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TEST REPORT

SCOPE OF WORK:
47 CFR FCC Part 15.247 – Radio Spectrum report

Model:
SMSHB1A2

REPORT NUMBER
220200201THC-001

ISSUE DATE
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Radio Spectrum
TEST REPORT

Applicant:	**SmartAC.com, Inc.** **5302 Egbert Street, Houston, TX 77007, United States**
Product:	**Gateway**
Model No.:	**SMSHB1A2**
FCC ID:	**2AVMLSMSHB2**
Test Method/ Standard:	**47 CFR FCC Part 15.247 & ANSI C63.10 2013** **KDB 558074 D01 v05r02**
Test By:	**Intertek Testing Services Taiwan Ltd.,** **Hsinchu Laboratory** **No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,** **Shiang-Shan District, Hsinchu City, Taiwan**

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Revision History

Report No.	Issue Date	Revision Summary
220200201THC-001	Apr. 22, 2022	Original report

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Summary of Test Data

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

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.
Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Gateway
Model No.:	SMSHB1A2
Operating Frequency:	2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20, 802.11n HT40
Channel Number:	11 channels
Frequency of Each Channel:	2412+5 k, k＝0 ~ 10 for 802.11b, 802.11g, 802.11n HT20 2422+5k, k = 0~6, for 802.11n HT40
Rated Power:	DC 5V from adapter
Power Cord:	N/A
Sample receiving date:	2022/02/17
Sample condition:	Workable
Test Date(s):	2022/03/10 ~ 2022/04/18

1.2 Adapter information

The EUT will be supplied with a power supply from below list:

No.	Model no.	Specification
Adapter	PG062-0501000UC	I/P: 100-240V~, 50/60Hz, 0.3A O/P: 5V⎓, 1000mA

1.3 Antenna description

Antenna Gain : 2.69 dBi
Antenna Type : PIFA antenna
Connector Type : Fixed

1.4 Operation mode

The EUT connected to Notebook PC USB port, executing “teraterm” and select different frequency and modulation.

With individual verifying, the maximum output power was found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n(HT20) mode, 13.5 Mbps data rate for 802.11n(HT40) mode the final tests were executed under these conditions recorded in this report individually.

Mode	Channel	Frequency (MHz)	Data rate (Mbps)	Signal on time (ms)	Signal on+off time (ms)	Duty cycle	Duty factor (dB)
802.11b	6	2437	1	12.41	12.53	0.990	0.042
802.11g	6	2437	6	2.06	2.21	0.931	0.310
802.11nHT20	6	2437	6.5	1.91	1.97	0.968	0.141
802.11nHT40	6	2437	13.5	0.95	1.02	0.929	0.319

1.5 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Description of Data Cable
Notebook PC	DELL	Latitude E5420	HXYJBT1	Micro USB shielded cable 1m
Fixture (By client)	N/A	N/A	N/A	N/A
Wireless Router	BUFFALO	WZR-AGL300NH	N/A	RJ45 cable 6m
Micro SD Card	Transcend	Micro SD HC 16G	N/A	N/A
Sensor 1	Misbox	SMCOM1A1	N/A	N/A
Sensor 2	Misbox	SMWAT1A1	N/A	N/A
Sensor 3	Misbox	SMFIL1A1	N/A	N/A

2. Minimum 6 dB Bandwidth

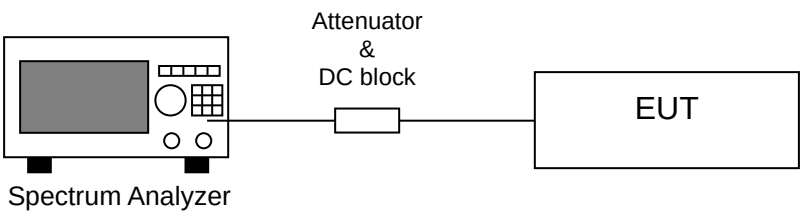
2.1 Instrument Setting

Spectrum Parameter	Setting
Detector	Peak
RBW	100kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

2.2 Test Procedure

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

2.3 Test Diagram



2.4 Limit

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

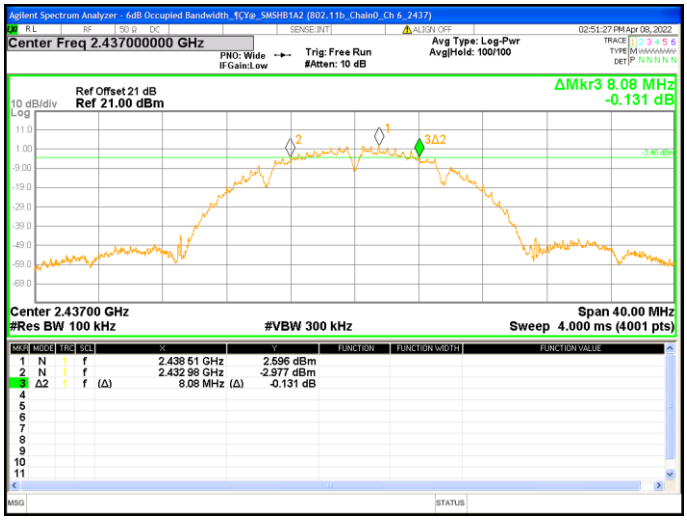
2.5 Test Results

Temperature (℃) :	23
Relative Humidity (%):	62
Test date:	2022/04/08

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1	2412	8.54	>0.5	Pass
	6	2437	8.08	>0.5	Pass
	11	2462	8.55	>0.5	Pass
802.11g	1	2412	16.16	>0.5	Pass
	6	2437	16.09	>0.5	Pass
	11	2462	16.35	>0.5	Pass
802.11n(HT20)	1	2412	17.42	>0.5	Pass
	6	2437	17.35	>0.5	Pass
	11	2462	17.28	>0.5	Pass
802.11n(HT40)	3	2422	31.92	>0.5	Pass
	6	2437	33.20	>0.5	Pass
	9	2452	34.74	>0.5	Pass

Chain 0: 6dB Bandwidth @ 802.11b Mode Ch 1

Chain 0: 6dB Bandwidth @ 802.11b Mode Ch 6



Chain 0: 6dB Bandwidth @ 802.11b Mode Ch11

Chain 0: 6dB Bandwidth @ 802.11g Mode Ch 1

Chain 0: 6dB Bandwidth @ 802.11g Mode Ch 6

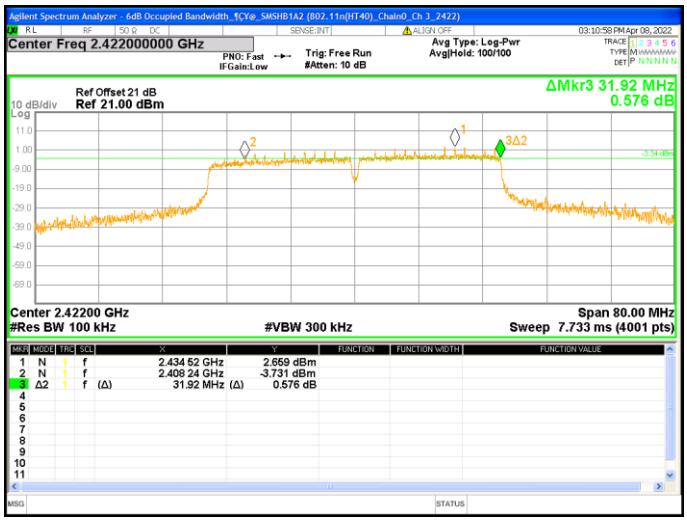
Chain 0: 6dB Bandwidth @ 802.11g Mode Ch11

Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1

Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch 6

Chain 0: 6dB Bandwidth @ 802.11n(HT20) Mode Ch11

Chain 0: 6dB Bandwidth @ 802.11n(HT40) Mode Ch 3



Chain 0: 6dB Bandwidth @ 802.11n(HT40) Mode Ch 6

Chain 0: 6dB Bandwidth @ 802.11n(HT40) Mode Ch 9

3. Maximum Peak Conducted Output Power

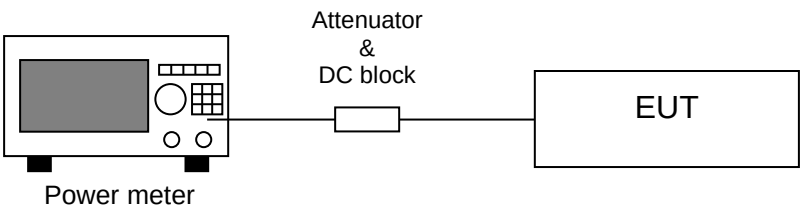
3.1 Instrument Setting

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

3.2Test Procedure

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

3.3 Test Diagram



3.4 Limit

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

3.5 Test Results

Temperature (℃) :	23
Relative Humidity (%) :	62
Test date :	2022/04/08

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	10.58	11.43	12.61	18.24	30	-17.39
	6	2437	12.06	16.07	14.86	30.62	30	-15.14
	11	2462	12.76	18.88	15.39	34.59	30	-14.61
802.11g	1	2412	15.65	36.73	23.99	250.61	30	-6.01
	6	2437	18.28	67.30	24.32	270.40	30	-5.68
	11	2462	18.58	72.11	24.62	289.73	30	-5.38
802.11n (HT20)	1	2412	15.50	35.48	23.56	226.99	30	-6.44
	6	2437	18.21	66.22	24.31	269.77	30	-5.69
	11	2462	18.55	71.61	24.42	276.69	30	-5.58
802.11n (HT40)	3	2422	16.73	47.10	23.85	242.66	30	-6.15
	6	2437	18.27	67.14	24.12	258.23	30	-5.88
	9	2452	18.57	71.94	24.11	257.63	30	-5.89

4. Power Spectral Density

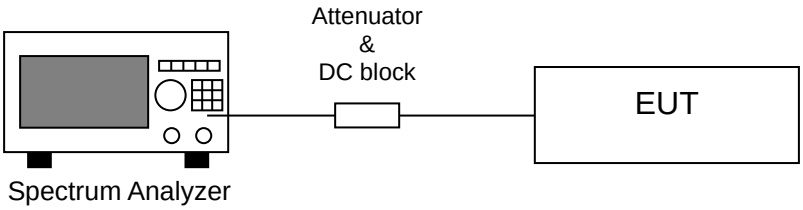
4.1 Instrument Setting

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

4.2 Test Procedure

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

4.3 Test Diagram



4.4 Limit

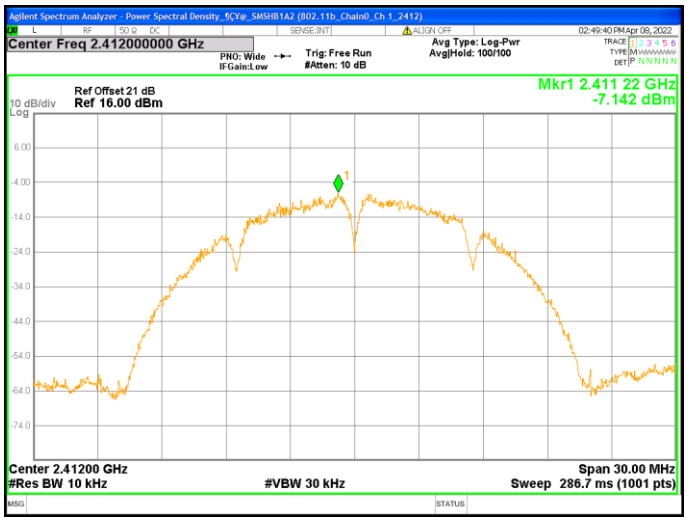
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 10 kHz band during any time interval of continuous transmission

4.5 Test Results

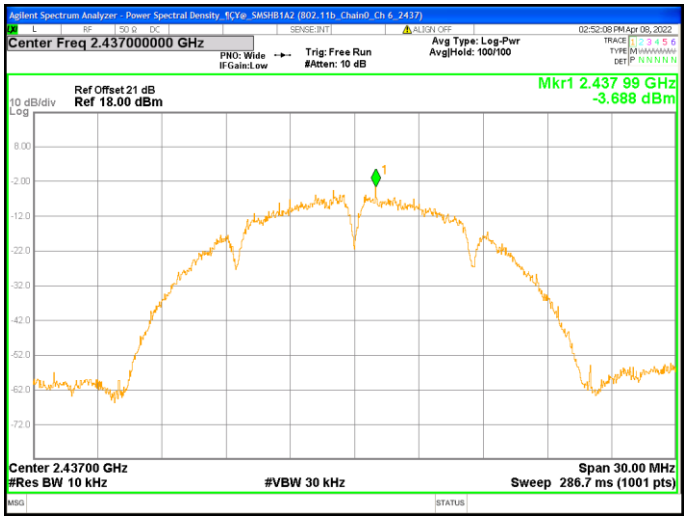
Temperature (℃) :	23
Relative Humidity (%):	62
Test date:	2022/04/08

Mode	Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
802.11b	1	2412	-7.142	8	-15.142
	6	2437	-3.688	8	-11.688
	11	2462	-5.617	8	-13.617
802.11g	1	2412	-5.125	8	-13.125
	6	2437	-3.451	8	-11.451
	11	2462	-1.660	8	-9.660
802.11n(HT20)	1	2412	-5.510	8	-13.510
	6	2437	-1.188	8	-9.188
	11	2462	-1.880	8	-9.880
802.11n(HT40)	3	2422	-5.849	8	-13.849
	6	2437	-4.683	8	-12.683
	9	2452	-5.166	8	-13.166

