

Prüfbericht-Nr.: <i>Test report No.:</i>	50090059 001	Auftrags-Nr.: <i>Order No.:</i>	164094026	Seite 1 von 22 <i>Page 1 of 22</i>	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	29.05.2017		
Auftraggeber: <i>Client:</i>	Binatone Electronics International Ltd. Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong				
Prüfgegenstand: <i>Test item:</i>	Smart Monitoring Companion				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	MBP162CONNECT (Trade Mark: motorola)				
Auftrags-Inhalt: <i>Order content:</i>	FCC and IC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 2: Section 2.1091	RSS-247 Issue 2 February 2017 RSS-Gen Issue 4 November 2014 RSS-102 Issue 5 March 2015			
Wareneingangsdatum: <i>Date of receipt:</i>	30.05.2017	Please refer to photo documents			
Prüfmuster-Nr.: <i>Test sample No.:</i>	LY170525030-01 to 003				
Prüfzeitraum: <i>Testing period:</i>	02.06.2017 - 28.06.2017				
Ort der Prüfung: <i>Place of testing:</i>	EMTEK(Shenzhen) Co., Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:	kontrolliert von / reviewed by:				
12.07.2017	Alex Lan / Project Engineer		12.07.2017	Owen Tian / Technical Certifier	
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date	Name/Stellung Name/Position	Unterschrift Signature
Sonstiges / Other:					
FCC ID: VLJ-MBP162 IC: 4522A-MBP162			HVIN: MBP162CONNECT		
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(pass) = entspricht o.g. Prüfgrundlage(n) F(fail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(pass) = passed a.m. test specifications(s) F(fail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

Prüfbericht - Nr.: 50090059 001
Test Report No.

Seite 2 von 22
Page 2 of 22

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 99% BANDWIDTH

RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.8 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

6.1.1 ELECTROMAGNETIC FIELDS

RESULT: Pass

Prüfbericht - Nr.: 50090059 001
Test Report No.Seite 3 von 22
Page 3 of 22**Contents**

1	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS	4
2	TEST SITES	4
2.1	TEST FACILITIES	4
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	5
2.3	TRACEABILITY	6
2.4	CALIBRATION	6
2.5	MEASUREMENT UNCERTAINTY.....	6
2.6	LOCATION OF ORIGINAL DATA.....	6
2.7	STATUS OF FACILITY USED FOR TESTING.....	6
3	GENERAL PRODUCT INFORMATION	7
3.1	PRODUCT FUNCTION AND INTENDED USE.....	7
3.2	RATINGS AND SYSTEM DETAILS	7
3.3	INDEPENDENT OPERATION MODES	8
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	8
3.5	SUBMITTED DOCUMENTS.....	8
4	TEST SET-UP AND OPERATION MODES	9
4.1	PRINCIPLE OF CONFIGURATION SELECTION	9
4.2	TEST OPERATION AND TEST SOFTWARE.....	9
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	9
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	9
4.5	TEST SETUP DIAGRAM	10
5	TEST RESULTS	12
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	12
5.1.1	Antenna Requirement	12
5.1.2	Maximum Peak Conducted Output Power.....	13
5.1.3	Conducted Power Spectral Density	14
5.1.4	6dB Bandwidth	15
5.1.5	99% Bandwidth	16
5.1.6	Conducted Spurious Emissions Measured in 100 kHz Bandwidth	17
5.1.7	Radiated Spurious Emission	18
5.1.8	Conducted Emission on AC Mains.....	19
6	SAFETY HUMAN EXPOSURE	20
6.1	RADIO FREQUENCY EXPOSURE COMPLIANCE	20
6.1.1	Electromagnetic Fields	20
7	PHOTOGRAPHS OF THE TEST SET-UP	22
8	LIST OF TABLES.....	22

Prüfbericht - Nr.: 50090059 001
Test Report No.

Seite 4 von 22
Page 4 of 22

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of Conducted Testing

Appendix C: Test Results of Radiated Testing

2 Test Sites

2.1 Test Facilities

EMTEK(Shenzhen) Co., Ltd.

Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China.

FCC Registration No.: 406365

Test site Industry Canada No.: 4088A-2

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

Prüfbericht - Nr.: 50090059 001
Test Report No.

Seite 5 von 22
Page 5 of 22

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Test				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Temp. / Humidity Chamber	Kingson	THS-M1	242	20.05.2018
EMI Test Receiver	Rohde & Schwarz	ESCI	101045	21.05.2018
Vector Signal Generator	Agilent	N5182B	My53050553	20.05.2018
Analog Signal Generator	Agilent	N5171B	My53050878	20.05.2018
Signal Analyzer	Agilent	N9010A	My53470879	21.05.2018
Power Analyzer	Agilent	PS-X10-200	N/A	21.05.2018
Test Accessories	Agilent	PS-X10-100	N/A	20.05.2018
Spurious Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	20.05.2018
Pre-Amplifier	HP	8447D	2944A07999	20.05.2018
Bilog Antenna	Schwarzbeck	VULB9163	142	21.05.2018
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	21.05.2018
Horn Antenna	Schwarzbeck	BBHA 9120	D143	21.05.2018
Cable	Schwarzbeck	AK9513	ACRX1	21.05.2018
Cable	Rosenberger	N/A	FP2RX2	21.05.2018
Cable	Schwarzbeck	AK9513	CRPX1	21.05.2018
Cable	Schwarzbeck	AK9513	CRRX2	21.05.2018
Pre-Amplifier	LUNAR-EM	LNA30M3G-25	J10100000070	20.05.2018
Band reject Filter(50dB)	WI/DE	WRCGV-2400(2400-2485MHz)	2	20.05.2018
Conducted Emission on AC Mains				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	19.05.2018
L.I.S.N.	Rohde & Schwarz	ENV216	101161	19.05.2018
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	20.05.2018
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	20.05.2018

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Item	Extended Uncertainty	
Conducted Emission	± 2.74 dB	
Radiated Emission (30-1000MHz)	Field strength (dB μ V/m)	4.27dB
Radiated Emission (above 1000MHz)	Field strength (dB μ V/m)	4.46dB
Radio Spectrum	± 1.5 dB	

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The EMTEK(Shenzhen) Co., Ltd. Test facility located at Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Smart Monitoring Companion system, it supports Wi-Fi 802.11 b/g/n wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Smart Monitoring Companion
Type Designation	MBP162CONNECT
Trade Mark	motorola
FCC ID	VLJ-MBP162
IC	4522A-MBP162
HVIN	MBP162CONNECT
Operating Voltage	AC 100-240V, 50/60Hz, 150mA
Testing Voltage	AC 120V, 60Hz
Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Gain	2 dBi

Prüfbericht - Nr.: 50090059 001

Test Report No.

Seite 8 von 22
Page 8 of 22

Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
01	2412	/
02	2417	/
03	2422	2422
04	2427	2427
05	2432	2432
06	2437	2437
07	2442	2442
08	2447	2447
09	2452	2452
10	2457	/
11	2462	/

Test frequencies are lowest channel: 2412 MHz, middle channel: 2437 MHz and highest channel: 2462 MHz for 802.11b/g/n(HT20)

Test frequencies are lowest channel: 2422 MHz, middle channel: 2437 MHz and highest channel: 2452 MHz for 802.11n(HT40)

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Wi-Fi 802.11 b/g/n wireless transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. On, Normal operation with Wi-Fi 802.11 b/g/n wireless transmitting
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Notebook	Lenovo	Lenovo ideapad 300S-14ISK	R90J1L2K
IPhone 5C	Apple	A1526	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

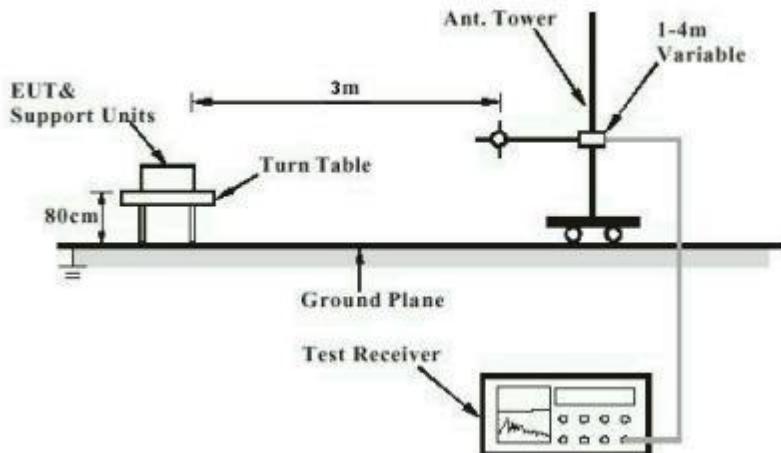
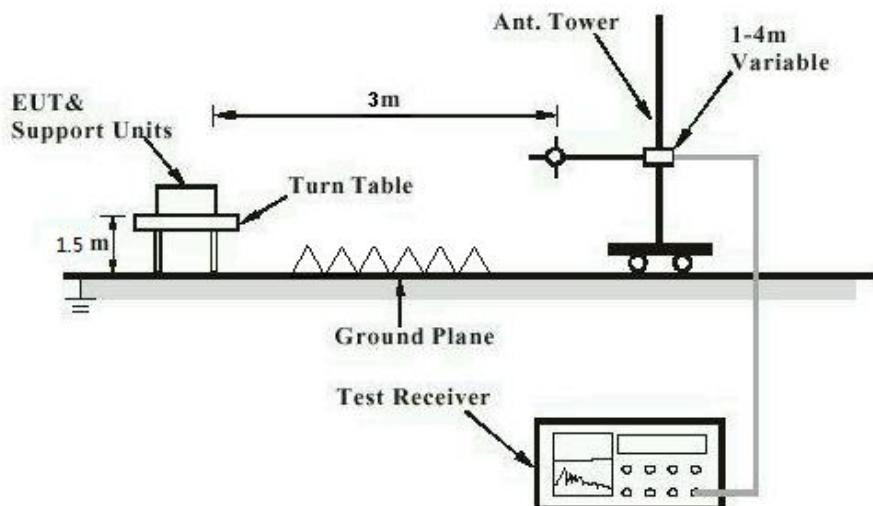
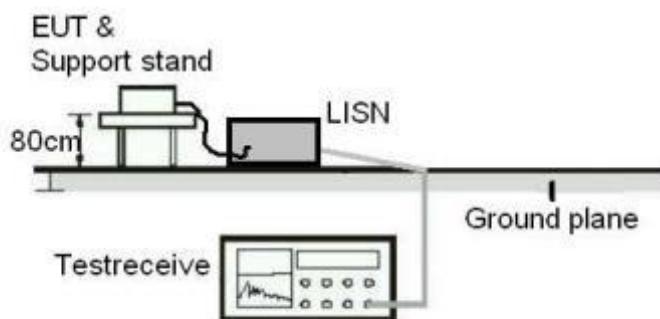
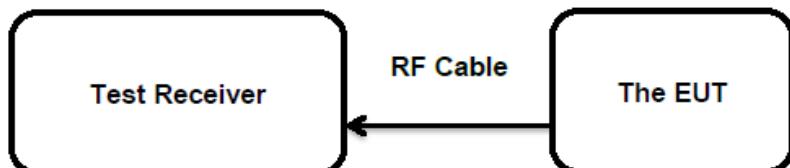


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



Prüfbericht - Nr.: 50090059 001
Test Report No.Seite 11 von 22
Page 11 of 22**Diagram of Measurement Configuration for Mains Conduction Measurement****Diagram of Measurement Configuration for Conducted Transmitter Measurement**

5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: Pass

Test Specification

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen Clause 8.3
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 2 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

Prüfbericht - Nr.: 50090059 001
Test Report No.

 Seite 13 von 22
 Page 13 of 22

5.1.2 Maximum Peak Conducted Output Power

RESULT:
Pass
Test Specification

Test standard	:	FCC Part 15.247(b)(3) RSS-247 Clause 5.4(4)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 1 Watt
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	28.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 5: Test Result of Maximum Peak Conducted Output Power, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	Measured Power		Limit
			dBm	W	
802.11b	1 Mbps	2412	17.71	0.05902	< 1.0W
		2437	18.02	0.06339	
		2462	18.12	0.06486	
802.11g	6 Mbps	2412	17.65	0.05821	< 1.0W
		2437	17.85	0.06095	
		2462	17.54	0.05675	
802.11n (HT20)	MCS0	2412	17.63	0.05794	< 1.0W
		2437	18.24	0.06668	
		2462	17.11	0.05140	
802.11n (HT40)	MCS0	2422	16.28	0.04246	< 1.0W
		2437	16.07	0.04046	
		2452	16.10	0.04074	
Maximum Measured Value			18.24	0.06668	

Note: The maximum e.r.i.p. is 20.24 dBm less than 4W (36dBm).

The cable loss is taken into account in results.

Prüfbericht - Nr.: 50090059 001
Test Report No.

Seite 14 von 22
Page 14 of 22

5.1.3 Conducted Power Spectral Density

RESULT:

Pass

Test Specification

Test standard	:	FCC Part 15.247(e) RSS-247 Clause 5.2(2)
Basic standard	:	ANSI C63.10: 2013
Limits	:	8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	28.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 6: Test Result of Power Spectral Density, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	Measured Peak Power Spectral Density (dBm/3KHz)
802.11b	1 Mbps	2412	-6.918
		2437	-7.596
		2462	-7.765
802.11g	6 Mbps	2412	-14.757
		2437	-16.130
		2462	-15.596
802.11n (HT20)	MCS0	2412	-16.289
		2437	-16.076
		2462	-16.914
802.11n (HT40)	MCS0	2422	-19.578
		2437	-18.103
		2452	-19.475
Maximum Measured Value			-6.918

Note: The cable loss is taken into account in results.

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 50090059 001
Test Report No.

Seite 15 von 22
Page 15 of 22

5.1.4 6dB Bandwidth

RESULT:

Pass

Test Specification

Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(1)
Basic standard	:	ANSI C63.10: 2013
Limits	:	> 500 KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	27.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 7: Test Result of 6dB Bandwidth, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	-6dB Bandwidth (MHz)	Limit (kHz)
802.11b	1 Mbps	2412	9.08	> 500
		2437	9.05	
		2462	8.60	
802.11g	6 Mbps	2412	16.38	> 500
		2437	16.36	
		2462	16.37	
802.11n (HT20)	MCS0	2412	17.59	> 500
		2437	17.61	
		2462	17.63	
802.11n (HT40)	MCS0	2422	36.32	> 500
		2437	36.18	
		2452	36.35	
Minimum Measured Value			8.600	

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 50090059 001
Test Report No.

 Seite 16 von 22
 Page 16 of 22

5.1.5 99% Bandwidth

RESULT:
Pass
Test Specification

Test standard	:	RSS-Gen Clause 6.6
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	27.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 8: Test Result of 99% Bandwidth, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	99% Bandwidth (MHz)	Limit (kHz)
802.11b	1 Mbps	2412	11.573	/
		2437	11.432	
		2462	11.401	
802.11g	6 Mbps	2412	16.769	/
		2437	16.779	
		2462	16.788	
802.11n (HT20)	MCS0	2412	17.855	/
		2437	17.838	
		2462	17.919	
802.11n (HT40)	MCS0	2422	36.438	/
		2437	36.421	
		2452	36.483	
Maximum Measured Value			36.483	

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 50090059 001
*Test Report No.*Seite 17 von 22
Page 17 of 22**5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)

Kind of test site : Shielded Room

Test Setup

Date of testing	:	27.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: 50090059 001
*Test Report No.*Seite 18 von 22
Page 18 of 22**5.1.7 Radiated Spurious Emission****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Issue 4 Table 4

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing	:	27.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23°C
Relative humidity	:	48%
Atmospheric pressure	:	101 kPa

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix C.

