

Johnson Health Tech. Co., Ltd

TEST REPORT

Model:

Target Training Console-02

REPORT NUMBER

240800350THC-001

ISSUE DATE

Sep. 16, 2024

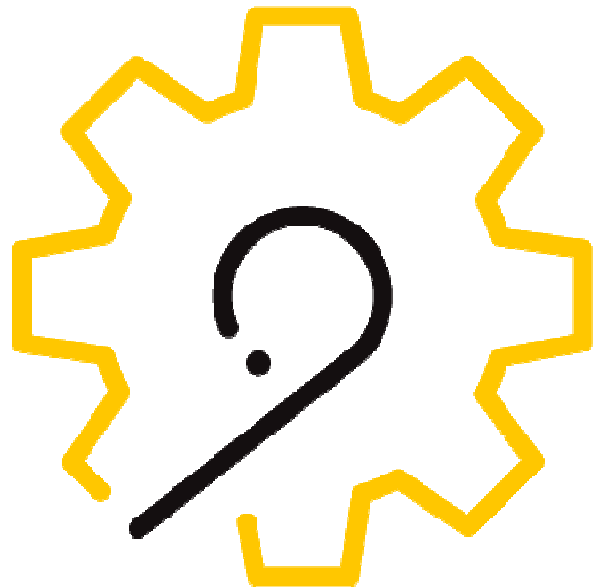
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DOCUMENT CONTROL NUMBER

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Radio Spectrum TEST REPORT

Applicant:	Johnson Health Tech. Co., Ltd. No.999, Sec. 2, Dongda Rd., Daya Dist Taichung City 428, Taiwan
Product:	Console for Exercise Machine
Model No.:	Target Training Console-02
Brand Name:	MATRIX
FCC ID:	TN7PHOENIXRF-02
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
240800350THC-001	Sep. 16, 2024	Change the RFID module. After engineer judgment does not affect other module technologies, no additional tests were considered necessary, then this report are based on Report No.: 210700132THC-001

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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:	Console for Exercise Machine
Model No.:	Target Training Console-02
Operating Frequency:	2412 MHz ~ 2462 MHz
Channel Number:	11 channels
Frequency of Each Channel:	2412+5 k, k=0 ~ 10 for 802.11b, 802.11g, 802.11n HT20
Rated Power:	DC 5V
Power Cord:	N/A
Sample receiving date:	2021/07/09
Sample condition:	Workable
Test Date(s):	2021/08/07 ~ 2021/08/11

1.2 Description of the EUT

Modulation mode	Transmit path	
	Chain 0 / Main	Chain 1 / AUX
802.11b	V	V
802.11g	V	V
802.11n(HT20)	V	V
802.11n(HT40)	X	X

1.3 Antenna description

Antenna 1 (Chain 0)

Antenna Gain : 3 dBi
 Antenna Type : Unipolar Antenna
 Connector Type : I-PEX

Antenna 2 (Chain 1)

Antenna Gain : 3 dBi
 Antenna Type : Unipolar Antenna
 Connector Type : I-PEX

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1.4 Operation mode

The EUT was supplied with DC 5 V from Adapter (Test voltage: 120Vac, 60Hz).

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

With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 13 Mbps data rate for 802.11n(HT20) 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)	1/T Minimum VBW (kHz)
802.11b	6	2437	1	8.41	8.51	98.82%	0.05	0.01
802.11g	6	2437	6	2.05	2.09	97.99%	0.09	0.49
802.11n(HT20)	6	2437	13	1.91	1.94	98.45%	0.07	0.01

1.5 Peripherals equipment

No.	Model no.	Specification
Adapter	GS18U05	I/P: 100-240V~,50/60Hz, 0.5A O/P: 5Vdc 3.0A 15W Max

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H	USB to Micro USB cable 1 meter

2. Minimum 6 dB Bandwidth

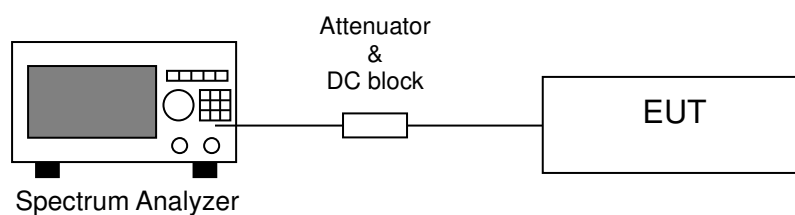
2.1 Instrument Setting

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

2.2 Test Procedure

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

2.3 Test Diagram



2.4 Limit

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

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2.5 Test Results

Temperature (°C) :	27
Relative Humidity (%) :	61
Test date :	2021/8/11

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b Chain0	1	2412	7.08	>0.5	Pass
	6	2437	7.53	>0.5	Pass
	11	2462	7.06	>0.5	Pass
802.11b Chain1	1	2412	7.06	>0.5	Pass
	6	2437	6.55	>0.5	Pass
	11	2462	7.55	>0.5	Pass
802.11g Chain0	1	2412	16.12	>0.5	Pass
	6	2437	16.07	>0.5	Pass
	11	2462	16.33	>0.5	Pass
802.11g Chain1	1	2412	16.34	>0.5	Pass
	6	2437	16.37	>0.5	Pass
	11	2462	16.39	>0.5	Pass
802.11n(HT20) Chain0	1	2412	17.58	>0.5	Pass
	6	2437	17.57	>0.5	Pass
	11	2462	17.57	>0.5	Pass
802.11n(HT20) Chain1	1	2412	17.61	>0.5	Pass
	6	2437	17.60	>0.5	Pass
	11	2462	17.61	>0.5	Pass

Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 1



Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 6



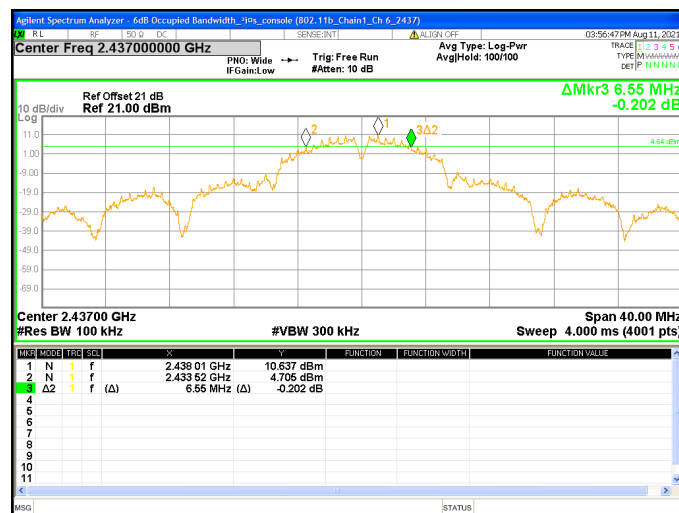
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch11



Chain1 : 6dB Bandwidth @ 802.11b Mode Ch 1



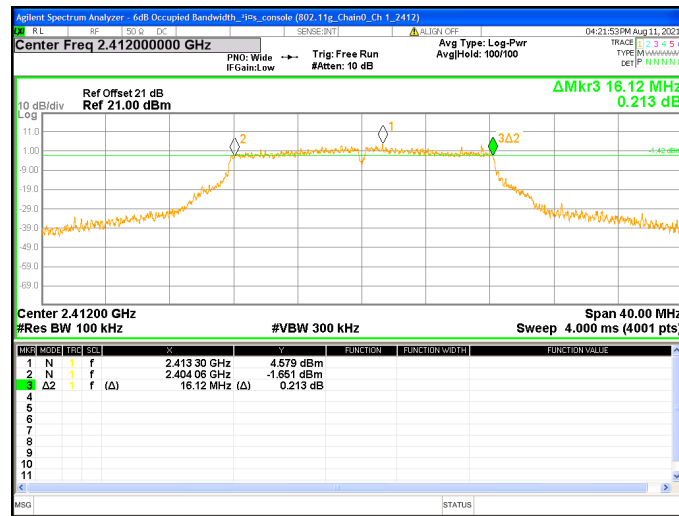
Chain1 : 6dB Bandwidth @ 802.11b Mode Ch 6



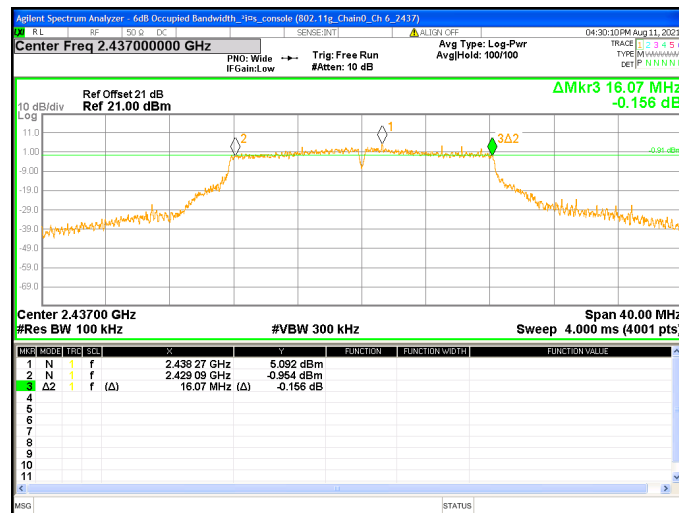
Chain1 : 6dB Bandwidth @ 802.11b Mode Ch11



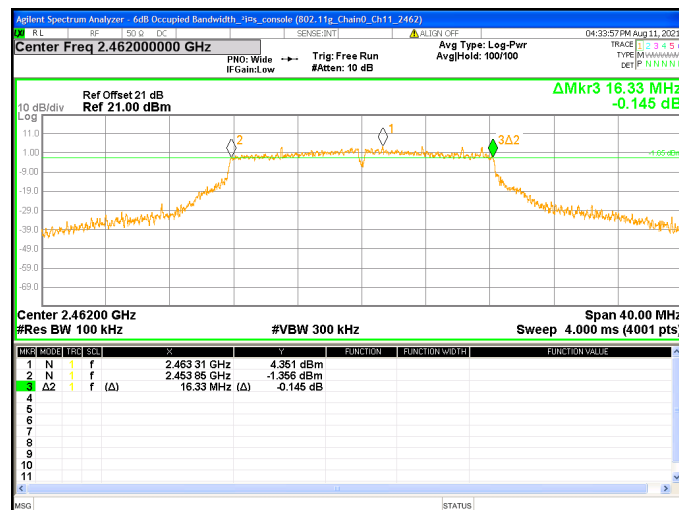
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 1



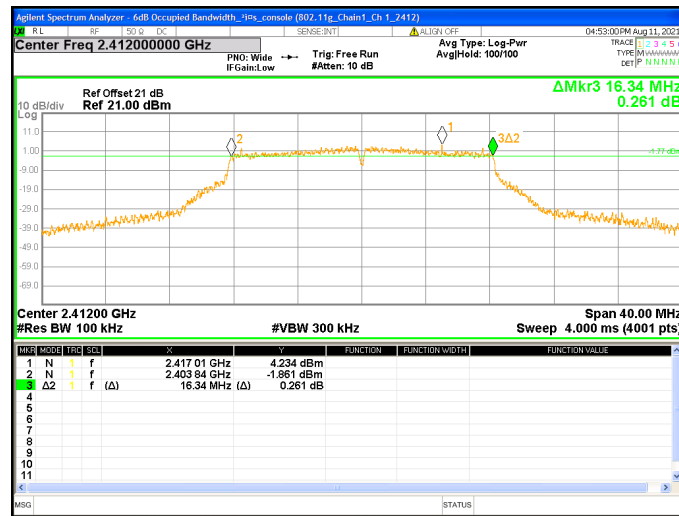
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 6



Chain0 : 6dB Bandwidth @ 802.11g Mode Ch11



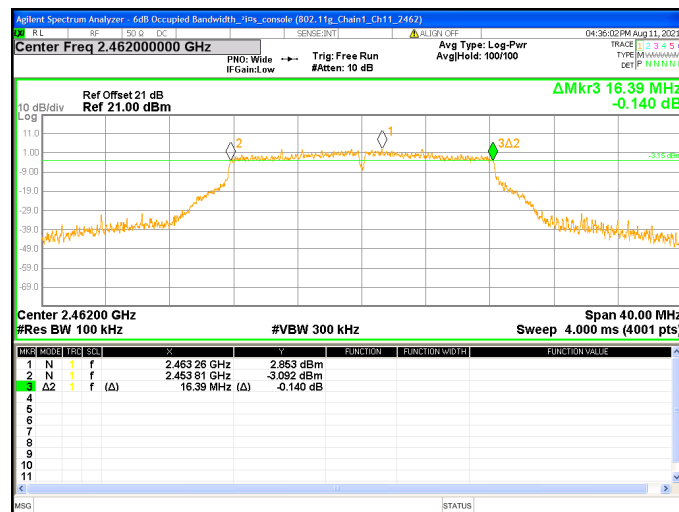
Chain1 : 6dB Bandwidth @ 802.11g Mode Ch 1



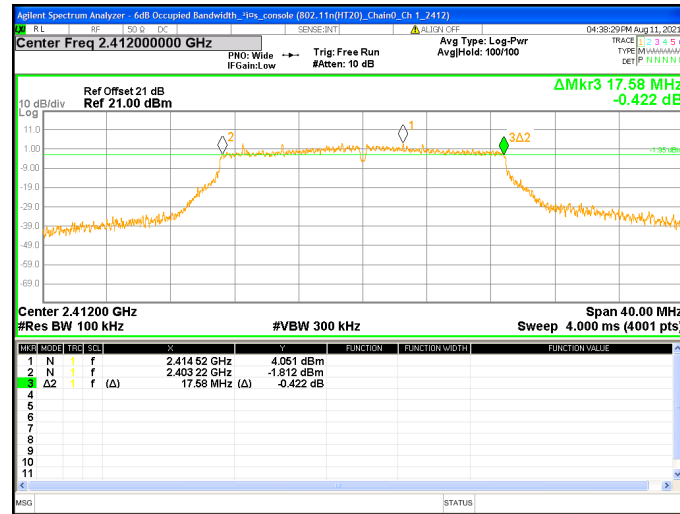
Chain1 : 6dB Bandwidth @ 802.11g Mode Ch 6



Chain1 : 6dB Bandwidth @ 802.11g Mode Ch11



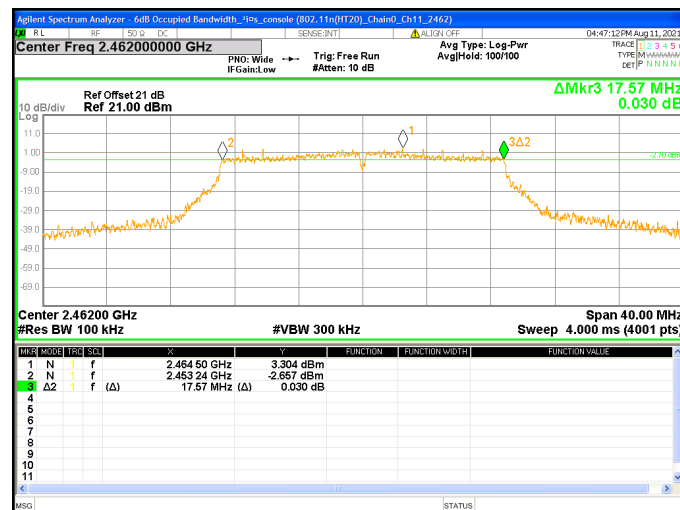
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1



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



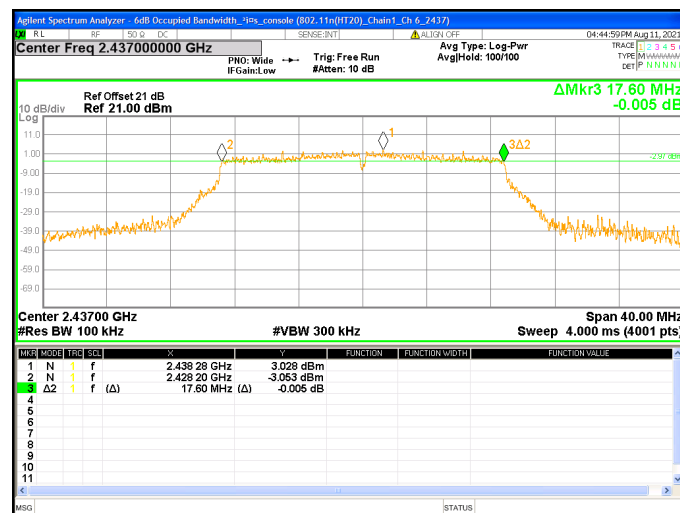
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch11



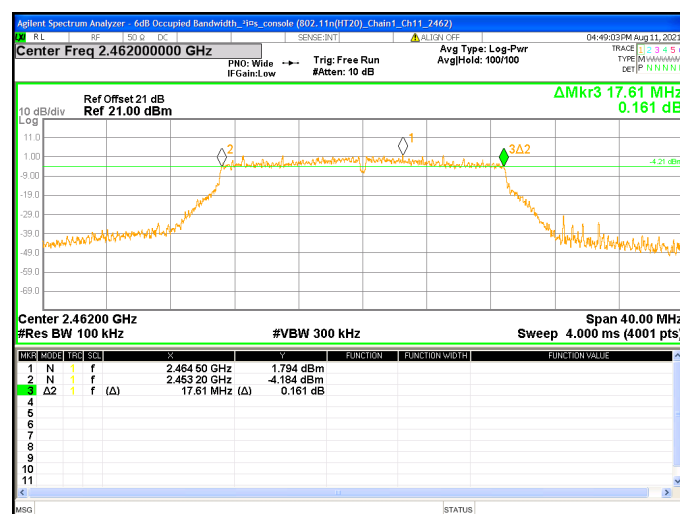
Chain1 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1



