FCC TEST REPORT

Product Name:	4K Android TV OTT Box
Trade Mark:	Entel
Model No.:	DIW585 UHD Entel
Add. Model No.:	N/A
Report Number:	191023001RFC-4
Test Standards:	FCC 47 CFR Part 15 Subpart E
FCC ID:	2AUWA-DV8235M3
Test Result:	PASS
Date of Issue:	December 4, 2019

Prepared for:

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Prepared by:

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Date: December 4, 2019

Version

Version No.	Date	Description
V1.0	December 4, 2019	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Shenzhen SDMC Technology Co.,Ltd.
Address of Applicant:	7/F, W2-A, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen SDMC Technology Co.,Ltd.
Address of Manufacturer:	7/F, W2-A, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	4K Android TV OTT Box		
Model No.:	DIW585 UHD Entel		
Add. Model No.:	N/A		
Trade Mark:	Entel		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V4.2	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
Sample Received Date:	October 25, 2019		
Sample Tested Date:	October 25, 2019 to November 22, 2019		

1.2.2 Description of Accessories

Adaptor(1)	
Model No.:	NBS12F050200VE
Input:	100-240 V~50/60 Hz 0.3A
Output:	5V ⎓ 2A
DC Cable:	1.80 Meter, Unshielded without ferrite

Cable (1)	
Description:	HDMI Cable
Cable Type:	Unshielded without ferrite
Length:	1.5 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)	
	5250 MHz to 5350 MHz (U-NII-2A)	
	5470 MHz to 5725 MHz (U-NII-2C)	
	5 725 MHz to 5 850 MHz (U-NII-3)	
Frequency Ranges:	5180 MHz to 5240 MHz	
	5260 MHz to 5320 MHz	
	5500 MHz to 5700 MHz	
	5 745 MHz to 5 825 MHz	
Support Standards:	IEEE 802.11a/n/ac	
TPC Function:	Not Support	
DFS Operational mode:	Slave without radar Interference detection function	
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)	
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)	
	IEEE 802.11ac: OFDM(64QAM, 16QAM, QPSK, BPSK)	
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz	
	IEEE 802.11n-HT40/ac-VHT40: 40 MHz	
	IEEE 802.11ac-VHT80: 80 MHz	
Data Rate:	IEEE 802.11a: Up to 54 Mbps	
	IEEE 802.11n-HT20: Up to MCS15	
	IEEE 802.11n-HT40: Up to MCS15	
	IEEE 802.11ac-VHT20: Up to MCS8	
	IEEE 802.11ac-VHT40: Up to MCS9	
	IEEE 802.11ac-VHT80: Up to MCS9	
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40)/ac-VHT40 1 for IEEE 802.11acVHT80	
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40)/ac-VHT40 1 for IEEE 802.11acVHT80	
	5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20 5 for IEEE 802.11n-HT40/ac-VHT40 2 for IEEE 802.11ac-VHT80	
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80	
Antenna Type:	Chain 0	FPC Antenna
	Chain 1	FPC Antenna
Antenna Gain:	Chain 0	5150 MHz to 5250 MHz: 3.05 dBi
		5250 MHz to 5350 MHz: 3.05 dBi
		5470 MHz to 5725 MHz: 3.21 dBi
		5725 MHz to 5850 MHz: 3.37 dBi
	Chain 1	5150 MHz to 5250 MHz: 3.04 dBi
		5250 MHz to 5350 MHz: 3.04 dBi

		5470 MHz to 5725 MHz: 2.92 dBi			
		5725 MHz to 5850 MHz: 2.93 dBi			
Maximum conducted output power (dBm):	**SISO_Chain 0**	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	11.92	11.50	13.52	11.08
	SISO_Chain 1	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	14.03	13.03	12.06	12.81
	MIMO_Chain 0+1	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11n-HT20:	15.91	15.22	15.62	14.56
	IEEE 802.11n-HT40:	15.33	15.76	15.67	14.74
	IEEE 802.11ac-VHT20:	15.86	15.28	15.55	14.57
	IEEE 802.11ac-VHT40:	15.38	15.76	15.84	14.77
	IEEE 802.11ac-VHT80:	14.59	15.04	15.04	14.12
Normal Test Voltage:	AC 120V/60Hz				

1.4 OTHER INFORMATION

Operation Frequency Each of Channel				
	U-NII-1	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
IEEE 802.11a, IEEE 802.11n-HT20, IEEE 802.11ac-VHT20	**f = 5000 + 5k, k = 32 + 4n**			**f = 5000 + 5k, k = 145 + 4n**
	n = 1,…, 4	**n = 5,…, 8**	**n = 17,…, 27**	**n = 1,…, 5**
IEEE 802.11n-HT40, IEEE 802.11ac-VHT40	**f = 5000 + 5k, k = 30 + 8n**			**f = 5000 + 5k, k = 143 + 8n**
	n = 1, 2	**n = 1,…, 5**	**n = 9,…, 13**	**n = 1, 2**
IEEE 802.11ac-VHT80	**f = 5000 + 5k, k = 26 + 16n**			**f = 5000 + 5k, k = 155**
	n = 1	**n = 1, 2**	**n = 5, 6**	
Note: **f** is the operating frequency (MHz); **k** is the operating channel.				

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	FCC ID	Supplied by
USB disk	Kingston	DTSE9	N/A	UnionTrust	UnionTrust
Wireless Home Router	SAGEMCOM	FAST5280	N/A	VW3FAST5280	UnionTrust
Monitor	LG	U3202S	N/A	UnionTrust	UnionTrust
Micro SD	Kingston	16GB	N/A	UnionTrust	UnionTrust
DVD	GIEC	BDP-G4305	N/A	UnionTrust	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.15 Meter	UnionTrust
2	Ethernet Cable	RJ45	1.5 Unshielded without ferrite	UnionTrust
3	AV	AV	1.2 Unshielded without ferrite	UnionTrust
4	SPDIF	SPDIF	1.5 Unshielded without ferrite	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart C Section 15.407(a)(1) (2)	N/A	PASS
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v02r01 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v02r01 Section C.2	PASS
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	PASS
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section F	PASS
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	PASS
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013, Section 6.2.	PASS

For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A[1]
U-NII Detection Bandwidth	N/A[1]
Channel Closing Transmission Time	PASS
Channel Move Time	PASS
DFS Detection Threshold	N/A[1]
Non- Occupancy Period	N/A[1]

Note:

1) The EUT is slave, NA In this whole report not applicable.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 18, 2019	May 18, 2020
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2019	Nov. 23, 2020
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 08, 2018	Dec. 08, 2019
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 23, 2019	Jun. 23, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jan. 05, 2019	Jan. 05, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2019	Nov. 23, 2020
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2019	Nov. 23, 2020
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 24, 2019	Nov. 23, 2020
☐	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Nov. 24, 2019	Nov. 23, 2020
☒	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Nov. 24, 2019	Nov. 23, 2020

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	AC 120V/60Hz and AC 240V/50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
AC Power Line Conducted Emission	23.4	41.0	100.12	Bert Xiong
26 dB emission bandwidth	24.5	56.0	100.3	Hank Wu
Maximum conducted output power	24.5	56.0	100.3	Hank Wu
Peak Power Spectral Density	24.5	56.0	100.3	Hank Wu
6 dB bandwidth	24.5	56.0	100.3	Hank Wu
Dynamic Frequency Selection	24.5	56.0	100.3	Hank Wu
Radiated Emissions and Band Edge Measurement	23.0	68.0	99.7	Andy Lin

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 120	Channel 140
		5500 MHz	5600 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 118	Channel 134
		5510 MHz	5590 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80	5150 MHz to 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5250 MHz to 5350 MHz	--	Channel 58	--
		--	5290 MHz	--
	5470 MHz to 5725 MHz	Channel 106	--	Channel 122
		5530 MHz	--	5610 MHz
	5725 MHz to 5850 MHz	--	Channel 155	--
		--	5775 MHz	--

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11a/n/ac	1Tx/1Rx or 2Tx/2Rx	1. Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

Power Setting								
Mode	U-NII-1		U-NII-2A		U-NII-2C		U-NII-3	
	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
IEEE 802.11a	0	0	0	0	0	0	0	0
IEEE 802.11n-HT20	0	0	0	0	0	0	0	0
IEEE 802.11n-HT40	0	0	0	0	0	0	0	0
IEEE 802.11ac-VHT20	0	0	0	0	0	0	0	0
IEEE 802.11ac-VHT40	0	0	0	0	0	0	0	0
IEEE 802.11ac-VHT80	0	0	0	0	0	0	0	0

Test Software
Test software name: Ampak RF Test Tool VER 5.3;

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ac-VHT20	MCS0
IEEE 802.11ac-VHT40	MCS0
IEEE 802.11ac-VHT80	MCS0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

