MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID:	TK4WLE600VX
APPLICANT:	Compex Systems Pte Ltd

Application Type:	Class II Permissive Change
Product:	802.11ac Dual Band Module
Model No.:	WLE600VX, WLE600VX-I
Brand Name:	COMPEX
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v01r03, KDB 662911 D01v02r01, KDB 644545 D03v01
Test Date:	March 20 ~ May 02, 2017

Reviewed By : Robin Wu
(Robin Wu)

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 D02v01r03. 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
1703RSU03002	Rev. 01	Initial report	05-24-2017	Valid

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§2.1033 General Information

Applicant:	Compex Systems Pte Ltd
Applicant Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Manufacturer:	Compex Systems Pte Ltd
Manufacturer Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.407
FCC ID:	TK4WLE600VX
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.**

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of 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 Communiqué dated 8 January 2009).

Presented this 6th day of September 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2018

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

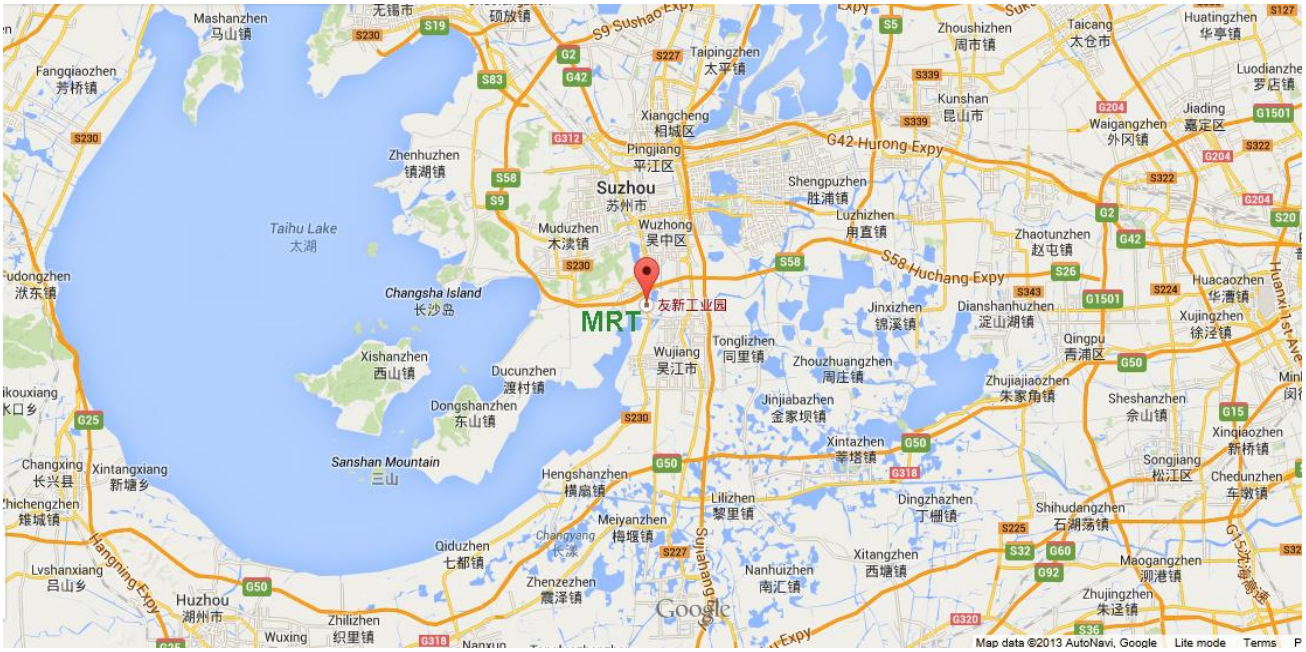
1. INTRODUCTION

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, 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:	802.11ac Dual Band Module
Model No.:	WLE600VX, WLE600VX-I
Brand Name:	COMPEX
Wi-Fi Specification:	802.11a/b/g/n/ac

Note: Differences between all models are for different marketing requirement.

2.2. Product Specification Subjective to this Report

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
Channel Number:	802.11a/ n-HT20: 24 802.11ac-VHT20: 25 802.11n-HT40: 11 802.11ac-VHT40: 12 802.11ac-VHT80: 6
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: 20.33dBm 802.11n-HT20: 22.80dBm 802.11n-HT40: 22.77dBm 802.11ac-VHT20: 21.82dBm 802.11ac-VHT40: 22.16dBm 802.11ac-VHT80: 19.04dBm

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

2.3. Working Frequencies for this report

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

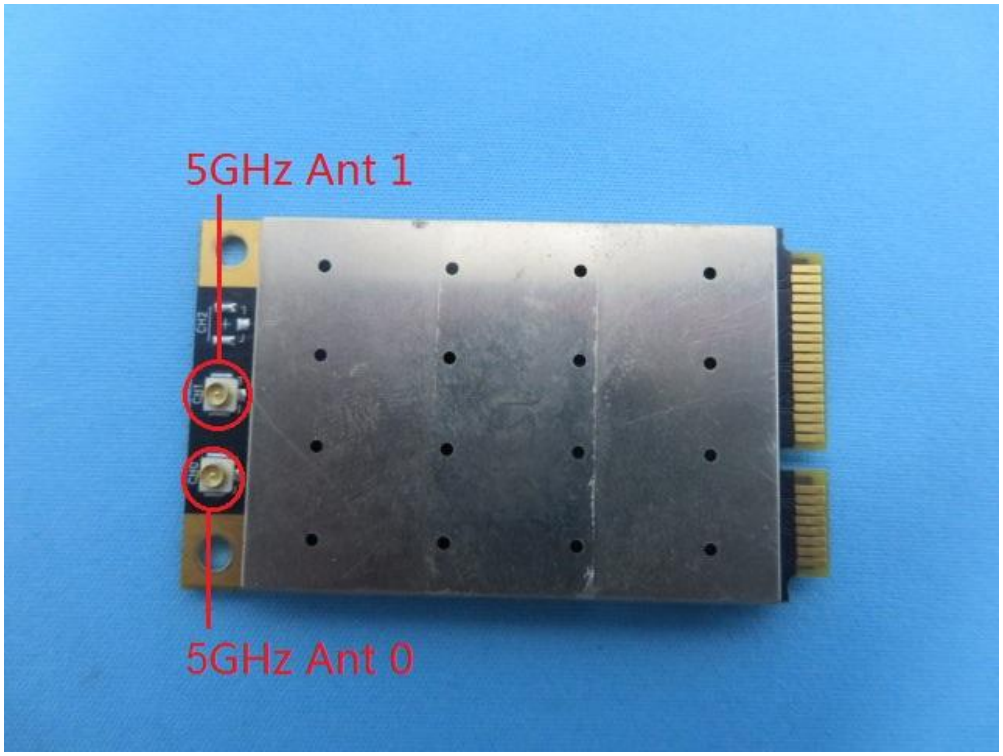
2.4. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	Model	Model	Max Peak Antenna Gain (dBi)
	5150 ~ 5875	MTI Wireless E dge Ltd.	MT-485001	18.0
	4900 ~ 5875	PENSON Wireless, Inc., Taiwan	OM24580703	7.0

Note: The device didn't support beam-forming technology and Cyclic Delay Diversity (CDD) technology, and the transmit signals are uncorrected, so no add array gain to the band power and band PSD.

2.5. Description of Antenna RF Port

Antenna RF Port		
--	5GHz RF Port	
Software Control Port for 1Tx	Ant 0	Ant 1
Software Control Port for 2Tx	Ant 0	Ant 1



2.6. 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

2.7. Description of Test Software

The test utility software used during testing was “ART2-GUI”, and the version was 2.3.

Power Parameter Value

1TX

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value	
			Ant 0	Ant 1
802.11a	36	5180	12.0	12.0
	44	5220	11.0	13.0
	48	5240	12.0	13.0
	52	5260	9.5	9.0
	60	5300	9.5	9.5
	64	5320	9.0	9.5
	100	5500	8.0	8.5
	120	5600	9.5	9.0
	140	5700	11.5	11.0
	149	5745	20.5	21.0
	157	5785	18.0	18.0
	165	5825	23.0	23.0

2TX

Test Mode	Test Channel No.	Test Frequency (MHz)	Power Parameter Value
802.11 n-HT20	36	5180	10.0
	44	5220	10.0
	48	5240	10.5
	52	5260	6.5
	60	5300	6.5
	64	5320	6.5
	100	5500	6.0
	120	5600	5.5
	140	5700	6.0
	149	5745	14.5
	157	5785	18.0
	165	5825	23.0
802.11n-HT40	38	5190	9.5
	46	5230	15.0
	54	5270	9.0
	62	5310	9.5
	102	5510	7.0
	118	5590	8.5
	134	5670	9.5
	151	5755	18.0
	159	5795	23.0
802.11ac-VHT20	36	5180	10.0
	44	5220	10.5
	48	5240	10.5
	52	5260	6.5
	60	5300	7.0
	64	5320	6.5
	100	5500	5.5
	120	5600	6.0
	140	5700	9.0
	144	5720	10.0
	149	5745	15.0
	157	5785	18.0
	165	5825	23.0

802.11ac-VHT40	38	5190	9.0
	46	5230	15.5
	54	5270	7.5
	62	5310	8.0
	102	5510	7.0
	118	5590	8.5
	134	5670	9.5
	142	5710	10.0
	151	5755	18.0
	159	5795	23.0
802.11ac-VHT80	42	5210	7.0
	58	5290	8.0
	106	5530	5.5
	122	5610	9.0
	138	5690	10.5
	155	5775	18.5

