FCC TEST REPORT

For

Shenzhen Sunvell electronics Co ., Ltd

Smart TV Box

Model No.: T95U pro

Additional Model No. : Please refer to page 6

Prepared for	:	Shenzhen Sunvell electronics Co ., Ltd
Address	:	Floor 5th, Building F, Hongzhuyongqi Technology Park, Lezhujiao Village, Xixiang Town, Bao' an District, Shenzhen City, Guangdong Province, China
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Date of receipt of test sample	:	October 27, 2016
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	October 27, 2016~November 16, 2016
Date of Report	:	November 16, 2016

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FCC TEST REPORT
FCC CFR 47 PART 15 C(15.247): 2015

Report Reference No.	**:**	**LCS1610272027E**
Date of Issue	:	November 16, 2016
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	**Shenzhen Sunvell electronics Co ., Ltd**
Address	:	Floor 5th, Building F, Hongzhuyongqi Technology Park, Lezhujiao Village, Xixiang Town, Bao' an District, Shenzhen City, Guangdong Province, China
Test Specification		
Standard	:	FCC CFR 47 PART 15 C(15.247): 2015
Test Report Form No.	**:**	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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EUT Description.	**:**	**Smart TV Box**
Trade Mark.....	:	DragonTouch, KINGSLI, AKASO, Sunvell, wechip
Model/ Type reference	:	T95U pro
Ratings.....	:	DC 5.0V, 2.0A
Result	:	**Positive**

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

FCC -- TEST REPORT

Test Report No. : LCS1610272027E	November 16, 2016 Date of issue

EUT.....	: Smart TV Box
Type / Model.....	: T95U pro
Applicant.....	**: Shenzhen Sunvell electronics Co ., Ltd**
Address.....	: Floor 5th, Building F, Hongzhuyongqi Technology Park, Lezhujiao Village, Xixiang Town, Bao' an District, Shenzhen City, Guangdong Province, China
Telephone.....	: 0755-83542061
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Manufacturer.....	**: Shenzhen Sunvell electronics Co ., Ltd**
Address.....	: Floor 5th, Building F, Hongzhuyongqi Technology Park, Lezhujiao Village, Xixiang Town, Bao' an District, Shenzhen City, Guangdong Province, China
Telephone.....	: 0755-83542061
Fax.....	: 0755-83542061
Factory.....	**: Shenzhen Sunvell electronics Co ., Ltd**
Address.....	: Floor 5th, Building F, Hongzhuyongqi Technology Park, Lezhujiao Village, Xixiang Town, Bao' an District, Shenzhen City, Guangdong Province, China
Telephone.....	: 0755-83542061
Fax.....	: 0755-83542061

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	2016-11-16	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Smart TV Box
Model Number	:	T95U pro, T95K pro, T95W pro, T95F pro, T95 Gpro, T95R pro, X9 pro, T95U, T95U Plus, Air TV T700, T95K, T95K Plus, T95F, T95F Plus, T95W, T95W PLUS, R-BOX, R-BOX PLUS, R-BOX PRO, Q-BOX Plus, Q-BOX Pro, MX95 Plus
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Test Model	:	T95U pro
Power Supply	:	DC 5.0V, 2.0A
Frequency Range	:	2412.00~2462.00MHz;
Channel Number	:	11 Channels for WIFI 20MHz Bandwidth(IEEE 802.11b/g/n-HT20) 7 Channels for WIFI 40MHz Bandwidth(IEEE 802.11n-HT20)
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)
Data Rates	:	IEEE 802.11b: 1-11Mbps IEEE 802.11g: 6-54Mbps IEEE 802.11n: MCS0-MCS7
Antenna Type And Gain	:	FPC antenna, 2.0dBi

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
Sony	TV	--	--	DoC

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
DC	1	N/A
AV	1	N/A
USB	1	N/A
RJ45	1	N/A
HDMI	1	1.0m, Shielded
Optical	1	N/A
TF Card	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 worse case was found when EUT in X position.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be 802.11b mode(High Channel).

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 802.11b mode(High Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case datarates used during the testing are as follows:
802.11b Mode: 1 Mbps, DSSS.
802.11g Mode: 6 Mbps, OFDM.
802.11n Mode HT20: MCS0, OFDM.
802.11n Mode HT40: MCS15, OFDM.

Channel List & Frequency

802.11b/g/n(HT20)

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

802.11n(HT40)

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

2. TEST METHODOLOGY

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

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

2.1. EUT Configuration

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

2.2. EUT Exercise

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

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas. Guidance v03r05 and KDB 6622911 are required to be used for this kind of FCC 15.247 digital modulation device.

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

2.3. General Test Procedures

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmit 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 C		
FCC Rules	Description of Test	Result
§15.247(b)	Maximum Conducted Output Power	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(a)	Occupied Bandwidth	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.207(a)	Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant
§15.247(i)§2.1093	RF Exposure	Compliant

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5. TEST RESULT

5.1. On Time and Duty Cycle

5.1.1. Standard Applicable

None; for reporting purpose only.

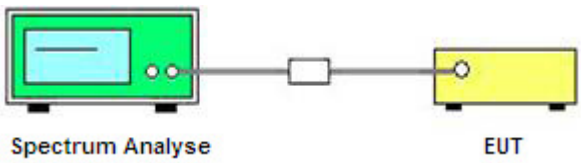
5.1.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyse.

5.1.3. Test Procedures

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

5.1.4. Test Setup Layout



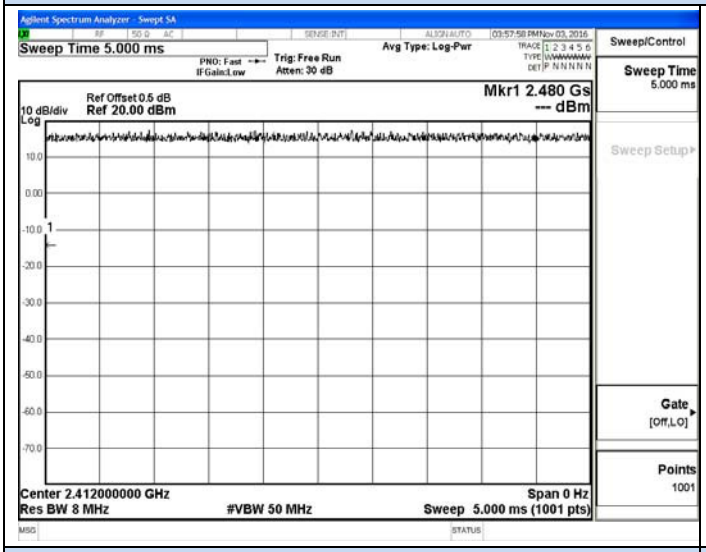
5.1.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

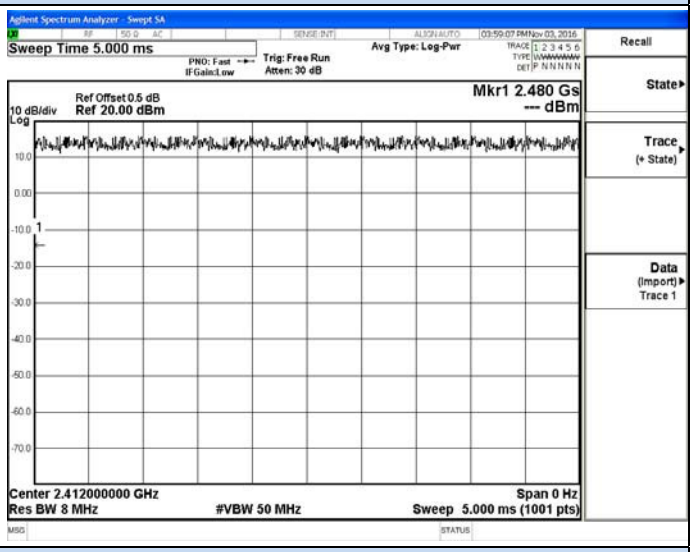
5.1.6. Test result

Mode	On Time B (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW(KHz)
IEEE 802.11b	5.0	5.0	1	100	0	0.01
IEEE 802.11g	5.0	5.0	1	100	0	0.01
IEEE 802.11n -HT20	5.0	5.0	1	100	0	0.01
IEEE 802.11n -HT40	5.0	5.0	1	100	0	0.01

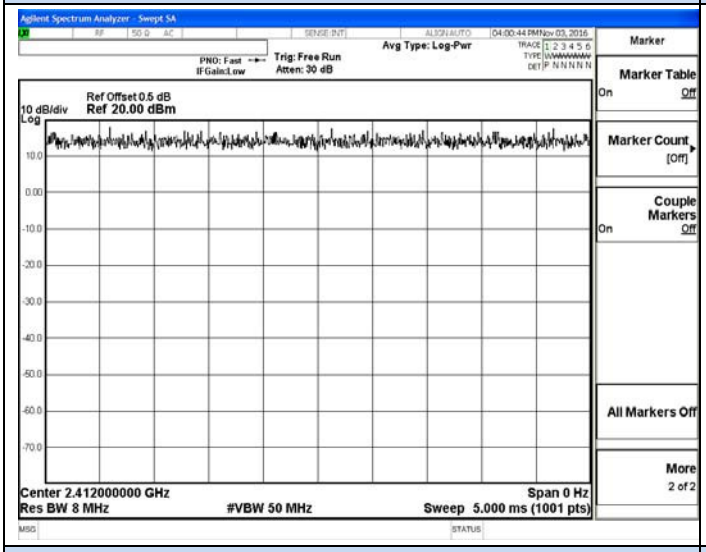
Test plot of On Time and Duty Cycle



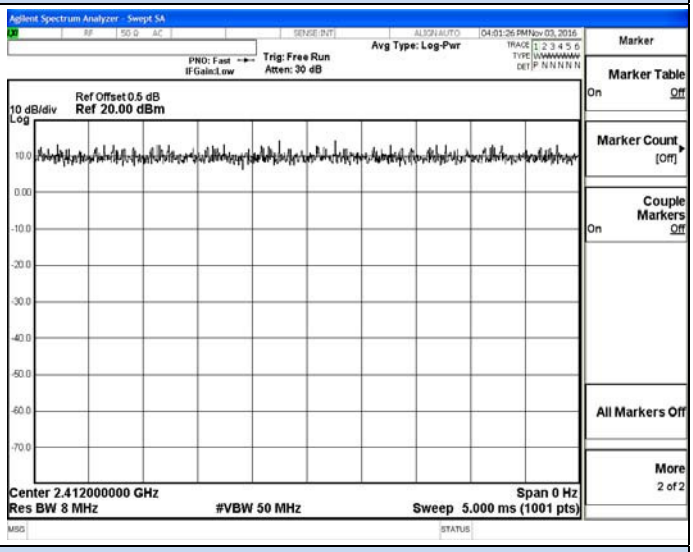
IEEE 802.11b



IEEE 802.11g



IEEE 802.11n-HT20



IEEE 802.11n-HT40

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

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

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

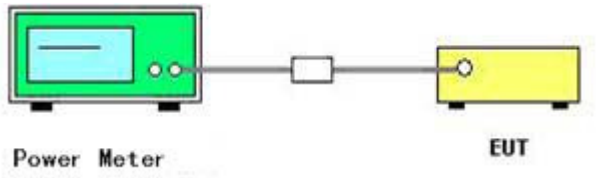
5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments 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℃	Humidty	60%
Test Engineer	Jacky	Configurations	IEEE 802.11b/g/n

Peak Power					
Mode	Channel	Frequency (MHz)	Conducted Power (Peak, dBm)	Max. Limit (dBm)	Result
IEEE 802.11b	1	2412	21.36	30	Complies
	6	2437	21.33	30	Complies
	11	2462	21.42	30	Complies
IEEE 802.11g	1	2412	23.23	30	Complies
	6	2437	23.44	30	Complies
	11	2462	23.13	30	Complies
IEEE 802.11n (HT20)	1	2412	23.99	30	Complies
	6	2437	23.45	30	Complies
	11	2462	22.54	30	Complies
IEEE 802.11n (HT40)	3	2422	23.18	30	Complies
	6	2437	23.95	30	Complies
	9	2452	23.38	30	Complies

Average Power(for report purpose only)			
Mode	Channel	Frequency (MHz)	Conducted Power (AV, dBm)
IEEE 802.11b	1	2412	15.27
	6	2437	15.21
	11	2462	15.36
IEEE 802.11g	1	2412	12.45
	6	2437	12.87
	11	2462	12.39
IEEE 802.11n(HT20)	1	2412	12.56
	6	2437	12.25
	11	2462	11.78
IEEE 802.11n(HT40)	1	2402	12.41
	19	2440	12.48
	40	2480	12.25

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

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

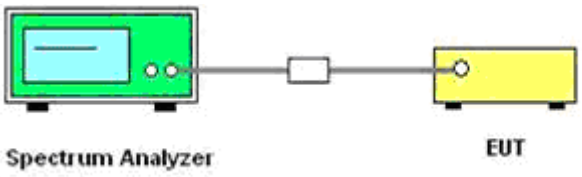
5.3.2. Measuring Instruments and Setting

Please refer to section 6 of equipments 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 = 3 kHz~100kHz.
4. Set the VBW ≥ 3*RBW
5. Set the span to 1.5 times the DTS channel bandwidth.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

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	Jakcy	Configurations	IEEE 802.11b/g/n

IEEE 802.11b				
Channel	Frequency (MHz)	Mearsured Power Density (dBm100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	6.979	8	Complies
6	2437	6.907	8	Complies
11	2462	5.719	8	Complies

IEEE 802.11g				
Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	2.252	8	Complies
6	2437	2.061	8	Complies
11	2462	2.139	8	Complies

IEEE 802.11n-HT20				
Channel	Frequency (MHz)	Mearsured Power Density (dBm/100KHz)	Max. Limit (dBm/3KHz)	Result
1	2412	1.561	8	Complies
6	2437	1.435	8	Complies
11	2462	1.826	8	Complies

IEEE 802.11n-HT40				
Channel	Frequency (MHz)	Mearsured Power Density (dBm/3KHz)	Max. Limit (dBm/3KHz)	Result
3	2422	-2.914	8	Complies
6	2437	-2.952	8	Complies
9	2452	-2.958	8	Complies

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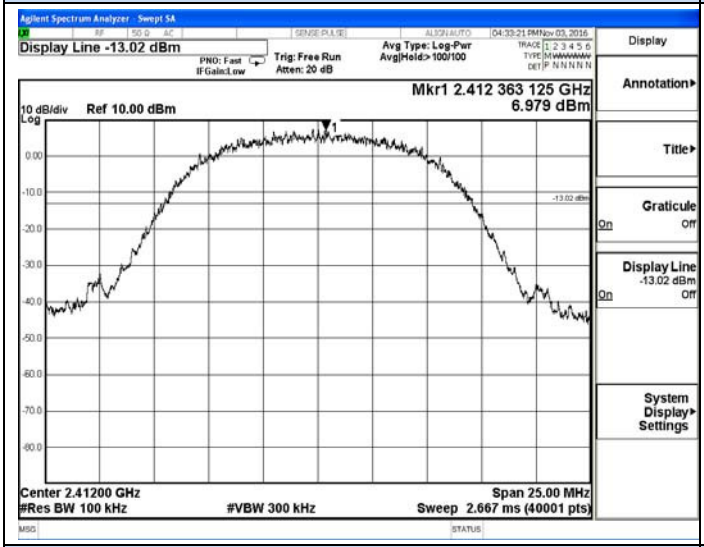
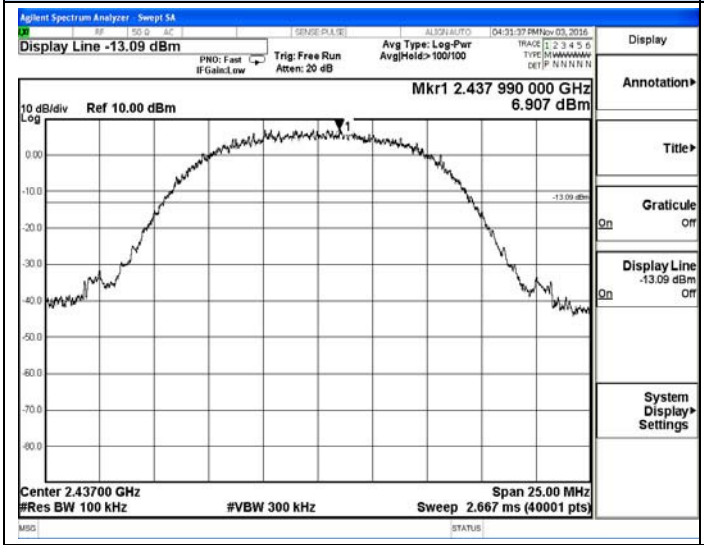
Test plot of Power Spectral Density

