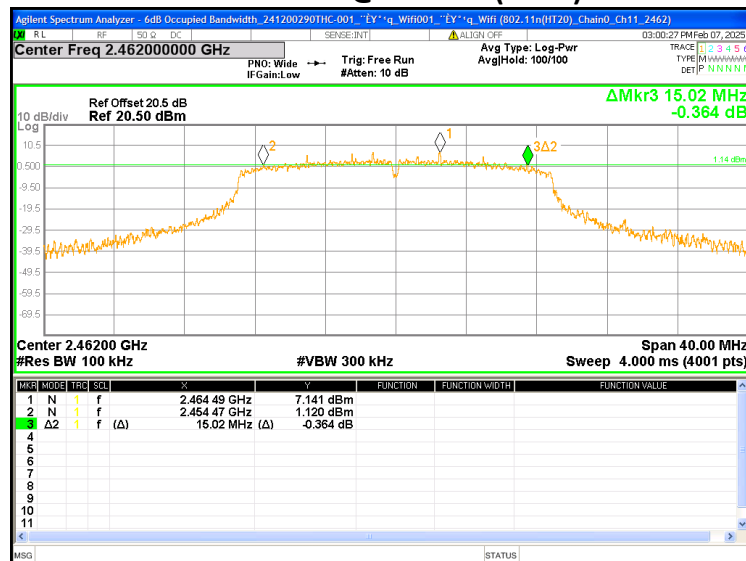
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1



Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 6



Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch11



3. Maximum Peak Conducted Output Power

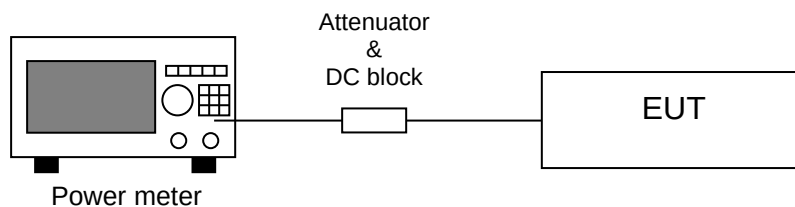
3.1 Instrument Setting

Power Meter Parameter	Setting
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

3.2 Test Procedure

The preferred methodology is to use integrated average power measurements, as described in 11.9.2 and 11.13.3 of ANSI C63.10. The peak integrated band power methods of 11.9.1.2 and 11.13.3.2 of ANSI C63.10 are not applicable for FCC compliance testing purposes.

3.3 Test Diagram



3.4 Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

3.5 Test Results

Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power [AV] (dBm)	Total Power [AV] (mW)	Maximum power [PK] (dBm)	Maximum power [PK] (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	1	18.35	68.39	20.70	117.49	30	-9.30
	6	2437		18.31	67.76	20.60	114.82	30	-9.40
	11	2462		18.41	69.34	20.75	118.85	30	-9.25
802.11g	1	2412	6	18.07	64.12	25.48	353.18	30	-4.52
	6	2437		18.43	69.66	25.73	374.11	30	-4.27
	11	2462		17.98	62.81	25.84	383.71	30	-4.16
802.11n (HT20)	1	2412	6.5	17.97	62.66	25.70	371.54	30	-4.30
	6	2437		18.18	65.77	25.83	382.82	30	-4.17
	11	2462		18.48	70.47	25.74	374.97	30	-4.26

4. Power Spectral Density

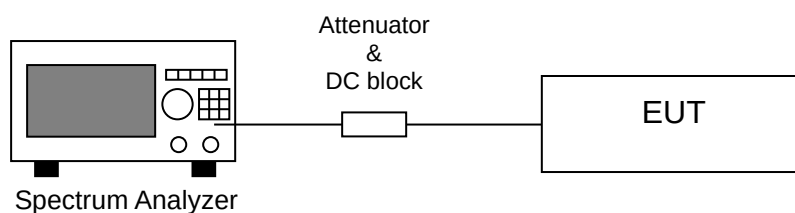
4.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	≥ 3 kHz
VBW	$\geq 3 \times$ RBW
Sweep	Auto couple
Trace	Max hold
Span	1.5 times x 6dB bandwidth
Attenuation	Auto

4.2 Test Procedure

Step 1	Test procedure refer to subclause 11.10 of ANSI C63.10.
Step 2	Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
Step 3	Use the peak marker function to determine the maximum amplitude level within the RBW.

4.3 Test Diagram



4.4 Limit

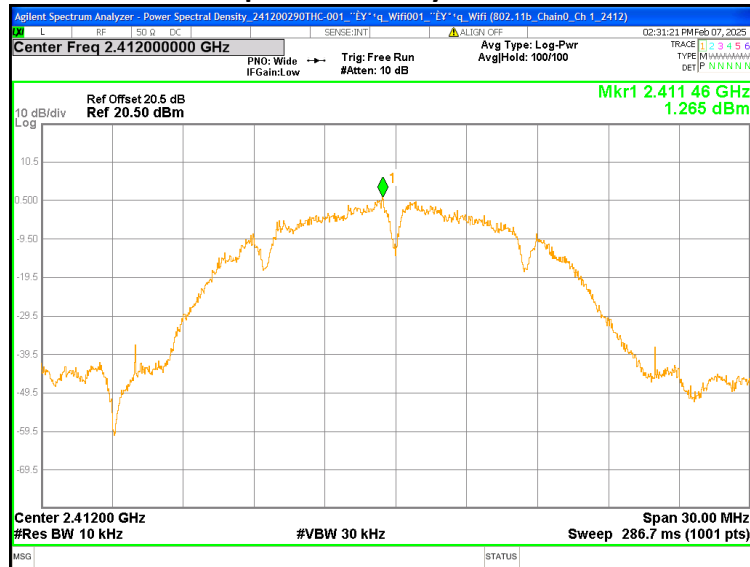
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 10 kHz band during any time interval of continuous transmission

4.5 Test Results

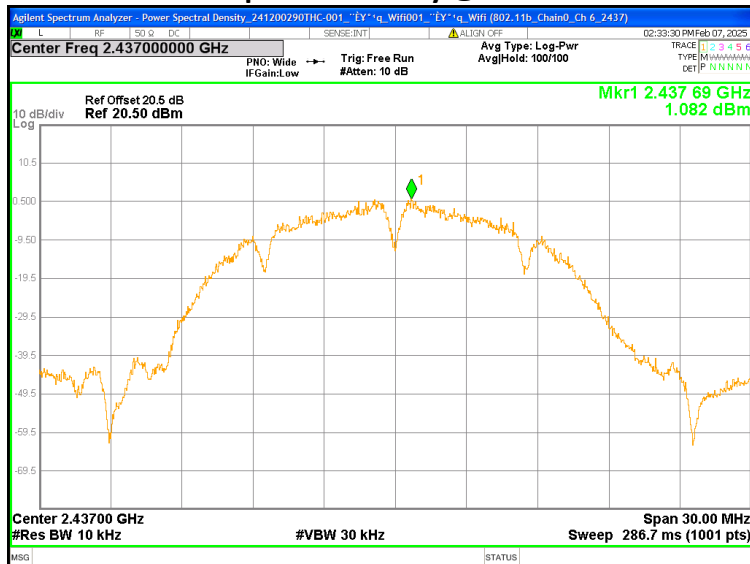
Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
802.11b	1	2412	1.26	8	-6.74
	6	2437	1.08	8	-6.92
	11	2462	0.84	8	-7.16
802.11g	1	2412	-0.92	8	-8.92
	6	2437	0.48	8	-7.52
	11	2462	-1.04	8	-9.04
802.11n(HT20)	1	2412	-0.93	8	-8.93
	6	2437	-1.51	8	-9.51
	11	2462	-0.73	8	-8.73

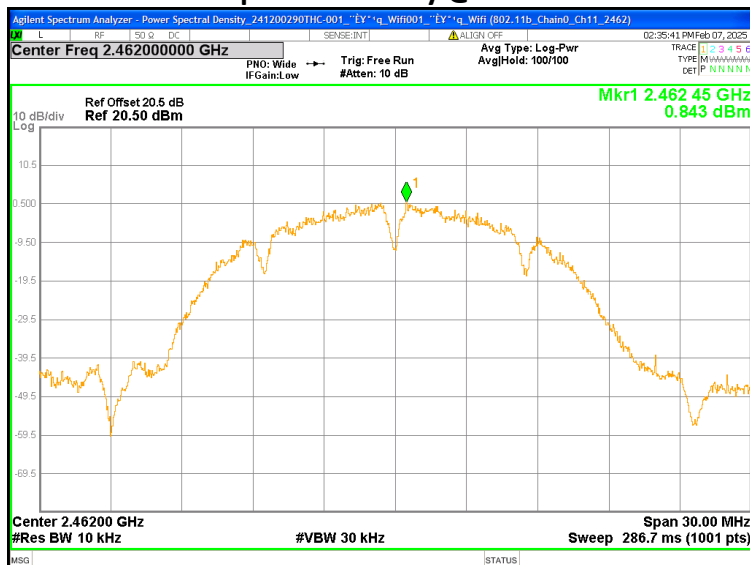
Chain0 : Power Spectral Density @ 802.11b Mode Ch 1



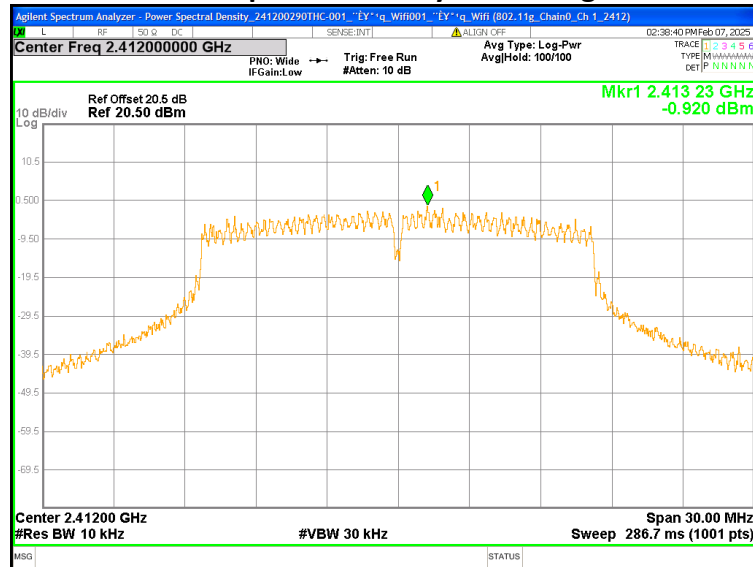
Chain0 : Power Spectral Density @ 802.11b Mode Ch 6



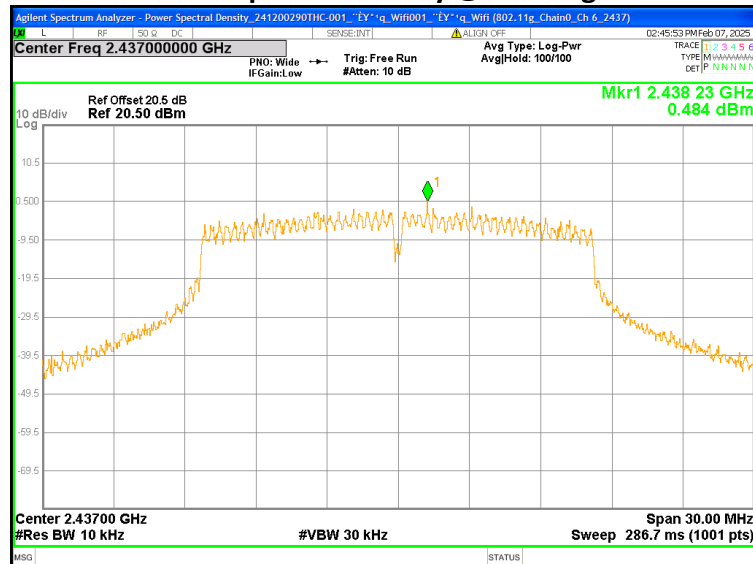
Chain0 : Power Spectral Density @ 802.11b Mode Ch11



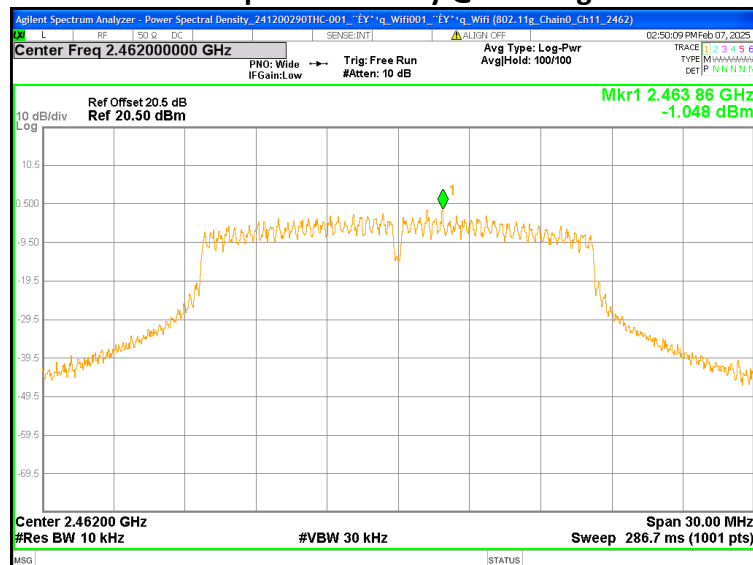
Chain0 : Power Spectral Density @ 802.11g Mode Ch 1



