MEASUREMENT REPORT

FCC PART 15.407 / RSS-247 WLAN 802.11a/n/ac

FCC ID:	SFK-802W
IC	22479-802W
APPLICANT:	CIG Shanghai Co., Ltd.
Application Type:	Certification
Product:	Wi-Fi Extender
Model No.:	WF-802W
Brand Name:	CIG
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
IC Rule(s):	RSS-247 Issue 2
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v01r04, KDB 644545 D03v01, KDB 662911 D01v02r01,
Test Date:	March 20, 2017 ~ June 27, 2017

Reviewed By : Sunny Sun
(Sunny Sun)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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 D02v01r04. 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	Note
1703RSU02004	Rev. 01	Initial Report	07-13-2017	Valid

CONTENTS

Description Page

§2.1033 General Information

Applicant:	CIG Shanghai Co., Ltd.
Applicant Address:	5F, Building 8, NO.2388 CHENGHANG ROAD, MINHANG DISTRTCT, SHANGHAI
Manufacturer:	CIG Shanghai Co., Ltd., Shanghai Branch.
Manufacturer Address:	F/2, 3 Building 1, No. 505 Jiangyue Road, Minhang District, Shanghai, P.R.China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	809388
IC Registration No.:	11384A
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

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.**

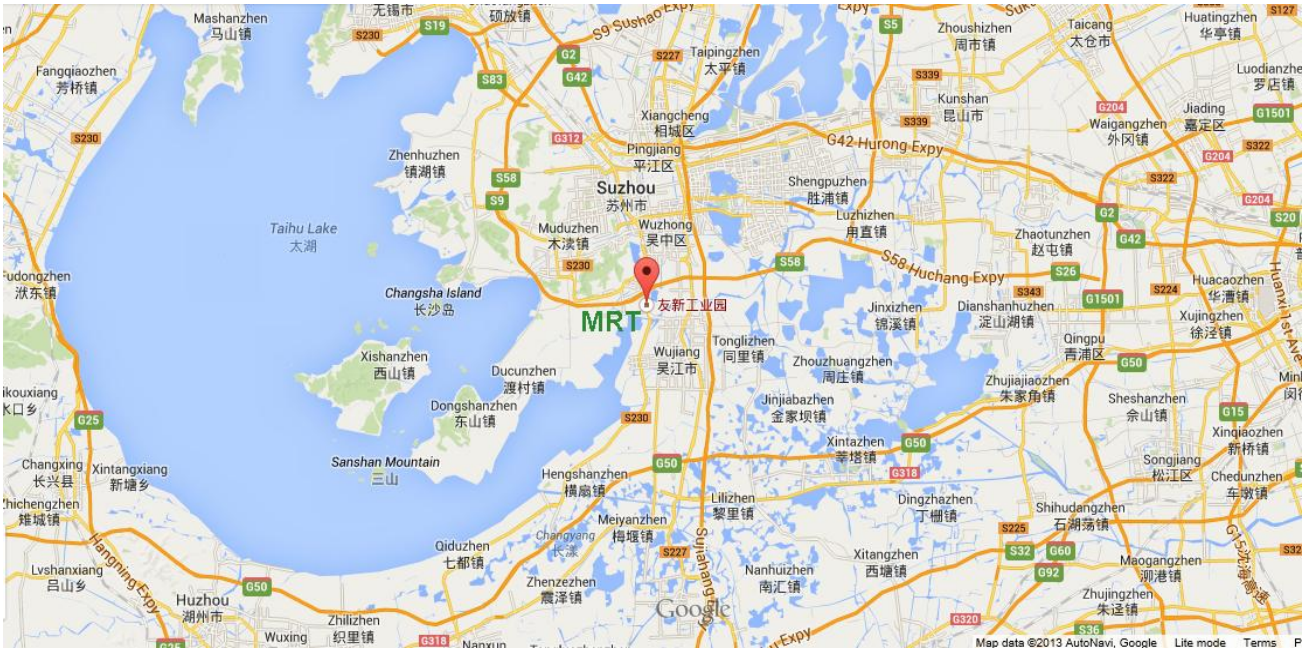
1. INTRODUCTION

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, 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	Wi-Fi Extender
Model No.	WF-802W
Brand Name:	CIG
Wi-Fi Specification:	802.11a/b/g/n/ac

2.2. Product Specification Subjective to this Report

Frequency Range:	For 802.11 a/n-HT20/ac-VHT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11 n-HT40/ac-VHT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
Type of Modulation:	802.11a/n/ac: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps
Maximum Average Output Power:	802.11a: 22.24dBm 802.11n-HT20: 22.19dBm 802.11n-HT40: 22.21dBm 802.11ac-VHT20: 22.19dBm 802.11ac-VHT40: 22.24dBm 802.11ac-VHT80: 21.94dBm

Note: For other features of this EUT, test report will be issued separately.

2.3. Working Frequencies for this report

802.11a/n-HT20/ac-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/ac-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

Note: The device can't operate in 5600~5650 MHz band in Canada (The frequency of blue font).

2.4. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Per Chain Max Antenna Gain (dBi)		Directional Gain (dBi)	Beam-Forming Gain (dBi)
			Ant 0	Ant 1		
PIFA Antenna	2412 ~ 2462	2	2.24	2.66	5.46	5.46
	5150 ~ 5850	2	3.44	3.66	6.56	6.56

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 $N_{ANT} \le 4$;
   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.

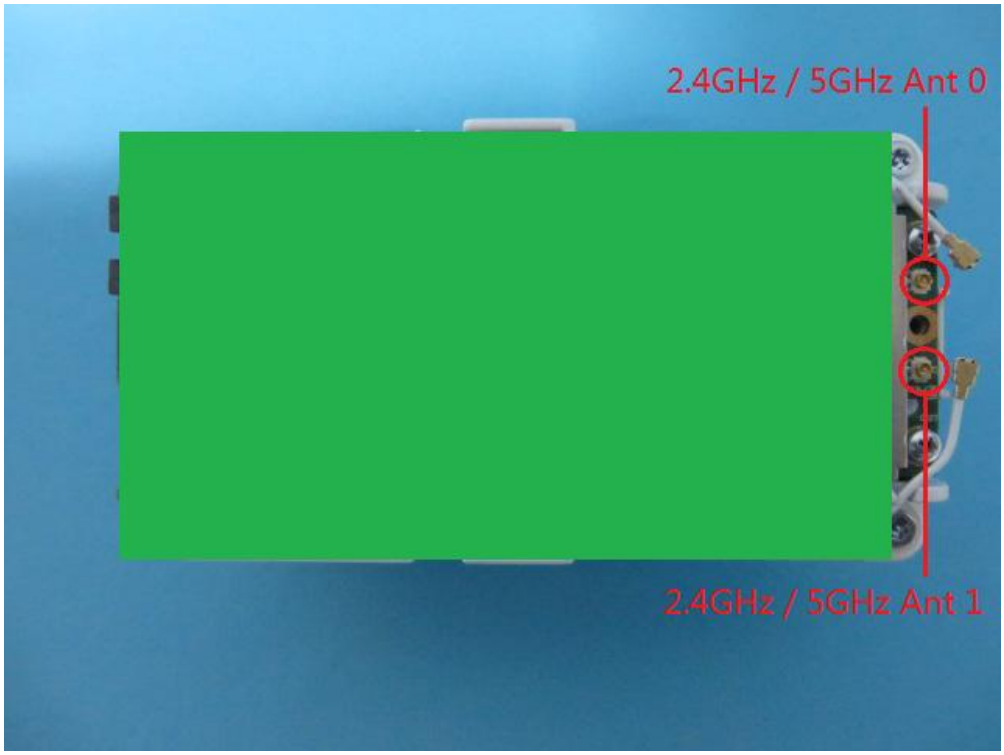
2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n, not include 802.11a/ac.
   Correlated signals include, but are not limited to, signals transmitted in any of the following modes:
   - Any transmit Beam Forming mode, whether fixed or adaptive (e.g., phased array modes, closed loop MIMO modes, Transmitter Adaptive Antenna modes, Maximum Ratio Transmission (MRT) modes, and Statistical Eigen Beam Forming (EBF) modes).

   Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi.

- transmit signals are correlated, then
- Directional gain = 10*log[(10$^{G1/20}$ + 10$^{G2/20}$ + … + 10$^{GN/20}$)^2/N_{ANT}] dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2.5. Description of Antenna RF Port

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



2.6. Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20 (CDD Mode / Beam-Forming Mode)
	Mode 3: Transmit by 802.11n-HT40 (CDD Mode / Beam-Forming Mode)
	Mode 4: Transmit by 802.11ac-VHT20 (CDD Mode / Beam-Forming Mode)
	Mode 5: Transmit by 802.11ac-VHT40 (CDD Mode / Beam-Forming Mode)
	Mode 6: Transmit by 802.11ac-VHT80 (CDD Mode / Beam-Forming Mode)

2.7. Description of Test Software

The test utility software used during testing was “QRCT”.