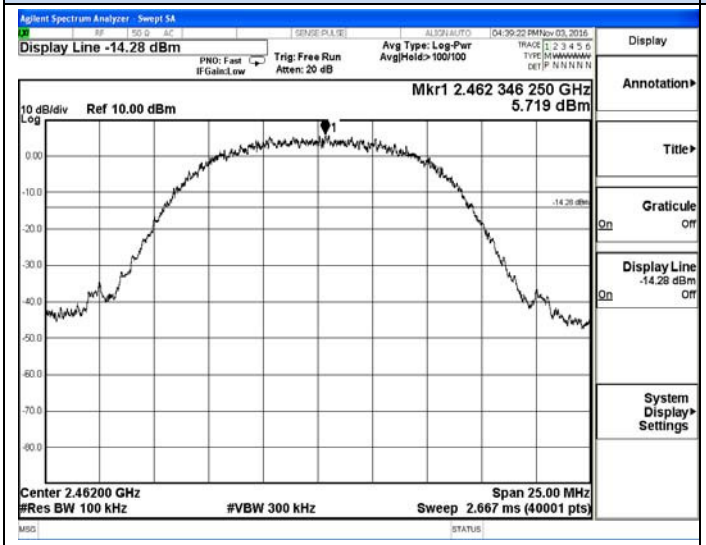
IEEE 802.11b



Low channel

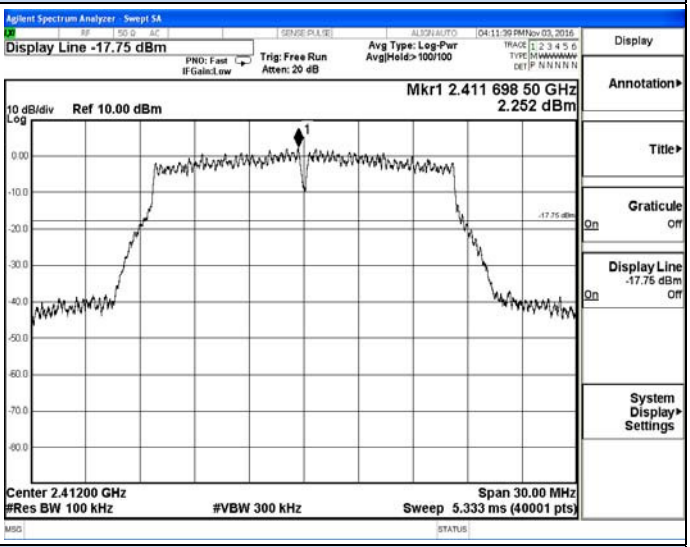


Middle channel

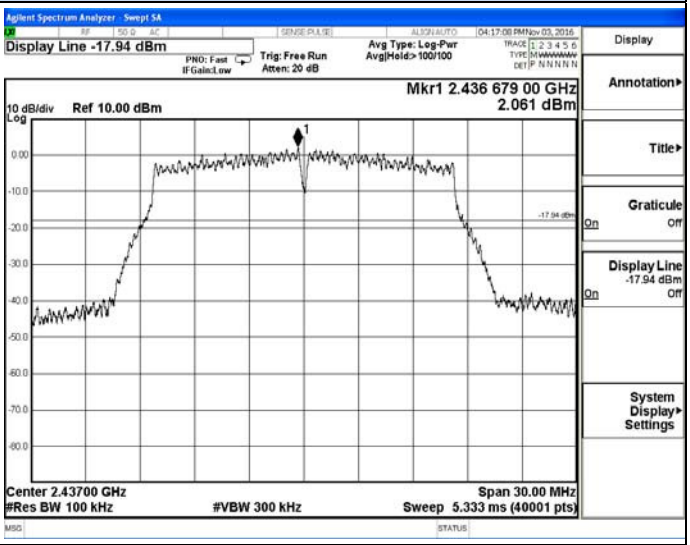


High channel

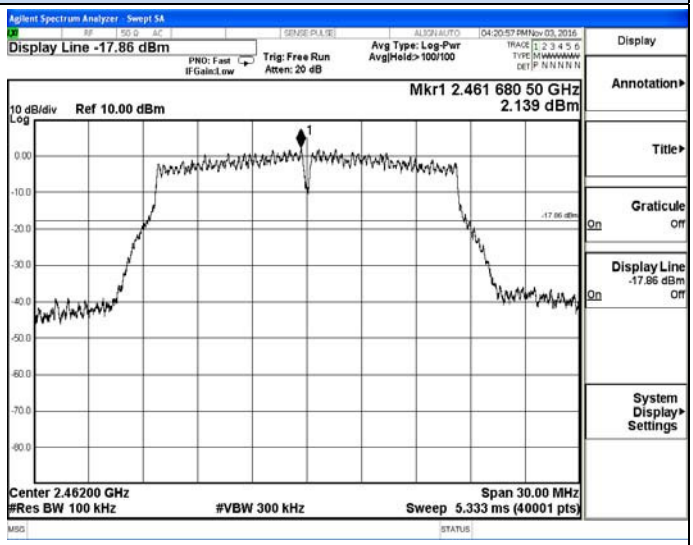
IEEE 802.11g



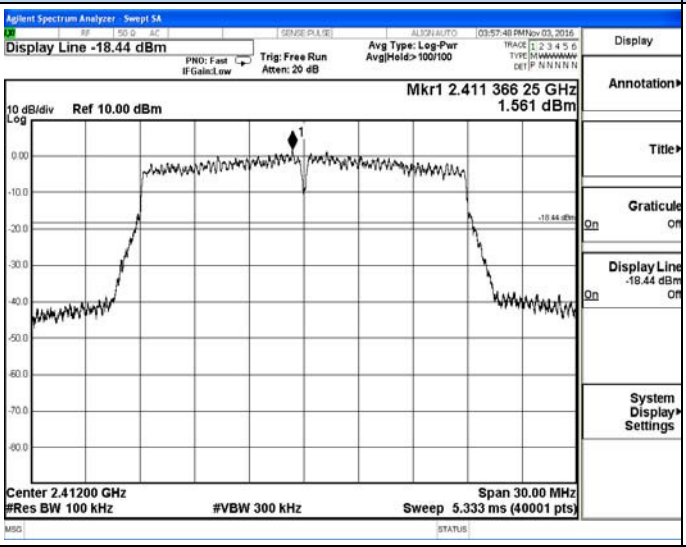
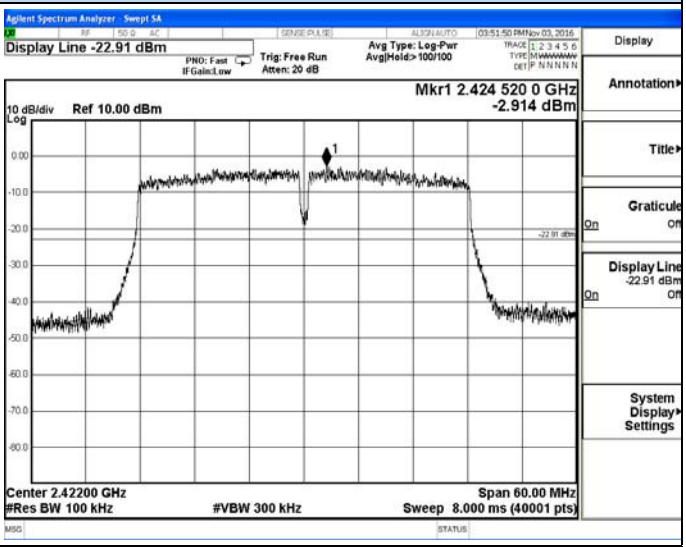
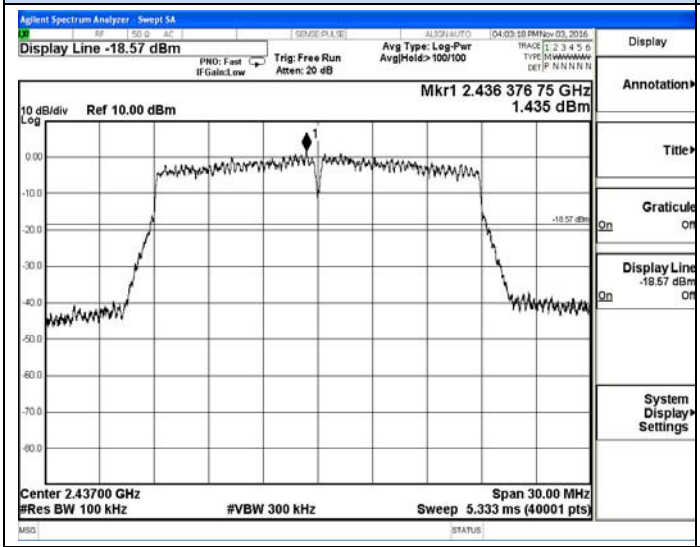
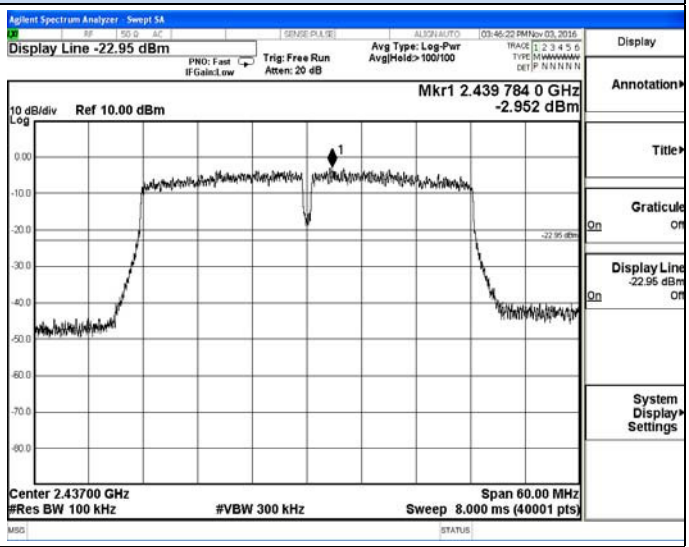
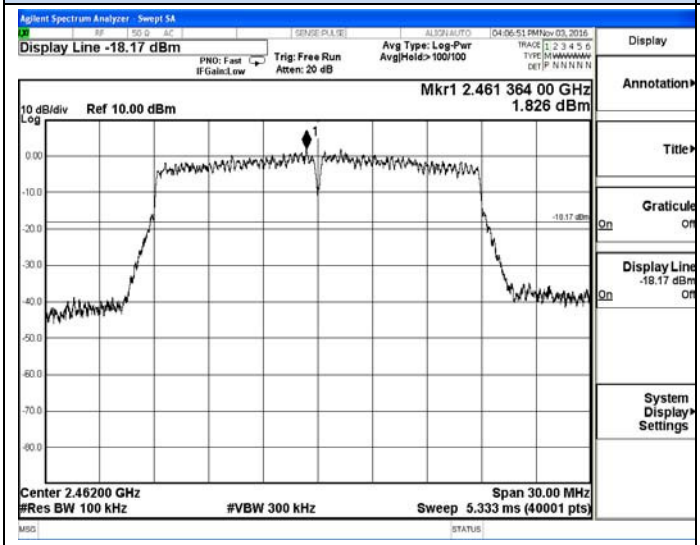
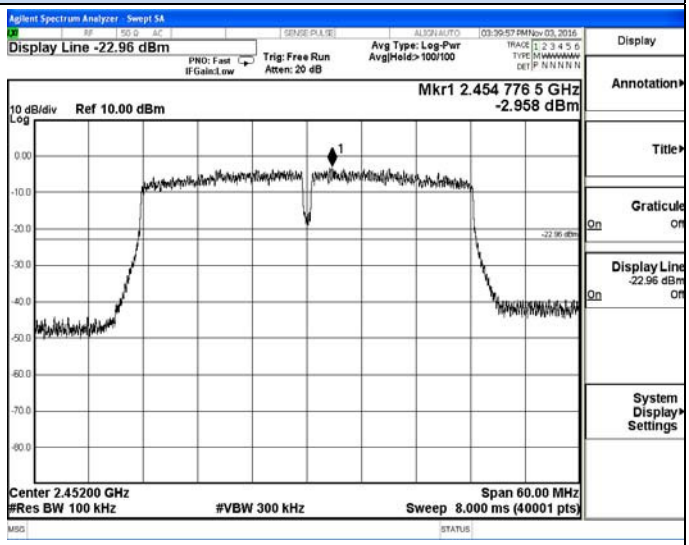
Low channel



Middle channel



High channel

IEEE 802.11n HT20	IEEE 802.11n HT40
	
Low channel	Low channel
	
Middle channel	Middle channel
	
High channel	High channel

5.4. 6 dB Spectrum Bandwidth Measurement

5.4.1. Standard Applicable

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

5.4.2. Measuring Instruments and Setting

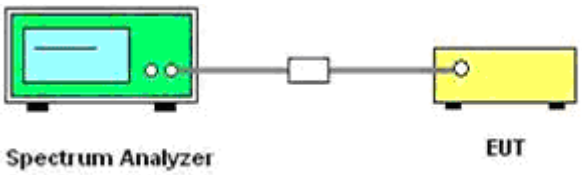
Please refer to section 6 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

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

5.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth and the video bandwidth were set according to KDB558074.
3. Measured the spectrum width with power higher than 6dB below carrier.

5.4.4. Test Setup Layout



5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Test Result of 6dB Spectrum Bandwidth

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

IEEE 802.11b				
Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	10.030	500	Complies
6	2437	9.021	500	Complies
11	2462	9.473	500	Complies

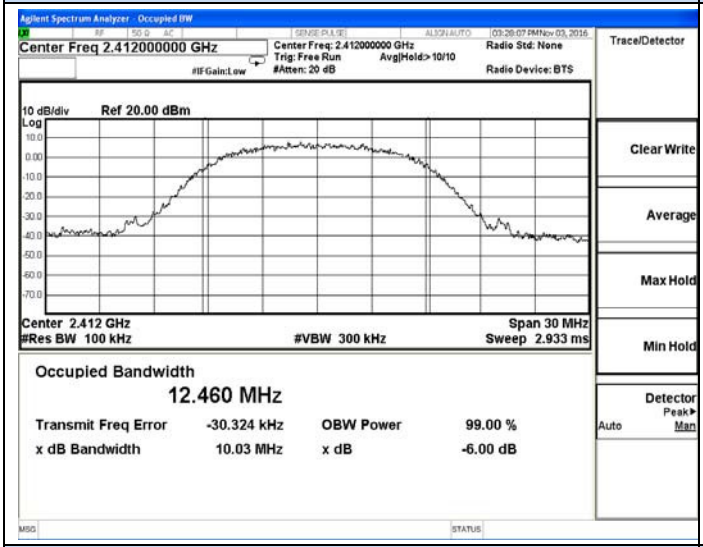
IEEE 802.11g				
Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	15.59	500	Complies
6	2437	15.43	500	Complies
11	2462	16.05	500	Complies

IEEE 802.11n HT20				
Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	17.61	500	Complies
6	2437	17.67	500	Complies
11	2462	17.64	500	Complies

IEEE 802.11n HT40				
Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
3	2422	36.37	500	Complies
6	2437	36.40	500	Complies
9	2452	36.39	500	Complies

