



FCC/IC Test Report

FOR

Honeywell International Inc

Model Number: 70eLGN

Product Description: Dolphin 70e Black, Enterprise Digital Assistant (EDA)

FCC ID: HD570ELGN

IC ID: 1693B-70E1

47 CFR Part 15.247 for (DTS), 2.4 & 5GHz WLAN

IC RSS-210 Issue 8, Annex 8

TEST REPORT #: EMC_HONEY_095_12003_70eLGN_DTS

DATE: 2013-05-28



FCC :
Accredited

IC recognized #
3462B

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: info@cetecomusa.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

TABLE OF CONTENTS

1	Assessment	4
2	Administrative Data.....	5
2.1	Identification of the Testing Laboratory Issuing the Test Report.....	5
2.2	Identification of the Client.....	5
2.3	Identification of the Manufacturer.....	5
3	Equipment under Test (EUT).....	6
3.1	Specification of the Equipment under Test	6
3.2	Identification of the Equipment Under Test (EUT).....	7
3.3	Identification of Accessory Equipment	7
3.4	Environmental conditions during Test:	7
3.5	Dates of Testing:.....	7
3.6	Other Testing Notes:.....	7
4	Subject of Investigation	9
5	Summary of Measurement Results.....	10
6	Measurements.....	11
6.1	Radiated Measurement Procedure	11
6.2	Measurement Method:	11
6.3	Radiated Measurement Procedure	11
6.4	Sample Calculations for Radiated Measurements	13
6.5	Conducted Measurement Procedure	14
6.6	Maximum Peak Conducted Output Power	15
6.6.1	Limits:.....	15
6.6.2	Test Conditions:.....	15
6.6.3	Test Procedure:	15
6.6.4	Test Results: 2.4 GHz Band.....	16
6.6.5	Test Results: 5 GHz Band.....	17
6.6.6	Test Data/plots:	18
6.7	Emission/ Occupied Bandwidth.....	26
6.7.1	Limits:.....	26
6.7.2	Test Conditions:.....	26
6.7.3	Test Procedure:	26
6.7.4	Test Results: 2.4 GHz Band.....	26
6.7.5	Test Results: 5 GHz Band.....	27
6.7.6	Test Data/plots:	28
6.8	Maximum Power Spectral Density Level in the Fundamental Emission	44
6.8.1	Limits:.....	44
6.8.2	Test procedure:.....	44
6.8.3	Test Conditions:.....	44
6.8.4	Test results: 2.4 GHz Band.....	44
6.8.5	Test results: 5 GHz Band.....	45
6.8.6	Test Data/plots:	46
6.9	Unwanted Emissions into Non-Restricted Frequency Bands- Conducted	54
6.9.1	Reference and Limits:.....	54
6.9.2	Test Conditions:.....	54
6.9.3	Test Procedure:	54
6.9.4	Test Result: 2.4 GHz Band	54

6.9.5	Test Result: 5 GHz Band	55
6.9.6	Test data/ plots:	56
6.10	Unwanted Emissions into Restricted Frequency Bands – Conducted.....	77
6.10.1	Limits: §15.247/15.205	77
6.10.2	Test Conditions:	77
6.10.3	Test Procedure:	77
6.10.4	Test Data/Plots:	78
6.11	Unwanted Emissions into Restricted Frequency Bands- Radiated.....	82
6.11.1	Limits:	82
6.11.2	Test Conditions:	83
6.11.3	Test Procedure:	83
6.11.4	Test Data/plots:	84
6.12	Transmitter Spurious Emissions- Radiated.....	90
6.12.1	Limits:	90
6.12.2	Test Conditions:	90
6.12.3	Test Result:	90
6.12.4	Test data/ plots:	91
7	AC Power Line Conducted Emissions	131
7.1.1	References:	131
7.1.2	Limits:	131
7.1.3	Test Conditions:	131
7.1.4	Test Results:	132
8	Test Equipment and Ancillaries used for tests.....	134
9	Test Setup Diagrams:.....	135
10	Revision History	136

1 Assessment

The following equipment (and as identified in Ch.3 of this test report) was evaluated against the applicable criteria specified in FCC CFR47 Part 15.247, 15.207, 15.209 and Industry Canada Standards RSS 210 Issue 8, Annex 8.

No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Honeywell International Inc	Dolphin 70e Black Enterprise Digital Assistant (EDA)	70eLGN

Responsible for Testing Laboratory:

2013-05-28	Compliance	Franz Engert (Acting Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

2013-05-28	Compliance	Tunji Yusuf (EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Acting Lab Manager:	Franz Engert
Test Engineer:	Tunji Yusuf

2.2 Identification of the Client

Applicant's Name:	Honeywell International Inc
Street Address:	700 Visions Drive
City/Zip Code	Skaneateles Falls, NY 13153
Country	USA
Contact Person:	Michael Robinson
Phone No.	+1 (315) 554 6387
Fax:	+1 (315) 554 6393
e-mail:	michael.robinson3@honeywell.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as client.
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	Dolphin 70e Black
Model Number:	70eLGN
FCC-ID :	HD570ELGN
IC ID:	1693B-70E1
Product Description:	Dolphin 70e Black, Enterprise Digital Assistant (EDA)
Technology / Type(s) of Modulation:	2.4 GHz 802.11 b/g/n: CCK, BPSK, QPSK, 16QAM, 64QAM 5 GHz 802.11 a/n: BPSK, QPSK, 16QAM, 64QAM
Modes of Operation	In the 2.4 GHz band: Client, Adhoc mode connection and active beacon scanning supported In the 5 GHz band 4: Client only, no Adhoc mode connection or active beacon scanning supported
Channel Bandwidths	HT20
Operating Frequency Ranges (MHz) / Channels:	Nominal band: 2400 – 2483.5; Center to center with HT20: 2412(ch 1) – 2462(ch 11), 11 channels Nominal band: 5725 – 5850 Center to center with HT20: 5745(ch 149) – 5825(ch 165), 5 channels
Antenna info:	Internal PIFA; 1 transmit & 1 receive chain, no beam forming Documented max antenna gain: 2.4GHz = 0.7dBi 5 GHz = 3.1dBi
Max. Output Powers:	Conducted (Measured) 2.4 GHz 802.11 b/g/n: 19.15dBm (0.082W) 5 GHz 802.11 a/n: 18.64dBm (0.073 W) Radiated –EIRP (Calculated with documented antenna gain) 2.4 GHz 802.11 b/g/n: 19.85dBm (0.097 W) 5 GHz 802.11 a/n: 21.74dBm (0.15 W)
Rated Operating Voltage Range:	Vmin: 3.3V/ Vnom: 3.6V/ Vmax: 4.3V
Rated Operating Temperature Range:	Tmin: -30°C/ Tmax: 70°C

Test Sample Status:	Prototype
Other Radios included:	- Sierra Wireless SL9090 Radio Module 850/900/1800/1900Mhz GSM power class 4/1 - GPRS Class B, Multislot 10 operation - EDGE Multislot class 12 operation 850/1900/2100 Mhz WCDMA / HSPA+ - HSDPA Category 10 data rate - 14.4 Mbps - HSUPA Category 6 data rate - 5.76 Mbps 800/1900 MHz CDMA 1xRTT / EV-D0 - CDMA EVDO Rev A data rate - 3.1 Mbps - BT 2.1+ EDR - Murata LBEH5Z9UWC module 2.4 GHz band of operation - GPS 1575.42 MHz - NFC (NXP PN65N Module; 13.56 MHz)

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	Sample	HW/SW Version	Note
1	12359J0015	Conducted	DVT 1.5-9090N/40.0	2.4 GHz and 5GHz Bands
2	12359J0038	Radiated	DVT 1.5-9090N/40.0	2.4 GHz and 5GHz Bands

3.3 Identification of Accessory Equipment

STE #	Type	Manufacturer	Model	Serial Number
1	AC Switching Power Supply	PHIHONG	PSAI05R-050Q	P112103004A1

3.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:

Ambient Temperature: 20-25°C

Relative humidity: 40-60%

3.5 Dates of Testing:

01/08/2013 – 03/01/2013

3.6 Other Testing Notes:

The device was configured with a manufacturer provided test SW, capable of setting the unit in different supported modulation schemes, data rates and channels of operation.

The device was set to continuous framed tx (burst) mode per test SW and could thus be operated with 100% duty cycle during testing.

The EUT was tested on the low, mid and high channels of the tested frequency bands (2.4GHz and 5GHz band 4).

The below listed worst case test modes of operation have been established from output power measurement and evaluation of long term test data available to the lab for the different data rates and modulations which are supported by the equipment.

Mode		Data rate (Mbps)
2.4GHz	802.11b	1.0
	802.11g	6.0
	802.11n (HT20)	6.5
5GHz	802.11a	6.0
	802.11n(HT20)	6.0



4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- FCC CFR47 Parts 15.247, 15.207, 15.209
- IC RSS-210 Issue 8

This test report is to support a request for new equipment authorization under the FCC ID: **HD570ELGN** and IC ID: **1693B-70E1**.

5 Summary of Measurement Results

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§15.247(e) RSS210 A8.2(b)	Power Spectral Density	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.247(a)(1) RSS210 A8.1(b)	Carrier Frequency Separation	Nominal	-	□	□	■	□	See Note 1
§15.247(a)(1) RSS210 A8.1(d)	Number of Hopping Channels	Nominal	-	□	□	■	□	See Note 1
§15.247(a)(1)(iii) RSS210 A8.3(1)	Time of occupancy	Nominal	-	□	□	■	□	See Note 1
§15.247(a)(1) RSS210 A8.2(a)	Spectrum Bandwidth	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.247(b)(1) RSS210 A8.4(2)	Maximum Peak Conducted Output Power	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.247(d) RSS210 A8.5	Band edge compliance-Conducted	Nominal	802.11 a/n	■	□	□	□	Complies
§15.247(d) RSS210 A8.5	Band edge compliance-Radiated	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.247(d) RSS210 A8.5	TX Spurious emissions-Conducted	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.247(d) RSS210 A8.5	TX Spurious emissions-Radiated	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.209(a) RSS Gen	TX Spurious Emissions Radiated<30MHz	Nominal	802.11 a/b/g/n	■	□	□	□	Complies
§15.207(a) RSS Gen	AC Line Conducted Emissions<30MHz	Nominal	802.11 g	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.

1. Test only applicable to frequency hopping systems.

6 Measurements

6.1 Radiated Measurement Procedure

6.2 Measurement Method:

All radiated and conducted testing is performed according to guidelines in FCC publication KDB558074 D01Meas Guidance v02: Measurement Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) operating under 15.247, Oct 2012.

6.3 Radiated Measurement Procedure

ANSI C63.4 (2009) Section 8.3.1.1: Exploratory radiated emission measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beam width, the measurement antenna shall be aligned with the EUT.

