FCC REPORT

Applicant:	Shanghai Huace Navigation Technology LTD.
Address of Applicant:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Manufacturer/Factory:	Shanghai Huace Navigation Technology LTD.
Address of Manufacturer/Factory:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Equipment Under Test (EUT)	
Product Name:	Handheld GNSS Data Collector
Model No.:	LT700
Trade Mark:	CHCNAV
FCC ID:	SY4-B01012
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407:2017
Date of sample receipt:	January 15, 2018
Date of Test:	January 15, 2018-July 12, 2018
Date of report issue:	July 12, 2018
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

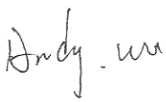
Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*July 12, 2018*	*Original*

Prepared By:  ***Date:*** ***July 12, 2018***

Project Engineer

Check By:  ***Date:*** ***July 12, 2018***

Reviewer

3 Contents

Page

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	PASS
AC Power Line Conducted Emission	15.207	PASS
Peak Transmit Power	15.407(a)(1)	PASS
Power Spectral Density	15.407(a)(1)	PASS
Undesirable Emission	15.407(b)(6), 15.205/15.209	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.205	PASS
Frequency Stability	15.407(f)	N/A

Remark:

Pass: The EUT complies with the essential requirements in the standard.

Frequency Stability： The manufacturer stated in the user's manual.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 40GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014			

5 General Information

5.1 General Description of EUT

Product Name:	Handheld GNSS Data Collector
Model No.:	LT700
Test Model No:	LT700
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.	
Sample(s) Status:	Engineer sample
Quantity of tested samples	1
Serial No.:	T180507
Tested Sample(s) ID:	N/A
Hardware Version:	A8001_MPCB_V3.0_0912
Software Version:	A8001_V1.0
Operation Frequency:	802.11a/n(HT20)/ac(HT20): 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz 802.11n(HT40)/ac(HT40): 5190~5230MHz; 5260-5320MHz; 5510-5670MHz; 5755~5795MHz 802.11ac(HT80): 5210MHz, 5290MHz, 5530MHz, 5775MHz
Channel separation:	802.11a/n(HT20)/ac(HT20): 20MHz; 802.11n(HT40)/ac(HT40): 40MHz 802.11ac(HT80): 80MHz
Modulation technology:	CCK/OFDM/DBPSK/DAPSK
Antenna Type:	PIFA Antenna
Antenna gain:	1.3dBi(max.)
Power supply:	DC 3.8V by battery or DC 5V from adapter input AC 120V, 60Hz

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation. EUT was test with 99% duty cycle at its maximum power control level.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, sBaoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.5 Description of Support Units

None.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Other Information Requested by the Customer

None.

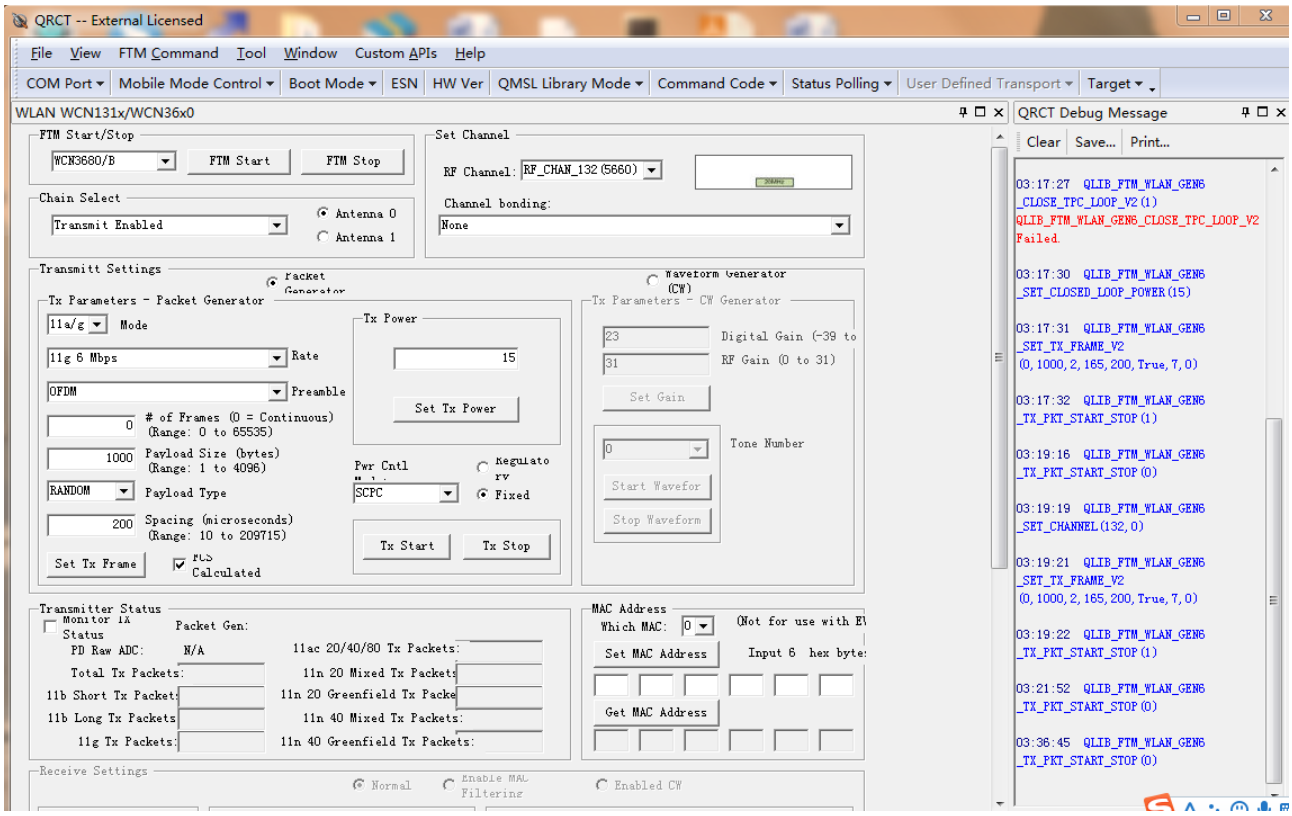
5.9 Additional instructions

Software (Used for test) from client

Mode	QRCT—External Licensed

Channel	Power level
Lowest	Default
Middle	Default
Highest	Default

Test software set:



6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 28 2017	June. 27 2018
4	Spectrum analyzer	Agilent	E4447A	GTS516	June. 28 2017	June. 27 2018
5	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 28 2017	June. 27 2018
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 28 2017	June. 27 2018
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 28 2017	June. 27 2018
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 28 2017	June. 27 2018
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	June. 28 2017	June. 27 2018
11	Coaxial Cable	GTS	N/A	GTS211	June. 28 2017	June. 27 2018
12	Coaxial cable	GTS	N/A	GTS210	June. 28 2017	June. 27 2018
13	Coaxial Cable	GTS	N/A	GTS212	June. 29 2017	June. 27 2018
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 28 2017	June. 27 2018
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 28 2017	June. 27 2018
16	Amplifier (18-40GHz)	MITEQ	AMF-6F-18004000-29-8P	GTS534	June. 28 2017	June. 27 2018
17	Band filter	Amindeon	82346	GTS219	June. 28 2017	June. 27 2018
18	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	June. 28 2017	June. 27 2018
19	D.C. Power Supply	Instek	PS-3030	GTS232	June. 28 2017	June. 27 2018
20	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June. 28 2017	June. 27 2018
21	Splitter	Agilent	11636B	GTS237	June. 28 2017	June. 27 2018
22	Power Meter	Anritsu	ML2495A	GTS540	June. 28 2017	June. 27 2018
23	Power Sensor	Anritsu	MA2411B	GTS541	June. 28 2017	June. 27 2018

Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May 16 2014	May 15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 28 2017	June. 27 2018
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	June. 28 2017	June. 27 2018
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 28 2017	June. 27 2018
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 28 2017	June. 27 2018
6	Coaxial Cable	GTS	N/A	GTS227	June. 28 2017	June. 27 2018
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Thermo meter	KTJ	TA328	GTS233	June. 28 2017	June. 27 2018

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	June. 28 2017	June. 27 2018

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203

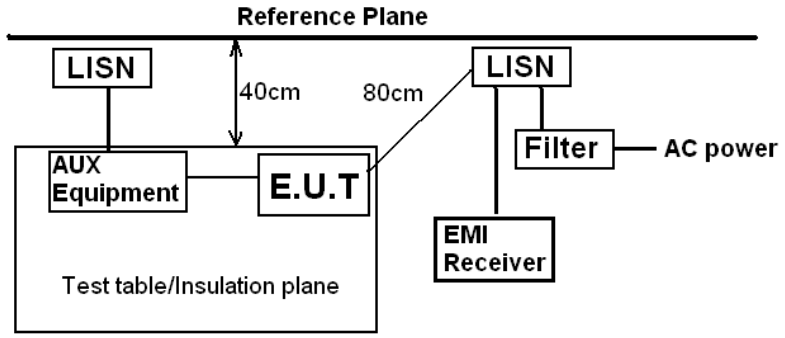
15.203 requirement:

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.

E.U.T Antenna:	

The antenna is Integral antenna. The best case gain of the antenna is 2.0dBi.

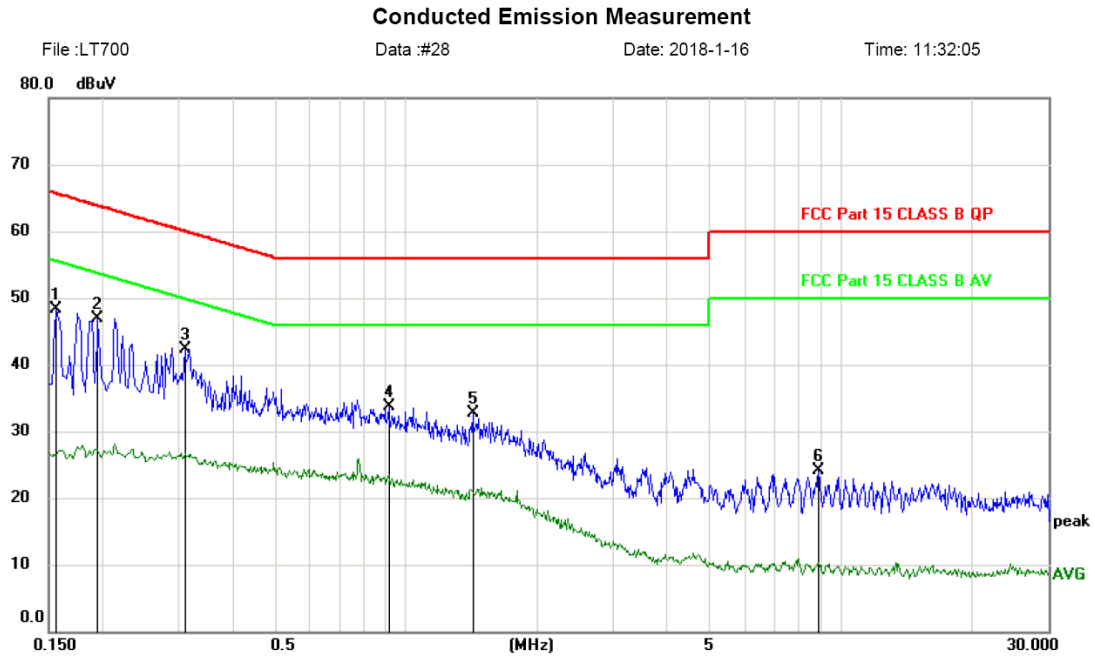
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