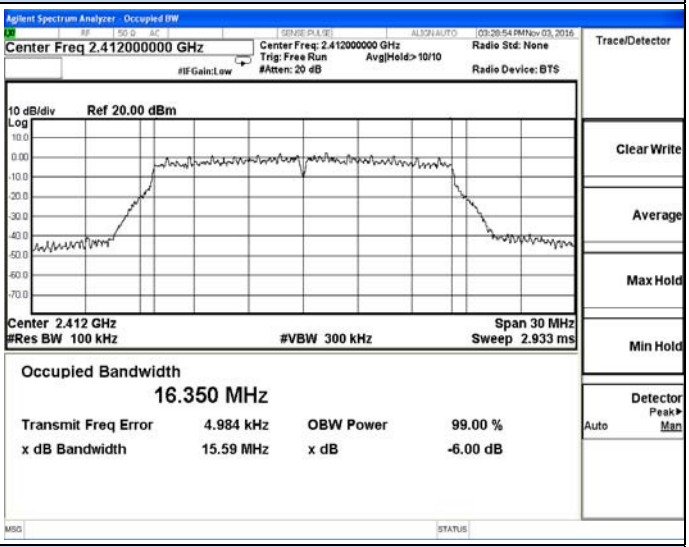
Test plot of 6 dB Bandwidth

IEEE 802.11b



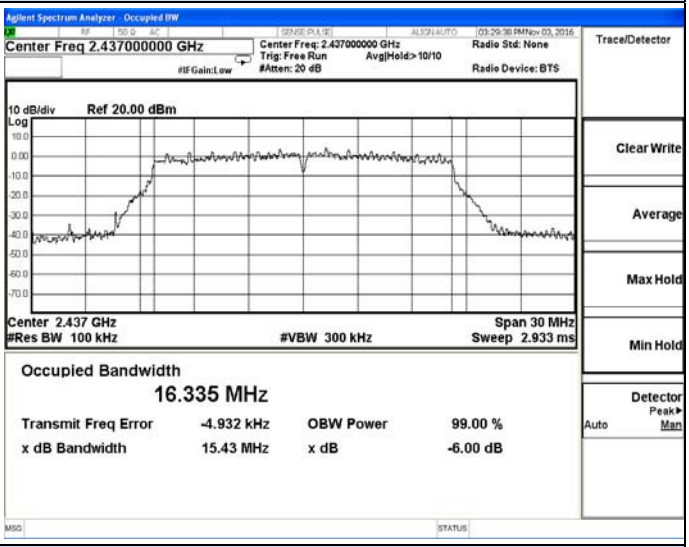
802.11b-Low channel

IEEE 802.11g

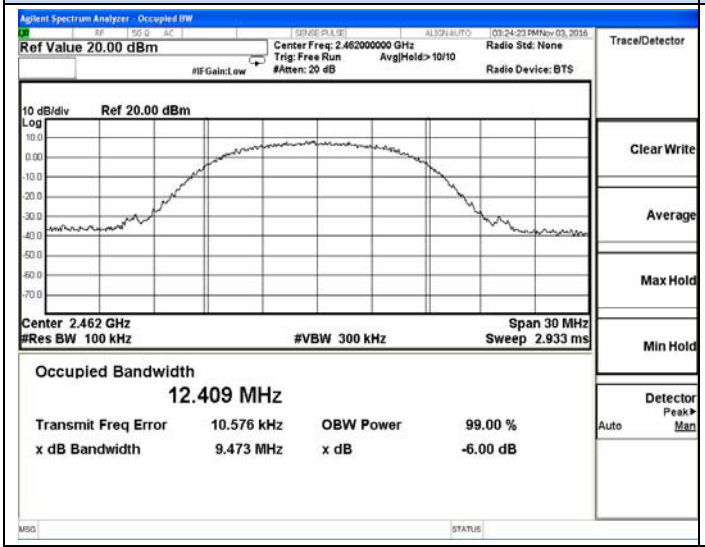


802.11g-Low channel

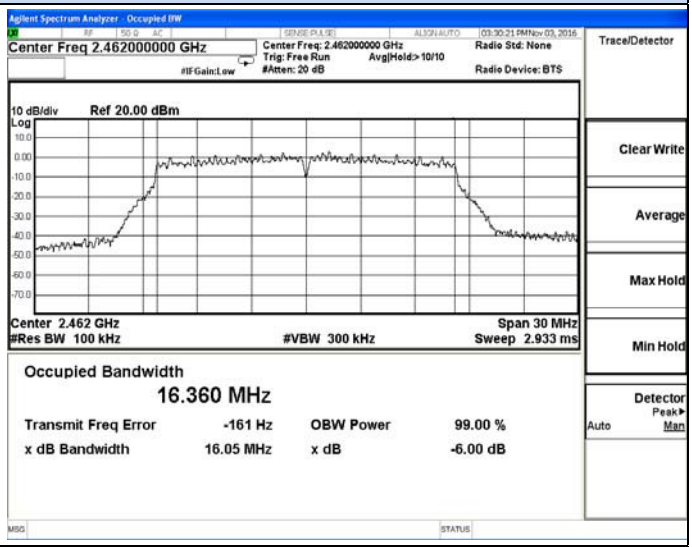
802.11b-Middle channel



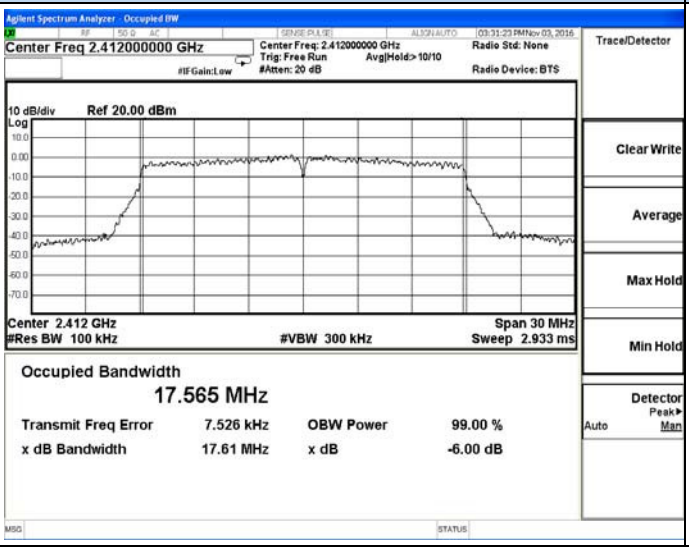
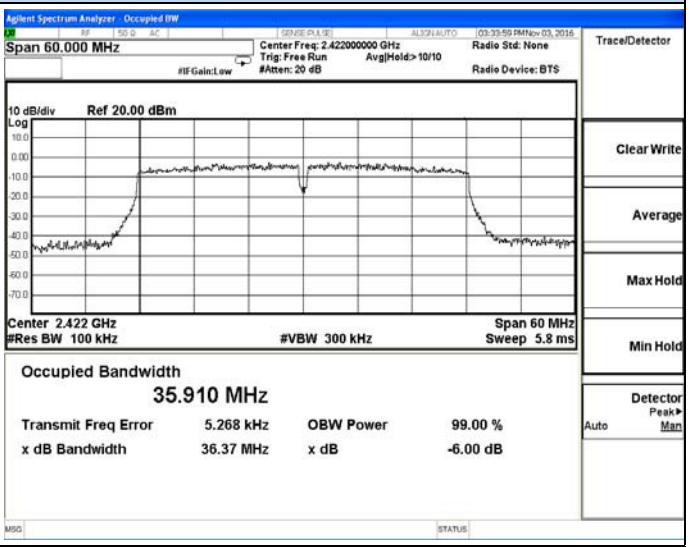
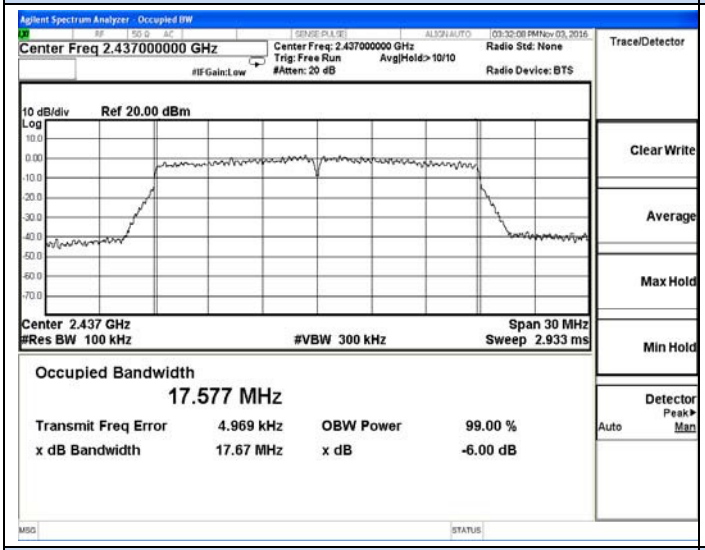
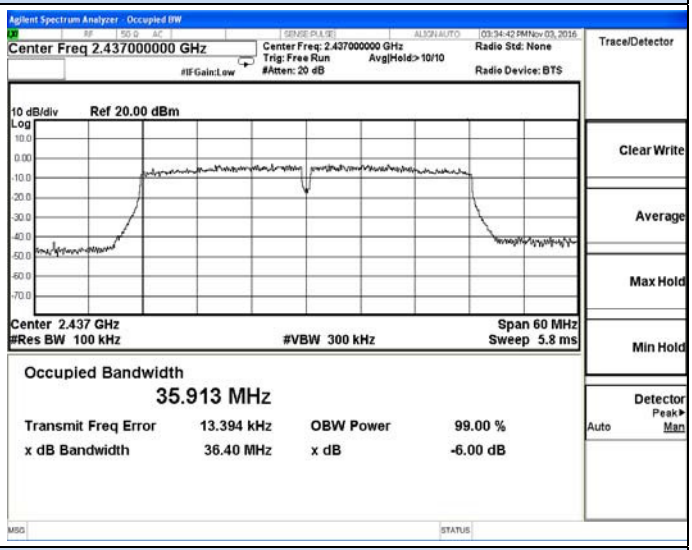
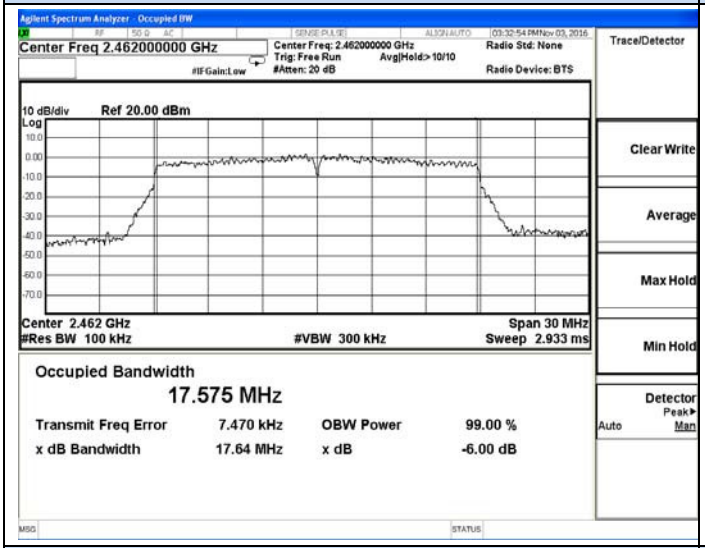
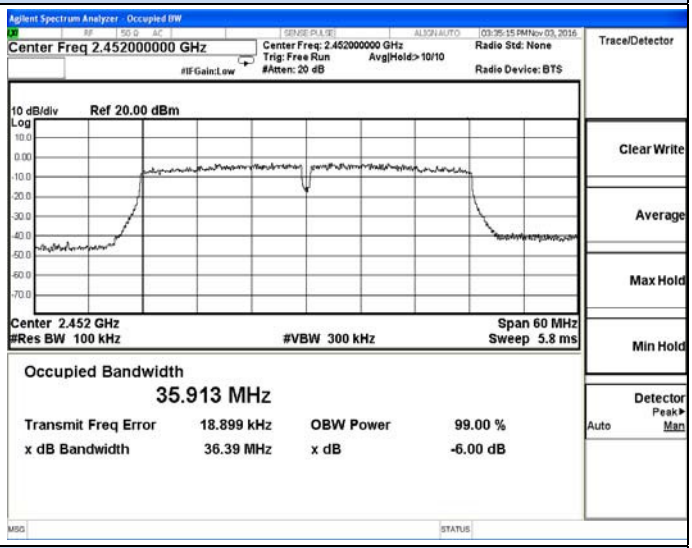
802.11g-Middle channel



802.11b-High channel



802.11g-High channel

IEEE 802.11n HT20	IEEE 802.11n HT40
	
Low channel	Low channel
	
Middle channel	Middle channel
	
High channel	High channel

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

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. 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 equipments 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 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.

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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.

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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.

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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.

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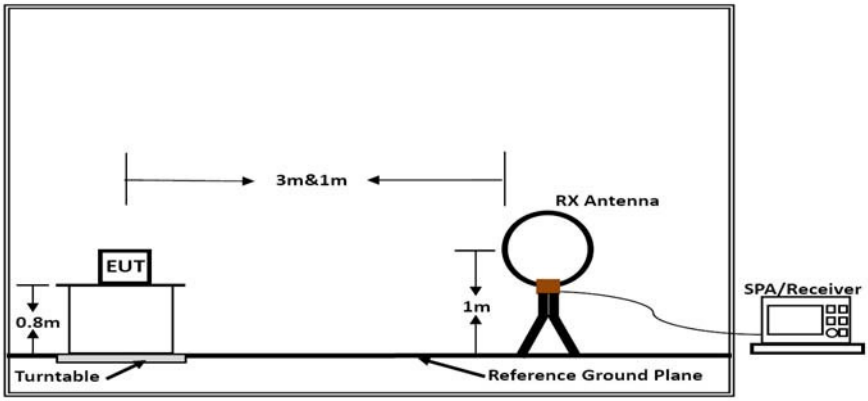
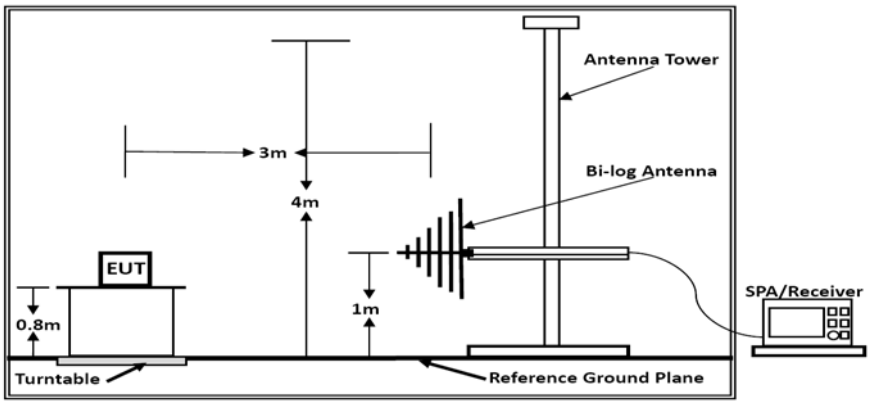
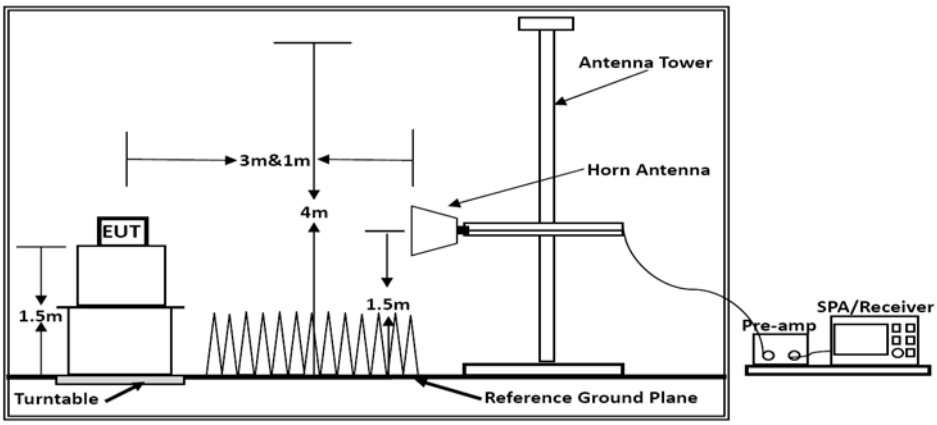
5.5.4. Test Setup Layout



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 1.5m.

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 (9kHz~30MHz)

Temperature	25℃	Humidty	60%
Test Engineer	Jacky	Configurations	IEEE 802.11b/g/n

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

Note:

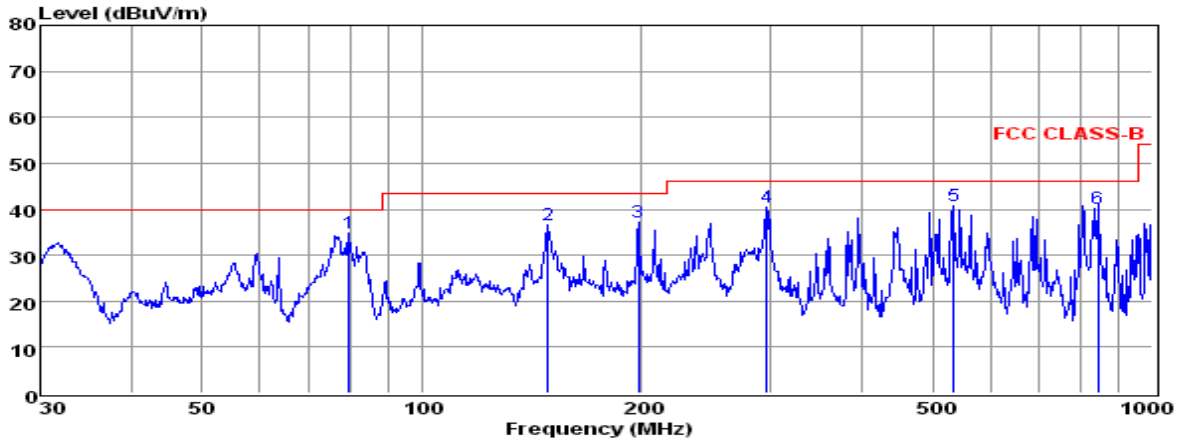
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

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

Temperature	25℃	Humidty	60%
Test Engineer	Jacky	Configurations	IEEE 802.11b (High CH)

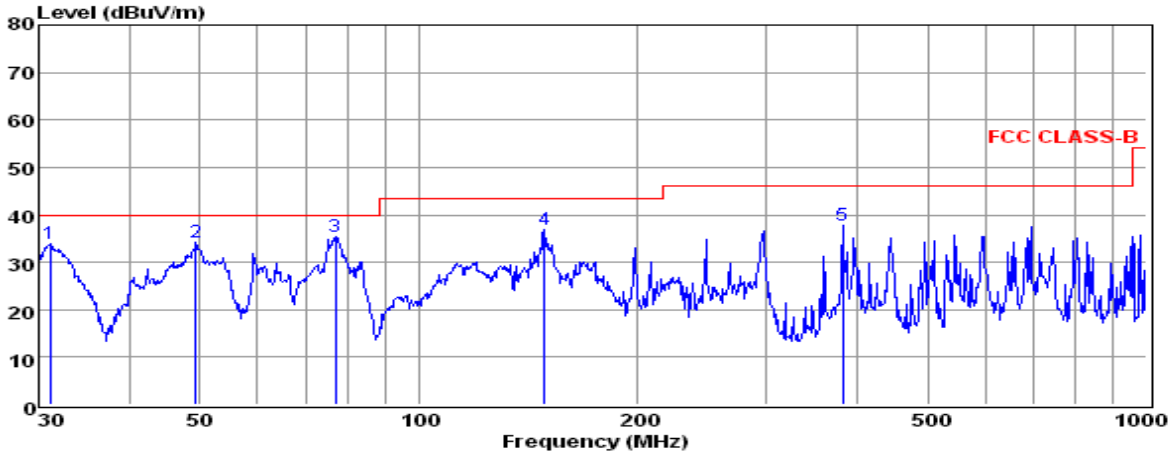
Test result for 802.11b (High Channel)



Env./Ins: 24℃/56%
pol: HORIZONTAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	79.52	25.71	0.65	8.47	34.83	40.00	-5.17	QP
2	148.96	27.41	0.86	8.25	36.52	43.50	-6.98	QP
3	197.89	25.84	0.84	10.57	37.25	43.50	-6.25	QP
4	296.18	26.43	1.12	12.99	40.54	46.00	-5.46	QP
5	535.71	22.10	1.46	17.25	40.81	46.00	-5.19	QP
6	842.13	17.88	1.88	20.49	40.25	46.00	-5.75	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	31.07	21.05	0.39	12.32	33.76	40.00	-6.24	QP
2	49.36	20.40	0.54	13.29	34.23	40.00	-5.77	QP
3	76.78	26.92	0.47	8.06	35.45	40.00	-4.55	QP
4	148.96	27.75	0.86	8.25	36.86	43.50	-6.64	QP
5	382.59	22.09	1.13	14.65	37.87	46.00	-8.13	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:

1). Pre-scan all mode and recorded the worst case results in this report (IEEE 802.11b(High Channel)).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
2). Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

IEEE 802.11b

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	61.60	33.06	35.04	3.94	63.56	74	-10.44	Peak	Horizontal
4824.00	47.49	33.06	35.04	3.94	49.45	54	-4.55	Average	Horizontal
4824.00	58.85	33.06	35.04	3.94	60.81	74	-13.19	Peak	Vertical
4824.00	44.41	33.06	35.04	3.94	46.37	54	-7.63	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	61.24	33.16	35.15	3.96	63.21	74	-10.79	Peak	Horizontal
4874.00	47.47	33.16	35.15	3.96	49.44	54	-4.56	Average	Horizontal
4874.00	58.04	33.16	35.15	3.96	60.01	74	-13.99	Peak	Vertical
4874.00	43.90	33.16	35.15	3.96	45.87	54	-8.13	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	61.22	33.26	35.14	3.98	63.32	74	-10.68	Peak	Horizontal
4924.00	47.68	33.26	35.14	3.98	49.78	54	-4.22	Average	Horizontal
4924.00	58.31	33.26	35.14	3.98	60.41	74	-13.59	Peak	Vertical
4924.00	43.95	33.26	35.14	3.98	46.05	54	-7.95	Average	Vertical

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IEEE 802.11g

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	59.40	33.06	35.04	3.94	61.36	74	-12.64	Peak	Horizontal
4824.00	45.45	33.06	35.04	3.94	47.41	54	-6.59	Average	Horizontal
4824.00	56.05	33.06	35.04	3.94	58.01	74	-15.99	Peak	Vertical
4824.00	43.89	33.06	35.04	3.94	45.85	54	-8.15	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	59.92	33.16	35.15	3.96	61.89	74	-12.11	Peak	Horizontal
4874.00	45.26	33.16	35.15	3.96	47.23	54	-6.77	Average	Horizontal
4874.00	56.18	33.16	35.15	3.96	58.15	74	-15.85	Peak	Vertical
4874.00	43.77	33.16	35.15	3.96	45.74	54	-8.26	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	59.32	33.26	35.14	3.98	61.42	74	-12.58	Peak	Horizontal
4924.00	45.53	33.26	35.14	3.98	47.63	54	-6.37	Average	Horizontal
4924.00	56.13	33.26	35.14	3.98	58.23	74	-15.77	Peak	Vertical
4924.00	43.48	33.26	35.14	3.98	45.58	54	-8.42	Average	Vertical

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IEEE 802.11n HT20

Channel 1

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4824.00	59.23	33.06	35.04	3.94	61.19	74	-12.81	Peak	Horizontal
4824.00	45.27	33.06	35.04	3.94	47.23	54	-6.77	Average	Horizontal
4824.00	56.82	33.06	35.04	3.94	58.78	74	-15.22	Peak	Vertical
4824.00	43.49	33.06	35.04	3.94	45.45	54	-8.55	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	59.07	33.16	35.15	3.96	61.04	74	-12.96	Peak	Horizontal
4874.00	45.59	33.16	35.15	3.96	47.56	54	-6.44	Average	Horizontal
4874.00	56.42	33.16	35.15	3.96	58.39	74	-15.61	Peak	Vertical
4874.00	43.29	33.16	35.15	3.96	45.26	54	-8.74	Average	Vertical

Channel 11

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4924.00	59.54	33.26	35.14	3.98	61.64	74	-12.36	Peak	Horizontal
4924.00	44.98	33.26	35.14	3.98	47.08	54	-6.92	Average	Horizontal
4924.00	56.05	33.26	35.14	3.98	58.15	74	-15.85	Peak	Vertical
4924.00	43.36	33.26	35.14	3.98	45.46	54	-8.54	Average	Vertical

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IEEE 802.11n HT40

Channel 3

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4844.00	58.91	33.06	35.04	3.94	60.87	74	-13.13	Peak	Horizontal
4844.00	44.40	33.06	35.04	3.94	46.36	54	-7.64	Average	Horizontal
4844.00	55.19	33.06	35.04	3.94	57.15	74	-16.85	Peak	Vertical
4844.00	41.08	33.06	35.04	3.94	43.04	54	-10.96	Average	Vertical

Channel 6

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4874.00	58.29	33.16	35.15	3.96	60.26	74	-13.74	Peak	Horizontal
4874.00	44.76	33.16	35.15	3.96	46.73	54	-7.27	Average	Horizontal
4874.00	55.44	33.16	35.15	3.96	57.41	74	-16.59	Peak	Vertical
4874.00	41.92	33.16	35.15	3.96	43.89	54	-10.11	Average	Vertical

Channel 9

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
4904.00	58.27	33.26	35.14	3.98	60.37	74	-13.63	Peak	Horizontal
4904.00	44.79	33.26	35.14	3.98	46.89	54	-7.11	Average	Horizontal
4904.00	55.52	33.26	35.14	3.98	57.62	74	-16.38	Peak	Vertical
4904.00	41.37	33.26	35.14	3.98	43.47	54	-10.53	Average	Vertical

Notes:

1). Measuring frequencies from 9k~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9k~10th harmonic or 26.5GHz (which is less) 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.

