

FCC REPORT

Applicant: Nuvvyo Inc.

Address of Applicant: 555 Legget Drive Tower B Suite 836 Kanata, ON K2K2X3, Canada

Manufacturer: Nuvvyo Inc.

Address of Manufacturer: 555 Legget Drive Tower B Suite 836 Kanata, ON K2K2X3, Canada

Factory: SHENZHEN GIEC DIGITAL CO., LTD

Address of Factory: 1 Building, Factory, .7 District, Dayang Development Areas, Fuyong Street, Bao'an, Shenzhen, Guangdong, China

Equipment Under Test (EUT)

Product Name: OTA streamer

Model No.: TABLO DUAL LITE DVR, TABLO DUAL 64 DVR

FCC ID: 2AOR7-TABLOBOX

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.407

Date of sample receipt: January 30, 2018

Date of Test: January 31, 2018-March 20, 2018

Date of report issued: March 21, 2018

Test Result : PASS *

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

Authorized Signature:



Robinson Lo

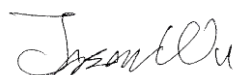
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	March 21, 2018	Original

Prepared By:

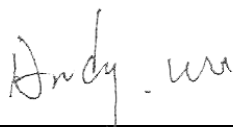


Date:

March 21, 2018

Project Engineer

Check By:



Date:

March 21, 2018

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
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass

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

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 40GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(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:	OTA streamer
Model No.:	TABLO DUAL LITE DVR, TABLO DUAL 64 DVR
Test Model No:	TABLO DUAL LITE DVR
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color, model name and storage capacity for commercial purpose. All of the samples with different storage capacity (8GB and 64GB) have been tested, only the worst case 64GB was shown the report.</i>	
Serial No.:	GI-C02097152
Test sample(s) ID:	GTS201801000072-1
Sample(s) Status	Engineer sample
Operation Frequency:	802.11a/802.11n(HT20)/802.11ac(HT20) @5.8G Band: 5745MHz ~ 5825MHz 802.11n(HT40)/ 802.11ac(HT40) @ 5.8G Band: 5755MHz ~ 5795MHz 802.11ac(HT80): 5775MHz
Channel numbers:	802.11a/802.11n(HT20)/802.11ac(HT20) @5.8G Band: 6 802.11n(HT40)/ 802.11ac(HT40) @ 5.8G Band: 2 802.11ac(HT80): 1
Channel bandwidth:	802.11a/802.11n(HT20)/802.11ac(HT20) : 20MHz 802.11n(HT40)/802.11ac(HT40) : 40MHz 802.11ac(HT80): 80MHz
Modulation technology:	802.11a/802.11n(H20)/802.11n(H40)/802.11ac(HT20)/802.11ac(HT40) /802.11ac(HT80): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Integral antenna
Antenna gain:	Main Antenna: 6.43dBi Aux Antenna: 5.59dBi
Power supply:	Adapter Model:BSY018B120150U W Input: AC 100-240V, 50/60Hz, 0.4A Output: DC 12V, 1.5A

Remark: 802.11a is SISO mode , All other modulations are MIMO mode

Directional gain of MIMO mode : $=10 \log[(10^{G1}/20 + 10^{G2}/20 + \dots + 10^{GN}/20)^2 / NANT]$ dBi
 $=10 \log[(10^{6.43}/20 + 10^{5.59}/20)^2 / 2] = 9.03 \text{dBi}$

Operation Frequency each of channel @ 5.8G Band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	153	5765MHz	155	5775MHz	157	5785MHz
161	5805MHz	165	5825MHz				

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)		
	5.8G Band		
	802.11a 802.11n(HT20) 802.11ac(HT20)	802.11n(HT40) 802.11ac(HT40)	802.11ac(HT80)
Lowest channel	5745	5755	
Middle channel	5785		5775
Highest channel	5825	5795	

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, the duty cycle>98%, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

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:

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

Mode	Data rate
802.11a	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13Mbps
802.11ac(HT20)	6.5Mbps
802.11ac(HT40)	13.5Mbps
802.11ac(HT80)	29.3Mbps

5.3 Description of Support Units

None.

5.4 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, 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.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

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

Tel: 0755-27798480

Fax: 0755-27798960

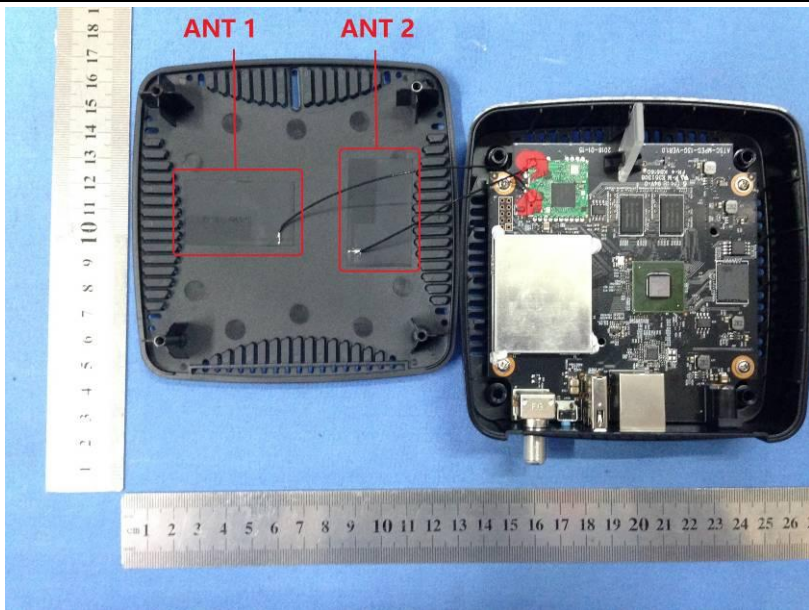
6 Test Instruments list

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 28 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

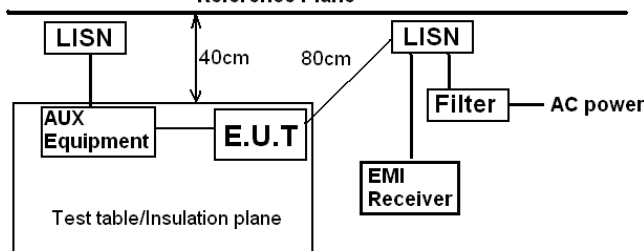
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May 16 2014	May 15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June 28 2017	June 27 2018
3	Pulse Limiter	R&S	ESH3-Z2	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

7 Test results and Measurement Data

7.1 Antenna requirement

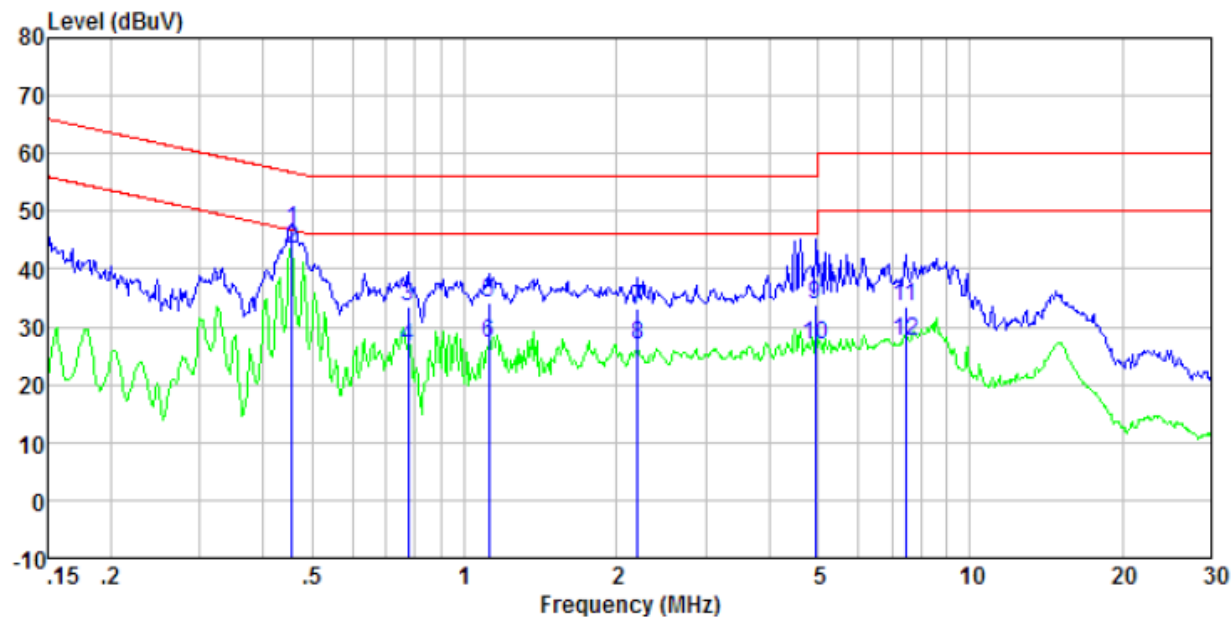
Standard requirement:	FCC Part15 C Section 15.203
<i>15.203 requirement:</i> <i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a 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.</i>	
E.U.T Antenna:	
<i>The antenna is integral antenna, the best case gain of the main antenna is 6.43dBi and aux antenna is 5.59dBi</i>	
	

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, Sweep time=auto		
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 setup:	Reference Plane  Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m		
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. 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 Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.2 for details		
Test results:	Pass		

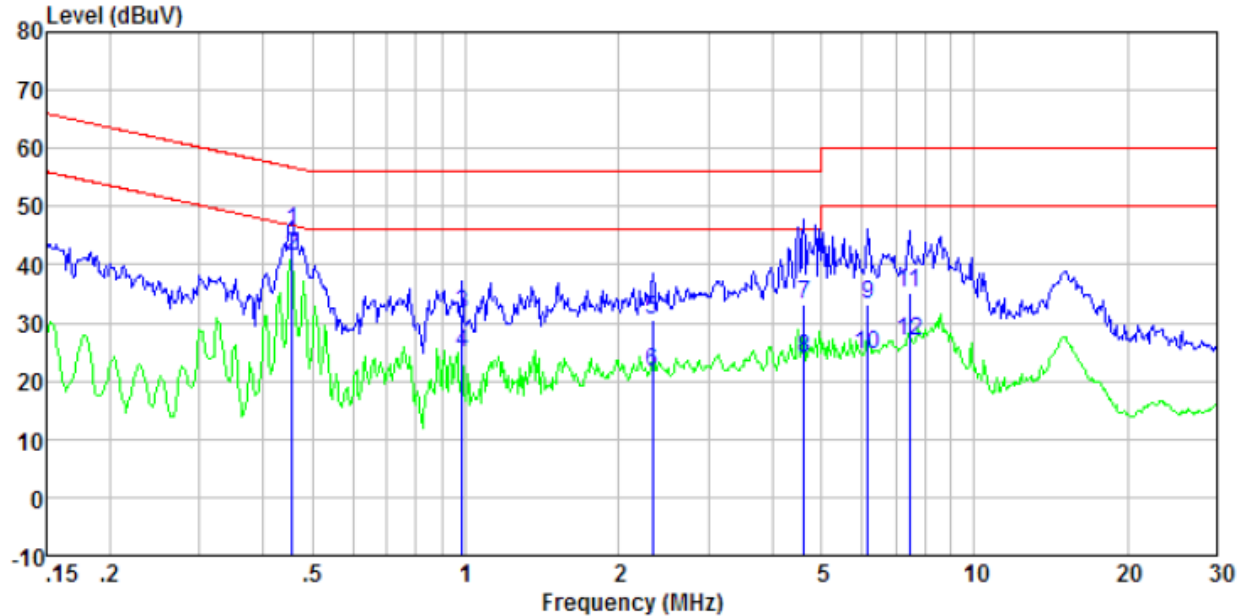
Measurement data

Line:



Freq MHz	Reading level dBuV	ISSN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.456	46.33	0.33	0.11	46.77	56.76	-9.99	QP
0.456	42.98	0.33	0.11	43.42	46.76	-3.34	Average
0.775	33.09	0.24	0.14	33.47	56.00	-22.53	QP
0.775	26.26	0.24	0.14	26.64	46.00	-19.36	Average
1.117	33.98	0.20	0.15	34.33	56.00	-21.67	QP
1.117	26.98	0.20	0.15	27.33	46.00	-18.67	Average
2.201	32.84	0.20	0.18	33.22	56.00	-22.78	QP
2.201	26.36	0.20	0.18	26.74	46.00	-19.26	Average
4.952	33.45	0.20	0.17	33.82	56.00	-22.18	QP
4.952	26.62	0.20	0.17	26.99	46.00	-19.01	Average
7.446	33.27	0.20	0.19	33.66	60.00	-26.34	QP
7.446	27.29	0.20	0.19	27.68	50.00	-22.32	Average

Neutral:

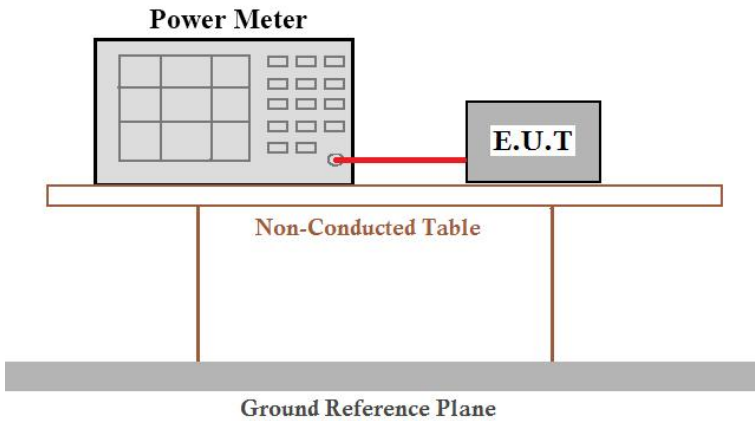


Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.456	45.38	0.33	0.11	45.82	56.76	-10.94	QP
0.456	41.12	0.33	0.11	41.56	46.76	-5.20	Average
0.984	31.26	0.20	0.15	31.61	56.00	-24.39	QP
0.984	24.39	0.20	0.15	24.74	46.00	-21.26	Average
2.334	30.12	0.20	0.18	30.50	56.00	-25.50	QP
2.334	21.25	0.20	0.18	21.63	46.00	-24.37	Average
4.622	32.81	0.20	0.17	33.18	56.00	-22.82	QP
4.622	23.65	0.20	0.17	24.02	46.00	-21.98	Average
6.186	32.77	0.20	0.18	33.15	60.00	-26.85	QP
6.186	24.27	0.20	0.18	24.65	50.00	-25.35	Average
7.446	34.70	0.20	0.19	35.09	60.00	-24.91	QP
7.446	26.35	0.20	0.19	26.74	50.00	-23.26	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
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Main Antenna: Antenna gain=6.43dBi Limit=30-(6.43-6)=29.57dBm

