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.
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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 C(15.247): 2016

Report Reference No.	**:**	**LCS170925010AE1**
Date of Issue	:	October 25, 2017
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, 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 C(15.247): 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
Test Model.....	:	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. : LCS170925010AE1	October 25, 2017 Date of issue

EUT.....	:	11AC Dual Band Wireless Adapter
Test 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

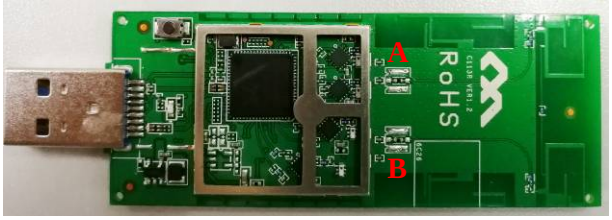
Revision	Issue Date	Revisions	Revised By
00	October 25, 2017	Initial Issue	Gavin Liang

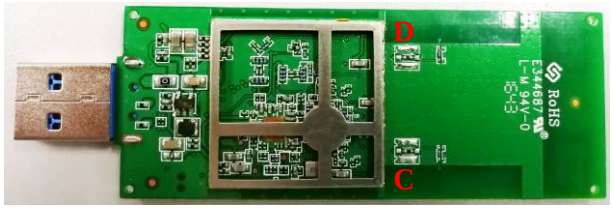
TABLE OF CONTENTS

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 IEEE 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(IEEE 802.11b/g/n HT20) 7 Channels for 2422-2452MHz(IEEE 802.11n HT40) 5 Channels for 5745-5825MHz(IEEE 802.11a/ac VHT20/n HT20) 2 Channels for 5755-5795MHz(IEEE 802.11ac VHT40/n HT40) 1 Channels for 5775MHz(IEEE 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 Cable

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 C63.10 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 worse 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 802.11n HT40 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 802.11n HT40 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 802.11b Mode: 1 Mbps, DSSS.
IEEE 802.11g Mode: 6 Mbps, OFDM.
IEEE 802.11n Mode HT20: MCS0, OFDM.
IEEE 802.11n Mode HT40: MCS0, OFDM.

Antenna & Bandwidth

Antenna	Antenna 0		Antenna 1		Antenna 2		Simultaneously
Bandwidth Mode	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	/
IEEE 802.11b	☑	☐	☑	☐	☑	☐	☐
IEEE 802.11g	☑	☐	☑	☐	☑	☐	☐
IEEE 802.11n	☑	☑	☑	☑	☑	☑	☑

Note: The Antenna D is used for receiving only.

Channel List & Frequency

IEEE 802.11b/g/n HT20

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2412~2462MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	--	--

IEEE 802.11n HT40

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2422~2452MHz	1	--	7	2442
	2	--	8	2447
	3	2422	9	2452
	4	2427	10	--
	5	2432	11	--
	6	2437	--	--

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 558074 D01 DTS Meas Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01 are required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

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 C		
FCC Rules	Description of Test	Result
/	Duty Cycle	Compliant
§15.247(b)	Maximum Conducted Output Power	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(a)	Occupied Bandwidth	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.207(a)	Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant
§15.247(i)§2.1093	RF Exposure	Compliant

5. TEST RESULT

5.1. On Time and Duty Cycle

5.1.1. Standard Applicable

None; for reporting purpose only.

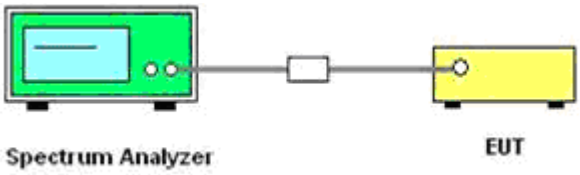
5.1.2. Measuring Instruments and Setting

Please refer to equipment's 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.

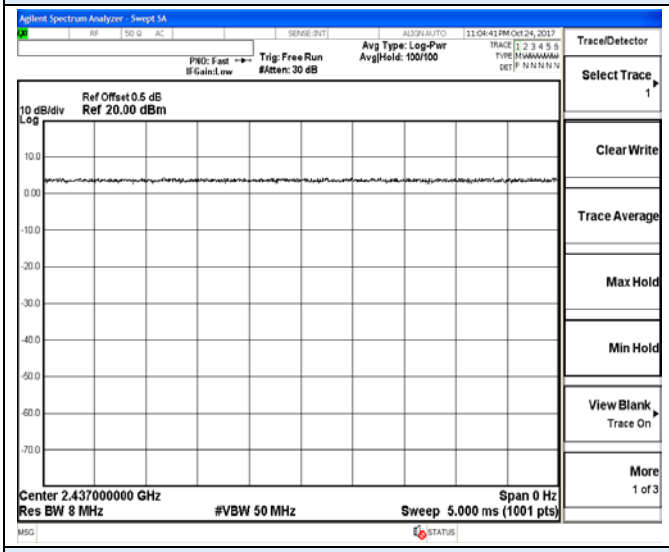
5.1.6. Test result

Mode	On Time B (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW(KHz)
IEEE 802.11b	5	5	1	100	0	0.010
IEEE 802.11g	5	5	1	100	0	0.010
IEEE 802.11n HT20	5	5	1	100	0	0.010
IEEE 802.11n HT40	5	5	1	100	0	0.010

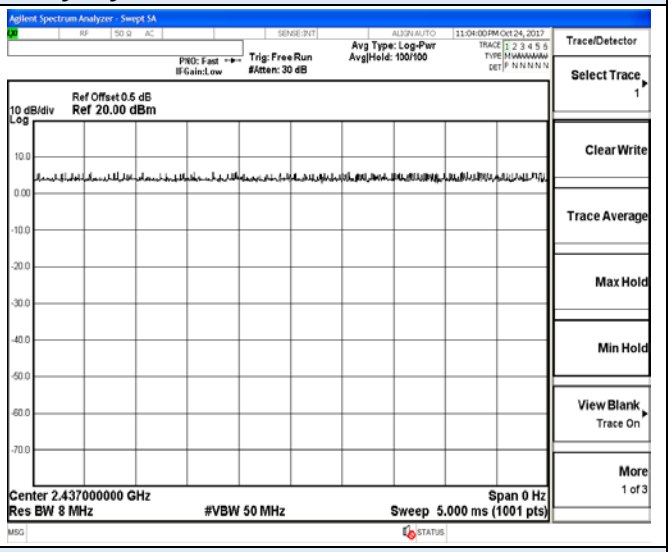
Remark:

1. Measured duty cycle for WLAN at antenna 0, antenna 1 and antenna 2 port, the two antenna ports results were same, just recorded results at antenna 0;

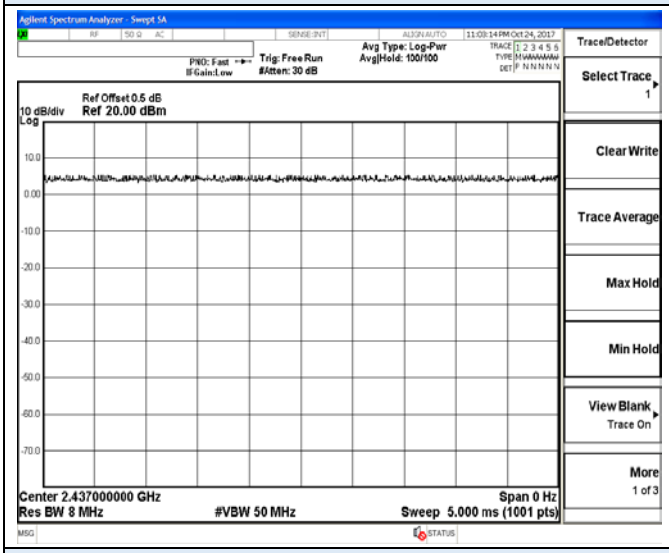
On Time and Duty Cycle



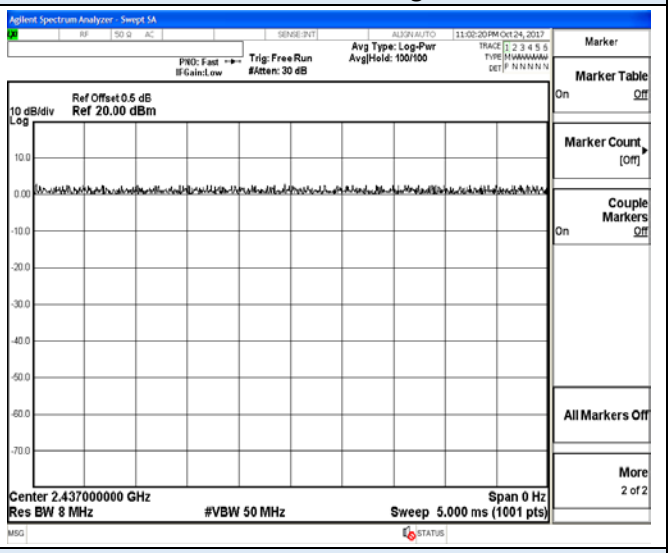
IEEE 802.11b



IEEE 802.11g



IEEE 802.11n HT20



IEEE 802.11n HT40

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

According to §15.247(b): For systems using digital modulation in the 2400-2483.5 MHz and 5725-5850 MHz band, the limit for maximum peak conducted output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceeds 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter peak output power.

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

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power, 9.1.2 the maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

According to KDB558074 D01 DTS Measurement Guidance Section 9.2 Maximum average conducted output power, 9.2.3.1 Method AVGPM (Measurement using an RF average power meter)

(a) As an alternative to spectrum analyzer or EMI receiver measurements, 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.

1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.

2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

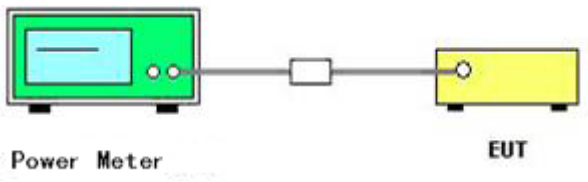
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

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

(d) Adjust the measurement in dBm by adding 10log (1/x), where x is the duty cycle to the measurement result.

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	25.1℃	Humidity	52.4%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11b/g/n

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)				Limits (dBm)	Verdict
			Antenna 0	Antenna 1	Antenna 2	Sum		
IEEE 802.11b	1	2412	10.56	10.87	10.69	-/-	30	PASS
	6	2437	10.64	11.16	10.43	-/-		
	11	2462	10.18	10.45	10.31	-/-		
IEEE 802.11g	1	2412	11.22	11.03	11.52	-/-	30	PASS
	6	2437	10.58	11.50	11.19	-/-		
	11	2462	11.65	11.57	10.88	-/-		
IEEE 802.11n HT20	1	2412	6.81	6.89	6.64	11.55	30	PASS
	6	2437	7.43	7.29	7.04	12.03		
	11	2462	6.24	7.01	7.37	11.67		
IEEE 802.11n HT40	3	2422	8.39	8.16	8.28	13.05	30	PASS
	6	2437	8.02	7.93	7.82	12.70		
	9	2452	7.55	7.21	7.43	12.17		

Test Mode	Channel	Frequency (MHz)	Measured Average Output Power (dBm)				Limits (dBm)	Verdict
			Antenna 0	Antenna 1	Antenna 2	Sum		
IEEE 802.11b	1	2412	8.77	8.95	8.79	-/-	30	PASS
	6	2437	8.81	9.03	8.71	-/-		
	11	2462	8.45	8.72	8.42	-/-		
IEEE 802.11g	1	2412	8.12	8.09	8.23	-/-	30	PASS
	6	2437	8.01	8.22	8.11	-/-		
	11	2462	8.29	8.25	8.05	-/-		
IEEE 802.11n HT20	1	2412	3.41	3.42	3.37	8.17	30	PASS
	6	2437	3.55	3.52	3.48	8.29		
	11	2462	3.28	3.33	3.29	8.07		
IEEE 802.11n HT40	3	2422	3.70	3.61	3.68	8.43	30	PASS
	6	2437	3.59	3.54	3.53	8.32		
	9	2452	3.37	3.28	3.32	8.09		

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 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;*
4. *"-/-" means no need measured or sum as cannot work at MIMO mode;*
5. *Average power is for report only;*

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

According to §15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.3.2. Measuring Instruments and Setting

Please refer to equipment's 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.

