

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

Applicant: Sharp Corporation, Mobile Communication B.U.
2-13-1, Hachihonmatsu-lida, Higashi-hiroshima-shi,
Hiroshima 739-0192, Japan

Manufacturer: Sharp Corporation
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Product Name: Smart Phone

Report Number: T190308W01-RP5

FCC ID: APYHRO00273

FCC Rule Part: §15.407, Cat: NII

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Issued by: Compliance Certification Services Inc. Wugu Lab.
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The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report
The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Tested By: _____

Wei Chang
Wei Chang / Engineer

Approved By: _____

Kevin Tsai
Kevin Tsai / Deputy Manager



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Revision History

Report Number	Revision	Description	Effectuated Page	Issue Date	Revised By
T190308W01-RP5	Rev.00	Initial creation of document	All	Apr. 09, 2019	Violetta Tang

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Smart Phone
Hardware Version:	DVT
Software Version:	N/A
Power Supply:	3.85V from Rechargeable Li-ion Battery

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WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. Power (dBm)	Modulation Technology
11a_20	5180~5240	4	16.84	OFDM
	5260~5320	4	16.88	
	5500~5720	12	16.63	
	5745~5825	5	16.90	
11n_HT / ac_VHT 20M	5180~5240	4	HT: 16.98 (Worst Case)	OFDM
	5260~5320	4	HT: 16.93 (Worst Case)	
	5500~5720	12	HT: 16.91 (Worst Case)	
	5745~5825	5	HT: 16.98 (Worst Case)	
11n_HT / ac_VHT 40M	5190~5230	2	HT: 16.97 (Worst Case)	OFDM
	5270~5310	2	HT: 16.85 (Worst Case)	
	5500~5710	6	HT: 16.80 (Worst Case)	
	5745~5825	5	HT: 16.97 (Worst Case)	
11ac VHT80M	5210	1	14.37	OFDM
	5290	1	14.42	
	5530~5690	3	16.35	
	5775	1	14.75	
Modulation Type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only		
Transition Rate:		802.11 a: 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 802.11 ac_20MHz: 6.5 – 173.3Mbps 802.11 ac_40MHz: 13.5 – 400.0Mbps 802.11 ac_80MHz: 29.3 – 866.7Mbps		
Antenna Designation:		Inverted-F Antenna, 5150~5250MHz Gain: -0.3dBi (ANT0) / -2.8dBi (ANT1) 5250~5350MHz Gain: -0.3dBi (ANT0) / -2.8dBi (ANT1) 5470~5725MHz Gain: -0.1dBi (ANT0) / -2.2dBi (ANT1) 5725~5850MHz Gain: -0.7dBi (ANT0) / -2.3dBi (ANT1)		

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

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

1.3 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd.,

Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1309)

FCC Designation number: TW1309

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

1.6 Referencing test data across separate equipment authorization

The test report T190304W03-RP5 under original FCC ID: APYHRO00272 are fully referred for the new FCC ID: APYHRO00273 in this report of U-NII-1, U-NII-2-A and U-NII-2-C bands. Furthermore, additional test plots of U-NII-2-C and U-NII-3 bands are newly tested for the new FCC ID: APYHRO00273.

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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 placed on a turn 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 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 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 plan. 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.

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission



Fig. 2-2 Conducted (Antenna Port) Emission

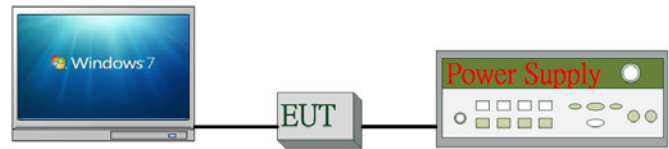


Fig. 2-2 AC Power Line Conducted Emission



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	Anritsu	E3640A	MY52410006	N/A	Unshielded
3.	Notebook	Lenovo	T440P	PC-089AH5	Shielded	Unshielded

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3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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4. DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
36	5180
40	5200
44	5220
48	5240

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
38	5190
46	5230

802.11ac VHT80 Mode	
channel	Frequency
42	5210

Operated band in 5250 MHz ~5350 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
channel	Frequency
52	5260
56	5280
60	5300
64	5320

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
54	5270
62	5310

802.11ac VHT80 Mode	
Channel	Frequency
58	5290

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Operated band in 5470 MHz ~5725 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
102	5510
110	5550
118	5590
126	5630
134	5670
142	5710

802.11ac VHT80 Mode	
channel	Frequency
106	5530
122	5610
138	5690

Operated band in 5745 MHz ~5850 MHz:

802.11a / n HT20 Mode, 802.11ac VHT20 Mode	
Channel	Frequency
149	5745
153	5765
157	5785
161	5805
165	5825

802.11 n HT40 Mode, 802.11ac VHT40 Mode	
channel	Frequency
151	5755
159	5795

802.11ac VHT80 Mode	
channel	Frequency
155	5775

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting 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
<input type="checkbox"/> 802.11 a	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input checked="" type="checkbox"/> 2TX
<input type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input checked="" type="checkbox"/> MIMO
<input type="checkbox"/> 802.11 ac	<input checked="" type="checkbox"/> Ch0	<input checked="" type="checkbox"/> Ch1	<input checked="" type="checkbox"/> 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.

AC POWER LINE CONDUCTED EMISSION TEST:

Test Condition	AC Power line conducted emission for line and neutral
Worst Case	Operation in normal mode

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RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	2TX
802.11a	5260~5320	52 to 64	60	OFDM	6	2TX
802.11a	5500~5720	100 to 144	116	OFDM	6	2TX
802.11a	5745~5825	149 to 165	157	OFDM	6	2TX
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS8	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11ac_VHT80	5290	58	58	OFDM	MCS8	MIMO
802.11a	5500~5720	100 to 144	100,116,140,144	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5510~5710	102 to 142	102,110,134,142	OFDM	MCS8	MIMO
802.11ac_VHT80	5530~5690	106 to 138	106,122,138	OFDM	MCS8	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS8	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 802.11a/n/ac Transmitter for channel Low, Mid and High, the worst case E1 position was reported.

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20				MCS8	MIMO	
802.11ac_VHT20						MCS0
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT40					MCS0	
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11n_HT20				MCS8	MIMO	
802.11ac_VHT20						MCS0
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11ac_VHT40					MCS0	
802.11ac_VHT80	5290	58	58	OFDM	MCS0	MIMO
802.11a	5500~5720	100 to 144	100,116,140,144	OFDM	6	2TX
802.11n_HT20				MCS8	MIMO	
802.11ac_VHT20						MCS0
802.11n_HT40	5510~5710	102 to 142	102,110,134,142	OFDM	MCS8	MIMO
802.11ac_VHT40					MCS0	
802.11ac_VHT80	5530~5690	106 to 138	106,122,138	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20				MCS8	MIMO	
802.11ac_VHT20						MCS0
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT40					MCS0	
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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5. MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
26dB & 6dB Emission Bandwidth	+/- 147.256 Hz
The Maximum Output Power	+/- 2.128 dB
Peak Power Spectral Density	+/- 2.878 dB
Frequency Stability	+/- 147.256 Hz
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.
3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6. CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz 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.
CABLE	EMCI	CFD300-NL	CERF	06/29/2018	06/28/2019
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020
Software	EZ-EMC(CCS-3A1-CE)				

6.3 EUT Setup

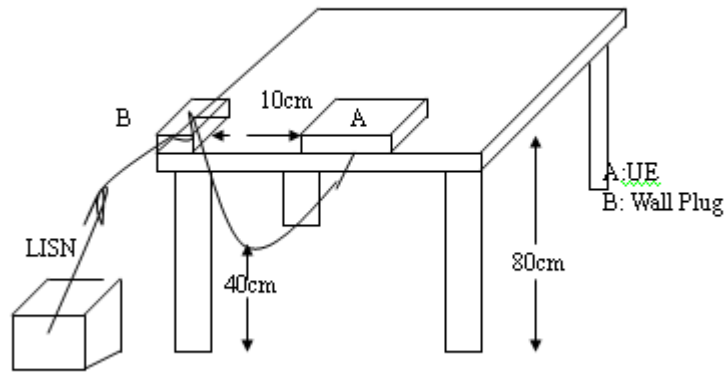
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP



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.

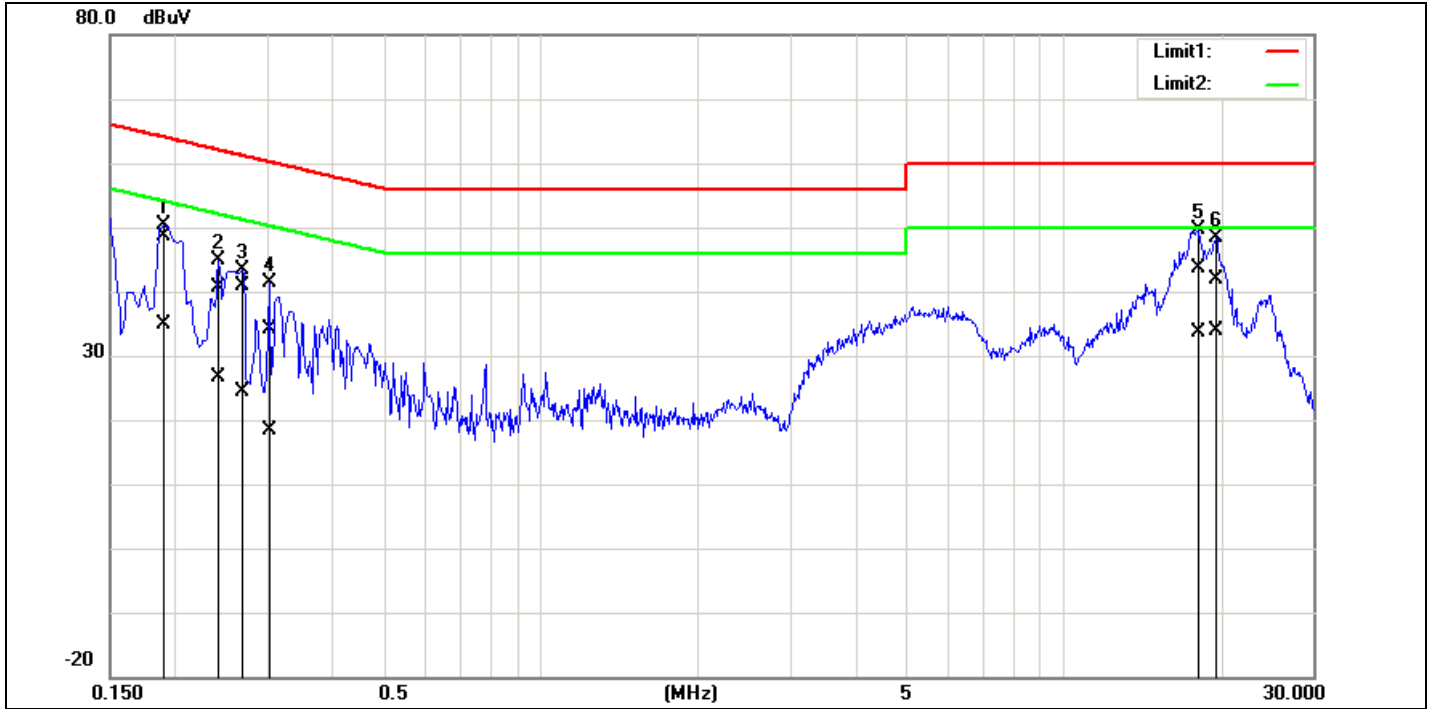
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Description:	Operation	Date:	2019/3/11
Line:	L1	Temp.(°C)/Hum.(%):	24(°C)/52%
Test Voltage:	AC 120V/60Hz	Test By:	Peter



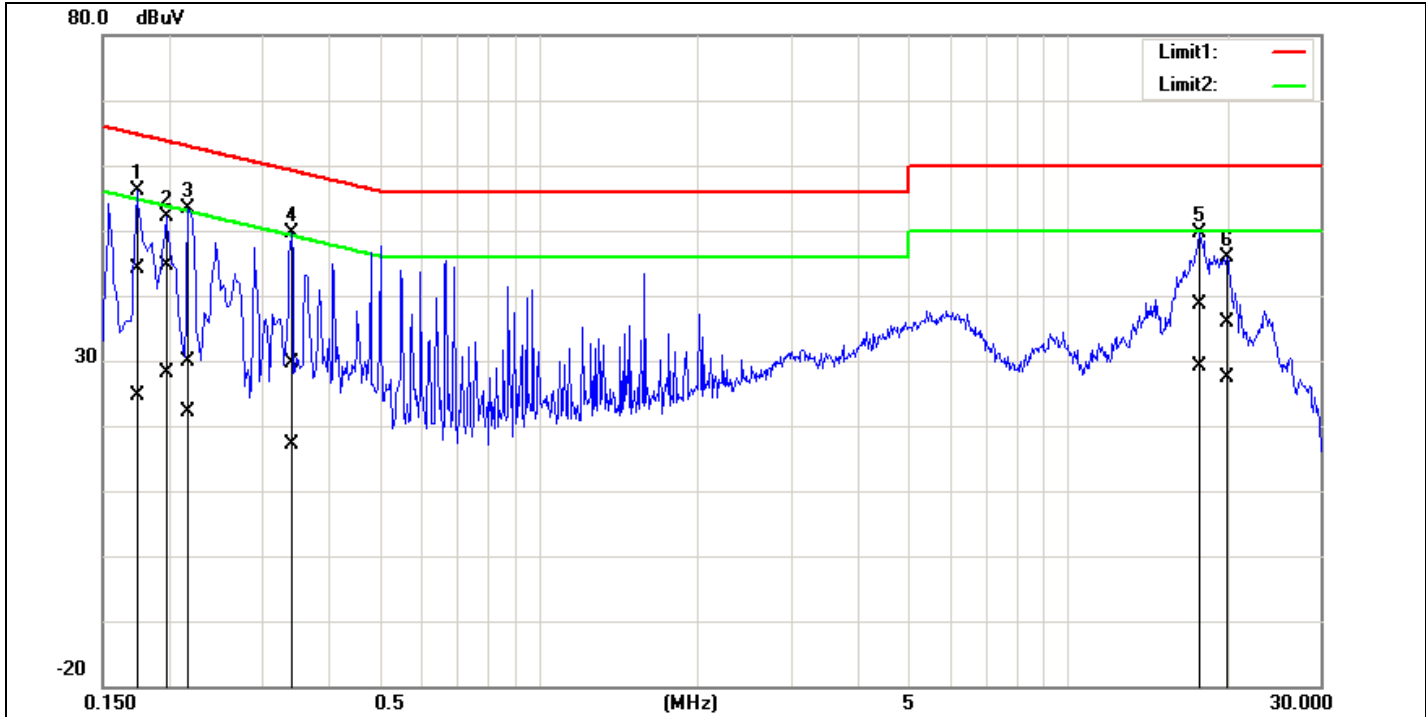
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1900	48.48	34.61	0.15	48.63	34.76	64.03	54.04	-15.40	-19.28	Pass
2	0.2420	40.36	26.44	0.15	40.51	26.59	62.02	52.03	-21.51	-25.44	Pass
3	0.2700	40.69	24.21	0.15	40.84	24.36	61.12	51.12	-20.28	-26.76	Pass
4	0.3020	34.00	18.13	0.16	34.16	18.29	60.19	50.19	-26.03	-31.90	Pass
5	18.1100	42.96	33.00	0.65	43.61	33.65	60.00	50.00	-16.39	-16.35	Pass
6	19.5340	41.17	33.17	0.69	41.86	33.86	60.00	50.00	-18.14	-16.14	Pass

