MEASUREMENT REPORT
FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID: O9C-BJNGAFB0008

APPLICANT: Hewlett Packard Company

Application Type: Certification
Product: Wireless LAN Access Point
Model No.: BJNGA-FB0008, JH306A
Brand Name: HP
FCC Classification: Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s): Part 15.407
Test Procedure(s): ANSI C63.10-2013, KDB 789033 D02v01,
KDB 662911 D01v02r01, KDB 644545 D03v01
KDB 662911 D02v01
Test Date: Mar.16 ~ May. 29, 2015

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v01. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date
1503RSU02002	Rev. 01	Initial report	06-01-2015

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§2.1033 General Information

Applicant:	Hewlett Packard Company
Applicant Address:	153 Taylor Street Littleton Massachusetts, United States 01460-1407
Manufacturer:	Hewlett Packard Company
Manufacturer Address:	153 Taylor Street Littleton Massachusetts, United States 01460-1407
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT FCC Registration No.:	809388
FCC Rule Part(s):	Part 15.407
Model No.:	BJNGA-FB0008, JH306A
FCC ID:	O9C-BJNGAFB0008
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communique dated 9 January 2009*).

Presented this 17th day of June 2014.

President & CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2016

For the term to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

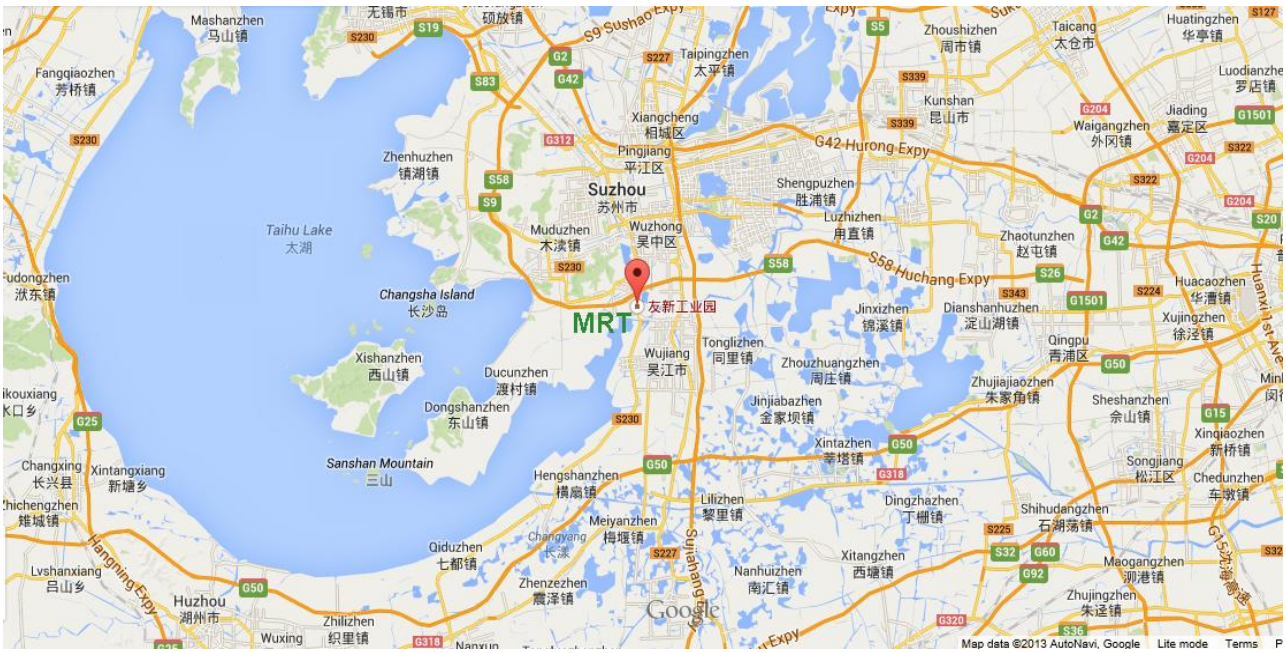
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Wireless LAN Access Point
Model No.	BJNGA-FB0008, JH306A
Power Type	POE input
Frequency Range	For 802.11a/n-HT20: 5180~5320MHz, 5500~5700MHz, 5745~5825MHz For 802.11ac-VHT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40: 5190~5310MHz, 5510~5670MHz, 5755~5795MHz For 802.11ac-VHT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
Maximum Output Power	802.11a: 28.50dBm 802.11n-HT20: 28.28dBm 802.11n-HT40: 27.90dBm 802.11ac-VHT20: 28.36dBm 802.11ac-VHT40: 27.86dBm 802.11ac-VHT80: 23.55dBm
Type of Modulation	802.11a/n/ac: OFDM

2.2. Operation Frequency / Channel list

802.11a/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

802.11ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	144	5720 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	--	--	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
151	5755 MHz	159	5795 MHz	--	--

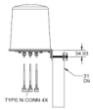
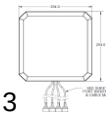
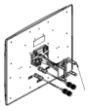
802.11ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
142	5710 MHz	151	5755 MHz	159	5795 MHz

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz
122	5610 MHz	138	5690 MHz	155	5775 MHz

2.3. Description of Available Antennas

Antenna No.	Frequency Band (GHz)	Operation Mode	Product Number	Tx Paths	Max Peak Gain (dBi)	> 30 Degree Peak Gain (dBi)	Directional Gain (dBi)	
							For Power	For PSD
1	2.4	Indoor P-T-MP	JG696A	2	3.83	---	3.83	6.84
	5			2	5.69	---	5.69	8.70
 2	2.4	Outdoor P-T-MP	JL195A	2	6.70	---	6.70	9.71
	5			2	10.70	-2.0	10.70	13.71
 3	2.4	Outdoor P-T-MP	JL193A	2	8.80	---	8.80	8.80
	5			2	8.90	7.0	8.90	8.90
 4	2.4	Outdoor P-T-P	JL194A	2	11.50	---	11.50	11.50
	5			2	15.60	---	15.60	15.60

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

   For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.

   1) If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

   - For power spectral density (PSD) measurements on all devices,
     Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;
   - For power measurements on IEEE 802.11 devices,
     Array Gain = 0 dB for N_{ANT} ≤ 4;

   2) If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:

   - Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;
   - $$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

2. The antenna 3# and antenna 4# belong to cross-polarized antenna (horizontal and vertical polarizations) refer to antenna specification. According to 662911 D02 MIMO with Cross-Polarized Antennas v01, directional gain is the gain of an individual antenna.

2.4. Description of Antenna RF Port

Antenna RF Port				
--	2.4GHz RF Port		5GHz RF Port	
	2.4G-1	2.4G-2	5G-1	5G-2
Software Control Port	Ant 1	Ant 0	Ant 0	Ant 1

Antenna RF Port Plot

2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20
	Mode 3: Transmit by 802.11n-HT40
	Mode 4: Transmit by 802.11ac-VHT20
	Mode 5: Transmit by 802.11ac-VHT40
	Mode 6: Transmit by 802.11ac-VHT80

2.6. Test Software

The test utility software used during testing were “ART2-GUI Version: 2.3” and “CART Version: 4.9”. Final Power Parameter Value of the test software.

Test Mode	Test Frequency	Power Parameter Value	Test Mode	Test Frequency	Power Parameter Value
ANTENNA 1#					
802.11a	5180	22.0	802.11n-HT20	5180	22.0
	5220	23.0		5220	23.0
	5240	22.5		5240	23.0
	5260	17.0		5260	17.0
	5300	17.5		5300	16.5
	5320	17.5		5320	17.5
	5500	16.5		5500	17.0
	5600	15.5		5600	16.5
	5700	16.0		5700	16.0
	5745	20.0		5745	21.5
	5785	24.0		5785	24.0
	5825	24.0		5825	23.0
802.11ac-VHT20	5180	23.0	802.11n-HT40	5190	19.0
	5220	23.0		5230	24.0
	5240	22.5		5270	20.0
	5260	17.0		5310	20.0
	5300	17.0		5510	19.5
	5320	17.0		5590	19.5
	5500	16.5		5670	19.5
	5600	16.0		5755	21.0
	5700	16.0		5795	24.0
	5720	16.0	802.11ac-VHT40	5190	20.0
	5745	22.0		5230	24.0
	5785	24.0		5270	20.0
	5825	24.0		5310	20.0
802.11ac-VHT80	5210	19.0		5510	19.0
	5290	15.5		5590	19.5
	5530	15.0		5670	19.5
	5610	20.5		5710	18.5

