ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

+Cam Outdoor HD/+CAM-HD-AW

MODEL No.: QCP-A420,QCP-A421,QCP-A422

FCC ID: A5JC42421

REPORT NO.: ES140904045E

ISSUE DATE: October 17, 2014

Prepared for

Quadrant Technology(Shenzhen) Co., Ltd.

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Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	Quadrant Technology(Shenzhen) Co., Ltd. 3rd floor, 7TH building, Hongfa JiaTeLi Hi-Tech park of ShiXin Village, Shiyan Town, Shenzhen City, Guangdong province, China.
Manufacturer:	Quadrant Technology(Shenzhen) Co., Ltd. 3rd floor, 7TH building, Hongfa JiaTeLi Hi-Tech park of ShiXin Village, Shiyan Town, Shenzhen City, Guangdong province, China.
Product Description:	+Cam Outdoor HD/+CAM-HD-AW
Model Number:	QCP-A420, QCP-A421, QCP-A422
Trade mark	Imogenstudio
File Number:	ES140904045E
Date of Test:	September 05, 2014 to October 17, 2014

We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : September 05, 2014 to October 17, 2014

Prepared by : Jack Li/Editor

Reviewer : Joe Xia/Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

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1. General Information

1.1 Product Description

A major technical descriptions of EUT is described as following:

A). Standards: IEEE802.11b/g/n
B). Operation Frequency: 802.11b/g/n HT20: 2412-2462MHz;
802.11n HT40: 2422-2452 MHz
C). Modulation: OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n,
DSSS with DBPSK/DQPSK/CCK for 802.11b
D). Number of Channel: 802.11b/g/n(HT20): 11Channels,
802.11n(HT40): 7 Channels
E). Support Data Rate: 1, 2, 5.5, 11, 6, 9, 12, 24, 36, 48, 54, 65, 72.2Mbps
F).Conducted Power:18.93dBm MAX
G) Antenna Gain: Chain A: 1.8dBi, Chain B: 1.8dBi
H). Antenna Type: Chip Antenna
I). Power Supply: DC 12V from AC Adapter
J).Adapter1: Model: DSA-12PFA-09 FUS 120100
Input: 100-240V~, 50/60Hz, 0.5A
Output: DC 12V, 1A
K).Adapter2: Model: DSA-12PFA-09 FUK 120100
Input: 100-240V~, 50/60Hz, 0.5A
Output: DC 12V, 1A

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

Note:
1. This device is included 802.11b, 802.11g, and 802.11n 2.4GHz transceiver function.
2. Test of channel was included the lowest middle and highest frequency in lowest data rate and to perform the test, then record on this report.

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for **FCC ID: A5JC42421** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system is compliance with Subpart B is authorized under a DOC procedure.

1.3 Test Methodology

All the test program has follow FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02, Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab.	:	Accredited by CNAS, 2013.10.29 The certificate is valid until 2014.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS/CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen 2010.5.25 The Laboratory has been assessed according to the requirements ISO/IEC 17025 Accredited by FCC, October 28, 2010 The Certificate Registration Number is 406365. Accredited by Industry Canada, March 05, 2010 The Certificate Registration Number is 46405-4480.
Name of Firm	:	SHENZHEN EMTEK CO., LTD.
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2. System Test Configuration

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 which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table 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 max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

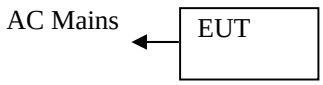


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	+Cam Outdoor HD/+CAM-HD-AW	Imogenstudio	QCP-A420	A5JC42421	N/A	EUT
2.	Adapter1	DVE	DSA-12PFA-09 FUS 120100	N/A	N/A	
3.	Adapter2	DVE	DSA-12PFA-09 FUK 120100	N/A	N/A	

Note:

(1) Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

(2) Adapter1 and Adapter2 are identical in circuitry and electrical, mechanical and physical construction; the only differences are the Pin location

3. Description of Test Modes

The Transmitter of EUT is an +Cam Outdoor HD/+CAM-HD-AW and powered by host equipment; these is Digital Transmission system (DTS) and have modulation OFDM, DSSS, DBPSK, DQPSK, CCK, 16QAM, 64QAM. According exploratory test, EUT will have maximum output power in those data rate (802.11b: 11 Mbps; 802.11g: 6 Mbps; 802.11n: MCS0), so those data rate were used for all test.
The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE 802.11 protocol to enable wireless communications between the host and Wireless rooter.

Preliminary tests were performed in different data rate to find the worst radiated emission. The min data rate 802.11b (1Mbps), 802.11g (6Mbps), 802.11n (MCS0) was the worst-case rate with all test items. EUT has two antennas, and different modes support different transmit mode what describe as following form:

Mode	Tx/Rx
11b, 11g, 11n (HT20, HT40)MCS 0-7	1Tx, 1Rx
11n(HT20, HT40) MCS 8-15	2Tx, 2Rx

We take data rate (11b 11 Mbps, 11g 6 Mbps, 11n (HT20, HT40) MCS0) to test. And the worst test data was recorded in this report.

For 802.11b/g/n H20:
For lowest channel: 2412MHz (Channel 1)
For middle channel: 2437MHz (Channel 6)
For highest channel: 2462MHz (Channel 11)

For 802.11n H40:
For lowest channel: 2422MHz (Channel 3)
For middle channel: 2437MHz (Channel 6)
For highest channel: 2452MHz (Channel 9)

4. Summary of Test Results

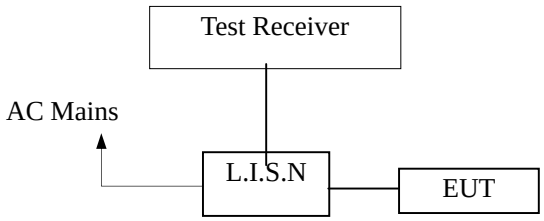
FCC Rules	Description Of Test	Result
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(b)(3)	Max Peak output Power test	Pass
§15.247(e)	Power density	Pass
§15.247(d)	Band edge test	Pass
§15.207	AC Power Conducted Emission	Pass
§15.247(d), §15.209	Radiated Emission	Pass
§15.247(d)	Antenna Port Emission	Pass
§15.247(b)&§15.203	Antenna Application	Pass

5. Conducted Emissions Test

5.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/17/2014	05/16/2015
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/17/2014	05/16/2015
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/17/2014	05/16/2015
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/17/2014	05/16/2015

5.4 Conducted Emission Limit

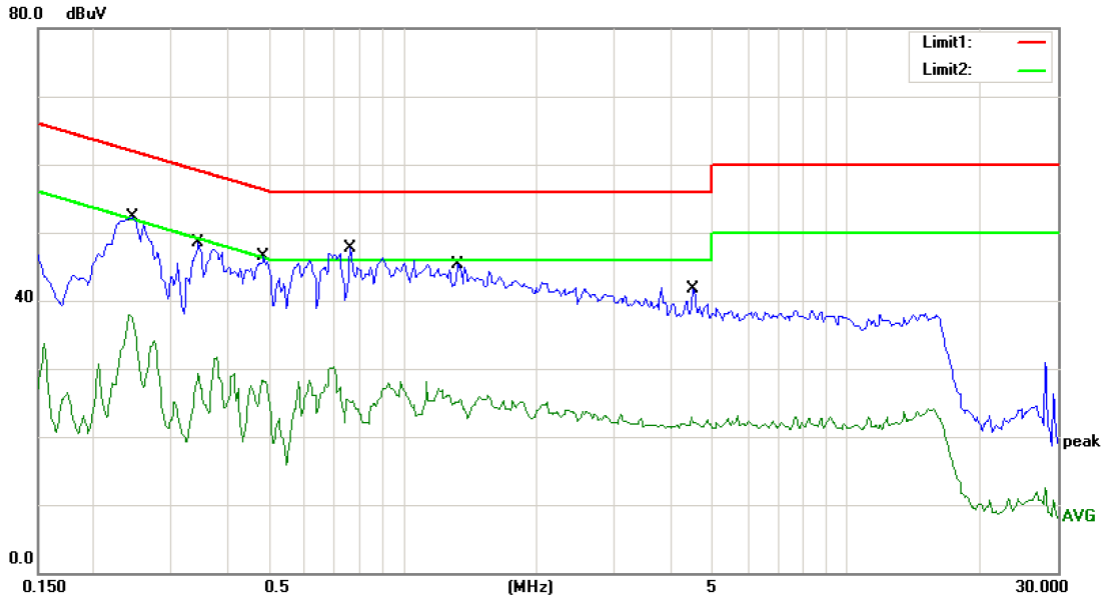
Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.5 Measurement Result

All the modulation modes with all adapters were tested the data of the worst mode are recorded in the following pages.



Site Conduction #1 Phase: *L1* Temperature: 26

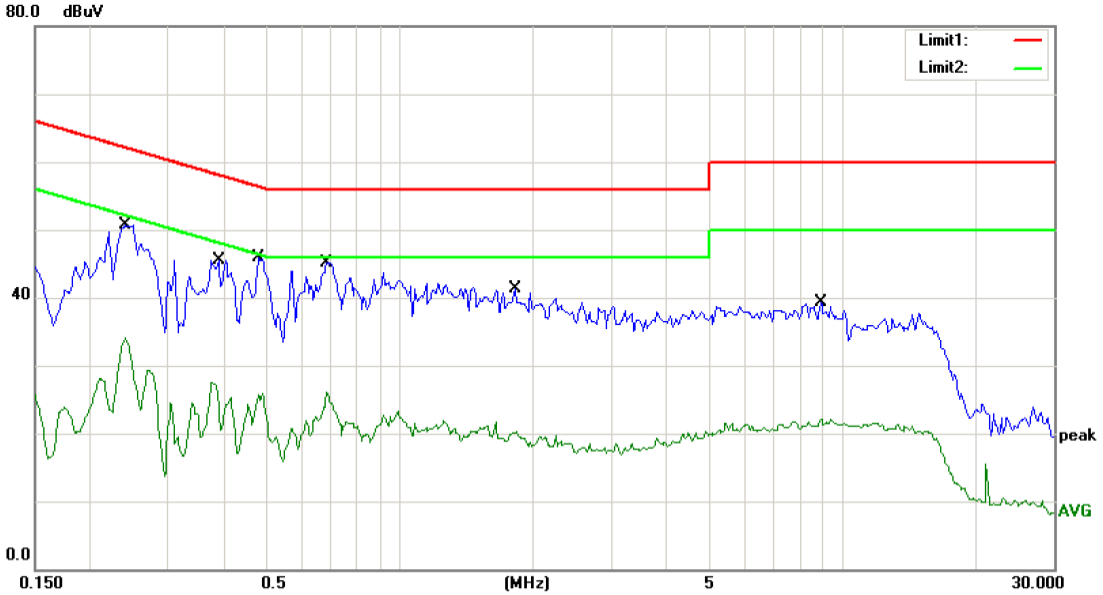
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 60 %

Mode: ON

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2450	52.27	0.00	52.27	61.92	-9.65	QP	
2		0.2450	36.33	0.00	36.33	51.92	-15.59	AVG	
3		0.3450	48.52	0.00	48.52	59.08	-10.56	QP	
4		0.3450	28.65	0.00	28.65	49.08	-20.43	AVG	
5		0.4850	46.43	0.00	46.43	56.25	-9.82	QP	
6		0.4850	28.19	0.00	28.19	46.25	-18.06	AVG	
7	*	0.7600	47.79	0.00	47.79	56.00	-8.21	QP	
8		0.7600	25.06	0.00	25.06	46.00	-20.94	AVG	
9		1.3300	45.29	0.00	45.29	56.00	-10.71	QP	
10		1.3300	25.06	0.00	25.06	46.00	-20.94	AVG	
11		4.5200	41.71	0.00	41.71	56.00	-14.29	QP	
12		4.5200	22.19	0.00	22.19	46.00	-23.81	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Cai



Site Conduction #1 Phase: *N* Temperature: 26
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 60 %
Mode: ON
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2400	50.61	0.00	50.61	62.10	-11.49	QP	
2		0.2400	33.95	0.00	33.95	52.10	-18.15	AVG	
3		0.3900	45.57	0.00	45.57	58.06	-12.49	QP	
4		0.3900	22.91	0.00	22.91	48.06	-25.15	AVG	
5	*	0.4800	45.82	0.00	45.82	56.34	-10.52	QP	
6		0.4800	24.71	0.00	24.71	46.34	-21.63	AVG	
7		0.6850	45.19	0.00	45.19	56.00	-10.81	QP	
8		0.6850	25.88	0.00	25.88	46.00	-20.12	AVG	
9		1.8200	41.21	0.00	41.21	56.00	-14.79	QP	
10		1.8200	20.19	0.00	20.19	46.00	-25.81	AVG	
11		8.9500	39.29	0.00	39.29	60.00	-20.71	QP	
12		8.9500	22.18	0.00	22.18	50.00	-27.82	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Cai

6. Radiated Emission Test

6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

When spectrum scanned from 30 MHz to 1GHz setting resolution bandwidth 120 kHz and video bandwidth 300kHz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	120kHz
VB	300kHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

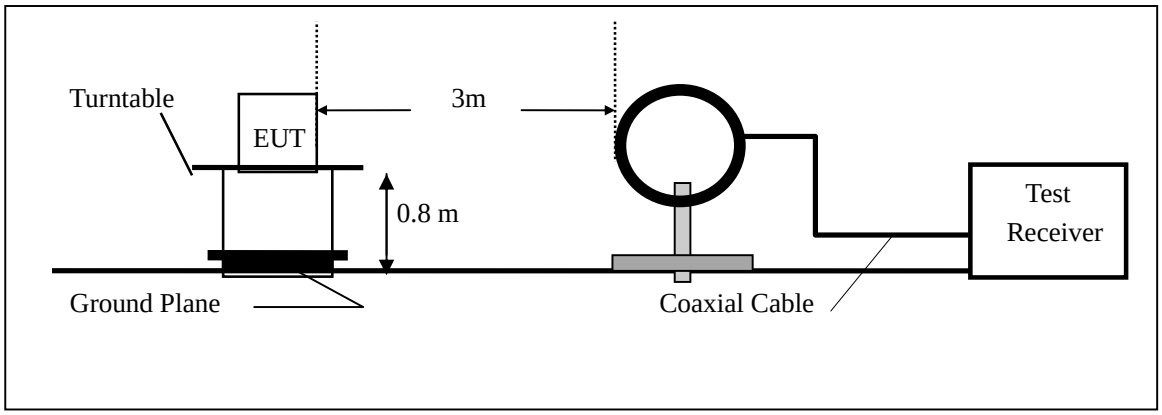
EMI Test Receiver	Setting
Attenuation	Auto
RB	1M
VB	3M
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

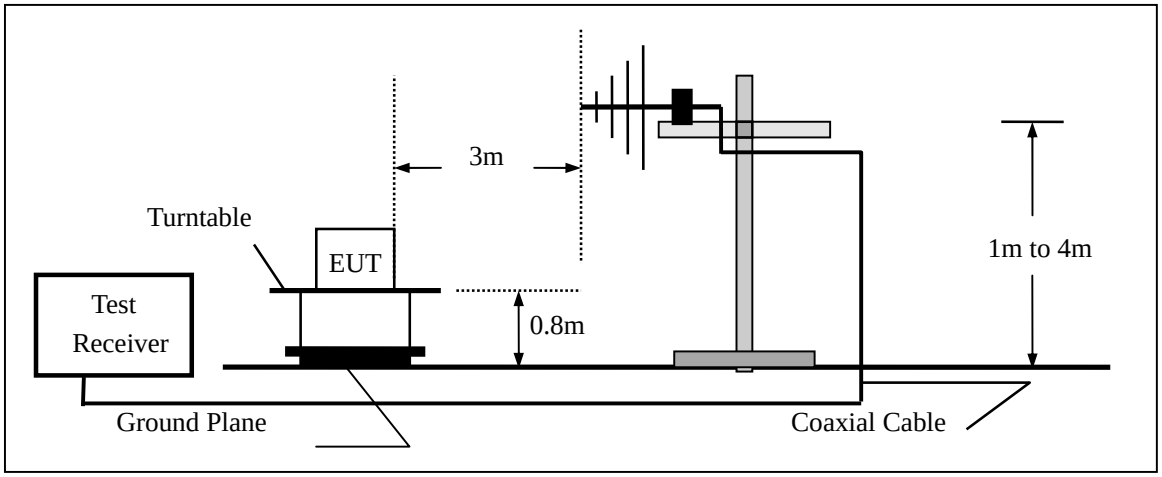
EMI Test Receiver	Setting
Attenuation	Auto
RB	1M
VB	10Hz
Detector	Peak
Trace	Max hold

6.2 Test SET-UP (Block Diagram of Configuration)

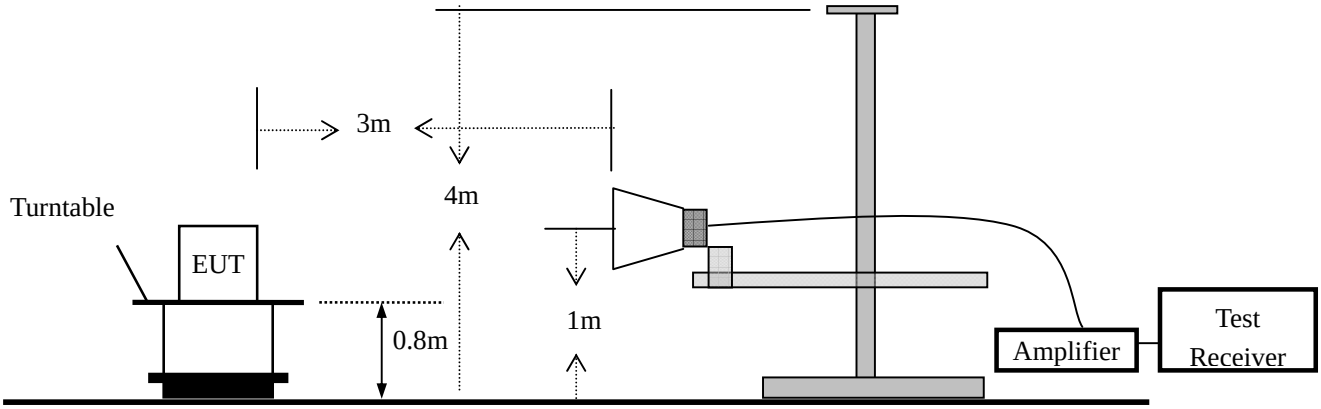
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



