



TEST REPORT

Date: 2012-07-12

Report No.: 68.870.12.039.01F

Applicant: Philips Consumer Lifestyle
1600 Summer Street Stamford, Connecticut, 06905,
United States

Description of Samples: Model name: HD Media Player
Brand name: PHILIPS
Model no.: HMP200X#/ZZ(X can be 0-9, # can be A-Z
or blank, ZZ can be 07, 17, 37 or F7)
FCCID: BOUHMP2000

Date Samples Received: 2012-06-27

Date Tested: 2012-06-28 to 2012-07-10

Investigation Requested: FCC Part 15 Subpart C, Section 15.247

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: ----

Checked by: Approved by:-

John Zhi
Project Engineer
Wireless & Telecom department

Prudence Poon
Technical Manager
Wireless & Telecom department

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Appendix A

Photos of Test Setup

Appendix B

External EUT Photos

Appendix C

Internal EUT Photos



1.0 General Details

1.1 Test Laboratory

SEM.Test Compliance Services Co., Ltd.
EMC Laboratory registered by FCC with
FCC Registration Number: 994117

Test By: Susan Su
Susan Su

1.2 Applicant Details **Applicant**

Philips Consumer Lifestyle

1600 Summer Street Stamford, Connecticut, 06905,
United States

Manufacturers

(1)Action Asia (Shenzhen) Co. Ltd.

(2)Action Industries (Malaysia) Sdn. Bhd.

(1)Dede Industrial Park Jianan Rd,FuyongHI-Tech
Park ,Shenzhen, China

(2)2480, TINGKAT PERUSAHAAN ENAM, PRAI FREE
TRADE ZONE,13600 PERAI, PENANG, MALAYSIA.



1.3 Equipment Under Test [EUT]

Description of EUT

Product Description:	HD Media Player
Model No.:	HMP200X#/ZZ(X can be 0-9, # can be A-Z or blank, ZZ can be 07, 17, 37 or F7.)
Brand Name:	PHILIPS
FCCID:	BOUHMP2000
Rating:	DC5V, 1.5A powered by AC/DC adapter Model : ASUC12A-050150
Operated Frequency:	2412 -2462 MHz
No. of Operated Channel:	11 (802.11b/g/nHT20) 7 (802.11nHT40)
Data Rate:	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0-7, up to 150Mbps
Modulation:	BPSK, QPSK, CCK and OFDM (BPSK/QPSK/16-QAM/ 64-QAM)
Accessories and Auxiliary Equipments:	AC/DC power adaptor.
Antenna Type:	Compact PCB Antenna
Manufacture of Antenna:	SHENZHEN BENTLEY TECHNOLOGY CO., LTD
Antenna Gain:	2.3dBi
Antenna Model:	ANT2401A

General Operation of EUT

The EUT is the HD Media Player system operated at 2.4 GHz, which includes of a 802.11b/g/n module (transceiver).

As per Client Declaration, The HD media player with additional series model HMP200x#/zz. HMP200x#/zz consist of the versions which are identical in electrical, mechanical and physical construction except the following differences.

“x” can be 0-9, denoting for any types of connection cable to be by-packed.

“#” can be A-Z or blank, such “W” as white, “B” as black, “S” as Silver etc, denoting for cabinet colour.

“zz” can be /07, /17, /37 or /F7 denoting exported country exported countries will have different plug type of adaptor for suitable using to the exported country and various safeties marking.

Therefore this application can be regarded as identical in performance to the submitted test sample HMP2000/37.

Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1Mbps data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11nHT20: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with MCS0 data rate (worst case) are chosen for the final testing.

IEEE802.11nHT40: Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with MCS0 data rate (the worst case) are chosen for the final testing.

1.4 Related Submittal(s) Grants

This is a signal application subject to Certificate Authorization.



2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2009 and ANSI C63.4: 2003 for FCC Verification

2.2 Test Standards and Results Summary Tables

Test Condition	Test Requirement	Test Result	
		Pass	N/A
Number of Frequency Hopping	Section 15.247 (a1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6dB Bandwidth Measurement	Section 15.247 (a2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	Section 15.247 (e)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pseudorandom Hopping Algorithm	Section 15.247 (a1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Band Edge Measurement	Section 15.247	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Maximum Output Power	Section 15.247 (b3)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Out of Band Emission	Section 15.247 (d)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission in Restricted Band	Section 15.247 (d)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted Emission on AC Mains	Section 15.207	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RF Exposure	Section 15.247 (i)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna Requirement	Section 15.203	<input checked="" type="checkbox"/> See note 1	<input type="checkbox"/>

Note 1 : The EUT uses a permanently attached antenna, which in accordance to Section 15.203, is considered sufficient to comply with the provisions of this section.

Remark: N/A - Not Applicable



3.0 Test Methodology

3.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. 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 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.

*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 994117.

3.2 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$\text{FS} = \text{R} + \text{System Factor}$$
$$\text{System Factor} = \text{AF} + \text{CF} + \text{FA} - \text{PA}$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

3.3 Conducted Emissions

The test was performed in accordance with ANSI C63.4: 2003, with the following: initial measurements were performed in peak and average detection modes on the live line of personal computer, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.



4.0 Test Results

4.1 6 dB Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.247 (a2)
Test Date:	2012-07-08
Mode of Operation:	Transmitting continuously mode.
Detector Function:	Max Hold

Result: PASS

Test Setup:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

For 802.11b Mode

Channel	Measured frequency (MHz)	6dB Bandwidth (MHz)
Lowest	2412	10.215
Middle	2437	10.178
Highest	2462	10.206

This result is used for checking the systems using digital modulation techniques may operate in the 2400–2483.5 MHz.

Limits for 6 dB bandwidth [Section 15.247 (a2)]:

The minimum 6 dB bandwidth shall be at least 500 kHz.

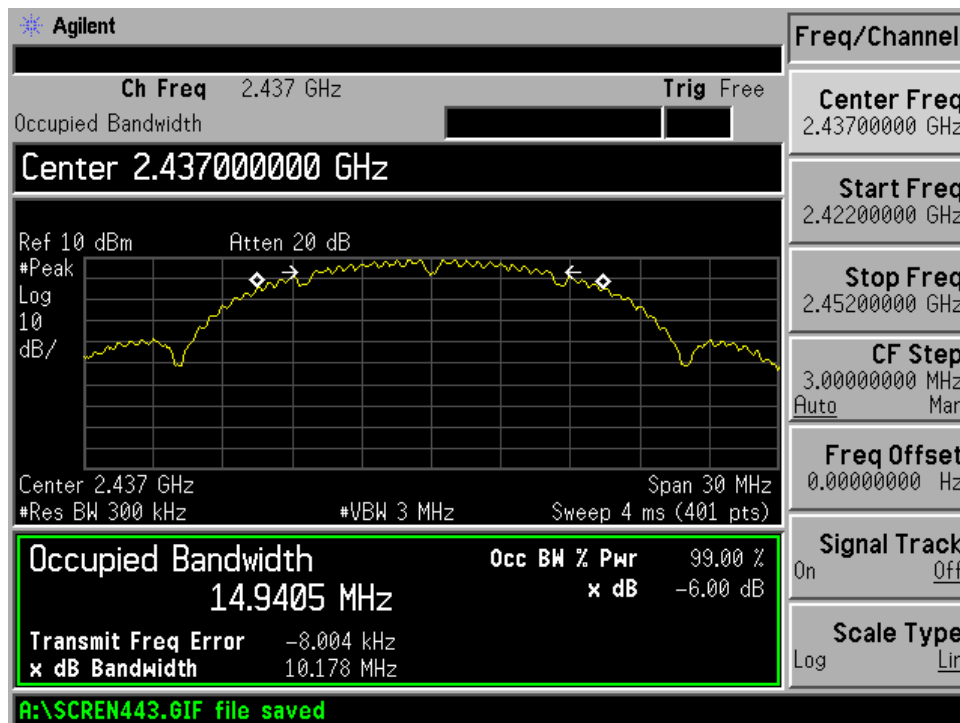


For 802.11b Mode

Result data graph shows 6 dB bandwidth, CF = 2.412GHz, BW = 10.215MHz

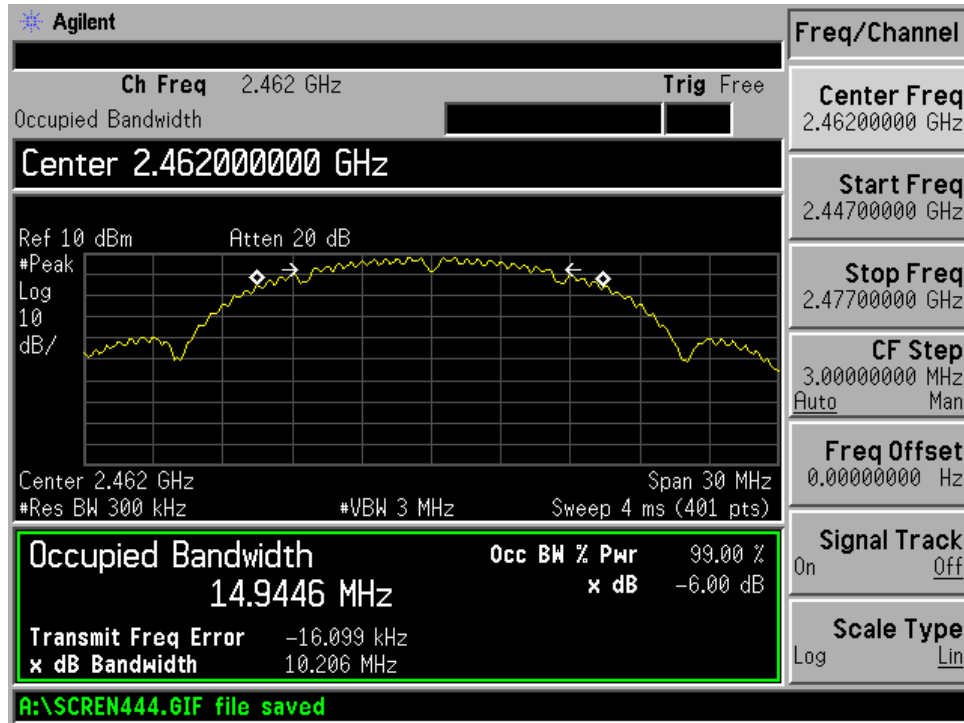


Result data graph shows 6 dB bandwidth, CF = 2.437GHz, BW = 10.178MHz





Result data graph shows 6 dB bandwidth, CF = 2.462GHz, BW = 10.206MHz





For 802.11g Mode

Channel	Measured frequency (MHz)	6dB Bandwidth (MHz)
Lowest	2412	16.493
Middle	2437	16.423
Highest	2462	16.497

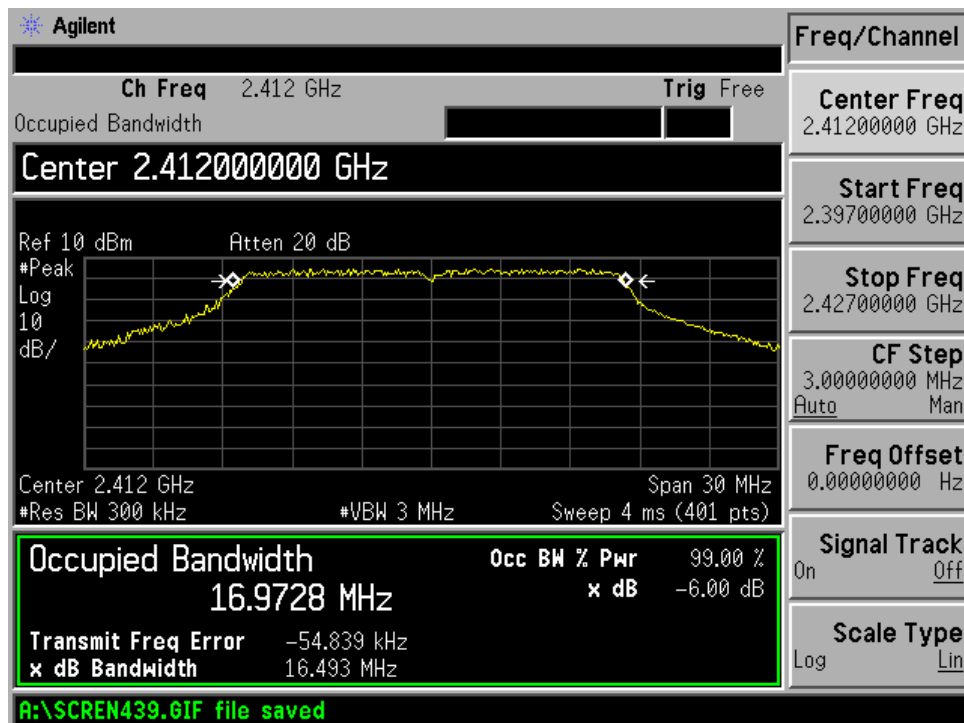
This result is used for checking the systems using digital modulation techniques may operate in the 2400–2483.5 MHz.

Limits for 6 dB bandwidth [Section 15.247 (a2)]:

The minimum 6 dB bandwidth shall be at least 500 kHz.

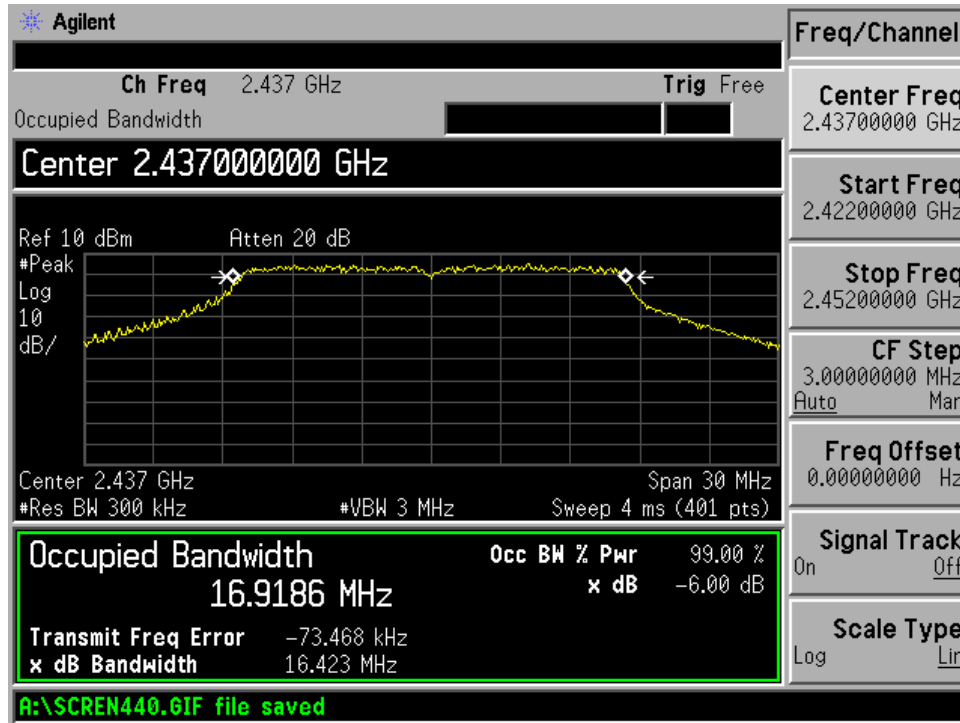
For 802.11g Mode

Result data graph shows 6 dB bandwidth, CF = 2.412GHz, BW = 16.493 MHz

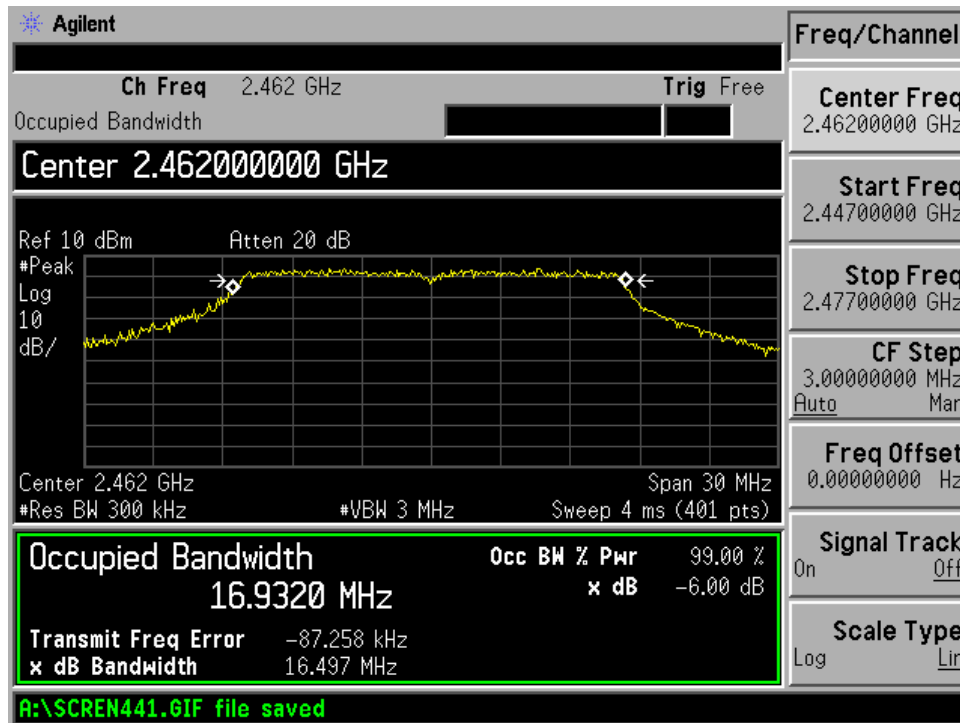




Result data graph shows 6 dB bandwidth, CF = 2.437GHz, BW = 16.423MHz



Result data graph shows 6 dB bandwidth, CF = 2.462GHz, BW = 16.497MHz





For 802.11N HT20 Mode

Channel	Measured frequency (MHz)	6dB Bandwidth (MHz)
Lowest	2412	17.699
Middle	2437	17.666
Highest	2462	17.689