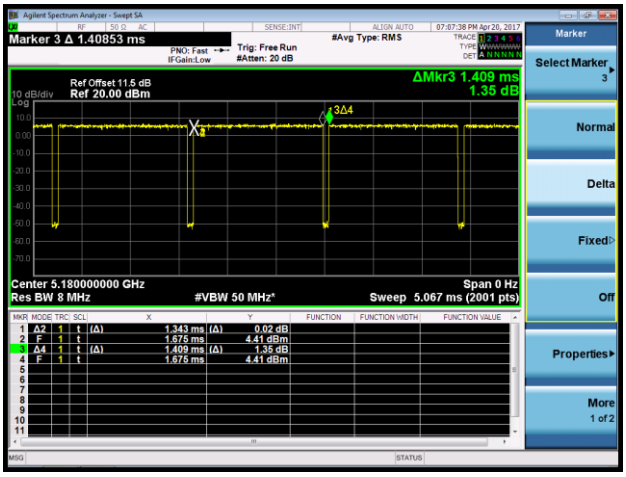
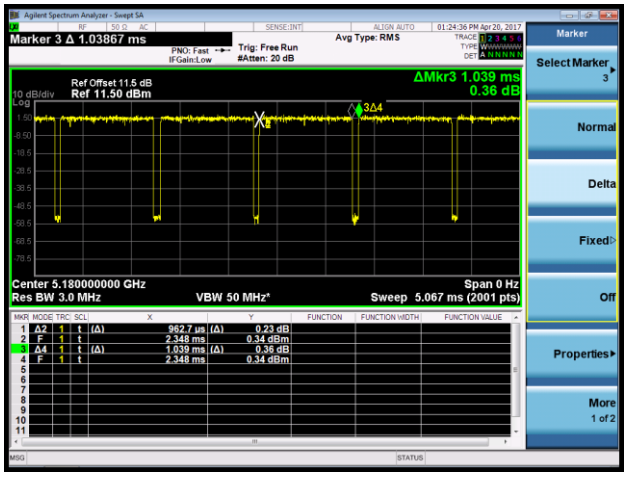
2.8. Device Capabilities

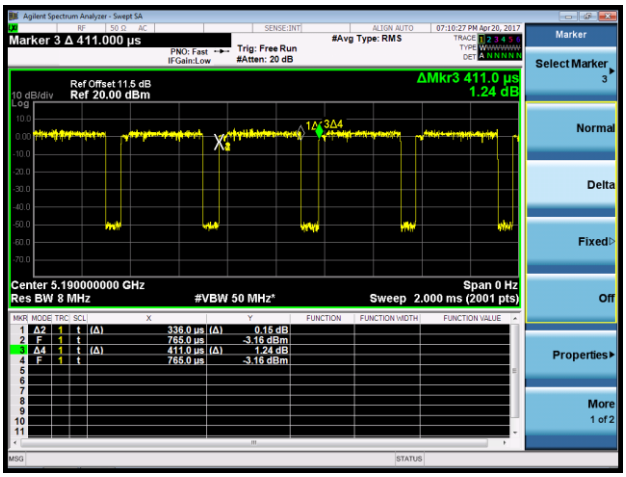
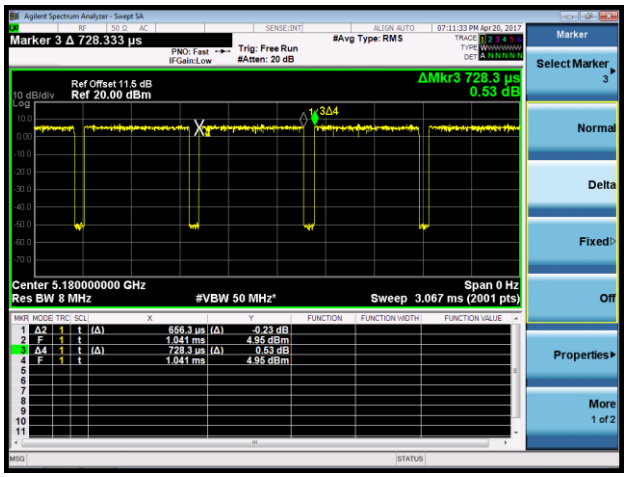
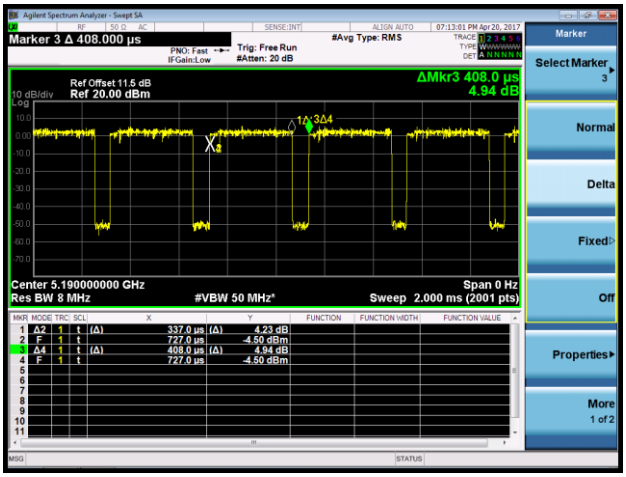
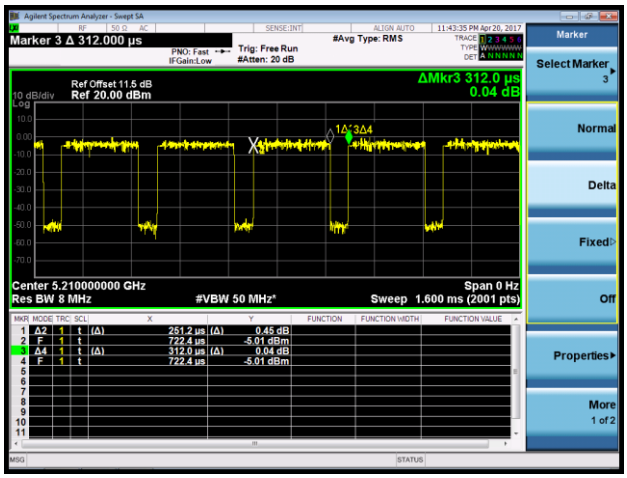
This device contains the following capabilities:

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 D02v01r03. 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	95.32 %
802.11n-HT20	92.66 %
802.11n-HT40	81.75 %
802.11ac-VHT20	90.11 %
802.11ac-VHT40	82.60 %
802.11ac-VHT80	80.51 %

802.11a	802.11n-HT20
	

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

2.9. Test Configuration

The **802.11ac Dual Band Module** was tested per the guidance of KDB 789033 D02v01r03. 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 D02v01r03 were used in the measurement of the **802.11ac Dual Band Module.**

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 **802.11ac Dual Band Module** uses a unique connector (I-PEX).

Conclusion:

The **802.11ac Dual Band Module FCC ID: TK4WLE600VX** 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	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/20
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2017/05/10

Radiated Spurious Emission and Radiated Restricted Band Edge - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2017/05/07
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2017/06/21
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2018/03/28
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2018/04/16
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2017/11/21
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2017/12/10
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2017/12/10
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/01/04
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/20
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2017.05.10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2017/05/07
USB wideband power sensor	Boonton	55006	MRTSUE06109	1 year	2017/05/08
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

7. TEST RESULT

7.1. Summary

Product Name: **802.11ac Dual Band Module**

FCC ID: **TK4WLE600VX**

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	≤ 30 dBm U-NII-1 ≤ 24 dBm U-NII-2A & 2C ≤ 30 dBm U-NII-3 Detail see section 7.4		Pass	Section 7.4
15.407(a)(1)(ii), (2), (3), (5)	Peak Power Spectral Density	≤ 17 dBm/MHz U-NII-1 ≤ 11 dBm/MHz U-NII-2A&2C ≤ 30 dBm/500kHz U-NII-3		Pass	Section 7.5
15.407(g)	Frequency Stability	N/A		Pass	Section 7.6
15.407(b)(1), (2), (3), (4)(i)	Undesirable Emissions	≤ -27dBm/MHz EIRP Detail see section 7.8	Radiated	Pass	Section 7.7 & 7.8
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 7.9

Notes:

1) 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.
2) Test Items “26dB Bandwidth” & “99% Bandwidth” & “6dB Bandwidth” & “Frequency Stability” have been assessed MIMO transmission, and showed the worst single test data in this report.

