ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247

OF

Applicant:	Microsoft Corporation One Microsoft Way, Redmond, WA 98052-6399 USA
Product Name:	Portable Computing Device
Brand Name:	Microsoft
Model No.:	1825
Model Difference:	N/A
FCC ID:	C3K1825
IC:	3048A-1825
Report Number:	E2/2018/70119
FCC Rule Part:	§15.247, Cat: DTS
IC Rule Part:	RSS-247 issue 2 Feb 2017
Issue Date:	Sep. 22, 2018
Date of Test:	Jun. 26, 2018 ~ Sep. 10, 2018
Date of EUT Received:	Jun. 26, 2018

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.

Tested By: _____

Vito Pei / Sr. Engineer

Approved By: _____

Jim Chang / Manager

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/70119	Rev.00	Initial creation of document	All	Sep. 22, 2018	Violetta Tang

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Contents

1 GENERAL INFORMATION 4
2 SYSTEM TEST CONFIGURATION 6
3 SUMMARY OF TEST RESULTS 8
4 DESCRIPTION OF TEST MODES 8
5 MEASUREMENT UNCERTAINTY 11
6 CONDUCTED EMISSION TEST 12
7 DUTY CYCLE OF TEST SIGNAL 16
8 PEAK OUTPUT POWER MEASUREMENT 19
9 6dB & 99% BANDWIDTH MEASUREMENT 30
10 CONDUCTED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT 49
11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT 80
12 PEAK POWER SPECTRAL DENSITY 167
13 ANTENNA REQUIREMENT 173

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Portable Computing Device	
Brand Name:	Microsoft	
Model No.:	1825	
Model Difference:	N/A	
Product SW/HW version:	Windows 10 Pro / EV2.7	
Radio SW/HW version:	18.33.105.6 / EV2.7	
Test SW Version:	3.0.271.0	
Power Supply:	7.66Vdc from Rechargeable Li-ion Battery or 15V from AC/DC Adapter	
	Battery:	Model No.: G16QA043H, Supplier: SMP
	Adapter:	Model No.: 1735, Supplier: LITEON

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power in dBm (Peak)	Rated Power in dBm (EIRP)	Type of Emission	Modulation Technology
802.11b	2412-2472	13	20.16	22.29	13M3G1D	DSSS
802.11g			23.53	22.29	16M5D1D	OFDM
802.11n HT20			23.67	22.29	17M7D1D	
802.11n HT40	2422-2462	9	24.00	22.28	36M3D1D	

**** Note:*** EIRP = Average Power + Gain

Antenna Designation:	PIFA Antenna, Main Antenna Gain: 1.23dBi / Aux Antenna Gain: 2.29dBi
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 – 144.4Mbps 802.11 n_40MHz: 13.5 – 300.0Mbps

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 v05 DTS Meas. Guidance

FCC KDB 662911 D01 Multiple Transmitter Output

Canada RSS-247 issue 2 Feb. 2017

Canada RSS-Gen issue 5 Apr. 2018

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

(TAF code 0513)

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620A-5 .

1.4 Special Accessories

AC Adapter is used while the test is conducted and there is no other accessory attached. This is the worst case condition.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT is configured to operate in a continuous transmission mode. EUT placement and various angles were checked to find worst mode where the emission characteristics are maximized.

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 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 according to §15.207. The two LISNs provide 50 ohm/ 50uH 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 Radiated Emissions

The EUT is a placed on as 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

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.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss and attenuator.

Offset:

= RF cable loss (dB)+ attenuation factor(dB) =10.6 (dB) for SISO / 13.6 (dB) for MIMO

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2.5 Configuration of Tested System

Fig. 2-1 Radiated & Conducted Emission Configuration

Fig.2-2 Conducted Emission (Antenna Port) Configuration

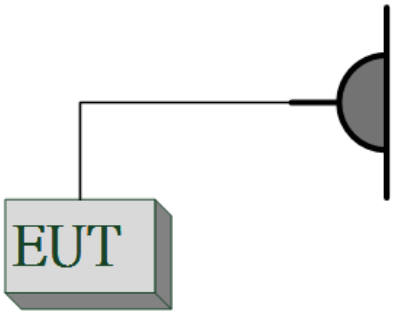

Table 2-1 Equipment Used in Tested System

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	Notebook	Lenovo	L420	S0011721	Shielded	Unshielded

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3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 (1) RSS-Gen §6.7	6dB & 99% Emission Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2(2)	Power Spectral Density	Compliant
§15.203	RSS- Gen §6.8	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

13 channels are provided for 802.11b, 802.11g and 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	8	2447 MHz
2	2417 MHz	9	2452 MHz
3	2422 MHz	10	2457 MHz
4	2427 MHz	11	2462 MHz
5	2432 MHz	12	2467 MHz
6	2437 MHz	13	2472 MHz
7	2442 MHz		

9 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422 MHz	8	2447 MHz
4	2427 MHz	9	2452 MHz
5	2432 MHz	10	2457 MHz
6	2437 MHz	11	2462 MHz
7	2442 MHz		

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1. The EUT has been tested under operating condition.
2. Test 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.
4. For MIMO modes, the 2TX emission testing was considered as a worst case scenario and was performed at power levels, per transimit chain, greater than or equal to the maximum power in any 1TX mode.
5. Power line conducted emission were performed with the EUT set to transimit at the channel with highest output power as worst-case scenario.

AC POWER LINE CONDUCTION EMISSION

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE
802.11n 20MHz	Operation in normal mode			

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 13	1, 6, 11,12,13	OFDM	6	2TX

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 13	1, 6, 11,12,13	DSSS	1	2TX
802.11g	1 to 13	1, 6, 11,12,13	OFDM	6	2TX
802.11n HT20	1 to 13	1, 6, 11,12,13	OFDM	MCS 8	MIMO
802.11n HT40	3 to 11	3, 6, 9,10,11	OFDM	MCS 8	MIMO

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

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 13	1, 6, 11,12,13	DSSS	1	2TX
802.11g	1 to 13	1, 6, 11,12,13	OFDM	6	2TX
802.11n HT20	1 to 13	1, 6, 11,12,13	OFDM	MCS 8	MIMO
802.11n HT40	3 to 11	3, 6, 9,10,11	OFDM	MCS 8	MIMO

Directional gain (MIMO)

The Tx transmission to construct MIMO operation is cyclic delay diversity, and the following deduction to obtain the array gain of MIMO operation is based on the approach given by KDB 662911 D01.

d) *Unequal antenna gains, with equal transmit powers.* For antenna gains given by $G_1, G_2, \ldots, G_N$ dBi

(i) If transmit signals are *correlated*, then

Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N_{ANT}]$ 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.]

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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 Edge	+/- 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: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	9kHz-30MHz: +/-2.87dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

Frequency range MHz	Limits dB(uV)	
	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.**
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/02/13
EMI Test Receiver	R&S	ESCI	101300	2017/11/02	2018/11/01
Coaxial Cable	EMC Instruments Corp	EMC5D-BM-BM-3000	1401004	2018/05/25	2019/05/24

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.

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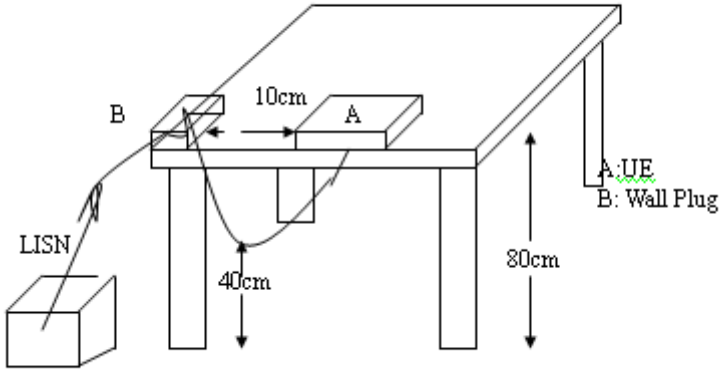
6.4 Test SET-UP (Block Diagram of Configuration)



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

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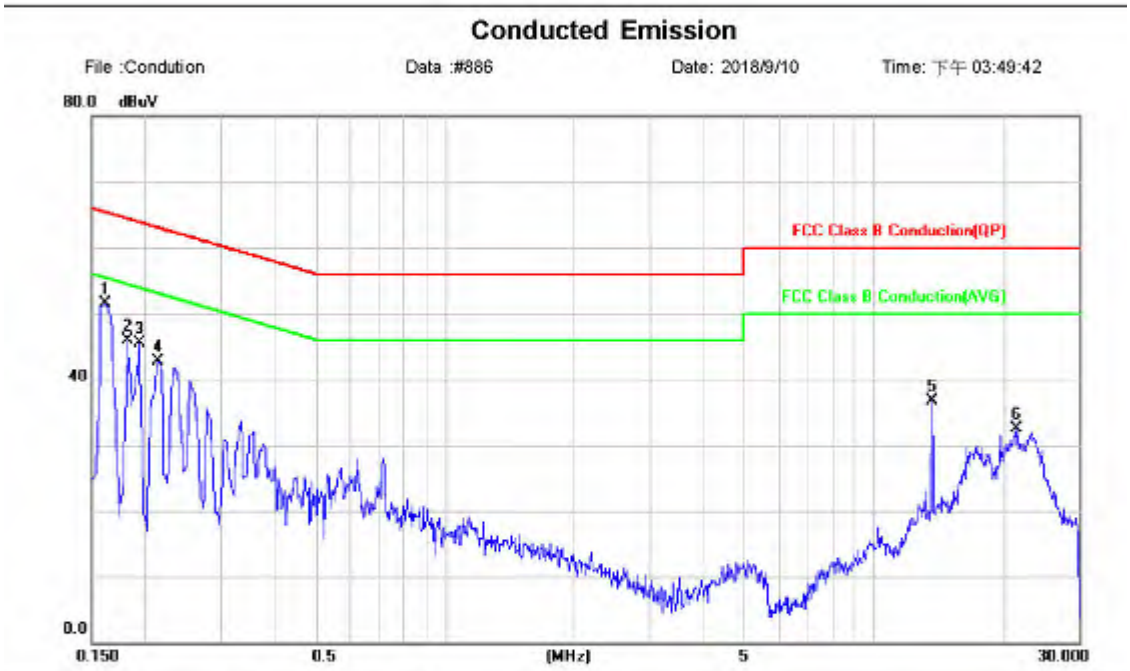
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	operation mode	Test By:	Jerry

Site : Conduction Room
Limit: FCC Class B Conduction(QP)
Mode:
Note:

Phase: L1
Power: AC 120V/60Hz

Temperature: 22 ℃
Humidity: 70 %



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1620	51.41	0.04	51.45	65.36	-13.91	peak	
2		0.1820	45.96	0.03	45.99	64.39	-18.40	peak	
3		0.1940	45.43	0.03	45.46	63.86	-18.40	peak	
4		0.2140	42.65	0.03	42.68	63.05	-20.37	peak	
5		13.6900	36.08	0.60	36.68	60.00	-23.32	peak	
6		21.3780	31.54	0.90	32.44	60.00	-27.56	peak	

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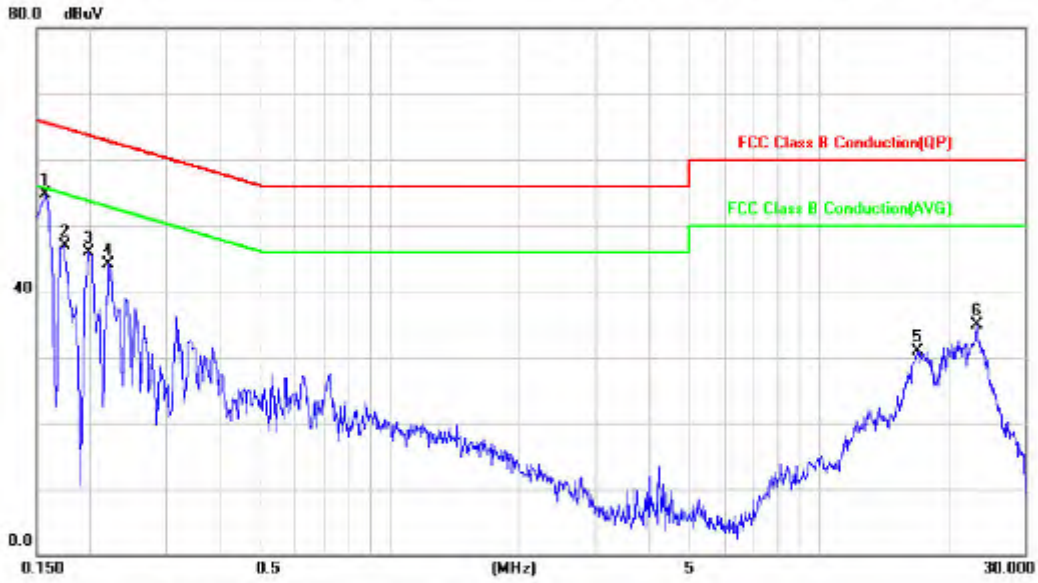
Site : Conduction Room
Limit: FCC Class B Conduction(QP)
Mode:
Note:

Phase: N
Power: AC 120V/60Hz

Temperature: 22 ℃
Humidity: 70 %

Conducted Emission

File :Condution Data :#887 Date: 2018/9/10 Time: 下午 03:51:15



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1580	54.71	0.04	54.75	65.57	-10.82	peak	
2		0.1740	46.95	0.04	46.99	64.77	-17.78	peak	
3		0.1980	45.83	0.04	45.87	63.69	-17.82	peak	
4		0.2220	43.99	0.05	44.04	62.74	-18.70	peak	
5		16.8460	30.37	0.54	30.91	60.00	-29.09	peak	
6		23.1940	34.20	0.71	34.91	60.00	-25.09	peak	

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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.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Measurement Procedure:

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

Duty Cycle:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
802.11b	99.30	0.03	0.08	1.00
802.11g	94.74	0.23	0.48	1.00
802.11n_20	89.57	0.48	1.01	2.00
802.11n_40	81.16	0.91	2.02	3.00

b = 99.3%, g = 94.74%,n_ht_20 = 89.57%

Duty Cycle Factor: 10 * log(1/0.993) = 0.03
Duty Cycle Factor: 10 * log(1/0.9474) = 0.23
Duty Cycle Factor: 10 * log(1/0.8957) = 0.48
Duty Cycle Factor: 10 * log(1/0.8116) = 0.91

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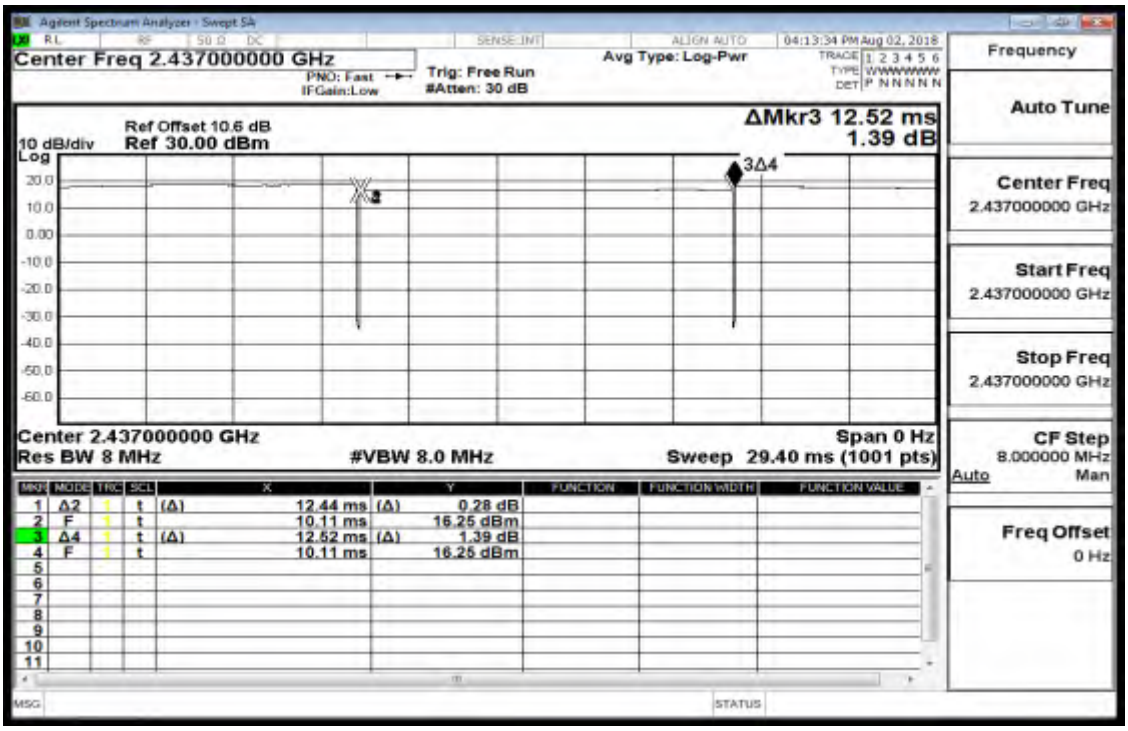
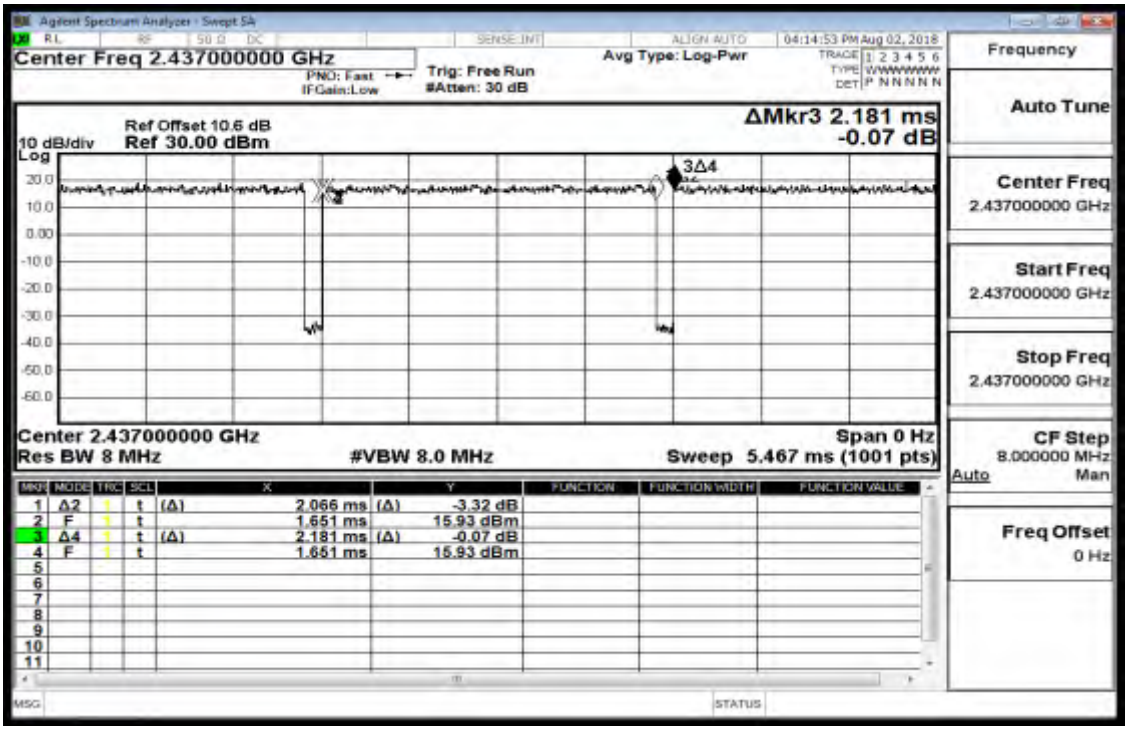
7.1 DUTY CYCLE TEST SIGNAL Measurement Result

802.11 b



802.11 g



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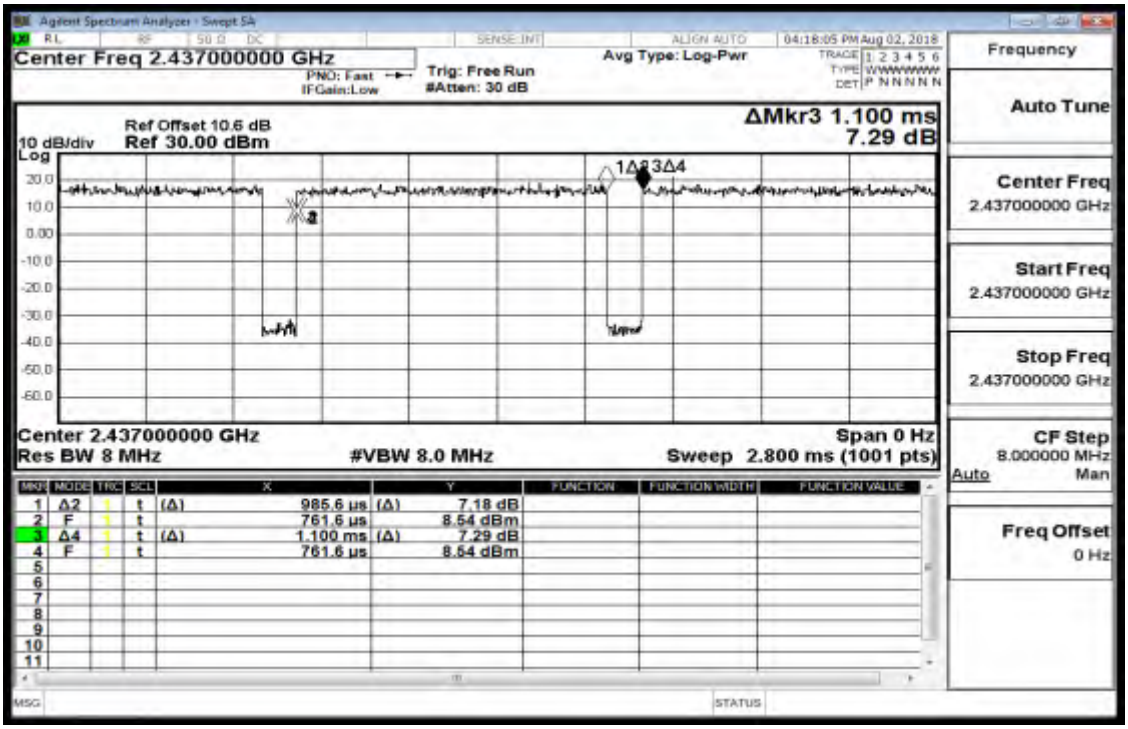
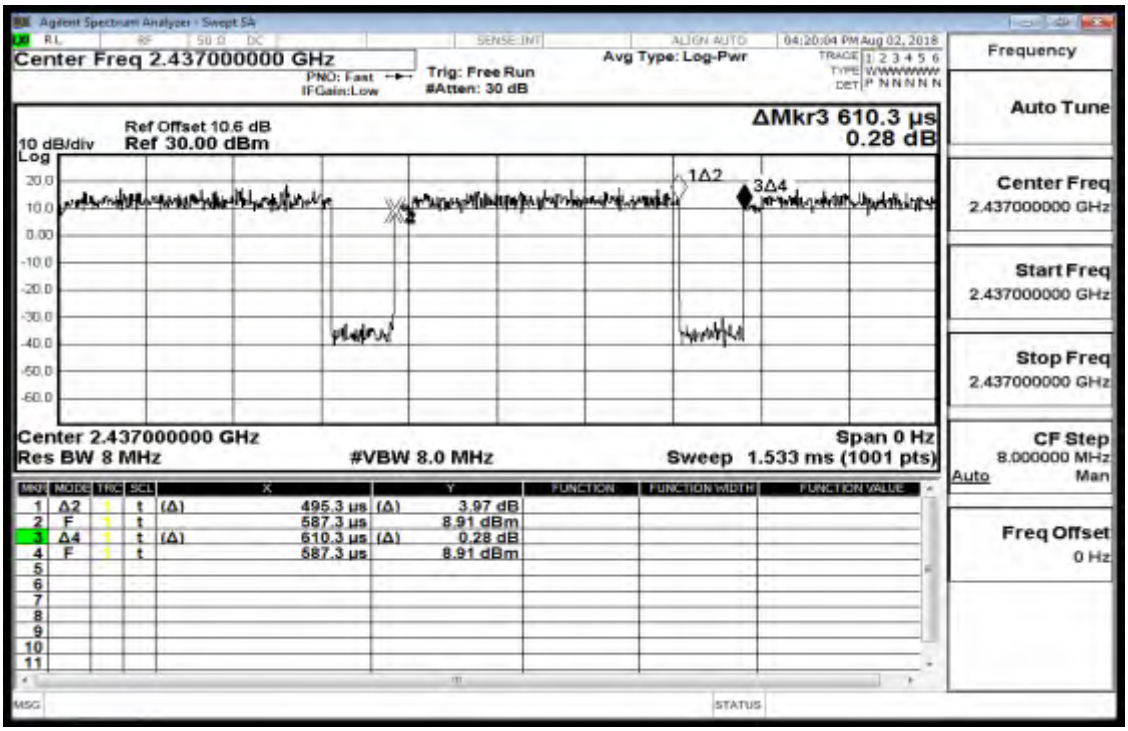
802.11 n_20 MHz



802.11 n_40 MHz



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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.

Per RSS-247 §5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

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.

