FCC - TEST REPORT

Report Number	:	**709502304460-00A**	Date of Issue:	November 30, 2023

Model	:	FabWash
Product Type	:	Post-processing Unit
Applicant	:	SHINING 3D Tech. Co., Ltd.
Address	:	No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, China
Production Facility	:	SHINING 3D Tech. Co., Ltd.
Address	:	No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, China

Test Result	:	■ **Positive**	☐ **Negative**
Total pages including Appendices	:	65	

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3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
Phone: +86 21 61410123, Fax:+86 21 61408600

1 Table of Contents

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
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Phone: +86 21 61410123, Fax:+86 21 61408600

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.:	25988

3 Description of the Equipment under Test

Product:	Post-processing Unit
Model no.:	FabWash
Hardware Version Identification No. (HVIN)	V1.0
Product Marketing Name (PMN)	V1.0
FCC ID:	2AMG4-FABWASH
Options and accessories:	NA
Rating:	DC 24V
RF Transmission Frequency:	For 2.4G Wi-Fi: For 802.11b/g/n-HT20: 2412~2462 MHz For 802.11n-HT40: 2422~2452 MHz For 5G Wi-Fi: For 802.11a/n: 5180~5240 MHz (U-NII-1) 5745~5825 MHz (U-NII-3)
No. of Operated Channel:	For 2.4G Wi-Fi: 11 for 802.11b/802.11g/802.11n(H20) 7 for 802.11n(H40) For 5G Wi-Fi: 5180~5240 MHz (U-NII-1) 5745~5825 MHz (U-NII-3)
Modulation:	For 2.4G Wi-Fi: Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n For 5G Wi-Fi: Orthogonal Frequency Division Multiplexing (OFDM) for 802.11a/n

Channel list:

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		

802.11n(HT40)			
Ch	Fre(MHz)	Ch	Fre(MHz)
3	2422	8	2447
4	2427	9	2452
5	2432		
6	2437		
7	2442		

Antenna Type:	FPC
Antenna Gain:	2.47 dBi for 2.4GWi-Fi 4.28 dBi for 5GWi-Fi

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Description of the EUT:	The Equipment Under Test (EUT) is a Post-processing Unit with Wi-Fi Module. The EUT support Wi-Fi operated at 2.4GHz and 5GHz.
Test sample no.:	SHA-740170-1 (Radiated sample) SHA-740170-2 (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 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 Measurement Guidance.

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C & RSS-247 Issue 3/RSS-Gen Issue 5						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	13-17	Site 1	☒	☐	☐
§15.247 (b) (3)	Conducted peak output power	18-19	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	20-24	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	25-29	Site 1	☒	☐	☐
§15.247(e)	Spurious RF conducted emissions	30-42	Site 1	☒	☐	☐
§15.247(d)	Band edge	43-51	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	52-61	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: Remark 1: The EUT only operation at 2.4G Wi-Fi and 5G Wi-Fi UNII Band (5180MHz-5240MHz, 5745MHz-5825MHz).
Note 1: The EUT uses a FPC antenna, which gain is 2.47 dBi for 2.4GWi-Fi, 4.28 dBi for 5GWi-Fi. 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: 2AMG4-FABWASH complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

According to the client's declaration, the model has 2 kinds of adaptor power supply (the model: HKA15024063-7C and the model: FSP150-AAAN3).

This report is only for 2.4GHz Wi-Fi test report, for the 5GHz Wi-Fi test report please refer to 709502304460-00B.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

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

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

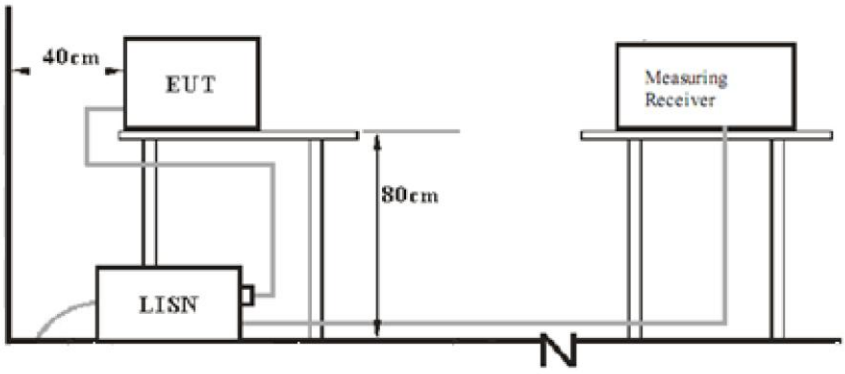
Sample Received Date:	July 4, 2023
Testing Start Date:	July 8, 2023
Testing End Date:	July 28, 2023

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

Reviewed by:	Prepared by:	Tested by:
Hui TONG	Wenqiang LU	Huali CHENG
Review Engineer	Project Engineer	Test Engineer

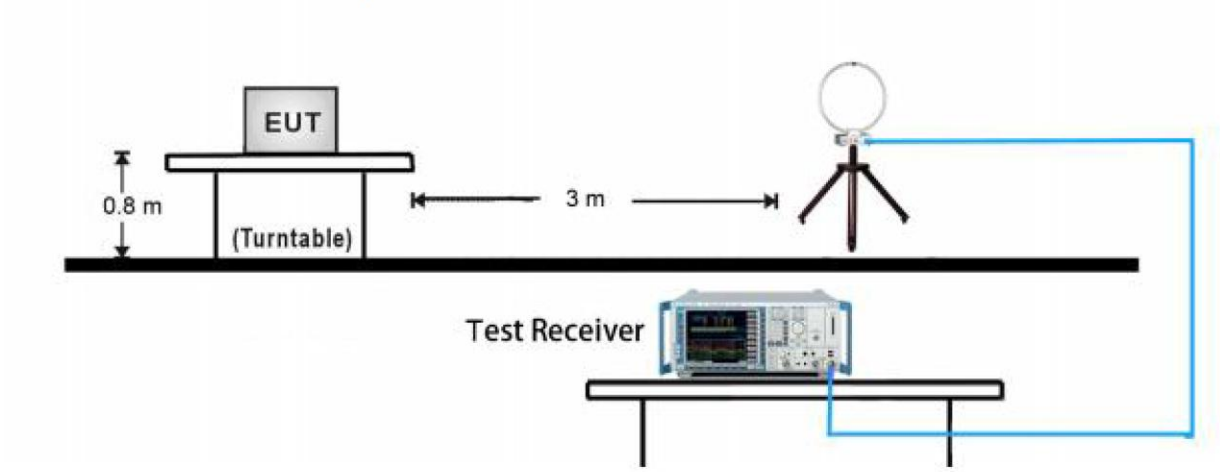
7 Test Setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



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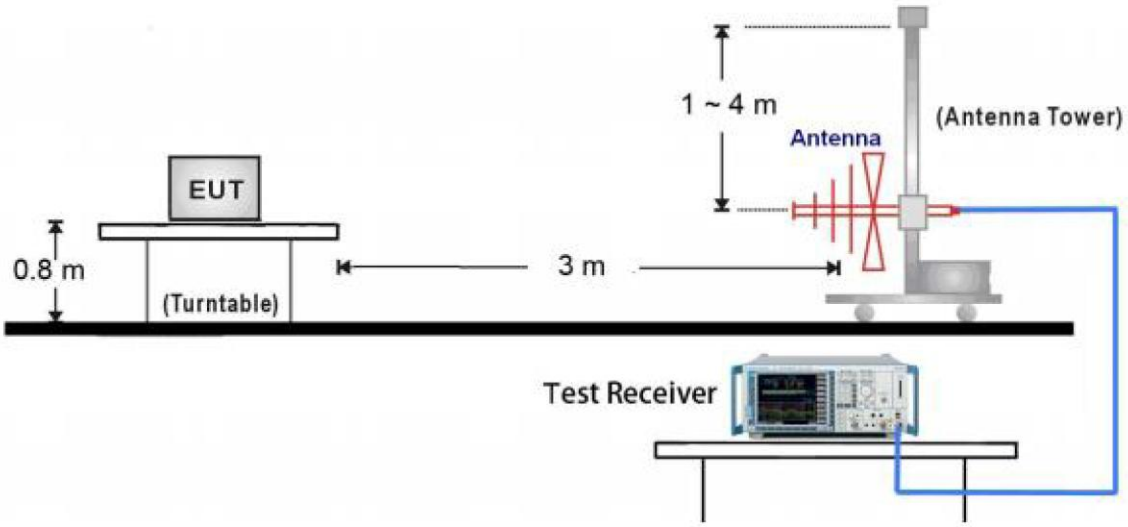
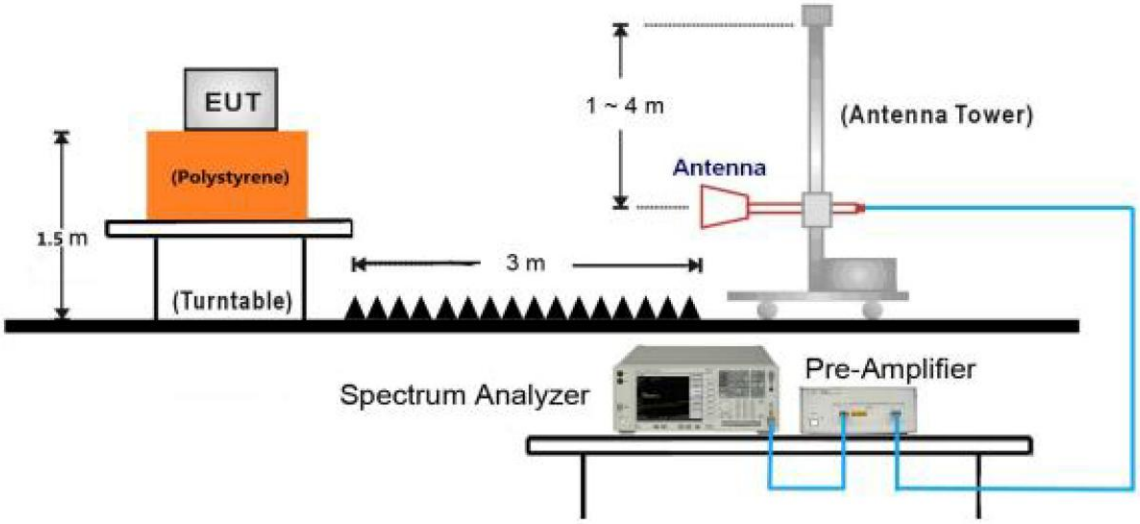
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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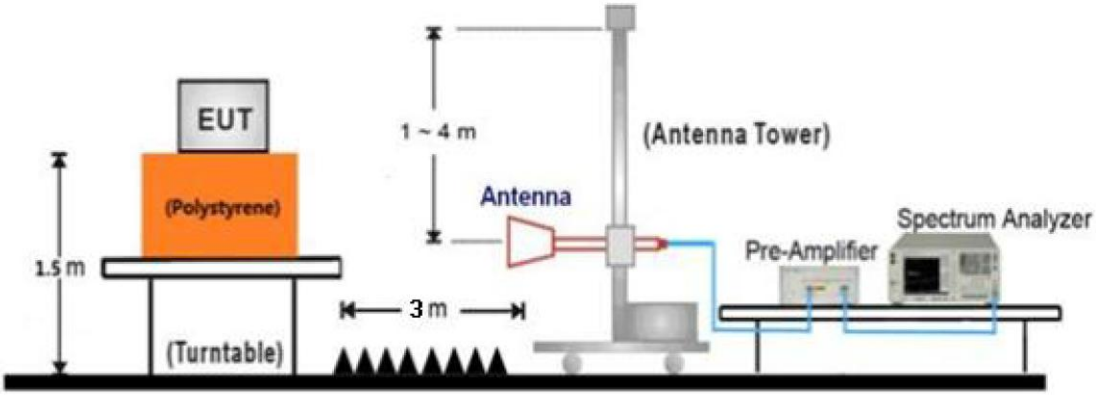
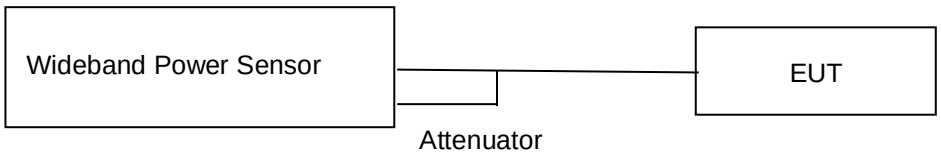
18GHz ~ 25GHz Test Setup:



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	MSI	Crossnair 15 R6E B12UEZ	--

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

The system was configured to channel 1(2412MHz), 6(2437MHz), and 11(2462MHz) for 802.11 b/g/n HT20 test and channel 3(2422MHz), 6(2437MHz), 9(2452MHz) for 802.11n (HT40).

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Index Value (Power level setting)
802.11b	1	1	CCK	99
	6	1	CCK	99
	11	1	CCK	99
802.11g	1	6	OFDM	86
	6	6	OFDM	84
	11	6	OFDM	83
802.11n HT20	1	MCS0	OFDM	88
	6	MCS0	OFDM	83
	11	MCS0	OFDM	84
802.11n HT40	3	MCS0	OFDM	87
	6	MCS0	OFDM	83
	9	MCS0	OFDM	85

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. A 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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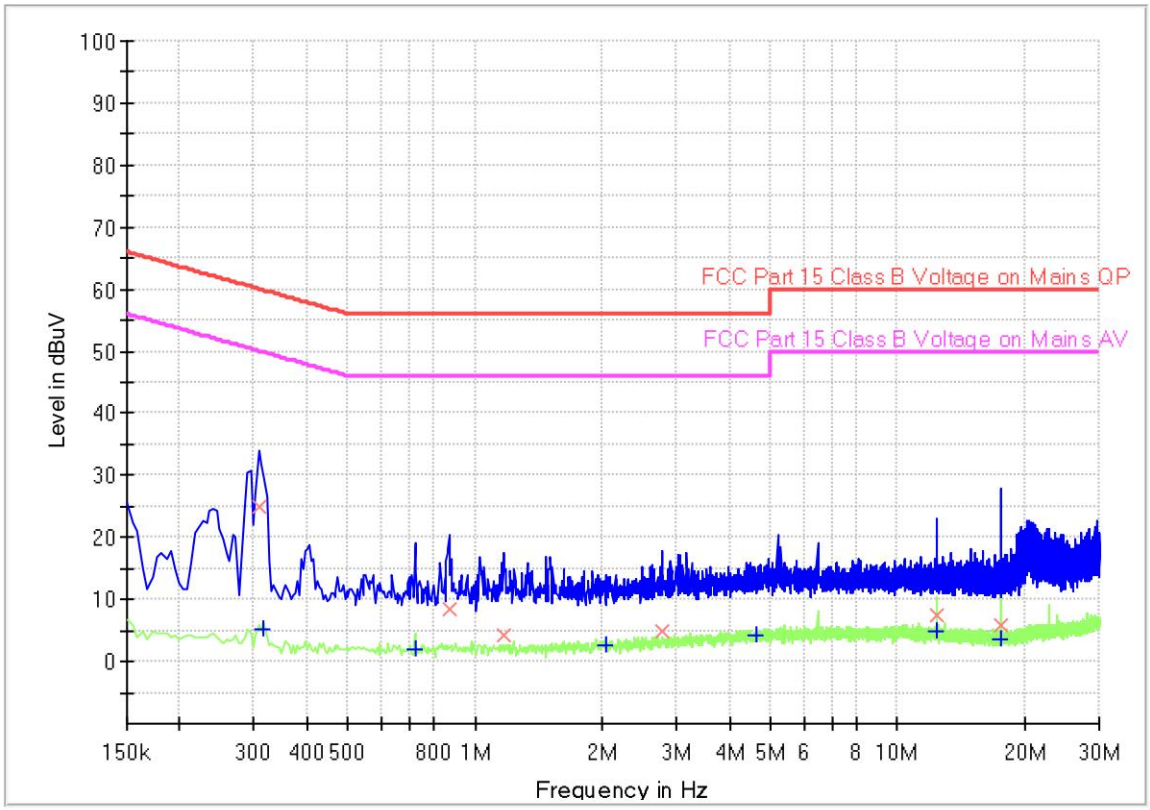
Product Type	:	Post-processing Unit
M/N	:	FabWash
Operating Condition	:	Mode 1: Tx_2412MHz for 802.11N20 (worst case)
Test Specification	:	L-line (adaptor: HKA15024063-7C)
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.307500	24.92	---	60.04	35.12	1000.0	9.000	L1	19.6
0.316500	---	5.19	49.80	44.61	1000.0	9.000	L1	19.6
0.721500	---	2.06	46.00	43.94	1000.0	9.000	L1	19.6
0.870000	8.55	---	56.00	47.45	1000.0	9.000	L1	19.6
1.171500	4.24	---	56.00	51.76	1000.0	9.000	L1	19.6
2.035500	---	2.54	46.00	43.46	1000.0	9.000	L1	19.6
2.773500	4.84	---	56.00	51.16	1000.0	9.000	L1	19.6
4.618500	---	4.14	46.00	41.86	1000.0	9.000	L1	19.6
12.363000	---	4.73	50.00	45.27	1000.0	9.000	L1	19.8
12.367500	7.60	---	60.00	52.40	1000.0	9.000	L1	19.8
17.533500	---	3.75	50.00	46.25	1000.0	9.000	L1	19.9
17.533500	5.94	---	60.00	54.06	1000.0	9.000	L1	19.9