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Description:	Operation	Date:	2019/3/11
Line:	N	Temp.(°C)/Hum.(%):	24(°C)/52%
Test Voltage:	AC 120V/60Hz	Test By:	Peter



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1740	44.02	24.65	0.10	44.12	24.75	64.76	54.77	-20.64	-30.02	Pass
2*	0.1980	44.43	28.14	0.10	44.53	28.24	63.69	53.69	-19.16	-25.45	Pass
3	0.2180	29.75	22.13	0.10	29.85	22.23	62.89	52.89	-33.04	-30.66	Pass
4	0.3420	29.47	16.91	0.11	29.58	17.02	59.15	49.15	-29.57	-32.13	Pass
5	17.7099	38.12	28.61	0.51	38.63	29.12	60.00	50.00	-21.37	-20.88	Pass
6	19.9900	35.45	26.81	0.55	36.00	27.36	60.00	50.00	-24.00	-22.64	Pass

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7. DUTY CYCLE 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:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

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

Duty Cycle (U-NII-1, U-NII-2-A and U-NII-2-C):

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	98.17	0.08	0.49	1.00
802.11n_20	98.00	0.09	0.53	1.00
802.11n_40	96.02	0.18	1.08	2.00
802.11ac_80	100.00	0.00	0.00	0.01

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9817) = 0.08$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.98) = 0.09$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.9602) = 0.18$$

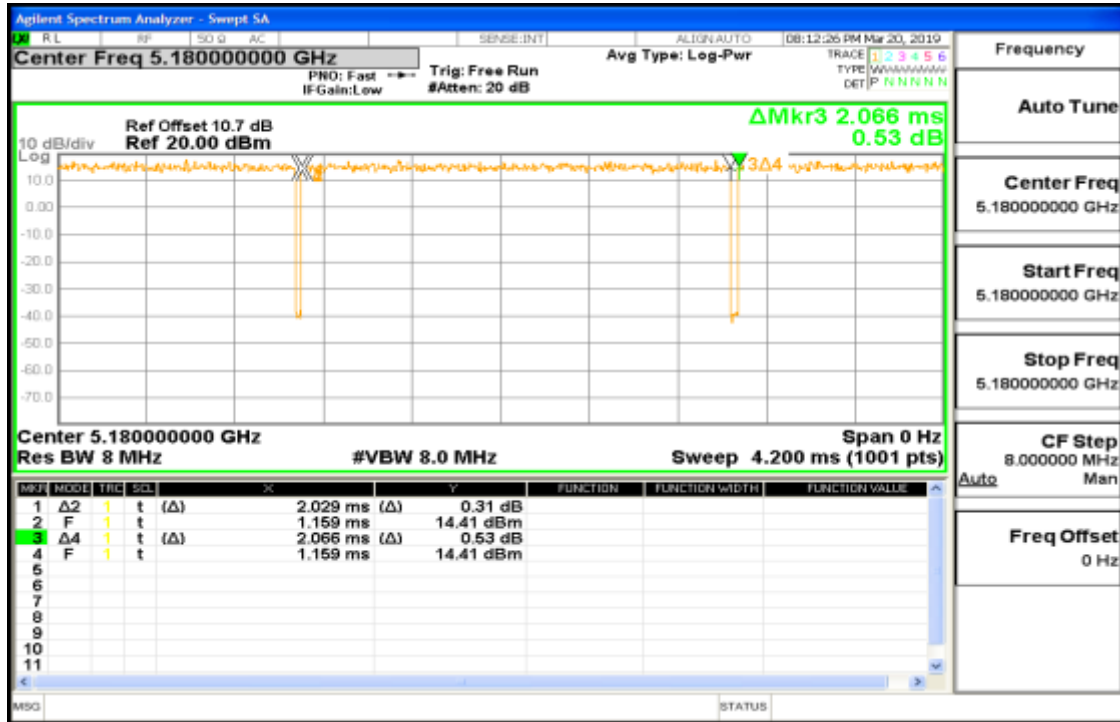
$$\text{Duty Cycle Factor: } 10 * \log(1/1) = 0$$

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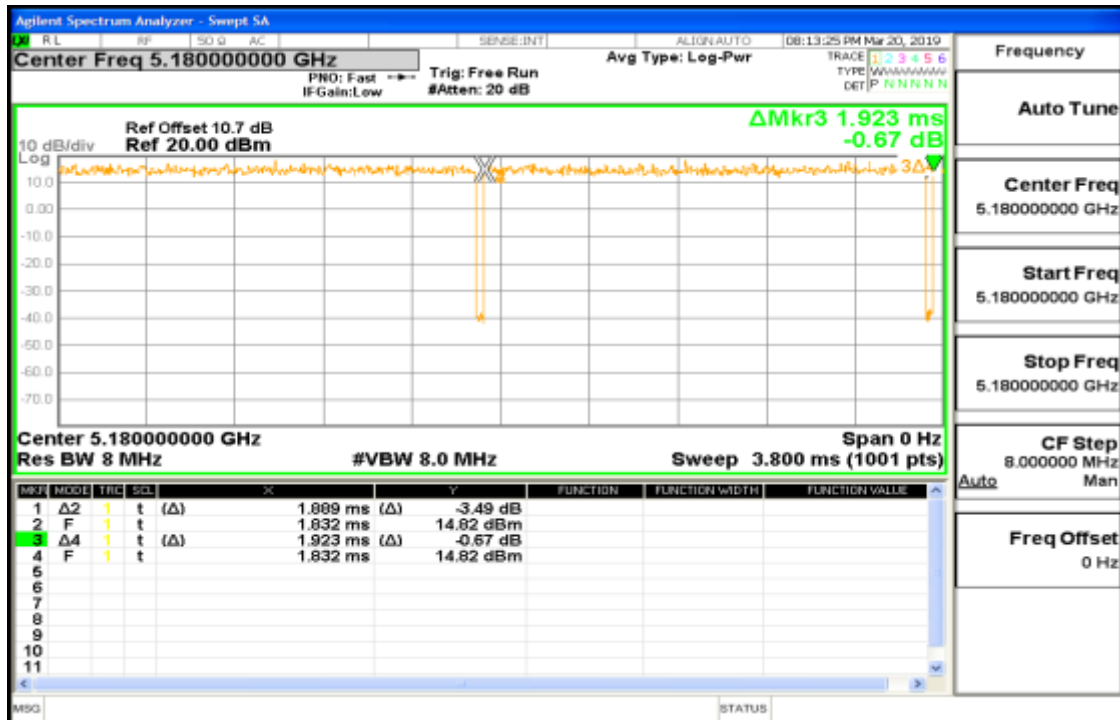
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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20

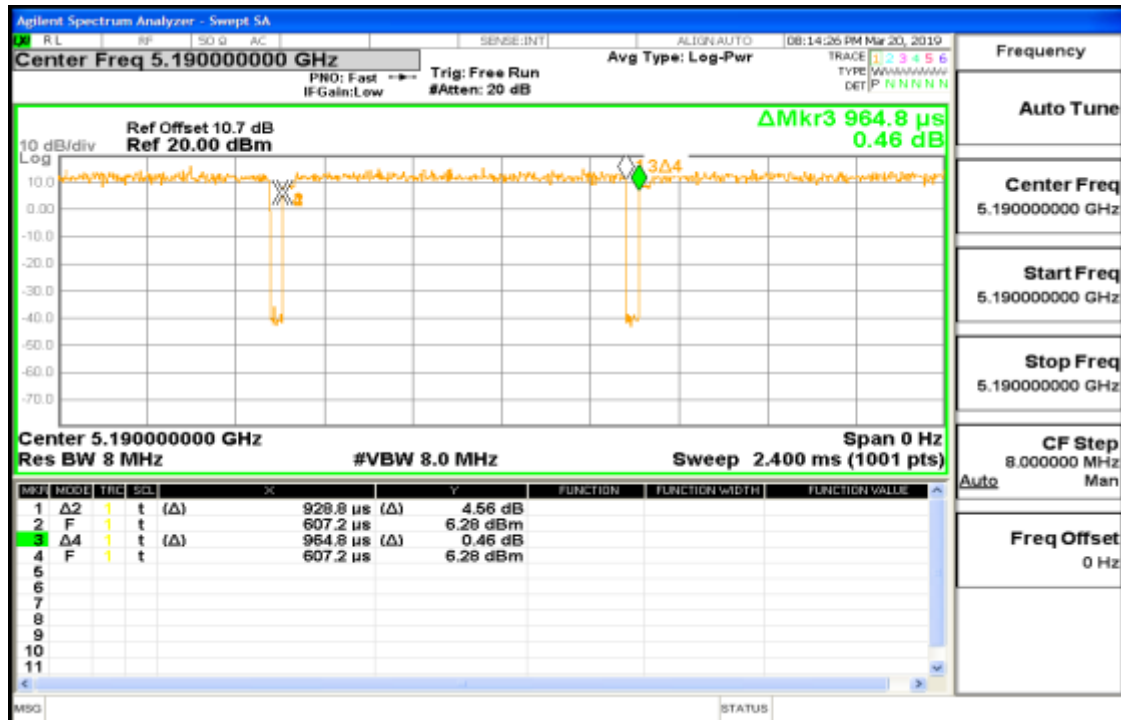


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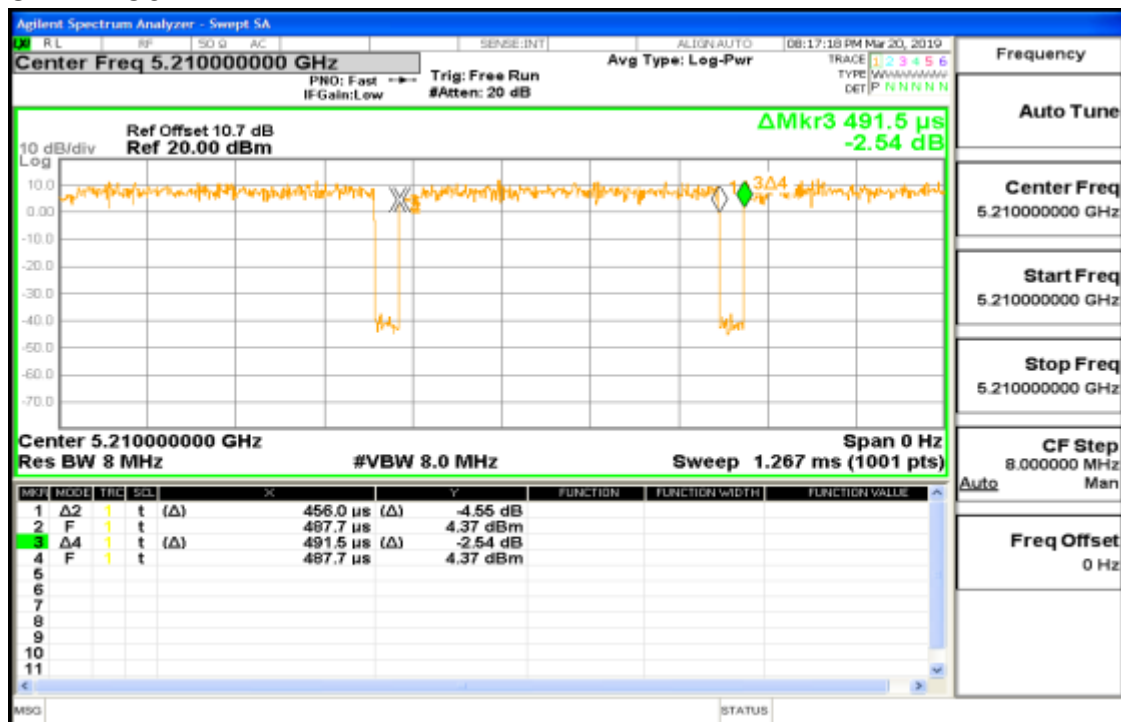
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802.11n HT 40



802.11 ac VHT 80



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Duty Cycle (U-NII-3):

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	98.17	0.08	0.49	1.00
802.11n_20	98.00	0.09	0.53	1.00
802.11n_40	96.26	0.17	1.08	2.00
802.11ac_80	92.54	0.34	2.19	3.00