	5690	20.0		5755	21.0
	5775	16.5		5795	24.0
ANTENNA 2#					
802.11a	5180	18.0	802.11n-HT20	5180	17.5
	5220	18.0		5220	18.0
	5240	18.0		5240	18.0
	5260	12.5		5260	12.5
	5300	12.5		5300	12.0
	5320	12.0		5320	12.5
	5500	12.0		5500	12.0
	5600	11.5		5600	12.0
	5700	10.5		5700	11.5
	5745	19.0		5745	18.0
	5785	21.5		5785	21.5
	5825	20.5		5825	20.5
802.11ac-VHT20	5180	17.0	802.11n-HT40	5190	17.0
	5220	18.5		5230	18.5
	5240	19.0		5270	15.5
	5260	12.5		5310	15.0
	5300	12.5		5510	14.5
	5320	12.5		5590	15.0
	5500	12.0		5670	14.5
	5600	12.0		5755	17.5
	5700	11.5		5795	21.5
	5720	11.5	802.11ac-VHT40	5190	17.5
	5745	18.5		5230	18.5
	5785	21.5		5270	15.5
	5825	18.0		5310	15.0
802.11ac-VHT80	5210	11.0		5510	14.5
	5290	5.5		5590	14.5
	5530	10.5		5670	15.0
	5610	15.5		5710	14.0
	5690	16.5		5755	16.5
	5775	11.5		5795	21.5

ANTENNA 3#					
802.11a	5180	10.5	802.11n-HT20	5180	10.5
	5220	10.5		5220	11
	5240	10.5		5240	11
	5260	16.0		5260	16.5
	5300	16.0		5300	16.0
	5320	16.0		5320	16.0
	5500	15.5		5500	15.5
	5600	15.0		5600	15.5
	5700	14.5		5700	15.0
	5745	20.0		5745	21.0
	5785	23.5		5785	23.5
	5825	23.5		5825	23.5
802.11ac-VHT20	5180	11	802.11n-HT40	5190	10.5
	5220	11		5230	10.5
	5240	10.5		5270	17.5
	5260	16.5		5310	17.5
	5300	16.5		5510	17.5
	5320	16.0		5590	17.5
	5500	15.5		5670	17.5
	5600	15.5		5755	18.5
	5700	15.0		5795	23.5
	5720	15.0	802.11ac-VHT40	5190	10.5
	5745	20.5		5230	10.5
	5785	23.5		5270	17.5
	5825	23.5		5310	17.5
802.11ac-VHT80	5210	11.0		5510	17.5
	5290	13.5		5590	17.5
	5530	12.0		5670	17.5
	5610	18.0		5710	17.5
	5690	18.0		5755	17.5
	5775	13.0		5795	23.5
ANTENNA 4#					
802.11a	5180	14.0	802.11n-HT20	5180	15.5
	5220	21.0		5220	21.0
	5240	23.0		5240	23.5

	5260	10.5		5260	10.0
	5300	10.0		5300	10.5
	5320	10.0		5320	10.0
	5500	9.5		5500	10.0
	5600	9.0		5600	9.5
	5700	8.5		5700	9.0
	5745	19.0		5745	18.5
	5785	24.0		5785	24.0
	5825	22.0		5825	22.0
802.11ac-VHT20	5180	15.5	802.11n-HT40	5190	14.0
	5220	16.0		5230	20.5
	5240	16.0		5270	11.0
	5260	10.0		5310	11.0
	5300	10.0		5510	11.0
	5320	10.0		5590	10.5
	5500	9.5		5670	10.5
	5600	9.5		5755	15.5
	5700	9.0		5795	24.0
	5720	9.0	802.11ac-VHT40	5190	14.0
	5745	18.0		5230	18.0
	5785	24.0		5270	11.0
	5825	22.0		5310	11.0
802.11ac-VHT80	5210	5.5		5510	11.0
	5290	5.5		5590	11.0
	5530	5.5		5670	10.5
	5610	11.0		5710	10.5
	5690	11.0		5755	16.0
	5775	11.0		5795	24.0

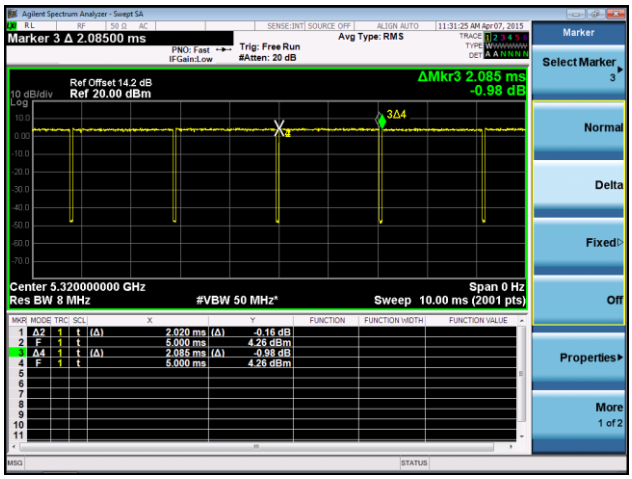
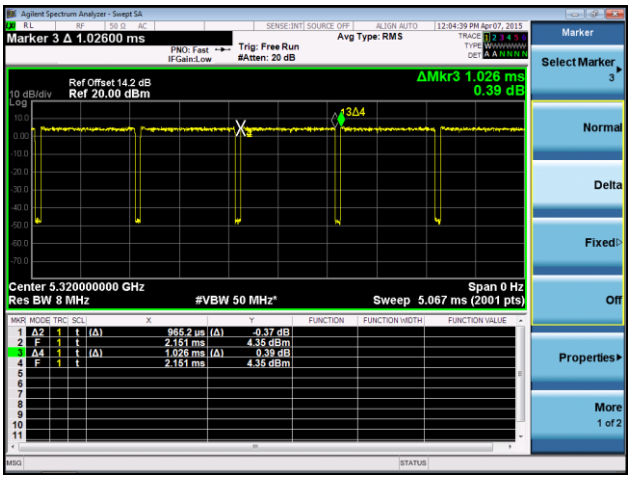
2.7. Device Capabilities

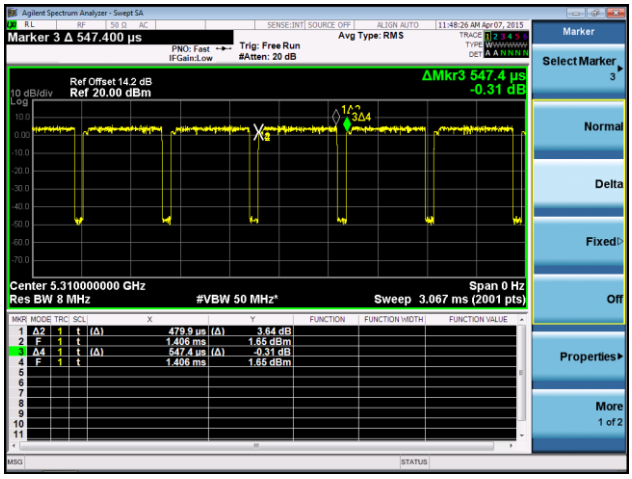
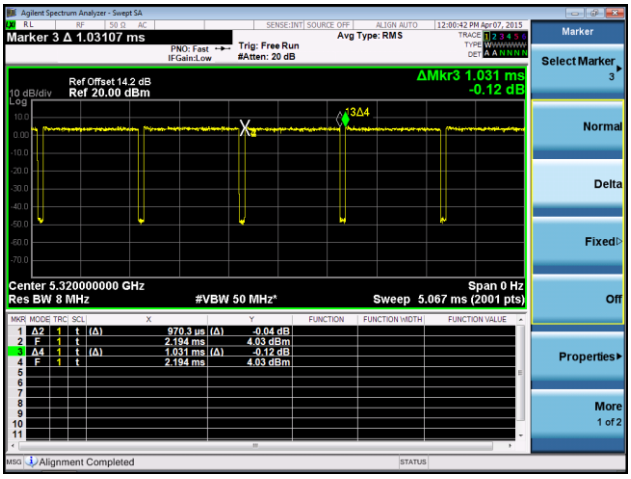
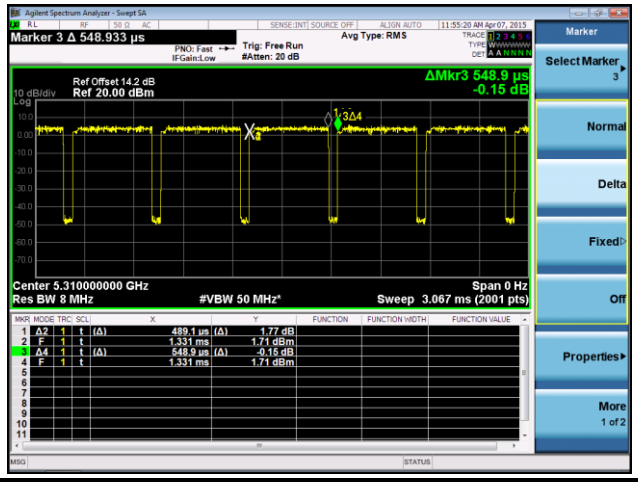
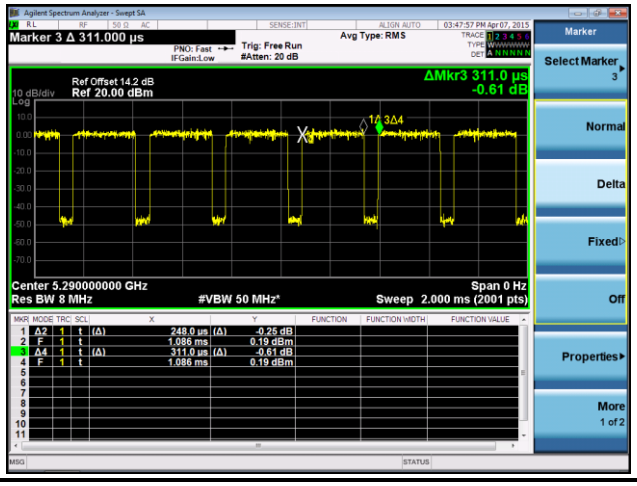
This device contains the following capabilities:

2.4GHz WLAN (DTS) and 5GHz WLAN (UNII).

Note: 5GHz (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = average per the guidance of Section B)2)b) of KDB 789033 D02v01. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11a	97.1%
802.11n-HT20	93.6%
802.11n-HT40	89.6%
802.11ac-VHT20	94.3%
802.11ac-VHT40	89.6%
802.11ac-VHT80	81.8%

802.11a – Duty Cycle	802.11n-HT20 – Duty Cycle
	

802.11n-HT40 – Duty Cycle	802.11ac-VHT20 – Duty Cycle
	
802.11ac-VHT40 – Duty Cycle	**802.11ac-VHT80 – Duty Cycle**
	

2.8. Test Configuration

The **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0008** was tested per the guidance of KDB 789033 D02v01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v01 were used in the measurement of the **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0008.**
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.
Line conducted emissions test results are shown in Section 7.10.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section."

Conclusion:

The **Wireless LAN Access Point FCC ID: O9C-BJNGAFB0008** unit belongs to the professional installation of equipment, and doesn't need to comply with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2015/11/07
Temperature/ Meter Humidity	Anymetre	TH101B	MRTSUE06045	1 year	2015/11/14

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MRTSUE06028	1 year	2015/10/09
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2015/11/07
Preamplifier	MRT	AP18G40	MRTSUE06020	1 year	2015/10/06
Preamplifier	Agilent	83017A	MRTSUE06019	1 year	2015/12/13
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2015/11/08
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2015/11/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2015/11/08
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2016/01/05
Temperature/Humidity Meter	Anymetre	TH101B	MRTSUE06048	1 year	2015/11/14

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/04/23
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2015/10/15
Temperature/Humidity Meter	Anymetre	TH101B	MRTSUE06046	1 year	2015/11/14

6. MEASUREMENT UNCERTAINTY

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

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 40GHz: 4.76dB

7. TEST RESULT

7.1. Summary

Company Name: **Hewlett Packard Company**

FCC ID: **O9C-BJNGAFB0008**

FCC Classification: **Unlicensed National Information Infrastructure (UNII)**

Data Rate(s) Tested: **6Mbps ~ 54Mbps (a);**
13/14.4Mbps ~ 130/144.4Mbps (n-HT20MHz BW);
27/30Mbps ~ 270/300Mbps (n-HT40MHz BW);
13/14.4Mbps ~ 156/173.4Mbps (ac-VHT20MHz BW);
27/30Mbps ~ 360/400Mbps (ac-VHT40MHz BW);
58.6/65Mbps ~ 780/866.6Mbps (ac-VHT80MHz BW)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	≥ 500kHz		Pass	Section 7.3
15.407(a)(1)(ii), (2), (3)	Maximum Conducted Output Power	≤ 30 dBm U-NII-1 ≤ 24 dBm U-NII-2A ≤ 24 dBm U-NII-2C ≤ 30 dBm U-NII-3		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		Pass	Section 7.5
15.407(a)(1)(ii), (2), (3), (5)	Peak Power Spectral Density	≤ 17 dBm/MHz U-NII-1 ≤ 11 dBm/MHz U-NII-2A ≤ 11 dBm/MHz U-NII-2C ≤ 30 dBm/500kHz U-NII-3		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(1), (2), (3), (4)	Undesirable Emissions	≤ -27dBm/MHz EIRP ≤ -17dBm/MHz EIRP	Radiated	Pass	Section 7.8 & 7.9
15.205, 15.209 15.407(b)(5), (6), (7)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.10

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 26dB Bandwidth Measurement

7.2.1. Test Limit

N/A

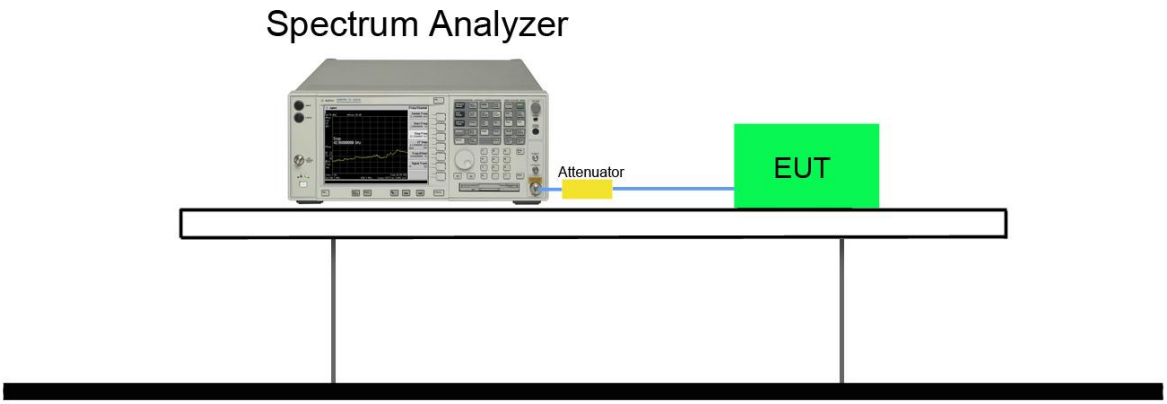
7.2.2. Test Procedure used

KDB 789033 D02v01 – Section C.1

7.2.3. Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4. Test Setup



7.2.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Ant 0 / Ant 0 + 1						
802.11a	6	36	5180	23.18	16.80	Pass
802.11a	6	44	5220	23.60	16.79	Pass
802.11a	6	48	5240	24.13	16.80	Pass
802.11a	6	52	5260	24.07	16.84	Pass
802.11a	6	60	5300	23.85	16.84	Pass
802.11a	6	64	5320	24.81	17.95	Pass
802.11a	6	100	5500	24.24	16.88	Pass
802.11a	6	120	5600	24.72	16.86	Pass
802.11a	6	140	5700	23.65	16.86	Pass
802.11a	6	149	5745	23.91	16.82	Pass
802.11a	6	157	5785	23.53	16.82	Pass
802.11a	6	165	5825	23.62	16.79	Pass
802.11n-HT20	13	36	5180	24.74	17.95	Pass
802.11n-HT20	13	44	5220	24.64	17.92	Pass
802.11n-HT20	13	48	5240	23.79	17.90	Pass
802.11n-HT20	13	52	5260	24.82	17.90	Pass
802.11n-HT20	13	60	5300	25.01	17.96	Pass
802.11n-HT20	13	64	5320	25.04	17.94	Pass
802.11n-HT20	13	100	5500	24.62	17.93	Pass
802.11n-HT20	13	120	5600	24.62	17.94	Pass
802.11n-HT20	13	140	5700	24.89	17.94	Pass
802.11n-HT20	13	149	5745	24.76	17.90	Pass
802.11n-HT20	13	157	5785	24.54	17.93	Pass
802.11n-HT20	13	165	5825	25.13	17.87	Pass
802.11n-HT40	27	38	5190	47.34	36.57	Pass
802.11n-HT40	27	46	5230	45.91	36.50	Pass
802.11n-HT40	27	54	5270	47.23	36.52	Pass
802.11n-HT40	27	62	5310	46.87	36.48	Pass
802.11n-HT40	27	102	5510	48.64	36.58	Pass
802.11n-HT40	27	118	5590	49.45	36.59	Pass
802.11n-HT40	27	134	5670	48.59	36.50	Pass
802.11n-HT40	27	151	5755	46.17	36.55	Pass