Test CH	Peak Output Power (dBm)						Limit(dBm)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	15.54	15.55	15.39	14.80	13.07	---	29.57	Pass
Middle	15.11	15.19	14.36	---	---	12.40		
Highest	16.81	15.34	14.44	14.67	14.48	---		

Remark: "---" is not applicable

Aux Antenna:

Test CH	Peak Output Power (dBm)						Limit(dBm)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	10.10	13.89	10.10	13.68	9.22	---	30.00	Pass
Middle	9.10	14.29	10.01	---	---	7.43		
Highest	11.36	15.17	10.78	13.94	9.77	---		

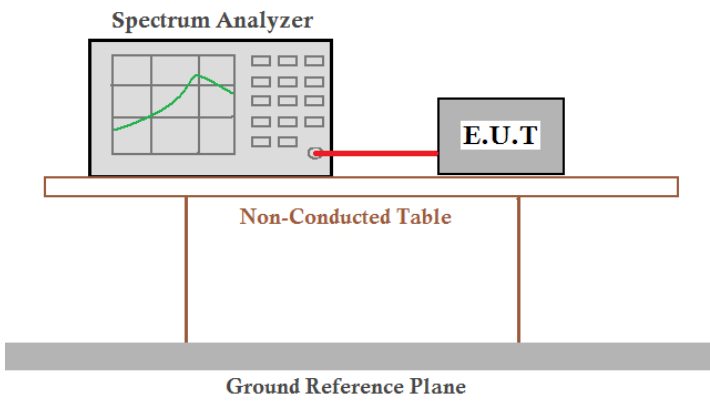
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MIMO:

Test mode	Channel	Main Antenna power dBm	AUX Antenna power dBm	MIMO power dBm	Limit (dBm)	Result
802.11n(HT20) (MIMO)	Lowest	15.55	13.89	17.81	26.97	Pass
	Middle	15.19	14.29	17.77		
	Highest	15.34	15.17	18.27		
802.11ac(HT20) (MIMO)	Lowest	15.39	10.10	16.52		
	Middle	14.36	10.01	15.72		
	Highest	14.44	10.78	15.99		
802.11n(HT40) (MIMO)	Lowest	14.80	13.68	17.29		
	Highest	14.67	13.94	17.33		
802.11ac(HT40) (MIMO)	Lowest	13.07	9.22	14.57		
	Highest	14.48	9.77	15.74		
802.11ac(HT80) (MIMO)	Middle	12.40	7.43	13.60		

NOTE: MIMO output power = ANT main Power+ANT AUX Power
Directional gain=9.03dBi
Limit=30-(9.03-6)=26.97dBm

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	>500KHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer, showing a frequency spectrum on its screen, is connected to an Equipment Under Test (E.U.T.) by a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the setup.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Main Antenna:

5.8G Band								
Test CH	6dB Channel Bandwidth (MHz)						Limit (KHz)	Result
	802.11a	802.11n(H T20)	802.11ac(HT20)	802.11n(H T40)	802.11ac(HT40)	802.11ac(HT80)		
Lowest	16.445	16.472	17.584	36.393	36.331	---	>500	Pass
Middle	16.406	16.450	17.618	---	---	75.373		
Highest	16.441	16.449	17.592	36.388	36.081	---		

Remark: "---" is not applicable

Aux Antenna:

5.8G Band								
Test CH	6dB Channel Bandwidth (MHz)						Limit (KHz)	Result
	802.11a	802.11n(H T20)	802.11ac(HT20)	802.11n(H T40)	802.11ac(HT40)	802.11ac(HT80)		
Lowest	16.466	17.616	17.601	35.863	36.165	---	>500	Pass
Middle	16.486	17.316	17.601	---	---	75.556		
Highest	16.480	17.340	17.674	36.177	36.197	---		

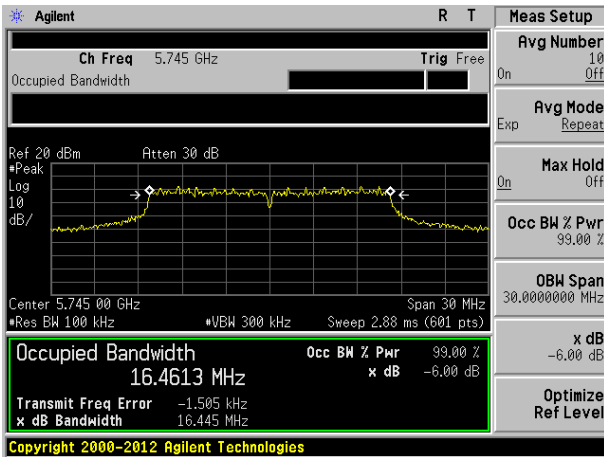
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Test plot as follows:

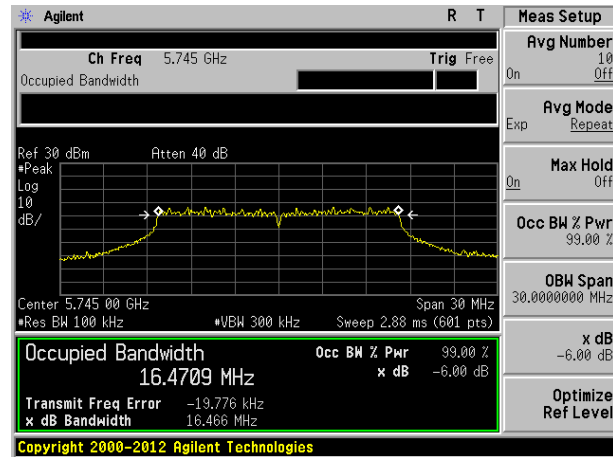
Test mode: 802.11a

Main Antenna:

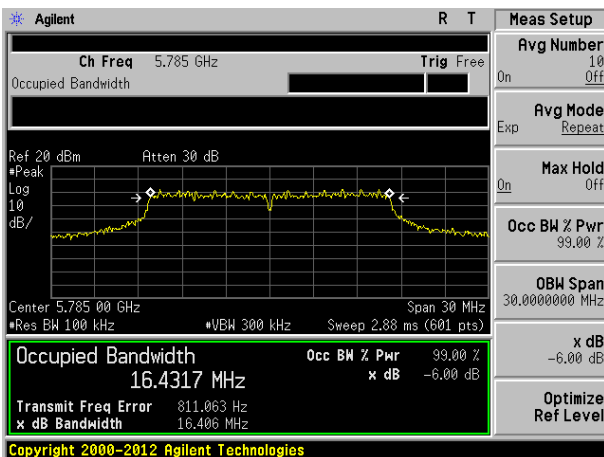
Aux Antenna:



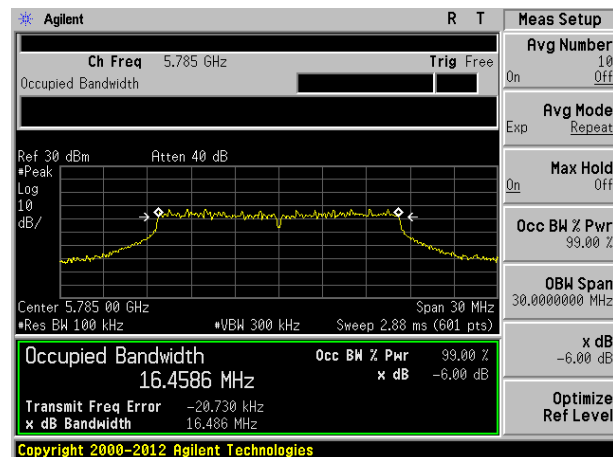
Lowest channel



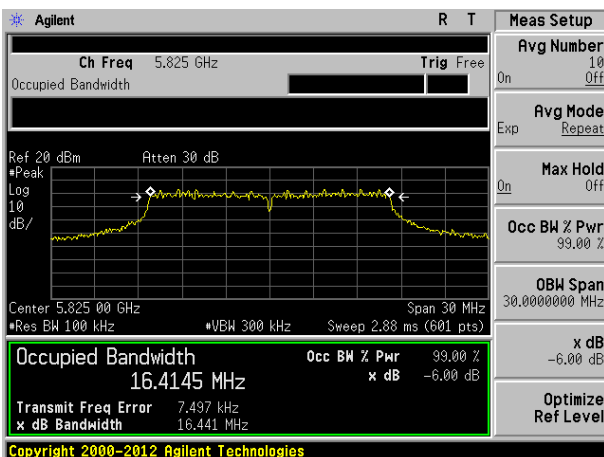
Lowest channel



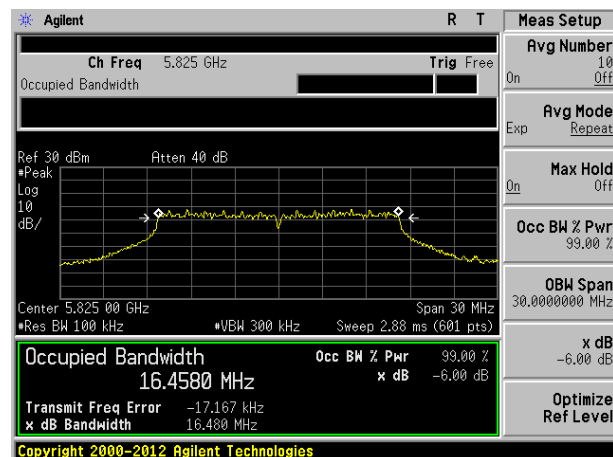
Middle channel



Middle channel



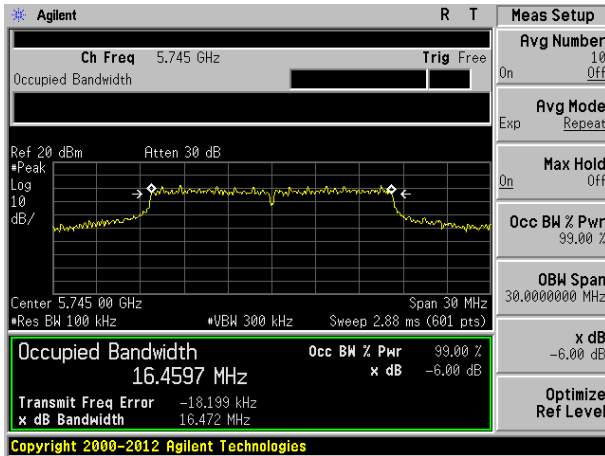
Highest channel



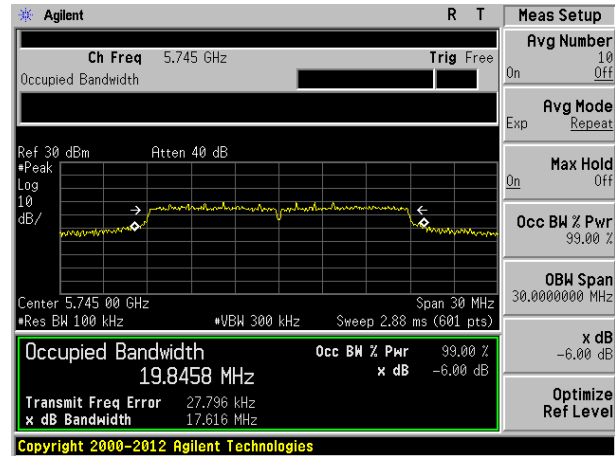
Highest channel

Test mode: 802.11n(HT20) @ 5.8G Band

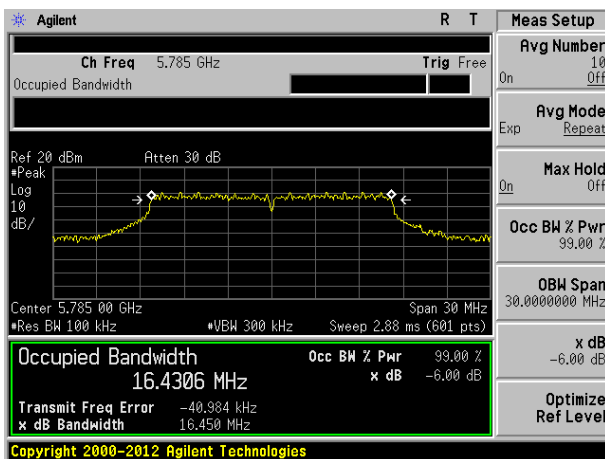
Main Antenna:	Aux Antenna:
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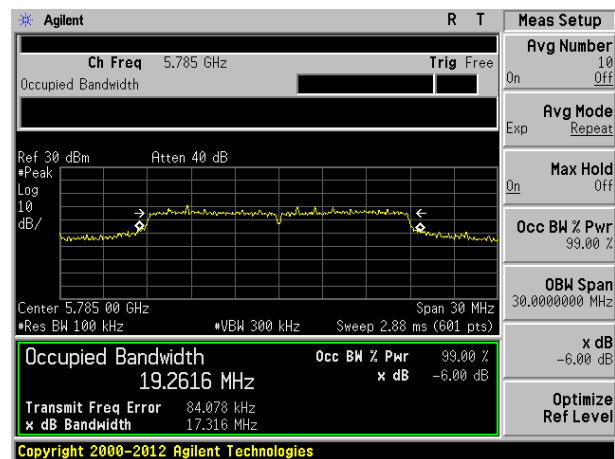
Lowest channel