Duty Cycle Factor: $10 * \log(1/0.9817) = 0.08$

Duty Cycle Factor: $10 * \log(1/0.98) = 0.09$

Duty Cycle Factor: $10 * \log(1/0.9626) = 0.17$

Duty Cycle Factor: $10 * \log(1/0.9619) = 0.17$

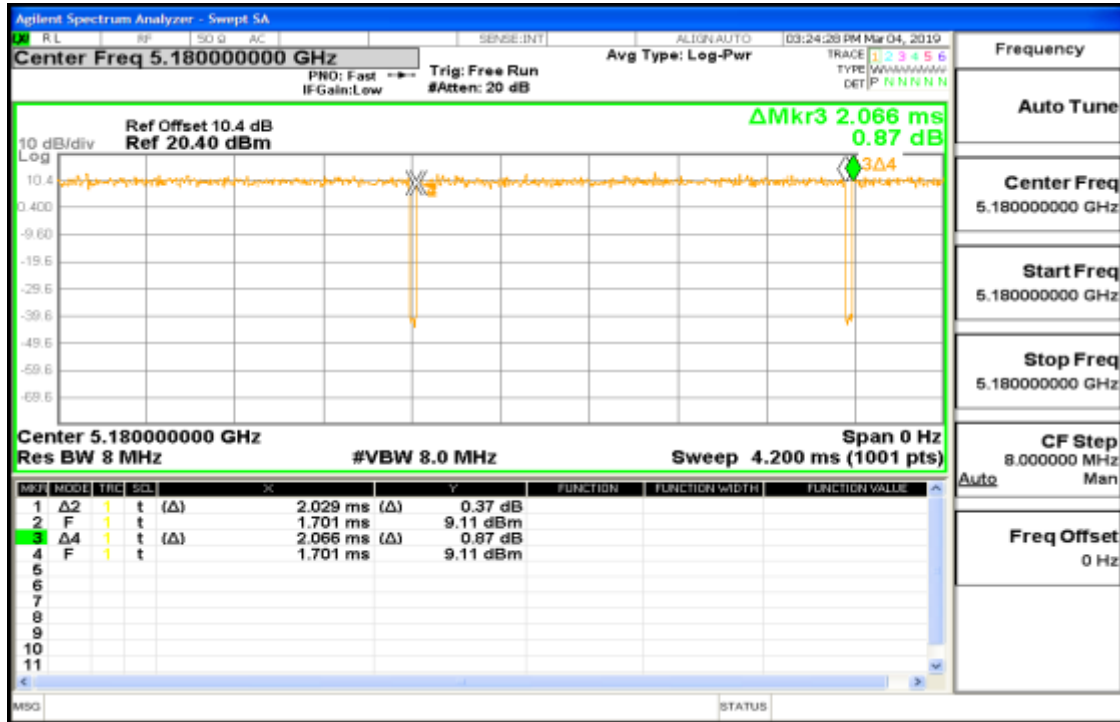
Duty Cycle Factor: $10 * \log(1/0.9254) = 0.34$

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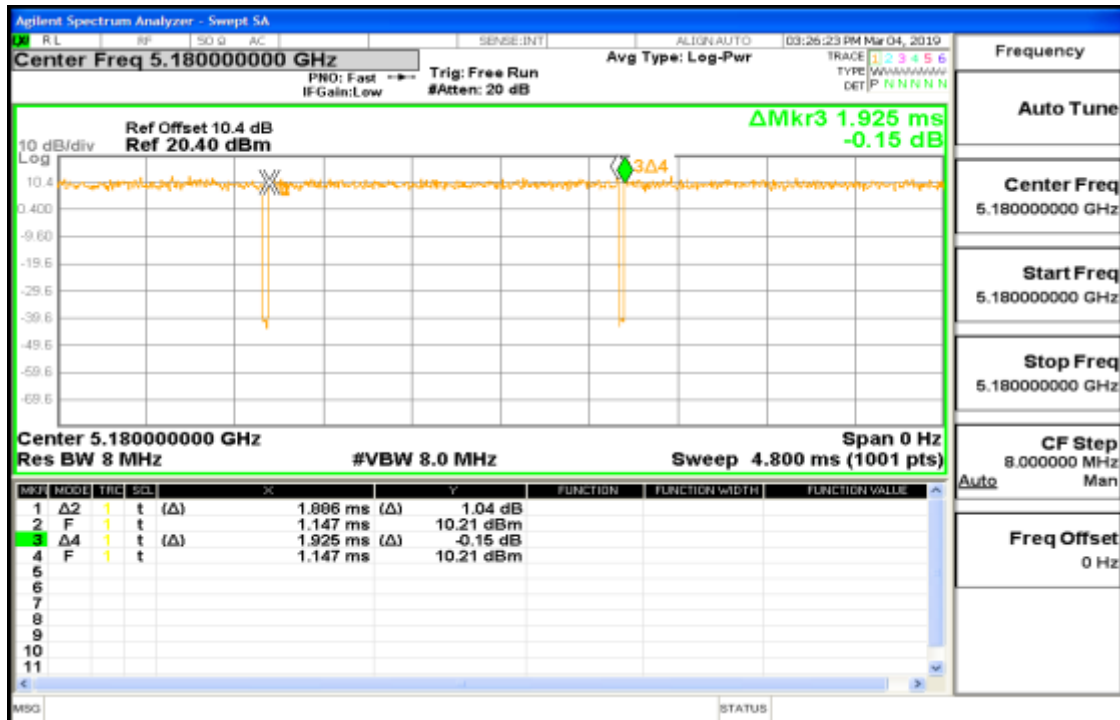
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DUTY CYCLE TEST SIGNAL Measurement Result 802.11a



802.11n HT20

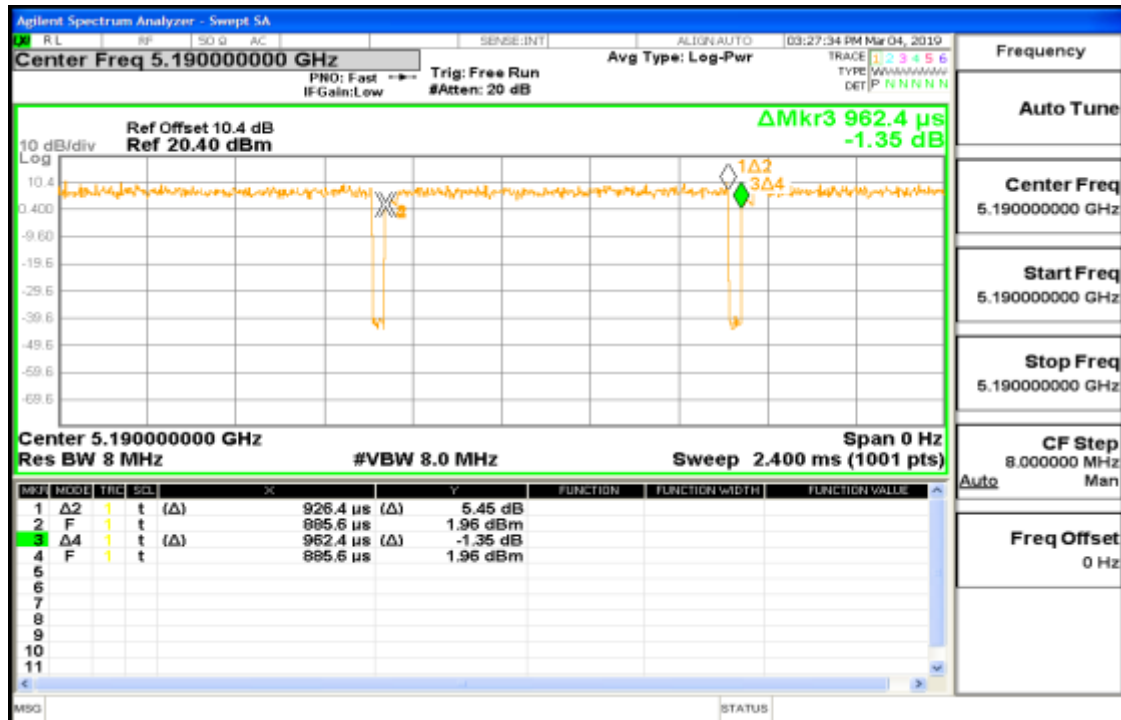


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802.11n HT 40



802.11 ac VHT 80



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8. 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
 - b. 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=Sample, Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

8.3 Measurement Equipment Used

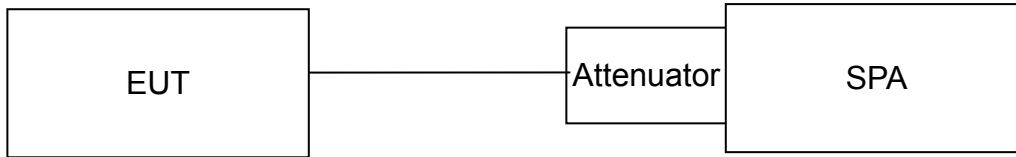
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/09/2018	04/08/2019
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020

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8.4 Test Set-up



8.5 Measurement Result

26dB Bandwidth

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.68	13.556
5220	22.90	13.598
5240	23.12	13.640
5260	23.36	13.685
5300	22.71	13.562
5320	23.13	13.642
5500	23.65	13.738
5580	23.62	13.733
5700	23.20	13.655

802.11a_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.53	13.528
5220	22.44	13.510
5240	23.17	13.649
5260	22.19	13.462
5300	22.75	13.570
5320	22.66	13.552
5500	23.01	13.619
5580	23.40	13.692
5700	23.74	13.755

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	15.96	12.030
5720 (U-NII 3)	6.16	7.896

802.11a_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	16.68	12.222
5720 (U-NII 3)	7.08	8.500

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802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	23.54	13.717
5220	22.85	13.588
5240	23.67	13.742
5260	23.30	13.673
5300	23.68	13.743
5320	23.75	13.757
5500	23.47	13.706
5580	24.05	13.812
5700	23.62	13.733

802.11n_HT20_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	22.43	13.508
5220	23.31	13.675
5240	23.30	13.673
5260	23.67	13.741
5300	23.92	13.788
5320	22.25	13.474
5500	24.20	13.838
5580	23.65	13.738
5700	23.39	13.690

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	16.84	12.263
5720 (U-NII 3)	6.44	8.089

802.11n_HT20_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	17.00	12.304
5720 (U-NII 3)	5.96	7.752

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802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.06	16.134
5230	41.59	16.190
5270	41.17	16.146
5310	40.97	16.125
5510	40.87	16.114
5550	40.29	16.052
5670	40.75	16.101

802.11n_HT40_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	41.03	16.130
5230	41.32	16.162
5270	40.51	16.076
5310	40.83	16.110
5510	40.97	16.124
5550	41.44	16.174
5670	41.35	16.165

802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5710 (U-NII 2C)	35.64	15.519
5710 (U-NII 3)	5.40	7.324

802.11n_HT40_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5710 (U-NII 2C)	35.24	15.470
5710 (U-NII 3)	5.56	7.451

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	83.60	19.222
5290	82.53	19.166
5530	83.82	19.233
5610	82.91	19.186

802.11ac_VHT80_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	83.96	19.241
5290	82.97	19.189
5530	82.84	19.182
5610	83.53	19.218

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5690 (U-NII 2C)	75.80	18.797
5690 (U-NII 3)	6.12	7.868

802.11ac_VHT80_Ch1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5690 (U-NII 2C)	75.96	18.806
5690 (U-NII 3)	6.92	8.401

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6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.34	11.858
5785	15.10	11.789
5825	16.33	12.130

802.11a_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.35	12.135
5785	13.42	11.277
5825	16.32	12.127

802.11n_HT20_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.58	12.451
5785	15.17	11.810
5825	16.20	12.095

802.11n_HT20_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.26	12.370
5785	16.90	12.278
5825	15.33	11.854

802.11n_HT40_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.48	15.500
5795	36.33	15.603

802.11n_HT40_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.45	15.496
5795	35.81	15.540

802.11ac_VHT80_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.20	18.762

802.11ac_VHT80_Ch1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.18	18.761

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99% BW verification for DFS Function

802.11a_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.37	< 5250

802.11a_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.37	< 5250

802.11a_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.75	> 5725

802.11a_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.75	> 5725

802.11n_HT20_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.97	< 5250

802.11n_HT20_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.97	< 5250

802.11n_HT20_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.12	> 5725

802.11n_HT20_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5745	5736.15	> 5725

802.11n_HT40_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.20	< 5250

802.11n_HT40_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.15	< 5250

802.11n_HT40_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5755	5736.80	> 5725

802.11n_HT40_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5755	5736.90	> 5725

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802.11ac_VHT80_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5248.00	< 5250

802.11n_HT80_Ch1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5248.00	< 5250

802.11ac_VHT80_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5775	5737.20	> 5725

802.11n_HT80_Ch1

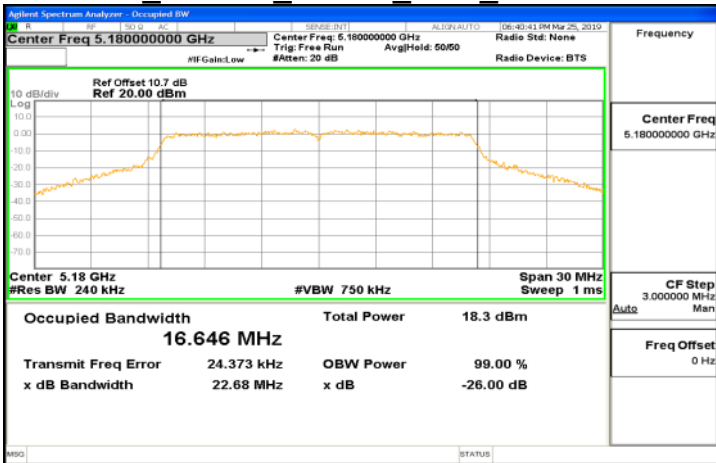
Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5775	5737.20	> 5725