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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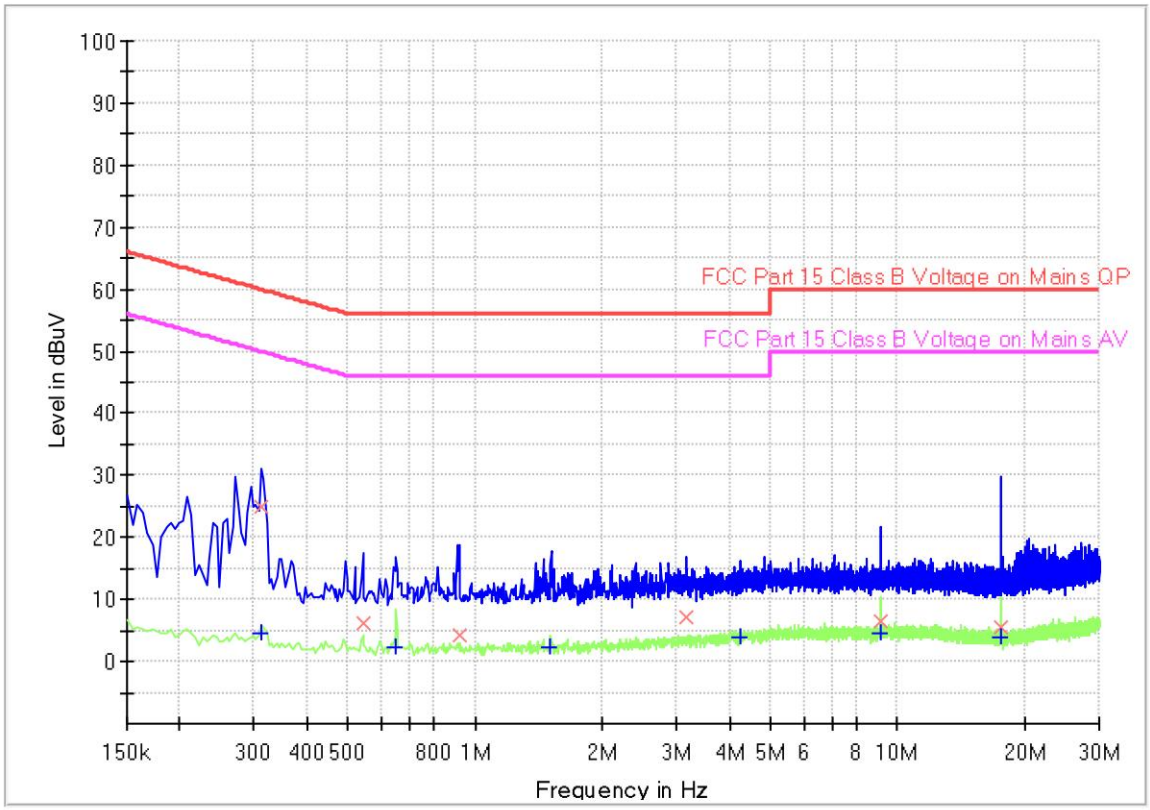
Test Specification	:	N-line (adaptor: HKA15024063-7C)
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.312000	---	4.66	49.92	45.26	1000.0	9.000	N	19.6
0.312000	25.04	---	59.92	34.88	1000.0	9.000	N	19.6
0.541500	6.27	---	56.00	49.73	1000.0	9.000	N	19.6
0.649500	---	2.18	46.00	43.82	1000.0	9.000	N	19.6
0.915000	4.26	---	56.00	51.74	1000.0	9.000	N	19.6
1.509000	---	2.20	46.00	43.80	1000.0	9.000	N	19.6
3.169500	7.11	---	56.00	48.89	1000.0	9.000	N	19.6
4.222500	---	4.06	46.00	41.94	1000.0	9.000	N	19.7
9.154500	6.54	---	60.00	53.46	1000.0	9.000	N	19.8
9.154500	---	4.69	50.00	45.31	1000.0	9.000	N	19.8
17.538000	---	3.76	50.00	46.24	1000.0	9.000	N	19.9
17.538000	5.59	---	60.00	54.41	1000.0	9.000	N	19.9

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
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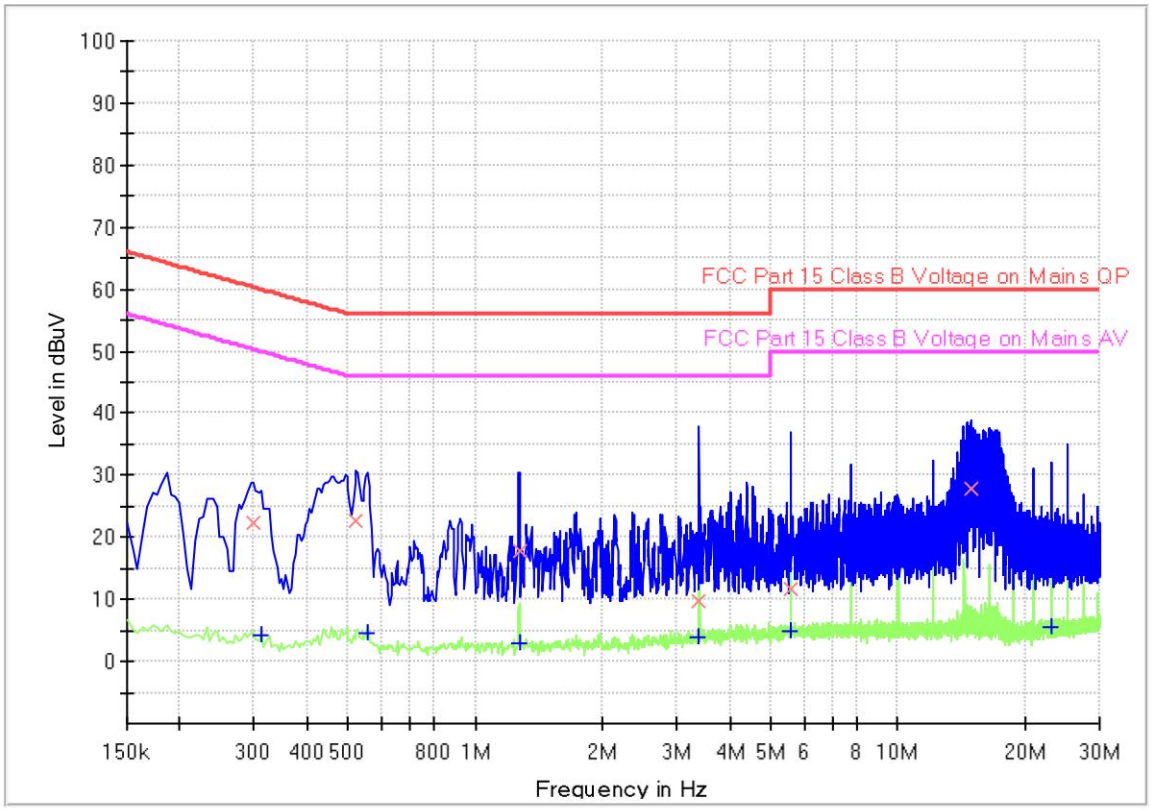
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.298500	22.28	---	60.28	38.00	1000.0	9.000	L1	19.6
0.312000	---	4.17	49.92	45.75	1000.0	9.000	L1	19.6
0.523500	22.73	---	56.00	33.27	1000.0	9.000	L1	19.6
0.555000	---	4.59	46.00	41.41	1000.0	9.000	L1	19.6
1.270500	---	3.09	46.00	42.91	1000.0	9.000	L1	19.6
1.270500	17.71	---	56.00	38.29	1000.0	9.000	L1	19.6
3.390000	9.78	---	56.00	46.22	1000.0	9.000	L1	19.6
3.390000	---	3.94	46.00	42.06	1000.0	9.000	L1	19.6
5.559000	11.82	---	60.00	48.18	1000.0	9.000	L1	19.6
5.559000	---	4.81	50.00	45.19	1000.0	9.000	L1	19.6
14.896500	27.79	---	60.00	32.21	1000.0	9.000	L1	19.8
23.064000	---	5.41	50.00	44.59	1000.0	9.000	L1	20.0

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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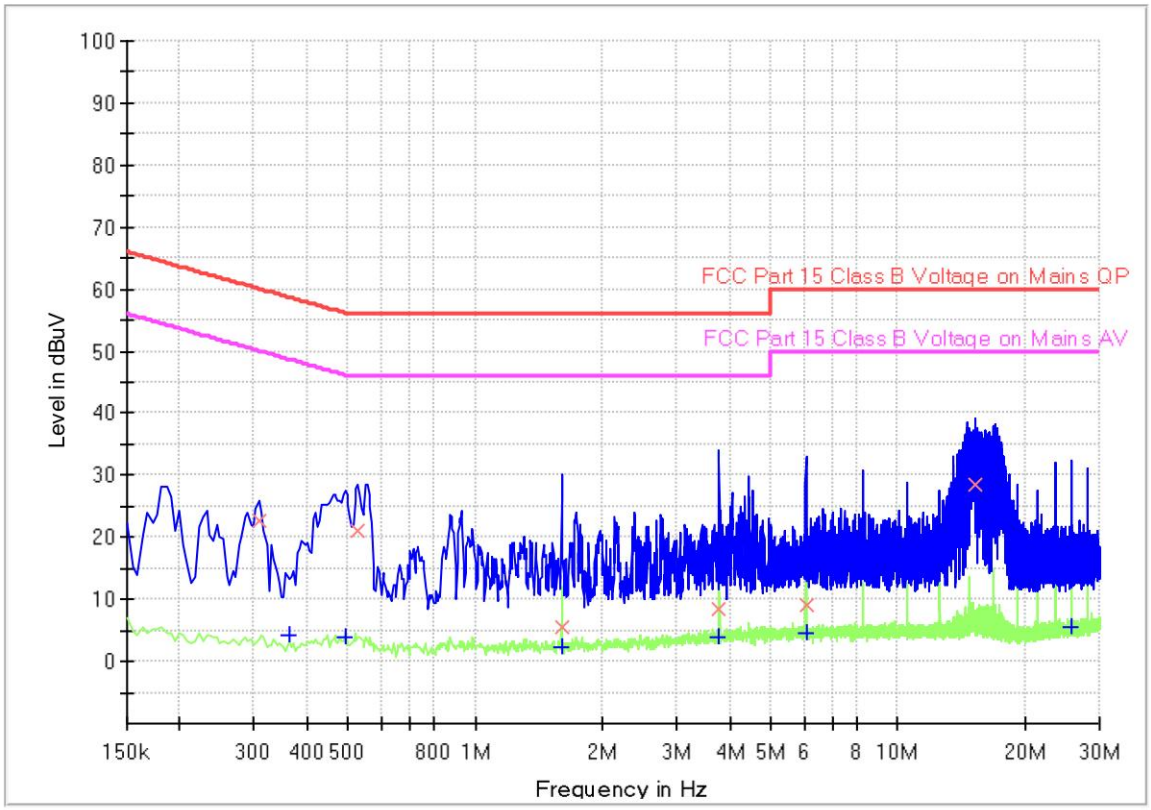
Comment	:	AC 120V/60Hz



Final_Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.307500	22.70	---	60.04	37.34	1000.0	9.000	N	19.5
0.361500	---	4.34	48.69	44.35	1000.0	9.000	N	19.5
0.492000	---	3.98	46.13	42.15	1000.0	9.000	N	19.5
0.528000	21.02	---	56.00	34.98	1000.0	9.000	N	19.5
1.603500	---	2.24	46.00	43.76	1000.0	9.000	N	19.5
1.603500	5.66	---	56.00	50.34	1000.0	9.000	N	19.5
3.777000	8.53	---	56.00	47.47	1000.0	9.000	N	19.6
3.777000	---	3.94	46.00	42.06	1000.0	9.000	N	19.6
6.058500	9.23	---	60.00	50.77	1000.0	9.000	N	19.6
6.058500	---	4.54	50.00	45.46	1000.0	9.000	N	19.6
15.297000	28.56	---	60.00	31.44	1000.0	9.000	N	19.9
25.854000	---	5.37	50.00	44.63	1000.0	9.000	N	20.1

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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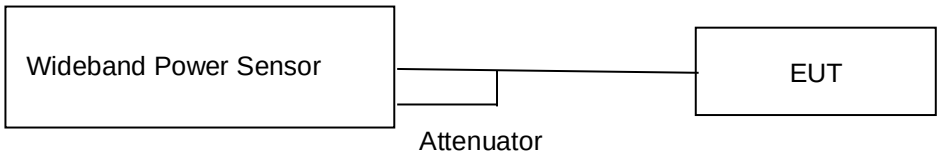
9.2 Conducted peak output power

Test Method

1) 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

Limits

According to §15.247 (b) (1), 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 as below table

802.11b: Antenna gain= 2.47dBi			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)		
	Result	limit	Verdict
2412MHz	19.69	≤30	Pass
2437MHz	20.2	≤30	Pass
2462MHz	20.37	≤30	Pass

802.11g: Antenna gain= 2.47dBi			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)		
	Result	limit	Verdict
2412MHz	21.65	≤30	Pass
2437MHz	21.35	≤30	Pass
2462MHz	21.01	≤30	Pass

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802.11n(HT20): Antenna gain= 2.47dBi			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)		
	Result	limit	Verdict
2412MHz	21.73	≤30	Pass
2437MHz	21.25	≤30	Pass
2462MHz	21.66	≤30	Pass

802.11n(HT40): Antenna gain= 2.47dBi			
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (1)		
	Result	limit	Verdict
2422MHz	21.73	≤30	Pass
2437MHz	21.3	≤30	Pass
2452MHz	21.66	≤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	9.535	≥0.5	Pass
	2437	8.993	≥0.5	Pass
	2462	9.511	≥0.5	Pass
802.11g	2412	16.332	≥0.5	Pass
	2437	16.316	≥0.5	Pass
	2462	16.308	≥0.5	Pass
802.11n(HT20)	2412	16.305	≥0.5	Pass
	2437	16.963	≥0.5	Pass
	2462	16.879	≥0.5	Pass
802.11n(HT40)	2422	33.83	≥0.5	Pass
	2437	35.049	≥0.5	Pass
	2452	34.981	≥0.5	Pass

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6 dB Bandwidth

11B_Ant1_2412

11B_Ant1_2437

11B_Ant1_2462

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11G_Ant1_2412

11G_Ant1_2437

11G_Ant1_2462

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11N20_Ant1_2412

11N20_Ant1_2437

11N20_Ant1_2462

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11N40_Ant1_2422

11N40_Ant1_2437

11N40_Ant1_2452

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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	-6.14	Pass
Middle channel 2437MHz	-5.52	Pass
High channel 2462MHz	-5.1	Pass

802.11 G

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-10.97	Pass
Middle channel 2437MHz	-10.25	Pass
High channel 2462MHz	-11.77	Pass

802.11 N20

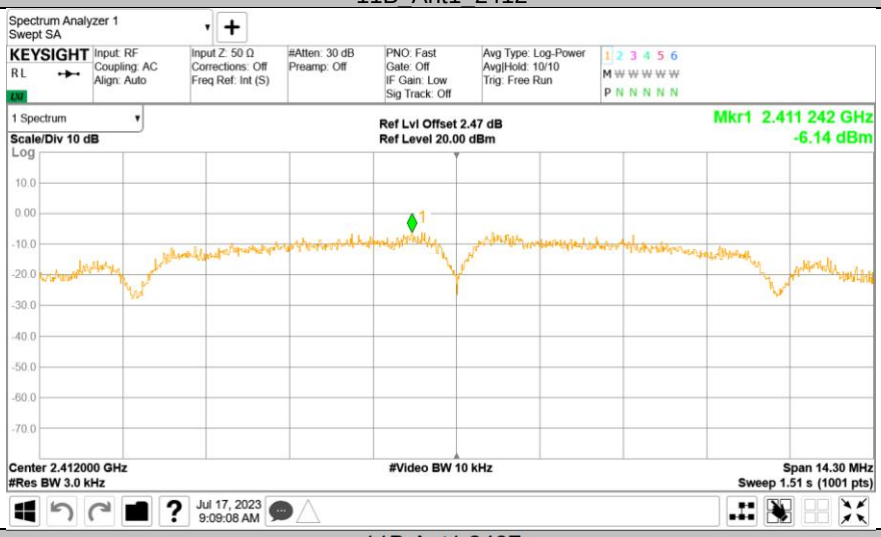
Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-10.53	Pass
Middle channel 2437MHz	-10.85	Pass
High channel 2462MHz	-10.4	Pass

802.11 N40

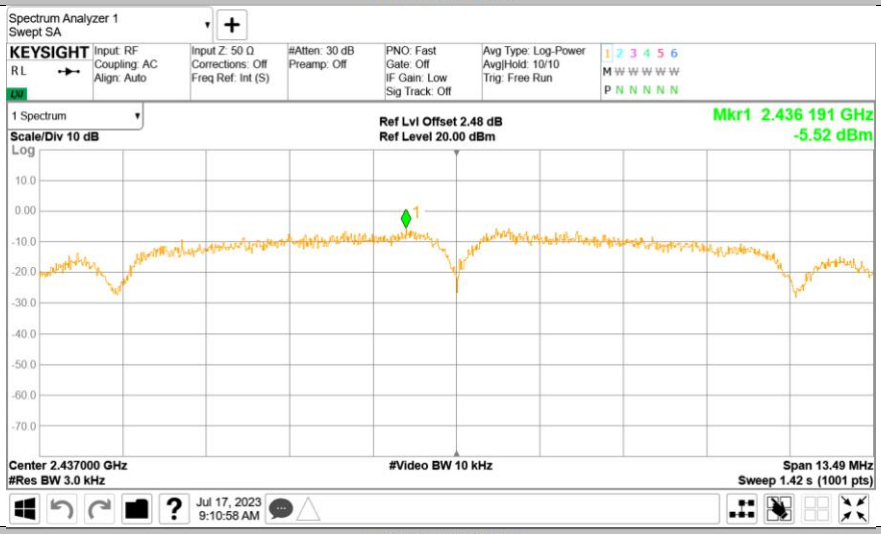
Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2422MHz	-13.71	Pass
Middle channel 2437MHz	-13.73	Pass
High channel 2452MHz	-14.16	Pass