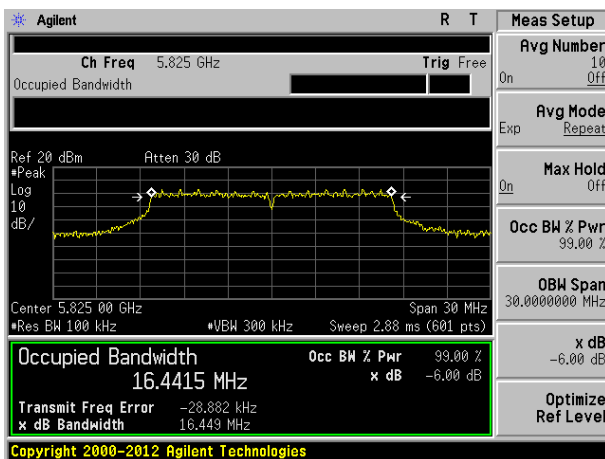
Lowest channel



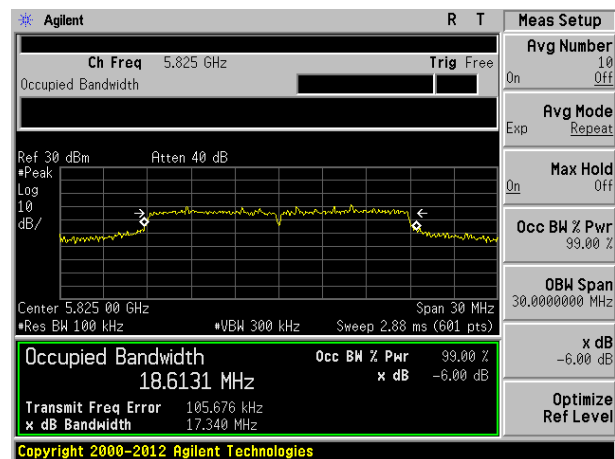
Middle channel



Middle channel



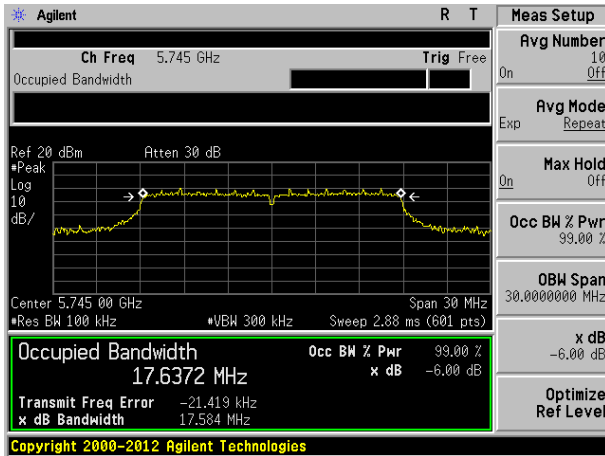
Highest channel



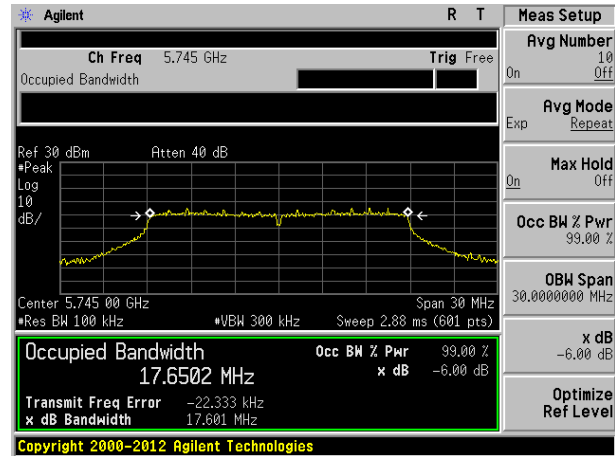
Highest channel

Test mode: 802.11ac(HT20)

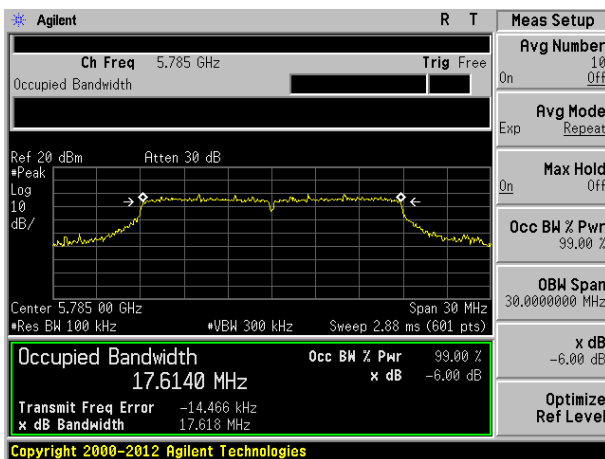
Main Antenna:	Aux Antenna:
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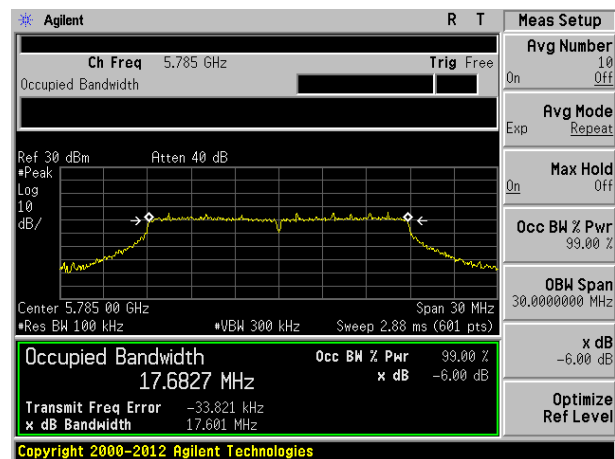
Lowest channel



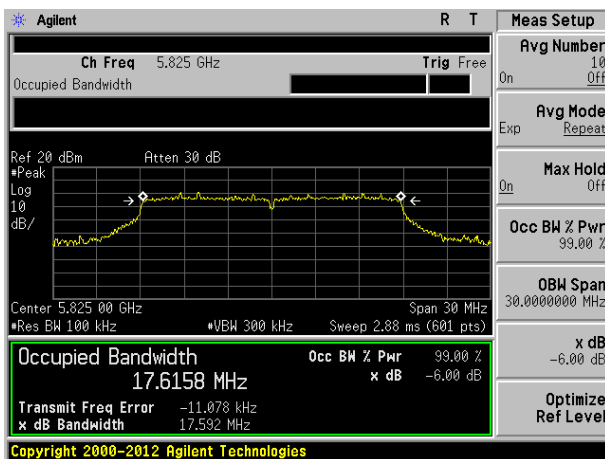
Lowest channel



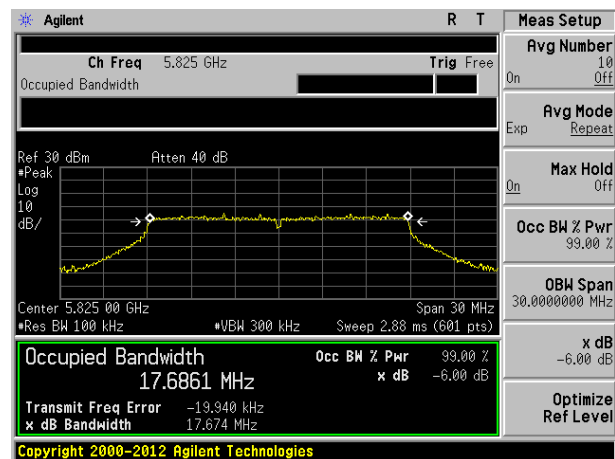
Middle channel



Middle channel



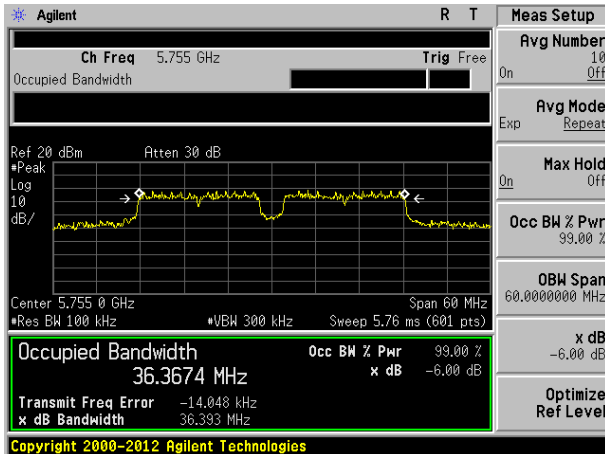
Highest channel



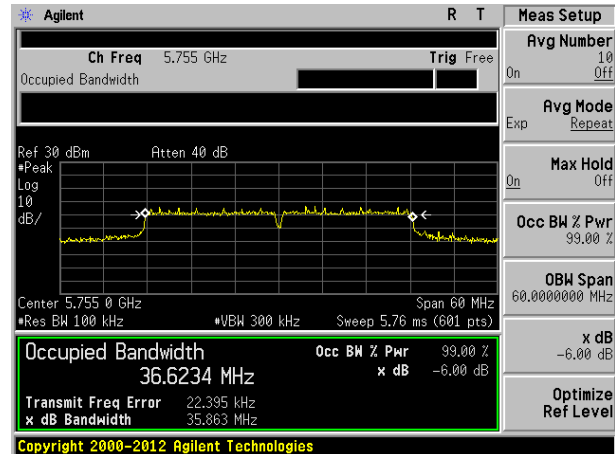
Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band

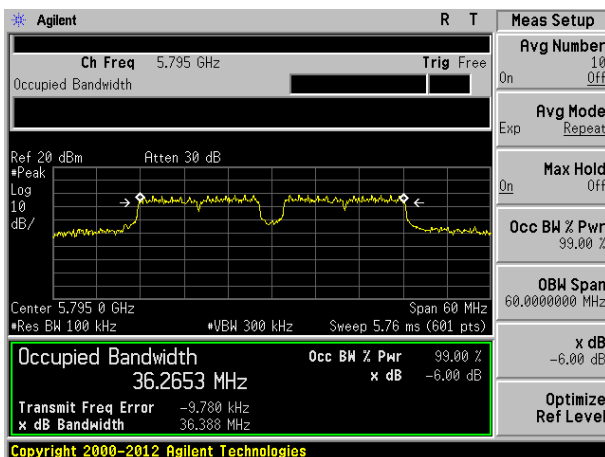
Main Antenna:	Aux Antenna:
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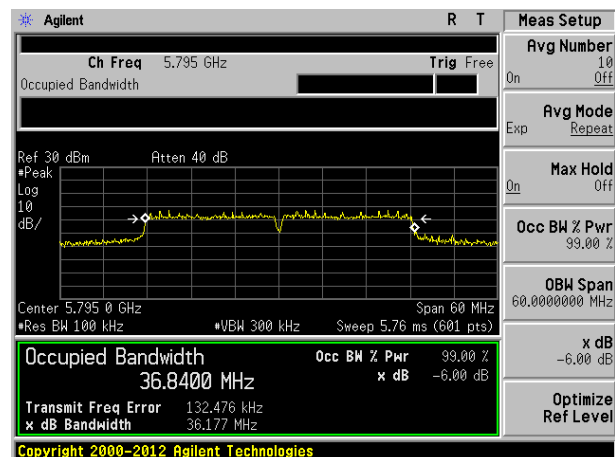
Lowest channel



Lowest channel



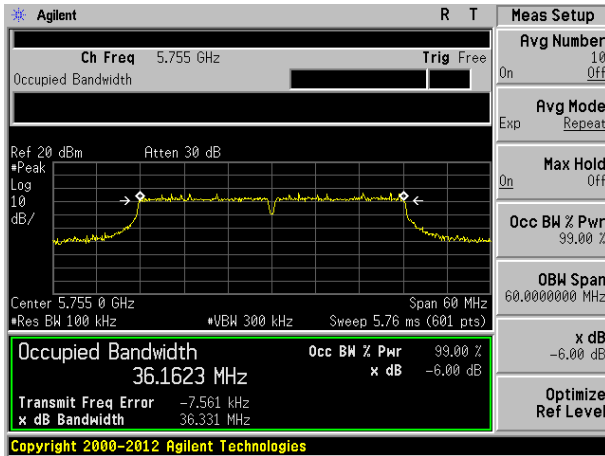
Highest channel



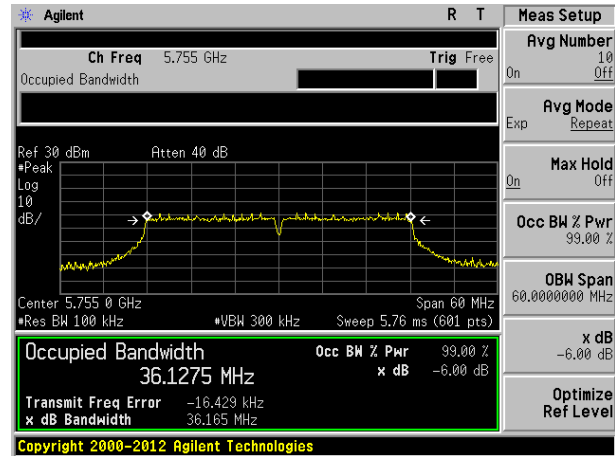
Highest channel

Test mode: 802.11ac(HT40)

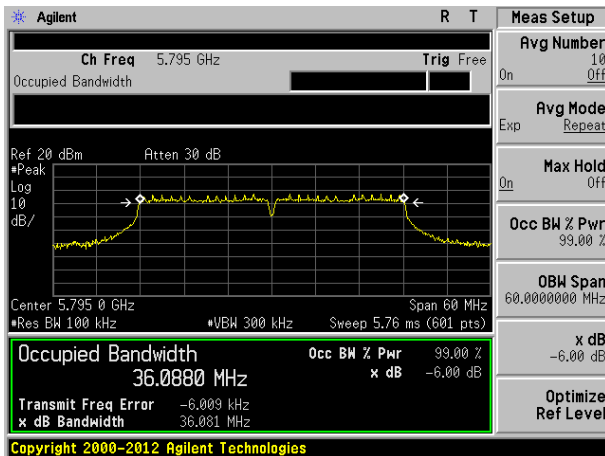
Main Antenna:	Aux Antenna:
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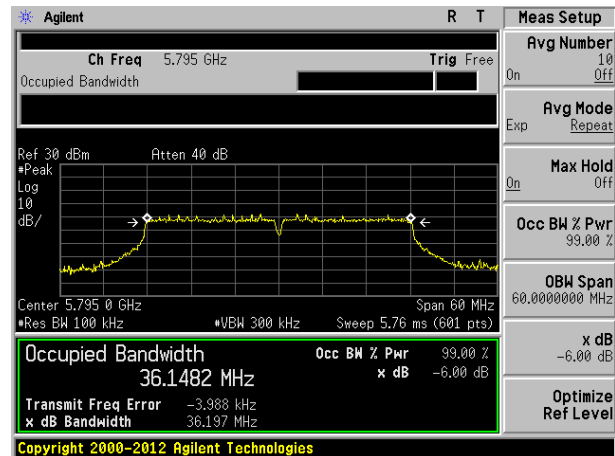
Lowest channel