An initial pre-scan was performed on the line and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Line:

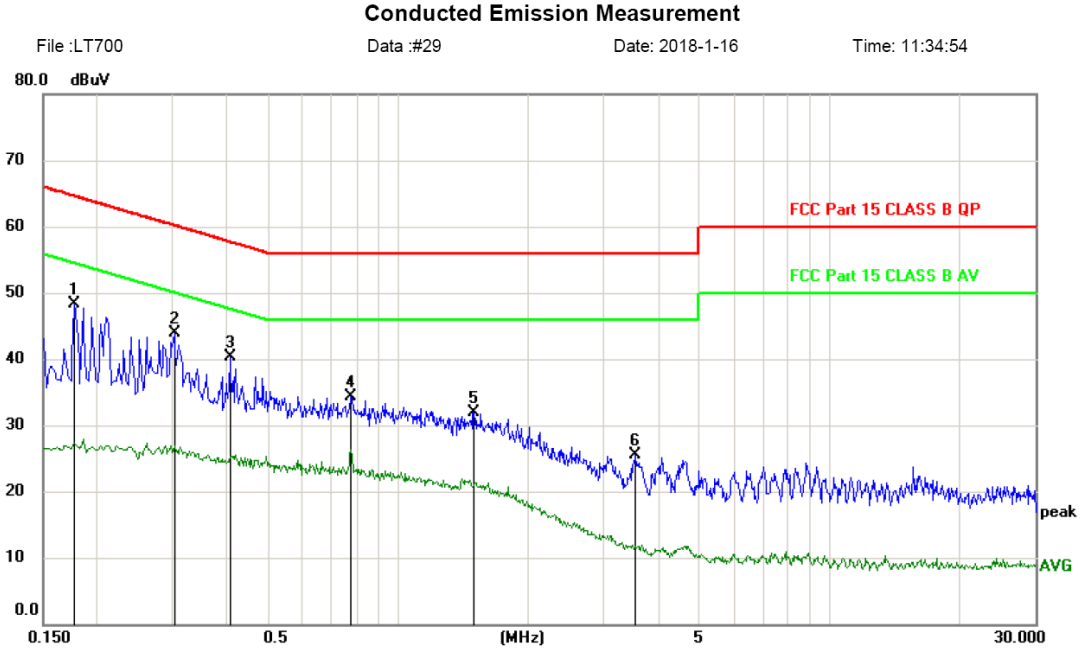


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1560	38.58	9.66	48.24	65.67	-17.43	peak	
2	*	0.1949	37.29	9.67	46.96	63.83	-16.87	peak	
3		0.3090	32.62	9.69	42.31	60.00	-17.69	peak	
4		0.9120	23.96	9.77	33.73	56.00	-22.27	peak	
5		1.4220	22.82	9.81	32.63	56.00	-23.37	peak	
6		8.8770	13.82	10.29	24.11	60.00	-35.89	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Neutral:

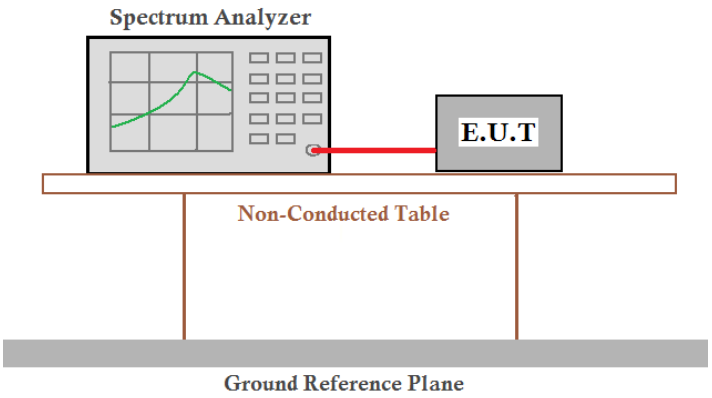


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1770	38.58	9.66	48.24	64.63	-16.39	peak	
2	*	0.3030	34.25	9.69	43.94	60.16	-16.22	peak	
3		0.4080	30.57	9.70	40.27	57.69	-17.42	peak	
4		0.7770	24.53	9.74	34.27	56.00	-21.73	peak	
5		1.4880	22.02	9.82	31.84	56.00	-24.16	peak	
6		3.5640	15.43	10.05	25.48	56.00	-30.52	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

7.3 Emission Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

Band 1 (5150-5250 MHz):

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
36	5180.00	18.522	19.409	19.538	32.89	37.35	39.75
40	5200.00	18.066	18.878	19.334	34.31	36.08	39.05
48	5240.00	18.644	19.307	19.644	37.23	37.45	39.17

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
38	5190.00	37.414	37.283	77.43	71.49
46	5230.00	38.938	39.909	80.00	77.61

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210.00	76.038	143.20

Band 2A (5250-5350 MHz):

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
52	5260.00	18.279	18.881	18.818	36.34	37.41	36.25
56	5280.00	18.138	18.745	18.745	35.42	35.76	35.76
64	5320.00	17.870	18.654	18.490	35.64	36.69	35.56

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
54	5270.00	37.573	37.676	73.38	77.19
62	5310.00	37.272	37.417	74.45	71.36

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
58	5290.00	75.855	137.1

Band 2C (5470-5725 MHz):

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
100	5500.00	17.636	18.546	18.403	35.39	35.13	33.10
116	5580.00	17.990	18.537	18.465	35.33	37.31	33.53
132	5660.00	17.894	18.687	18.601	36.88	38.21	34.29
140	5700.00	17.836	18.696	18.567	33.25	37.86	35.55

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
102	5510.00	36.924	36.941	74.52	71.41
110	5550.00	36.755	36.860	71.15	65.20
134	5670.00	37.447	37.515	74.71	71.24

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
106	5530.00	75.407	122.5

Band 3 (5725-5850 MHz):

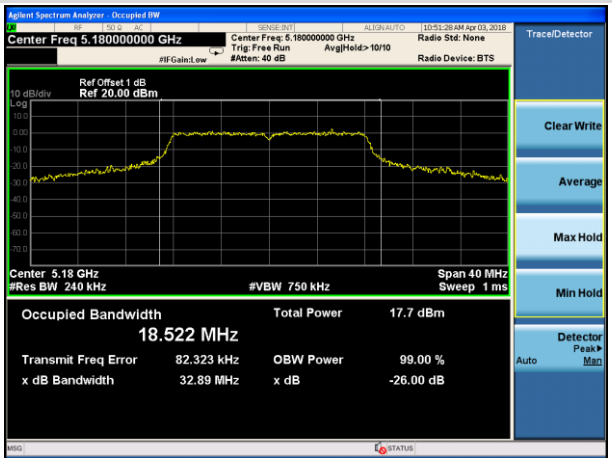
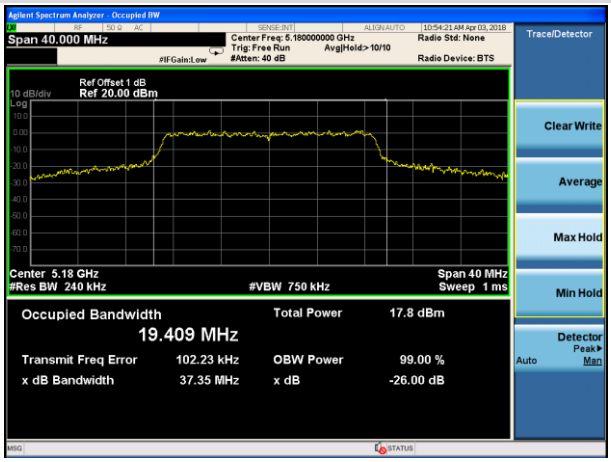
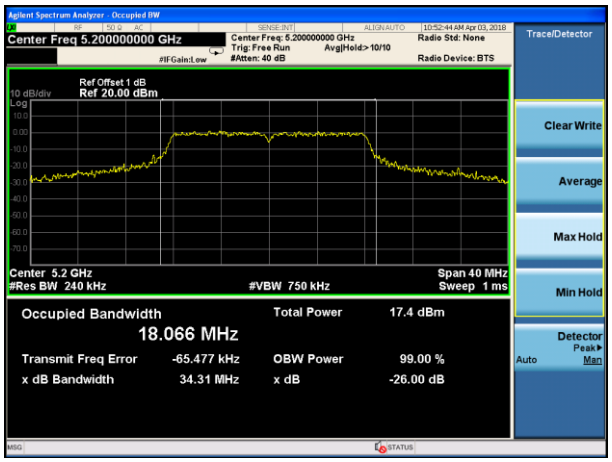
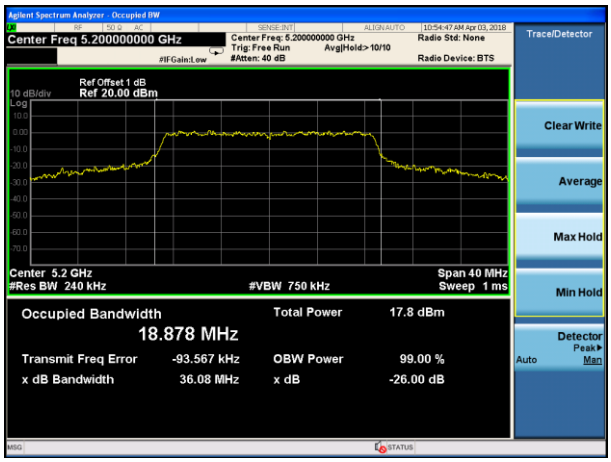
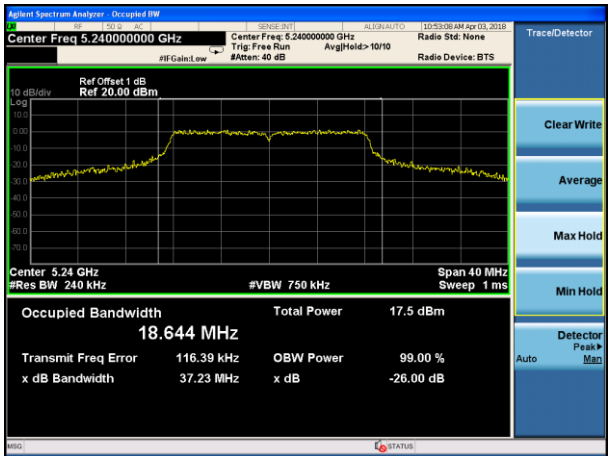
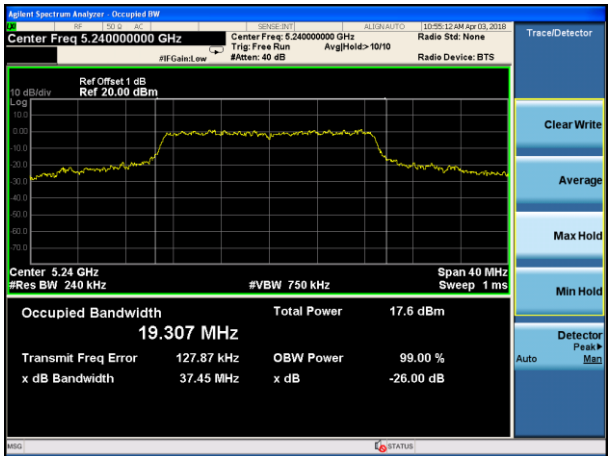
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			6dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
149	5745.00	17.510	18.333	18.148	16.37	17.58	17.61
157	5785.00	17.520	18.285	18.080	16.37	17.58	17.60
165	5825.00	17.492	18.128	18.093	16.37	17.58	17.35

