FCC Part 15C
Measurement and Test Report

For

BIOPOD SYSTEMS INC

110, 3442 – 118 Ave SE, Calgary, Alberta, T2Z 3X1

FCC ID: 2AK7QBIOPODONE

FCC Rule(s):	FCC Part 15C
Product Description:	Biopod System
Tested Model:	Biopod One
Report No.:	STR17018023I-1
Tested Date:	2017-01-04 to 2017-02-17
Issued Date:	2017-02-18
Tested By:	Rode Liu / Engineer
Reviewed By:	Silin Chen / EMC Manager
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	BIOPOD SYSTEMS INC
Address of applicant:	110, 3442 – 118 Ave SE, Calgary, Alberta, T2Z 3X1
Manufacturer:	Fireaqua Equipment(Foshan) Co., Ltd
Address of manufacturer:	A2 Jiujiang Fuzuo Industrial Zone, Nanhai District, Foshan Guangdong 528203, China

General Description of EUT	
Product Name:	Biopod System
Trade Name:	biopod
Model No.:	Biopod One
Adding Model(s):	Biopod Terra, Biopod Aqua, Biopod Aqua 2, Biopod Grand
Rated Voltage:	DC 24V
Power Adapter Model:	Model: ZF120A-2404000 Input: AC100-240V 2.0A 50/60Hz Output: 24VDC 4.0A
Software Version:	t1-wr720n-V5P1
Hardware Version:	wifi-biop-15c01-v8
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model Biopod One, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz
RF Output Power:	11.65dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels:	11/9
Channel Separation:	5MHz
Type of Antenna:	PCB
Antenna Gain:	1.0dBi
Lowest Internal Frequency	32.768kHz

1.2 Test Standards

The following report is prepared on behalf of the BIOPOD SYSTEMS INC in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, 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. The measurement guide KDB 558074 D01 v03r05 for digital transmission systems shall be performed also.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology 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 and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	2412MHz, 2437MHz, 2462MHz
TM2	802.11g	2412MHz, 2437MHz, 2462MHz
TM3	802.11n-HT20	2412MHz, 2437MHz, 2462MHz
TM4	802.11n-HT40	2422MHz, 2437MHz, 2452MHz

Accessories Equipment List and Details			
Description	**Manufacturer**	**Model No.**	**Serial Number**
/	/	/	/
Accessories Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**
/	/	/	/
EUT Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has an PCB antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

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.

5.2 Test Procedure

According to the KDB 558074 D01 v03r05, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Environmental Conditions

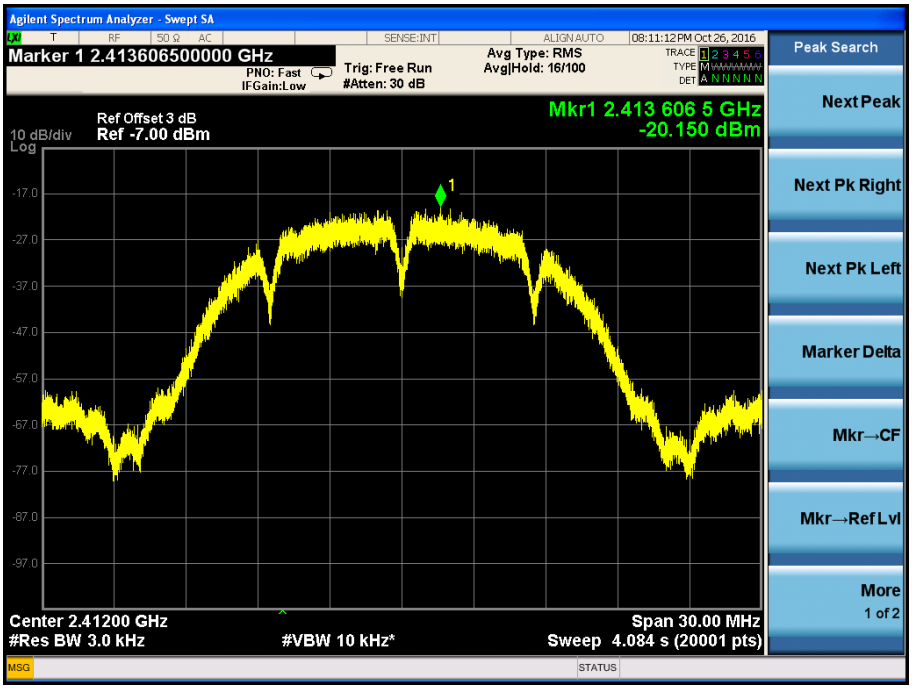
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results/Plots

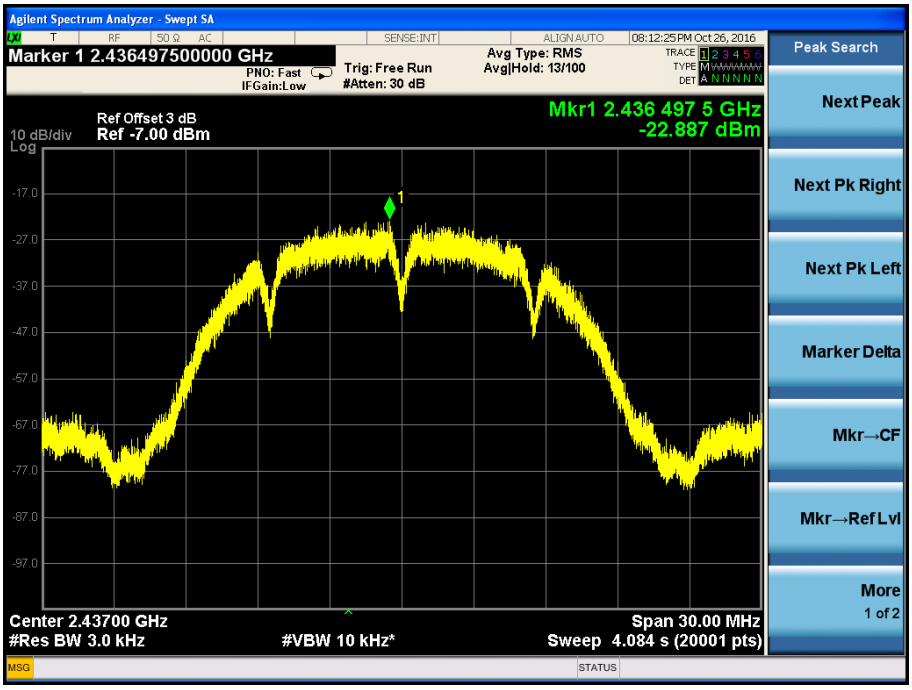
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
802.11b	2412	-20.150	8
	2437	-22.887	8
	2462	-26.691	8
802.11g	2412	-20.825	8
	2437	-24.316	8
	2462	-26.916	8
802.11n HT20	2412	-21.254	8
	2437	-23.448	8
	2462	-28.306	8
802.11n HT40	2422	-25.203	8
	2437	-24.349	8
	2452	-27.939	8

Please refer to the following test plots:

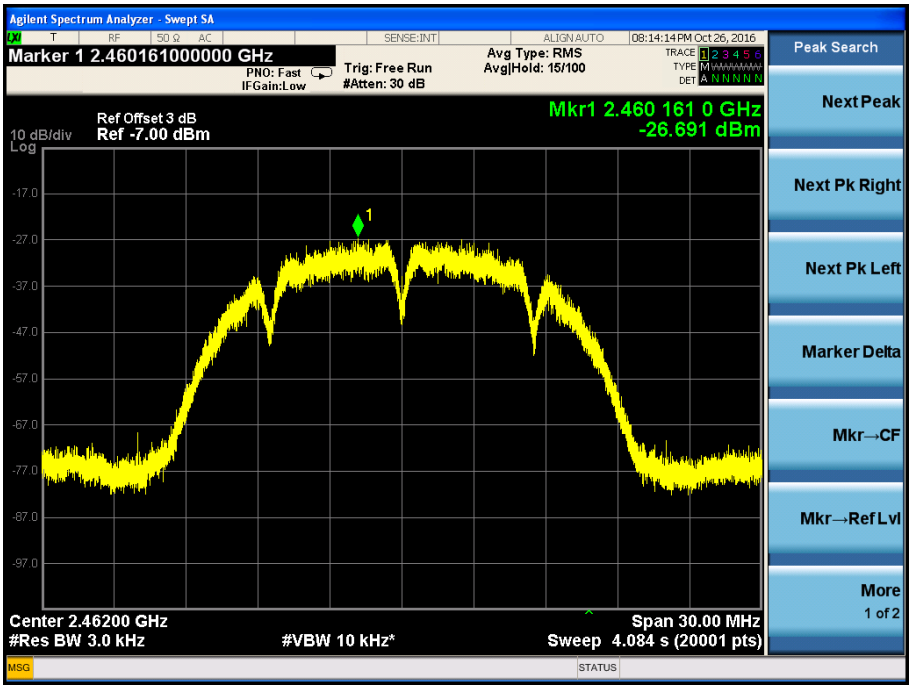
802.11b-Low Channel



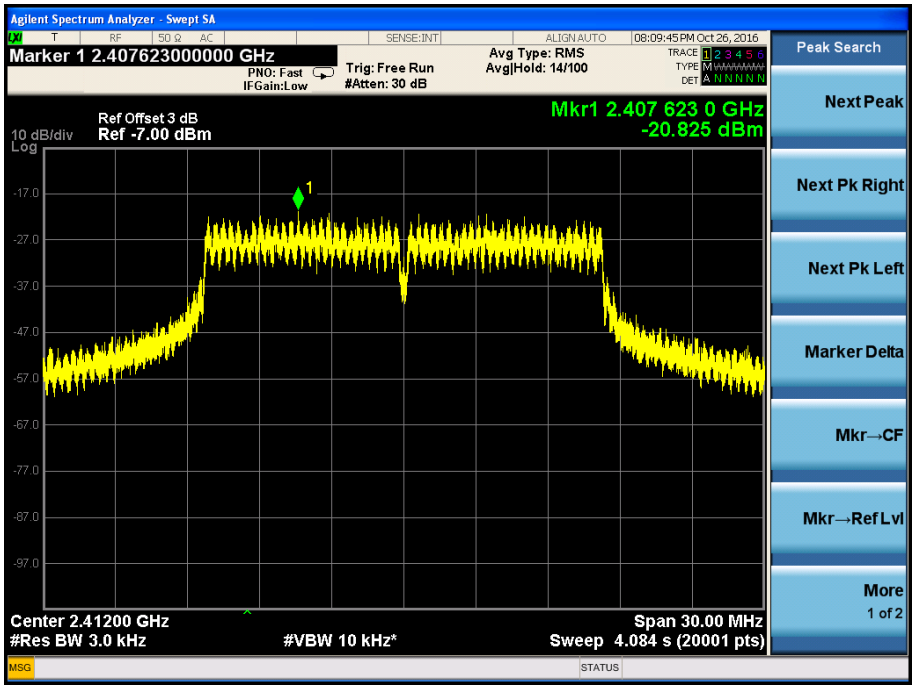
802.11b-Middle Channel



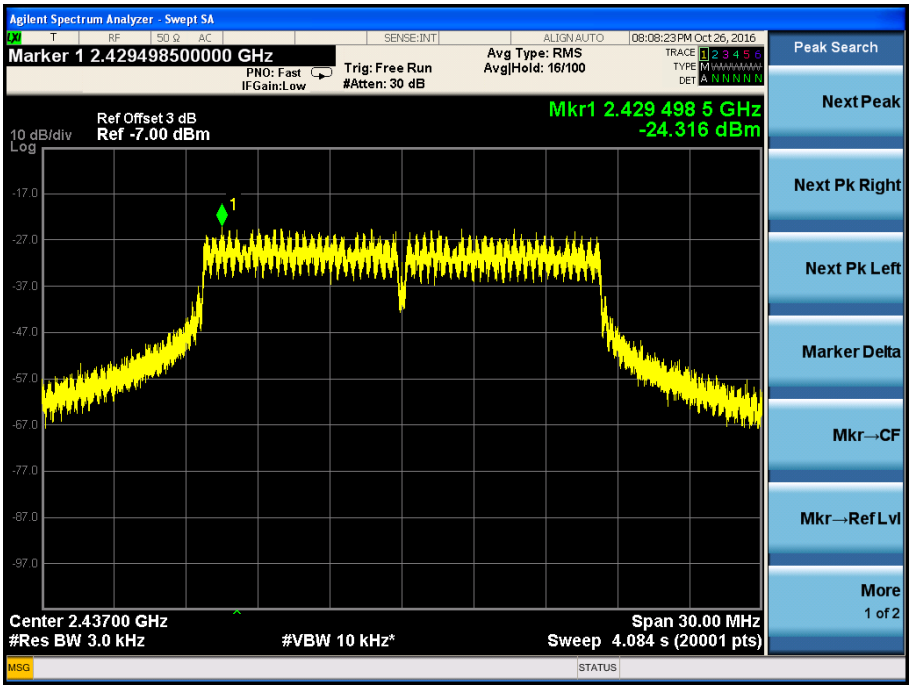
802.11b-High Channel



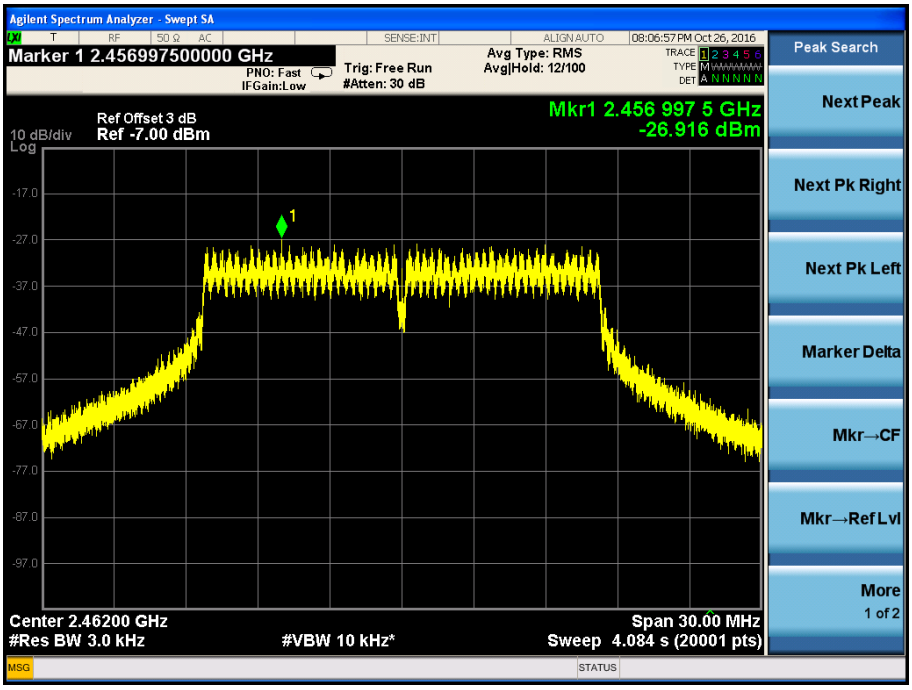
802.11g-Low Channel



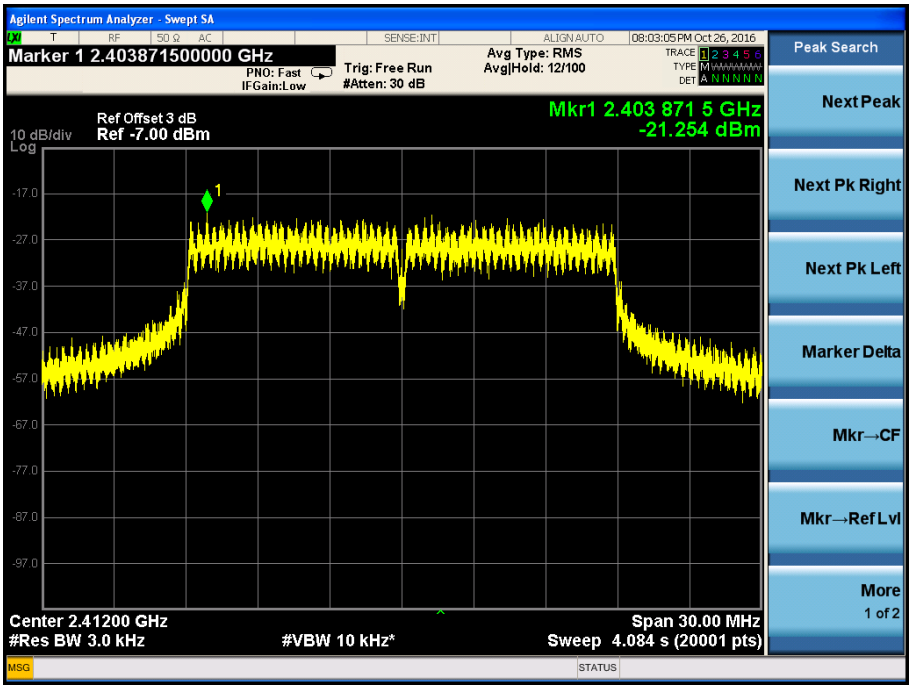
802.11g-Middle Channel



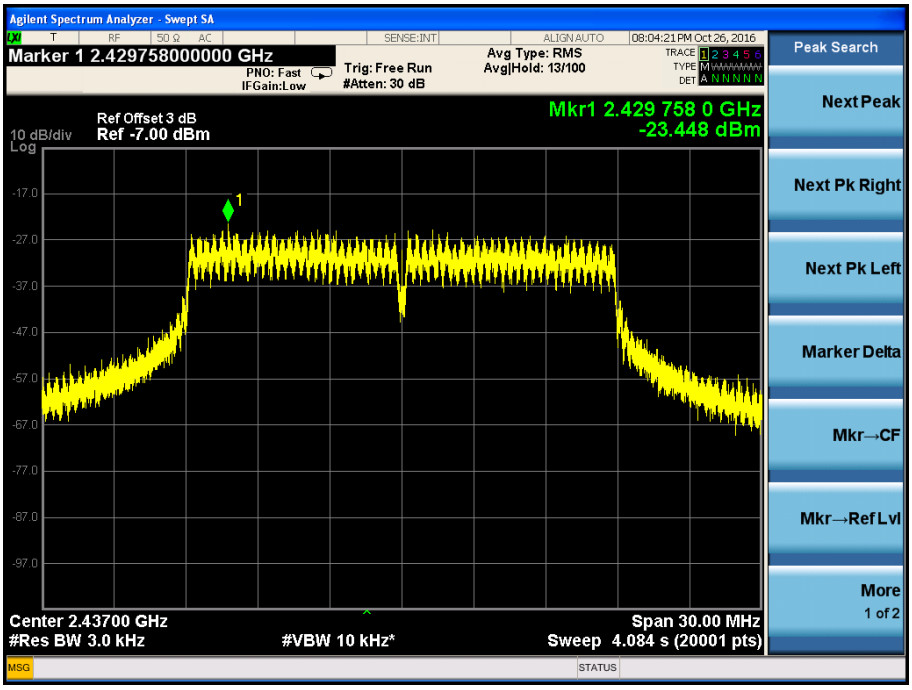
802.11g-High Channel



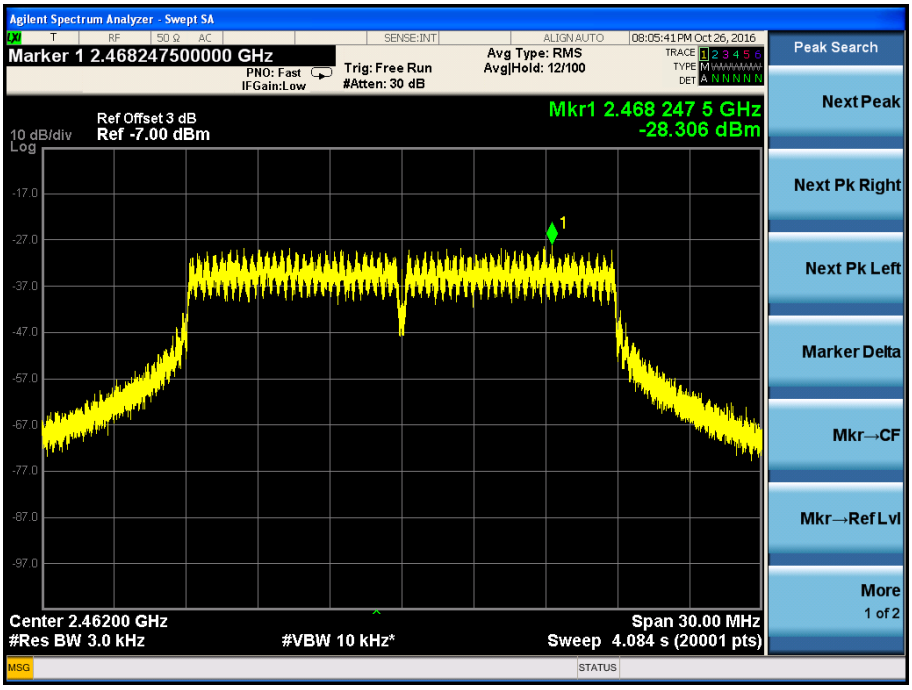
802.11n-HT20-Low Channel



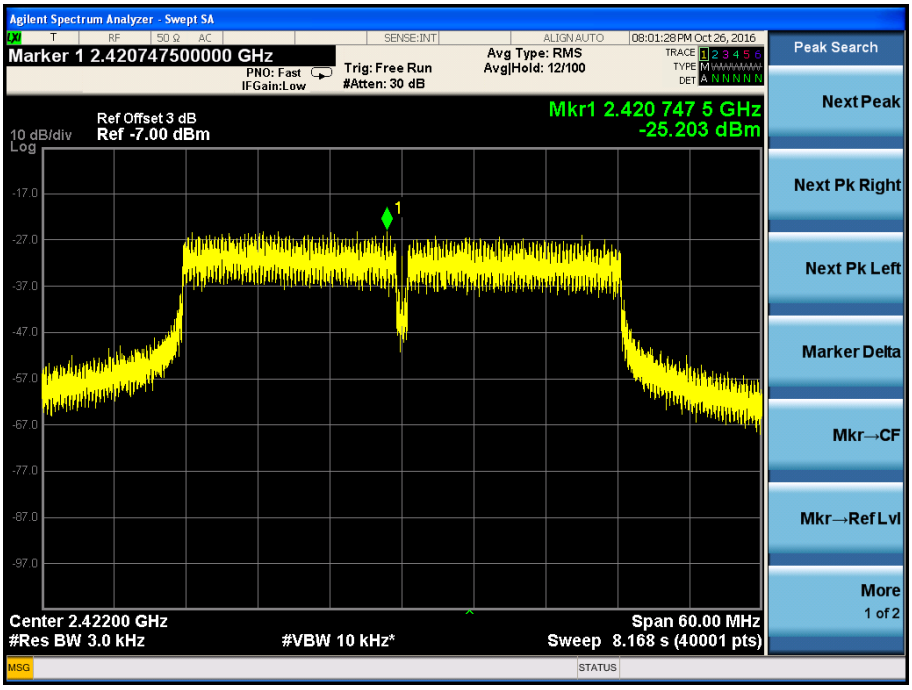
802.11n-HT20-Middle Channel



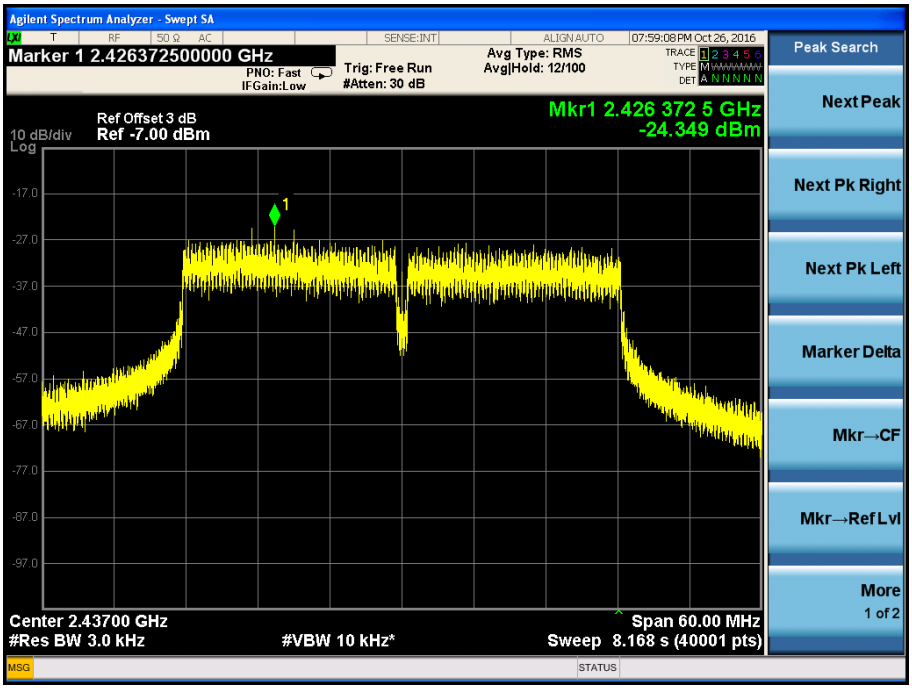
802.11n-HT20-High Channel



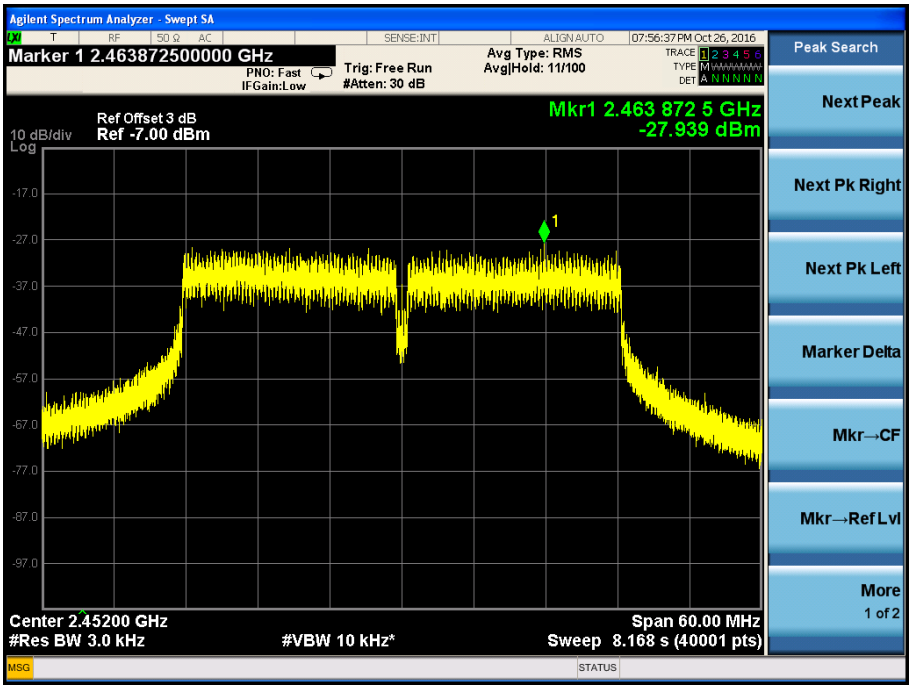
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



6. 6dB Bandwidth

6.1 Standard Applicable

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 Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Environmental Conditions

Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

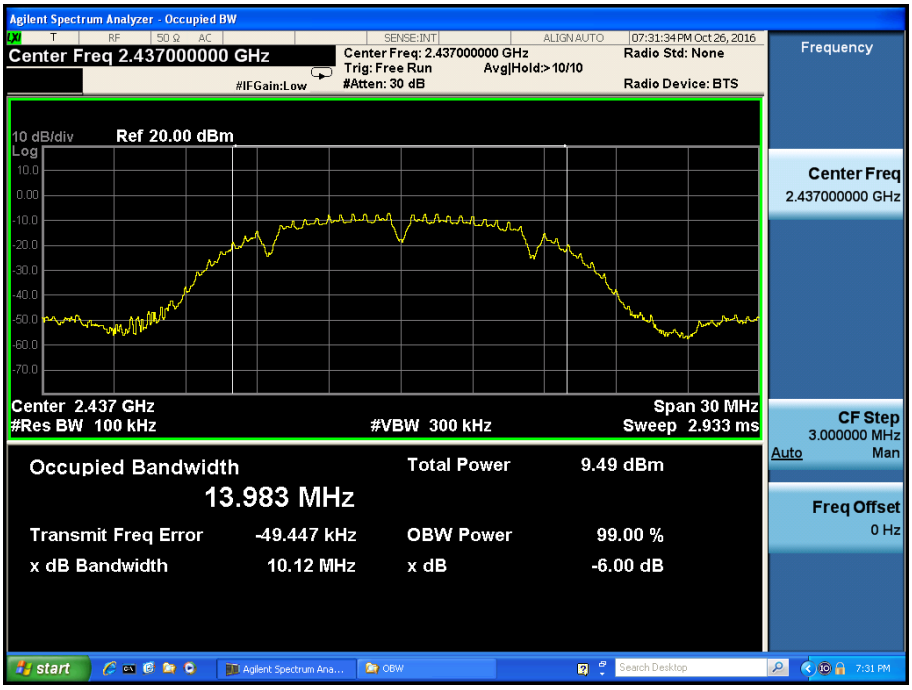
6.4 Summary of Test Results/Plots

Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit kHz
802.11b	2412	10.12	13.994	≥500
	2437	10.12	13.983	≥500
	2462	10.11	13.964	≥500
802.11g	2412	16.34	16.676	≥500
	2437	16.36	16.584	≥500
	2462	16.37	16.537	≥500
802.11n-HT20	2412	17.17	17.809	≥500
	2437	17.23	17.727	≥500
	2462	17.60	17.711	≥500
802.11n-HT40	2422	36.10	36.341	≥500
	2437	35.80	36.278	≥500
	2452	36.38	36.293	≥500

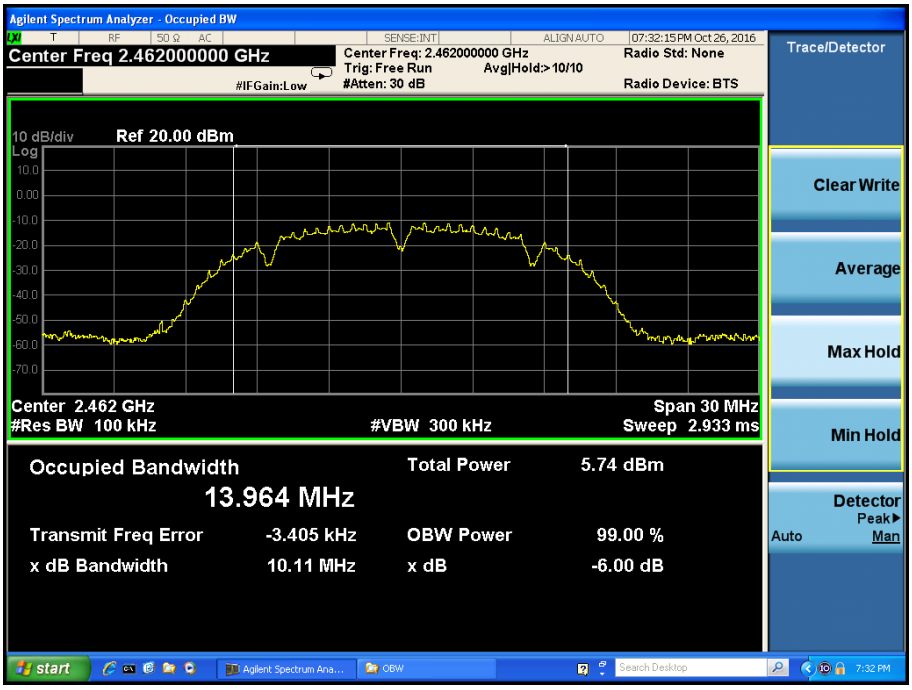
Please refer to the following test plots:

