TEST REPORT

Applicant:	Quantum Creations LLC.
Address of Applicant:	15705 NW 13th Ave, Miami Gardens, Miami Beach, Florida, United States 33169
Manufacturer/Factory:	QUTHC Limited
Address of Manufacturer/Factory:	7th Floor, Building C, Longsheng Industrial Park, Huiyang District, Huizhou City, Guangdong province (516211) P.R.China

Equipment Under Test (EUT)

Product Name:	Access4
Model No.:	AG3221, AG3111, AG3112, AG3113, AG3222, AG3223, AG3211, AG3212, AG3213, AG3121, AG3122, AG3123
Trade Mark:	AZULLE
FCC ID:	2AFJI-ACCESS4
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	April 27, 2020
Date of Test:	April 27, 2020-May 07, 2020
Date of report issue:	May 07, 2020
Test Result :	PASS *

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

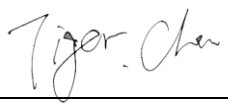
Authorized Signature:

Robinson Lo

Laboratory Manager

2 Version

Version No.	Date	Description
00	*May 07, 2020*	*Original*

Prepared By:  ***Date:*** *May 07, 2020*

Project Engineer

Check By:  ***Date:*** *May 07, 2020*

Reviewer

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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	15.407(b)(1)	PASS
Frequency Stability	15.407(g)	PASS

Remark:

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

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Access4
Model No.:	AG3221, AG3111, AG3112, AG3113, AG3222, AG3223, AG3211, AG3212, AG3213, AG3121, AG3122, AG3123
Test Model No:	AG3221

Remark: All models have the same motherboard and wifi module,the difference between different model is DDR capacity, EMMC capacity and OS,the following table illustrates these differences.

Model	Processor	DDR capacity	eMMC capacity	OS
AG3111	Gemini Lake	2	32	Windows 10 Pro
AG3112	Gemini Lake	2	32	Windows IOT
AG3113	Gemini Lake	2	32	NO OS
AG3221	Gemini Lake	4	64	Windows 10 Pro
AG3222	Gemini Lake	4	64	Windows IOT
AG3223	Gemini Lake	4	64	NO OS
AG3211	Gemini Lake	4	32	Windows 10 Pro
AG3212	Gemini Lake	4	32	Windows IOT
AG3213	Gemini Lake	4	32	NO OS
AG3121	Gemini Lake	2	64	Windows 10 Pro
AG3122	Gemini Lake	2	64	Windows IOT
AG3123	Gemini Lake	2	64	NO OS

Serial No.:	ACCESS4-2004200001
Hardware Version:	V30
Software Version:	V1.10
Test sample(s) ID:	GTS202004000210-1
Sample(s) Status:	Engineer sample

Operation Frequency:

Band	Mode	Frequency Range (MHz)	Number of channels
U-NII Band I	IEEE 802.11a	5180-5240	4
	IEEE 802.11n 20MHz	5180-5240	4
	IEEE 802.11n 40MHz	5190-5230	2
	IEEE 802.11ac 80MHz	5210	1

Modulation technology:	OFDM
Antenna Type:	ANT 1: FPCB Antenna ANT 2: Integral Antenna
Antenna gain:	ANT 1: 0.5dBi ANT 2: 3.7dBi
Power supply:	SWITCHING ADAPTOR

	Model No.:FJ-SW126G0503000N Input: AC 100-240V 50/60Hz 0.6A Max Output: DC 5.0V 3.0A 15.0W

Channel list for 802.11a/n(HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz

Channel list for 802.11n(HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz				

Channel list for 802.11ac(HT80)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210MHz						

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation..

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.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a/n(HT20)	6/6.5 Mbps
802.11n(HT40)	13.5 Mbps
802.11ac(HT80)	29.3 Mbps

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 fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

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

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, 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 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

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. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

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.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 26 2019	June. 25 2020
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 26 2019	June. 25 2020
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 26 2019	June. 25 2020
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 26 2019	June. 25 2020
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 26 2019	June. 25 2020

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 26 2019	June. 25 2020
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 26 2019	June. 25 2020
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 26 2019	June. 25 2020
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 26 2019	June. 25 2020
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 26 2019	June. 25 2020
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 26 2019	June. 25 2020
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 26 2019	June. 25 2020

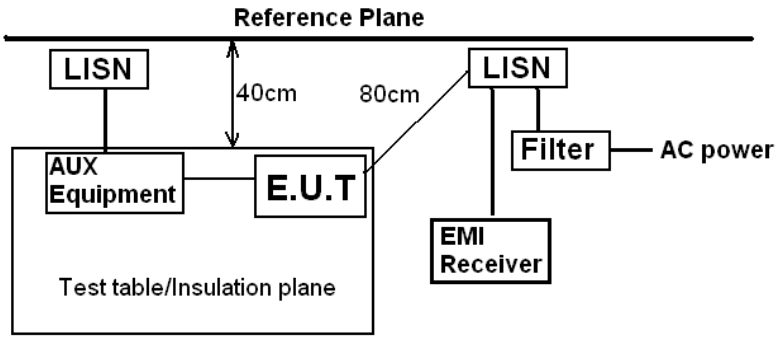
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

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 ANT1 is FPCB antenna, the best case gain of the antenna is 0.5dBi; The ANT2 is integral antenna, the best case gain of the antenna is 3.7dBi, reference to the appendix II for details	

7.2 Conducted Emissions

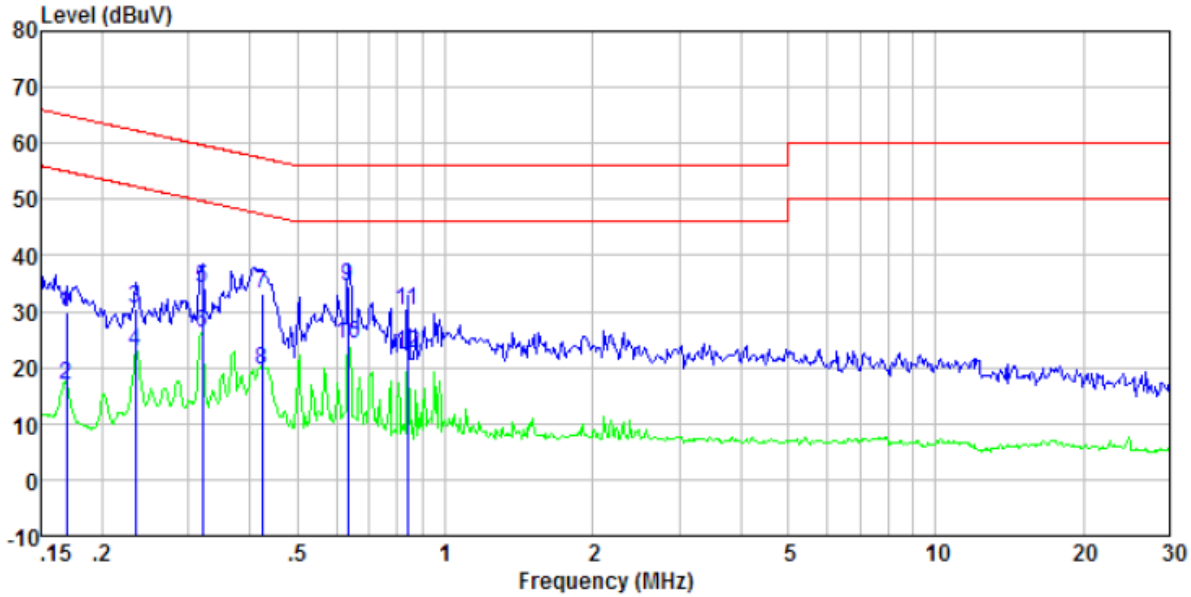
<table>
<tr><td>Test Requirement:</td><td colspan="6">FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td colspan="6">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="6">150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td colspan="6">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="6">RBW=9KHz, VBW=30KHz</td></tr>
<tr><td>Limit:</td><td colspan="6"><table><tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr><tr><td>Quasi-peak</td><td>Average</td></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test procedure</td><td colspan="6">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.</td></tr>
<tr><td>Test setup:</td><td colspan="6"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1012mbar</td></tr>
<tr><td>Test voltage:</td><td colspan="6">AC 120V, 60Hz</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

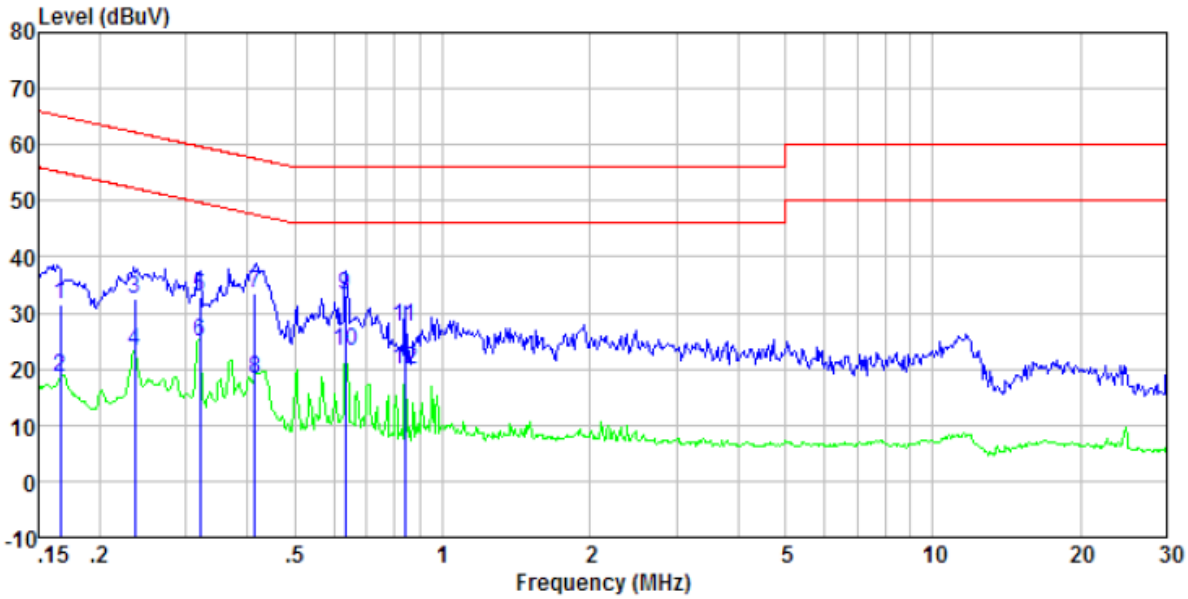
Measurement data:

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.17	9.23	20.40	0.09	29.72	64.99	-35.27	QP
0.17	-3.51	20.40	0.09	16.98	54.99	-38.01	Average
0.23	9.92	20.40	0.11	30.43	62.30	-31.87	QP
0.23	2.37	20.40	0.11	22.88	52.30	-29.42	Average
0.32	13.68	20.39	0.10	34.17	59.71	-25.54	QP
0.32	5.77	20.39	0.10	26.26	49.71	-23.45	Average
0.42	12.84	20.34	0.11	33.29	57.37	-24.08	QP
0.42	-0.73	20.34	0.11	19.72	47.37	-27.65	Average
0.63	14.00	20.28	0.12	34.40	56.00	-21.60	QP
0.63	3.65	20.28	0.12	24.05	46.00	-21.95	Average
0.84	9.95	20.23	0.14	30.32	56.00	-25.68	QP
0.84	2.30	20.23	0.14	22.67	46.00	-23.33	Average

Neutral:

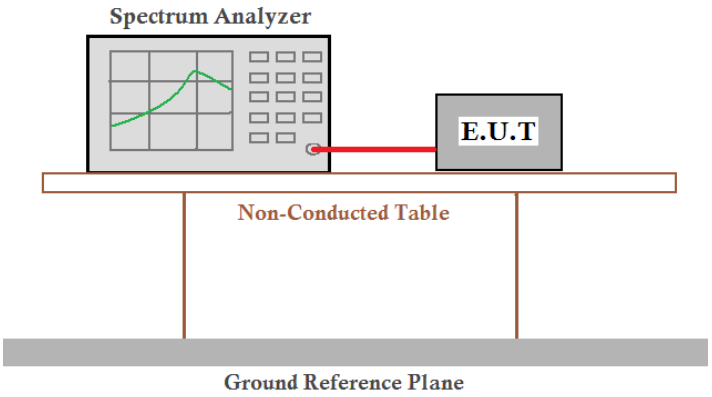


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.17	10.91	20.40	0.08	31.39	65.16	-33.77	QP
0.17	-1.86	20.40	0.08	18.62	55.16	-36.54	Average
0.24	12.05	20.40	0.11	32.56	62.26	-29.70	QP
0.24	2.66	20.40	0.11	23.17	52.26	-29.09	Average
0.32	12.30	20.39	0.10	32.79	59.71	-26.92	QP
0.32	4.35	20.39	0.10	24.84	49.71	-24.87	Average
0.41	12.94	20.35	0.11	33.40	57.55	-24.15	QP
0.41	-2.13	20.35	0.11	18.33	47.55	-29.22	Average
0.63	12.92	20.28	0.12	33.32	56.00	-22.68	QP
0.63	2.66	20.28	0.12	23.06	46.00	-22.94	Average
0.84	7.23	20.23	0.14	27.60	56.00	-28.40	QP
0.84	-0.40	20.23	0.14	19.97	46.00	-26.03	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*

7.3 Emission Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

ANT:1

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	16.603	17.664	17.687	25.329	23.800	22.383
40	5200.00	16.632	17.664	17.666	25.766	25.176	22.393
48	5240.00	16.415	17.831	17.835	20.547	27.771	28.243

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	36.091	36.094	49.257	46.596
46	5230.00	36.118	36.136	45.624	50.367

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210.00	75.013	80.069

ANT:2

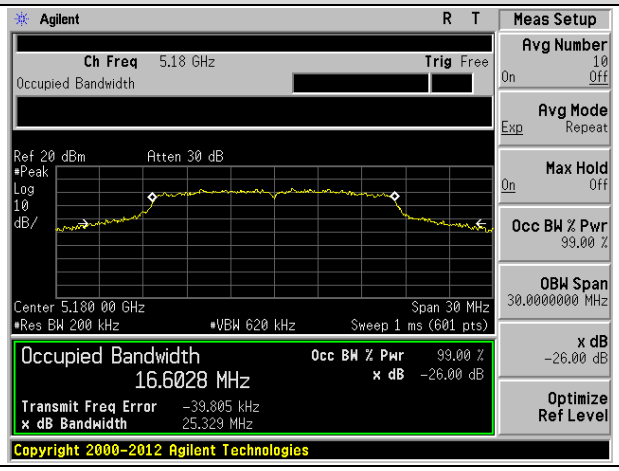
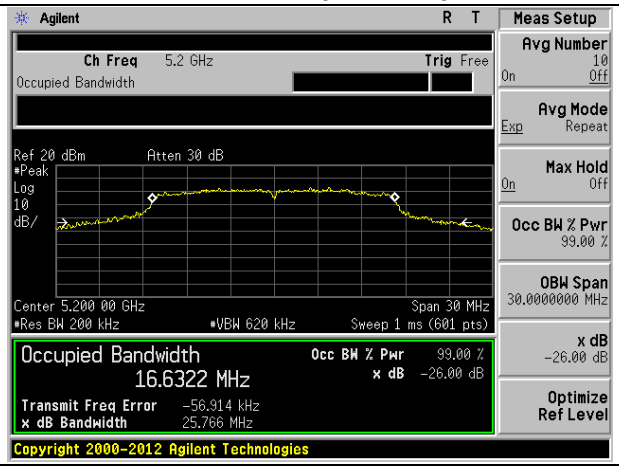
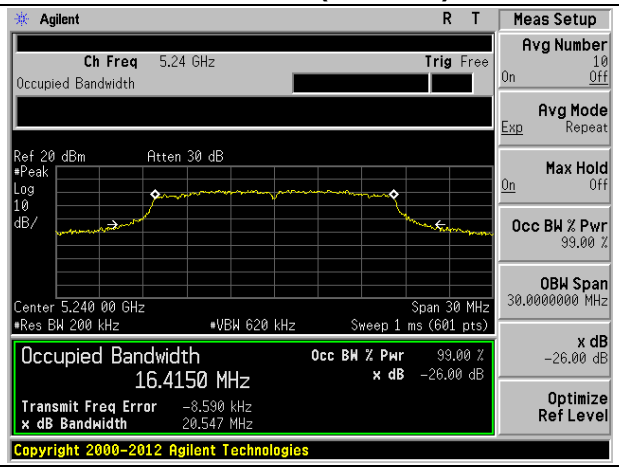
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
36	5180.00	16.540	17.682	17.676	23.886	23.380	23.929
40	5200.00	16.568	17.697	17.671	24.177	23.087	22.967
48	5240.00	16.417	17.829	17.803	20.530	26.252	29.060

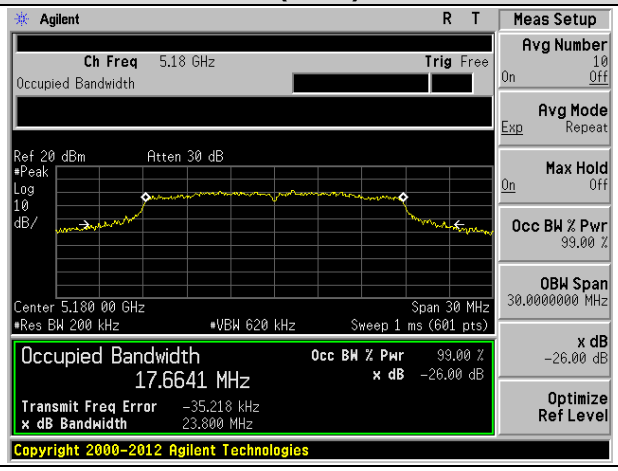
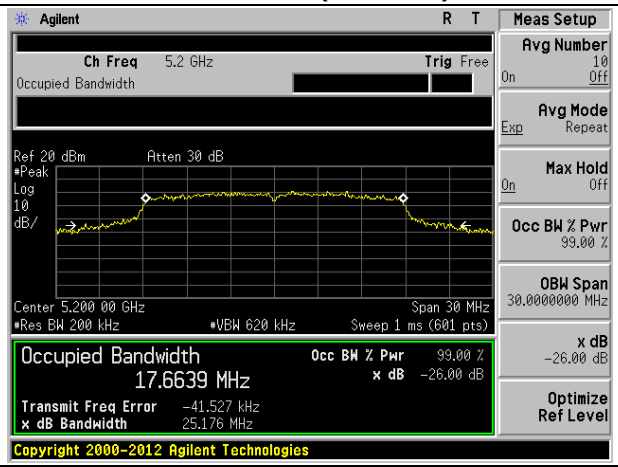
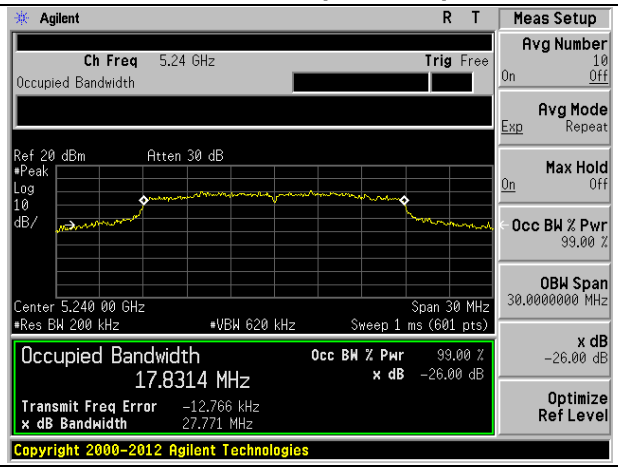
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
38	5190.00	36.070	36.105	46.108	46.506
46	5230.00	36.133	36.102	47.857	48.066

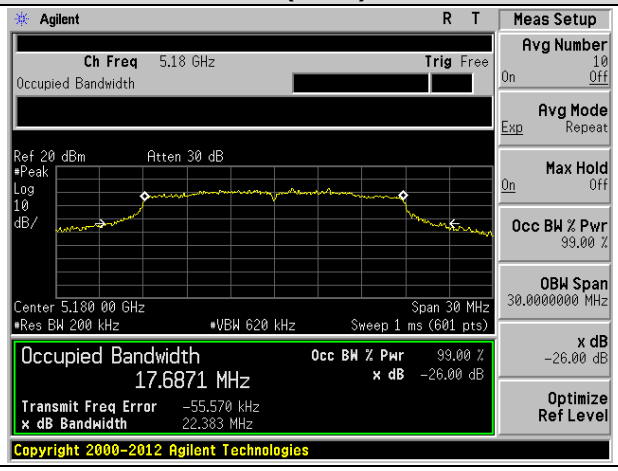
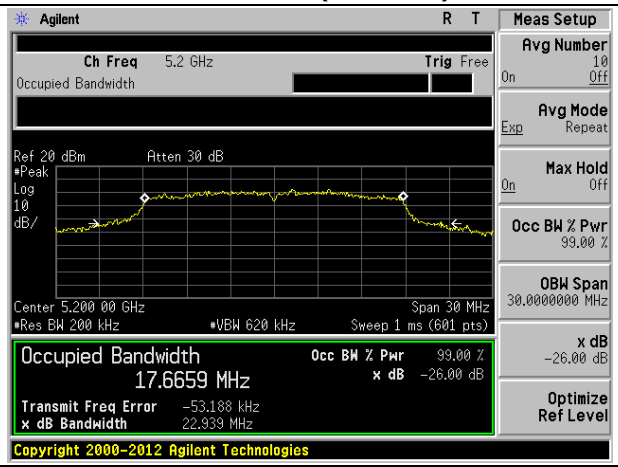
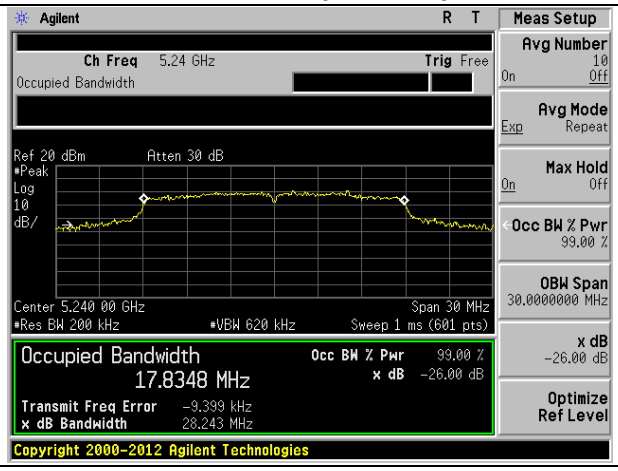
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210.00	75.144	80.344

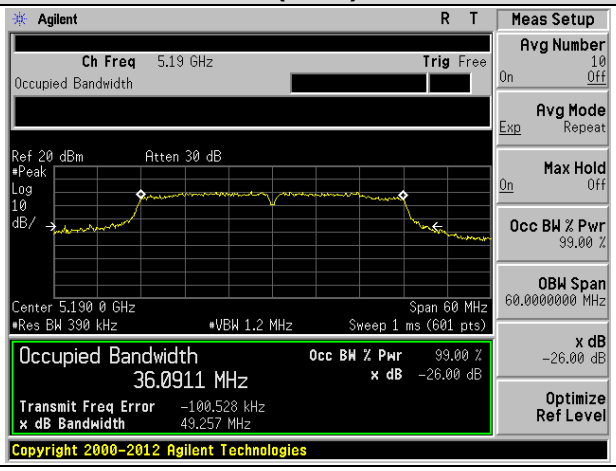
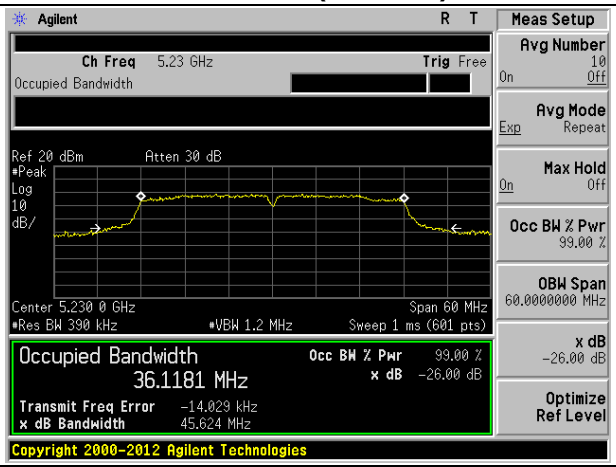
Test plots as followed:

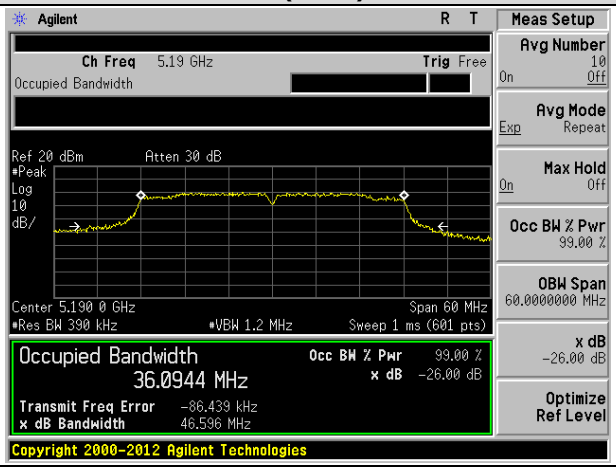
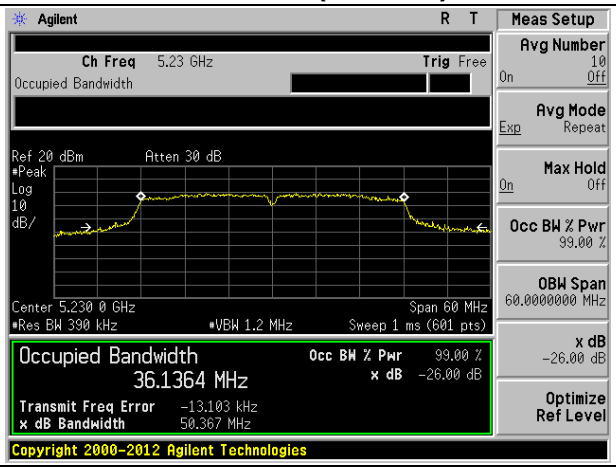
ANT:1

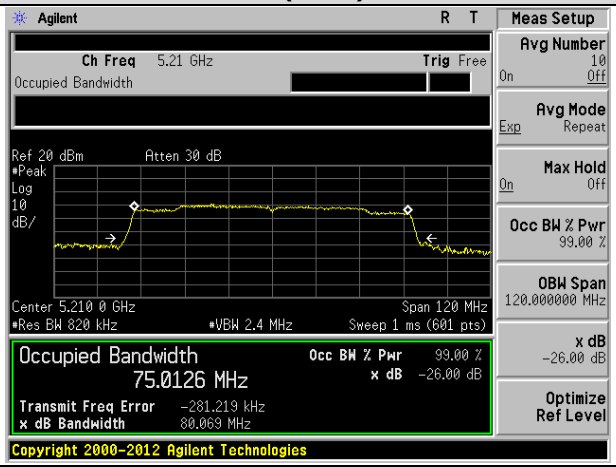
802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

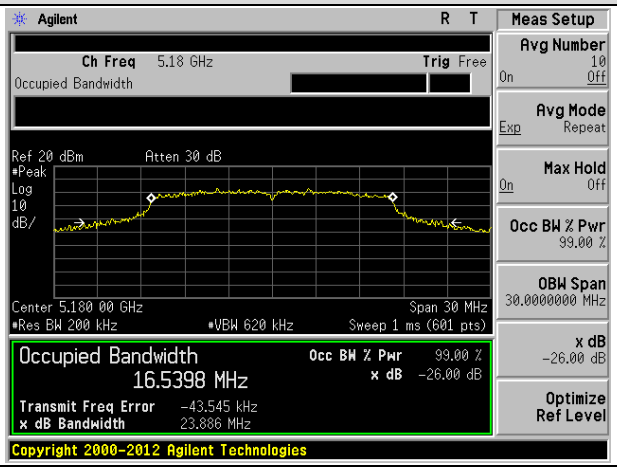
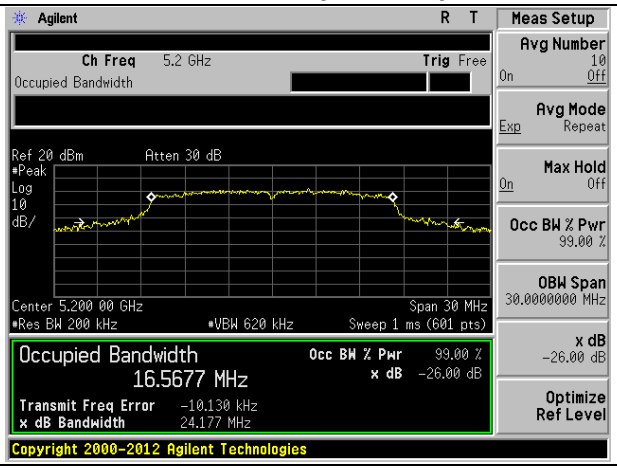
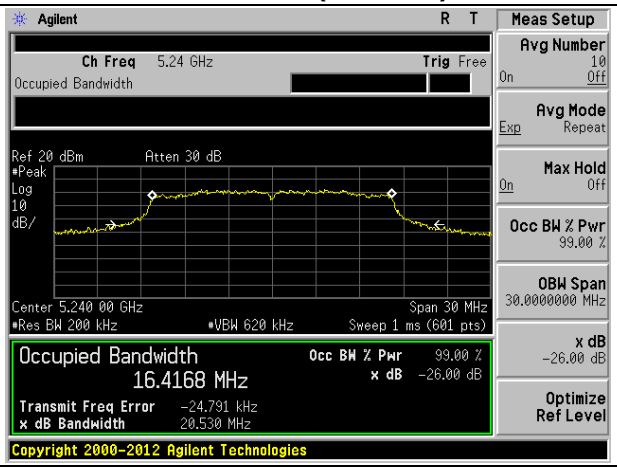
802.11ac(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

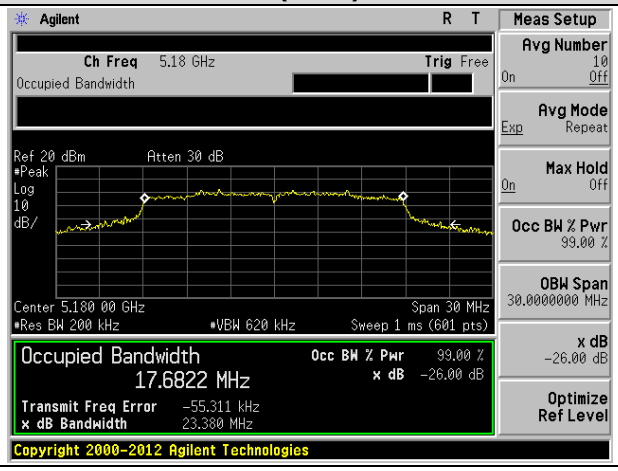
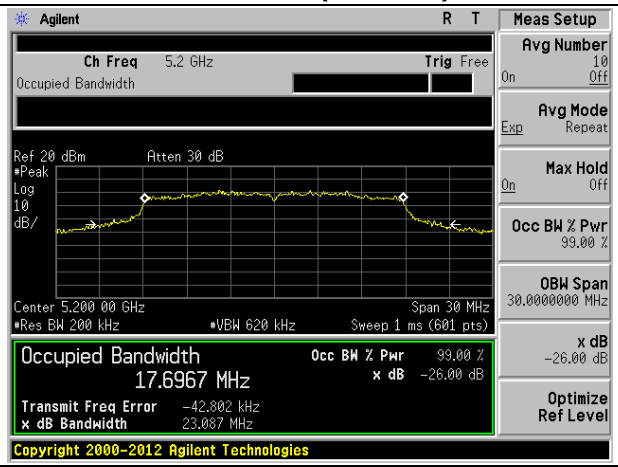
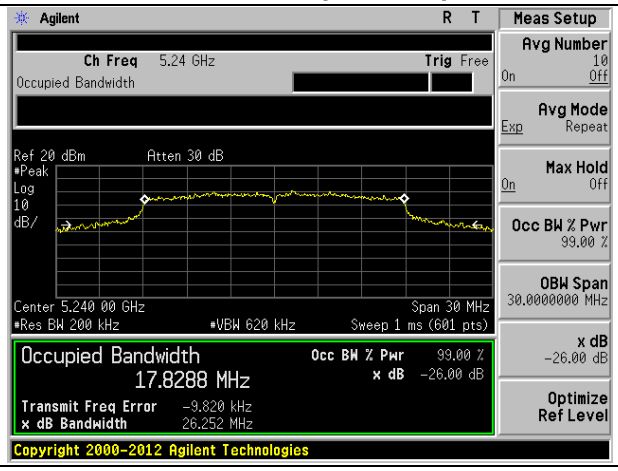
802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

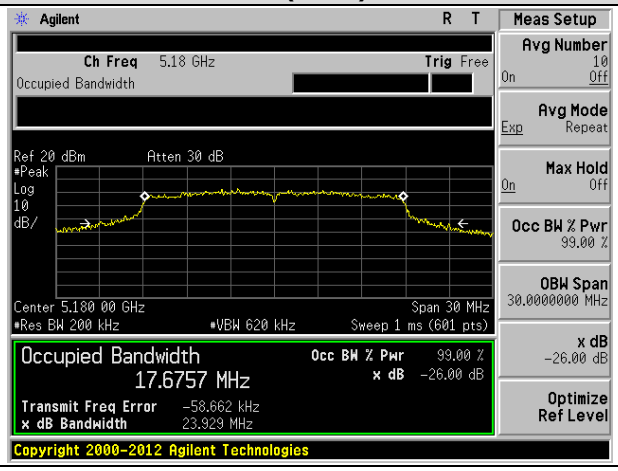
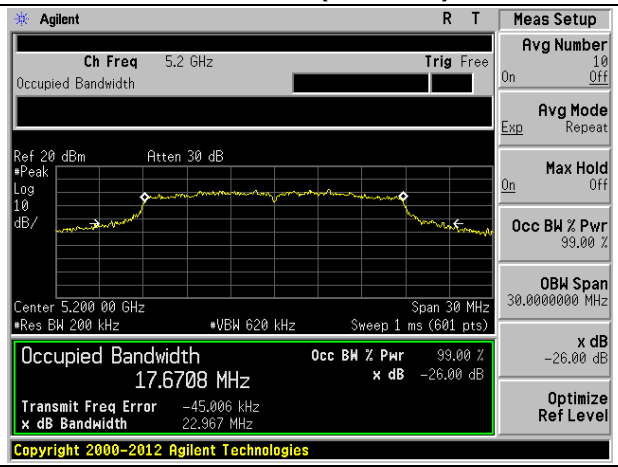
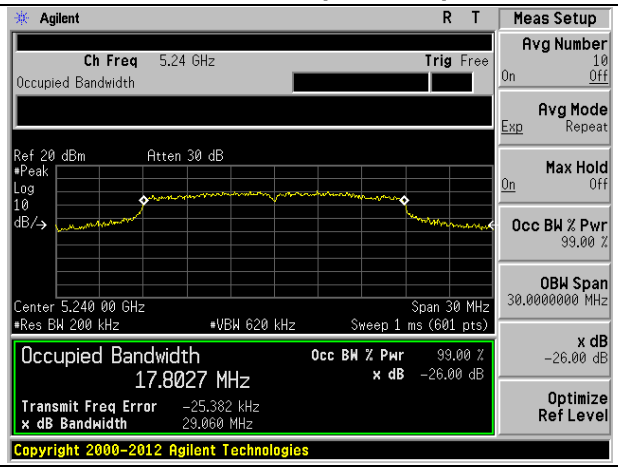
802.11ac(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