6.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/17/2014	05/16/2015
Pre-Amplifier	HP	8447D	2944A07999	05/17/2014	05/16/2015
Bilog Antenna	Schwarzbeck	VULB9163	142	05/17/2014	05/16/2015
Loop Antenna	ARA	PLA-1030/B	1029	05/17/2014	05/16/2015
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/17/2014	05/16/2015
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	ACRX1	05/17/2014	05/16/2015
Cable	Rosenberger	N/A	FP2RX2	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	CRPX1	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	CRRX2	05/17/2014	05/16/2015

6.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Frequencies (MHz)	Field Strength (micorvolts/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

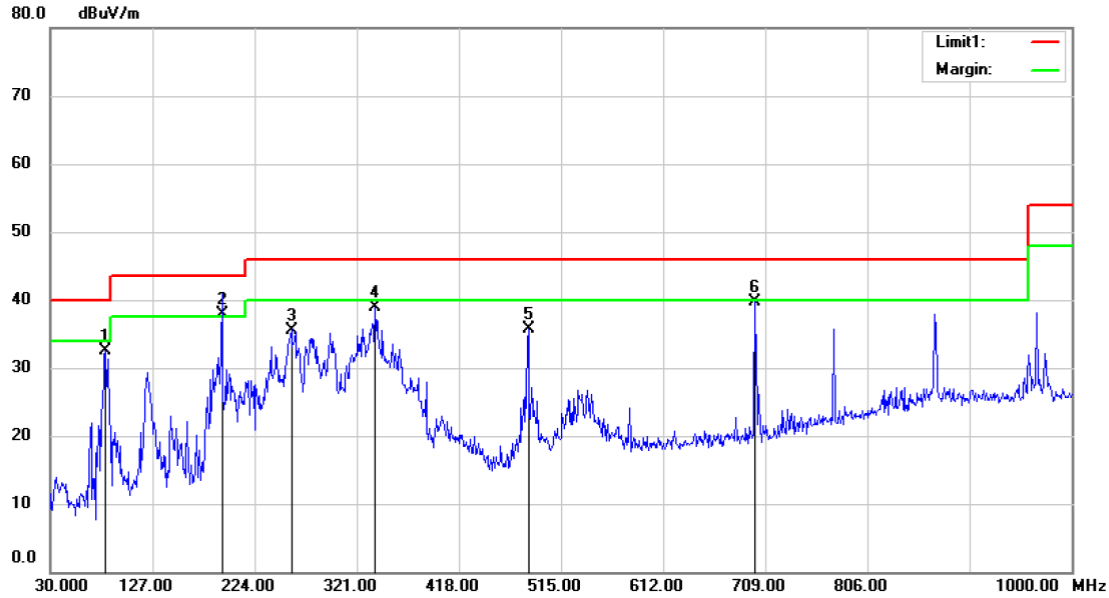
15.205 Restricted bands of operation

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])

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

6.5 Measurement Result

All the modulation modes with all adapters were tested the data of the worst mode (802.11b) are recorded in the following pages.



Site :Radiated 3M 3# Polarization: ***Horizontal*** Temperature: 24 C

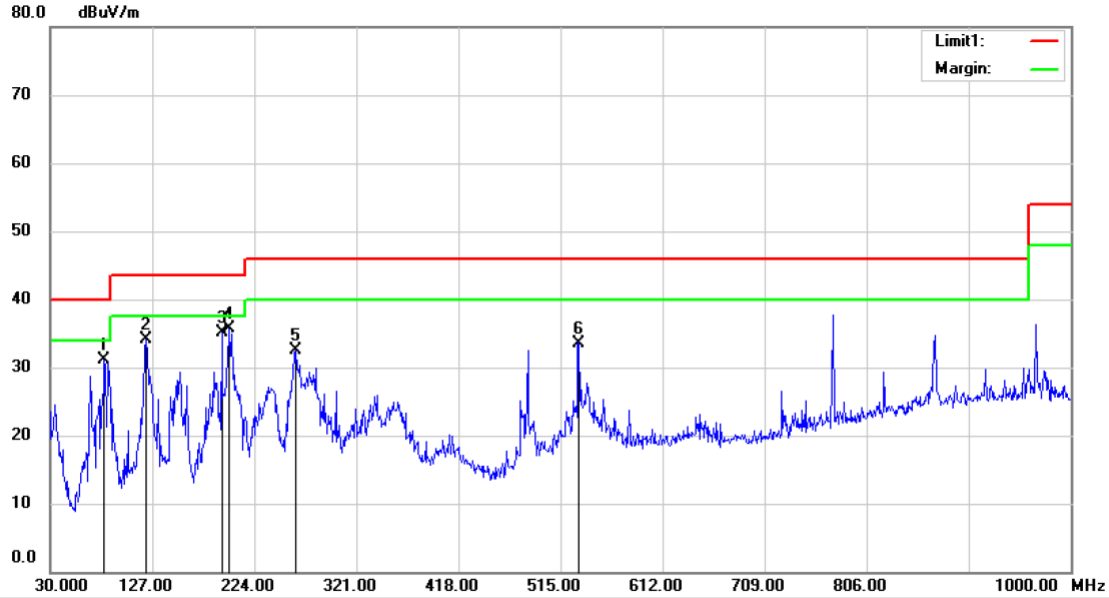
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH1

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		82.3800	51.56	-18.98	32.58	40.00	-7.42	QP			
2	*	192.9600	55.01	-17.01	38.00	43.50	-5.50	QP			
3		258.9200	48.45	-12.85	35.60	46.00	-10.40	QP			
4		338.4600	51.41	-12.55	38.86	46.00	-7.14	QP			
5		483.9600	44.89	-9.18	35.71	46.00	-10.29	QP			
6		699.3000	45.68	-5.99	39.69	46.00	-6.31	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP



Site :Radiated 3M 3# Polarization: ***Vertical*** Temperature: 24 C

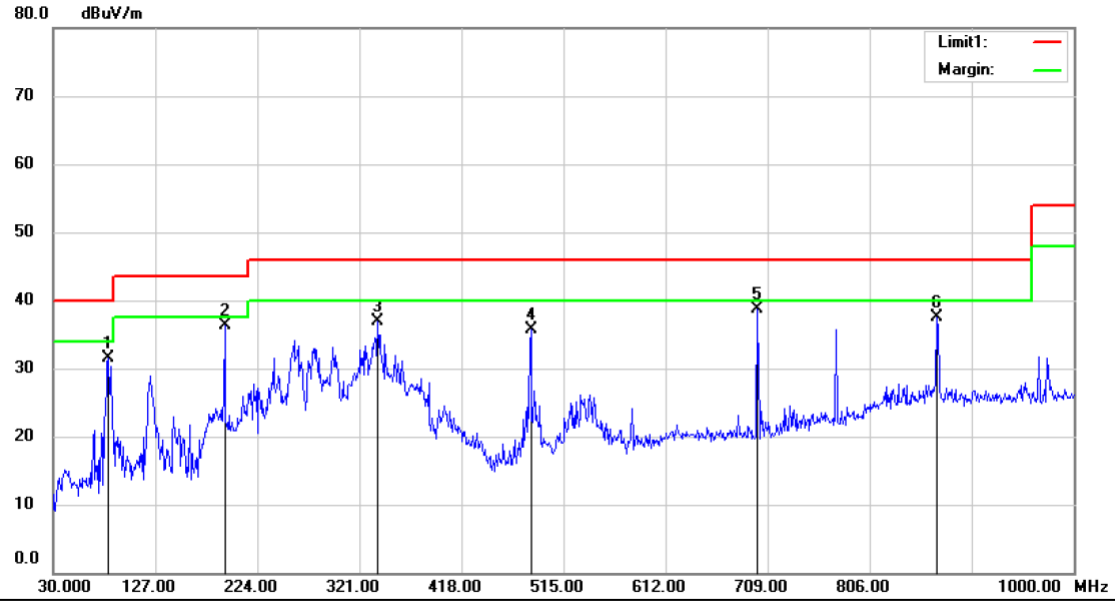
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH1

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		81.4100	50.19	-19.15	31.04	40.00	-8.96	QP			
2		121.1800	50.53	-16.45	34.08	43.50	-9.42	QP			
3		192.9600	52.03	-17.01	35.02	43.50	-8.48	QP			
4	*	199.7500	52.11	-16.42	35.69	43.50	-7.81	QP			
5		263.7700	45.26	-12.75	32.51	46.00	-13.49	QP			
6		532.4600	41.13	-7.53	33.60	46.00	-12.40	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP



Site 3m Chamber #3 Polarization: ***Horizontal*** Temperature: 24 C

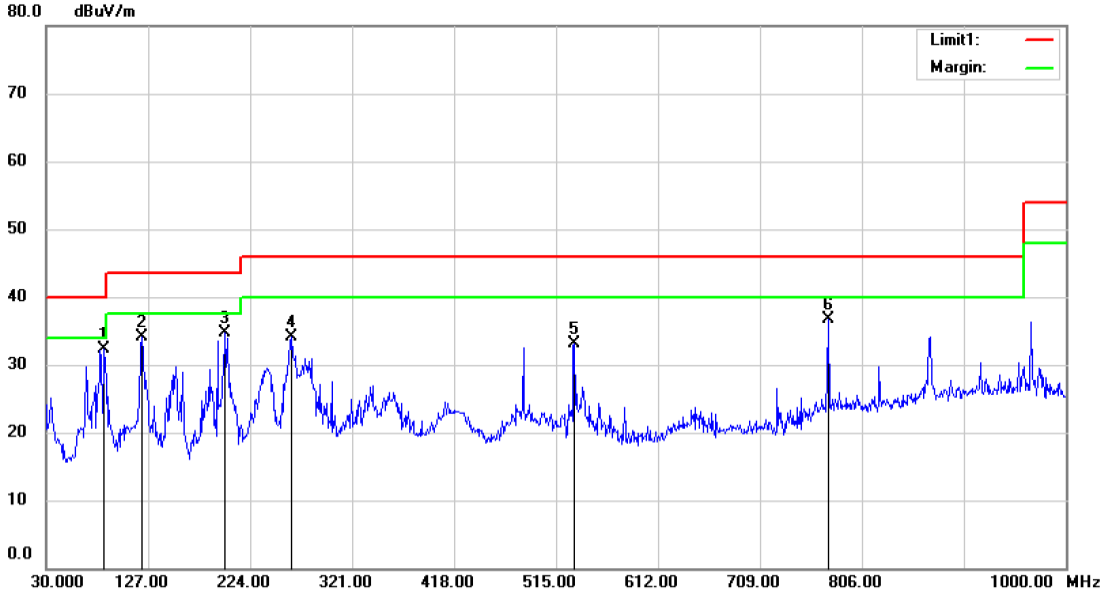
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH6

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		82.3800	50.56	-18.98	31.58	40.00	-8.42	QP			
2	*	192.9600	53.37	-17.01	36.36	43.50	-7.14	QP			
3		338.4600	49.41	-12.55	36.86	46.00	-9.14	QP			
4		483.9600	44.89	-9.18	35.71	46.00	-10.29	QP			
5		699.3000	44.68	-5.99	38.69	46.00	-7.31	QP			
6		870.0200	38.75	-1.30	37.45	46.00	-8.55	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP



Site 3m Chamber #3 Polarization: *Vertical* Temperature: 24 C

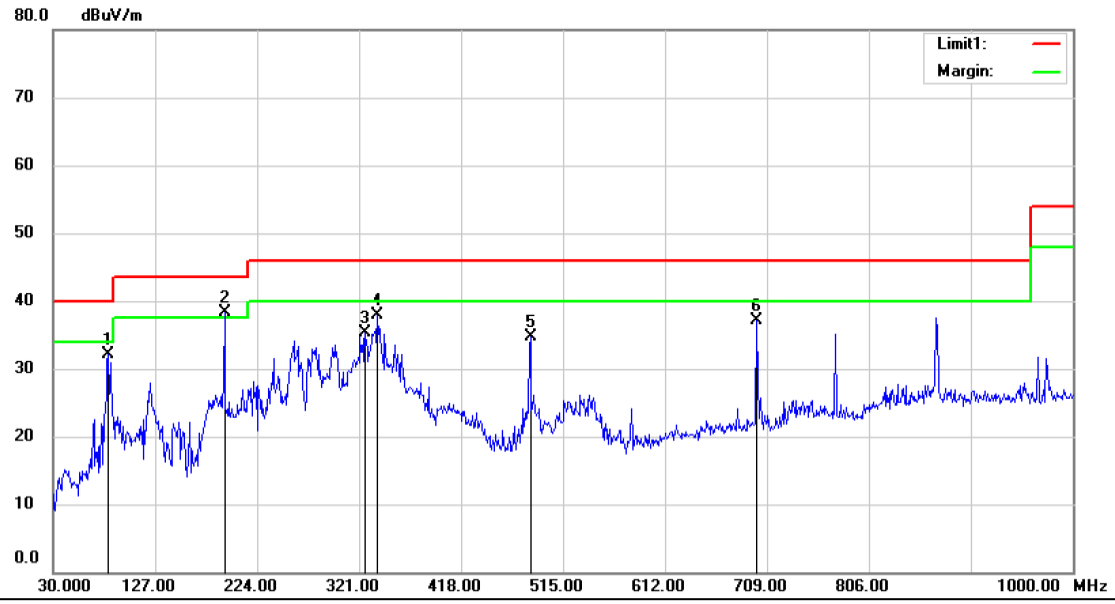
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH6

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	85.2900	50.68	-18.41	32.27	40.00	-7.73	QP			
2		121.1800	50.53	-16.45	34.08	43.50	-9.42	QP			
3		199.7500	51.11	-16.42	34.69	43.50	-8.81	QP			
4		263.7700	46.76	-12.75	34.01	46.00	-11.99	QP			
5		532.4600	40.63	-7.53	33.10	46.00	-12.90	QP			
6		773.9900	40.43	-3.69	36.74	46.00	-9.26	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP



Site 3m Chamber #3 Polarization: ***Horizontal*** Temperature: 24 C

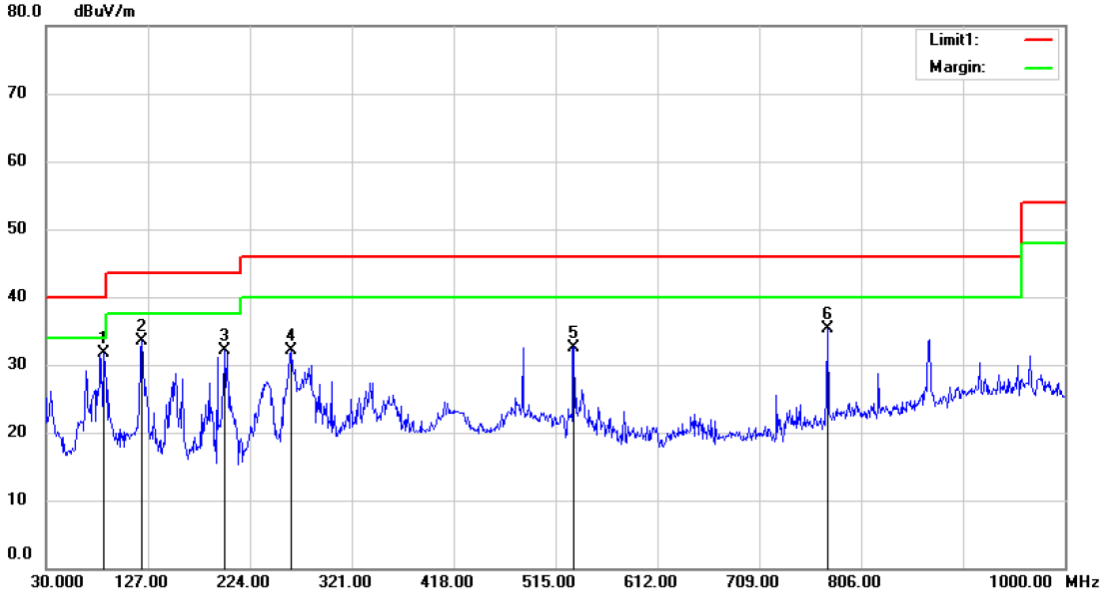
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH11

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		82.3800	51.06	-18.98	32.08	40.00	-7.92	QP			
2	*	192.9600	55.37	-17.01	38.36	43.50	-5.14	QP			
3		326.8200	48.37	-13.15	35.22	46.00	-10.78	QP			
4		338.4600	50.41	-12.55	37.86	46.00	-8.14	QP			
5		483.9600	43.89	-9.18	34.71	46.00	-11.29	QP			
6		699.3000	43.18	-5.99	37.19	46.00	-8.81	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP



Site 3m Chamber #3 Polarization: ***Vertical*** Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode:TX CH11

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	85.2900	50.18	-18.41	31.77	40.00	-8.23	QP			
2		121.1800	50.03	-16.45	33.58	43.50	-9.92	QP			
3		199.7500	48.61	-16.42	32.19	43.50	-11.31	QP			
4		263.7700	44.76	-12.75	32.01	46.00	-13.99	QP			
5		532.4600	40.13	-7.53	32.60	46.00	-13.40	QP			
6		773.9900	38.93	-3.69	35.24	46.00	-10.76	QP			

*:Maximum data x:Over limit !:over margin Operator: SYP

Operation Mode:	802.11b TX Channel 1	Test Date :	September 16, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) AV
4824.00	V	54.19	44.17	74.00	54.00	-19.81	-9.83
7236.00	V	56.09	44.77	74.00	54.00	-17.91	-9.23
9648.00	V	57.92	46.83	74.00	54.00	-16.08	-7.17
12060.00	V	61.23	49.68	74.00	54.00	-12.77	-4.32
14472.00	V	64.13	49.30	74.00	54.00	-9.87	-4.70
16884.00	V	64.34	49.65	74.00	54.00	-9.66	-4.35
4824.00	H	54.20	44.12	74.00	54.00	-19.80	-9.88
7236.00	H	56.59	45.63	74.00	54.00	-17.41	-8.37
9648.00	H	58.18	48.36	74.00	54.00	-15.82	-5.64
12060.00	H	59.81	47.68	74.00	54.00	-14.19	-6.32
14472.00	H	60.53	47.45	74.00	54.00	-13.47	-6.55
16884.00	H	63.55	50.08	74.00	54.00	-10.45	-3.92

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(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.