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 = 3 KHz~100 KHz.

4. Set the VBW ≥ 3*RBW

5. Set the span to 1.5 times the DTS channel bandwidth.

6. Detector = peak.

7. Sweep time = auto couple.

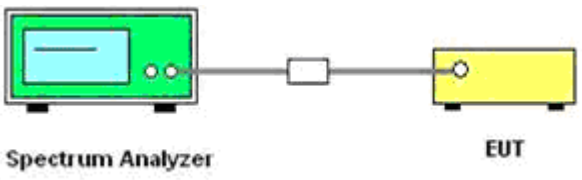
8. Trace mode = max hold.

9. Allow trace to fully stabilize.

10. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

11. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

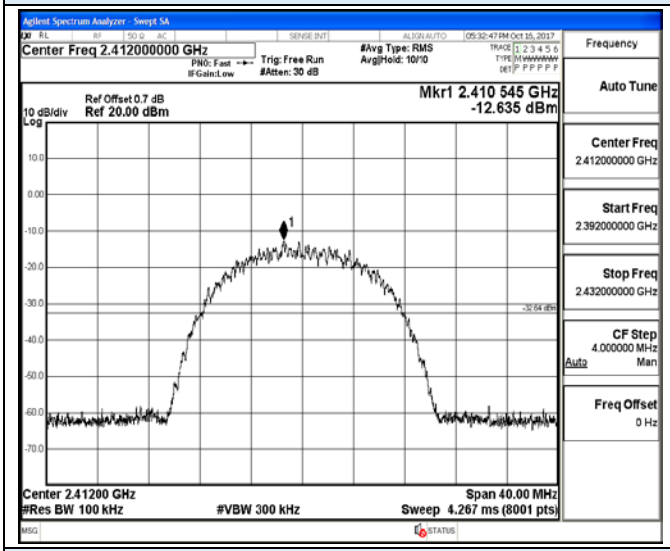
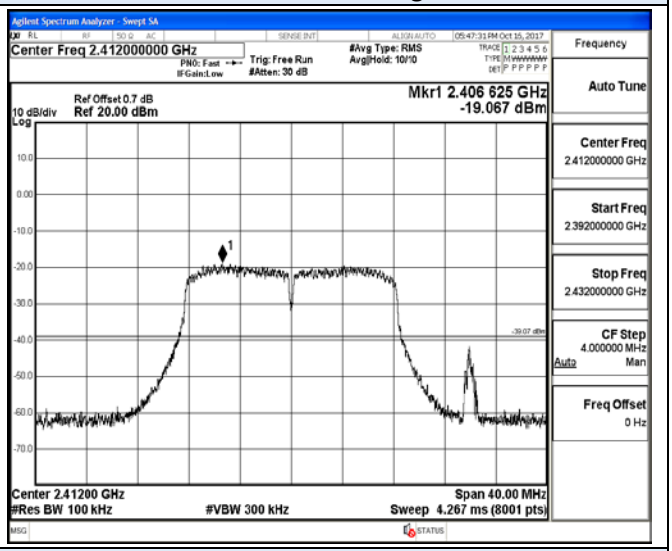
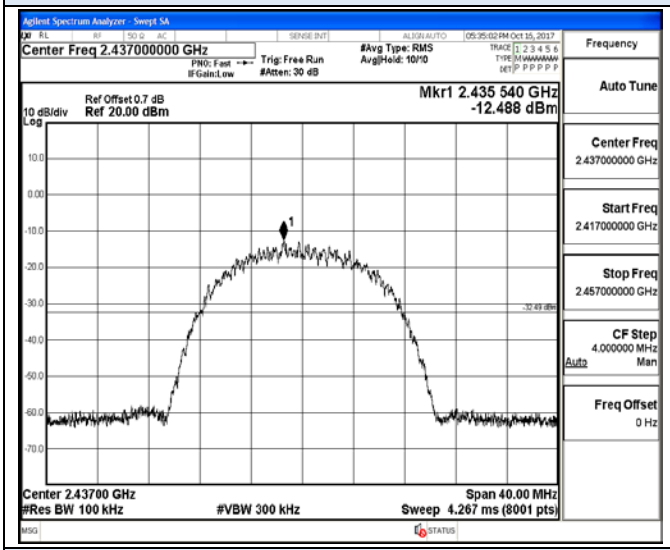
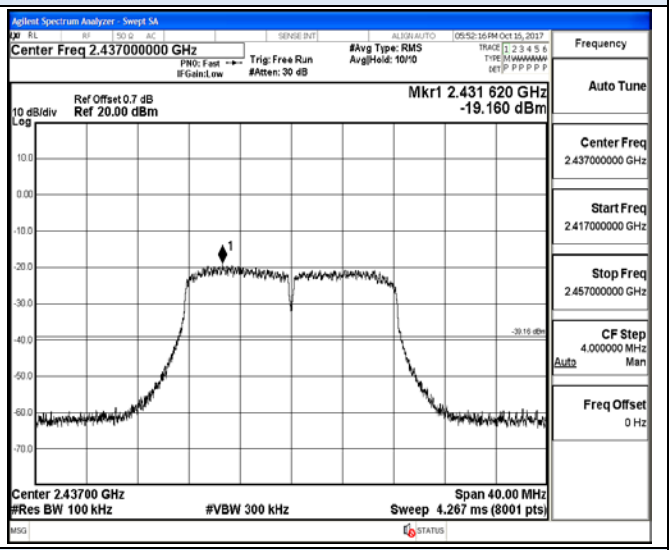
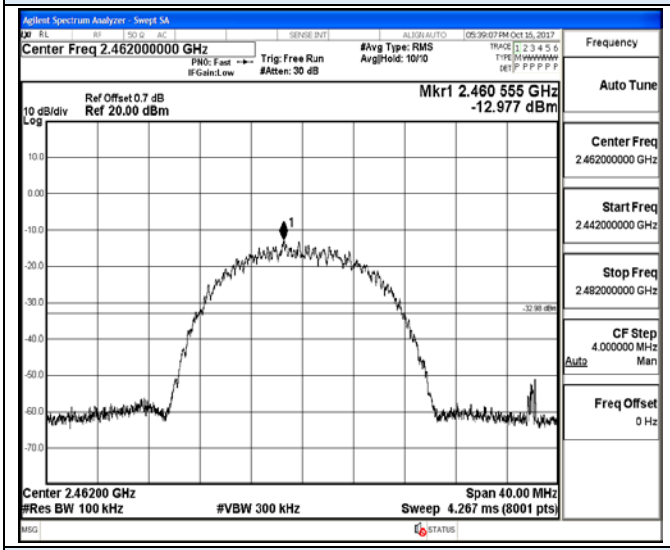
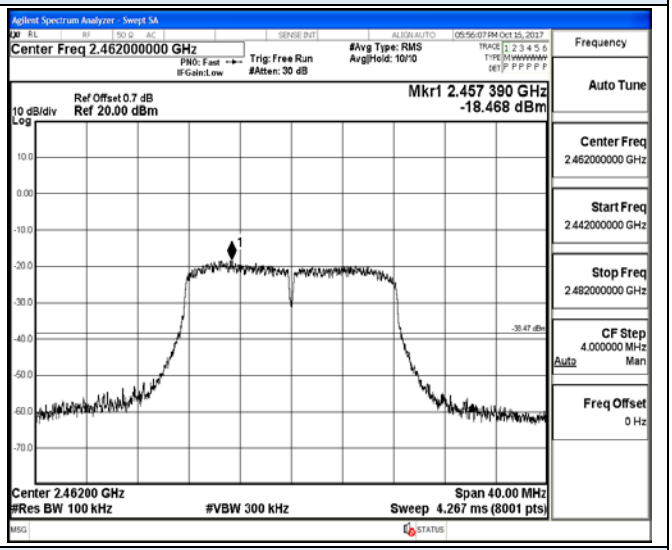
5.3.6. Test Result of Power Spectral Density

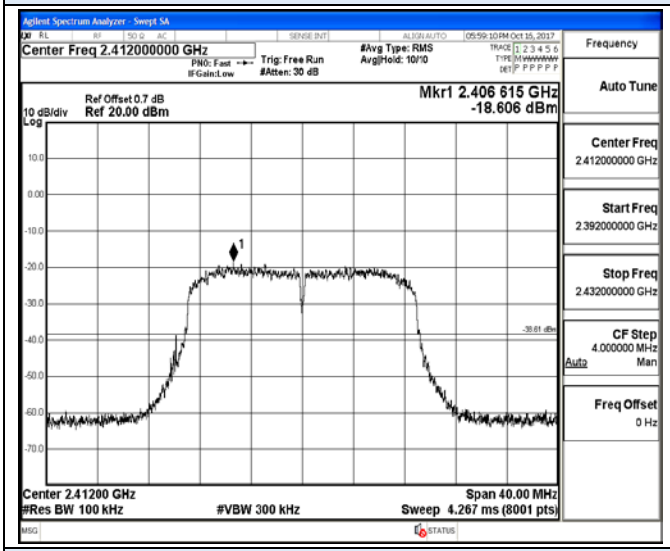
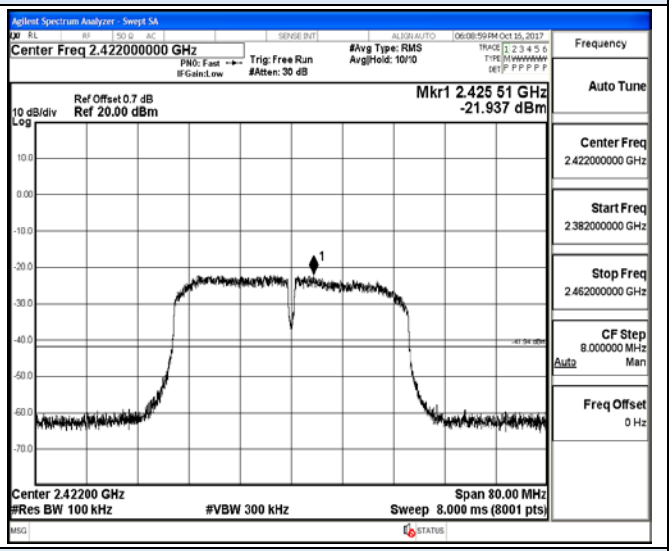
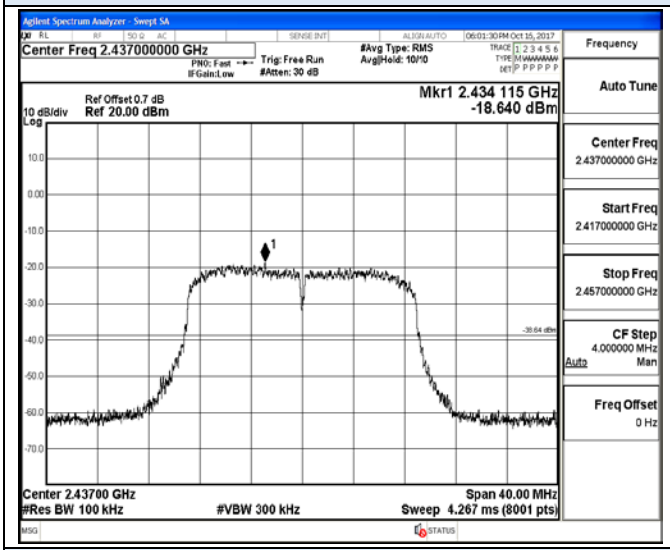
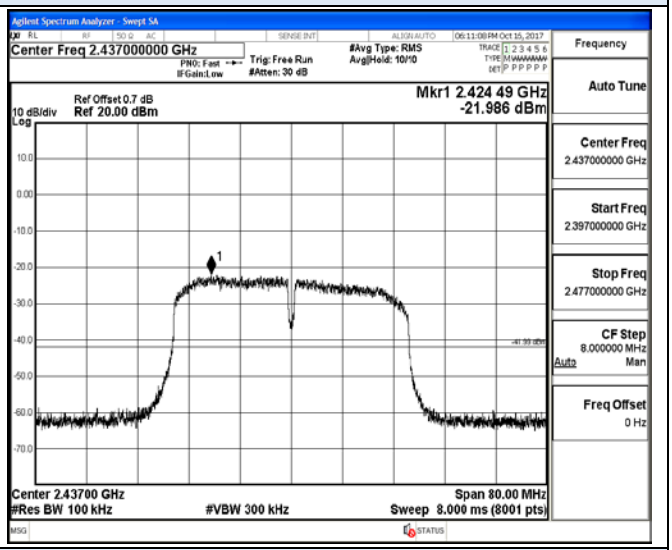
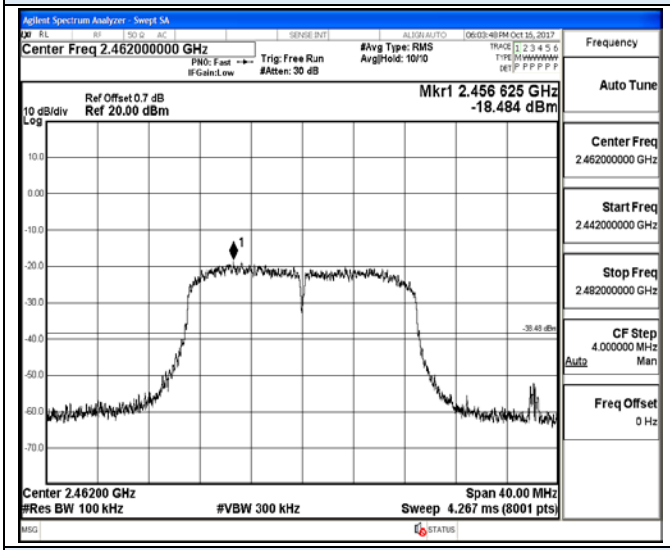
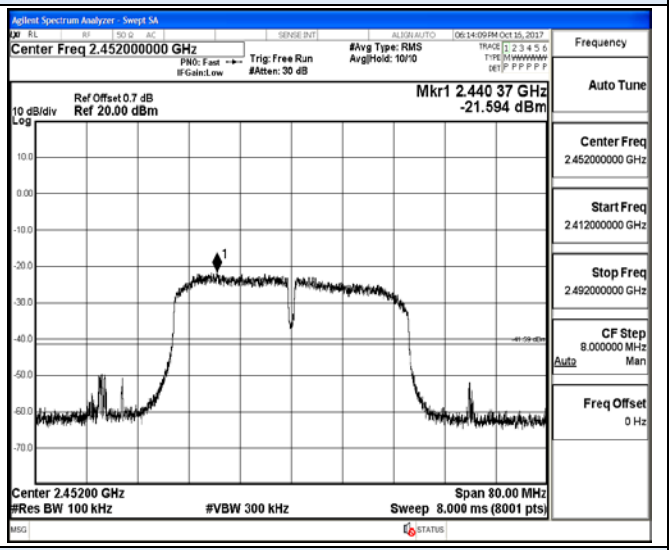
Temperature	25.1℃	Humidity	52.4%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11b/g/n