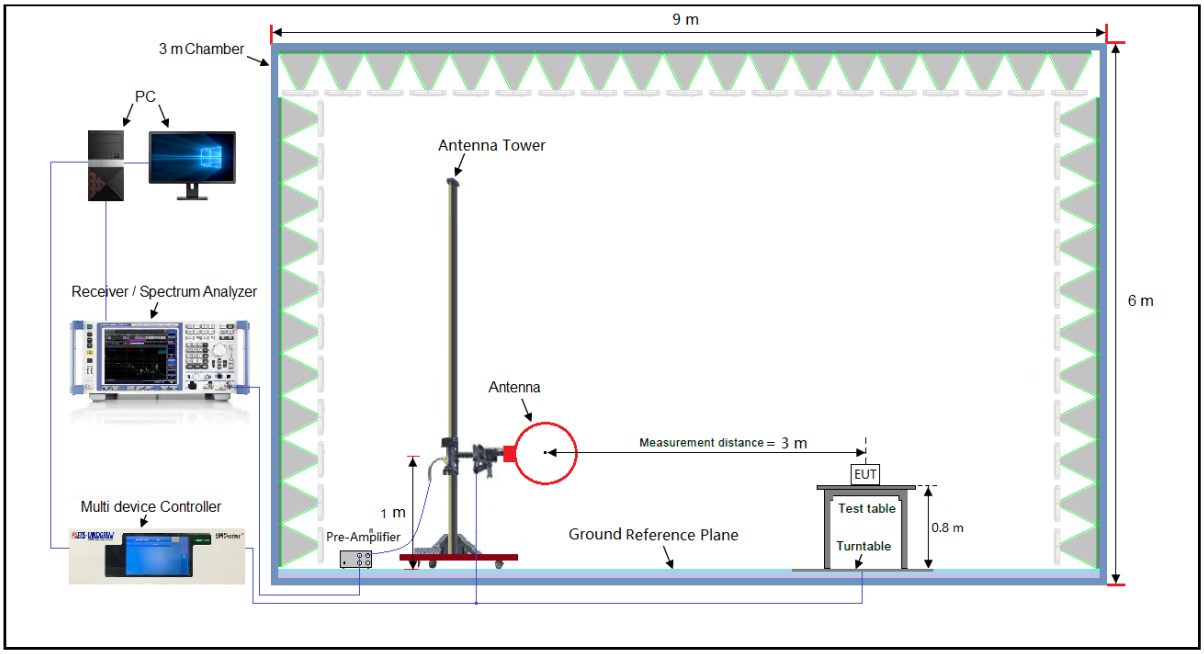


Figure 1. Below 30MHz

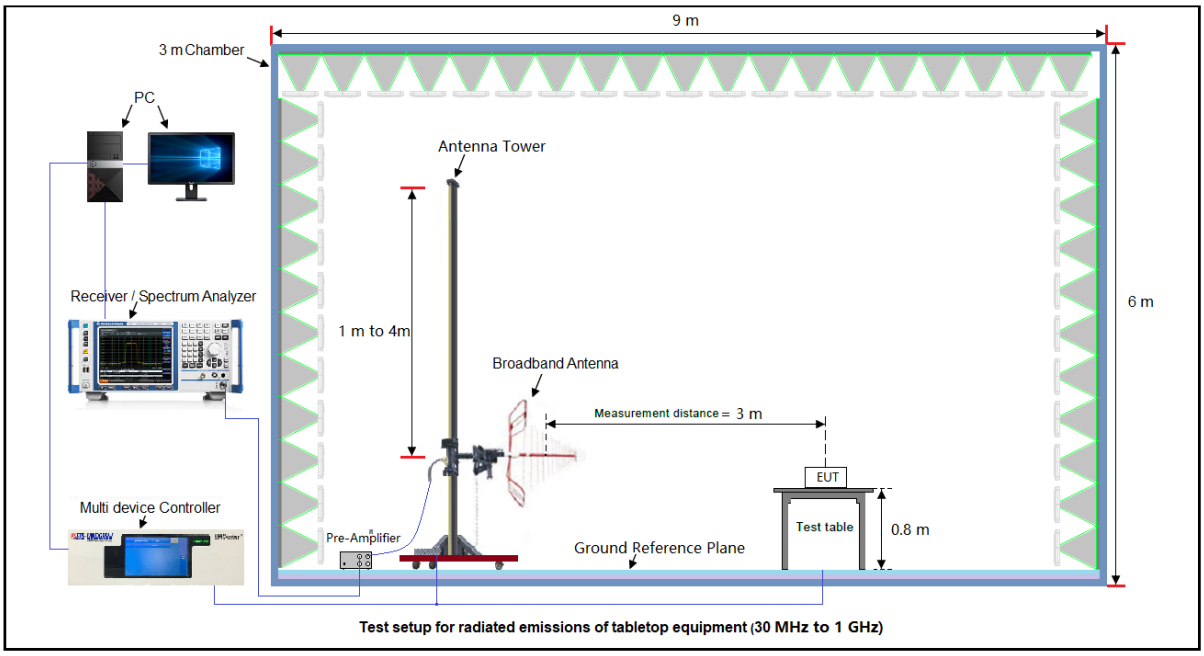


Figure 2. 30MHz to 1GHz

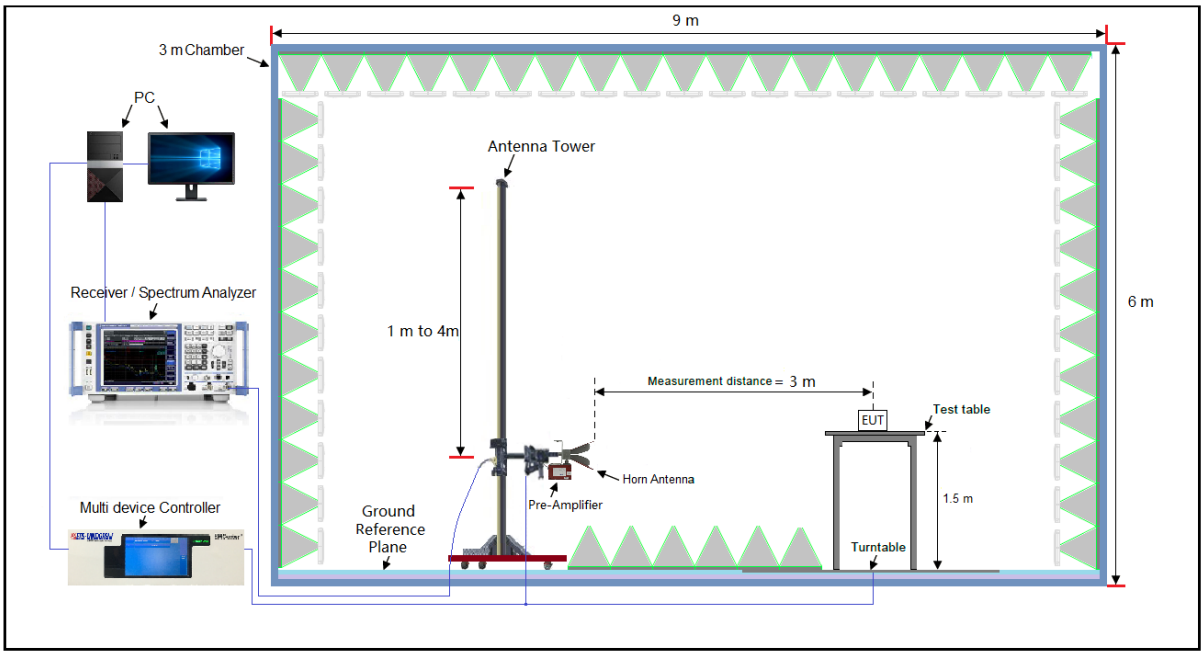
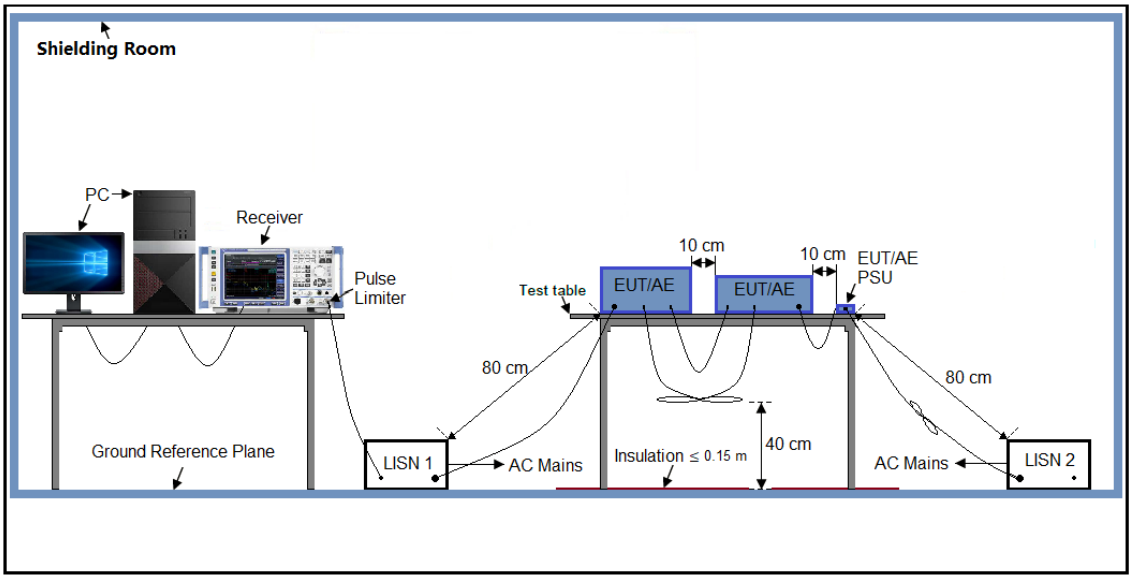
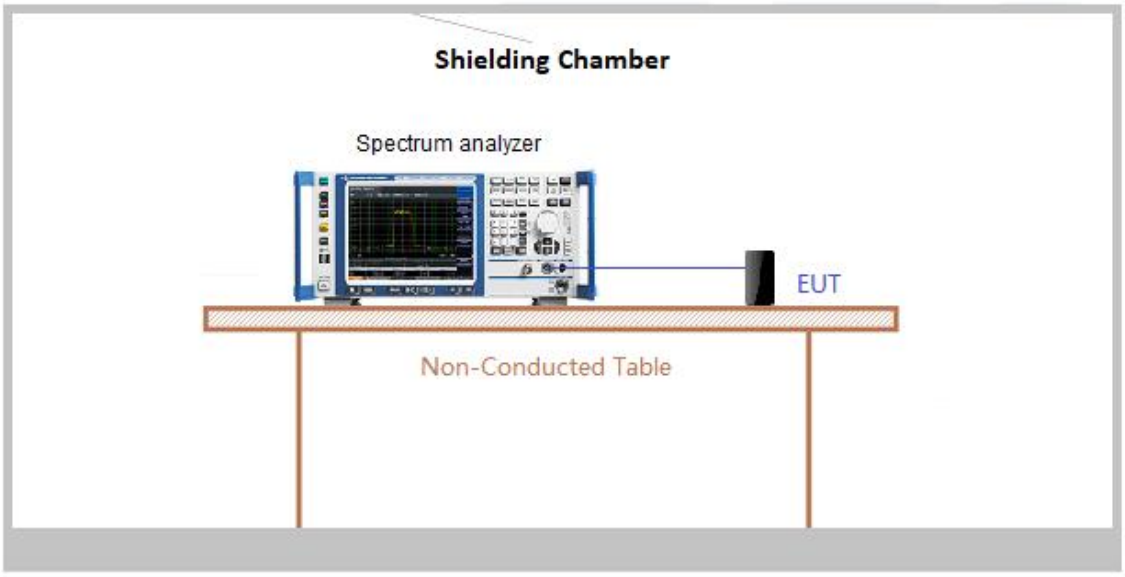


