FCC TEST REPORT

For

SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.

10.1 inch tablet

Model No.: Ava Book 1

Additional Model No.: /

Prepared for	:	SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.
Address	:	4#, Shangxue Technology Industrial Park(North), Bantian, Buji Town, Longgang 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	:	March 10, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	March 10, 2017~March 31, 2017
Date of Report	:	March 31, 2017

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

Report Reference No.	**:**	**LCS170327093AE**
Date of Issue	:	March 31, 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 ..... :		**SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.**
Address	:	4#, Shangxue Technology Industrial Park(North), Bantian, Buji Town, Longgang 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. ..... :		**10.1 inch tablet**
Trade Mark	:	Shairlook
Model/ Type reference	:	Ava Book 1
Ratings	:	DC 5.0V by Lithium ion polymer battery (6000mAh) Recharge Voltage: DC 5V/2500mA
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
		
Aking Jin/ File administrators	Glin Lu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCS170327093AE**	March 31, 2017 Date of issue

EUT.....	: 10.1 inch tablet
Type / Model.....	: Ava Book 1
Applicant.....	**: SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.**
Address.....	: 4#, Shangxue Technology Industrial Park(North), Bantian, Buji Town, Longgang District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.**
Address.....	: 4#, Shangxue Technology Industrial Park(North), Bantian, Buji Town, Longgang District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: SHENZHE SUNGWORLD ELECTRONICS CO.,LTD.**
Address.....	: 4#, Shangxue Technology Industrial Park(North), Bantian, Buji Town, Longgang 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	March 31, 2017	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: 10.1 inch tablet
Model Number	: Ava Book 1
Model Declaration	: /
Test Model	: Ava Book 1
Hardware version	: 210_V0.1
Software version	: V2.1RC3
Power Supply	: DC 5.0V by Lithium ion polymer battery (6000mAh) Recharge Voltage: DC 5V/2500mA
Bluetooth	: Supported BT 4.0
Operation frequency	: 2402MHz-2480MHz
Channel Spacing	: 1MHz for Bluetooth 4.0(DSS); 2MHz for Bluetooth 4.0(DTS);
Modulation Type	: GFSK,π/4DQPSK, 8DPSK for Bluetooth 4.0(DSS); GFSK for Bluetooth 4.0(DTS)
Bluetooth Version	: 4.0
Channel Number	: 79 Channels for Bluetooth 4.0(DSS);40 Channels for Bluetooth 4.0(DTS)
WLAN	: Supported 802.11b/802.11g/802.11n/802.11a/802.11ac
Operation frequency	: IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz/5150-5250MHz/5745-5850MHz IEEE 802.11n HT40:5150-5250MHz/5745-5850MHz IEEE 802.11a:5150-5250MHz/5745-5850MHz IEEE 802.11ac:5150-5250MHz/5745-5850MHz
Modulation Type	: 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)
Channel Number	: 11 Channels for 2412.00-2462.00MHz(802.11b/g/n-HT20) 4 Channels for 5180.00-5240.00MHz(802.11a/ac/n-HT20) 5 Channels for 5745.00-5825.00MHz(802.11a/ac/n-HT20) 2 Channels for 5190.00-5230.00MHz(802.11ac/n-HT40) 2 Channels for 5755.00-5795.00MHz(802.11ac/n-HT40) 1 Channels for 5210.00MHz(802.11ac-HT80) 1 Channels for 5775.00MHz(802.11ac-HT80)
Antenna Type	: PIFA Antenna
Antenna Gain	: 1.2dBi (Max.) For WIFI/BT
Extreme temp. Tolerance	: -10°C to +50°C
Extreme vol. Limits	: 3.40VDC to 4.20VDC (nominal: 3.70VDC)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Sunun Power Technology Co.,Ltd.	AC Adapter	SA18V-0502 50U	--	FCC VoC

1.3. External I/O Port

I/O Port Description	Quantity	Cable
Micro USB Port	1	N/A
TF Card Slot	1	N/A
Earphone Jack	1	N/A
DC 5V Charging Port	1	1.2m, unshielded

1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
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

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.

Pre-test AC conducted emission at both power adapter and charge from PC mode, recorded worst case.

Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, 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, which was determined to be IEEE 802.11a mode (Low Channel).

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 802.11a mode (Low Channel).

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

Antenna & Bandwidth

Antenna	Single (Port.1)			Two (Port.1 + Port.2)		
Bandwidth Mode	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
IEEE 802.11a	☑	☐	☐	☐	☐	☐
IEEE 802.11n	☑	☑	☐	☐	☐	☐
IEEE 802.11ac	☑	☑	☑	☐	☐	☐

The test configuration of the test software shows as below:

Test mode	Channel No.	Frequency(MHz)	Software setting value
IEEE 802.11a	36	5180	20
	44	5220	20
	48	5240	20
IEEE 802.11n HT20	36	5180	19
	44	5220	19
	48	5240	19
IEEE 802.11ac VHT20	36	5180	19
	44	5220	19
	48	5240	19
IEEE 802.11n HT40	38	5190	18
	46	5230	18
IEEE 802.11ac VHT40	38	5190	18
	46	5230	17
IEEE 802.11ac VHT80	42	5210	17

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 789033 D02 General UNII Test Procedures New Rules v01r03 is 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 (Installed in the tablet PC: RFTestTool-user-5.4) 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(a)	26dB Bandwidth	Compliant
§15.407(a)	99% Occupied Bandwidth	Compliant
§15.407(b)	Radiated Emissions	Compliant
§15.407(b)	Band edge Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.407(g)	Frequency Stability	N/A
§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 section 6 of equipment list in this report. The following table is the setting of the spectrum analyzer.

5.1.3. Test Procedures

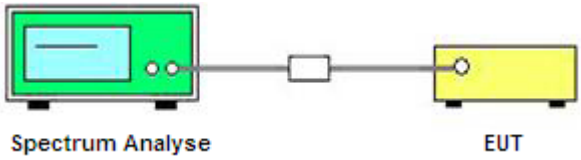
1). Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

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



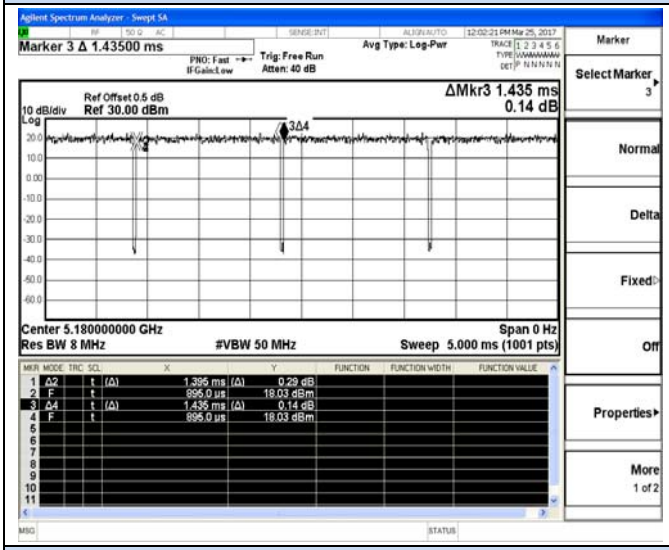
5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

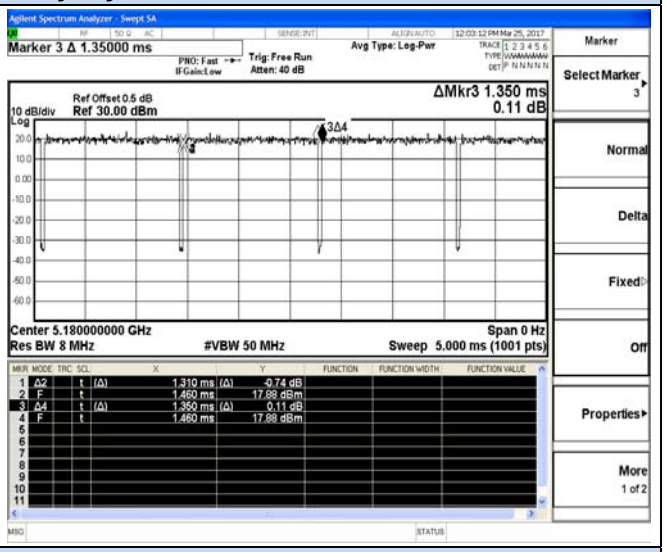
5.1.6. Test result

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	1.395	1.435	1	97.21%	0.123	0.717
IEEE 802.11n HT20	1.310	1.350	1	97.04%	0.130	0.763
IEEE 802.11ac VHT20	1.315	1.355	1	97.05%	0.130	0.760
IEEE 802.11n HT40	0.645	0.685	1	94.16%	0.261	1.550
IEEE 802.11ac VHT40	0.645	0.690	1	93.48%	0.293	1.550
IEEE 802.11ac VHT80	0.325	0.365	1	89.04%	0.504	3.077
Note: Duty Cycle Correction Factor=10log(1/Duty cycle)						

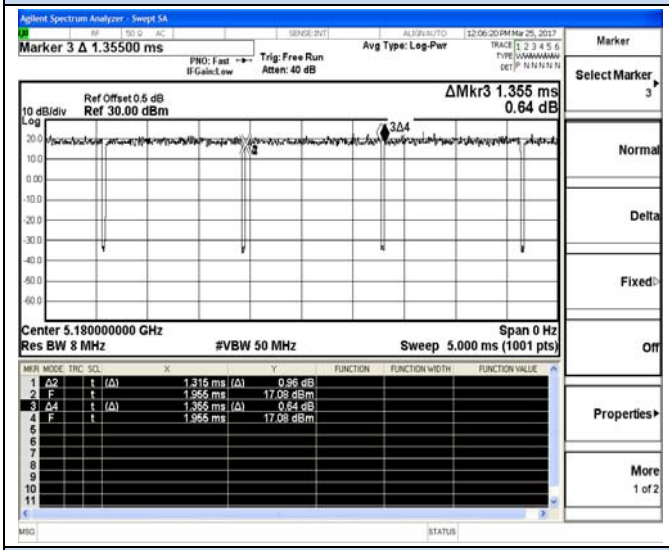
On Time and Duty Cycle



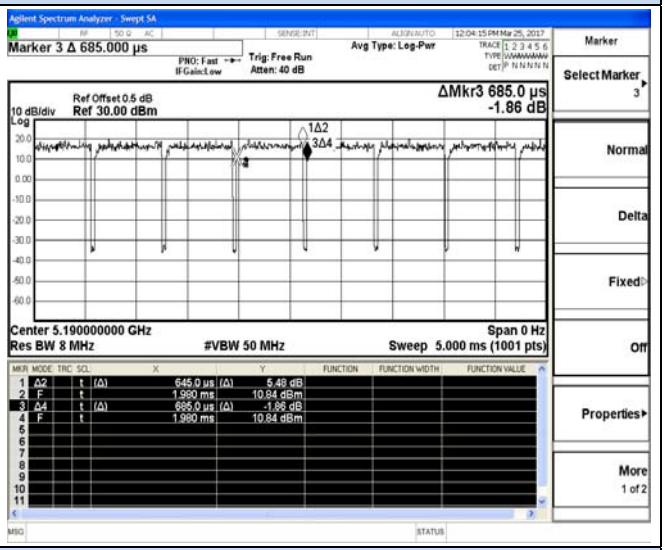
IEEE 802.11a



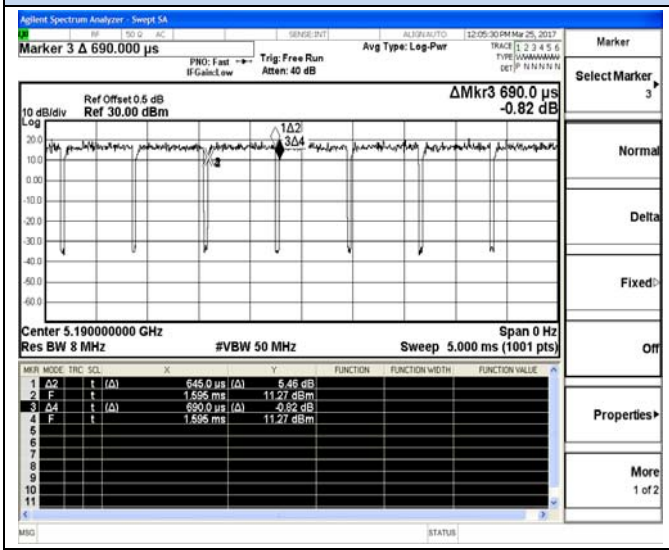
IEEE 802.11n HT20



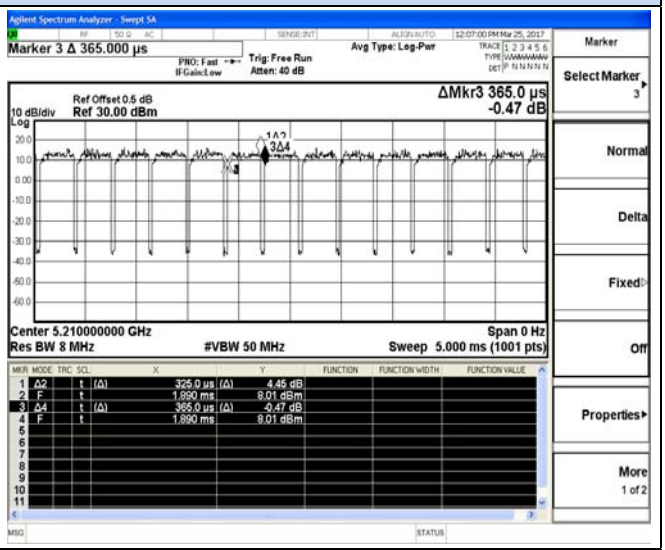
IEEE 802.11ac VHT20



IEEE 802.11n HT40



IEEE 802.11ac VHT40



IEEE 802.11ac VHT80

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

(1) For the band 5.15~5.25GHz

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. 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.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2.2. Measuring Instruments and Setting

Please refer to section 6 of 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.

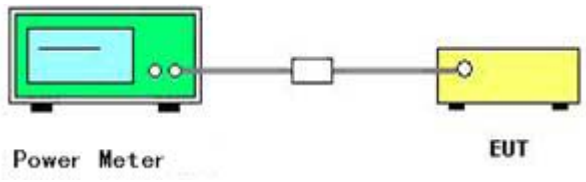
- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at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

(iv) Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25%).