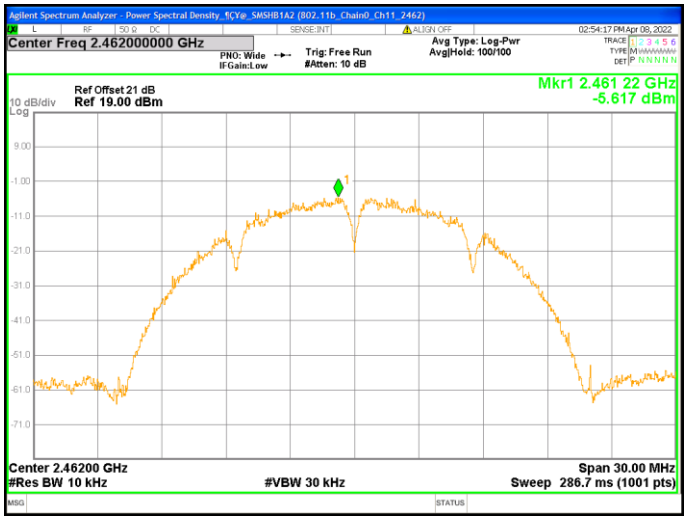
Chain 0: Power Spectral Density @ 802.11b Mode Ch 1



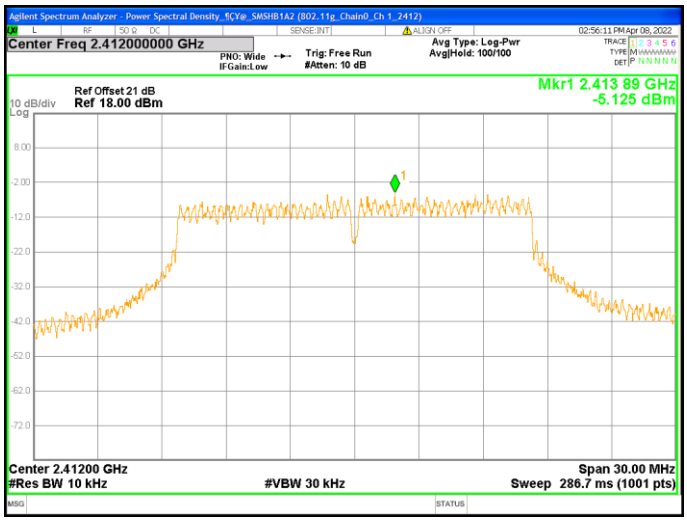
Chain 0: Power Spectral Density @ 802.11b Mode Ch 6



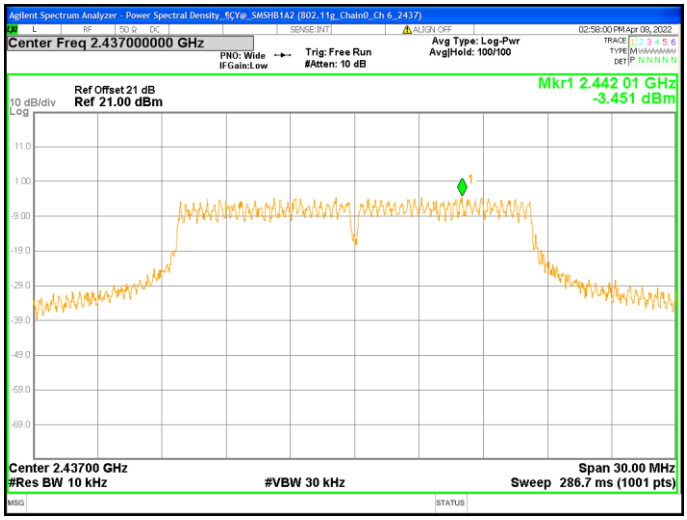
Chain 0: Power Spectral Density @ 802.11b Mode Ch11



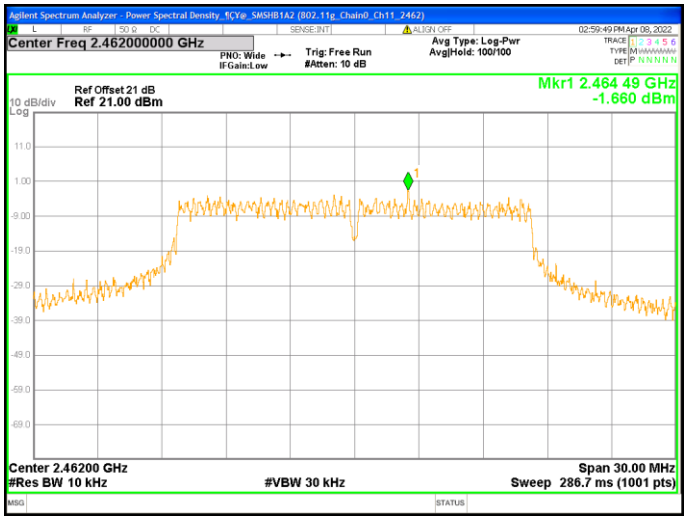
Chain 0: Power Spectral Density @ 802.11g Mode Ch 1



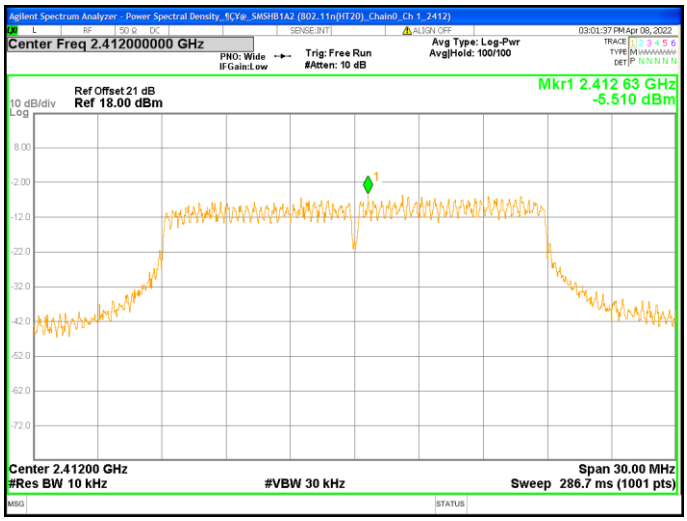
Chain 0: Power Spectral Density @ 802.11g Mode Ch 6



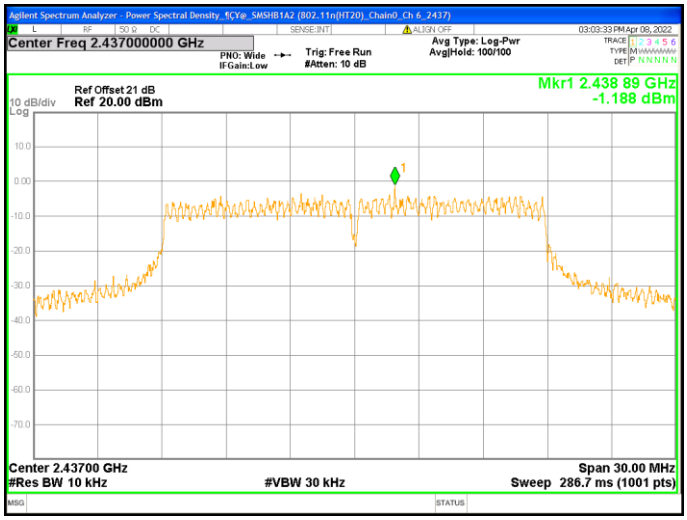
Chain 0: Power Spectral Density @ 802.11g Mode Ch11



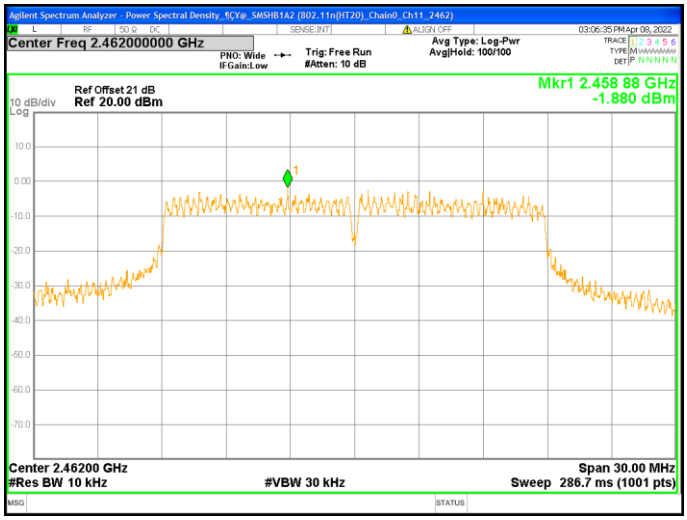
Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch 1



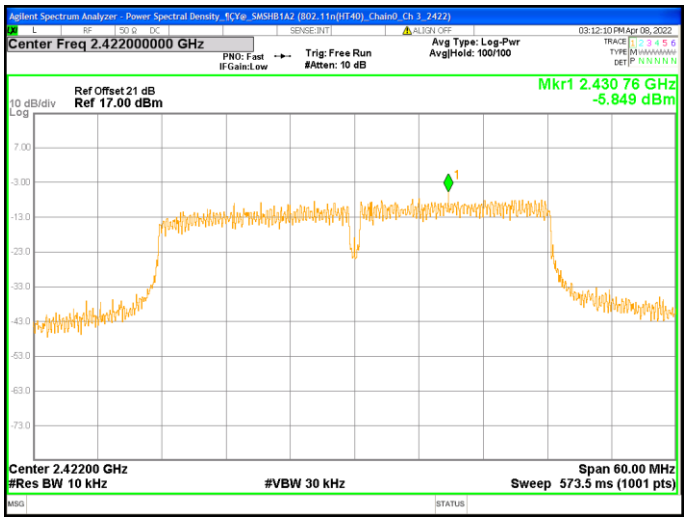
Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch 6



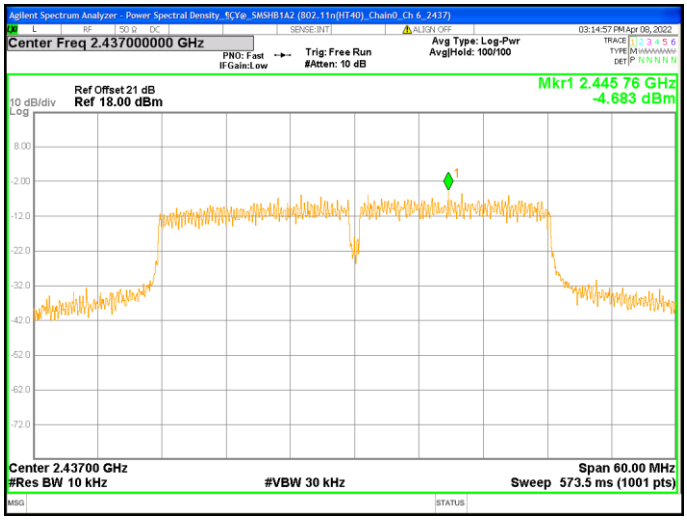
Chain 0: Power Spectral Density @ 802.11n(HT20) Mode Ch11



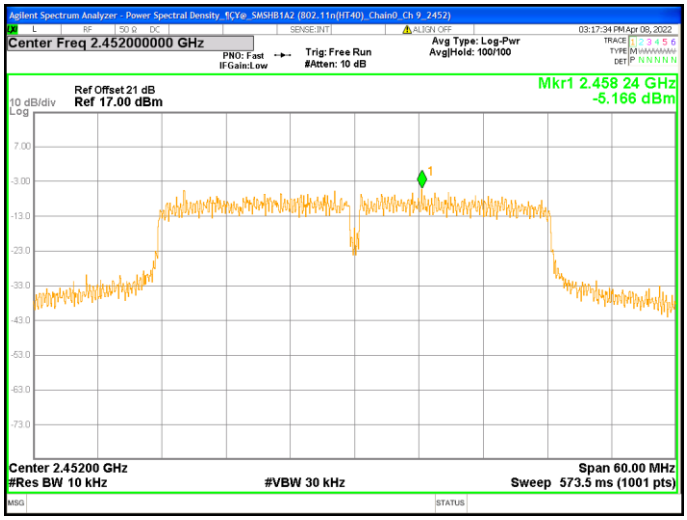
Chain 0: Power Spectral Density @ 802.11n(HT40) Mode Ch 3



