ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	silex technology, Inc. 2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237, Japan
Product Name:	SX-PCEAC-DB Rev2
Brand Name:	SILEX TECHNOLOGY
Model No.:	SX-PCEAC-DB, SX-PCEAC
Model Difference:	Both hardware is identical. SX-PCEAC-DB works on 2.4GHz and 5GHz, SX-PCEAC does on 5GHz only. It's controlled by driver software.
Report Number:	ER/2020/10095
FCC ID:	N6C-PCEACDBR2
FCC Rule Part:	§15.247, Cat: DTS
Issue Date:	Apr. 17, 2020
Date of Test:	Feb. 14, 2020 ~ Feb. 26, 2020
Date of EUT Received:	Jan. 16, 2020

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.
The test results of this report relate only to the tested sample identified in this report.

Approved By: _____

Jim Chang / Manager

Testing Laboratory
0513

Revision History				
Report Number	**Revision**	**Description**	**Issue Date**	**Remark**
ER/2020/10095	Rev.00	Original.	Apr. 17, 2020	Revised By: Yuri Tsai

Note:

1、 Multiple Model numbers or Trademarks
The variant model numbers are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

2、 Disclaimer
Variant information between model numbers is provided by the applicant, test results of this report are applicable to the sample EUT received.

Table of Contents

1 GENERAL INFORMATION

1.1 Product description

Product Name:	SX-PCEAC-DB Rev2
Brand Name:	SILEX TECHNOLOGY
Model No.:	SX-PCEAC-DB, SX-PCEAC
Model Difference:	Both hardware is identical. SX-PCEAC-DB works on 2.4GHz and 5GHz, SX-PCEAC does on 5GHz only. It's controlled by driver software.
Hardware Version:	PW104021XX
Firmware Version:	10.2-00082-4
Software Version:	Ver.1
Power Supply:	3.3V from DC Power Supply

Wi-Fi 802.11	Frequency Range	Channels	Rated Power (dBm)	Modulation Technology
b	2412-2462	11	17.49 (3TX)	DSSS
g			27.58 (3TX)	OFDM
n_HT20			26.41 (MIMO)	
n_HT40	2422-2452	7	22.98 (MIMO)	
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:	802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 216.7Mbps 802.11 n_40MHz: 13.5 – 450.0Mbps			

1.2 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Worst Antenna Gain
ROD	STAF	1019-015A	2400~2483.5	2.14	V
	Sansei Denki	ANTDC-081A0		2	
	Sansei Denki	ANTDP-027A0		1.5	
PCB	Molex	146153		3.25	V
	Unictron	H2B1PC1A1C (AA258)		2.9	
	Unictron	H2B1PD1A1C (AA222)		2.8	
Note: Pre-scanned was done on the above 6 antennas, the 1019-015A & 146153 results higher emission at 2.4GHz. Therefore, the completed set of measurement was done on the antenna to be presented on this test report.					

1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10:2013

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0001

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted (Antenna Port)

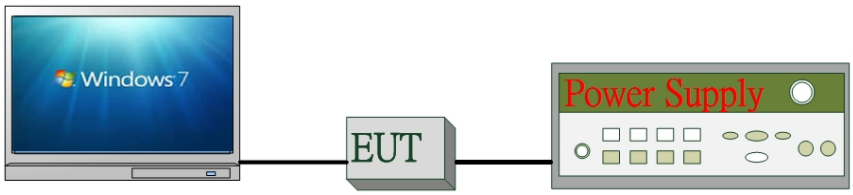


Fig. 2-2 Conducted (AC Power Line) Emission

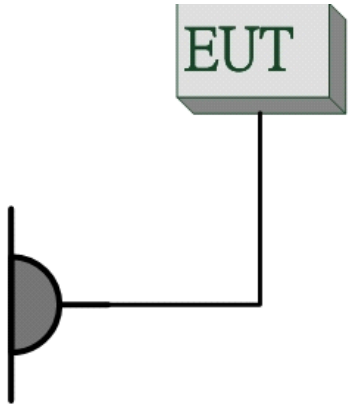


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3640A	MY40000811	N/A	N/A
3.	Notebook	Lenovo	L480	PF-1S9Q32	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b/g/n 20M.

CHANNEL	FREQUENCY (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

7 channels are provided for 802.11n 40M

CHANNEL	FREQUENCY (MHz)
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. aTest program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.
   The given UE is pre-scanned among below modes.

Modulation	Transmission Chain				Multiple Transmission Spatial
☒ 802.11 b	☒ Ch0	☒ Ch1	☒ Ch2	☐ Ch3	☒ 3TX
☒ 802.11 g	☒ Ch0	☒ Ch1	☒ Ch2	☐ Ch3	☒ 3TX
☒ 802.11 n	☒ Ch0	☒ Ch1	☒ Ch2	☐ Ch3	☒ MIMO
☐ 802.11 ax	☐ Ch0	☐ Ch1	☐ Ch2	☐ Ch3	☐ MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

4.3 Radiated Emission Test:

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
RADIATED EMISSION TEST (BELOW 1 GHz)					
802.11g	1 to 11	6	OFDM	6	3TX
802.11n 40M	3 to 9	6	OFDM	MCS 16	MIMO
RADIATED EMISSION TEST (ABOVE 1 GHz)					
802.11b	1 to 11	1, 6, 11	DSSS	1	3TX
802.11g	1 to 11	1, 6, 11	OFDM	6	3TX
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 16	MIMO
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 16	MIMO

Note:
The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

4.4 Antenna Port Conducted Mesurement:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1, 6, 11	DSSS	1	3TX
802.11g	1 to 11	1, 6, 11	OFDM	6	3TX
802.11n 20M	1 to 11	1, 6, 11	OFDM	MCS 16	MIMO
802.11n 40M	3 to 9	3, 6, 9	OFDM	MCS 16	MIMO

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission Measurement Uncertainty	
Polarization: Vertical	9kHz~30MHz: +-2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Polarization: Horizontal	9kHz~30MHz: +-2.3dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

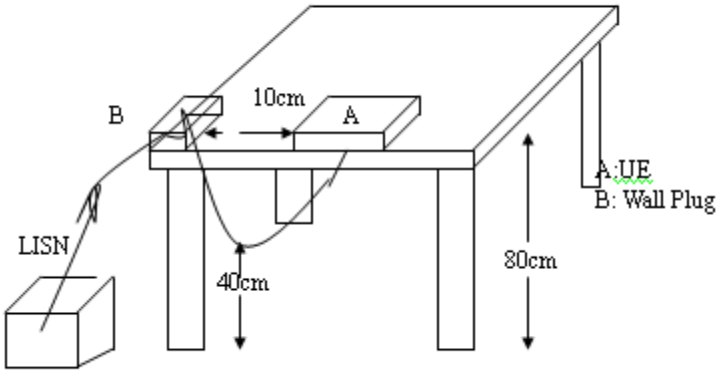
6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020
LISN	SCHWARZ-BECK	NSLK 8127	8127-649	04/02/2019	04/01/2020
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R	N.C.R
Coaxial Cables	N/A	WK CE Cable	N/A	01/02/2020	01/01/2021

6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

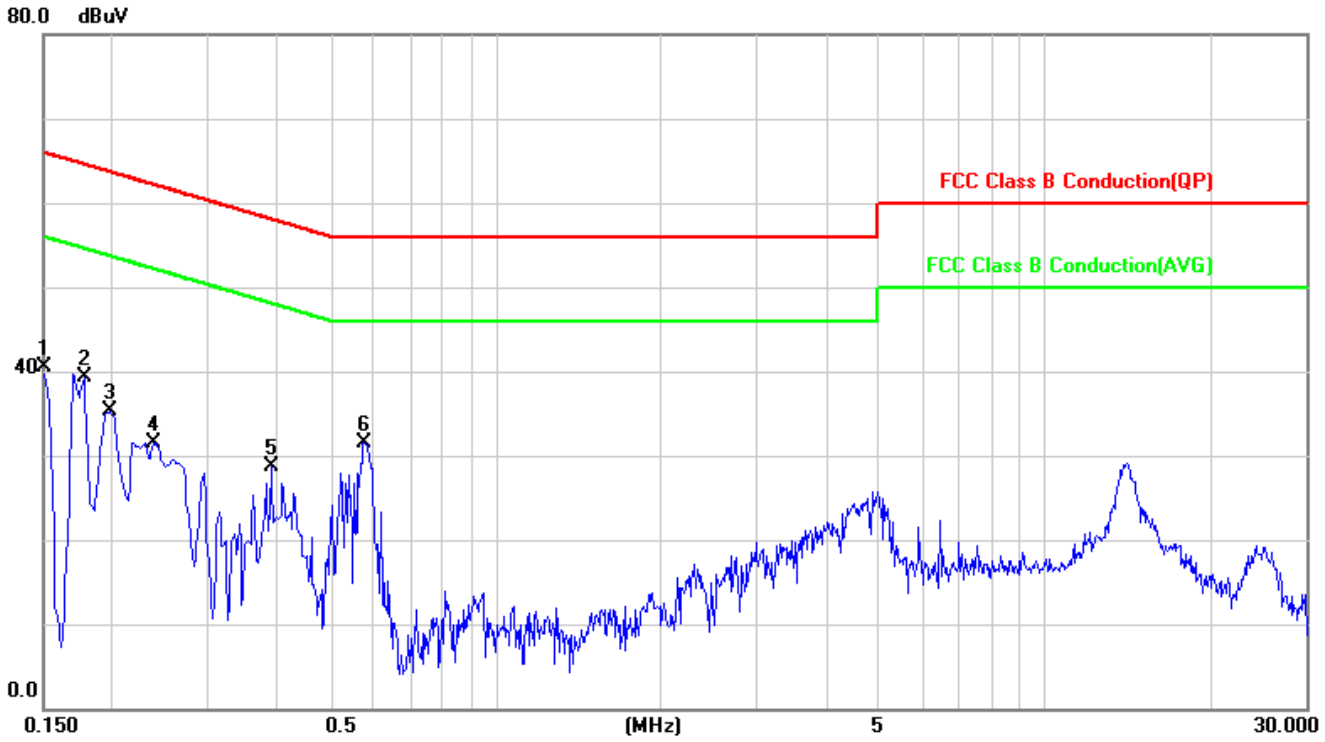
6.6 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit.

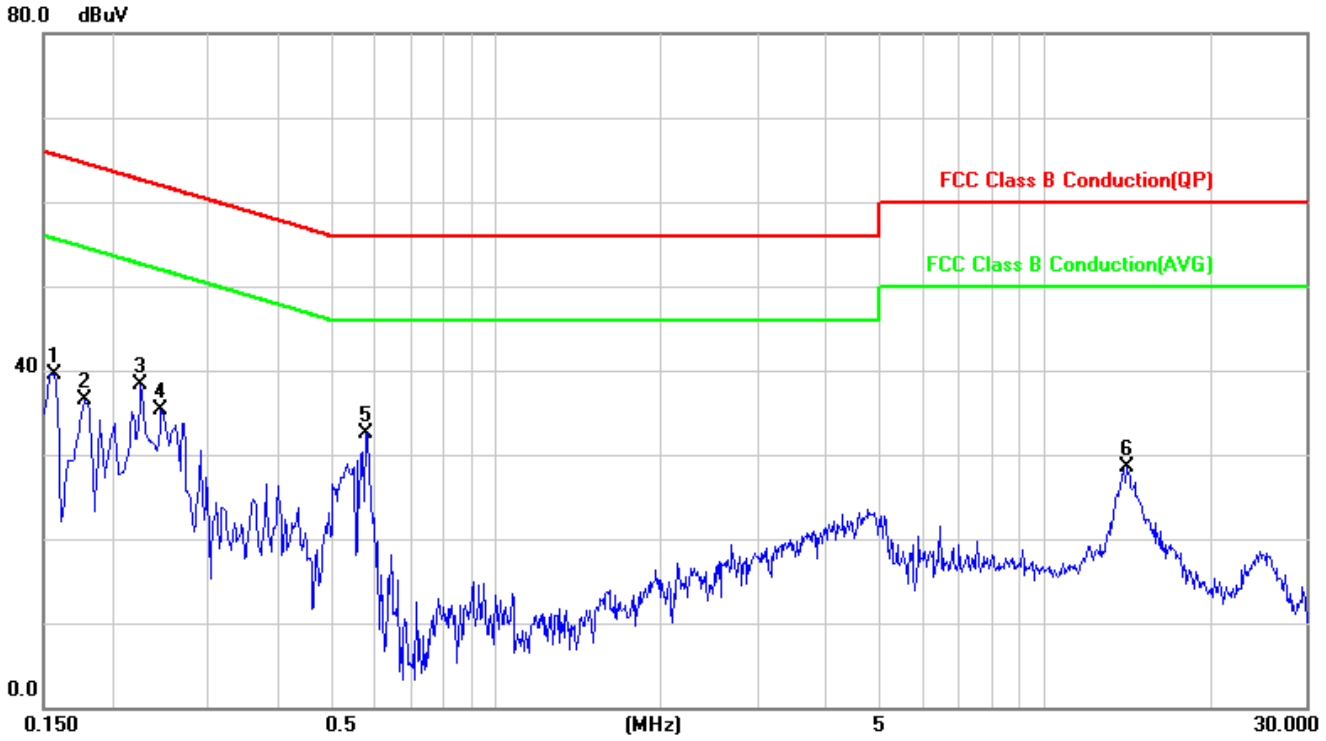
AC POWER LINE CONDUCTED EMISSION TEST DATA

Description:	**Operation**	**Date:**	**2020/02/26**
Line:	**L1**	**Temp.(℃)/Hum.(%):**	**20.5(℃)/51%**
Test Voltage:	**AC 120V/60Hz**	**Test By:**	**Nick**
Report Number:	**ER/2020/10095**	**Note:**	**ROD Antenna**