Chain1 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 6



Chain1 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch11



3. Maximum Peak Conducted Output Power

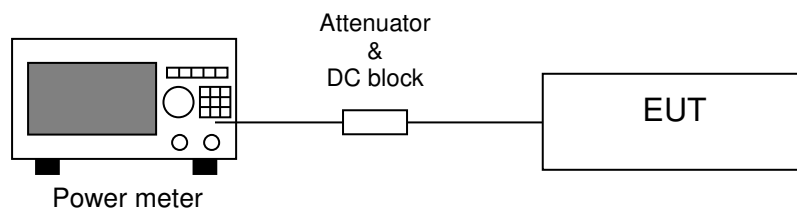
3.1 Instrument Setting

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

3.2 Test Procedure

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

3.3 Test Diagram



3.4 Limit

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

3.5 Test Results

Temperature (°C) :	27
Relative Humidity (%) :	61
Test date :	2021/8/11

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)				Output Power (mW)				Total Power (dBm)				Limit (dBm)	Margin (dB)
				Chian 0		Chain 1		Chain 0		Chian 1		AV		PK			
				AV	PK	AV	PK	AV	PK	AV	PK	0+1(mW)	0+1(dBm)	0+1(mW)	0+1(dBm)		
802.11b Chain0+1	1	2412	1	17.25	20.44	18.11	21.71	53.09	110.66	64.71	148.25	117.80	20.71	258.91	24.13	30	-5.87
	6	2437		18.46	21.28	17.46	20.34	70.15	134.28	55.72	108.14	125.86	21.00	242.42	23.85	30	-6.15
	11	2462		18.30	21.19	17.96	21.35	67.61	131.52	62.52	136.46	130.13	21.14	267.98	24.28	30	-5.72
802.11g Chain0+1	1	2412	6	16.38	24.22	16.03	23.73	43.45	264.24	40.09	236.05	83.54	19.22	500.29	26.99	30	-3.01
	6	2437		16.14	24.99	16.38	24.39	41.11	315.50	43.45	274.79	84.57	19.27	590.29	27.71	30	-2.29
	11	2462		16.00	23.25	15.07	23.26	39.81	211.35	32.14	211.84	71.95	18.57	423.19	26.27	30	-3.73
802.11n(HT20) Chain0+1	1	2412	13	16.36	25.18	16.34	24.49	43.25	329.61	43.05	281.19	86.30	19.36	610.80	27.86	30	-2.14
	6	2437		16.22	24.30	15.14	23.05	41.88	269.15	32.66	201.84	74.54	18.72	470.99	26.73	30	-3.27
	11	2462		14.93	23.07	14.22	22.79	31.12	202.77	26.42	190.11	57.54	17.60	392.88	25.94	30	-4.06

4. Power Spectral Density

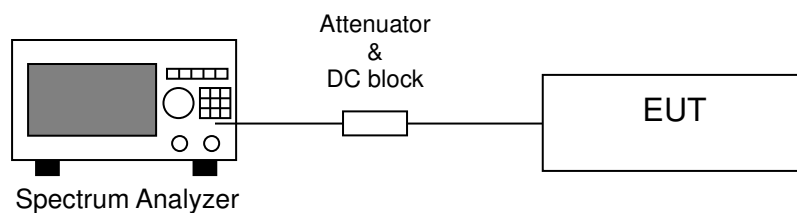
4.1 Instrument Setting

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

4.2 Test Procedure

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

4.3 Test Diagram



4.4 Limit

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

4.5 Test Results

Temperature (°C) :	27
Relative Humidity (%) :	61
Test date :	2021/8/11

Mode	Channel	Frequency (MHz)	RBW Factor	PSD (dBm) in 10kHz		PSD (dBm) in 3kHz		Total PSD		MIMO Correction	Result	Limit (dBm)	Margin (dB)
				chain0	chain1	chain0	chain1	mW	dBm				
802.11b Chain0+1	1	2412	5.23	-1.74	-1.13	-6.97	-6.36	0.43	-3.64	3.01	-0.63	8	-8.63
	6	2437	5.23	-2.28	-2.11	-7.51	-7.34	0.36	-4.41	3.01	-1.40	8	-9.40
	11	2462	5.23	-3.43	-1.26	-8.66	-6.49	0.36	-4.43	3.01	-1.42	8	-9.42
802.11g Chain0+1	1	2412	5.23	-7.27	-7.32	-12.50	-12.55	0.11	-9.51	3.01	-6.50	8	-14.50
	6	2437	5.23	-8.16	-8.76	-13.39	-13.99	0.09	-10.67	3.01	-7.66	8	-15.66
	11	2462	5.23	-8.32	-8.51	-13.55	-13.74	0.09	-10.63	3.01	-7.62	8	-15.62
802.11n(HT20) Chain0+1	1	2412	5.23	-7.58	-8.72	-12.81	-13.95	0.09	-10.33	3.01	-7.32	8	-15.32
	6	2437	5.23	-8.40	-8.65	-13.63	-13.88	0.08	-10.74	3.01	-7.73	8	-15.73
	11	2462	5.23	-9.55	-9.91	-14.78	-15.14	0.06	-11.94	3.01	-8.93	8	-16.93

Note: Correction (RBW) Factor in 3kHz = $10\log(10\text{kHz}/3\text{kHz}) = 5.23$

MIMO Correction: $10\log(N_{ant}) = 10\log(2) = 3.01$

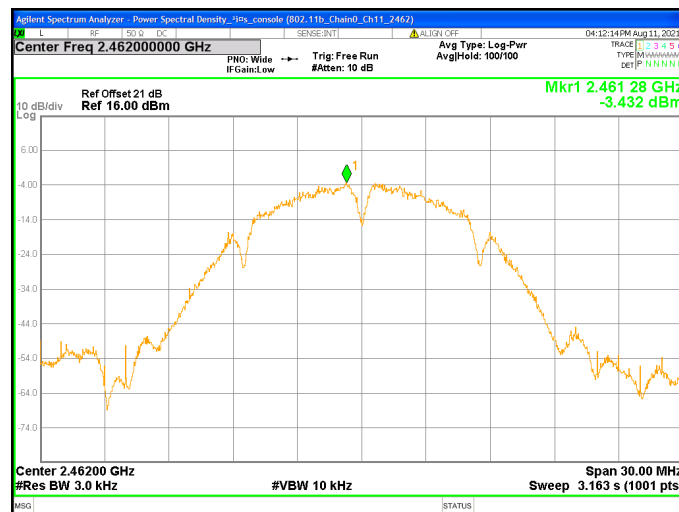
Chain0 : Power Spectral Density @ 802.11b Mode Ch 1



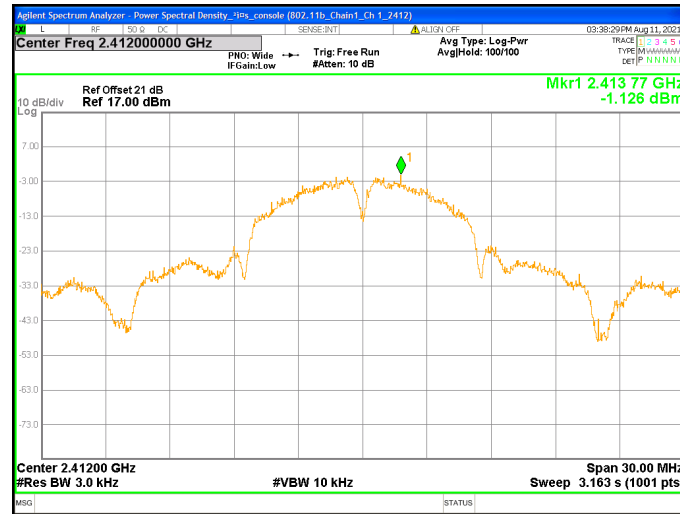
Chain0 : Power Spectral Density @ 802.11b Mode Ch 6



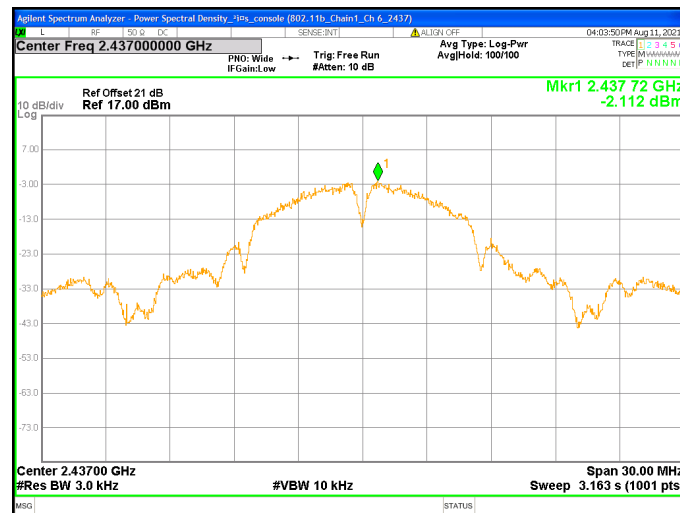
Chain0 : Power Spectral Density @ 802.11b Mode Ch11



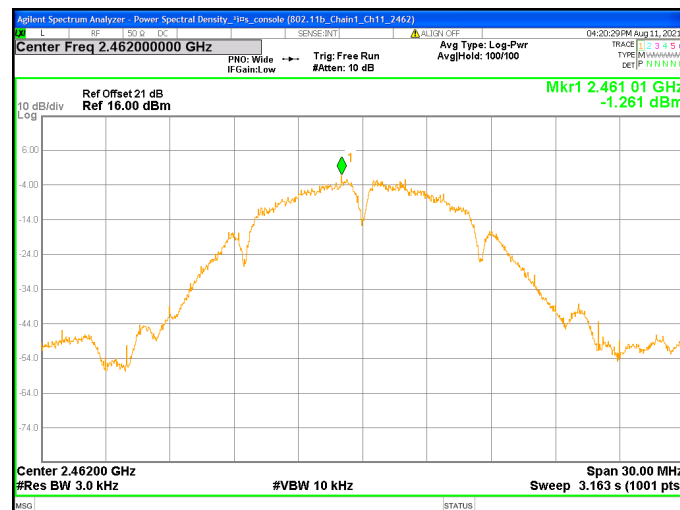
Chain1 : Power Spectral Density @ 802.11b Mode Ch 1



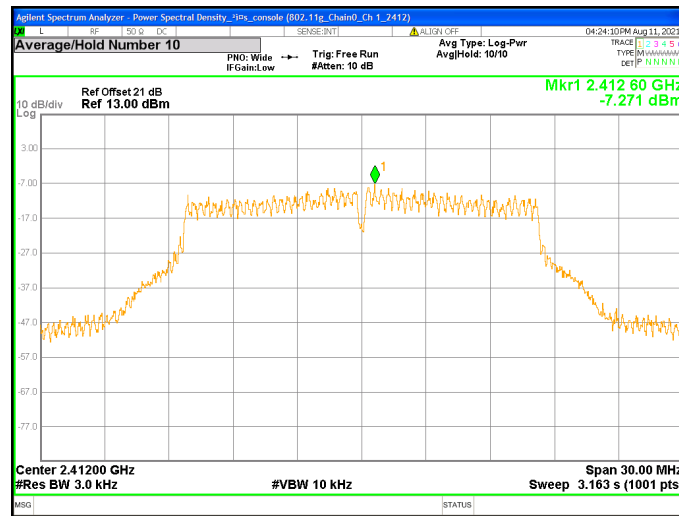
Chain1 : Power Spectral Density @ 802.11b Mode Ch 6



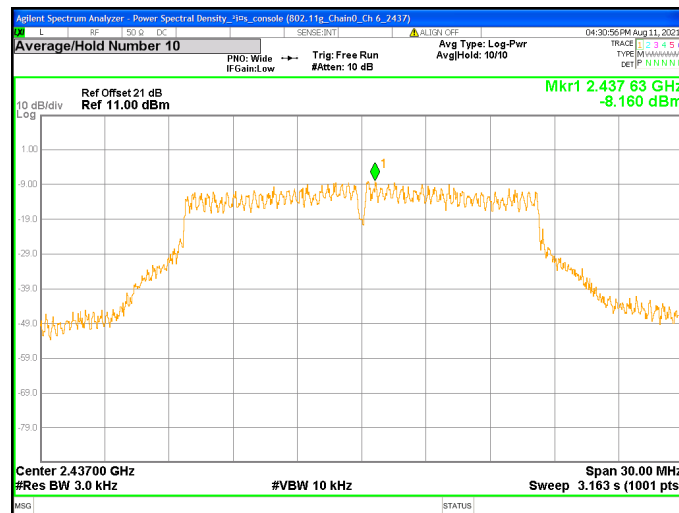
Chain1 : Power Spectral Density @ 802.11b Mode Ch11



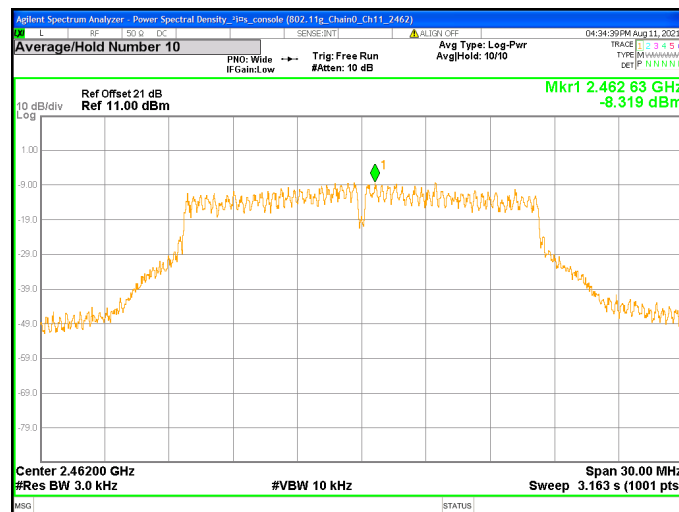
Chain0 : Power Spectral Density @ 802.11g Mode Ch 1



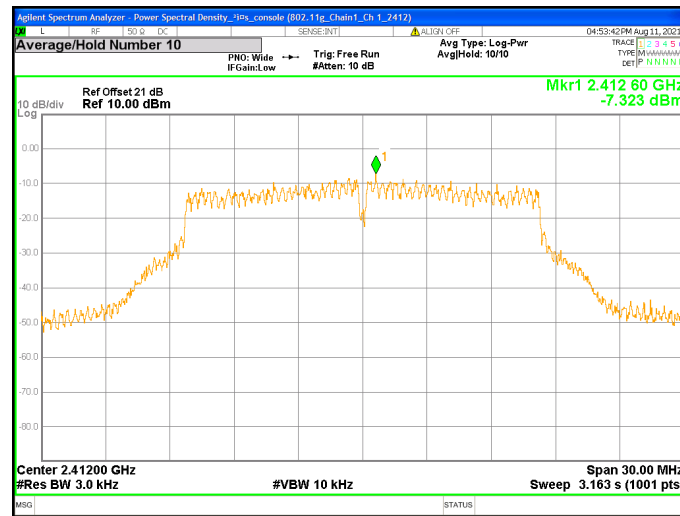
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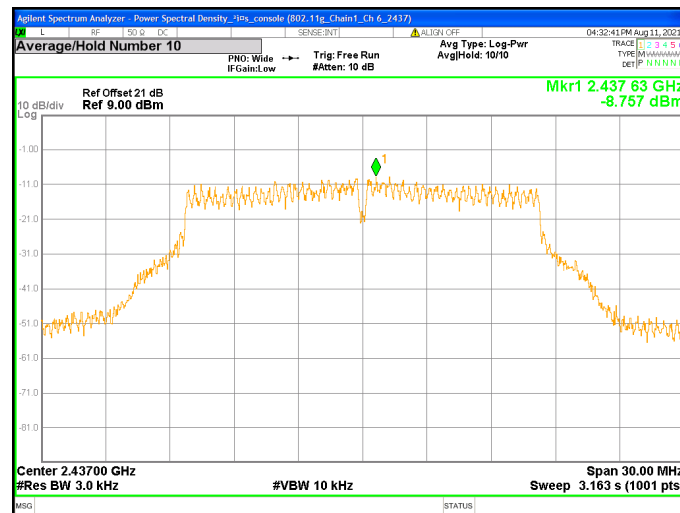
Chain0 : Power Spectral Density @ 802.11g Mode Ch11



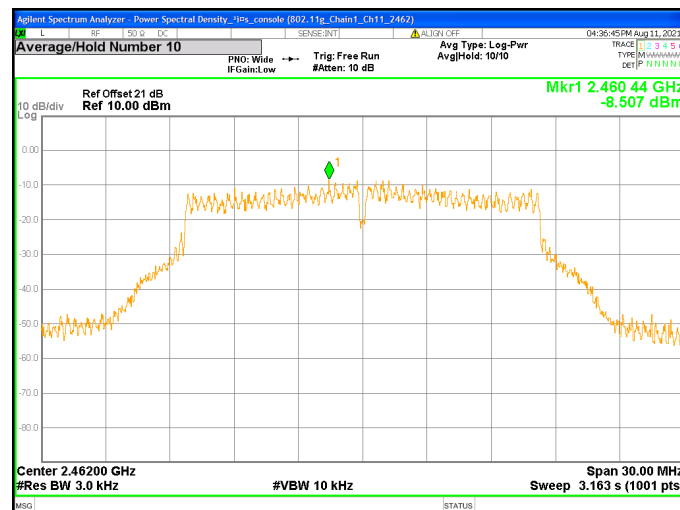
Chain1 : Power Spectral Density @ 802.11g Mode Ch 1