7.2. 26dB Bandwidth Measurement

7.2.1. Test Limit

N/A

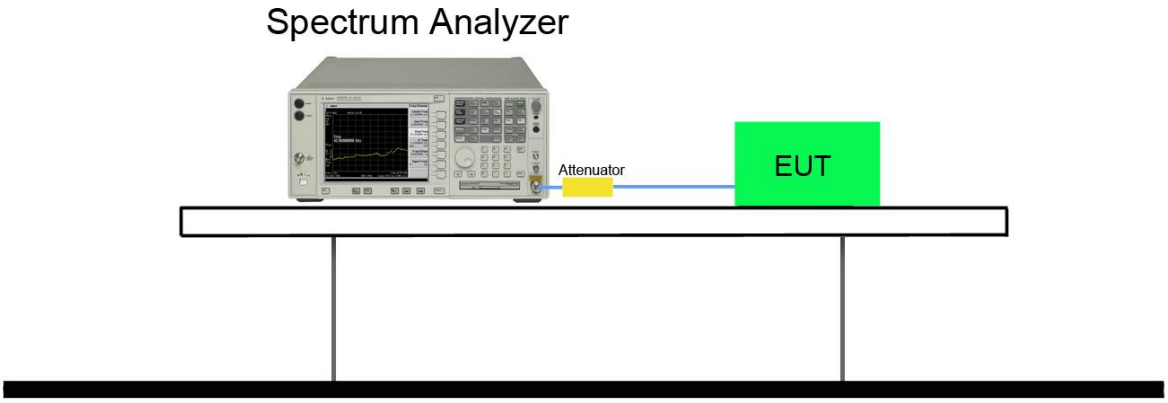
7.2.2. Test Procedure used

KDB 789033 D02v01r03 - 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	802.11ac Dual Band Module	Temperature	22°C
Test Engineer	Bruce Wang	Relative Humidity	54%
Test Site	TR3	Test Date	2017/03/25

1TX

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0					
802.11a	6	36	5180	22.22	16.69
802.11a	6	44	5220	24.90	16.84
802.11a	6	48	5240	25.62	16.77
802.11a	6	52	5260	22.28	16.68
802.11a	6	60	5300	22.19	16.68
802.11a	6	64	5320	21.19	16.64
802.11a	6	100	5500	21.96	16.67
802.11a	6	120	5600	22.04	16.67
802.11a	6	140	5700	22.50	16.67
802.11a	6	149	5745	22.00	16.66
802.11a	6	157	5785	22.51	16.66
802.11a	6	165	5825	26.40	16.84
Ant 1					
802.11a	6	36	5180	21.95	16.66
802.11a	6	44	5220	22.34	16.68
802.11a	6	48	5240	23.16	16.69
802.11a	6	52	5260	22.25	16.66
802.11a	6	60	5300	22.39	16.67
802.11a	6	64	5320	21.76	16.69
802.11a	6	100	5500	21.71	16.65
802.11a	6	120	5600	22.35	16.64
802.11a	6	140	5700	21.83	16.65
802.11a	6	149	5745	25.79	16.81
802.11a	6	157	5785	21.98	16.67
802.11a	6	165	5825	24.59	16.79

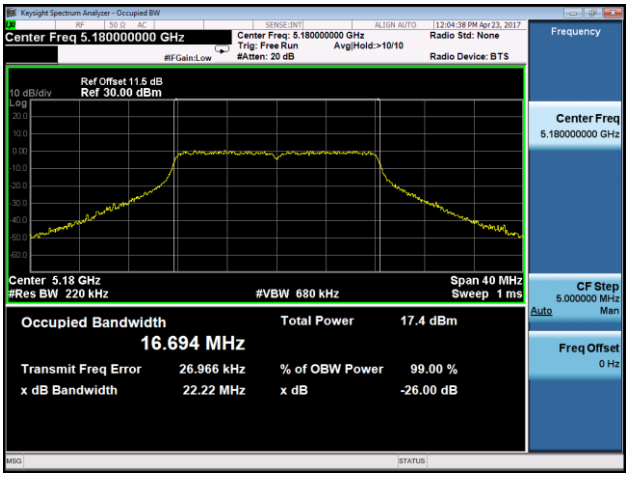
2TX

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 1 / Ant 0 + 1					
802.11n-HT20	13	36	5180	22.73	17.84
802.11n-HT20	13	44	5220	22.98	17.77
802.11n-HT20	13	48	5240	23.19	17.78
802.11n-HT20	13	52	5260	23.21	17.82
802.11n-HT20	13	60	5300	22.40	17.79
802.11n-HT20	13	64	5320	22.58	17.81
802.11n-HT20	13	100	5500	22.38	17.74
802.11n-HT20	13	120	5600	22.99	17.90
802.11n-HT20	13	140	5700	21.48	17.63
802.11n-HT20	13	149	5745	21.93	17.79
802.11n-HT20	13	157	5785	23.40	17.86
802.11n-HT20	13	165	5825	24.95	17.87
802.11n-HT40	27	38	5190	43.36	36.33
802.11n-HT40	27	46	5230	43.24	36.35
802.11n-HT40	27	54	5270	43.51	36.38
802.11n-HT40	27	62	5310	43.30	36.39
802.11n-HT40	27	102	5510	43.84	36.34
802.11n-HT40	27	118	5590	42.83	36.39
802.11n-HT40	27	134	5670	43.34	36.32
802.11n-HT40	27	151	5755	43.20	36.36
802.11n-HT40	27	159	5795	43.67	36.40

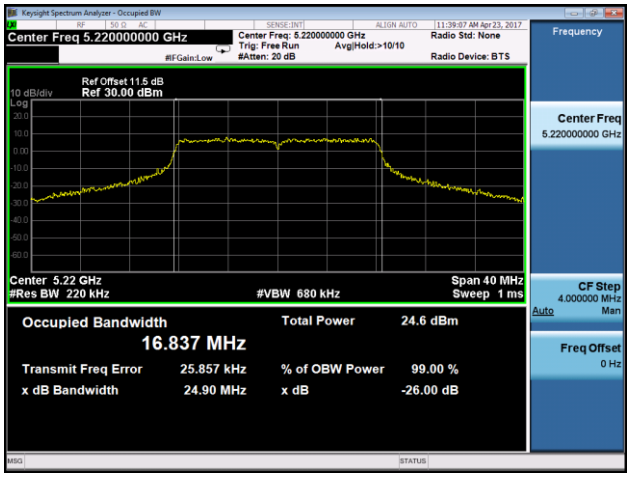
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 1 / Ant 0 + 1					
802.11ac-VHT20	13	36	5180	22.23	17.76
802.11ac-VHT20	13	44	5220	24.09	17.81
802.11ac-VHT20	13	48	5240	23.57	17.85
802.11ac-VHT20	13	52	5260	22.44	17.78
802.11ac-VHT20	13	60	5300	22.86	17.81
802.11ac-VHT20	13	64	5320	22.71	17.81
802.11ac-VHT20	13	100	5500	22.36	17.72
802.11ac-VHT20	13	120	5600	21.90	17.63
802.11ac-VHT20	13	140	5700	23.22	17.92
802.11ac-VHT20	13	144	5720	21.90	17.84
802.11ac-VHT20	13	149	5745	21.55	17.71
802.11ac-VHT20	13	157	5785	22.87	17.73
802.11ac-VHT20	13	165	5825	24.22	17.88
802.11ac-VHT40	27	38	5190	44.68	36.45
802.11ac-VHT40	27	46	5230	45.14	36.42
802.11ac-VHT40	27	54	5270	44.97	36.42
802.11ac-VHT40	27	62	5310	45.07	36.43
802.11ac-VHT40	27	102	5510	44.62	36.31
802.11ac-VHT40	27	118	5590	44.98	36.52
802.11ac-VHT40	27	134	5670	44.38	36.70
802.11ac-VHT40	27	142	5710	43.63	36.21
802.11ac-VHT40	27	151	5755	44.07	36.21
802.11ac-VHT40	27	159	5795	45.03	36.41
802.11ac-VHT80	58.6	42	5210	85.30	75.92
802.11ac-VHT80	58.6	58	5290	85.38	76.00
802.11ac-VHT80	58.6	106	5530	87.09	75.94
802.11ac-VHT80	58.6	122	5610	89.00	75.94
802.11ac-VHT80	58.6	138	5690	86.26	75.79
802.11ac-VHT80	58.6	155	5775	86.78	76.07

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0

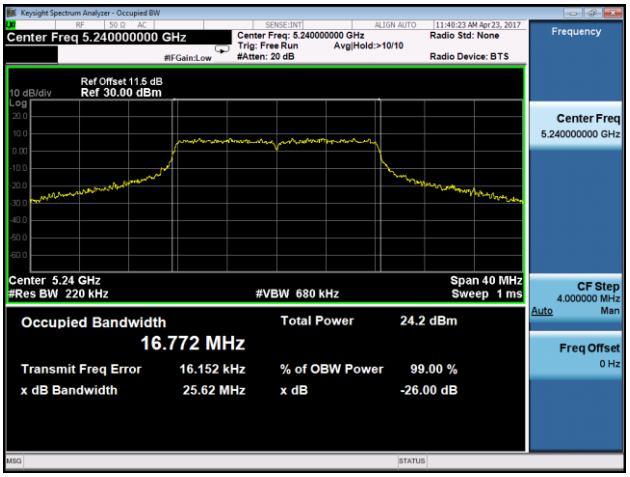
Channel 36 (5180MHz)



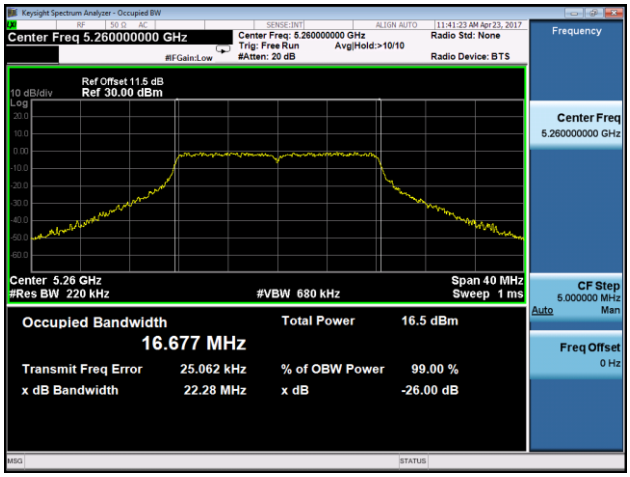
Channel 44 (5220MHz)