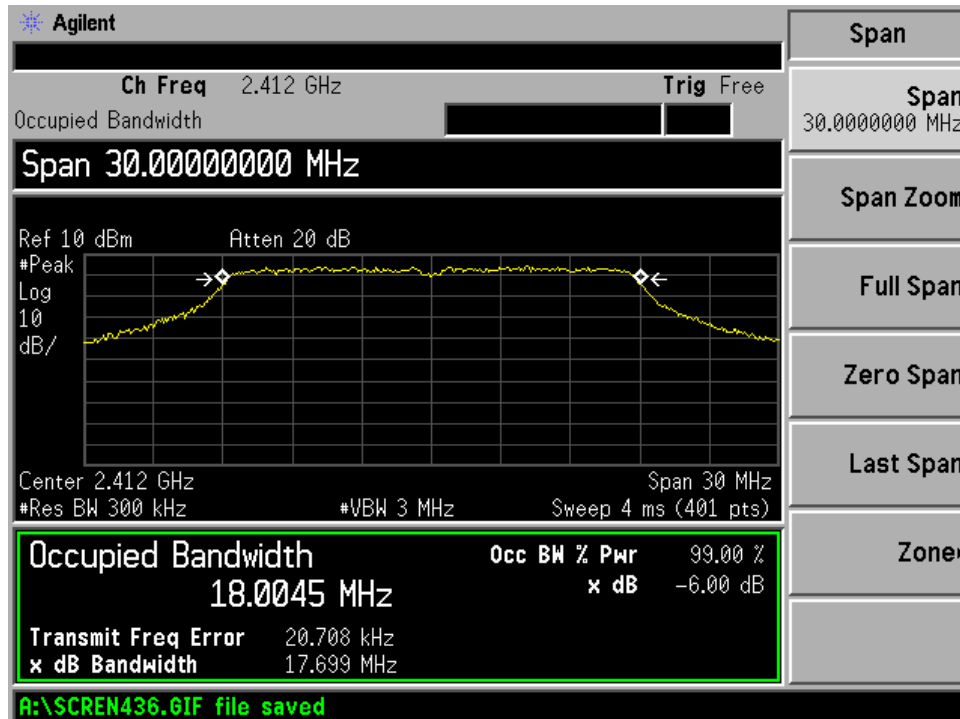
This result is used for checking the systems using digital modulation techniques may operate in the 2400–2483.5 MHz.

Limits for 6 dB bandwidth [Section 15.247 (a2)]:

The minimum 6 dB bandwidth shall be at least 500 kHz.

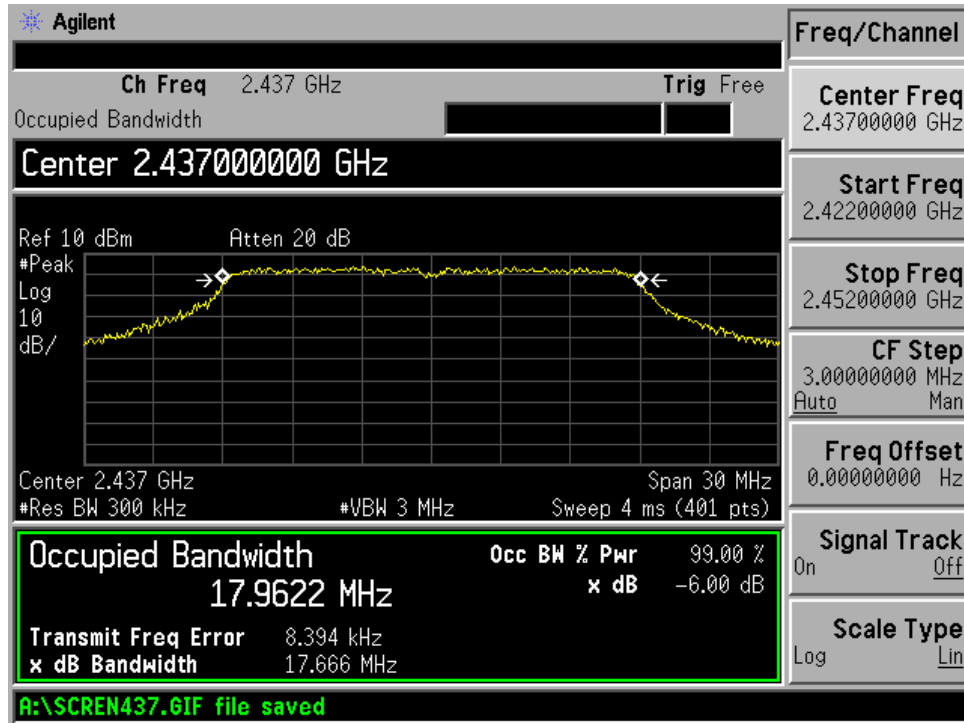
For 802.11n HT20 Mode

Result data graph shows 6 dB bandwidth, CF = 2.412GHz, BW = 17.699 MHz

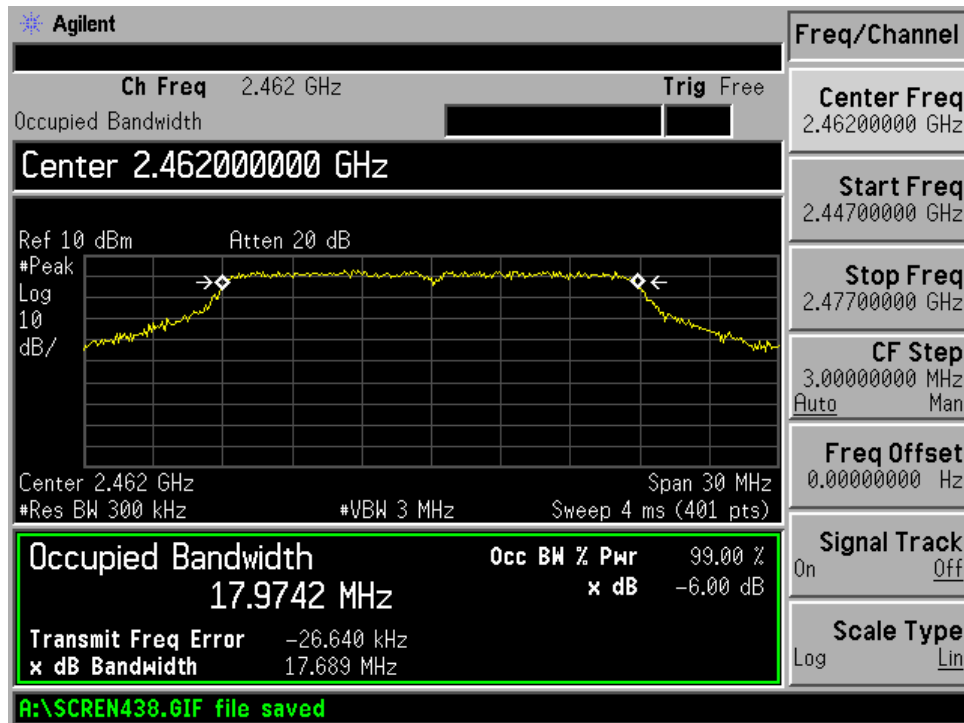




Result data graph shows 6 dB bandwidth, CF = 2.437GHz, BW = 17.666MHz



Result data graph shows 6 dB bandwidth, CF = 2.462GHz, BW = 17.689MHz





For 802.11n HT40 Mode

Channel	Measured frequency (MHz)	6dB Bandwidth (MHz)
Lowest	2422	36.303
Middle	2437	36.123
Highest	2452	36.268

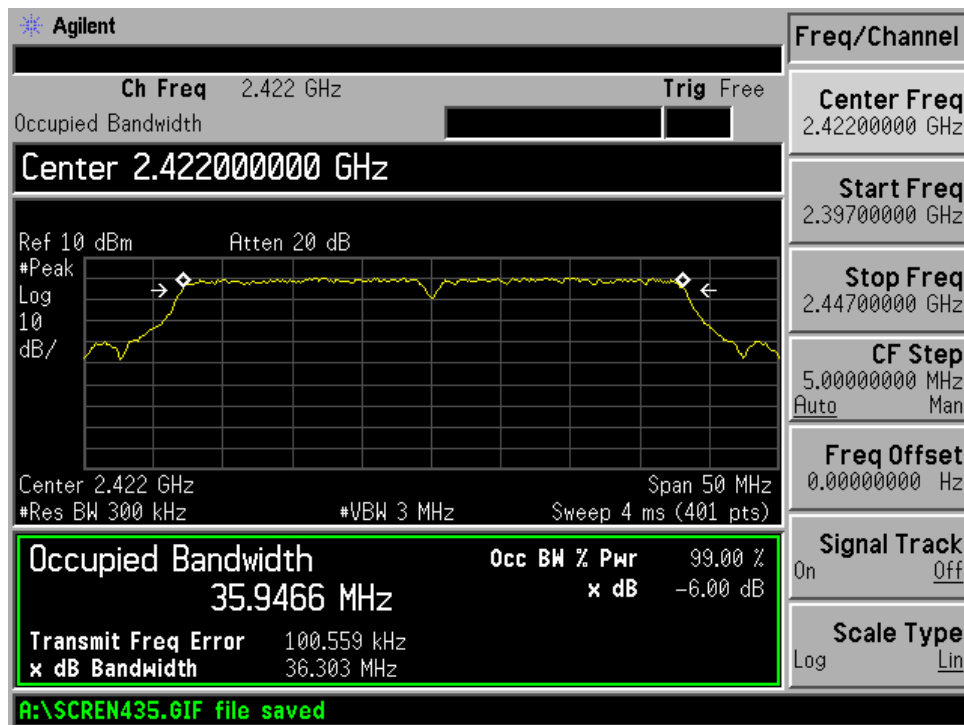
This result is used for checking the systems using digital modulation techniques may operate in the 2400–2483.5 MHz.

Limits for 6 dB bandwidth [Section 15.247 (a2)]:

The minimum 6 dB bandwidth shall be at least 500 kHz.

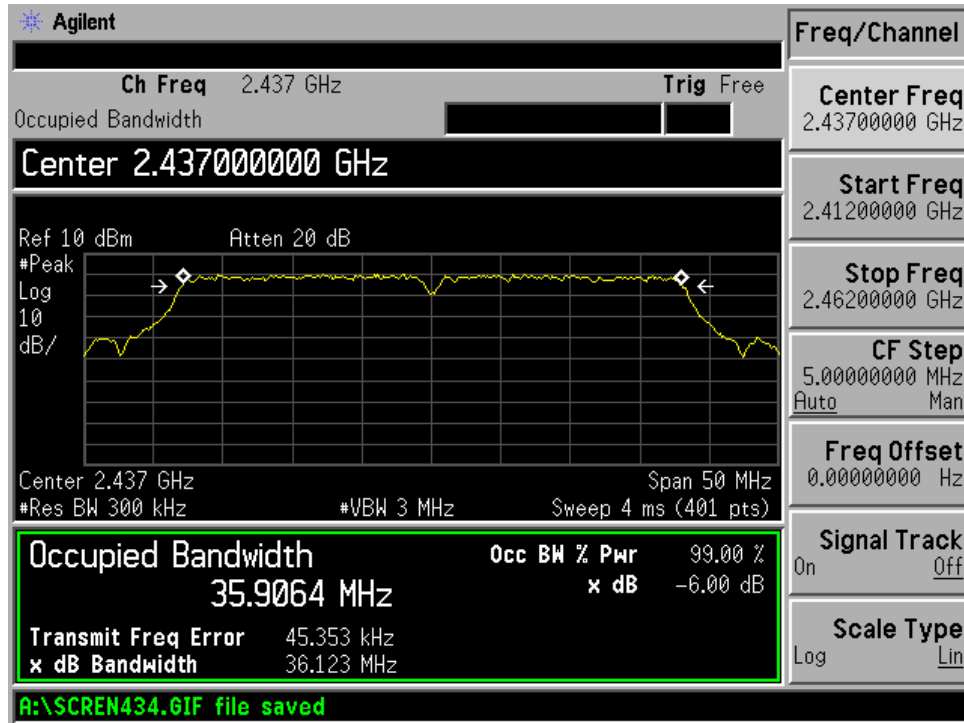
For 802.11N HT40 Mode

Result data graph shows 6 dB bandwidth, CF = 2.422GHz, BW = 36.303MHz

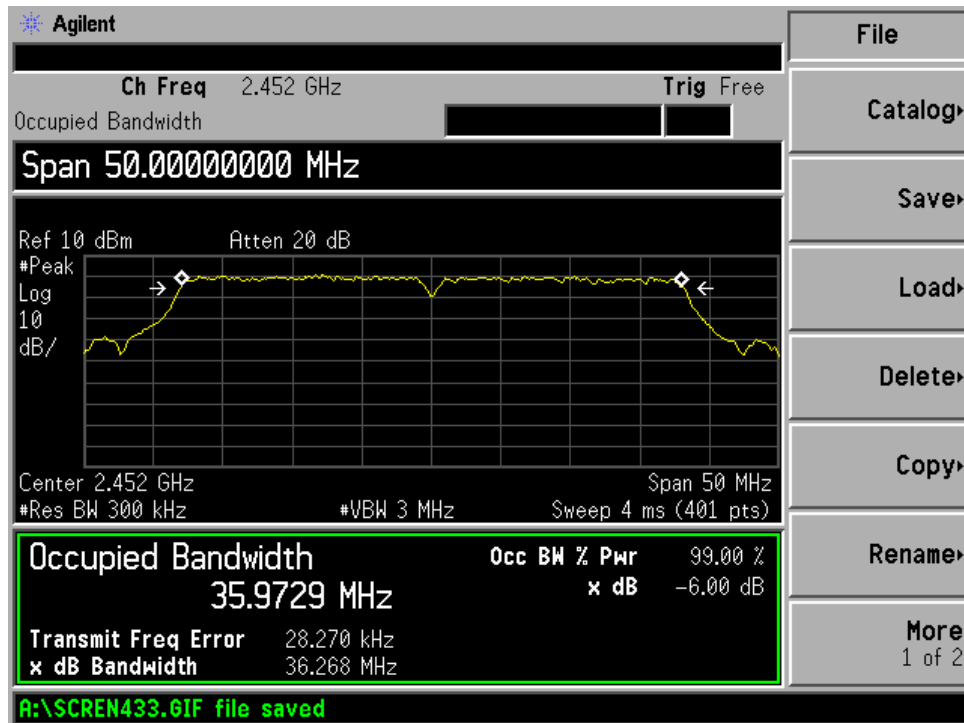




Result data graph shows 6 dB bandwidth, CF = 2.437GHz, BW = 36.123MHz



Result data graph shows 6 dB bandwidth, CF = 2.452GHz, BW = 36.268MHz





4.2 Power Spectral Density

Test Requirement: FCC part 15 section 15.247 (e)
 Test Date: 2012-07-08
 Mode of Operation: Transmitting continuously mode.
 Detector Function: Average

Result : PASS

Measured Result :