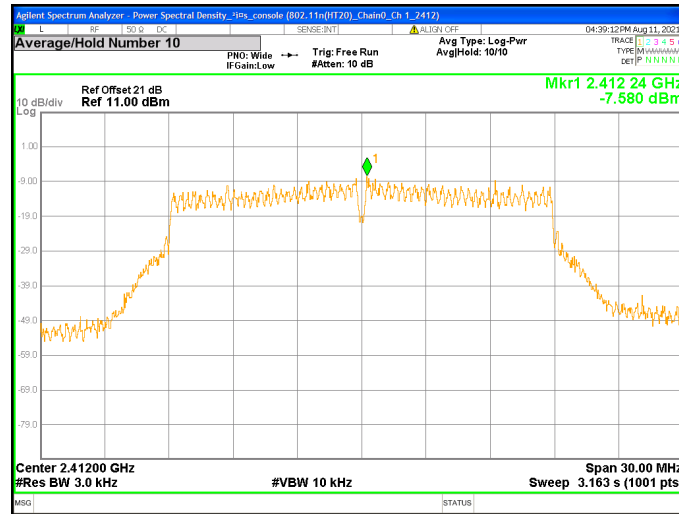
Chain1 : Power Spectral Density @ 802.11g Mode Ch 6



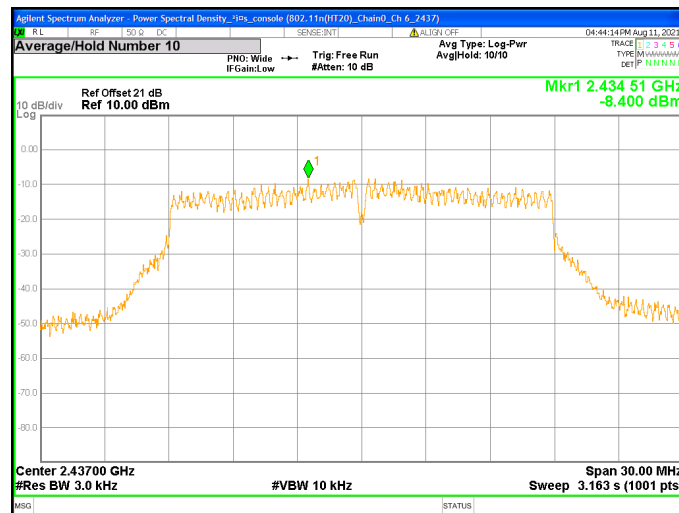
Chain1 : Power Spectral Density @ 802.11g Mode Ch11



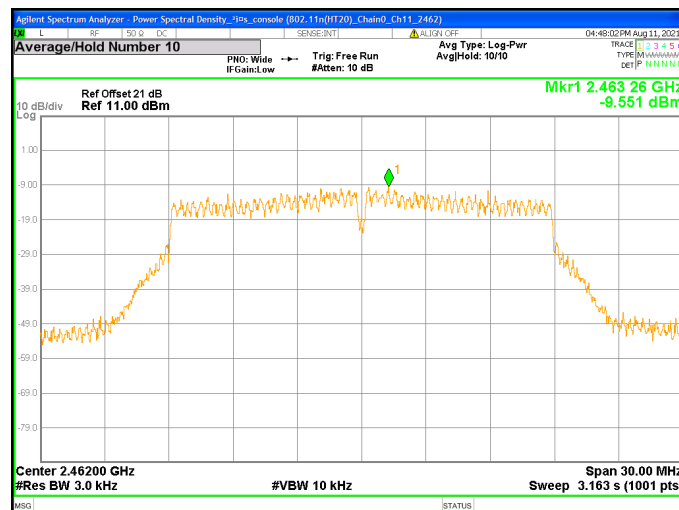
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



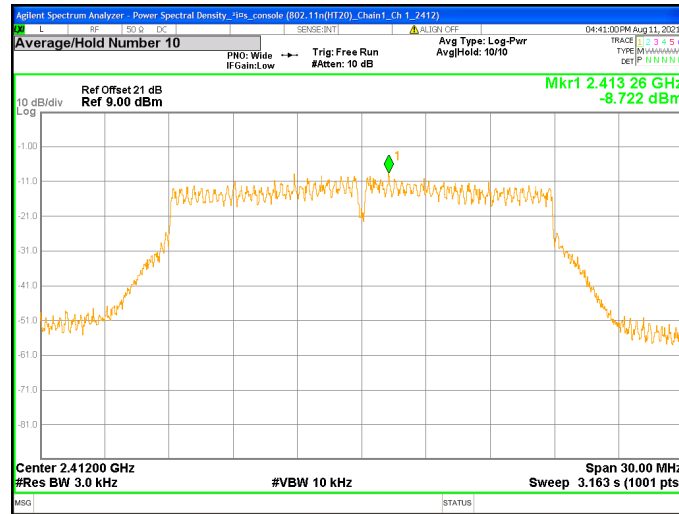
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



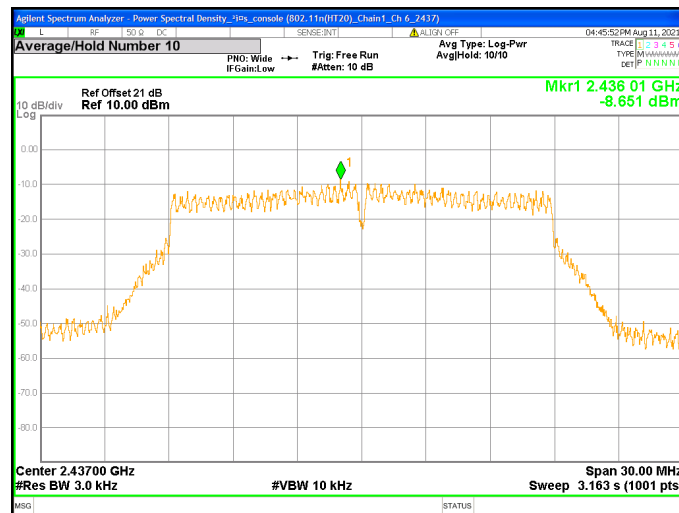
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



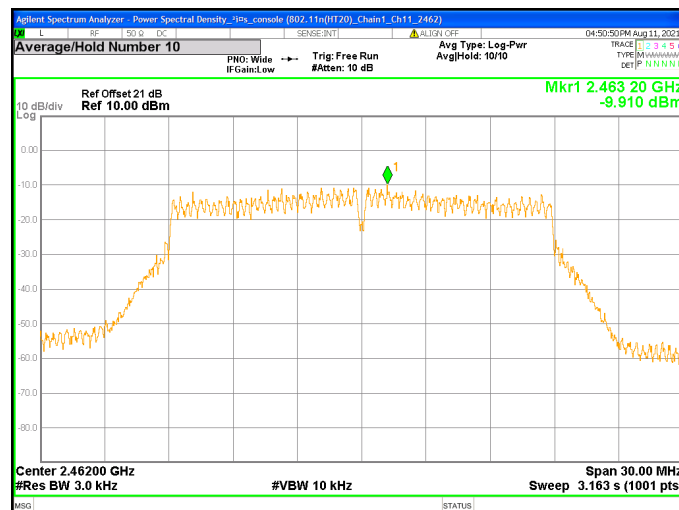
Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



5. Emissions in Non-Restricted Frequency Bands

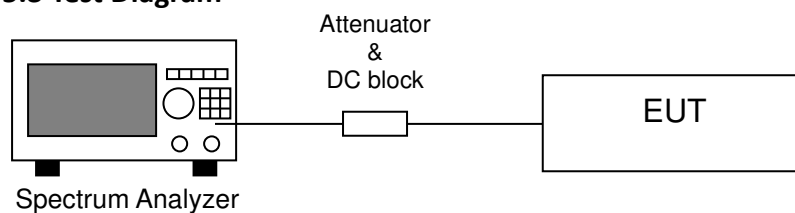
5.1 Instruments Setting

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

5.2 Test Procedure

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

5.3 Test Diagram



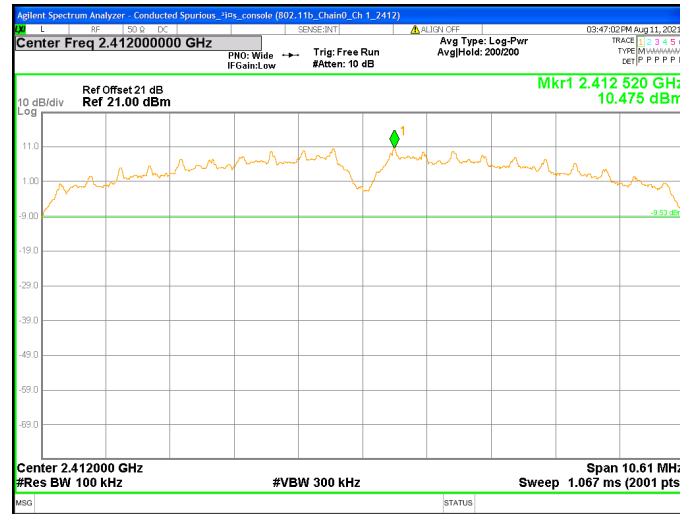
5.4 Limit

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

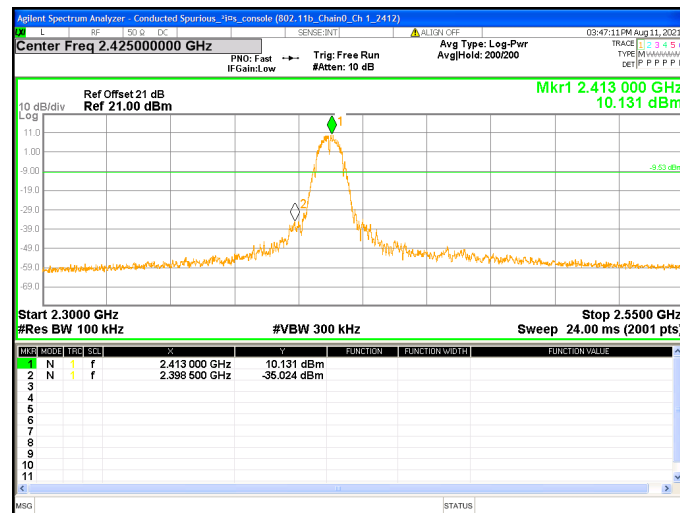
5.5 Test Results

Temperature (°C) :	27
Relative Humidity (%) :	61
Test date :	2021/8/11

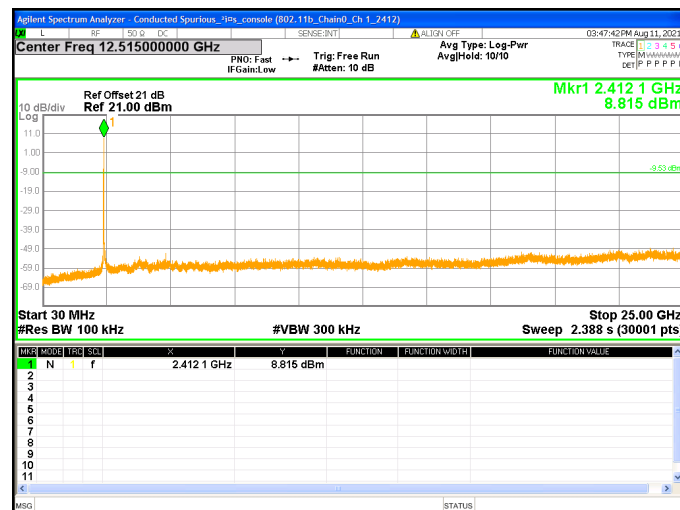
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



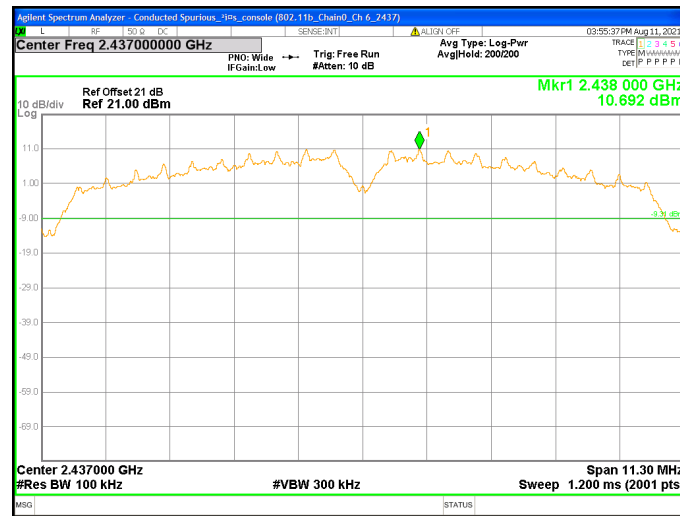
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



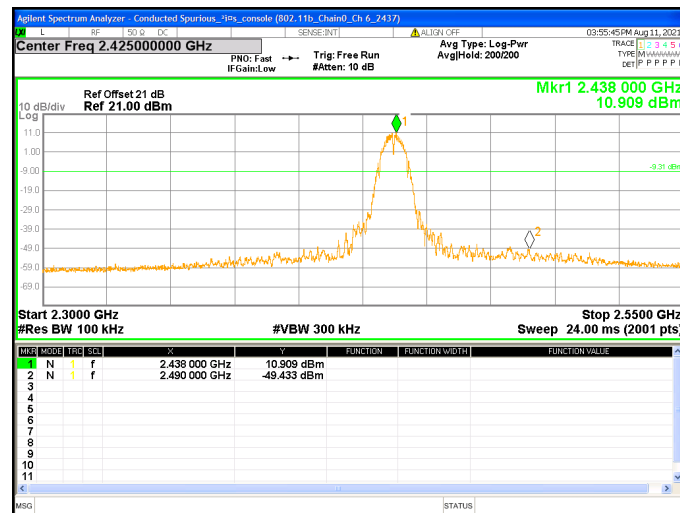
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



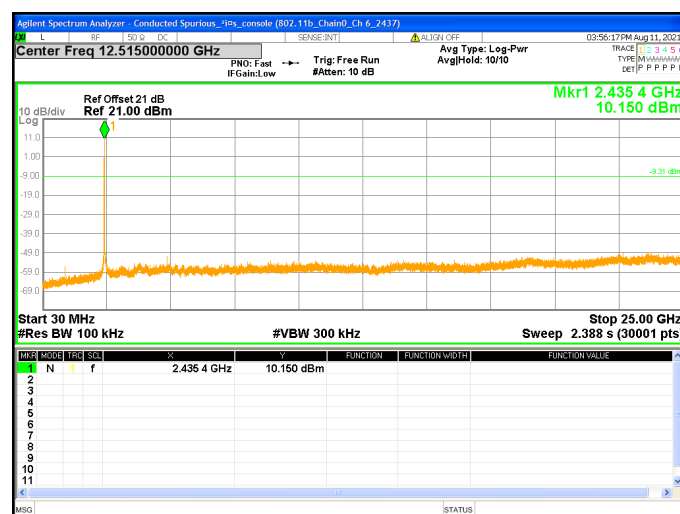
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



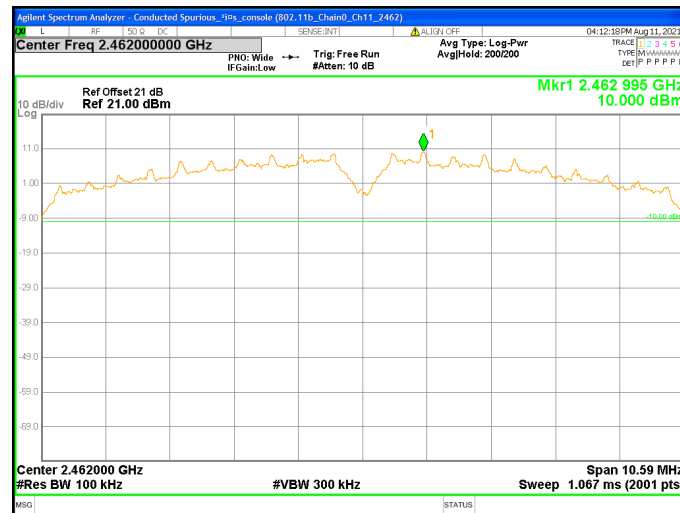
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



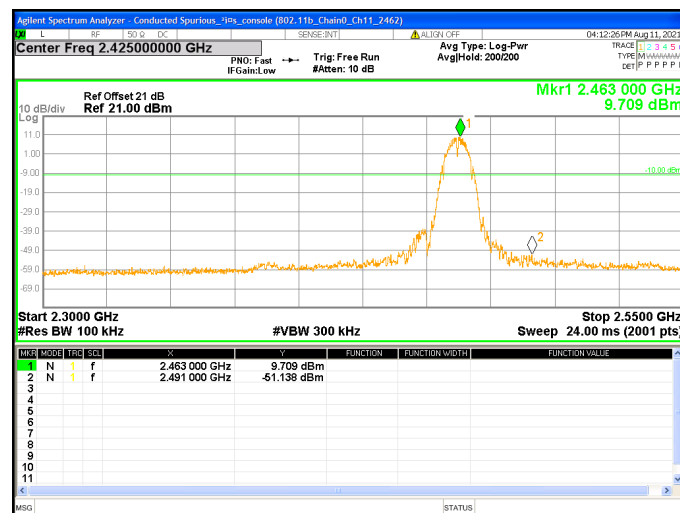
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



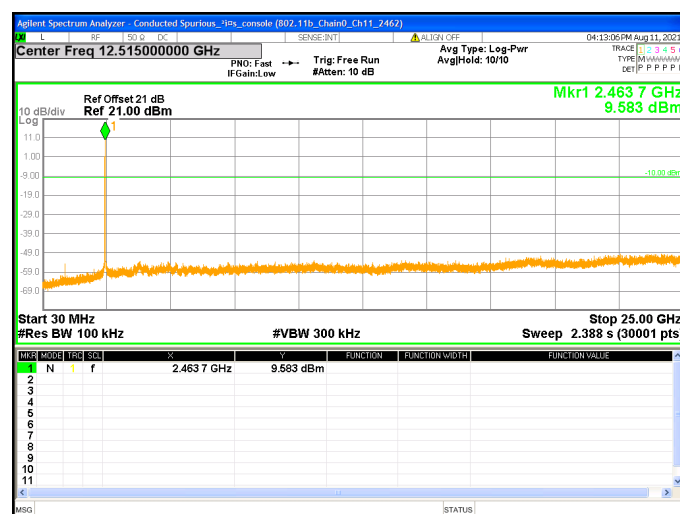
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