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

Frequency (MHz)	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
2412~2462	4.80	30

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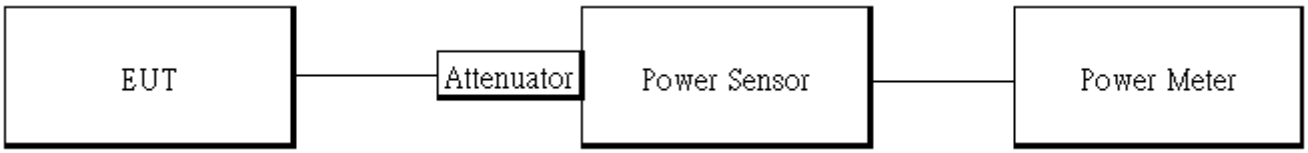
8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Power Meter	Anritsu	ML2496A	1326001	2018/08/09	2019/08/02
Power Sensor	Anritsu	MA2411B	1315048	2018/08/09	2019/08/02
Power Sensor	Anritsu	MA2411B	1315049	2018/08/09	2019/08/02
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Attenuator	Marvelous	MVE2213-10	RF31	2017/12/26	2018/12/25
DC Block	PASTERNACK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

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.

Note: The reported CH0 and CH1 power values in the 2Tx and MIMO tables were measured whe performing additional measurements and all reported values are within compliance.

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8.5 Measurement Result

802.11b Chain0							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	1	16.71	1 Watt =	30.00	dBm	PASS
6	2437	1	16.55	1 Watt =	30.00	dBm	PASS
11	2462	1	16.92	1 Watt =	30.00	dBm	PASS
12	2467	1	16.36	1 Watt =	30.00	dBm	PASS
13	2472	1	16.37	1 Watt =	30.00	dBm	PASS
802.11b Chain0							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	1	14.35	1 Watt =	30.00	dBm	PASS
6	2437	1	14.23	1 Watt =	30.00	dBm	PASS
11	2462	1	14.45	1 Watt =	30.00	dBm	PASS
12	2467	1	13.83	1 Watt =	30.00	dBm	PASS
13	2472	1	13.85	1 Watt =	30.00	dBm	PASS

802.11b Chain1							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	1	16.66	1 Watt =	30.00	dBm	PASS
6	2437	1	**16.97**	1 Watt =	30.00	dBm	PASS
11	2462	1	16.80	1 Watt =	30.00	dBm	PASS
12	2467	1	16.35	1 Watt =	30.00	dBm	PASS
13	2472	1	16.30	1 Watt =	30.00	dBm	PASS
802.11b Chain1							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	1	14.22	1 Watt =	30.00	dBm	PASS
6	2437	1	**14.46**	1 Watt =	30.00	dBm	PASS
11	2462	1	14.34	1 Watt =	30.00	dBm	PASS
12	2467	1	13.86	1 Watt =	30.00	dBm	PASS
13	2472	1	13.81	1 Watt =	30.00	dBm	PASS

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802.11b_2TX										
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit			RESULT
			CH 0	CH 1						
1	2412	1	16.69	16.60	19.66	92.37	1 Watt =	30.00	dBm	PASS
6	2437	1	17.25	17.04	**20.16**	103.67	1 Watt =	30.00	dBm	PASS
11	2462	1	17.18	16.79	20.00	99.99	1 Watt =	30.00	dBm	PASS
12	2467	1	16.41	15.87	19.16	82.39	1 Watt =	30.00	dBm	PASS
13	2472	1	16.23	15.79	19.03	79.91	1 Watt =	30.00	dBm	PASS

802.11b_2TX										
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit			RESULT
			CH 0	CH 1						
1	2412	1	14.34	14.16	17.29	53.55	1 Watt =	30.00	dBm	PASS
6	2437	1	14.50	14.40	**17.49**	56.06	1 Watt =	30.00	dBm	PASS
11	2462	1	14.35	14.26	17.34	54.22	1 Watt =	30.00	dBm	PASS
12	2467	1	13.95	13.88	16.95	49.56	1 Watt =	30.00	dBm	PASS
13	2472	1	13.90	13.61	16.79	47.80	1 Watt =	30.00	dBm	PASS

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802.11g Chain0							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	6	20.45	1 Watt =	30.00	dBm	PASS
6	2437	6	20.32	1 Watt =	30.00	dBm	PASS
11	2462	6	20.37	1 Watt =	30.00	dBm	PASS
12	2467	6	18.93	1 Watt =	30.00	dBm	PASS
13	2472	6	9.99	1 Watt =	30.00	dBm	PASS
802.11g Chain0							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	6	14.47	1 Watt =	30.00	dBm	PASS
6	2437	6	14.31	1 Watt =	30.00	dBm	PASS
11	2462	6	**14.49**	1 Watt =	30.00	dBm	PASS
12	2467	6	12.45	1 Watt =	30.00	dBm	PASS
13	2472	6	3.41	1 Watt =	30.00	dBm	PASS

802.11g Chain1							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	6	20.69	1 Watt =	30.00	dBm	PASS
6	2437	6	20.51	1 Watt =	30.00	dBm	PASS
11	2462	6	**20.70**	1 Watt =	30.00	dBm	PASS
12	2467	6	18.75	1 Watt =	30.00	dBm	PASS
13	2472	6	9.95	1 Watt =	30.00	dBm	PASS
802.11g Chain1							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	6	14.38	1 Watt =	30.00	dBm	PASS
6	2437	6	14.27	1 Watt =	30.00	dBm	PASS
11	2462	6	**14.49**	1 Watt =	30.00	dBm	PASS
12	2467	6	12.35	1 Watt =	30.00	dBm	PASS
13	2472	6	3.45	1 Watt =	30.00	dBm	PASS

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802.11g_2TX										
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit			RESULT
			CH 0	CH 1						
1	2412	6	20.45	20.52	23.50	223.64	1 Watt =	30.00	dBm	PASS
6	2437	6	20.36	20.55	23.47	222.14	1 Watt =	30.00	dBm	PASS
11	2462	6	20.37	20.66	**23.53**	225.31	1 Watt =	30.00	dBm	PASS
12	2467	6	18.94	18.43	21.70	148.01	1 Watt =	30.00	dBm	PASS
13	2472	6	9.94	10.08	13.02	20.05	1 Watt =	30.00	dBm	PASS
802.11g_2TX										
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit			RESULT
			CH 0	CH 1						
1	2412	6	14.27	14.20	17.48	56.00	1 Watt =	30.00	dBm	PASS
6	2437	6	14.01	13.98	17.24	52.99	1 Watt =	30.00	dBm	PASS
11	2462	6	14.25	14.24	**17.49**	56.13	1 Watt =	30.00	dBm	PASS
12	2467	6	12.43	11.54	15.25	33.53	1 Watt =	30.00	dBm	PASS
13	2472	6	3.07	3.54	6.56	4.53	1 Watt =	30.00	dBm	PASS

802.11n_HT20M Chain0							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	MCS0	20.35	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	20.41	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	20.52	1 Watt =	30.00	dBm	PASS
12	2467	MCS0	19.03	1 Watt =	30.00	dBm	PASS
13	2472	MCS0	10.07	1 Watt =	30.00	dBm	PASS
802.11n_HT20M Chain0							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	MCS0	**14.49**	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	14.40	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	**14.49**	1 Watt =	30.00	dBm	PASS
12	2467	MCS0	12.29	1 Watt =	30.00	dBm	PASS
13	2472	MCS0	3.45	1 Watt =	30.00	dBm	PASS

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802.11n_HT20M Chain1					
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit	RESULT
1	2412	MCS0	**20.80**	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	20.56	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	20.62	1 Watt = 30.00 dBm	PASS
12	2467	MCS0	18.81	1 Watt = 30.00 dBm	PASS
13	2472	MCS0	9.98	1 Watt = 30.00 dBm	PASS

802.11n_HT20M Chain1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	MCS0	14.48	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	14.30	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	**14.49**	1 Watt = 30.00 dBm	PASS
12	2467	MCS0	12.21	1 Watt = 30.00 dBm	PASS
13	2472	MCS0	3.31	1 Watt = 30.00 dBm	PASS

802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	20.35	20.64	23.51	224.27	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	20.21	20.45	23.34	215.87	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	20.46	20.86	23.67	233.07	1 Watt = 30.00 dBm	PASS
12	2467	MCS8	18.82	18.74	21.79	151.02	1 Watt = 30.00 dBm	PASS
13	2472	MCS8	9.91	10.27	13.10	20.44	1 Watt = 30.00 dBm	PASS

802.11n_HT20M MIMO								
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	14.04	13.97	**17.49**	56.14	1 Watt = 30.00 dBm	PASS
6	2437	MCS8	13.88	13.85	17.35	54.35	1 Watt = 30.00 dBm	PASS
11	2462	MCS8	13.97	14.04	**17.49**	56.14	1 Watt = 30.00 dBm	PASS
12	2467	MCS8	12.09	11.23	15.17	32.87	1 Watt = 30.00 dBm	PASS
13	2472	MCS8	3.01	3.26	6.62	4.60	1 Watt = 30.00 dBm	PASS

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802.11n_HT40M Chain0							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
3	2422	MCS0	20.24	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	20.53	1 Watt =	30.00	dBm	PASS
9	2452	MCS0	15.61	1 Watt =	30.00	dBm	PASS
10	2457	MCS0	19.00	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	9.32	1 Watt =	30.00	dBm	PASS
802.11n_HT40M Chain0							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
3	2422	MCS0	12.98	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	**14.49**	1 Watt =	30.00	dBm	PASS
9	2452	MCS0	8.26	1 Watt =	30.00	dBm	PASS
10	2457	MCS0	11.45	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	1.82	1 Watt =	30.00	dBm	PASS

802.11n_HT40M Chain1							
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
3	2422	MCS0	20.07	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	**21.13**	1 Watt =	30.00	dBm	PASS
9	2452	MCS0	15.41	1 Watt =	30.00	dBm	PASS
10	2457	MCS0	18.72	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	9.06	1 Watt =	30.00	dBm	PASS
802.11n_HT40M Chain1							
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
3	2422	MCS0	12.95	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	**14.45**	1 Watt =	30.00	dBm	PASS
9	2452	MCS0	8.18	1 Watt =	30.00	dBm	PASS
10	2457	MCS0	11.49	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	1.94	1 Watt =	30.00	dBm	PASS

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802.11n_HT40M MIMO										
CH	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit			RESULT
			CH 0	CH 1						
3	2422	MCS8	19.86	19.61	22.75	188.24	1 Watt =	30.00	dBm	PASS
6	2437	MCS8	20.87	21.10	24.00	251.00	1 Watt =	30.00	dBm	PASS
9	2452	MCS8	15.66	15.29	18.49	70.62	1 Watt =	30.00	dBm	PASS
10	2457	MCS8	18.35	18.20	21.29	134.46	1 Watt =	30.00	dBm	PASS
11	2462	MCS8	8.82	8.49	11.67	14.68	1 Watt =	30.00	dBm	PASS
802.11n_HT40M MIMO										
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Max. Avg. Output include tune up tolerance Power (dBm)	Max. Avg. Output include tune up tolerance Power (mW)	Limit			RESULT
			CH 0	CH 1						
3	2422	MCS8	12.57	11.51	15.99	39.74	1 Watt =	30.00	dBm	PASS
6	2437	MCS8	13.64	13.48	**17.48**	55.99	1 Watt =	30.00	dBm	PASS
9	2452	MCS8	8.01	6.95	11.43	13.91	1 Watt =	30.00	dBm	PASS
10	2457	MCS8	10.81	9.76	14.24	26.53	1 Watt =	30.00	dBm	PASS
11	2462	MCS8	1.12	0.19	4.60	2.88	1 Watt =	30.00	dBm	PASS

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

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EIRP

802.11b_2TX

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
1	2412	1	14.34	14.16	17.29	53.55	4.80	22.09	4W= 36 dBm	PASS
6	2437	1	14.50	14.40	**17.49**	**56.06**	4.80	**22.29**	4W= 36 dBm	PASS
11	2462	1	14.35	14.26	17.34	54.22	4.80	22.14	4W= 36 dBm	PASS
12	2467	1	13.95	13.88	16.95	**49.56**	4.80	**21.75**	4W= 36 dBm	PASS
13	2472	1	13.90	13.61	16.79	47.80	4.80	21.60	4W= 36 dBm	PASS

802.11g_2TX

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
1	2412	6	14.27	14.20	17.48	56.00	**4.80**	22.28	4W= 36 dBm	PASS
6	2437	6	14.01	13.98	17.24	52.99	**4.80**	22.04	4W= 36 dBm	PASS
11	2462	6	14.25	14.24	**17.49**	**56.13**	**4.80**	**22.29**	4W= 36 dBm	PASS
12	2467	6	12.43	11.54	15.25	**33.53**	**4.80**	**20.06**	4W= 36 dBm	PASS
13	2472	6	3.07	3.54	6.56	4.53	**4.80**	11.36	4W= 36 dBm	PASS

802.11n_HT20M MIMO

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
1	2412	MCS8	14.04	13.97	**17.49**	**56.14**	**4.80**	**22.29**	4W= 36 dBm	PASS
6	2437	MCS8	13.88	13.85	17.35	54.35	**4.80**	22.15	4W= 36 dBm	PASS
11	2462	MCS8	13.97	14.04	**17.49**	**56.14**	**4.80**	**22.29**	4W= 36 dBm	PASS
12	2467	MCS8	12.09	11.23	15.17	**32.87**	**4.80**	**19.97**	4W= 36 dBm	PASS
13	2472	MCS8	3.01	3.26	6.62	4.60	**4.80**	11.43	4W= 36 dBm	PASS

802.11n_HT40M MIMO

CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Total Peak Output Power (mW)	Antenna Gain (dBi)	EIRP (dBm)	Limit	RESULT
			CH 0	CH 1						
3	2422	MCS8	12.57	11.51	15.99	39.74	**4.80**	20.79	4W= 36 dBm	PASS
6	2437	MCS8	13.64	13.48	**17.48**	**55.99**	**4.80**	**22.28**	4W= 36 dBm	PASS
9	2452	MCS8	8.01	6.95	11.43	13.91	**4.80**	16.23	4W= 36 dBm	PASS
10	2457	MCS8	10.81	9.76	14.24	**26.53**	**4.80**	**19.04**	4W= 36 dBm	PASS
11	2462	MCS8	1.12	0.19	4.60	2.88	**4.80**	9.40	4W= 36 dBm	PASS

**** Note:*** EIRP = Average Power + Gain

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8.6 Some channels have reduced power and were tested at the reduced power

802.11	Channel list	Power value (dBm)
b	Channel 12	16.95
	Channel 13	16.97
g	Channel 12	15.25
	Channel 13	6.56
n_HT20	Channel 12	15.17
	Channel 13	6.62
n_HT40	Channel 3	15.99
	Channel 9	11.43
	Channel 10	14.24
	Channel 11	4.60

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9 6DB & 99% BANDWIDTH MEASUREMENT

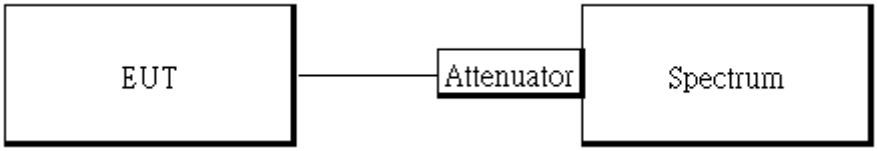
9.1 Standard Applicable

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.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
DC Block	PASTERNACK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

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 = 30M/50MHz, Detector=peak, Sweep=auto.
5. Mark the peak frequency and –6dB (upper and lower) frequency.
6. For 99% Bandwidth:

   Set the spectrum analyzer as RBW=1%, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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9.5 Measurement Result

6dB Bandwidth

802.11b Chain0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	8076.00	> 500	PASS
2437	7582.00	> 500	PASS
2462	8560.00	> 500	PASS
2467	**8576.00**	> 500	PASS
2472	8091.00	> 500	PASS

802.11b Chain1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	8066.00	> 500	PASS
2437	7585.00	> 500	PASS
2462	8556.00	> 500	PASS
2467	**8569.00**	> 500	PASS
2472	8556.00	> 500	PASS

802.11g Chain0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**16270.00**	> 500	PASS
2437	15930.00	> 500	PASS
2462	15970.00	> 500	PASS
2467	15750.00	> 500	PASS
2472	**15930.00**	> 500	PASS

802.11g Chain1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**16300.00**	> 500	PASS
2437	16070.00	> 500	PASS
2462	15730.00	> 500	PASS
2467	15750.00	> 500	PASS
2472	**15760.00**	> 500	PASS

802.11_n_HT20 Chain0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	**16800.00**	> 500	PASS
2437	16670.00	> 500	PASS
2462	16550.00	> 500	PASS
2467	16110.00	> 500	PASS
2472	**16380.00**	> 500	PASS

802.11_n_HT20 Chain1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16580.00	> 500	PASS
2437	**16650.00**	> 500	PASS
2462	16110.00	> 500	PASS
2467	**16380.00**	> 500	PASS
2472	16360.00	> 500	PASS

802.11_n_HT40 Chain0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	35480.00	> 500	PASS
2437	35480.00	> 500	PASS
2452	35470.00	> 500	PASS
2457	**35490.00**	> 500	PASS
2462	35460.00	> 500	PASS

802.11_n_HT40 Chain1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	**35490.00**	> 500	PASS
2437	35170.00	> 500	PASS
2452	35350.00	> 500	PASS
2457	**35360.00**	> 500	PASS
2462	35130.00	> 500	PASS

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99% Bandwidth

802.11b Chain0		802.11b Chain1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	13.076	2412	13.071
2437	12.848	2437	12.850
2462	13.265	2462	13.266
2467	**13.325**	2467	**13.325**
2472	13.298	2472	13.299

802.11g Chain0		802.11g Chain1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	**16.514**	2412	**16.506**
2437	16.502	2437	16.500
2462	16.484	2462	16.485
2467	**16.481**	2467	**16.483**
2472	16.480	2472	16.432

802.11n_HT20M Chain0		802.11n_HT20M Chain1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2412	**17.649**	2412	**17.650**
2437	17.613	2437	17.608
2462	17.631	2462	17.623
2467	**17.627**	2467	**17.607**
2472	17.587	2472	17.596

802.11n_HT40M Chain0		802.11n_HT40M Chain1	
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)
2422	**36.314**	2422	**36.320**
2437	36.188	2437	36.155
2452	36.122	2452	36.121
2457	36.138	2457	36.126
2462	**36.142**	2462	**36.152**

*Refer to next page for plots

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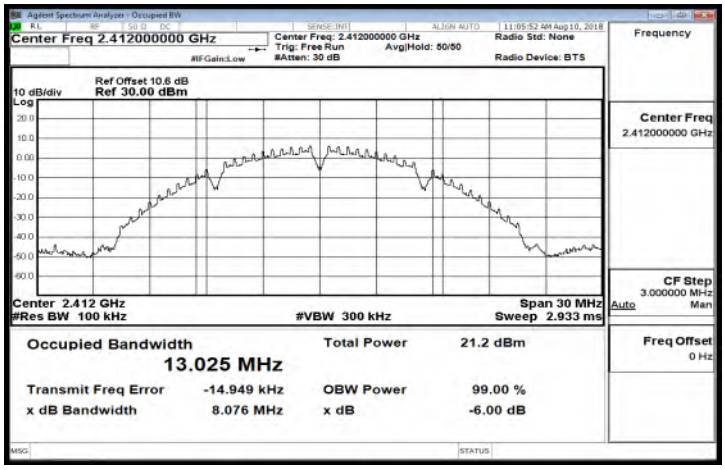
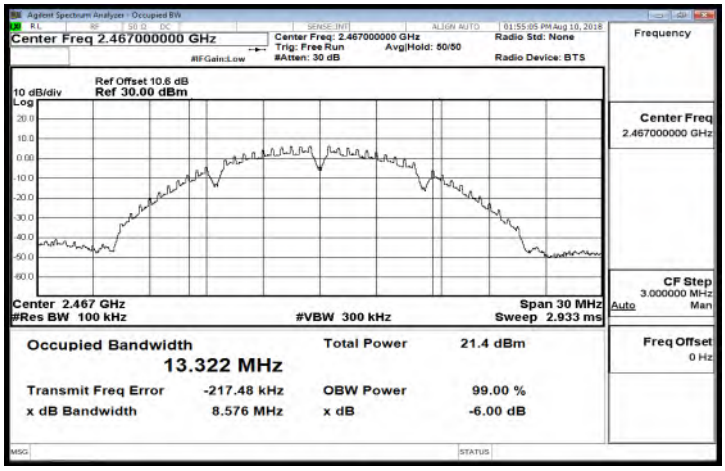
802.11b (CH0)

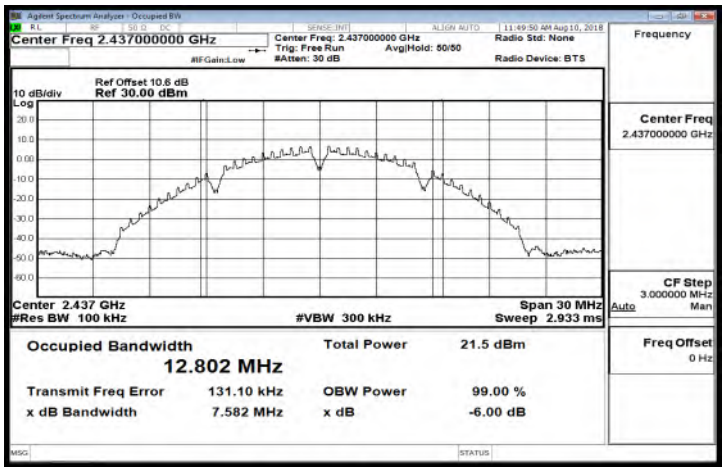
6dB Band Width Test Data CH-Low



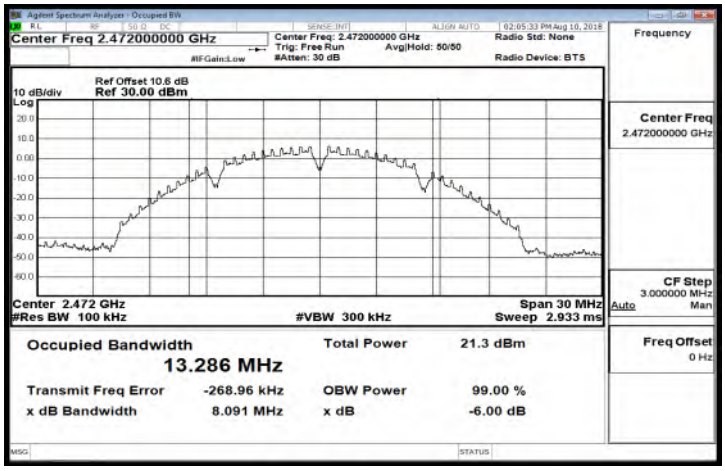
6dB Band Width Test Data CH-High 2467MHz



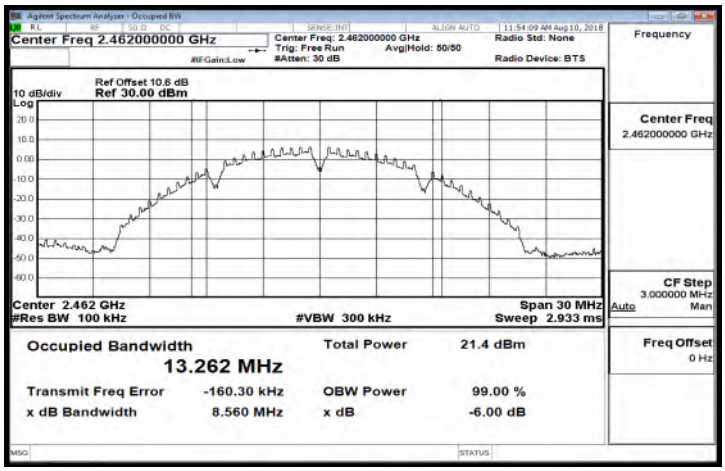
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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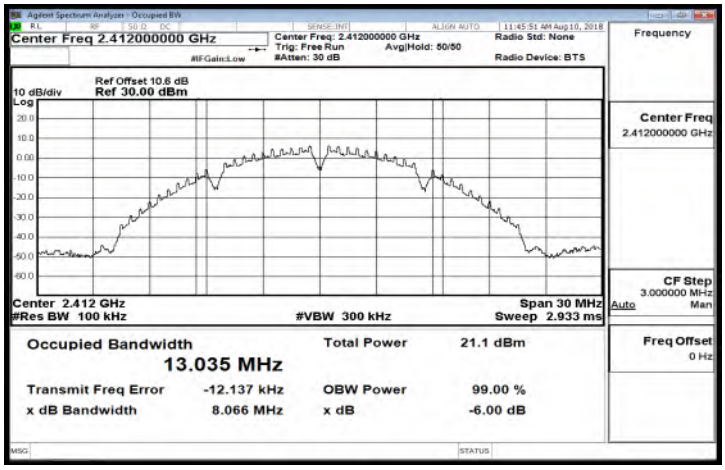
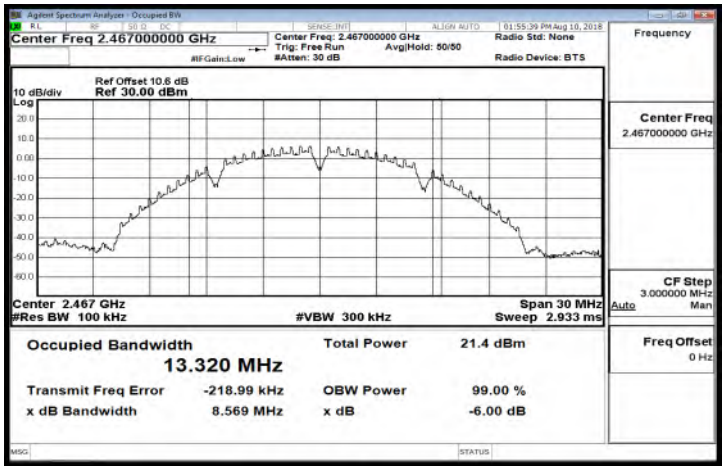
802.11b (CH1)

