intertek
Total Quality. Assured.

ReGrow Helmet Inc

TEST REPORT

REPORT NUMBER
190500195TWN-001

ISSUE DATE

May 13, 2020

PAGES
58

© 2020 INTERTEK

Radio Spectrum
TEST REPORT

Applicant:	**ReGrow Helmet Inc** **Unit 105, 264 Queens Quay West Toronto, Ontario Canada M5J 1B5**
Product:	**Regrow Helmet with BT4.0 & WiFi**
Model No.:	**RGH1**
Brand Name:	**Regrow Helmet**
FCC ID:	**2AUSE-RGH1**
Test Method/ Standard:	**47 CFR FCC Part 15.247 & ANSI C63.10 2013** **KDB 558074 D01 v04**
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**

ilac-MRA
TAF
Testing Laboratory
0597

Prepared and Checked by:

Durant Wei

Durant Wei
Engineer

Approved by:

Rico Deng

Rico Deng
Supervisor

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Revision History

Report No.	Issue Date	Revision Summary
190500195TWN-001	May 13, 2020	Original report

Table of Contents

1. General Information 6
1.1 Identification of the EUT 6
1.2 Antenna description 6
1.3 Peripherals equipment 6
1.4 Peripherals equipment 6
1.5 Operation mode 7
1.6 Power setting 7

2. Minimum 6 dB Bandwidth 8
2.1 Instrument Setting 8
2.2 Test Procedure 8
2.3 Test Diagram 8
2.4 Limit 8
2.5 Operating Environment Condition 8
2.6 Test Results 9

3. Maximum Peak Conducted Output Power 14
3.1 Instrument Setting 14
3.2Test Procedure 14
3.3 Test Diagram 14
3.4 Limit 14
3.5 Operating Environment Condition 14
3.6 Test Results 15

4. Power Spectral Density 16
4.1 Instrument Setting 16
4.2 Test Procedure 16
4.3 Test Diagram 16
4.4 Limit 16
4.5 Operating Environment Condition 16
4.6 Test Results 17

5. Emissions in Non-Restricted Frequency Bands 22
5.1 Instruments Setting 22
5.2 Test Procedure 22
5.3 Test Diagram 22
5.4 Limit 22
5.5 Operating Environment Condition 22
5.6 Test Results 23

6. Emissions in Restricted Frequency Bands (Radiated emission measurements) 34
6.1 Instrument Setting 34
6.2 Test Procedure 34
6.3 Test Diagram 35

6.3.1Radiated emission from 9kHz to 30MHz uses Loop Antenna: 35
6.3.2 Radiated emission below 1GHz using Bilog Antenna 35
6.3.3 Radiated emission above 1GHz using Horn Antenna 36
6.4 Limit 36
6.5 Operating Environment Condition 36
6.6 Test Result 37

7. Emission on Band Edge 42
7.1 Instrument Setting 42
7.2 Test Procedure 42
7.3 Operating Environment Condition 42
7.4 Test Results 43

8. AC Power Line Conducted Emission 52
8.1 Measuring instrument setting 52
8.2 Test Procedure 52
8.3 Test Diagram 52
8.4 Limit 53
8.5 Operating Environment Condition 53
8.6 Test Results 54

Appendix A: Test equipment list 56

Appendix B: Measurement Uncertainty 58

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

1. General Information

1.1 Identification of the EUT

Product:	Regrow Helmet with BT4.0 & WiFi
Model No.:	RGH1
Operating Frequency:	1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20 2. 2412 MHz ~ 2452 MHz for 802.11n(HT40)
Channel Number:	1. 11 channels for 2412 MHz ~ 2462 MHz 2. 9 channels for 2412 MHz ~ 2462 MHz
Frequency of Each Channel:	1. 2412+5 k, k＝0 ~ 10 for 802.11b, 802.11g, 802.11n HT20 2. 2412+5 k, k＝0 ~ 8 for 802.11n(HT40)
Access scheme:	DSSS, OFDM
Rated Power:	DC 12V from adapter
Power Cord:	N/A
Sample receiving date:	May 27, 2019
Sample condition:	Workable
Test Date(s):	Jun. 24, 2019 ~ Apr. 17, 2020

1.2 Antenna description

Antenna Gain : -0.9 dBi
Antenna Type : Chip Antenna
Connector Type : Fixed

1.3 Peripherals equipment

No.	Model no.	Specification
Adapter	EM1024QU	I/P: 100-240V~, 1.0~0.5A, 50-60Hz O/P: 12V, 2A

1.4 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	DELL	Latitude E5420	HXYJBT1	USB shielded cable 0.8 meter

1.5 Operation mode

(1) TX mode: EUT use 「Tera Term」 entering test mode to change different channel and modulation.

(2) 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, MCS0 Mbps data rate for 802.11n(HT20) mode , MCS0 Mbps data rate for 802.11n(HT40) mode , the final tests were executed under these conditions recorded in this report individually.

802.11b ch6 chain0		802.11g ch6 chain0		802.11n(HT20) ch6 chain0		802.11n(HT40) ch6 chain0	
Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)
1	6.95	6	7.18	MCS0	7.26	MCS0	7.16
2	6.88	9	7.11	MCS1	7.19	MCS1	7.10
5.5	6.79	12	7.05	MCS2	7.14	MCS2	7.02
11	6.69	18	6.94	MCS3	7.08	MCS3	6.93
		24	6.87	MCS4	7.00	MCS4	6.85
		36	6.79	MCS5	6.95	MCS5	6.72
		48	6.66	MCS6	6.86	MCS6	6.64
		54	6.58	MCS7	6.78	MCS7	6.55

1.6 Power setting

Mode	Power setting
802.11b	25
802.11g	40
802.11n(HT20)	40
802.11n(HT40)	42

2. Minimum 6 dB Bandwidth

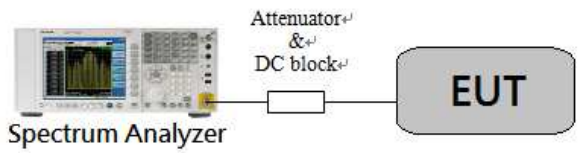
2.1 Instrument Setting

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 in accordance with clause 8.1 option1 of KDB 558074 D01.
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 Operating Environment Condition

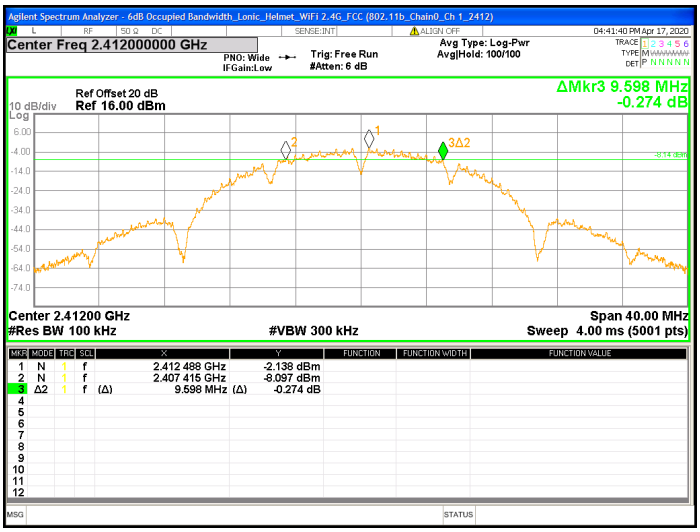
Temperature (℃) :	24
Relative Humidity (%) :	55
Test Date :	2020/4/17

2.6 Test Results

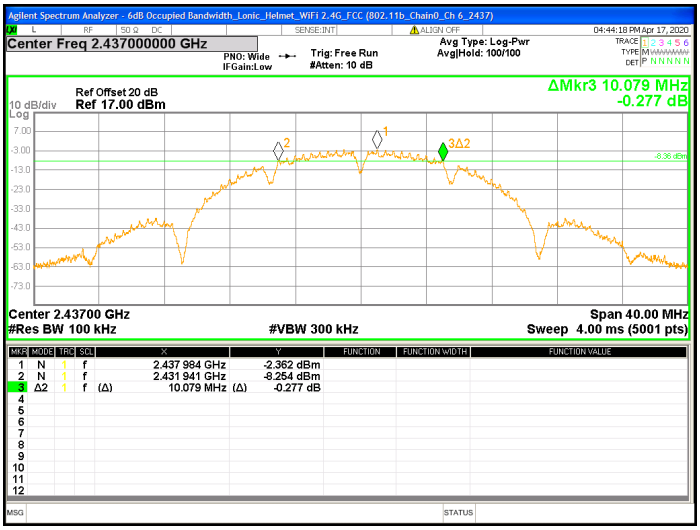
Chain 0

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Test Result
802.11b	1	2412	9.60	>0.5	Pass
	6	2437	10.08	>0.5	Pass
	11	2462	10.07	>0.5	Pass
802.11g	1	2412	16.58	>0.5	Pass
	6	2437	16.56	>0.5	Pass
	11	2462	16.56	>0.5	Pass
802.11n (HT20)	1	2412	17.81	>0.5	Pass
	6	2437	17.81	>0.5	Pass
	11	2462	17.80	>0.5	Pass
802.11n (HT40)	3	2422	36.40	>0.5	Pass
	6	2437	36.40	>0.5	Pass
	9	2452	36.41	>0.5	Pass

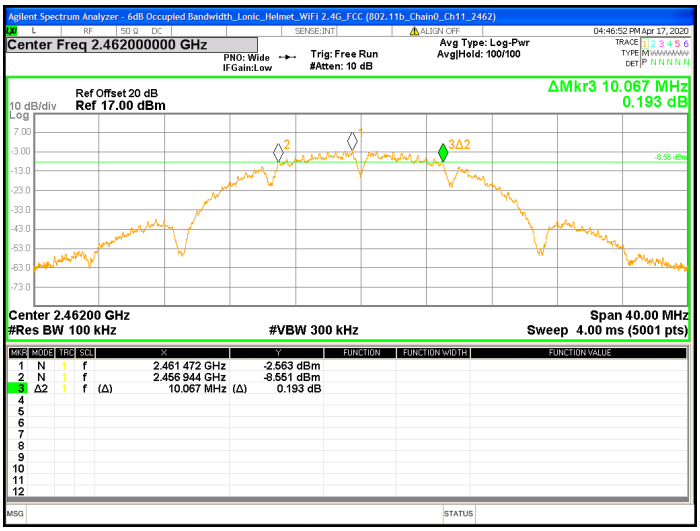
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 1



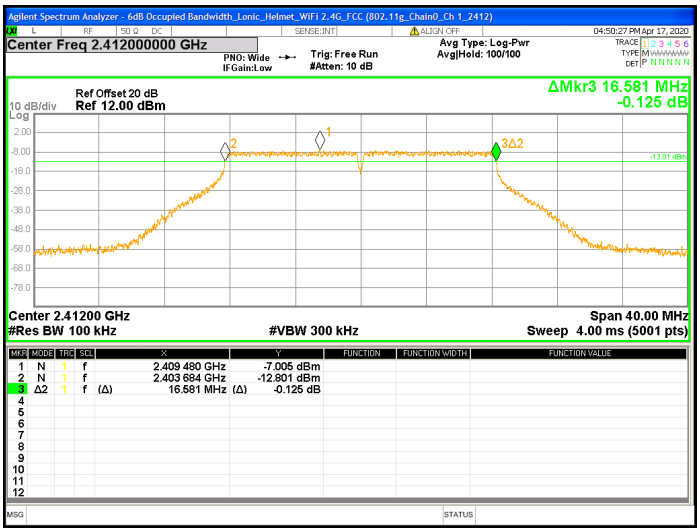
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch 6



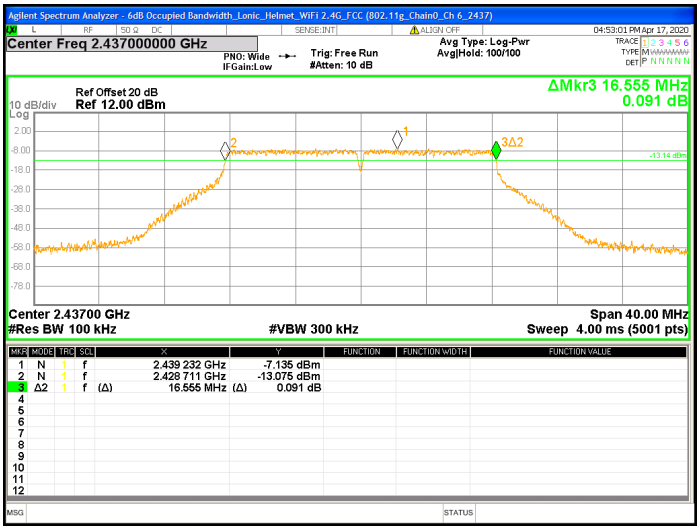
Chain0 : 6dB Bandwidth @ 802.11b Mode Ch11



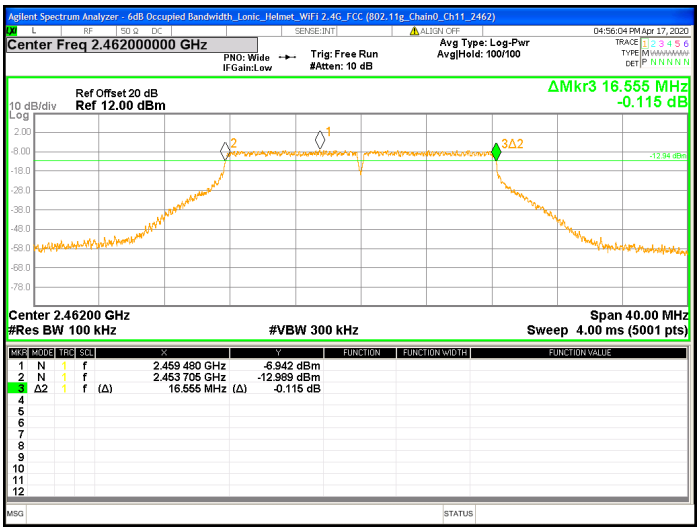
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 1



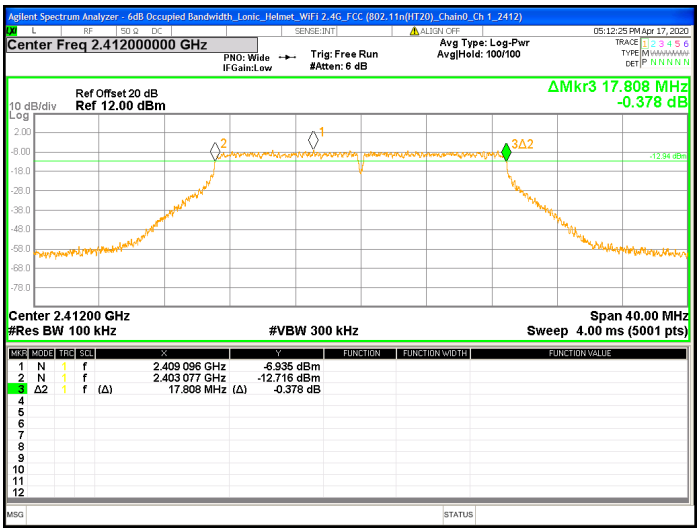
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch 6



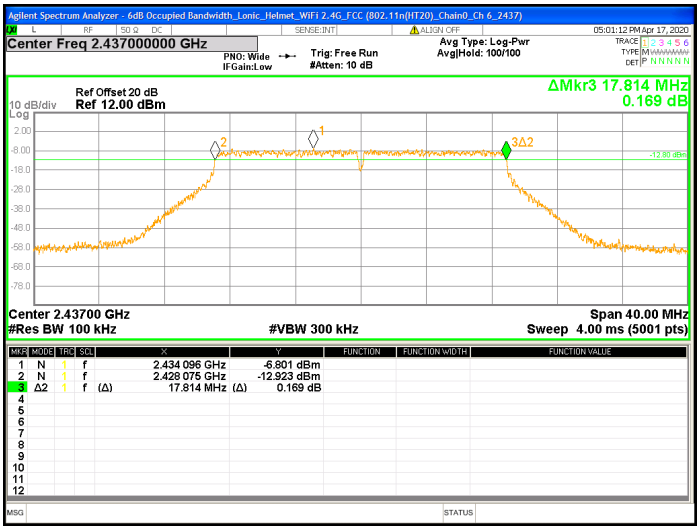
Chain0 : 6dB Bandwidth @ 802.11g Mode Ch11



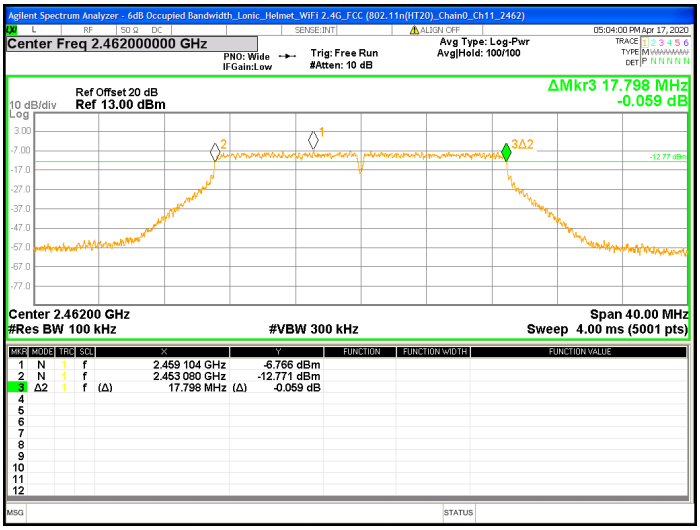
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 1



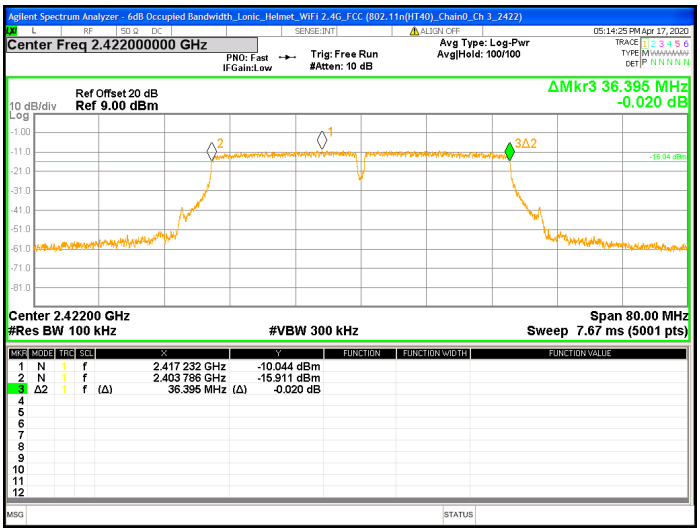
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch 6