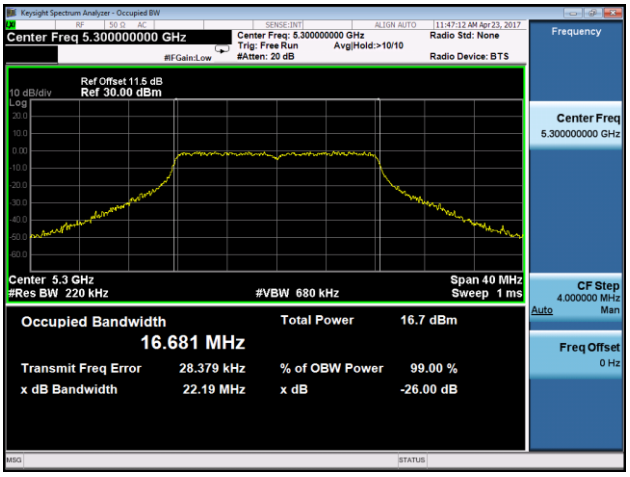
Channel 48 (5240MHz)



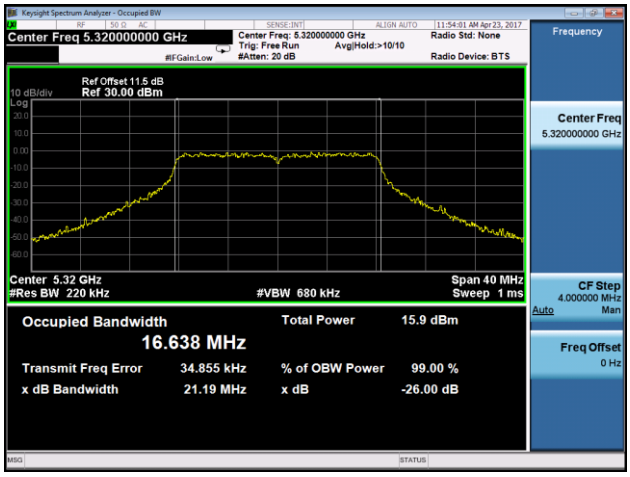
Channel 52 (5260MHz)



Channel 60 (5300MHz)

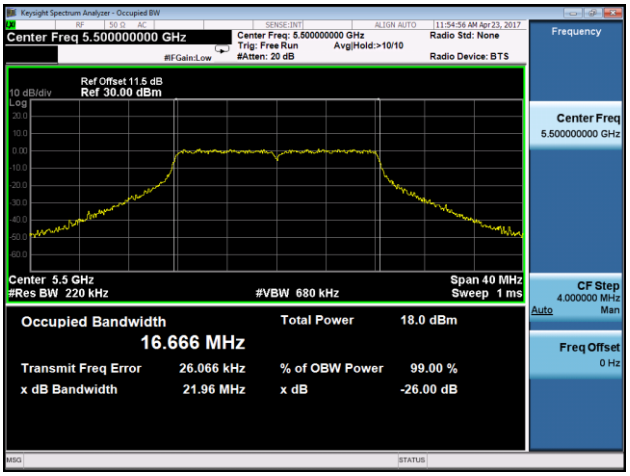


Channel 64 (5320MHz)

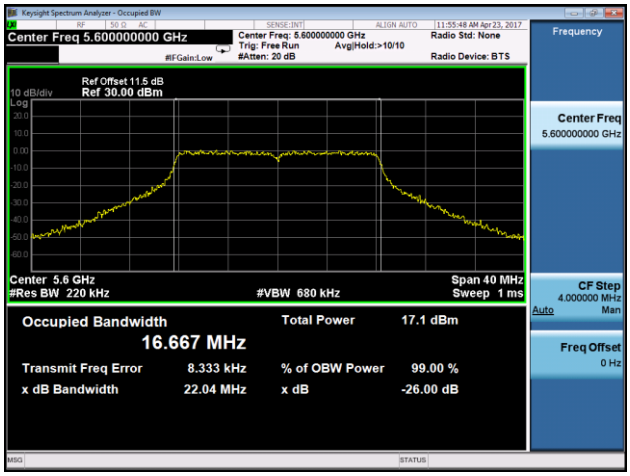


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0

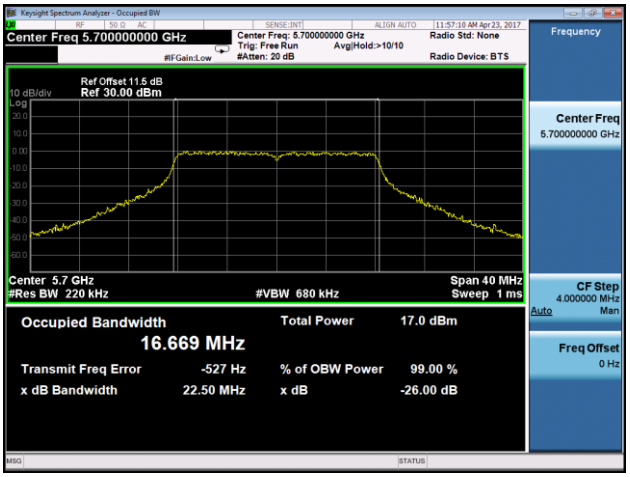
Channel 100 (5500MHz)



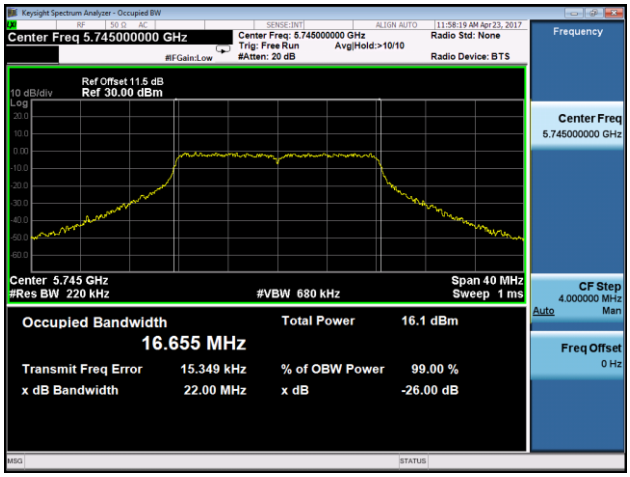
Channel 120 (5600MHz)



Channel 140 (5700MHz)

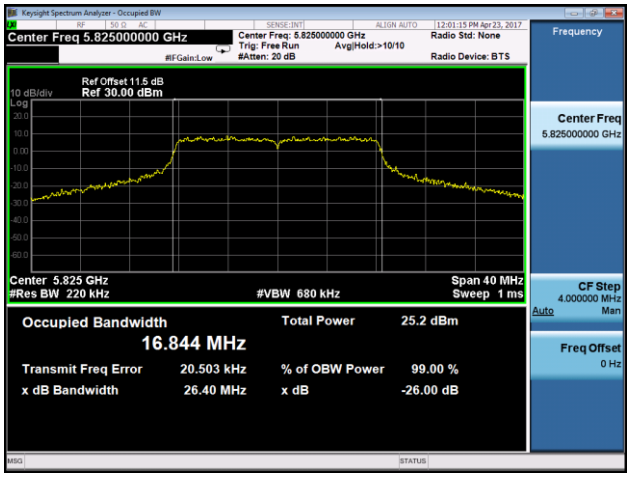


Channel 149 (5745MHz)



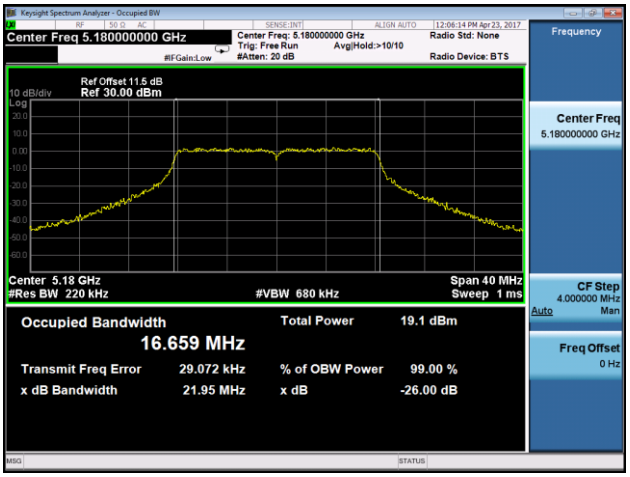
Channel 157 (5785MHz)

Channel 165 (5825MHz)