Operation Mode:	802.11b TX Channel 7	Test Date :	September 16, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4874.00	V	55.35	44.90	74.00	54.00	-18.65	-9.10
7311.00	V	57.25	45.50	74.00	54.00	-16.75	-8.50
9748.00	V	59.08	47.56	74.00	54.00	-14.92	-6.44
12185.00	V	62.39	50.41	74.00	54.00	-11.61	-3.59
14622.00	V	65.29	49.82	74.00	54.00	-8.71	-4.18
17059.00	V	65.50	50.38	74.00	54.00	-8.50	-3.62
4874.00	H	55.36	44.85	74.00	54.00	-18.64	-9.15
7311.00	H	57.75	46.36	74.00	54.00	-16.25	-7.64
9748.00	H	59.34	48.59	74.00	54.00	-14.66	-5.41
12185.00	H	60.97	47.91	74.00	54.00	-13.03	-6.09
14622.00	H	61.69	47.48	74.00	54.00	-12.31	-6.52
17059.00	H	64.71	50.81	74.00	54.00	-9.29	-3.19

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(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.

Operation Mode:	802.11b TX Channel 11	Test Date :	September 16, 2014
Frequency Range:	Above 1GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Measured Distance:	3m	Test By:	KK

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4924.00	V	55.17	44.86	74.00	54.00	-18.83	-9.14
7386.00	V	57.07	45.46	74.00	54.00	-16.93	-8.54
9848.00	V	58.90	47.52	74.00	54.00	-15.10	-6.48
12310.00	V	62.21	50.37	74.00	54.00	-11.79	-3.63
14772.00	V	65.11	49.99	74.00	54.00	-8.89	-4.01
17234.00	V	65.32	50.34	74.00	54.00	-8.68	-3.66
4924.00	H	55.18	44.81	74.00	54.00	-18.82	-9.19
7386.00	H	57.57	46.32	74.00	54.00	-16.43	-7.68
9848.00	H	59.16	49.05	74.00	54.00	-14.84	-4.95
12310.00	H	60.79	48.37	74.00	54.00	-13.21	-5.63
14772.00	H	61.51	48.14	74.00	54.00	-12.49	-5.86
17234.00	H	64.53	50.77	74.00	54.00	-9.47	-3.23

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(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.

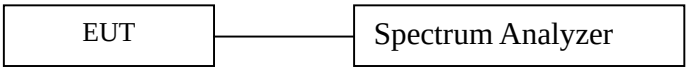
7. 6dB Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in IEEE 802.11b/g/n mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequency) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015

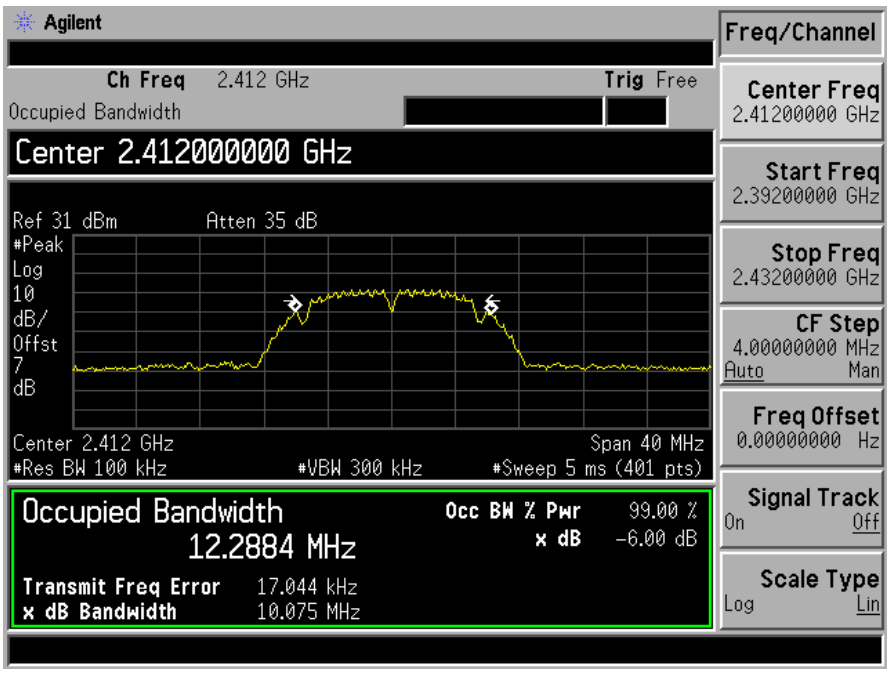
7.4 Measurement Results

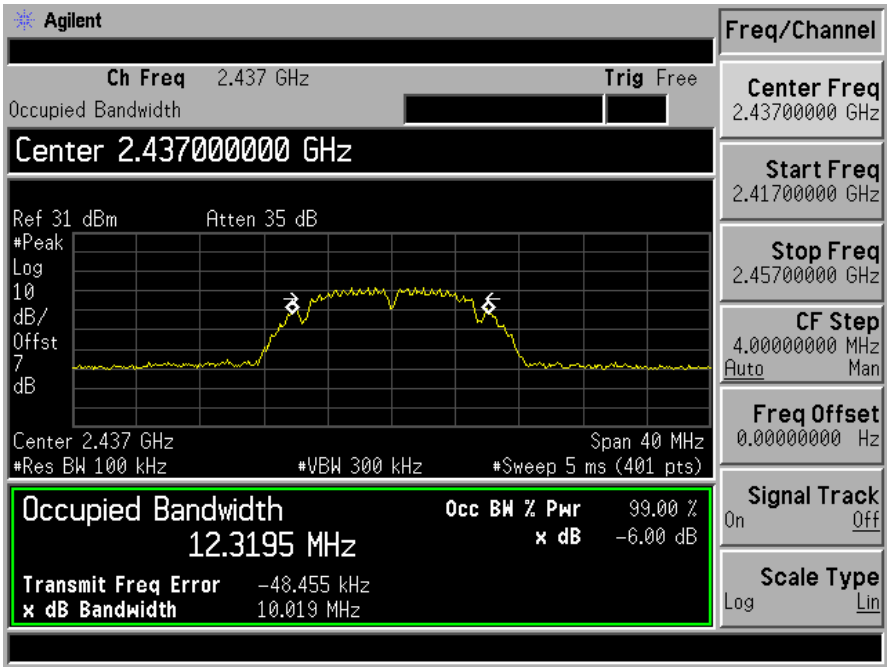
6 Bandwidth Test Data Chart:
Refer to attached data chart.

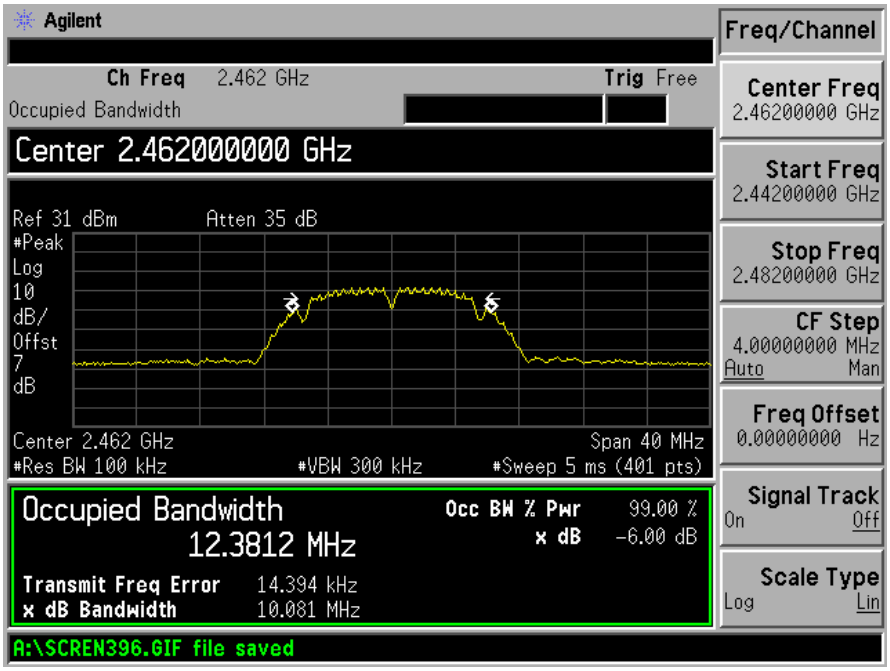
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11b

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (kHz)
1	2412	10.075	>500
6	2437	10.019	>500
11	2462	10.081	>500



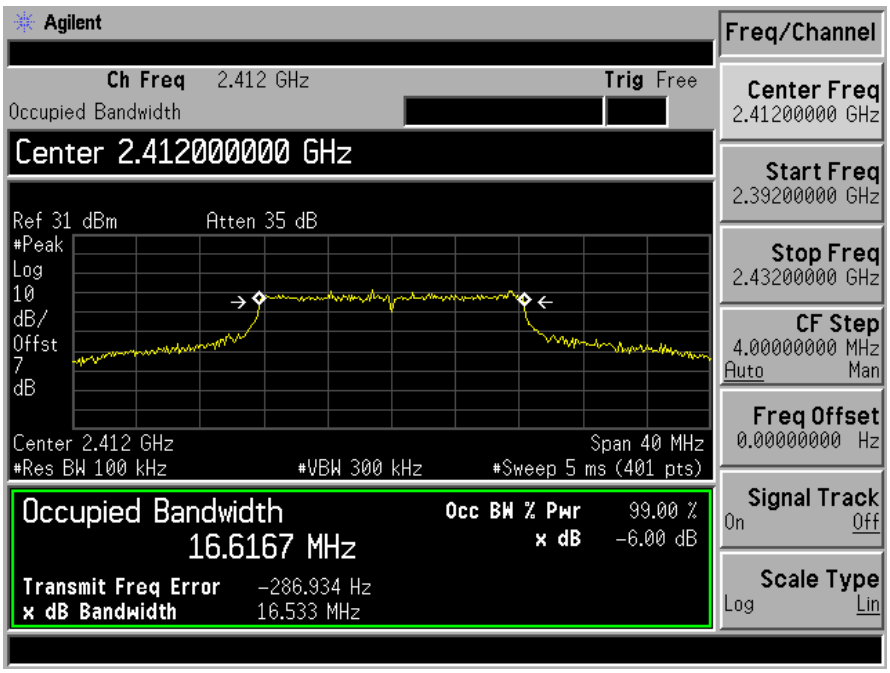

Agilent
Ch Freq 2.437 GHz
Trig Free
Occupied Bandwidth
Center 2.437000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.437 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
12.3195 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -48.455 kHz
x dB Bandwidth 10.019 MHz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.45700000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

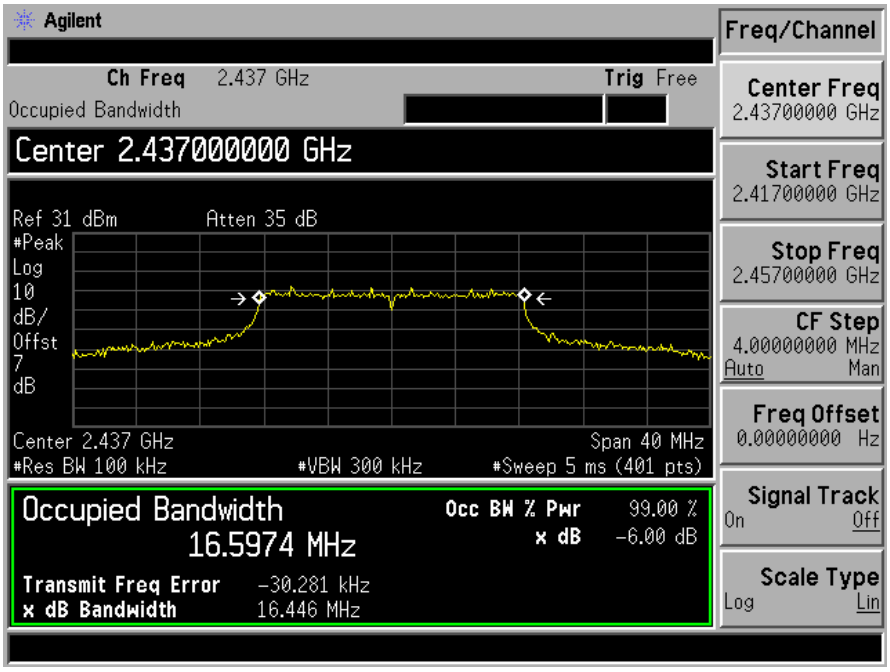

Agilent
Ch Freq 2.462 GHz
Trig Free
Occupied Bandwidth
Center 2.462000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.462 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
12.3812 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 14.394 kHz
x dB Bandwidth 10.081 MHz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.44200000 GHz
Stop Freq
2.48200000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin
A:\SCREN396.GIF file saved

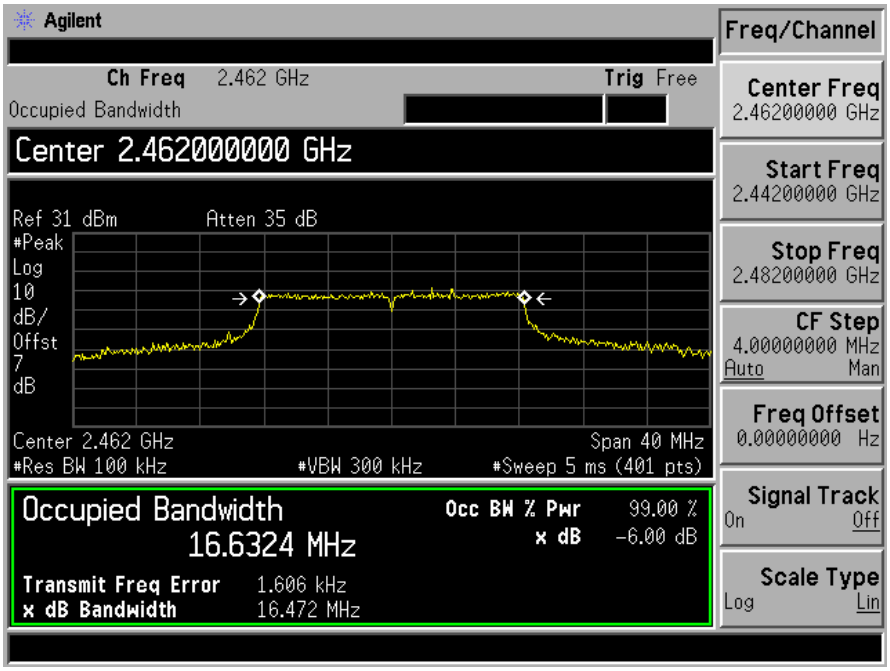
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11g

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (kHz)
1	2412	16.533	>500
6	2437	16.446	>500
11	2462	16.472	>500



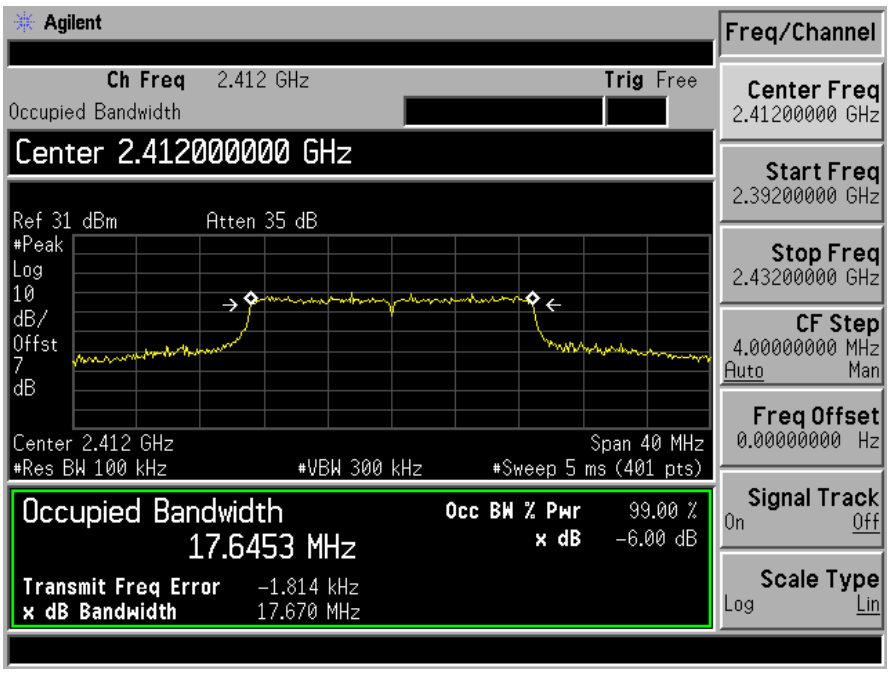

Agilent
Ch Freq 2.437 GHz
Trig Free
Occupied Bandwidth
Center 2.437000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.437 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
16.5974 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -30.281 kHz
x dB Bandwidth 16.446 MHz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.45700000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

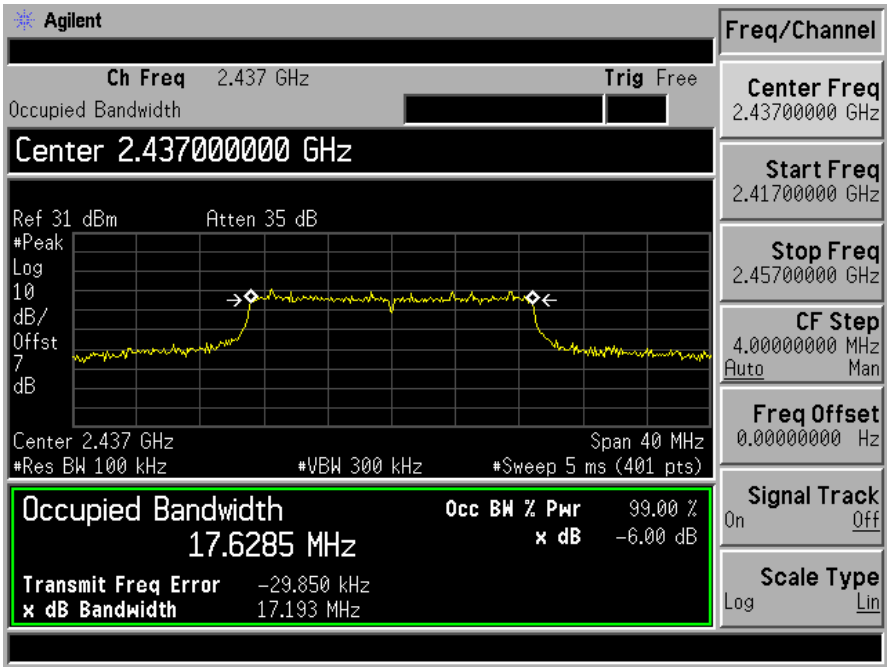

Agilent
Ch Freq 2.462 GHz
Trig Free
Occupied Bandwidth
Center 2.462000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.462 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
16.6324 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 1.606 kHz
x dB Bandwidth 16.472 MHz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.44200000 GHz
Stop Freq
2.48200000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