For 802.11b

Test mode	Test channel	Reading dBm/100kHz	Corrected dBm/3kHz	Limit dBm/3kHz
802.11b	Low channel (2412MHz)	-0.711	-15.911	8
	Mid channel (2437MHz)	-0.226	-15.426	8
	High channel (2462MHz)	-1.152	-16.352	8

For 802.11g

Test mode	Test channel	Reading dBm/100kHz	Corrected dBm/3kHz	Limit dBm/3kHz
802.11g	Low channel (2412MHz)	-7.142	-22.342	8
	Middle channel (2437MHz)	-7.226	-22.426	8
	High channel (2462MHz)	-7.918	-23.118	8

For 802.11n HT20/HT40

Test mode	Test channel	Reading dBm/100kHz	Corrected dBm/3kHz	Limit dBm/3kHz
802.11n HT20 (MCS0)	Low channel (2412MHz)	-7.709	-22.909	8
	Middle channel (2437MHz)	-7.585	-22.785	8
	High channel (2462MHz)	-8.307	-23.507	8
802.11n HT40 (MCS0)	Low channel (2422MHz)	-10.70	-25.90	8
	Middle channel (2437MHz)	-11.09	-26.29	8
	High channel (2452MHz)	-11.47	-26.67	8



Note:

1. Scale the observed power level in 100kHz to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$.

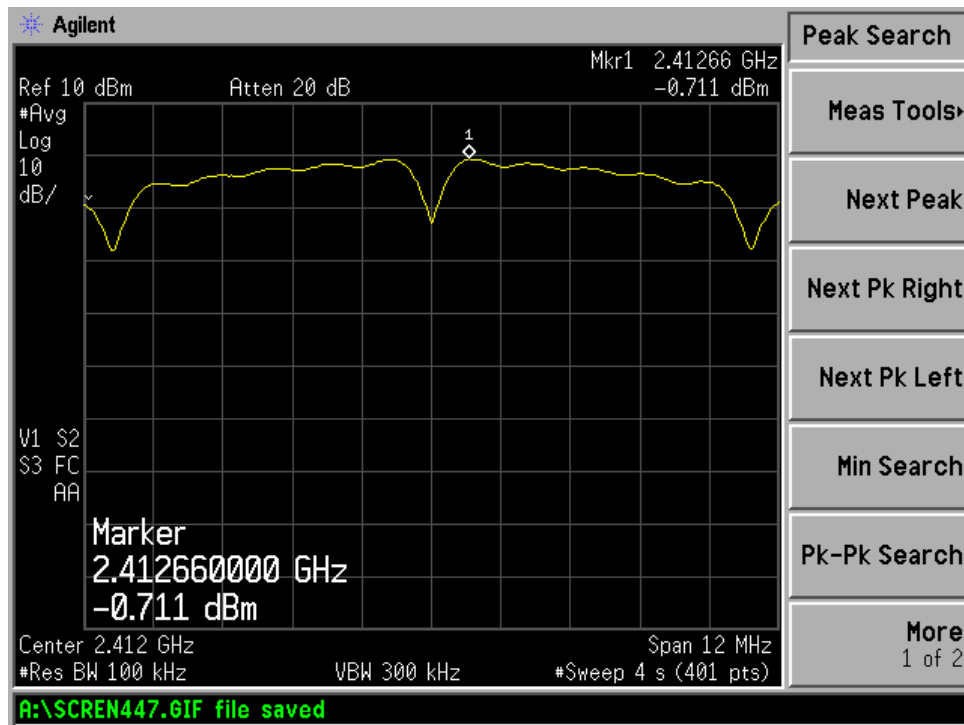
Above testing data is included of 0.5dB cable loss which between antenna port and spectrum.

Limits for power spectral density [Section 15.247 (e)]:

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

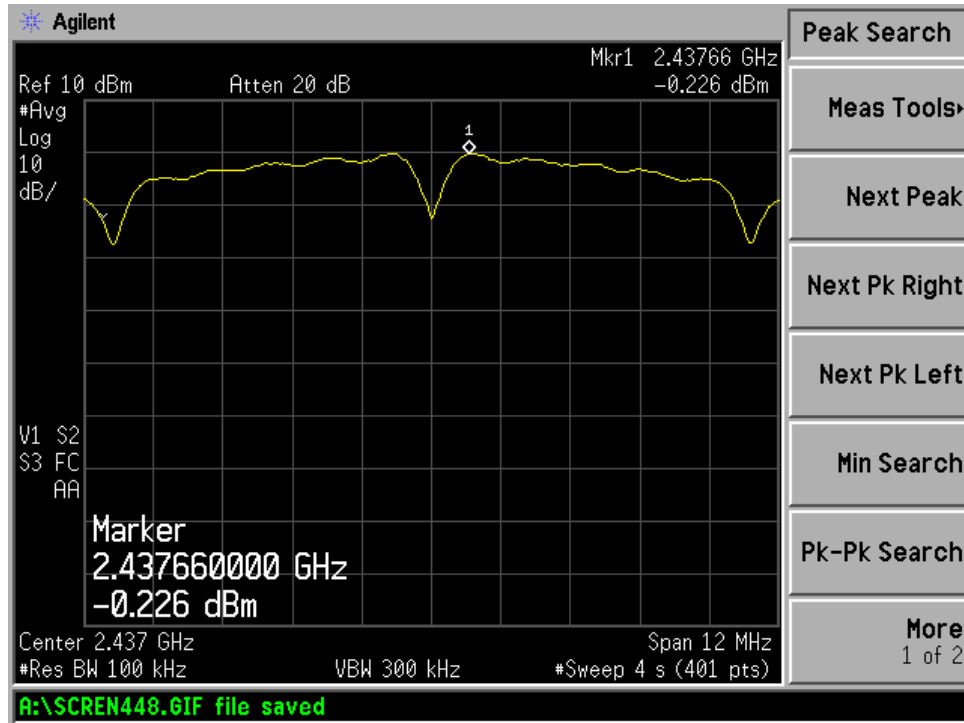
For 802.11b Mode

Result data graph shows Low channel power spectrum density is -0.711dBm at 100kHz RBW

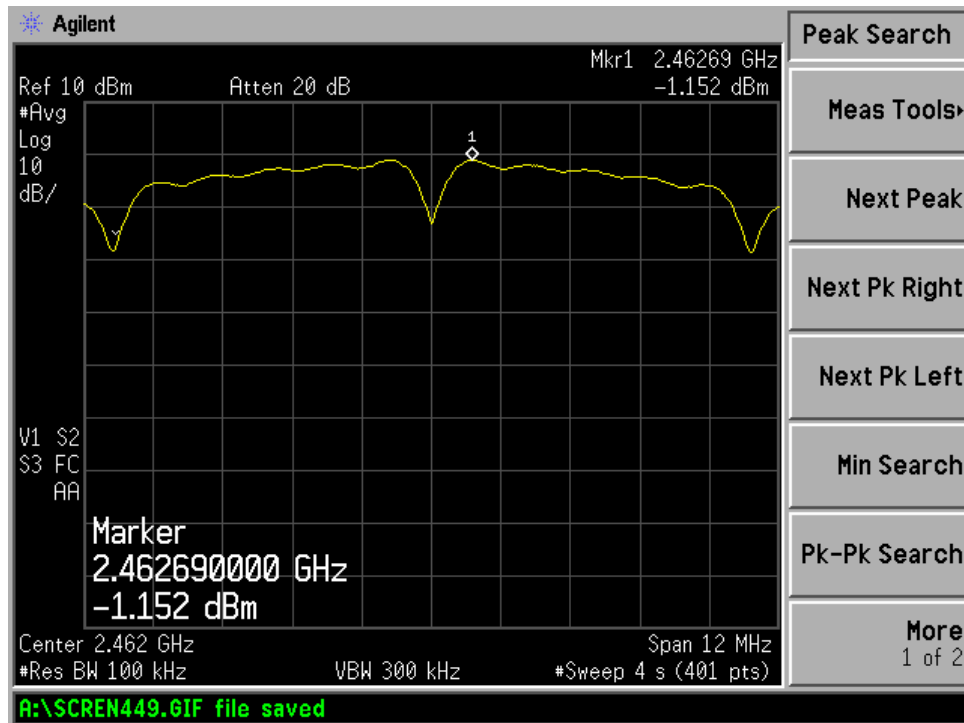




Result data graph shows middle channel power spectrum density is -0.226dBm at 100kHz RBW



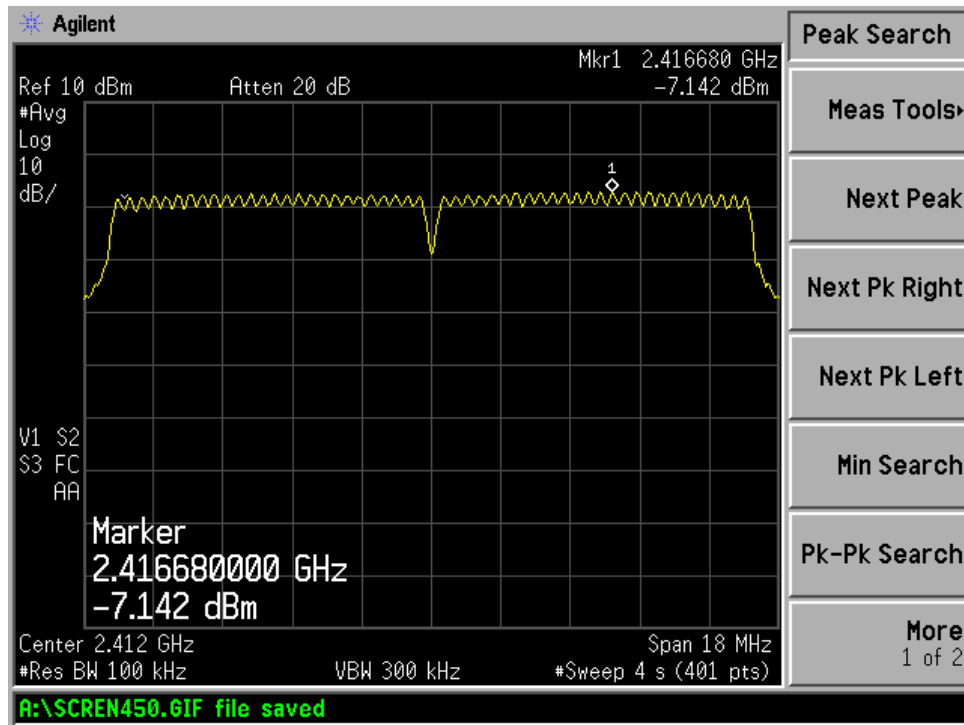
Result data graph shows high channel power spectrum density is -1.152dBm at 100kHz RBW



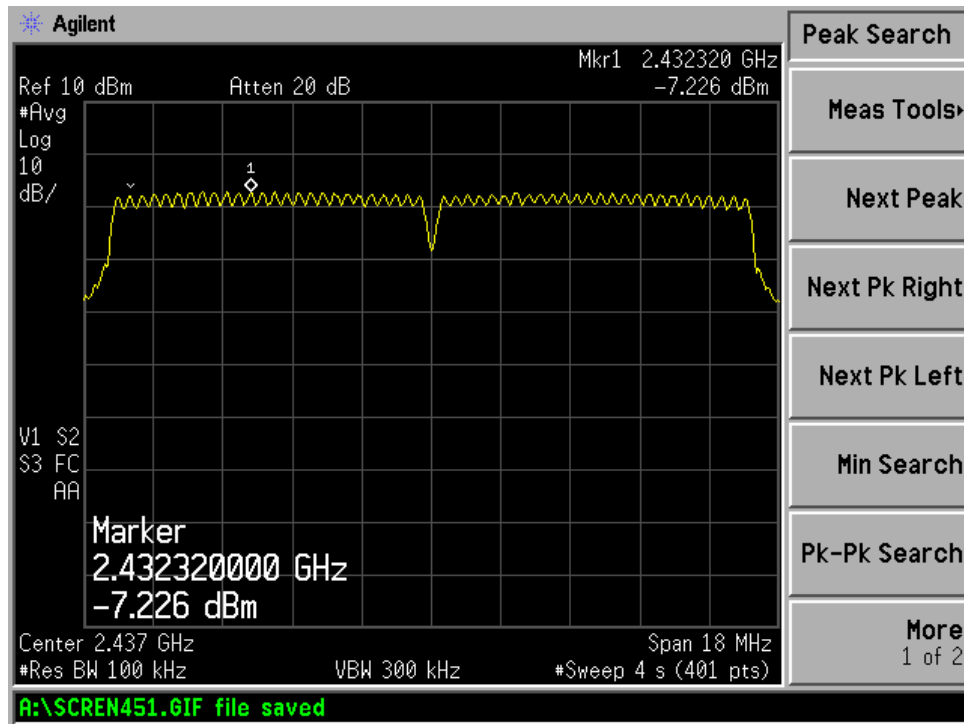


For 802.11g Mode

Result data graph shows Low channel power spectrum density is -7.142dBm at 100kHz RBW

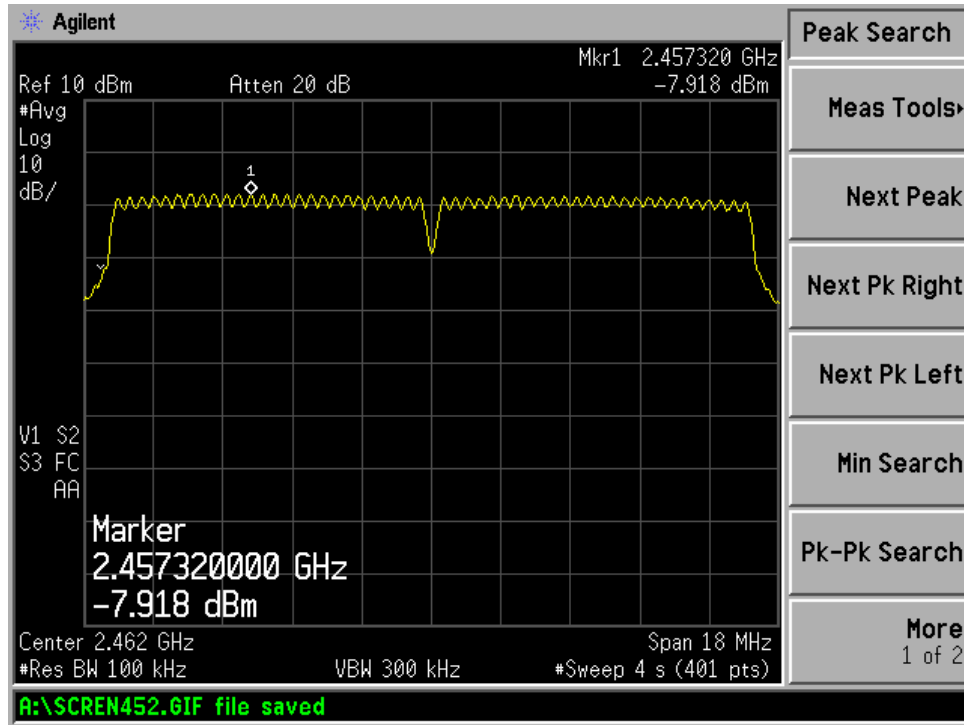


Result data graph shows middle channel power spectrum density is -7.226dBm at 100kHz RBW





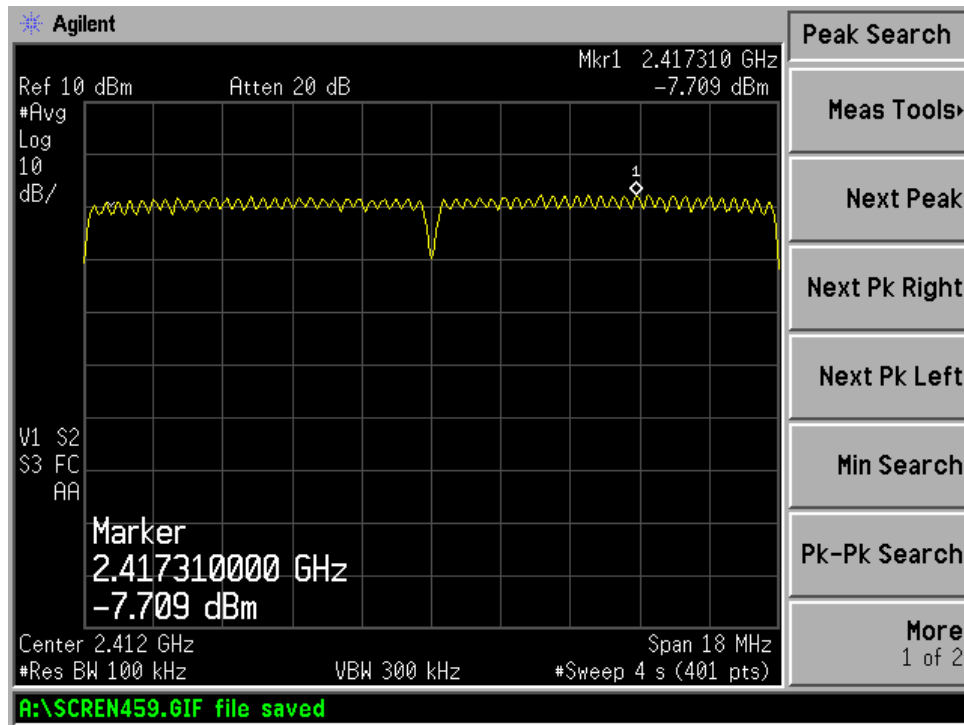
Result data graph shows high channel power spectrum density is -7.918dBm at 100kHz RBW