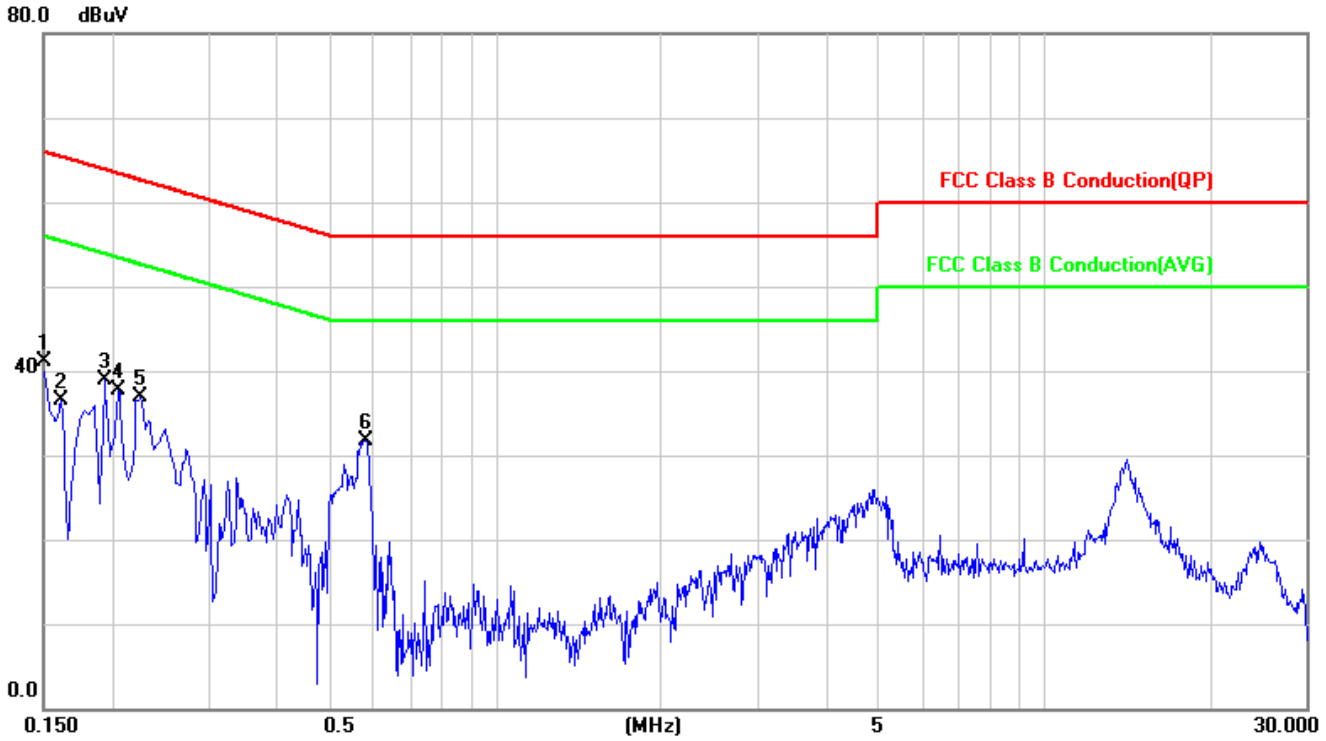
No.	Mk.	Freq.	Reading	Factor	Measure-ment	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1500	40.51	0.00	40.51	66.00	-25.49	peak	
2		0.1780	39.32	0.01	39.33	64.58	-25.25	peak	
3		0.1980	35.25	0.01	35.26	63.69	-28.43	peak	
4		0.2380	31.48	0.01	31.49	62.17	-30.68	peak	
5		0.3900	28.71	0.01	28.72	58.06	-29.34	peak	
6	*	0.5740	31.53	0.01	31.54	56.00	-24.46	peak	

Description:	**Operation**	**Date:**	**2020/02/26**
Line:	**N**	**Temp.(℃)/Hum.(%):**	**20.5(℃)/51%**
Test Voltage:	**AC 120V/60Hz**	**Test By:**	**Nick**
Report Number:	**ER/2020/10095**	**Note:**	**ROD Antenna**



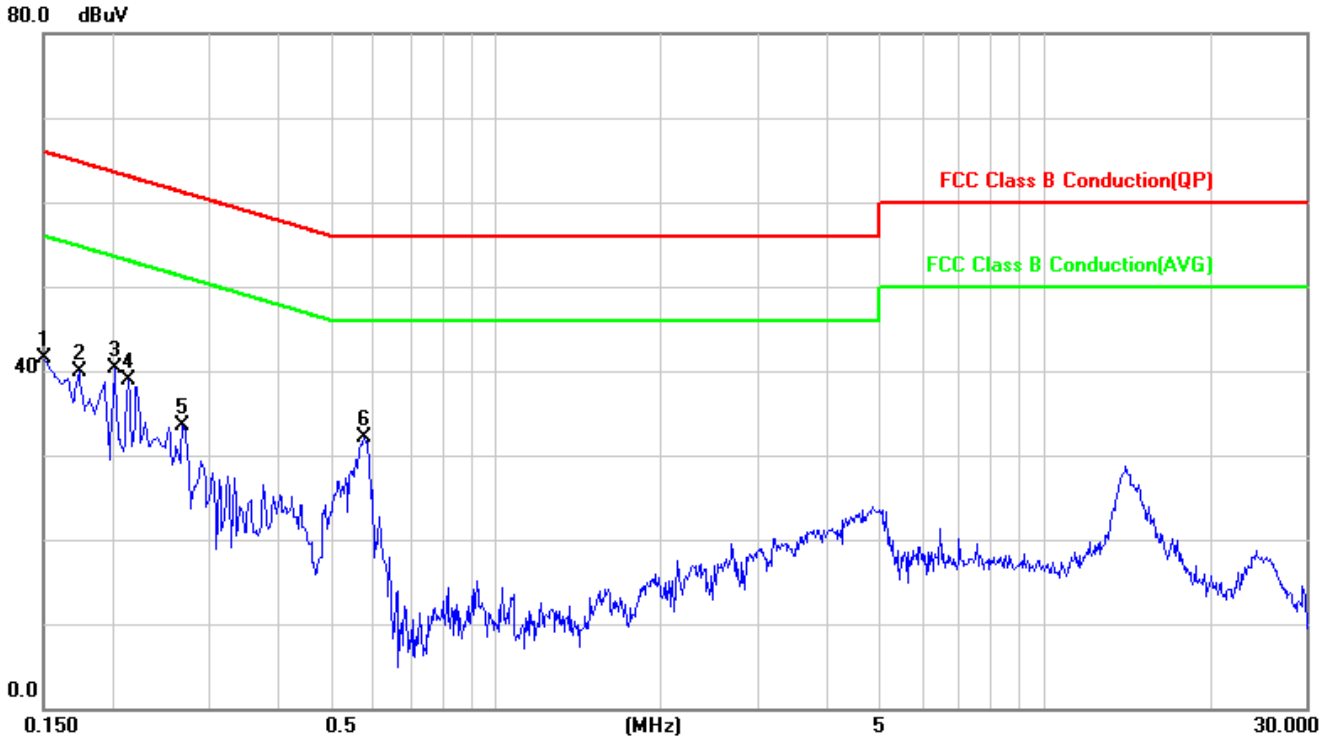
No.	Mk.	Freq.	Reading	Factor	Measure-ment	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1580	39.40	0.03	39.43	65.57	-26.14	peak	
2		0.1780	36.57	0.03	36.60	64.58	-27.98	peak	
3		0.2260	38.28	0.03	38.31	62.60	-24.29	peak	
4		0.2460	35.34	0.03	35.37	61.89	-26.52	peak	
5	*	0.5820	32.53	0.03	32.56	56.00	-23.44	peak	
6		14.1700	28.16	0.34	28.50	60.00	-31.50	peak	

Description:	**Operation**	**Date:**	**2020/02/26**
Line:	**L1**	**Temp.(℃)/Hum.(%):**	**20.5(℃)/51%**
Test Voltage:	**AC 120V/60Hz**	**Test By:**	**Nick**
Report Number:	**ER/2020/10095**	**Note:**	**PCB Antenna**



No.	Mk.	Freq.	Reading	Factor	Measure-ment	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1500	41.06	0.00	41.06	66.00	-24.94	peak	
2		0.1620	36.57	0.00	36.57	65.36	-28.79	peak	
3		0.1940	38.84	0.01	38.85	63.86	-25.01	peak	
4		0.2060	37.77	0.01	37.78	63.37	-25.59	peak	
5		0.2260	36.93	0.01	36.94	62.60	-25.66	peak	
6	*	0.5820	31.63	0.01	31.64	56.00	-24.36	peak	

Description:	**Operation**	**Date:**	**2020/02/26**
Line:	**N**	**Temp.(℃)/Hum.(%):**	**20.5(℃)/51%**
Test Voltage:	**AC 120V/60Hz**	**Test By:**	**Nick**
Report Number:	**ER/2020/10095**	**Note:**	**PCB Antenna**



No.	Mk.	Freq.	Reading	Factor	Measure-ment	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1500	41.38	0.03	41.41	66.00	-24.59	peak	
2		0.1740	39.85	0.03	39.88	64.77	-24.89	peak	
3	*	0.2020	40.25	0.03	40.28	63.53	-23.25	peak	
4		0.2140	38.95	0.03	38.98	63.05	-24.07	peak	
5		0.2700	33.39	0.03	33.42	61.12	-27.70	peak	
6		0.5780	32.06	0.03	32.09	56.00	-23.91	peak	

7 DUTY CYCLE OF TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

7.1 Measurement Procedure:

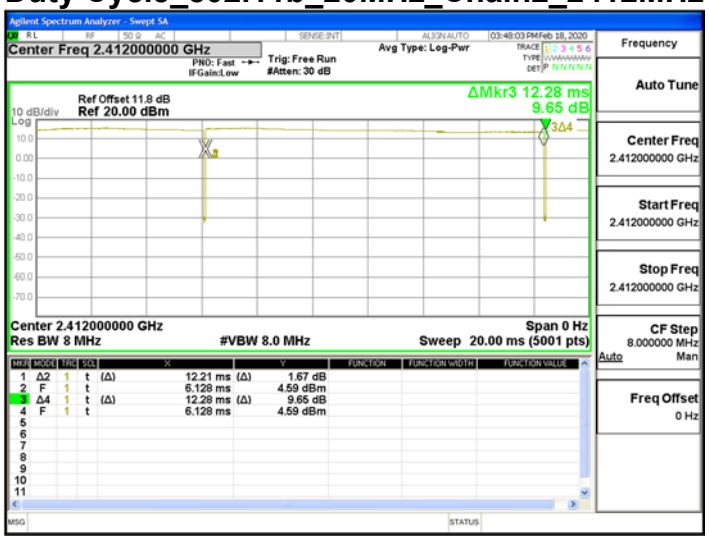
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

7.2 Duty Cycle:

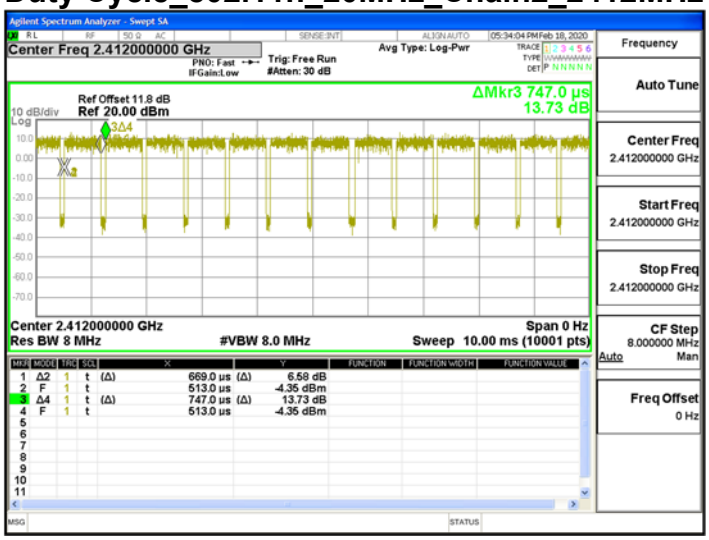
	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	99.45	0.02	0.08	0.01
802.11g	96.16	0.17	0.49	1.00
802.11n_20	89.56	0.48	1.49	2.00
802.11n_40	82.46	0.84	2.87	3.00

7.3 Duty Cycle test plots

Duty Cycle_802.11b_20MHz_Chain2_2412MHz

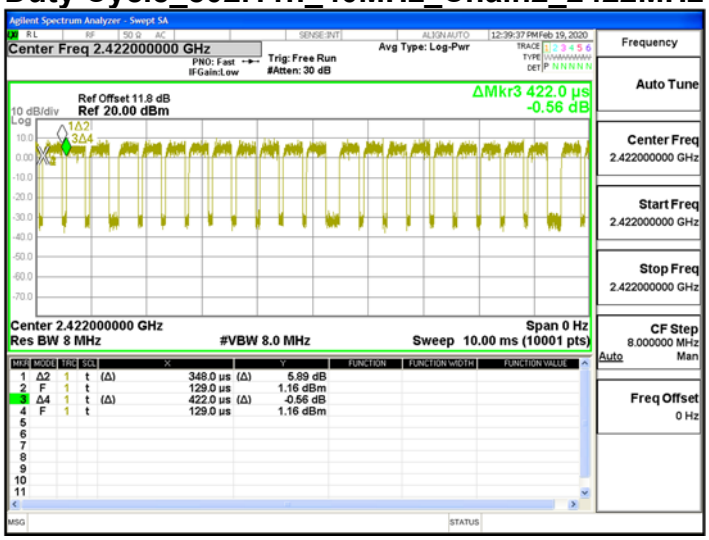


Duty Cycle_802.11n_20MHz_Chain2_2412MHz



Duty Cycle_802.11g_20MHz_Chain2_2412MHz

Duty Cycle_802.11n_40MHz_Chain2_2422MHz



8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, …, GN dBi.

