

Johnson Health Tech. Co., Ltd

TEST REPORT

SCOPE OF WORK:

47 CFR FCC Part 15.247 – Radio Spectrum report

Model:

Target Training Console-02

REPORT NUMBER

210700132THC-001

ISSUE DATE

Aug. 31, 2021

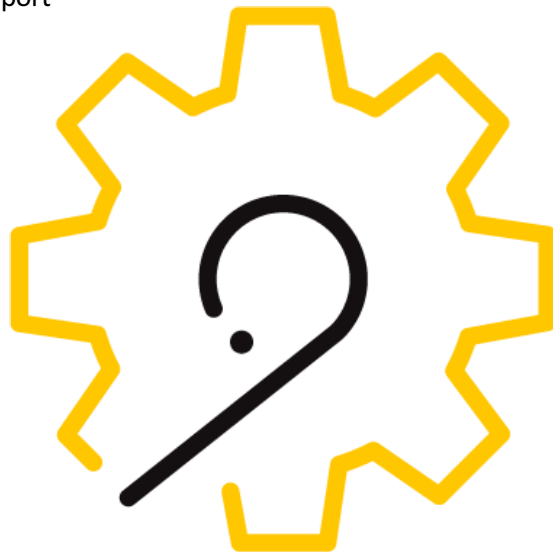
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63

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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 FITNESS
FCC ID:	TN7PHOENIX2
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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TEST REPORT**Revision History**

Report No.	Issue Date	Revision Summary
210700132THC-001	Aug. 31, 2021	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:	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

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

Antenna 2

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

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

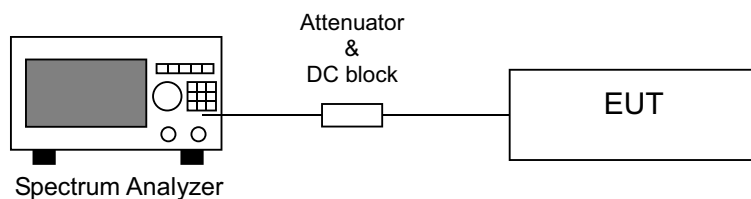
2.1 Instrument Setting

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.

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

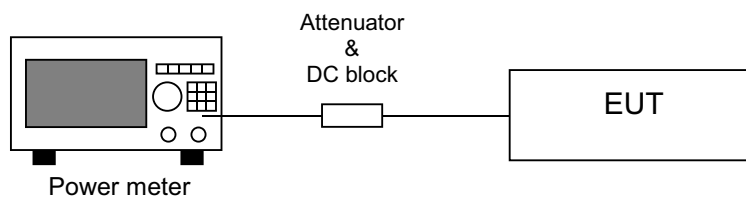
3.1 Instrument Setting

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

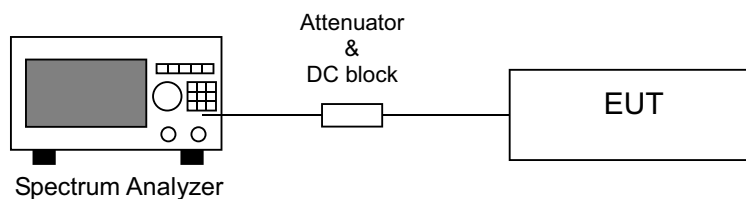
4.1 Instrument Setting

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: $10\log(\text{Nant}) = 10\log(2) = 3.01$

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



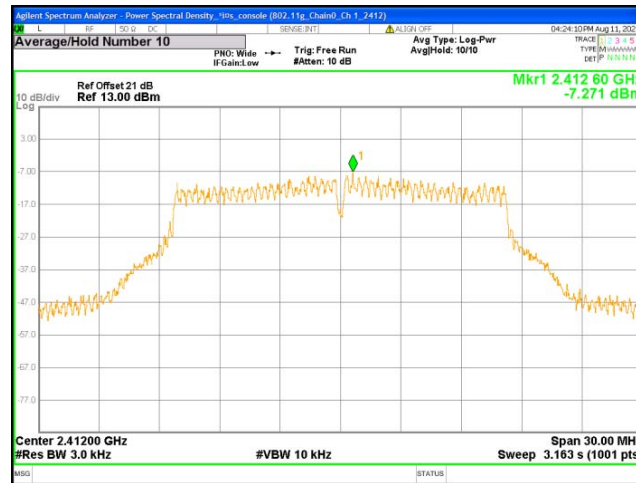
Chain1 : Power Spectral Density @ 802.11b Mode Ch 6