Power Parameter Value

For FCC Bands (UNII-1 & UNII-2A & UNII-2C & UNII-3) & IC Bands (UNII-2A & UNII-2C & UNII-3)

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value SISO Mode		Power Parameter Value MIMO Mode	
			Ant 0	Ant 1	CDD	Beam-Forming
802.11a	36	5180	19.5	19.5	18.0	--
	44	5220	20.0	19.5	18.5	--
	48	5240	20.0	19.5	18.5	--
	52	5260	19.5	19.5	16.5	--
	60	5300	19.5	19.5	16.0	--
	64	5320	18.5	19.5	16.5	--
	100	5500	20.0	19.0	16.0	--
	116	5580	19.5	18.5	15.5	--
	120	5600	19.5	18.0	15.0	--
	140	5700	18.5	17.5	16.0	--
	144	5720	18.5	17.5	16.0	--
	149	5745	19.5	17.5	18.0	--
	157	5785	19.5	18.0	18.5	--
	165	5825	20.0	19.0	19.0	--
802.11 n-HT20	36	5180	19.5	19.0	18.0	18.0
	44	5220	20.0	19.5	18.0	18.0
	48	5240	20.0	19.5	18.0	18.0
	52	5260	19.5	19.0	18.0	18.0
	60	5300	19.5	19.5	17.5	17.5
	64	5320	20.0	19.5	17.5	17.5
	100	5500	20.0	19.5	17.0	17.0
	116	5580	19.5	18.0	16.5	16.5
	120	5600	19.5	18.0	15.5	15.5
	140	5700	18.0	17.5	16.0	17.0
	144	5720	18.0	17.5	16.0	17.0
	149	5745	19.5	17.5	18.0	18.0
	157	5785	20.0	18.5	18.5	18.5
	165	5825	20.0	19.0	19.0	19.0

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value SISO Mode		Power Parameter Value MIMO Mode	
			Ant 0	Ant 1	CDD	Beam-Forming
802.11n-HT40	38	5190	20.0	18.0	18.5	18.0
	46	5230	20.5	20.0	19.0	19.0
	54	5270	20.0	20.0	18.5	18.5
	62	5310	20.5	19.0	18.0	18.0
	102	5510	19.5	19.5	17.5	19.0
	110	5550	20.0	19.0	18.5	18.5
	118	5590	20.0	18.5	18.5	18.5
	134	5670	20.0	18.0	18.5	18.5
	142	5710	20.0	18.0	18.5	18.5
	151	5755	20.0	18.0	18.5	18.5
	159	5795	20.5	19.0	19.0	19.0
802.11ac-VHT20	36	5180	19.5	19.0	18.0	18.0
	44	5220	20.0	19.5	18.0	18.0
	48	5240	20.0	19.5	18.0	18.0
	52	5260	20.0	19.0	17.5	17.5
	60	5300	20.0	19.5	17.5	17.5
	64	5320	20.0	19.5	17.5	17.5
	100	5500	20.0	19.5	17.0	17.0
	116	5580	19.5	18.0	16.0	16.0
	120	5600	19.5	18.0	15.5	15.5
	140	5700	18.0	17.5	16.5	16.5
	144	5720	19.5	17.5	16.5	16.5
	149	5745	19.5	17.5	18.0	18.0
	157	5785	20.0	18.0	18.0	18.0
	165	5825	20.0	19.0	19.0	19.0

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value SISO Mode		Power Parameter Value MIMO Mode	
			Ant 0	Ant 1	CDD	Beam-Forming
802.11ac-VHT40	38	5190	20.0	20.0	18.0	18.0
	46	5230	20.5	20.0	19.0	19.0
	54	5270	20.0	19.5	18.5	18.5
	62	5310	20.5	19.5	18.0	18.0
	102	5510	20.0	19.5	18.5	18.5
	110	5550	20.0	19.0	18.5	18.5
	118	5590	20.0	18.5	18.5	18.5
	134	5670	20.0	18.0	18.5	18.5
	142	5710	20.0	18.0	18.5	18.5
	151	5755	20.0	18.0	18.0	18.0
	159	5795	20.0	19.0	19.0	19.0
802.11ac-VHT80	42	5210	20.5	18.0	17.5	19.0
	58	5290	19.5	18.5	17.0	18.0
	106	5530	19.5	19.0	18.0	19.0
	122	5610	20.0	19.0	19.0	19.0
	138	5690	20.0	18.5	19.0	19.0
	155	5775	20.5	19.0	19.0	19.0

For IC Band (UNII-1)

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value SISO Mode		Power Parameter Value MIMO Mode	
			Ant 0	Ant 1	CDD	Beam-Forming
802.11a	36	5180	18.5	18.5	10.5	--
	44	5220	18.5	18.5	11.0	--
	48	5240	18.0	18.0	11.0	--
802.11 n-HT20	36	5180	18.5	18.5	11.0	11.0
	44	5220	18.5	18.5	11.0	11.0
	48	5240	18.5	18.5	11.0	11.0
802.11n-HT40	38	5190	20.0	18.0	12.5	12.5
	46	5230	20.5	20.0	13.0	13.0
802.11ac-VHT20	36	5180	18.5	18.5	11.0	11.0
	44	5220	18.5	18.5	11.0	11.0
	48	5240	18.5	18.5	11.0	11.0
802.11ac-VHT40	38	5190	20.0	18.0	12.5	12.5
	46	5230	20.5	20.0	13.0	13.0
802.11ac-VHT80	42	5210	19.5	17.5	13.0	13.0

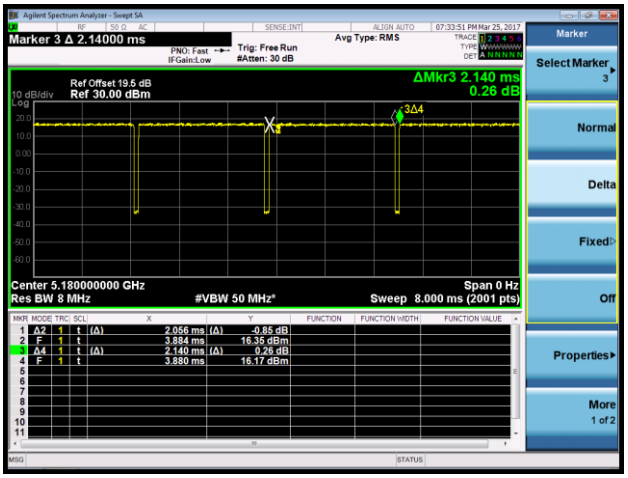
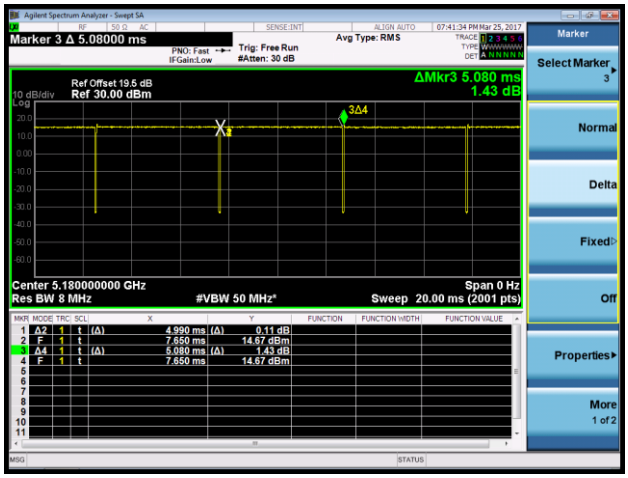
2.8. Device Capabilities

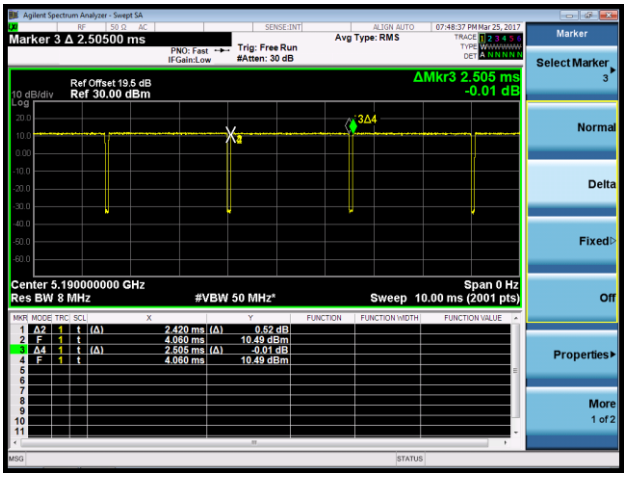
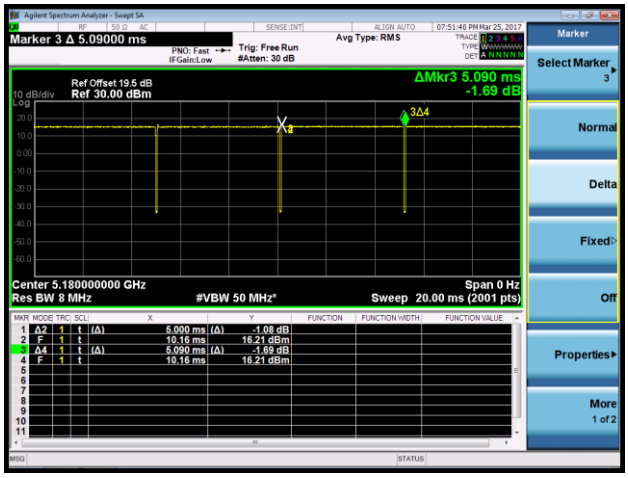
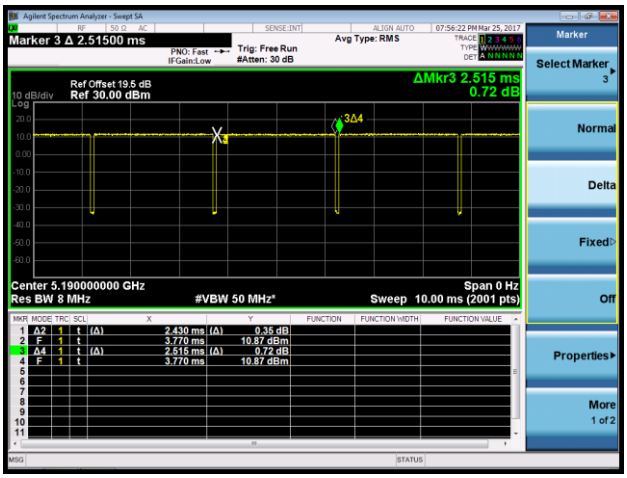
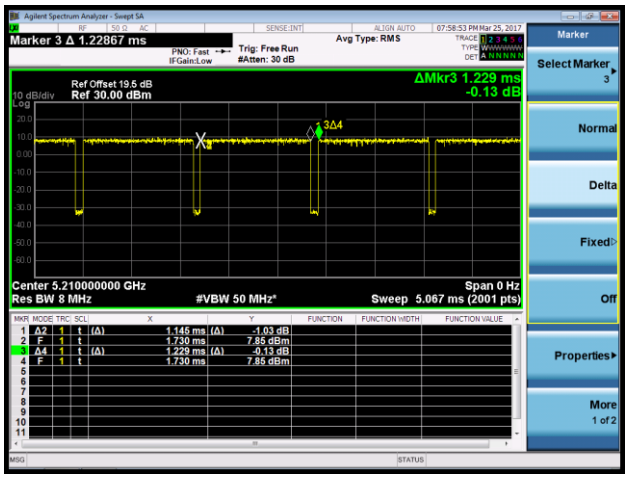
This device contains the following capabilities:

2.4GHz WLAN (DTS) and 5GHz WLAN (NII)

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 D02v01r04. 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	96.07 %
802.11n-HT20	98.23 %
802.11n-HT40	96.61 %
802.11ac-VHT20	98.23 %
802.11ac-VHT40	96.62 %
802.11ac-VHT80	93.17 %

802.11a	802.11n-HT20
	

802.11n-HT40	802.11ac-VHT20
	
802.11ac-VHT40	**802.11ac-VHT80**
	

2.9. Test Configuration

The **Wi-Fi Extender** was tested per the guidance of KDB 789033 D02v01r04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.10. EMI Suppression Device(s)/Modifications

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

2.11. 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 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 D02v01r04 were used in the measurement of the **Wi-Fi Extender.**

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 7.9.

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."

- The antenna of the **Wi-Fi Extender** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Wi-Fi Extender** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2018/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2018/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/20
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

Radiated Spurious Emission and Radiated Restricted Band Edge - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2017/08/03
Spectrum Analyzer	Agilent	N9010A	MRTSUE06195	1 year	2018/04/19
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2017/12/21
Bilog Period Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2017/10/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2017/11/19
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06106	1 year	2017/12/10
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/04/25
Digitial Thermometer & Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2017/11/30
Anechoic Chamber	RIKEN	Chamber-AC1	MRTSUE06213	1 year	2018/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/05/07
USB wideband power sensor	Boonton	55006	MRTSUE06109	1 year	2018/05/07
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Software	Version	Function
e3	V 8.3.5	EMI Test Software

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 - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
Spurious Emissions, Conducted - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

7. TEST RESULT

7.1. Summary

Product Name: **Wi-Fi Extender**

FCC ID: **SFK-WF802W**

IC: **22479-802W**

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

Data Rate / MCS Tested: **6Mbps for 802.11a;**
MCS0 for 802.11n-HT20MHz;
MCS0 for 802.11n-HT40MHz;
MCS0 for 802.11ac-VHT20MHz;
MCS0 for 802.11ac-VHT40MHz;
MCS0 for 802.11ac-VHT80MHz

FCC 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	Refer to Section 7.5		Pass	Section 7.5
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		Pass	Section 7.6
15.407(a)(1)(ii), (2), (3), (5)	Peak Power Spectral Density	Refer to Section 7.7		Pass	Section 7.7
15.407(g)	Frequency Stability	N/A		Pass	Section 7.8
15.407(b)(1), (2), (3), (4)	Undesirable Emissions	≤ -27dBm/MHz EIRP ≤ -17dBm/MHz EIRP	Radiated	Pass	Section 7.9 & 7.10
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 7.11

RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
RSS-247 §6.2	99% Bandwidth	N/A	Conducted	Pass	Section 7.2
RSS-247 §6.2.4	6dB Bandwidth	>500kHz		Pass	Section 7.3
RSS-247 §6.2.1	Operation Frequency Range of 26dB BW	26dBc frequency range above 5250MHz		Pass	Section 7.4
RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Max Conducted Output Power	Refer to Section 7.5		Pass	Section 7.5
	Maximum E.I.R.P				
RSS-247 §6.2.2, §6.2.3	Transmit Power Control	≤ 24 dBm		Pass	Section 7.6
RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Peak Power Spectral Density	Refer to Section 7.7		Pass	Section 7.7
RSS-Gen [8.11]	Frequency Stability	N/A		Pass	Section 7.8
RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Out-of-Band Emissions	≤ -27dBm/MHz EIRP ≤ -17dBm/MHz EIRP	Radiated	Pass	Section 7.9 & 7.10
RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in RSS-Gen [8.9]		Pass	
RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< RSS-Gen [8.8] limits	Line Conducted	Pass	Section 7.11

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.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

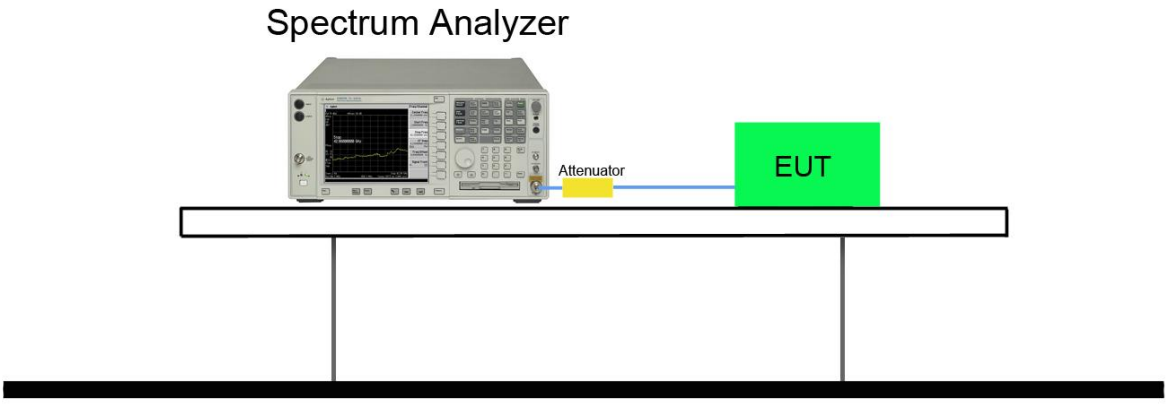
7.2.2.Test Procedure used

KDB 789033 D02v01r04 - 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

Product	Wi-Fi Extender	Temperature	22°C
Test Engineer	Lewis Huang	Relative Humidity	54%
Test Site	TR3	Test Date	2017/03/25

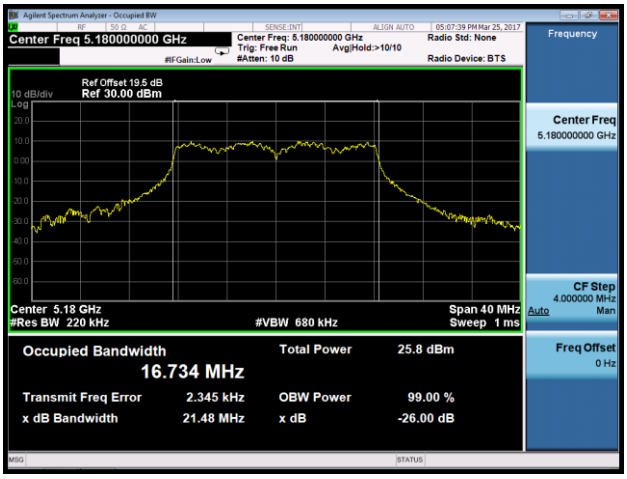
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11a	6Mbps	36	5180	21.48	16.73
802.11a	6Mbps	44	5220	21.46	16.72
802.11a	6Mbps	48	5240	21.51	16.66
802.11a	6Mbps	52	5260	21.40	16.67
802.11a	6Mbps	60	5300	21.26	16.58
802.11a	6Mbps	64	5320	21.25	16.53
802.11a	6Mbps	100	5500	21.39	16.59
802.11a	6Mbps	116	5580	22.34	16.69
802.11a	6Mbps	120	5600	22.00	16.65
802.11a	6Mbps	140	5700	21.16	16.74
802.11a	6Mbps	144	5720	21.05	16.58
802.11a	6Mbps	149	5745	24.51	16.85
802.11a	6Mbps	157	5785	23.81	16.71
802.11a	6Mbps	165	5825	21.11	16.64
802.11n-HT20	MCS0	36	5180	23.41	18.12
802.11n-HT20	MCS0	44	5220	22.91	17.97
802.11n-HT20	MCS0	48	5240	22.62	17.92
802.11n-HT20	MCS0	52	5260	22.27	17.91
802.11n-HT20	MCS0	60	5300	22.46	17.74
802.11n-HT20	MCS0	64	5320	22.23	17.74
802.11n-HT20	MCS0	100	5500	22.82	17.86
802.11n-HT20	MCS0	116	5580	22.97	18.04
802.11n-HT20	MCS0	120	5600	23.11	17.96
802.11n-HT20	MCS0	140	5700	23.47	18.18
802.11n-HT20	MCS0	144	5720	22.86	17.80
802.11n-HT20	MCS0	149	5745	23.12	18.14
802.11n-HT20	MCS0	157	5785	23.13	17.82
802.11n-HT20	MCS0	165	5825	22.78	17.78