(i) If transmit signals are correlated, then Directional gain

$=10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is grater than 6 dBi , therefore the limit needs to be reduced as below:

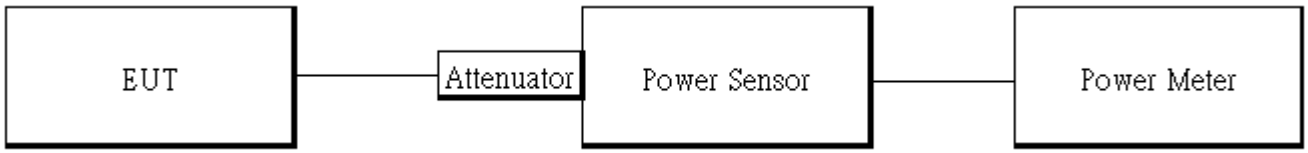
Frequency (MHz)	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
2412~2462	8.02	27.98

8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Meter	Anritsu	ML2496A	1242004	11/05/2019	11/04/2020
Power Sensor	Anritsu	MA2411B	1207365	11/05/2019	11/04/2020
Power Sensor	Anritsu	MA2411B	1207368	11/05/2019	11/04/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021

8.3 Test Set-up

Power Meter:



8.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

   Power Meter:

   It is used as the auxiliary test equipment to conduct the output power measurement.
4. Record the max. Reading as observed from Spectrum or Power Meter.

8.5 Measurement Result

802.11b_3TX								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)			Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	1	12.63	12.59	12.93	17.49	27.98	PASS
6	2437	1	12.51	12.49	12.78	17.37	27.98	PASS
11	2462	1	12.48	12.38	12.34	17.17	27.98	PASS
802.11b_3TX								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)			Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	1	10.33	10.21	10.64	15.19	27.98	PASS
6	2437	1	10.32	10.14	10.59	15.15	27.98	PASS
11	2462	1	10.24	10.07	10.10	14.93	27.98	PASS

802.11g_3TX								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)			Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	6	15.34	15.32	15.56	20.18	27.98	PASS
6	2437	6	22.89	22.51	23.01	27.58	27.98	PASS
11	2462	6	17.53	17.42	17.39	22.22	27.98	PASS
802.11g_3TX								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)			Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	6	9.12	9.09	9.42	14.15	27.98	PASS
6	2437	6	17.68	17.39	17.81	22.57	27.98	PASS
11	2462	6	11.35	11.25	11.26	16.23	27.98	PASS

802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)			Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	MCS16	13.37	13.28	13.56	18.18	27.98	PASS
6	2437	MCS16	21.79	21.34	21.77	26.41	27.98	PASS
11	2462	MCS16	16.51	16.34	16.32	21.16	27.98	PASS
802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)			Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
1	2412	MCS16	6.75	6.72	6.96	12.06	27.98	PASS
6	2437	MCS16	15.62	15.39	15.97	20.92	27.98	PASS
11	2462	MCS16	9.93	9.86	9.67	15.07	27.98	PASS

802.11n_HT40M MIMO								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)			Total Peak Output Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
3	2422	MCS16	13.31	13.22	13.56	18.14	27.98	PASS
6	2437	MCS16	18.23	18.09	18.31	22.98	27.98	PASS
9	2452	MCS16	15.36	15.13	15.35	20.05	27.98	PASS
802.11n_HT40M MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)			Max. Avg. Output include tune up tolerance Power (dBm)	Limit (dBm)	RESULT
			CH 0	CH 1	CH 2			
3	2422	MCS16	6.26	6.12	6.47	11.89	27.98	PASS
6	2437	MCS16	11.22	11.19	11.33	16.86	27.98	PASS
9	2452	MCS16	8.31	8.07	8.24	13.82	27.98	PASS

**** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.***

9 6DB BANDWIDTH MEASUREMENT

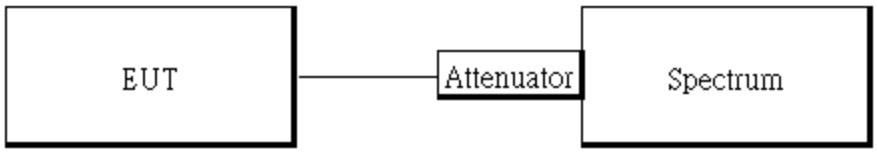
9.1 Standard Applicable

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

9.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021

9.3 Test Set-up



9.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. For 6dB Bandwidth:

   Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = large enough to capture all products of the modulation process, Detector=peak, Sweep=auto.
5. Mark the peak frequency and –6dB (upper and lower) frequency.
6. Repeat above procedures until all frequency of interest measured was complete.

9.5 6dB Bandwidth

802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**10110.00**	> 500	PASS
2437	**10110.00**	> 500	PASS
2462	**10110.00**	> 500	PASS

802.11b Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**10110.00**	> 500	PASS
2437	**10110.00**	> 500	PASS
2462	**10110.00**	> 500	PASS

802.11b Ch2

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**10110.00**	> 500	PASS
2437	**10110.00**	> 500	PASS
2462	**10110.00**	> 500	PASS

802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**16370.00**	> 500	PASS
2437	16330.00	> 500	PASS
2462	**16370.00**	> 500	PASS

802.11g Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16360.00	> 500	PASS
2437	16360.00	> 500	PASS
2462	**16370.00**	> 500	PASS

802.11g Ch2

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**16370.00**	> 500	PASS
2437	16340.00	> 500	PASS
2462	16340.00	> 500	PASS

802.11_n_HT20 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**17560.00**	> 500	PASS
2437	17550.00	> 500	PASS
2462	17330.00	> 500	PASS

802.11_n_HT20 Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	17590.00	> 500	PASS
2437	17590.00	> 500	PASS
2462	**17610.00**	> 500	PASS

802.11_n_HT20 Ch2

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**17590.00**	> 500	PASS
2437	17580.00	> 500	PASS
2462	17560.00	> 500	PASS

802.11_n_HT40 Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	**35750.00**	> 500	PASS
2437	35730.00	> 500	PASS
2452	35740.00	> 500	PASS

802.11_n_HT40 Ch1

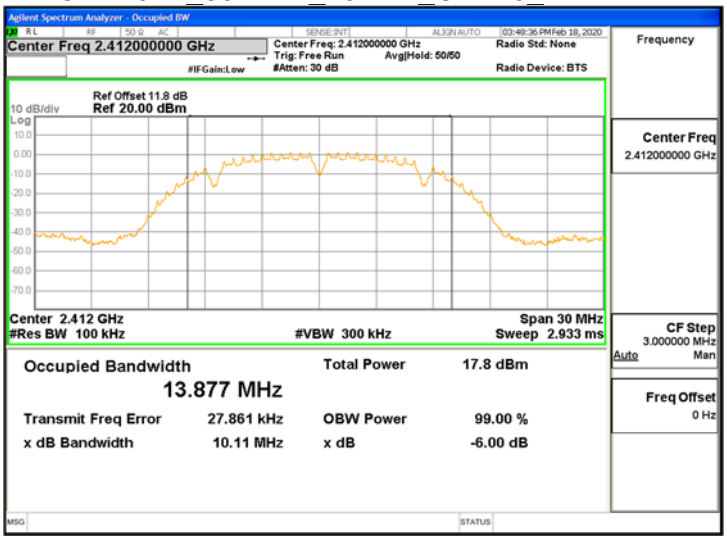
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	**36330.00**	> 500	PASS
2437	36310.00	> 500	PASS
2452	**36330.00**	> 500	PASS

802.11_n_HT40 Ch2

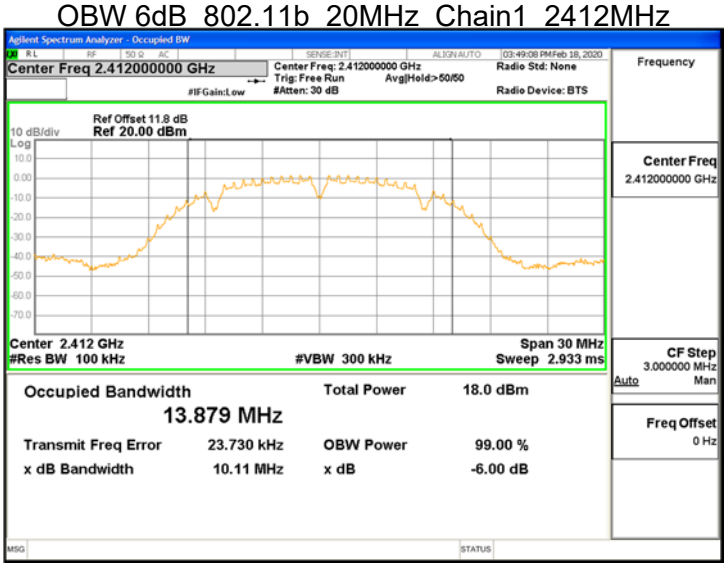
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	35750.00	> 500	PASS
2437	35740.00	> 500	PASS
2452	**35910.00**	> 500	PASS