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		6dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
151	5755.00	36.436	36.396	35.16	35.20
159	5795.00	36.472	36.397	35.21	35.22

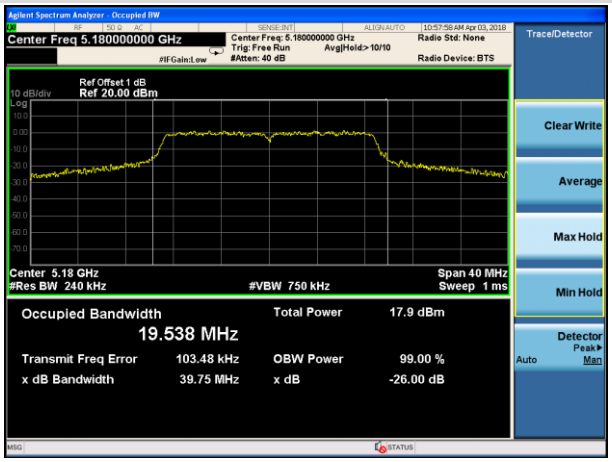
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	6dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
155	5775.00	75.218	73.82

Test plots as followed:

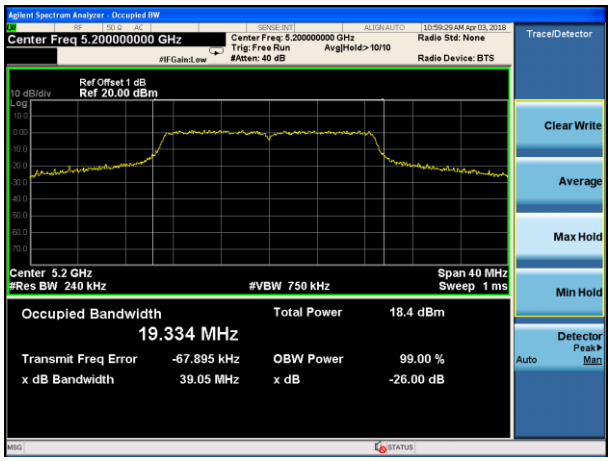
Band I (5150 - 5250 MHz)

802.11a mode	802.11n(HT20) mode
	
Channel 36 (5180MHz)	Channel 36 (5180MHz)
	
Channel 40 (5200MHz)	Channel 40 (5200MHz)
	
Channel 48 (5240MHz)	Channel 48 (5240MHz)

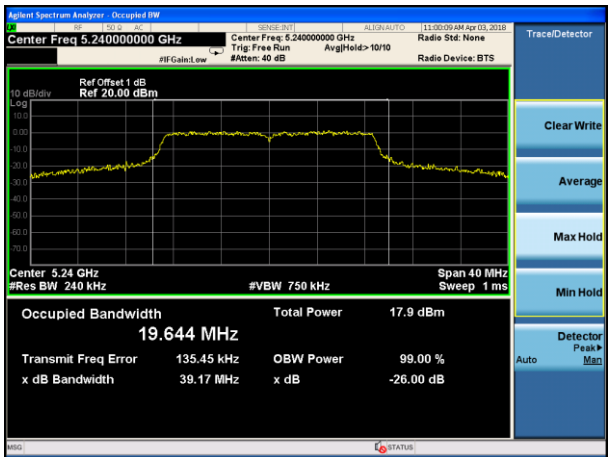
802.11ac(HT20) mode



Channel 36 (5180MHz)

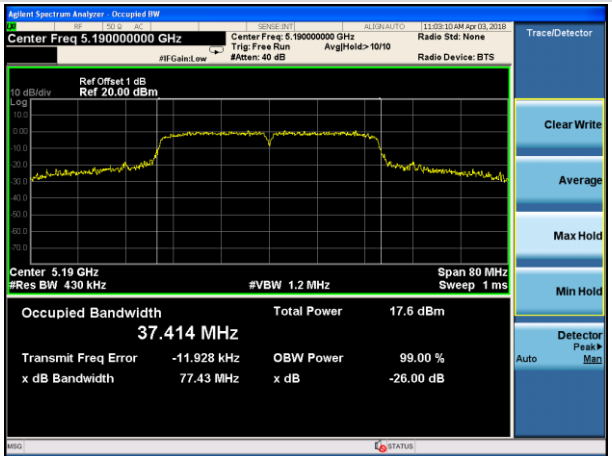


Channel 40 (5200MHz)



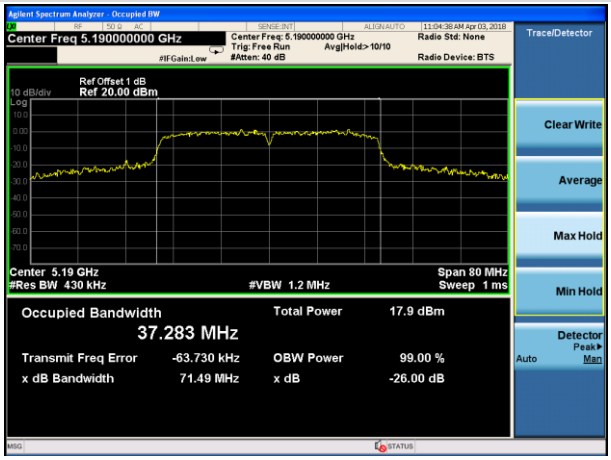
Channel 48 (5240MHz)

802.11n(HT40) mode

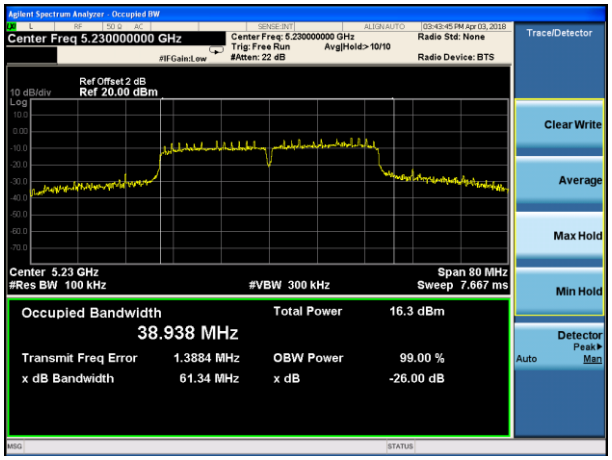


Channel 38 (5190MHz)

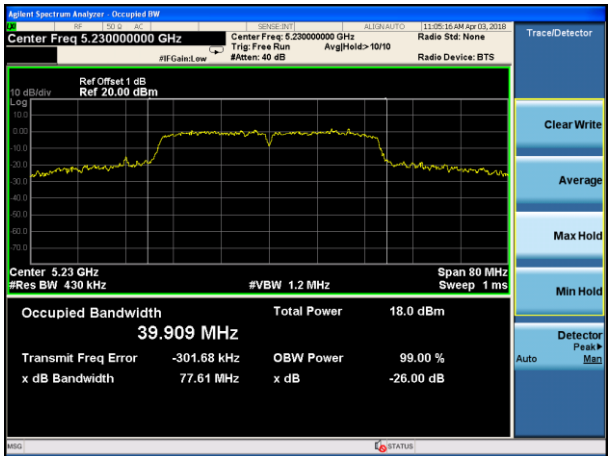
802.11ac(HT40) mode



Channel 38 (5190MHz)

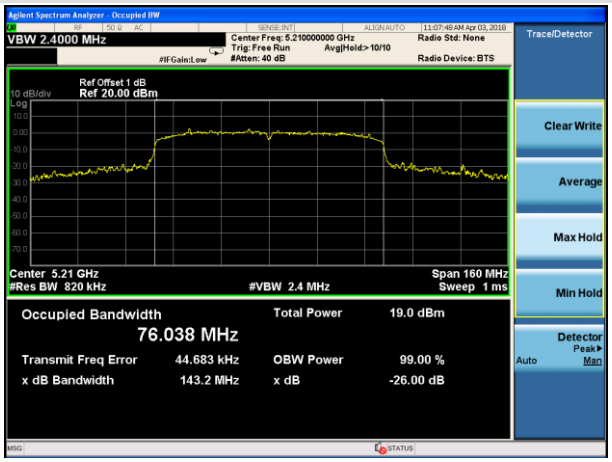


Channel 46 (5230MHz)



Channel 46 (5230MHz)

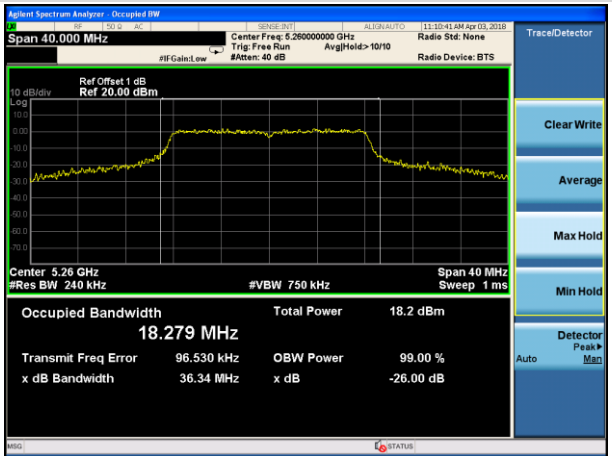
802.11ac(HT80) mode



Channel 40 (5210MHz)

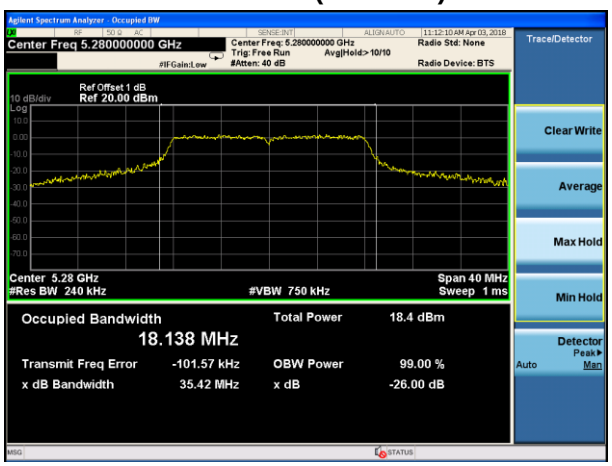
Band 2A (5250 - 5350 MHz)