802.11b-Low Channel

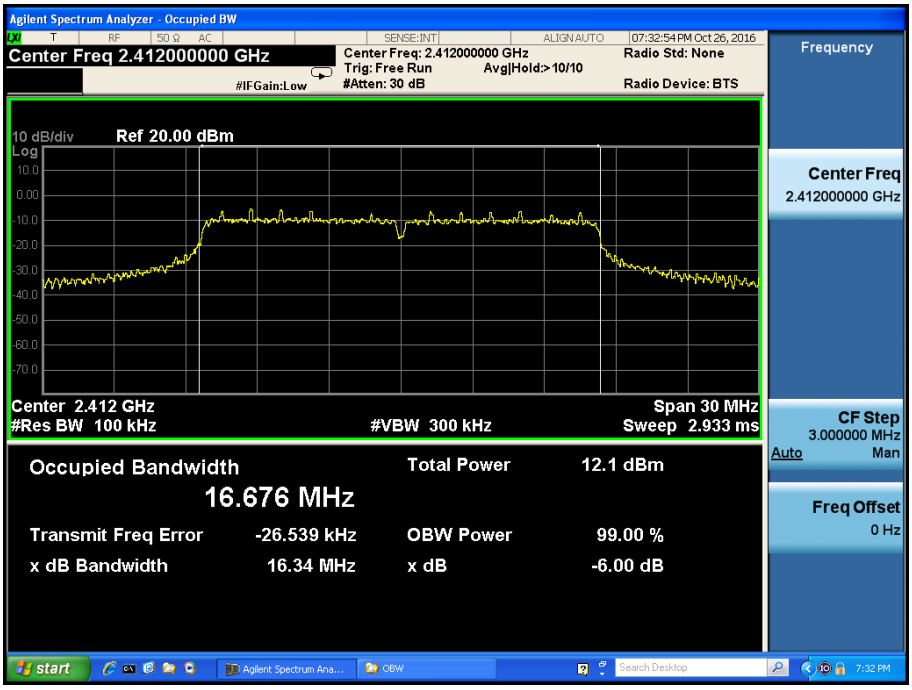
802.11b-Middle Channel



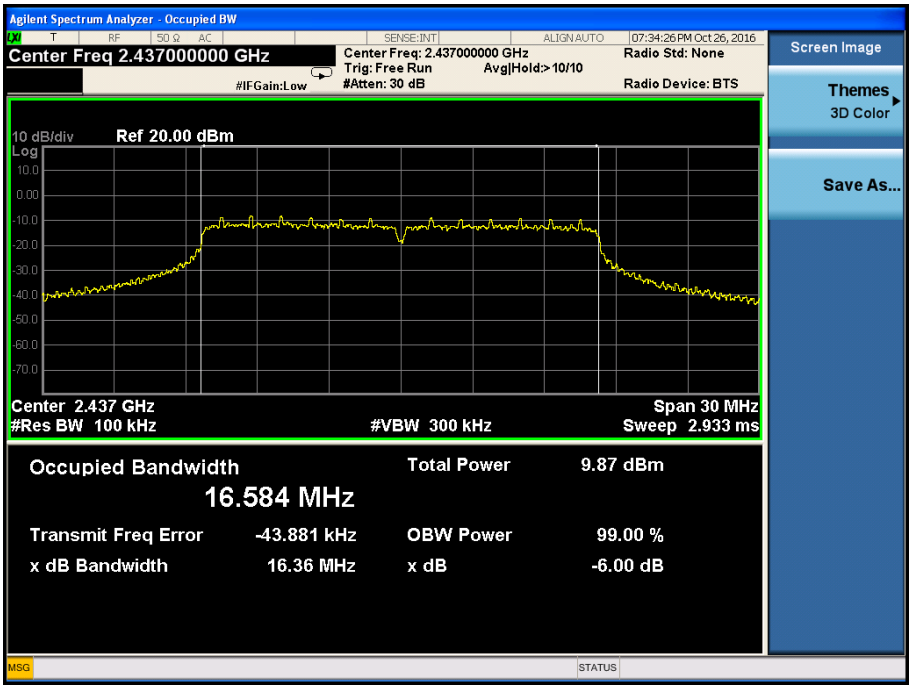
802.11b-High Channel



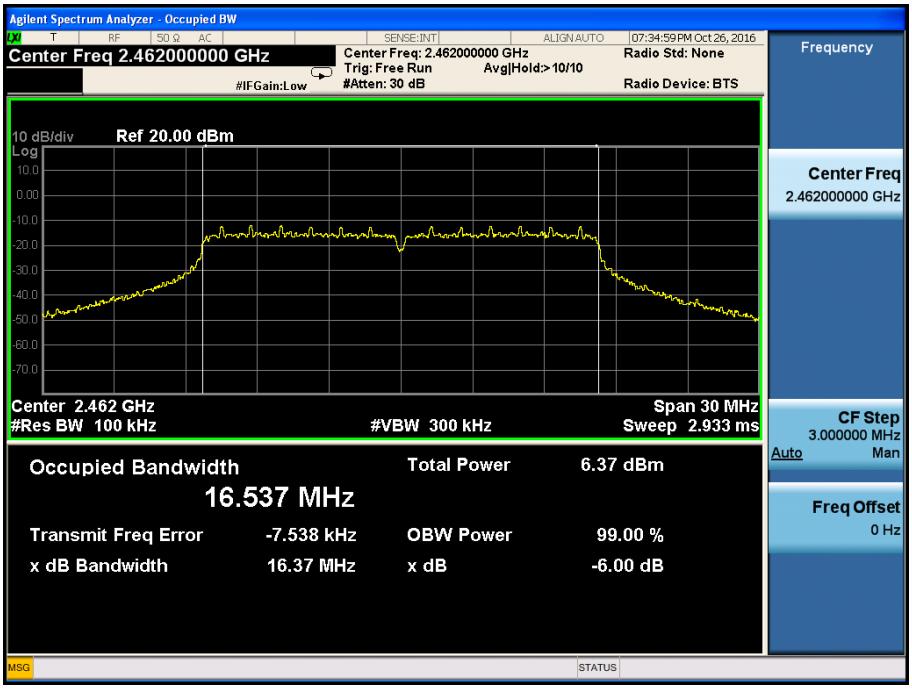
802.11g-Low Channel



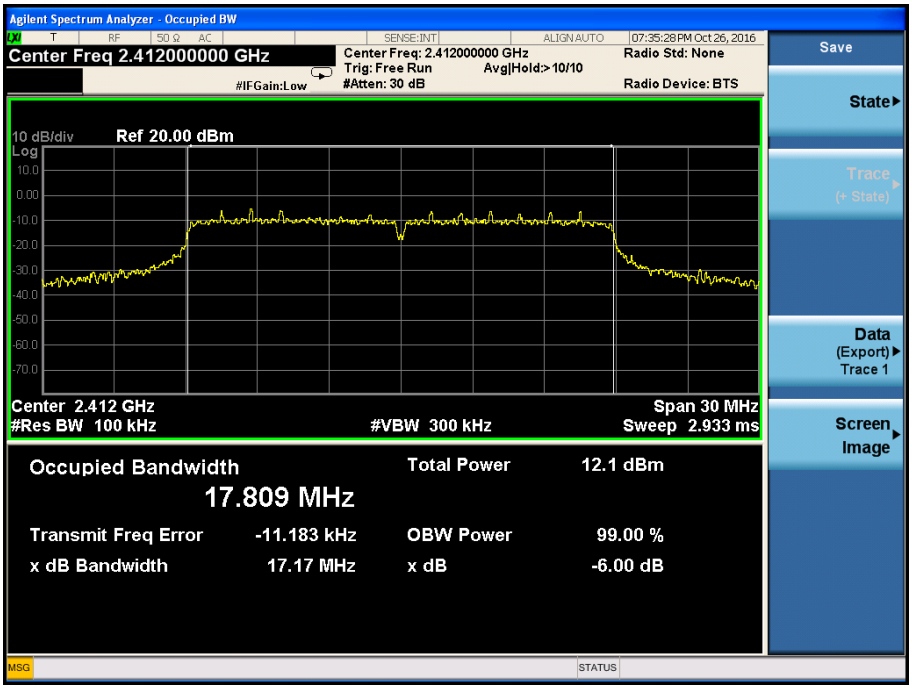
802.11g-Middle Channel



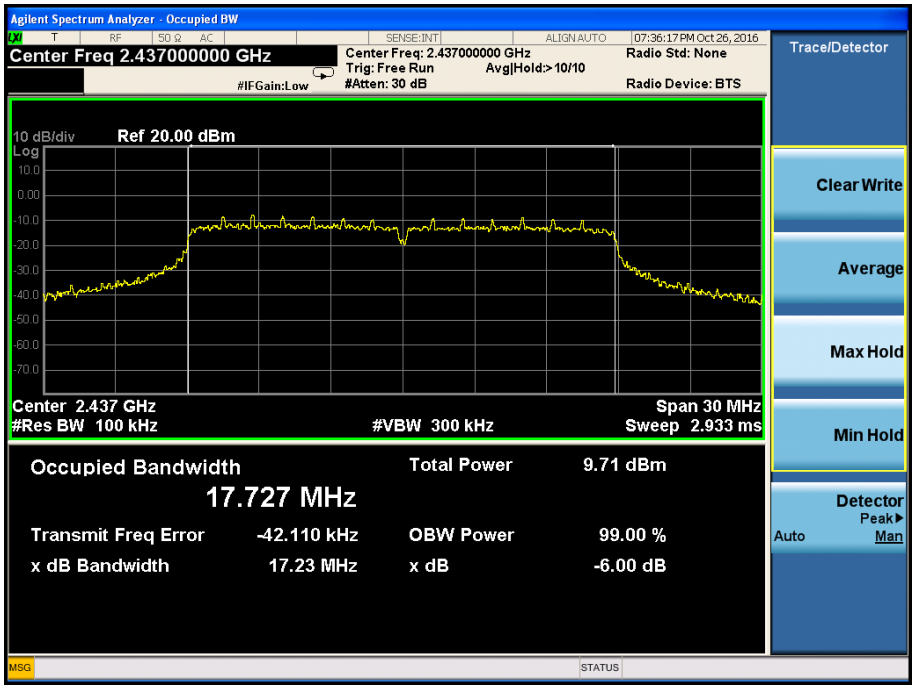
802.11g-High Channel



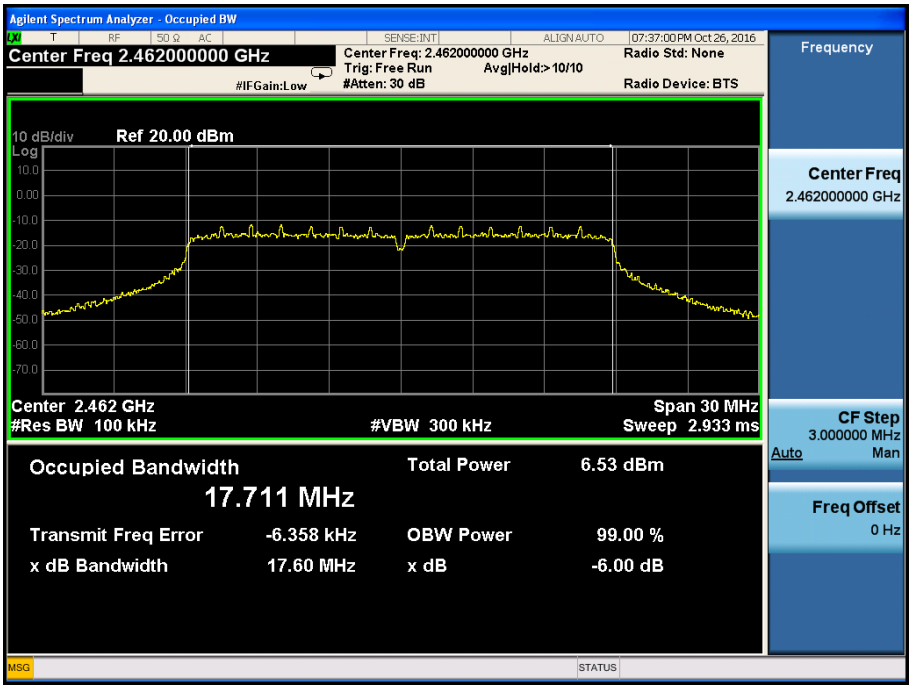
802.11n-HT20-Low Channel



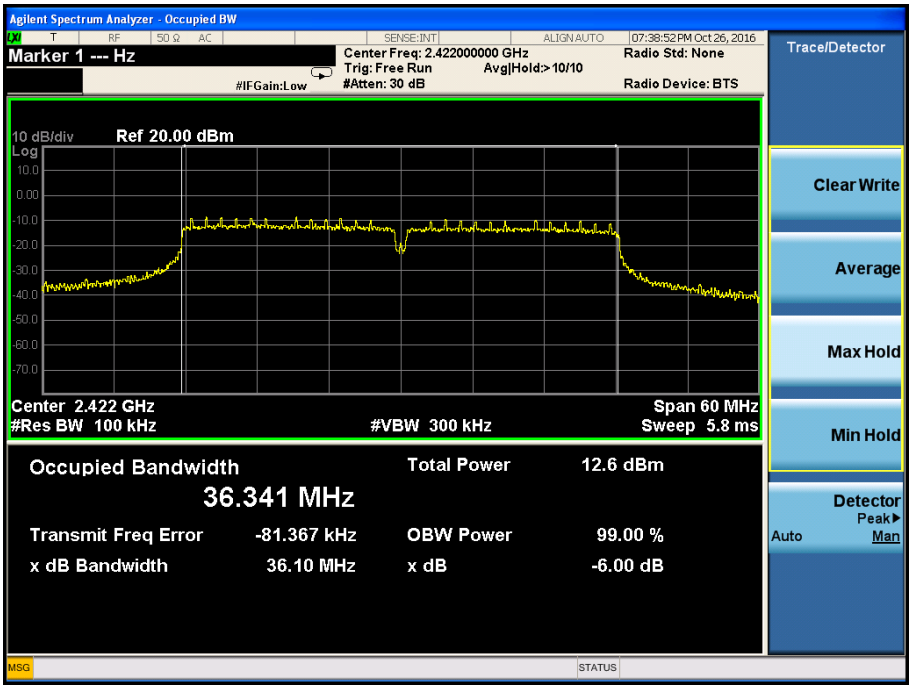
802.11n-HT20-Middle Channel



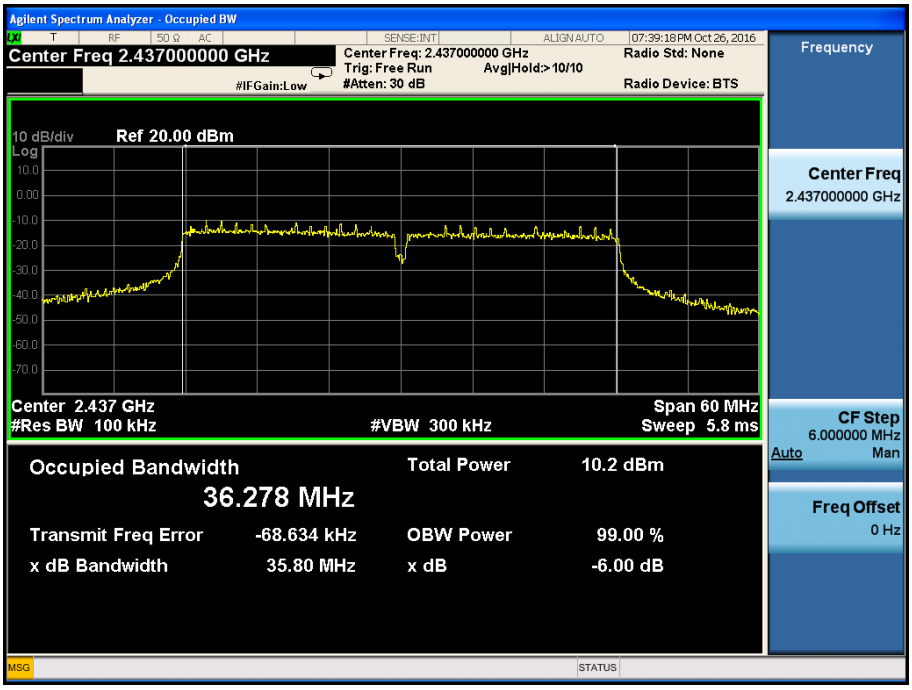
802.11n-HT20-High Channel



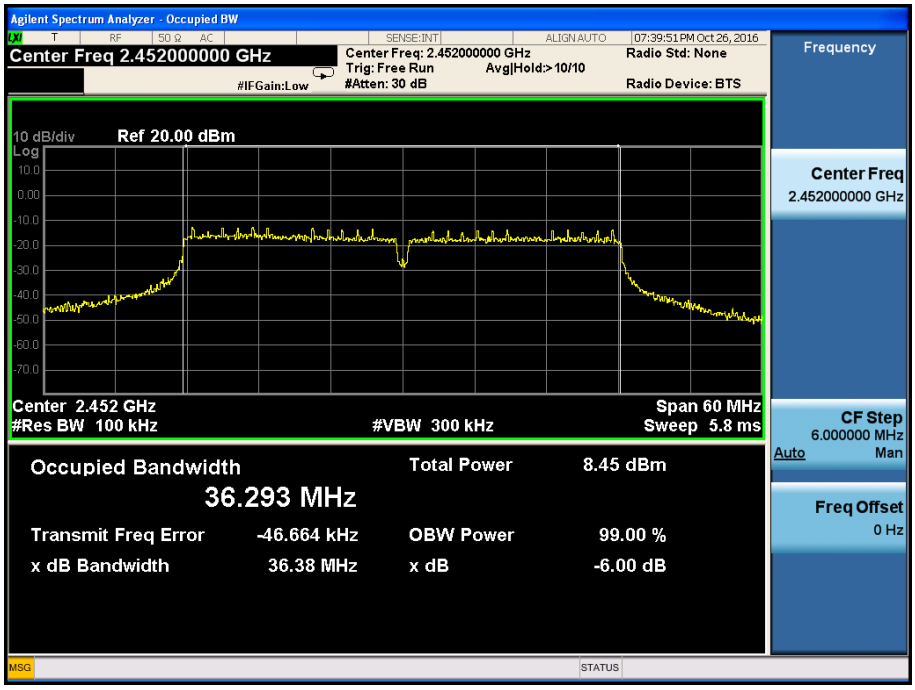
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



7. RF Output Power

7.1 Standard Applicable

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 Test Procedure

According to the KDB-558074 D01 v03r05, 9.2.2.2, when this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

7.3 Environmental Conditions

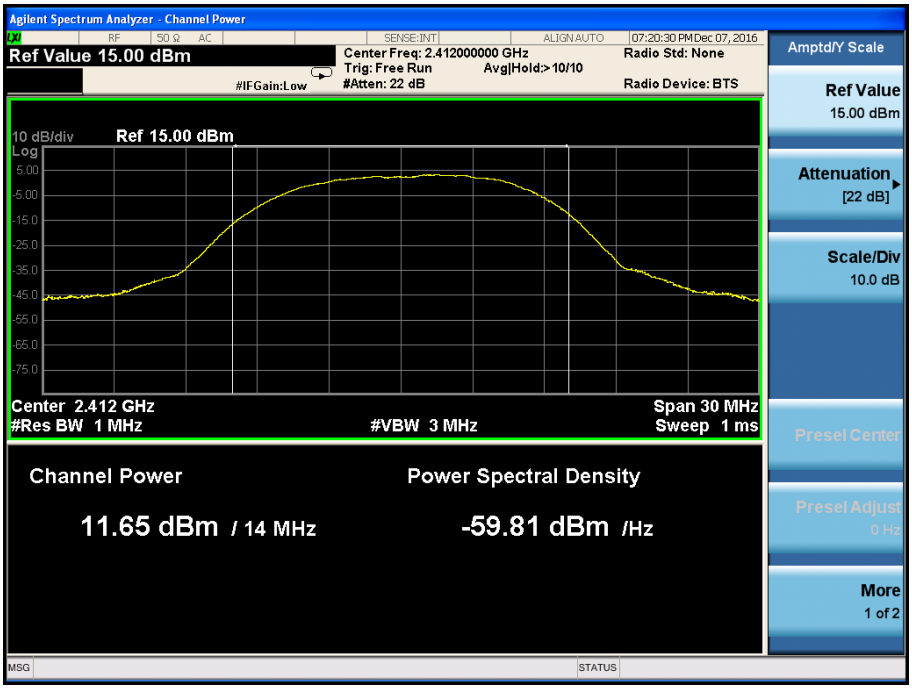
Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

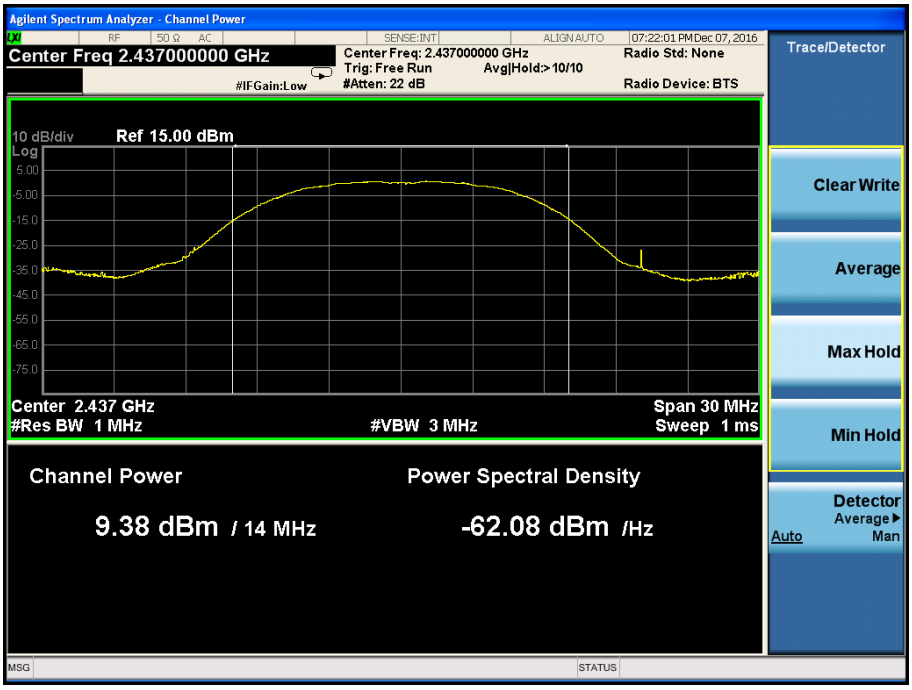
Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
802.11b _ 11Mbps	2412	11.65	14.62	1000
	2437	9.38	8.67	1000
	2462	7.87	6.12	1000
802.11g_54Mbps	2412	10.39	10.94	1000
	2437	7.76	5.97	1000
	2462	4.35	2.72	1000
802.11n HT20_MCS7	2412	10.67	11.67	1000
	2437	7.73	5.93	1000
	2462	4.22	2.64	1000
802.11n HT40_MCS7	2422	10.19	10.45	1000
	2437	8.47	7.03	1000
	2452	6.74	4.72	1000

Please refer to the following test plots:

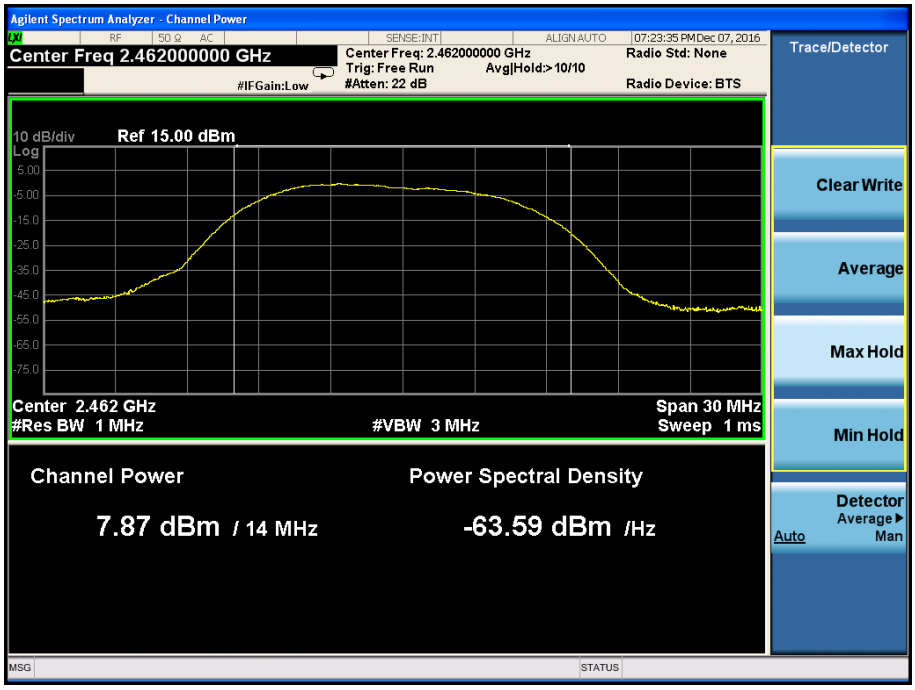
802.11b-11Mbps-Low Channel



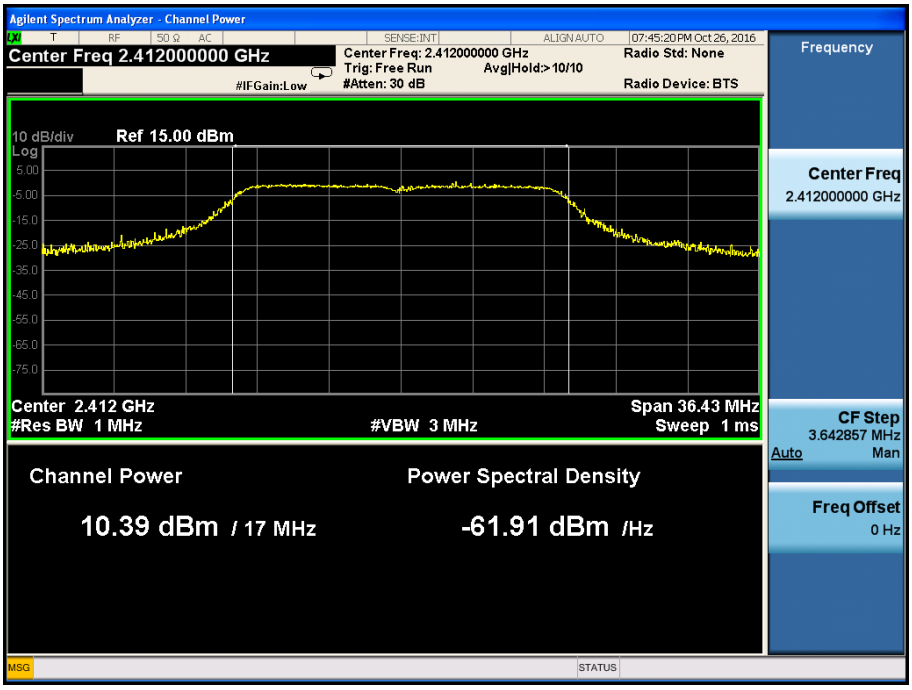
802.11b -11Mbps-Middle Channel



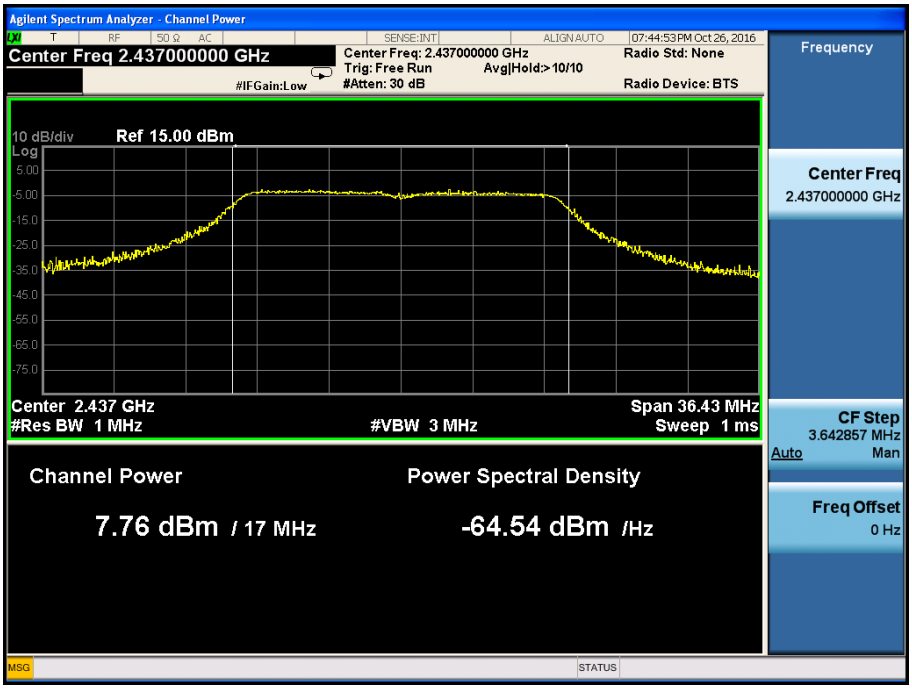
802.11b -11Mpbs-High Channel



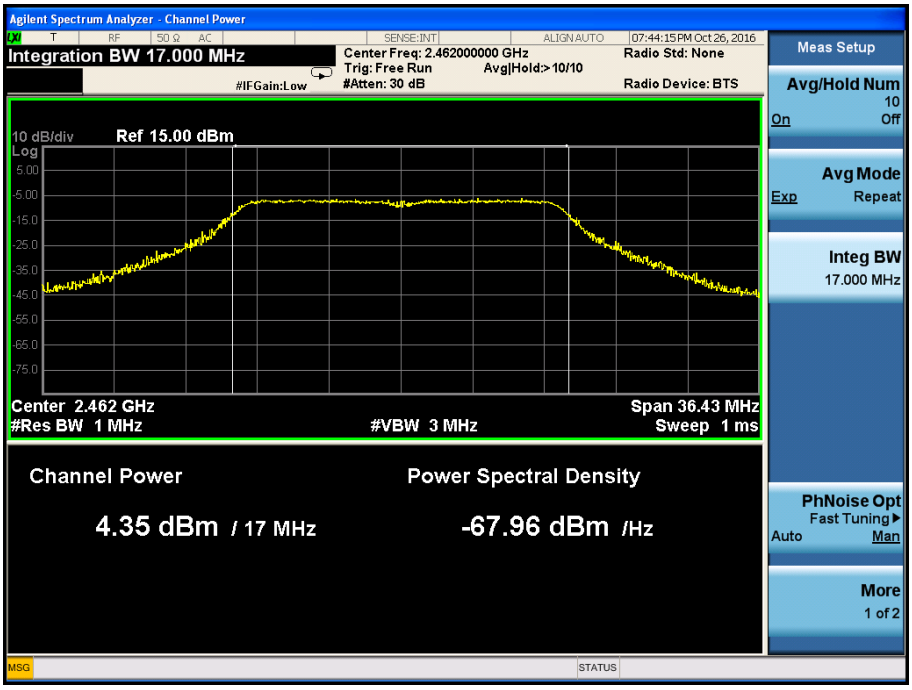
802.11g-54Mbps-Low Channel



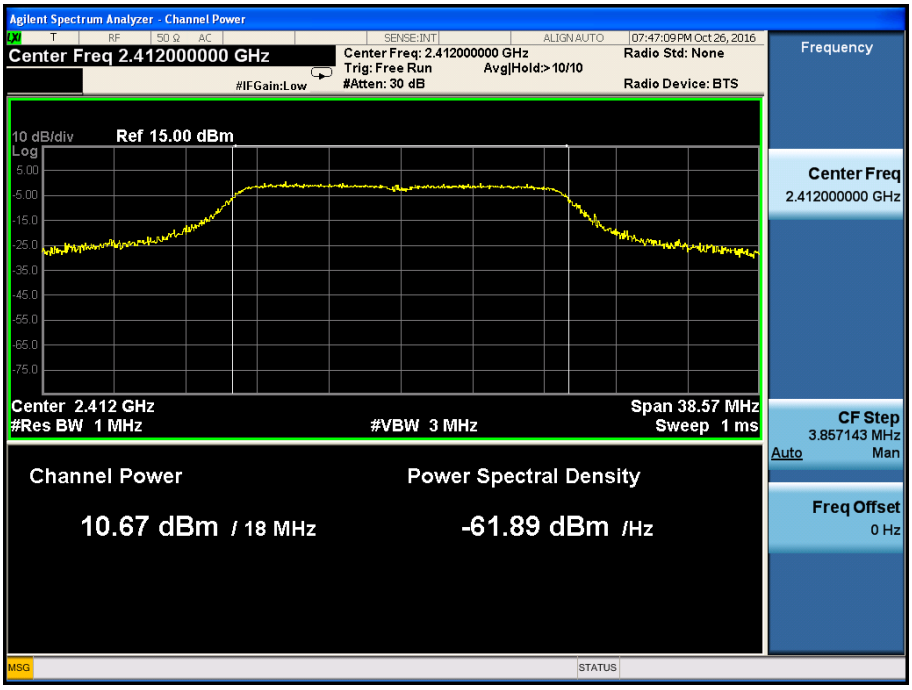
802.11g-54Mbps-Middle Channel



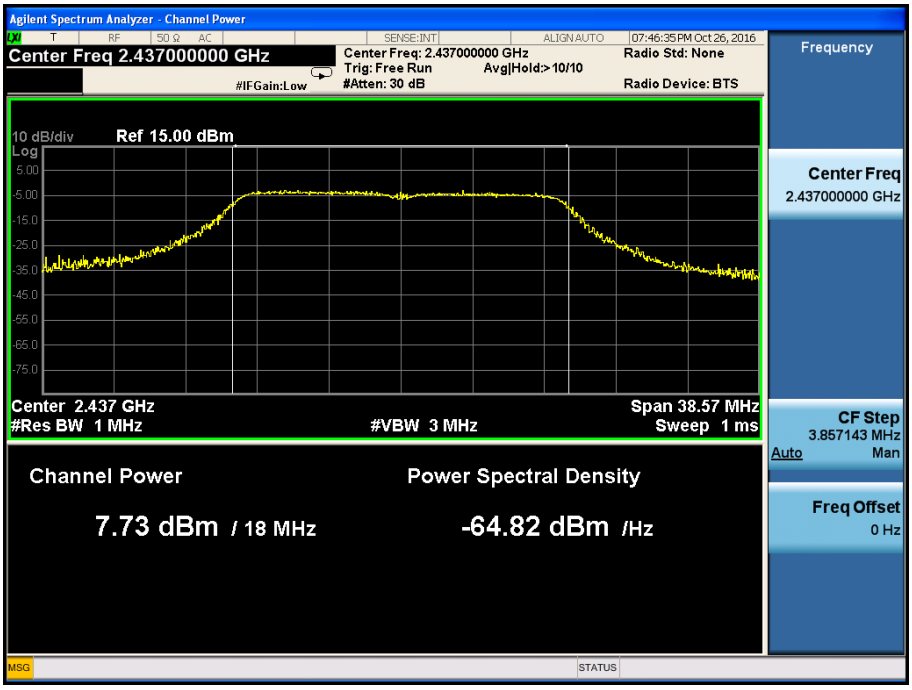
802.11g-54Mpbs-High Channel



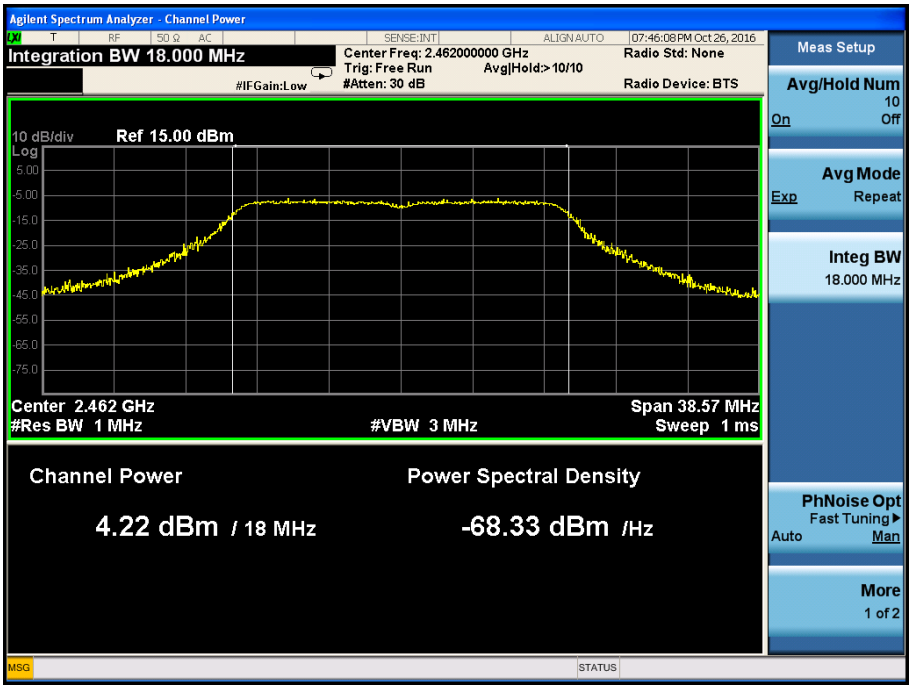
802.11n-HT20-MCS7-Low Channel



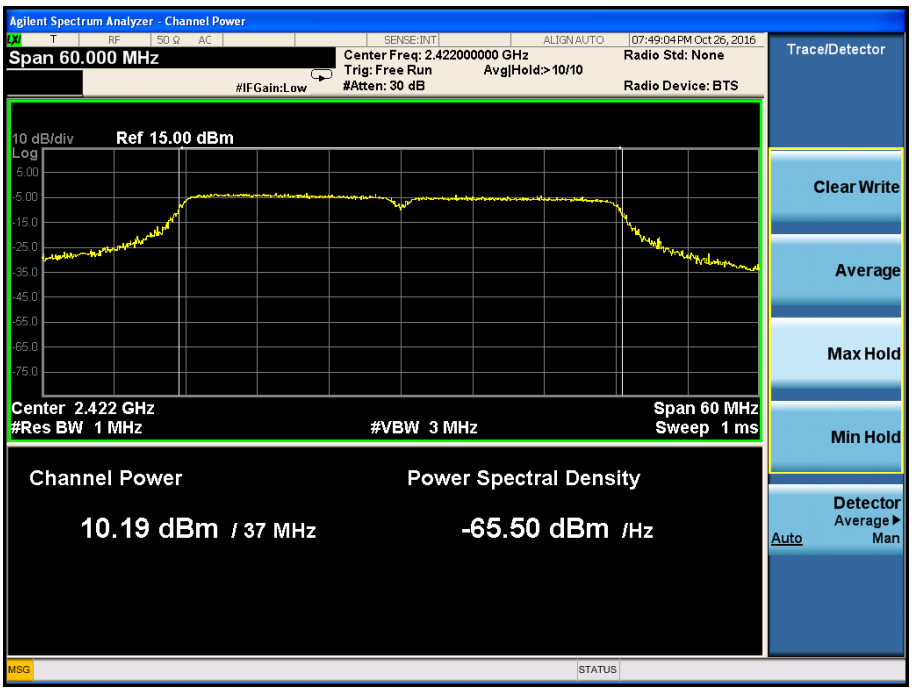
802.11n-HT20-MCS7-Middle Channel



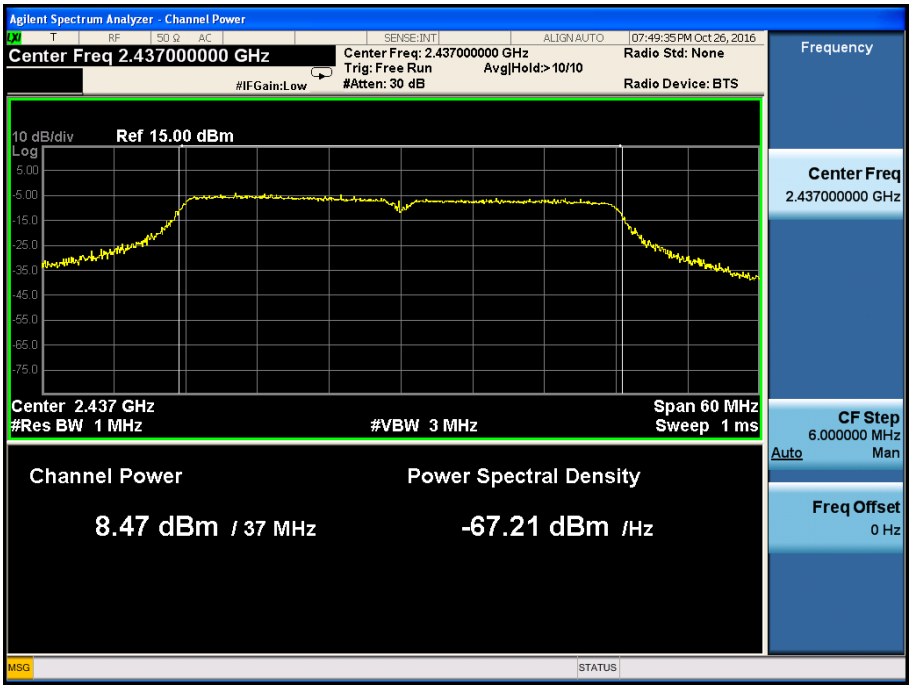
802.11n-HT20-MCS7-High Channel



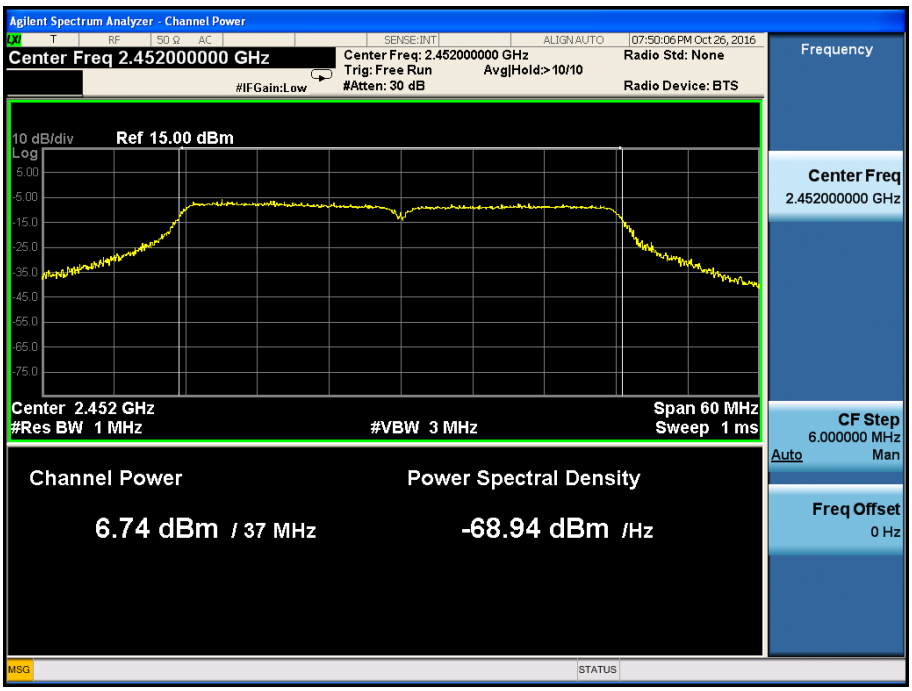
802.11n-HT40-MCS7-Low Channel



802.11n-HT40-MCS7-Middle Channel



802.11n-HT40-MCS7-High Channel



8. Field Strength of Spurious Emissions

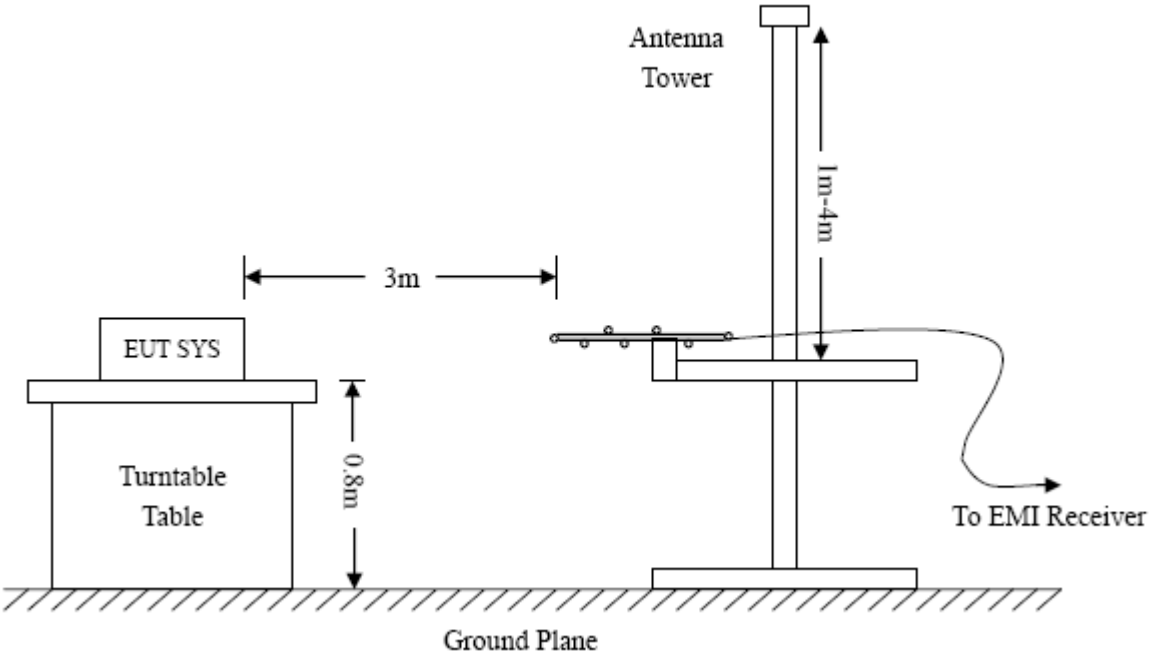
8.1 Standard Applicable

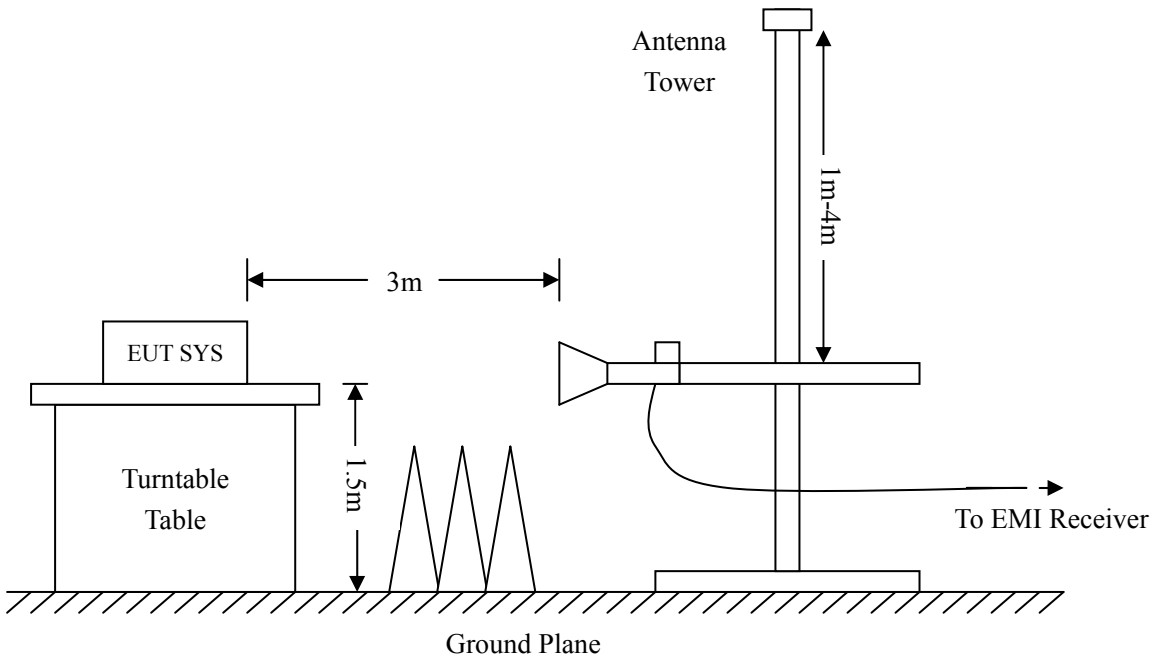
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

8.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.5 Summary of Test Results/Plots

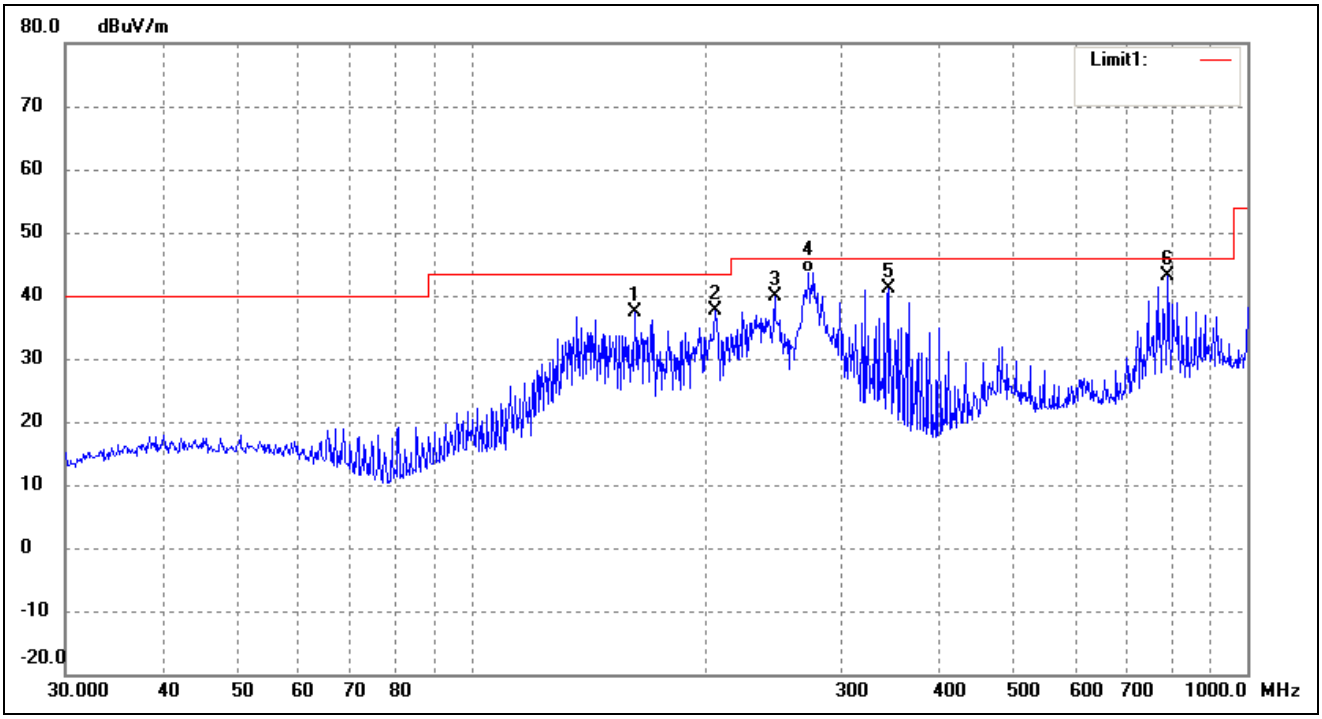
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

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

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

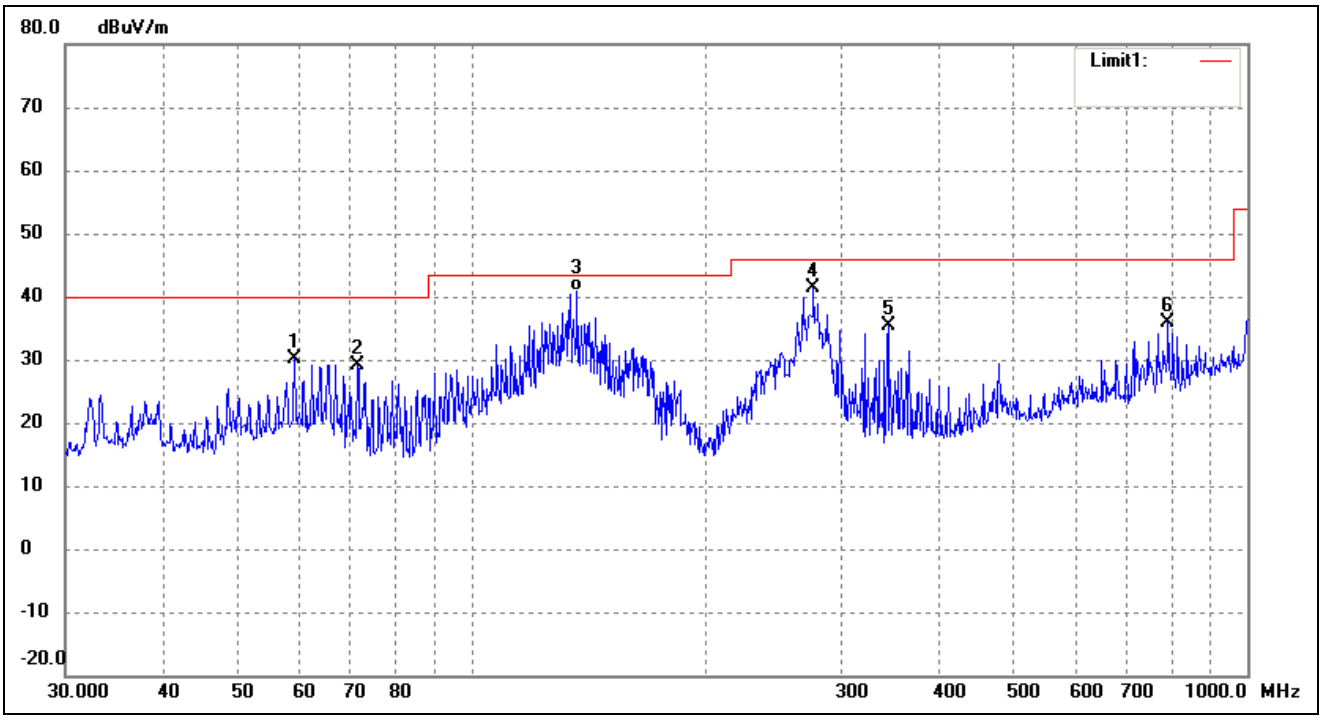
EUT: *Biopod System*