Chain 0: Power Spectral Density @ 802.11n(HT40) Mode Ch 6



Chain 0: Power Spectral Density @ 802.11n(HT40) Mode Ch 9



5. Emissions in Non-Restricted Frequency Bands

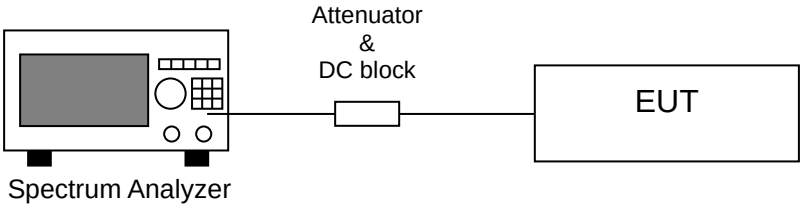
5.1 Instruments Setting

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

5.2 Test Procedure

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

5.3 Test Diagram



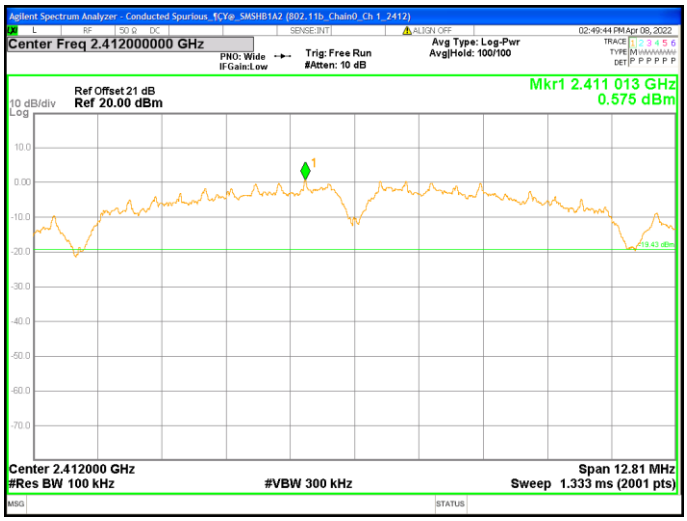
5.4 Limit

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

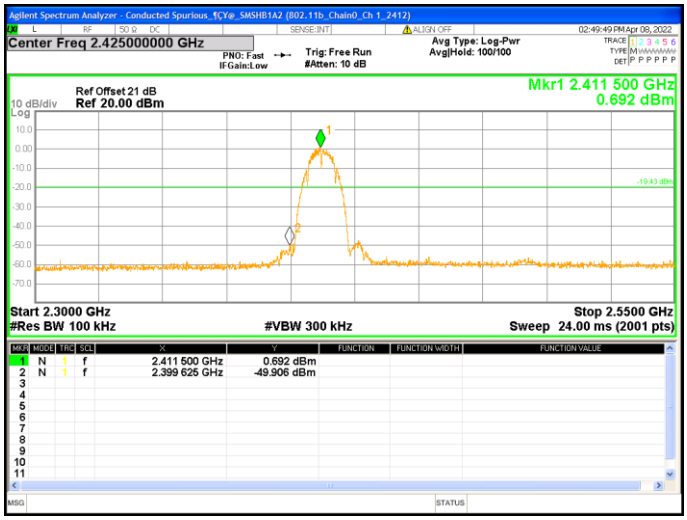
5.5 Test Results

Temperature (℃) :	23
Relative Humidity (%):	62
Test date:	2022/04/08

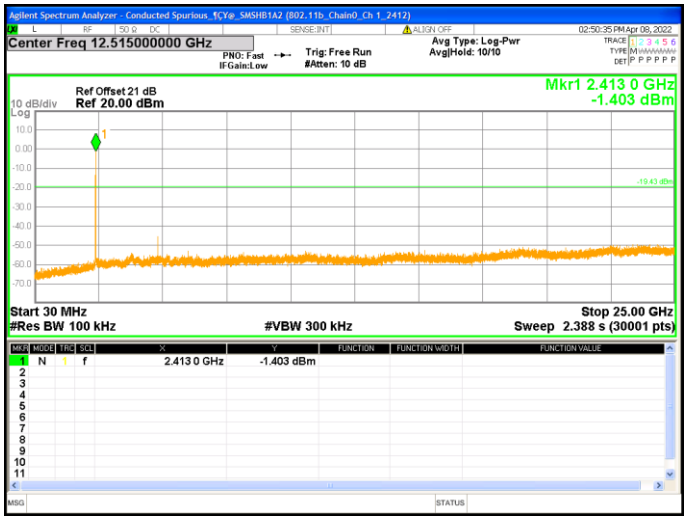
Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



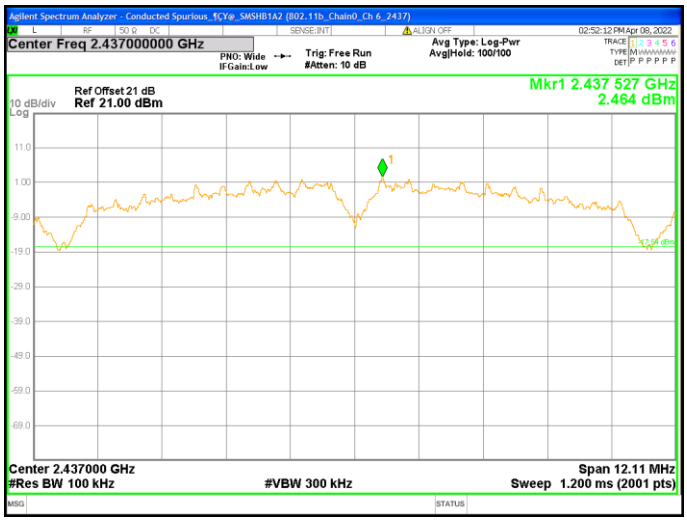
Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



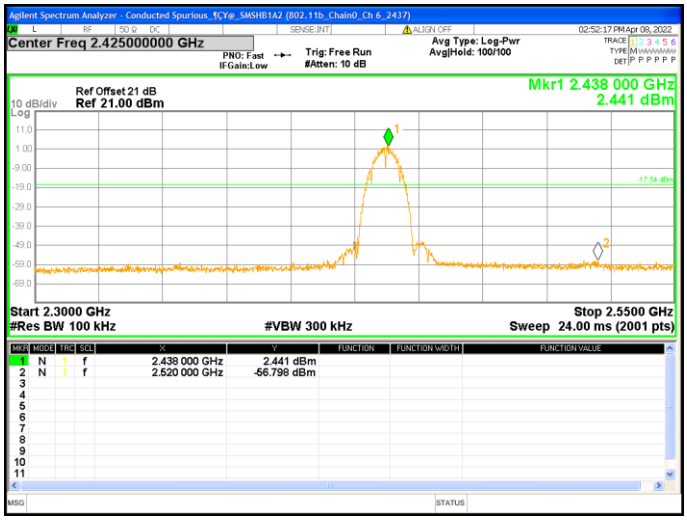
Chain 0: Conducted Spurious @ 802.11b Mode Ch 1



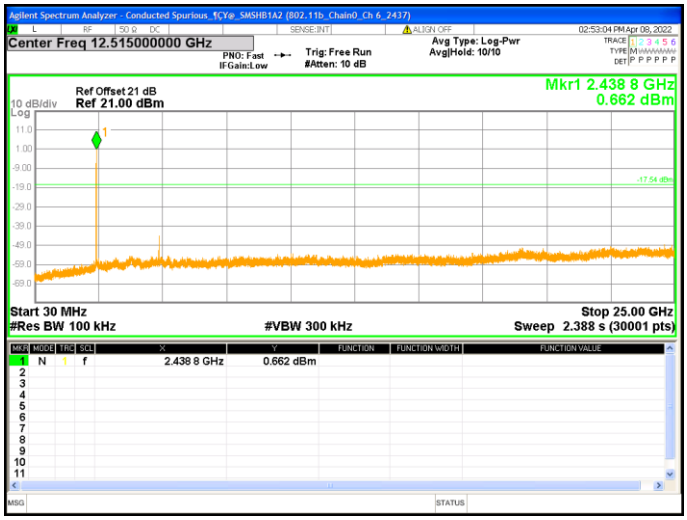
Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



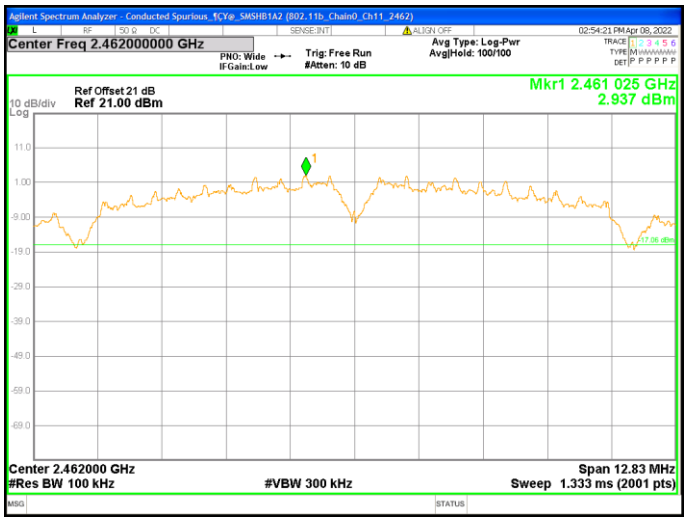
Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



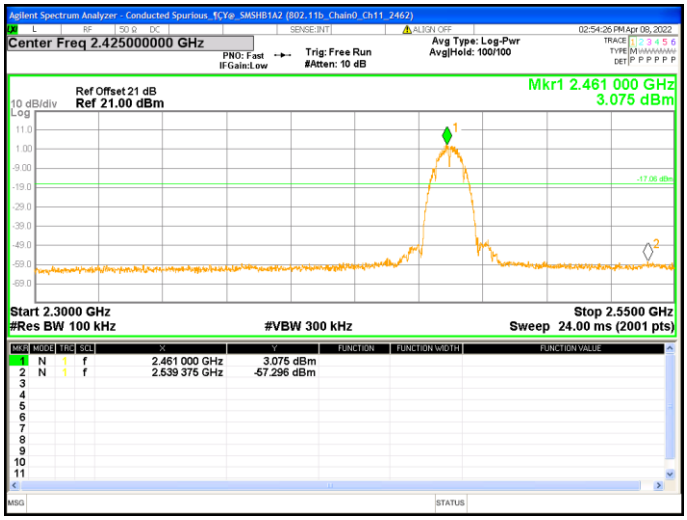
Chain 0: Conducted Spurious @ 802.11b Mode Ch 6



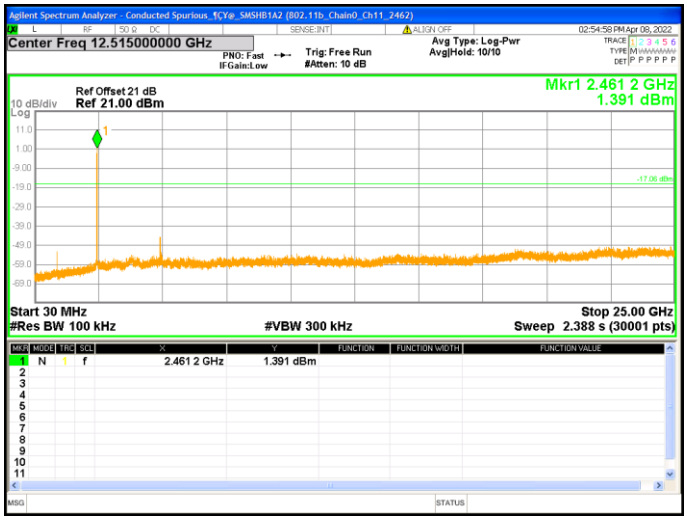
Chain 0: Conducted Spurious @ 802.11b Mode Ch11



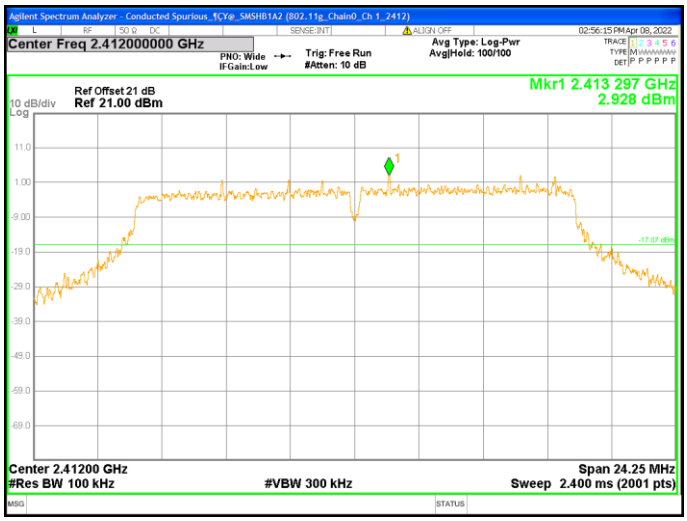
Chain 0: Conducted Spurious @ 802.11b Mode Ch11



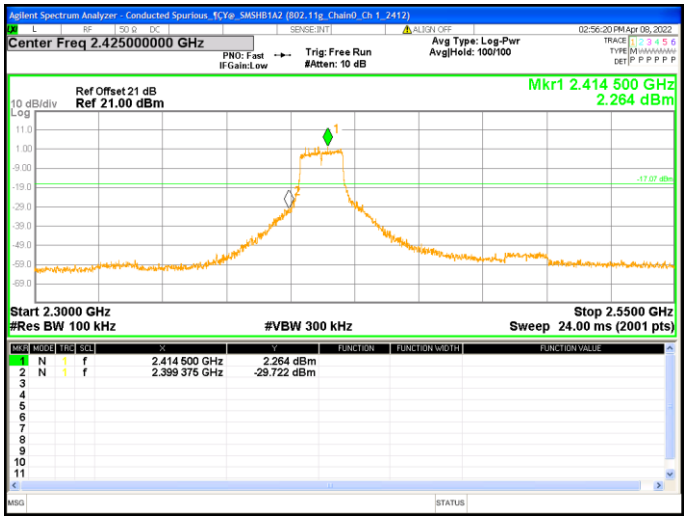
Chain 0: Conducted Spurious @ 802.11b Mode Ch11



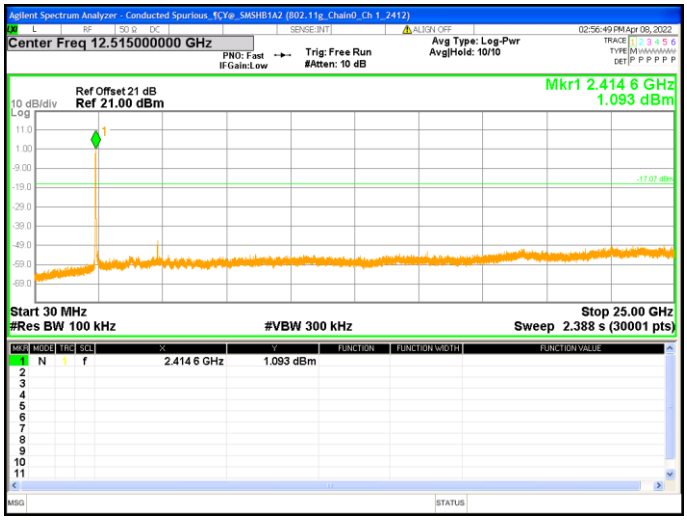
Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