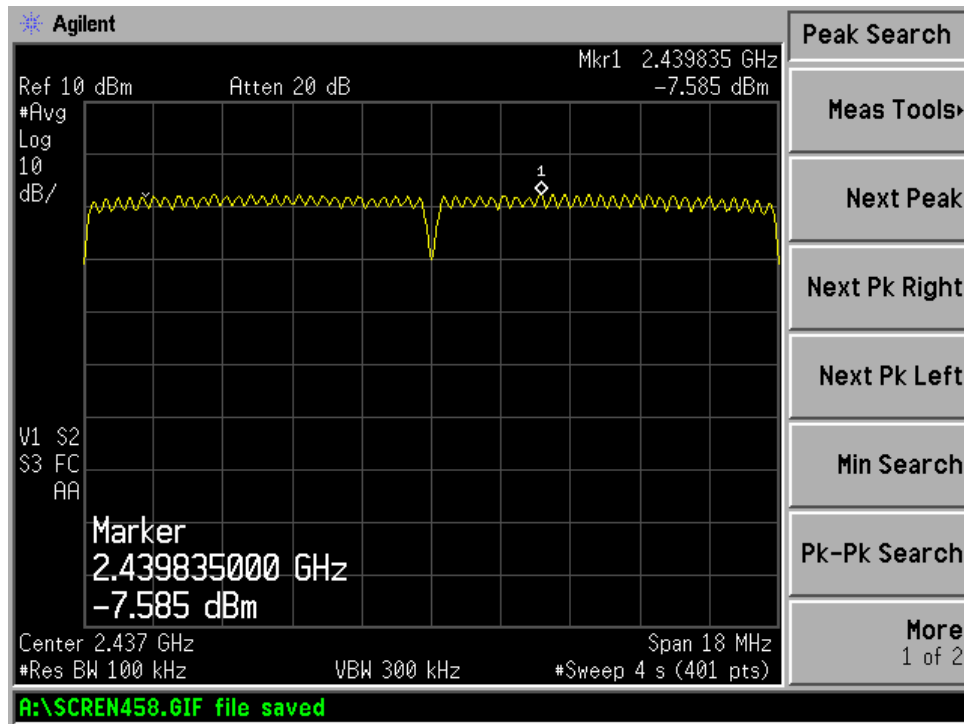


For 802.11n HT20 Mode

Result data graph shows Low channel power spectrum density is -7.709dBm at 100kHz RBW

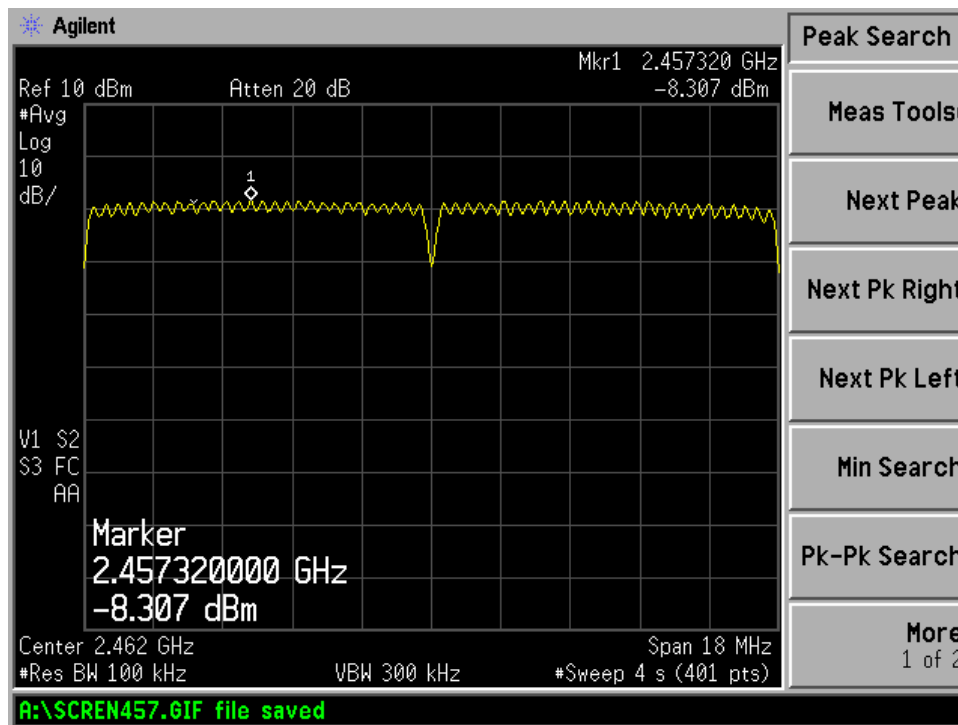


Result data graph shows middle channel power spectrum density is -7.585dBm at 100kHz RBW





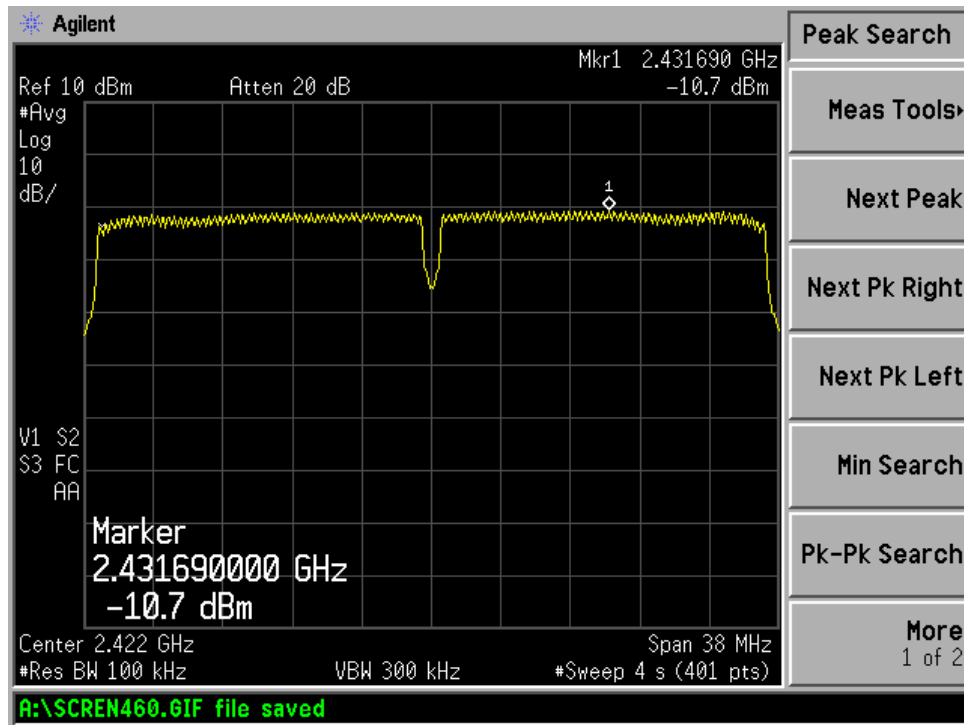
Result data graph shows high channel power spectrum density is -8.307dBm at 100kHz RBW



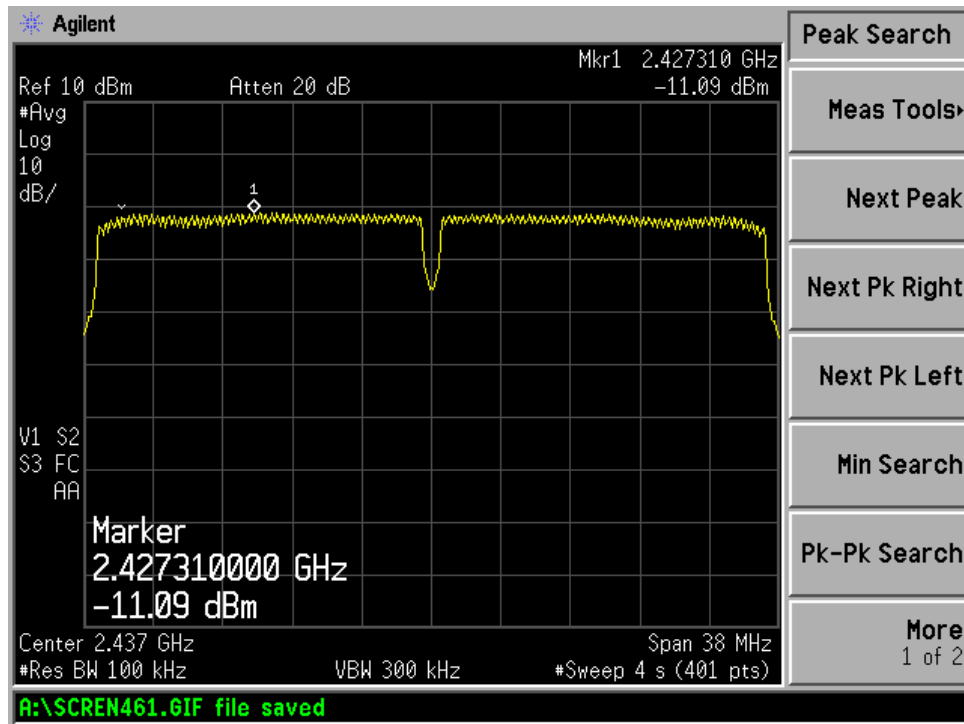


For 802.11n HT40 Mode

Result data graph shows Low channel power spectrum density is -10.70dBm at 100kHz RBW

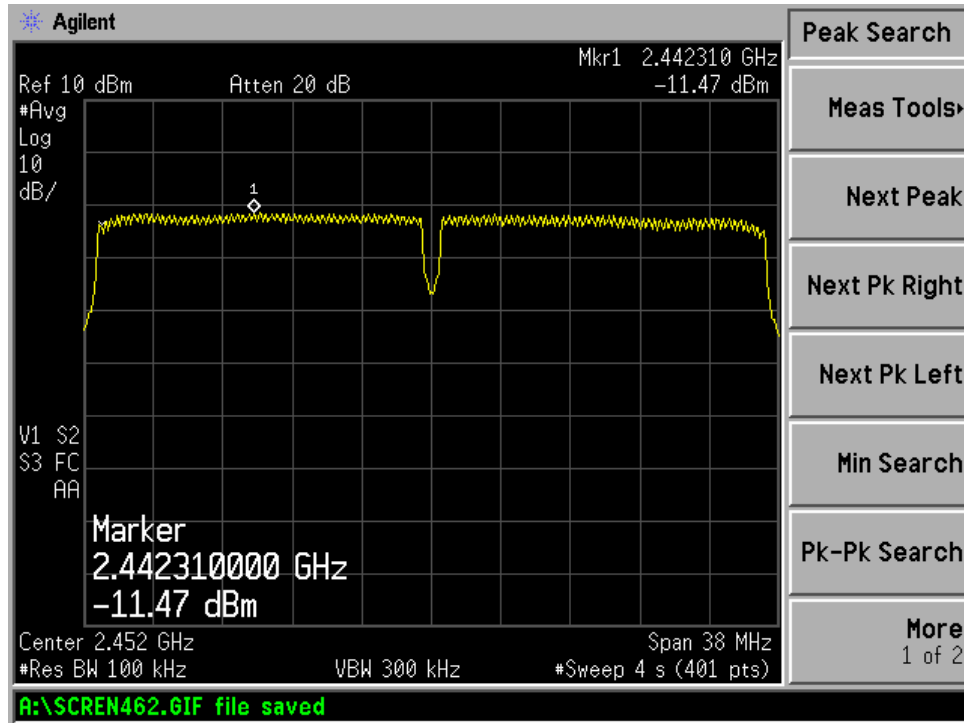


Result data graph shows middle channel power spectrum density is -11.09dBm at 100kHz RBW





Result data graph shows high channel power spectrum density is -11.47dBm at 100kHz RBW





4.3 Band Edge Measurement

Test Requirement: FCC part 15 section 15.247
 Test Date: 2012-07-09
 Mode of Operation: Transmitting continuously mode.
 Detector Function: Max Hold

Result: PASS

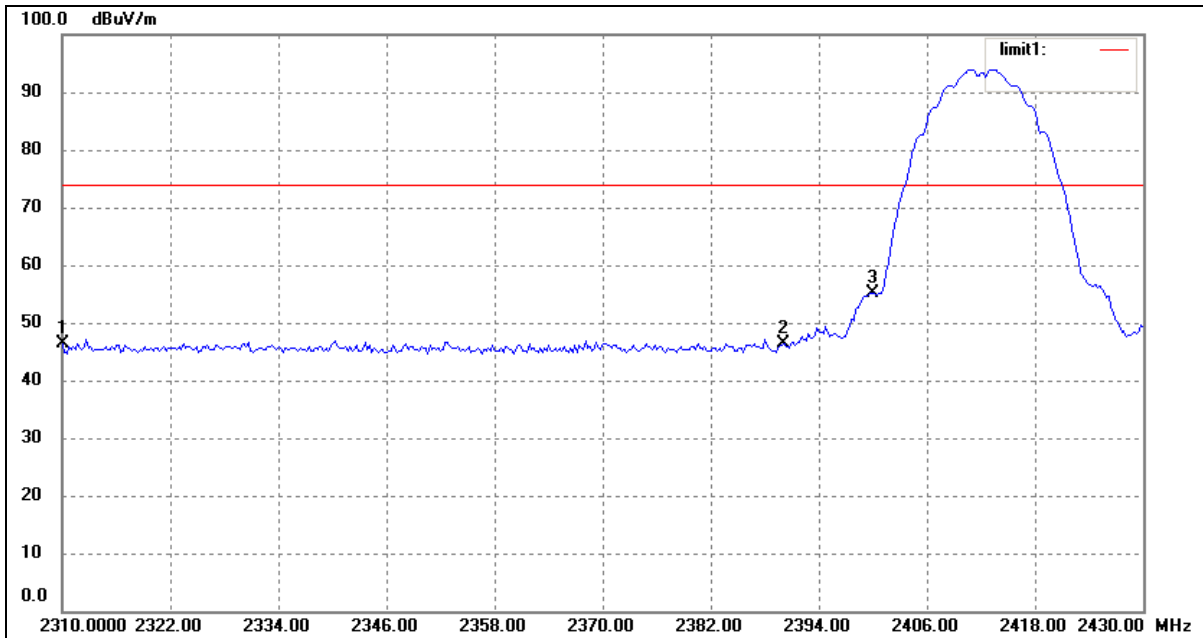
Measured Result :

Refer to the diagram and table, it shows the frequency of lower band edge and upper band edge is 2.412GHz and 2.462GHz separately.

Limits of Band Edge for Carrier Frequencies Operated within the Bands [Section 15.247]:

The carrier frequencies should operate within 2400-2483.5MHz.

