FCC TEST REPORT

For

Shenzhen Four Seas Global Link Network Technology Co., Ltd

11AC Dual Band Wireless Adapter

Test Model: CF-917AC

List Model No.: CF-913AC, CF-915AC, CF-916AC, CF-7500AC, CF-923AC, CF-926AC, CF-WU910A, CF-WU925A, CF-WU710N, CF-WU757F, CF-WU772AC, CF-918AC, CF-925AC, CF-927AC, CF-928AC, CF-930AC, CF-933AC, CF-935AC, CF-936AC

Prepared for	:	Shenzhen Four Seas Global Link Network Technology Co., Ltd
Address	:	Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road, Longhua District, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	September 26, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	September 26, 2017~October 25, 2017
Date of Report	:	October 25, 2017

FCC TEST REPORT
FCC CFR 47 PART 15 E(15.407): 2016

Report Reference No. ..... :	**LCS170925123AE1**
Date of Issue..... :	October 25, 2017
Testing Laboratory Name ..... :	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address..... :	1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure..... :	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name..... :	**Shenzhen Four Seas Global Link Network Technology Co., Ltd**
Address..... :	Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road, Longhua District, Shenzhen, China
Test Specification	
Standard ..... :	FCC CFR 47 PART 15 E(15.407): 2016
Test Report Form No. ..... :	LCSEMC-1.0
TRF Originator ..... :	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF..... :	Dated 2011-03

EUT Description. ..... :	**11AC Dual Band Wireless Adapter**
Trade Mark..... :	COMFAST
Model/ Type reference..... :	CF-917AC
Ratings..... :	DC 5V by USB Port of PC
Result ..... :	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Leo Lee	Dick Su	Gavin Liang
Leo Lee/ File administrators	Dick Su/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCS170925123AE1**	October 25, 2017 Date of issue

EUT.....	:	11AC Dual Band Wireless Adapter
Type / Model.....	:	CF-917AC
Applicant.....	**:**	**Shenzhen Four Seas Global Link Network Technology Co., Ltd**
Address.....	:	Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road, Longhua District, Shenzhen, China
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**Shenzhen Four Seas Global Link Network Technology Co., Ltd**
Address.....	:	Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road, Longhua District, Shenzhen, China
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**Shenzhen Four Seas Global Link Network Technology Co., Ltd**
Address.....	:	Room 607-610, Block B, TAOJINDI Electronic Business Incubation Base, Tenglong Road, Longhua District, Shenzhen, China
Telephone.....	:	/
Fax.....	:	/

Test Result:	**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

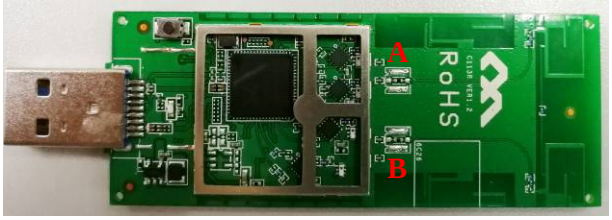
Revision	Issue Date	Revisions	Revised By
00	October 25, 2017	Initial Issue	Gavin Liang

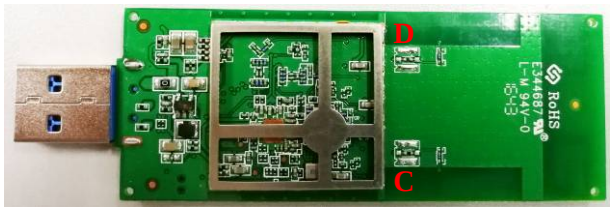
TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	11AC Dual Band Wireless Adapter
Model Number	:	CF-917AC, CF-913AC, CF-915AC, CF-916AC, CF-7500AC, CF-923AC, CF-926AC, CF-WU910A, CF-WU925A, CF-WU710N, CF-WU757F, CF-WU772AC, CF-918AC, CF-925AC, CF-927AC, CF-928AC, CF-930AC, CF-933AC, CF-935AC, CF-936AC
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, Only models name is different for these models.
Test Model	:	CF-917AC
Power Supply	:	DC 5V by USB Port of PC
Hardware version	:	V1.3
Software version	:	1030.4
WLAN	:	Supported 802.11a/b/g/n/ac
WLAN FCC Operation Frequency	:	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz / 5745-5825MHz IEEE 802.11n HT40:2422-2452MHz / 5755-5795MHz IEEE 802.11a: 5745-5825MHz IEEE 802.11ac VHT20: 5745-5825MHz IEEE 802.11ac VHT40: 5755-5795MHz IEEE 802.11ac VHT80: 5775MHz
WLAN Channel Number	:	11 Channels for 2412-2462MHz(802.11b/g/n HT20) 7 Channels for 2422-2452MHz(802.11n HT40) 5 Channels for 5745-5825MHz(802.11a/ac VHT20/n HT20) 2 Channels for 5755-5795MHz(802.11ac VHT40/n HT40) 1 Channels for 5775MHz(802.11ac VHT80)
WLAN Modulation Technology	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Type And Gain	:	PCB Antenna A, 2.0dBi(Max.), for TX/RX (Antenna 0) PCB Antenna B, 2.0dBi(Max.), for TX/RX (Antenna 1) PCB Antenna C, 2.0dBi(Max.), for TX/RX (Antenna 2) PCB Antenna D, 2.0dBi(Max.), for RX Only This device is a 3T4R wireless product.
Directional Gain	:	2.0 + 10log(3) = 6.77 dBi





1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate

1.3. External I/O Port

I/O Port Description	Quantity	Cable
USB Port	1	N/A

1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is CN5024.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001
NVLAP Registration Code is 600167-0

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

AC power line conducted emission pre-test at both at AC 120V/60Hz and AC 240V/50Hz modes, recorded worst case.

Worst-case mode and channel used for 150 KHz-30 MHz power line conducted emissions was the mode and channel with the highest output power that was determined to be IEEE 802.11ac VHT20 mode (Low Channel, Chain 0+Chain 1+Chain 2).

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be IEEE 802.11ac VHT20 mode (Low Channel, Chain 0+Chain 1+Chain 2).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

IEEE 802.11a Mode: 6 Mbps, OFDM.
IEEE 802.11n HT20 Mode: MCS0, OFDM.
IEEE 802.11n HT40 Mode: MCS0, OFDM.
IEEE 802.11ac VHT20 Mode: MCS0, OFDM.
IEEE 802.11ac VHT40 Mode: MCS0, OFDM.
IEEE 802.11ac VHT80 Mode: MCS0, OFDM.

Antenna & Bandwidth

Antenna	Antenna 0			Antenna 1			Antenna 2			Simultaneously
Bandwidth Mode	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz	/
IEEE 802.11a	☑	☐	☐	☑	☐	☐	☑	☐	☐	☐
IEEE 802.11n	☑	☑	☐	☑	☑	☐	☑	☑	☐	☑
IEEE 802.11ac	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Note: The Antenna D is used for receiving only.

Channel & Frequency:

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
5745~5825MHz	**149**	**5745**	**155**	**5775**
	151	**5755**	**159**	**5795**
	153	5765	161	5805
	157	**5785**	**165**	**5825**
For IEEE 802.11a/n HT20/ac VHT20, Channel 149, 157 and 165 were tested. For IEEE 802.11n HT40/ac VHT40, Channel 151 and 159 were tested. For IEEE 802.11ac VHT80, Channel 155 was tested.				

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB 789033 D02 General UNII Test Procedures New Rules v01r04 and KDB 662911 D01 Multiple Transmitter Output v02r01 are required to be used for this kind of FCC 15.407 UII device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013.

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (MPTool) provided by application.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
1	PC	Lenovo	Ideapad	A131101550	/	/	DOC
2	Power adapter	Lenovo	CPA-A090	36200414	1.00m	unshielded	DOC

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart E		
FCC Rules	Description of Test	Result
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.407(e)	6dB Bandwidth	Compliant
§15.407(b)	Radiated Emissions	Compliant
§15.407(b)	Band edge Emissions	Compliant
§15.407(g)	Frequency Stability	Note
§15.207(a)	Line Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant
§2.1093	RF Exposure	Compliant

Note: The customer declared frequency stability is better than 20ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.

5. TEST RESULT

5.1. On Time and Duty Cycle

5.1.1. Standard Applicable

None; for reporting purpose only.

5.1.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of the spectrum analyzer.

5.1.3. Test Procedures

1. Set the Centre frequency of the spectrum analyzer to the transmitting frequency;
2. Set the span=0MHz, RBW=8MHz, VBW=50MHz, Sweep time=5ms;
3. Detector = peak;
4. Trace mode = Single hold.

5.1.4. Test Setup Layout

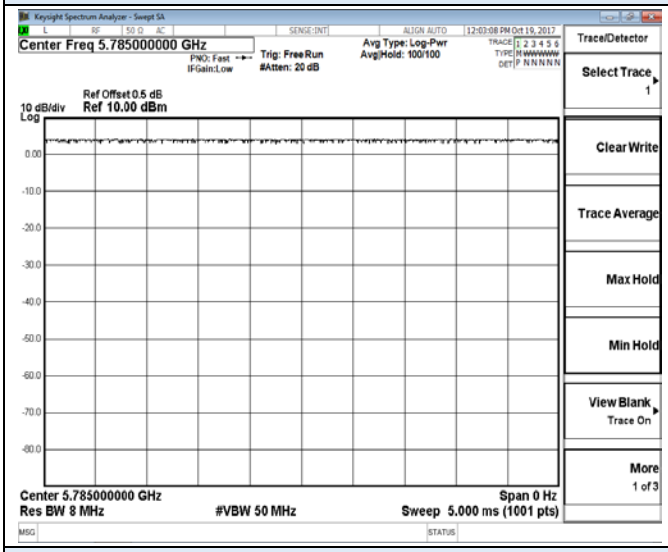
5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

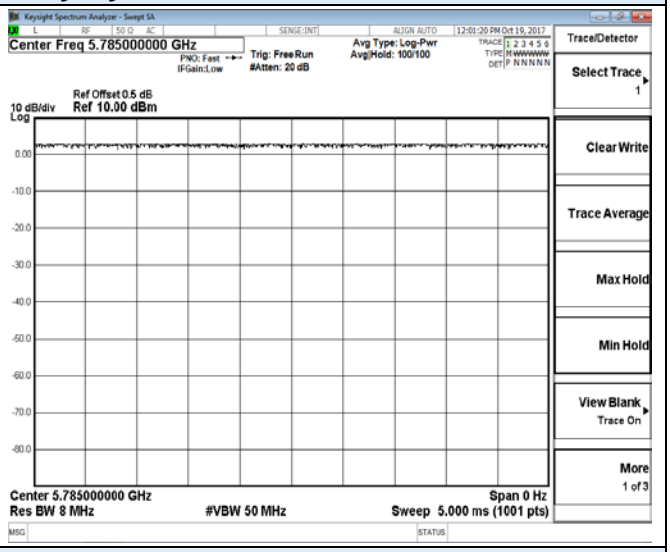
5.1.6. Test result

Mode	On Time B (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW(KHz)
IEEE 802.11a	5.0	5.0	1	100%	0	0.01
IEEE 802.11n HT20	5.0	5.0	1	100%	0	0.01
IEEE 802.11ac VHT20	5.0	5.0	1	100%	0	0.01
IEEE 802.11n HT40	5.0	5.0	1	100%	0	0.01
IEEE 802.11ac VHT40	5.0	5.0	1	100%	0	0.01
IEEE 802.11ac VHT80	5.0	5.0	1	100%	0	0.01
Note: Duty Cycle Correction Factor=10log(1/Duty cycle)						

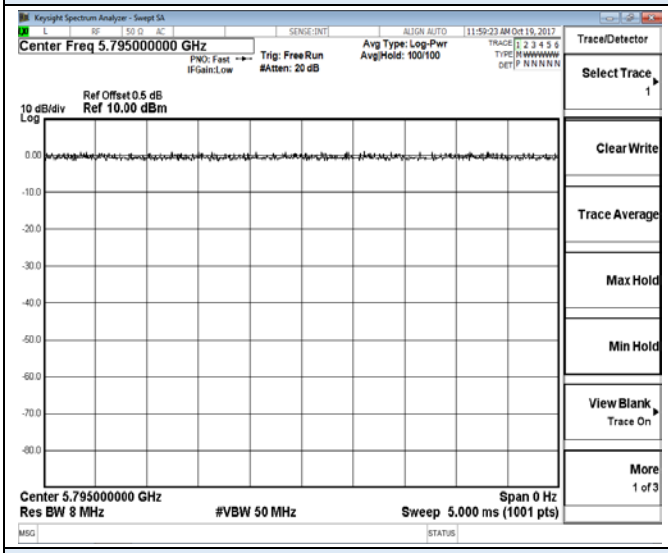
On Time and Duty Cycle



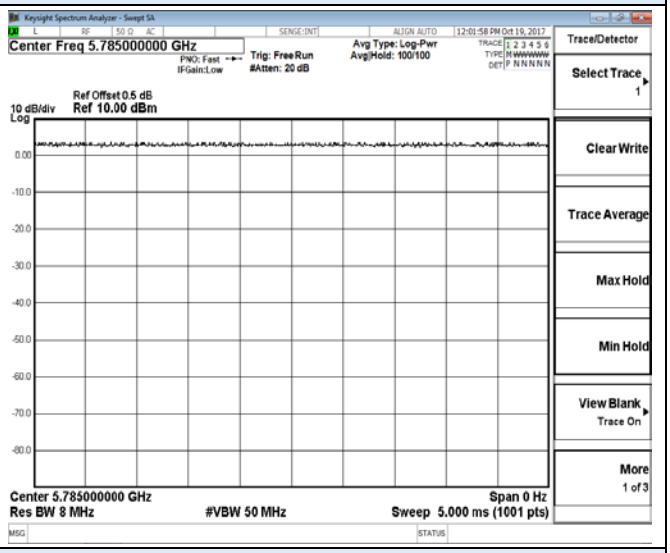
IEEE 802.11a



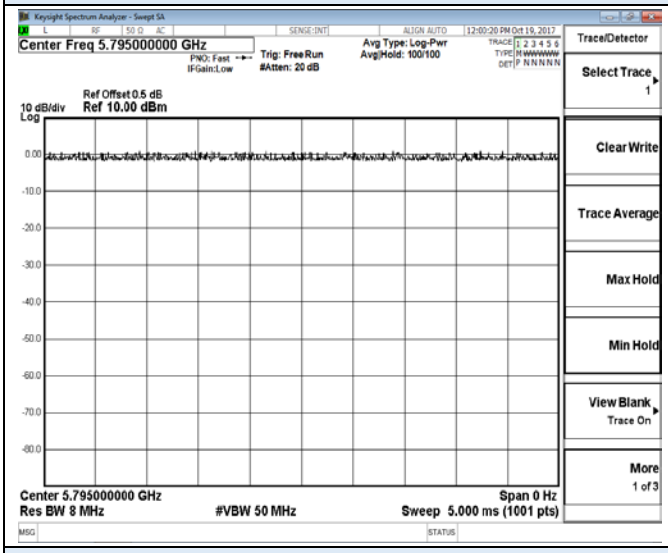
IEEE 802.11n HT20



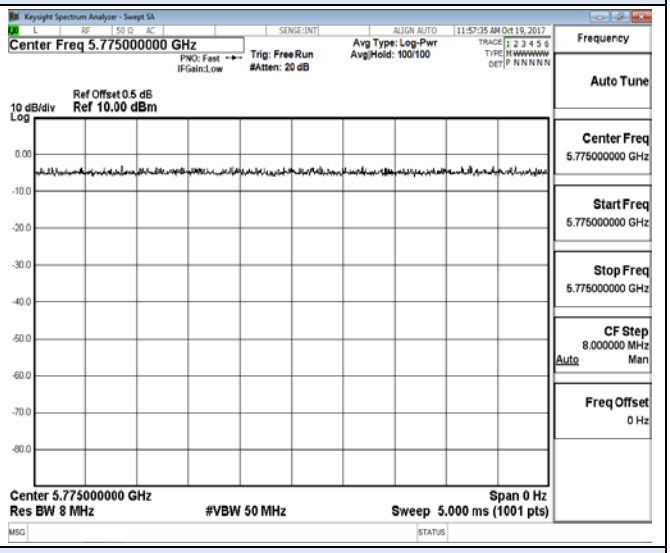
IEEE 802.11n HT40



IEEE 802.11ac VHT20



IEEE 802.11ac VHT40



IEEE 802.11ac VHT80

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

For 5725~5850MHz

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.2.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of the power meter.