Lowest channel



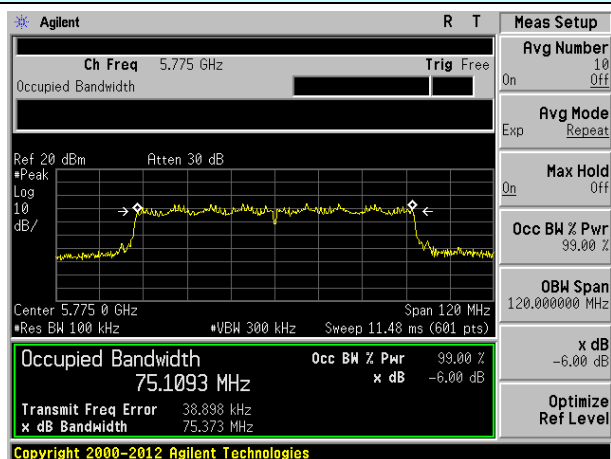
Highest channel



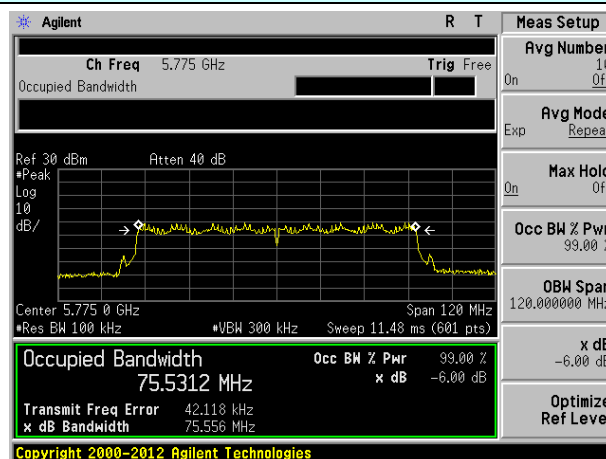
Highest channel

Test mode: 802.11ac(HT80)

Main Antenna:	Aux Antenna:
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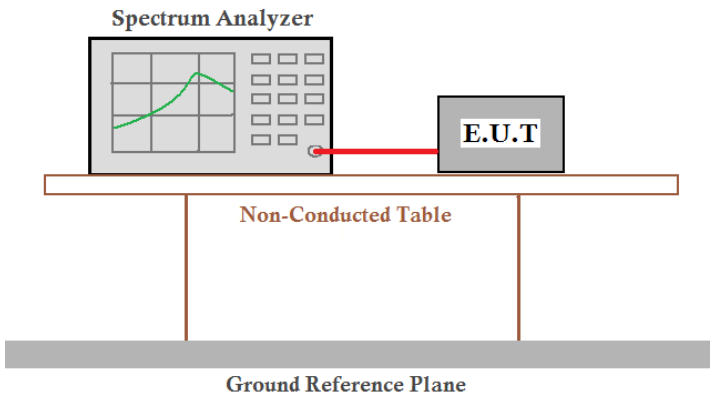


Middle channel



Middle channel

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Main Antenna: Antenna gain=6.43dBi Limit=30-(6.43-6)=29.57dBm

5.8G Band								
Test CH	Power Spectral Density (dBm)						Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT 20)	802.11ac(H T20)	802.11n(HT 40)	802.11ac(H T40)	802.11ac(H T80)		
Lowest	6.16	5.56	3.43	2.18	0.59	---	29.57	Pass
Middle	6.57	5.20	3.18	---	---	-3.12		
Highest	6.88	5.93	4.73	2.44	0.17	---		

Aux Antenna:

5.8G Band								
Test CH	Power Spectral Density (dBm)						Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT 20)	802.11ac(H T20)	802.11n(HT 40)	802.11ac(H T40)	802.11ac(H T80)		
Lowest	0.10	2.76	-1.83	-0.71	-3.74	---	30.00	Pass
Middle	1.33	4.09	-0.76	---	---	-9.66		
Highest	2.73	4.12	-0.45	0.66	-4.62	---		

Remark: "---" is not applicable

MIMO:

Test mode	Channel	Main Antenna PSD dBm	AUX Antenna PSD dBm	MIMO PSD dBm	Limit (dBm)	Result
802.11n(HT20) (MIMO)	Lowest	5.56	2.76	7.39	26.97	Pass
	Middle	5.20	4.09	7.69		
	Highest	5.93	4.12	8.13		
802.11ac(HT20) (MIMO)	Lowest	3.43	-1.83	4.56		
	Middle	3.18	-0.76	4.65		
	Highest	4.73	-0.45	5.88		
802.11n(HT40) (MIMO)	Lowest	2.18	-0.71	3.98		
	Highest	2.44	0.66	4.65		
802.11ac(HT40) (MIMO)	Lowest	0.59	-3.74	1.95		
	Highest	0.17	-4.62	1.41		
802.11ac(HT80) (MIMO)	Middle	-3.12	-9.66	-2.25		

NOTE: MIMO output power = ANT main Power+ANT AUX Power

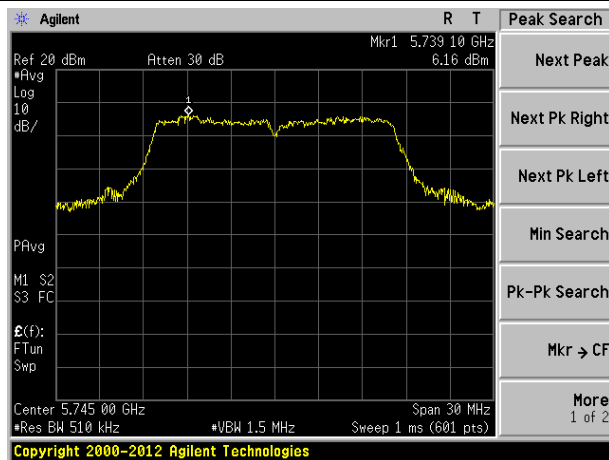
Directional gain=9.03

Limit=30-(9.03-6)=26.97dBm

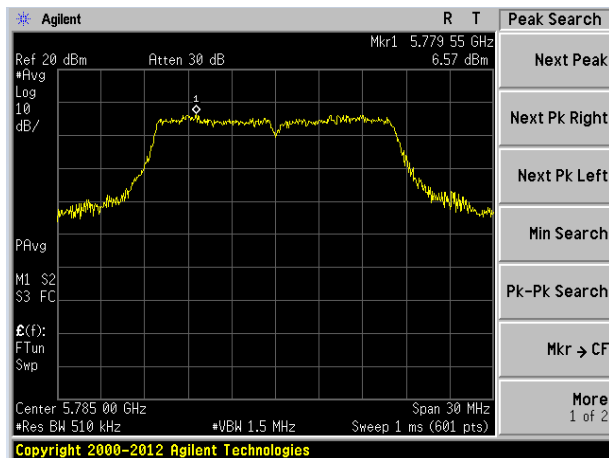
Test plot as follows:

Test mode: 802.11a

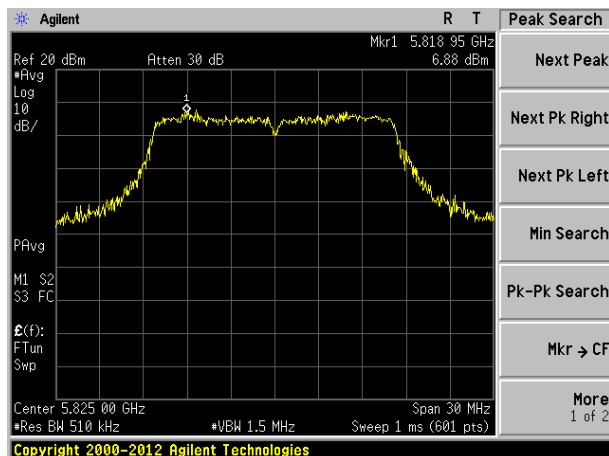
Antenna 1:



Lowest channel

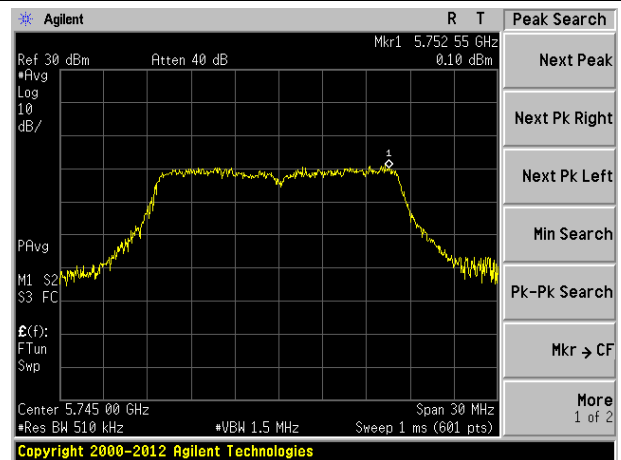


Middle channel

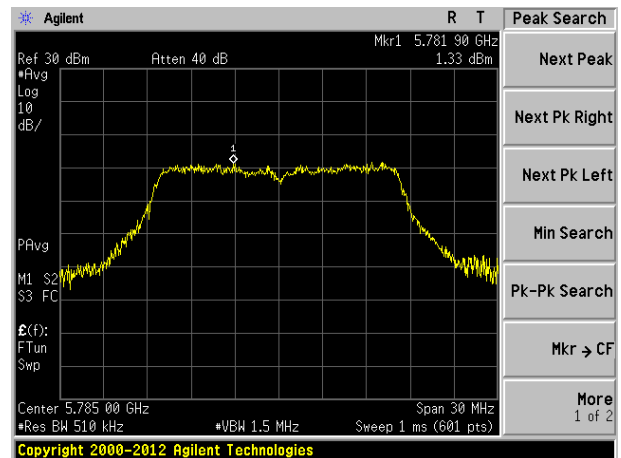


Highest channel

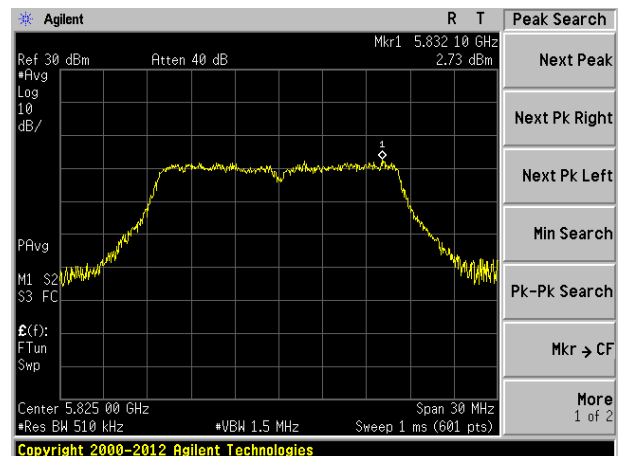
Aux Antenna:



Lowest channel



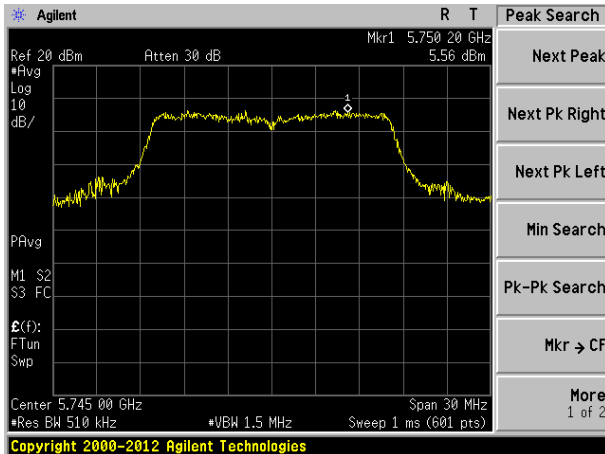
Middle channel



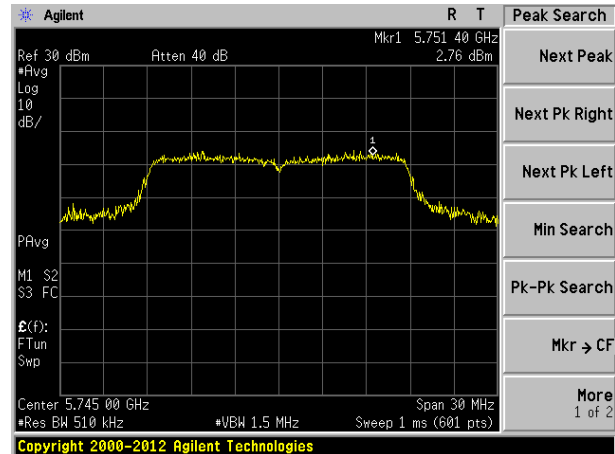
Highest channel

Test mode: 802.11n(HT20) @ 5.8G Band

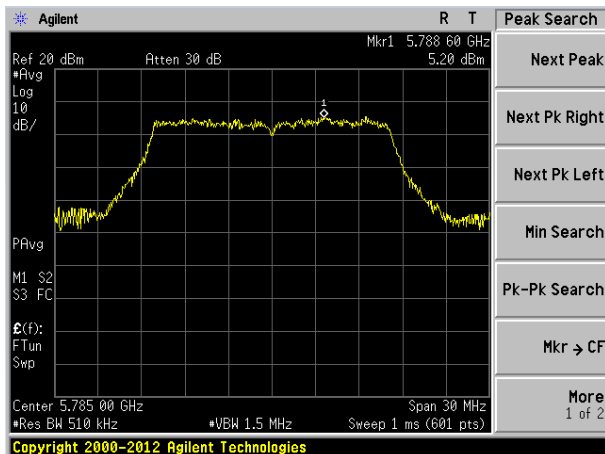
Main Antenna:	Aux Antenna:
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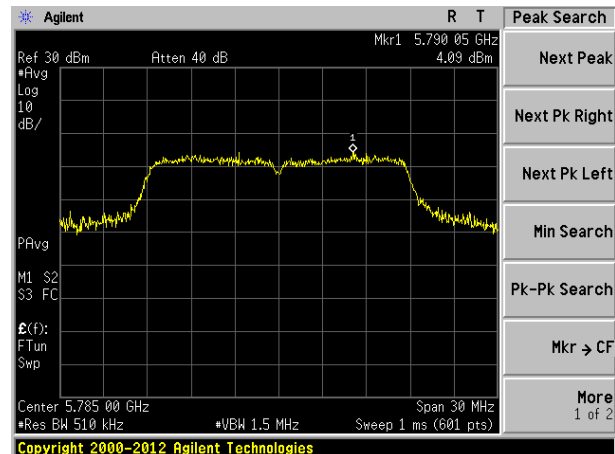
Lowest channel