ANSI C63.4 (2009) Section 8.3.1.2: Final radiated emission measurements

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be re-maximized at the final test location before final radiated emissions measurements are performed. However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. 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 antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

NOTES

- 1— Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- 2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.
- 3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

Measurement Uncertainty: $\pm 3\text{dB}$

6.4 Sample Calculations for Radiated Measurements

6.4.1.1 Field Strength Measurements:

Measurements from the Spectrum Analyzer/ Receiver are used to calculate the Field Strength, taking into account the following parameters:

1. Measured reading in dB μ V
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

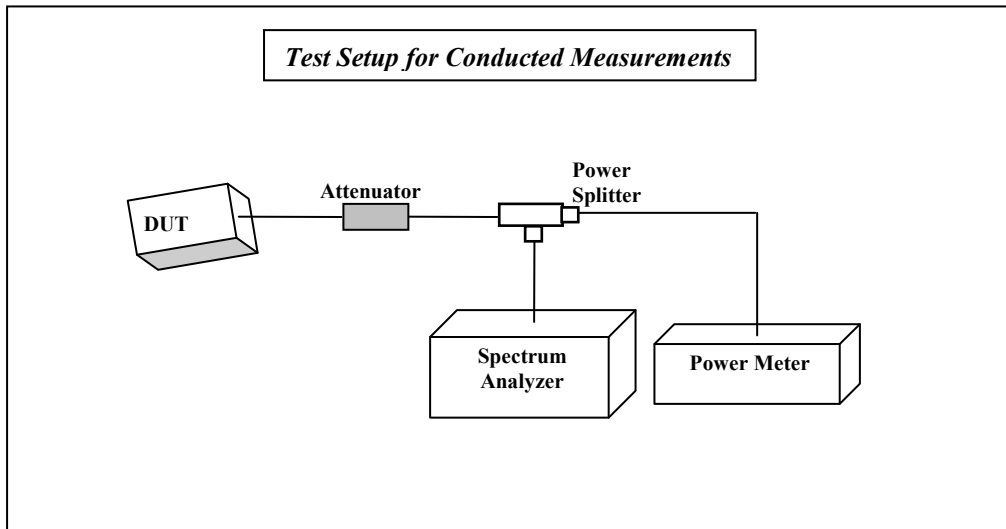
FS (dB μ V/m) = Measured Value on SA (dB μ V) + Cable Loss (dB) + Antenna Factor (dB/m)

Eg:

Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the above equation.

6.5 Conducted Measurement Procedure



1. Connect the equipment as shown in the above diagram.
2. A test SW provided by the manufacturer is used to control the different modulations, data rates and max output power configurations.
3. Measurements are to be performed with the EUT set to the low, middle and high channels for 802.11 a/b/g/n modes.

6.6 Maximum Peak Conducted Output Power

6.6.1 Limits:

§15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

RSS 210- A8.4(2)

Nominal Peak Output Power < 30 dBm (1W)

6.6.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

Measurement Uncertainty= ±0.5 dB

6.6.3 Test Procedure:

Measurement according to FCC KDB 558074 D01 DTS Meas Guidance v02, section 8.1.1- Option 2

Spectrum Analyzer settings:

RBW=1MHz, VBW=3MHz, Detector: Peak- Max Hold.

Sweep Time: Auto

Span= 20 MHz (to fully encompass DTS Bandwidth)

Antenna Gain (dBi): 0.7 dBi for 2.4GHz band of operation and 3.1 dBi for 5GHz band of operation.

6.6.4 Test Results: 2.4 GHz Band

Measured Maximum Peak Conducted Output Power (dBm)			
Mode	Frequency (MHz)		
	2412 Channel 1	2437 Channel 6	2462 Channel 11
802.11b	18.78	19.02	19.15
802.11g	16.27	16.85	16.72
802.11n (HT20)	15.98	16.75	16.86

Calculated Maximum Peak Radiated Output Power (dBm)			
Mode	Frequency (MHz)		
	2412 Channel 1	2437 Channel 6	2462 Channel 11
802.11b	19.48	19.72	19.85
802.11g	16.97	17.55	17.42
802.11n (HT20)	16.68	17.45	17.56

Note: Radiated EIRP is calculated as
Conducted Measurement + Antenna Gain

6.6.4.1 Measurement Verdict:
 Pass.

6.6.5 Test Results: 5 GHz Band

Measured Maximum Peak Conducted Output Power (dBm)			
Mode	Frequency (MHz)		
	5745 Channel 149	5785 Channel 157	5825 Channel 165
802.11a	18.64	18.25	18.09
802.11n (HT20)	18.48	18.04	17.92

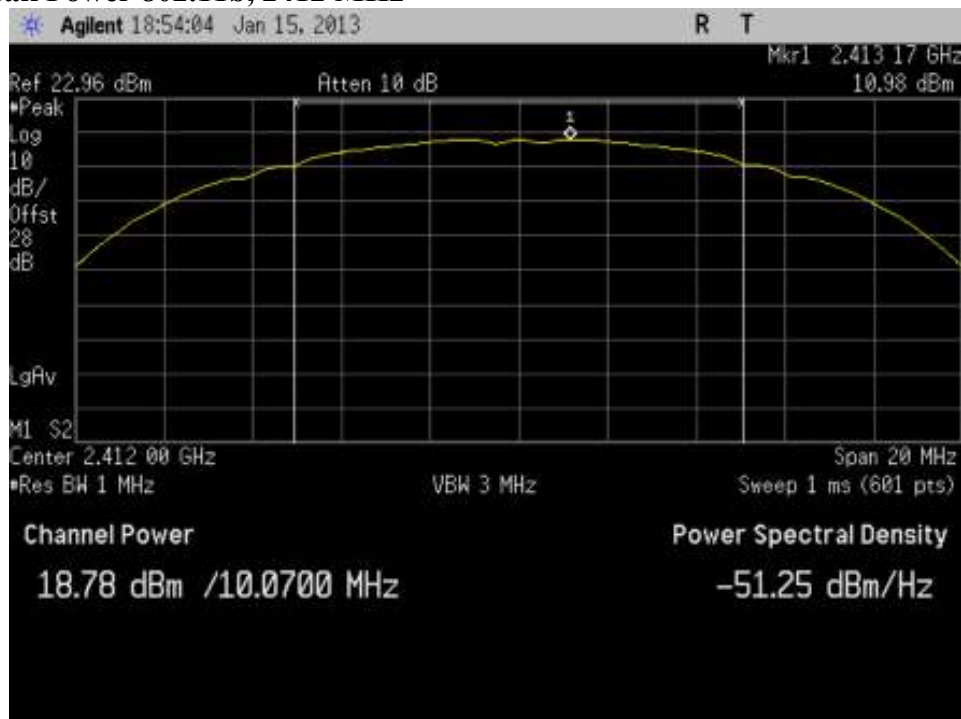
Calculated Maximum Peak Radiated Output Power (dBm)			
Mode	Frequency (MHz)		
	5745 Channel 149	5785 Channel 157	5825 Channel 165
802.11a	21.74	21.35	21.19
802.11n (HT20)	21.58	21.14	21.02

