FCC TEST REPORT

For

JACS SOLUTIONS LLC

8 inch Tablet

Model No.: TG800

Additional Model No. : TG801, TG802, TG803, TG804

Prepared for	:	JACS SOLUTIONS LLC
Address	:	8808 CentrePark Drive Suite 305 Columbia, MD 21045, USA
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	December 12, 2016
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	December 12, 2016~December 27, 2016
Date of Report	:	December 27, 2016

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

Report Reference No.	**:**	**LCS1608302570E**
Date of Issue	:	December 27, 2016
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 ..... :		**JACS SOLUTIONS LLC**
Address	:	8808 CentrePark Drive Suite 305 Columbia, MD 21045, USA
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. ..... :		**8 inch Tablet**
Trade Mark	:	N/A
Model/ Type reference	:	TG800
Ratings	:	DC 3.7V
Result	:	**Positive**

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

FCC -- TEST REPORT

Test Report No. : **LCS1608302570E**	December 27, 2016 Date of issue

EUT.....	: 8 inch Tablet
Type / Model.....	: TG800
Applicant.....	**: JACS SOLUTIONS LLC**
Address.....	: 8808 CentrePark Drive Suite 305 Columbia, MD 21045, USA
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: JACS SOLUTIONS LLC**
Address.....	: 8808 CentrePark Drive Suite 305 Columbia, MD 21045, USA
Telephone.....	: /
Fax.....	: /
Factory.....	**: JACS SOLUTIONS LLC**
Address.....	: 8808 CentrePark Drive Suite 305 Columbia, MD 21045, USA
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	2016-12-27	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : 8 inch Tablet

Model Number : TG800

Model Declaration : PCB board, structure and internal of these model(s) are the same, So no additional models were tested

Test Model : TG800, TG801, TG802, TG803, TG804

Power Supply : DC 3.7V

Frequency Range : 2412.00~2462.00MHz; 5180.00-5240.00MHz; 5745.00-5825.00MHz

Channel Number : 11 Channels for WIFI 20MHz Bandwidth(IEEE 802.11b/g/n-HT20);
4 Channels for 5180.00-5240.00MHz(IEEE 802.11a/n-HT20);
5 Channels for 5745.00-5825.00MHz(IEEE 802.11a/n-HT20);
2 Channels for 5190.00-5230.00MHz(IEEE 802.11n-HT40);
2 Channels for 5755.00-5795.00MHz(IEEE 802.11n-HT40)

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)

Data Rates : IEEE 802.11b: 1-11Mbps
IEEE 802.11g: 6-54Mbps
IEEE 802.11n: MCS0-MCS7
IEEE 802.11a: 6-54Mbps

Antenna Type And Gain : PIFA antenna, 2.0dBi

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
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1.3. External I/O Port

I/O Port Description	Quantity	Cable
DC	1	N/A
Aux	1	N/A
Dock	1	N/A
HDMI	1	0.8m, Shielded
RJ45	1	N/A

1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
VCCI Registration Number. is C-4260 and R-3804.
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.

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 (High Channel).

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 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be IEEE 802.11a mode(High 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 802.11n-HT20 Mode: MCS0, OFDM.
IEEE 802.11n-HT40 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	☐	☐	☐	☐	☐	☐

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 and KDB 6622911 are required to be used for this kind of FCC 15.407 UII device.

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

2.3. General Test Procedures

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

3. SYSTEM TEST CONFIGURATION

3.1. Justification

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

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

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

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

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

5. TEST RESULT

5.1. On Time and Duty Cycle

5.1.1. Standard Applicable

None; for reporting purpose only.

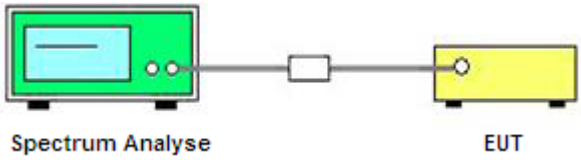
5.1.2. Measuring Instruments and Setting

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



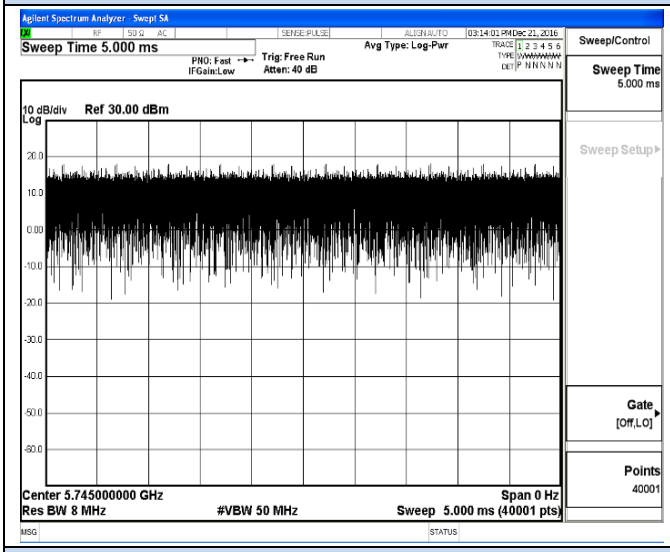
5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

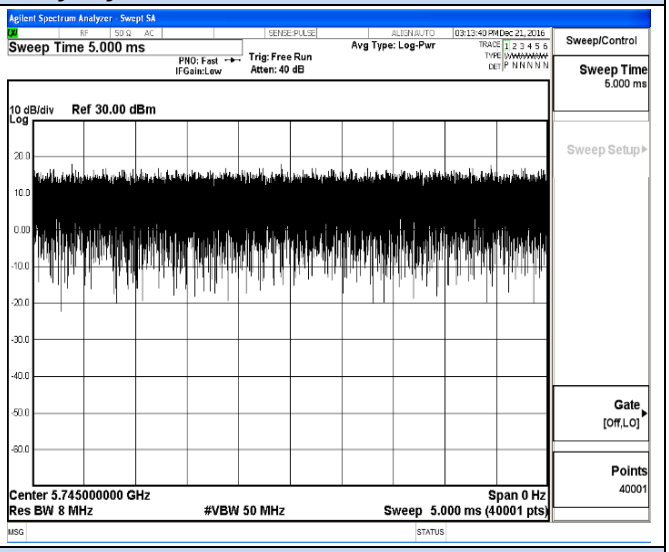
5.1.6. Test result

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	5.0	5.0	1	100	0.0	0.01
IEEE 802.11n HT20	5.0	5.0	1	100	0.0	0.01
IEEE 802.11n HT40	5.0	5.0	1	100	0.0	0.01

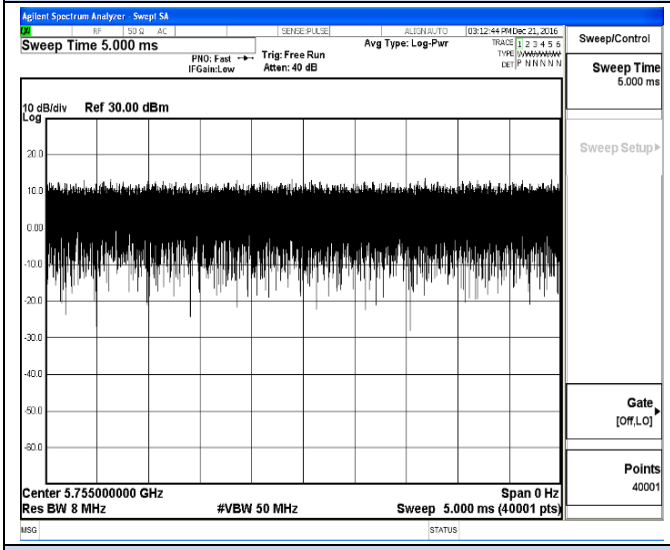
On Time and Duty Cycle



IEEE 802.11a



IEEE 802.11n HT20



IEEE 802.11n HT40

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

For 5725~5850MHz

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

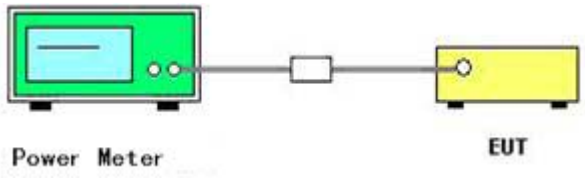
5.2.2. Measuring Instruments and Setting

Please refer to 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.