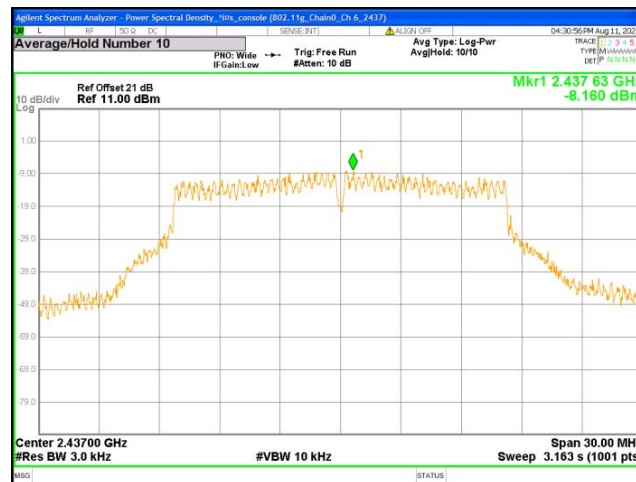
Chain1 : Power Spectral Density @ 802.11b Mode Ch11



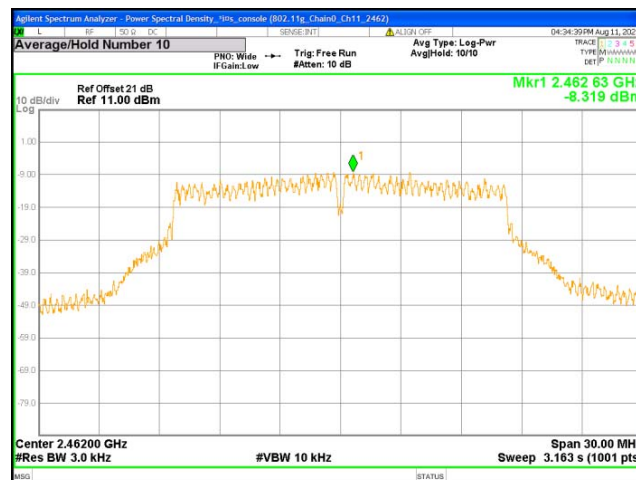
Chain0 : Power Spectral Density @ 802.11g Mode Ch 1



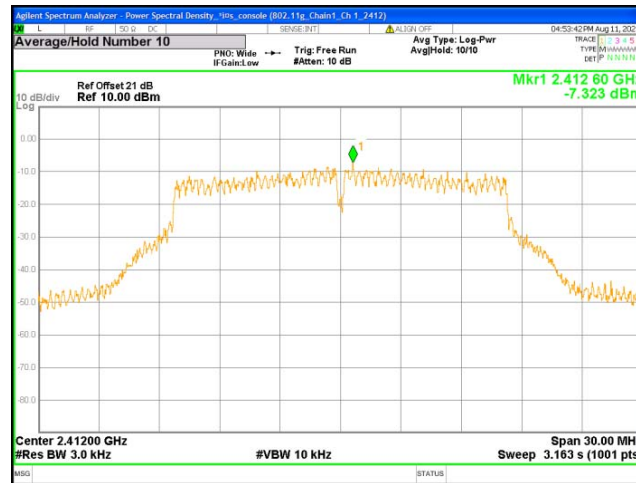
Chain0 : Power Spectral Density @ 802.11g Mode Ch 6



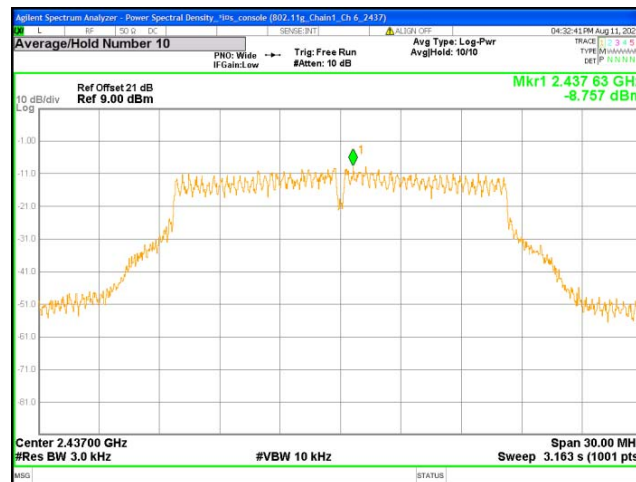
Chain0 : Power Spectral Density @ 802.11g Mode Ch11