Tested Model: *Biopod One*
Operating Condition: *802.11b Transmitting Low Channel-2412MHz (Worst case)*
Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	162.6106	52.24	-14.92	37.32	43.50	-6.18	135	100	QP
2	206.3976	49.49	-11.88	37.61	43.50	-5.89	319	100	QP
3	245.9508	50.54	-10.69	39.85	46.00	-6.15	83	100	QP
4	272.2776	53.39	-9.73	43.66	46.00	-2.34	75	100	QP
5	344.3854	50.62	-9.39	41.23	46.00	-4.77	240	100	QP
6	790.6187	42.88	0.21	43.09	46.00	-2.91	130	100	QP

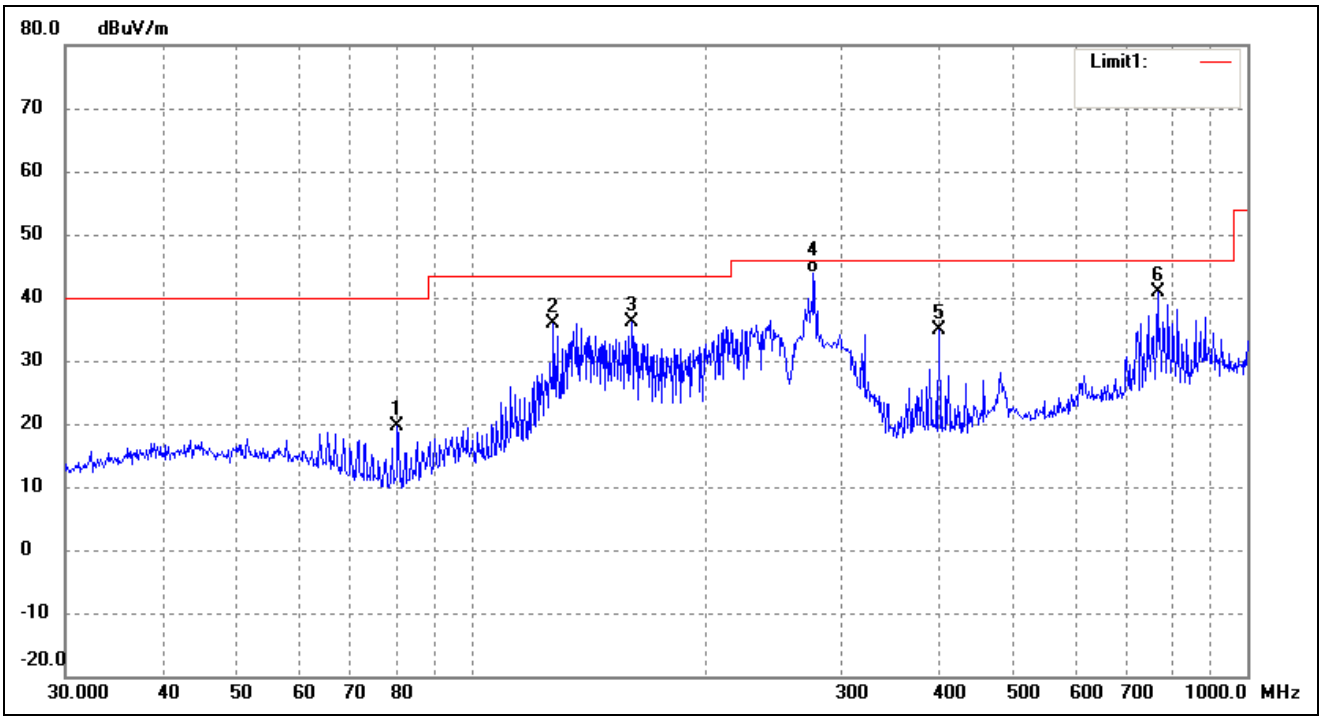
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	59.2325	43.52	-13.43	30.09	40.00	-9.91	132	100	QP
2	71.3299	45.71	-16.51	29.20	40.00	-10.80	124	100	QP
3	136.9391	55.44	-14.63	40.81	43.50	-2.69	251	100	QP
4	276.1235	50.99	-9.62	41.37	46.00	-4.63	91	100	QP
5	344.3854	44.70	-9.39	35.31	46.00	-10.69	254	100	QP
6	790.6187	35.57	0.21	35.78	46.00	-10.22	326	100	QP

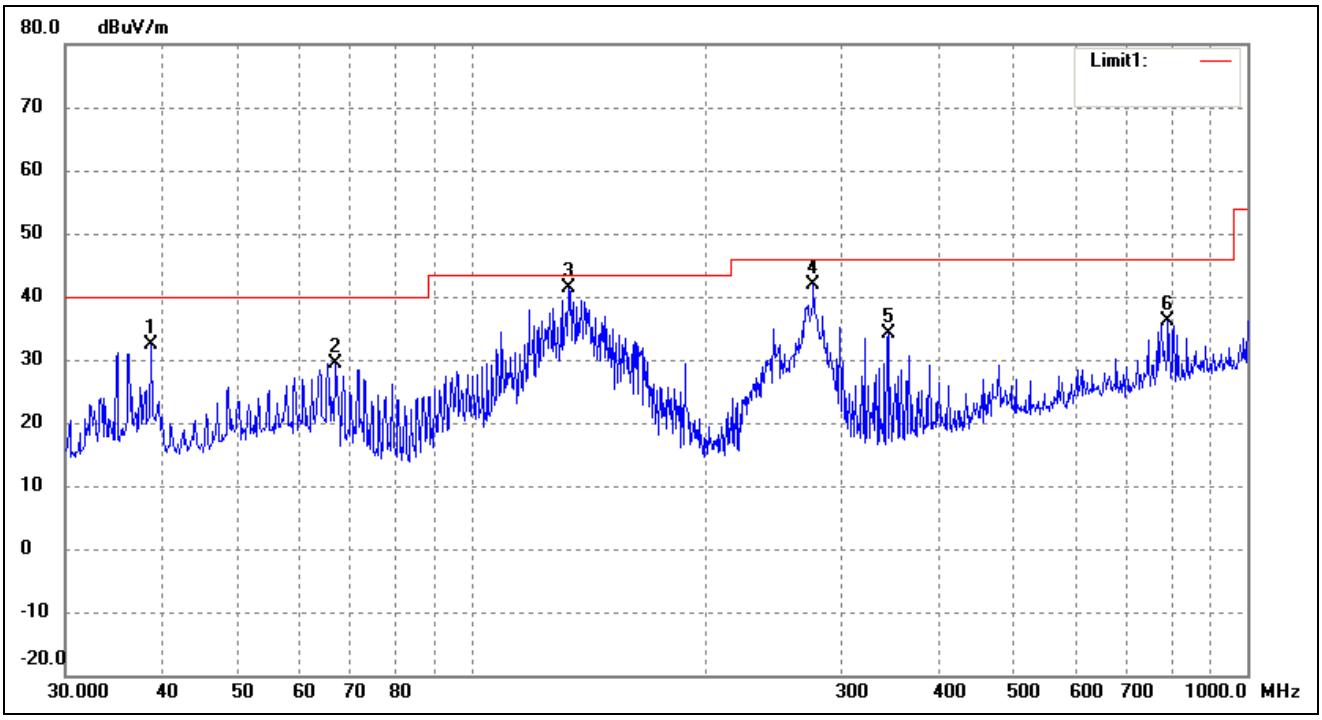
Operating Condition: *802.11b Transmitting Middle Channel-2437MHz (Worst case)*
Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	80.3619	36.08	-16.44	19.64	40.00	-20.36	90	100	QP
2	127.6645	50.04	-14.12	35.92	43.50	-7.58	302	100	QP
3	160.9089	51.17	-15.00	36.17	43.50	-7.33	247	100	QP
4	276.1235	53.41	-9.62	43.79	46.00	-2.21	88	100	QP
5	400.4319	42.56	-7.61	34.95	46.00	-11.05	132	100	QP
6	766.0571	41.59	-0.69	40.90	46.00	-5.10	143	100	QP