5.2.4. Test Setup Layout



5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Test Result of Maximum Conducted Output Power

Temperature	25℃	Humidity	60%
Test Engineer	Jacky	Configurations	IEEE 802.11a/n

Test Mode	Channel	Frequency (MHz)	Measured Output Average Power (dBm)	Duty Cycle factor (dB)	Limits (dBm)	Verdict
IEEE 802.11a	149	5745	15.63	0.00	30	PASS
	157	5785	14.97	0.00		
	165	5825	14.14	0.00		
IEEE 802.11n HT20	149	5745	15.81	0.00	30	PASS
	157	5785	14.59	0.00		
	165	5825	14.98	0.00		
IEEE 802.11n HT40	151	5755	15.59	0.00	30	PASS
	159	5795	15.14	0.00		

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 802.11 a; 13Mbps at IEEE 802.11 n HT20; 27Mbps at IEEE 802.11 n HT40*

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

For 5725~5850MHz

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

5.3.2. Measuring Instruments and Setting

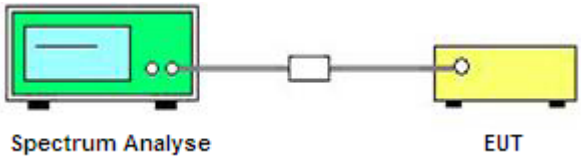
Please refer to section 6 of equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.3.3. Test Procedures

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

2. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
3. Set the RBW = 300 kHz.
4. Set the VBW= 1000 kHz
5. Span=Encompass the entire emissions bandwidth (EBW) of the signal
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

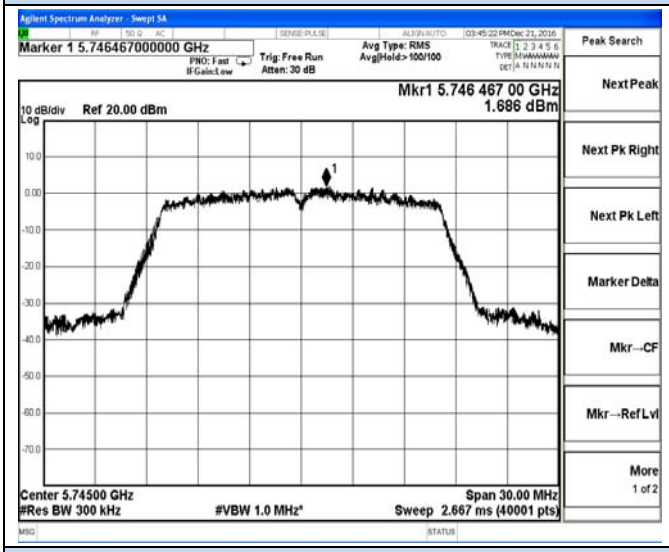
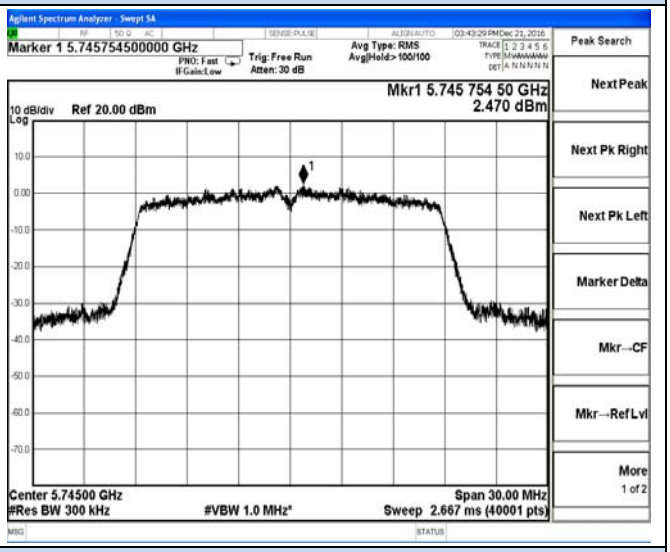
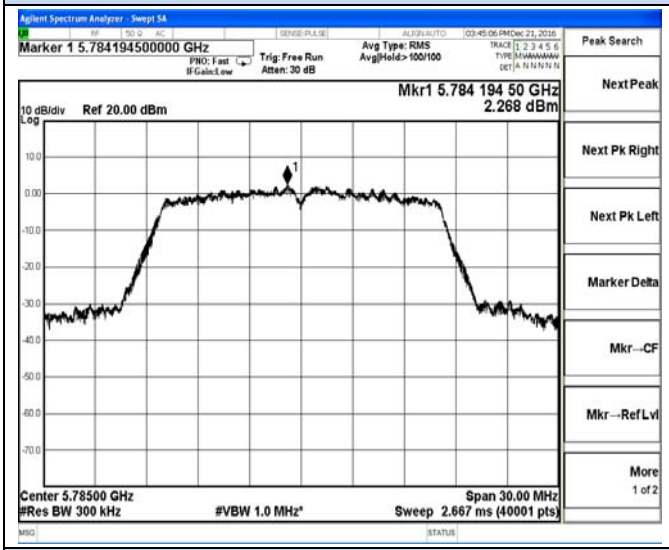
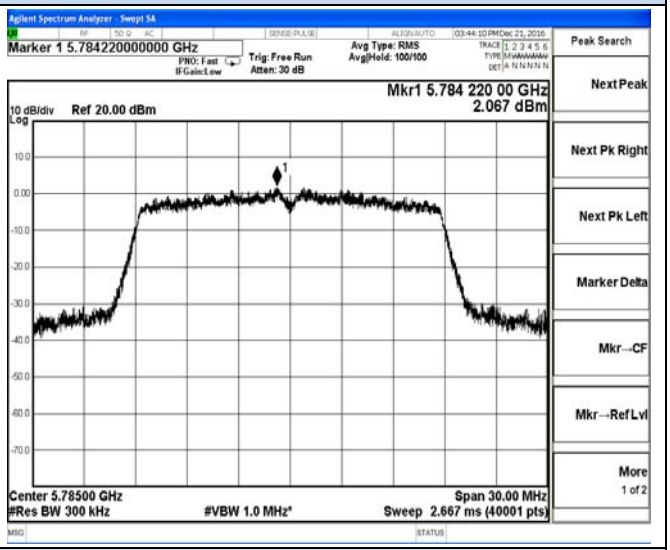
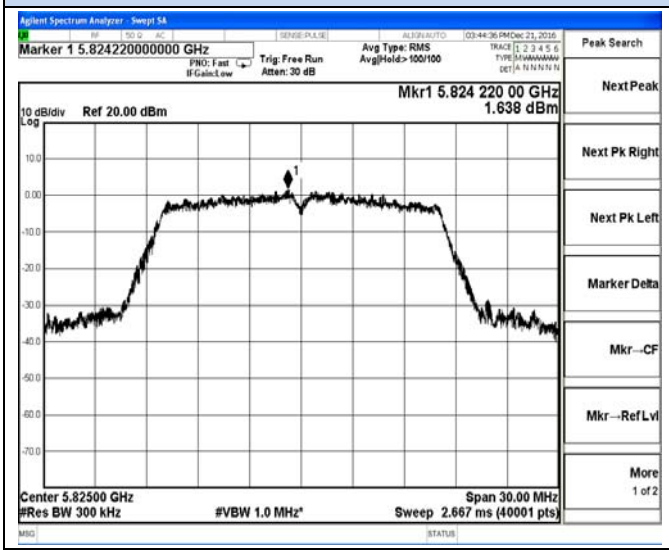
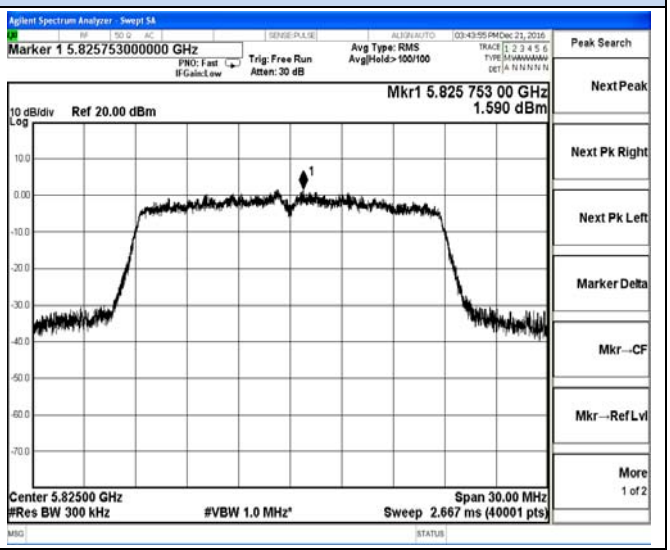
5.3.6. Test Result of Power Spectral Density