Figure 3. Above 1GHz

4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



Normal Environment

4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by AC 120V/60Hz. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 12.2.

Test Results

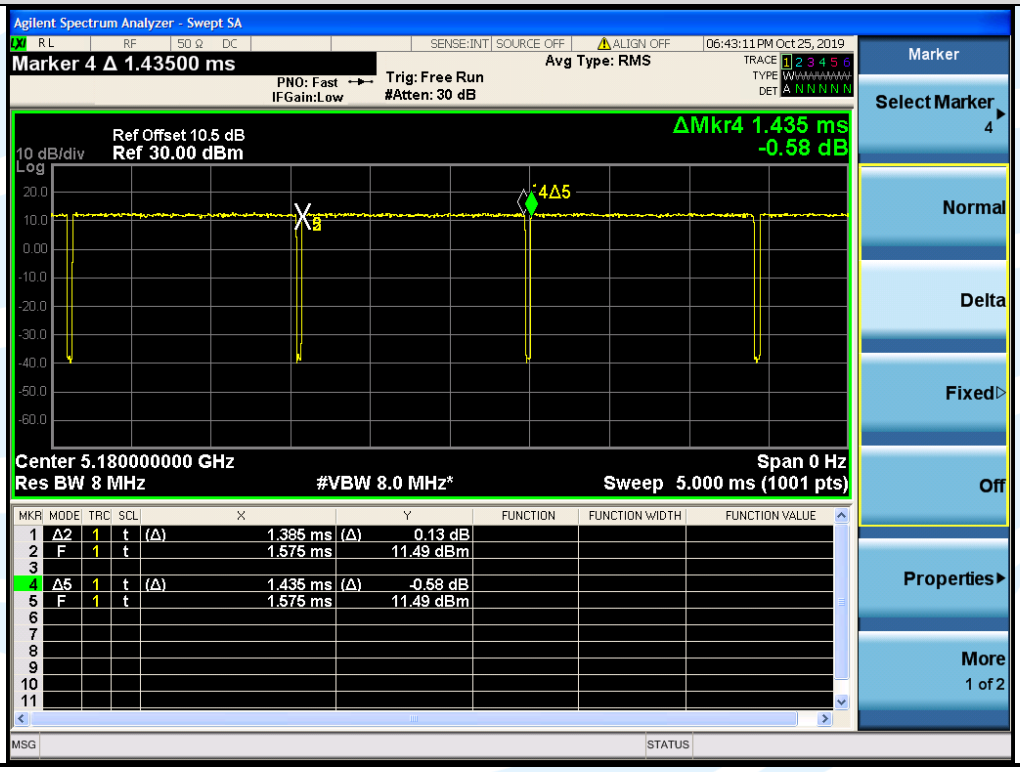
Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	54	1.385	1.435	0.97	96.52	0.15	0.72	-0.31
IEEE 802.11n-HT20	MCS15	1.310	1.350	0.97	97.04	0.13	0.76	-0.26
IEEE 802.11n-HT40	MCS15	0.648	0.687	0.94	94.32	0.25	1.54	-0.51
IEEE 802.11ac-VHT20	MCS8	1.315	1.355	0.97	97.05	0.13	0.76	-0.26
IEEE 802.11ac-VHT40	MCS9	0.654	0.696	0.94	93.97	0.27	1.53	-0.54
IEEE 802.11ac-VHT80	MCS9	0.324	0.364	0.89	89.01	0.51	3.09	-1.01

Remark:

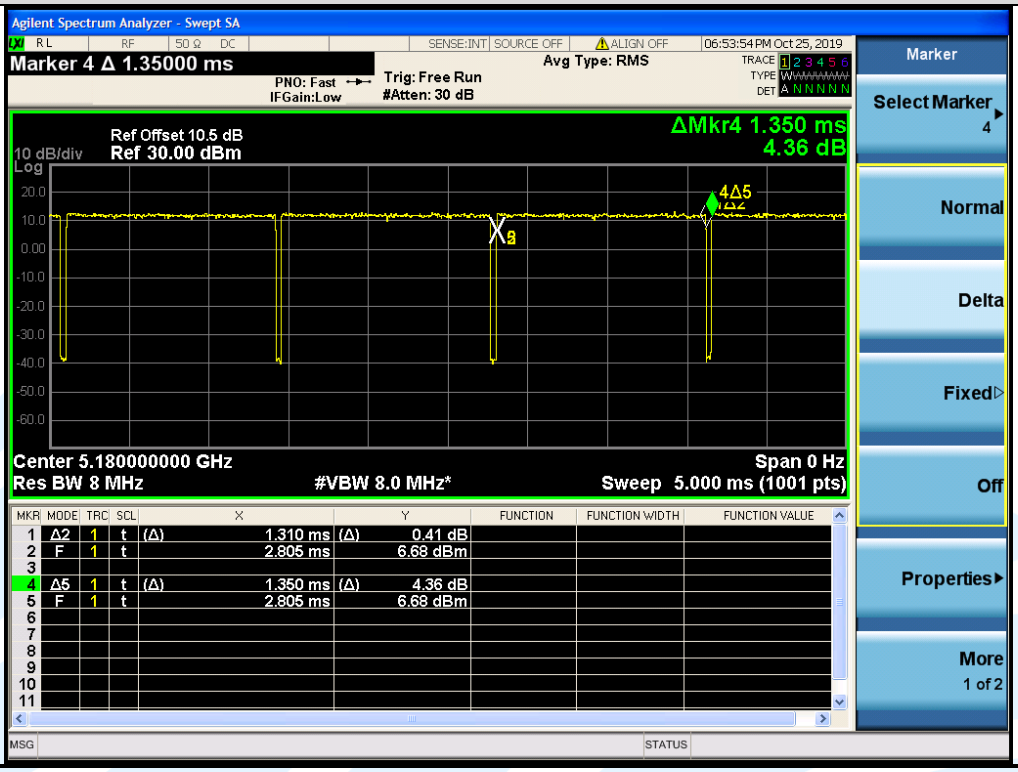
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