802.11a mode	802.11n(HT20) mode

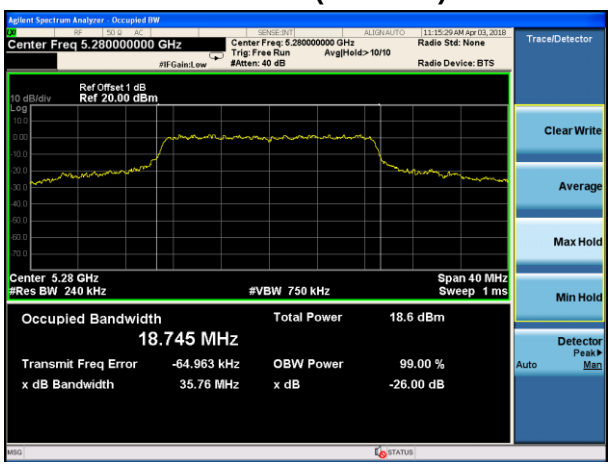


Channel 52 (5260MHz)

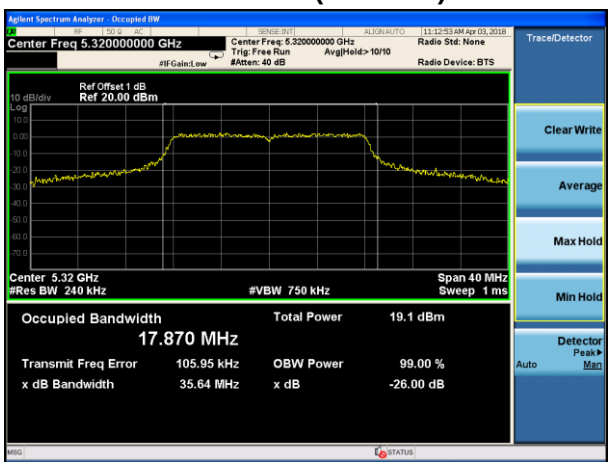
Channel 52 (5260MHz)



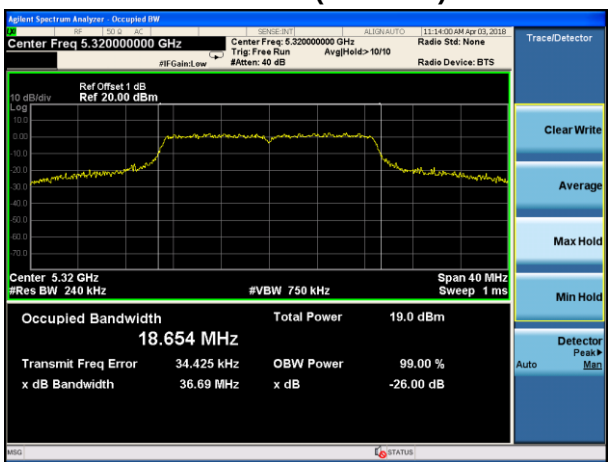
Channel 56 (5280MHz)



Channel 56 (5280MHz)

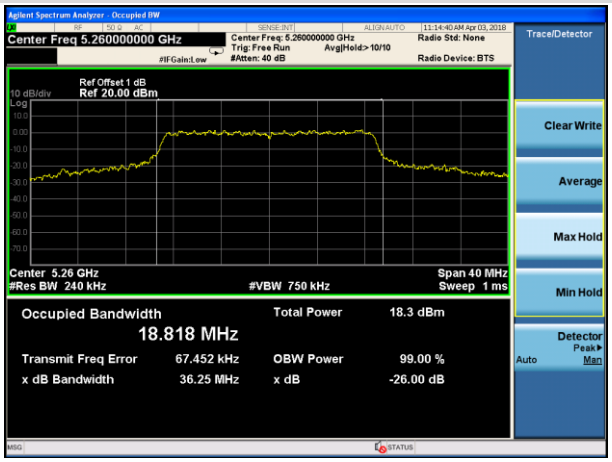


Channel 64 (5320MHz)

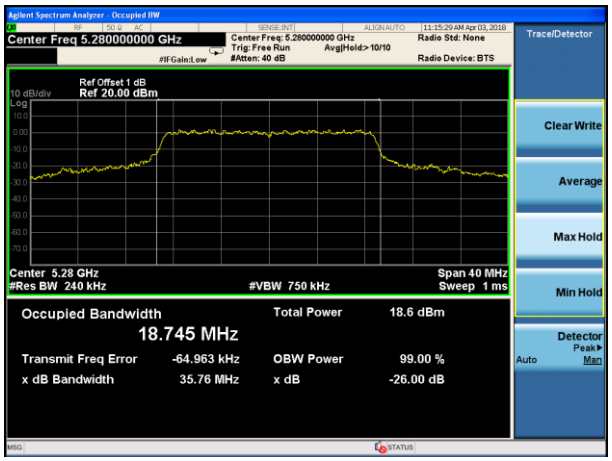


Channel 64 (5320MHz)

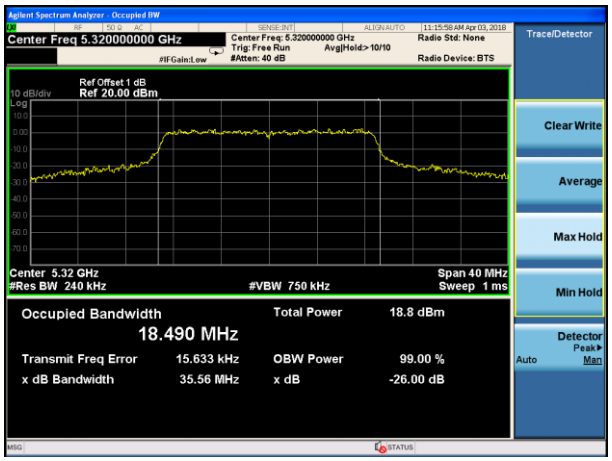
802.11ac(HT20) mode



Channel 52 (5260MHz)

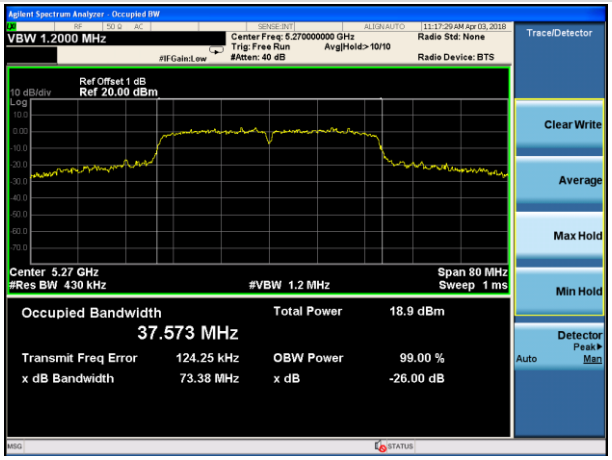


Channel 56 (5280MHz)



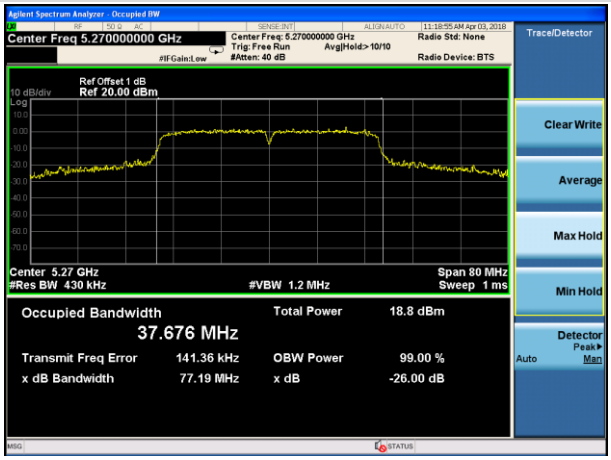
Channel 64 (5320MHz)

802.11n(HT40) mode

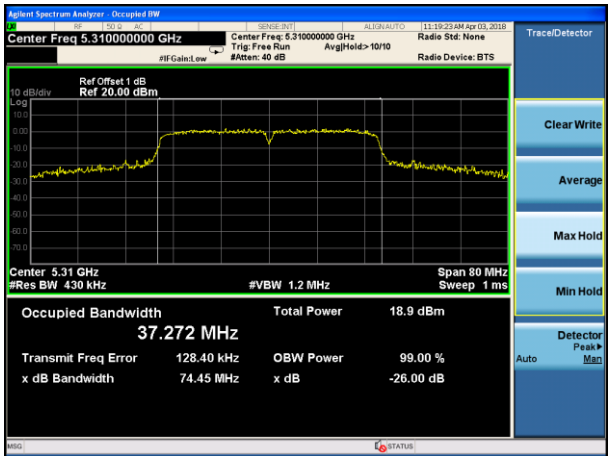


Channel 54 (5270MHz)

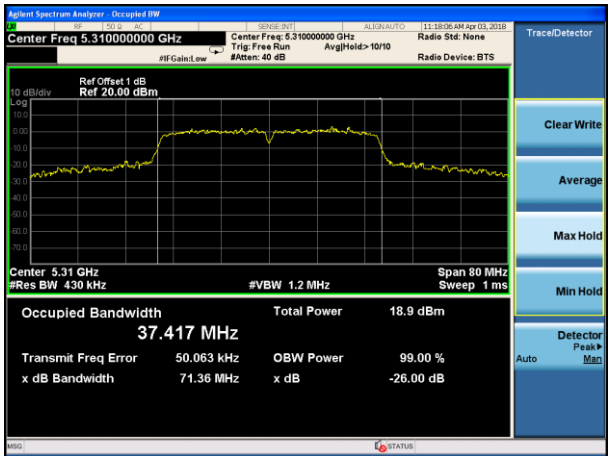
802.11ac(HT40) mode



Channel 54 (5270MHz)

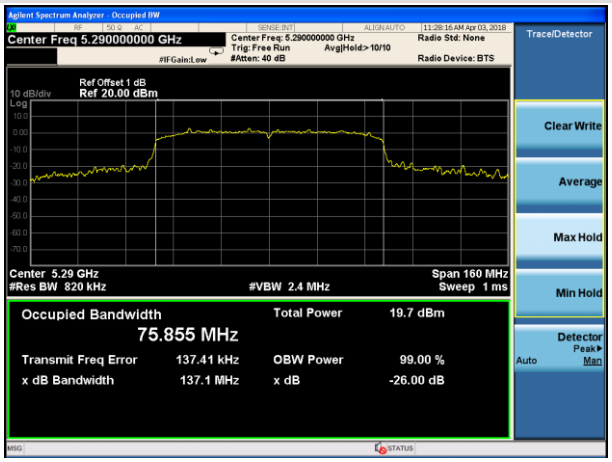


Channel 62 (5310MHz)



Channel 62 (5310MHz)