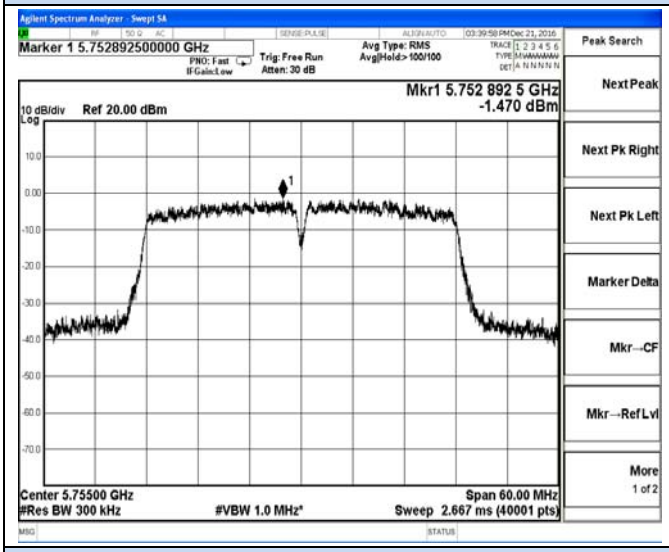
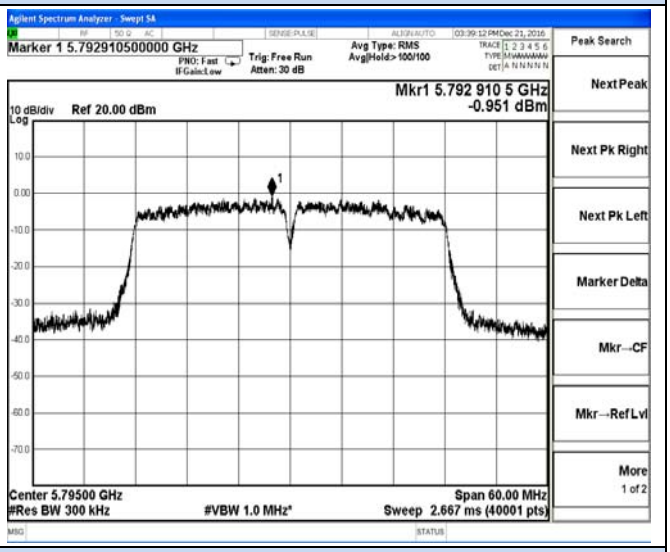
Temperature	25℃	Humidity	60%
Test Engineer	Jacky	Configurations	IEEE 802.11a/n

Test Mode	Channel	Frequency (MHz)	Report Peak Power Spectral Density (dBm/500KHz)	Duty Cycle factor (dB)	RBW factor (dB)	Limits (dBm/500KHz)	Verdict
IEEE 802.11a	149	5745	3.904	0.00	2.218	30	PASS
	157	5785	4.486	0.00	2.218		
	165	5825	3.856	0.00	2.218		
IEEE 802.11n HT20	149	5745	4.688	0.00	2.218	30	PASS
	157	5785	4.285	0.00	2.218		
	165	5825	3.808	0.00	2.218		
IEEE 802.11n HT40	151	5755	0.748	0.00	2.218	30	PASS
	159	5795	1.267	0.00	2.218		

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 802.11 a; 13Mbps at IEEE 802.11 n HT20; 27Mbps at IEEE 802.11 n HT40;*
4. *RBW factor =* 10 log (500 *kHz/RBW) = 10*log (500KHz/300KHz) = 2.218 dB;*
5. *Report peak power spectral density = Measure peak power spectral density + RBW factor + Duty Cycle factor*
6. *please refer to following plots;*

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

Peak Power Spectral Density	
IEEE 802.11 n HT40	IEEE 802.11 n HT40
	
Channel 151 / 5755 MHz	Channel 159 / 5795 MHz

5.4. 6dB Occupied Bandwidth Measurement

5.4.1. Standard Applicable

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

5.4.2. Measuring Instruments and Setting

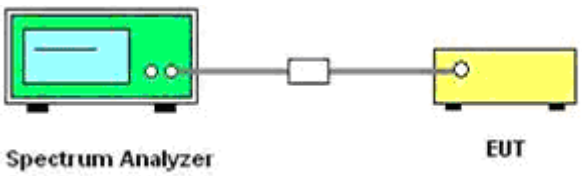
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.4.3. Test Procedures

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

5.4.4. Test Setup Layout



5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

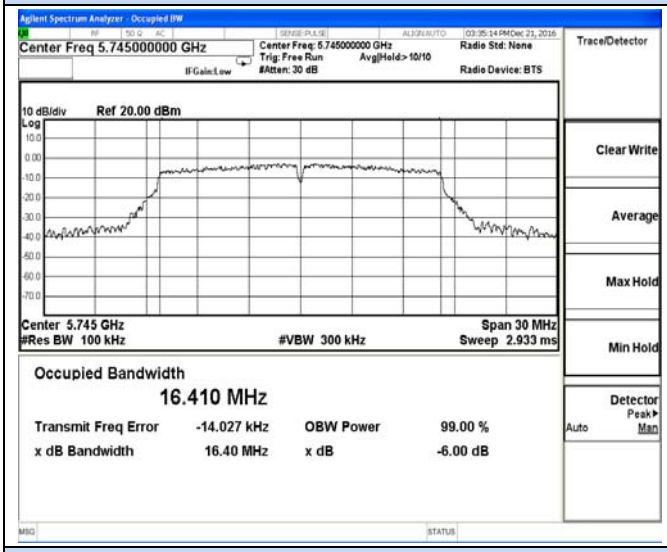
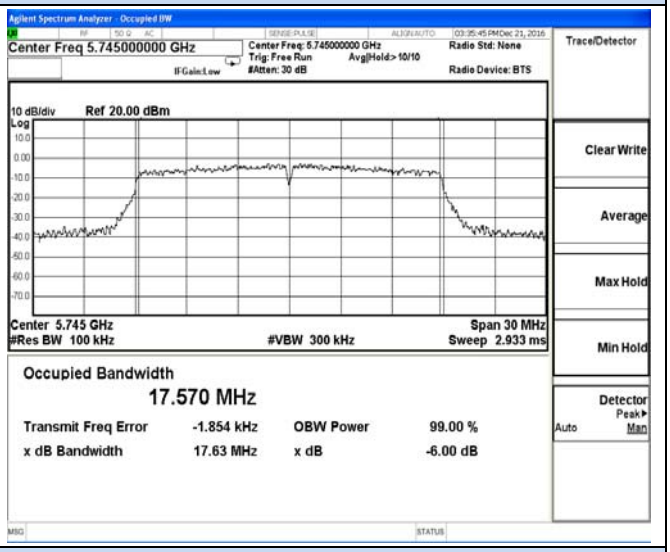
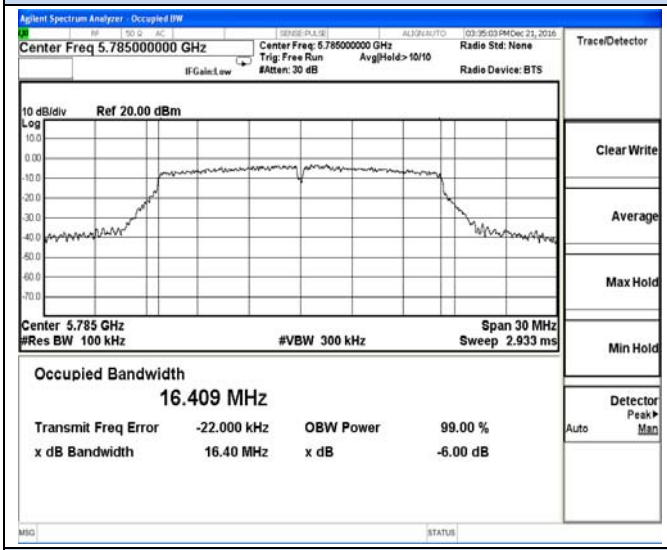
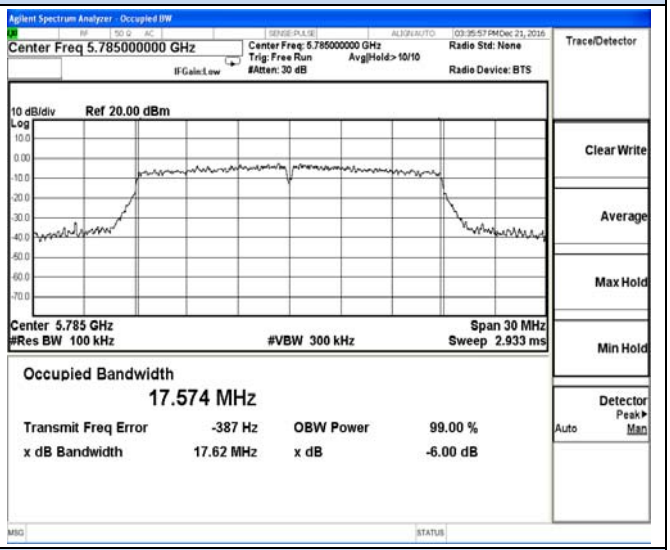
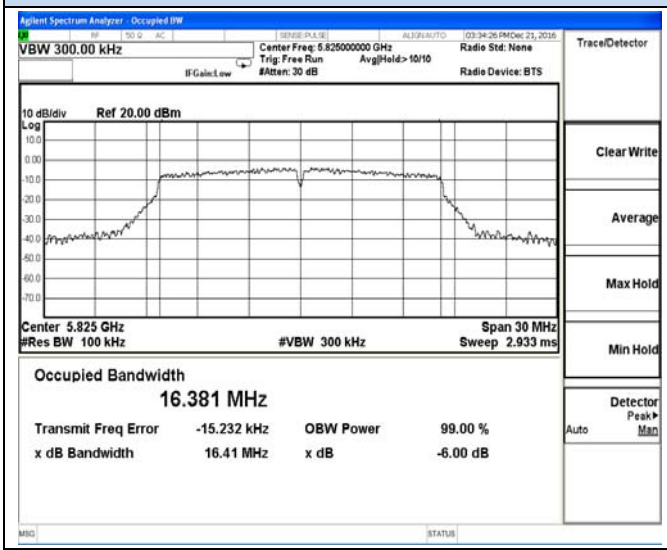
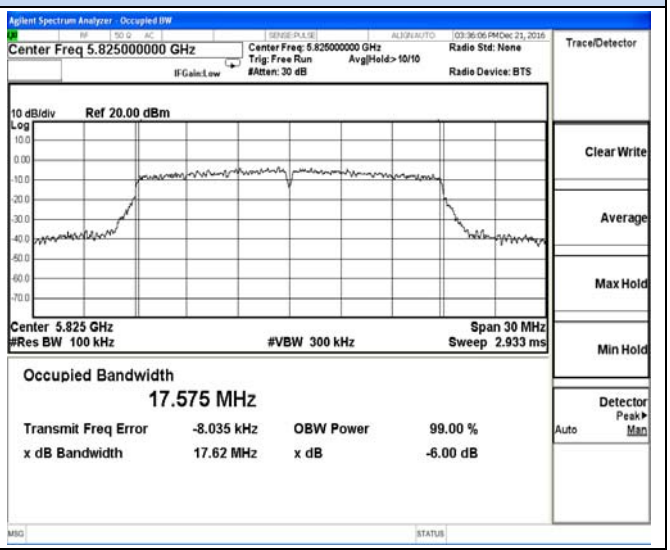
5.4.6. Test Result of 6dB Occupied Bandwidth