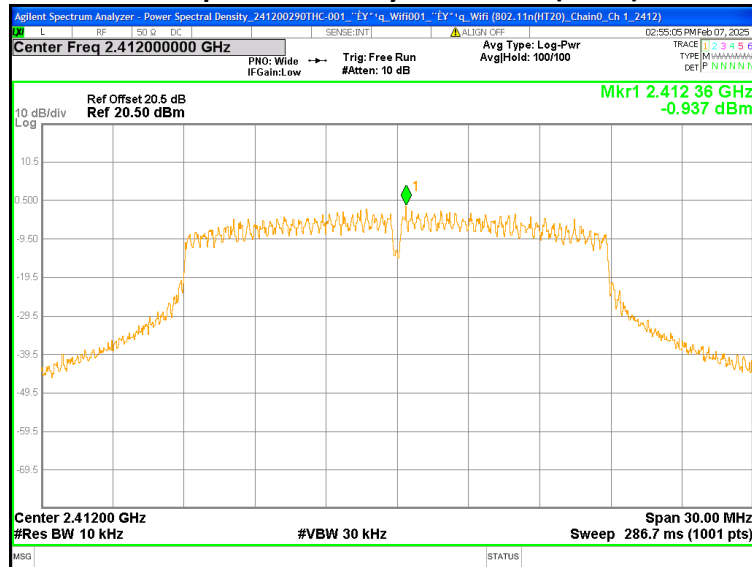
Chain0 : Power Spectral Density @ 802.11g Mode Ch 6



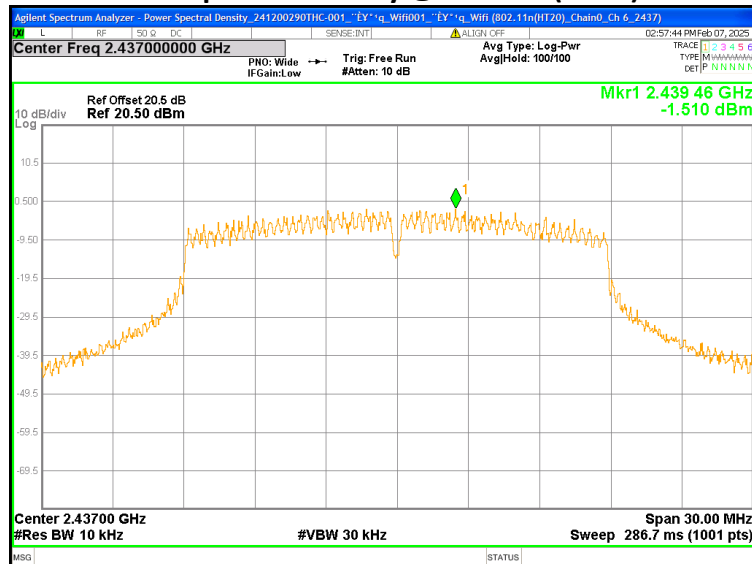
Chain0 : Power Spectral Density @ 802.11g Mode Ch11



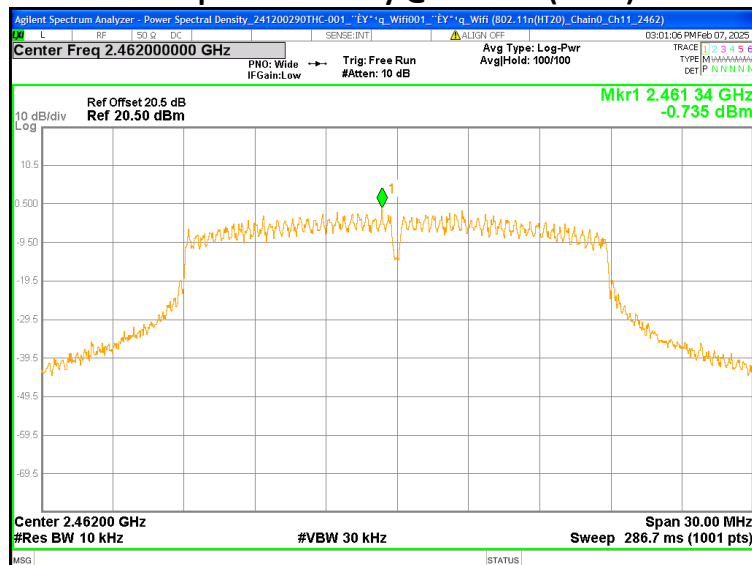
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



5. Emissions in Non-Restricted Frequency Bands

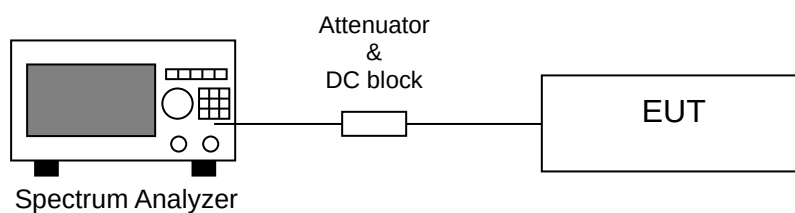
5.1 Instruments Setting

Spectrum Function	Setting (Reference Level)	Setting (Emission Level)
Detector	Peak	Peak
RBW	≥ 100 kHz	≥ 100 kHz
VBW	$\geq 3 \times$ RBW	$\geq 3 \times$ RBW
Sweep	Auto couple	Auto couple
Trace	Max hold	Max hold
Span	≥ 1.5 time 6dB bandwidth	
Attenuation	Auto	Auto

5.2 Test Procedure

- Step 1 The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
- Step 2 Set instrument center frequency to center frequency.
- Step 3 Use the parameter configured in subclause 11.11 of ANSI C63.10 to measure.
- Step 4 Use the peak marker function to determine the maximum amplitude level.

5.3 Test Diagram



5.4 Limit

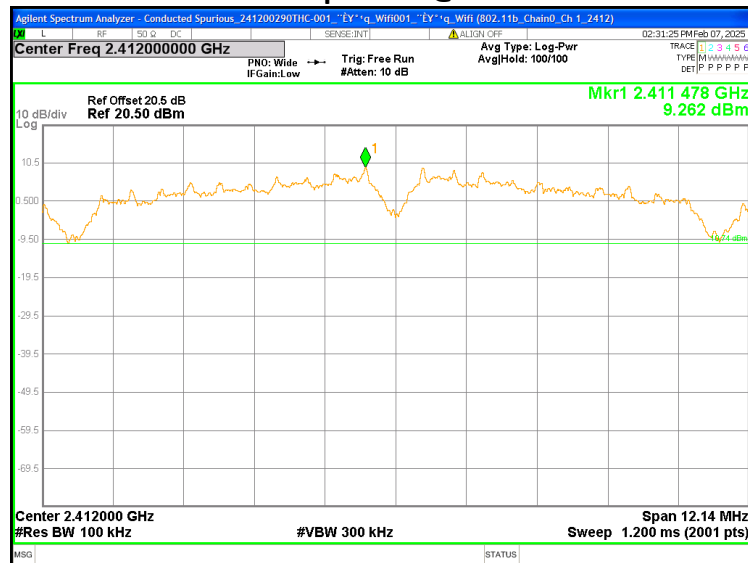
The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

5.5 Test Results

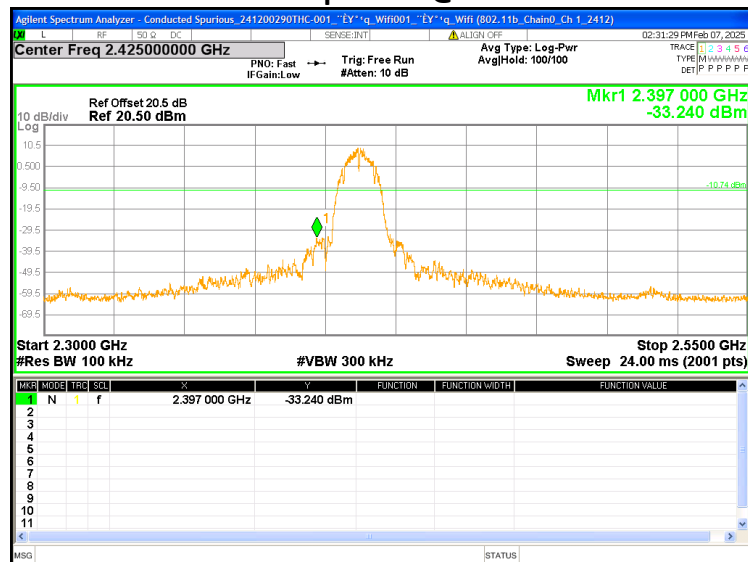
Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	Delta (dBc)	Limit (dBc)
802.11b	1	2412	42.50	>20
	6	2437	58.74	>20
	11	2462	55.71	>20
802.11g	1	2412	34.07	>20
	6	2437	55.72	>20
	11	2462	45.22	>20
802.11n(HT20)	1	2412	32.11	>20
	6	2437	55.68	>20
	11	2462	42.95	>20

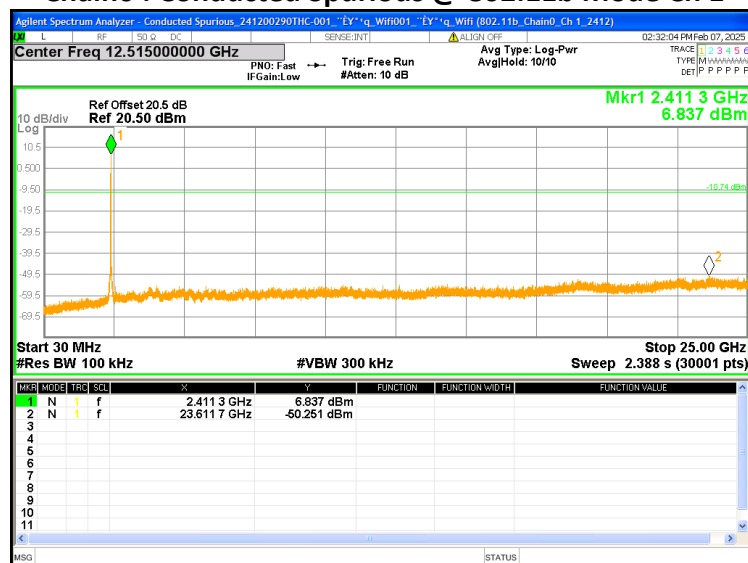
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



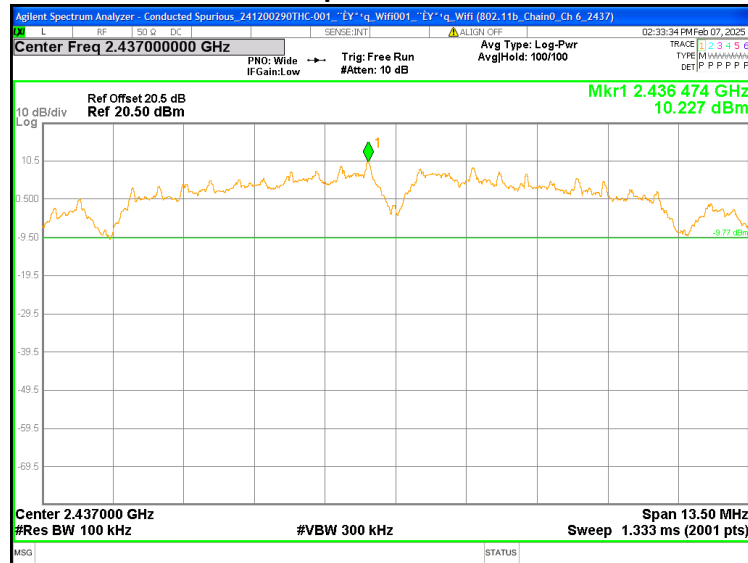
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



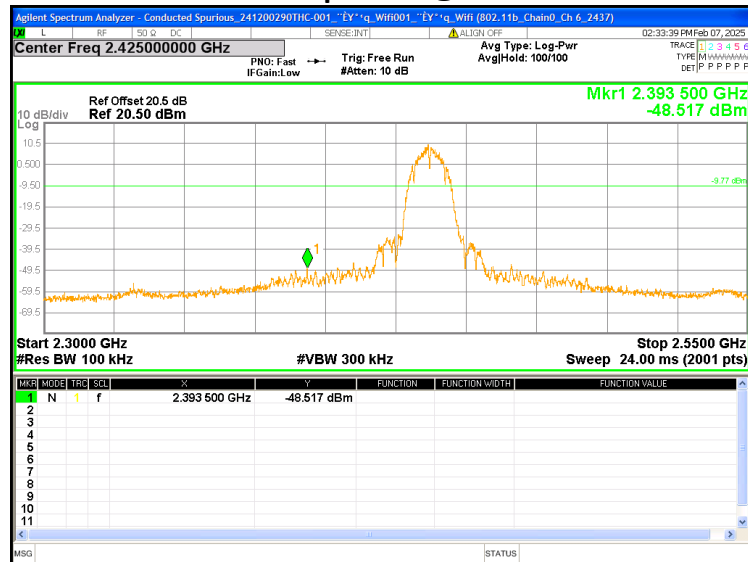
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



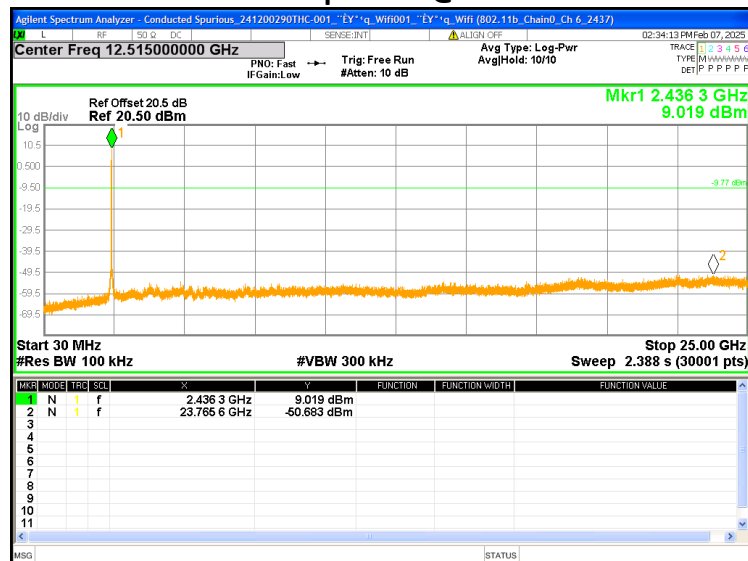
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