The test plots as follows

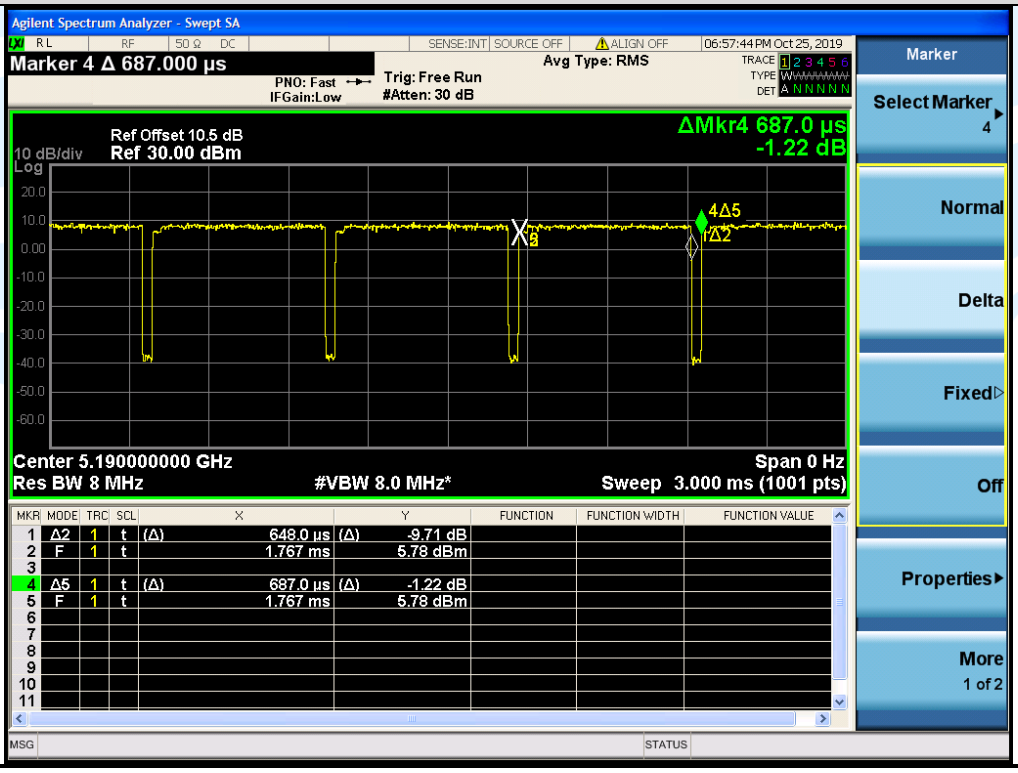
IEEE 802.11a



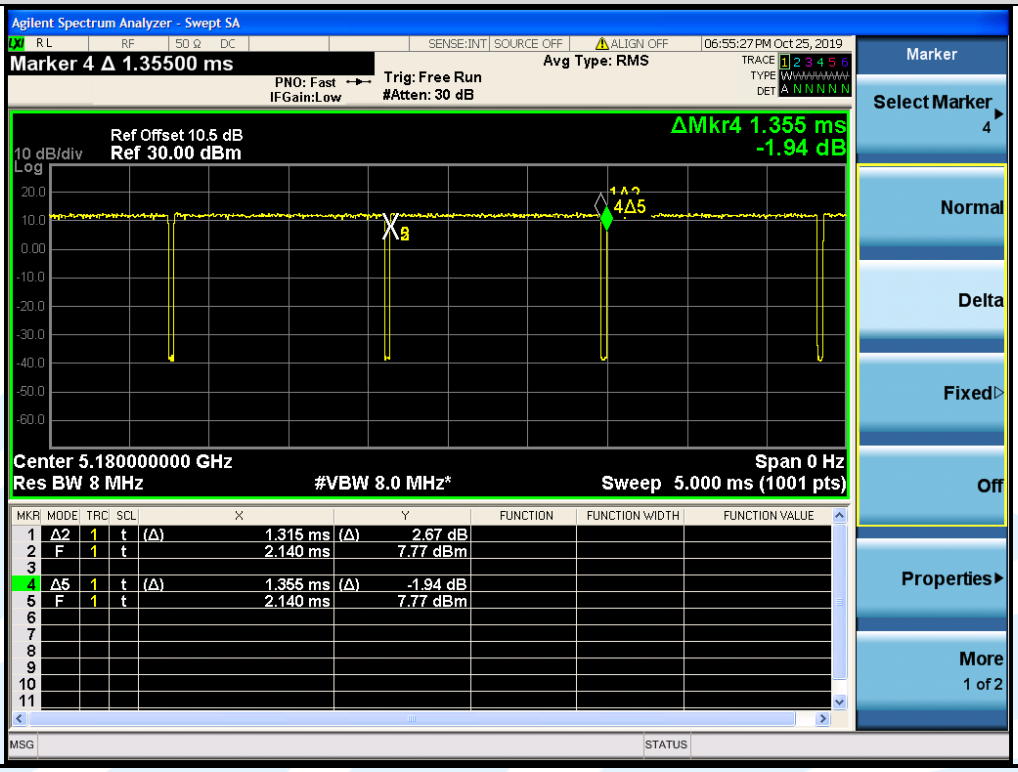
IEEE 802.11n-HT20



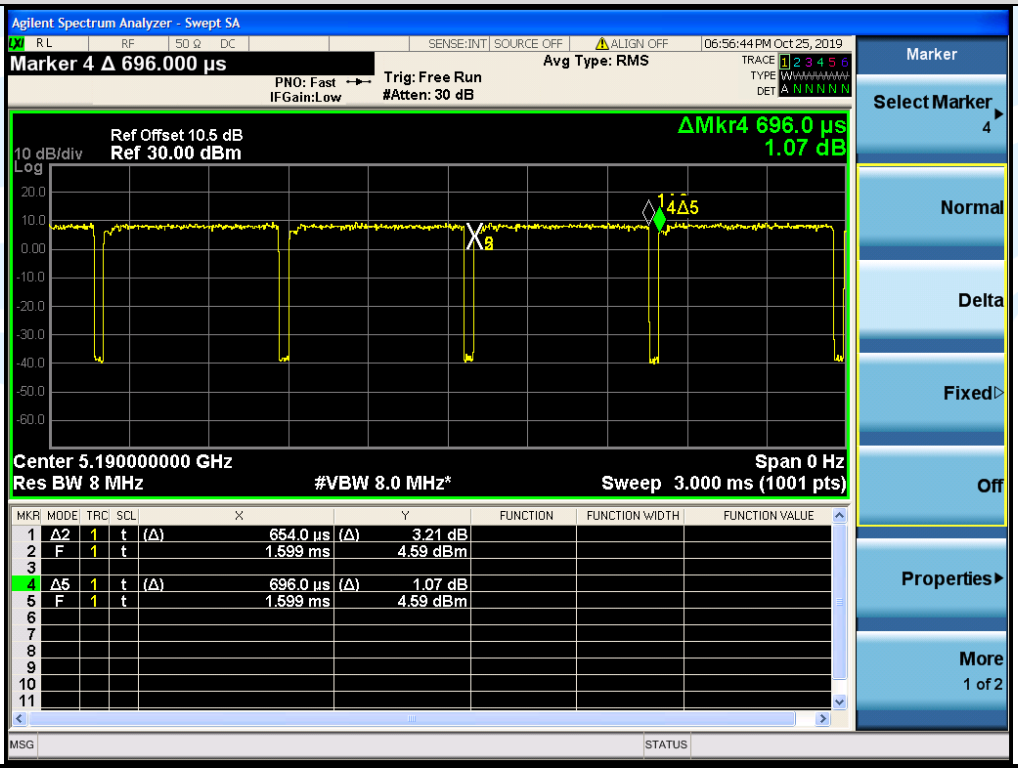
IEEE 802.11n-HT40



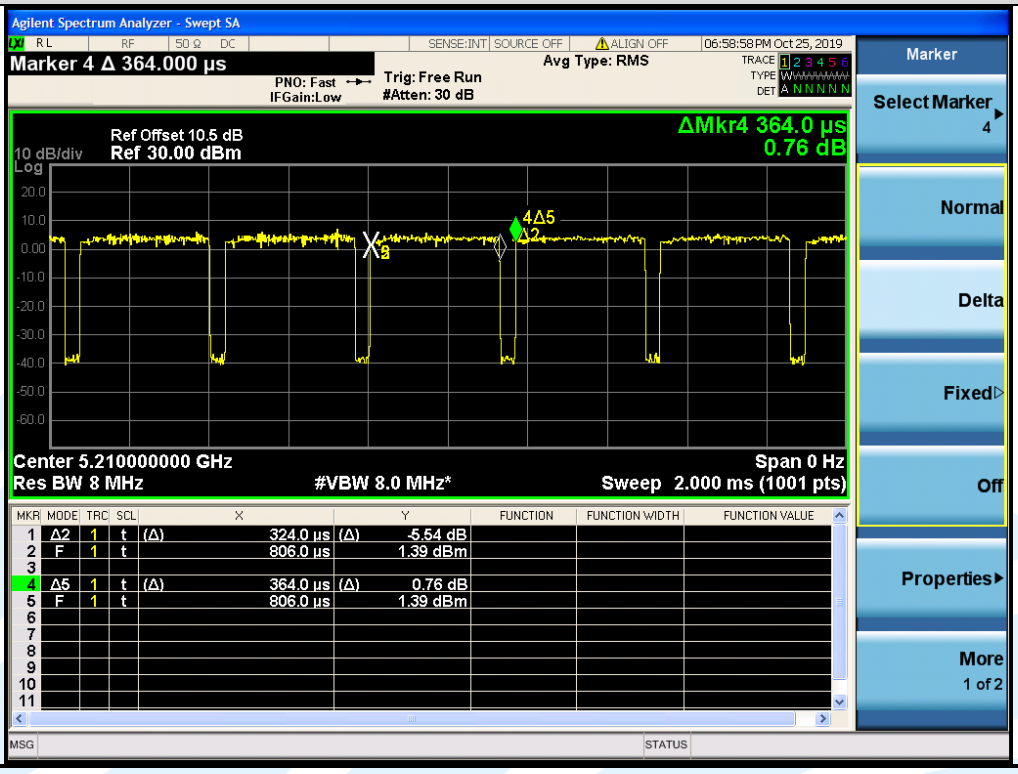
IEEE 802.11ac-VHT20



IEEE 802.11ac-VHT40



IEEE 802.11ac-VHT80



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
4	KDB 789033 D02 General UNII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
5	KDB 905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(§15.407)
6	KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance measurement procedures for Unlicensed –National Information Infrastructure devices operates in the frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands incorporating dynamic frequency selection
7	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability
8	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.407(a)(1) (2) requirement:** The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is **6.52** dBi (See section 5.5).

5.3 26 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a) (2)(5)
Test Method: KDB 789033 D02 v02r01 Section C.1
Limit: None; for reporting purposes only.

Test Procedure:
The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

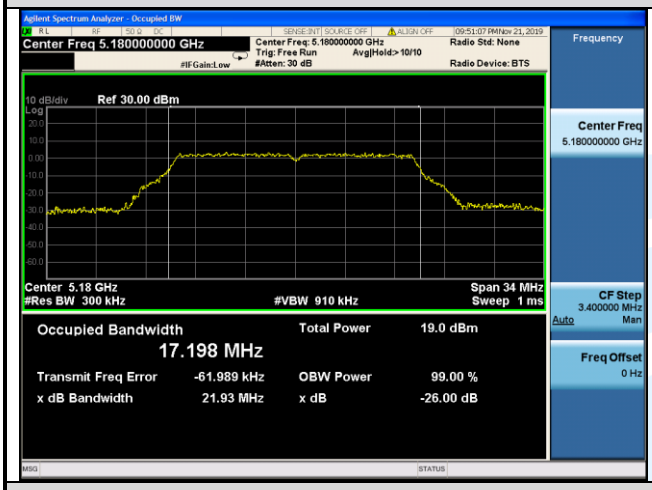
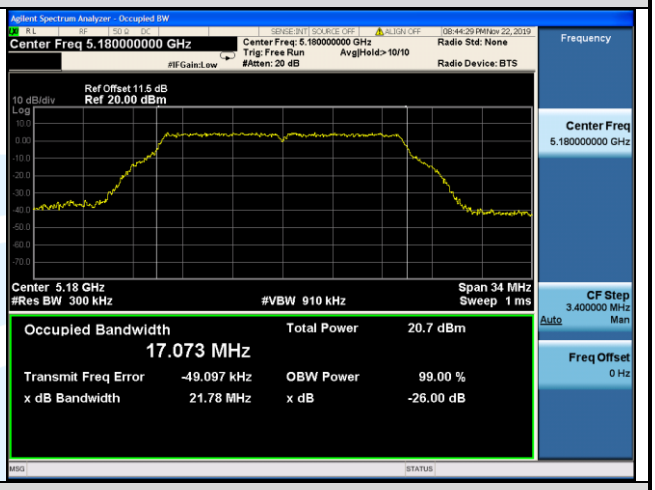
Spectrum analyzer according to the following Settings:
a) Set RBW = approximately 1 % of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.
Test Setup: Refer to section 4.5.3 for details.
Instruments Used: Refer to section 3 for details
Test Mode: Transmitter mode
Test Results: Pass

Mode	Channel	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
		Chain 0	Chain 1	Chain 0	Chain 1
IEEE 802.11a	36 (5180)	21.93	21.78	17.198	17.073