Prüfbericht - Nr.: 50090059 001
*Test Report No.*Seite 19 von 22
Page 19 of 22**5.1.8 Conducted Emission on AC Mains****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a) RSS-Gen Table 3
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	02.06.2017
Input voltage	:	AC 120V, 60Hz
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	24 °C
Relative humidity	:	53 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix C.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: Pass

Test Specification

Test standard	:	CFR47 FCC Part 2: Section 2.1091
		CFR47 FCC Part 1: Section 1.1310
		FCC KDB Publication 447498 v06
		FCC KDB Publication 865664 D02 v01r02
		OET Bulletin 65 (Edition 97-01)
		RSS-102 Issue 5 March 2015

➤ FCC requirements

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to OET Bulletin 65

Power Density: $S_{(\text{mW/cm}^2)} = PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

S = power density (mW/cm^2)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm)

The nominal maximum conducted output power specified:

802.11b/g/n: 19.00 dBm

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain (2.0 dBi 802.11b/g/n), the RF power density can be calculated as below:

For 802.11b/g/n: $S_{(\text{mW/cm}^2)} = PG/4\pi R^2 = 0.025 \text{ mW/cm}^2$

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310: 1.0 mW/cm^2

Prüfbericht - Nr.: 50090059 001
Test Report No.Seite 21 von 22
Page 21 of 22

- **IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

- RF exposure evaluation exempted power for 802.11b/g/n: 2.684 W

The nominal maximum conducted output power specified:

802.11b/g/n: 19.00 dBm

Antenna Gain: 2.0 dBi for 802.11b/g/n

The Max. e.i.r.p. for 802.11b/g/n: 21.00 dBm = 0.126 W

The e.i.r.p. for the 802.11b/g/n is less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

"RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons."

7 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

8 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Technical Specification of EUT	7
Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n	8
Table 4: List of Accessories and Auxiliary Equipment.....	9
Table 5: Test Result of Maximum Peak Conducted Output Power, Wi-Fi 802.11 b/g/n.....	13
Table 6: Test Result of Power Spectral Density, Wi-Fi 802.11 b/g/n	14
Table 7: Test Result of 6dB Bandwidth, Wi-Fi 802.11 b/g/n.....	15
Table 8: Test Result of 99% Bandwidth, Wi-Fi 802.11 b/g/n	16

Appendix B: Test Results of Conducted Testing

APPENDIX B: TEST RESULTS OF CONDUCTED TESTING	1
APPENDIX B.1: CONDUCTED POWER SPECTRAL DENSITY	2
<i>Wi-Fi 802.11 b mode, 1 Mbps</i>	2
<i>Wi-Fi 802.11 g mode, 6 Mbps</i>	3
<i>Wi-Fi 802.11 n(HT20) mode, MCS0</i>	5
<i>Wi-Fi 802.11 n(HT40) mode, MCS0</i>	6
APPENDIX B.2: 6dB BANDWIDTH.....	8
<i>Wi-Fi 802.11 b mode, 1 Mbps</i>	8
<i>Wi-Fi 802.11 g mode, 6 Mbps</i>	9
<i>Wi-Fi 802.11 n(HT20) mode, MCS0</i>	11
<i>Wi-Fi 802.11 n(HT40) mode, MCS0</i>	12
APPENDIX B.3: 99% BANDWIDTH	14
<i>Wi-Fi 802.11 b mode, 1 Mbps</i>	14
<i>Wi-Fi 802.11 g mode, 6 Mbps</i>	15
<i>Wi-Fi 802.11 n(HT20) mode, MCS0</i>	17
<i>Wi-Fi 802.11 n(HT40) mode, MCS0</i>	18
APPENDIX B.4: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH.....	20
<i>Wi-Fi 802.11 b mode, 1 Mbps</i>	20
<i>Wi-Fi 802.11 g mode, 6 Mbps</i>	23
<i>Wi-Fi 802.11 n(HT20) mode, MCS0</i>	26
<i>Wi-Fi 802.11 n(HT40) mode, MCS0</i>	29
<i>Wi-Fi 802.11 b mode, Band Edge</i>	32
<i>Wi-Fi 802.11 g mode, Band Edge</i>	33
<i>Wi-Fi 802.11 n(HT20) mode, Band Edge</i>	34
<i>Wi-Fi 802.11 n(HT40) mode, Band Edge</i>	35

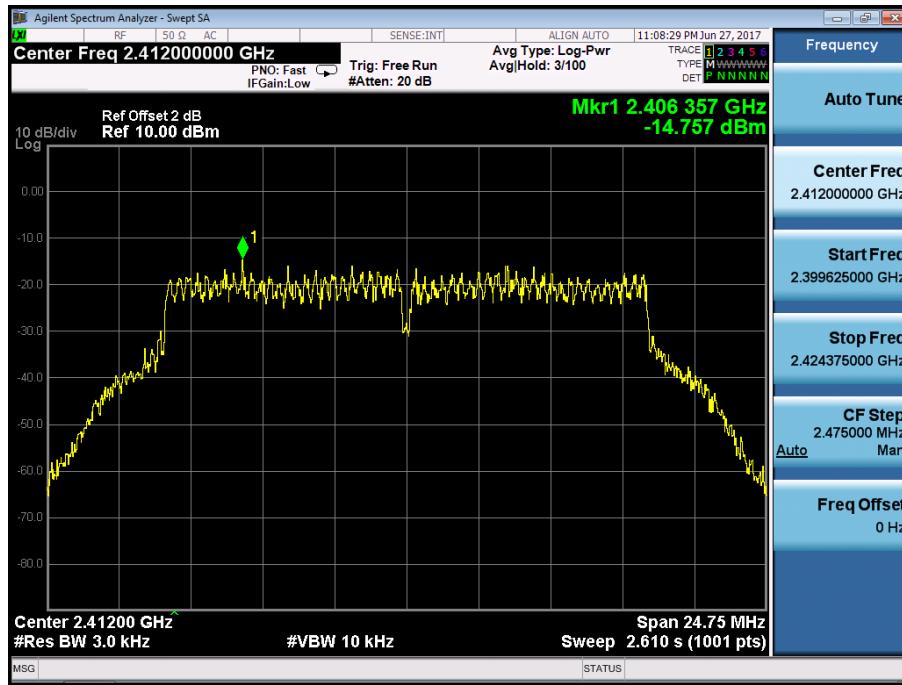
Appendix B.1: Conducted Power Spectral Density

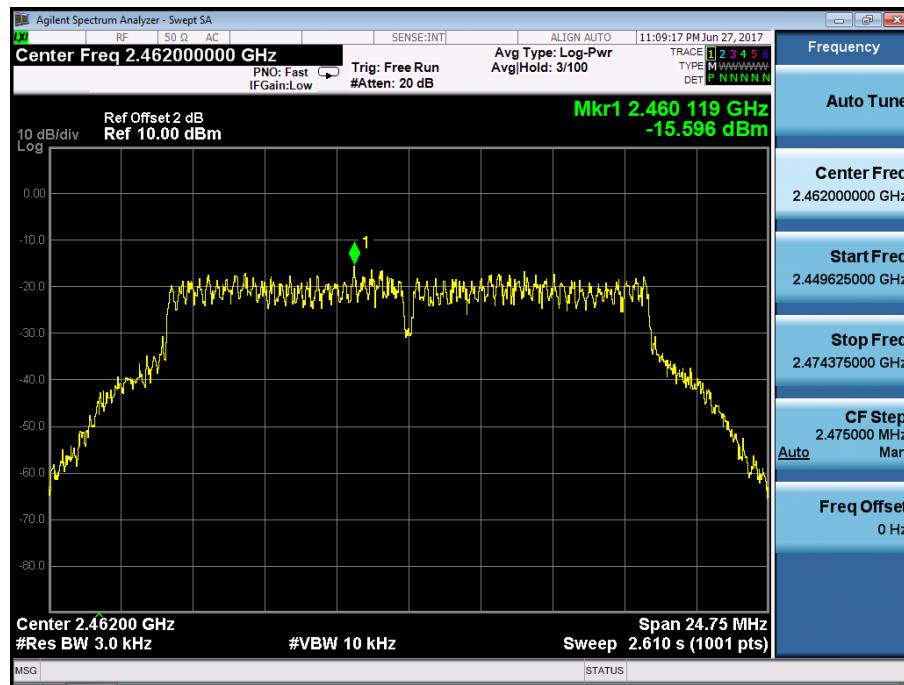
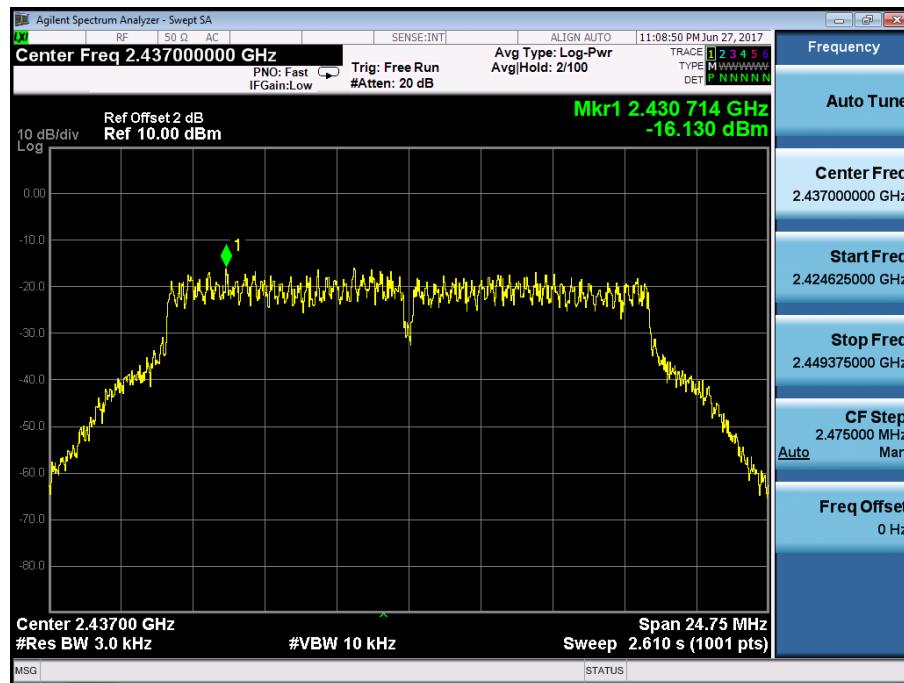
Wi-Fi 802.11 b mode, 1 Mbps



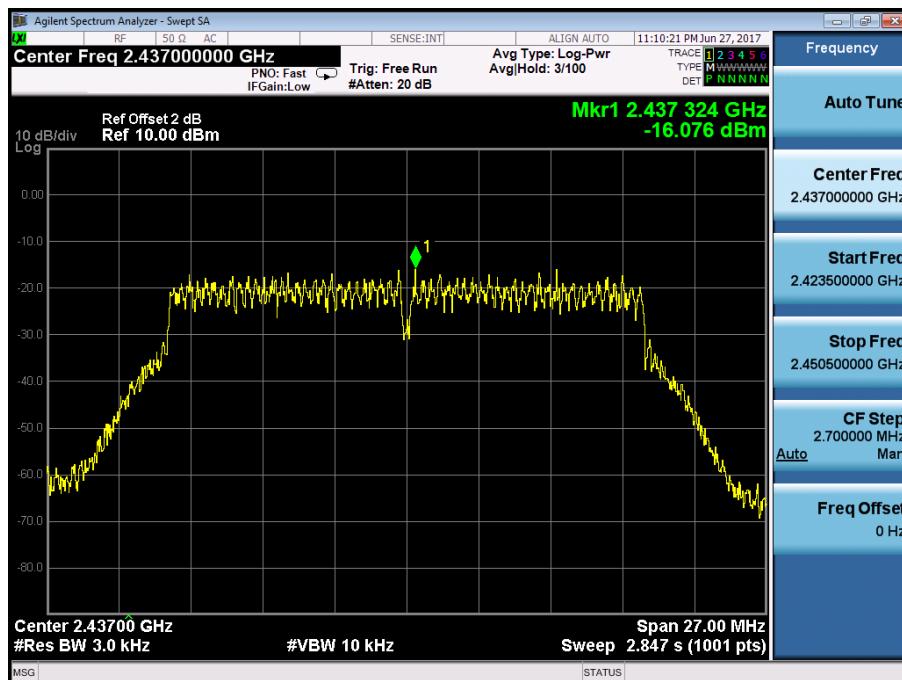
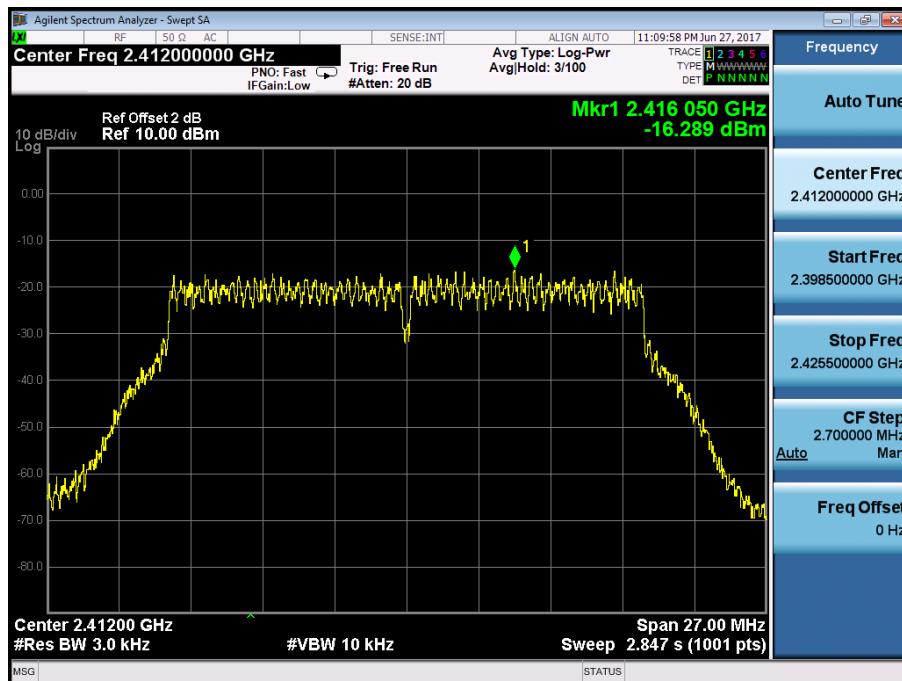