5.2.3. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

According to KDB 789033 D02 Section 3 (a) Method PM (Measurement using an RF average power meter):

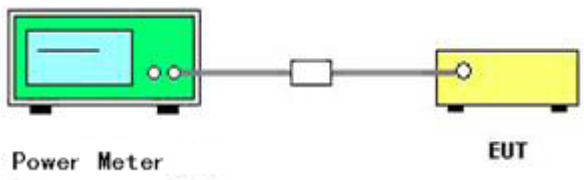
(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

5.2.4. Test Setup Layout



5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Test Result of Maximum Conducted Output Power

Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a/n/ac

Test Mode	Channel	Frequency (MHz)	Measured Conducted Average Power (dBm)				Duty Cycle Factor (dB)	Report Conducted Average Power (dBm)				Maximum Limit (dBm)	Result
			Antenna 0	Antenna 1	Antenna 2	Sum		Antenna 0	Antenna 1	Antenna 2	Sum		
IEEE 802.11a	149	5745	2.94	2.91	2.84	-/-	0.000	2.94	2.91	2.84	-/-	30	PASS
	157	5785	2.78	2.75	2.71	-/-	0.000	2.78	2.75	2.71	-/-		
	165	5825	2.66	2.56	2.55	-/-	0.000	2.66	2.56	2.55	-/-		
IEEE 802.11n HT20	149	5745	2.63	2.51	2.53	7.33	0.000	2.63	2.51	2.53	7.33	30	PASS
	157	5785	2.47	2.40	2.46	7.21	0.000	2.47	2.40	2.46	7.21		
	165	5825	2.64	2.51	2.58	7.35	0.000	2.64	2.51	2.58	7.35		
IEEE 802.11n HT40	151	5755	2.51	2.47	2.48	7.26	0.000	2.51	2.47	2.48	7.26	30	PASS
	159	5795	2.44	2.41	2.35	7.17	0.000	2.44	2.41	2.35	7.17		
IEEE 802.11ac VHT20	149	5745	2.76	2.73	2.73	7.51	0.000	2.76	2.73	2.73	7.51	30	PASS
	157	5785	2.60	2.56	2.53	7.33	0.000	2.60	2.56	2.53	7.33		
	165	5825	2.40	2.44	2.38	7.18	0.000	2.40	2.44	2.38	7.18		
IEEE 802.11ac VHT40	151	5755	2.37	2.31	2.35	7.11	0.000	2.37	2.31	2.35	7.11	30	PASS
	159	5795	2.55	2.52	2.45	7.28	0.000	2.55	2.52	2.45	7.28		
IEEE 802.11ac VHT80	155	5775	2.38	2.31	2.32	7.11	0.000	2.38	2.31	2.32	7.11	30	PASS

Remark:

1. *Measured output power at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *Report conducted power = Measured conducted average power + Duty Cycle factor.*

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

For 5725~5850MHz

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.3.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.3.3. Test Procedures

1). The transmitter was connected directly to a Spectrum Analyzer through a directional couple.

2). The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.

3). Set the RBW = 300 kHz

4). Set the VBW ≥ 3*RBW

5). Span=Encompass the entire emissions bandwidth (EBW) of the signal

6). Detector = RMS.

7). Sweep time = auto couple.

8). Trace mode = max hold.

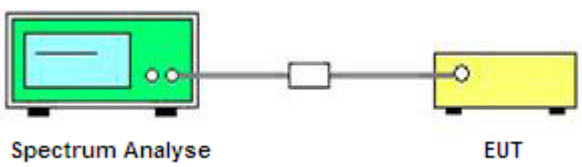
9). Allow trace to fully stabilize.

10). If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

11). If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

12). Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

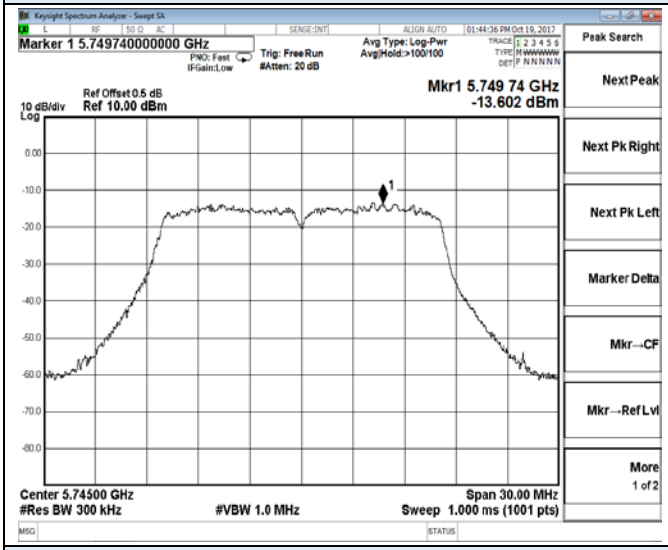
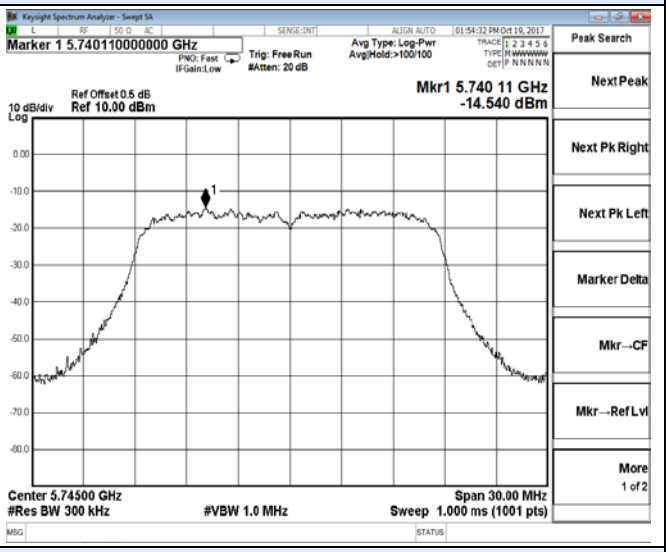
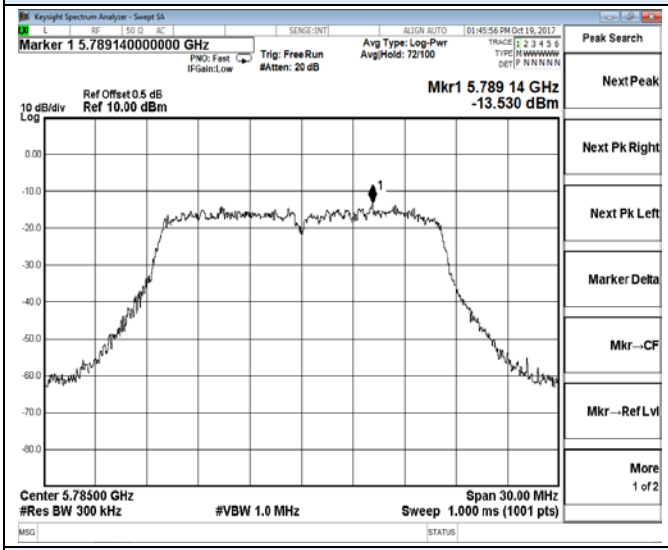
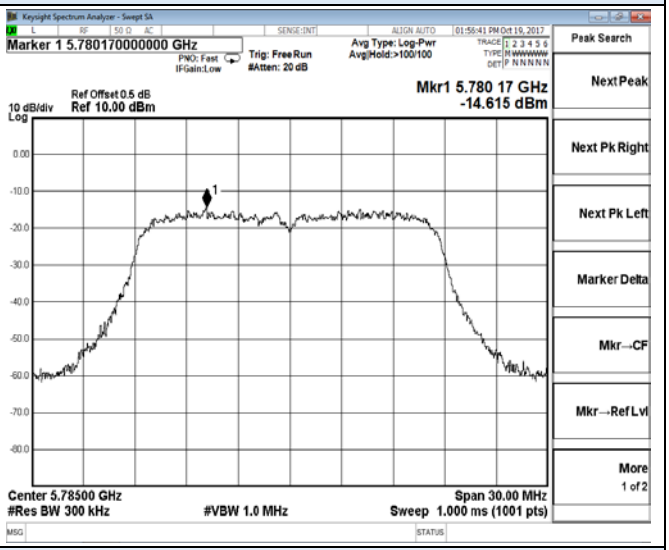
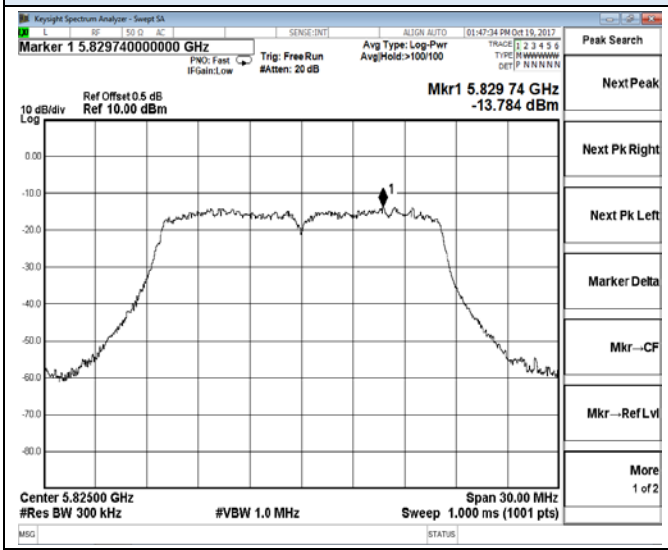
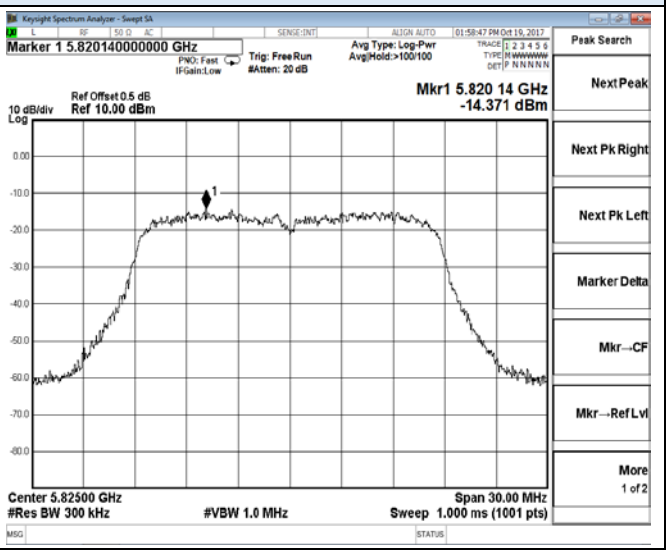
5.3.6. Test Result of Power Spectral Density