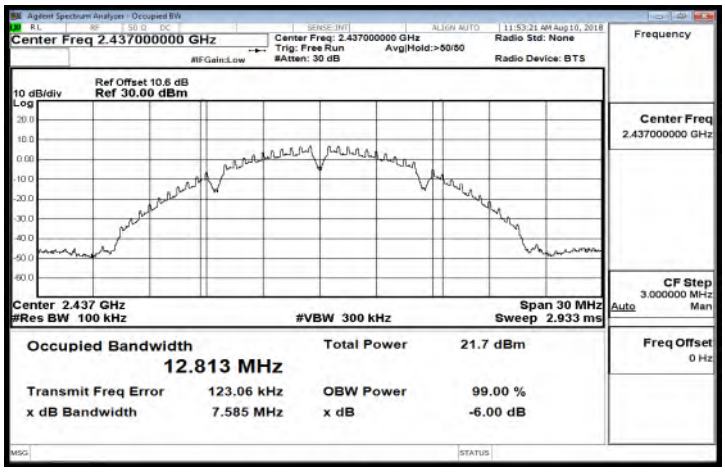
6dB Band Width Test Data CH-Low



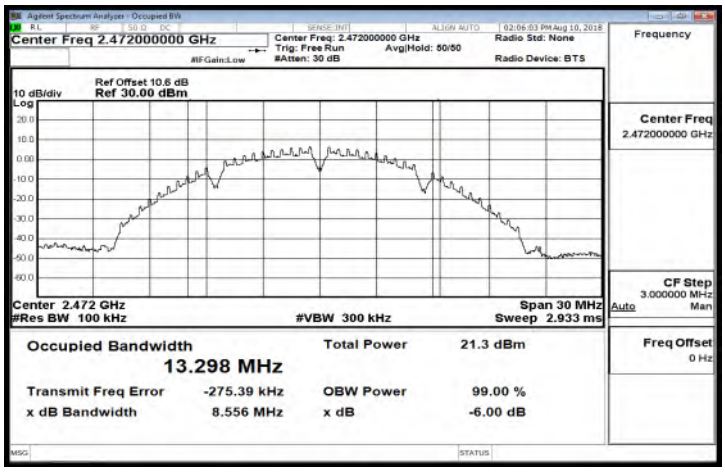
6dB Band Width Test Data CH-High 2467MHz



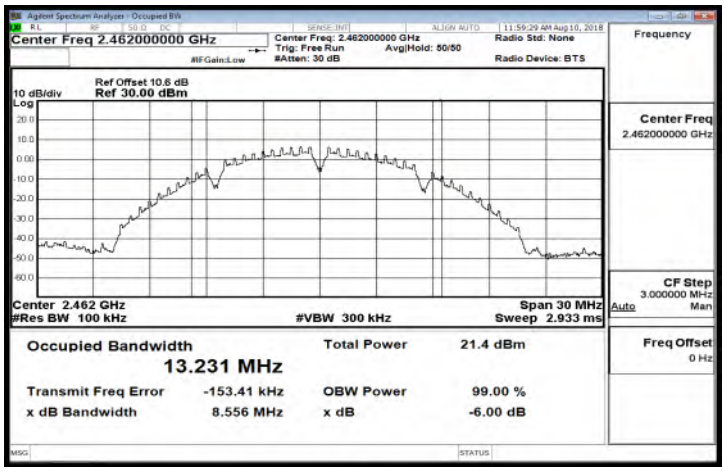
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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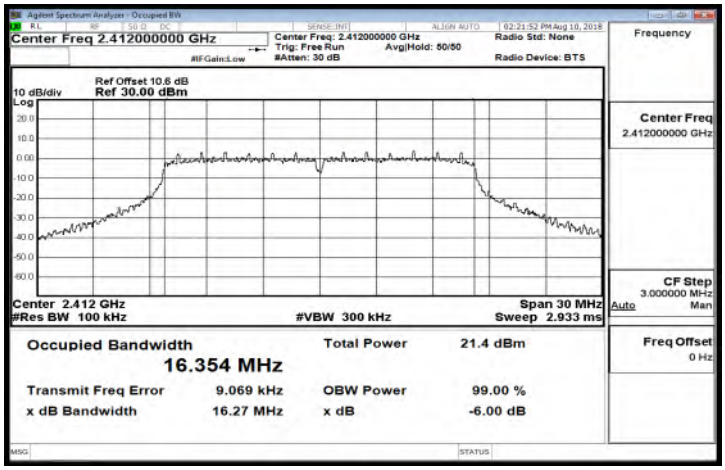
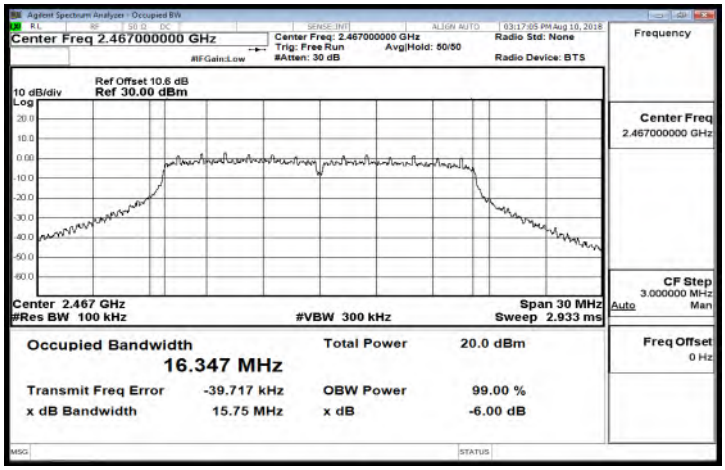
802.11g (CH0)

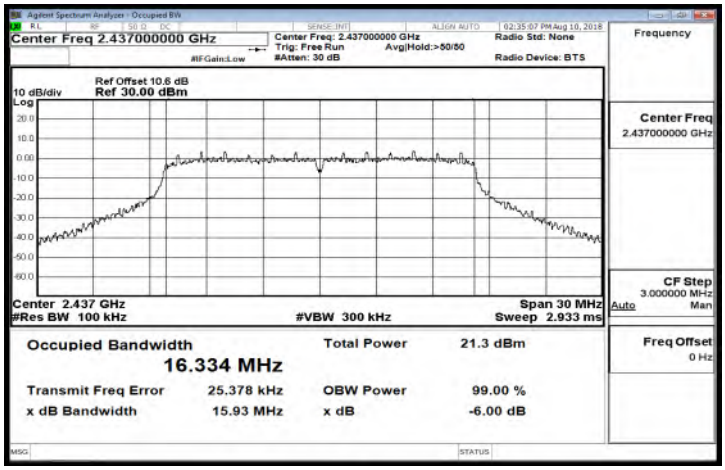
6dB Band Width Test Data CH-Low



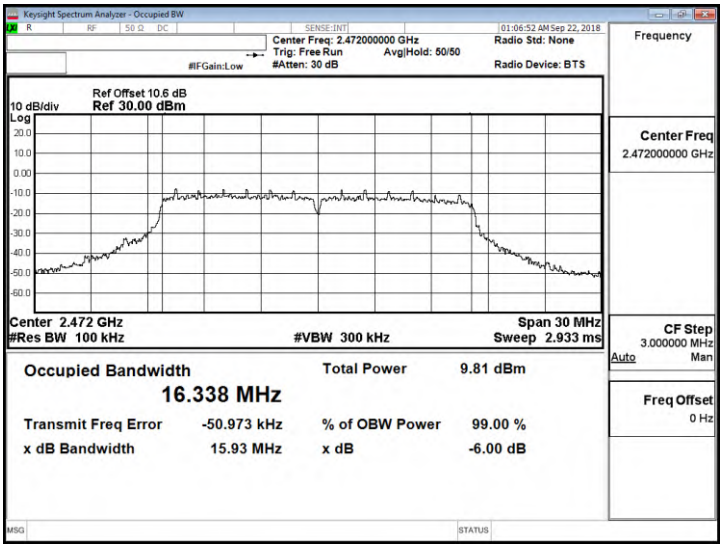
6dB Band Width Test Data CH-High 2467MHz



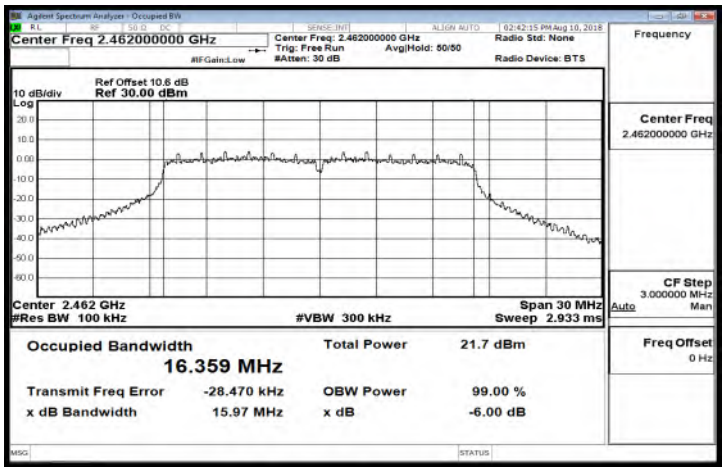
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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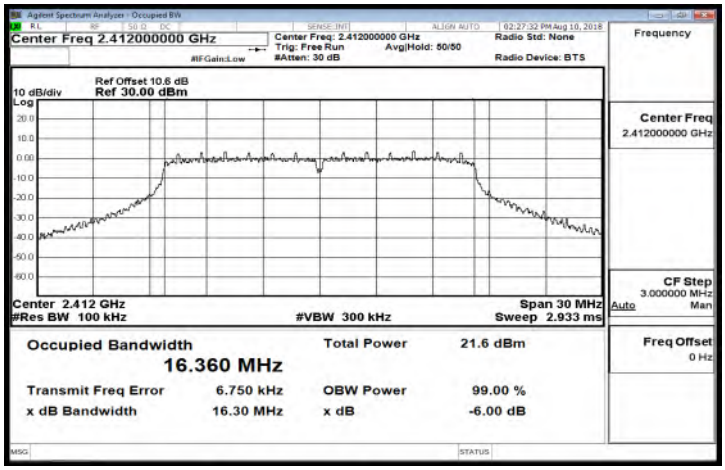
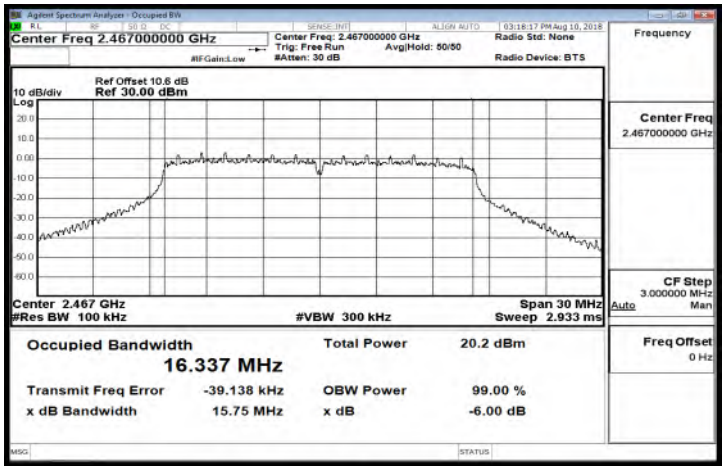
802.11g (CH1)

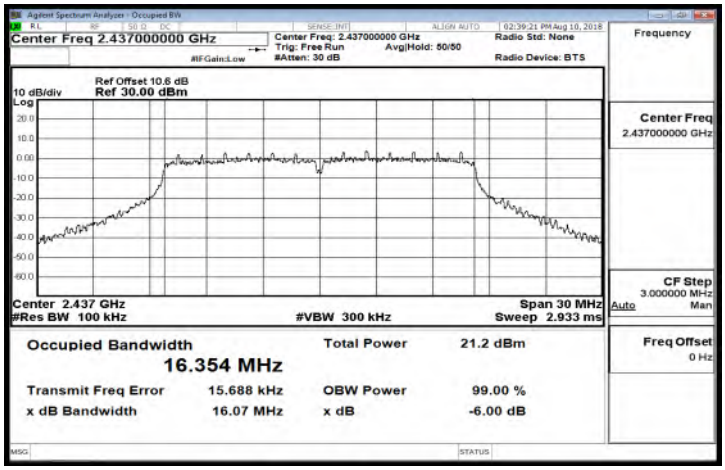
6dB Band Width Test Data CH-Low



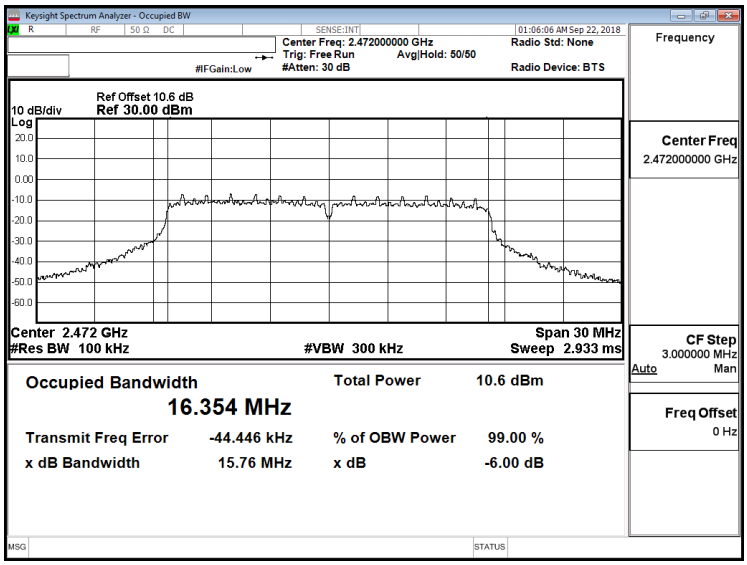
6dB Band Width Test Data CH-High 2467MHz



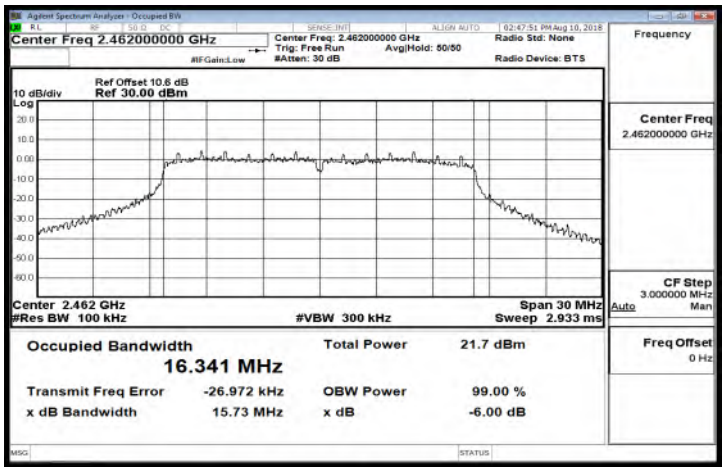
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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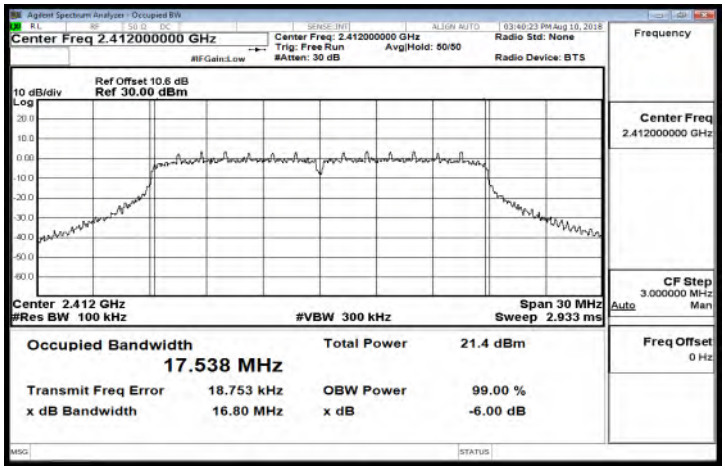
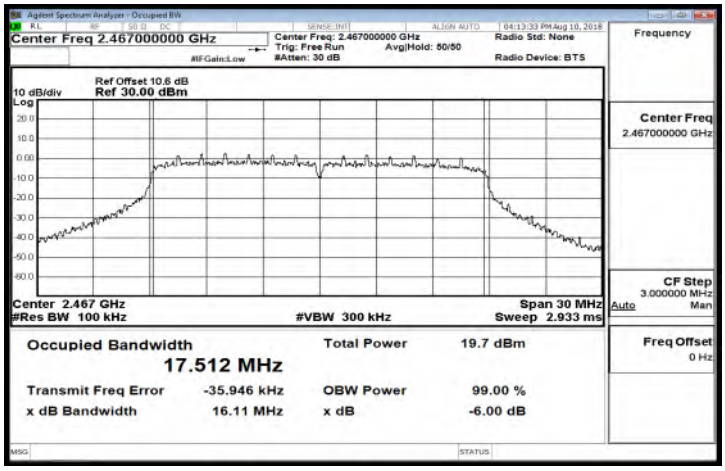
802.11n_20M (CH0)

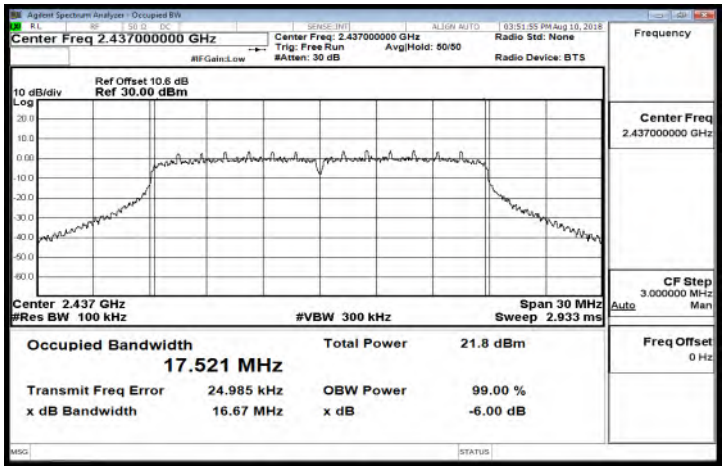
6dB Band Width Test Data CH-Low



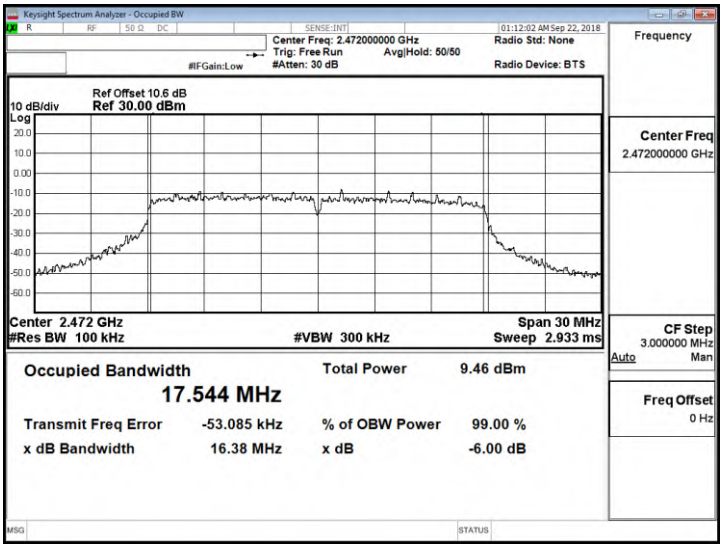
6dB Band Width Test Data CH-High 2467MHz



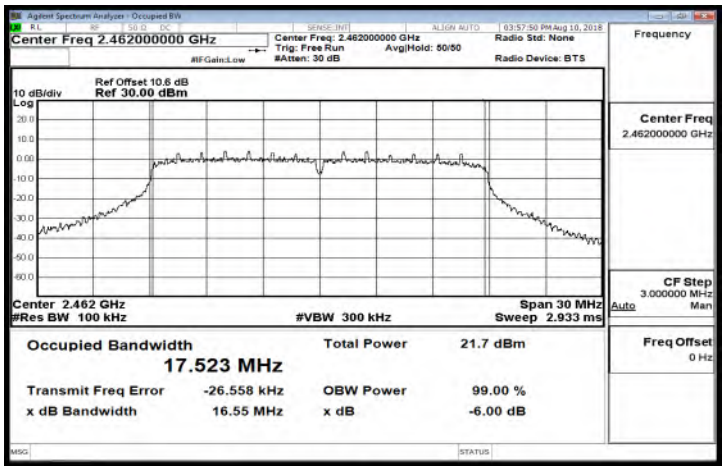
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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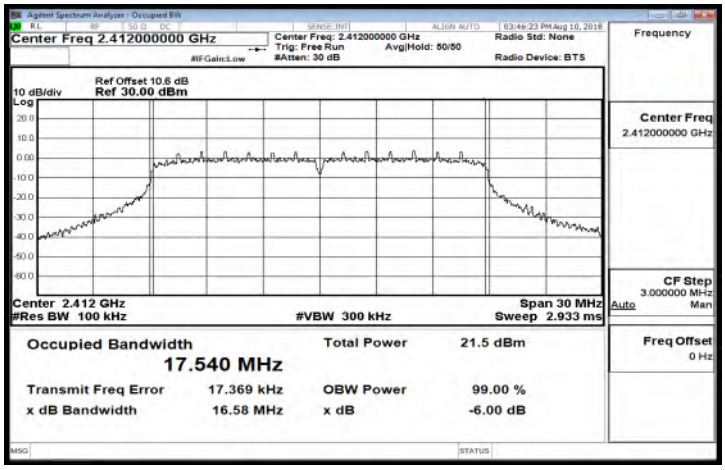
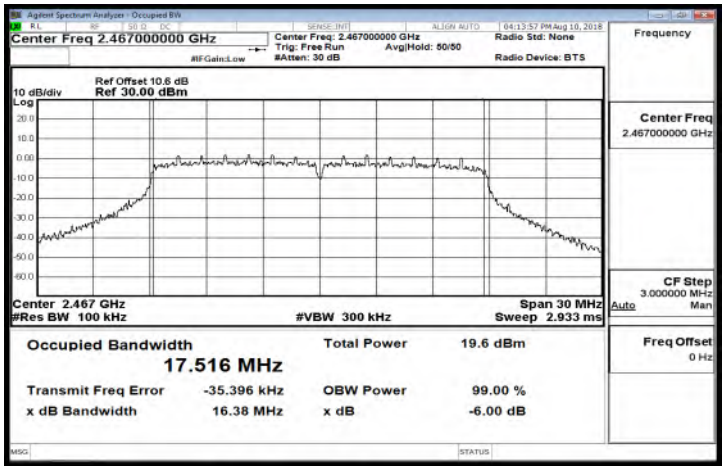
802.11n_20M (CH1)

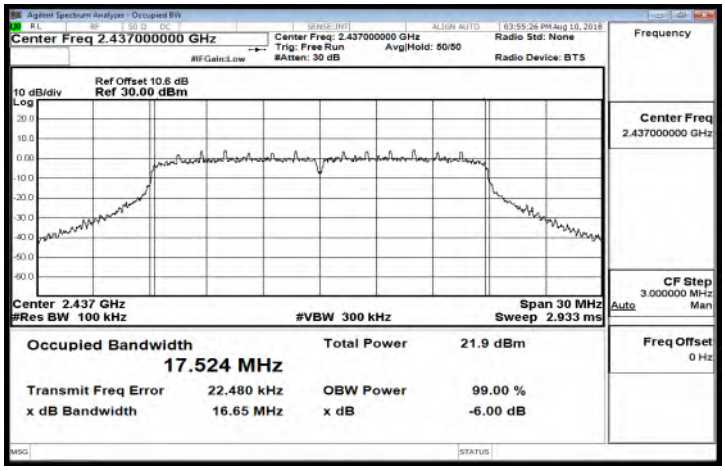
6dB Band Width Test Data CH-Low



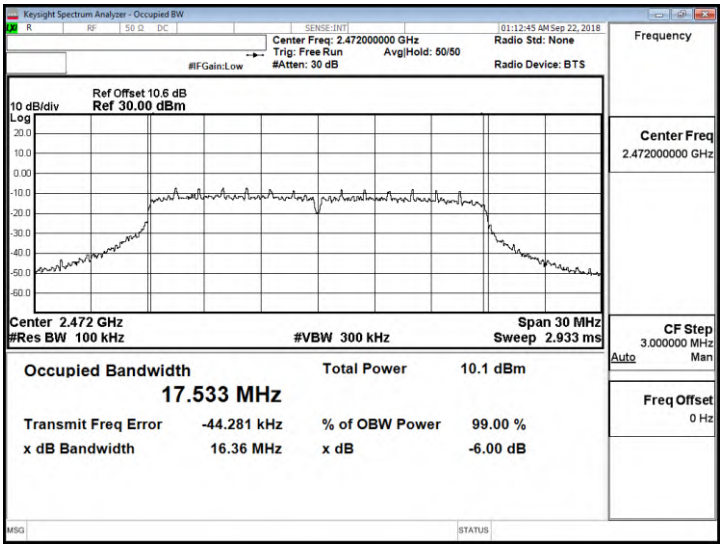
6dB Band Width Test Data CH-High 2467MHz