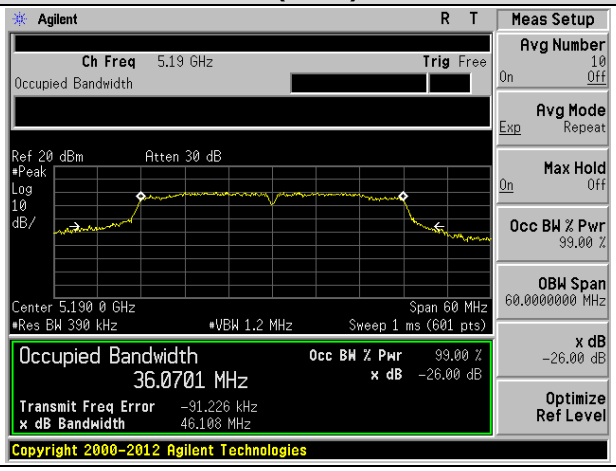
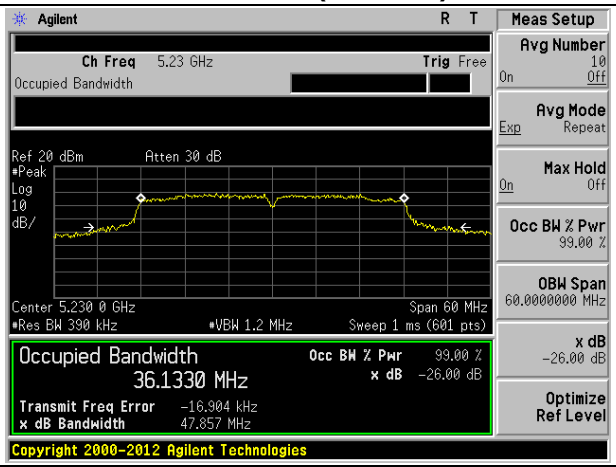
802.11ac(HT80) mode

Channel 40 (5210MHz)

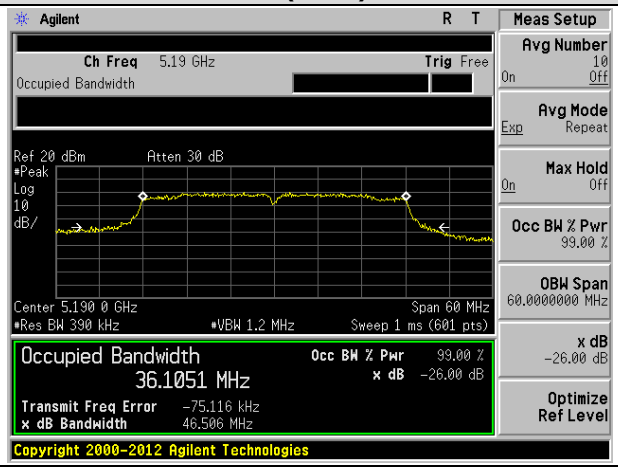
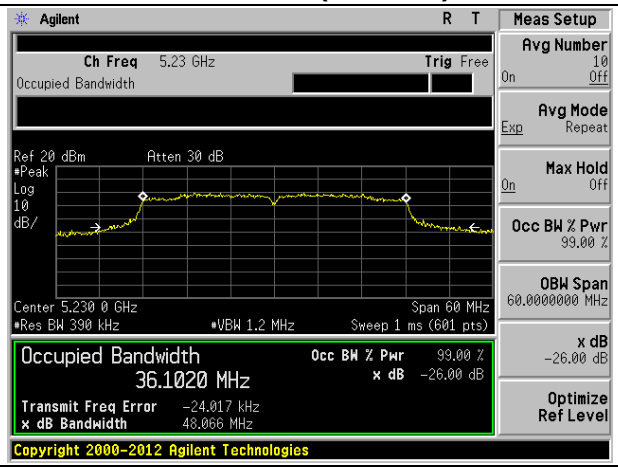
ANT:2

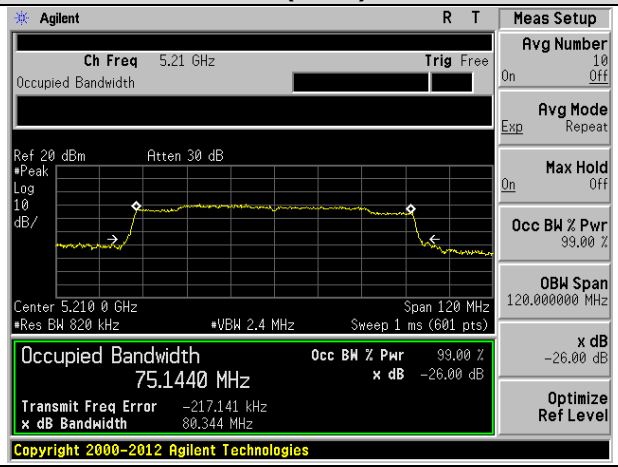
802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

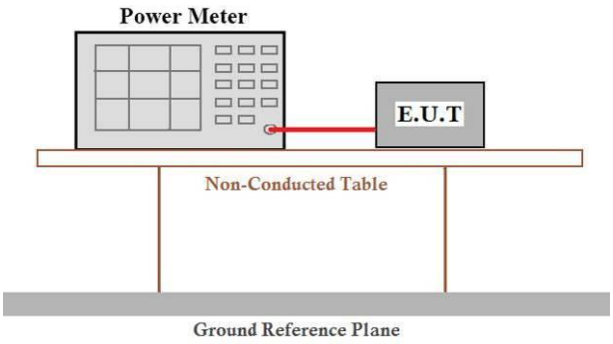
802.11ac(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

802.11ac(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

802.11ac(HT80) mode

Channel 40 (5210MHz)

7.4 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	<table><tr><td>Frequency band (MHz)</td><td>Limit</td></tr><tr><td rowspan="2">5150-5250</td><td>≤1W(30dBm) for master device</td></tr><tr><td>≤250mW(23.98dBm) for client device</td></tr><tr><td>5250-5350</td><td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td></tr><tr><td>5470-5725</td><td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td></tr><tr><td colspan="2">Remark: *Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.</td></tr></table>
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 5.2 for details
Test results:	Pass

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	98.8%	0.05
802.11n(HT20)	98.8%	0.05
802.11n(HT40)	97.5%	0.11
802.11ac(HT20)	98.9%	0.05
802.11ac(HT40)	97.4%	0.11
802.11ac(HT80)	95.2%	0.21

802.11a(HT20) mode (SISO)								
CH No.	Frequency (MHz)	Measured Power (dBm)					Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1 Output Power (dBm)	Total ANT2 Output Power (dBm)		
36	5180.00	12.24	11.98	0.05	12.29	12.03	23.98	Pass
40	5200.00	10.11	11.82	0.05	10.16	11.87	23.98	Pass
48	5240.00	12.37	11.56	0.05	12.42	11.61	23.98	Pass

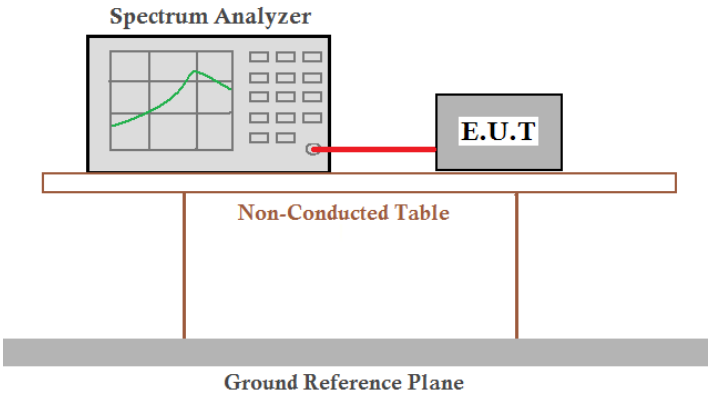
ANT1 + ANT2:

802.11n(HT20) mode (MIMO)									
CH No.	Frequency (MHz)	Measured Power (dBm)					Output Power (dBm)	Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1	Total ANT2			
36	5180.00	13.03	11.12	0.05	13.08	11.17	15.24	23.98	Pass
40	5200.00	12.76	10.36	0.05	12.81	10.41	14.78	23.98	Pass
48	5240.00	11.98	10.09	0.05	12.03	10.14	14.20	23.98	Pass
802.11ac(HT20) mode (MIMO)									
CH No.	Frequency (MHz)	Measured Power (dBm)					Output Power (dBm)	Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1	Total ANT2			
36	5180.00	11.88	10.20	0.05	11.93	10.25	14.18	23.98	Pass
40	5200.00	10.96	10.34	0.05	11.01	10.39	13.72	23.98	Pass
48	5240.00	10.75	10.73	0.05	10.8	10.78	13.8	23.98	Pass
802.11n(HT40) mode (MIMO)									
CH No.	Frequency (MHz)	Measured Power (dBm)					Output Power (dBm)	Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1	Total ANT2			
38	5190.00	12.19	11.03	0.11	12.3	11.14	14.77	23.98	Pass
46	5230.00	11.37	10.72	0.11	11.48	10.83	14.18	23.98	Pass

802.11ac(HT40) mode (MIMO)									
CH No.	Frequency (MHz)	Measured Power (dBm)					Output Power (dBm)	Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1	Total ANT2			
38	5190.00	12.07	11.77	0.11	12.18	11.88	15.04	23.98	Pass
46	5230.00	12.48	10.02	0.11	12.59	10.13	14.52	23.98	Pass
802.11ac(HT80) mode (MIMO)									
CH No.	Frequency (MHz)	Measured Power (dBm)					Output Power (dBm)	Limit (dBm)	Result
		ANT1	ANT2	Duty Factor	Total ANT1	Total ANT2			
42	5210.00	12.48	11.26	0.21	12.69	11.47	15.13	23.98	Pass

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

7.5 Power Spectral Density

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407</td></tr>
<tr><td>Test Method:</td><td>KDB 789033 D02 General U-NII Test Procedures New Rules v02r01</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency band (MHz)</td><td>Limit</td></tr>
<tr><td rowspan="2">5150-5250</td><td>≤17dBm in 1MHz for master device</td></tr>
<tr><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td>5250-5350</td><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td>5470-5725</td><td>≤11dBm in 1MHz for client device</td></tr>
<tr><td colspan="2">Remark: The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test procedure:</td><td>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.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	98.8%	0.05
802.11n(HT20)	98.8%	0.05
802.11n(HT40)	97.5%	0.11
802.11ac(HT20)	98.9%	0.05
802.11ac(HT40)	97.4%	0.11
802.11ac(HT80)	95.2%	0.21

ANT:1

802.11a mode (SISO)					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	6.01	6.06	11.00	Pass
40	5200.00	5.91	5.96	11.00	Pass
48	5240.00	4.62	4.67	11.00	Pass

ANT:2

802.11a mode (SISO)					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	5.58	5.63	11.00	Pass
40	5200.00	5.72	5.77	11.00	Pass
48	5240.00	5.70	5.75	11.00	Pass

ANT 1+ANT 2

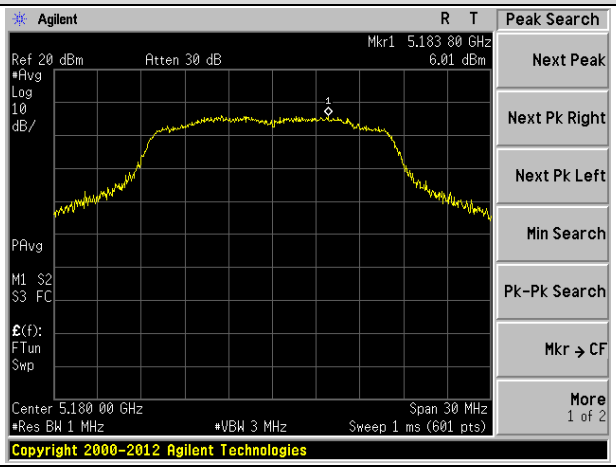
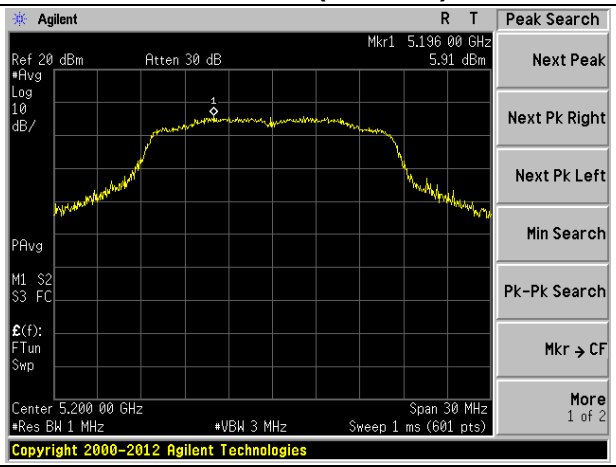
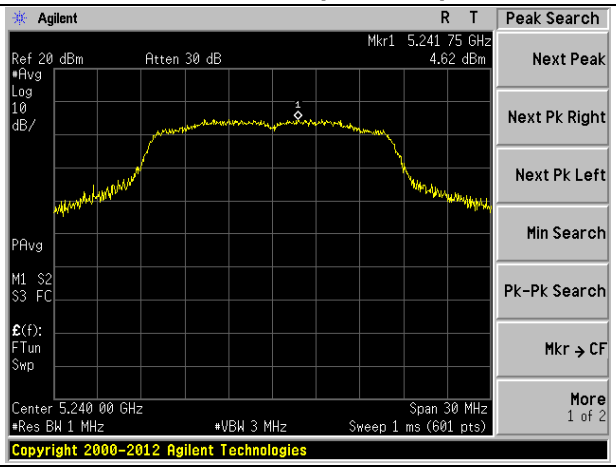
802.11n(HT20) mode (MIMO)						
Channel No.	Frequency (MHz)	ANT 1 Total PPSD (dBm/MHz)	ANT 2 Total PPSD (dBm/MHz)	Total	(dBm/MHz)	Result
36	5180.00	5.23	4.8	8.03	11.00	Pass
40	5200.00	3.93	3.91	6.93	11.00	Pass
48	5240.00	3.63	3.35	6.5	11.00	Pass
802.11ac(HT20) mode (MIMO)						
Channel No.	Frequency (MHz)	ANT 1 Total PPSD (dBm/MHz)	ANT 2 Total PPSD (dBm/MHz)	Total	(dBm/MHz)	Result
36	5180.00	4.83	4.79	7.82	11.00	Pass
40	5200.00	5.35	5.52	8.45	11.00	Pass
48	5240.00	3.82	4.4	7.13	11.00	Pass
802.11n(HT40) mode (MIMO)						
Channel No.	Frequency (MHz)	ANT 1 Total PPSD (dBm/MHz)	ANT 2 Total PPSD (dBm/MHz)	Total	(dBm/MHz)	Result