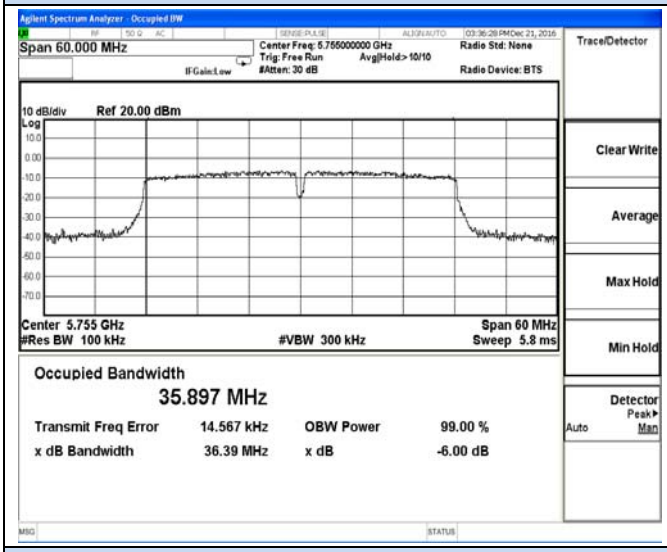
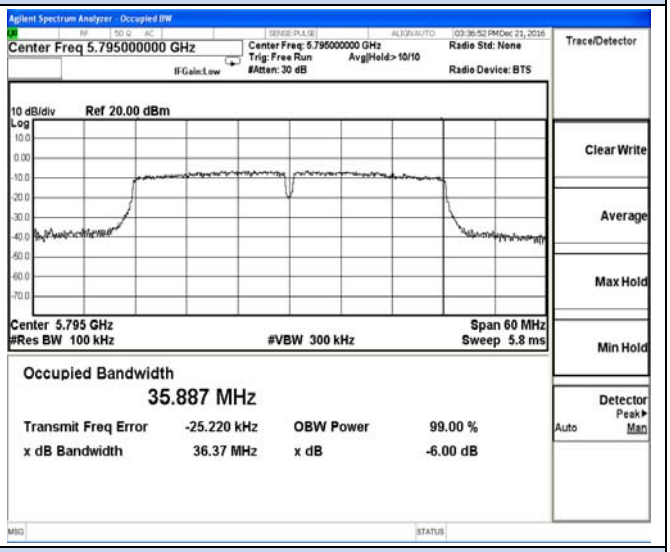
Temperature	25℃	Humidity	60%
Test Engineer	Jacky	Configurations	IEEE 802.11a/n

Test Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limits (MHz)	Verdict
IEEE 802.11a	149	5745	16.400	0.500	PASS
	157	5785	16.400		
	165	5825	16.410		
IEEE 802.11n HT20	149	5745	17.630	0.500	PASS
	157	5785	17.620		
	165	5825	17.620		
IEEE 802.11n HT40	151	5755	36.390	0.500	PASS
	159	5795	36.370		

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 802.11 a; 13Mbps at IEEE 802.11 n HT20; 27Mbps at IEEE 802.11 n HT40*
4. *please refer to following plots;*

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

6dB Occupied Bandwidth	
IEEE 802.11 n HT40	IEEE 802.11 n HT40
	
Channel 151 / 5755 MHz	Channel 159 / 5795 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 5.725-5.85 GHz band:

All emissions shall be limited to a level of −27 dBm/MHz(68.2dBuV/m at 3m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz(105.2dBuV/m at 3m) 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(110.8dBuV/m at 3m) 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(122.2dBuV/m at 3m) at the band edge.

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	10th 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/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz 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 polarisations of the antenna.

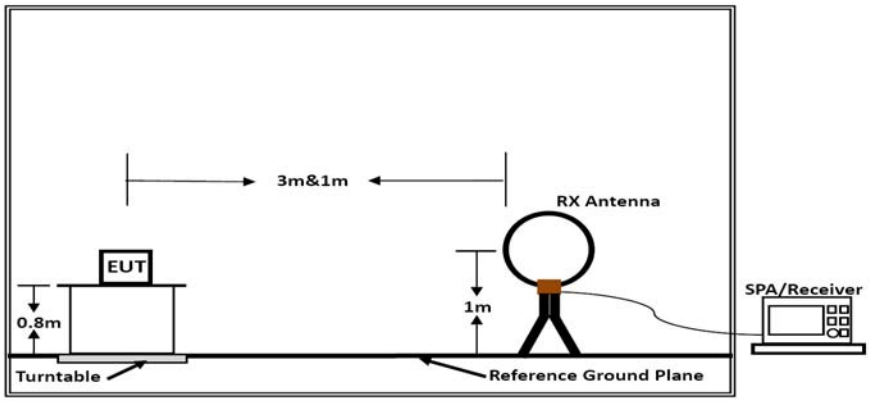
Final measurement:

--- 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.