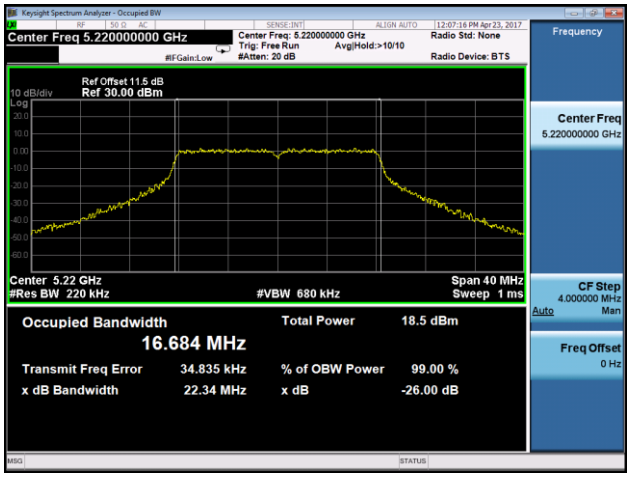


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1

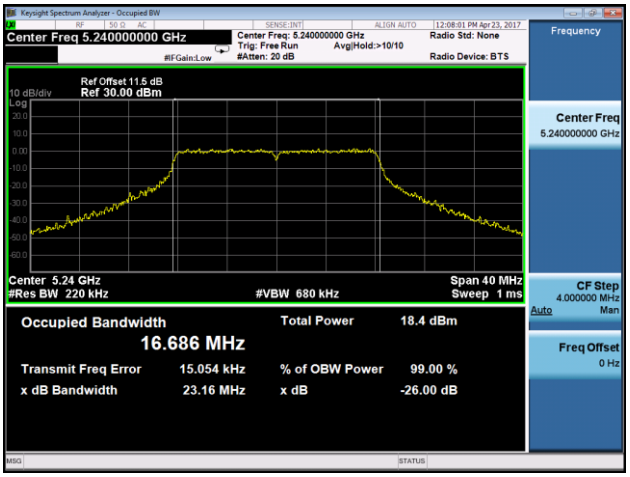
Channel 36 (5180MHz)



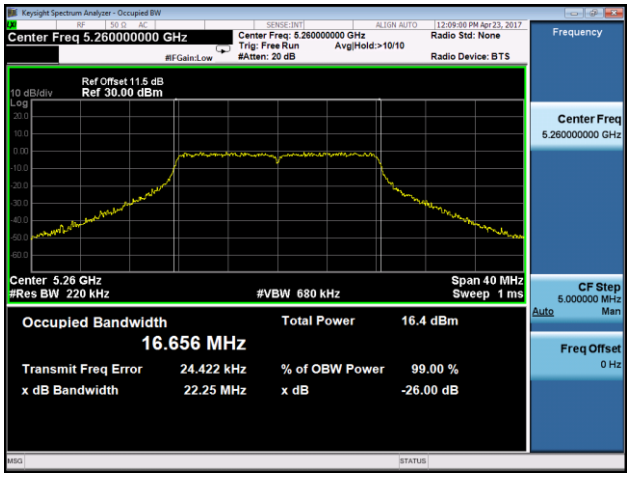
Channel 44 (5220MHz)



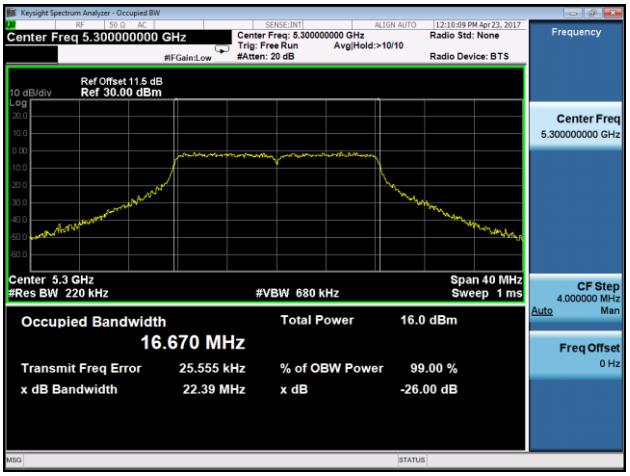
Channel 48 (5240MHz)



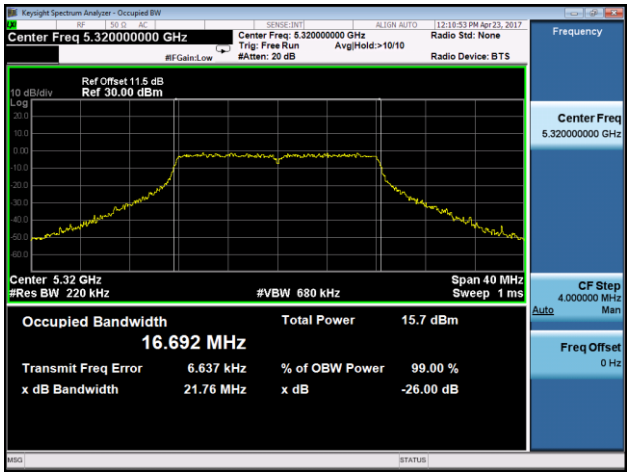
Channel 52 (5260MHz)



Channel 60 (5300MHz)

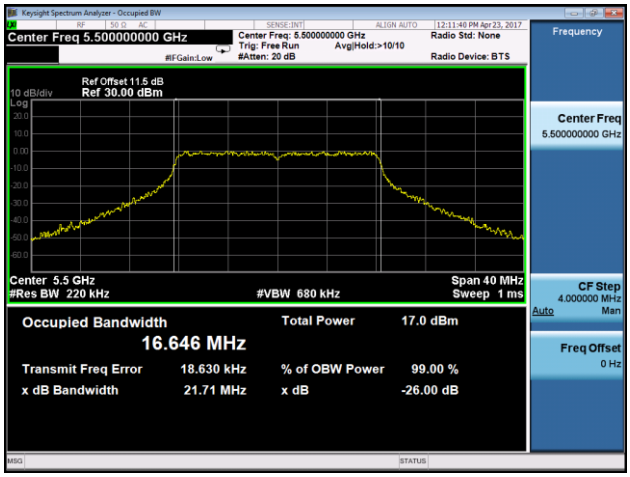


Channel 64 (5320MHz)

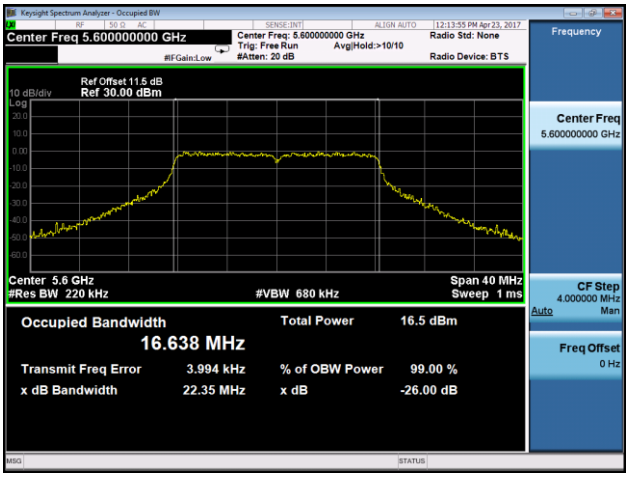


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1

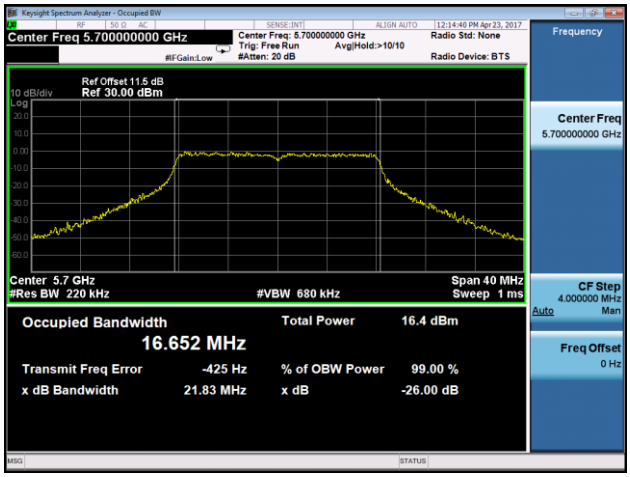
Channel 100 (5500MHz)



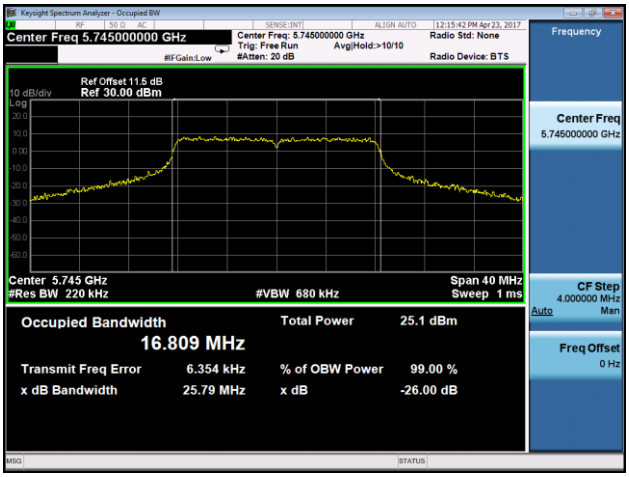
Channel 120 (5600MHz)



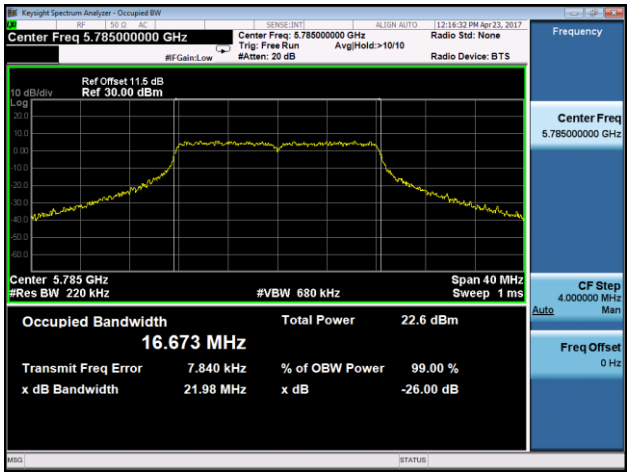
Channel 140 (5700MHz)