Power spectral density

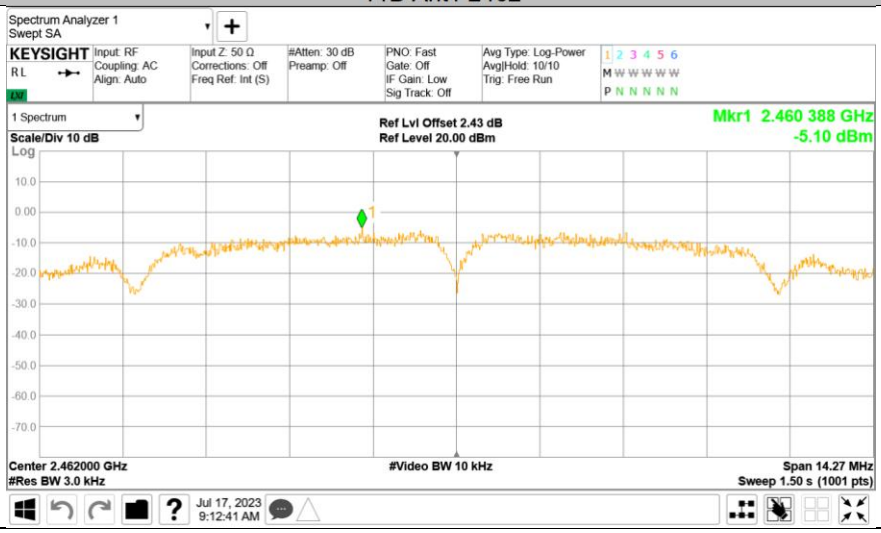
11B_Ant1_2412



11B Ant1 2437



11B Ant1 2462



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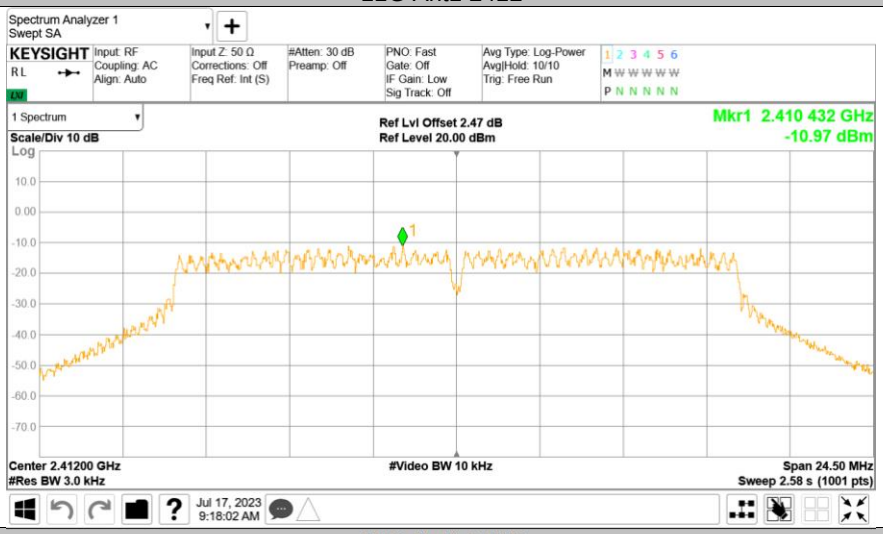
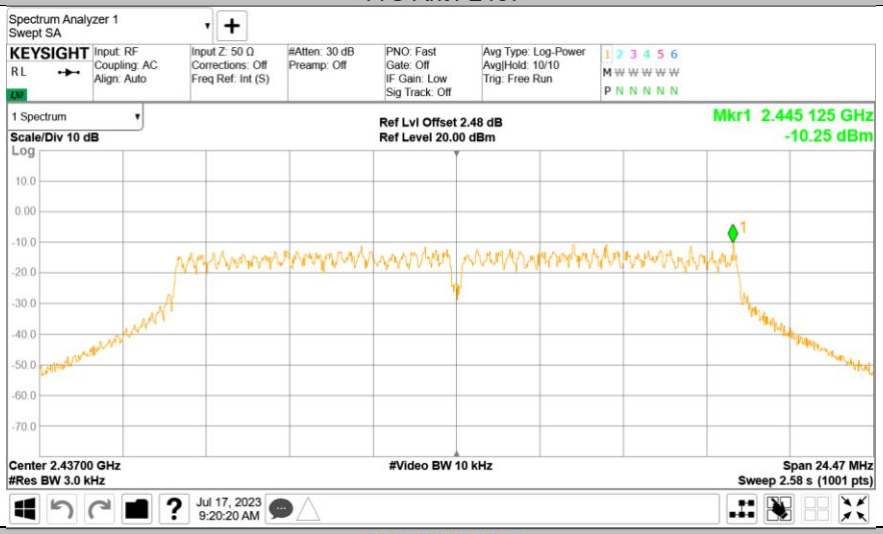
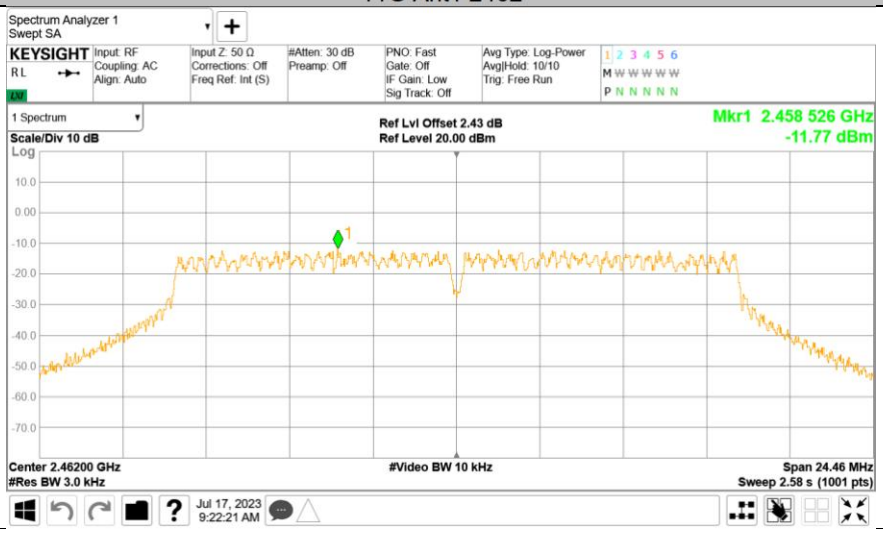
11G Ant1 2412



11G Ant1 2437



11G Ant1 2462



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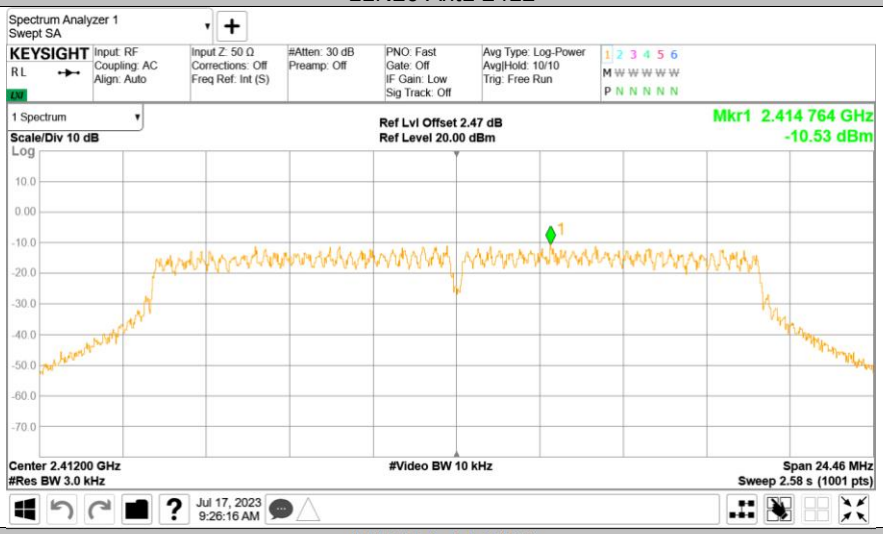
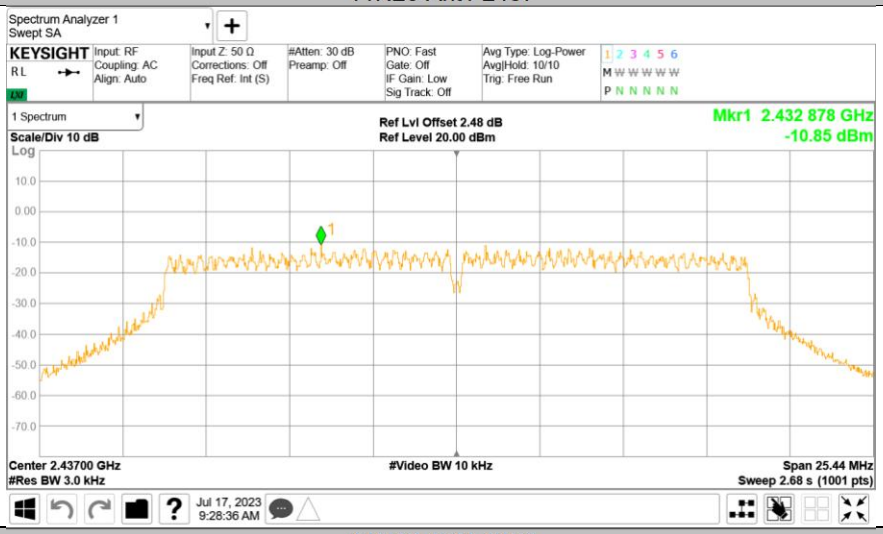
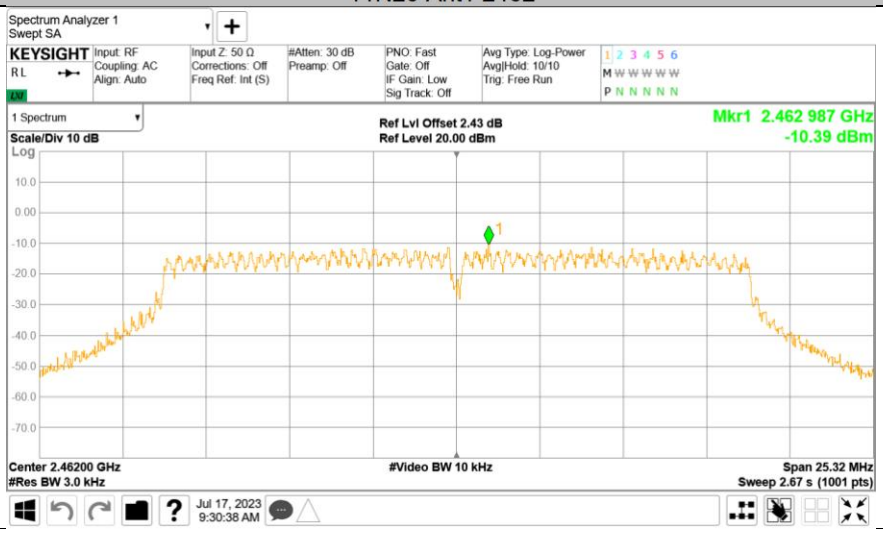
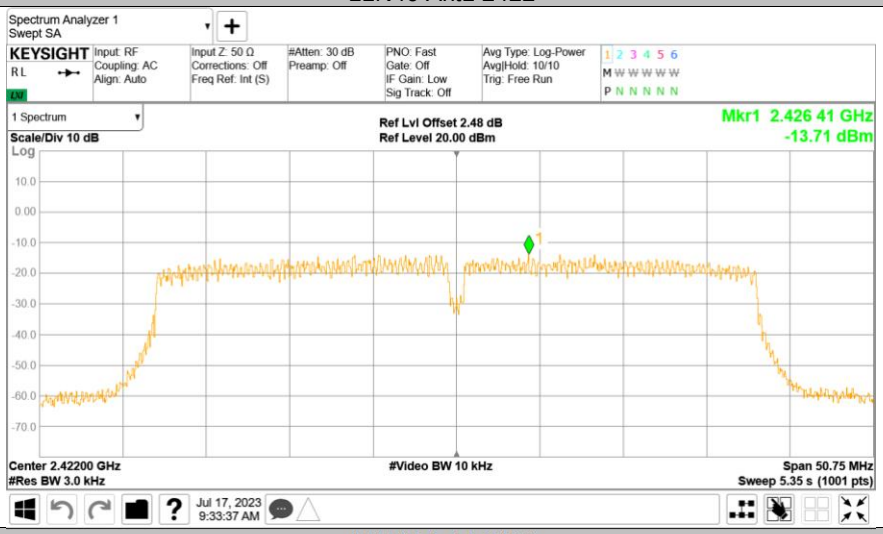
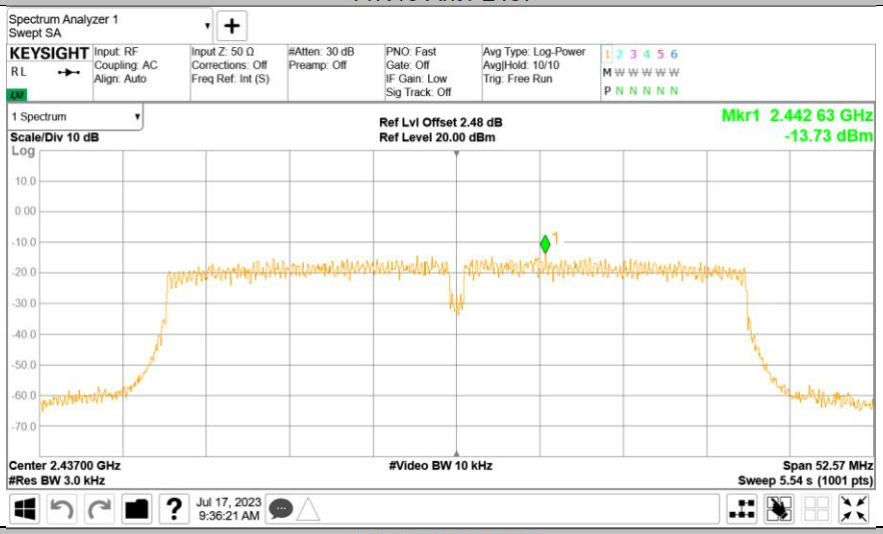
11N20 Ant1 2412

11N20 Ant1 2437

11N20 Ant1 2462


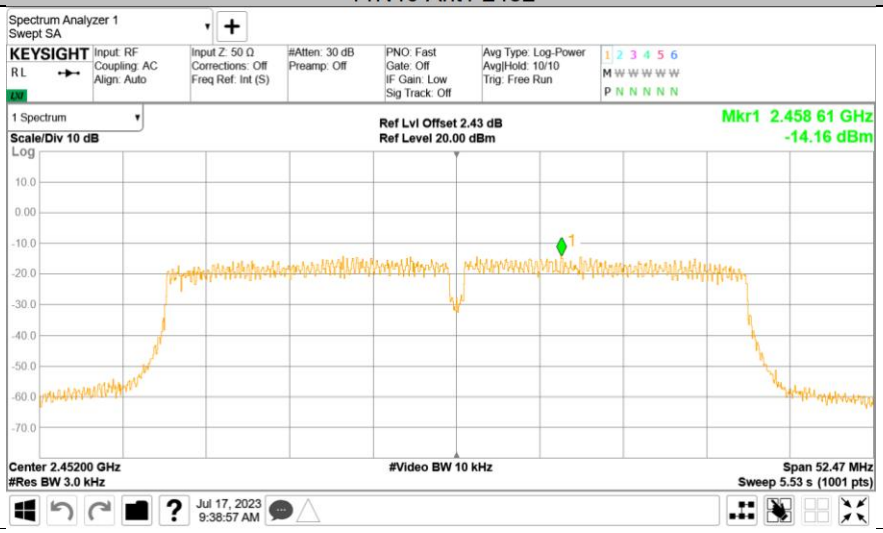
11N40 Ant1 2422



11N40 Ant1 2437



11N40 Ant1 2452



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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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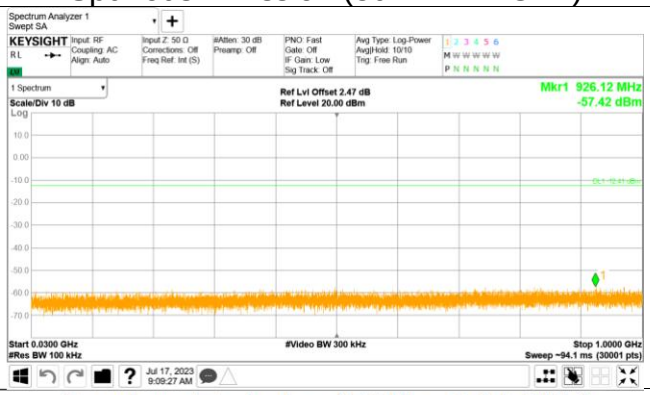
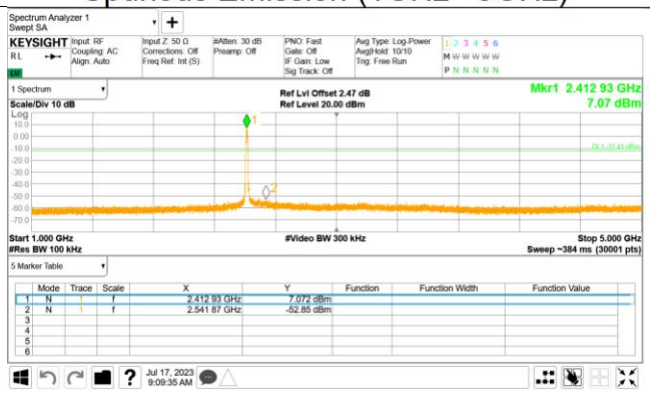
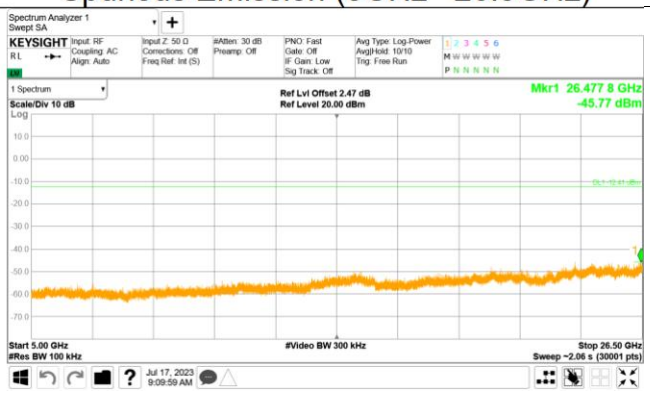
Spurious RF conducted emissions

