FCC Part 15C

Measurement And Test Report

For

Shenzhen Smart-eye Digital Electronics Co., Ltd

#6 Northern Zone, Shangxue S&T City, Bantian, Longgang District, Shenzhen, China.

Model:NC545/W,NV545/W, NC541/W,NV541/W

Mar. 7, 2011

This Report Concerns: ☒ Original Report	**Equipment Type:** IP Camera
Report Number:	MTI110214001RF
Test Engineer:	Bill Chen
Reviewed By:	Denny Ma
Approved & Authorized By:	Hebe Lee
Test Date:	**Mar. 1-7,2011**
Prepared By:	**MTI Technology Laboratory Ltd.** 10F, Yinxing Business Hotel, Xixiang Road, Bao'an District, Shenzhen, P,R.China. Tel: +86-755-8885 0135 Fax: +86-755-8885 0136

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of MTI Technology Laboratory Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Shenzhen Smart-eye Digital Electronics Co.,Ltd
Address of applicant:	#6 Northern Zone, Shangxue S&T City, Bantian, Longgang District, Shenzhen, China
Manufacturer:	Shenzhen Smart-eye Digital Electronics Co.,Ltd
Address of manufacturer:	#6 Northern Zone, Shangxue S&T City, Bantian, Longgang District, Shenzhen, China
Equipment Under Test:	IP Camera
Tested Model No.:	NC545/W
Supplementary Models No:	NV545/W ,NC541/W,NV541/W
	Remark: supplementary models are only different in exterior with tested Model and with the same circuit construction
Type of Modulation:	CCK, OFDM
Frequency Band:	2412~2462 MHz for 802.11b/g, 802.11n/HT20;
	2422~2452 MHz for 802.11n/HT40
Number of Channels:	13 for 802.11b/g, 802.11n/HT20; 11 for 802.11n/HT40
Channel Separation:	5MHz
EIRP Power:	18.39dBm
Power Supply:	120V/60Hz

Remark: * *The test data gathered are from the production sample provided by the manufacturer.*

1.2 Related Submittal(s) / Grant (s)

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.207, and 15.247 rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

All measurement required was performed at laboratory of MTI Technology Laboratory Ltd. at 10F,Yinxing Business Building, Xixiang Road, Bao'an District, Shenzhen, P.R.China.

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

FCC – Registration No.: 167003

MTI Technology Laboratory 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 167003, May 04, 2009.

2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart C.

2.1 EUT Configuration

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

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 List of Measuring Equipments Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100079	2010/6	1 year
2	Horn Antenna	R/S	CH14-H052	1091698	2010/6	1 year
3	3m Semi- Anechoic Chamber	ETS	N/A	N/A	2010/6	1 year
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2010/11	1 year
2	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	2010/11	1 year
3	Receiver/ Spectrum Analyzer	ROHDE & SCHWARZ	ESCI	100106	2010/11	1 year
4	Spectrum Analyzer	Agilent	E7405A	US41160415	2010/11	1 year
5	Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2010/11	1 year
6	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2010/11	1 year
7	LISN	COM Power	LI-200	12212	2010/11	1 year
8	LISN	COM Power	LI-200	12019	2010/11	1 year
9	3m/5m Semi-Anechoic Chamber	ETS	N/A	N/A	2010/11	1 year
10	Ultra-Broadband Antenna	R/S	HL562	100015	2010/11	1 year
11	Horn Antenna	R/S	HF906	100039	2010/11	1 year
12	RF Test Panel	R/S	TS / RSP	335015/ 0017	N/A	N/A
13	Turntable	ETS	2088	2149	N/A	N/A
14	Antenna Mast	ETS	2075	2346	N/A	N/A

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
15.203/15.247(b)/(c)	Antenna Requirement	Pass
15.207	AC Power Line Conducted Emission	Pass
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System	Pass
15.247(e)	Power Spectral Density	Pass
15.247(b)(1)	Maximum Peak Output Power	Pass
15.247(d)	Band Edges Emission	Pass
15.247(d)	Radiated Emission	Pass

4. ANTENNA REQUIREMENT

4.1 Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Antenna Connected Construction

The antennas used in this product are PIFA. PIFA antenna with WNC connector, The maximum Gain of the antenna is 2.50dBi.

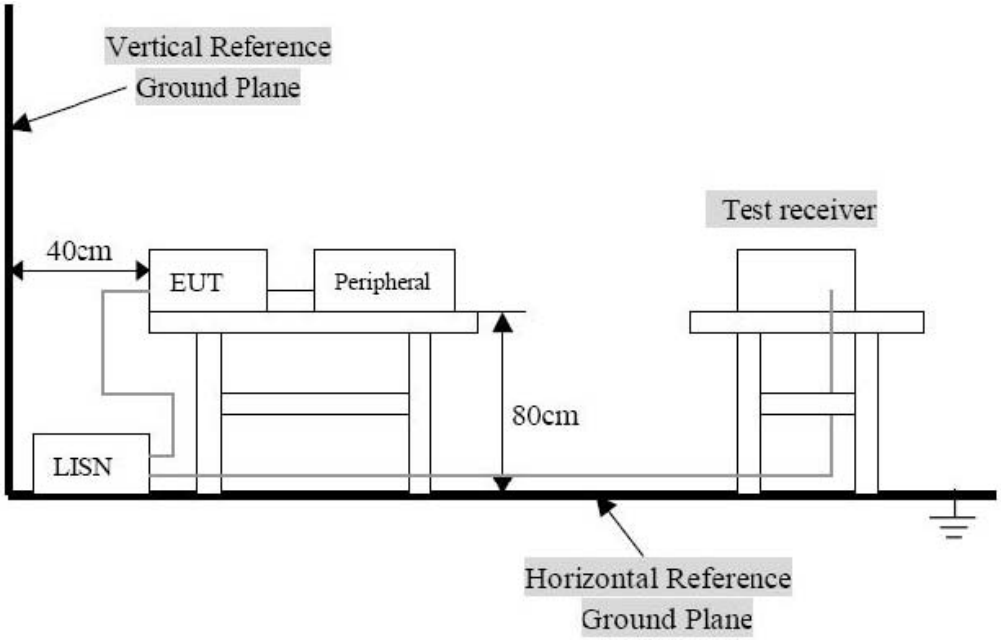
5. CONDUCTED EMISSION Measurement

5.1 Limits of Conducted Emission

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

5.2 Test Setup Diagram



5.3 Instrument Setting

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……150 KHz to 30 MHz
Detector……..Peak & Quasi-Peak & Average
Sweep Speed……Auto
IF Band Width……..9 KHz

5.4 Test Equipment List and Details

See section 2.4 of this report.

5.5 Test Procedure

1. Configure the EUT according to ANSI C63.4.

2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.

3. Connect EUT to the power mains through a line impedance stabilization network (LISN)

4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.

5. The frequency range from 150 KHz to 30 MHz was searched.

6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the “H” Patter Generator software to make the supporting equipments stay on working condition.

7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

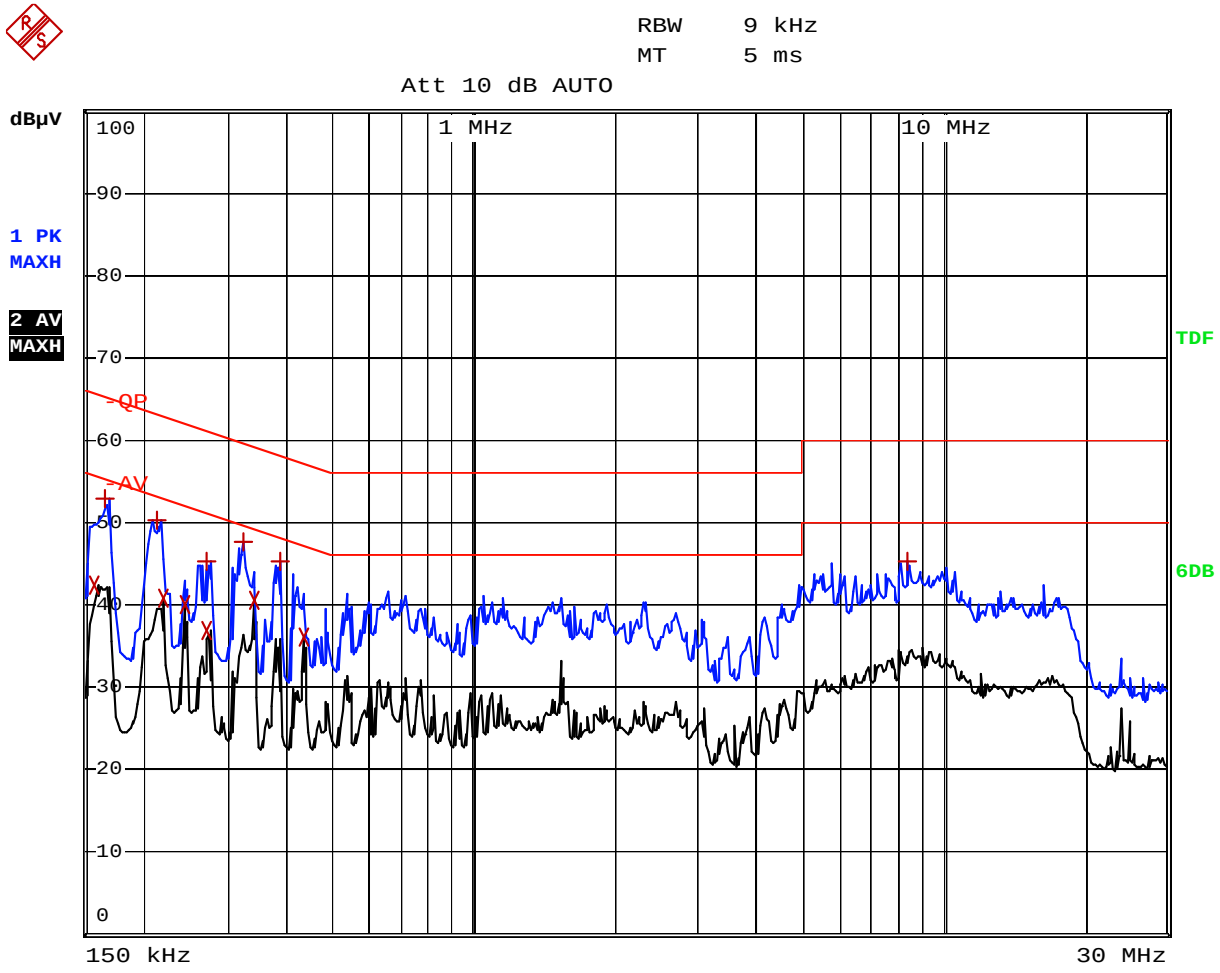
8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.6 Test Result

PASS

Detailed information, Please refer to the following page.

EUT: IP Camera
M/N: NC545/W
Operator: Amy
Test Specification: L

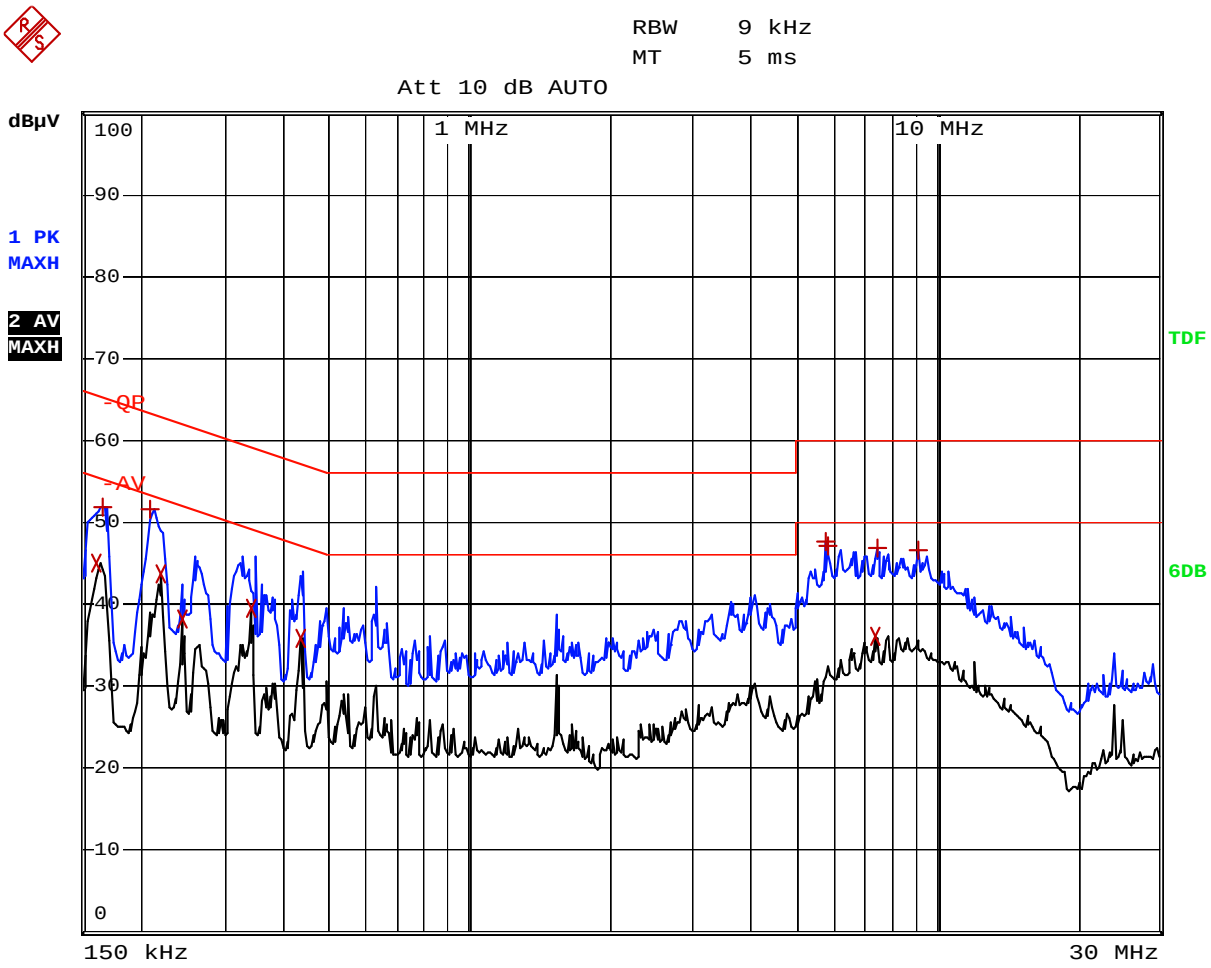


EDIT PEAK LIST (Prescan Results)

Trace1:	-QP
Trace2:	-AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	158 kHz	42.35	-13.21
1 Max Peak	166 kHz	52.86	-12.29
1 Max Peak	214 kHz	50.38	-12.66
2 Average	218 kHz	40.72	-12.17
2 Average	242 kHz	40.07	-11.94
1 Max Peak	274 kHz	45.35	-15.64
2 Average	274 kHz	36.79	-14.20
1 Max Peak	322 kHz	47.58	-12.07
2 Average	338 kHz	40.42	-8.82
1 Max Peak	386 kHz	45.40	-12.74
2 Average	434 kHz	36.18	-10.99
1 Max Peak	8.374 MHz	45.40	-14.59

EUT: IP Camera
M/N: NC545/W
Operator: Amy
Test Specification: N



EDIT PEAK LIST (Prescan Results)

Trace1: -QP
Trace2: -AV
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	162 kHz	45.10	-10.25
1 Max Peak	166 kHz	51.91	-13.24
1 Max Peak	210 kHz	51.58	-11.62
2 Average	218 kHz	43.62	-9.26
2 Average	242 kHz	38.26	-13.75
2 Average	338 kHz	39.50	-9.74
2 Average	434 kHz	35.90	-11.27
1 Max Peak	5.83 MHz	47.56	-12.43
1 Max Peak	5.89 MHz	47.19	-12.80
2 Average	7.442 MHz	36.04	-13.96
1 Max Peak	7.494 MHz	46.84	-13.15
1 Max Peak	9.194 MHz	46.71	-13.28

6. 6dB Bandwidth Measurement

6.1 Limits of 6dB Bandwidth Measurement

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 EUT Setup

Spectrum

6.3 Test Equipment List and Details

See section 2.4.

6.4 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

2. Set center frequency of spectrum analyzer = operating frequency.

3. The spectrum analyzer as RBW=100KHz (1 % of Bandwidth.), Sweep=auto

4. Mark the peak frequency and –6dB (upper and lower) frequency.

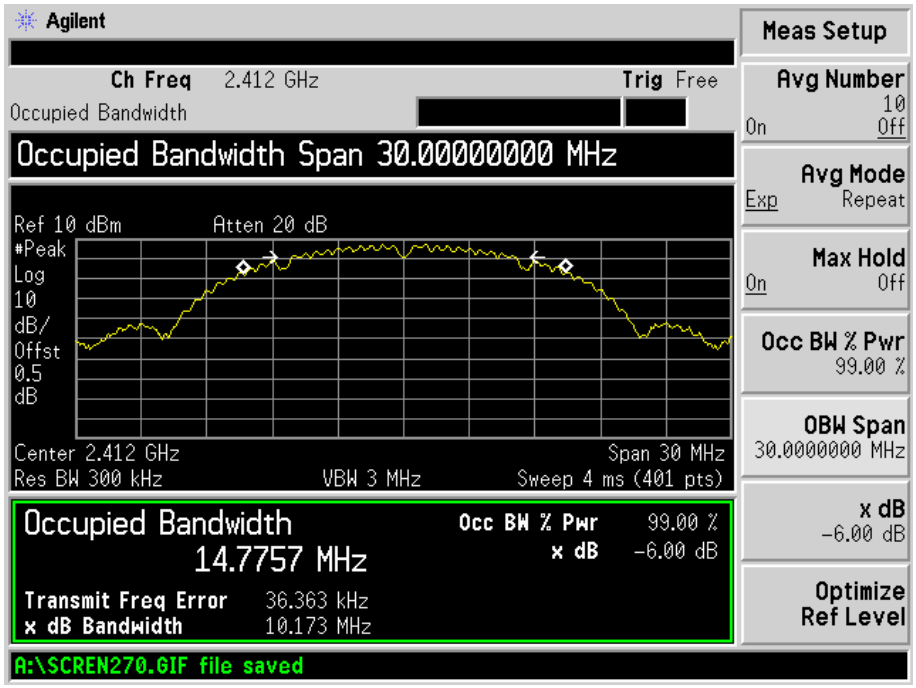
6.5 Test Result

PASS

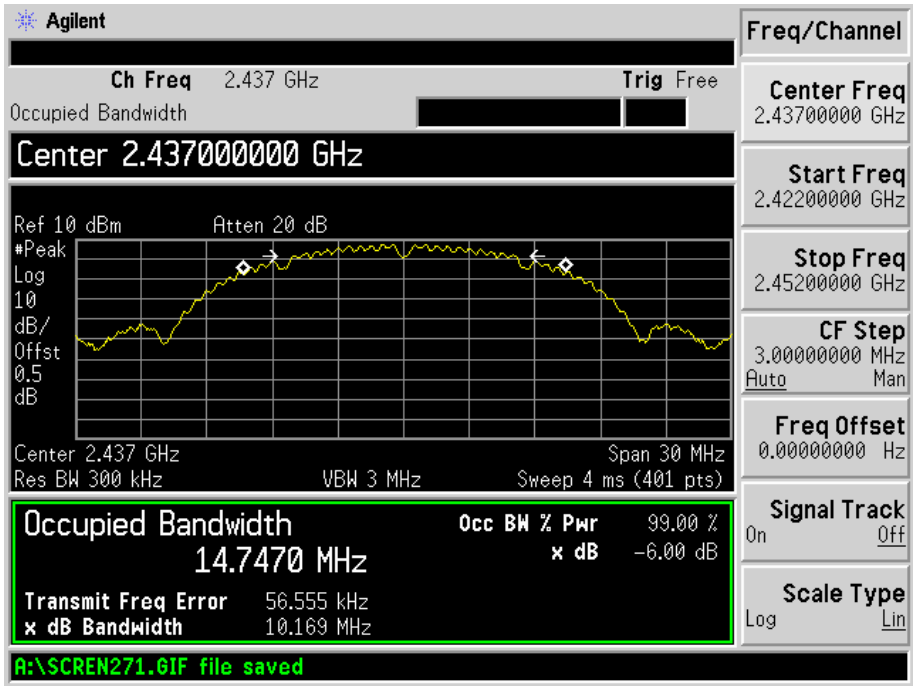
Detailed information, Please refer to the following pages.

Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11b	2412	10173	500
	2437	10169	500
	2462	10132	500
802.11g	2412	16498	500
	2437	16481	500
	2462	16661	500
802.11n/HT20	2412	17666	500
	2437	17767	500
	2462	17679	500
802.11n/HT40	2422	36303	500
	2437	36343	500
	2452	36336	500

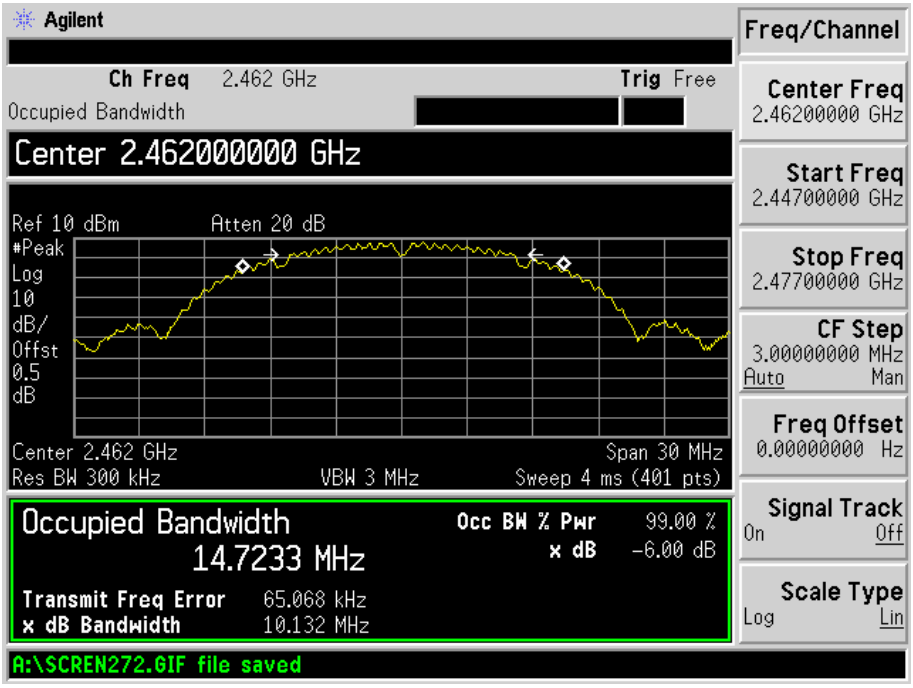
For 802.11b
Low Channel



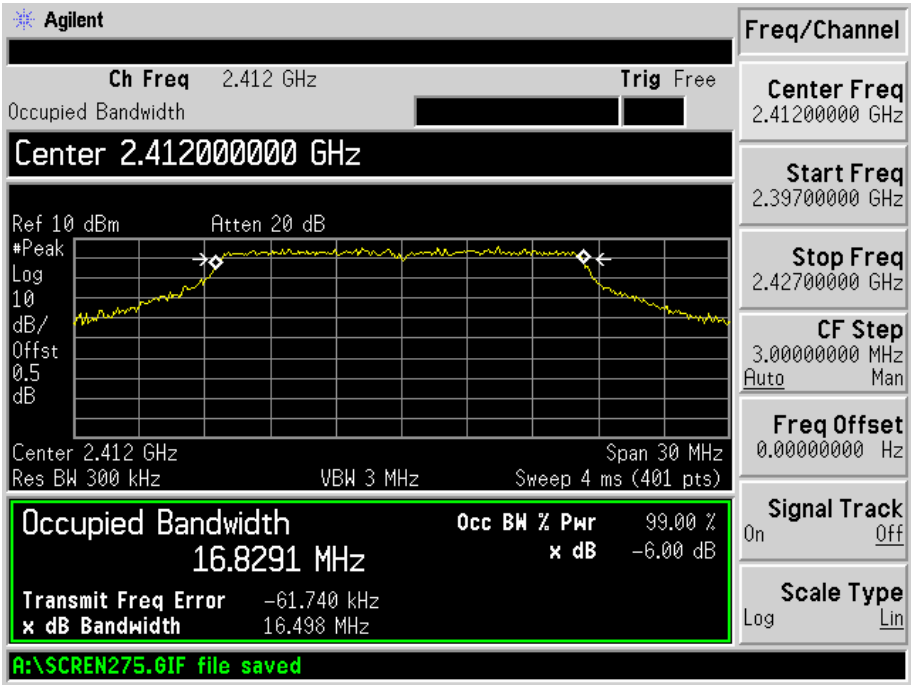
Middle Channel



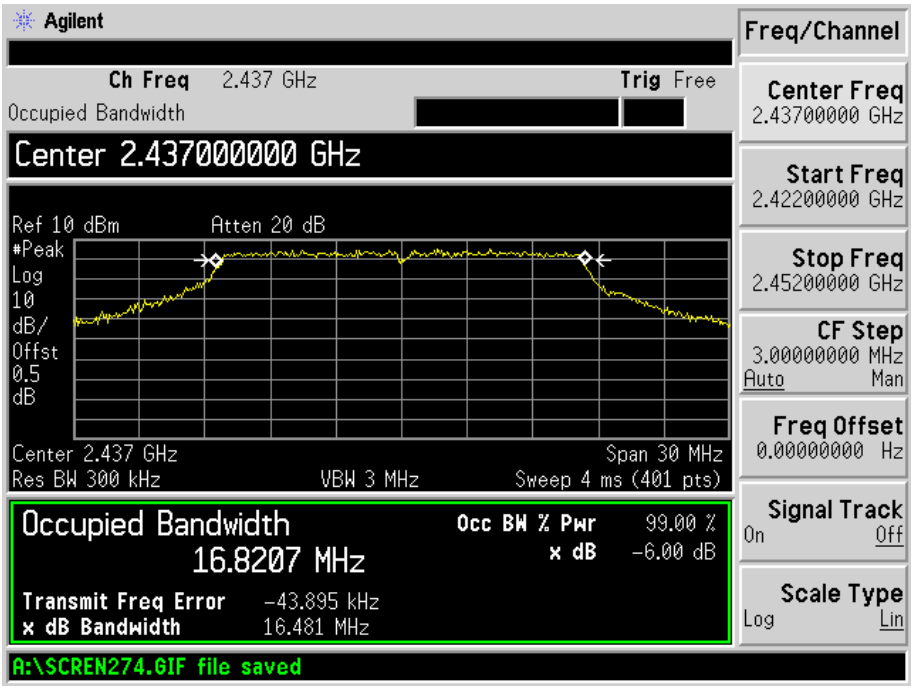
High Channel



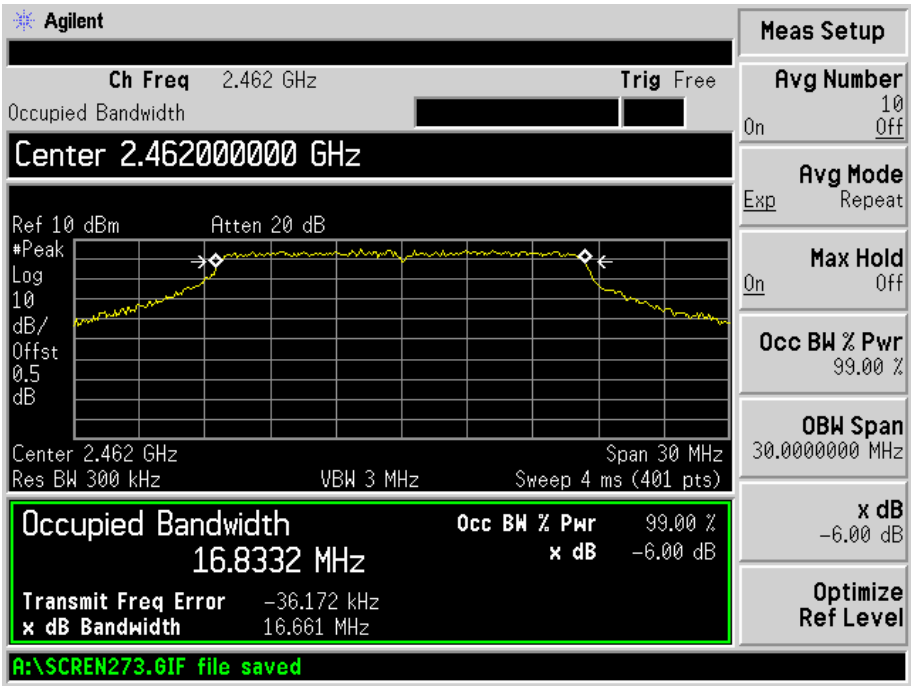
For 802.11g
Low Channel



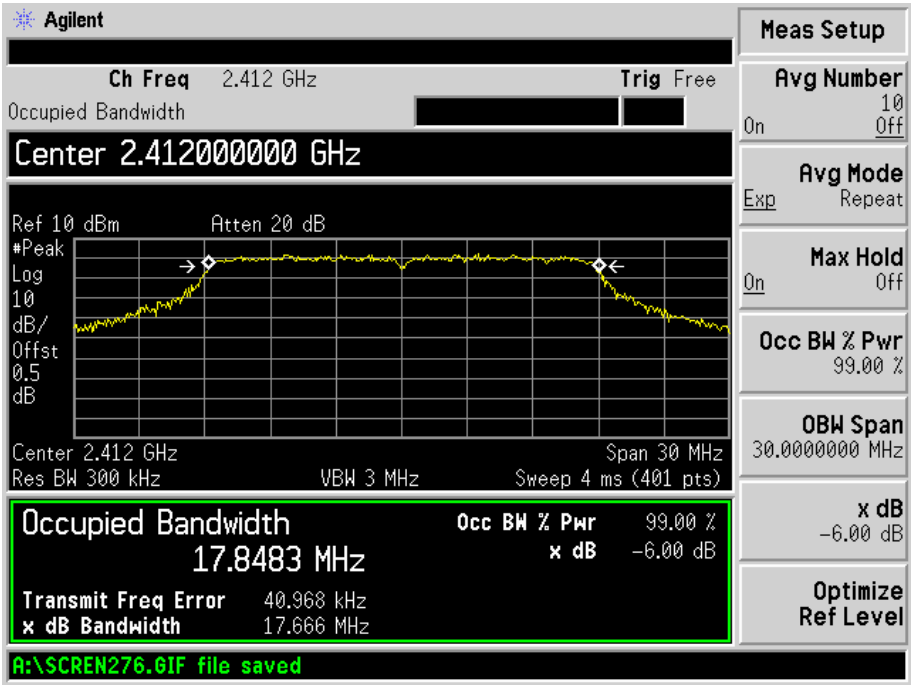
Middle Channel



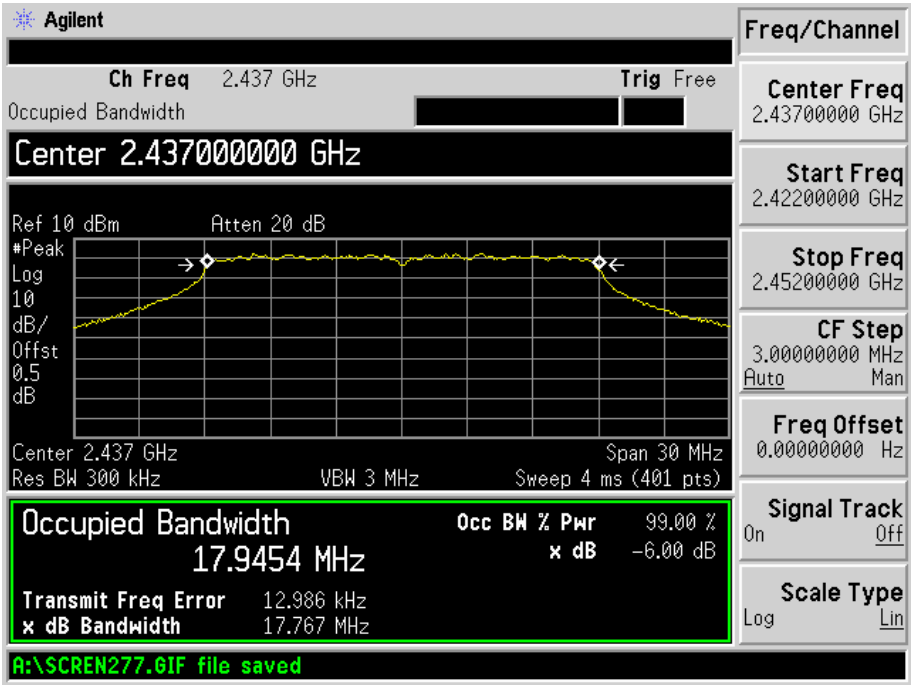
High Channel



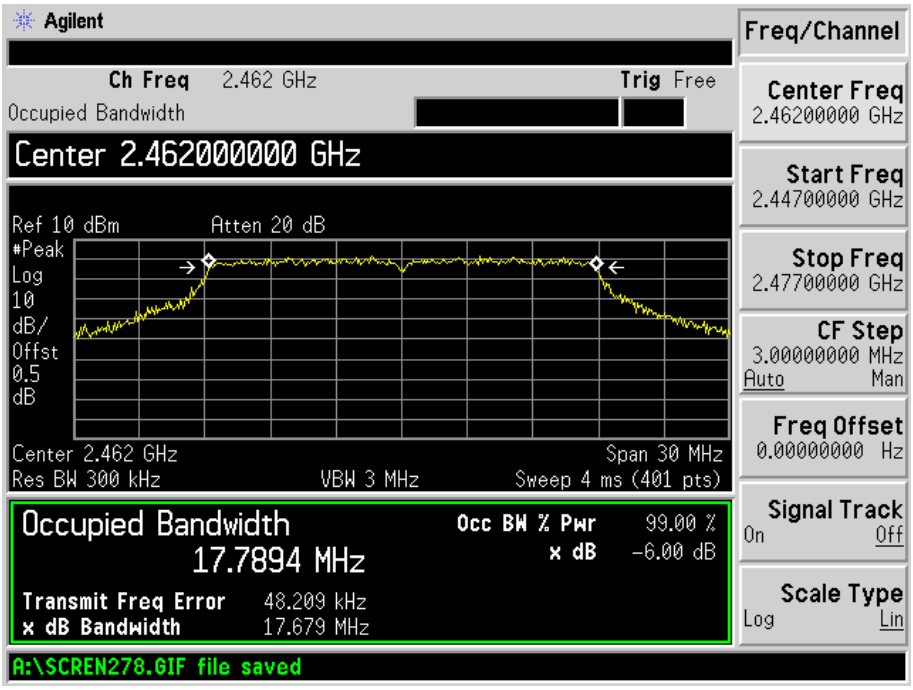
For 802.11n/HT20
Low Channel



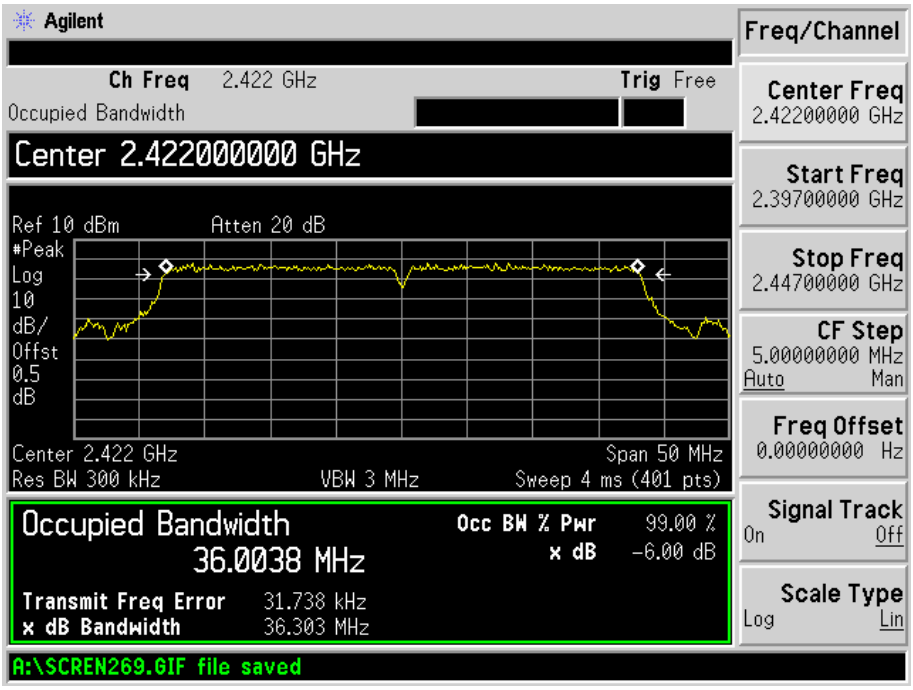
Middle Channel



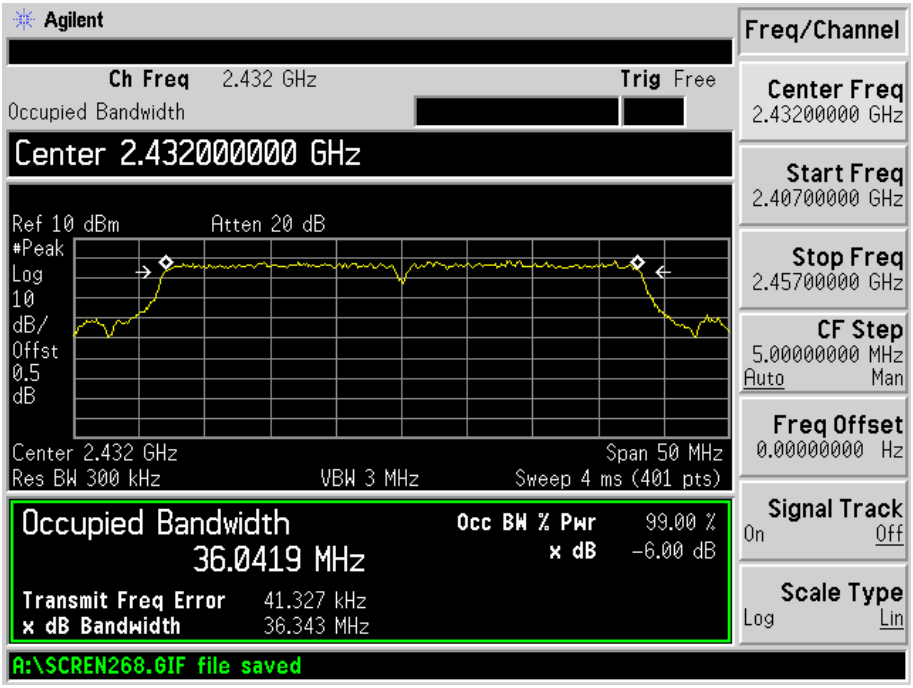
High Channel: 2462MHz



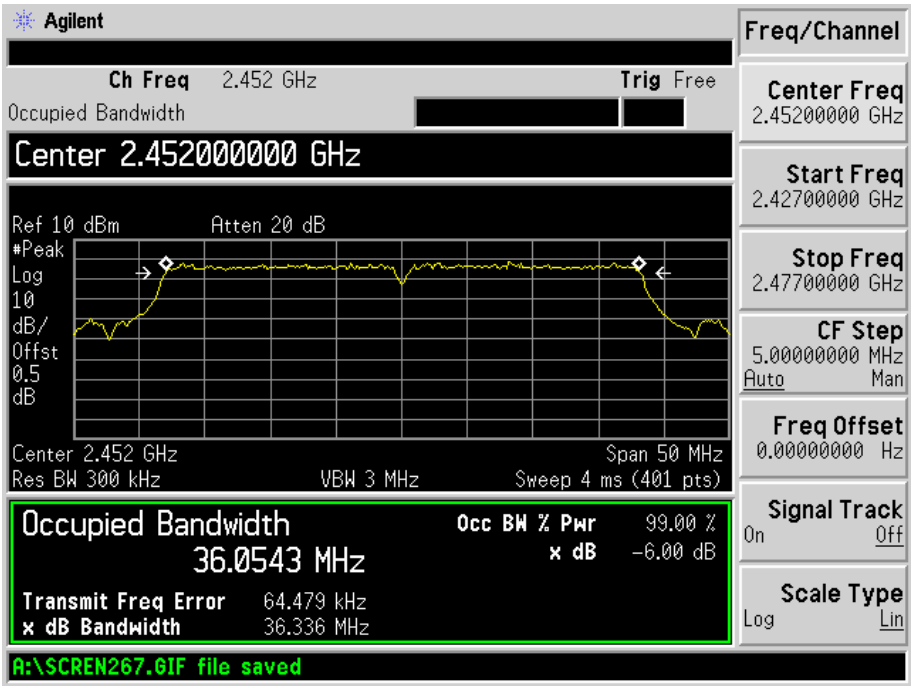
For 802.11n/HT40
Low Channel



Middle Channel



High Channel



7. Maximum Peak Output Power

7.1 Limits of Maximum Peak Output Power Measurement

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

7.2 EUT Setup

7.3 Test Equipment List and Details

See section 2.4.