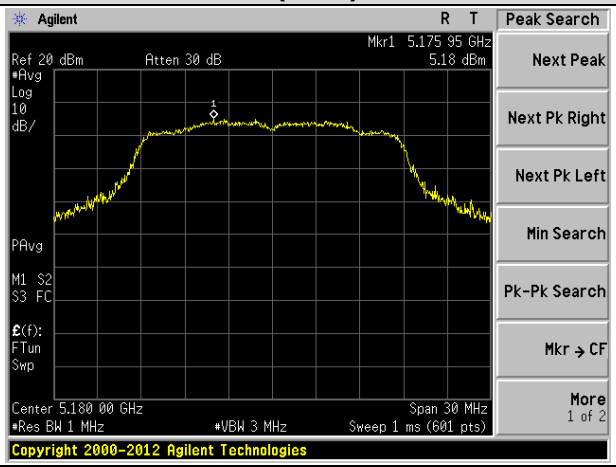
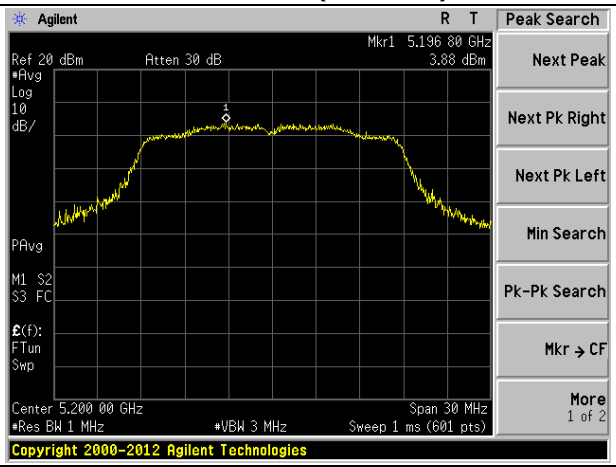
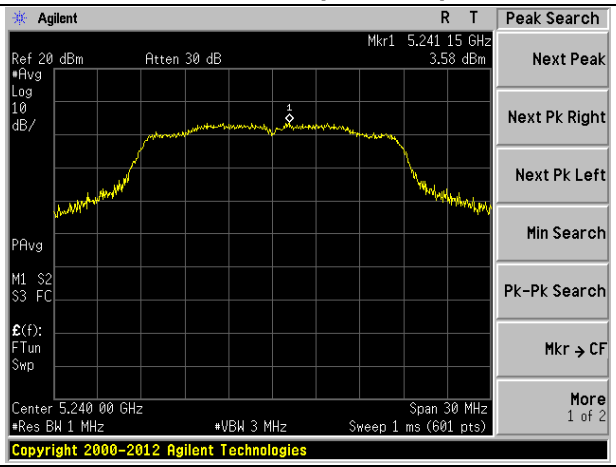
38	5190.00	1.11	1.2	4.17	11.00	Pass
46	5230.00	0.4	0.23	3.33	11.00	Pass
802.11ac(HT40) mode (MIMO)						
Channel No.	Frequency (MHz)	ANT 1 Total PPSD (dBm/MHz)	ANT 2 Total PPSD (dBm/MHz)	Total	(dBm/MHz)	Result
38	5190.00	1.13	1.4	4.28	11.00	Pass
46	5230.00	-0.51	-0.29	2.61	11.00	Pass
802.11ac(HT80) mode (MIMO)						
Channel No.	Frequency (MHz)	ANT 1 Total PPSD (dBm/MHz)	ANT 2 Total PPSD (dBm/MHz)	Total	(dBm/MHz)	Result
42	5210.00	-2.11	-0.08	2.03	11.00	Pass

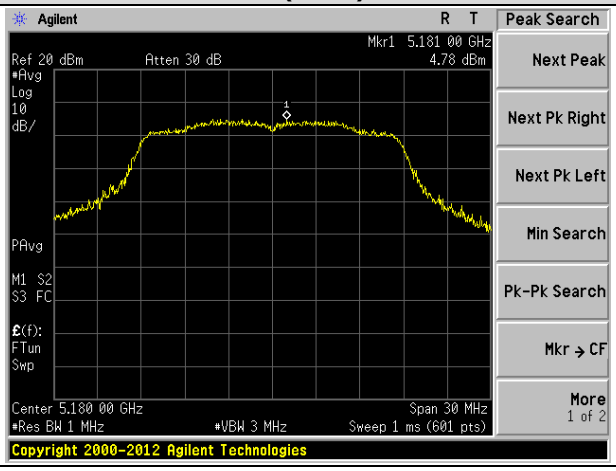
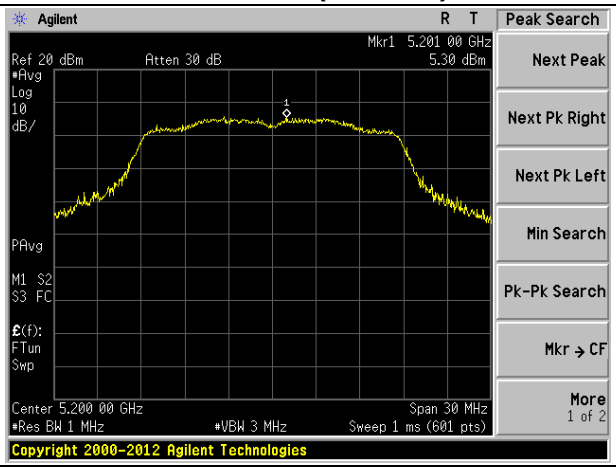
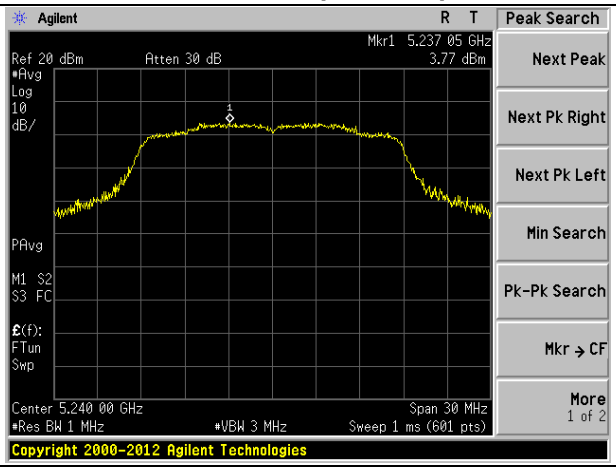
Note: Output Power = Measured Power + Duty Factor

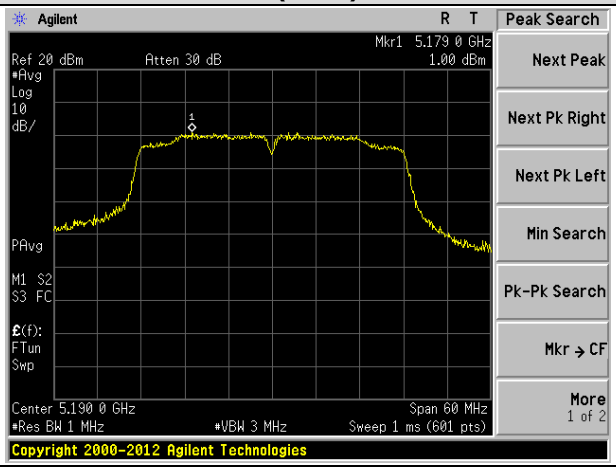
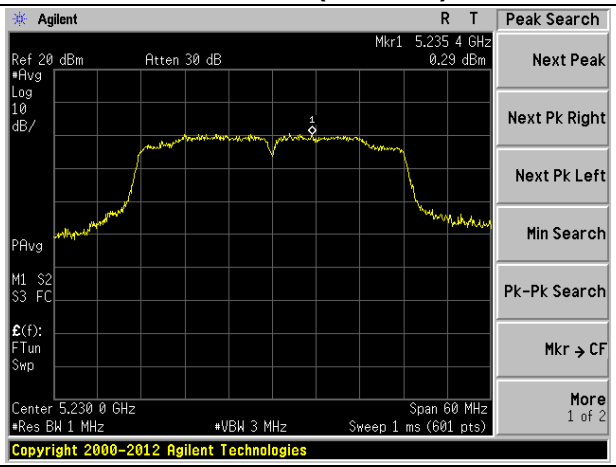
Duty Factor = 10 log (1/Duty Cycle)

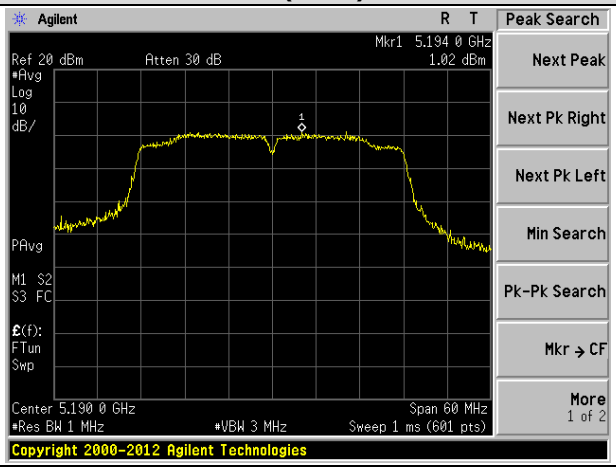
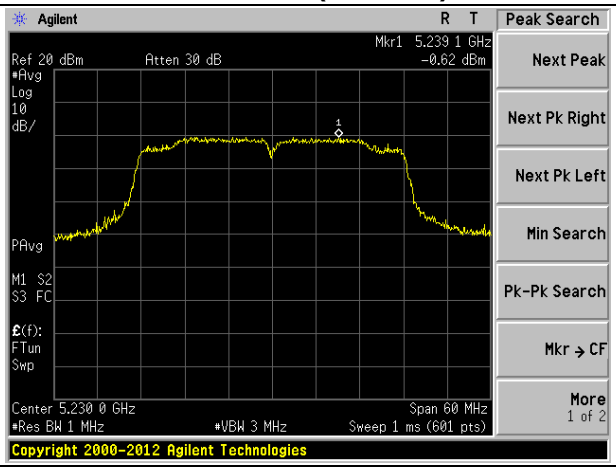
ANT:1

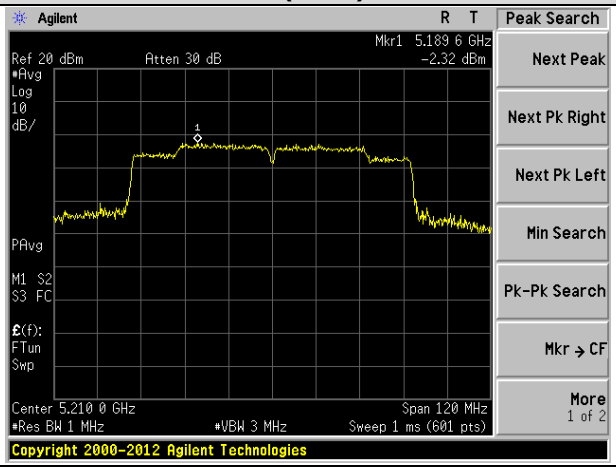
802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