	44 (5220)	21.76	21.42	17.059	17.034
	48 (5240)	21.58	21.81	17.118	17.035
	52 (5260)	21.65	21.72	16.959	17.040
	60 (5300)	21.66	21.82	17.041	17.083
	64 (5320)	21.51	21.55	17.109	17.035
	100 (5500)	21.84	21.77	17.176	17.087
	120 (5600)	32.53	21.67	17.468	17.012
	140 (5700)	32.90	21.69	17.712	17.078
IEEE 802.11n-HT20	36 (5180)	21.95	21.75	18.097	18.006
	44 (5220)	21.99	21.67	18.120	18.001
	48 (5240)	21.83	21.80	18.133	18.023
	52 (5260)	21.74	21.76	18.121	17.962
	60 (5300)	21.75	21.48	18.128	17.994
	64 (5320)	21.88	21.73	18.093	18.063
	100 (5500)	21.74	21.68	18.208	18.012
	120 (5600)	25.27	21.73	18.239	18.003
	140 (5700)	29.73	21.81	18.349	17.997
IEEE 802.11n-HT40	38 (5190)	40.43	39.80	36.442	36.340
	46 (5230)	40.46	39.59	36.457	36.339
	54 (5270)	40.48	39.58	36.484	36.349
	62 (5310)	46.18	39.68	36.515	36.283
	102 (5510)	58.04	39.76	36.525	36.354
	118 (5590)	58.26	39.42	36.578	36.363
	134 (5670)	59.03	39.66	36.470	36.345

IEEE 802.11ac-VHT20	36 (5180)	21.82	21.74	18.114	17.998
	44 (5220)	22.00	21.61	18.158	17.988
	48 (5240)	21.94	21.94	18.134	18.029
	52 (5260)	21.87	21.66	18.163	18.015
	60 (5300)	22.07	21.62	18.153	18.038
	64 (5320)	21.96	21.70	18.147	17.975
	100 (5500)	21.77	21.69	18.228	18.014
	120 (5600)	30.32	21.72	18.276	18.014
	140 (5700)	28.37	21.79	18.320	17.975
IEEE 802.11ac-VHT40	38 (5190)	40.16	40.04	36.454	36.273
	46 (5230)	40.30	39.63	36.468	36.324
	54 (5270)	40.39	39.80	36.423	36.314
	62 (5310)	40.26	39.50	36.489	36.285
	102 (5510)	59.37	39.70	36.541	36.390
	118 (5590)	59.46	39.70	36.593	36.341
	134 (5670)	59.08	39.68	36.582	36.378
IEEE 802.11ac-VHT80	42 (5230)	82.11	81.90	75.829	75.742
	58 (5290)	82.28	82.13	75.892	75.819
	106 (5530)	100.3	82.15	76.058	75.777
	122(5610)	101.6	81.77	75.947	75.765

The test plots as follows:

IEEE 802.11a	
Chain 0	**Chain 1**
Channel 36	
	
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	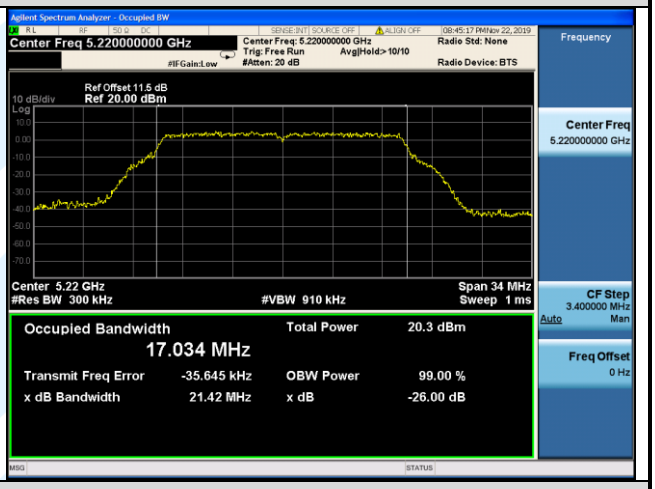
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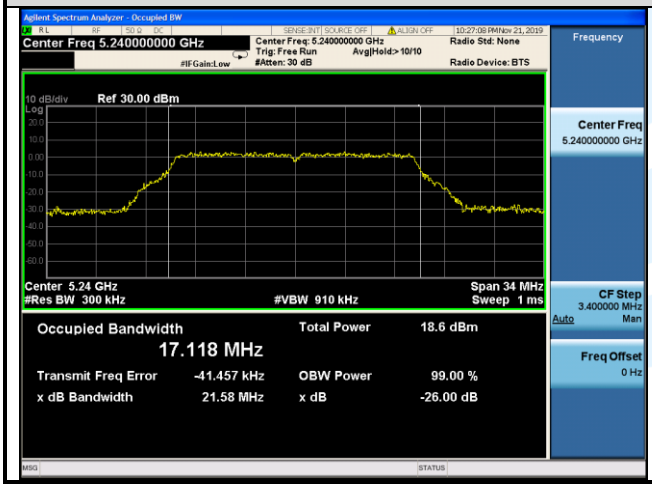
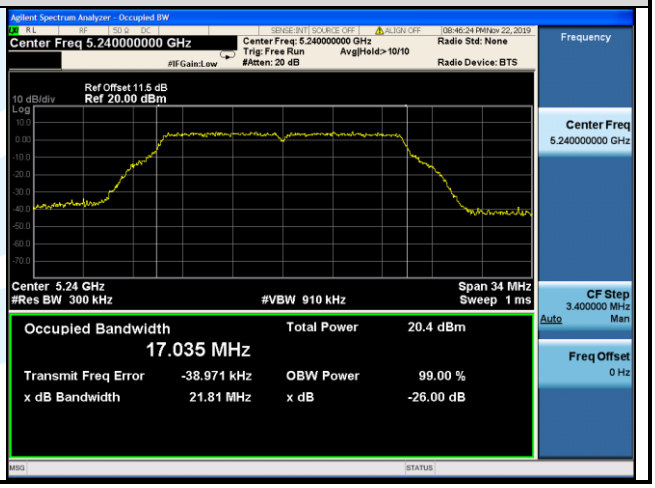
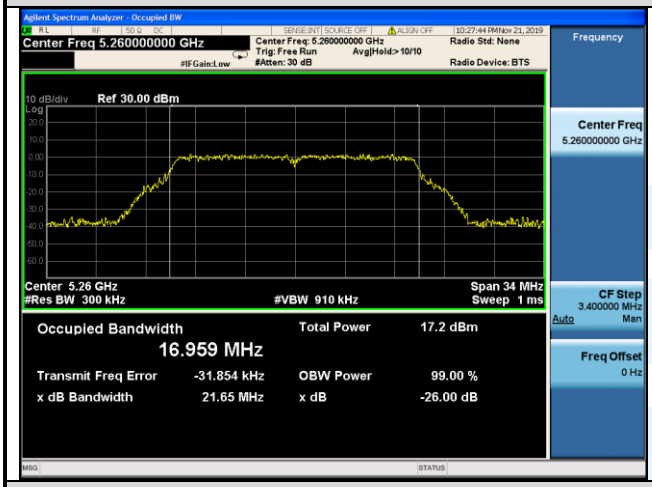
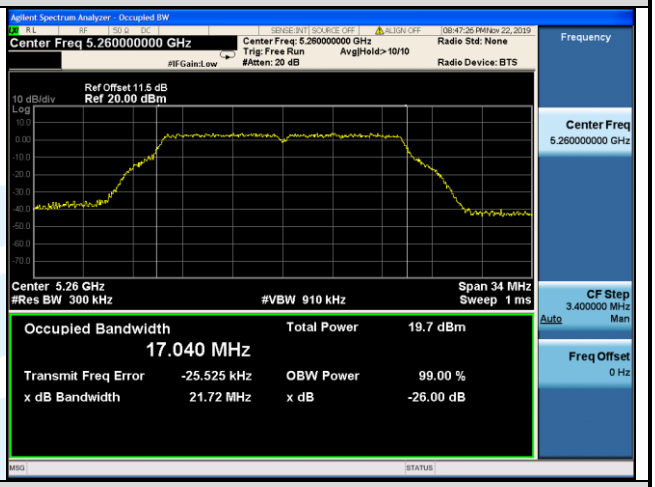
	

IEEE 802.11a	
Chain 0	Chain 1
Channel 52	
	
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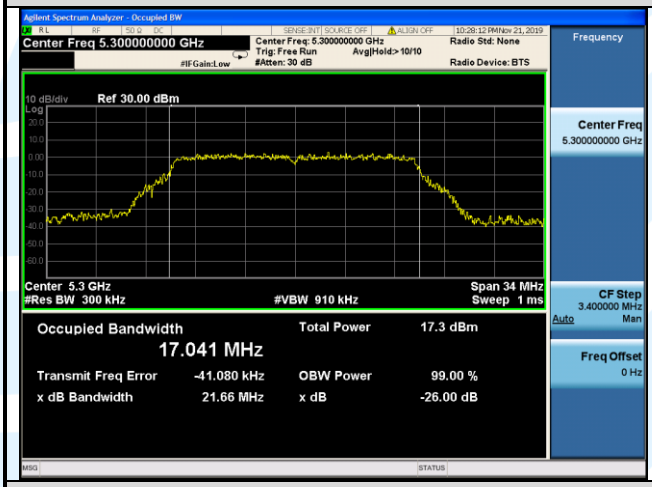	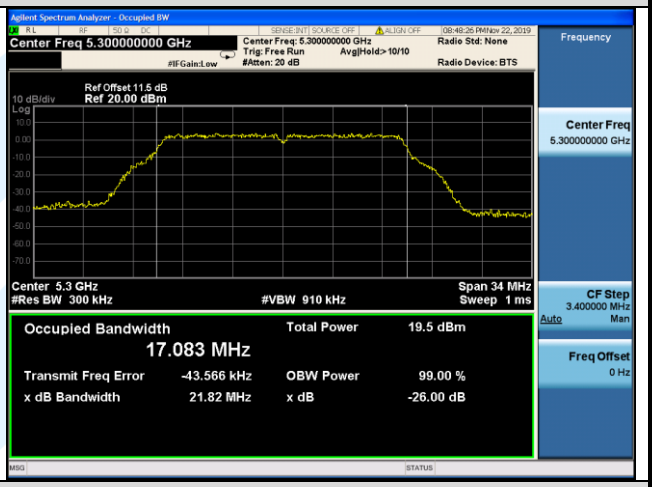
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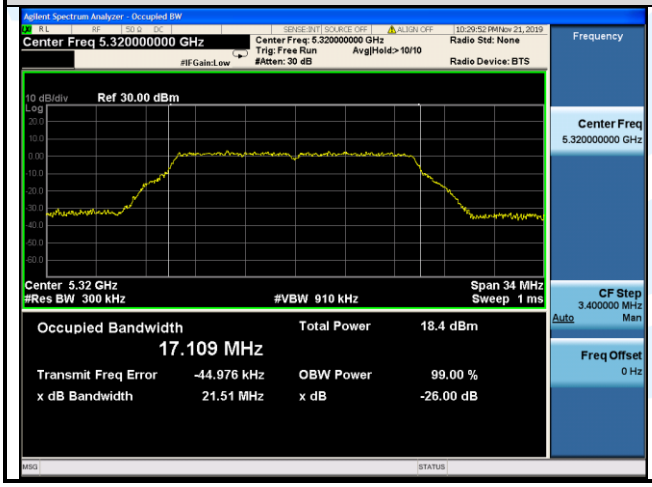
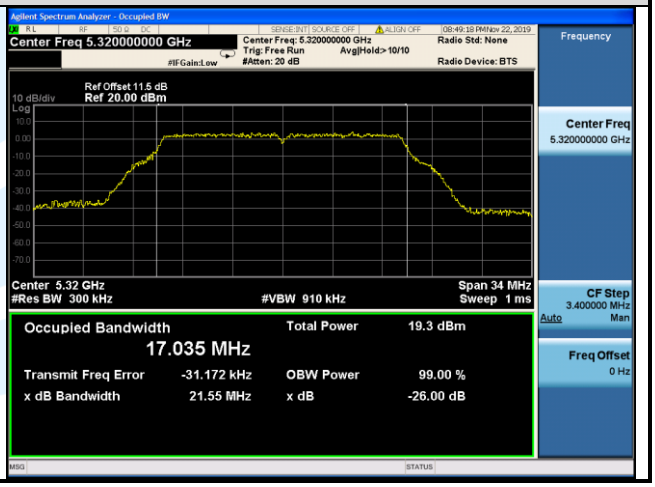
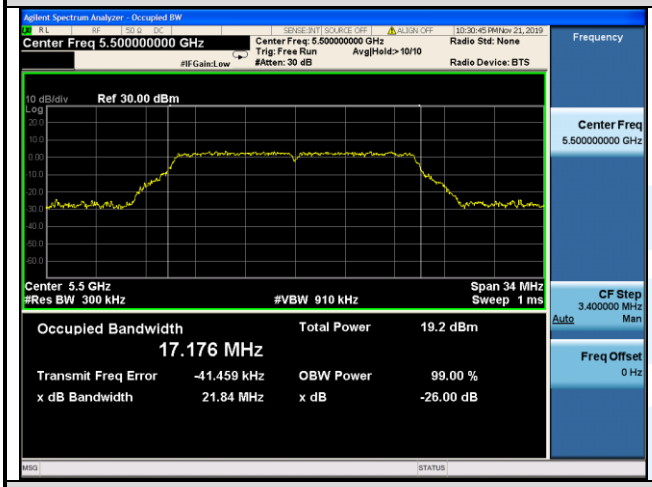
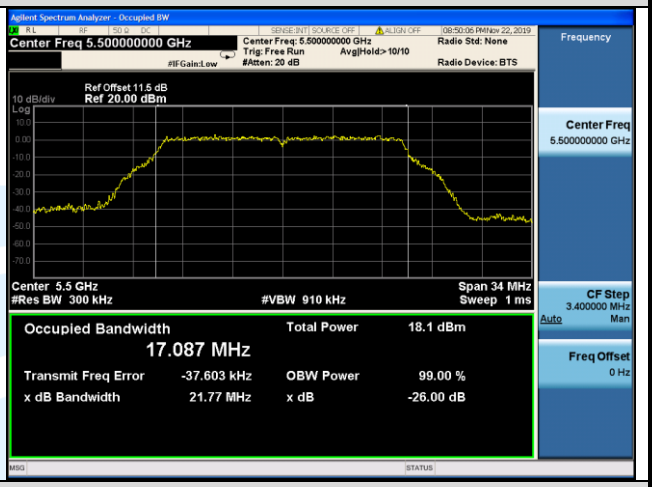
	