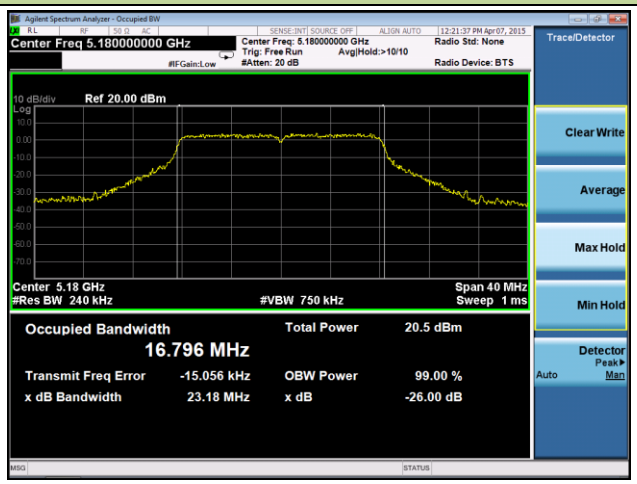
802.11n-HT40	27	159	5795	48.73	36.54	Pass
802.11ac-VHT20	13	36	5180	23.66	17.80	Pass
802.11ac-VHT20	13	44	5220	23.54	17.91	Pass
802.11ac-VHT20	13	48	5240	24.07	17.88	Pass
802.11ac-VHT20	13	52	5260	25.07	17.94	Pass
802.11ac-VHT20	13	60	5300	24.44	17.95	Pass
802.11ac-VHT20	13	64	5320	24.60	17.92	Pass
802.11ac-VHT20	13	100	5500	25.69	17.94	Pass
802.11ac-VHT20	13	120	5600	24.45	17.90	Pass
802.11ac-VHT20	13	140	5700	24.31	17.90	Pass
802.11ac-VHT20	13	144	5720	24.51	17.86	Pass
802.11ac-VHT20	13	149	5745	24.26	17.90	Pass
802.11ac-VHT20	13	157	5785	23.86	17.90	Pass
802.11ac-VHT20	13	165	5825	23.86	17.86	Pass
802.11ac-VHT40	27	38	5190	46.57	36.42	Pass
802.11ac-VHT40	27	46	5230	45.83	36.40	Pass
802.11ac-VHT40	27	54	5270	47.23	36.45	Pass
802.11ac-VHT40	27	62	5310	47.57	36.39	Pass
802.11ac-VHT40	27	102	5510	48.86	36.50	Pass
802.11ac-VHT40	27	118	5590	47.57	36.46	Pass
802.11ac-VHT40	27	134	5670	48.53	36.46	Pass
802.11ac-VHT40	27	142	5710	48.36	36.46	Pass
802.11ac-VHT40	27	151	5755	47.35	36.42	Pass
802.11ac-VHT40	27	159	5795	46.06	36.44	Pass
802.11ac-VHT80	58.6	42	5210	89.47	75.94	Pass
802.11ac-VHT80	58.6	58	5290	91.07	75.93	Pass
802.11ac-VHT80	58.6	106	5530	91.77	75.95	Pass
802.11ac-VHT80	58.6	122	5610	94.20	76.03	Pass
802.11ac-VHT80	58.6	138	5690	92.29	75.94	Pass
802.11ac-VHT80	58.6	155	5775	88.66	75.77	Pass

Ant 1 / Ant 0 + 1						
802.11a	6	36	5180	23.55	16.75	Pass
802.11a	6	44	5220	23.31	16.71	Pass
802.11a	6	48	5240	23.26	16.72	Pass
802.11a	6	52	5260	23.24	16.75	Pass
802.11a	6	60	5300	23.89	16.80	Pass
802.11a	6	64	5320	23.93	16.82	Pass
802.11a	6	100	5500	23.49	16.81	Pass
802.11a	6	120	5600	24.51	16.80	Pass
802.11a	6	140	5700	23.68	16.79	Pass
802.11a	6	149	5745	23.44	16.71	Pass
802.11a	6	157	5785	23.52	16.76	Pass
802.11a	6	165	5825	23.62	16.75	Pass
802.11n-HT20	13	36	5180	23.03	17.82	Pass
802.11n-HT20	13	44	5220	23.33	17.82	Pass
802.11n-HT20	13	48	5240	23.10	17.80	Pass
802.11n-HT20	13	52	5260	24.04	17.83	Pass
802.11n-HT20	13	60	5300	24.58	17.85	Pass
802.11n-HT20	13	64	5320	24.52	17.89	Pass
802.11n-HT20	13	100	5500	24.09	17.88	Pass
802.11n-HT20	13	120	5600	24.21	17.85	Pass
802.11n-HT20	13	140	5700	23.39	17.82	Pass
802.11n-HT20	13	149	5745	23.62	17.83	Pass
802.11n-HT20	13	157	5785	22.63	17.79	Pass
802.11n-HT20	13	165	5825	23.25	17.85	Pass
802.11n-HT40	27	38	5190	45.26	36.34	Pass
802.11n-HT40	27	46	5230	44.19	36.32	Pass
802.11n-HT40	27	54	5270	46.54	36.43	Pass
802.11n-HT40	27	62	5310	45.89	36.38	Pass
802.11n-HT40	27	102	5510	44.22	36.35	Pass
802.11n-HT40	27	118	5590	46.06	36.38	Pass
802.11n-HT40	27	134	5670	46.39	36.39	Pass
802.11n-HT40	27	151	5755	44.15	36.42	Pass
802.11n-HT40	27	159	5795	45.86	36.41	Pass
802.11ac-VHT20	13	36	5180	22.77	17.78	Pass
802.11ac-VHT20	13	44	5220	22.80	17.75	Pass

802.11ac-VHT20	13	48	5240	23.59	17.81	Pass
802.11ac-VHT20	13	52	5260	23.25	17.87	Pass
802.11ac-VHT20	13	60	5300	23.87	17.84	Pass
802.11ac-VHT20	13	64	5320	24.44	17.83	Pass
802.11ac-VHT20	13	100	5500	24.48	17.83	Pass
802.11ac-VHT20	13	120	5600	24.29	17.86	Pass
802.11ac-VHT20	13	140	5700	23.62	17.82	Pass
802.11ac-VHT20	13	144	5720	22.91	17.79	Pass
802.11ac-VHT20	13	149	5745	24.00	17.84	Pass
802.11ac-VHT20	13	157	5785	24.20	17.83	Pass
802.11ac-VHT20	13	165	5825	23.94	17.84	Pass
802.11ac-VHT40	27	38	5190	45.19	36.35	Pass
802.11ac-VHT40	27	46	5230	45.50	36.32	Pass
802.11ac-VHT40	27	54	5270	46.19	36.41	Pass
802.11ac-VHT40	27	62	5310	45.43	36.40	Pass
802.11ac-VHT40	27	102	5510	45.80	36.36	Pass
802.11ac-VHT40	27	118	5590	45.88	36.34	Pass
802.11ac-VHT40	27	134	5670	45.57	36.41	Pass
802.11ac-VHT40	27	142	5710	44.87	36.35	Pass
802.11ac-VHT40	27	151	5755	45.23	36.47	Pass
802.11ac-VHT40	27	159	5795	46.95	36.40	Pass
802.11ac-VHT80	58.6	42	5210	85.94	75.76	Pass
802.11ac-VHT80	58.6	58	5290	88.44	76.01	Pass
802.11ac-VHT80	58.6	106	5530	90.27	75.89	Pass
802.11ac-VHT80	58.6	122	5610	94.36	76.05	Pass
802.11ac-VHT80	58.6	138	5690	88.40	75.87	Pass
802.11ac-VHT80	58.6	155	5775	95.79	76.03	Pass

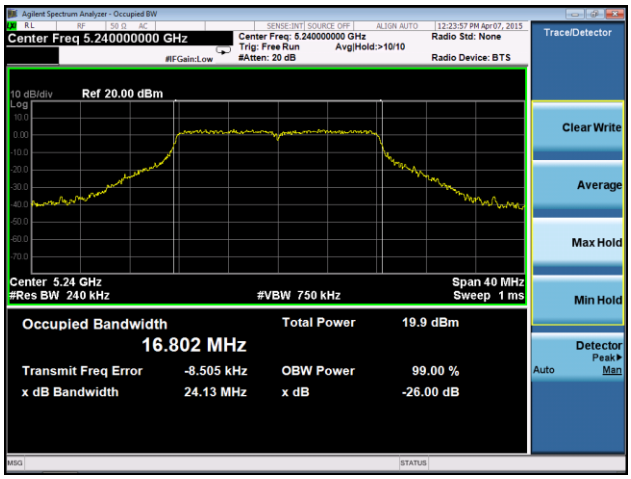
802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