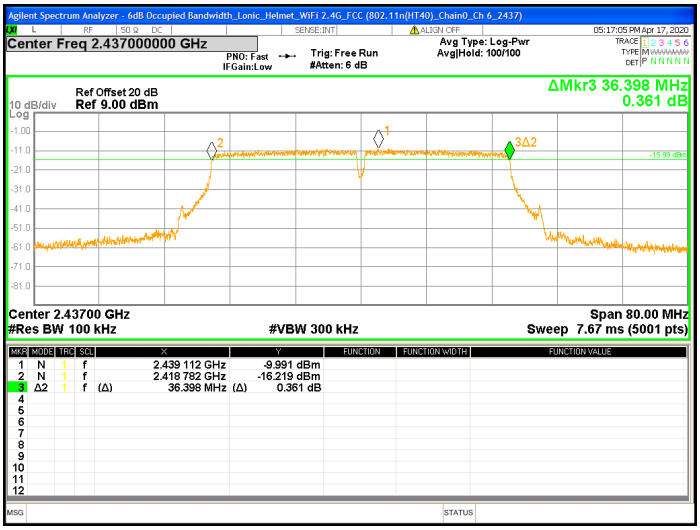
Chain0 : 6dB Bandwidth @ 802.11n(HT20) Mode Ch11



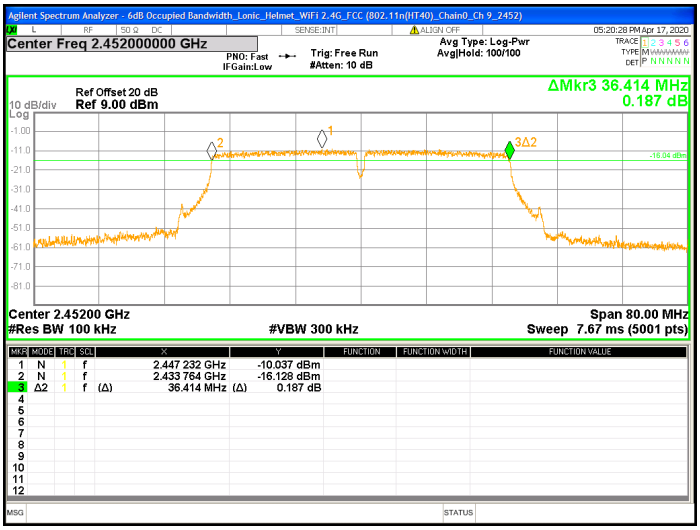
Chain0 : 6dB Bandwidth @ 802.11n(HT40) Mode Ch 3



Chain0 : 6dB Bandwidth @ 802.11n(HT40) Mode Ch 6



Chain0 : 6dB Bandwidth @ 802.11n(HT40) Mode Ch 9



3. Maximum Peak Conducted Output Power

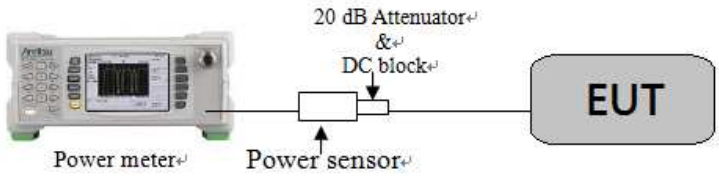
3.1 Instrument Setting

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

3.2Test Procedure

Test procedures refer to clause 9.1.3 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

3.3 Test Diagram



3.4 Limit

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

3.5 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	55
Test Date :	2020/4/17

3.6 Test Results

Single Tx

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	7.04	5.06	30	-22.96
	6	2437	6.95	4.95	30	-23.05
	11	2462	6.87	4.86	30	-23.13
802.11g	1	2412	7.25	5.31	30	-22.75
	6	2437	7.18	5.22	30	-22.82
	11	2462	7.05	5.07	30	-22.95
802.11n (HT20)	1	2412	7.32	5.40	30	-22.68
	6	2437	7.26	5.32	30	-22.74
	11	2462	7.18	5.22	30	-22.82
802.11n (HT40)	3	2422	7.24	5.30	30	-22.76
	6	2437	7.16	5.20	30	-22.84
	9	2452	7.07	5.09	30	-22.93

4. Power Spectral Density

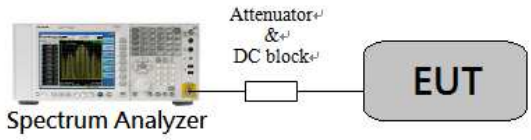
4.1 Instrument Setting

Spectrum Function	Setting
Detector	Average
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 clause 10.2 method PSD of KDB 558074 D01.
Step 2	Using the average 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 3 kHz band during any time interval of continuous transmission

4.5 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	55
Test Date :	2020/4/17

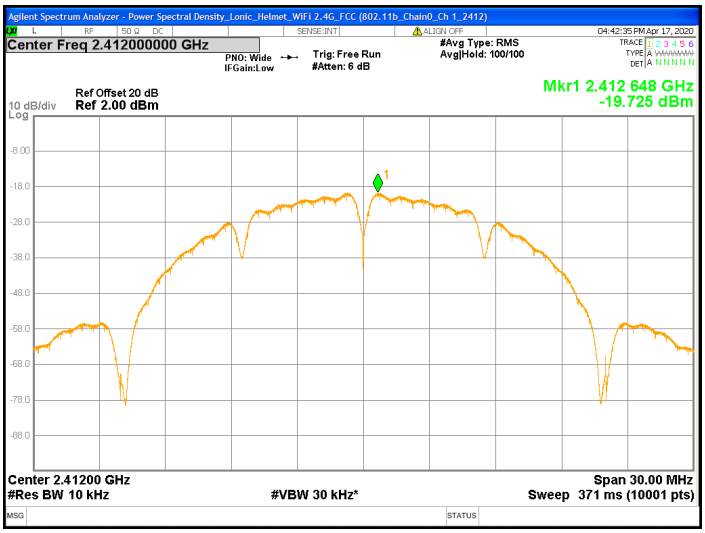
4.6 Test Results

Single TX

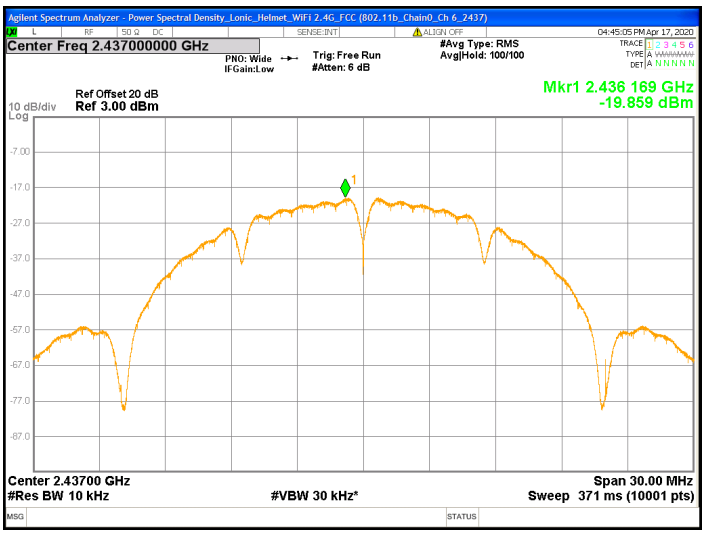
Mode	Channel	Frequency (MHz)	RBW factor	PSD in 10kHz	PSD in 3kHz		Limit (dBm)	Margin (dB)
					(dBm)	(mW)		
802.11b	1	2412	5.23	-19.73	-24.95	0.00	8	-32.95
	6	2437	5.23	-19.86	-25.09	0.00	8	-33.09
	11	2462	5.23	-20.30	-25.53	0.00	8	-33.53
802.11g	1	2412	5.23	-21.34	-26.57	0.00	8	-34.57
	6	2437	5.23	-21.76	-26.98	0.00	8	-34.98
	11	2462	5.23	-21.93	-27.16	0.00	8	-35.16
802.11n (HT20)	1	2412	5.23	-22.20	-27.43	0.00	8	-35.43
	6	2437	5.23	-21.77	-27.00	0.00	8	-35.00
	11	2462	5.23	-21.68	-26.91	0.00	8	-34.91
802.11n (HT40)	3	2422	5.23	-24.01	-29.24	0.00	8	-37.24
	6	2437	5.23	-24.74	-29.97	0.00	8	-37.97
	9	2452	5.23	-24.39	-29.62	0.00	8	-37.62

Note1: RBW Correction = 10*log(10kHz/3kHz) = 5.229
Note2: PSD in 3kHz = PSD in 10kHz – RBW Correction

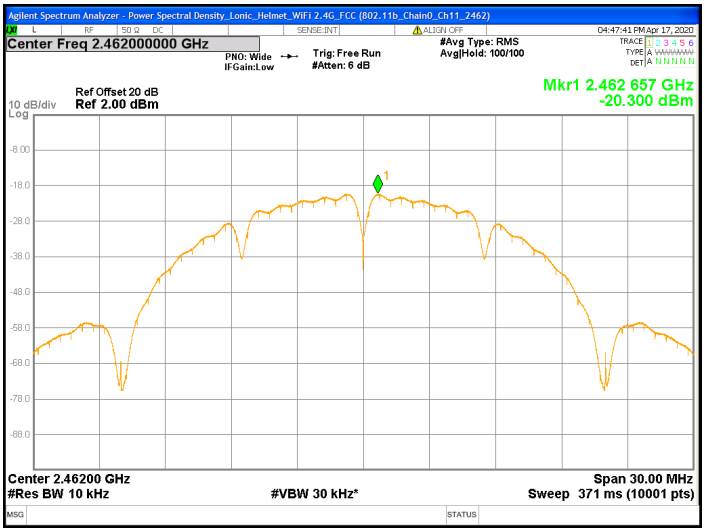
Chain0 : Power Spectral Density @ 802.11b Mode Ch 1



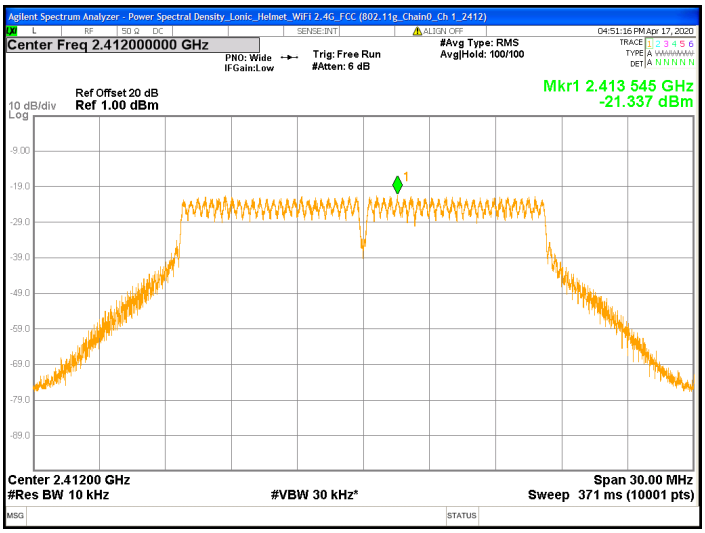
Chain0 : Power Spectral Density @ 802.11b Mode Ch 6



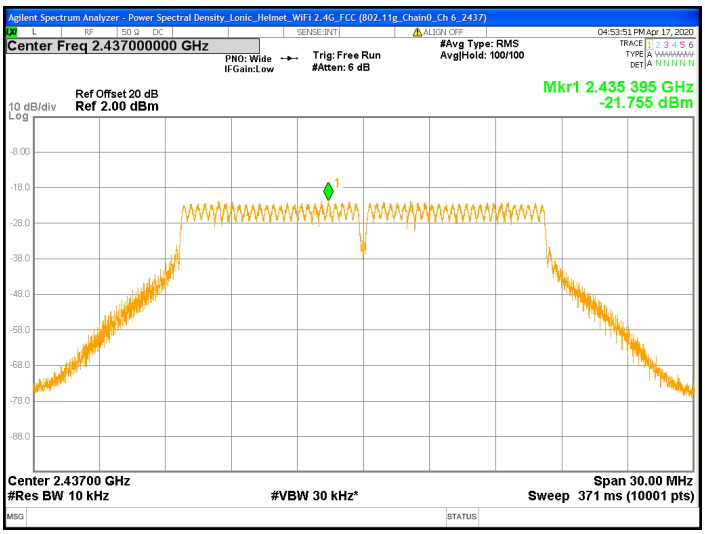
Chain0 : Power Spectral Density @ 802.11b Mode Ch11



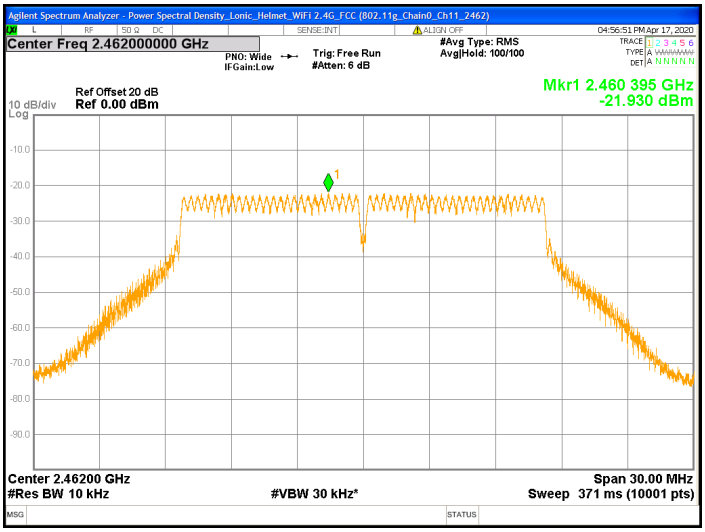
Chain0 : Power Spectral Density @ 802.11g Mode Ch 1



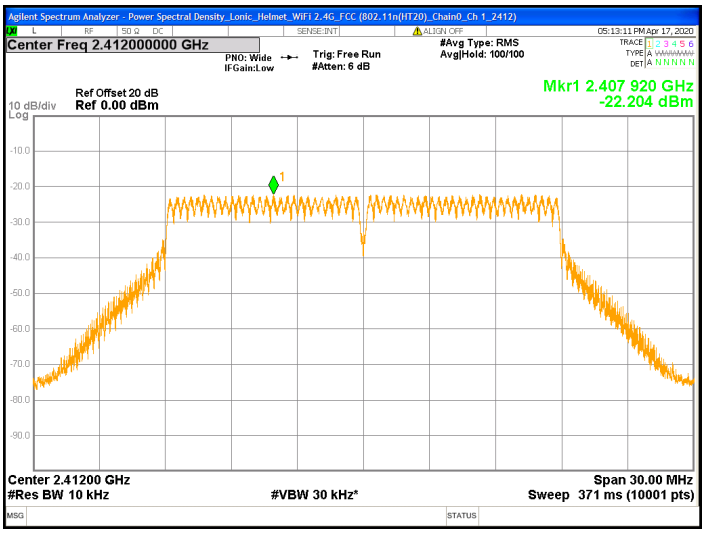
Chain0 : Power Spectral Density @ 802.11g Mode Ch 6



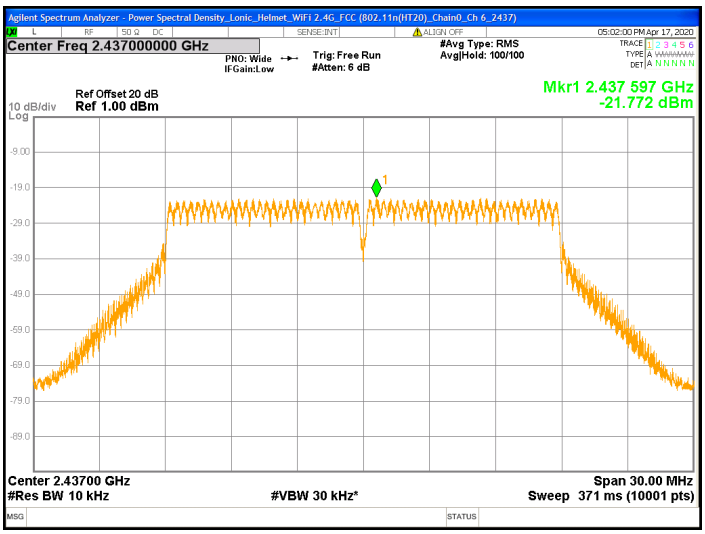
Chain0 : Power Spectral Density @ 802.11g Mode Ch11



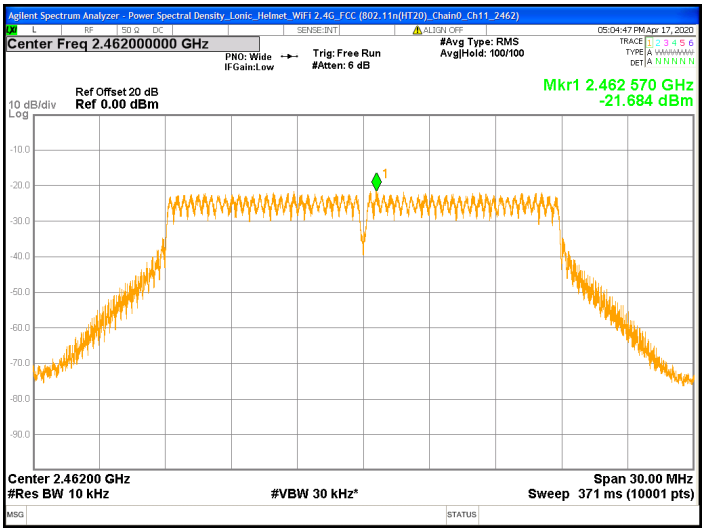
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



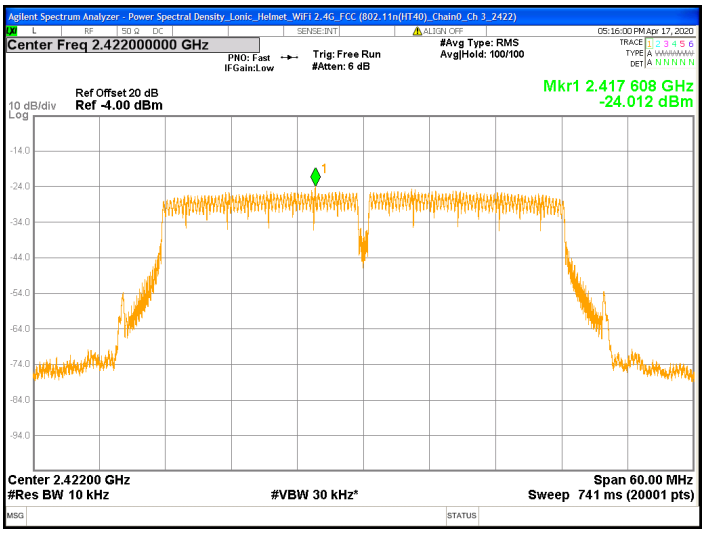
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



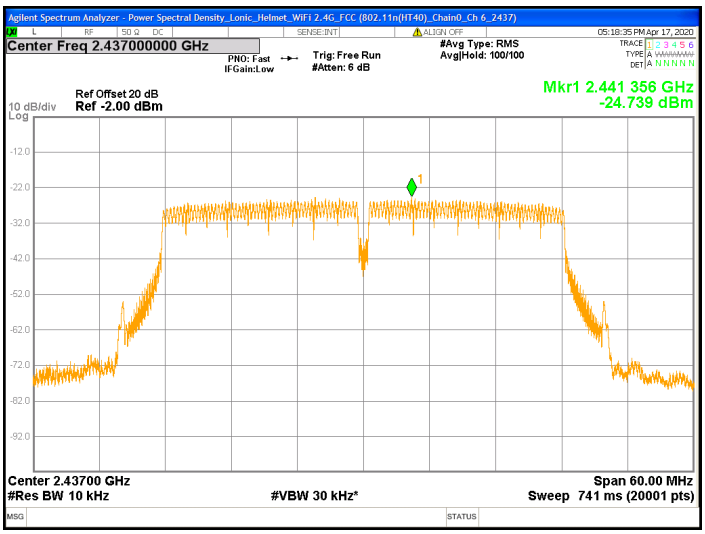
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



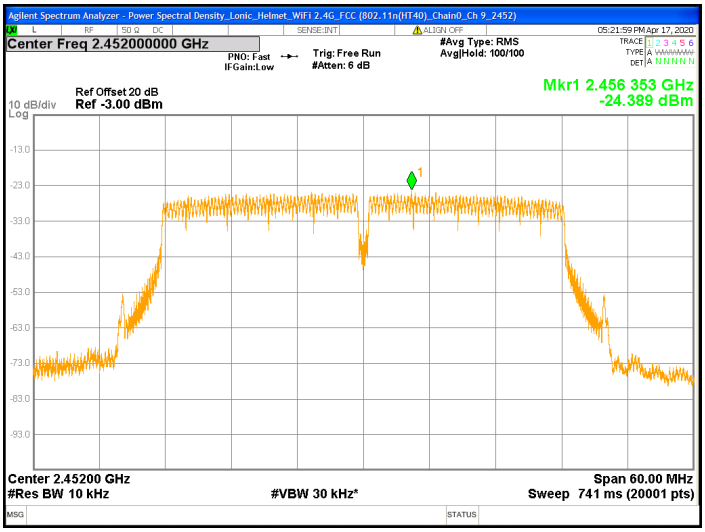
Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 3



Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 6



Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 9



5. Emissions in Non-Restricted Frequency Bands

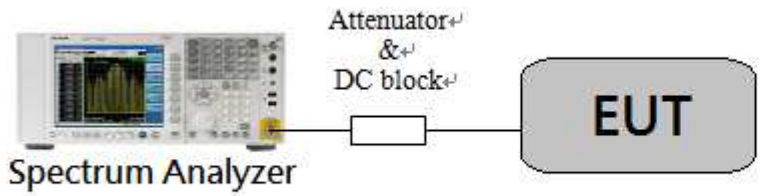
5.1 Instruments Setting

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 clause 5.1 to measure.
Step 4 Use the peak marker function to determine the maximum amplitude level.