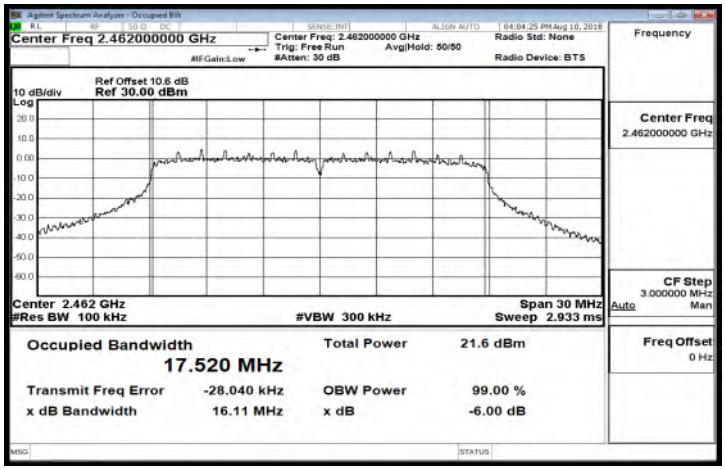
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2472MHz



6dB Band Width Test Data CH-High



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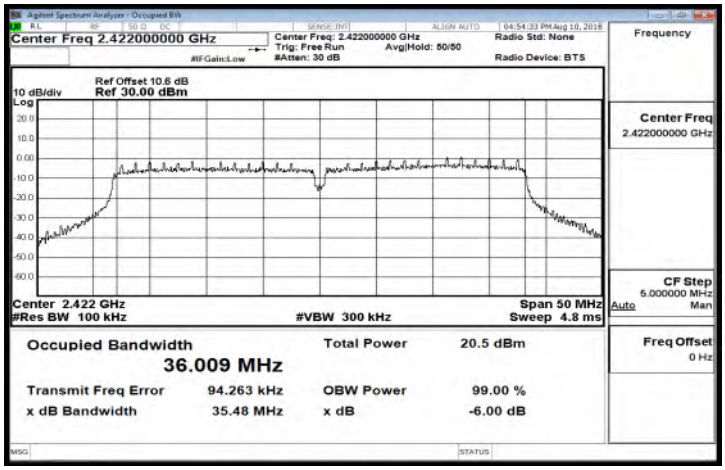
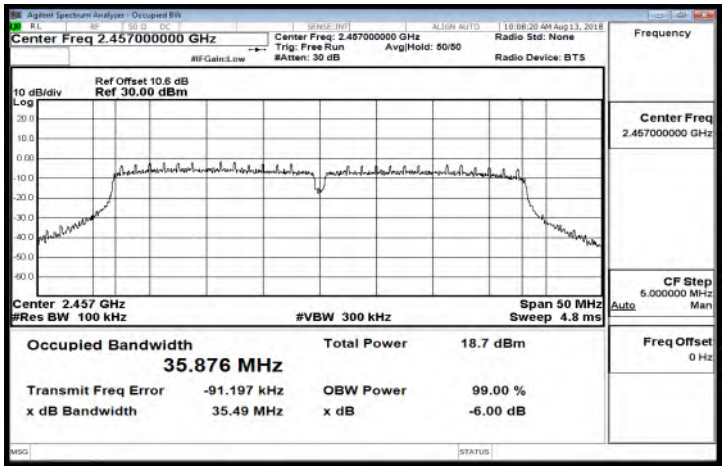
802.11n_40M (CH0)

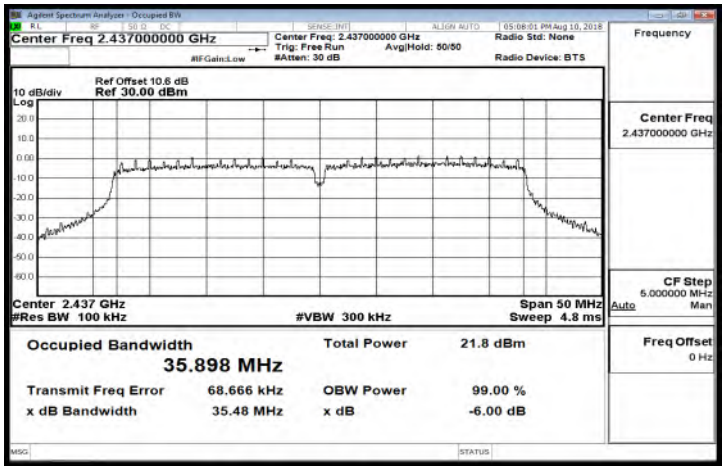
6dB Band Width Test Data CH-Low



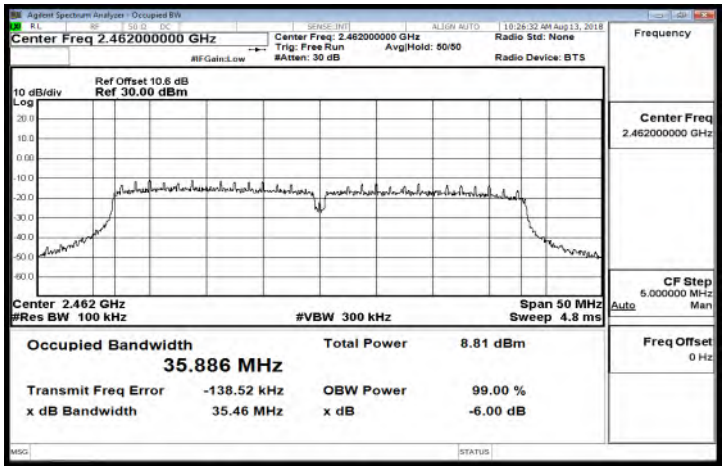
6dB Band Width Test Data CH-High 2457MHz



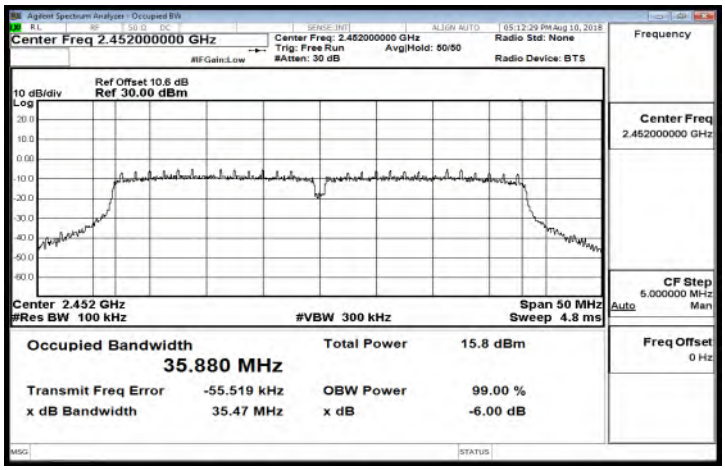
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2462MHz



6dB Band Width Test Data CH-High



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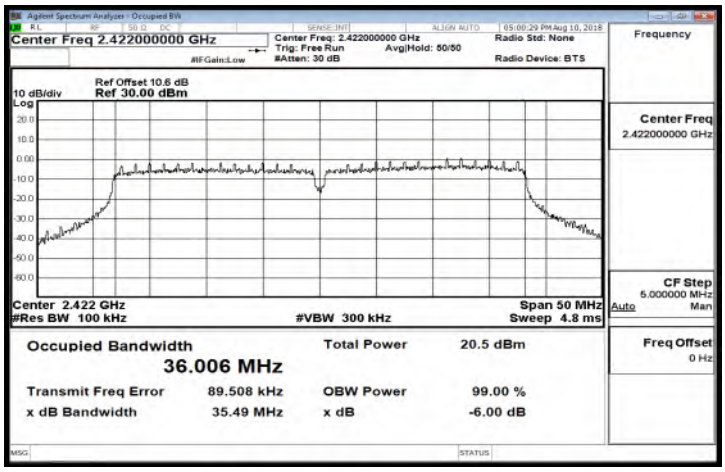
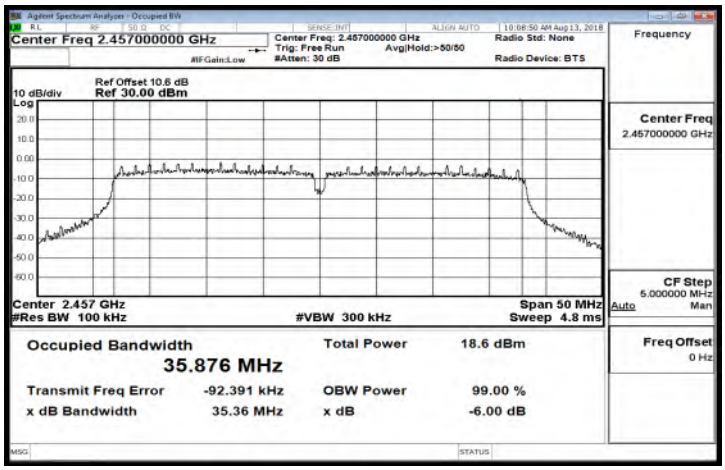
802.11n_40M (CH1)

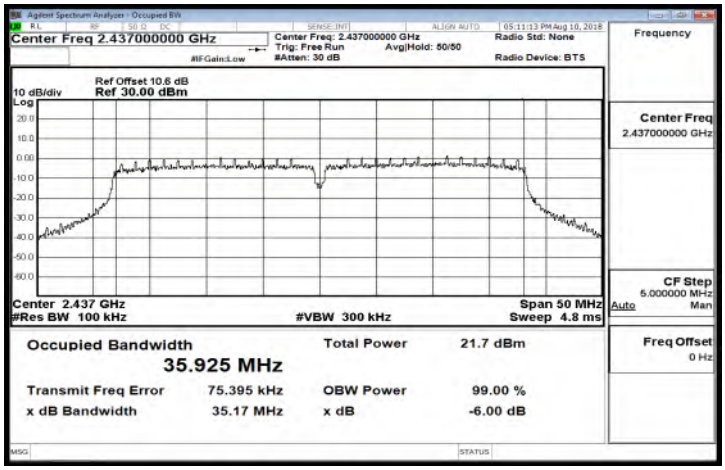
6dB Band Width Test Data CH-Low



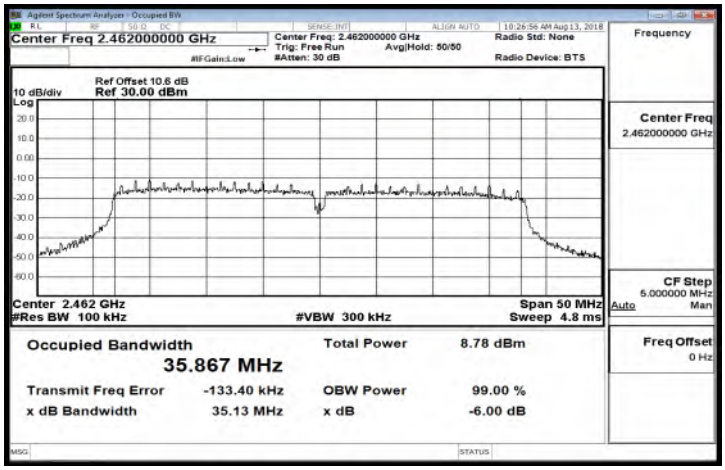
6dB Band Width Test Data CH-High 2457MHz



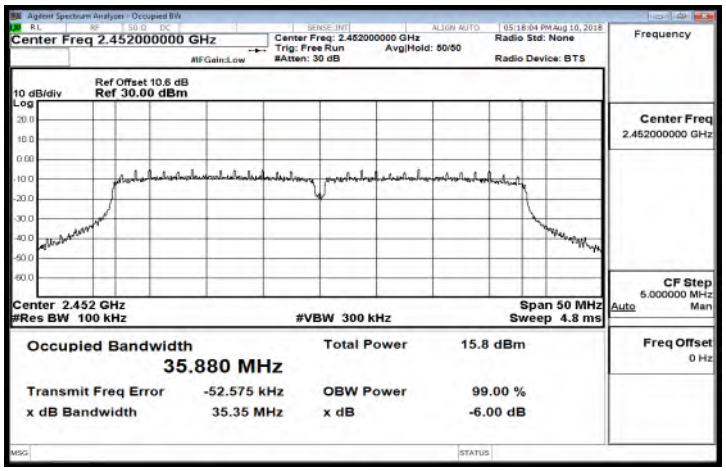
6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High 2462MHz



6dB Band Width Test Data CH-High



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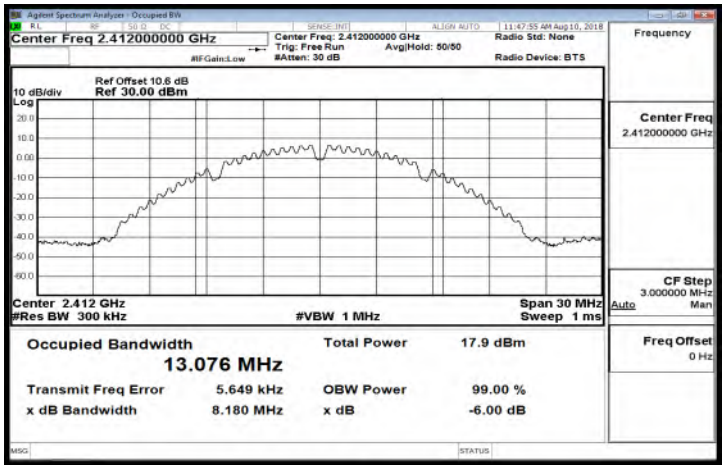
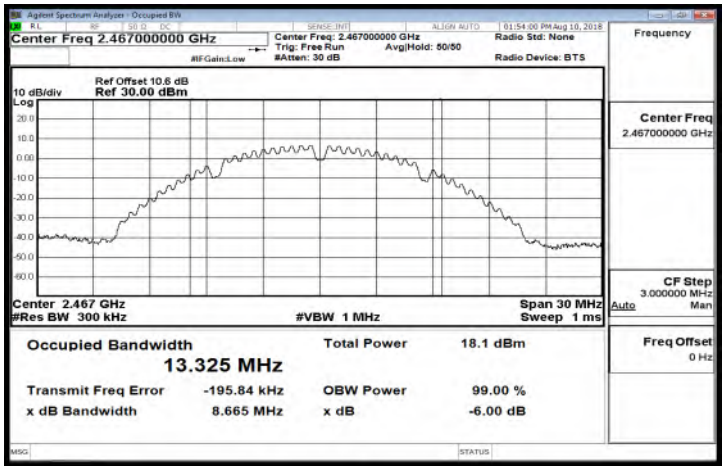
802.11b (CH0)

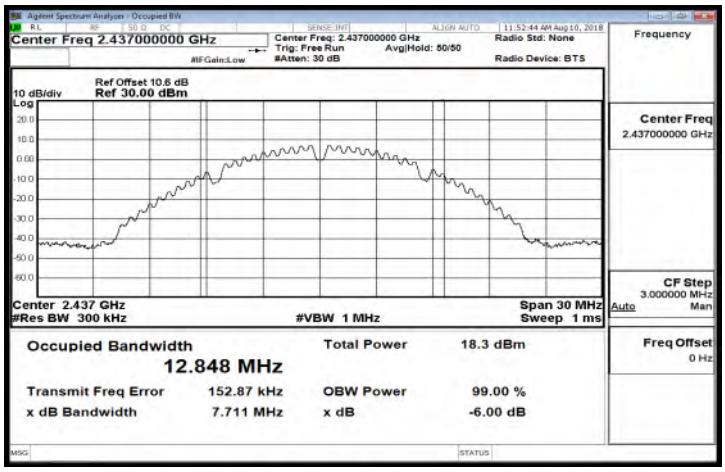
99% Band Width Test Data CH-Low



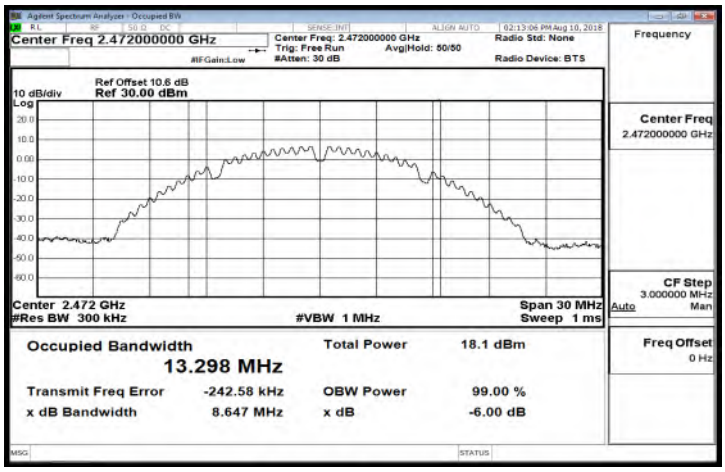
99% Band Width Test Data CH-High 2467MHz



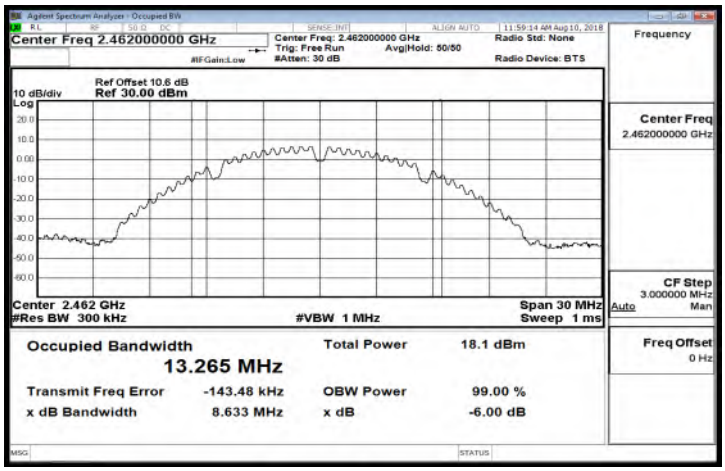
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2472MHz



99% Band Width Test Data CH-High



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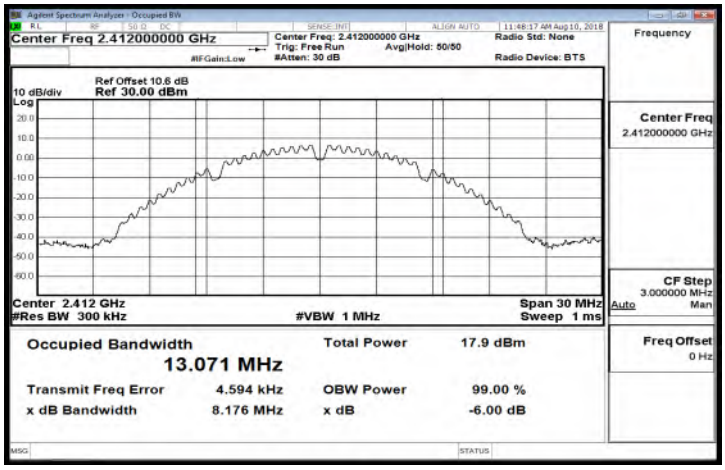
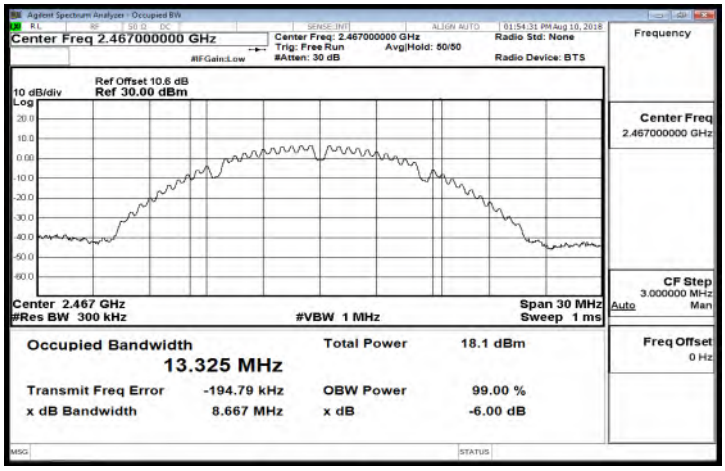
802.11b (CH1)

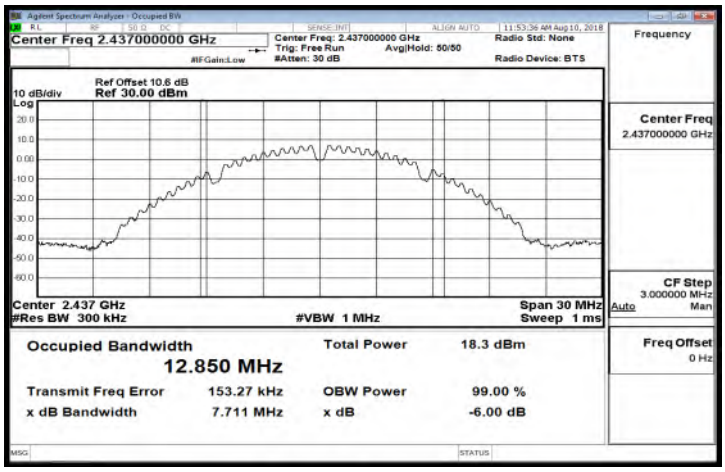
99% Band Width Test Data CH-Low



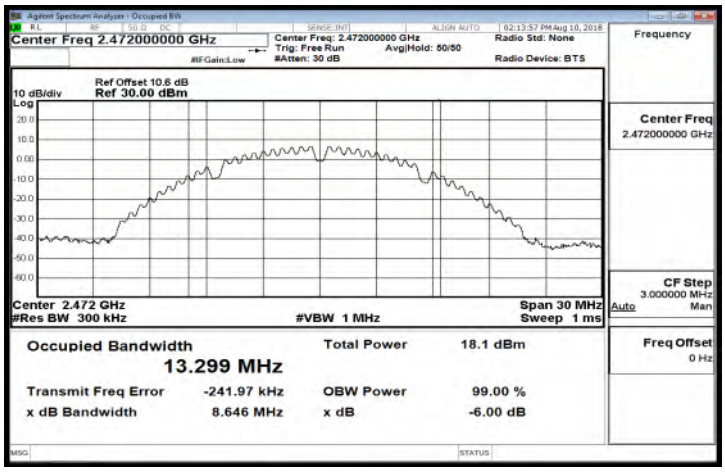
99% Band Width Test Data CH-High 2467MHz



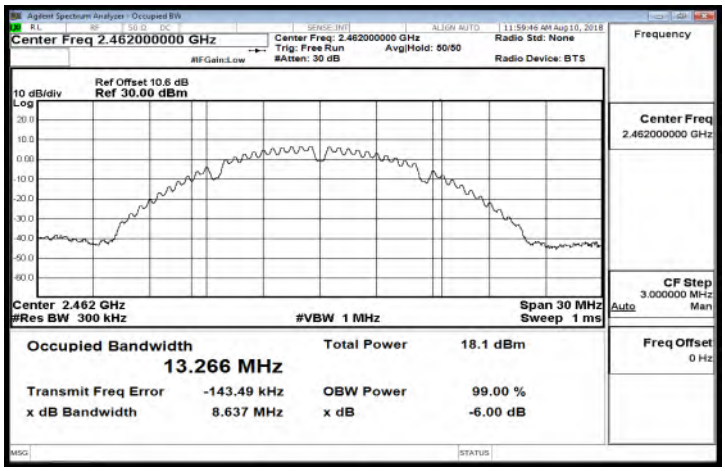
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2472MHz



99% Band Width Test Data CH-High



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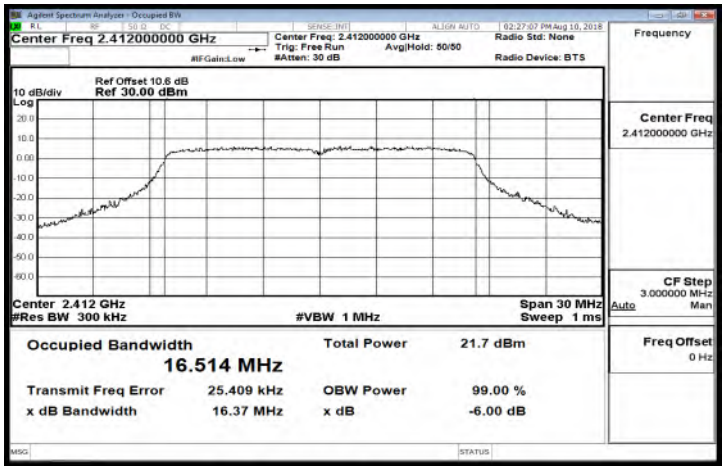
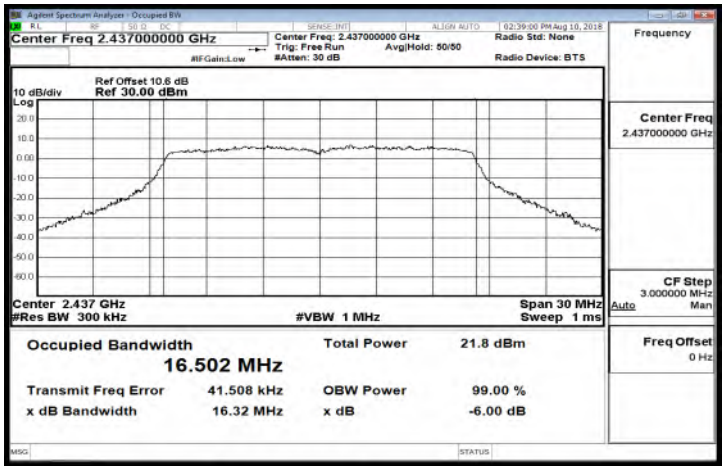
802.11g (CH0)