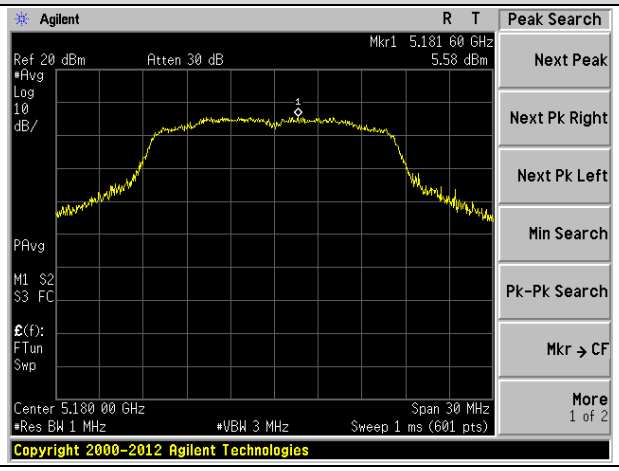
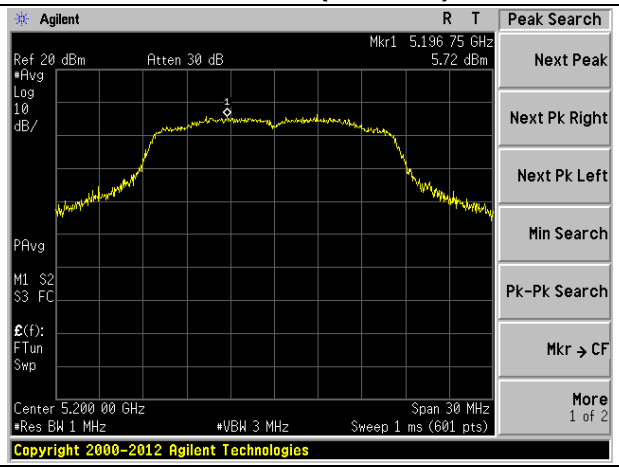
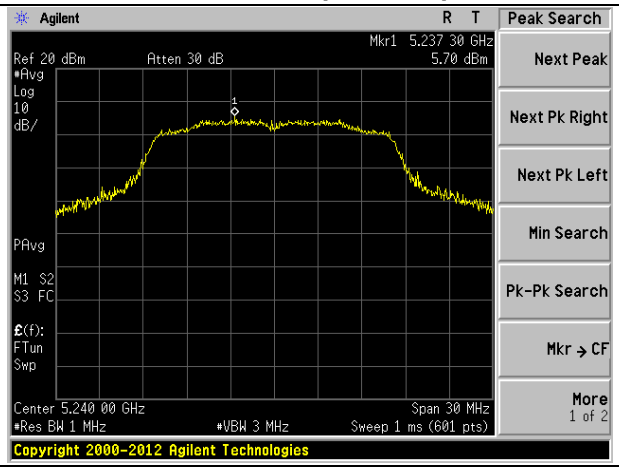
802.11ac(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

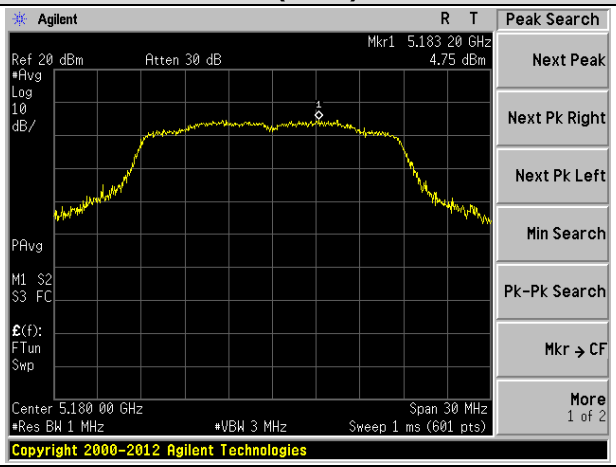
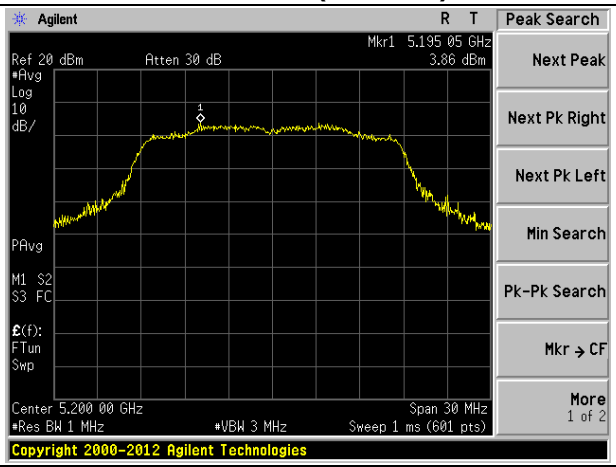
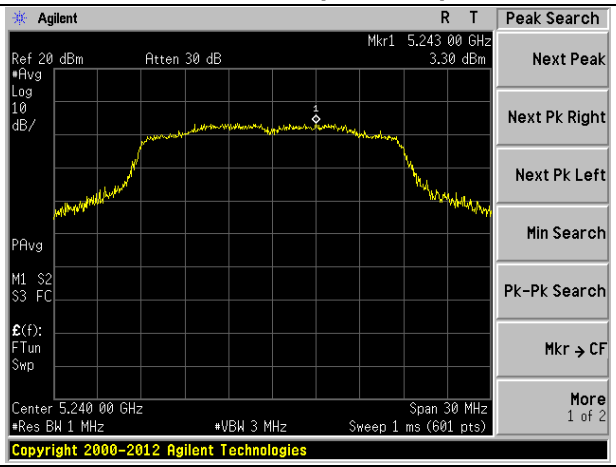
802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

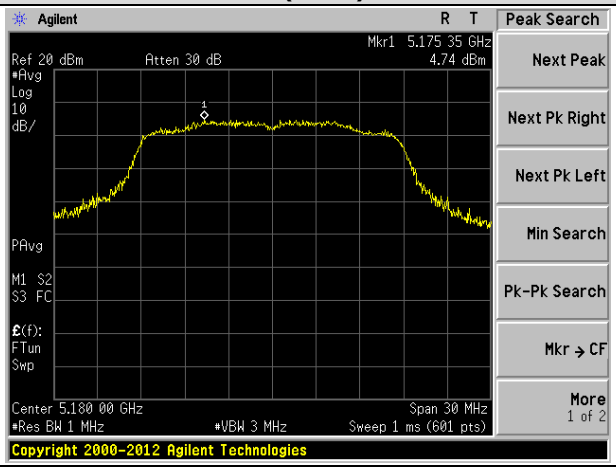
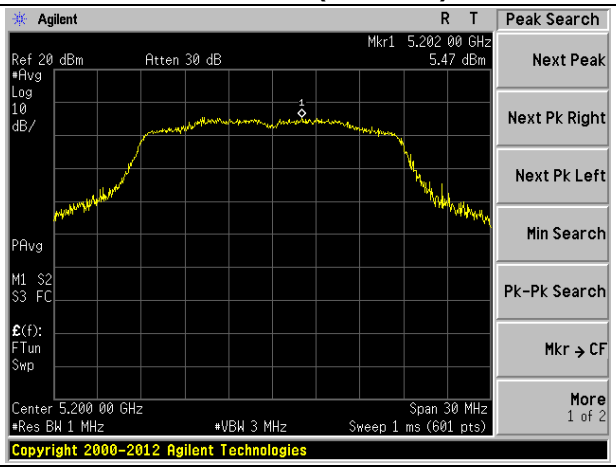
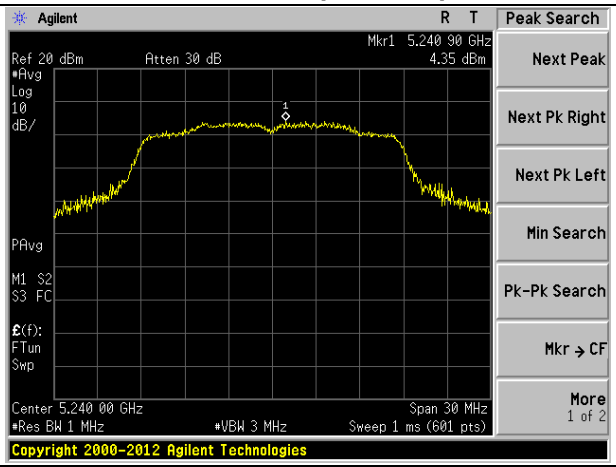
802.11ac(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

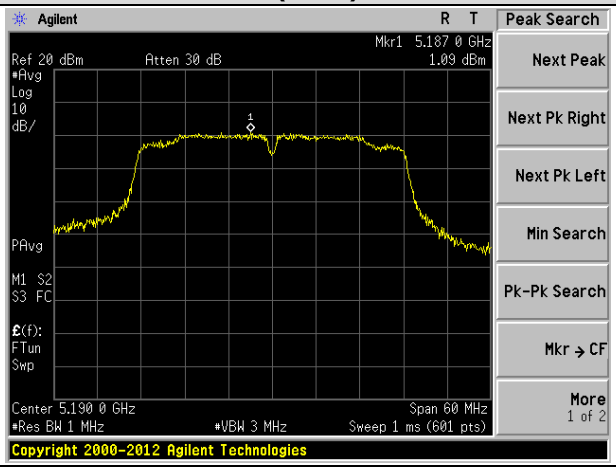
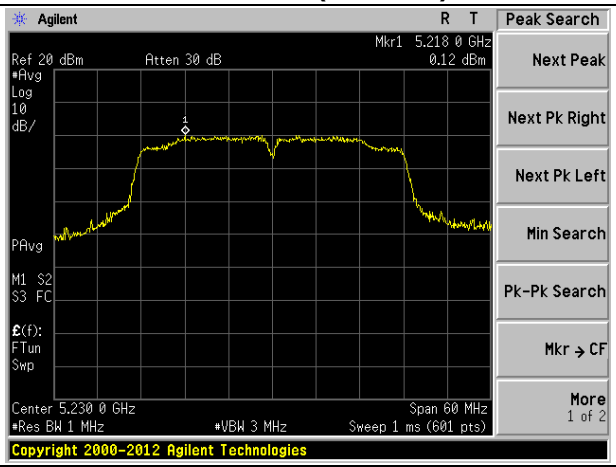
802.11ac(HT80) mode

Channel 40 (5210MHz)

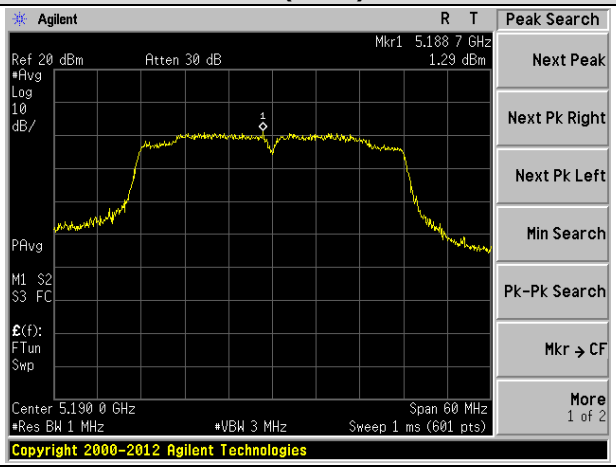
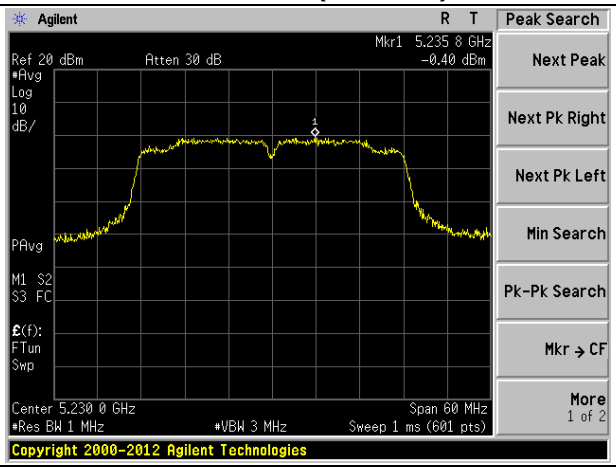
ANT:2