5.3 Test Diagram



5.4 Limit

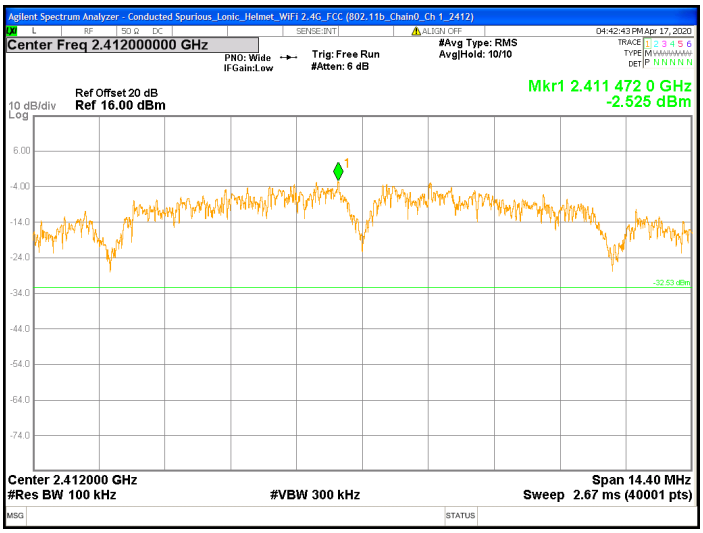
The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz

5.5 Operating Environment Condition

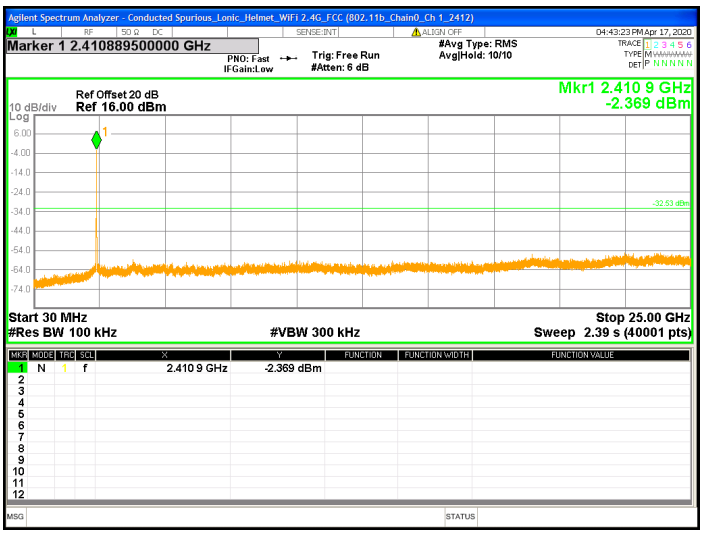
Temperature (℃) :	24
Relative Humidity (%) :	55
Test Date :	2020/4/17

5.6 Test Results

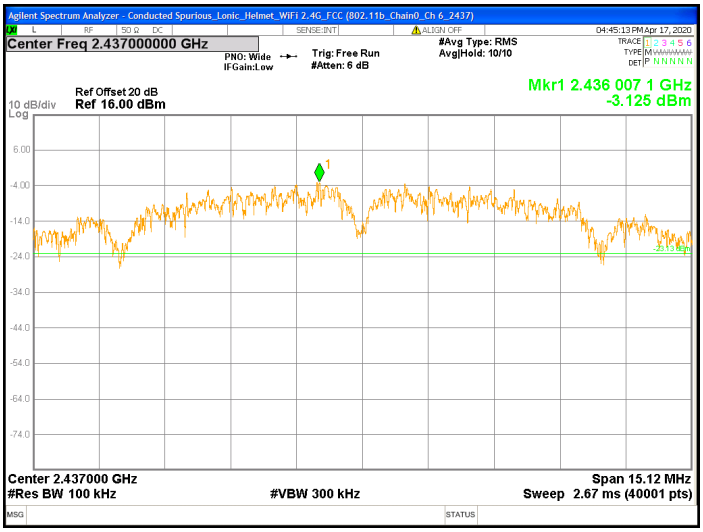
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



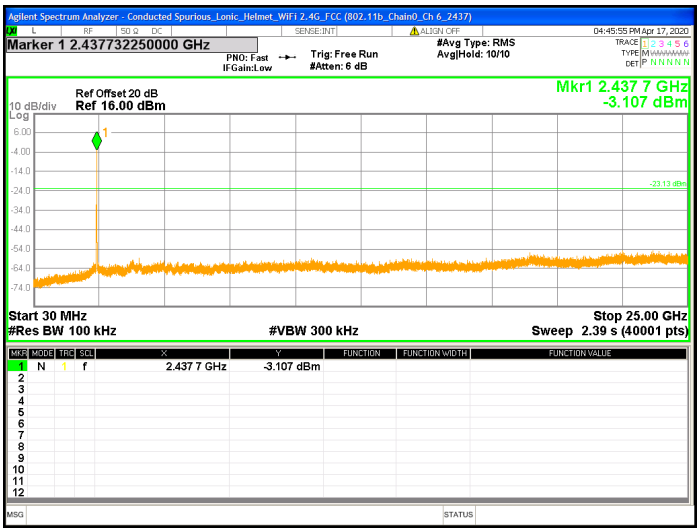
Chain0 : Conducted Spurious @ 802.11b Mode Ch 1



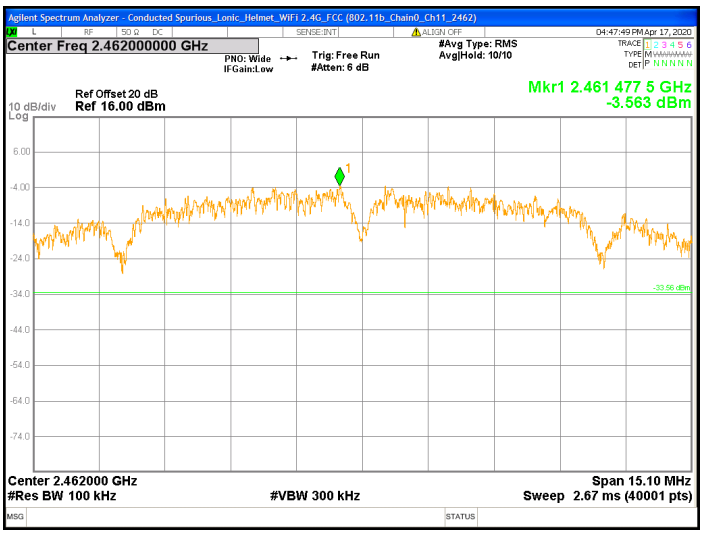
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



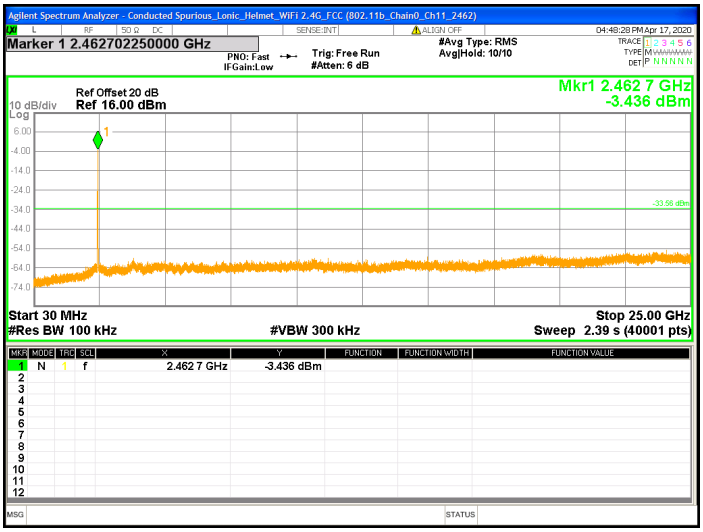
Chain0 : Conducted Spurious @ 802.11b Mode Ch 6



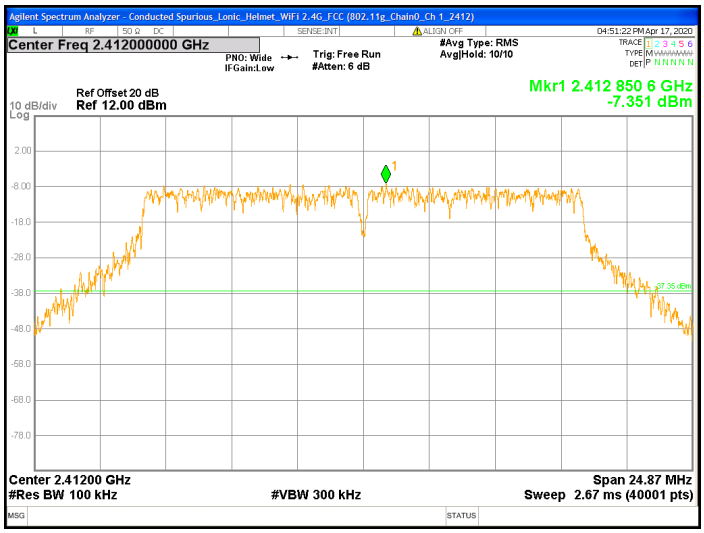
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



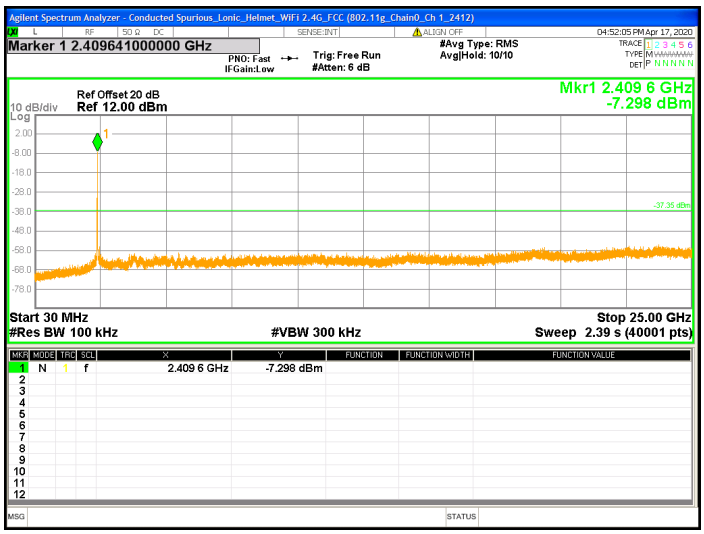
Chain0 : Conducted Spurious @ 802.11b Mode Ch11



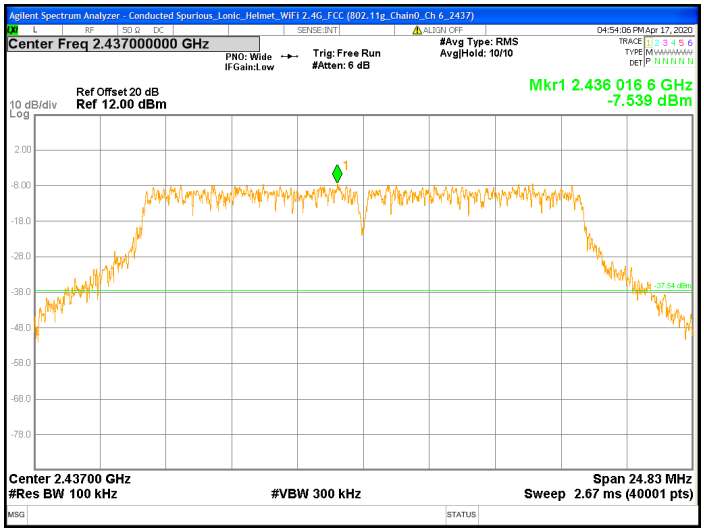
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



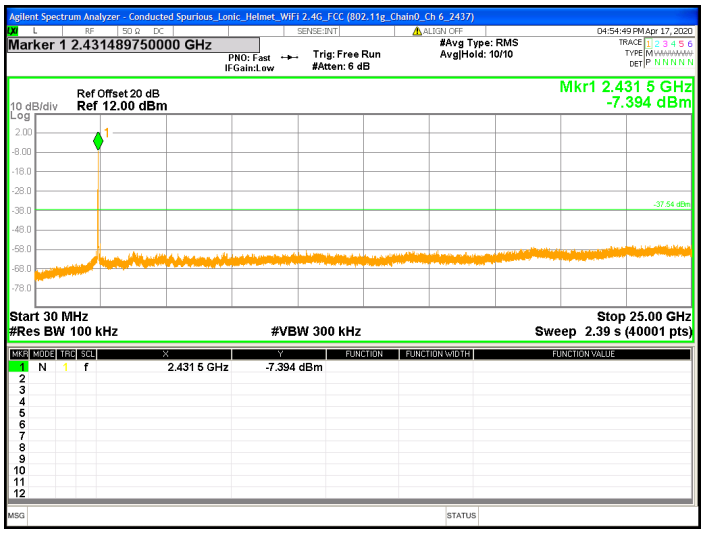
Chain0 : Conducted Spurious @ 802.11g Mode Ch 1



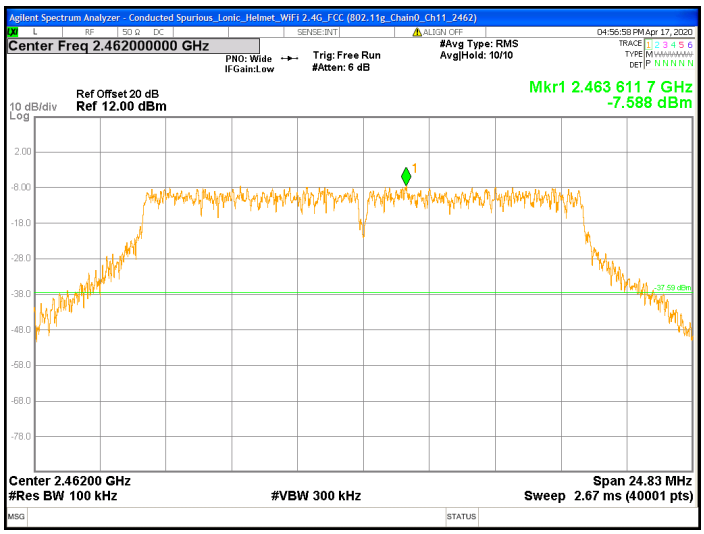
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



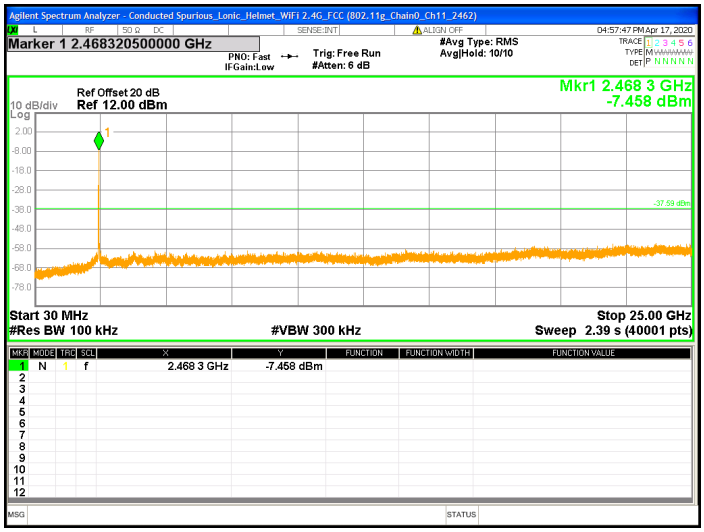
Chain0 : Conducted Spurious @ 802.11g Mode Ch 6



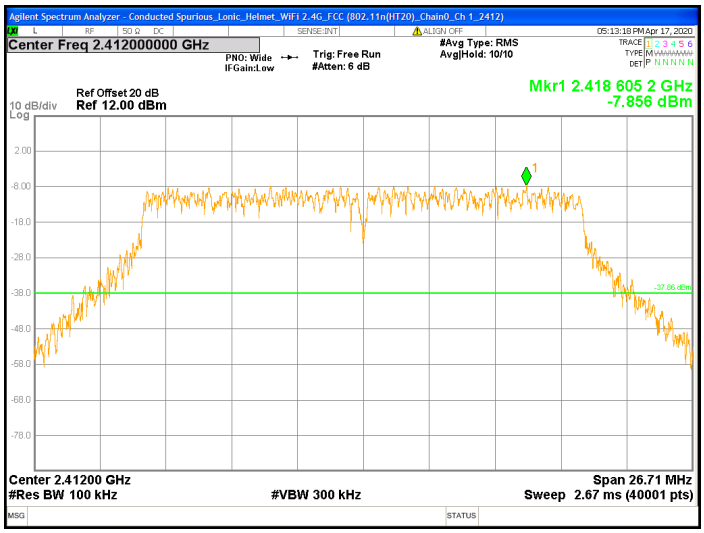
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