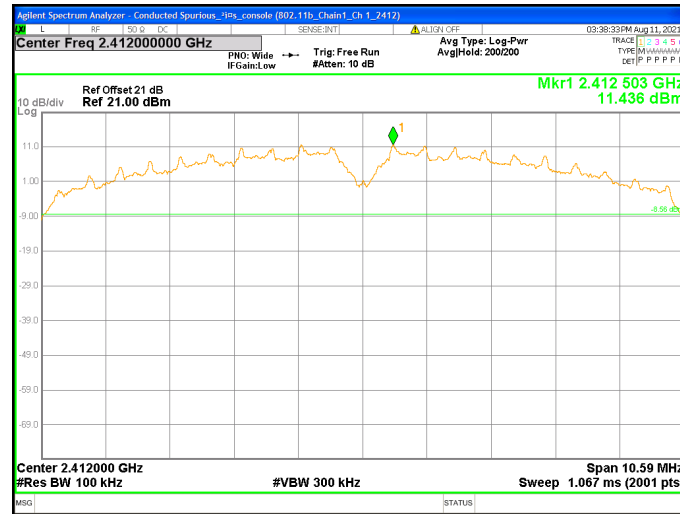
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



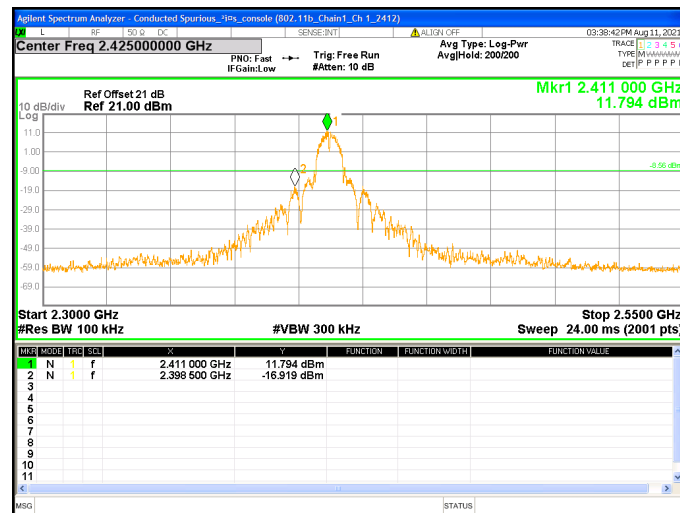
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



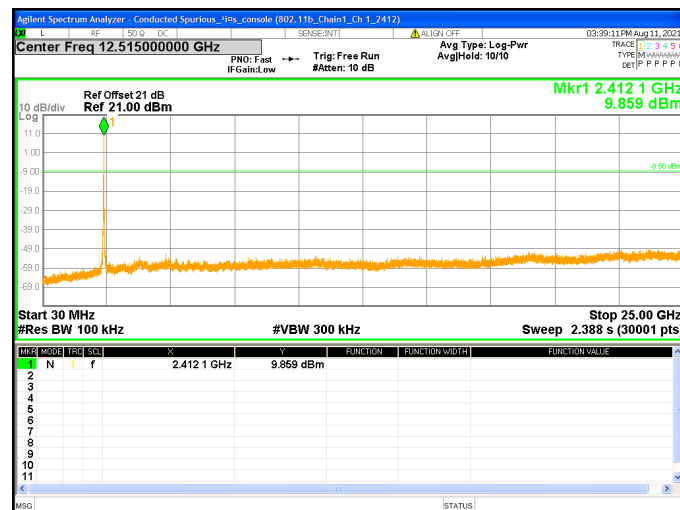
Chain1 : Conducted Spurious @ 802.11b Mode Ch 1



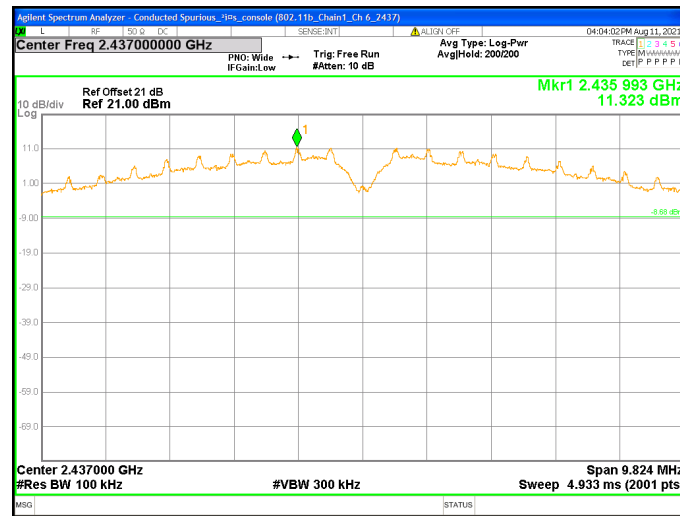
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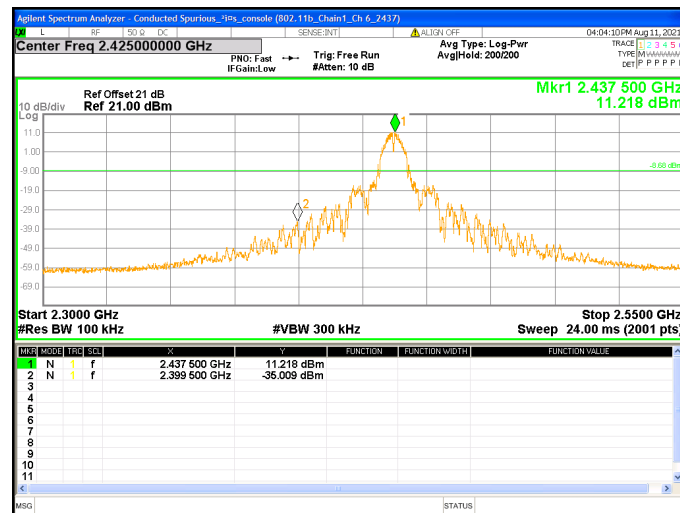
Chain1 : Conducted Spurious @ 802.11b Mode Ch 1



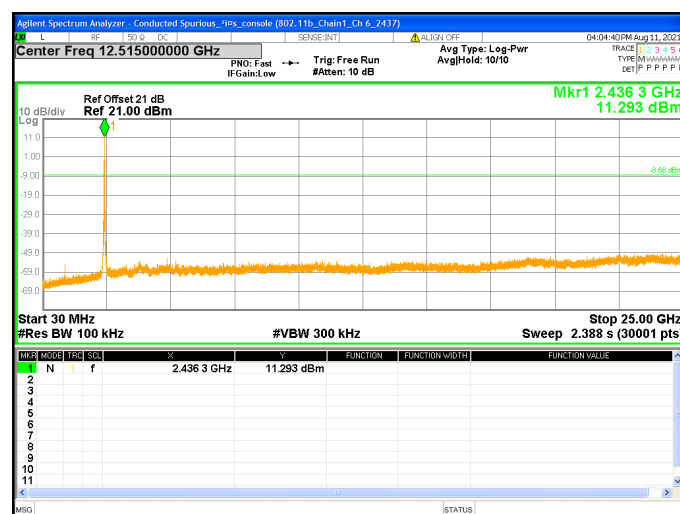
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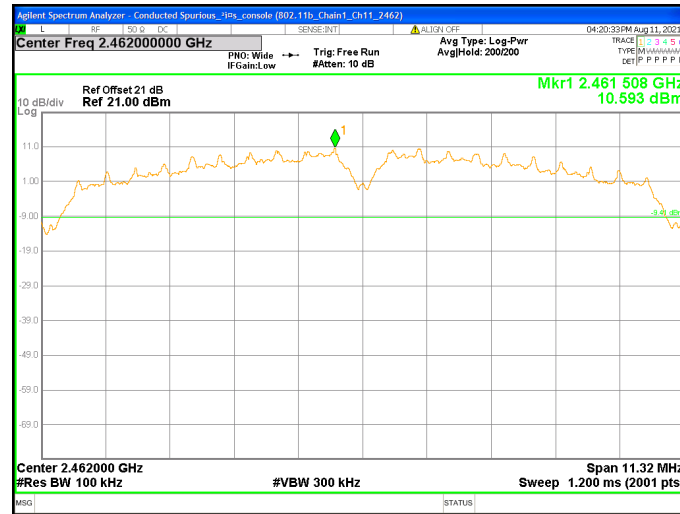
Chain1 : Conducted Spurious @ 802.11b Mode Ch 6



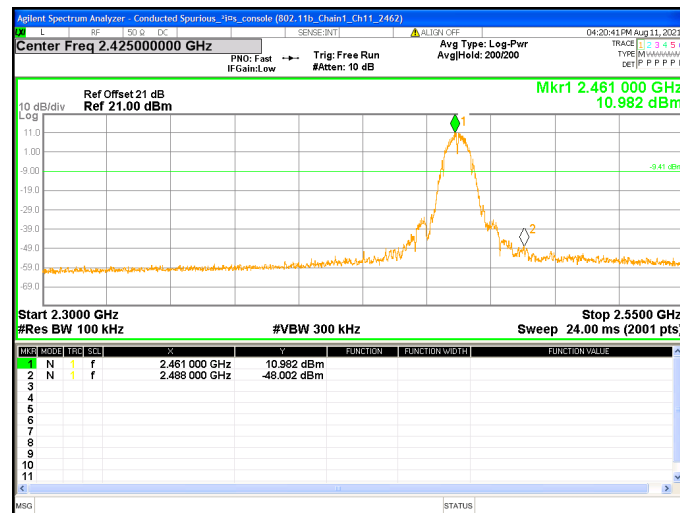
Chain1 : Conducted Spurious @ 802.11b Mode Ch 6



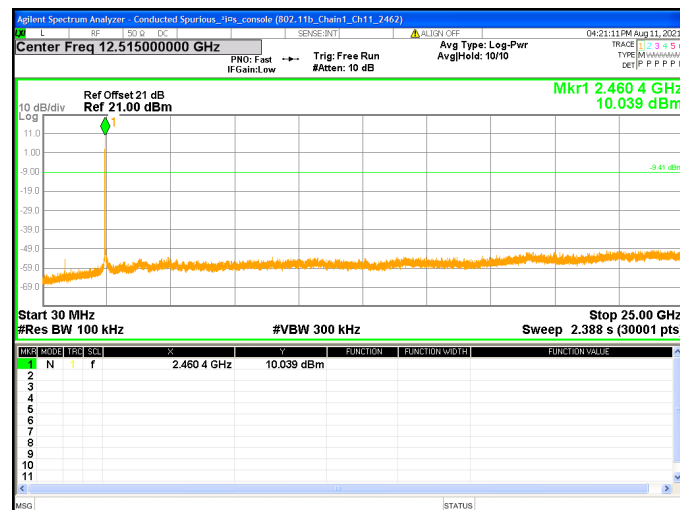
Chain1 : Conducted Spurious @ 802.11b Mode Ch11



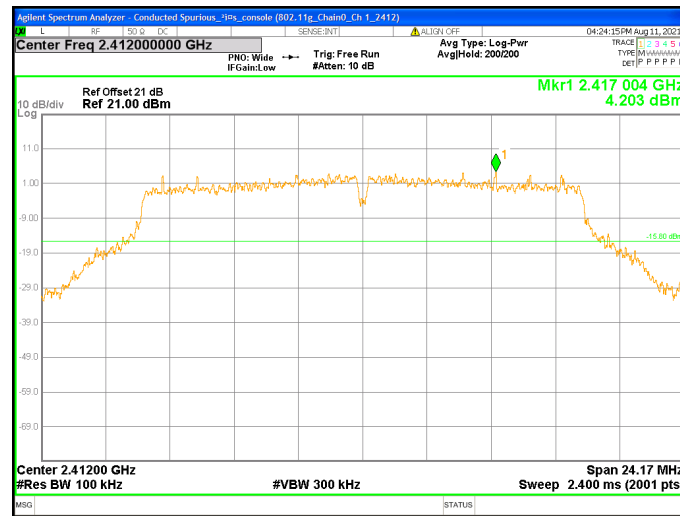
Chain1 : Conducted Spurious @ 802.11b Mode Ch11



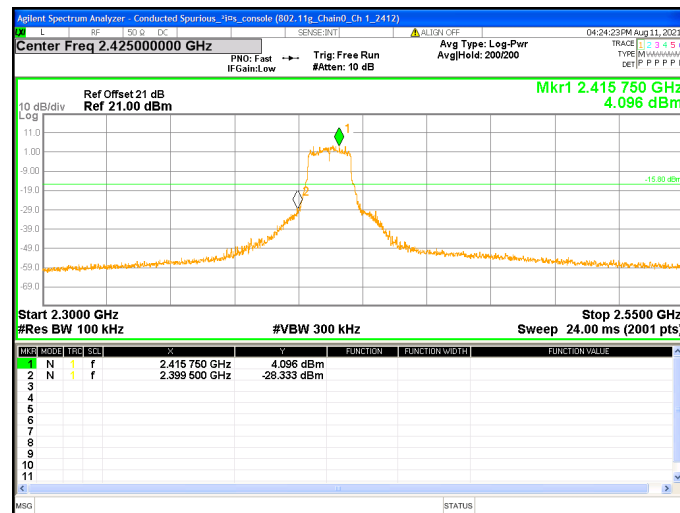
Chain1 : Conducted Spurious @ 802.11b Mode Ch11



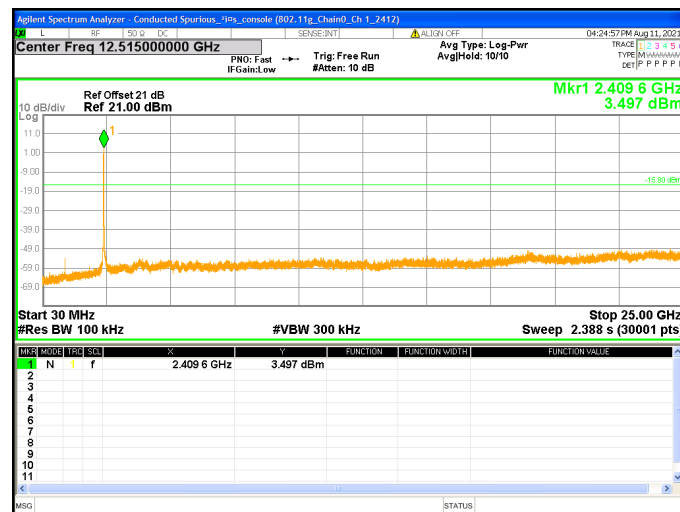
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



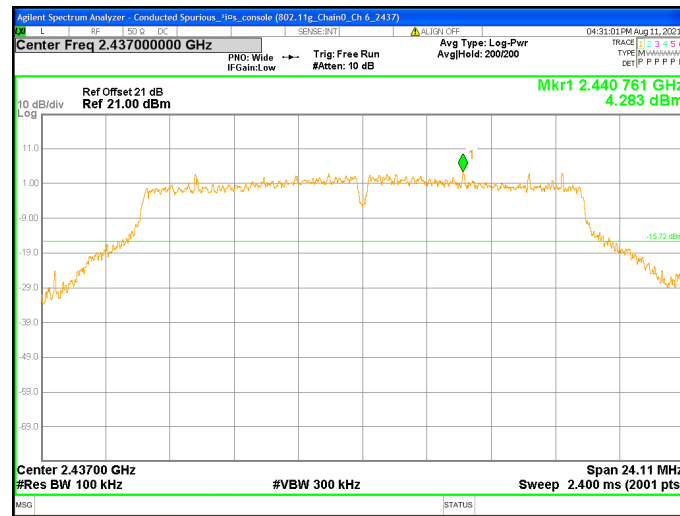
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



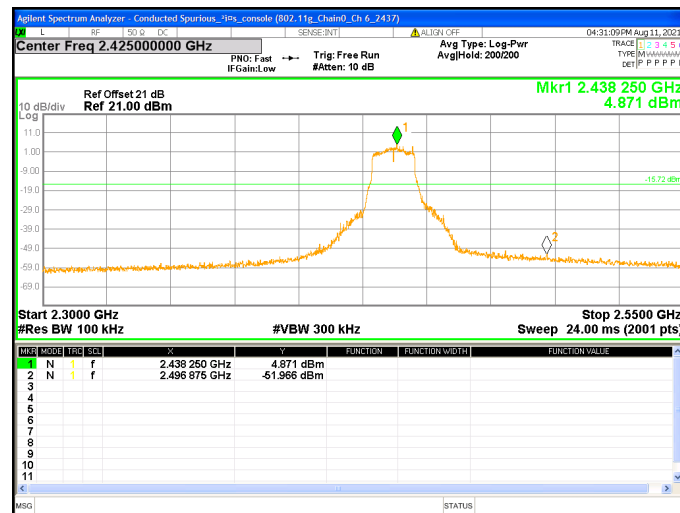
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



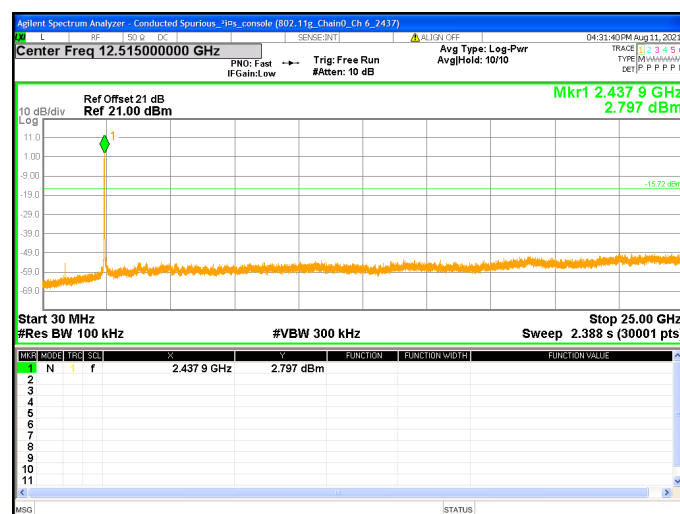
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