IEEE 802.11a	
Chain 0	Chain 1
Channel 100	
	
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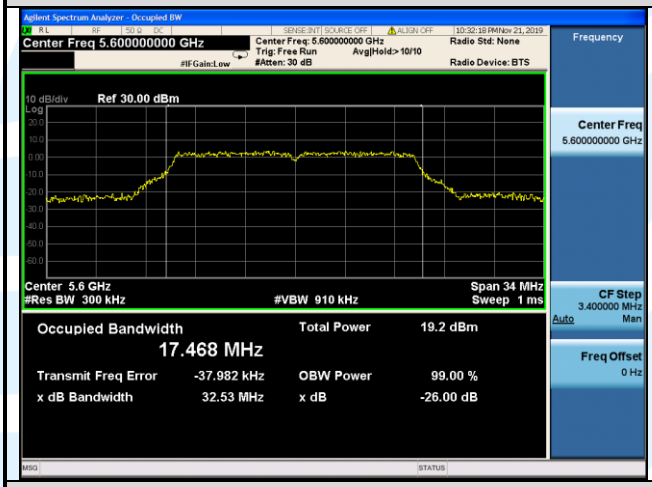	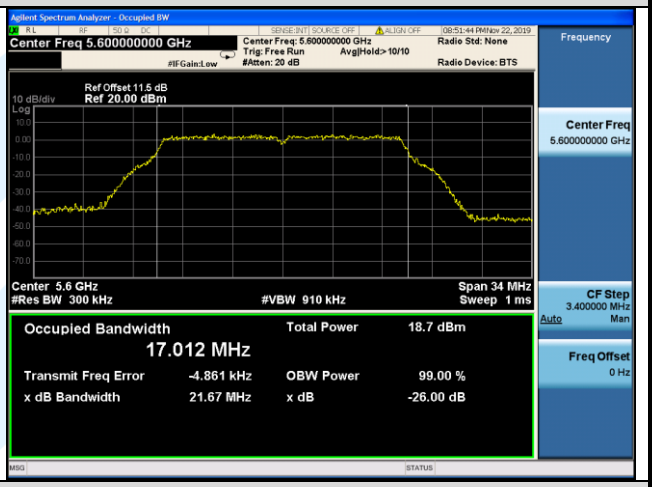
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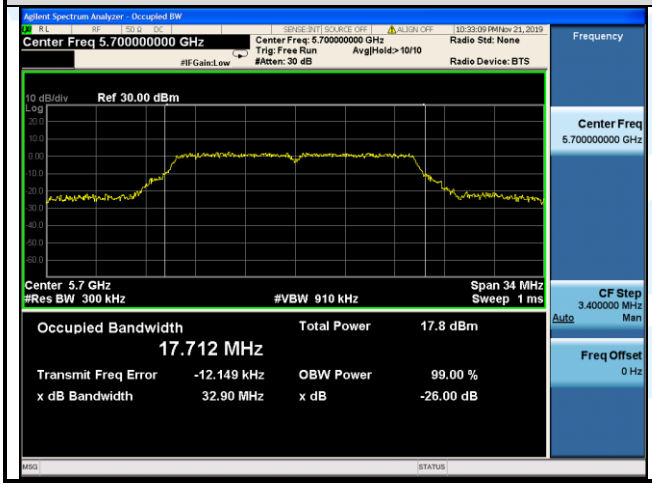	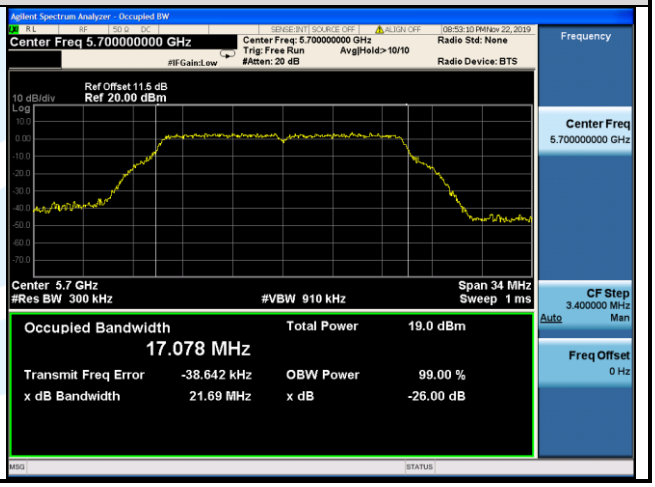