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11n-HT40	MCS0	38	5190	43.25	36.23
802.11n-HT40	MCS0	46	5230	42.94	36.41
802.11n-HT40	MCS0	54	5270	43.41	36.48
802.11n-HT40	MCS0	62	5310	43.68	36.66
802.11n-HT40	MCS0	102	5510	42.99	36.51
802.11n-HT40	MCS0	110	5550	43.31	36.37
802.11n-HT40	MCS0	118	5590	42.71	36.21
802.11n-HT40	MCS0	134	5670	42.24	36.11
802.11n-HT40	MCS0	142	5710	43.63	36.49
802.11n-HT40	MCS0	151	5755	43.41	36.23
802.11n-HT40	MCS0	159	5795	43.61	36.57
802.11ac-VHT20	MCS0	36	5180	23.36	18.12
802.11ac-VHT20	MCS0	44	5220	22.94	17.94
802.11ac-VHT20	MCS0	48	5240	22.68	17.91
802.11ac-VHT20	MCS0	52	5260	22.82	17.93
802.11ac-VHT20	MCS0	60	5300	22.27	17.78
802.11ac-VHT20	MCS0	64	5320	21.85	17.76
802.11ac-VHT20	MCS0	100	5500	22.05	17.84
802.11ac-VHT20	MCS0	116	5580	22.83	18.00
802.11ac-VHT20	MCS0	120	5600	23.21	18.01
802.11ac-VHT20	MCS0	140	5700	23.37	18.18
802.11ac-VHT20	MCS0	144	5720	23.30	18.15
802.11ac-VHT20	MCS0	149	5745	23.19	18.10
802.11ac-VHT20	MCS0	157	5785	23.00	17.83
802.11ac-VHT20	MCS0	165	5825	21.95	17.77

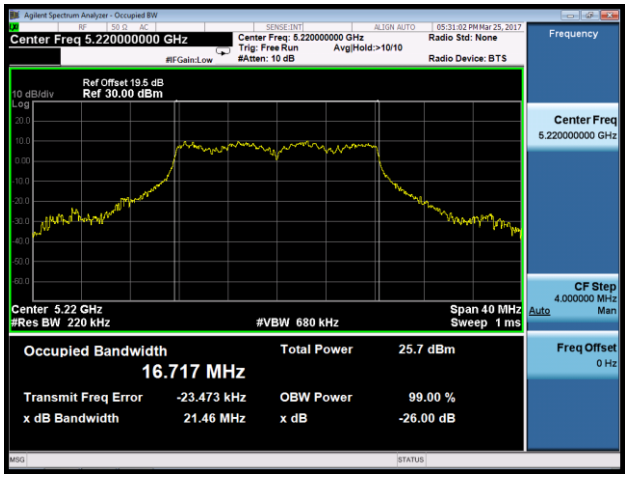
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11ac-VHT40	MCS0	38	5190	43.48	36.34
802.11ac-VHT40	MCS0	46	5230	43.01	36.46
802.11ac-VHT40	MCS0	54	5270	43.75	36.39
802.11ac-VHT40	MCS0	62	5310	43.79	36.59
802.11ac-VHT40	MCS0	102	5510	42.87	36.48
802.11ac-VHT40	MCS0	110	5550	42.80	36.28
802.11ac-VHT40	MCS0	118	5590	42.39	36.30
802.11ac-VHT40	MCS0	134	5670	42.61	36.22
802.11ac-VHT40	MCS0	142	5710	42.75	36.28
802.11ac-VHT40	MCS0	151	5755	42.99	36.21
802.11ac-VHT40	MCS0	159	5795	43.19	36.52
802.11ac-VHT80	MCS0	42	5210	87.30	75.92
802.11ac-VHT80	MCS0	58	5290	87.85	76.13
802.11ac-VHT80	MCS0	106	5530	87.77	76.18
802.11ac-VHT80	MCS0	122	5610	86.75	75.85
802.11ac-VHT80	MCS0	138	5690	86.96	75.73
802.11ac-VHT80	MCS0	155	5775	87.63	76.15

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

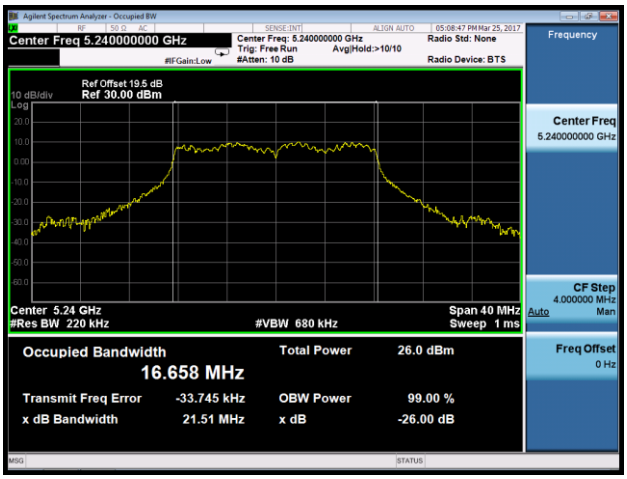
Channel 36 (5180MHz)



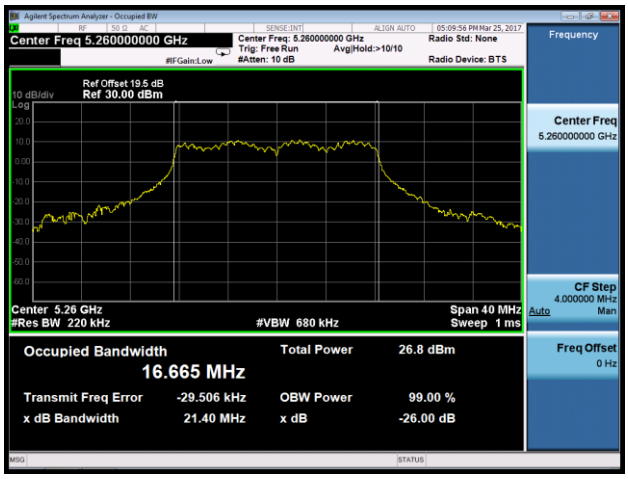
Channel 44 (5220MHz)



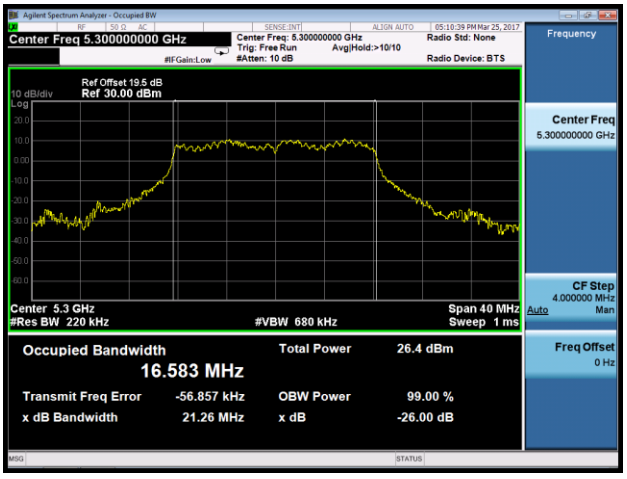
Channel 48 (5240MHz)



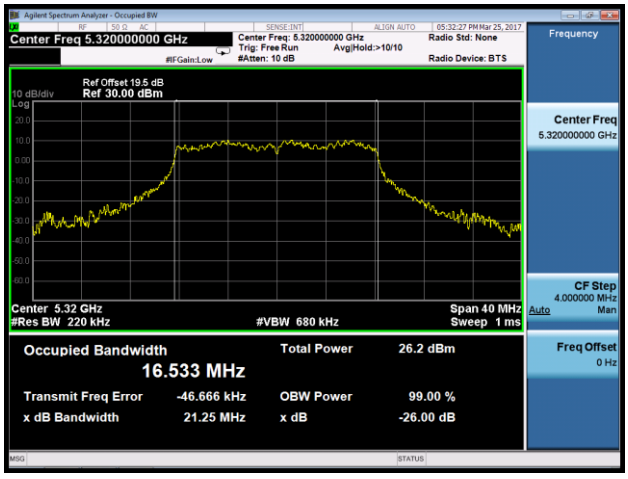
Channel 52 (5260MHz)



Channel 60 (5300MHz)

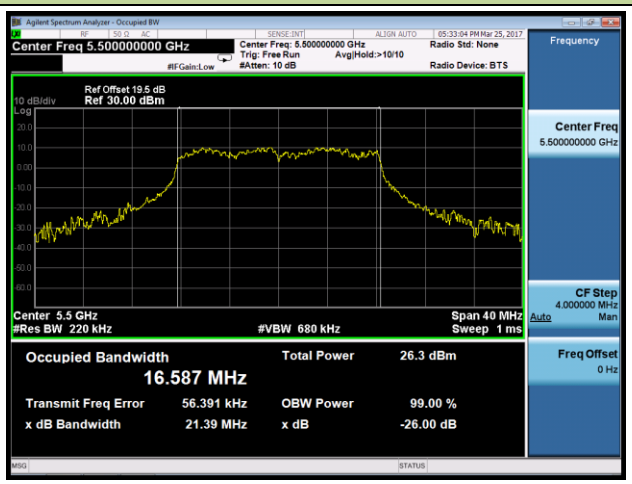


Channel 64 (5320MHz)