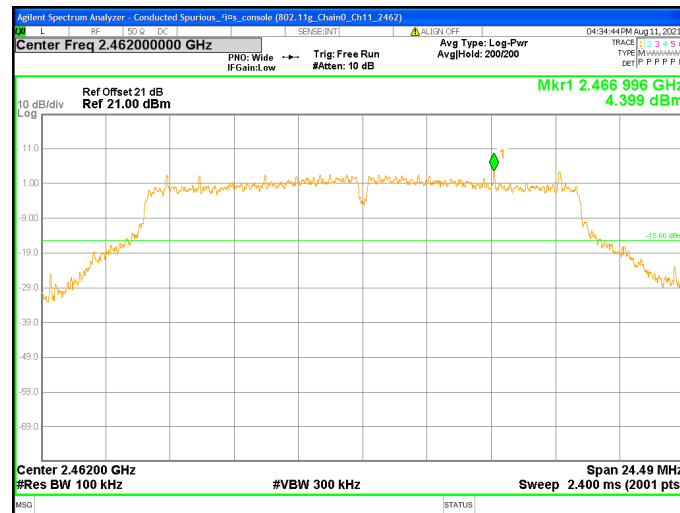
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



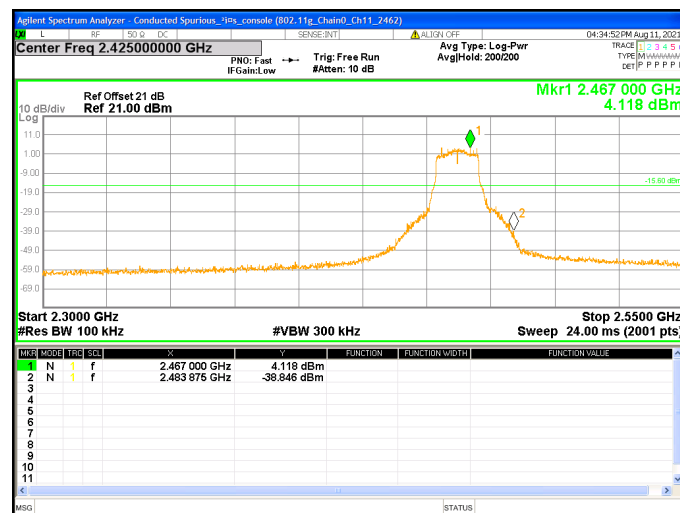
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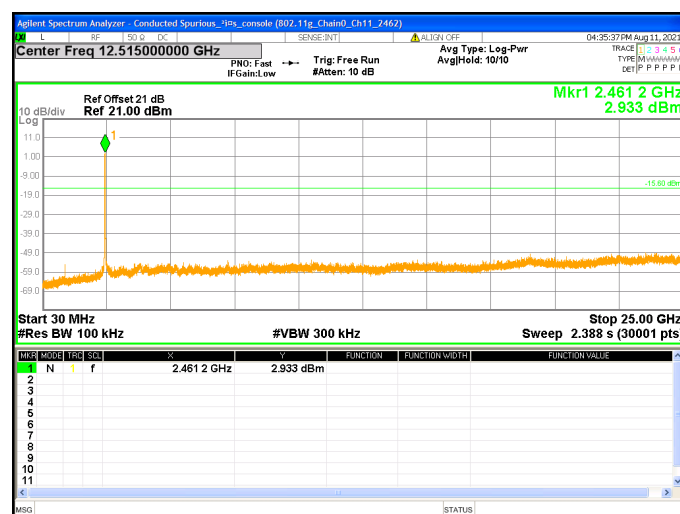
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



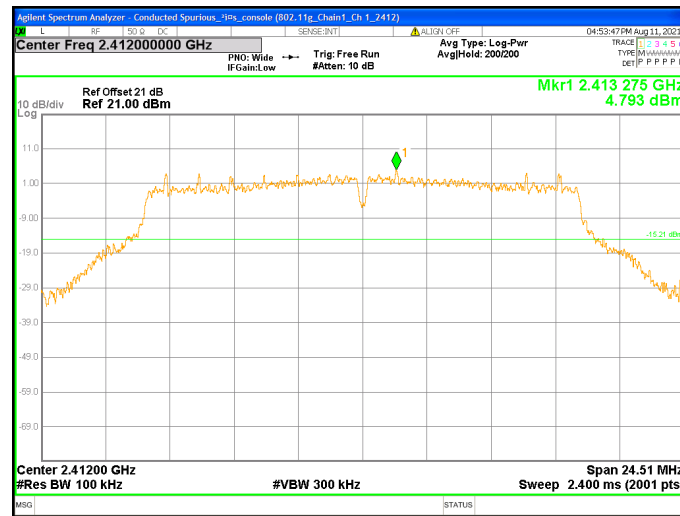
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



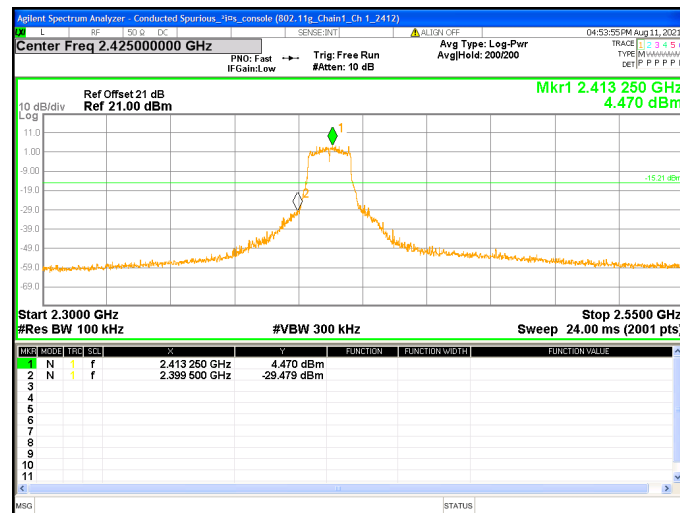
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



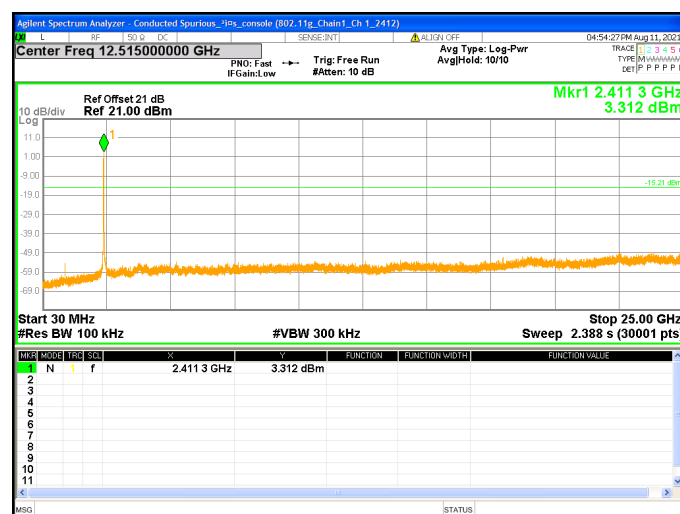
Chain1 : Conducted Spurious @ 802.11g Mode Ch 1



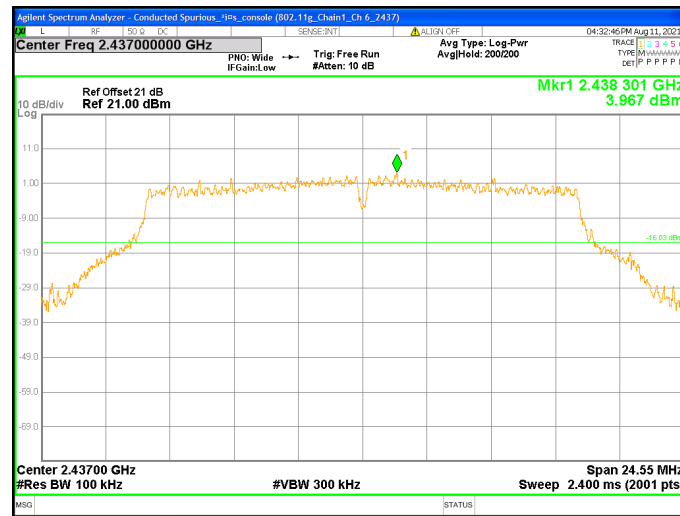
Chain1 : Conducted Spurious @ 802.11g Mode Ch 1



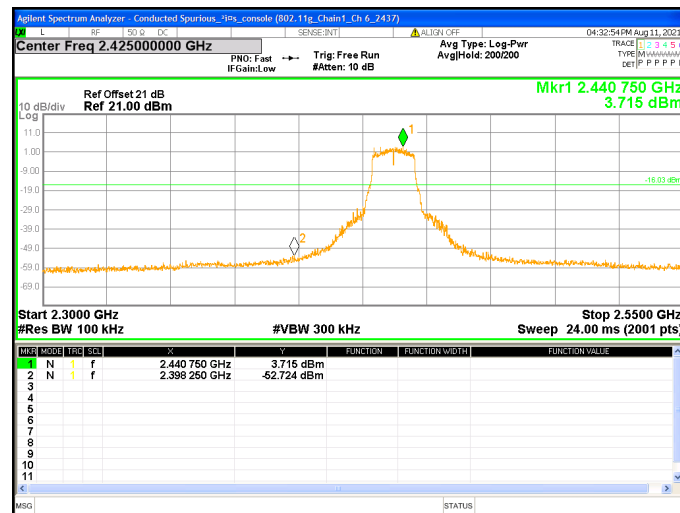
Chain1 : Conducted Spurious @ 802.11g Mode Ch 1



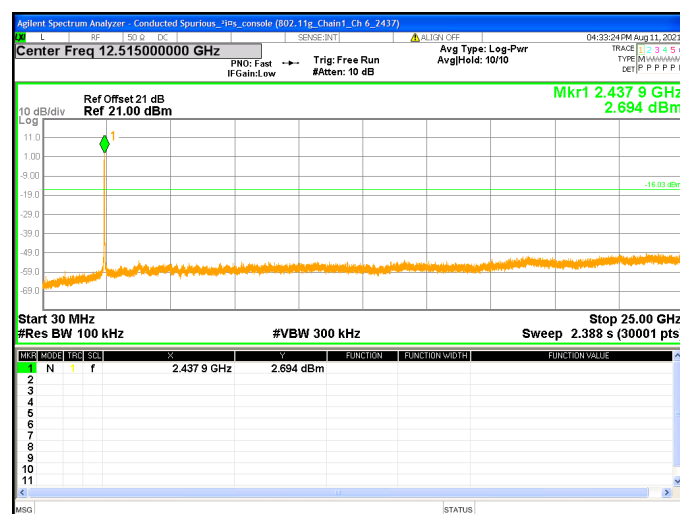
Chain1 : Conducted Spurious @ 802.11g Mode Ch 6



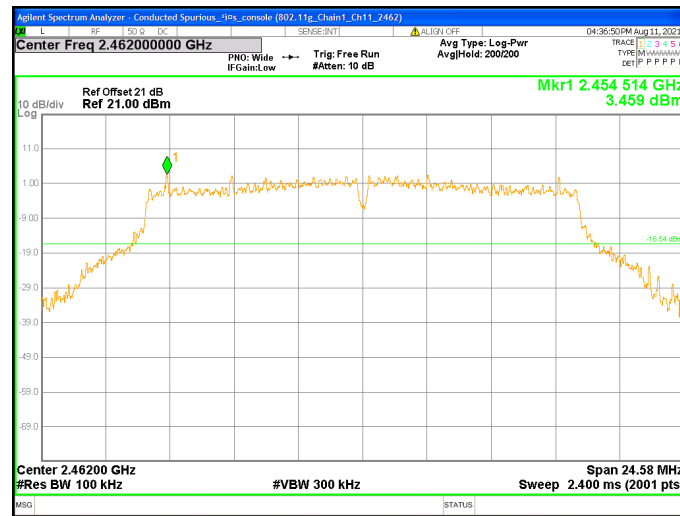
Chain1 : Conducted Spurious @ 802.11g Mode Ch 6



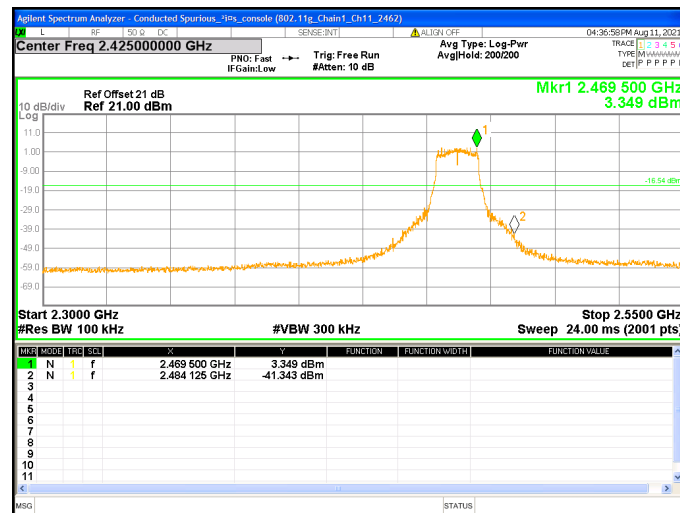
Chain1 : Conducted Spurious @ 802.11g Mode Ch 6



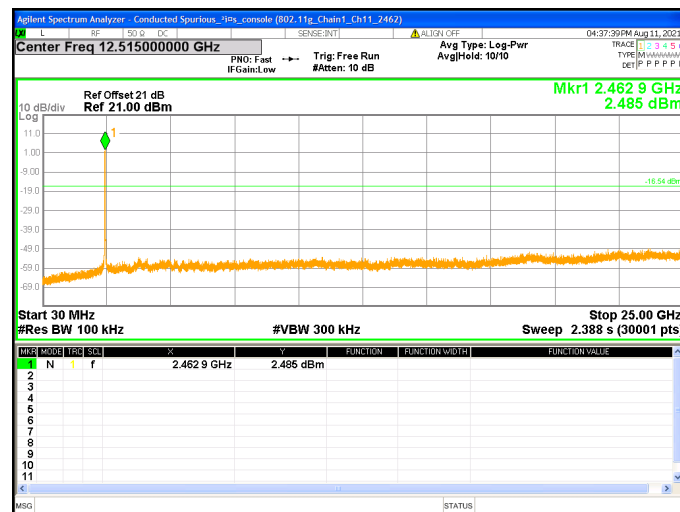
Chain1 : Conducted Spurious @ 802.11g Mode Ch11



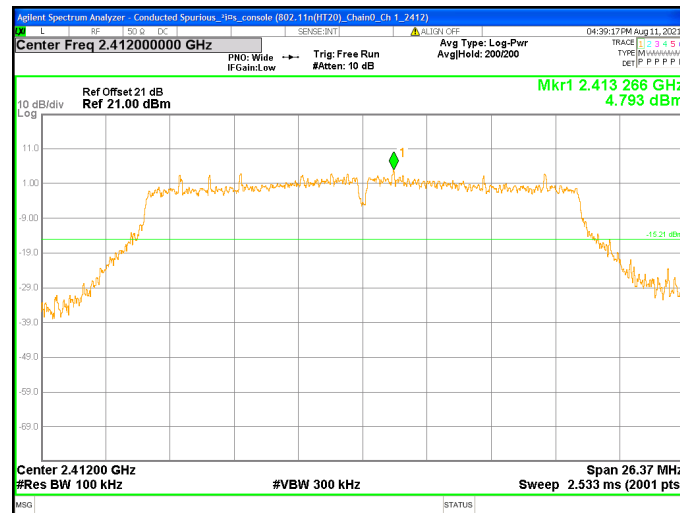
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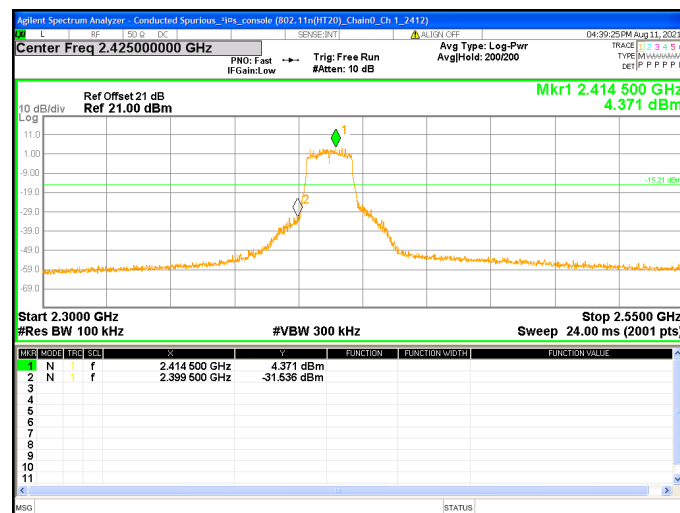
Chain1 : Conducted Spurious @ 802.11g Mode Ch11



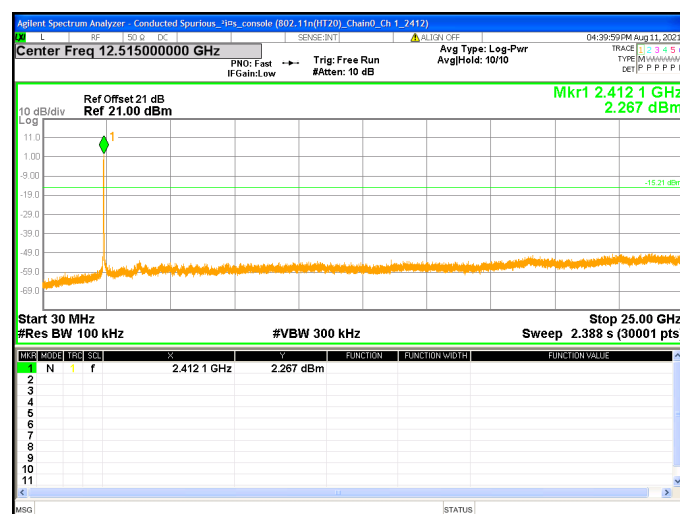
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