5.2.4. Test Setup Layout



5.1.5. 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)	AVG Conducted Power (dBm)	Duty Cycle Factor (dB)	Report Conducted Power (dBm)	Maximum Limit (dBm)	Result
IEEE 802.11a	36	5180	20.65	0.123	20.773	24	Complies
	44	5220	20.58	0.123	20.703		
	48	5240	20.89	0.123	21.013		
IEEE 802.11n HT20	36	5180	20.33	0.130	20.460	24	Complies
	44	5220	20.45	0.130	20.580		
	48	5240	20.33	0.130	20.460		
IEEE 802.11ac VHT20	36	5180	20.15	0.130	20.280	24	Complies
	44	5220	20.32	0.130	20.450		
	48	5240	20.44	0.130	20.570		
IEEE 802.11n HT40	38	5190	19.85	0.261	20.111	24	Complies
	46	5230	19.78	0.261	20.041		
IEEE 802.11ac VHT40	38	5190	19.92	0.293	20.213	24	Complies
	46	5230	19.65	0.293	19.943		
IEEE 802.11ac VHT80	42	5210	19.32	0.504	19.824	24	Complies

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 5.15~5.25GHz

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.note1
(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.note1
(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.
(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. note1
Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

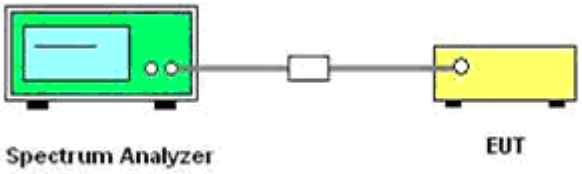
5.3.2. Measuring Instruments and Setting

Please refer to section 6 of 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 = 1MHz.
4). Set the VBW ≥ 3MHz
5). Span=Encompass the entire emissions bandwidth (EBW) of the signal (or, alternatively, the entire 99% occupied bandwidth) of the signal.
6). Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
7). Manually set sweep time ≥ 10 × (number of points in sweep) × (total on/off period of the transmitted signal).
8). Set detector = power averaging (rms).
9). Sweep time = auto couple.
10). Trace mode = max hold.
11). Allow trace to fully stabilize.
12). Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively.
13). Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25%.
14). Use the peak marker function to determine the maximum power level in any 1MHz band segment within the fundamental EBW.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

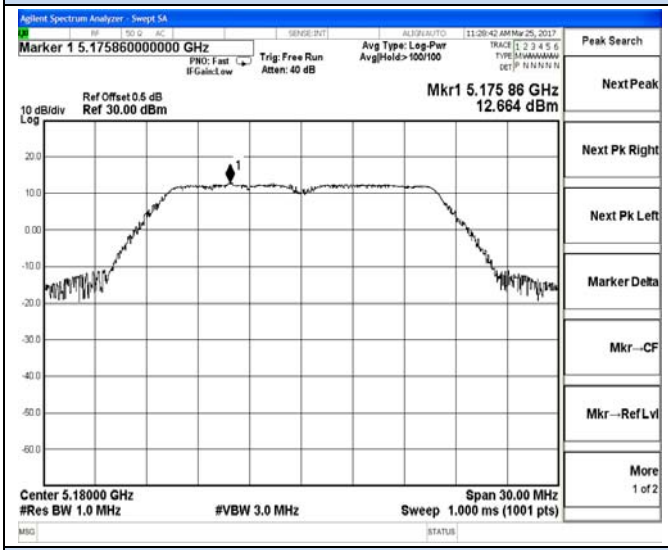
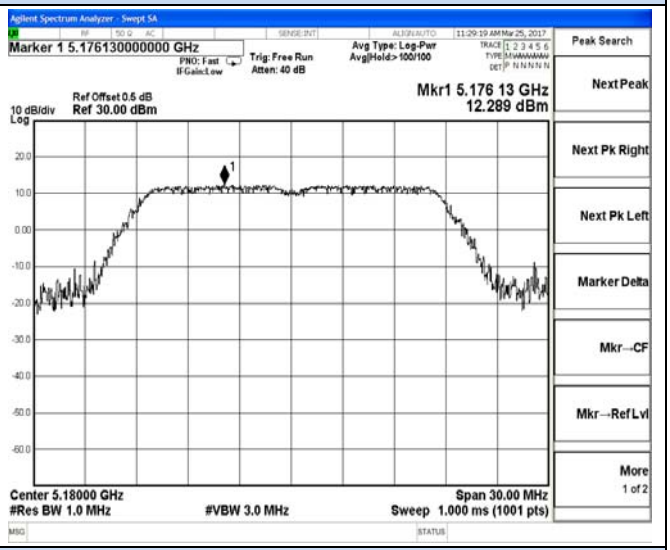
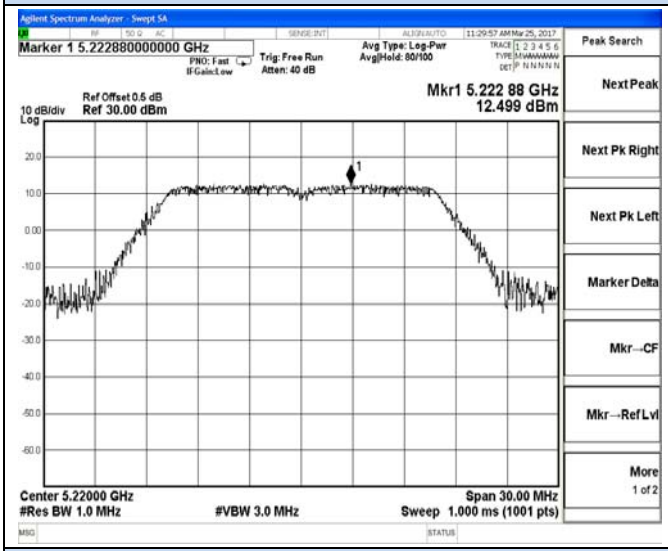
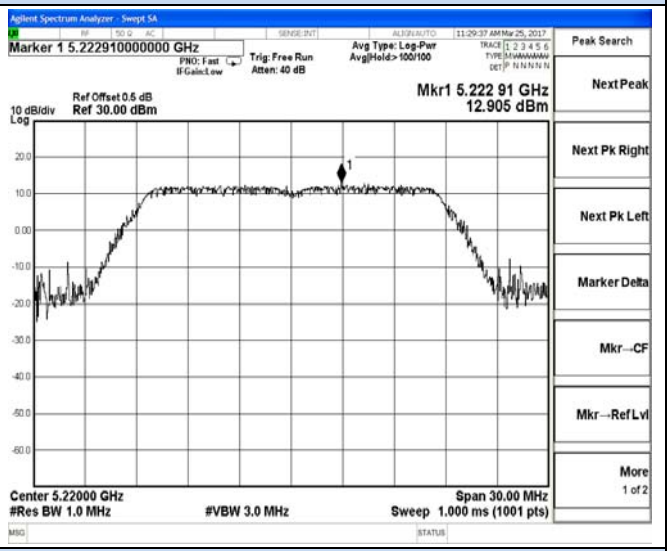
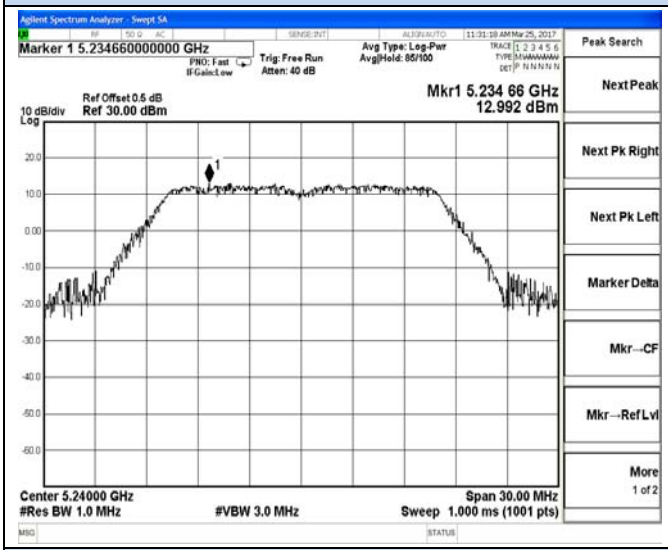
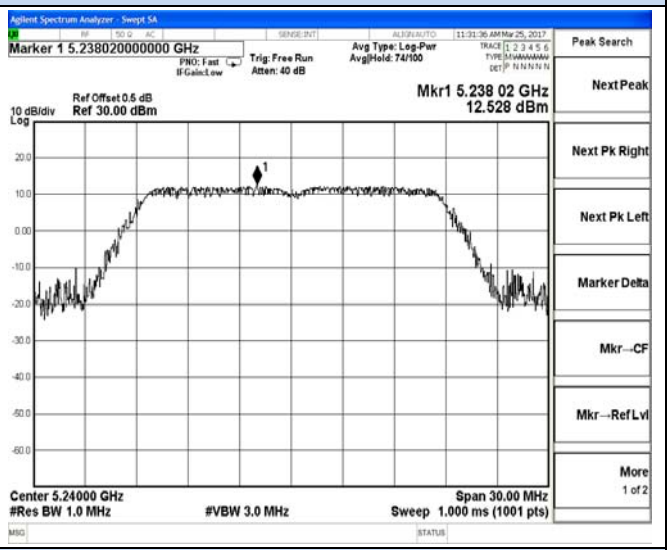
5.3.6. Test Result of Power Spectral Density

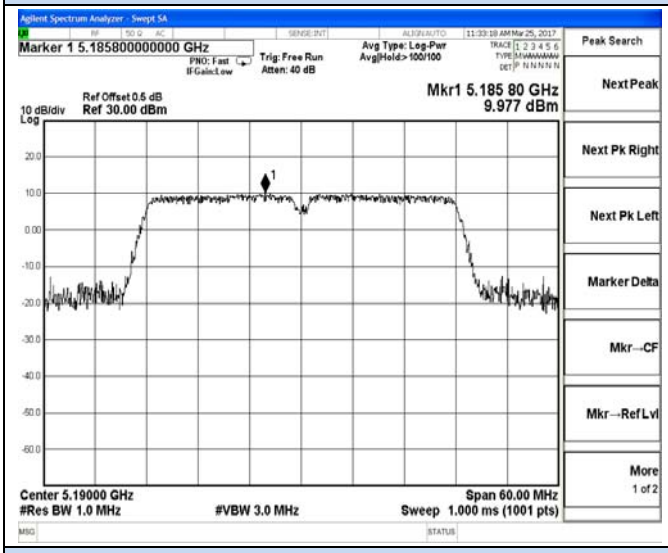
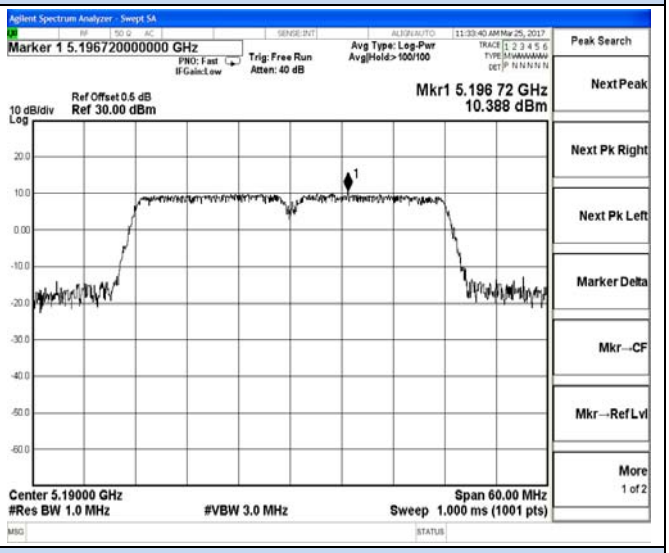
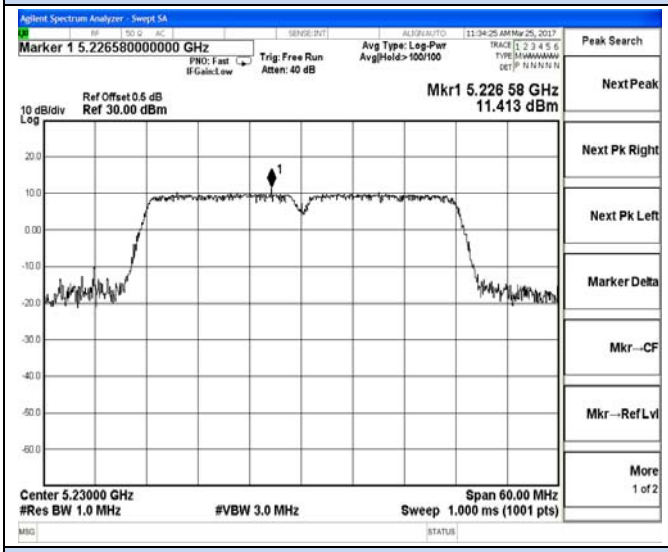
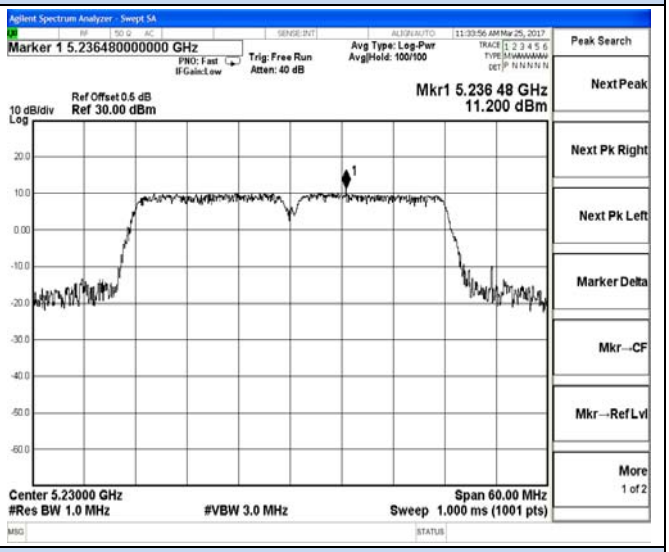
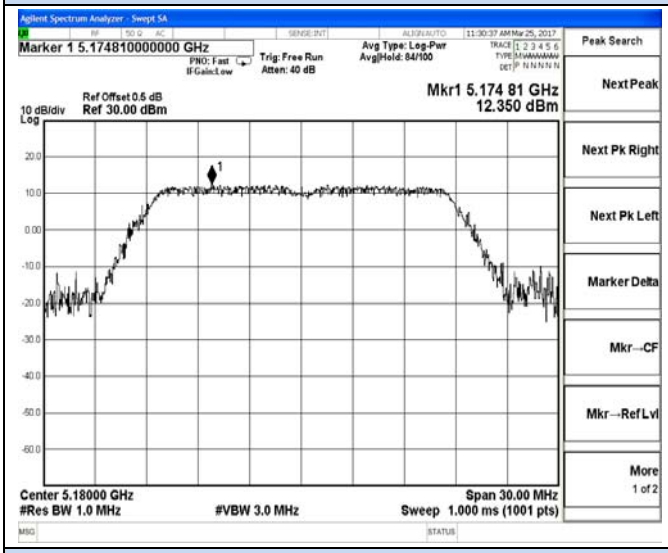
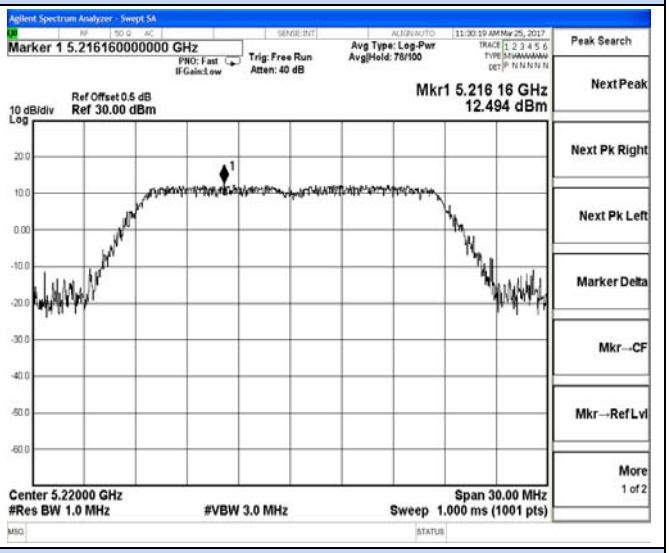
Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a/n/ac