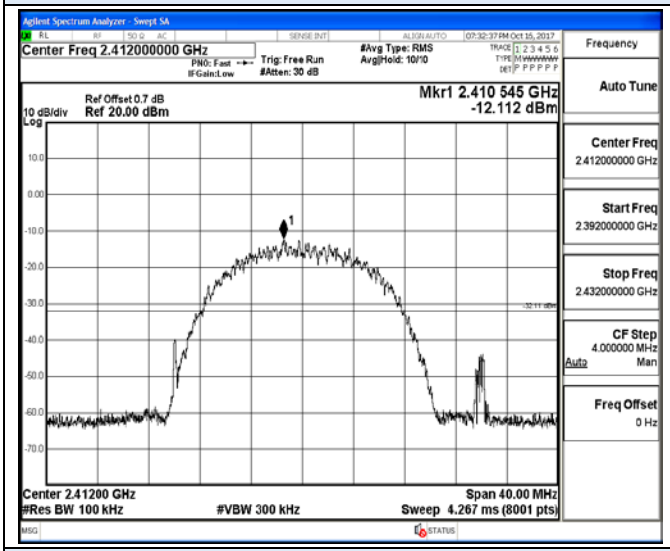
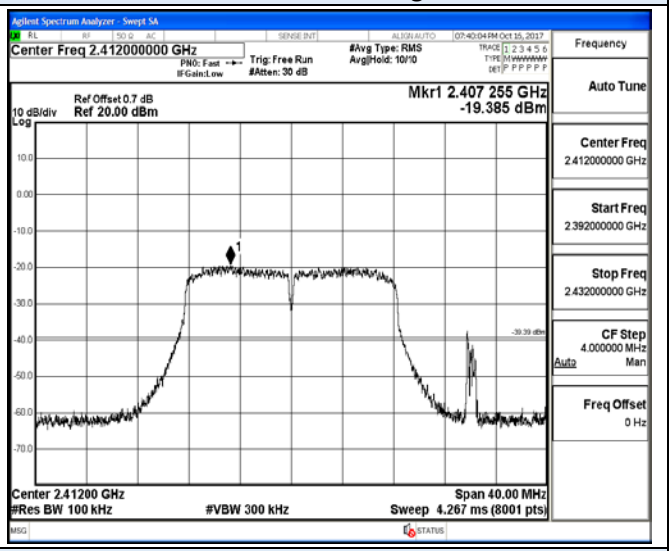
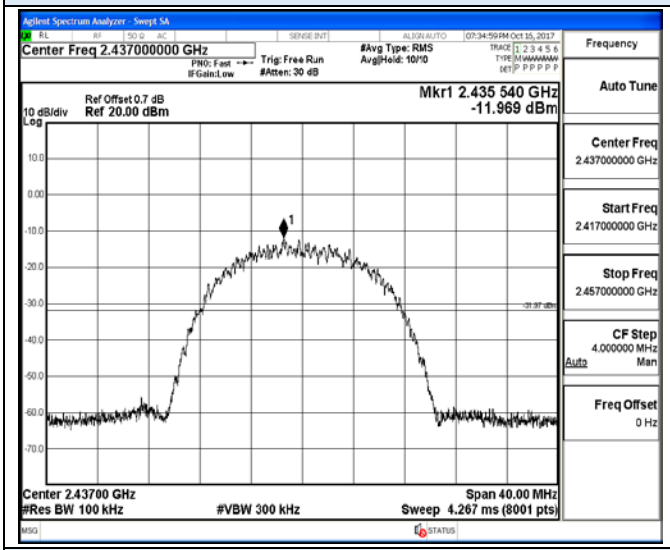
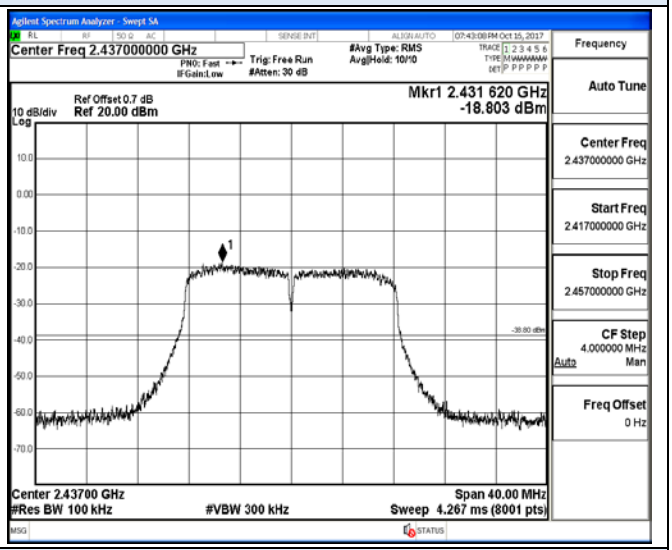
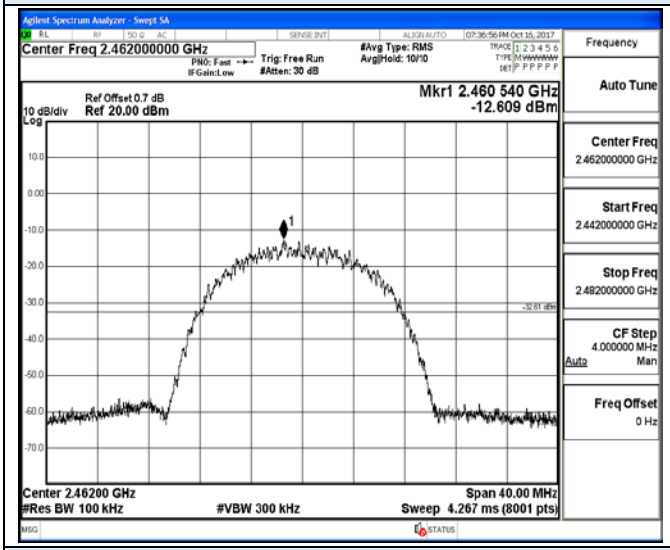
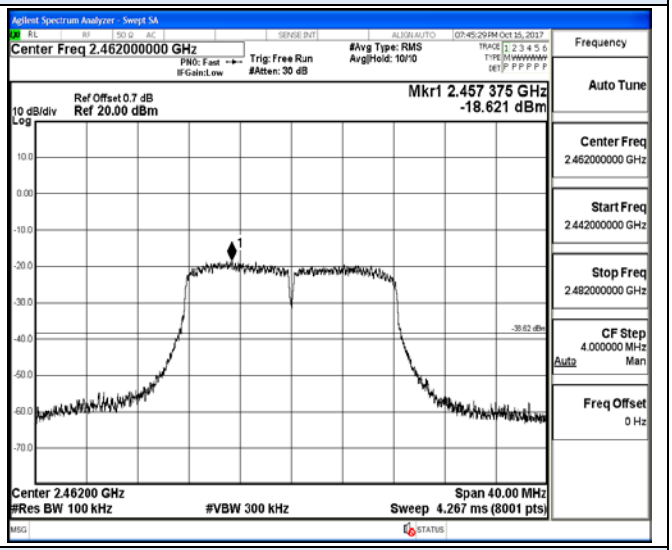
Test Mode	Channel	Frequency (MHz)	Measured Peak Power Spectral Density (dBm/100KHz)				Directional Gain	Limits (dBm/3KHz)	Verdict
			Antenna 0	Antenna 1	Antenna 2	Sum			
IEEE 802.11b	1	2412	-12.635	-12.112	-12.446	-/-	-/-	8.00	PASS
	6	2437	-12.488	-11.969	-12.958	-/-	-/-		
	11	2462	-12.977	-12.609	-12.798	-/-	-/-		
IEEE 802.11g	1	2412	-19.067	-19.385	-18.738	-/-	-/-	8.00	PASS
	6	2437	-19.160	-18.803	-19.034	-/-	-/-		
	11	2462	-18.468	-18.621	-19.531	-/-	-/-		
IEEE 802.11n HT20	1	2412	-18.606	-18.412	-18.841	-13.845	6.77	7.23	PASS
	6	2437	-18.640	-18.088	-18.894	-13.756	6.77		
	11	2462	-18.484	-18.813	-19.462	-14.130	6.77		
IEEE 802.11n HT40	3	2422	-21.937	-22.245	-23.025	-17.607	6.77	7.23	PASS
	6	2437	-21.986	-21.752	-23.213	-17.500	6.77		
	9	2452	-21.594	-21.530	-22.742	-17.150	6.77		