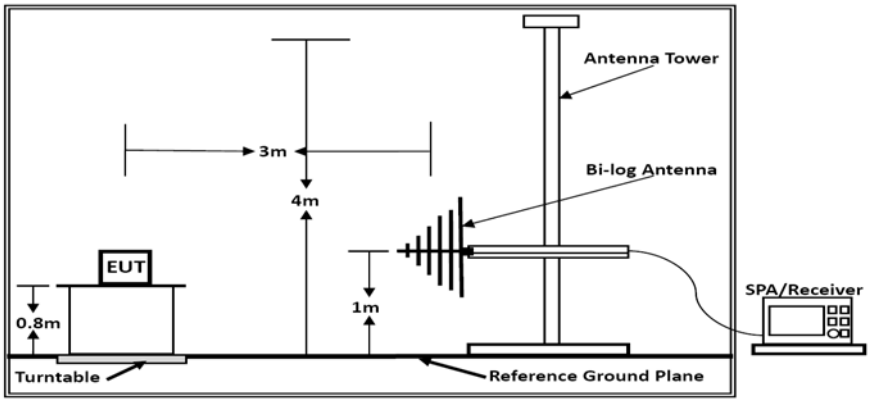
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.5.4. Test Setup Layout

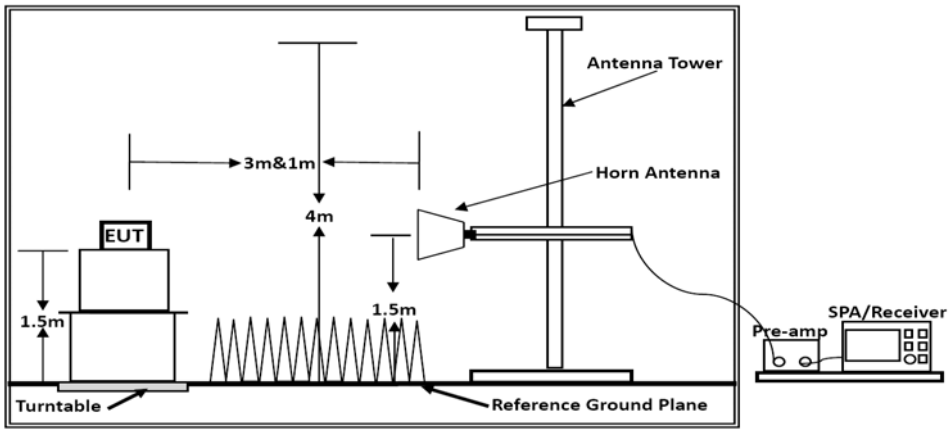
For radiated emissions below 30MHz



Below 30MHz



Below 1GHz



Above 1GHz

Above 10 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	Jacky	Configurations	IEEE 802.11a/n

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	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.

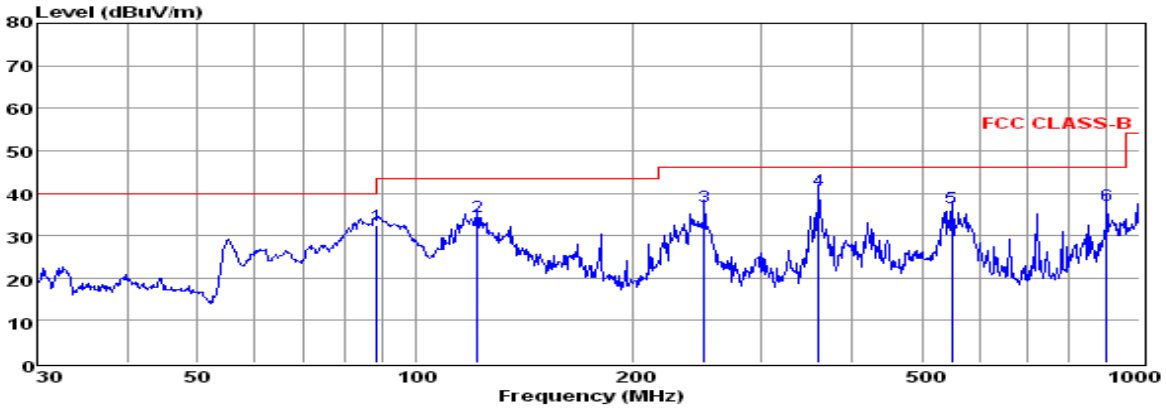
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

Temperature	25℃	Humidity	60%
Test Engineer	Jacky	Configurations	IEEE 802.11a, 5825MHz

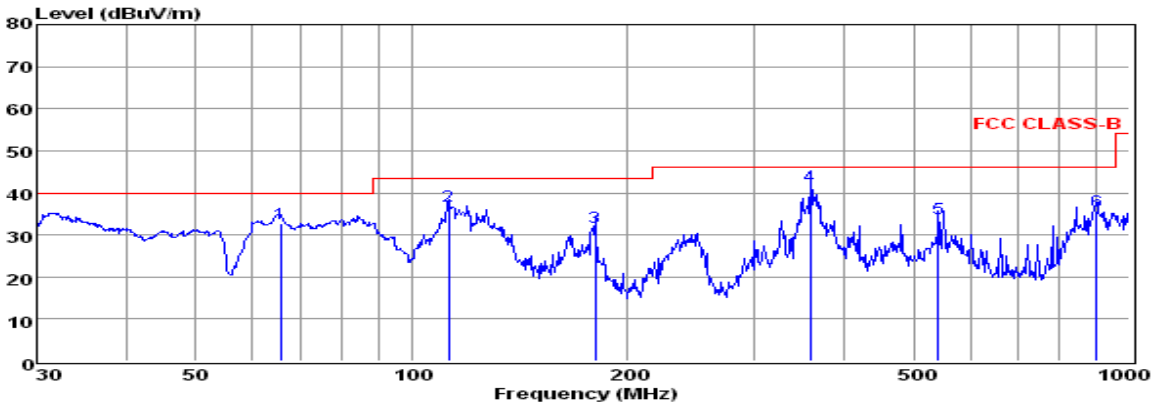
Test result for IEEE 802.11a - 5825MHz



Env./Ins: 24℃/56%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	88.34	20.44	0.68	11.37	32.49	43.50	-11.01	QP
2	121.55	23.69	0.70	10.24	34.63	43.50	-8.87	QP
3	250.30	23.80	1.02	12.07	36.89	46.00	-9.11	QP
4	360.45	24.99	1.18	14.43	40.60	46.00	-5.40	QP
5	550.95	17.59	1.39	17.53	36.51	46.00	-9.49	QP
6	900.15	14.34	1.88	21.09	37.31	46.00	-8.69	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



Env./Ins: 24℃/56%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	65.57	21.74	0.52	10.47	32.73	40.00	-7.27	QP
2	112.52	24.44	0.65	11.80	36.89	43.50	-6.61	QP
3	180.02	21.40	0.89	9.68	31.97	43.50	-11.53	QP
4	359.19	25.97	1.18	14.42	41.57	46.00	-4.43	QP
5	541.37	15.31	1.34	17.35	34.00	46.00	-12.00	QP
6	900.15	12.66	1.88	21.09	35.63	46.00	-10.37	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-5825MHz).
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 149 / 5745 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
17.235	60.69	33.23	35.04	3.91	62.79	68.2	-11.21	Peak	Horizontal
17.235	46.48	33.23	35.04	3.91	48.58	54.0	-5.42	Average	Horizontal
17.235	56.17	33.23	35.04	3.91	58.27	68.2	-15.73	Peak	Vertical
17.235	42.31	33.23	35.04	3.91	44.41	54.0	-9.59	Average	Vertical

Channel 157 / 5785 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
17.355	61.91	33.27	35.15	3.93	63.96	68.2	-10.04	Peak	Horizontal
17.355	46.23	33.27	35.15	3.93	48.28	54.0	-5.72	Average	Horizontal
17.355	56.41	33.27	35.15	3.93	58.46	68.2	-15.54	Peak	Vertical
17.355	42.96	33.27	35.15	3.93	45.01	54.0	-8.99	Average	Vertical

Channel 163 / 5825 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
17.475	60.1	33.32	35.14	3.97	62.25	68.2	-11.75	Peak	Horizontal
17.475	45.48	33.32	35.14	3.97	47.63	54.0	-6.37	Average	Horizontal
17.475	57.26	33.32	35.14	3.97	59.41	68.2	-14.59	Peak	Vertical
17.475	41.87	33.32	35.14	3.97	44.02	54.0	-9.98	Average	Vertical

IEEE 802.11n HT20

Channel 149 / 5745 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
17.235	59.26	33.23	35.04	3.91	61.36	68.2	-12.64	Peak	Horizontal
17.235	46.16	33.23	35.04	3.91	48.26	54.0	-5.74	Average	Horizontal
17.235	56.31	33.23	35.04	3.91	58.41	68.2	-15.59	Peak	Vertical
17.235	41.95	33.23	35.04	3.91	44.05	54.0	-9.95	Average	Vertical