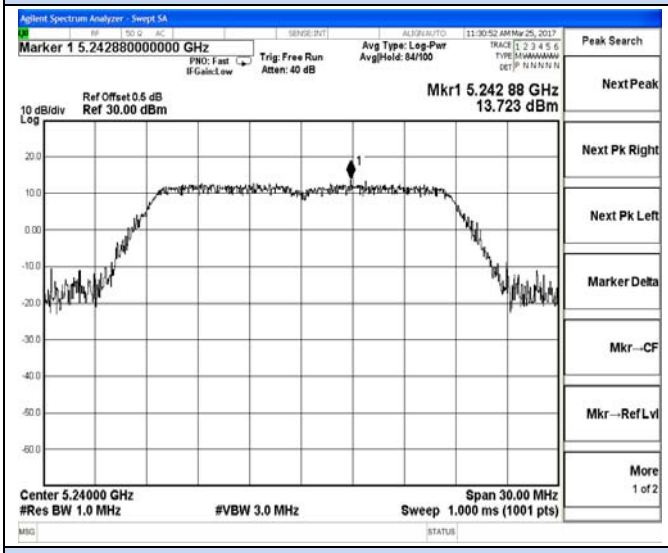
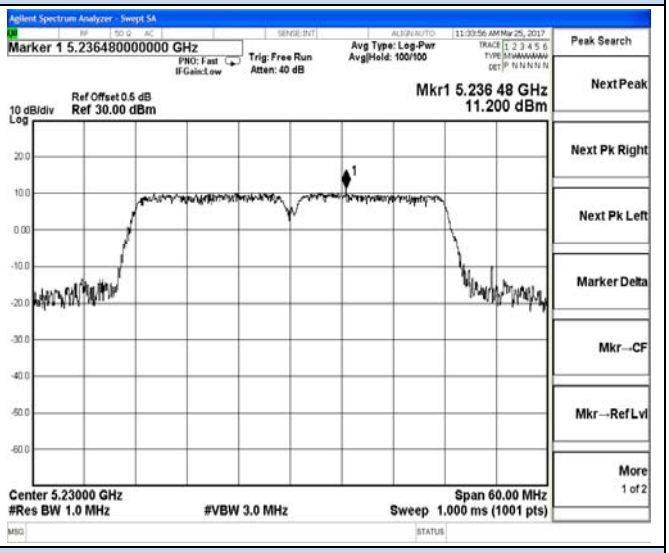
Test Mode	Channel	Frequency (MHz)	Power Density (dBm/MHz)	Duty cycle factor (dB)	Report conducted PSD	Max. Limit (dBm/MHz)	Result
IEEE 802.11a	36	5180	12.664	0.123	12.787	11.00	Complies
	44	5220	12.499	0.123	12.622		
	48	5240	12.992	0.123	13.115		
IEEE 802.11n HT20	36	5180	12.289	0.130	12.419	11.00	Complies
	44	5220	12.905	0.130	13.035		
	48	5240	12.528	0.130	12.658		
IEEE 802.11ac VHT20	36	5180	12.350	0.130	12.480	11.00	Complies
	44	5220	12.494	0.130	12.624		
	48	5240	13.723	0.130	13.853		
IEEE 802.11n HT40	38	5190	9.977	0.261	10.238	11.00	Complies
	46	5230	11.413	0.261	11.674		
IEEE 802.11ac VHT40	38	5190	10.388	0.293	10.681	11.00	Complies
	46	5230	11.200	0.293	11.493		
IEEE 802.11ac VHT80	42	5210	7.692	0.504	8.196	11.00	Complies

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 average power + Duty Cycle factor;*
5. *Please refer to following test plots;*

Power Spectral Density	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz	Channel 36 / 5180 MHz
	
Channel 44 / 5220 MHz	Channel 44 / 5220 MHz
	
Channel 48 / 5240 MHz	Channel 48 / 5240 MHz

Power Spectral Density	
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 38 / 5190 MHz	Channel 38 / 5190 MHz
	
Channel 46 / 5230 MHz	Channel 46 / 5230 MHz
IEEE 802.11ac VHT20	IEEE 802.11ac VHT20
	
Channel 36 / 5180 MHz	Channel 44 / 5220 MHz

Power Spectral Density	
IEEE 802.11ac VHT20	IEEE 802.11ac VHT80
	
Channel 48 / 5240 MHz	Channel 48 / 5210 MHz

5.4. 99% and 26dB Occupied Bandwidth Measurement

5.4.1. Standard Applicable

No restriction limits. But resolution bandwidth within band edge measurement is 1% of the 99% occupied bandwidth.

5.4.2. Measuring Instruments and Setting

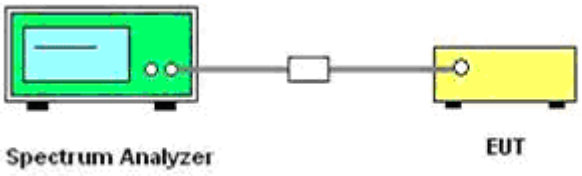
Please refer to section 6 of equipment list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span	> 26dB Bandwidth
Detector	Peak
Trace	Max Hold
Sweep Time	100ms

5.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The RBW = 1% - 3% of occupied bandwidth, VBW = 3*RBW;
3. Measured the spectrum width with power higher than 26dB 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.

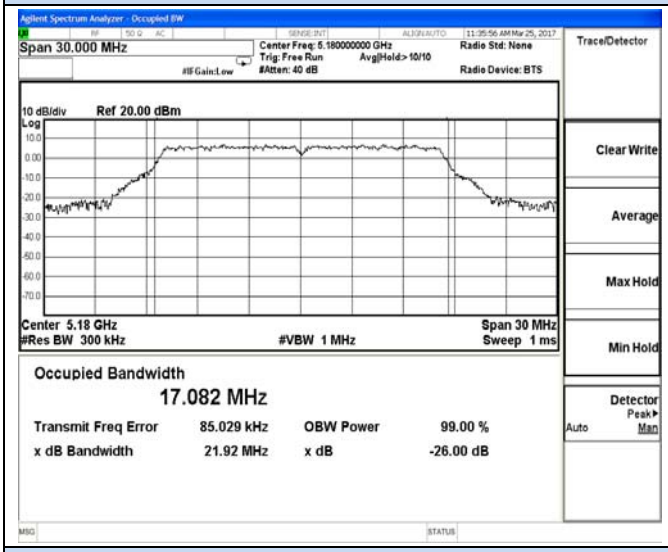
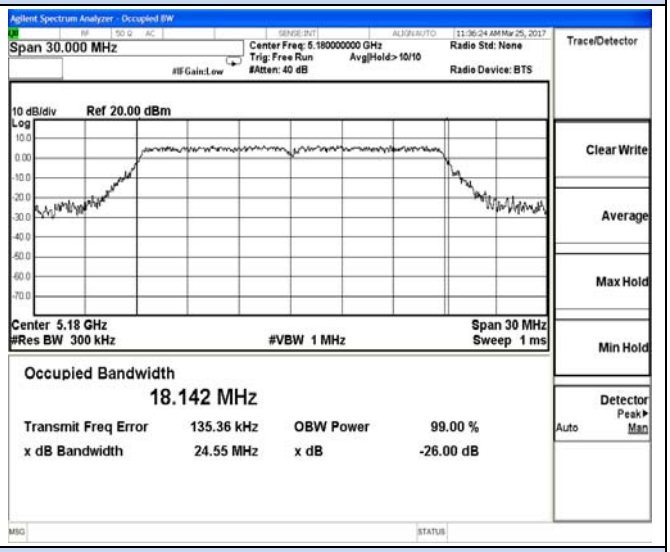
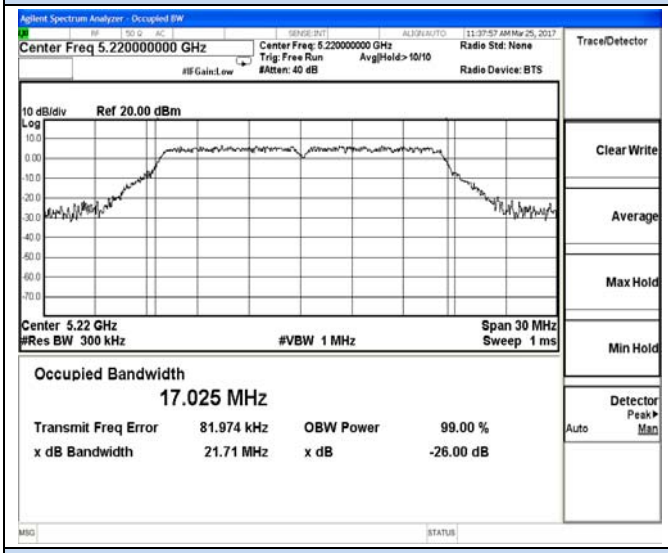
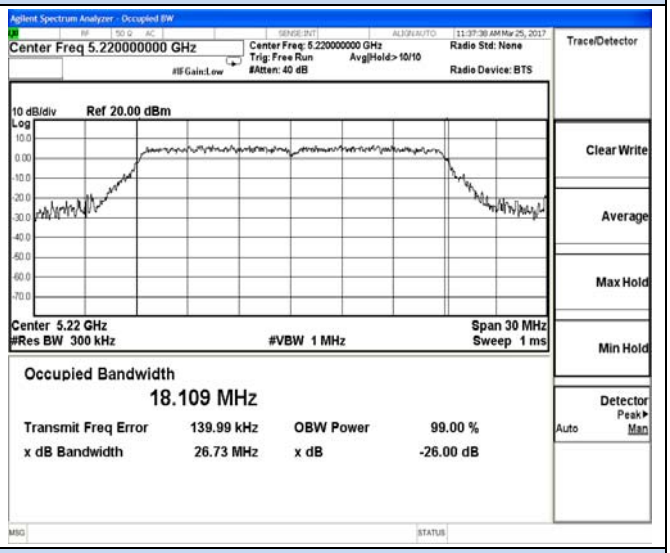
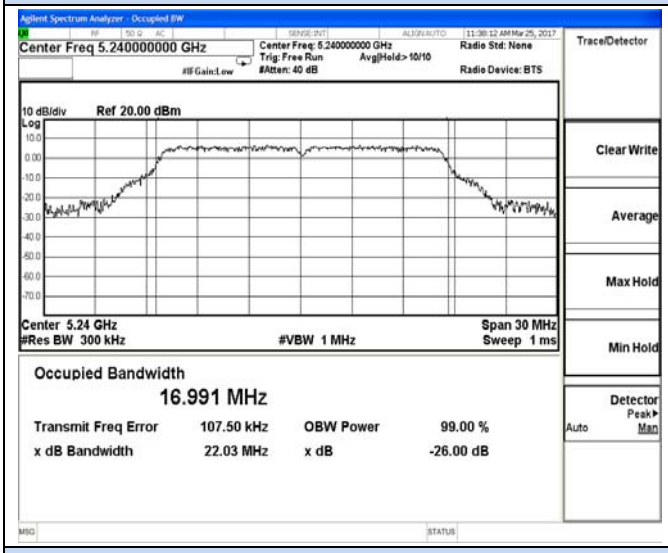
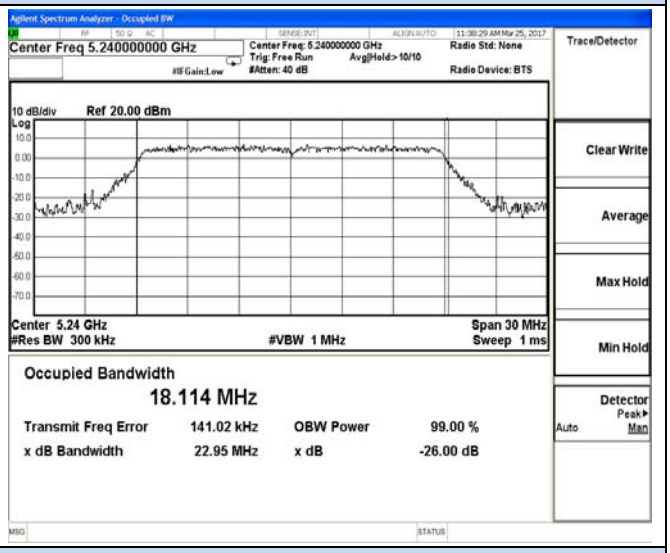
5.4.6. Test Result of 99% and 26dB Occupied Bandwidth