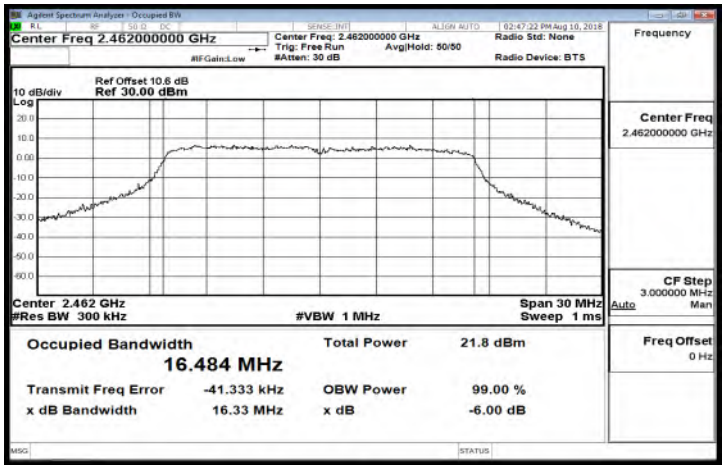
99% Band Width Test Data CH-Low



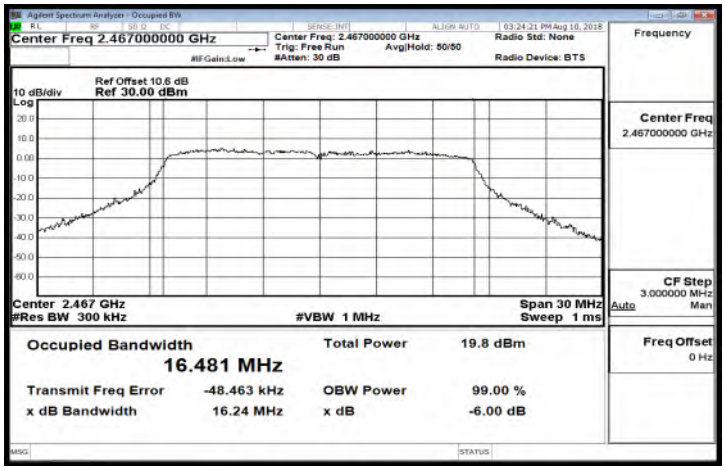
99% Band Width Test Data CH-Mid



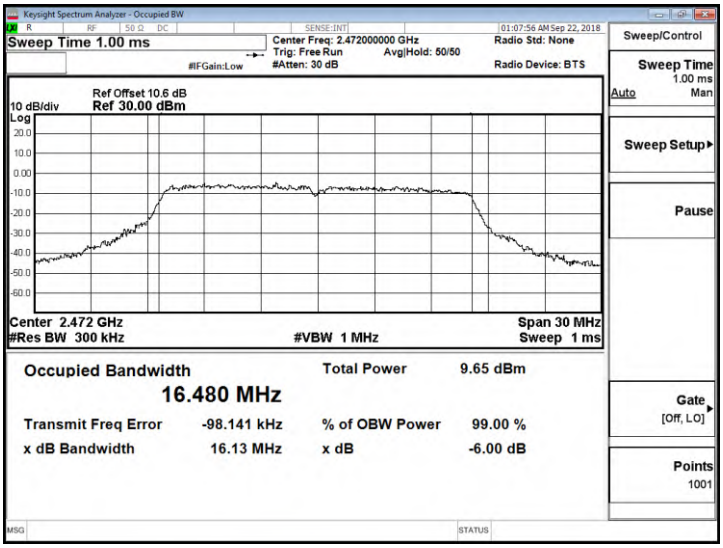
99% Band Width Test Data CH-High



99% Band Width Test Data CH-High 2467MHz



99% Band Width Test Data CH-High 2472MHz



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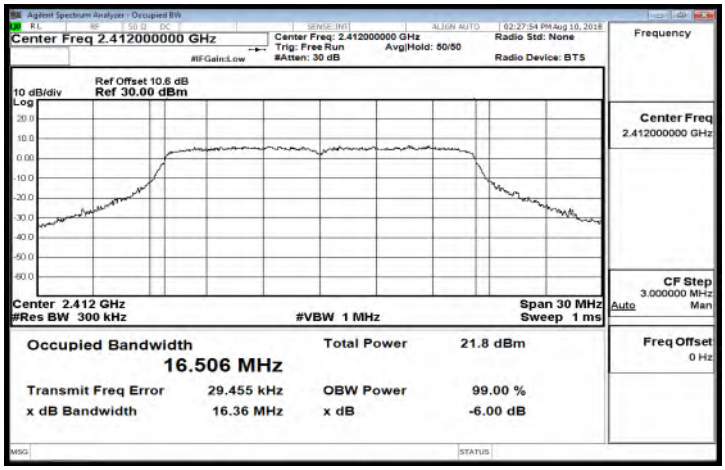
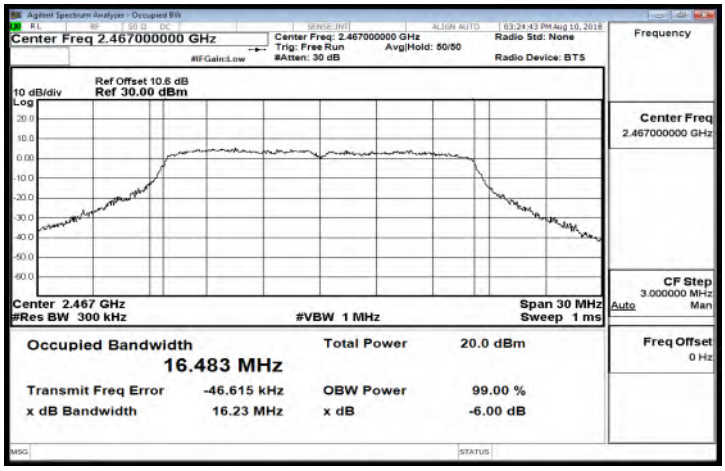
802.11g (CH1)

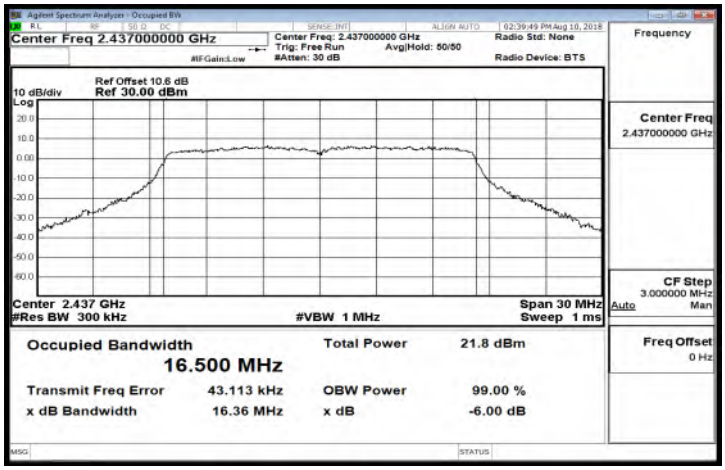
99% Band Width Test Data CH-Low



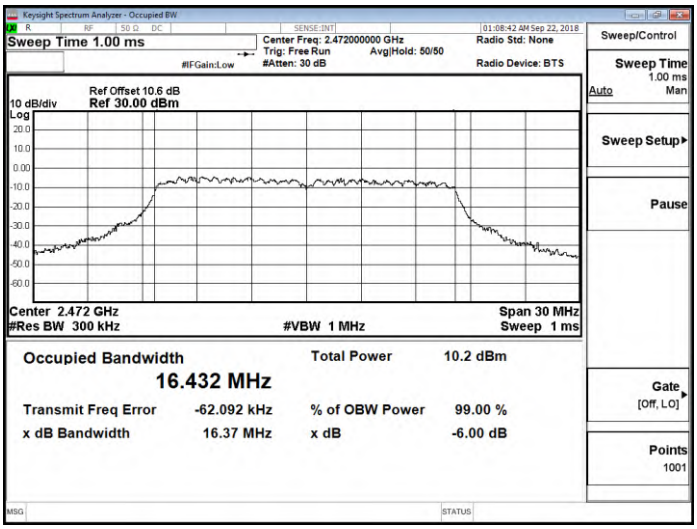
99% Band Width Test Data CH-High 2467MHz



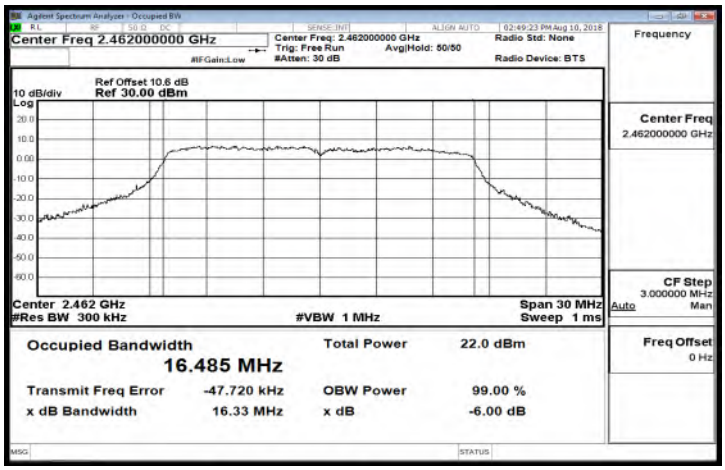
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2472MHz



99% Band Width Test Data CH-High



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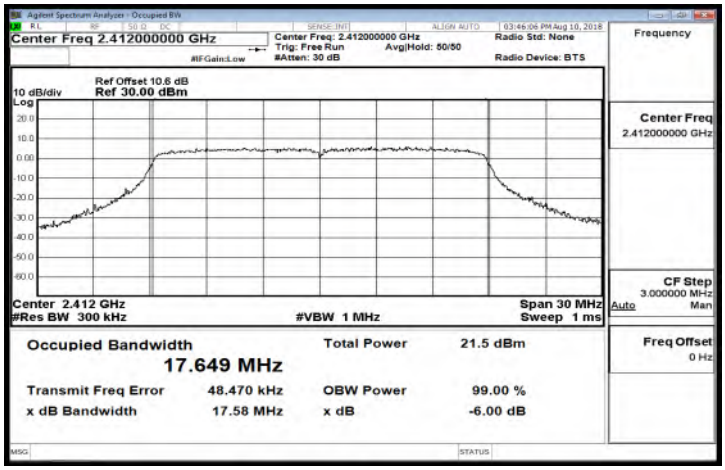
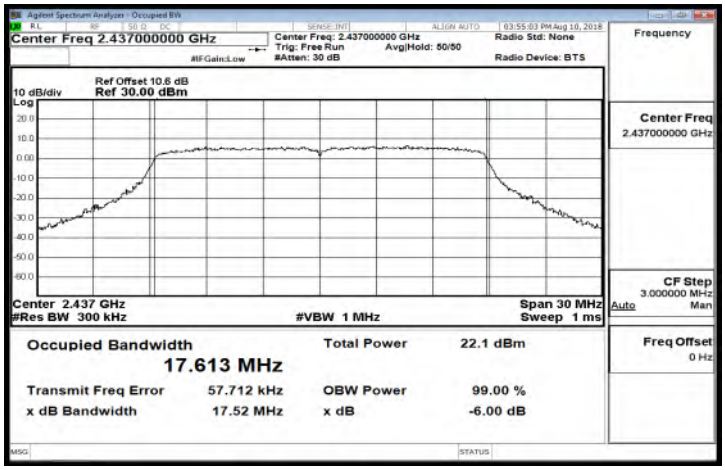
802.11n_20M (CH0)

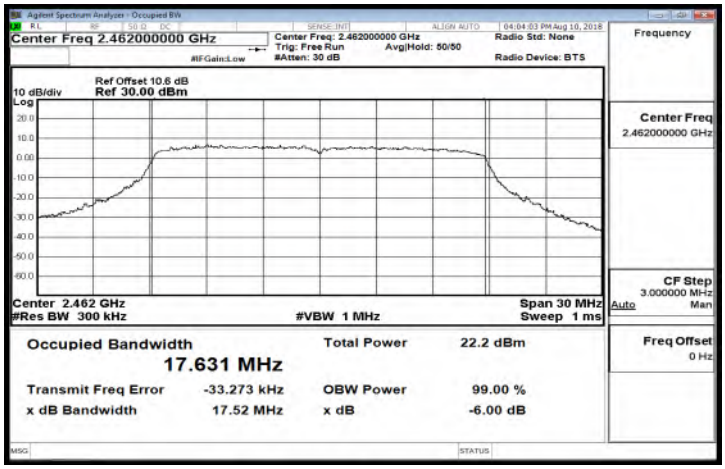
99% Band Width Test Data CH-Low



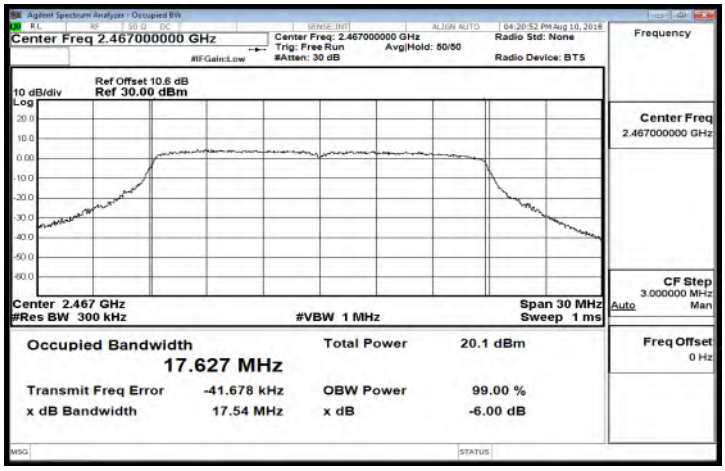
99% Band Width Test Data CH-Mid



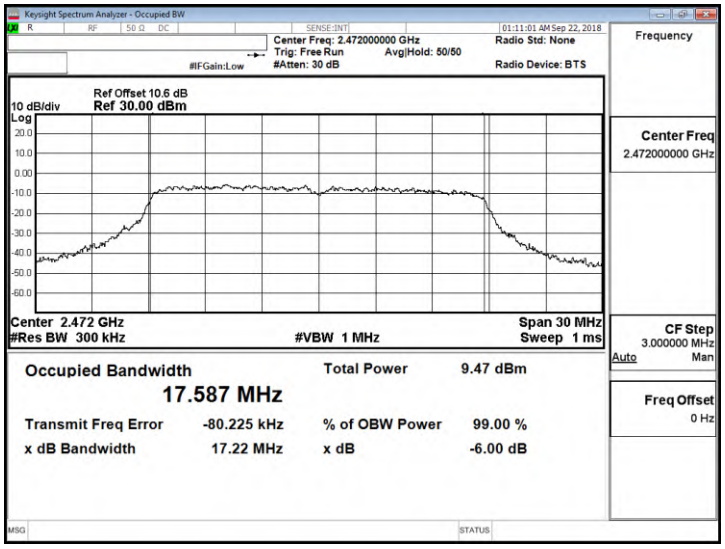
99% Band Width Test Data CH-High



99% Band Width Test Data CH-High 2467MHz



99% Band Width Test Data CH-High 2472MHz



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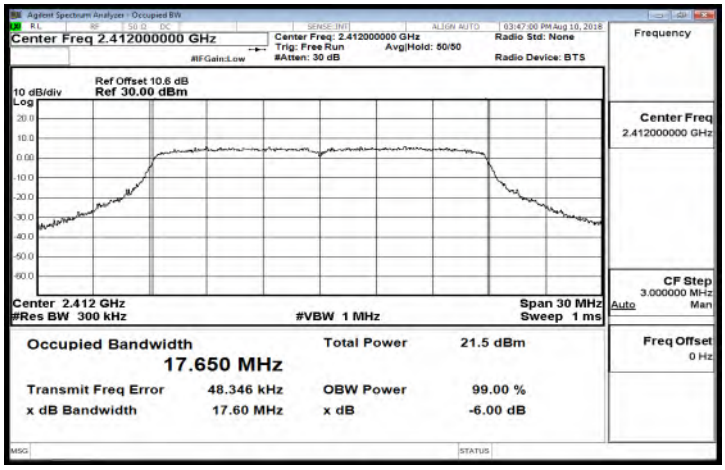
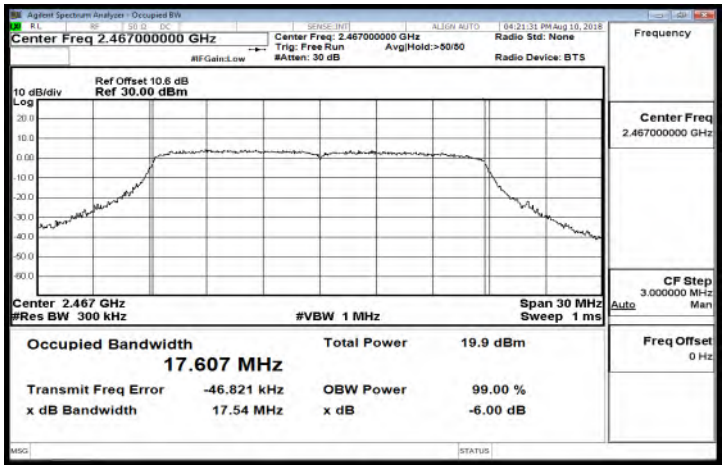
802.11n_20M (CH1)

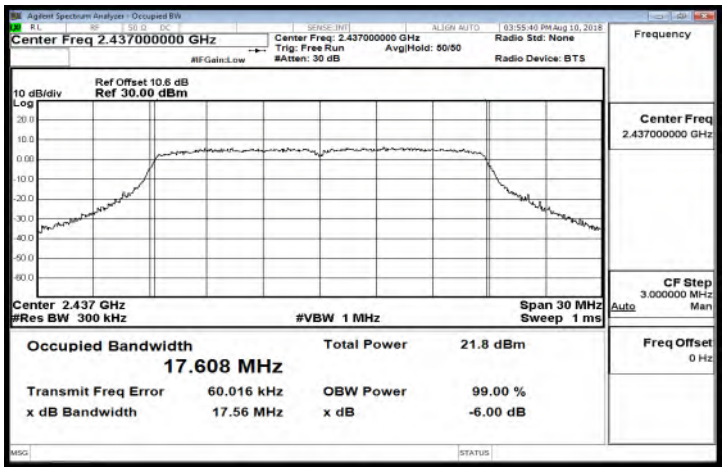
99% Band Width Test Data CH-Low



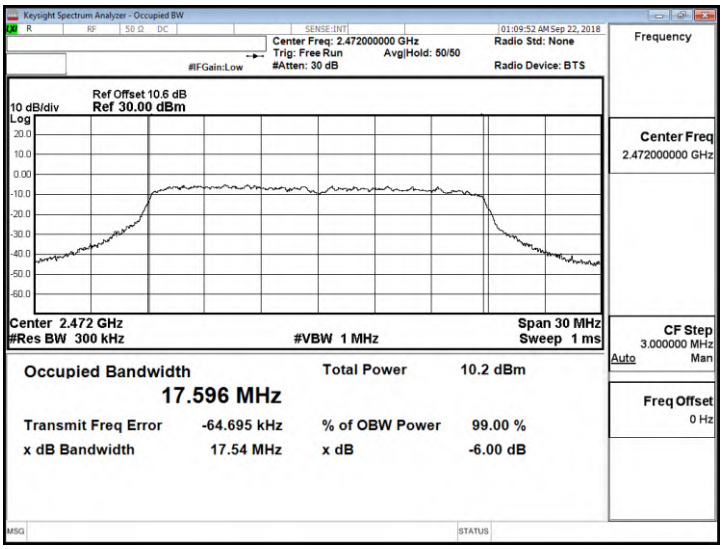
99% Band Width Test Data CH-High 2467MHz



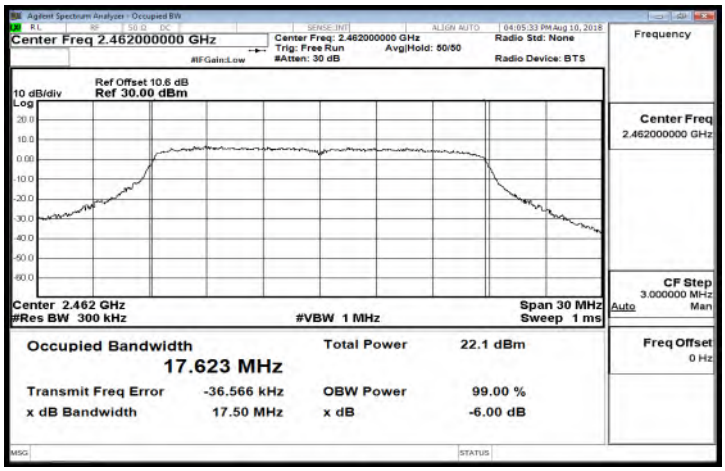
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2472MHz



99% Band Width Test Data CH-High



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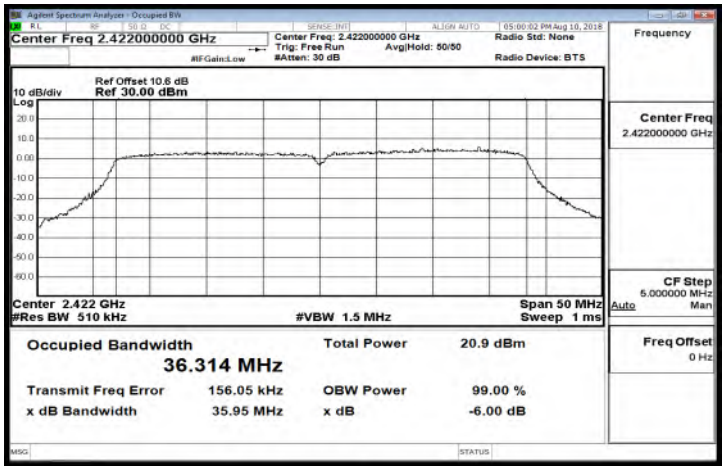
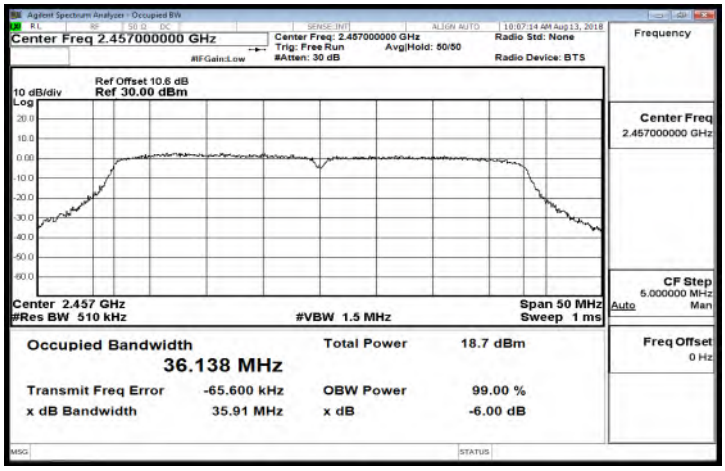
802.11n_40M (CH0)

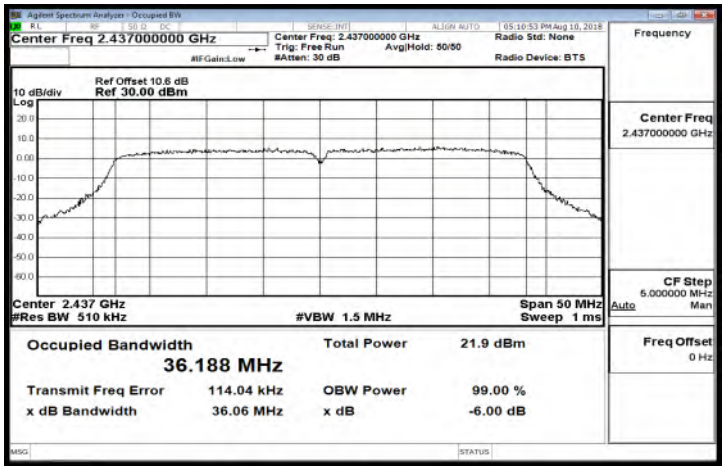
99% Band Width Test Data CH-Low



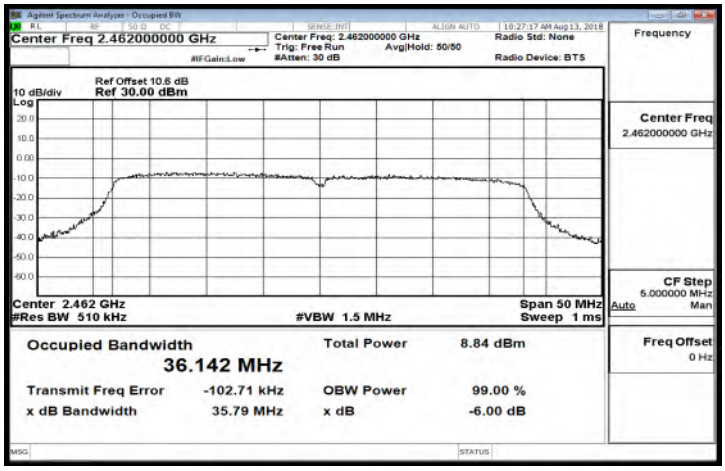
99% Band Width Test Data CH-High 2457MHz