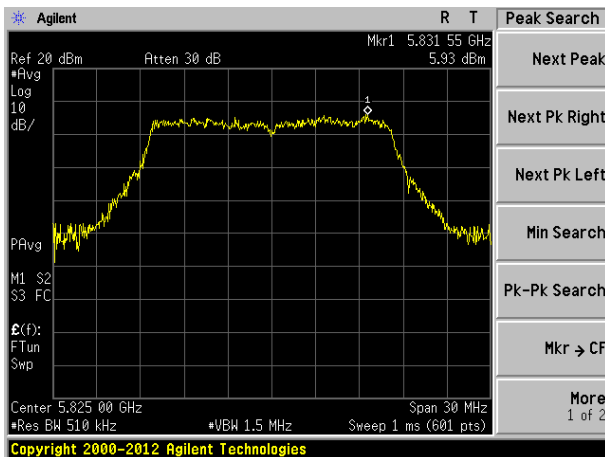
Lowest channel



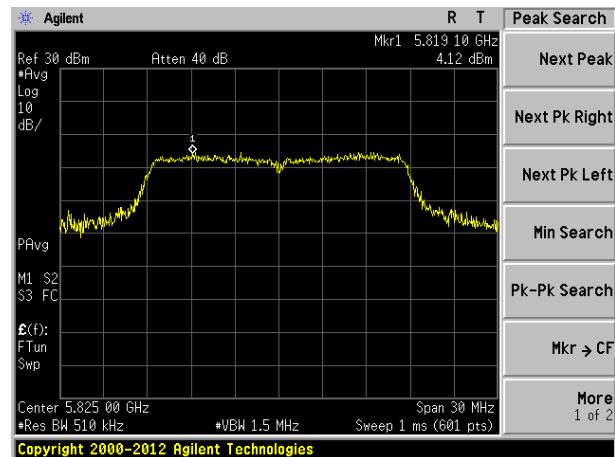
Middle channel



Middle channel



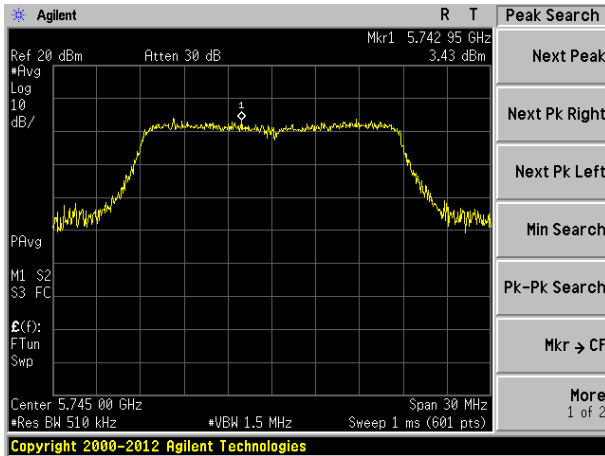
Highest channel



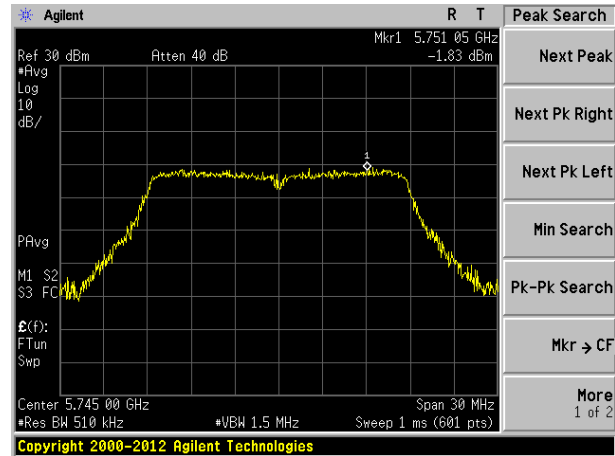
Highest channel

Test mode: 802.11ac(HT20)

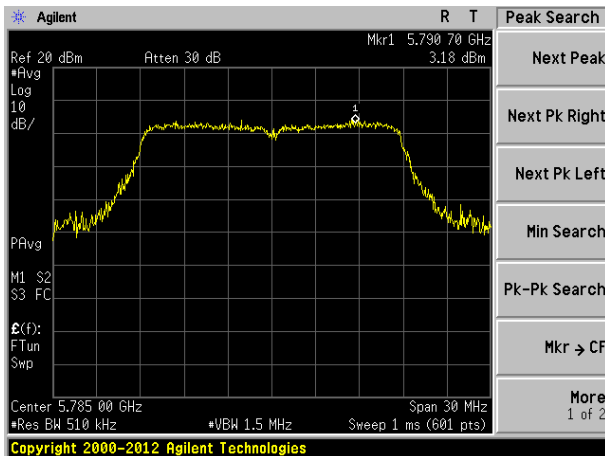
Main Antenna:	Aux Antenna::
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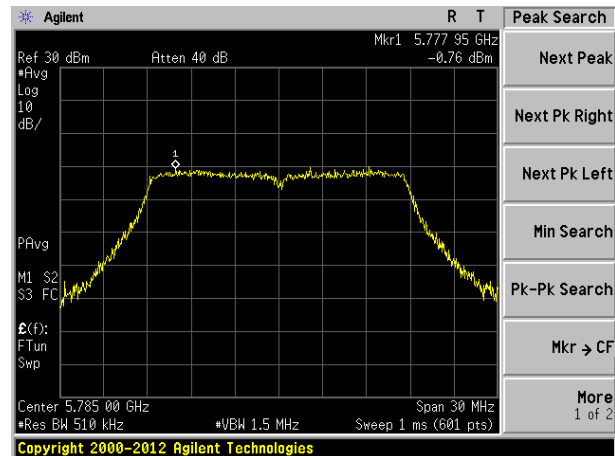
Lowest channel



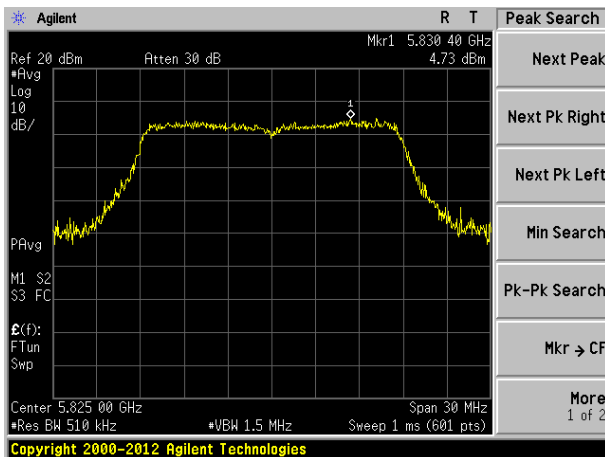
Lowest channel



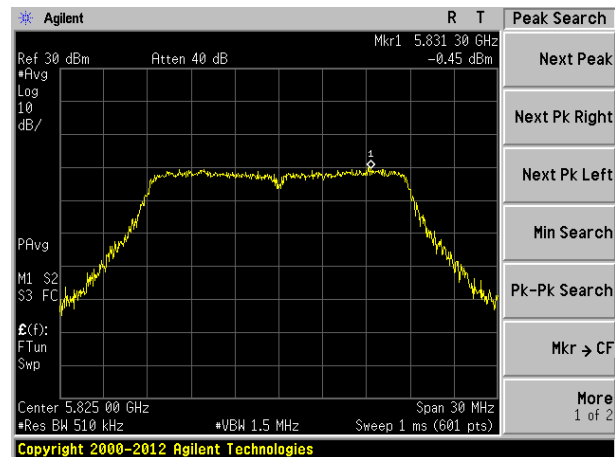
Middle channel



Middle channel



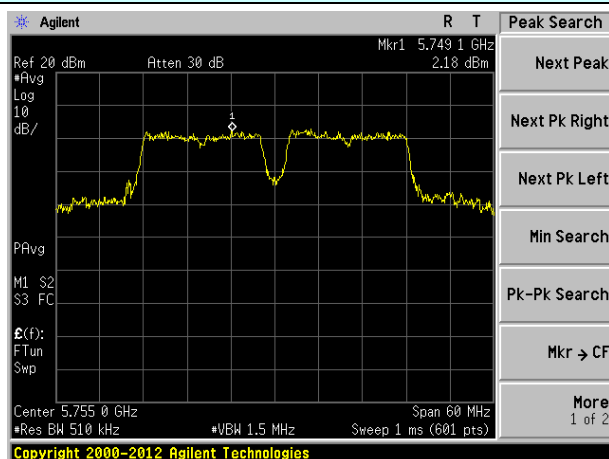
Highest channel



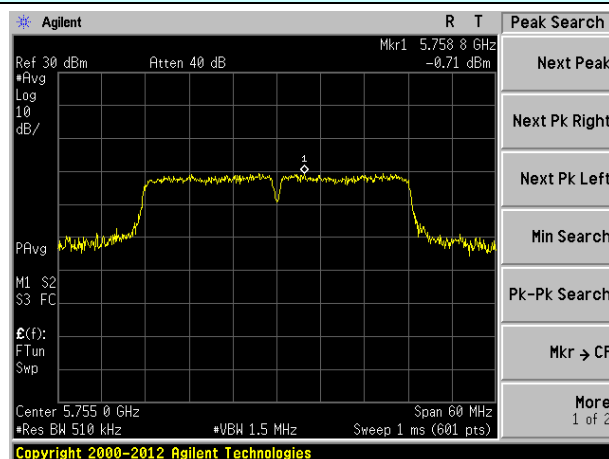
Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band

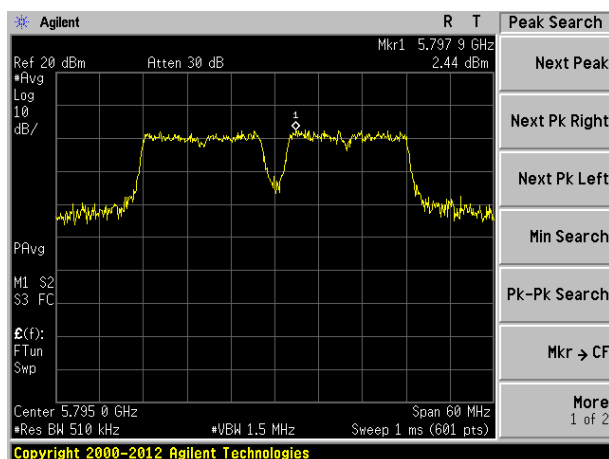
Main Antenna:	Aux Antenna:
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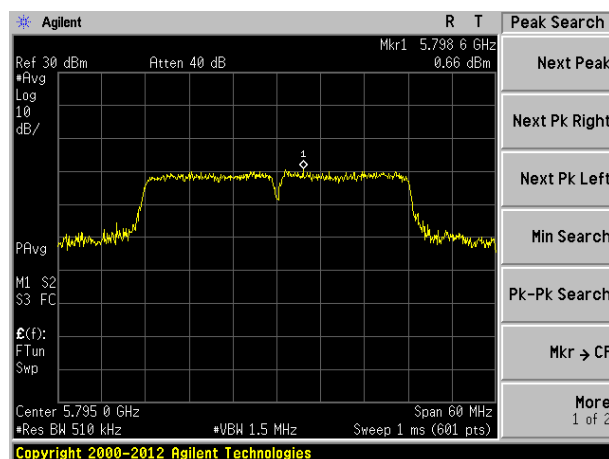
Lowest channel



Lowest channel



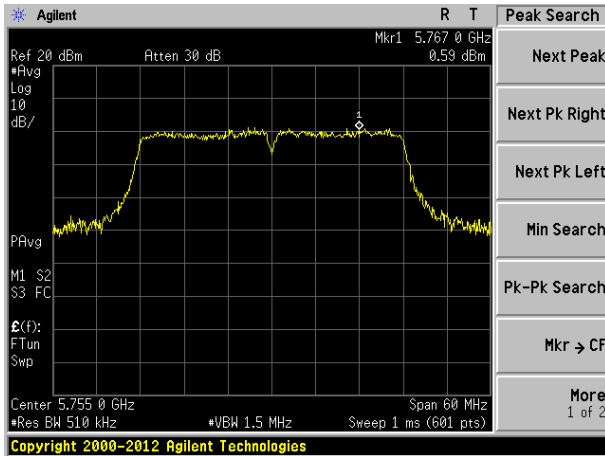
Highest channel



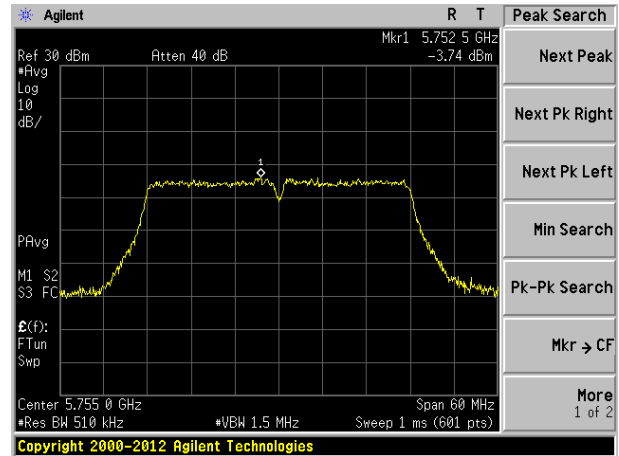
Highest channel

Test mode: 802.11ac(HT40)