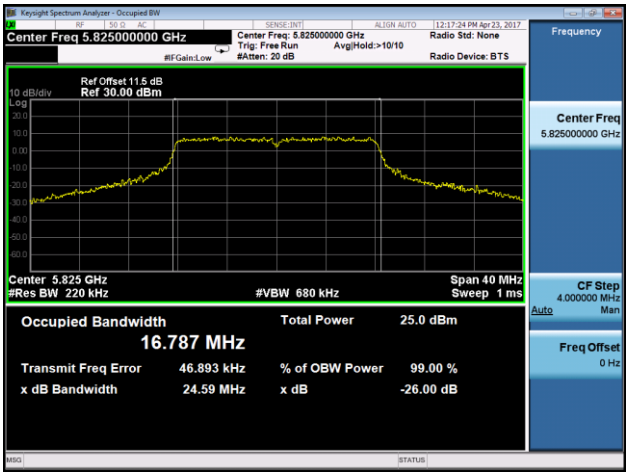
Channel 149 (5745MHz)



Channel 157 (5785MHz)

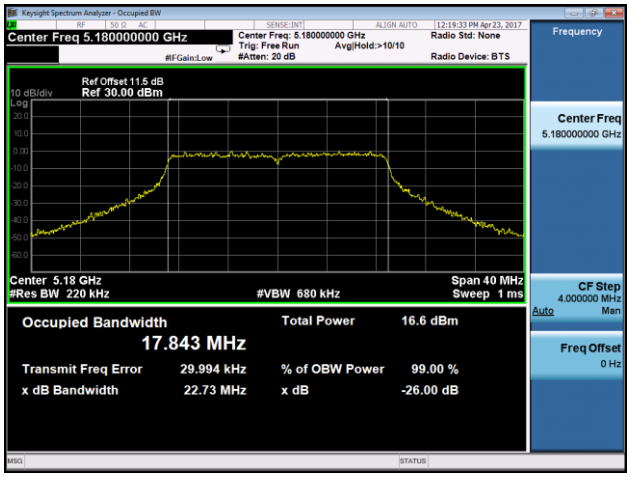


Channel 165 (5825MHz)

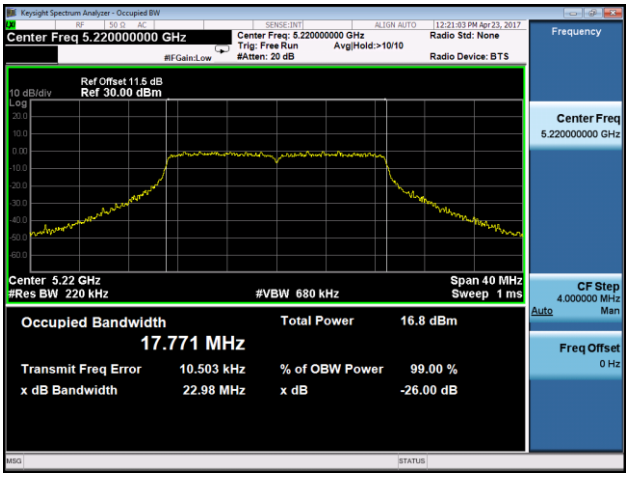


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 +1

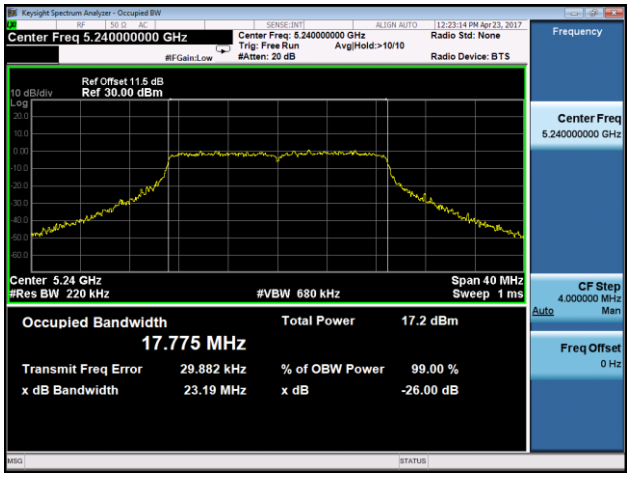
Channel 36 (5180MHz)



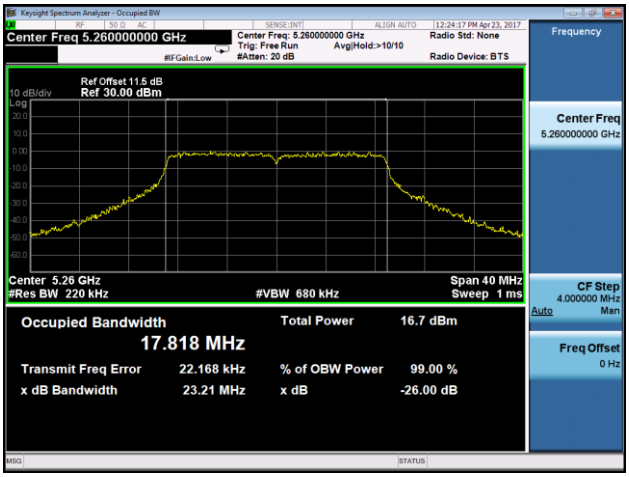
Channel 44 (5220MHz)



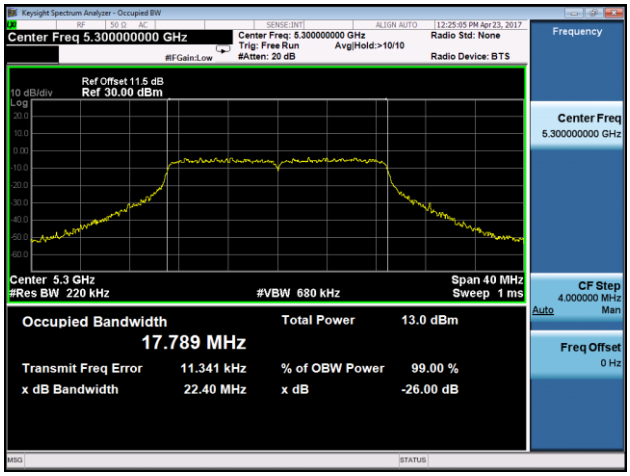
Channel 48 (5240MHz)



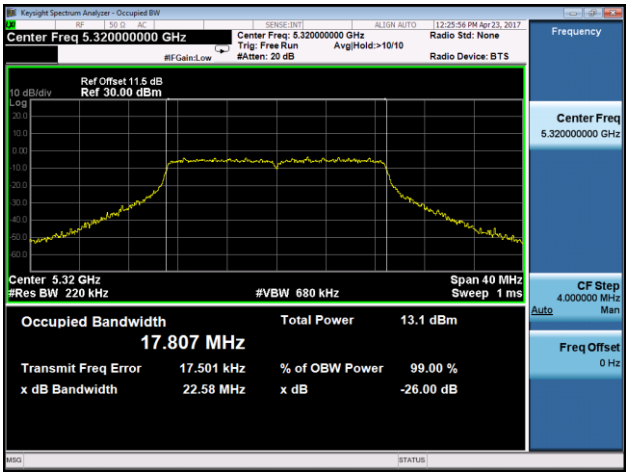
Channel 52 (5260MHz)



Channel 60 (5300MHz)

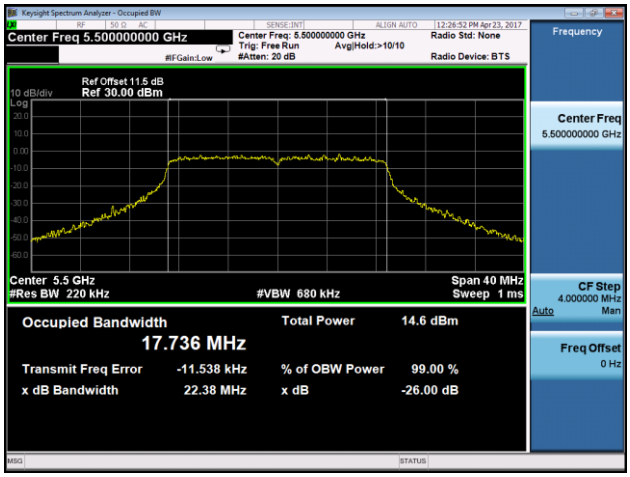


Channel 64 (5320MHz)

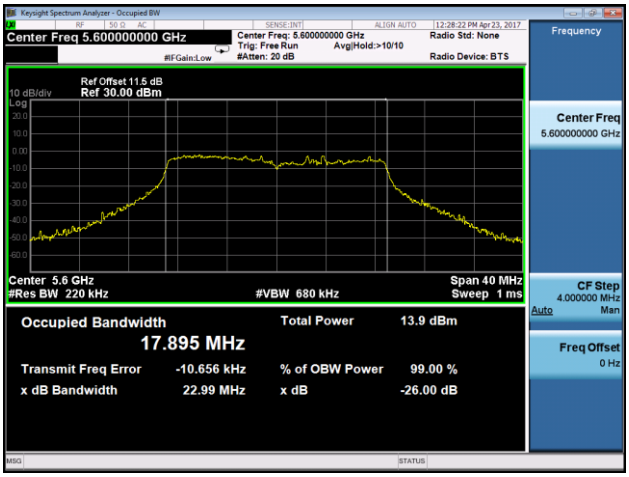


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 +1

Channel 100 (5500MHz)