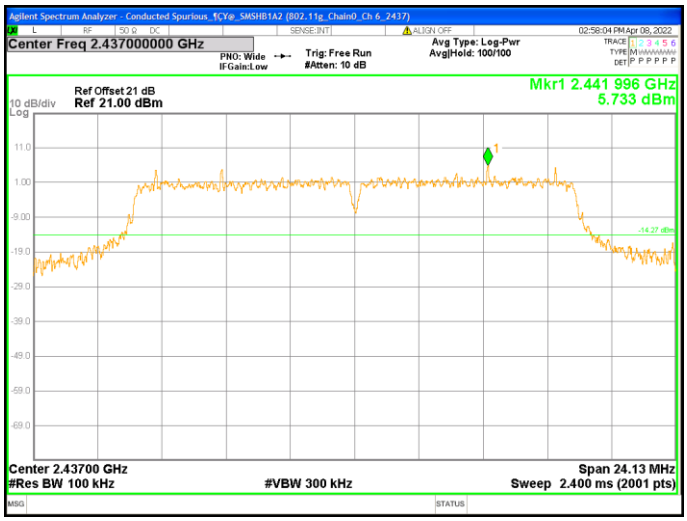
Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



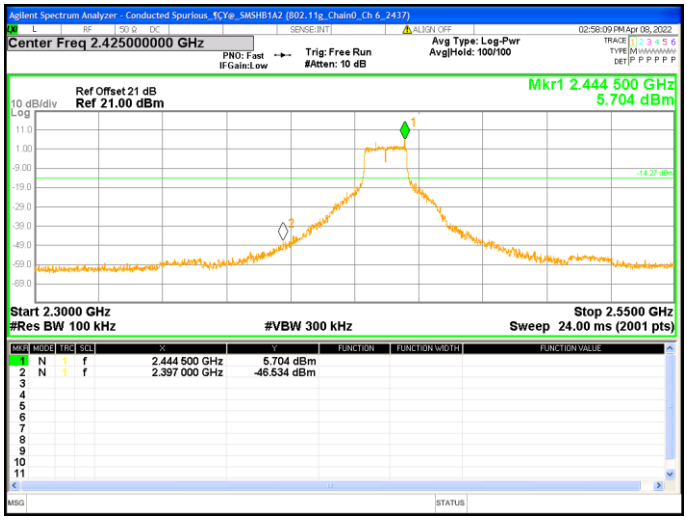
Chain 0: Conducted Spurious @ 802.11g Mode Ch 1



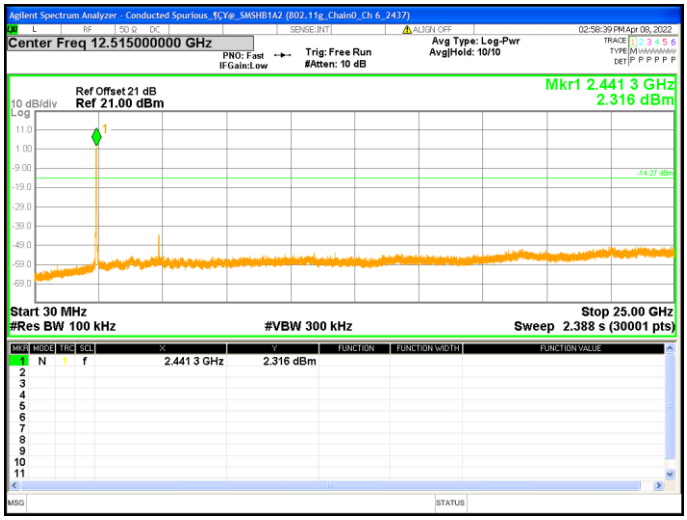
Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



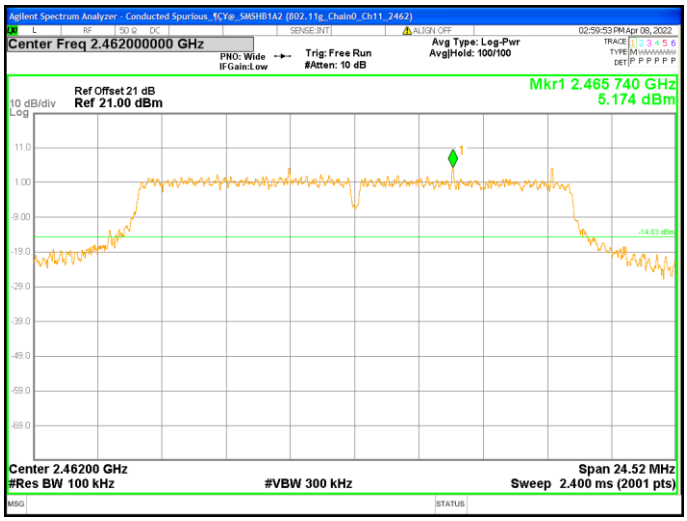
Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



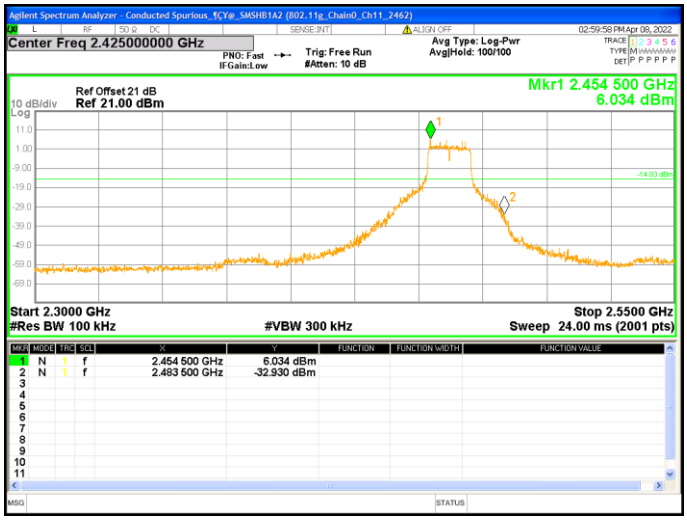
Chain 0: Conducted Spurious @ 802.11g Mode Ch 6



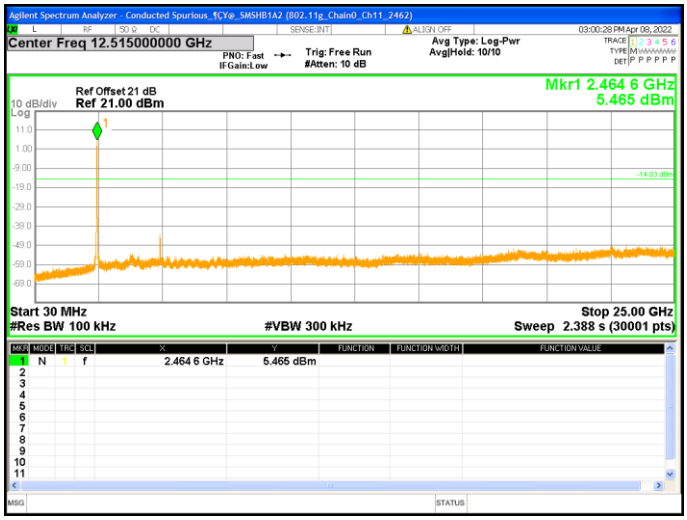
Chain 0: Conducted Spurious @ 802.11g Mode Ch11



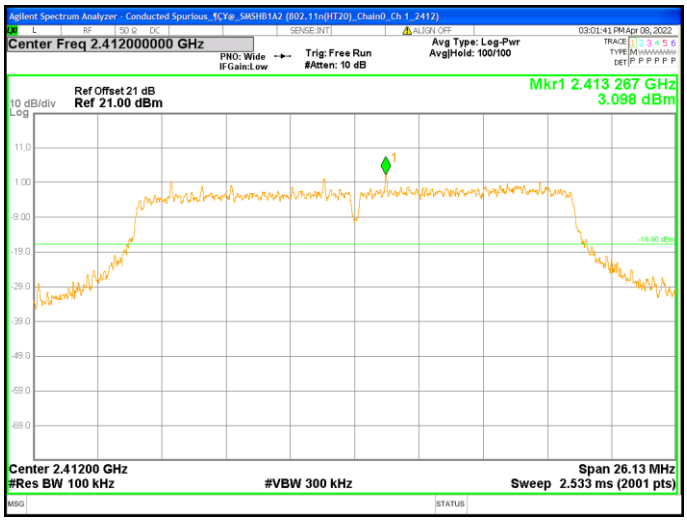
Chain 0: Conducted Spurious @ 802.11g Mode Ch11



Chain 0: Conducted Spurious @ 802.11g Mode Ch11



Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 1



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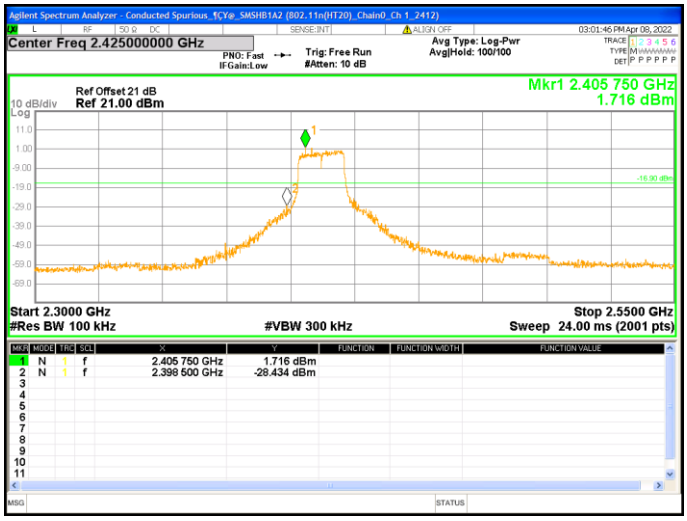
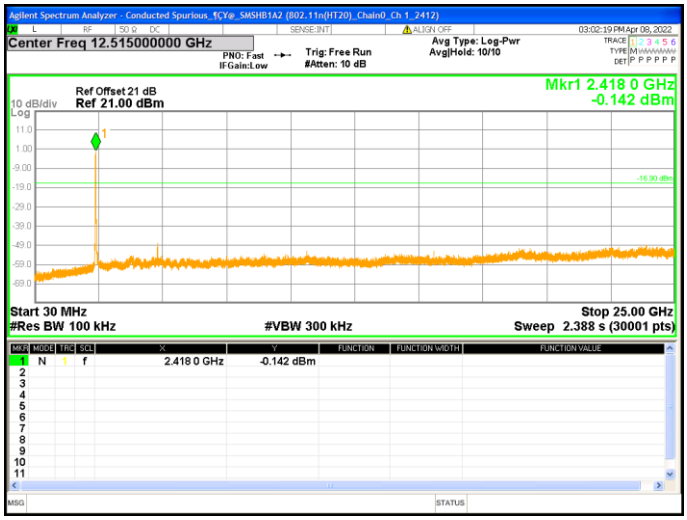
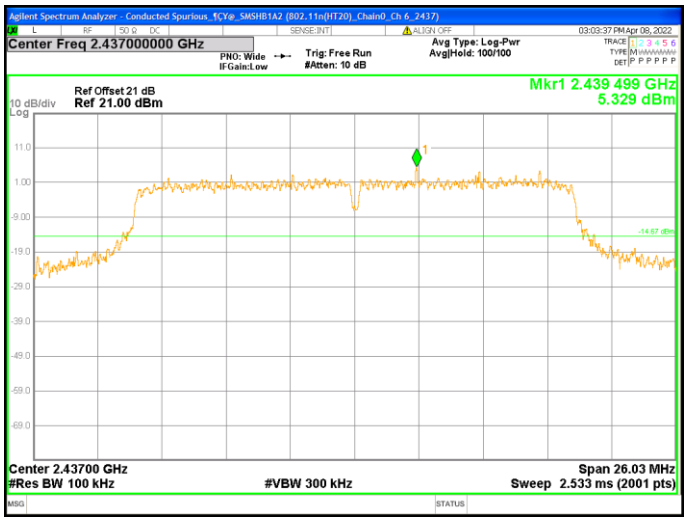


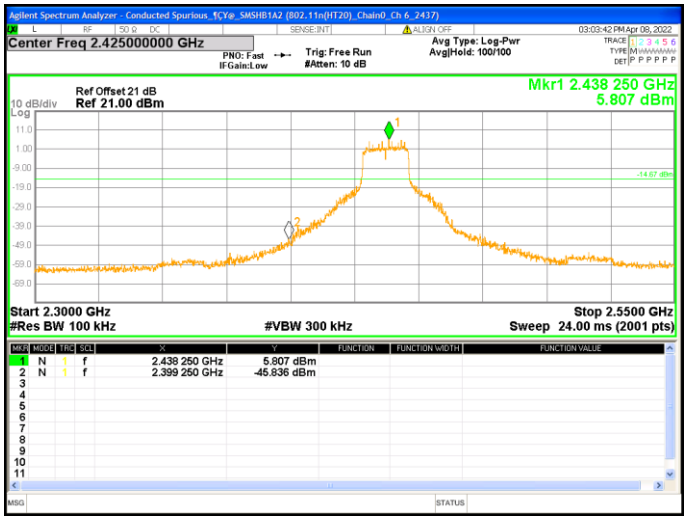
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 1



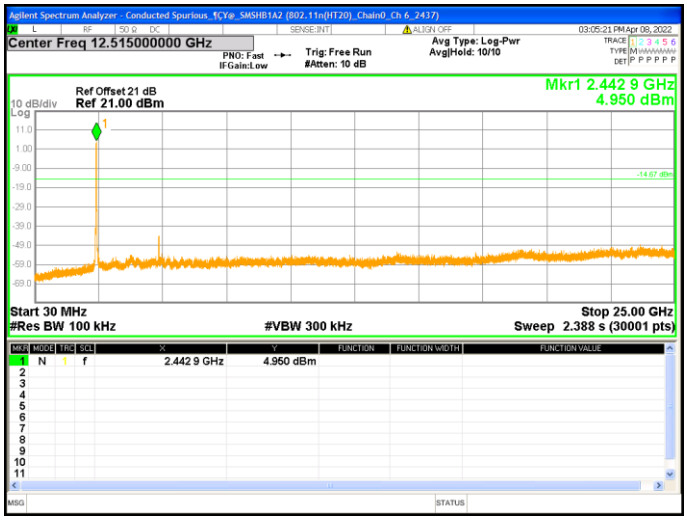
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