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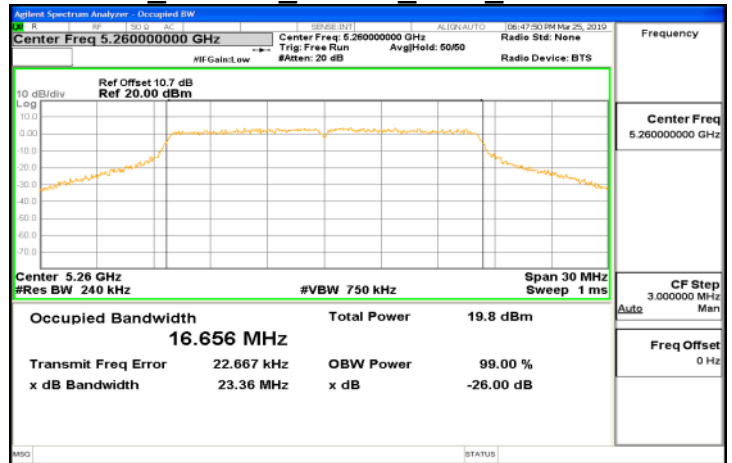
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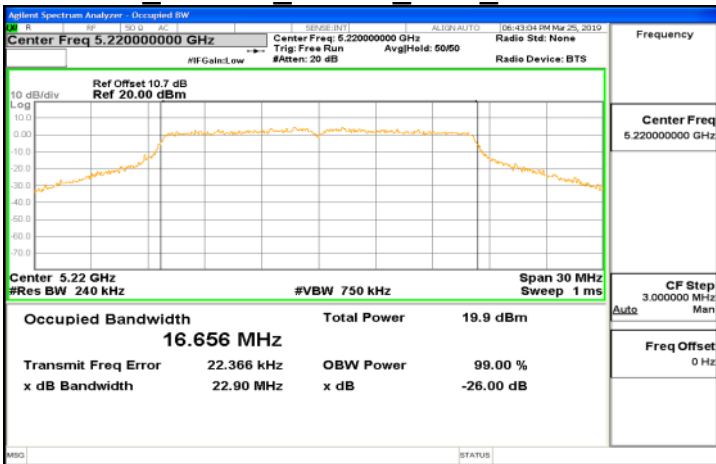
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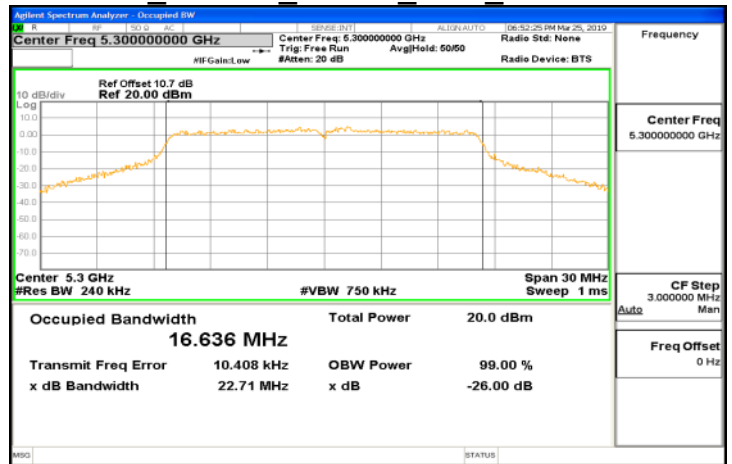
FCC 802.11a 20MHz Main 5260MHz



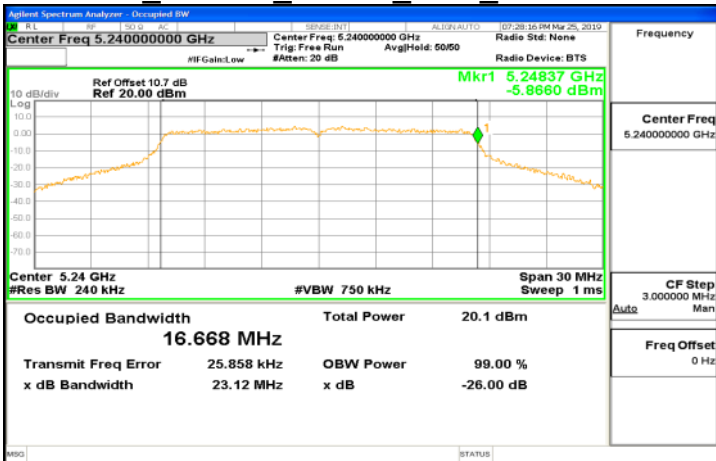
FCC 802.11a 20MHz Main 5220MHz



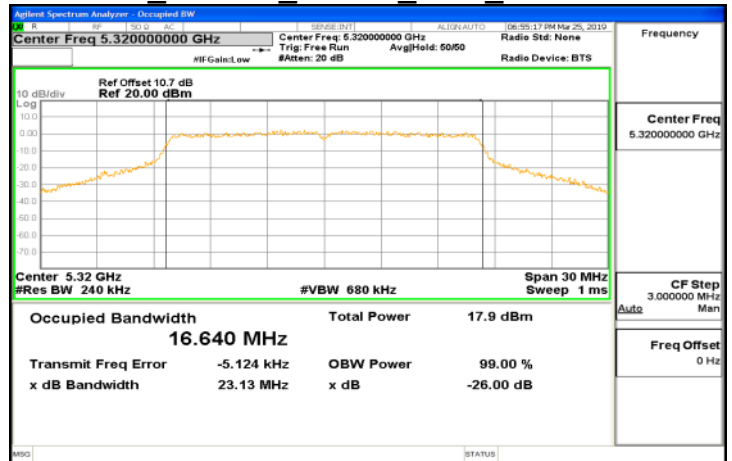
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FCC 802.11a 20MHz Main 5240MHz



FCC 802.11a 20MHz Main 5320MHz

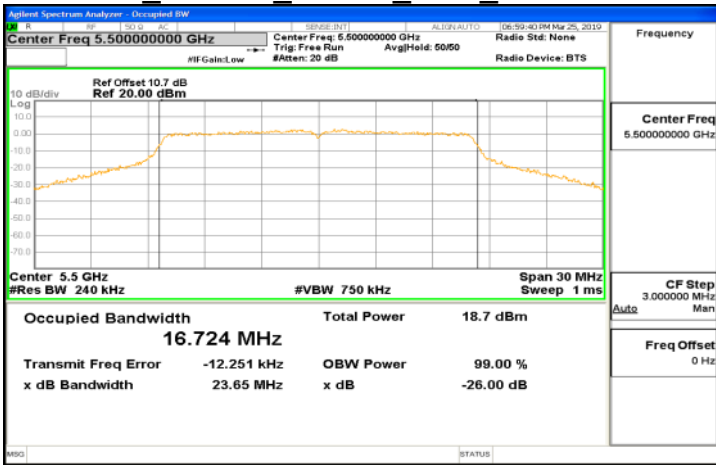


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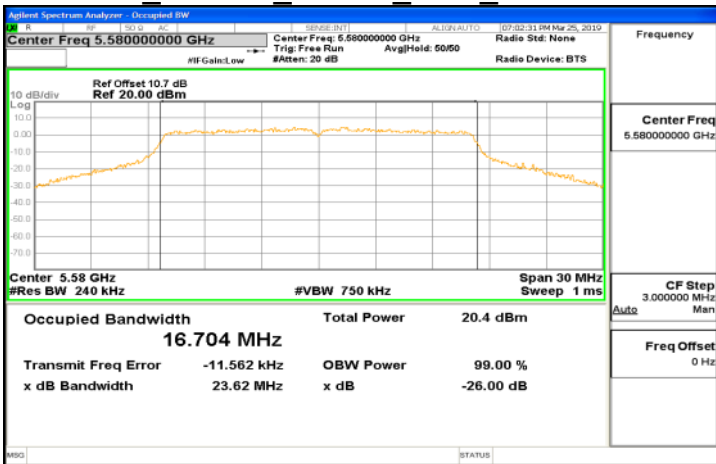
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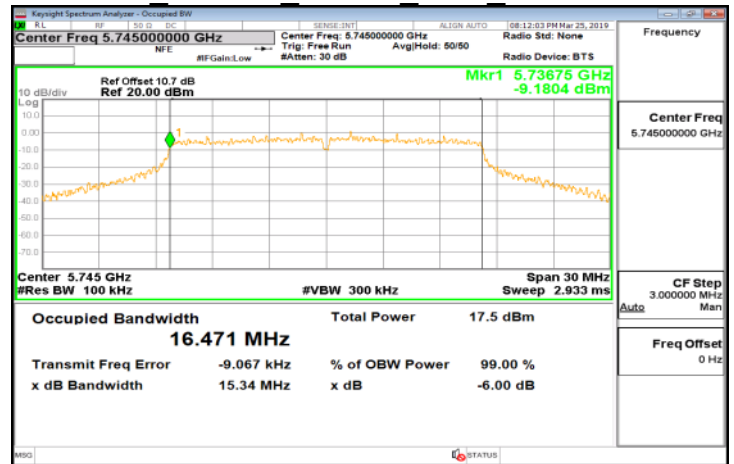
FCC 802.11a 20MHz Main 5720MHz



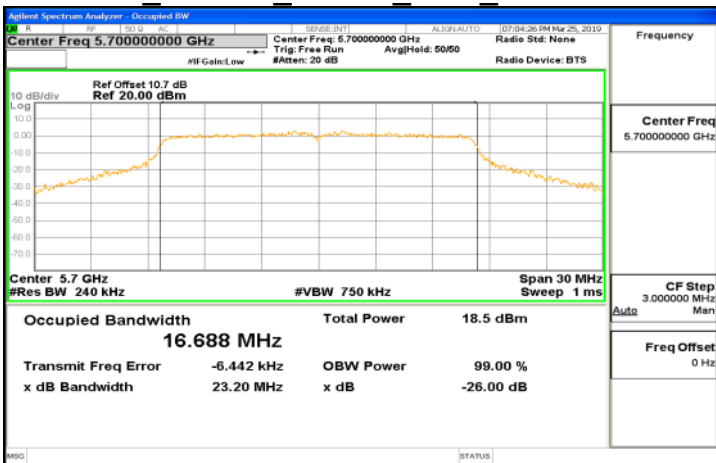
FCC 802.11a 20MHz Main 5580MHz



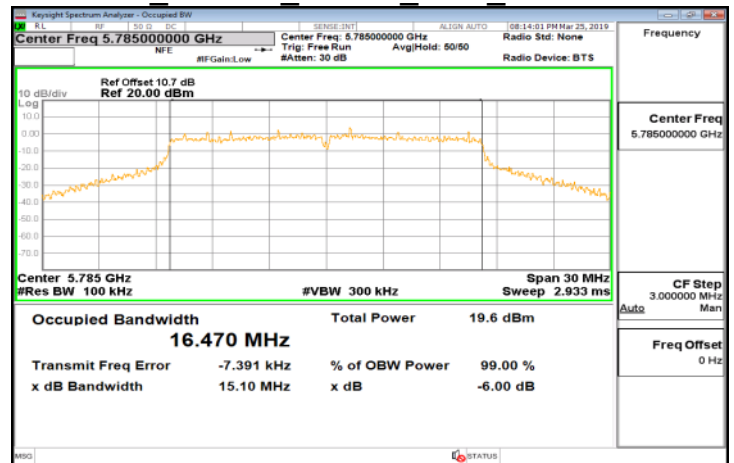
FCC 802.11a 20MHz Main 5745MHz



FCC 802.11a 20MHz Main 5700MHz



FCC 802.11a 20MHz Main 5785MHz

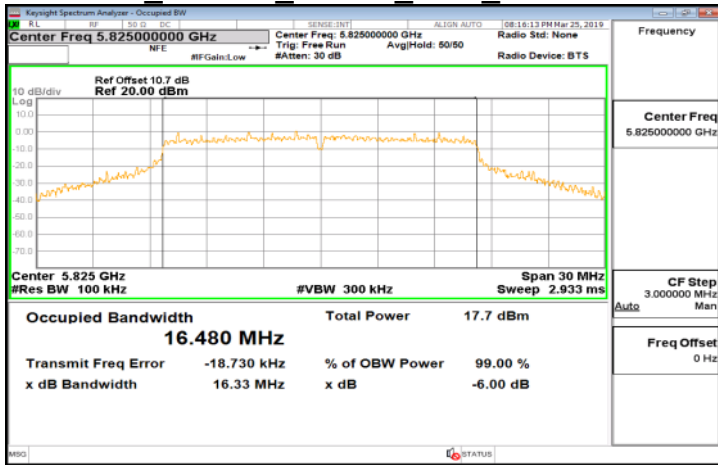


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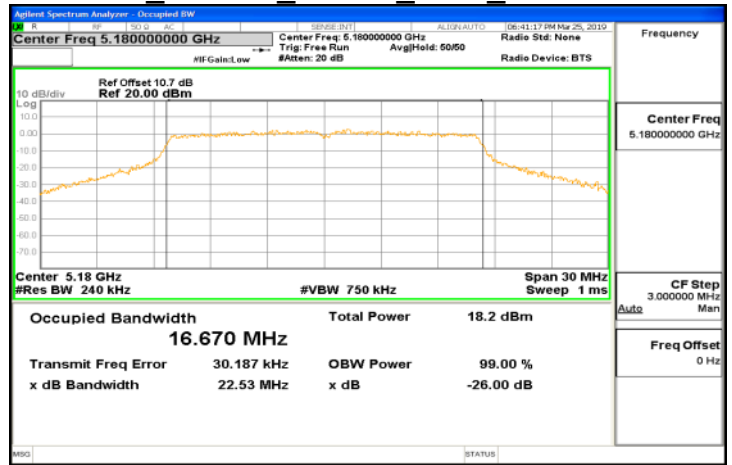
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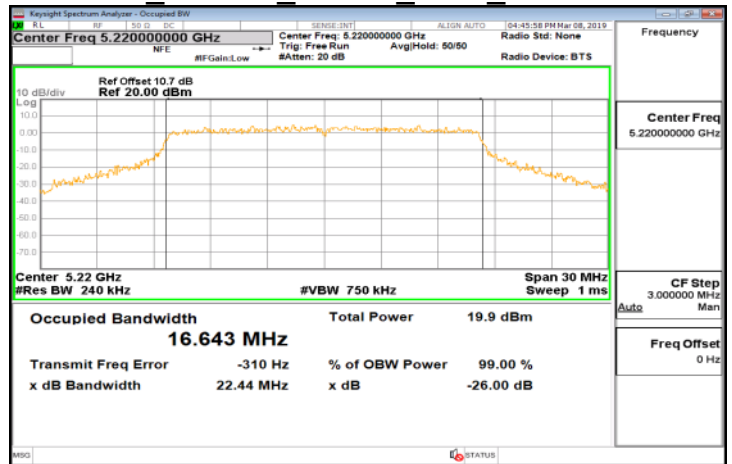
FCC 802.11a 20MHz Main 5825MHz