Channel 36 (5180MHz)



Channel 44 (5220MHz)

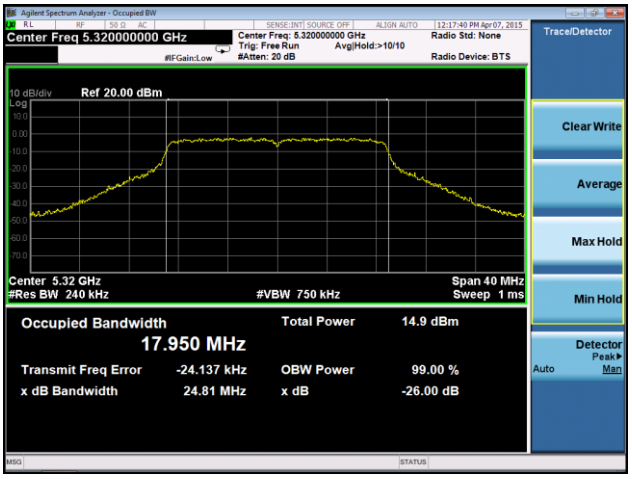
Channel 48 (5240MHz)



Channel 52 (5260MHz)

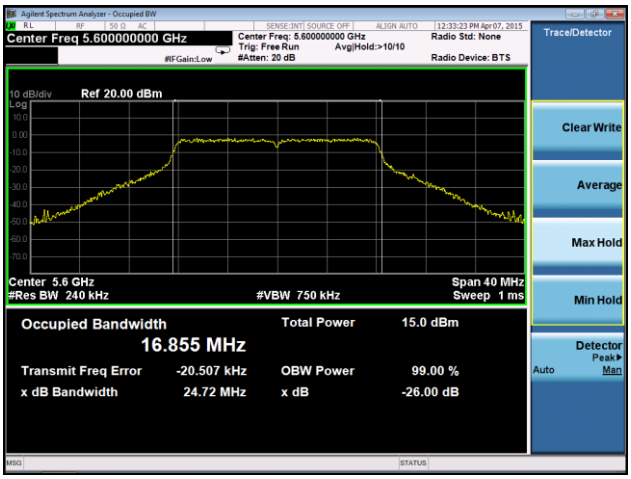
Channel 60 (5300MHz)

Channel 64 (5320MHz)



Channel 100 (5500MHz)

Channel 120 (5600MHz)



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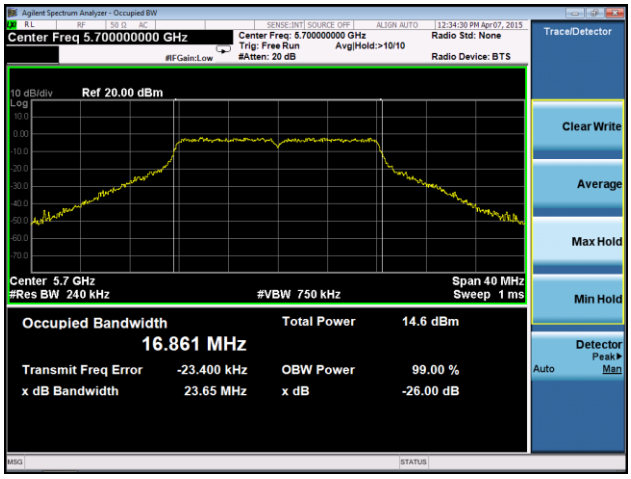
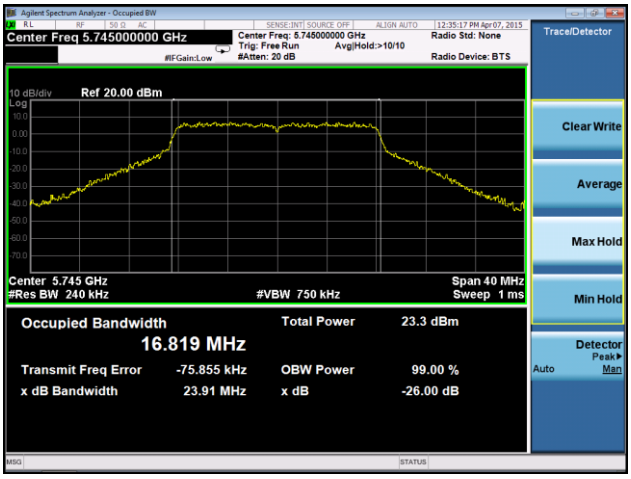
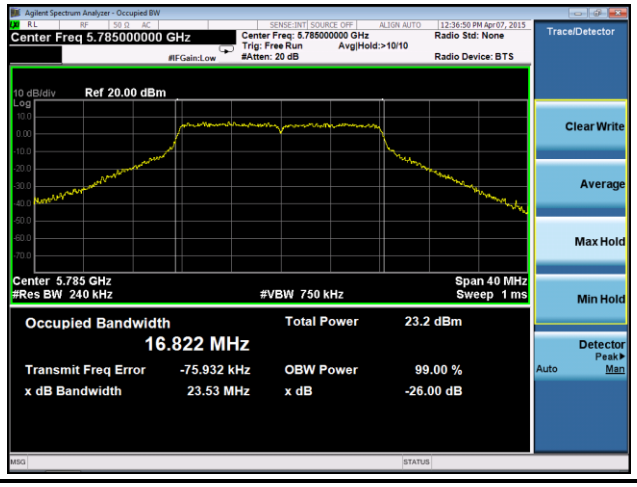


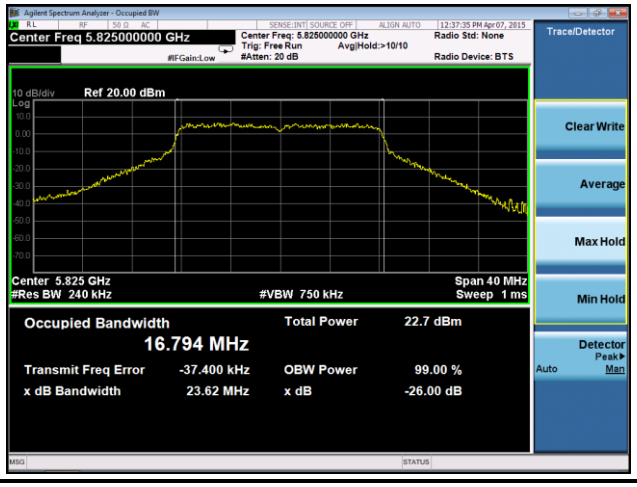
Channel 149 (5745MHz)



Channel 157 (5785MHz)

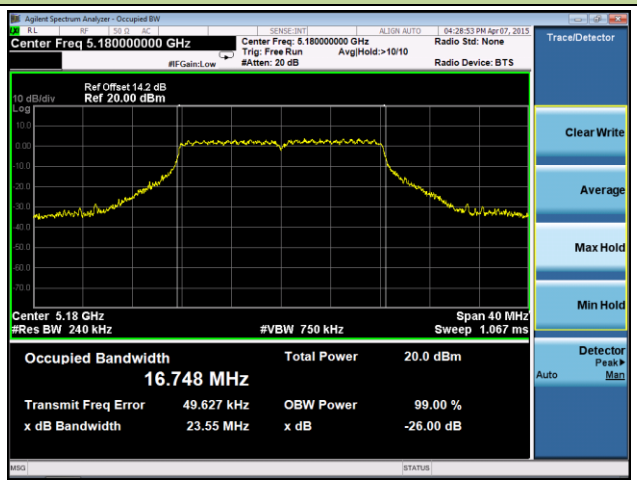


Channel 165 (5825MHz)

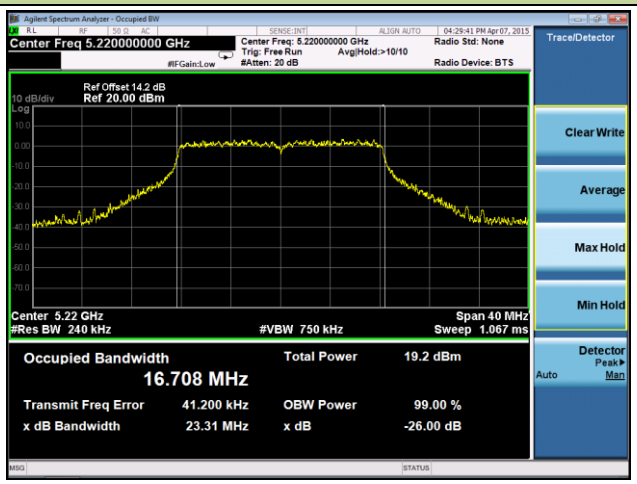


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1

Channel 36 (5180MHz)