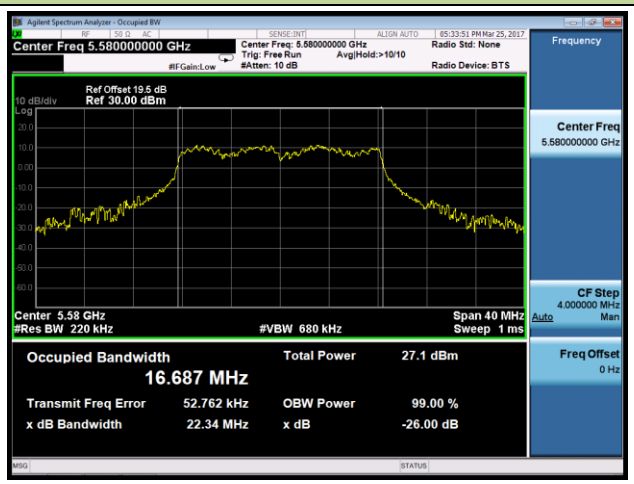


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

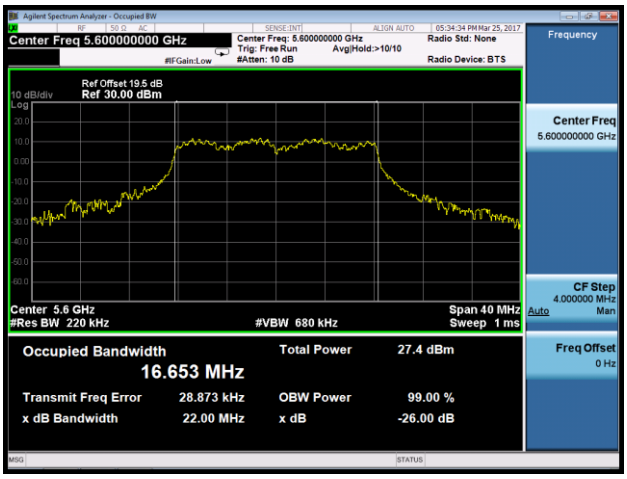
Channel 100 (5500MHz)



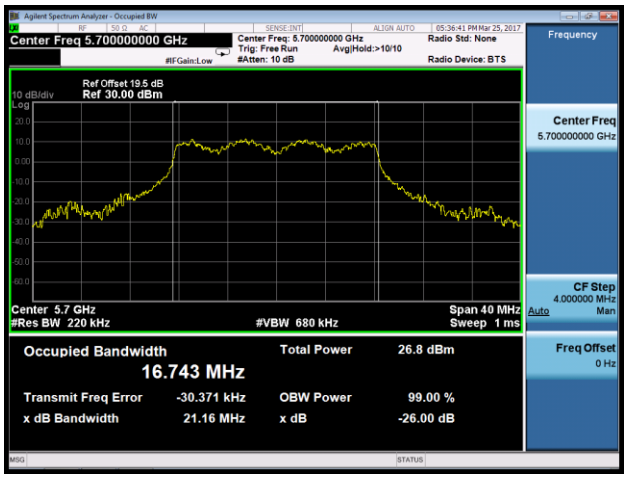
Channel 116 (5580MHz)



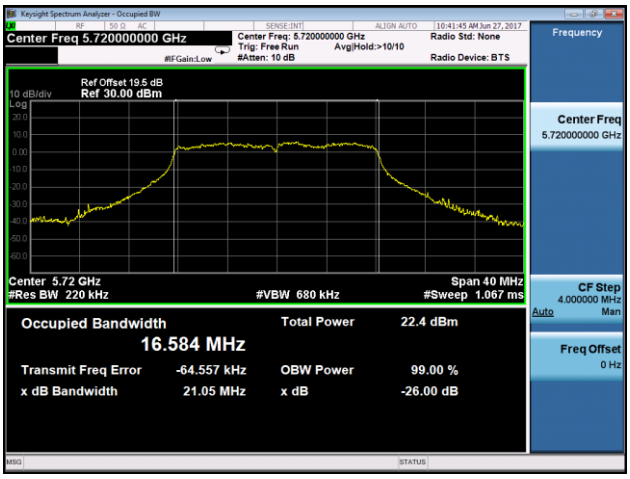
Channel 100 (5600MHz)



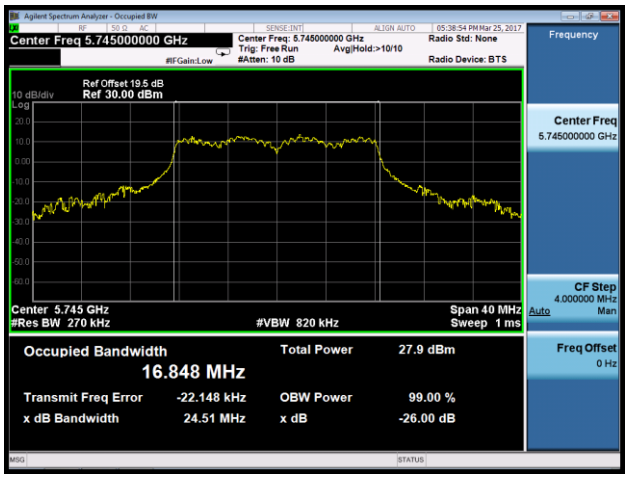
Channel 140 (5700MHz)

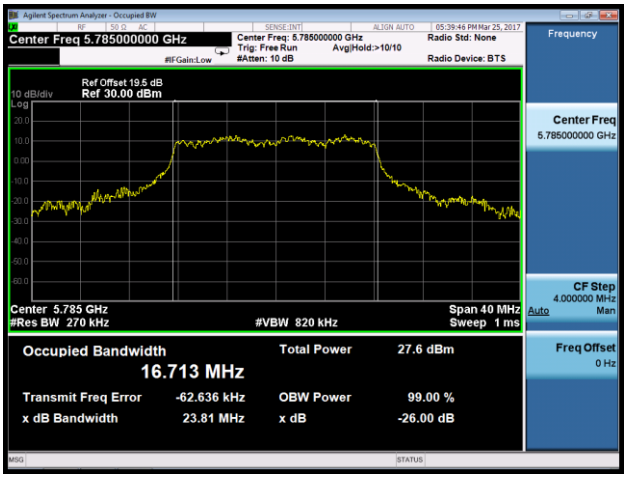
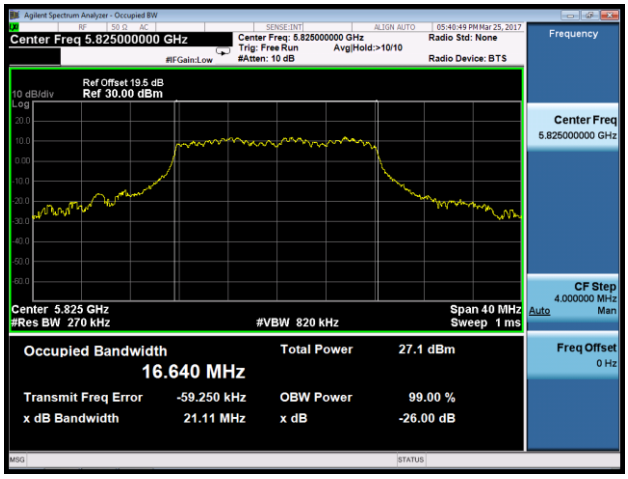