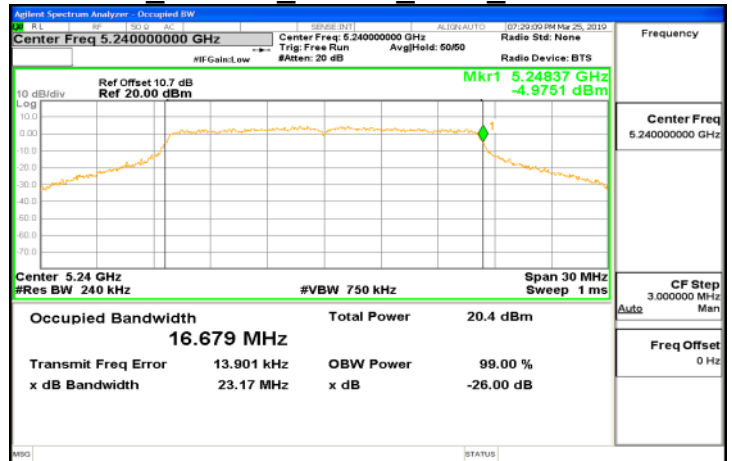
FCC 802.11a 20MHz Aux1 5180MHz



FCC 802.11a 20MHz Aux1 5220MHz



FCC 802.11a 20MHz Aux1 5240MHz

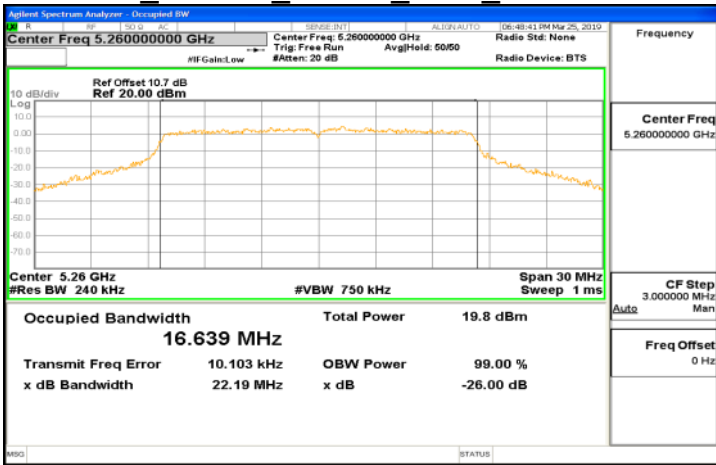


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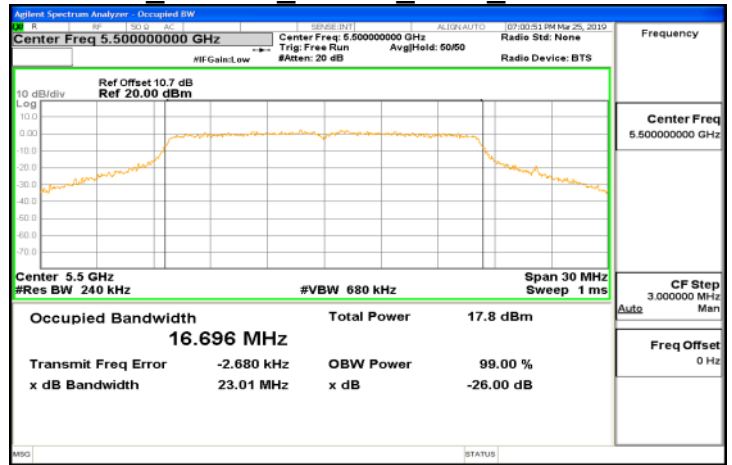
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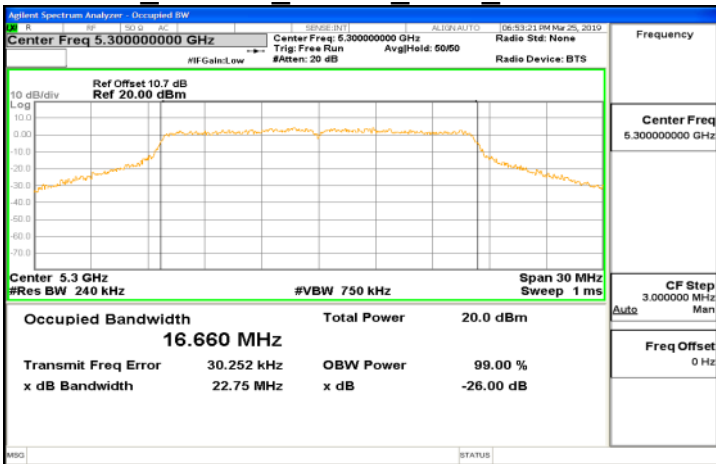
FCC 802.11a 20MHz Aux1 5260MHz



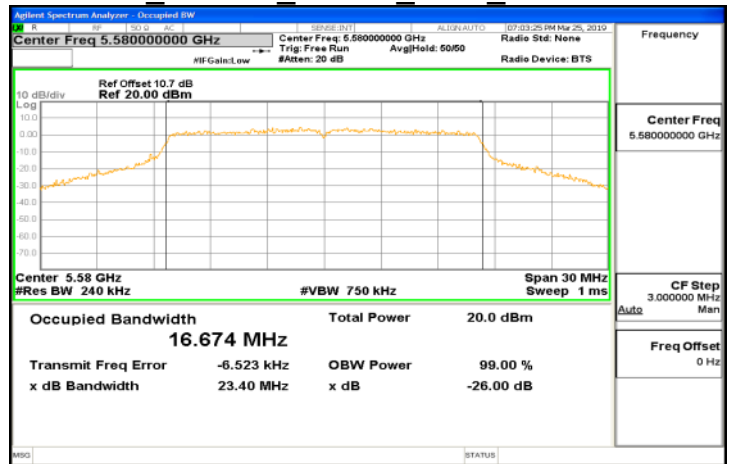
FCC 802.11a 20MHz Aux1 5500MHz



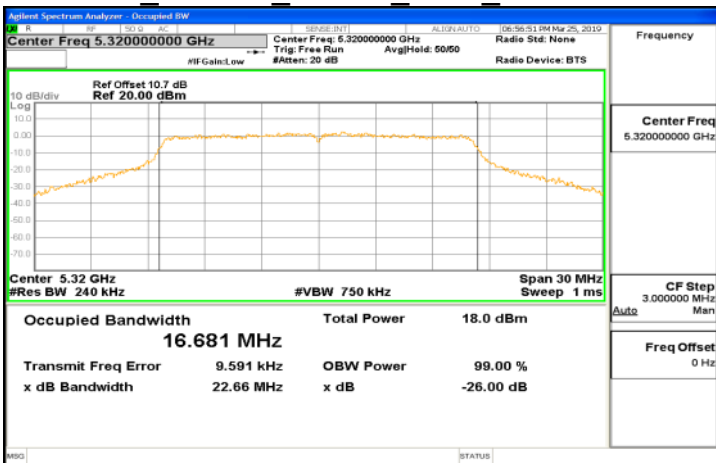
FCC 802.11a 20MHz Aux1 5300MHz



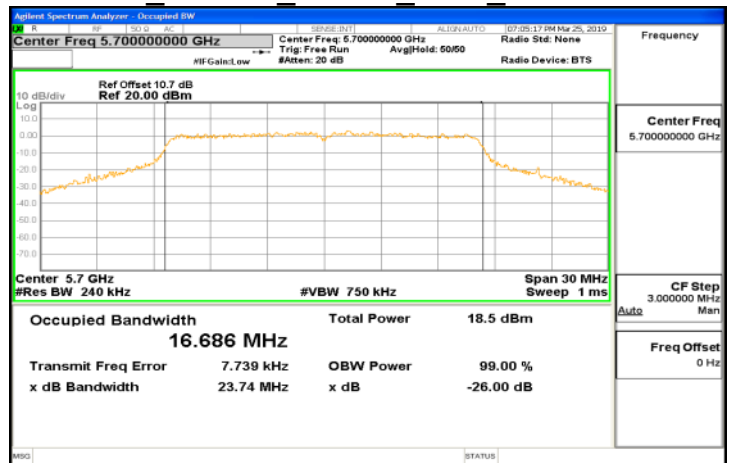
FCC 802.11a 20MHz Aux1 5580MHz



FCC 802.11a 20MHz Aux1 5320MHz



FCC 802.11a 20MHz Aux1 5700MHz



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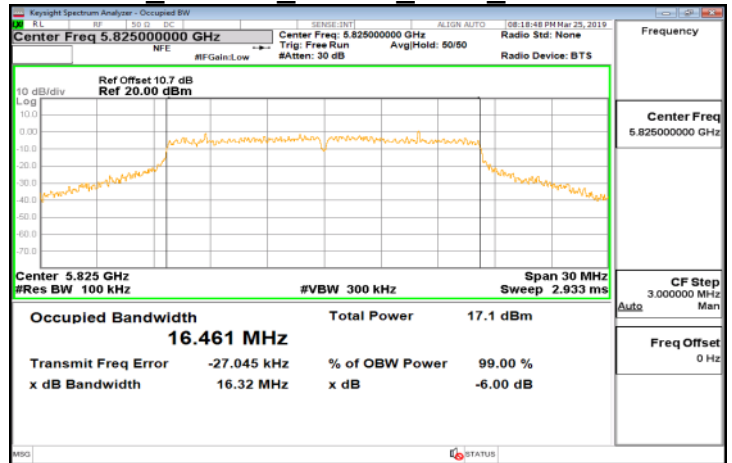
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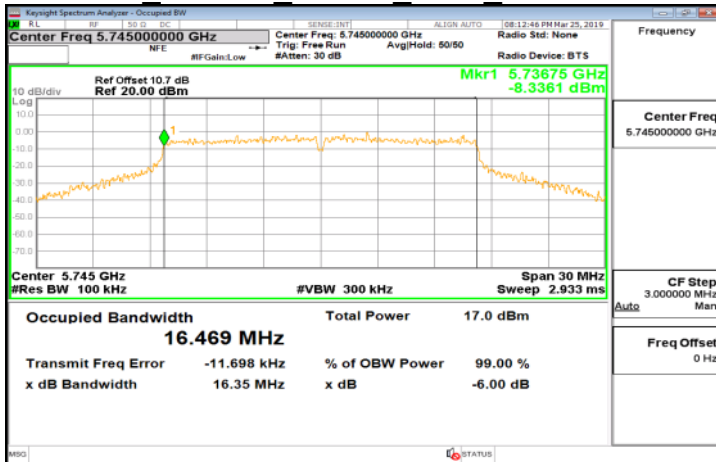
FCC 802.11a 20MHz Aux1 5720MHz



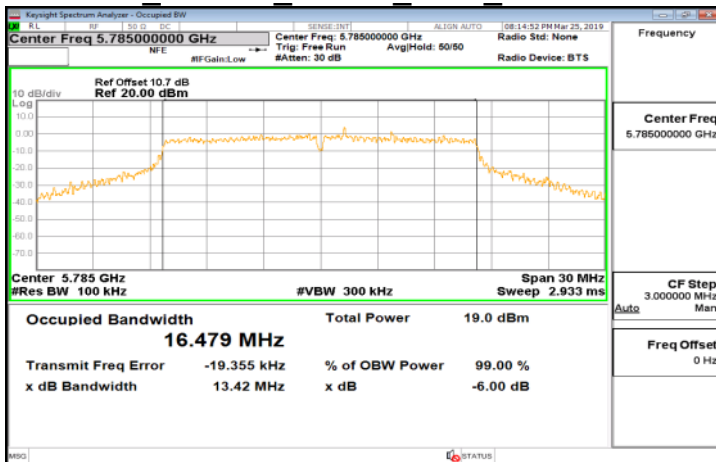
FCC 802.11a 20MHz Aux1 5825MHz



FCC 802.11a 20MHz Aux1 5745MHz



FCC 802.11a 20MHz Aux1 5785MHz

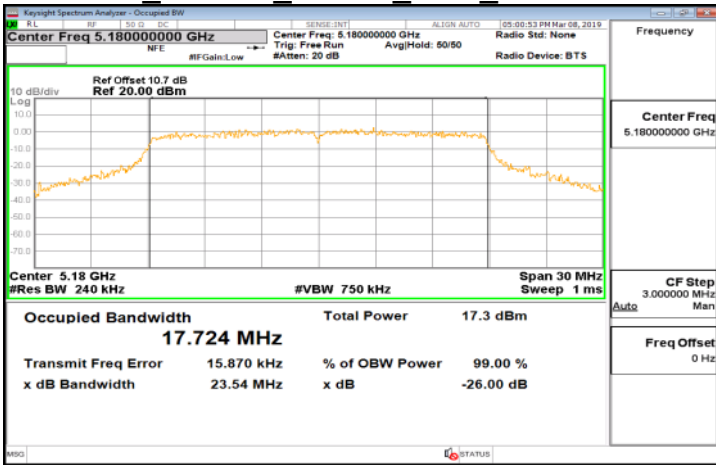


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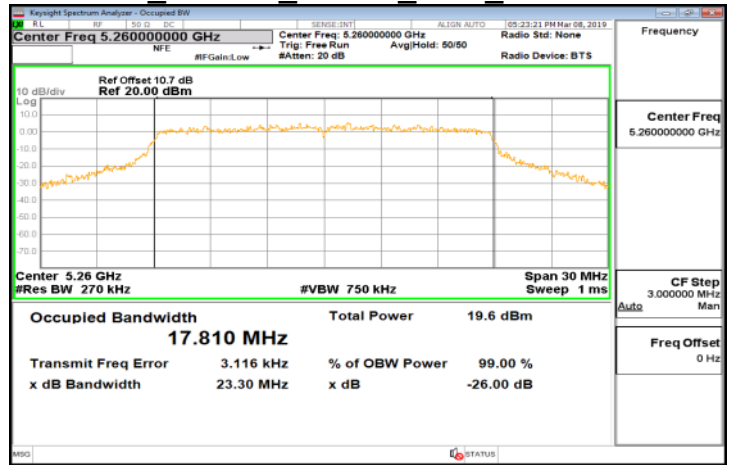
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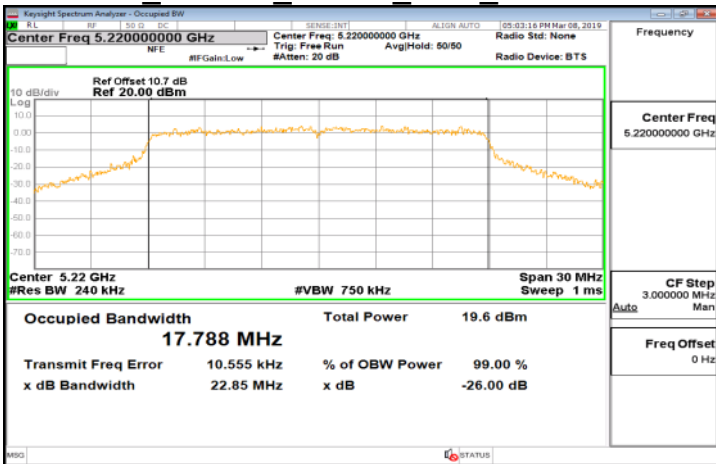
FCC 802.11n 20MHz Main 5180MHz