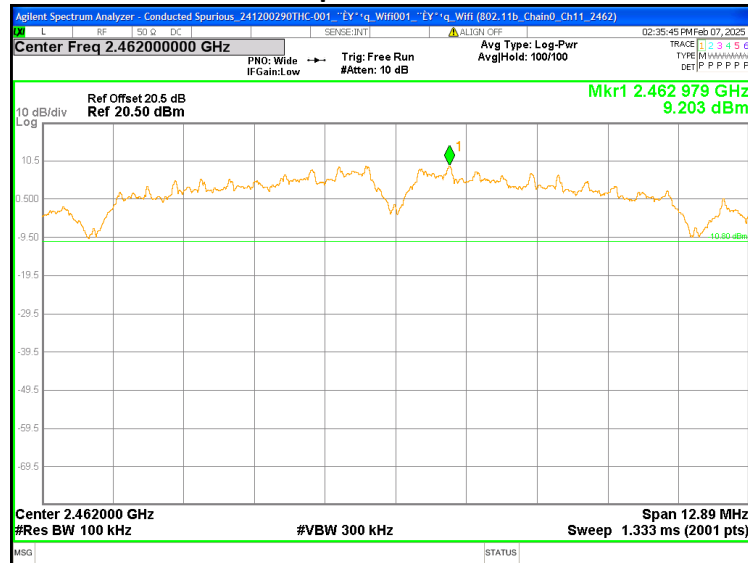
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



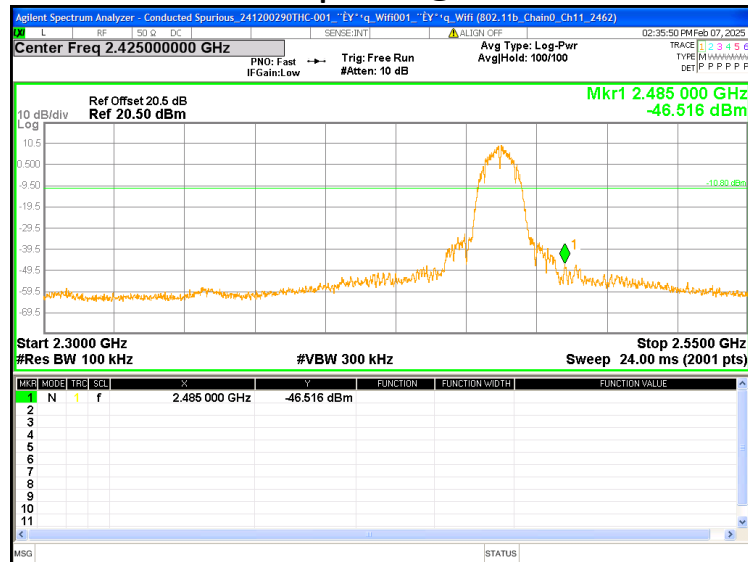
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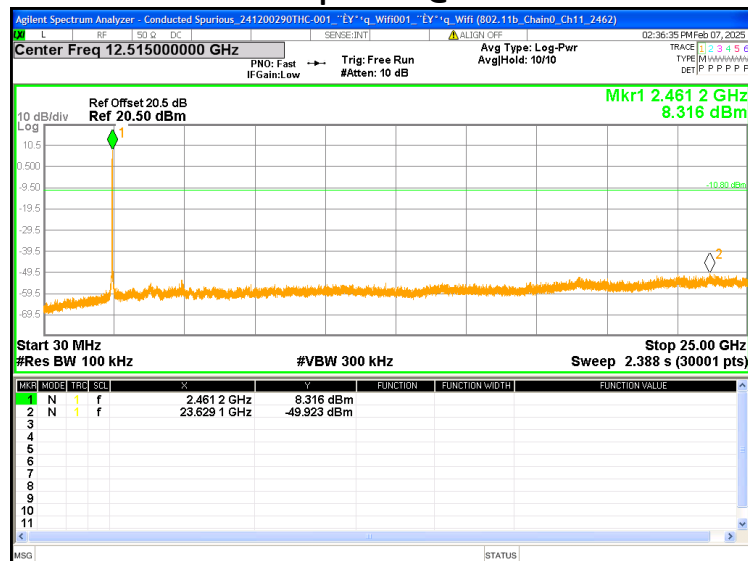
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



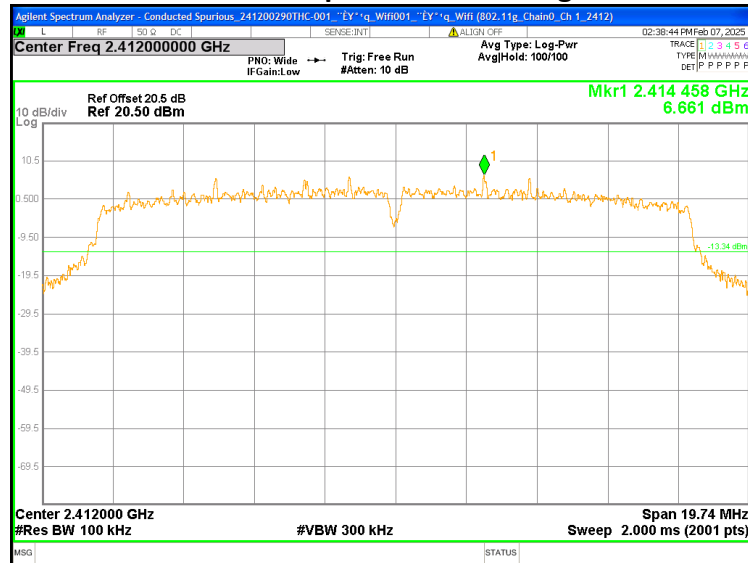
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



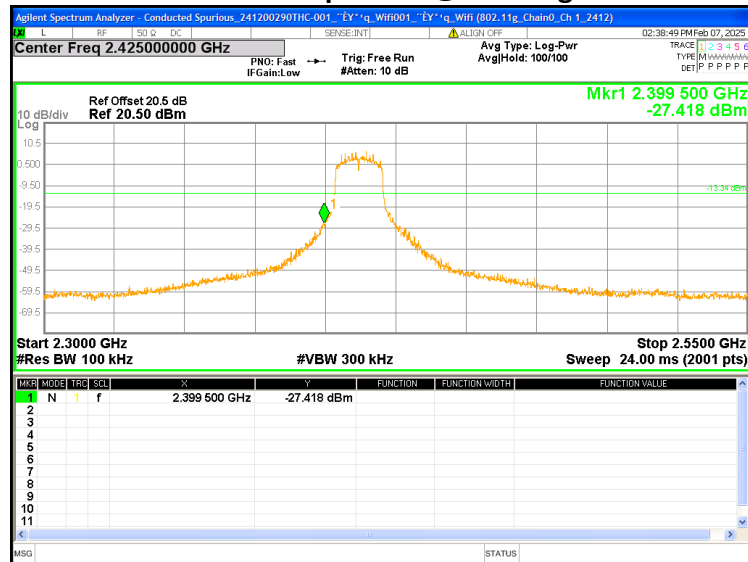
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



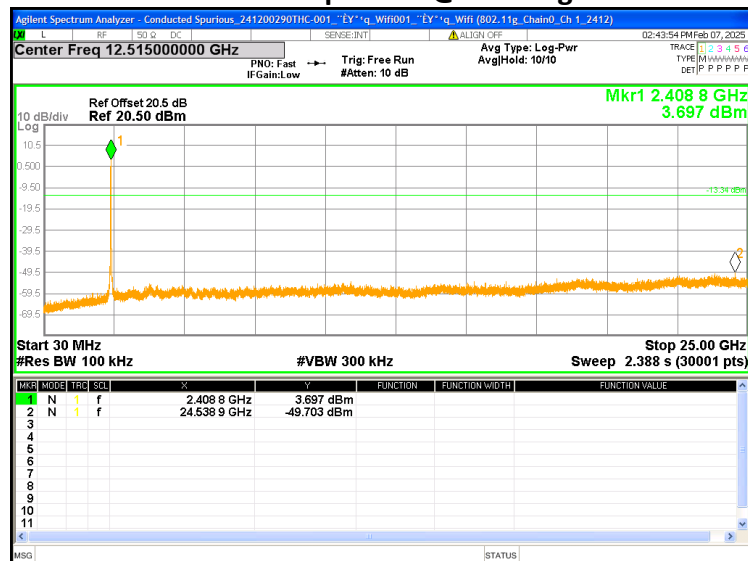
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



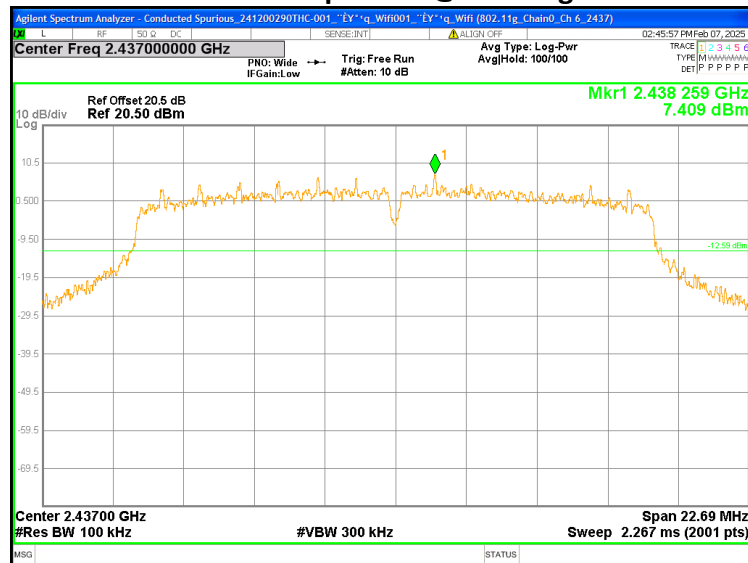
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



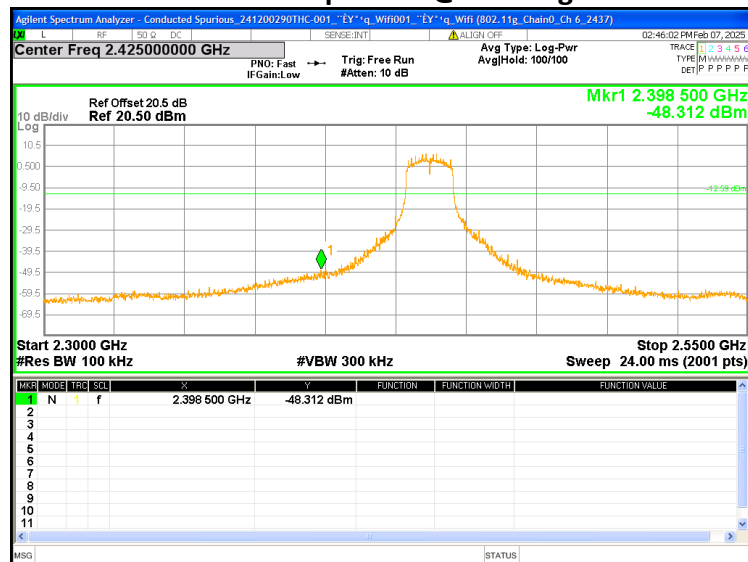
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



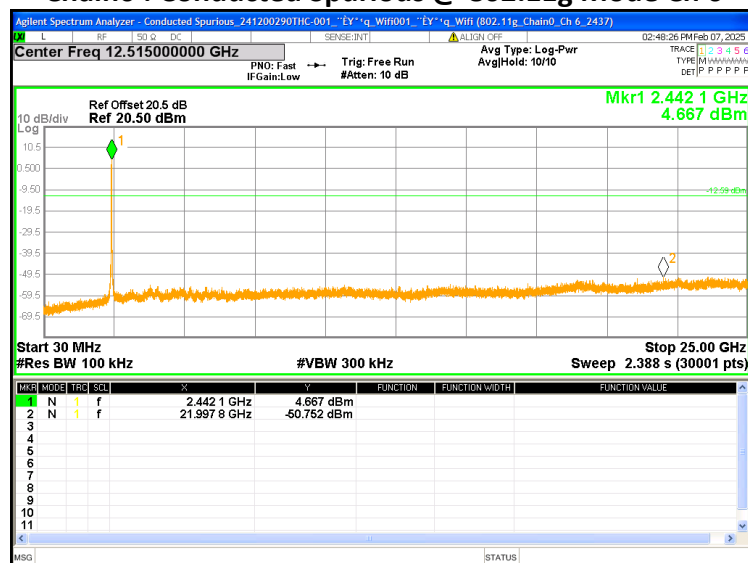
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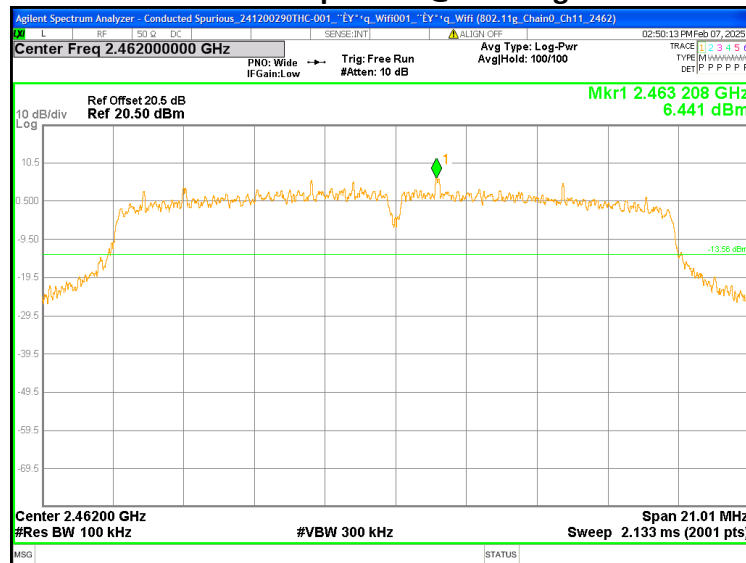
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