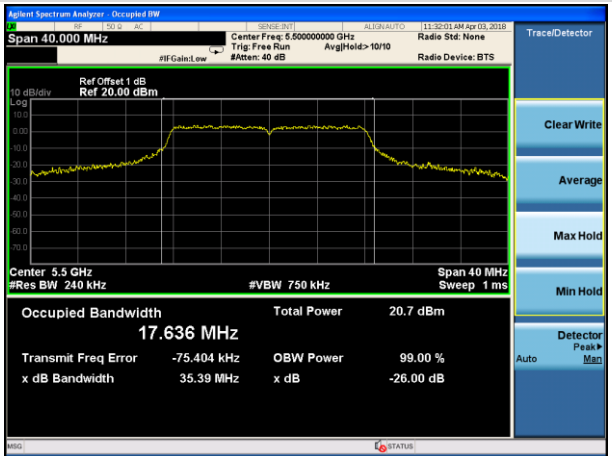
802.11ac(HT80) mode



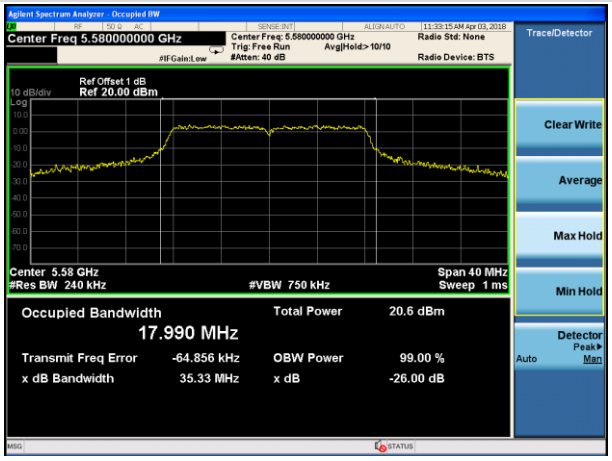
Channel 58 (5290MHz)

Band 2C (5470 - 5725 MHz)

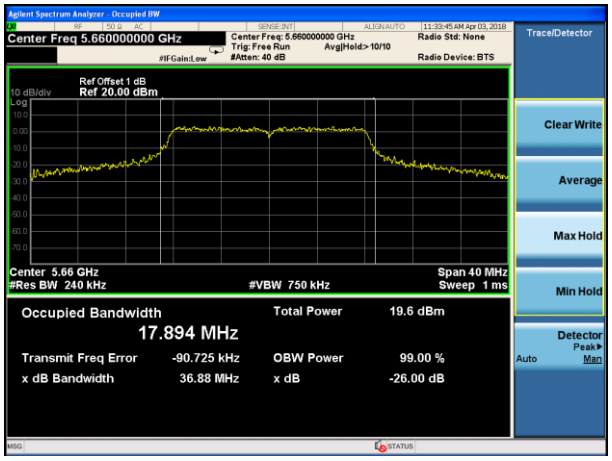
802.11a mode



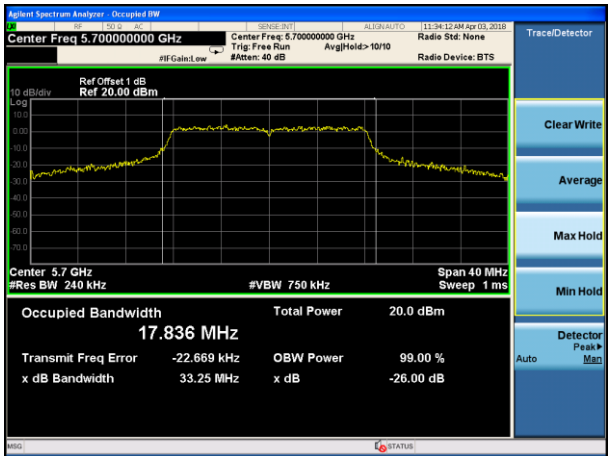
Channel 100 (5500MHz)



Channel 116 (5580MHz)



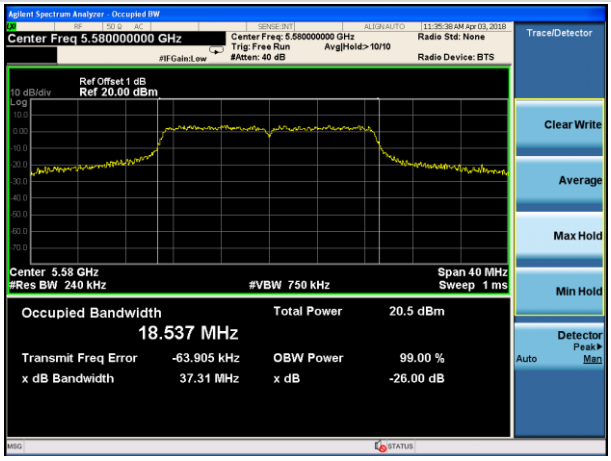
Channel 132 (5660MHz)



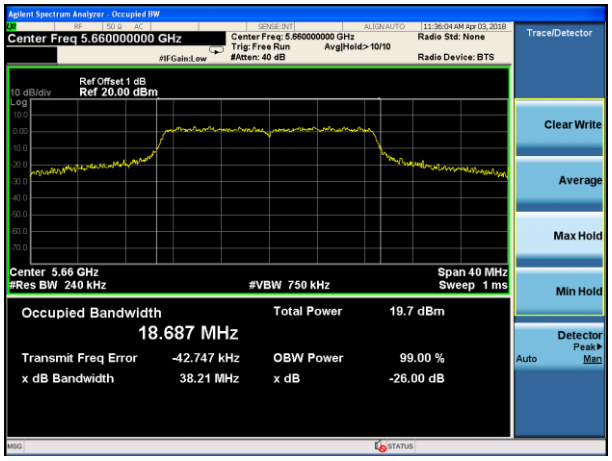
Channel 140 (5700MHz)

802.11n(HT20) mode

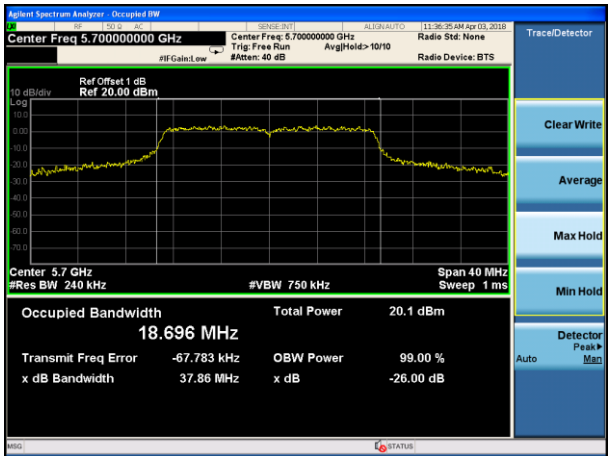
Channel 100 (5500MHz)



Channel 116 (5580MHz)



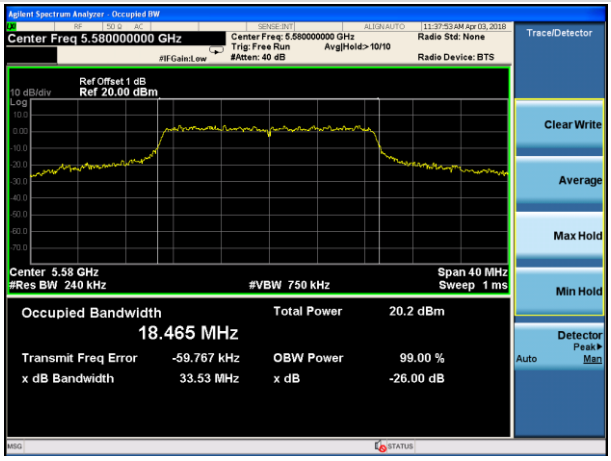
Channel 132 (5660MHz)



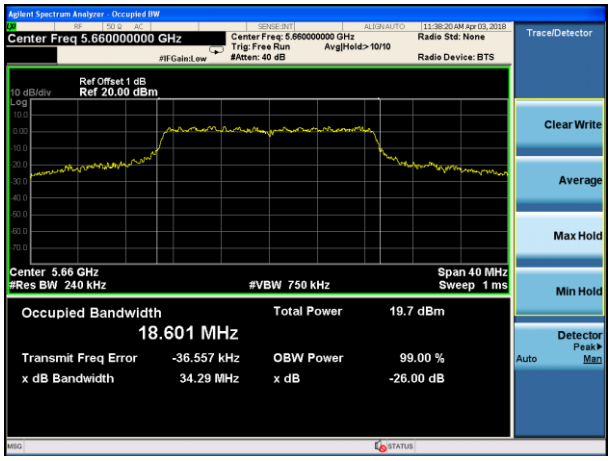
Channel 140 (5700MHz)

802.11ac(HT20) mode

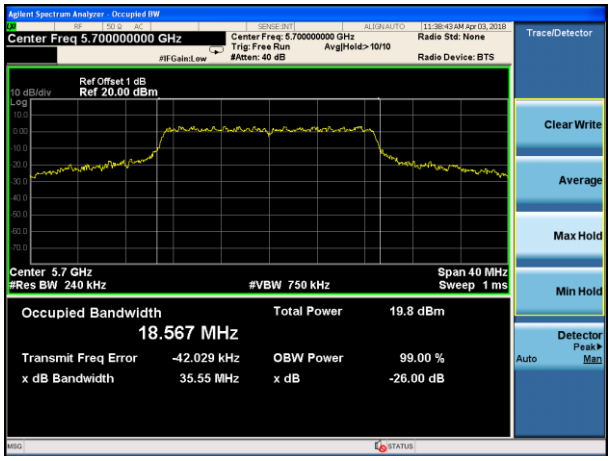
Channel 100 (5500MHz)



Channel 116 (5580MHz)

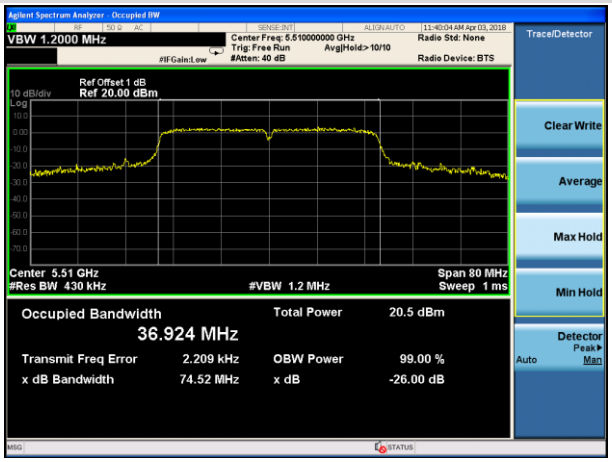


Channel 132 (5660MHz)

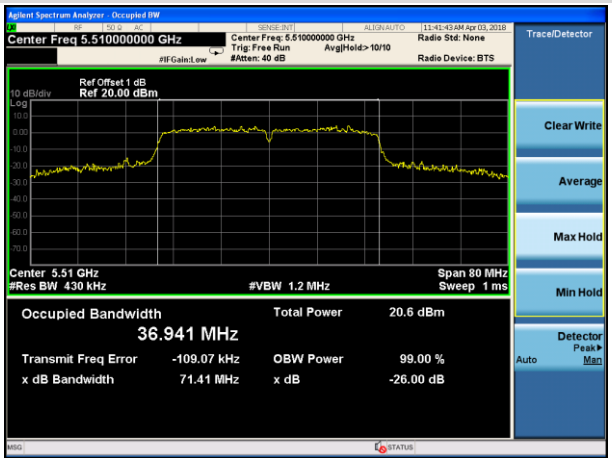


Channel 140 (5700MHz)