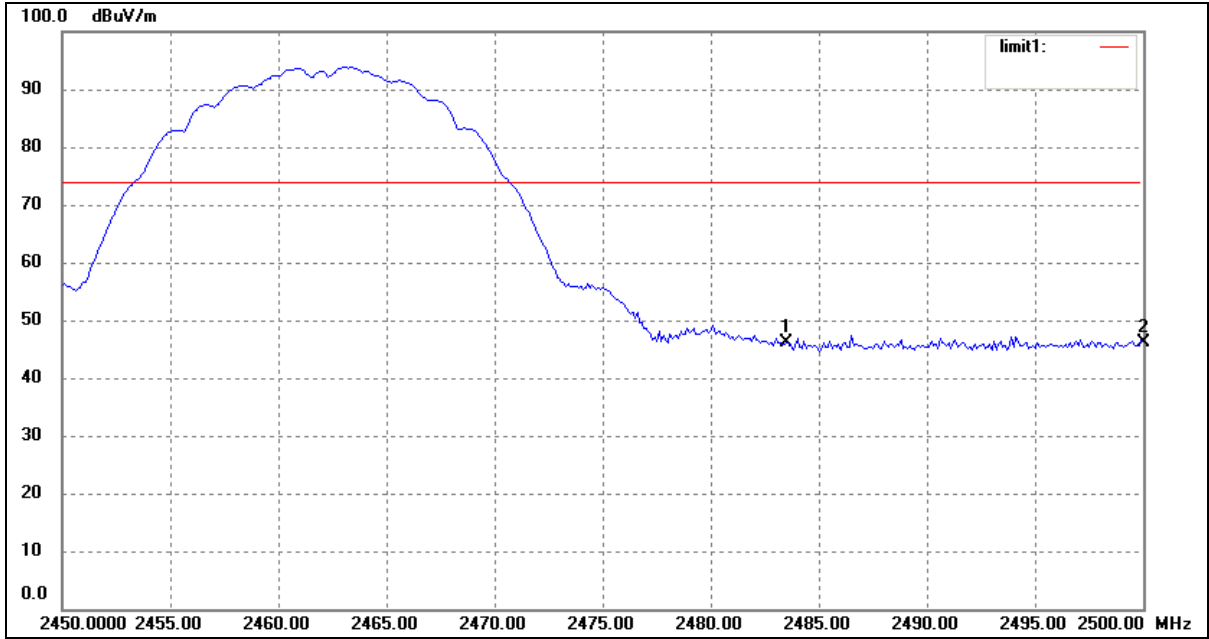
**Result data graph shows the frequency of lowest channel.
 For 802.11b Low Channel Mode :**



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	47.98	-1.72	46.26	74.00	-27.74	peak
2	2390.000	48.15	-1.75	46.40	74.00	-27.60	peak
3	2400.000	56.96	-1.75	55.21	74.00	-18.79	peak



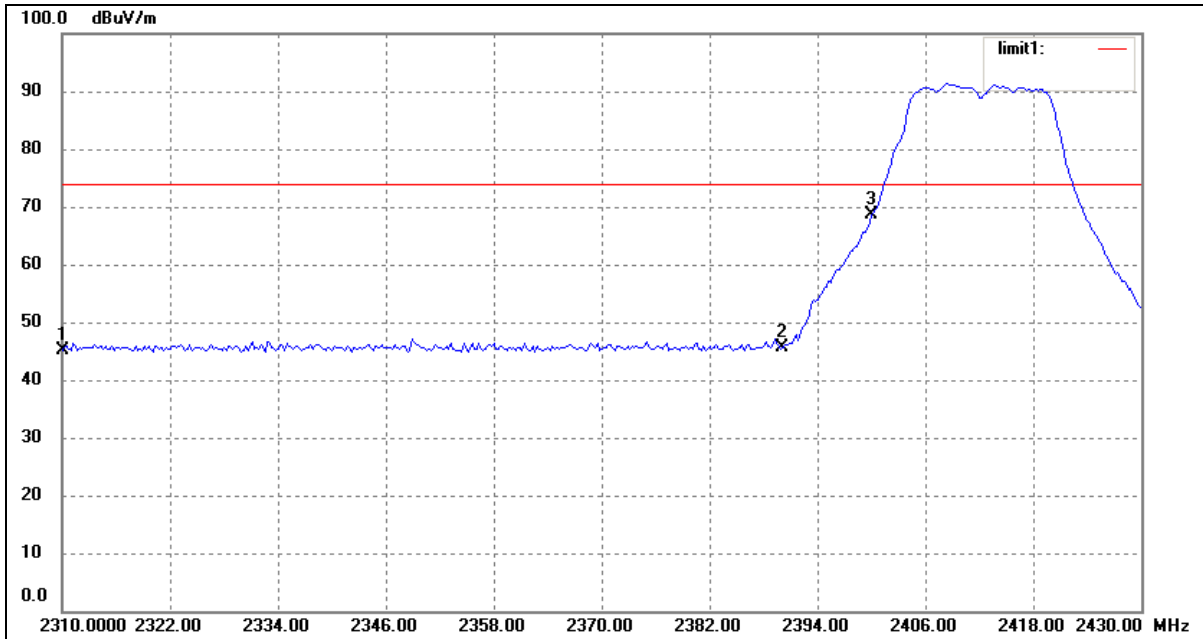
For 802.11b High Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	47.83	-1.78	46.05	74.00	-27.95	peak
2	2500.000	47.89	-1.78	46.11	74.00	-27.89	peak



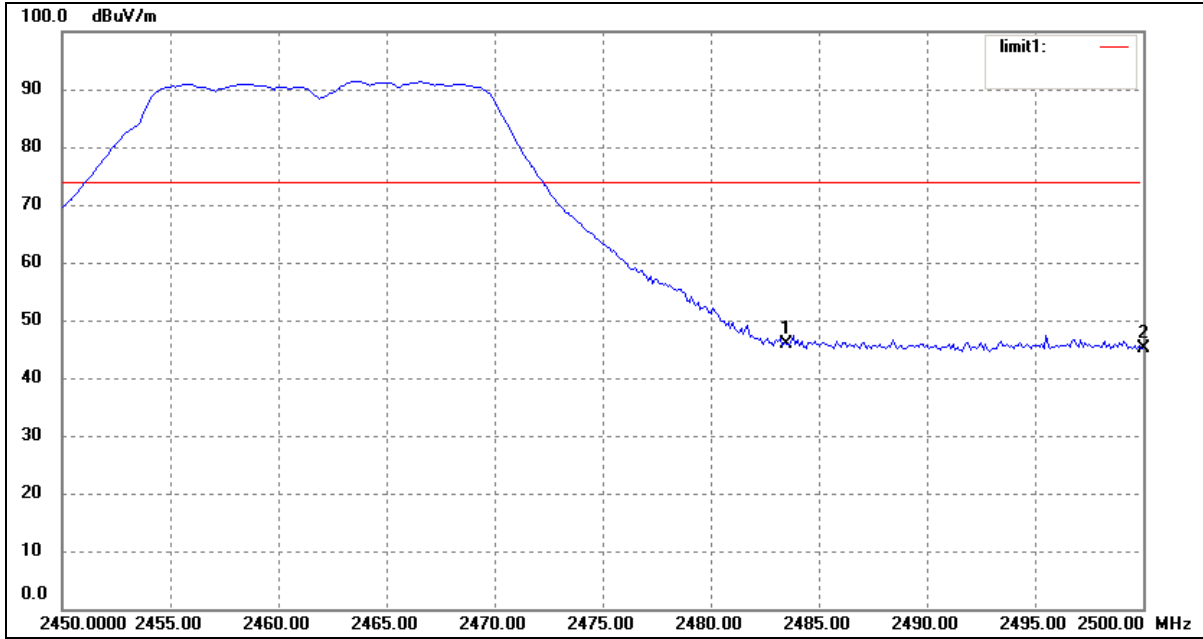
For 802.11g Low Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	46.89	-1.72	45.17	74.00	-28.83	peak
2	2390.000	47.48	-1.75	45.73	74.00	-28.27	peak
3	2400.000	70.39	-1.75	68.64	74.00	-5.36	peak



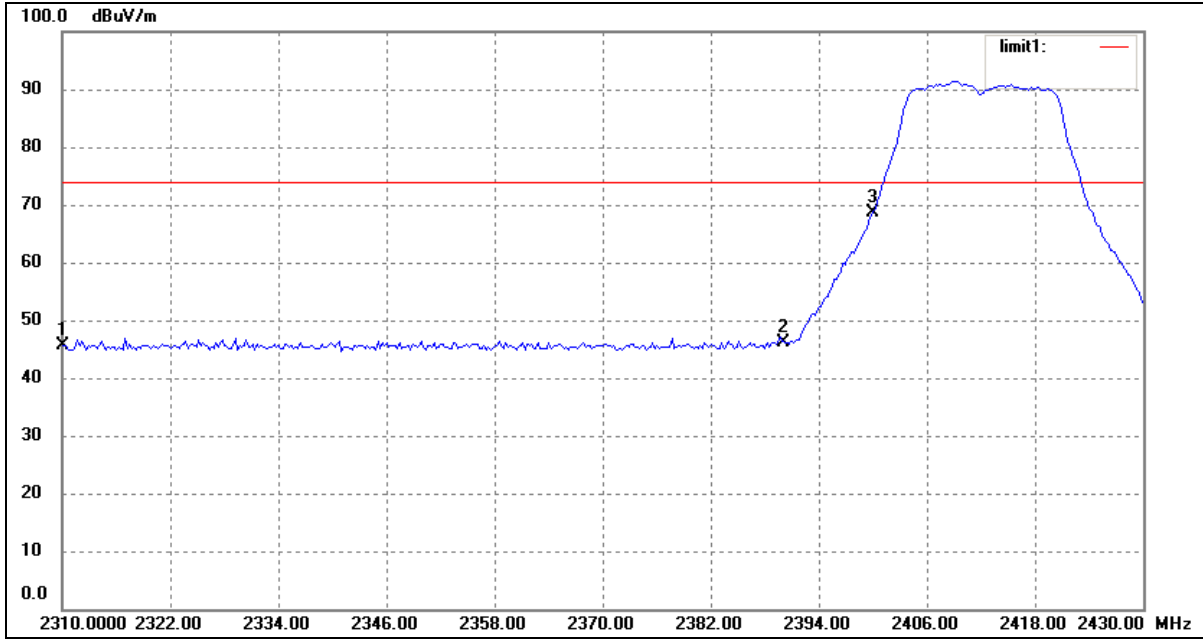
For 802.11g High Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	47.73	-1.78	45.95	74.00	-28.05	Peak
2	2500.000	46.98	-1.78	45.20	74.00	-28.80	Peak



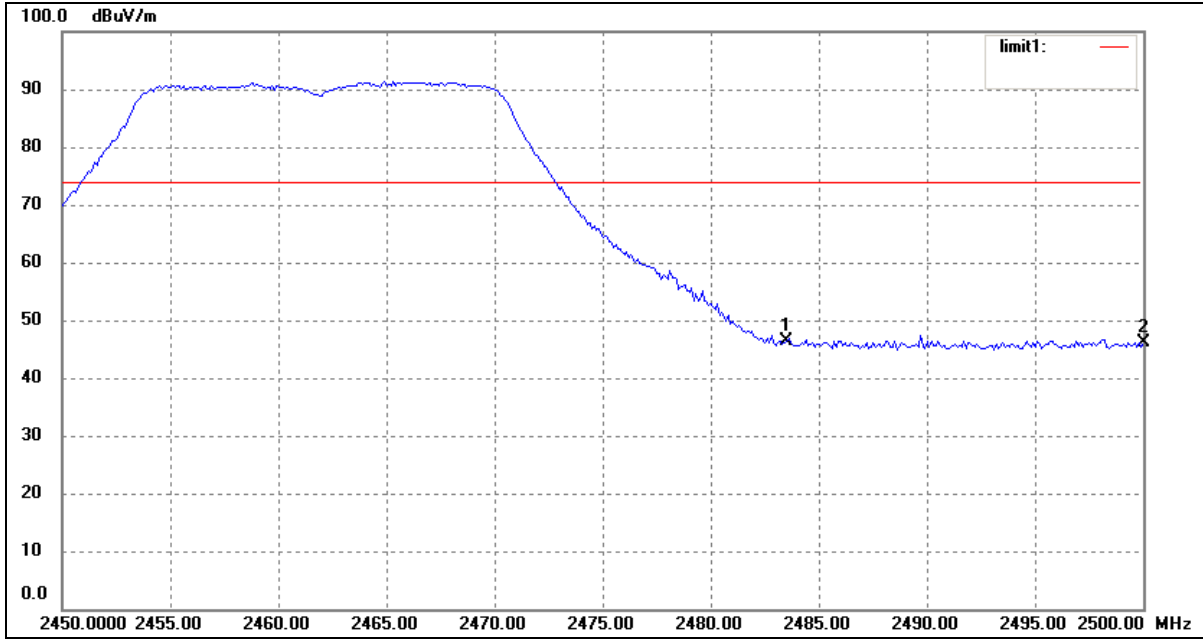
For 802.11n HT20 Low Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	47.42	-1.72	45.70	74.00	-28.30	Peak
2	2390.000	47.84	-1.75	46.09	74.00	-27.91	Peak
3	2400.000	70.50	-1.75	68.75	74.00	-5.25	Peak



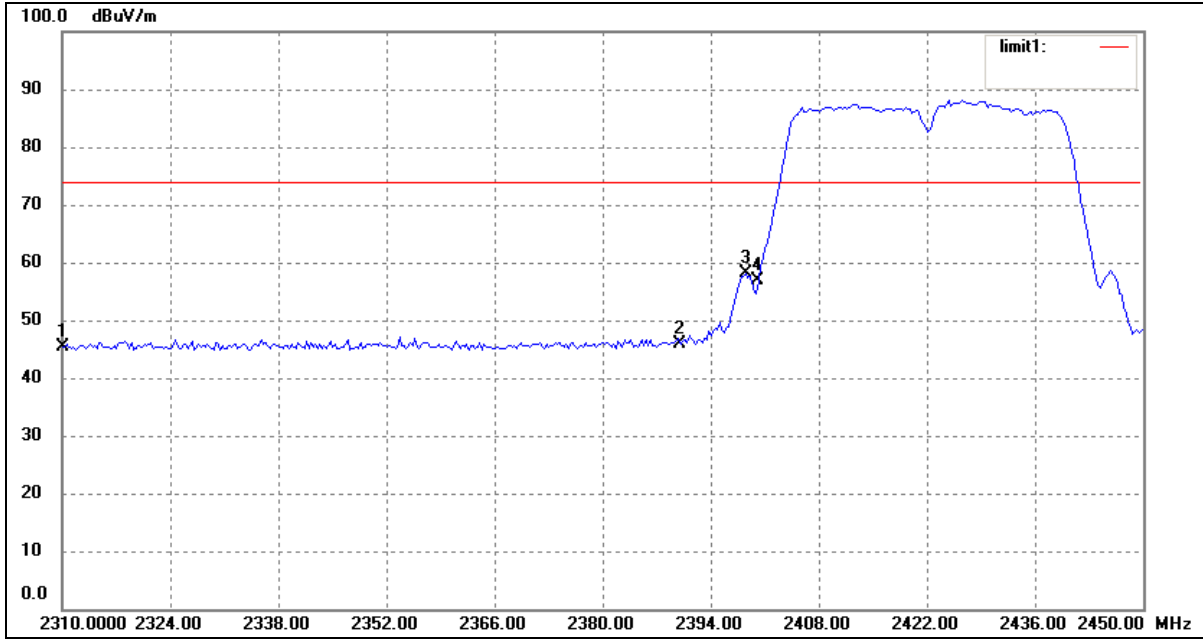
For 802.11n HT20 High Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	48.28	-1.78	46.50	74.00	-27.50	Peak
2	2500.000	47.98	-1.78	46.20	74.00	-27.80	Peak



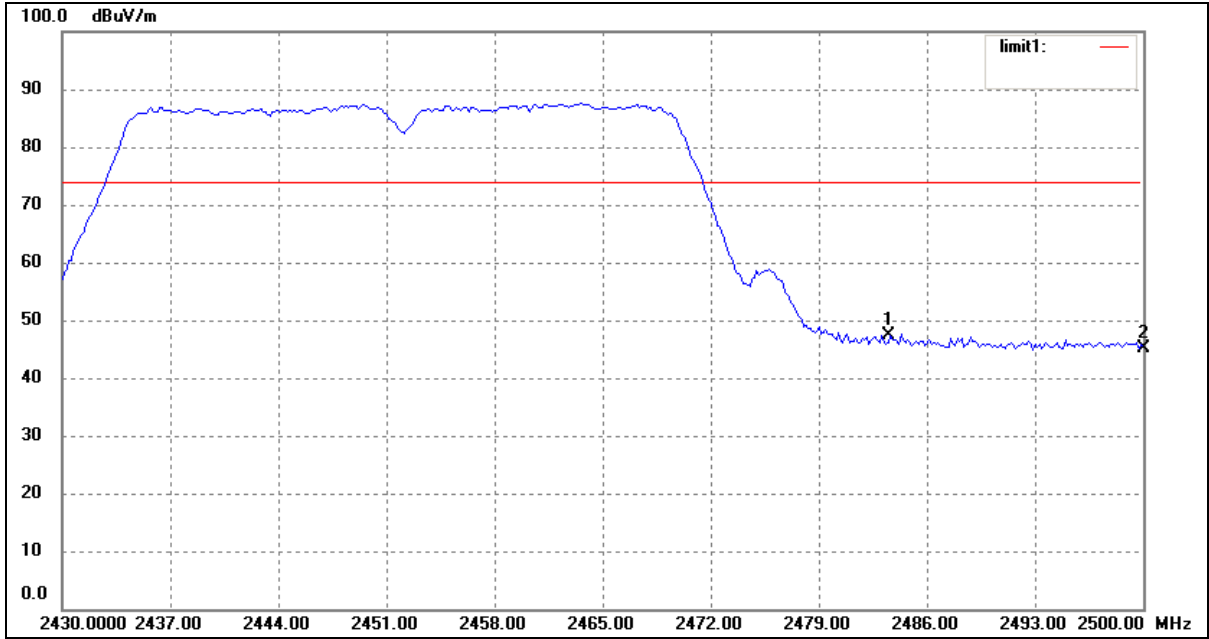
For 802.11n HT40 Low Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	47.16	-1.72	45.44	74.00	-28.56	Peak
2	2390.000	47.74	-1.75	45.99	74.00	-28.01	Peak
3	2398.480	59.81	-1.75	58.06	74.00	-15.94	Peak
4	2400.000	58.52	-1.75	56.77	74.00	-17.23	Peak



For 802.11n HT40 High Channel Mode



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	49.11	-1.78	47.33	74.00	-26.67	Peak
2	2500.000	47.03	-1.78	45.25	74.00	-28.75	Peak



4.4 Maximum Output Power

Test Requirement:	FCC part 15 section 15.247 (b3)
Test Method:	ANSI C63.4:2003
Test Date:	2012-07-09
Mode of Operation:	Transmitting continuously mode.
Detector Function:	Average
Measurement BW:	RBW 1MHz ; VBW 3MHz

Test Procedure :

According to section 15.247(b)-power output of the KDB-558074 (2012), the method #1 of the power output option2 was used, the following is the measurement procedure.