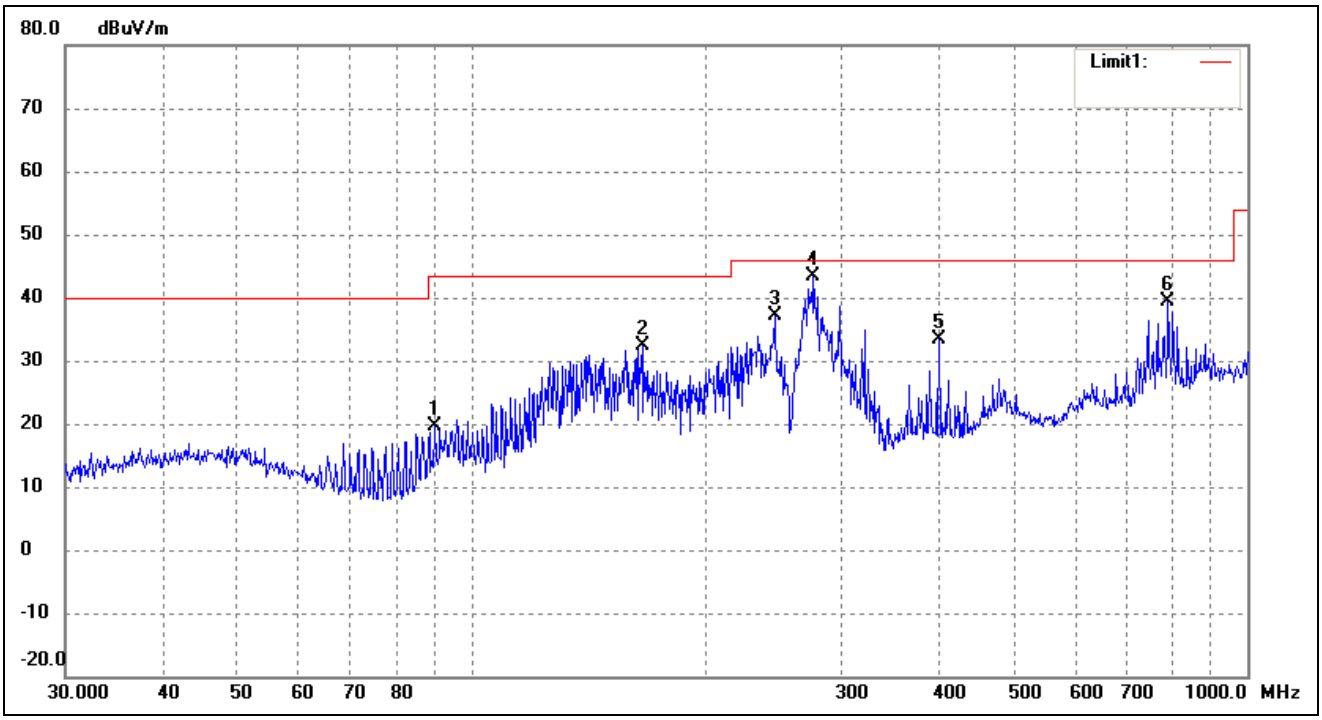
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.7518	43.01	-10.68	32.33	40.00	-7.67	162	100	QP
2	66.9669	44.76	-15.48	29.28	40.00	-10.72	323	100	QP
3	133.6188	55.79	-14.45	41.34	43.50	-2.16	126	100	QP
4	276.1236	51.39	-9.62	41.77	46.00	-4.23	93	100	QP
5	344.3855	43.57	-9.39	34.18	46.00	-11.82	265	100	QP
6	790.6188	35.95	0.21	36.16	46.00	-9.84	202	100	QP

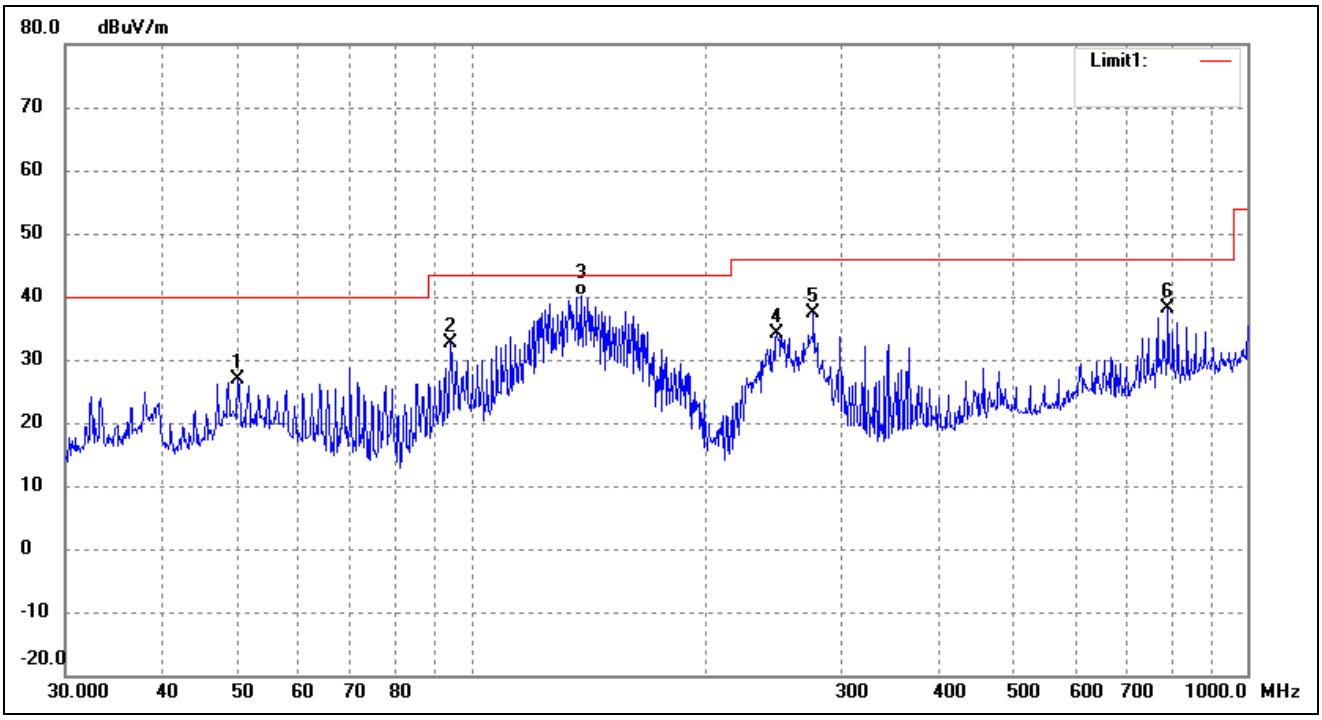
Operating Condition: *802.11b Transmitting High Channel-2462MHz (Worst case)*
Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	89.9047	33.18	-13.65	19.53	43.50	-23.97	121	100	QP
2	166.0680	47.07	-14.79	32.28	43.50	-11.22	215	100	QP
3	245.9509	47.87	-10.69	37.18	46.00	-8.82	103	100	QP
4	276.1236	52.98	-9.62	43.36	46.00	-2.64	64	100	QP
5	400.4319	41.07	-7.61	33.46	46.00	-12.54	335	100	QP
6	790.6188	39.23	0.21	39.44	46.00	-6.56	271	100	QP

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	50.0566	37.20	-10.42	26.78	40.00	-13.22	99	100	QP
2	94.0979	45.43	-12.71	32.72	43.50	-10.78	149	100	QP
3	138.3873	54.93	-14.72	40.21	43.50	-3.29	252	100	QP
4	247.6819	44.63	-10.60	34.03	46.00	-11.97	63	100	QP
5	276.1235	46.94	-9.62	37.32	46.00	-8.68	357	100	QP
6	790.6188	37.91	0.21	38.12	46.00	-7.88	295	100	QP

Spurious Emissions Above 1GHz

Test Mode: 802.11b (Worst case)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	67.15	-3.87	63.28	74	-10.72	H	PK
4824.000	52.86	-3.87	48.99	54	-5.01	H	AV
7236.000	65.77	1.14	66.91	74	-7.09	H	PK
7236.000	47.34	1.19	48.53	54	-5.47	H	AV
4824.000	67.07	-3.86	63.21	74	-10.79	V	PK
4824.000	52.50	-3.86	48.64	54	-5.36	V	AV
7236.000	65.09	1.1	66.19	74	-7.81	V	PK
7236.000	46.69	1.1	47.79	54	-6.21	V	AV
Middle Channel-2437MHz							
4874.000	65.96	-3.74	62.22	74	-11.78	H	PK
4874.000	51.73	-3.74	47.99	54	-6.01	H	AV
7311.000	66.73	1.47	68.20	74	-5.80	H	PK
7311.000	48.75	1.47	50.22	54	-3.78	H	AV
4874.000	65.50	-3.74	61.76	74	-12.24	V	PK
4874.000	52.74	-3.74	49.00	54	-5.00	V	AV
7311.000	68.38	1.47	69.85	74	-4.15	V	PK
7311.000	46.34	1.47	47.81	54	-6.19	V	AV
High Channel-2462MHz							
4924.000	67.53	-3.59	63.94	74	-10.06	H	PK
4924.000	51.43	-3.59	47.84	54	-6.16	H	AV
7386.000	66.18	1.79	67.97	74	-6.03	H	PK
7386.000	48.10	1.79	49.89	54	-4.11	H	AV
4924.000	66.90	-3.59	63.31	74	-10.69	V	PK
4924.000	50.31	-3.59	46.72	54	-7.28	V	AV
7386.000	67.12	1.79	68.91	74	-5.09	V	PK
7386.000	46.10	1.79	47.89	54	-6.11	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

9. Out of Band Emissions

9.1 Standard Applicable

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Test Procedure

According to the KDB 558074D01 v03r05, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak/average; Trace = max hold
All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 v03r05, the conducted spurious emissions test method as follows:
1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW ≥ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

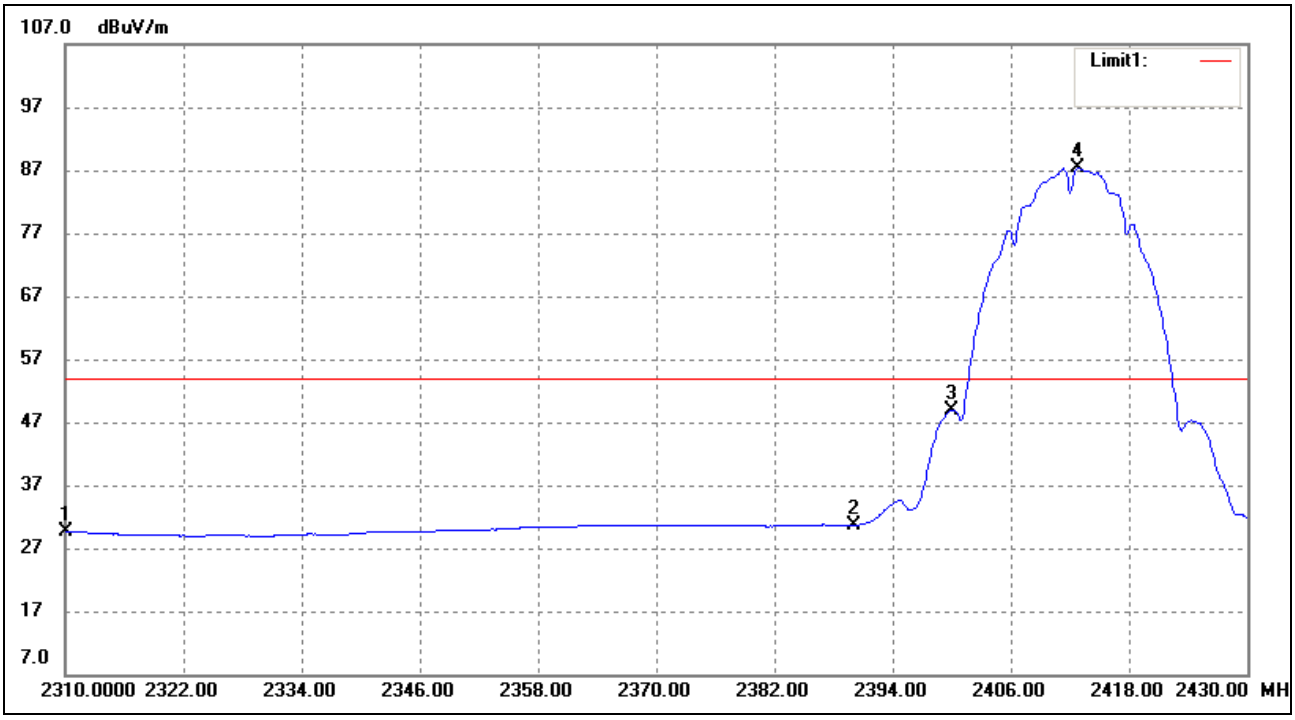
9.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

802.11b-Lowest Bandedge

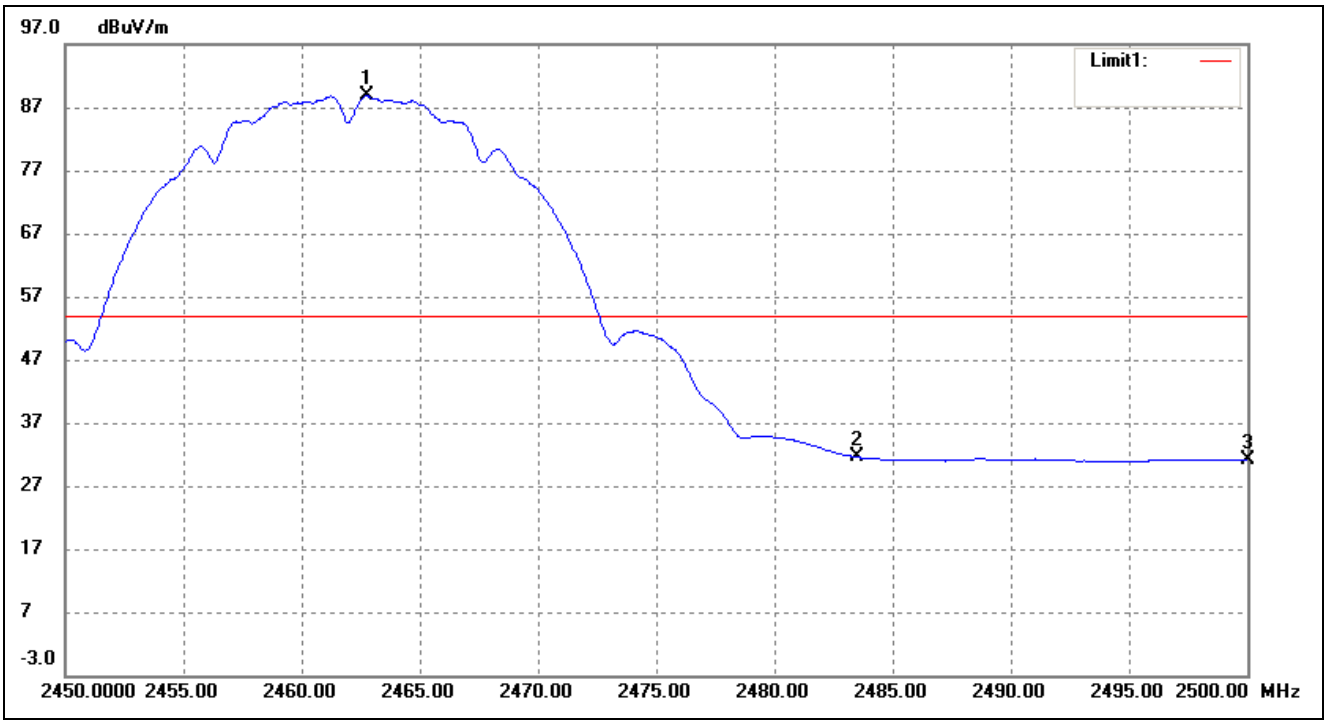
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.95	-4.42	29.53	54.00	-24.47	Average Detector
	2310.000	44.98	-4.42	40.56	74.00	-33.44	Peak Detector
2	2390.000	34.34	-3.72	30.62	54.00	-23.38	Average Detector
	2390.000	45.43	-3.72	41.71	74.00	-32.29	Peak Detector
3	2400.000	52.53	-3.64	48.89	54.00	-5.11	Average Detector
	2400.000	58.48	-3.64	54.84	74.00	-19.16	Peak Detector
4	2412.840	90.97	-3.54	87.43	/	/	Average Detector
	2413.080	95.80	-3.54	92.26	/	/	Peak Detector