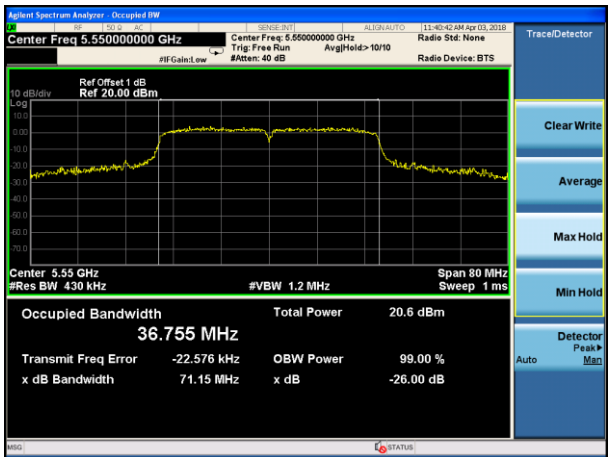
802.11n(HT40) mode	802.11ac(HT40) mode



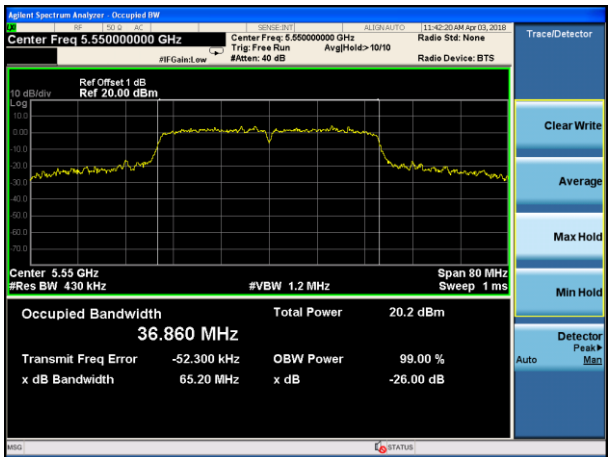
Channel 102 (5510MHz)



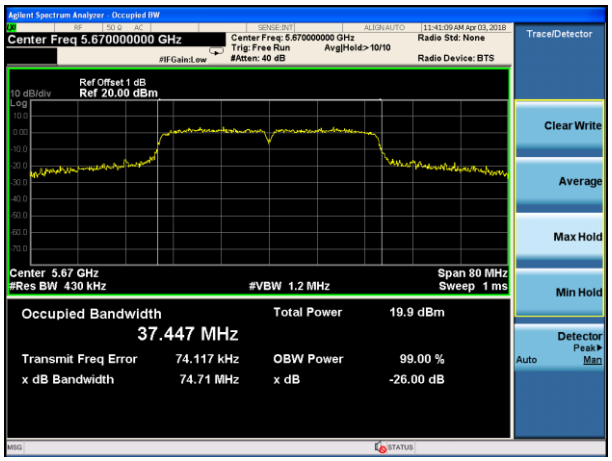
Channel 102 (5510MHz)



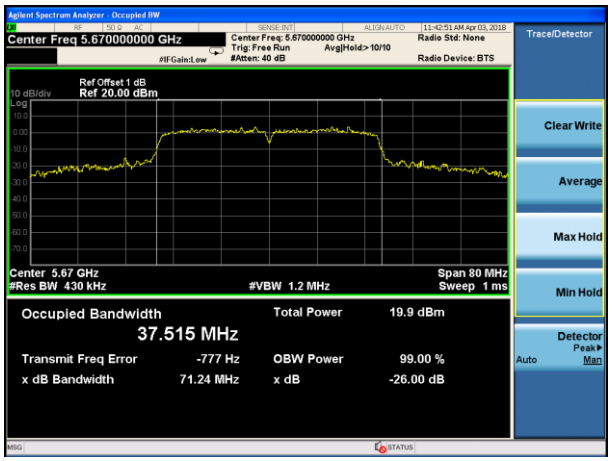
Channel 110 (5550MHz)



Channel 110 (5550MHz)

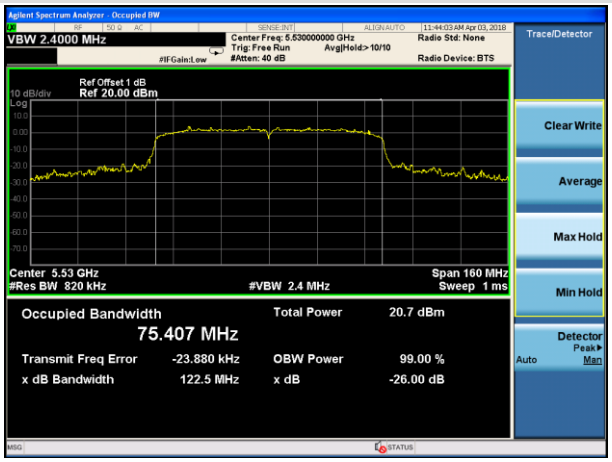


Channel 134 (5670MHz)



Channel 134 (5670MHz)

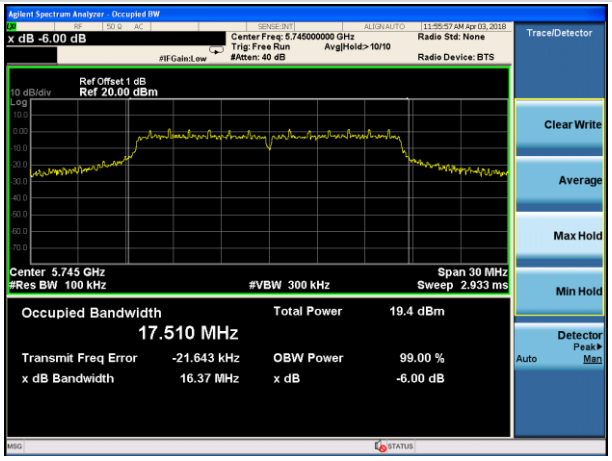
802.11ac(HT80) mode



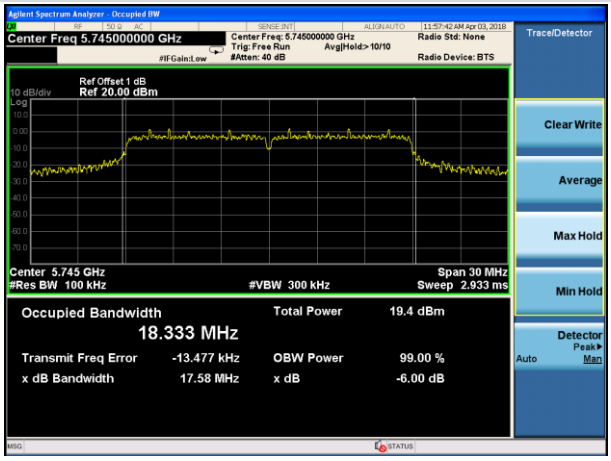
Channel 106 (5530MHz)

Band 3 (5725 - 5850 MHz)

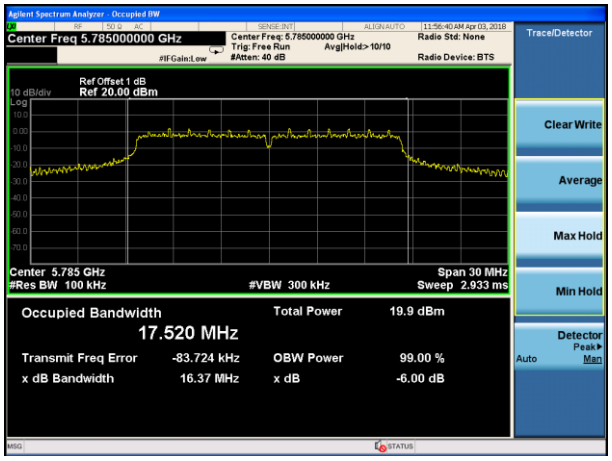
802.11a mode	802.11n(HT20) mode



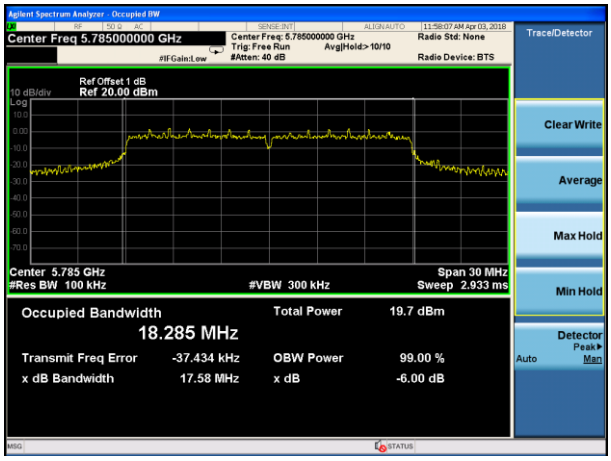
Channel 149 (5745MHz)



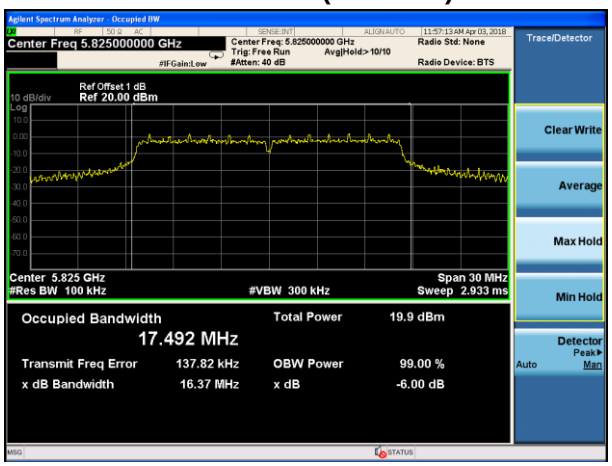
Channel 149 (5745MHz)



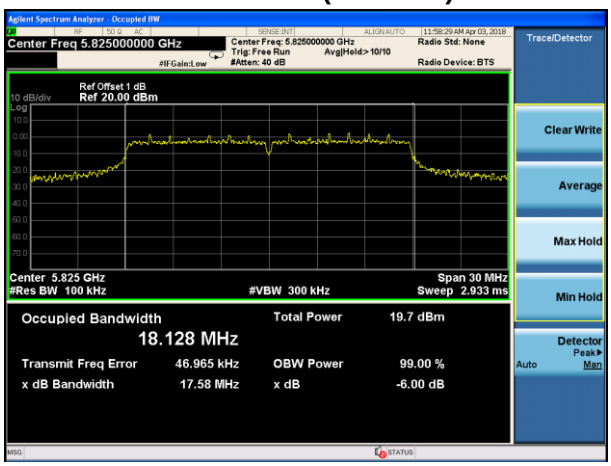
Channel 157 (5785MHz)



Channel 157 (5785MHz)