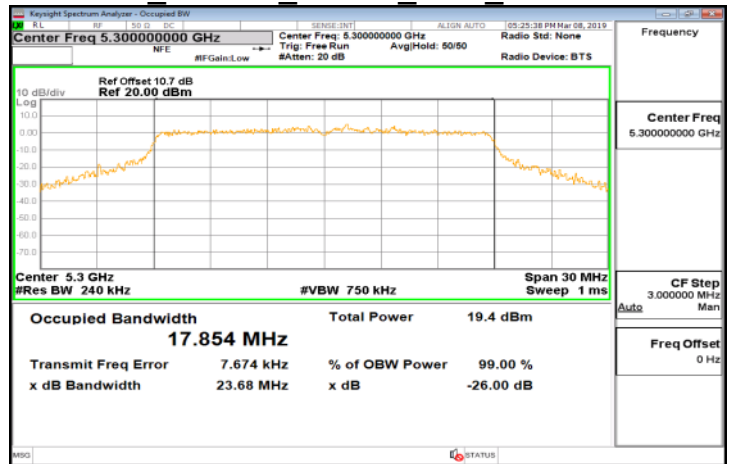
FCC 802.11n 20MHz Main 5260MHz



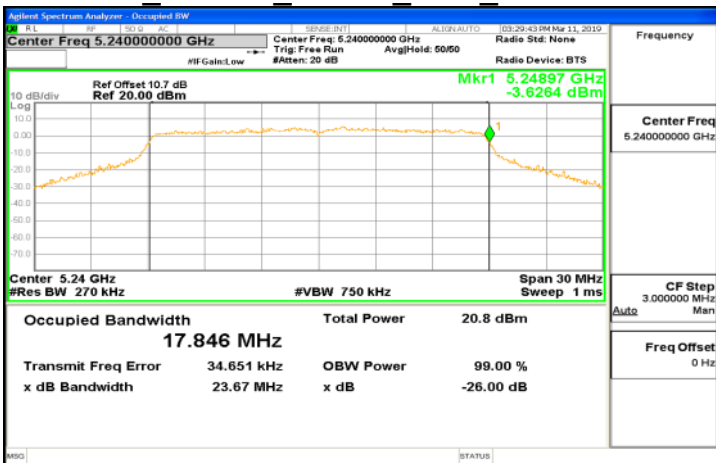
FCC 802.11n 20MHz Main 5220MHz



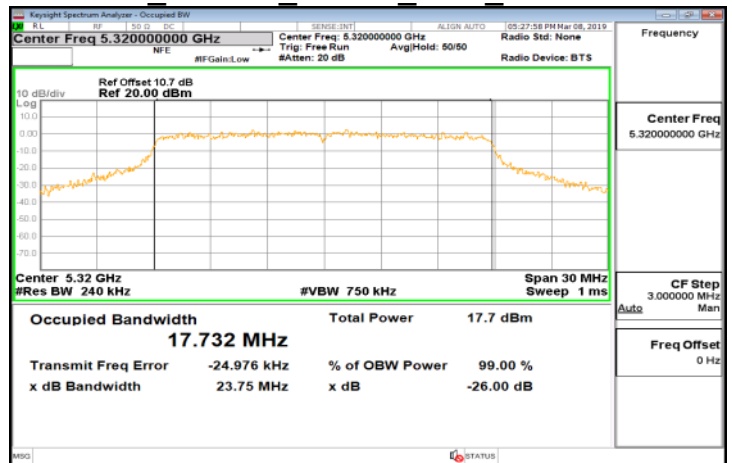
FCC 802.11n 20MHz Main 5300MHz



FCC 802.11n 20MHz Main 5240MHz



FCC 802.11n 20MHz Main 5320MHz

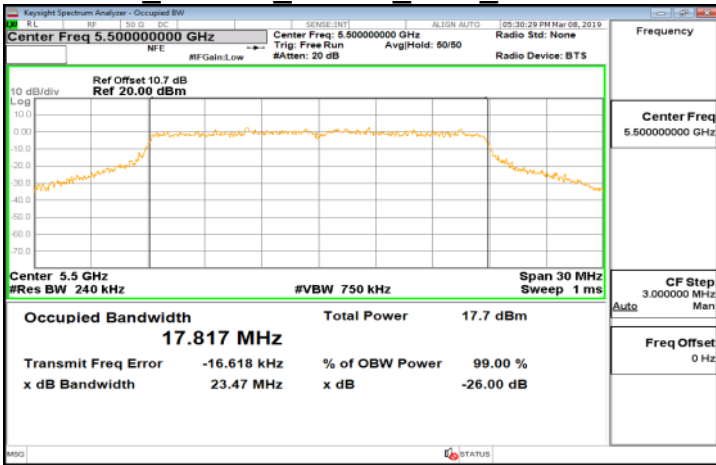


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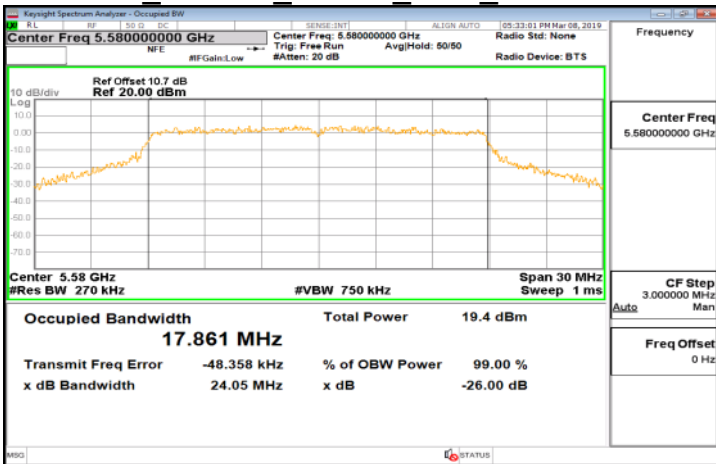
FCC 802.11n 20MHz Main 5500MHz



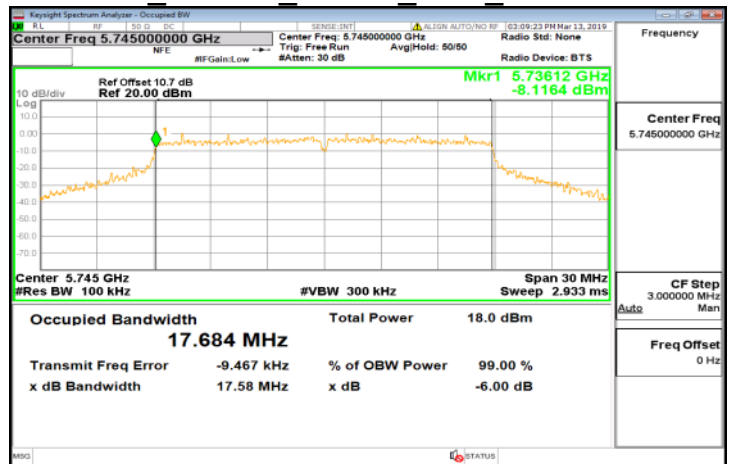
FCC 802.11n 20MHz Main 5720MHz



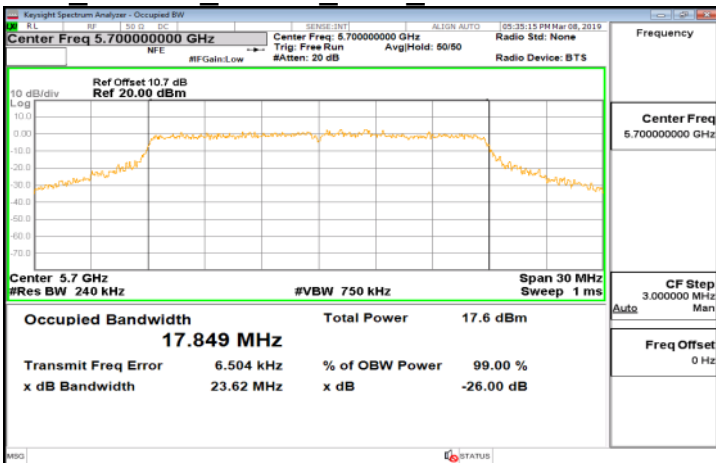
FCC 802.11n 20MHz Main 5580MHz



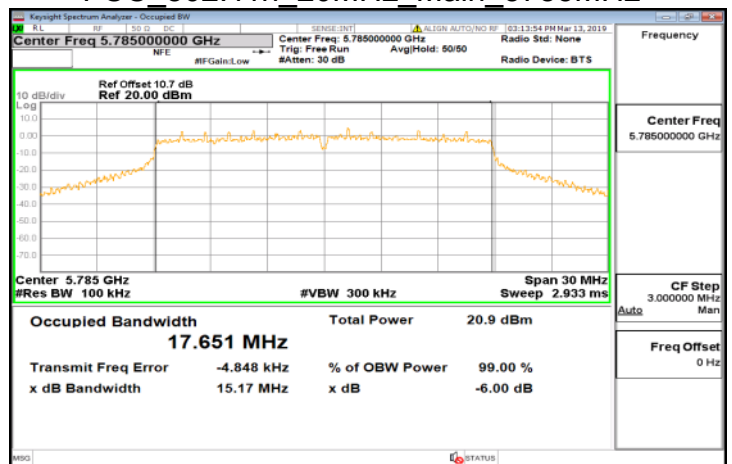
FCC 802.11n 20MHz Main 5745MHz



FCC 802.11n 20MHz Main 5700MHz



FCC 802.11n 20MHz Main 5785MHz

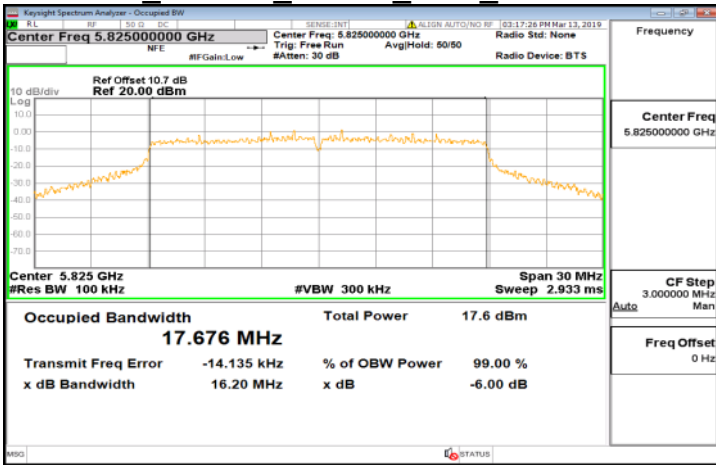


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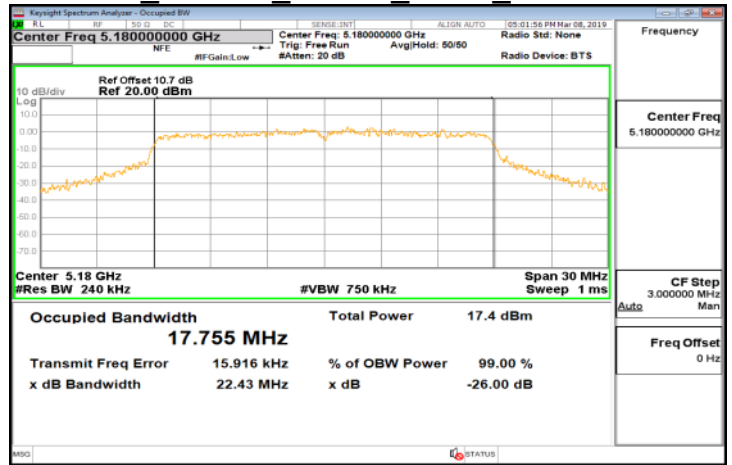
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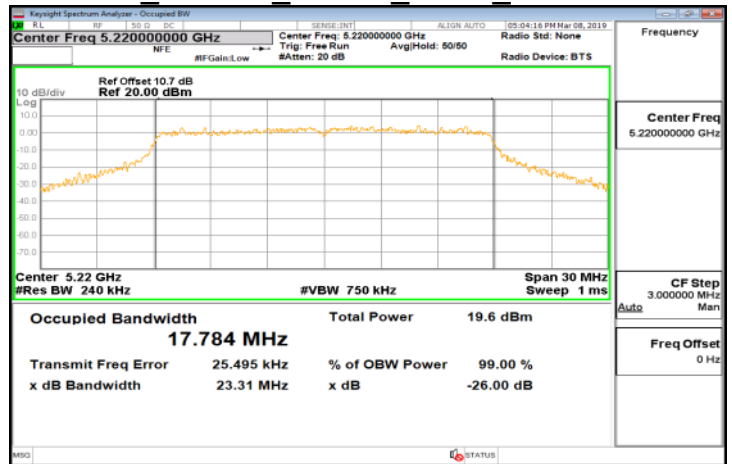
FCC 802.11n 20MHz Main 5825MHz