7.4 Test Procedure

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.

2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.

3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

7.5 Test Result

PASS

802.11b:

Channel No.	Frequency (MHz)	PEAK POWEROUTPUT (dBm)	PEAK POWEROUTPUT (W)	PEAK POWER LIMIT (W)	PASS/FAIL
LOW	2412	15.93	0.0392	1	PASS
Mid	2437	15.72	0.0373	1	PASS
High	2462	16.12	0.0409	1	PASS

802.11g:

Channel No.	Frequency (MHz)	PEAK POWEROUTPUT (dBm)	PEAK POWEROUTPUT (W)	PEAK POWER LIMIT (W)	PASS/FAIL
LOW	2412	13.01	0.0200	1	PASS
Mid	2437	9.50	0.0089	1	PASS
High	2462	9.40	0.0087	1	PASS

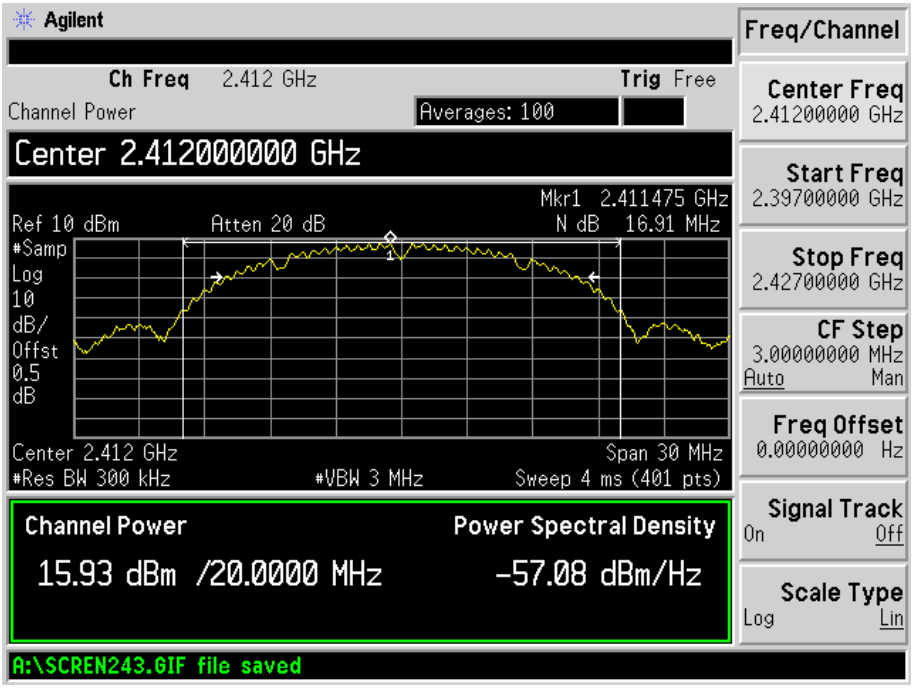
802.11n/HT20

Channel No.	Frequency (MHz)	PEAK POWEROUTPUT (dBm)	PEAK POWEROUTPUT (W)	PEAK POWER LIMIT (W)	PASS/FAIL
LOW	2412	10.82	0.0121	1	PASS
Mid	2437	15.45	0.0351	1	PASS
High	2462	12.55	0.0180	1	PASS

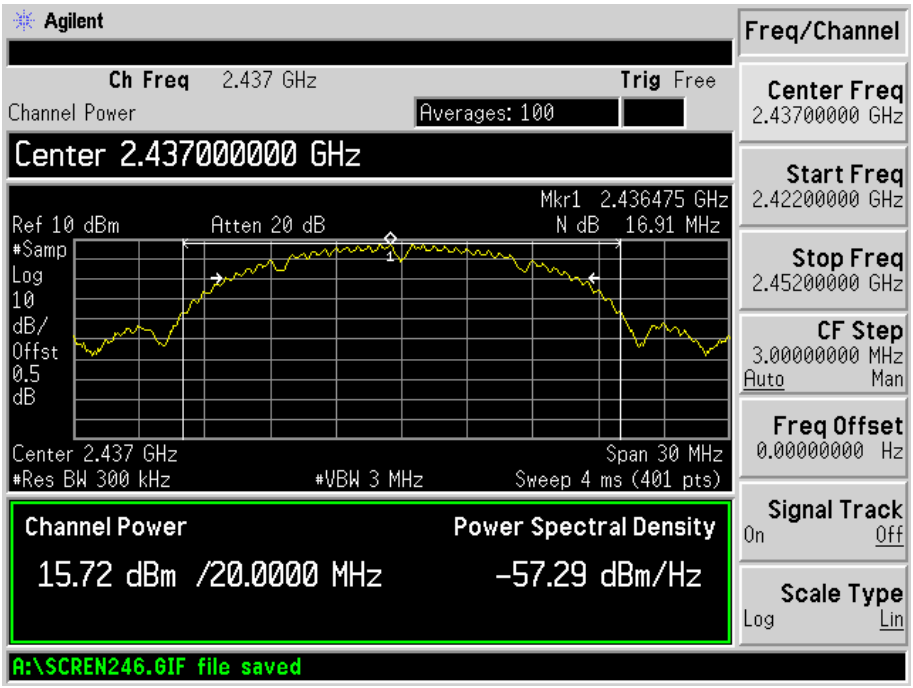
802.11n/HT40

Channel No.	Frequency (MHz)	PEAK POWEROUTPUT (dBm)	PEAK POWEROUTPUT (W)	PEAK POWER LIMIT (W)	PASS/FAIL
LOW	2422	9.48	0.0089	1	PASS
Mid	2437	8.87	0.0071	1	PASS
High	2452	8.90	0.0078	1	PASS