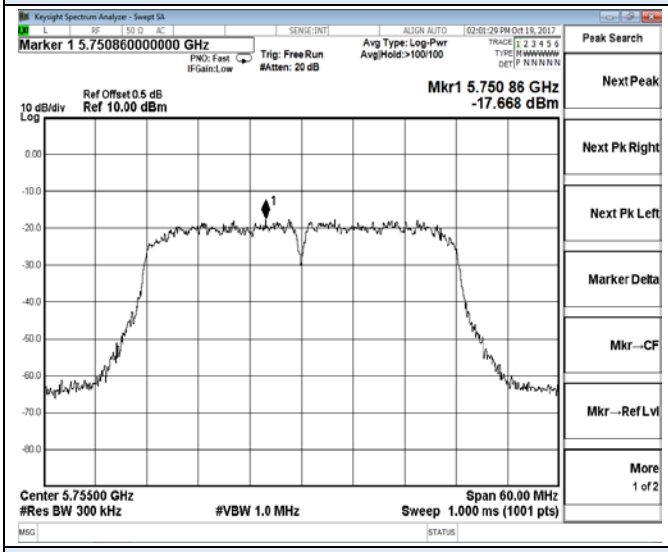
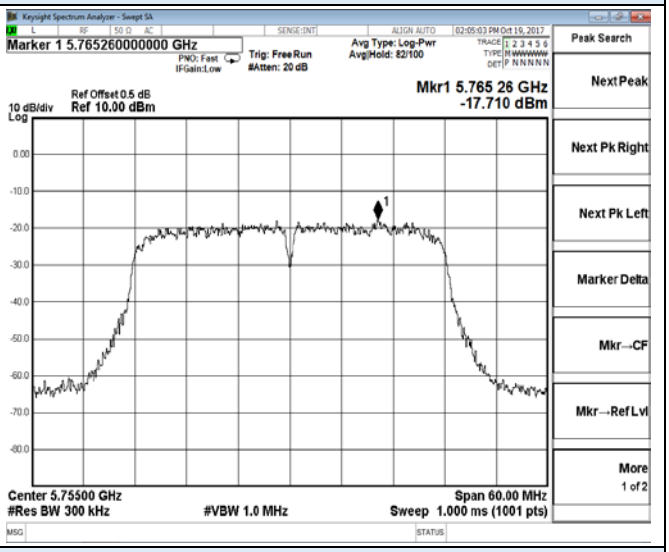
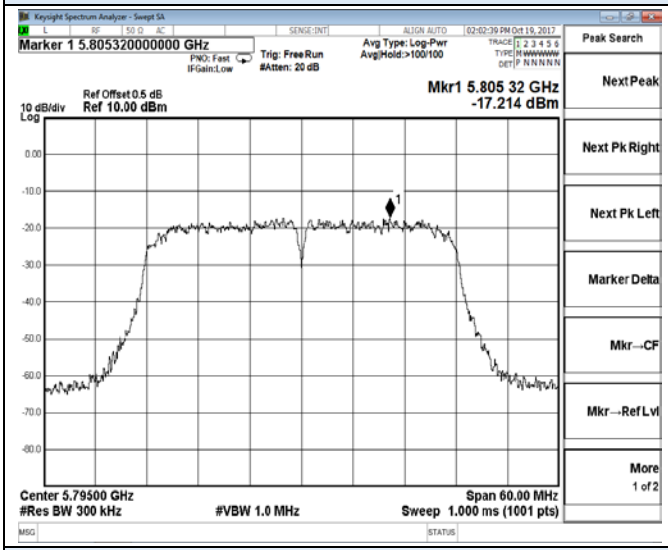
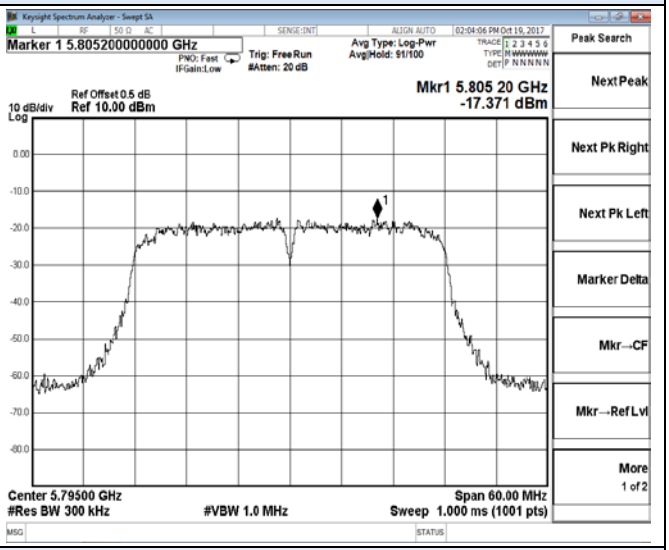
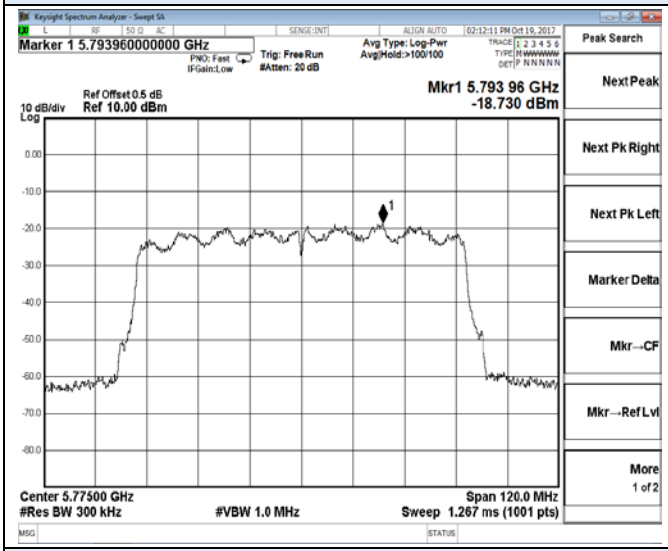
Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a/n/ac

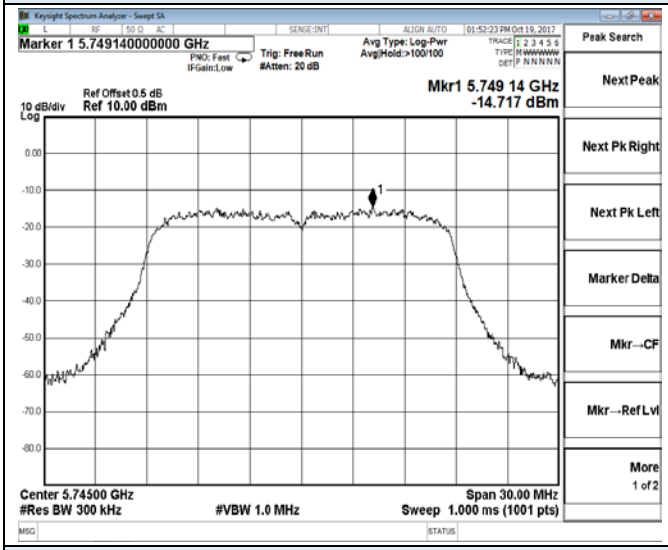
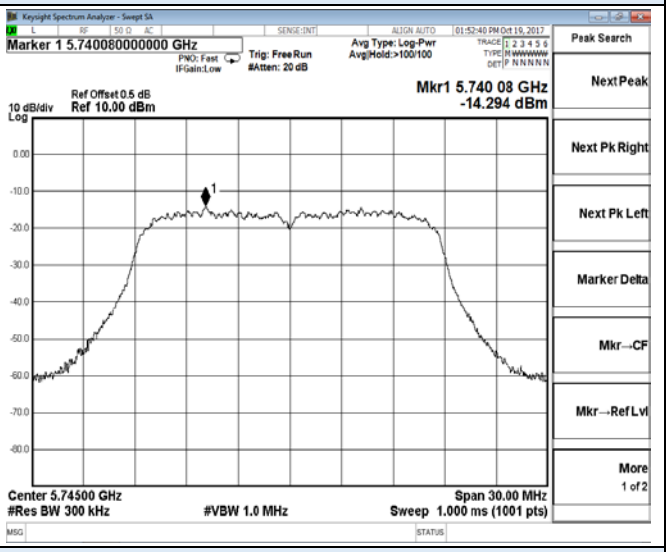
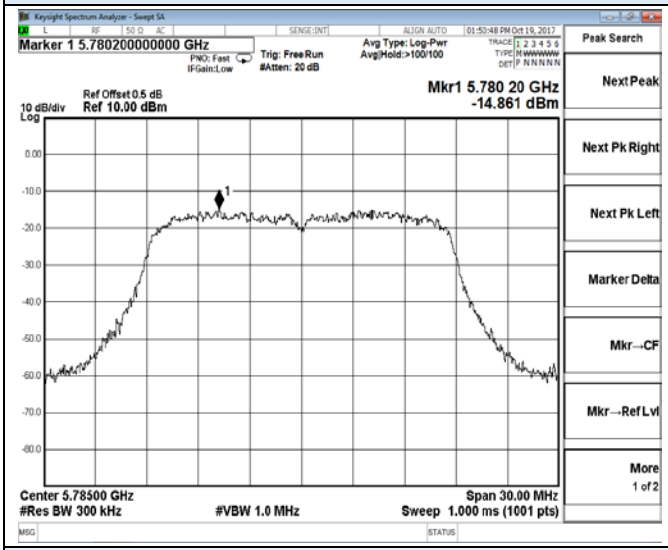
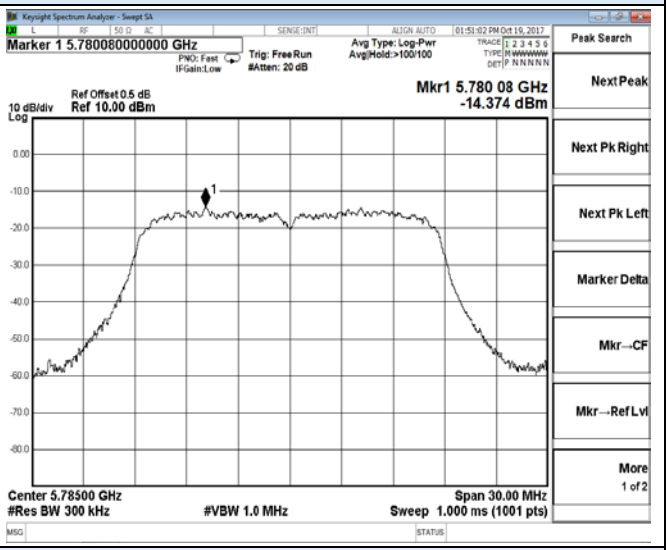
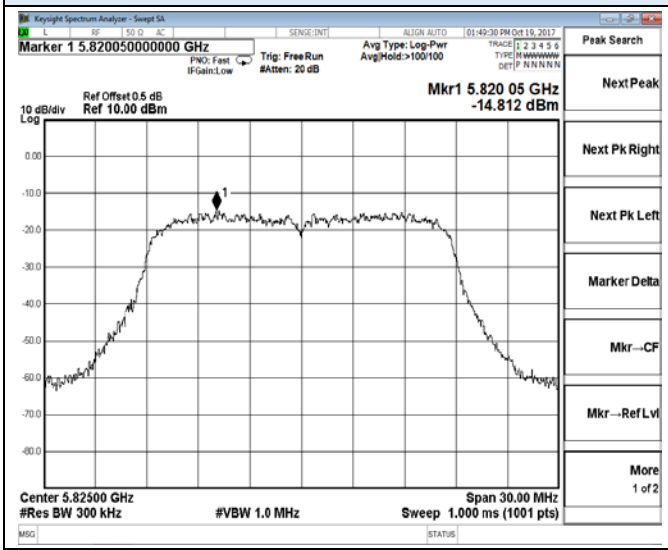
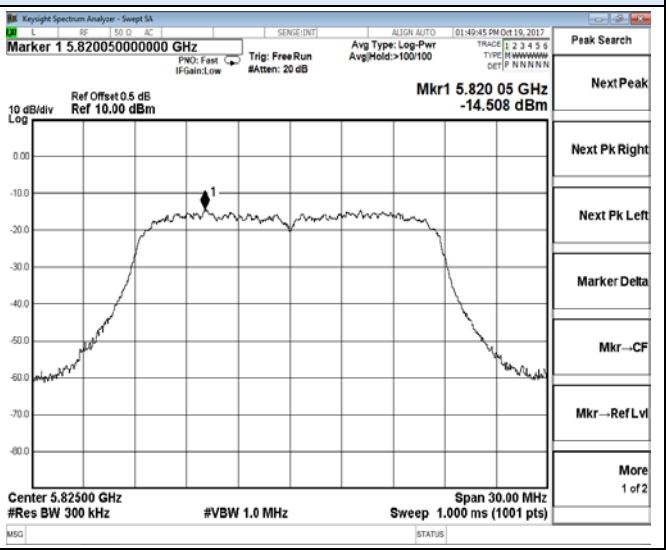
Test Mode	CH No.	Frequency (MHz)	Power Density (dBm/300KHz)				Duty Cycle Factor (dB)	RBW factor (dB)	Report conducted PSD (dBm/500KHz)				Max. Limit (dBm/ 500KHz)	Result
			Antenna 0	Antenna 1	Antenna 2	Sum			Antenna 0	Antenna 1	Antenna 2	Sum		
IEEE 802.11a	149	5745	-13.602	-13.268	-13.414	/	0.000	2.218	-11.384	-11.05	-11.196	/	30	PASS
	157	5785	-13.530	-13.621	-13.420	/	0.000	2.218	-11.312	-11.403	-11.202	/		
	165	5825	-13.784	-13.466	-12.976	/	0.000	2.218	-11.566	-11.248	-10.758	/		
IEEE 802.11n HT20	149	5745	-14.540	-14.437	-14.389	-9.684	0.000	2.218	-12.322	-12.219	-12.171	-7.466	29.229	PASS
	157	5785	-14.615	-14.476	-14.092	-9.617	0.000	2.218	-12.397	-12.258	-11.874	-7.399		
	165	5825	-14.371	-14.239	-13.948	-9.411	0.000	2.218	-12.153	-12.021	-11.73	-7.193		
IEEE 802.11n HT40	151	5755	-17.668	-17.399	-17.212	-12.651	0.000	2.218	-15.45	-15.181	-14.994	-10.433	29.229	PASS
	159	5795	-17.214	-16.937	-17.030	-12.288	0.000	2.218	-14.996	-14.719	-14.812	-10.07		
IEEE 802.11ac VHT20	149	5745	-14.717	-14.294	-14.138	-9.605	0.000	2.218	-12.499	-12.076	-11.92	-7.387	29.229	PASS
	157	5785	-14.861	-14.374	-14.163	-9.685	0.000	2.218	-12.643	-12.156	-11.945	-7.467		
	165	5825	-14.812	-14.508	-14.150	-9.710	0.000	2.218	-12.594	-12.29	-11.932	-7.492		
IEEE 802.11ac VHT40	151	5755	-17.710	-17.472	-17.406	-12.756	0.000	2.218	-15.492	-15.254	-15.188	-10.538	29.229	PASS
	159	5795	-17.371	-17.310	-17.282	-12.550	0.000	2.218	-15.153	-15.092	-15.064	-10.332		
EEE 802.11ac VHT80	155	5775	-18.730	-18.496	-18.452	-13.786	0.000	2.218	-16.512	-16.278	-16.234	-11.568	29.229	PASS