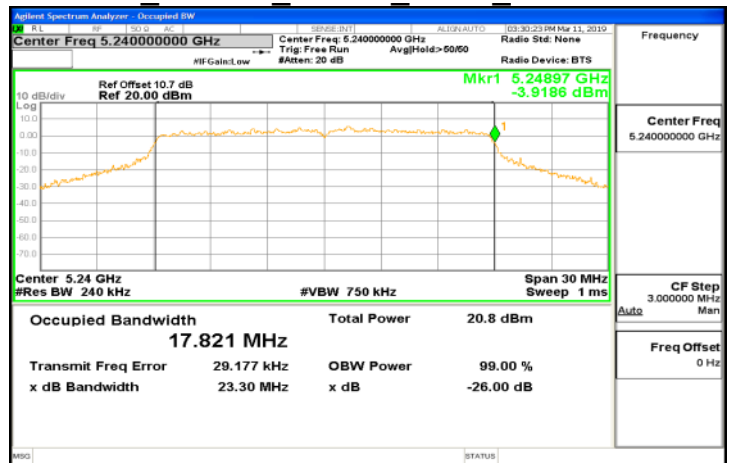
FCC 802.11n 20MHz AUX1 5180MHz



FCC 802.11n 20MHz AUX1 5220MHz



FCC 802.11n 20MHz AUX1 5240MHz

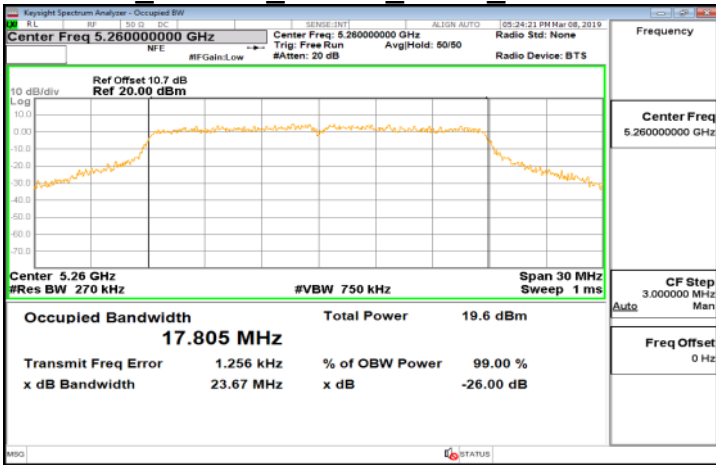


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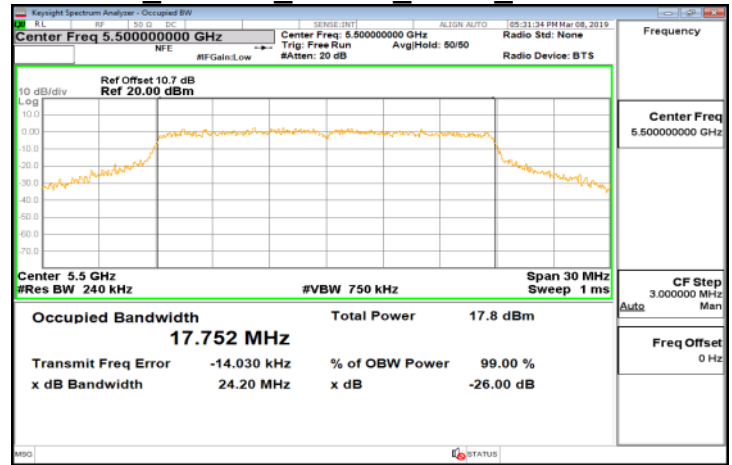
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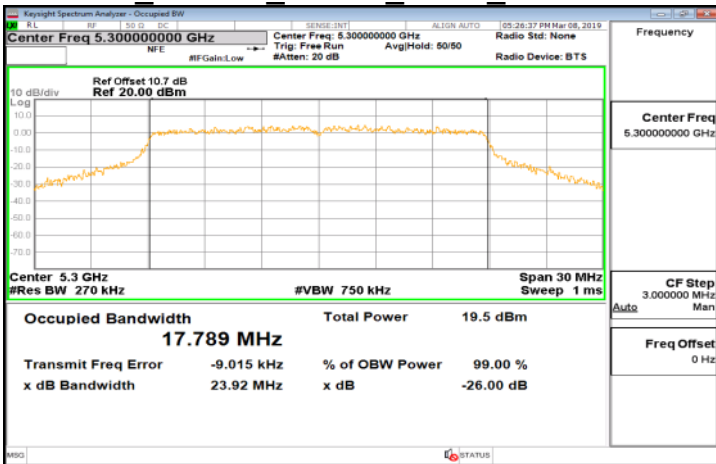
FCC 802.11n 20MHz AUX1 5260MHz



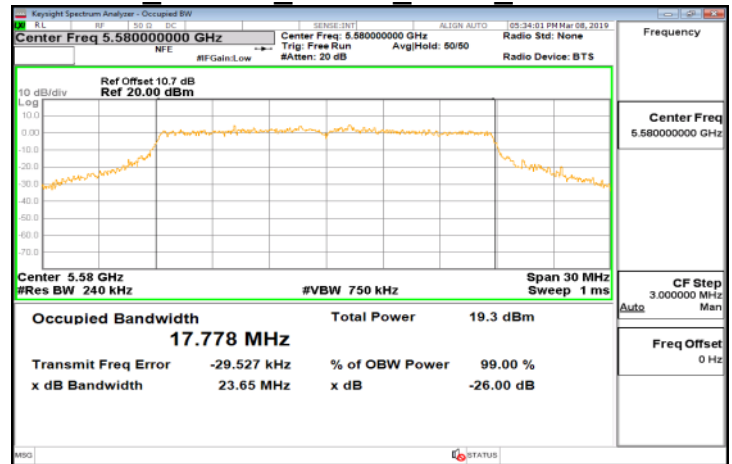
FCC 802.11n 20MHz AUX1 5500MHz



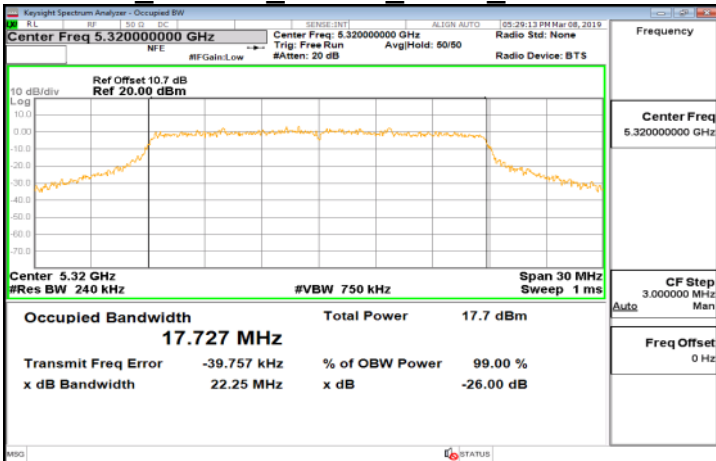
FCC 802.11n 20MHz AUX1 5300MHz



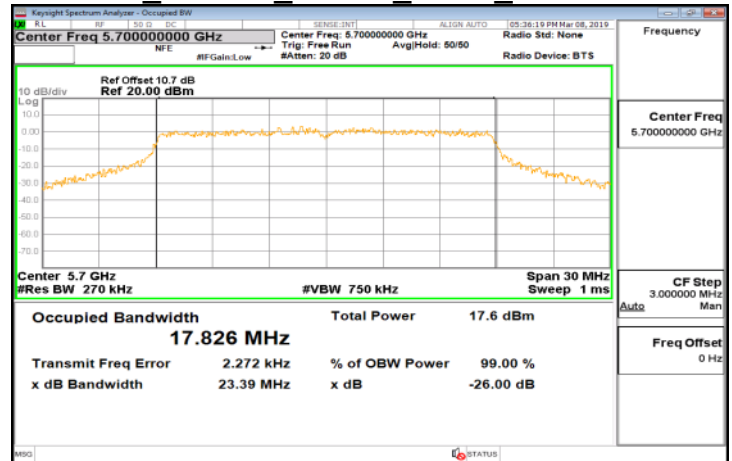
FCC 802.11n 20MHz AUX1 5580MHz



FCC 802.11n 20MHz AUX1 5320MHz



FCC 802.11n 20MHz AUX1 5700MHz



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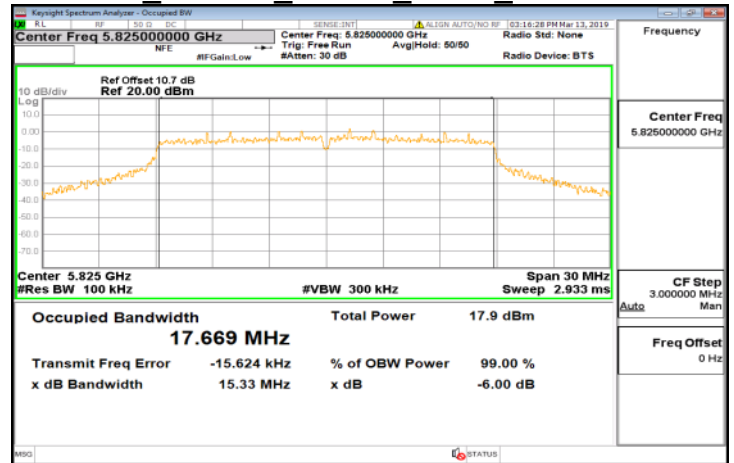
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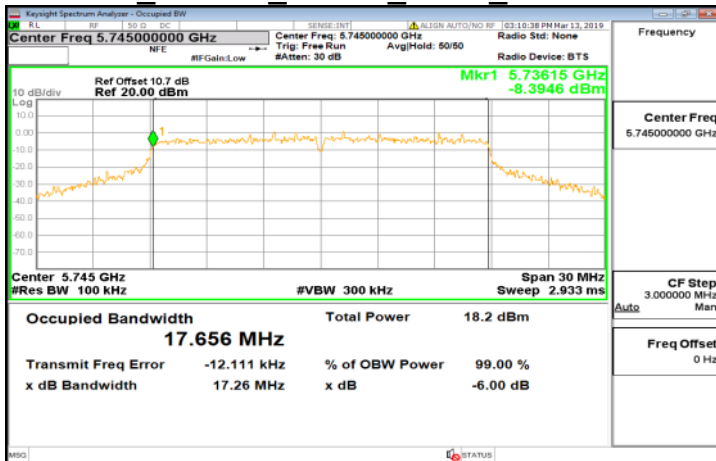
FCC 802.11n 20MHz AUX1 5720MHz



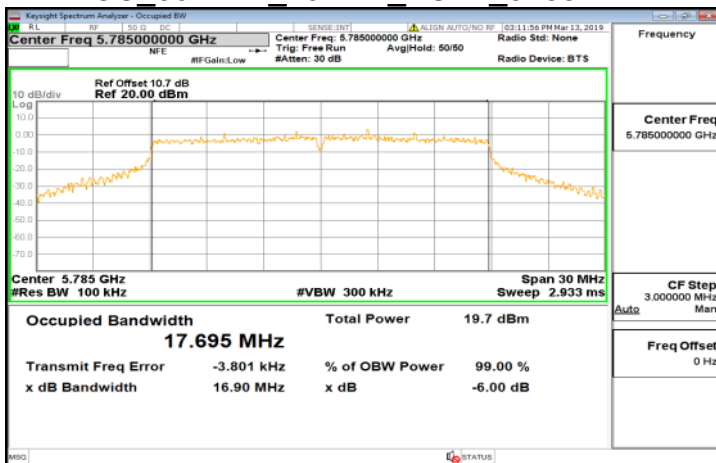
FCC 802.11n 20MHz AUX1 5825MHz



FCC 802.11n 20MHz AUX1 5745MHz



FCC 802.11n 20MHz AUX1 5785MHz

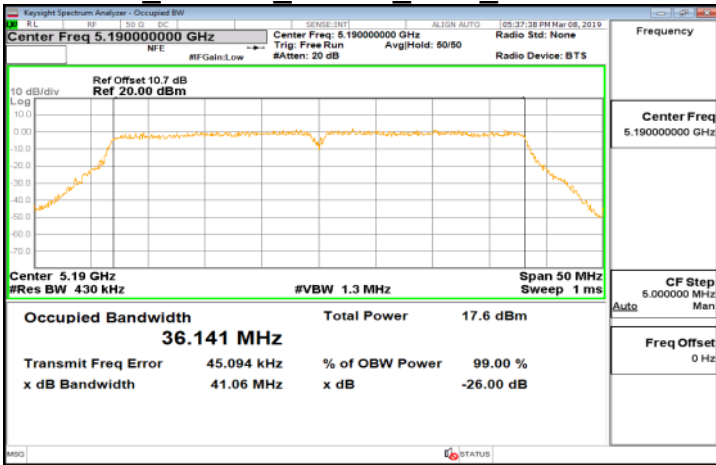


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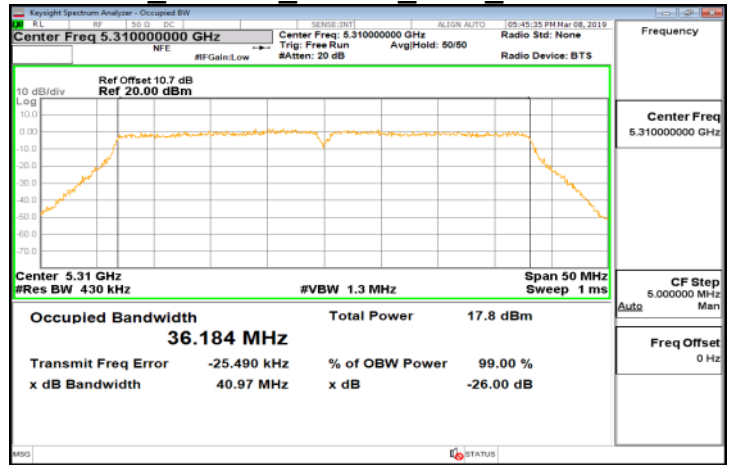
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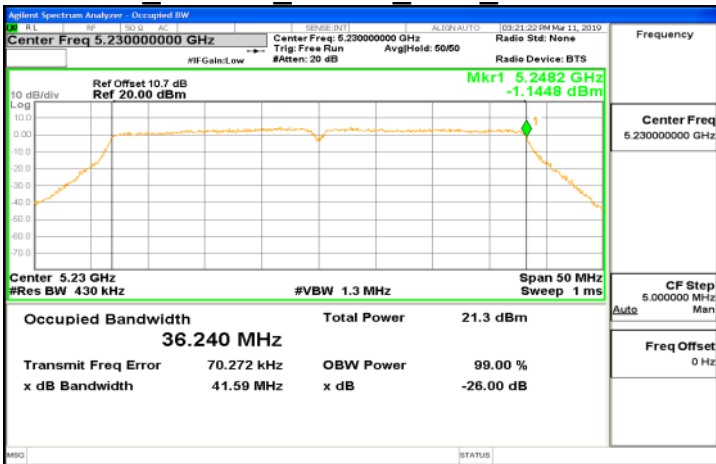
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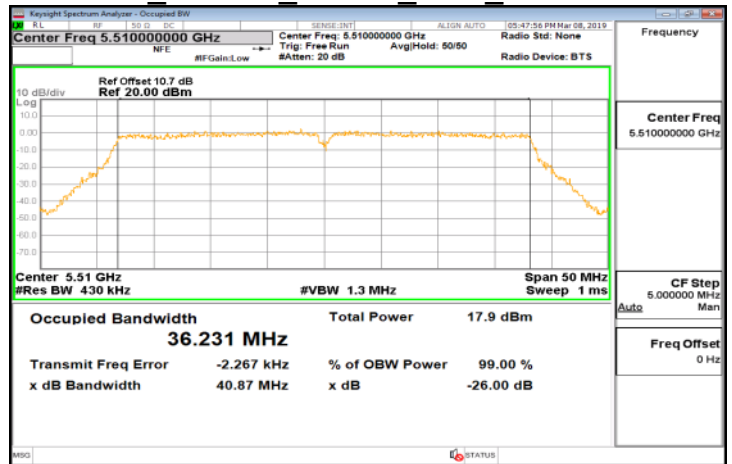
FCC 802.11n 40MHz Main 5310MHz