Channel 157 / 5785 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
17.355	60.18	33.27	35.15	3.93	62.23	68.2	-11.77	Peak	Horizontal
17.355	44.97	33.27	35.15	3.93	47.02	54.0	-6.98	Average	Horizontal
17.355	56.12	33.27	35.15	3.93	58.17	68.2	-15.83	Peak	Vertical
17.355	41.73	33.27	35.15	3.93	43.78	54.0	-10.22	Average	Vertical

Channel 163 / 5825 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
17.475	58.88	33.32	35.14	3.97	61.03	68.2	-12.97	Peak	Horizontal
17.475	44.96	33.32	35.14	3.97	47.11	54.0	-6.89	Average	Horizontal
17.475	55.37	33.32	35.14	3.97	57.52	68.2	-16.48	Peak	Vertical
17.475	41.31	33.32	35.14	3.97	43.46	54.0	-10.54	Average	Vertical

IEEE 802.11n HT40

Channel 151 / 5755 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
17.265	58.36	33.23	35.04	3.91	60.46	68.2	-13.54	Peak	Horizontal
17.265	43.29	33.23	35.04	3.91	45.39	54.0	-8.61	Average	Horizontal
17.265	56.15	33.23	35.04	3.91	58.25	68.2	-15.75	Peak	Vertical
17.265	41.97	33.23	35.04	3.91	44.07	54.0	-9.93	Average	Vertical

Channel 159 / 5795 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
17.385	57.66	33.27	35.15	3.93	59.71	68.2	-14.29	Peak	Horizontal
17.385	42.84	33.27	35.15	3.93	44.89	54.0	-9.11	Average	Horizontal
17.385	55.10	33.27	35.15	3.93	57.15	68.2	-16.85	Peak	Vertical
17.385	41.20	33.27	35.15	3.93	43.25	54.0	-10.75	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz – 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9 KHz – 40 GHz were made with an instrument using Peak detector mode.
3). 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

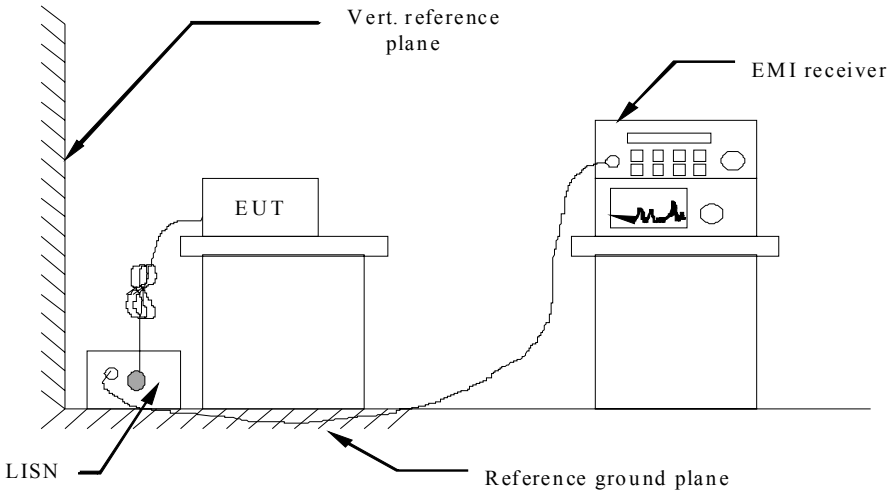
5.6.1 Standard Applicable

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

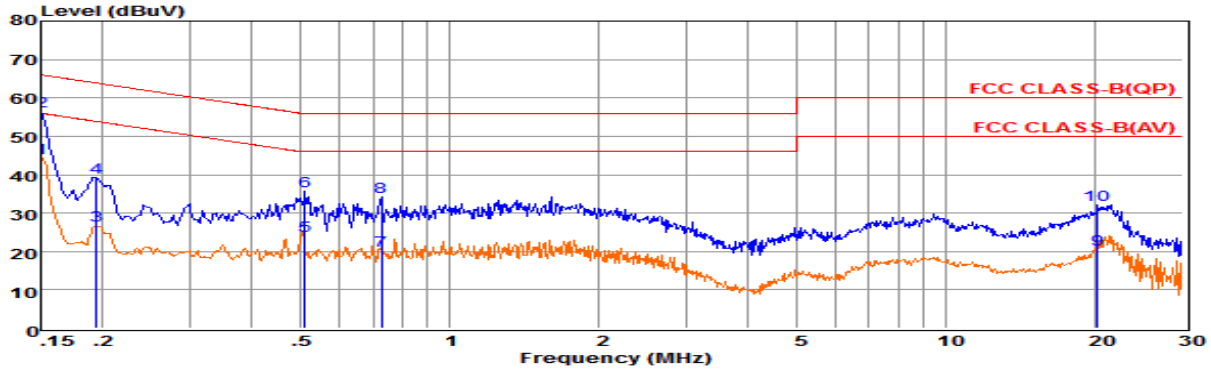


5.6.3 Test Results

PASS.

The test data please refer to following page.

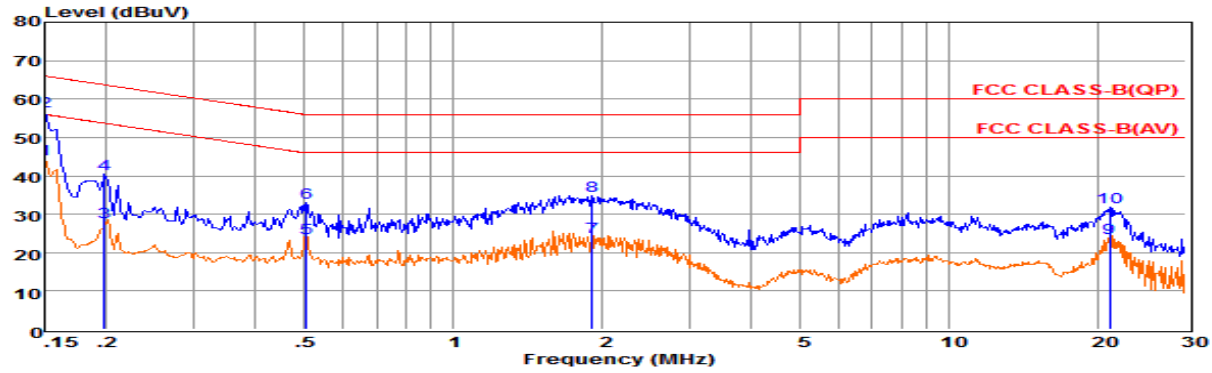
AC Conducted Emission of power by adapter @ AC 120V/60Hz @ IEEE 802.11a (worst case)



Env. Ins: 24*/56%
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	24.48	9.70	0.02	10.00	44.20	56.00	-11.80	Average
2	0.15	36.76	9.70	0.02	10.00	56.48	66.00	-9.52	QP
3	0.19	7.06	9.60	0.02	10.00	26.68	53.84	-27.16	Average
4	0.19	19.78	9.60	0.02	10.00	39.40	63.84	-24.44	QP
5	0.51	4.39	9.62	0.04	10.00	24.05	46.00	-21.95	Average
6	0.51	15.99	9.62	0.04	10.00	35.65	56.00	-20.35	QP
7	0.73	0.55	9.63	0.04	10.00	20.22	46.00	-25.78	Average
8	0.73	14.41	9.63	0.04	10.00	34.08	56.00	-21.92	QP
9	20.16	0.54	9.88	0.12	10.00	20.54	50.00	-29.46	Average
10	20.16	12.11	9.88	0.12	10.00	32.11	60.00	-27.89	QP