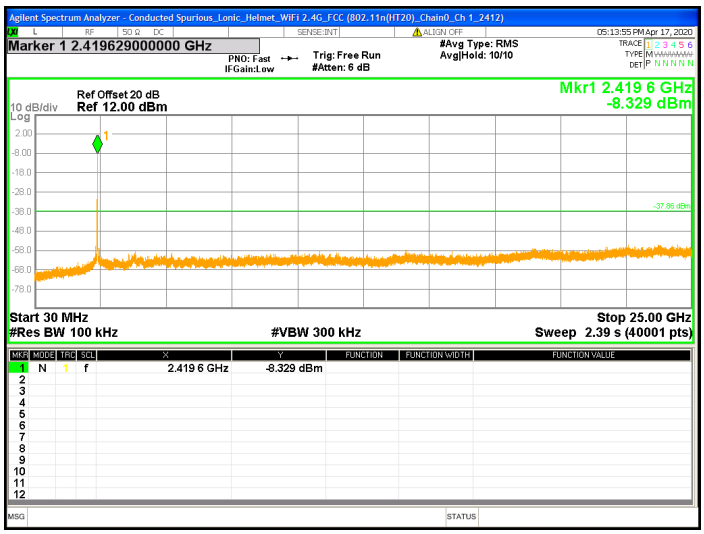
Chain0 : Conducted Spurious @ 802.11g Mode Ch11



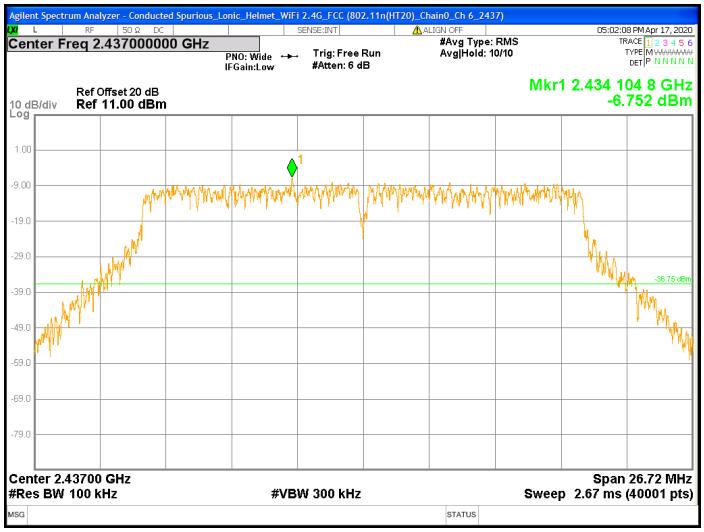
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



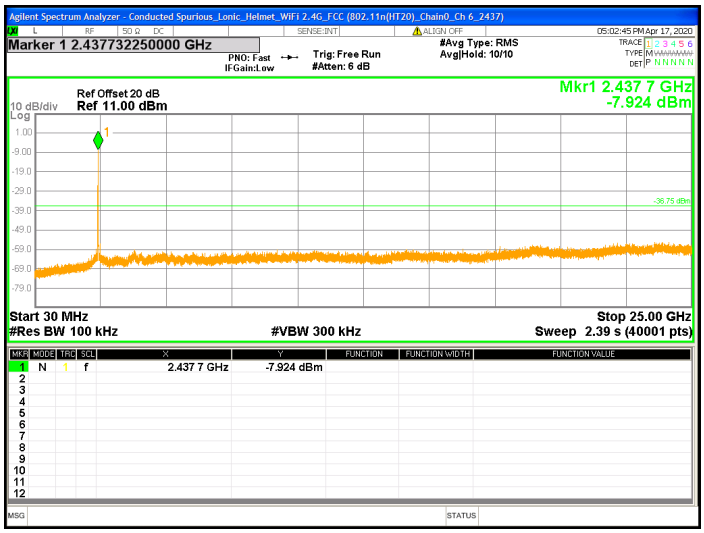
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 1



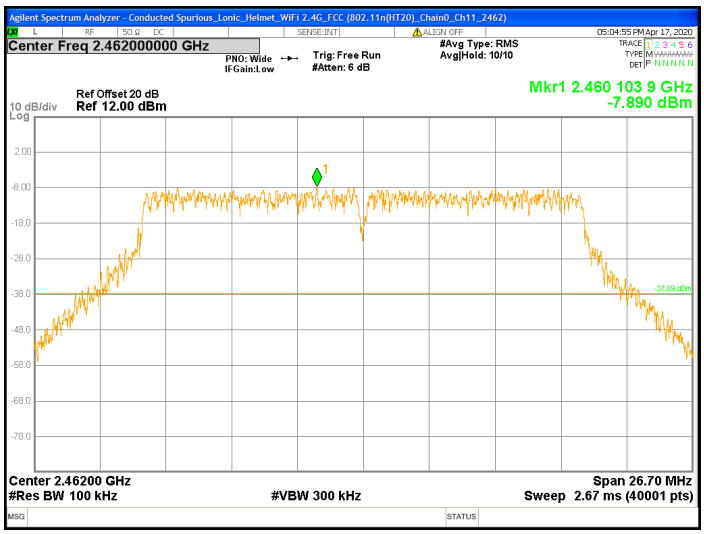
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



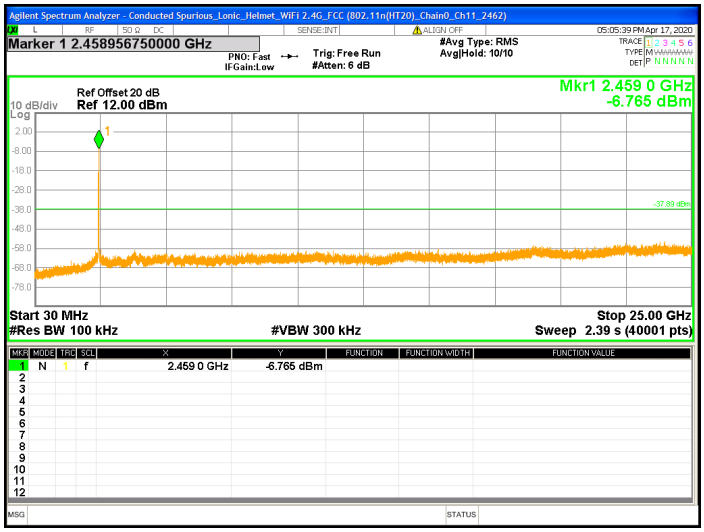
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch 6



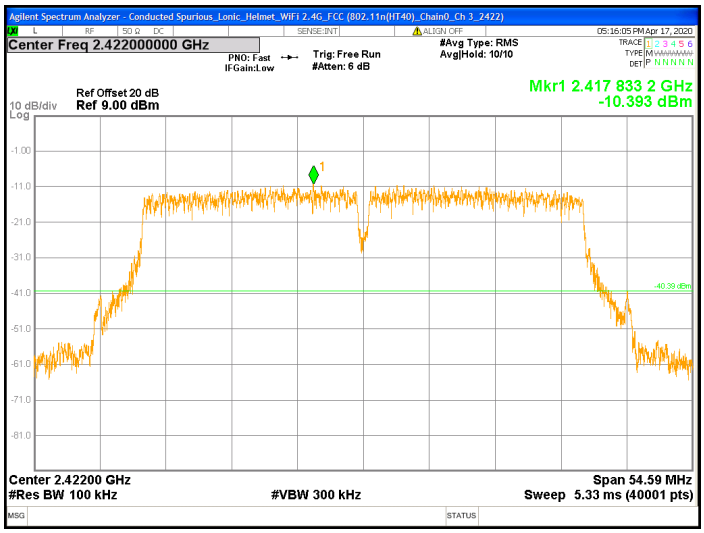
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



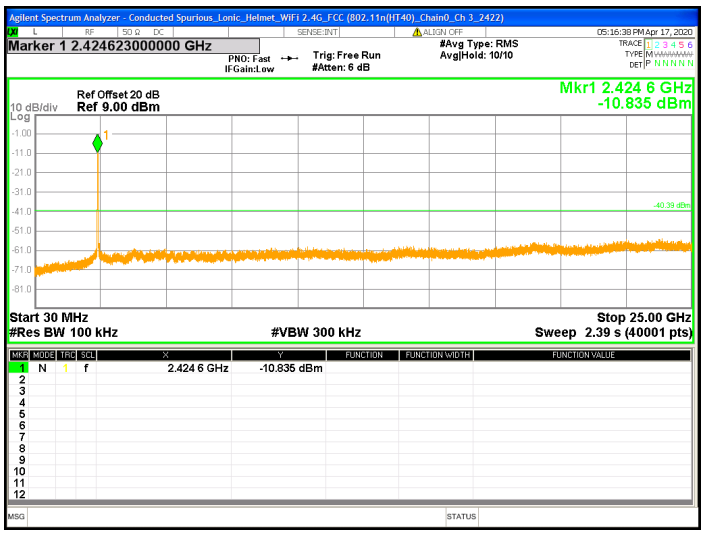
Chain0 : Conducted Spurious @ 802.11n(HT20) Mode Ch11



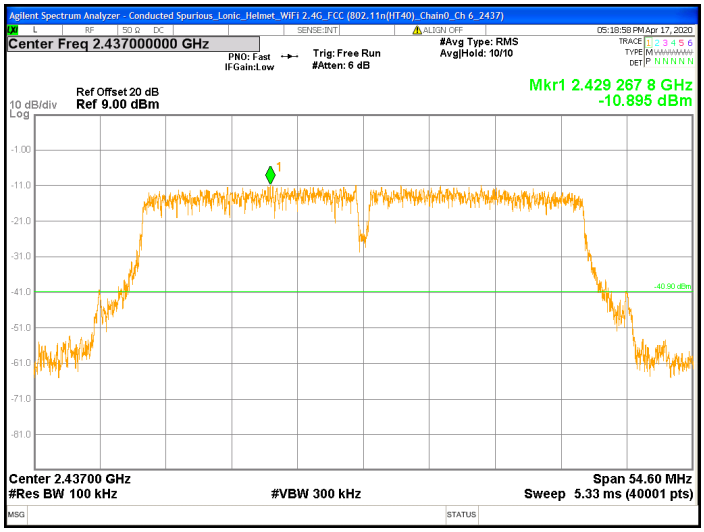
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 3



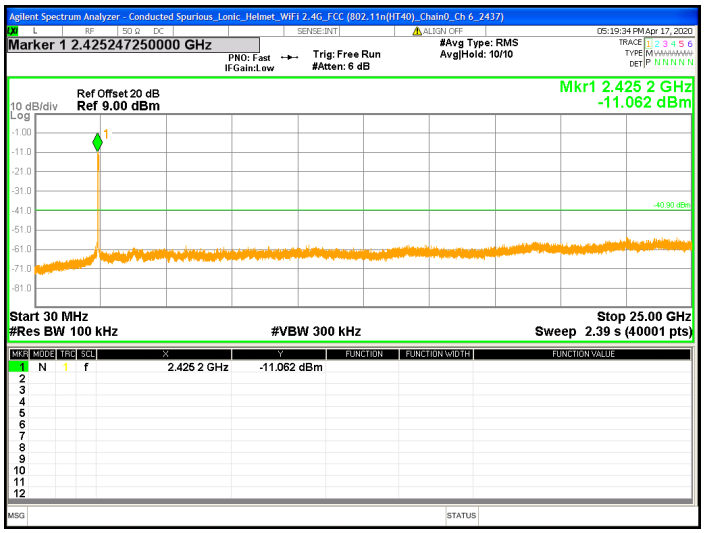
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 3



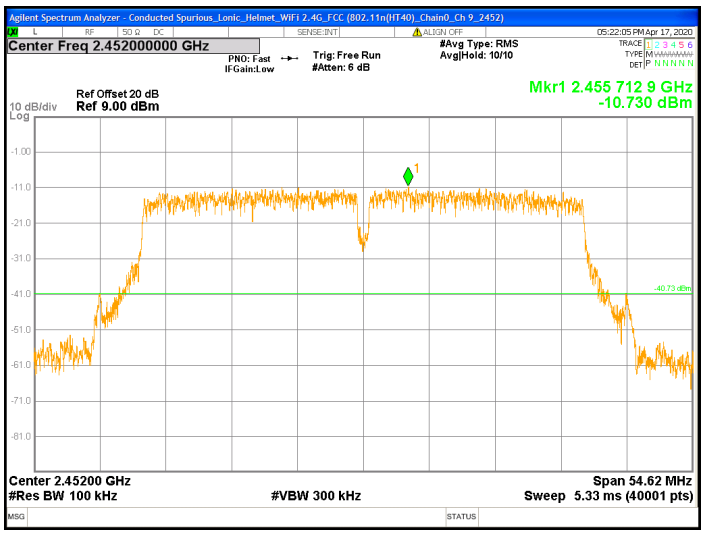
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 6



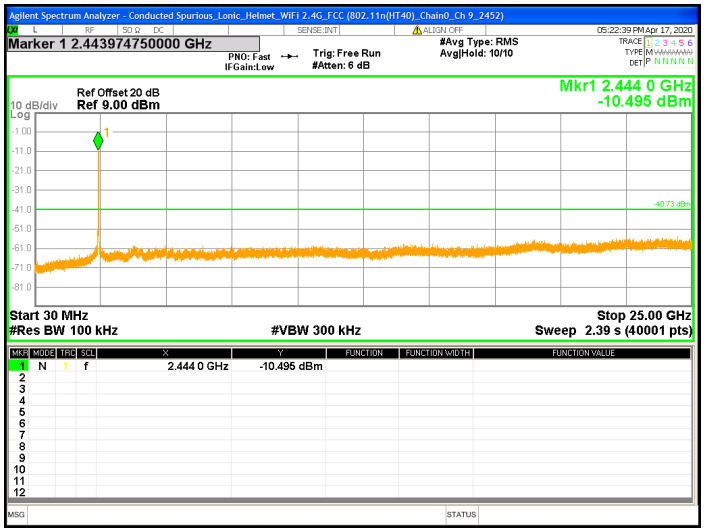
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 6



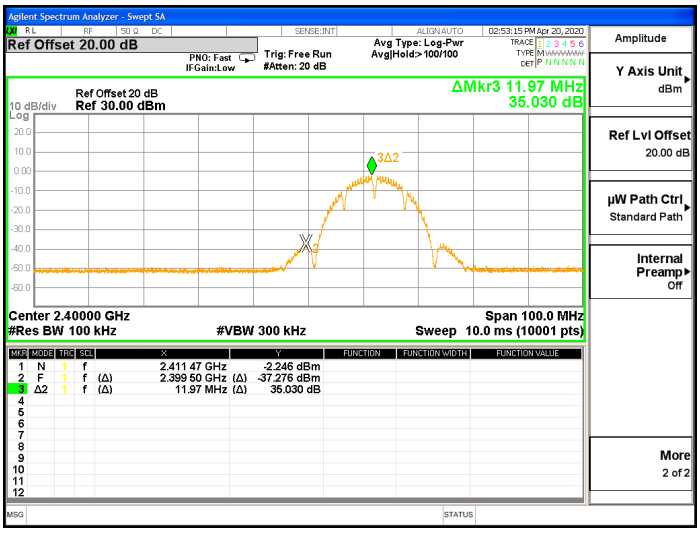
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 9



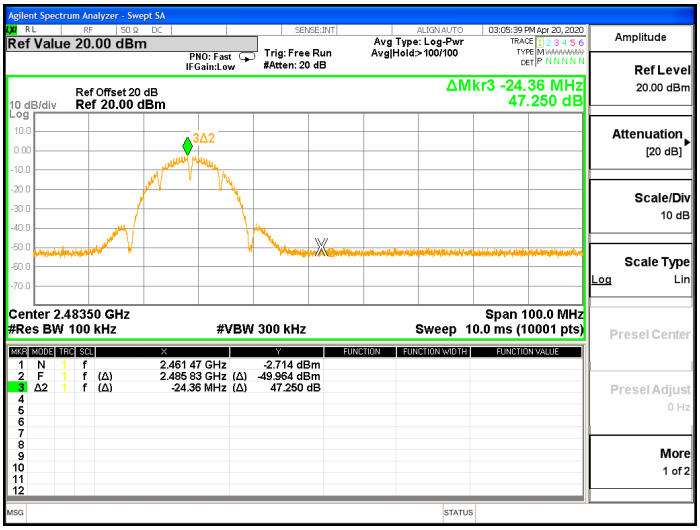
Chain0 : Conducted Spurious @ 802.11n(HT40) Mode Ch 9



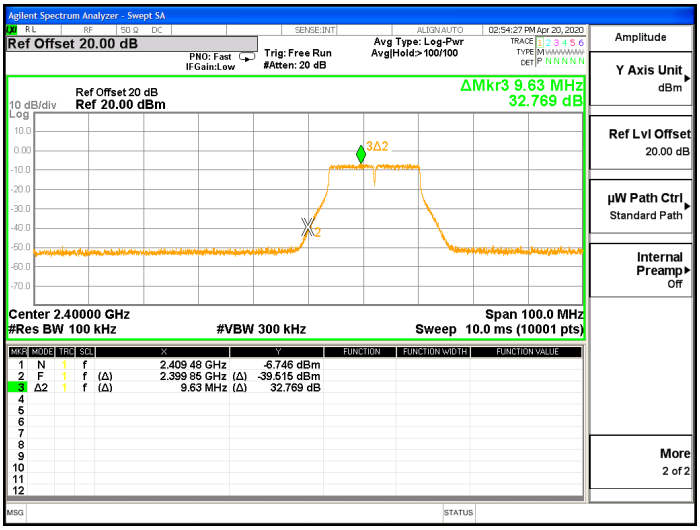
Chain0 : Authorized Band Bandedge @ 802.11b Mode Ch1



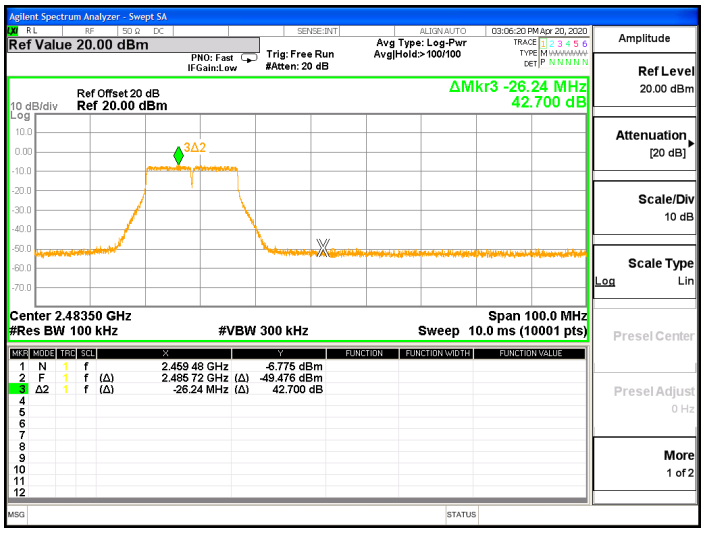
Chain0 : Authorized Band Bandedge @ 802.11b Mode Ch11