802.11b-Highest Bandedge

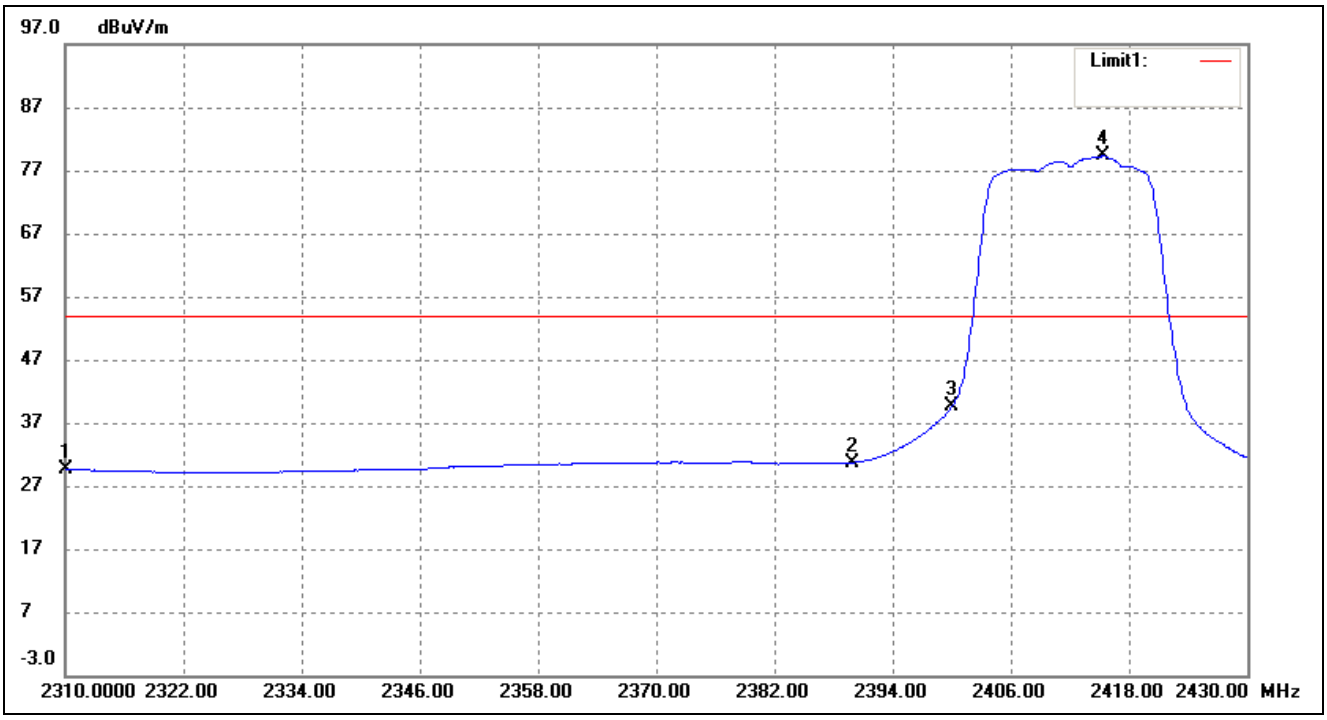
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.750	91.97	-3.17	88.80	/	/	Average Detector
	2463.050	96.99	-3.16	93.83	/	/	Peak Detector
2	2483.500	34.58	-3.01	31.57	54.00	-22.43	Average Detector
	2483.500	46.43	-3.01	43.42	74.00	-30.58	Peak Detector
3	2500.000	34.03	-2.88	31.15	54.00	-22.85	Average Detector
	2500.000	45.70	-2.88	42.82	74.00	-31.18	Peak Detector

802.11g-Lowest Bandedge

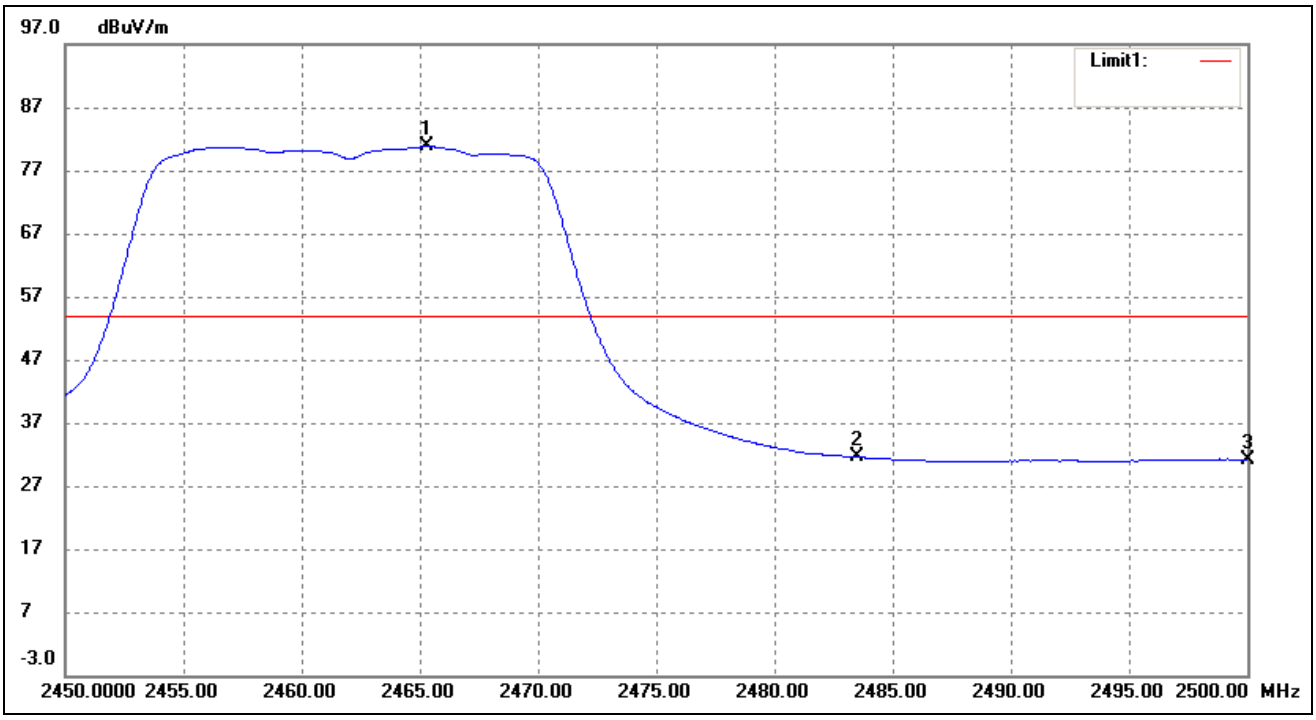
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.03	-4.42	29.61	54.00	-24.39	Average Detector
	2310.000	45.73	-4.42	41.31	74.00	-32.69	Peak Detector
2	2390.000	34.44	-3.72	30.72	54.00	-23.28	Average Detector
	2390.000	46.55	-3.72	42.83	74.00	-31.17	Peak Detector
3	2400.000	43.16	-3.64	39.52	54.00	-14.48	Average Detector
	2400.000	72.22	-3.64	68.58	74.00	-5.42	Peak Detector
4	2415.360	82.79	-3.52	79.27	/	/	Average Detector
	2415.240	94.51	-3.52	90.99	/	/	Peak Detector

802.11g-Highest Bandedge

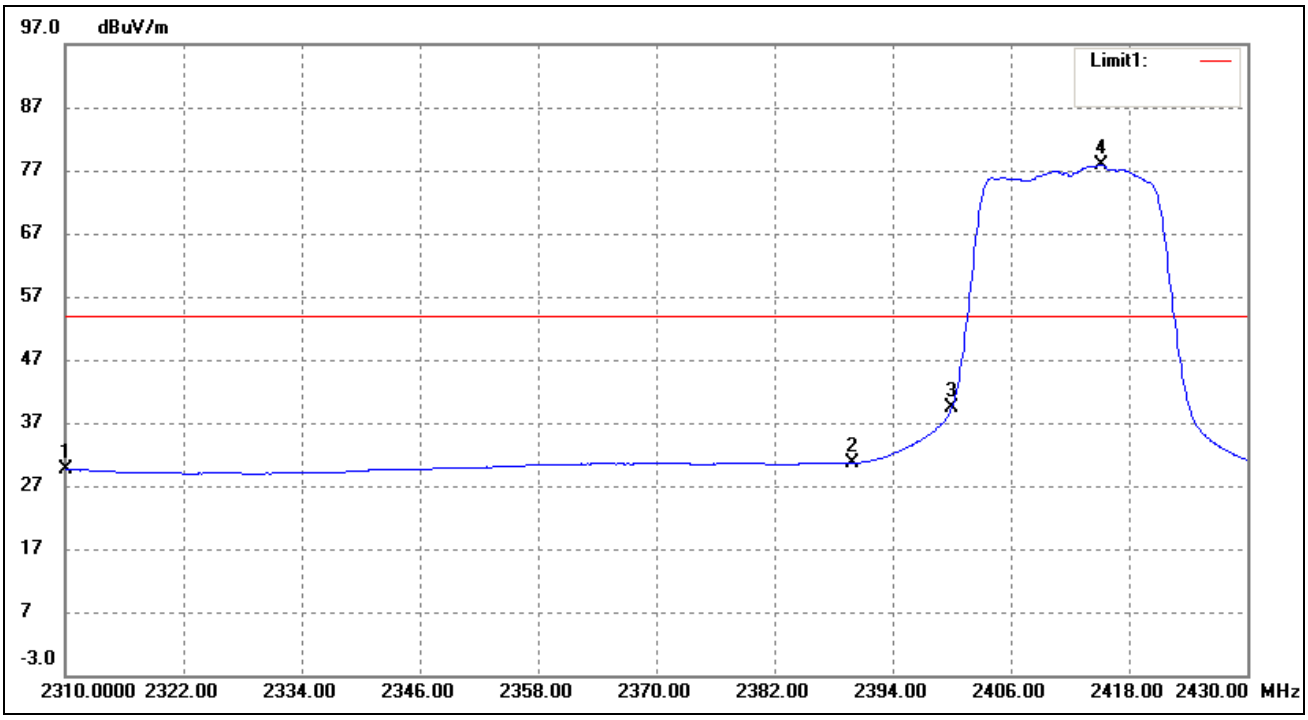
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2465.300	83.97	-3.15	80.82	/	/	Average Detector
	2465.100	95.79	-3.15	92.64	/	/	Peak Detector
2	2483.500	34.58	-3.01	31.57	54.00	-22.43	Average Detector
	2483.500	47.33	-3.01	44.32	74.00	-29.68	Peak Detector
3	2500.000	34.13	-2.88	31.25	54.00	-22.75	Average Detector
	2500.000	46.58	-2.88	43.70	74.00	-30.30	Peak Detector

802.11n-HT20-Lowest Bandedge

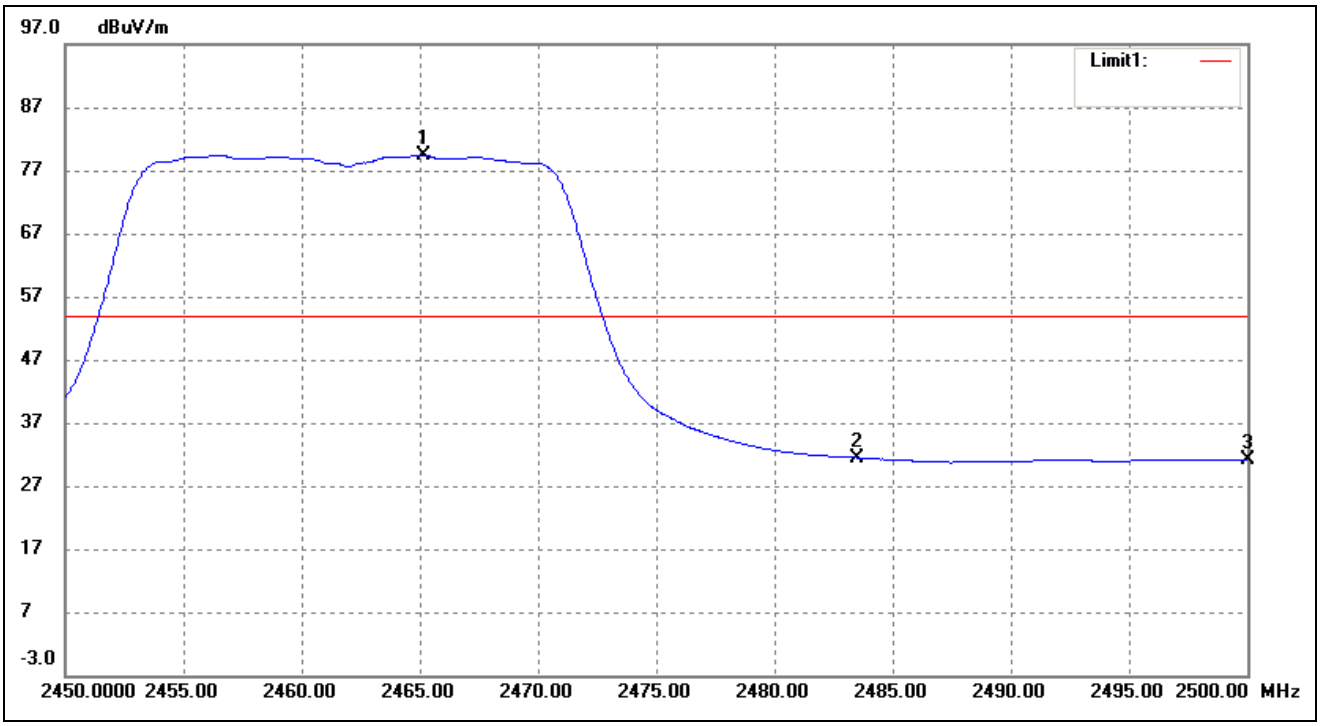
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.94	-4.42	29.52	54.00	-24.48	Average Detector
	2310.000	46.11	-4.42	41.69	74.00	-32.31	Peak Detector
2	2390.000	34.35	-3.72	30.63	54.00	-23.37	Average Detector
	2390.000	46.19	-3.72	42.47	74.00	-31.53	Peak Detector
3	2400.000	43.02	-3.64	39.38	54.00	-14.62	Average Detector
	2400.000	71.95	-3.64	68.31	74.00	-5.69	Peak Detector
4	2415.120	81.33	-3.52	77.81	/	/	Average Detector
	2415.240	92.00	-3.52	88.48	/	/	Peak Detector

802.11n-HT20-Highest Bandedge

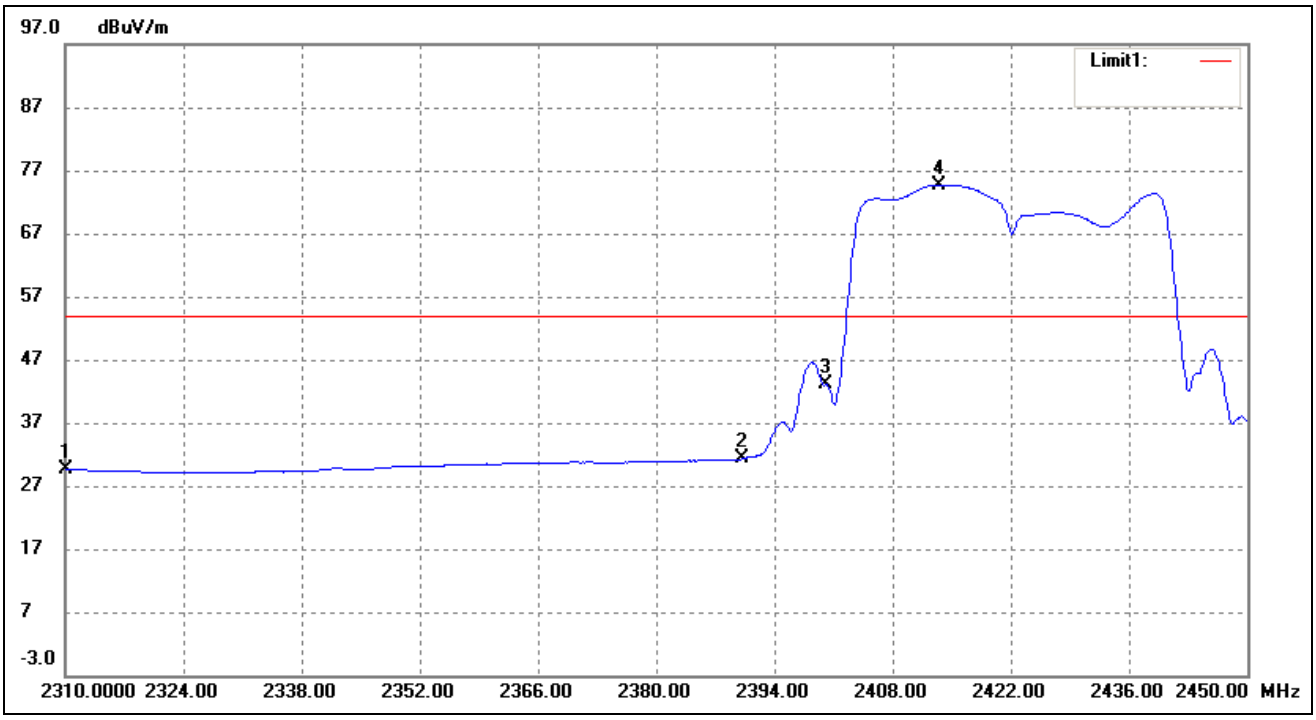
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2465.150	82.62	-3.15	79.47	/	/	Average Detector
	2458.850	93.69	-3.19	90.50	/	/	Peak Detector
2	2483.500	34.51	-3.01	31.50	54.00	-22.50	Average Detector
	2483.500	47.39	-3.01	44.38	74.00	-29.62	Peak Detector
3	2500.000	34.06	-2.88	31.18	54.00	-22.82	Average Detector
	2500.000	45.37	-2.89	42.48	74.00	-31.52	Peak Detector

802.11n-HT40-Lowest Bandedge

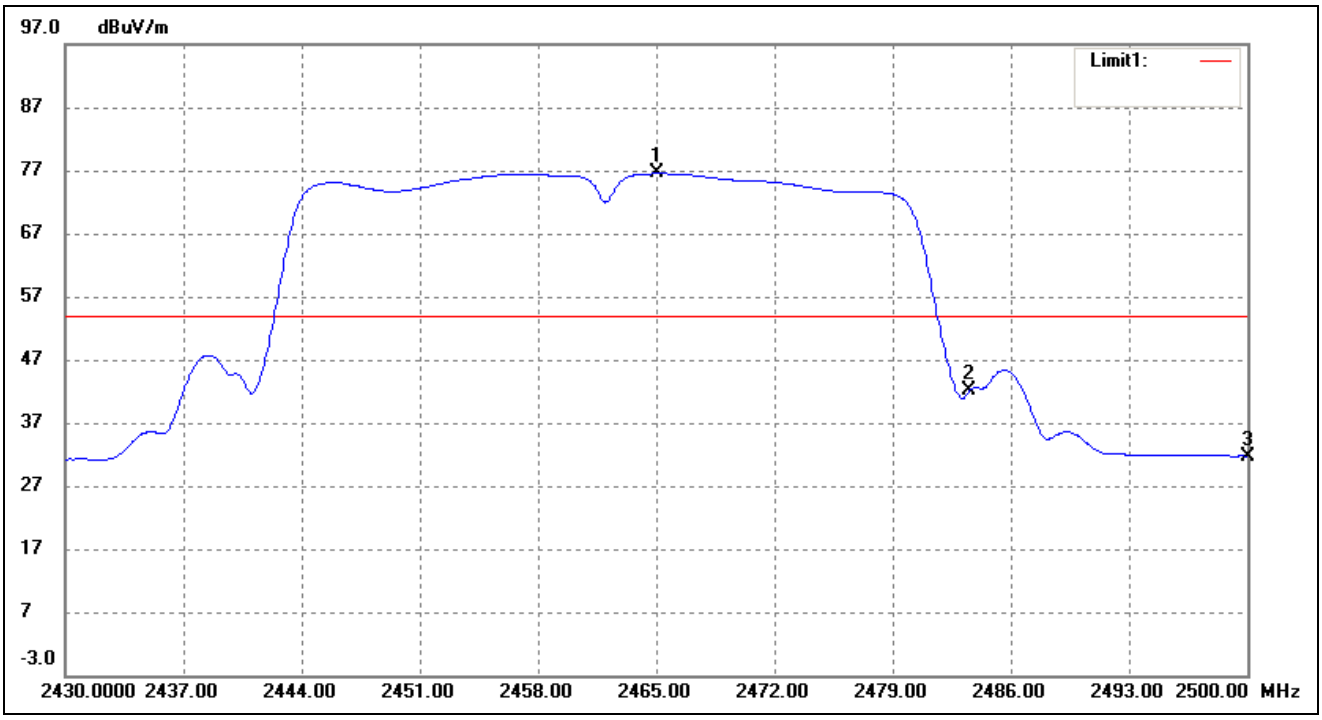
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.05	-4.42	29.63	54.00	-24.37	Average Detector
	2310.000	45.99	-4.42	41.57	74.00	-32.43	Peak Detector
2	2390.000	34.99	-3.72	31.27	54.00	-22.73	Average Detector
	2390.000	47.98	-3.72	44.26	74.00	-29.74	Peak Detector
3	2400.000	46.68	-3.64	43.04	54.00	-10.96	Average Detector
	2400.000	59.64	-3.64	56.00	74.00	-18.00	Peak Detector
4	2413.460	78.26	-3.53	74.73	/	/	Average Detector
	2412.620	88.65	-3.54	85.11	/	/	Peak Detector