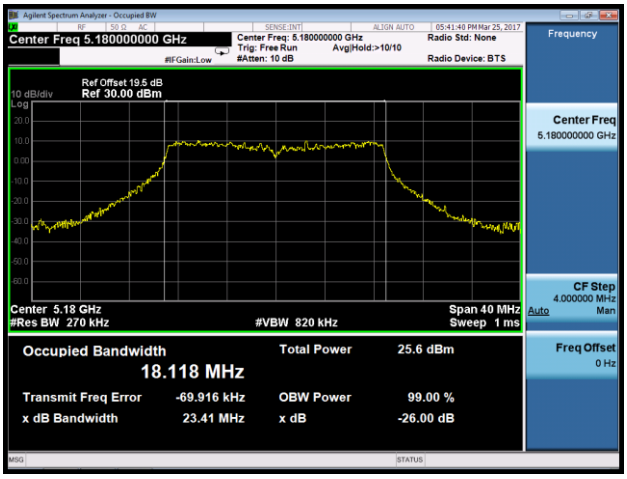
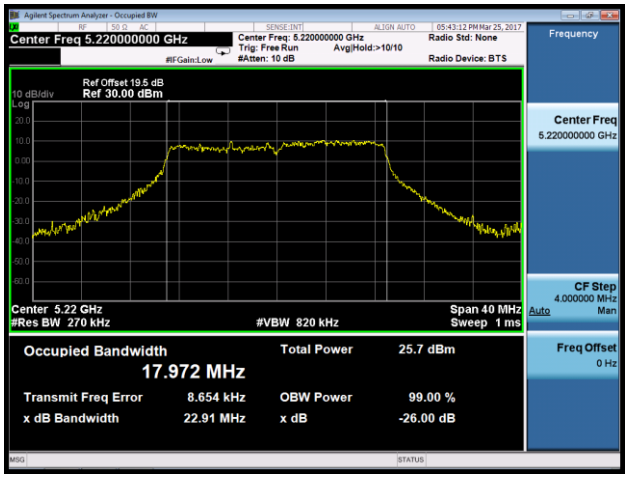
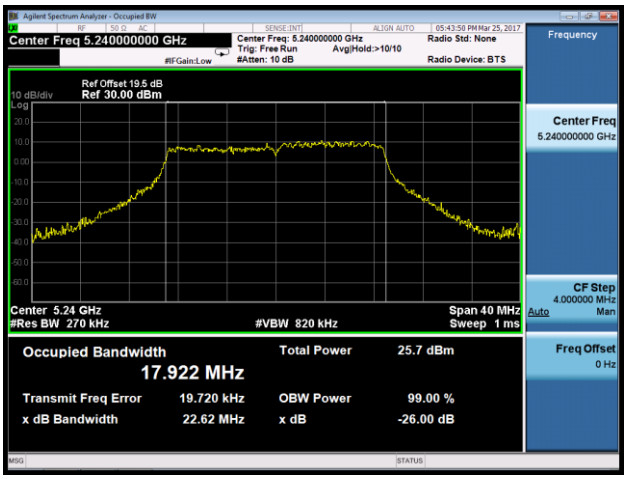
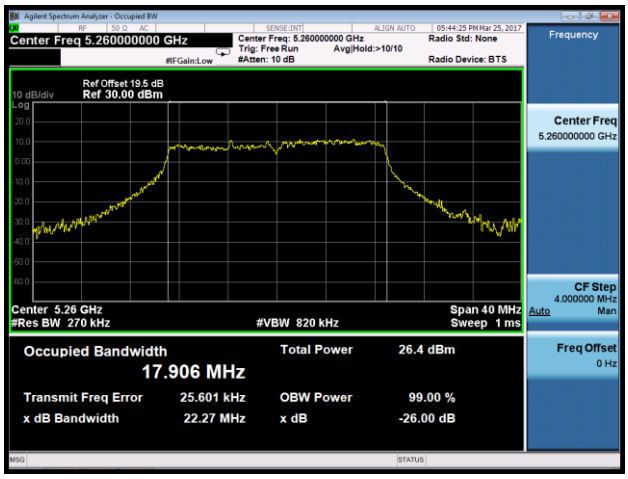
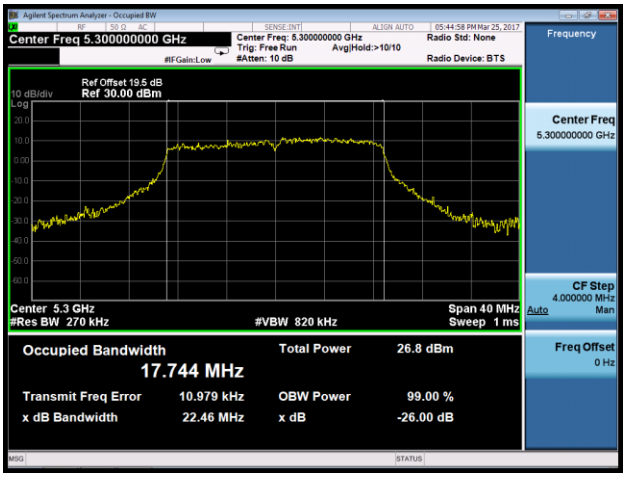
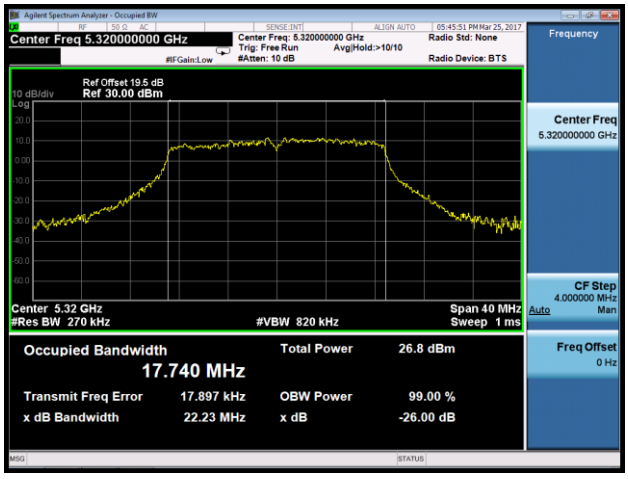
Channel 144 (5720MHz)

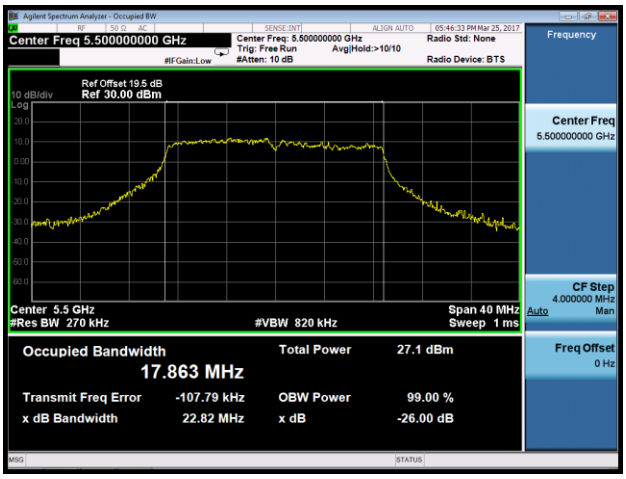
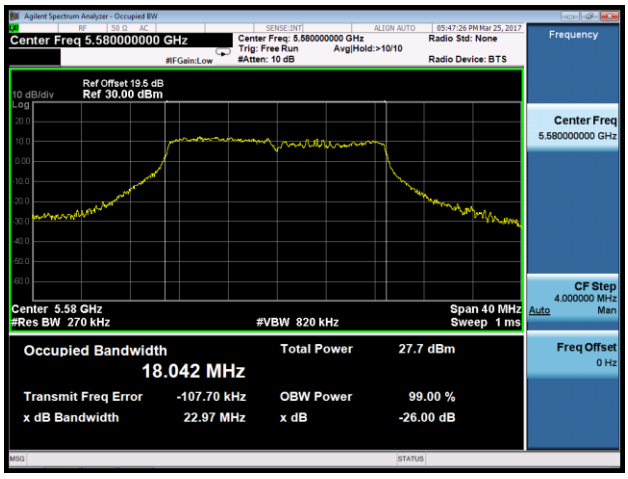
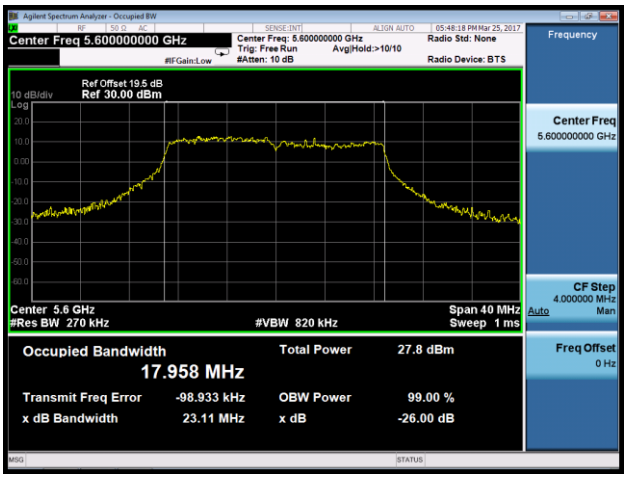
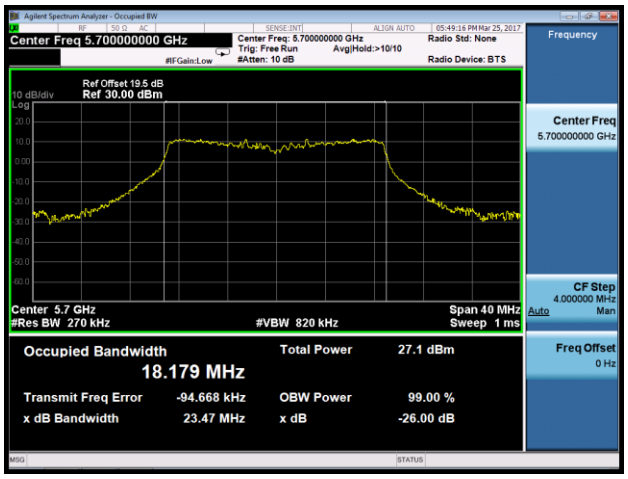
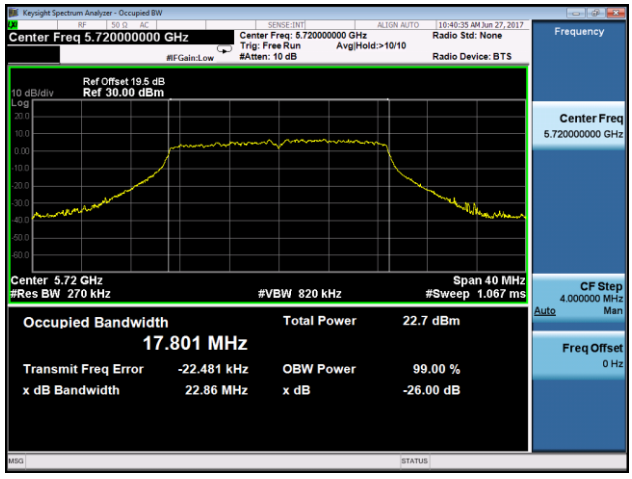
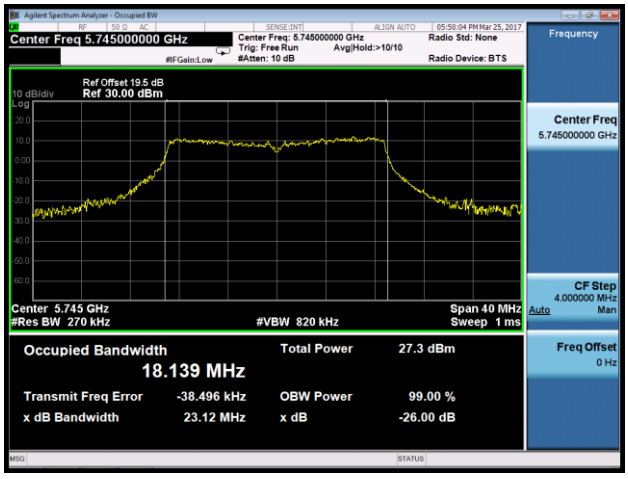