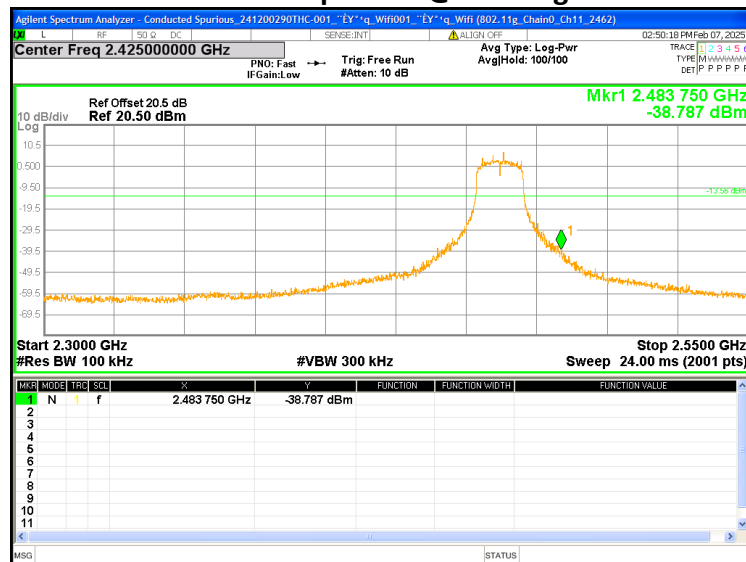
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



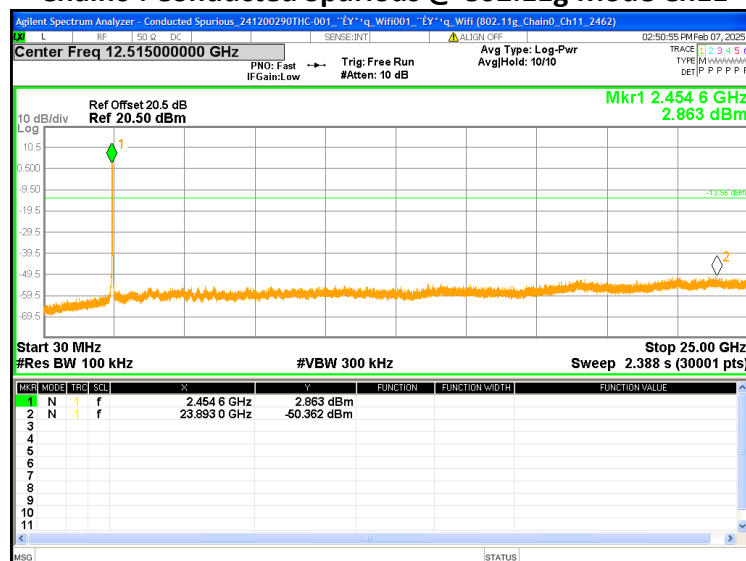
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



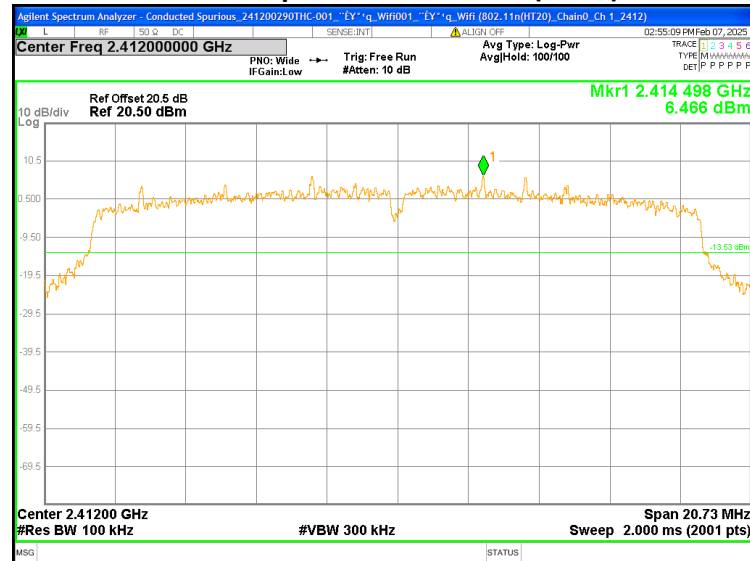
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



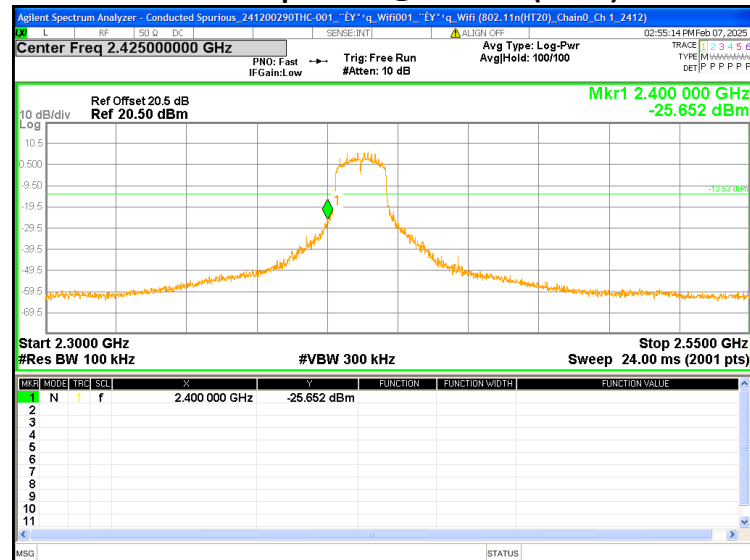
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



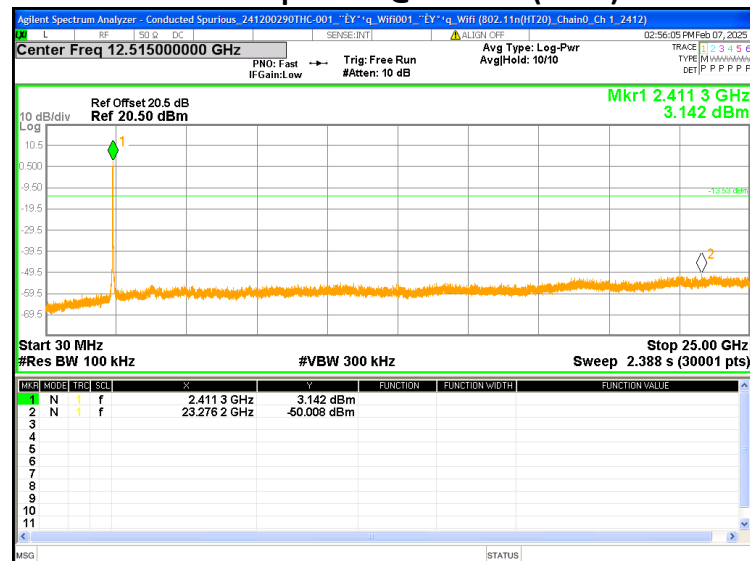
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



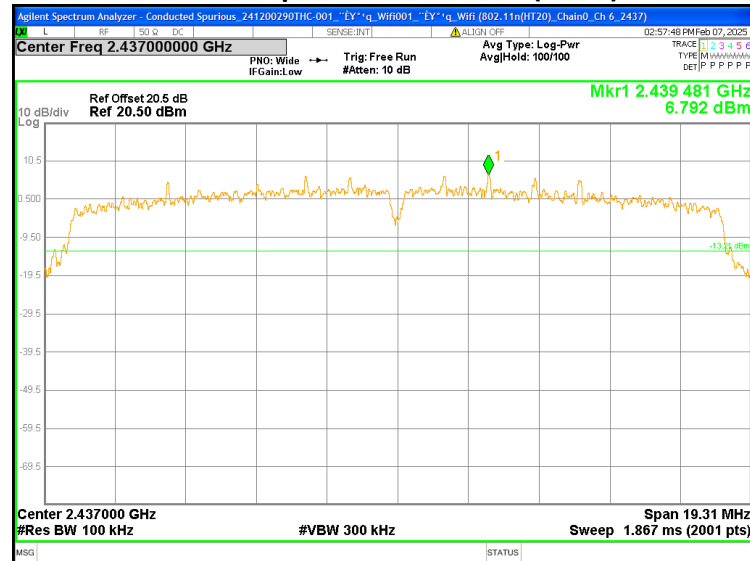
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



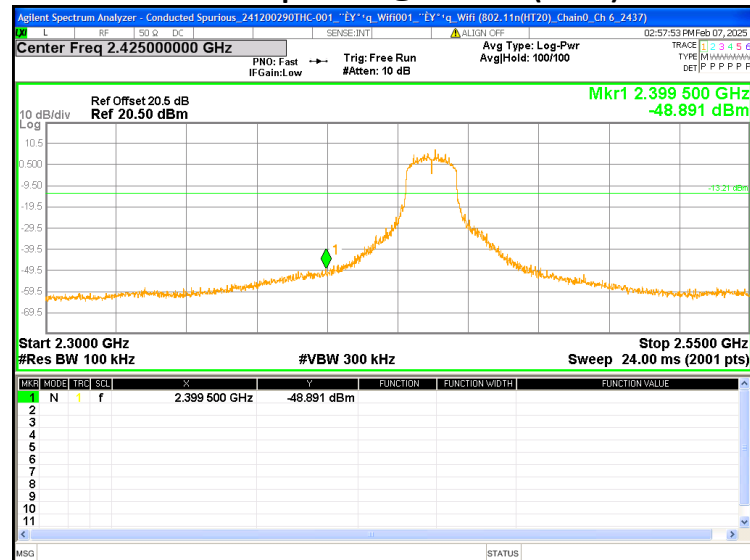
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



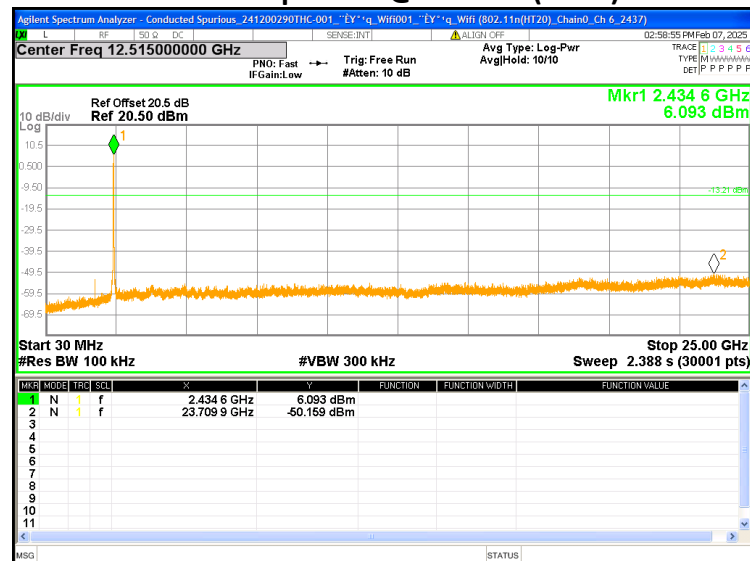
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



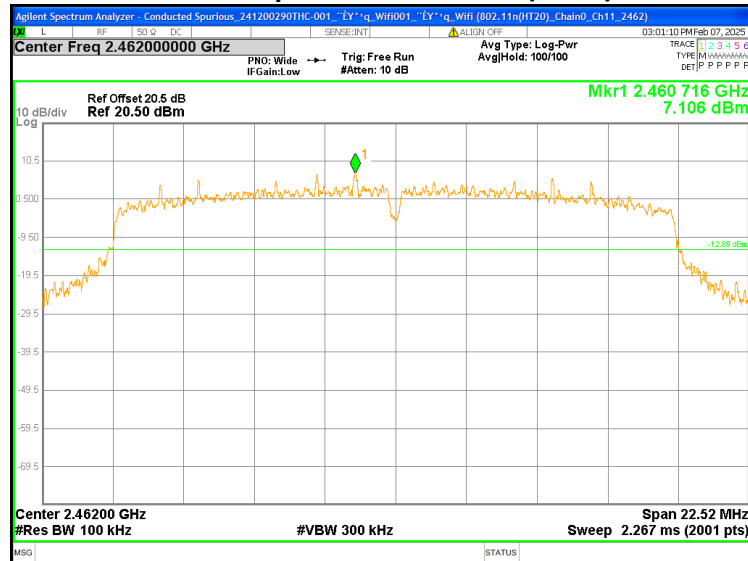
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