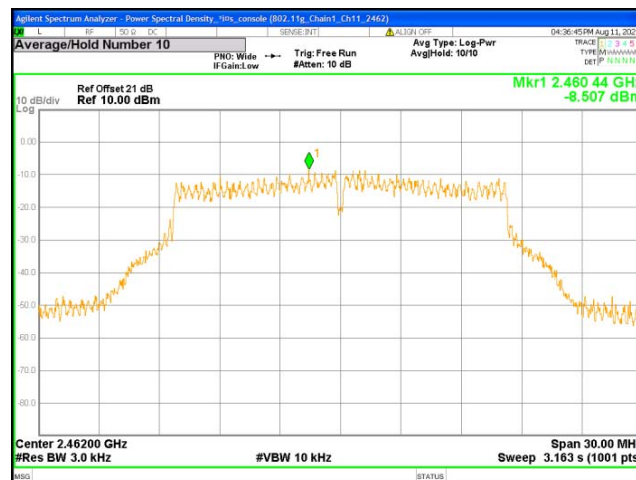
Chain1 : Power Spectral Density @ 802.11g Mode Ch 1



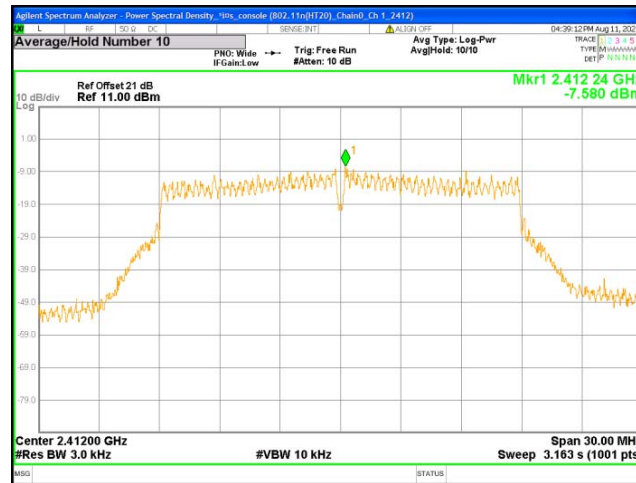
Chain1 : Power Spectral Density @ 802.11g Mode Ch 6



Chain1 : Power Spectral Density @ 802.11g Mode Ch11



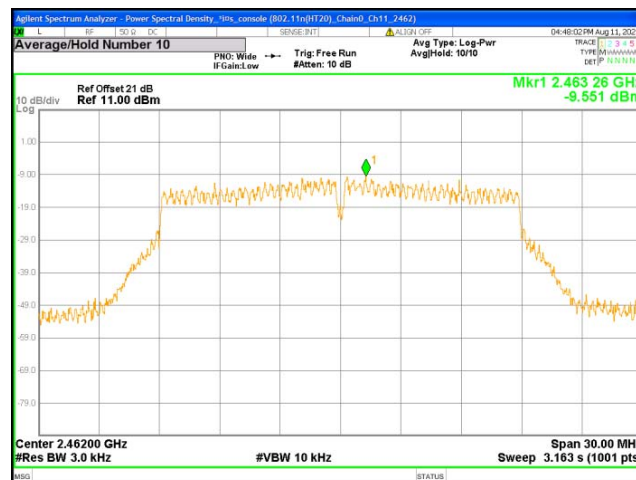
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



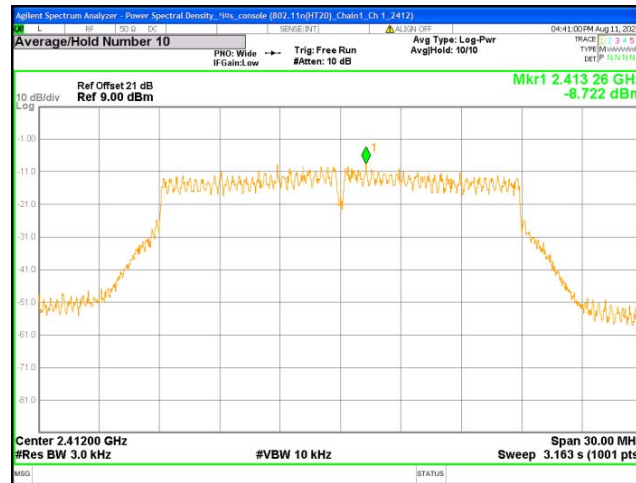
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