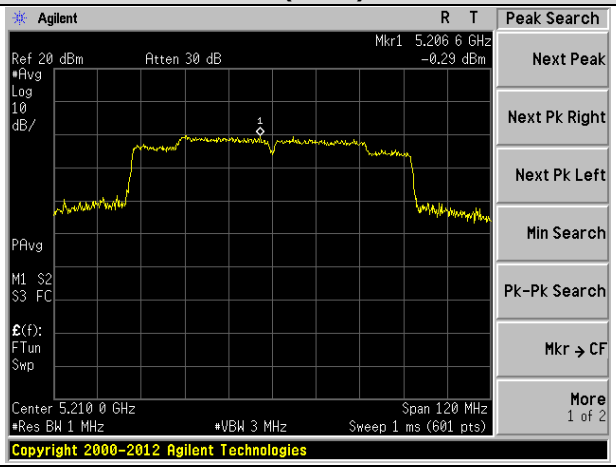
802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11ac(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

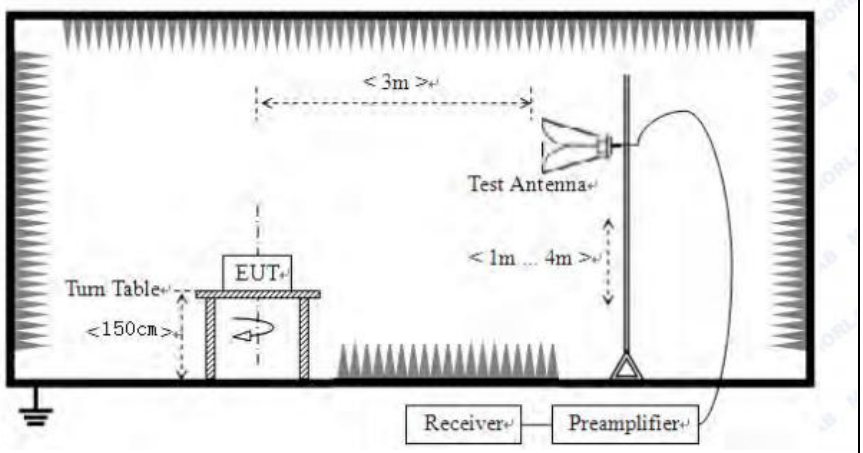
802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

802.11ac(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

802.11ac(HT80) mode

Channel 40 (5210MHz)

7.6 Band Edge

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 and 5.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>68.2</td><td>Peak Value</td></tr>
</table>
Undesirable emission limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not
</td></tr>
</table>

	have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test setup:	For radiated emissions above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remarks:

1. *Only show the worst case ant 2 test data.*
2. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
5. *According to KDB 789033 D02 v02r01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:*
   E[dBuV/m] = EIRP[dBm] + 95.2;
   For example, if EIRP = -27dBm
   E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

Measurement Data:

802.11a(HT20)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	42.76	32.07	8.99	37.49	46.33	68.2	-21.87	Horizontal
5350.00	44.40	31.75	9.29	37.2	48.24	68.2	-19.96	Horizontal
5150.00	48.14	32.07	8.99	37.49	51.71	68.2	-16.49	Vertical
5350.00	46.97	31.75	9.29	37.2	50.81	68.2	-17.39	Vertical

802.11a(HT20)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.77	32.07	8.99	37.49	37.34	54	-16.66	Horizontal
5350.00	33.31	31.75	9.29	37.2	37.15	54	-16.85	Horizontal
5150.00	37.25	32.07	8.99	37.49	40.82	54	-13.18	Vertical
5350.00	36.25	31.75	9.29	37.2	40.09	54	-13.91	Vertical

802.11n(HT20)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.46	32.07	8.99	37.49	47.03	68.2	-21.17	Horizontal
5350.00	43.50	31.75	9.29	37.2	47.34	68.2	-20.86	Horizontal
5150.00	48.00	32.07	8.99	37.49	51.57	68.2	-16.63	Vertical
5350.00	47.61	31.75	9.29	37.2	51.45	68.2	-16.75	Vertical

802.11n(HT20)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.78	32.07	8.99	37.49	37.35	54	-16.65	Horizontal
5350.00	33.37	31.75	9.29	37.2	37.21	54	-16.79	Horizontal
5150.00	36.55	32.07	8.99	37.49	40.12	54	-13.88	Vertical
5350.00	36.47	31.75	9.29	37.2	40.31	54	-13.69	Vertical

802.11n(HT40)					PK			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	42.90	32.07	8.99	37.49	46.47	68.2	-21.73	Horizontal
5350.00	43.68	31.75	9.29	37.2	47.52	68.2	-20.68	Horizontal
5150.00	48.40	32.07	8.99	37.49	51.97	68.2	-16.23	Vertical
5350.00	47.81	31.75	9.29	37.2	51.65	68.2	-16.55	Vertical

802.11n(HT40)					AV			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.83	32.07	8.99	37.49	37.40	54	-16.60	Horizontal
5350.00	33.51	31.75	9.29	37.2	37.35	54	-16.65	Horizontal
5150.00	36.74	32.07	8.99	37.49	40.31	54	-13.69	Vertical
5350.00	36.62	31.75	9.29	37.2	40.46	54	-13.54	Vertical

802.11ac(HT20)					PK			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	42.68	32.07	8.99	37.49	46.25	68.2	-21.95	Horizontal
5350.00	44.05	31.75	9.29	37.2	47.89	68.2	-20.31	Horizontal
5150.00	47.73	32.07	8.99	37.49	51.30	68.2	-16.90	Vertical
5350.00	47.85	31.75	9.29	37.2	51.69	68.2	-16.51	Vertical

802.11ac(HT20)					AV			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.76	32.07	8.99	37.49	37.33	54	-16.67	Horizontal
5350.00	32.84	31.75	9.29	37.2	36.68	54	-17.32	Horizontal
5150.00	36.68	32.07	8.99	37.49	40.25	54	-13.75	Vertical
5350.00	36.64	31.75	9.29	37.2	40.48	54	-13.52	Vertical

802.11ac(HT40)					PK			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	42.66	32.07	8.99	37.49	46.23	68.2	-21.97	Horizontal
5350.00	44.26	31.75	9.29	37.2	48.10	68.2	-20.10	Horizontal
5150.00	48.35	32.07	8.99	37.49	51.92	68.2	-16.28	Vertical
5350.00	47.13	31.75	9.29	37.2	50.97	68.2	-17.23	Vertical

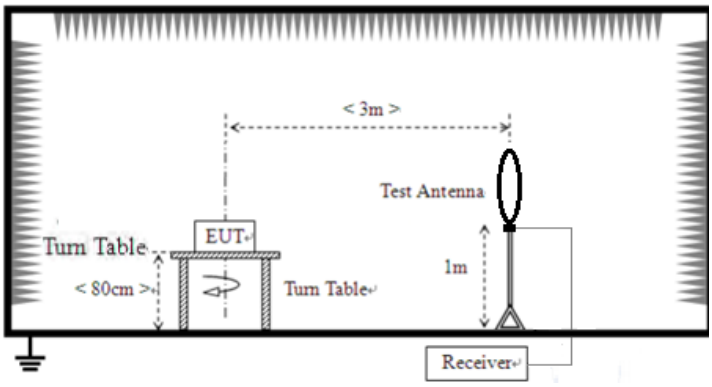
802.11ac(HT40)					AV			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.89	32.07	8.99	37.49	37.46	54	-16.54	Horizontal
5350.00	33.42	31.75	9.29	37.2	37.26	54	-16.74	Horizontal
5150.00	37.10	32.07	8.99	37.49	40.67	54	-13.33	Vertical
5350.00	36.49	31.75	9.29	37.2	40.33	54	-13.67	Vertical

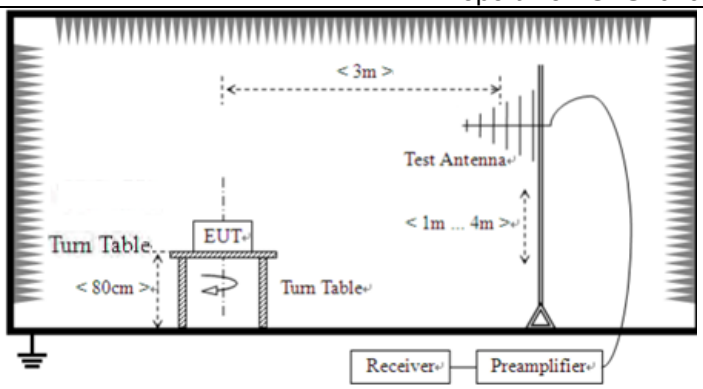
802.11ac(HT80)					PK			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.18	32.07	8.99	37.49	46.75	68.2	-21.45	Horizontal
5350.00	44.04	31.75	9.29	37.2	47.88	68.2	-20.32	Horizontal
5150.00	47.85	32.07	8.99	37.49	51.42	68.2	-16.78	Vertical
5350.00	47.59	31.75	9.29	37.2	51.43	68.2	-16.77	Vertical

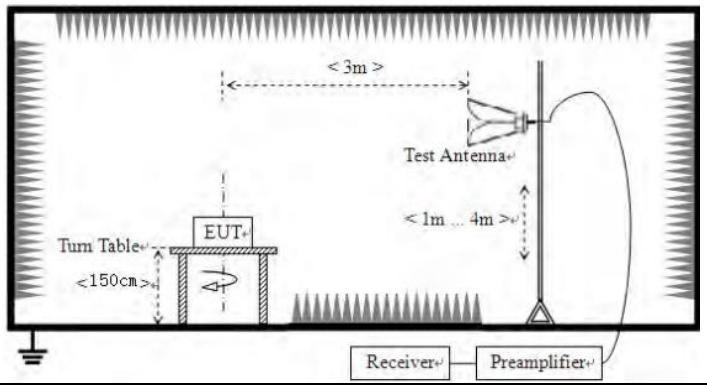
802.11ac(HT80)					AV			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.56	32.07	8.99	37.49	37.13	54	-16.87	Horizontal
5350.00	33.27	31.75	9.29	37.2	37.11	54	-16.89	Horizontal
5150.00	36.58	32.07	8.99	37.49	40.15	54	-13.85	Vertical
5350.00	36.07	31.75	9.29	37.2	39.91	54	-14.09	Vertical

7.7 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>9kHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (uV/m)</th><th>Value</th><th>Measurement Distance</th></tr>
<tr><td>0.009MHz-0.490MHz</td><td>2400/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>0.490MHz-1.705MHz</td><td>24000/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>1.705MHz-30MHz</td><td>30</td><td>QP</td><td>30m</td></tr>
<tr><td>30MHz-88MHz</td><td>100</td><td>QP</td><td rowspan="6">3m</td></tr>
<tr><td>88MHz-216MHz</td><td>150</td><td>QP</td></tr>
<tr><td>216MHz-960MHz</td><td>200</td><td>QP</td></tr>
<tr><td>960MHz-1GHz</td><td>500</td><td>QP</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>500</td><td>Average</td></tr>
<tr><td>5000</td><td>Peak</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>Substitution method was performed to determine the actual ERP emission levels of the EUT.
The following test procedure as below:
1>.Below 1GHz test procedure:
1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
2>.Above 1GHz test procedure:</td></tr>
</table>

	1. On the test site as test setup graph above,the EUT shall be placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider. 2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver. 3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test. 4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 6. Remove the transmitter and replace it with a substitution antenna 7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi) where: Pg is the generator output power into the substitution antenna.
Test setup:	For radiated emissions from 9kHz to 30MHz  For radiated emissions from 30MHz to1GHz

<table>
<tr><td></td><td colspan="6"> 

For radiated emissions above 1GHz

</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 5.10 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1012mbar</td></tr>
<tr><td>Test voltage:</td><td colspan="6">AC 120V, 60Hz</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

Remarks:

1. *Only show the worst case ant 2 test data.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