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW \geq 3 MHz.
4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) $<$ 0.5 RBW. Otherwise use peak detector mode.
5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "free run".
6. Trace average 100 traces in power averaging mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges.

**Result : PASS**

For 802.11b/g

Test mode	Frequency MHz	Reading (dBm)	Output power (W)	Limit (W)
802.11b (1M)	2412	13.81	0.0240	1
	2437	13.89	0.0245	1
	2462	13.15	0.0207	1
802.11g (6M)	2412	11.62	0.0145	1
	2437	12.10	0.0162	1
	2462	11.03	0.0127	1

For 802.11n HT20/HT40

Test mode	Frequency MHz	Reading (dBm)	Output power (W)	Limit (W)
802.11n HT20 (MCS0)	2412	12.13	0.0163	1
	2437	11.94	0.0156	1
	2462	11.44	0.0139	1
802.11n HT40 (MCS0)	2422	11.06	0.0128	1
	2437	11.05	0.0127	1
	2452	10.74	0.0118	1

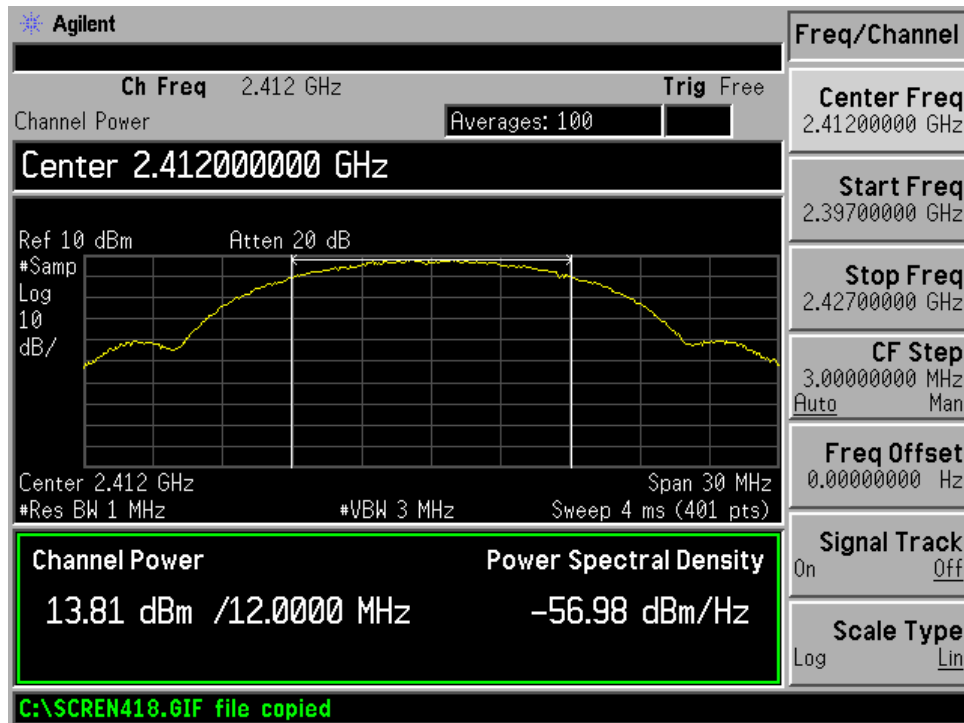
Note: Above testing data is included of 0.5dB cable loss which between antenna port and spectrum.

Limits for Maximum Output Power [Section 15.247 (b3)]:

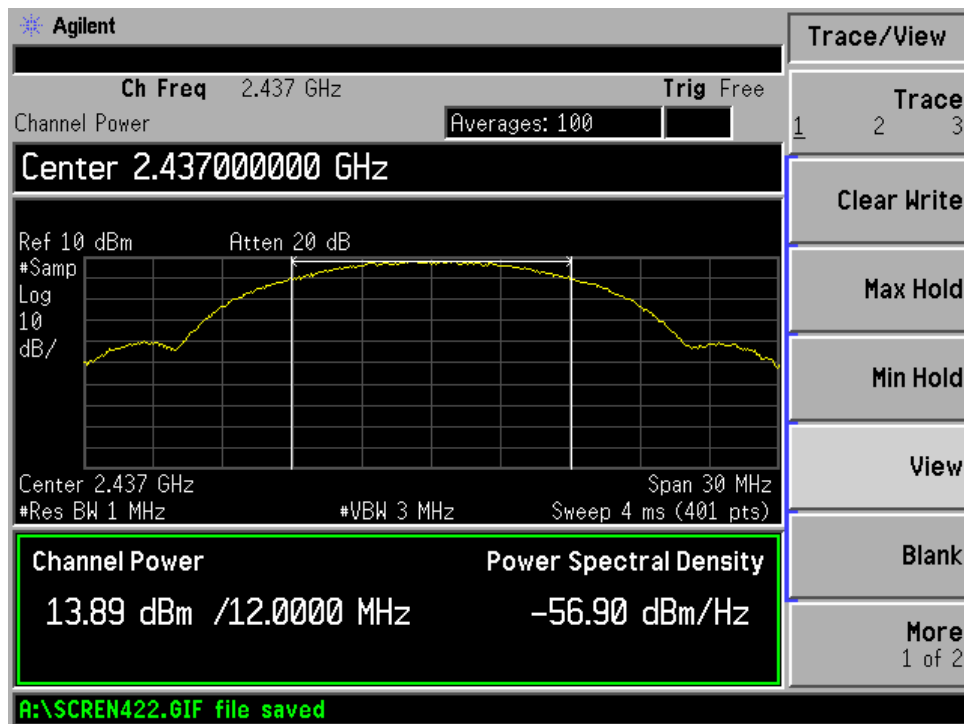
For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.



For 802.11b 1Mbps Mode
Result data graph shows Low channel conducted power = 13.81dBm

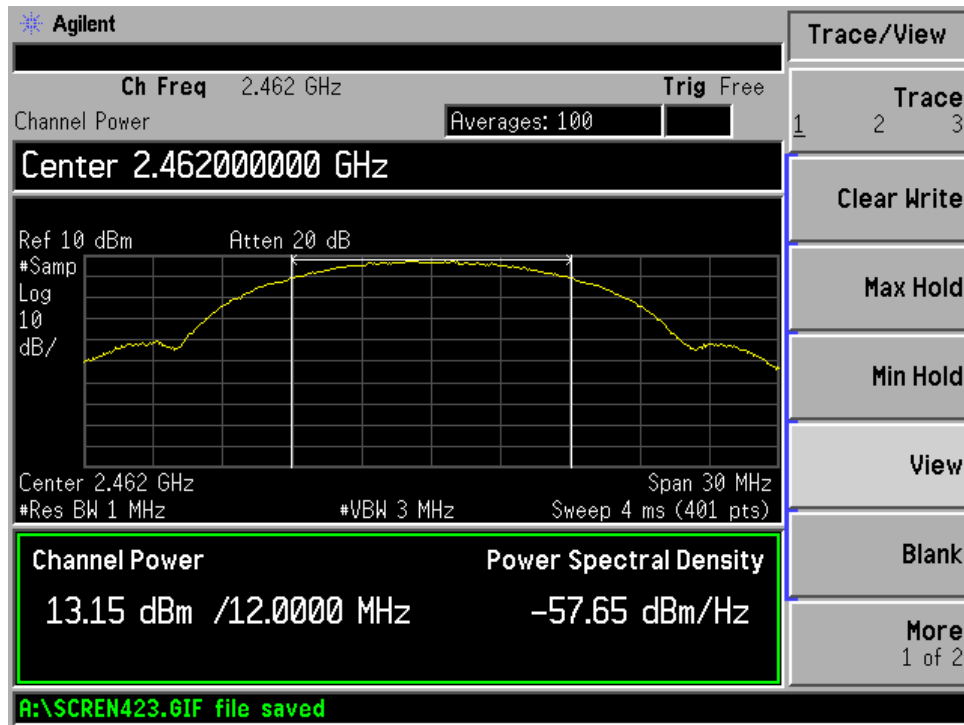


Result data graph shows middle channel conducted power = 13.89dBm



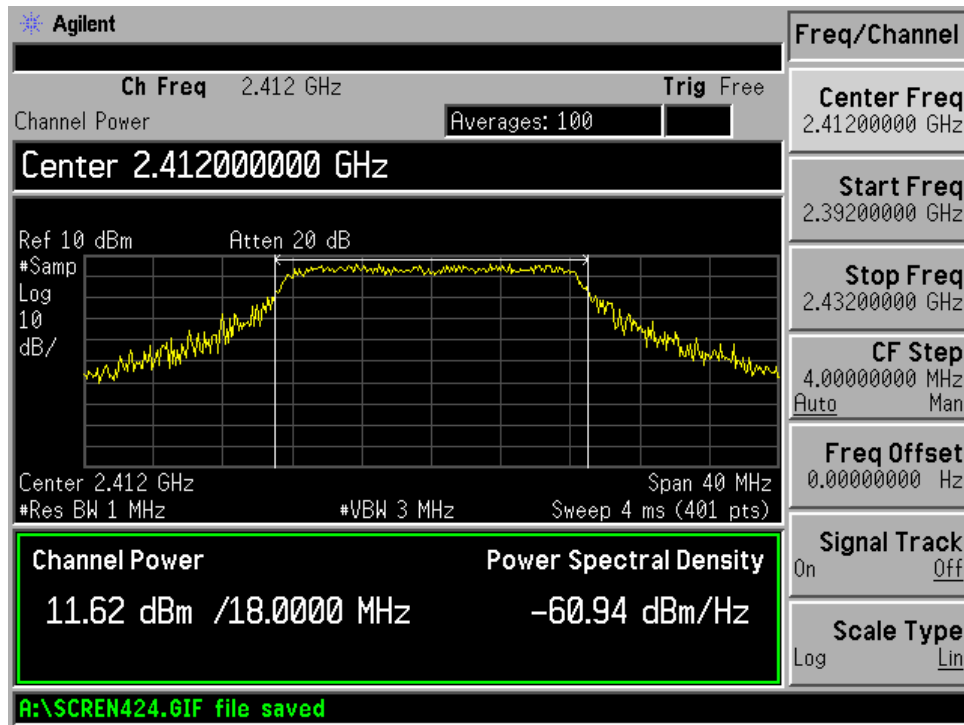


Result data graph shows high channel conducted power = 13.15dBm

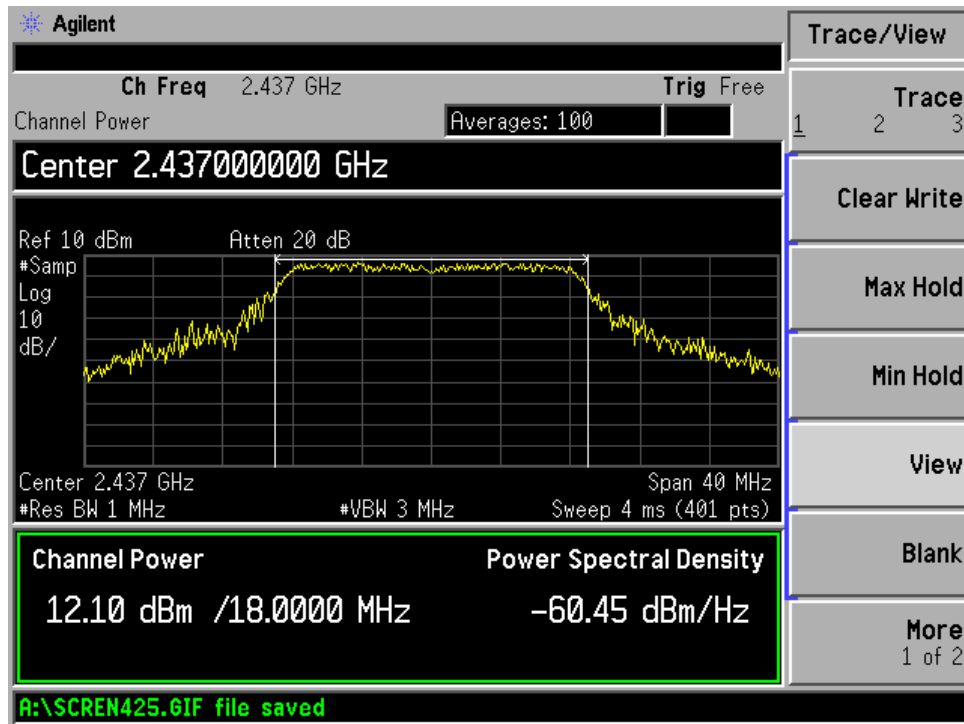




For 802.11g 6Mbps Mode
Result data graph shows Low channel conducted power = 11.62dBm