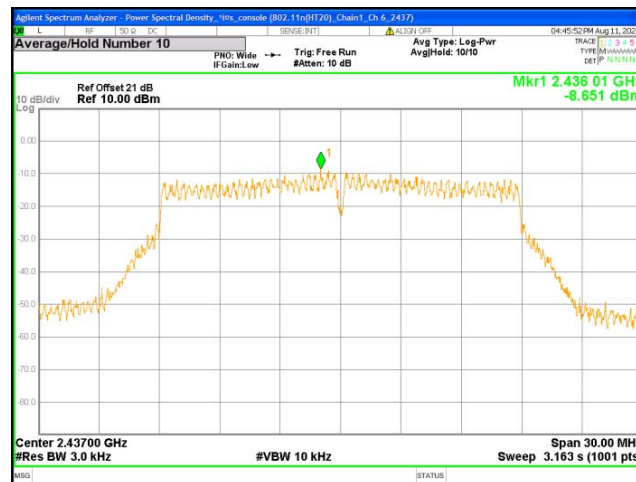
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



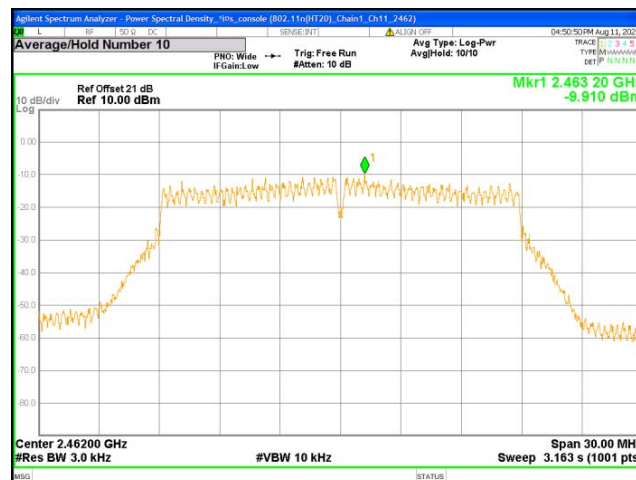
Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