802.11 B

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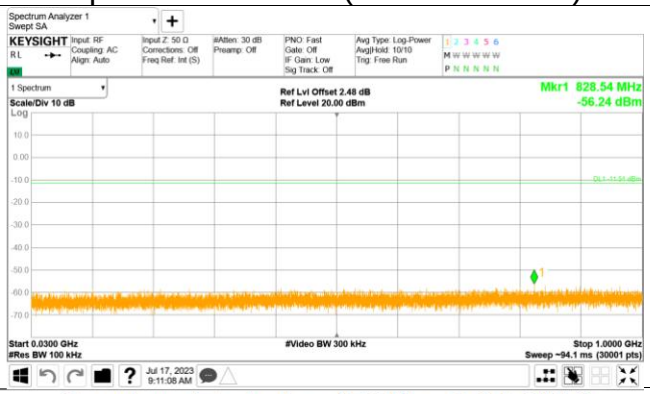
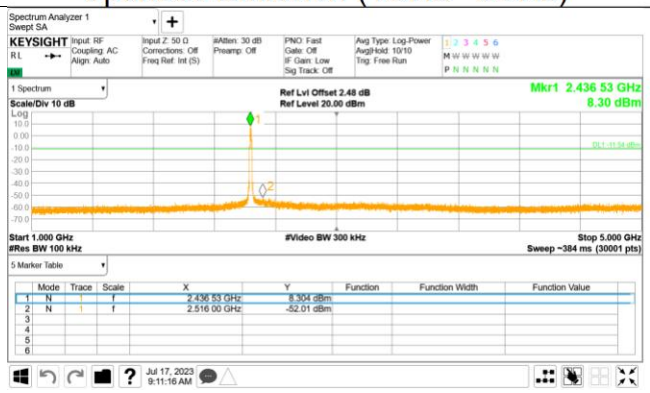
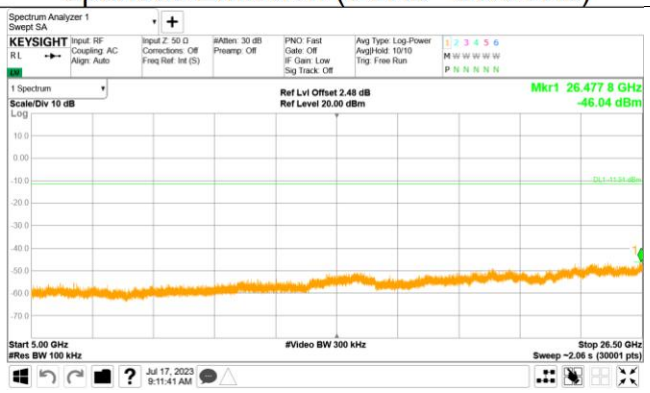
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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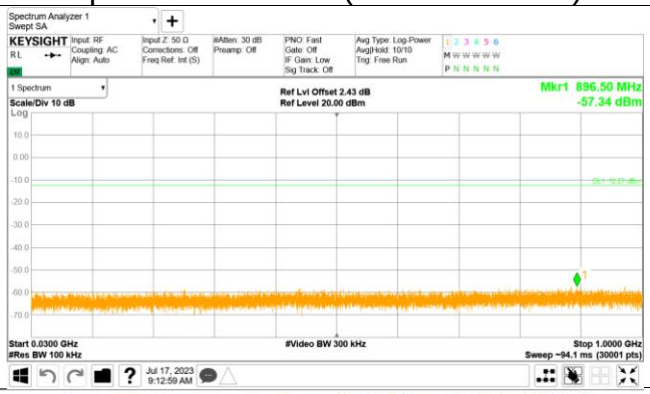
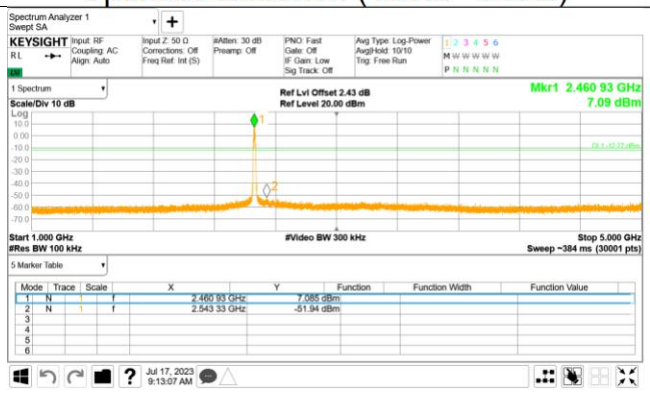
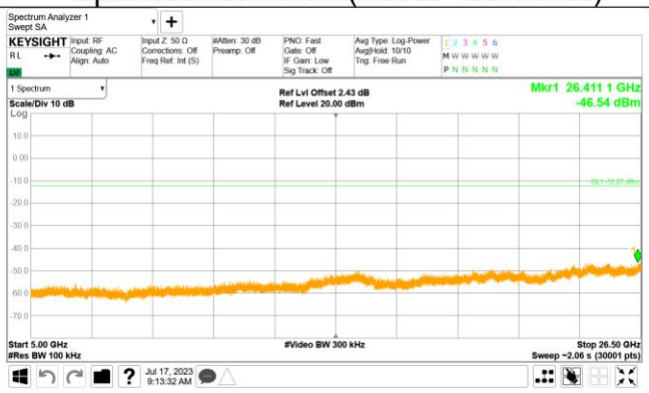
Out-of-Band Emissions	
Channel 11 (2462MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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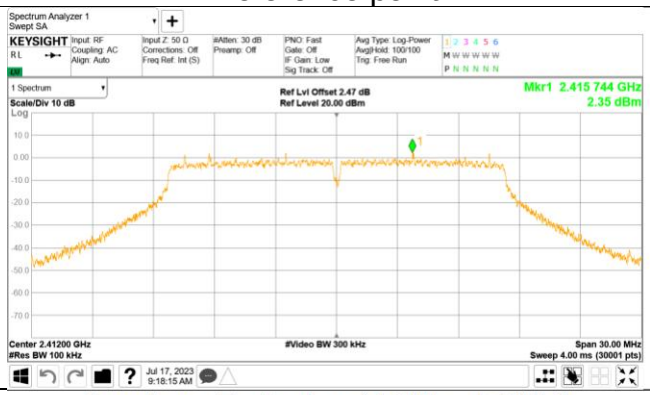
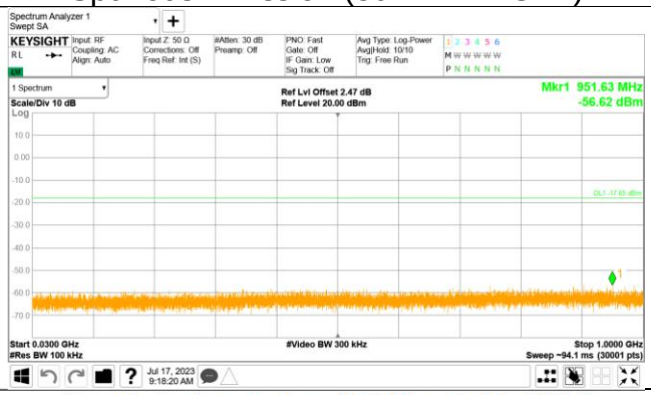
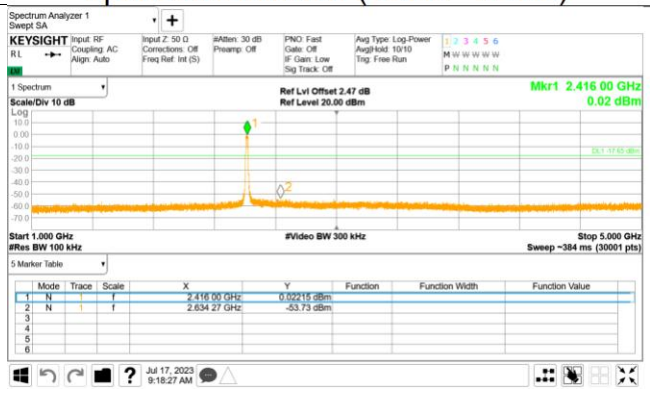
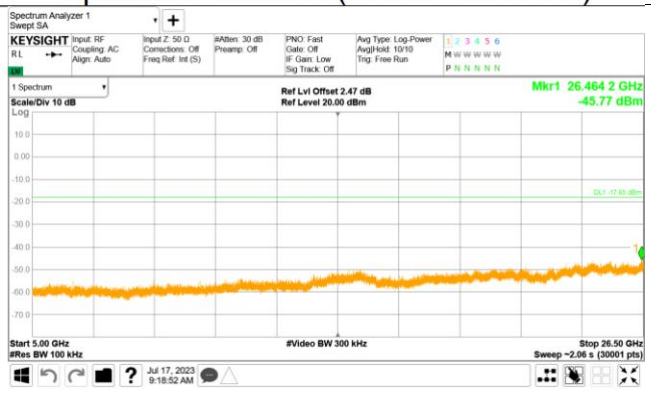
802.11 G

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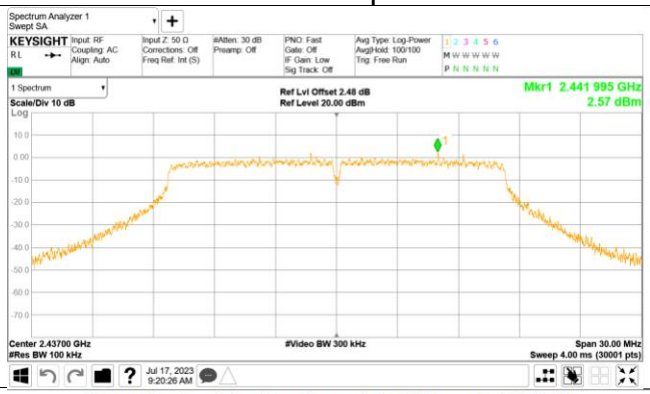
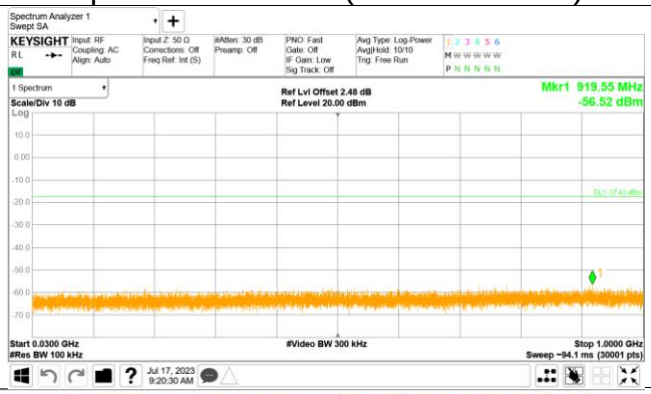
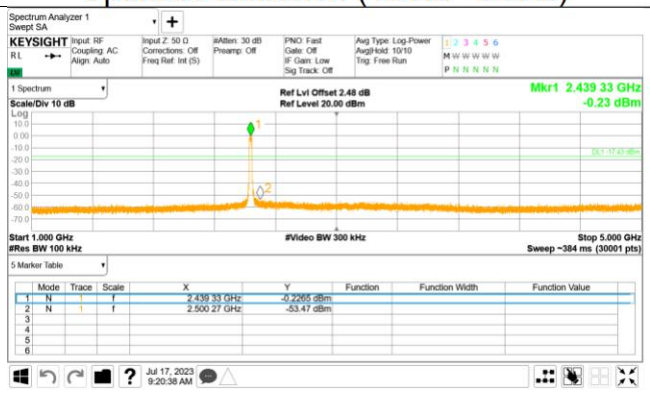
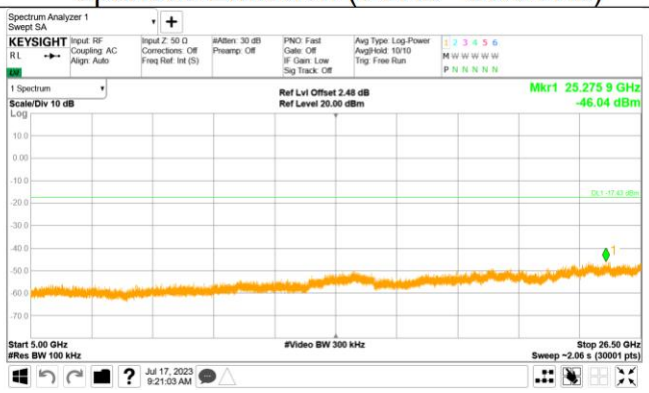
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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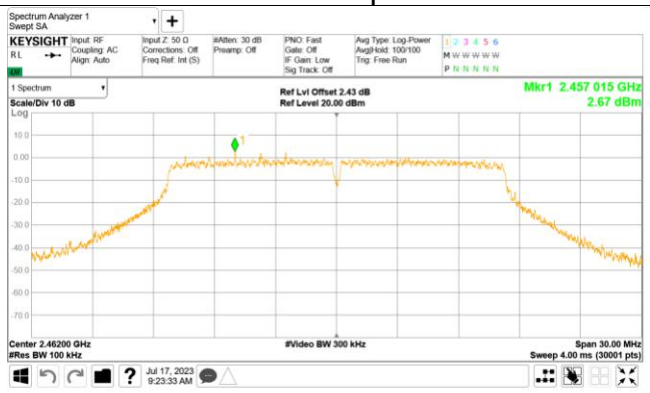
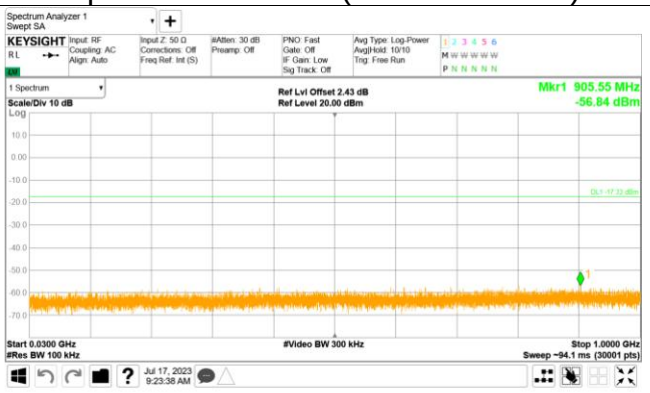
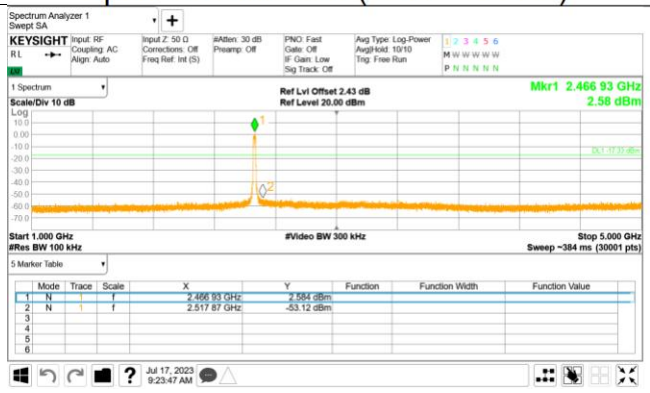
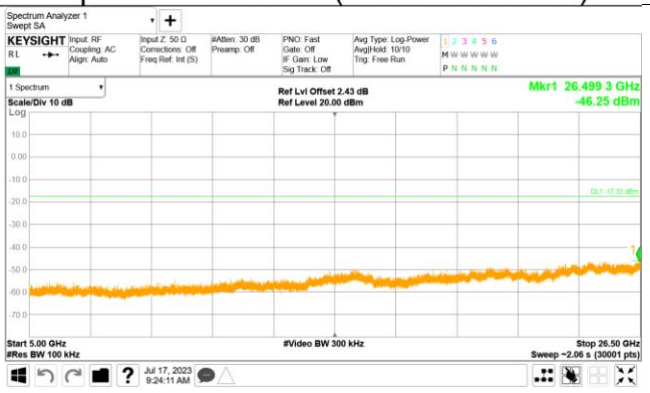
Out-of-Band Emissions	
Channel 11 (2462MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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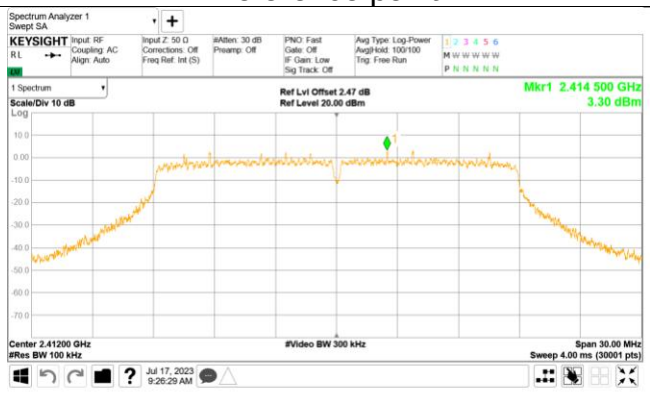
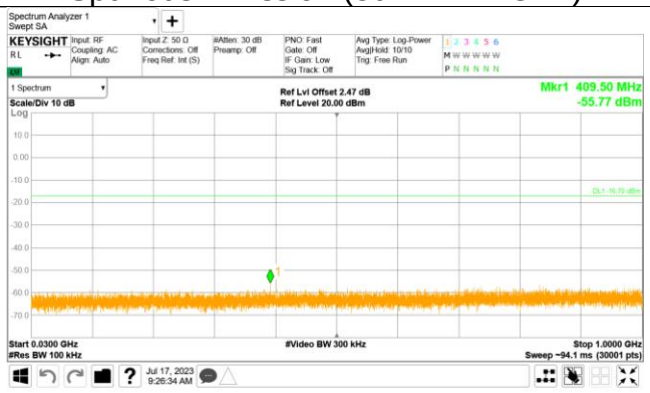
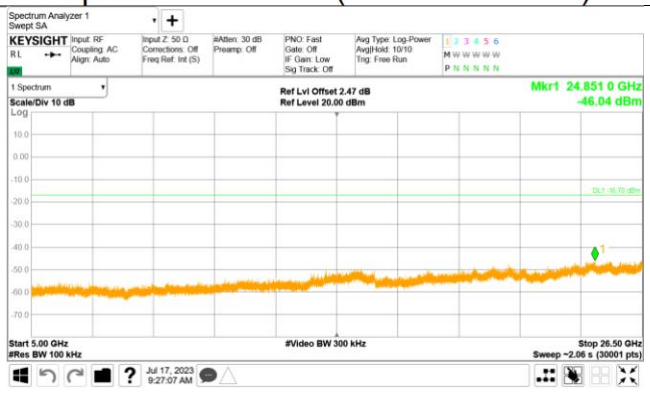
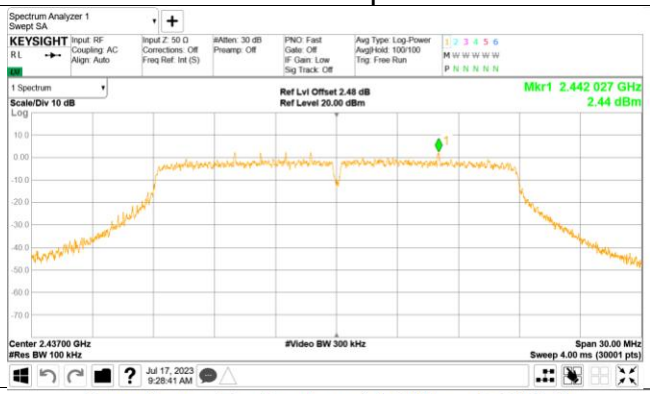
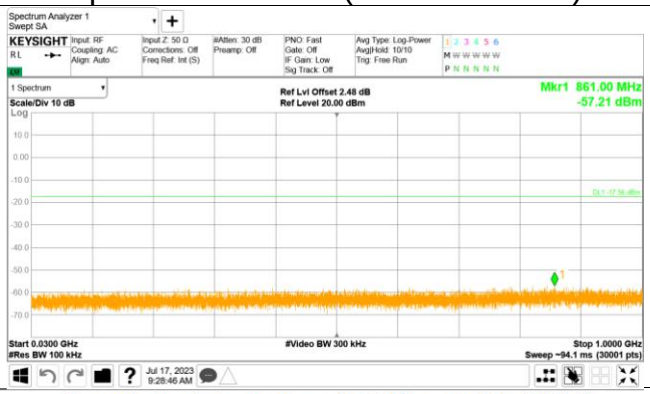
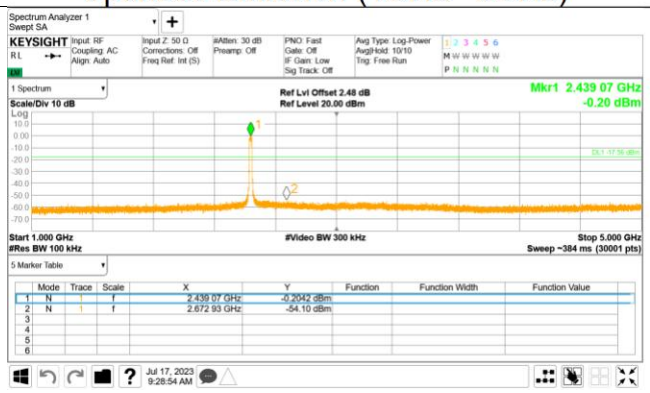
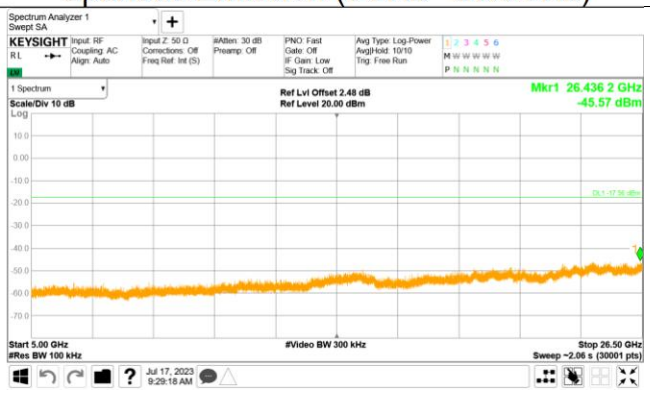
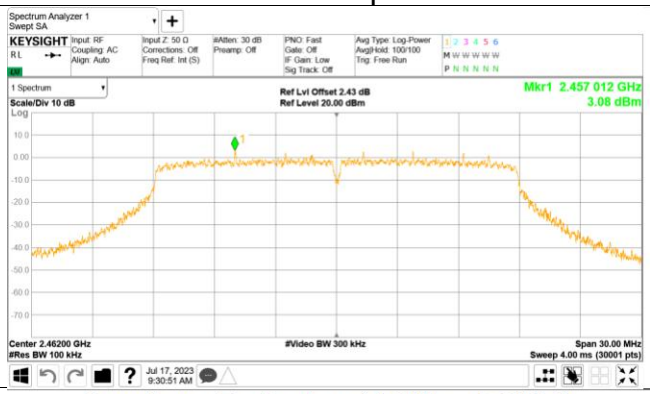
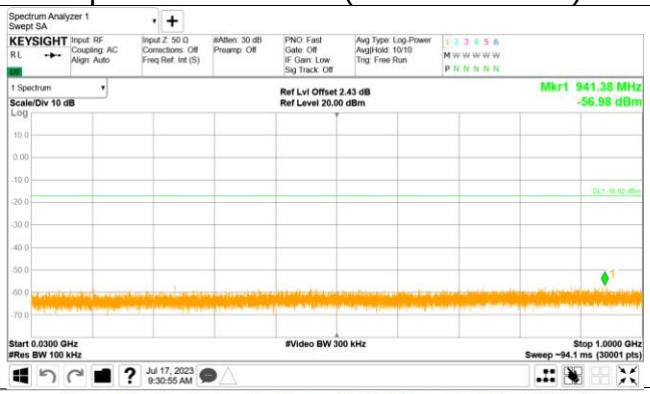
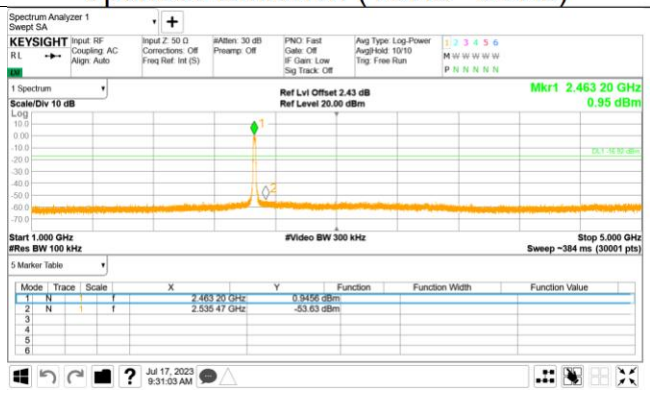
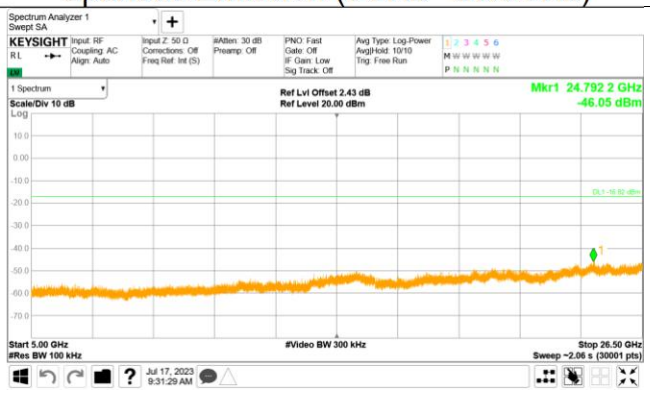
802.11 N20