Note: Radiated EIRP is calculated as
Conducted Measurement + Antenna Gain

6.6.5.1 Measurement Verdict:
 Pass.

6.6.6 Test Data/plots:

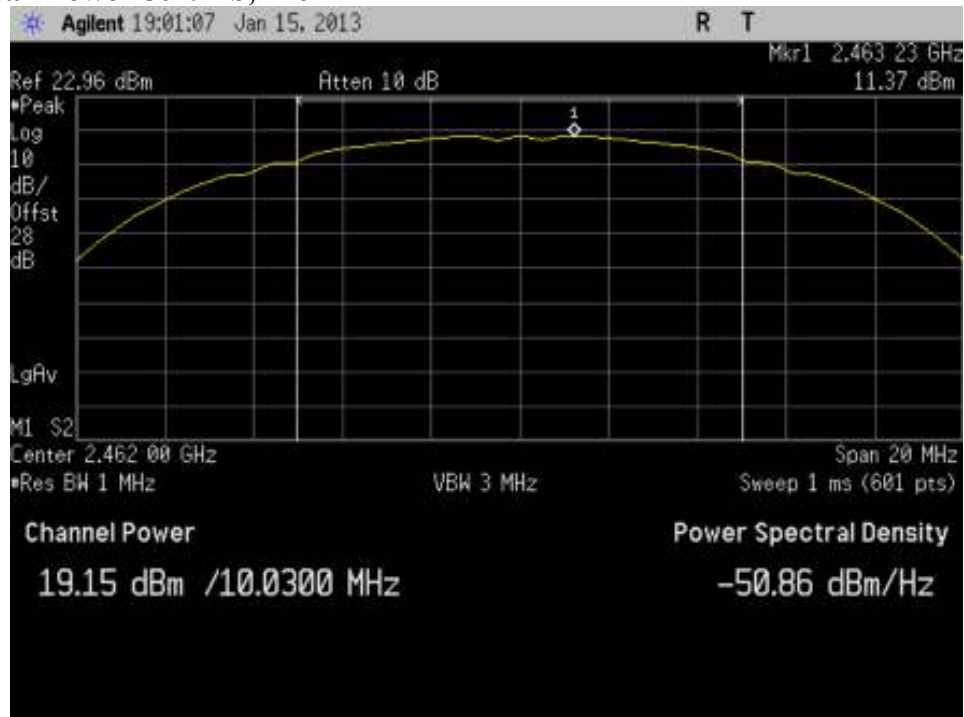
Conducted Peak Power 802.11b, 2412 MHz



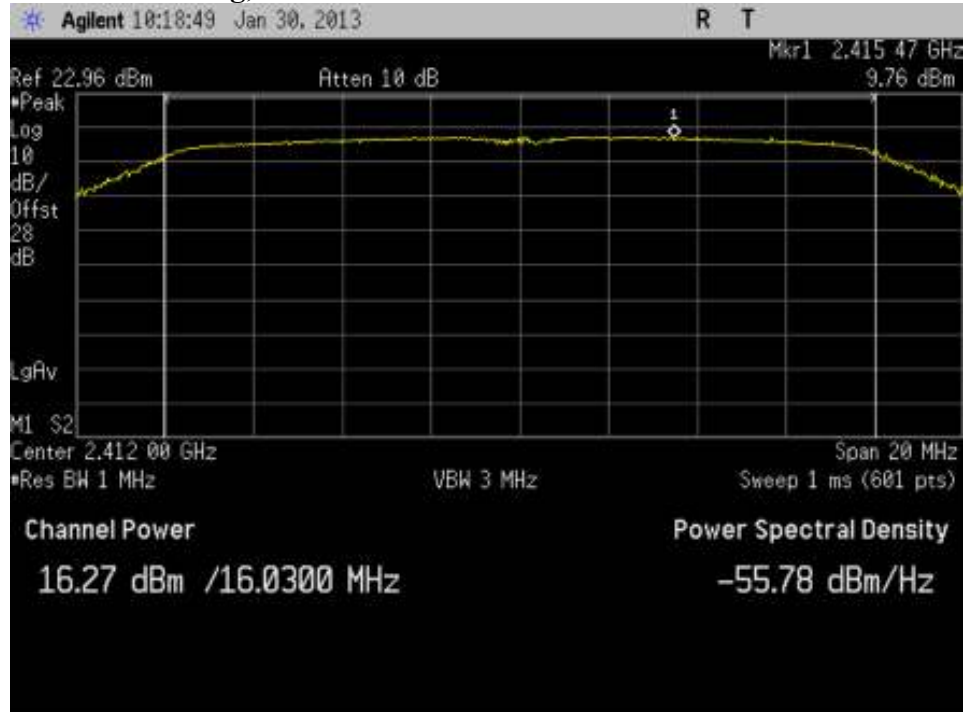
Conducted Peak Power 802.11b, 2437 MHz



Conducted Peak Power 802.11b, 2462 MHz



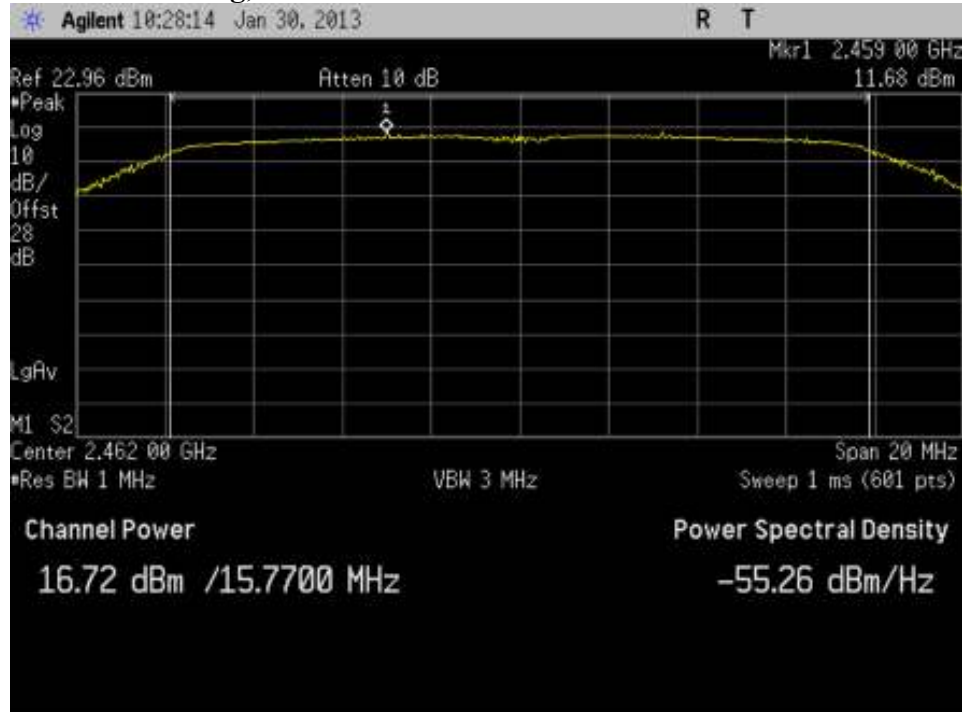
Conducted Peak Power 802.11g, 2412 MHz



Conducted Peak Power 802.11g, 2437 MHz



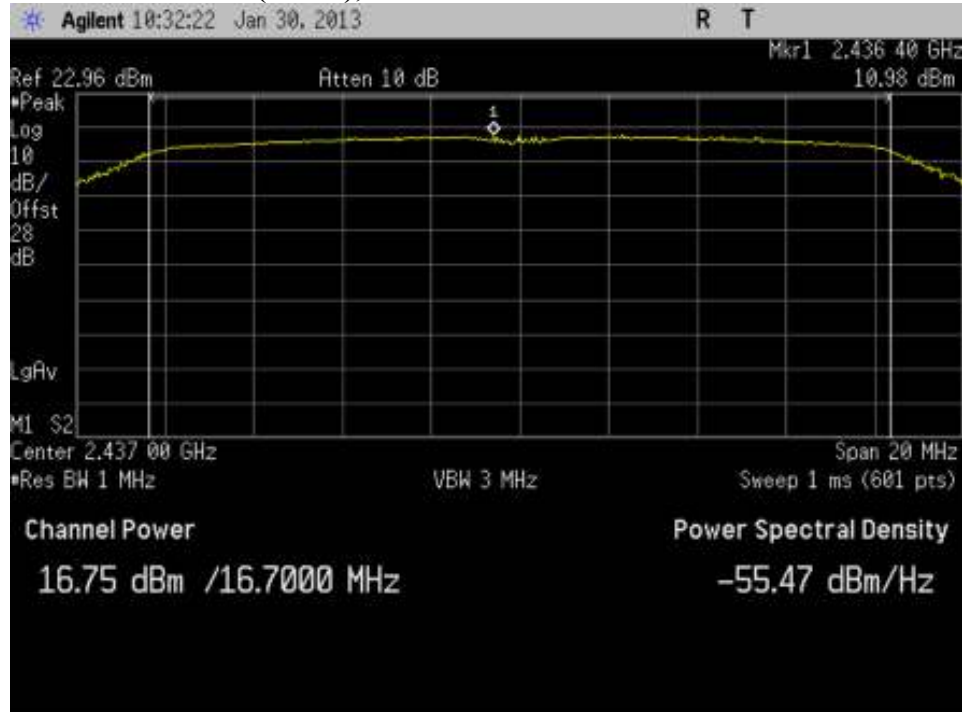
Conducted Peak Power 802.11g, 2462 MHz



Conducted Peak Power 802.11n (HT20), 2412 MHz



Conducted Peak Power 802.11n (HT20), 2437 MHz



Test Report #: EMC_HONEY_095_12003_70eLGN_DTS
Date of Report : 2013-05-28

FCC ID: HD570ELGN
IC ID: 1693B-70E1



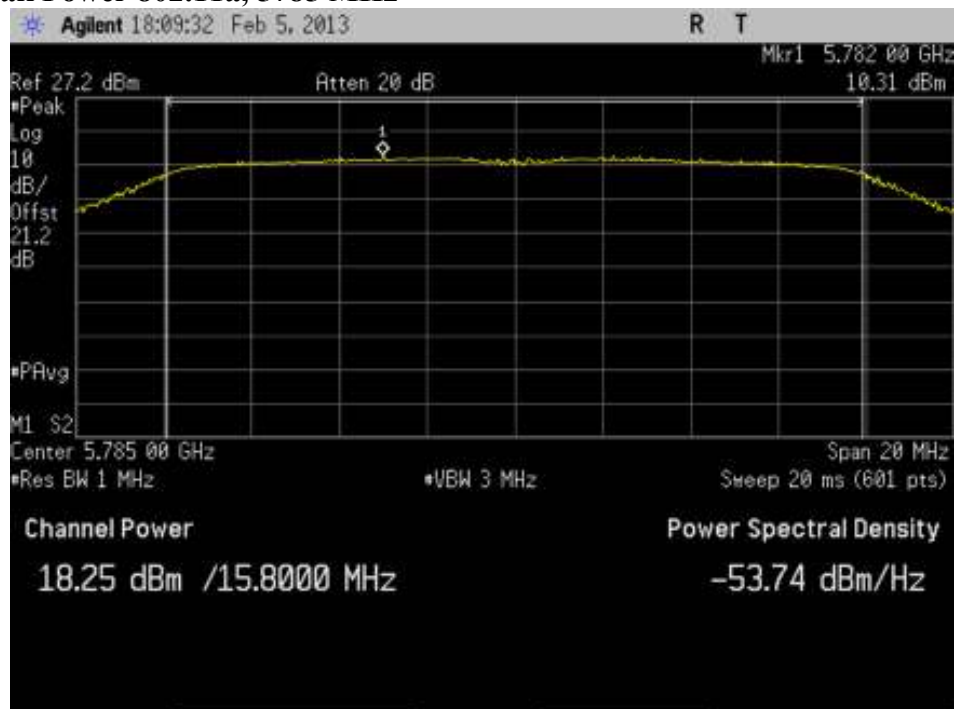
Conducted Peak Power 802.11n (HT20), 2462 MHz



Conducted Peak Power 802.11a, 5745 MHz



Conducted Peak Power 802.11a, 5785 MHz



Conducted Peak Power 802.11a, 5825 MHz



Conducted Peak Power 802.11n, 5745 MHz



Conducted Peak Power 802.11n, 5785 MHz



Conducted Peak Power 802.11n, 5825 MHz



6.7 Emission/ Occupied Bandwidth

6.7.1 Limits:

§15.247 (a)(2)

RSS-210 A8.2 (a)

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

6.7.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

Measurement Uncertainty= ±100 kHz

6.7.3 Test Procedure:

Measurement according to FCC KDB 558074 D01 Meas Guidance v02, section 7.1 – DTS (6dB)

Channel Bandwidth Procedure Option 1

Spectrum Analyzer settings:

DTS (6dB) Bandwidth:

RBW = 100 kHz, VBW = 300 kHz, Detector: Peak- Max hold;

Sweep Time: Auto

Span = b mode: 15 MHz; g and n modes: 20 MHz

99% Bandwidth:

RBW = 300 kHz, VBW = 1 MHz, Detector: Peak-Max hold;

Sweep Time: Auto

Span = 2 x Signal Bandwidth

6.7.4 Test Results: 2.4 GHz Band

Occupied Bandwidth (MHz)						
Mode	Frequency (MHz)					
	2412 Channel 1		2437 Channel 6		2462 Channel 11	
	6dB	20dB/ 99%	6dB	20dB/ 99%	6dB	20dB/ 99%
802.11b	10.07	13.84	10.10	13.90	10.03	13.92
802.11g	16.03	16.74	15.63	16.72	15.77	16.74
802.11n (HT20)	16.87	17.82	16.7	17.83	16.13	17.79

6.7.4.1 Measurement Verdict

Pass.



6.7.5 Test Results: 5 GHz Band

Occupied Bandwidth (MHz)						
Mode	Frequency (MHz)					
	5745 Channel 149		5785 Channel 157		5825 Channel 165	
	6dB	20dB/ 99%	6dB	20dB/ 99%	6dB	20dB/ 99%
802.11a	15.73	16.69	15.8	16.71	15.70	16.71
802.11n (HT20)	16.23	17.79	15.90	17.84	16.30	17.79

6.7.5.1 Measurement Verdict

Pass.

6.7.6 Test Data/plots:

6.7.6.1 2.4 GHz 6dB BW:

6dB Bandwidth 802.11b, 2412 MHz



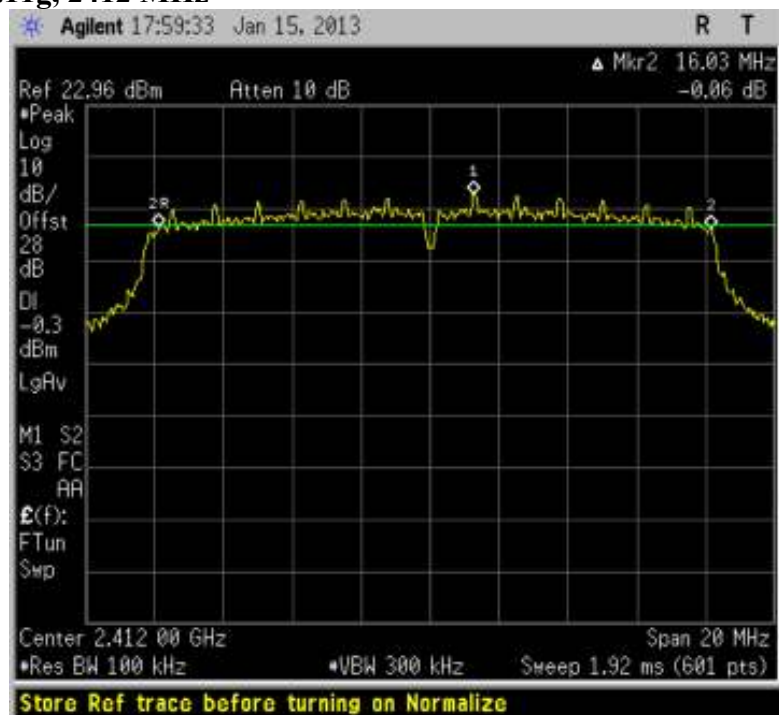
6dB Bandwidth 802.11b, 2437 MHz



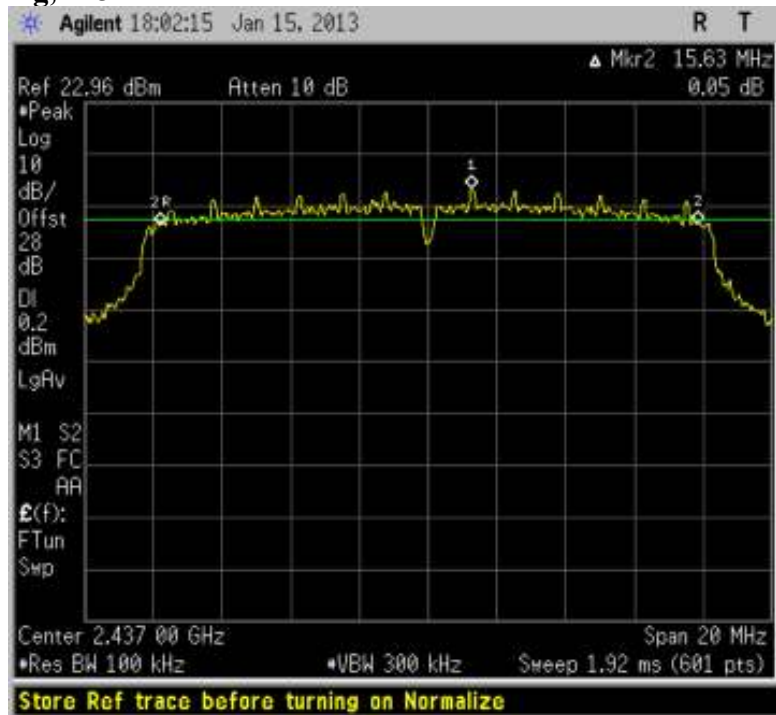
6dB Bandwidth 802.11b, 2462 MHz



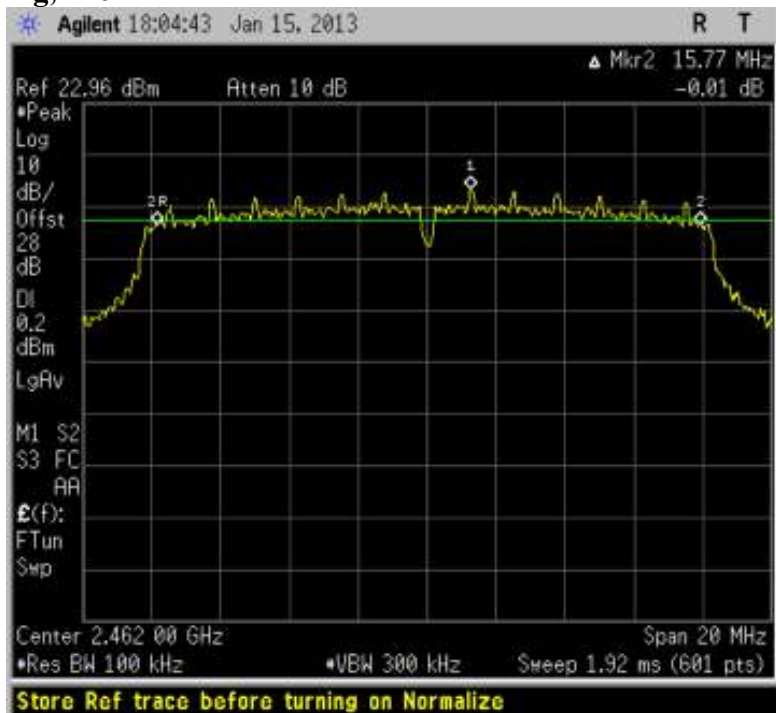
6dB Bandwidth 802.11g, 2412 MHz



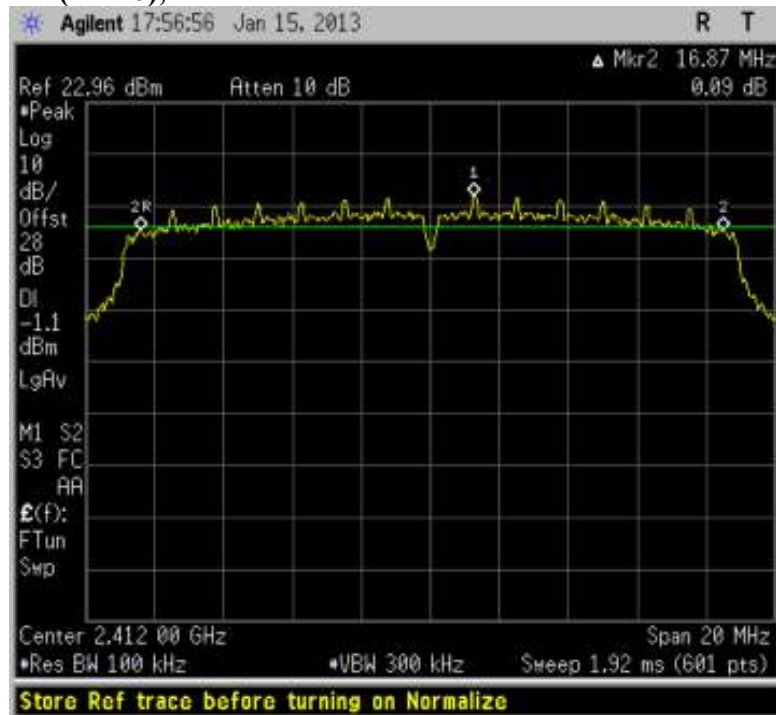
6dB Bandwidth 802.11g, 2437 MHz



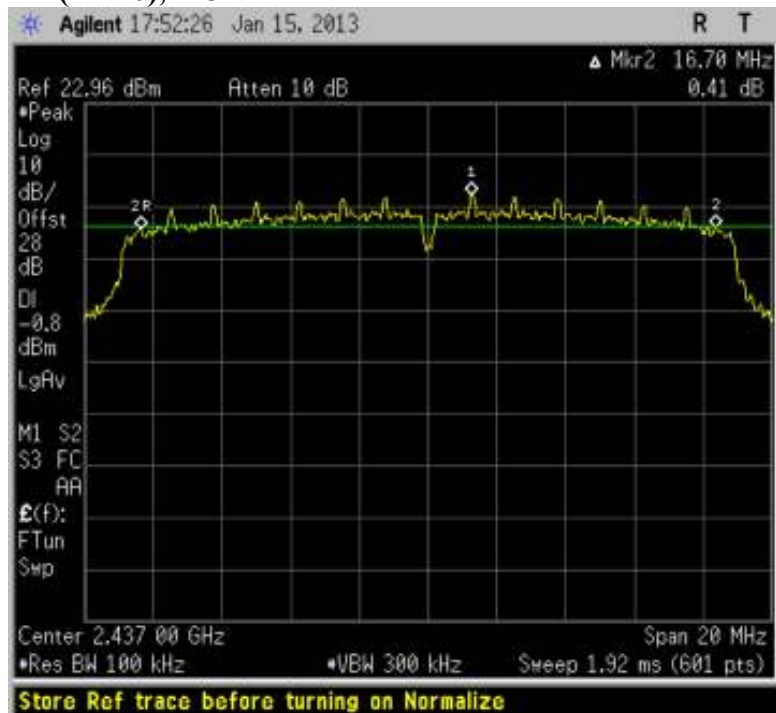
6dB Bandwidth 802.11g, 2462 MHz



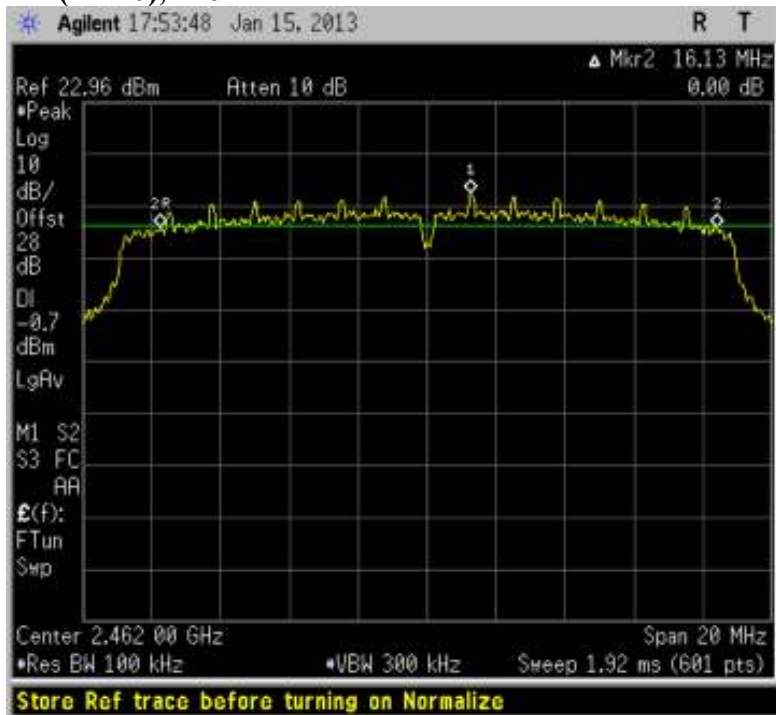
6dB Bandwidth 802.11n (HT20), 2412 MHz



6dB Bandwidth 802.11n (HT20), 2437 MHz

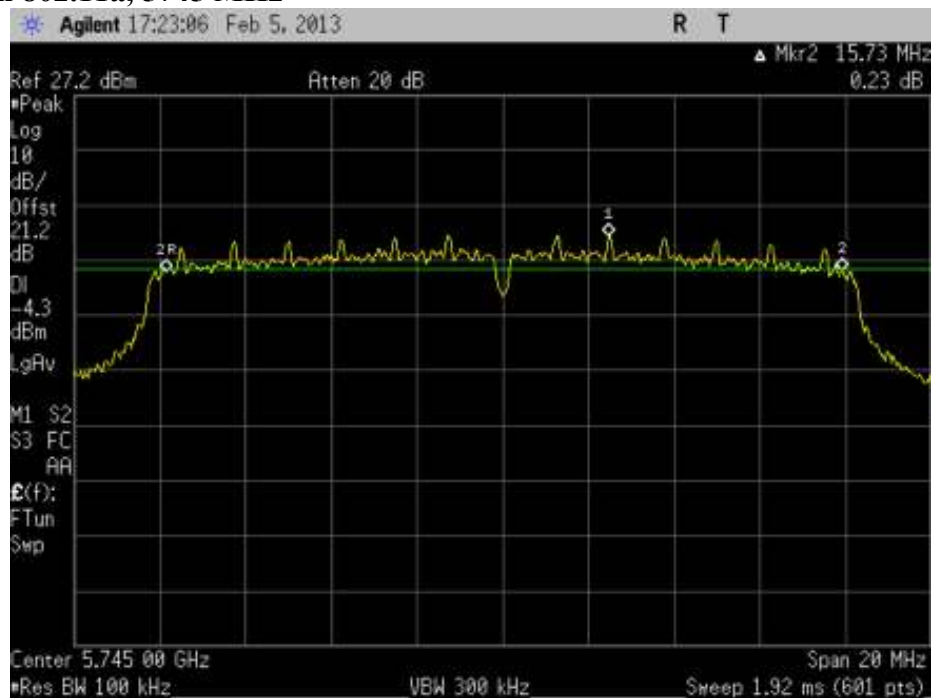