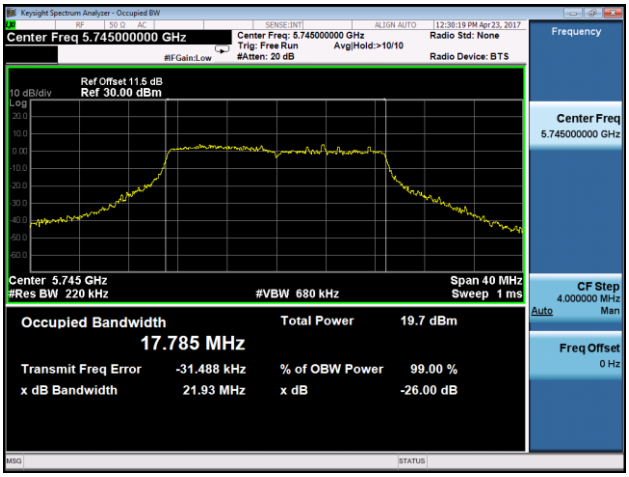


Channel 120 (5600MHz)

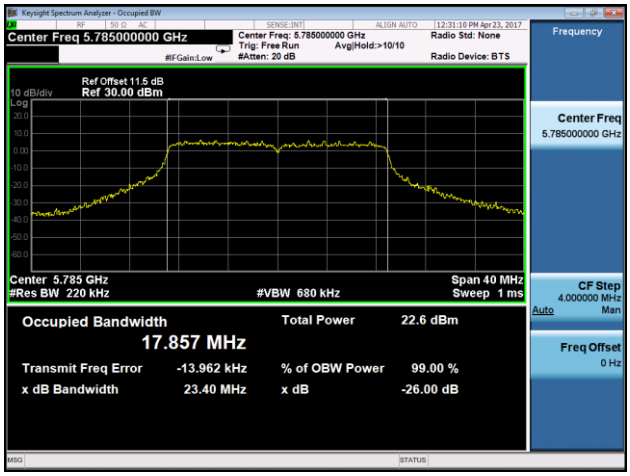


Channel 140 (5700MHz)

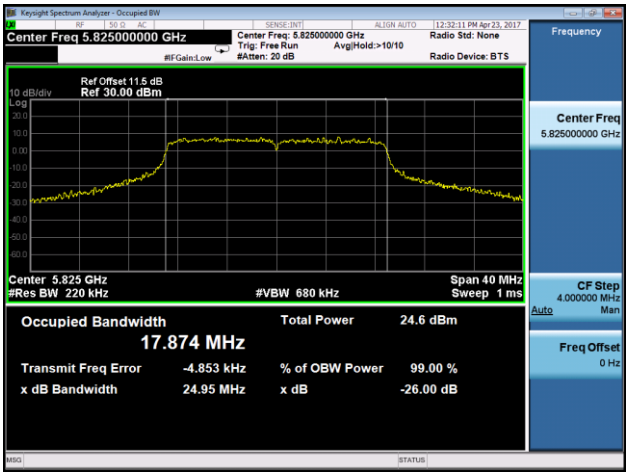
Channel 149 (5745MHz)



Channel 157 (5785MHz)

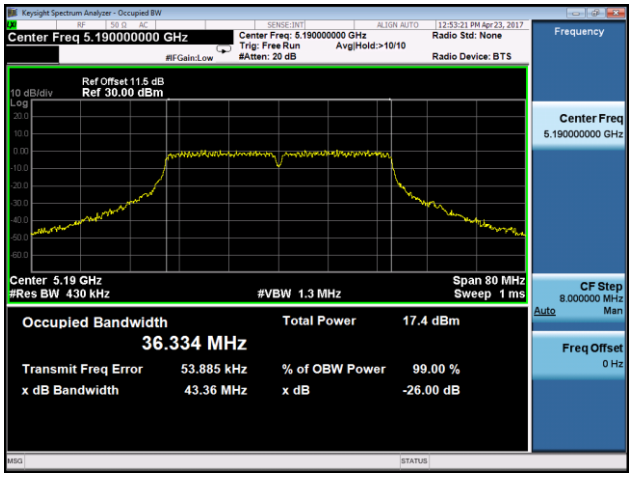


Channel 165 (5825MHz)

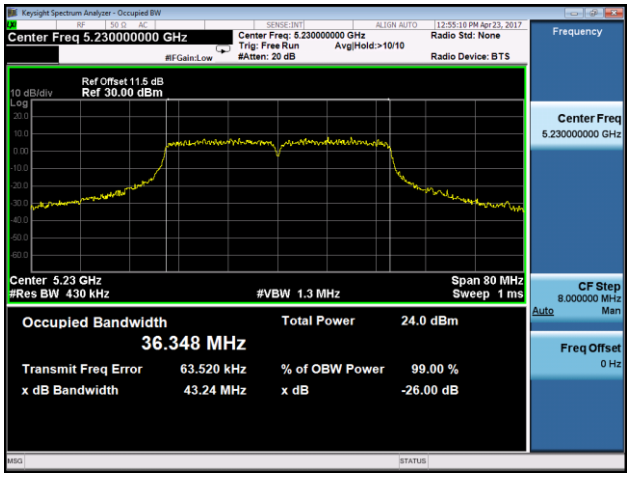


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 +1

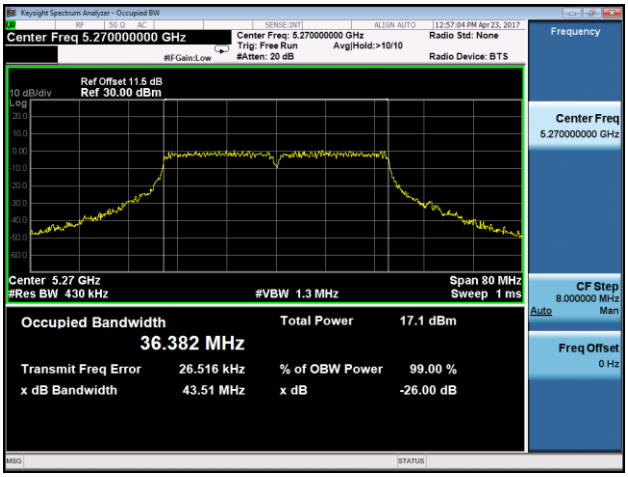
Channel 38 (5190MHz)



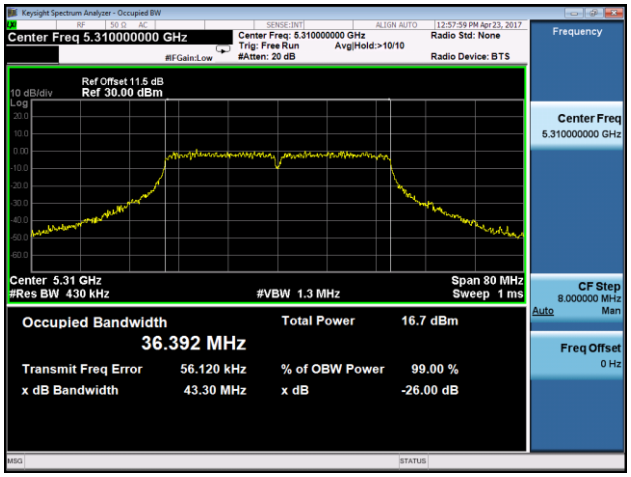
Channel 46 (5230MHz)



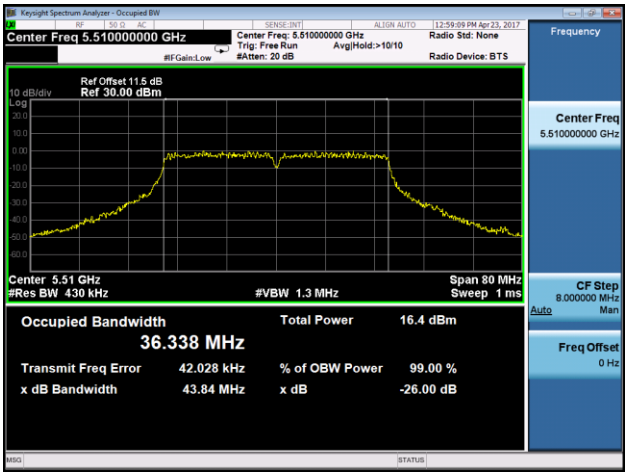
Channel 54 (5270MHz)



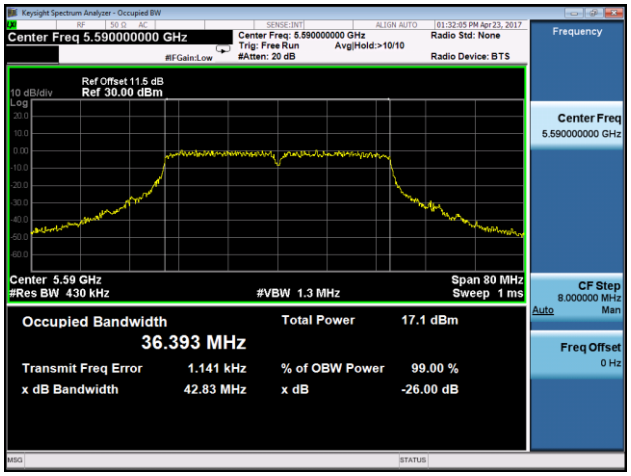
Channel 62 (5310MHz)



Channel 102 (5510MHz)