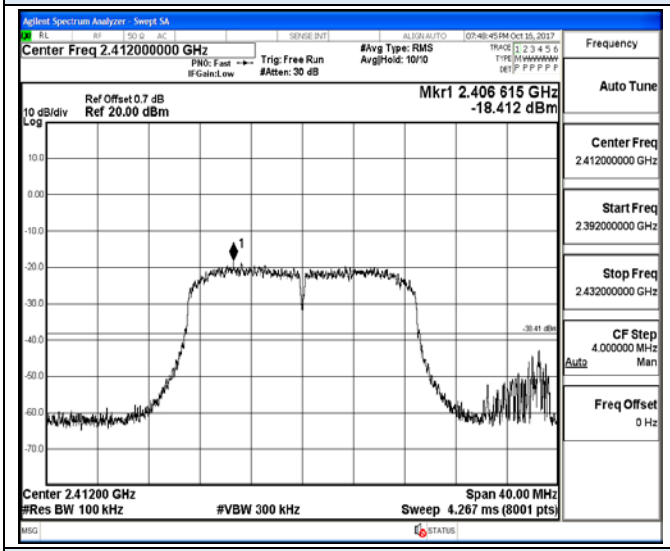
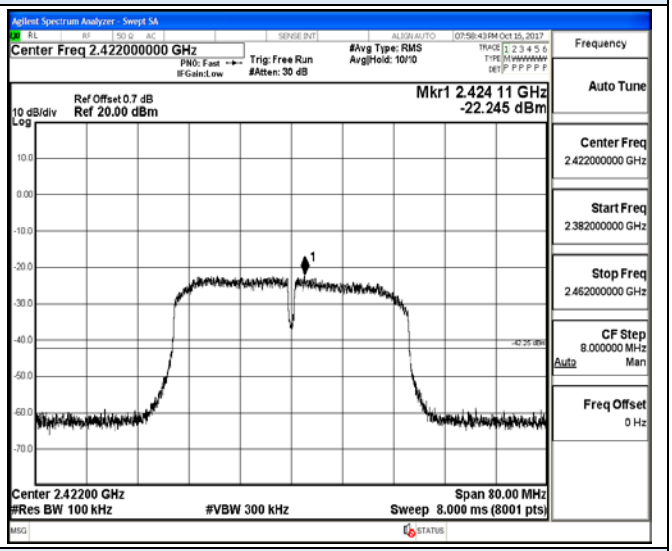
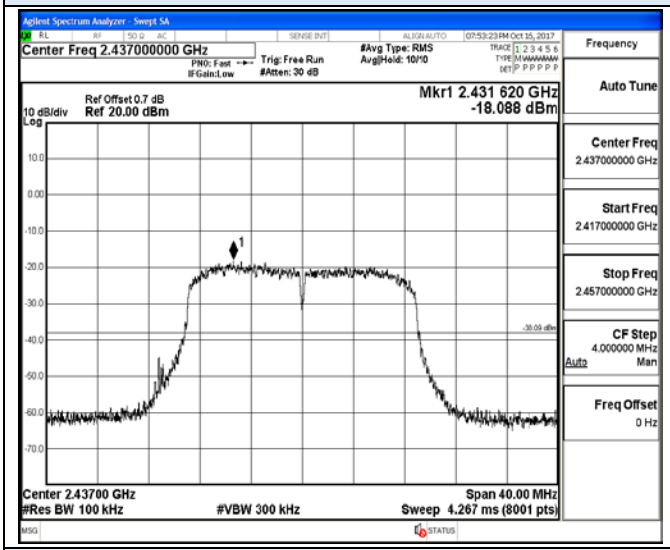
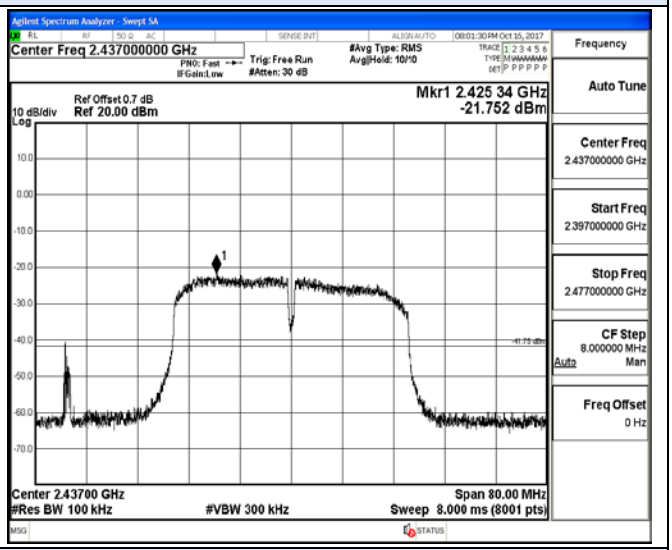
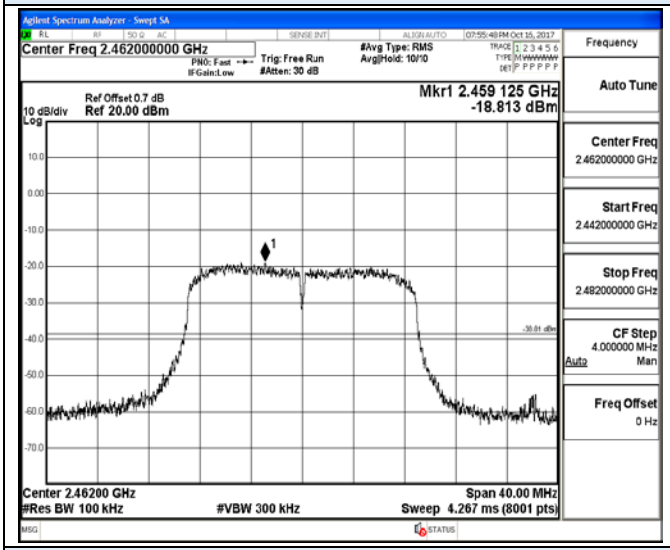
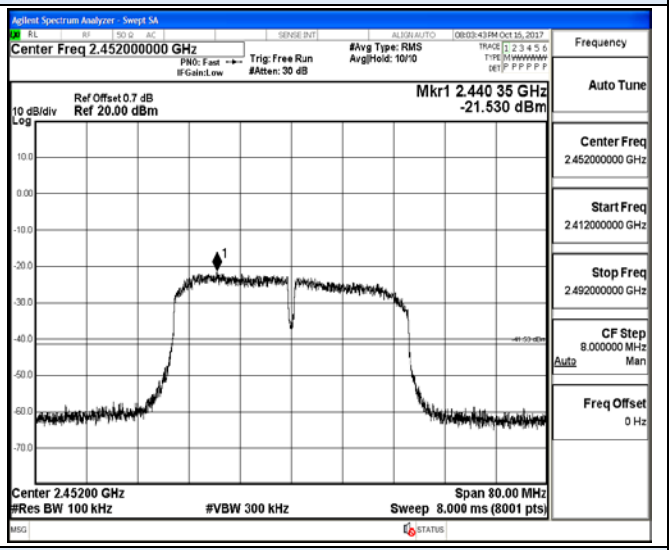
Remark:

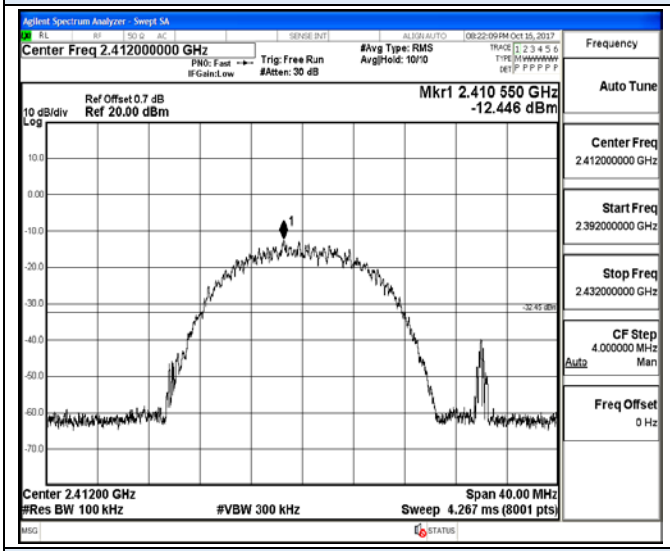
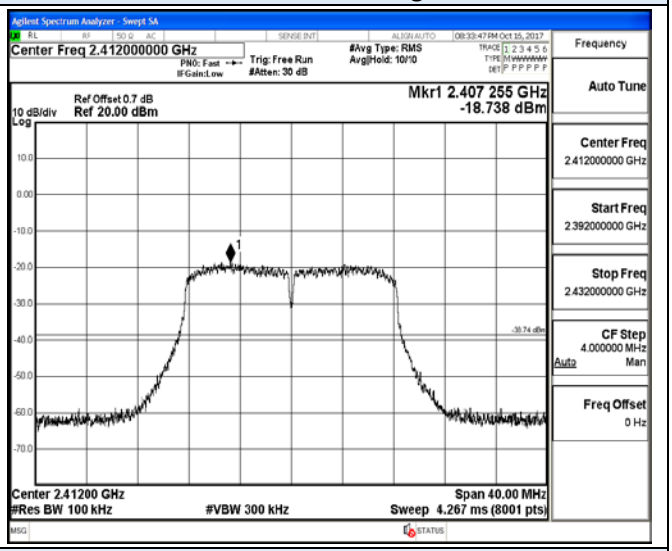
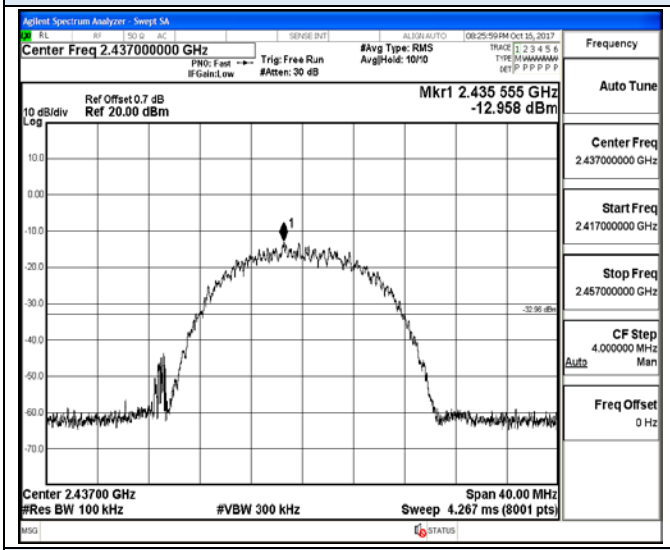
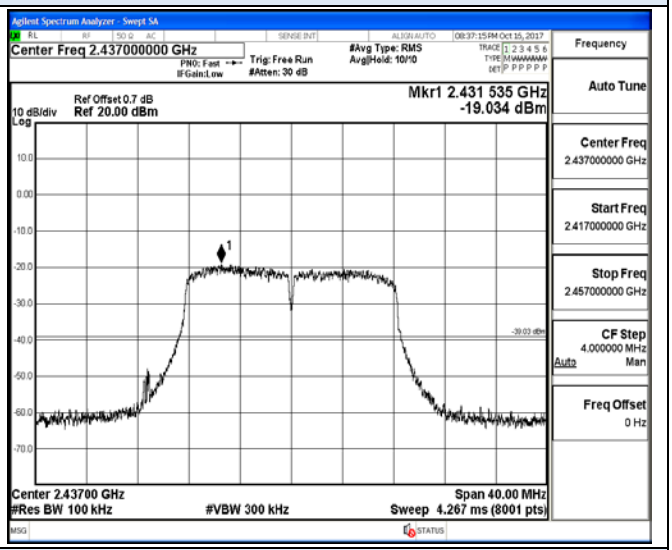
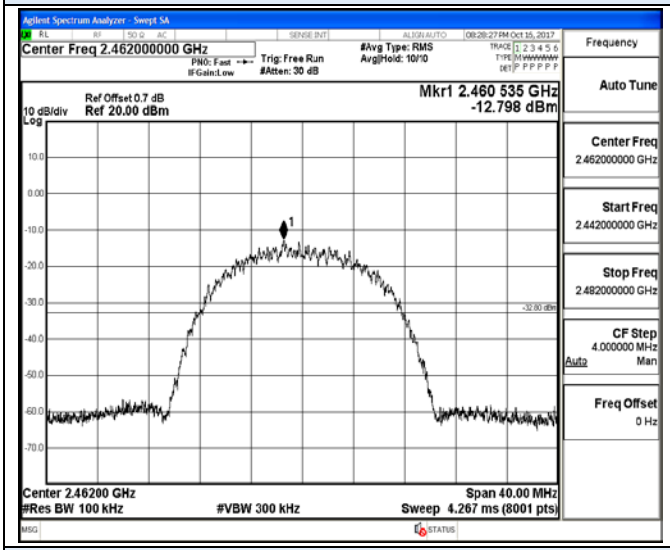
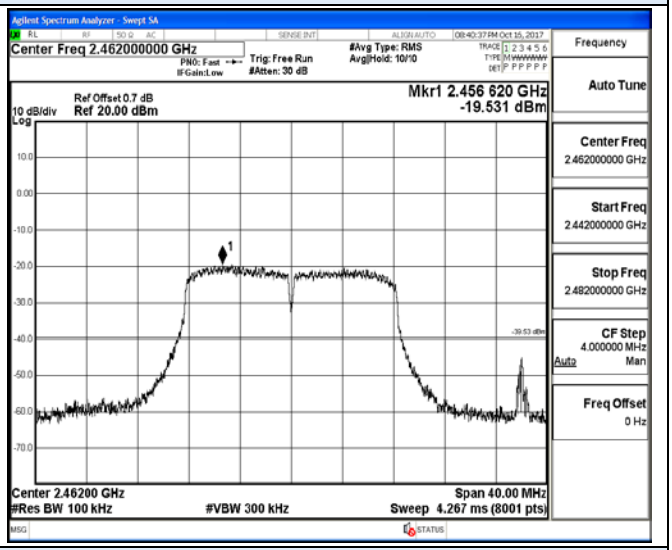
1. *Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;*
4. *Please refer to following plots;*
5. *The PSD limits of IEEE 802.11n HT20 and IEEE 802.11n HT40 for MIMO with CDD technology should be reduce to 8.00-(2.0+10*log(3)-6.00)=7.23 dBm/3KHz according to KDB662911D01;*
6. *For MIMO with CCD 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.
7. *"-/-" means no need measured or sum as cannot work at MIMO mode;*