6dB Bandwidth 802.11n (HT20), 2462 MHz

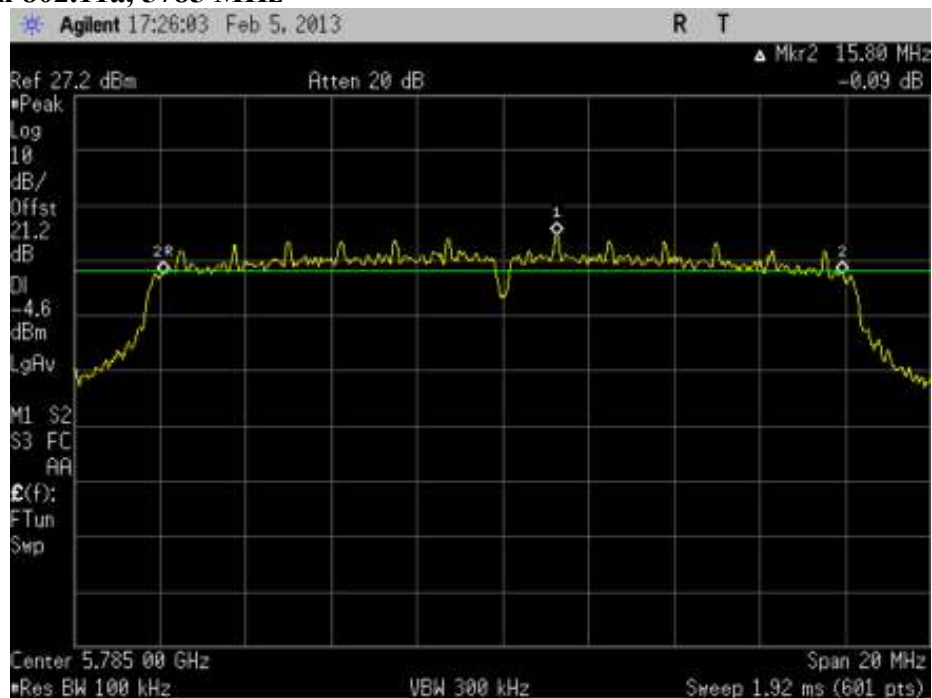


6.7.6.2 5 GHz 6dB BW:

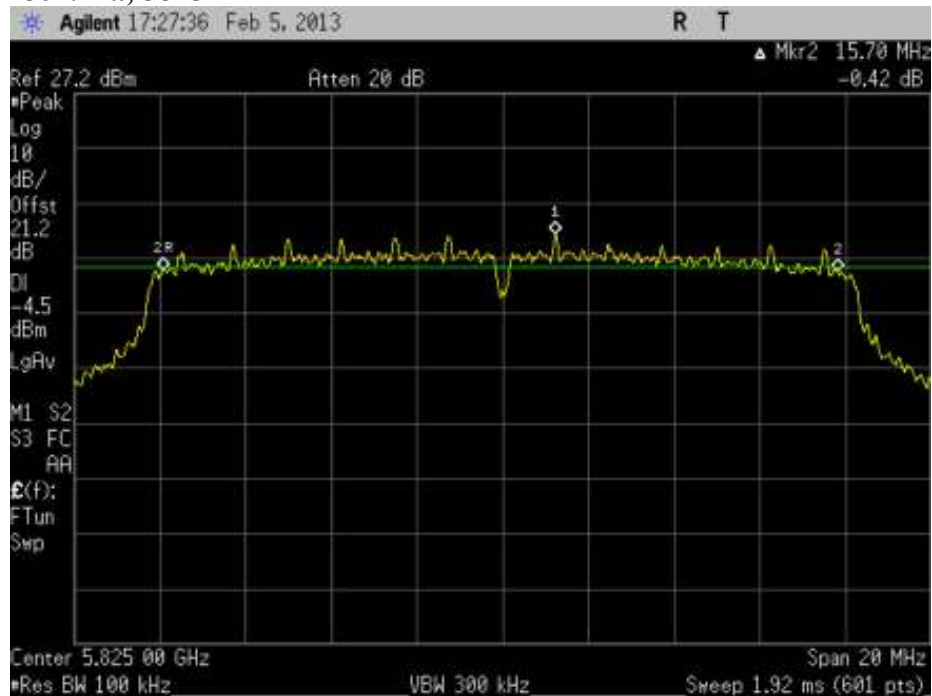
6dB Bandwidth 802.11a, 5745 MHz



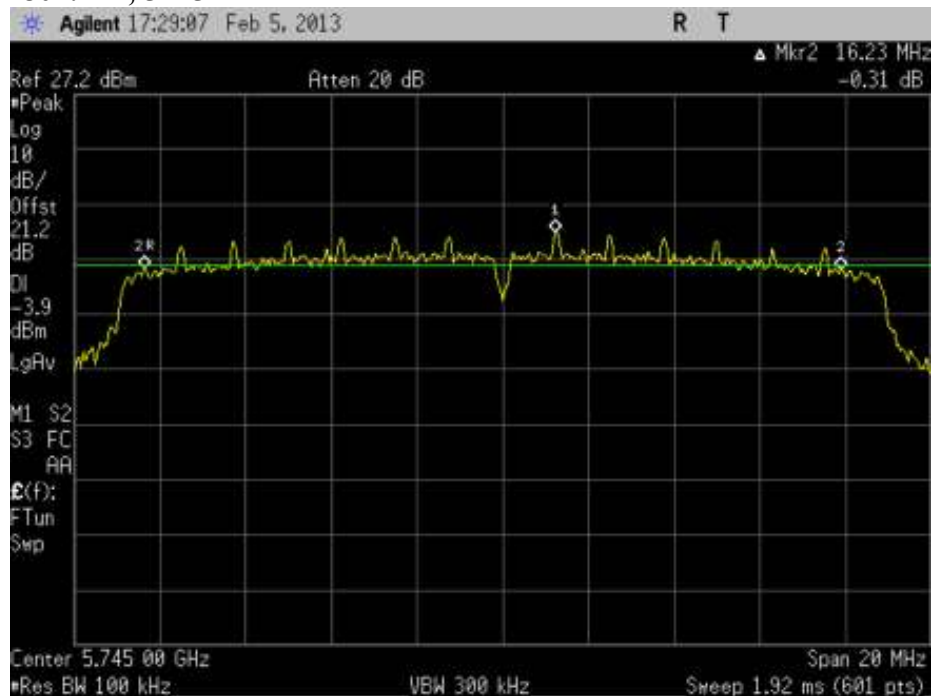
6dB Bandwidth 802.11a, 5785 MHz



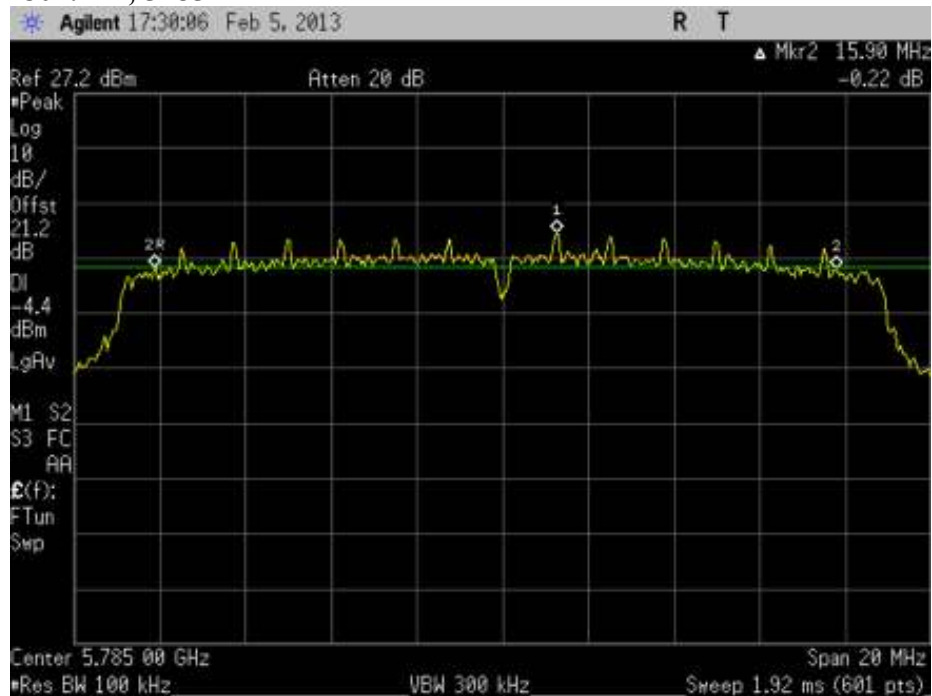
6dB Bandwidth 802.11a, 5825 MHz



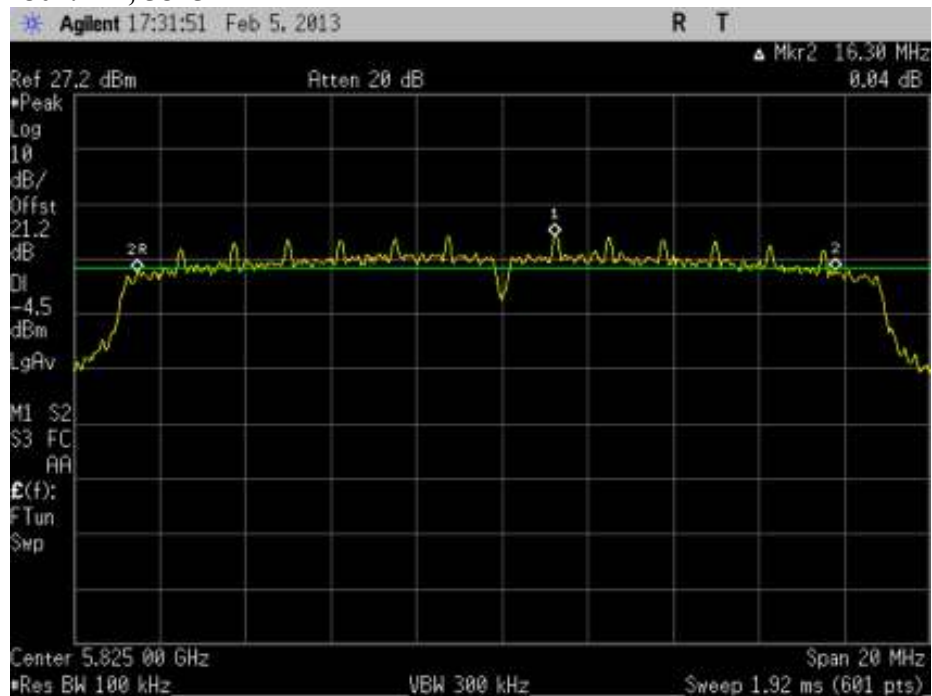
6dB Bandwidth 802.11n, 5745 MHz



6dB Bandwidth 802.11n, 5785 MHz



6dB Bandwidth 802.11n, 5825 MHz

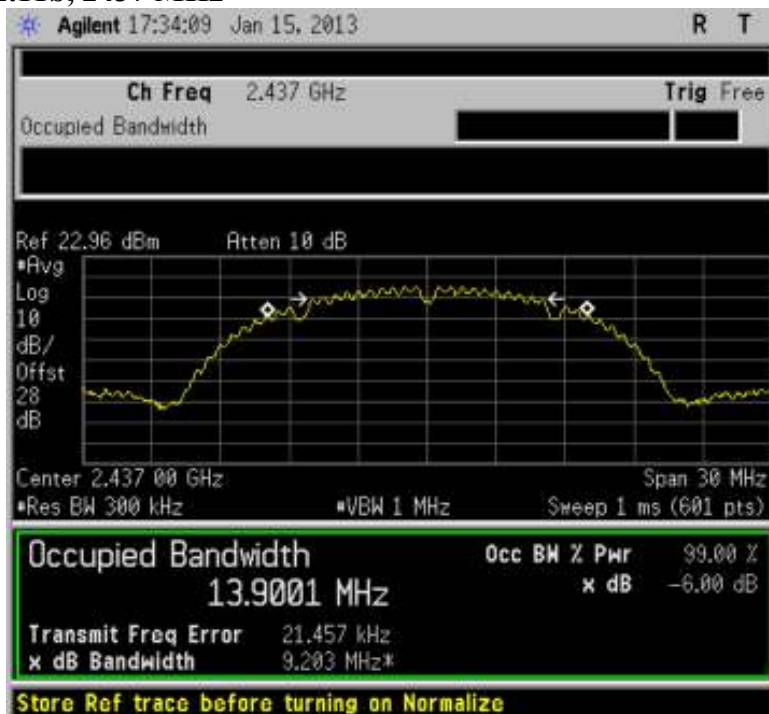


6.7.6.3 2.4 GHz 20dB BW:

20dB Bandwidth 802.11b, 2412 MHz

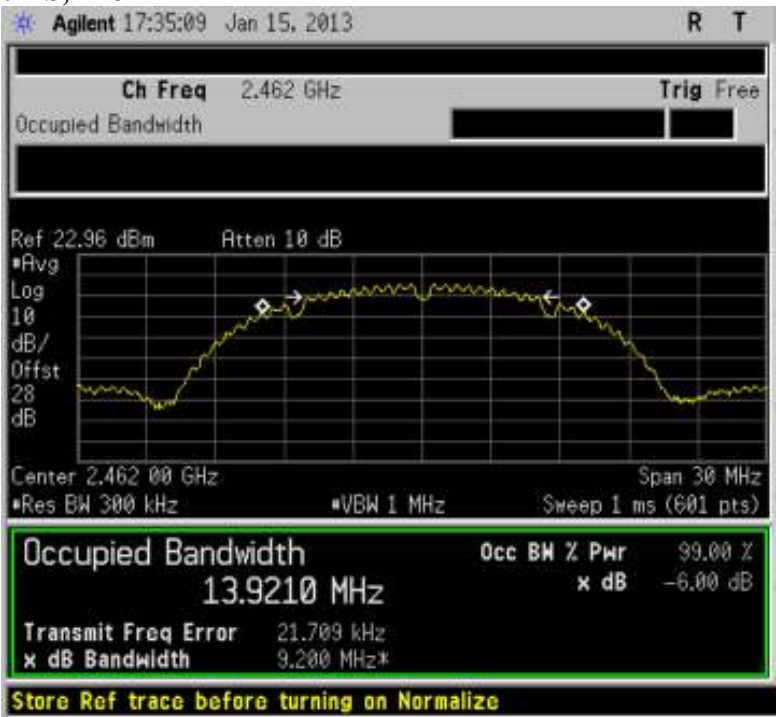


20dB Bandwidth 802.11b, 2437 MHz

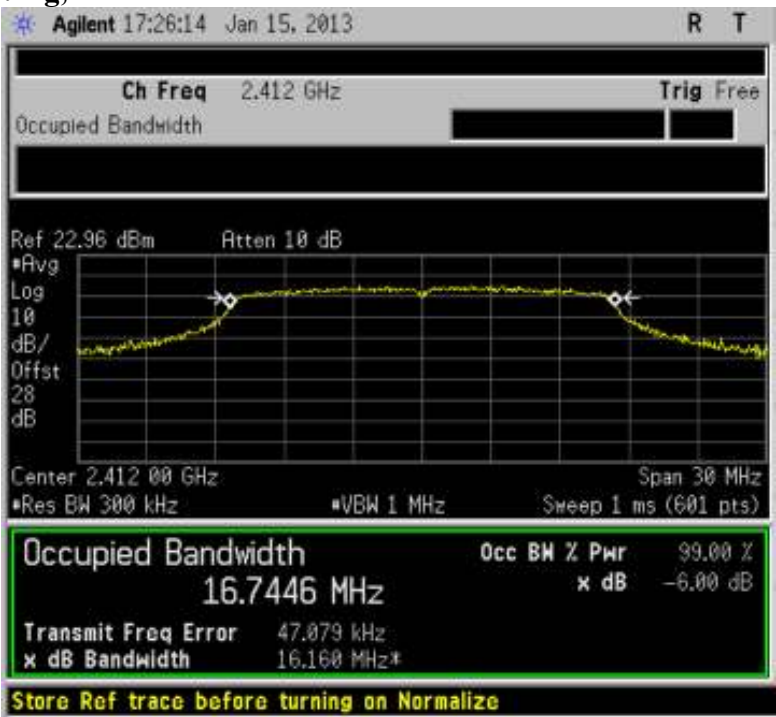




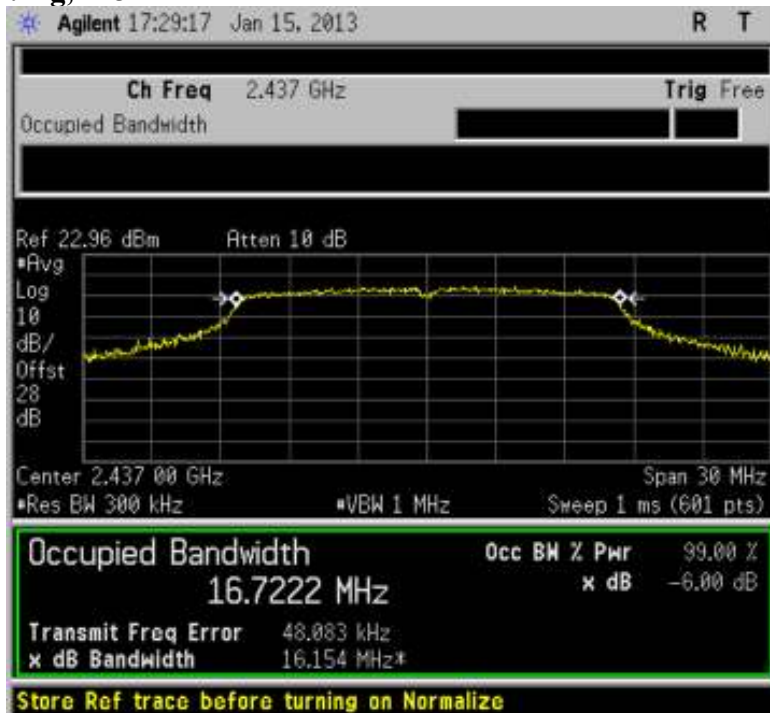
20dB Bandwidth 802.11b, 2462 MHz



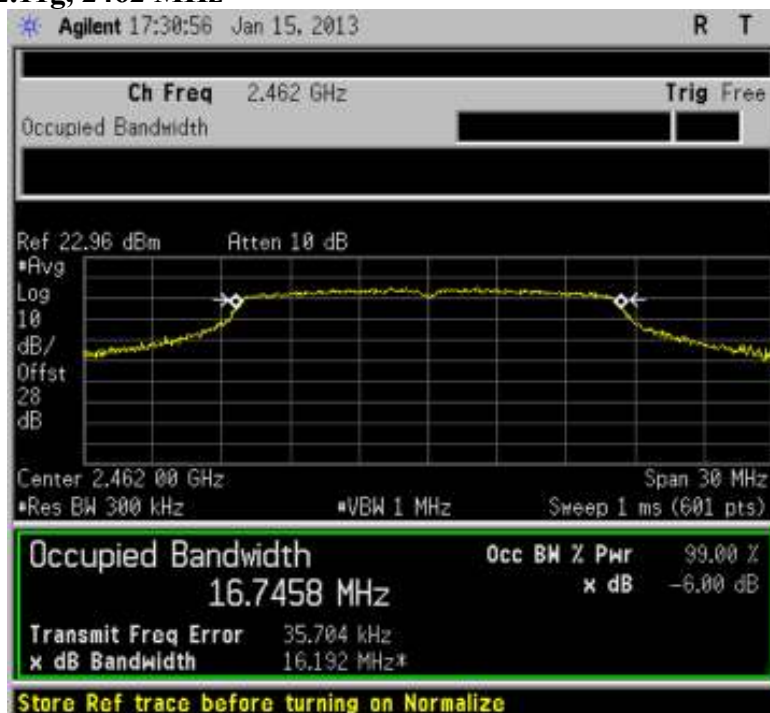
20dB Bandwidth 802.11g, 2412 MHz



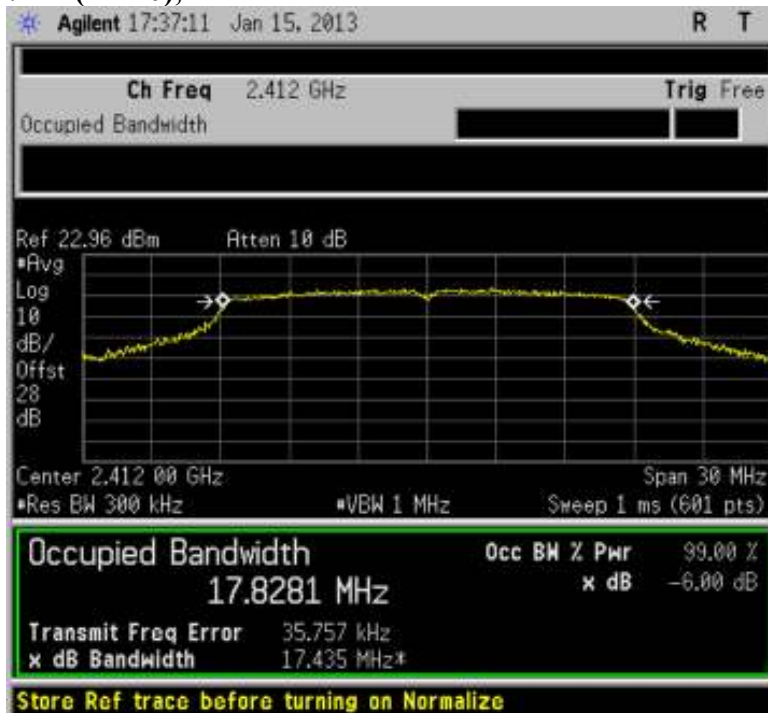
20dB Bandwidth 802.11g, 2437 MHz



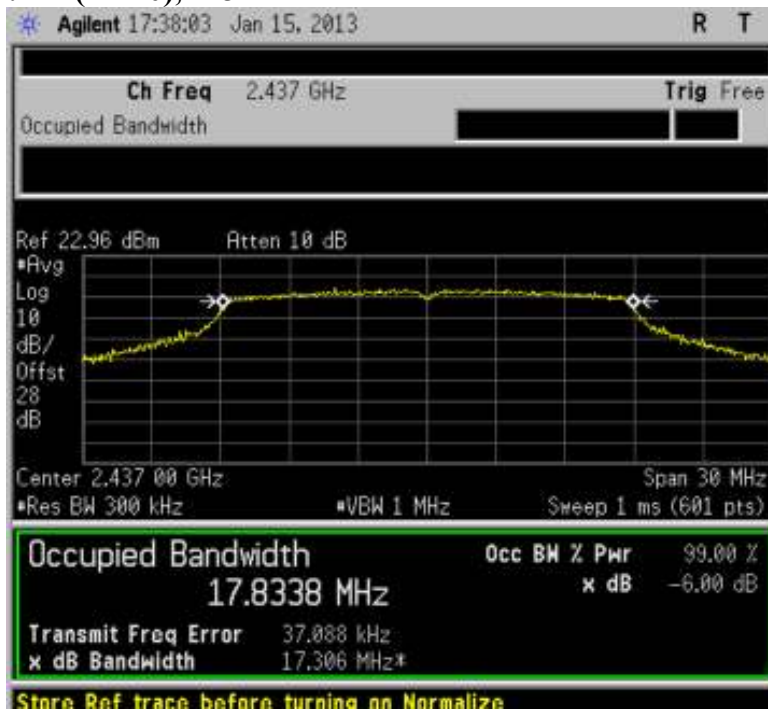
20dB Bandwidth 802.11g, 2462 MHz



20dB Bandwidth 802.11n (HT20), 2412 MHz



20dB Bandwidth 802.11n (HT20), 2437 MHz





20dB Bandwidth 802.11n (HT20), 2462 MHz



6.7.6.4 5 GHz 20dB BW:

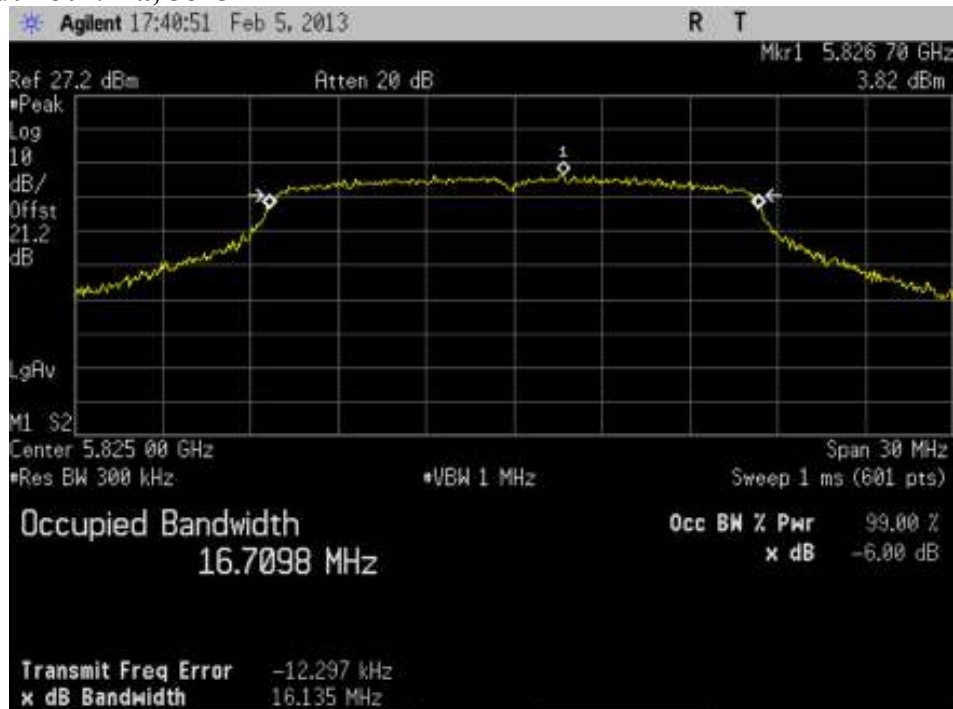
20dB Bandwidth 802.11a, 5745 MHz



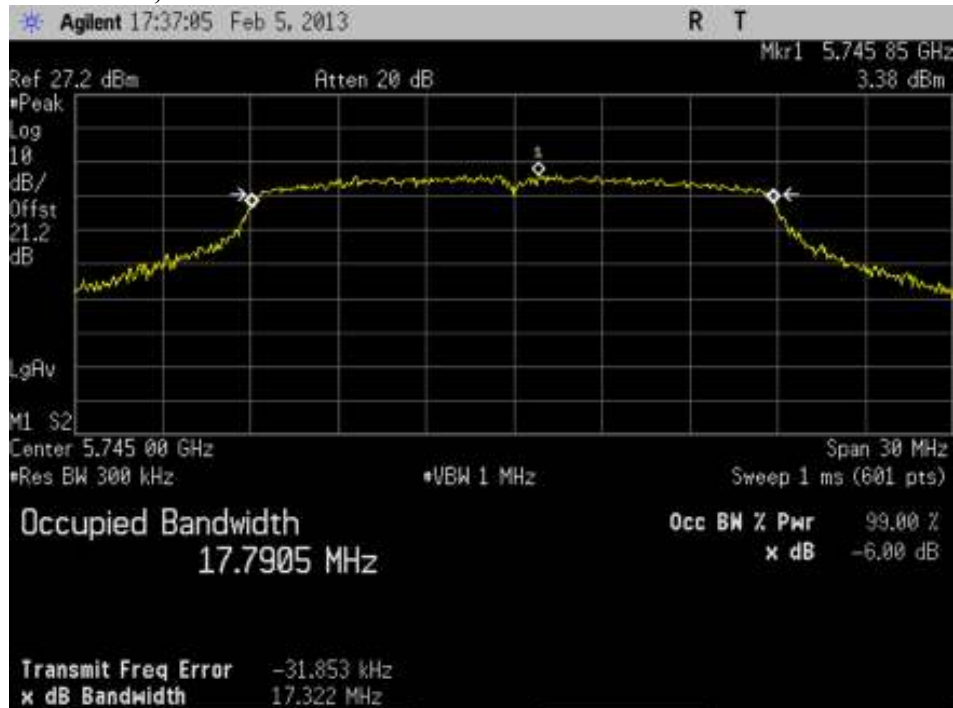
20dB Bandwidth 802.11a, 5785 MHz



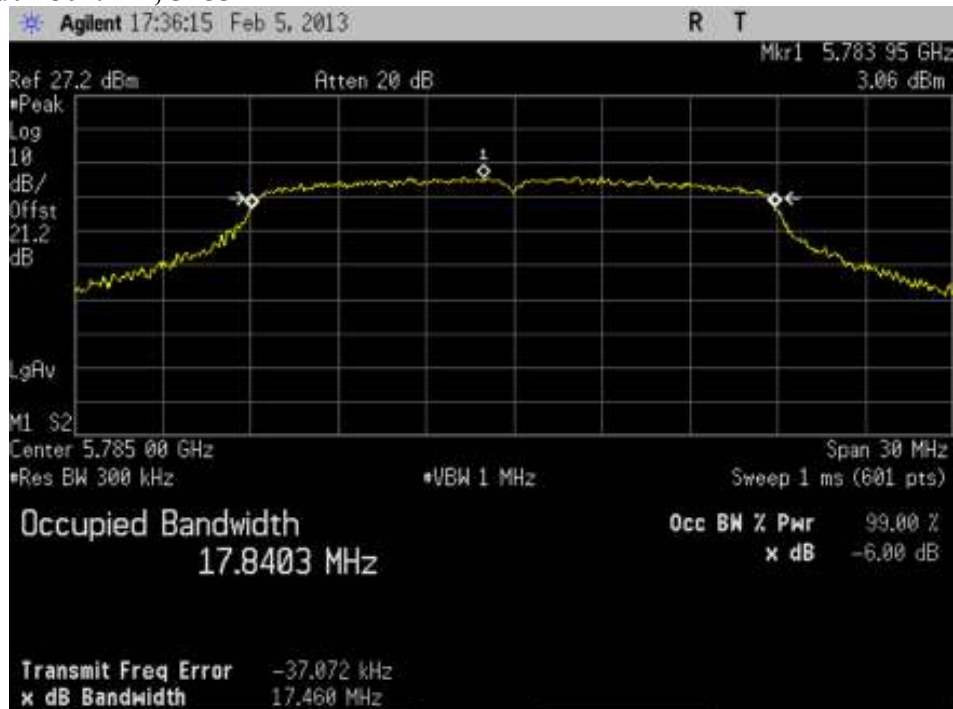
20dB Bandwidth 802.11a, 5825 MHz



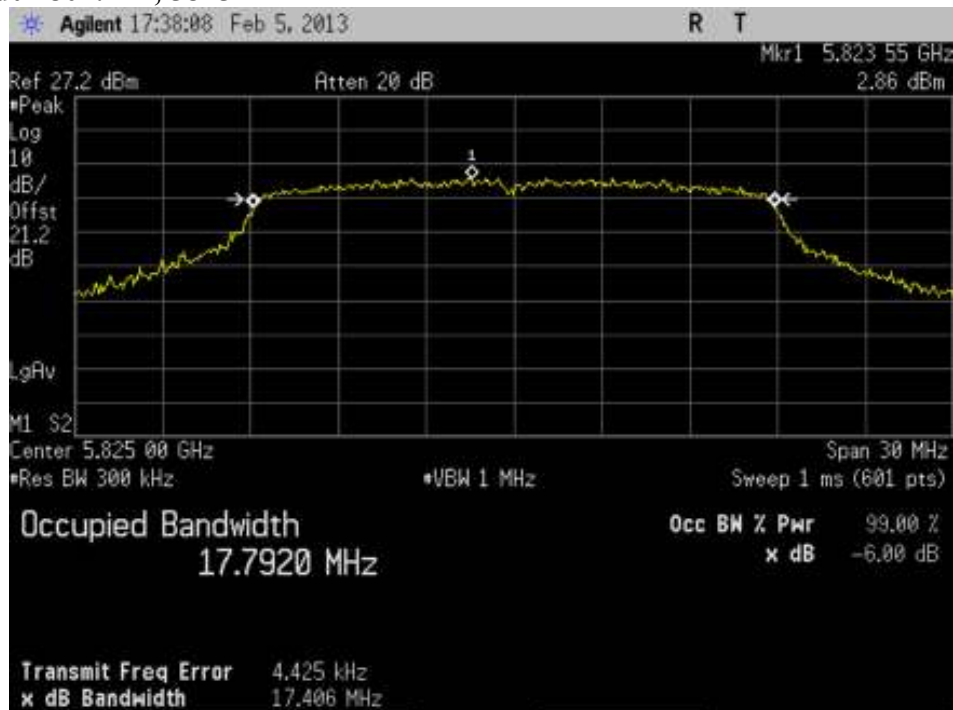
20dB Bandwidth 802.11n, 5745 MHz



20dB Bandwidth 802.11n, 5785 MHz



20dB Bandwidth 802.11n, 5825 MHz



6.8 Maximum Power Spectral Density Level in the Fundamental Emission

6.8.1 Limits:

§ 15.247 (e)

RSS-210 A8.2 (b)

For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

6.8.2 Test procedure:

Measurement according to FCC KDB 558074 D01 Meas Guidance v02, section 9.1 Option 1

1. Set the analyzer center frequency to DTS channel center frequency
2. Span = 1.5 x DTS channel Bandwidth
3. RBW = 3 KHz; VBW = 10 KHz; Detector: Peak – Max hold

6.8.3 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

Measurement Uncertainty: ±0.5dB

6.8.4 Test results: 2.4 GHz Band

Corrected Power Spectral Density (dBm)			
Mode	Frequency (MHz)		
	2412 Channel 1	2437 Channel 6	2462 Channel 11
802.11b	-5.24	-4.19	-5.15
802.11g	-10.72	-12.00	-9.92
802.11n (HT20)	-10.10	-11.82	-10.47

6.8.4.1 Measurement Verdict

Pass.