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

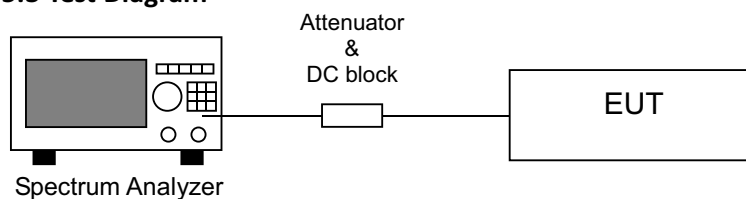
5.1 Instruments Setting

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

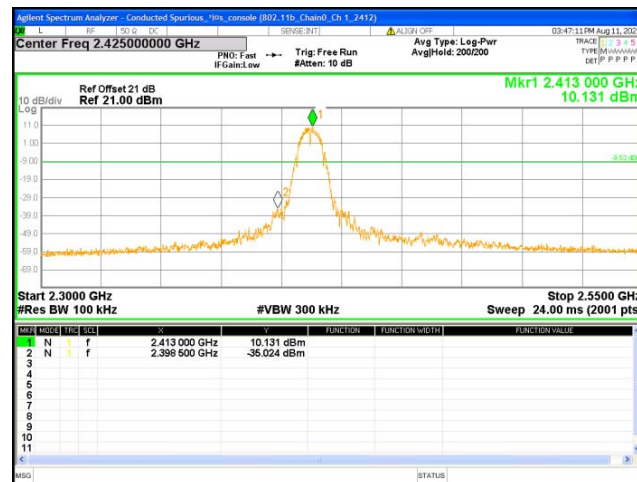
5.5 Test Results

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

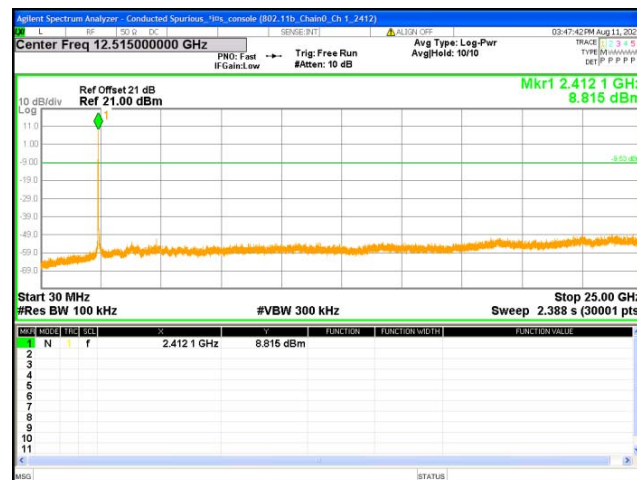
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



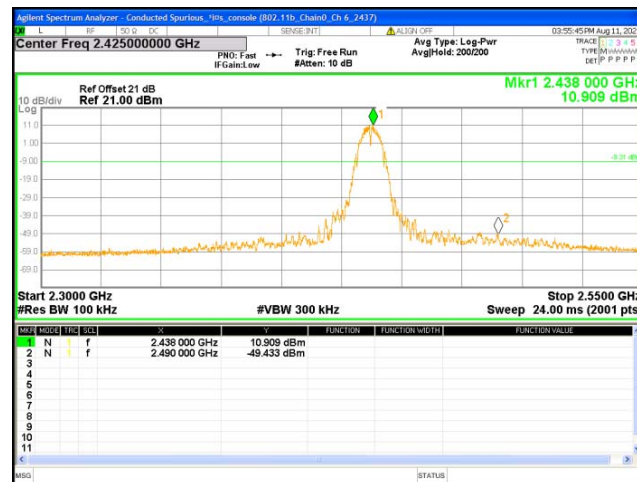
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



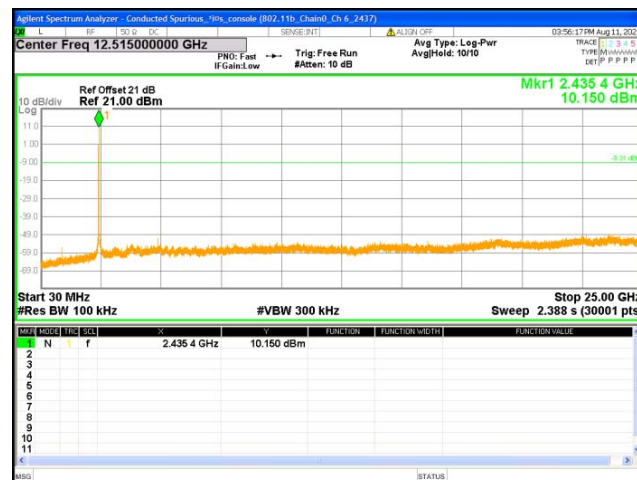
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



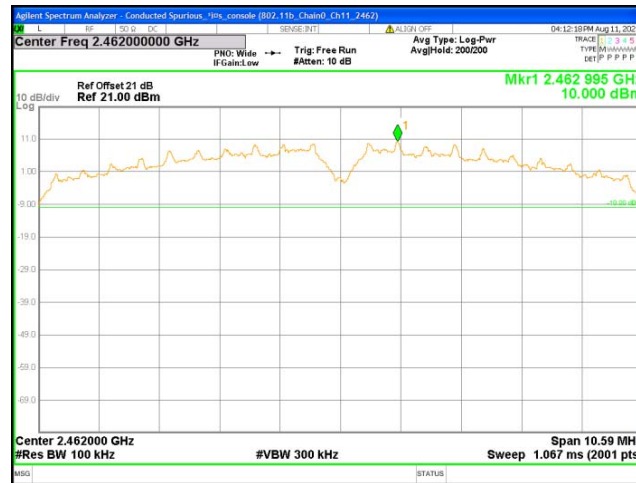
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