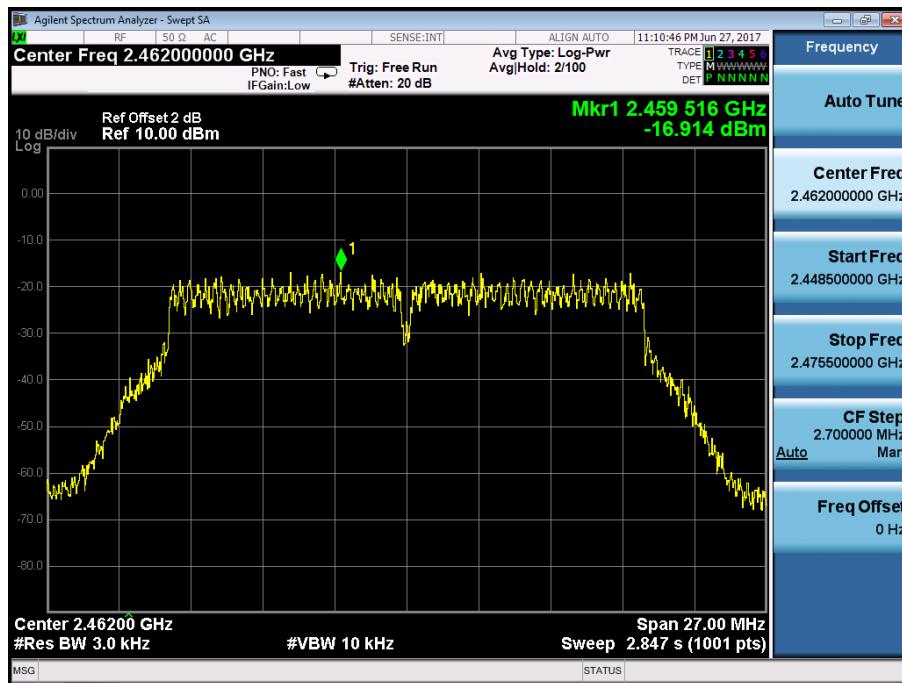
Wi-Fi 802.11 g mode, 6 Mbps



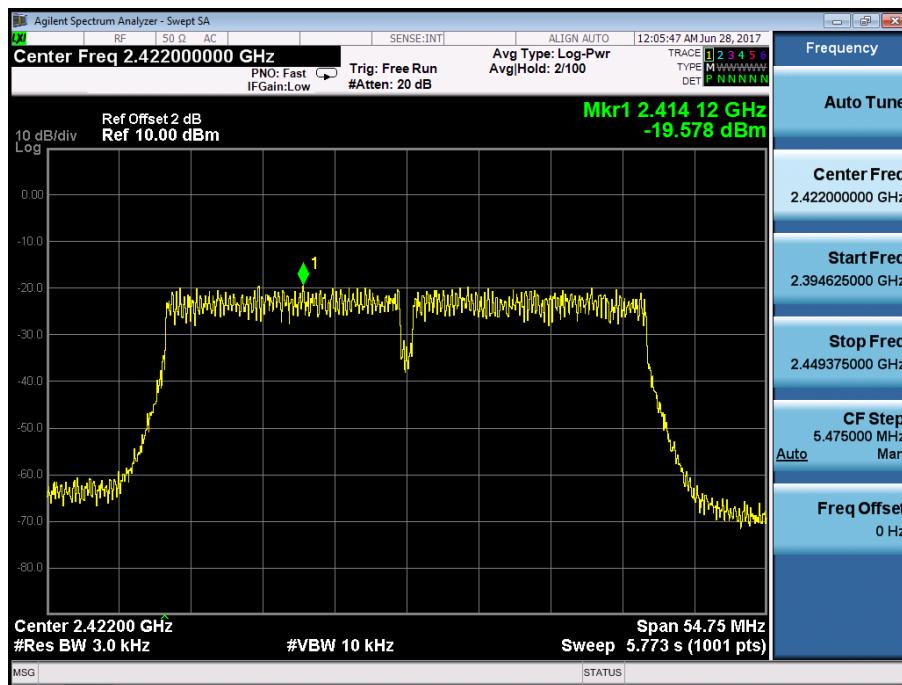


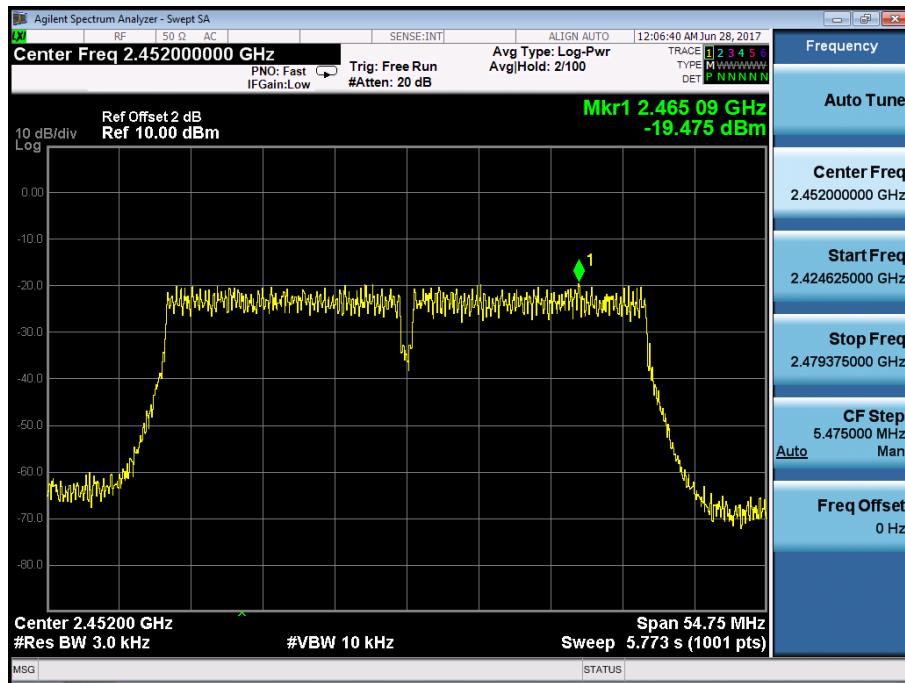
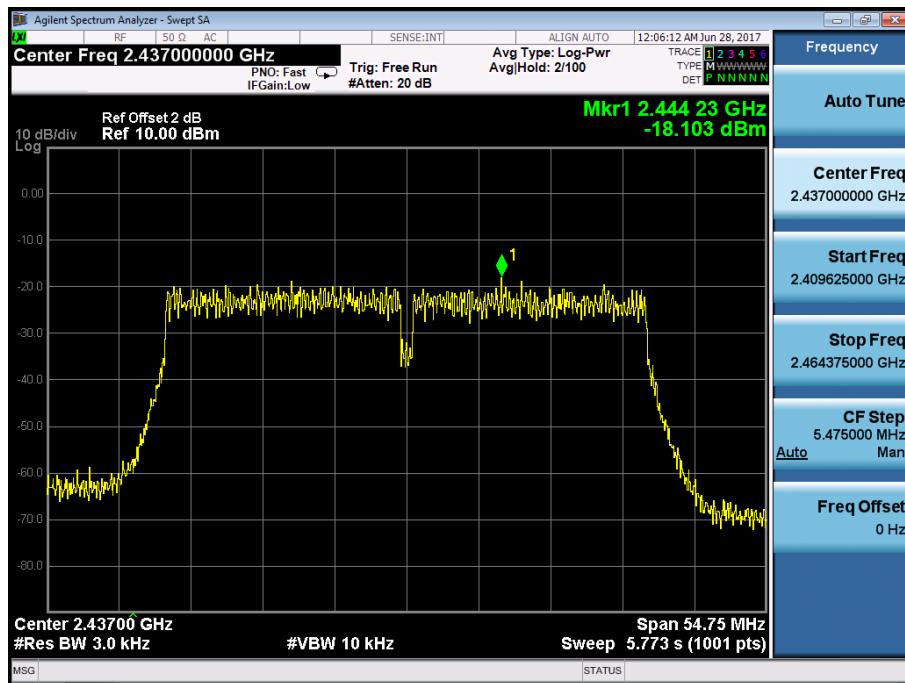
Wi-Fi 802.11 n(HT20) mode, MCS0





Wi-Fi 802.11 n(HT40) mode, MCS0

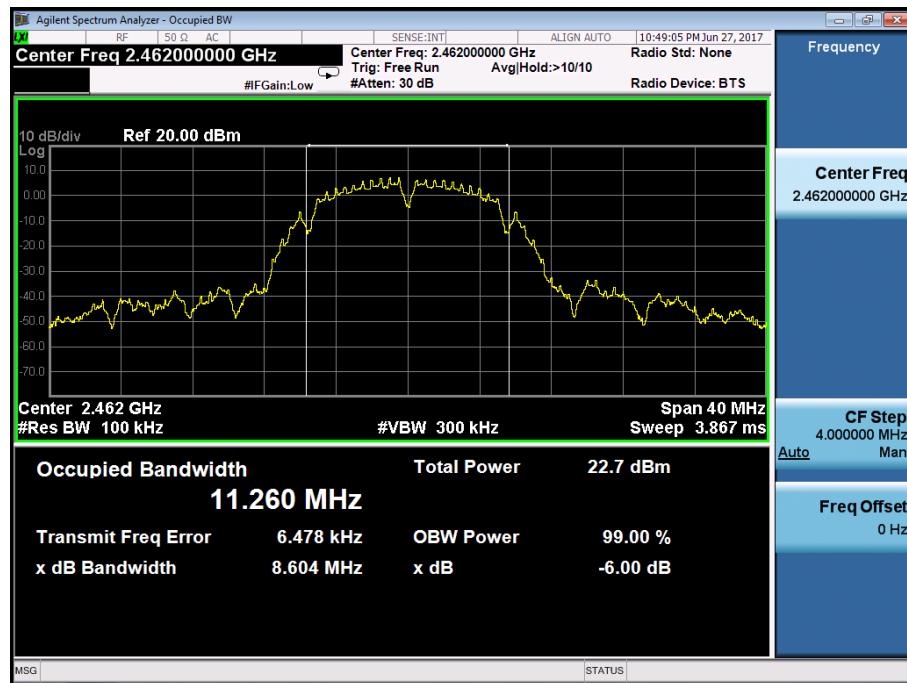




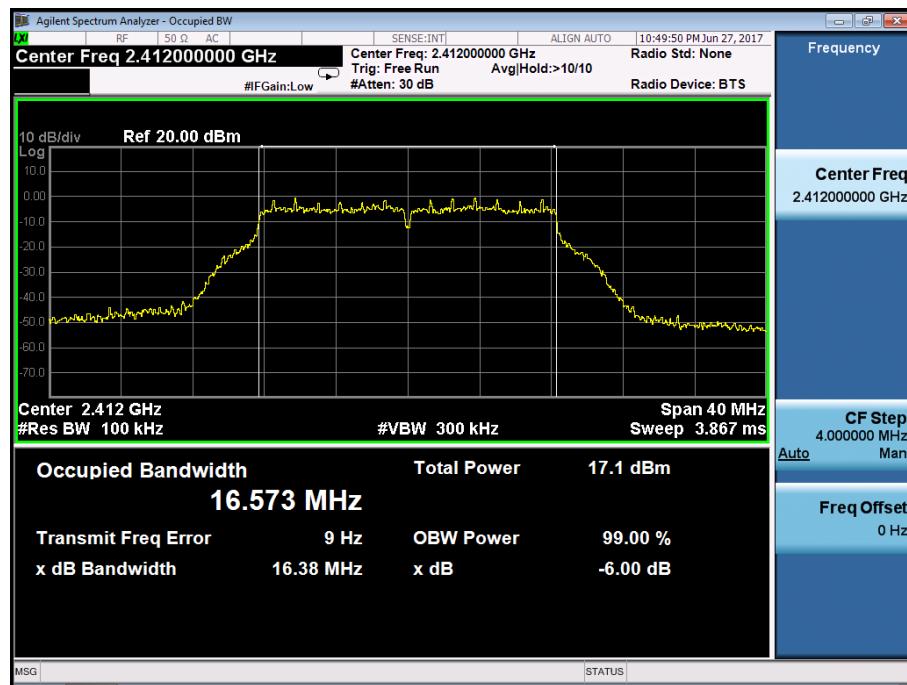
Appendix B.2: 6dB Bandwidth

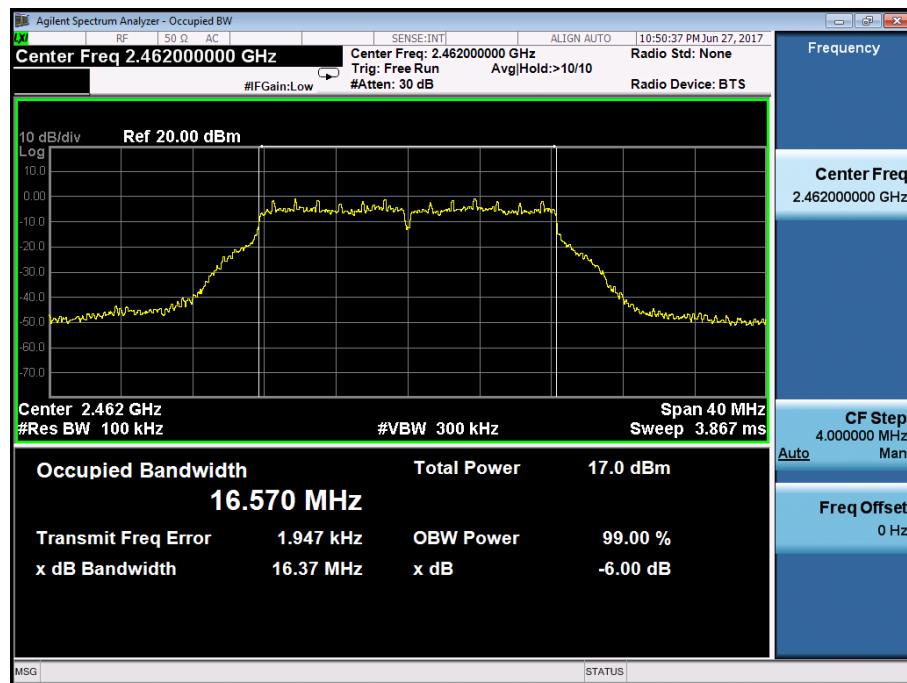
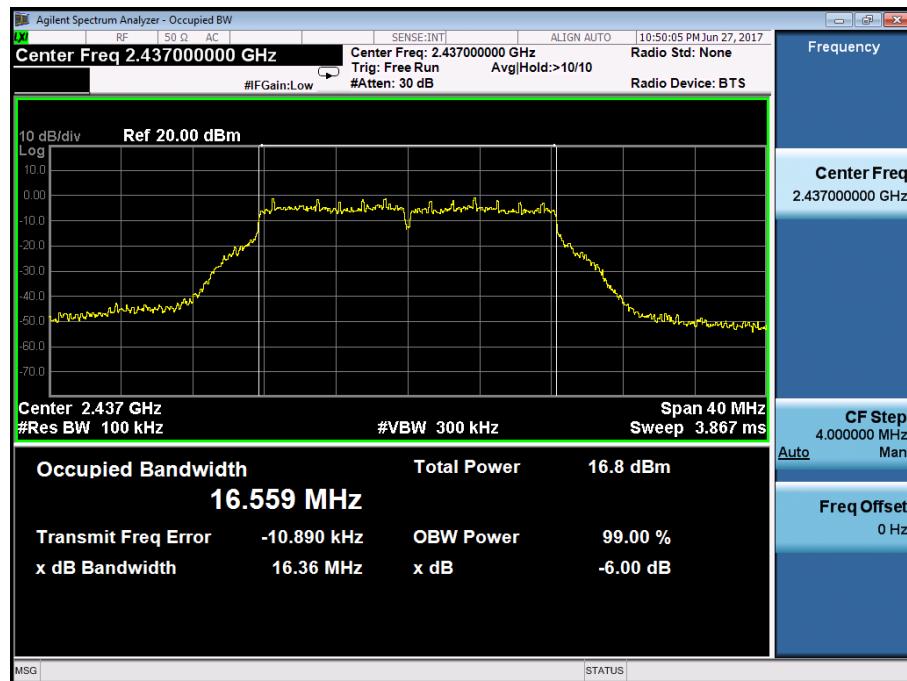
Wi-Fi 802.11 b mode, 1 Mbps