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

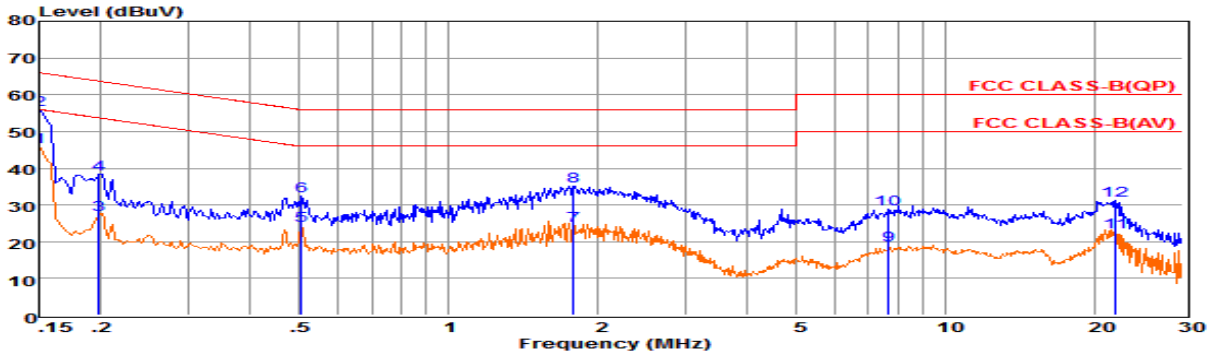


Env. Ins: 24*/56%
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	24.72	9.57	0.02	10.00	44.31	56.00	-11.69	Average
2	0.15	37.10	9.57	0.02	10.00	56.69	66.00	-9.31	QP
3	0.20	8.27	9.63	0.02	10.00	27.92	53.71	-25.79	Average
4	0.20	20.67	9.63	0.02	10.00	40.32	63.71	-23.39	QP
5	0.50	4.24	9.62	0.04	10.00	23.90	46.00	-22.10	Average
6	0.50	13.28	9.62	0.04	10.00	32.94	56.00	-23.06	QP
7	1.91	4.46	9.64	0.05	10.00	24.15	46.00	-21.85	Average
8	1.91	15.25	9.64	0.05	10.00	34.94	56.00	-21.06	QP
9	21.04	4.04	9.73	0.12	10.00	23.89	50.00	-26.11	Average
10	21.04	11.87	9.73	0.12	10.00	31.72	60.00	-28.28	QP

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

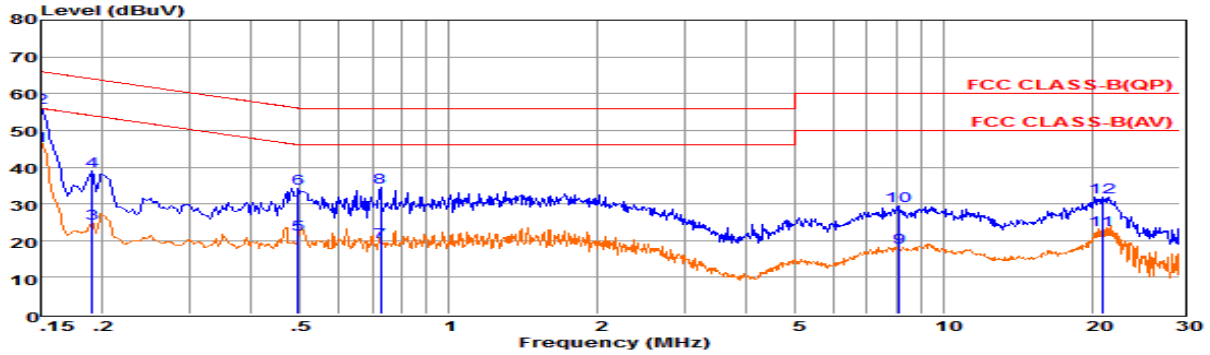
AC Conducted Emission of power by adapter @ AC 240V/50Hz @ IEEE 802.11a (worst case)



Env. Ins: 24*/56%
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	26.34	9.57	0.02	10.00	45.93	56.00	-10.07	Average
2	0.15	36.43	9.57	0.02	10.00	56.02	66.00	-9.98	QP
3	0.20	7.60	9.63	0.02	10.00	27.25	53.71	-26.46	Average
4	0.20	18.71	9.63	0.02	10.00	38.36	63.71	-25.35	QP
5	0.50	4.83	9.62	0.04	10.00	24.49	46.00	-21.51	Average
6	0.50	12.77	9.62	0.04	10.00	32.43	56.00	-23.57	QP
7	1.78	4.66	9.64	0.05	10.00	24.35	46.00	-21.65	Average
8	1.78	15.34	9.64	0.05	10.00	35.03	56.00	-20.97	QP
9	7.69	-0.86	9.68	0.07	10.00	18.89	50.00	-31.11	Average
10	7.69	9.14	9.68	0.07	10.00	28.89	60.00	-31.11	QP
11	21.95	2.84	9.71	0.12	10.00	22.67	50.00	-27.33	Average
12	21.95	11.39	9.71	0.12	10.00	31.22	60.00	-28.78	QP

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



Env. Ins: 24*/56%
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	26.03	9.70	0.02	10.00	45.75	56.00	-10.25	Average
2	0.15	36.62	9.70	0.02	10.00	56.34	66.00	-9.66	QP
3	0.19	5.04	9.61	0.02	10.00	24.67	54.02	-29.35	Average
4	0.19	19.43	9.61	0.02	10.00	39.06	64.02	-24.96	QP
5	0.50	2.11	9.62	0.04	10.00	21.77	46.05	-24.28	Average
6	0.50	14.66	9.62	0.04	10.00	34.32	56.05	-21.73	QP
7	0.73	-0.14	9.63	0.04	10.00	19.53	46.00	-26.47	Average
8	0.73	14.80	9.63	0.04	10.00	34.47	56.00	-21.53	QP
9	8.15	-1.49	9.70	0.07	10.00	18.28	50.00	-31.72	Average
10	8.15	9.77	9.70	0.07	10.00	29.54	60.00	-30.46	QP
11	20.92	2.92	9.85	0.12	10.00	22.89	50.00	-27.11	Average
12	20.92	11.83	9.85	0.12	10.00	31.80	60.00	-28.20	QP

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).*

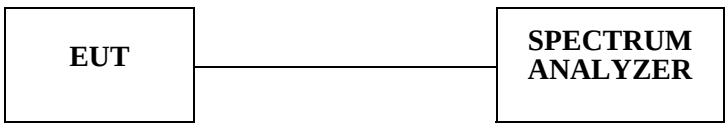
5.7. Undesirable Emissions Measurement

5.7.1 Test Requirements

According toξ15.407 (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:

(1) 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.
(2) 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.
(3) 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.
(4) 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.
(5) 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.
(6) 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.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) 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) (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."

(i) 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.

(ii) 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.