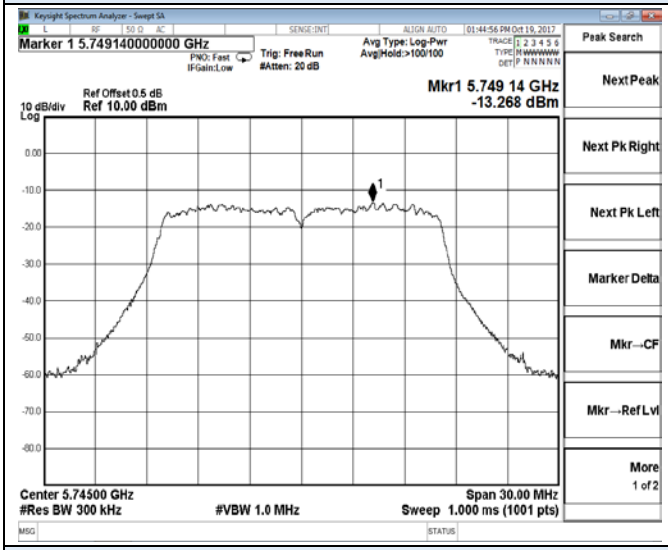
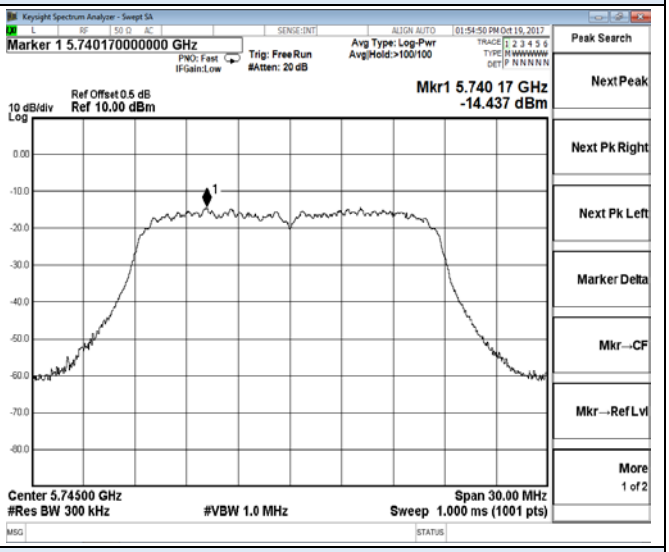
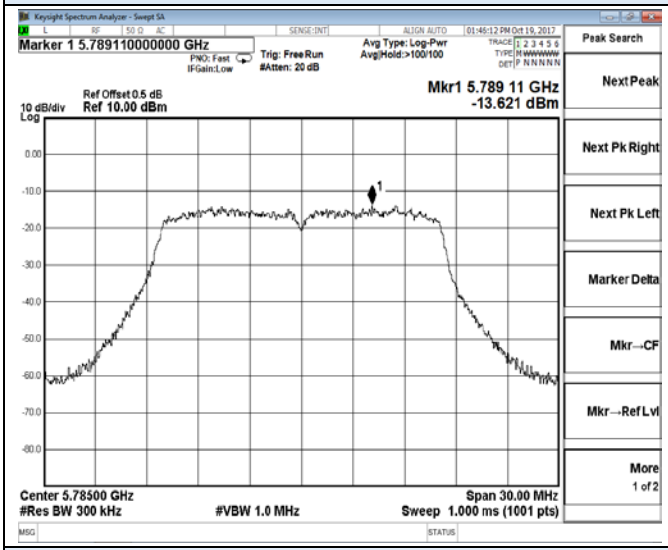
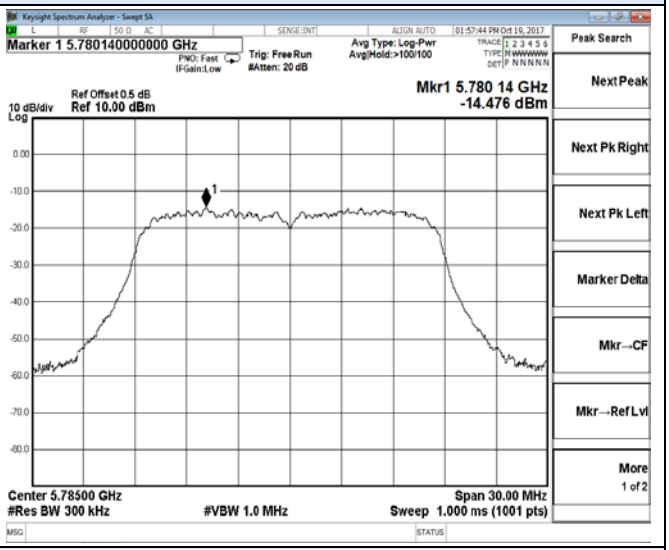
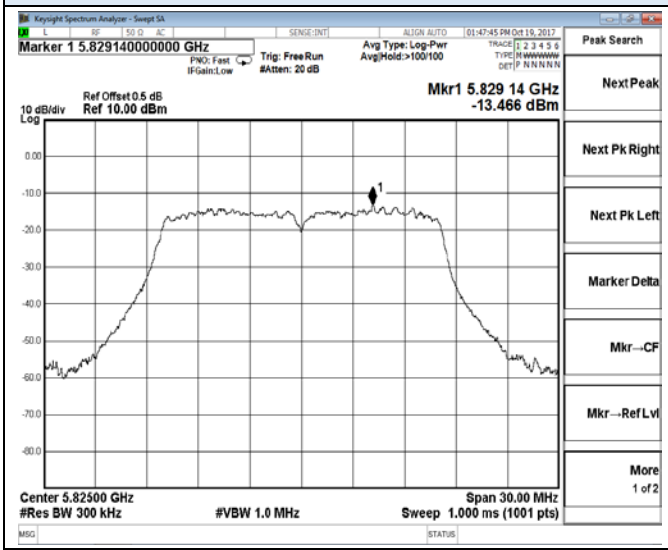
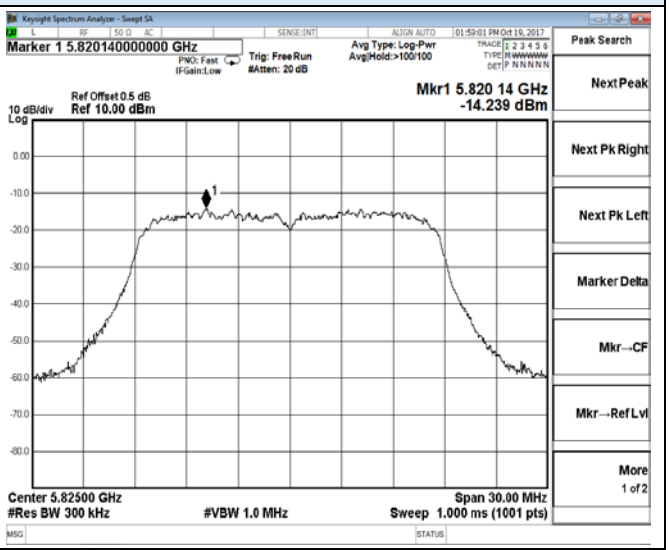
Remark:

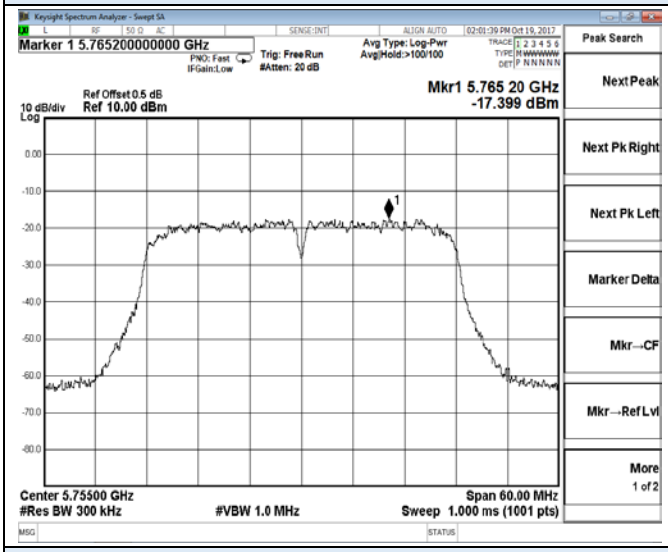
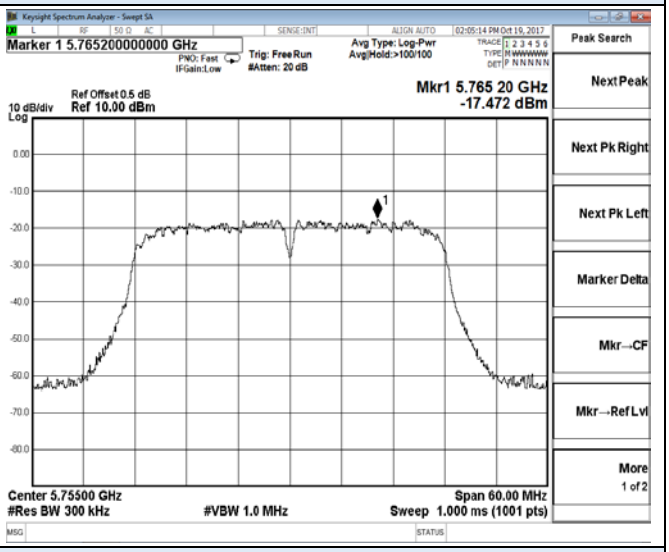
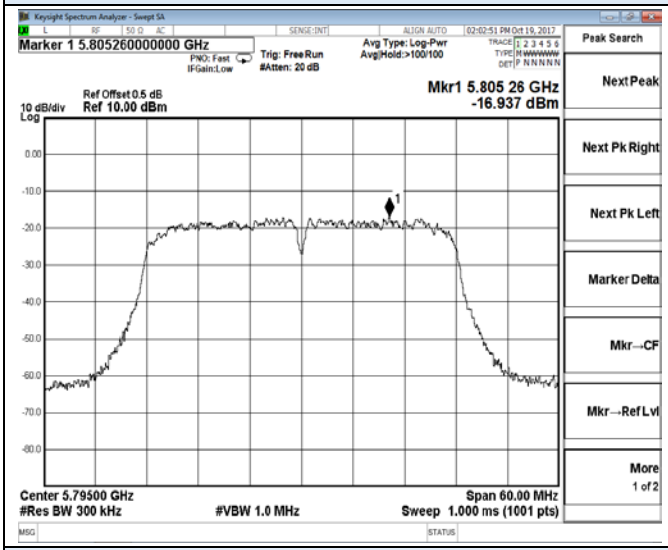
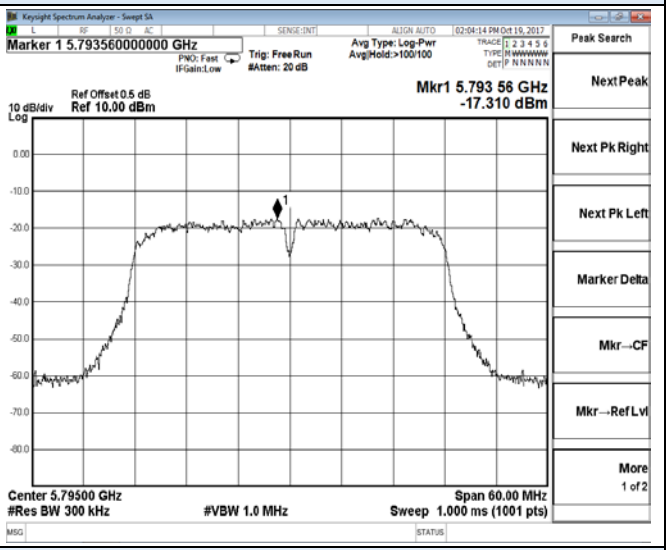
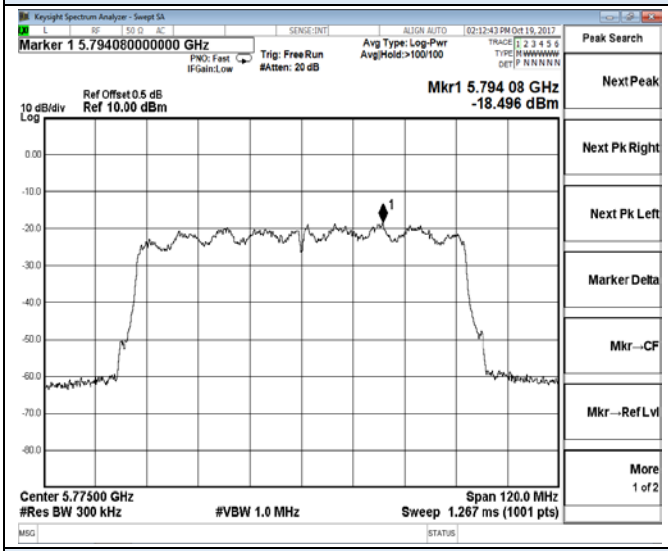
1. *Measured power spectrum density at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *Report conducted PSD = measured conducted PSD + Duty Cycle factor + RBW factor;*
5. *For MIMO with technology device, The Directional Gain = Gain of individual transmit antennas (dBi) + Array Gain; Array Gain = 10*log (N_{ant}), Where N_{ant} is the number of transmit antennas.*
   *Directional Gain = 2.0 + 10*log (3) = 6.771dBi;*
   So the power spectrum density limit should be reduce to 30.0 - (6.771- 6.0) = 29.229 dBm/500KHz
6. *RBW factor = 10*log (500 KHz / 300 KHz) = 2.218 dB;*
7. *Please refer to following test plots;*