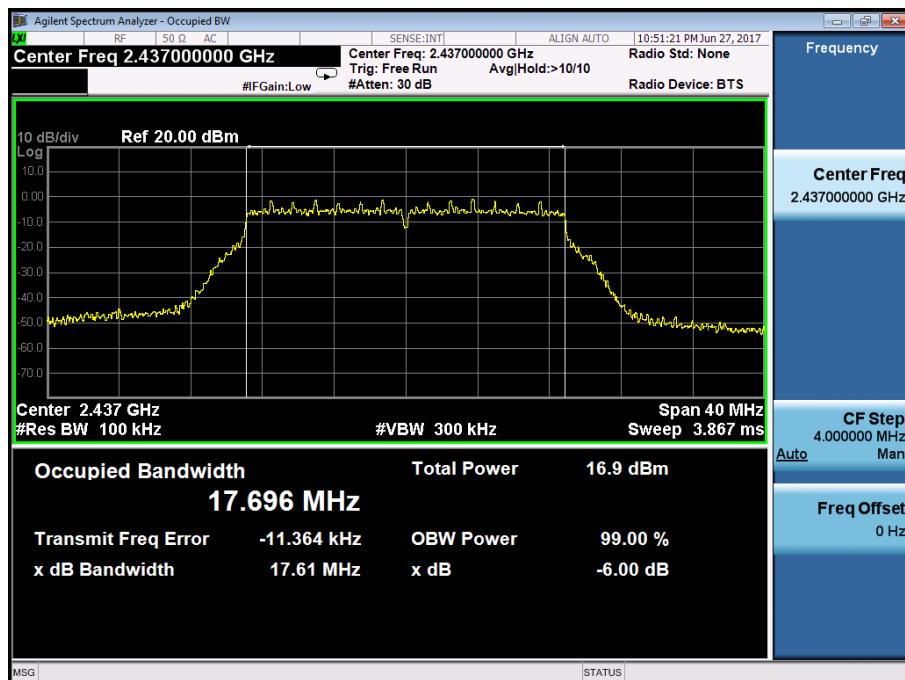
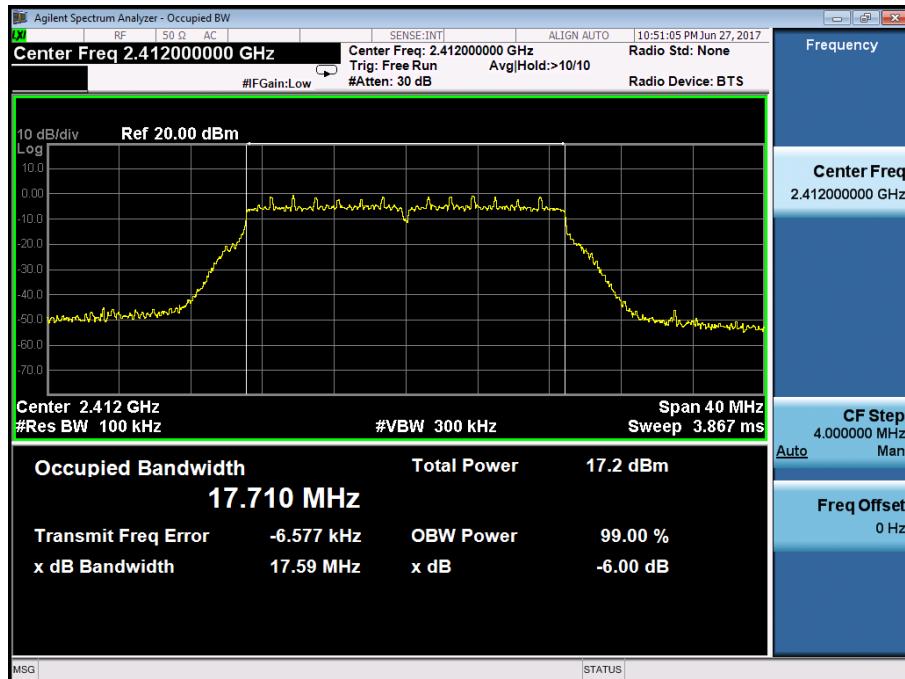


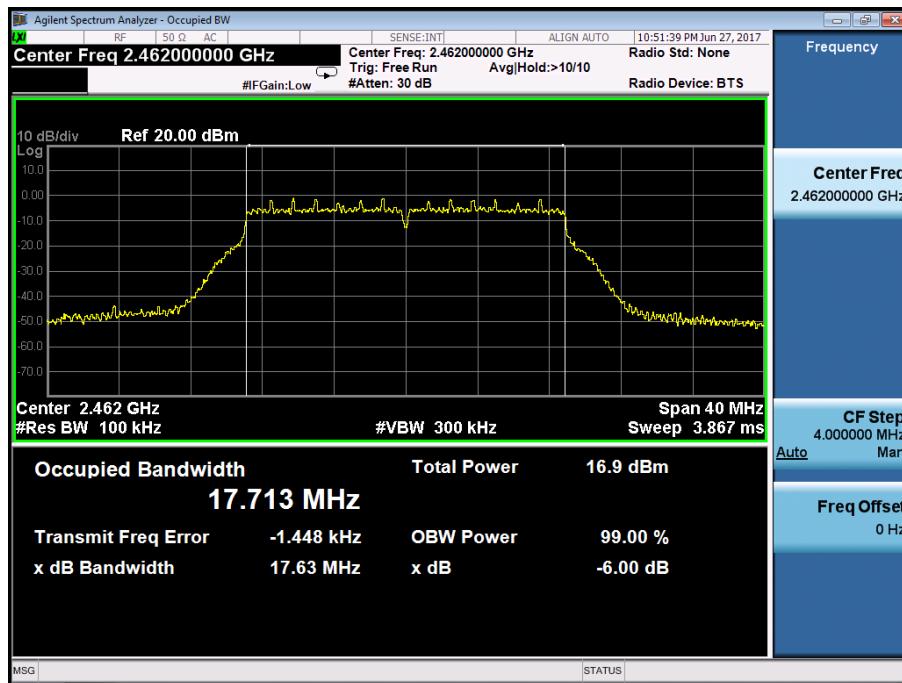
Wi-Fi 802.11 g mode, 6 Mbps



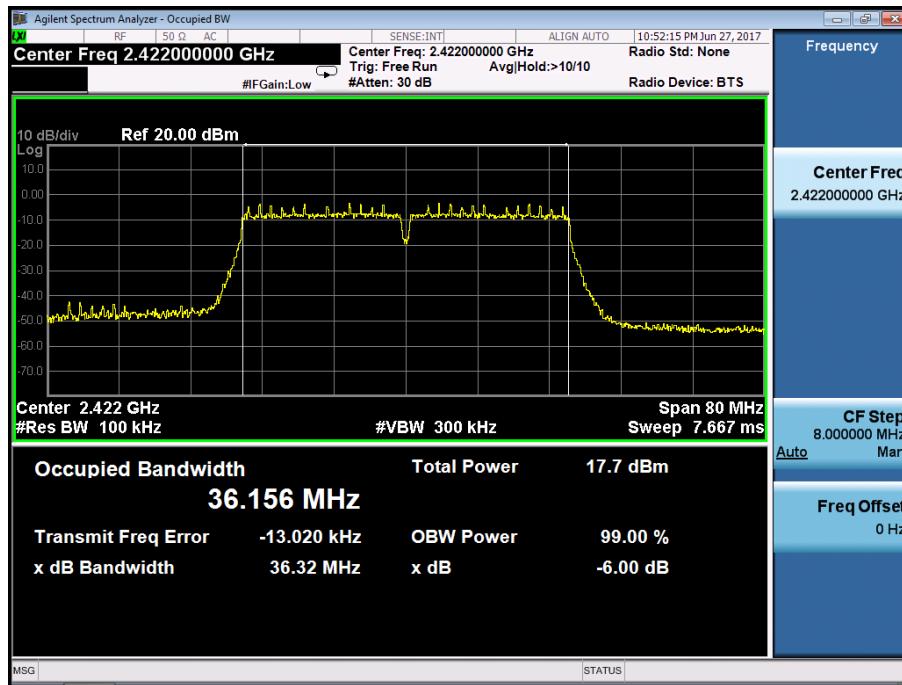


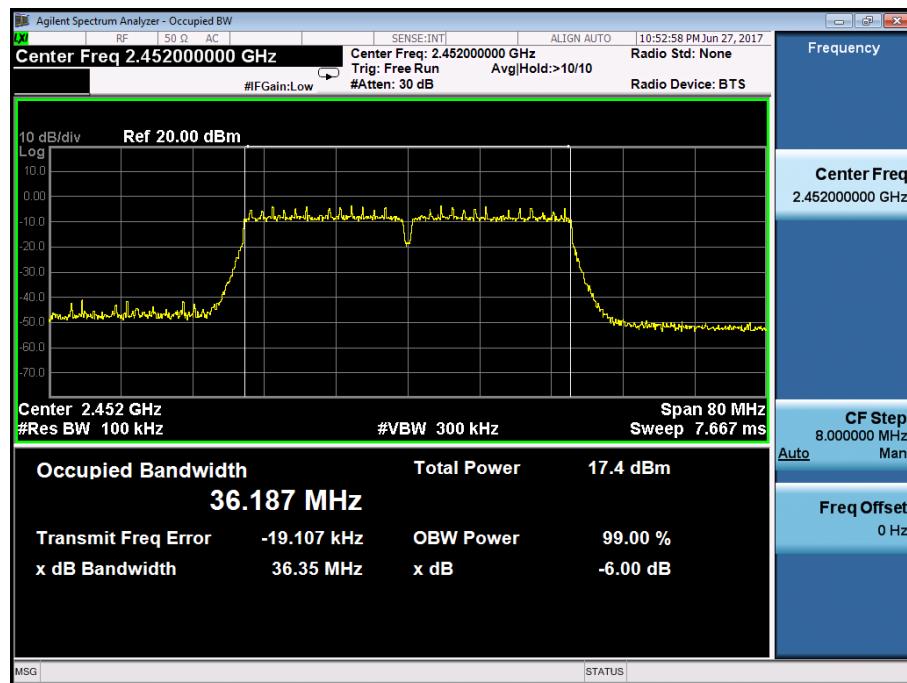
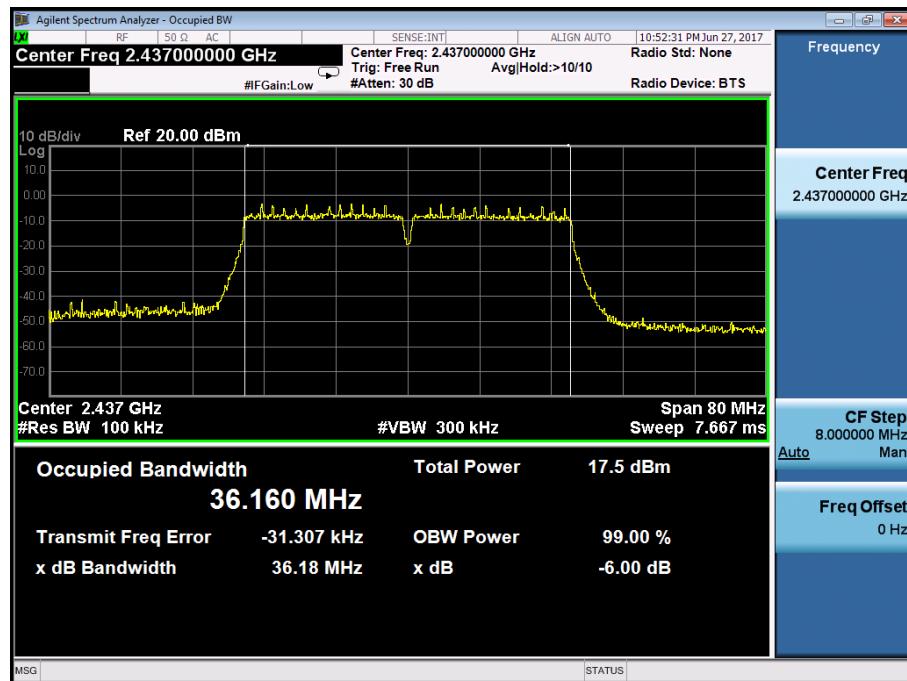
Wi-Fi 802.11 n(HT20) mode, MCS0