5.5.9. Results of Restricted Bands Test (Conducted)

IEEE 802.11b						
Freq. MHz	Reading Level dBm	Antenna Gain dBi	Measured E dBuV/m	Limit dBuV/m	Margin dB	Remark
2310.000	-51.254	2.0	46.046	74	-27.954	Peak
2310.000	-59.207	2.0	38.093	54	-15.907	Average
2390.000	-47.186	2.0	50.114	74	-23.886	Peak
2390.000	-55.264	2.0	42.036	54	-11.964	Average
2483.500	-47.612	2.0	49.688	74	-24.312	Peak
2483.500	-55.881	2.0	41.419	54	-12.581	Average
2500.000	-48.431	2.0	48.869	74	-25.131	Peak
2500.000	-56.080	2.0	41.220	54	-12.780	Average

IEEE 802.11g						
Freq. MHz	Reading Level dBm	Antenna Gain dBi	Measured E dBuV/m	Limit dBuV/m	Margin dB	Remark
2310.000	-50.296	2.0	47.004	74	-26.996	Peak
2310.000	-57.284	2.0	40.016	54	-13.984	Average
2390.000	-39.552	2.0	57.748	74	-16.252	Peak
2390.000	-47.262	2.0	50.038	54	-3.962	Average
2483.500	-35.583	2.0	61.717	74	-12.283	Peak
2483.500	-47.269	2.0	50.031	54	-3.969	Average
2500.000	-43.110	2.0	54.190	74	-19.810	Peak
2500.000	-53.854	2.0	43.446	54	-10.554	Average

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IEEE 802.11n(HT20)						
Freq. MHz	Reading Level dBm	Antenna Gain dBi	Measured E dBuV/m	Limit dBuV/m	Margin dB	Remark
2310.000	-50.661	2.0	46.639	74	-27.361	Peak
2310.000	-57.967	2.0	39.333	54	-14.667	Average
2390.000	-39.717	2.0	57.583	74	-16.417	Peak
2390.000	-47.848	2.0	49.452	54	-4.548	Average
2483.500	-34.347	2.0	62.953	74	-11.047	Peak
2483.500	-47.453	2.0	49.847	54	-4.153	Average
2500.000	-44.148	2.0	53.152	74	-20.848	Peak
2500.000	-54.657	2.0	42.643	54	-11.357	Average

IEEE 802.11n(HT40)						
Freq. MHz	Reading Level dBm	Antenna Gain dBi	Measured E dBuV/m	Limit dBuV/m	Margin dB	Remark
2310.000	-50.678	2.0	46.622	74	-27.378	Peak
2310.000	-58.983	2.0	38.317	54	-15.683	Average
2390.000	-37.698	2.0	59.602	74	-14.398	Peak
2390.000	-45.362	2.0	51.938	54	-2.062	Average
2483.500	-35.150	2.0	62.150	74	-11.850	Peak
2483.500	-44.689	2.0	52.611	54	-1.389	Average
2500.000	-38.760	2.0	58.540	74	-15.460	Peak
2500.000	-50.671	2.0	46.629	54	-7.371	Average

Note:

1). All modes have been tested and we only record the worst test result;
2). Measured E=Reading Level+Antenna Gain+104.8-9.54(20LogD), Where D is 3

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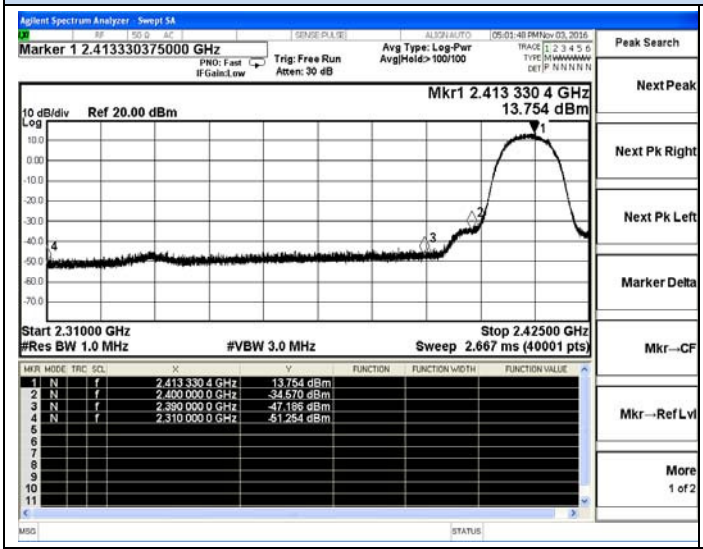
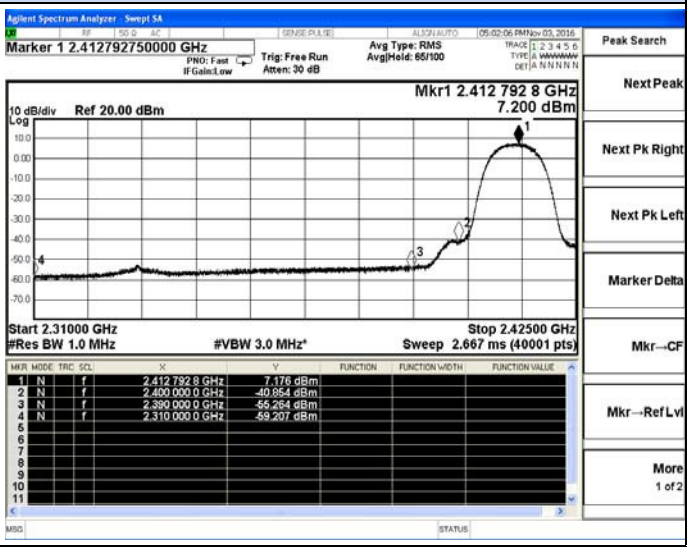
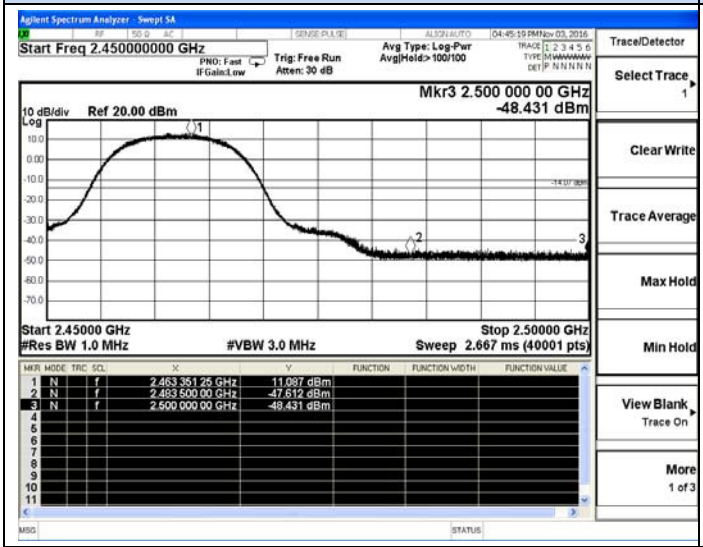
Test plot of Restricted Bands



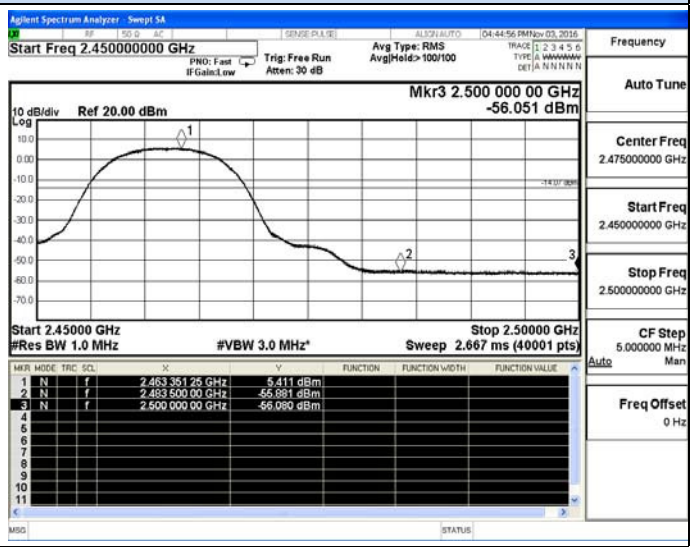
IEEE 802.11b-Low channel(Peak)



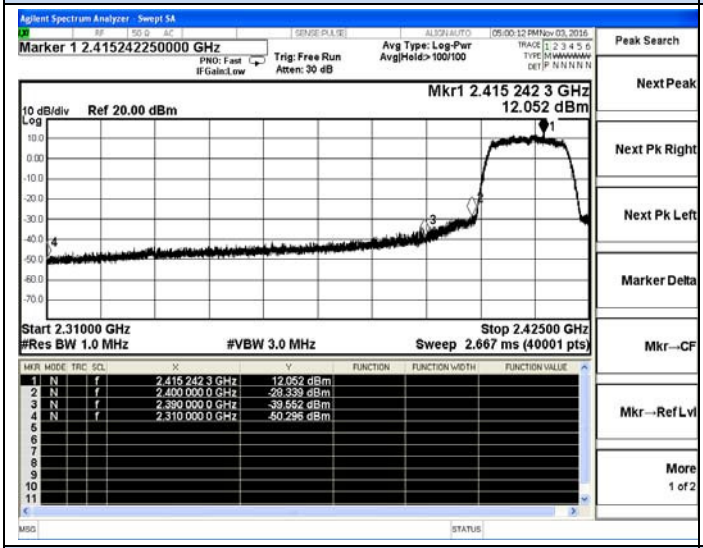
IEEE 802.11b-Low channel(Average)



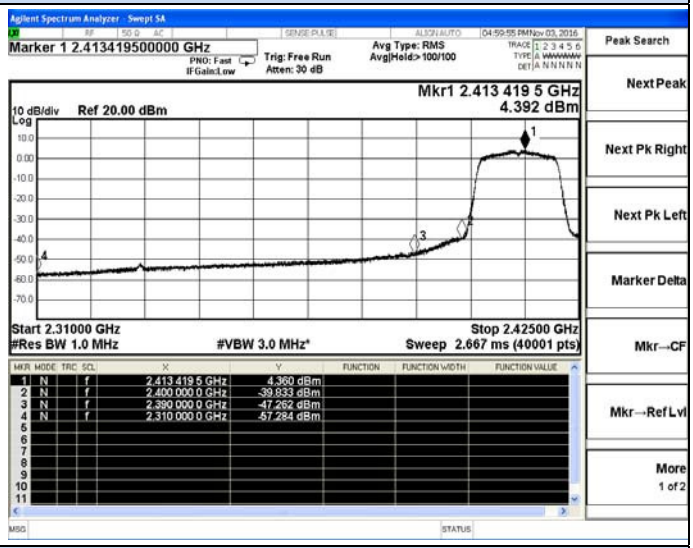
IEEE 802.11b-High channel(Peak)



IEEE 802.11b-High channel(Average)

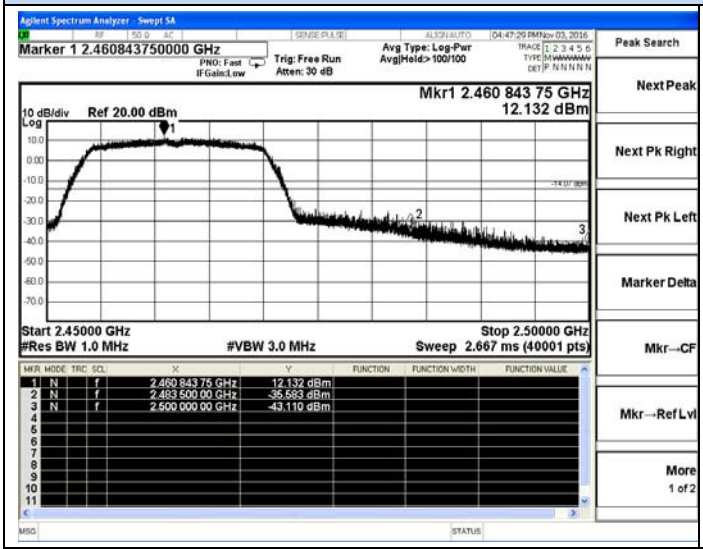


IEEE 802.11g-Low channel(Peak)

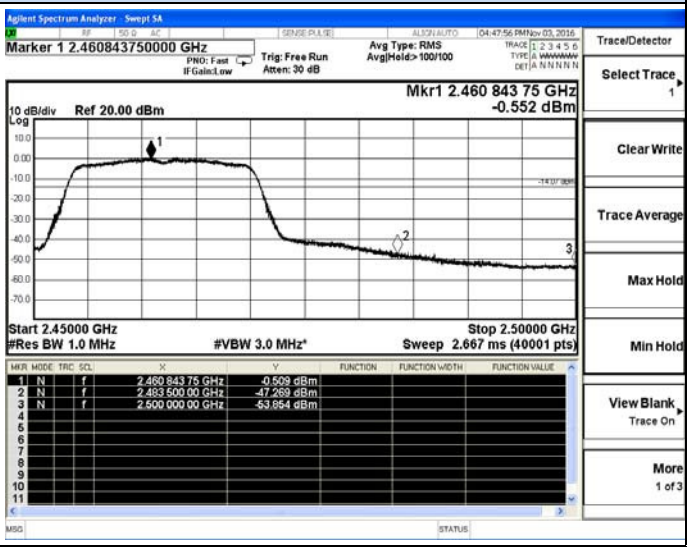


IEEE 802.11g-Low channel(Average)

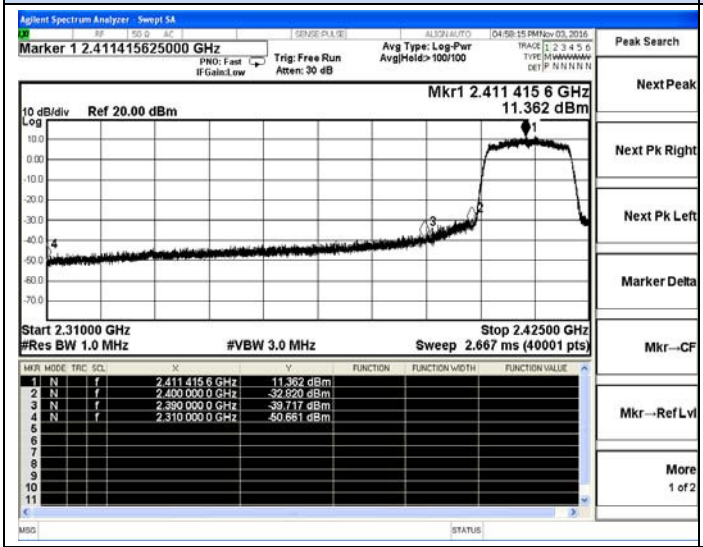
Test plot of Restricted Bands



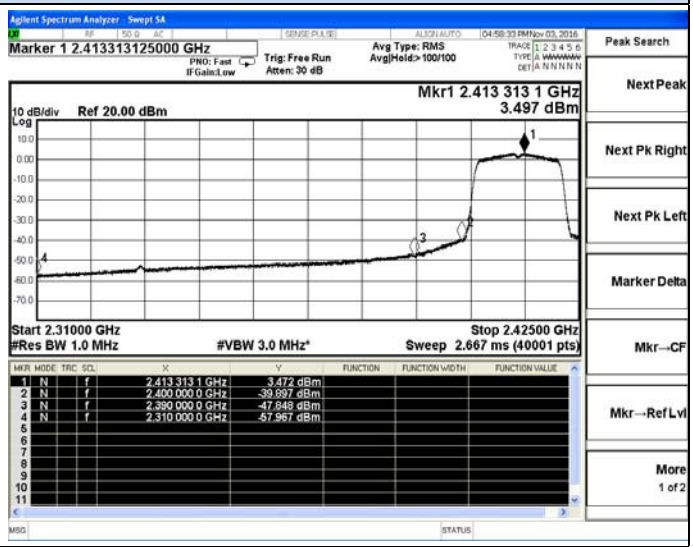
IEEE 802.11g-High channel(Peak)