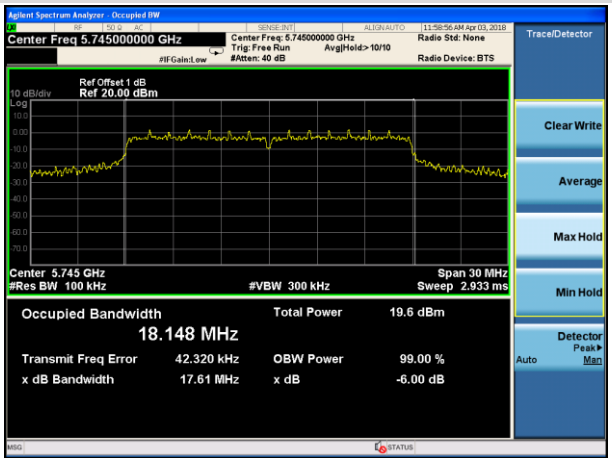


Channel 165 (5825MHz)

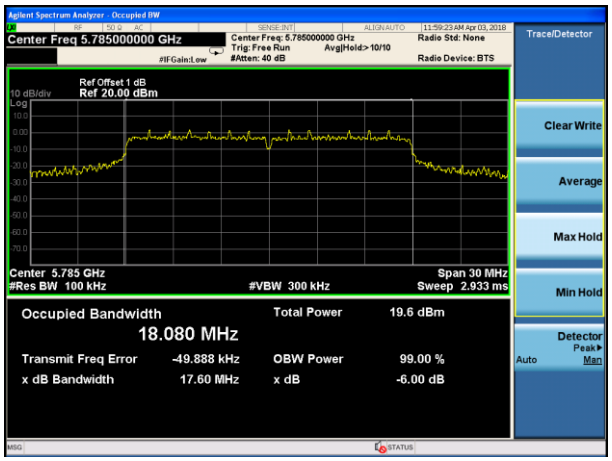


Channel 165 (5825MHz)

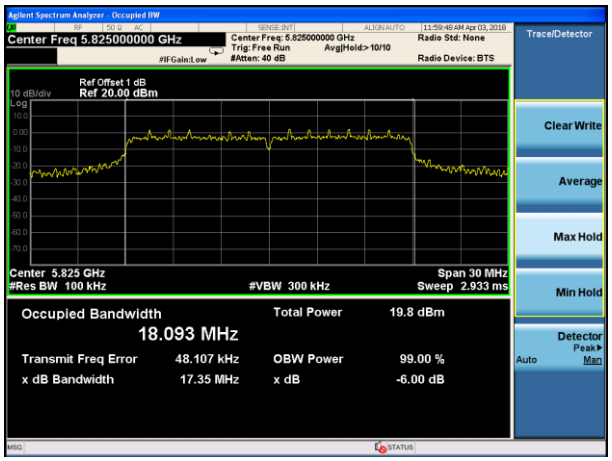
802.11ac(HT20) mode



Channel 149 (5745MHz)

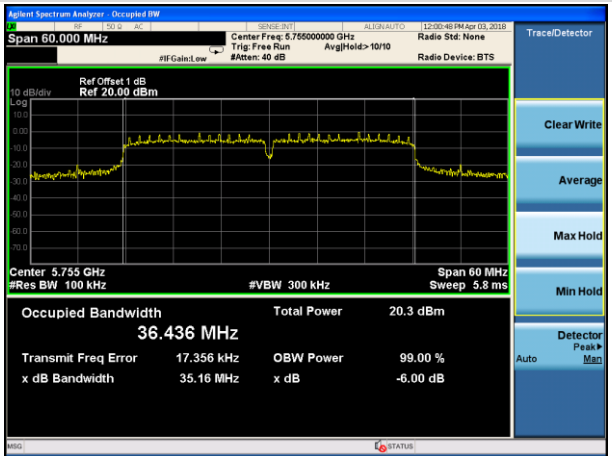


Channel 157 (5785MHz)



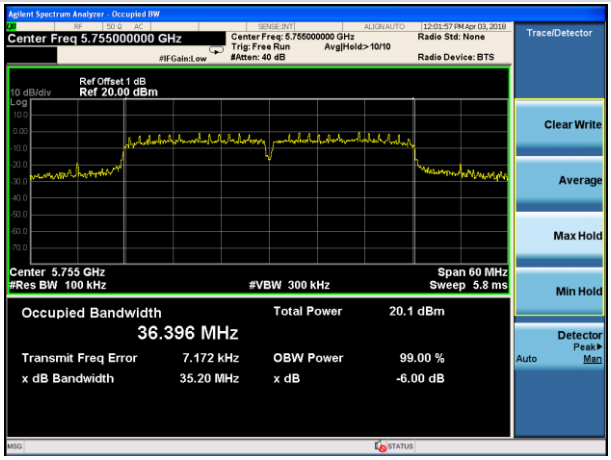
Channel 165 (5825MHz)

802.11n(HT40) mode

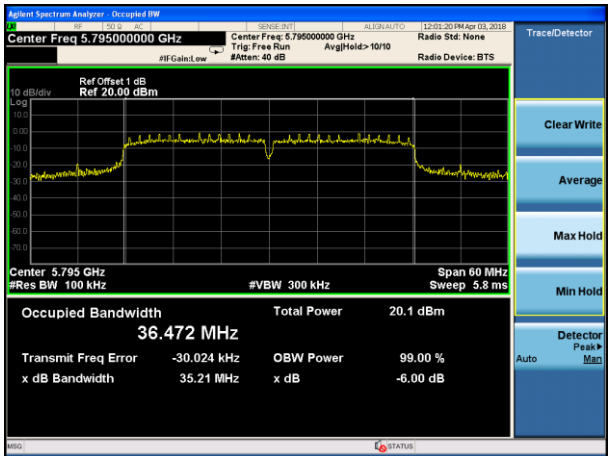


Channel 151 (5755MHz)

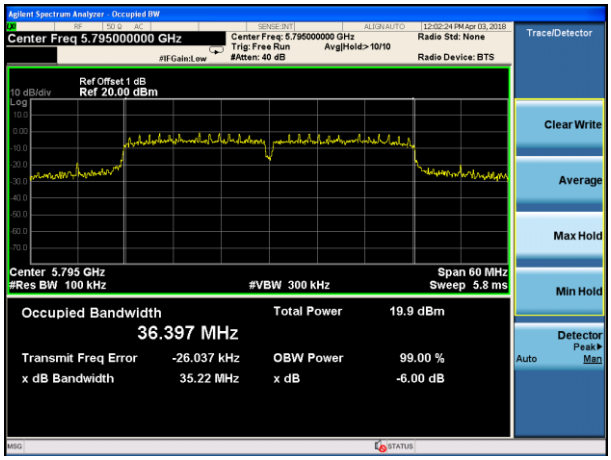
802.11ac(HT40) mode



Channel 151 (5755MHz)

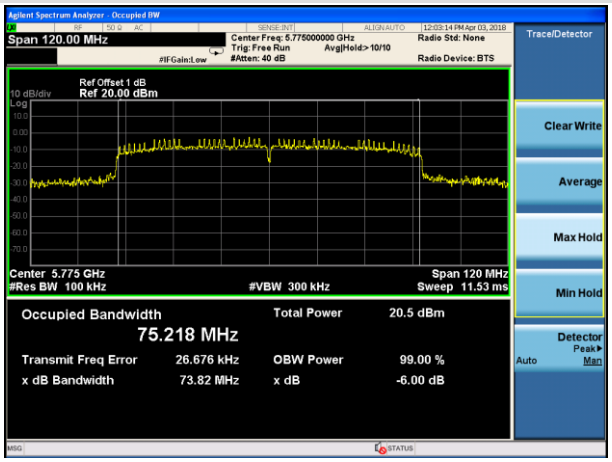


Channel 159 (5795MHz)



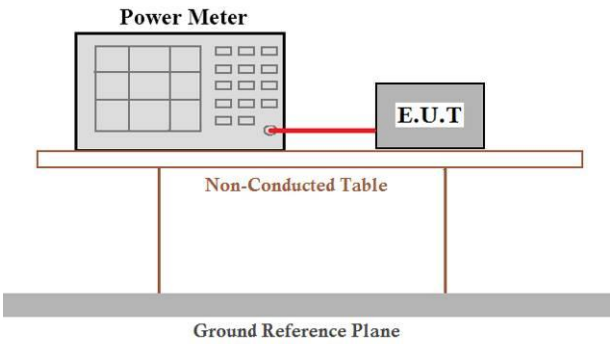
Channel 159 (5795MHz)

802.11ac(HT80) mode



Channel 155(5775MHz)

7.4 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	For the band 5.15-5.25GHz, 5.25-5.35GHz, 5.47-5.725GHz,the maximum conducted output power over the frequency bands of operation shall not exceed 250mW. For the band 5.725-5.85GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 1W.
Test setup:	
Test procedure:	**Measurement using an RF average power meter** (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Band 1 (5150-5250 MHz)

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	21.66	0.04	21.70	23.98	Pass
40	5200.00	21.46	0.04	21.50	23.98	Pass
48	5240.00	20.37	0.04	20.41	23.98	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	19.88	0.04	19.92	23.98	Pass
40	5200.00	19.84	0.04	19.88	23.98	Pass
48	5240.00	19.98	0.04	20.02	23.98	Pass

802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	20.81	0.04	20.85	23.98	Pass
40	5200.00	19.74	0.04	19.78	23.98	Pass
48	5240.00	21.17	0.04	21.21	23.98	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190.00	19.36	0.04	19.40	23.98	Pass
46	5230.00	19.46	0.04	19.50	23.98	Pass

802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190.00	19.59	0.04	19.63	23.98	Pass
46	5230.00	19.89	0.04	19.93	23.98	Pass

802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
42	5210.00	19.00	0.04	19.04	23.98	Pass

Note: Output Power = Measured Power + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)=10log(1/0.99)=0.04

Band 2A (5250 -5350 MHz)

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
52	5260.00	20.78	0.04	20.82	23.98	Pass
56	5280.00	20.49	0.04	20.53	23.98	Pass
64	5320.00	21.18	0.04	21.22	23.98	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
52	5260.00	20.60	0.04	20.64	23.98	Pass
56	5280.00	20.95	0.04	20.99	23.98	Pass
64	5320.00	20.61	0.04	20.65	23.98	Pass

802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
52	5260.00	20.79	0.04	20.83	23.98	Pass
56	5280.00	21.74	0.04	21.78	23.98	Pass
64	5320.00	20.54	0.04	20.58	23.98	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
54	5270.00	21.38	0.04	21.42	23.98	Pass
62	5310.00	20.63	0.04	20.67	23.98	Pass

802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
54	5270.00	20.54	0.04	20.58	23.98	Pass
62	5310.00	20.59	0.04	20.63	23.98	Pass

802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
58	5290.00	19.29	0.04	19.33	23.98	Pass

Note: Output Power = Measured Power + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)=10log(1/0.99)=0.04

Band 2C (5470-5725 MHz)

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
100	5500.00	19.65	0.04	19.69	23.98	Pass
116	5580.00	19.65	0.04	19.69	23.98	Pass
132	5660.00	19.28	0.04	19.32	23.98	Pass
140	5700.00	19.42	0.04	19.46	23.98	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
100	5500.00	19.65	0.04	19.77	23.98	Pass
116	5580.00	19.65	0.04	19.77	23.98	Pass
132	5660.00	19.21	0.04	19.25	23.98	Pass
140	5700.00	19.74	0.04	19.78	23.98	Pass