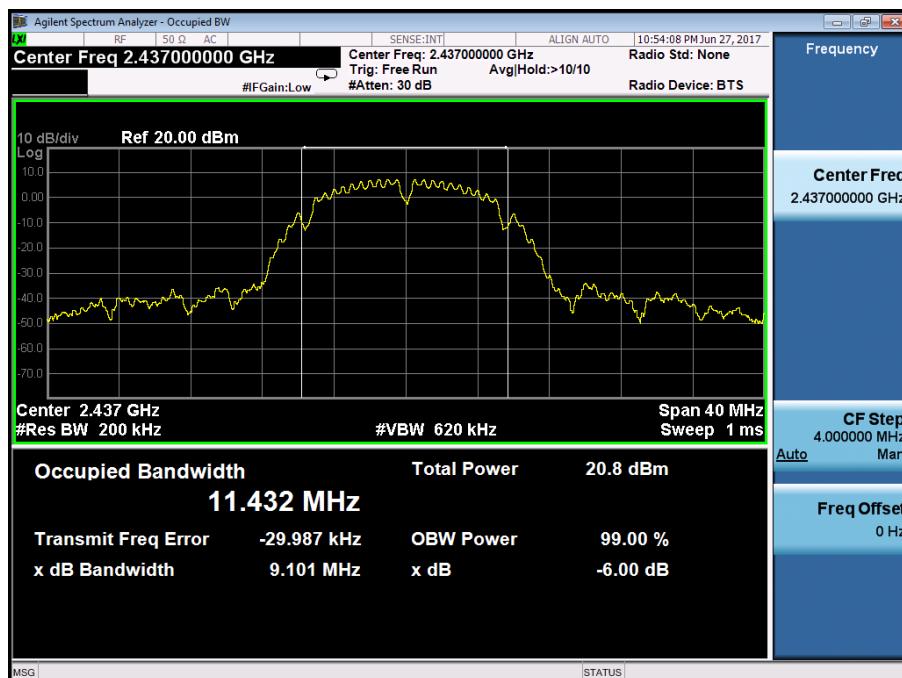
Wi-Fi 802.11 n(HT40) mode, MCS0

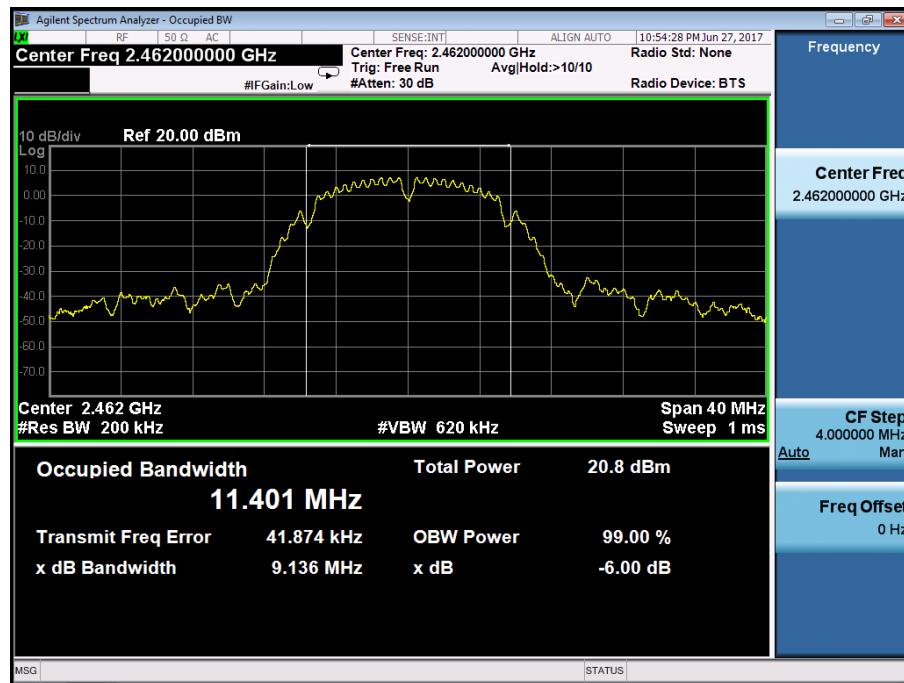




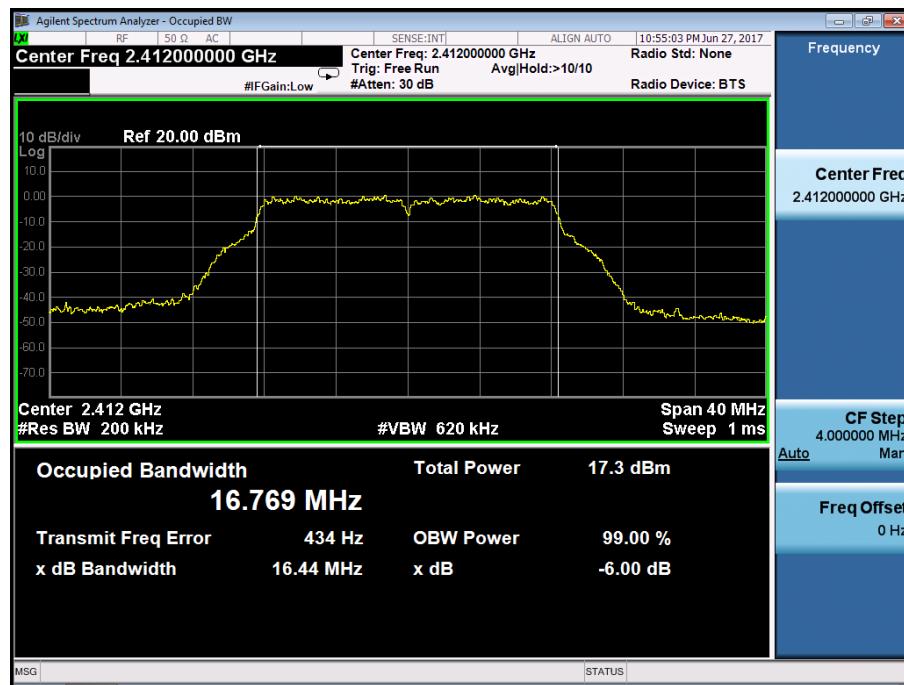
Appendix B.3: 99% Bandwidth

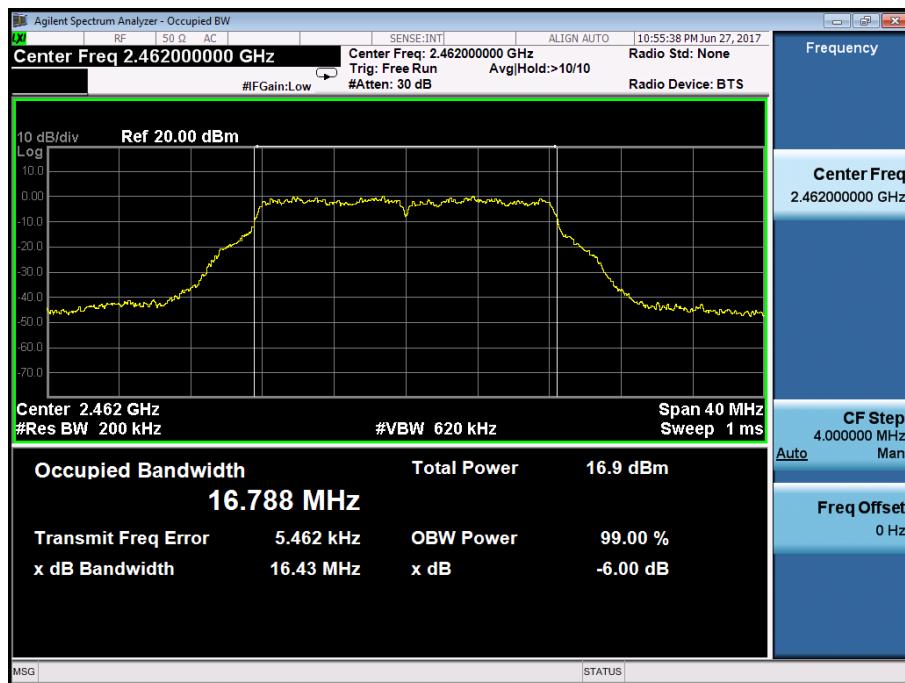
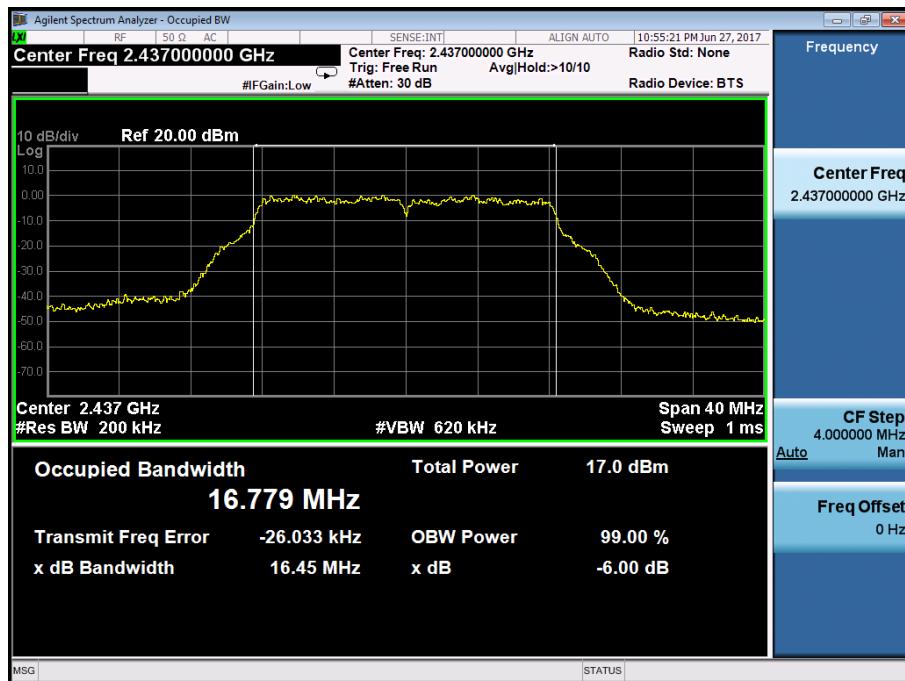
Wi-Fi 802.11 b mode, 1 Mbps



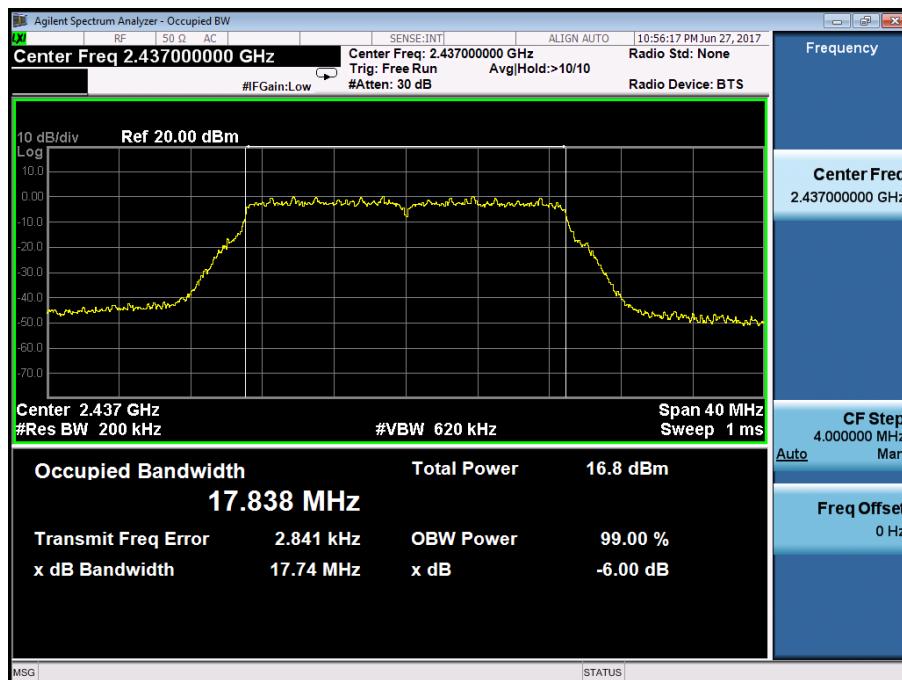


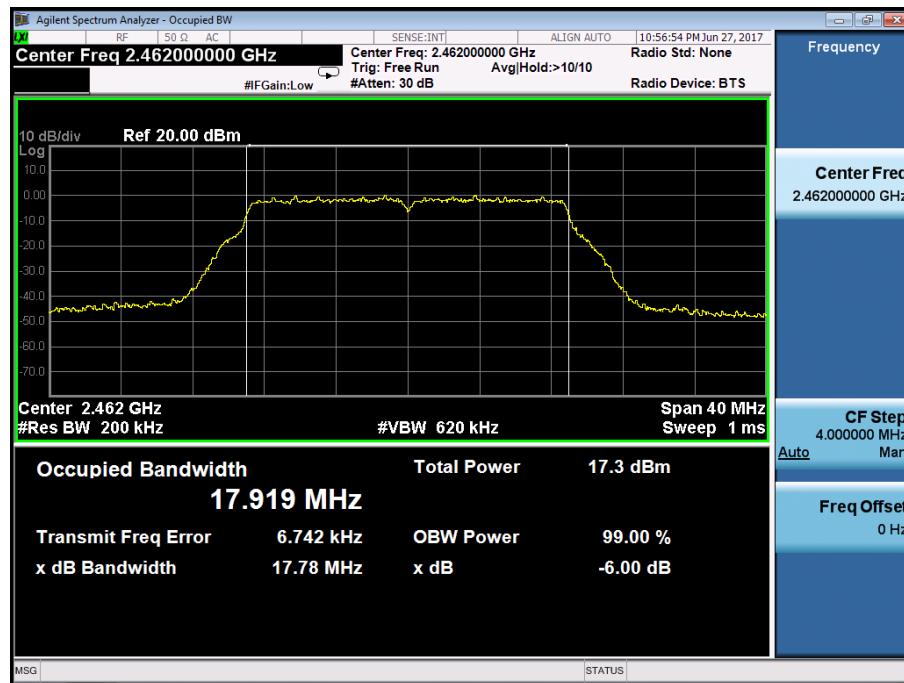
Wi-Fi 802.11 g mode, 6 Mbps



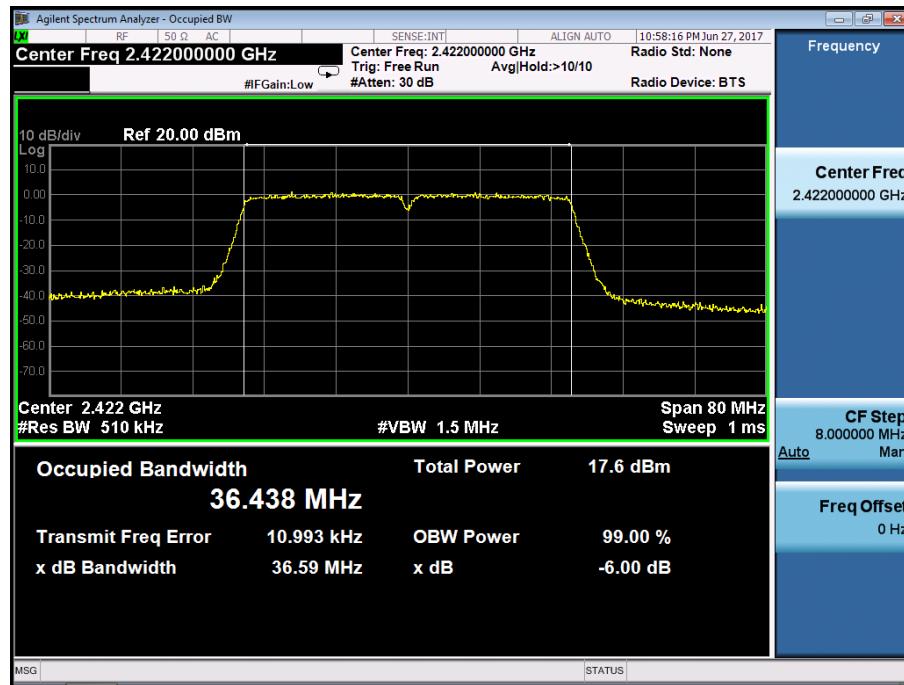


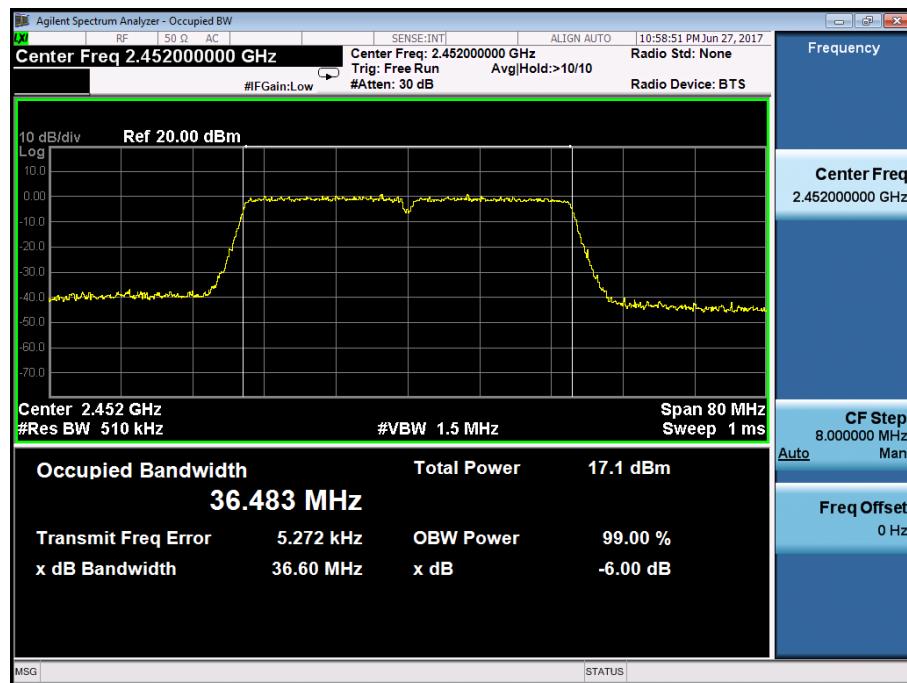
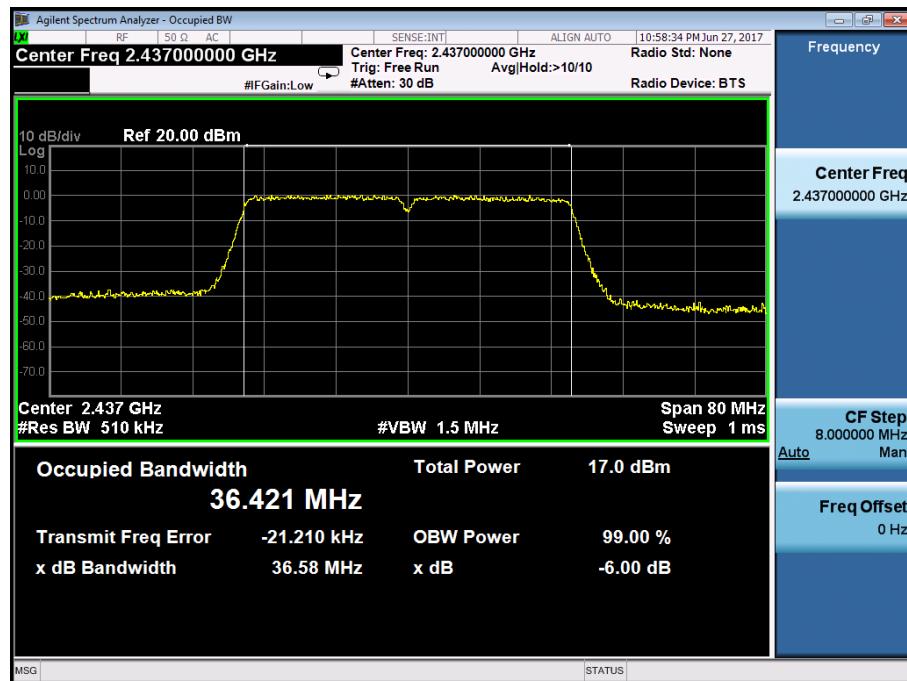
Wi-Fi 802.11 n(HT20) mode, MCS0





