FCC REPORT

Report Reference No. .....:	**TRE1612015803**	R/C…….: 95076
FCC ID .....:	**SG7201611G152**	
Applicant's name .....:	**Haier Telecom(Qingdao) CO., Ltd.**	
Address .....:	No1.Haier Road,Hi-tech Zone Qingdao,China	
Manufacturer.....:	Haier Telecom(Qingdao) CO., Ltd.	
Address.....:	No1.Haier Road,Hi-tech Zone Qingdao,China	
Test item description.....:	Smartphone	
Trade Mark .....:	Haier	
Model/Type reference .....:	L11	
Standard .....:	47 CFR Part 15 Subpart C: Radio Frequency Devices ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices	
Date of receipt of test sample……..:	Nov. 14, 2016	
Date of testing……:	Dec. 05, 2016 - Dec. 12, 2016	
Date of issue……...:	Dec. 23, 2016	
Result ..... ……...:	**Pass**	

Compiled by (position+printed name+signature)..... :	File administrators Shayne Zhu	Shayne Zhu
Supervised by (position+printed name+signature)..... :	Project Engineer Lion Cai	Lion Cai
Approved by (position+printed name+signature)..... :	Manager Hans Hu	Hans Hu

Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address .....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

TABLE OF CONTENTS

1. GENERAL INFORMATION 3

1.1. EUT Description 3

1.2. Test Standards and Results 4

1.3. Table for Supporting Units 5

1.4. Facilities and Accreditations 5

2. 47 CFR PART 15C REQUIREMENTS 6

2.1. Antenna requirement 6

2.2. Peak Output Power 7

2.3. 6dB Bandwidth 9

2.4. Conducted Band Edges and Spurious Emissions 17

2.5. Power spectral density (PSD) 34

2.6. Radiated Band Edge and Spurious Emission 42

2.7. Conducted Emission 54

3. LIST OF MEASURING EQUIPMENT 58

4. UNCERTAINTY OF EVALUATION 59

Change History		
Issue	Date	Reason for change
1.0	2016.12.23	First edition

1. General Information

1.1. EUT Description

EUT Type	Smartphone	
Hardware Version	WMEYb	
Software Version	L11-H01-S004-Tigo	
EUT supports Radios application	GSM/GPRS/EDGE/WCDMA/HSPA WLAN2.4GHz 802.11b/g/n (HT20/HT40) Bluetooth V3.0+EDR / Bluetooth V4.0LE	
Frequency Range	WLAN	802.11b/g/n20MHz: 2.412GHz - 2.462GHz 802.11n-40MHz: 2.422GHz - 2.452GHz
Channel Number	WLAN	802.11b/g/n20MHz: 11 802.11n40MHz: 7
Bit Rate of Transmitter	WLAN	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n : up to 135 Mbps
Modulation Type	WLAN	DSSS (802.11b), OFDM (802.11g/n20/n40)
Antenna Type	PIFA Antenna	
Antenna Gain	-0.08dBi	

Note 1: The EUT is a Smartphone, it contain WIFI operating at 2.4GHz ISM band; it supports 802.11b, 802.11g, 802.11n20/n40 and they are all tested in this report.

Note 2: The frequencies allocated is F (MHz) =2412+5*(n-1) (1<=n<=11). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1ch (2412MHz), 6ch(2437MHz), 11ch(2462MHz) for 802.11b/g/n-20MHz., and 3ch(2422MHz), 6ch(2437MHz), 9ch(2452MHz) for 802.11n-40MHz.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 4: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (WiFi, 2.4GHz ISM band radiators) for the EUT FCC Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C 2013	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Description	Result
1	15.203	Antenna Requirement	PASS
2	15.247(b)	Peak Output Power	PASS
3	15.247(a)	6dB Bandwidth	PASS
4	15.247(d)	Conducted Band Edges and Spurious Emission	PASS
5	15.247(e)	Power spectral density (PSD)	PASS
6	15.207	Conducted Emission	PASS
7	15.209 15.247(d)	Radiated Band Edges and Spurious Emission	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10-2013.

These RF tests were performed according to the method of measurements prescribed in KDB558074 D01 v03r05.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

There are two bandwidth systems:

For 20MHz bandwidth systems, use Channel 1~ Channel 11

For 40MHz bandwidth systems, use Channel 3~ Channel 9

Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
1	2412MHz	5	2432MHz	9	2452MHz
2	2417MHz	6	2437MHz	10	2457MHz
3	2422MHz	7	2442MHz	11	2462MHz
4	2427MHz	8	2447MHz		

Test Items	Mode	Data Rate	Channel
Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Conducted and Spurious Emission Radiated and Spurious Emission	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	MCS 0	1/6/11
	11n(40MHz)/OFDM	MCS 0	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	MCS 0	1/11
	11n(40MHz)/OFDM	MCS 0	3/9

1.3. Table for Supporting Units

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.	Note
1	Notebook	DELL	PP11L	DELL	H5914A03	FCC DOC

1.4. Facilities and Accreditations

1.4.1. Facilities

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories

(identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

FCC-Registration No.: 317478

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

1.4.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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.

And according to FCC 47 CFR Section 15.247(c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2.1.2. Antenna Information

Antenna Category: PIFA antenna

A PIFA antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

No.	EUT	Ant. Type	Gain(dBi)
1	Smartphone	PIFA	-0.08

2.1.3. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Peak Output Power

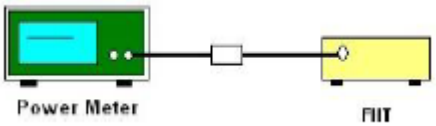
2.2.1. Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Setup



2.2.4. Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v03r05.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

2.2.5. Test Result

Test mode	Channel	Frequency (MHz)	RF Power(dBm)	Limit (dBm)	Verdict
802.11b	1	2412	19.37	30	PASS
	6	2437	20.07		PASS
	11	2462	19.25		PASS
802.11g	1	2412	20.53		PASS
	6	2437	21.35		PASS
	11	2462	21.26		PASS
802.11n20	1	2412	21.35		PASS
	6	2437	21.55		PASS
	11	2462	21.40		PASS
802.11n40	3	2422	21.51		PASS
	6	2437	21.53		PASS
	9	2452	21.41		PASS

Note: All data rates are testing, but the worse case data rate was record in the report.

2.3. 6dB Bandwidth

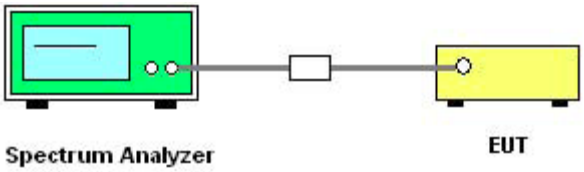
2.3.1. Limit of 6dB Bandwidth

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

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

1. The testing follows FCC KDB558074 D01 v03r05.

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.

5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30 kHz and set the Video bandwidth (VBW) = 100 kHz.

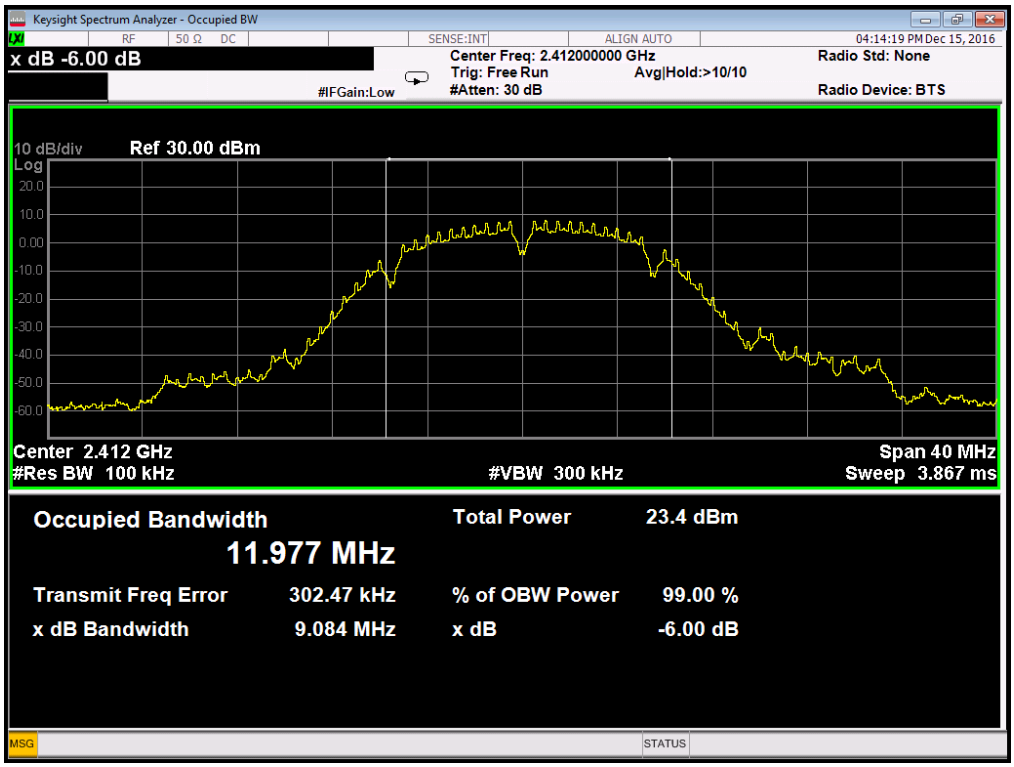
6. Measure and record the results in the test report.

2.3.5. Test Results of 6dB Bandwidth

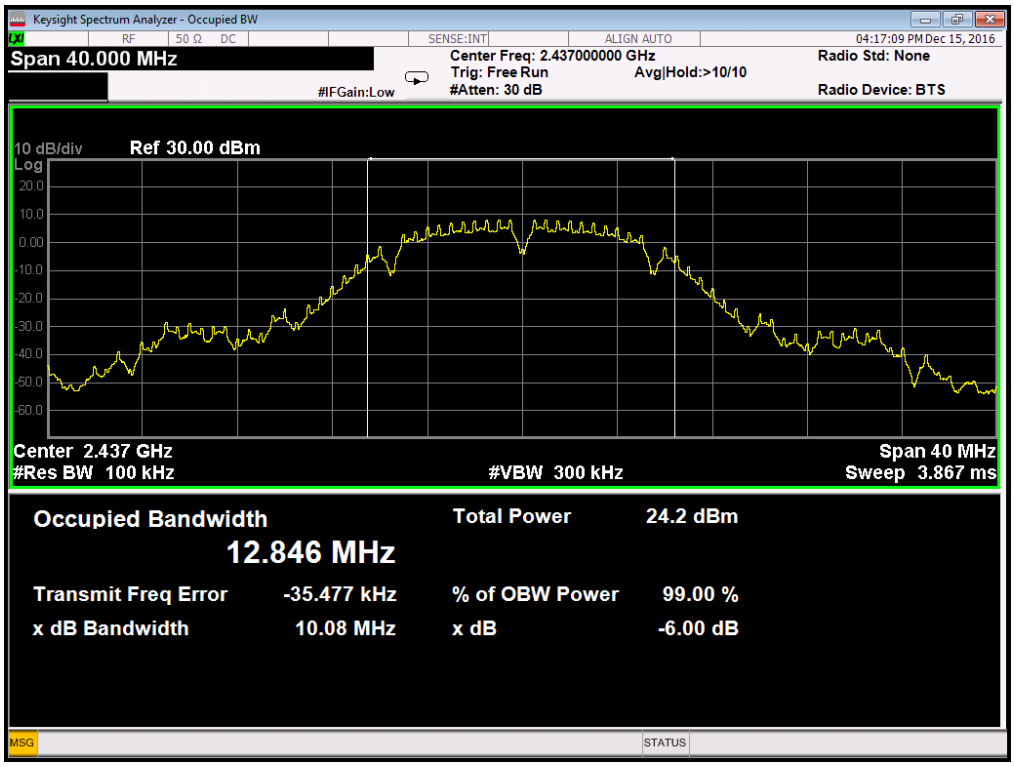
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (MHz)	Result
802.11b	1	2412	9.084	≥0.5	PASS
	6	2437	10.08		PASS
	11	2462	9.063		PASS
802.11g	1	2412	13.88		PASS
	6	2437	15.90		PASS
	11	2462	15.11		PASS
802.11n20	1	2412	13.88		PASS
	6	2437	17.30		PASS
	11	2462	15.11		PASS
802.11n40	3	2422	33.85		PASS
	6	2437	35.90		PASS
	9	2452	35.15		PASS

2.3.6. Test Results (plots) of 6dB Bandwidth

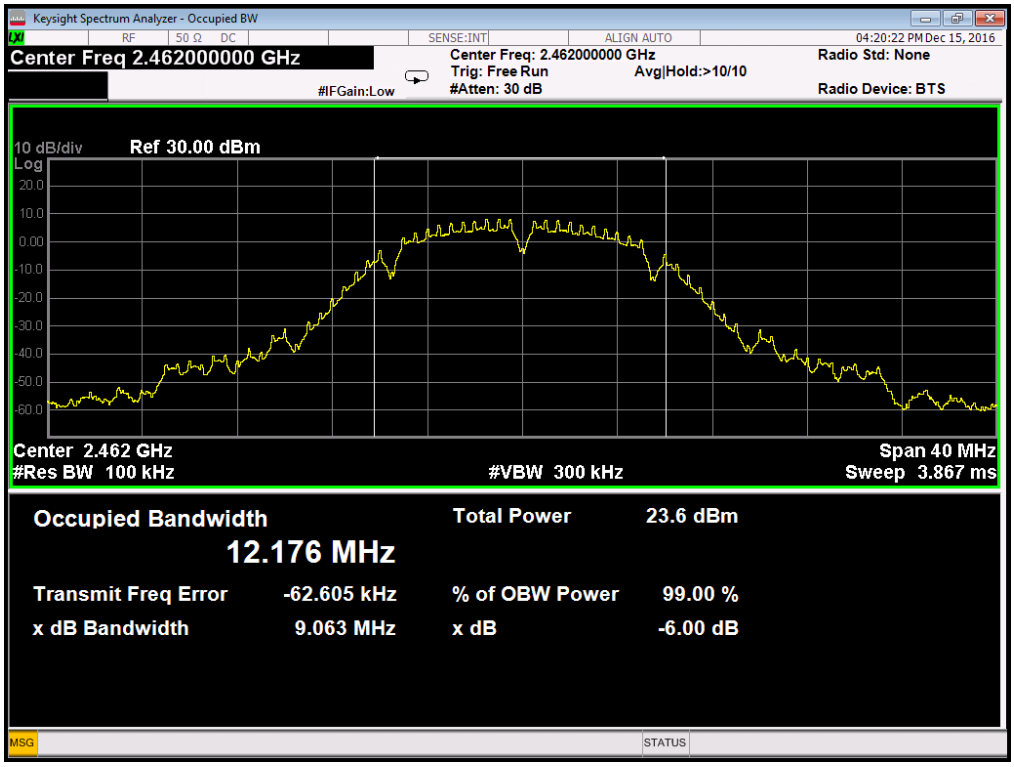
802.11b - 6 dB Bandwidth Plot on channel 1



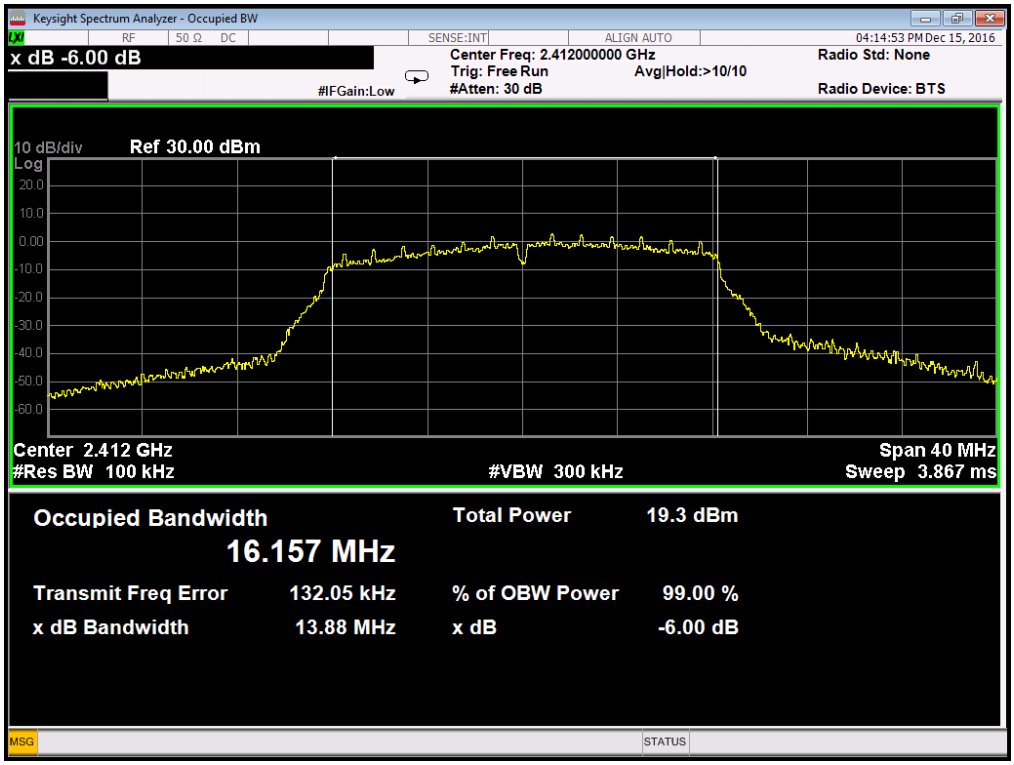
802.11b - 6 dB Bandwidth Plot on channel 6



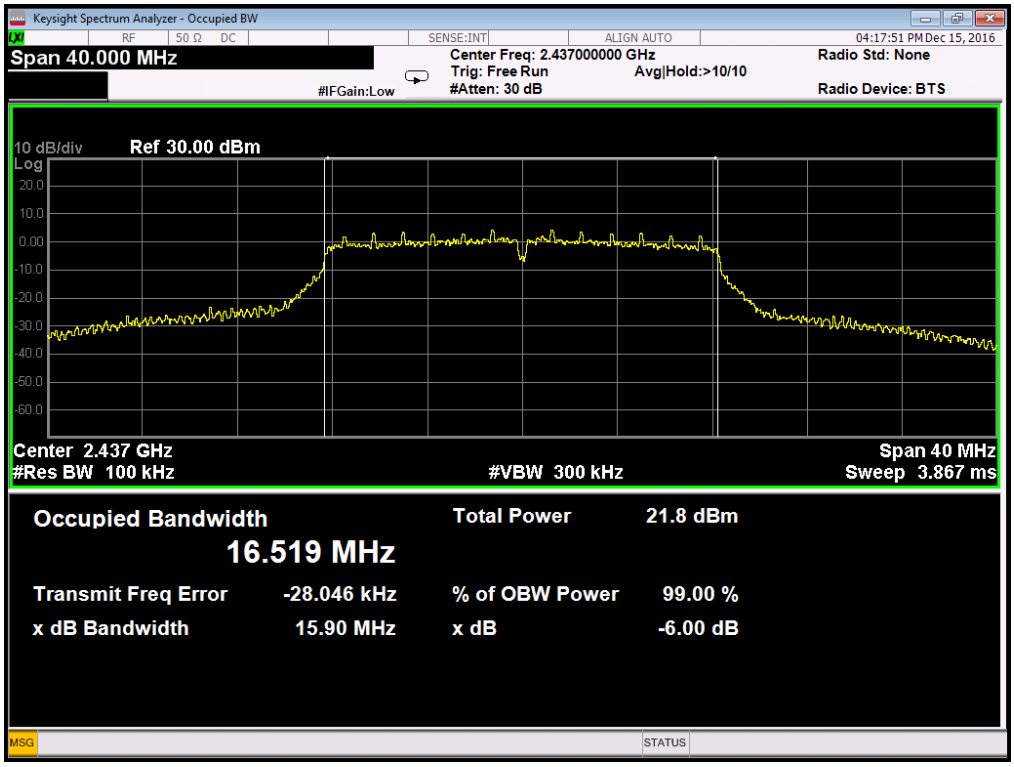
802.11b - 6 dB Bandwidth Plot on channel 11



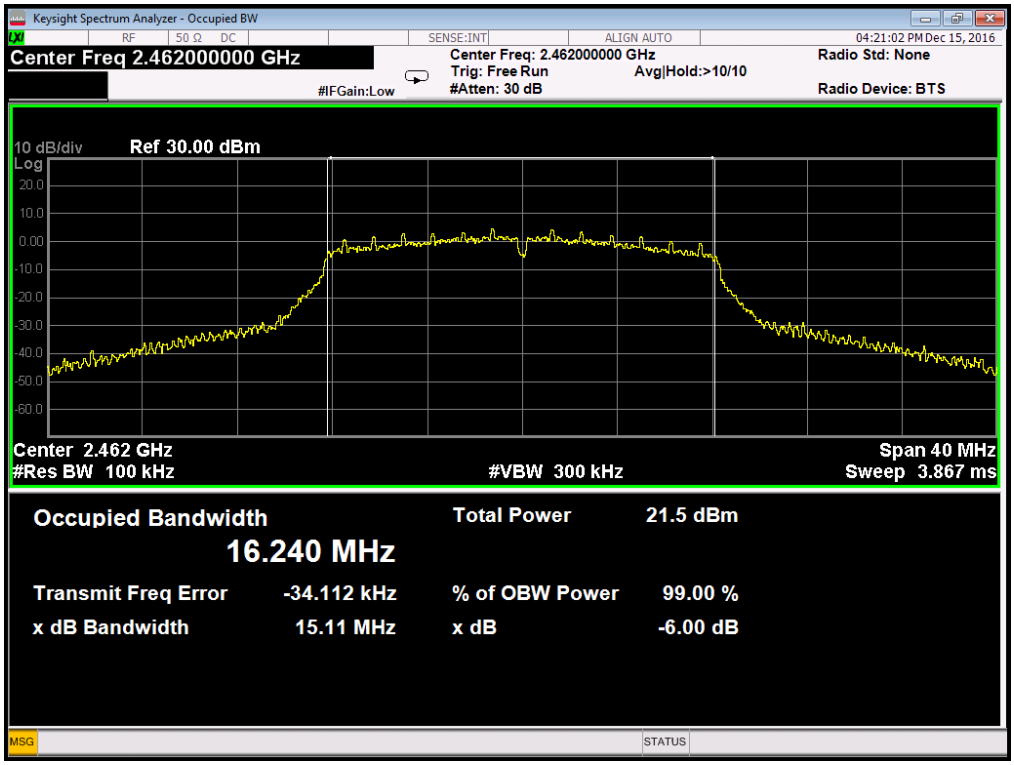
802.11g - 6 dB Bandwidth Plot on channel 1