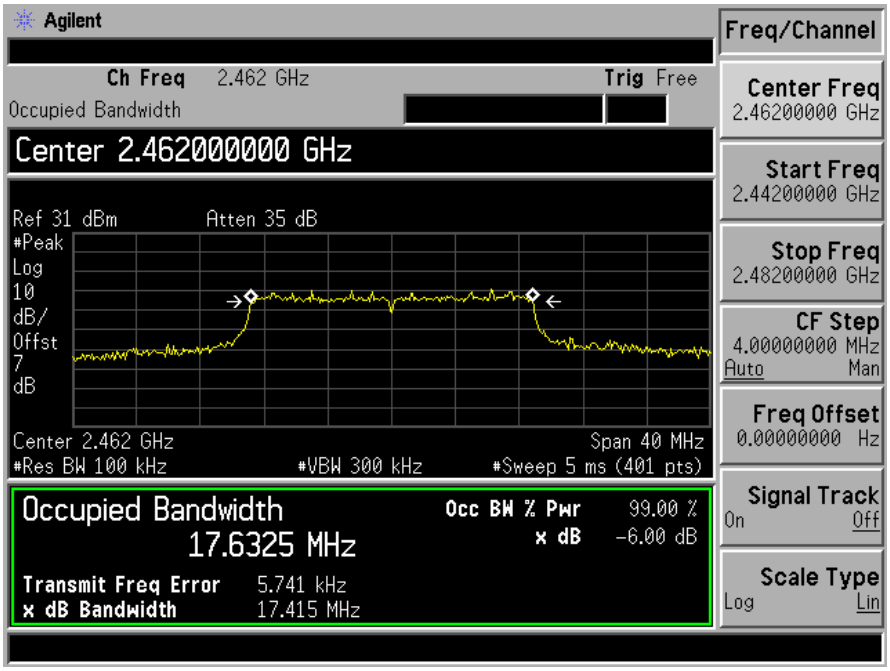
Spectrum Detector:	PK	Test Date :	October17, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11n HT 20

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (kHz)
1	2412	17.670	>500
6	2437	17.193	>500
11	2462	17.415	>500



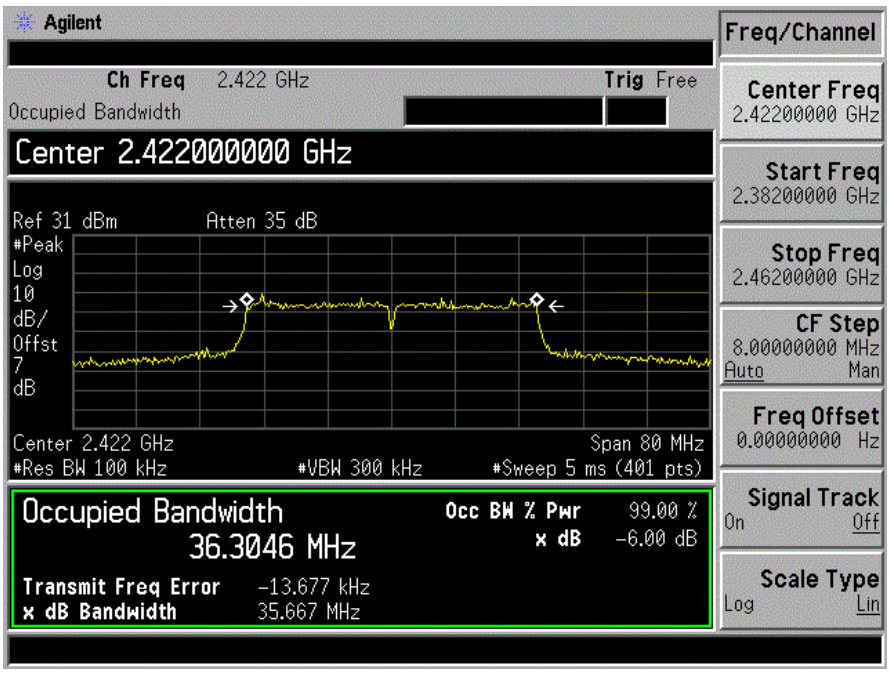

Agilent
Ch Freq 2.437 GHz
Trig Free
Occupied Bandwidth
Center 2.437000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.437 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
17.6285 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -29.850 kHz
x dB Bandwidth 17.193 MHz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.45700000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

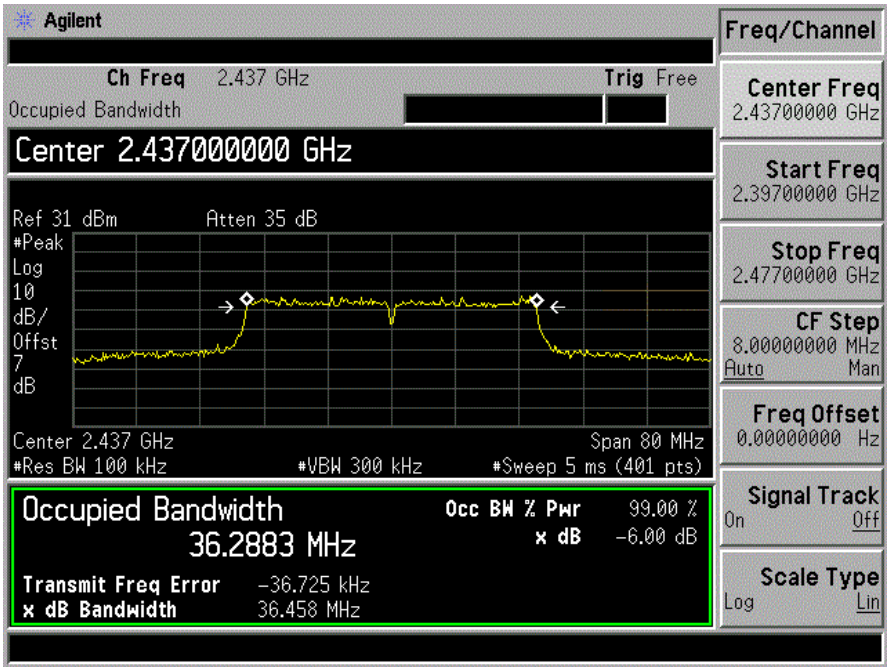

Agilent
Ch Freq 2.462 GHz
Trig Free
Occupied Bandwidth
Center 2.462000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.462 GHz
Span 40 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
17.6325 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 5.741 kHz
x dB Bandwidth 17.415 MHz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.44200000 GHz
Stop Freq
2.48200000 GHz
CF Step
4.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

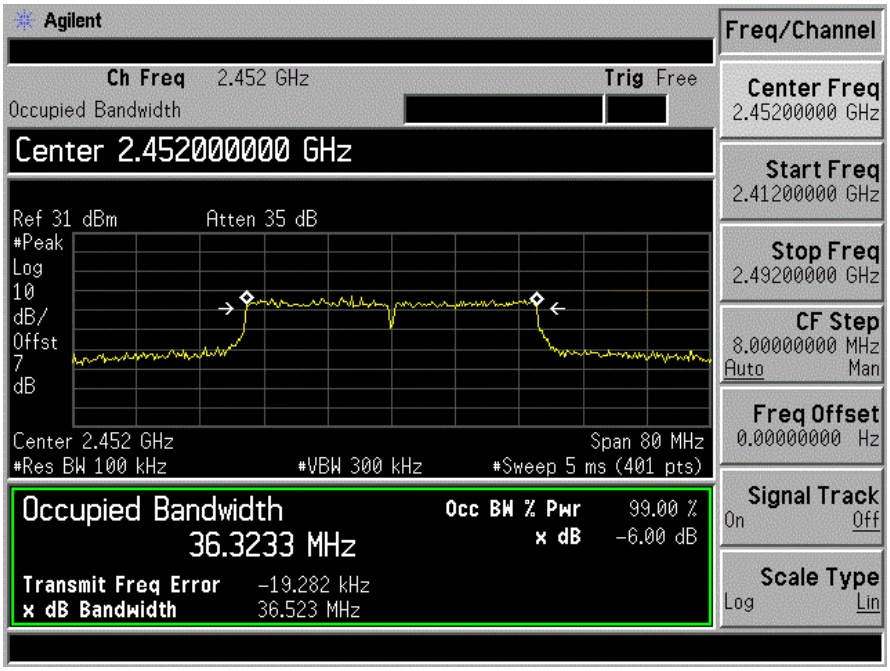
Spectrum Detector:	PK	Test Date :	October17, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11n HT40

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (kHz)
3	2422	36.667	>500
6	2437	36.458	>500
9	2452	36.523	>500




Agilent
Ch Freq 2.437 GHz
Trig Free
Occupied Bandwidth
Center 2.437000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.437 GHz
Span 80 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
36.2883 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -36.725 kHz
x dB Bandwidth 36.458 MHz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.39700000 GHz
Stop Freq
2.47700000 GHz
CF Step
8.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

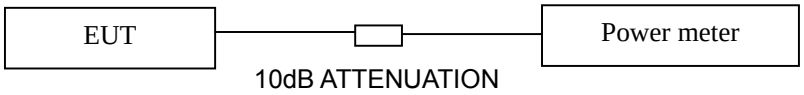

Agilent
Ch Freq 2.452 GHz
Trig Free
Occupied Bandwidth
Center 2.452000000 GHz
Ref 31 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
7
dB
Center 2.452 GHz
Span 80 MHz
#Res BW 100 kHz
#VBW 300 kHz
#Sweep 5 ms (401 pts)
Occupied Bandwidth
36.3233 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -19.282 kHz
x dB Bandwidth 36.523 MHz
Freq/Channel
Center Freq
2.45200000 GHz
Start Freq
2.41200000 GHz
Stop Freq
2.49200000 GHz
CF Step
8.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

8. Maximum Peak Output Power Test

8.1 Measurement Procedure

a. The testing follows FCC public Notice DA 00-705 Measurement Guidelines.
b. The RF output of EUT was connected to the power meter by RF cable and attnuator. The path loss was compensated to the results for each measurement.
c. Set to the maximum output power setting and enable the EUT transmit continuously.
d. Measure the conducted output power with cable loss and record the results in the test report.
e. Measure and record the results in the report.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

EQUIPMENT TYPE	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	ML2495A	0824006	05/17/2014	05/16/2015
Power sensor	MA2411B	0738172	05/17/2014	05/16/2015

8.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

8.5 Measurement Results

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
802.11n HT40: 2422-2452MHz
Antenna gain: Chain A: 1.8dBi, Chain B:1.8dBi,
Directional Gain= G_{ANT}+10log(N_{ANT})dBi=4.35dBi (MIMO)

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11b Chain A

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	16.13	1W(30dBm)	PASS
6	2437.00	15.76	1W(30dBm)	PASS
11	2462.00	15.90	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11b Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	15.97	1W(30dBm)	PASS
6	2437.00	15.74	1W(30dBm)	PASS
11	2462.00	15.88	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11g Chain A

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	**18.93**	1W(30dBm)	PASS
6	2437.00	18.79	1W(30dBm)	PASS
11	2462.00	18.57	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11g Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	18.92	1W(30dBm)	PASS
6	2437.00	18.43	1W(30dBm)	PASS
11	2462.00	18.66	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT20 Chain A

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	18.11	1W(30dBm)	PASS
6	2437.00	18.05	1W(30dBm)	PASS
11	2462.00	17.75	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT20 Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	17.99	1W(30dBm)	PASS
6	2437.00	17.58	1W(30dBm)	PASS
11	2462.00	17.29	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT20 Chain A+ Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	21.06	1W(30dBm)	PASS
6	2437.00	20.83	1W(30dBm)	PASS
11	2462.00	20.54	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT40 Chain A

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
3	2422.00	17.13	1W(30dBm)	PASS
6	2437.00	17.05	1W(30dBm)	PASS
9	2452.00	16.69	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT40 Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
3	2422.00	16.78	1W(30dBm)	PASS
6	2437.00	16.57	1W(30dBm)	PASS
9	2452.00	16.54	1W(30dBm)	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT40 Chain A+ Chain B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
3	2422.00	19.97	1W(30dBm)	PASS
6	2437.00	19.83	1W(30dBm)	PASS
9	2452.00	19.63	1W(30dBm)	PASS

9. Band Edge Test

9.1 Measurement Procedure

a. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02.
b. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
c. The EUT was placed on a turntable with 0.8 meter above ground.
d. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
e. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
f. Use the following spectrum analyzer settings:
(1) Span shall wide enough to fully capture the emission being measured;
(2) Set RBW=100 kHz for f < 1 GHz; VBW⩾RBW; Sweep = auto; Detector function = peak; Trace = max hold;
(3) Set RBW = 1 MHz, VBW= 3MHz for f⩾1 GHz for peak measurement.
For average measurement:
VBW = 10 Hz, when duty cycle is no less than 98 percent.
VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

9.2 Test SET-UP (Block Diagram of Configuration)

As 6.2 Test set up (B) and (C)

9.3 Measurement Equipment Used

Same as 6.3 Radiated Emission Measurement.

9.4 Measurement Results

All the modulation modes were tested the data of the worst mode are recorded in the following pages.

Spectrum Detector:	PK/AV	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test channel:	1&11	Humidity:	53 %

802.11b –Lowest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2390.00	V	58.54	-3.54	55.00	74.00	-19.00	PK
2390.00	V	45.55	-3.54	42.01	54.00	-11.99	AV
2400.00	V	50.72	-3.51	47.21	Delta=48.79dBc		AV
2412.00	V	99.48	-3.48	96.00			AV

802.11b –Highest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2470.77	V	98.26	-3.35	94.91	/	/	PK
2470.91	V	89.79	-3.35	86.44	/	/	AV
2483.50	V	Delta=43.07dBc		51.84	74.00	-22.16	PK
2483.50	V			43.37	54.00	-10.63	AV

802.11g –Lowest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2390.00	V	60.64	-3.54	57.10	74.00	-16.90	PK
2390.00	V	48.77	-3.54	45.23	54.00	-8.77	AV
2400.00	V	48.83	-3.51	45.32	Delta=48.64dBc		AV
2412.00	V	97.44	-3.48	93.96			AV

802.11g –Highest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2472.22	V	97.24	-3.34	93.90	/	/	PK
2472.55	V	86.33	-3.35	82.98	/	/	AV
2483.50	V	Delta=42.67dBc		51.23	74.00	-22.77	PK
2483.50	V			40.31	54.00	-13.69	AV

802.11n HT20 –Lowest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2390.00	V	60.27	-3.54	56.73	74.00	-17.27	PK
2390.00	V	49.59	-3.54	46.05	54.00	-7.95	AV
2400.00	V	47.64	-3.51	44.13	Delta=50.08dBc		AV
2412.00	V	97.69	-3.48	94.21			AV

802.11n HT20 –Highest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2473.11	V	97.88	-3.35	94.53	/	/	PK
2470.95	V	88.05	-3.33	84.72	/	/	AV
2483.50	V	Delta=39.89dBc		54.64	74.00	-19.36	PK
2483.50	V			44.83	54.00	-9.17	AV

802.11n HT40 –Lowest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2390.00	V	62.21	-3.54	58.67	74.00	-15.33	PK
2390.00	V	49.44	-3.54	45.90	54.00	-8.10	AV
2400.00	V	51.16	-3.51	47.65	Delta=44.24dBc		AV
2420.32	V	95.35	-3.46	91.89			AV

802.11n HT40 –Highest Bandedge
Vertical(Worst case)

Frequency (MHz)	Polarity	Reading	Correct Factor	Result	Limited	Margin	Remark
		(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(Detector)
2452.87	V	92.51	-3.39	89.12	/	/	PK
2452.33	V	81.89	-3.38	78.51	/	/	AV
2483.50	V	Delta=42.75dBc		46.37	74.00	-27.63	PK
2483.50	V			35.76	54.00	-18.24	AV

10. Power Density

10.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015

10.2 Measuring Instruments and Setting

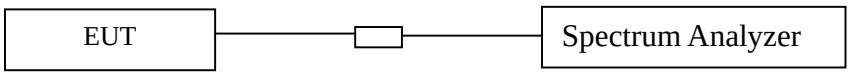
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS bandwidth.
RB	3kHz ≤RBW ≤100KHz
VB	3 x RBW
Detector	Peak
Trace	Max hold
Sweep Time	Automatic

10.3 Test Procedures

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set analyzer center frequency to DTS channel center frequency.
c. Set the analyzer span to a minimum of 1.5 times the DTS bandwidth.
d. Set the RBW ≥ 3 kHz. Set the VBW ≥ 3 x RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

10.4 Block Diagram of Test Setup



10.5 Limit

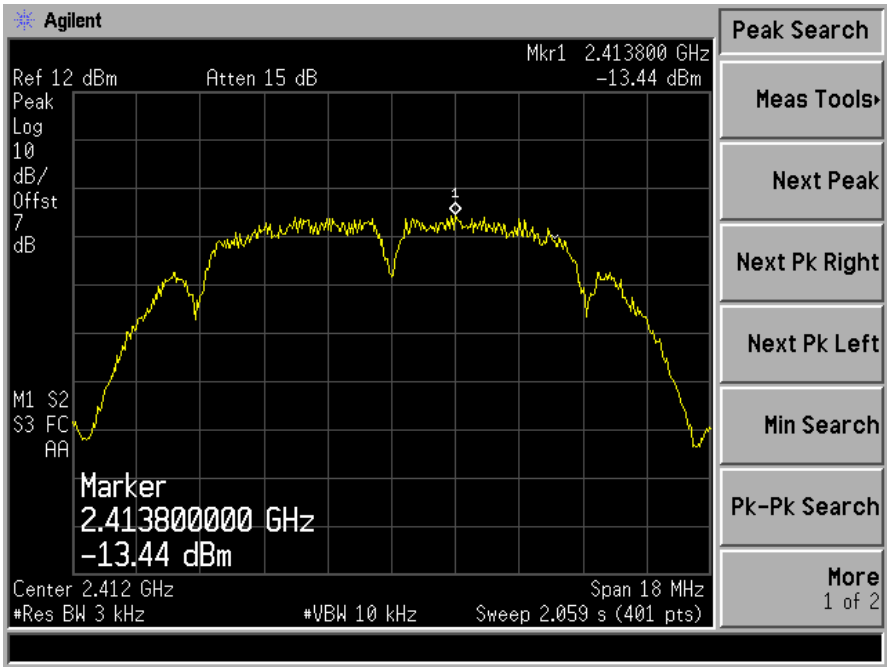
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