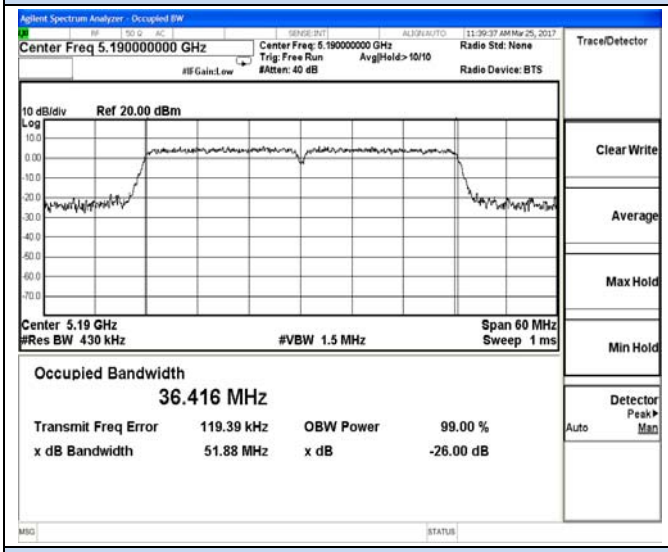
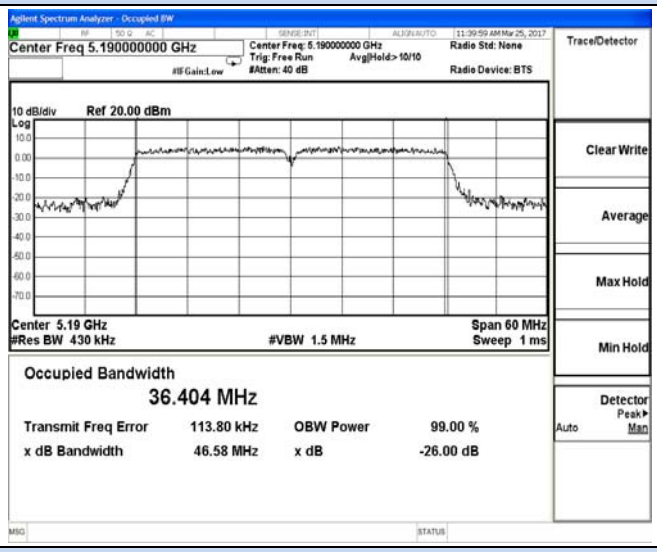
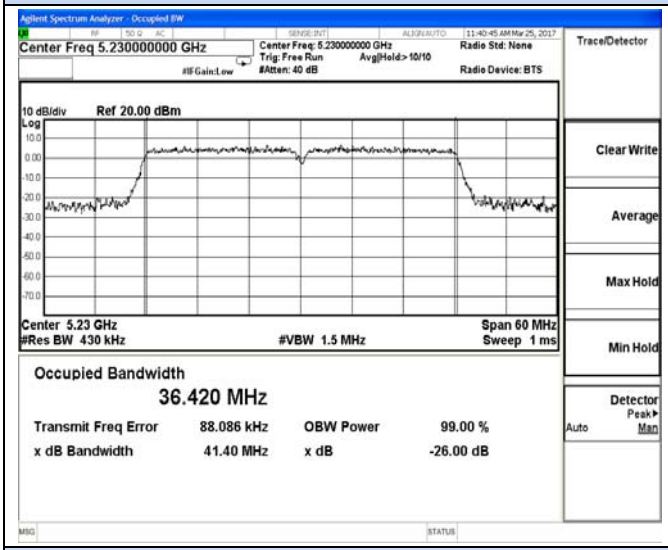
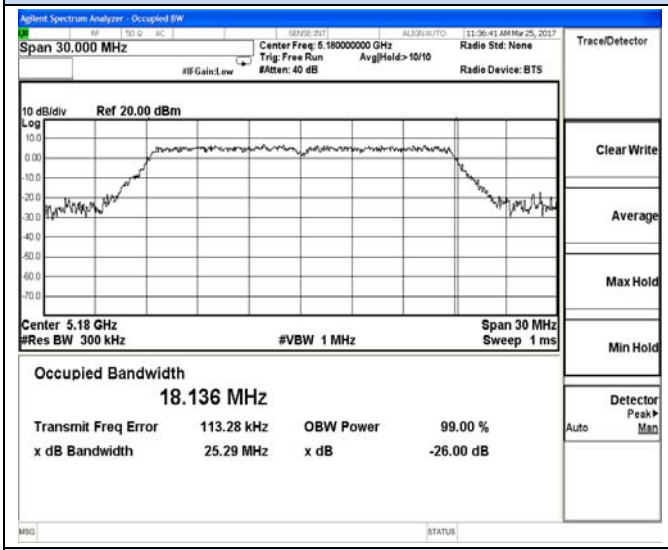
Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a/n/ac

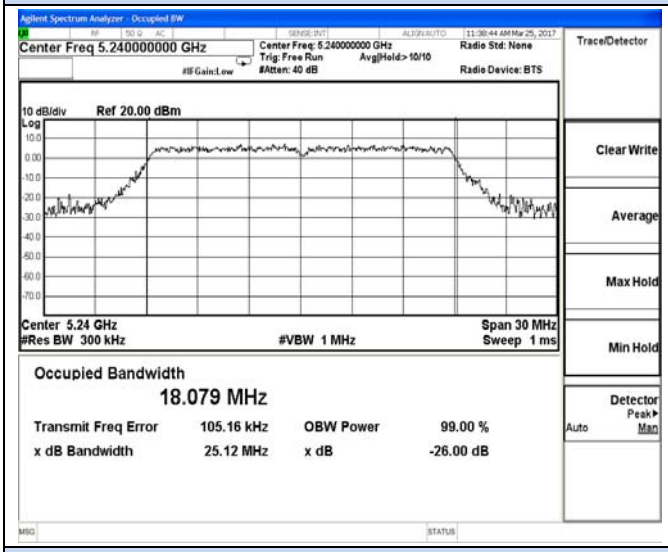
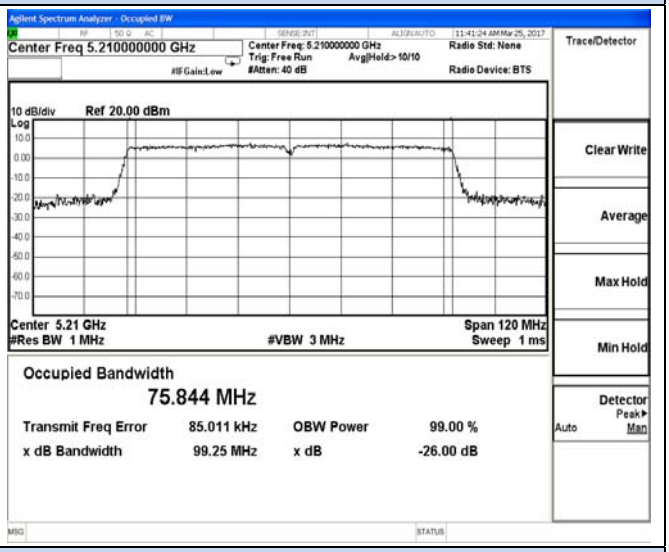
Test Mode	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limits (MHz)	Verdict
IEEE 802.11a	36	5180	21.92	17.082	No Limit	PASS
	44	5220	21.71	17.025		
	48	5240	22.03	16.991		
IEEE 802.11n HT20	36	5180	24.55	18.142	No Limit	PASS
	44	5220	26.73	18.109		
	48	5240	22.95	18.114		
IEEE 802.11ac VHT20	36	5180	25.29	18.136	No Limit	PASS
	44	5220	21.89	18.154		
	48	5240	25.12	18.079		
IEEE 802.11n HT40	38	5190	51.88	36.416	No Limit	PASS
	46	5230	41.40	36.420		
IEEE 802.11ac VHT40	38	5190	46.58	36.404	No Limit	PASS
	46	5230	50.32	36.406		
IEEE 802.11ac VHT80	42	5210	99.25	75.844	No Limit	PASS

Remark:

1. *Measured 99% and 26dB 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;*

99% and 26dB Occupied Bandwidth	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz	Channel 36 / 5180 MHz
	
Channel 44 / 5220 MHz	Channel 44 / 5220 MHz
	
Channel 48 / 5240 MHz	Channel 48 / 5240 MHz

99% and 26dB Occupied Bandwidth	
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 38 / 5190 MHz	Channel 38 / 5190 MHz
	
Channel 46 / 5230 MHz	Channel 46 / 5230 MHz
IEEE 802.11ac VHT20	IEEE 802.11ac VHT20
	
Channel 36 / 5180 MHz	Channel 44 / 5220 MHz

99% and 26dB Occupied Bandwidth	
IEEE 802.11ac VHT20	IEEE 802.11ac VHT80
	
Channel 48 / 5240 MHz	Channel 42 / 5210 MHz

5.5. Radiated Emissions Measurement

5.5.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
\2\ Above 38.6

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz (68.2dBuV/m at 3m).

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.5.2. Measuring Instruments and Setting

Please refer to section 6 of equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10^{th} carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

5.5.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

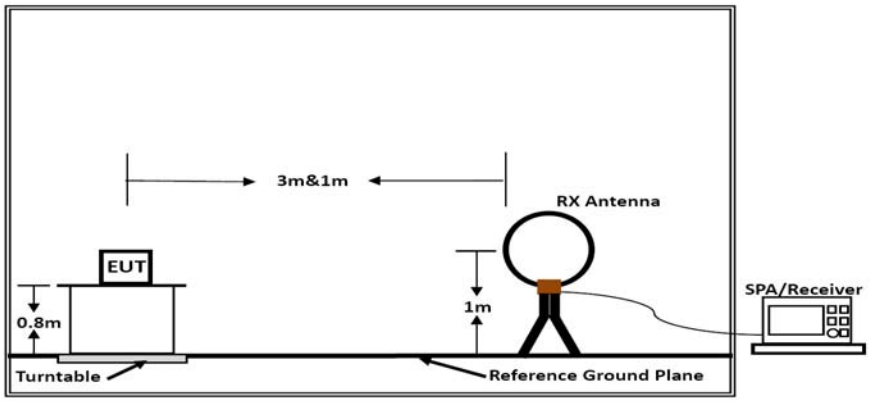
Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

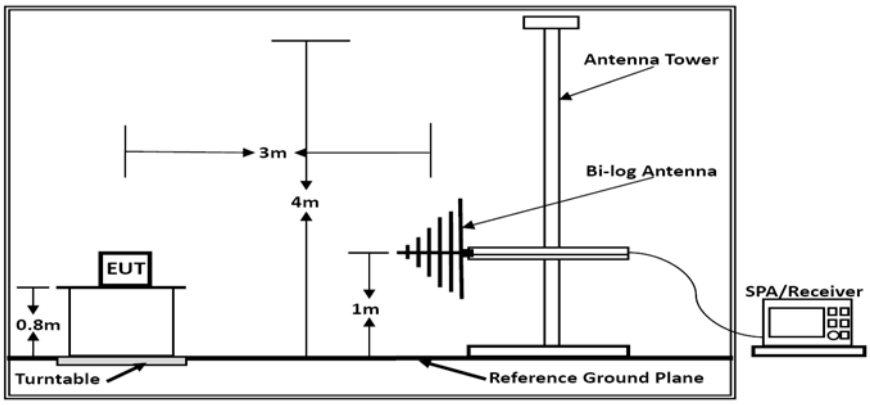
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.5.4. Test Setup Layout

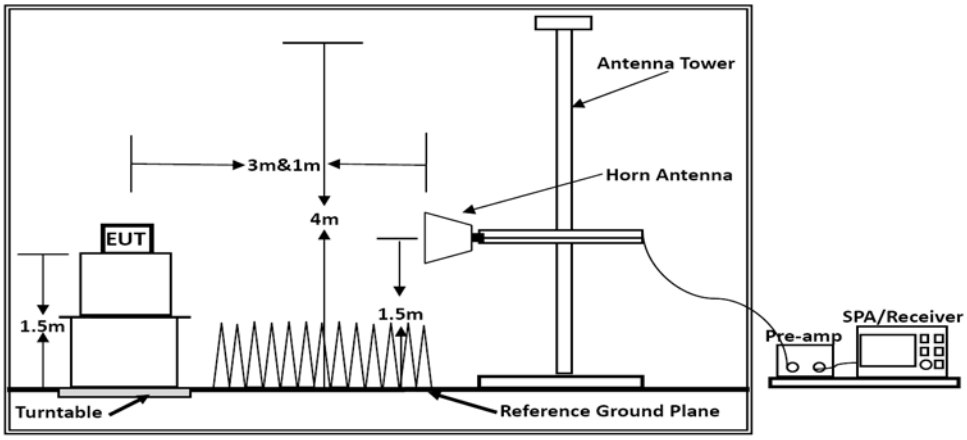
For radiated emissions below 30MHz



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6. Results of Radiated Emissions (9 KHz~30MHz)

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

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dB)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

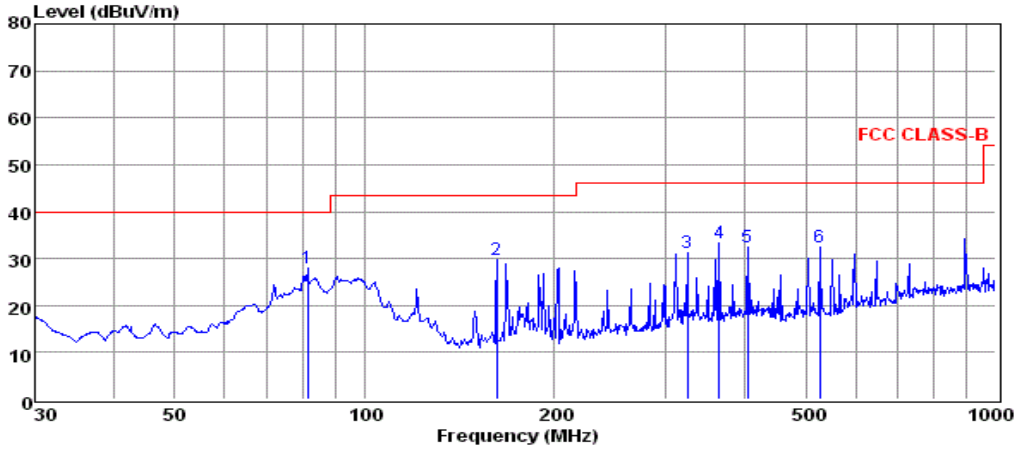
Limit line = specific limits (dBuV) + distance extrapolation factor.