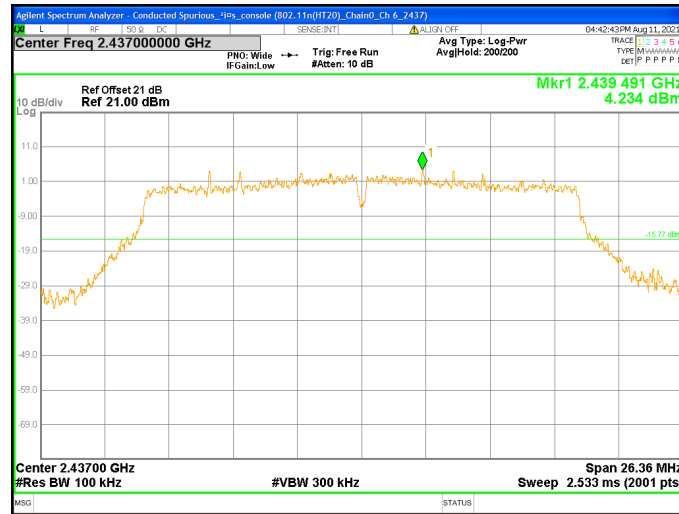
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



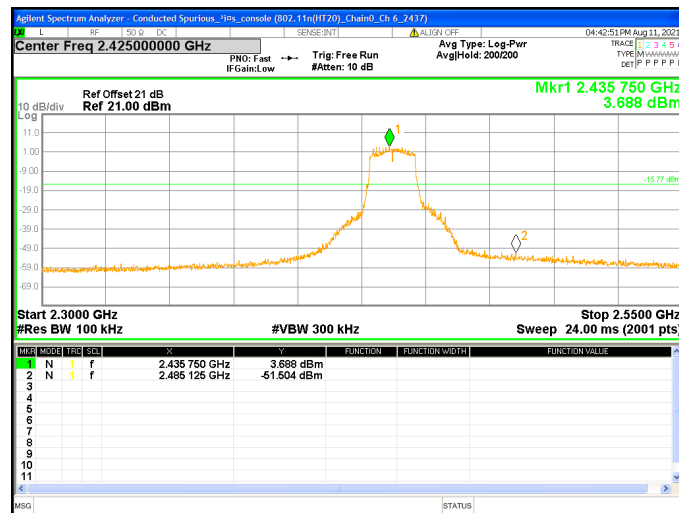
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



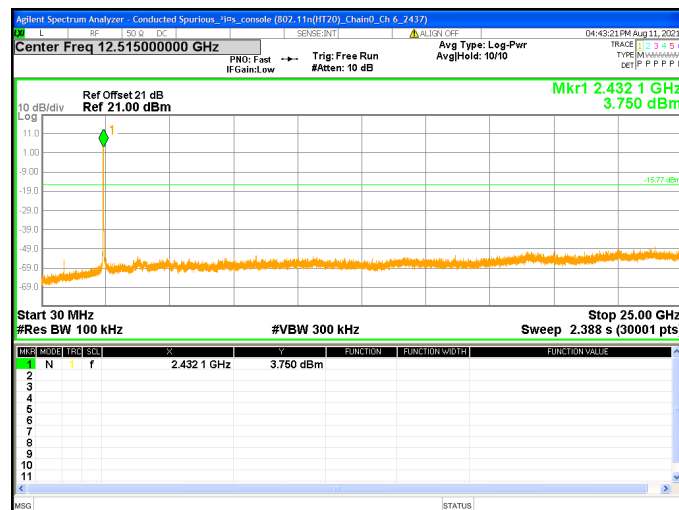
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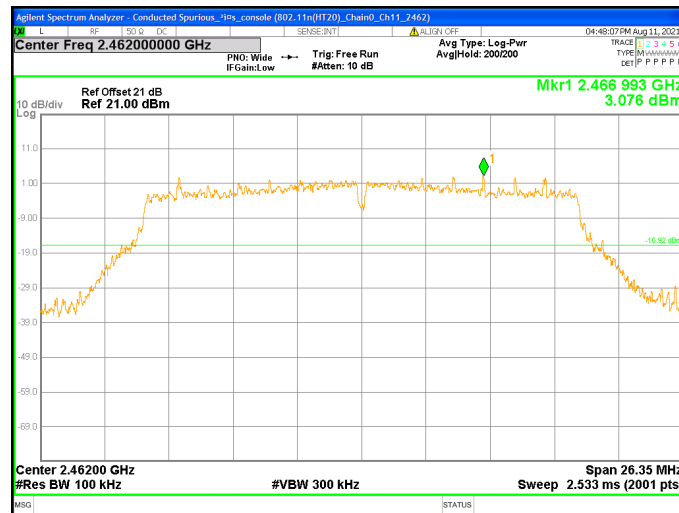
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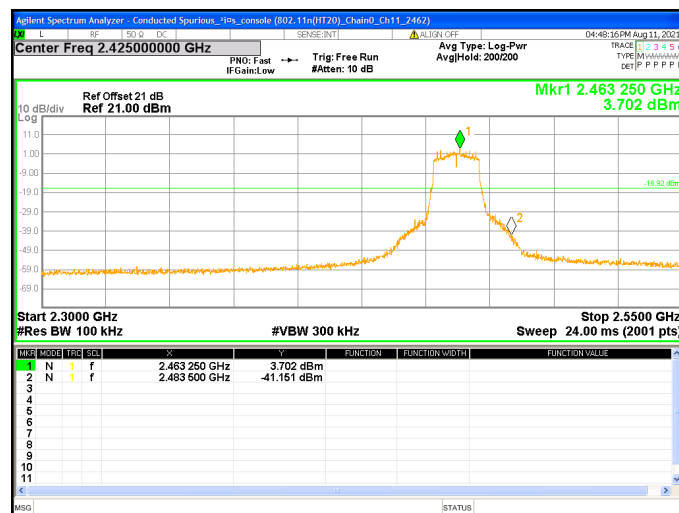
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



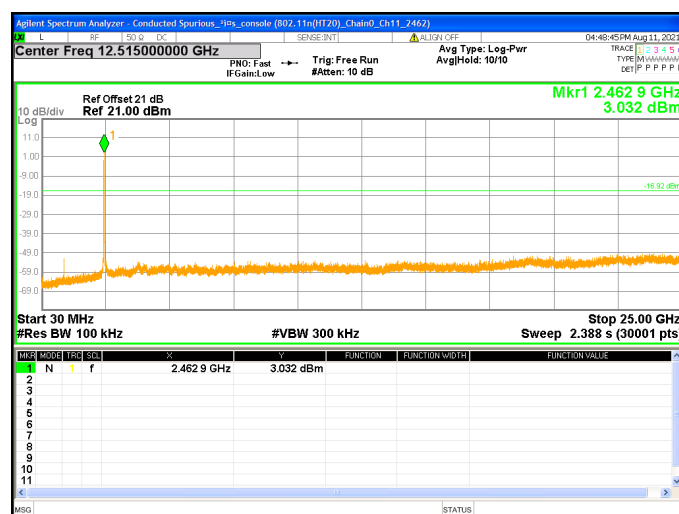
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



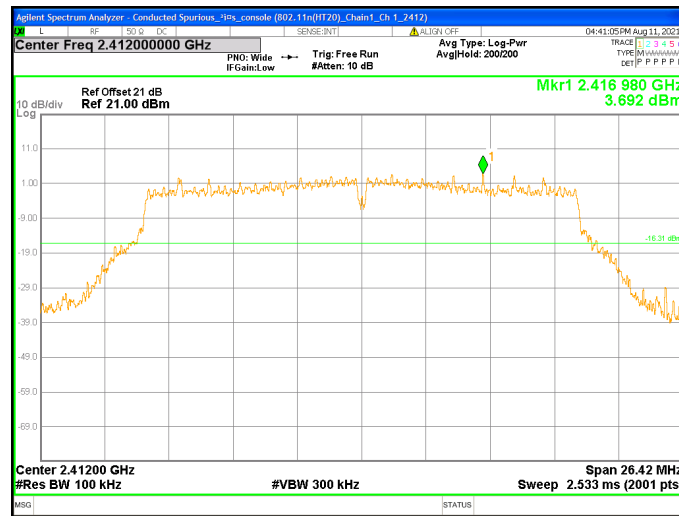
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



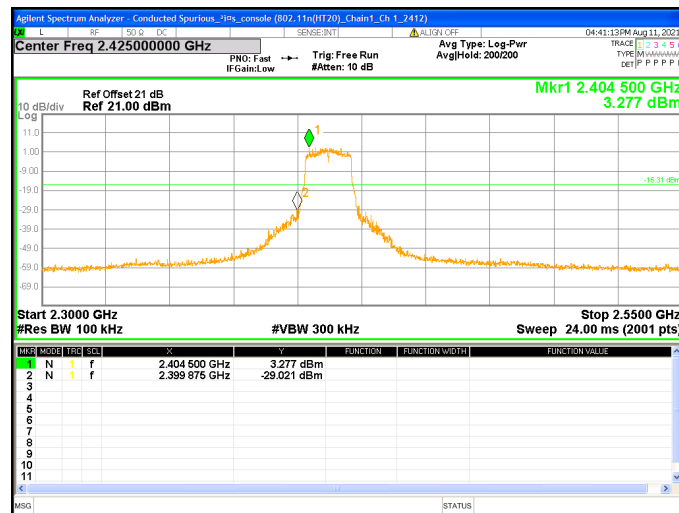
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



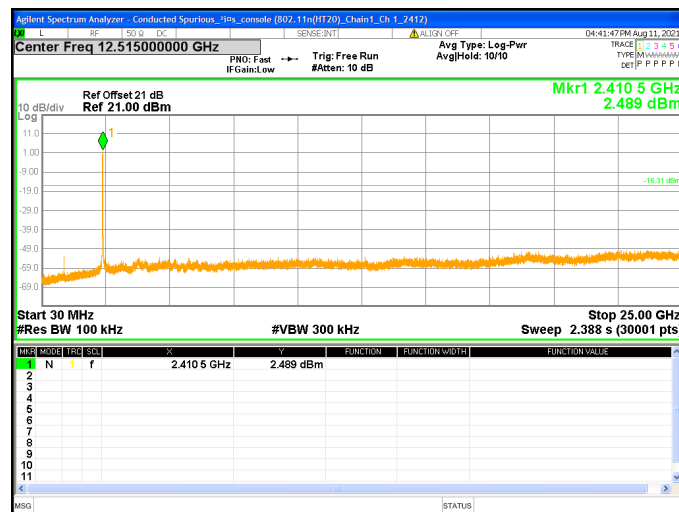
Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



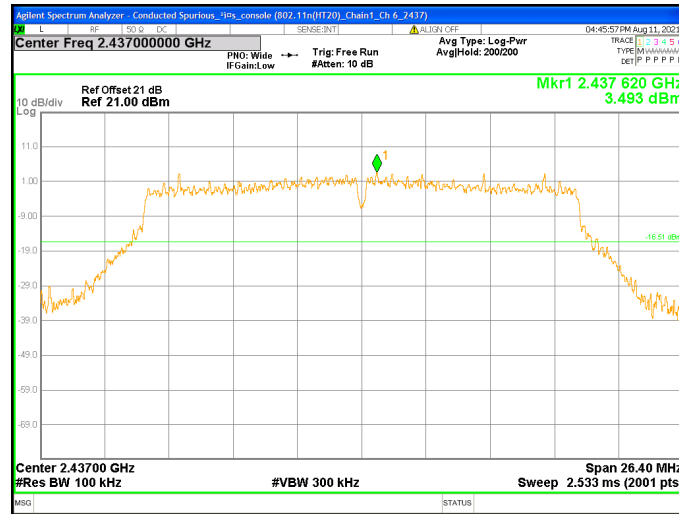
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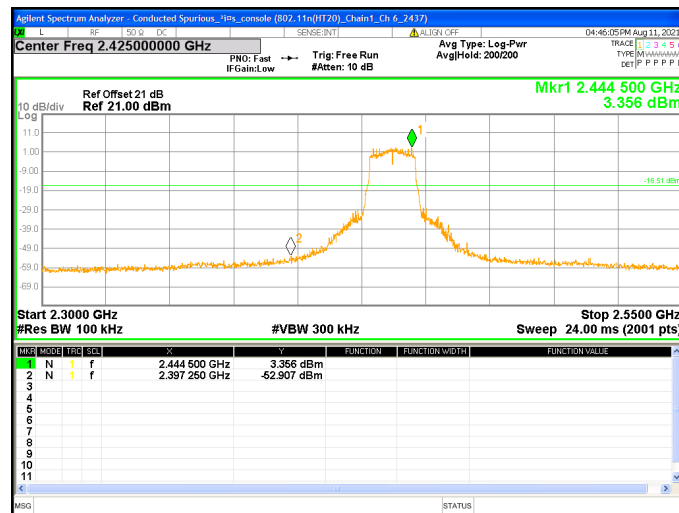
Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



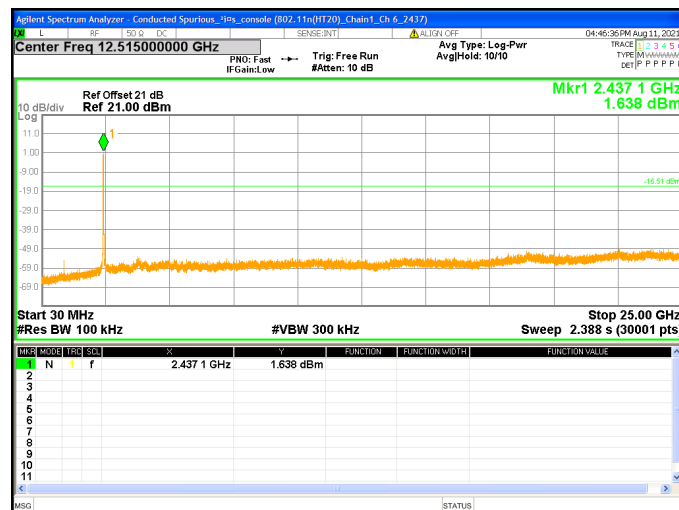
Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



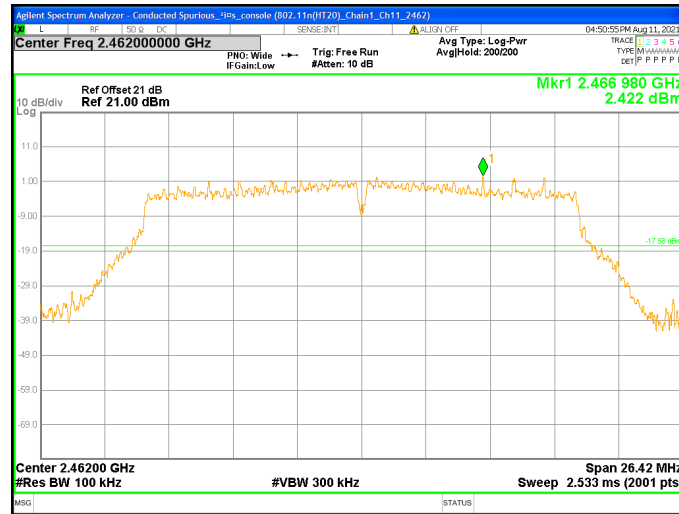
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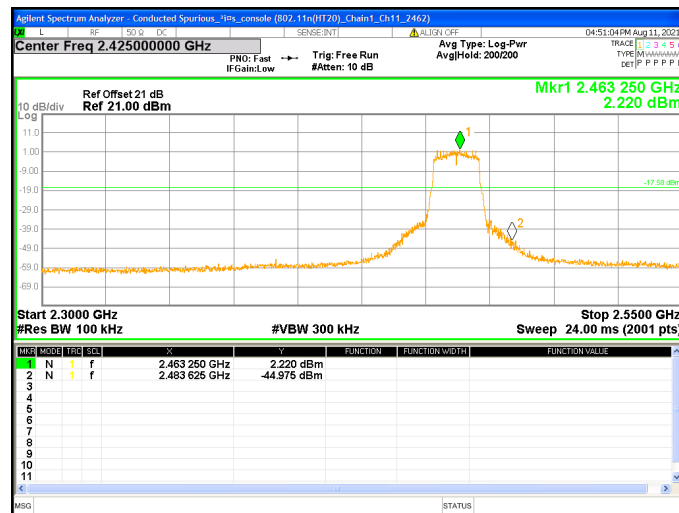
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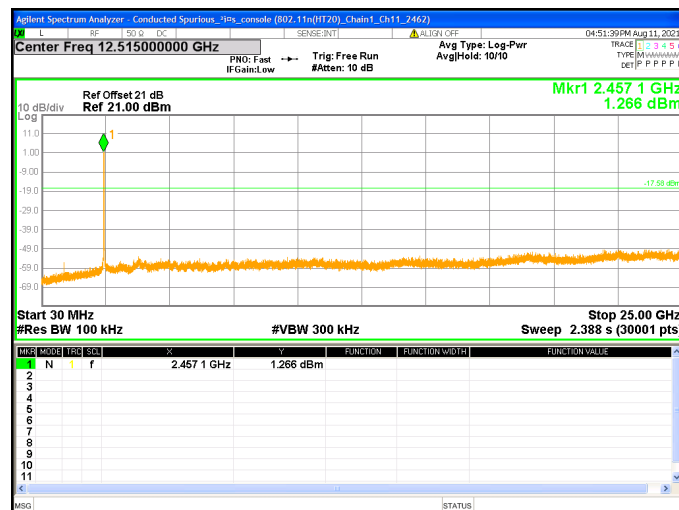
Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