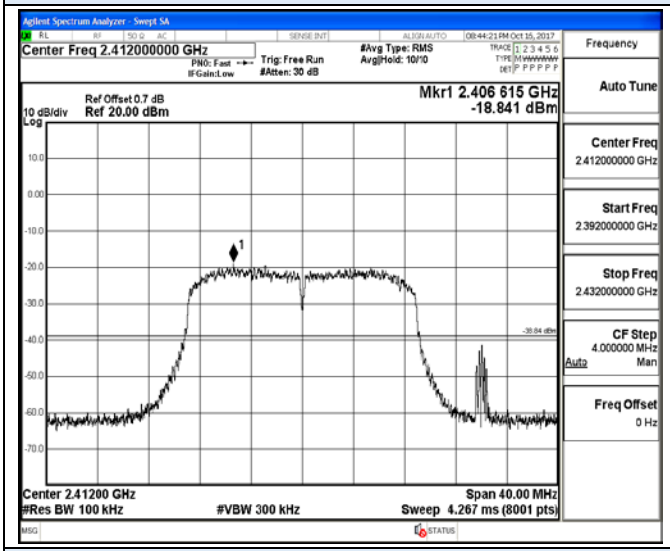
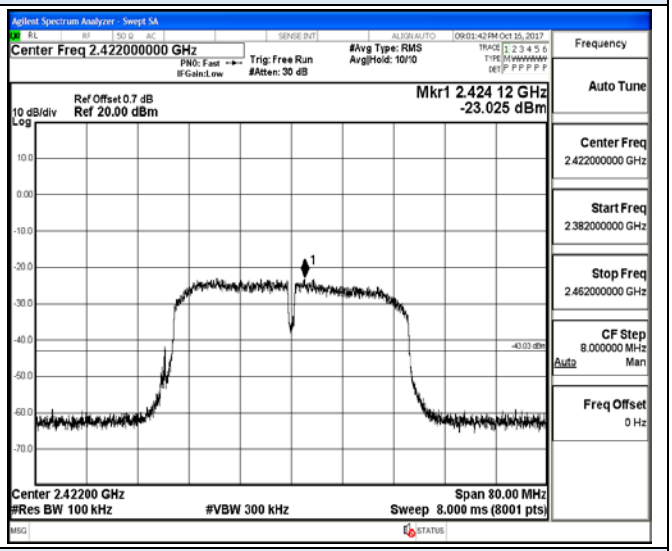
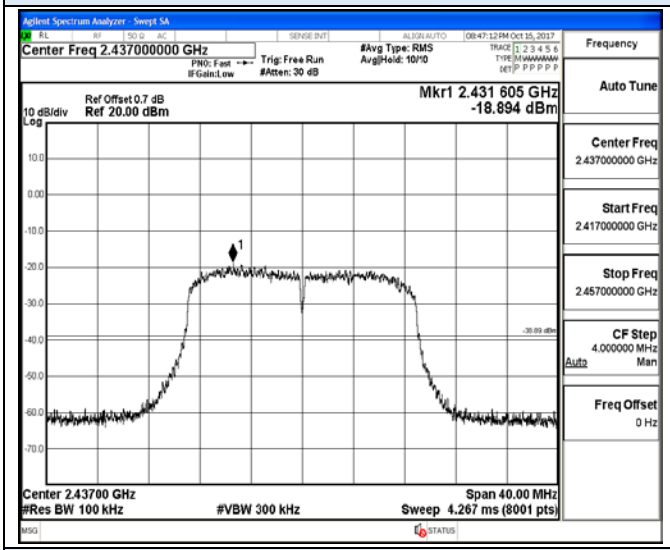
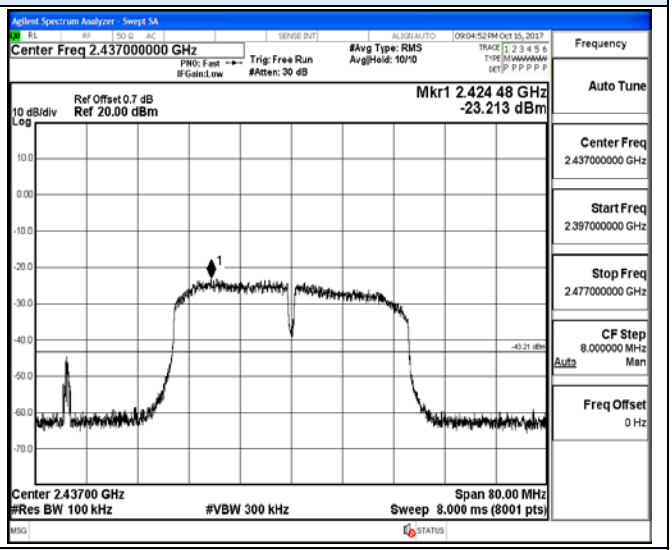
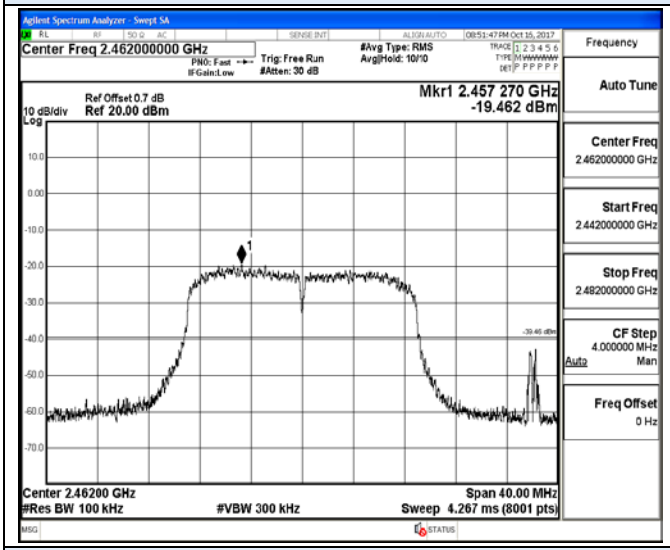
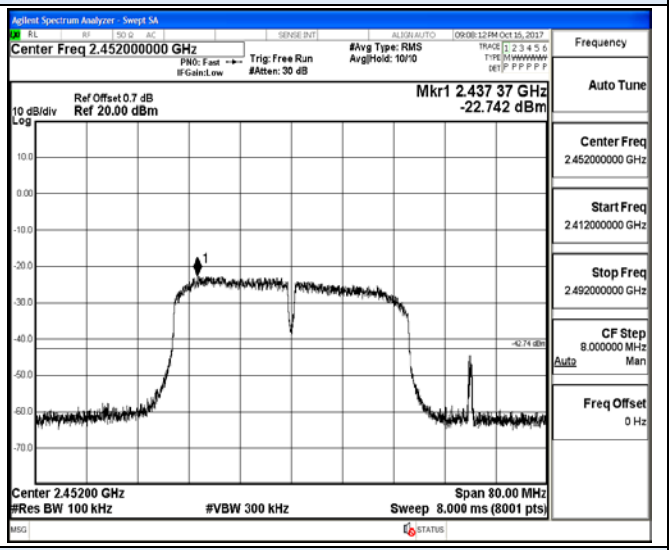
Power Spectral Density	
Antenna 0	Antenna 0
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz

Power Spectral Density	
Antenna 0	Antenna 0
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 1 / 2412 MHz	Channel 3 / 2422 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 9 / 2452 MHz

Power Spectral Density	
Antenna 1	Antenna 1
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz

Power Spectral Density	
Antenna 1	Antenna 1
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 1 / 2412 MHz	Channel 3 / 2422 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 9 / 2452 MHz

Power Spectral Density	
Antenna 2	Antenna 2
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz

Power Spectral Density	
Antenna 2	Antenna 2
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 1 / 2412 MHz	Channel 3 / 2422 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 9 / 2452 MHz

5.4. 6 dB Spectrum Bandwidth Measurement

5.4.1. Standard Applicable

According to §15.247(a) (2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.4.2. Measuring Instruments and Setting

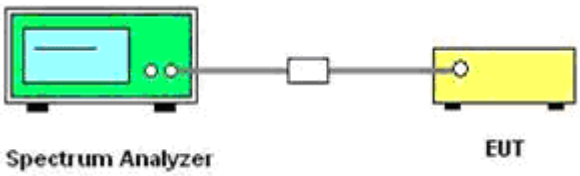
Please refer to equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	100ms

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 and the video bandwidth were set according to KDB558074.
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.