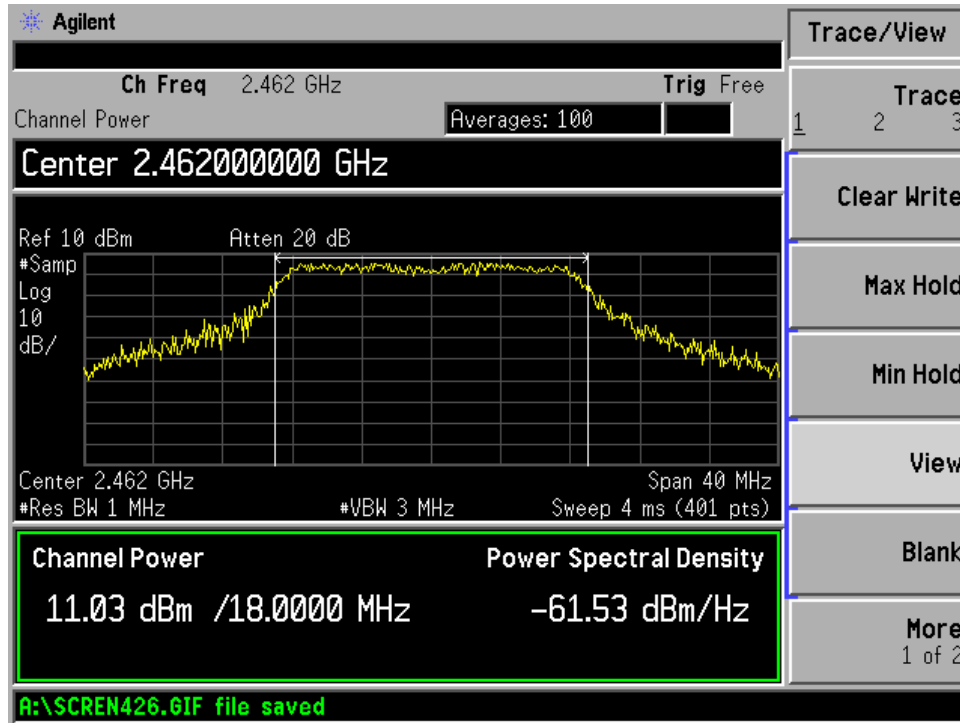


Result data graph shows middle channel conducted power = 12.10dBm





Result data graph shows high channel conducted power = 11.03dBm

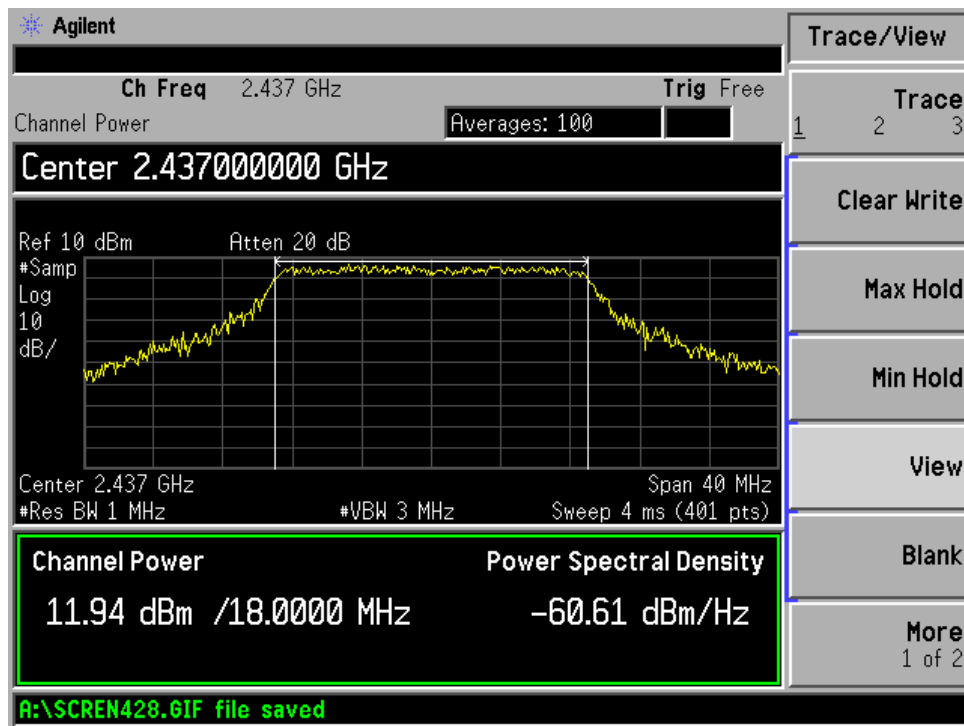




For 802.11n HT20 MCS0Mbps Mode
Result data graph shows Low channel conducted power = 12.13dBm

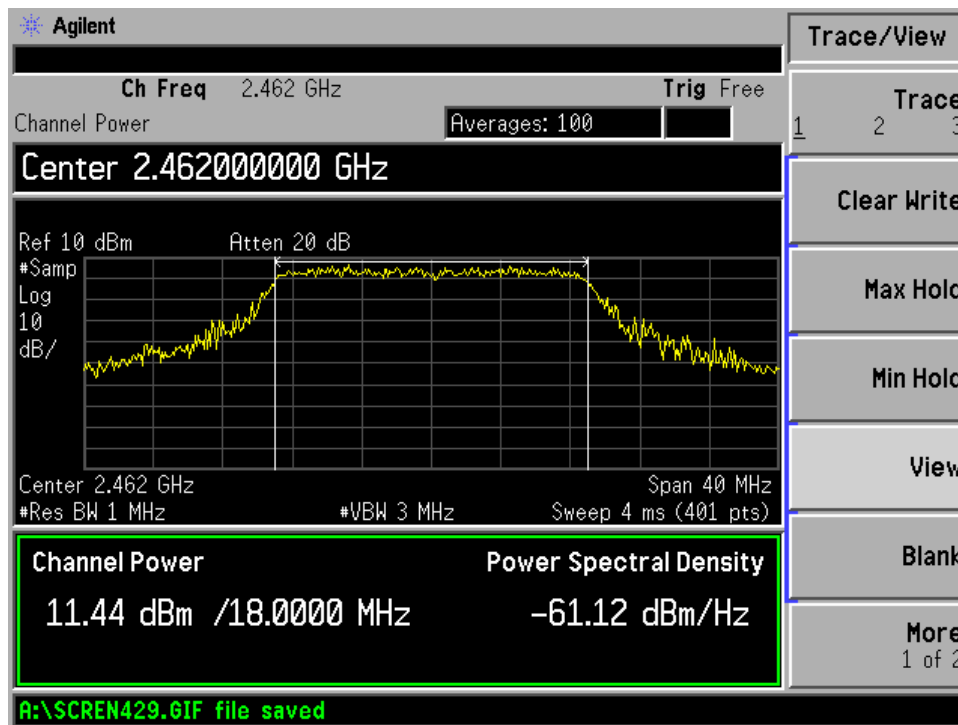


Result data graph shows middle channel conducted power = 11.94dBm



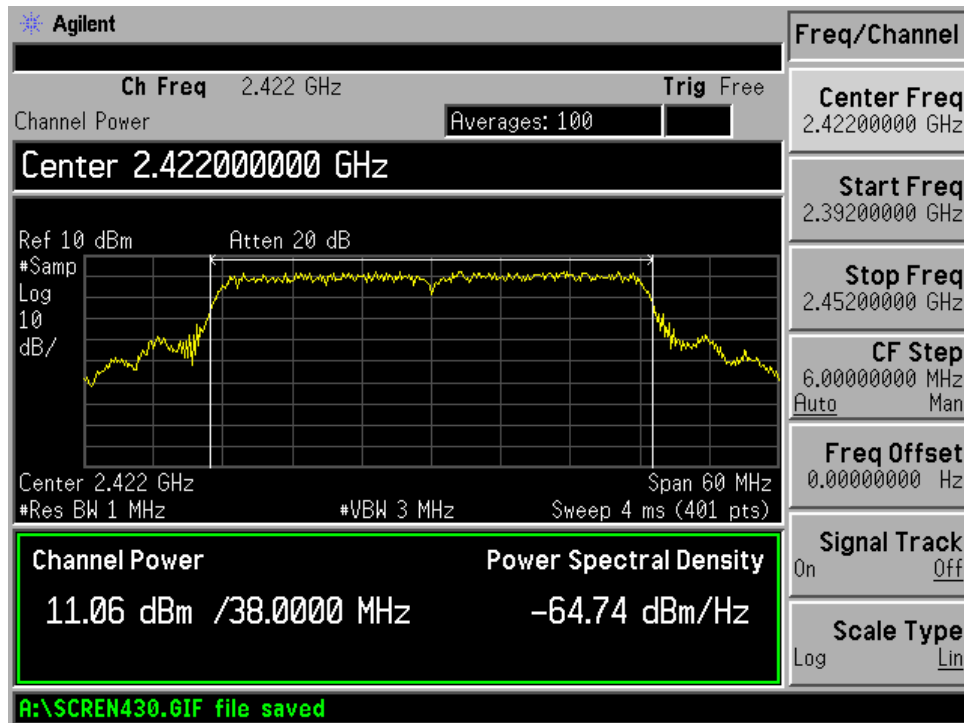


Result data graph shows high channel conducted power = 11.44dBm

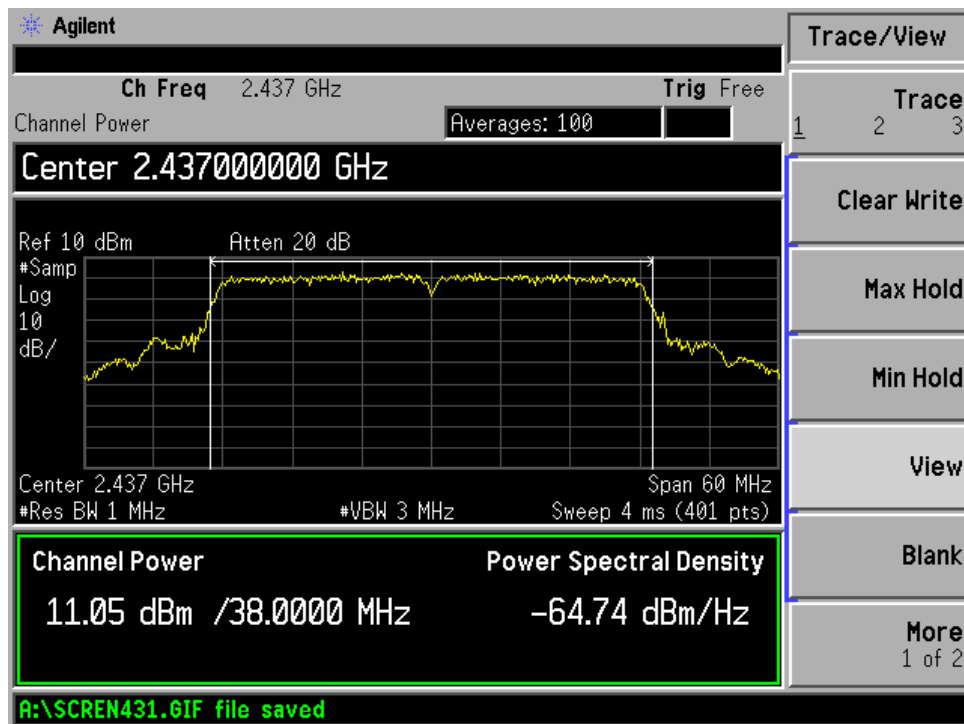




For 802.11n HT40 MCS0 Mbps Mode
 Result data graph shows Low channel conducted power = 11.06dBm

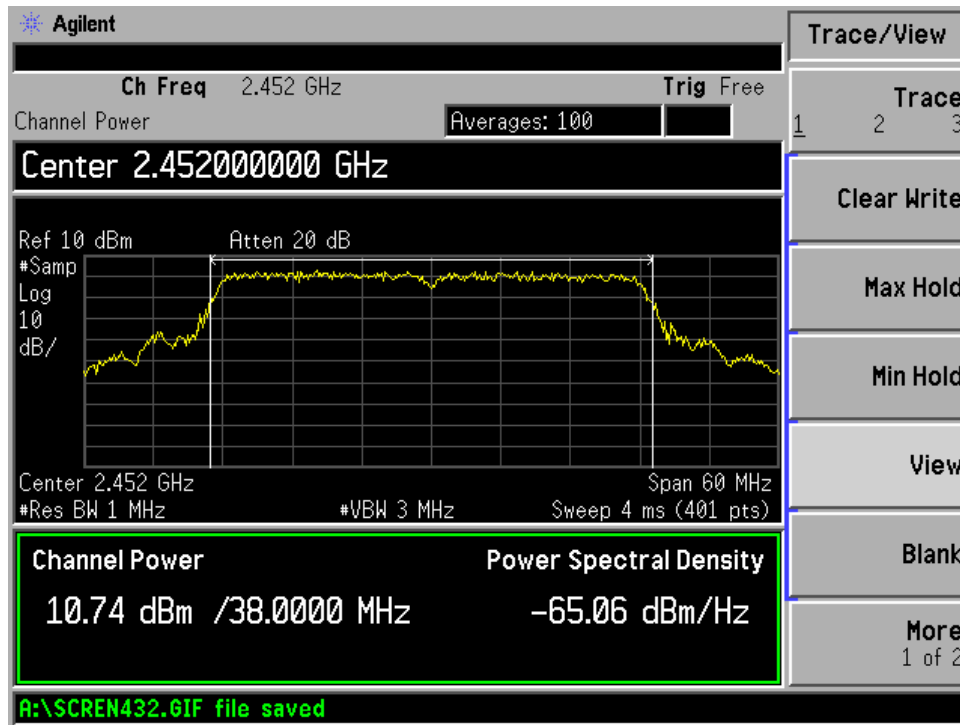


Result data graph shows middle channel conducted power = 11.05dBm





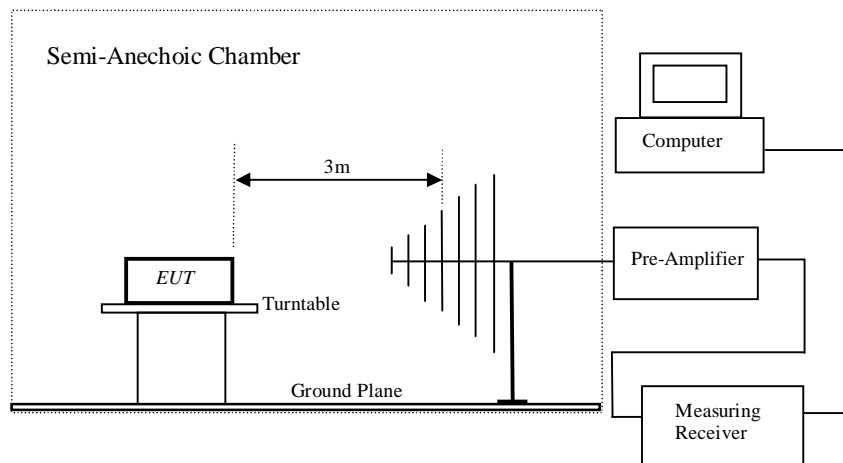
Result data graph shows high channel conducted power = 10.74dBm



4.5 Out of Band Emissions and Emissions in Restricted Bands

Test Requirement:	FCC part 15 section 15.247 (d)
Test Method:	ANSI C63.4:2003
Test Date:	2012-07-09
Mode of Operation:	Transmitting continuously mode.
Detector Function:	Peak
Measurement BW:	RBW 100KHz ; VBW 300KHz

Test Setup:





Result : PASS

Out of Frequency Band Emissions:

For out of band emissions that are close to or exceed 20dB attenuation requirement, and emission falls into restricted band, radiated emission was performed in order to show compliance with the general radiated emission requirement.

Result Summary:

Refer to Figure 10 to 11 for the emission data graph, result shows that the significant emissions detected are with more than 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

Limits for Out of Frequency Band Emission [Section 15.247 (d)]:

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. Attenuation below the general limits specified in Section 15.209(a) is not required.

Limit for Radiated Emission Falling in Restricted Bands [Section 15.209]:

Frequency (MHz)	Field Strength [$\mu\text{V/m}$]	Field Strength [dB $\mu\text{V/m}$]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

All Emission and Emissions Fall into Restricted Band were recorded as below:



Below 1GHz (Mode: 802.11b Lowest Channel 1Mbps)

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarization
35.2512	21.14	8.92	30.06	40.00	-9.94	peak	H
59.2325	17.83	5.76	23.59	40.00	-16.41	peak	H
286.9823	18.59	9.57	28.16	46.00	-17.84	peak	H
428.0193	25.46	10.93	36.39	46.00	-9.61	peak	H
574.6258	23.43	13.95	37.38	46.00	-8.62	peak	H
925.7563	20.14	18.49	38.63	46.00	-7.37	peak	H
35.2512	27.93	8.92	36.85	40.00	-3.15	peak	V
42.3022	25.86	8.98	34.84	40.00	-5.16	peak	V
434.0651	23.54	11.10	34.64	46.00	-11.36	peak	V
550.9480	21.43	13.26	34.69	46.00	-11.31	peak	V
574.6258	23.52	13.95	37.47	46.00	-8.53	peak	V
603.5392	22.58	14.62	37.20	46.00	-8.80	peak	V



**Above 1GHz
For IEEE 802.11b Mode**

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarization
Lowest Channel							
*4828.000	54.03	6.13	60.16	74.00	-13.84	peak	H
*4828.000	40.61	6.13	46.74	54.00	-7.26	AVG	H
*7512.000	37.74	12.29	50.03	54.00	-3.97	AVG	H
*7534.000	52.33	12.24	64.57	74.00	-9.43	peak	H
*4828.000	62.95	6.13	69.08	74.00	-4.92	peak	V
*4828.000	44.39	6.13	50.52	54.00	-3.48	AVG	V
*7490.000	51.78	12.25	64.03	74.00	-9.97	peak	V
*7512.000	37.73	12.29	50.02	54.00	-3.98	AVG	V
Middle Channel							
5158.000	47.05	7.21	54.26	74.00	-19.74	peak	H
5180.000	35.54	7.29	42.83	54.00	-11.17	AVG	H
*7314.000	47.43	11.49	58.92	74.00	-15.08	peak	H
*7358.000	35.58	11.67	47.25	54.00	-6.75	AVG	H
*4872.000	56.54	6.26	62.80	74.00	-11.20	peak	V
*4872.000	40.41	6.26	46.67	54.00	-7.33	AVG	V
*7490.000	47.02	12.25	59.27	74.00	-14.73	peak	V
*7490.000	35.67	12.25	47.92	54.00	-6.08	AVG	V
Highest Channel							
*4916.000	49.22	6.38	55.60	74.00	-18.40	peak	H
*4916.000	36.28	6.38	42.66	54.00	-11.34	AVG	H
*7402.000	48.19	11.87	60.06	74.00	-13.94	peak	H
*7490.000	35.72	12.25	47.97	54.00	-6.03	AVG	H
*4916.000	59.10	6.38	65.48	74.00	-8.52	peak	V
*4916.000	42.46	6.38	48.84	54.00	-5.16	AVG	V
*7424.000	47.02	11.97	58.99	74.00	-15.01	peak	V
*7490.000	35.83	12.25	48.08	54.00	-5.92	AVG	V

Remark (*): This frequency falls into restricted band.