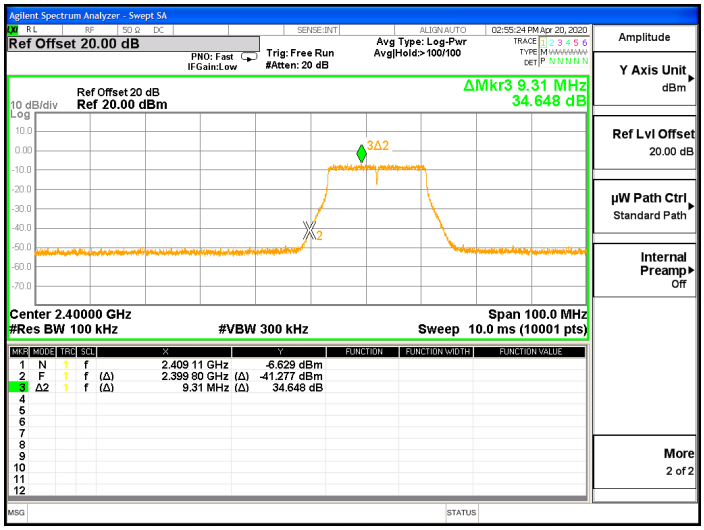
Chain0 : Authorized Band Bandedge @ 802.11g Mode Ch1



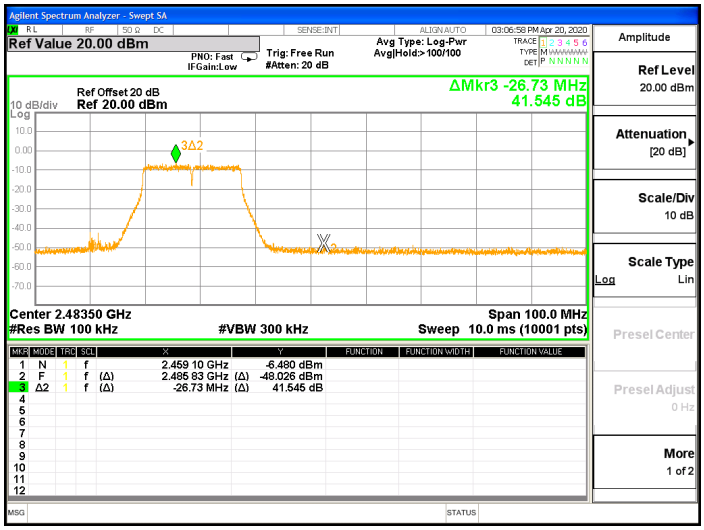
Chain0 : Authorized Band Bandedge @ 802.11g Mode Ch11



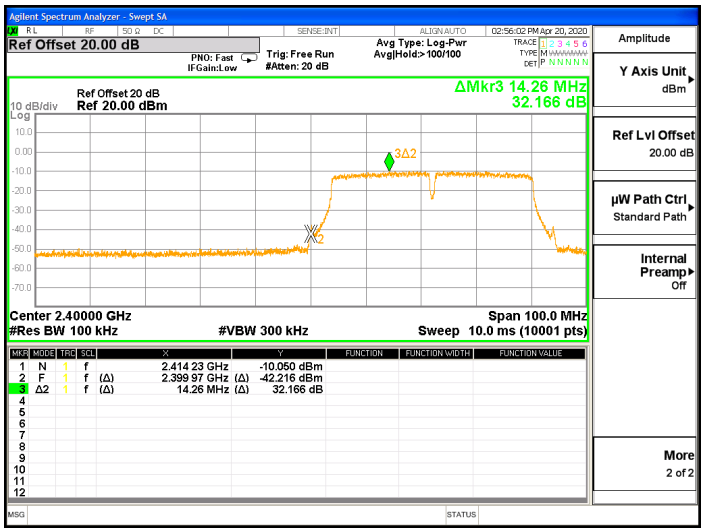
Chain0 : Authorized Band Bandedge @ 802.11n(HT20) Mode Ch1



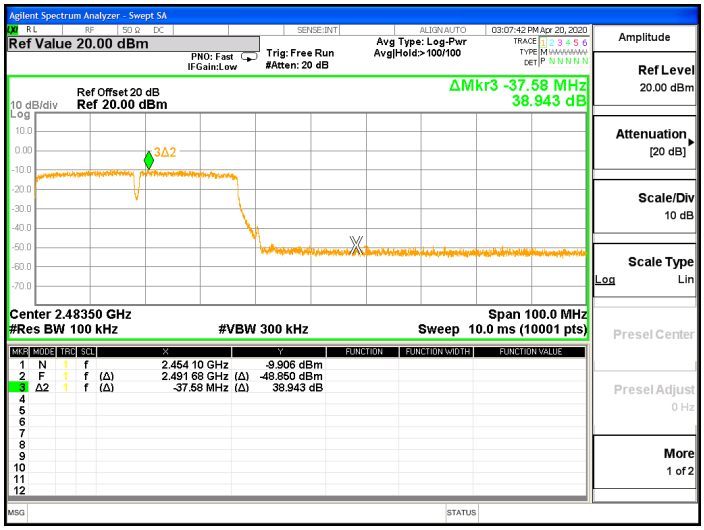
Chain0 : Authorized Band Bandedge @ 802.11n(HT20) Mode Ch11



Chain0 : Authorized Band Bandedge @ 802.11n(HT40) Mode Ch3



Chain0 : Authorized Band Bandedge @ 802.11n(HT40) Mode Ch9



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
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

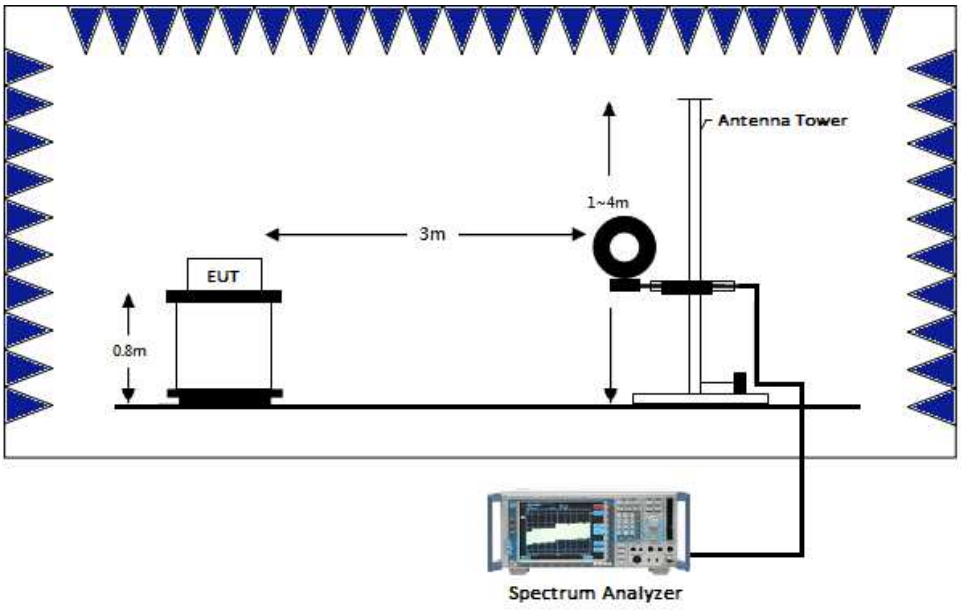
6.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter (below 1GHz) and 1.5 meter (above 1GHz) above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
Step 2	Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
Step 3	The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization.
Step 4	If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
Step 5	Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
Step 6	For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
Step 7	If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
Step 8	For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

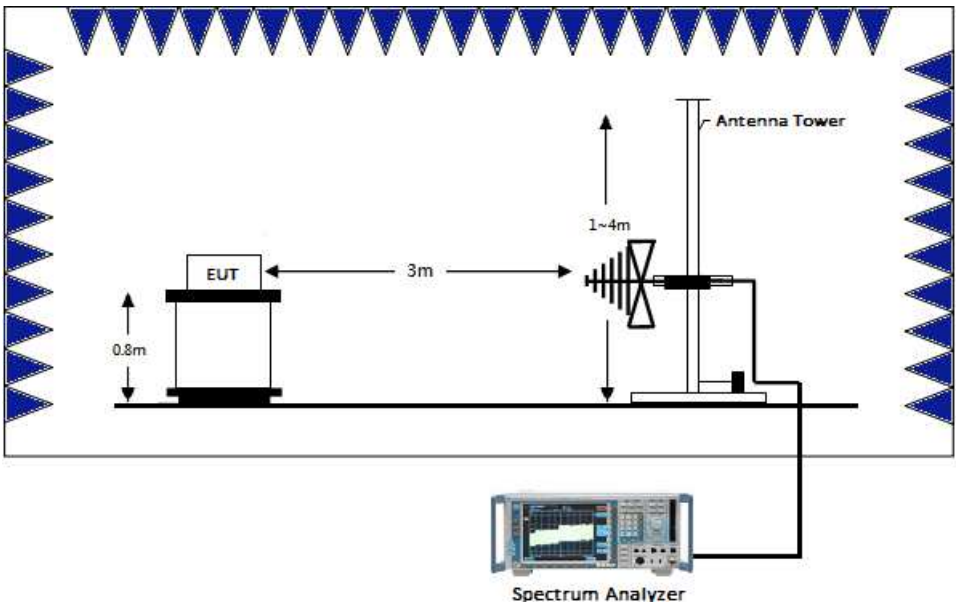
Step 9	In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

6.3 Test Diagram

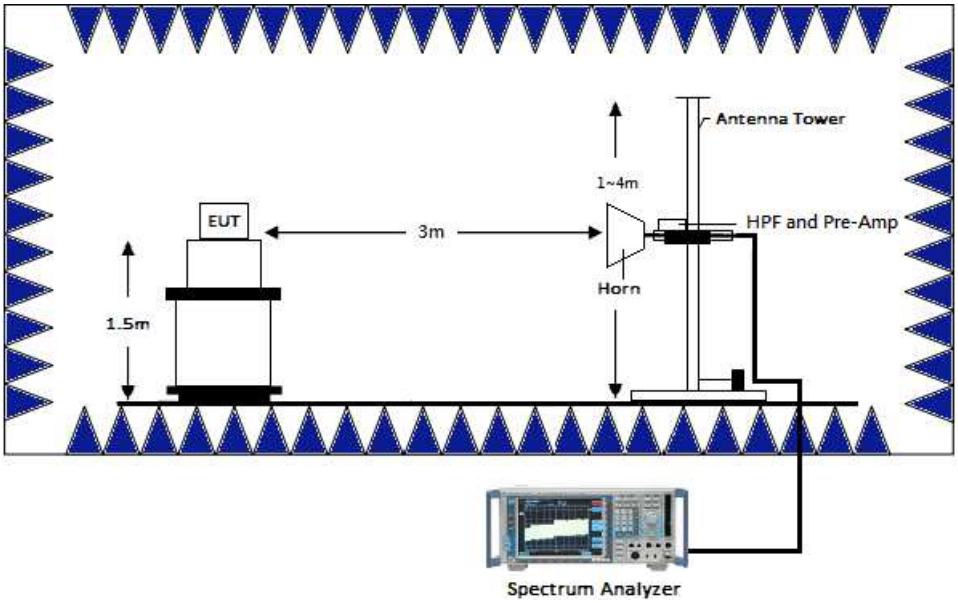
6.3.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



6.3.2 Radiated emission below 1GHz using Bilog Antenna



6.3.3 Radiated emission above 1GHz using Horn Antenna



6.4 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

6.5 Operating Environment Condition

Temperature (℃) :	25
Relative Humidity (%) :	59
Test Date :	2019/7/5

6.6 Test Result

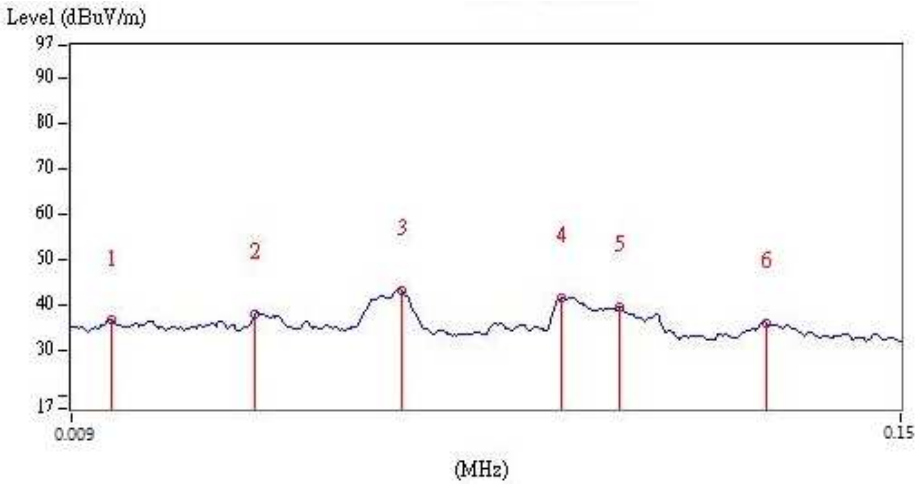
6.6.1 Measurement results: frequencies 9kHz to 30MHz

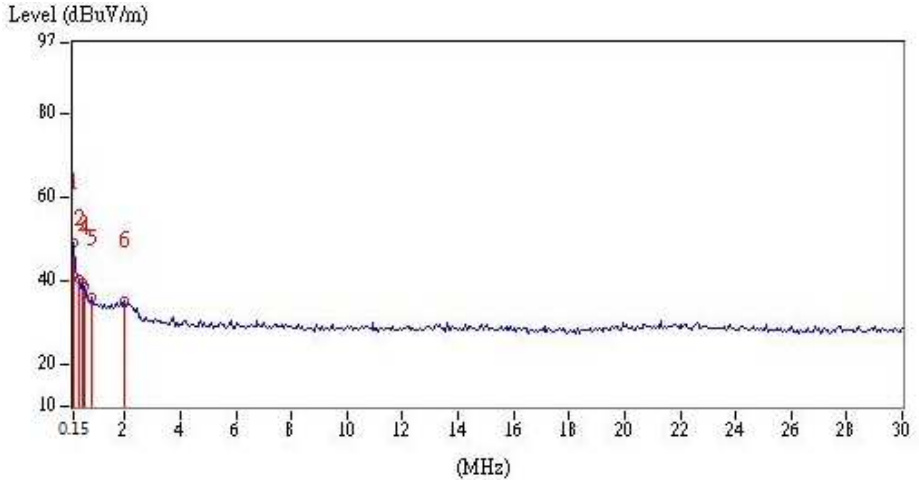
The test was performed on EUT under 802.11b/g/n continuously transmitting mode. The worst case occurred at 802.11g Channel 11.

EUT: RGH1

Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3 m (dBµV/m)	Margin (dB)
0.02	PK	18.63	17.90	36.53	121.58	-85.05
0.04	PK	18.85	19.08	37.93	115.56	-77.63
0.07	PK	18.54	24.51	43.05	110.70	-67.65
0.09	PK	18.32	23.13	41.45	108.52	-67.07
0.10	QP	18.26	21.31	39.57	107.60	-68.03
0.13	PK	18.27	17.62	35.89	105.33	-69.44
0.15	PK	18.27	30.95	49.23	104.08	-54.85
0.33	PK	18.33	22.18	40.51	97.23	-56.72
0.45	PK	18.37	21.04	39.41	94.54	-55.13
0.57	QP	18.43	20.06	38.49	72.49	-34.00
0.81	QP	18.57	17.35	35.92	69.43	-33.51
2.00	QP	18.82	16.55	35.37	69.54	-34.17

Remark: Corr. Factor = Antenna Factor + Cable Loss


Level (dBuV/m)
97
90
80
70
60
50
40
30
17
1
2
3
4
5
6
0.009
0.15
(MHz)

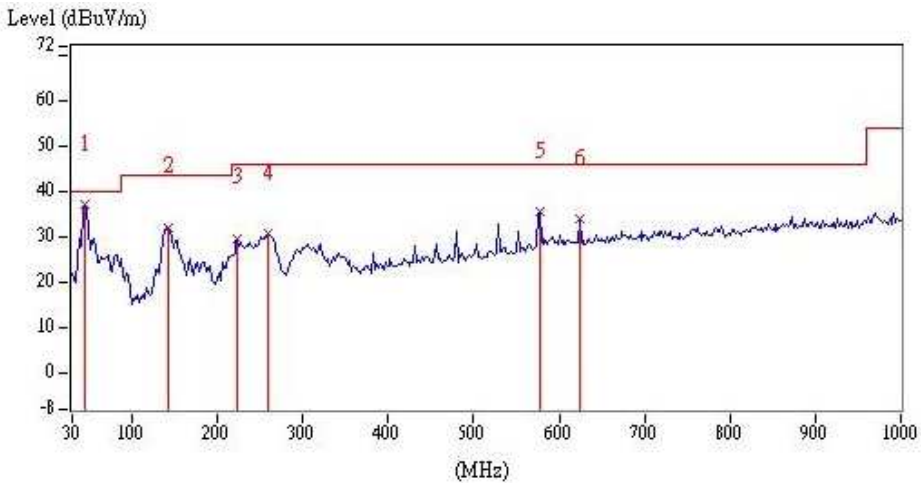

Level (dBuV/m)
97
80
60
40
20
10
1
2
4
5
6
0.15
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
(MHz)

6.6.1 Measurement results: frequencies below 1 GHz

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

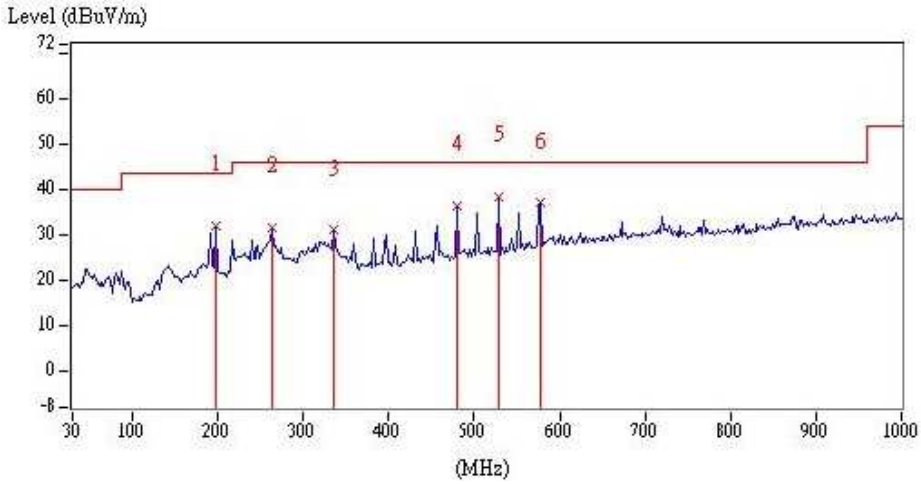
EUT: RGH1

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Vertical	45.52	QP	20.36	16.69	37.05	40.00	-2.95
Vertical	142.52	QP	19.89	12.20	32.09	43.50	-11.41
Vertical	224.00	QP	19.20	10.55	29.76	46.00	-16.24
Vertical	258.92	QP	20.50	10.29	30.79	46.00	-15.21
Vertical	577.08	QP	27.72	7.80	35.52	46.00	-10.48
Vertical	623.64	QP	28.63	5.27	33.90	46.00	-12.10



Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Horizontal	196.84	QP	17.78	14.25	32.03	43.50	-11.47
Horizontal	262.80	QP	20.58	11.15	31.72	46.00	-14.28
Horizontal	336.52	QP	22.31	8.72	31.03	46.00	-14.97
Horizontal	480.08	QP	25.75	10.70	36.45	46.00	-9.55
Horizontal	528.58	QP	26.59	11.88	38.47	46.00	-7.53
Horizontal	577.08	QP	27.72	9.36	37.08	46.00	-8.92

Remark: Corr. Factor = Antenna Factor + Cable Loss



6.6.2 Measurement results: frequency above 1GHz to 25GHz

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	8.30	46.59	54.89	74.00	-19.11
	4824	AV	V	8.30	44.90	53.20	54.00	-0.80
	4824	PK	H	8.30	40.91	49.21	74.00	-24.79
802.11b_Ch6	4874	PK	V	8.62	46.69	55.31	74.00	-18.69
	4874	AV	V	8.62	44.86	53.48	54.00	-0.52
	4874	PK	H	8.62	41.82	50.44	74.00	-23.56
802.11b_Ch11	4924	PK	V	8.85	46.74	55.59	74.00	-18.41
	4924	AV	V	8.85	44.58	53.43	54.00	-0.57
	4924	PK	H	8.85	42.04	50.89	74.00	-23.11
802.11g_Ch1	4824	PK	V	8.39	48.83	57.23	74.00	-16.77
	4824	AV	V	8.39	38.59	46.98	54.00	-7.02
	4824	PK	H	8.39	43.87	52.26	74.00	-21.74
802.11g_Ch6	4874	PK	V	8.62	52.82	61.44	74.00	-12.56
	4874	AV	V	8.62	40.75	49.37	54.00	-4.63
	7311	PK	V	16.27	37.60	53.86	74.00	-20.14
	4874	PK	H	8.62	48.00	56.63	74.00	-17.37
	4874	AV	H	8.62	36.12	44.74	54.00	-9.26
802.11g_Ch11	4924	PK	V	8.85	52.12	60.97	74.00	-13.03
	4924	AV	V	8.85	39.02	47.87	54.00	-6.13
	7386	PK	V	16.60	38.60	55.21	74.00	-18.79
	7386	AV	V	16.60	26.18	42.78	54.00	-11.22
	4924	PK	H	8.85	47.75	56.60	74.00	-17.40
802.11n(HT20)_Ch1	4824	PK	V	8.39	48.08	56.48	74.00	-17.52
	4824	AV	V	8.39	35.73	44.12	54.00	-9.88
	4824	PK	H	8.39	41.47	49.87	74.00	-24.13
802.11n(HT20)_Ch6	4874	PK	V	8.62	51.10	59.72	74.00	-14.28
	4874	AV	V	8.62	38.25	46.87	54.00	-7.13
	4874	PK	H	8.62	44.71	53.33	74.00	-20.67
802.11n(HT20)_Ch11	4924	PK	V	8.85	52.79	61.64	74.00	-12.36
	4924	AV	V	8.85	38.50	47.35	54.00	-6.65
	4924	PK	H	8.85	47.12	55.98	74.00	-18.02
	4924	AV	H	8.85	34.84	43.69	54.00	-10.31
802.11n(HT40)_Ch3	4844	PK	V	8.49	44.89	53.37	74.00	-20.63
	4844	PK	H	8.49	39.40	47.89	74.00	-26.11
802.11n(HT40)_Ch6	4874	PK	V	8.62	45.59	54.21	74.00	-19.79
	4874	AV	V	8.62	35.29	43.91	54.00	-10.09
	4874	PK	H	8.62	40.40	49.02	74.00	-24.98
802.11n(HT40)_Ch9	4904	PK	V	8.76	46.42	55.18	74.00	-18.82
	4904	AV	V	8.76	34.90	43.66	54.00	-10.34
	4904	PK	H	8.76	42.29	51.05	74.00	-22.95

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
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 Operating Environment Condition

Temperature (℃) :	25
Relative Humidity (%) :	51
Test Date :	2019/6/24

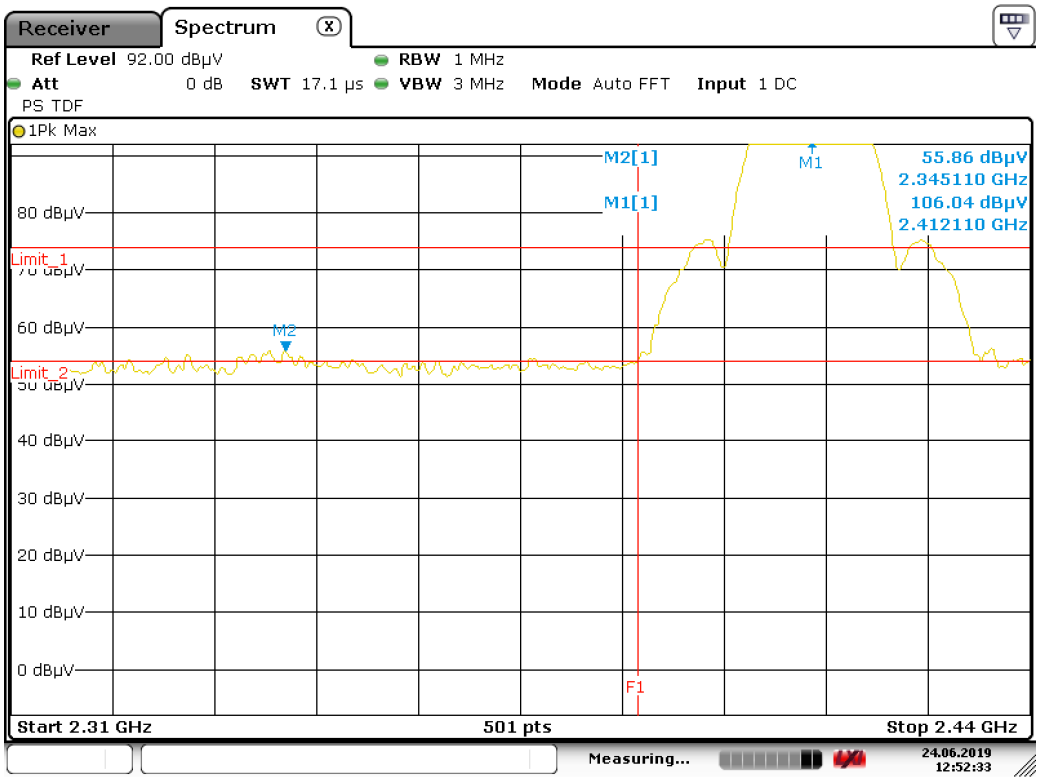
7.4 Test Results

EUT: RGH1

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	2345.11	PK	H	34.37	21.49	55.86	74	-18.14	2310~2390
	2389.22	AV	H	34.48	9.75	44.23	54	-9.77	
	2486.13	PK	H	34.72	21.81	56.53	74	-17.47	2483.5~2500
	2498.59	AV	H	34.75	9.16	43.91	54	-10.09	
802.11g	2390.00	PK	H	34.48	34.92	69.40	74	-4.60	2310~2390
	2390.00	AV	H	34.48	18.99	53.47	54	-0.53	
	2483.50	PK	H	34.71	37.05	71.76	74	-2.24	2483.5~2500
	2483.50	AV	H	34.71	18.65	53.36	54	-0.64	
802.11n (HT20)	2390.00	PK	H	34.48	38.78	73.26	74	-0.74	2310~2390
	2390.00	AV	H	34.48	17.95	52.43	54	-1.57	
	2483.50	PK	H	34.71	36.15	70.86	74	-3.14	2483.5~2500
	2483.50	AV	H	34.71	16.61	51.32	54	-2.68	
802.11n (HT40)	2388.92	PK	H	34.48	33.01	67.49	74	-6.51	2310~2390
	2390.00	AV	H	34.48	17.61	52.09	54	-1.91	
	2487.94	PK	H	34.72	34.93	69.65	74	-4.35	2483.5~2500
	2483.50	AV	H	34.71	18.49	53.20	54	-0.80	

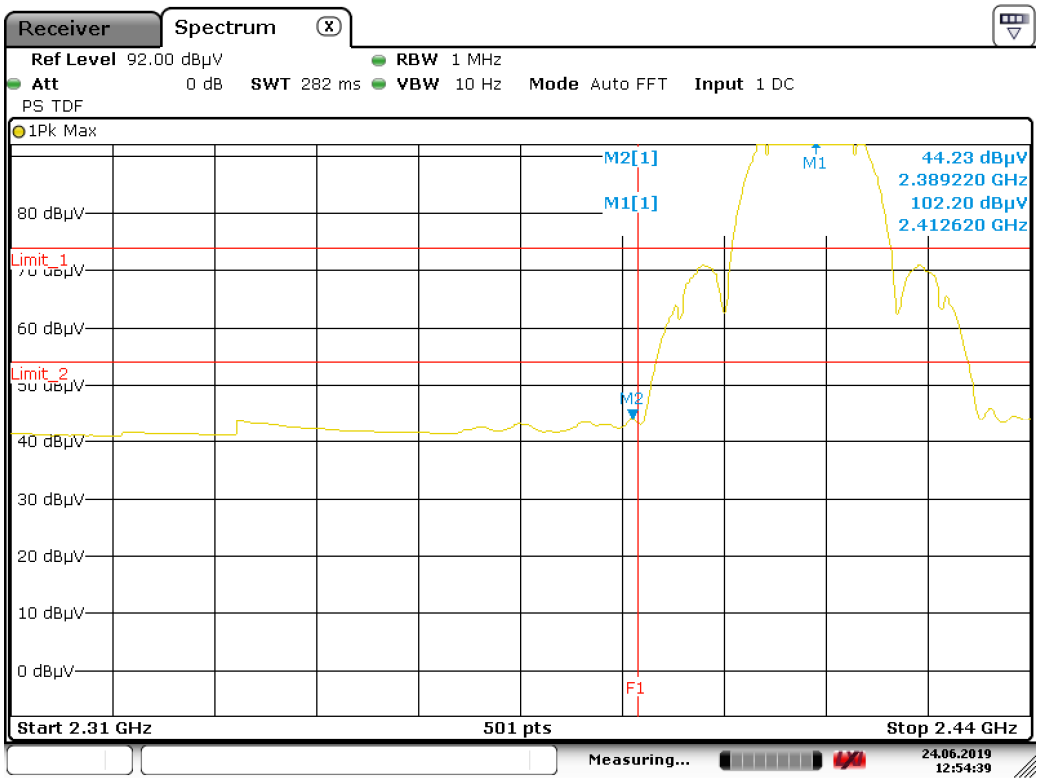
Remark: Correction Factor = Antenna Factor + Cable Loss