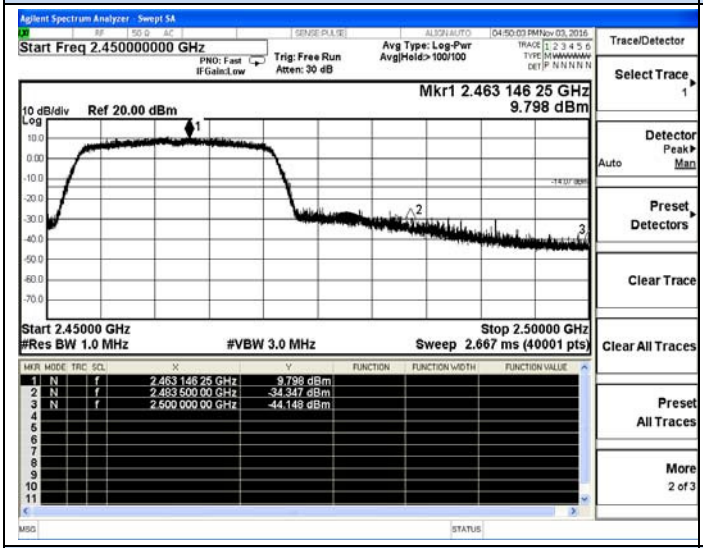
IEEE 802.11g-High channel(Average)



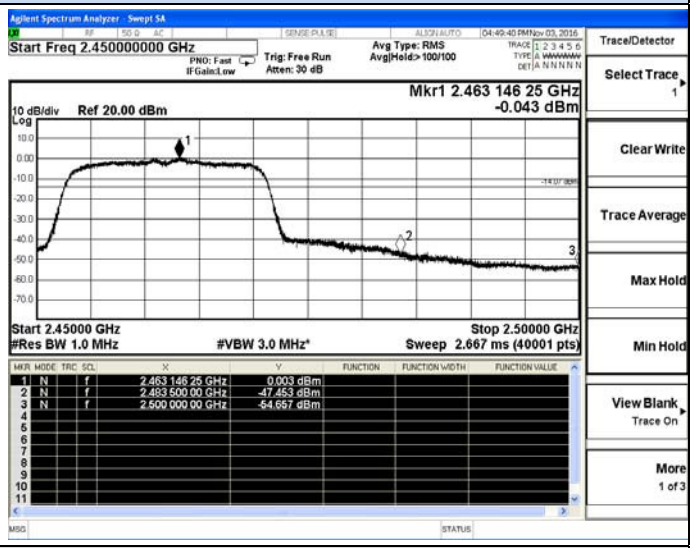
IEEE 802.11n(HT20)-Low channel(Peak)



IEEE 802.11n(HT20)-Low channel(Average)

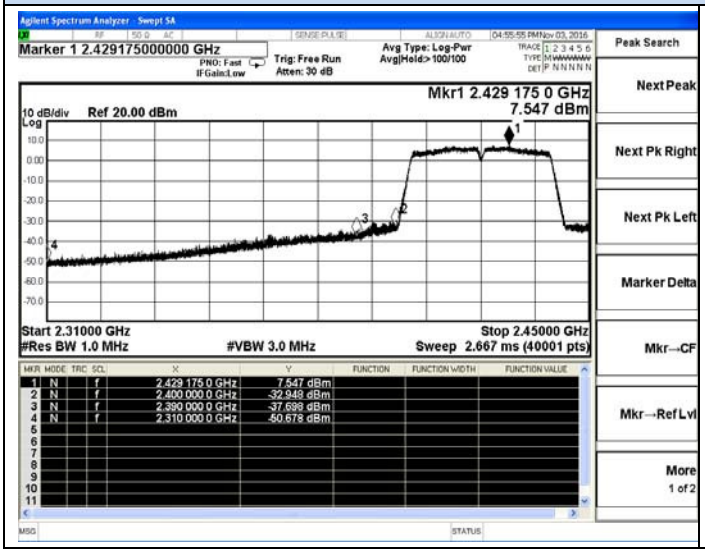


IEEE 802.11n(HT20)-High channel(Peak)

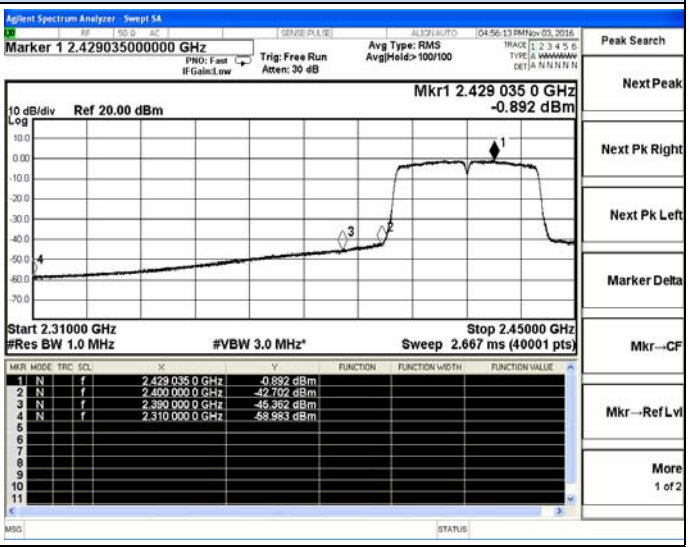


IEEE 802.11n(HT20)-High channel(Average)

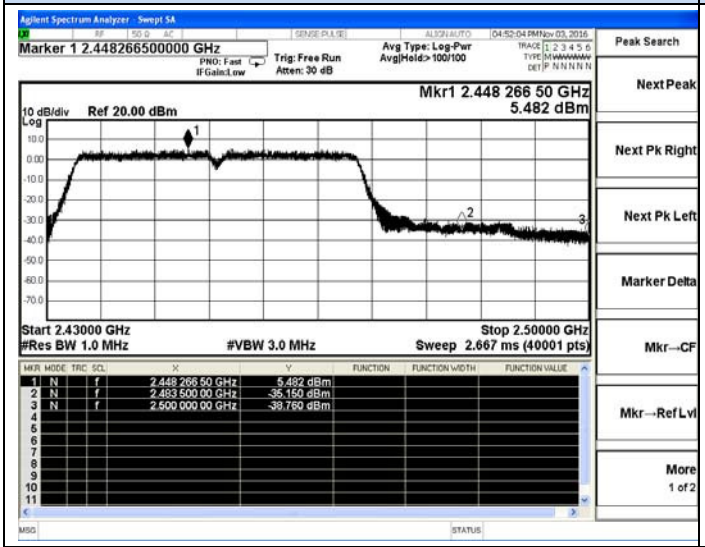
Test plot of Restricted Bands



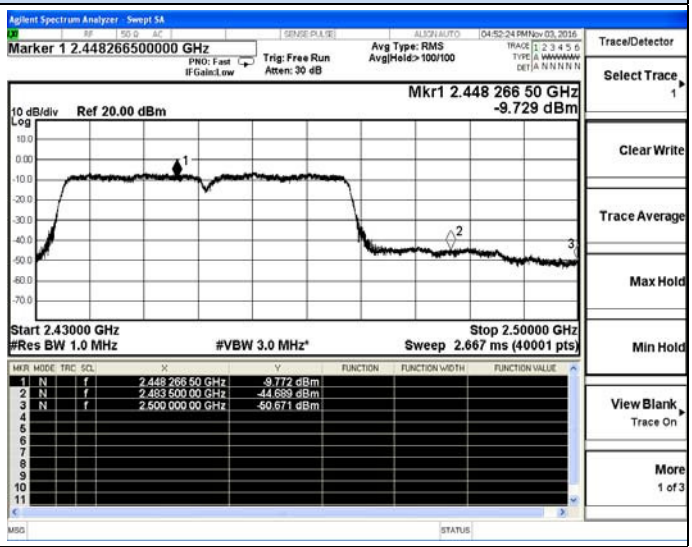
IEEE 802.11n(HT40)-Low channel(Peak)



IEEE 802.11n(HT40)-Low channel(Average)



IEEE 802.11n(HT40)-High channel(Peak)



IEEE 802.11n(HT40)-High channel(Average)

5.6. Conducted Spurious Emissions and Band Edges Test

5.6.1. Standard Applicable

According to §15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
RB / VB (Emission in restricted band)	100KHz/300KHz
RB / VB (Emission in non-restricted band)	100KHz/300KHz

5.6.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9kHz to 26.5GHz is investigated with the transmitter set to the lowest,middle, and highest channels.

5.6.4. Test Setup Layout

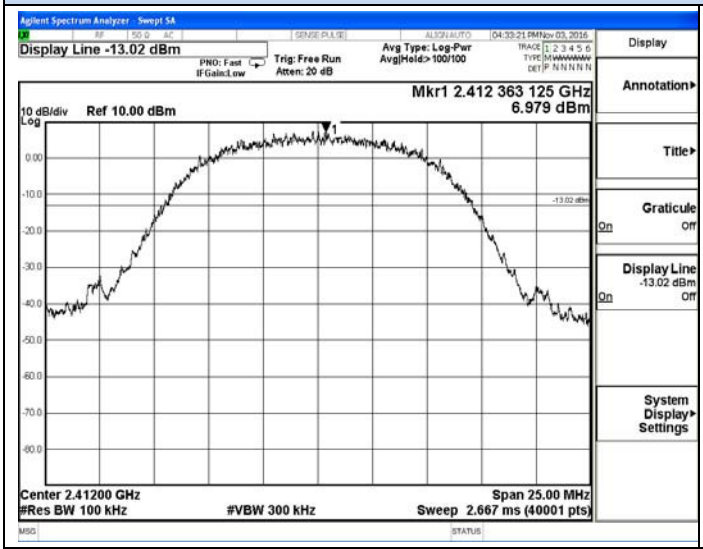
This test setup layout is the same as that shown in section 5.4.4.

5.6.5. EUT Operation during Test

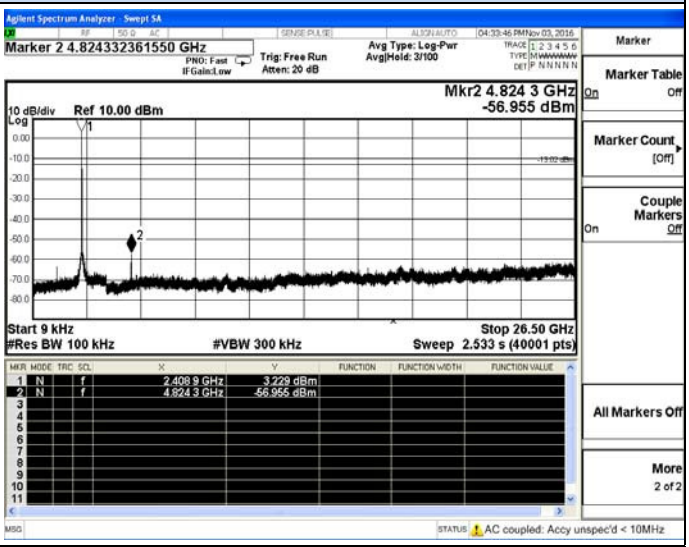
The EUT was programmed to be in continuously transmitting mode.

5.6.6. Test Results of Conducted Spurious Emissions

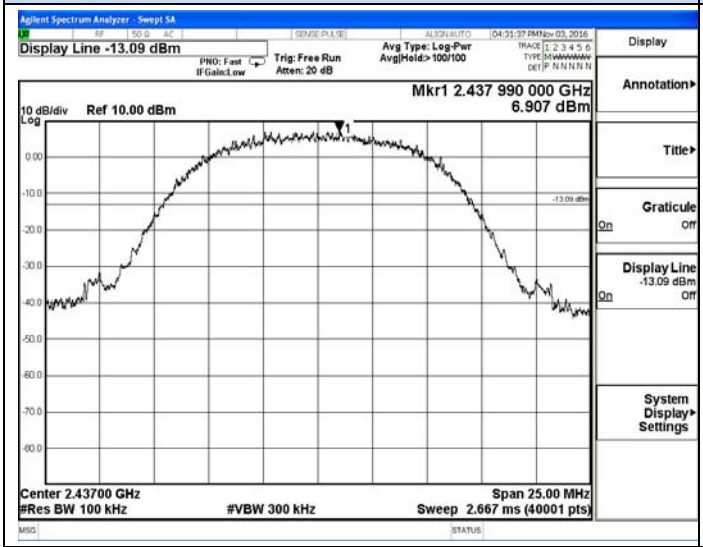
Test plot of Conducted Spurious Emission



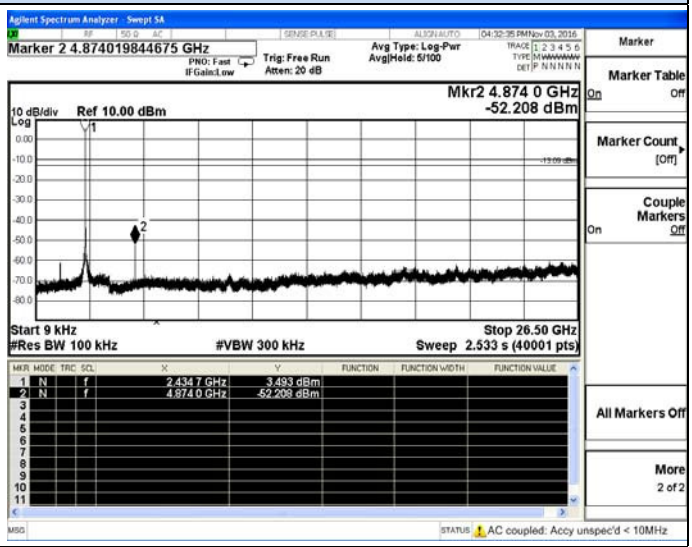
IEEE 802.11b-Low channel Reference



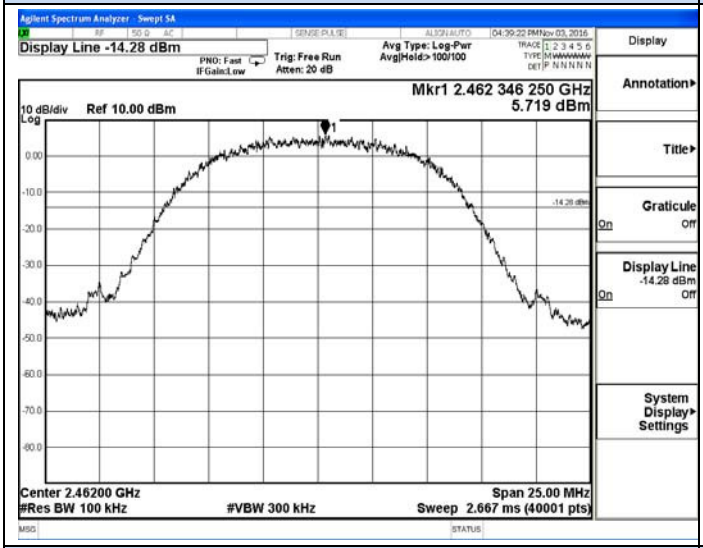
IEEE 802.11b-Low channel



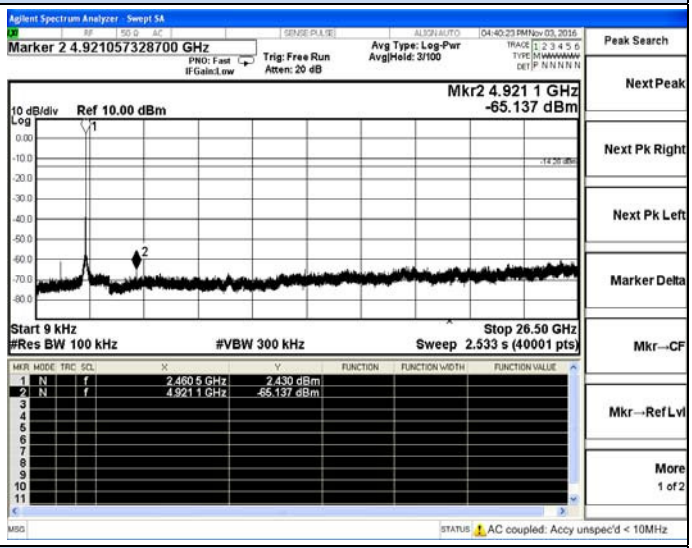
IEEE 802.11b-Middle channel Reference



IEEE 802.11b-Middle channel

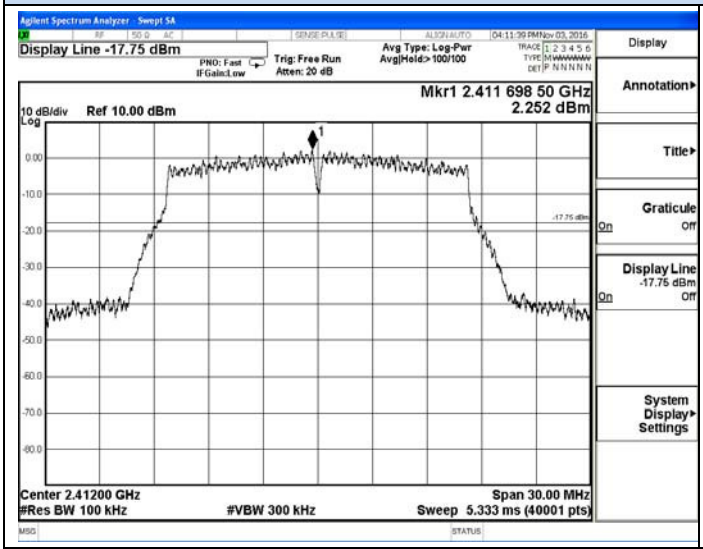


IEEE 802.11b-High channel Reference

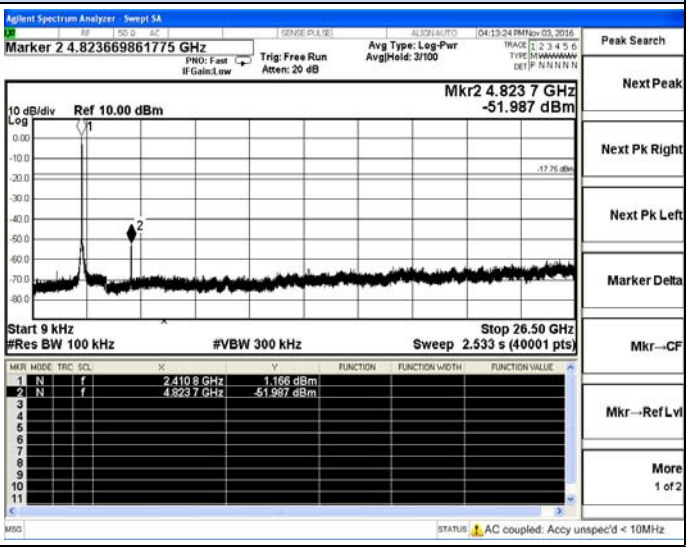


IEEE 802.11b-High channel

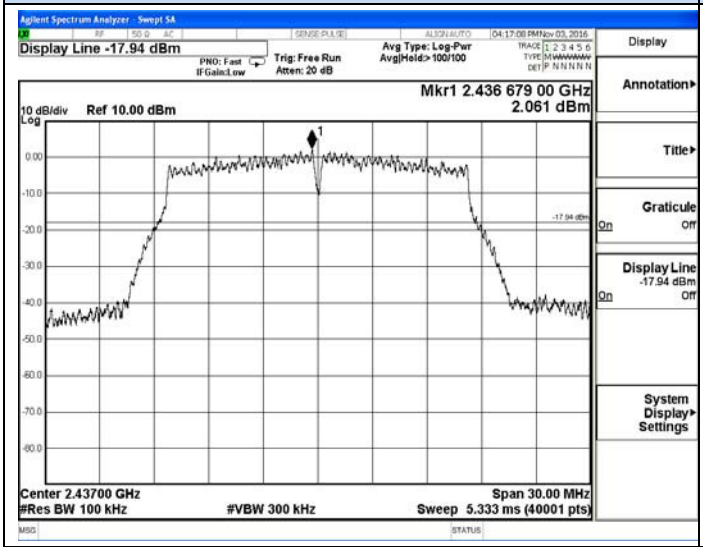
Test plot of Conducted Spurious Emission