802.11n-HT40-Highest Bandedge

Vertical (Worst case)

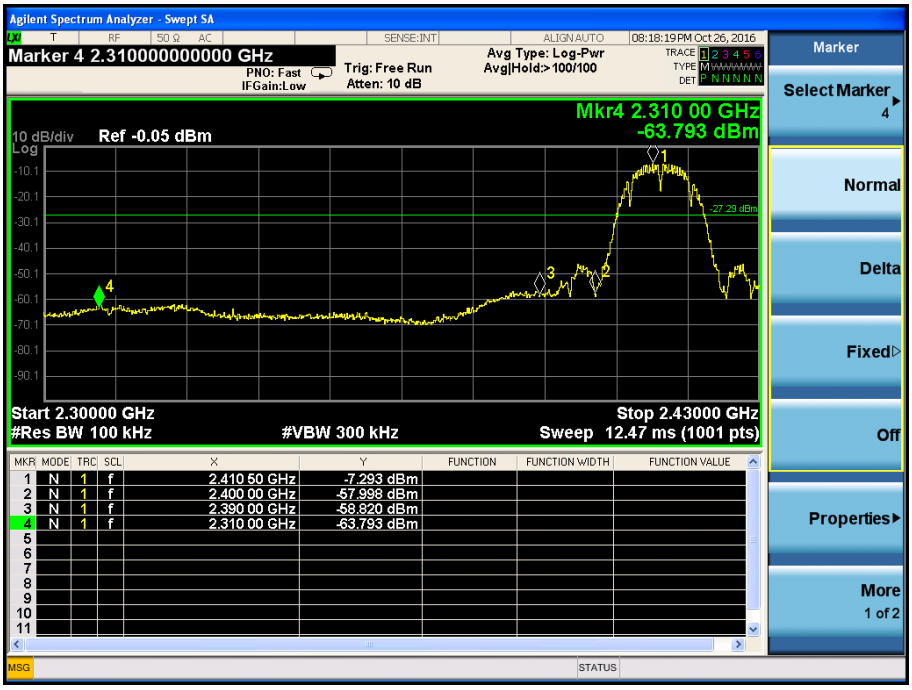


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2465.000	79.69	-3.15	76.54	/	/	Average Detector
	2458.350	90.17	-3.19	86.98	/	/	Peak Detector
2	2483.500	45.15	-3.01	42.14	54.00	-11.86	Average Detector
	2483.500	60.65	-3.01	57.64	74.00	-16.36	Peak Detector
3	2500.000	34.62	-2.88	31.74	54.00	-22.26	Average Detector
	2500.000	46.72	-2.88	43.84	74.00	-30.16	Peak Detector

Spurious (Conducted)

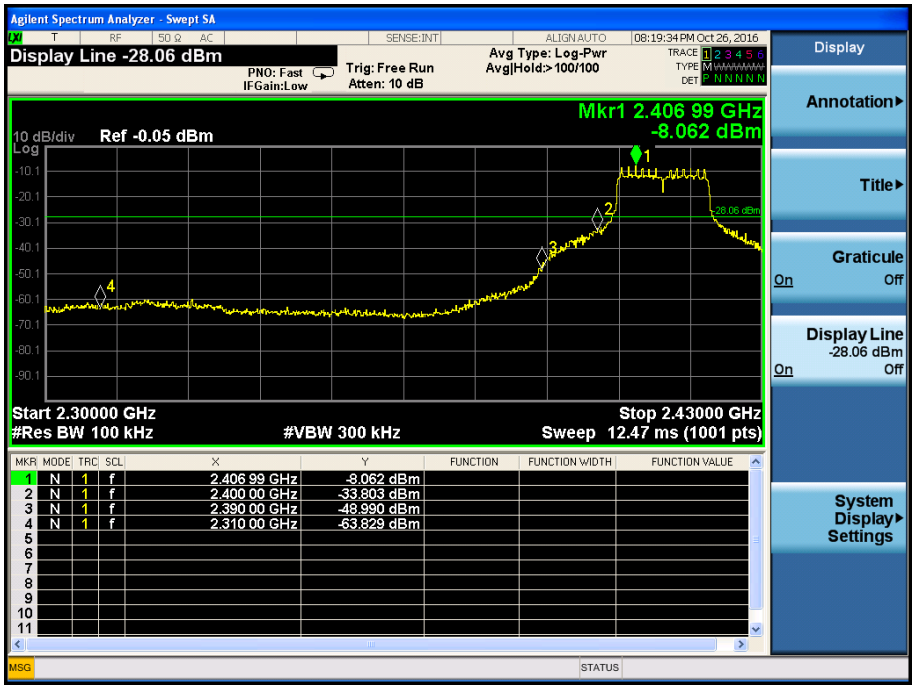
802.11b-Lowest

Lowest



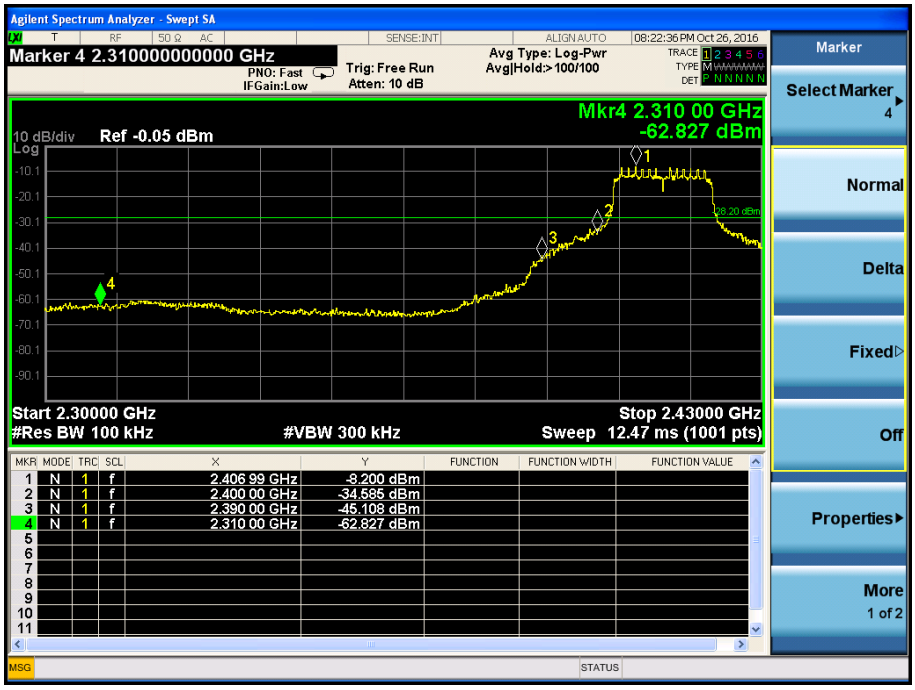
Highest

Spurious (Conducted)
802.11g-Lowest
Lowest



Highest

Spurious (Conducted)
802.11n-HT20-Lowest
Lowest



Highest

Spurious (Conducted)
802.11n-HT40-Lowest
Lowest

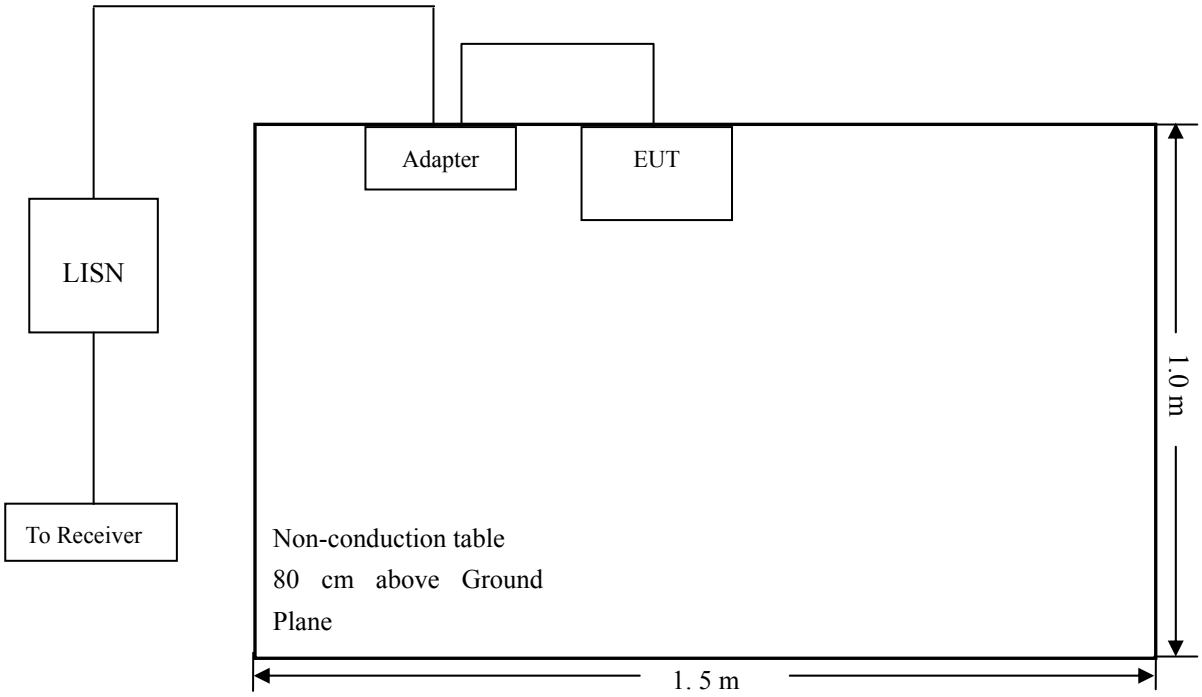
Highest

10. Conducted Emissions

10.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

10.2 Basic Test Setup Block Diagram



10.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed ..... Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth ..... 9 kHz
Quasi-Peak Adapter Mode ..... Normal

10.5 Summary of Test Results/Plots

According to the data in section 10.6, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

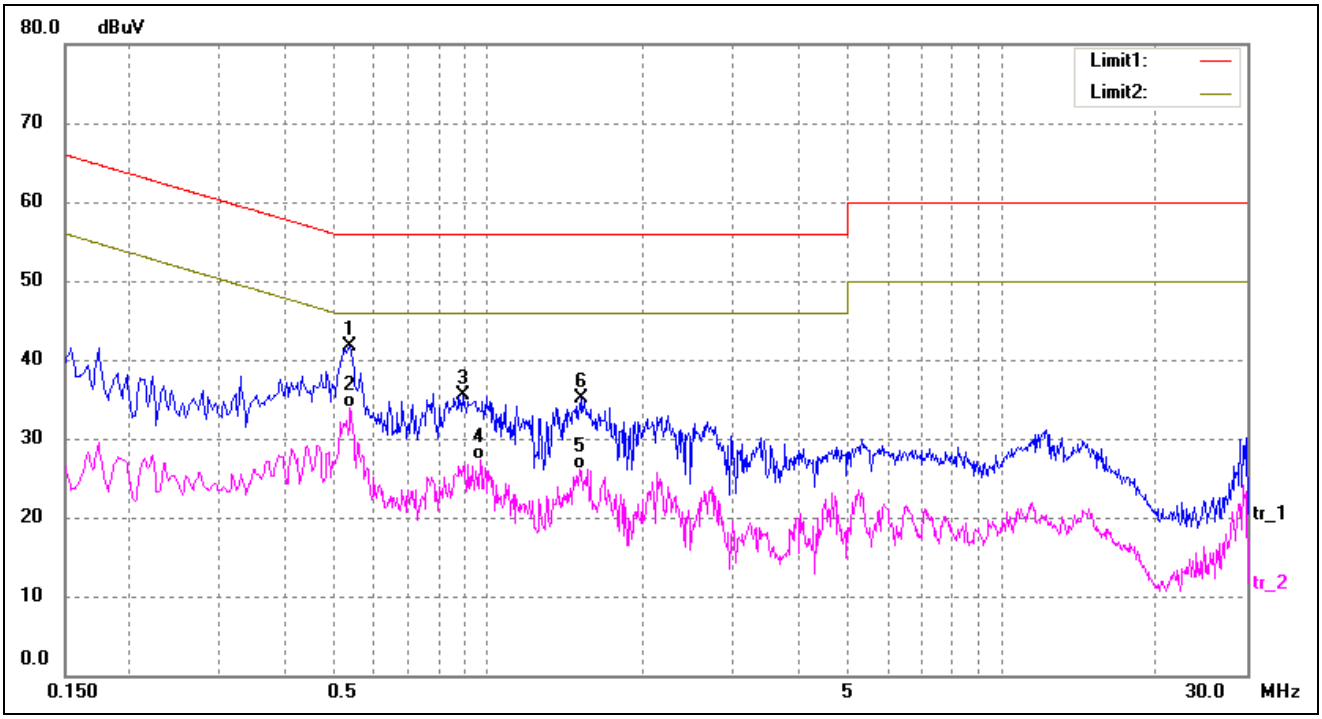
-12.02 dB at 0.5380 MHz in the **Neutral** mode**, Average** detector, **0.15-30MHz**

10.6 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

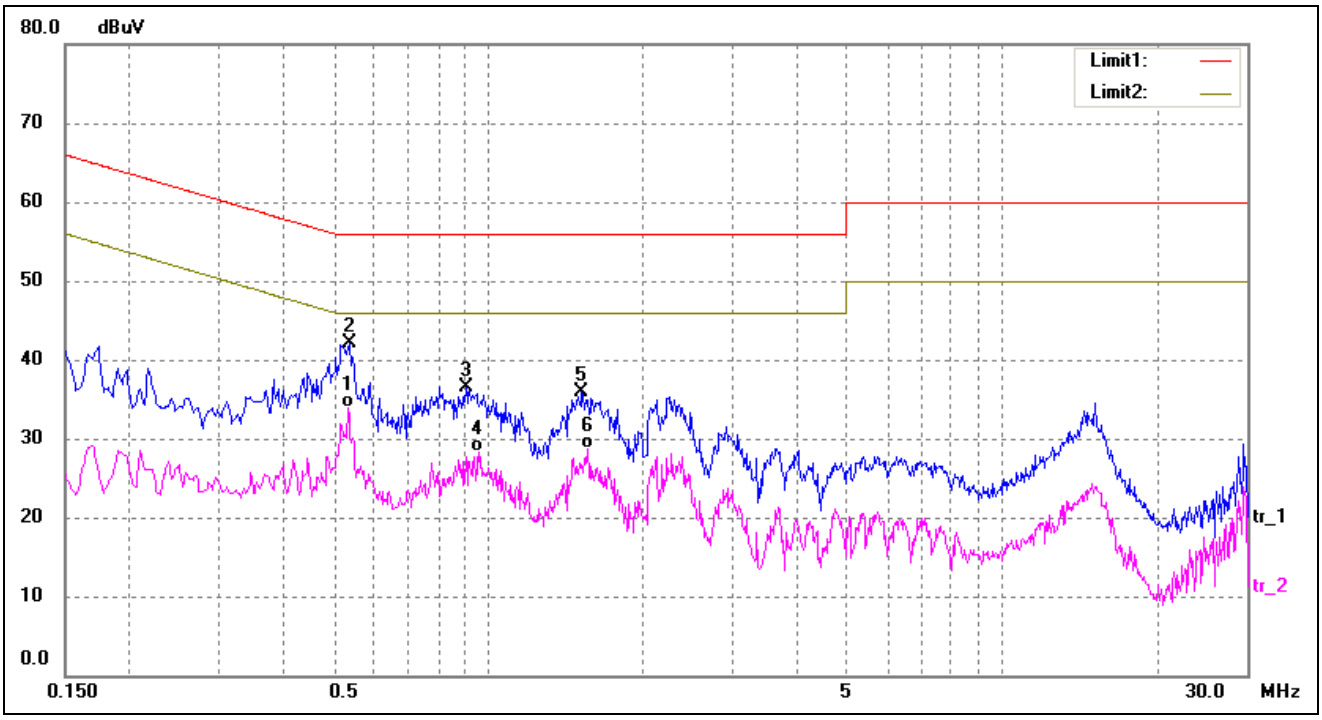
EUT: *Biopod System*
Tested Model: *Biopod One*
Operating Condition: *Transmitting(Wi-Fi)*
Comment: *AC 120V/60Hz*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.5380	31.96	9.80	41.76	56.00	-14.24	QP
2*	0.5380	24.18	9.80	33.98	46.00	-12.02	AVG
3	0.8940	25.72	9.77	35.49	56.00	-20.51	QP
4	0.9660	17.48	9.76	27.24	46.00	-18.76	AVG
5	1.5100	16.36	9.75	26.11	46.00	-19.89	AVG
6	1.5260	25.43	9.75	35.18	56.00	-20.82	QP

Test Specification: *Line*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.5340	24.13	9.80	33.93	46.00	-12.07	AVG
2	0.5380	32.21	9.80	42.01	56.00	-13.99	QP
3	0.9060	26.80	9.77	36.57	56.00	-19.43	QP
4	0.9620	18.60	9.76	28.36	46.00	-17.64	AVG
5	1.5260	26.10	9.75	35.85	56.00	-20.15	QP
6	1.5660	18.93	9.75	28.68	46.00	-17.32	AVG

******* END OF REPORT *******