Refer to next page for plots

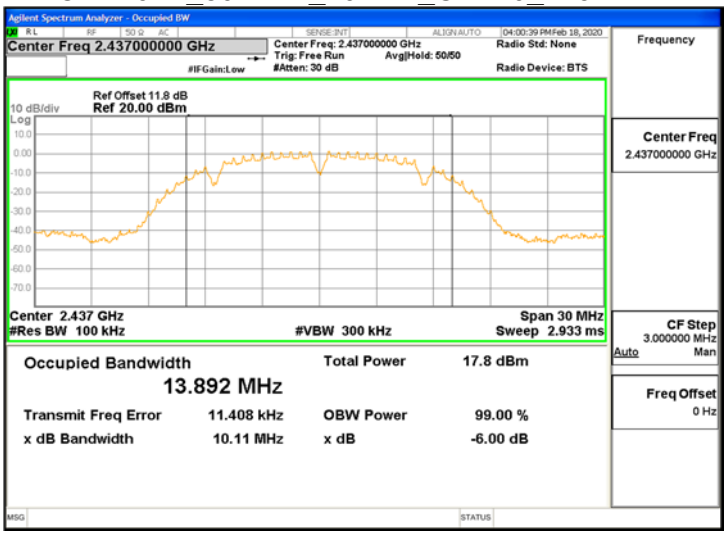
OBW 6dB_802.11b_20MHz_Chain0_2412MHz



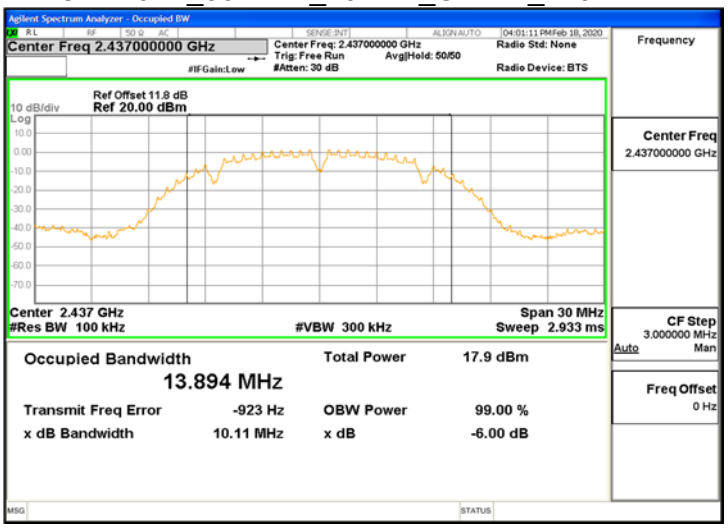
OBW 6dB_802.11b_20MHz_Chain1_2412MHz



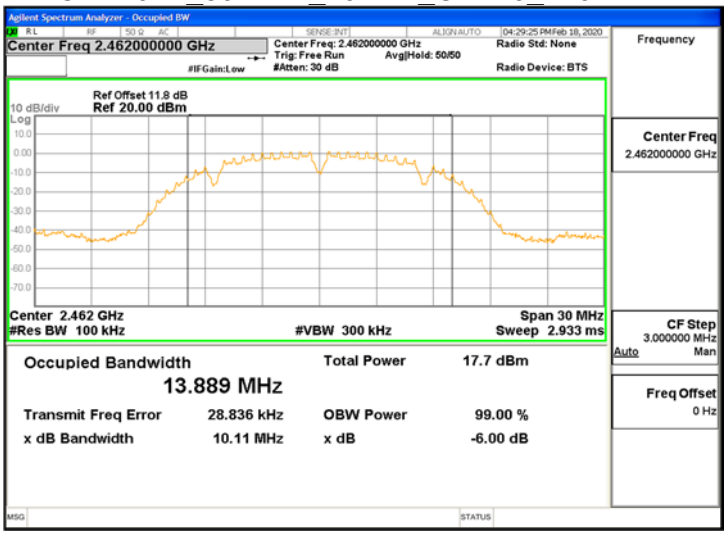
OBW 6dB_802.11b_20MHz_Chain0_2437MHz



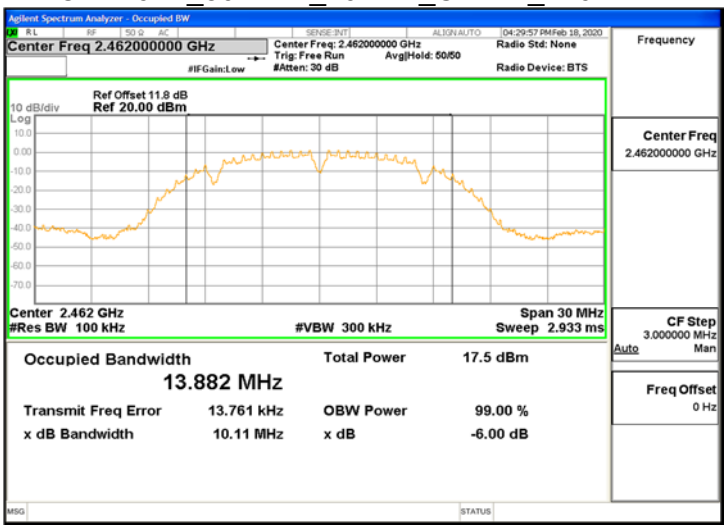
OBW 6dB_802.11b_20MHz_Chain1_2437MHz



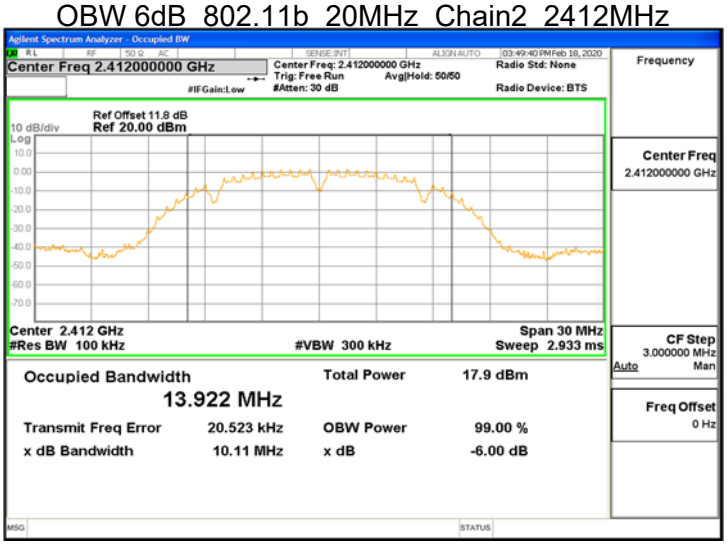
OBW 6dB_802.11b_20MHz_Chain0_2462MHz



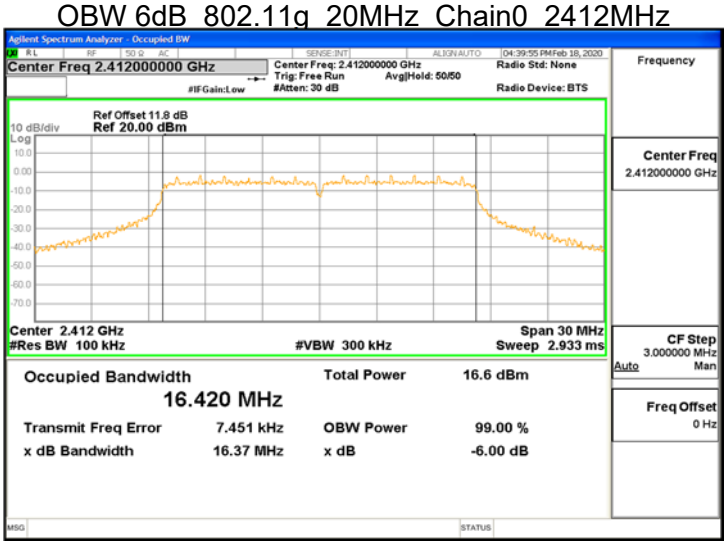
OBW 6dB_802.11b_20MHz_Chain1_2462MHz



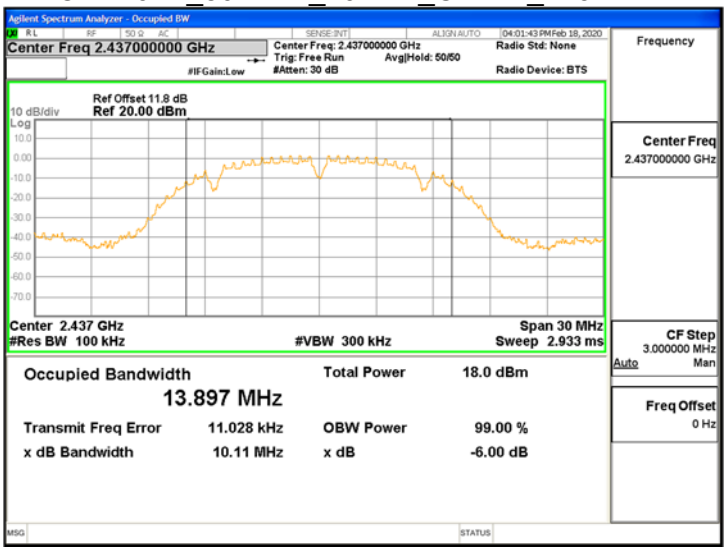
OBW 6dB_802.11b_20MHz_Chain2_2412MHz



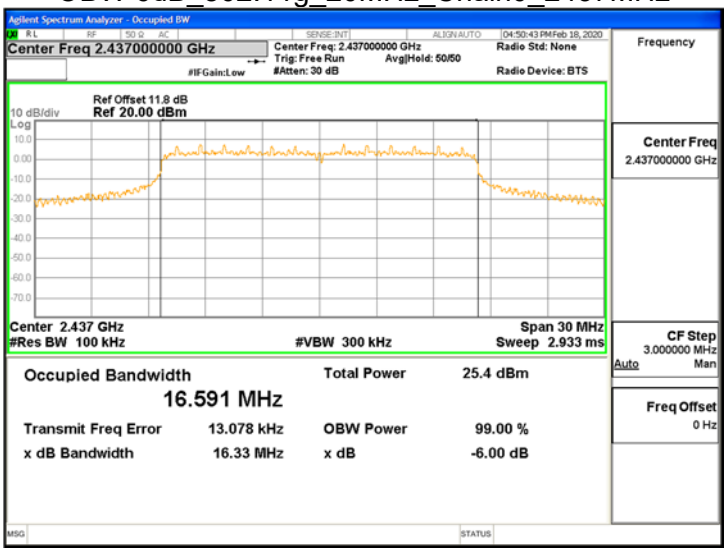
OBW 6dB_802.11g_20MHz_Chain0_2412MHz



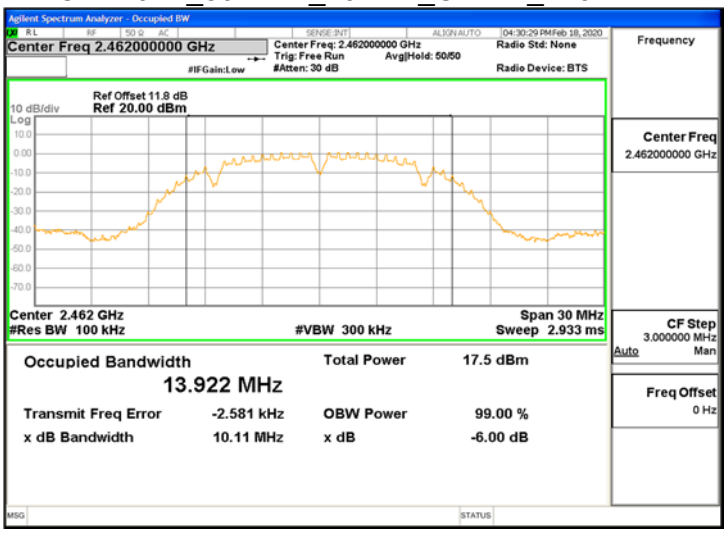
OBW 6dB_802.11b_20MHz_Chain2_2437MHz



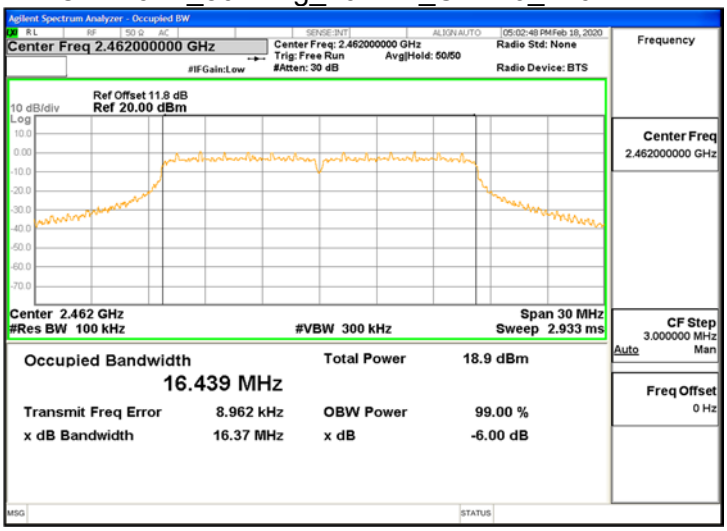
OBW 6dB_802.11g_20MHz_Chain0_2437MHz



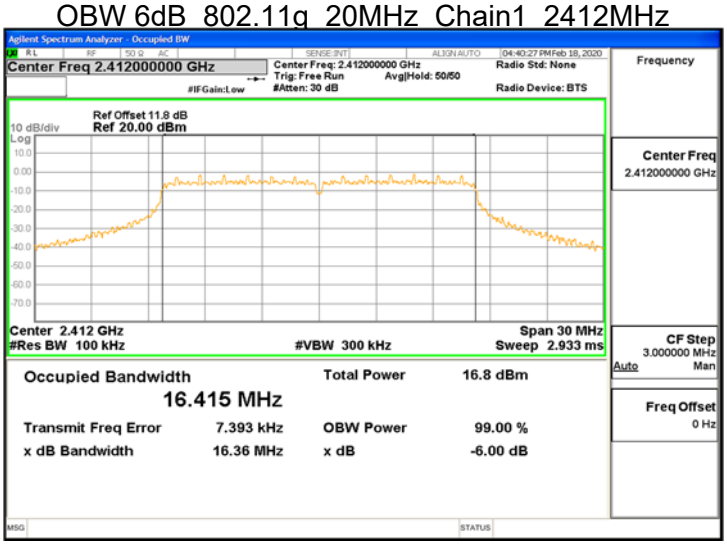
OBW 6dB_802.11b_20MHz_Chain2_2462MHz



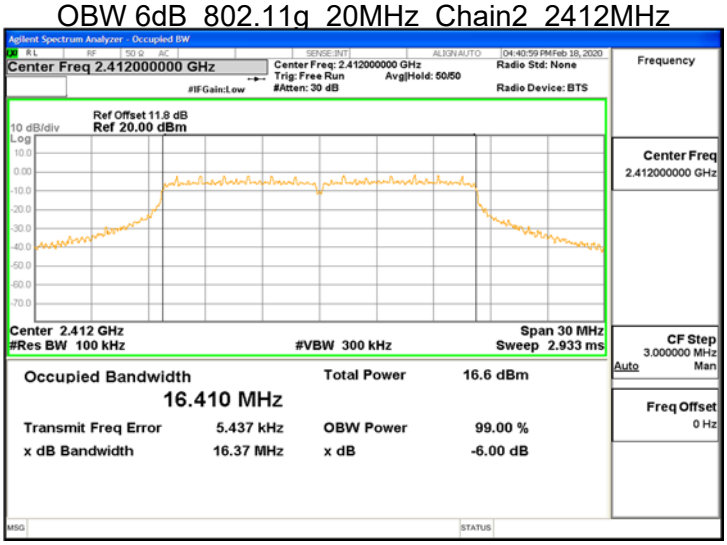
OBW 6dB_802.11g_20MHz_Chain0_2462MHz



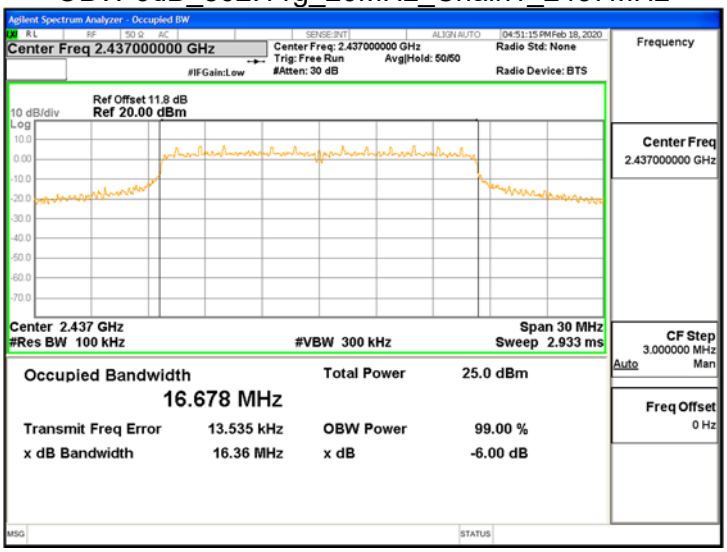
OBW 6dB_802.11g_20MHz_Chain1_2412MHz



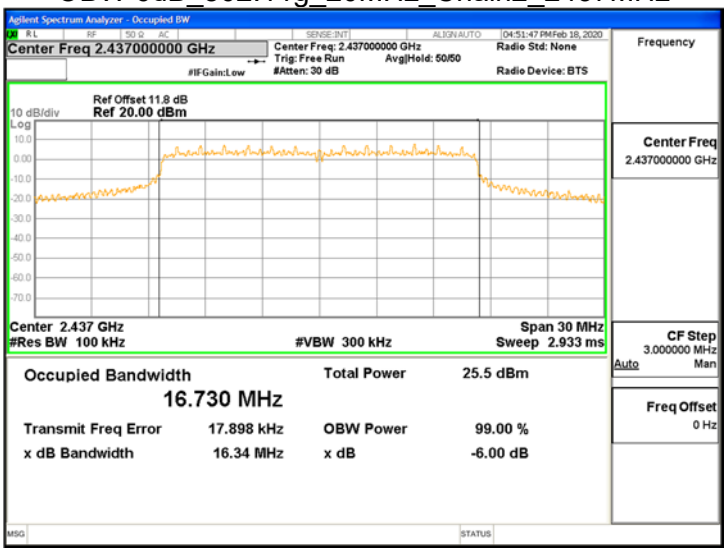
OBW 6dB_802.11g_20MHz_Chain2_2412MHz