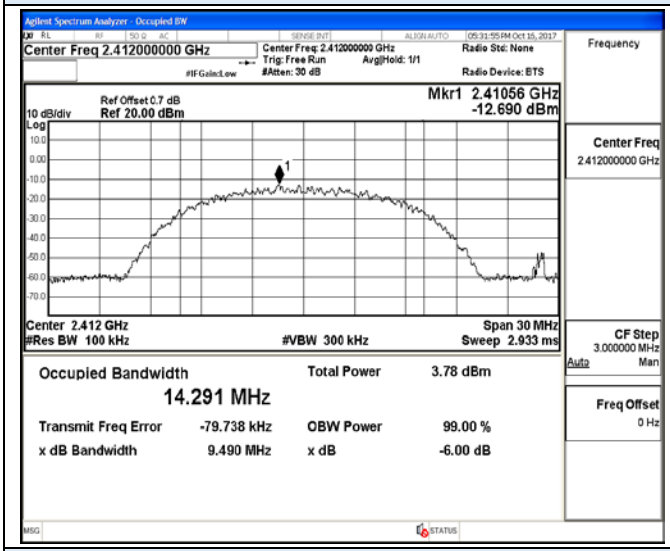
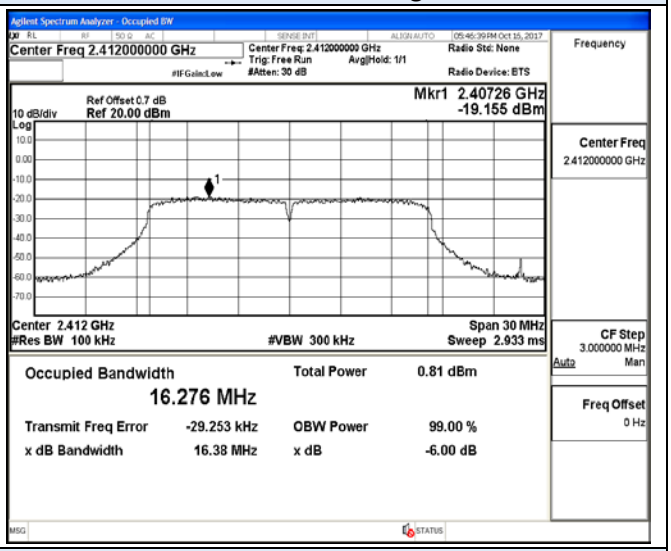
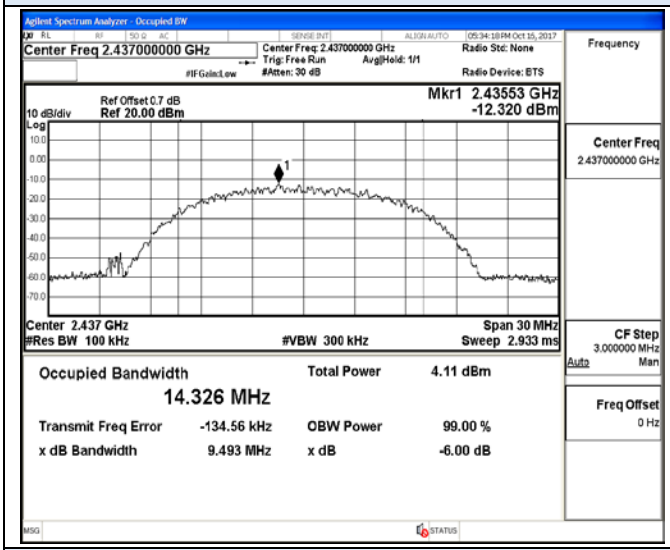
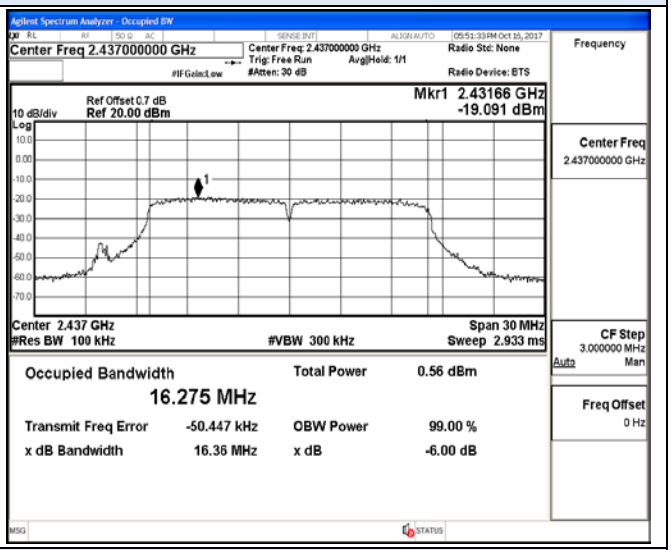
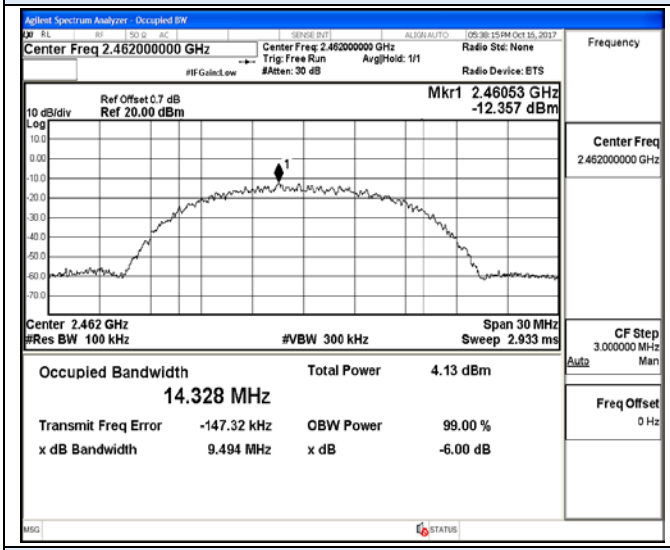
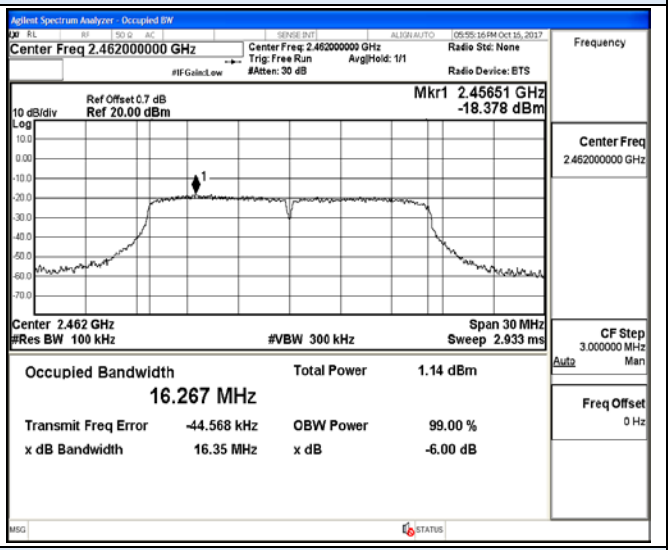
5.4.6. Test Result of 6dB Spectrum Bandwidth

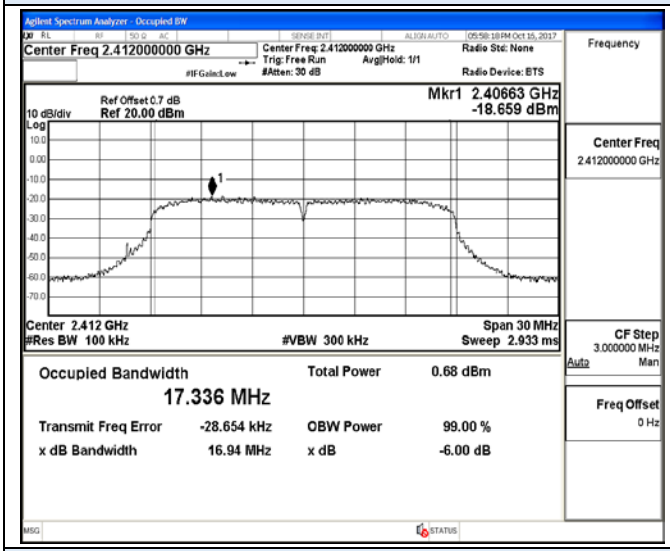
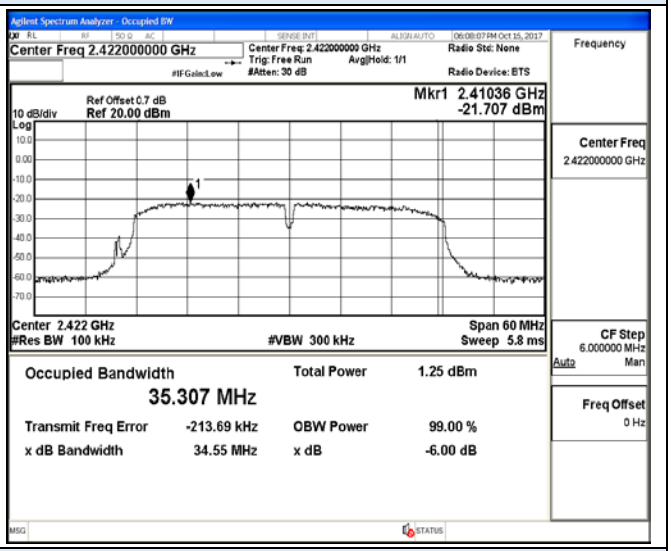
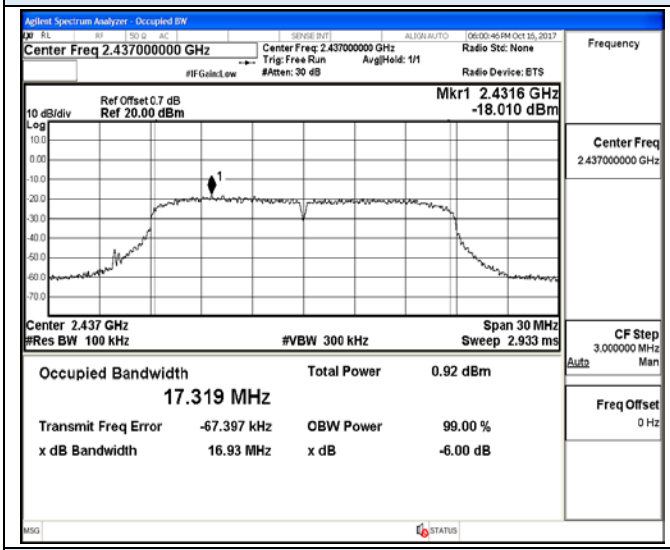
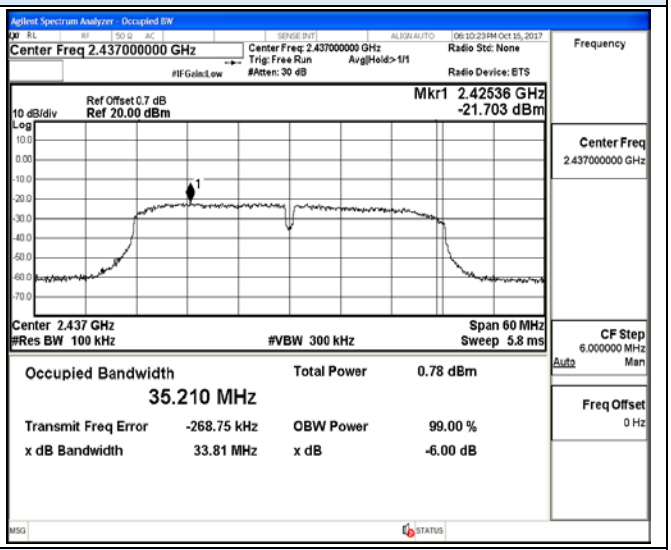
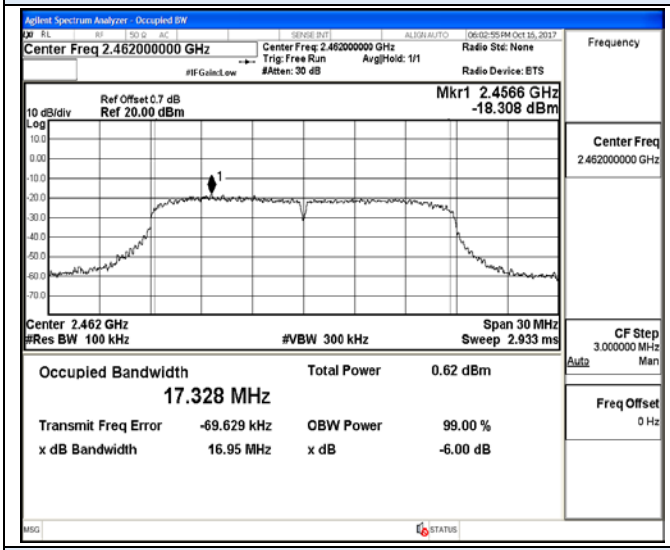
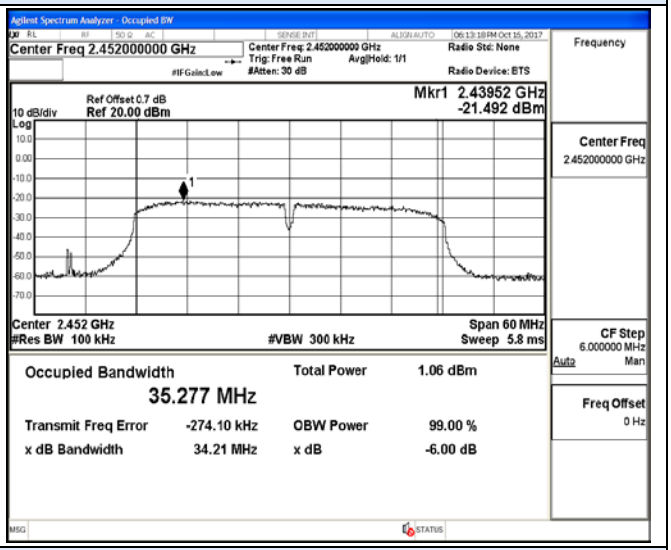
Temperature	25.1℃	Humidity	52.4%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11b/g/n