IEEE 802.11n-HT20

Chain 0	Chain 1
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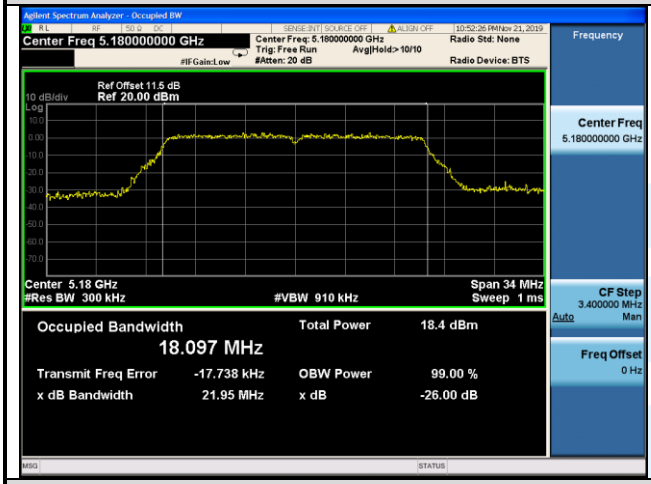	
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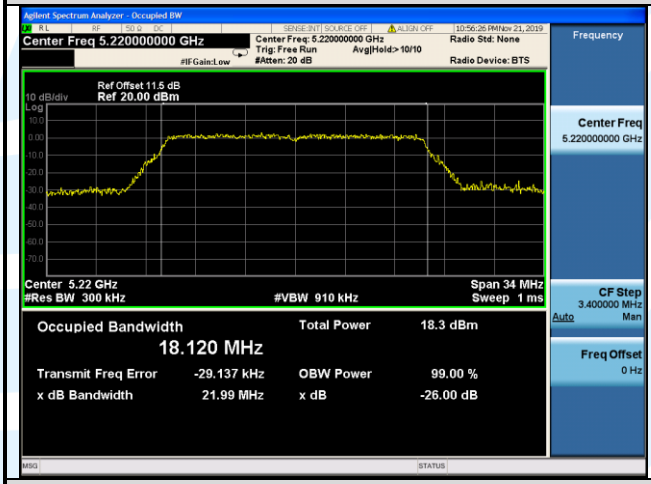	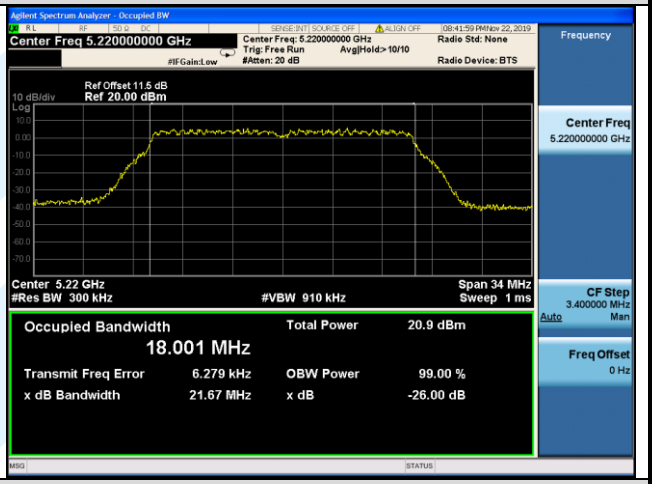
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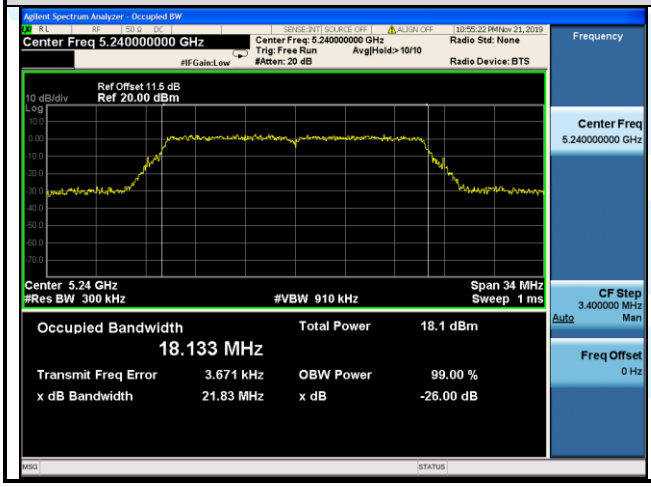
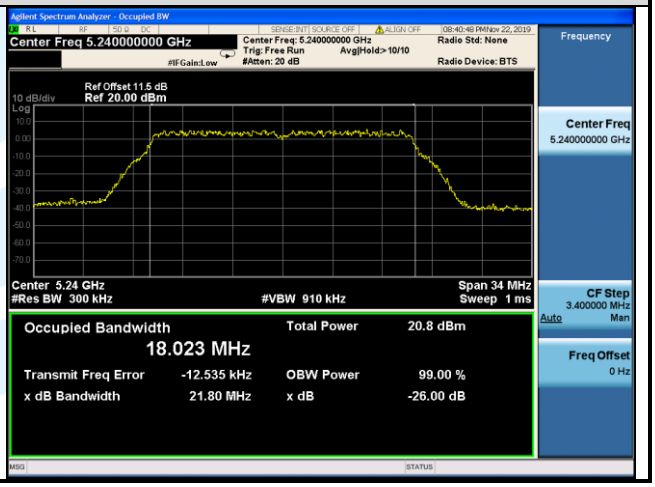
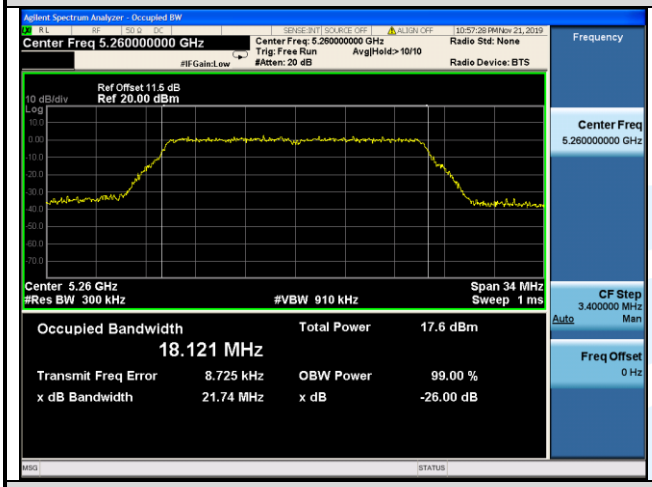
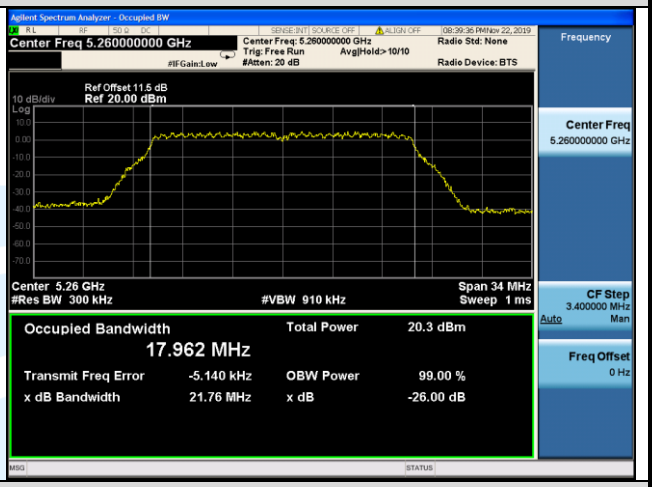
	

IEEE 802.11n-HT20

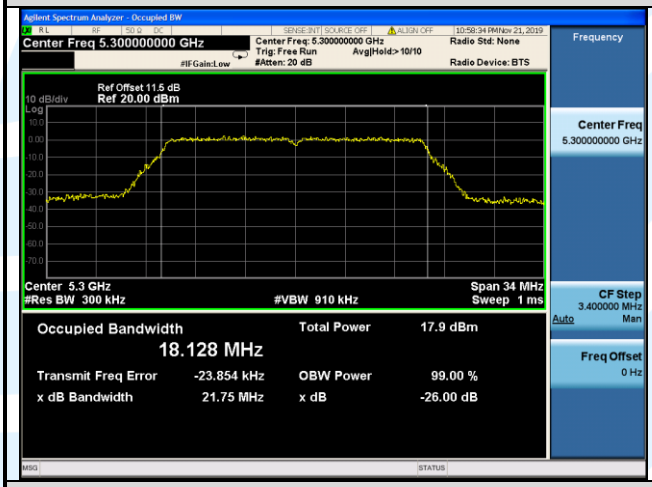
Chain 0	Chain 1

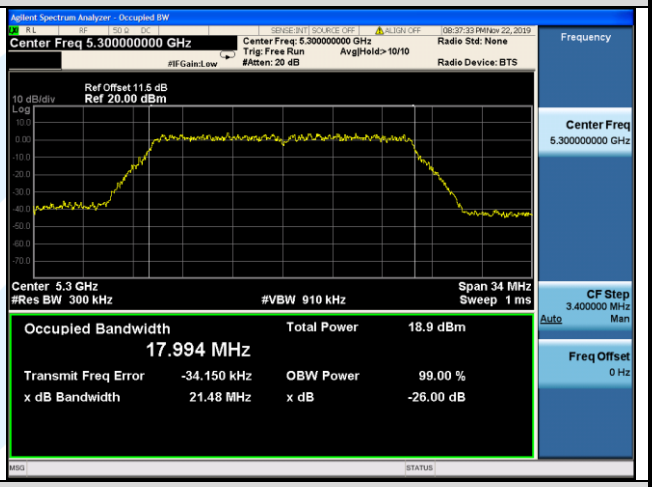
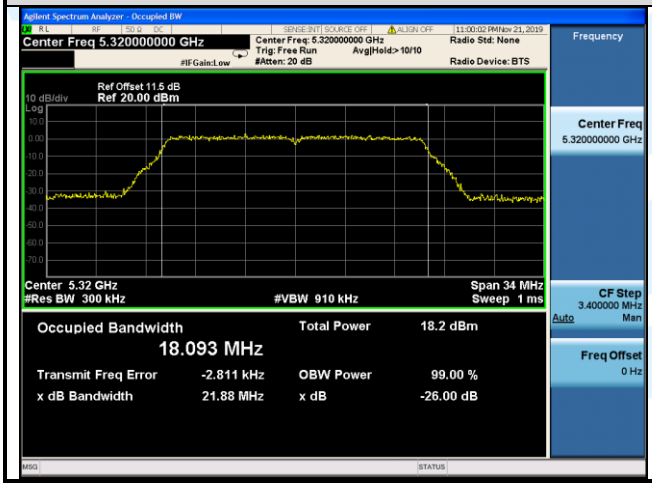
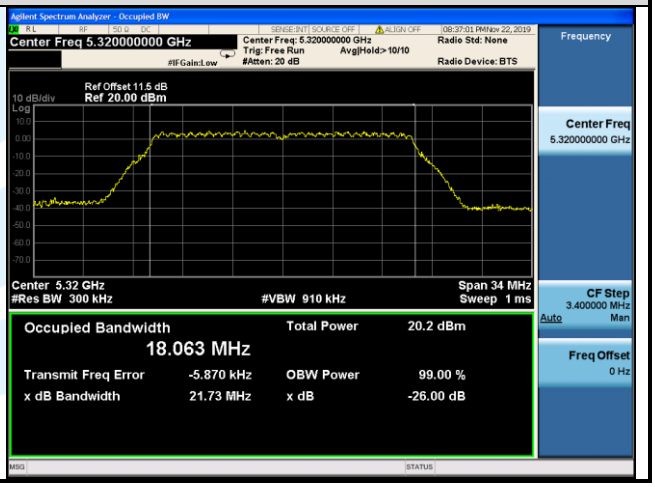
Channel 52





Channel 60

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