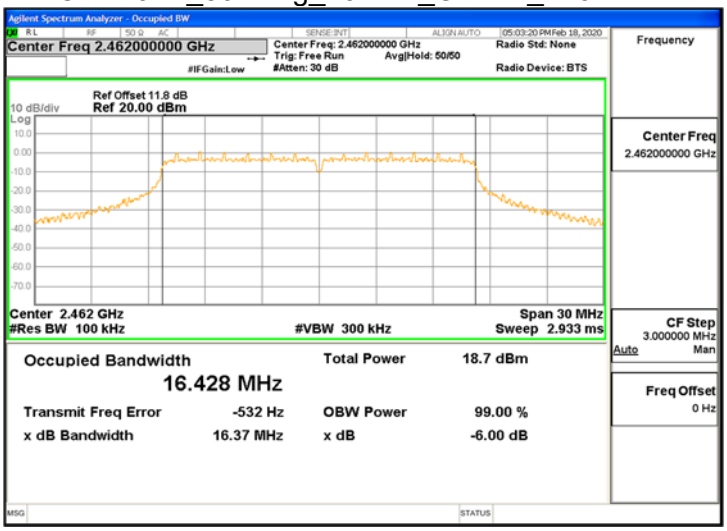
OBW 6dB_802.11g_20MHz_Chain1_2437MHz



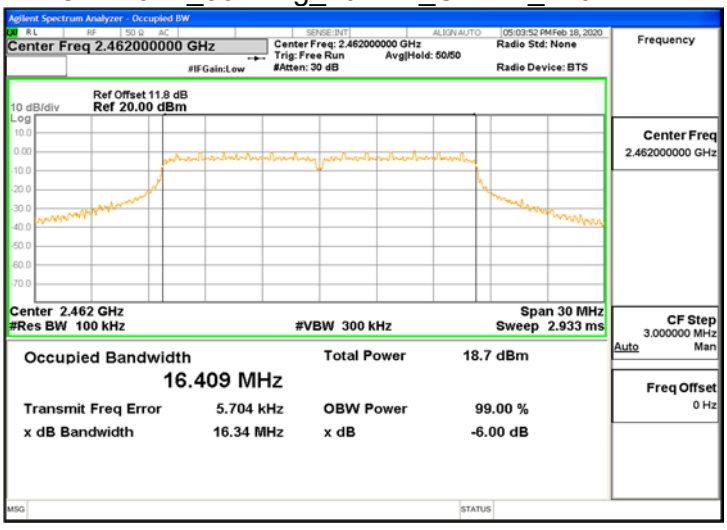
OBW 6dB_802.11g_20MHz_Chain2_2437MHz



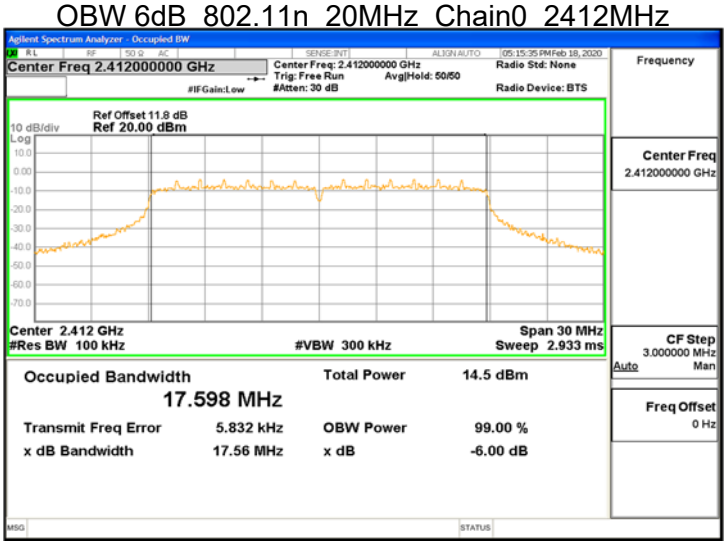
OBW 6dB_802.11g_20MHz_Chain1_2462MHz



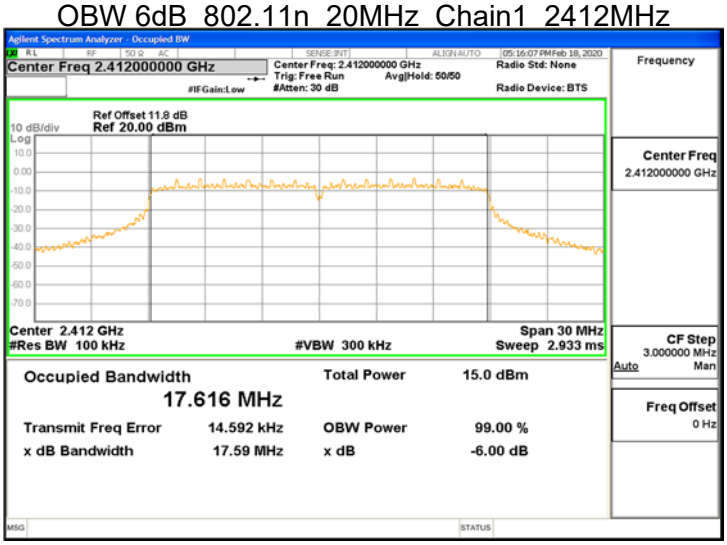
OBW 6dB_802.11g_20MHz_Chain2_2462MHz



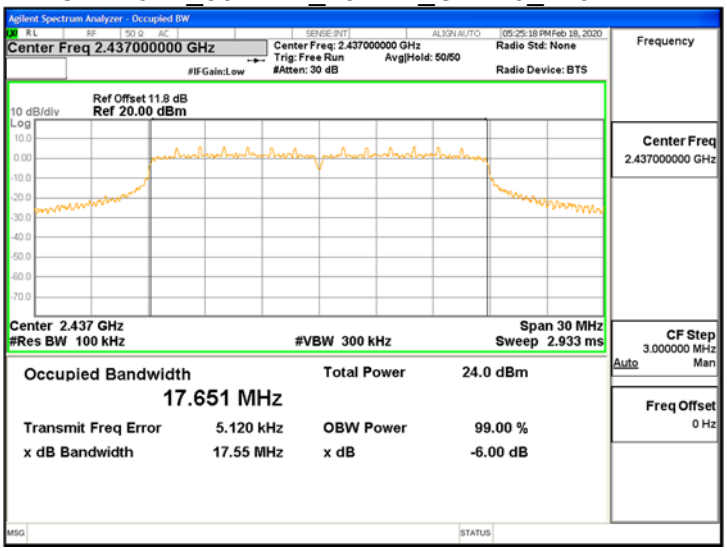
OBW 6dB_802.11n_20MHz_Chain0_2412MHz



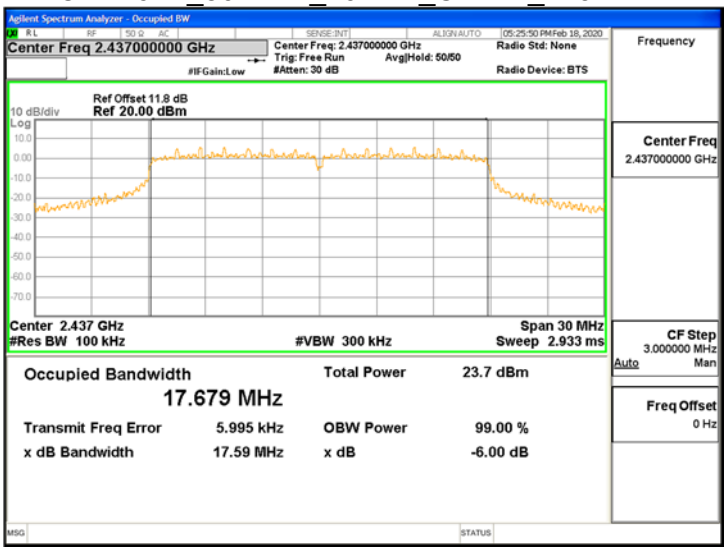
OBW 6dB_802.11n_20MHz_Chain1_2412MHz



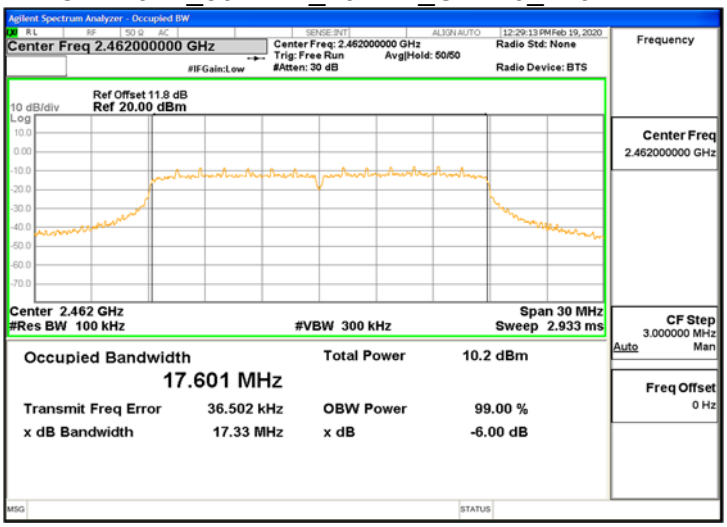
OBW 6dB_802.11n_20MHz_Chain0_2437MHz



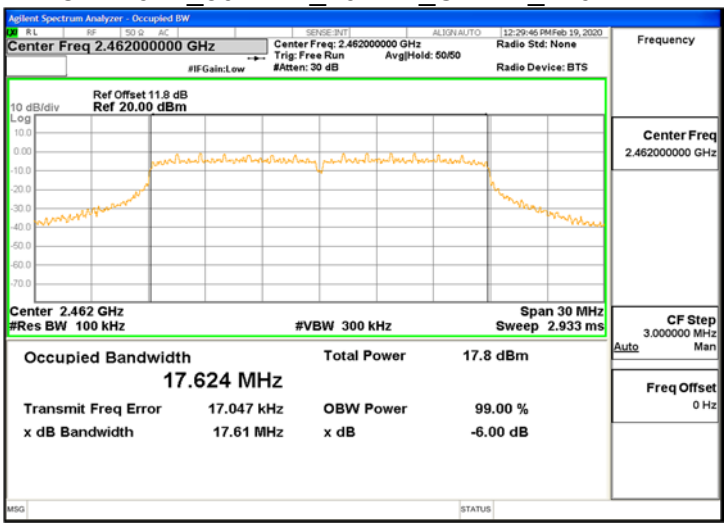
OBW 6dB_802.11n_20MHz_Chain1_2437MHz



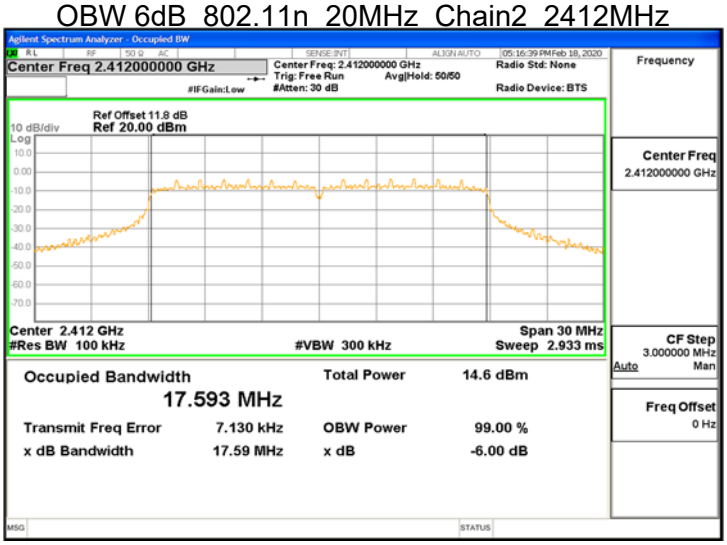
OBW 6dB_802.11n_20MHz_Chain0_2462MHz



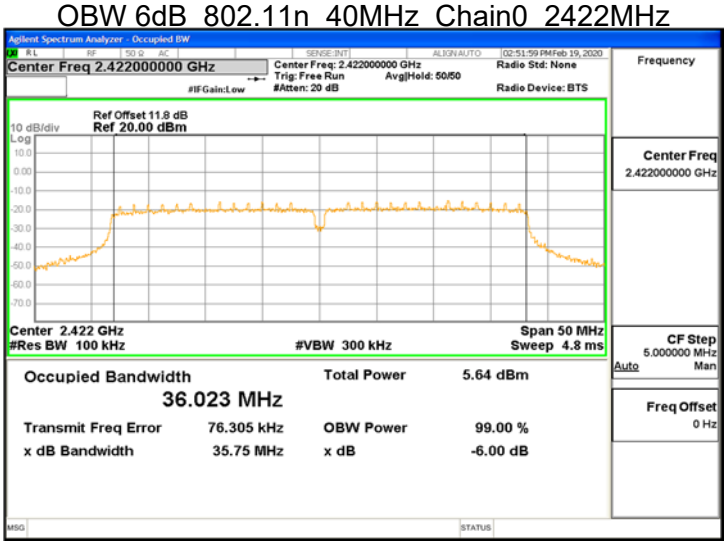
OBW 6dB_802.11n_20MHz_Chain1_2462MHz



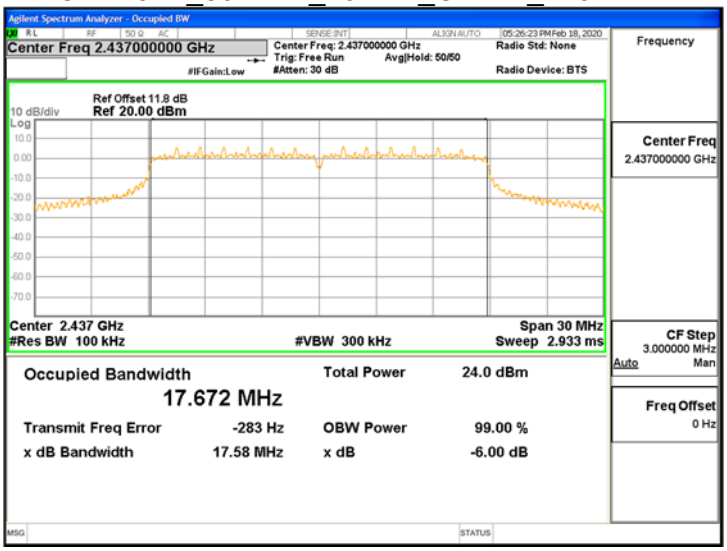
OBW 6dB_802.11n_20MHz_Chain2_2412MHz



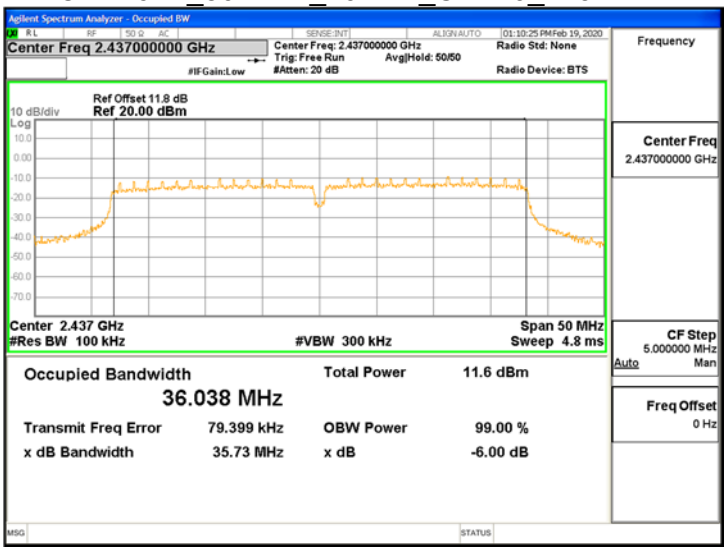
OBW 6dB_802.11n_40MHz_Chain0_2422MHz



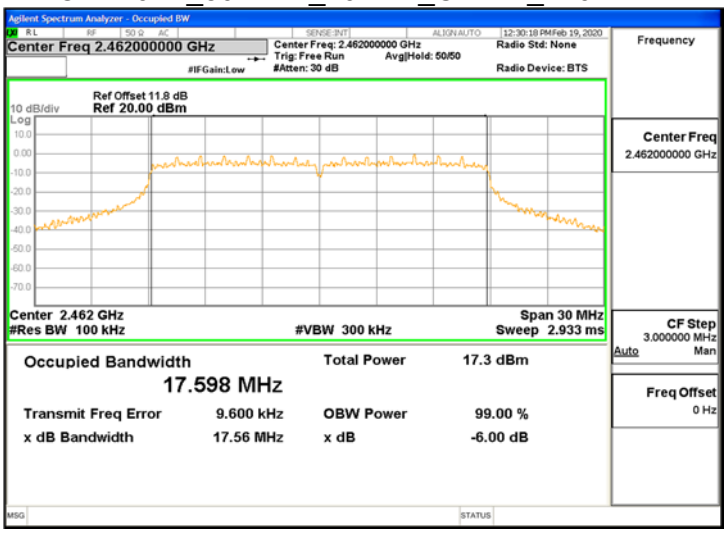
OBW 6dB_802.11n_20MHz_Chain2_2437MHz



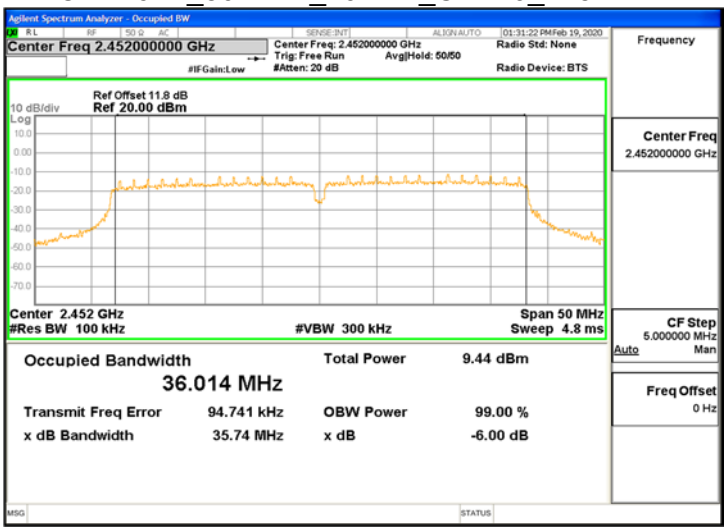
OBW 6dB_802.11n_40MHz_Chain0_2437MHz



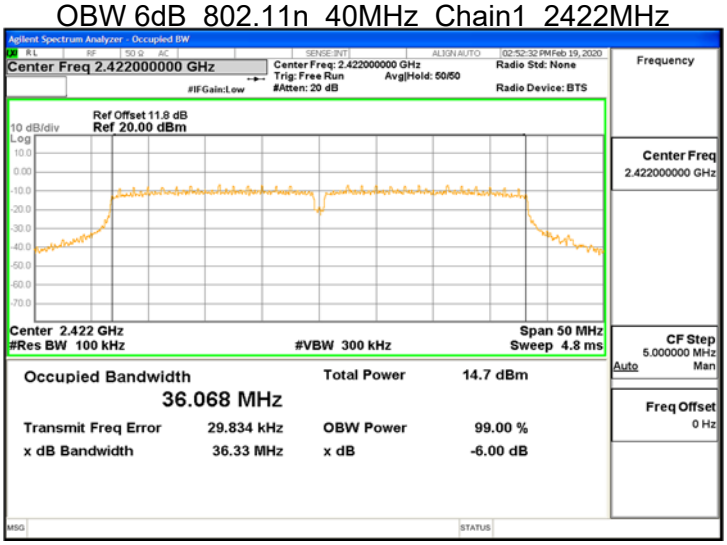