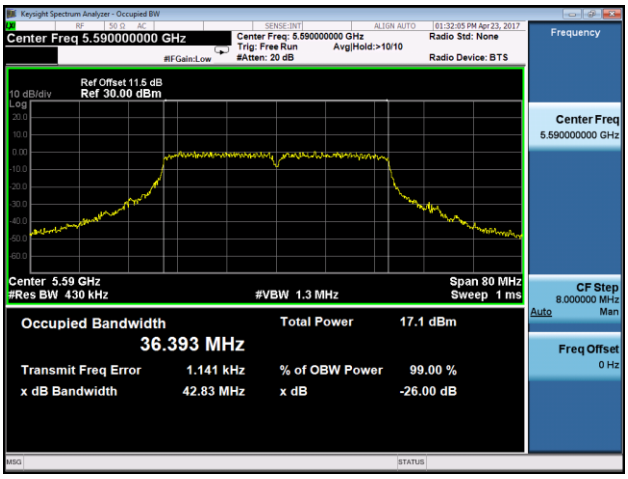


Channel 118 (5590MHz)

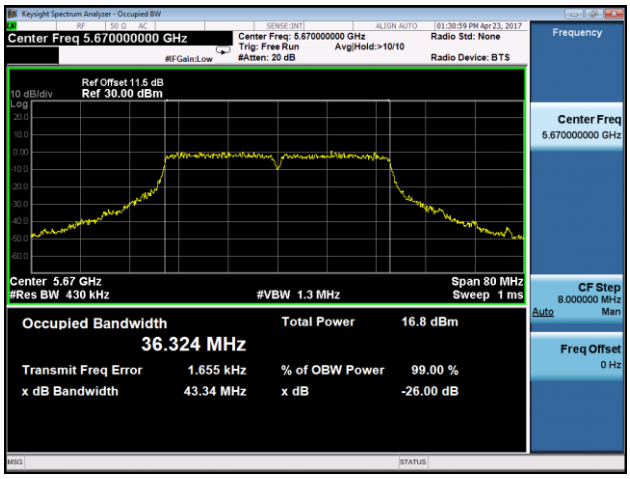


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 +1

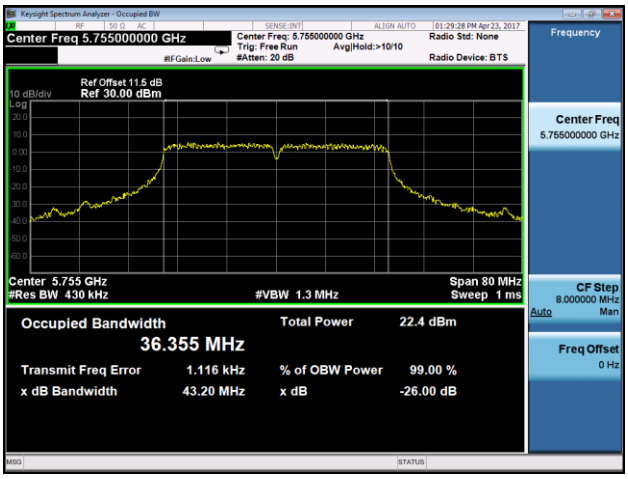
Channel 118 (5590MHz)



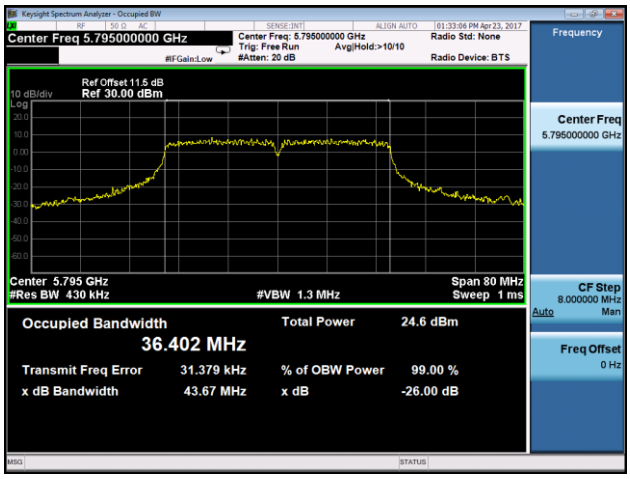
Channel 134 (5670MHz)



Channel 151 (5755MHz)

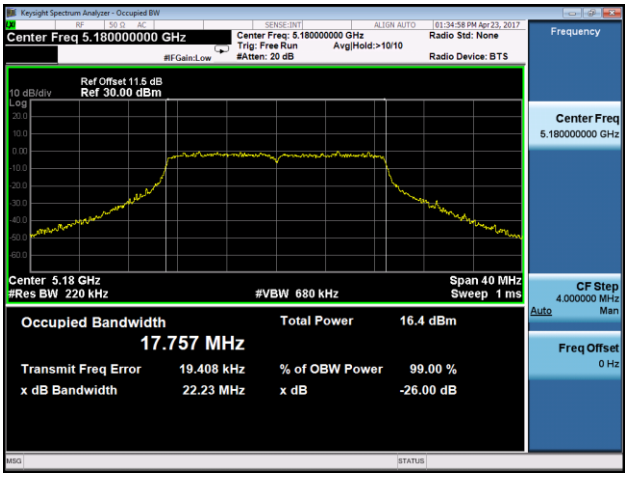


Channel 159 (5795MHz)

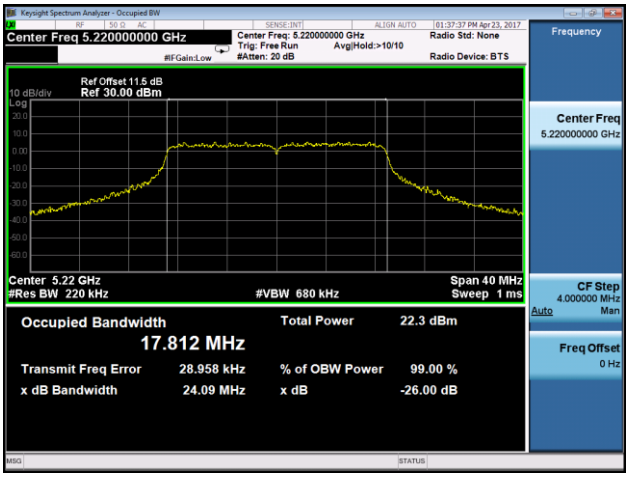


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 +1

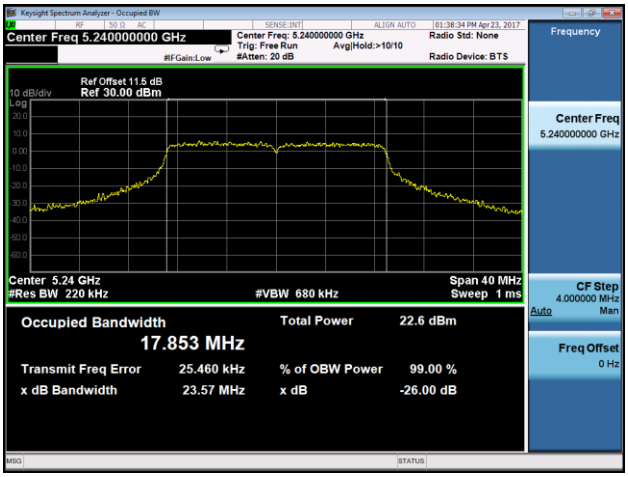
Channel 36 (5180MHz)



Channel 44 (5220MHz)

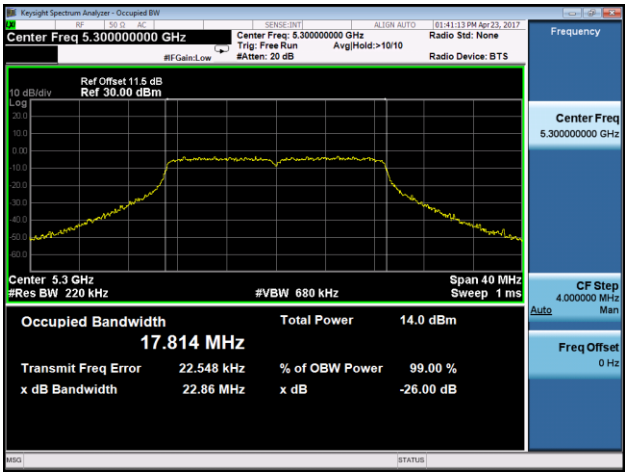
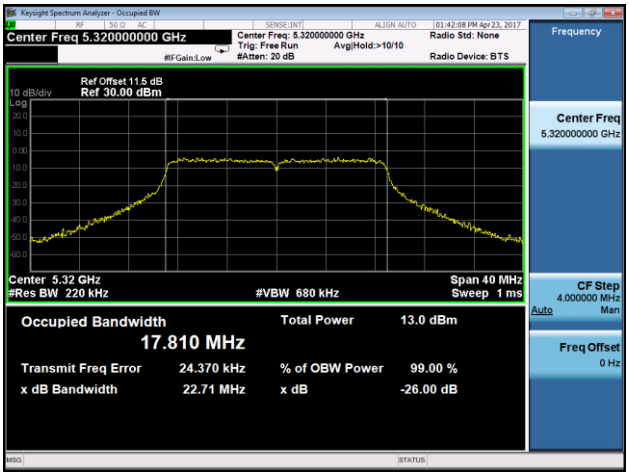


Channel 48 (5240MHz)



Channel 52 (5260MHz)

Channel 60 (5300MHz)



Channel 64 (5320MHz)