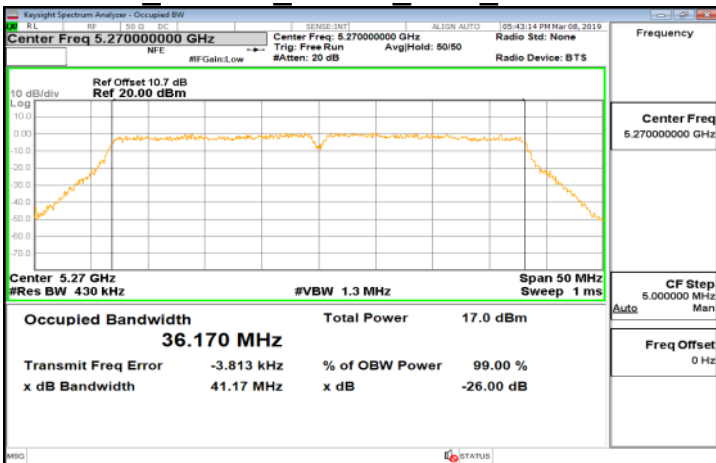
FCC 802.11n 40MHz Main 5230MHz



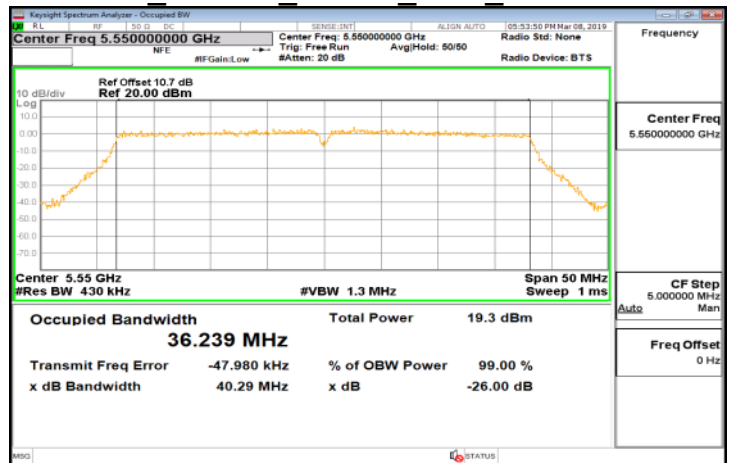
FCC 802.11n 40MHz Main 5510MHz



FCC 802.11n 40MHz Main 5270MHz



FCC 802.11n 40MHz Main 5550MHz

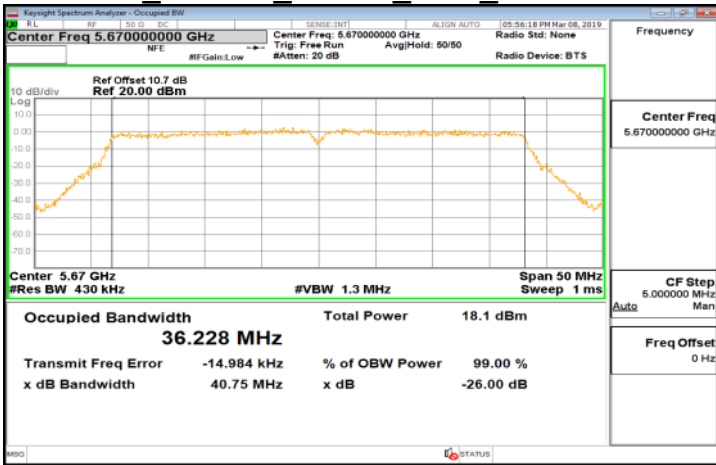


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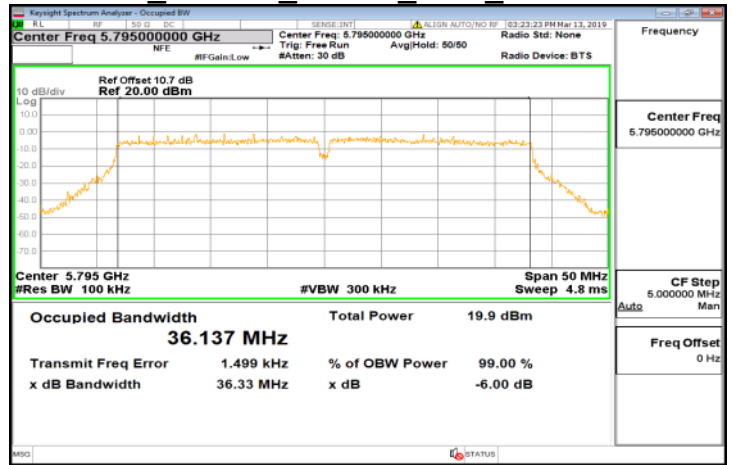
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FCC 802.11n 40MHz Main 5670MHz



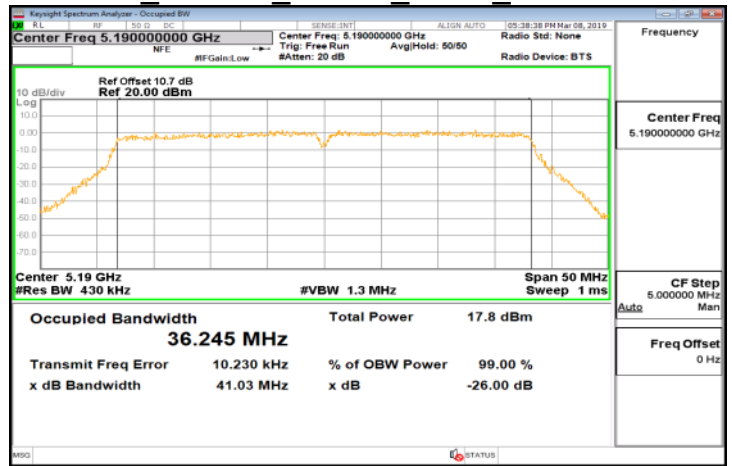
FCC 802.11n 40MHz Main 5795MHz



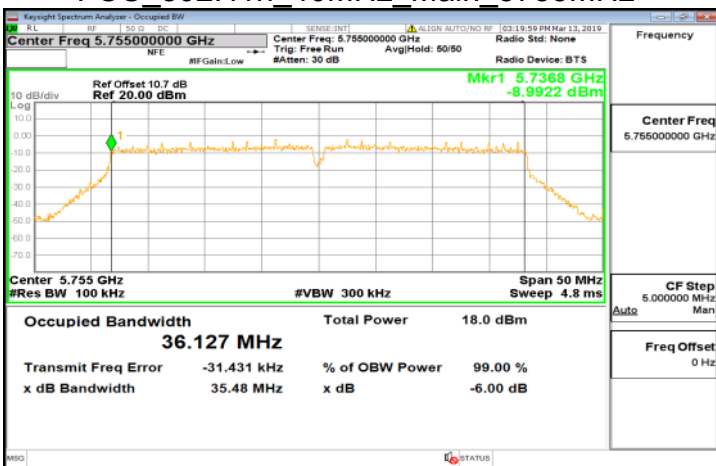
FCC 802.11n 40MHz Main 5710MHz



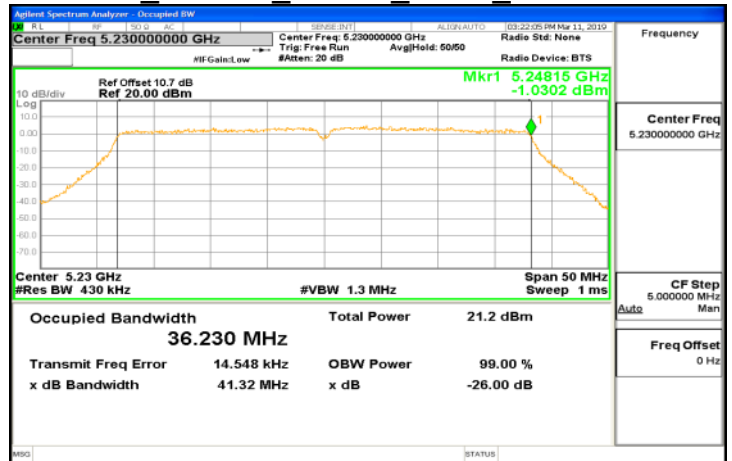
FCC 802.11n 40MHz AUX1 5190MHz



FCC 802.11n 40MHz Main 5755MHz



FCC 802.11n 40MHz AUX1 5230MHz

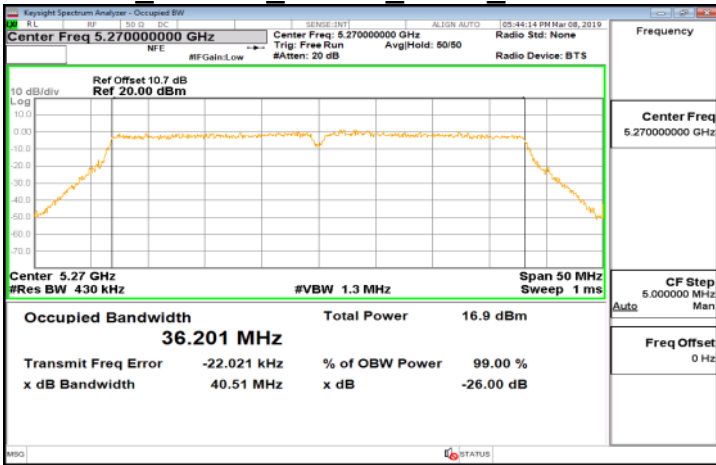


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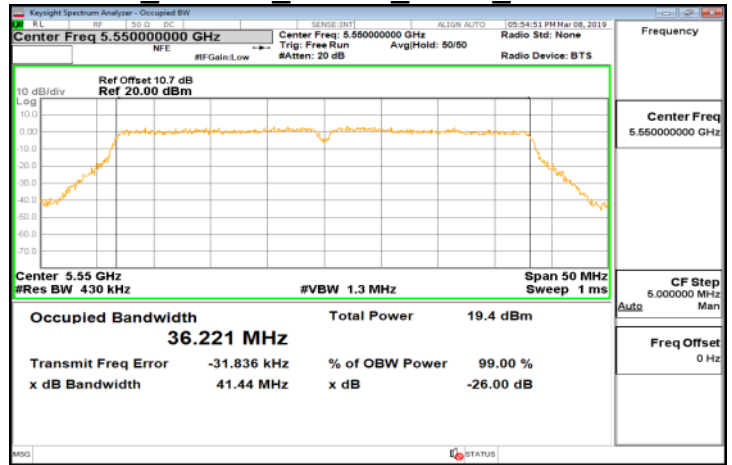
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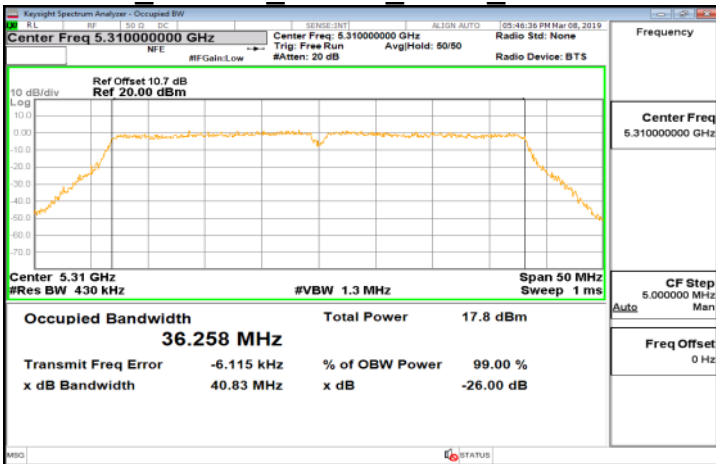
FCC 802.11n 40MHz AUX1 5270MHz



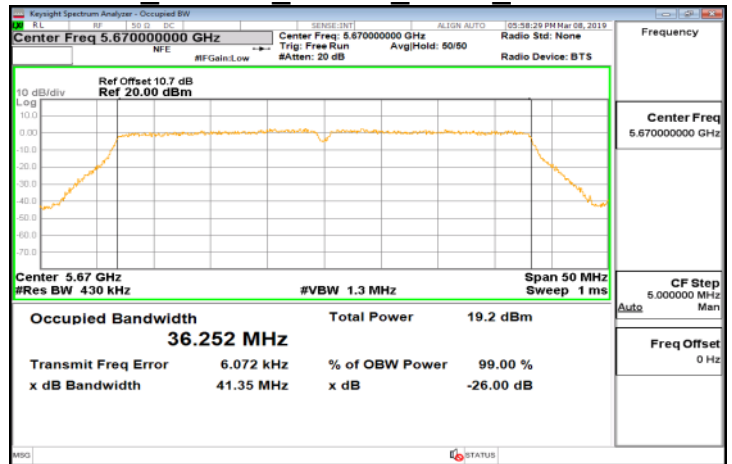
FCC 802.11n 40MHz AUX1 5550MHz



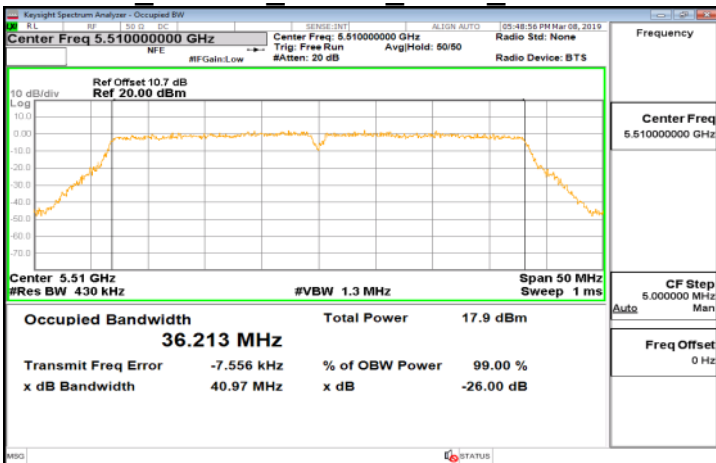
FCC 802.11n 40MHz AUX1 5310MHz



FCC 802.11n 40MHz AUX1 5670MHz



FCC 802.11n 40MHz AUX1 5510MHz



FCC 802.11n 40MHz AUX1 5710MHz



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