OBW 6dB_802.11n_20MHz_Chain2_2462MHz



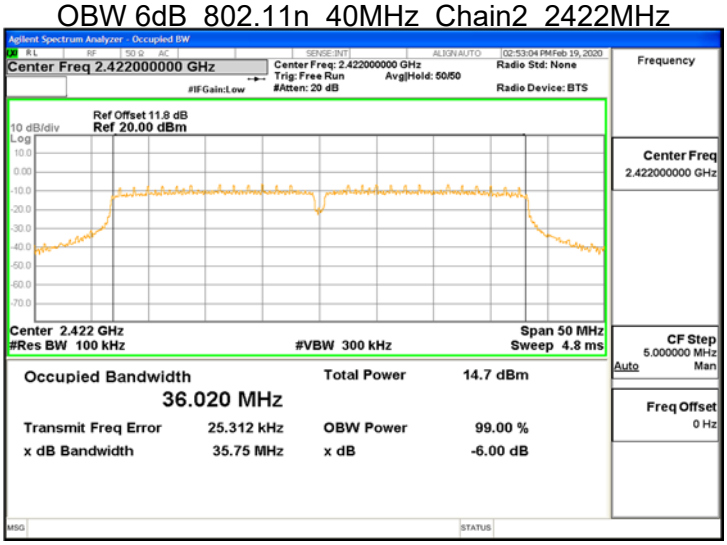
OBW 6dB_802.11n_40MHz_Chain0_2452MHz



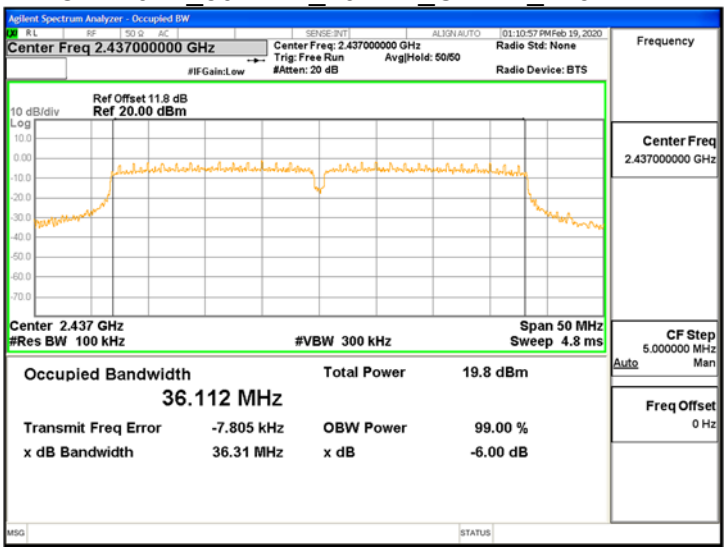
OBW 6dB_802.11n_40MHz_Chain1_2422MHz



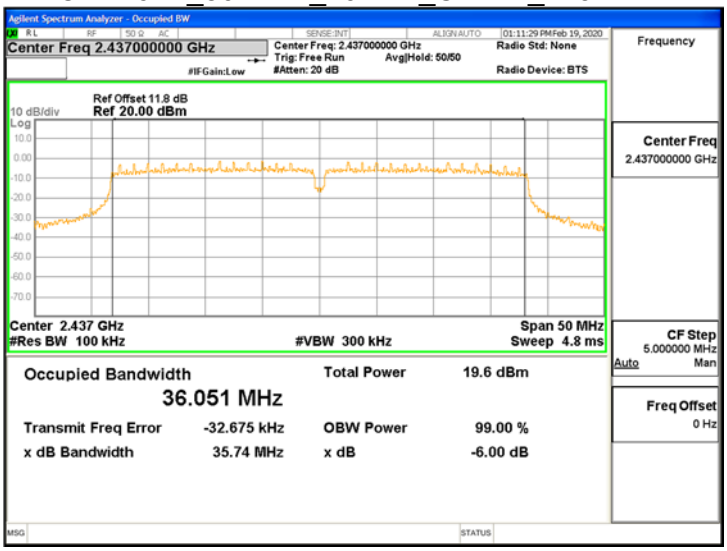
OBW 6dB_802.11n_40MHz_Chain2_2422MHz



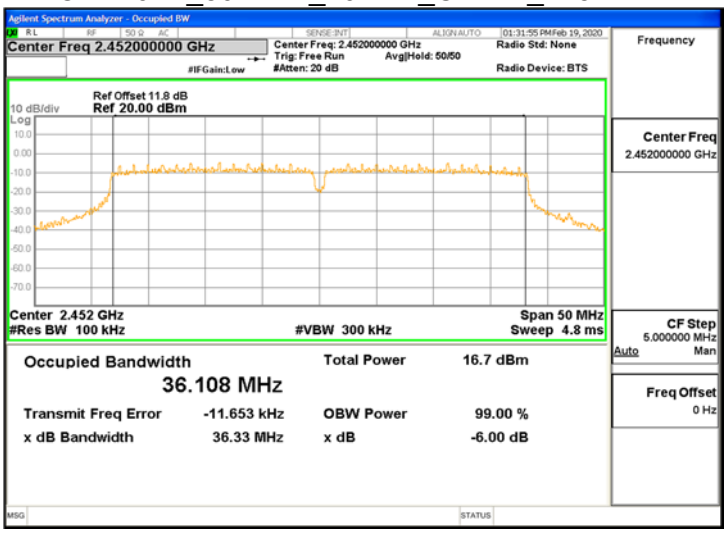
OBW 6dB_802.11n_40MHz_Chain1_2437MHz



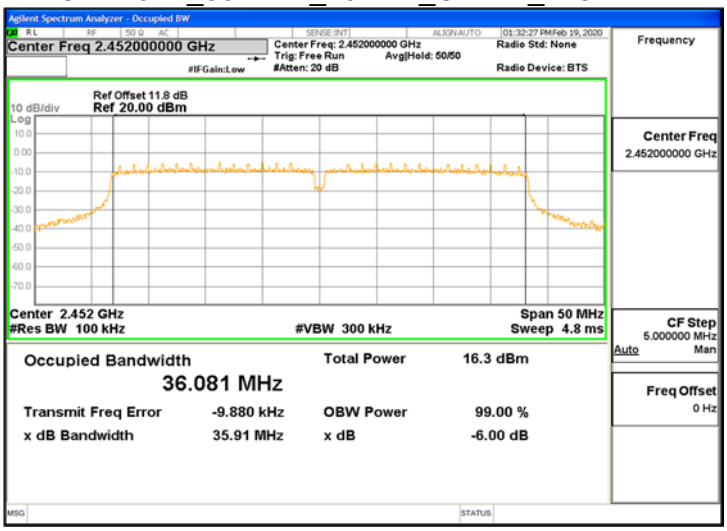
OBW 6dB_802.11n_40MHz_Chain2_2437MHz



OBW 6dB_802.11n_40MHz_Chain1_2452MHz



OBW 6dB_802.11n_40MHz_Chain2_2452MHz



10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

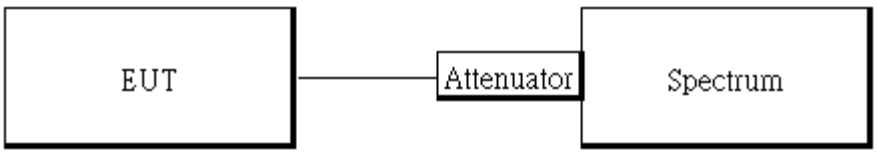
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

10.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021

10.3 Test SET-UP



10.4 Measurement Procedure

Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
   Use the peak marker function to determine the maximum amplitude level.

Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Mark the highest reading of the emission as the reference level measurement.
7. Set DL as the limit = reading on marker 1 – 20dBm
8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
3. Set RBW = 100 kHz & VBW= 300 kHz, Detector =Peak, Sweep = Auto.