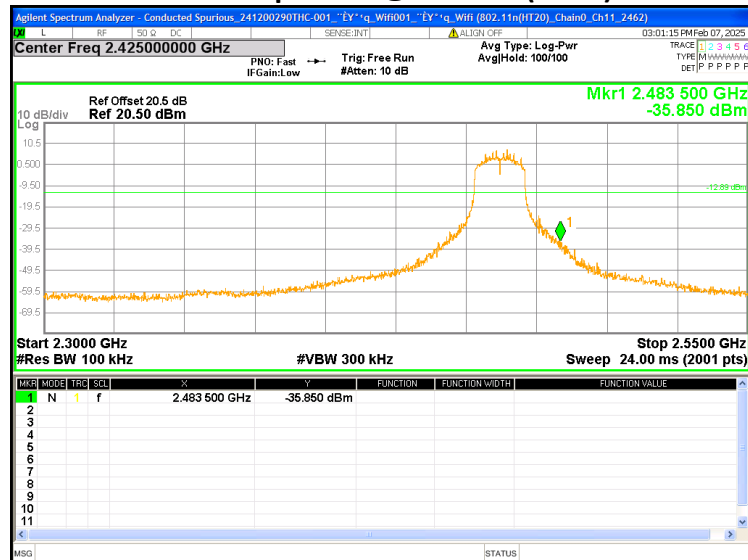
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



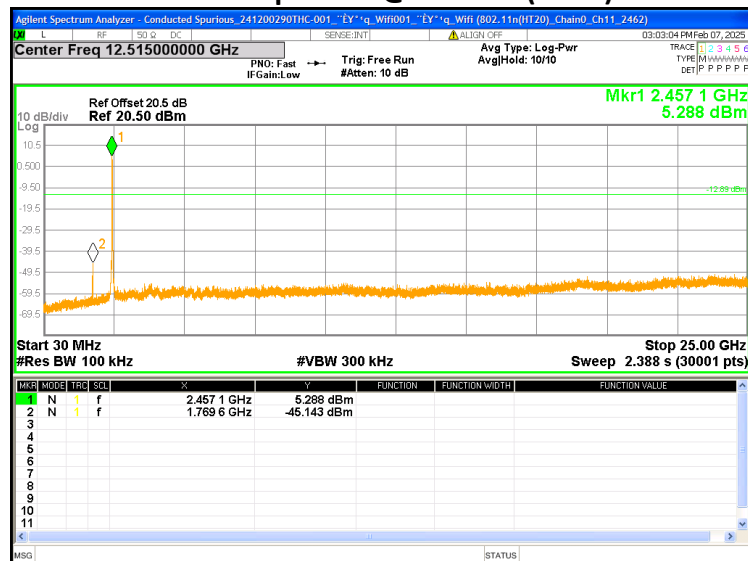
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



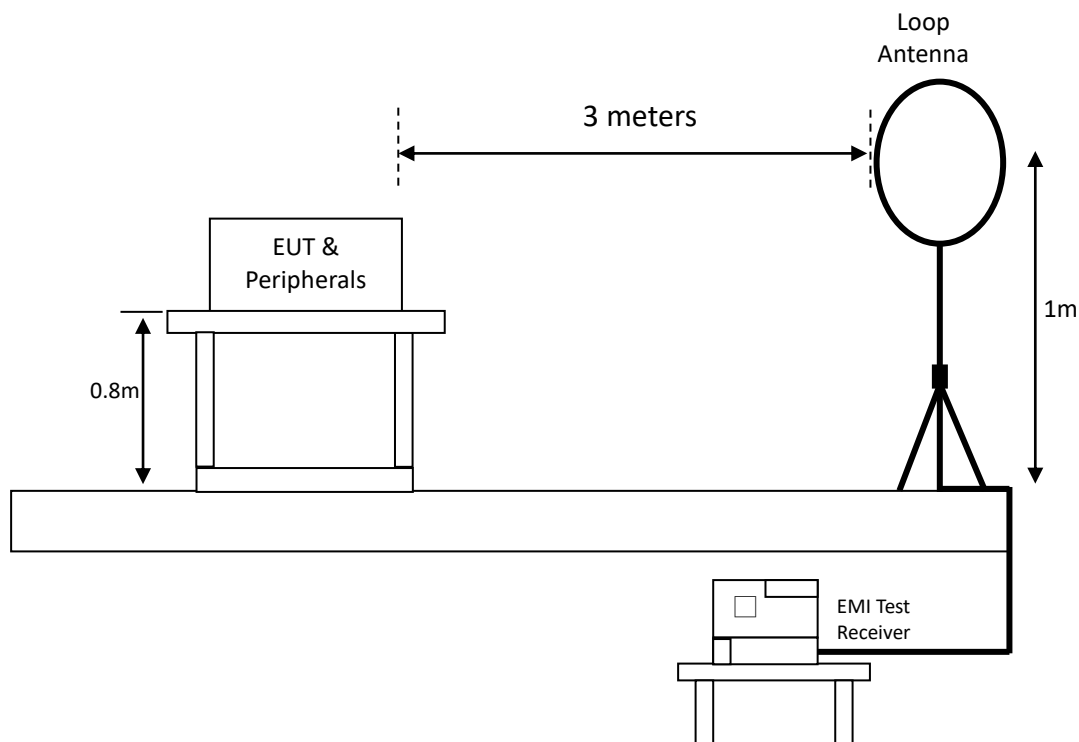
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1 Instrument Setting

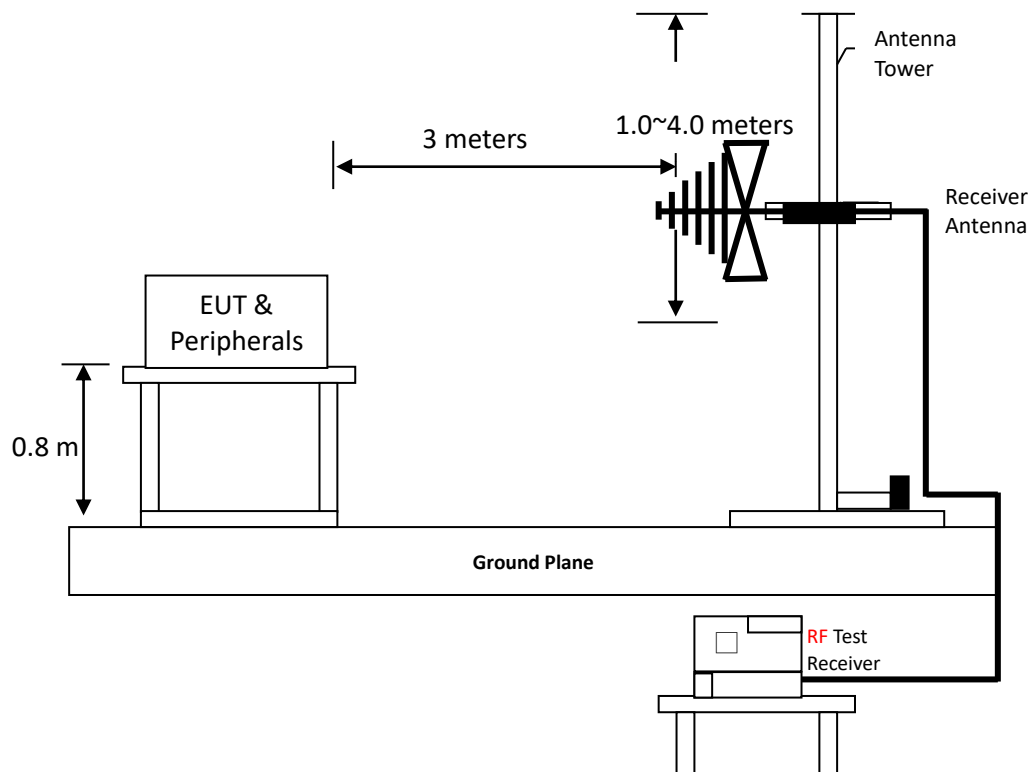
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz & 1/T minimum kHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

6.2 Test setup & procedure

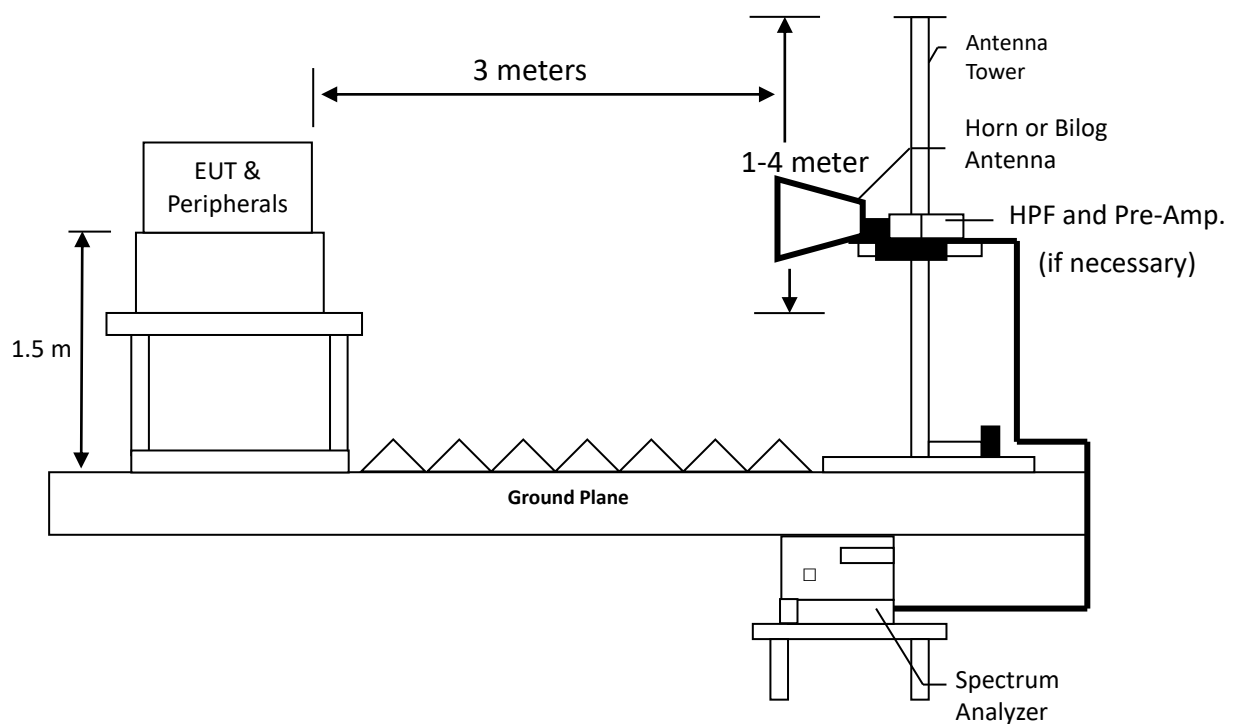
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



TEST REPORT

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 1/T minimum kHz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

6.3 Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

6.4 Test Result

6.4.1 Measurement results: frequencies 9kHz to 30MHz

Temperature (°C) :	21
Relative Humidity (%) :	48
Test date :	2025/02/05

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11g Channel 11.

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.219	PK	17.02	30.54	47.56	100.80	-53.24
Perpendicular	0.519	PK	17.42	36.20	53.62	73.30	-19.68
Perpendicular	0.609	PK	17.50	38.60	56.10	71.91	-15.81
Perpendicular	0.729	PK	17.53	27.59	45.12	70.35	-25.23
Perpendicular	1.239	PK	17.48	30.33	47.81	65.74	-17.93
Perpendicular	1.868	PK	17.41	26.25	43.66	69.54	-25.88

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Parallel	0.429	PK	17.26	29.60	46.86	94.96	-48.10
Parallel	0.519	PK	17.42	30.01	47.43	73.30	-25.87
Parallel	0.609	PK	17.50	32.00	49.50	71.91	-22.41
Parallel	0.699	PK	17.50	27.50	45.00	70.72	-25.72
Parallel	0.879	PK	17.60	25.65	43.25	68.73	-25.48
Parallel	0.999	PK	17.50	21.28	38.78	67.62	-28.84

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Ground-parallel	0.039	PK	17.68	41.30	58.98	115.79	-56.81
Ground-parallel	0.189	PK	16.94	21.80	38.74	102.08	-63.34
Ground-parallel	0.459	PK	17.32	23.46	40.78	94.37	-53.59
Ground-parallel	0.579	PK	17.48	26.25	43.73	72.35	-28.62
Ground-parallel	0.729	PK	17.53	16.04	33.57	70.35	-36.78
Ground-parallel	1.119	PK	17.49	13.90	31.39	66.63	-35.24

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.5.2 Measurement results: frequencies below 1 GHz

Temperature (°C) :	21
Relative Humidity (%) :	48
Test date :	2025/02/05

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11g Channel 11.