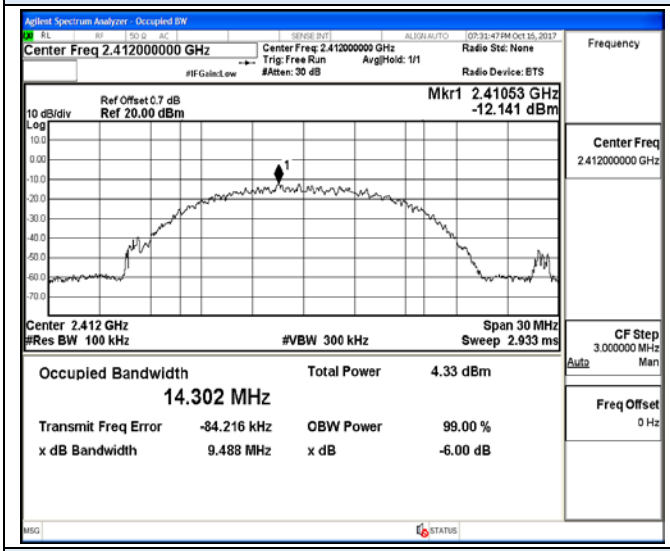
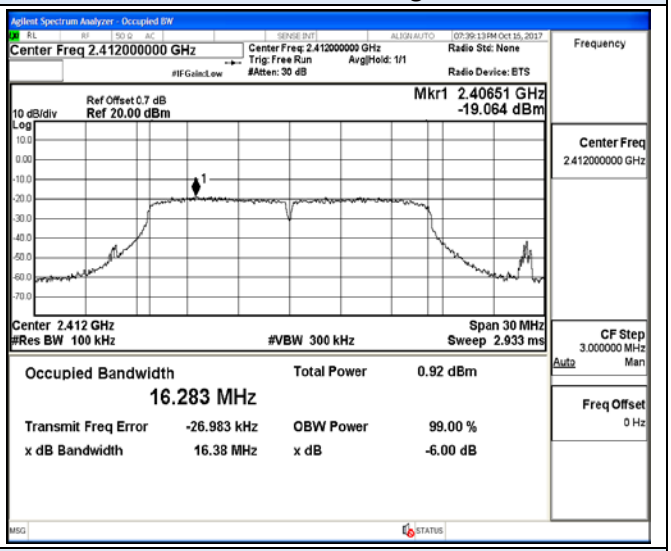
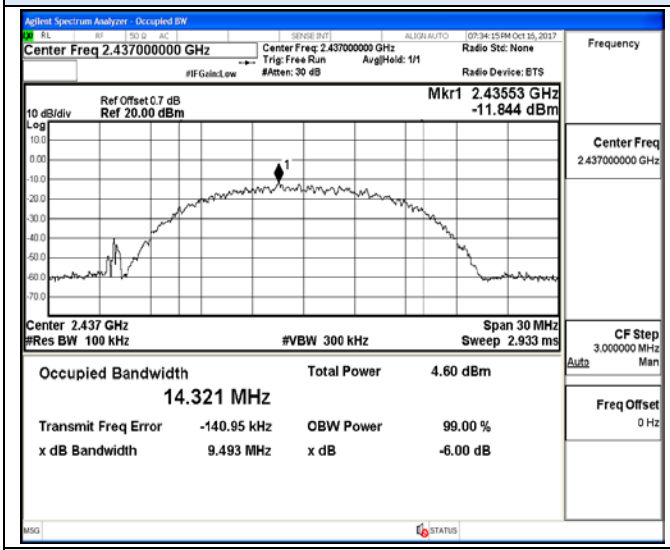
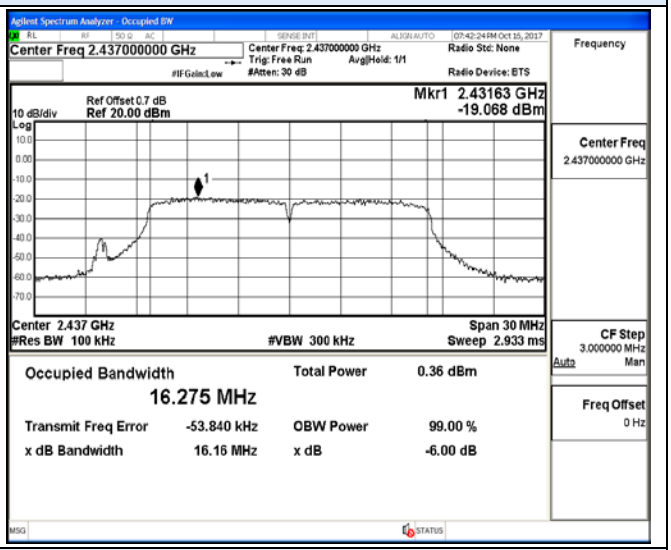
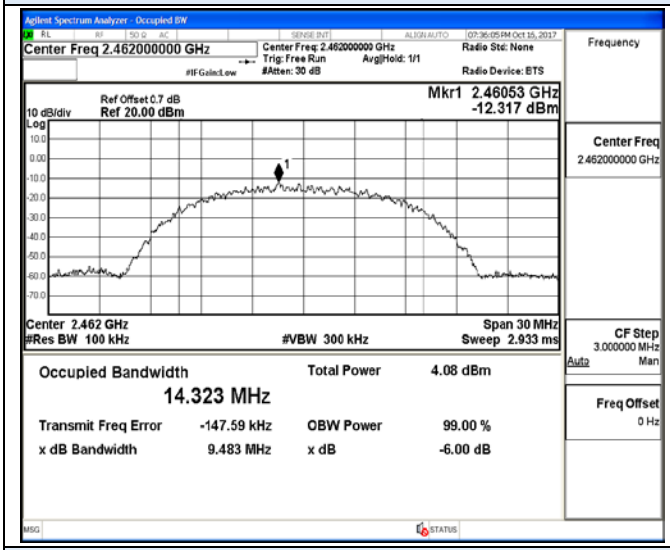
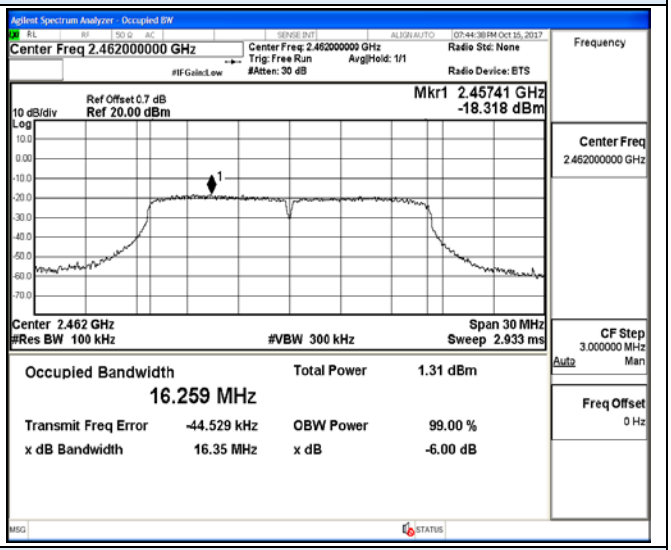
Test Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Limits (MHz)	Verdict
			Antenna 0	Antenna 1	Antenna 2		
IEEE 802.11b	1	2412	9.490	9.488	9.485	0.500	PASS
	6	2437	9.493	9.493	9.484		
	11	2462	9.494	9.483	9.487		
IEEE 802.11g	1	2412	16.380	16.380	16.380	0.500	PASS
	6	2437	16.360	16.160	16.170		
	11	2462	16.350	16.350	16.370		
IEEE 802.11n HT20	1	2412	16.940	16.940	16.940	0.500	PASS
	6	2437	16.930	16.950	16.680		
	11	2462	16.950	16.960	16.950		
IEEE 802.11n HT40	3	2422	34.550	34.440	34.430	0.500	PASS
	6	2437	33.810	33.930	34.220		
	9	2452	34.210	33.960	33.910		