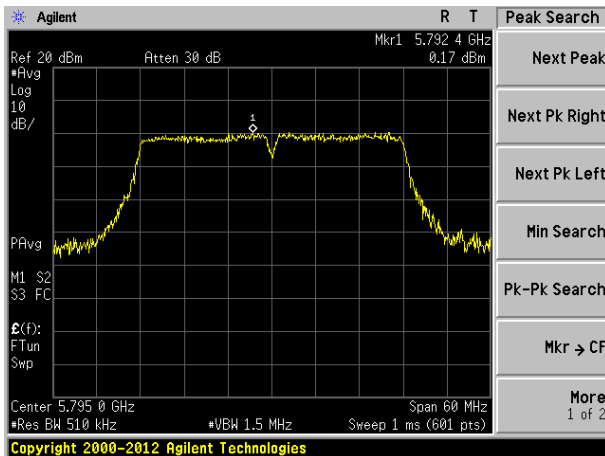
Main Antenna:	Aux Antenna:
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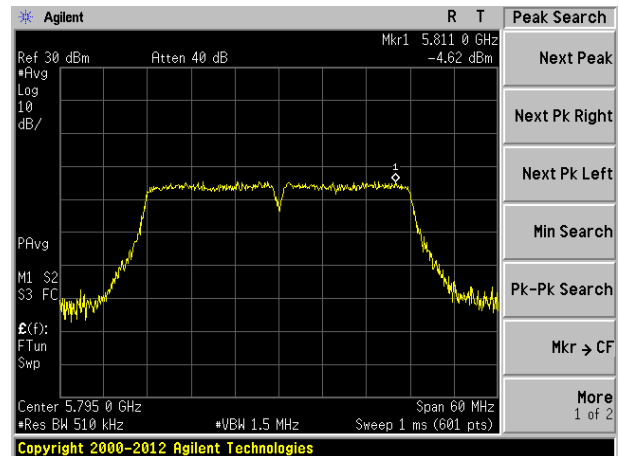
Lowest channel



Lowest channel



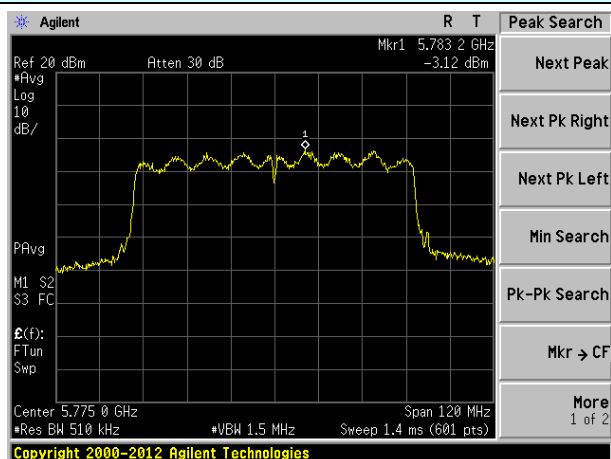
Highest channel



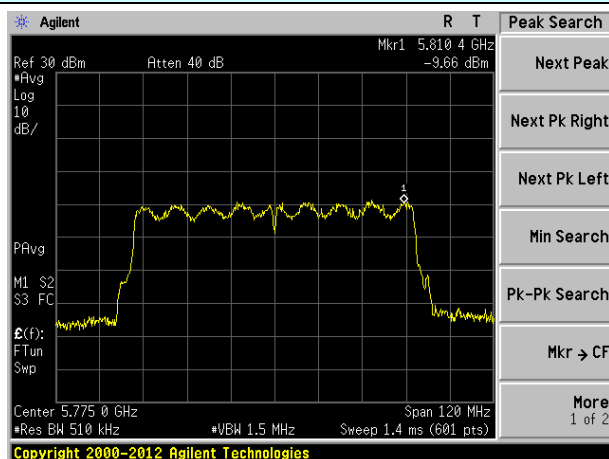
Highest channel

Test mode: 802.11ac(HT80)

Main Antenna:	Aux Antenna:
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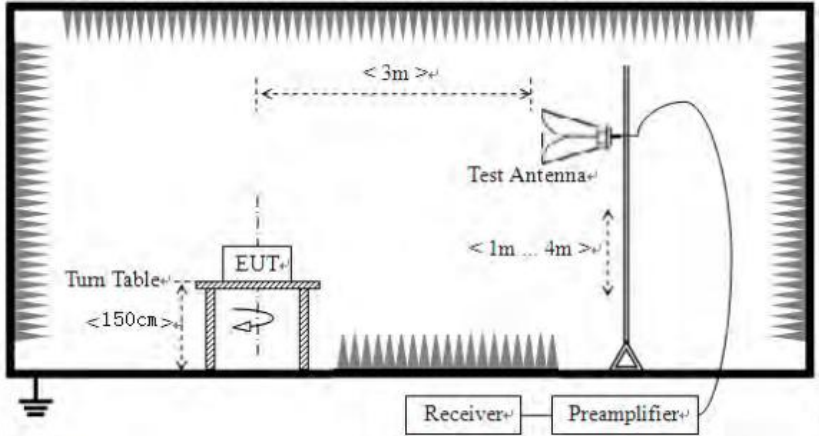
Middle channel



Middle channel

7.6 Band edges

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	30MHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		RMS	1MHz	3MHz	AV
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.				
Test setup:					
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters 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 rota 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. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Remark:

According to KDB 789033 D02V01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

For example, if EIRP = -27dBm

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$

Main Antenna:

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

Test mode:	802.11a	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	38.11	32.68	9.97	23.86	56.90	68.20	-11.30	Horizontal
5725.00	39.56	32.68	9.97	23.86	58.35	68.20	-9.85	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.25	32.68	9.97	23.86	49.04	54.00	-4.96	Horizontal
5725.00	29.77	32.68	9.97	23.86	48.56	54.00	-5.44	Vertical

Test mode:	802.11a	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	36.57	32.7	9.99	23.87	55.39	68.20	-12.81	Horizontal
5850.00	33.96	32.7	9.99	23.87	52.78	68.20	-15.42	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	31.22	32.7	9.99	23.87	50.04	54.00	-3.96	Horizontal
5850.00	31.01	32.7	9.99	23.87	49.83	54.00	-4.17	Vertical

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Aux Antenna:

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

Test mode:	802.11a	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	39.77	32.68	9.97	23.86	58.56	68.20	-9.64	Horizontal
5725.00	38.17	32.68	9.97	23.86	56.96	68.20	-11.24	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.02	32.68	9.97	23.86	48.81	54.00	-5.19	Horizontal
5725.00	28.57	32.68	9.97	23.86	47.36	54.00	-6.64	Vertical

Test mode:	802.11a	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	35.79	32.7	9.99	23.87	54.61	68.20	-13.59	Horizontal
5850.00	37.48	32.7	9.99	23.87	56.30	68.20	-11.90	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	30.75	32.7	9.99	23.87	49.57	54.00	-4.43	Horizontal
5850.00	29.65	32.7	9.99	23.87	48.47	54.00	-5.53	Vertical

Remark:

3. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

The emission levels of other frequencies are very lower than the limit and not show in test report.

MIMO:

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

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	36.25	32.68	9.97	23.86	55.04	68.20	-13.16	Horizontal
5725.00	37.87	32.68	9.97	23.86	56.66	68.20	-11.54	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.55	32.68	9.97	23.86	49.34	54.00	-4.66	Horizontal
5725.00	30.69	32.68	9.97	23.86	49.48	54.00	-4.52	Vertical

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	39.79	32.7	9.99	23.87	58.61	68.20	-9.59	Horizontal
5850.00	40.25	32.7	9.99	23.87	59.07	68.20	-9.13	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	30.10	32.7	9.99	23.87	48.92	54.00	-5.08	Horizontal
5850.00	29.87	32.7	9.99	23.87	48.69	54.00	-5.31	Vertical

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11ac(HT20)	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	39.23	32.68	9.97	23.86	58.02	68.20	-10.18	Horizontal
5725.00	37.16	32.68	9.97	23.86	55.95	68.20	-12.25	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	28.22	32.68	9.97	23.86	47.01	54.00	-6.99	Horizontal
5725.00	28.79	32.68	9.97	23.86	47.58	54.00	-6.42	Vertical

Test mode:	802.11ac(HT20)	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	38.76	32.74	10.04	23.87	57.67	68.20	-10.53	Horizontal
5850.00	37.52	32.74	10.04	23.87	56.43	68.20	-11.77	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	28.33	32.74	10.04	23.87	47.24	54.00	-6.76	Horizontal
5850.00	28.61	32.74	10.04	23.87	47.52	54.00	-6.48	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	35.23	32.53	9.83	23.84	53.75	68.20	-14.45	Horizontal
5725.00	37.65	32.53	9.83	23.84	56.17	68.20	-12.03	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.55	32.53	9.83	23.84	49.07	54.00	-4.93	Horizontal
5725.00	29.62	32.53	9.83	23.84	48.14	54.00	-5.86	Vertical

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	36.99	32.7	9.99	23.87	55.81	68.20	-12.39	Horizontal
5850.00	36.15	32.7	9.99	23.87	54.97	68.20	-13.23	Vertical

AV value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	29.60	32.7	9.99	23.87	48.42	54.00	-5.58	Horizontal
5850.00	29.42	32.7	9.99	23.87	48.24	54.00	-5.76	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11ac(HT40)	Test channel:	Lowest
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Peak value:

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
5725.00	33.32	32.53	9.83	23.84	51.84	68.20	-16.36	Horizontal
5725.00	33.89	32.53	9.83	23.84	52.41	68.20	-15.79	Vertical

AV value:

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
5725.00	29.87	32.53	9.83	23.84	48.39	54.00	-5.61	Horizontal
5725.00	29.76	32.53	9.83	23.84	48.28	54.00	-5.72	Vertical

Test mode:	802.11ac(HT40)	Test channel:	Highest
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Peak value:

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
5850.00	38.25	32.7	9.99	23.87	57.07	68.20	-11.13	Horizontal
5850.00	37.45	32.7	9.99	23.87	56.27	68.20	-11.93	Vertical

AV value:

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
5850.00	29.25	32.7	9.99	23.87	48.07	54.00	-5.93	Horizontal
5850.00	30.85	32.7	9.99	23.87	49.67	54.00	-4.33	Vertical

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11ac(HT80)	Test channel:	Middle
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	36.95	32.53	9.83	23.84	55.47	68.20	-12.73	Horizontal
5850.00	38.71	32.7	9.99	23.87	57.53	68.20	-10.67	Vertical

AV value:

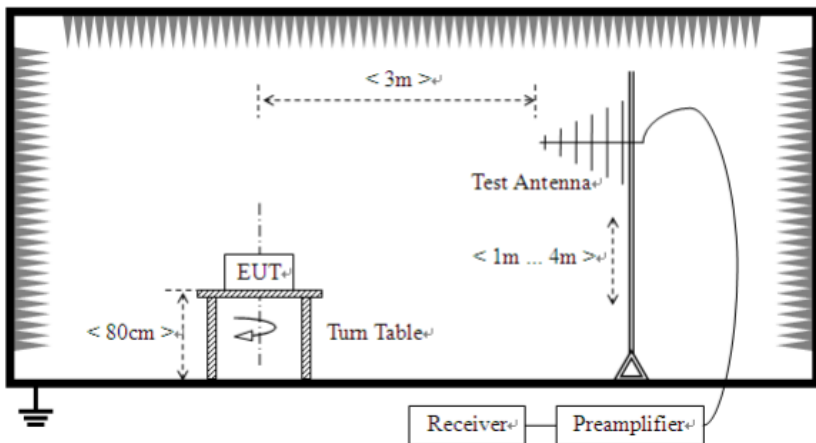
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	28.56	32.53	9.83	23.84	47.08	54.00	-6.92	Horizontal
5850.00	29.22	32.7	9.99	23.87	48.04	54.00	-5.96	Vertical

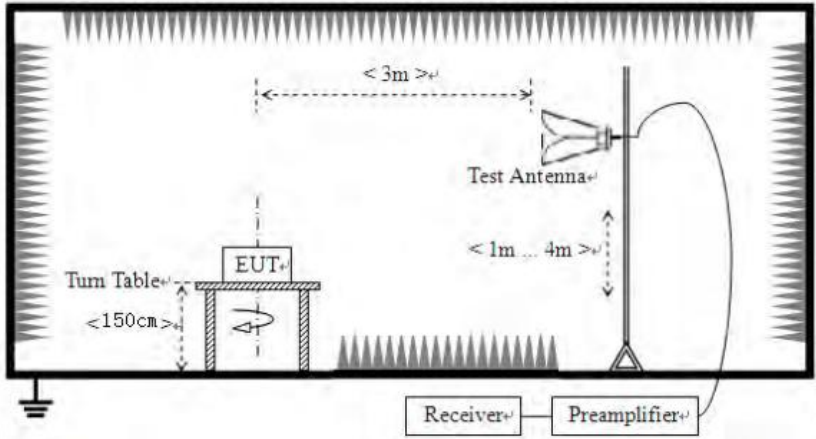
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.7 Spurious Emission