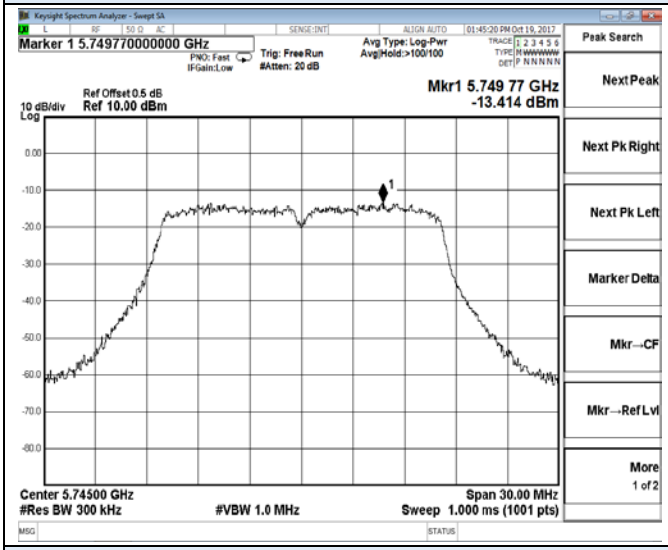
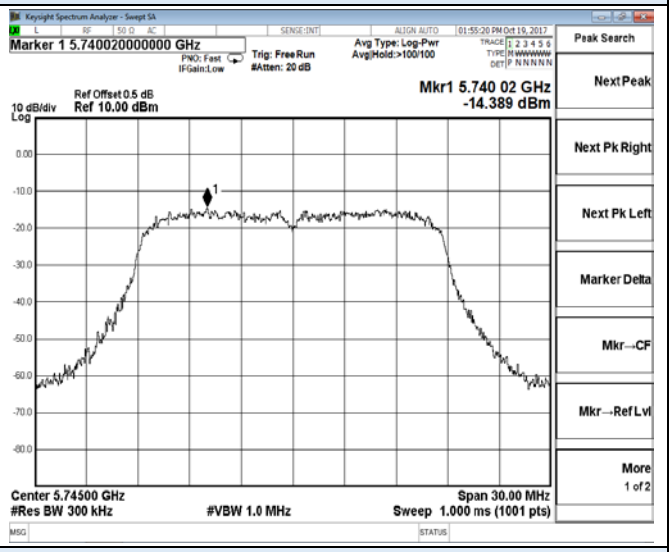
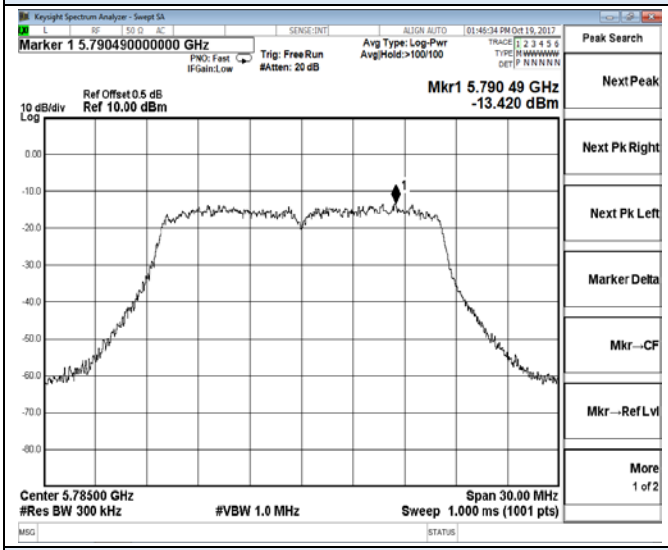
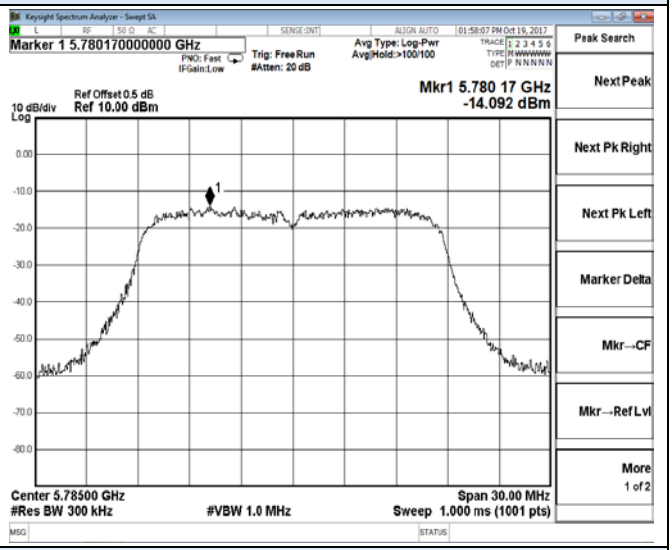
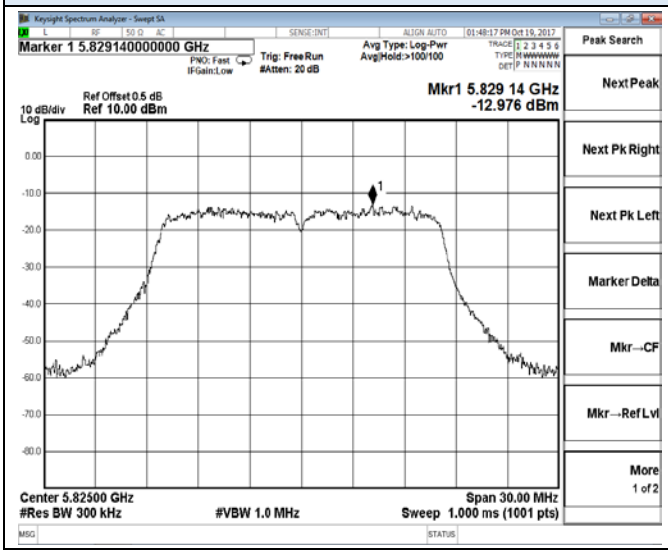
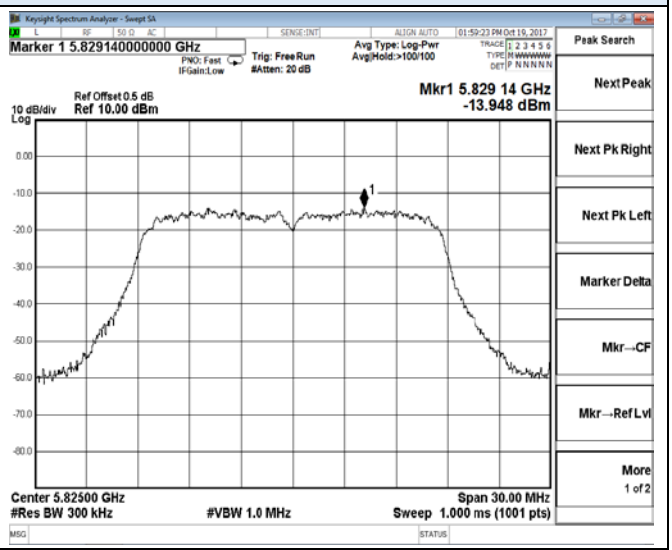
Power Spectral Density	
Antenna 0	Antenna 0
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

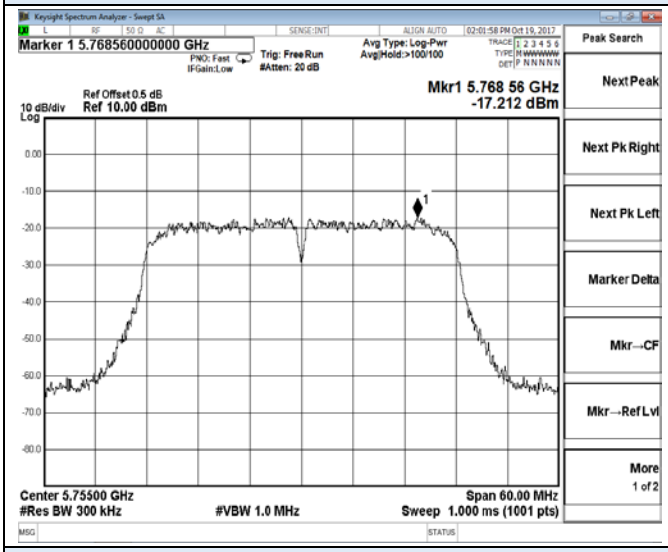
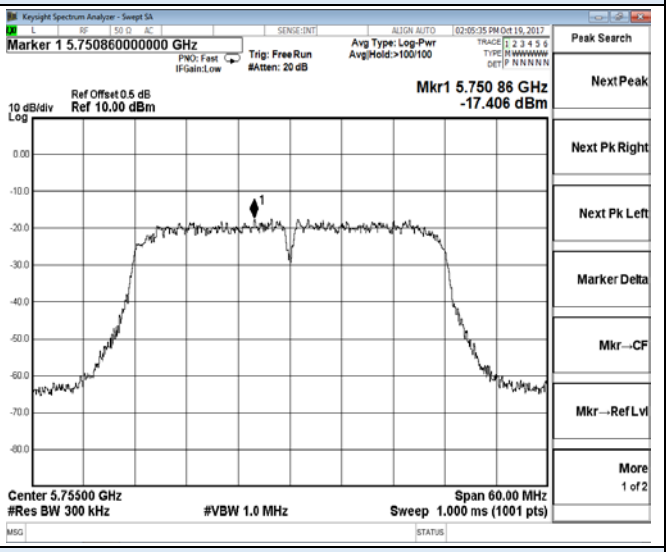
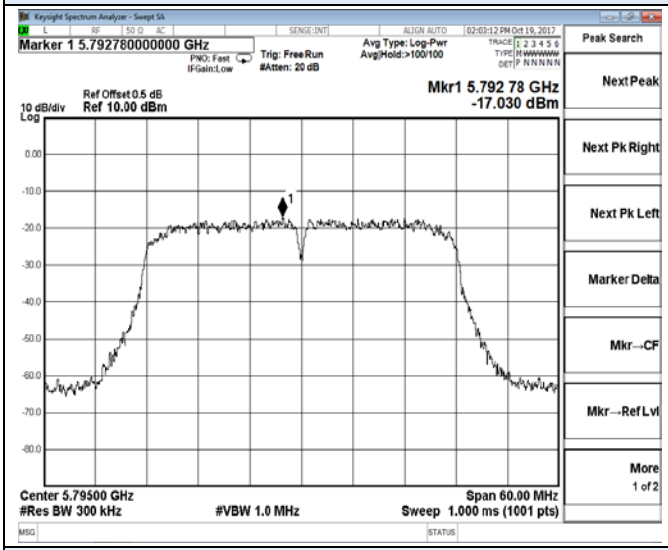
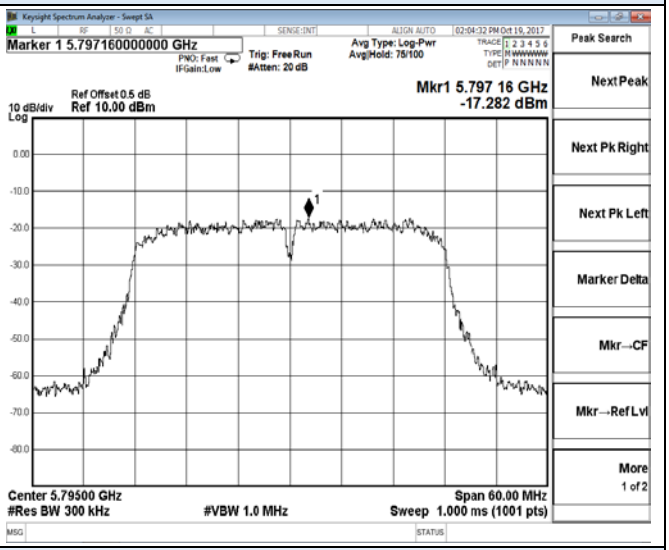
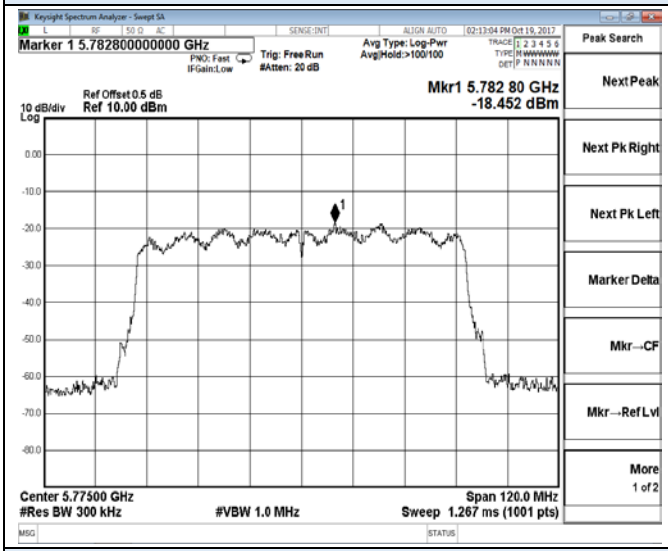
Power Spectral Density	
Antenna 0	Antenna 0
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
	
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT80	
	
Channel 155 / 5775 MHz	

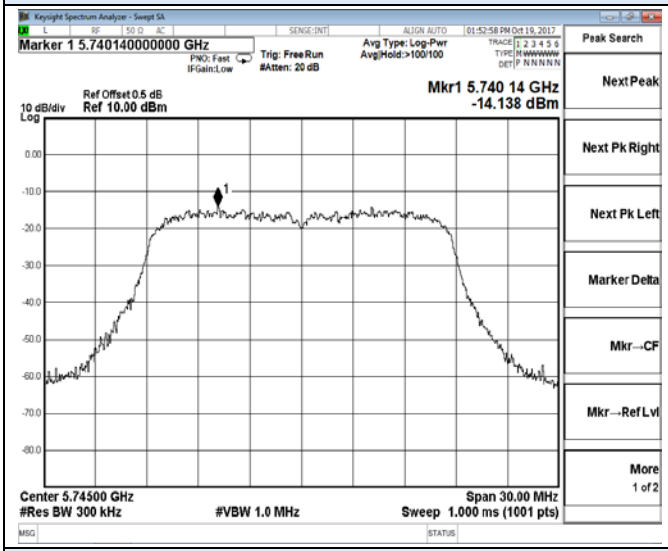
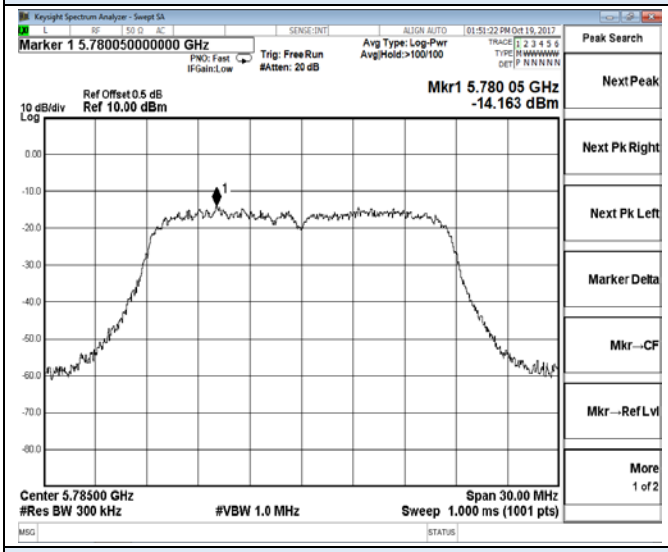
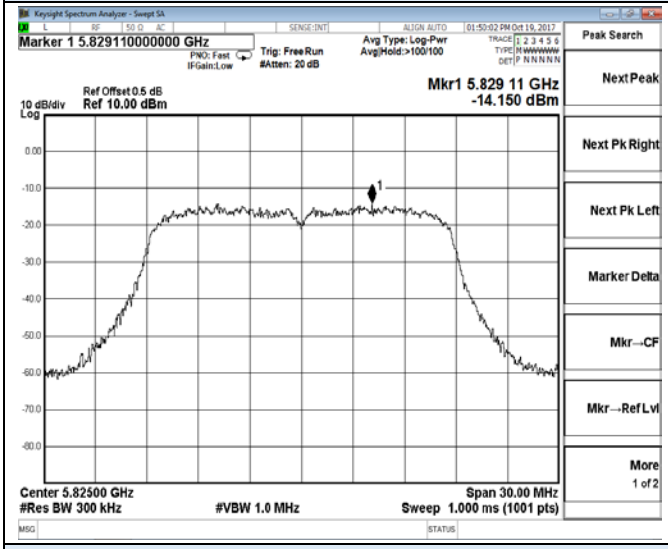
Power Spectral Density	
Antenna 0	Antenna 1
IEEE 802.11ac VHT20	IEEE 802.11ac VHT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