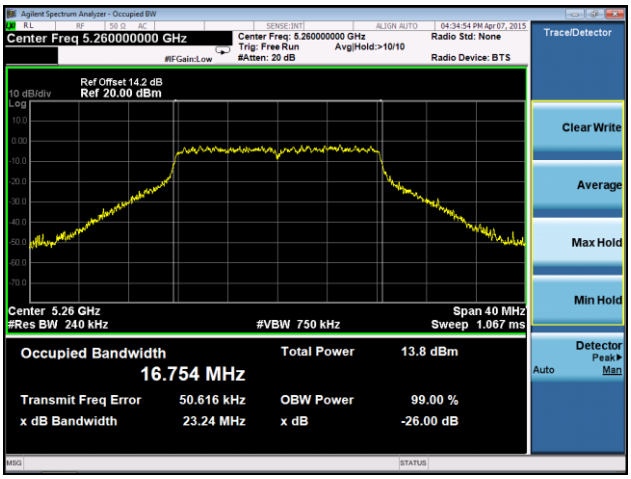


Channel 44 (5220MHz)

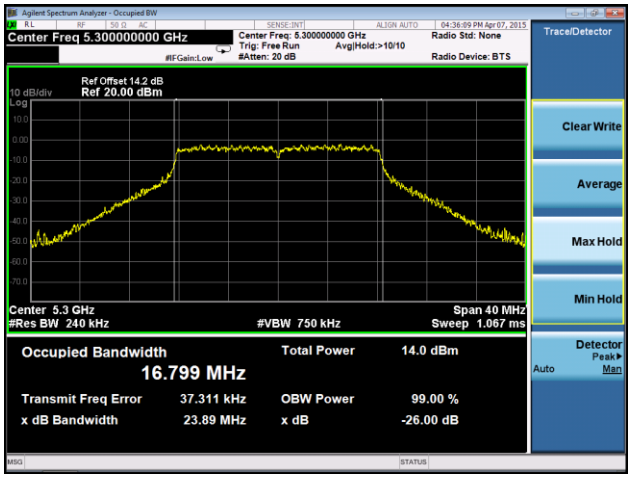


Channel 48 (5240MHz)

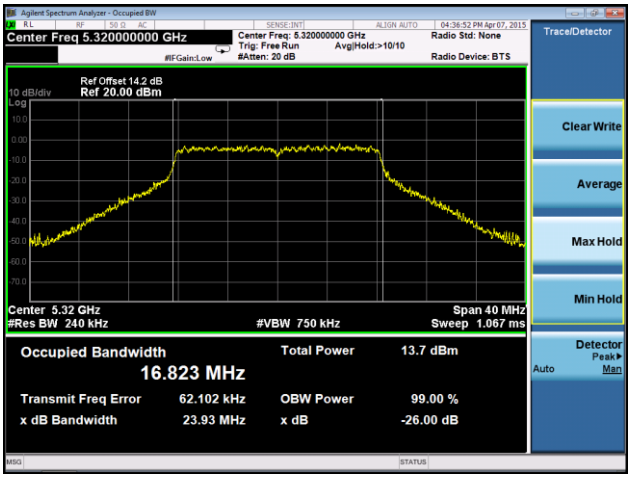
Channel 52 (5260MHz)



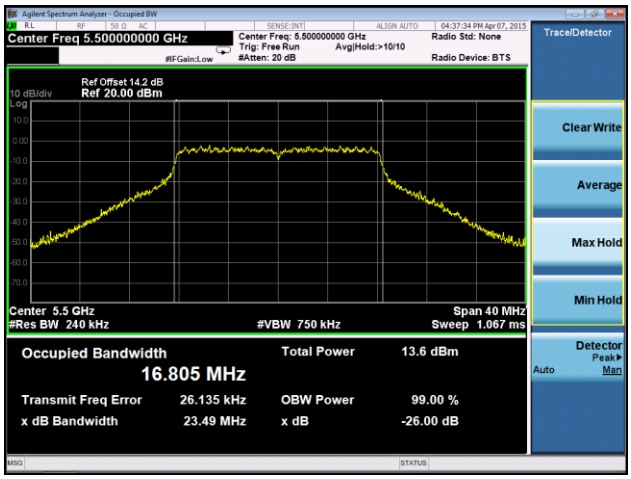
Channel 60 (5300MHz)



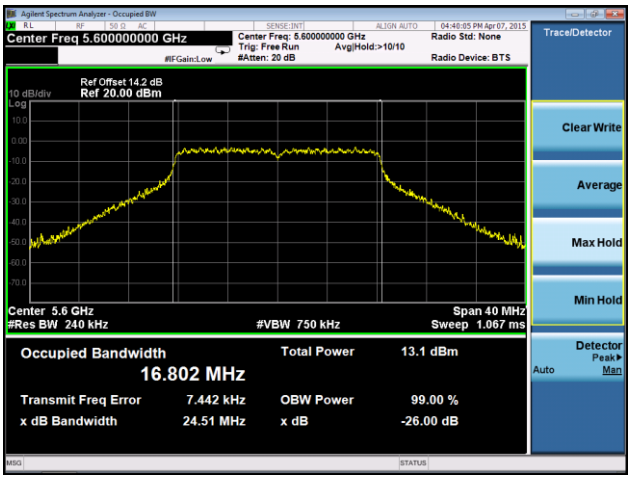
Channel 64 (5320MHz)



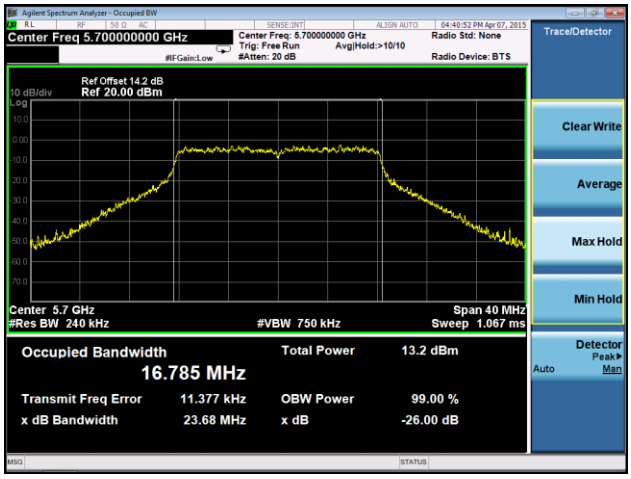
Channel 100 (5500MHz)



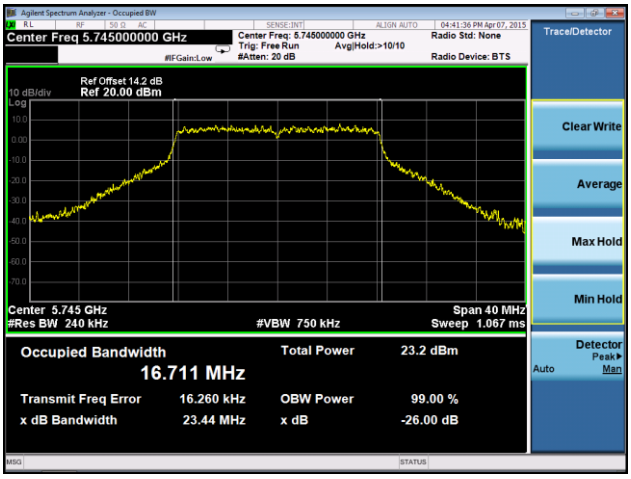
Channel 120 (5600MHz)



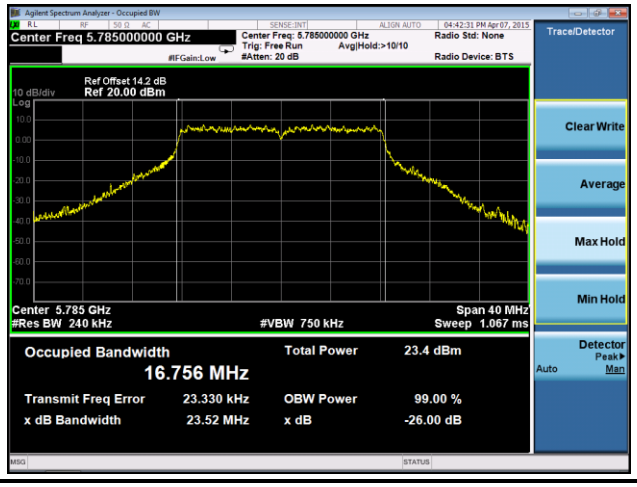
Channel 140 (5700MHz)