d) 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] - 95.2

5.7.4. Test Results

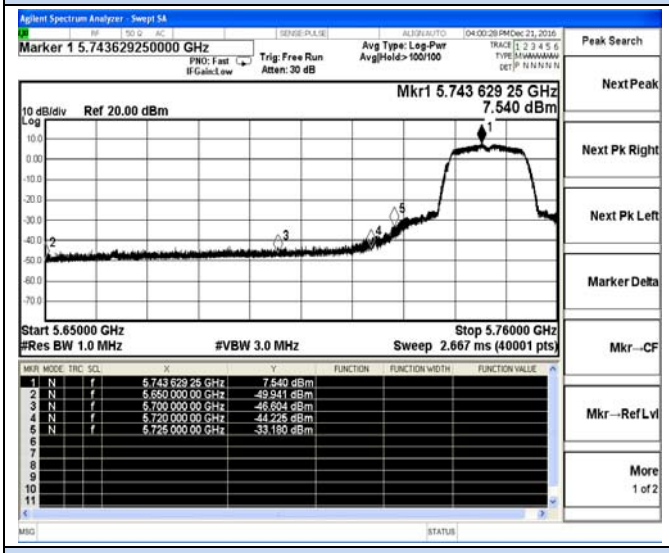
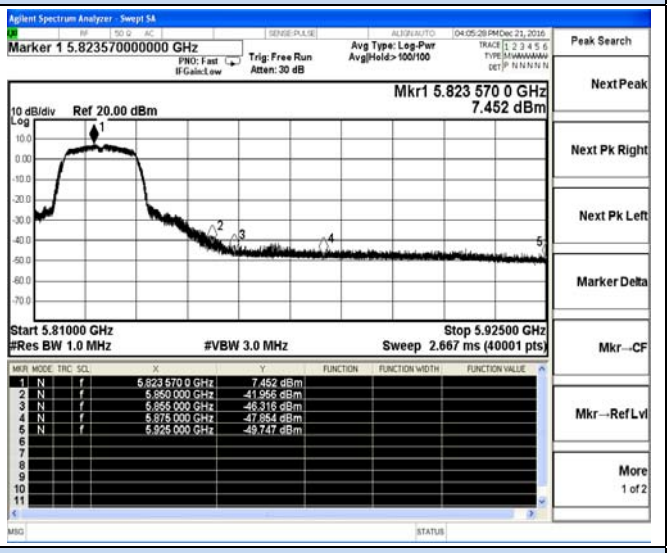
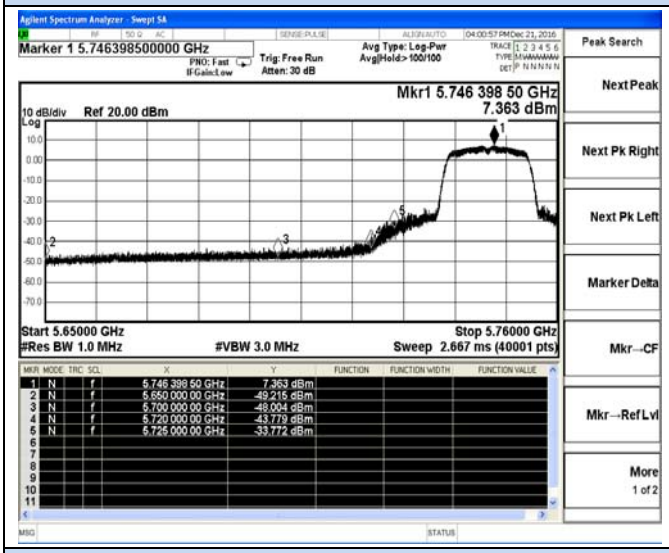
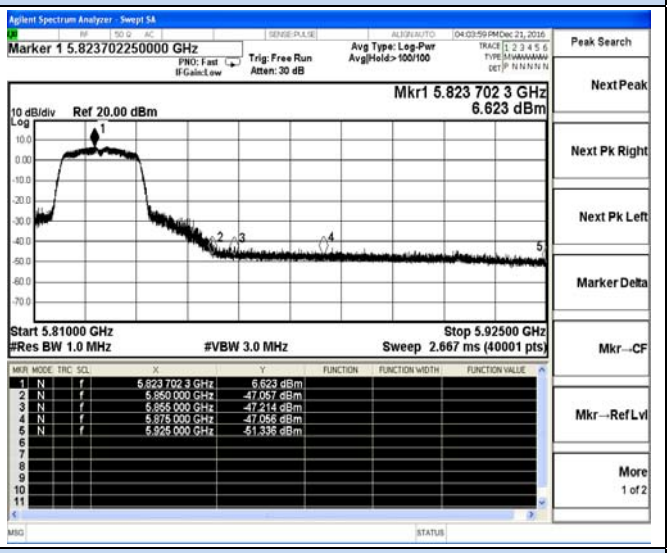
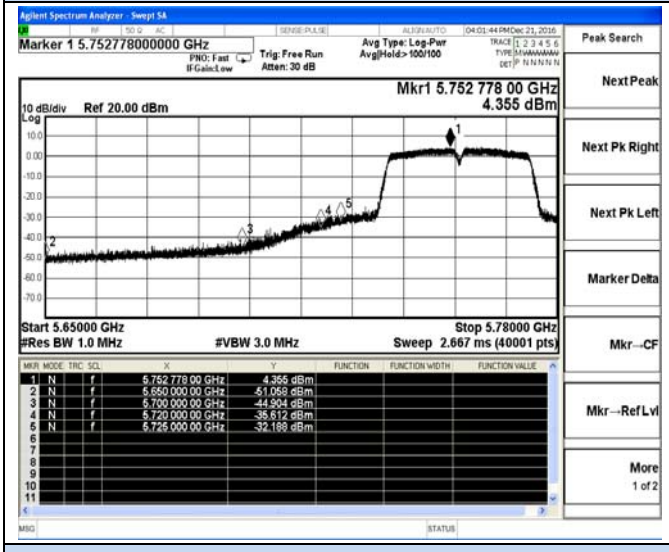
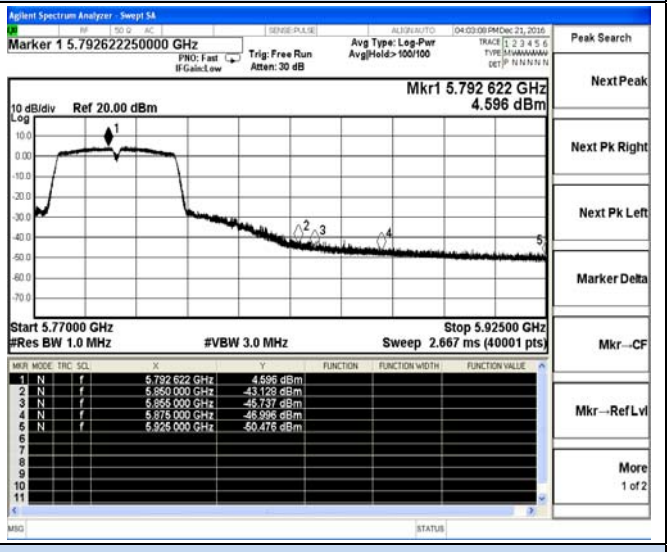
IEEE 802.11a						
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Verdict
5650.000	-49.941	2.00	-47.941	Peak	-27.000	PASS
5700.000	-46.604	2.00	-44.604	Peak	-37.000	PASS
5720.000	-44.225	2.00	-42.225	Peak	15.600	PASS
5725.000	-33.180	2.00	-31.180	Peak	27.000	PASS
5850.000	-41.956	2.00	-39.956	Peak	27.000	PASS
5855.000	-46.316	2.00	-44.316	Peak	15.600	PASS
5875.000	-47.854	2.00	-45.854	Peak	-37.000	PASS
5925.000	-49.747	2.00	-47.747	Peak	-27.000	PASS

IEEE 802.11n HT20						
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Verdict
5650.000	-49.125	2.00	-47.125	Peak	-27.000	PASS
5700.000	-48.004	2.00	-46.004	Peak	-37.000	PASS
5720.000	-43.779	2.00	-41.779	Peak	15.600	PASS
5725.000	-33.772	2.00	-31.772	Peak	27.000	PASS
5850.000	-47.057	2.00	-45.057	Peak	27.000	PASS
5855.000	-47.214	2.00	-45.214	Peak	15.600	PASS
5875.000	-47.056	2.00	-45.056	Peak	-37.000	PASS
5925.000	-51.336	2.00	-49.336	Peak	-27.000	PASS

IEEE 802.11n HT40						
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm/1MHz)	Detector	Limit (dBm/1MHz)	Verdict
5650.000	-51.058	2.00	-49.058	Peak	-27.000	PASS
5700.000	-44.904	2.00	-42.904	Peak	-37.000	PASS
5720.000	-35.612	2.00	-33.612	Peak	15.600	PASS
5725.000	-32.188	2.00	-30.188	Peak	27.000	PASS
5850.000	-43.128	2.00	-41.128	Peak	27.000	PASS
5855.000	-45.737	2.00	-43.737	Peak	15.600	PASS
5875.000	-46.996	2.00	-44.996	Peak	-37.000	PASS
5925.000	-50.476	2.00	-48.476	Peak	-27.000	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 1Mbps at IEEE 802.11a; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40, please refer to following plots;*
4. *The average measurement was not performed when the peak measured data under the limit of average detection.*

Undesirable Emissions	
IEEE 802.11a	IEEE 802.11a
	
Channel 149 / 5745 MHz – Peak	Channel 165 / 5825 MHz – Peak
IEEE 802.11n HT20	IEEE 802.11n HT20
	
Channel 149 / 5745 MHz – Peak	Channel 165 / 5825 MHz – Peak
IEEE 802.11n HT40	IEEE 802.11n HT40
	
Channel 151 / 5755 MHz – Peak	Channel 159 / 5795 MHz – Peak

5.7. Antenna Requirements

5.8.1 Standard Applicable

According to antenna requirement of §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 shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 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 2.0dBi, and the antenna is an FPC antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

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 UNI 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	IC
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 5745 MHz	Middle Channel 5785 MHz	Highest Channel 5825 MHz
Conducted power [dBm] Measured with OFDM modulation		7.569	7.603	7.471
Radiated power [dBm] Measured with OFDM modulation		8.482	8.596	8.328
Gain [dBi] Calculated		0.913	0.993	0.857
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	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	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-18GHz 3m	June 18, 2016	June 17, 2017
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	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 Antenna	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 Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2016	June 17, 2017
RF Cable-HIGH	SUHNER	SUCOFLEX 106	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 Sourer	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidity	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	6.110830	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.

----------THE END OF REPORT----------