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.

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.

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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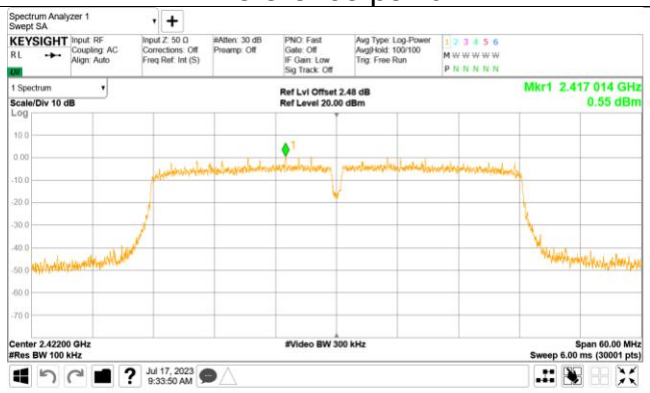
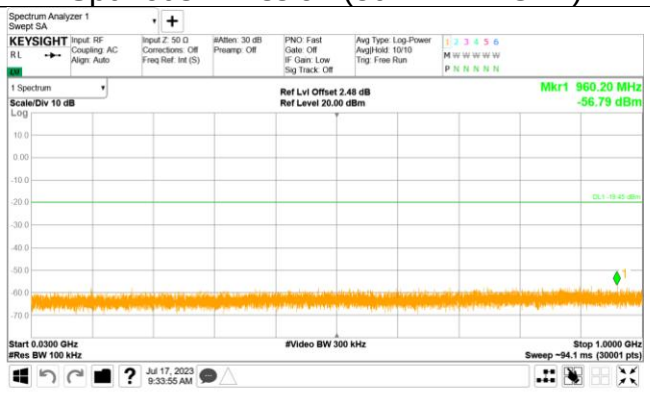
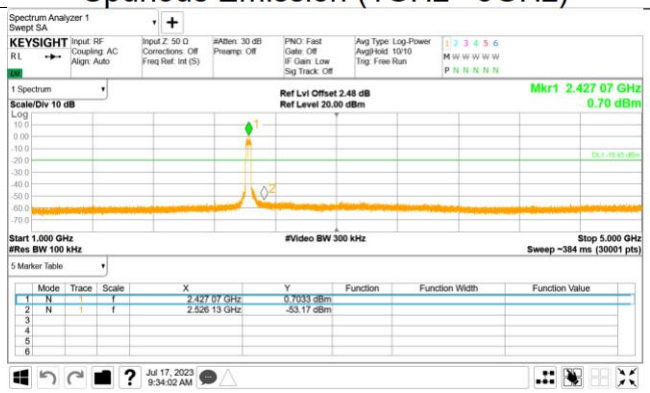
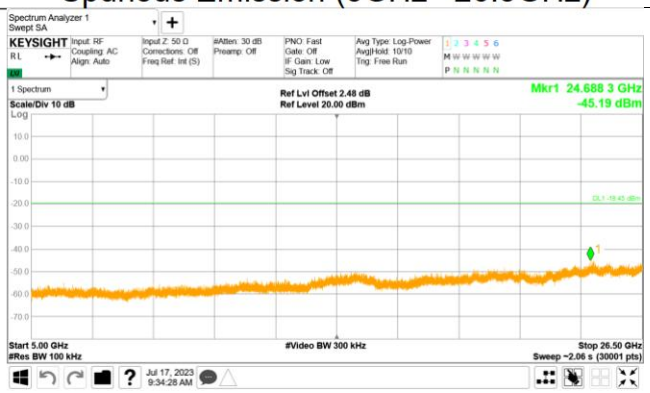
802.11 N40

Out-of-Band Emissions	
Channel 1 (2422MHz)	
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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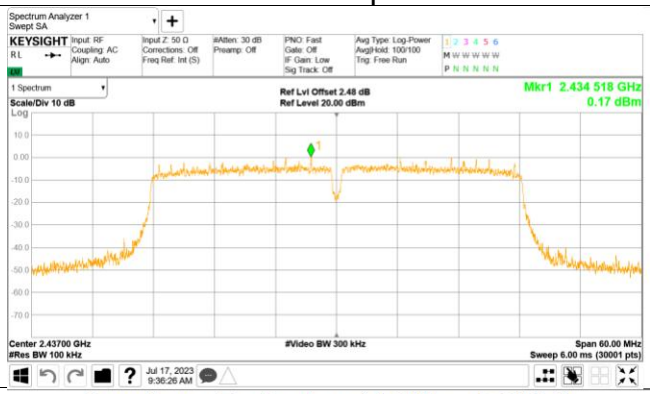
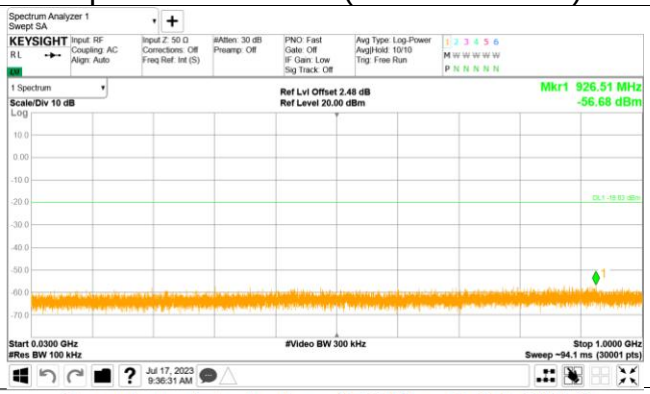
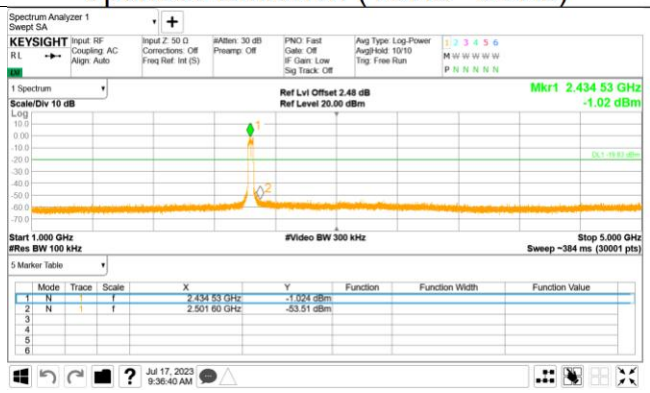
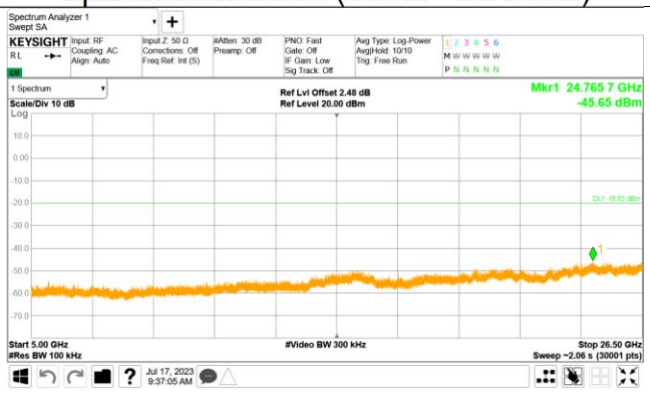
Out-of-Band Emissions	
Channel 6 (2437MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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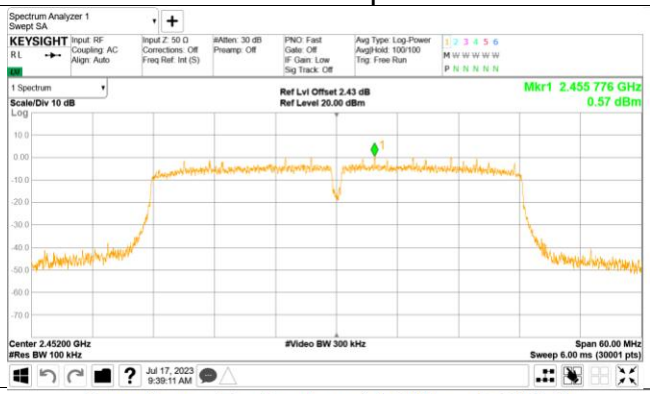
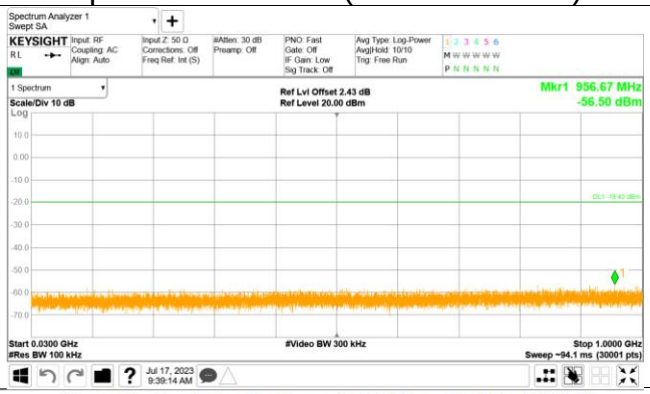
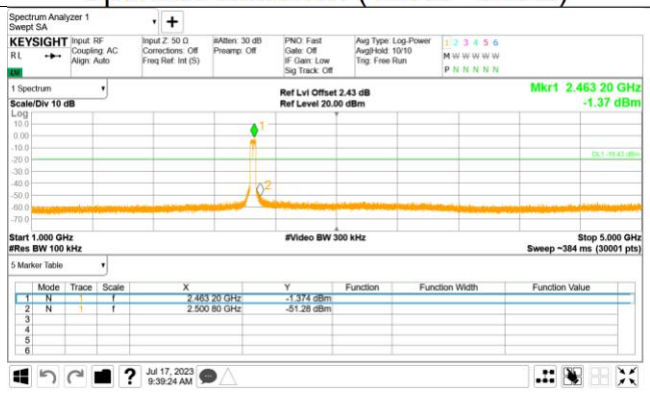
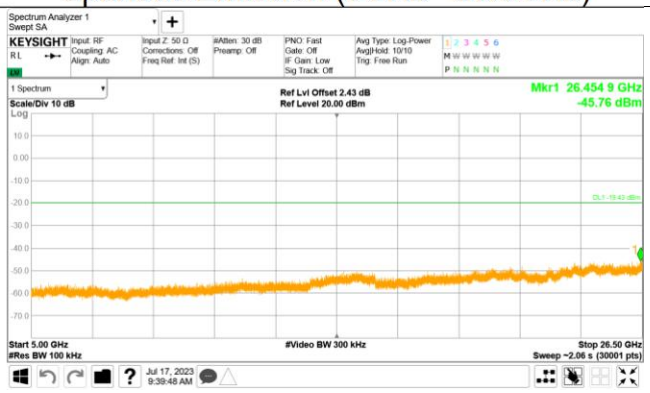
Out-of-Band Emissions	
Channel 11 (2452MHz)	
Reference point	Spurious Emission (30MHz – 1GHz)
	
Spurious Emission (1GHz –5GHz)	Spurious Emission (5GHz –26.5GHz)
	

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

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9.6 Band edge

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
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize, use the peak and delta measurement to record the result.
5. The level displayed must comply with the limit specified in this Section.
6. Repeat above procedures until all frequencies measured were complete and submit all the plots.

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3), the attenuation required shall be 30 dB instead of 20 dB.