For IEEE 802.11g Mode

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarization
Lowest Channel							
*4696.000	48.89	5.75	54.64	74.00	-19.36	peak	H
*4740.000	35.53	5.87	41.40	54.00	-12.60	AVG	H
7006.000	35.81	10.12	45.93	54.00	-8.07	AVG	H
7028.000	48.39	10.22	58.61	74.00	-15.39	peak	H
*4828.000	50.61	6.13	56.74	74.00	-17.26	peak	V
*4828.000	37.65	6.13	43.78	54.00	-10.22	AVG	V
7182.000	47.16	10.91	58.07	74.00	-15.93	peak	V
*7270.000	35.03	11.29	46.32	54.00	-7.68	AVG	V
Middle Channel							
*4894.000	48.03	6.32	54.35	74.00	-19.65	peak	H
*4894.000	35.25	6.32	41.57	54.00	-12.43	AVG	H
*7314.000	48.38	11.49	59.87	74.00	-14.13	peak	H
*7314.000	35.56	11.49	47.05	54.00	-6.95	AVG	H
*4872.000	48.98	6.26	55.24	74.00	-18.76	peak	V
*4872.000	38.47	6.26	44.73	54.00	-9.27	AVG	V
6984.000	35.87	10.06	45.93	54.00	-8.07	AVG	V
7072.000	47.24	10.42	57.66	74.00	-16.34	peak	V
Highest Channel							
*4982.000	47.06	6.58	53.64	74.00	-20.36	peak	H
*5048.000	35.47	6.80	42.27	54.00	-11.73	AVG	H
*7446.000	47.39	12.06	59.45	74.00	-14.55	peak	H
*7490.000	35.73	12.25	47.98	54.00	-6.02	AVG	H
*4916.000	49.71	6.38	56.09	74.00	-17.91	peak	V
*4916.000	37.92	6.38	44.30	54.00	-9.70	AVG	V
*7336.000	47.54	11.58	59.12	74.00	-14.88	peak	V
*7446.000	35.52	12.06	47.58	54.00	-6.42	AVG	V

Remark (*): This frequency falls into restricted band.



For IEEE 802.11n/HT20 Mode

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarization
Lowest Channel							
*5004.000	47.37	6.64	54.01	74.00	-19.99	peak	H
5026.000	35.15	6.73	41.88	54.00	-12.12	AVG	H
*7314.000	48.04	11.49	59.53	74.00	-14.47	peak	H
*7336.000	35.64	11.58	47.22	54.00	-6.78	AVG	H
*4828.000	51.72	6.13	57.85	74.00	-16.15	peak	V
*4828.000	38.22	6.13	44.35	54.00	-9.65	AVG	V
*7490.000	48.07	12.25	60.32	74.00	-13.68	peak	V
*7490.000	35.69	12.25	47.94	54.00	-6.06	AVG	V
Middle Channel							
*5026.000	35.21	6.73	41.94	54.00	-12.06	AVG	H
*5048.000	46.70	6.80	53.50	74.00	-20.50	peak	H
7182.000	46.65	10.91	57.56	74.00	-16.44	peak	H
7204.000	35.02	11.00	46.02	54.00	-7.98	AVG	H
*4872.000	50.23	6.26	56.49	74.00	-17.51	peak	V
*4872.000	38.20	6.26	44.46	54.00	-9.54	AVG	V
7006.000	35.72	10.12	45.84	54.00	-8.16	AVG	V
7050.000	47.02	10.33	57.35	74.00	-16.65	peak	V
Highest Channel							
*5092.000	47.81	6.97	54.78	74.00	-19.22	peak	H
5202.000	35.41	7.38	42.79	54.00	-11.21	AVG	H
*7314.000	48.13	11.49	59.62	74.00	-14.38	peak	H
*7336.000	35.67	11.58	47.25	54.00	-6.75	AVG	H
*4916.000	52.62	6.38	59.00	74.00	-15.00	peak	V
*4916.000	38.64	6.38	45.02	54.00	-8.98	AVG	V
*7358.000	48.22	11.67	59.89	74.00	-14.11	peak	V
*7490.000	35.66	12.25	47.91	54.00	-6.09	AVG	V

Remark (*): This frequency falls into restricted band.



For IEEE 802.11n/HT40 Mode

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarization
Lowest Channel							
*4916.000	35.34	6.38	41.72	54.00	-12.28	AVG	H
*4938.000	47.67	6.45	54.12	74.00	-19.88	peak	H
*7490.000	35.55	12.25	47.80	54.00	-6.20	AVG	H
*7512.000	47.48	12.29	59.77	74.00	-14.23	peak	H
*4850.000	47.56	6.20	53.76	74.00	-20.24	peak	V
*4850.000	36.90	6.20	43.10	54.00	-10.90	AVG	V
*7358.000	46.71	11.67	58.38	74.00	-15.62	peak	V
*7358.000	35.43	11.67	47.10	54.00	-6.90	AVG	V
Middle Channel							
*5070.000	46.69	6.89	53.58	74.00	-20.42	peak	H
*5092.000	35.25	6.97	42.22	54.00	-11.78	AVG	H
*7402.000	46.99	11.87	58.86	74.00	-15.14	peak	H
*7490.000	35.54	12.25	47.79	54.00	-6.21	AVG	H
*4850.000	48.77	6.20	54.97	74.00	-19.03	peak	V
*4872.000	36.44	6.26	42.70	54.00	-11.30	AVG	V
7094.000	48.46	10.52	58.98	74.00	-15.02	peak	V
7204.000	35.09	11.00	46.09	54.00	-7.91	AVG	V
Highest Channel							
*5048.000	35.14	6.80	41.94	54.00	-12.06	AVG	H
*5070.000	46.89	6.89	53.78	74.00	-20.22	peak	H
*7380.000	47.44	11.78	59.22	74.00	-14.78	peak	H
*7380.000	35.35	11.78	47.13	54.00	-6.87	AVG	H
*4894.000	36.93	6.32	43.25	54.00	-10.75	AVG	V
*4916.000	47.44	6.38	53.82	74.00	-20.18	peak	V
*7314.000	48.23	11.49	59.72	74.00	-14.28	peak	V
*7314.000	35.60	11.49	47.09	54.00	-6.91	AVG	V

Remark (*): This frequency falls into restricted band.



Remark: Only background noise was measured from 12GHz-26GHz.

Result Summary:

- 1) Communication mode: All other emissions are more than 20dB below FCC part 15.209 limit.
- 2) No further spurious emissions found between 30 MHz and lowest internal used/generated frequency and from 30MHz to 1GHz.
- 3) Test data is base on the worst case lowest channel's emission data graph from 30MHz-26GHz.

Remarks:

1. “ * ” Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).
2. Emission level with more than 20dB below the FCC required limit is not mentioned in table.
3. Delta to Limit = Field strength (dB μ V/m) – Limit (dB μ V/m).
4. Calculated measurement uncertainty: 9kHz -30MHz: 1.8dB.
30MHz -1GHz: 5.2dB.
1GHz -18GHz: 5.1dB.



4.6 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC part 15 Section 15.207 Class B
Test Method:	ANSI C63.4:2003
Test Date:	2012-06-29
Mode of Operation:	Transmitting continuously mode
Detector Function:	CISPR Quasi Peak
Measurement BW:	100 kHz
Worst Case:	802.11b Lowest Channel 1Mbps

Results: PASS

- Refer following the result data graph.

Limits for Conducted Emission [Section 15.207]:

Frequency Range [MHz]	Quasi-Peak Limit [dB μ V]	Average Limit [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

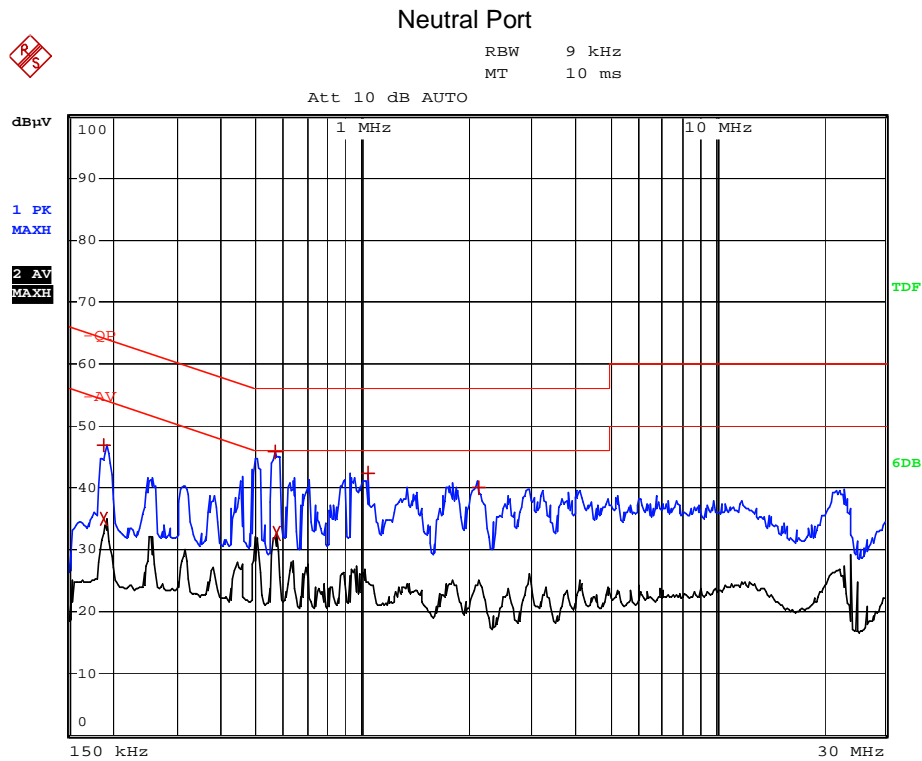
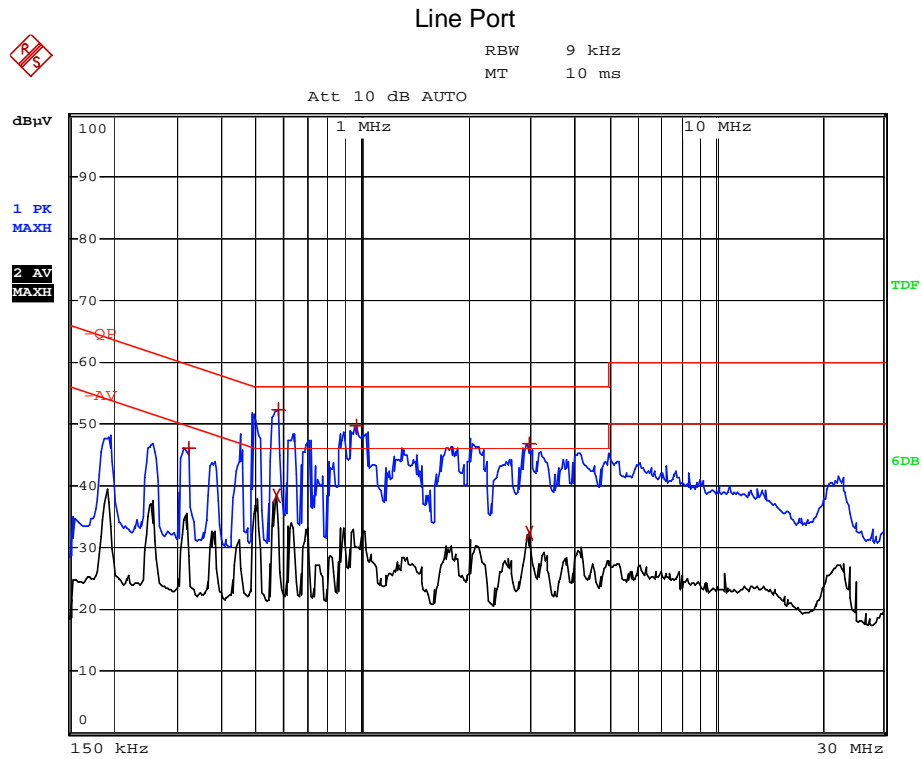
* Decreases with the logarithm of the frequency.

Remarks:

Calculated measurement uncertainty: ± 2.8 dB



Result data graph shows the conducted emission (Live and Neutral).





Result data table shows the conducted emission (Live and Neutral).

Frequency (MHz)	Detector (QP/AV)	Phase	Result (dB μ V)	Limit (dB μ V)	Margin
0.322	QP	L	46.03	59.65	-13.62
0.574	AV	L	38.35	46.00	-7.65
0.578	QP	L	52.28	56.00	-3.72
0.966	QP	L	49.80	56.00	-6.20
2.962	AV	L	32.31	46.00	-13.69
2.986	QP	L	46.80	56.00	-9.20
0.190	QP	N	46.88	64.03	-17.15
0.190	AV	N	35.05	54.03	-18.98
0.566	QP	N	45.82	56.00	-10.18
0.570	AV	N	32.77	46.00	-13.23
1.034	QP	N	42.35	56.00	-13.65
2.134	QP	N	39.93	56.00	-16.07



5.0 RF Exposure Compliance Requirement

Test Requirement:	FCC part 15 section 15.247 (i)
Test Method:	FCC part 15 section 1.1307 (b1) OET Bulletin 65, Edition 01-01

Results: PASS

Systems operation under the provision of this section shall be operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the Commission's guideline,

The EUT is considered as a mobile device according to OET Bulletin 65, Edition 01-01, therefore distance to human body of min. 20cm is determined.

Frequency Band:	2.412GHz ~2.462GHz
Device Category:	<input type="checkbox"/> Portable (< 20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others :
Exposure Classification:	<input type="checkbox"/> Occupational/ Controlled exposure <input checked="" type="checkbox"/> General Population / Uncontrolled exposure
Max Transmit Power	0.0245W (9.54dBm)
Antenna Gain	4dBi (Numeric gain:2.51)
Evaluation Applied:	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

MPE calculation:

Refer to clause 4.4 of this test report, it shows that the maximum output power = 13.89dBm,
 The maximum radiated power (EIRP) = the maximum output power+ antenna gain
 =13.89dBm+2.3dBi=16.19dBm = 41.59mW

The power density at 20cm from the antenna : = EIRP / 4π R²
 = 0.008278mW / cm²

Limits for General Population/Uncontrolled Exposure [OET Bulletin 65, Edition 01-01]:

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30



6.0 List of Measurement Equipment

Radiated Emission

Manufacturer	Equipment	Model No.	Serial No.	Cal. Date	Due Date
R&S	Spectrum Analyzer	FSP30	836079/035	2012-03-28	2013-03-27
R&S	Test Receiver	ESI26	838786/013	2012-03-28	2013-03-27
Albatross Projects	Anechoic chamber	MCDC	---	2011-12-20	2012-12-19
SCHWARZBECK	Trilog Broadband Antenna	VULB9163	9163-333	2012-02-25	2013-02-24
ETS	Horn Antenna	3117	00086197	2012-02-25	2013-02-24
Agilent	Pre-amplifier	8447F	3113A06717	2012-03-28	2013-03-27
Compliance Direction	Pre-amplifier	PAP-0118	24002	2012-03-28	2013-03-27
Anechoic chamber	Albatross Projects	MCDC	----	2012-03-20	2013-03-19

Line Conducted

Manufacturer	Equipment	Model No.	Serial No.	Cal. Date	Due Date
Rohde & Schwarz	EMI Test Receiver	ESPI	101611	2012-03-28	2013-03-27
Schwarz beck	L.I.S.N	NSLK8126	8126-224	2012-03-28	2013-03-27
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	100911	2012-03-28	2013-03-27
EMCO	AMN	3825/2	11967C	2012-03-28	2013-03-27
FCC	Current Probe	F-33-4	091684	2012-03-28	2013-03-27

N/A Not Applicable or Not Available