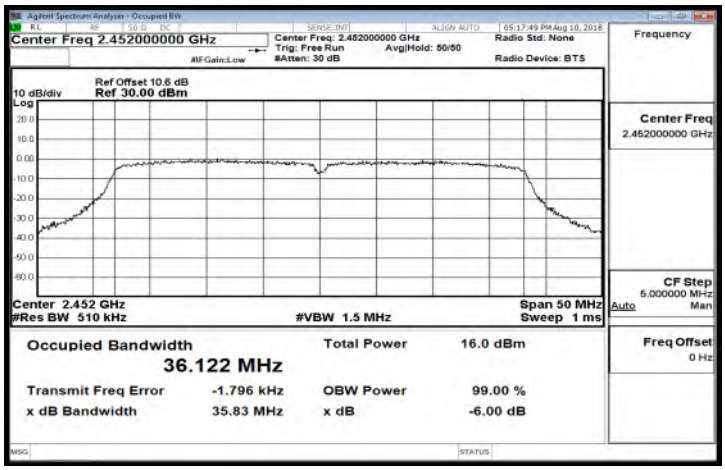
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2462MHz



99% Band Width Test Data CH-High



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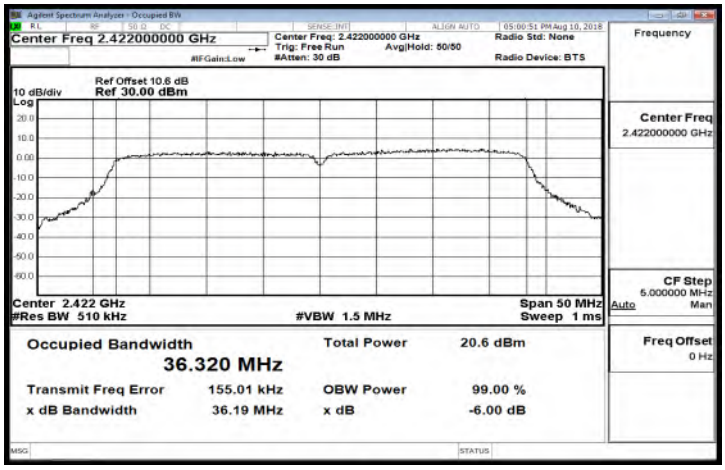
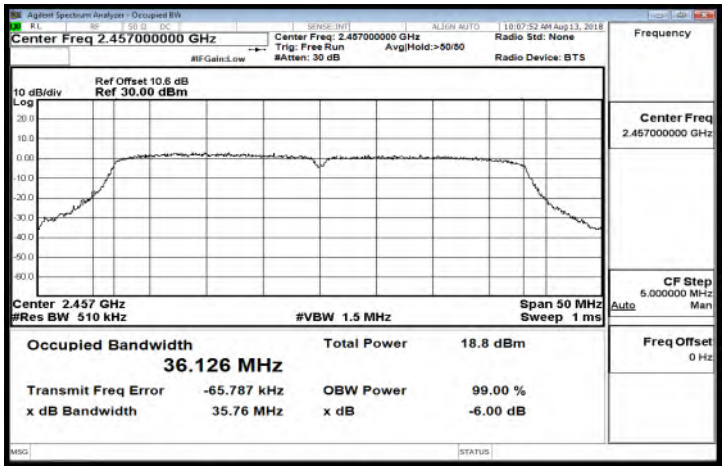
802.11n_40M (CH1)

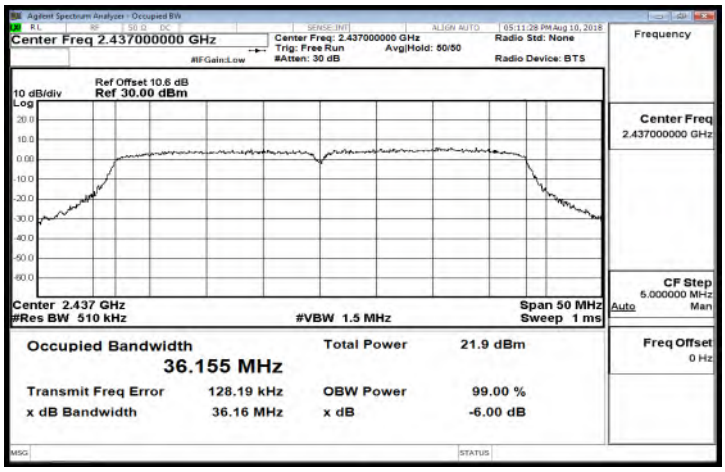
99% Band Width Test Data CH-Low



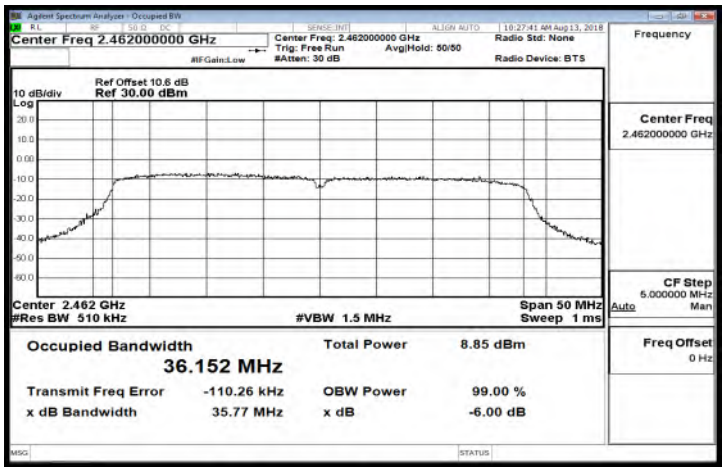
99% Band Width Test Data CH-High 2457MHz



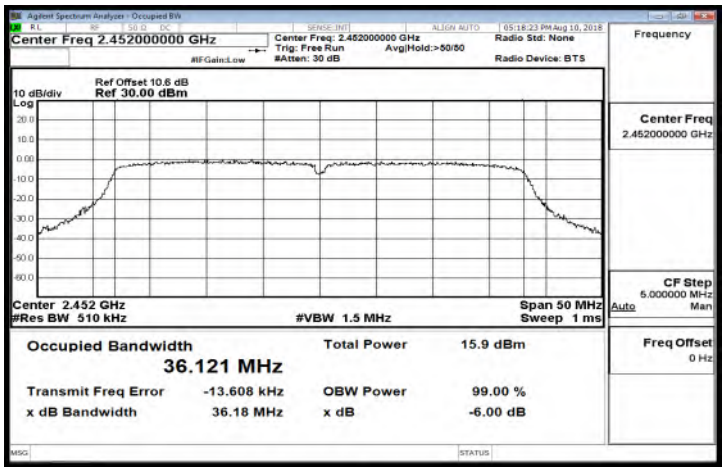
99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High 2462MHz



99% Band Width Test Data CH-High



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10 CONDUCTED BAND EDGE 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.

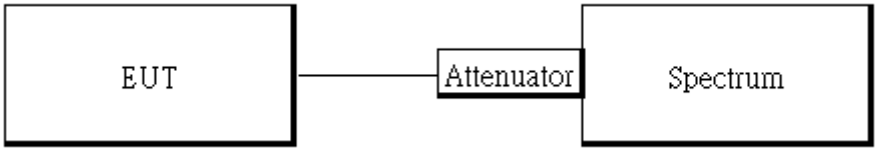
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.8.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

10.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
DC Block	PASTERNACK	PE8210	RF29	2017/12/26	2018/12/25
Notebook	Lenovo	L420	S0011721	N/A	N/A

10.3 Test SET-UP



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10.4Measurement Procedure

Conducted Band Edge Reference Level Measurement Procedure

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.
9. 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.
7. 802.11n MIMO mode: offset is set following “measure and add 10 Log (N)” on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application for the test of PSD at MIMO mode, the highest emission of worst case is employing.

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10.5Measurement Result

Reference Level of Limit 802.11b mode			Reference Level of Limit 802.11g mode		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	9.050	-10.95	2412	6.760	-13.24
2437	9.819	-10.18	2437	6.536	-13.46
2462	9.300	-10.70	2462	7.020	-12.98
2467	8.990	-11.01	2467	5.810	-14.19
2472	9.250	-10.75	2472	-2.741	-22.74

Reference Level of Limit 802.11n20 mode			Reference Level of Limit 802.11n40 MODE		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)	Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	6.620	-13.38	2422	2.850	-17.15
2437	7.450	-12.55	2437	3.834	-16.17
2462	7.020	-12.98	2452	-1.818	-21.82
2467	4.920	-15.08	2457	1.036	-18.96
2472	-2.511	-22.51	2462	-8.421	-28.42

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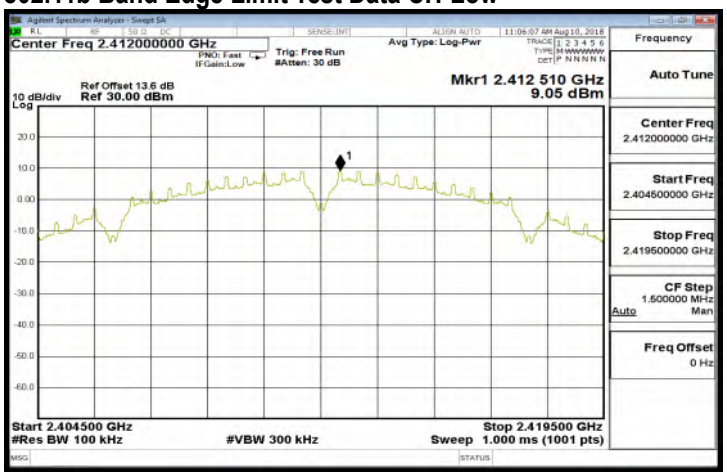
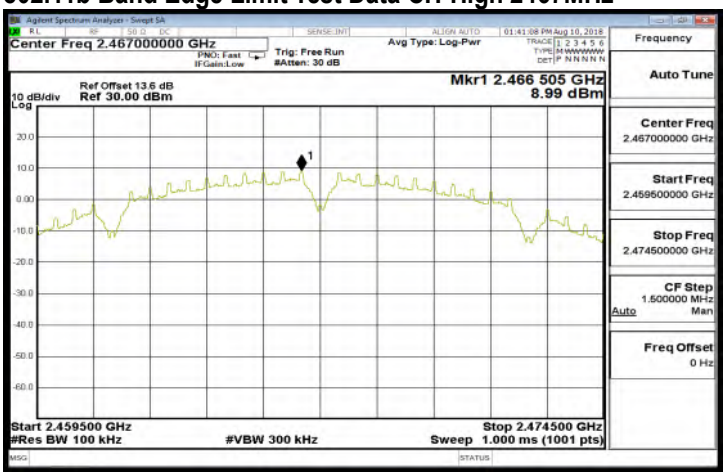
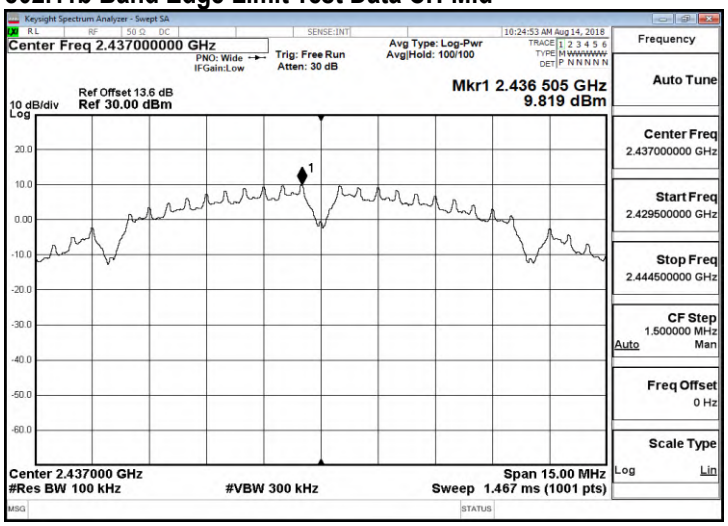
802.11b Band Edge Limit Test Data CH-Low



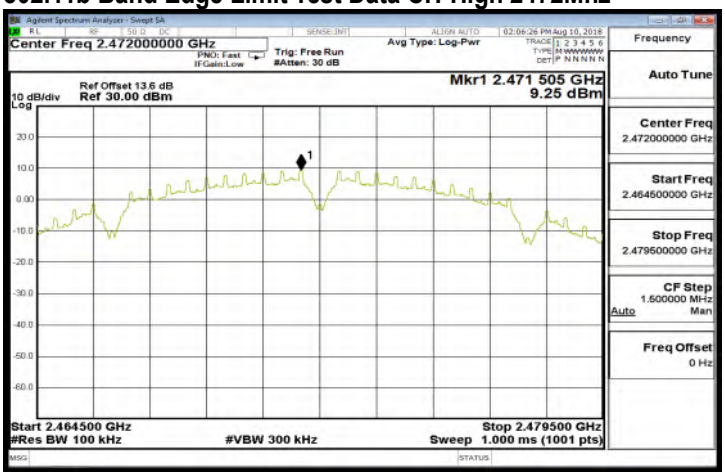
802.11b Band Edge Limit Test Data CH-High 2467MHz



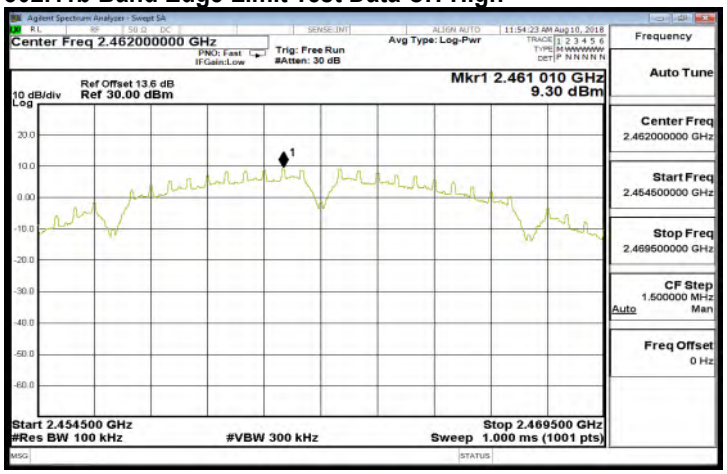
802.11b Band Edge Limit Test Data CH-Mid



802.11b Band Edge Limit Test Data CH-High 2472Mhz



802.11b Band Edge Limit Test Data CH-High



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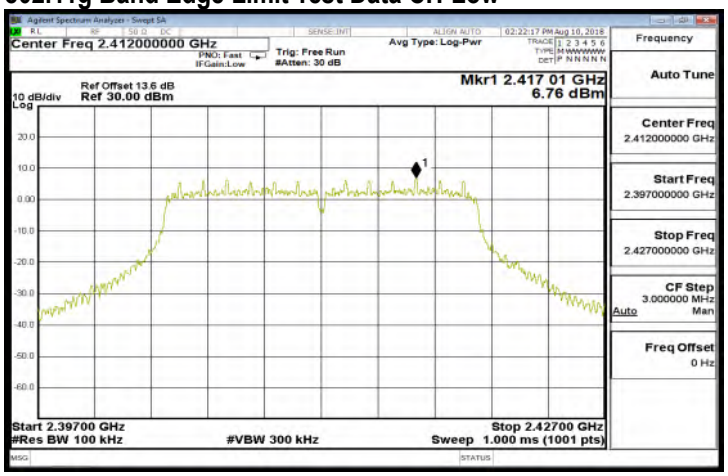
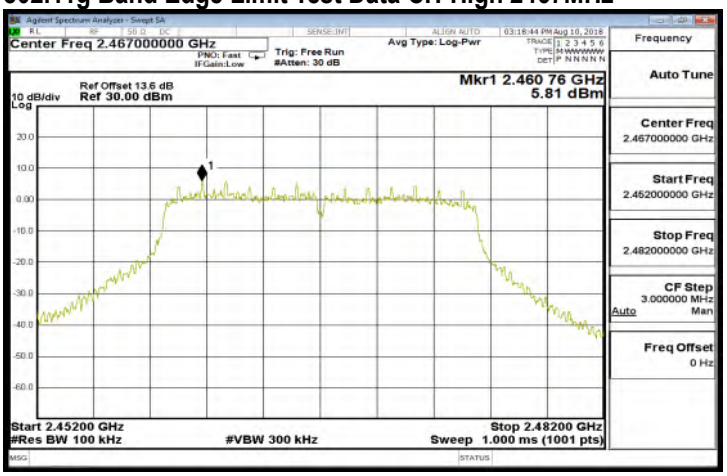
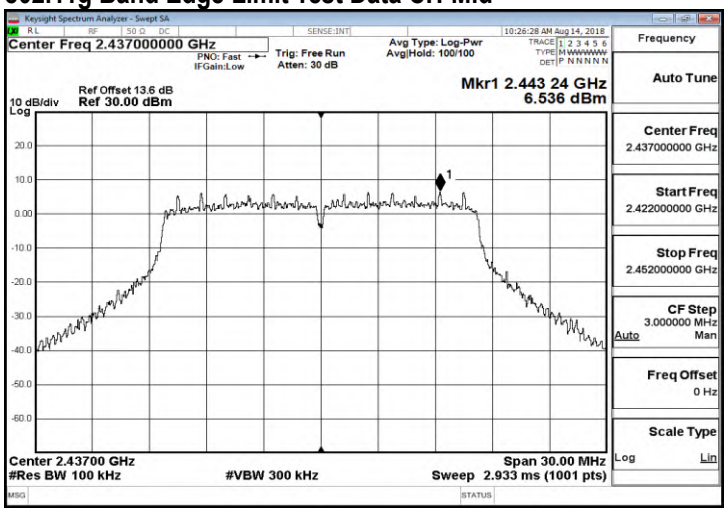
802.11g Band Edge Limit Test Data CH-Low



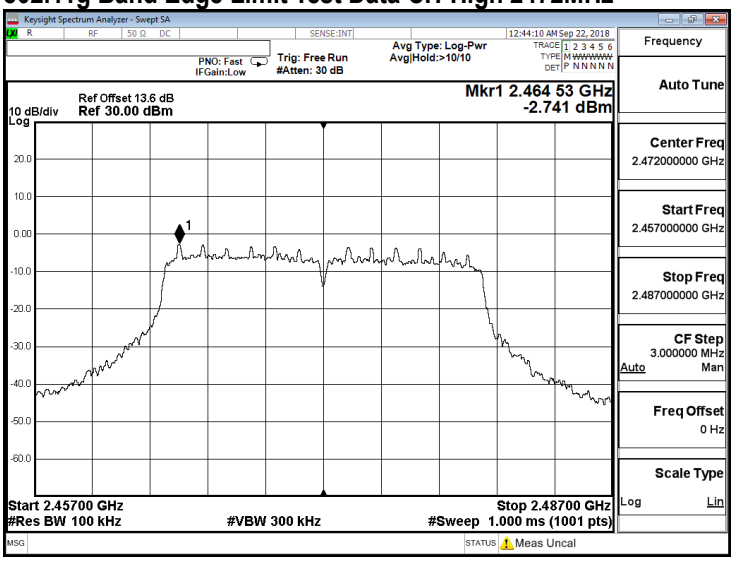
802.11g Band Edge Limit Test Data CH-High 2467MHz



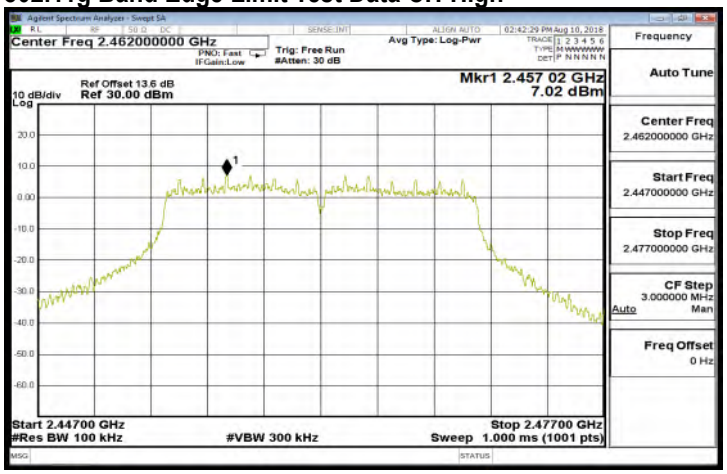
802.11g Band Edge Limit Test Data CH-Mid



802.11g Band Edge Limit Test Data CH-High 2472MHz



802.11g Band Edge Limit Test Data CH-High



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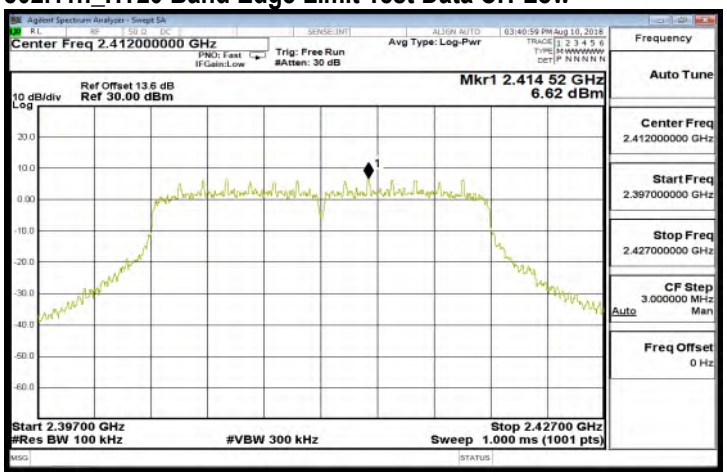
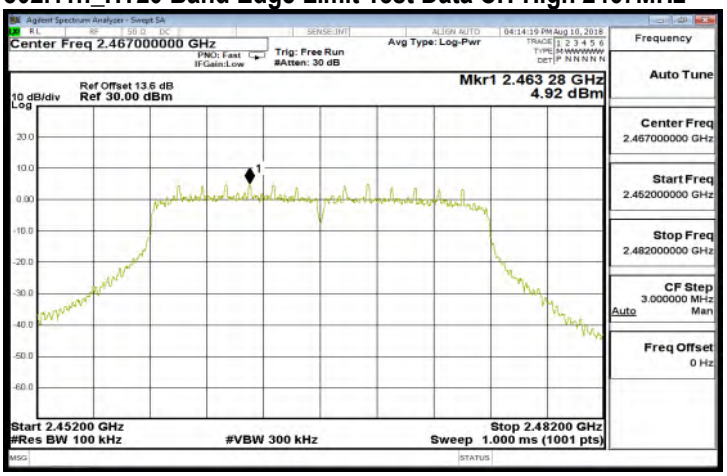
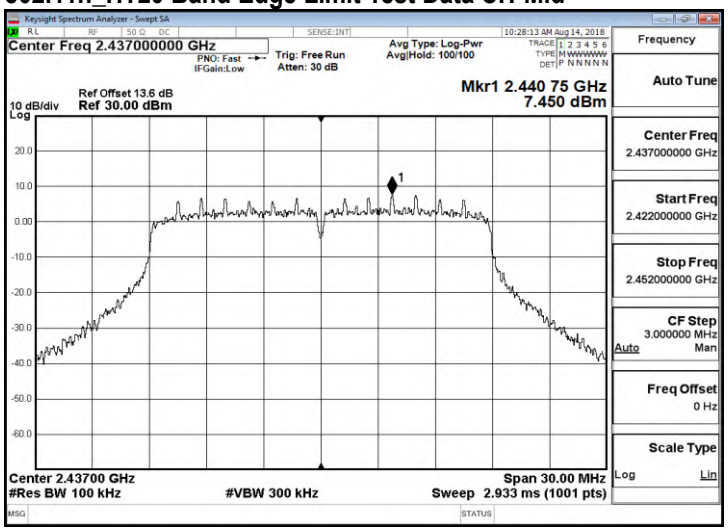
802.11n_HT20 Band Edge Limit Test Data CH-Low



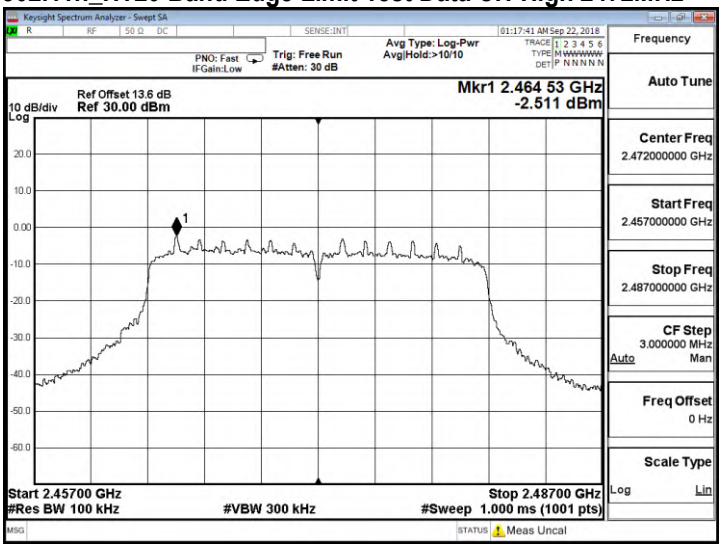
802.11n_HT20 Band Edge Limit Test Data CH-High 2467MHz