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	82.38	PK	15.47	10.90	26.37	40.00	-13.63
Horizontal	135.73	PK	19.45	11.20	30.65	43.50	-12.85
Horizontal	141.55	PK	20.12	9.23	29.35	43.50	-14.15
Horizontal	150.28	PK	20.66	6.70	27.36	43.50	-16.14
Horizontal	288.02	PK	21.41	8.10	29.51	46.00	-16.49
Horizontal	345.25	PK	22.76	6.43	29.19	46.00	-16.81

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	40.67	PK	19.68	16.55	36.23	40.00	-3.77
Vertical	116.33	PK	17.53	14.83	32.36	43.50	-11.14
Vertical	137.67	PK	19.62	12.55	32.17	43.50	-11.33
Vertical	147.37	PK	20.60	12.15	32.75	43.50	-10.75
Vertical	155.13	PK	20.86	12.98	33.84	43.50	-9.66
Vertical	197.81	PK	18.02	10.15	28.17	43.50	-15.33

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.5.3 Measurement results: frequency above 1GHz to 25GHz

Temperature (°C) :	19
Relative Humidity (%) :	52
Test date :	2025/02/04

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11b Ch1	3615	PK	H	-11.81	61.35	49.54	74	-24.46
	4824	PK	H	-6.01	51.01	45.00	74	-29.00
	7236	PK	H	2.86	48.81	51.67	74	-22.33
	3615	PK	V	-11.81	59.91	48.10	74	-25.90
	3990	PK	V	-9.92	55.10	45.18	74	-28.82
	4260	PK	V	-8.74	56.39	47.65	74	-26.35
	4824	PK	V	-6.01	52.22	46.21	74	-27.79
	7236	PK	V	2.86	48.51	51.37	74	-22.63
802.11b Ch6	3660	PK	H	-11.52	60.82	49.30	74	-24.70
	4874	PK	H	-6.02	49.20	43.18	74	-30.82
	7311	PK	H	2.79	47.73	50.52	74	-23.48
	3660	PK	V	-11.52	58.50	46.98	74	-27.02
	3990	PK	V	-9.92	55.75	45.83	74	-28.17
	4260	PK	V	-8.74	59.62	50.88	74	-23.12
	4874	PK	V	-6.02	49.23	43.21	74	-30.79
	7311	PK	V	2.79	49.79	52.58	74	-21.42
802.11b Ch11	3690	PK	H	-11.42	59.07	47.65	74	-26.35
	4924	PK	H	-5.92	47.66	41.74	74	-32.26
	7386	PK	H	2.79	49.59	52.38	74	-21.62
	3690	PK	V	-11.42	57.10	45.68	74	-28.32
	3990	PK	V	-9.92	57.01	47.09	74	-26.91
	4260	PK	V	-8.74	56.41	47.67	74	-26.33
	4924	PK	V	-5.92	49.65	43.73	74	-30.27
	7386	PK	V	2.79	50.88	53.67	74	-20.33
	7386	AV	V	2.79	47.76	50.55	54	-3.45

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
2. The emissions were very low against the limit above 18 GHz.

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11g Ch1	3615	PK	H	-11.81	60.98	49.17	74	-24.83
	4824	PK	H	-6.01	48.34	42.33	74	-31.67
	7236	PK	H	2.86	51.97	54.83	74	-19.17
	7236	AV	H	2.86	43.56	46.42	54	-7.58
	3615	PK	V	-11.81	59.19	47.38	74	-26.62
	3990	PK	V	-9.92	57.96	48.04	74	-25.96
	4245	PK	V	-8.88	59.56	50.68	74	-23.32
	4824	PK	V	-6.01	49.89	43.88	74	-30.12
	7236	PK	V	2.86	49.02	51.88	74	-22.12
802.11g Ch6	3660	PK	H	-11.52	61.50	49.98	74	-24.02
	4874	PK	H	-6.02	46.50	40.48	74	-33.52
	7311	PK	H	2.79	50.95	53.74	74	-20.26
	7311	AV	H	2.79	43.56	46.35	54	-7.65
	3660	PK	V	-11.52	58.53	47.01	74	-26.99
	4260	PK	V	-8.74	61.64	52.90	74	-21.10
	4874	PK	V	-6.02	48.81	42.79	74	-31.21
	7311	PK	V	2.79	52.78	55.57	74	-18.43
	7311	AV	V	2.79	42.32	45.11	54	-8.89
802.11g Ch11	3690	PK	H	-11.42	59.19	47.77	74	-26.23
	4924	PK	H	-5.92	45.43	39.51	74	-34.49
	7386	PK	H	2.79	49.37	52.16	74	-21.84
	3990	PK	V	-9.92	59.08	49.16	74	-24.84
	4260	PK	V	-8.74	60.99	52.25	74	-21.75
	4924	PK	V	-5.92	45.62	39.70	74	-34.30
	7386	PK	V	2.79	53.41	56.20	74	-17.80
	7386	AV	V	2.79	42.68	45.47	54	-8.53

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
2. The emissions were very low against the limit above 18 GHz.

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11n(HT20) Ch1	3615	PK	H	-11.81	61.50	49.69	74	-24.31
	4824	PK	H	-6.01	47.57	41.56	74	-32.44
	7236	PK	H	2.86	49.41	52.27	74	-21.73
	3615	PK	V	-11.81	59.59	47.78	74	-26.22
	3990	PK	V	-9.92	58.53	48.61	74	-25.39
	4260	PK	V	-8.74	59.22	50.48	74	-23.52
	4824	PK	V	-6.01	49.64	43.63	74	-30.37
	7236	PK	V	2.86	50.25	53.11	74	-20.89
802.11n(HT20) Ch6	3660	PK	H	-11.52	60.83	49.31	74	-24.69
	4874	PK	H	-6.02	46.92	40.90	74	-33.10
	7311	PK	H	2.79	51.72	54.51	74	-19.49
	7311	AV	H	2.79	44.51	47.30	54	-6.70
	3660	PK	V	-11.52	58.84	47.32	74	-26.68
	4260	PK	V	-8.74	56.79	48.05	74	-25.95
	4874	PK	V	-6.02	46.95	40.93	74	-33.07
	7311	PK	V	2.79	54.68	57.47	74	-16.53
	7311	AV	V	2.79	42.70	45.49	54	-8.51
802.11n(HT20) Ch11	3690	PK	H	-11.42	59.60	48.18	74	-25.82
	4924	PK	H	-5.92	46.62	40.70	74	-33.30
	7386	PK	H	2.79	50.65	53.44	74	-20.56
	4245	PK	V	-8.88	57.92	49.04	74	-24.96
	4924	PK	V	-5.92	46.61	40.69	74	-33.31
	5340	PK	V	-4.02	49.01	44.99	74	-29.01
	7386	PK	V	2.79	52.57	55.36	74	-18.64
	7386	AV	V	2.79	43.77	46.56	54	-7.44

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
2. The emissions were very low against the limit above 18 GHz.

7. Emission on Band Edge

7.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak and Average
RBW	1MHz
VBW	3MHz & 1/T minimum kHz
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

7.2 Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

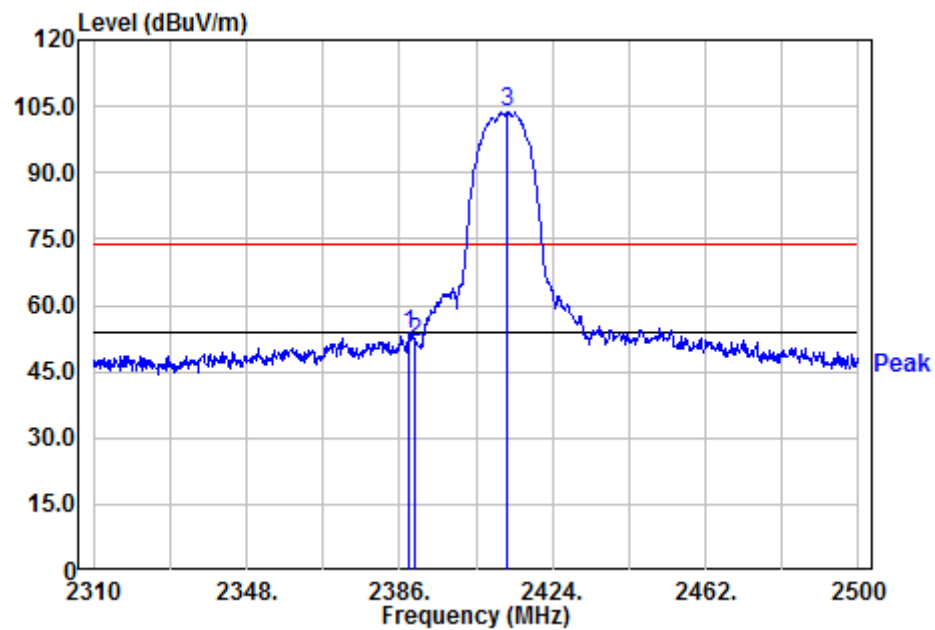
7.2 Test Results

Temperature (°C) :	19
Relative Humidity (%) :	52
Test date :	2025/02/04

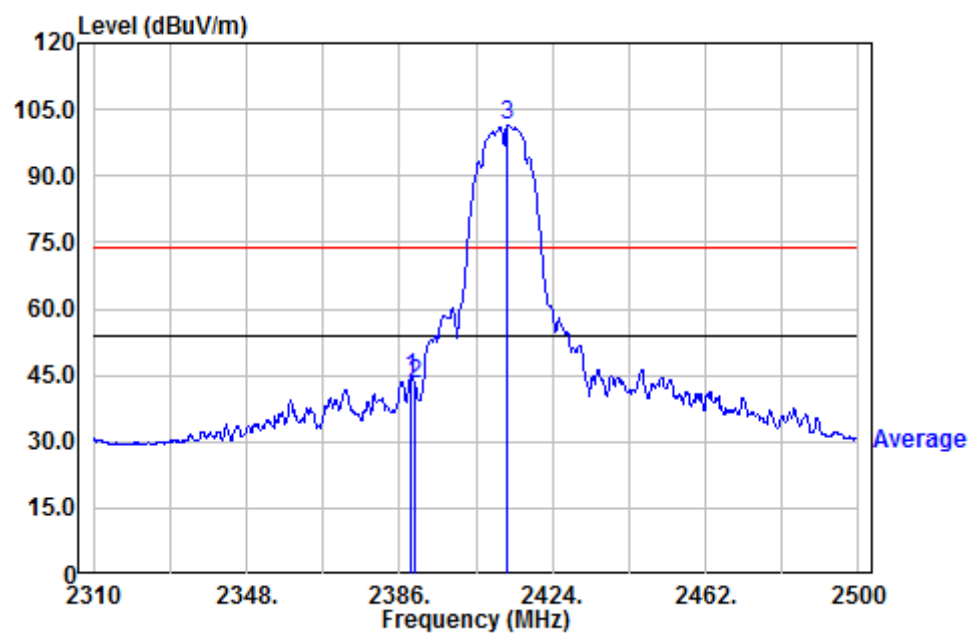
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b	2388.47	PK	V	34.35	19.08	53.43	74	-20.57	2310~2390
	2388.85	AV	V	34.35	10.01	44.36	54	-9.64	
	2484.80	PK	V	34.53	22.30	56.83	74	-17.17	2483.5~2500
	2485.18	AV	V	34.53	13.60	48.13	54	-5.87	
802.11g	2389.23	PK	V	34.35	30.37	64.72	74	-9.28	2310~2390
	2390.00	AV	V	34.35	18.51	52.86	54	-1.14	
	2483.50	PK	V	34.53	33.75	68.28	74	-5.72	2483.5~2500
	2483.50	AV	V	34.53	17.57	52.10	54	-1.90	
802.11n (HT20)	2390.00	PK	V	34.35	31.26	65.61	74	-8.39	2310~2390
	2390.00	AV	V	34.35	15.74	50.09	54	-3.91	
	2483.50	PK	V	34.53	34.08	68.61	74	-5.39	2483.5~2500
	2483.50	AV	V	34.53	16.04	50.57	54	-3.43	

Remark: Correction Factor = Antenna Factor + Cable Loss

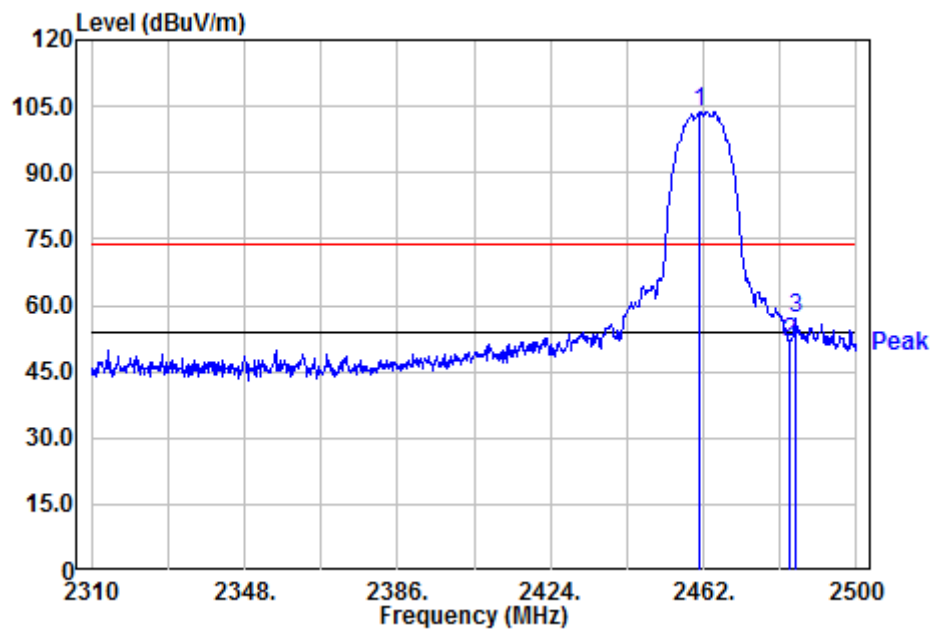
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