7.7.1 Radiated Emission Method

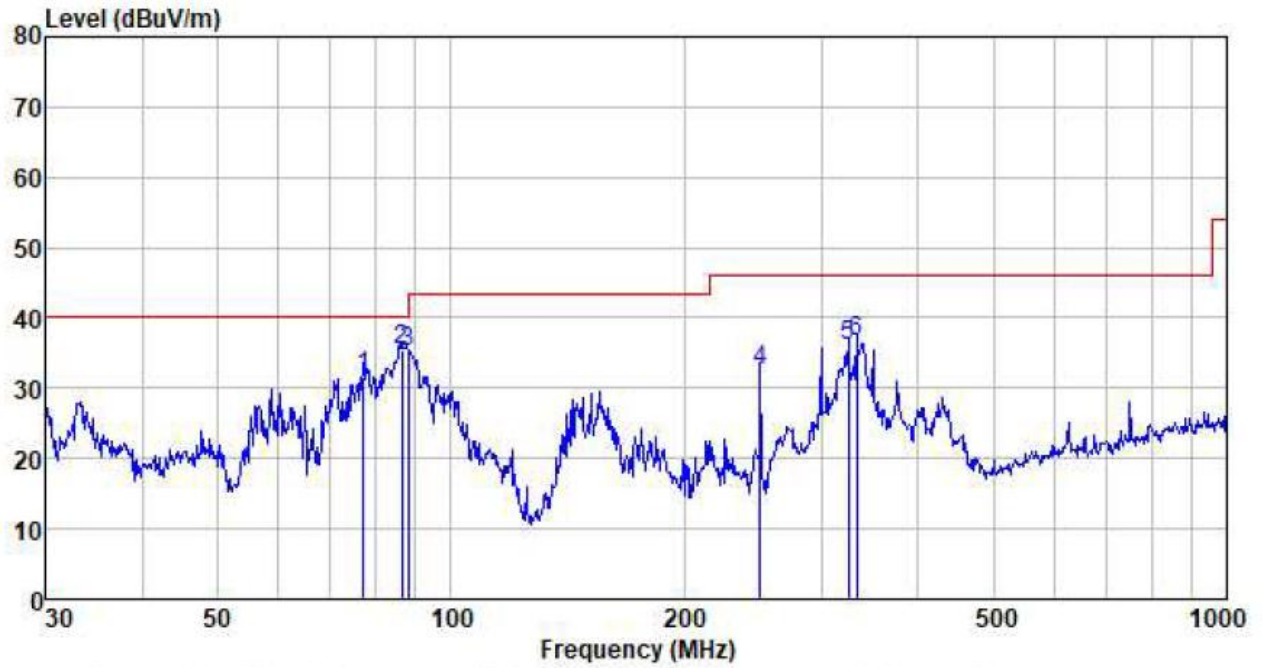
Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	AV Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	Above 960MHz		54.0		Quasi-peak Value
	Above 1000MHz		74.0		Peak Value
	Above 1000MHz		54.0		Avg Value
Test setup:	Below 1GHz				
					
	Above 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 rota 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. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

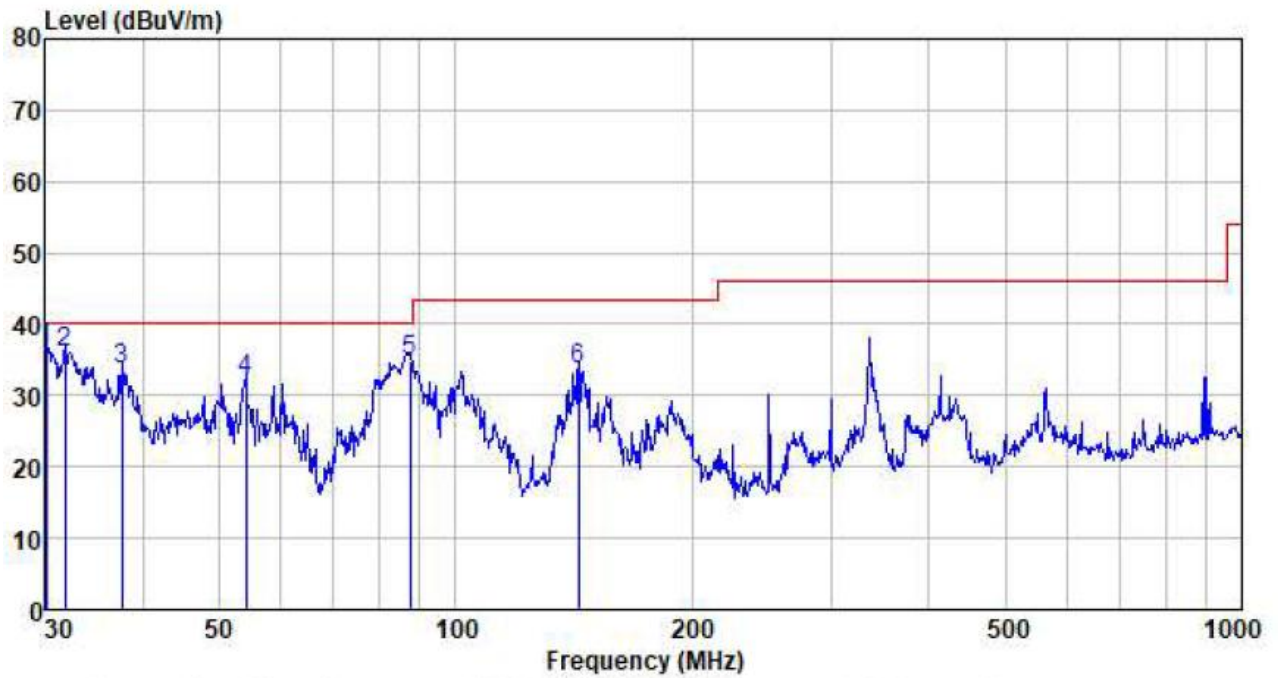
■ Below 1GHz

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
77.051	59.65	7.43	1.00	36.52	31.56	40.00	-8.44	QP
86.503	61.28	9.56	1.08	36.61	35.31	40.00	-4.69	QP
88.033	60.73	10.07	1.09	36.62	35.27	43.50	-8.23	QP
250.301	55.61	12.18	2.12	37.38	32.53	46.00	-13.47	QP
325.596	56.83	14.09	2.49	37.45	35.96	46.00	-10.04	QP
333.687	57.42	14.23	2.54	37.46	36.73	46.00	-9.27	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
30.105	59.94	11.20	0.55	35.01	36.68	40.00	-3.32	QP
31.843	59.33	11.24	0.57	35.14	36.00	40.00	-4.00	QP
37.680	56.62	11.80	0.64	35.53	33.53	40.00	-6.47	QP
54.071	55.69	11.88	0.81	36.24	32.14	40.00	-7.86	QP
87.418	60.59	9.81	1.09	36.62	34.87	40.00	-5.13	QP
143.326	61.70	7.47	1.53	37.04	33.66	43.50	-9.84	QP

■ Above 1GHz

Main Antenna:

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

Test mode:		802.11a(SISO)			Test channel:		lowest
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector
V	11510.00	28.48	21.64	50.12	54(Note3)	-3.88	PK
V	17265.00	26.21	21.8	48.01	54(Note3)	-5.99	PK
H	11510.00	26.28	21.83	48.11	54(Note3)	-5.89	PK
H	17265.00	25.08	21.67	46.75	54(Note3)	-7.25	PK

Aux Antenna:

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

Test mode:		802.11a(SISO)			Test channel:		lowest
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector
V	11570.00	26.31	21.64	47.95	54(Note3)	-6.05	PK
V	17355.00	25.00	21.8	46.80	54(Note3)	-7.20	PK
H	11570.00	22.66	21.83	44.49	54(Note3)	-9.51	PK
H	17355.00	23.32	21.67	44.99	54(Note3)	-9.01	PK

Note: All low mid high channels have been tested , only worse case is reported

MIMO:

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

Test mode:		802.11n(HT20)(MIMO)			Test channel:		Lowest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	
V	11510.00	28.35	21.64	49.99	54(Note3)	-4.01	PK	
V	17265.00	26.08	21.8	47.88	54(Note3)	-6.12	PK	
H	11510.00	26.15	21.83	47.98	54(Note3)	-6.02	PK	
H	17265.00	24.95	21.67	46.62	54(Note3)	-7.38	PK	

Test mode:		802.11ac(HT40)(MIMO)			Test channel:		Lowest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	
V	11590.00	27.87	21.67	49.54	54(Note3)	-4.46	PK	
V	17385.00	26.48	21.83	48.31	54(Note3)	-5.69	PK	
H	11590.00	27.01	21.67	48.68	54(Note3)	-5.32	PK	
H	17385.00	26.28	21.83	48.11	54(Note3)	-5.89	PK	

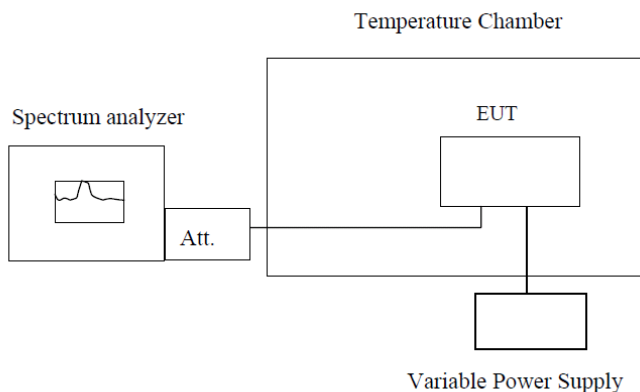
Test mode:		802.11ac(HT80)(MIMO)			Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	
V	11550.00	26.25	21.65	47.90	54(Note3)	-6.10	PK	
V	17325.00	24.38	21.81	46.19	54(Note3)	-7.81	PK	
H	11550.00	23.72	21.65	45.37	54(Note3)	-8.63	PK	
H	17325.00	23.18	21.81	44.99	54(Note3)	-9.01	PK	

Note:

1. Measure Level = Reading Level + 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.

Note: All low mid high channels have been tested , only worse case is reported

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

Measurement data:

ANT 1

802.11a					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5743.7755	5743.9939	5743.5938	5743.8221
	5785	5783.6604	5784.3583	5783.3354	5783.0101
	5825	5823.5966	5824.3013	5823.1900	5824.5009
-20	5745	5743.9063	5743.8295	5744.6653	5744.4905
	5785	5784.8079	5784.7311	5784.2394	5784.9087
	5825	5824.1038	5824.1129	5824.7660	5824.4284
-10	5745	5744.8886	5743.7222	5744.3722	5744.6189
	5785	5783.3654	5783.2115	5784.2369	5784.5545
	5825	5824.5549	5824.7134	5824.9032	5824.3329
0	5745	5743.2044	5744.4009	5744.1738	5744.0520
	5785	5784.4554	5783.1686	5784.9246	5783.6544
	5825	5823.3507	5823.6627	5824.2139	5823.9005
10	5745	5744.7182	5744.7204	5743.3345	5743.3149
	5785	5784.7836	5783.2114	5783.8618	5784.6109
	5825	5824.0678	5824.0003	5824.0464	5824.3727
20	5745	5744.3345	5744.2668	5744.4933	5744.1528
	5785	5784.2273	5783.3450	5784.1075	5784.2671
	5825	5824.8287	5824.0907	5824.2436	5823.7564
30	5745	5744.2523	5744.5006	5744.5575	5744.1341
	5785	5784.8962	5783.3813	5783.7408	5784.6093
	5825	5824.8480	5823.0308	5824.2447	5824.5384
40	5745	5744.2574	5744.0942	5743.7982	5744.4894
	5785	5783.4429	5784.2789	5784.5524	5784.9325
	5825	5824.2645	5824.9945	5824.8395	5824.2491
50	5745	5743.4549	5744.0568	5744.5678	5744.7525
	5785	5783.2331	5784.7478	5784.7202	5784.1743
	5825	5823.9285	5824.3686	5824.0987	5824.0676
Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5745	5743.9528	5744.0659	5743.5211	5743.6578
	5785	5783.3496	5784.0114	5784.0955	5784.2434
	5825	5823.1869	5823.5849	5823.7384	5823.5114
120	5745	5743.7894	5744.9610	5743.7445	5743.4438
	5785	5783.4962	5783.5416	5783.0821	5783.6904
	5825	5824.7701	5824.6736	5824.2410	5823.3051
132	5745	5744.8124	5744.8283	5743.1231	5744.0488
	5785	5783.3829	5784.8578	5783.2288	5784.4835
	5825	5824.3453	5823.7694	5823.1854	5823.2422

Note: The worst case in MIMO mode is FL=5743.1231MHz, FH=5824.8480MHz

ANT 2

802.11a					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5743.4164	5743.8258	5744.2687	5744.1295
	5785	5784.8216	5784.4330	5783.5911	5784.3350
	5825	5824.6582	5823.7401	5824.3976	5824.4201
-20	5745	5744.4902	5744.3489	5744.4798	5744.5141
	5785	5783.2844	5783.8328	5784.8549	5784.7770
	5825	5824.7328	5823.4870	5824.0544	5824.7670
-10	5745	5743.2049	5743.4402	5744.3589	5744.2324
	5785	5783.4403	5784.6484	5784.6639	5784.6612
	5825	5823.5909	5824.6490	5824.0535	5824.0544
0	5745	5744.5722	5743.2693	5744.8984	5744.3458
	5785	5784.3121	5784.9804	5784.2672	5783.0557
	5825	5824.6763	5824.2783	5824.6627	5824.0597
10	5745	5743.7852	5744.5079	5744.4624	5744.3583
	5785	5784.5917	5783.1020	5784.0271	5784.1516
	5825	5824.5566	5824.6078	5824.4377	5824.0734
20	5745	5744.7602	5744.4995	5744.6469	5744.7486
	5785	5783.8992	5783.6710	5783.0863	5783.2787
	5825	5823.7985	5824.8032	5823.3436	5823.0524
30	5745	5743.1024	5743.0792	5743.7977	5744.3863
	5785	5783.5563	5783.0979	5784.6098	5784.4405
	5825	5823.2437	5823.4387	5824.0896	5824.9986
40	5745	5744.0805	5744.5016	5744.1861	5744.0160
	5785	5784.5939	5783.3891	5784.0664	5784.5571
	5825	5823.6589	5823.9325	5824.6437	5824.2236
50	5745	5743.5778	5743.5194	5744.2515	5744.4130
	5785	5783.1596	5783.3490	5784.9956	5784.9634
	5825	5824.9052	5824.6680	5824.2114	5824.0029
Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5745	5743.5619	5743.2371	5743.5741	5743.7971
	5785	5783.3268	5783.1362	5784.7699	5783.9622
	5825	5823.6202	5823.7416	5824.6399	5824.5766
120	5745	5743.2877	5744.6633	5744.8225	5743.6653
	5785	5783.6257	5784.5210	5783.1536	5784.0816
	5825	5823.8217	5824.0274	5824.2131	5823.9294
132	5745	5743.8879	5743.2819	5743.0444	5743.7467
	5785	5784.7513	5784.1213	5783.0978	5784.3980
	5825	5823.8847	5823.8952	5824.4377	5824.8529