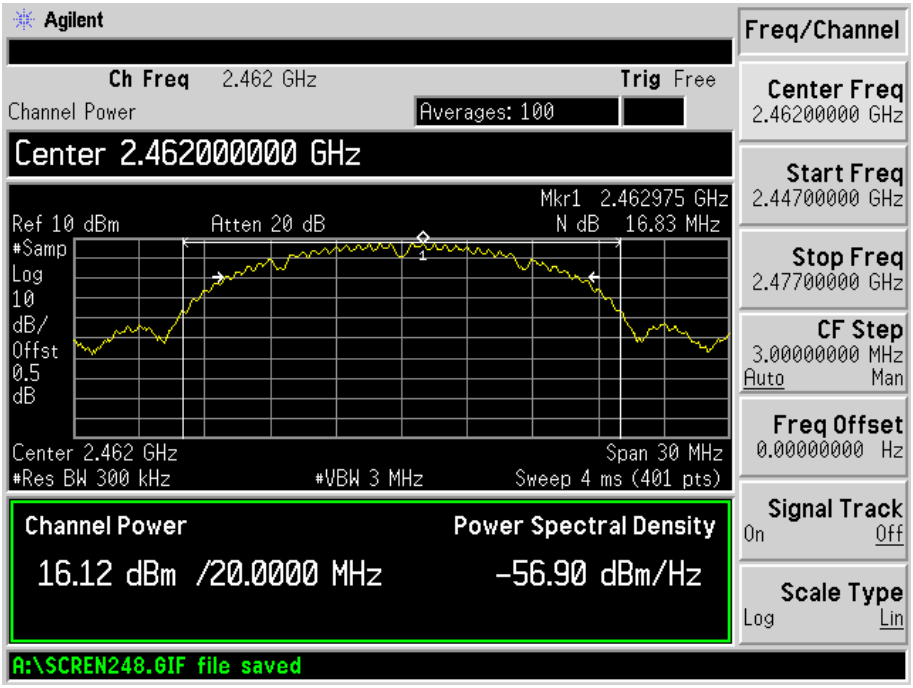
For 802.11b
Low Channel



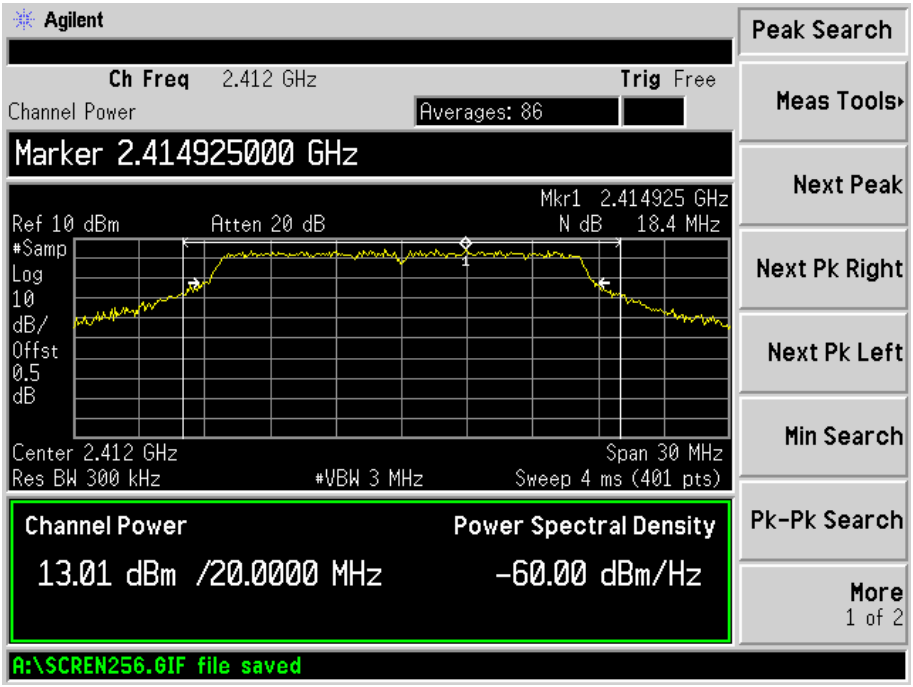
Middle Channel



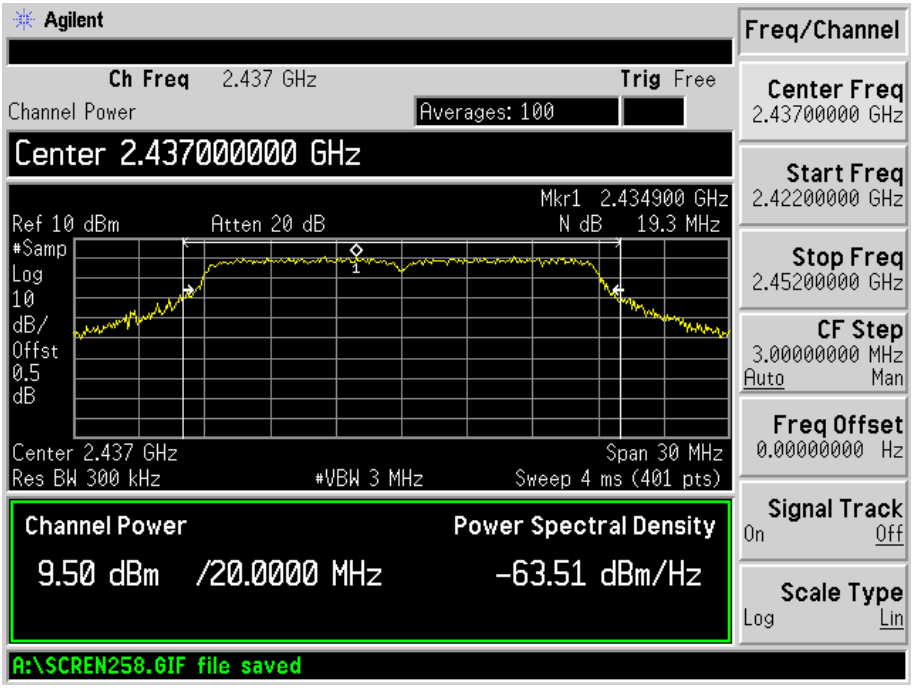
High Channel



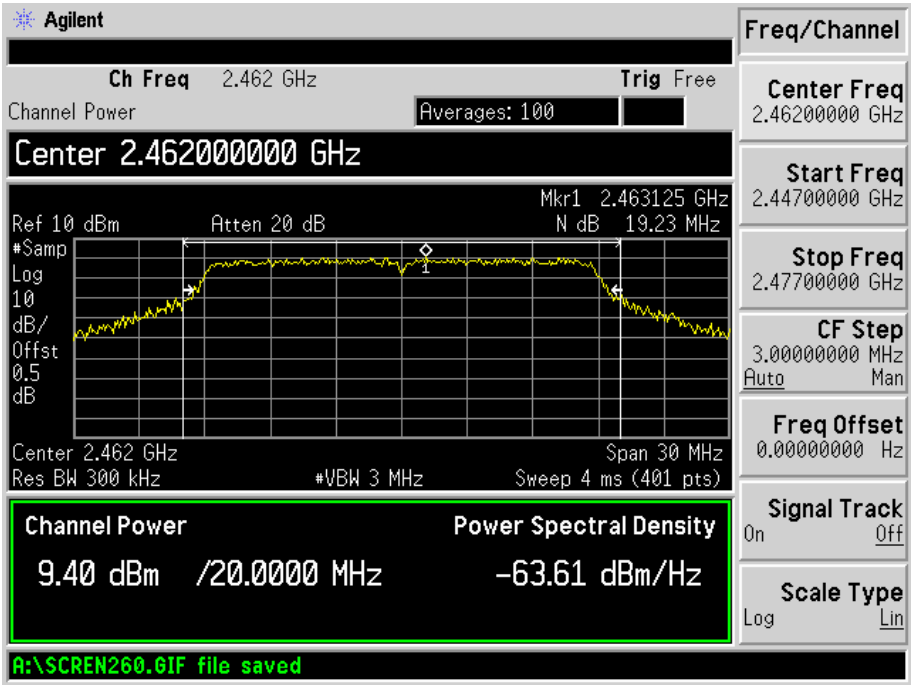
For 802.11g
Low Channel



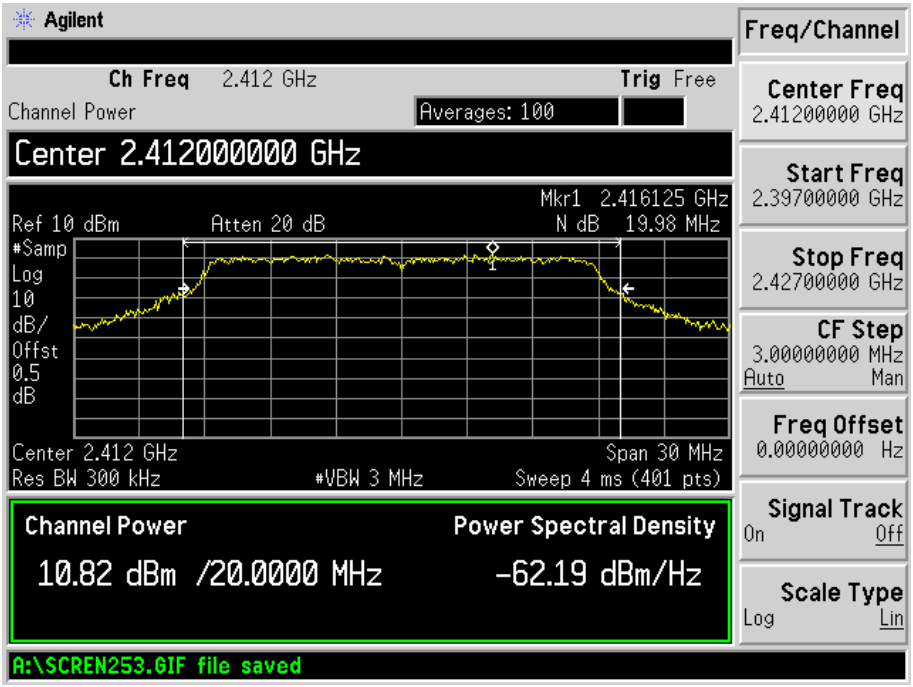
Middle Channel



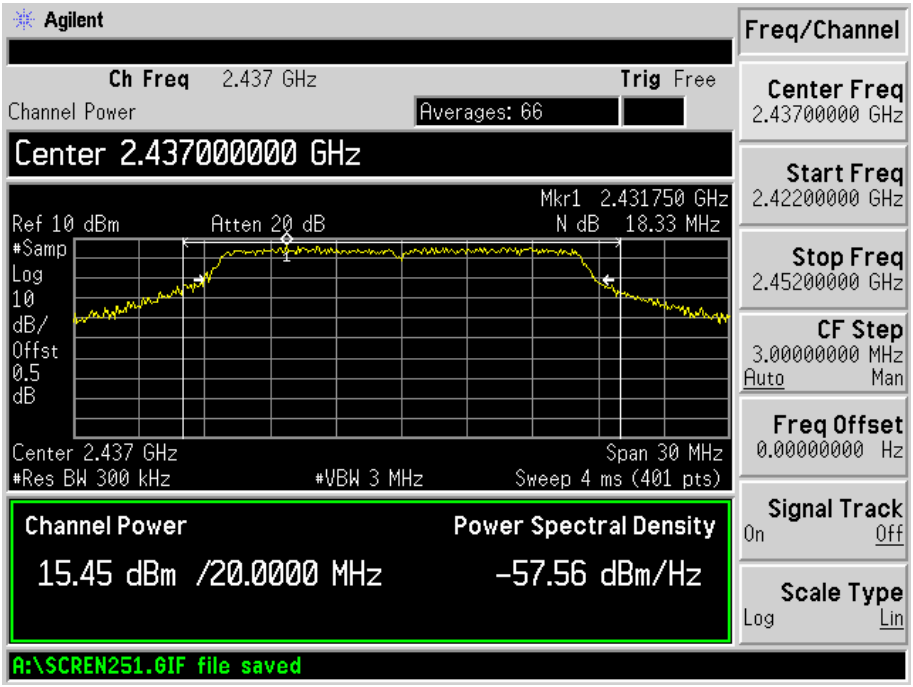
High Channel



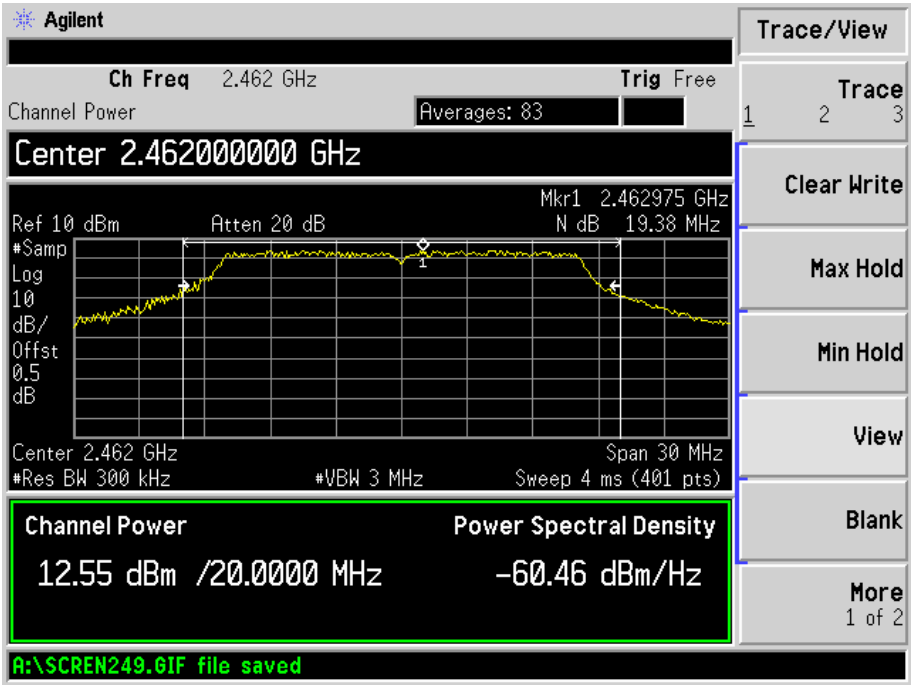
For 802.11n/HT20
Low Channel



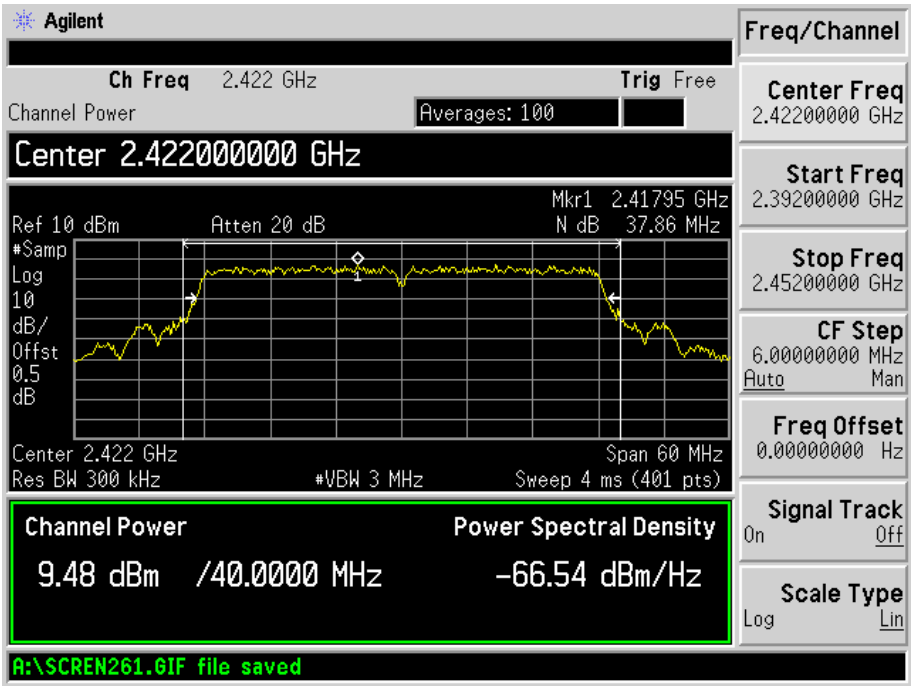
Mid Channel



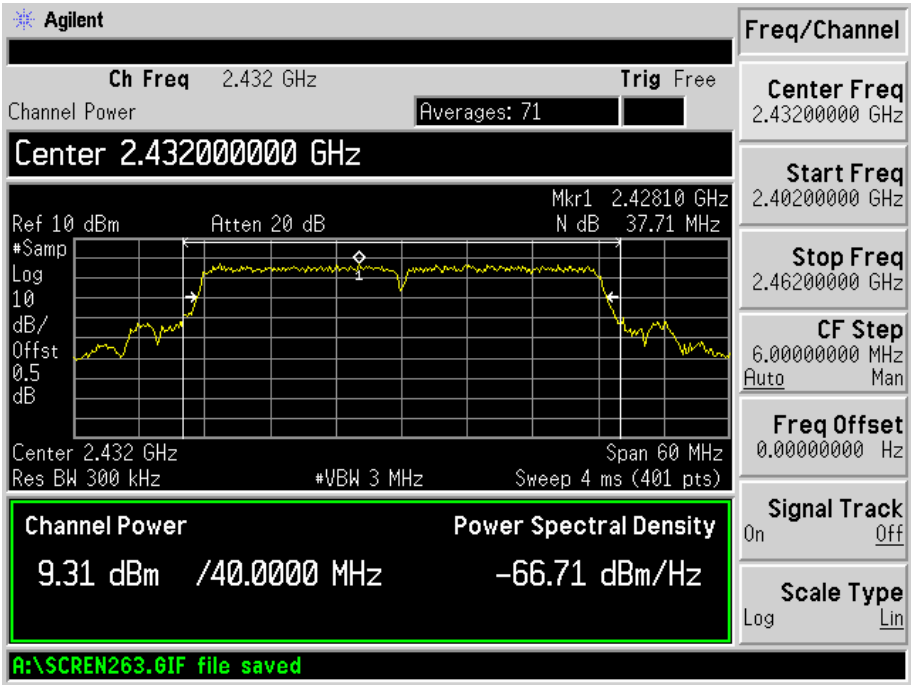
High Channel



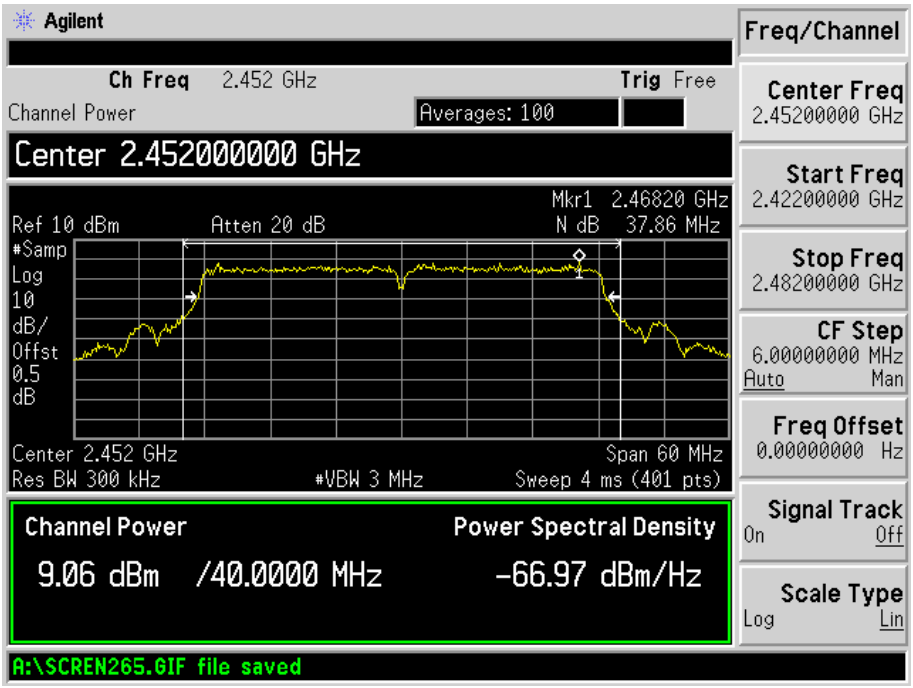
802.11n/HT40



Middle Channel



High Channel



8. Power Spectral Density Measurement

8.1 Limits of Power Spectral Density Measurement

According to 15.247(a)(1)(iii), 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.

8.2 EUT Setup

8.3 Test Equipment List and Details

See section 2.4.

8.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

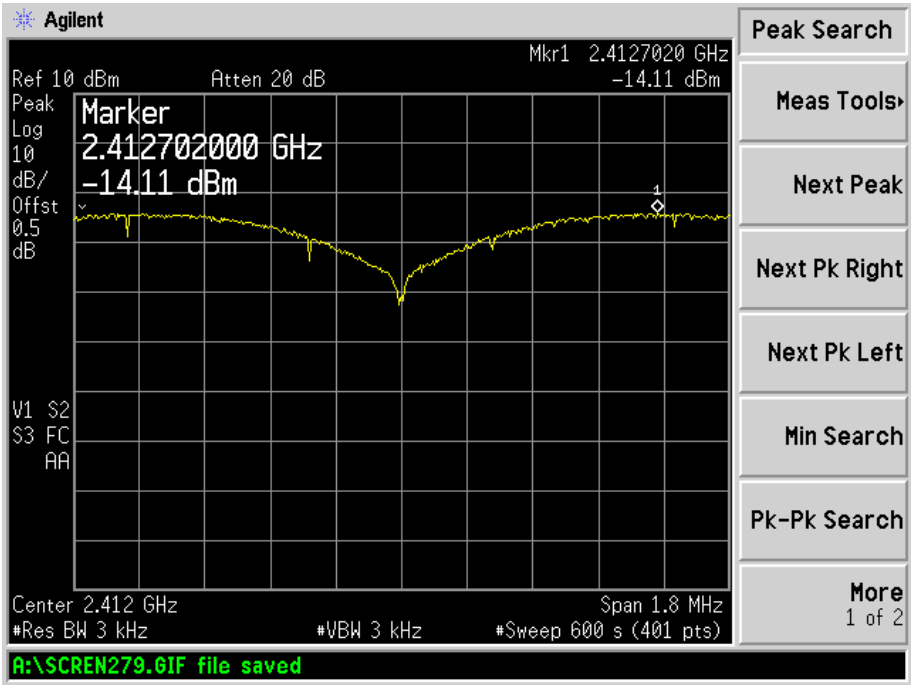
8.5 Test Result

PASS

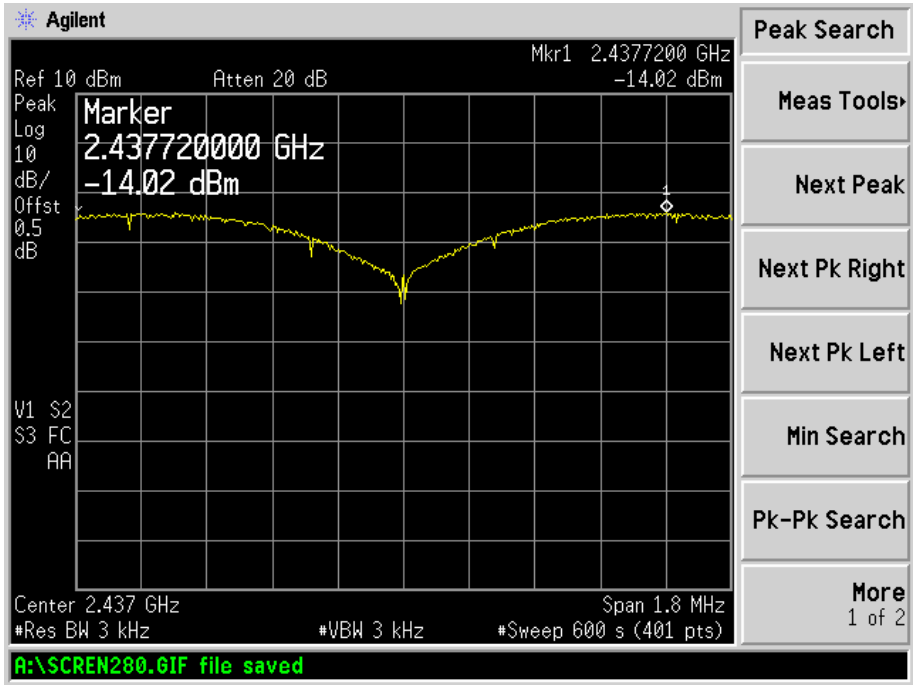
Test mode	Test channel	Reading dBm/3kHz	Limit dBm/3kHz
802.11b	Low channel (2412MHz)	-14.11	8
	Middle channel (2437MHz)	-14.02	8
	High channel (2462MHz)	-13.73	8
802.11g	Low channel (2412MHz)	-14.50	8
	Middle channel (2437MHz)	-14.39	8
	High channel (2462MHz)	-14.78	8
802.11n HT20	Low channel (2412MHz)	-19.33	8
	Middle channel (2437MHz)	-19.70	8
	High channel (2462MHz)	-20.08	8
802.11n HT40	Low channel (2422MHz)	-22.65	8
	Middle channel (2437MHz)	-22.41	8
	High channel (2452MHz)	-22.18	8

IEEE 802.11b

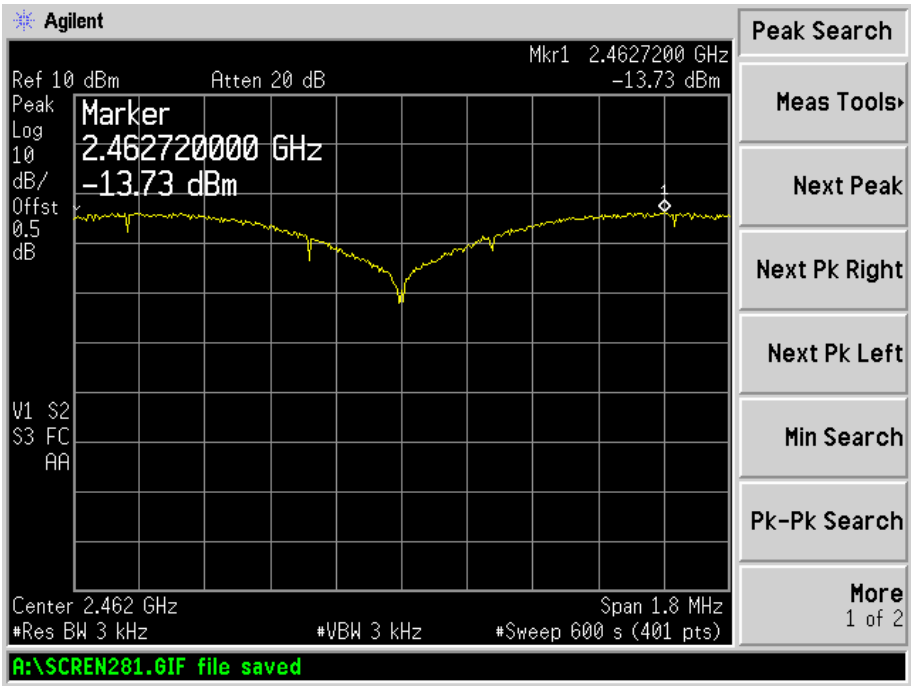
Low Channel:



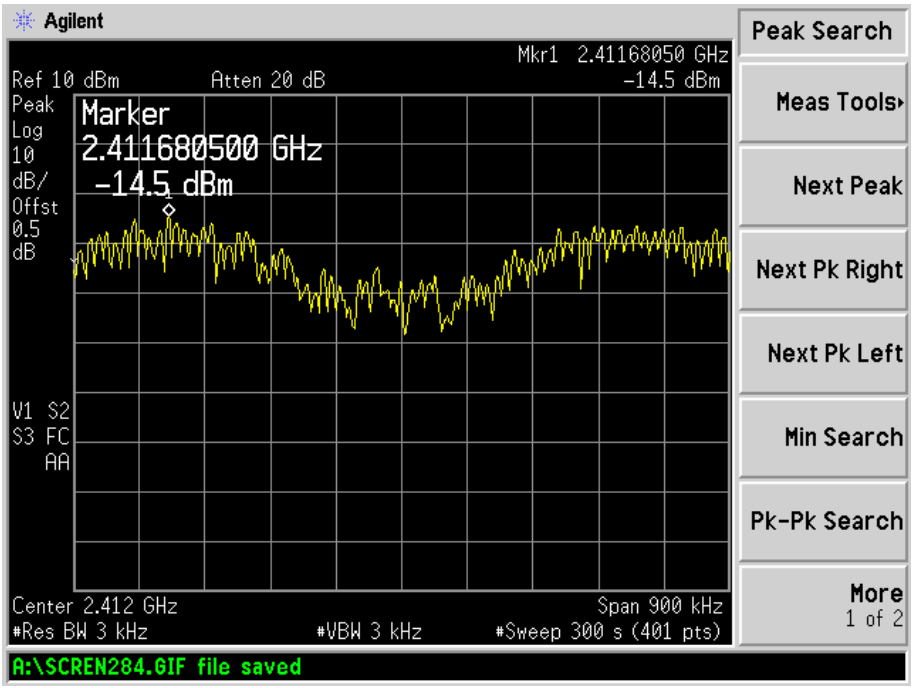
Middle Channel



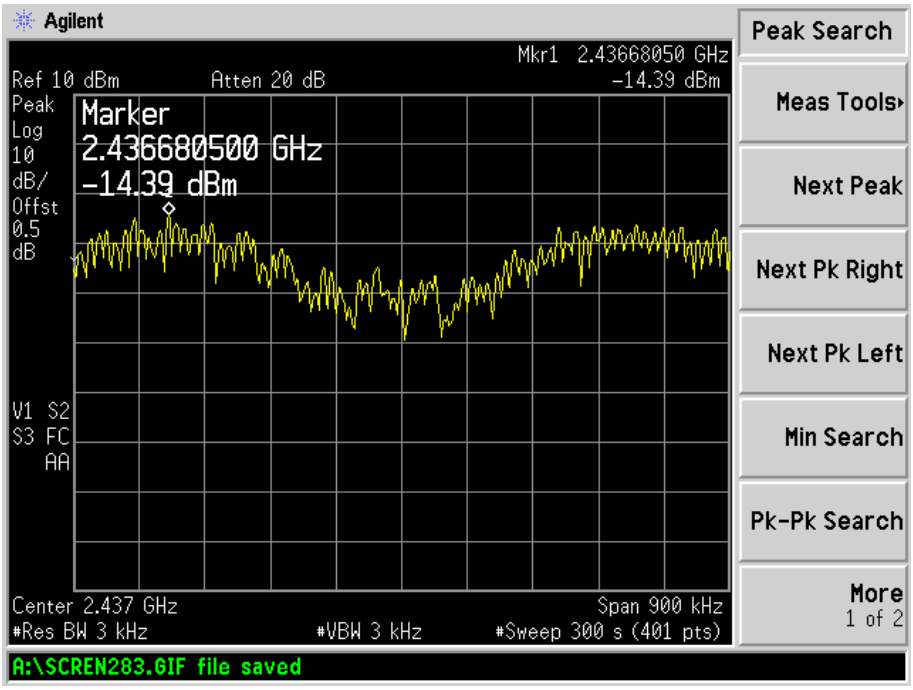
High Channel



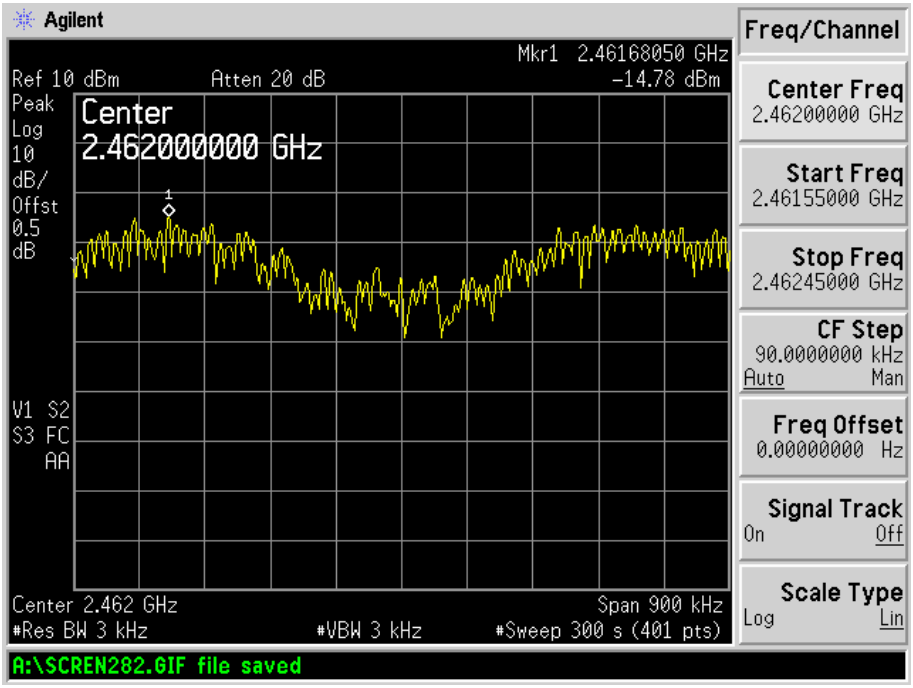
For 802.11g
Low Channel



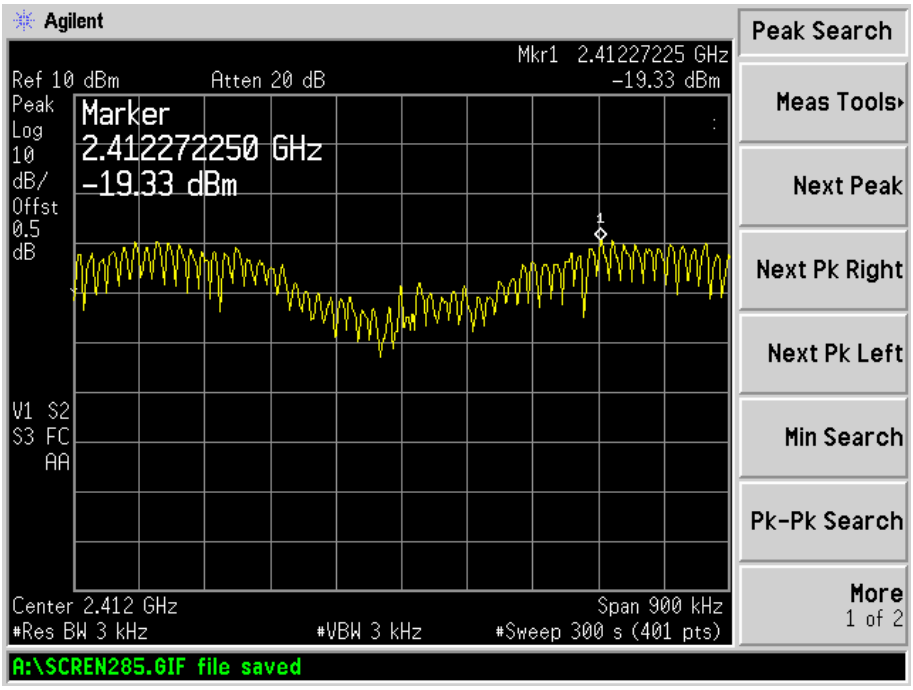
Middle Channel



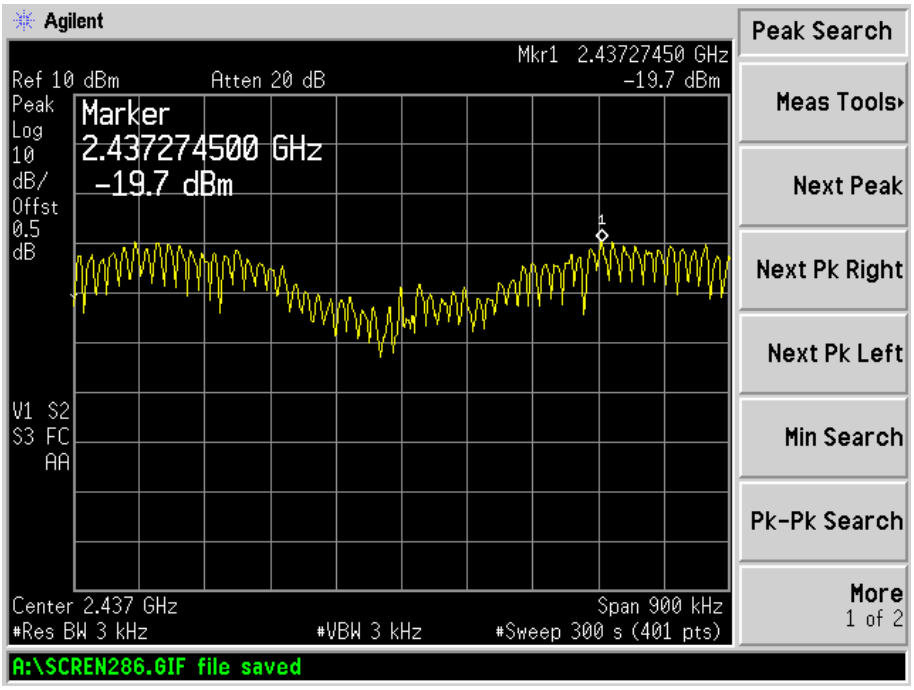
High Channel



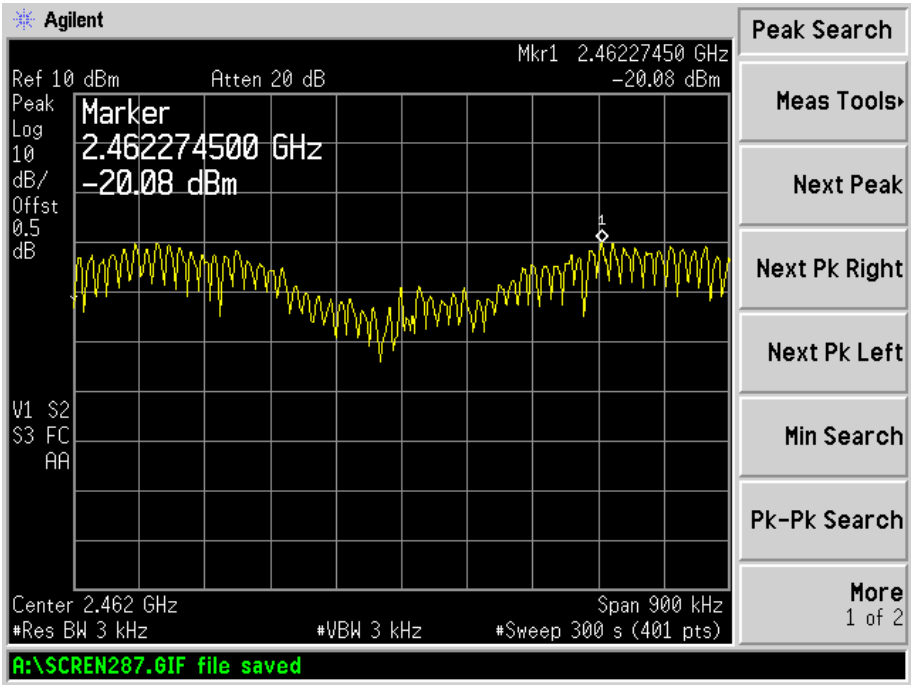
For 802.11n/HT20
Low Channel



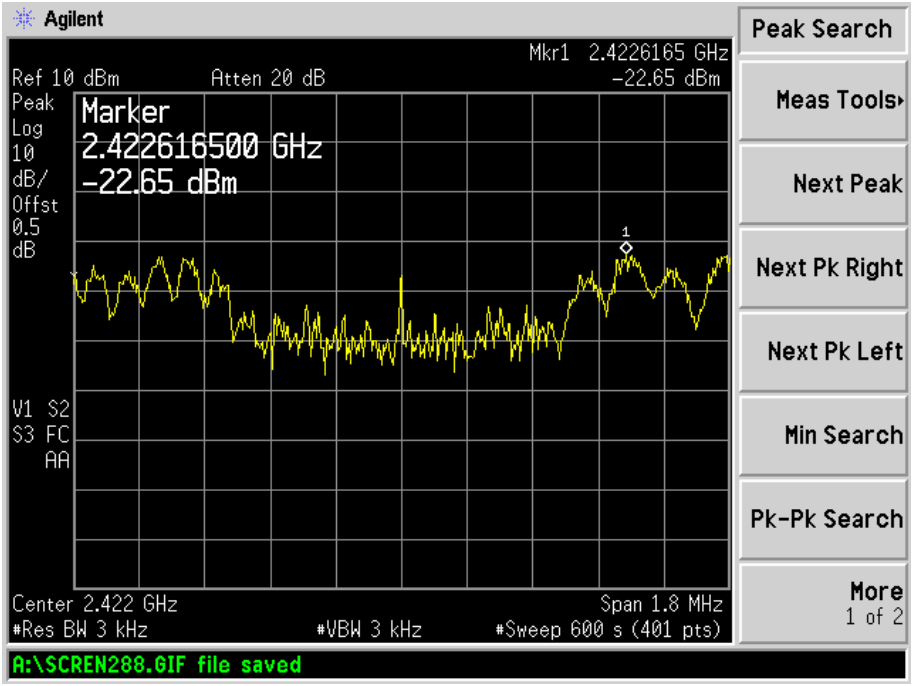
Middle Channel



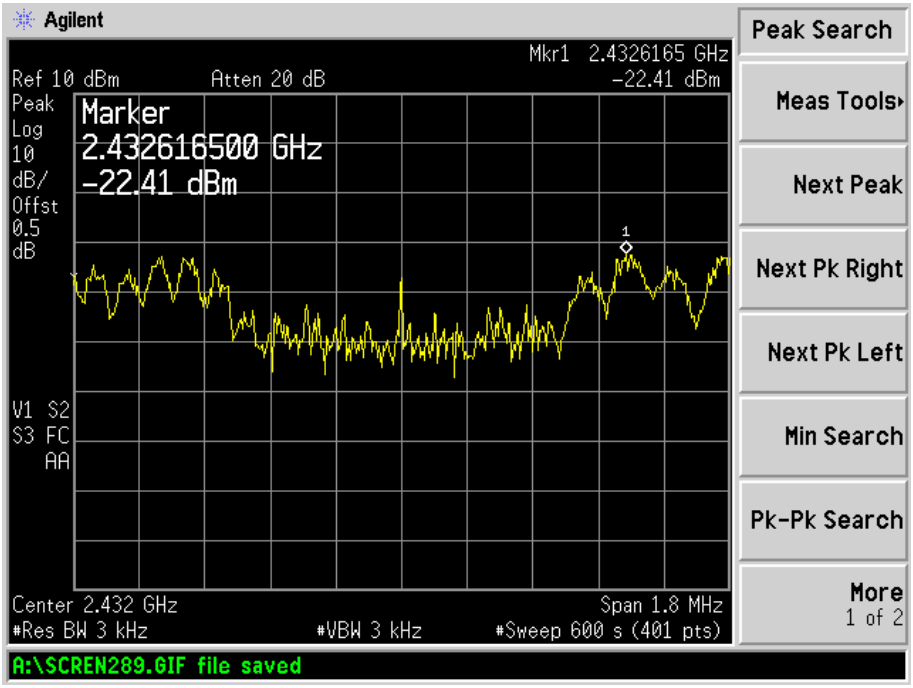
High Channel



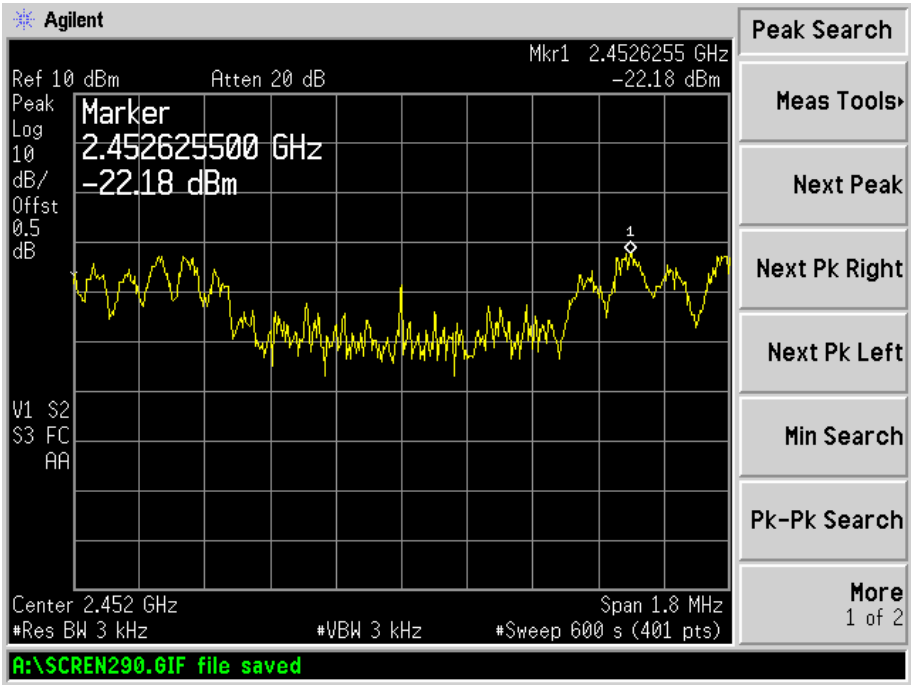
For 802.11n/HT4
Low Channel



Middle Channel



High Channel



9. Band Edges Measurement

9.1 Limits of Band Edges Measurement

According to §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

9.2 Test Equipment List and Details

See section 2.4.

9.3 Test Procedure

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded. The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

9.4 Test Result

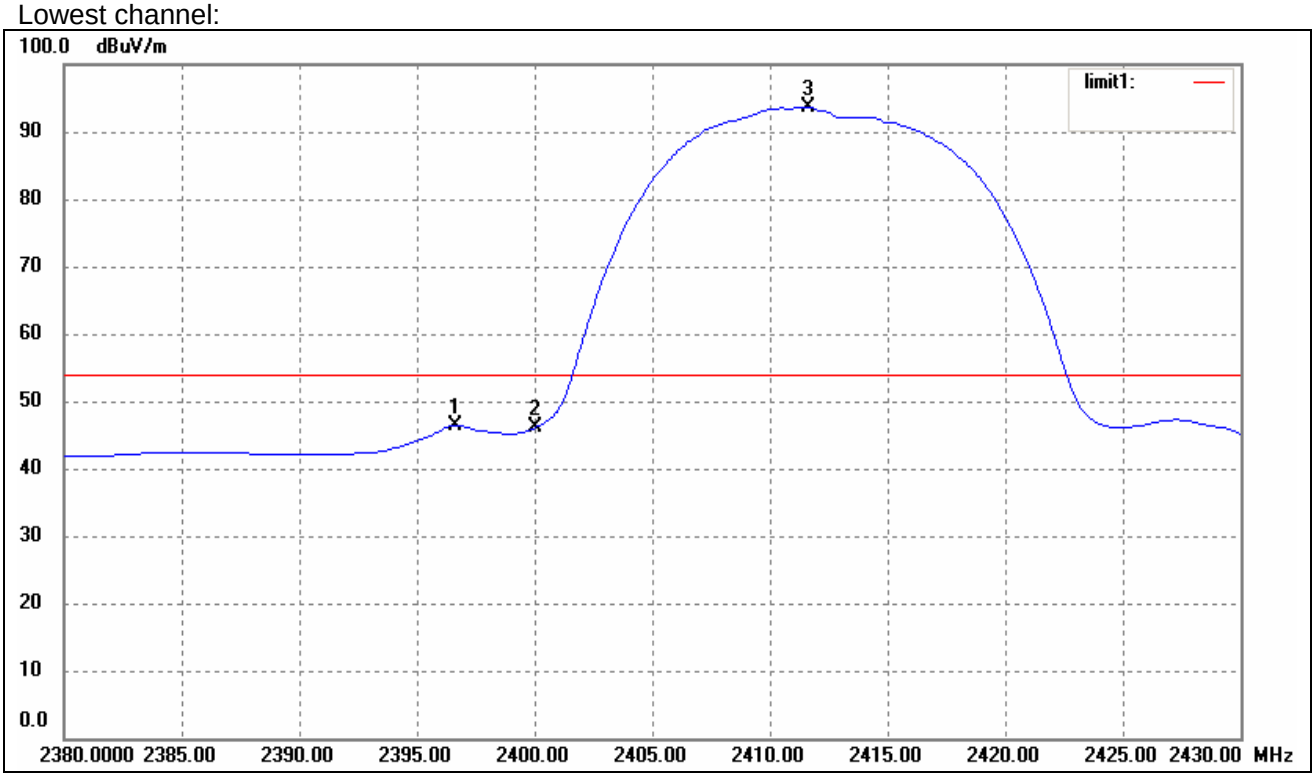
PASS

Test mode	Frequency MHz	Limit dBuV /dB	Result
802.11b	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802.11g	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802.11n HT20	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802.11n HT40	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass

.

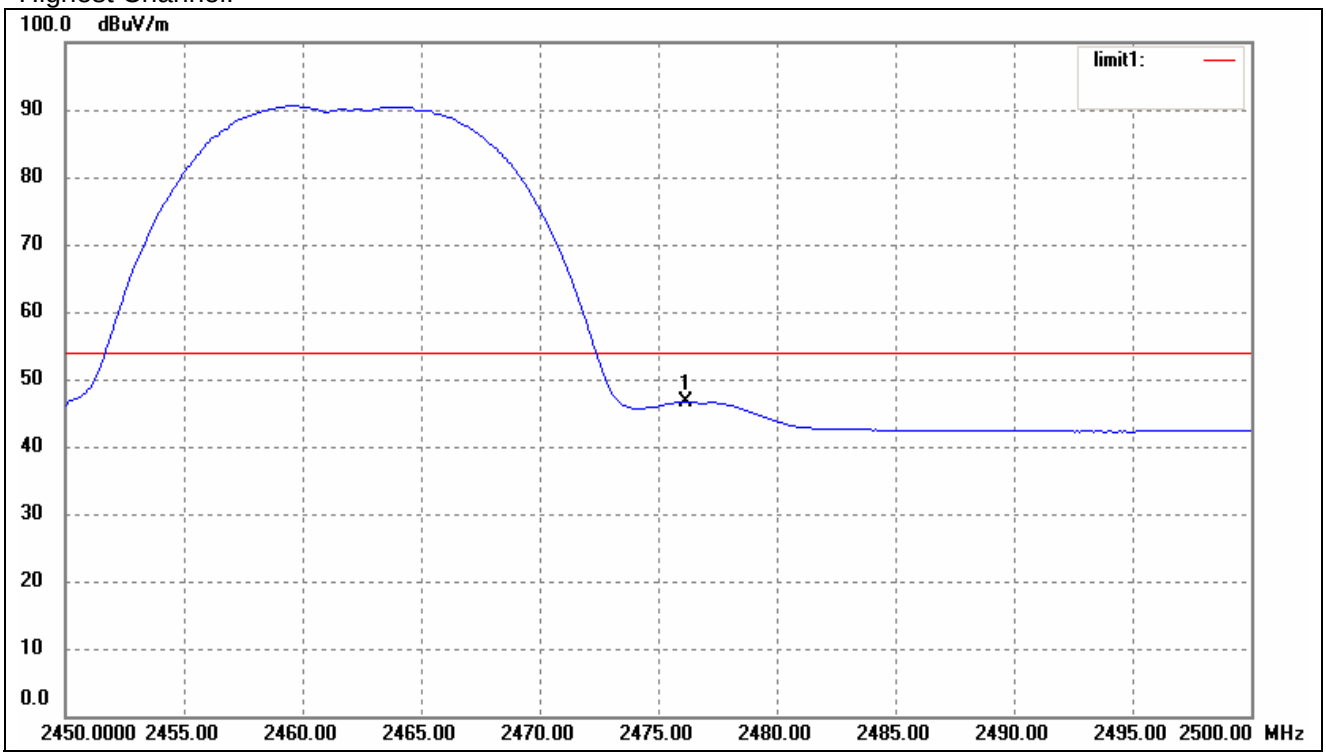
IEEE 802.11b

Lowest channel:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2396.633	10.74	35.65	46.39	54.00	-7.61	Average Detector
	2396.633	13.87	35.65	49.52	74.00	-24.48	Peak Detector

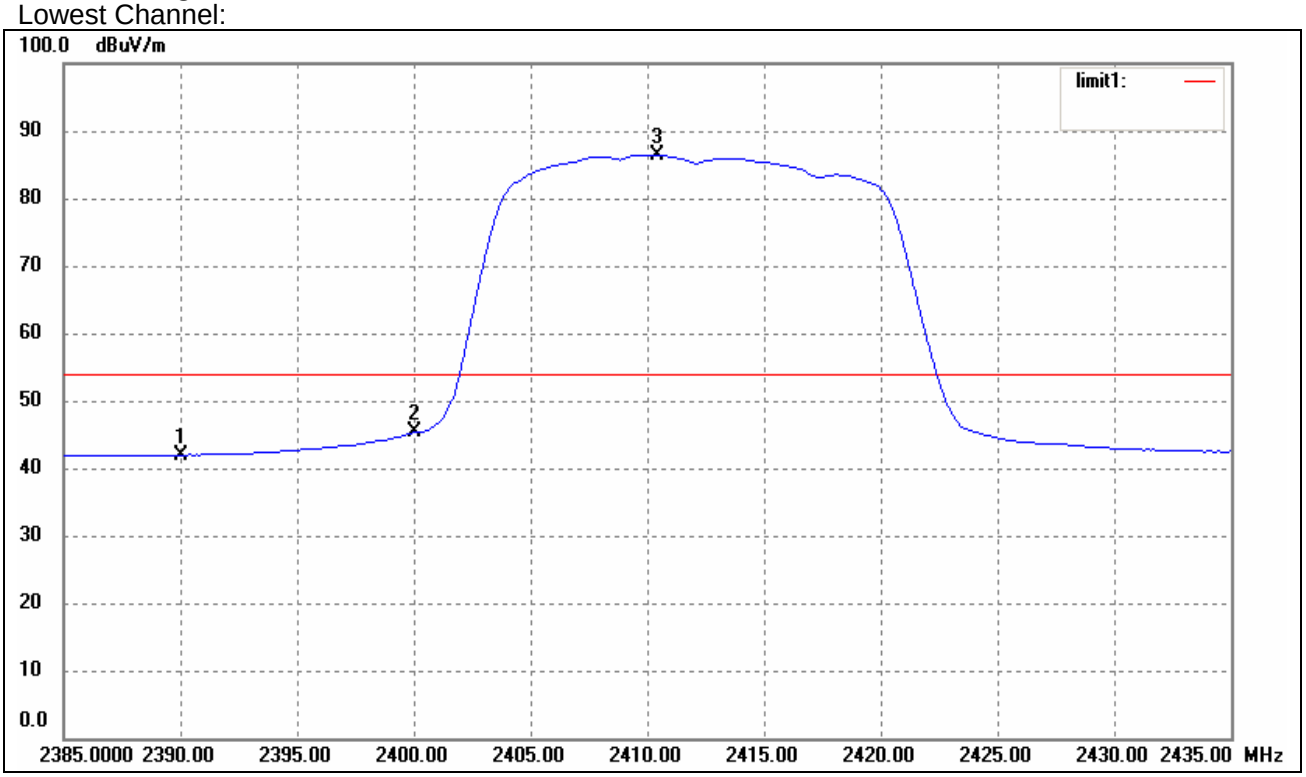
Highest Channel:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2476.152	10.67	35.95	46.62	54.00	-7.38	Average Detector
	2476.152	13.92	35.95	49.87	74.00	-24.13	Peak Detector