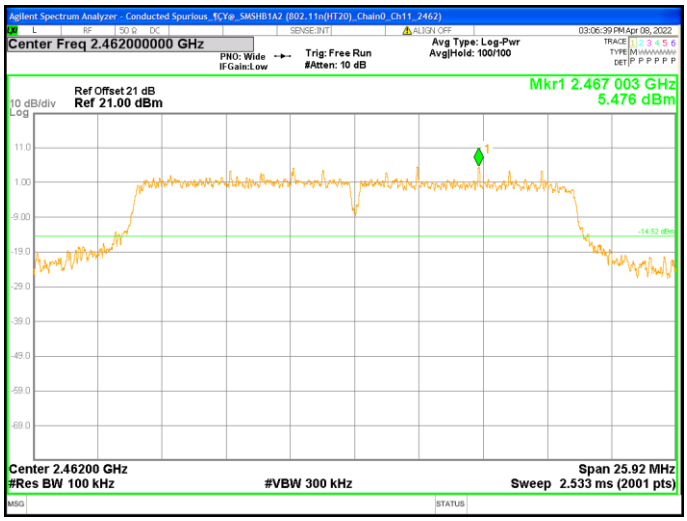
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



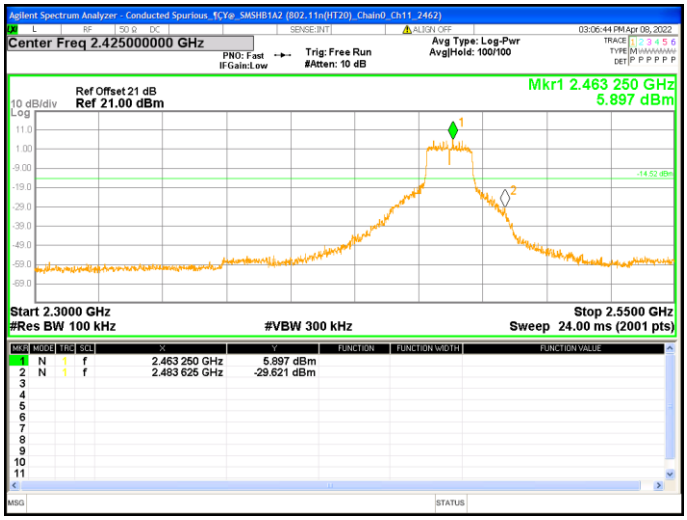
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch 6



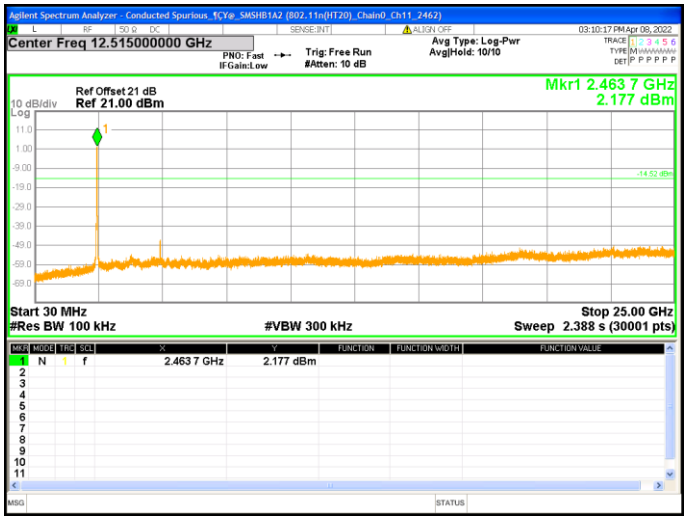
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11



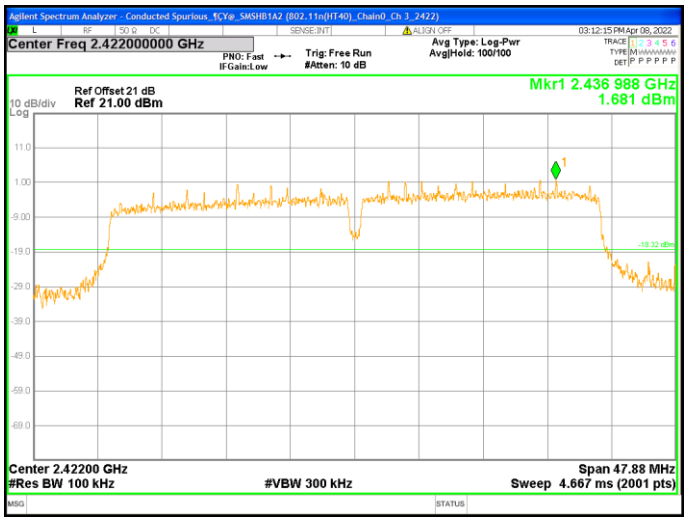
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11



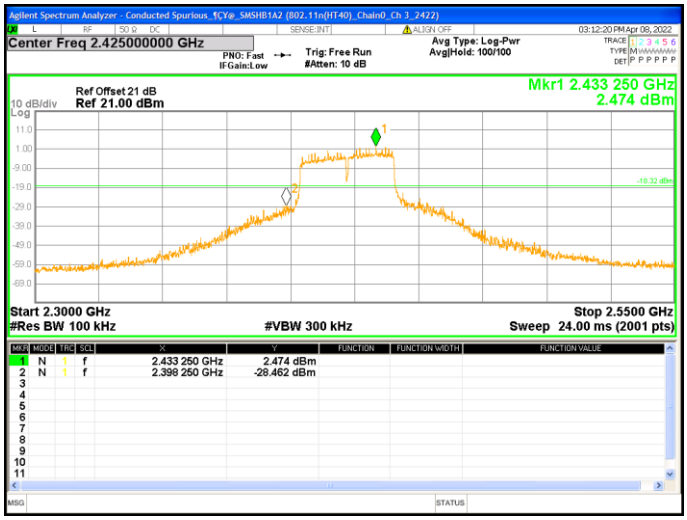
Chain 0: Conducted Spurious @ 802.11n(HT20) Mode Ch11



Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 3



Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 3



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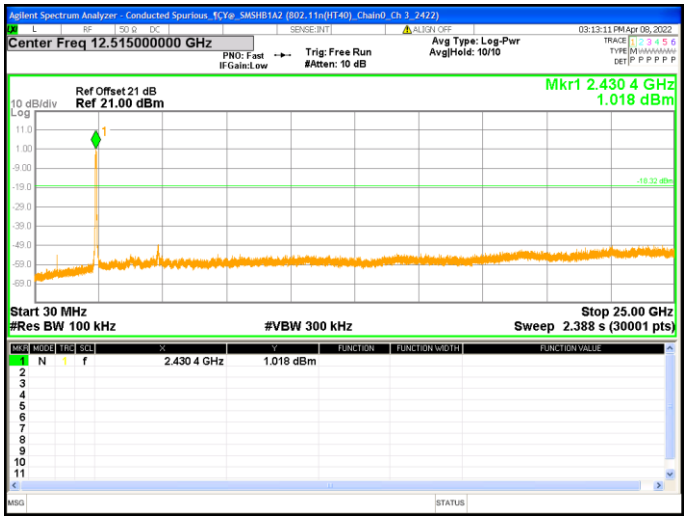
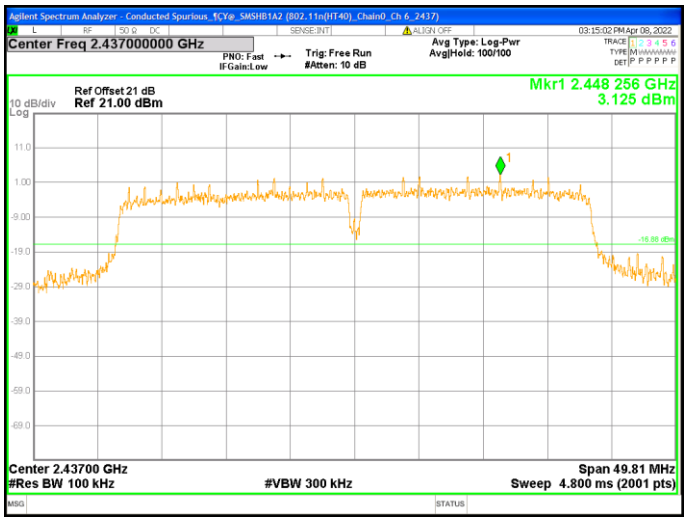


Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 6



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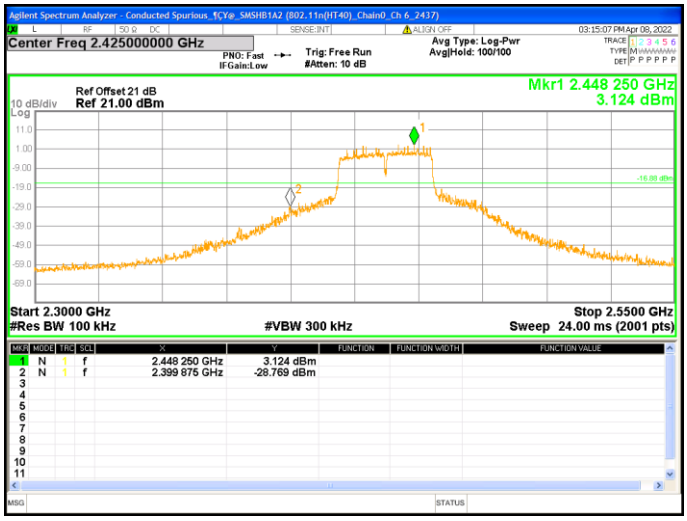
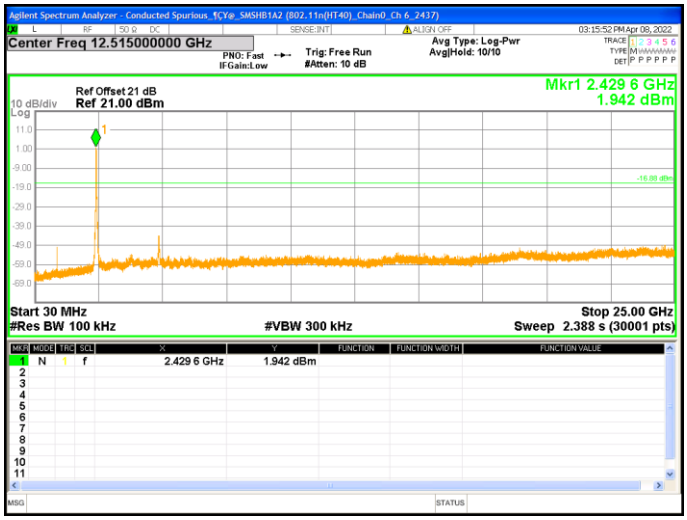
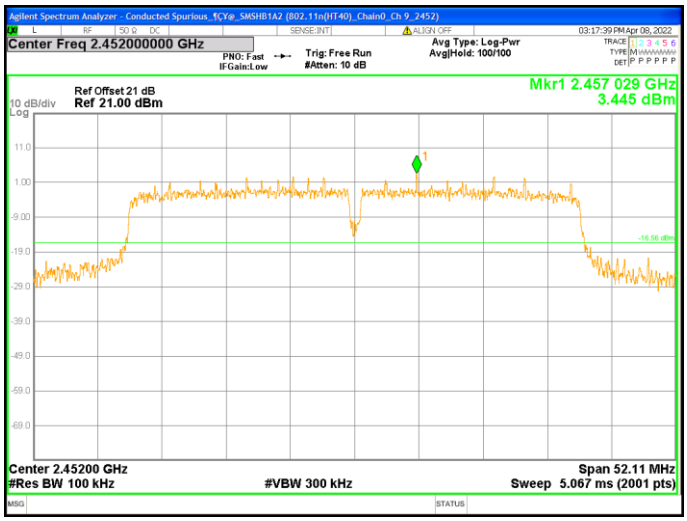


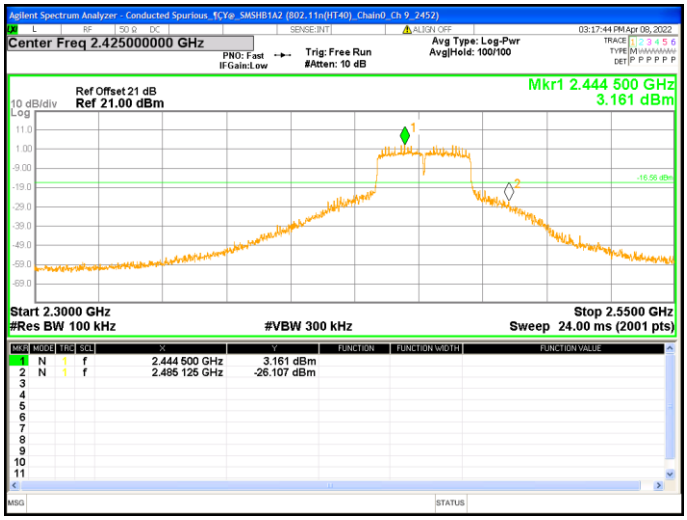
Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 6



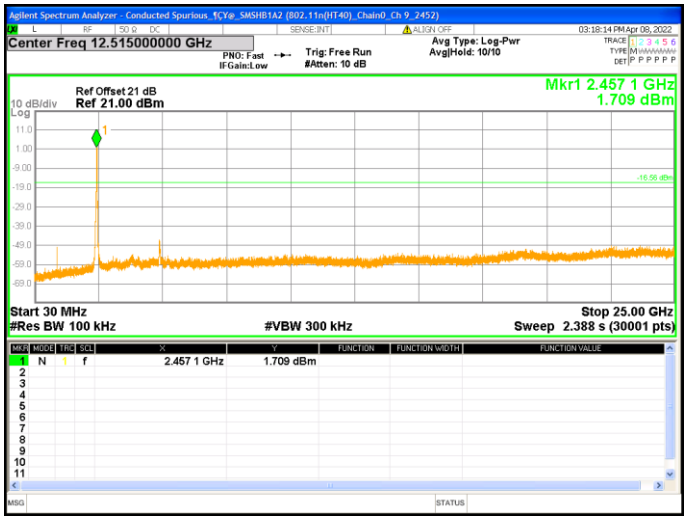
Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 9



Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 9



Chain 0: Conducted Spurious @ 802.11n(HT40) Mode Ch 9



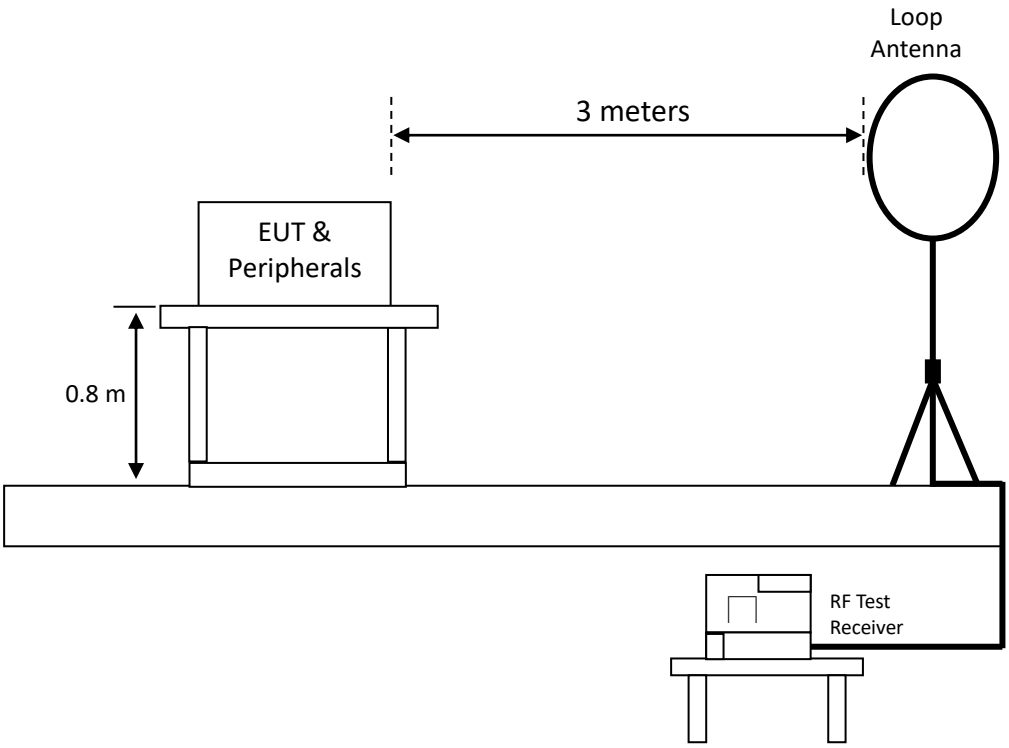
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1 Instrument Setting

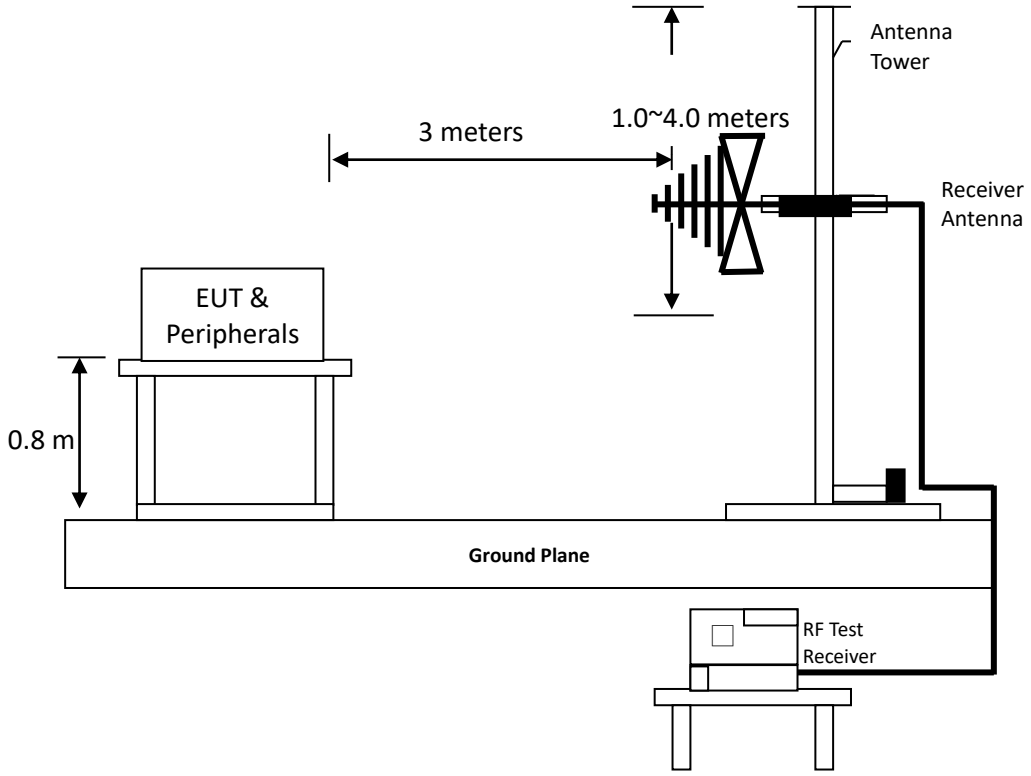
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	≧3 x RBW	3MHz & 1/T minimum kHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation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

6.2 Test setup & procedure

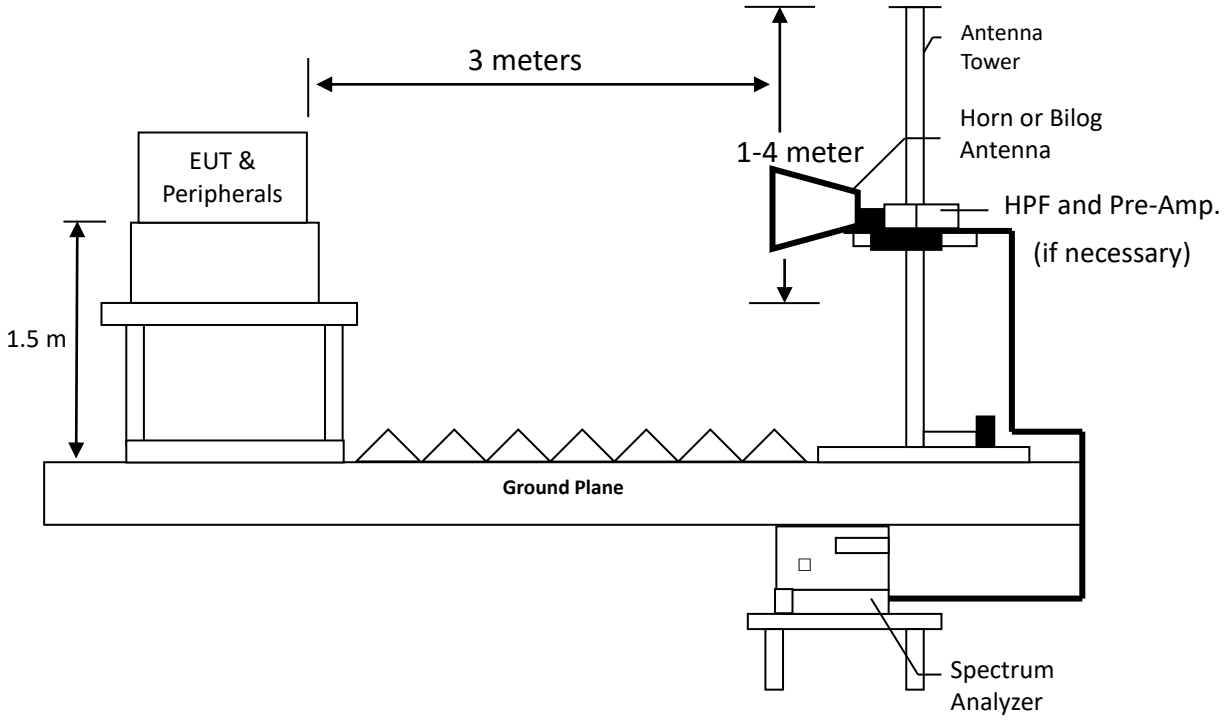
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 1/T minimum kHz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.
The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

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

6.3 Limit

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

Remark:

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

6.4 Test Result

6.4.1 Measurement results: frequencies 9kHz to 30MHz

The emissions are more than 20 dB below the limit, the value has no need to be reported.

6.4.2 Measurement results: frequencies from 30 MHz to 1 GHz

Temperature (℃) :	21
Relative Humidity (%):	61
Test date:	2022/04/18

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

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	104.51	QP	17.03	7.36	24.39	43.50	-19.11
Vertical	141.06	QP	20.35	-0.42	19.93	43.50	-23.57
Vertical	288.67	QP	21.81	2.80	24.61	46.00	-21.39
Vertical	422.22	QP	25.44	1.92	27.36	46.00	-18.64
Vertical	567.01	QP	28.35	1.62	29.97	46.00	-16.03
Vertical	620.44	QP	29.69	1.43	31.12	46.00	-14.88

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	98.88	QP	16.24	10.22	26.46	43.50	-17.04
Horizontal	145.28	QP	20.69	-0.36	20.33	43.50	-23.17
Horizontal	159.33	QP	21.10	-1.07	20.03	43.50	-23.47
Horizontal	245.09	QP	20.28	-0.81	19.47	46.00	-26.53
Horizontal	496.73	QP	26.94	6.25	33.19	46.00	-12.81
Horizontal	515.00	QP	27.28	3.73	31.01	46.00	-14.99

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.4.3 Measurement results: frequency from 1GHz to 25GHz

Temperature (℃) :	23
Relative Humidity (%):	61
Test date:	2022/04/07

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarity (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11b_Ch1	4824	PK	H	-5.45	71.10	65.65	74	-8.35
	4824	AV	H	-5.45	57.51	52.06	54	-1.94
	4824	PK	V	-5.45	54.60	49.15	74	-24.85
	4874	PK	H	-5.12	59.36	54.24	74	-19.76
802.11b_Ch6	4874	AV	H	-5.12	58.02	52.90	54	-1.10
	4874	PK	V	-5.12	53.45	48.33	74	-25.67
802.11b_Ch11	4924	PK	H	-4.98	56.10	51.12	74	-22.88
	4924	PK	V	-4.98	55.04	50.06	74	-23.94
	4824	PK	H	-5.45	60.62	55.17	74	-18.83
802.11g_Ch1	4824	AV	H	-5.45	55.54	50.09	54	-3.91
	4824	PK	V	-5.45	58.11	52.66	74	-21.34
	4824	AV	V	-5.45	49.52	44.07	54	-9.93
	4874	PK	H	-5.12	62.64	57.52	74	-16.48
802.11g_Ch6	4874	AV	H	-5.12	53.53	48.41	54	-5.59
	4874	PK	V	-5.27	57.62	52.35	74	-21.65
	4874	AV	V	-5.27	52.02	46.75	54	-7.25
	4924	PK	H	-5.08	60.85	55.77	74	-18.23
802.11g_Ch11	4924	AV	H	-5.08	50.78	45.70	54	-8.30
	4924	PK	V	-5.08	56.06	50.98	74	-23.02
	4824	PK	H	-5.40	63.57	58.17	74	-15.83
802.11n(HT20)_Ch1	4824	AV	H	-5.40	55.45	50.05	54	-3.95
	4824	PK	V	-5.40	57.11	51.71	74	-22.29
	4874	PK	H	-5.27	63.18	57.91	74	-16.09
802.11n(HT20)_Ch6	4874	AV	H	-5.27	52.78	47.51	54	-6.49
	4874	PK	V	-5.27	56.44	51.17	74	-22.83
	4924	PK	H	-5.08	59.47	54.39	74	-19.61
802.11n(HT20)_Ch11	4924	AV	H	-5.08	54.51	49.43	54	-4.57
	4924	PK	V	-5.08	52.92	47.84	74	-26.16
	4844	PK	H	-5.30	61.67	56.37	74	-17.63
802.11n(HT40)_Ch3	4844	AV	H	-5.30	51.50	46.20	54	-7.80
	4844	PK	V	-5.30	54.11	48.81	74	-25.19
	4874	PK	H	-5.27	59.43	54.16	74	-19.84
802.11n(HT40)_Ch6	4874	AV	H	-5.27	51.33	46.06	54	-7.94
	4874	PK	V	-5.27	55.35	50.08	74	-23.92
	4904	PK	H	-5.21	58.95	53.74	74	-20.26
802.11n(HT40)_Ch9	4904	AV	H	-5.21	48.40	43.19	54	-10.81
	4904	PK	V	-5.21	51.86	46.65	74	-27.35