Note: The worst case in MIMO mode is FL=5743.0792MHz, FH=5824.9986MHz

802.11n(HT20) (MIMO)					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5746.0321	5744.6231	5743.2301	5746.1722
	5785	5786.3488	5784.5036	5784.0494	5785.8685
	5825	5825.1964	5824.9149	5824.7965	5825.5071
-20	5745	5745.9714	5744.7306	5744.0198	5745.4726
	5785	5785.3295	5784.1870	5784.9216	5785.9526
	5825	5825.2287	5824.4045	5824.4132	5825.8588
-10	5745	5745.7957	5744.5499	5744.8982	5745.4522
	5785	5785.0126	5784.2396	5784.5264	5785.2675
	5825	5825.4067	5824.3563	5824.6853	5825.0618
0	5745	5745.2145	5744.5141	5744.2428	5745.3582
	5785	5785.9254	5784.8415	5784.3974	5785.1910
	5825	5825.9623	5824.1823	5824.7502	5825.3071
10	5745	5745.0036	5744.2444	5744.0653	5745.1089
	5785	5785.3425	5784.8680	5784.4577	5785.7859
	5825	5825.0613	5824.9815	5824.6148	5825.9171
20	5745	5745.8240	5744.9379	5744.5799	5745.8999
	5785	5785.2623	5784.1142	5784.1212	5785.1161
	5825	5825.5494	5824.6582	5824.6403	5825.8024
30	5745	5745.6296	5744.6211	5744.4339	5745.8581
	5785	5785.1123	5784.6908	5784.9012	5785.2673
	5825	5825.7040	5824.1011	5824.8345	5825.2687
40	5745	5745.4745	5744.0726	5744.8474	5745.0051
	5785	5785.6747	5784.6491	5784.1088	5785.4462
	5825	5825.1506	5824.1288	5824.6321	5825.5045
50	5745	5745.9109	5744.5265	5744.2492	5745.1560
	5785	5785.2370	5784.0786	5784.0104	5785.1530
	5825	5825.1194	5824.0306	5824.9192	5825.1047

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5745	5745.3542	5745.9630	5743.9680	5744.3542
	5785	5785.3237	5785.7600	5784.1378	5784.7915
	5825	5825.8763	5825.7182	5824.1717	5824.4041
120	5745	5745.5533	5745.9579	5744.9351	5744.1602
	5785	5785.1725	5785.1033	5784.0467	5784.7845
	5825	5825.0938	5825.5552	5824.2071	5824.4988
132	5745	5745.1567	5745.2959	5744.4628	5744.6867
	5785	5785.5226	5785.2419	5784.4836	5784.7520
	5825	5825.5200	5825.1392	5824.8401	5824.7349

Note: The worst case in MIMO mode is FL=5743.2301MHz, FH=5825.9623MHz

802.11ac(HT20) (MIMO)					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5743.4476	5742.7958	5742.5163	5744.8098
	5785	5783.7577	5783.4474	5783.3548	5784.2429
	5825	5823.0611	5824.3921	5824.8846	5824.3724
-20	5745	5744.4983	5744.2540	5744.9763	5744.3231
	5785	5784.2134	5784.5934	5784.9866	5784.5378
	5825	5824.7252	5824.1802	5824.9484	5824.1051
-10	5745	5744.7197	5744.3846	5744.6172	5744.6994
	5785	5784.2880	5784.4085	5784.6091	5784.5947
	5825	5824.6942	5824.9276	5824.7545	5824.4105
0	5745	5744.5454	5744.4297	5744.5024	5744.3501
	5785	5784.9148	5784.4566	5784.7966	5784.7640
	5825	5824.6717	5824.5566	5824.7624	5824.9510
10	5745	5744.3803	5744.3048	5744.9109	5744.4724
	5785	5784.0289	5784.2715	5784.1128	5784.3431
	5825	5824.4896	5824.7435	5824.1455	5824.3616
20	5745	5744.6680	5744.3557	5744.2206	5744.9423
	5785	5784.9093	5784.2894	5784.1072	5784.4305
	5825	5824.2136	5824.6482	5824.6267	5824.3223
30	5745	5744.8067	5744.9653	5744.2538	5744.1858
	5785	5784.4194	5784.5581	5784.6233	5784.7274
	5825	5824.3870	5824.2516	5824.5907	5824.8179
40	5745	5744.9405	5744.1803	5744.0676	5744.8314
	5785	5784.6395	5784.8405	5784.7679	5784.7463
	5825	5824.3293	5824.6223	5824.7091	5824.2124
50	5745	5744.6983	5744.4397	5744.9237	5744.3904
	5785	5784.4802	5784.8356	5784.6221	5784.1746
	5825	5824.5998	5824.0806	5824.4182	5824.4060

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5745	5744.3156	5743.5572	5745.5648	5747.1131
	5785	5784.6606	5783.0472	5785.6811	5786.0439
	5825	5824.7313	5823.1723	5825.2748	5826.8013
120	5745	5744.9800	5744.3935	5745.6712	5745.5164
	5785	5784.3732	5784.1479	5785.8496	5785.5518
	5825	5824.4165	5824.1039	5825.0080	5825.7429
132	5745	5744.8863	5744.1281	5745.3532	5745.1958
	5785	5784.4323	5784.7762	5785.0529	5785.4784
	5825	5824.5383	5824.8274	5825.3178	5825.8423

Note: The worst case in MIMO mode is FL=574.4476MHz, FH=5826.8013MHz

802.11n(HT40) (MIMO)					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5755	5755.5083	5754.7011	5753.7775	5756.1505
	5795	5795.3902	5794.6841	5793.3388	5796.2516
-20	5755	5755.9156	5754.7775	5753.9281	5755.1257
	5795	5795.0071	5794.7495	5793.1777	5795.0546
-10	5755	5755.4976	5754.9180	5754.5892	5755.5810
	5795	5795.6045	5794.7490	5794.7338	5795.4490
0	5755	5755.5817	5754.1598	5754.4637	5755.4987
	5795	5795.3430	5794.9726	5794.4367	5795.9669
10	5755	5755.7718	5754.7561	5754.7712	5755.0119
	5795	5795.9985	5794.3271	5794.4389	5795.7603
20	5755	5755.8838	5754.2319	5754.5188	5755.1075
	5795	5795.9057	5794.3775	5794.6778	5795.7042
30	5755	5755.3315	5754.7775	5754.3341	5755.7014
	5795	5795.8379	5794.4202	5794.9215	5795.5008
40	5755	5755.3796	5754.5460	5754.4376	5755.5686
	5795	5795.6658	5794.0970	5794.4896	5795.3580
50	5755	5755.6849	5754.3079	5754.9898	5755.8844
	5795	5795.4633	5794.6307	5794.5900	5795.2476

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5755	5756.6520	5754.4189	5755.8541	5754.6644
	5795	5796.8265	5794.2712	5795.6654	5794.7569
120	5755	5755.3358	5754.0064	5755.8474	5754.9823
	5795	5795.4761	5794.4925	5795.8171	5794.4061
132	5755	5755.9171	5754.0829	5755.6160	5754.6347
	5795	5795.0863	5794.8919	5795.3694	5794.3954

Note: The worst case in MIMO mode is FL=5753.7775MHz, FH=5796.8265MHz

802.11ac(HT40) (MIMO)					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5755	5756.2796	5754.6376	5755.9485	5754.4091
	5795	5795.2206	5794.6619	5795.4374	5794.0915
-20	5755	5755.2854	5754.4673	5755.7700	5754.9446
	5795	5795.2492	5794.8477	5795.0178	5794.8350
-10	5755	5755.7207	5754.5281	5755.7597	5754.0076
	5795	5795.9526	5794.4495	5795.0067	5794.4291
0	5755	5755.7509	5754.0030	5755.0503	5754.3974
	5795	5795.3610	5794.5530	5795.7075	5794.3195
10	5755	5755.0795	5754.9147	5755.6853	5754.2414
	5795	5795.9811	5794.6236	5795.6474	5794.3591
20	5755	5755.0022	5754.7769	5755.3960	5754.4976
	5795	5795.2115	5794.9962	5795.3900	5794.2797
30	5755	5755.9180	5754.2961	5755.8284	5754.9575
	5795	5795.8105	5794.9920	5795.0353	5794.6390
40	5755	5755.7823	5754.9237	5755.8533	5754.8416
	5795	5795.7808	5794.4179	5795.0515	5794.7745
50	5755	5755.5987	5754.7620	5755.3541	5754.6849
	5795	5795.3620	5794.9352	5795.4563	5794.7278

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5755	5755.6955	5754.3718	5756.5217	5754.2352
	5795	5795.9567	5794.3860	5795.4991	5794.9229
120	5755	5755.1880	5754.5847	5755.1018	5754.0533
	5795	5795.1670	5794.3336	5795.6172	5794.5398
132	5755	5755.6407	5754.7893	5755.9473	5754.4046
	5795	5795.1646	5794.6572	5795.6910	5794.9808

Note: The worst case in MIMO mode is FL=5754.9575MHz, FH=5795.9811MHz

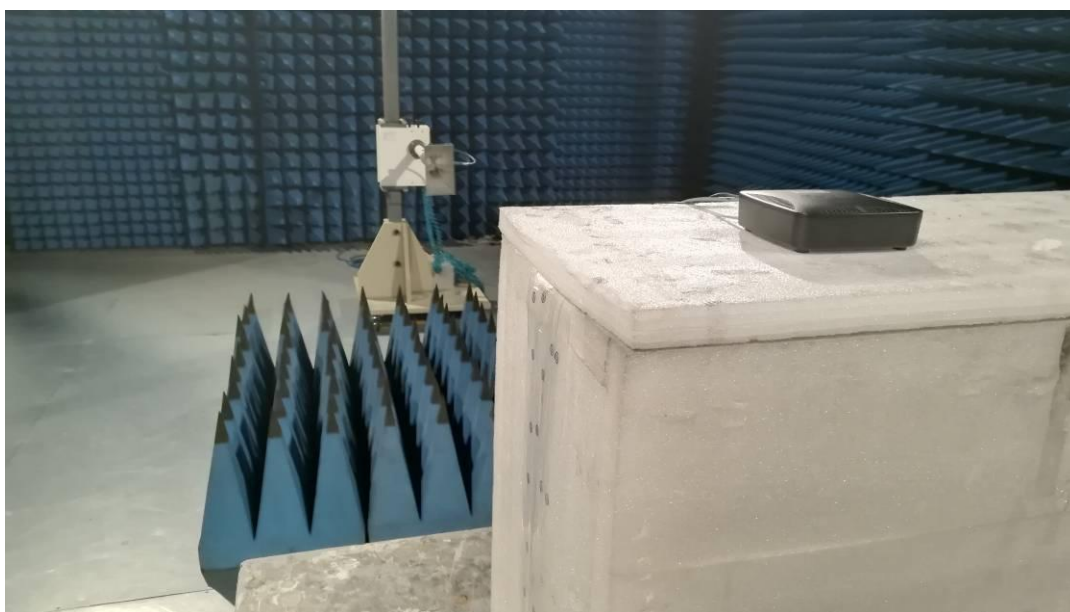
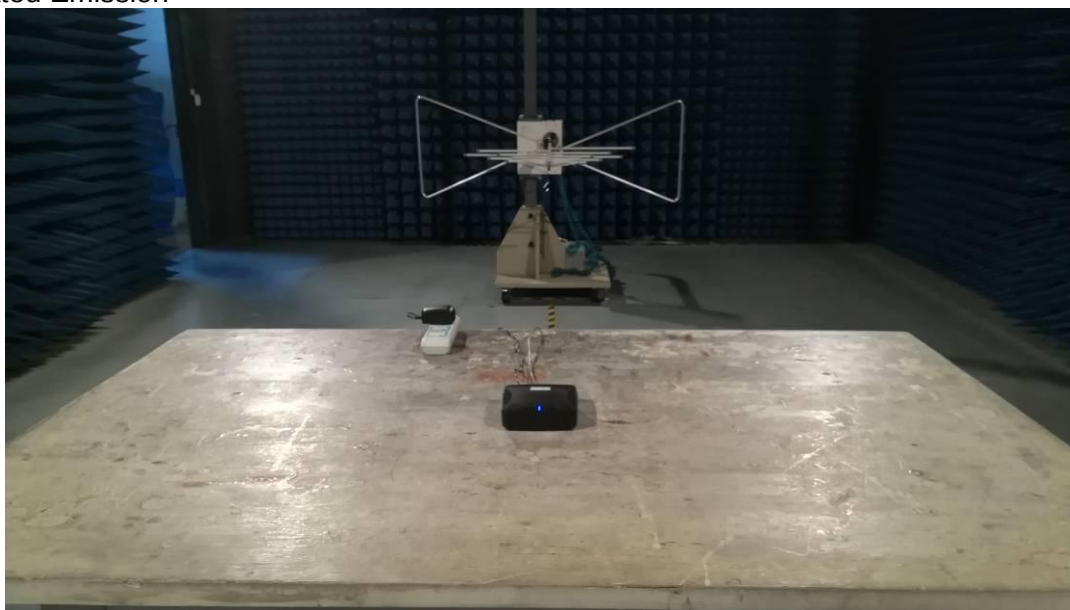
802.11ac(HT80)(MIMO)					
Frequency stability versus Temp.					
Power Supply: AC120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5775	5775.7476	5775.5829	5773.5947	5774.8656
-20	5775	5775.8689	5775.7208	5774.3385	5774.4904
-10	5775	5775.3935	5775.3415	5774.0378	5774.1550
0	5775	5775.7071	5775.0344	5774.8413	5774.7147
10	5775	5775.5849	5775.1268	5774.3425	5774.3690
20	5775	5775.1355	5775.0517	5774.8082	5774.4162
30	5775	5775.5758	5775.9507	5774.5810	5774.4925
40	5775	5775.1846	5775.2201	5774.7227	5774.5681
50	5775	5775.9781	5775.5341	5774.9905	5774.3938

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
108	5775	5773.8225	5776.1104	5775.0711	5775.0426
120	5775	5774.9326	5775.4284	5776.4234	5775.7647
132	5775	5774.7537	5775.6675	5776.9075	5776.6786

Note: The worst case in MIMO mode is FL=5774.0378MHz, FH=5776.9075MHz

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201801000072F01

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