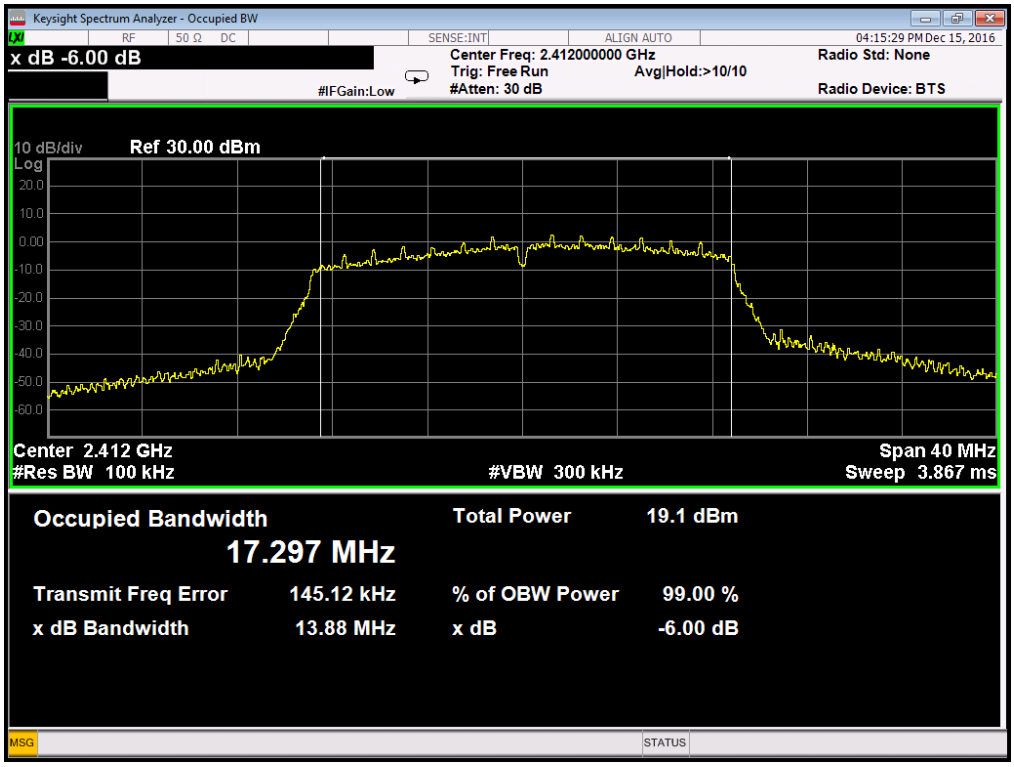
802.11g - 6 dB Bandwidth Plot on channel 6



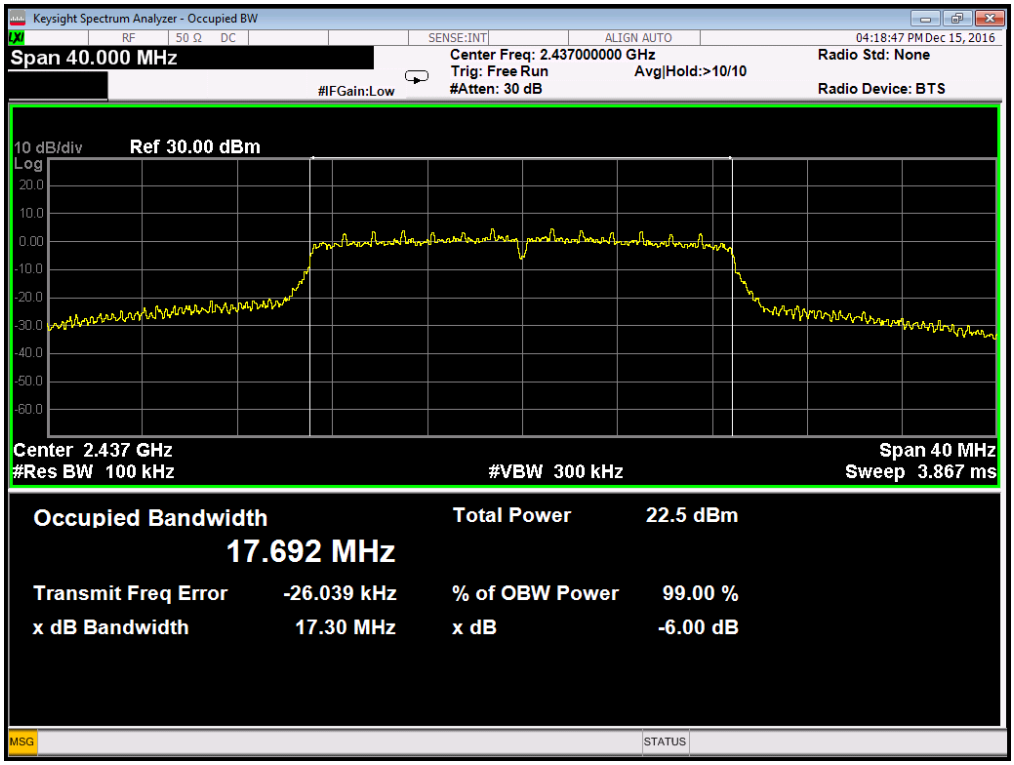
802.11g - 6 dB Bandwidth Plot on channel 11



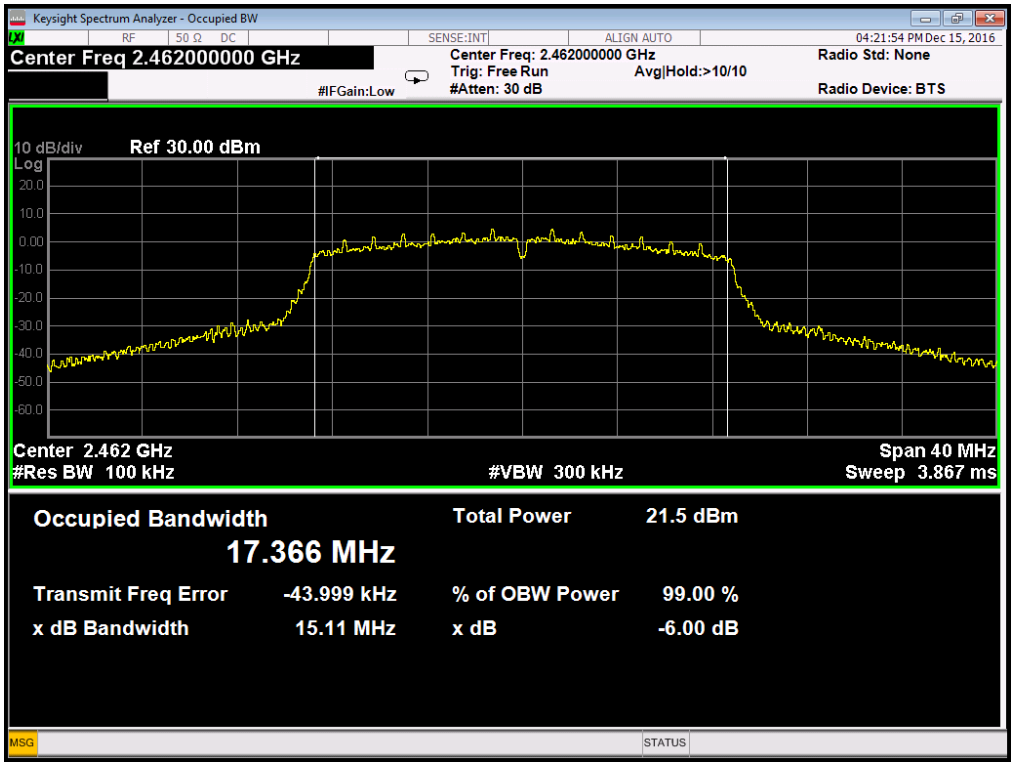
802.11n20 - 6 dB Bandwidth Plot on channel 1



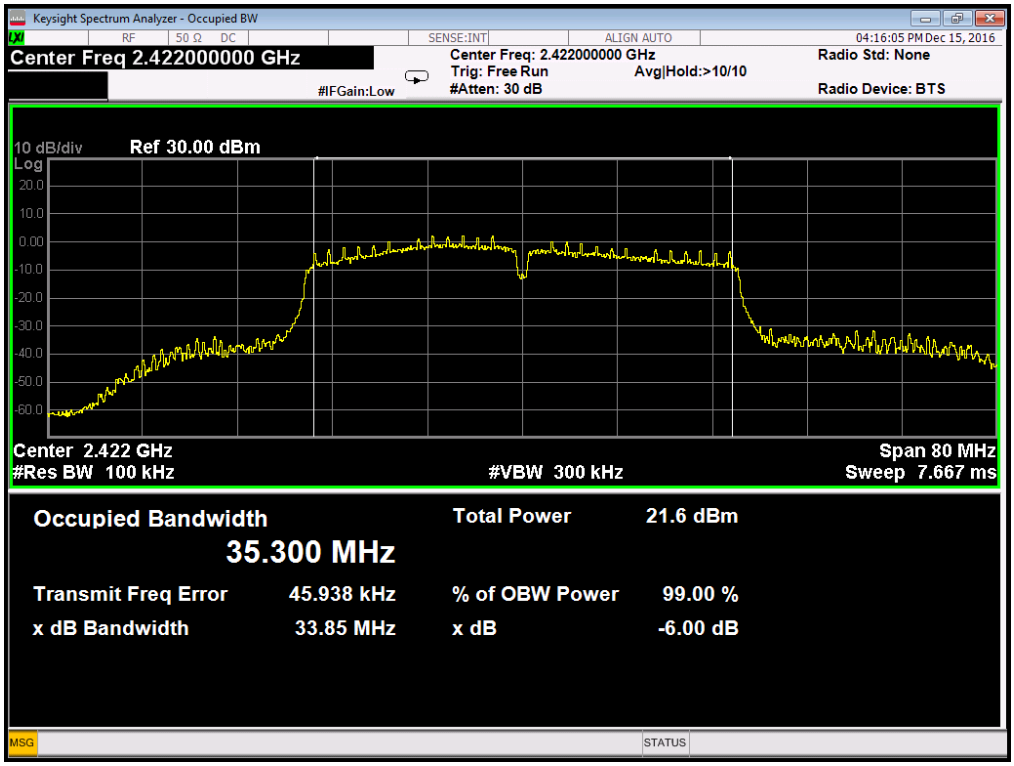
802.11n20 - 6 dB Bandwidth Plot on channel 6



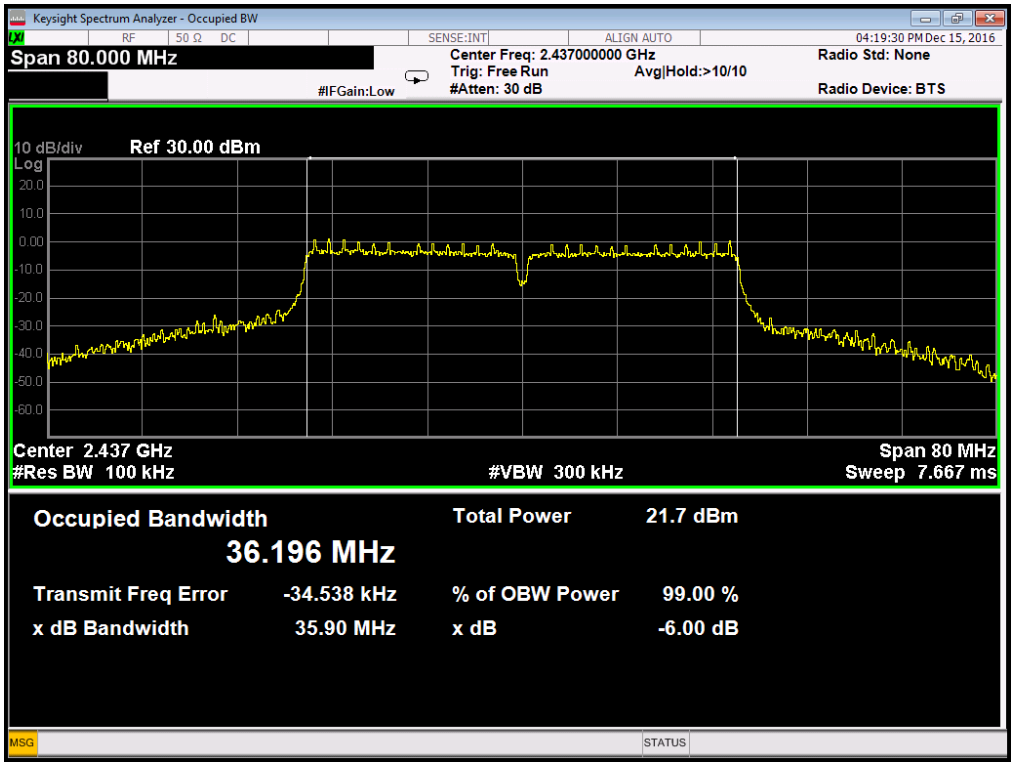
802.11n20 - 6 dB Bandwidth Plot on channel 11



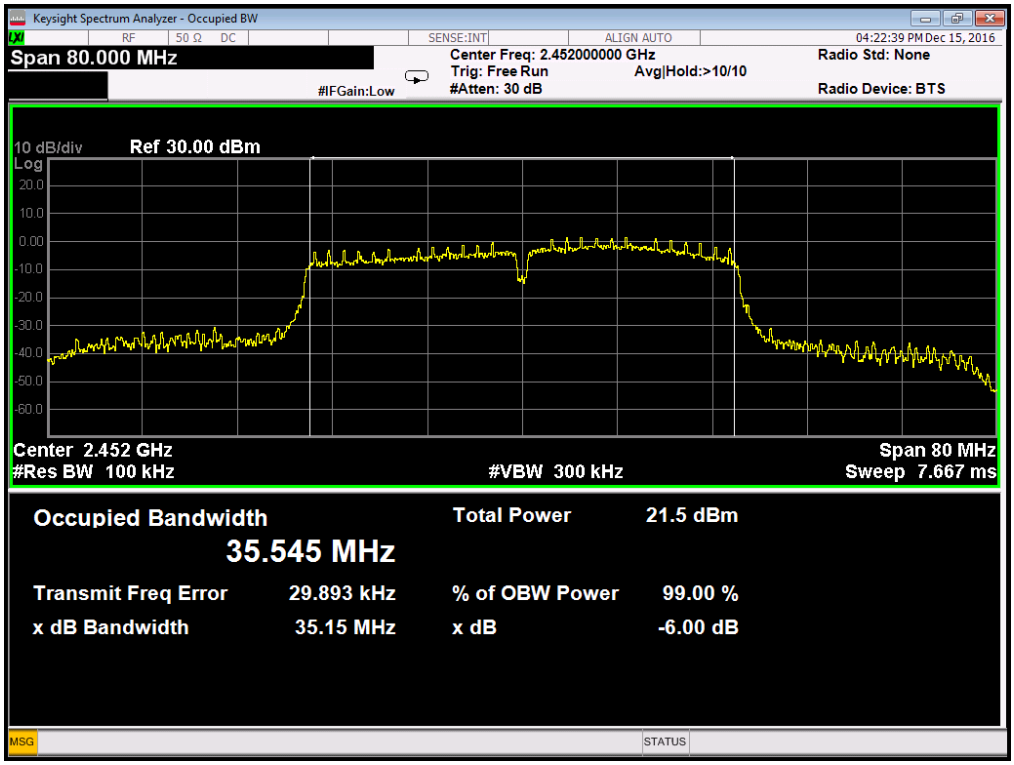
802.11n40 - 6 dB Bandwidth Plot on channel 3



802.11n40 - 6 dB Bandwidth Plot on channel 6



802.11n40 - 6 dB Bandwidth Plot on channel 9



2.4. Conducted Band Edges and Spurious Emissions

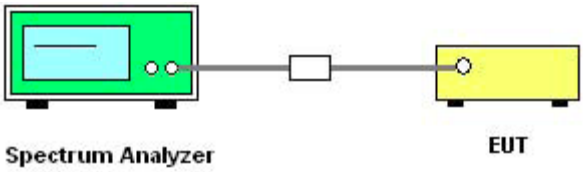
2.4.1. Limit of Conducted Band Edges and Spurious Emissions

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

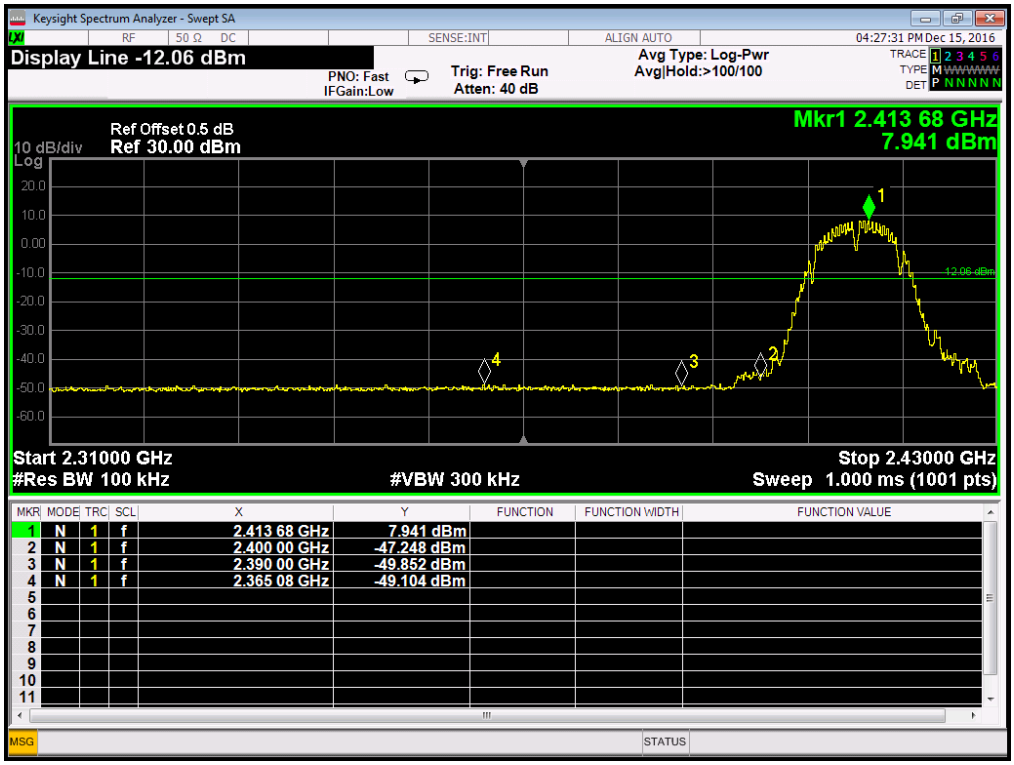
2.4.3. Test Setup



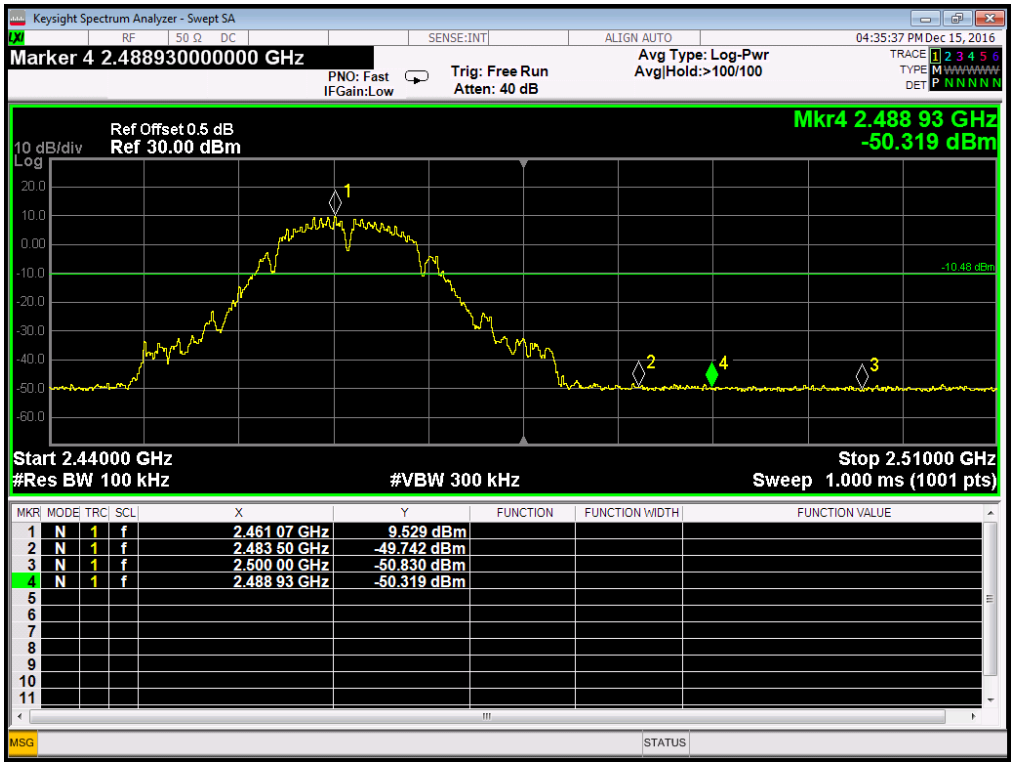
2.4.4. Test Procedure

1. The testing follows FCC KDB558074 D01 v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

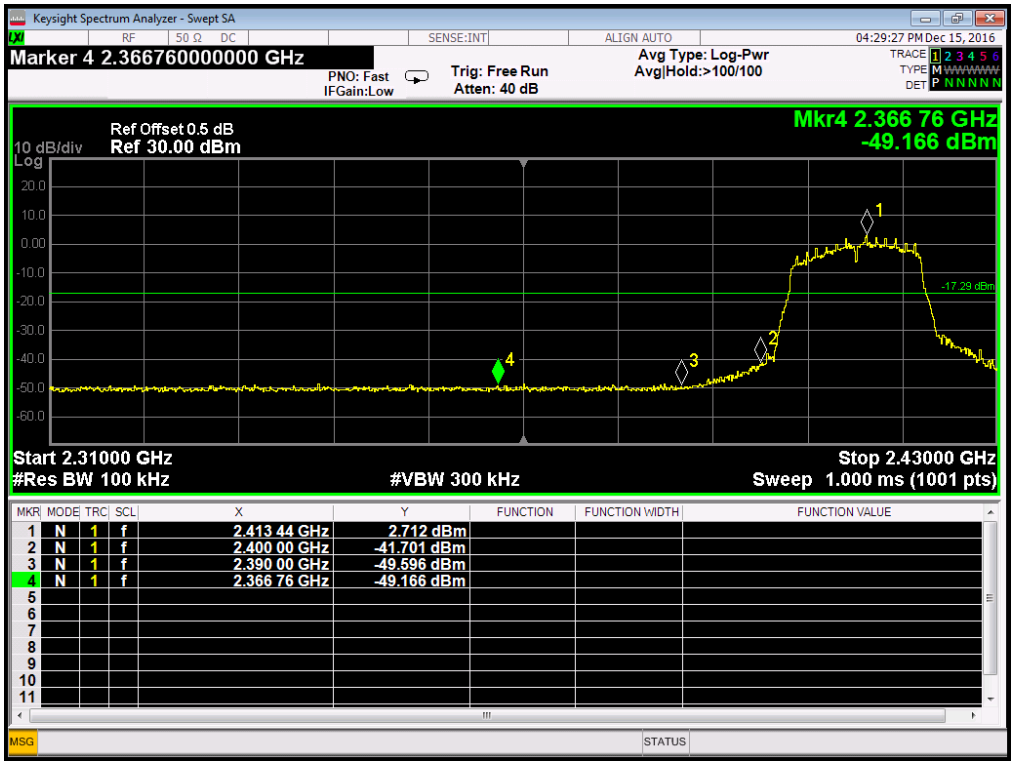
2.4.5. Test Results of Conducted Band Edges



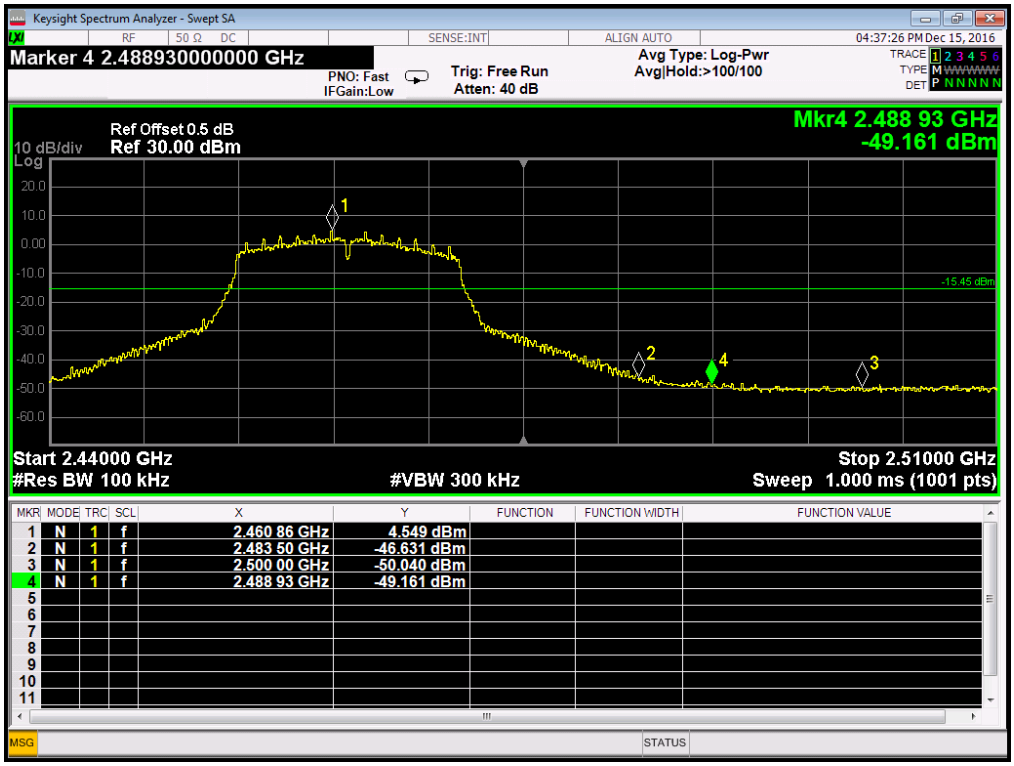
802.11b - Low Band Edge Plot on Channel 1



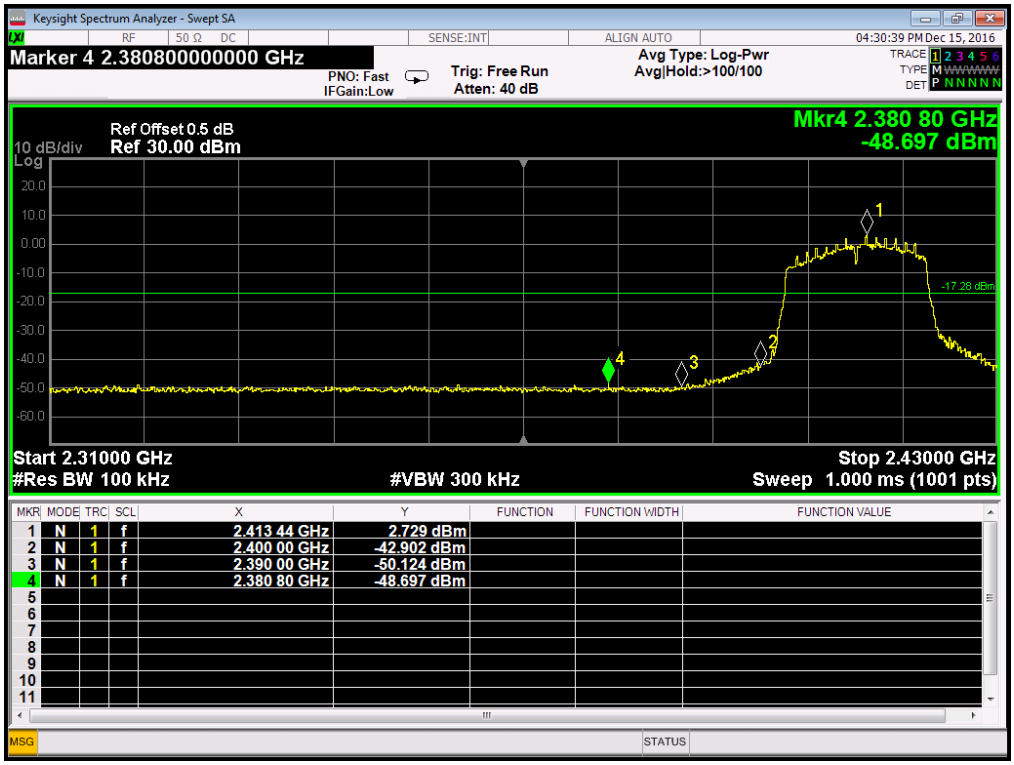
802.11b - High Band Edge Plot on Channel 11



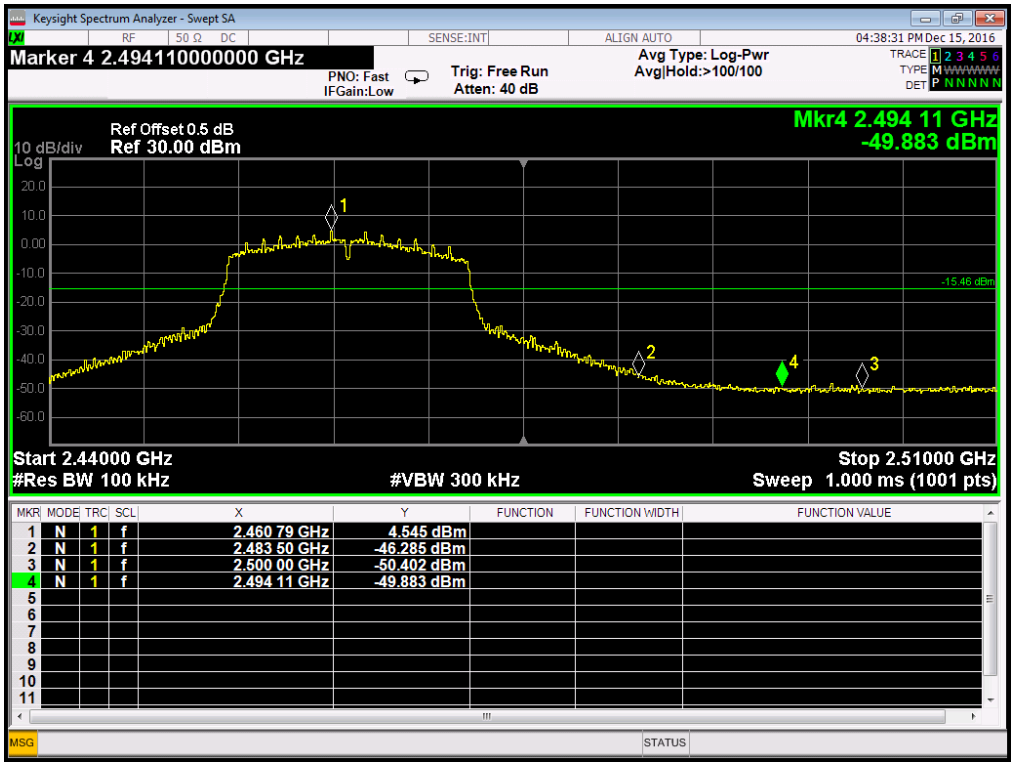
802.11g - Low Band Edge Plot on Channel 1



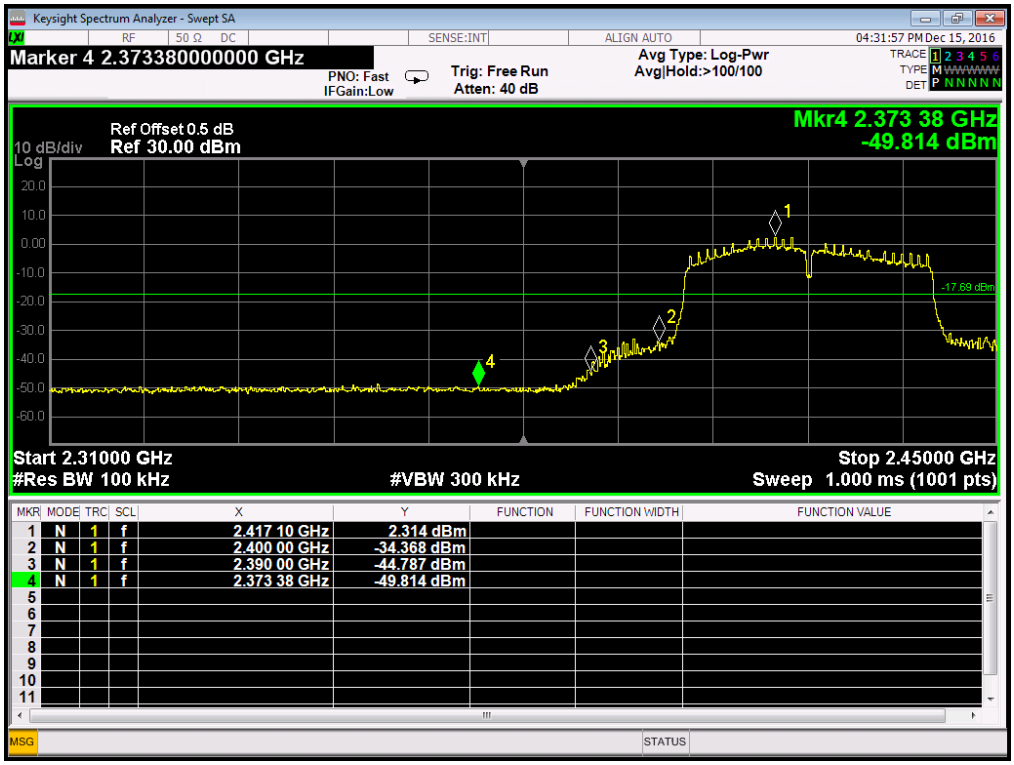
802.11g - High Band Edge Plot on Channel 11



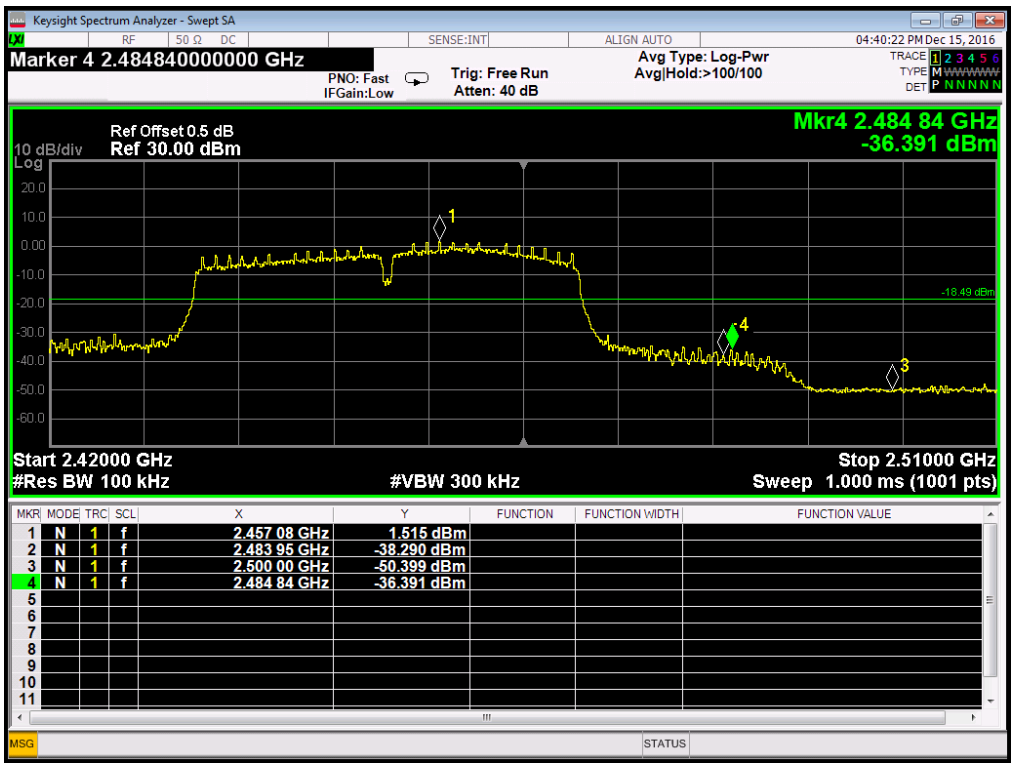
802.11n20 - Low Band Edge Plot on Channel 1



802.11n20 - High Band Edge Plot on Channel 11



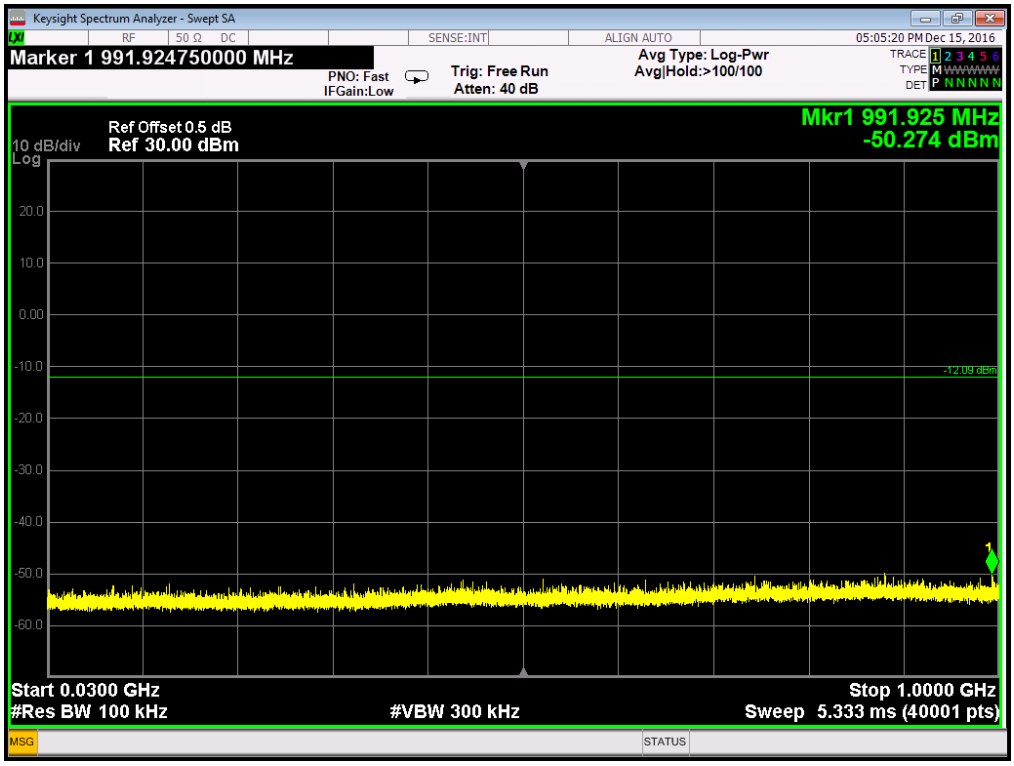
802.11n40 - Low Band Edge Plot on Channel 3



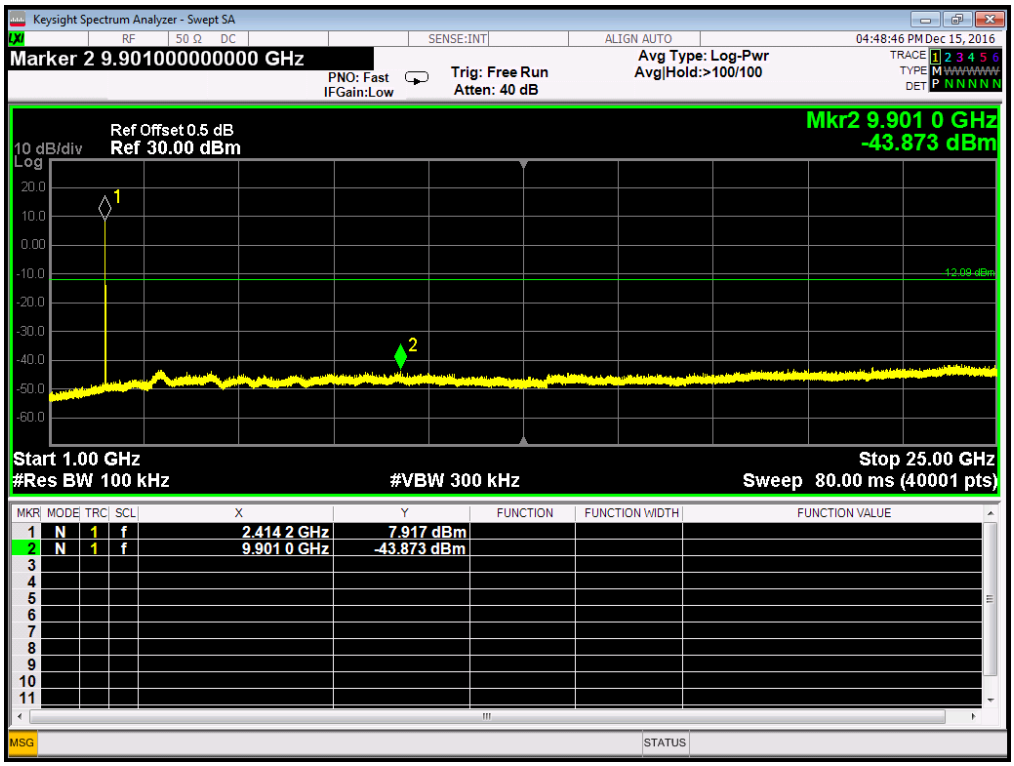
802.11n40 - High Band Edge Plot on Channel 9

2.4.6. Test Result of Conducted Spurious Emission

802.11b - Conducted Spurious Emission Plot on channel 1

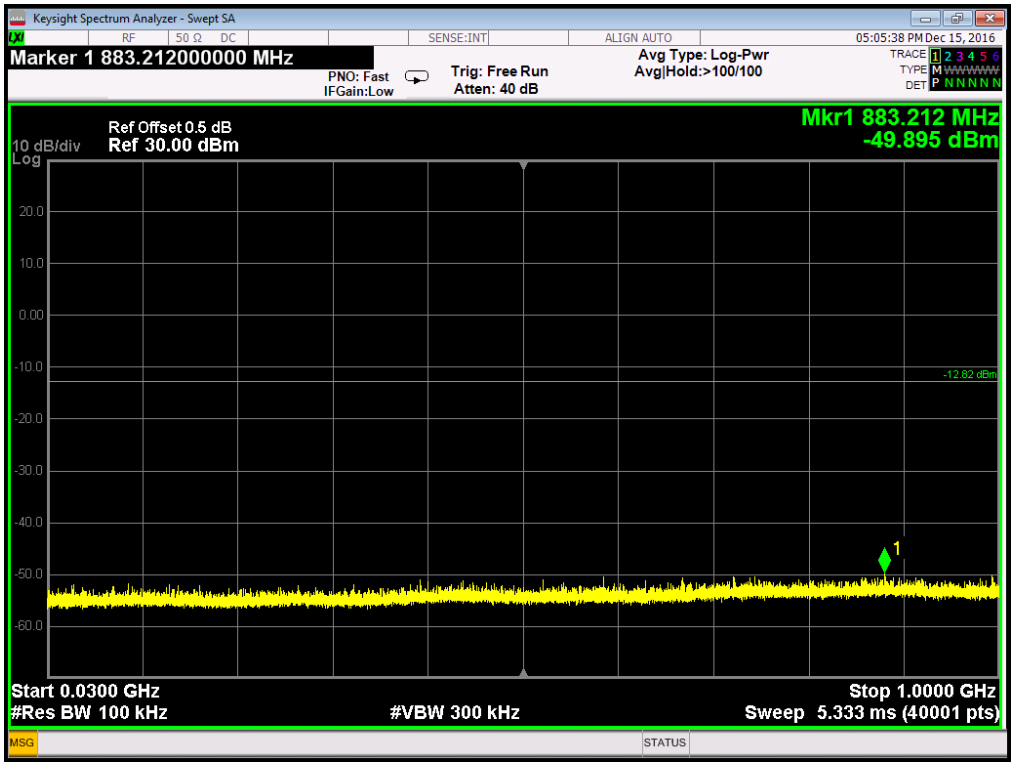


Channel = 1, 30MHz to 1GHz

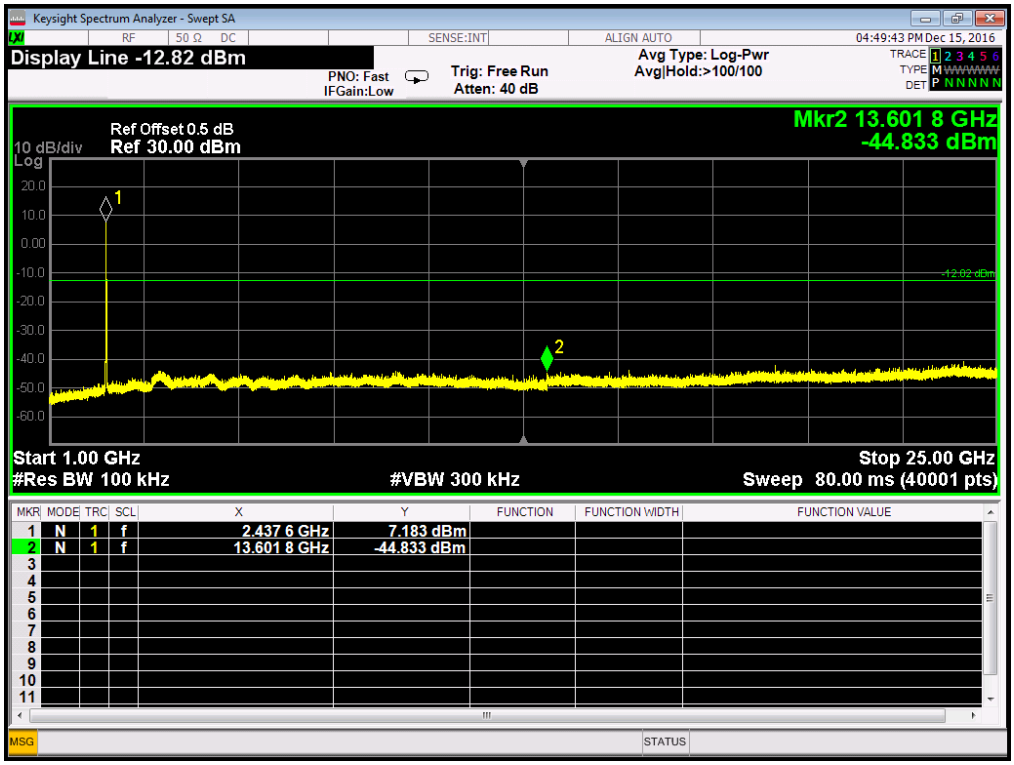


Channel = 1, 1GHz to 25GHz

802.11b - Conducted Spurious Emission Plot on channel 6

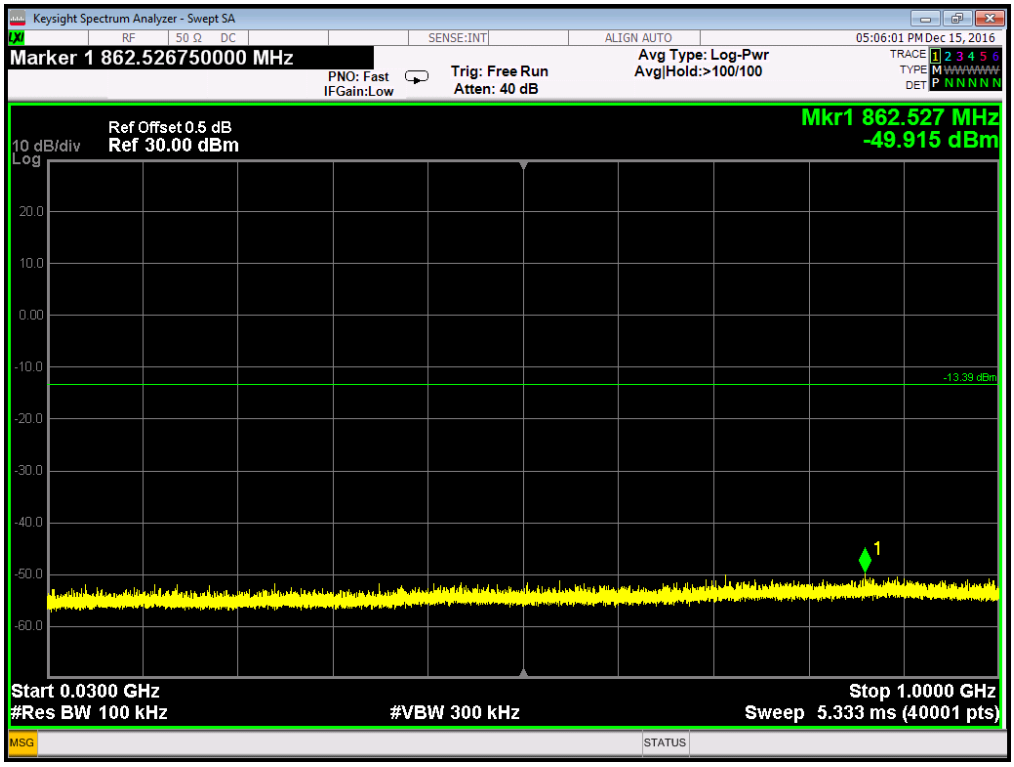


Channel = 6, 30MHz to 1GHz

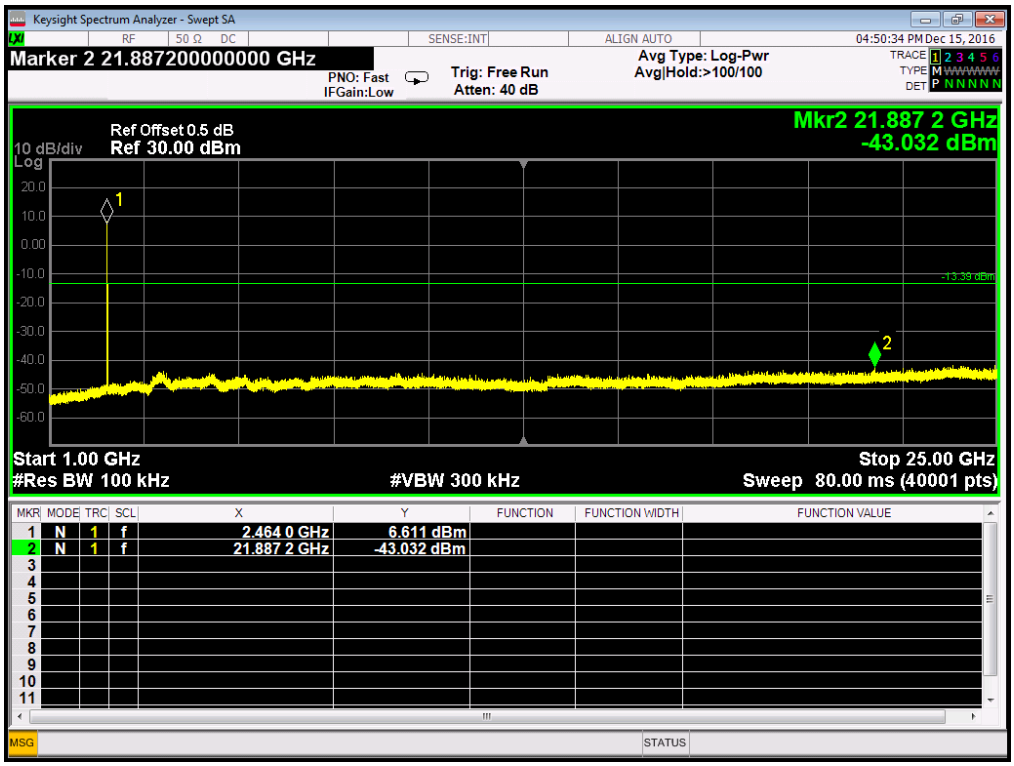


Channel = 6, 1GHz to 25GHz

802.11b - Conducted Spurious Emission Plot on channel 11

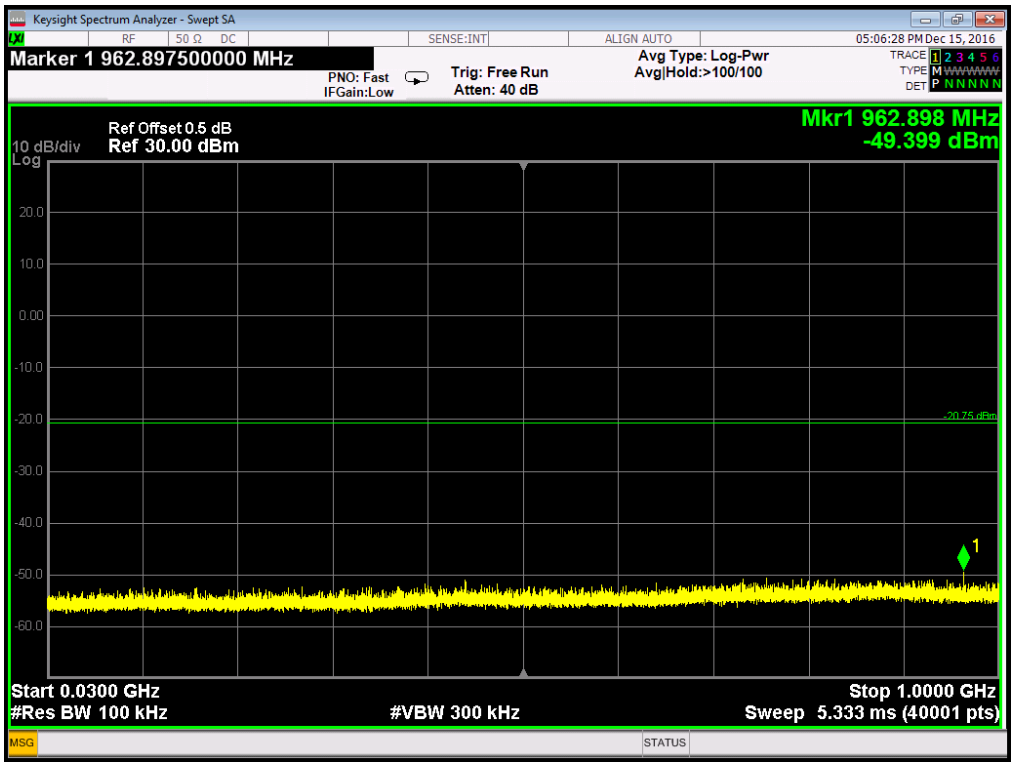


Channel = 11, 30MHz to 25GHz

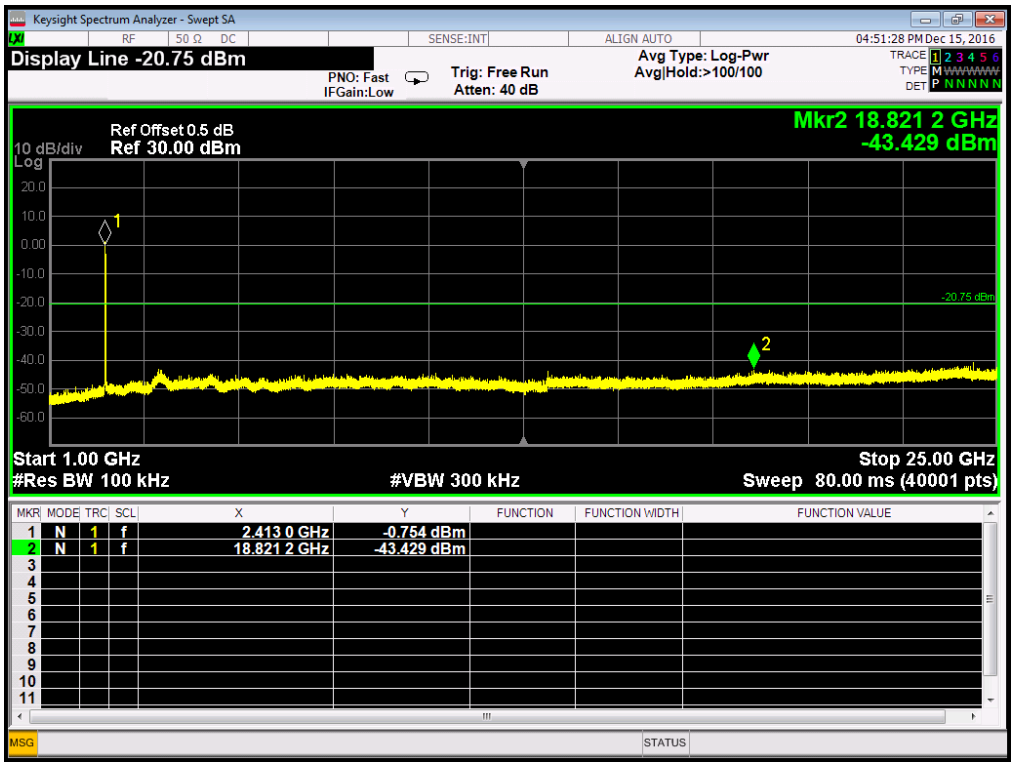


Channel = 11, 1GHz to 25GHz

802.11g - Conducted Spurious Emission Plot on channel 1

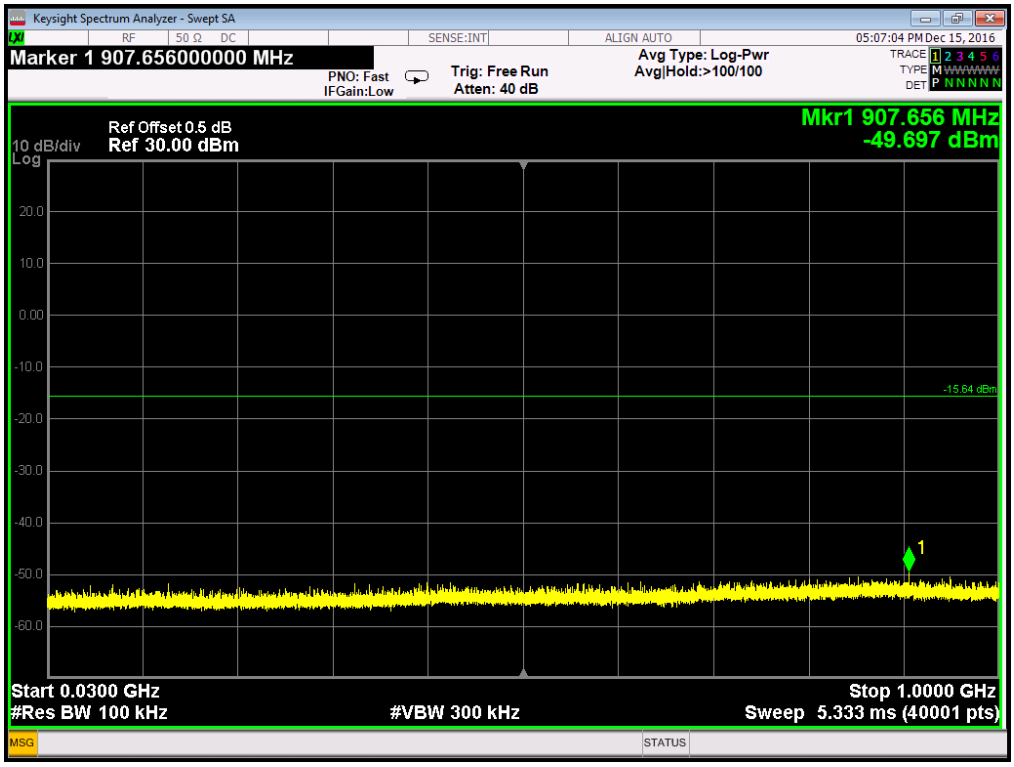


Channel = 1, 30MHz to 1GHz

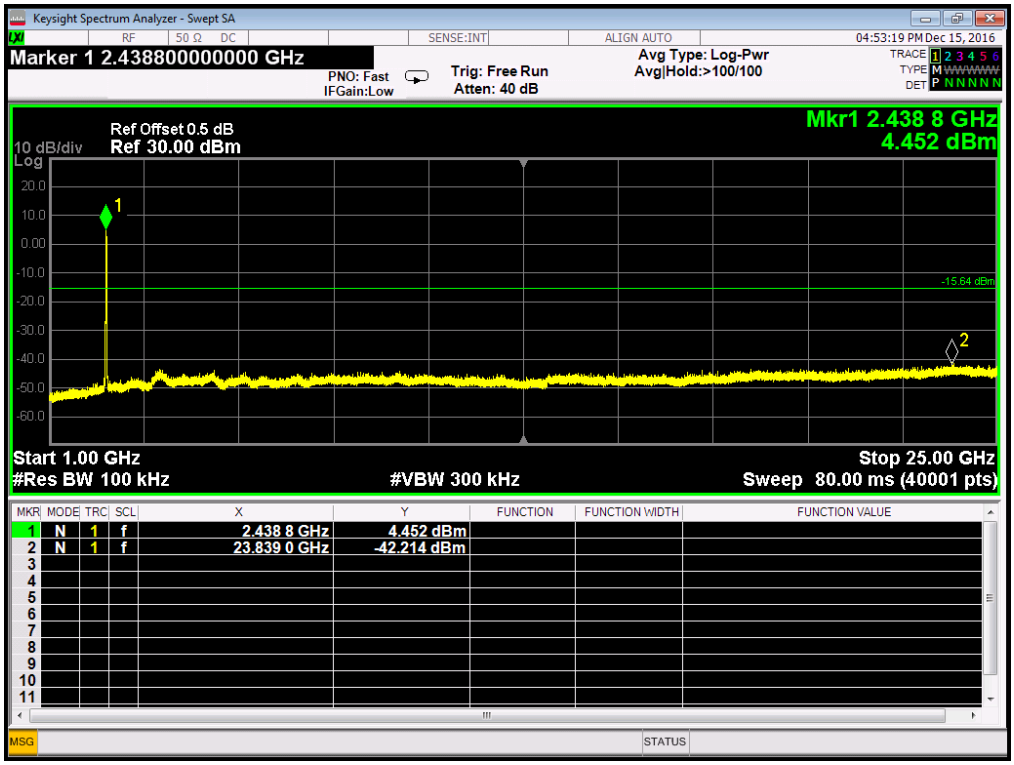


Channel = 1, 1GHz to 25GHz

802.11g - Conducted Spurious Emission Plot on channel 6

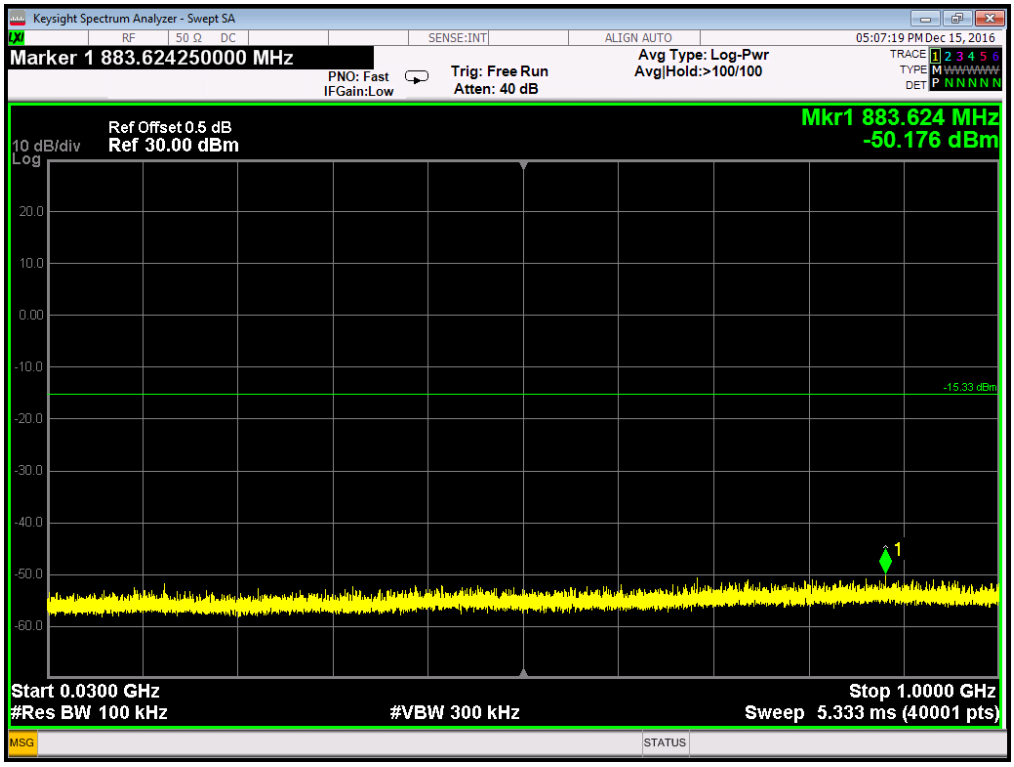


Channel = 6, 30MHz to 1GHz

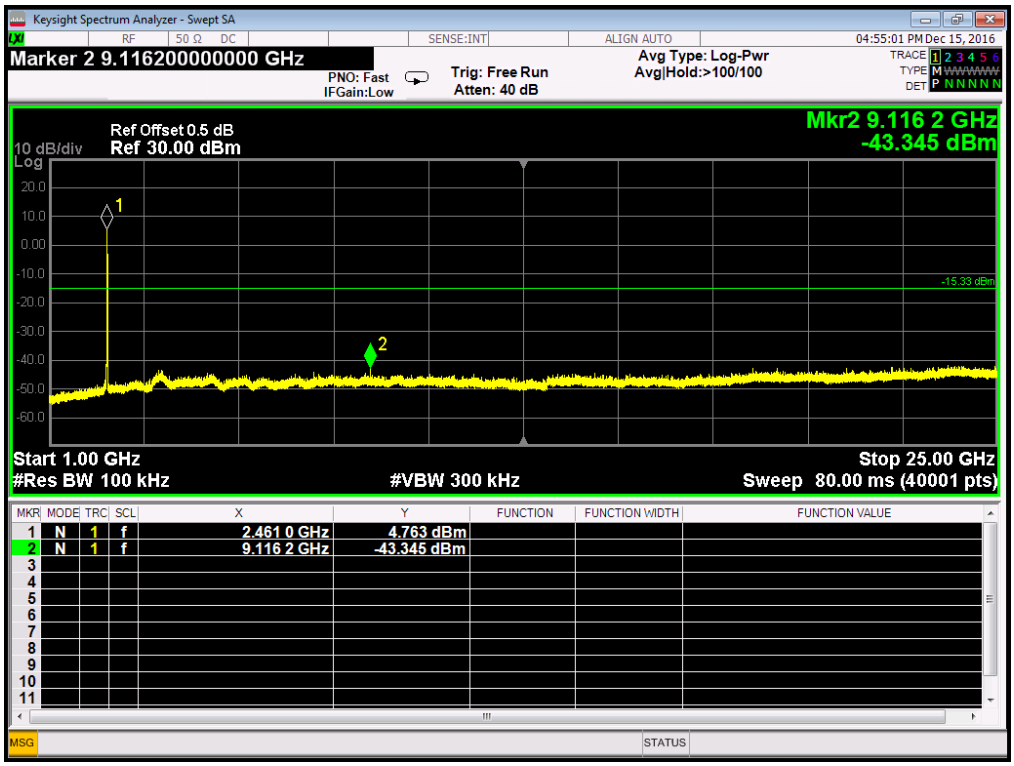


Channel = 6, 1GHz to 25GHz

802.11g - Conducted Spurious Emission Plot on channel 11

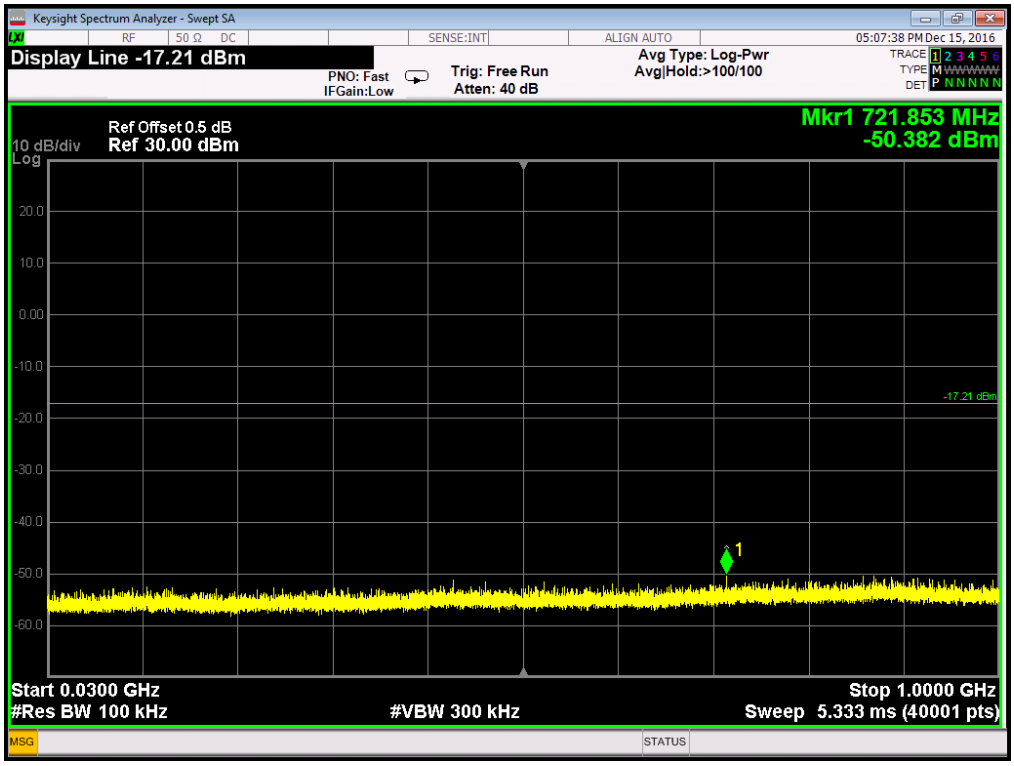


Channel = 11, 30MHz to 25GHz

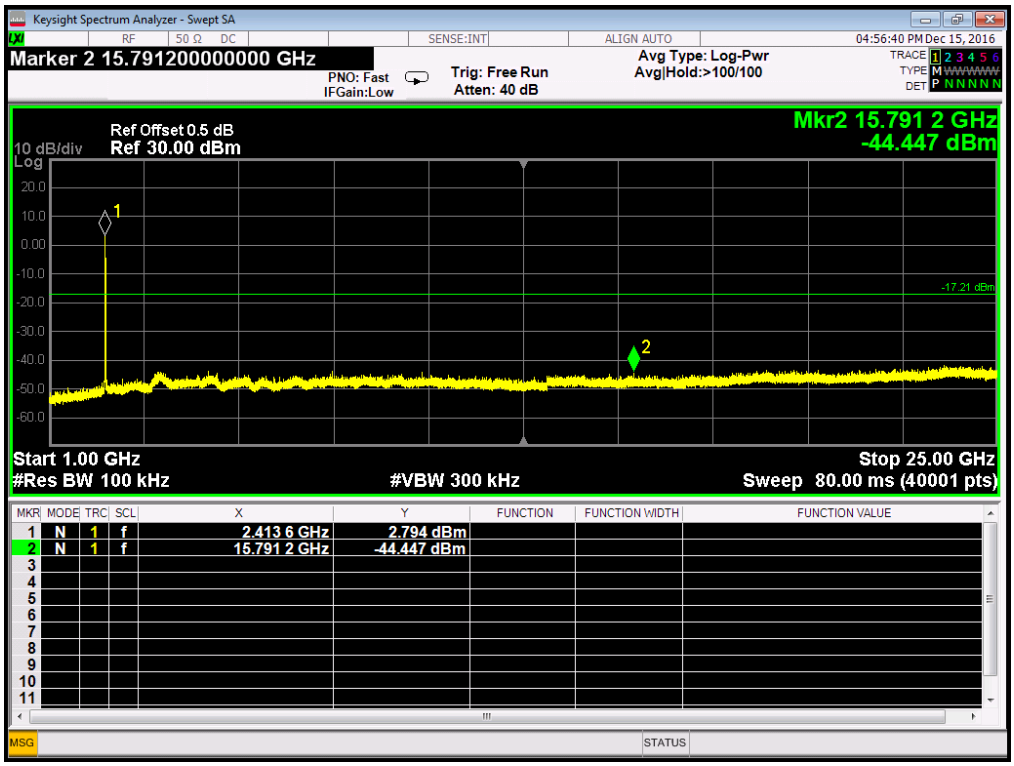


Channel = 11, 1GHz to 25GHz

802.11n20 - Conducted Spurious Emission Plot on channel 1

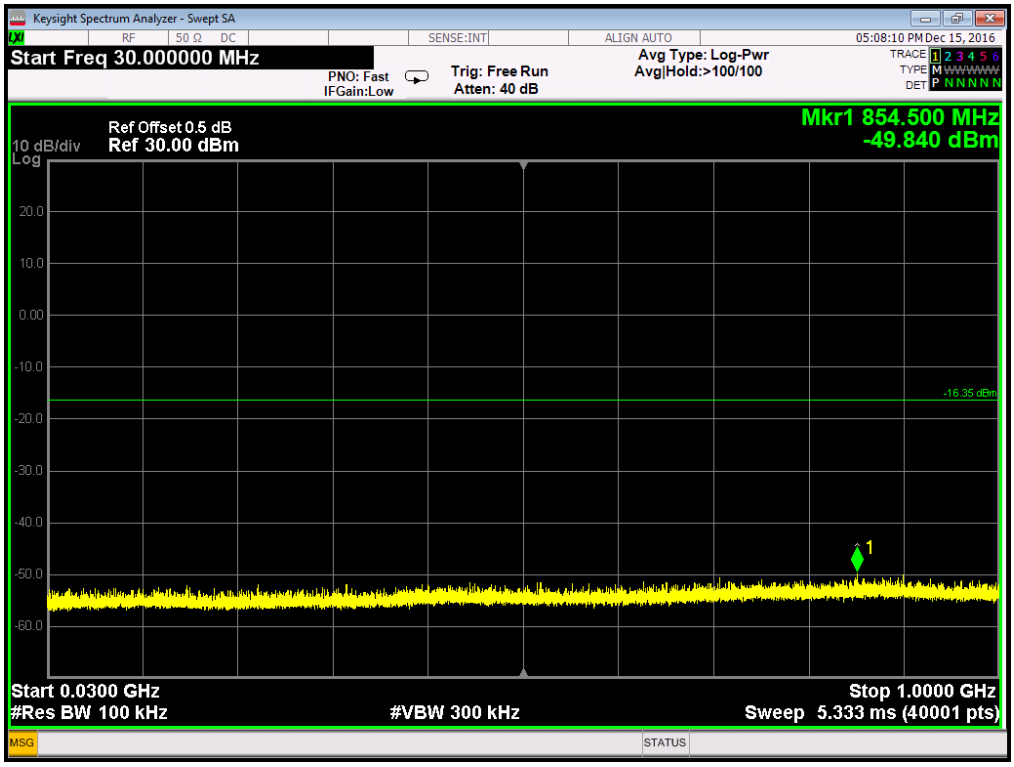


Channel = 1, 30MHz to 1GHz

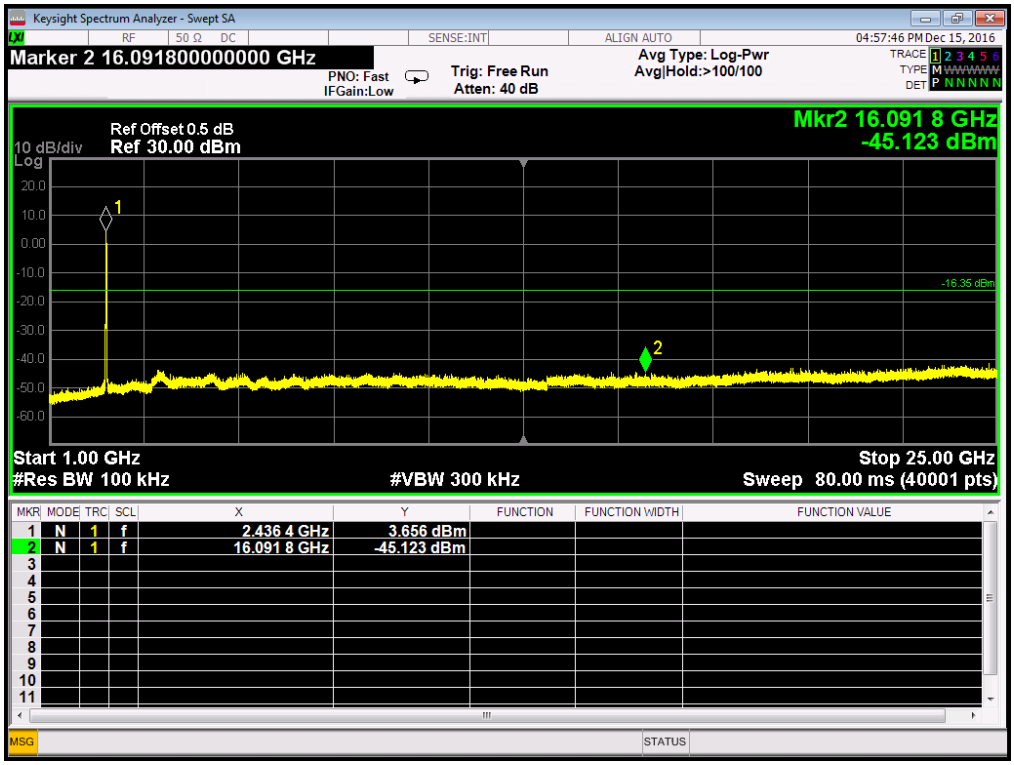


Channel = 1, 1GHz to 25GHz

802.11n20 - Conducted Spurious Emission Plot on channel 6

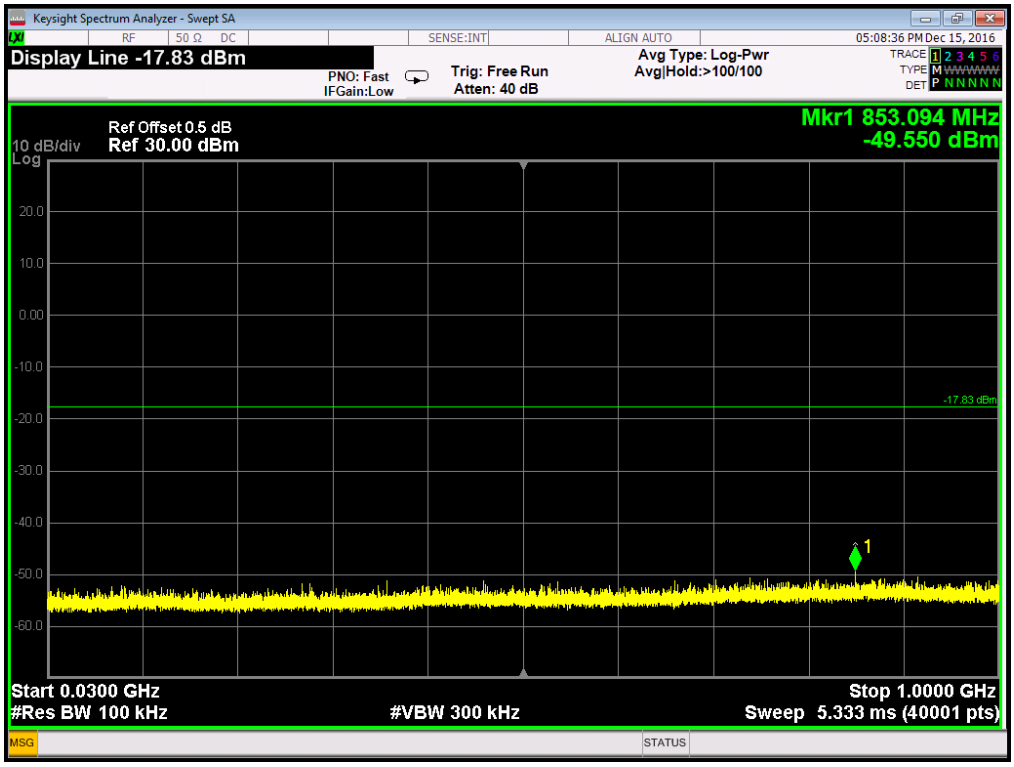


Channel = 6, 30MHz to 1GHz

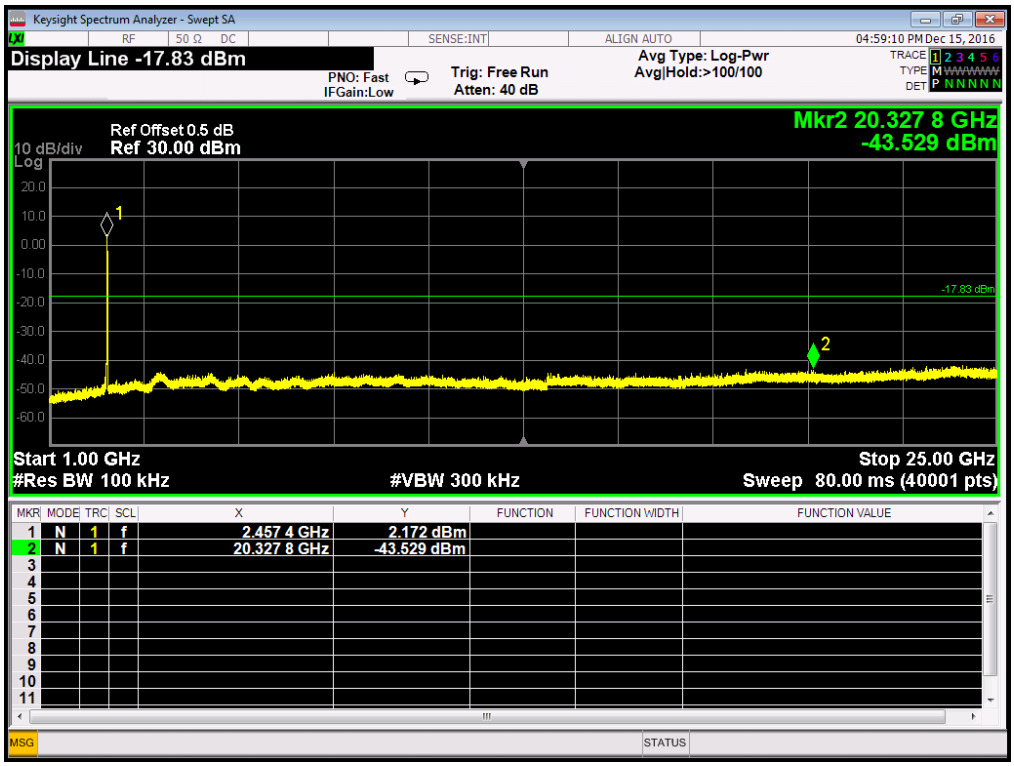


Channel = 6, 1GHz to 25GHz

802.11n20 - Conducted Spurious Emission Plot on channel 11

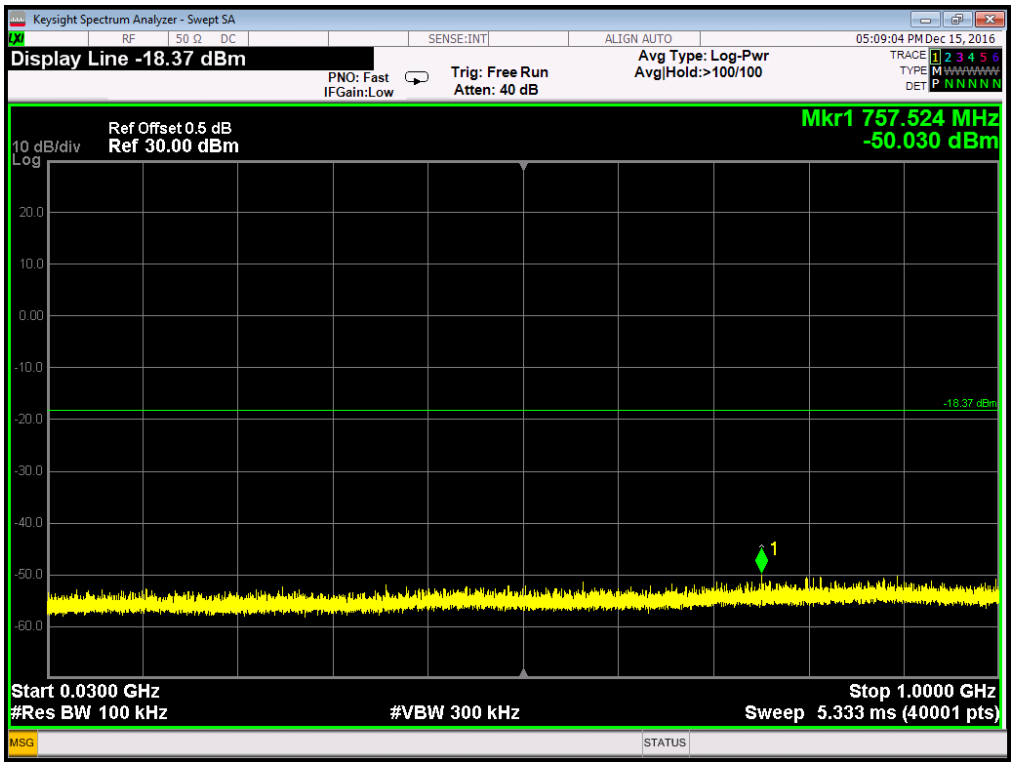


Channel = 11, 30MHz to 25GHz

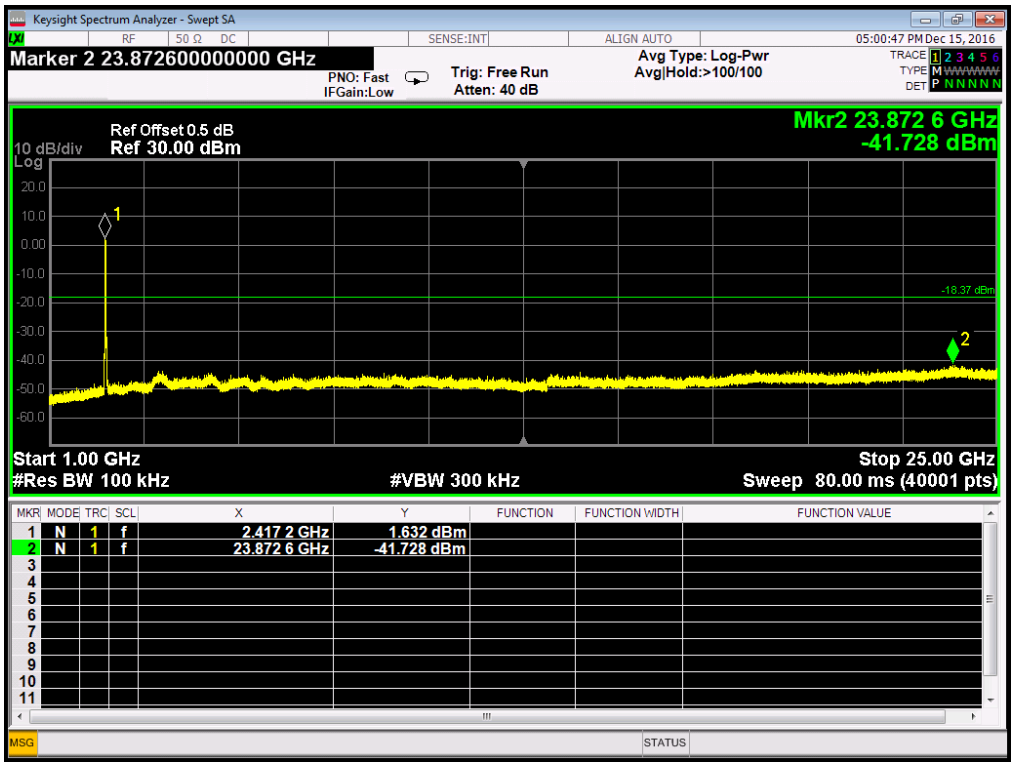


Channel = 11, 1GHz to 25GHz

802.11n40 - Conducted Spurious Emission Plot on channel 3

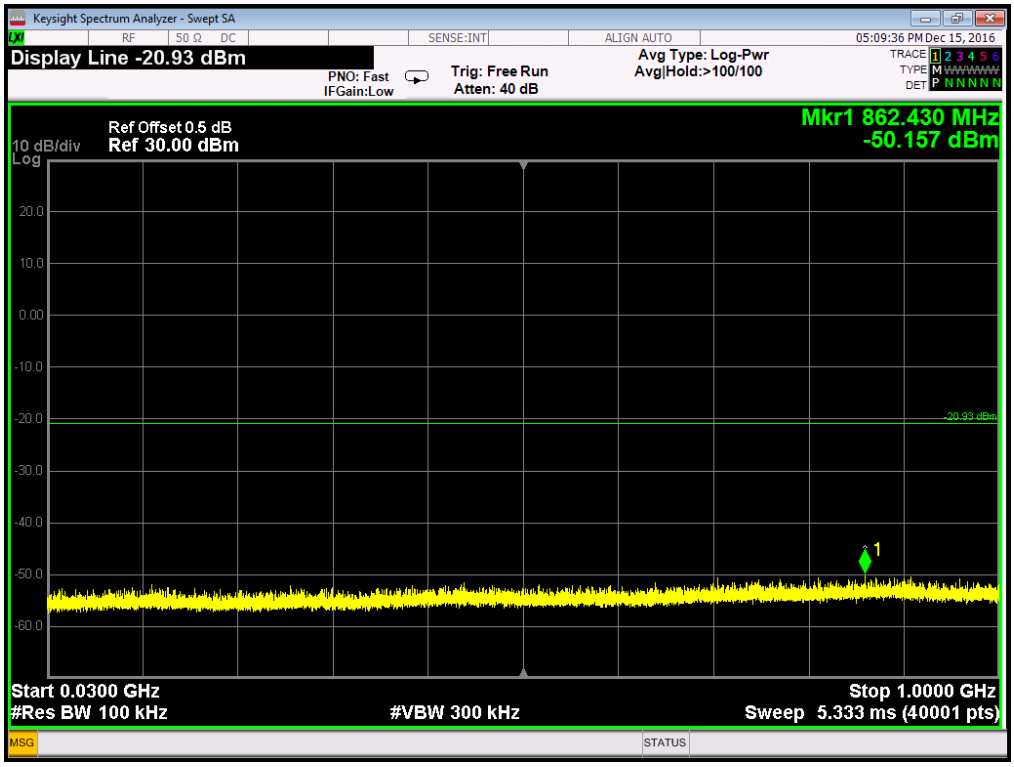


Channel = 3, 30MHz to 1GHz

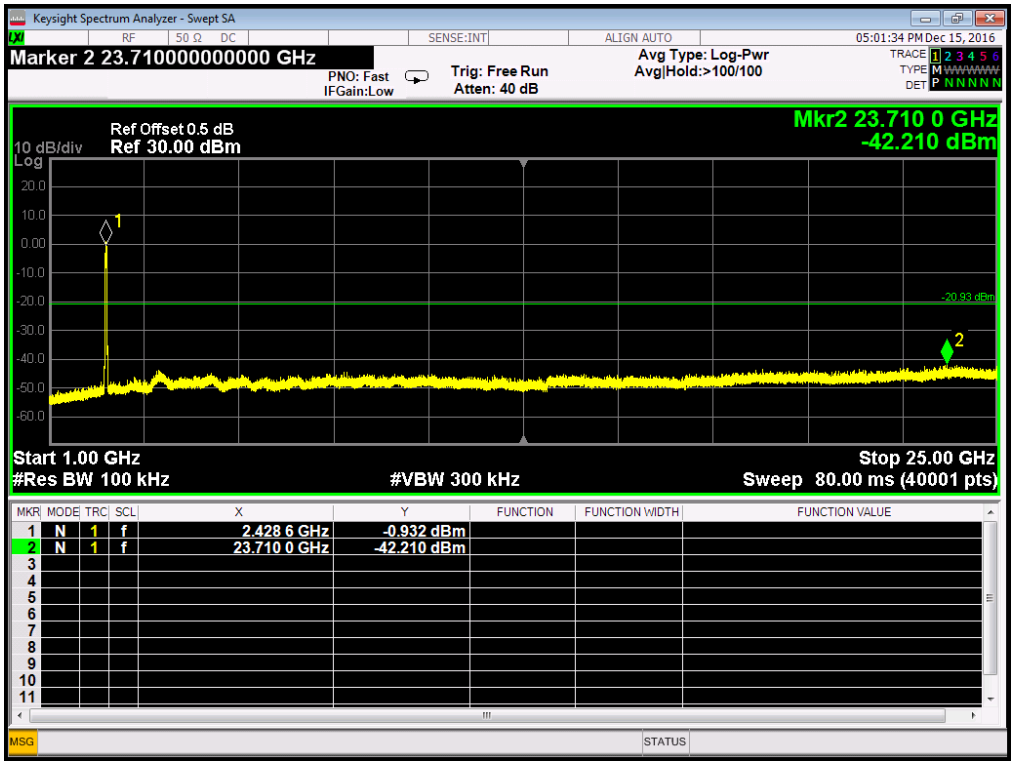


Channel = 3, 1GHz to 25GHz

802.11n40 - Conducted Spurious Emission Plot on channel 6

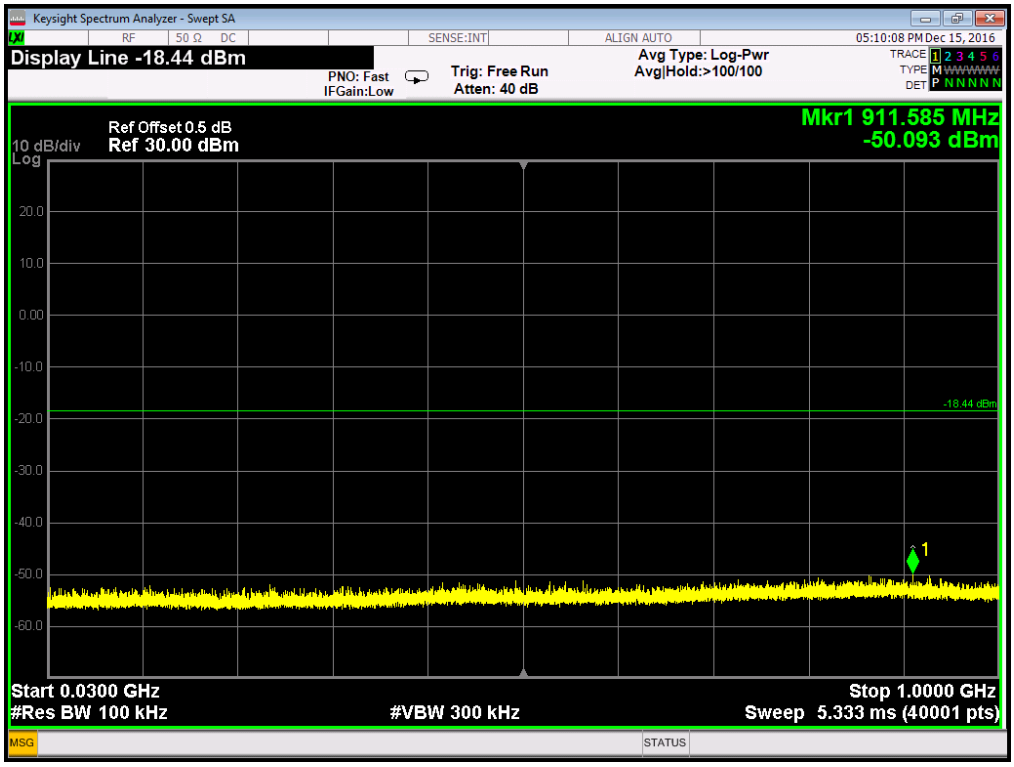


Channel = 6, 30MHz to 1GHz

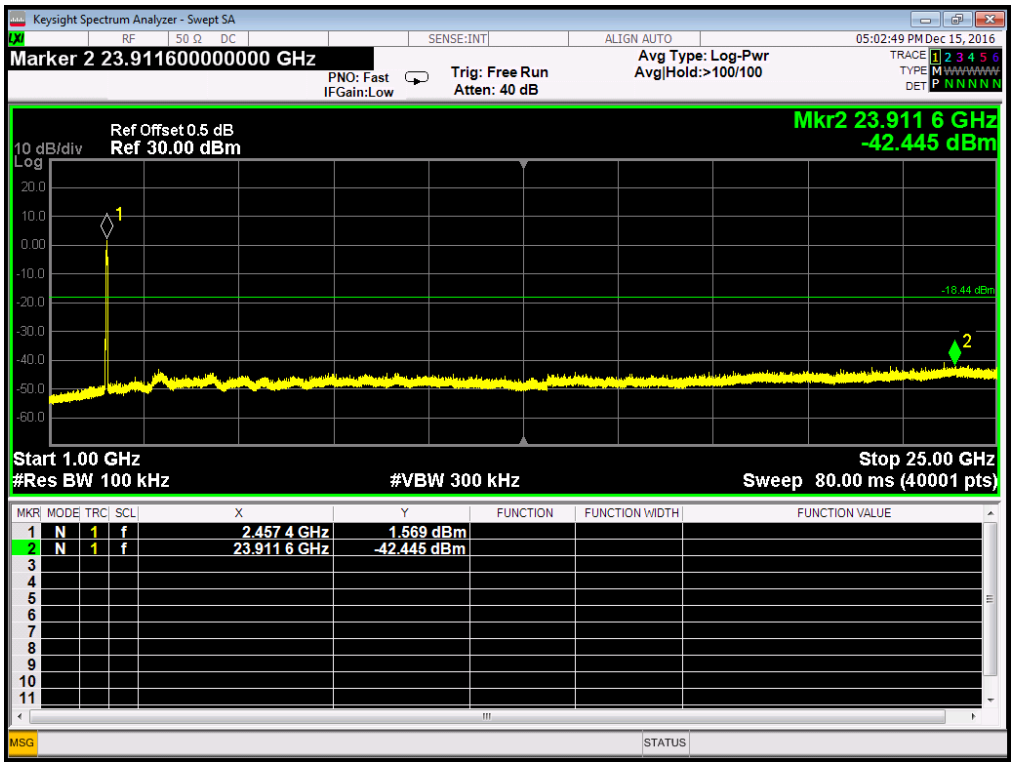


Channel = 6, 1GHz to 25GHz

802.11n40 - Conducted Spurious Emission Plot on channel 9



Channel = 9, 30MHz to 25GHz



Channel = 9, 1GHz to 25GHz

2.5. Power spectral density (PSD)

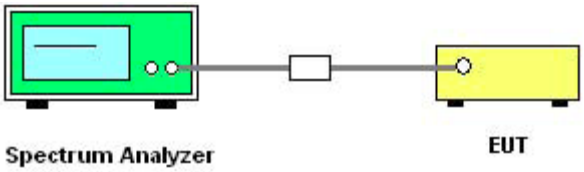
2.5.1. Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.5.3. Test Setup



2.5.4. Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB558074 D01 v03r05.

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)

5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.

6. Measure and record the results in the test report.

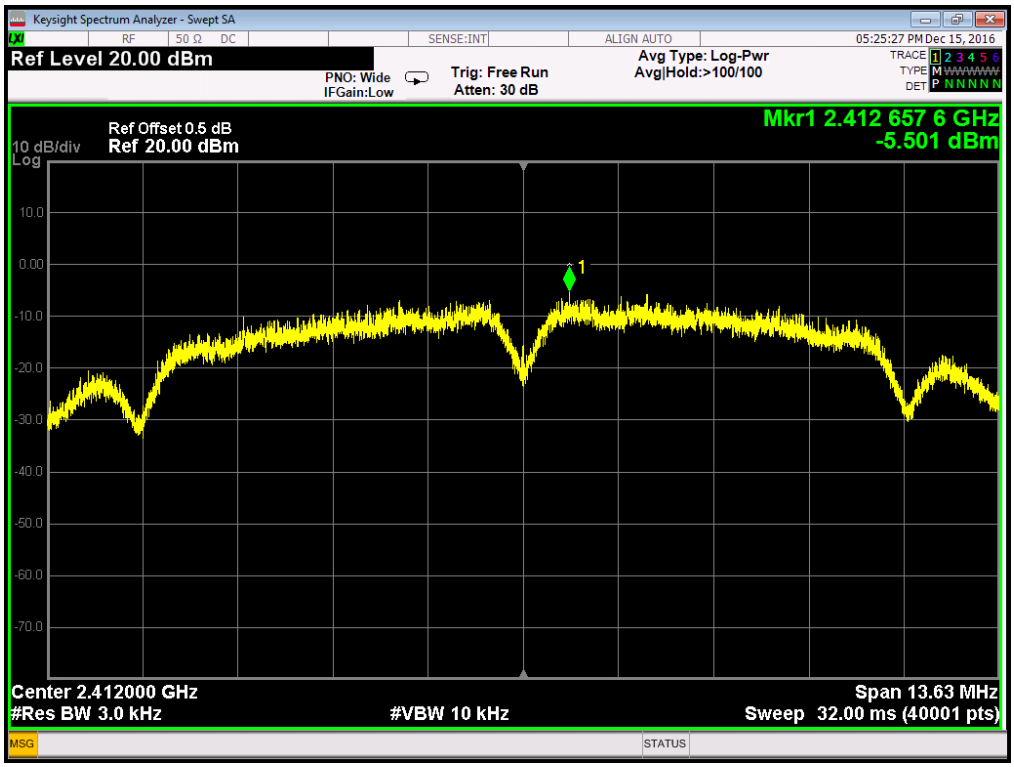
7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

2.5.5. Test Results of Power spectral density

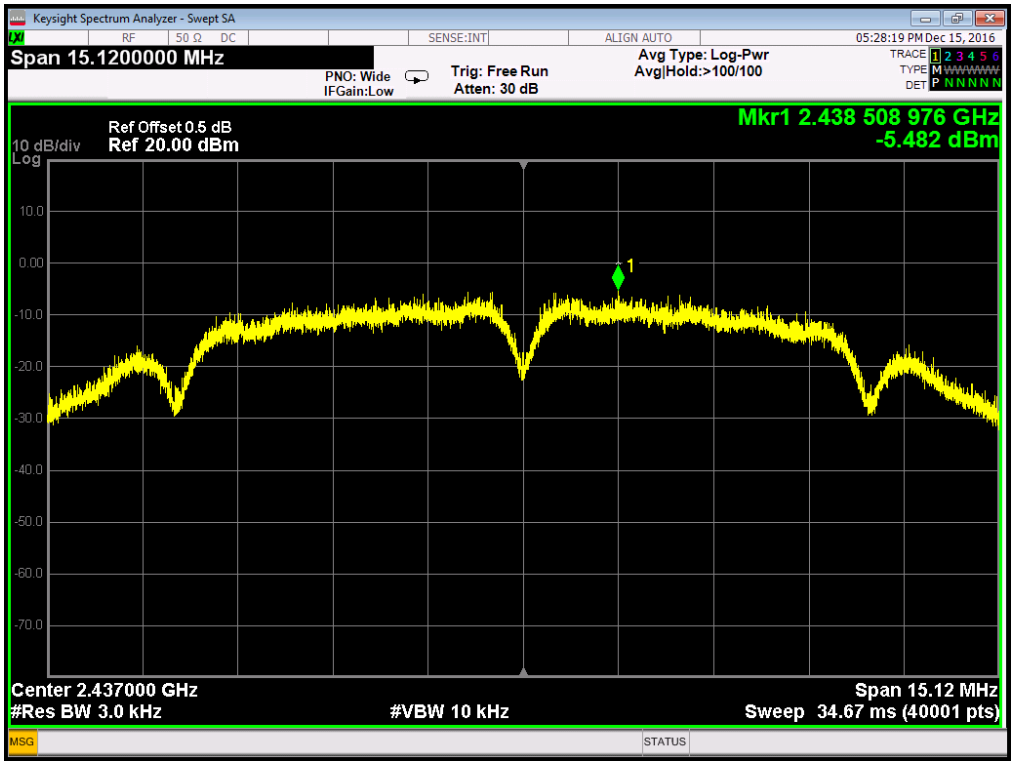
Spectral power density (dBm)					
Test mode	Channel	Frequency (MHz)	PSD/3kHz (dBm)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	-5.501	8	PASS
	6	2437	-5.482		PASS
	11	2462	-5.282		PASS
802.11g	1	2412	-9.857		PASS
	6	2437	-8.182		PASS
	11	2462	-8.576		PASS
802.11n20	1	2412	-10.891		PASS
	6	2437	-7.496		PASS
	11	2462	-9.239		PASS
802.11n40	3	2422	-11.198		PASS
	6	2437	-13.007		PASS
	9	2452	-11.269		PASS
Measurement uncertainty: ±1.3dB					

Note: 1. Measured power density (dBm) has offset with cable loss.

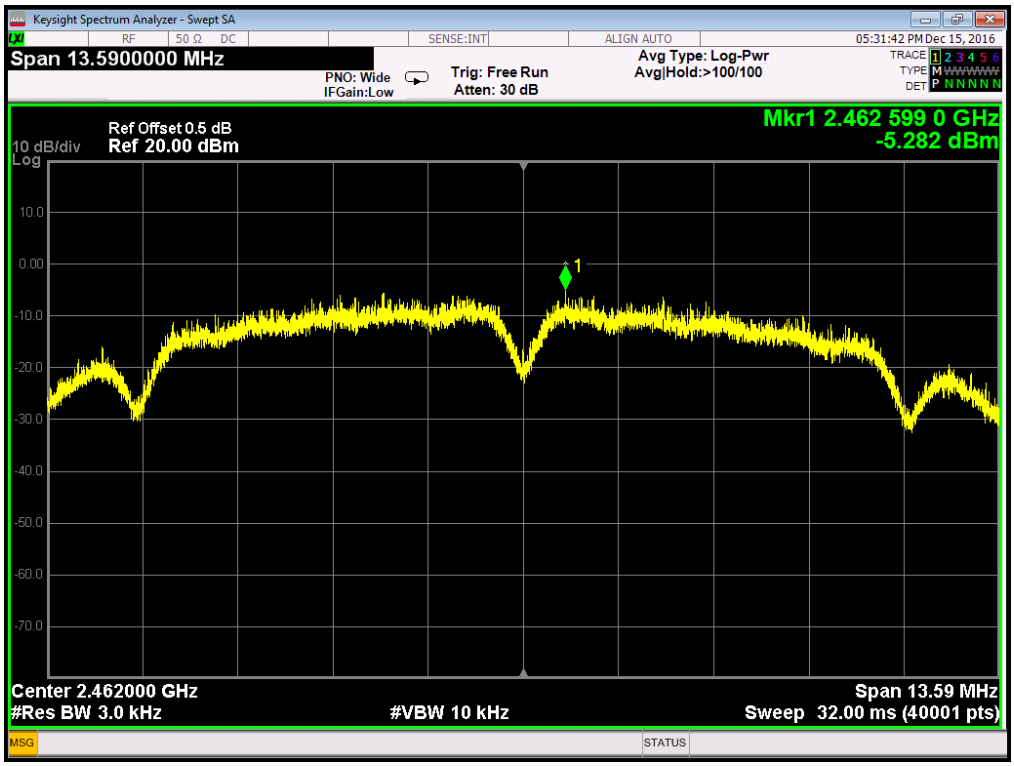
2.5.6. Test Results (plots) of Power spectral density



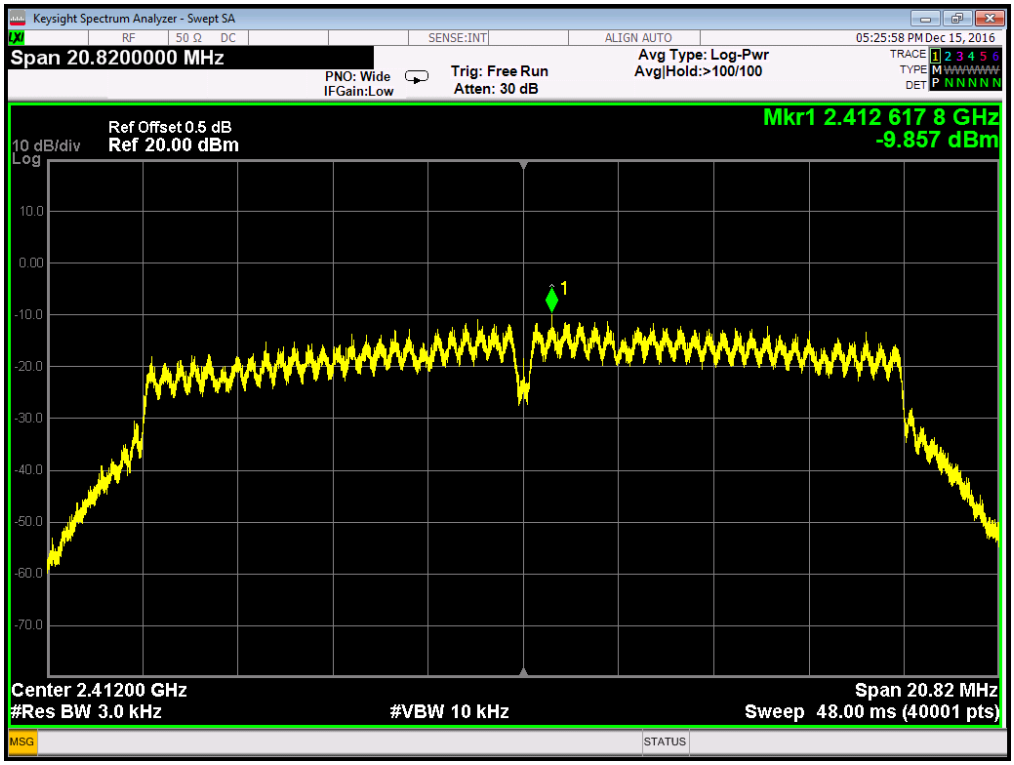
802.11b - Channel 1



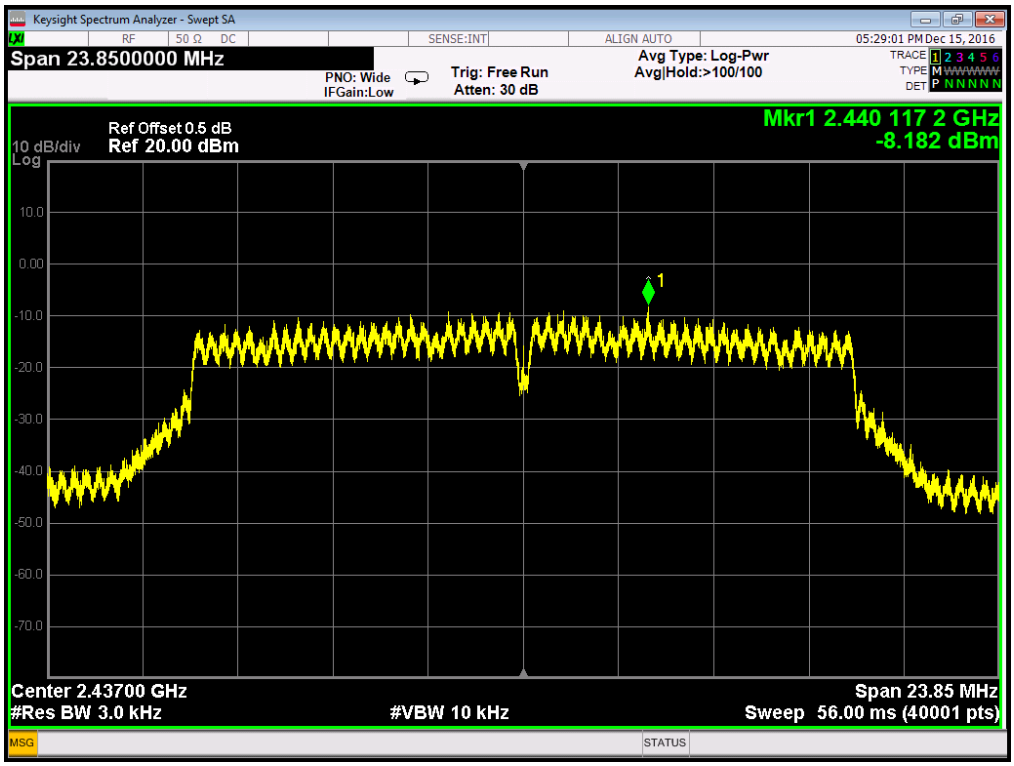
802.11b - Channel 6



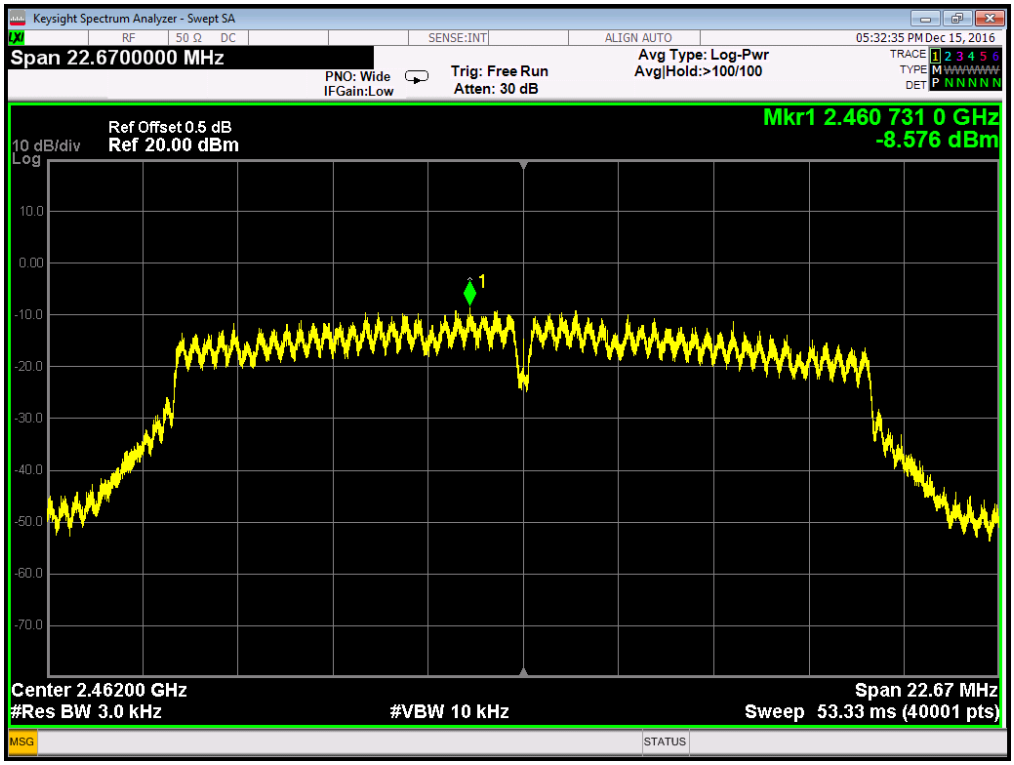
802.11b - Channel 11



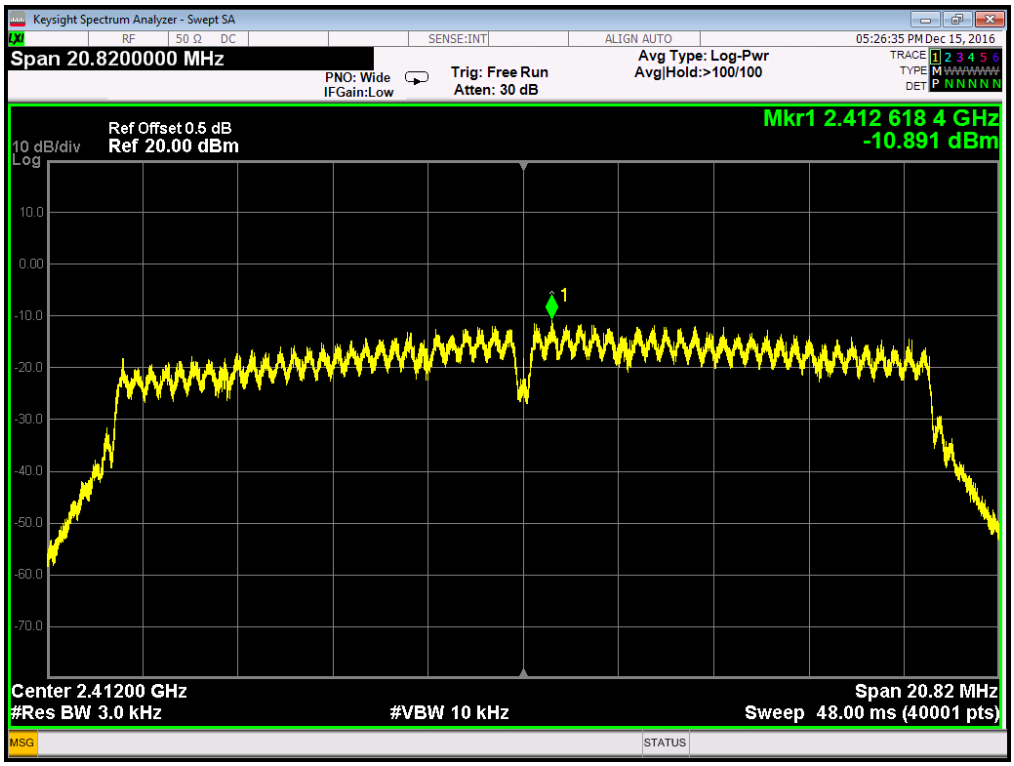
802.11g - Channel 1



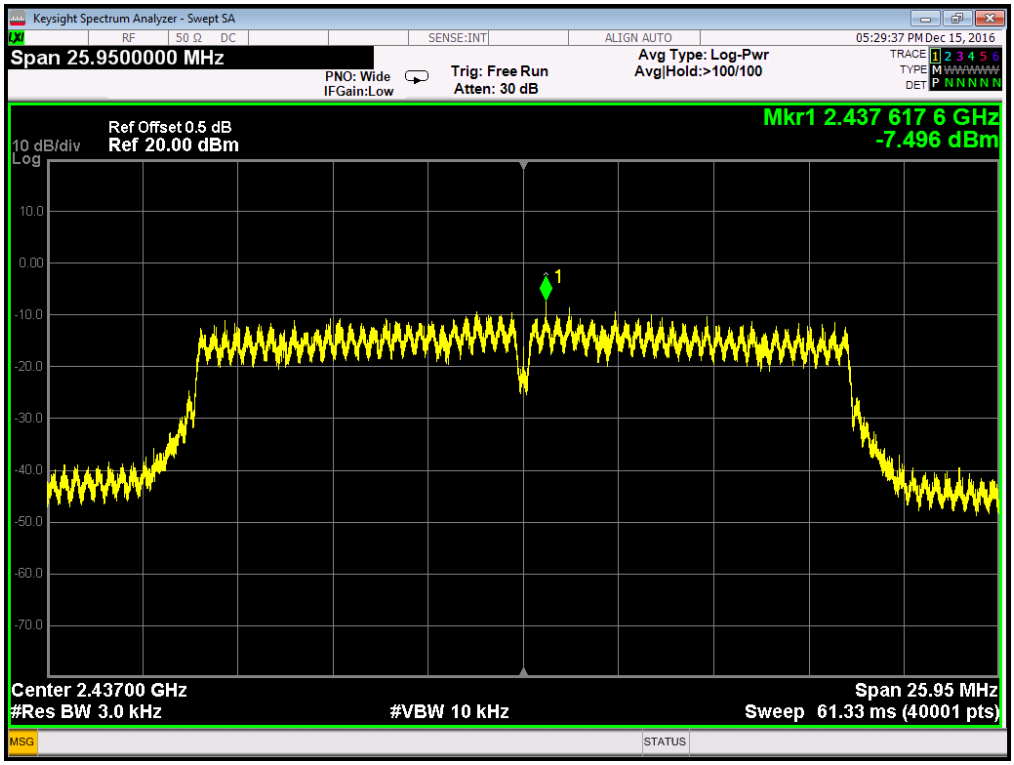
802.11g - Channel 6



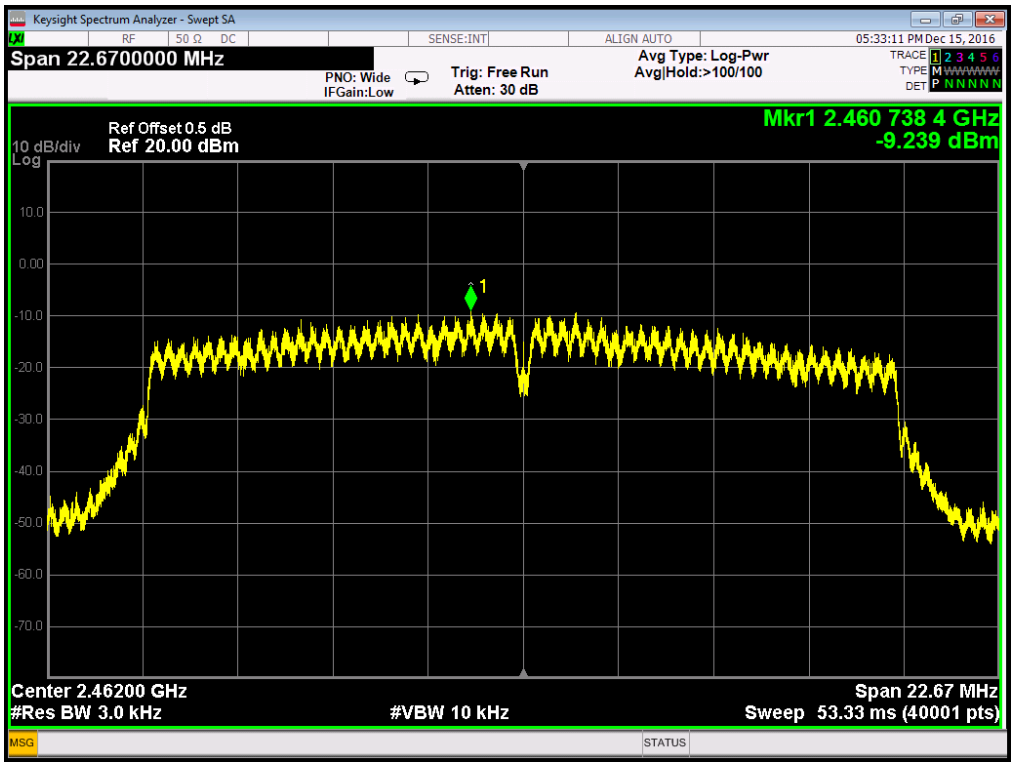
802.11g - Channel 11



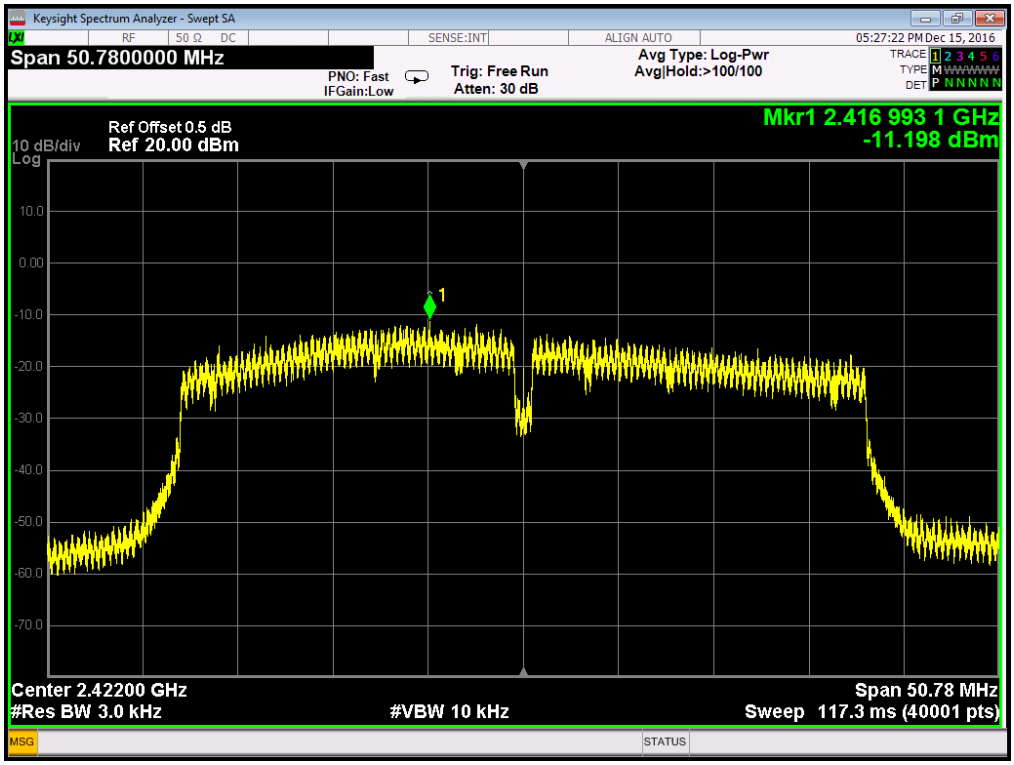
802.11n20 - Channel 1



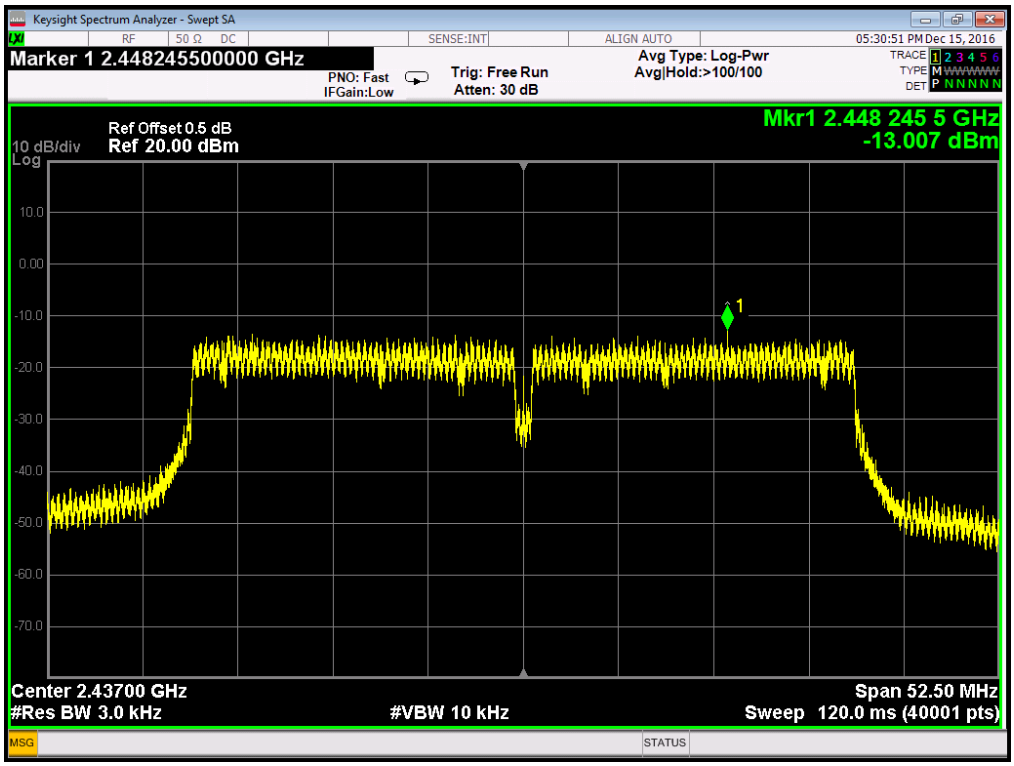
802.11n20 - Channel 6



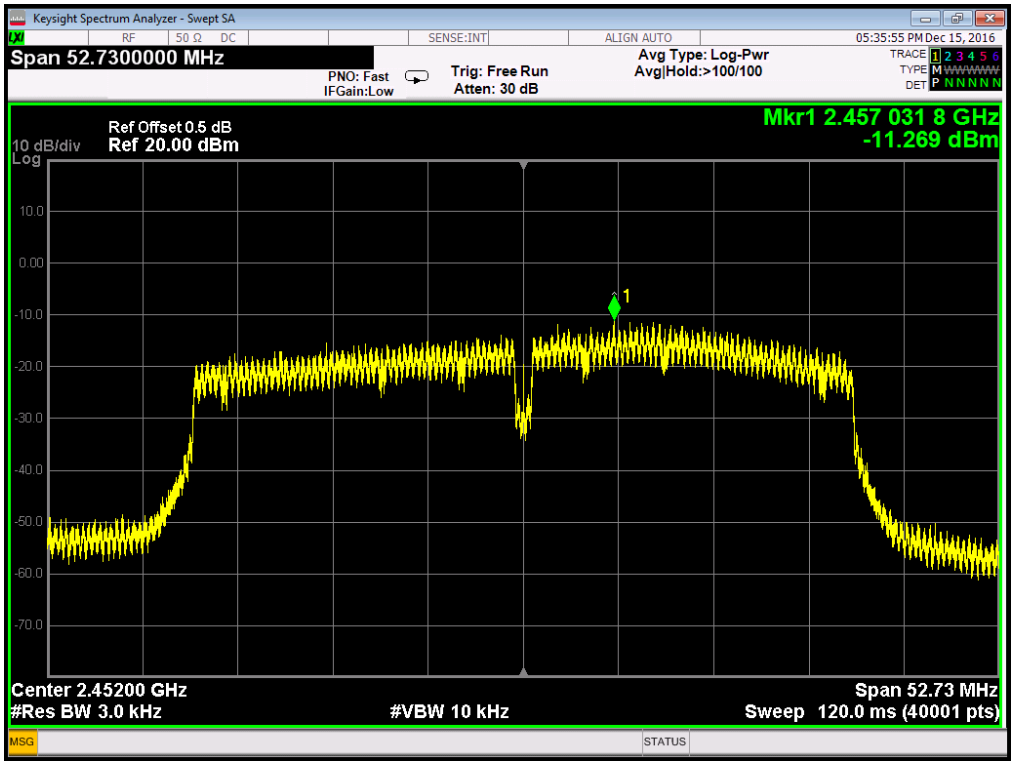
802.11n20 - Channel 11



802.11n40 - Channel 3



802.11n40 - Channel 6



802.11n40 - Channel 9

2.6. Radiated Band Edge and Spurious Emission

2.6.1. Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Note: Wireless charger configuration was evaluated.

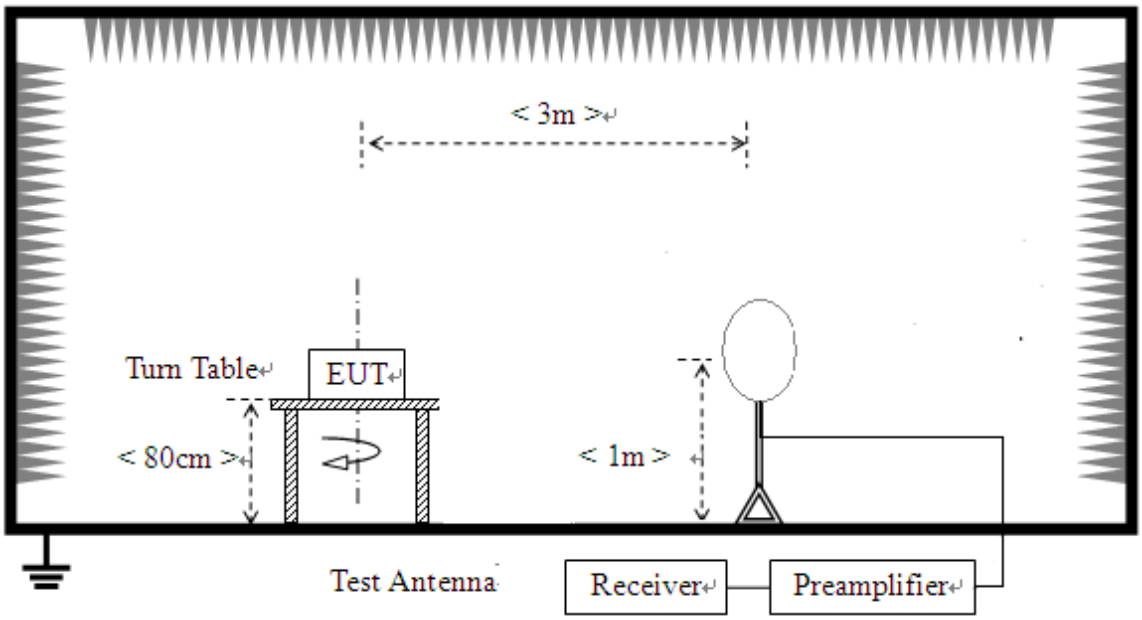
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

2.6.2. Measuring Instruments

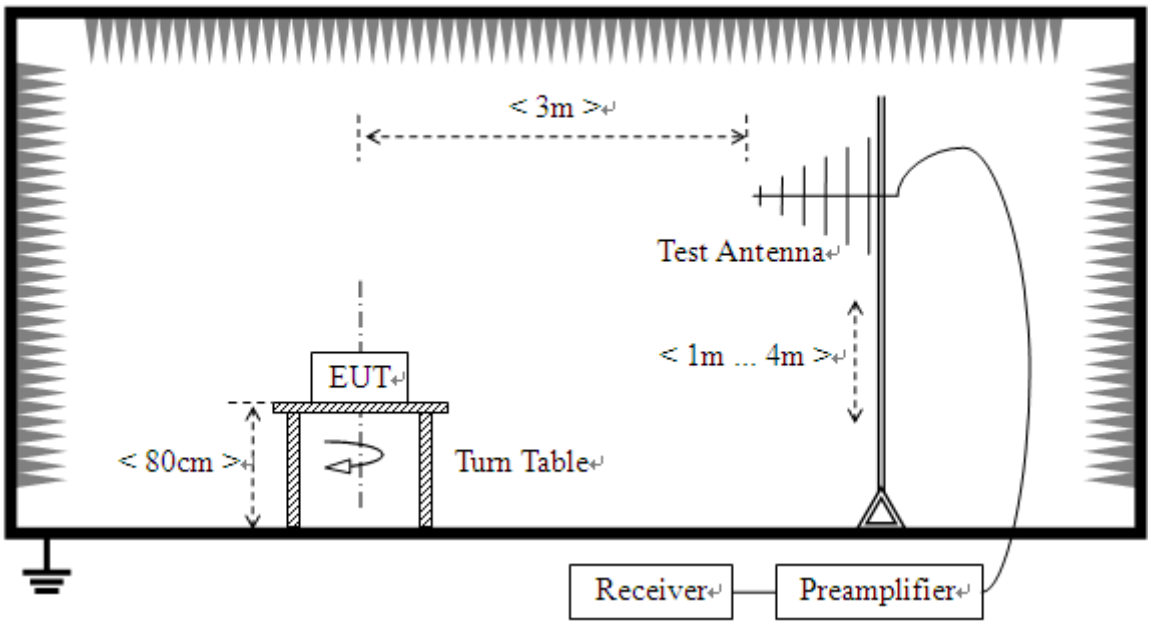
The measuring equipment is listed in the section 3 of this test report.

2.6.3. Test Setup

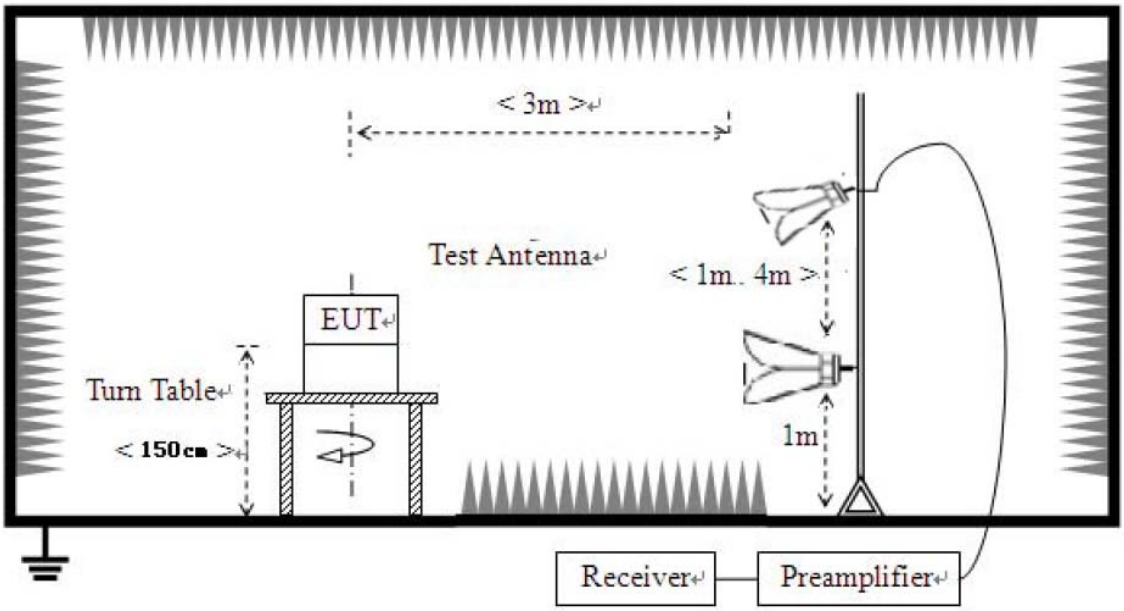
For radiated emissions from 9 KHz to 30 MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.6.4. Test Procedures

1. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 meters 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. Height of receiving antenna 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported.
   Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

NOTE:

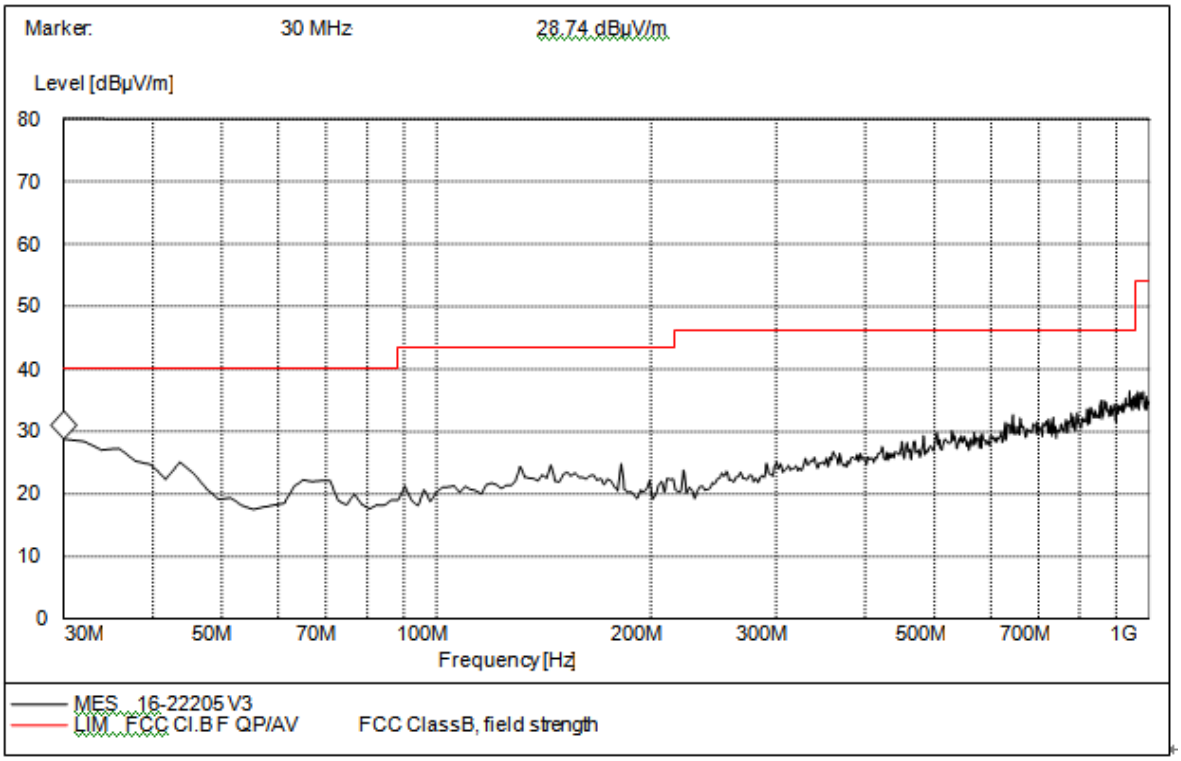
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

2.6.5. Test Results of Radiated Band Edge and Spurious Emission

For 9 kHz to 30MHz

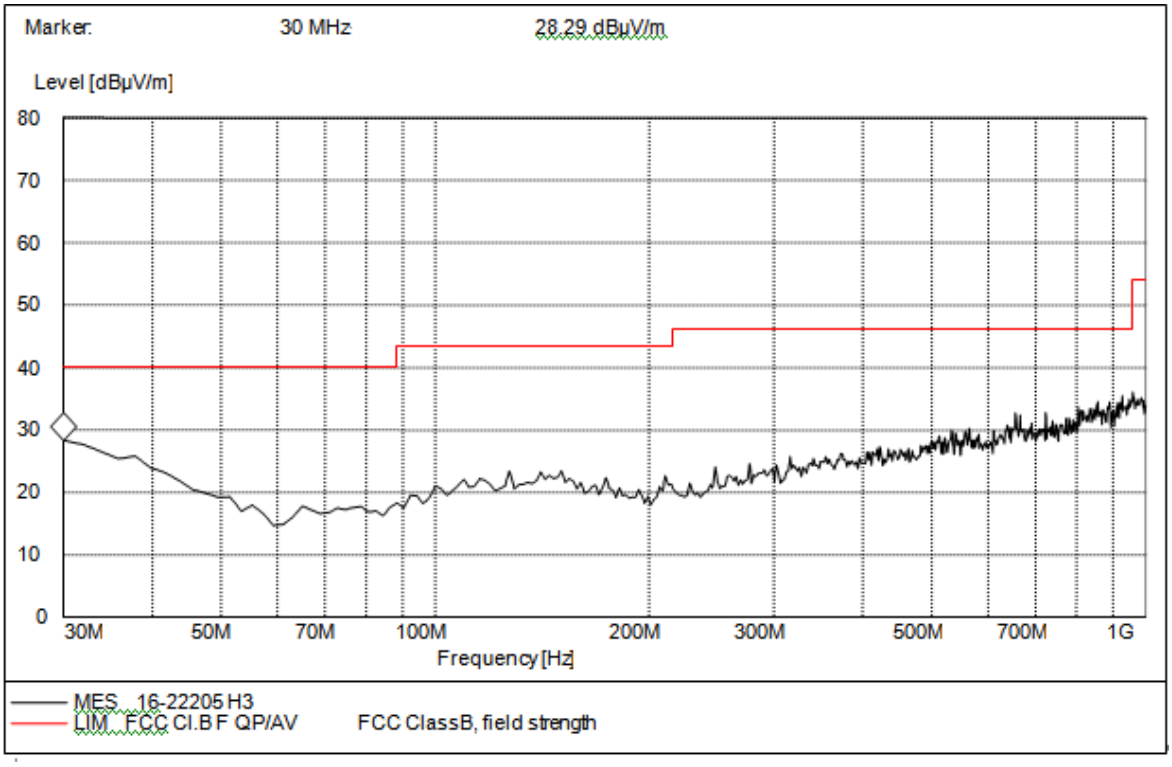
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

For 30MHz to 1000 MHz



30MHz to 1GHz, Antenna Vertical

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Antenna	Verdict
30.000000	27.00	120.000	100.0	40.0	Vertical	Pass
65.360000	21.58	120.000	100.0	40.0	Vertical	Pass
134.20000	23.03	120.000	100.0	43.5	Vertical	Pass
186.690000	23.61	120.000	100.0	43.5	Vertical	Pass
521.320000	28.74	120.000	100.0	46.0	Vertical	Pass
636.680000	32.59	120.000	100.0	46.0	Vertical	Pass



30MHz to 1GHz, Antenna Horizontal

Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB µ V/m)	Antenna	Verdict
30.000000	27.12	120.000	100.0	40.0	Horizontal	Pass
126.210000	21.54	120.000	100.0	43.5	Horizontal	Pass
148.520000	22.88	120.000	100.0	43.5	Horizontal	Pass
255.250000	22.61	120.000	100.0	46.0	Horizontal	Pass
533.60000	28.46	120.000	100.0	46.0	Horizontal	Pass
670.150000	32.61	120.000	100.0	46.0	Horizontal	Pass

For 1GHz to 25 GHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	49.68	PK	74.00	-24.32	1.50 H	52	48.38	1.3
2	2390.00	37.53	AV	54.00	-16.47	1.50 H	52	36.23	1.3
3	4824.00	49.07	PK	74.00	-24.93	1.50 H	33	42.67	6.4
4	4824.00	38.83	AV	54.00	-15.17	1.50 H	33	32.43	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	50.12	PK	74.00	-23.88	1.50 V	44	48.82	1.3
2	2390.00	37.53	AV	54.00	-16.47	1.50 V	44	36.23	1.3
3	4824.00	48.47	PK	74.00	-25.53	1.50 V	25	42.07	6.4
4	4824.00	36.83	AV	54.00	-17.17	1.50 V	25	30.43	6.4

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	48.95	PK	74.00	-25.05	1.50 H	25	42.45	6.5
2	4874.00	36.91	AV	54.00	-17.09	1.50 H	25	30.41	6.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	50.06	PK	74.00	-23.94	1.50 V	32	43.56	6.5
2	4874.00	37.29	AV	54.00	-16.71	1.50 V	32	30.79	6.5

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11b_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	50.46	PK	74.00	-23.54	1.50 H	45	47.86	2.6
2	2483.50	38.31	AV	54.00	-15.69	1.50 H	45	35.71	2.6
3	4924.00	49.56	PK	74.00	-24.44	1.50 H	30	42.86	6.7
4	4924.00	37.04	AV	54.00	-16.96	1.50 H	30	30.34	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11b_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	50.77	PK	74.00	-23.23	1.50 V	38	48.17	2.6
2	2483.50	38.31	AV	54.00	-15.69	1.50 V	38	35.71	2.6
3	4924.00	49.08	PK	74.00	-24.92	1.50 V	22	42.38	6.7
4	4924.00	37.04	AV	54.00	-16.96	1.50 V	22	30.34	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	49.90	PK	74.0	-24.10	1.50 H	40	48.60	1.3
2	2390.00	37.52	AV	54.0	-16.48	1.50 H	40	36.22	1.3
3	4824.00	50.16	PK	74.00	-23.84	1.50 H	22	43.76	6.4
4	4824.00	36.84	AV	54.00	-17.16	1.50 H	22	30.44	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	49.79	PK	74.0	-24.21	1.50 V	30	48.49	1.3
2	2390.00	37.52	AV	54.0	-16.48	1.50 V	30	36.22	1.3
3	4824.00	49.72	PK	74.00	-24.28	1.50 V	20	43.32	6.4
4	4824.00	36.83	AV	54.00	-17.17	1.50 V	20	30.43	6.4

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	48.75	PK	74.00	-25.25	1.50 H	23	42.25	6.5
2	4874.00	37.29	AV	54.00	-16.71	1.50 H	23	30.79	6.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	49.43	PK	74.00	-24.57	1.50 V	32	42.93	6.5
2	4874.00	36.91	AV	54.00	-17.09	1.50 V	32	30.41	6.5

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11g_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	52.55	PK	74.0	-21.45	1.50 H	25	49.95	2.6
2	2483.50	39.53	AV	54.0	-14.47	1.50 H	25	36.93	2.6
3	4924.00	50.19	PK	74.0	-23.81	1.50 H	30	43.49	6.7
4	4924.00	37.42	AV	54.0	-16.58	1.50 H	30	30.72	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11g_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	52.20	PK	74.0	-21.80	1.50 V	25	49.60	2.6
2	2483.50	39.89	AV	54.0	-14.11	1.50 V	25	37.29	2.6
3	4924.00	49.56	PK	74.0	-24.44	1.50 V	30	42.86	6.7
4	4924.00	37.42	AV	54.0	-16.58	1.50 V	30	30.72	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n20_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	50.23	PK	74.00	-23.77	1.50 H	25	48.93	1.3
2	2390.00	37.47	AV	54.00	-16.53	1.50 H	25	36.17	1.3
3	4824.00	48.26	PK	74.00	-25.74	1.50 H	52	41.86	6.4
4	4824.00	36.83	AV	54.00	-17.17	1.50 H	52	30.43	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n20_2412MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	49.79	PK	74.00	-24.21	1.50 V	30	48.49	1.3
2	2390.00	37.52	AV	54.00	-16.48	1.50 V	30	36.22	1.3
3	4824.00	48.67	PK	74.00	-25.33	1.50 V	55	42.27	6.4
4	4824.00	36.83	AV	54.00	-17.17	1.50 V	55	30.43	6.4

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n20_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	50.14	PK	74.00	-23.86	1.50 H	22	43.64	6.5
2	4874.00	36.90	AV	54.00	-17.10	1.50 H	22	30.40	6.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n20_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	48.64	PK	74.00	-25.36	1.50 V	32	42.14	6.5
2	4874.00	36.90	AV	54.00	-17.10	1.50 V	32	30.40	6.5

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n20_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	54.63	PK	74.0	-19.37	1.50 H	35	52.03	2.6
2	2483.50	39.89	AV	54.0	-14.11	1.50 H	35	37.29	2.6
3	4924.00	48.98	PK	74.0	-25.02	1.50 H	20	42.28	6.7
4	4924.00	37.04	AV	54.0	-16.96	1.50 H	20	30.34	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n20_2462MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	54.77	PK	74.0	-19.23	1.50 V	42	52.17	2.6
2	2483.50	40.25	AV	54.0	-13.75	1.50 V	42	37.65	2.6
3	4924.00	49.47	PK	74.0	-24.53	1.50 V	30	42.77	6.7
4	4924.00	37.04	AV	54.0	-16.96	1.50 V	30	30.34	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n40_2422MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	56.61	PK	74.0	-17.39	1.50 H	35	55.31	1.3
2	2390.00	41.20	AV	54.0	-12.80	1.50 H	35	39.90	1.3
3	4844.00	48.38	PK	74.00	-25.62	1.50 H	44	41.98	6.4
4	4844.00	36.83	AV	54.00	-17.17	1.50 H	44	30.43	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n40_2422MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2390.00	59.41	PK	74.0	-14.59	1.50 V	35	58.11	2.3
2	2390.00	42.05	AV	54.0	-11.95	1.50 V	35	40.75	2.3
3	4844.00	48.58	PK	74.00	-25.42	1.50 V	42	42.18	6.7
4	4844.00	36.84	AV	54.00	-17.16	1.50 V	42	30.44	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n40_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	50.07	PK	74.00	-23.93	1.50 H	35	43.57	6.5
2	4874.00	37.39	AV	54.00	-16.61	1.50 H	35	30.89	6.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n40_2437MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	4874.00	50.25	PK	74.00	-23.75	1.50 V	30	43.75	6.5
2	4874.00	37.40	AV	54.00	-16.60	1.50 V	30	30.90	6.5

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（802.11n40_2452MHz									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	61.48	PK	74.0	-12.52	1.50 H	40	58.88	2.6
2	2483.50	42.66	AV	54.0	-11.34	1.50 H	40	40.06	2.6
3	4904.00	49.08	PK	74.0	-24.92	1.50 H	30	42.38	6.7
4	4904.00	37.42	AV	54.0	-16.58	1.50 H	30	30.72	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（802.11n40_2452MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)
1	2483.50	60.36	PK	74.0	-13.64	1.50 V	45	57.76	2.6
2	2483.50	42.35	AV	54.0	-11.65	1.50 V	45	39.75	2.6
3	4904.00	49.47	PK	74.0	-24.53	1.50 V	25	42.77	6.7
4	4904.00	37.04	AV	54.0	-16.96	1.50 V	25	30.34	6.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) － Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level － Limit value
5. " * ": Fundamental frequency.

2.7. Conducted Emission

2.7.1. Limit of Conducted Emission

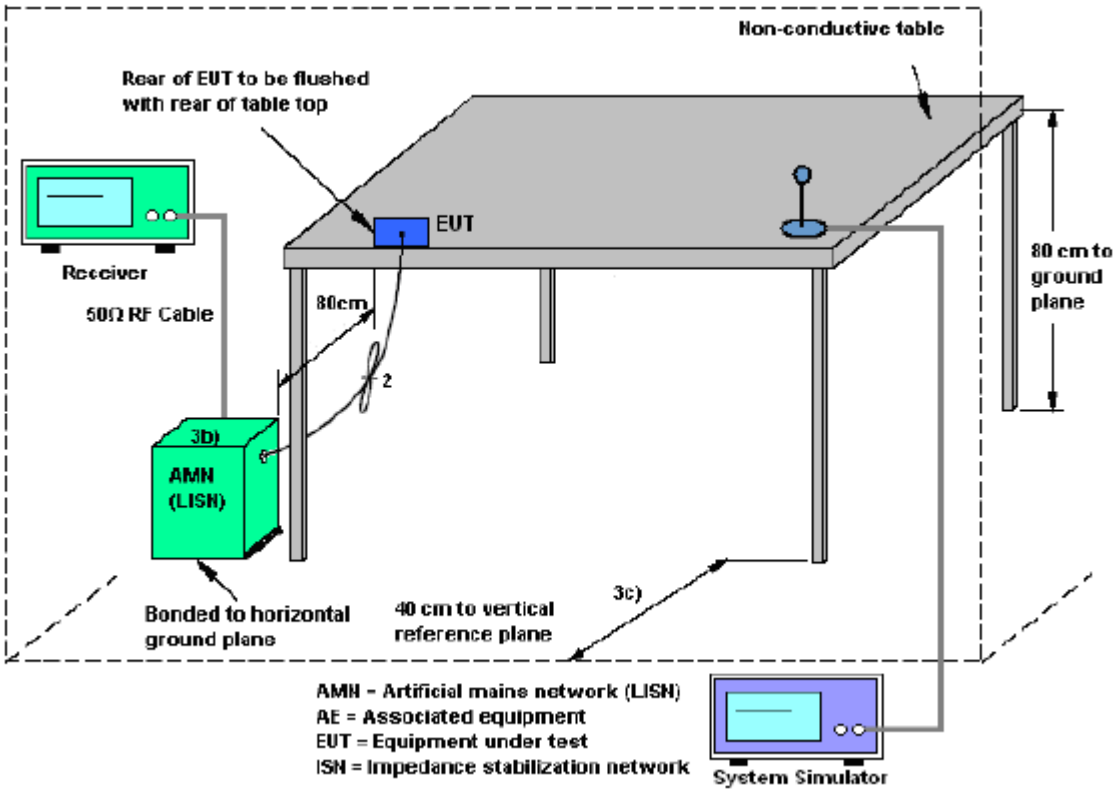
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

2.7.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3. Test Setup



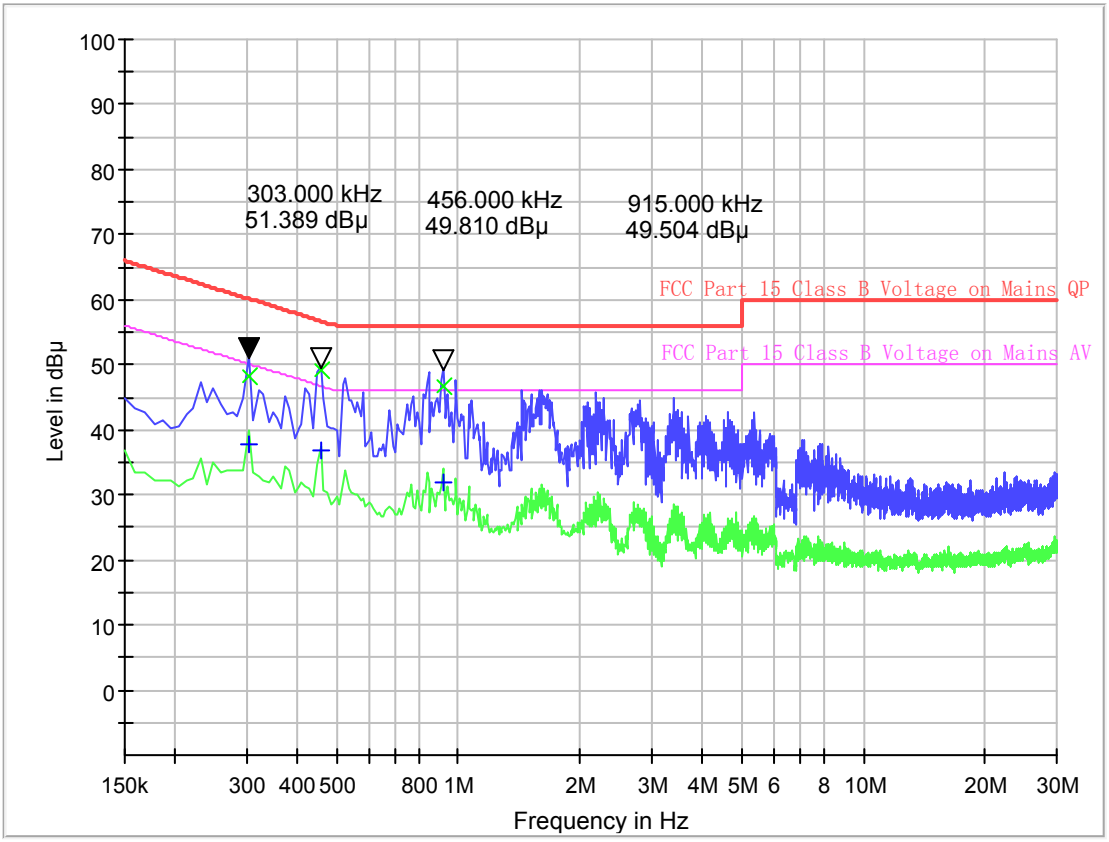
2.7.4. Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 micrometry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

2.7.5. Test Results of Conducted Emission

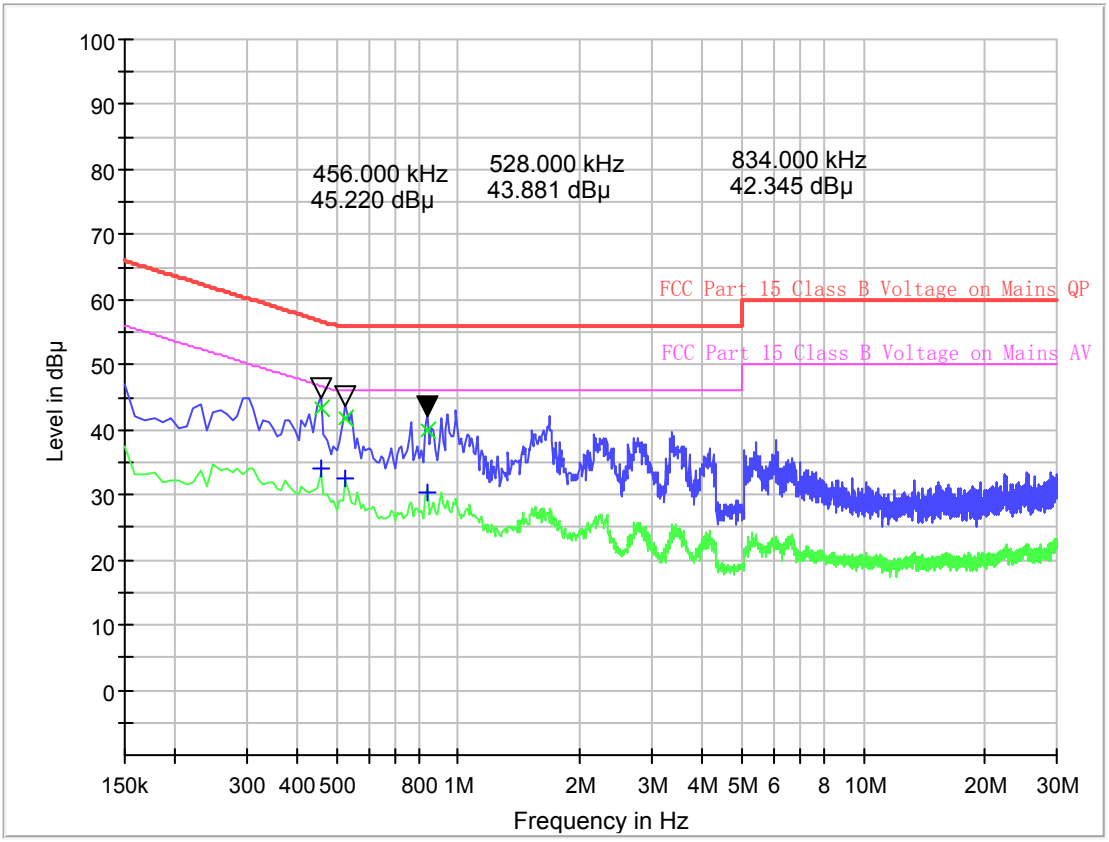
1. The EUT configuration of the emission tests is WLAN Link + USB Cable (Charging from Adapter) + Earphone.
2. The power adapter support (100~240V AC, 50/60Hz), the EUT was tested at the both available voltages (120, 240V AC), and 60Hz. Only the worst-case mode (120V/60Hz) was record in this report.

FCC Part 15 Class B Voltage Test



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals					
L Test Data					
QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.303000	60.2	48.32	0.303000	50.2	37.77
0.456000	56.8	49.08	0.456000	46.8	36.90
0.915000	56.0	46.59	0.915000	46.0	31.99



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals					
N Test Data					
QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.456000	56.8	43.41	0.456000	34.18	33.83
0.528000	56.0	41.91	0.528000	32.62	34.34
0.834000	56.0	40.03	0.834000	30.50	30.22

Test Result: PASS

3. List of measuring equipment

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	11/13/2016
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	11/13/2016
3	EMI TEST Software	Audix	E3	N/A	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORNANTENNA	ShwarzBeck	9120D	1011	11/13/2016
8	Amplifer	Sonoma	310N	E009-13	11/13/2016
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	11/13/2016
10	High pass filter	Compliance Direction systems	BSU-6	34202	11/13/2016
11	HORNANTENNA	ShwarzBeck	9120D	1012	11/13/2016
12	Amplifer	Compliance Direction systems	PAP1-4060	120	11/13/2016
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	11/13/2016
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/13/2016
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	11/13/2016

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	11/13/2016
2	Spectrum Analyzer	Keysight	N9030A	ATO-67098	07/19/2016
3	Power Meter	Anritsu	ML2480B	100798	11/13/2016
4	Power Sensor	Anritsu	MA2411B	100258	11/13/2016

4. Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.35dB
Radiated emissions	9kHz~30MHz	2.20dB
	30MHz~1000MHz	2.45dB
	1G~18GHz	2.21dB
	18G~40GHz	1.96dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

** END OF REPORT **