Wi-Fi 802.11 n(HT40) mode, MCS0





Appendix B.4: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Wi-Fi 802.11 b mode, 1 Mbps

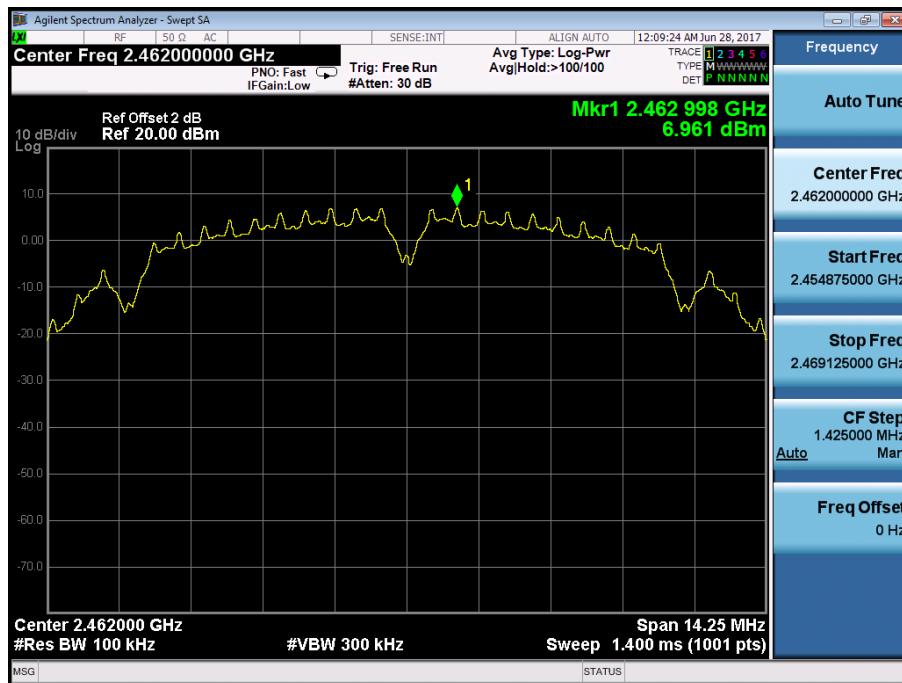
Low Channel



Middle Channel



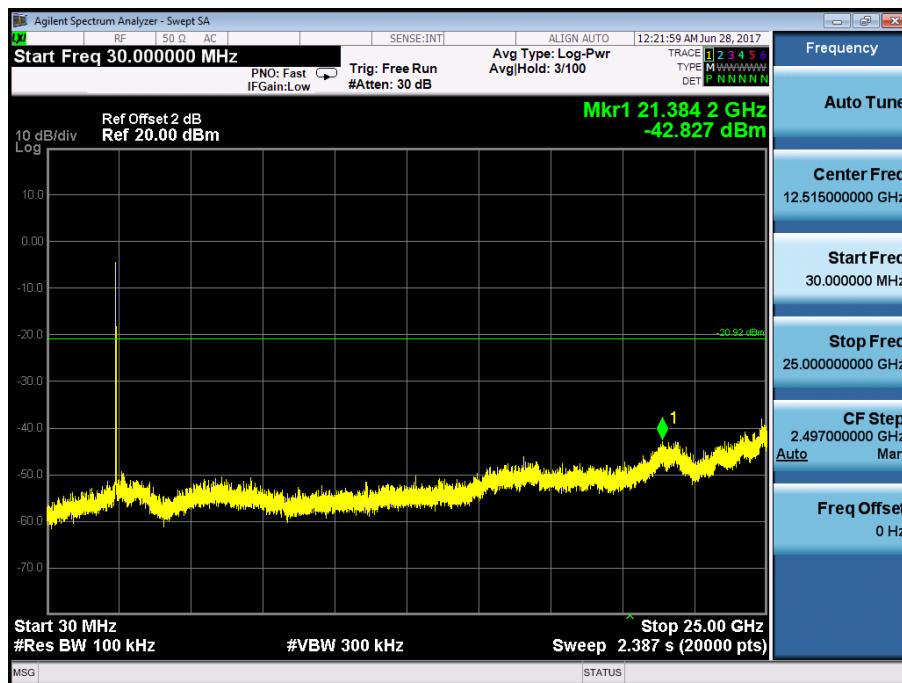
High Channel



Wi-Fi 802.11 g mode, 6 Mbps
Low Channel



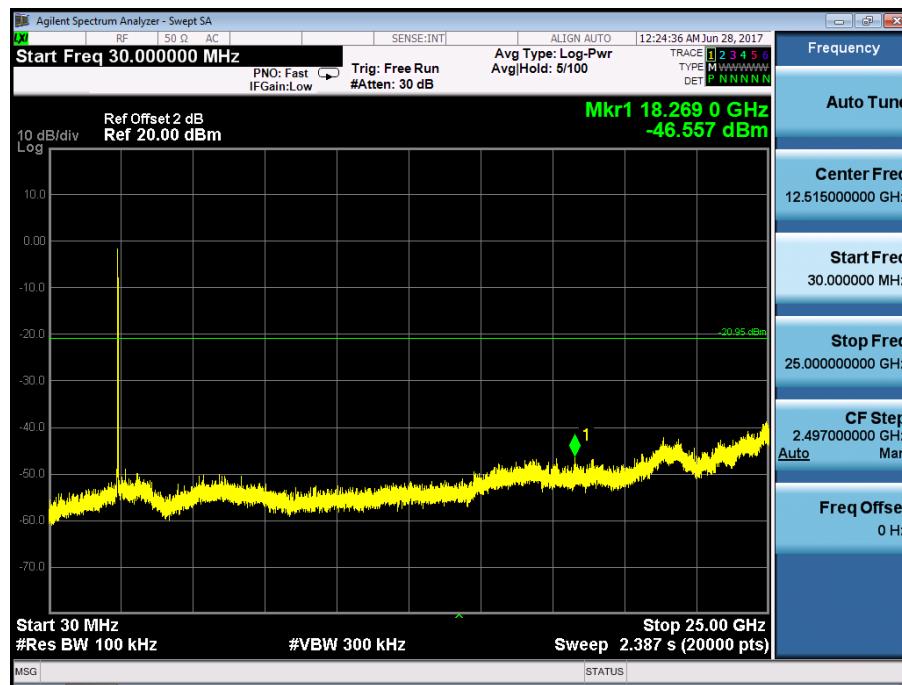
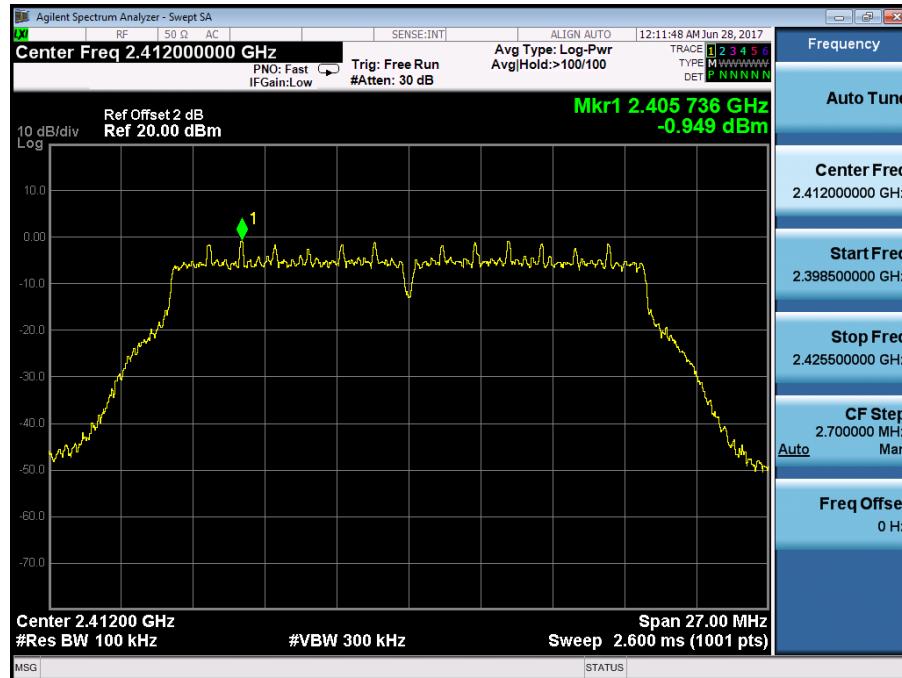
Middle Channel



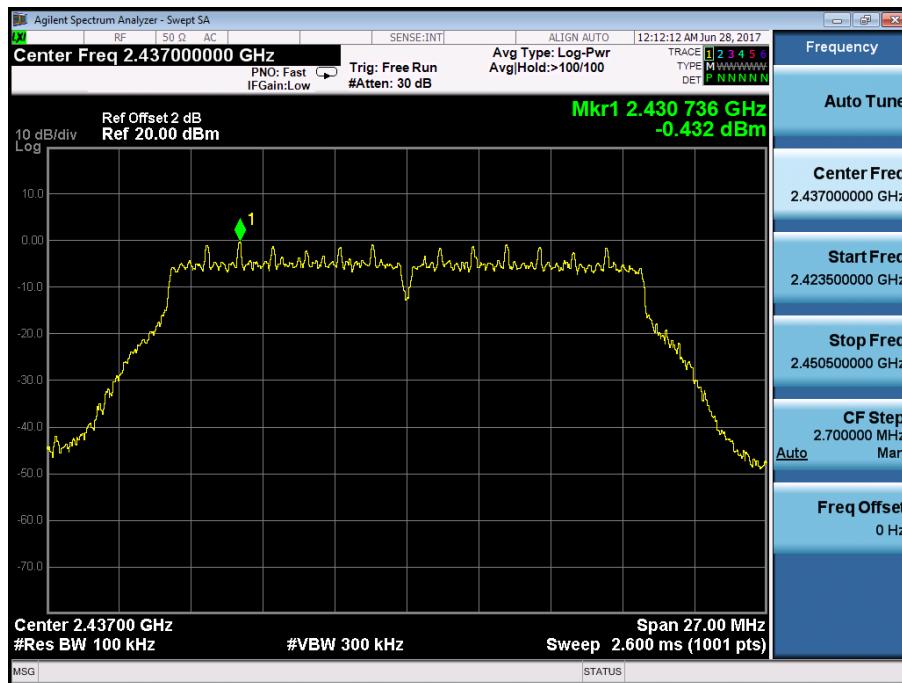
High Channel



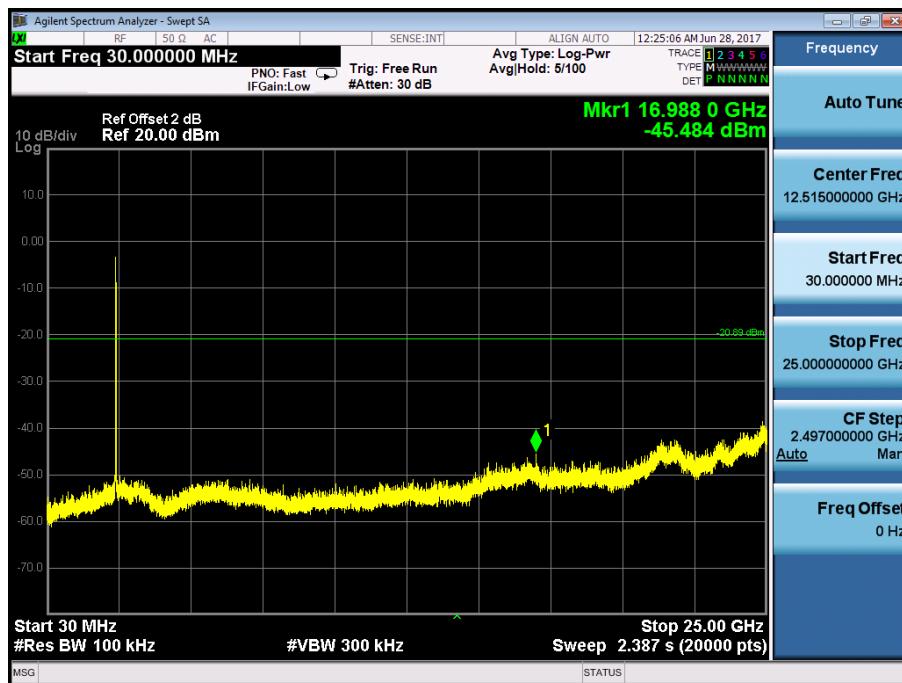
Wi-Fi 802.11 n(HT20) mode, MCS0
Low Channel