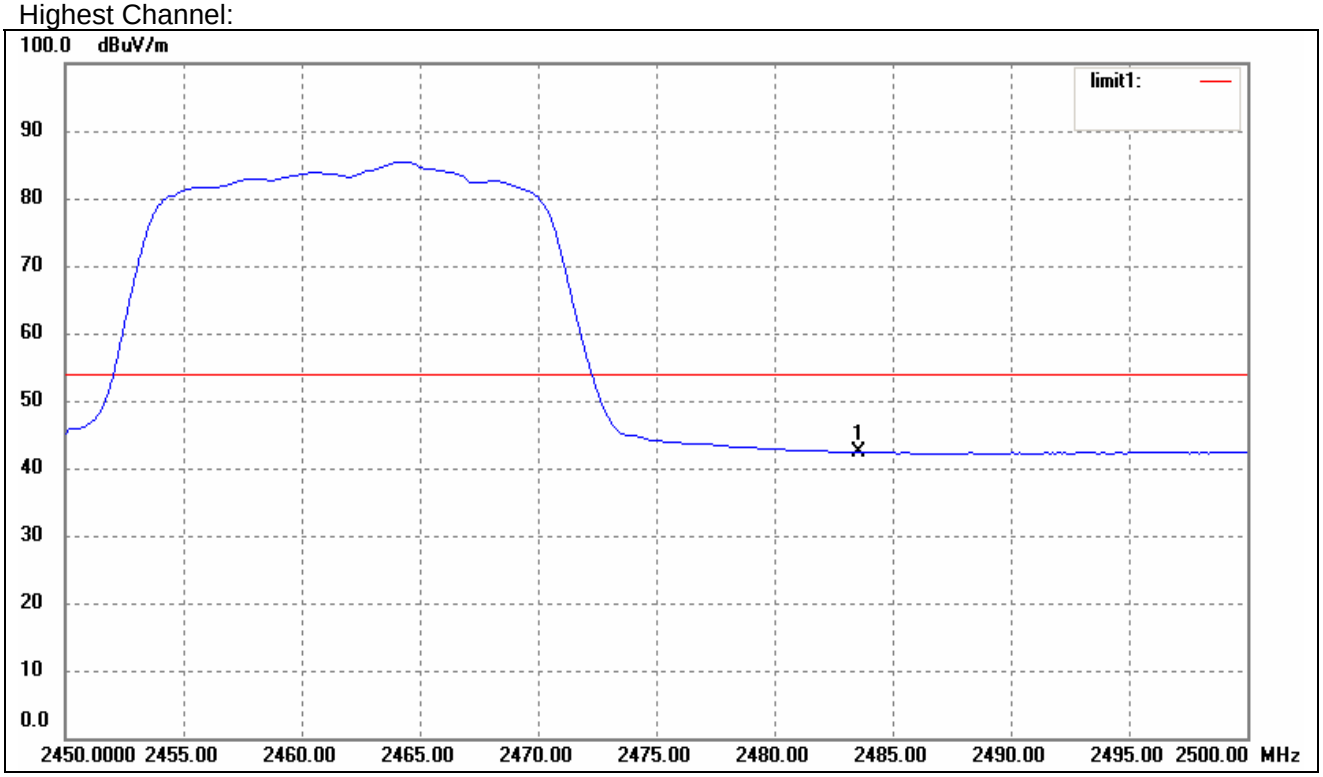
IEEE 802.11g

Lowest Channel:



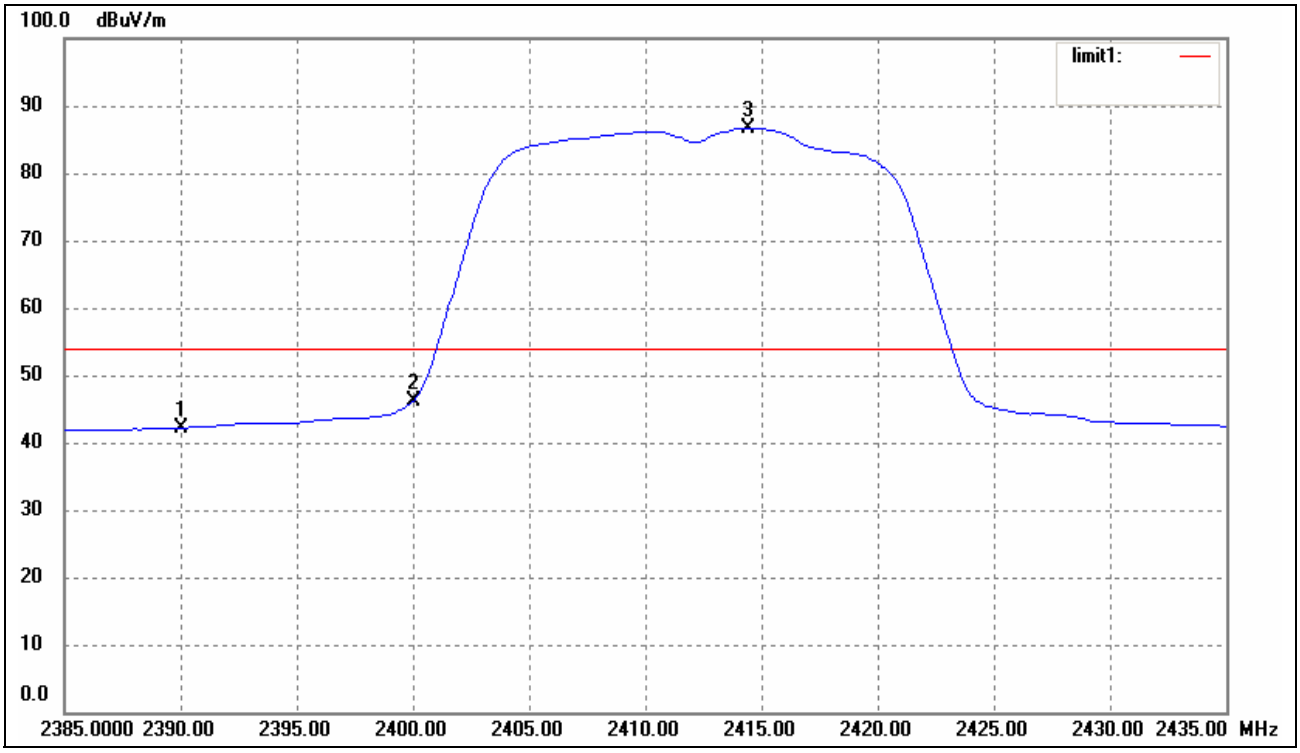
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	6.41	35.59	42.00	54.00	-12.00	Average Detector
	2390.000	12.05	35.59	47.64	74.00	-26.36	Peak Detector

Highest Channel:



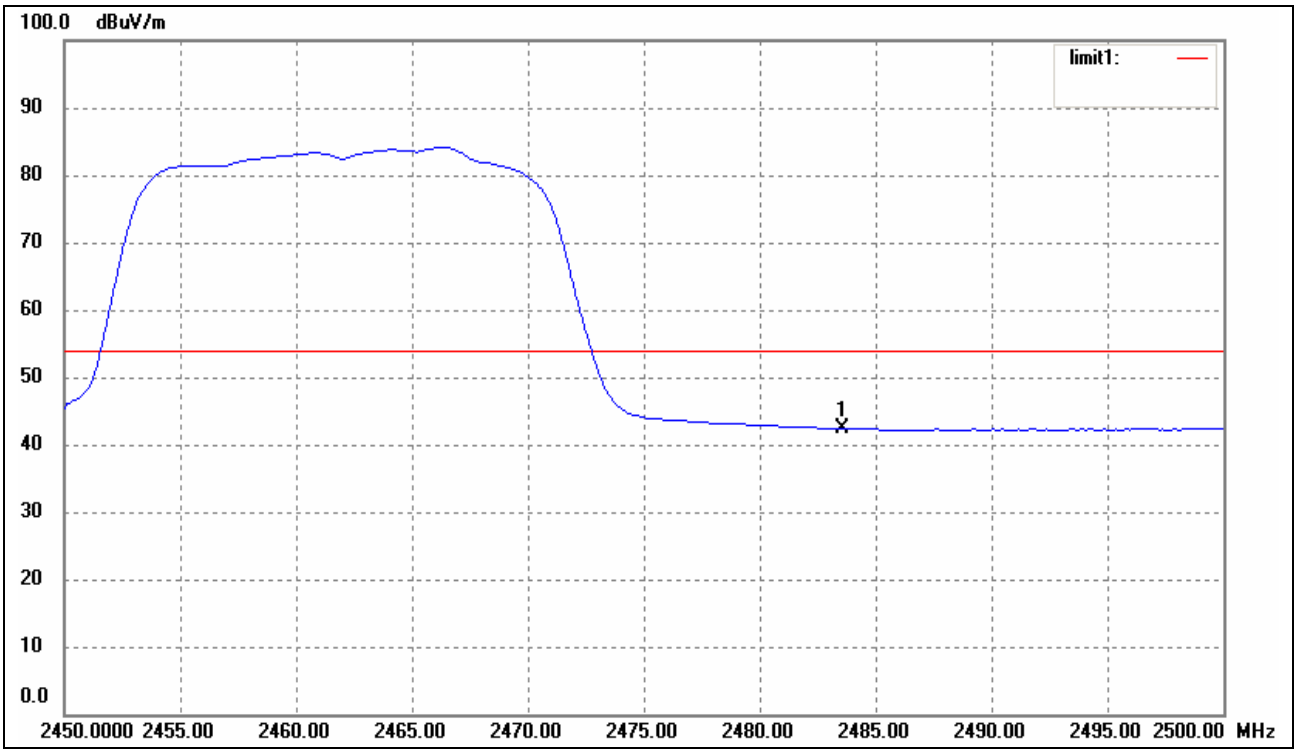
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	6.40	35.97	42.37	54.00	-11.63	Average Detector
	2483.500	9.79	35.97	45.76	74.00	-28.24	Peak Detector

For 802.11n/HT20
Lowest Channel



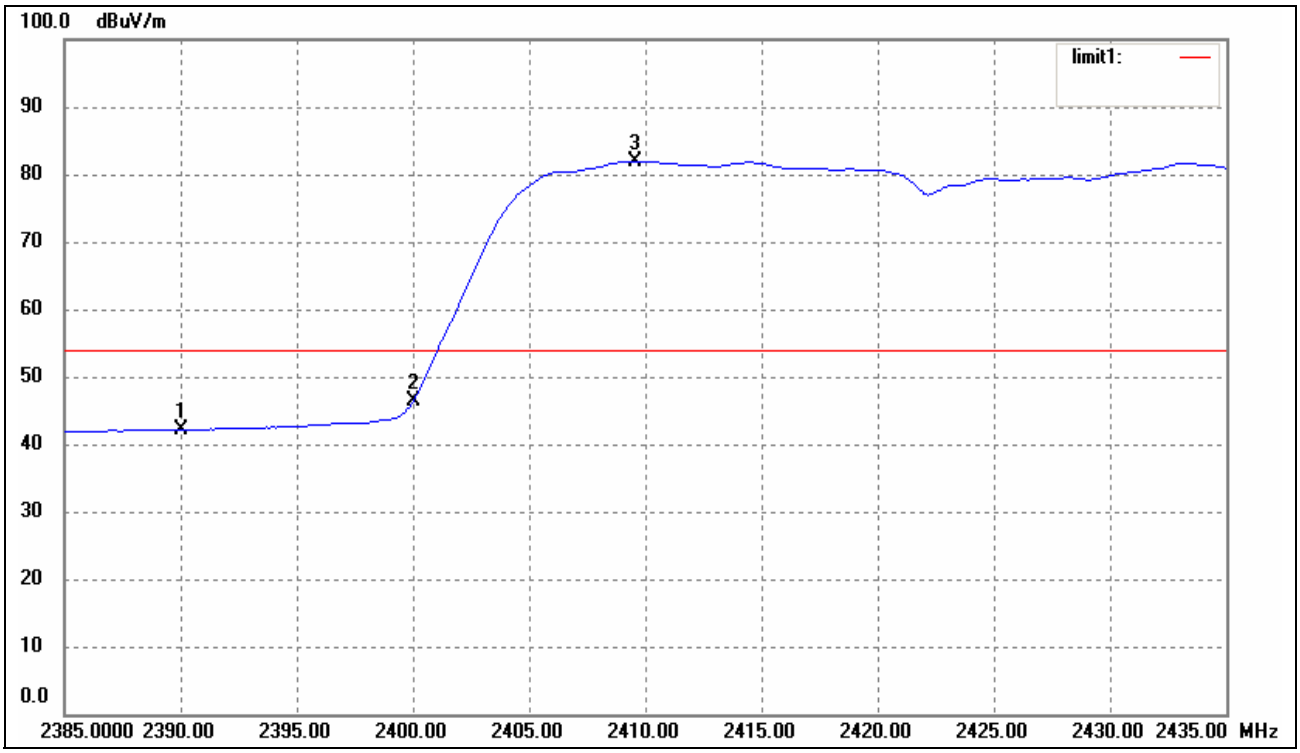
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	6.57	35.59	42.16	54.00	-11.84	Average Detector
	2390.000	10.31	35.59	45.90	74.00	-28.10	Peak Detector

Highest channel



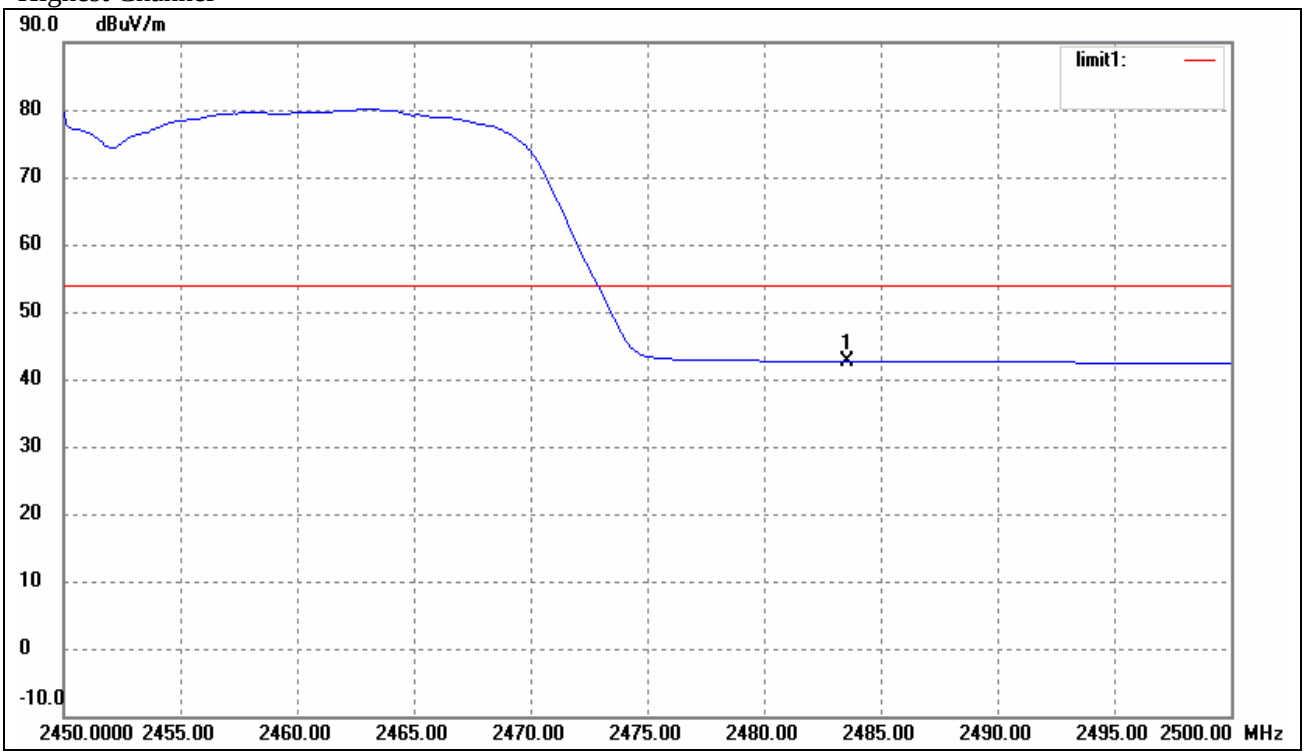
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	6.41	35.97	42.38	54.00	-11.62	Average Detector
	2483.500	11.64	35.97	47.61	74.00	-26.39	Peak Detector

For 802.11n/HT40
Lowest Channel



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	6.56	35.59	42.15	54.00	-11.85	Average Detector
	2390.000	11.19	35.59	46.78	74.00	-27.22	Peak Detector

Highest Channel



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	6.64	35.97	42.61	54.00	-11.39	Average Detector
	2483.500	11.54	35.97	47.51	74.00	-26.49	Peak Detector

10. Radiated Emission Measurement

10.1 Limits of Radiated Emission Measurement

According to §15.247(c), 15.205 15.209(b) &15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

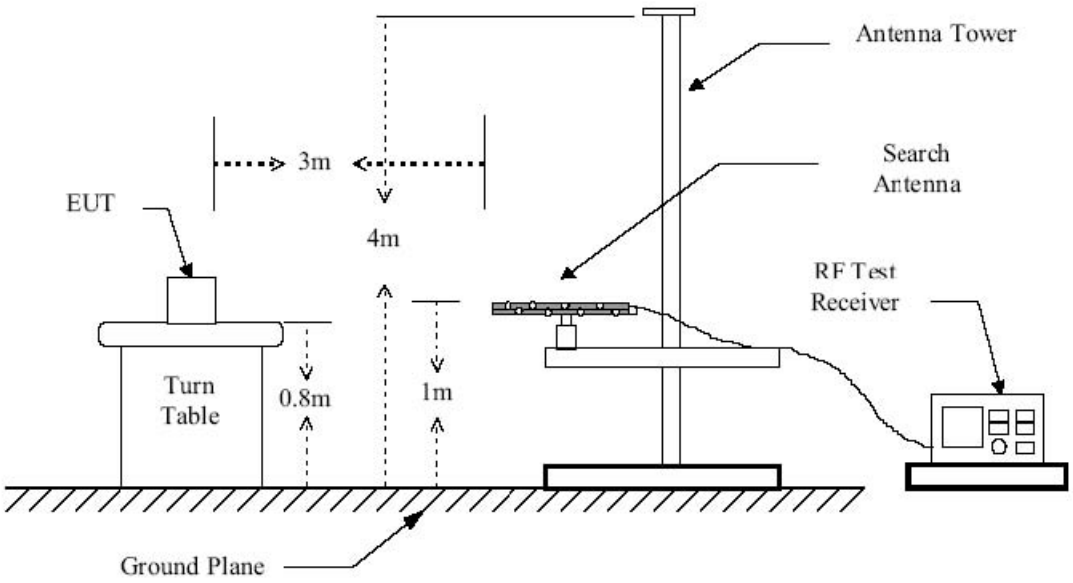
Section 15.209:
30 - 88 MHz 40 dBuV/m @3M
88 -216 MHz 43.5 dBuV/m @3M
216 -960 MHz 46 dBuV/m @3M
Above 960 MHz 54dBuV/m @3M

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

10.2 EUT Setup

Radiated Measurement Setup



10.3 Test Equipment List and Details

See section 2.4.