5.5.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25℃	Humidity	60%
Test Engineer	Jayden Zhuo	Configurations	IEEE 802.11a, 5180MHz

Test result for IEEE 802.11a-5240MHz

Horizontal:

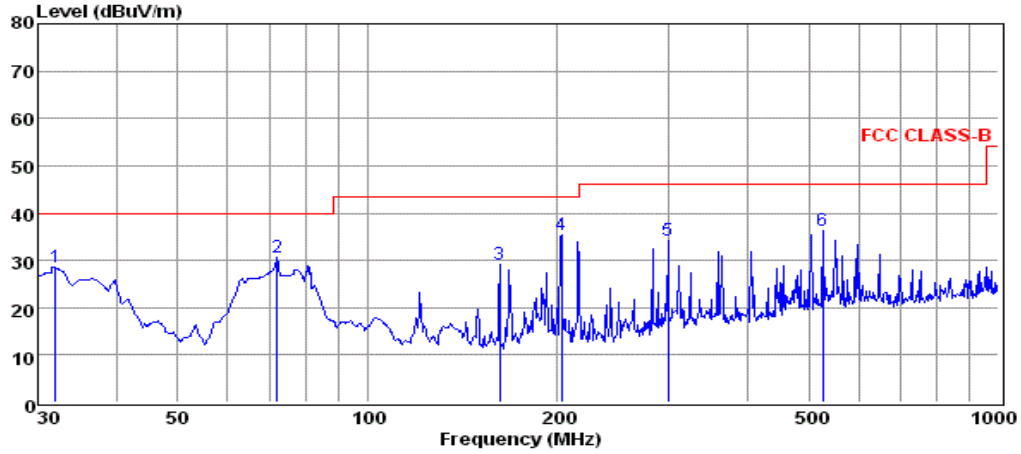


pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	81.21	18.20	0.65	8.97	27.82	40.00	-12.18	QP
2	162.04	20.17	0.75	8.73	29.65	43.50	-13.85	QP
3	324.46	16.73	1.10	13.51	31.34	46.00	-14.66	QP
4	364.26	17.71	1.14	14.46	33.31	46.00	-12.69	QP
5	404.67	15.89	1.32	15.16	32.37	46.00	-13.63	QP
6	526.40	14.02	1.45	17.07	32.54	46.00	-13.46	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Vertical:



pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	31.95	15.78	0.37	12.32	28.47	40.00	-11.53	QP
2	71.83	21.87	0.55	8.34	30.76	40.00	-9.24	QP
3	162.04	19.74	0.75	8.73	29.22	43.50	-14.28	QP
4	202.81	23.85	0.82	10.66	35.33	43.50	-8.17	QP
5	299.32	19.88	1.13	13.05	34.06	46.00	-11.94	QP
6	526.40	17.77	1.45	17.07	36.29	46.00	-9.71	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Note:

Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11a Low channel).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

IEEE 802.11a

Channel 36 / 5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	58.60	33.06	35.04	3.94	60.56	74.00	-13.44	Peak	Horizontal
15.54	41.96	33.06	35.04	3.94	43.92	54.00	-10.08	Average	Horizontal
15.54	57.69	33.06	35.04	3.94	59.65	74.00	-14.35	Peak	Vertical
15.54	40.11	33.06	35.04	3.94	42.07	54.00	-11.93	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	57.93	33.16	35.15	3.96	59.90	74.00	-14.10	Peak	Horizontal
15.60	39.88	33.16	35.15	3.96	41.85	54.00	-12.15	Average	Horizontal
15.60	57.59	33.16	35.15	3.96	59.56	74.00	-14.44	Peak	Vertical
15.60	36.33	33.16	35.15	3.96	38.30	54.00	-15.70	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	59.47	33.26	35.14	3.98	61.57	74.00	-12.43	Peak	Horizontal
15.72	40.80	33.26	35.14	3.98	42.90	54.00	-11.10	Average	Horizontal
15.72	55.83	33.26	35.14	3.98	57.93	74.00	-16.07	Peak	Vertical
15.72	38.20	33.26	35.14	3.98	40.30	54.00	-13.70	Average	Vertical

IEEE 802.11n HT20

Channel 36 / 5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	59.17	33.06	35.04	3.94	61.13	74.00	-12.87	Peak	Horizontal
15.54	41.29	33.06	35.04	3.94	43.25	54.00	-10.75	Average	Horizontal
15.54	57.87	33.06	35.04	3.94	59.83	74.00	-14.17	Peak	Vertical
15.54	40.78	33.06	35.04	3.94	42.74	54.00	-11.26	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	58.05	33.16	35.15	3.96	60.02	74.00	-13.98	Peak	Horizontal
15.60	41.59	33.16	35.15	3.96	43.56	54.00	-10.44	Average	Horizontal
15.60	55.89	33.16	35.15	3.96	57.86	74.00	-16.14	Peak	Vertical
15.60	36.42	33.16	35.15	3.96	38.39	54.00	-15.61	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	59.86	33.26	35.14	3.98	61.96	74.00	-12.04	Peak	Horizontal
15.72	40.39	33.26	35.14	3.98	42.49	54.00	-11.51	Average	Horizontal
15.72	55.70	33.26	35.14	3.98	57.80	74.00	-16.20	Peak	Vertical
15.72	37.22	33.26	35.14	3.98	39.32	54.00	-14.68	Average	Vertical

IEEE 802.11ac VHT20

Channel 36 / 5180 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.54	58.68	33.06	35.04	3.94	60.64	74.00	-13.36	Peak	Horizontal
15.54	41.48	33.06	35.04	3.94	43.44	54.00	-10.56	Average	Horizontal
15.54	57.90	33.06	35.04	3.94	59.86	74.00	-14.14	Peak	Vertical
15.54	39.24	33.06	35.04	3.94	41.20	54.00	-12.80	Average	Vertical

Channel 44 / 5220 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.60	57.89	33.16	35.15	3.96	59.86	74.00	-14.14	Peak	Horizontal
15.60	39.92	33.16	35.15	3.96	41.89	54.00	-12.11	Average	Horizontal
15.60	56.44	33.16	35.15	3.96	58.41	74.00	-15.59	Peak	Vertical
15.60	36.63	33.16	35.15	3.96	38.60	54.00	-15.40	Average	Vertical

Channel 48 / 5240 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.72	60.09	33.26	35.14	3.98	62.19	74.00	-11.81	Peak	Horizontal
15.72	40.69	33.26	35.14	3.98	42.79	54.00	-11.21	Average	Horizontal
15.72	56.35	33.26	35.14	3.98	58.45	74.00	-15.55	Peak	Vertical
15.72	38.07	33.26	35.14	3.98	40.17	54.00	-13.83	Average	Vertical

IEEE 802.11n HT40

Channel 38 / 5190 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.57	58.11	33.06	35.04	3.94	60.07	74.00	-13.93	Peak	Horizontal
15.57	41.28	33.06	35.04	3.94	43.24	54.00	-10.76	Average	Horizontal
15.57	57.42	33.06	35.04	3.94	59.38	74.00	-14.62	Peak	Vertical
15.57	38.98	33.06	35.04	3.94	40.94	54.00	-13.06	Average	Vertical

Channel 46 / 5230 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.69	56.85	33.16	35.15	3.96	58.82	74.00	-15.18	Peak	Horizontal
15.69	40.18	33.16	35.15	3.96	42.15	54.00	-11.85	Average	Horizontal
15.69	56.65	33.16	35.15	3.96	58.62	74.00	-15.38	Peak	Vertical
15.69	36.50	33.16	35.15	3.96	38.47	54.00	-15.53	Average	Vertical

IEEE 802.11ac VHT40

Channel 38 / 5190 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.57	58.73	33.06	35.04	3.94	60.69	74.00	-13.31	Peak	Horizontal
15.57	41.74	33.06	35.04	3.94	43.70	54.00	-10.30	Average	Horizontal
15.57	57.37	33.06	35.04	3.94	59.33	74.00	-14.67	Peak	Vertical
15.57	39.21	33.06	35.04	3.94	41.17	54.00	-12.83	Average	Vertical

Channel 46 / 5230 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.69	58.26	33.16	35.15	3.96	60.23	74.00	-13.77	Peak	Horizontal
15.69	41.47	33.16	35.15	3.96	43.44	54.00	-10.56	Average	Horizontal
15.69	57.20	33.16	35.15	3.96	59.17	74.00	-14.83	Peak	Vertical
15.69	38.14	33.16	35.15	3.96	40.11	54.00	-13.89	Average	Vertical

IEEE 802.11ac VHT80

Channel 42 / 5210 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
15.63	58.24	33.06	35.04	3.94	60.20	74.00	-13.80	Peak	Horizontal
15.63	42.15	33.06	35.04	3.94	44.11	54.00	-9.89	Average	Horizontal
15.63	56.79	33.06	35.04	3.94	58.75	74.00	-15.25	Peak	Vertical
15.63	40.53	33.06	35.04	3.94	42.49	54.00	-11.51	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz ~ 40GHz, No emission found between lowest internal used/generated frequency to 30MHz.

2). Radiated emissions measured in frequency range from 9 KHz ~ 40GHz were made with an instrument using Peak detector mode.

3). 18~40GHz at least have 20dB margin. No recording in the test report.

4). 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;

5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.6. Power line conducted emissions

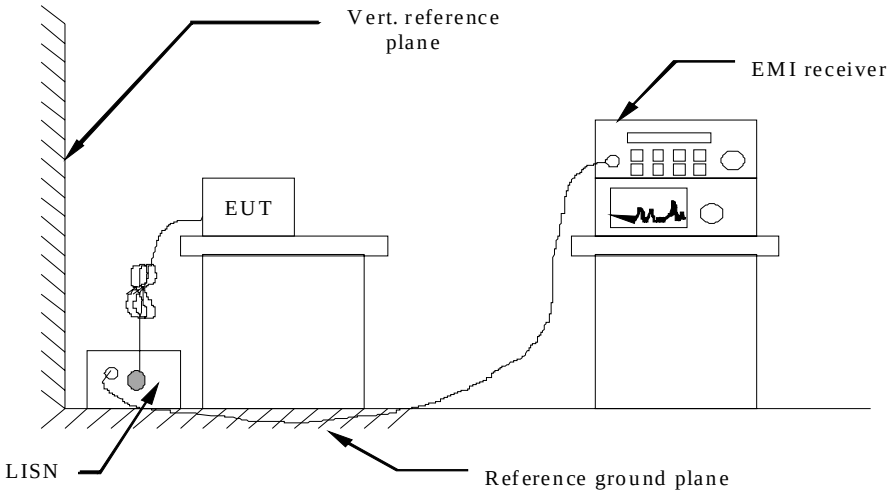
5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.6.2 Block Diagram of Test Setup

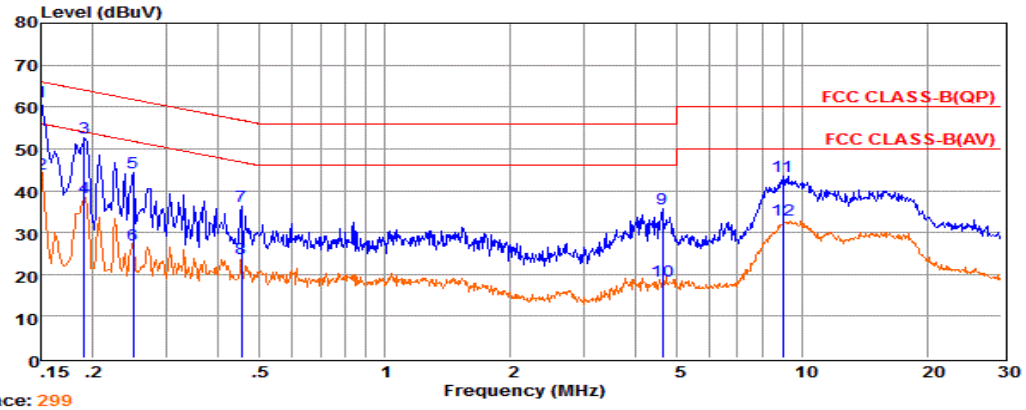


5.6.3 Test Results

PASS.

The test data please refer to following page.

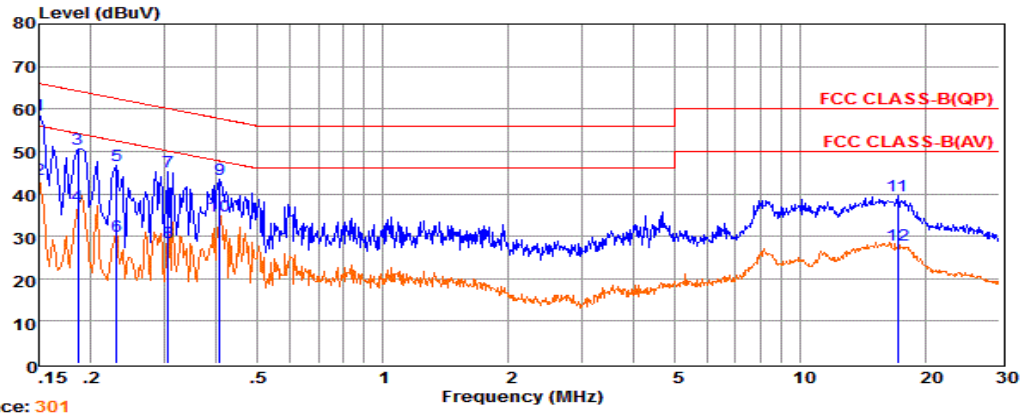
AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11a (worst case)



Trace: 299
Power Rating: AC 120V/60Hz
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	41.49	9.70	0.02	10.00	61.21	66.00	-4.79	QP
2	0.15	24.23	9.70	0.02	10.00	43.95	55.99	-12.04	Average
3	0.19	33.14	9.61	0.02	10.00	52.77	64.02	-11.25	QP
4	0.19	18.65	9.61	0.02	10.00	38.28	54.02	-15.74	Average
5	0.25	24.69	9.60	0.03	10.00	44.32	61.78	-17.46	QP
6	0.25	7.54	9.60	0.03	10.00	27.17	51.77	-24.60	Average
7	0.45	16.52	9.62	0.04	10.00	36.18	56.80	-20.62	QP
8	0.45	4.06	9.62	0.04	10.00	23.72	46.80	-23.08	Average
9	4.62	15.82	9.66	0.06	10.00	35.54	56.00	-20.46	QP
10	4.62	-1.33	9.66	0.06	10.00	18.39	46.00	-27.61	Average
11	8.96	23.60	9.71	0.08	10.00	43.39	60.00	-16.61	QP
12	8.96	13.22	9.71	0.08	10.00	33.01	50.00	-16.99	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

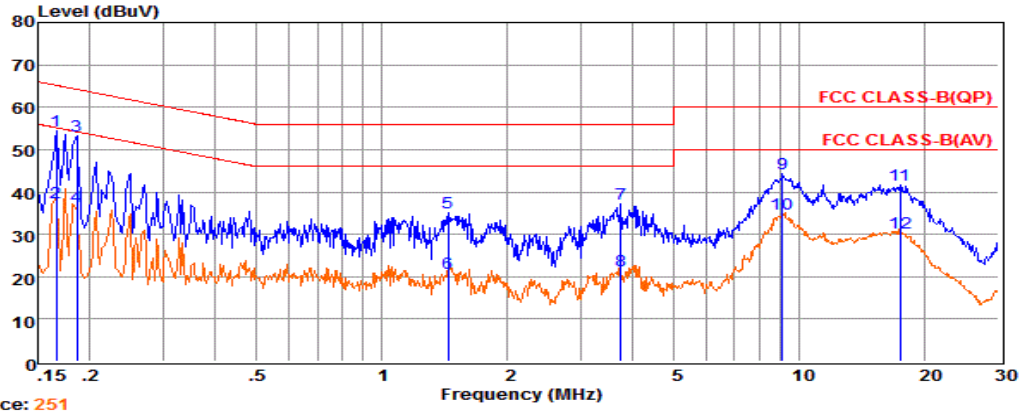


Trace: 301
Power Rating: AC 120V/60Hz
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	39.11	9.57	0.02	10.00	58.70	66.00	-7.30	QP
2	0.15	23.70	9.57	0.02	10.00	43.29	55.99	-12.70	Average
3	0.19	30.91	9.62	0.02	10.00	50.55	64.20	-13.65	QP
4	0.19	17.56	9.62	0.02	10.00	37.20	54.19	-16.99	Average
5	0.23	26.94	9.63	0.03	10.00	46.60	62.44	-15.84	QP
6	0.23	10.28	9.63	0.03	10.00	29.94	52.43	-22.49	Average
7	0.31	25.66	9.63	0.03	10.00	45.32	60.06	-14.74	QP
8	0.31	8.92	9.63	0.03	10.00	28.58	50.06	-21.48	Average
9	0.41	23.87	9.62	0.04	10.00	43.53	57.73	-14.20	QP
10	0.41	15.07	9.62	0.04	10.00	34.73	47.72	-12.99	Average
11	17.11	19.58	9.73	0.11	10.00	39.42	60.00	-20.58	QP
12	17.11	7.99	9.73	0.11	10.00	27.83	50.00	-22.17	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