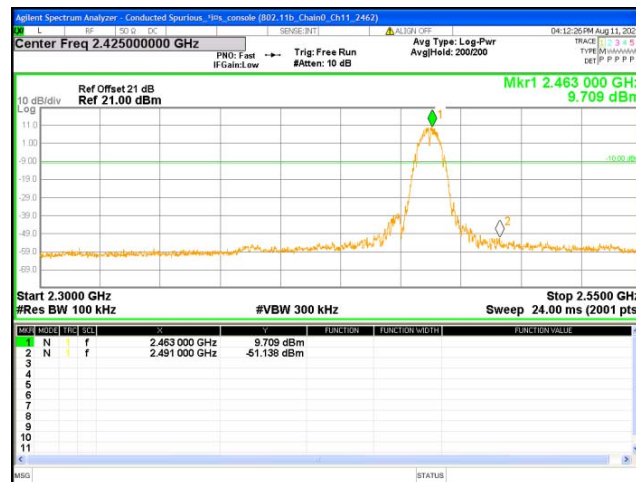
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



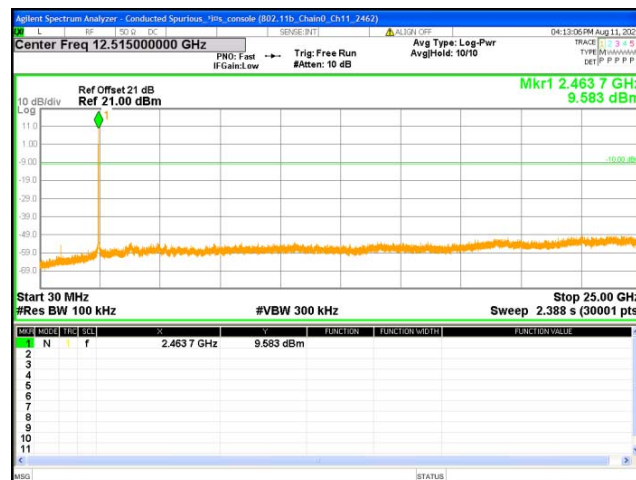
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



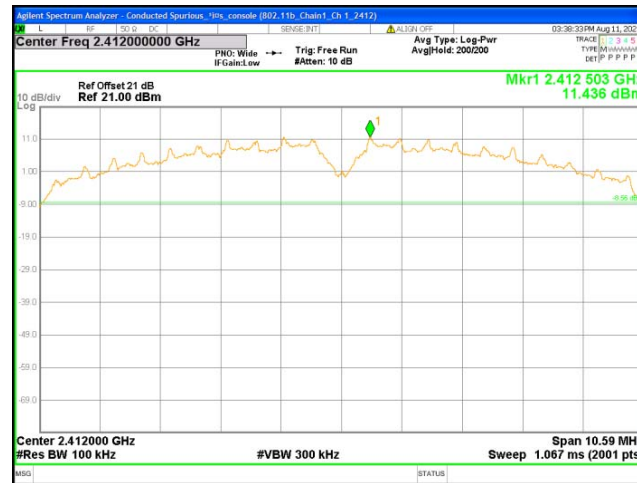
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



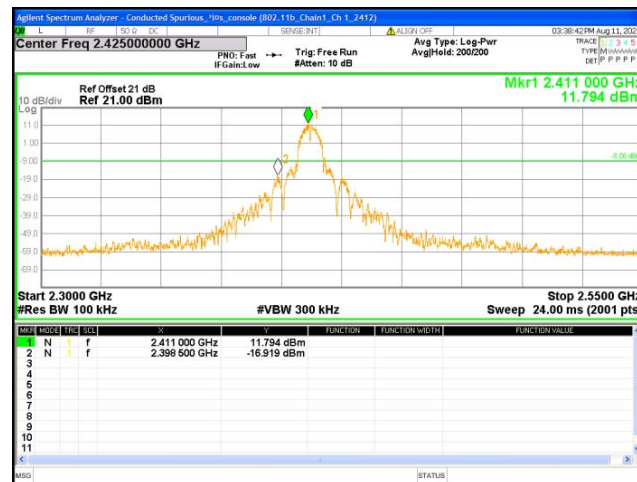
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



Chain1 : Conducted Spurious @ 802.11b Mode Ch 1



Chain1 : Conducted Spurious @ 802.11b Mode Ch 1



Chain1 : Conducted Spurious @ 802.11b Mode Ch 1