802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
100	5500.00	18.07	0.04	18.11	23.98	Pass
116	5580.00	18.82	0.04	18.86	23.98	Pass
132	5660.00	18.87	0.04	18.91	23.98	Pass
140	5700.00	18.98	0.04	19.02	23.98	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
102	5510.00	18.10	0.04	18.14	23.98	Pass
110	5550.00	18.74	0.04	18.78	23.98	Pass
134	5670.00	18.85	0.04	18.89	23.98	Pass

802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
102	5510.00	18.05	0.04	18.09	23.98	Pass
110	5550.00	18.82	0.04	18.86	23.98	Pass
134	5670.00	18.92	0.04	18.96	23.98	Pass

802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
106	5530.00	18.14	0.04	18.18	23.98	Pass

Note: Output Power = Measured Power + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)=10log(1/0.99)=0.04

Band 3 (5725 - 5850)

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
149	5745.00	14.62	0.04	14.66	30.00	Pass
157	5785.00	14.43	0.04	14.47	30.00	Pass
165	5825.00	13.34	0.04	13.38	30.00	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
149	5745.00	12.86	0.04	12.90	30.00	Pass
157	5785.00	12.88	0.04	12.92	30.00	Pass
165	5825.00	13.02	0.04	13.06	30.00	Pass

802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
149	5745.00	13.79	0.04	13.83	30.00	Pass
157	5785.00	12.70	0.04	12.74	30.00	Pass
165	5825.00	14.22	0.04	14.26	30.00	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
151	5755.00	12.35	0.04	12.39	30.00	Pass
159	5795.00	12.53	0.04	12.57	30.00	Pass

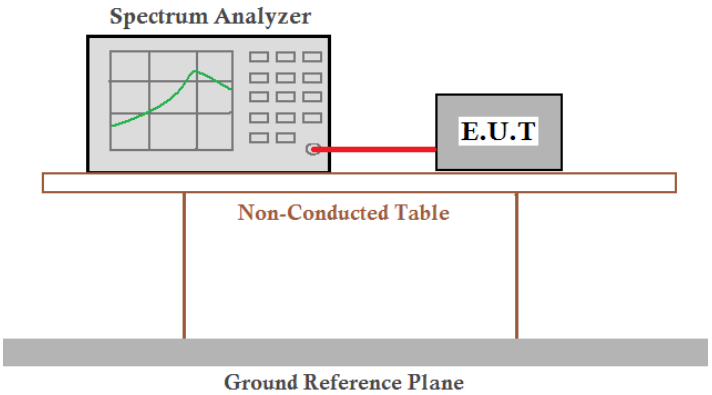
802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
151	5755.00	12.64	0.04	12.68	30.00	Pass
159	5795.00	12.88	0.04	12.92	30.00	Pass

802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
155	5775.00	13.51	0.04	13.55	30.00	Pass

Note: Output Power = Measured Power + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)=10log(1/0.99)=0.04

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	≤11.00dBm/MHz for 5150MHz-5250MHz, 5250-5350MHz and 5470-5725 MHz ≤30.00dBm/500KHz for 5725MHz-5850MHz
Test setup:	
Test procedure:	1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. 2) Use the peak search function on the instrument to find the peak of the spectrum. 3) Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum. b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. 4) The result is the PSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Band 1 (5150 - 5250 MHz)

802.11a mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	7.870	0.04	7.91	11	Pass
40	5200.00	7.943	0.04	7.98	11	Pass
48	5240.00	8.405	0.04	8.45	11	Pass

802.11n(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	8.014	0.04	8.05	11	Pass
40	5200.00	7.932	0.04	7.97	11	Pass
48	5240.00	7.845	0.04	7.89	11	Pass

802.11ac(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	7.108	0.04	7.15	11	Pass
40	5200.00	7.755	0.04	7.80	11	Pass
48	5240.00	7.146	0.04	7.19	11	Pass

802.11n(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190.00	5.669	0.04	5.71	11	Pass
46	5230.00	5.124	0.04	5.16	11	Pass

802.11ac(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190.00	5.323	0.04	5.36	11	Pass
46	5230.00	5.193	0.04	5.23	11	Pass

802.11ac(HT80) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5210.00	2.950	0.04	2.99	11	Pass

Note: Total PSD = Measured PSD + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)

Band 2A (5250 -5350 MHz)

802.11a mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
52	5260.00	8.803	0.04	8.84	11	Pass
56	5280.00	8.383	0.04	8.42	11	Pass
64	5320.00	8.934	0.04	8.97	11	Pass

802.11n(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
52	5260.00	8.040	0.04	8.08	11	Pass
56	5280.00	8.256	0.04	8.30	11	Pass
64	5320.00	8.388	0.04	8.43	11	Pass

802.11ac(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
52	5260.00	8.034	0.04	8.07	11	Pass
56	5280.00	8.128	0.04	8.17	11	Pass
64	5320.00	9.392	0.04	9.43	11	Pass

802.11n(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
54	5270.00	5.442	0.04	5.48	11	Pass
62	5310.00	6.317	0.04	6.36	11	Pass

802.11ac(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
54	5270.00	6.073	0.04	6.11	11	Pass
62	5310.00	6.225	0.04	6.27	11	Pass

802.11ac(HT80) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
58	5290.00	3.594	0.04	3.63	11	Pass

Note: Total PSD = Measured PSD + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)

Band 2C (5470 - 5725 MHz)

802.11a mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
100	5500.00	10.224	0.04	10.26	11	Pass
116	5580.00	10.715	0.04	10.76	11	Pass
132	5660.00	10.433	0.04	10.47	11	Pass
140	5700.00	9.945	0.04	9.99	11	Pass

802.11n(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
100	5500.00	9.259	0.04	9.30	11	Pass
116	5580.00	9.976	0.04	10.02	11	Pass
132	5660.00	10.103	0.04	10.14	11	Pass
140	5700.00	10.294	0.04	10.33	11	Pass

802.11ac(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
100	5500.00	10.089	0.04	10.13	11	Pass
116	5580.00	10.250	0.04	10.29	11	Pass
132	5660.00	9.629	0.04	9.67	11	Pass
140	5700.00	9.860	0.04	9.90	11	Pass

802.11n(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
102	5510.00	7.830	0.04	7.87	11	Pass
110	5550.00	8.515	0.04	8.56	11	Pass
134	5670.00	7.015	0.04	7.06	11	Pass

802.11ac(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
102	5510.00	7.816	0.04	7.86	11	Pass
110	5550.00	7.846	0.04	7.89	11	Pass
134	5670.00	7.09	0.04	7.13	11	Pass

802.11ac(HT80) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
106	5530.00	4.776	0.04	4.82	11	Pass

Note: Total PSD = Measured PSD + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)

Band 3 (5725 - 5850 MHz)

802.11a mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
149	5745.00	6.561	0.04	6.60	30	Pass
157	5785.00	6.845	0.04	6.89	30	Pass
165	5825.00	6.976	0.04	7.02	30	Pass

802.11n(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
149	5745.00	6.453	0.04	6.49	30	Pass
157	5785.00	6.608	0.04	6.65	30	Pass
165	5825.00	6.652	0.04	6.69	30	Pass

802.11ac(HT20) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
149	5745.00	5.901	0.04	5.94	30	Pass
157	5785.00	6.331	0.04	6.37	30	Pass
165	5825.00	6.194	0.04	6.23	30	Pass

802.11n(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
151	5755.00	4.031	0.04	4.07	30	Pass
159	5795.00	4.177	0.04	4.22	30	Pass

802.11ac(HT40) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
151	5755.00	4.702	0.04	4.74	30	Pass
159	5795.00	4.152	0.04	4.19	30	Pass

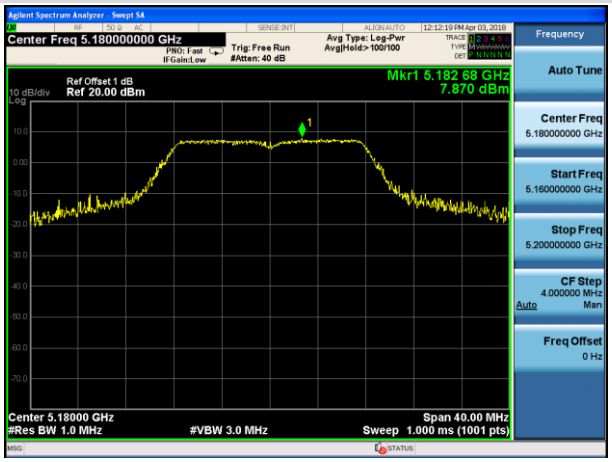
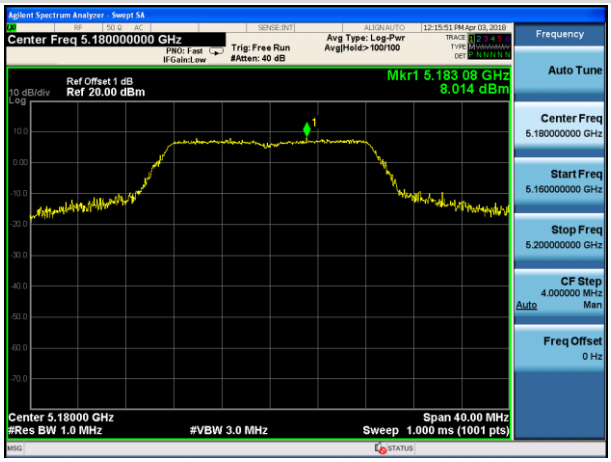
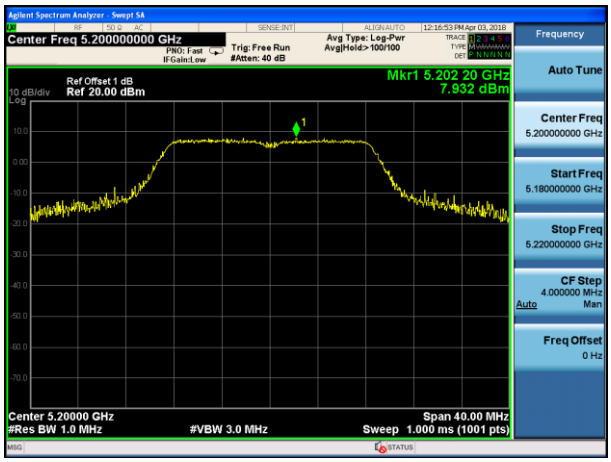
802.11ac(HT80) mode						
Channel No.	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
155	5775.00	2.044	0.04	2.08	30	Pass

Note: Total PSD = Measured PSD + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)

Test plots as followed:

Band 1 (5150 - 5250 MHz)

802.11a mode	802.11n(HT20) mode
	
Channel 36 (5180MHz)	**Channel 36 (5180MHz)**
	
Channel 40 (5200MHz)	**Channel 40 (5200MHz)**
	
Channel 48 (5240MHz)	**Channel 48 (5240MHz)**