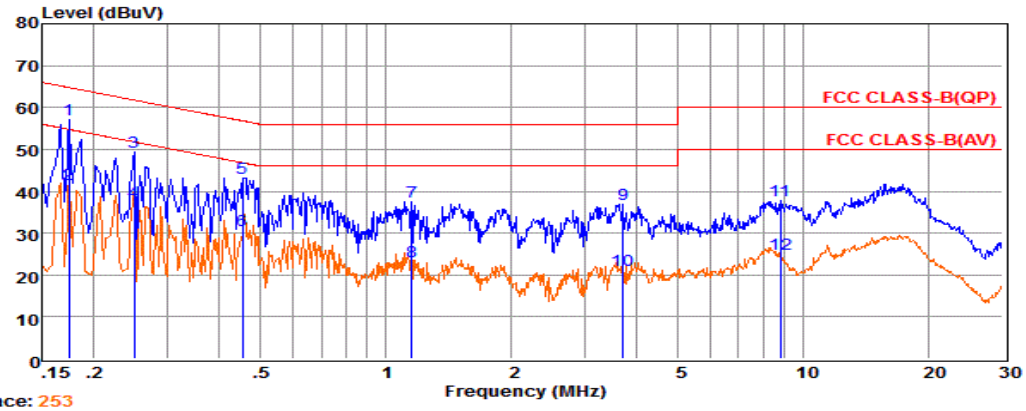
AC Conducted Emission of power by adapter @ AC 240V/50Hz @ IEEE 802.11a (worst case)



Trace: 251
Power Rating: AC 240V/60Hz
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.17	34.67	9.66	0.02	10.00	54.35	65.16	-10.81	QP
2	0.17	17.76	9.66	0.02	10.00	37.44	55.16	-17.72	Average
3	0.19	33.69	9.62	0.02	10.00	53.33	64.20	-10.87	QP
4	0.19	16.83	9.62	0.02	10.00	36.47	54.19	-17.72	Average
5	1.44	15.37	9.63	0.05	10.00	35.05	56.00	-20.95	QP
6	1.44	1.10	9.63	0.05	10.00	20.78	46.00	-25.22	Average
7	3.74	17.40	9.65	0.06	10.00	37.11	56.00	-18.89	QP
8	3.74	1.83	9.65	0.06	10.00	21.54	46.00	-24.46	Average
9	9.11	24.48	9.71	0.08	10.00	44.27	60.00	-15.73	QP
10	9.11	14.99	9.71	0.08	10.00	34.78	50.00	-15.22	Average
11	17.47	21.67	9.78	0.11	10.00	41.56	60.00	-18.44	QP
12	17.48	10.49	9.78	0.11	10.00	30.38	50.00	-19.62	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Trace: 253
Power Rating: AC 240V/60Hz
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.17	37.41	9.60	0.02	10.00	57.03	64.77	-7.74	QP
2	0.17	21.90	9.60	0.02	10.00	41.52	54.76	-13.24	Average
3	0.25	29.58	9.63	0.03	10.00	49.24	61.78	-12.54	QP
4	0.25	17.78	9.63	0.03	10.00	37.44	51.77	-14.33	Average
5	0.45	23.60	9.62	0.04	10.00	43.26	56.80	-13.54	QP
6	0.45	10.84	9.62	0.04	10.00	30.50	46.80	-16.30	Average
7	1.15	17.68	9.63	0.05	10.00	37.36	56.00	-18.64	QP
8	1.15	3.53	9.63	0.05	10.00	23.21	46.00	-22.79	Average
9	3.70	17.24	9.65	0.06	10.00	36.95	56.00	-19.05	QP
10	3.70	1.52	9.65	0.06	10.00	21.23	46.00	-24.77	Average
11	8.82	18.09	9.69	0.08	10.00	37.86	60.00	-22.14	QP
12	8.82	5.27	9.69	0.08	10.00	25.04	50.00	-24.96	Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

****Note: Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11a).*

5.7 Undesirable Emissions Measurement

5.7.1 Limit

According to ξ15.407 (b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(a) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(b) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(c) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(d) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

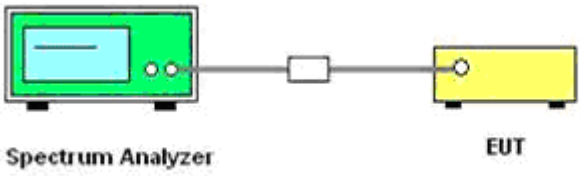
(e) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(f) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(g) The provisions of §15.205 apply to intentional radiators operating under this section.

(h) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

5.7.2 Test Configuration



5.7.3 Test Procedure

According to KDB789033 D02 General UNII Test Procedures New Rules v01 Section G: Unwanted Emission Measurement

1. Unwanted Emissions in the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits. If all peak measurements satisfy the average limit, then average measurements are not required.

d) For conducted measurements above 1000 MHz, EIRP shall be computed as specified in section II.G.3.b) and then field strength shall be computed as follows (see KDB Publication 412172):

i) E[dBμV/m] = EIRP[dBm] - 20 log (d[meters]) + 104.77, where E = field strength and d = distance at which field strength limit is specified in the rules;

ii) E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters

e) For conducted measurements below 1000 MHz, the field strength shall be computed as specified in d), above, and then an additional 4.7 dB shall be added as an upper bound on the field strength that would be observed on a test range with a ground plane for frequencies between 30 MHz and 1000 MHz, or an additional 6 dB shall be added for frequencies below 30 MHz.

2. Unwanted Emissions that fall Outside of the Restricted Bands

a) For all measurements, follow the requirements in section II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b) At frequencies below 1000 MHz, use the procedure described in section II.G.4. “Procedure for Unwanted Emissions Measurements below 1000 MHz.”

c) At frequencies above 1000 MHz, use the procedure for maximum emissions described in section II.G.5., “Procedure for Unwanted Maximum Unwanted Emissions Measurements Above 1000 MHz.”

d) Section 15.407(b) (1-3) specifies the unwanted emissions limit for the U-NII-1 and 2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz dBm/MHz peak emission limit.

i) Section 15.407(b) (4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b) (4) (i). An alternative to the band emissions mask is specified in Section 15.407(b) (4) (ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative limit.

e) If radiated measurements are performed, field strength is then converted to EIRP as follows:

i) EIRP = ((E×d) ^2) / 30

Where:

- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotopically radiated power in watts;

ii) Working in dB units, the above equation is equivalent to:

EIRP [dBm] = E [dBμV/m] + 20 log (d [meters]) - 104.77

iii) Or, if d is 3 meters:

EIRP [dBm] = E [dBμV/m] - 95.23

3) Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on radiated measurements; however, as an alternative, antenna-port conducted measurements in conjunction with cabinet emissions tests will be permitted to demonstrate compliance provided that the following steps are performed:

(i) Cabinet emissions measurements. A radiated test shall be performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna may be replaced by a termination matching the nominal impedance of the antenna.

(ii) Impedance matching. Conducted tests shall be performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT.

(iii) EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.3 However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20% of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected.

(iv) EIRP adjustments for multiple outputs. For devices with multiple outputs occupying the same or overlapping frequency ranges in the same band (e.g., MIMO or beamforming devices), compute the total EIRP as follows:

- Compute EIRP for each output, as described in (iii), above.
- Follow the procedures specified in KDB Publication 662911 for summing emissions across the outputs or adjusting emission levels measured on individual outputs by 10 log (N_{ANT}), where N_{ANT} is the number of outputs.
- Add the array gain term specified in KDB Publication 662911 for out-of-band and spurious signals.

(v) Direction of maximum emission.

For all radiated emissions tests, measurements shall correspond to the direction of maximum emission level for each measured emission (see ANSI C63.10 for guidance).

5.7.4 Test Results

IEEE 802.11a							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-52.691	1.200	0.000	44.567	Peak	74.00	PASS
4500.000	-62.844	1.200	0.000	34.414	Average	54.00	PASS
5150.000	-31.337	1.200	0.000	65.921	Peak	74.00	PASS
5150.000	-47.962	1.200	0.000	49.296	Average	54.00	PASS
5350.000	-44.236	1.200	0.000	53.022	Peak	74.00	PASS
5350.000	-54.555	1.200	0.000	42.703	Average	54.00	PASS
5387.688	-39.723	1.200	0.000	57.535	Peak	74.00	PASS
5391.696	-50.354	1.200	0.000	46.904	Average	54.00	PASS
5460.000	-46.496	1.200	0.000	50.762	Peak	74.00	PASS
5460.000	-55.953	1.200	0.000	41.305	Average	54.00	PASS

IEEE 802.11n HT20							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-54.891	1.200	0.000	42.367	Peak	74.00	PASS
4500.000	-62.483	1.200	0.000	34.775	Average	54.00	PASS
5150.000	-34.385	1.200	0.000	62.873	Peak	74.00	PASS
5150.000	-47.460	1.200	0.000	49.798	Average	54.00	PASS
5350.000	-45.278	1.200	0.000	51.980	Peak	74.00	PASS
5350.000	-54.562	1.200	0.000	42.696	Average	54.00	PASS
5393.520	-39.898	1.200	0.000	57.360	Peak	74.00	PASS
5386.104	-50.725	1.200	0.000	46.533	Average	54.00	PASS
5460.000	-46.556	1.200	0.000	50.702	Peak	74.00	PASS
5460.000	-55.980	1.200	0.000	41.278	Average	54.00	PASS

IEEE 802.11ac VHT20							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-55.139	1.200	0.000	42.119	Peak	74.00	PASS
4500.000	-62.754	1.200	0.000	34.504	Average	54.00	PASS
5150.000	-36.448	1.200	0.000	60.810	Peak	74.00	PASS
5150.000	-46.784	1.200	0.000	50.474	Average	54.00	PASS
5350.000	-45.669	1.200	0.000	51.589	Peak	74.00	PASS
5350.000	-54.902	1.200	0.000	42.356	Average	54.00	PASS
5394.336	-39.854	1.200	0.000	57.404	Peak	74.00	PASS
5391.168	-50.718	1.200	0.000	46.540	Average	54.00	PASS
5460.000	-47.989	1.200	0.000	49.269	Peak	74.00	PASS
5460.000	-56.163	1.200	0.000	41.095	Average	54.00	PASS

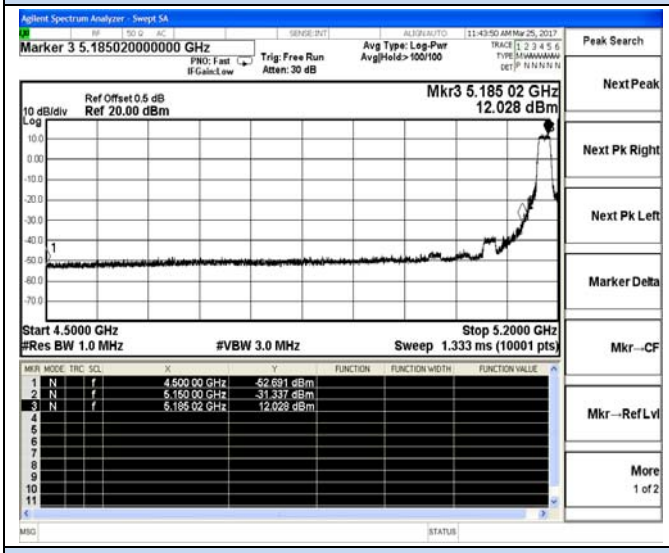
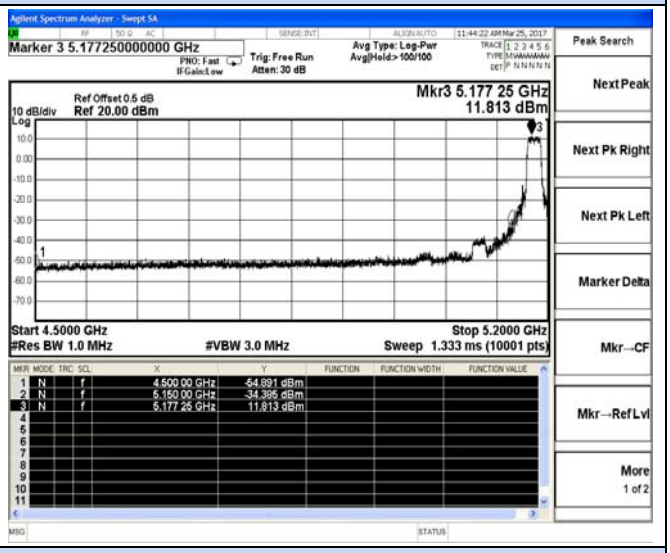
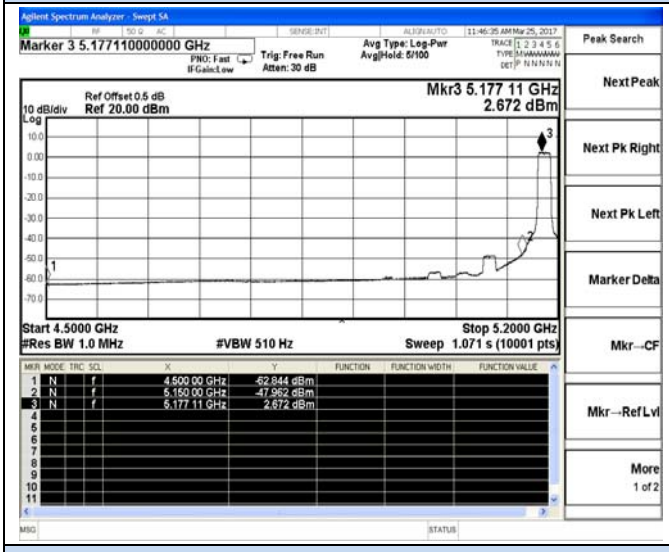
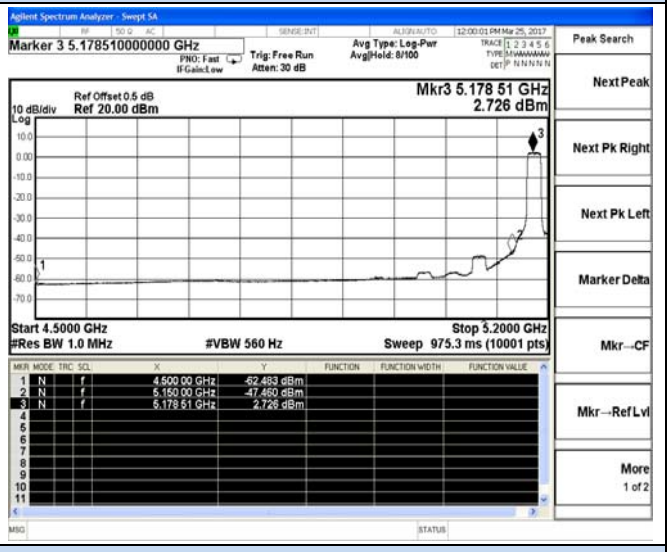
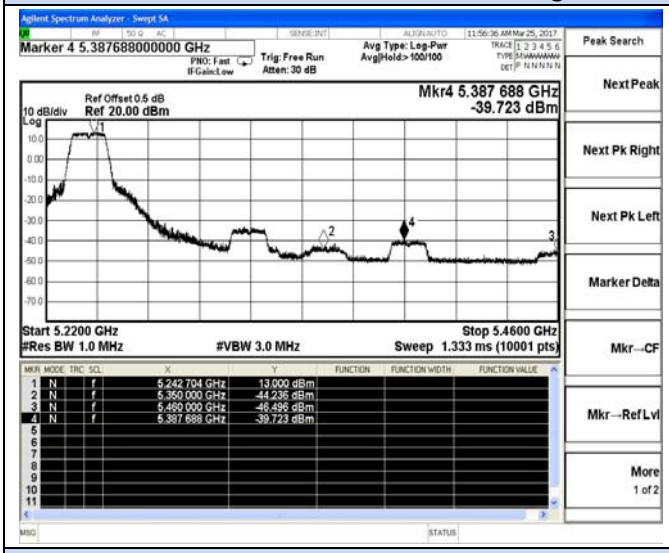
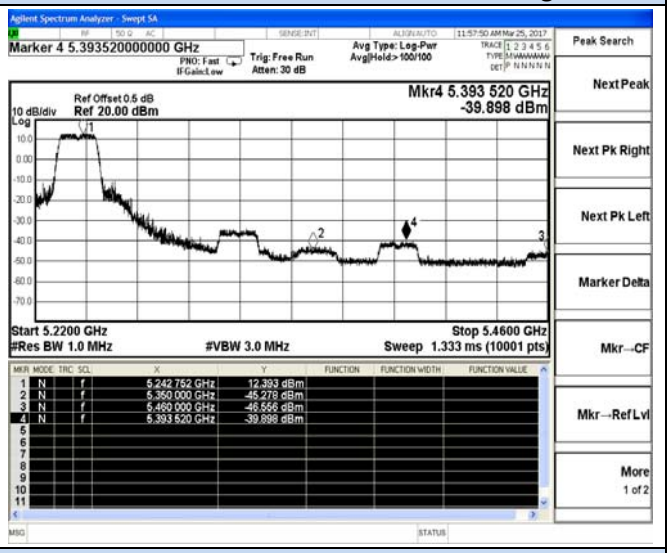
IEEE 802.11n HT40							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-54.828	1.200	0.000	42.430	Peak	74.00	PASS
4500.000	-63.259	1.200	0.000	33.999	Average	54.00	PASS
5150.000	-40.684	1.200	0.000	56.574	Peak	74.00	PASS
5150.000	-49.217	1.200	0.000	48.041	Average	54.00	PASS
5350.000	-45.965	1.200	0.000	51.293	Peak	74.00	PASS
5350.000	-55.314	1.200	0.000	41.944	Average	54.00	PASS
5460.000	-50.345	1.200	0.000	46.913	Peak	74.00	PASS
5460.000	-59.359	1.200	0.000	37.899	Average	54.00	PASS