Power Spectral Density	
Antenna 1	Antenna 1
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

Power Spectral Density	
Antenna 1	Antenna 1
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
	
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT80	
	
Channel 155 / 5775 MHz	

Power Spectral Density	
Antenna 2	Antenna 2
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

Power Spectral Density	
Antenna 2	Antenna 2
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
	
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT80	
	
Channel 155 / 5775 MHz	

Power Spectral Density	
Antenna 2	
IEEE 802.11ac VHT20	
	
Channel 149 / 5745 MHz	
	
Channel 157 / 5785 MHz	
	
Channel 165 / 5825 MHz	

5.4. 6dB Occupied Bandwidth Measurement

5.4.1. Standard Applicable

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.4.2. Measuring Instruments and Setting

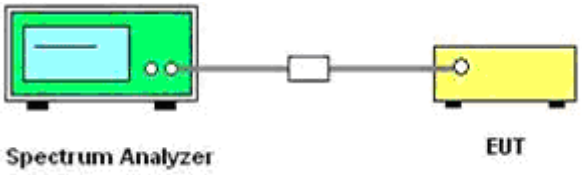
Please refer to equipment list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span	> 26dB Bandwidth
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 KHz and the video bandwidth of 300 KHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

5.4.4. Test Setup Layout



5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

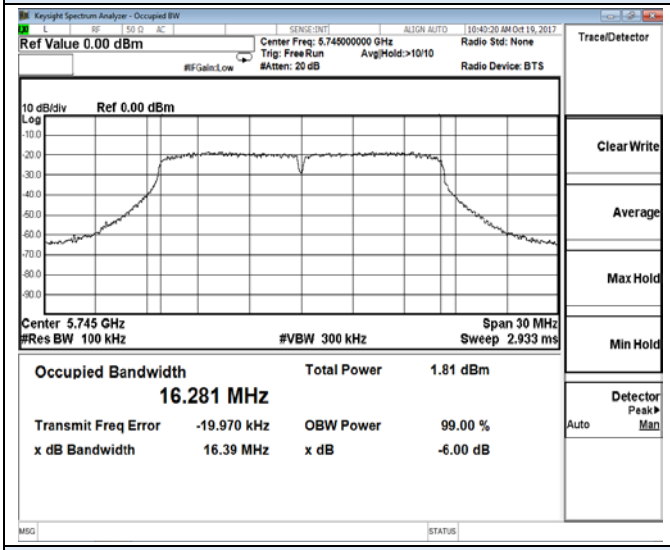
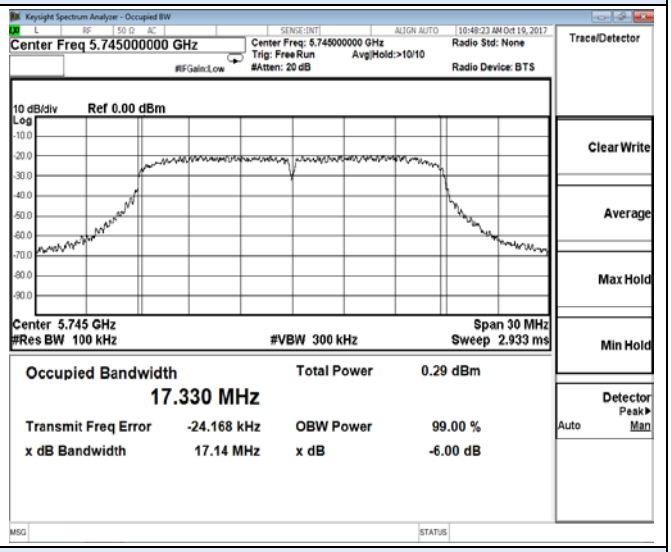
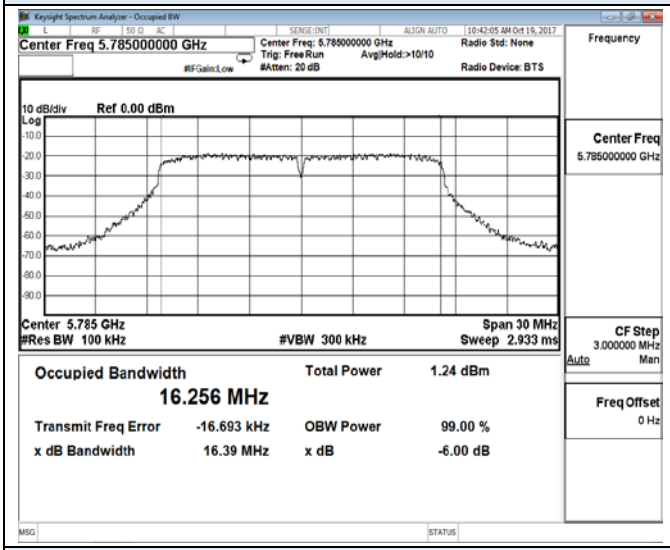
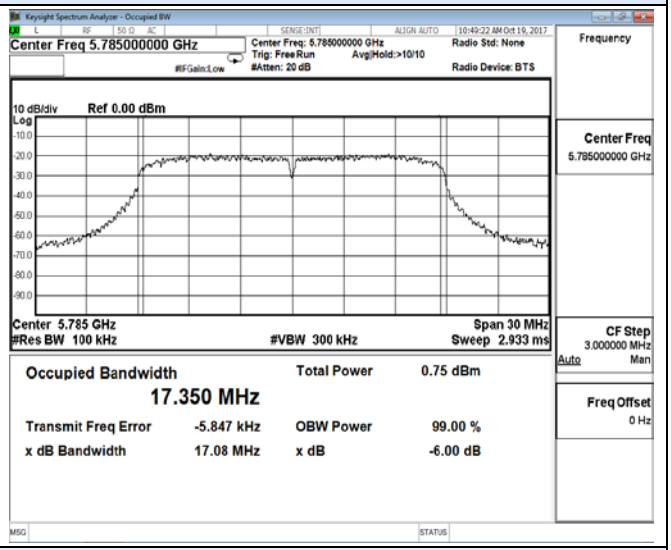
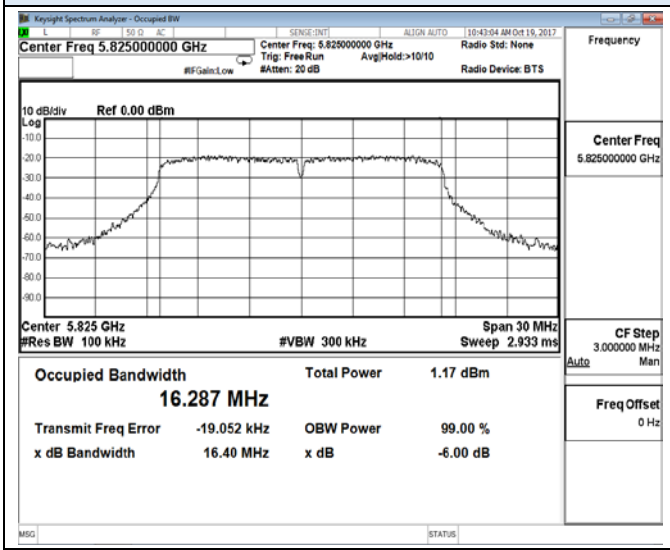
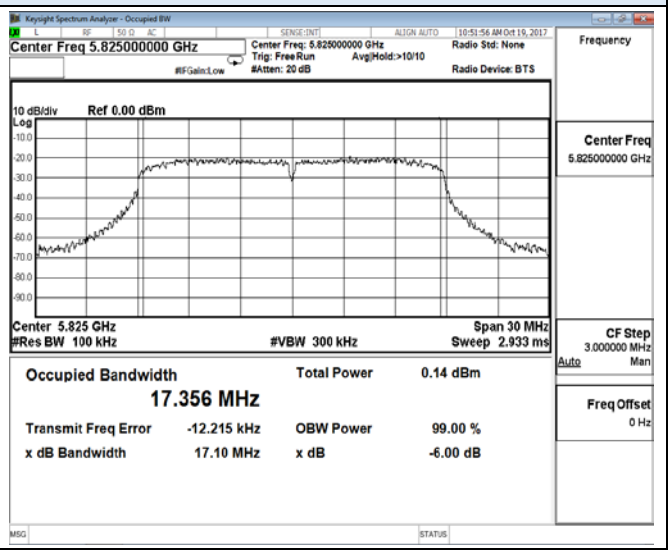
5.4.6. Test Result of 6dB Occupied Bandwidth

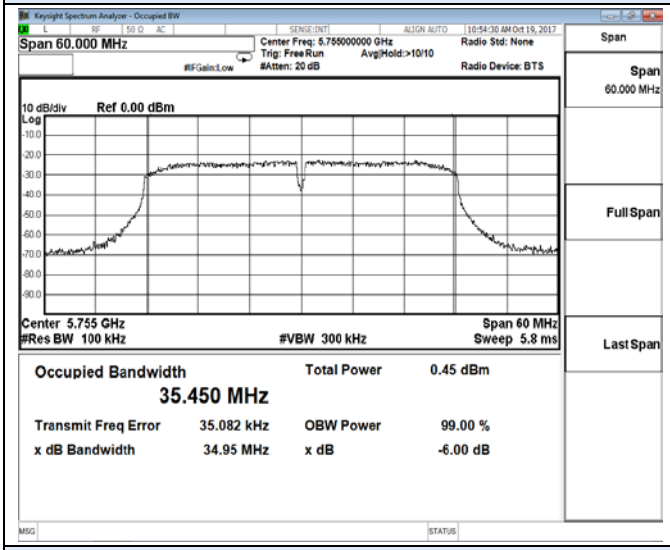
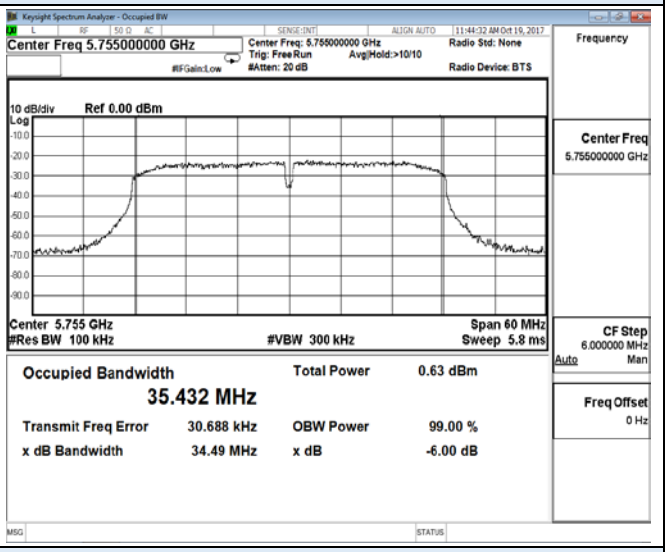
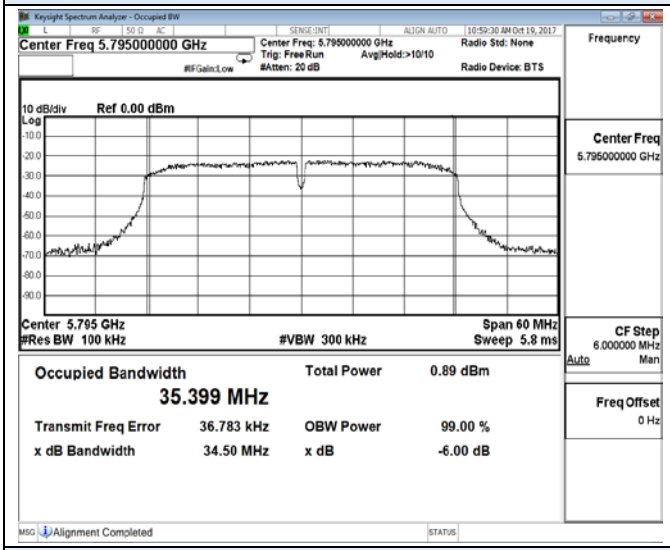
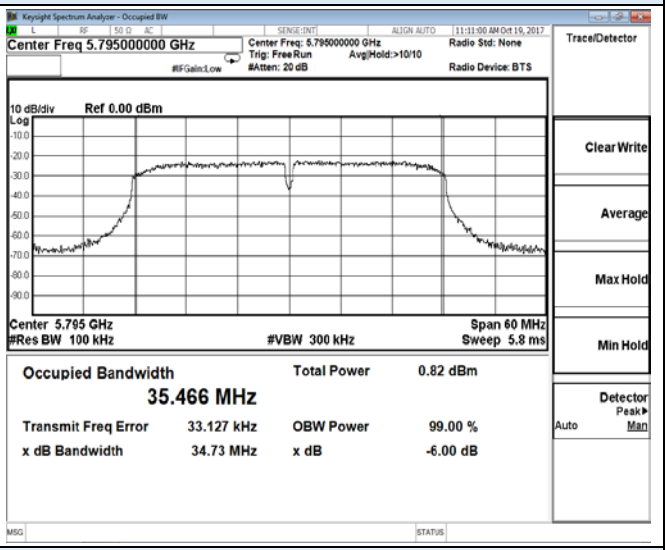
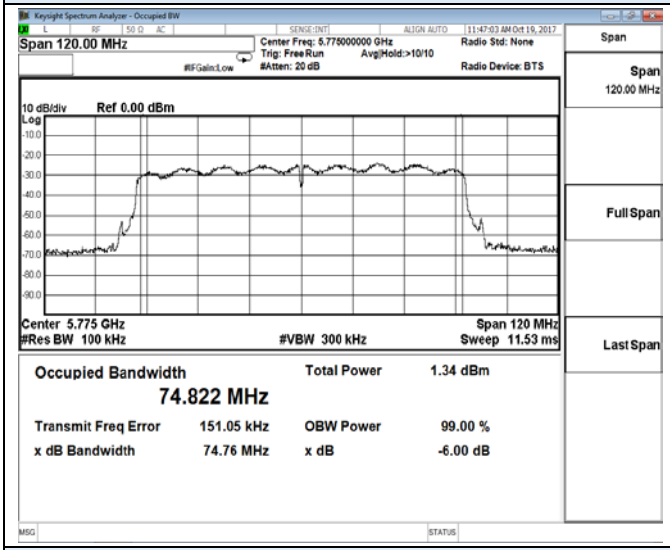
Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a/n/ac