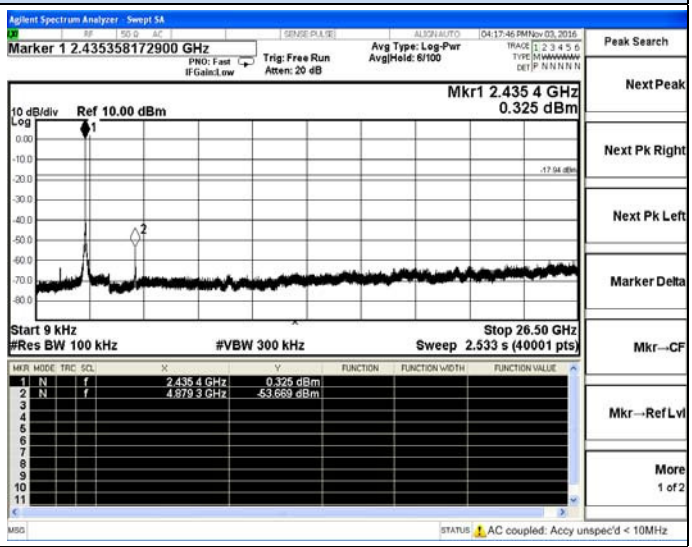
IEEE 802.11g-Low channel Reference



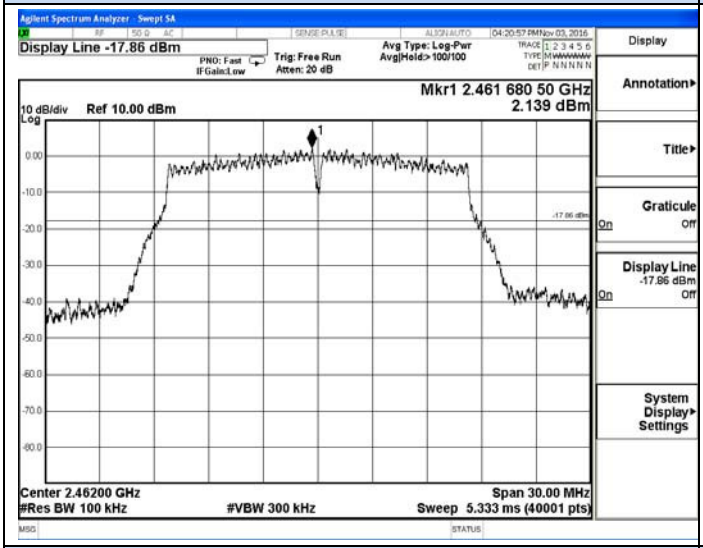
IEEE 802.11g-Low channel



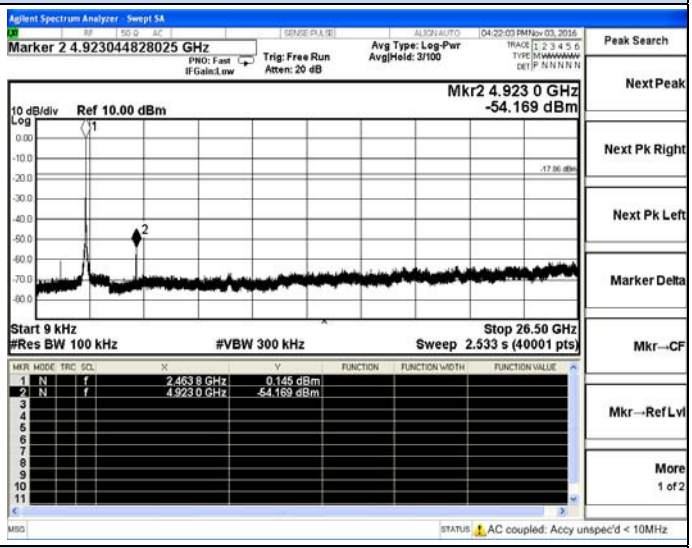
IEEE 802.11g-Middle channel Reference



IEEE 802.11g-Middle channel

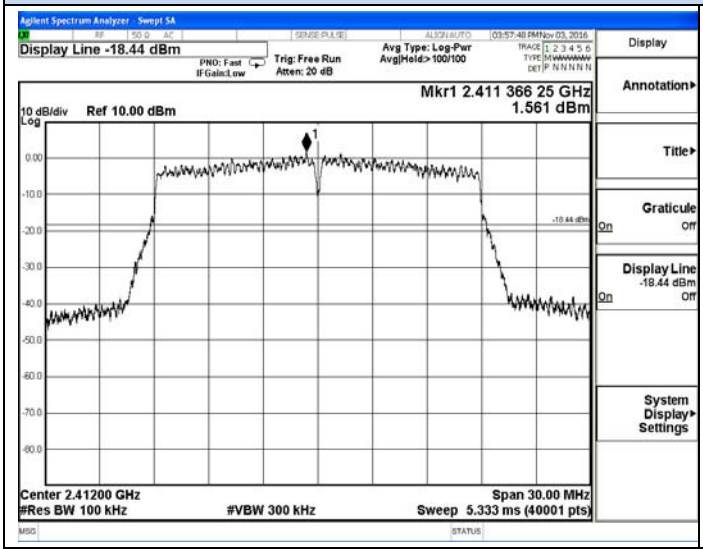


IEEE 802.11g-High channel Reference

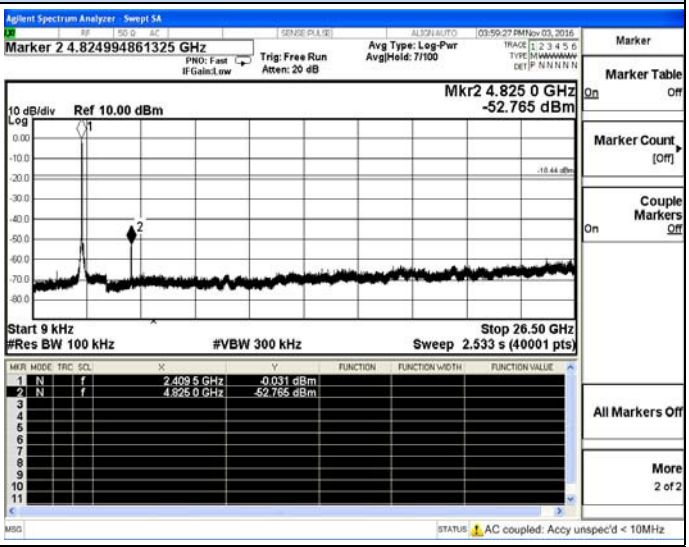


IEEE 802.11g-High channel

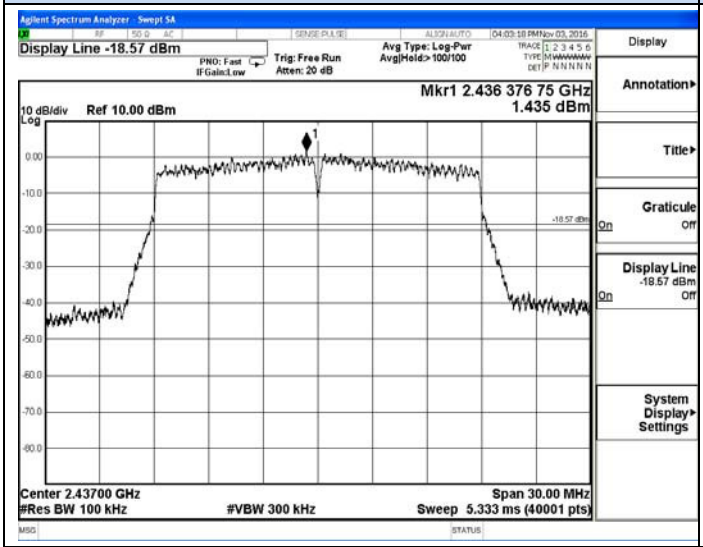
Test plot of Conducted Spurious Emission



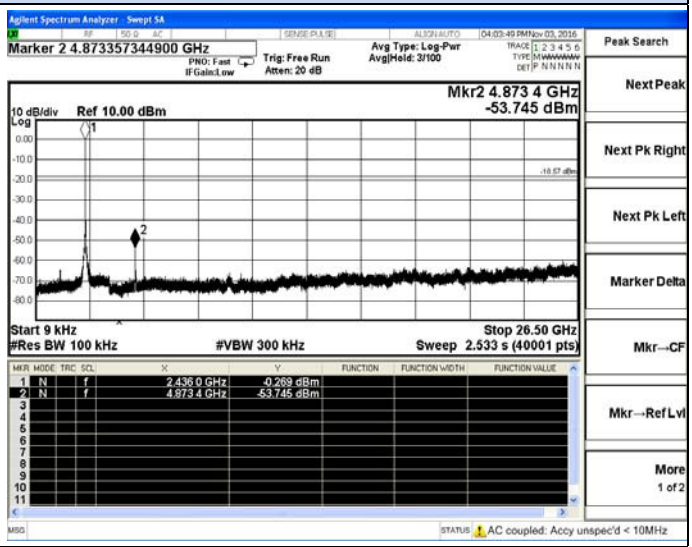
IEEE 802.11n(HT20)-Low channel Reference



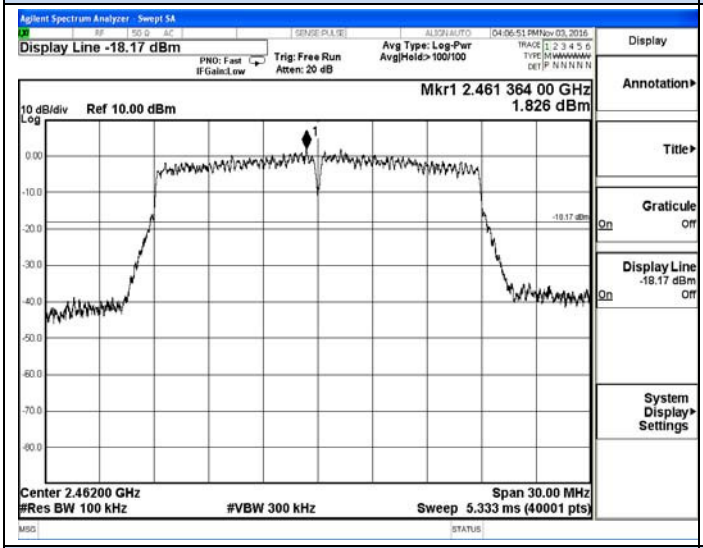
IEEE 802.11n(HT20)-Low channel



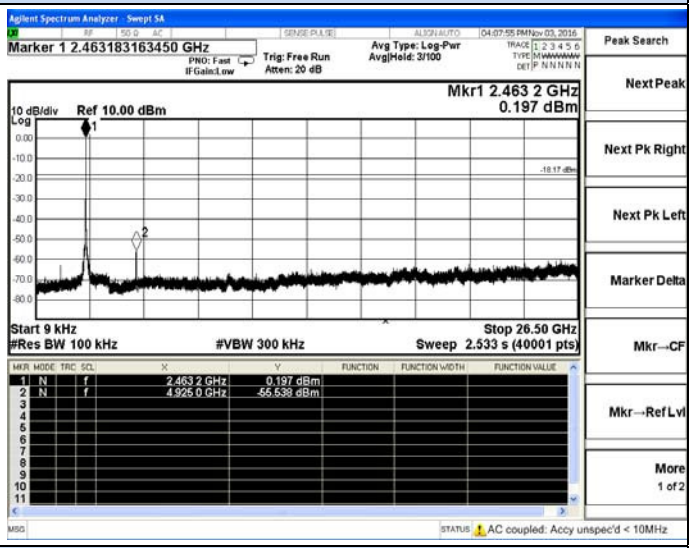
IEEE 802.11n(HT20)-Middle channel Reference



IEEE 802.11n(HT20)-Middle channel

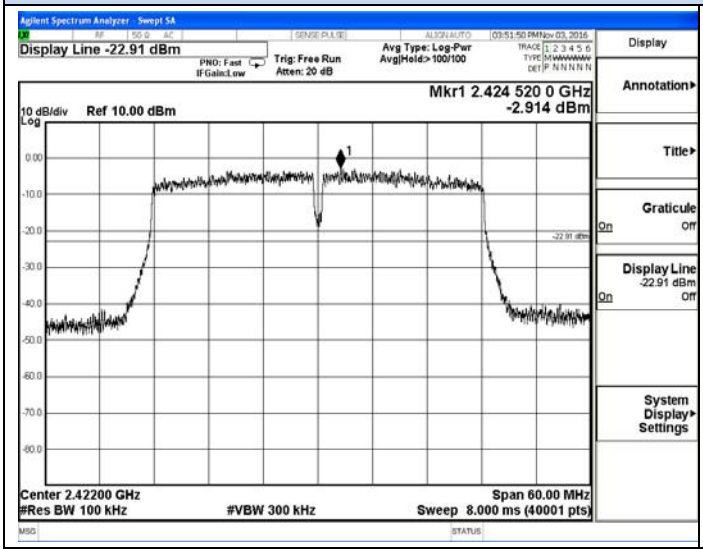


IEEE 802.11n(HT20)-High channel Reference

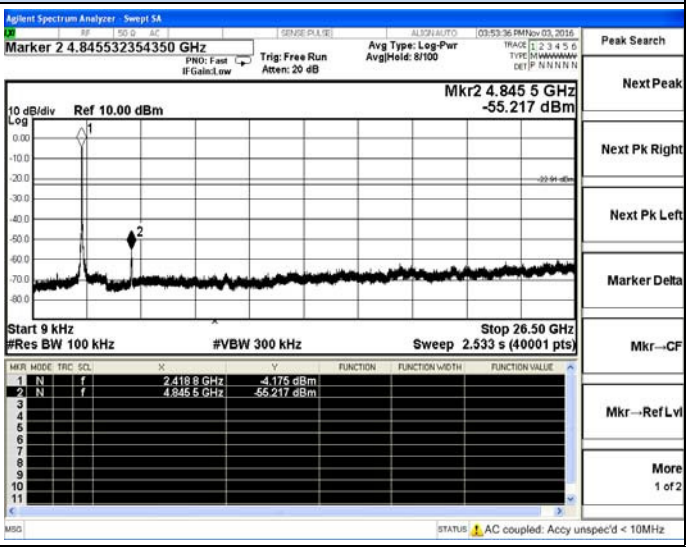


IEEE 802.11n(HT20)-High channel

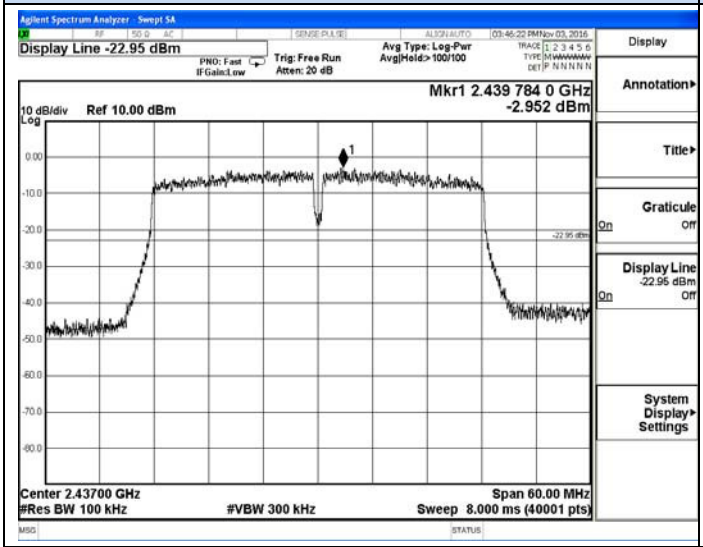
Test plot of Conducted Spurious Emission



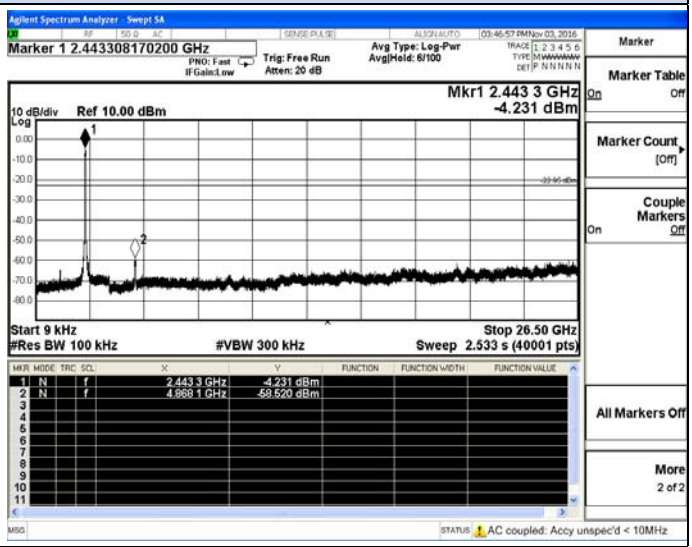
IEEE 802.11n(HT40)-Low channel Reference