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

7. Emission on Band Edge

7.1 Instrument Setting

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

7.2 Test Procedure

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

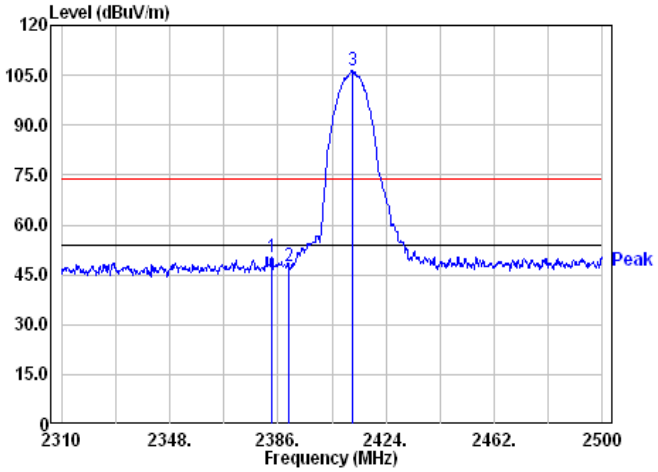
7.3 Test Results

Temperature (℃) :	23
Relative Humidity (%):	61
Test date:	2022/04/07

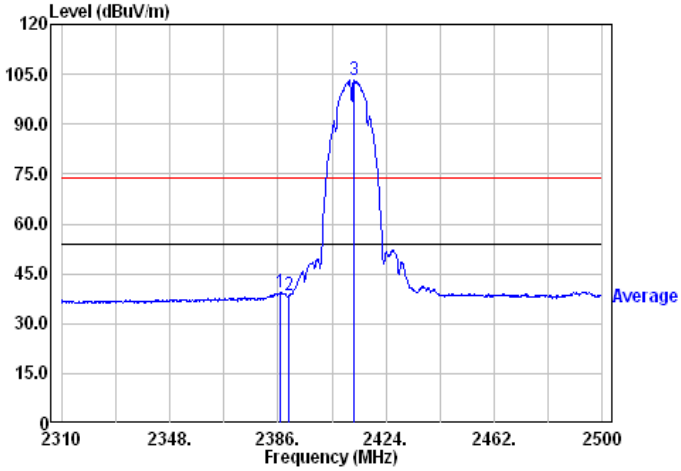
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarity (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b	2383.72	PK	H	34.66	15.67	50.33	74	-23.67	2310~2390
	2386.95	AV	H	34.63	4.85	39.48	54	-14.52	
	2487.84	PK	H	34.81	16.44	51.25	74	-22.75	2483.5~2500
	2487.46	AV	H	34.80	6.89	41.69	54	-12.31	
802.11g	2386.57	PK	H	34.64	19.55	54.19	74	-19.81	2310~2390
	2390.00	AV	H	34.62	9.53	44.15	54	-9.85	
	2483.50	PK	H	34.77	28.81	63.58	74	-10.42	2483.5~2500
	2483.50	AV	H	34.77	16.79	51.56	54	-2.44	
802.11n (HT20)	2390.00	PK	H	34.62	18.24	52.86	74	-21.14	2310~2390
	2390.00	AV	H	34.62	10.77	45.39	54	-8.61	
	2486.89	PK	H	34.80	30.18	64.98	74	-9.02	2483.5~2500
	2483.50	AV	H	34.77	17.14	51.91	54	-2.09	
802.11n (HT40)	2390.00	PK	H	34.62	20.86	55.48	74	-18.52	2310~2390
	2390.00	AV	H	34.62	13.39	48.01	54	-5.99	
	2493.92	PK	H	34.85	29.44	64.29	74	-9.71	2483.5~2500
	2483.50	AV	H	34.77	17.56	52.33	54	-1.67	

Remark: Correction Factor = Antenna Factor + Cable Loss

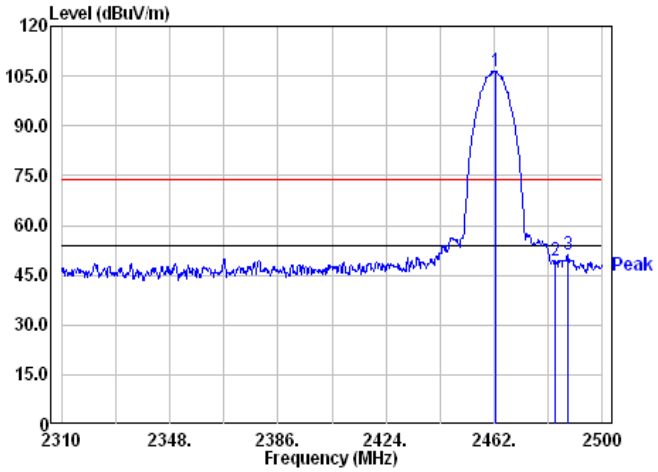
Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch1 PK



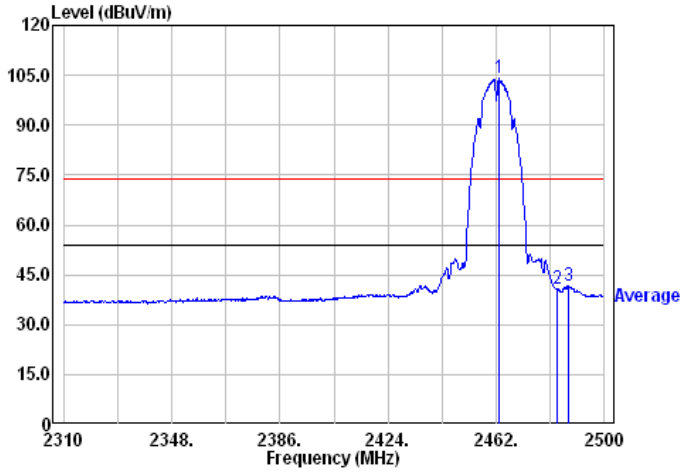
Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch1 AV



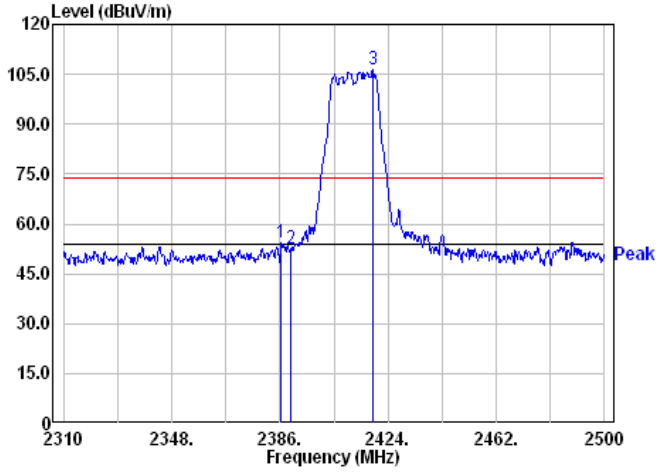
Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch11 PK



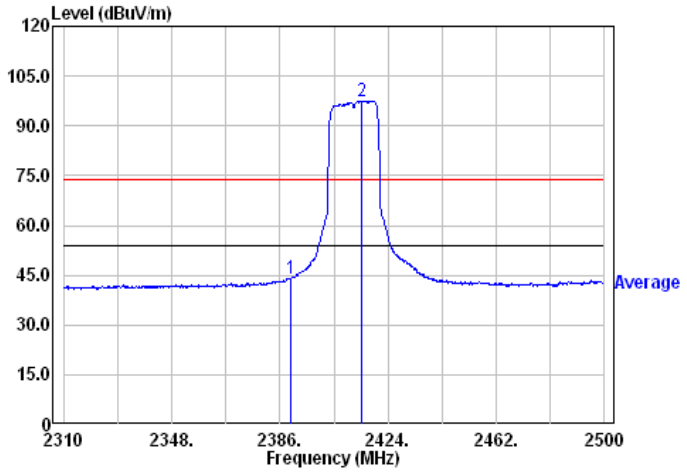
Chain 0: Restricted Band Bandedge @ 802.11b Mode Ch11 AV



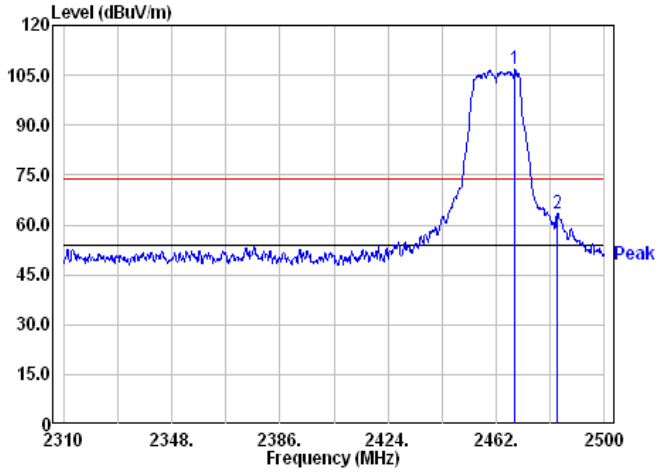
Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch1 PK



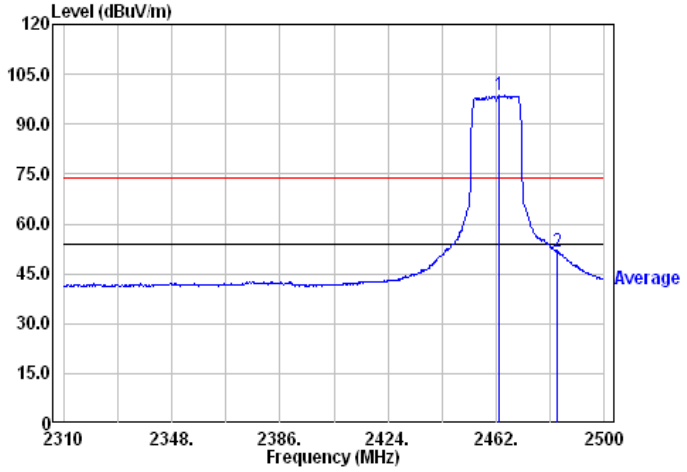
Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch1 AV



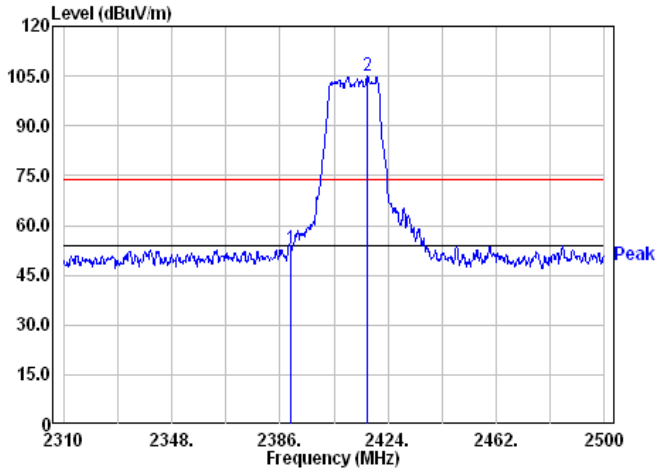
Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch11 PK



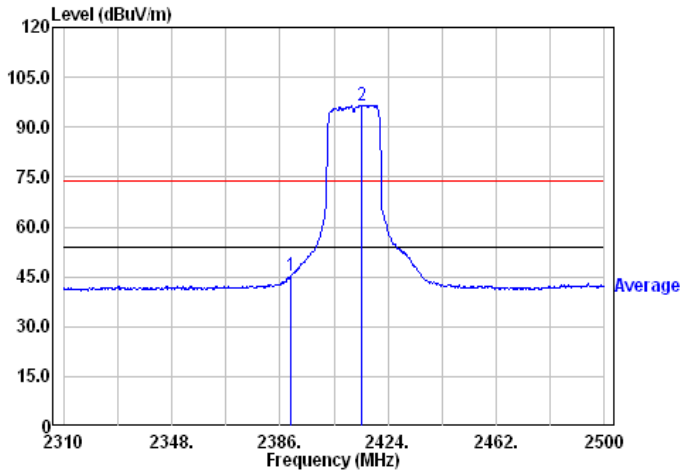
Chain 0: Restricted Band Bandedge @ 802.11g Mode Ch11 AV



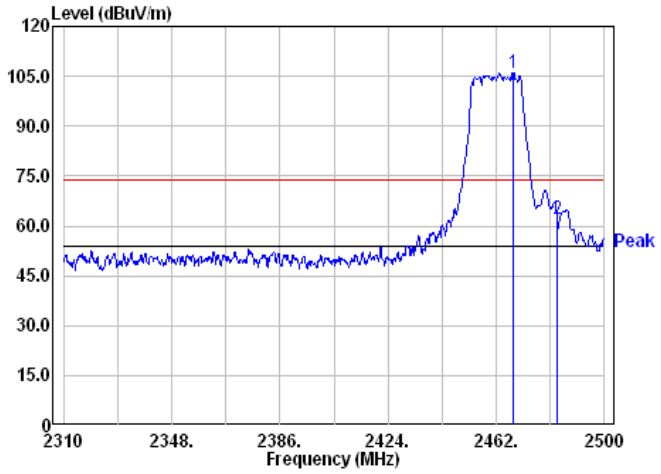
Chain 0: Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK



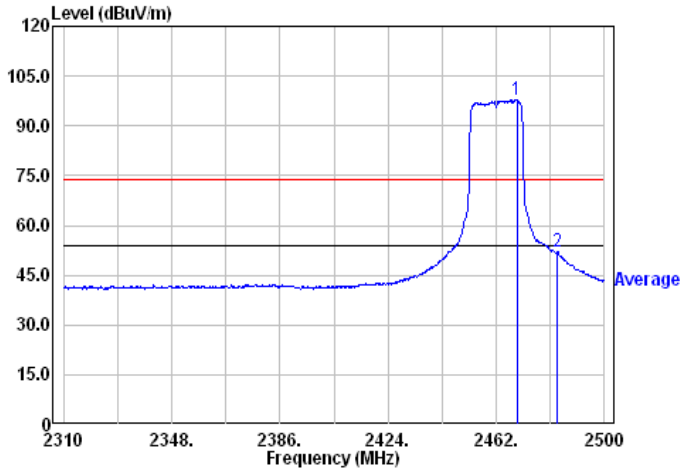
Chain 0: Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV



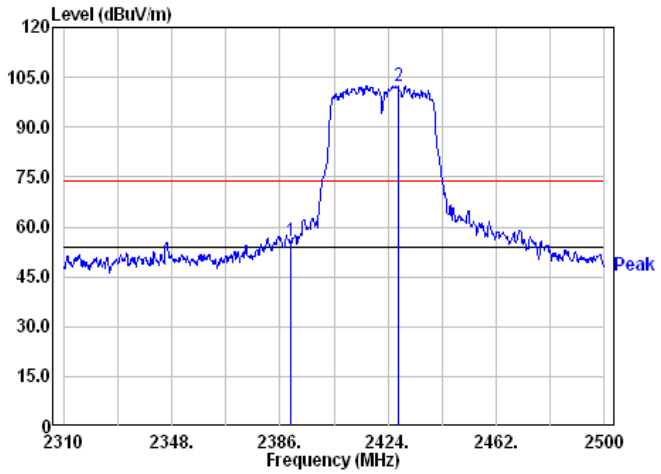
Chain 0: Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 PK



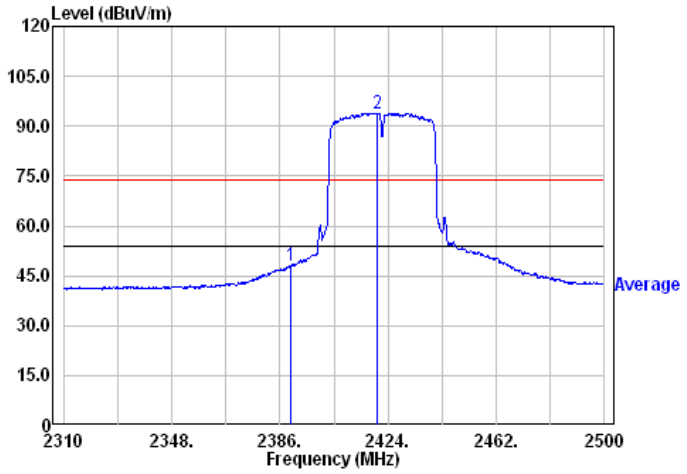
Chain 0: Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 AV



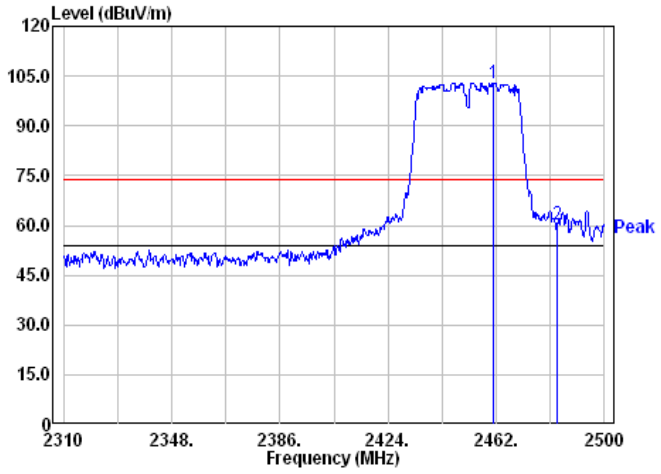
Chain 0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 PK



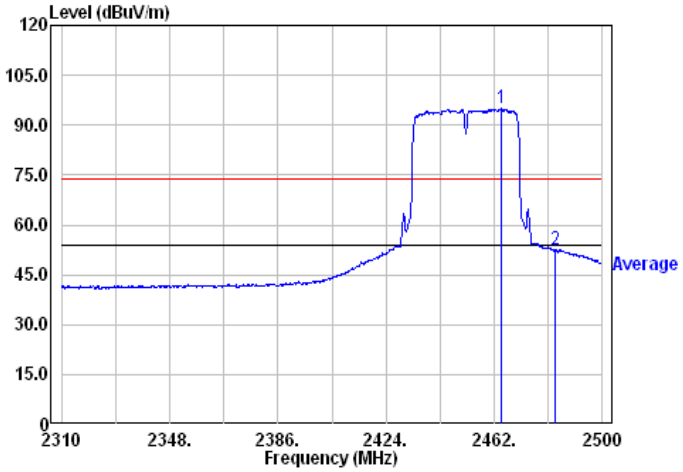
Chain 0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 AV



Chain 0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 PK



Chain 0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 AV



8. AC Power Line Conducted Emission

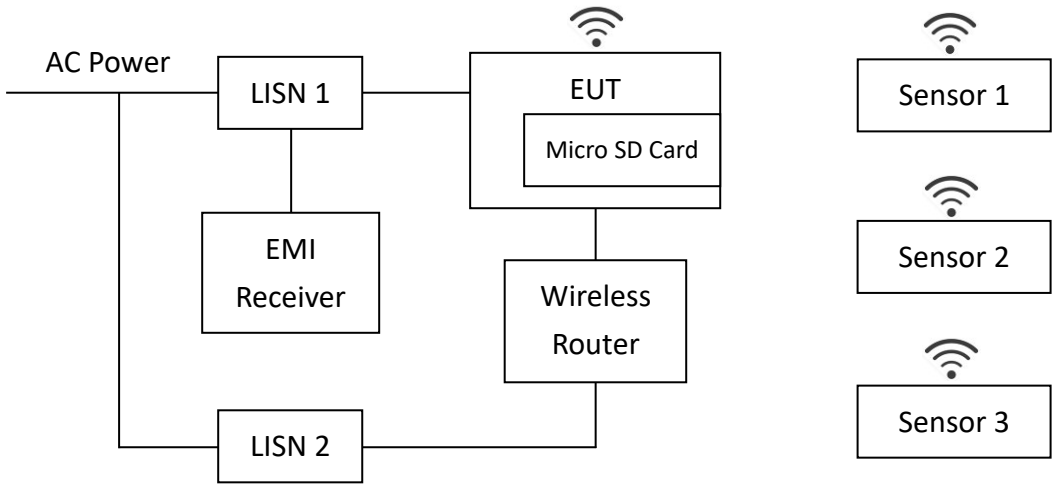
8.1 Measuring instrument setting

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

8.2 Test Procedure

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

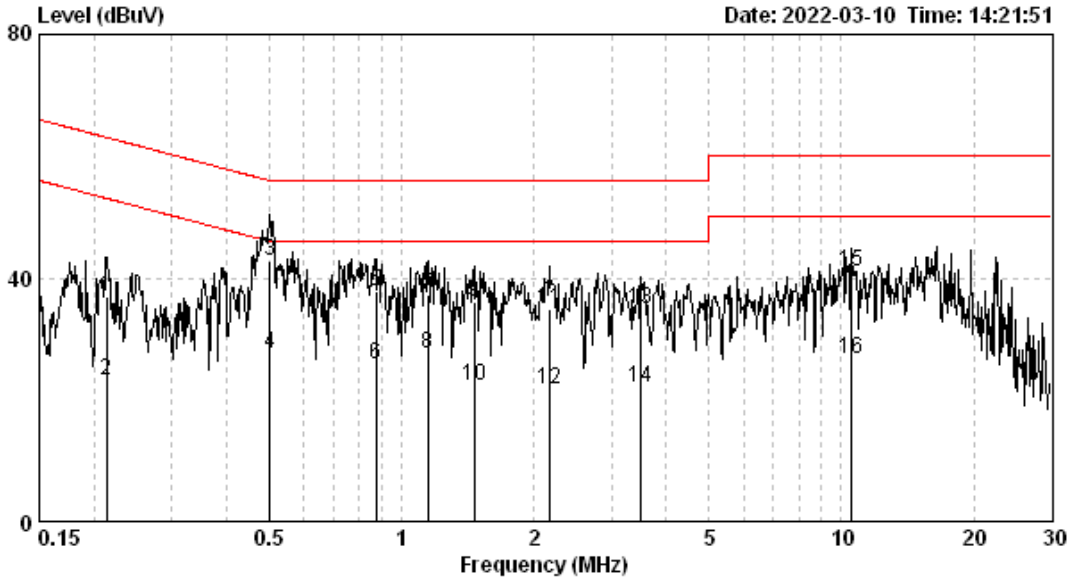
8.3 Test Diagram



8.4 Limit

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

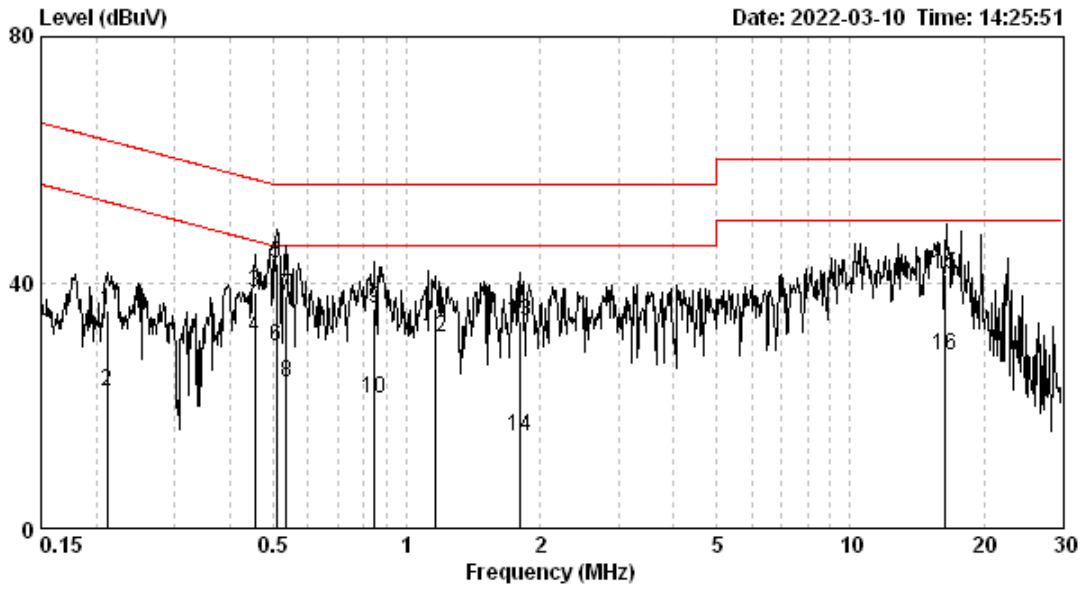
8.5 Test Results



Test voltage :120Vac, 60Hz
Temp./ R.H. :23 °C / 56 %RH
Atmospheric pressure :1007 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
LINE	0.214	0.09	36.71	36.80	63.05	22.93	23.02	53.05	-26.25	-30.03
LINE	0.502	0.09	42.57	42.66	56.00	27.49	27.58	46.00	-13.34	-18.42
LINE	0.876	0.12	37.79	37.91	56.00	25.72	25.84	46.00	-18.09	-20.16
LINE	1.147	0.14	37.03	37.17	56.00	27.43	27.57	46.00	-18.83	-18.43
LINE	1.464	0.16	35.79	35.95	56.00	22.02	22.18	46.00	-20.05	-23.82
LINE	2.167	0.19	34.82	35.01	56.00	21.36	21.55	46.00	-20.99	-24.45
LINE	3.509	0.18	34.71	34.89	56.00	21.82	22.00	46.00	-21.11	-24.00
LINE	10.508	0.57	40.48	41.05	60.00	26.03	26.60	50.00	-18.95	-23.40

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



Test voltage :120Vac, 60Hz
Temp./ R.H. :23 °C / 56 %RH
Atmospheric pressure :1007 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
NEUTRAL	0.212	0.08	35.35	35.43	63.14	22.19	22.27	53.14	-27.71	-30.87
NEUTRAL	0.454	0.08	38.43	38.51	56.80	30.85	30.93	46.80	-18.29	-15.87
NEUTRAL	0.510	0.09	43.12	43.21	56.00	29.41	29.50	46.00	-12.79	-16.50
NEUTRAL	0.535	0.09	37.66	37.75	56.00	23.69	23.78	46.00	-18.25	-22.22
NEUTRAL	0.848	0.11	35.65	35.76	56.00	21.04	21.15	46.00	-20.24	-24.85
NEUTRAL	1.160	0.13	35.70	35.83	56.00	31.03	31.16	46.00	-20.17	-14.84
NEUTRAL	1.810	0.17	33.58	33.75	56.00	14.82	14.99	46.00	-22.25	-31.01
NEUTRAL	16.312	0.61	40.60	41.21	60.00	27.53	28.14	50.00	-18.79	-21.86

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

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESR7	101822	2021/08/16	2022/08/15
Signal Analyzer	Agilent	N9030A	MY51380492	2021/08/17	2022/08/16
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2022/01/20	2023/01/19
Horn Antenna	EMCO	BBHA 9120 D	9120D-456	2022/01/21	2023/01/20
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170159	2021/04/08	2024/04/07
Broadband Amplifier	SGH	SGH118(45dB)	20220105-1	2022/01/07	2023/01/06
Pre-amplifier	SGH	SGH184	20201124-1	2021/12/06	2022/12/05
Power Meter	Anritsu	ML2495A	0844001	2021/10/17	2022/10/16
Power Sensor	Anritsu	MA2491A	031543	2022/03/07	2023/03/06
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2022/03/04	2023/03/03
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2022/03/04	2023/03/03
966-2 Cable	SUHNER	SUCOFLEX 104P	9403/4P	2021/11/30	2022/11/29
RF Cable	SUHNER	SUCOFLEX 104P	CB0006	2021/04/29	2022/04/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2022/01/14	2023/01/13
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2021/05/26	2022/05/25
20dB Attenuator	Mini-Circuits	BW-S20W5+	N/A	2021/05/26	2022/05/25
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	833364/011	2021/05/07	2022/05/06
LISN	R&S	ESH3-Z5	835239/023	2021/09/22	2022/09/21
CON-3 Cable	SUHNER	SUCOFLEX 106	27222 /6	2022/01/12	2023/01/11
Test software	Audix	e3	V4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.16 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.02 dB
Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	5.17 dB
Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.70 dB
Emission on the Band Edge Test	4.32 dB
Occupied Bandwidth	7.78 %
Maximum Peak Conducted Output Power	0.44 dB
Power Spectral Density	1.27 dB
Emissions In Non-Restricted Frequency Bands	1.27 dB
AC Power Line Conducted Emission	3.08 dB