Chain0: Restricted Band Bandedge @ 802.11b Mode Ch1 PK



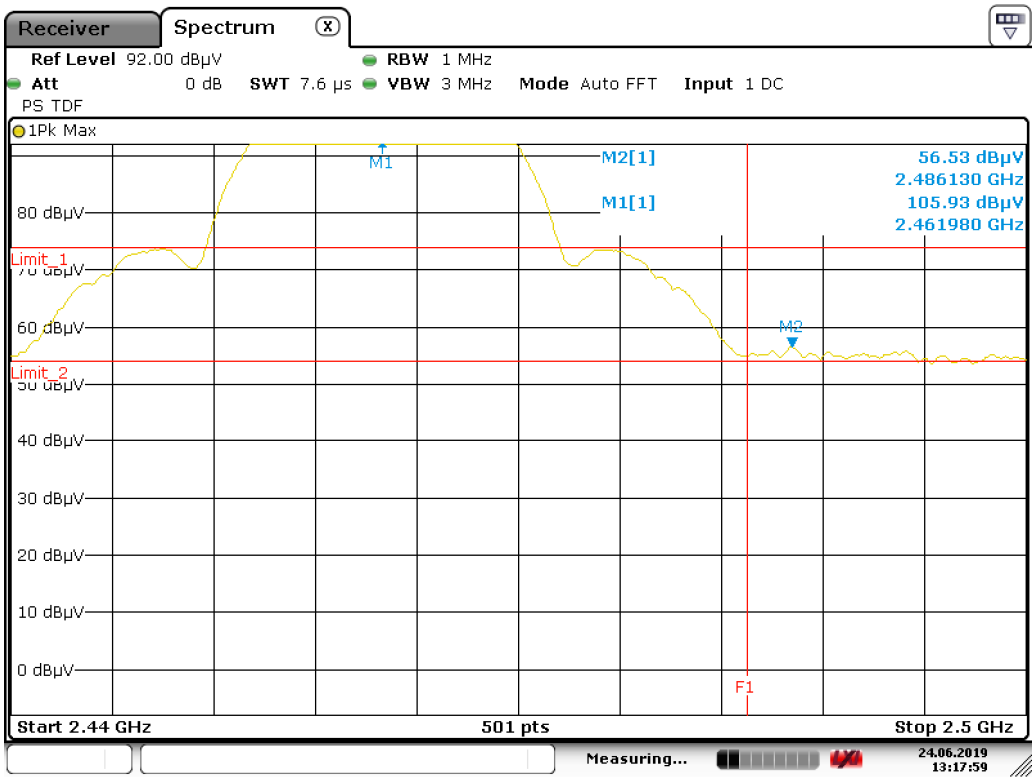
Date: 24.JUN.2019 12:52:34

Chain0: Restricted Band Bandedge @ 802.11b Mode Ch1 AV



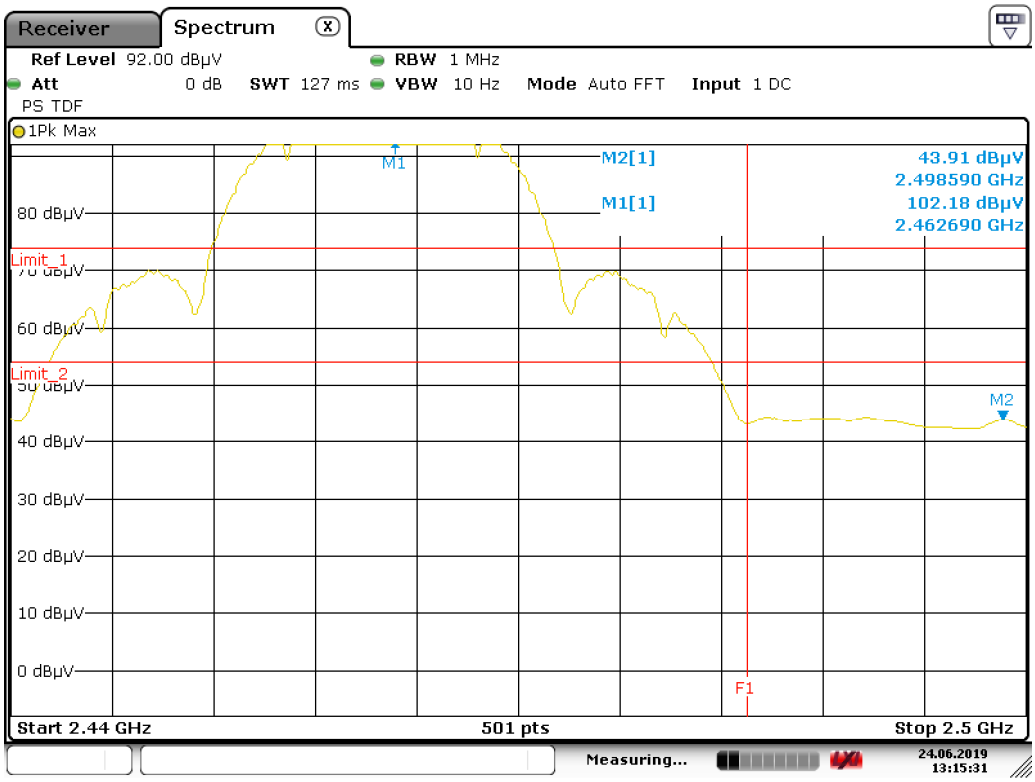
Date: 24.JUN.2019 12:54:39

Chain0: Restricted Band Bandedge @ 802.11b Mode Ch11 PK



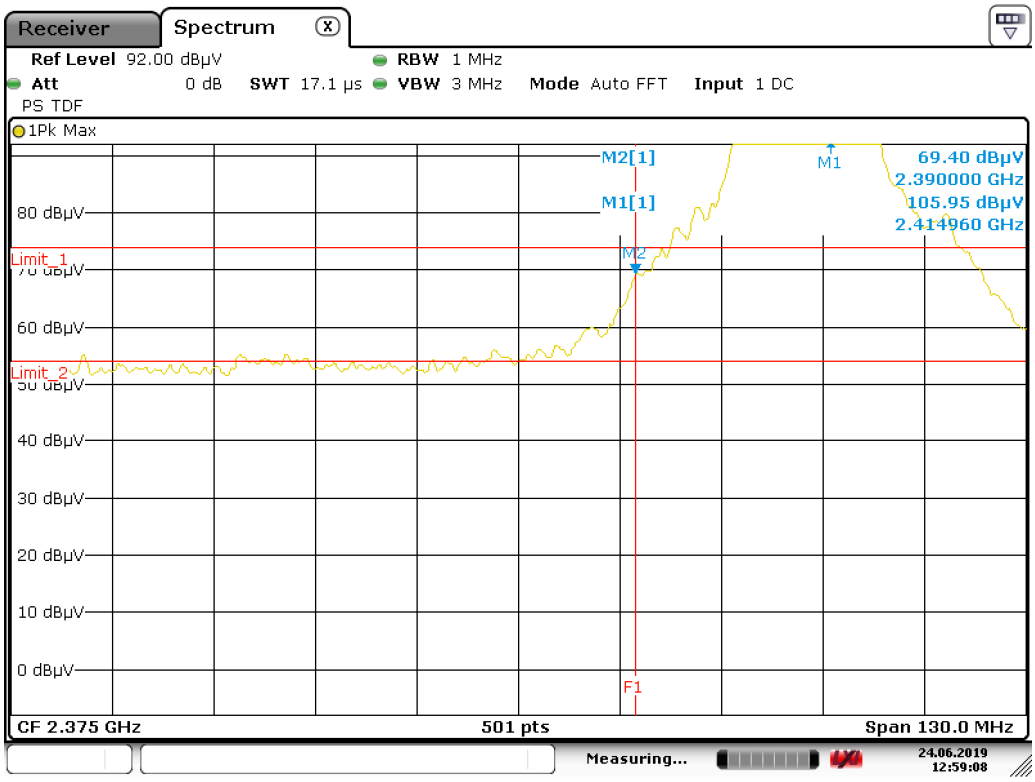
Date: 24.JUN.2019 13:17:59

Chain0: Restricted Band Bandedge @ 802.11b Mode Ch11 AV



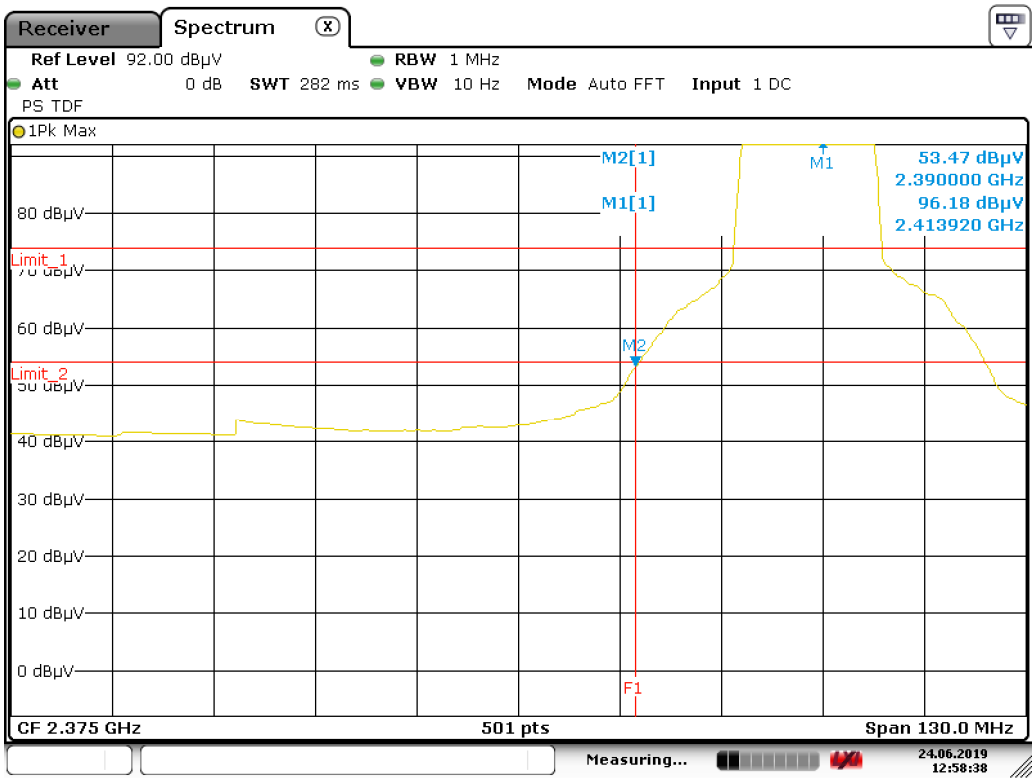
Date: 24.JUN.2019 13:15:32

Chain0: Restricted Band Bandedge @ 802.11g Mode Ch1 PK



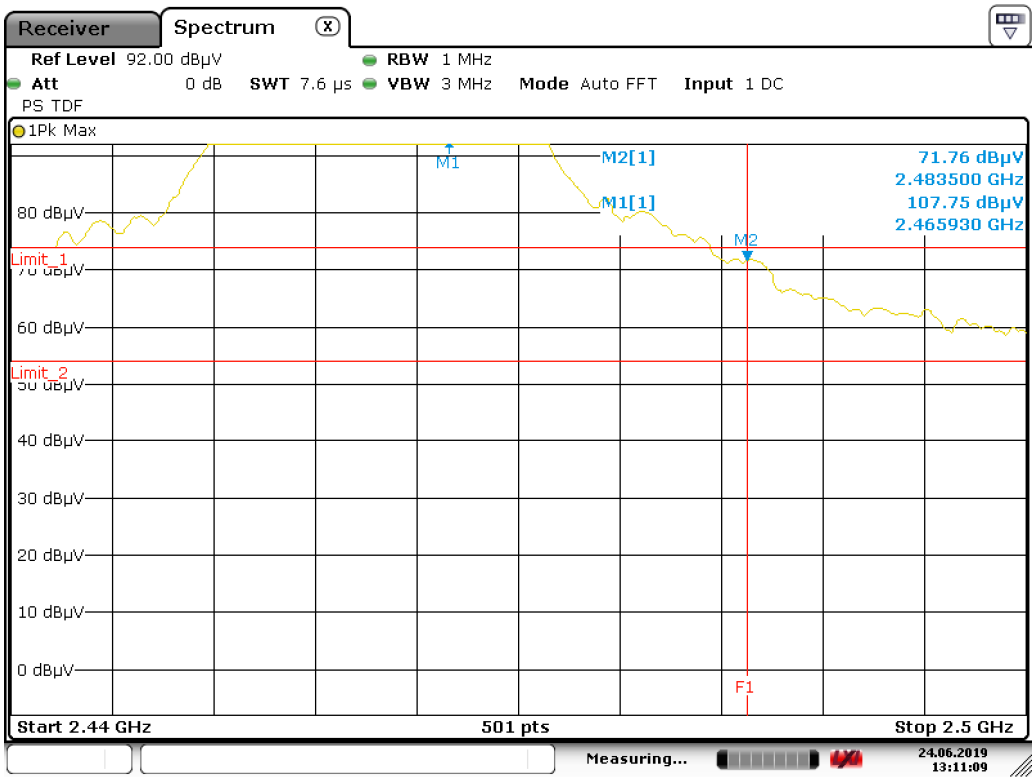
Date: 24.JUN.2019 12:59:08

Chain0: Restricted Band Bandedge @ 802.11g Mode Ch1 AV



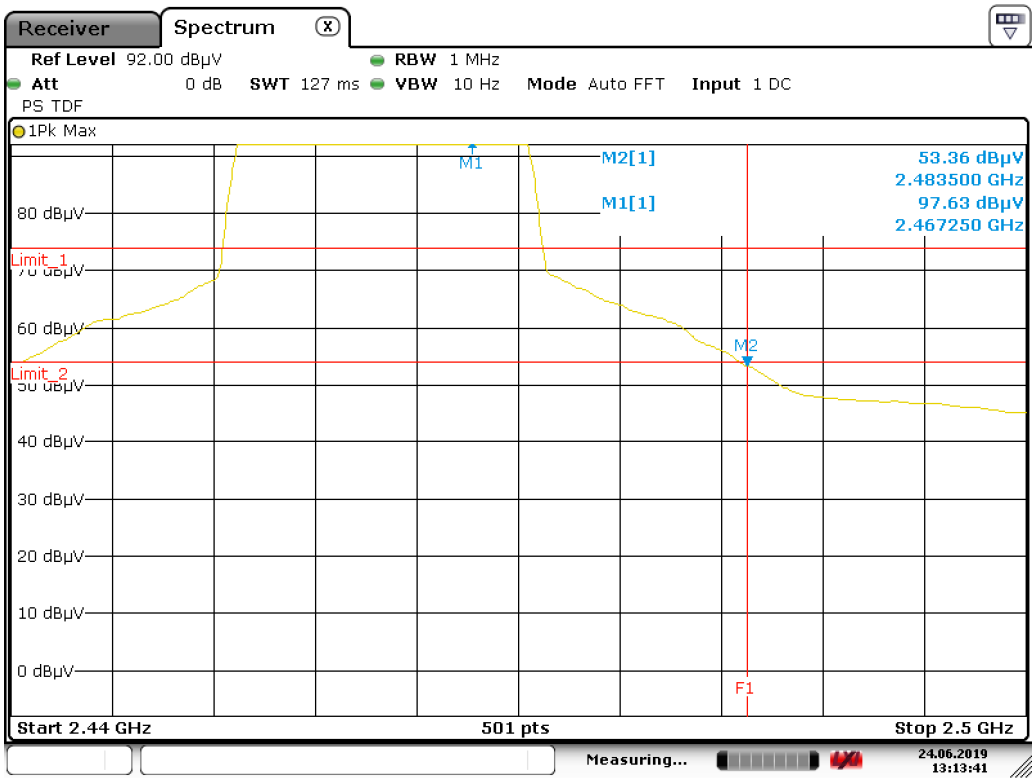
Date: 24.JUN.2019 12:58:39

Chain0: Restricted Band Bandedge @ 802.11g Mode Ch11 PK



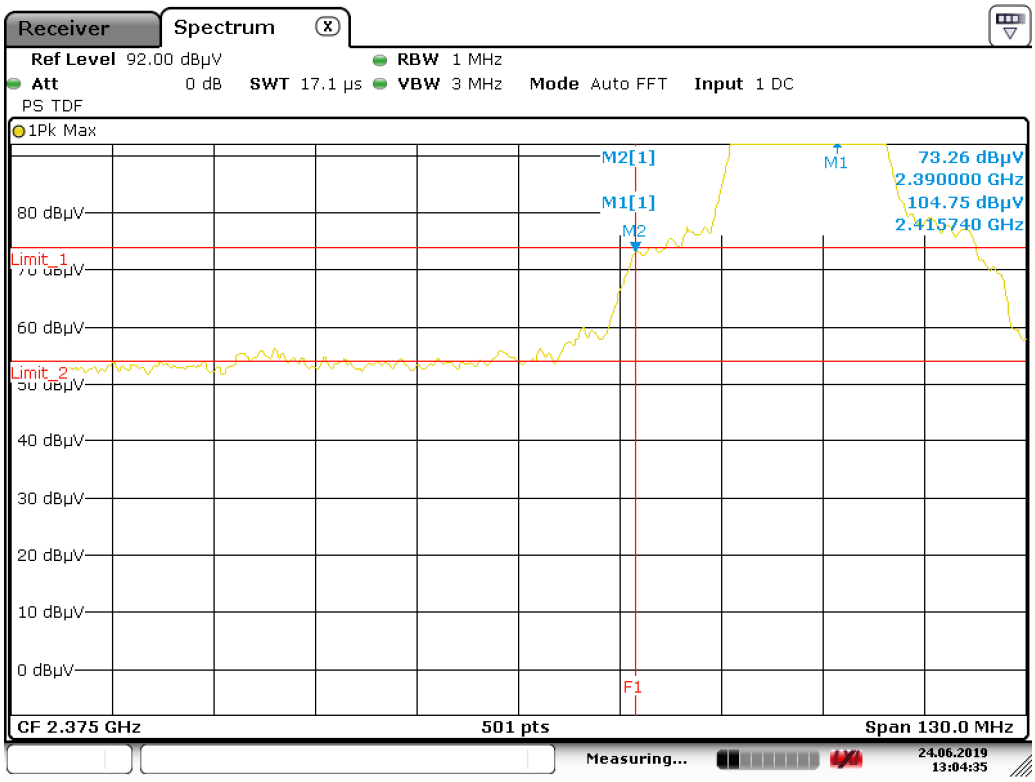
Date: 24.JUN.2019 13:11:10

Chain0: Restricted Band Bandedge @ 802.11g Mode Ch11 AV



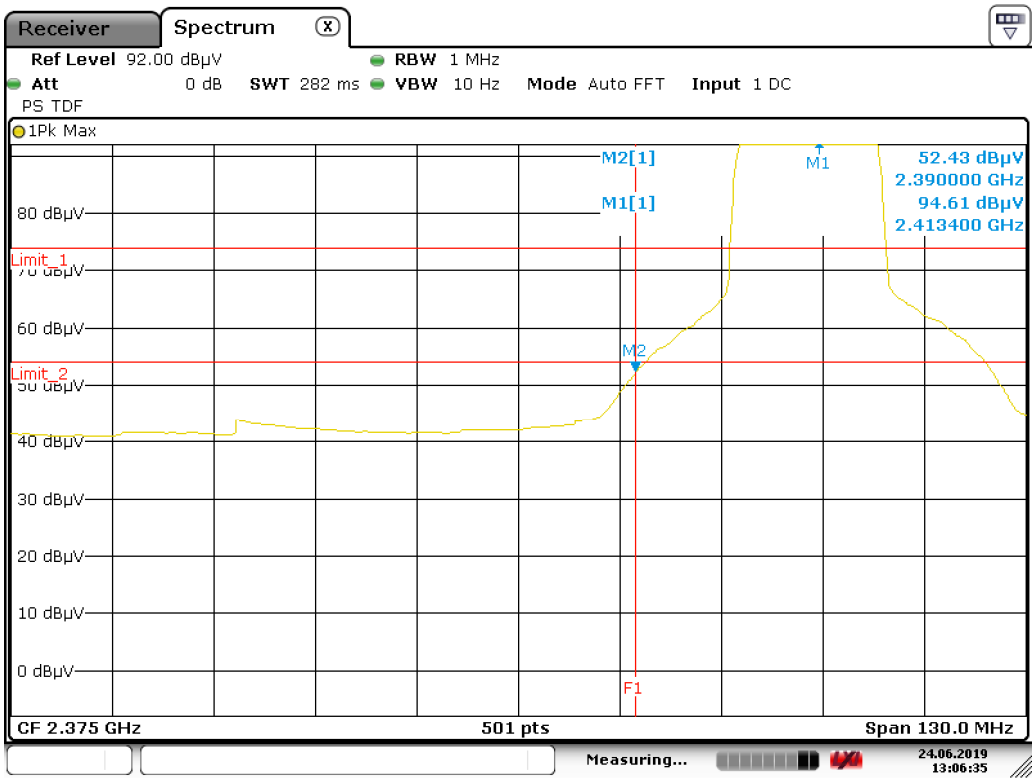
Date: 24.JUN.2019 13:13:42

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



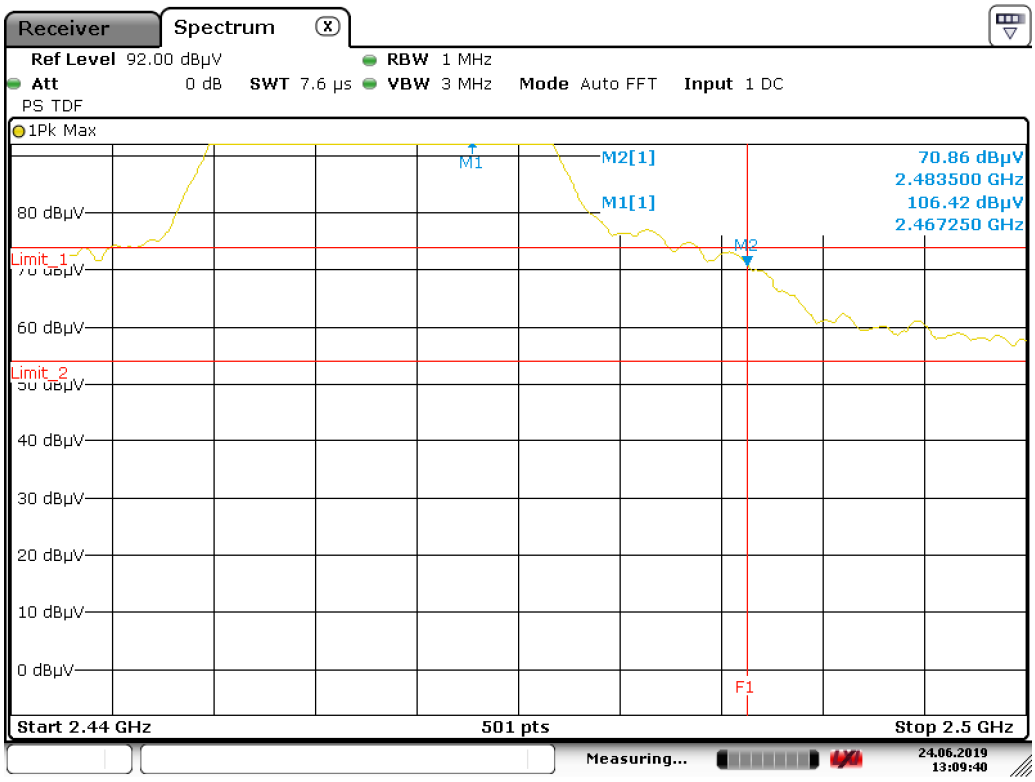
Date: 24.JUN.2019 13:04:36

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



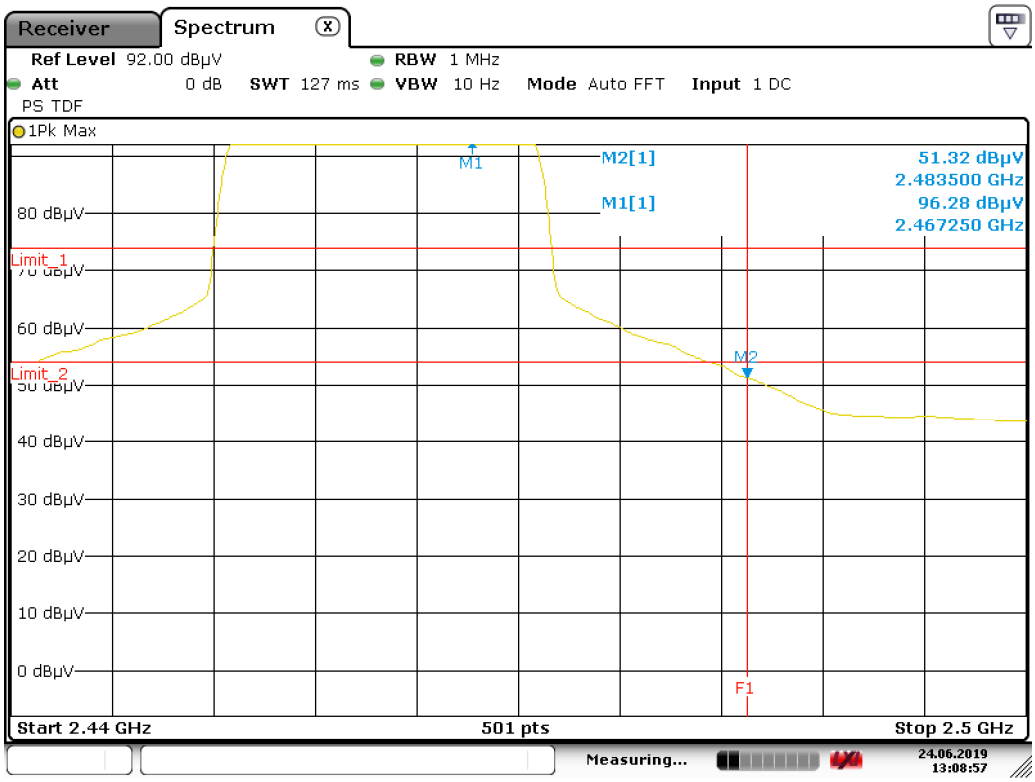
Date: 24.JUN.2019 13:06:35

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



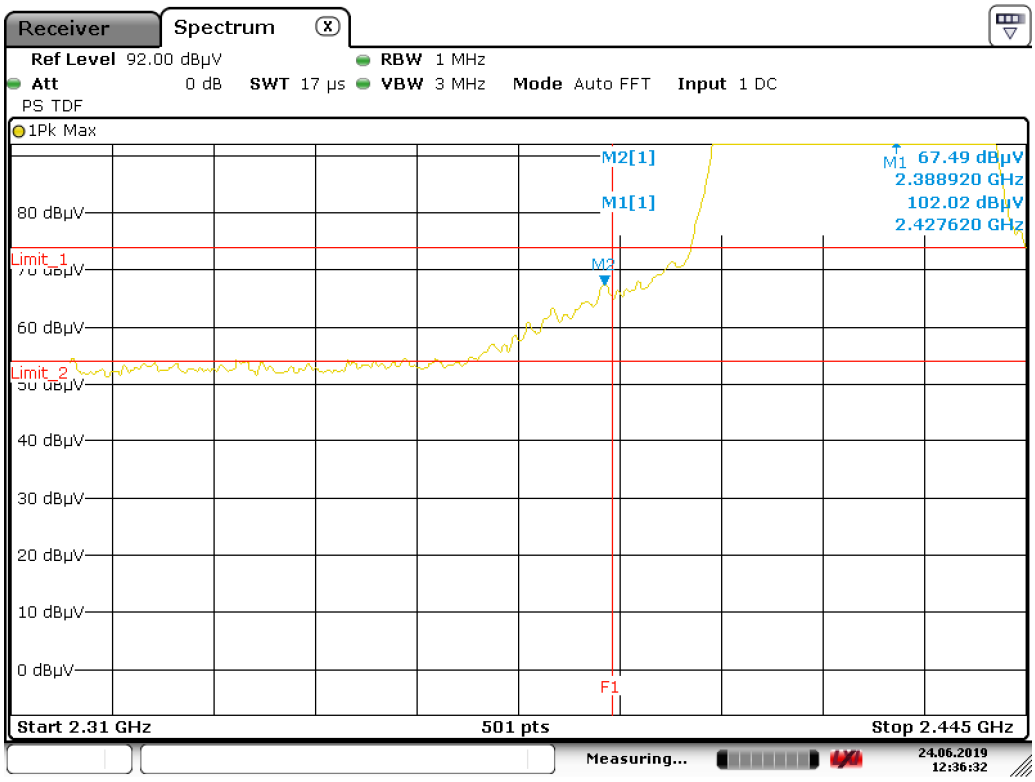
Date: 24.JUN.2019 13:09:41

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



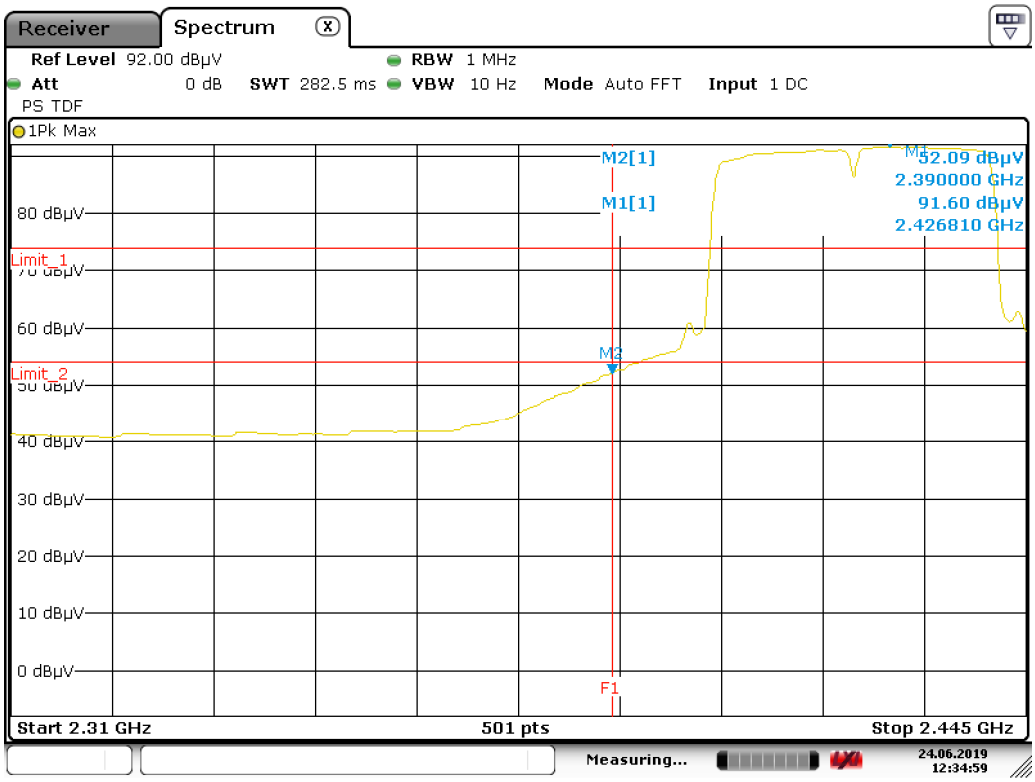
Date: 24.JUN.2019 13:08:58

Chain0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 PK



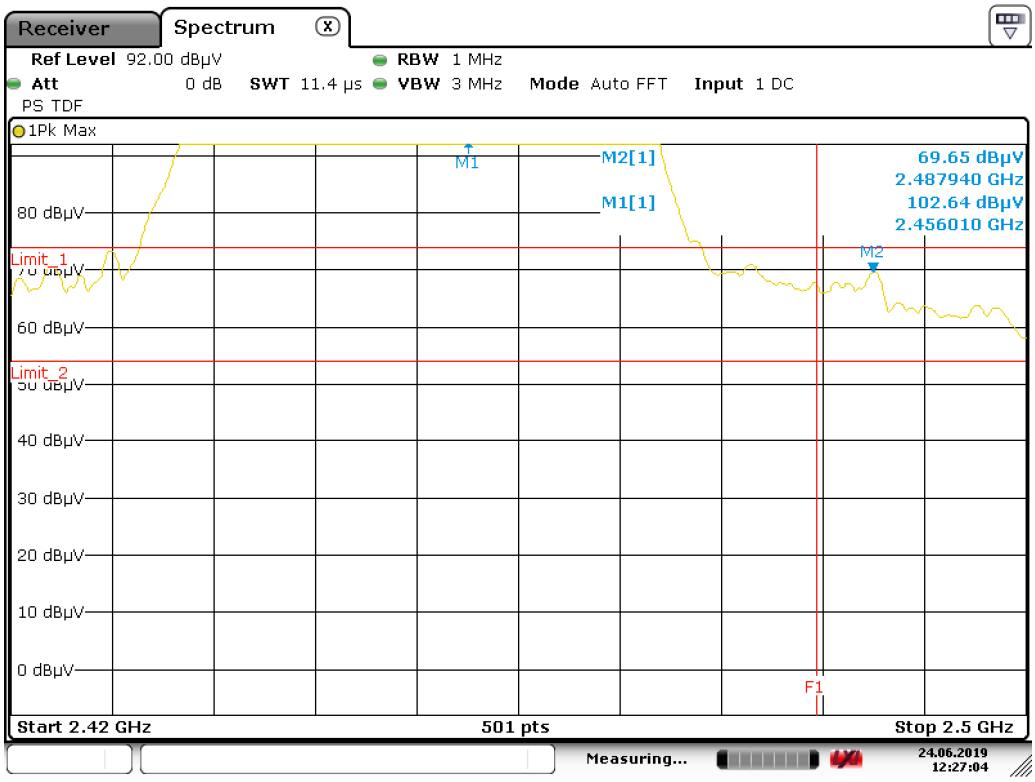
Date: 24.JUN.2019 12:36:33

Chain0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 AV



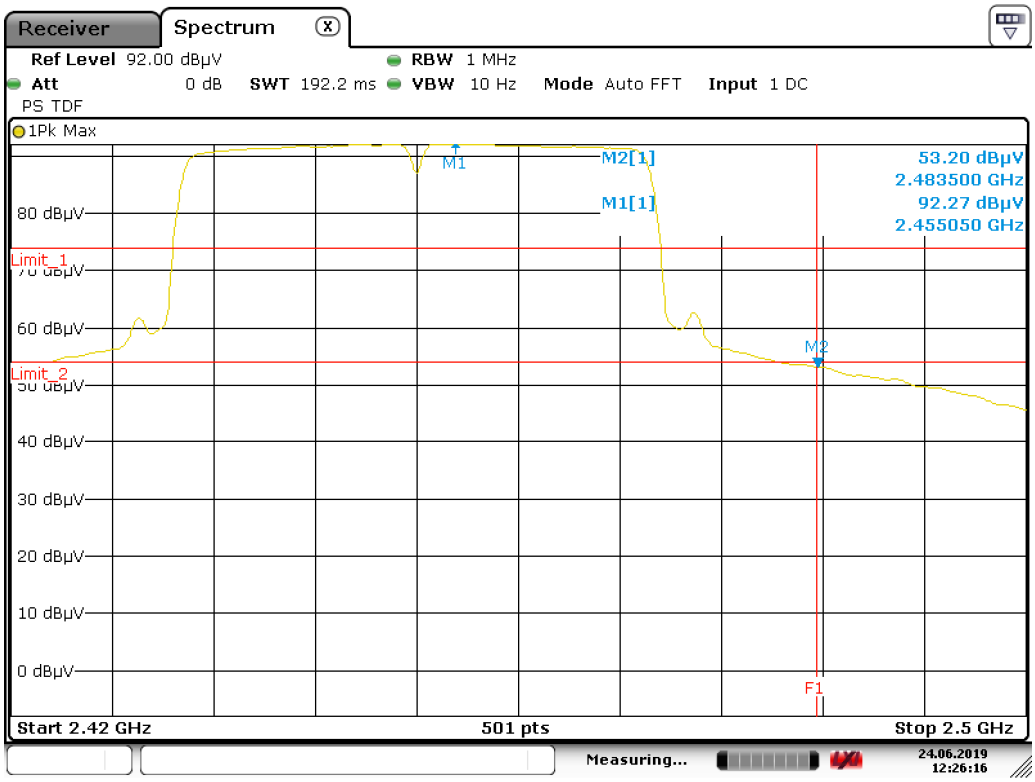
Date: 24.JUN.2019 12:34:59

Chain0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 PK



Date: 24.JUN.2019 12:27:05

Chain0: Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 AV



Date: 24.JUN.2019 12:26:16

8. AC Power Line Conducted Emission

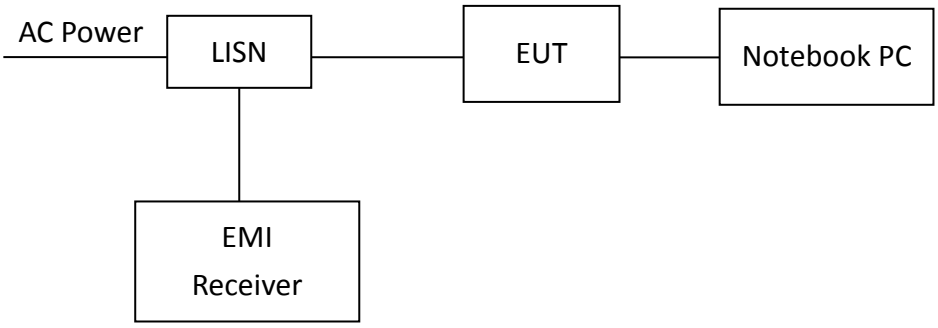
8.1 Measuring instrument setting

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 Operating Environment Condition

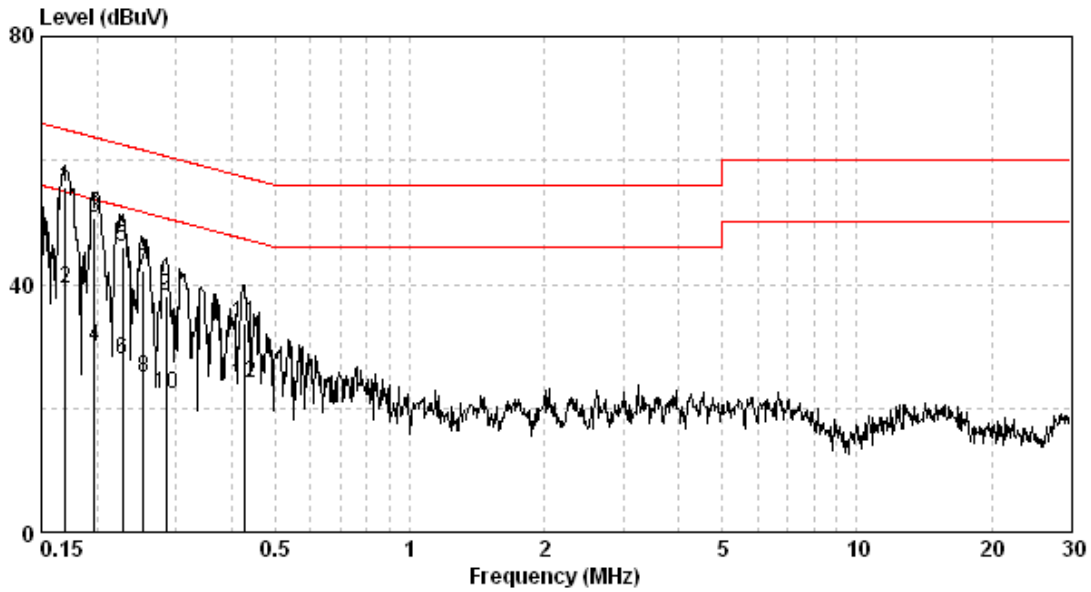
Temperature (℃) :	26
Relative Humidity (%) :	61
Atmospheric Pressure (hPa) :	1008
Test Date :	2019/07/02

8.6 Test Results

Phase: Live Line
Model No.: RGH1
Test Condition: Tx mode

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
0.169	9.70	45.99	55.69	64.99	29.53	39.23	54.99	-9.30	-15.76
0.198	9.69	40.94	50.63	63.71	20.30	29.99	53.71	-13.09	-23.72
0.228	9.69	36.45	46.14	62.52	18.21	27.90	52.52	-16.38	-24.62
0.253	9.69	32.64	42.33	61.64	15.21	24.90	51.64	-19.32	-26.74
0.285	9.69	28.50	38.19	60.68	12.59	22.28	50.68	-22.48	-28.40