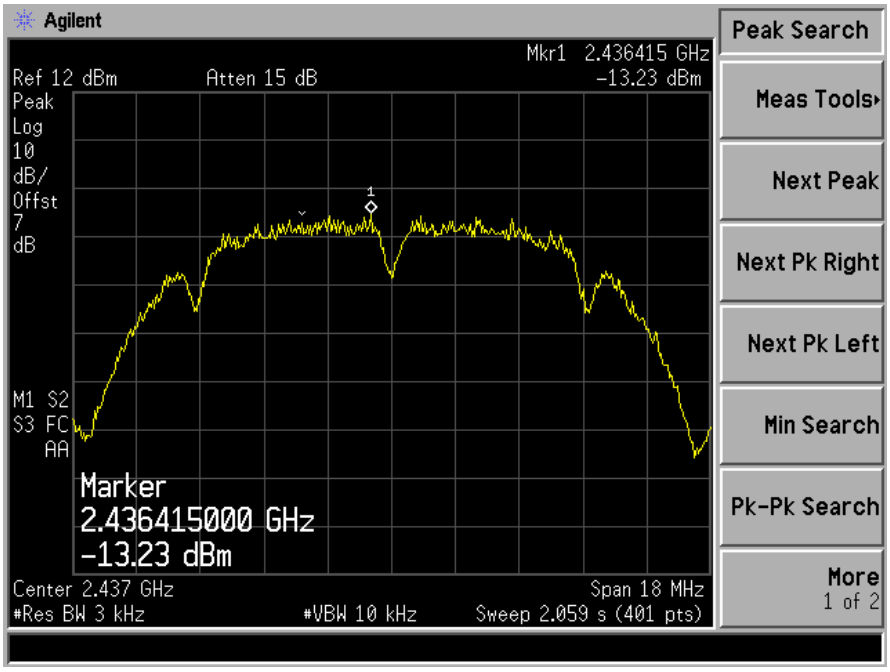
10.6 Test Result

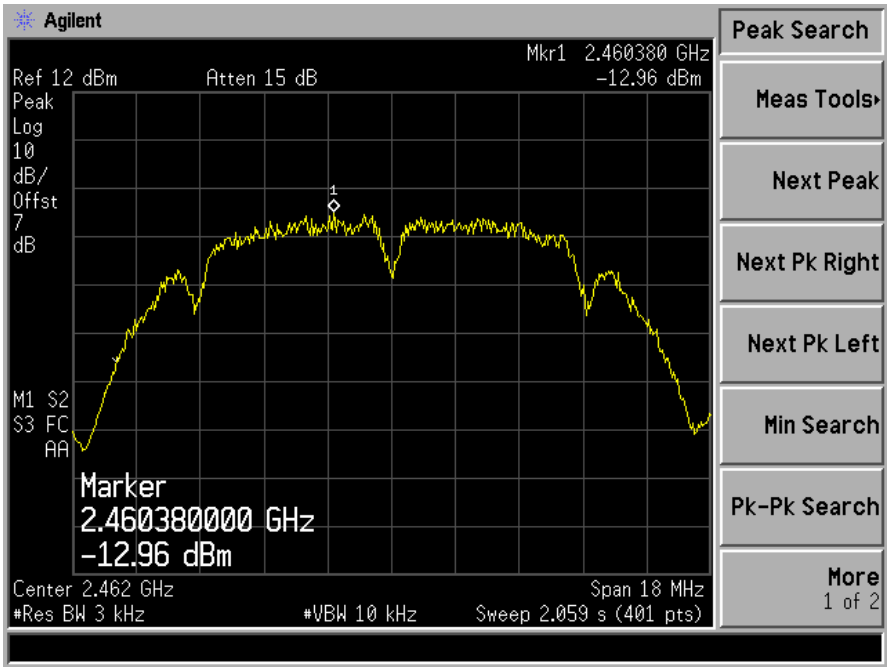
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11b Chain A

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-13.44	<8dBm	PASS
6	-13.23	<8dBm	PASS
11	-12.96	<8dBm	PASS



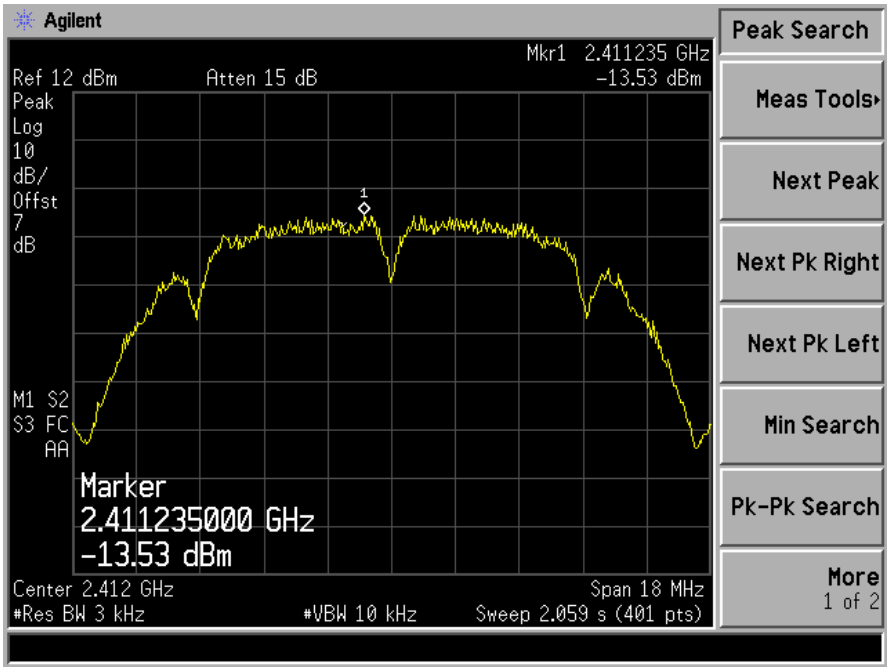

Agilent
Mkr1 2.436415 GHz
Ref 12 dBm
Atten 15 dB
-13.23 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.436415000 GHz
-13.23 dBm
Center 2.437 GHz
Span 18 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.059 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

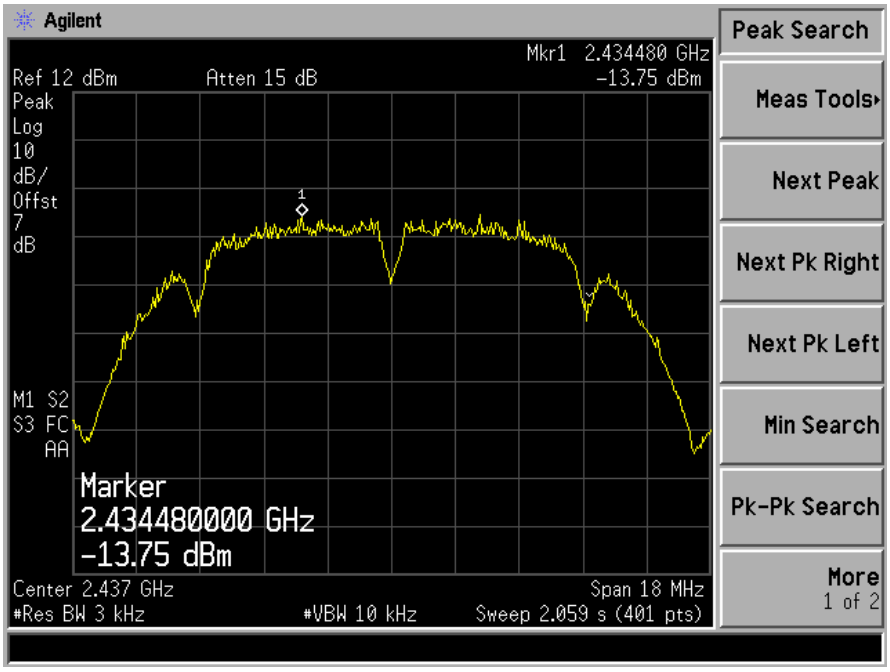

Agilent
Mkr1 2.460380 GHz
Ref 12 dBm
Atten 15 dB
-12.96 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.460380000 GHz
-12.96 dBm
Center 2.462 GHz
Span 18 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.059 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

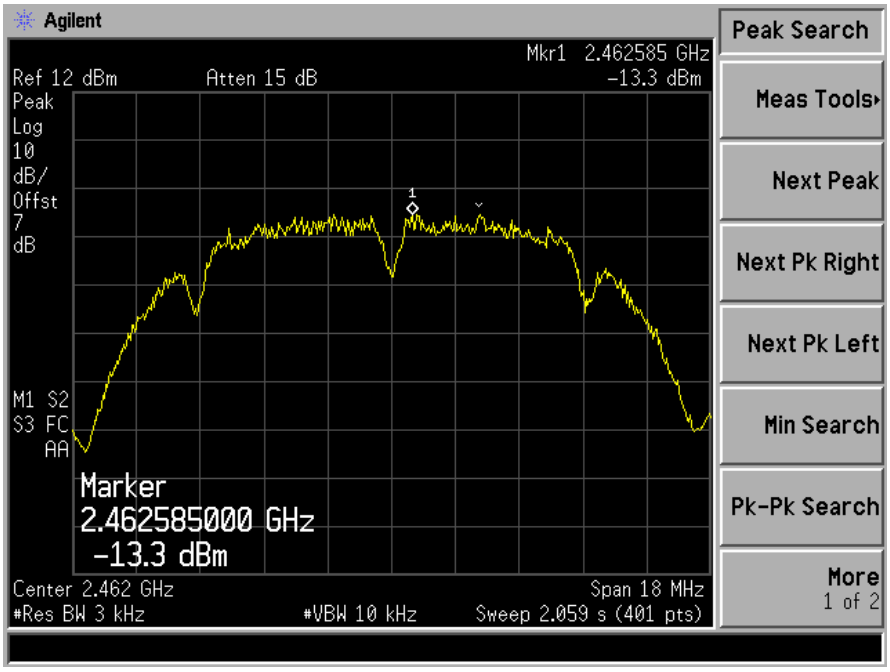
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11b Chain B

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-13.53	<8dBm	PASS
6	-13.75	<8dBm	PASS
11	-13.30	<8dBm	PASS



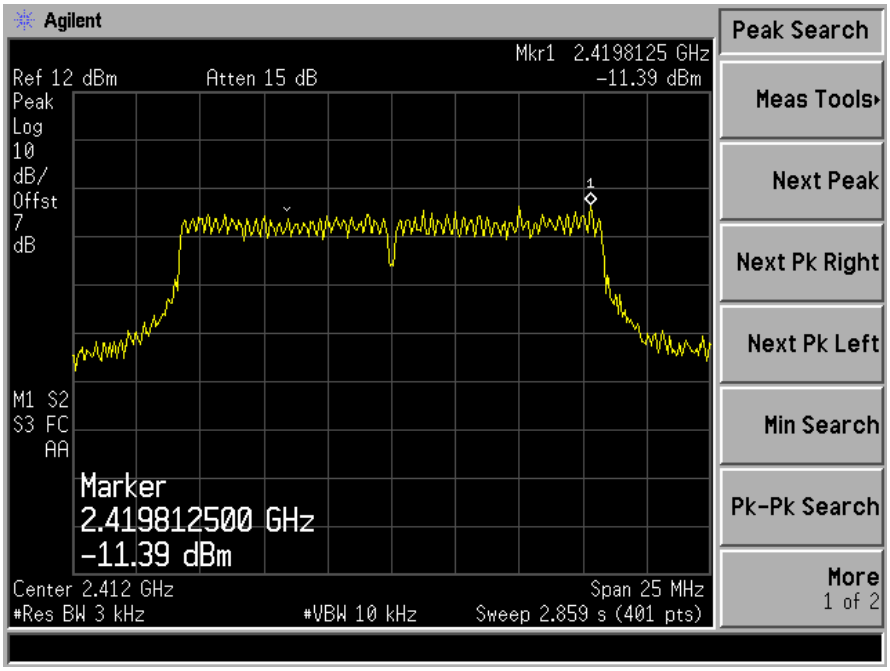

Agilent
Mkr1 2.434480 GHz
Ref 12 dBm
Atten 15 dB
-13.75 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.434480000 GHz
-13.75 dBm
Center 2.437 GHz
Span 18 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.059 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

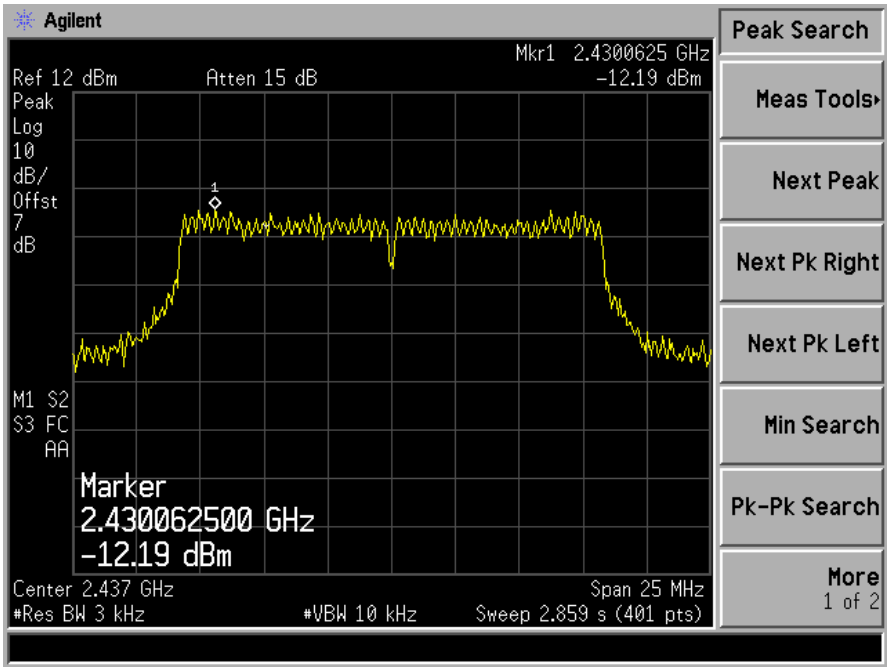

Agilent
Mkr1 2.462585 GHz
Ref 12 dBm
Atten 15 dB
-13.3 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.462585000 GHz
-13.3 dBm
Center 2.462 GHz
Span 18 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.059 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

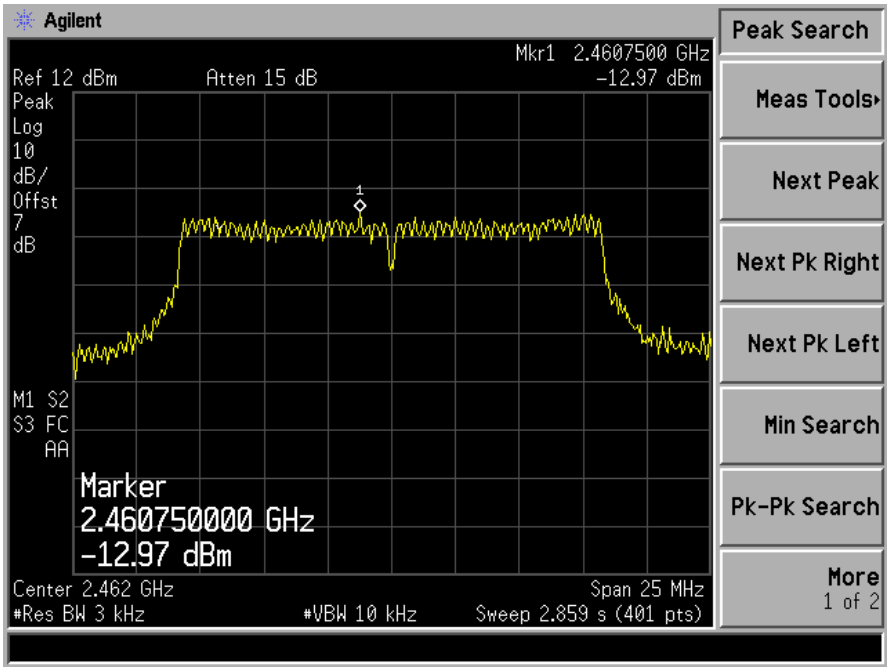
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11g Chain A

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-11.39	<8dBm	PASS
6	-12.19	<8dBm	PASS
11	-12.97	<8dBm	PASS



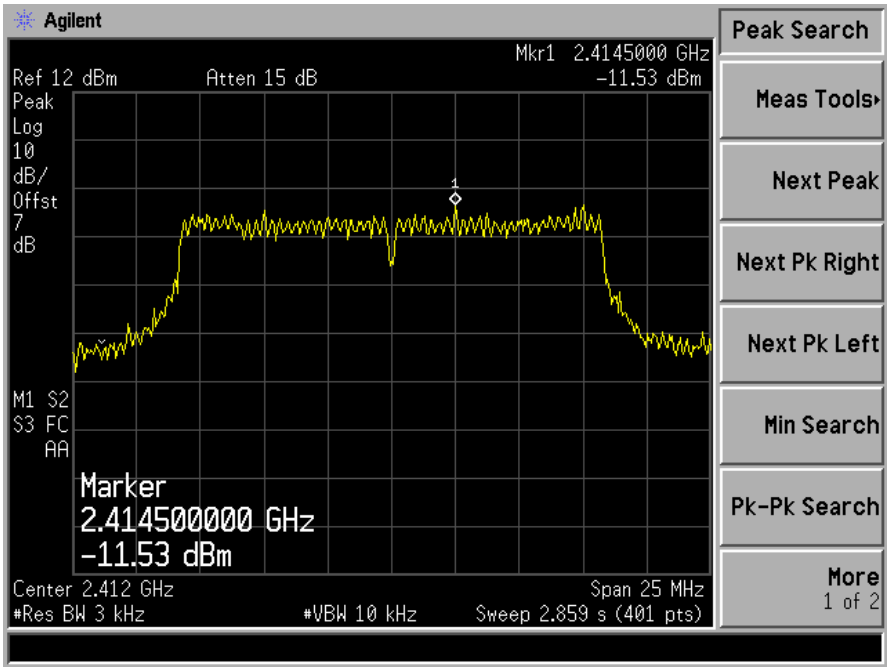

Agilent
Mkr1 2.4300625 GHz
Ref 12 dBm
Atten 15 dB
-12.19 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.430062500 GHz
-12.19 dBm
Center 2.437 GHz
Span 25 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.859 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

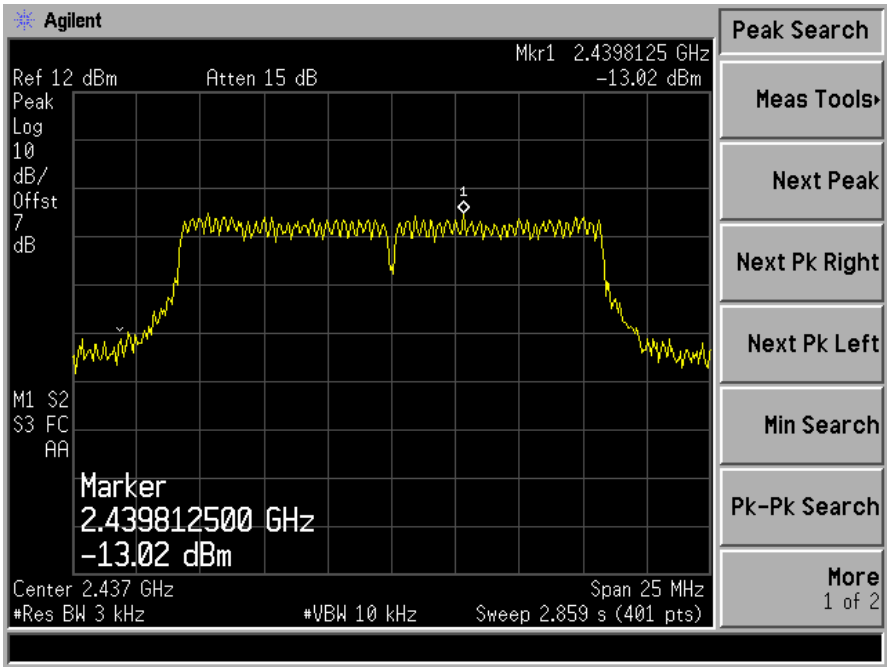

Agilent
Mkr1 2.4607500 GHz
Ref 12 dBm
Atten 15 dB
-12.97 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.460750000 GHz
-12.97 dBm
Center 2.462 GHz
Span 25 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.859 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

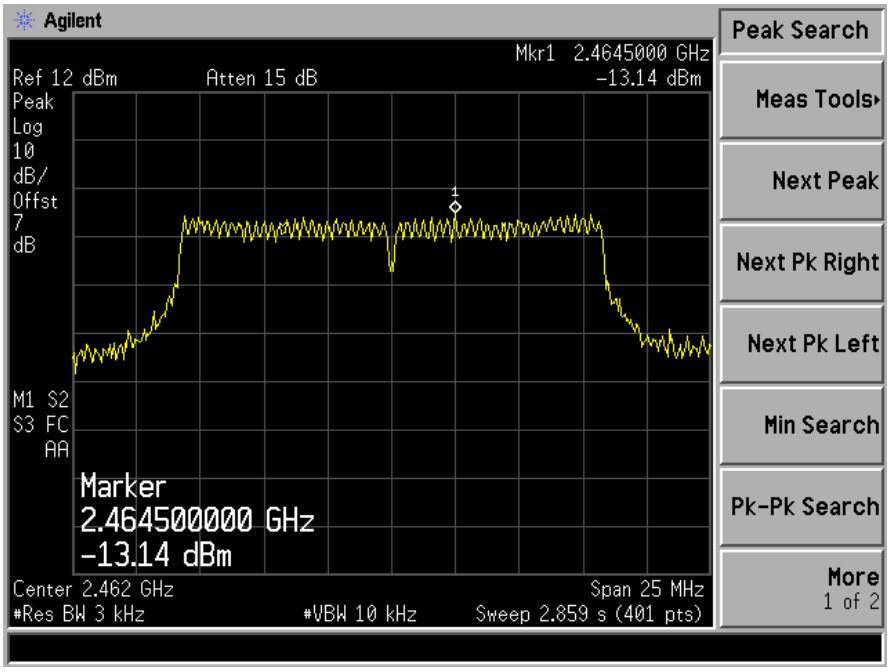
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11g Chain B

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-11.53	<8dBm	PASS
6	-13.02	<8dBm	PASS
11	-13.14	<8dBm	PASS




Agilent
Mkr1 2.4398125 GHz
Ref 12 dBm
Atten 15 dB
-13.02 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.439812500 GHz
-13.02 dBm
Center 2.437 GHz
Span 25 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.859 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
Mkr1 2.4645000 GHz
Ref 12 dBm
Atten 15 dB
-13.14 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.464500000 GHz
-13.14 dBm
Center 2.462 GHz
Span 25 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 2.859 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

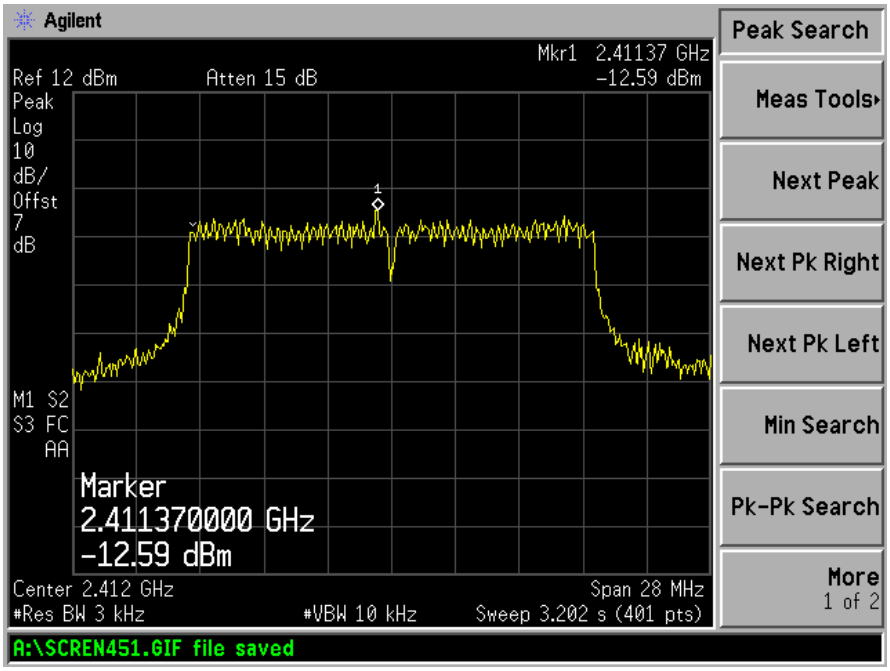
Operation Mode: 802.11n HT20 Chain A+ Chain B

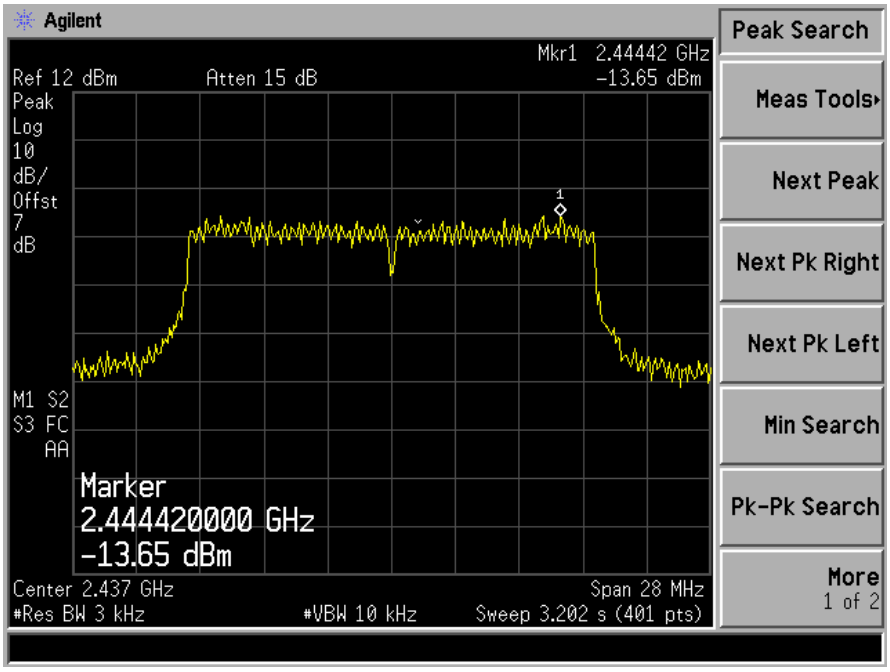
Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-10.17	<8dBm	PASS
6	-10.64	<8dBm	PASS
11	-10.59	<8dBm	PASS

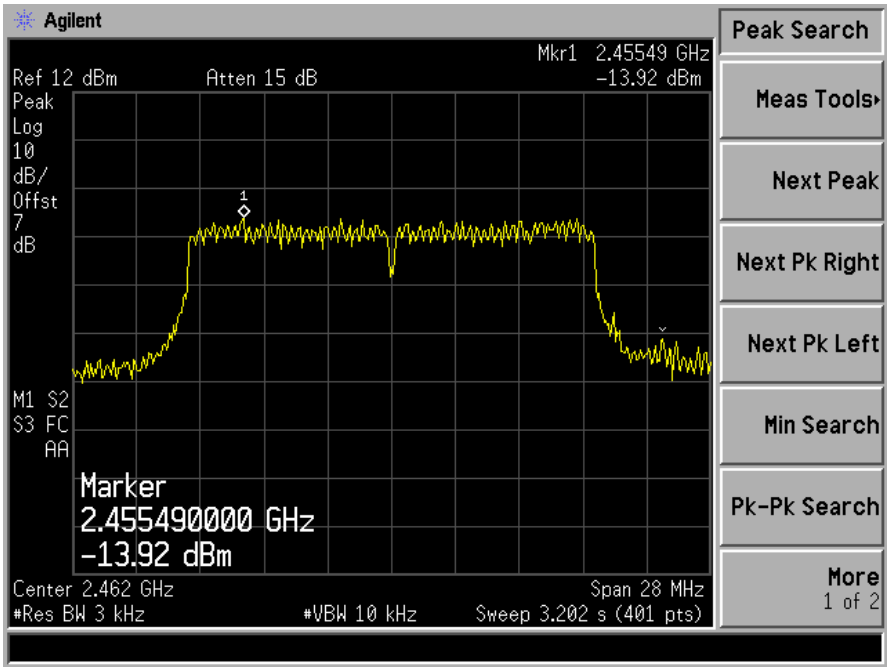
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	K	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11n HT20 Chain A

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-12.59	<8dBm	PASS
6	-13.65	<8dBm	PASS
11	-13.92	<8dBm	PASS



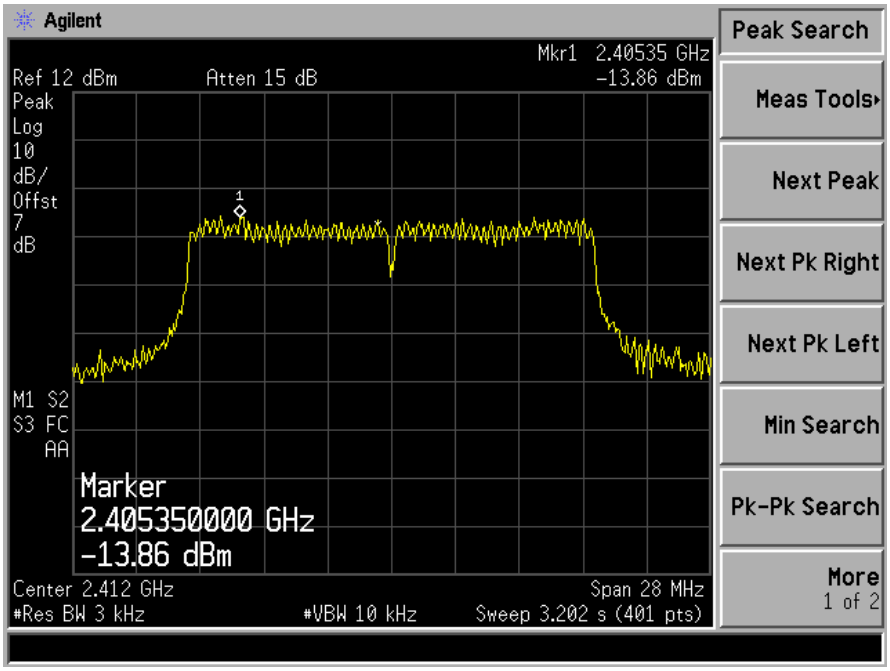

Agilent
Mkr1 2.44442 GHz
Ref 12 dBm
Atten 15 dB
-13.65 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.444420000 GHz
-13.65 dBm
Center 2.437 GHz
Span 28 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 3.202 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

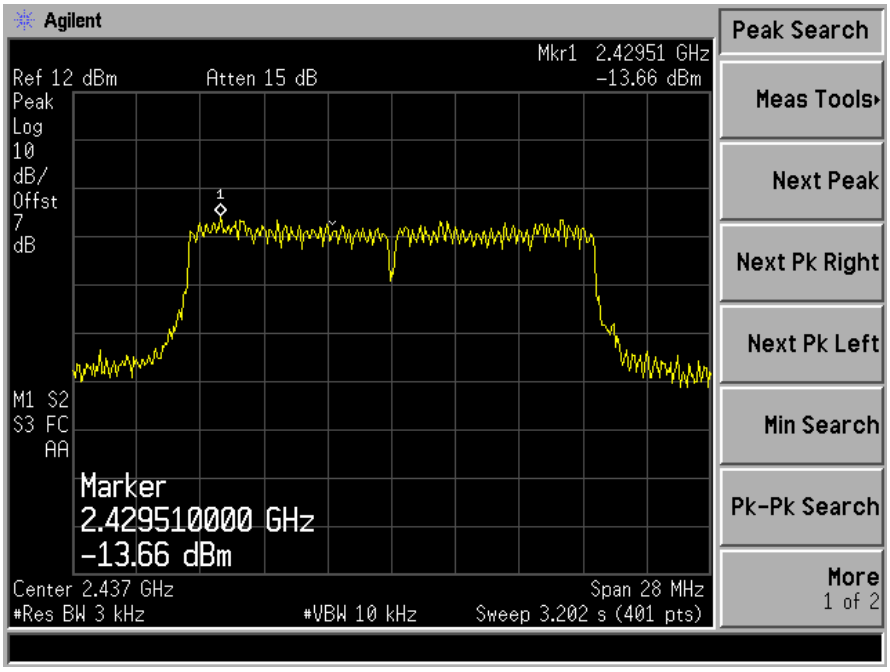

Agilent
Mkr1 2.45549 GHz
Ref 12 dBm
Atten 15 dB
-13.92 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.455490000 GHz
-13.92 dBm
Center 2.462 GHz
Span 28 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 3.202 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

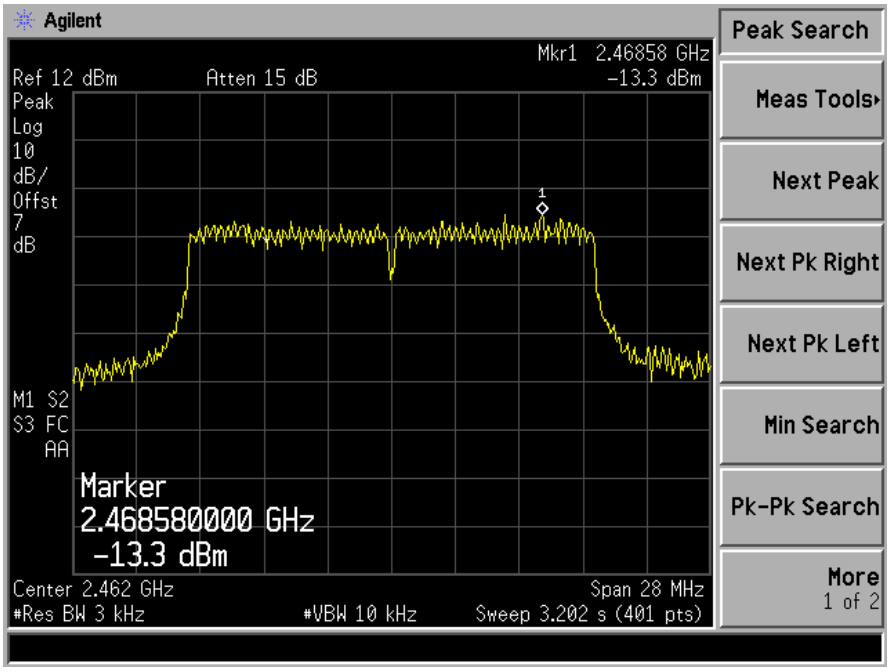
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11n HT20 Chain B

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-13.86	<8dBm	PASS
6	-13.66	<8dBm	PASS
11	-13.30	<8dBm	PASS




Agilent
Mkr1 2.42951 GHz
Ref 12 dBm
Atten 15 dB
-13.66 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.429510000 GHz
-13.66 dBm
Center 2.437 GHz
Span 28 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 3.202 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

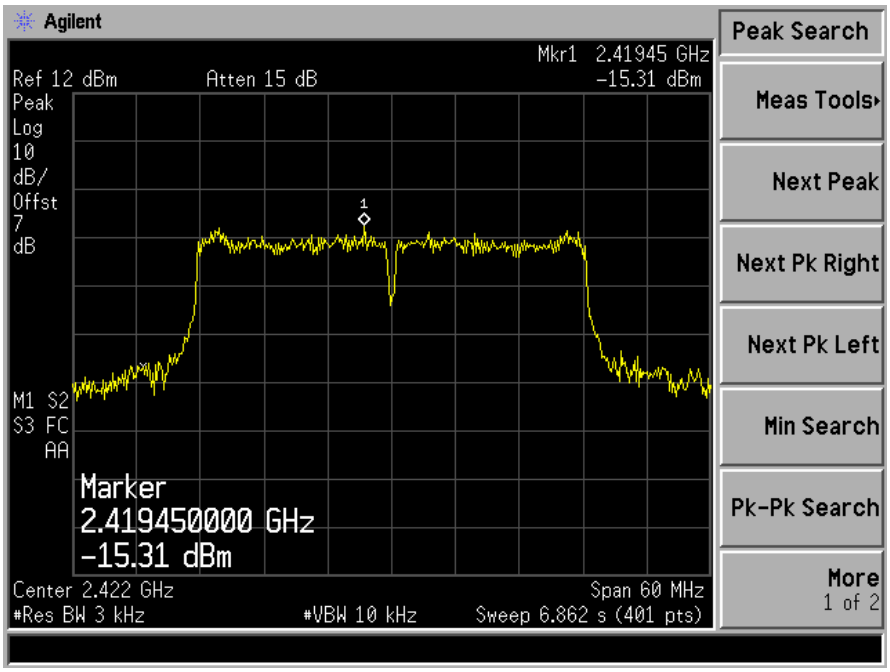

Agilent
Mkr1 2.46858 GHz
Ref 12 dBm
Atten 15 dB
-13.3 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.468580000 GHz
-13.3 dBm
Center 2.462 GHz
Span 28 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 3.202 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

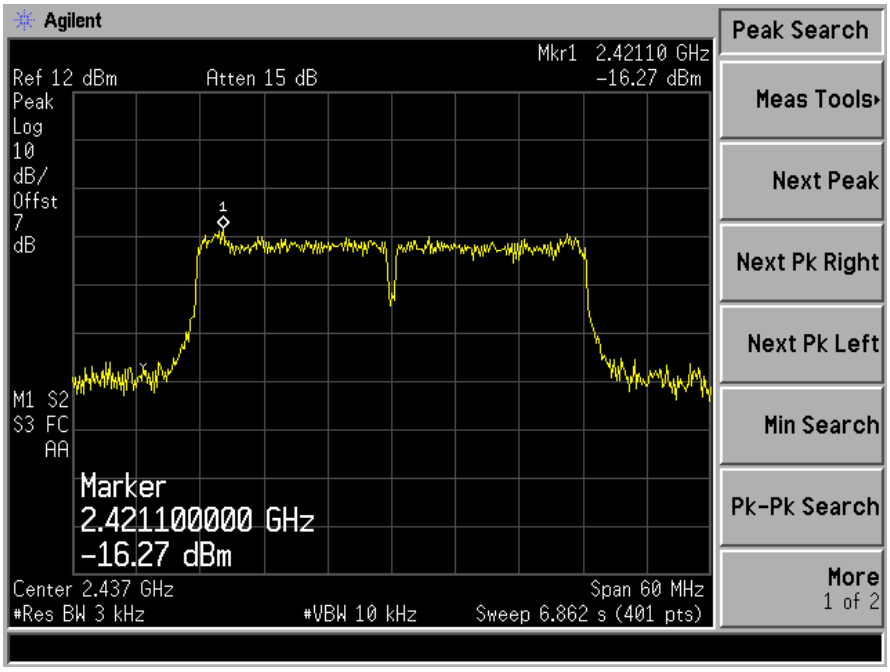
Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT40 Chain A+ Chain B

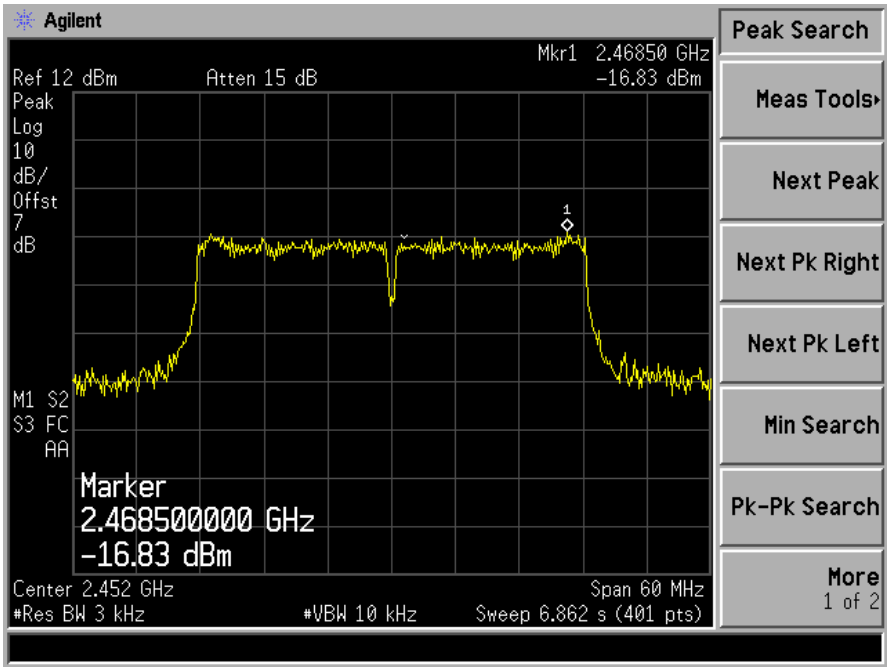
Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
3	-12.64	<8dBm	PASS
6	-13.35	<8dBm	PASS
9	-13.97	<8dBm	PASS

Spectrum Detector: PK Test Date: October17, 2014
Test By: KK Temperature: 24℃
Test Result: PASS Humidity: 53 %
Operation Mode: 802.11n HT40 Chain A

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
3	-15.31	<8dBm	PASS
6	-16.27	<8dBm	PASS
9	-16.83	<8dBm	PASS



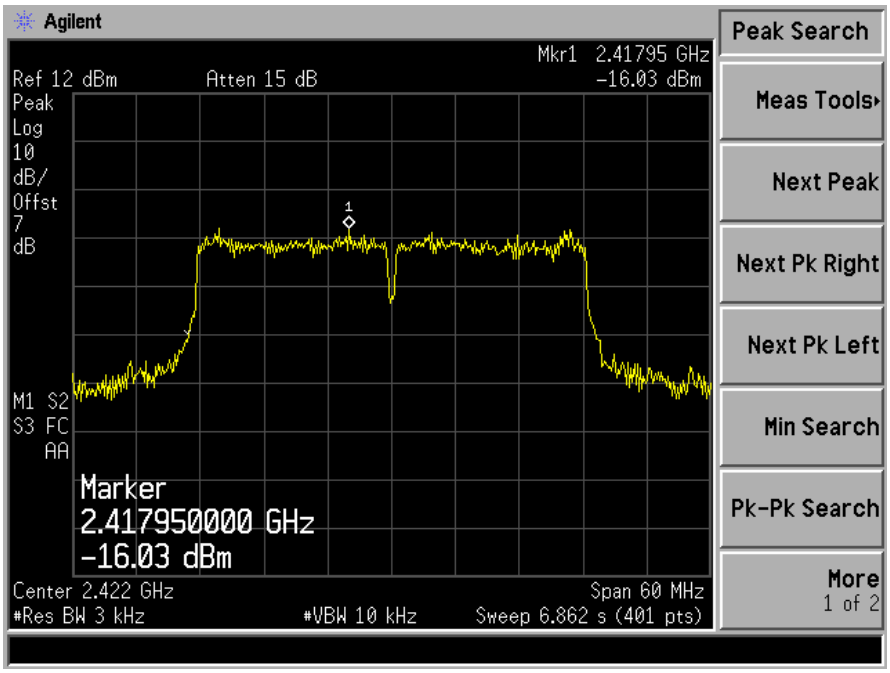

Agilent
Mkr1 2.42110 GHz
Ref 12 dBm
Atten 15 dB
-16.27 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.421100000 GHz
-16.27 dBm
Center 2.437 GHz
Span 60 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 6.862 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

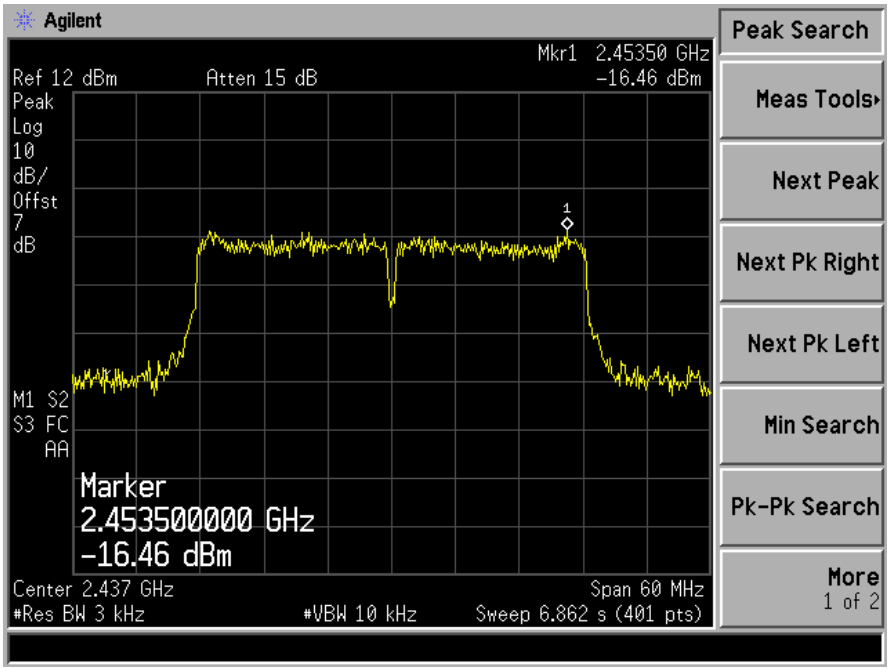

Agilent
Mkr1 2.46850 GHz
Ref 12 dBm
Atten 15 dB
-16.83 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.468500000 GHz
-16.83 dBm
Center 2.452 GHz
Span 60 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 6.862 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

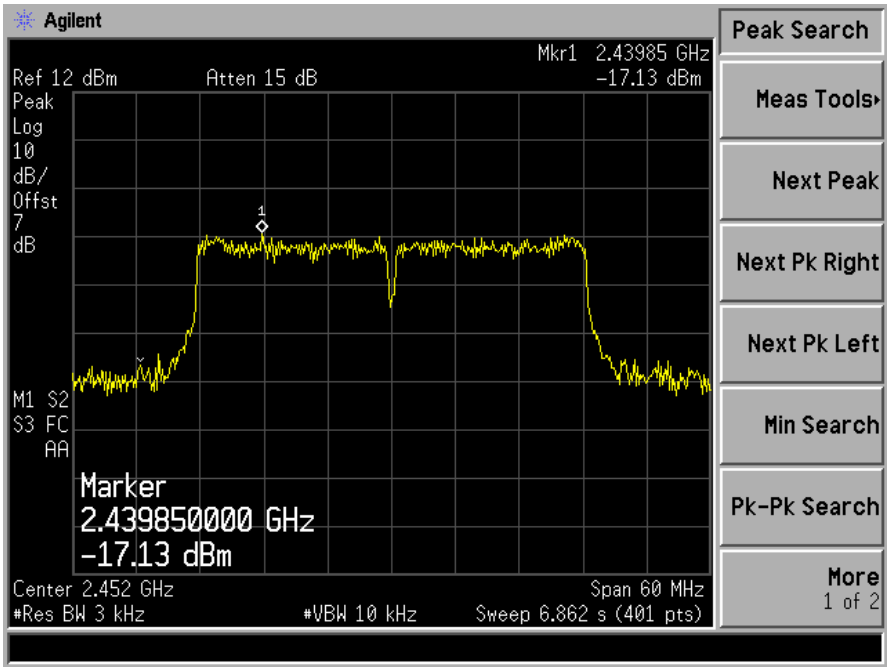
Spectrum Detector:	PK	Test Date:	October17, 2014
Test By:	KK	Temperature:	24℃
Test Result:	PASS	Humidity:	53 %

Operation Mode: 802.11n HT40 Chain B

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
3	-16.03	<8dBm	PASS
6	-16.46	<8dBm	PASS
9	-17.13	<8dBm	PASS




Agilent
Mkr1 2.45350 GHz
Ref 12 dBm
Atten 15 dB
-16.46 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.453500000 GHz
-16.46 dBm
Center 2.437 GHz
Span 60 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 6.862 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
Mkr1 2.43985 GHz
Ref 12 dBm
Atten 15 dB
-17.13 dBm
Peak
Log
10
dB/
Offst
7
dB
M1 S2
S3 FC
AA
Marker
2.439850000 GHz
-17.13 dBm
Center 2.452 GHz
Span 60 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 6.862 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

11. Antenna Port Emission

11.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015

11.2 Measuring Instruments and Setting

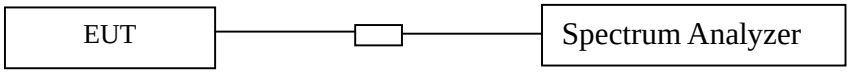
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
RB	100kHz for below 1GHz, 1MHz for above 1GHz
VB	300kHz for below 1GHz, 3MHz for above 1GHz
Detector	Peak
Trace	Max hold

11.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, Middle, and high channels, the limit was determined by attenuation 20dB of the RF peak power output.

11.4 Block Diagram of Test setup



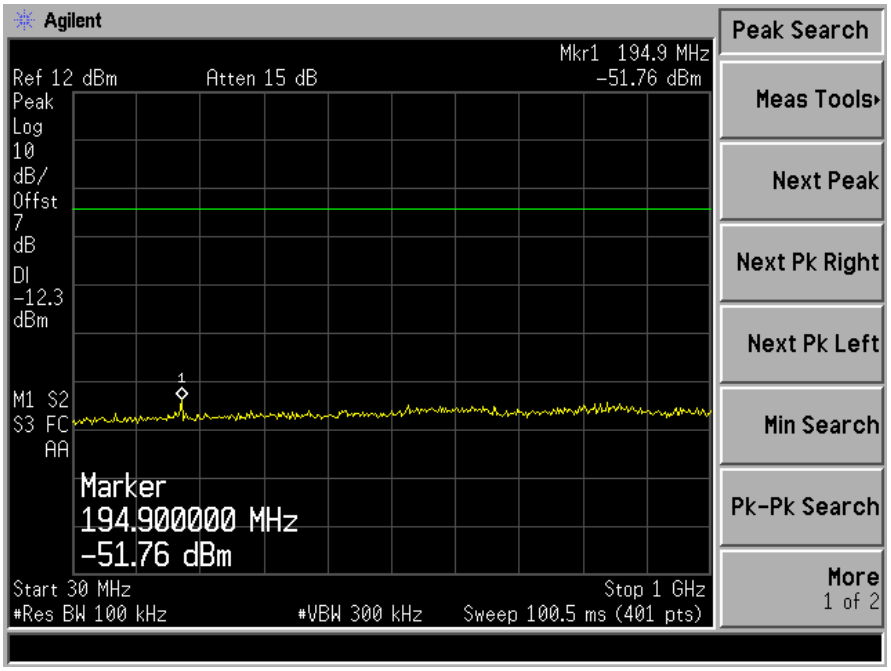
11.5 Test Result

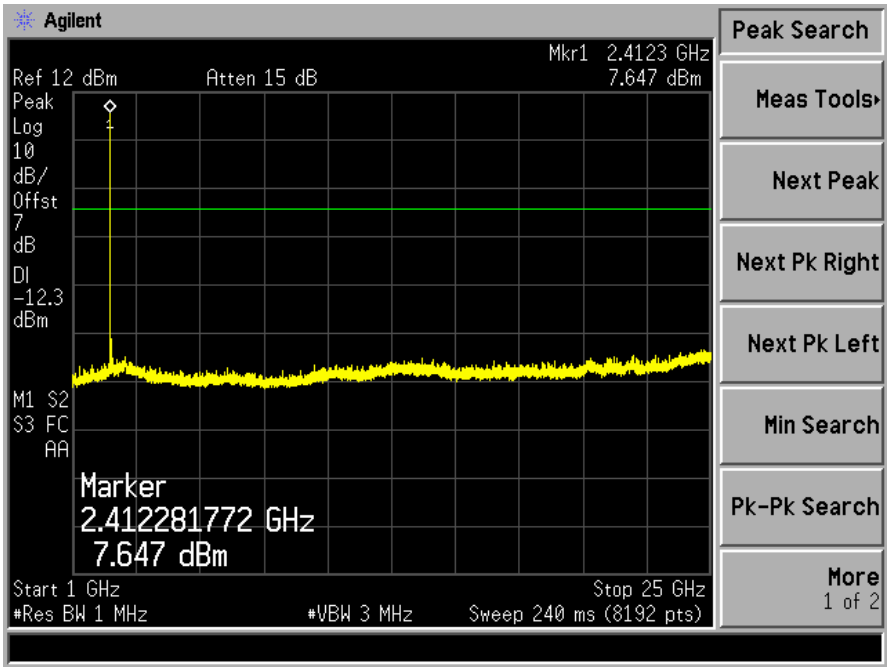
PASS.

All the modulation modes were tested the data of the worst mode (802.11b) are recorded in the following pages.

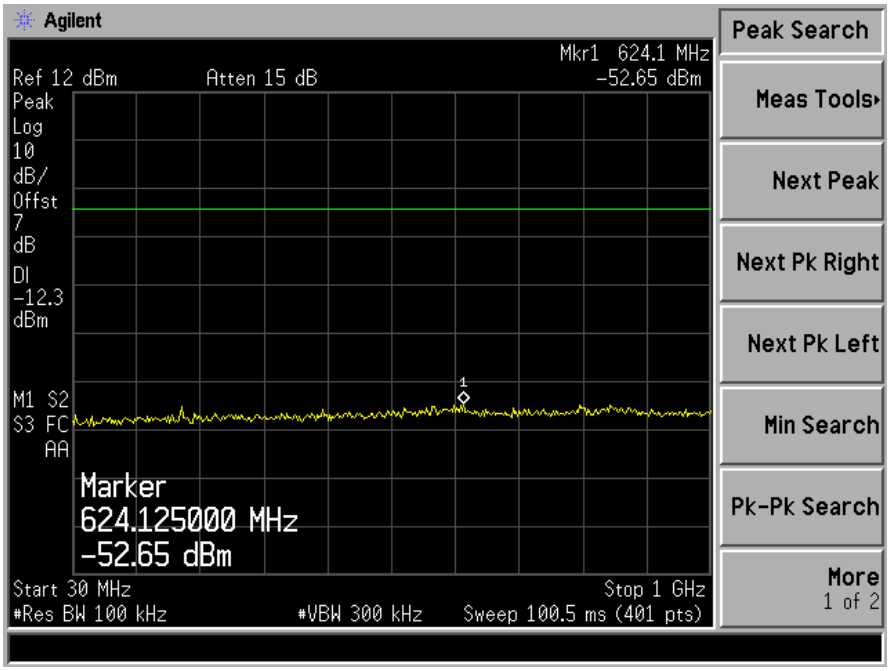
Chain A:

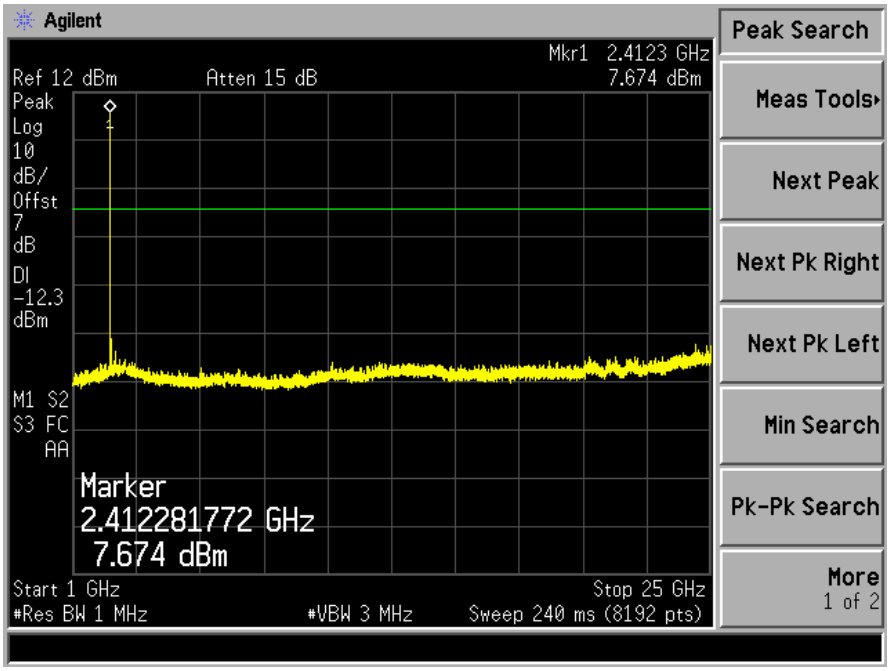
802.11b Low Channel 1



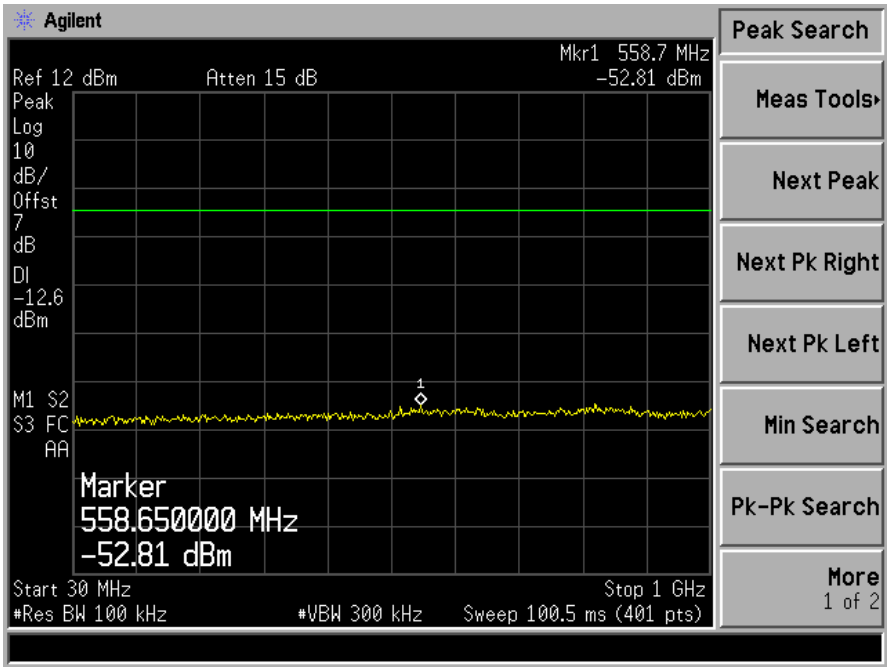


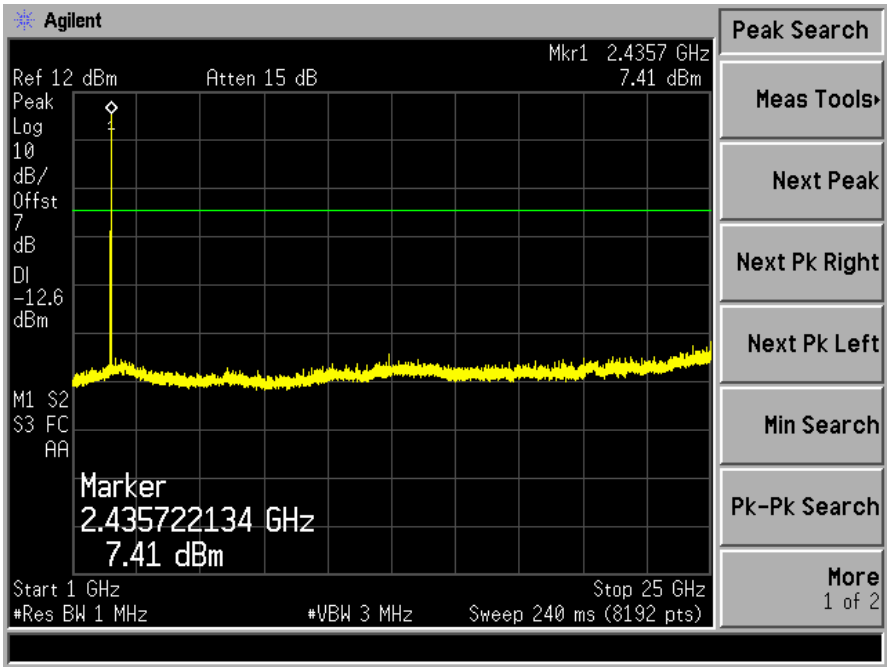
802.11b Mid Channel 6





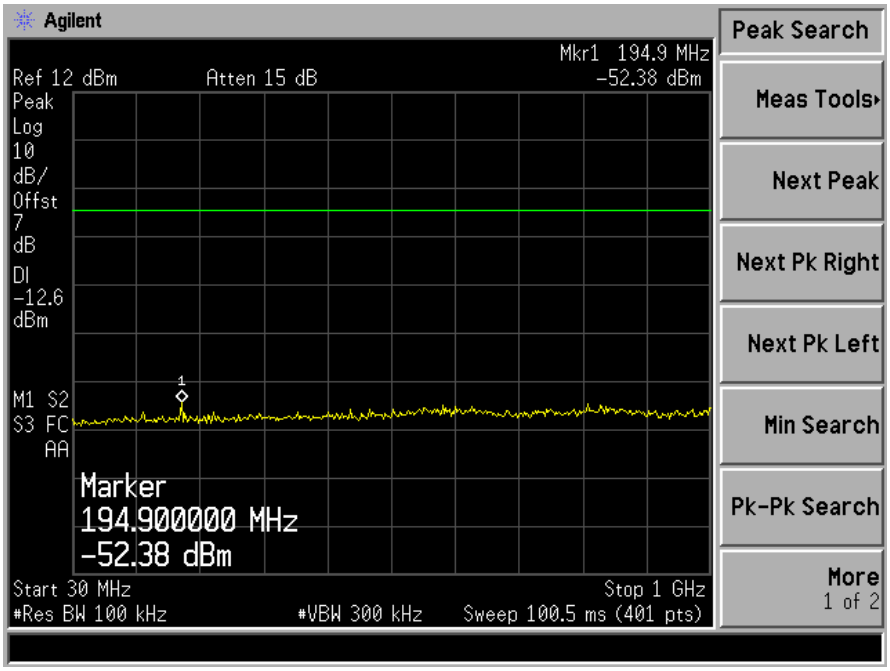
802.11b High Channel 11

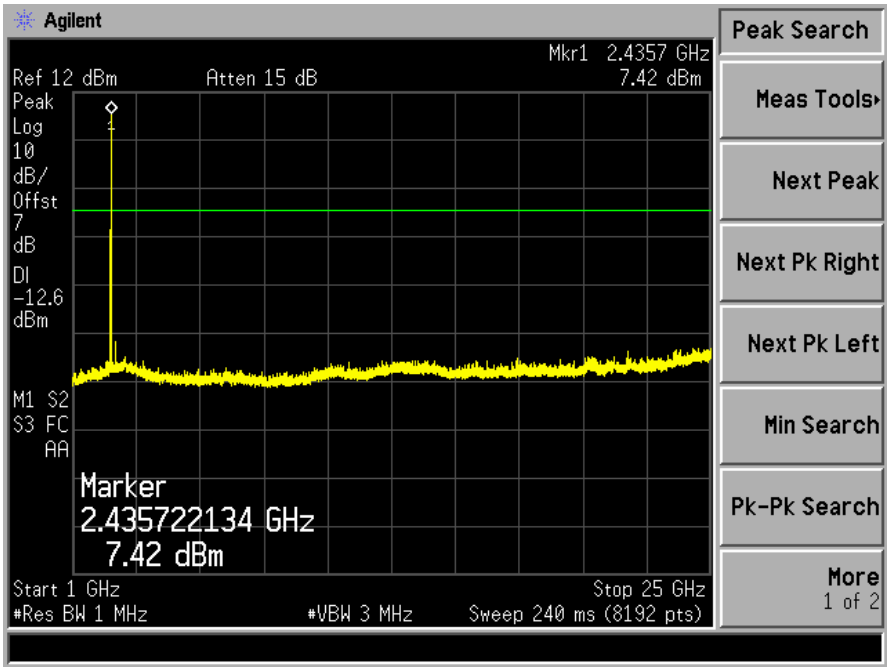




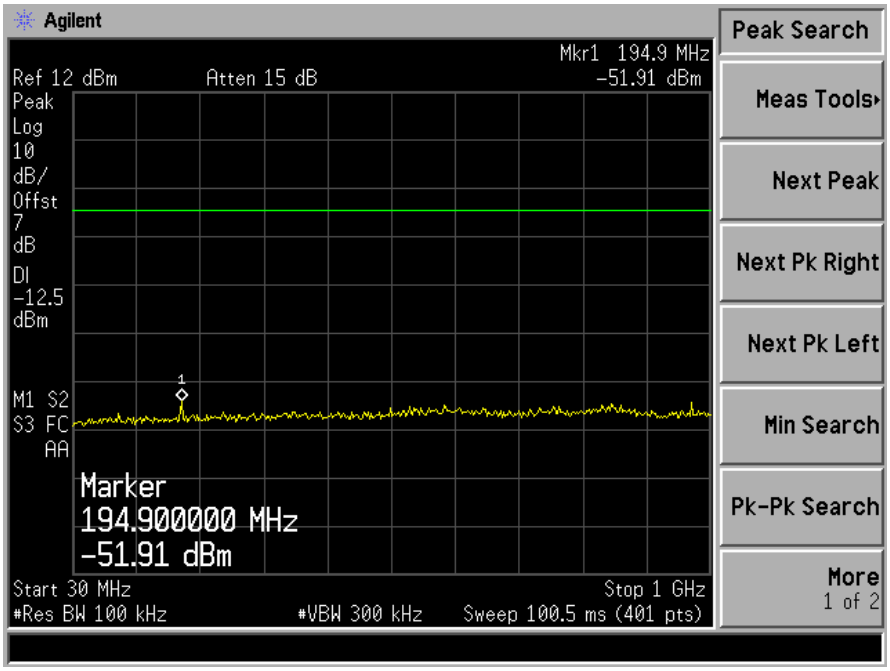
Chain B:

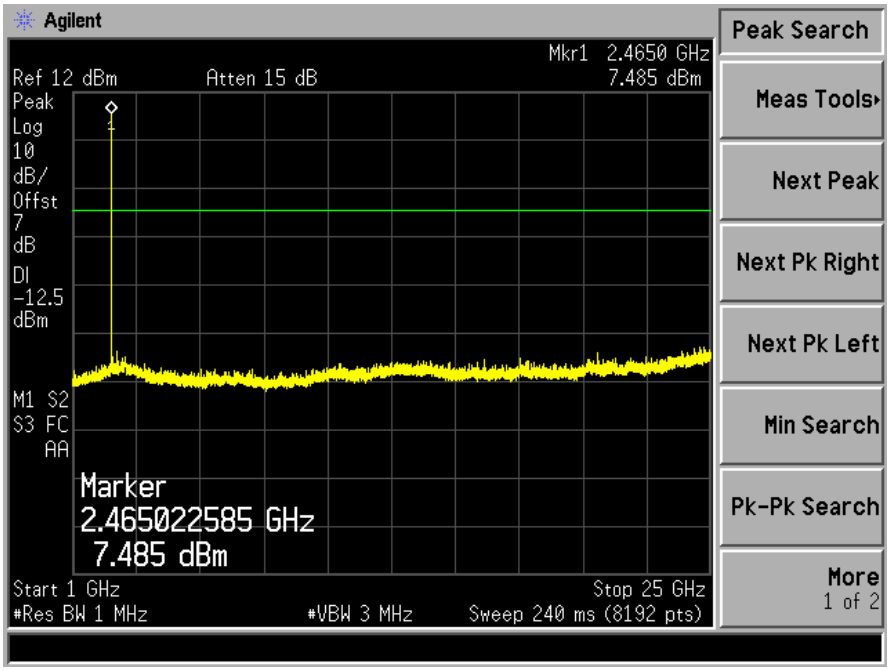
802.11b Low Channel 1



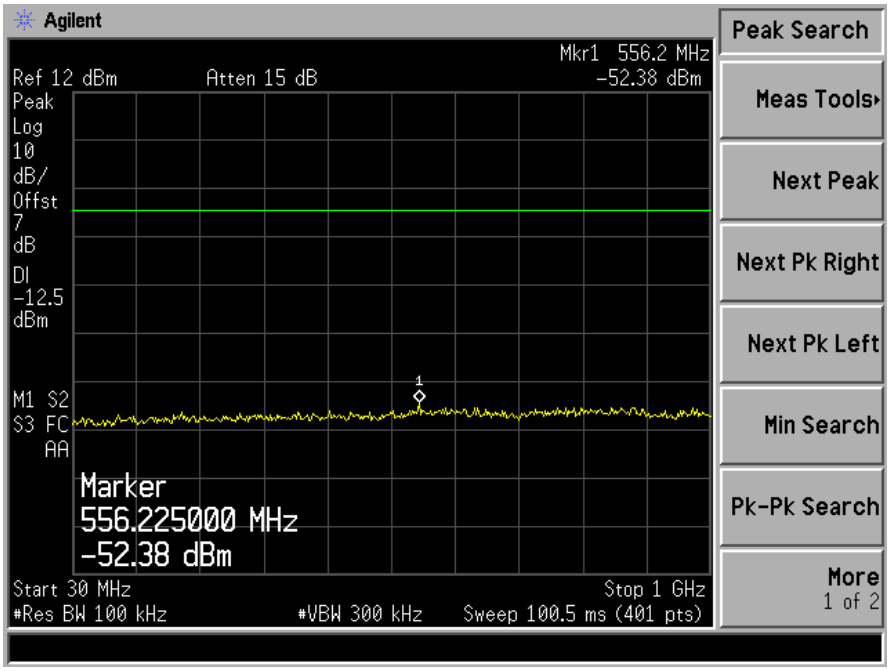


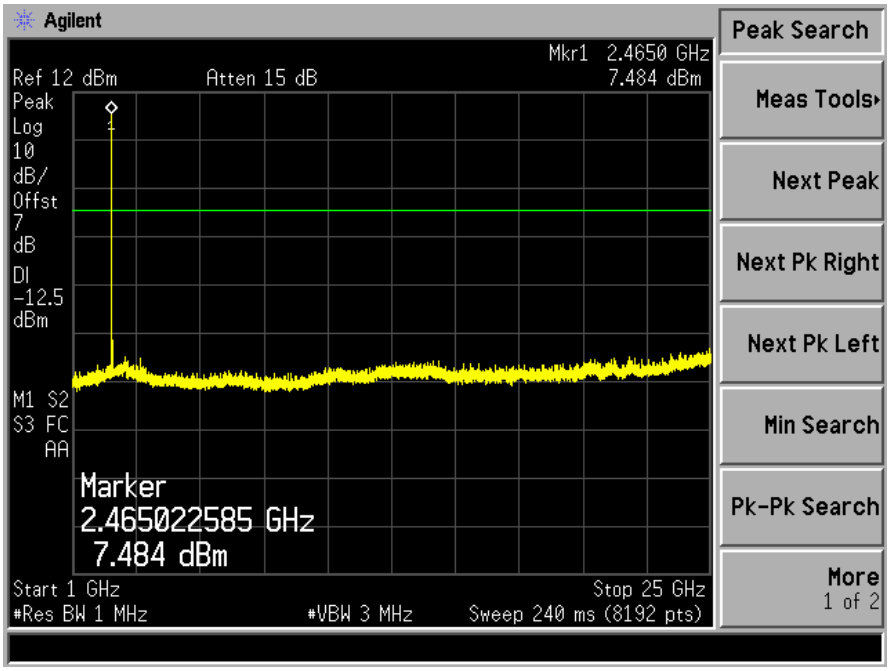
802.11b Mid Channel 6





802.11b High Channel 11





12. Antenna Application

12.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 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 replaced 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 §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 §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.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The EUT has 2 antennas: a Chip antenna for 2.4G WIFI, the gain is 1.8 dBi;
a Chip antenna for 2.4G WIFI, the gain is 1.8 dBi;
which in accordance to section 15.203, please refer to the internal photos.

12.2 Result

PASS