10.4 Test Procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

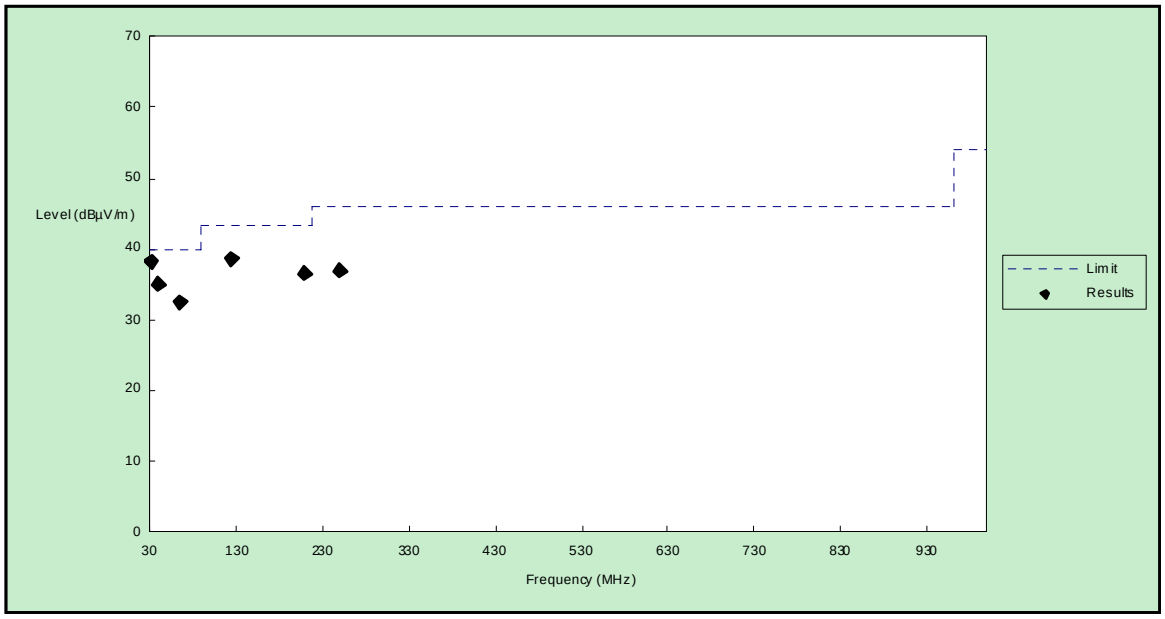
10.5 Test Result

According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst margin of:

-1.6 dBμV at **4824MHz** in the **Vertical** polarization, **Transmitting 802.11b Middle Channel** test mode with, **30 MHz to 25 GHz, 3Meters**

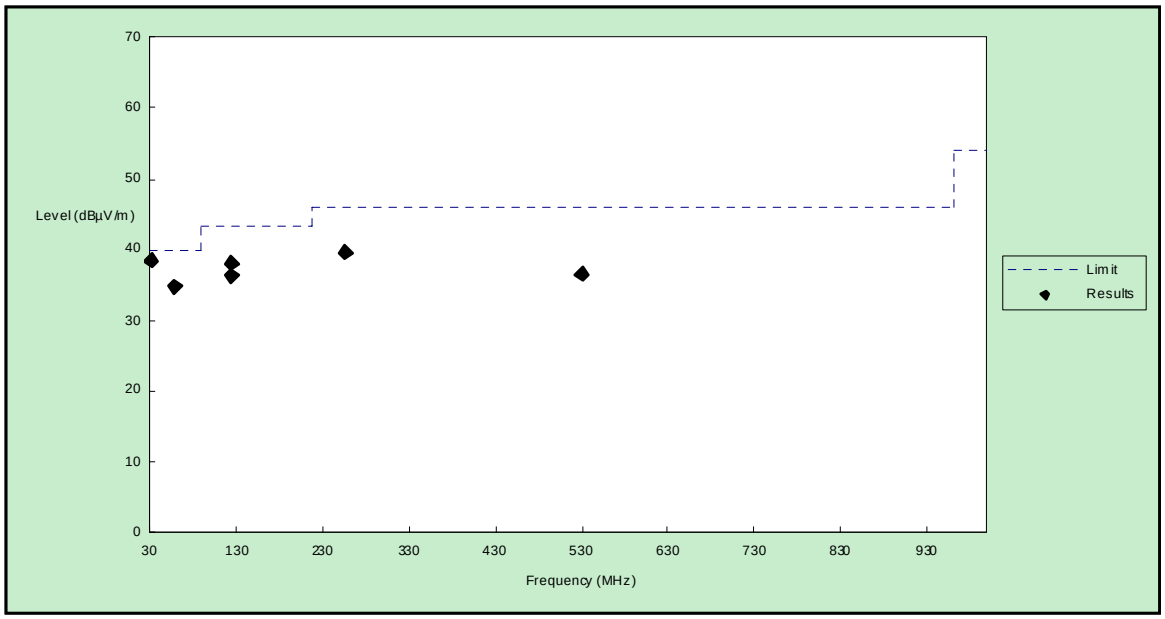
Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported*.

Spurious Emission From 30 MHz to 1 GHz
802.11b-Middle CH



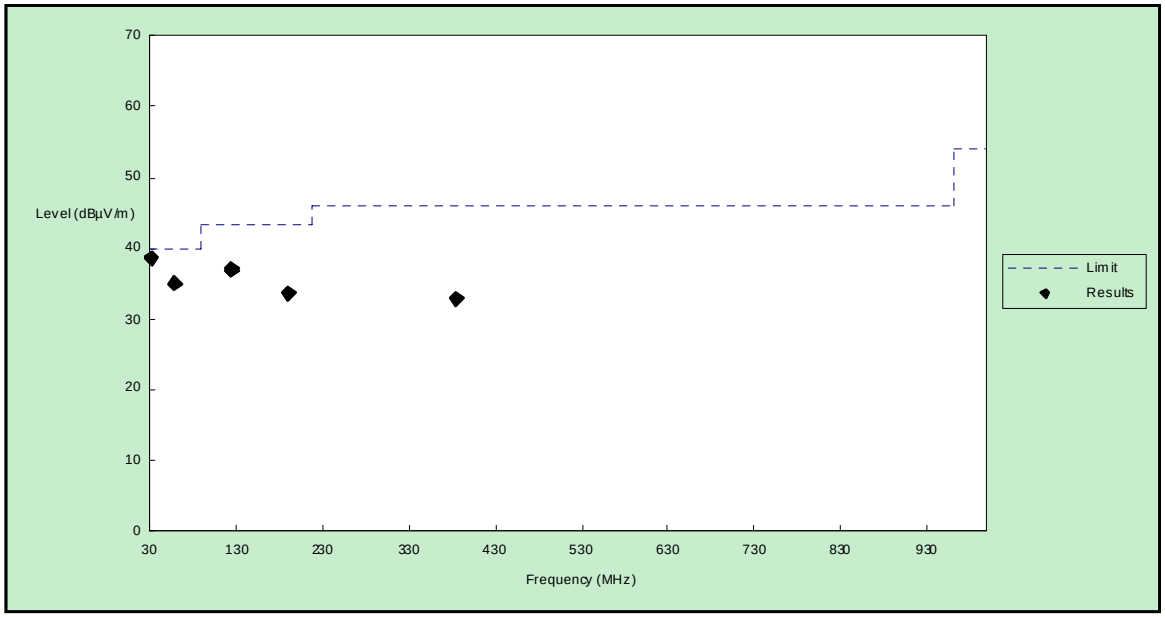
Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
124.9	Horizontal	38.7	43.5	86.1	150
208.7	Horizontal	36.4	43.5	66.1	150
250.5	Horizontal	36.9	46.0	70.0	200
30.6	Vertical	38.2	40.0	81.3	100
38.9	Vertical	35.0	40.0	56.2	100
65.4	Vertical	36.9	40.0	70.0	100

802.11g-Middle CH



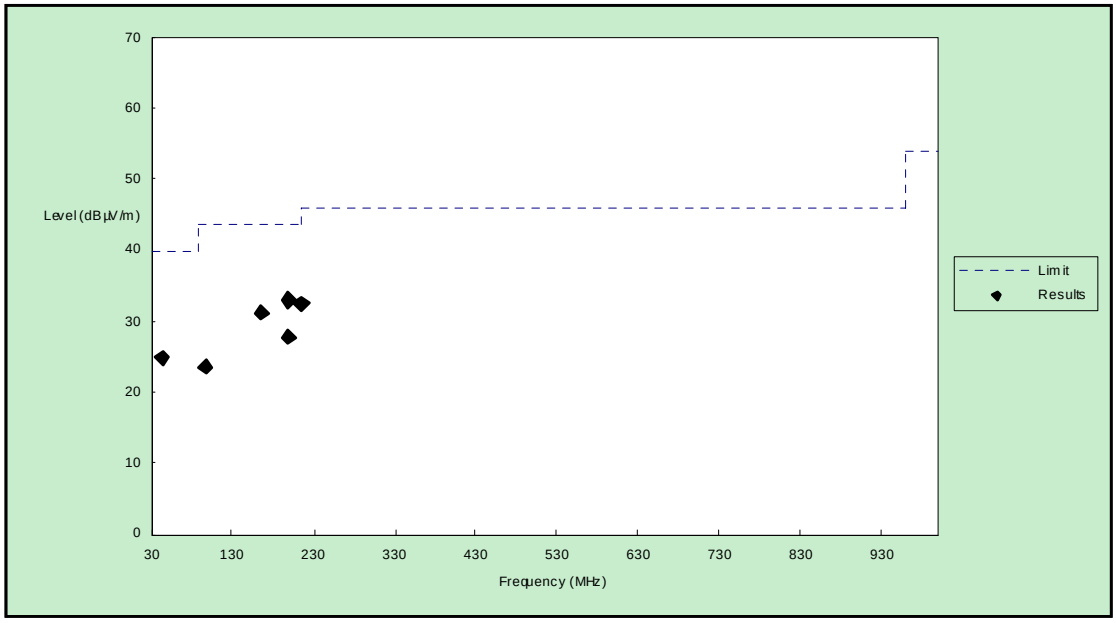
Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
124.9	Horizontal	38.1	43.5	80.4	150
255.8	Horizontal	39.6	46.0	95.5	200
531.3	Horizontal	36.5	46.0	66.8	200
30.6	Vertical	38.4	40.0	83.2	100
58.5	Vertical	34.8	40.0	55.0	100
124.9	Vertical	36.3	43.5	65.3	150

802.11n/HT20-Middle CH



Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
124.9	Horizontal	37.0	43.5	70.8	150
190.4	Horizontal	33.7	43.5	48.4	150
384.5	Horizontal	32.9	46.0	44.2	200
30.6	Vertical	38.6	40.0	85.1	100
58.5	Vertical	35.0	40.0	56.2	100
124.9	Vertical	36.9	43.5	70.0	150

802.11n/HT40



Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBµV/m	Limit @3m dBµV/m	Level @3m µV/m	Limit @3m µV/m
166.1	Horizontal	31.3	43.5	36.7	150
199.3	Horizontal	33.0	43.5	44.7	150
215.3	Horizontal	32.5	43.5	42.2	150
42.9	Vertical	24.9	40.0	17.6	100
97.5	Vertical	23.6	43.5	15.1	150
199.3	Vertical	27.8	43.5	24.5	150

Spurious Emission Above 1GHz

For 802.11b

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	48.5	90	V	34.1	5.2	33.0	54.8	74	-19.2
4824.0	PK	42.8	270	H	34.1	5.2	33.0	49.1	74	-24.9
7236.0	PK	43.3	180	V	37.4	6.1	33.5	53.3	74	-20.7
7236.0	PK	38.0	45	H	37.4	6.1	33.5	48.0	74	-26.0
4824.0	AV	46.1	270	V	34.1	5.2	33.0	52.4	54	-1.6
4824.0	AV	40.4	90	H	34.1	5.2	33.0	46.7	54	-7.3
7236.0	AV	40.6	45	V	37.4	6.1	33.5	50.6	54	-3.4
7236.0	AV	35.7	60	H	37.4	6.1	33.5	45.7	54	-8.3
Middle Channel (1G to 25GHz)										
4874.0	PK	46.4	45	V	34.1	5.2	33.0	52.7	74	-21.3
4874.0	PK	41.3	270	H	34.1	5.2	33.0	47.6	74	-26.4
7311.0	PK	44.4	45	V	37.4	6.1	33.5	54.4	74	-19.6
7311.0	PK	38.4	180	H	37.4	6.1	33.5	48.4	74	-25.6
4874.0	AV	44.1	270	V	34.1	5.2	33.0	50.4	54	-3.6
4874.0	AV	38.4	90	H	34.1	5.2	33.0	44.7	54	-9.3
7311.0	AV	41.9	60	V	37.4	6.1	33.5	51.9	54	-2.1
7311.0	AV	36.0	45	H	37.4	6.1	33.5	46.0	54	-8.0
High Channel (1G to 25GHz)										
4924.0	PK	49.1	270	V	34.1	5.2	33.0	55.4	74	-18.6
4924.0	PK	41.9	45	H	34.1	5.2	33.0	48.2	74	-25.8
7386.0	PK	42.7	180	V	37.4	6.1	33.5	52.7	74	-21.3
7386.0	PK	36.3	45	H	37.4	6.1	33.5	46.3	74	-27.7
4924.0	AV	45.7	90	V	34.1	5.2	33.0	52.0	54	-2.0
4924.0	AV	39.5	270	H	34.1	5.2	33.0	45.8	54	-8.2
7386.0	AV	40.5	60	V	37.4	6.1	33.5	50.5	54	-3.5
7386.0	AV	33.8	60	H	37.4	6.1	33.5	43.8	54	-10.2

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

For 802.11g

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	46.3	90	V	34.1	5.2	33.0	52.6	74	-21.4
4824.0	PK	40.9	270	H	34.1	5.2	33.0	47.2	74	-26.8
7236.0	PK	43.0	180	V	37.4	6.1	33.5	53.0	74	-21.0
7236.0	PK	37.6	45	H	37.4	6.1	33.5	47.6	74	-26.4
4824.0	AV	44.0	270	V	34.1	5.2	33.0	50.3	54	-3.7
4824.0	AV	38.1	90	H	34.1	5.2	33.0	44.4	54	-9.6
7236.0	AV	41.1	45	V	37.4	6.1	33.5	51.1	54	-2.9
7236.0	AV	35.0	60	H	37.4	6.1	33.5	45.0	54	-9.0
Middle Channel (1G to 25GHz)										
4874.0	PK	47.1	45	V	34.1	5.2	33.0	53.4	74	-20.6
4874.0	PK	39.8	270	H	34.1	5.2	33.0	46.1	74	-27.9
7311.0	PK	42.8	45	V	37.4	6.1	33.5	52.8	74	-21.2
7311.0	PK	38.3	180	H	37.4	6.1	33.5	48.3	74	-25.7
4874.0	AV	43.7	270	V	34.1	5.2	33.0	50.0	54	-4.0
4874.0	AV	37.4	90	H	34.1	5.2	33.0	43.7	54	-10.3
7311.0	AV	42.4	60	V	37.4	6.1	33.5	52.4	54	-1.6
7311.0	AV	35.6	45	H	37.4	6.1	33.5	45.6	54	-8.4
High Channel (1G to 25GHz)										
4924.0	PK	47.3	270	V	34.1	5.2	33.0	53.6	74	-20.4
4924.0	PK	42.4	45	H	34.1	5.2	33.0	48.7	74	-25.3
7386.0	PK	43.0	180	V	37.4	6.1	33.5	53.0	74	-21.0
7386.0	PK	35.1	45	H	37.4	6.1	33.5	45.1	74	-28.9
4924.0	AV	44.9	90	V	34.1	5.2	33.0	51.2	54	-2.8
4924.0	AV	40.0	270	H	34.1	5.2	33.0	46.3	54	-7.7
7386.0	AV	39.8	60	V	37.4	6.1	33.5	49.8	54	-4.2
7386.0	AV	32.4	60	H	37.4	6.1	33.5	42.4	54	-11.6

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

For 802.11n/HT20

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	47.0	90	V	34.1	5.2	33.0	53.3	74	-20.7
4824.0	PK	41.6	270	H	34.1	5.2	33.0	47.9	74	-26.1
7236.0	PK	42.2	180	V	37.4	6.1	33.5	52.2	74	-21.8
7236.0	PK	38.0	45	H	37.4	6.1	33.5	48.0	74	-26.0
4824.0	AV	45.1	270	V	34.1	5.2	33.0	51.4	54	-2.6
4824.0	AV	39.4	90	H	34.1	5.2	33.0	45.7	54	-8.3
7236.0	AV	39.7	45	V	37.4	6.1	33.5	49.7	54	-4.3
7236.0	AV	35.1	60	H	37.4	6.1	33.5	45.1	54	-8.9
Middle Channel (1G to 25GHz)										
4874.0	PK	47.5	45	V	34.1	5.2	33.0	53.8	74	-20.2
4874.0	PK	40.4	270	H	34.1	5.2	33.0	46.7	74	-27.3
7311.0	PK	42.1	45	V	37.4	6.1	33.5	52.1	74	-21.9
7311.0	PK	33.3	180	H	37.4	6.1	33.5	43.3	74	-30.7
4874.0	AV	44.3	270	V	34.1	5.2	33.0	50.6	54	-3.4
4874.0	AV	37.8	90	H	34.1	5.2	33.0	44.1	54	-9.9
7311.0	AV	39.1	60	V	37.4	6.1	33.5	49.1	54	-4.9
7311.0	AV	30.4	45	H	37.4	6.1	33.5	40.4	54	-13.6
High Channel (1G to 25GHz)										
4924.0	PK	45.1	270	V	34.1	5.2	33.0	51.4	74	-22.6
4924.0	PK	36.6	45	H	34.1	5.2	33.0	42.9	74	-31.1
7386.0	PK	44.0	180	V	37.4	6.1	33.5	54.0	74	-20.0
7386.0	PK	36.7	45	H	37.4	6.1	33.5	46.7	74	-27.3
4924.0	AV	42.4	90	V	34.1	5.2	33.0	48.7	54	-5.3
4924.0	AV	34.1	270	H	34.1	5.2	33.0	40.4	54	-13.6
7386.0	AV	41.7	60	V	37.4	6.1	33.5	51.7	54	-2.3
7386.0	AV	34.6	60	H	37.4	6.1	33.5	44.6	54	-9.4

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

For 8021..n/HT40

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4844.0	PK	47.1	90	V	34.1	5.2	33.0	53.4	74	-20.6
4844.0	PK	36.4	270	H	34.1	5.2	33.0	42.7	74	-31.3
7266.0	PK	41.0	180	V	37.4	6.1	33.5	51.0	74	-23.0
7236.0	PK	32.3	45	H	37.4	6.1	33.5	42.3	74	-31.7
4844.0	AV	43.5	270	V	34.1	5.2	33.0	49.8	54	-4.2
4844.0	AV	33.9	90	H	34.1	5.2	33.0	40.2	54	-13.8
7266.0	AV	38.7	45	V	37.4	6.1	33.5	48.7	54	-5.3
7266.0	AV	29.7	60	H	37.4	6.1	33.5	39.7	54	-14.3
Middle Channel (1G to 25GHz)										
4874.0	PK	46.1	45	V	34.1	5.2	33.0	52.4	74	-21.6
4874.0	PK	36.7	270	H	34.1	5.2	33.0	43.0	74	-31.0
7311.0	PK	42.6	45	V	37.4	6.1	33.5	52.6	74	-21.4
7311.0	PK	35.6	180	H	37.4	6.1	33.5	45.6	74	-28.4
4874.0	AV	43.3	270	V	34.1	5.2	33.0	49.6	54	-4.4
4874.0	AV	34.0	90	H	34.1	5.2	33.0	40.3	54	-13.7
7311.0	AV	40.7	60	V	37.4	6.1	33.5	50.7	54	-3.3
7311.0	AV	32.8	45	H	37.4	6.1	33.5	42.8	54	-11.2
High Channel (1G to 25GHz)										
4904.0	PK	47.3	270	V	34.1	5.2	33.0	53.6	74	-20.4
4904.0	PK	37.8	45	H	34.1	5.2	33.0	44.1	74	-29.9
7356.0	PK	44.5	180	V	37.4	6.1	33.5	54.5	74	-19.5
7356.0	PK	34.6	45	H	37.4	6.1	33.5	44.6	74	-29.4
4904.0	AV	43.6	90	V	34.1	5.2	33.0	49.9	54	-4.1
4904.0	AV	34.5	270	H	34.1	5.2	33.0	40.8	54	-13.2
7356.0	AV	41.8	60	V	37.4	6.1	33.5	51.8	54	-2.2
7356.0	AV	31.6	60	H	37.4	6.1	33.5	41.6	54	-12.4

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

APPENDIX A - PRODUCT LABELING

Proposed FCC ID Label Format

FCC ID: ZCBHYIPC-545
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received,
including interference that may cause undesired operation.

Specifications: Text is Black in color and justified. Labels are printed in indelible ink on permanent adhesive silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT.

