

# FCC REPORT

## (WIFI)

**Applicant:** Binatone Electronics International Limited

**Address of Applicant:** Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong

### Equipment Under Test (EUT)

**Product Name:** DECT Phone

**Model No.:** IVO, Smart75

**FCC ID:** VLJ-IVO

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247

**Date of sample receipt:** 29 Sep., 2016

**Date of Test:** 29 Sep., 2016 to 13 Oct., 2016

**Date of report issued:** 13 Oct., 2016

**Test Result:** PASS\*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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## 2 Version

Version No.	Date	Description
00	13 Oct., 2016	Original

Tested by:

Mike Ou

Date:

13 Oct., 2016

**Test Engineer**

Reviewed by:

Carey Chen

Date:

13 Oct., 2016

**Project Engineer**

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

## 5 General Information

### 5.1 Client Information

Applicant:	Binatone Electronics International Limited
Address of Applicant:	Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong
Manufacturer:	ShenZhen Concox Information Technology Co., Ltd
Address of Manufacturer:	4F, Building B, Gaoxinqi Industrial Park, Liuxian 1st Road, District 67, Bao'an, Shenzhen
Factory:	Huizhou Goldenchip Electronics Co., Ltd
Address of Factory:	No. 12 Factory, Songyang Road, Zhongkai Hi-tech Development Zone, Huizhou City, Guangdong Province, China

### 5.2 General Description of E.U.T.

Product Name:	DECT Phone
Model No.:	IVO, Smart75
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40))
Channel numbers:	11 for 802.11b/802.11g/802.11(H20) 7 for 802.11n(H40)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	Internal Antenna
Antenna gain:	0.5dBi
Power supply:	Rechargeable Li-ion Battery DC3.7V-1600mAh
AC adapter:	Model: S006AKU0500100 Input: AC100-240V 50/60Hz 0.2A Output: DC 5.0V, 1A
Remark:	The No.:IVO, Smart75 were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name.

**Operation Frequency each of channel For 802.11b/g/n(H20)**

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

**Operation Frequency each of channel For 802.11n(H40)**

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
		5	2432MHz	8	2447MHz		
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

802.11b/802.11g/802.11n (H20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

802.11n (H40)

Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz

### 5.3 Test environment and mode

<b>Operating Environment:</b>	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
<b>Test mode:</b>	
Operation mode	Keep the EUT in continuous transmitting with modulation
The sample was placed 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:										
<b>Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.</b>										
<table border="1"> <thead> <tr> <th>Mode</th><th>Data rate</th></tr> </thead> <tbody> <tr> <td>802.11b</td><td>1Mbps</td></tr> <tr> <td>802.11g</td><td>6Mbps</td></tr> <tr> <td>802.11n(H20)</td><td>6.5Mbps</td></tr> <tr> <td>802.11n(H40)</td><td>13.5Mbps</td></tr> </tbody> </table>	Mode	Data rate	802.11b	1Mbps	802.11g	6Mbps	802.11n(H20)	6.5Mbps	802.11n(H40)	13.5Mbps
Mode	Data rate									
802.11b	1Mbps									
802.11g	6Mbps									
802.11n(H20)	6.5Mbps									
802.11n(H40)	13.5Mbps									

#### Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20) and 13.5 Mbps for 802.11n(H40). Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.

### 5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

### 5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 817957, February 27, 2012.

- IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of

testing. The Registration No. is CNAS L6048.

## **5.6 Laboratory Location**

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No.B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,

Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755-23118282

Fax: +86-755-23116366

## 5.7 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017
6	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2016	03-31-2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2016	03-31-2017
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017
10	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2016	03-31-2017
11	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

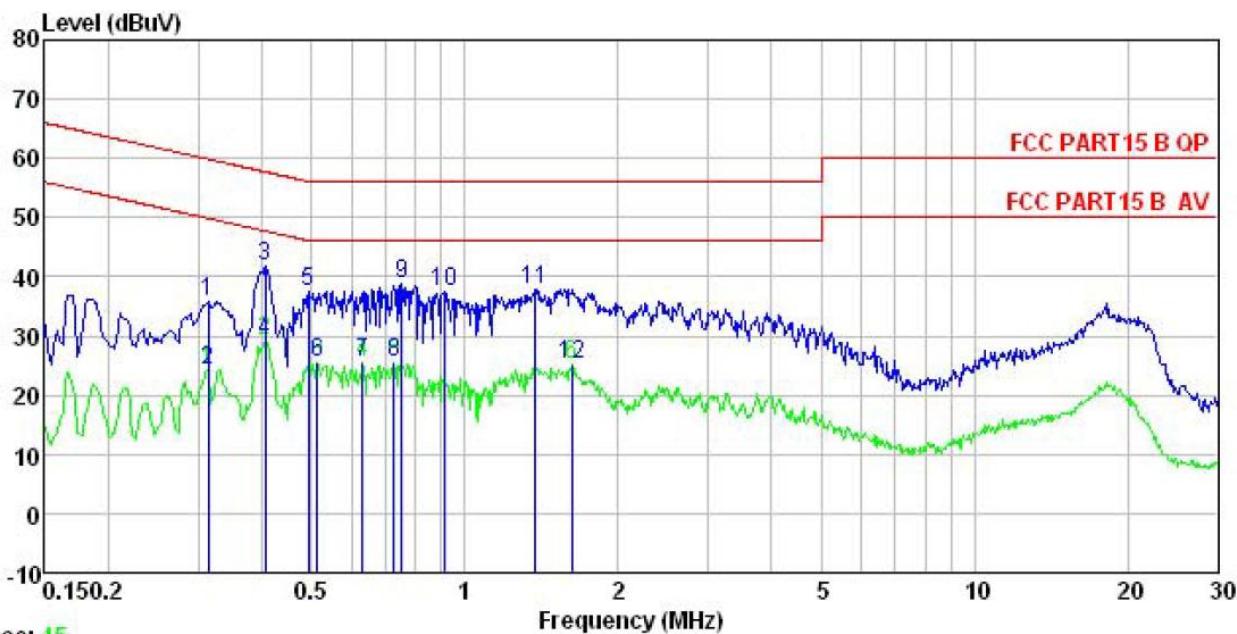
## 6 Test results and Measurement Data

### 6.1 Antenna requirement:

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<b>15.203 requirement:</b>	
<p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>	
<b>E.U.T Antenna:</b>	
<p>The WiFi antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 0.5 dBi.</p>	
	

## 6.2 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207		
Test Method:	ANSI C63.4: 2014		
Test Frequency Range:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test procedure	<ol style="list-style-type: none"> <li>The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.</li> </ol>		
Test setup:	<p><b>Reference Plane</b></p> <p>LISN                          LISN</p> <p>↓ 40cm                          80cm →</p> <p>AUX Equipment                  E.U.T</p> <p>EMI Receiver</p> <p>AC power</p> <p>Test table/Insulation plane</p> <p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p>		
Test Instruments:	Refer to section 5.6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

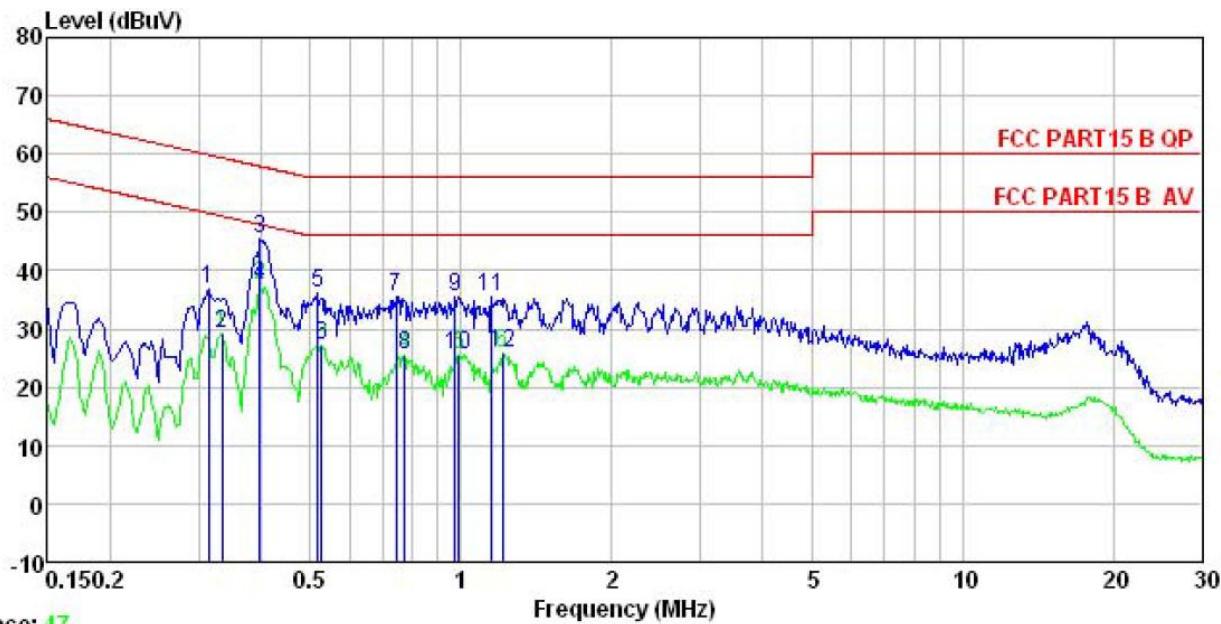
**Measurement Data:****Neutral:**

Freq	Read	LISM	Cable	Limit	Over	Remark
	Freq	Level	Factor	Loss	Level	
MHz	dBuV	dB	dB	dBuV	dBuV	dB
1	0.313	25.02	0.20	10.74	35.96	59.88 -23.92 QP
2	0.313	13.42	0.20	10.74	24.36	49.88 -25.52 Average
3	0.406	30.84	0.23	10.72	41.79	57.73 -15.94 QP
4	0.406	18.10	0.23	10.72	29.05	47.73 -18.68 Average
5	0.494	26.50	0.24	10.76	37.50	56.10 -18.60 QP
6	0.513	14.37	0.25	10.76	25.38	46.00 -20.62 Average
7	0.630	14.37	0.30	10.77	25.44	46.00 -20.56 Average
8	0.727	14.57	0.32	10.78	25.67	46.00 -20.33 Average
9	0.751	27.66	0.32	10.79	38.77	56.00 -17.23 QP
10	0.909	26.23	0.28	10.84	37.35	56.00 -18.65 QP
11	1.374	26.76	0.26	10.91	37.93	56.00 -18.07 QP
12	1.619	13.92	0.26	10.93	25.11	46.00 -20.89 Average

**Notes:**

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

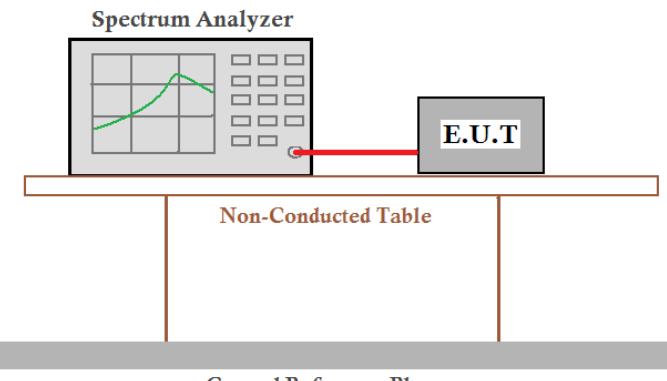
Line:



Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

### 6.3 Conducted Output Power

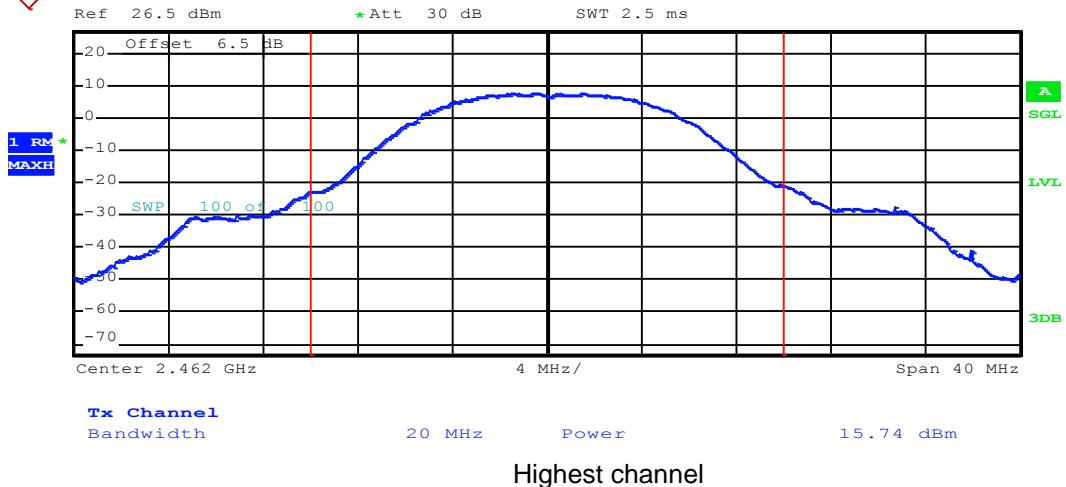
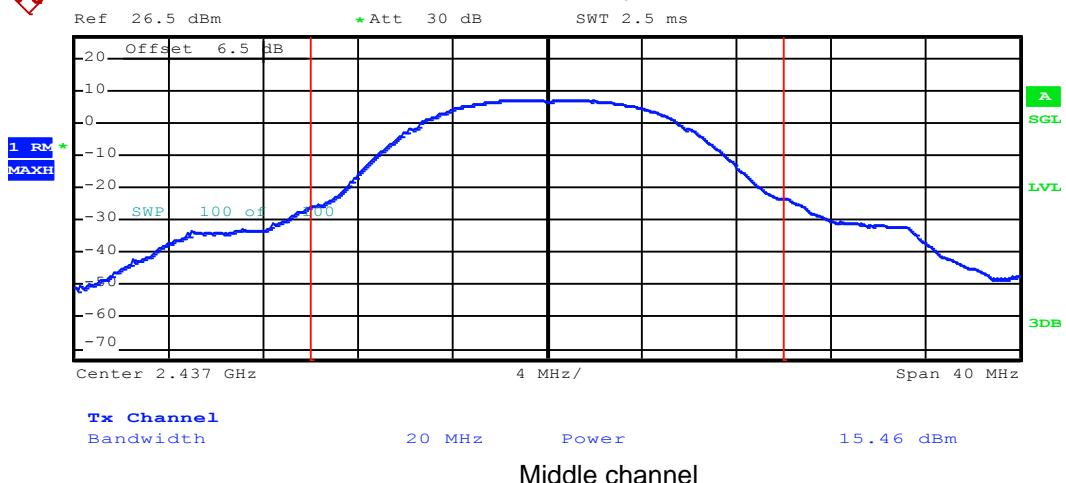
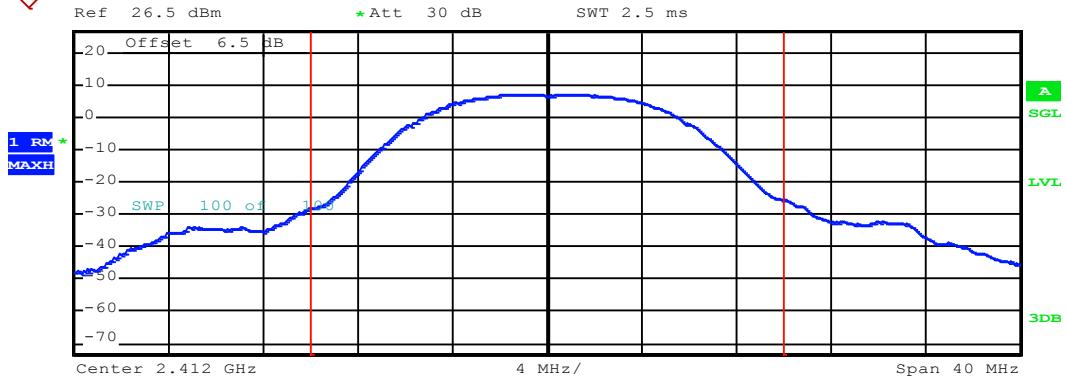
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 9.2.2.2
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

#### Measurement Data:

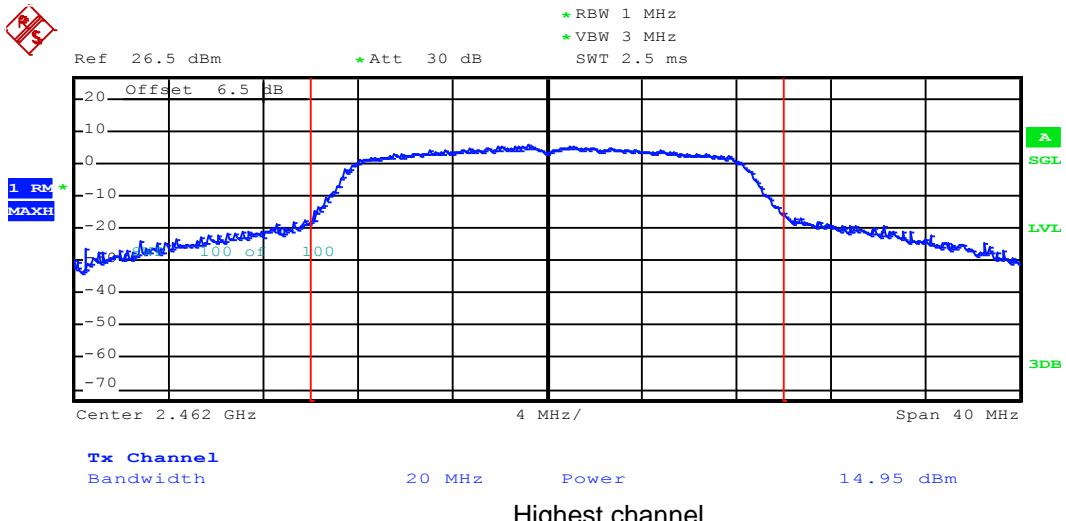
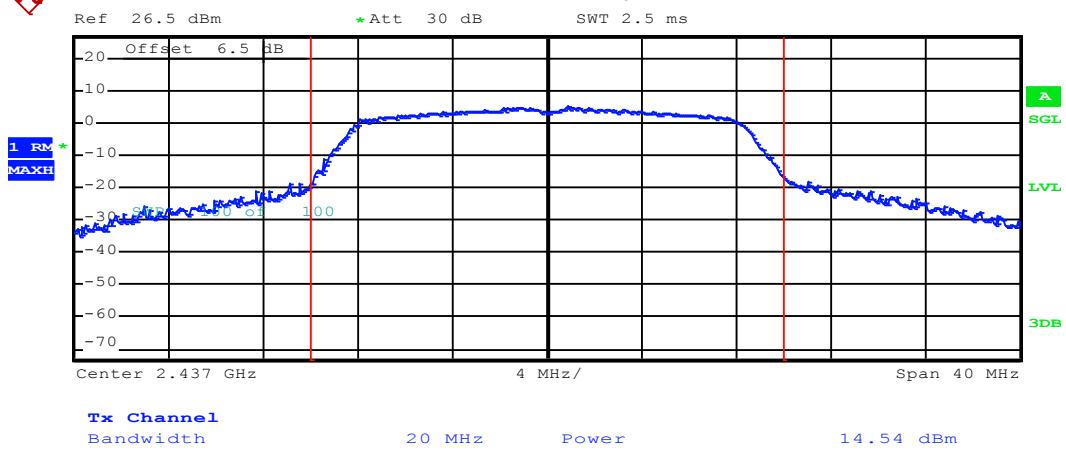
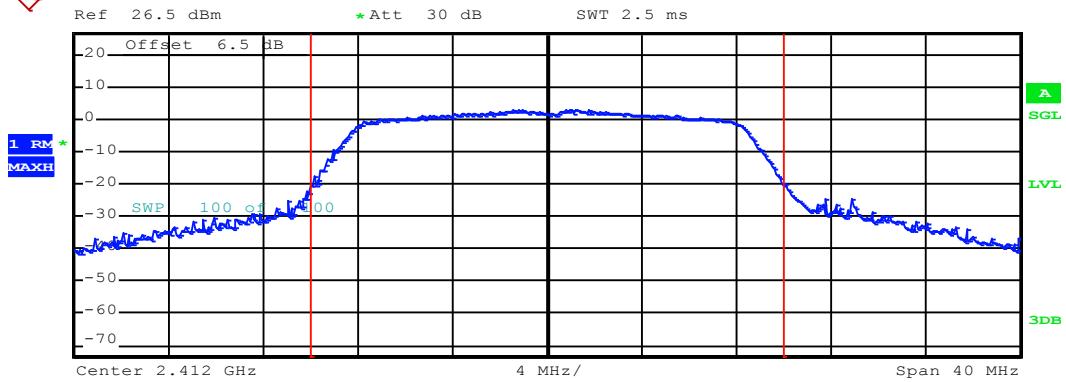
Test CH	Maximum Conducted Output Power (dBm)				Limit(dBm)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	15.40	12.58	12.57	11.91		
Middle	15.46	14.54	14.55	12.83	30.00	
Highest	15.74	14.95	14.93	12.74		Pass

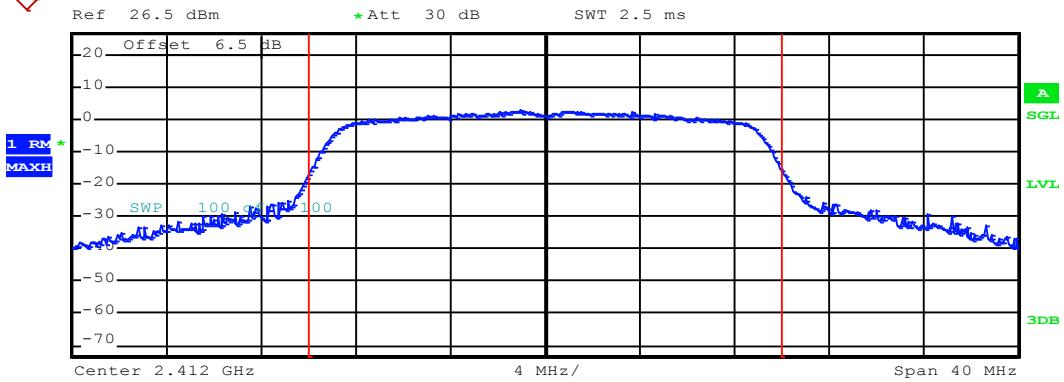
Test plot as follows:

**Test mode:802.11b**

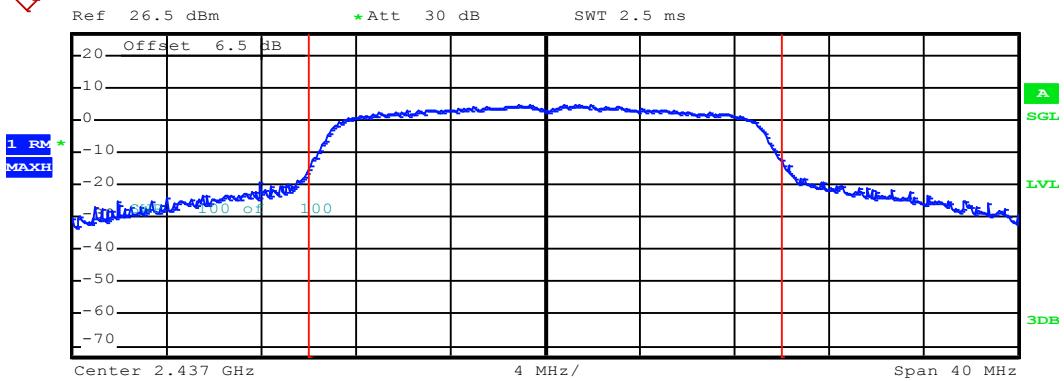


**Test mode: 802.11g**

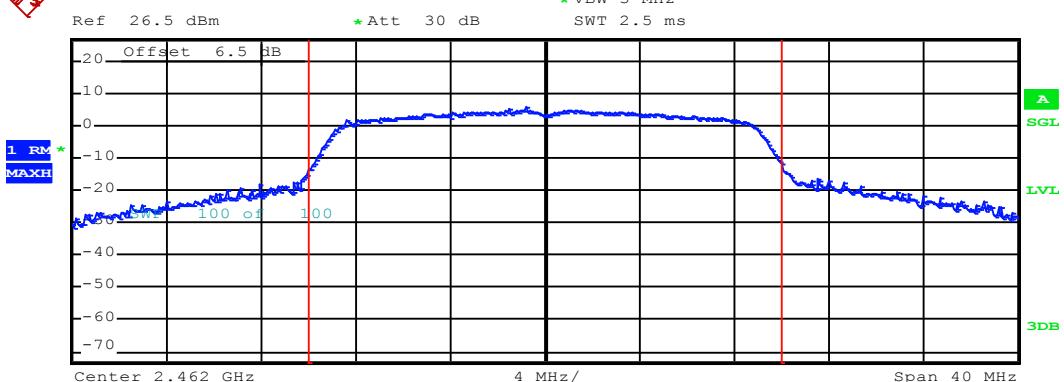


**Test mode: 802.11n(H20)**


**Tx Channel**  
Bandwidth 20 MHz Power 12.57 dBm  
Lowest channel

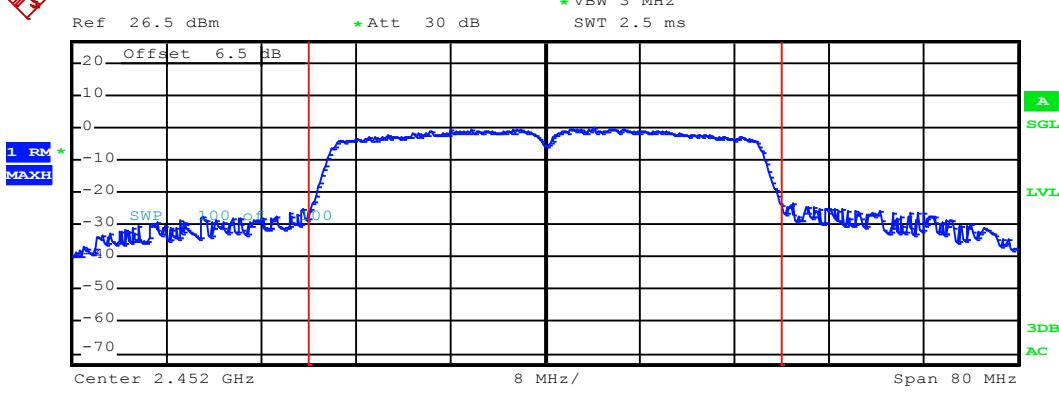
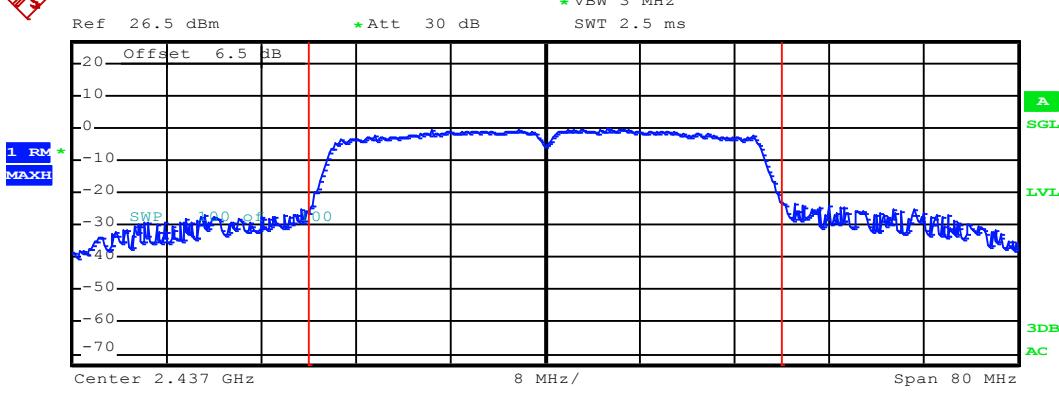
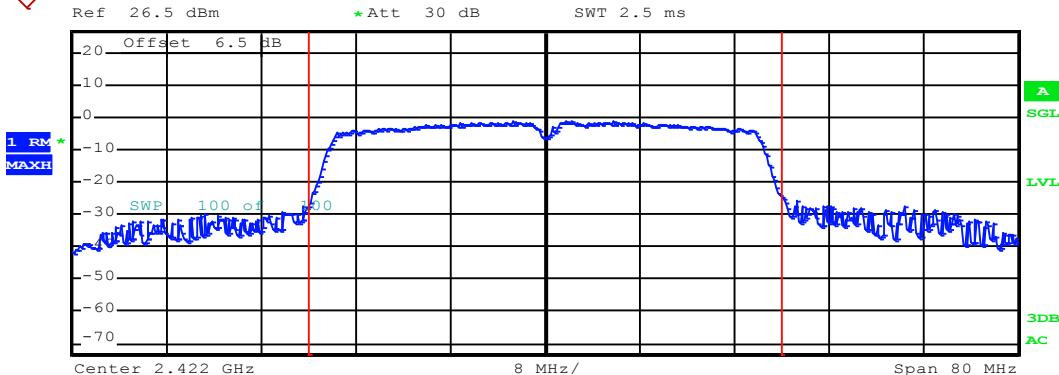


**Tx Channel**  
Bandwidth 20 MHz Power 14.55 dBm  
Middle channel

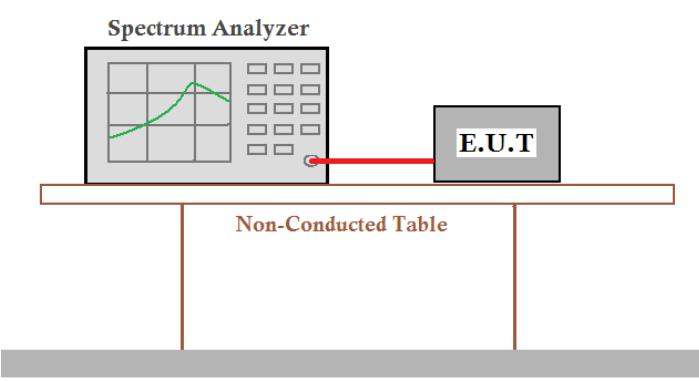


Highest channel

**Test mode:802.11n(H40)**



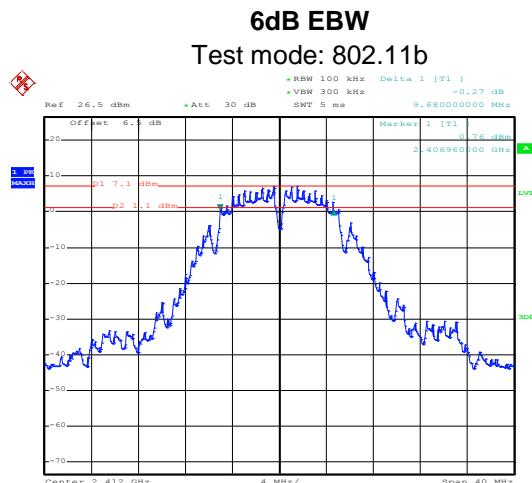
## 6.4 Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 8.1
Limit:	>500kHz
Test setup:	 <p>The diagram illustrates the measurement setup. A Spectrum Analyzer is positioned at the top left, displaying a green waveform on its screen. A red cable connects the analyzer to a gray rectangular box labeled 'E.U.T' (Equipment Under Test) located at the bottom right. This entire assembly rests on a light-colored rectangular table labeled 'Non-Conducted Table'. Below the table is a thick horizontal bar labeled 'Ground Reference Plane'.</p>
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

### Measurement Data:

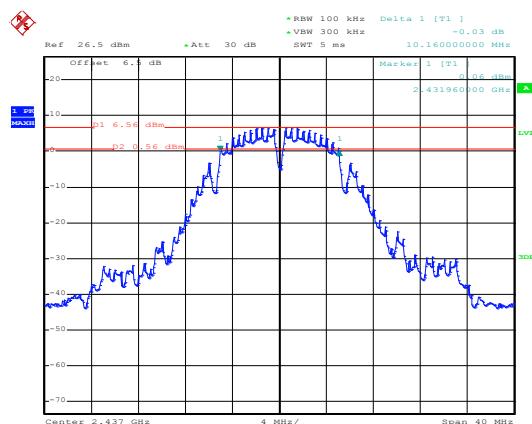
Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	9.68	15.28	15.28	35.52	>500	Pass
Middle	10.16	15.60	15.28	35.52		
Highest	10.24	15.28	15.28	35.52		
Test CH	99% Occupy Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	12.88	16.40	17.60	36.00	N/A	N/A
Middle	13.04	16.48	17.68	36.00		
Highest	13.20	16.64	17.76	36.00		

Test plot as follows:



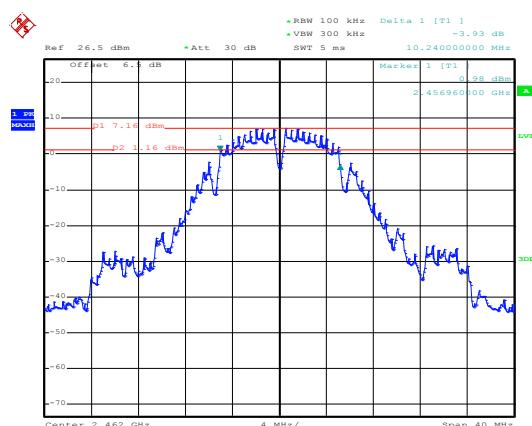
Date: 29.SEP.2016 22:15:20

### Lowest channel



Date: 29.SEP.2016 22:19:52

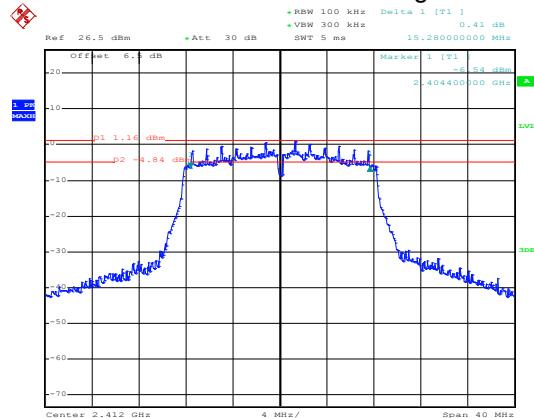
### Middle channel



Date: 29.SEP.2016 22:18:21

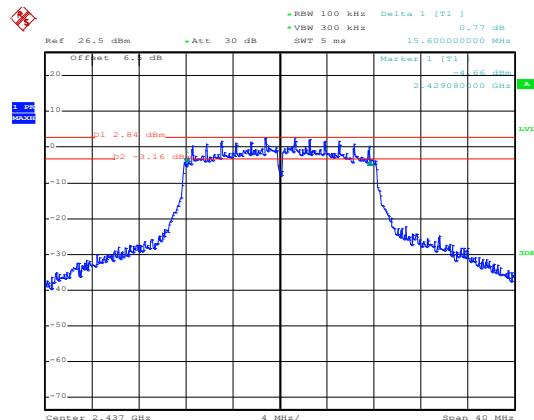
### Highest channel

Test mode: 802.11g



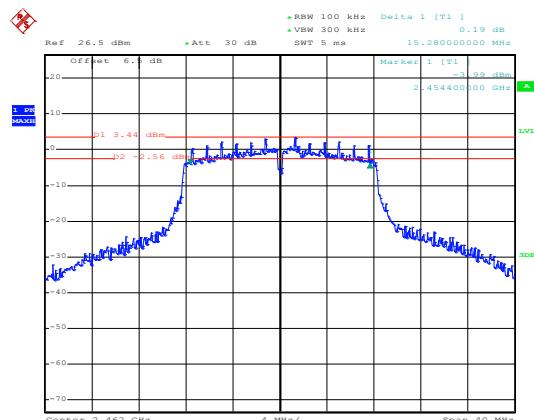
Date: 29.SEP.2016 22:21:02

Lowest channel



Date: 29.SEP.2016 22:22:11

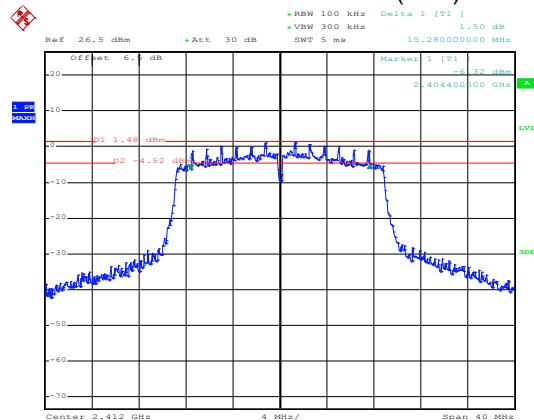
Middle channel



Date: 29.SEP.2016 22:23:15

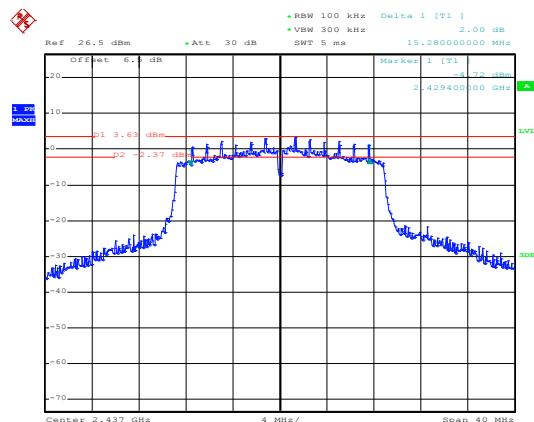
Highest channel

Test mode: 802.11n(H20)



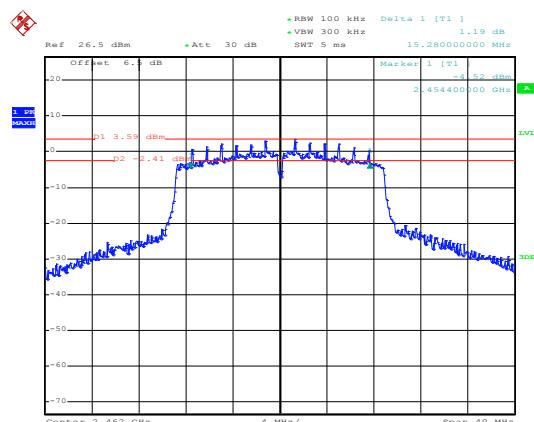
Date: 29.SEP.2016 22:24:23

Lowest channel



Date: 29.SEP.2016 22:25:16

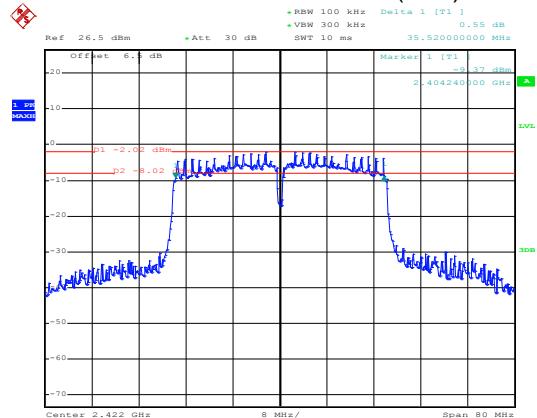
Middle channel



Date: 29.SEP.2016 22:26:10

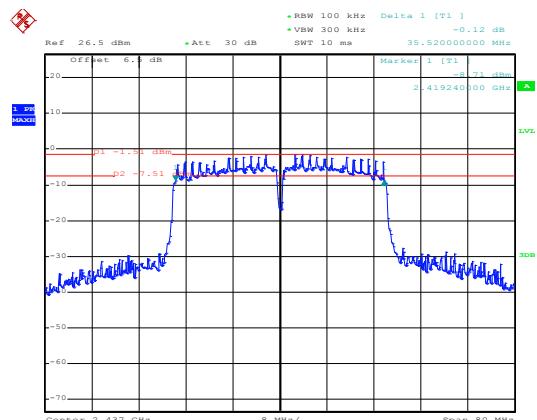
Highest channel

Test mode: 802.11n(H40)



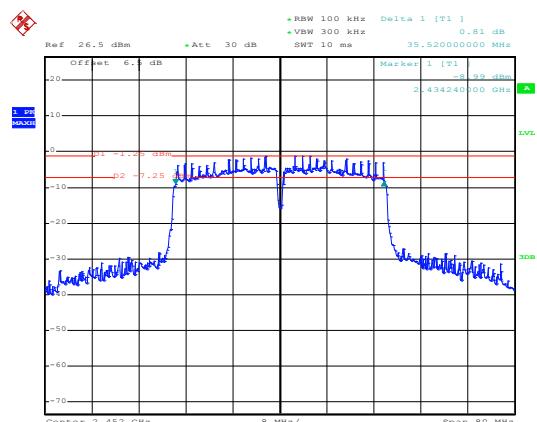
Date: 29.SEP.2016 22:27:33

Lowest channel



Date: 29.SEP.2016 22:28:26

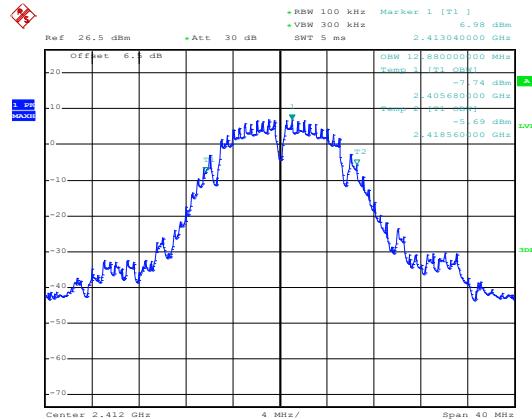
Middle channel



Date: 29.SEP.2016 22:29:22

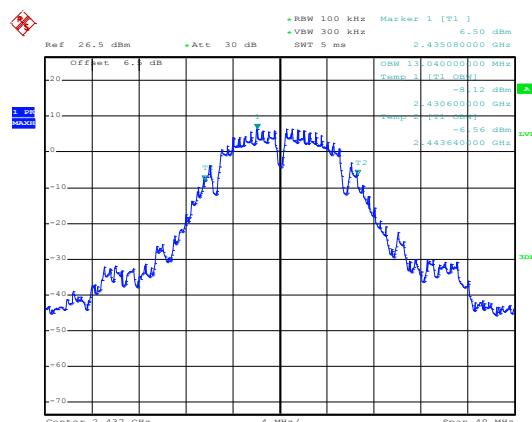
Highest channel

**99% OBW**  
Test mode: 802.11b



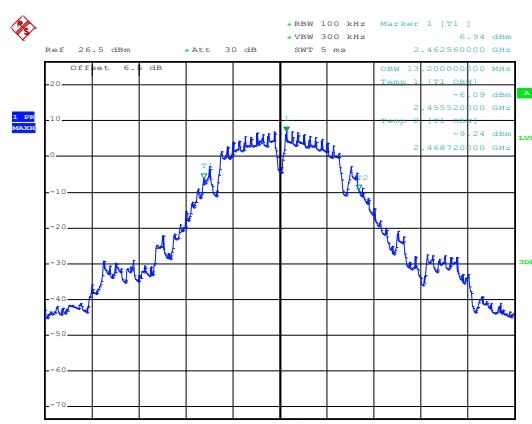
Date: 29.SEP.2016 22:30:26

**Lowest channel**



Date: 29.SEP.2016 22:30:44

**Middle channel**



Date: 29.SEP.2016 22:31:07

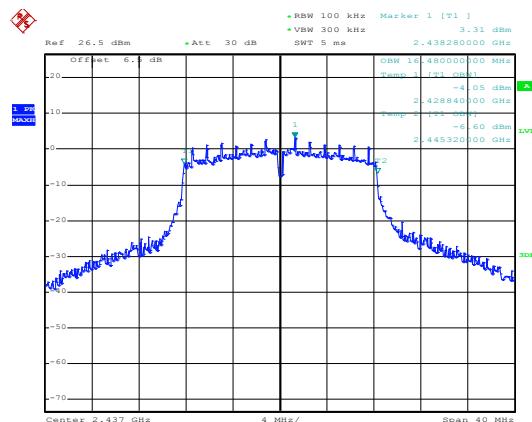
**Highest channel**

Test mode: 802.11g



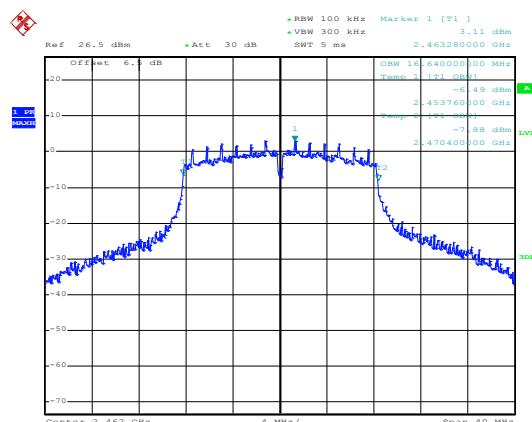
Date: 29.SEP.2016 22:31:37

Lowest channel



Date: 29.SEP.2016 22:32:04

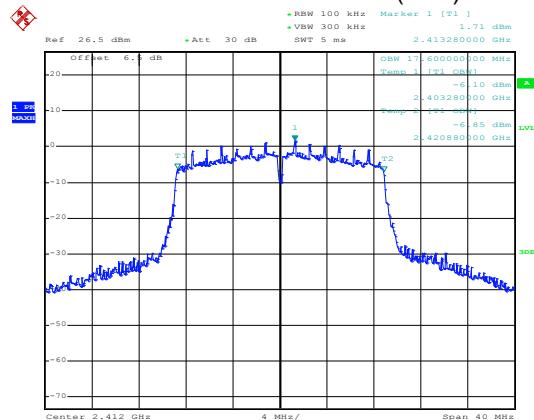
Middle channel



Date: 29.SEP.2016 22:32:30

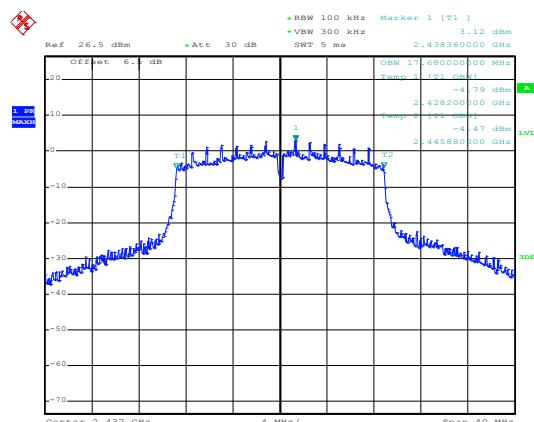
Highest channel

Test mode: 802.11n(H20)



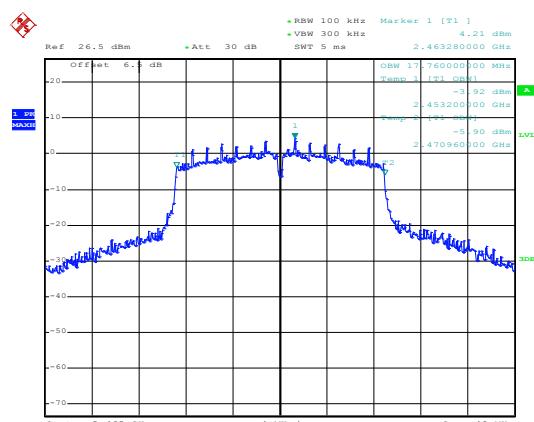
Date: 29.SEP.2016 22:33:02

Lowest channel



Date: 29.SEP.2016 22:33:25

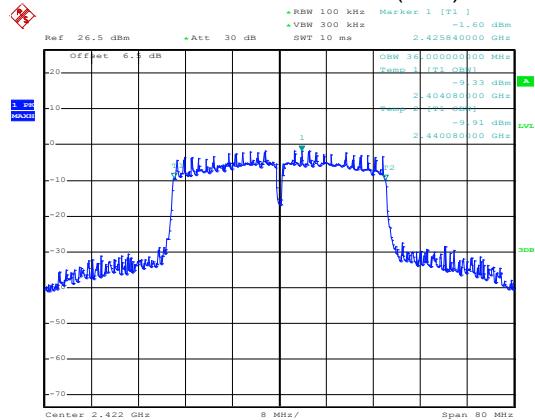
Middle channel



Date: 29.SEP.2016 22:33:50

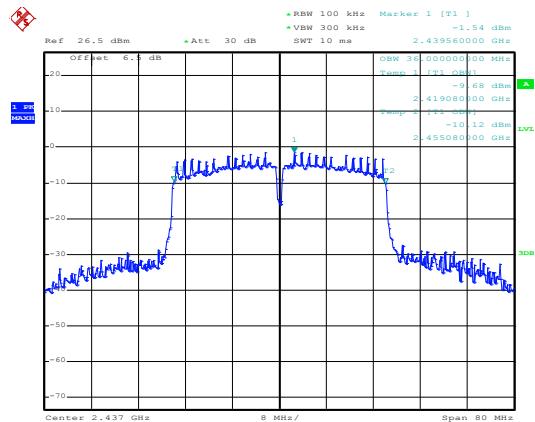
Highest channel

Test mode: 802.11n(H40)



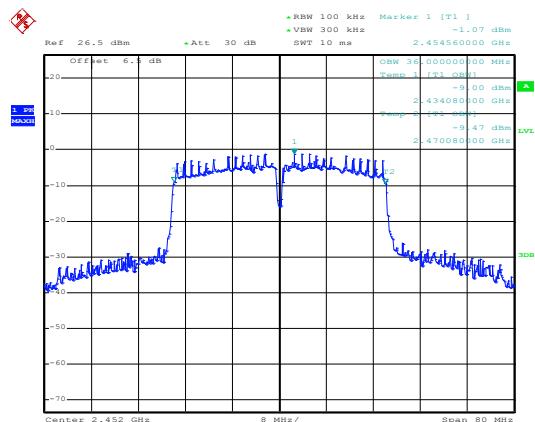
Date: 29.SEP.2016 22:34:27

Lowest channel



Date: 29.SEP.2016 22:34:59

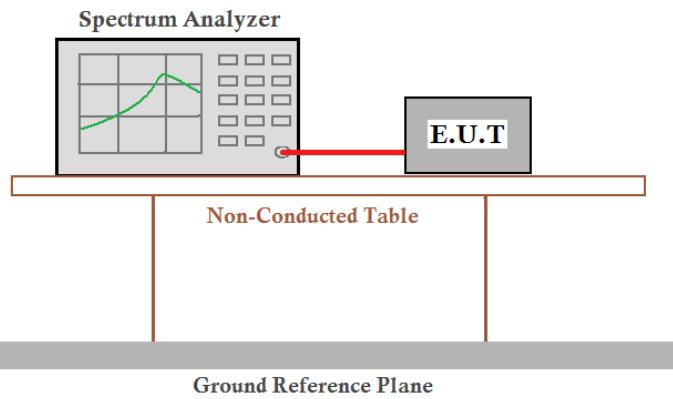
Middle channel



Date: 29.SEP.2016 22:35:30

Highest channel

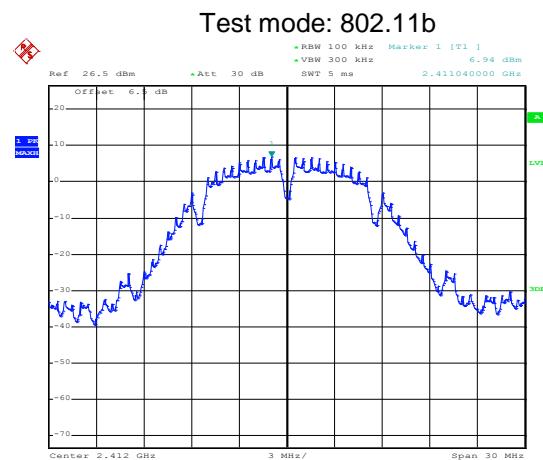
## 6.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 10.2
Limit:	8dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to the E.U.T (Equipment Under Test) via a cable. The E.U.T is placed on a Non-Conducted Table. The entire assembly sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

### Measurement Data:

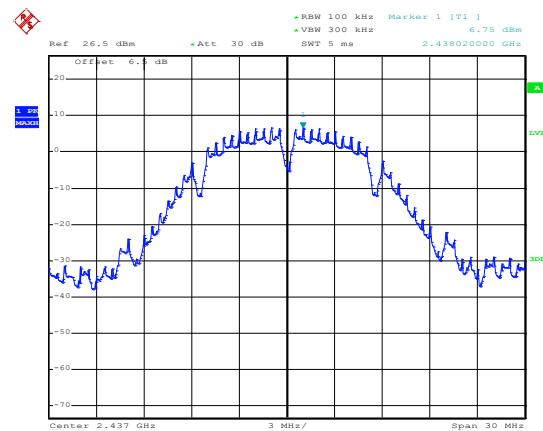
Test CH	Power Spectral Density (dBm)				Limit(dBm)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	6.94	1.21	1.27	-1.44	8.00	Pass
Middle	6.75	3.23	3.27	-1.53		
Highest	7.33	3.50	3.85	-1.05		

Test plot as follows:



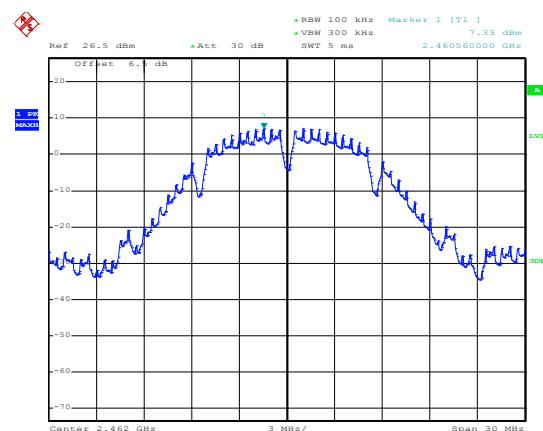
Date: 29.SEP.2016 22:36:36

### Lowest channel



Date: 29.SEP.2016 22:36:55

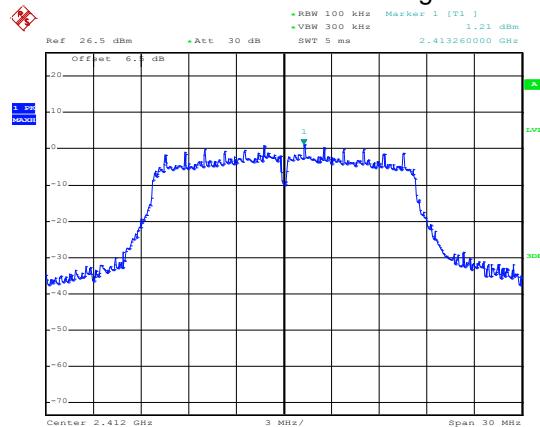
### Middle channel



Date: 29.SEP.2016 22:37:15

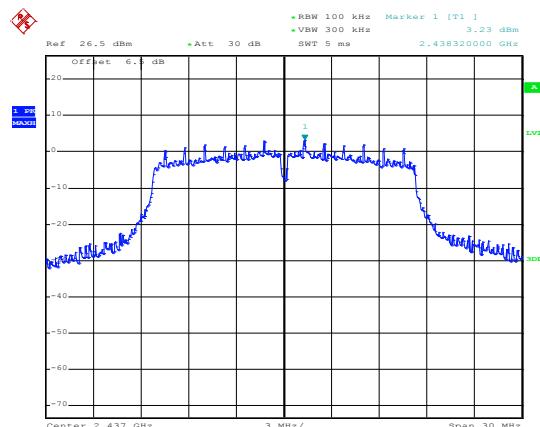
### Highest channel

Test mode: 802.11g



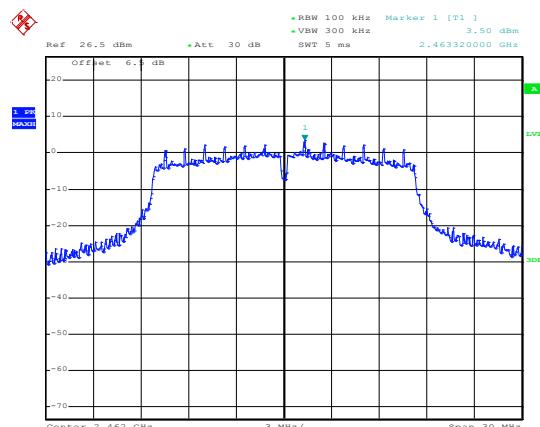
Date: 29.SEP.2016 22:37:47

Lowest channel



Date: 29.SEP.2016 22:38:07

Middle channel



Date: 29.SEP.2016 22:38:26

Highest channel