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

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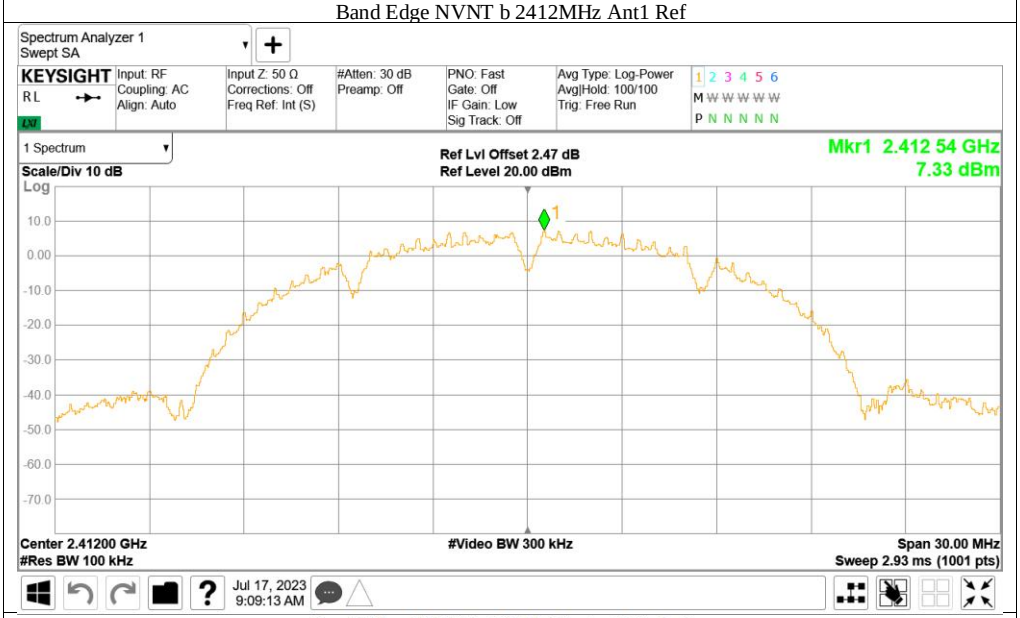
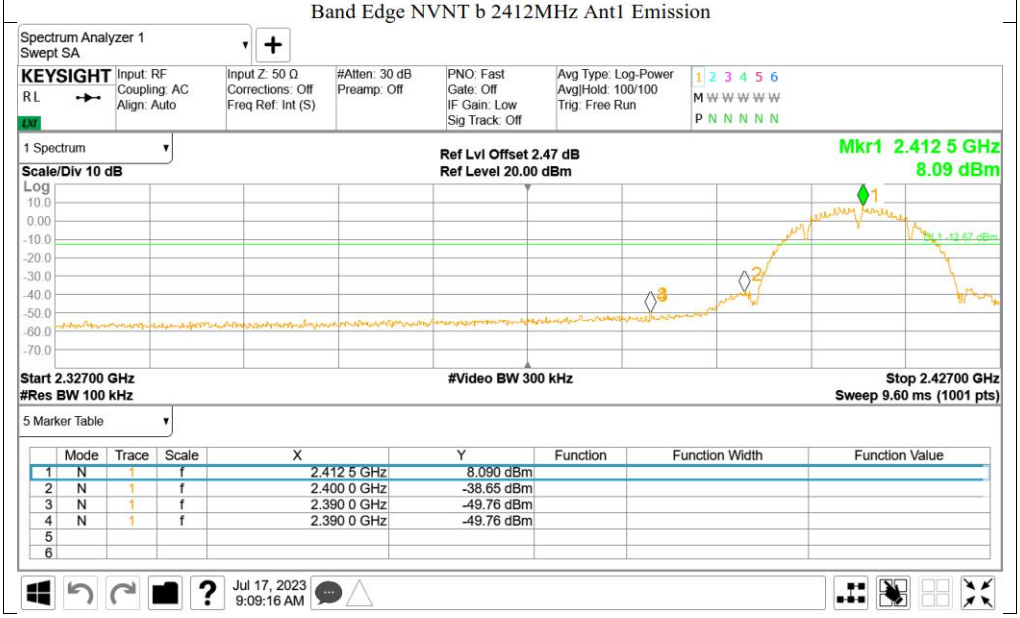
Test result

Test Graphs

Band Edge NVNT b 2412MHz Ant1 Ref

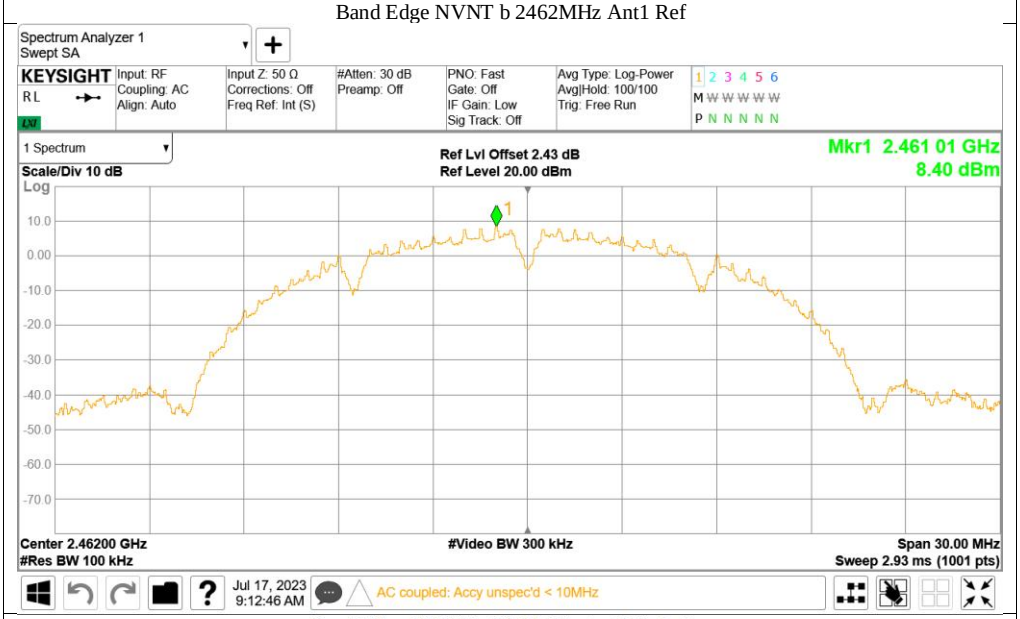


Band Edge NVNT b 2412MHz Ant1 Emission

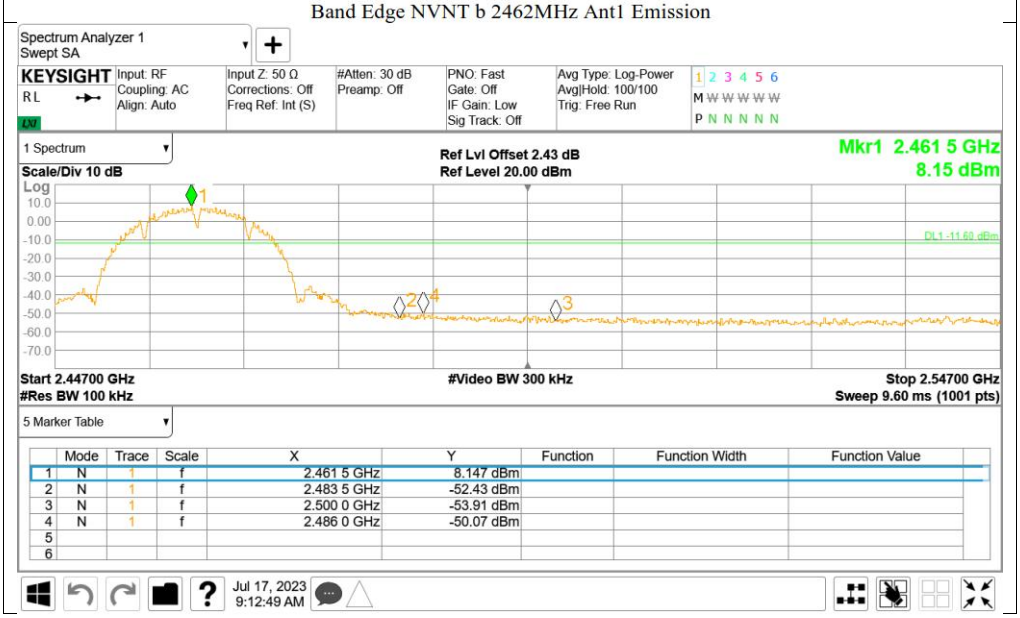


	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.412 5 GHz	8.090 dBm			
2	N	1	f	2.400 0 GHz	-38.65 dBm			
3	N	1	f	2.390 0 GHz	-49.76 dBm			
4	N	1	f	2.390 0 GHz	-49.76 dBm			
5								
6								

Band Edge NVNT b 2462MHz Ant1 Ref

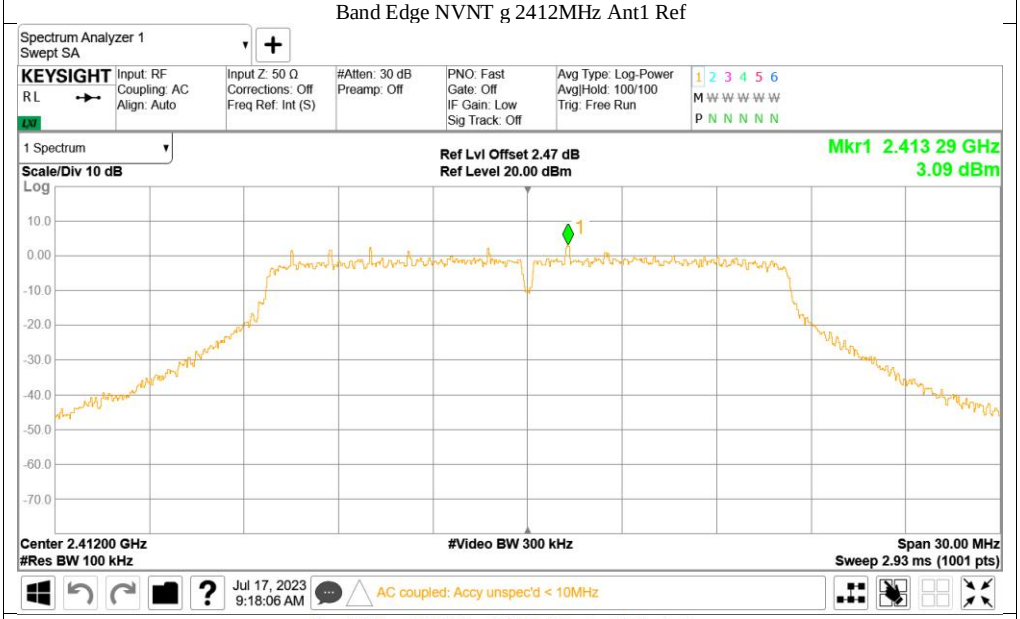


Band Edge NVNT b 2462MHz Ant1 Emission

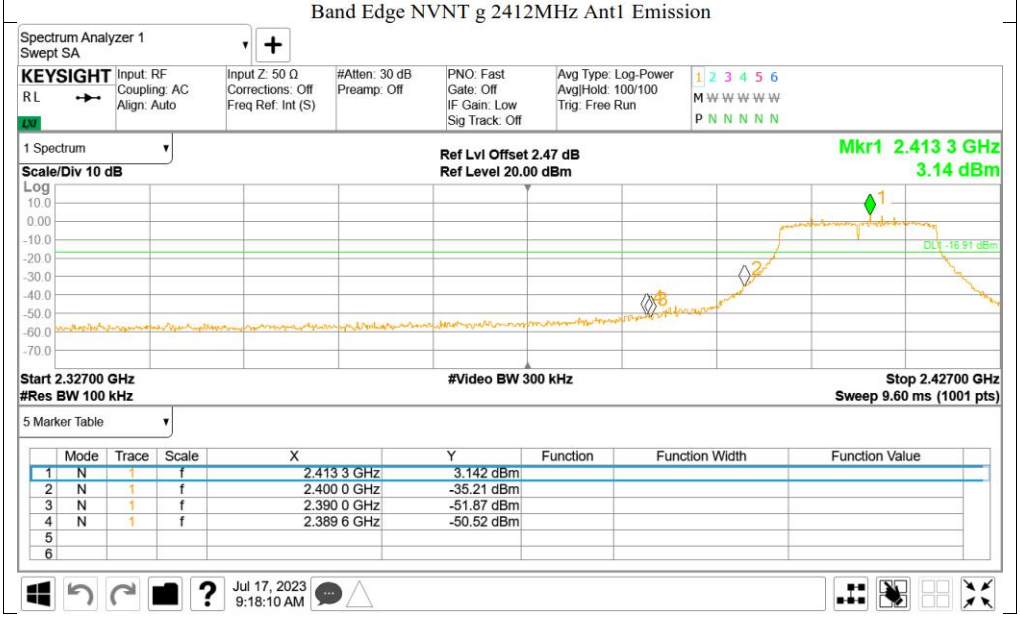


	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.461 5 GHz	8.147 dBm			
2	N	1	f	2.483 5 GHz	-52.43 dBm			
3	N	1	f	2.500 0 GHz	-53.91 dBm			
4	N	1	f	2.486 0 GHz	-50.07 dBm			
5								
6								

Band Edge NVNT g 2412MHz Ant1 Ref



Band Edge NVNT g 2412MHz Ant1 Emission



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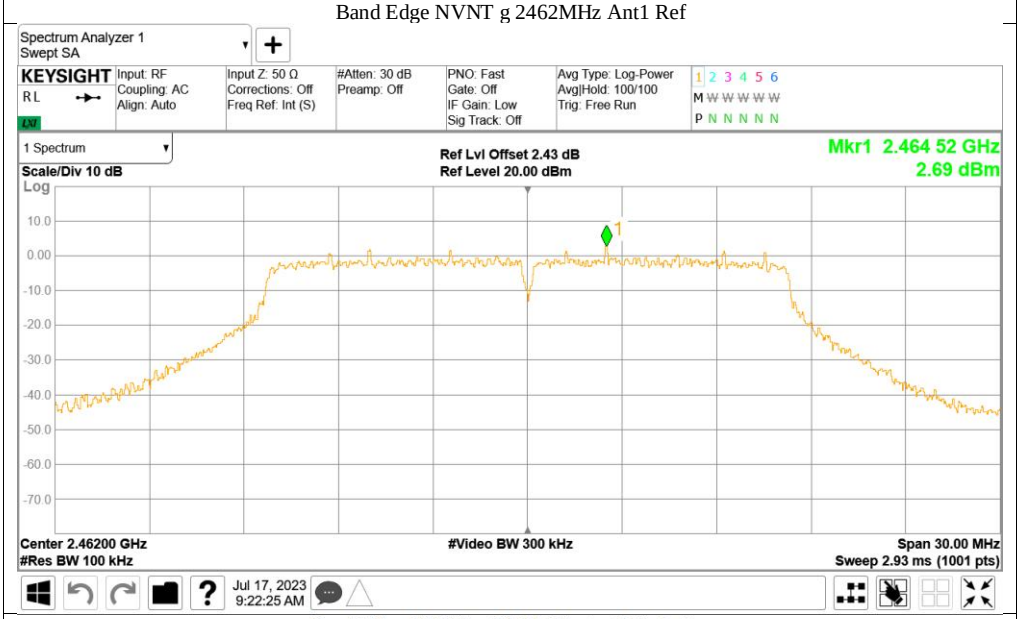
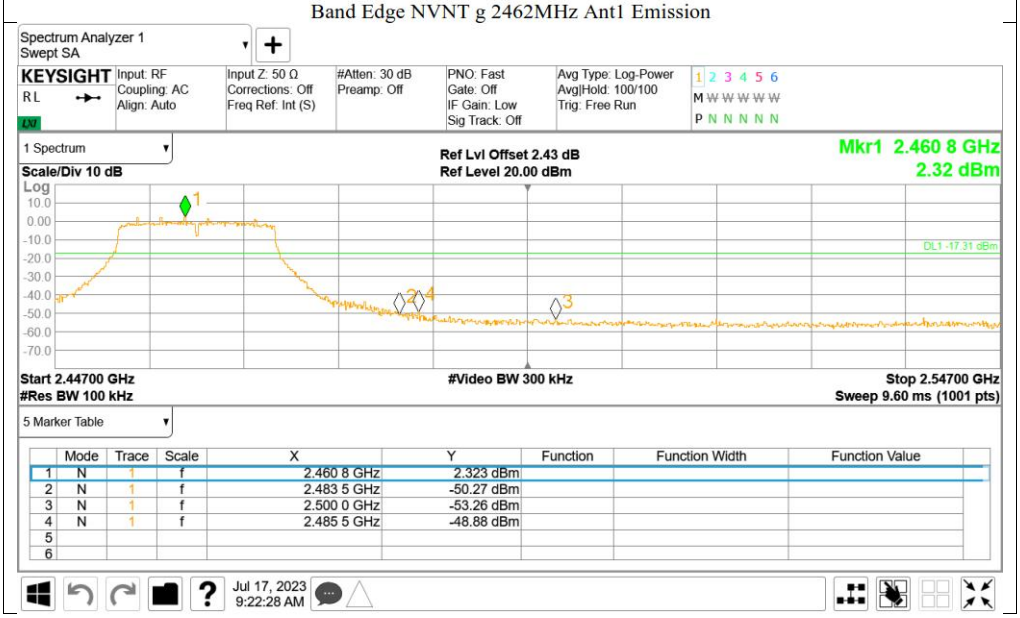
Band Edge NVNT g 2462MHz Ant1 Ref



Band Edge NVNT g 2462MHz Ant1 Emission



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.460 8 GHz	2.323 dBm			
2	N	1	f	2.483 5 GHz	-50.27 dBm			
3	N	1	f	2.500 0 GHz	-53.26 dBm			
4	N	1	f	2.485 5 GHz	-48.88 dBm			
5								
6								

