

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C AND CANADIAN RSS 210 ISSUE 8
REQUIREMENTS**

OF

DynaVox T15

MODEL No.: T15

FCC ID: 2AAOVT15

IC : 5534A-T15

Trademark: N/A

REPORT NO.: ES131231366E1

ISSUE DATE: April 29, 2014

Prepared for

**Dynavox Systems LLC
2100 Wharton Street Suite 400 Pittsburgh Pennsylvania 15203 USA**

Prepared by

SHENZHEN EMTEK CO., LTD

**Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China
TEL: 86-755-26954280
FAX: 86-755-26954282**

VERIFICATION OF COMPLIANCE

Applicant:	Dynavox Systems LLC 2100 Wharton Street Suite 400 Pittsburgh Pennsylvania 15203 USA
Manufacturer:	Dynavox Systems LLC 2100 Wharton Street Suite 400 Pittsburgh Pennsylvania 15203 USA
Product Description:	DynaVox T15
Model Number:	T15
File Number:	ES131231366E1
Date of Test:	April 15, 2014 to April 25, 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 and Canadian RSS 210 ISSUE 8 REQUIREMENTS

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

Date of Test : April 15, 2014 to April 25, 2014

Prepared by : 
Joe Xia/Editor

Reviewer : 
June Xie/Supervisor


Approve & Authorized Signer : 
Lisa Wang/Manager

Table of Contents

1. GENERAL INFORMATION.....	5
1.1 PRODUCT DESCRIPTION.....	5
1.2 RELATED SUBMITTAL(S) / GRANT(S).....	5
1.3 TEST METHODOLOGY.....	6
1.4 SPECIAL ACCESSORIES	6
1.5 EQUIPMENT MODIFICATIONS.....	6
1.6 TEST FACILITY	6
2. SYSTEM TEST CONFIGURATION.....	7
2.1 EUT CONFIGURATION	7
2.2 EUT EXERCISE.....	7
2.3 TEST PROCEDURE.....	7
2.4 CONFIGURATION OF TESTED SYSTEM.....	7
3. DESCRIPTION OF TEST MODES.....	9
4. SUMMARY OF TEST RESULTS	10
5. CONDUCTED EMISSIONS TEST.....	11
5.1 MEASUREMENT PROCEDURE.....	11
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	11
5.3 MEASUREMENT EQUIPMENT USED.....	11
5.4 CONDUCTED EMISSION LIMIT	11
5.5 MEASUREMENT RESULT	12
6. RADIATED EMISSION TEST.....	14
6.1 MEASUREMENT PROCEDURE	14
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	14
6.3 MEASUREMENT EQUIPMENT USED.....	15
6.4 RADIATED EMISSION LIMIT	15
6.5 MEASUREMENT RESULT	17
7. 6DB BANDWIDTH TEST AND 99% BANDWIDTH TEST	23
7.1 MEASUREMENT PROCEDURE.....	23
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	23
7.3 MEASUREMENT EQUIPMENT USED.....	23
7.4 MEASUREMENT RESULTS	23
8. MAXIMUM PEAK OUTPUT POWER TEST	36
8.1 MEASUREMENT PROCEDURE.....	36
8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	36
8.3 MEASUREMENT EQUIPMENT USED.....	36
8.4 PEAK POWER OUTPUT LIMIT	36
8.5 MEASUREMENT RESULTS	36
9. BAND EDGE TEST	38

9.1	MEASUREMENT PROCEDURE	38
9.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	38
9.3	MEASUREMENT EQUIPMENT USED	38
9.4	MEASUREMENT RESULTS	38
10.	POWER DENSITY	40
10.1	TEST EQUIPMENT	40
10.2	MEASURING INSTRUMENTS AND SETTING	40
10.3	TEST PROCEDURES	40
10.4	BLOCK DIAGRAM OF TEST SETUP	40
10.5	LIMIT	40
10.6	TEST RESULT	41
11.	ANTENNA PORT EMISSION.....	47
11.1	TEST EQUIPMENT	47
11.2	MEASURING INSTRUMENTS AND SETTING	47
11.3	TEST PROCEDURES	47
11.4	BLOCK DIAGRAM OF TEST SETUP.....	47
11.5	TEST RESULT	47
12.	ANTENNA APPLICATION	51
12.1	ANTENNA REQUIREMENT	51
12.2	RESULT.....	51
13.	UNCERTAINTY	52

1. General Information

1.1 Product Description

A major technical descriptions of EUT is described as following:

- A). Standards: FCC Rules Part 15.247 and Canadian RSS 210 ISSUE 8
- B). Operation Frequency: WIFI: 2412-2462MHz; Bluetooth: 2402-2480MHz
- C). Modulation: WIFI: OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n,
DSSS with DBPSK/DQPSK/CCK for 802.11b;
Bluetooth: GFSK, 1/4 Π -DQPSK, 8DPSK
- D). Number of Channel: 802.11b/g/n: 11Channels; Bluetooth: 79 Channels;
- E). Support Data Rate: WIFI: 1, 2, 5.5, 11, 6, 9, 12, 24, 36, 48, 54, 65, 72.2, 150Mbps;
Bluetooth: 1Mbps, 2Mbps, 3Mbps
- F). Conducted Power: WIFI: 21.61dBm(802.11b), 17.34dBm(802.11g),
17.28dBm(802.11n); Bluetooth: 9.32dBm
- G) Antenna Gain: 2.48dBi
- H). Antenna Type: PCB Antenna
- I). Power Supply: DC 12V with AC Adapter and DC 7.4V from Li-ion Battery.
- J). Adapter : Model:MTP451BX-120300
Input: AC 100-240V, 50/60Hz, 1.50A
Output: DC 12.0V, 3000mA

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 Tablet included 802.11b, 802.11g, 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: 2AAOVT15 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and also intended for IC ID: 5534A-T15 filing to comply with Canadian RSS 210 Issue 8.0.
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 new test procedure KDB558074 D01 v03r01, 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, 2010.10.29
The certificate is valid until 2013.10.28
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

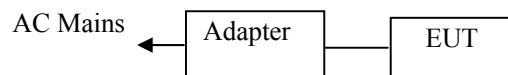


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	IC ID	Series No.	Note
1.	DynaVox T15	N/A	T15	2AAOVT15	5534A-T15	N/A	EUT
2.	Earphone	N/A	N/A	N/A	N/A	N/A	

Note:

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

3. Description of Test Modes

The Transmitter of EUT is an Mobile Internet Device 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: 1 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 router.

For 802.11b/g/n:

1. For lowest channel : 2412MHz (Channel 1)
2. For middle channel : 2437MHz (Channel 6)
3. For highest channel : 2462MHz (Channel 11)

4. Summary of Test Results

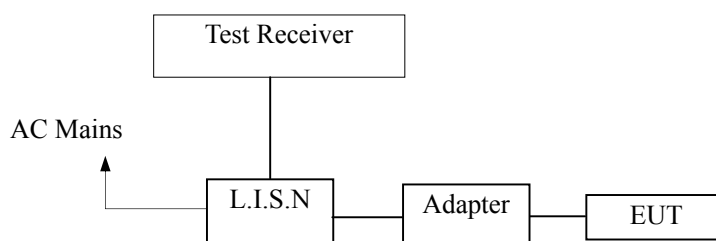
FCC Rules	IC Rule	Description Of Test	Result
§15.247(a)(2)	RSS-210, A8.2(a)	6dB bandwidth	Pass
§15.247(b)(3)	RSS-210, A8.4(2)	Max Peak output Power test	Pass
§15.247(e)	RSS-210, A8.2(b)	Power density	Pass
§15.247(d)	RSS-210, A2.9, A8.5	Band edge test	Pass
§15.207	RSS-GEN, Section 7.2.2	AC Power Conducted Emission	Pass
§15.247(d), §15.209	RSS-210, A2.9, A8.5	Radiated Emission	Pass
§15.247(d)	RSS-210, A8.5 RSS-GEN, Section 7.2.3	Antenna Port Emission	Pass
§15.247(b)&§15.203	N/A	Antenna Application	Pass
N/A	RSS-210, A1.1.3	99%dB Bandwidth	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

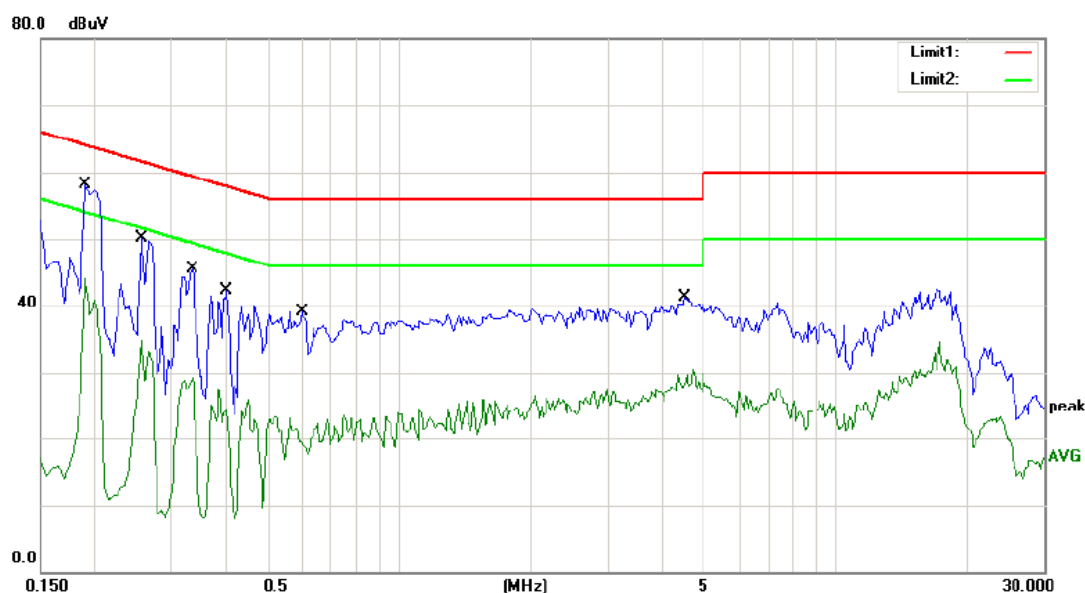
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/28/2013	05/27/2014
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/28/2013	05/27/2014
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/28/2013	05/27/2014
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/28/2013	05/27/2014
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/28/2013	05/27/2014

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



Site Conduction #2

Phase: **L1**

Temperature: 26

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

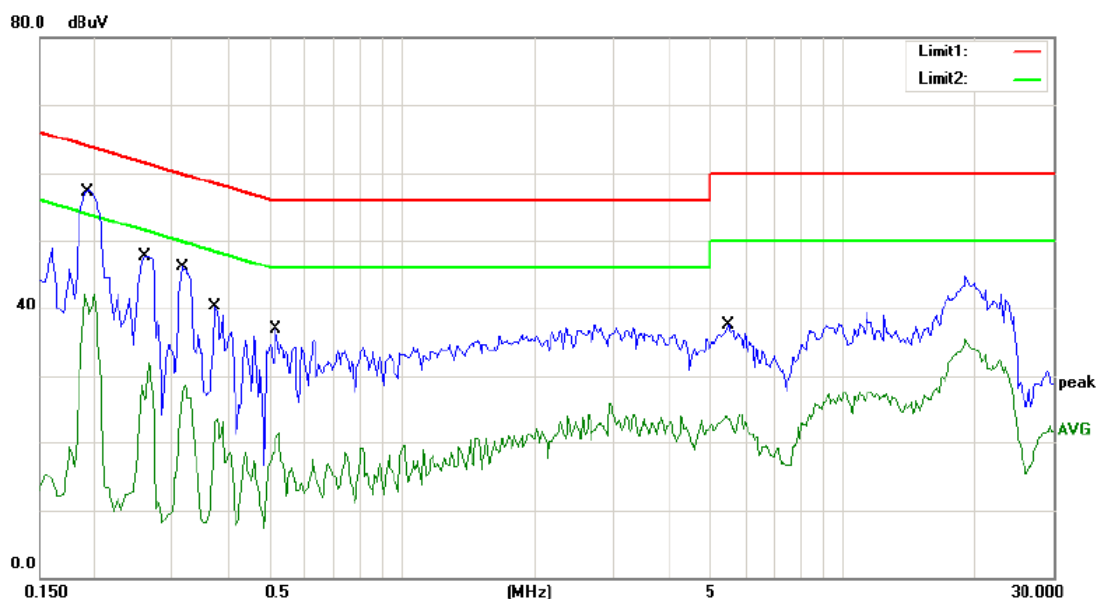
Humidity: 60 %

Mode: WIFI&BT ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1900	58.03	0.00	58.03	64.04	-6.01	QP	
2		0.1900	44.01	0.00	44.01	54.04	-10.03	AVG	
3		0.2550	50.01	0.00	50.01	61.59	-11.58	QP	
4		0.2550	34.96	0.00	34.96	51.59	-16.63	AVG	
5		0.3350	45.52	0.00	45.52	59.33	-13.81	QP	
6		0.3350	29.37	0.00	29.37	49.33	-19.96	AVG	
7		0.4000	42.23	0.00	42.23	57.85	-15.62	QP	
8		0.4000	27.45	0.00	27.45	47.85	-20.40	AVG	
9		0.5950	39.04	0.00	39.04	56.00	-16.96	QP	
10		0.5950	23.12	0.00	23.12	46.00	-22.88	AVG	
11		4.5100	41.23	0.00	41.23	56.00	-14.77	QP	
12		4.5100	29.61	0.00	29.61	46.00	-16.39	AVG	

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



Site Conduction #2

Phase: **N**

Temperature: 26

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 60 %

Mode: WIFI&BT ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1900	57.45	0.00	57.45	64.04	-6.59	QP	
2		0.1900	42.14	0.00	42.14	54.04	-11.90	AVG	
3		0.2600	47.67	0.00	47.67	61.43	-13.76	QP	
4		0.2600	31.81	0.00	31.81	51.43	-19.62	AVG	
5		0.3150	46.04	0.00	46.04	59.84	-13.80	QP	
6		0.3150	28.66	0.00	28.66	49.84	-21.18	AVG	
7		0.3750	40.38	0.00	40.38	58.39	-18.01	QP	
8		0.3750	23.44	0.00	23.44	48.39	-24.95	AVG	
9		0.5150	36.82	0.00	36.82	56.00	-19.18	QP	
10		0.5150	21.52	0.00	21.52	46.00	-24.48	AVG	
11		5.4300	37.50	0.00	37.50	60.00	-22.50	QP	
12		5.4300	24.00	0.00	24.00	50.00	-26.00	AVG	

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

6. Radiated Emission Test

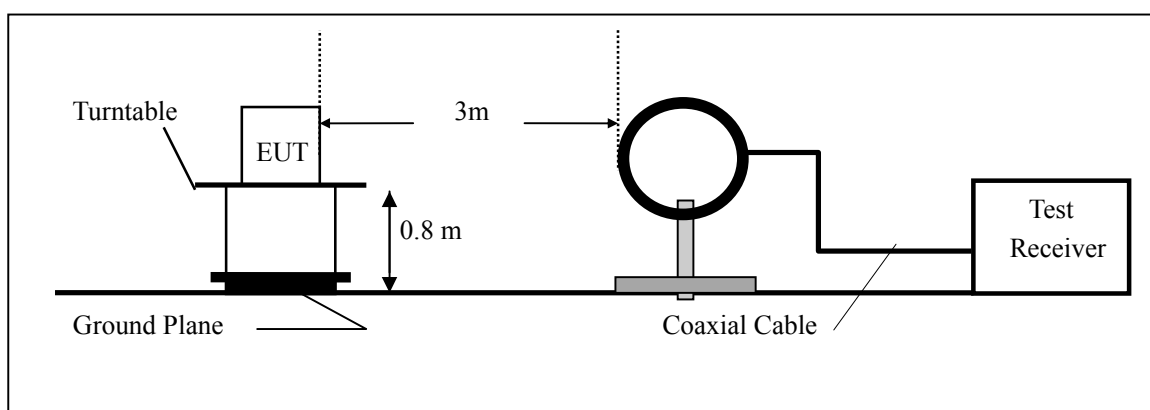
6.1 Measurement Procedure

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.

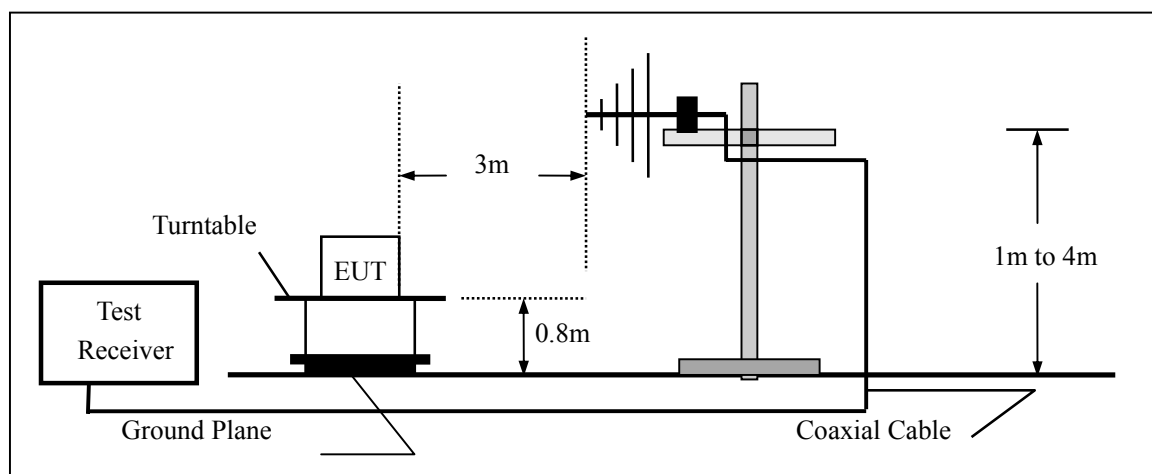
For emissions measurement set the bandwidth of the Spectrum's RBW at 1MHz above 1GHz and RBW 100 KHz below 1GHz.

6.2 Test SET-UP (Block Diagram of Configuration)

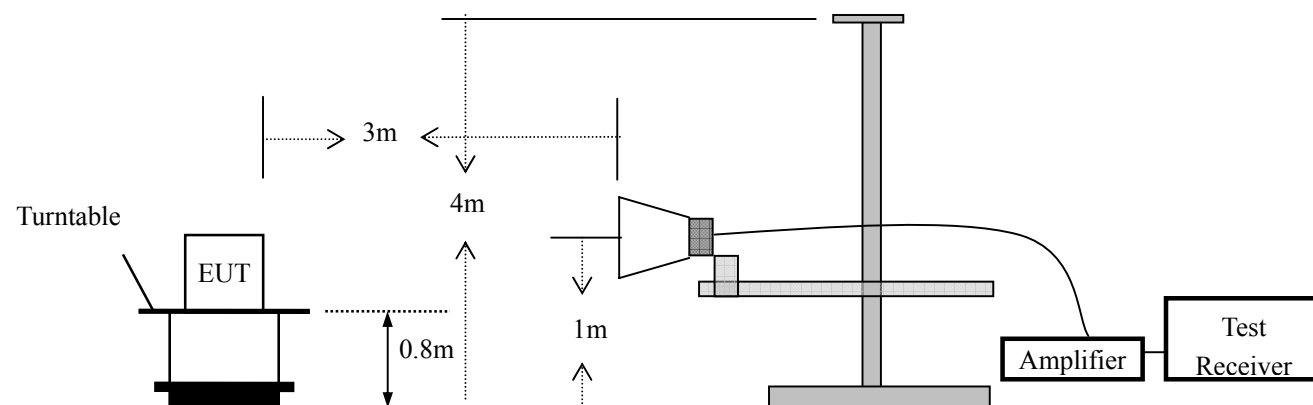
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(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	05/28/2013	05/27/2014
Pre-Amplifier	HP	8447D	2944A07999	05/28/2013	05/27/2014
Bilog Antenna	Schwarzbeck	VULB9163	142	05/14/2013	05/13/2014
Loop Antenna	ARA	PLA-1030/B	1029	05/14/2013	05/13/2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/14/2013	05/13/2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/14/2013	05/13/2014
Cable	Schwarzbeck	AK9513	ACRX1	05/28/2013	05/27/2014
Cable	Rosenberger	N/A	FP2RX2	05/28/2013	05/27/2014
Cable	Schwarzbeck	AK9513	CRPX1	05/28/2013	05/27/2014
Cable	Schwarzbeck	AK9513	CRRX2	05/28/2013	05/27/2014

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 § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

6.5 Measurement Result

Below 1GHz:

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

Operation Mode:	TX Mode	Test Date :	April 15, 2014
Frequency Range:	9KHz~30MHz	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Note:

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40 \log(\text{Specific distance} / \text{test distance})$ (dB);

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

Operation Mode:	802.11b TX Channel 1	Test Date :	April 15, 2014
Frequency Range:	30~1000MHz	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Note:

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Note
64.20	V	31.12	40.00	-8.88	QP
107.72	V	29.90	43.50	-13.60	QP
214.98	V	34.88	43.50	-8.62	QP
777.71	V	36.29	46.00	-9.71	QP
919.17	V	39.52	46.00	-6.48	QP
973.57	V	47.19	54.00	-6.81	QP
62.64	H	28.37	40.00	-11.63	QP
107.72	H	28.31	43.50	-15.19	QP
162.13	H	28.43	43.50	-15.07	QP
214.98	H	34.80	43.50	-8.70	QP
919.17	H	43.89	46.00	-2.11	QP
973.57	H	47.79	54.00	-6.21	QP

- Note:**
- (1) All Readings are Peak Value.
 - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
 - (3) The average measurement was not performed when the peak measured data under the limit of average detection.
 - (4) EUT stood on the table position is the worst case result in the report.

Operation Mode: 802.11b TX Channel 6 Test Date : April 15, 2014
 Frequency Range: 30~1000MHz Temperature : 28°C
 Test Result: PASS Humidity : 65 %
 Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Note
62.64	V	32.12	40.00	-7.88	QP
107.72	V	33.32	43.50	-10.18	QP
214.98	V	36.40	43.50	-7.10	QP
777.71	V	37.77	46.00	-8.23	QP
919.17	V	39.02	46.00	-6.98	QP
973.57	V	45.69	54.00	-8.31	QP
54.87	H	28.48	40.00	-11.52	QP
65.75	H	27.50	40.00	-12.50	QP
107.72	H	31.59	43.50	-11.91	QP
214.98	H	36.24	43.50	-7.26	QP
919.17	H	44.19	46.00	-1.81	QP
973.57	H	47.79	54.00	-6.21	QP

- Note:**
- (1) All Readings are Peak Value.
 - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
 - (3) The average measurement was not performed when the peak measured data under the limit of average detection.
 - (4) EUT stood on the table position is the worst case result in the report.

Operation Mode: 802.11b TX Channel 11 Test Date : April 15, 2014
Frequency Range: 30~1000MHz Temperature : 28°C
Test Result: PASS Humidity : 65 %
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)	Note
62.64	V	30.75	40.00	-9.25	QP
107.72	V	33.49	43.50	-10.01	QP
162.13	V	29.78	43.50	-13.72	QP
214.98	V	37.04	43.50	-6.46	QP
919.17	V	39.02	46.00	-6.98	QP
973.57	V	46.53	54.00	-7.47	QP
62.64	H	28.26	40.00	-11.74	QP
107.72	H	30.61	43.50	-12.89	QP
162.13	H	29.16	43.50	-14.34	QP
214.98	H	34.12	43.50	-9.38	QP
919.17	H	42.89	46.00	-3.11	QP
973.57	H	47.89	54.00	-6.11	QP

- Note:**
- (1) All Readings are Peak Value.
 - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
 - (3) The average measurement was not performed when the peak measured data under the limit of average detection.
 - (4) EUT stood on the table position is the worst case result in the report.

Above 1GHz:

Operation Mode: 802.11b TX Channel 1 Test Date : April 15, 2014
Frequency Range: 1GHz~25GHz Temperature : 28°C
Test Result: PASS Humidity : 65 %
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4920.42	V	52.30	37.37	74.00	54.00	-21.70	-16.63
7377.36	V	51.90	36.85	74.00	54.00	-22.10	-17.15
9849.49	V	51.28	34.53	74.00	54.00	-22.72	-19.47
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
4925.36	H	53.67	38.24	74.00	54.00	-20.33	-15.76
7369.42	H	53.43	36.72	74.00	54.00	-20.57	-17.28
9848.66	H	49.24	33.71	74.00	54.00	-24.76	-20.29

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 6 Test Date : April 15, 2014
Frequency Range: 1GHz~25GHz Temperature : 28°C
Test Result: PASS Humidity : 65 %
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4873.97	V	52.62	37.95	74.00	54.00	-21.38	-16.05
7309.24	V	52.10	36.80	74.00	54.00	-21.90	-17.20
9746.77	V	51.23	35.56	74.00	54.00	-22.77	-18.44
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
4876.98	H	52.76	37.68	74.00	54.00	-21.24	-16.32
7312.44	H	51.88	35.57	74.00	54.00	-22.12	-18.43
9742.61	H	48.82	33.34	74.00	54.00	-25.18	-20.66

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 : April 15, 2014
Frequency Range: 1GHz~25GHz Temperature : 28℃
Test Result: PASS Humidity : 65 %
Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4920.42	V	52.30	37.37	74.00	54.00	-21.70	-16.63
7377.36	V	51.90	36.85	74.00	54.00	-22.10	-17.15
9849.49	V	51.28	34.53	74.00	54.00	-22.72	-19.47
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
4925.36	H	53.67	38.24	74.00	54.00	-20.33	-15.76
7369.42	H	53.43	36.72	74.00	54.00	-20.57	-17.28
9848.66	H	49.24	33.71	74.00	54.00	-24.76	-20.29

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.247.

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.

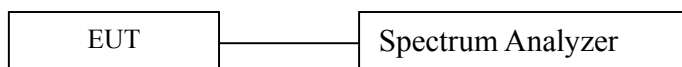
7. 6dB Bandwidth Test and 99% Bandwidth Test

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) $\geq 3 \times$ 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	05/28/2013	05/27/2014

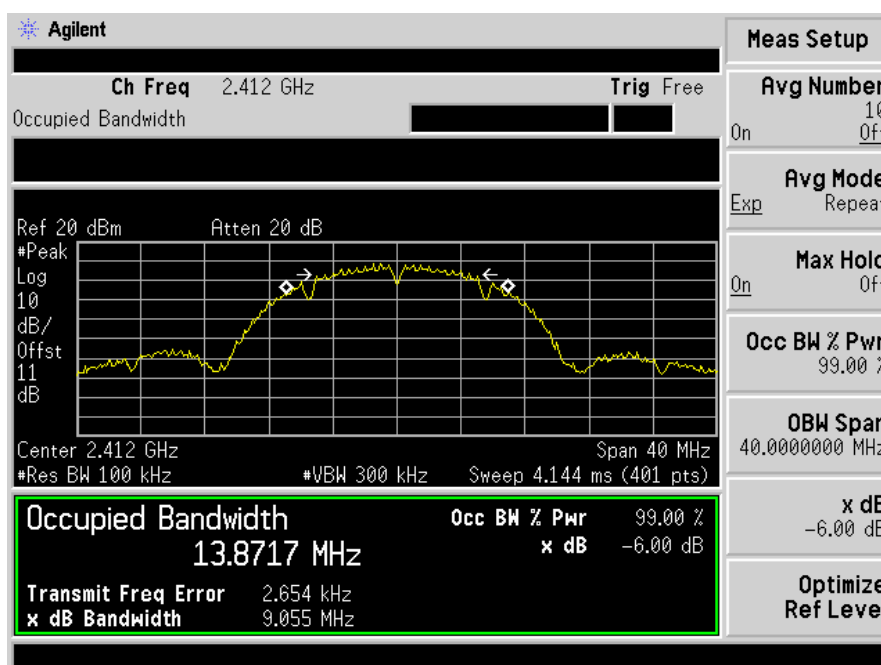
7.4 Measurement Results

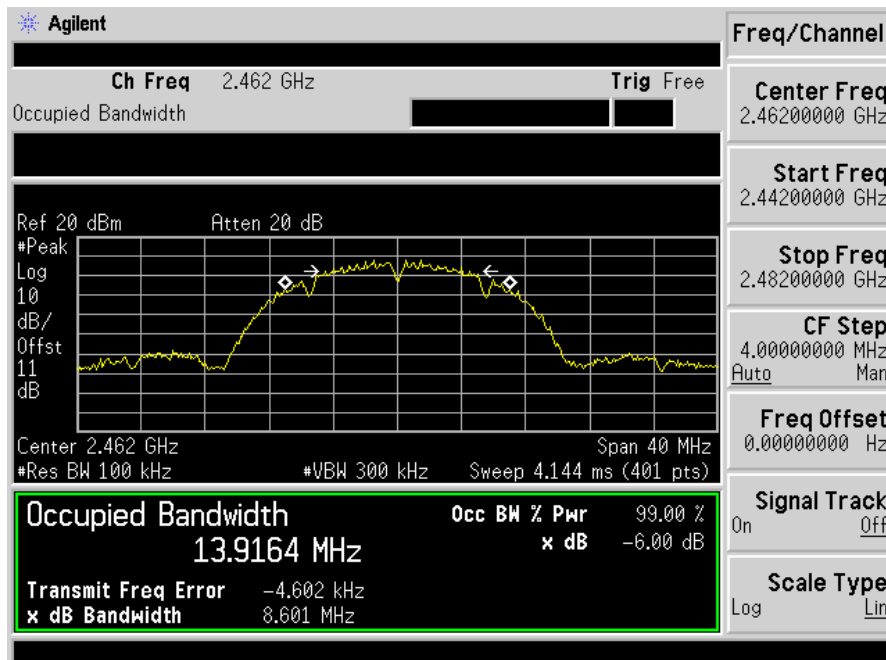
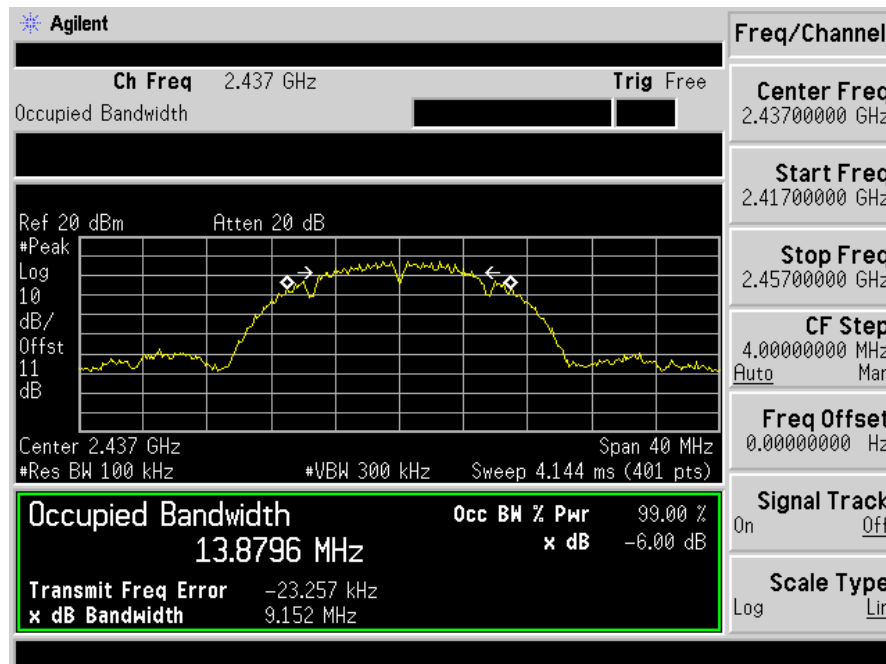
6dB Bandwidth Test Data Chart and 99% Bandwidth Test Data Chart:
Refer to attached data chart.

6dB Bandwidth Test

Spectrum Detector:	PK	Test Date :	July 20, 2013
Test By:	Andy	Temperature :	28°C
Test Result:	PASS	Humidity :	65 %
Operation Mode: 802.11b			

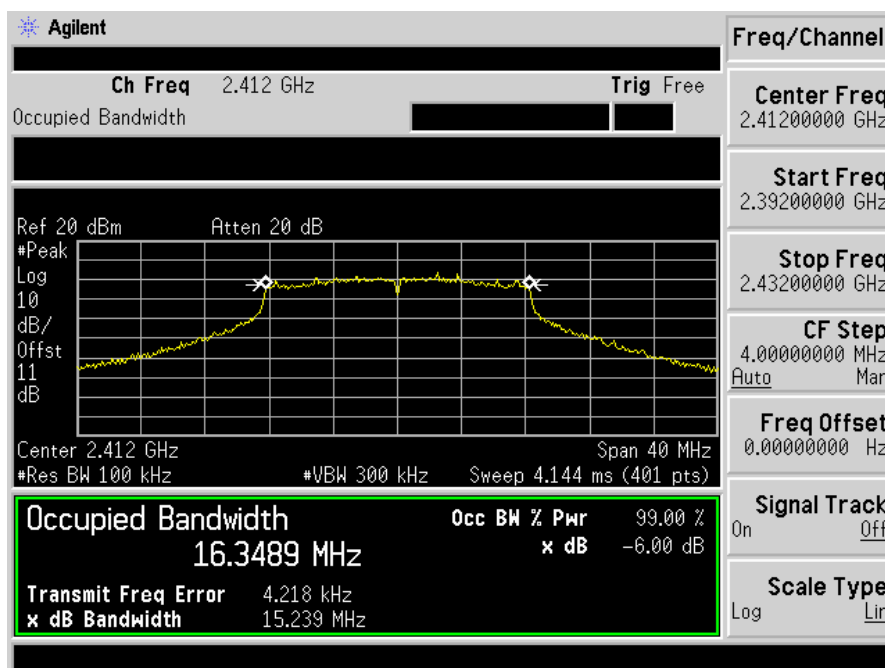
Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	9.05	6dB Bandwidth
6	2437	9.15	6dB Bandwidth
11	2462	8.60	6dB Bandwidth

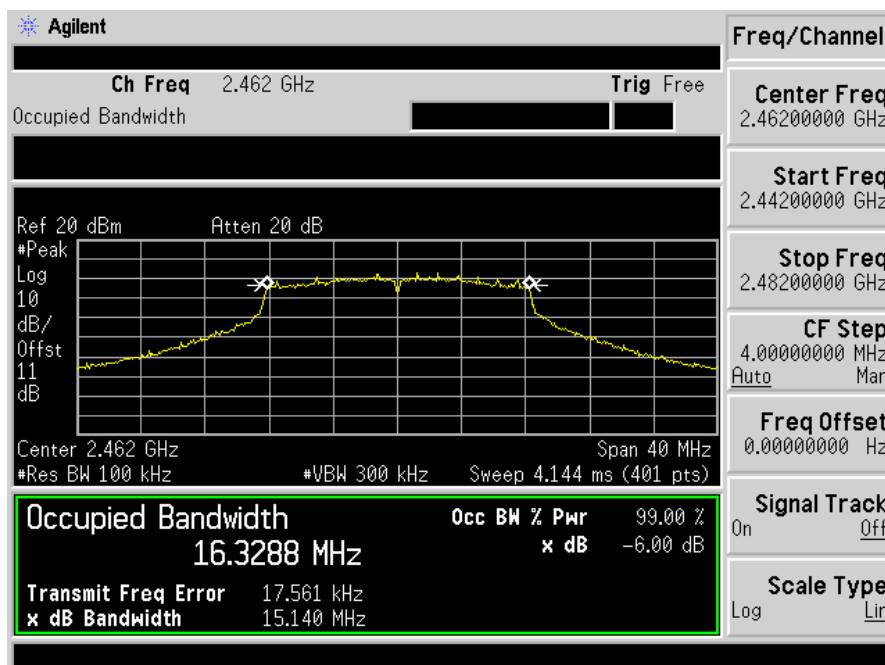
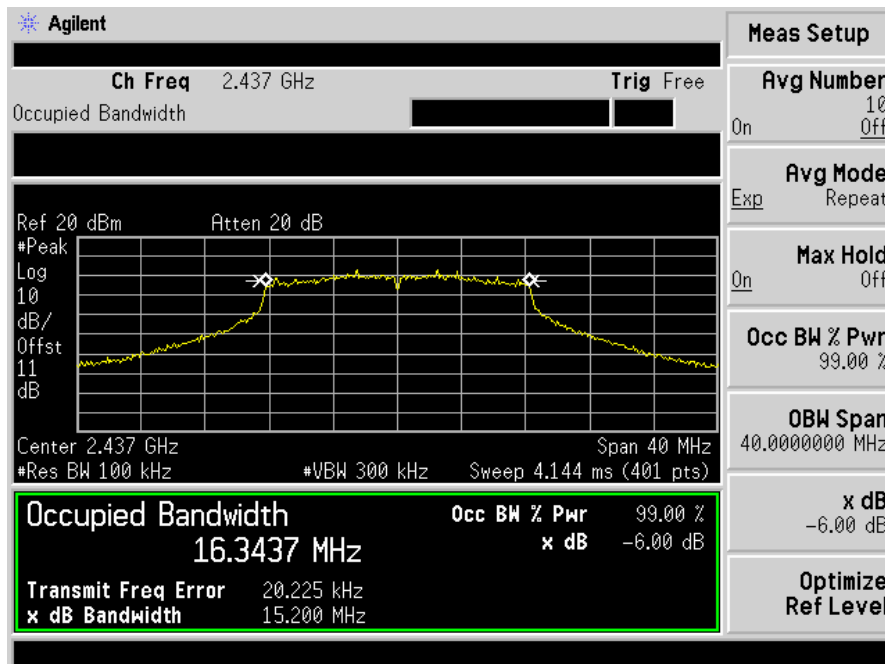




Spectrum Detector: PK Test Date : July 20, 2013
Test By: Andy Temperature : 28°C
Test Result: PASS Humidity : 65 %
Operation Mode: 802.11 g

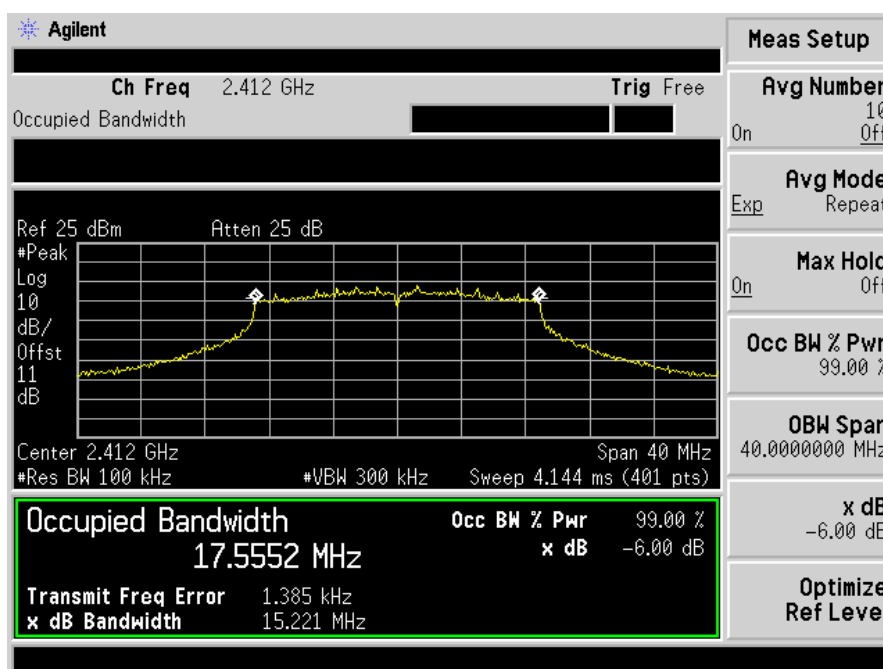
Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	15.239	6dB Bandwidth
6	2437	15.200	6dB Bandwidth
11	2462	15.140	6dB Bandwidth

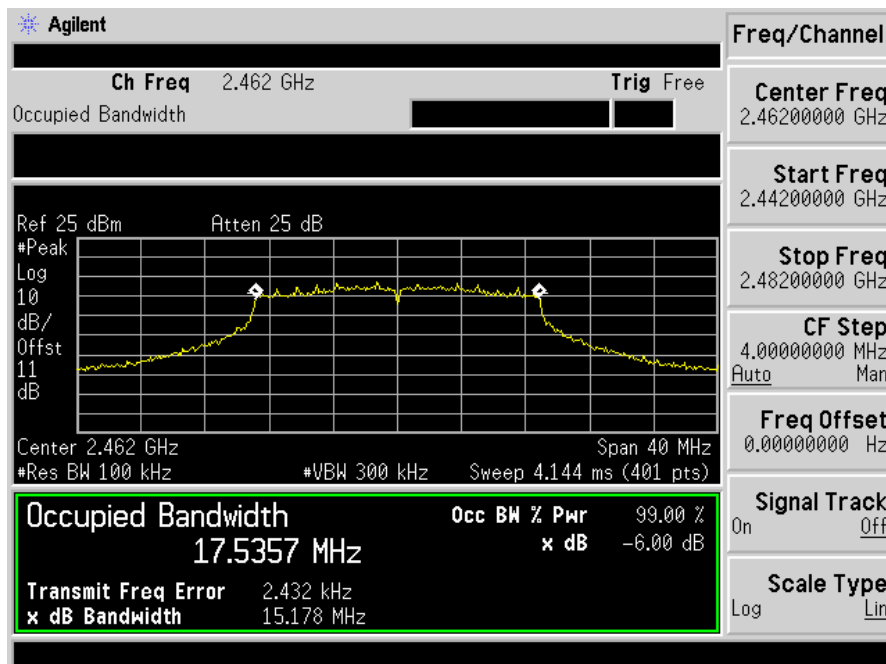
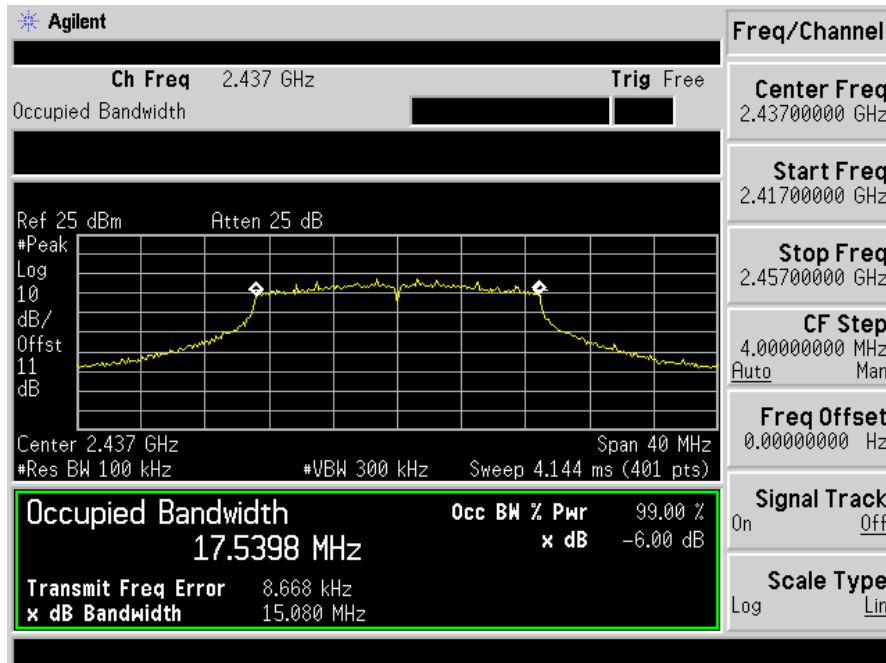




Spectrum Detector: PK Test Date : July 20, 2013
 Test By: Andy Temperature : 28°C
 Test Result: PASS Humidity : 65 %
 Operation Mode: 802.11 n

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	15.221	6dB Bandwidth
6	2437	15.080	6dB Bandwidth
11	2462	15.178	6dB Bandwidth

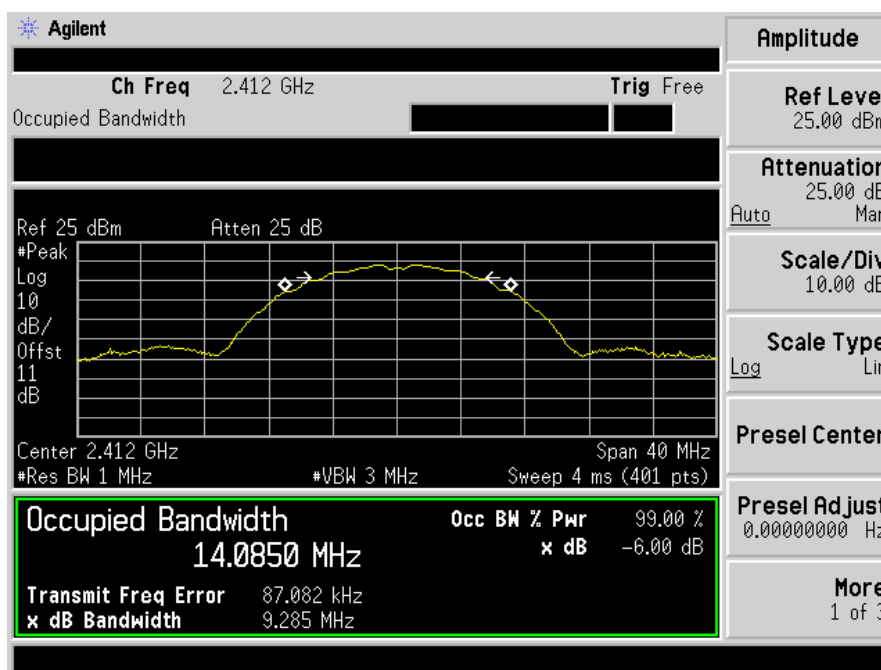


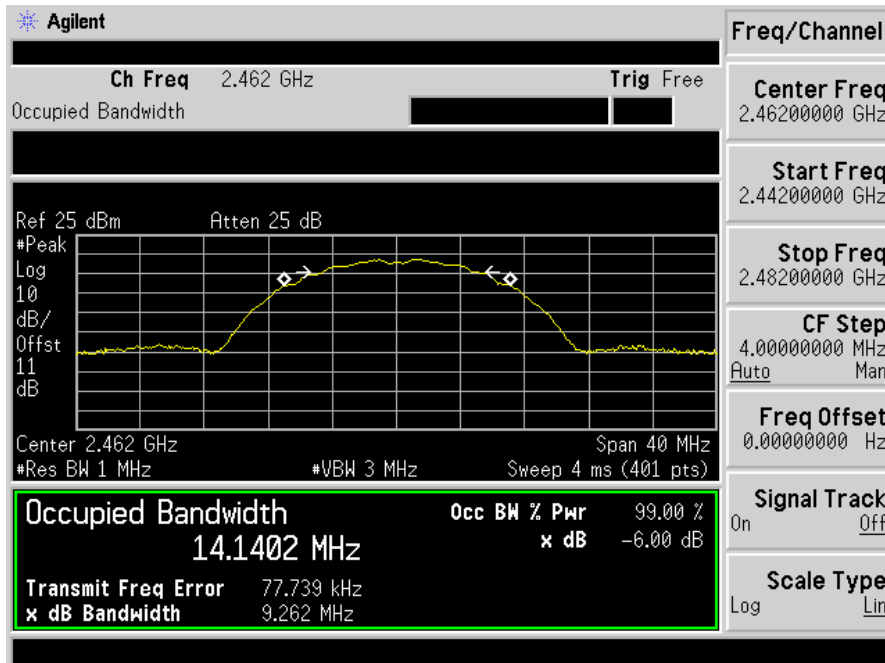
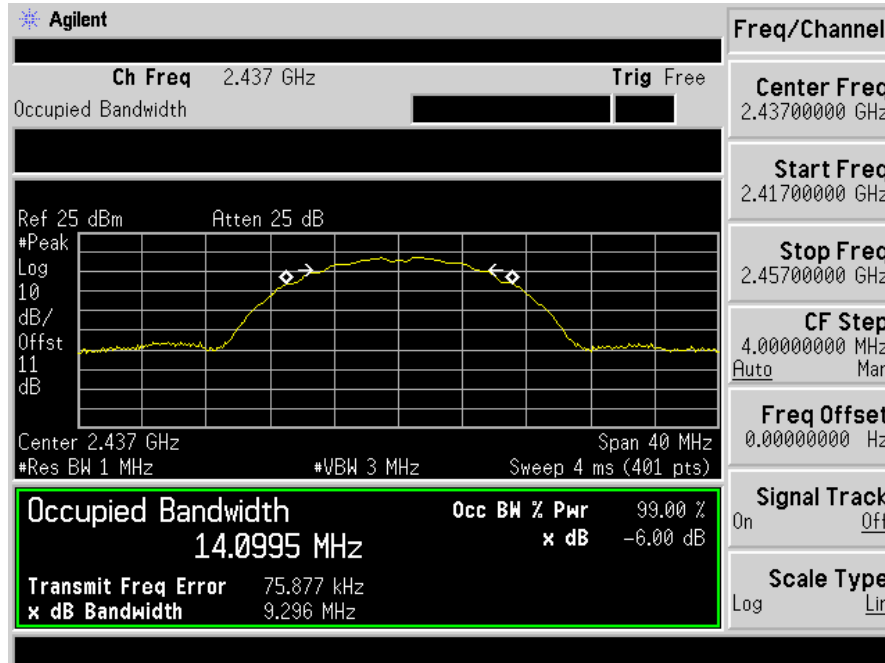


99% Bandwidth Test

Spectrum Detector:	PK	Test Date :	July 20, 2013
Test By:	Andy	Temperature :	28°C
Test Result:	PASS	Humidity :	65 %
Operation Mode: 802.11b			

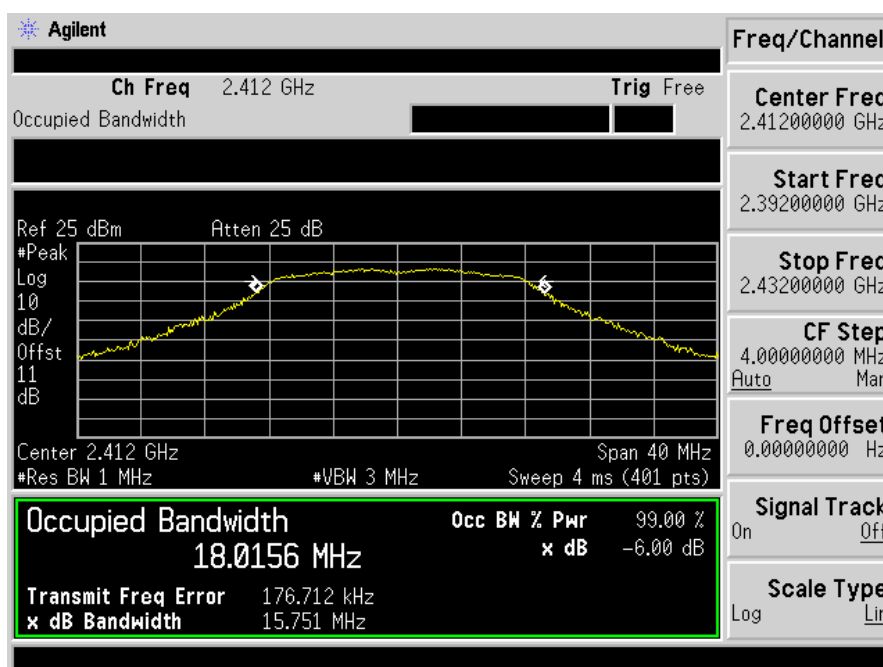
Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	14.085	99% Bandwidth Test
6	2437	14.099	99% Bandwidth Test
11	2462	14.140	99% Bandwidth Test

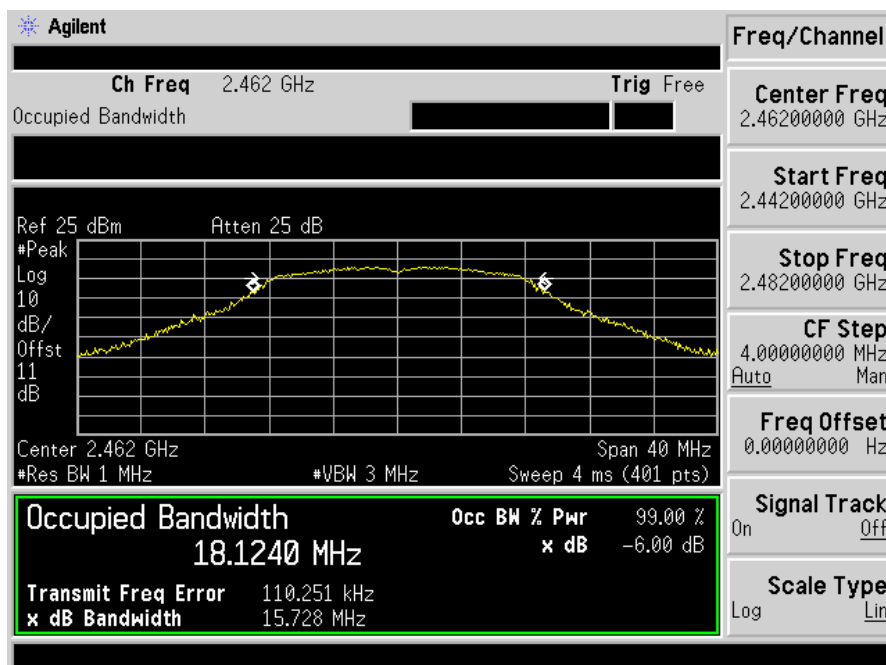
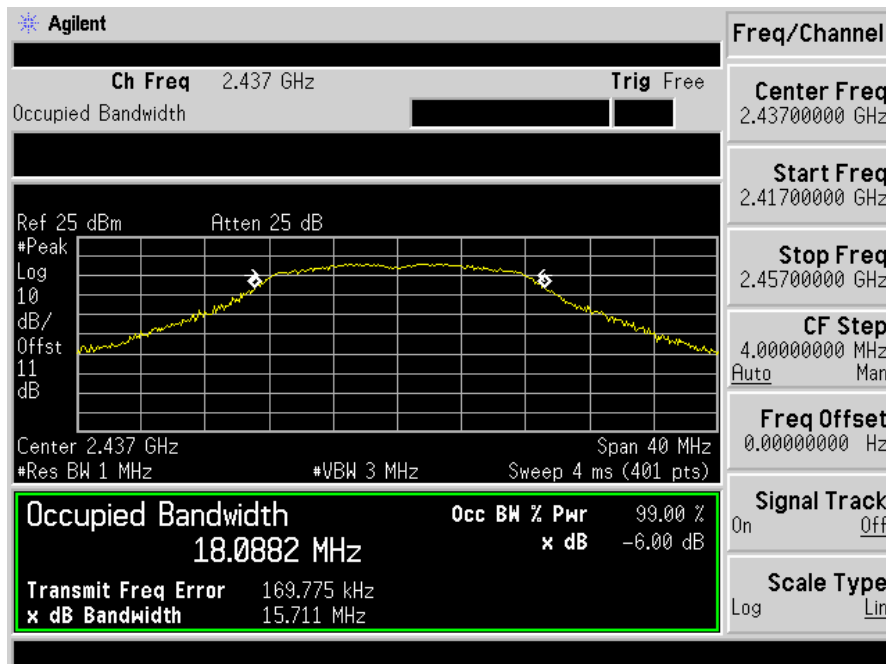




Spectrum Detector: PK Test Date : July 20, 2013
Test By: Andy Temperature : 28°C
Test Result: PASS Humidity : 65 %
Operation Mode: 802.11 g

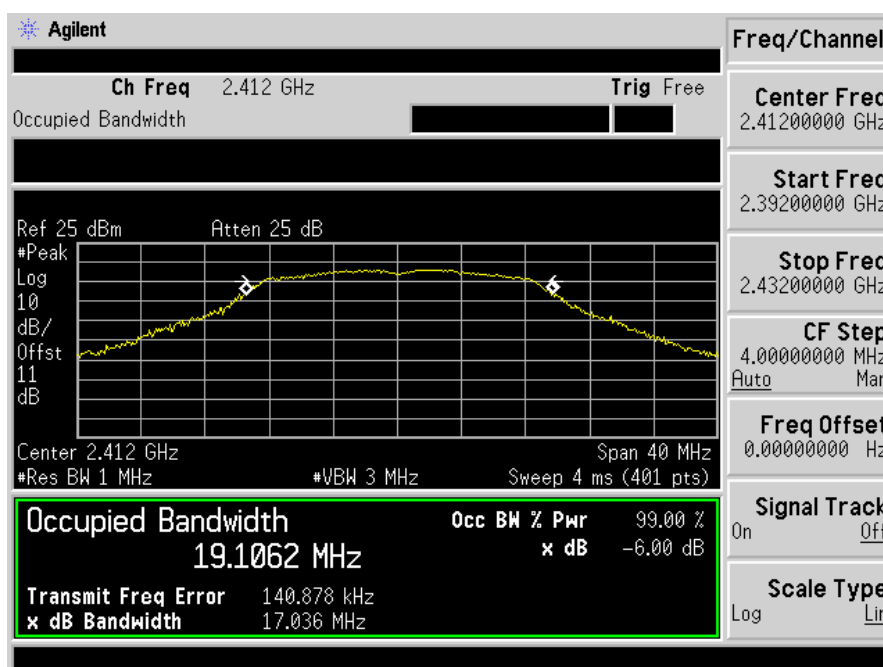
Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	18.01	99% Bandwidth Test
6	2437	18.09	99% Bandwidth Test
11	2462	18.12	99% Bandwidth Test

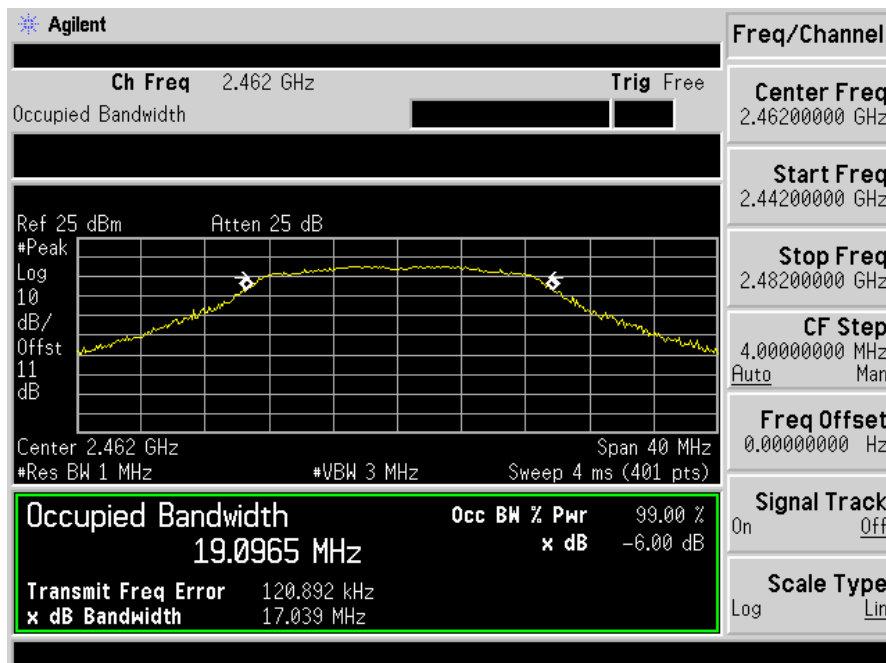
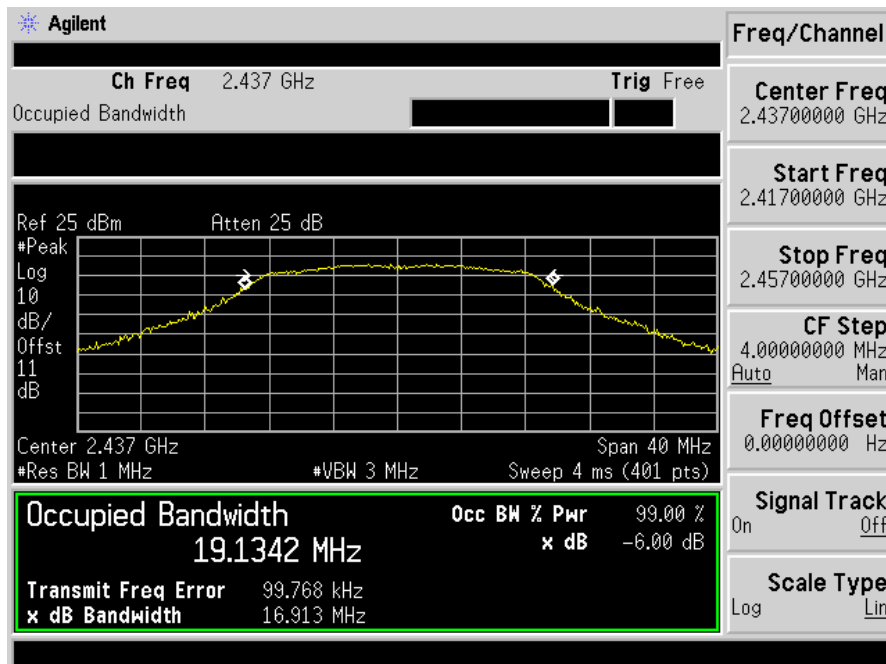




Spectrum Detector: PK Test Date : July 20, 2013
Test By: Andy Temperature : 28°C
Test Result: PASS Humidity : 65 %
Operation Mode: 802.11 n

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Mode
1	2412	19.11	99% Bandwidth Test
6	2437	19.13	99% Bandwidth Test
11	2462	19.09	99% Bandwidth Test





8. Maximum Peak Output Power Test

8.1 Measurement Procedure

The maximum peak conducted output power can be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type sensor.

- a. The Transmitter output (antenna port) was connected to the power meter.
- b. Turn on the EUT and power meter and then record the peak power value.
- c. Repeat above procedures on all channels needed to be tested.

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	05/28/2013	05/27/2014
Power sensor	MA2411B	0738172	05/28/2013	05/27/2014

8.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

8.5 Measurement Results

Spectrum Detector:	PK	Test Date :	April 20, 2014
Test By:	Andy	Temperature :	28°C
Test Result:	PASS	Humidity :	65 %
Operation Mode: 802.11b			

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412	21.61	1W(30dBm)	PASS
6	2437	21.15	1W(30dBm)	PASS
11	2462	20.93	1W(30dBm)	PASS

Spectrum Detector: PK Test Date : April 20, 2014
 Test By: Andy Temperature : 28°C
 Test Result: PASS Humidity : 65 %
 Operation Mode: 802.11g

Channel number	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	17.34	1W(30dBm)	PASS
6	2437.00	16.87	1W(30dBm)	PASS
11	2462.00	16.75	1W(30dBm)	PASS

Spectrum Detector: PK Test Date : April 20, 2014
 Test By: Andy Temperature : 28°C
 Test Result: PASS Humidity : 65 %
 Operation Mode: 802.11n

Channel number	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2412.00	17.28	1W(30dBm)	PASS
6	2437.00	16.90	1W(30dBm)	PASS
11	2462.00	16.58	1W(30dBm)	PASS

9. Band Edge Test

9.1 Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

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

Test mode: 802.11b

Spectrum Detector:	PK/AV	Test Date :	April 20, 2014
Test By:	Andy	Temperature :	28 °C
Test channel:	01	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390	H	44.62	35.08	74	54
2390	V	43.21	33.29	74	54

Spectrum Detector:	PK/AV	Test Date :	April 20, 2014
Test By:	Andy	Temperature :	28 °C
Test channel:	11	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2485.5	H	44.63	33.49	74	54
2485.5	V	42.89	32.08	74	54

Test mode: 802.11g

Spectrum Detector: PK/AV Test Date : April 20, 2014
Test By: Andy Temperature : 28 °C
Test channel: 01 Humidity : 65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390	H	44.89	33.42	74	54
2390	V	43.31	31.35	74	54

Spectrum Detector: PK/AV Test Date : April 20, 2014
Test By: Andy Temperature : 28 °C
Test channel: 11 Humidity : 65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2485.5	H	44.88	33.89	74	54
2485.5	V	48.75	33.36	74	54

Test mode: 802.11n

Spectrum Detector: PK/AV Test Date : April 20, 2014
Test By: Andy Temperature : 28 °C
Test channel: 01 Humidity : 65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390	H	44.81	32.41	74	54
2390	V	45.60	33.08	74	54

Spectrum Detector: PK/AV Test Date : April 20, 2014
Test By: Andy Temperature : 28 °C
Test channel: 11 Humidity : 65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2485.5	H	44.59	33.29	74	54
2485.5	V	45.31	34.13	74	54

10. Power Density

10.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/28/2013	05/27/2014

10.2 Measuring Instruments and Setting

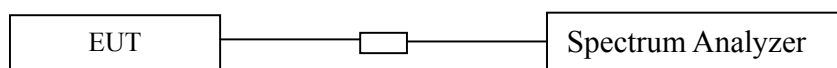
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS bandwidth.
RB	3kHz \geq RBW \leq 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 \geq 3 kHz. Set the VBW \geq 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



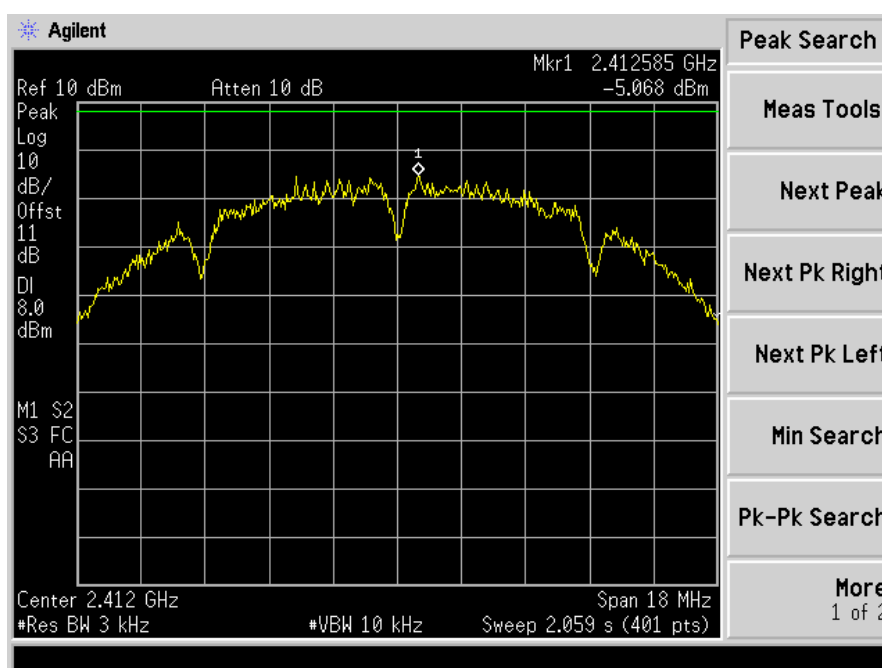
10.5 Limit

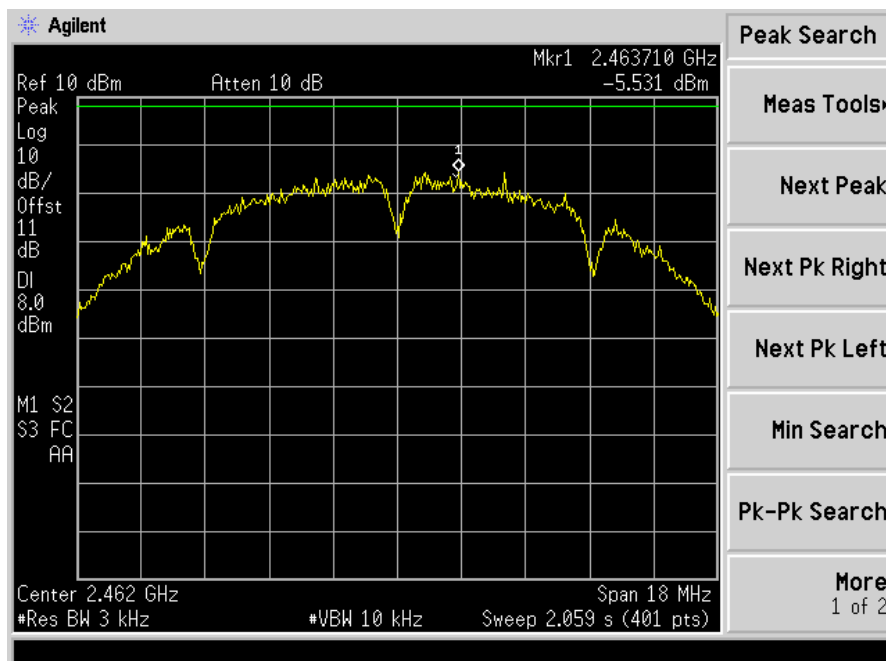
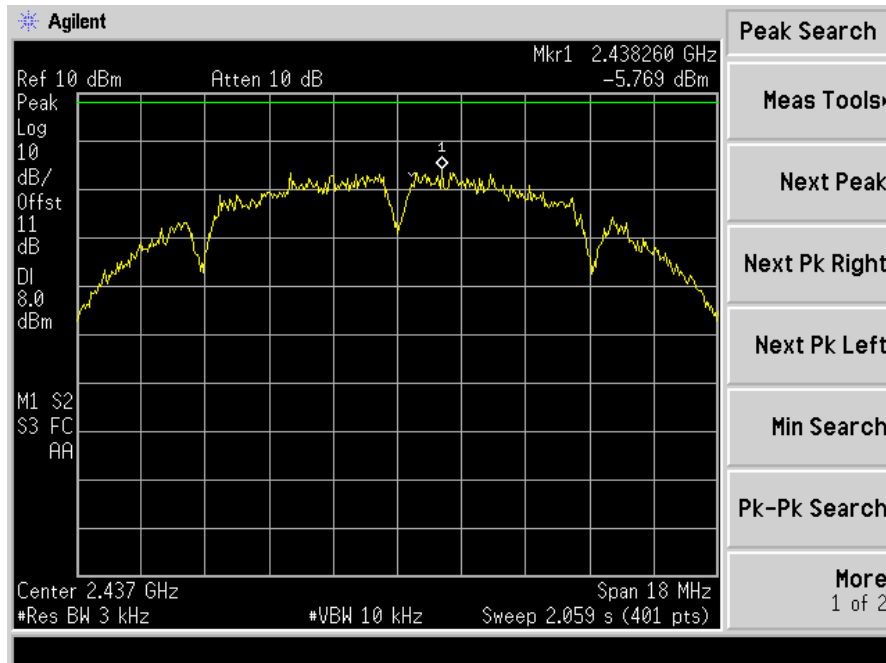
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

10.6 Test Result

Spectrum Detector:	PK	Test Date :	April 20, 2014
Test By:	Andy	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Operation Mode:	802.11 b		

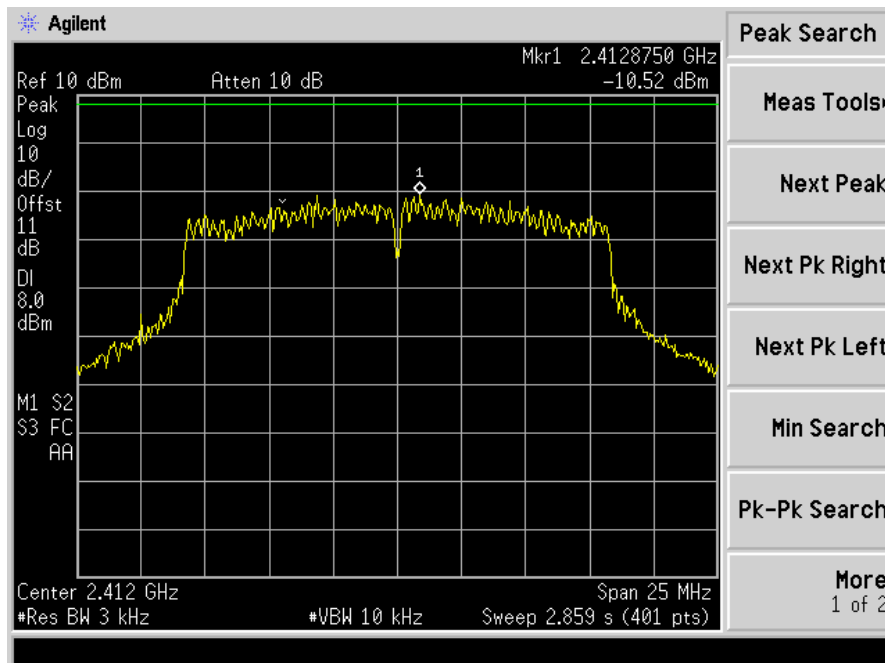
Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-5.06	<8dBm	PASS
6	-5.77	<8dBm	PASS
11	-5.53	<8dBm	PASS

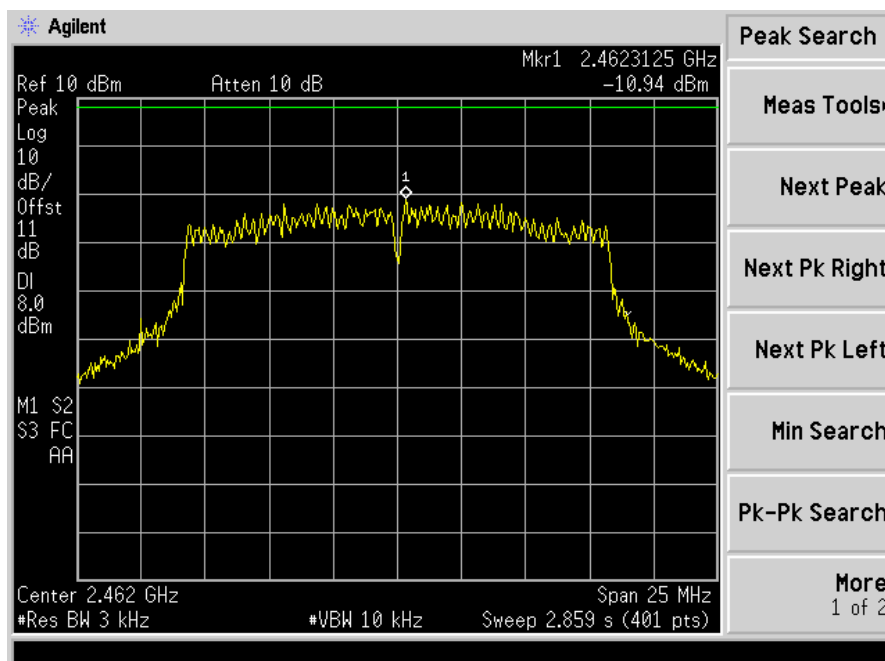
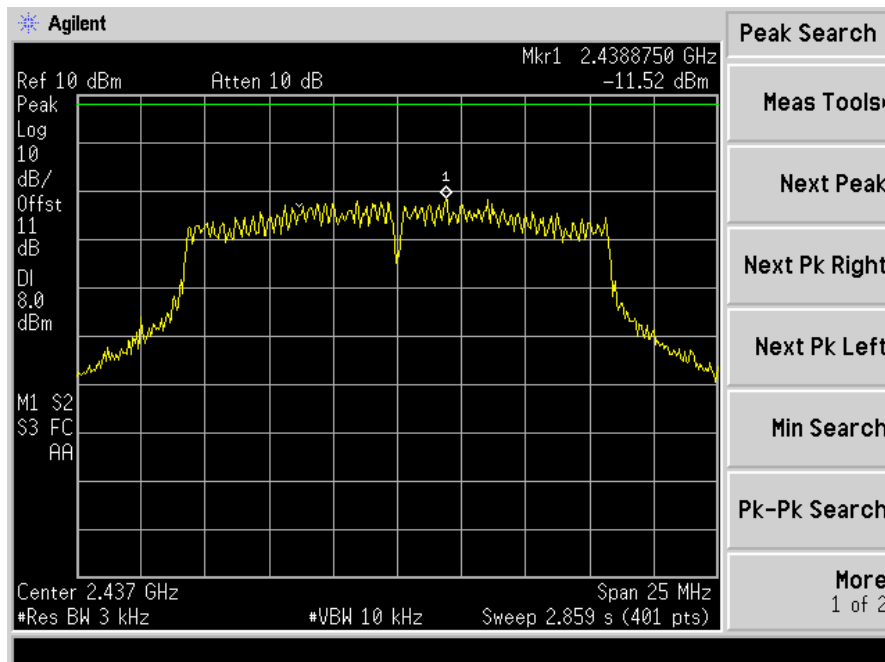




Spectrum Detector: PK Test Date : April 20, 2014
 Test By: Andy Temperature : 28℃
 Test Result: PASS Humidity : 65 %
 Operation Mode: 802.11 g

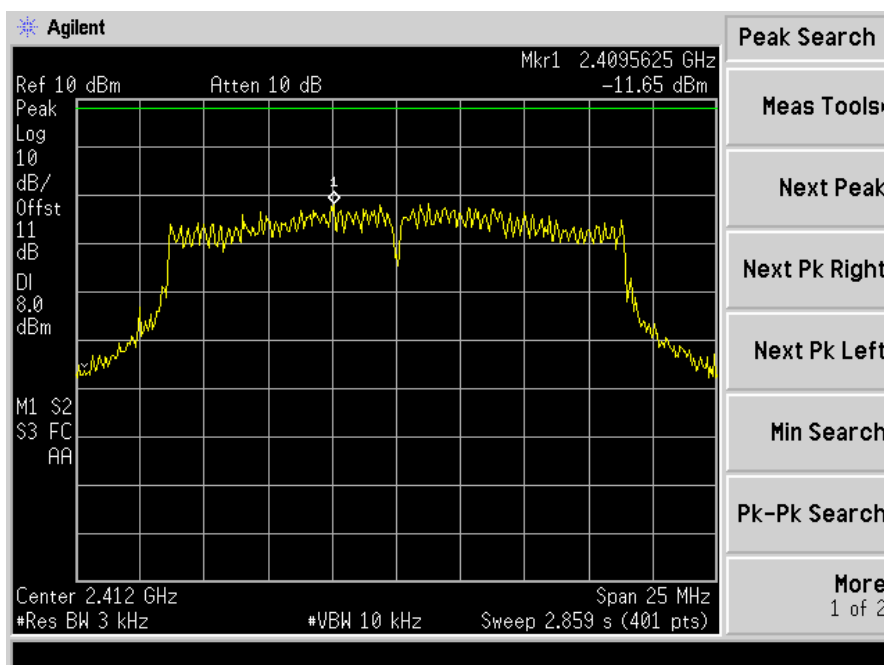
Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-10.52	<8dBm	PASS
6	-11.52	<8dBm	PASS
11	-10.94	<8dBm	PASS

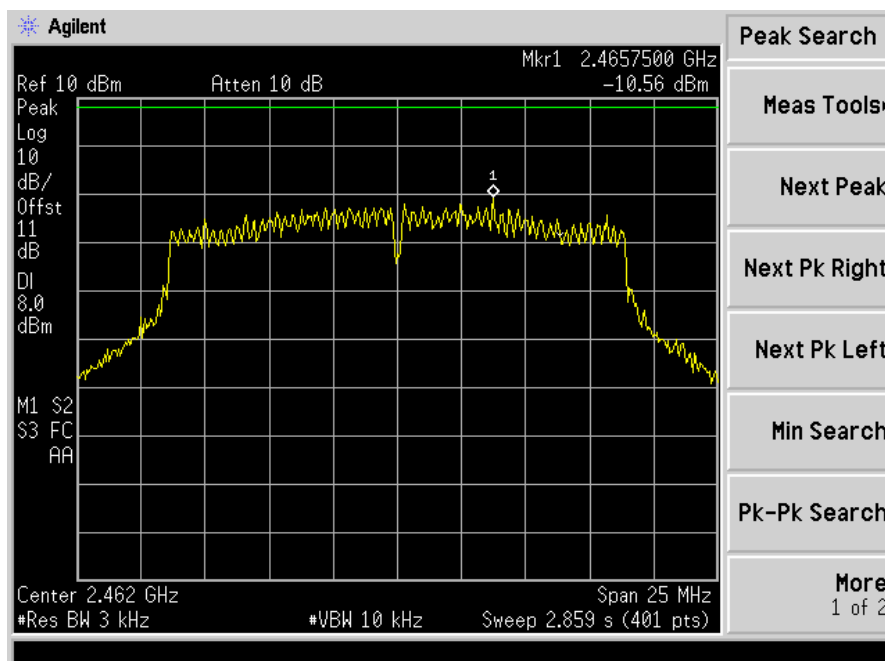
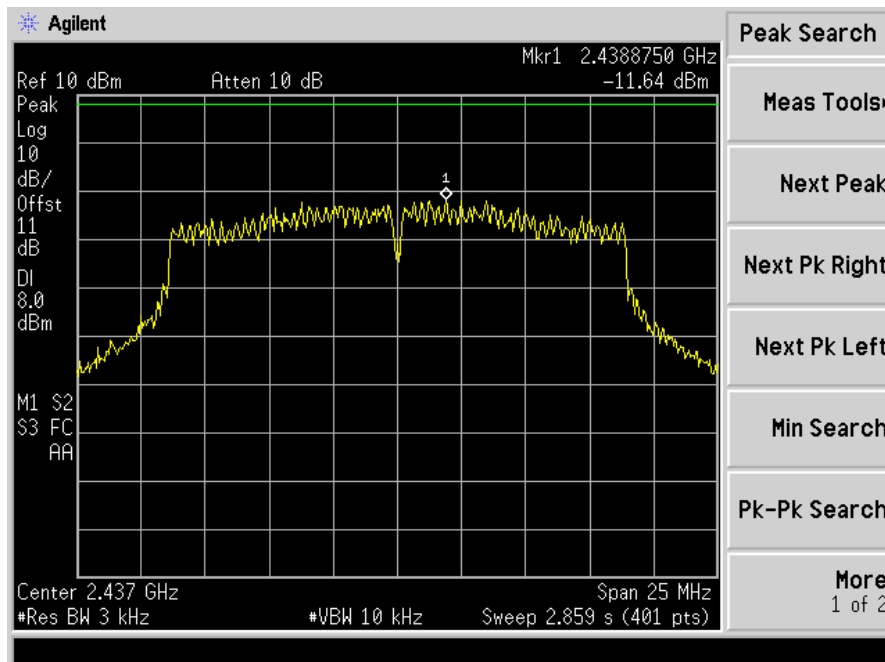




Spectrum Detector: PK Test Date : April 20, 2014
 Test By: Andy Temperature : 28℃
 Test Result: PASS Humidity : 65 %
 Operation Mode: 802.11 n

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-11.65	<8dBm	PASS
6	-11.64	<8dBm	PASS
11	-10.56	<8dBm	PASS





11. Antenna Port Emission

11.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/28/2013	05/27/2014

11.2 Measuring Instruments and Setting

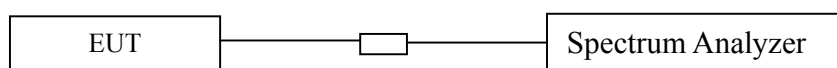
The following table is the setting of spectrum analyzer.

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.

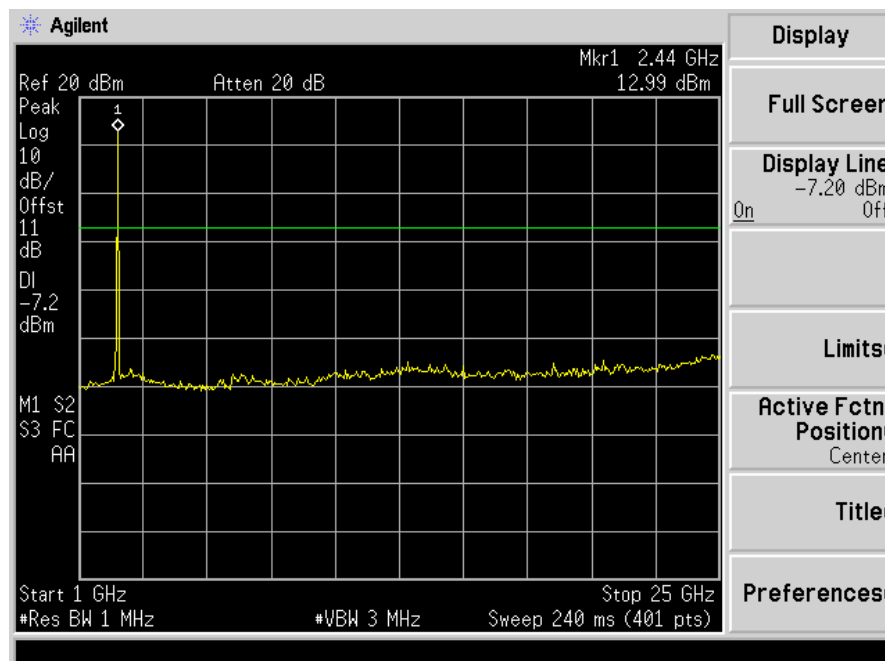
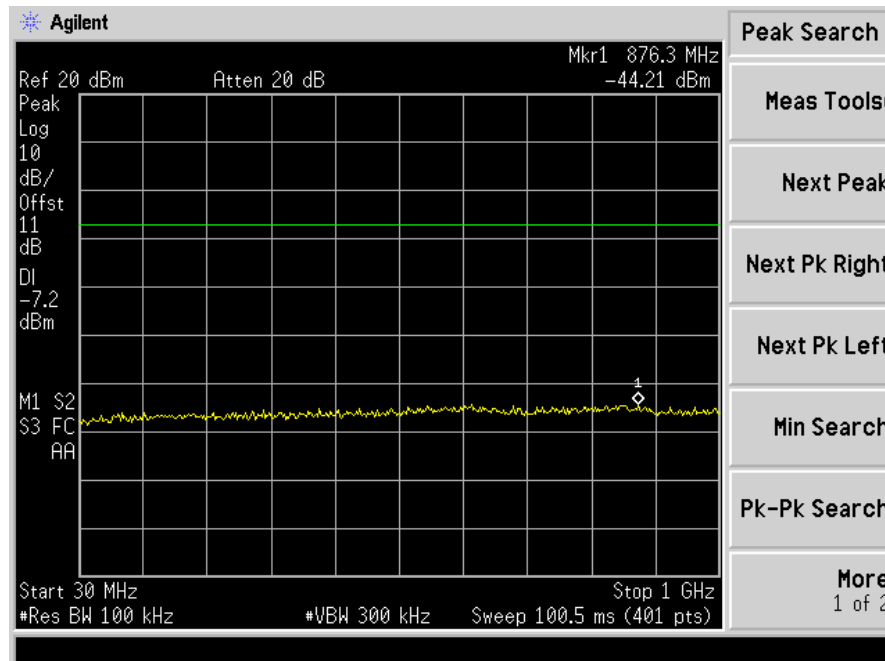
11.4 Block Diagram of Test setup



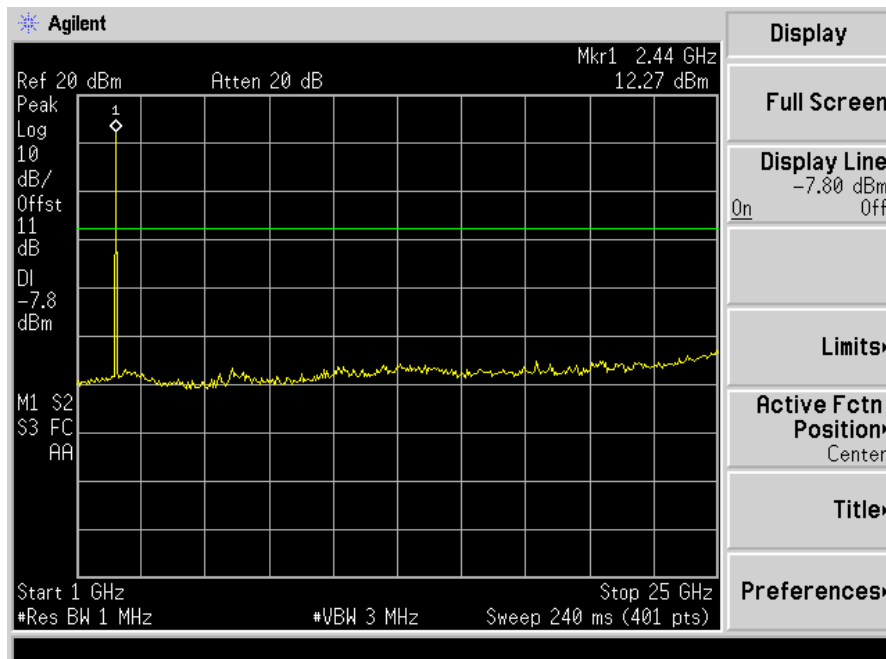
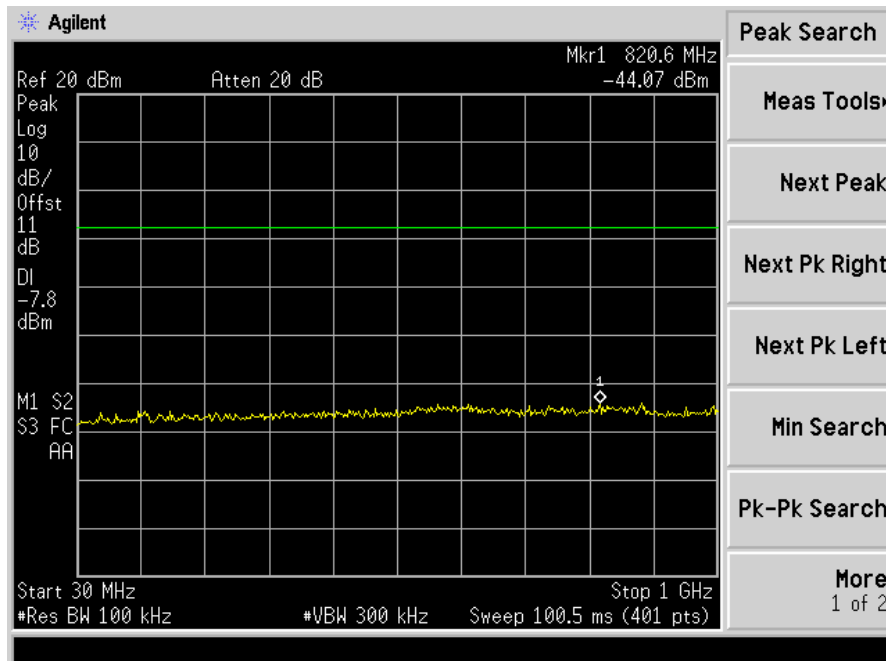
11.5 Test Result

PASS.

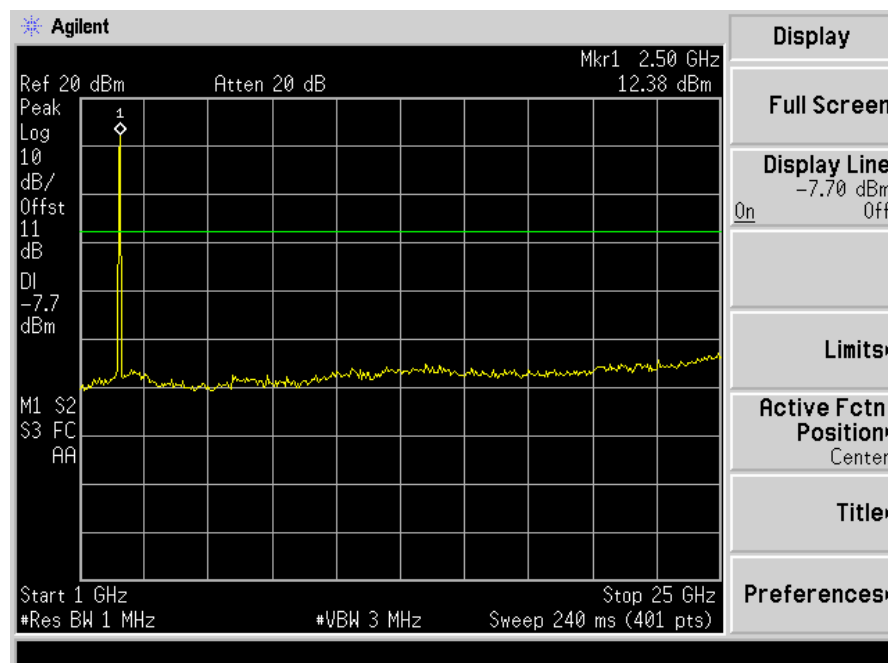
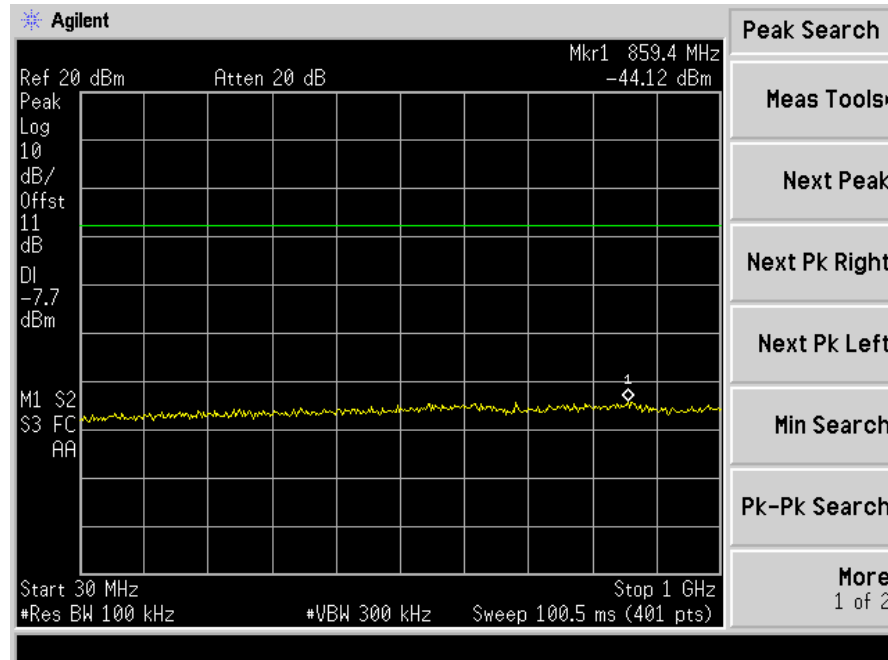
802.11b Low Channel 1



802.11b Mid Channel 6



802.11b High Channel 11



12. Antenna Application

12.1 Antenna Requirement

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.

12.2 Result

The EUT'S antenna is a PCB Antenna. The antenna's gain is 2.48dBi and meets the requirement.

13. Uncertainty

Measurement Uncertainty for a level of Confidence of 95%

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$