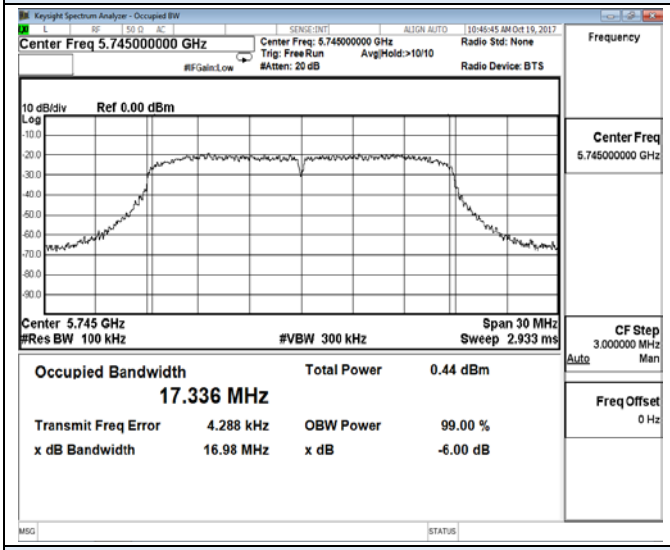
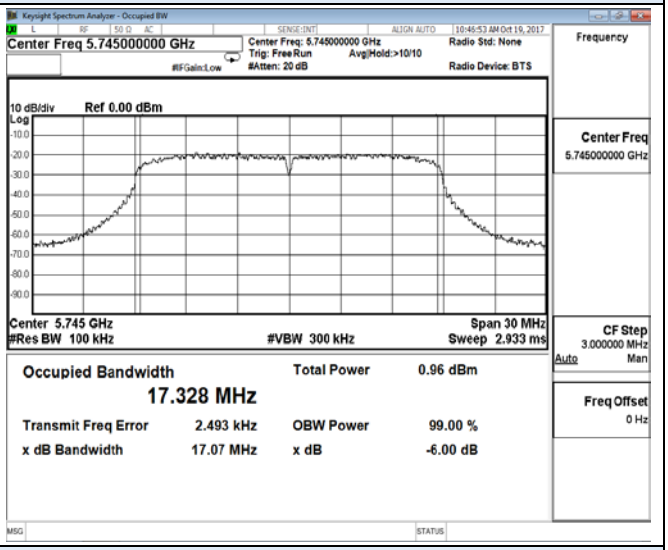
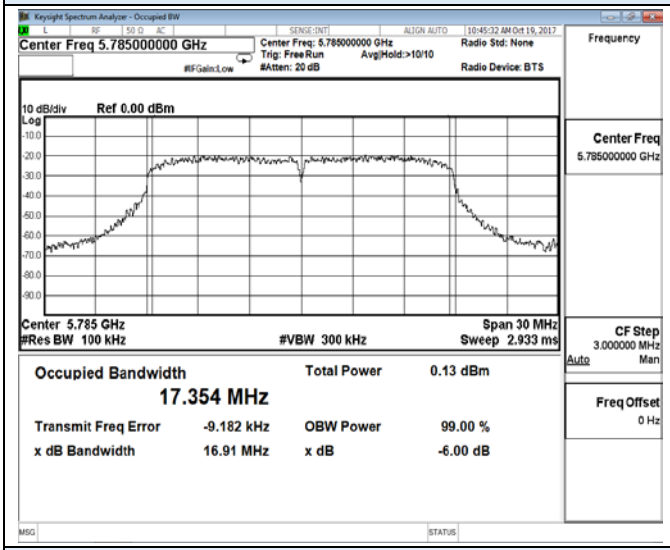
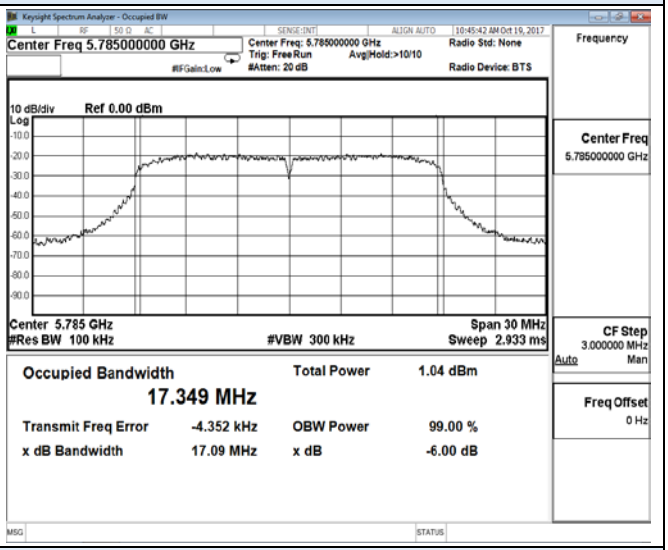
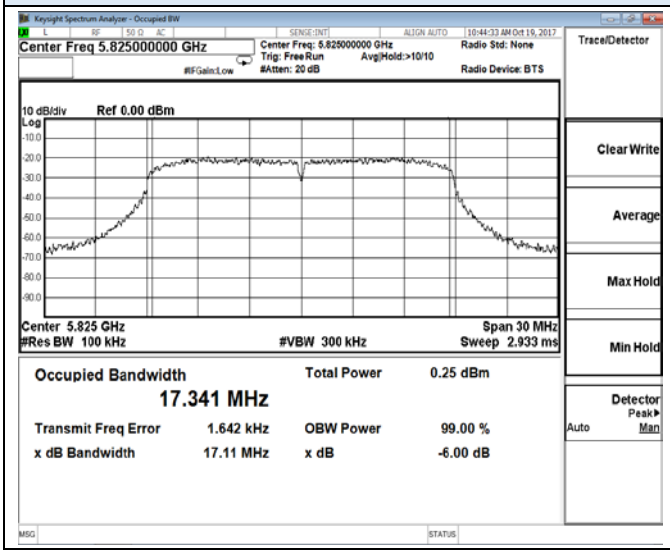
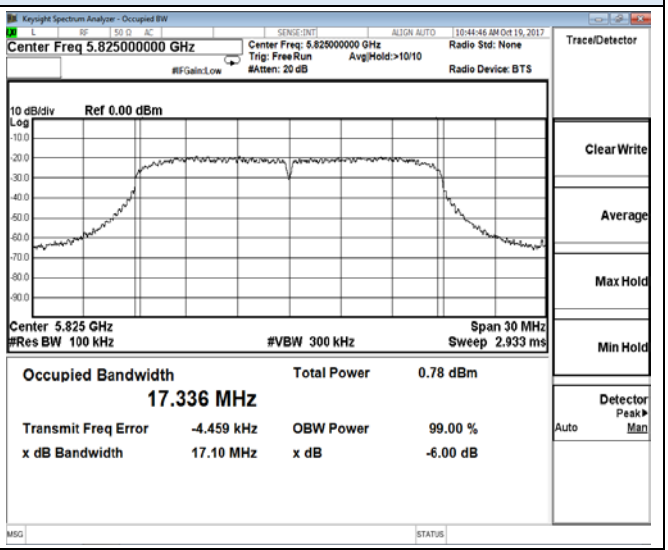
Test Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Limits (MHz)	Verdict
			Antenna 0	Antenna 1	Antenna 2		
IEEE 802.11a	149	5745	16.390	16.380	16.400	0.500	PASS
	157	5785	16.390	16.390	16.380		
	163	5825	16.400	16.390	16.400		
IEEE 802.11n HT20	149	5745	17.140	17.070	17.080	0.500	PASS
	157	5785	17.080	17.070	17.050		
	163	5825	17.100	17.090	17.070		
IEEE 802.11n HT40	151	5755	34.950	34.510	34.520	0.500	PASS
	159	5795	34.500	34.460	34.740		
IEEE 802.11ac VHT20	149	5745	16.980	17.070	17.330	0.500	PASS
	157	5785	16.910	17.090	17.010		
	163	5825	17.110	17.100	17.090		
IEEE 802.11ac VHT40	151	5755	34.490	34.550	34.470	0.500	PASS
	159	5795	34.730	34.520	34.450		
IEEE 802.11ac VHT80	155	5775	74.760	74.820	74.940	0.500	PASS

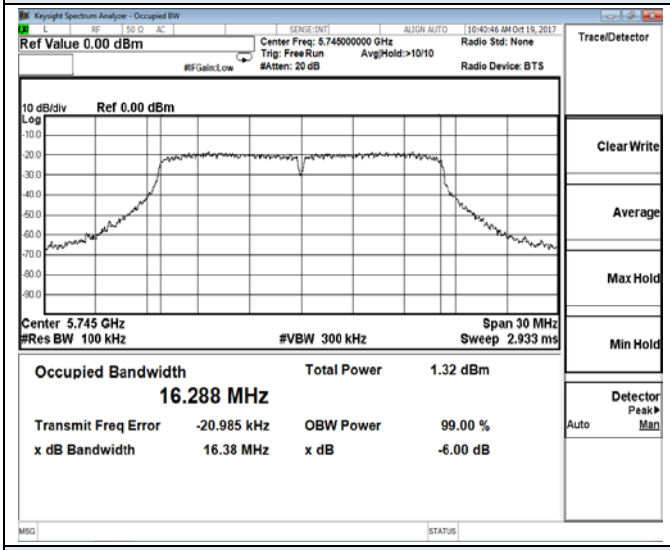
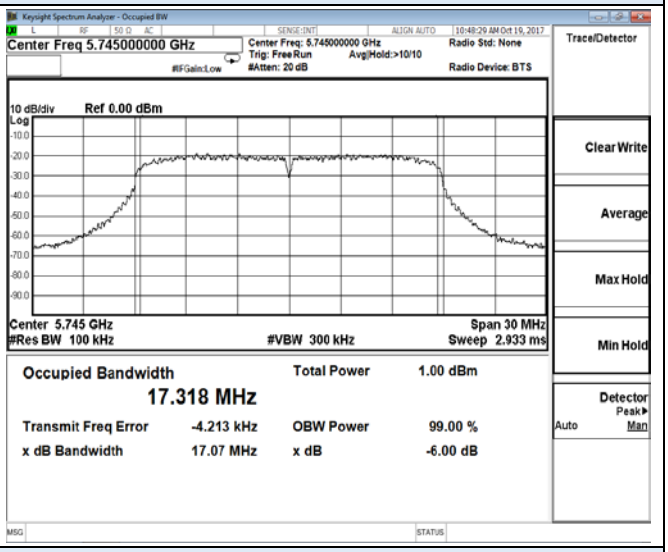
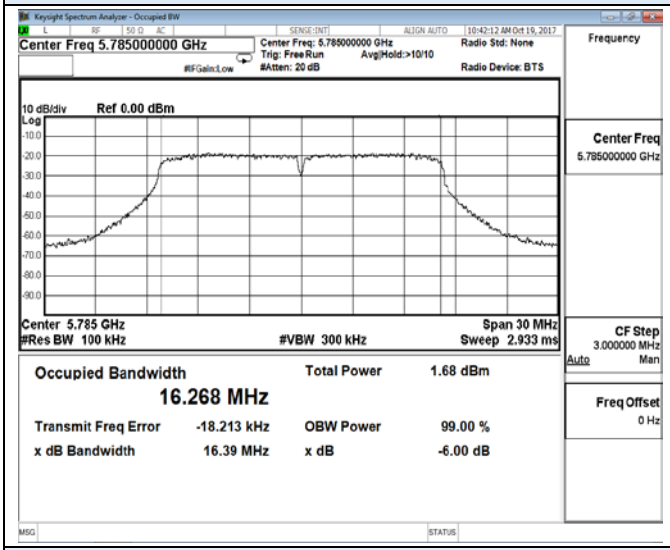
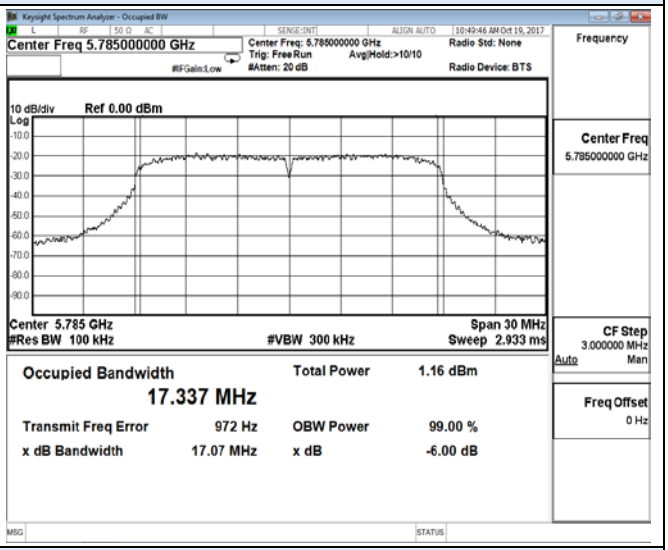
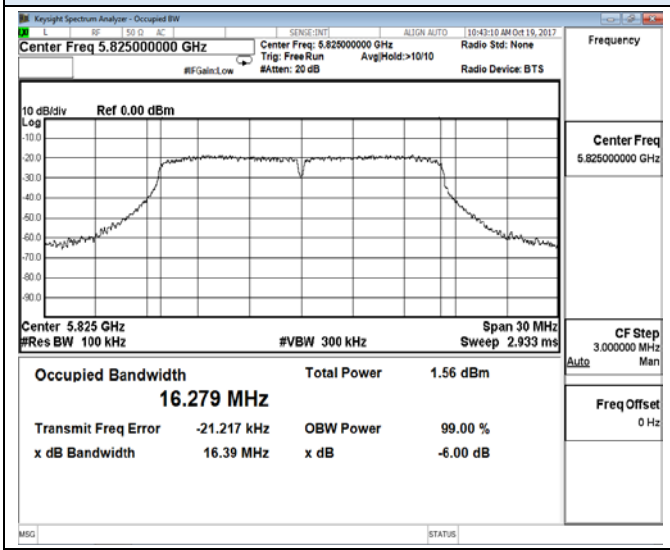
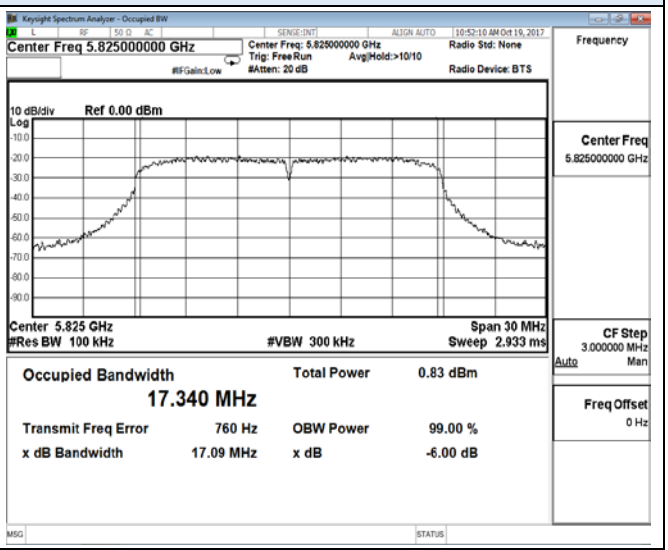
Remark:

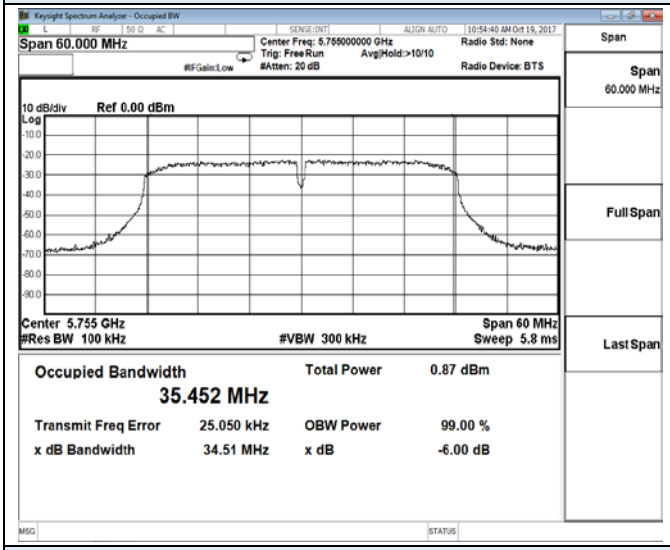
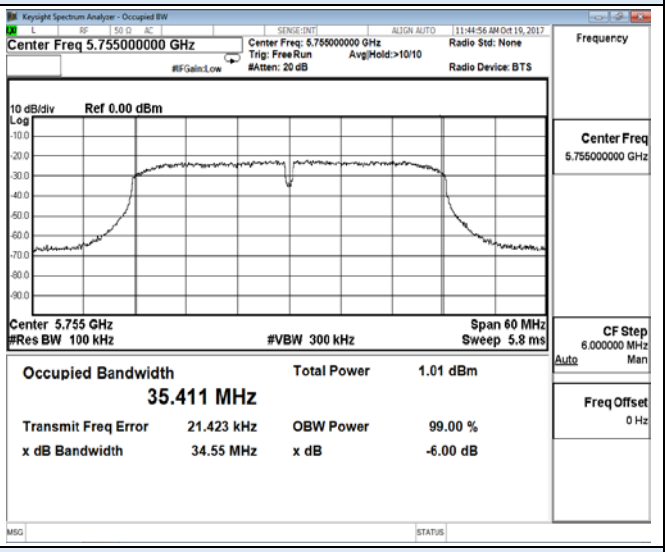
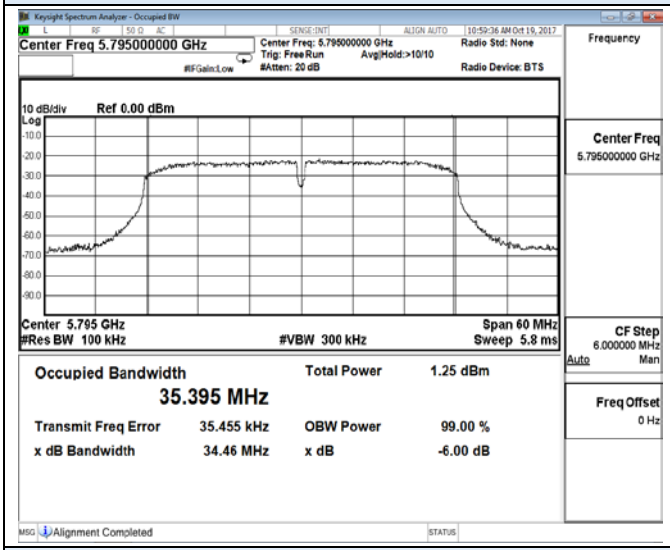
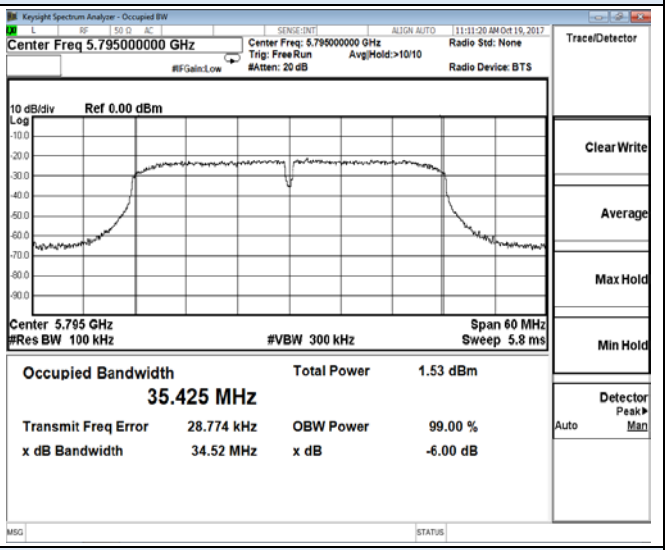
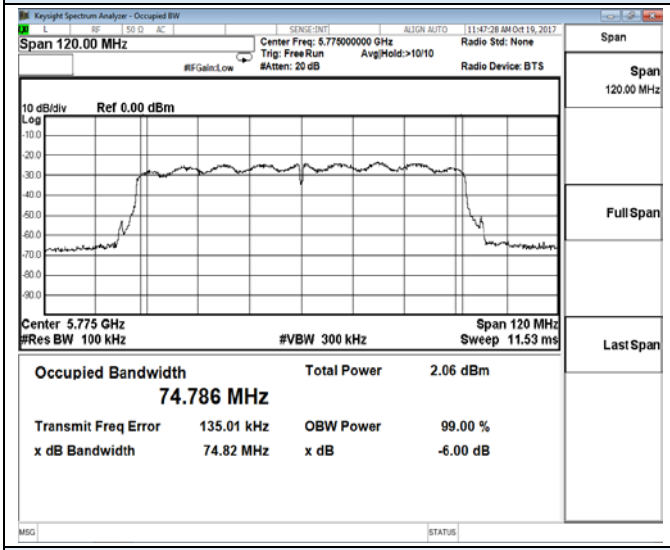
1. *Measured 6dB bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;*
4. *Please refer to following test plots;*

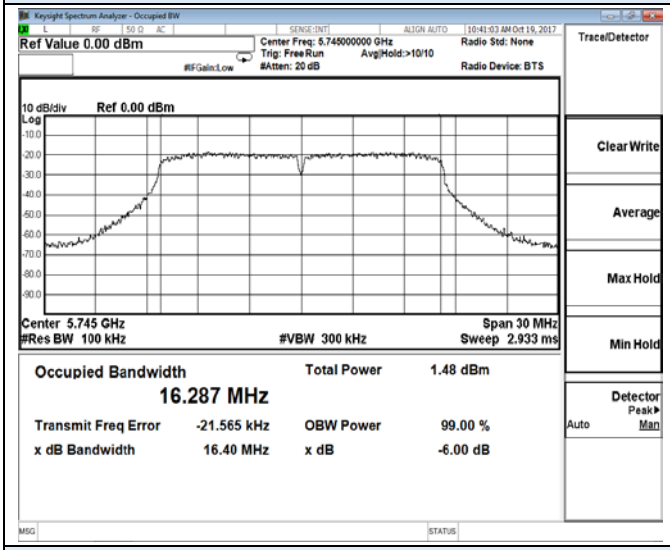
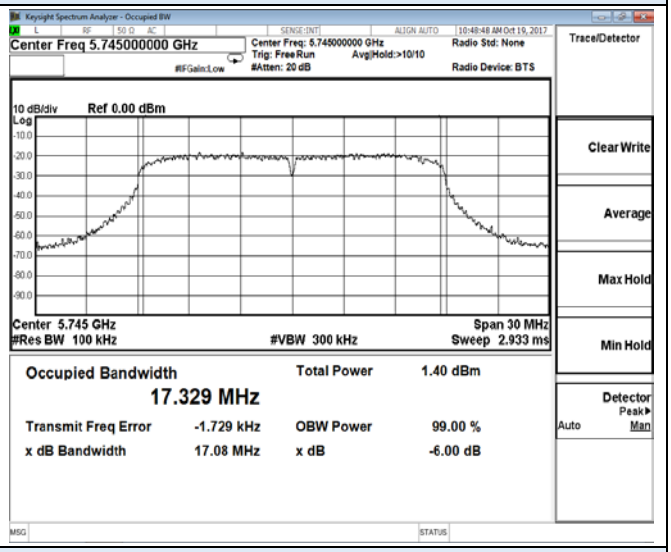
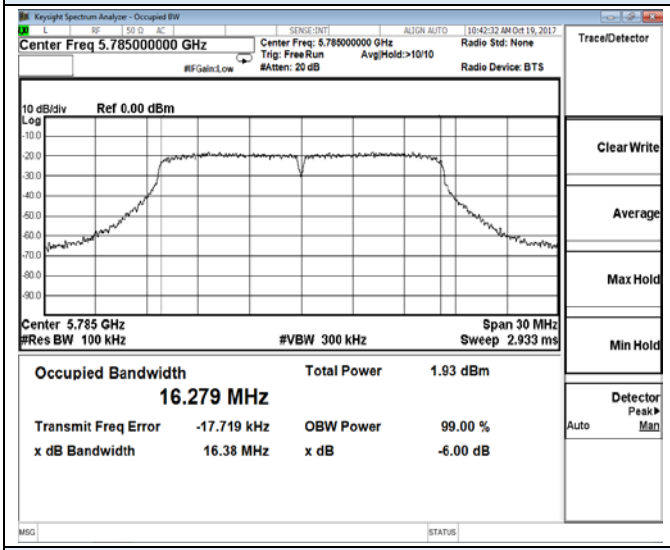
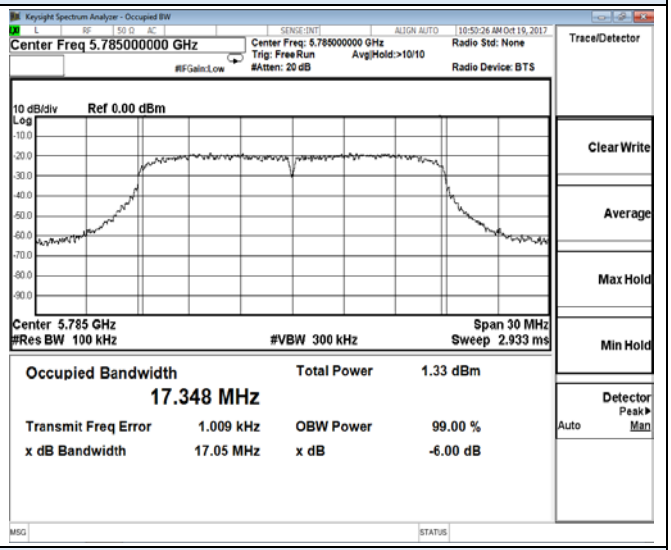
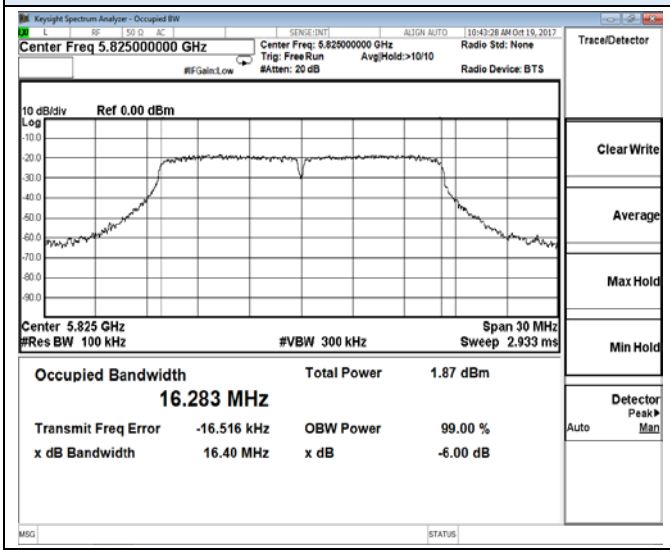
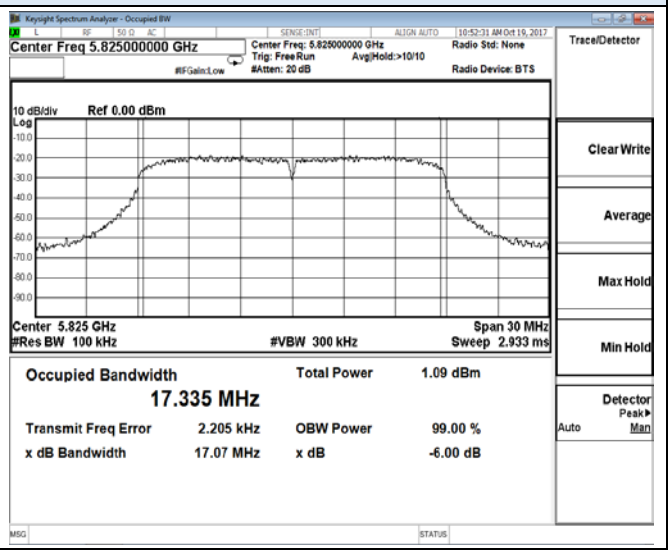
6dB Occupied Bandwidth	
Antenna 0	Antenna 0
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

6dB Occupied Bandwidth	
Antenna 0	Antenna 0
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
	
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT80	
	
Channel 155 / 5775 MHz	

6dB Occupied Bandwidth	
Antenna 0	Antenna 1
IEEE 802.11ac VHT20	IEEE 802.11ac VHT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

6dB Occupied Bandwidth	
Antenna 1	Antenna 1
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

6dB Occupied Bandwidth	
Antenna 1	Antenna 1
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
	
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT80	
	
Channel 155 / 5775 MHz	

6dB Occupied Bandwidth	
Antenna 2	Antenna 2
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
	
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
	
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz