FCC - TEST REPORT

Report Number	:	**708882407771-00B**	Date of Issue:	October 23, 2024

Model	:	PI3501
Product Type	:	Pet Water Fountain
Applicant	:	Hiigge Co., Ltd.
Address	:	Room 208,Floor 12,Building 1, No.588 Zixing Road, Minhang District, 201100 Shanghai, PEOPLE'S REPUBLIC OF CHINA
Production Facility	:	Dongguan Miha Intelligent Technology Co., Ltd
Address	:	Building 2, No. 15, Dongfang Road, Beizha, Humen Town, Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

Test Result	:	■ **Positive**	☐ **Negative**
Total pages including Appendices	:	70	

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
Telephone:	+86 21 6141 0123
Fax:	+86 21 6140 8600
FCC Registration No.:	820234
FCC Designation Number:	CN1183
ISED CAB identifier	CN0101
IC Registration No.:	31668

3 Description of the Equipment under Test

Product:	Pet Water Fountain
Model no.:	PI3501
FCC ID:	2BK23-P351
Options and accessories:	NA
Rating:	AC 120V/60Hz by adaptor; input: 5V, 2A
RF Transmission Frequency:	802.11b/g/n-HT20: 2412~2462 MHz
No. of Operated Channel:	11 for 802.11b/802.11g/802.11n(H20)
Modulation:	Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n
Hardware Version:	PI3501C1
Software Version:	1.0.9
Data speed:	11b 1-11Mbps 11g 6-54Mbps 11n(H20) 6.5-72.2Mbps
Channel list:	For 2.4G Wi-Fi:

802.11b/g/n(HT20)			
Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Antenna Type:	Internal Antenna
Antenna Gain:	5.24 dBi

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Description of the EUT:	The Equipment Under Test (EUT) is a Pet Water Fountain with Wi-Fi Module. The EUT support Wi-Fi operated at 2.4GHz.
Test sample no.:	SHA-850918-3 (Radiated sample) SHA-850918-2 (Conducted sample)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2023 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Measurement Guidance v05r02 and ANSI C63.10-2013.

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	14-16	Site 1	☒	☐	☐
§15.247 (b) (3)	Conducted peak (average) output power	17-18	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time - Average Time of Occupancy	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth	19-22	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	23-26	Site 1	☒	☐	☐
§15.247(e)	Spurious RF conducted emissions	27-36	Site 1	☒	☐	☐
§15.247(d)	Band edge	37-43	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	44-66	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.
Remark 2: The EUT only operation at 2.4G Wi-Fi.

Note 1: The EUT uses an Internal Antenna, which gain is 5.24 dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-

2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2BK23-P351, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

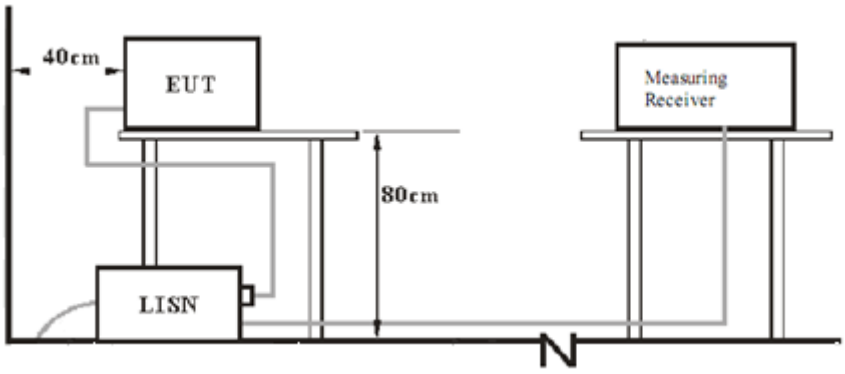
Sample Received Date:	September 18, 2024
Testing Start Date:	October 10, 2024
Testing End Date:	October 22, 2024

-TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Reviewed by:	Prepared by:	Tested by:
Hui TONG	Wenqiang LU	Tianji XU
Review Engineer	Project Engineer	Test Engineer

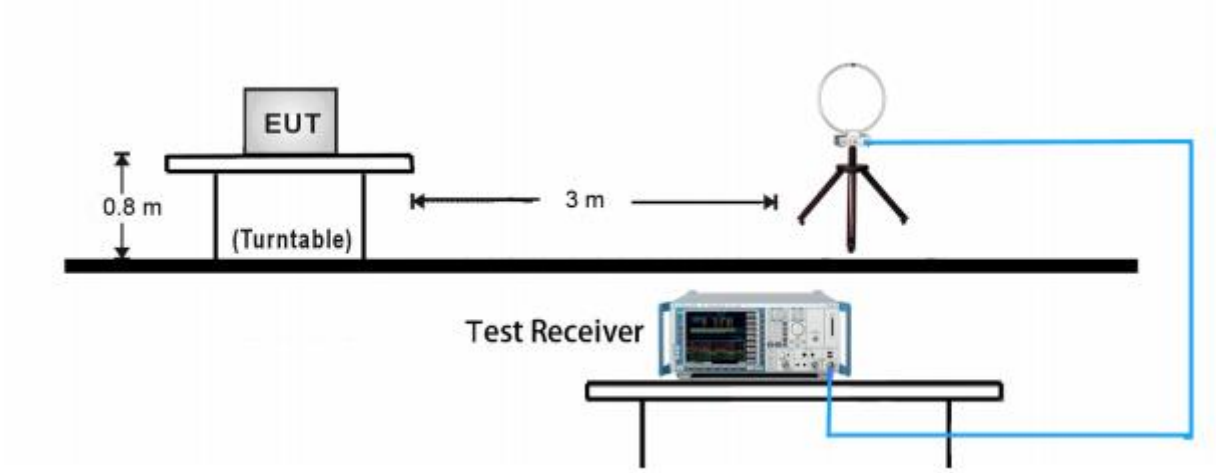
7 Test Setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



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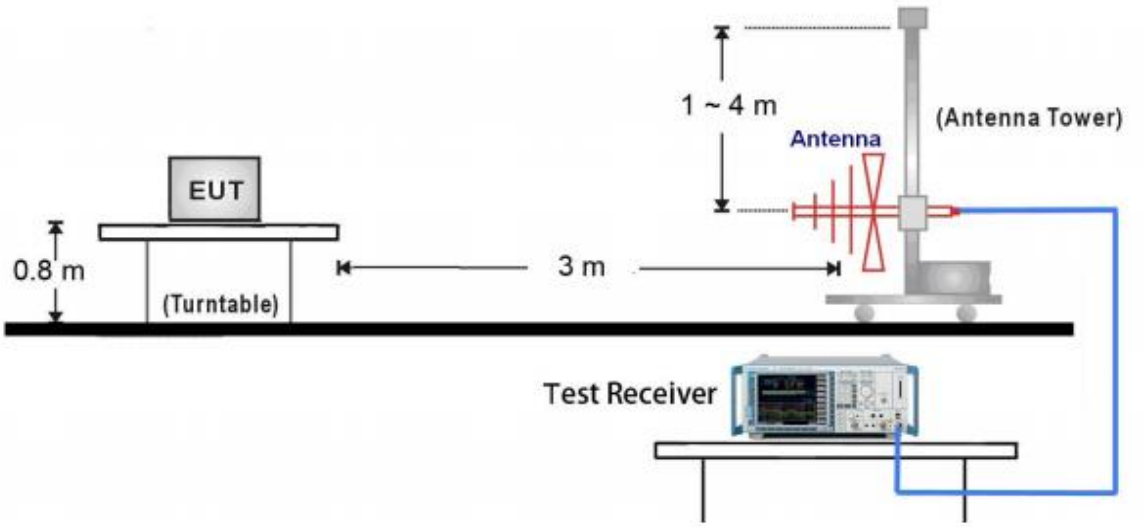
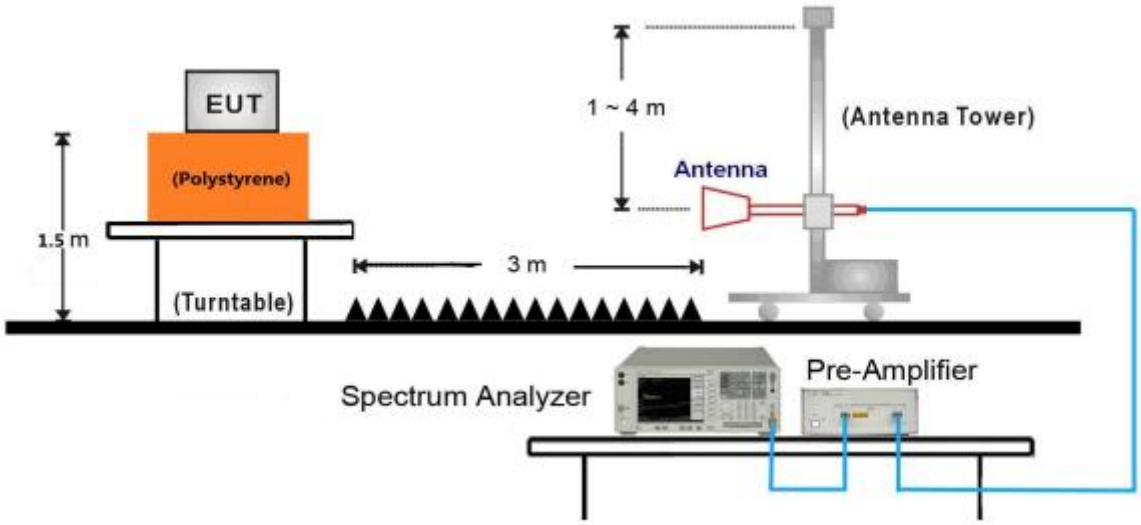
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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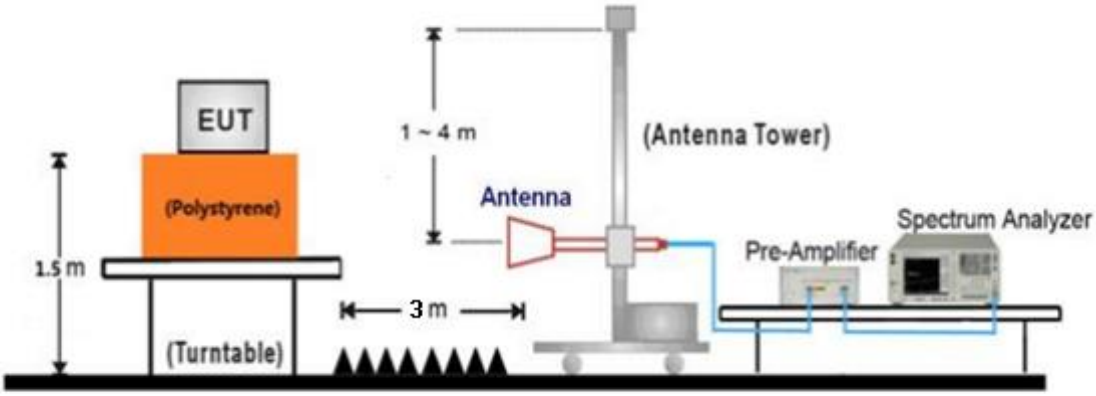
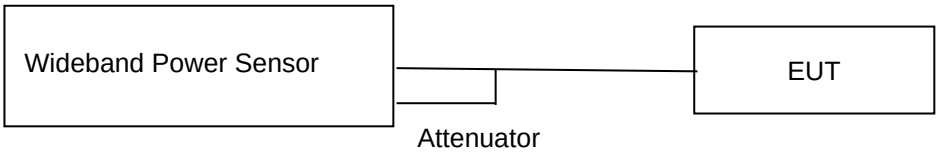
18GHz ~ 25GHz Test Setup:

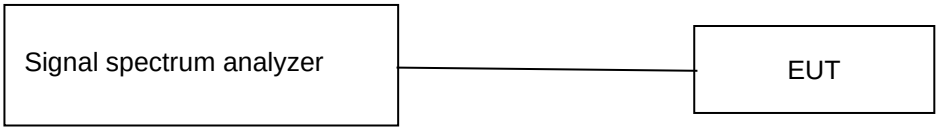


7.3 Conducted RF test setups

For Conducted peak output power



For other test items



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenove	E470	PF-OU5TS7 17/09

Test software: sscom5.13.1.exe, which used to control the EUT in continues transmitting mode.

The system was configured to channel 1(2412MHz), 6(2437MHz), and 11(2462MHz).

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Index Value (Power level setting)
802.11b	1	1	CCK	-20
	6	1	CCK	-20
	11	1	CCK	-16
802.11g	1	6	OFDM	Default
	6	6	OFDM	Default
	11	6	OFDM	-8
802.11n HT20	1	MCS0	OFDM	Default
	6	MCS0	OFDM	Default
	11	MCS0	OFDM	-8

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. An EMI test receiver is used to test the emissions from both sides of AC line

Limit

According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

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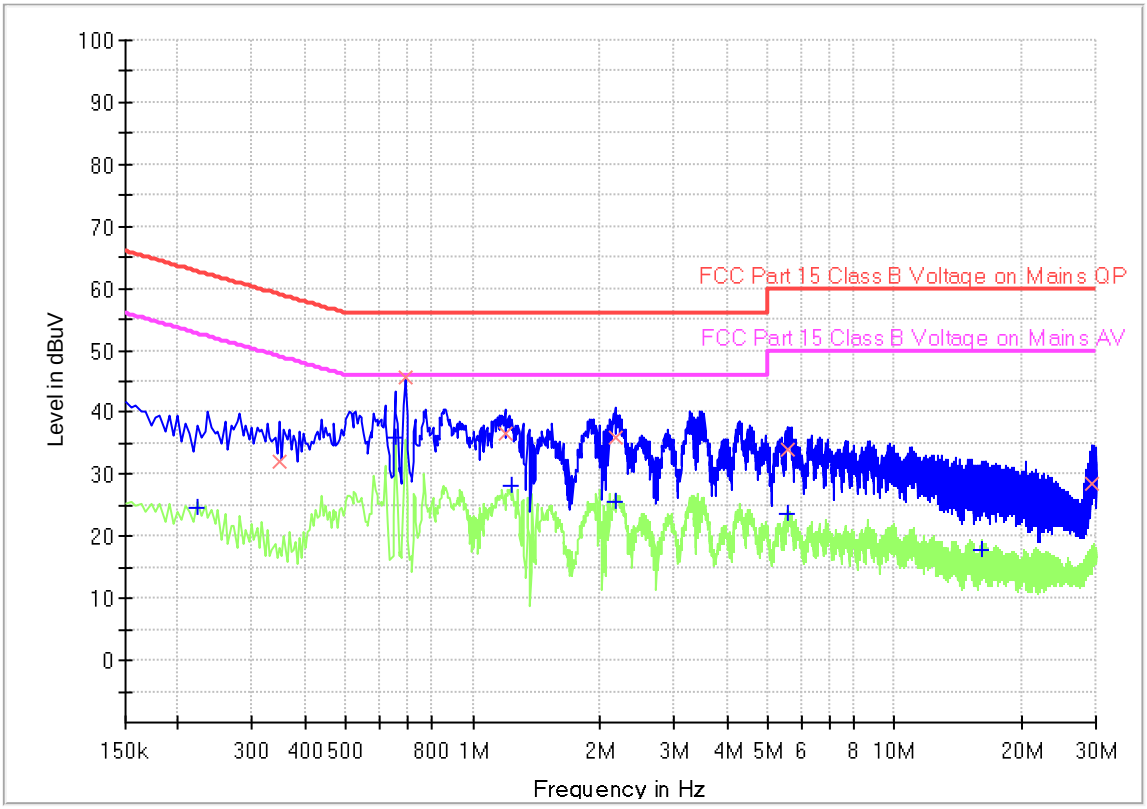
Product Type	:	Pet Water Fountain
M/N	:	PI3501
Operating Condition	:	Mode 1: 802.11g Tx_2412MHz (worst case)
Test Specification	:	L-line
Comment	:	5VDC (powered by adaptor whose input is 120V~, 60Hz)



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.222000	---	24.69	52.74	28.05	1000.0	9.000	L1	19.5
0.348000	32.06	---	59.01	26.95	1000.0	9.000	L1	19.5
0.654000	---	36.02	46.00	9.98	1000.0	9.000	L1	19.5
0.690000	45.54	---	56.00	10.46	1000.0	9.000	L1	19.5
1.189500	36.51	---	56.00	19.49	1000.0	9.000	L1	19.5
1.239000	---	28.22	46.00	17.78	1000.0	9.000	L1	19.5
2.170500	36.00	---	56.00	20.00	1000.0	9.000	L1	19.5
2.170500	---	25.70	46.00	20.30	1000.0	9.000	L1	19.5
5.581500	---	23.63	50.00	26.37	1000.0	9.000	L1	19.6
5.595000	33.94	---	60.00	26.06	1000.0	9.000	L1	19.6
16.071000	---	17.76	50.00	32.24	1000.0	9.000	L1	20.0
29.301000	28.50	---	60.00	31.50	1000.0	9.000	L1	21.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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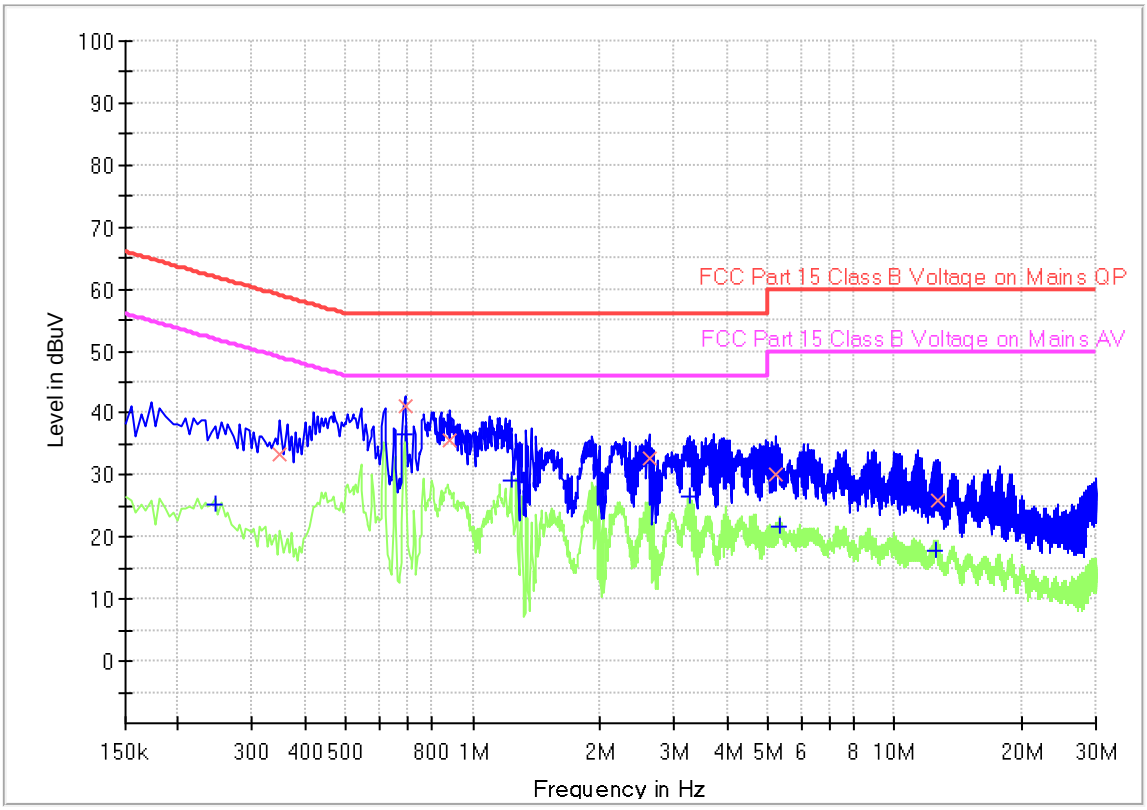
Product Type	:	Pet Water Fountain
M/N	:	PI3501
Operating Condition	:	Mode 1: 802.11g Tx_2412MHz (worst case)
Test Specification	:	N-line
Comment	:	5VDC (powered by adaptor whose input is 120V~, 60Hz)



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.244500	---	25.15	51.94	26.79	1000.0	9.000	N	19.4
0.348000	33.22	---	59.01	25.79	1000.0	9.000	N	19.4
0.690000	---	36.69	46.00	9.31	1000.0	9.000	N	19.4
0.690000	41.27	---	56.00	14.73	1000.0	9.000	N	19.4
0.883500	35.53	---	56.00	20.47	1000.0	9.000	N	19.5
1.230000	---	29.30	46.00	16.70	1000.0	9.000	N	19.5
2.611500	32.70	---	56.00	23.30	1000.0	9.000	N	19.5
3.259500	---	26.49	46.00	19.51	1000.0	9.000	N	19.5
5.203500	30.04	---	60.00	29.96	1000.0	9.000	N	19.6
5.329500	---	21.59	50.00	28.41	1000.0	9.000	N	19.6
12.574500	---	17.84	50.00	32.16	1000.0	9.000	N	19.8
12.651000	26.04	---	60.00	33.96	1000.0	9.000	N	19.8

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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9.2 Conducted peak output power

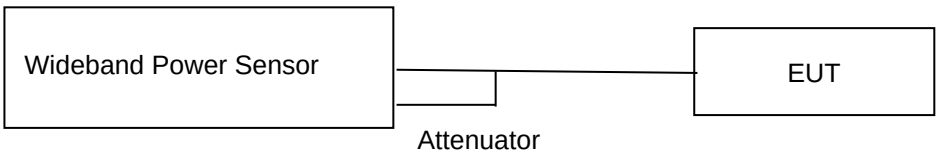
Test Method (1)

1. Measure the duty cycle D of the transmitter output signal.
2. Set span to at least 1.5 times the OBW.
3. Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
4. Set VBW ≥ [3 × RBW].
5. Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
6. Sweep time = auto.
7. Detector = RMS (i.e., power averaging), if available. Otherwise, use the sample detector mode.
8. Do not use sweep triggering. Allow the sweep to “free run.”
9. Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
10. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission).

Test Method (2)

1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

4) Measure the peak power of the transmitter. This measurement is a peak over both the ON and OFF periods of the transmitter.



Wideband Power Sensor conducted test setup

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Limits

According to §15.247 (b) (3), conducted peak output power limit as below:

	Frequency Range	Limit	Limit
	MHz	W	dBm
Conducted peak output power	2400-2483.5	≤1	≤30

Test result (conducted peak) as below table

802.11b			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
	Result	limit	Verdict
2412MHz	15.34	≤30	Pass
2437MHz	15.85	≤30	Pass
2462MHz	16.32	≤30	Pass

802.11g			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
	Result	limit	Verdict
2412MHz	**20.87**	≤30	Pass
2437MHz	20.81	≤30	Pass
2462MHz	19.21	≤30	Pass

802.11n(HT20)			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
	Result	limit	Verdict
2412MHz	19.74	≤30	Pass
2437MHz	19.58	≤30	Pass
2462MHz	16.97	≤30	Pass

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9.3 6dB bandwidth

Test Method for 6 dB Bandwidth

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   RBW=100KHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
5. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Limit

6dB bandwidth Limit [kHz]
≥500

Test result

Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result
		result	limit	verdict
802.11b	2412	10.336	≥0.5	Pass
	2437	10.335	≥0.5	Pass
	2462	10.334	≥0.5	Pass
802.11g	2412	16.293	≥0.5	Pass
	2437	16.296	≥0.5	Pass
	2462	16.589	≥0.5	Pass
802.11n(HT20)	2412	17.246	≥0.5	Pass
	2437	17.09	≥0.5	Pass
	2462	17.333	≥0.5	Pass

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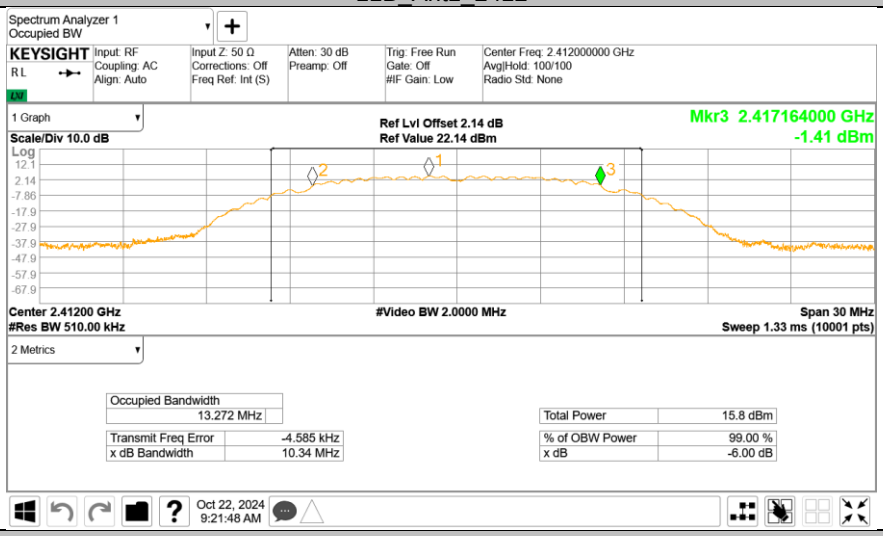
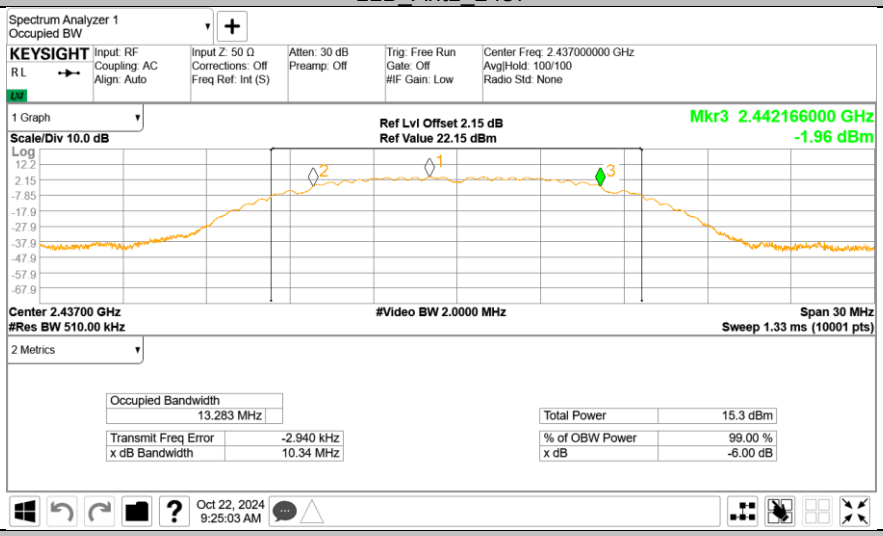
6 dB Bandwidth

11B_Ant1_2412



11B_Ant1_2437



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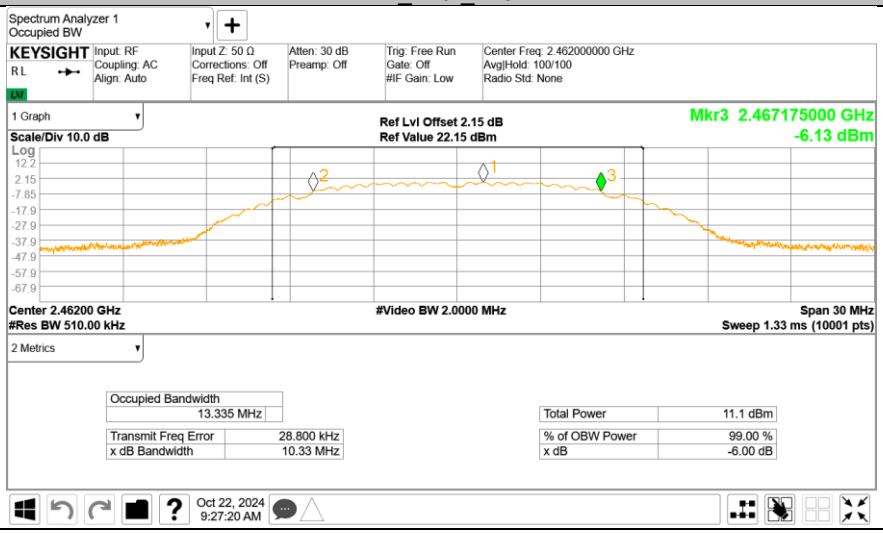

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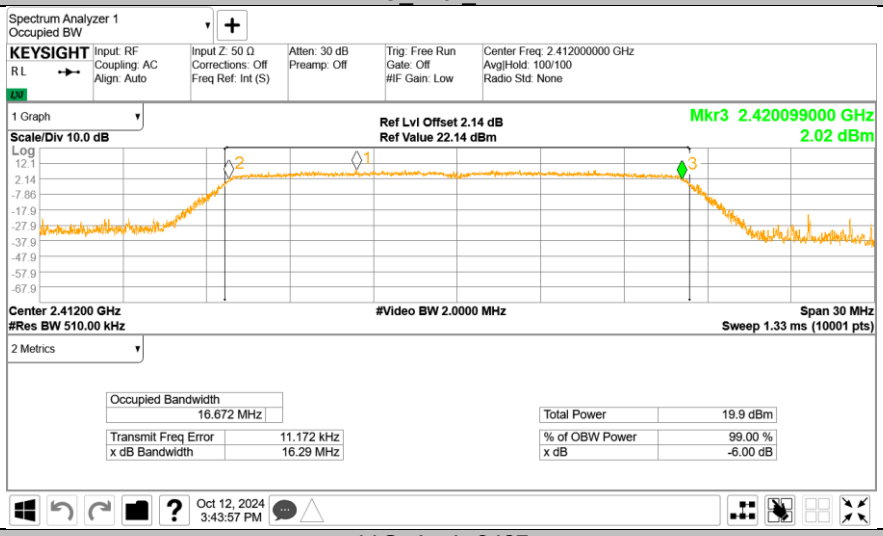
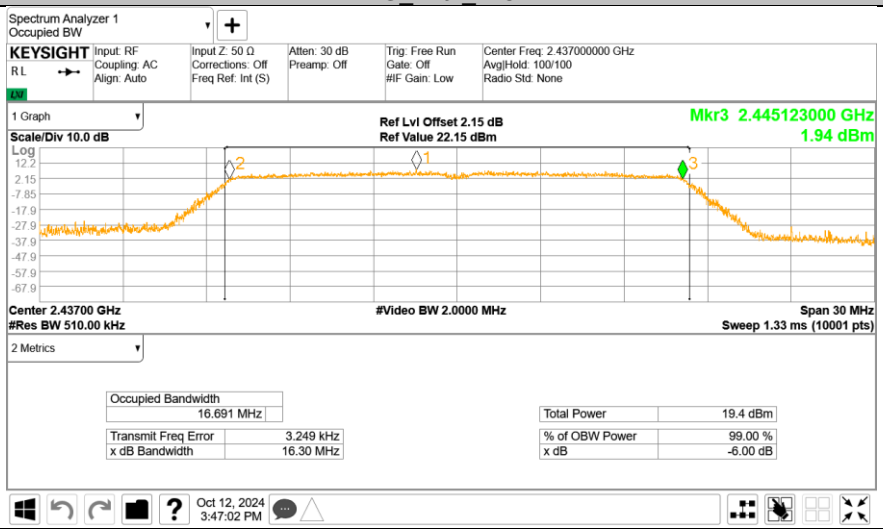
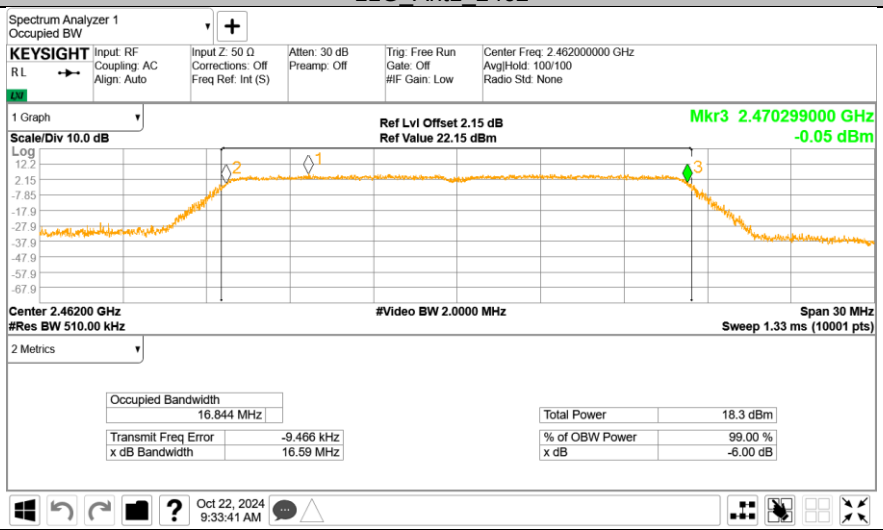
11G_Ant1_2412



11G_Ant1_2437



11G_Ant1_2462



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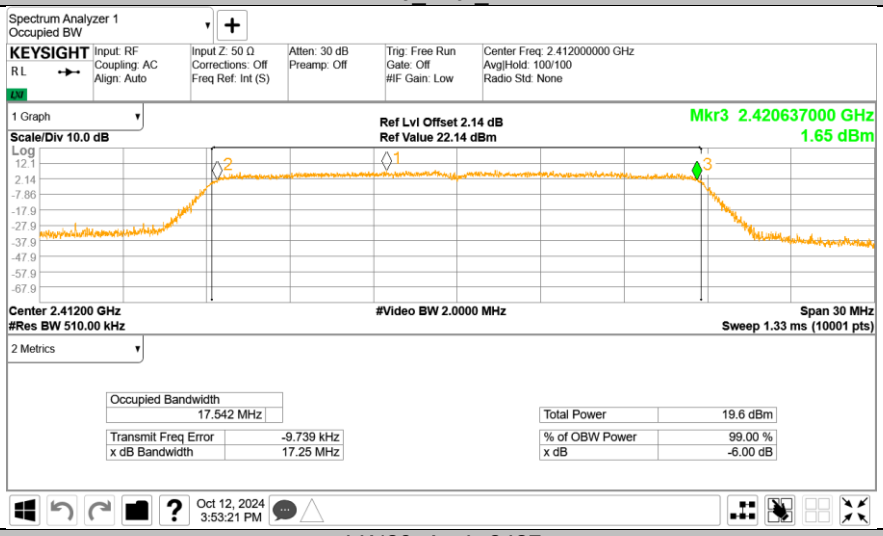
11N20_Ant1_2412



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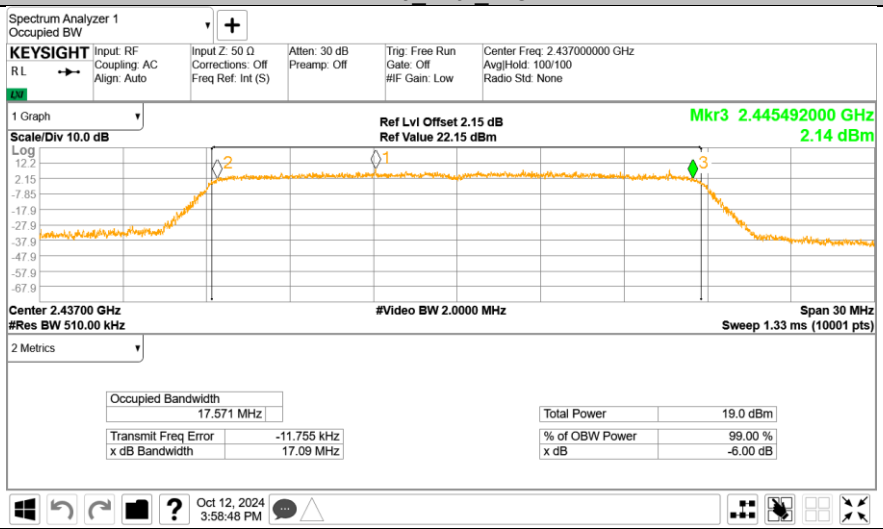

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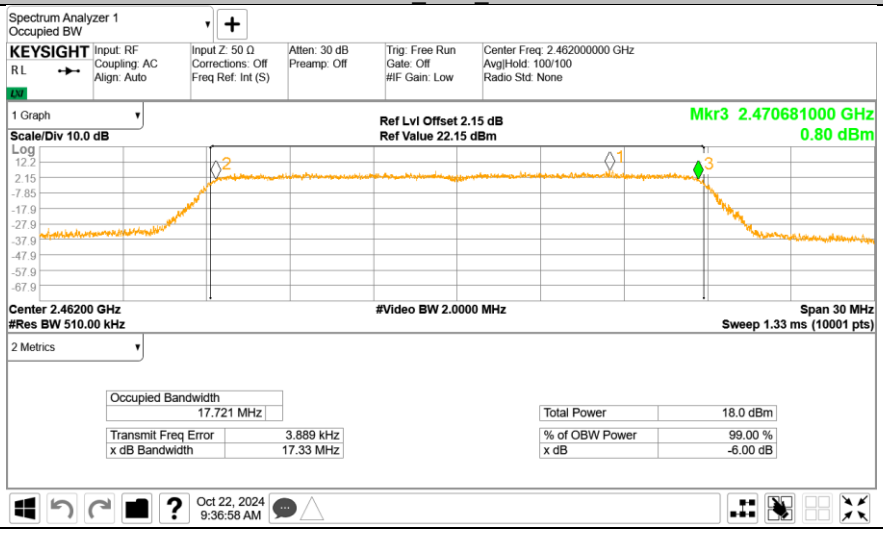

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9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3KHz]
≤8

Test result

802.11 B

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-7.76	Pass
Middle channel 2437MHz	-7.41	Pass
High channel 2462MHz	-12.18	Pass

802.11 G

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-10.7	Pass
Middle channel 2437MHz	-10.16	Pass
High channel 2462MHz	-11.51	Pass

802.11 N20

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-11.85	Pass
Middle channel 2437MHz	-11.11	Pass
High channel 2462MHz	-13.19	Pass

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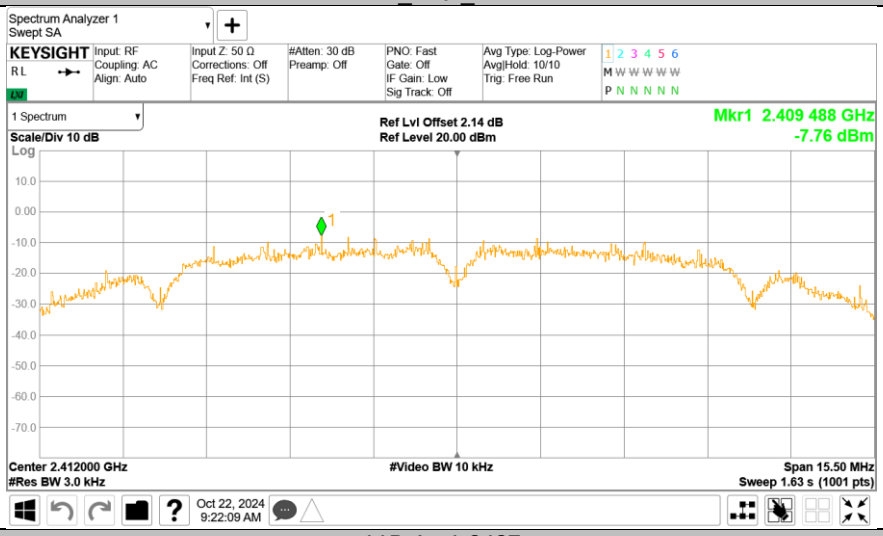
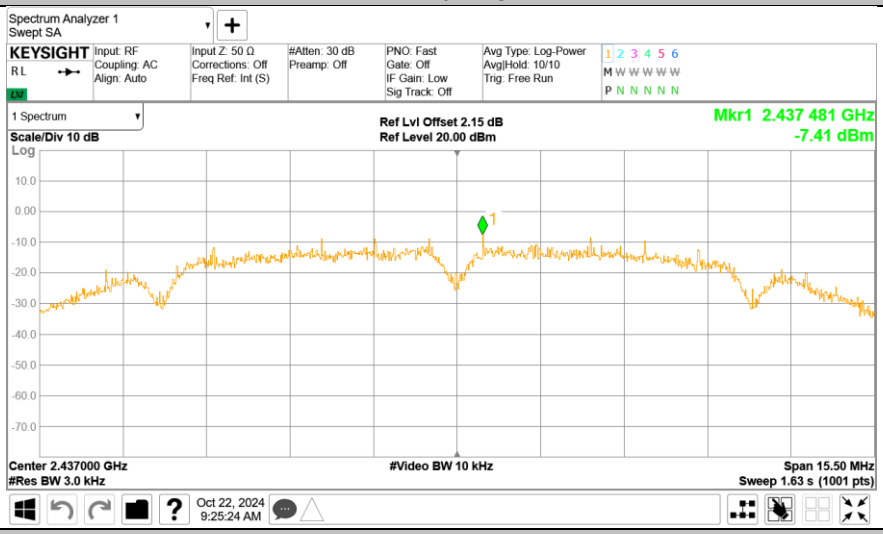
Power spectral density

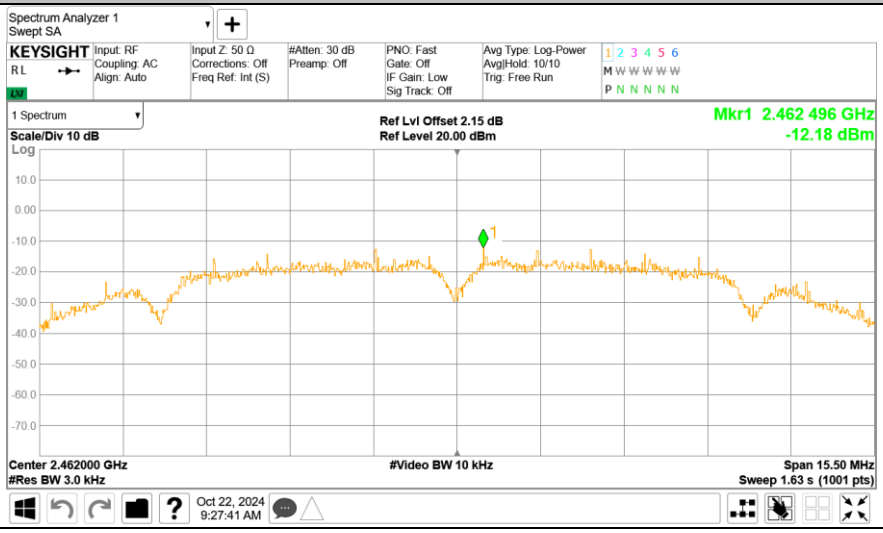
11B_Ant1_2412



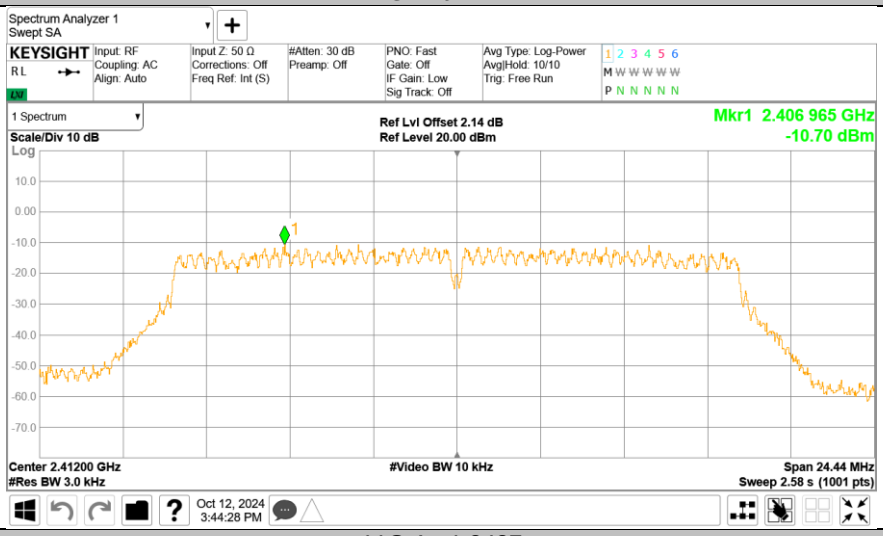
11B Ant1 2437



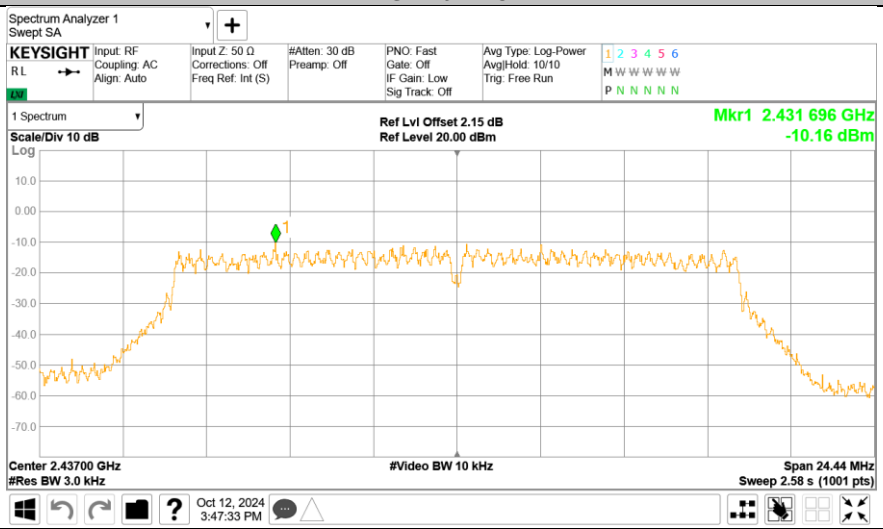
11B Ant1 2462



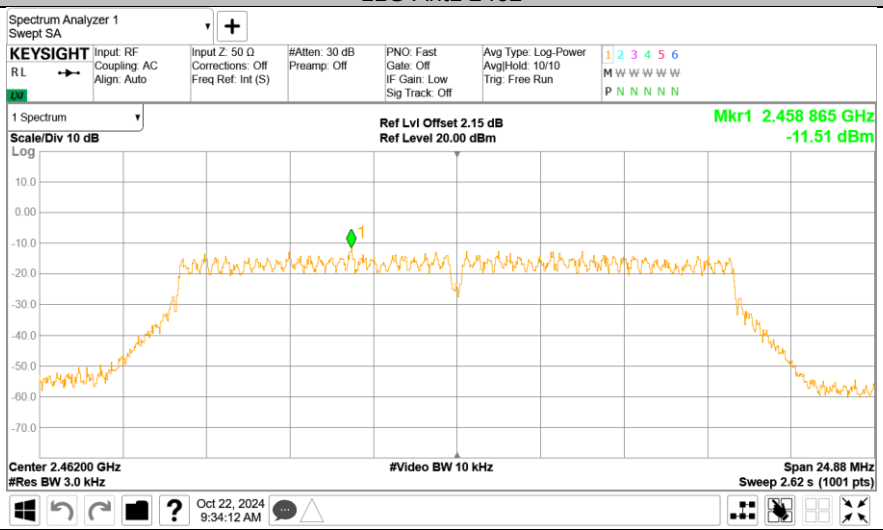
11G Ant1 2412



11G Ant1 2437



11G Ant1 2462



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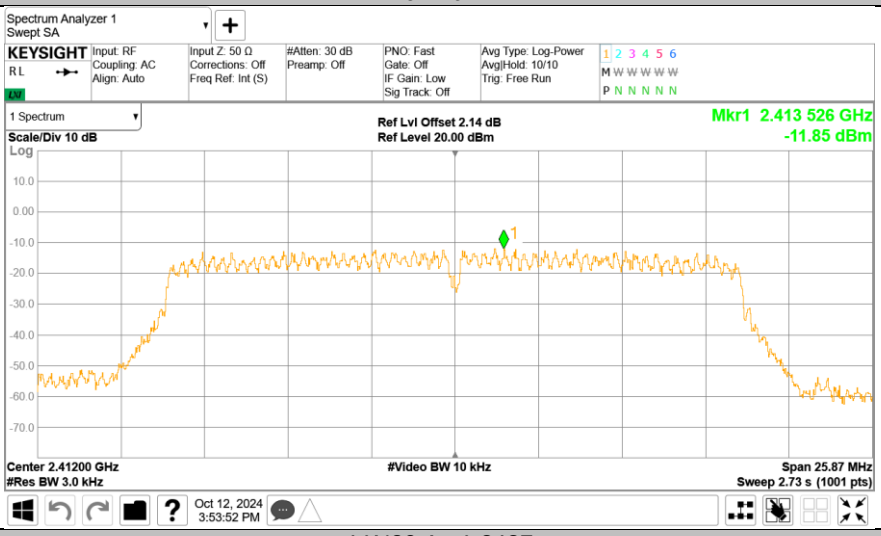
11N20 Ant1 2412

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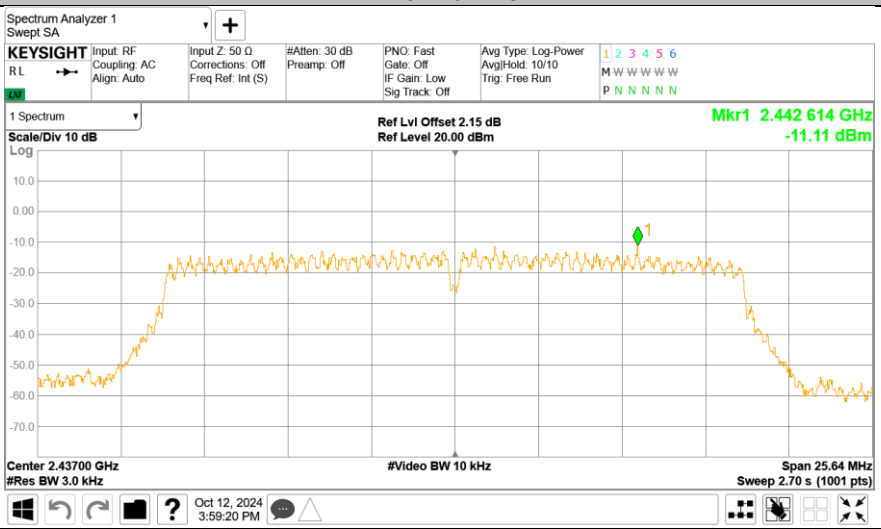
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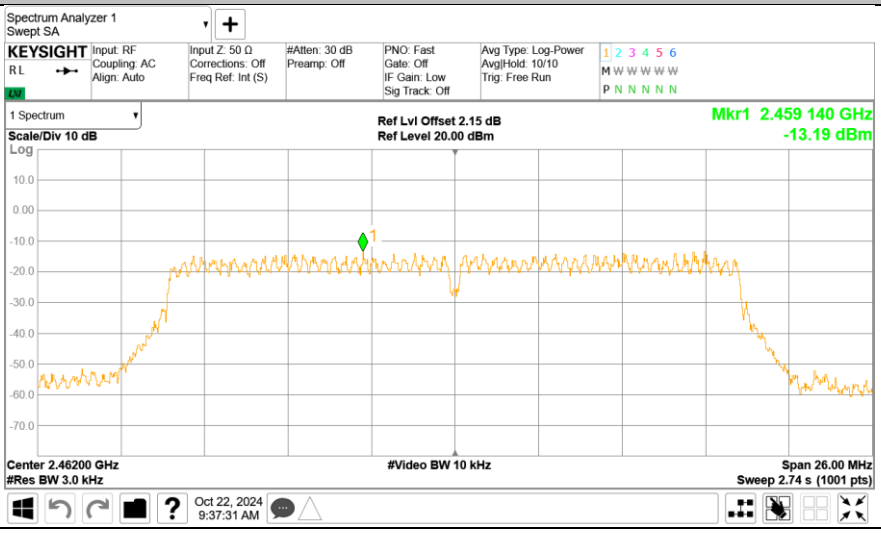

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9.5 Spurious RF conducted emissions

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
5. The level displayed must comply with the limit specified in this Section. Submit these plots.
6. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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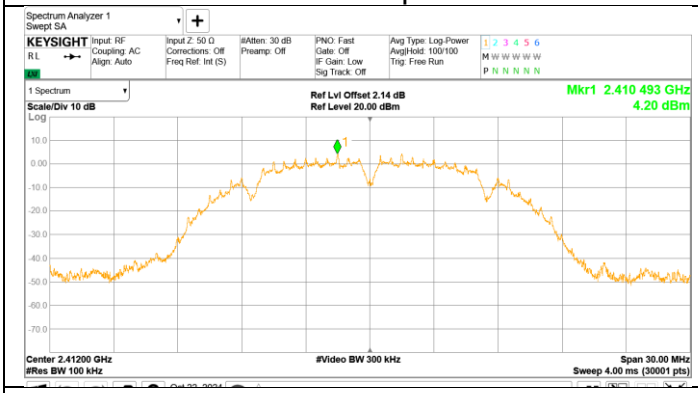
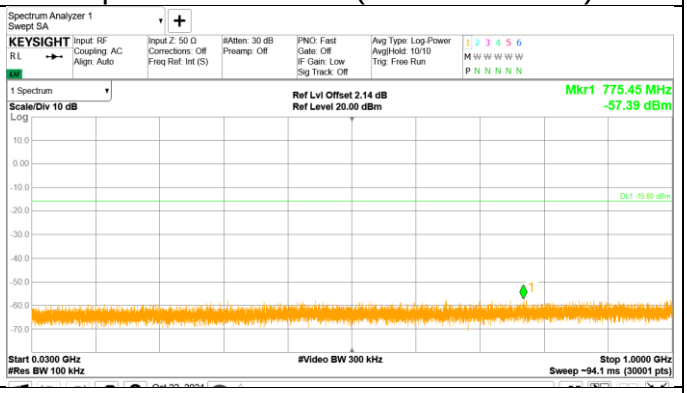
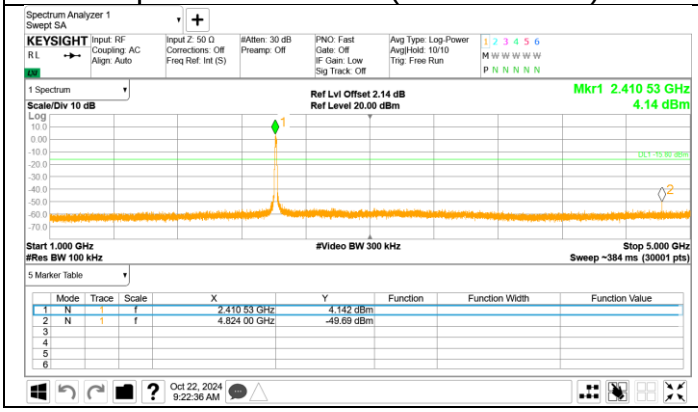
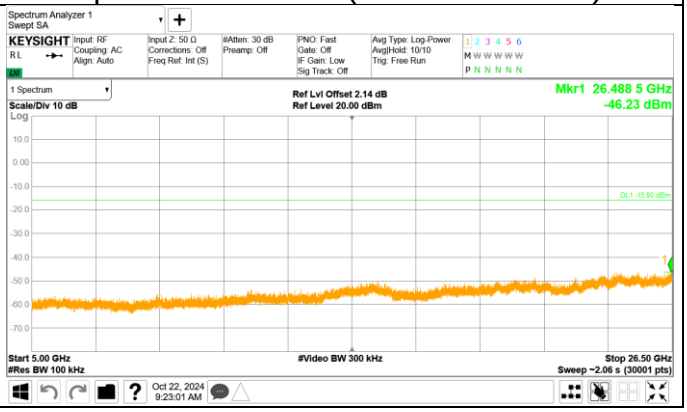
Spurious RF conducted emissions

802.11 B Ant1

Out-of-Band Emissions	
Channel 1 (2412MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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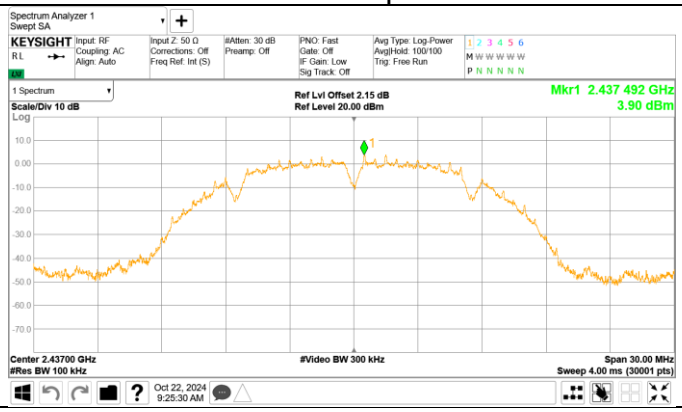
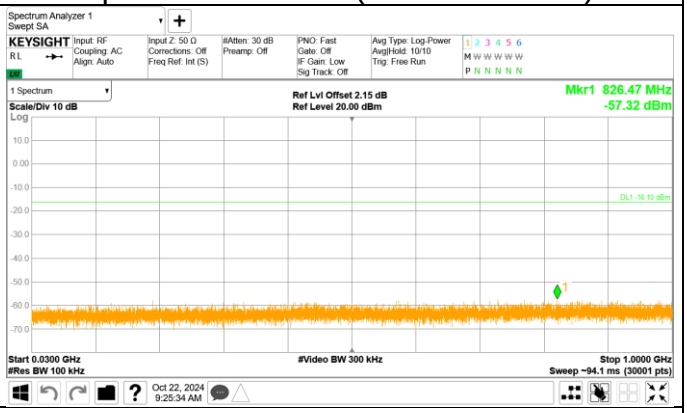
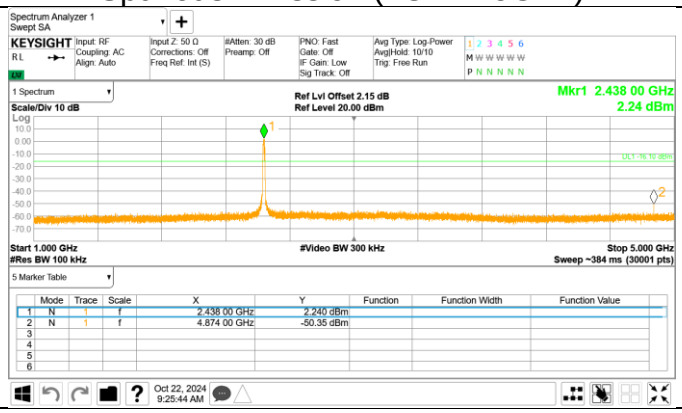
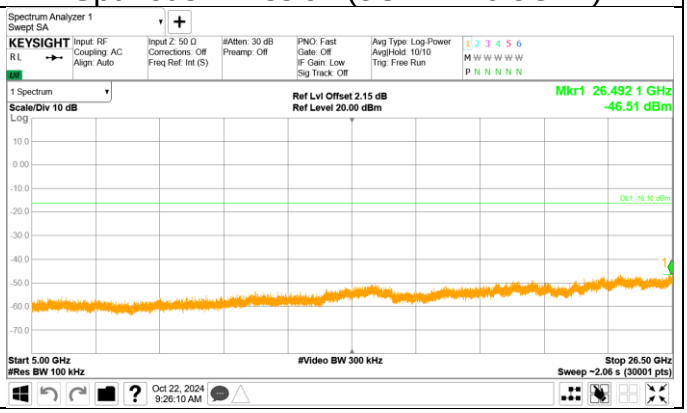
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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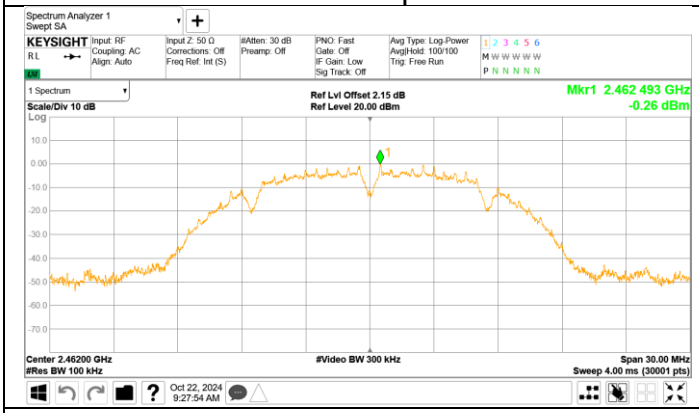
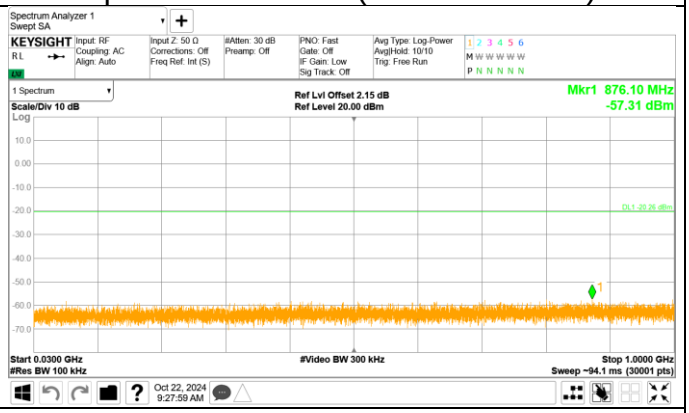
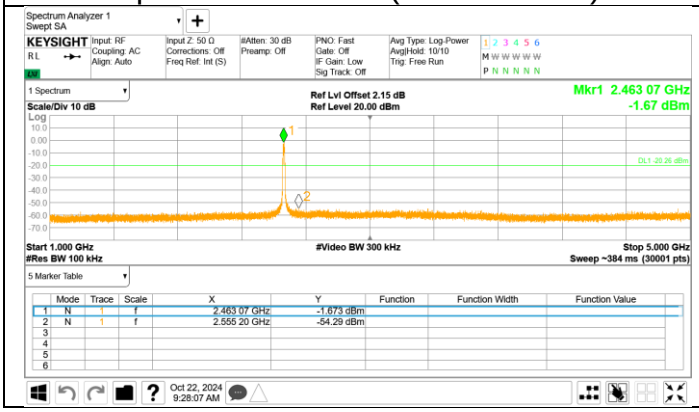
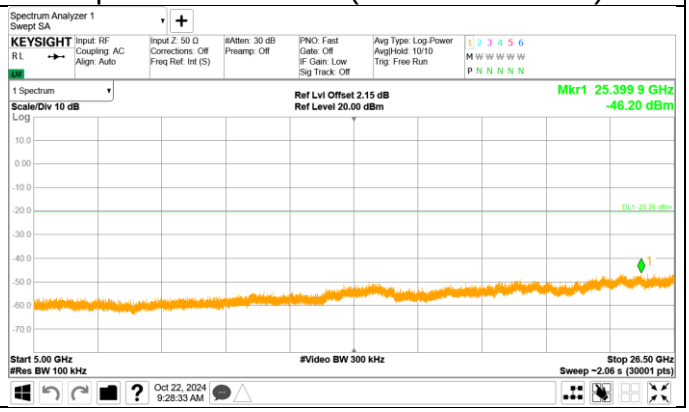
Out-of-Band Emissions	
Channel 11 (2462MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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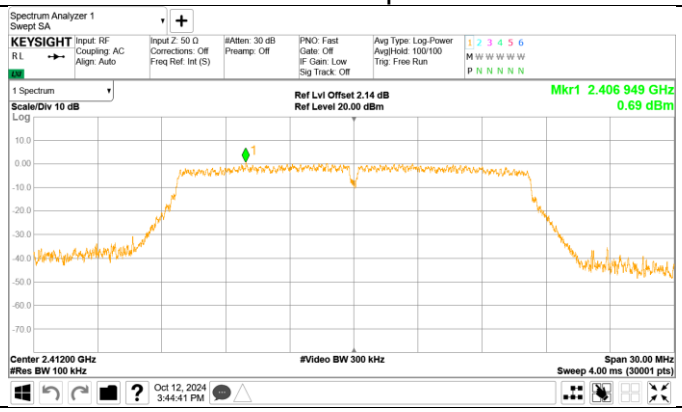
802.11 G Ant1

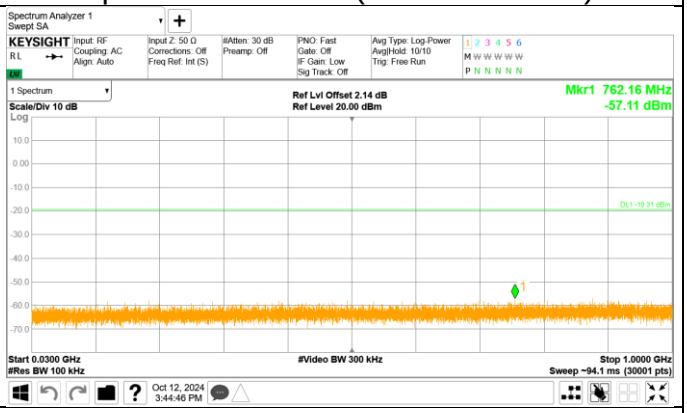
Out-of-Band Emissions

Channel 1 (2412MHz)

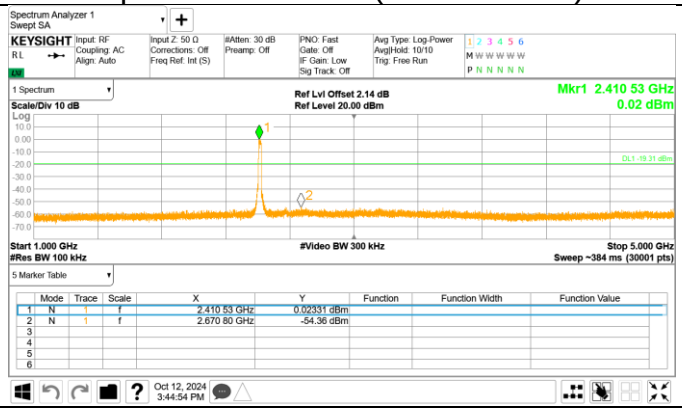
Reference point



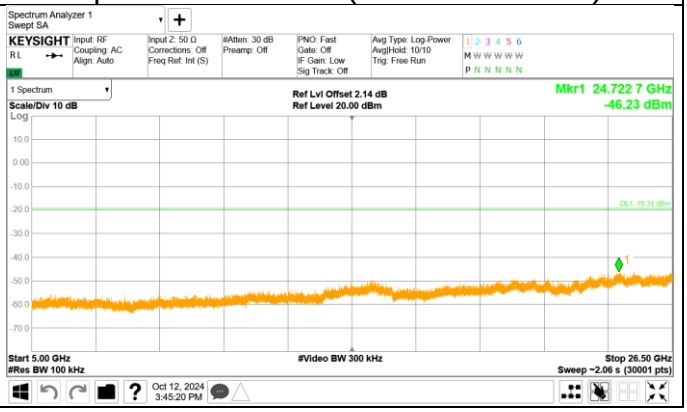
Spurious Emission (30MHz – 1GHz)



Spurious Emission (1GHz –5GHz)



Spurious Emission (5GHz –26.5GHz)



Note: The emission which exceed the limit is the fundamental.

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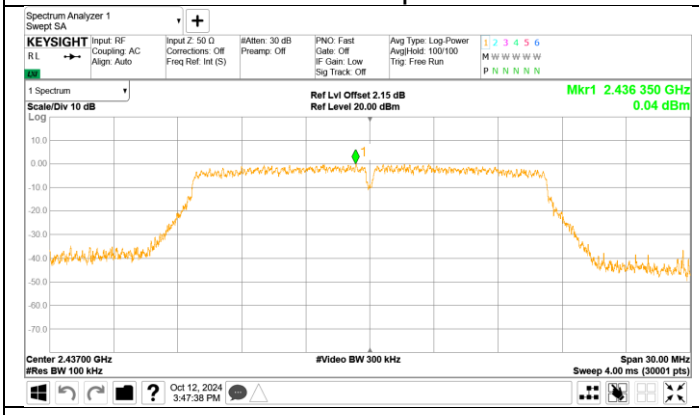
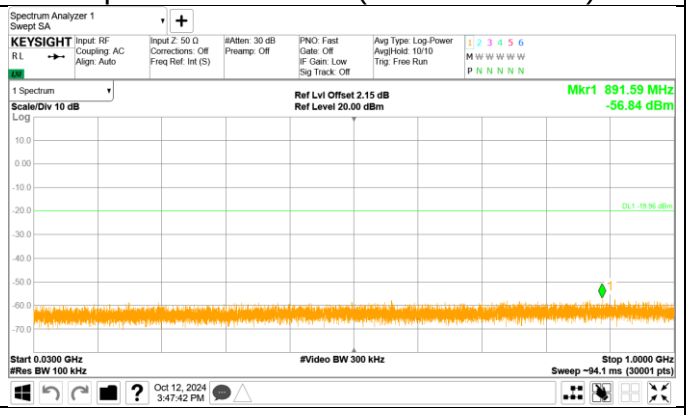
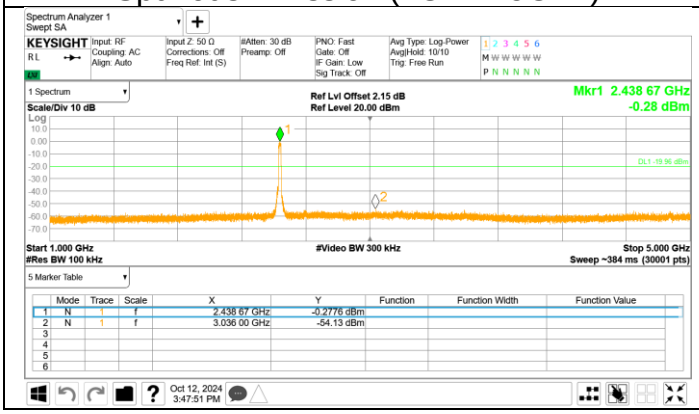
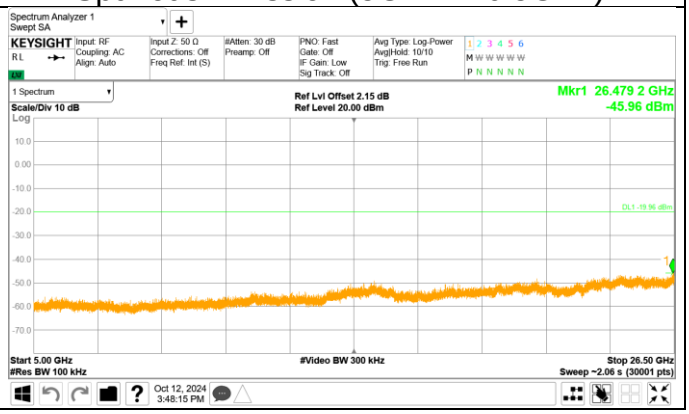
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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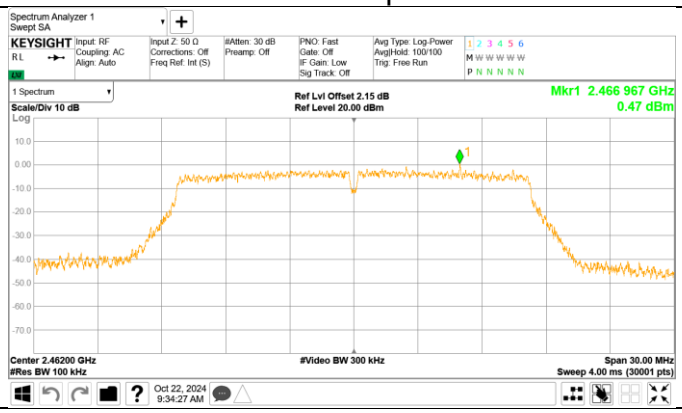
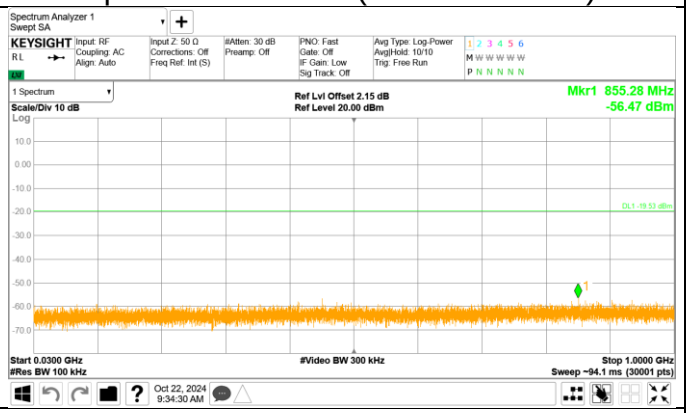
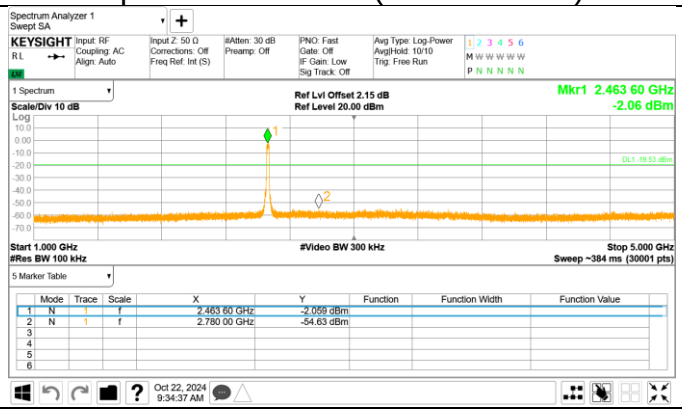
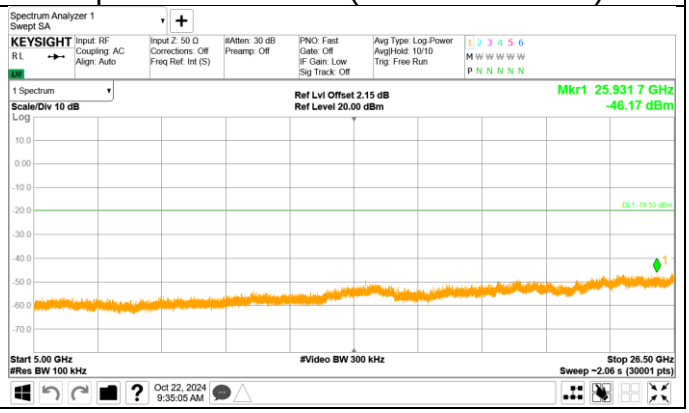
Out-of-Band Emissions	
Channel 11 (2462MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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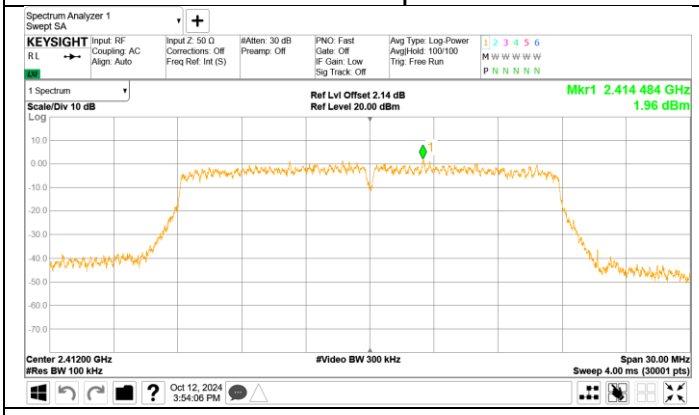
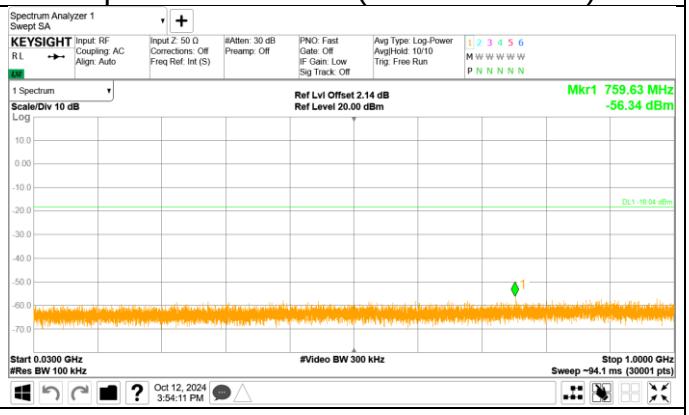
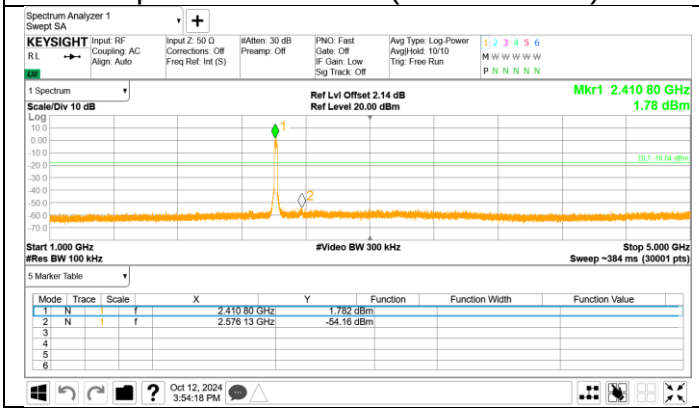
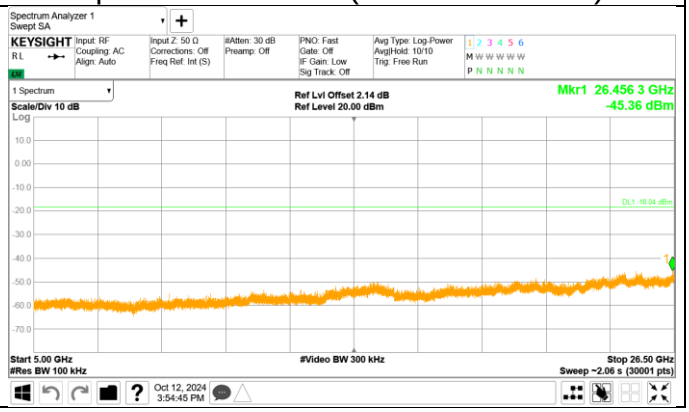
802.11 N20 Ant1

Out-of-Band Emissions	
Channel 1 (2412MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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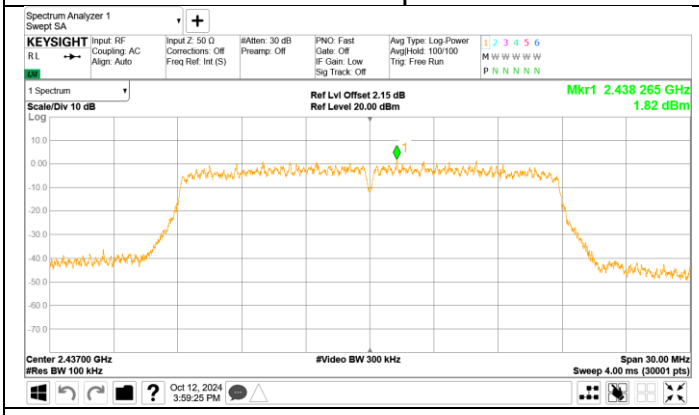
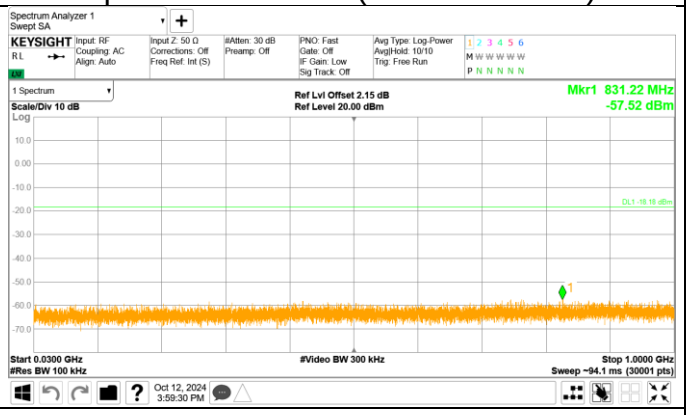
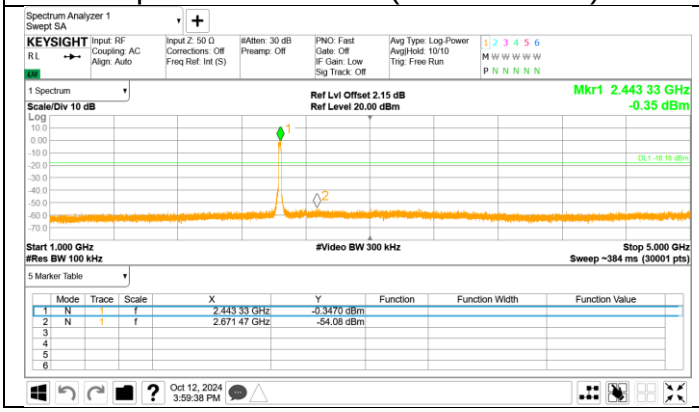
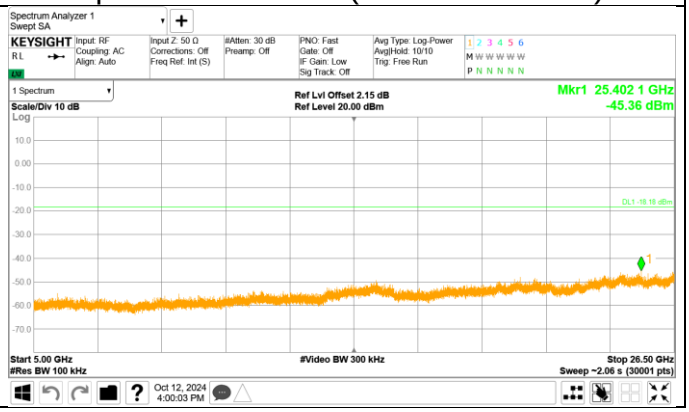
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

Note: The emission which exceed the limit is the fundamental.

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