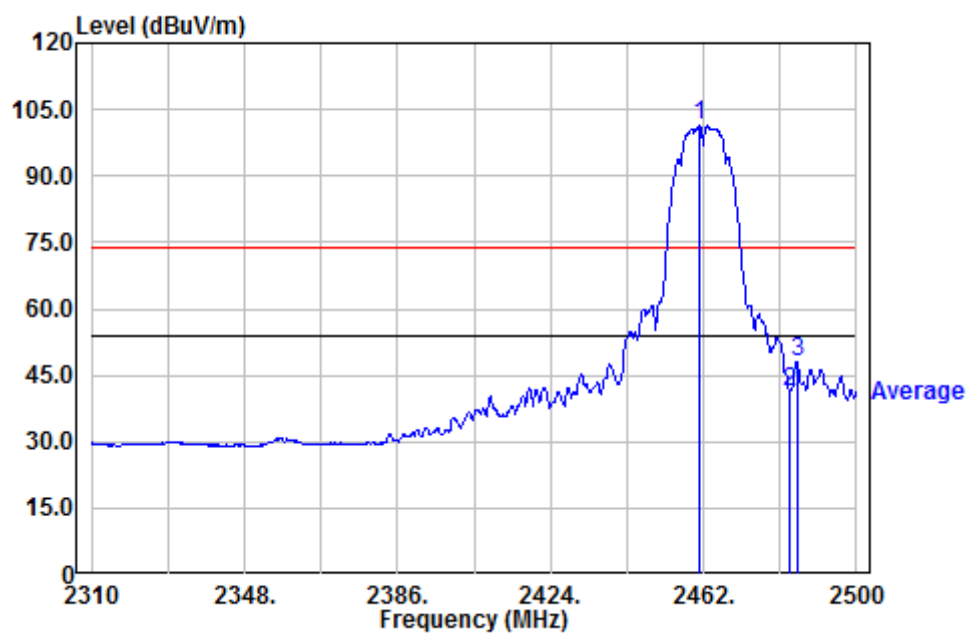
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



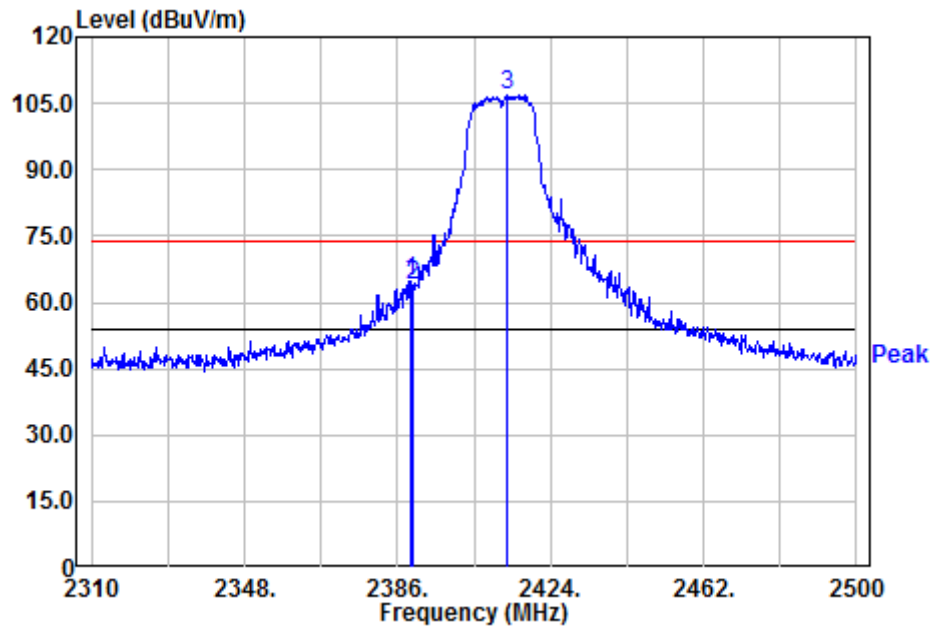
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



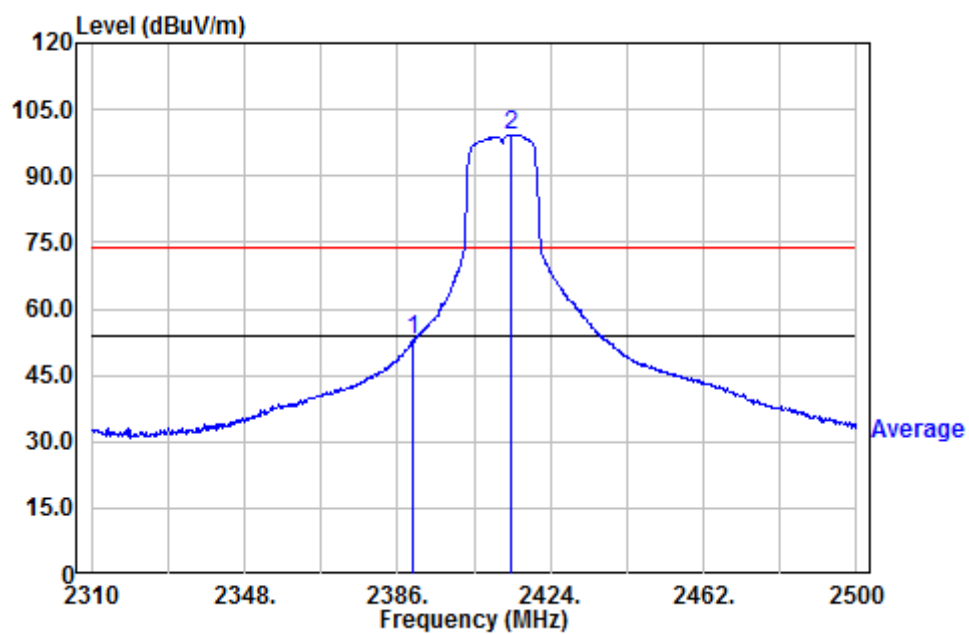
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



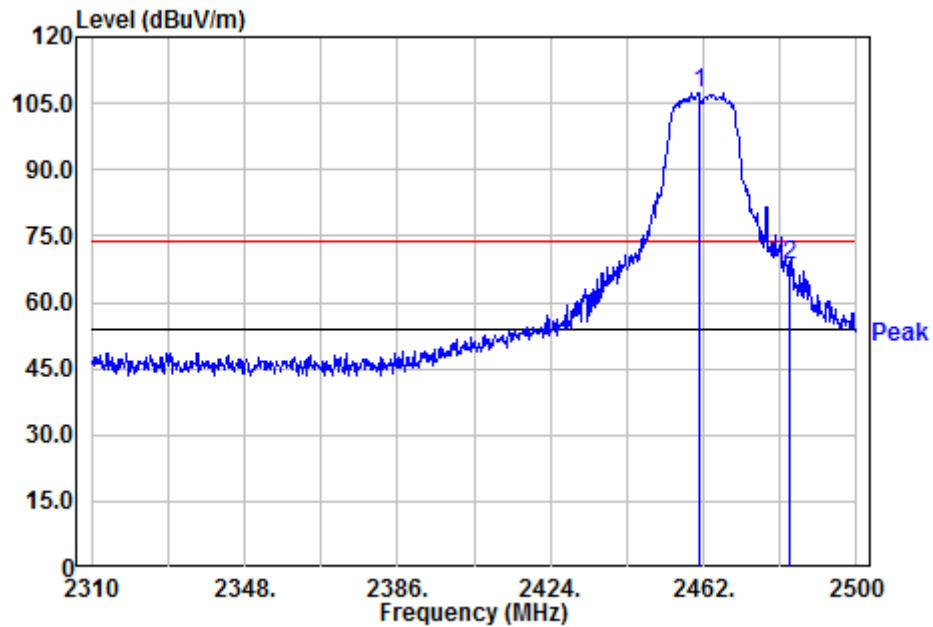
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch1 PK



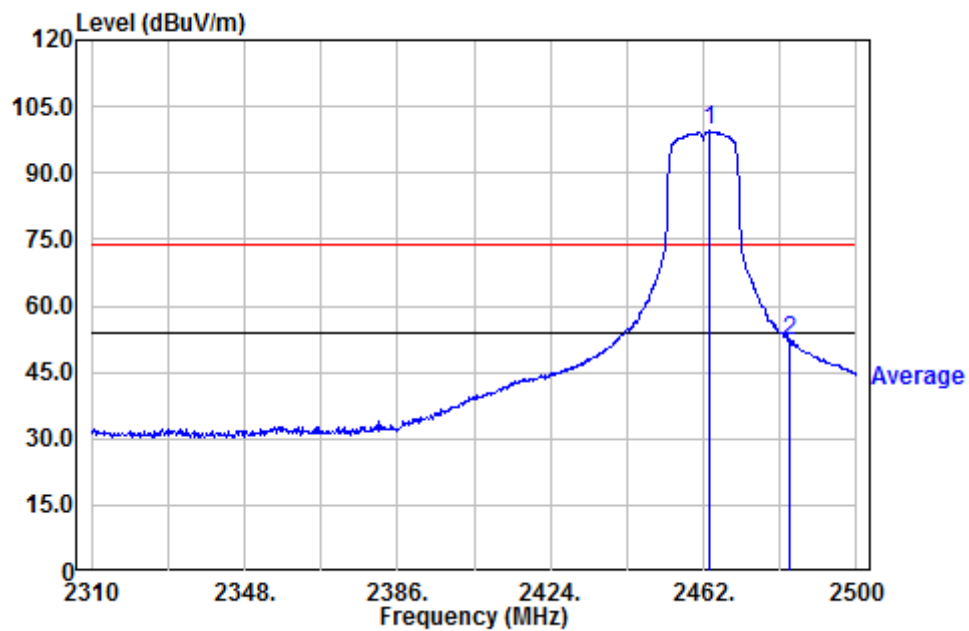
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch1 AV



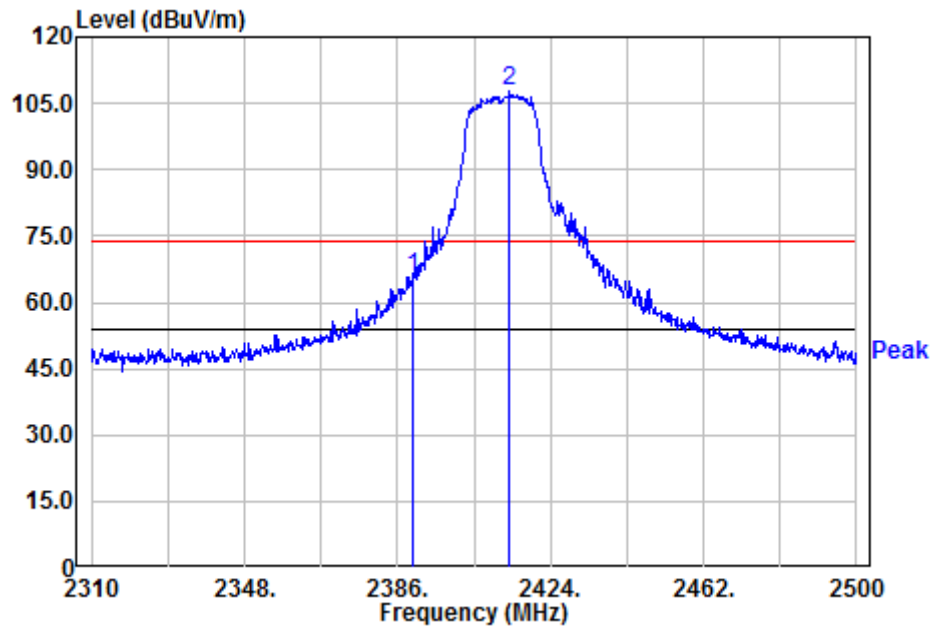
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch11 PK



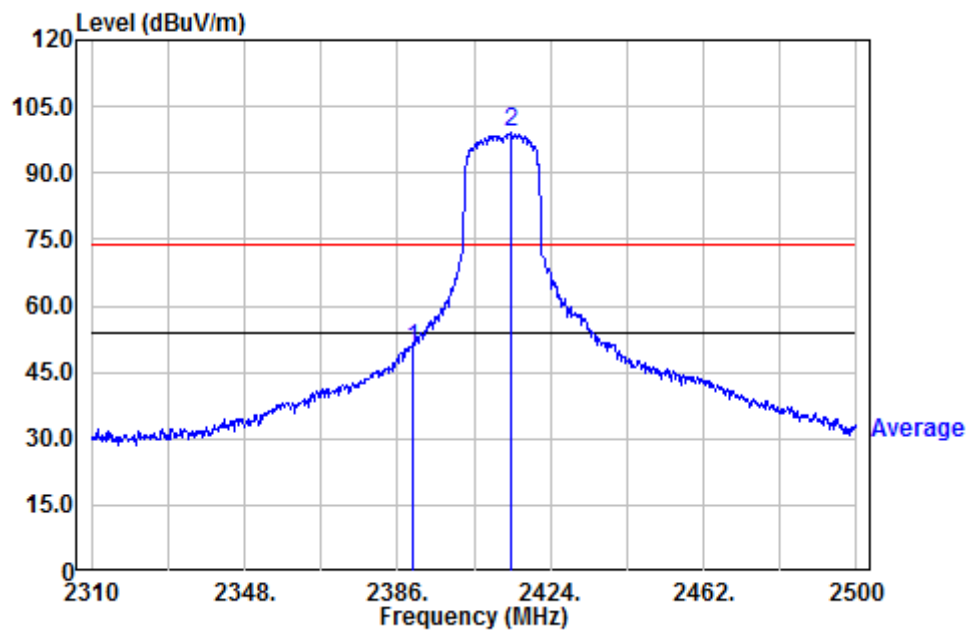
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch11 AV



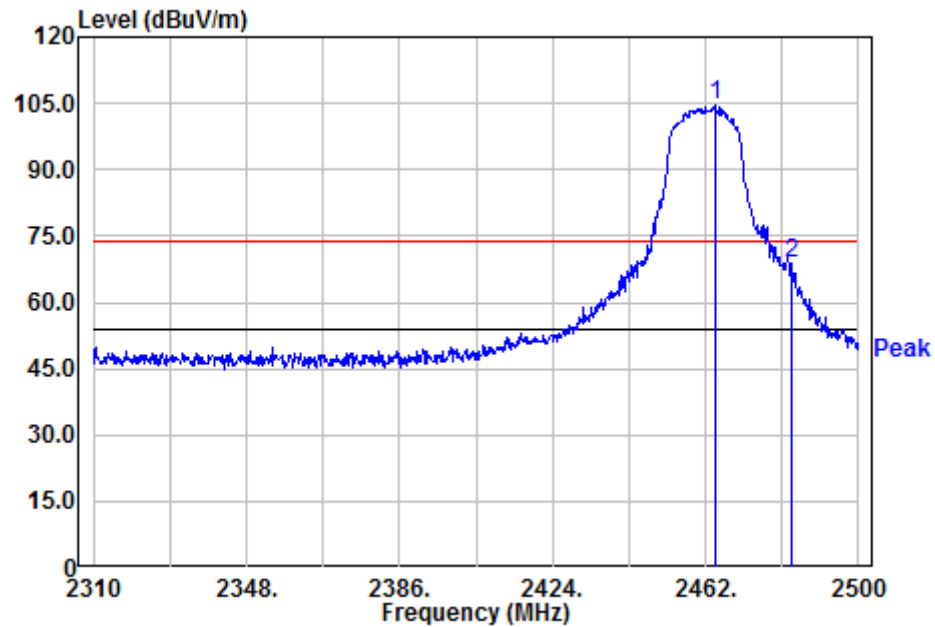
Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK



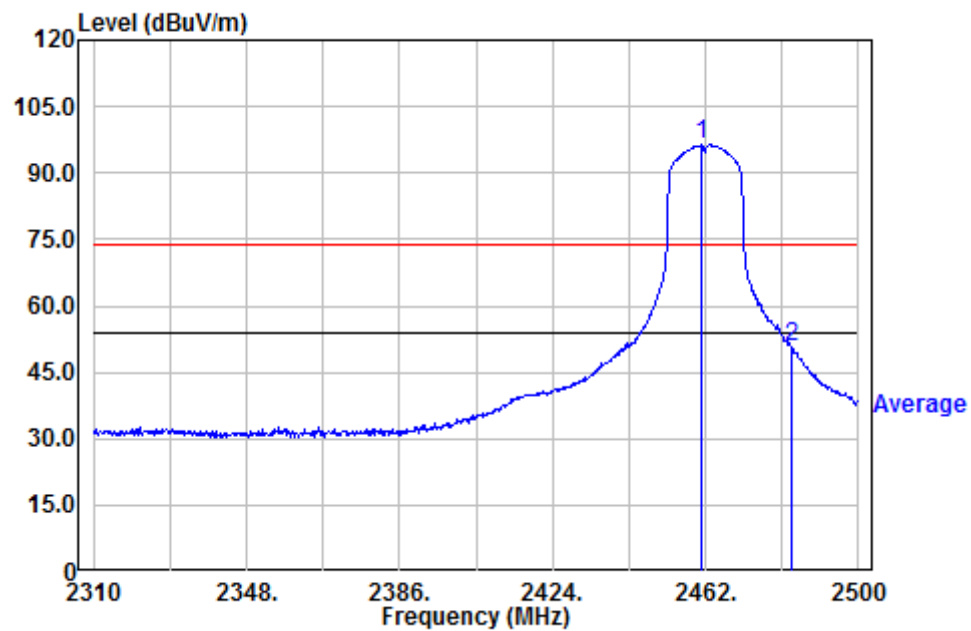
Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV



Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 PK



Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 AV



8. AC Power Line Conducted Emission

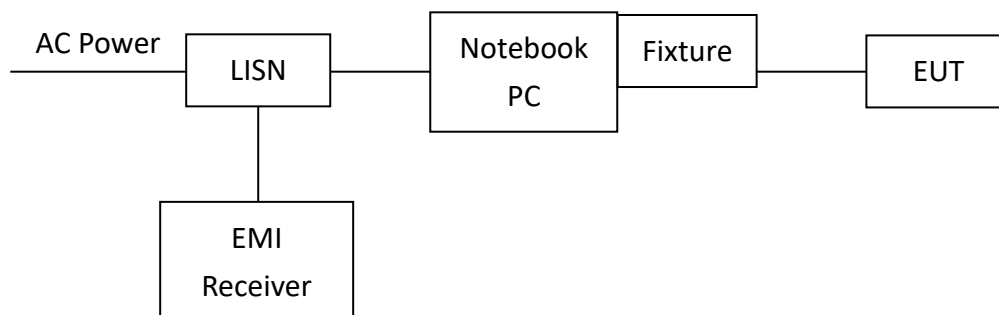
8.1 Measuring instrument setting

Receiver Function	Setting
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

8.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Step 2	Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
Step 3	All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
Step 4	The frequency range from 150 kHz to 30MHz was searched.
Step 5	Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
Step 6	The measurement has to be done between each power line and ground at the power terminal.

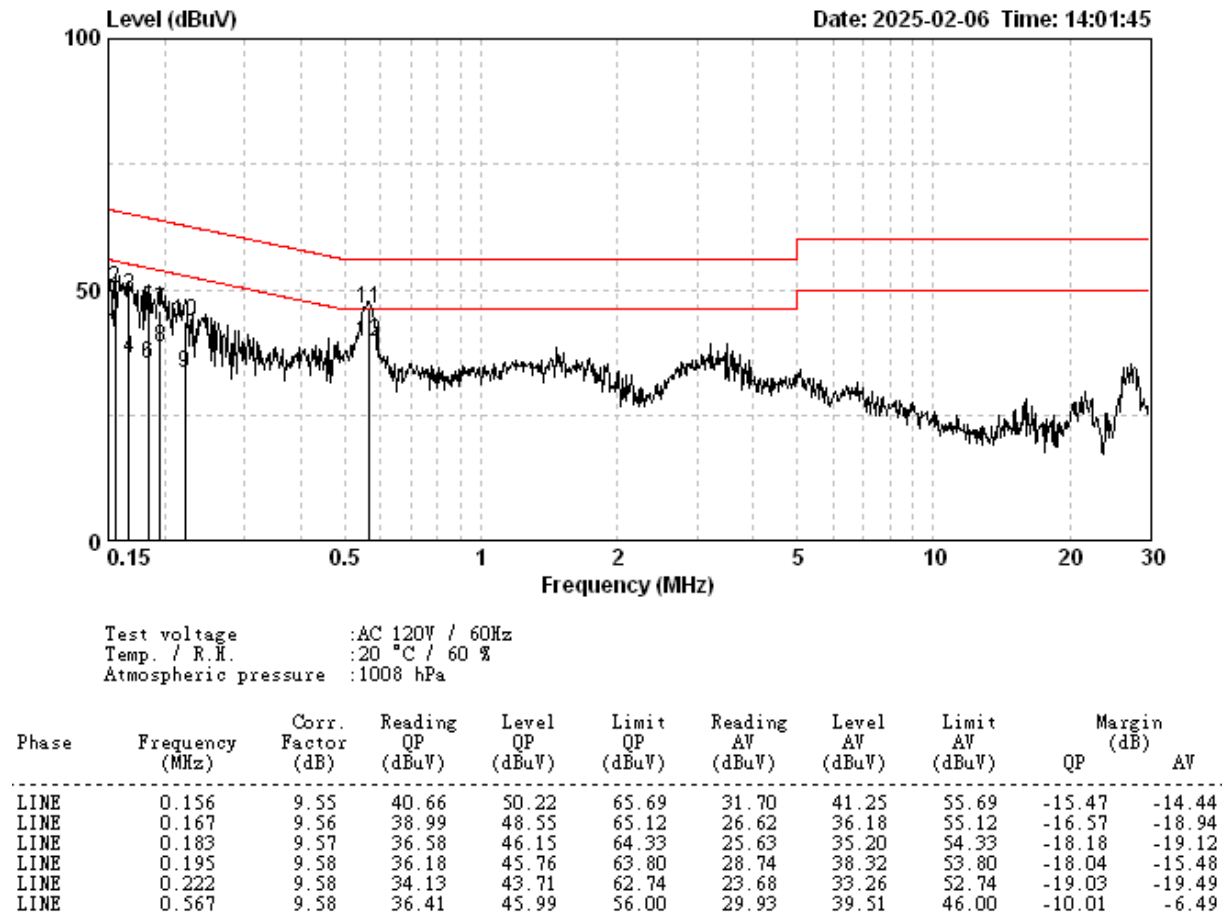
8.3 Test Diagram



8.4 Limit

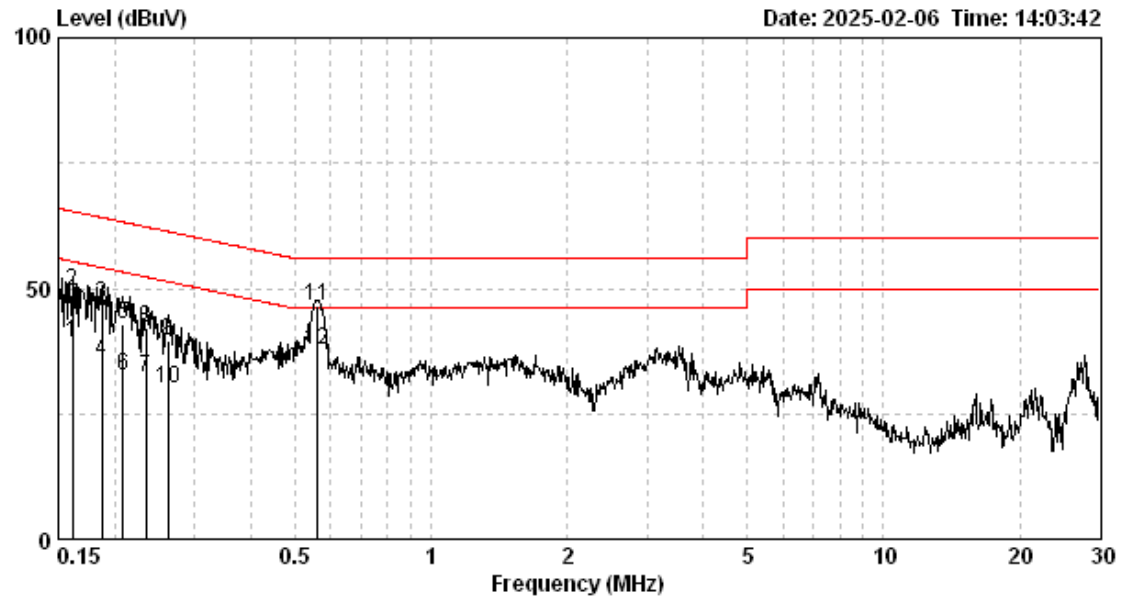
Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56	56 – 46
0.50~5.00	56	46
5.00~30.0	60	50

8.5 Test Results



Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Test voltage : AC 120V / 60Hz
Temp. / R.H. : 20 °C / 60 %
Atmospheric pressure : 1008 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
NEUTRAL	0.162	9.57	39.73	49.30	65.38	29.56	39.13	55.38	-16.08	-16.25
NEUTRAL	0.187	9.58	37.21	46.78	64.15	26.07	35.65	54.15	-17.37	-18.51
NEUTRAL	0.208	9.58	33.43	43.01	63.27	22.97	32.55	53.27	-20.26	-20.72
NEUTRAL	0.234	9.58	32.53	42.11	62.30	22.54	32.12	52.30	-20.19	-20.18
NEUTRAL	0.262	9.58	30.10	39.68	61.38	20.29	29.87	51.38	-21.70	-21.50
NEUTRAL	0.561	9.59	36.83	46.42	56.00	28.10	37.70	46.00	-9.58	-8.30

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Spectrum Analyzer	R&S	FSP30	100245	2025/01/14	2026/01/13
Signal Analyzer	Agilent	N9030A	MY51380492	2024/07/09	2025/07/08
Signal Analyzer	R&S	FSV40	101532	2024/07/12	2025/07/11
Bi_log Hybrid Antenna	ETC	MCTD 2786B	BLB17J04019 & JB-5-019	2024/07/17	2025/07/16
Horn Antenna	EMCO	3115	00040729	2024/05/15	2025/05/14
Pre-Amplifier	SGH	SGH0301(40dB)	20230109-1	2024/12/18	2025/12/17
Pre-Amplifier	SGH	SGH118(45dB)	20220105-1	2025/01/14	2026/01/13
Cable	SUHNER	SUCOFLEX 104	295105/4	2024/03/02	2025/03/02
Cable	SUHNER	SUCOFLEX 104P	CB0005	2024/06/14	2025/06/13
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2024/05/23	2025/05/23
Power Meter	Anritsu	ML2495A	0844001	2024/12/07	2025/12/06
Power Sensor	Anritsu	MA2491A	031543	2024/12/07	2025/12/06
20dB Attenuator	PE	PE7001-20	N/A	2024/05/23	2025/05/22
Signal Generator	R&S	SMB100A	115728	2024/07/09	2025/07/08
Wireless Connectivity Tester	R&S	CMW270	100996	2024/06/12	2025/06/11
Temperature&Hu midity Test Chamber	TERCHY	MHU-225LRU(SA)	950838	2024/06/28	2025/06/27
966-2_3m Semi-Anechoic Chamber	CHANCE MOST	CEM-966_2	N/A	2024/07/30	2025/07/29
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESCI	100018	2024/07/23	2025/07/22
LISN	R&S	ENV216	101160	2024/06/26	2025/06/25
Cable	SUHNER	EMCCFD300-BM -NM-6000	170502	2024/06/25	2025/06/24
Test software	Audix	e3	V4.20040112L	NCR	NCR
Test site	Intertek	Con-2	N/A	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2.0$.

Item	Uncertainty
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	2.73 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.91 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.49 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Conducted Measurement	0.69 dB
AC Power Line Conducted Emission	1.31 dB