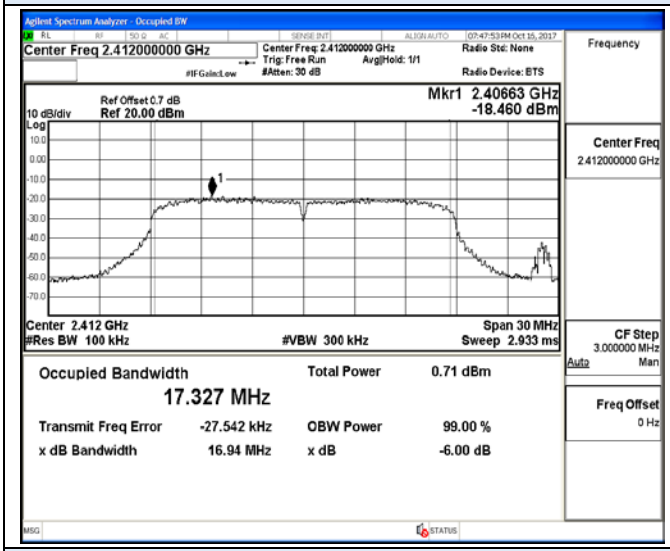
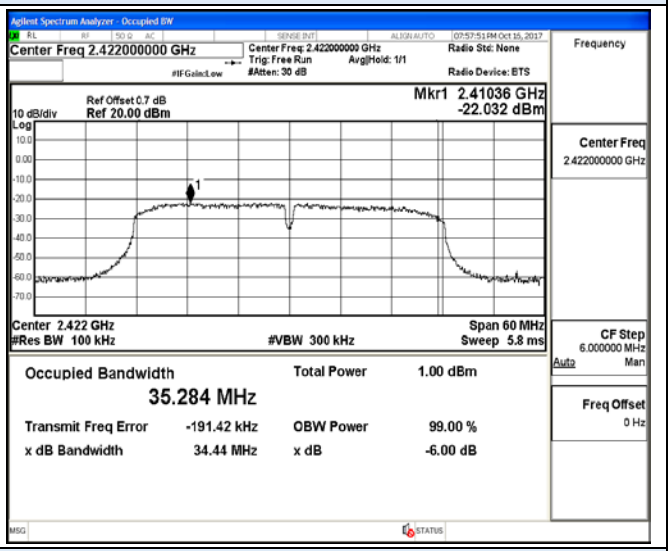
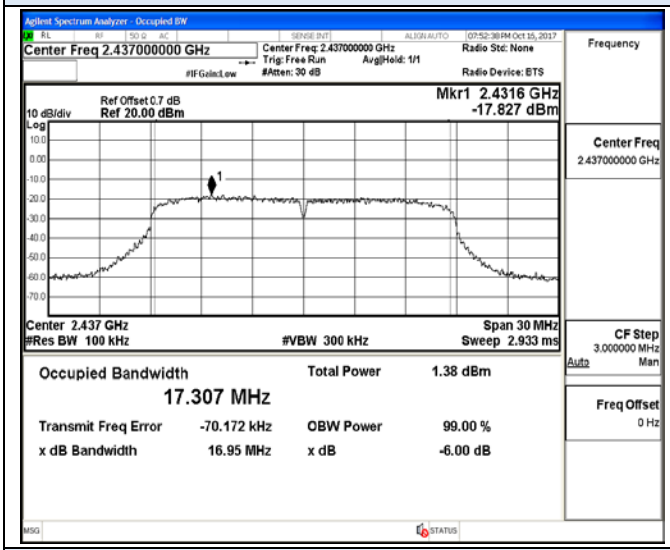
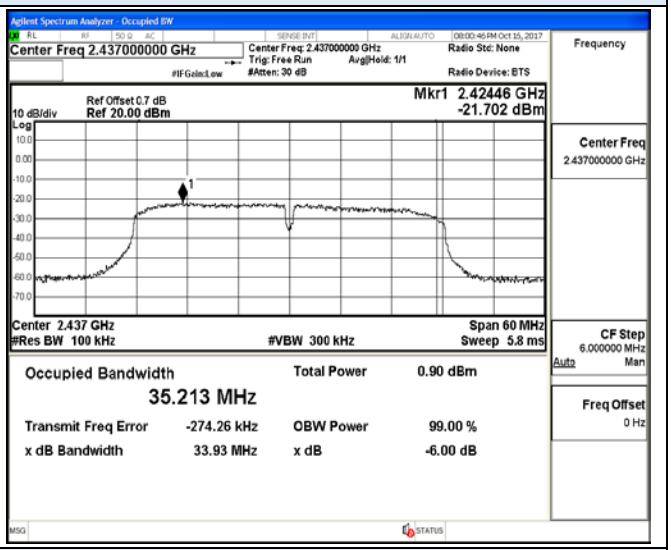
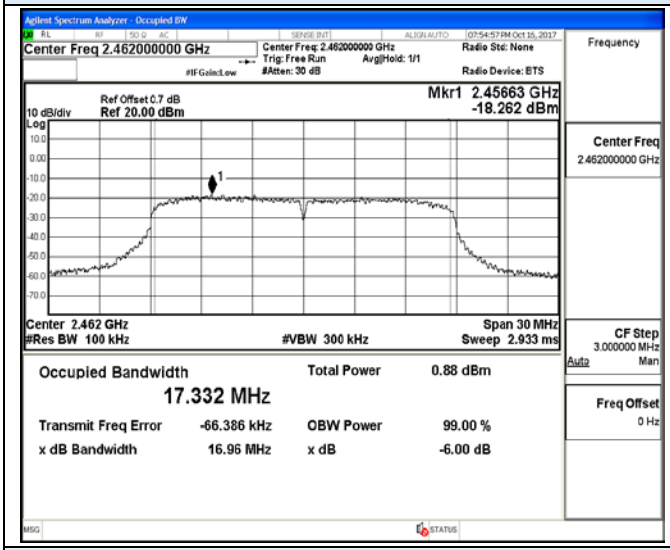
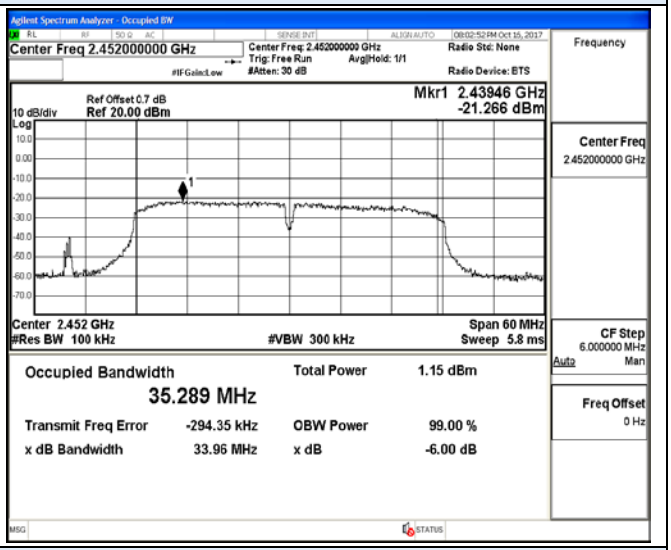
Remark:

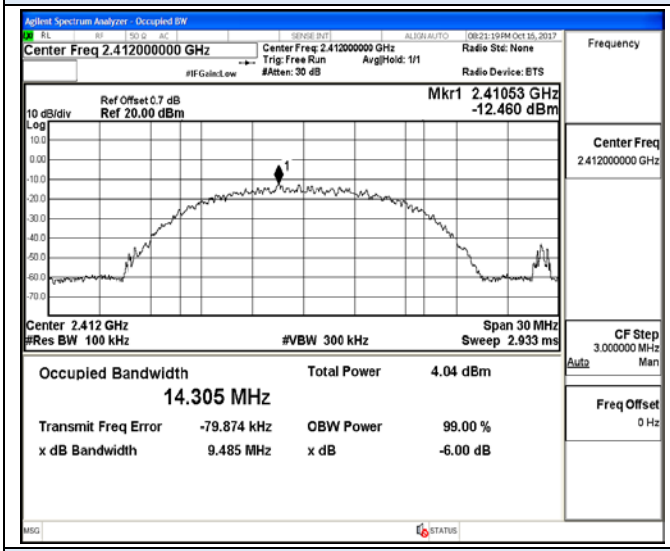
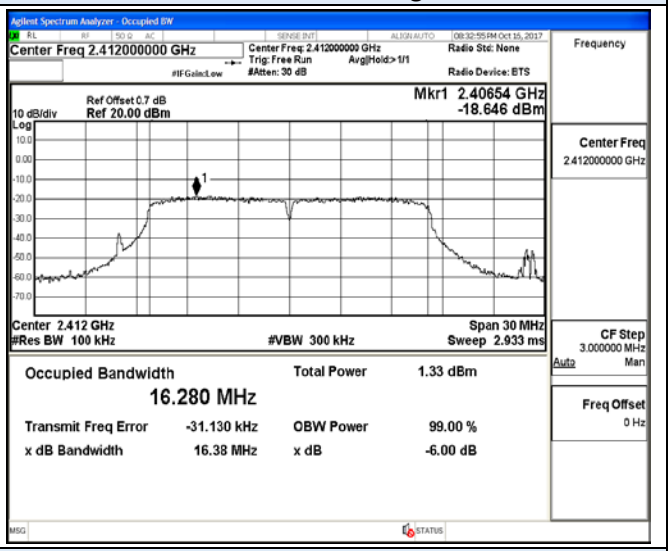
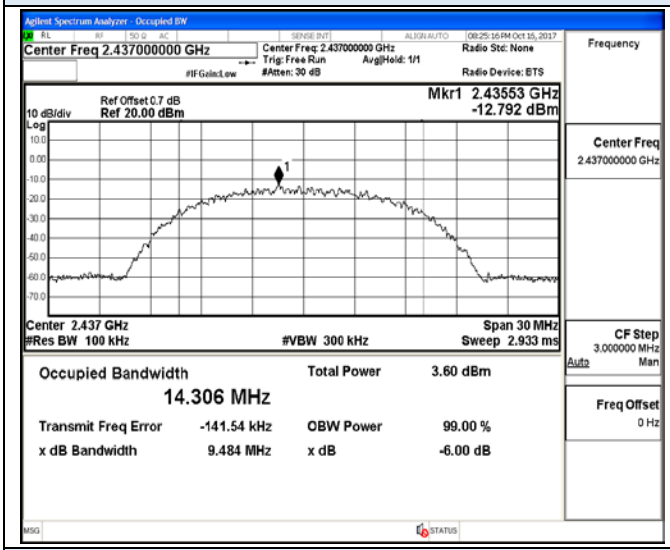
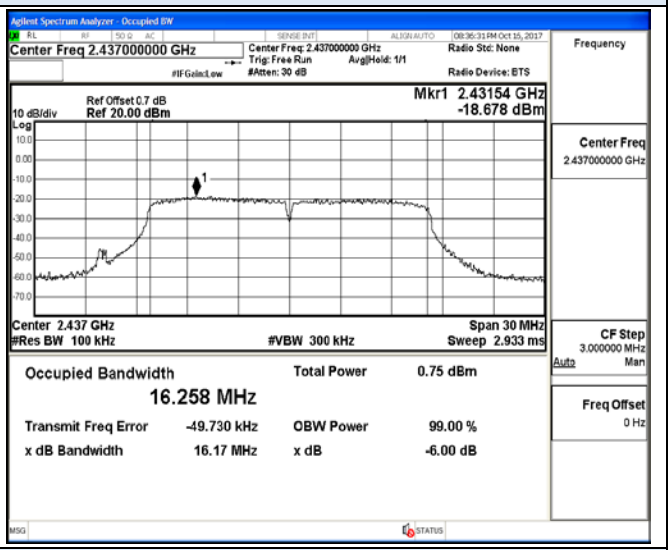
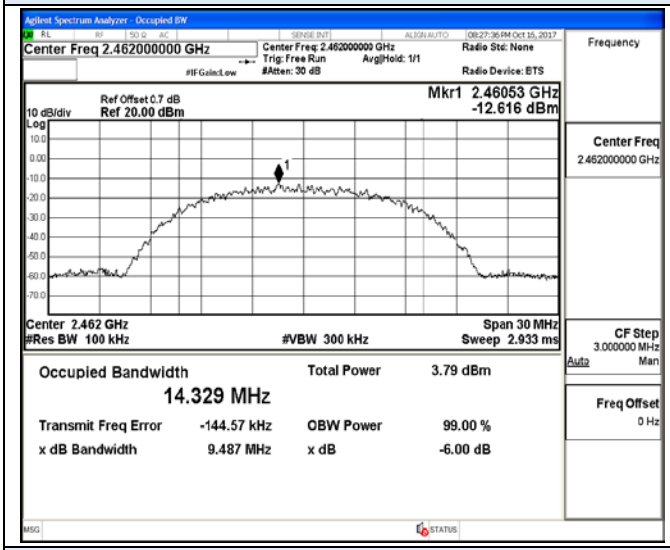
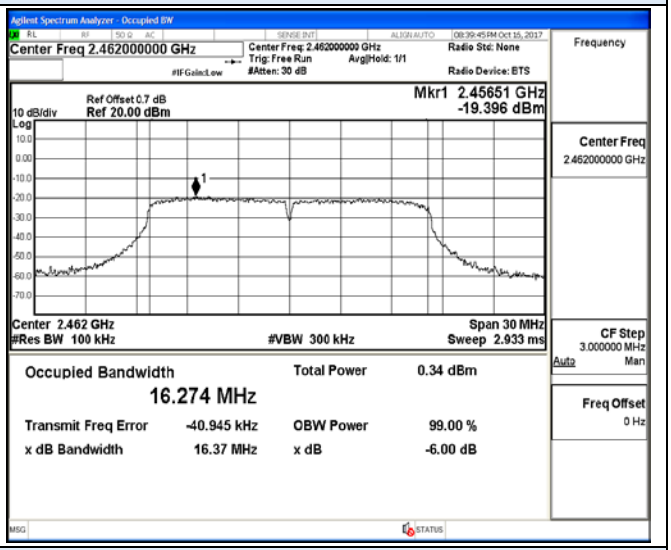
1. *Measured 6dB Bandwidth at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;*
4. *Please refer to following plots;*

6 dB Bandwidth	
Antenna 0	Antenna 0
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz

6 dB Bandwidth	
Antenna 0	Antenna 0
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 1 / 2412 MHz	Channel 3 / 2422 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 9 / 2452 MHz

6 dB Bandwidth	
Antenna 1	Antenna 1
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz

6 dB Bandwidth	
Antenna 1	Antenna 1
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 1 / 2412 MHz	Channel 3 / 2422 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 9 / 2452 MHz

6 dB Bandwidth	
Antenna 2	Antenna 2
IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz	Channel 1 / 2412 MHz
	
Channel 6 / 2437 MHz	Channel 6 / 2437 MHz
	
Channel 11 / 2462 MHz	Channel 11 / 2462 MHz