Proposed Label Location on EUT

FCC ID Label Location

APPENDIX B - EUT PHOTOGRAPHS

EUT - Front View

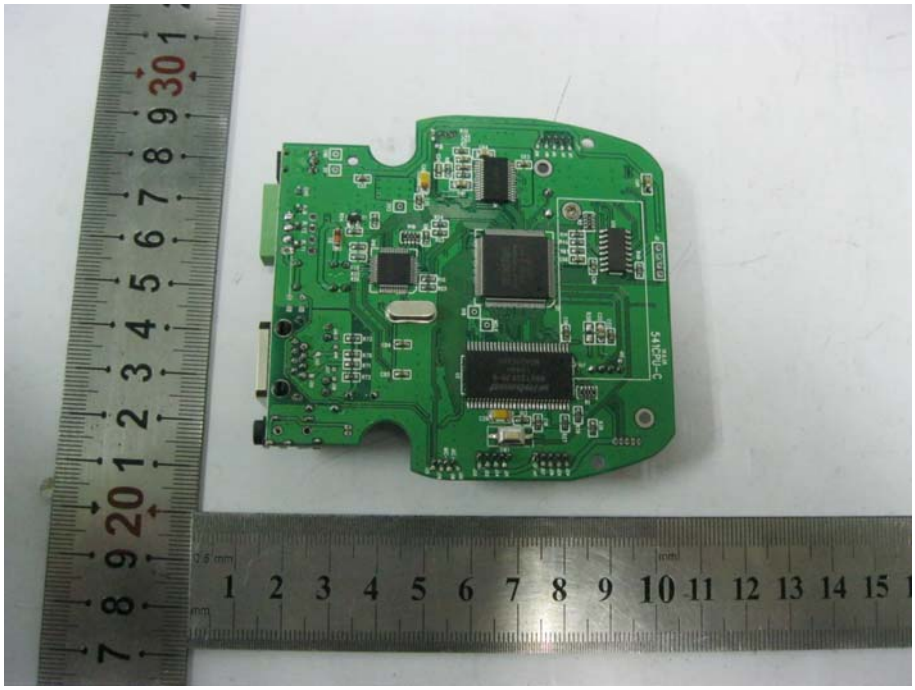
EUT - Rear View

APPENDIX C - EUT INTERNAL PHOTOGRAPHS

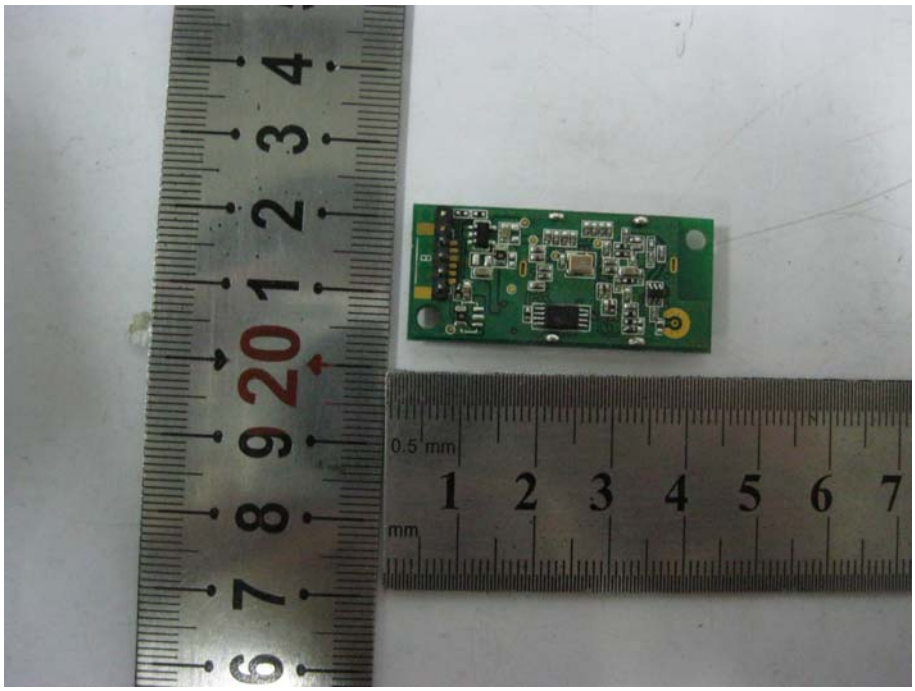
EUT – Inside View

EUT – PCB View 1

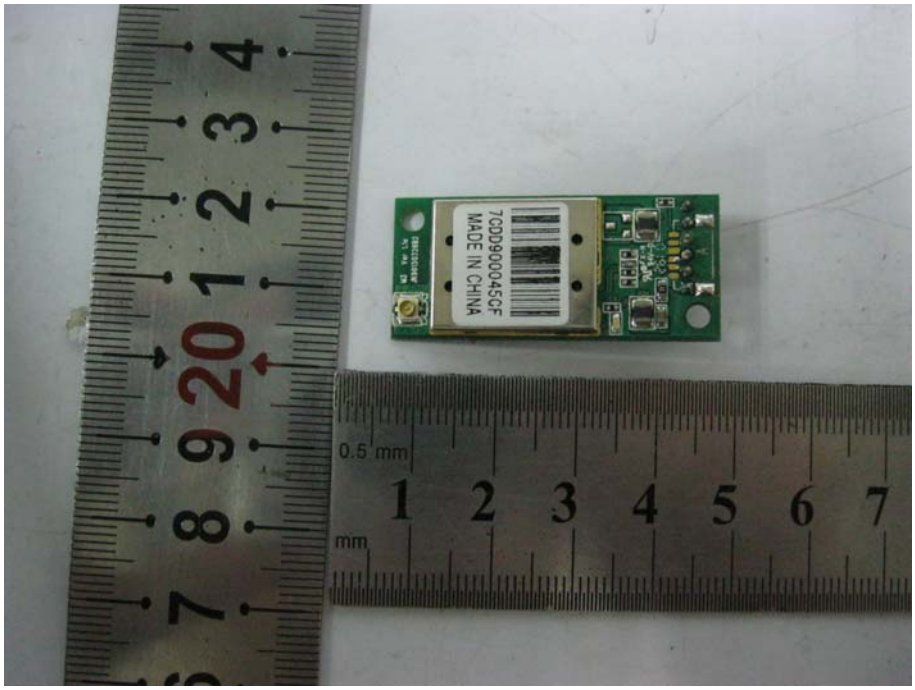
EUT – PCB View 2



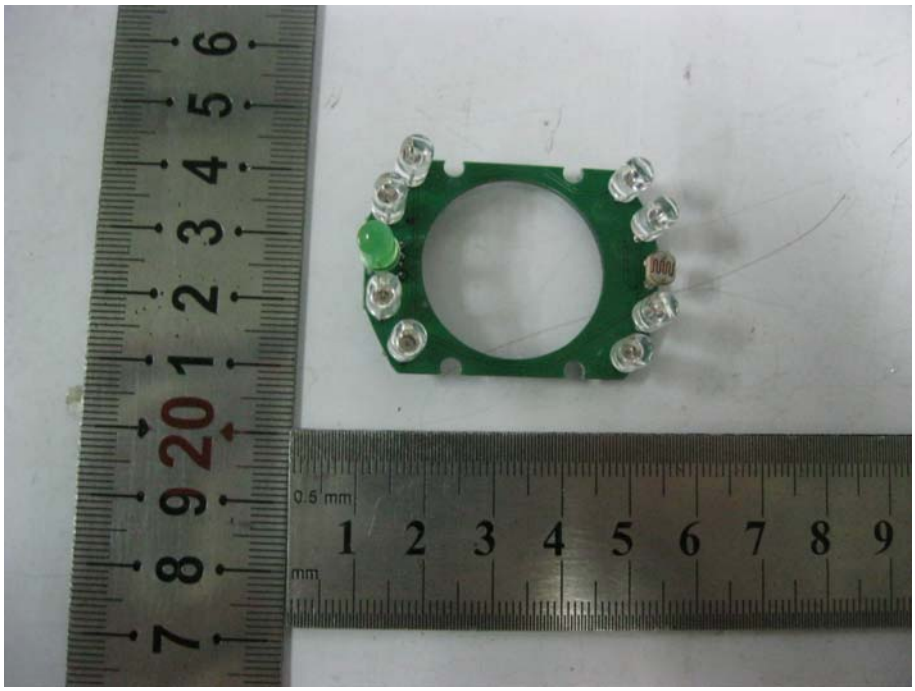
EUT – PCB View 3



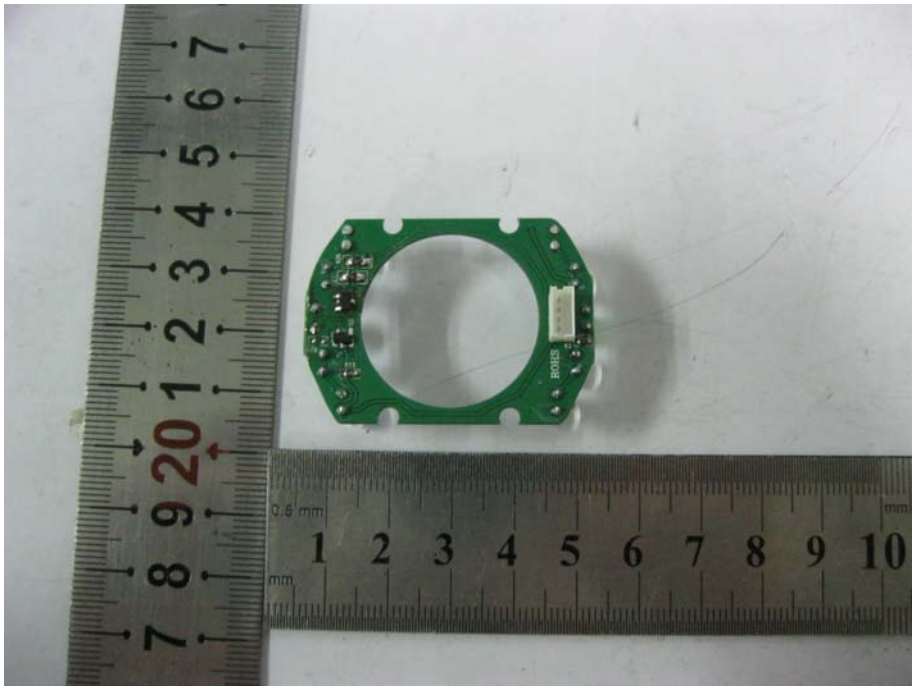
EUT – PCB View 4



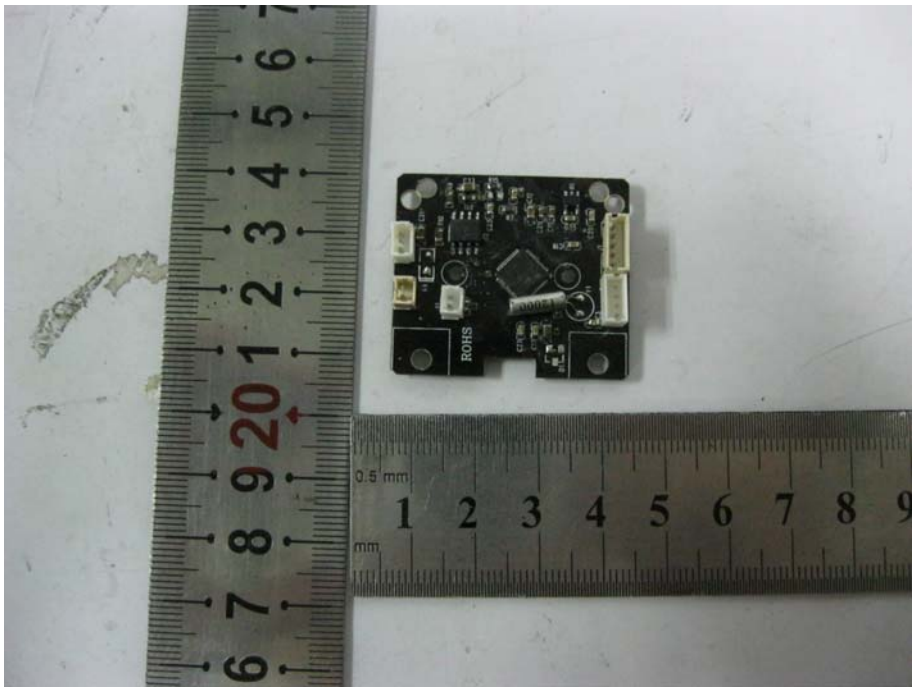
EUT – PCB View 5



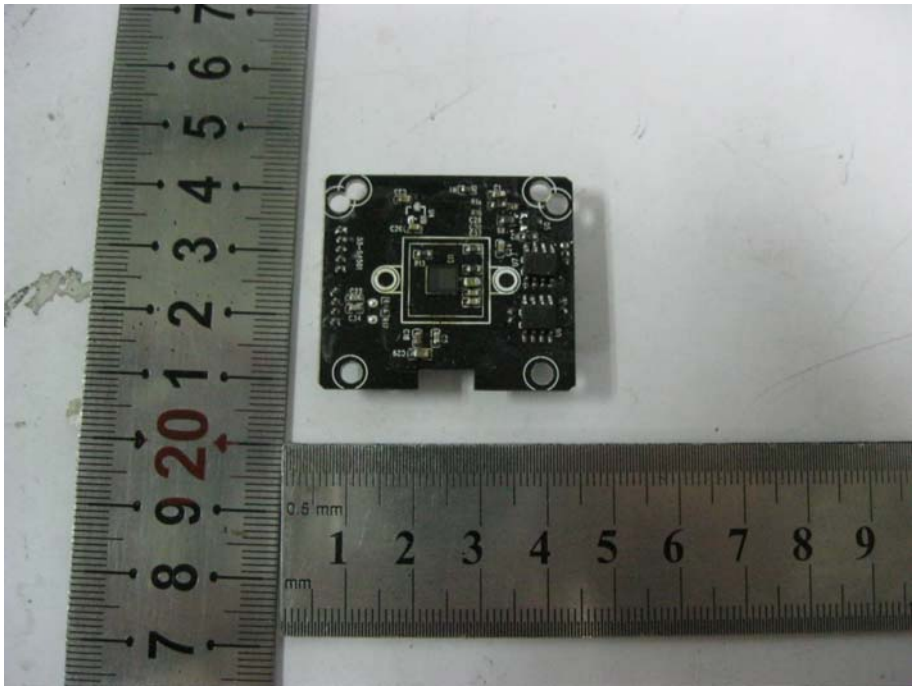
EUT – PCB View 6



EUT – PCB View 7

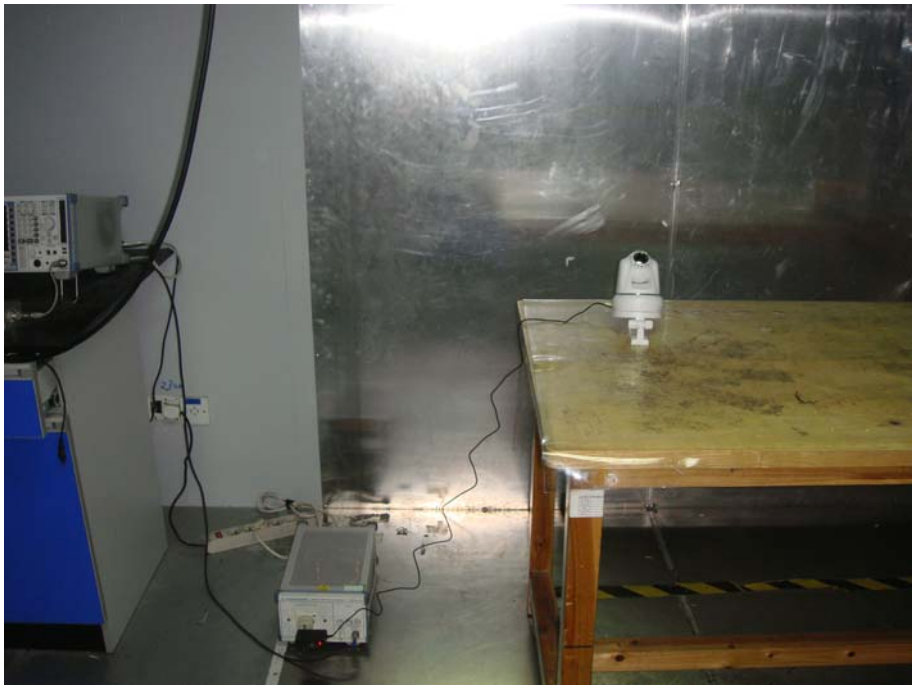


EUT – PCB View 8

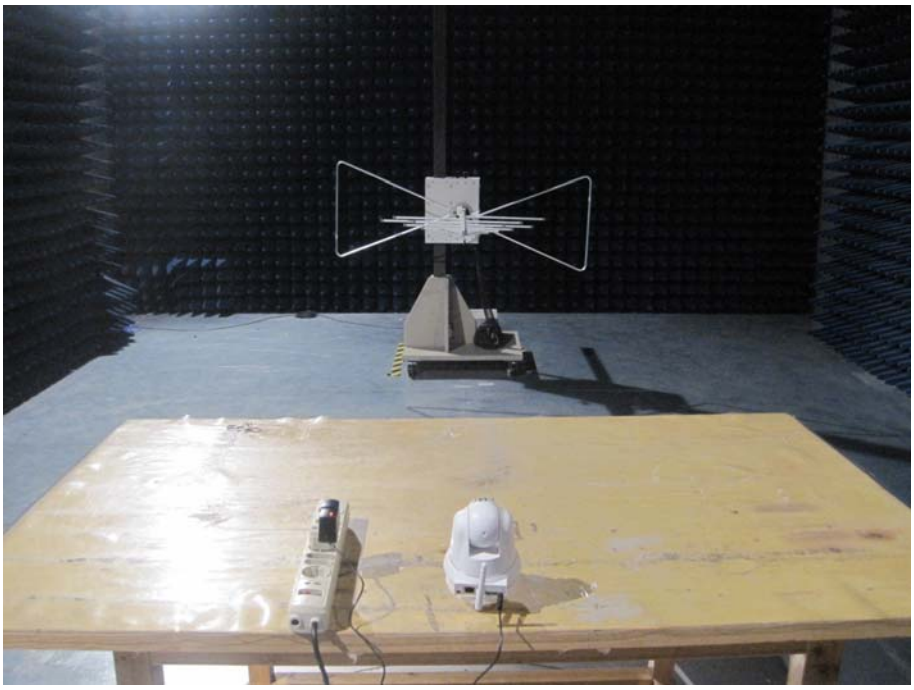


APPENDIX D - TEST SETUP PHOTOGRAPHS

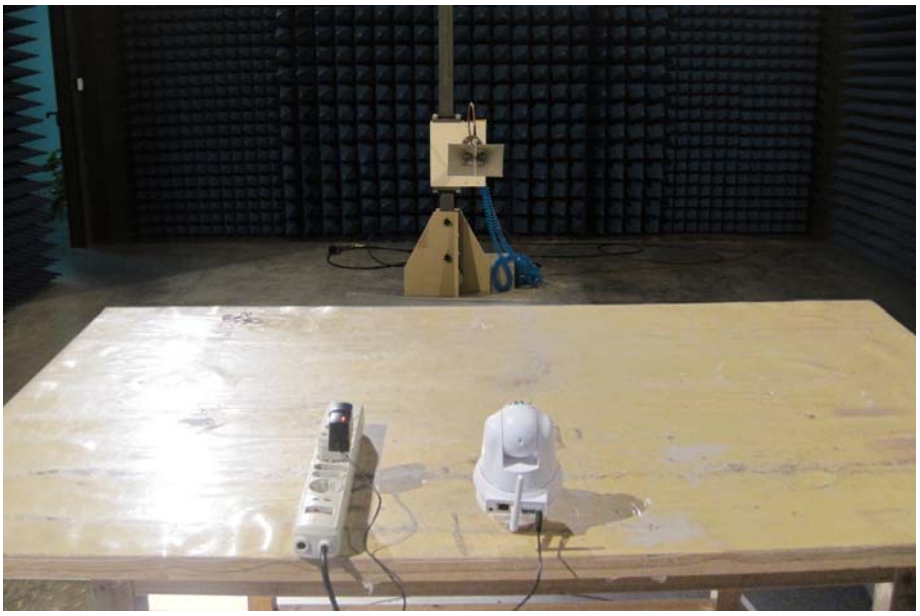
Conducted Emission Test Setup



Radiation Emission Test Setup (30MHz to 1GHz)



Radiation Emission Test Setup (Above 1GHz)



Other Model：