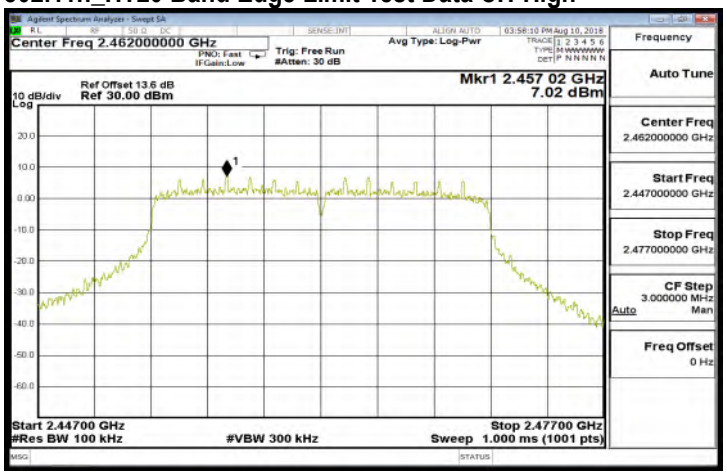
802.11n_HT20 Band Edge Limit Test Data CH-Mid



802.11n_HT20 Band Edge Limit Test Data CH-High 2472MHz



802.11n_HT20 Band Edge Limit Test Data CH-High



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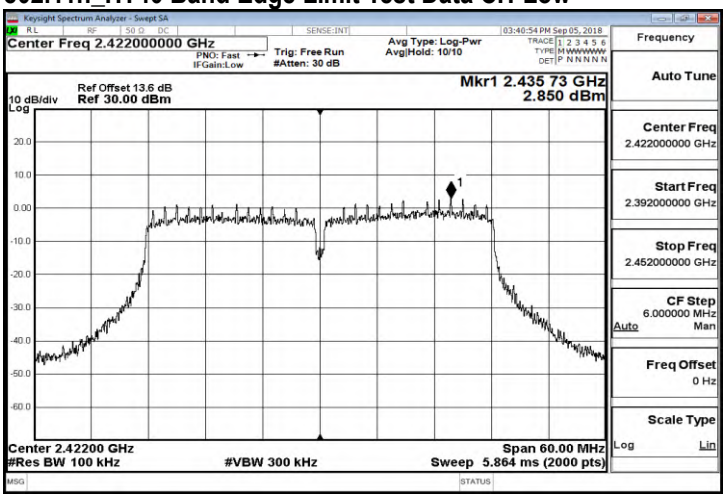
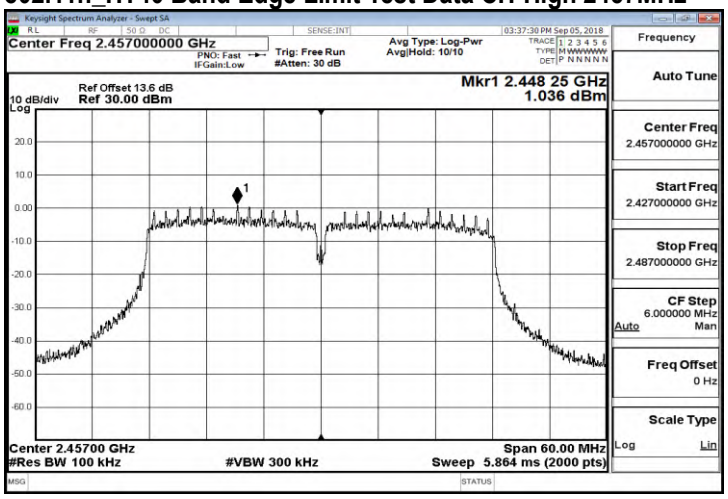
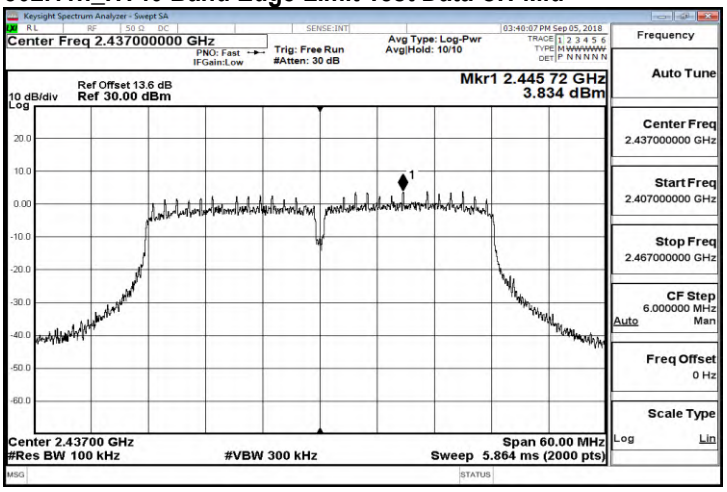
802.11n_HT40 Band Edge Limit Test Data CH-Low



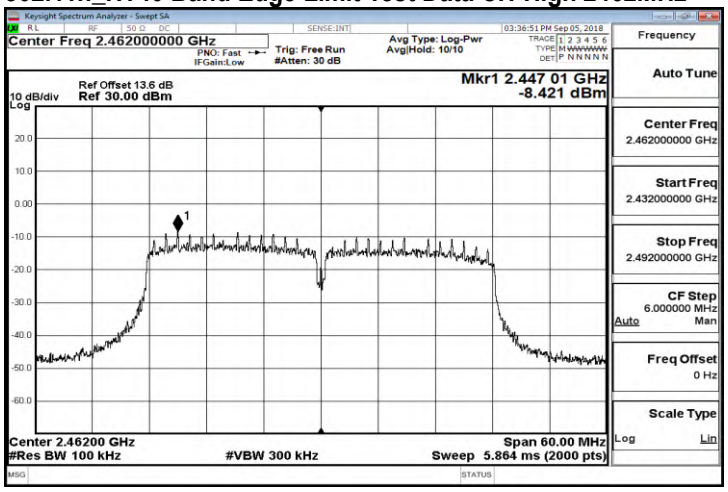
802.11n_HT40 Band Edge Limit Test Data CH-High 2457MHz



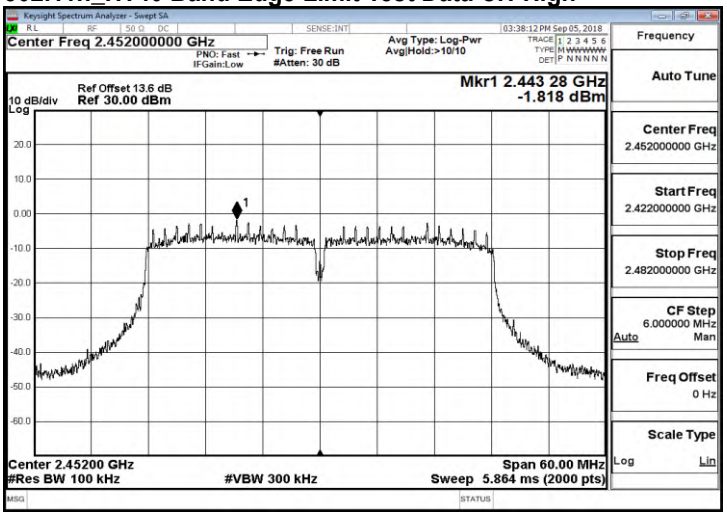
802.11n_HT40 Band Edge Limit Test Data CH-Mid



802.11n_HT40 Band Edge Limit Test Data CH-High 2462MHz



802.11n_HT40 Band Edge Limit Test Data CH-High



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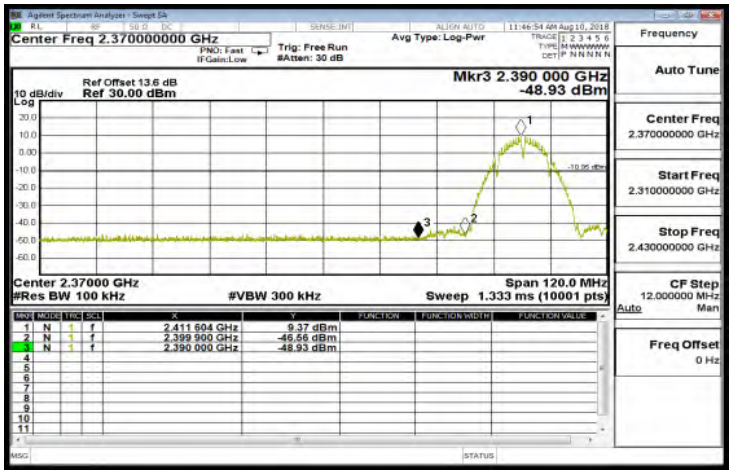
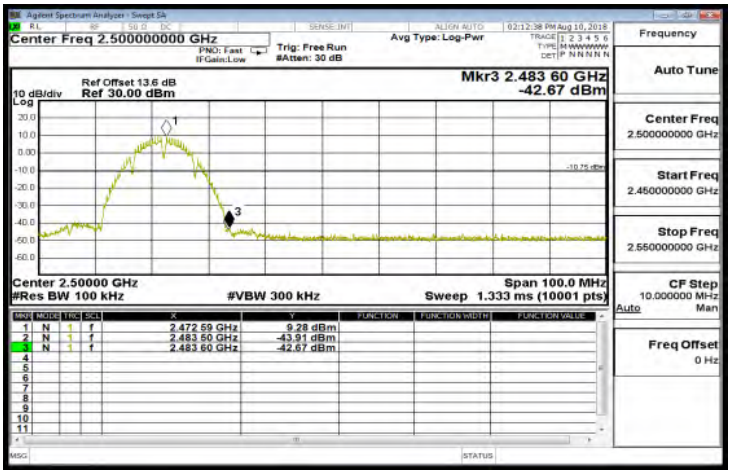
802.11b

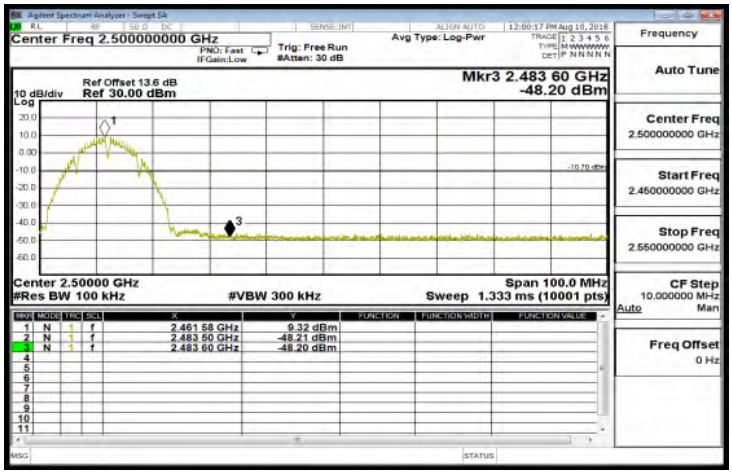
Band Edge Test Data CH-Low



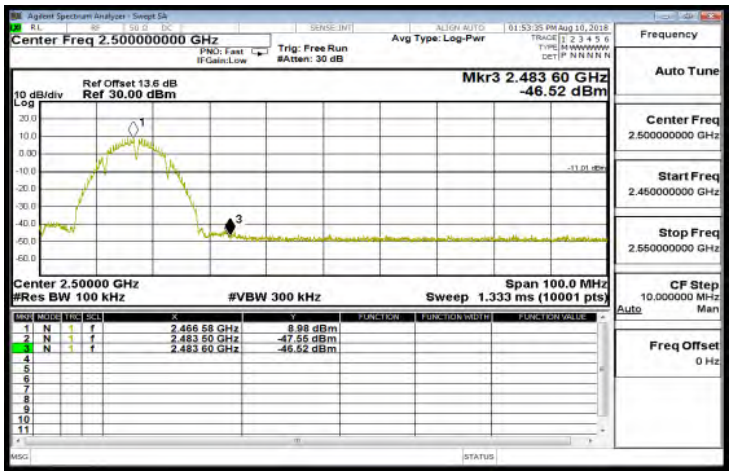
Band Edge Test Data CH-High 2472MHz



Band Edge Test Data CH-High



Band Edge Test Data CH-High 2467MHz



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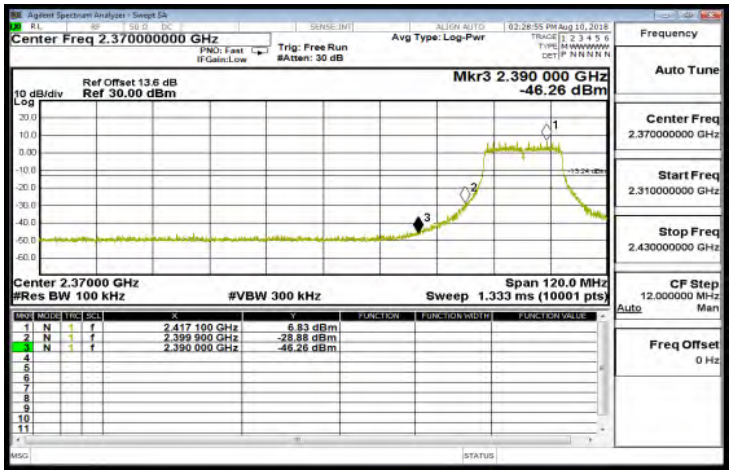
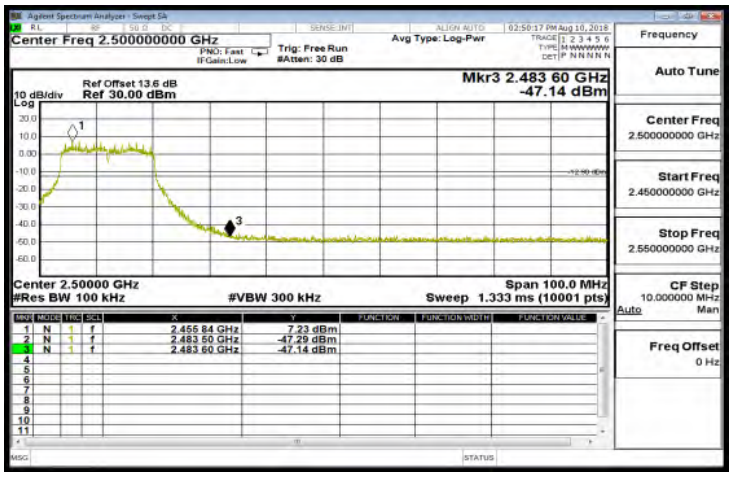
802.11g

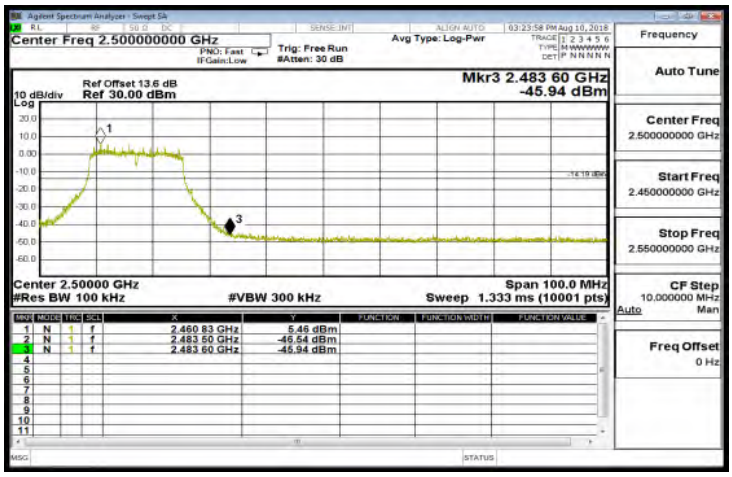
Band Edge Test Data CH-Low



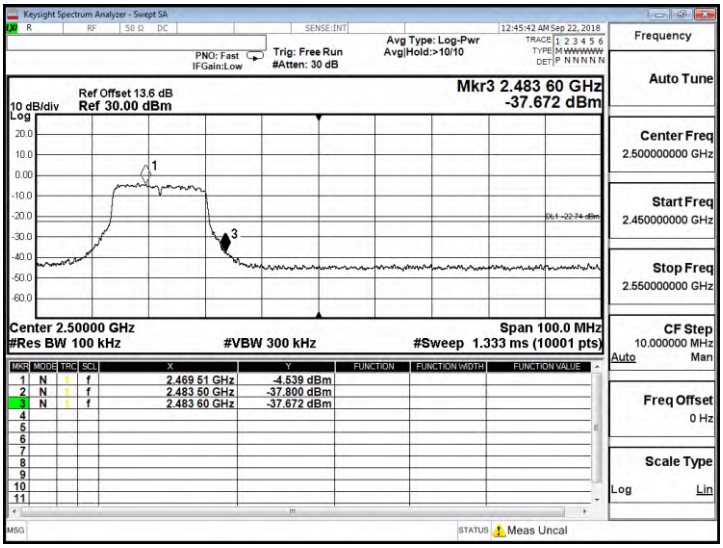
Band Edge Test Data CH-High



Band Edge Test Data CH-High 2467MHz



Band Edge Test Data CH-High 2472MHz



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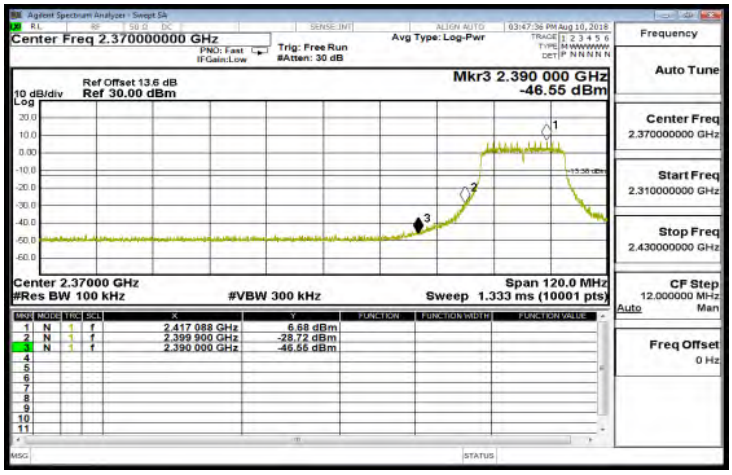
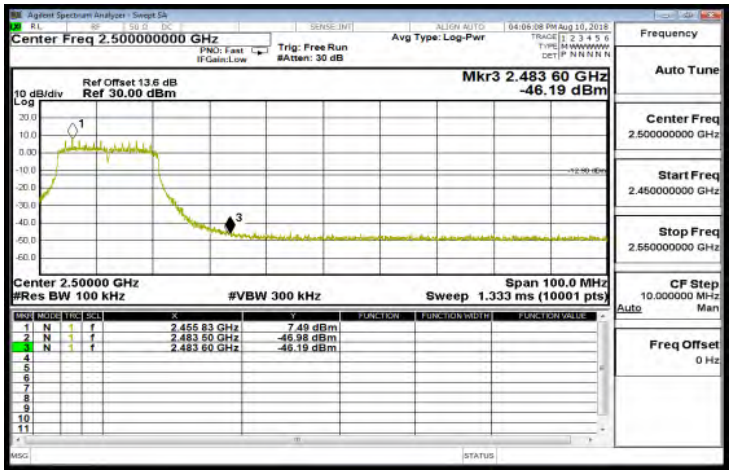
802.11n_HT20

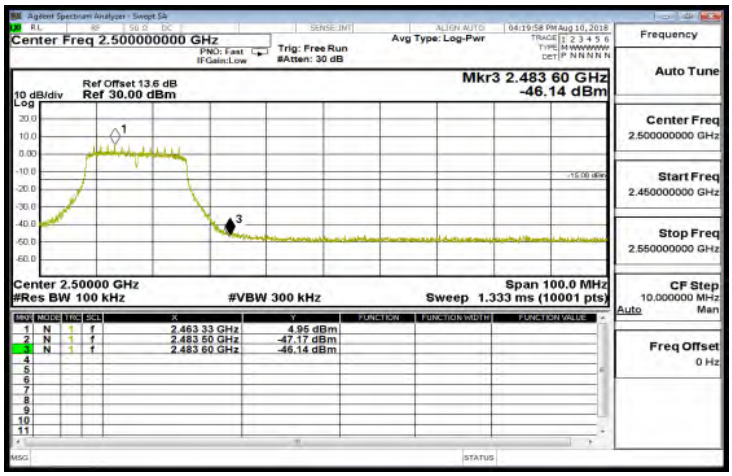
Band Edge Test Data CH-Low



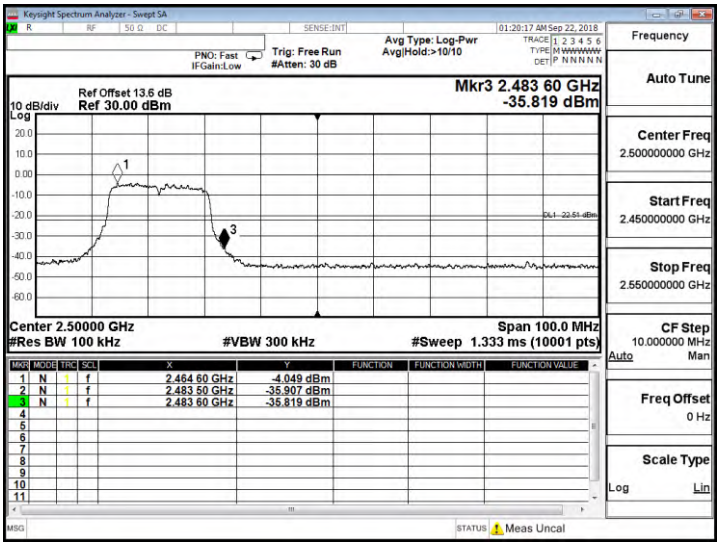
Band Edge Test Data CH-High



Band Edge Test Data CH-High 2467MHz



Band Edge Test Data CH-High 2472 MHz



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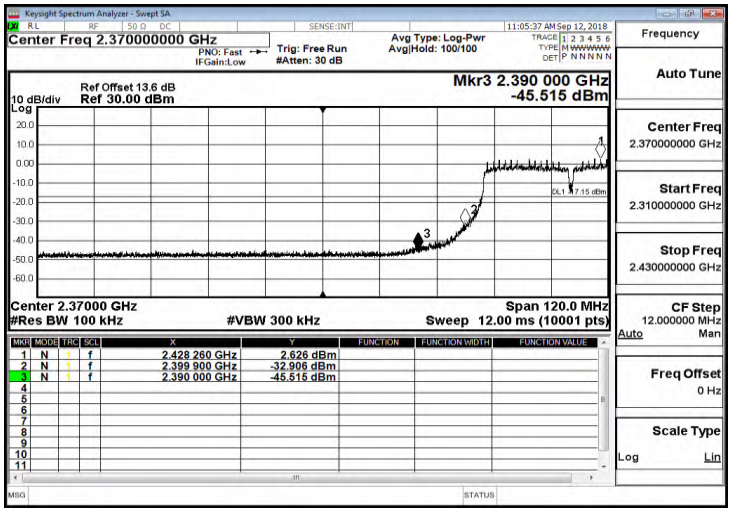
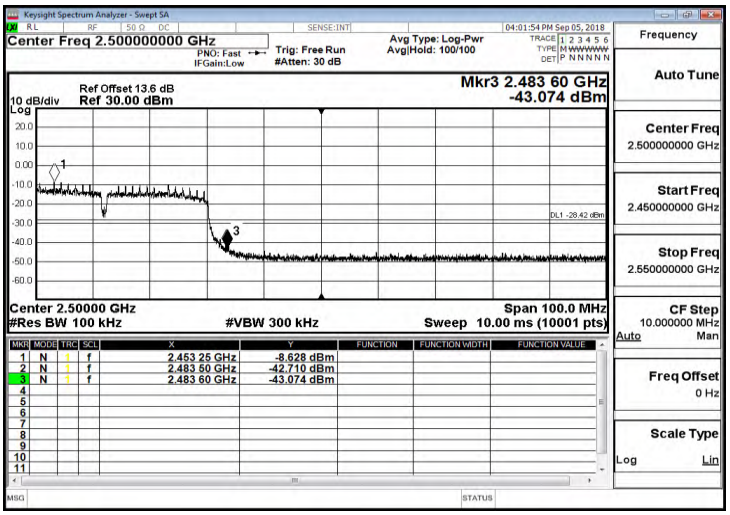
802.11n_HT40