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

10.5 Measurement Result

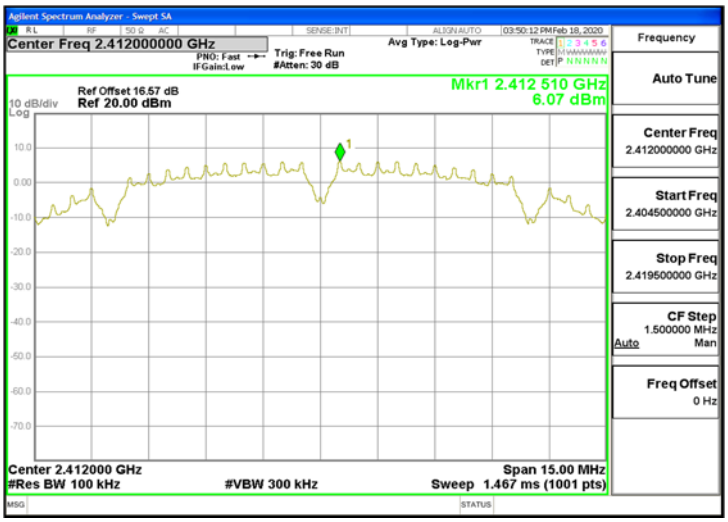
Reference Level of Limit 802.11b mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	6.07	-13.93
2437	6.08	-13.92
2462	5.63	-14.37

Reference Level of Limit 802.11g mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	3.36	-16.64
2437	11.56	-8.44
2462	5.43	-14.57

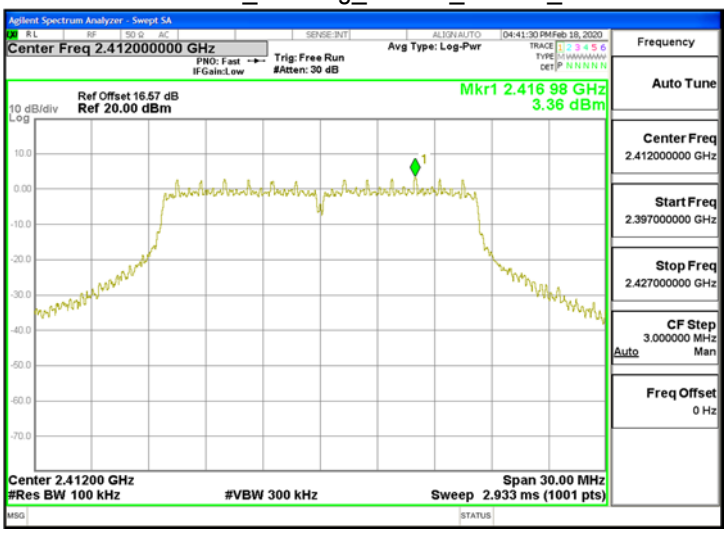
Reference Level of Limit 802.11n20 mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	1.45	-18.55
2437	10.86	-9.14
2462	4.34	-15.66

Reference Level of Limit 802.11n40 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2422	-1.66	-21.66
2437	3.39	-16.61
2452	0.12	-19.88

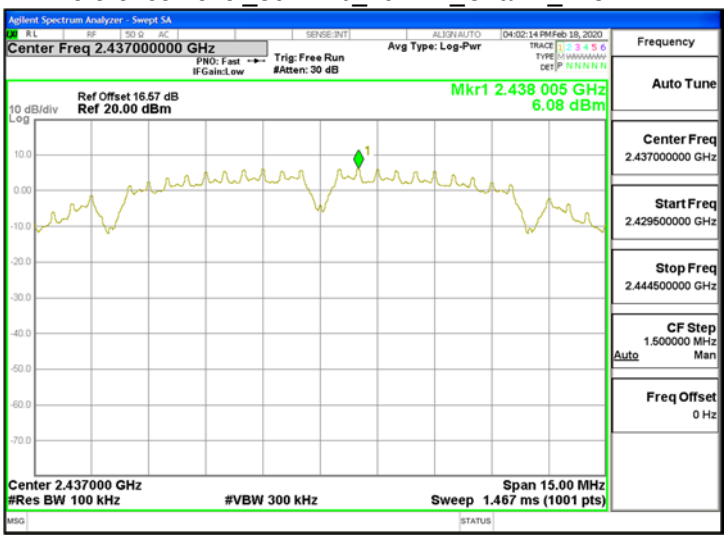
Reference Level_802.11b_20MHz_Chain2_2412MHz



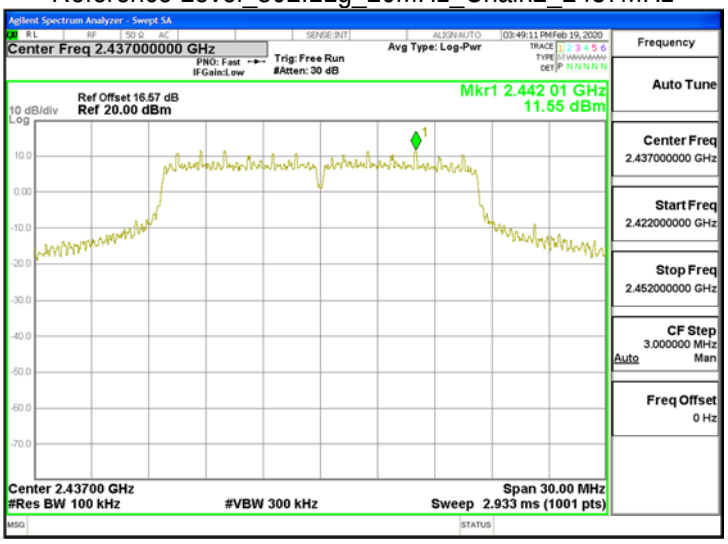
Reference Level_802.11g_20MHz_Chain2_2412MHz



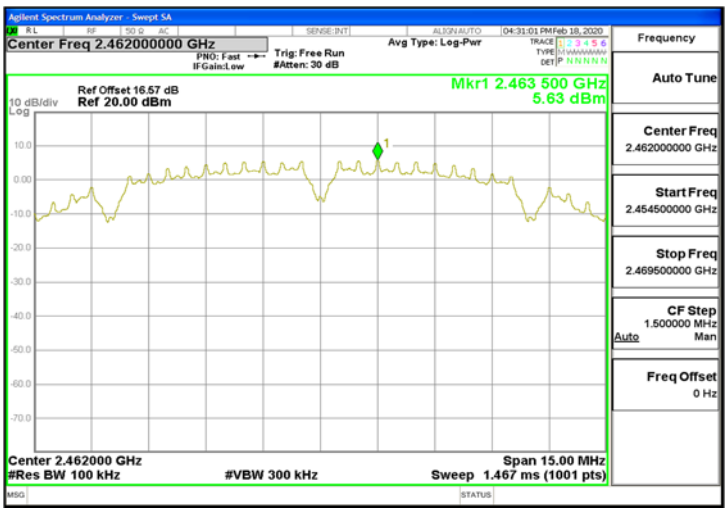
Reference Level_802.11b_20MHz_Chain2_2437MHz



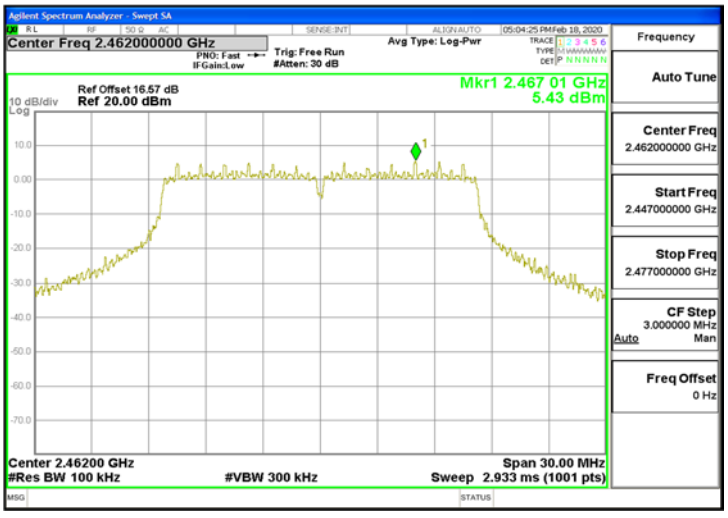
Reference Level_802.11g_20MHz_Chain2_2437MHz



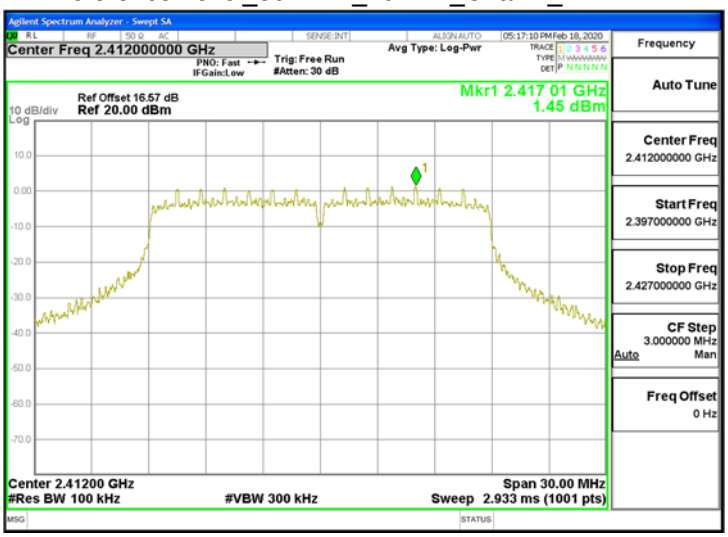
Reference Level_802.11b_20MHz_Chain2_2462MHz