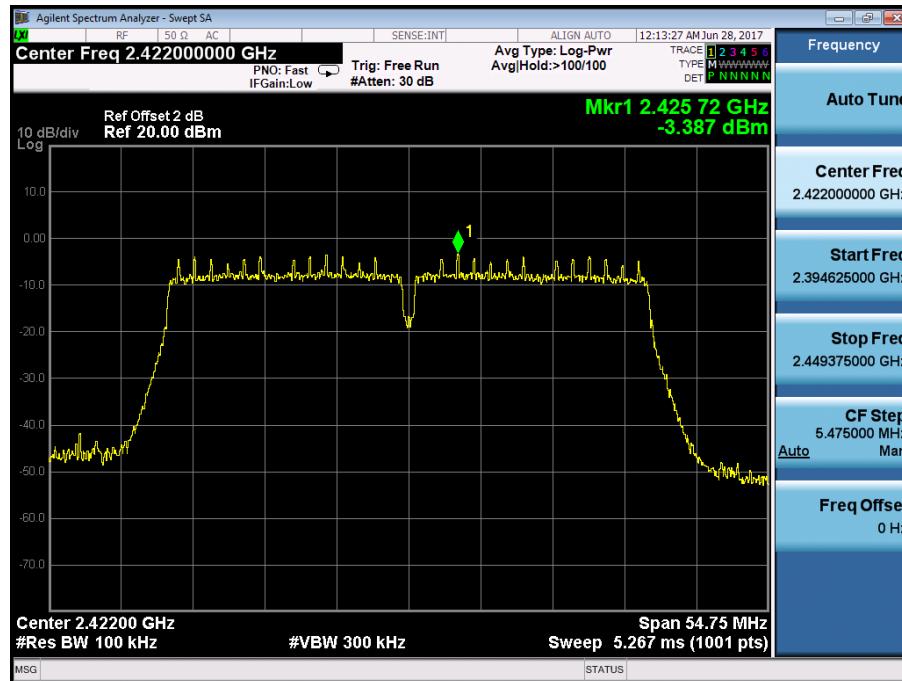


Middle Channel

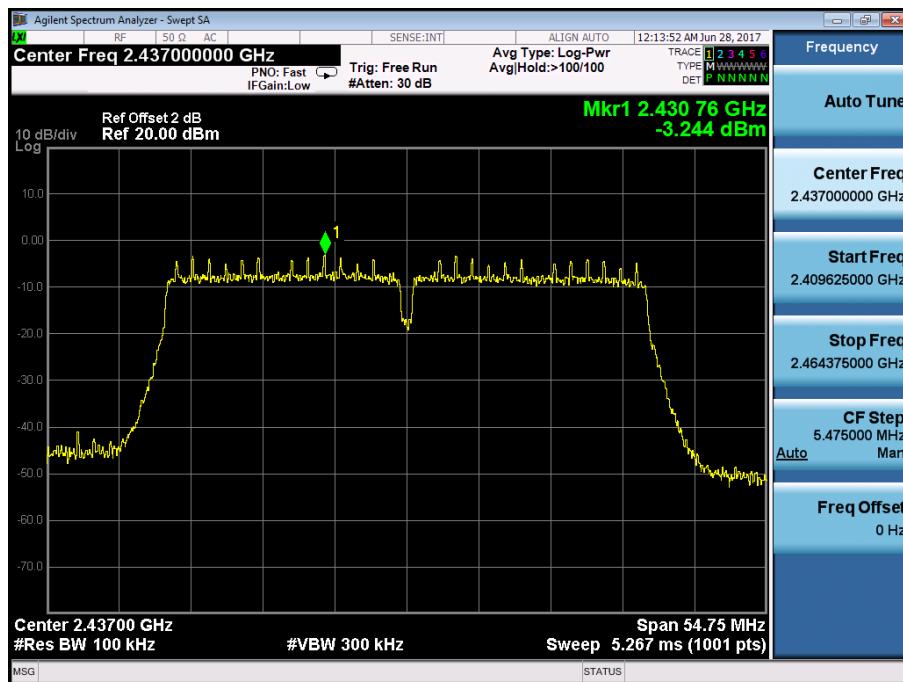


High Channel

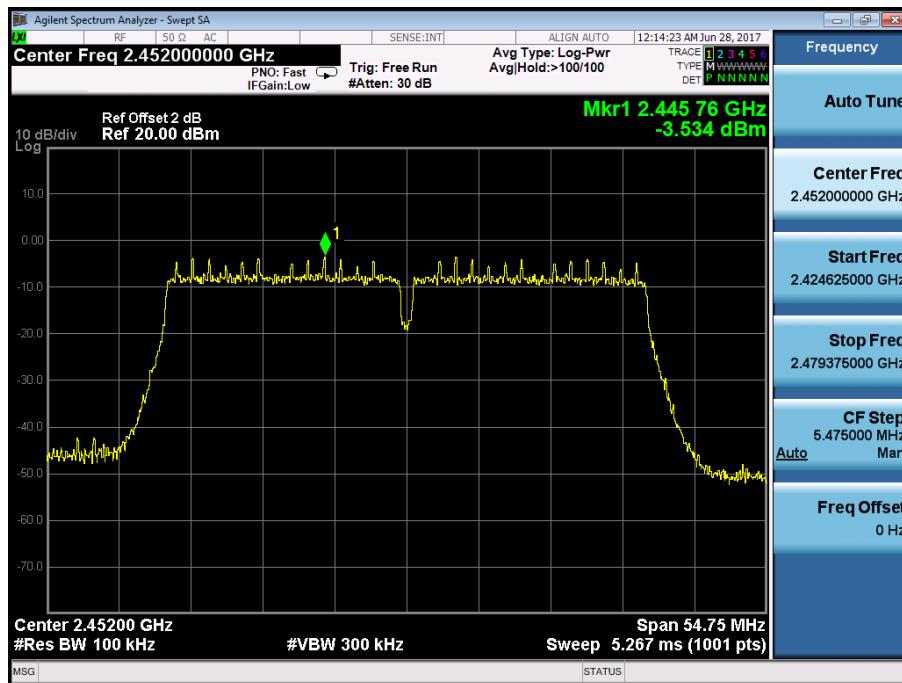


Wi-Fi 802.11 n(HT40) mode, MCS0
Low Channel

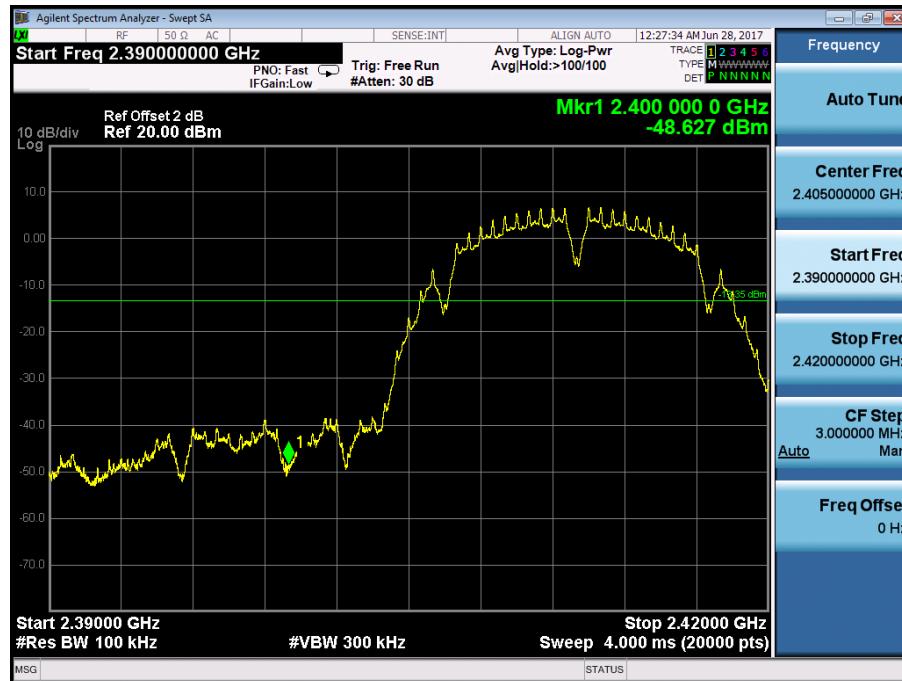
Middle Channel



High Channel



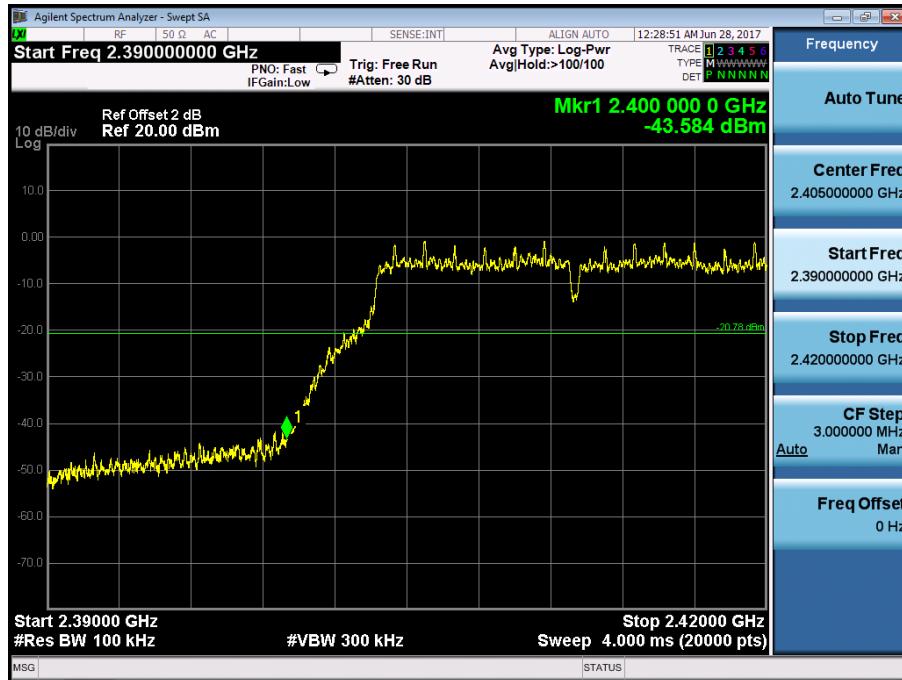
Wi-Fi 802.11 b mode, Band Edge
Low Channel



High Channel



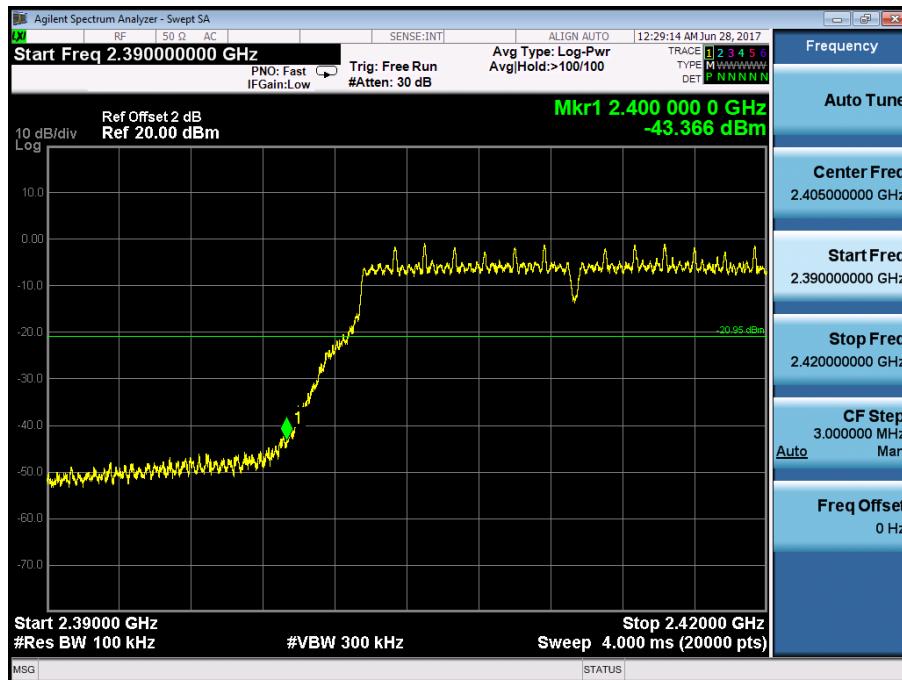
Wi-Fi 802.11 g mode, Band Edge
Low Channel



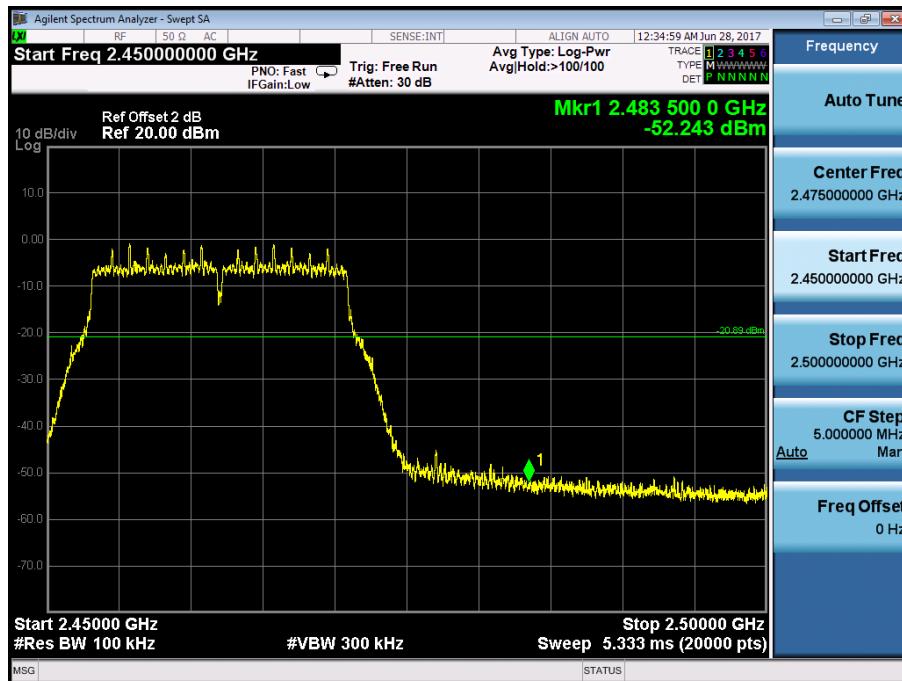
High Channel



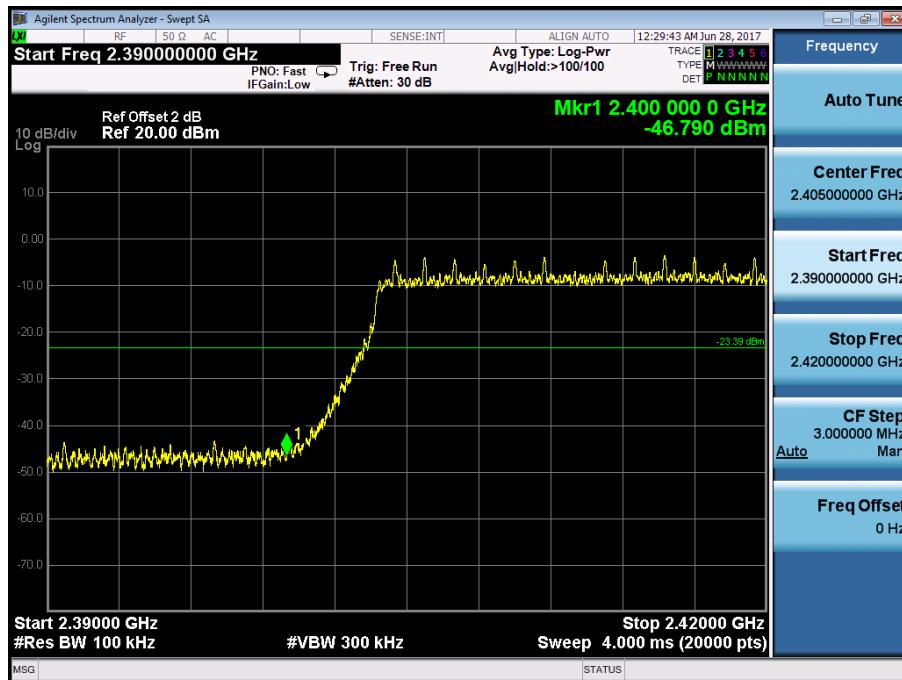
Wi-Fi 802.11 n(HT20) mode, Band Edge
Low Channel



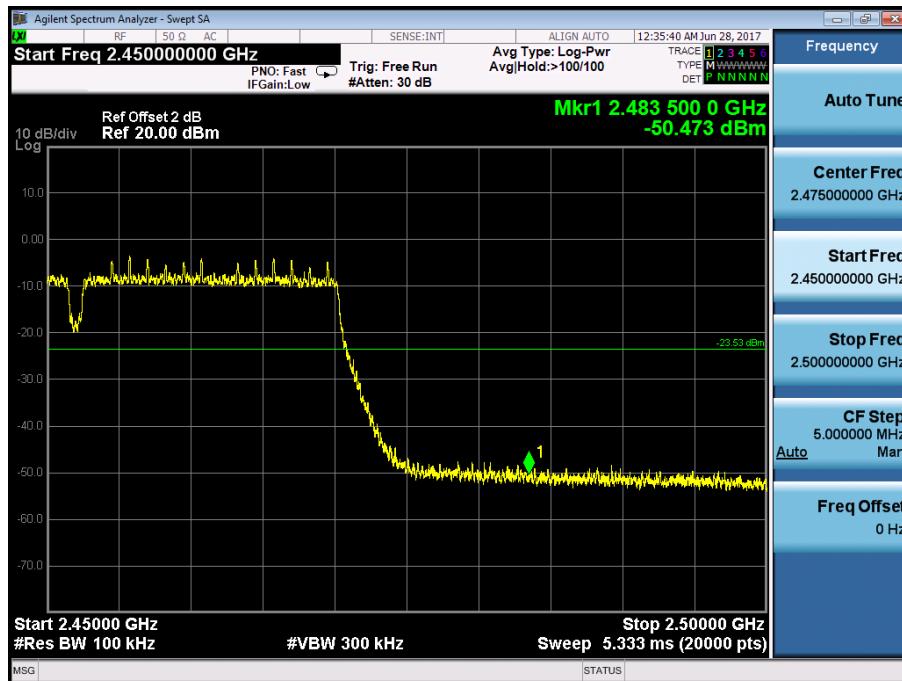
High Channel



Wi-Fi 802.11 n(HT40) mode, Band Edge
Low Channel



High Channel



Appendix C: Test Results of Radiated Testing

APPENDIX C: TEST RESULTS OF RADIATED TESTING	1
APPENDIX C.1: TEST RESULTS OF RADIATED SPURIOUS EMISSIONS	2
<i>Wi-Fi 802.11 b mode, 11 Mbps.....</i>	2
<i>Wi-Fi 802.11 g mode, 54 Mbps.....</i>	14
<i>Wi-Fi 802.11 n(HT20) mode, MCS0.....</i>	26
<i>Wi-Fi 802.11 n(HT40) mode, MCS0.....</i>	38
APPENDIX C.2: TEST RESULTS OF RADIATED EMISSIONS IN RESTRICTED BANDS	50
<i>Wi-Fi 802.11 b mode, 11 Mbps.....</i>	50
<i>Wi-Fi 802.11 g mode, 54 Mbps.....</i>	54
<i>Wi-Fi 802.11 n(HT20) mode, MCS0.....</i>	58
<i>Wi-Fi 802.11 n(HT40) mode, MCS0.....</i>	62
APPENDIX C.3: TEST RESULTS OF CONDUCTED EMISSION ON AC MAINS	66
<i>B mode.....</i>	66

Note 1: Testing was carried out within frequency range 9 kHz to the tenth harmonics. The measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

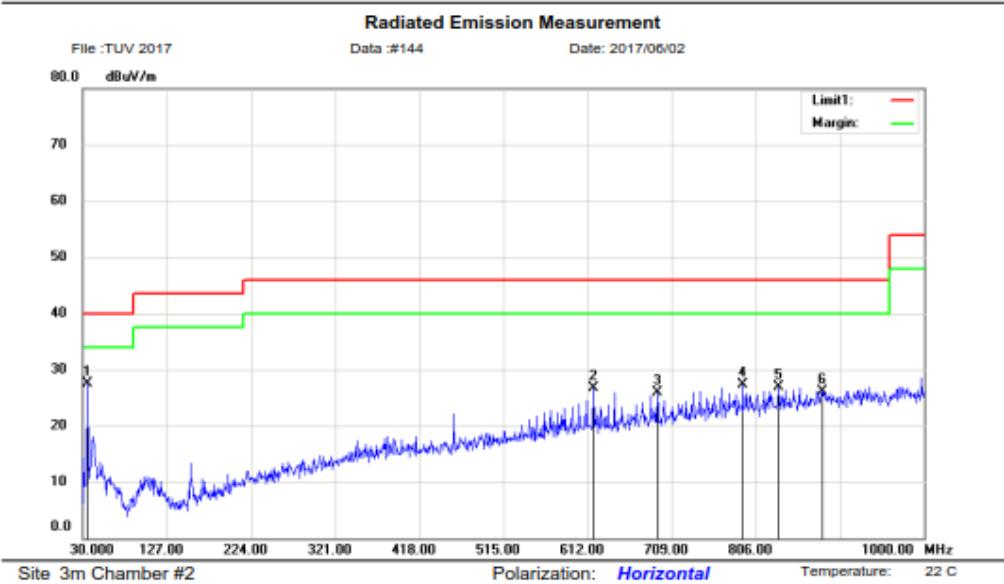
Appendix C.1: Test Results of Radiated Spurious Emissions

Wi-Fi 802.11 b mode, 11 Mbps

30MHz - 1GHz

Shenzhen EMTEK Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P. R. China
www.emtek.com.cn Tel:+86-755-2695 4280 Fax:+86-755-2695 4282


EMTEK Access to the World



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	35.8200	44.05	-16.45	27.60	40.00	-12.40	QP		
2		618.7900	30.94	-4.15	26.79	46.00	-19.21	QP		
3		692.5100	28.87	-3.01	25.86	46.00	-20.14	QP		
4		791.4500	28.57	-1.24	27.33	46.00	-18.67	QP		
5		832.1900	27.50	-0.69	26.81	46.00	-19.19	QP		
6		882.6300	26.24	-0.07	26.17	46.00	-19.83	QP		

*:Maximum data x:Over limit !:over margin

Operator: MATIN

File : TUV 2017\Data .#144

Page: 1

Shenzhen EMTEK Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P. R. China
www.emtek.com.cn Tel:+86-755-2695 4280 Fax:+86-755-2695 4282

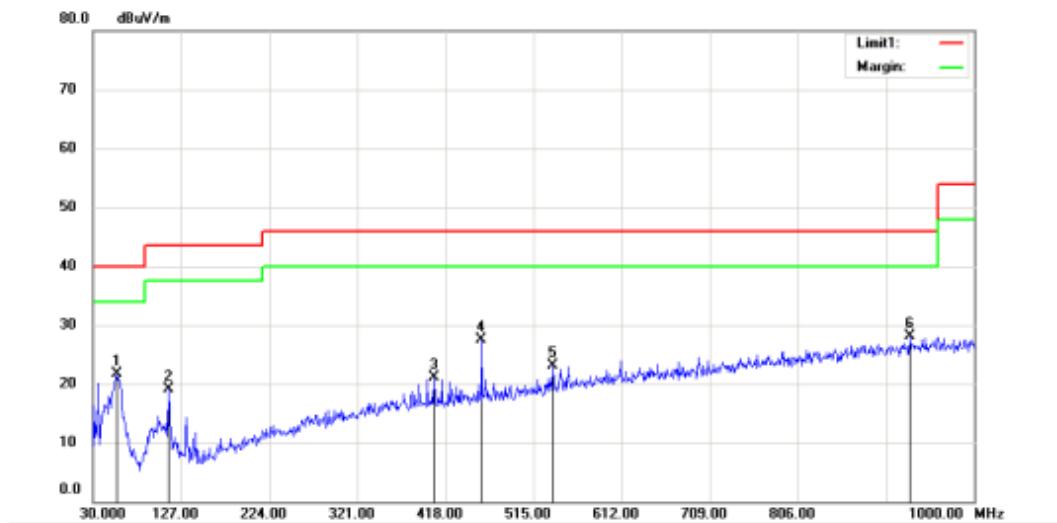


Radiated Emission Measurement

File :TUV 2017

Data #:143

Date: 2017/06/02



Site: 3m Chamber #2

Polarization: Vertical

Temperature: 22 C

Limit: (RE)FCC PART 15 C

Power: AC 120V/60Hz

Humidity: 55 %

EUT:Smart Monitoring Companion

M/N: MBP162

Mode:TX b 2412

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	Antenna Height	Table Degree	Comment	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	
1		56.1900	36.32	-14.71	21.61	40.00	-18.39	QP			
2		113.4200	34.57	-15.49	19.08	43.50	-24.42	QP			
3		405.3900	29.51	-8.39	21.12	46.00	-24.88	QP			
4		457.7700	35.28	-7.76	27.52	46.00	-18.48	QP			
5		536.3400	29.07	-5.91	23.16	46.00	-22.84	QP			
6	*	929.1900	27.67	0.46	28.13	46.00	-17.87	QP			

*:Maximum data x:Over limit !:over margin

Operator: MATIN

File :TUV 2017\Data #:143

Page: 1

Shenzhen EMTEK Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P. R. China
www.emtek.com.cn Tel:+86-755-2695 4280 Fax:+86-755-2695 4282

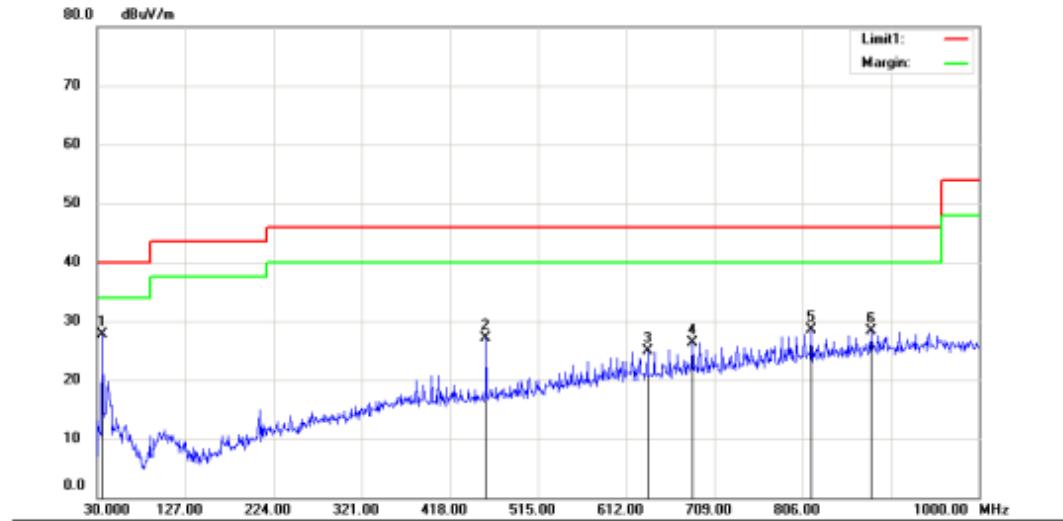


Radiated Emission Measurement

File : TUV 2017

Data #: 145

Date: 2017/06/02



Site: 3m Chamber #2

Polarization: Horizontal

Temperature: 22 C

Limit: (RE)FCC PART 15 C

Power: AC 120V/60Hz

Humidity: 55 %

EUT:Smart Monitoring Companion

M/N: MBP162

Mode: TX b 2437

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB	Over Detector	Antenna Height cm	Table Degree	Comment
1	*	35.8200	44.16	-16.45	27.71	40.00	-12.29	QP		
2		457.7700	34.87	-7.76	27.11	46.00	-18.89	QP		
3		635.2800	28.86	-3.90	24.96	46.00	-21.04	QP		
4		684.7500	29.44	-3.14	26.30	46.00	-19.70	QP		
5		815.7000	29.43	-0.89	28.54	46.00	-17.46	QP		
6		881.6600	28.33	-0.10	28.23	46.00	-17.77	QP		

*:Maximum data x:Over limit !:over margin

Operator: MATIN

File : TUV 2017 Data #: 145

Page: 1

Shenzhen EMTEK Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P. R. China
www.emtek.com.cn Tel:+86-755-2695 4280 Fax:+86-755-2695 4282

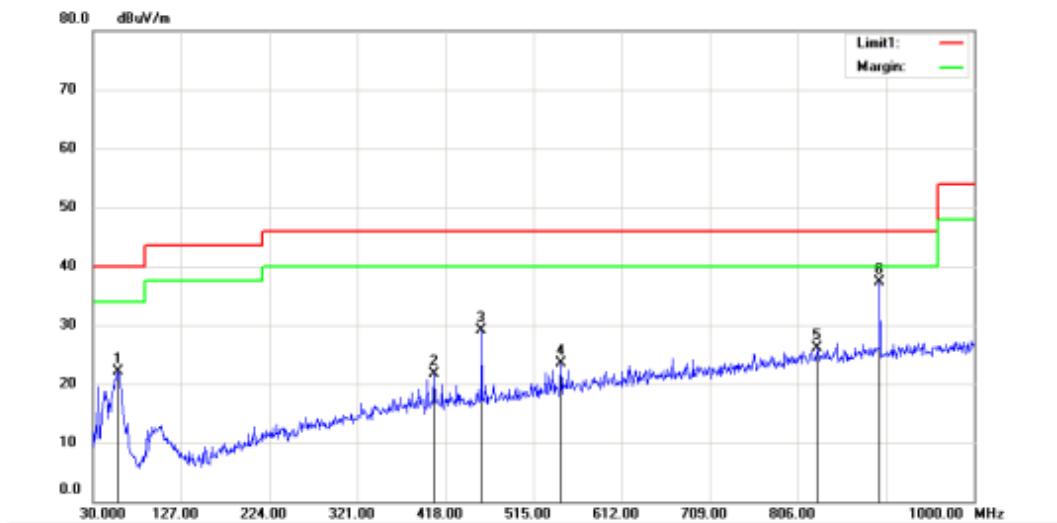


Radiated Emission Measurement

File :TUV 2017

Data #:146

Date: 2017/06/02



Site 3m Chamber #2

Polarization: Vertical

Temperature: 22 C

Limit: (RE)FCC PART 15 C

Power: AC 120V/60Hz

Humidity: 55 %

EUT:Smart Monitoring Companion

M/N: MBP162

Mode:TX b 2437

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	Antenna Height	Table Degree	Comment	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	
1		58.1300	38.38	-16.34	22.04	40.00	-17.96	QP			
2		405.3900	30.18	-8.39	21.79	46.00	-24.21	QP			
3		457.7700	36.89	-7.76	29.13	46.00	-16.87	QP			
4		545.0700	29.16	-5.70	23.46	46.00	-22.54	QP			
5		827.3400	26.91	-0.75	26.16	46.00	-19.84	QP			
6	*	896.2100	37.13	0.09	37.22	46.00	-8.78	QP			

*:Maximum data x:Over limit !:over margin

Operator: MATIN

File :TUV 2017\Data #:146

Page: 1