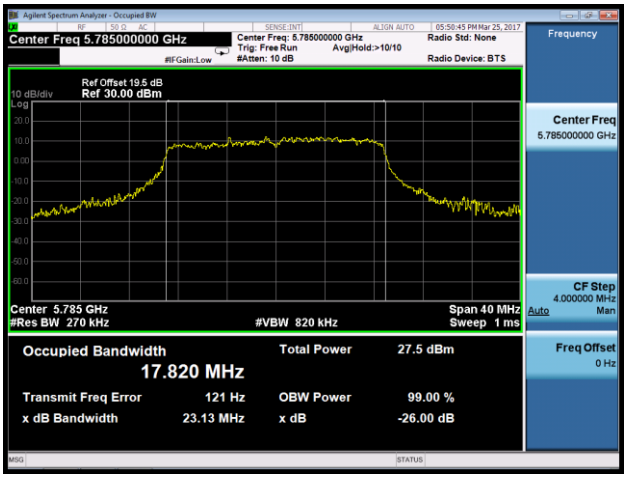
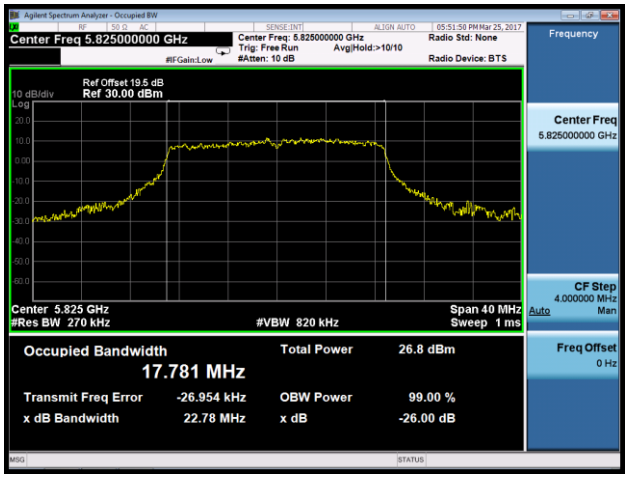
Channel 149 (5745MHz)



802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

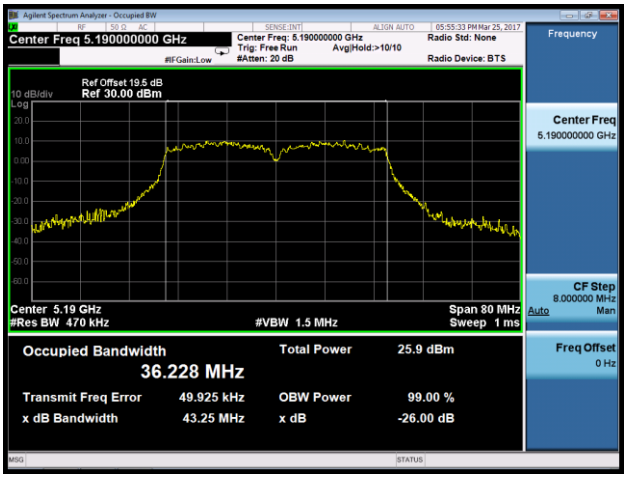
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 100 (5500MHz)	**Channel 116 (5580MHz)**
	
Channel 120 (5600MHz)	**Channel 140 (5700MHz)**
	
Channel 144 (5720MHz)	**Channel 149 (5745MHz)**
	

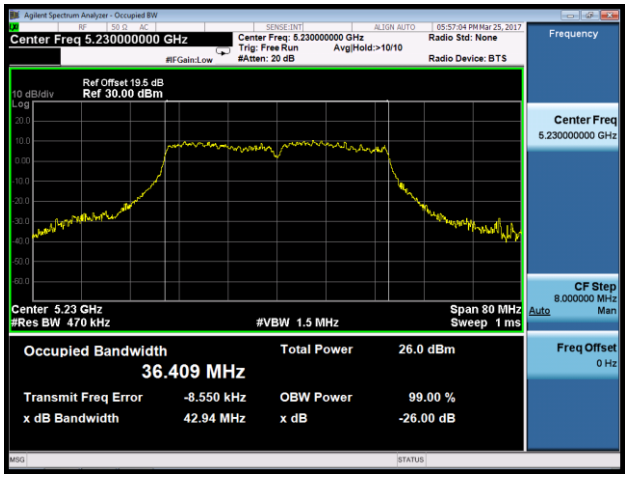
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

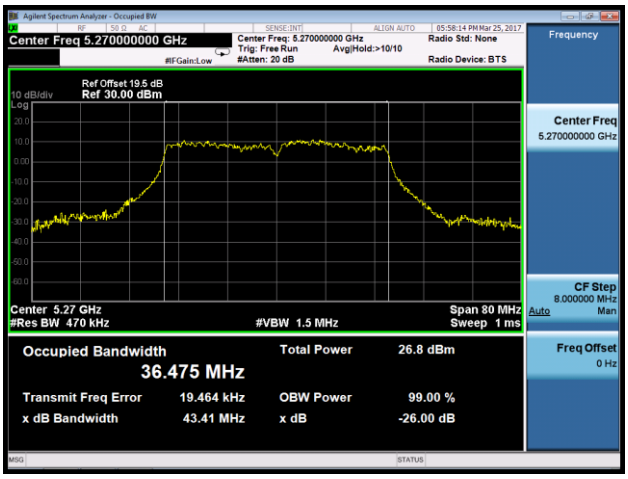
Channel 38 (5190MHz)



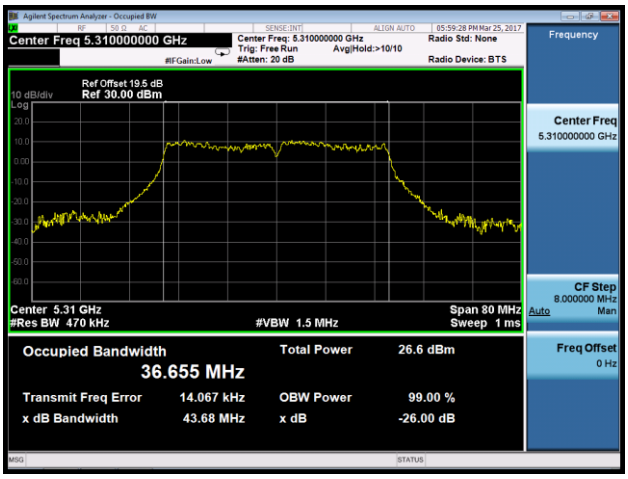
Channel 46 (5230MHz)



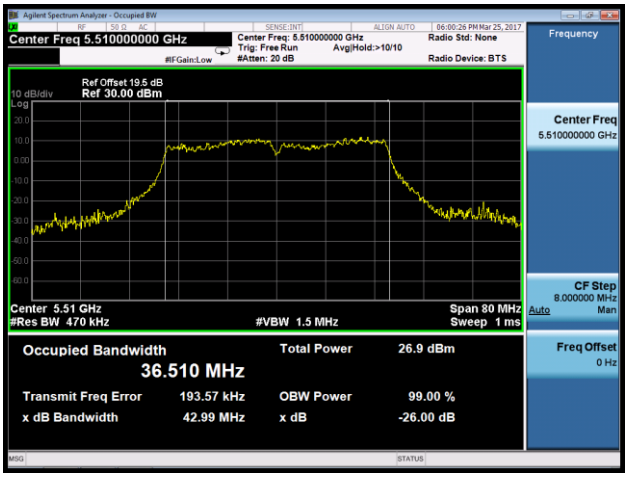
Channel 54 (5270MHz)



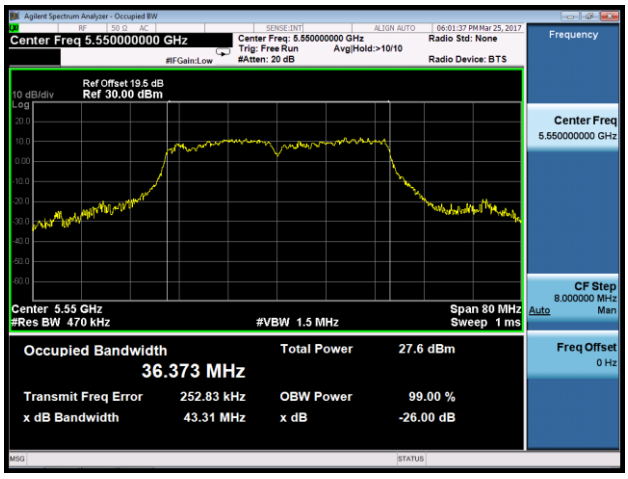
Channel 62 (5310MHz)



Channel 102 (5510MHz)

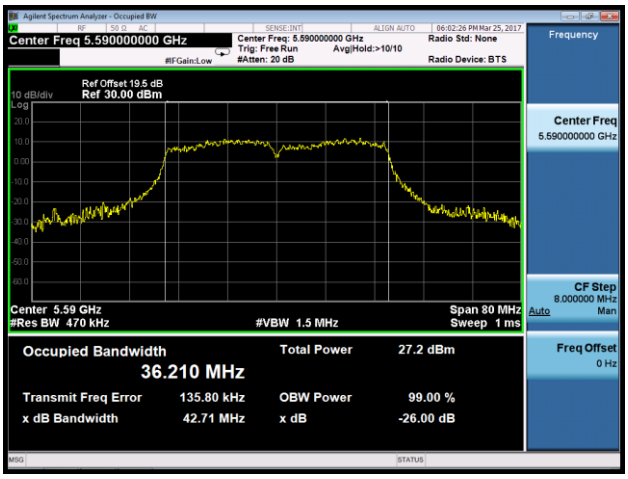


Channel 110 (5550MHz)