0.428	9.70	23.86	33.56	57.29	14.46	24.16	47.29	-23.73	-23.13

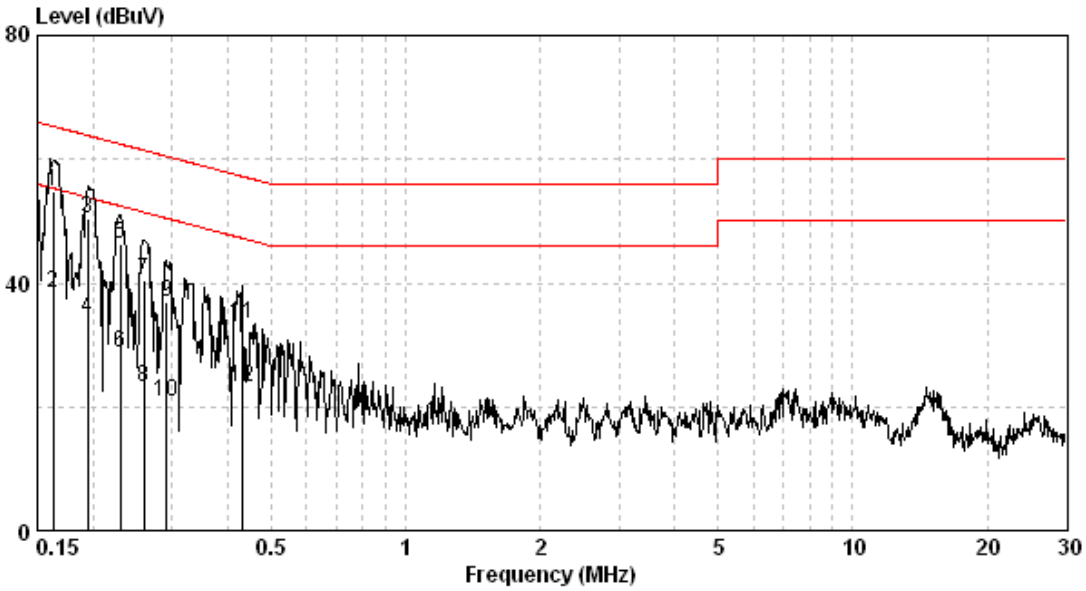
Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral Line
Model No.: RGH1
Test Condition: Tx mode

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
0.162	9.71	45.04	54.75	65.34	28.59	38.30	55.34	-10.59	-17.04
0.194	9.71	40.70	50.41	63.84	24.48	34.19	53.84	-13.43	-19.66
0.230	9.71	36.47	46.18	62.44	19.03	28.74	52.44	-16.26	-23.70
0.260	9.71	30.87	40.58	61.42	13.58	23.29	51.42	-20.84	-28.13
0.292	9.71	27.35	37.06	60.46	11.06	20.77	50.46	-23.39	-29.69
0.431	9.71	23.72	33.43	57.24	13.36	23.07	47.24	-23.81	-24.17

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
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2018/11/14	2019/11/13
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2018/09/03	2019/09/02
Signal Analyzer	Agilent	N9030A	MY51380492	2018/08/24	2019/08/23
Signal Analyzer	Agilent	N9030A	MY51380492	2019/08/21	2020/08/19
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2019/04/19	2020/04/17
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2019/06/05	2020/06/03
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2019/02/01	2020/01/31
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2018/08/28	2019/08/27
Power Meter	Anritsu	ML2495A	0844001	2019/10/23	2020/10/21
Power Sensor	Anritsu	MA2411B	0738452	2019/10/23	2020/10/21
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2018/08/07	2019/08/06
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 104P	CB0005	2018/08/07	2019/08/06
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2019/05/02	2020/04/30
Hight Pass Filter	Wainwright	WHKX3.0/18G-12SS	N/A	2019/05/30	2020/05/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2019/02/23	2020/02/22

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Receiver	R&S	ESCI	100059	2018/11/07	2019/11/06
Two-Line V-Network	R&S	ENV216	101159	2019/06/12	2020/06/10
Two-Line -V-Network	R&S	ESH3-Z5	825562/003	2019/08/27	2020/08/25
CON-1 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-1 Cable	SUHNER	SUCOFLEX-104	26438414	2019/05/02	2020/04/30
Test software	Audix	e3	4.20040112L	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	5.2 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.28 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.29 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.29 dB
Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.45 dB
Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.45 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	2.99 dB
Emission on the Band Edge Test	4.29 dB
Minimum 6 dB Bandwidth	7.69 %
Maximum Peak Conducted Output Power	0.37 dB
Power Spectral Density	1.15 dB
Emissions In Non-Restricted Frequency Bands	1.15 dB
AC Power Line Conducted Emission	2.59 dB