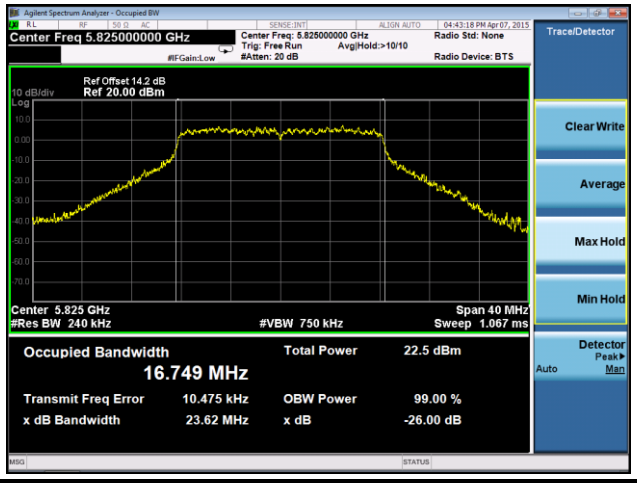
Channel 149 (5745MHz)



Channel 157 (5785MHz)

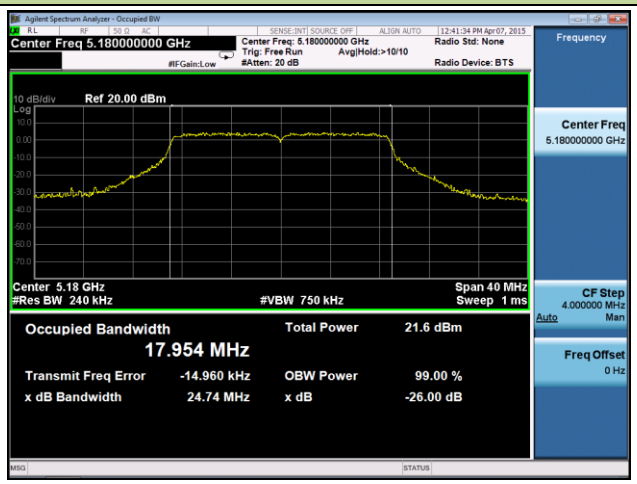


Channel 165 (5825MHz)

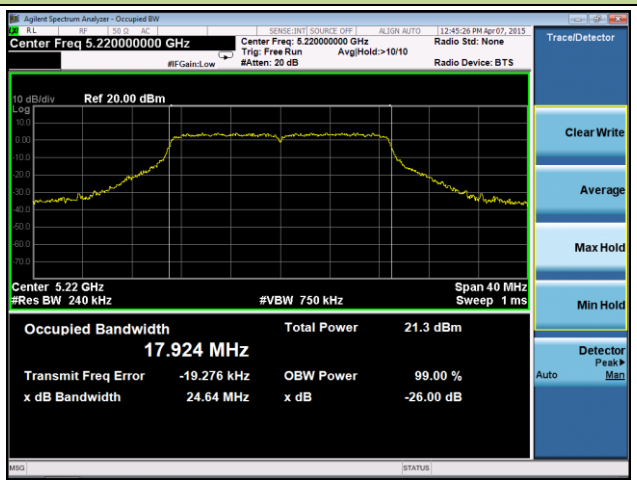


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

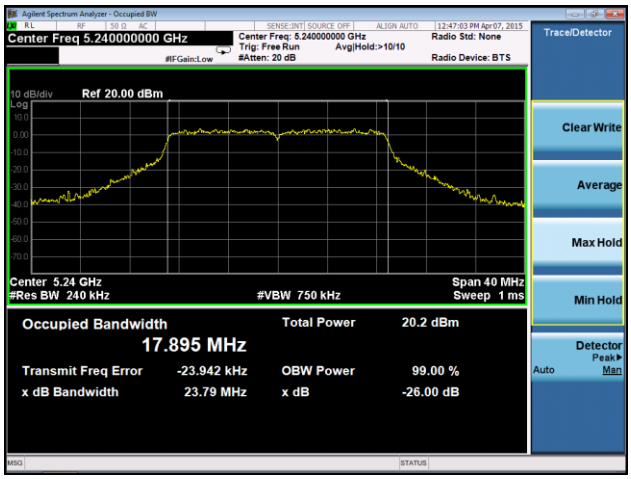
Channel 36 (5180MHz)



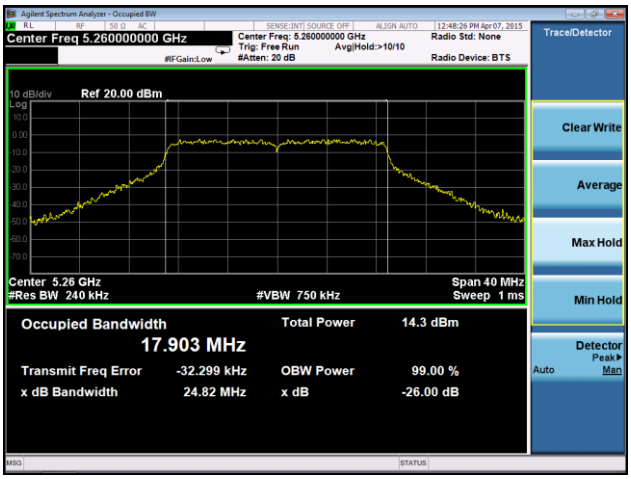
Channel 44 (5220MHz)



Channel 48 (5240MHz)

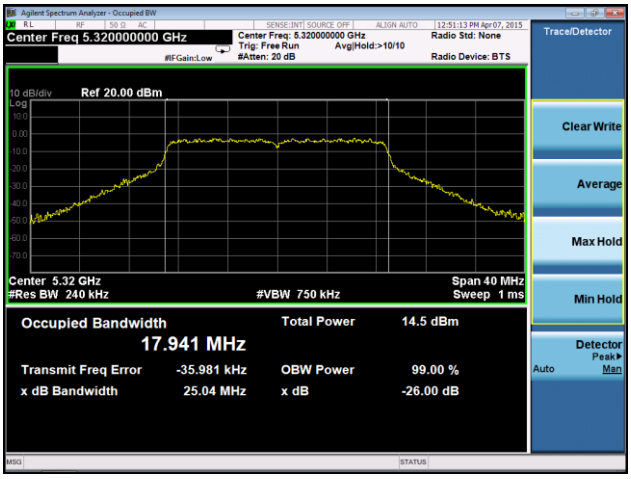


Channel 52 (5260MHz)



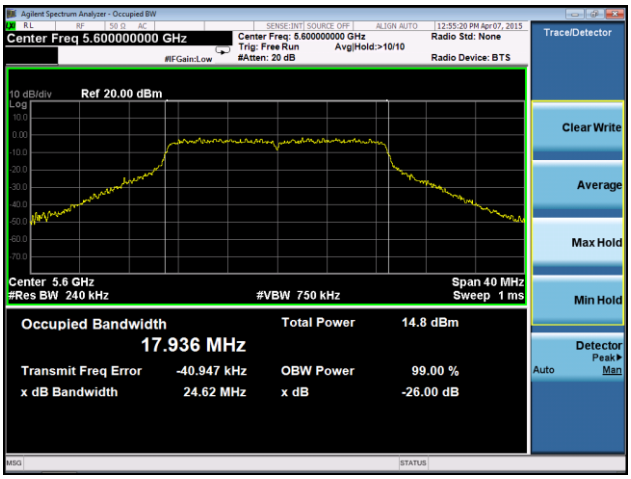
Channel 60 (5300MHz)

Channel 64 (5320MHz)



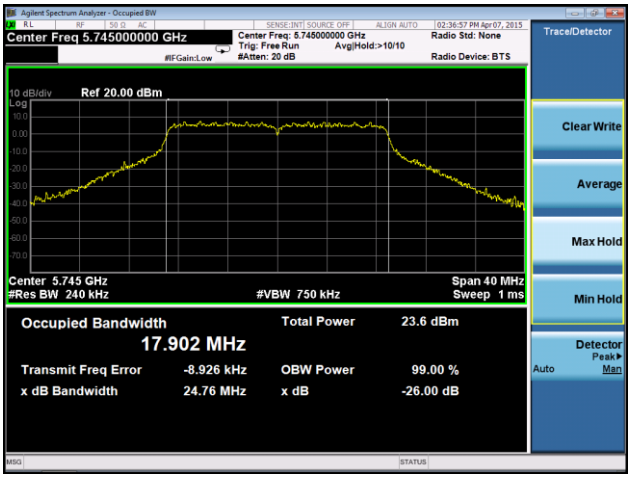
Channel 100 (5500MHz)