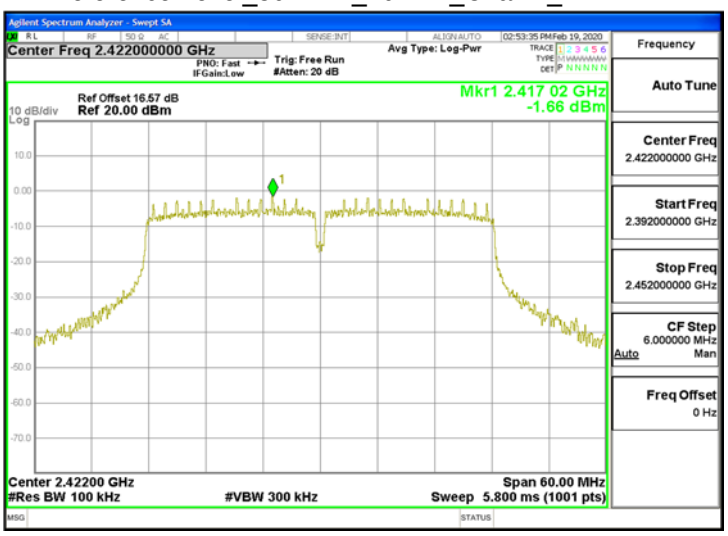
Reference Level_802.11g_20MHz_Chain2_2462MHz



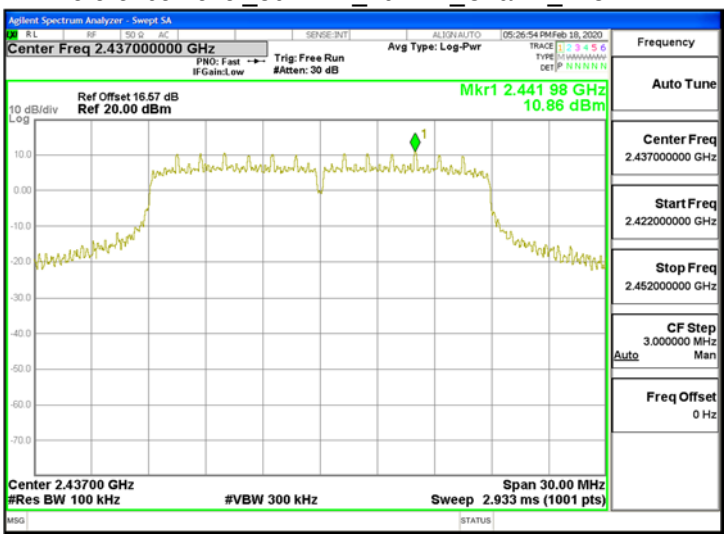
Reference Level_802.11n_20MHz_Chain2_2412MHz



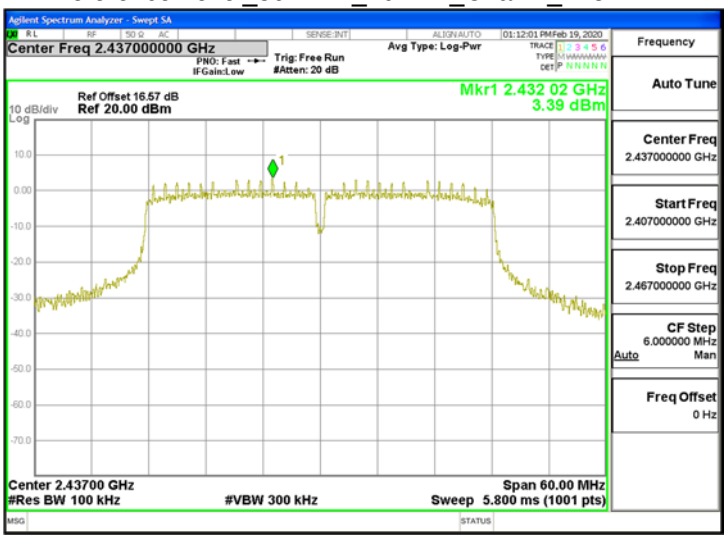
Reference Level_802.11n_40MHz_Chain2_2422MHz



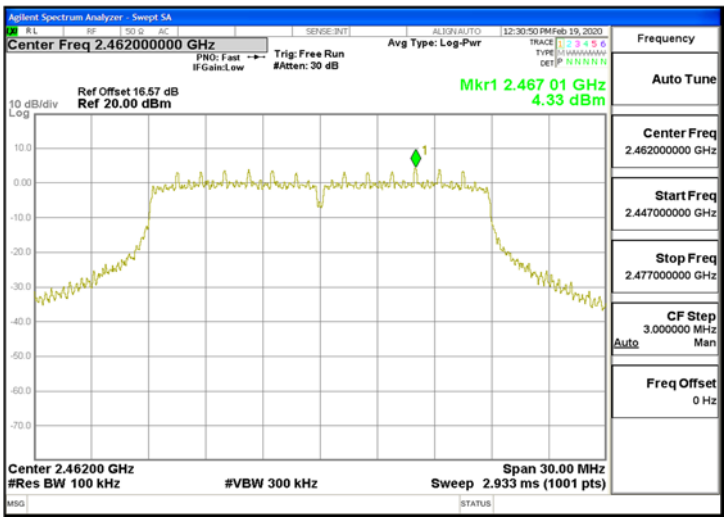
Reference Level_802.11n_20MHz_Chain2_2437MHz



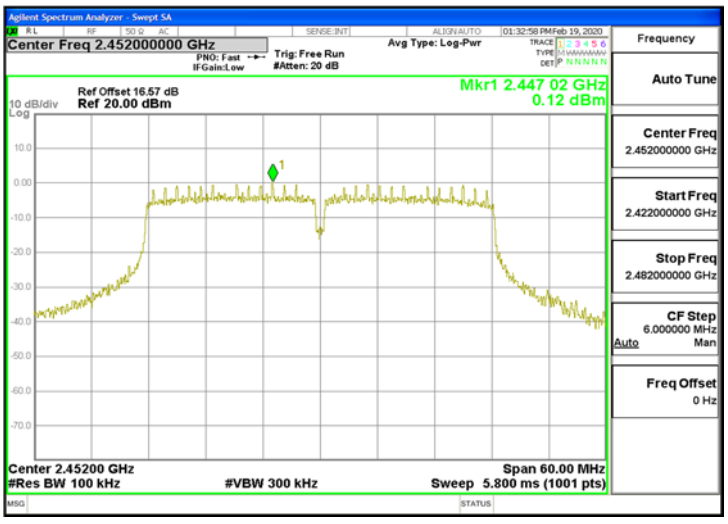
Reference Level_802.11n_40MHz_Chain2_2437MHz



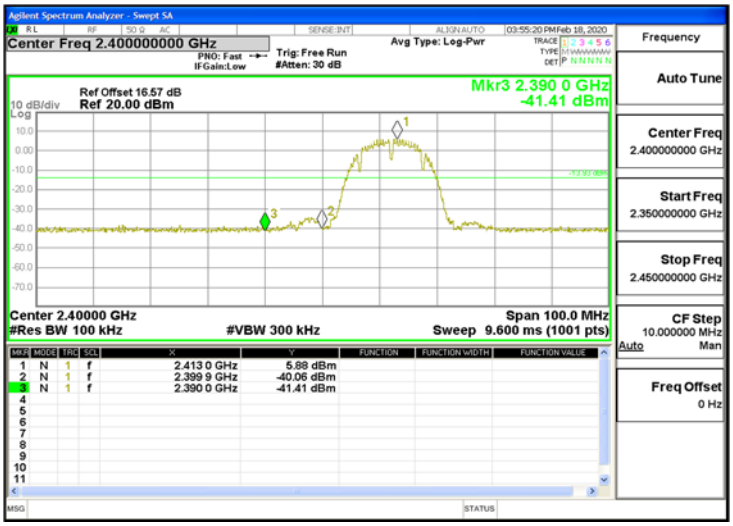
Reference Level_802.11n_20MHz_Chain2_2462MHz



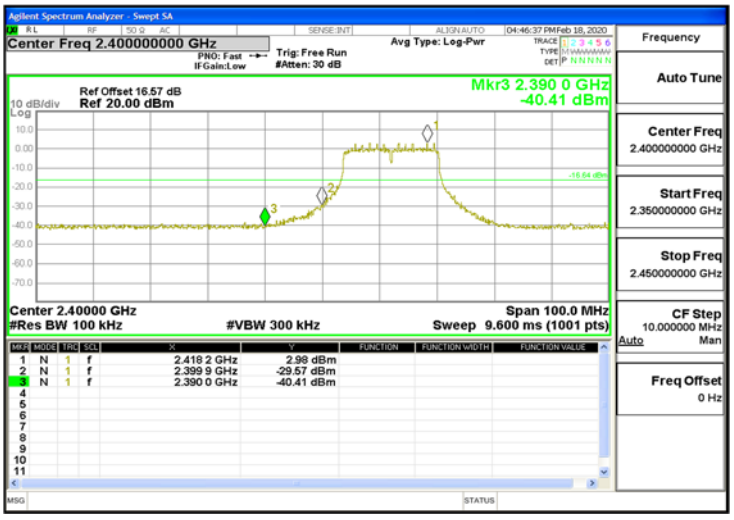
Reference Level_802.11n_40MHz_Chain2_2452MHz



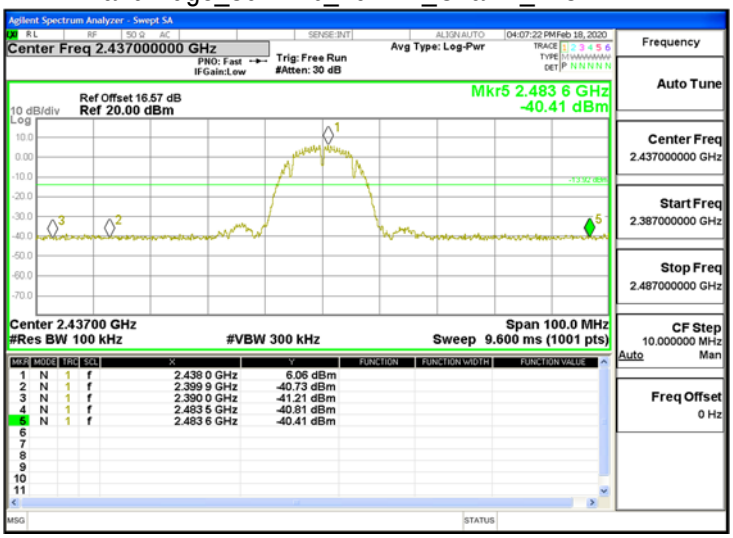
Band Edge_802.11b_20MHz_Chain2_2412MHz



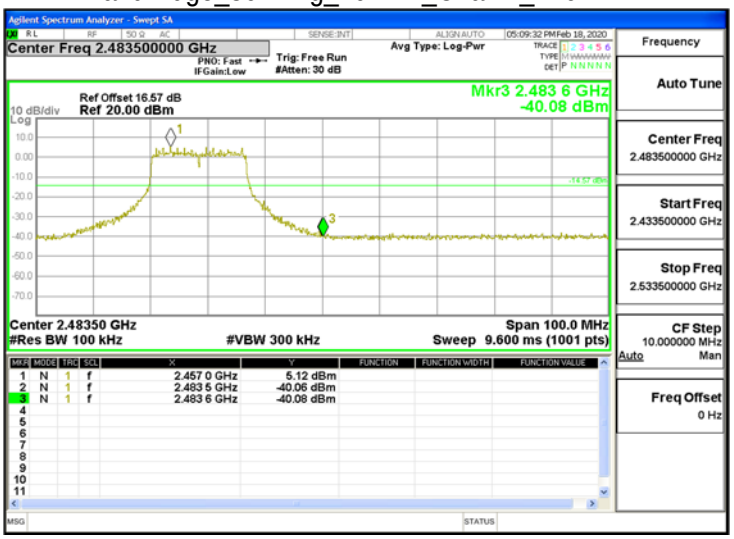
Band Edge_802.11g_20MHz_Chain2_2412MHz



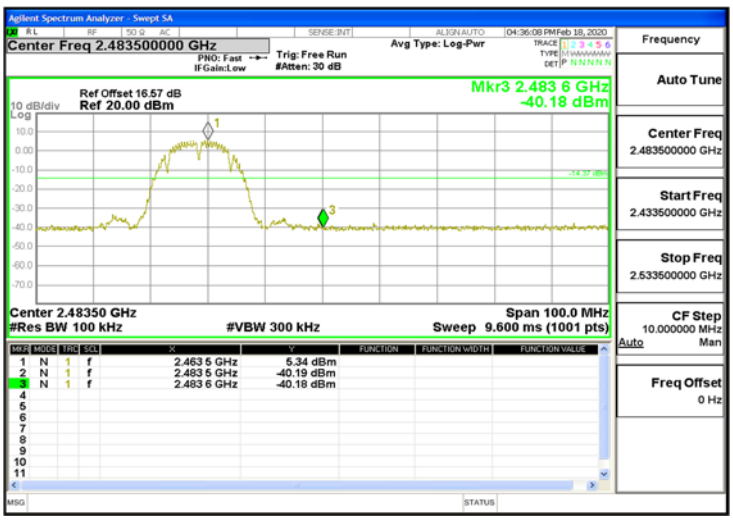
Band Edge_802.11b_20MHz_Chain2_2437MHz



Band Edge_802.11g_20MHz_Chain2_2462MHz



Band Edge_802.11b_20MHz_Chain2_2462MHz



Band Edge_802.11n_20MHz_Chain2_2412MHz