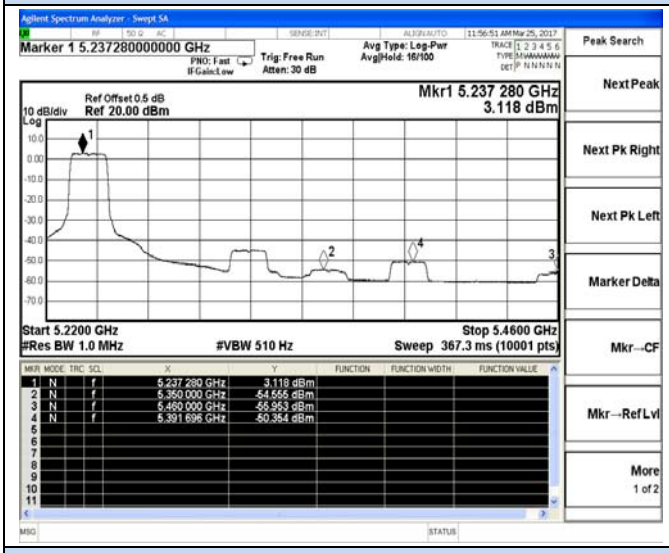
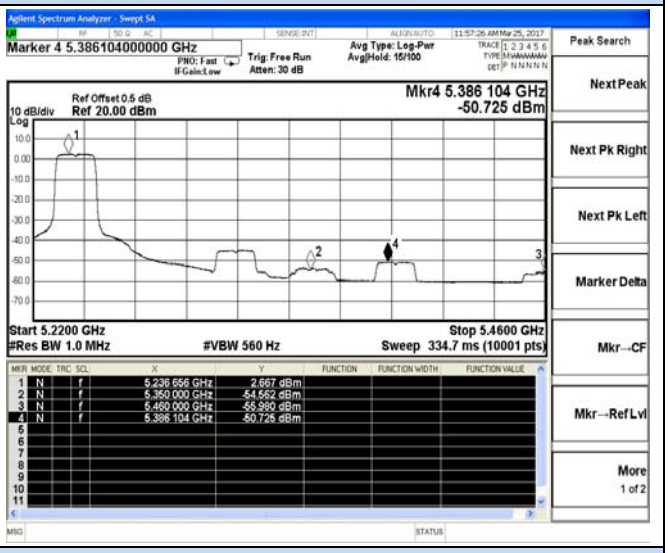
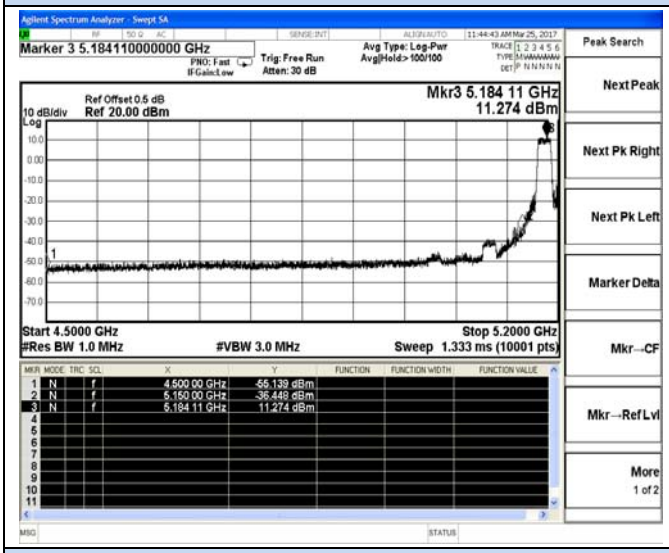
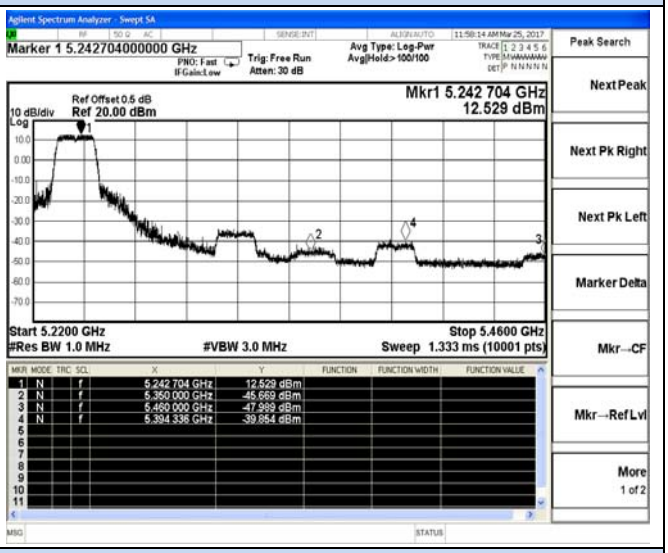
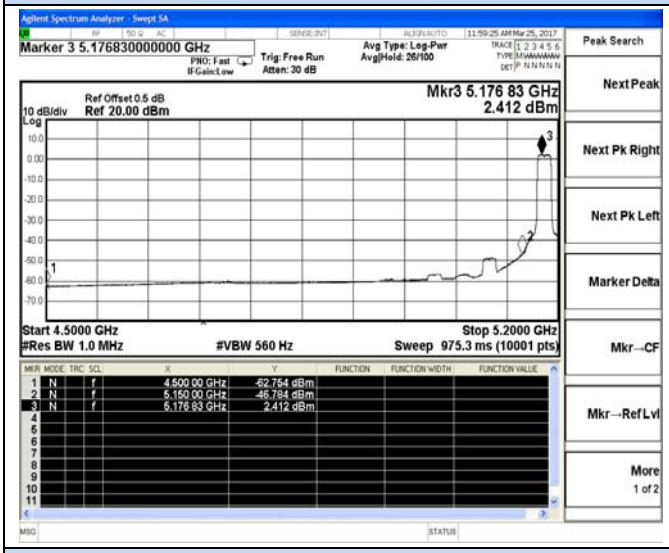
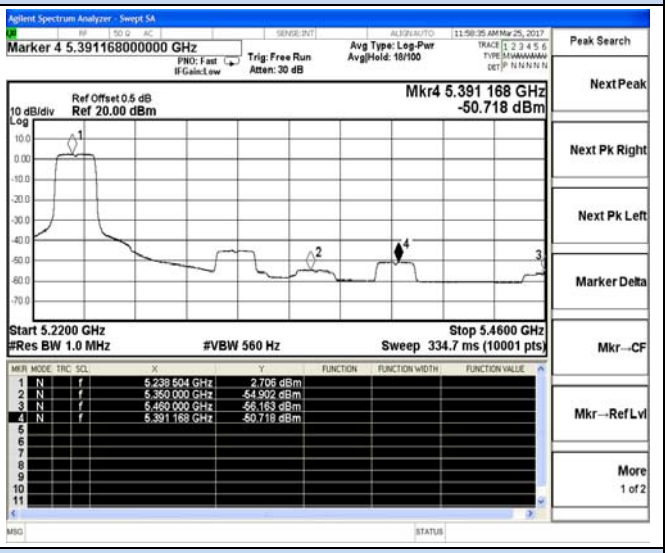
IEEE 802.11ac VHT40							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-53.365	1.200	0.000	43.893	Peak	74.00	PASS
4500.000	-63.453	1.200	0.000	33.805	Average	54.00	PASS
5150.000	-40.555	1.200	0.000	56.703	Peak	74.00	PASS
5150.000	-52.467	1.200	0.000	44.791	Average	54.00	PASS
5350.000	-44.222	1.200	0.000	53.036	Peak	74.00	PASS
5350.000	-55.382	1.200	0.000	41.876	Average	54.00	PASS
5460.000	-48.772	1.200	0.000	48.486	Peak	74.00	PASS
5460.000	-59.351	1.200	0.000	37.907	Average	54.00	PASS

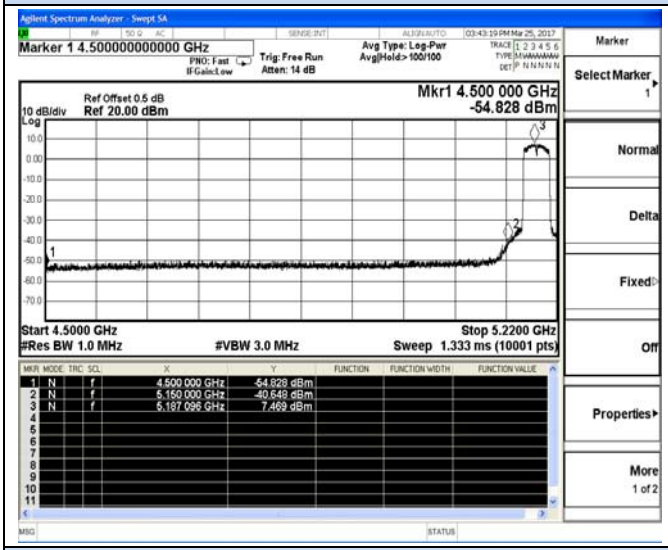
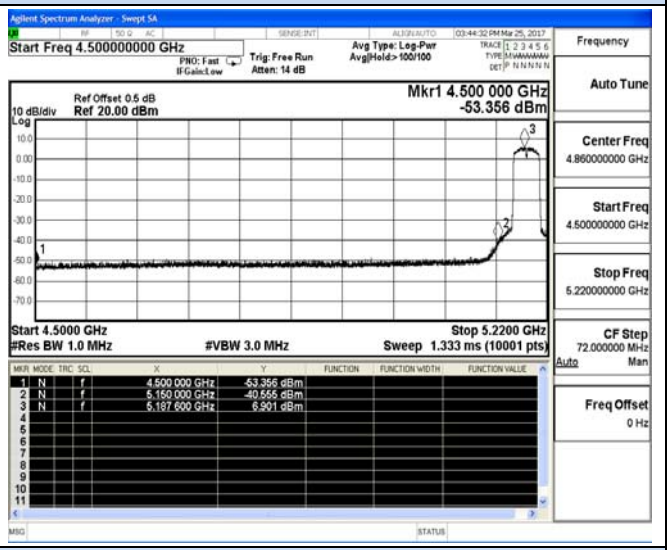
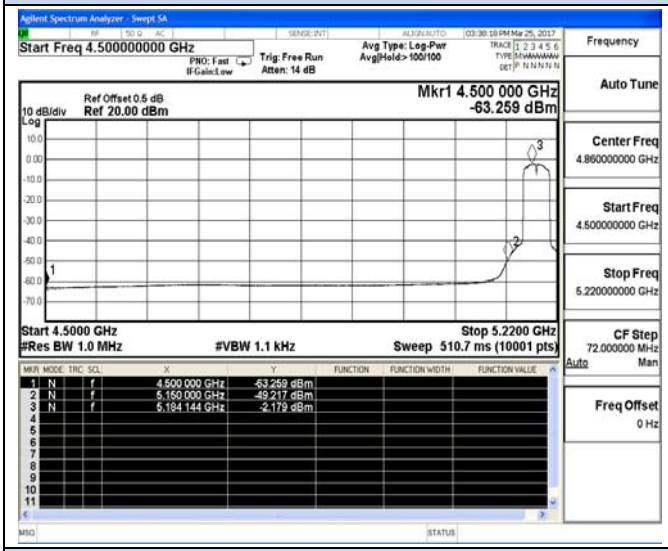
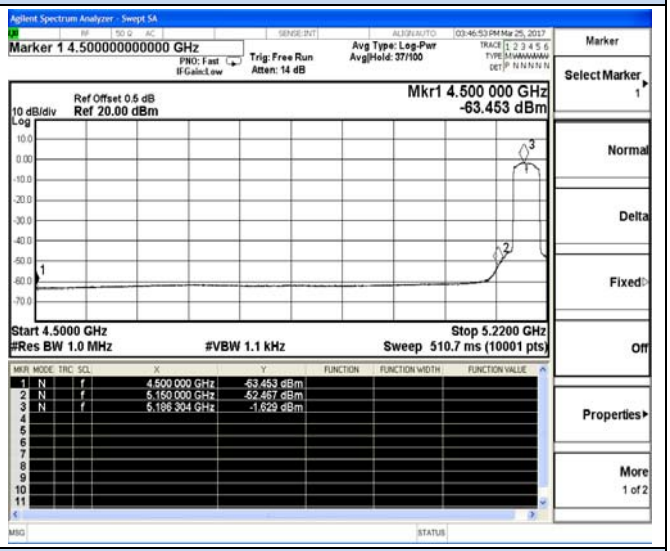
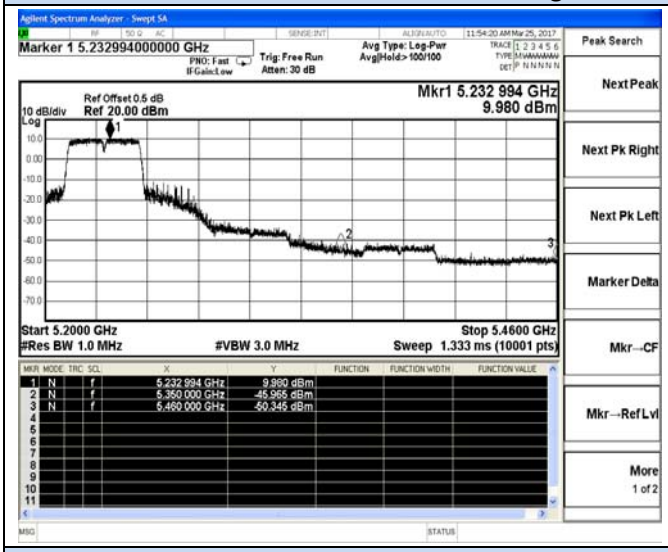
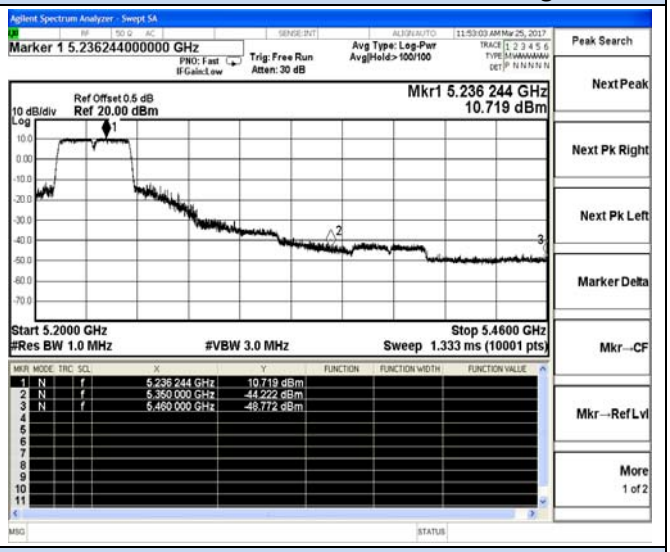
IEEE 802.11ac VHT80							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
4500.000	-54.327	1.200	0.000	42.931	Peak	74.00	PASS
4500.000	-62.889	1.200	0.000	34.369	Average	54.00	PASS
5150.000	-36.202	1.200	0.000	61.056	Peak	74.00	PASS
5150.000	-46.985	1.200	0.000	50.273	Average	54.00	PASS
5350.000	-50.144	1.200	0.000	47.114	Peak	74.00	PASS
5350.000	-51.913	1.200	0.000	45.345	Average	54.00	PASS
5460.000	-51.692	1.200	0.000	45.566	Peak	74.00	PASS
5460.000	-60.905	1.200	0.000	36.353	Average	54.00	PASS