Chain1 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



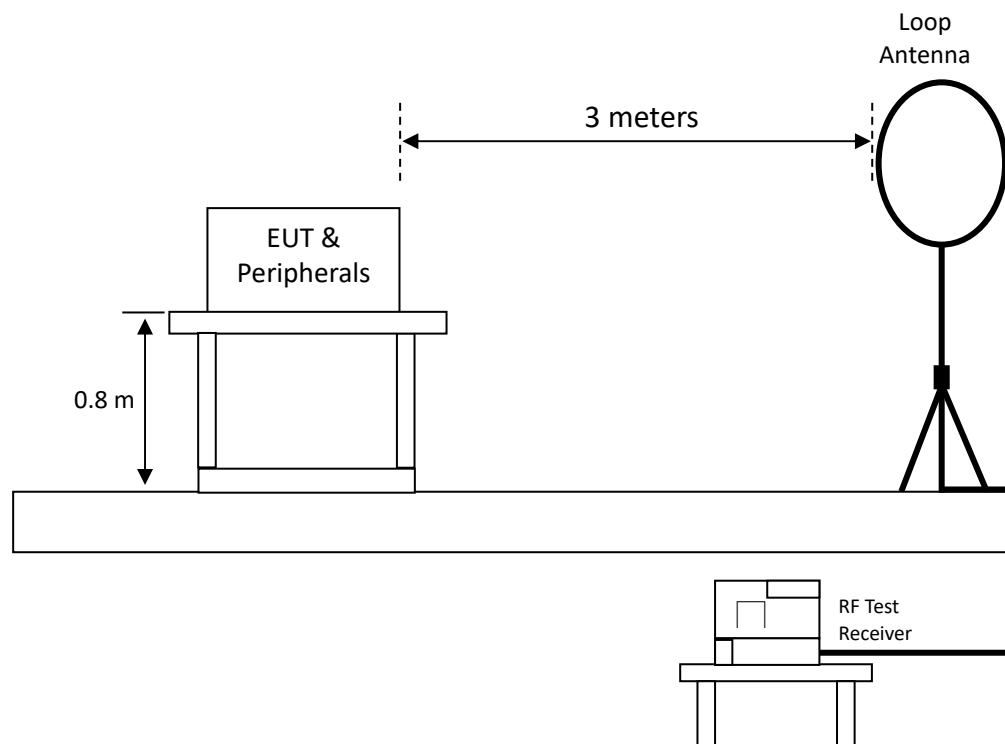
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1 Instrument Setting

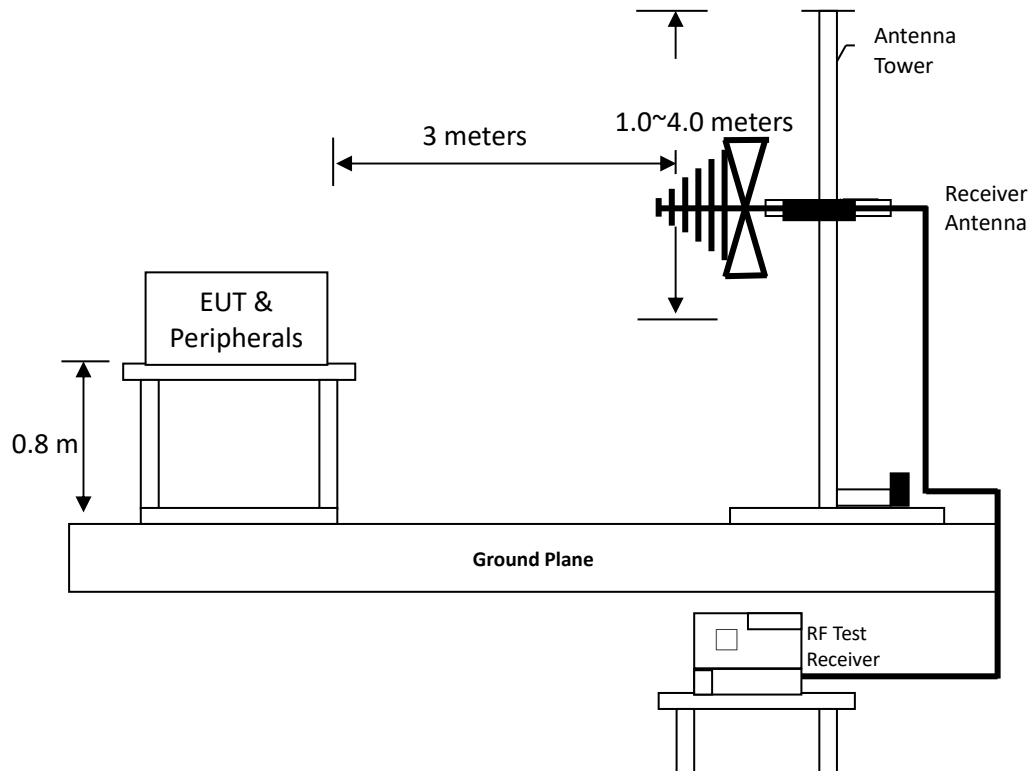
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz & 1/T minimum kHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth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

6.2 Test setup & procedure

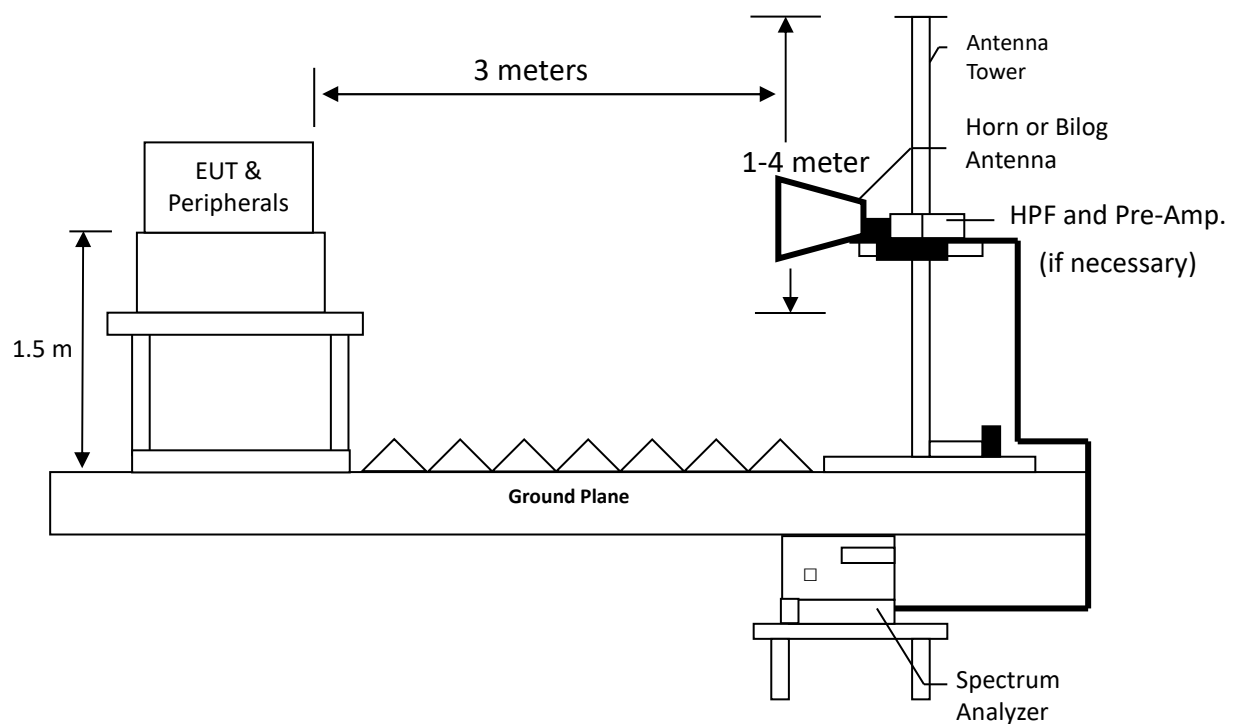
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



TEST REPORT

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

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

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

6.3 Limit

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

Remark:

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

6.4 Test Result

6.4.1 Measurement results: frequencies 9kHz to 30MHz

Temperature (°C) :	27
Relative Humidity (%) :	63
Test date :	2021/8/7

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11n(HT20)_Chain0+1_Ch1.

Antenna polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.14	AV	18.49	51.70	70.19	104.83	-34.64
Perpendicular	0.23	AV	18.75	47.73	66.48	100.56	-34.08
Perpendicular	0.36	AV	18.79	40.41	59.20	96.56	-37.36
Perpendicular	0.44	AV	19.09	38.86	57.95	94.67	-36.72
Perpendicular	0.53	QP	19.38	35.68	55.06	73.15	-18.09
Perpendicular	0.79	QP	19.65	29.45	49.10	69.65	-20.55

Antenna polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Parallel	0.14	AV	18.49	51.25	69.74	104.83	-35.09
Parallel	0.23	AV	18.75	49.11	67.86	100.56	-32.70
Parallel	0.31	AV	18.73	41.91	60.64	97.70	-37.06
Parallel	0.44	AV	19.09	38.73	57.82	94.67	-36.85
Parallel	0.79	QP	19.65	29.82	49.47	69.65	-20.18
Parallel	1.01	QP	19.50	17.34	36.84	67.53	-30.69

Antenna polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
Ground-parallel	0.14	AV	18.49	51.57	70.06	104.83	-34.77
Ground-parallel	0.23	AV	18.75	49.50	68.25	100.56	-32.31
Ground-parallel	0.44	AV	19.09	40.05	59.14	94.67	-35.53
Ground-parallel	0.53	QP	19.38	36.36	55.74	73.15	-17.41
Ground-parallel	0.79	QP	19.65	28.50	48.15	69.65	-21.50
Ground-parallel	0.97	QP	19.54	19.74	39.28	67.94	-28.66

TEST REPORT

6.5.2 Measurement results: frequencies below 1 GHz

Temperature (°C) :	27
Relative Humidity (%) :	63
Test date :	2021/8/7

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 802.11n(HT20)_Chain0+1_Ch1.

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	150.28	QP	20.78	17.74	38.52	43.50	-4.98
Vertical	211.39	QP	18.24	20.54	38.78	43.50	-4.72
Vertical	227.88	QP	18.90	24.13	43.03	46.00	-2.97
Vertical	236.61	QP	19.87	23.13	43.00	46.00	-3.00
Vertical	250.19	QP	20.49	15.28	35.77	46.00	-10.23
Vertical	600.36	QP	29.34	12.35	41.69	46.00	-4.31

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	102.75	QP	16.81	19.01	35.82	43.50	-7.68
Horizontal	201.69	QP	17.90	18.00	35.90	43.50	-7.60
Horizontal	213.33	QP	18.36	21.05	39.41	43.50	-4.09
Horizontal	231.76	QP	19.20	22.72	41.92	46.00	-4.08
Horizontal	239.52	QP	20.27	21.62	41.89	46.00	-4.11
Horizontal	335.55	QP	22.95	15.27	38.22	46.00	-7.78

Remark: Corr. Factor = Antenna Factor + Cable Loss

TEST REPORT

6.5.3 Measurement results: frequency above 1GHz to 25GHz

Temperature (°C) :	27
Relative Humidity (%) :	63
Test date :	2021/8/7

Chain0+1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11b_Ch1	4824	PK	V	17.62	28.00	45.62	74.00	-28.38
	4824	PK	H	17.62	27.82	45.44	74.00	-28.56
802.11b_Ch6	4874	PK	V	17.67	28.71	46.38	74.00	-27.62
	4874	PK	H	17.67	27.35	45.02	74.00	-28.98
802.11b_Ch11	4924	PK	V	17.78	29.56	47.34	74.00	-26.66
	4924	PK	H	17.78	30.02	47.80	74.00	-26.20
802.11g_Ch1	4824	PK	V	17.62	25.13	42.75	74.00	-31.25
	4824	PK	H	17.62	25.62	43.24	74.00	-30.76
802.11g_Ch6	4874	PK	V	17.67	25.28	42.95	74.00	-31.05
	4874	PK	H	17.67	25.19	42.86	74.00	-31.14
802.11g_Ch11	4924	PK	V	17.78	23.35	41.13	74.00	-32.87
	4924	PK	H	17.78	25.61	43.39	74.00	-30.61
802.11n20_Ch1	4824	PK	V	17.62	23.76	41.38	74.00	-32.62
	4824	PK	H	17.62	24.86	42.48	74.00	-31.52
802.11n20_Ch6	4874	PK	V	17.67	24.17	41.84	74.00	-32.16
	4874	PK	H	17.67	25.78	43.45	74.00	-30.55
802.11n20_Ch11	4924	PK	V	17.78	23.82	41.60	74.00	-32.40
	4924	PK	H	17.78	24.56	42.34	74.00	-31.66

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).

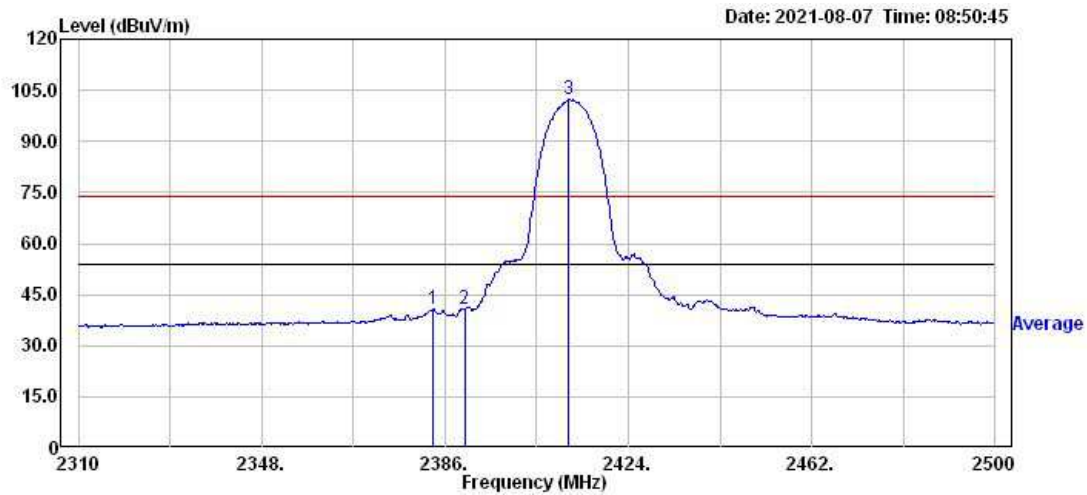
7.3 Test Results

Temperature (°C) :	27
Relative Humidity (%) :	63
Test date :	2021/8/7

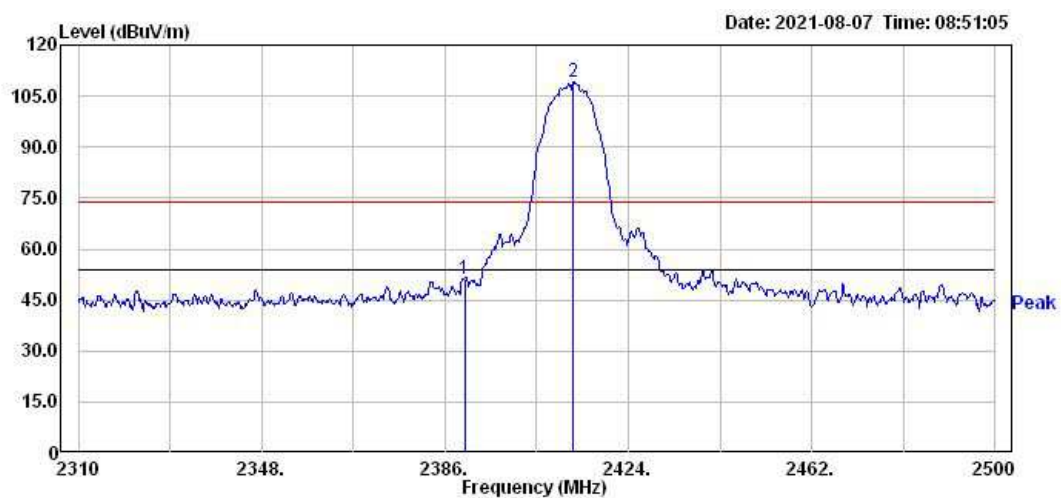
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b Chain0+1	2390.00	PK	V	34.86	16.49	51.35	74	-22.65	2310~2390
	2383.53	AV	V	34.86	5.99	40.85	54	-13.15	
	2488.79	PK	V	34.80	16.26	51.06	74	-22.94	2483.5~2500
	2483.50	AV	V	34.80	5.77	40.57	54	-13.43	
802.11g Chain0+1	2390.00	PK	V	34.86	26.68	61.54	74	-12.46	2310~2390
	2390.00	AV	V	34.86	15.22	50.08	54	-3.92	
	2483.50	PK	V	34.80	28.45	63.25	74	-10.75	2483.5~2500
	2483.50	AV	V	34.80	16.69	51.49	54	-2.51	
802.11n(HT20) Chain0+1	2390.00	PK	V	34.86	31.21	66.07	74	-7.93	2310~2390
	2390.00	AV	V	34.86	17.35	52.21	54	-1.79	
	2483.50	PK	V	34.80	30.59	65.39	74	-8.61	2483.5~2500
	2483.50	AV	V	34.80	15.53	50.33	54	-3.67	