Channel 120 (5600MHz)

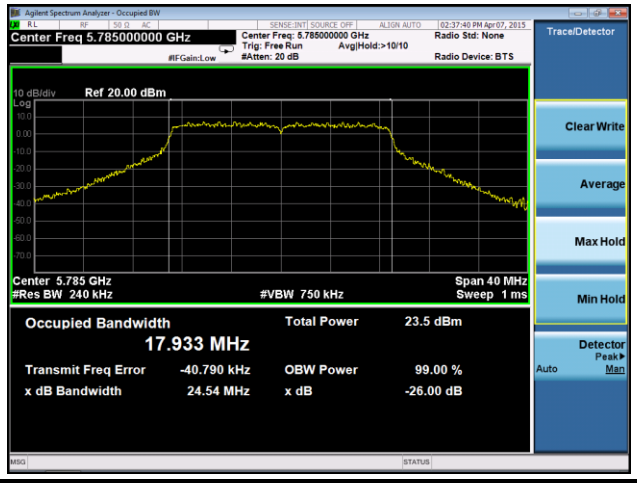


Channel 140 (5700MHz)

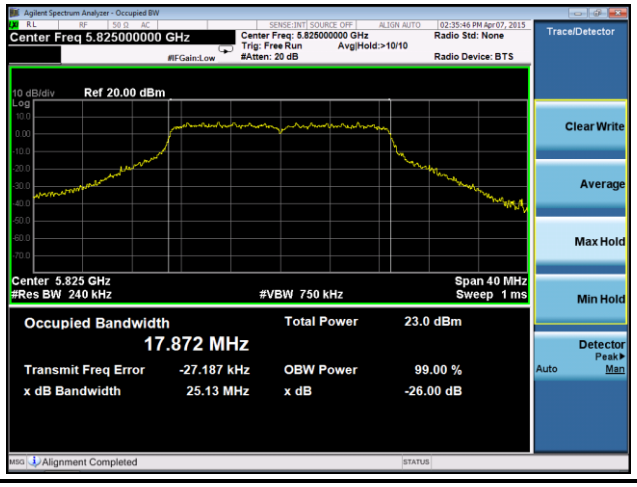
Channel 149 (5745MHz)



Channel 157 (5785MHz)

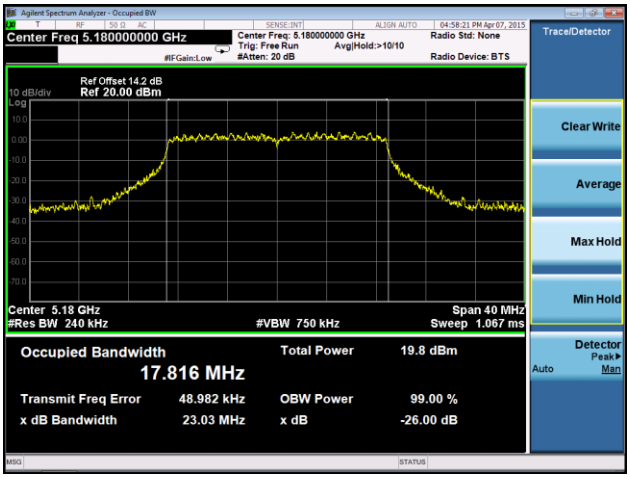


Channel 165 (5825MHz)

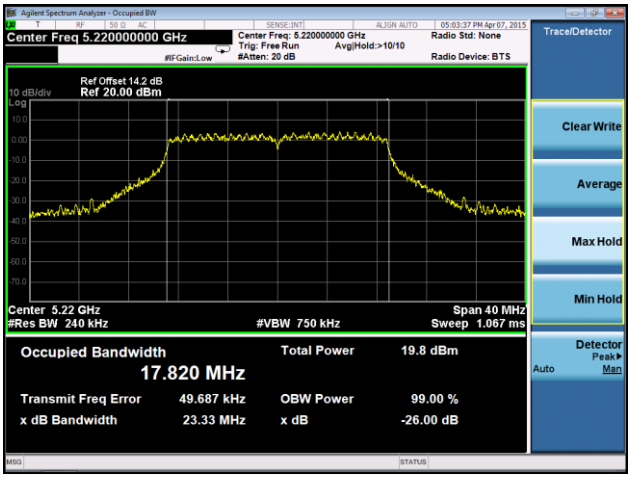


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1

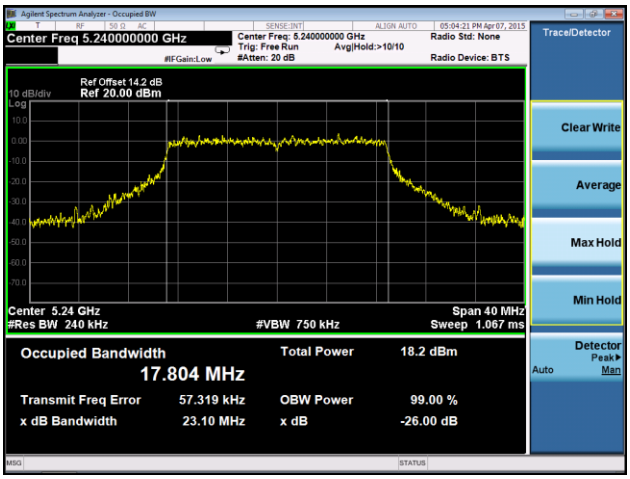
Channel 36 (5180MHz)



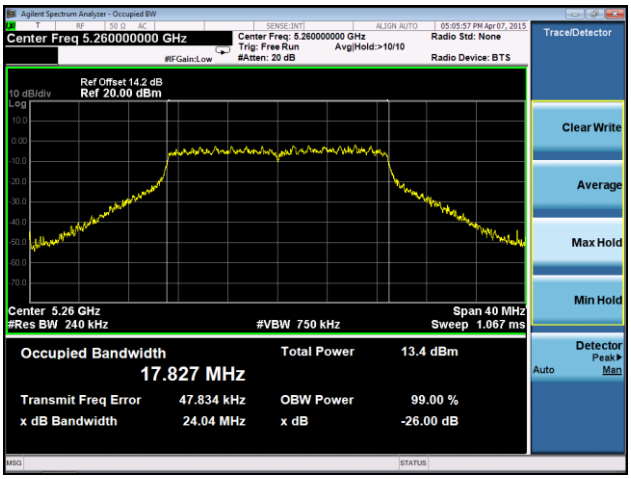
Channel 44 (5220MHz)



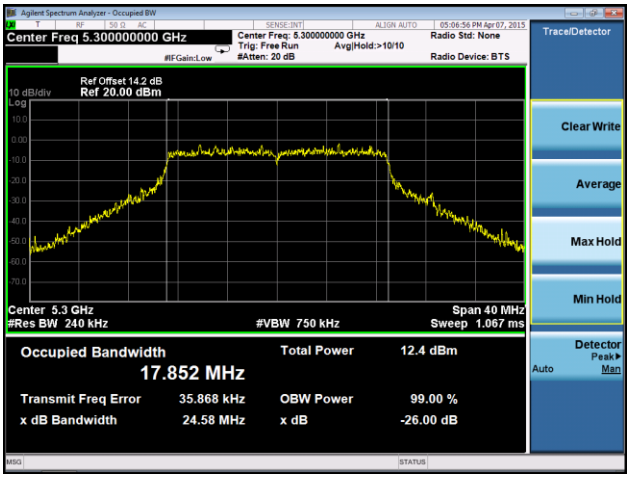
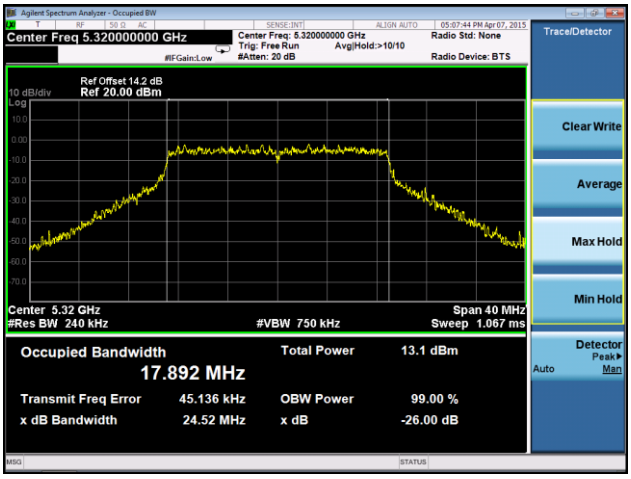
Channel 48 (5240MHz)



Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)