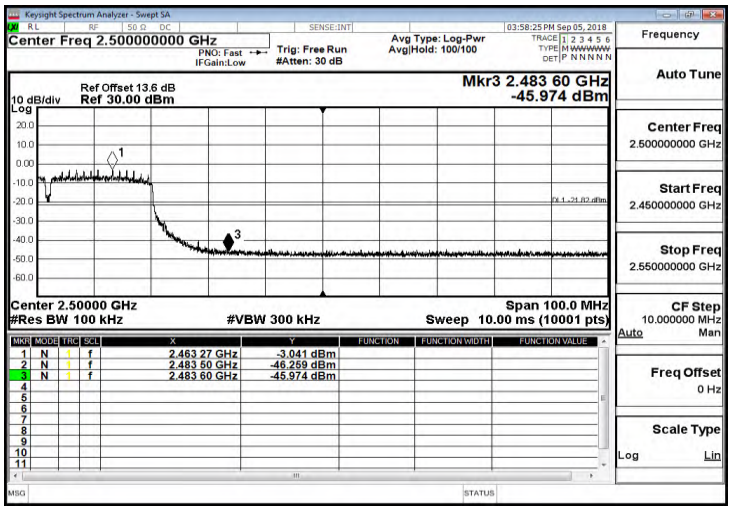
Band Edge Test Data CH-Low



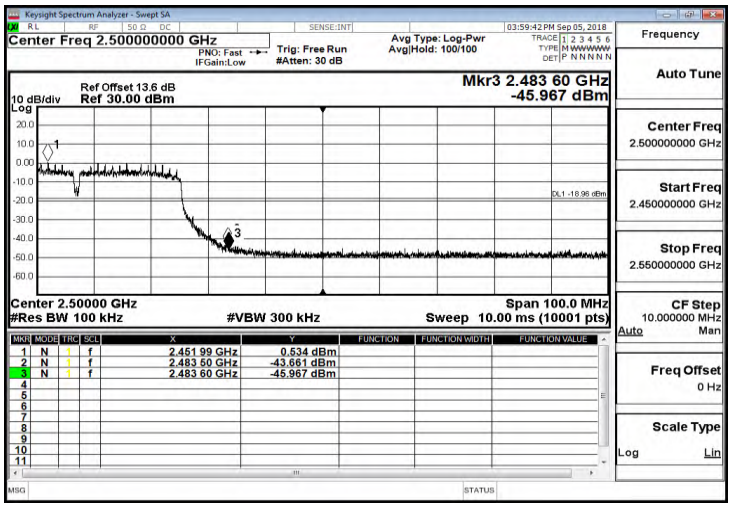
Band Edge Test Data CH-High 2462MHz



Band Edge Test Data CH-High



Band Edge Test Data CH-High 2457MHz



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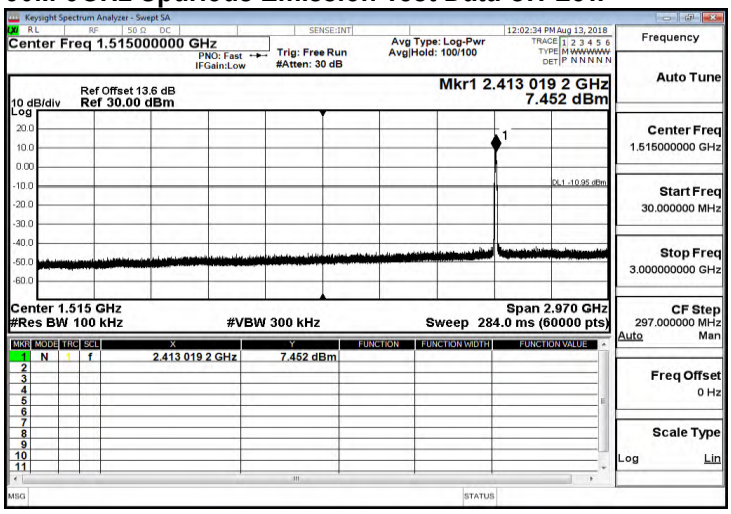
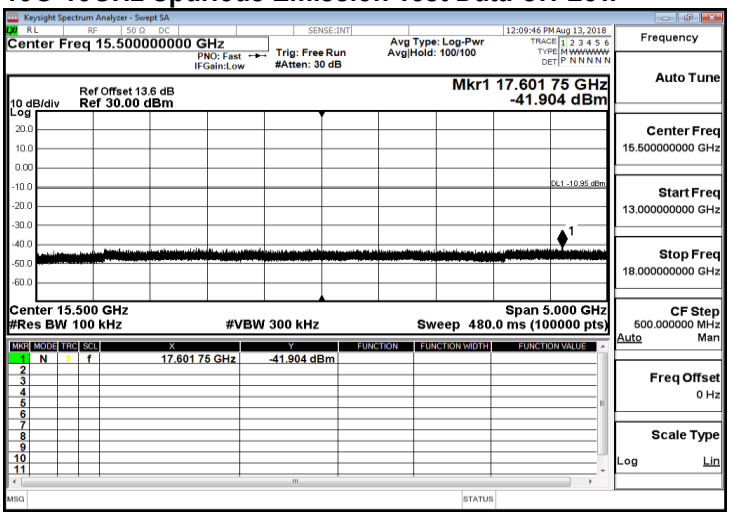
802.11b

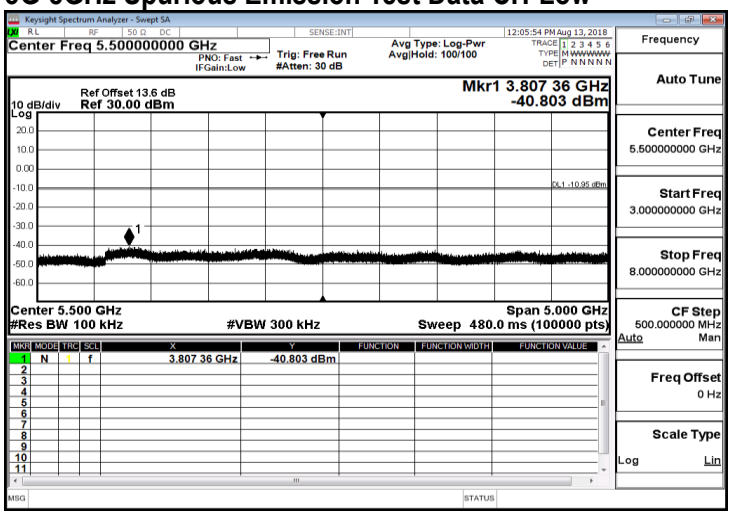
30M-3GHz Spurious Emission Test Data CH-Low



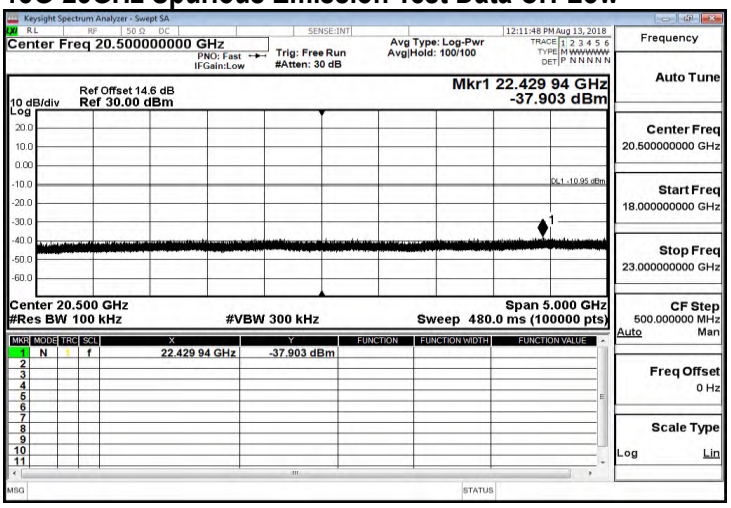
13G-18GHz Spurious Emission Test Data CH-Low



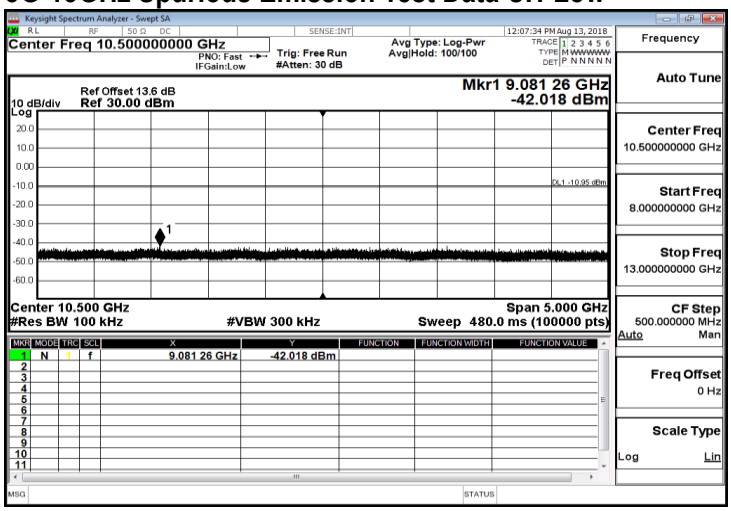
3G-8GHz Spurious Emission Test Data CH-Low



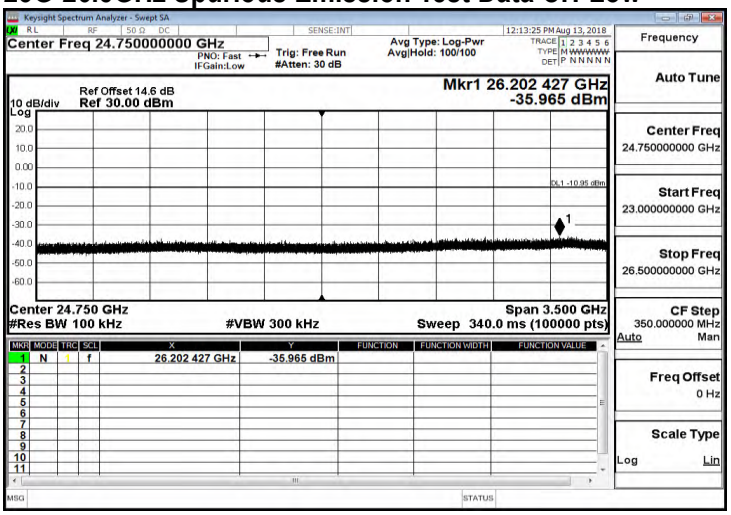
18G-23GHz Spurious Emission Test Data CH-Low



8G-13GHz Spurious Emission Test Data CH-Low



23G-26.5GHz Spurious Emission Test Data CH-Low



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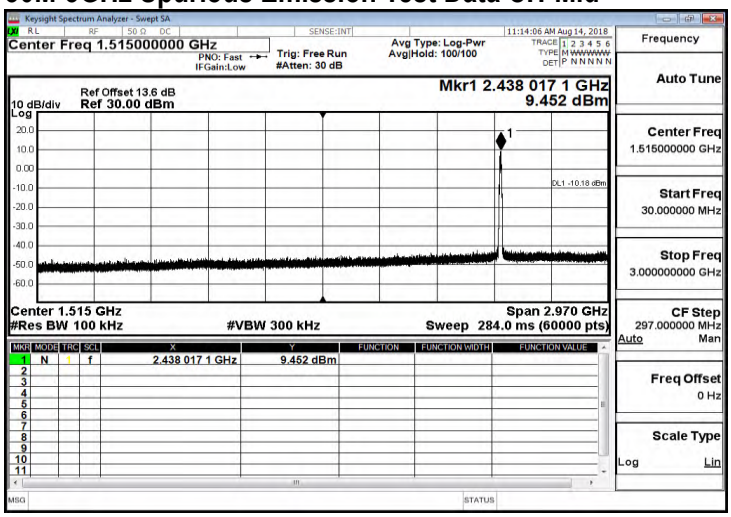
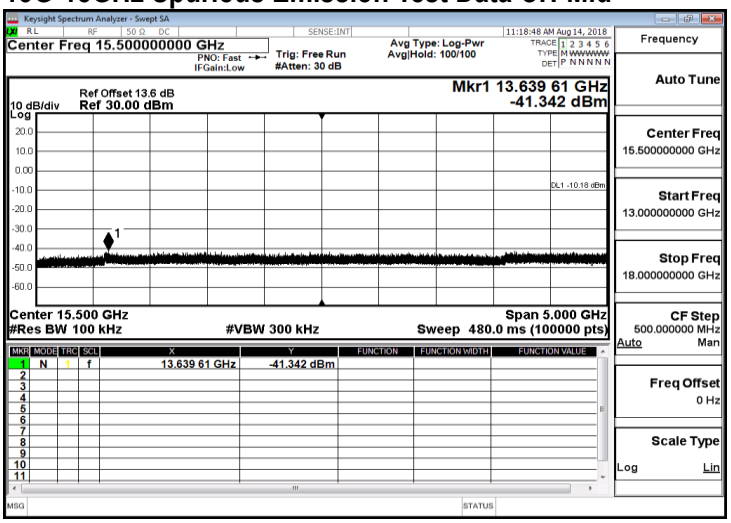
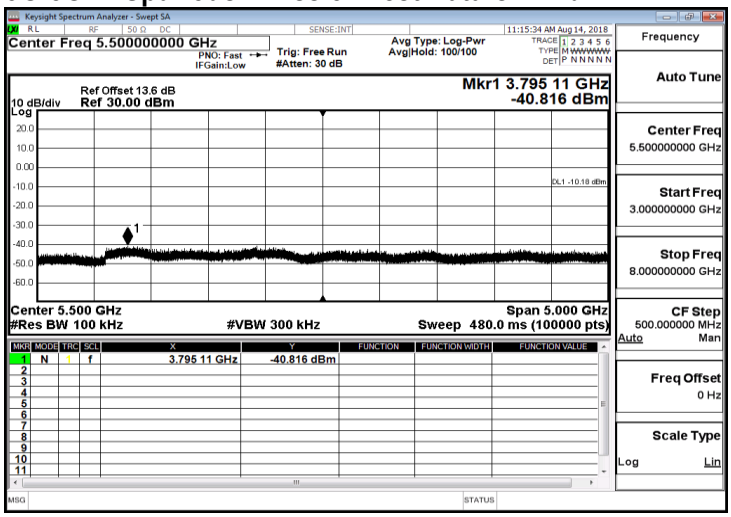
30M-3GHz Spurious Emission Test Data CH-Mid



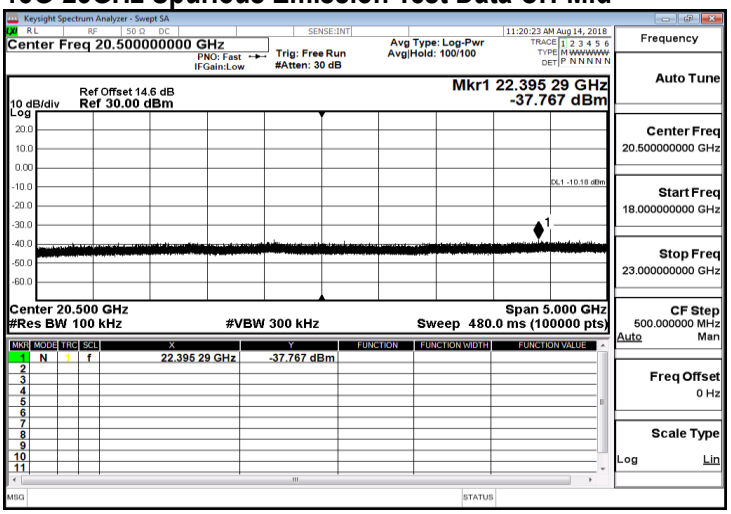
13G-18GHz Spurious Emission Test Data CH-Mid



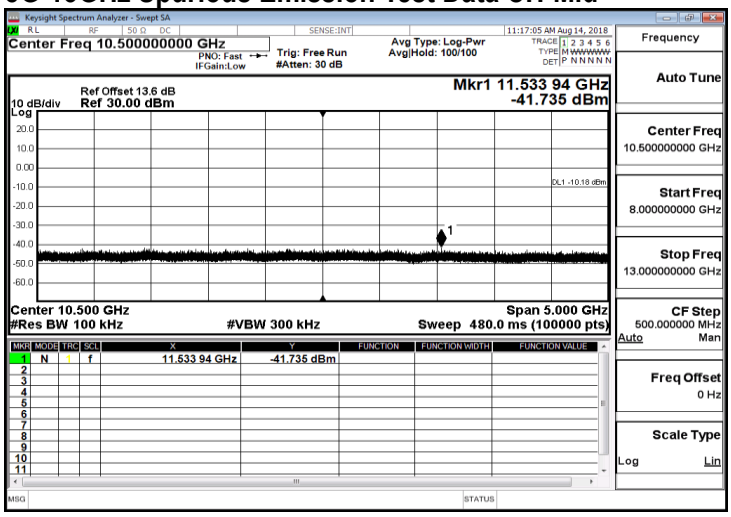
3G-8GHz Spurious Emission Test Data CH-Mid



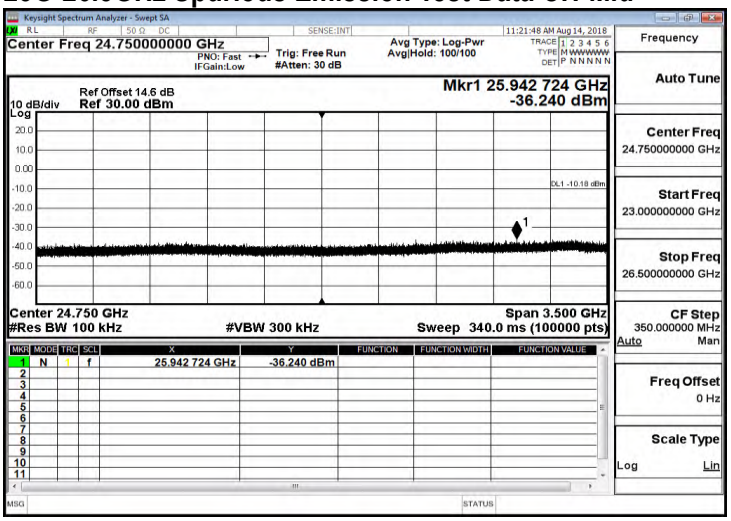
18G-23GHz Spurious Emission Test Data CH-Mid



8G-13GHz Spurious Emission Test Data CH-Mid



23G-26.5GHz Spurious Emission Test Data CH-Mid



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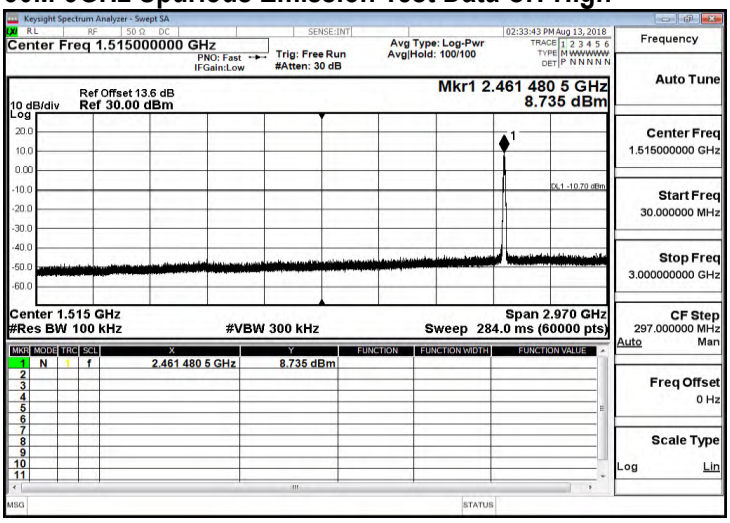
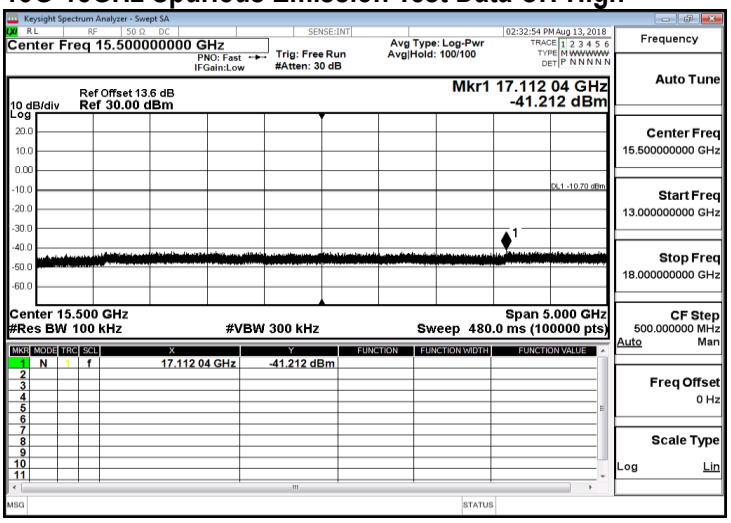
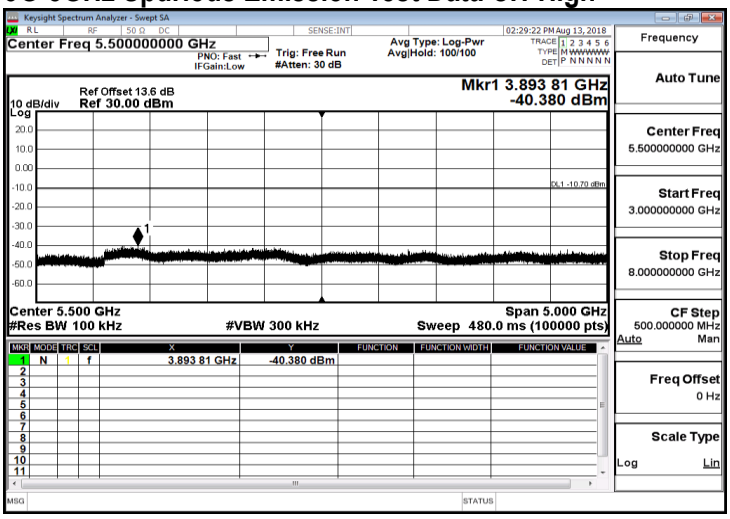
30M-3GHz Spurious Emission Test Data CH-High



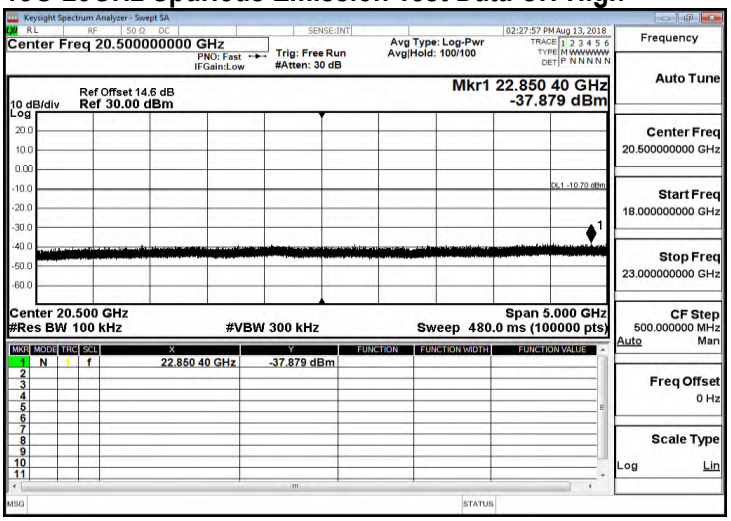
13G-18GHz Spurious Emission Test Data CH-High



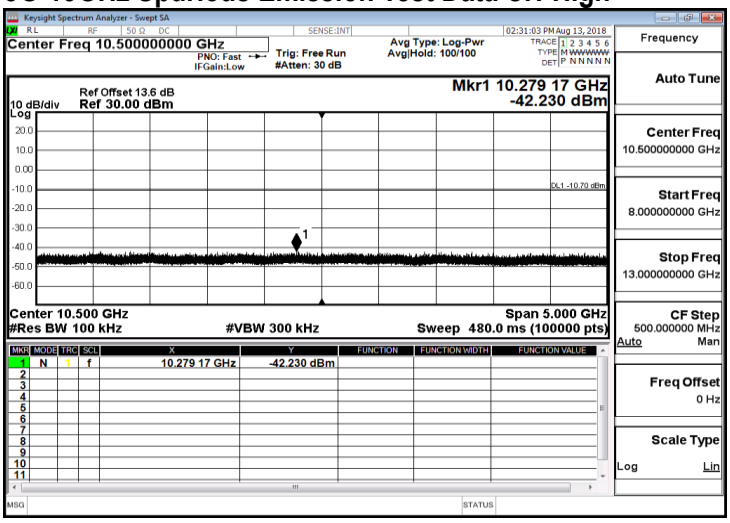
3G-8GHz Spurious Emission Test Data CH-High



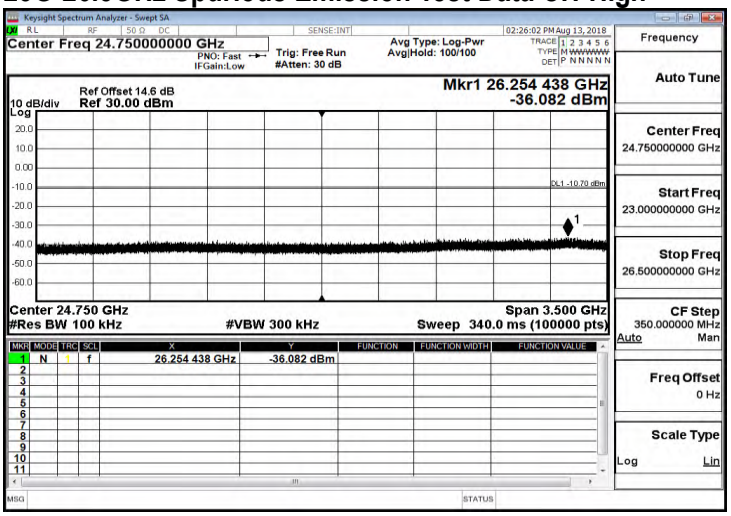
18G-23GHz Spurious Emission Test Data CH-High



8G-13GHz Spurious Emission Test Data CH-High



23G-26.5GHz Spurious Emission Test Data CH-High



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