Remark: Correction Factor = Antenna Factor + Cable Loss

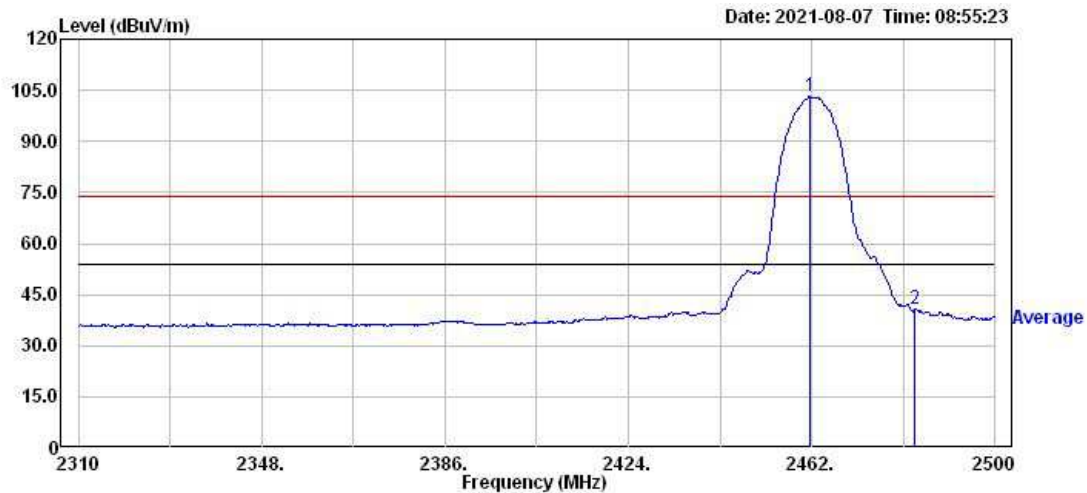
Chain0+1 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



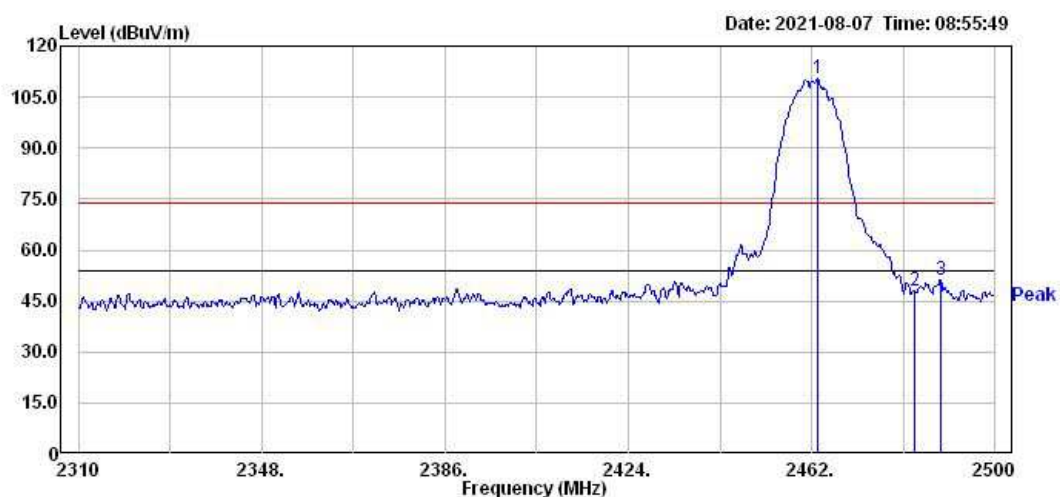
Chain0+1 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



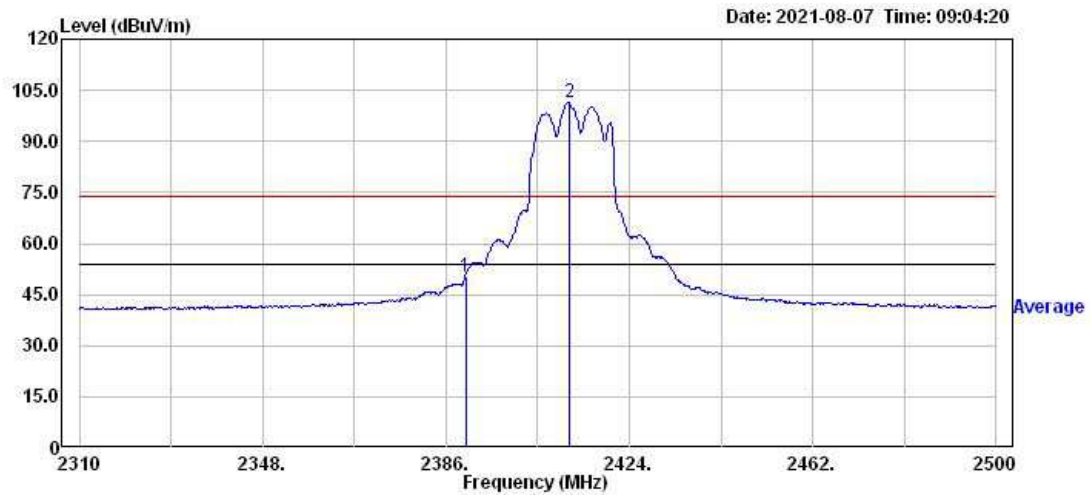
Chain0+1 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



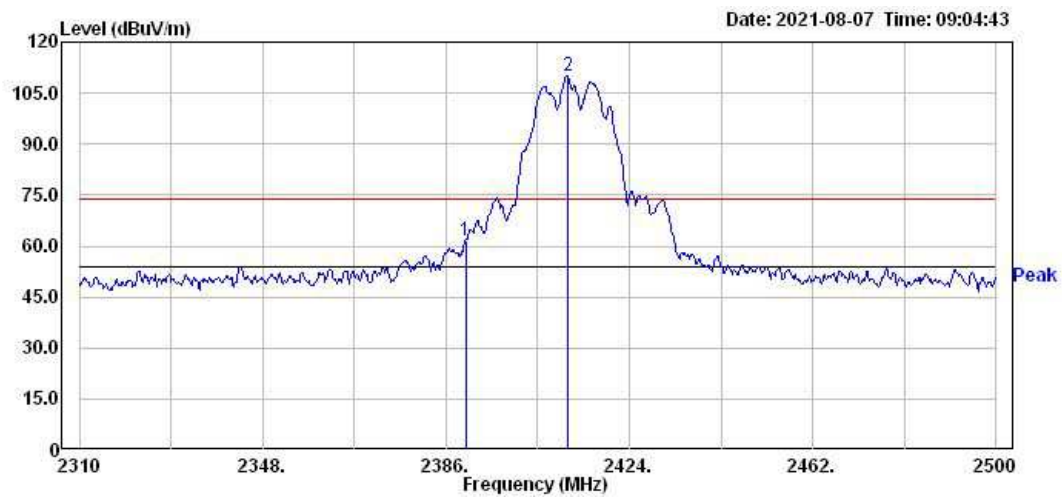
Chain0+1 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



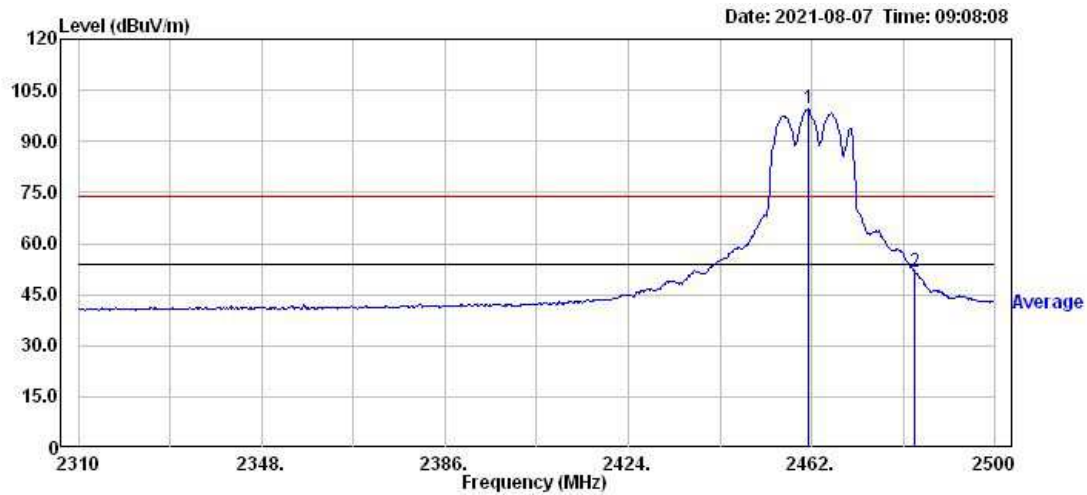
Chain0+1 : Restricted Band Bandedge @ 802.11g Mode Ch1 PK



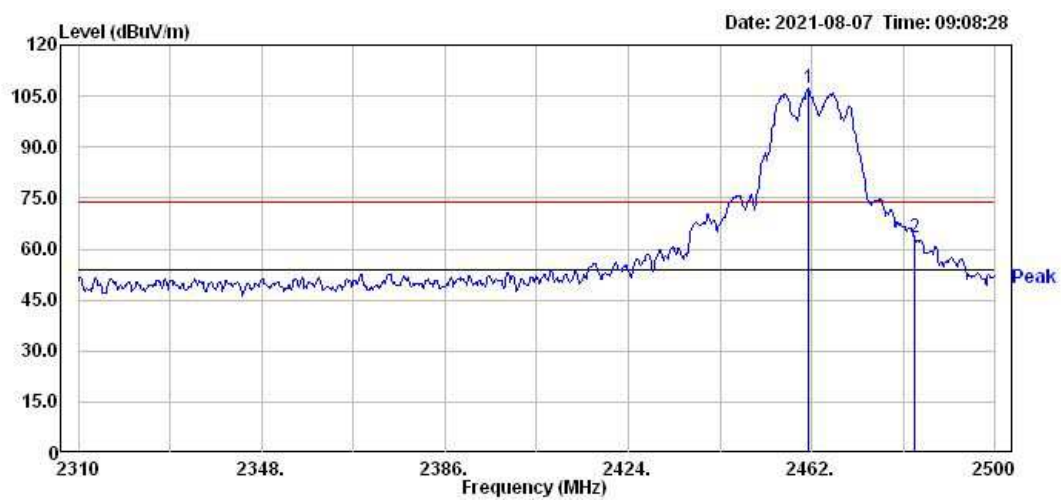
Chain0+1 : Restricted Band Bandedge @ 802.11g Mode Ch1 AV



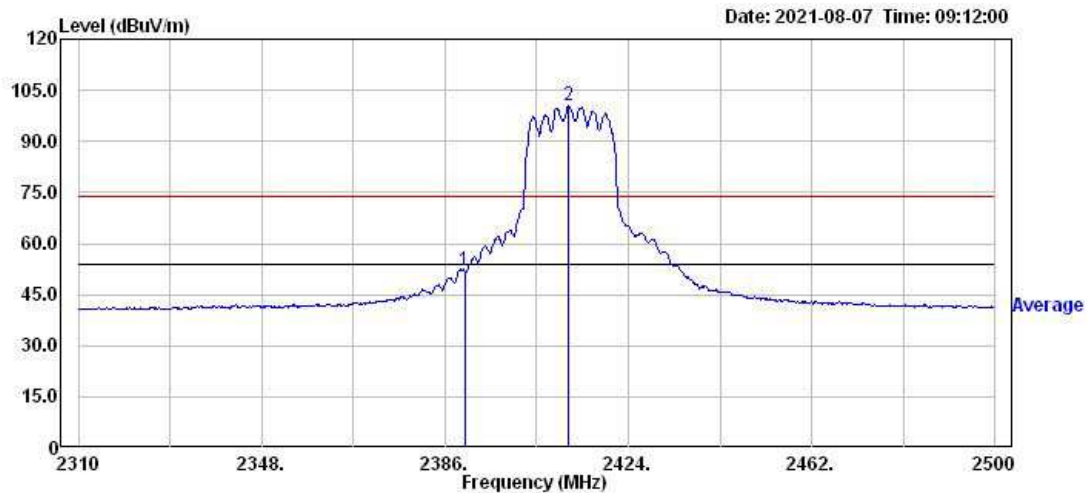
Chain0+1 : Restricted Band Bandedge @ 802.11g Mode Ch11 PK



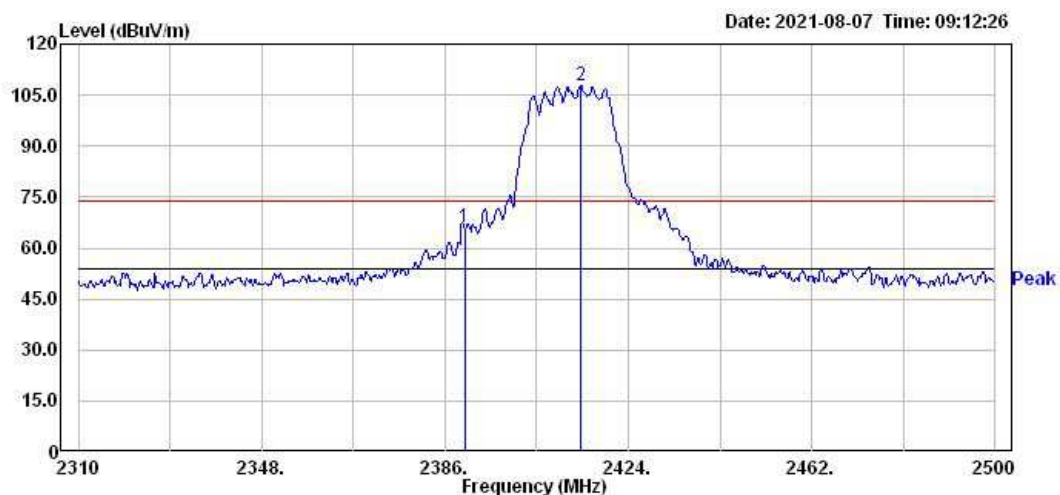
Chain1 : Restricted Band Bandedge @ 802.11g Mode Ch11 AV



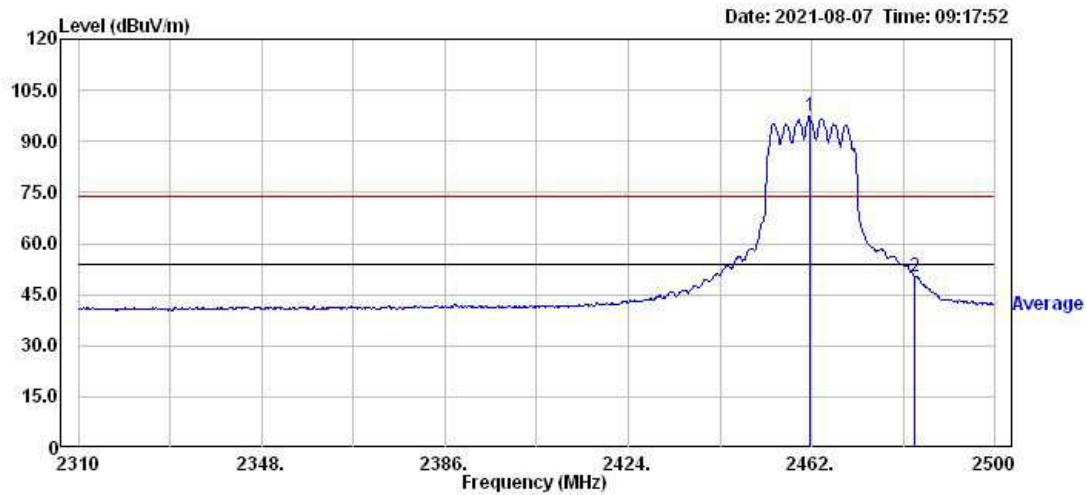
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK



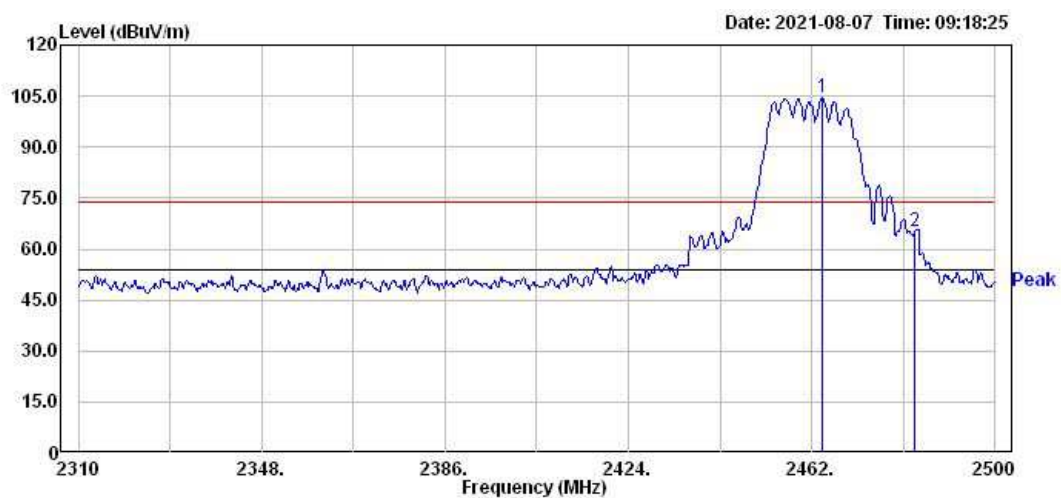
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV



Chain0+1 : Restricted Band Bandedge @ 802.11 n(HT20) Mode Ch11 PK



Chain0+1 : Restricted Band Bandedge @ 802.11 n(HT20) Mode Ch11 AV



8. AC Power Line Conducted Emission

Since the EUT is not connected to AC source, therefore, the test can be waived.

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	2020/08/18	2021/08/17
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2020/08/25	2021/08/24
Signal Analyzer	Agilent	N9030A	MY51380492	2020/08/17	2021/08/16
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2021/04/14	2022/04/13
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2021/01/29	2022/01/28
Horn Antenna	SHWARZBECK	BBHA 9120 D	9120D-456	2021/01/11	2022/01/10
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170159	2020/08/20	2023/08/19
Pre-Amplifier	AML	AML0120L3401	0419-114	2020/12/16	2021/12/15
Pre-amplifier	SGH	SGH184	20201124-1	2020/12/16	2021/12/15
Power Meter	Anritsu	ML2495A	0844001	2020/10/28	2021/10/27
Power Sensor	Anritsu	MA2411B	0738452	2020/10/28	2021/10/27
966-2(A) Cable	SUHNER	SUCOLEX 104	295105/4	2021/03/08	2022/03/07
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2021/03/08	2022/03/07
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	2021/01/15	2022/01/14
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).

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