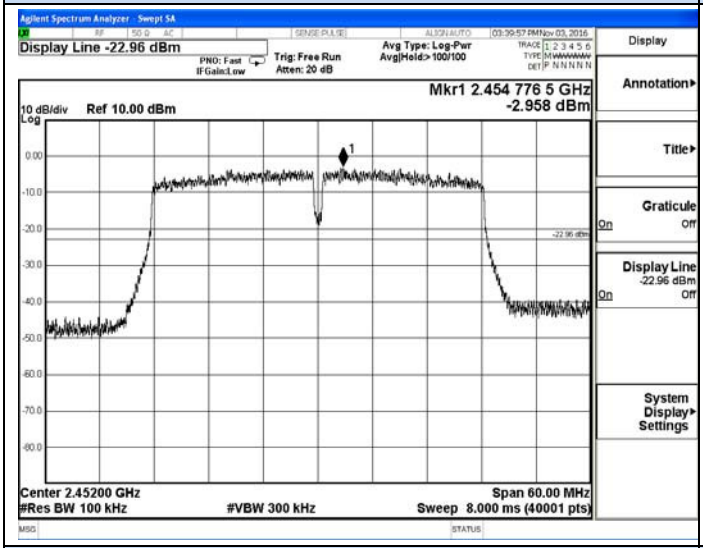
IEEE 802.11n(HT40)-Low channel



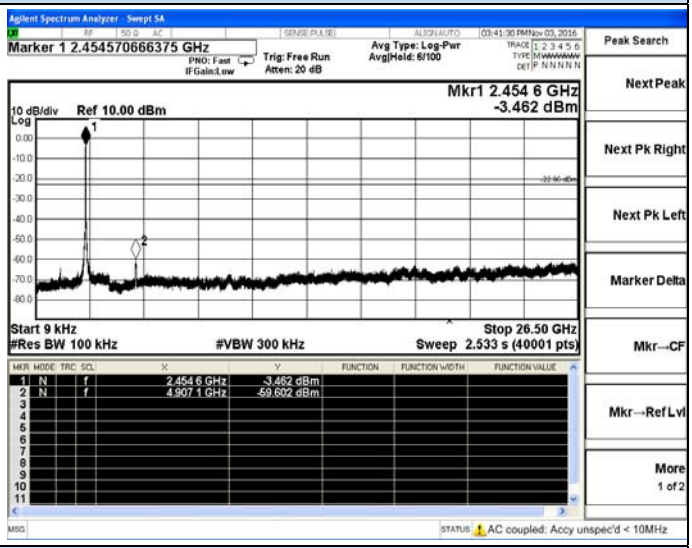
IEEE 802.11n(HT40)-Middle channel Reference



IEEE 802.11n(HT40)-Middle channel

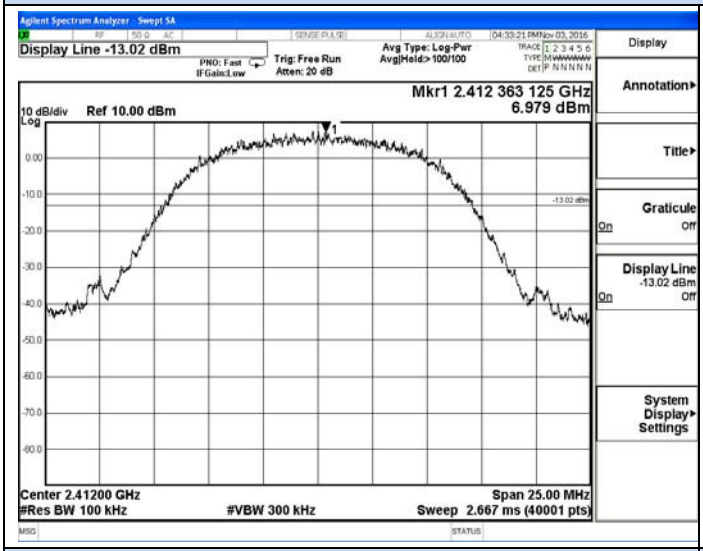
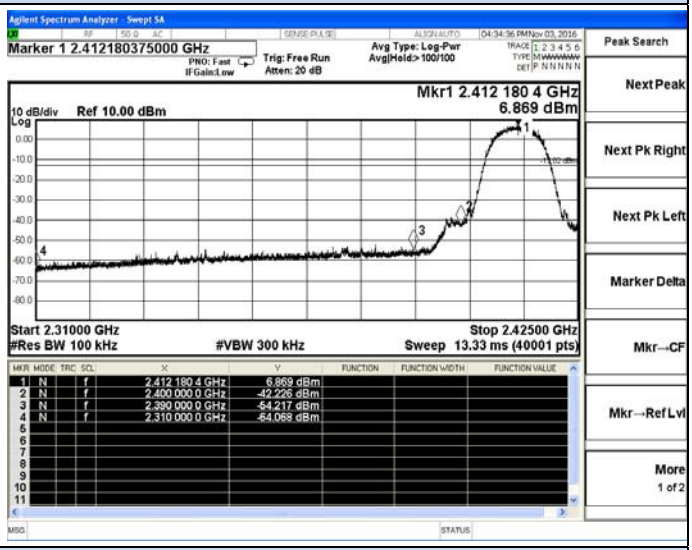
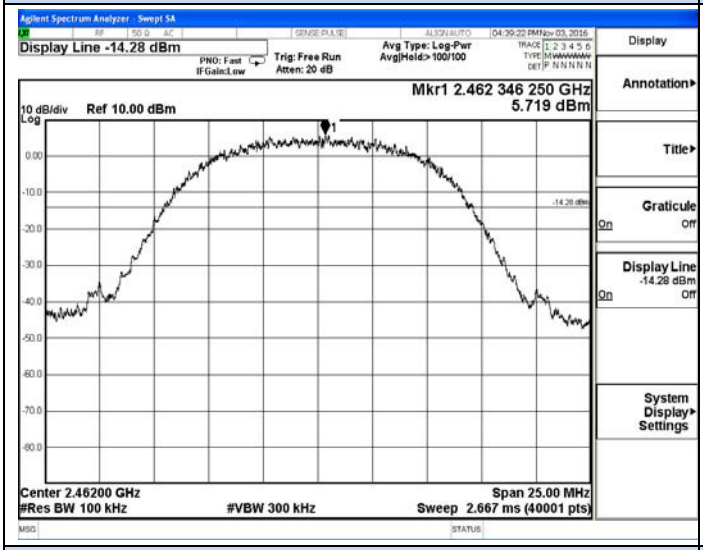
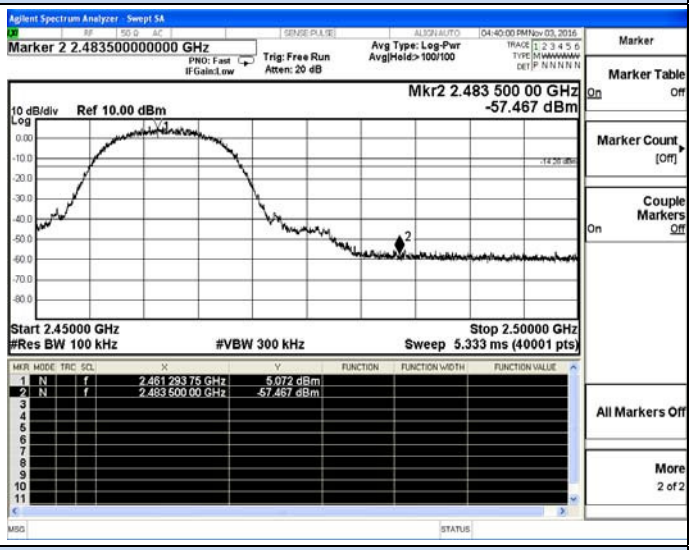
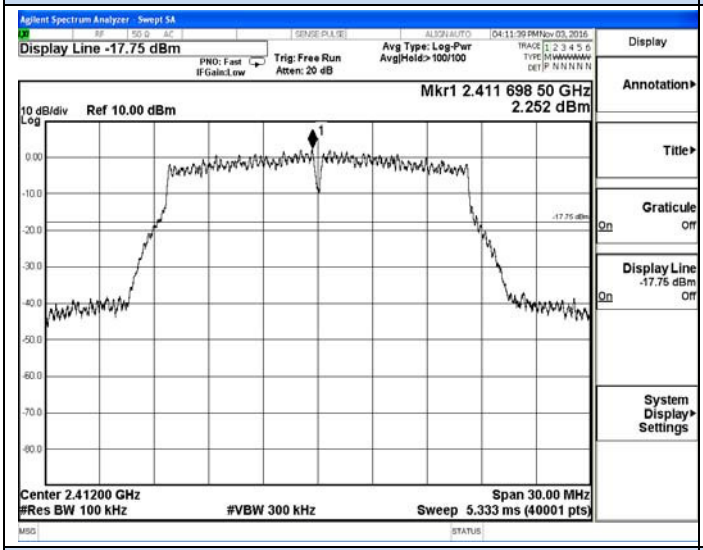
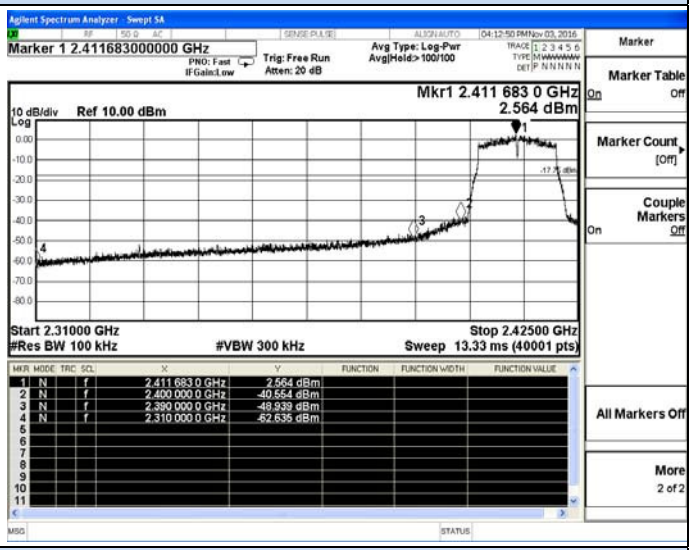


IEEE 802.11n(HT40)-High channel Reference

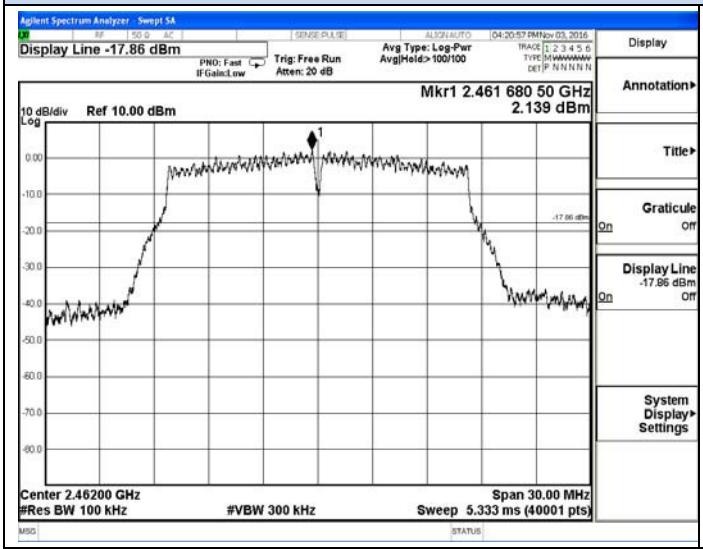


IEEE 802.11n(HT40)-High channel

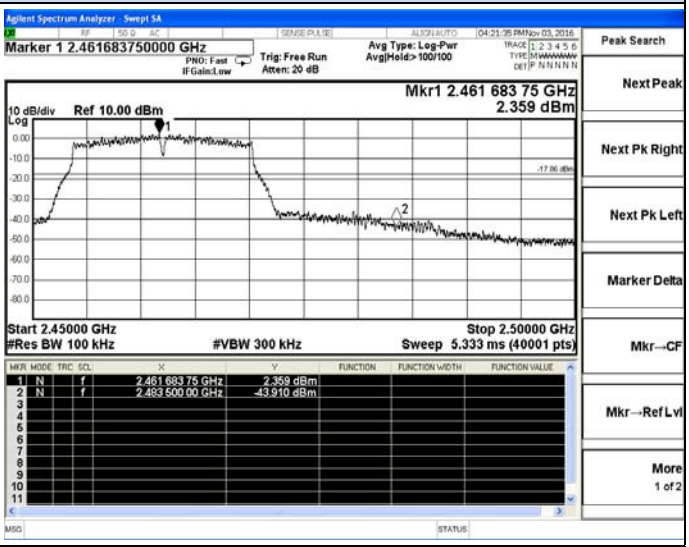
5.6.7. Test Results of Band Edges Test

Test plot of Band Edges Test	
	
IEEE 802.11b-Low channel Reference	IEEE 802.11b-Low channel
	
IEEE 802.11b-High channel Reference	IEEE 802.11b-High channel
	
IEEE 802.11g-Low channel Reference	IEEE 802.11g-Low channel

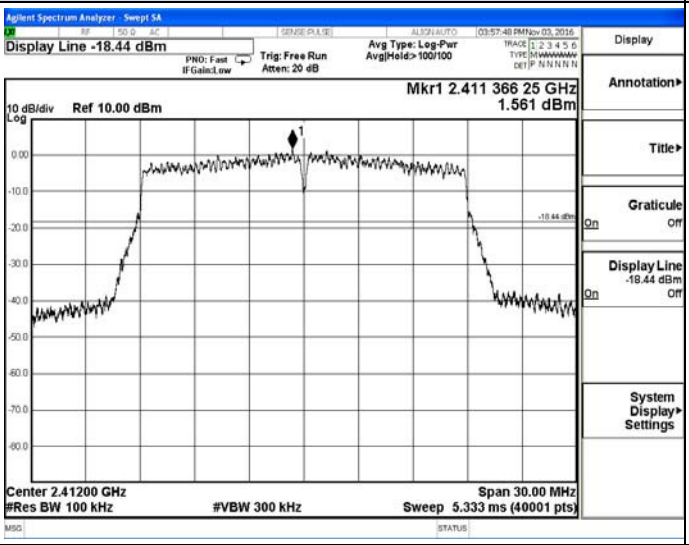
Test plot of Band Edges Test



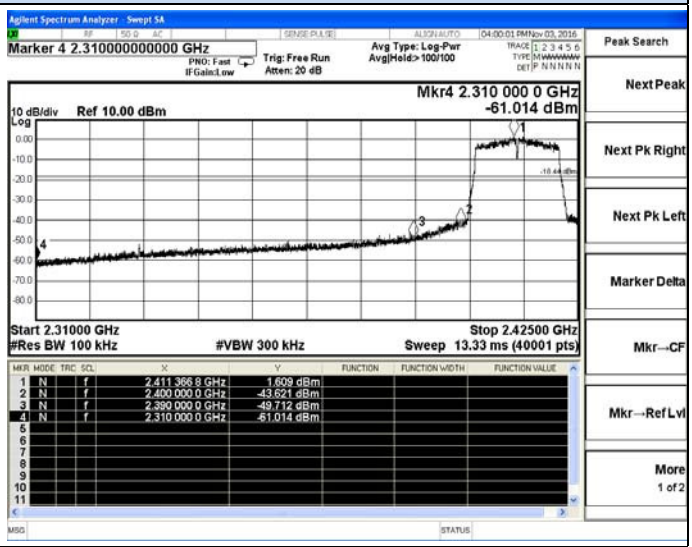
IEEE 802.11g-High channel Reference



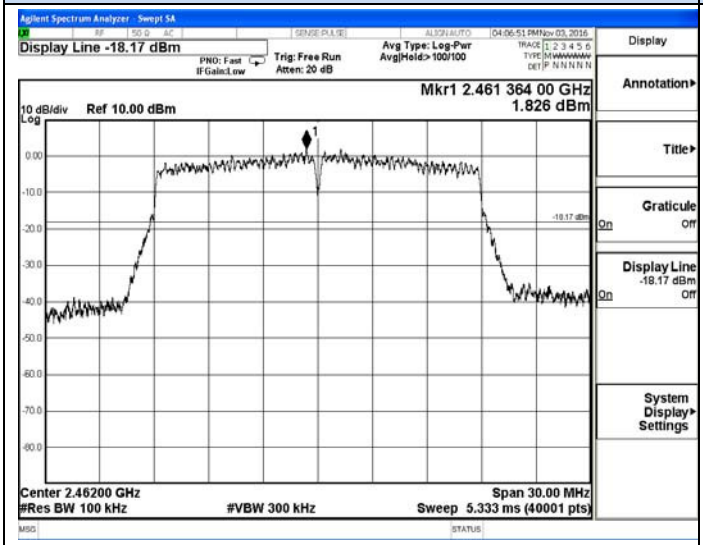
IEEE 802.11g-High channel



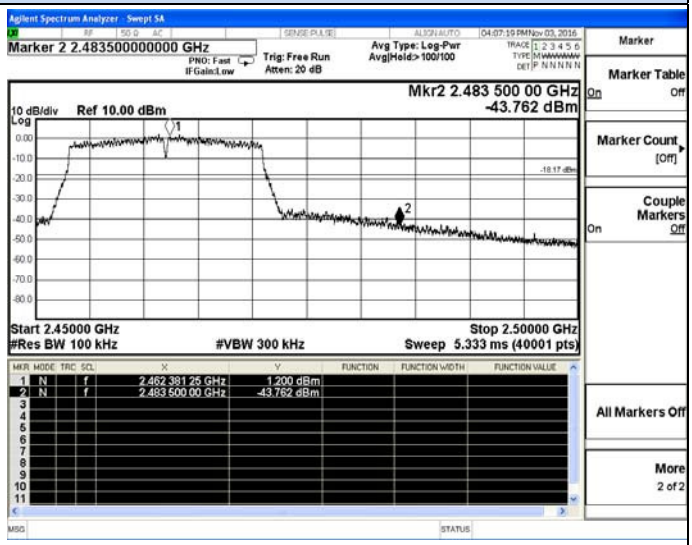
IEEE 802.11n(HT20)-Low channel Reference