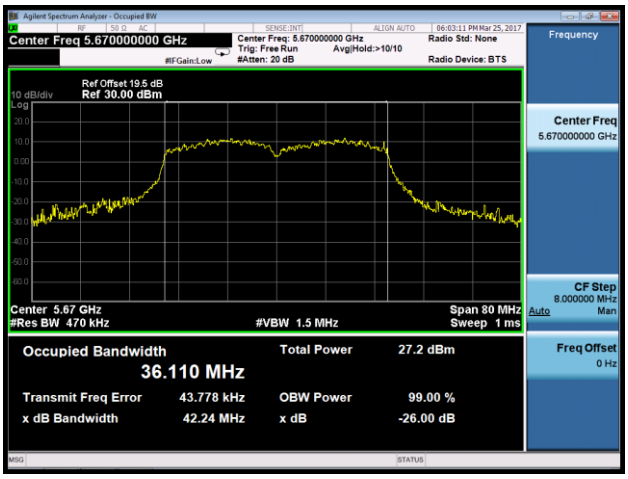


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

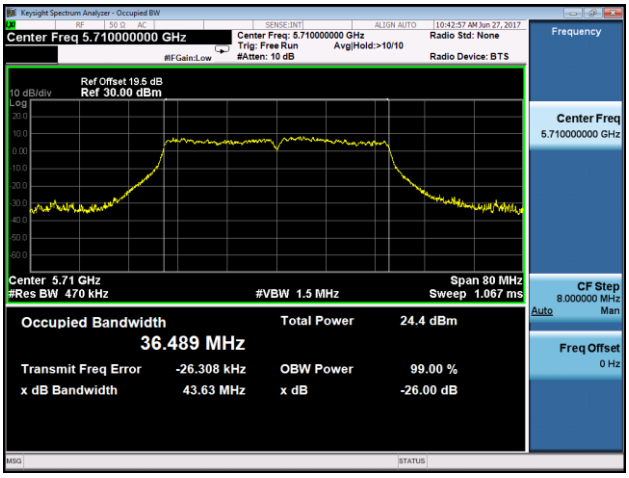
Channel 118 (5590MHz)



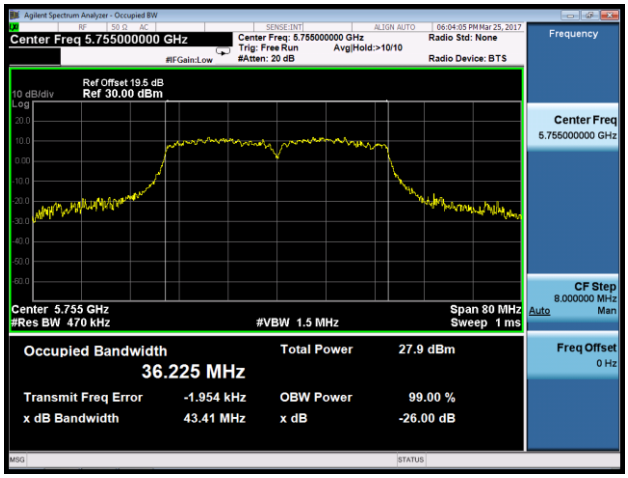
Channel 134 (5670MHz)



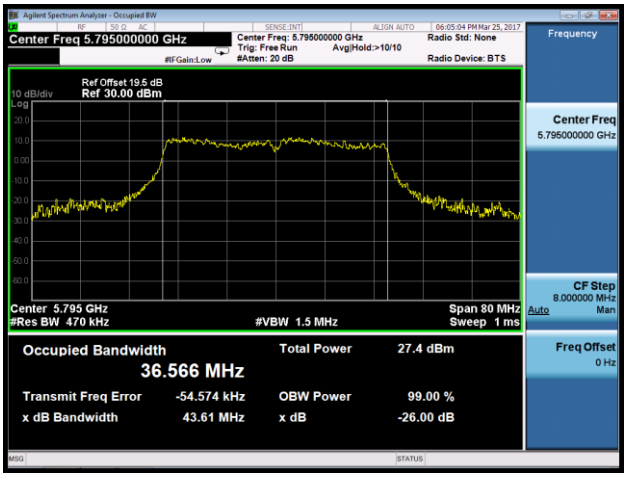
Channel 142 (5710MHz)



Channel 151 (5755MHz)

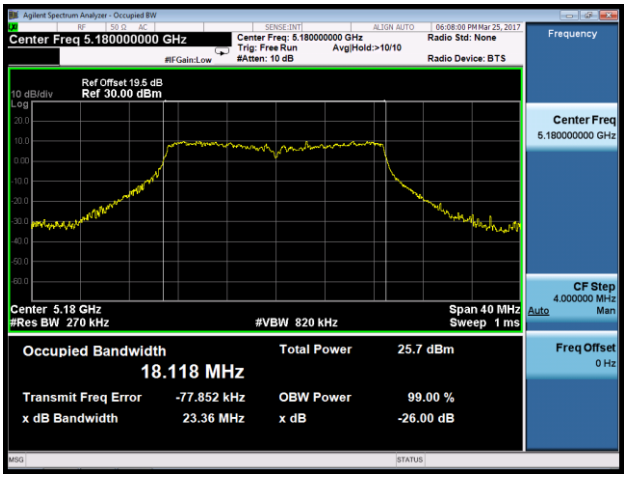


Channel 159 (5795MHz)

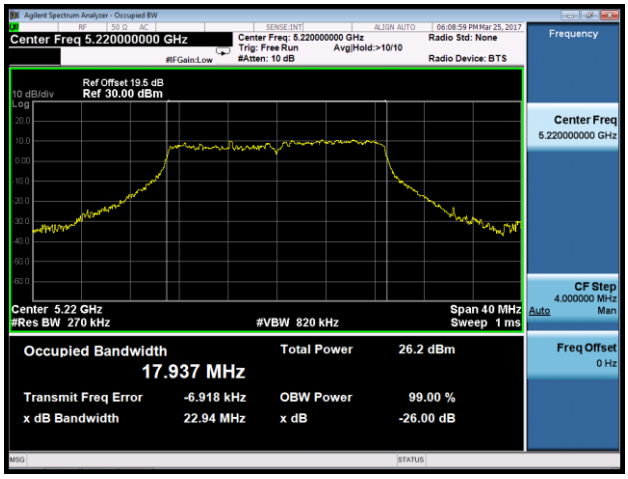


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1

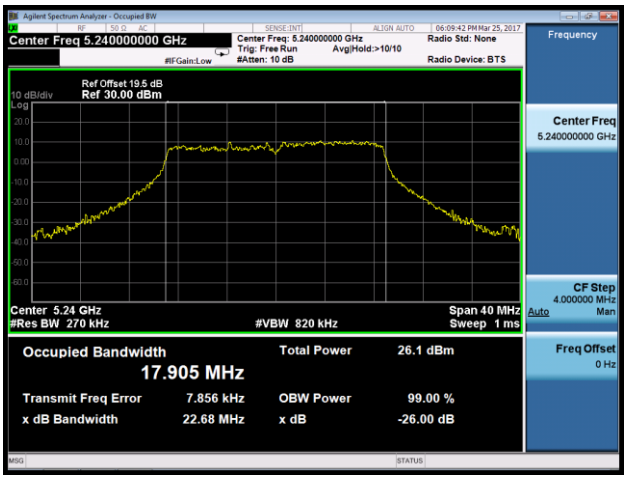
Channel 36 (5180MHz)



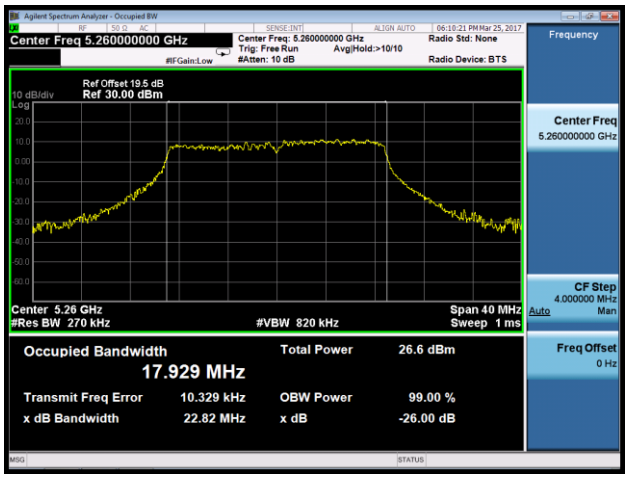
Channel 44 (5220MHz)



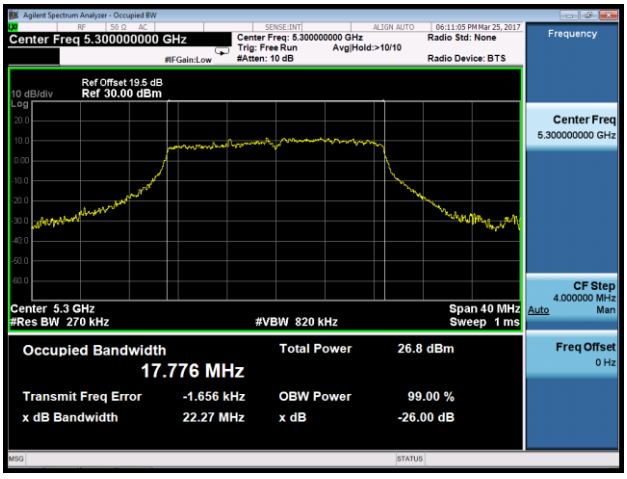
Channel 48 (5240MHz)



Channel 52 (5260MHz)



Channel 60 (5300MHz)



Channel 64 (5320MHz)