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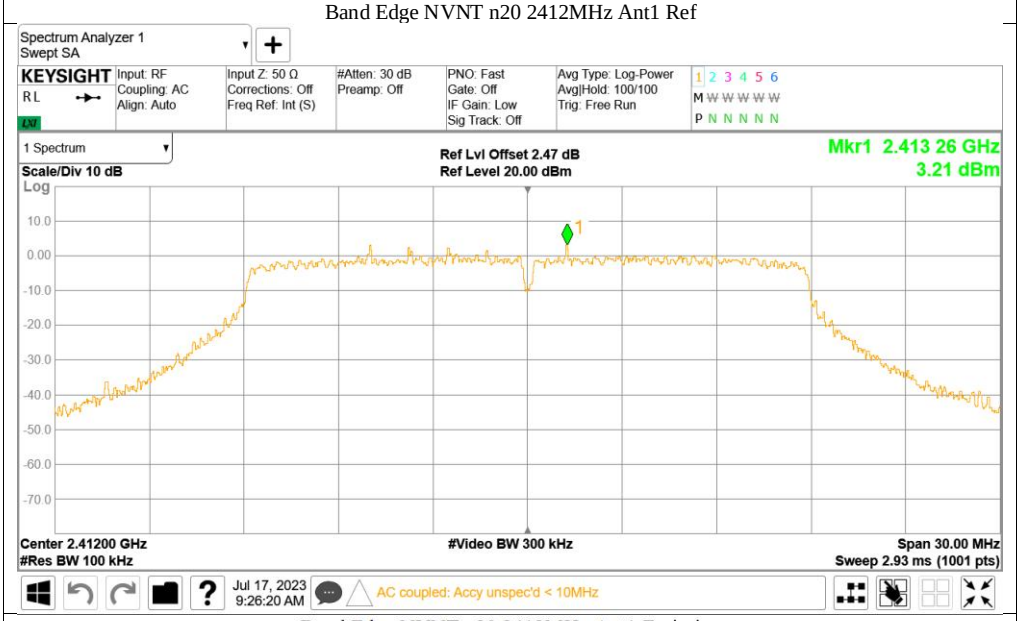
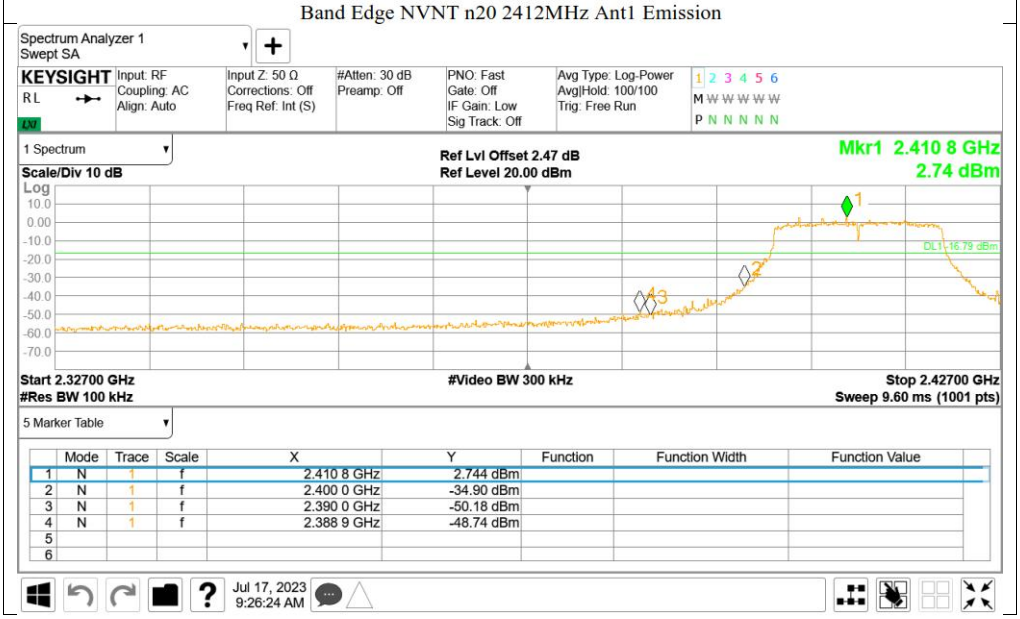
Band Edge NVNT n20 2412MHz Ant1 Ref



Band Edge NVNT n20 2412MHz Ant1 Emission



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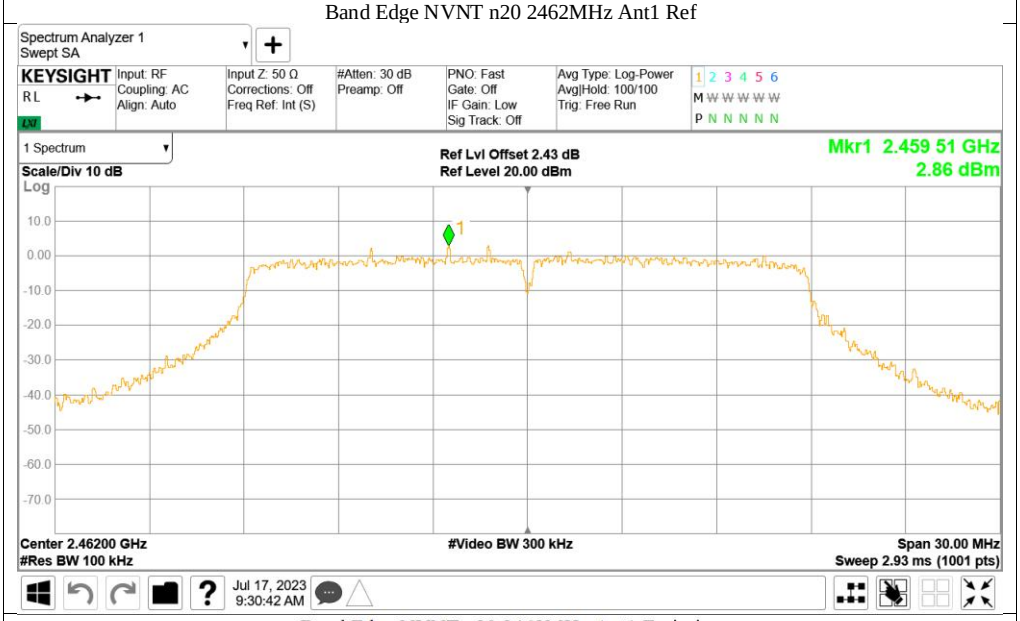
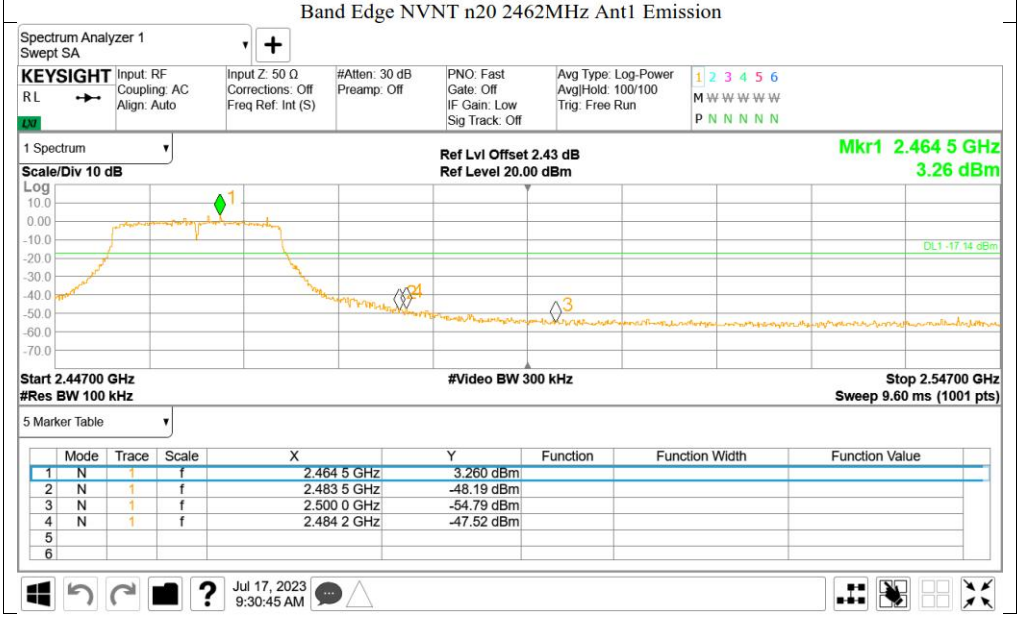
Band Edge NVNT n20 2462MHz Ant1 Ref



Band Edge NVNT n20 2462MHz Ant1 Emission



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.464 5 GHz	3.260 dBm			
2	N	1	f	2.483 5 GHz	-48.19 dBm			
3	N	1	f	2.500 0 GHz	-54.79 dBm			
4	N	1	f	2.484 2 GHz	-47.52 dBm			
5								
6								

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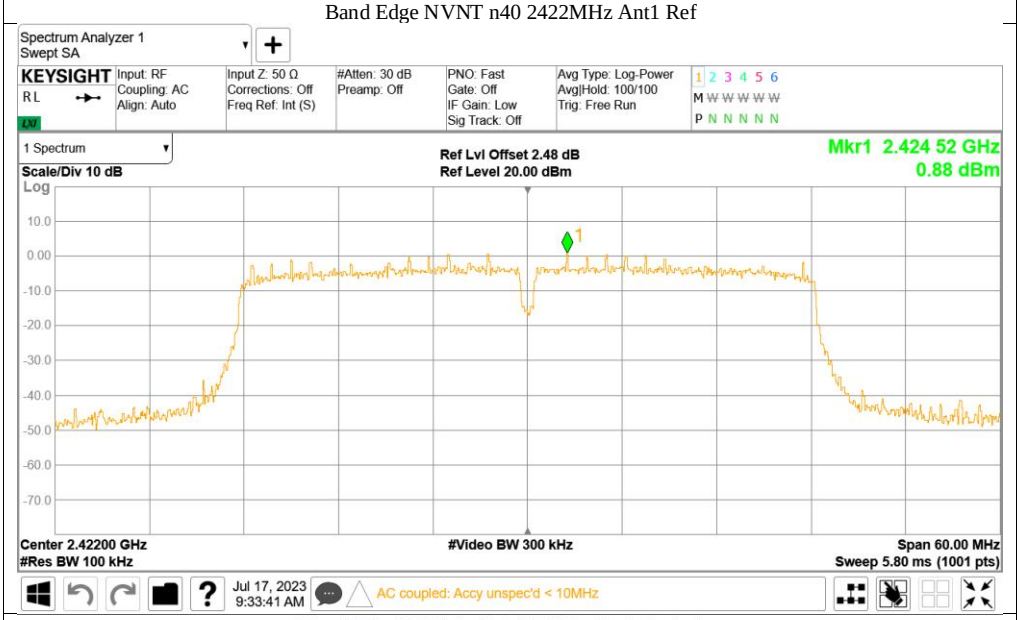
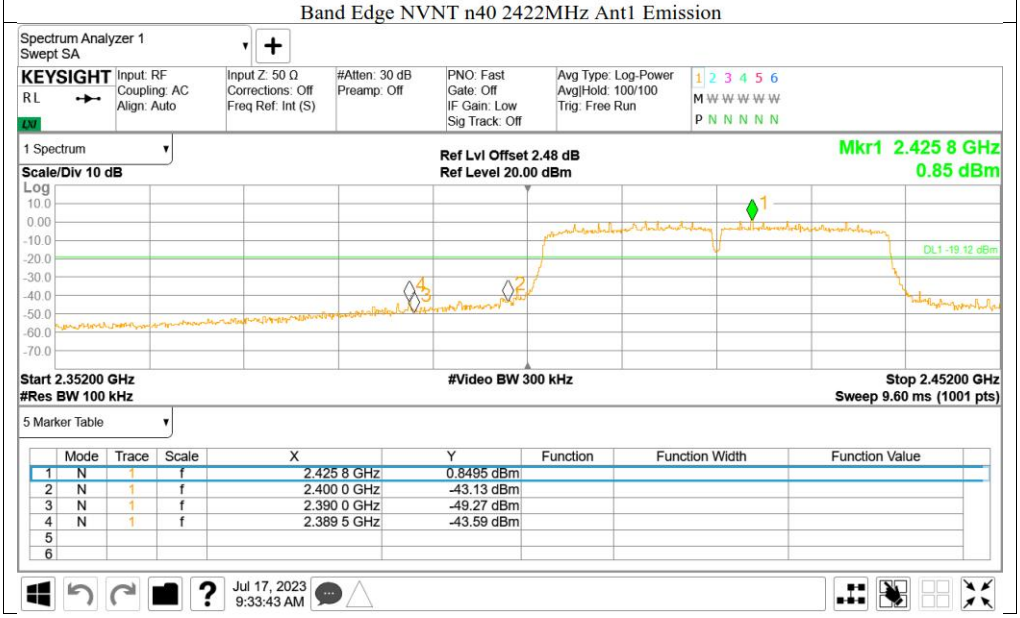
Test Graphs

Band Edge NVNT n40 2422MHz Ant1 Ref



Band Edge NVNT n40 2422MHz Ant1 Emission



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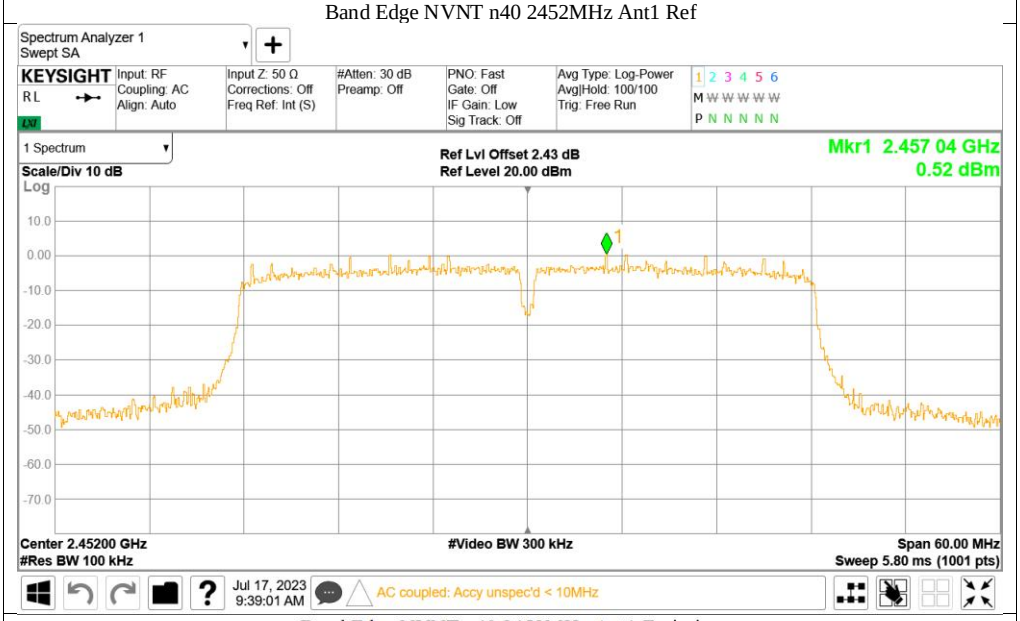
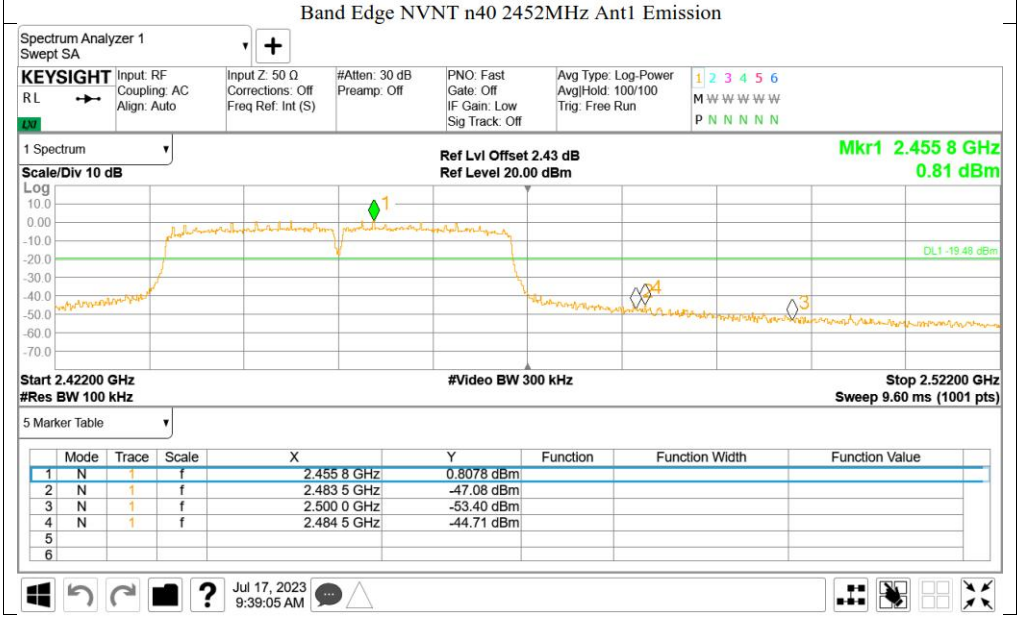
Band Edge NVNT n40 2452MHz Ant1 Ref



Band Edge NVNT n40 2452MHz Ant1 Emission



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.455 8 GHz	0.8078 dBm			
2	N	1	f	2.483 5 GHz	-47.08 dBm			
3	N	1	f	2.500 0 GHz	-53.40 dBm			
4	N	1	f	2.484 5 GHz	-44.71 dBm			
5								
6								

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9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. Use the following spectrum analyzer settings According to C63.10

   1) Procedure for Unwanted Emissions Measurements Below 1000 MHz

   Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 kHz to 120kHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

   2) For Peak unwanted emissions Above 1GHz:

   Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

   Procedures for average unwanted emissions measurements above 1GHz

   a) RBW = 1MHz.

   b) VBW \ [3 × RBW].

   c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.

   d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)

   e) Sweep time = auto.

   f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

   g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

   1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

   2) If linear voltage averaging mode was used in the preceding step e), then the correction

factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission (AV) at frequency above 1GHz.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that 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 § 15.247(b)(3), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§ 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

Frequency MHz	Field Strength μV/m	Field Strength dBμV/m	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	AV	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)
Note 2: Limit 3m(dBμV/m)=Limit 30m(dBμV/m)+40Log(30m/3m) (Below 30MHz)

Spurious Radiated Emissions for Transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.
Data of measurement within frequency range 9kHz-30MHz is the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.