IEEE 802.11n(HT20)-Low channel

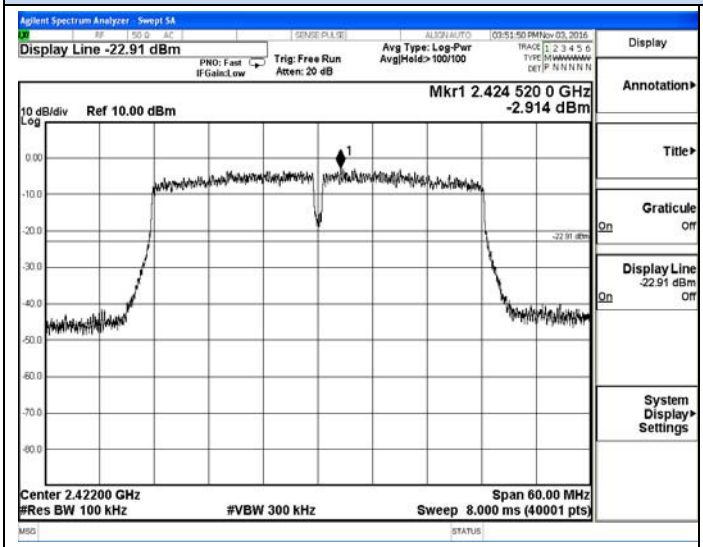


IEEE 802.11n(HT20)-High channel Reference

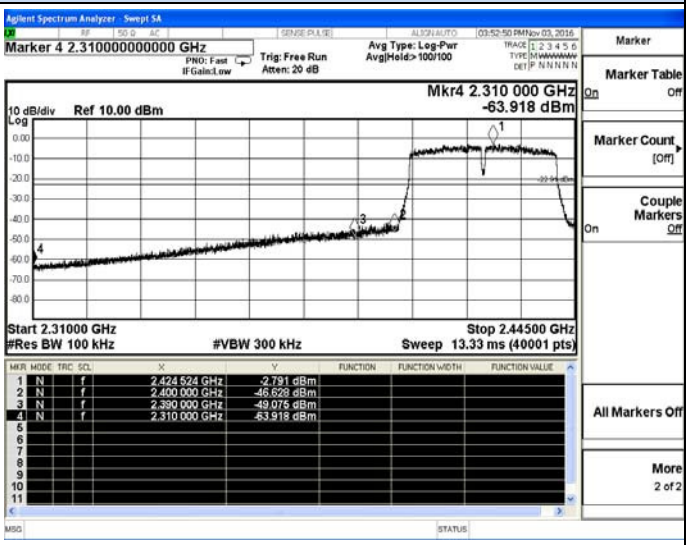


IEEE 802.11n(HT20)-High channel

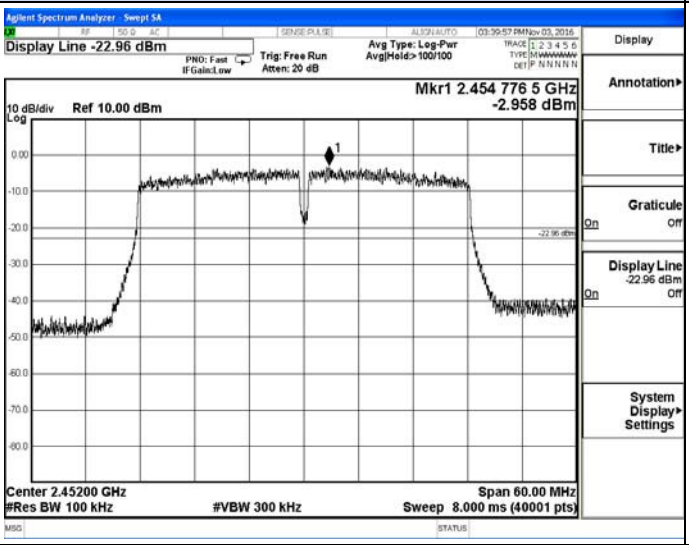
Test plot of Band Edges Test



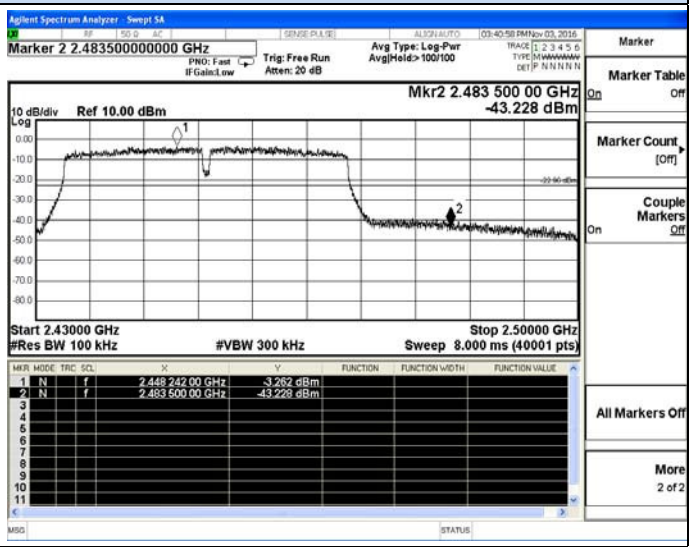
IEEE 802.11n(HT40)-Low channel Reference



IEEE 802.11n(HT40)-Low channel



IEEE 802.11n(HT40)-High channel Reference



IEEE 802.11n(HT40)-High channel

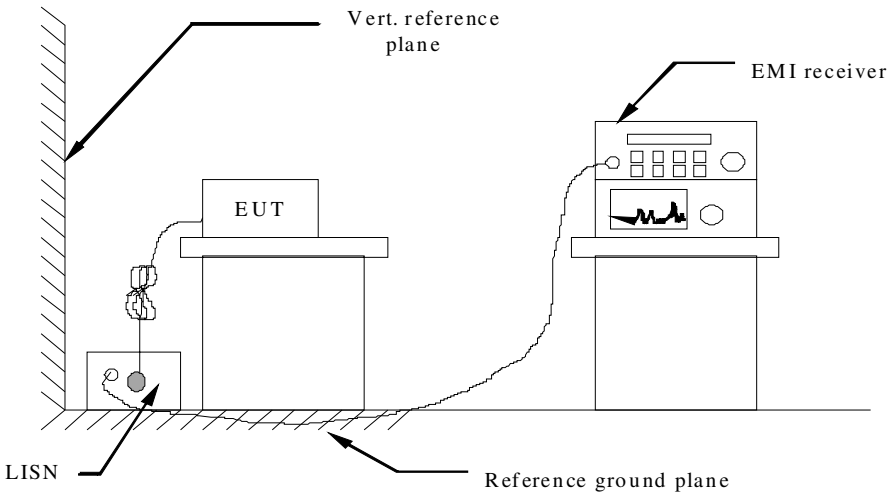
5.7. Power line conducted emissions

5.7.1 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 is 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

5.7.2 Block Diagram of Test Setup

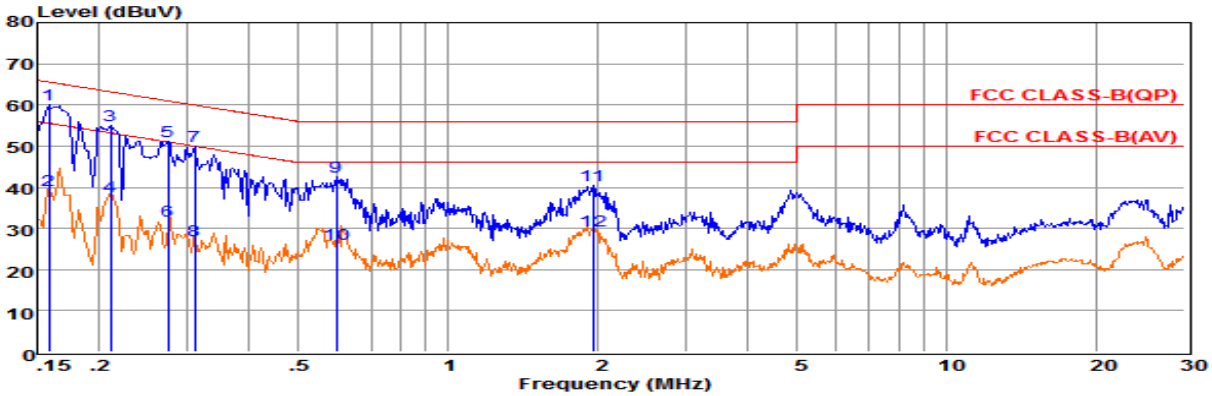


5.7.3 Test Results

PASS.

The test data please refer to following page.

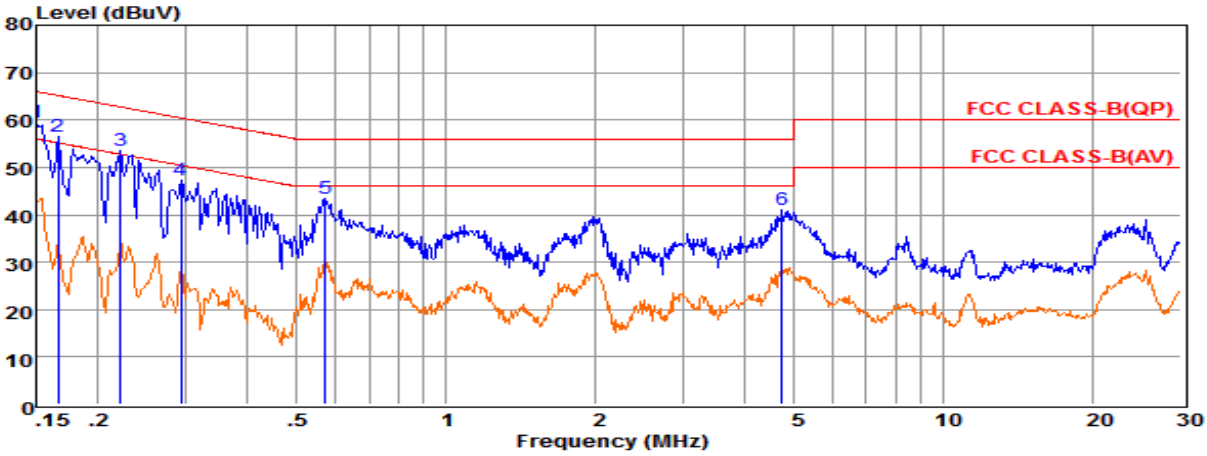
Test result for 802.11b(AC 120V)



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

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.16	40.32	9.68	0.02	10.00	60.02	65.56	-5.54	QP
2	0.16	19.42	9.68	0.02	10.00	39.12	55.55	-16.43	Average
3	0.21	35.39	9.59	0.03	10.00	55.01	63.18	-8.17	QP
4	0.21	18.28	9.59	0.03	10.00	37.90	53.18	-15.28	Average
5	0.27	31.51	9.60	0.03	10.00	51.14	60.98	-9.84	QP
6	0.27	12.15	9.60	0.03	10.00	31.78	50.98	-19.20	Average
7	0.31	30.42	9.60	0.03	10.00	50.05	59.97	-9.92	QP
8	0.31	7.52	9.60	0.03	10.00	27.15	49.97	-22.82	Average
9	0.60	22.78	9.63	0.04	10.00	42.45	56.00	-13.55	QP
10	0.60	6.58	9.63	0.04	10.00	26.25	46.00	-19.75	Average
11	1.95	20.67	9.63	0.05	10.00	40.35	56.00	-15.65	QP
12	1.95	9.63	9.63	0.05	10.00	29.31	46.00	-16.69	Average

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

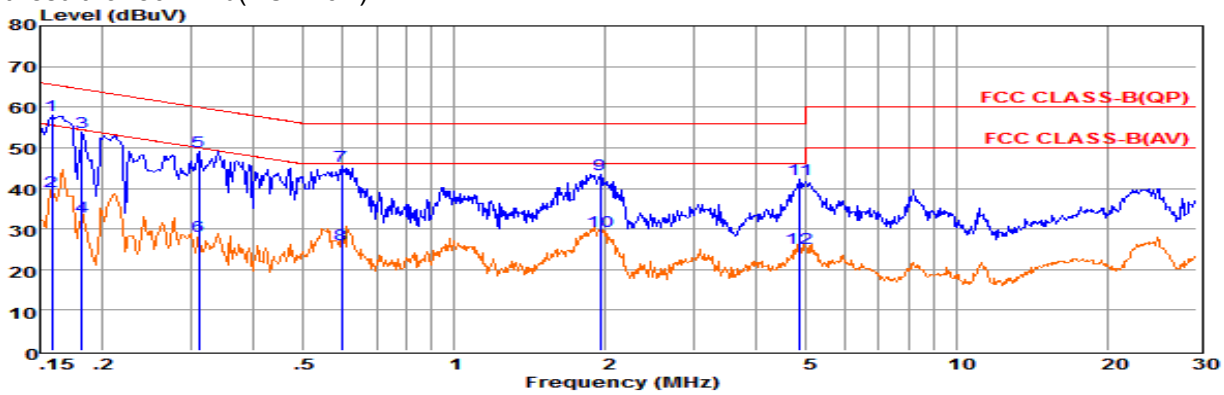


Env. Ins: 24*/56%
Pol: LINE

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.15	39.89	9.57	0.02	10.00	59.48	66.00	-6.52	QP
2	0.17	36.94	9.59	0.02	10.00	56.55	65.16	-8.61	QP
3	0.22	33.73	9.63	0.03	10.00	53.39	62.74	-9.35	QP
4	0.29	27.50	9.63	0.03	10.00	47.16	60.41	-13.25	QP
5	0.57	23.80	9.63	0.04	10.00	43.47	56.00	-12.53	QP
6	4.75	21.46	9.65	0.06	10.00	41.17	56.00	-14.83	QP

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

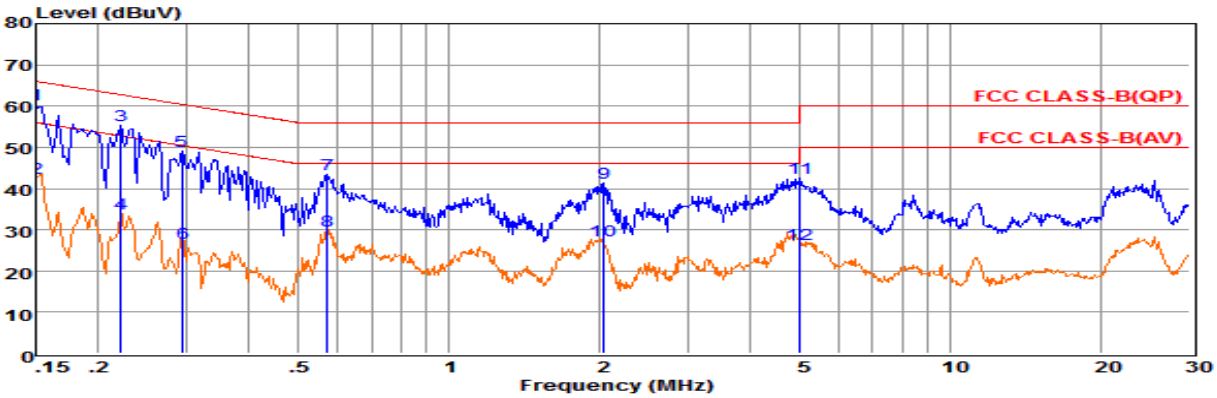
Test result for 802.11b(AC 240V)



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

	Freq MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.16	38.32	9.68	0.02	10.00	58.02	65.56	-7.54	QP
2	0.16	19.42	9.68	0.02	10.00	39.12	55.55	-16.43	Average
3	0.18	34.28	9.63	0.02	10.00	53.93	64.42	-10.49	QP
4	0.18	13.27	9.63	0.02	10.00	32.92	54.41	-21.49	Average
5	0.31	29.42	9.60	0.03	10.00	49.05	59.97	-10.92	QP
6	0.31	8.52	9.60	0.03	10.00	28.15	49.97	-21.82	Average
7	0.60	25.78	9.63	0.04	10.00	45.45	56.00	-10.55	QP
8	0.60	6.58	9.63	0.04	10.00	26.25	46.00	-19.75	Average
9	1.95	23.67	9.63	0.05	10.00	43.35	56.00	-12.65	QP
10	1.95	9.63	9.63	0.05	10.00	29.31	46.00	-16.69	Average
11	4.87	22.50	9.66	0.06	10.00	42.22	56.00	-13.78	QP
12	4.87	5.54	9.66	0.06	10.00	25.26	46.00	-20.74	Average

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 MHz	Reading dBuV	LISNFac dB	CabLos dB	Aux2Fac dB	Measured dB	Limit dBuV	Over dBuV	Remark dB
1	0.15	40.89	9.57	0.02	10.00	60.48	66.00	-5.52	QP
2	0.15	23.04	9.57	0.02	10.00	42.63	55.99	-13.36	Average
3	0.22	35.73	9.63	0.03	10.00	55.39	62.74	-7.35	QP
4	0.22	14.24	9.63	0.03	10.00	33.90	52.74	-18.84	Average
5	0.29	29.50	9.63	0.03	10.00	49.16	60.41	-11.25	QP
6	0.29	6.96	9.63	0.03	10.00	26.62	50.41	-23.79	Average
7	0.57	23.80	9.63	0.04	10.00	43.47	56.00	-12.53	QP
8	0.57	10.01	9.63	0.04	10.00	29.68	46.00	-16.32	Average
9	2.03	21.65	9.64	0.05	10.00	41.34	56.00	-14.66	QP
10	2.03	7.68	9.64	0.05	10.00	27.37	46.00	-18.63	Average
11	5.00	22.85	9.65	0.06	10.00	42.56	60.00	-17.44	QP
12	5.01	6.63	9.65	0.06	10.00	26.34	50.00	-23.66	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 mode and recorded the worst case results in this report (802.11b).

5.8. 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, 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 DTS 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 DSSS mode is used;

Tnom	Vnom	Lowest Channel 2412 MHz	Middle Channel 2437 MHz	Highest Channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		8.99	8.85	8.64
Radiated power [dBm] Measured with DSSS modulation		10.93	10.73	10.40
Gain [dBi] Calculated		1.94	1.88	1.76
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

Result: -/-

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 26, 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-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 Soure	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidigy 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
Note: All equipment through GRGT EST calibration						

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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----------

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