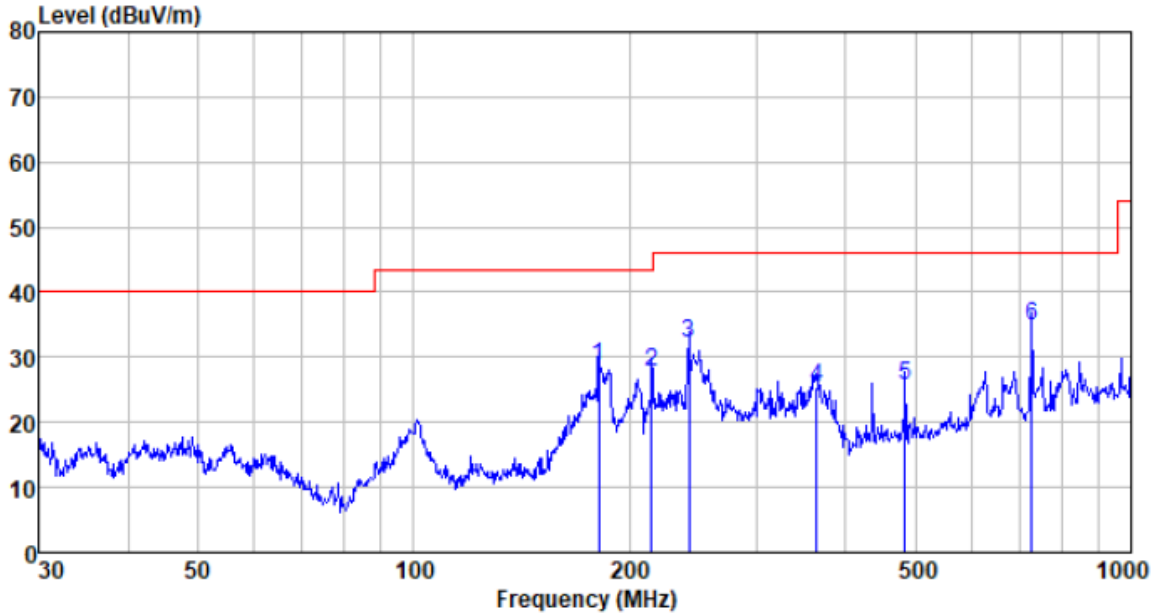
Measurement Data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

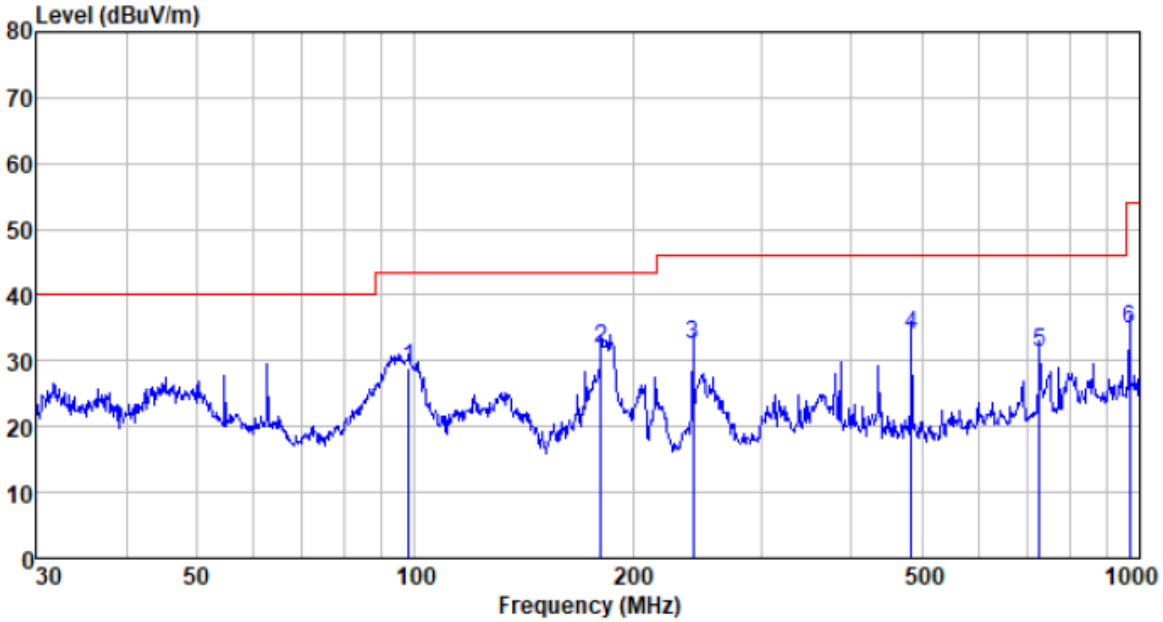
30MHz~ 1GHz

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
181.283	55.18	9.07	1.75	37.24	28.76	43.50	-14.74	QP
214.514	52.29	10.95	1.93	37.35	27.82	43.50	-15.68	QP
241.676	55.47	11.89	2.08	37.37	32.07	46.00	-13.93	QP
364.260	45.51	14.75	2.69	37.49	25.46	46.00	-20.54	QP
483.910	43.06	17.01	3.23	37.51	25.79	46.00	-20.21	QP
726.805	48.31	20.10	4.19	37.63	34.97	46.00	-11.03	QP

Vertical:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
98.142	52.57	11.93	1.18	36.71	28.97	43.50	-14.53	QP
180.649	58.38	8.98	1.74	37.24	31.86	43.50	-11.64	QP
241.676	55.75	11.89	2.08	37.37	32.35	46.00	-13.65	QP
483.910	51.28	17.01	3.23	37.51	34.01	46.00	-11.99	QP
726.805	44.52	20.10	4.19	37.63	31.18	46.00	-14.82	QP
968.934	44.77	22.59	5.11	37.54	34.93	54.00	-19.07	QP

Above 1GHz:

Only the data of worst case at each channel plan (nominal bandwidth =20MHz, 40MHz, 80MHz) is reported.

802.11 n(HT20) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB/m)	Measure Level(dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
36	H	10360.00	14.40	21.64	36.04	54(Note3)	-17.96	PK
	H	15540.00	13.37	21.80	35.17	54(Note3)	-18.83	PK
	V	10360.00	18.51	21.64	40.15	54(Note3)	-13.85	PK
	V	15540.00	14.23	21.80	36.03	54(Note3)	-17.97	PK
40	H	10400.00	19.28	21.67	40.95	54(Note3)	-13.05	PK
	H	15600.00	16.30	21.83	38.13	54(Note3)	-15.87	PK
	V	10400.00	16.42	21.67	38.09	54(Note3)	-15.91	PK
	V	15600.00	15.30	21.83	37.13	54(Note3)	-16.87	PK
48	H	10480.00	11.88	21.64	33.52	54(Note3)	-20.48	PK
	H	15720.00	13.11	22.16	35.27	54(Note3)	-18.73	PK
	V	10480.00	18.34	21.64	39.98	54(Note3)	-14.02	PK
	V	15720.00	20.08	22.16	42.24	54(Note3)	-11.76	PK

802.11n(HT40) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB/m)	Measure Level(dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
38	H	10380.00	19.09	21.64	40.73	54(Note3)	-13.27	PK
	H	15570.00	19.88	21.80	41.68	54(Note3)	-12.32	PK
	V	10380.00	13.36	21.64	35.00	54(Note3)	-19.00	PK
	V	15570.00	18.89	21.80	40.69	54(Note3)	-13.31	PK
46	H	10460.00	14.38	21.67	36.05	54(Note3)	-17.95	PK
	H	15690.00	11.46	21.83	33.29	54(Note3)	-20.71	PK
	V	10460.00	18.76	21.67	40.43	54(Note3)	-13.57	PK
	V	15690.00	11.39	21.83	33.22	54(Note3)	-20.78	PK

802.11ac(HT80) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB/m)	Measure Level(dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
42	H	10420.00	16.51	21.65	38.16	54(Note3)	-15.84	PK
	H	15630.00	16.00	21.81	37.81	54(Note3)	-16.19	PK
	V	10420.00	15.68	21.65	37.33	54(Note3)	-16.67	PK
	V	15630.00	21.14	21.81	42.95	54(Note3)	-11.05	PK

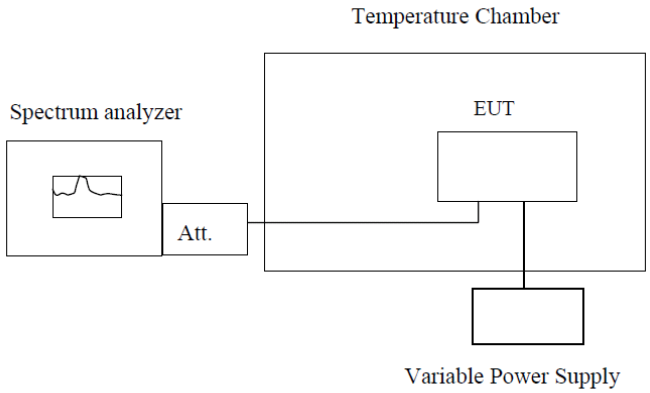
Notes:

1. Level = Read Level + Antenna Factor+ Cable loss- Preamp Factor.

2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Measurement data:

Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5180	5179.3900	5180.4302	5181.2834	5179.3409
	5200	5199.7358	5200.8922	5200.4664	5199.6501
	5220	5219.8152	5220.9935	5220.0400	5219.5366
	5240	5239.0317	5240.8838	5240.6395	5239.0413
-20	5180	5179.8594	5180.5304	5180.9920	5179.6644
	5200	5199.2254	5200.9459	5200.3614	5199.2621
	5220	5219.6799	5220.4225	5220.3316	5219.7227
	5240	5239.8509	5240.6913	5240.4697	5239.3872
-10	5180	5179.4833	5180.9986	5180.7941	5179.6366
	5200	5199.1111	5200.7852	5200.4042	5199.7067
	5220	5219.5915	5220.4426	5220.8519	5219.6115
	5240	5239.8505	5240.2472	5240.8283	5239.6368
0	5180	5179.9053	5180.8093	5180.5005	5179.0738
	5200	5199.5049	5200.1406	5200.5802	5199.0456
	5220	5219.5402	5220.4818	5220.9114	5219.1127
	5240	5239.1087	5240.6540	5240.1344	5239.7148
10	5180	5179.7970	5180.1279	5180.6510	5179.5427
	5200	5199.7431	5200.1663	5200.7023	5199.2366
	5220	5219.4983	5220.1503	5220.8579	5219.5115
	5240	5239.6791	5240.3988	5240.6535	5239.1430
20	5180	5179.1699	5180.5235	5180.0540	5179.0170
	5200	5199.5293	5200.6272	5200.5161	5199.7583
	5220	5219.2271	5220.0538	5220.5960	5219.9666
	5240	5239.9081	5240.7387	5240.3496	5239.6423
30	5180	5179.9892	5180.9680	5180.8311	5179.2188
	5200	5199.0612	5200.8695	5200.9199	5199.8172
	5220	5219.1244	5220.9173	5220.7411	5219.3485
	5240	5239.4150	5240.7036	5240.6642	5239.0037
40	5180	5179.5698	5180.2898	5180.2626	5179.9924
	5200	5199.9012	5200.0612	5200.7691	5199.7898
	5220	5219.3615	5220.3309	5220.5997	5219.4002
	5240	5239.1021	5240.3280	5240.6689	5239.0056
50	5180	5179.6074	5180.9497	5180.8072	5179.8478
	5200	5199.8604	5200.7754	5200.4974	5199.8040
	5220	5219.0129	5220.3957	5220.9845	5219.9772
	5240	5239.5926	5240.5795	5240.2278	5239.5200

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
3.3	5180	5182.0173	5180.4796	5176.6915	5178.2778
	5200	5201.6467	5200.9769	5196.8010	5198.5261
	5220	5220.9301	5220.2484	5219.3765	5219.6535
	5240	5240.6515	5240.8189	5239.8425	5239.8743
3.7	5180	5180.6673	5180.5956	5179.5673	5179.5044
	5200	5200.7179	5200.5907	5199.0971	5199.5995
	5220	5220.9683	5220.8501	5219.8751	5219.3421
	5240	5240.9025	5240.5040	5239.7319	5239.3985
4.1	5180	5180.4227	5180.0247	5179.4972	5179.8079
	5200	5200.1771	5200.5086	5199.2319	5199.7188
	5220	5220.1390	5220.9114	5219.5367	5219.9357
	5240	5240.7299	5240.3372	5239.9980	5239.9725

Note: The worst case is FL=5176.6915MHz, FH=5240.9025MHz

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

---END---