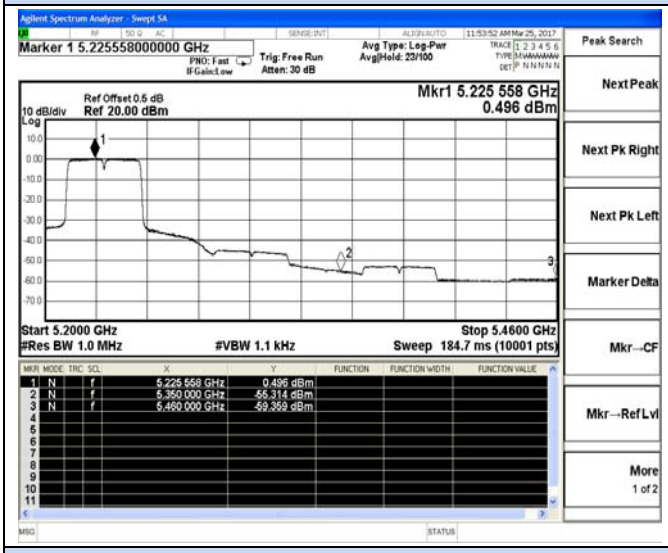
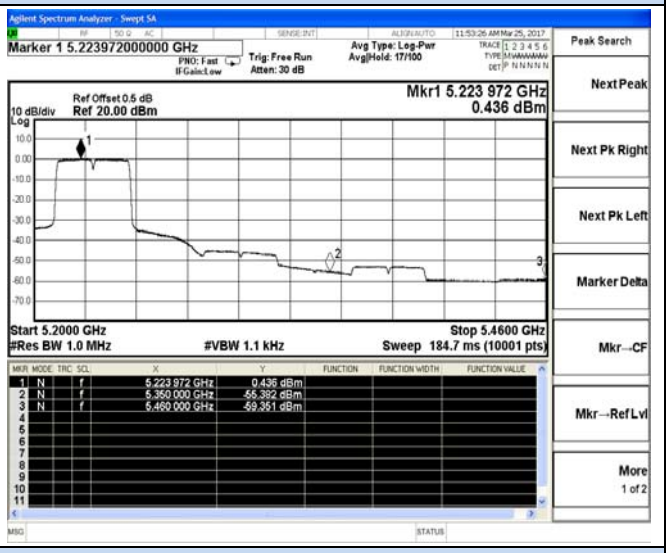
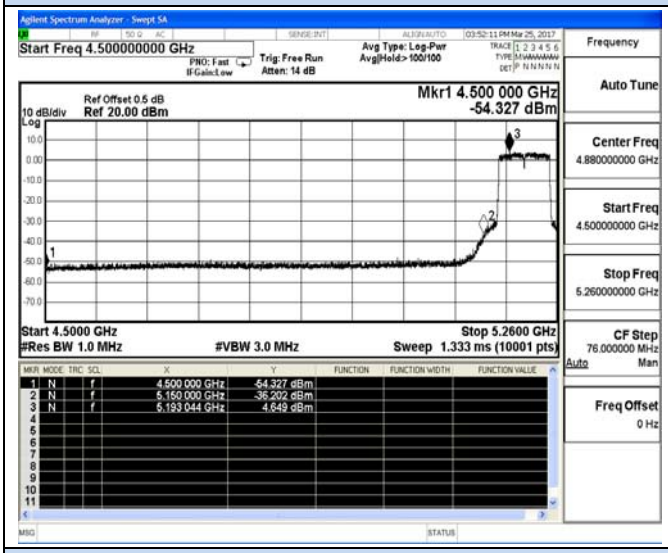
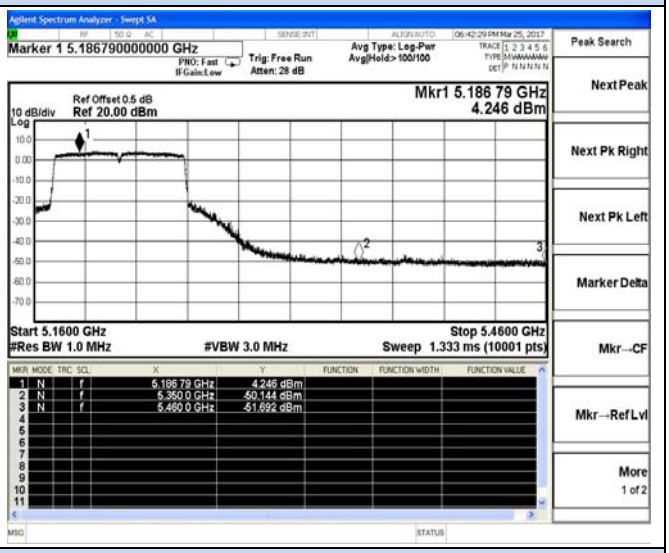
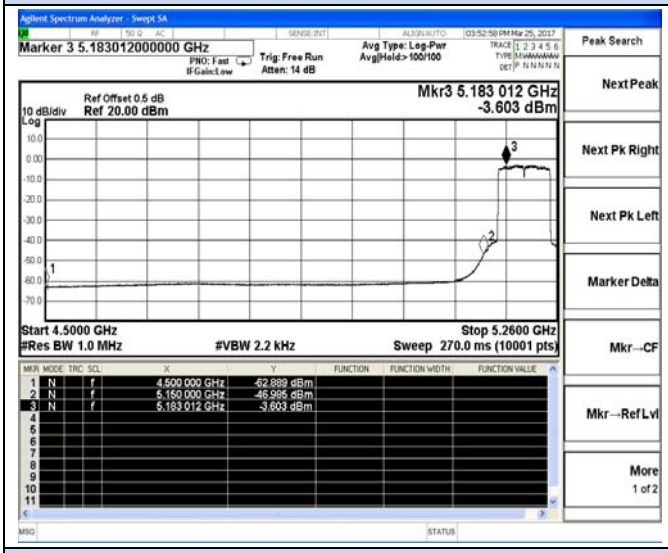
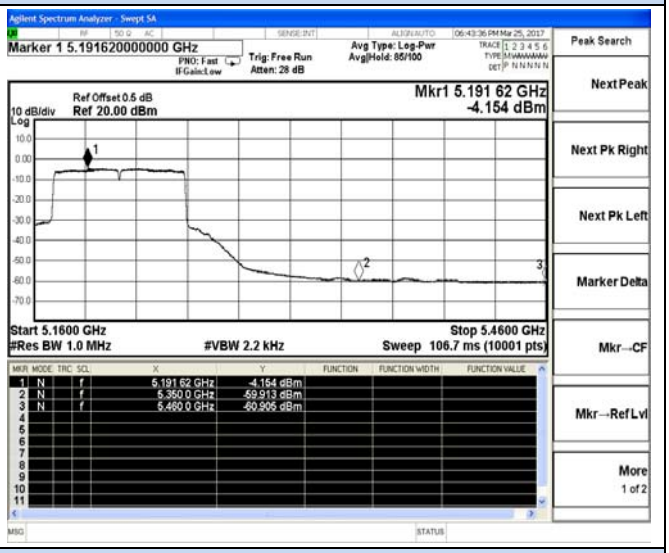
Remark:

1. *Measured Undesirable emission 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. *Covert Radiated E Level At 3m = Conducted average power + Directional Gain + 104.8-20*log(3);*
5. *Please refer to following test plots;*

Undesirable emission	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 36 / 5180 MHz – Peak	Channel 36 / 5180 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 36 / 5180 MHz – Average
	
Channel 48 / 5240 MHz – Peak	Channel 48 / 5240 MHz – Peak

Undesirable emission	
IEEE 802.11a	IEEE 802.11n HT20
	
Channel 48 / 5240 MHz – Average	Channel 48 / 5240 MHz – Average
IEEE 802.11ac VHT20	IEEE 802.11ac VHT20
	
Channel 36 / 5180 MHz – Peak	Channel 48 / 5240 MHz – Peak
	
Channel 36 / 5180 MHz – Average	Channel 48 / 5240 MHz – Average

Undesirable emission	
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 38 / 5190 MHz – Peak	Channel 38 / 5190 MHz – Peak
	
Channel 38 / 5190 MHz – Average	Channel 38 / 5190 MHz – Average
	
Channel 46 / 5230 MHz – Peak	Channel 46 / 5230 MHz – Peak

Undesirable emission	
IEEE 802.11n HT40	IEEE 802.11ac VHT40
	
Channel 46 / 5230 MHz – Average	Channel 46 / 5230 MHz – Average
IEEE 802.11ac VHT80	IEEE 802.11ac VHT80
	
Channel 42 / 5210 MHz – Peak	Channel 42 / 5210 MHz – Peak
	
Channel 42 / 5210 MHz – Average	Channel 42 / 5210 MHz –Average

5.8. Antenna Requirements

5.8.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2 Antenna Connected Construction

5.8.2.1. Standard Applicable

According to § 15.203 & RSS-Gen, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.8.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 1.2dBi, and the antenna is a PIFA antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

The WLAN and Bluetooth share same antenna.

5.8.2.3. Results: Compliance.

Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.
Conducted power refers ANSI C63.10:2013 Output power test procedure for NII devices.
Radiated power refers to ANSI C63.10:2013 Radiated emissions tests.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep Time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

Limits

FCC	ISED
Antenna Gain	
6 dBi	

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For WLAN devices, the OFDM (IEEE 802.11a) mode is used;

T_{nom}	V_{nom}	Lowest Channel 5180 MHz	Middle Channel 5220 MHz	Highest Channel 5240 MHz
Conducted power [dBm] Measured with DSSS modulation		12.179	12.004	13.107
Radiated power [dBm] Measured with DSSS modulation		12.956	12.798	13.945
Gain [dBi] Calculated		0.777	0.794	0.838
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

6. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18, 2016	June 17, 2017
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16, 2016	July 15, 2017
Signal analyzer	Agilent	N9020A	MY50510140	9kHz~26.5GHz	October 27, 2016	October 27, 2017
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18, 2016	June 17, 2017
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18, 2016	June 17, 2017
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18, 2016	June 17, 2017
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18, 2016	June 17, 2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-18GHz 3m	June 18, 2016	June 17, 2017
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHz	June 18, 2016	June 17, 2017
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16, 2016	July 15, 2017
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16, 2016	July 15, 2017
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18, 2016	June 17, 2017
By-log	SCHWARZBECK	VULB9163	9163-470	30MHz-1GHz	June 10, 2016	June 09, 2017
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10, 2016	June 09, 2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 10, 2016	June 09, 2017
RF	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2016	June 17, 2017
RF	SUHNER	SUCOFLEX	03CH03-HY	1GHz-40GHz	June 18, 2016	June 17, 2017
Power Meter	R&S	NRVS	100444	DC-40GHz	June 18, 2016	June 17, 2017
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18, 2016	June 17, 2017
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18, 2016	June 17, 2017
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 18, 2016	June 17, 2017
DC power Source	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidify Chamber	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18, 2016	June 17, 2017
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18, 2016	June 17, 2017
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18, 2016	June 17, 2017
EMC Test Software	Audix	E3	N/A	N/A	N/A	N/A
Note: All equipment through GRGT EST calibration						

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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