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Above 1GHz Transmitting spurious emission test result as below:

802.11 b
2412MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2387.0	47.7	Horizontal	74.0	Peak	26.3	pass
4823.9	43.5	Horizontal	74.0	Peak	30.5	pass
2385.1	44.7	Vertical	74.0	Peak	29.3	pass
4821.0	41.4	Vertical	74.0	Peak	32.6	pass

2437MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4873.7	43.1	Horizontal	74.0	Peak	30.9	pass
4878.3	42.6	Vertical	74.0	Peak	31.4	pass

2462MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2483.7	49.6	Horizontal	74.0	Peak	24.4	pass
4923.6	42.5	Horizontal	74.0	Peak	31.5	pass
2483.7	47.8	Vertical	74.0	Peak	26.2	pass
4923.6	41.5	Vertical	74.0	Peak	32.5	pass

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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802.11 g
2412MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2386.6	59.5	Horizontal	74.0	Peak	14.5	pass
2386.6	41.0	Horizontal	54.0	Average	13	pass
4823.9	41.0	Horizontal	74.0	Peak	33	pass
2389.0	50.6	Vertical	74.0	Peak	23.4	pass
4824.4	41.9	Vertical	74.0	Peak	32.1	pass

2437MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4877.1	41.6	Horizontal	74.0	Peak	32.4	pass
4873.2	42.2	Vertical	74.0	Peak	31.8	pass

2462MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2484.4	55.3	Horizontal	74.0	Peak	18.7	pass
2484.4	42.0	Horizontal	54.0	Average	12	pass
4924.8	41.2	Horizontal	74.0	Peak	32.8	pass
2483.6	57.4	Vertical	74.0	Peak	16.6	pass
2483.6	36.1	Vertical	54.0	Average	17.9	pass
4928.7	41.7	Vertical	74.0	Peak	32.3	pass

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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802.11 n20
2412MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2390.3	61.8	Horizontal	74.0	Peak	12.2	pass
2387.4	44.6	Horizontal	54.0	Average	9.4	pass
4824.5	40.9	Horizontal	74.0	Peak	33.1	pass
2390.0	49.9	Vertical	74.0	Peak	24.1	pass
2390.0	37.6	Vertical	54.0	Average	16.4	pass
4825.0	41.1	Vertical	74.0	Peak	32.9	pass

2437MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4870.3	42.4	Horizontal	74.0	Peak	31.6	pass
4876.0	42.4	Vertical	74.0	Peak	31.6	pass

2462MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2483.6	58.1	Horizontal	74.0	Peak	15.9	pass
2483.6	46.8	Horizontal	54.0	Average	7.2	pass
4927.6	41.6	Horizontal	74.0	Peak	32.4	pass
2483.6	53.2	Vertical	74.0	Peak	20.8	pass
2483.6	39.8	Vertical	54.0	Average	14.2	pass
4925.9	42.1	Vertical	74.0	Peak	31.9	pass

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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Phone: +86 21 61410123, Fax:+86 21 61408600

802.11 n40
2422MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2390.0	65.2	Horizontal	74.0	Peak	8.8	pass
2390.0	46.7	Horizontal	54.0	Average	7.3	pass
4843.2	41.1	Horizontal	74.0	Peak	32.9	pass
2390.0	54.8	Vertical	74.0	Peak	19.2	pass
2390.0	39.6	Vertical	54.0	Average	14.4	pass
4845.4	40.9	Vertical	74.0	Peak	33.1	pass

2437MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4873.2	42.1	Horizontal	74.0	Peak	31.9	pass
4874.3	41.1	Vertical	74.0	Peak	32.9	pass

2452MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
2483.6	71.2	Horizontal	74.0	Peak	2.8	pass
2483.6	52.2	Horizontal	54.0	Average	1.8	pass
4903.2	41.7	Horizontal	74.0	Peak	32.3	pass
2483.8	64.2	Vertical	74.0	Peak	9.8	pass
2483.8	45.1	Vertical	54.0	Average	8.9	pass
4902.1	41.2	Vertical	74.0	Peak	32.8	pass

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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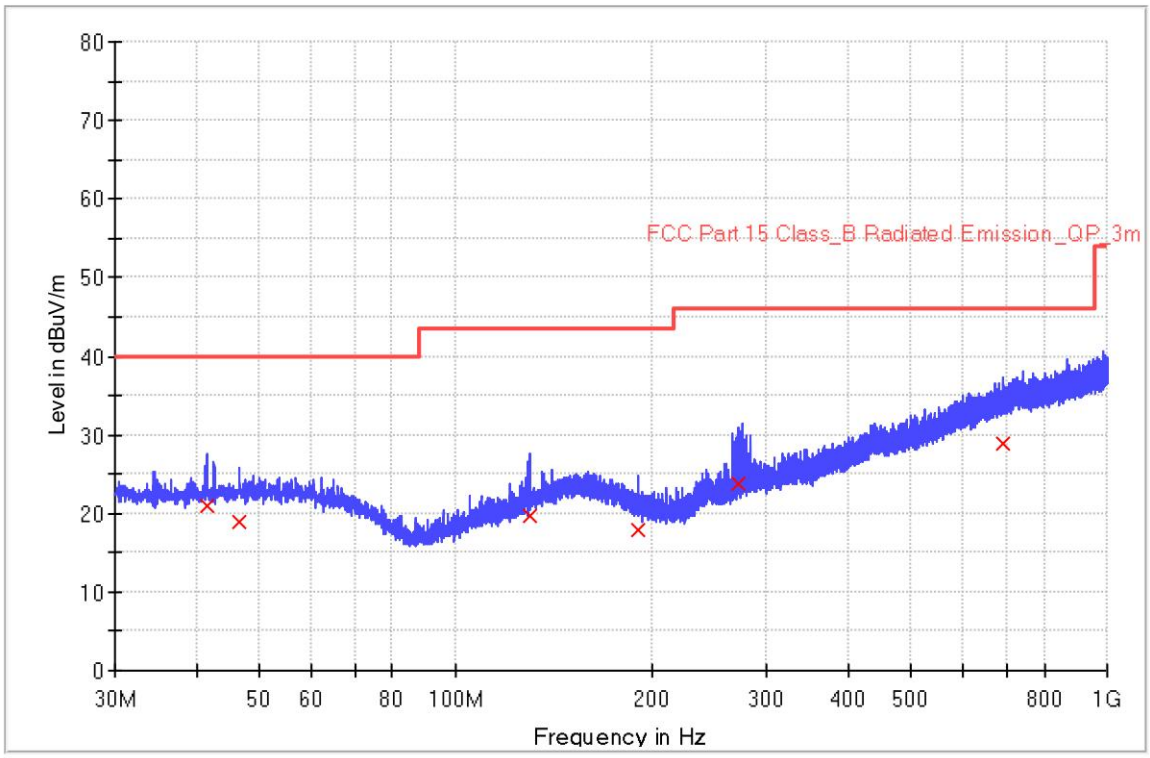
3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
Phone: +86 21 61410123, Fax:+86 21 61408600

The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2023/07/20 - 10:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Horizontal
EUT: Post-processing Unit, Model no: FabWash (adaptor: HKA15024063-7C)	Power: 120VAC, 60Hz
Note: Transmit by at channel 2412MHz for 802.11N20 (worst case).	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
41.560000	20.9	1000.0	120.000	112.0	H	121.0	20.1	19.1	40.0
46.600000	18.9	1000.0	120.000	160.0	H	154.0	20.5	21.1	40.0
130.040000	19.8	1000.0	120.000	240.0	H	168.0	19.3	23.7	43.5
190.680000	17.9	1000.0	120.000	136.0	H	247.0	18.5	25.6	43.5
272.160000	23.9	1000.0	120.000	178.0	H	295.0	20.2	22.2	46.0
691.440000	28.9	1000.0	120.000	126.0	H	335.0	30.4	17.1	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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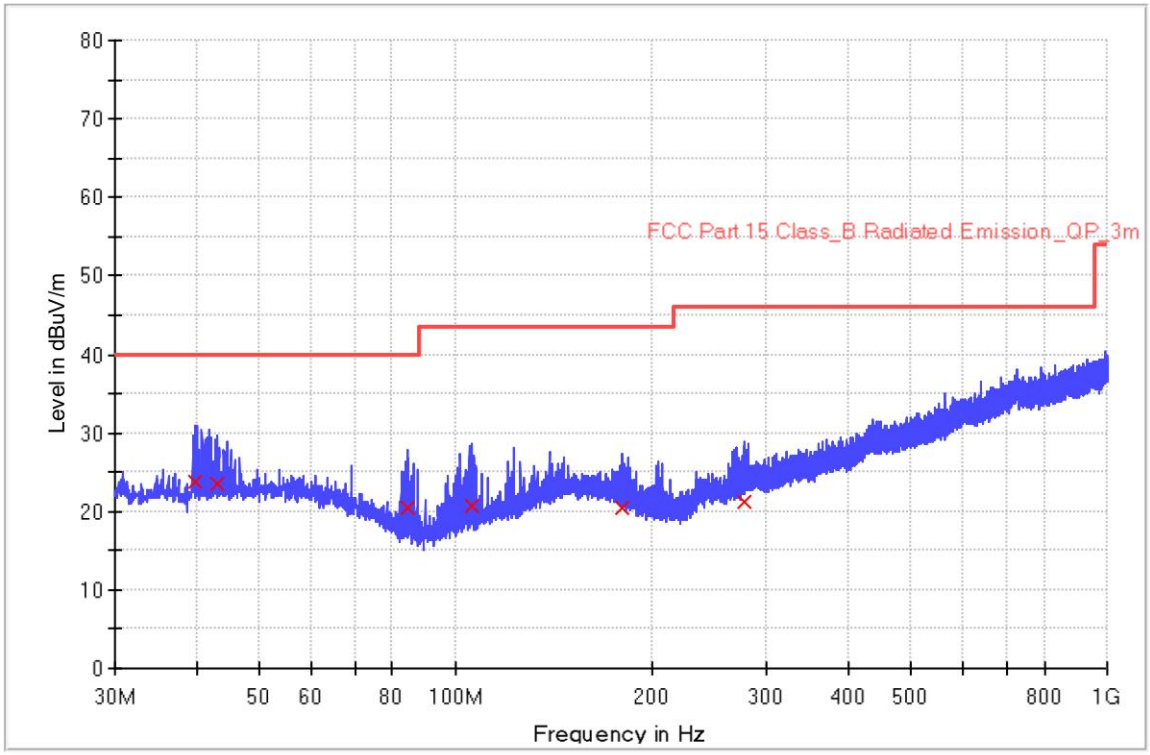
3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
Phone: +86 21 61410123, Fax:+86 21 61408600

Site: 3 meter chamber	Time: 2023/07/20 - 09:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Vertical
EUT: Post-processing Unit, Model no: FabWash (adaptor: HKA15024063-7C)	Power: 120VAC, 60Hz
Note: Transmit by at channel 2412MHz for 802.11N20 (worst case).	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
39.880000	23.8	1000.0	120.000	105.0	V	148.0	20.0	16.2	40.0
43.040000	23.5	1000.0	120.000	100.0	V	314.0	20.2	16.5	40.0
84.120000	20.3	1000.0	120.000	115.0	V	32.0	14.9	19.7	40.0
106.080000	20.8	1000.0	120.000	136.0	V	15.0	16.8	22.7	43.5
180.600000	20.3	1000.0	120.000	102.0	V	258.0	19.3	23.2	43.5
276.960000	21.3	1000.0	120.000	175.0	V	105.0	20.8	24.8	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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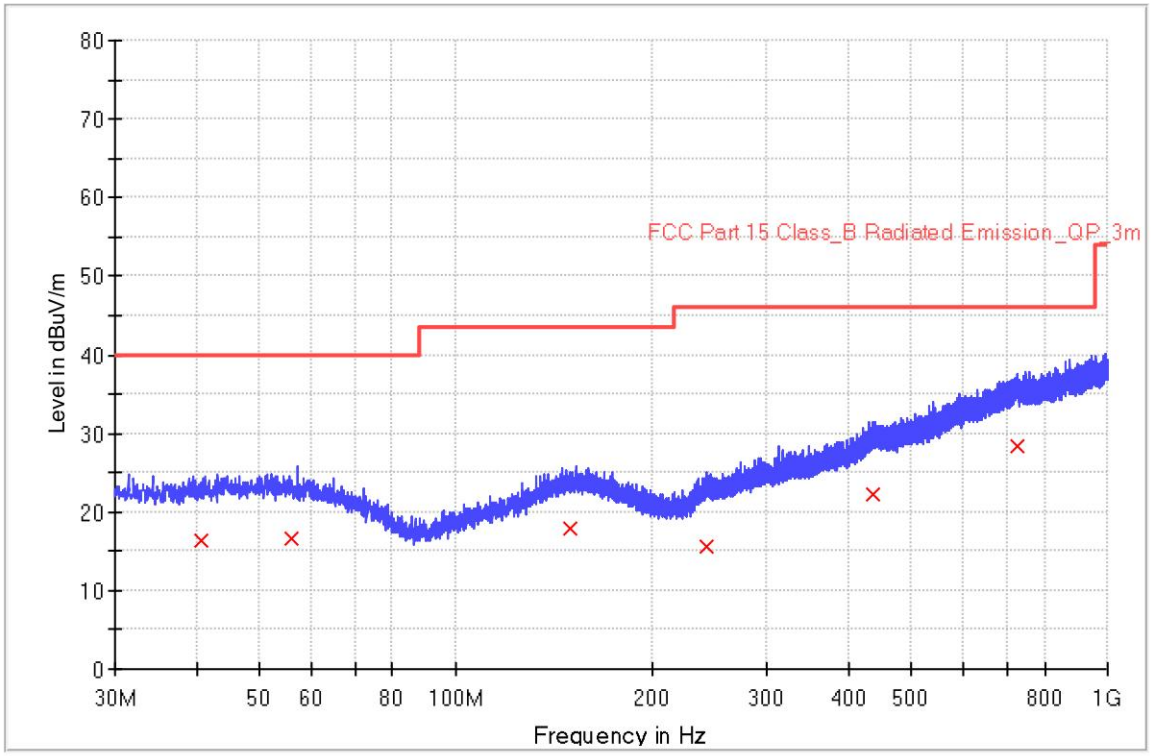
Phone: +86 21 61410123, Fax:+86 21 61408600

Site: 3 meter chamber	Time: 2023/07/22 - 11:23
Limit: FCC_Part15.209_RE(3m)	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Horizontal
EUT: Post-processing Unit, Model no: FabWash (adaptor: FSP150-AAAN3)	Power: 120VAC, 60Hz
Note: Transmit by at channel 2412MHz for 802.11N20 (worst case).	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
40.760000	16.4	1000.0	120.000	116.0	H	71.0	20.1	23.6	40.0
56.000000	16.5	1000.0	120.000	162.0	H	326.0	20.5	23.5	40.0
150.080000	18.0	1000.0	120.000	152.0	H	95.0	20.9	25.5	43.5
242.400000	15.6	1000.0	120.000	174.0	H	221.0	19.7	30.4	46.0
436.800000	22.3	1000.0	120.000	135.0	H	105.0	25.6	23.7	46.0
725.400000	28.4	1000.0	120.000	105.0	H	45.0	31.3	17.6	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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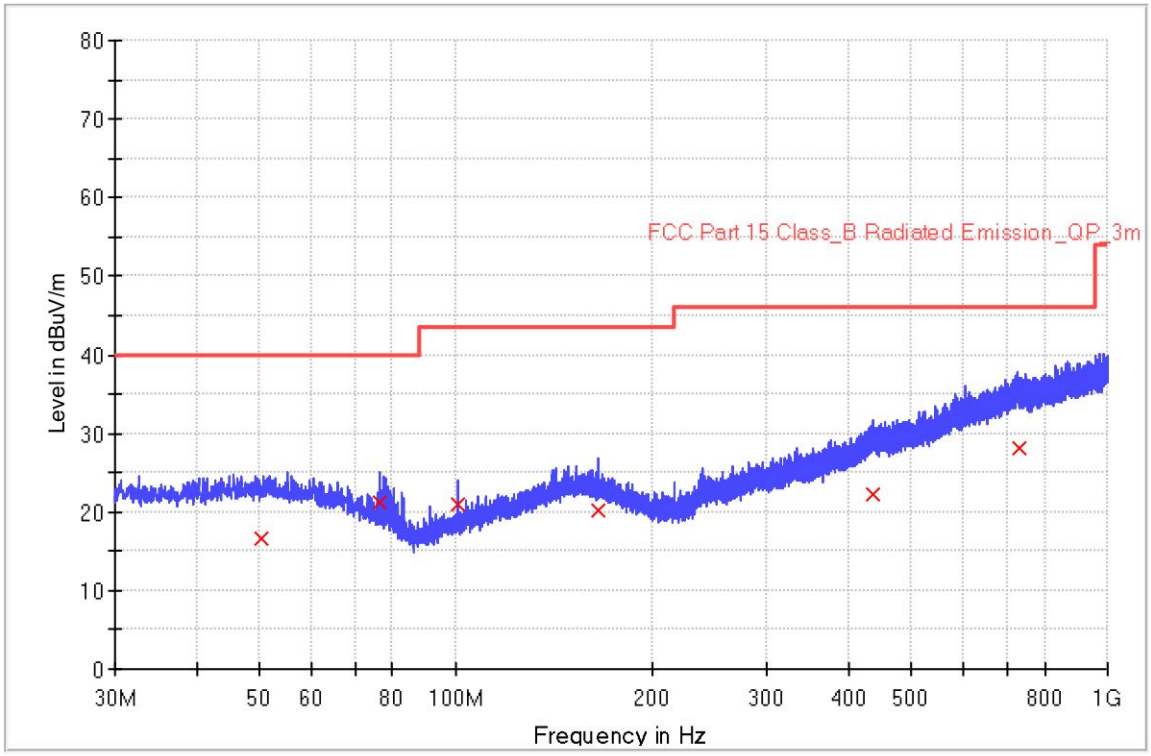
Site: 3 meter chamber	Time: 2023/07/22 - 12:34
Limit: FCC_Part15.209_RE(3m)	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Vertical
EUT: Post-processing Unit, Model no: FabWash (adaptor: FSP150-AAAN3)	Power: 120VAC, 60Hz
Note: Transmit by at channel 2412MHz for 802.11N20 (worst case).	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
50.360000	16.5	1000.0	120.000	121.0	V	108.0	20.5	23.5	40.0
76.400000	21.3	1000.0	120.000	100.0	V	16.0	17.2	18.7	40.0
100.800000	21.1	1000.0	120.000	103.0	V	23.0	16.2	22.5	43.5
165.080000	20.2	1000.0	120.000	112.0	V	105.0	20.6	23.3	43.5
437.560000	22.3	1000.0	120.000	105.0	V	226.0	25.6	23.7	46.0
730.240000	28.2	1000.0	120.000	100.0	V	324.0	31.4	17.8	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
C	Signal spectrum analyzer	Agilent	N9020B	MY59050168	2023-2-10	2024-2-9
	Wideband power sensor	Rohde & Schwarz	NRP-Z81	105903	2023-2-10	2024-2-9
	10dB Attenuator	Aeroflex Weinschel	CG-4689	93459	2023-2-10	2024-2-9
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2023-8-1	2024-7-31
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2023-8-1	2024-7-31
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2021-9-23	2024-9-22
	Double-ridged waveguide horn antenna	Rohde & Schwarz	HF907	102868	2021-3-15	2024-3-14
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2023-8-1	2024-7-31
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2023-6-15	2024-6-14
	Double Ridged Horn Antenna	ETS-Lindgren	3116C	00246076	2023-7-7	2026-7-6
	3m Semi-anechoic chamber	TDK	9X6X6	----	2021-5-8	2024-5-7
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	101907	2023-8-1	2024-7-31
	LISN	Rohde & Schwarz	ENV216	101924	2023-8-1	2024-7-31

Measurement Software Information			
Test Item	Software	Manufacturer	Version
C	MTS 8310	MWRFtest	3.0.0.0
	Power Viewer	Rohde & Schwarz	V 11.0
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.16dB
Radiated Disturbance	9kHz to 30MHz, 3.52dB 30MHz to 1GHz, 5.03dB (Horizontal) 5.12dB (Vertical) 1GHz to 18GHz, 5.49dB 18GHz to 40GHz, 5.63dB
RF Conducted Measurement	Power related： 1.16dB Frequency related： 6.00×10^{-8}

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

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3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
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12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

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3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
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13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

----------End of Test Report----------

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
Phone: +86 21 61410123, Fax:+86 21 61408600