6.8.5 Test results: 5 GHz Band

Corrected Power Spectral Density (dBm)			
Mode	Frequency (MHz)		
	5745 Channel 149	5785 Channel 157	5825 Channel 165
802.11a	-12.28	-12.59	-11.48
802.11n (HT20)	-12.24	-13.02	-12.41

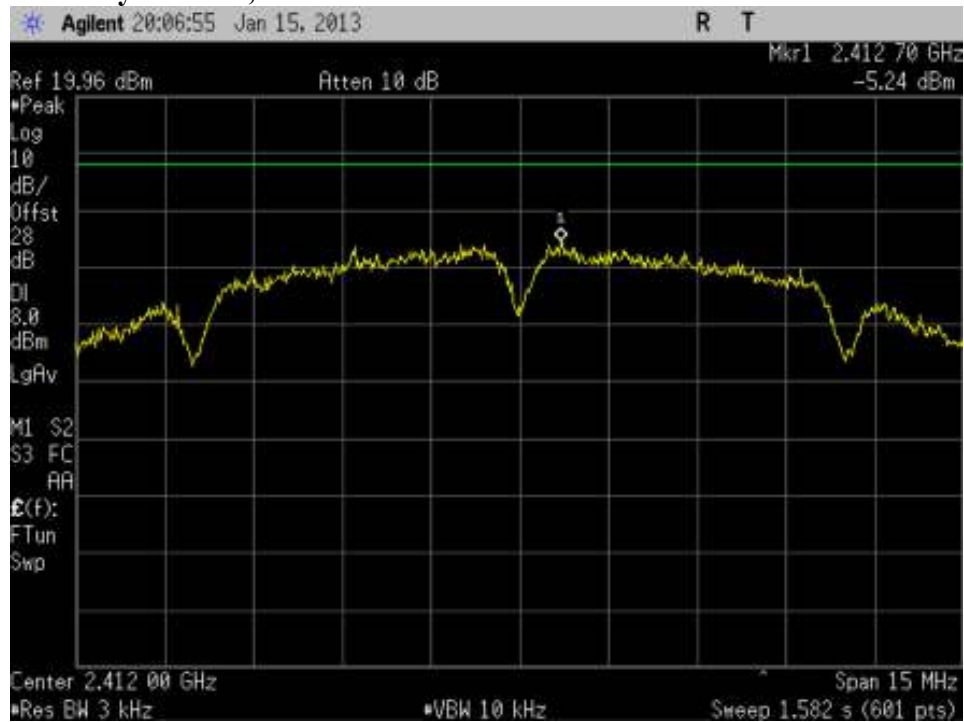
6.8.5.1 Measurement Verdict

Pass.

6.8.6 Test Data/plots:

6.8.6.1 2.4GHz

Power Spectral Density 802.11b, 2412 MHz



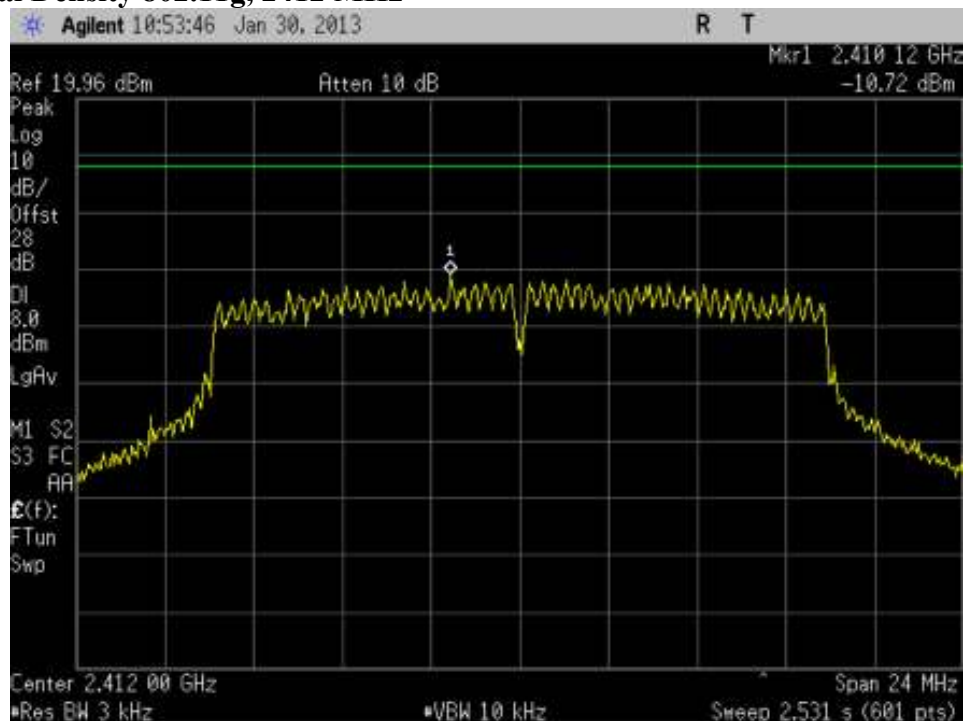
Power Spectral Density 802.11b, 2437 MHz



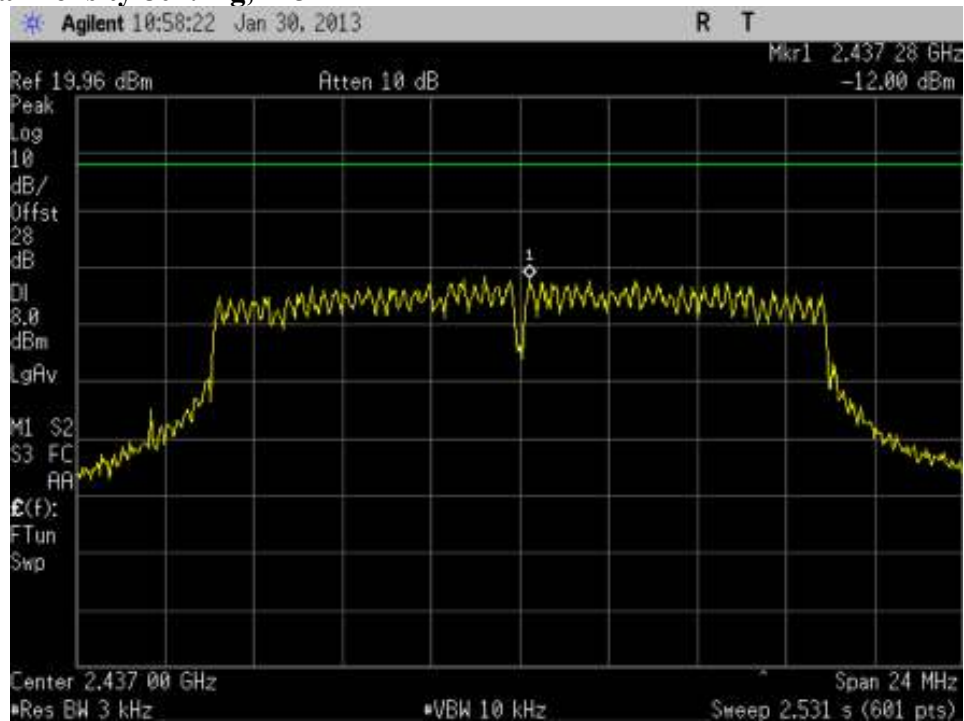
Power Spectral Density 802.11b, 2462 MHz



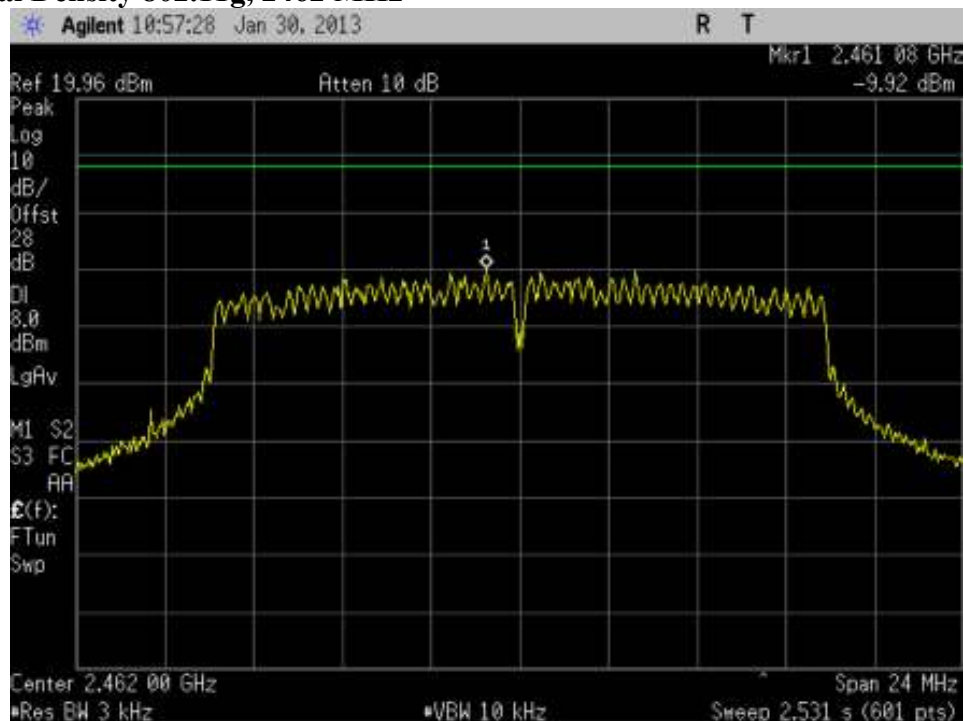
Power Spectral Density 802.11g, 2412 MHz



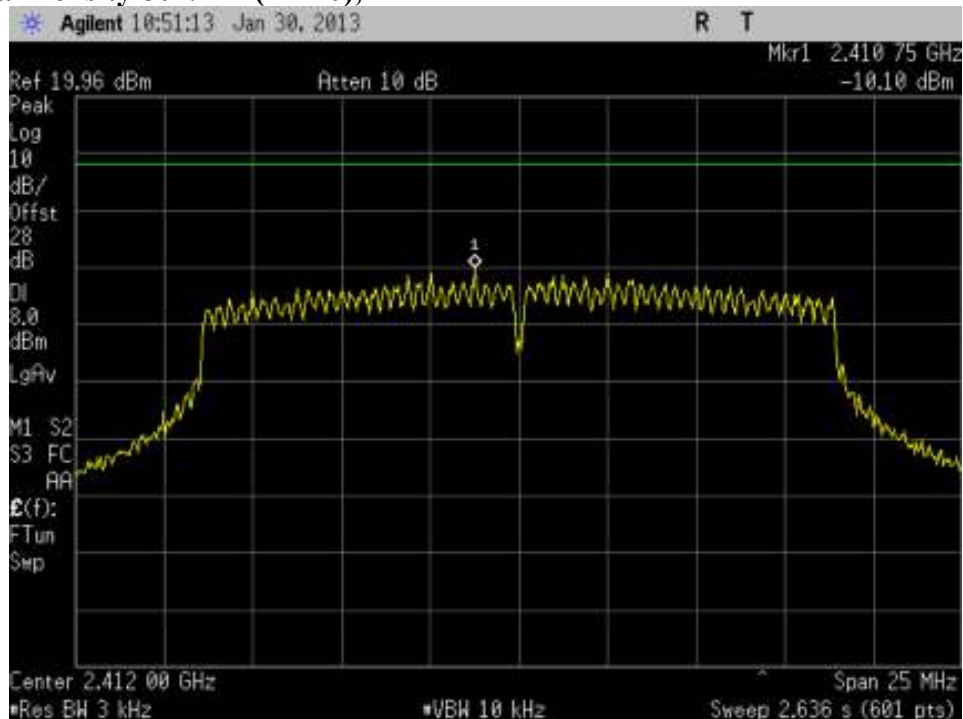
Power Spectral Density 802.11g, 2437 MHz



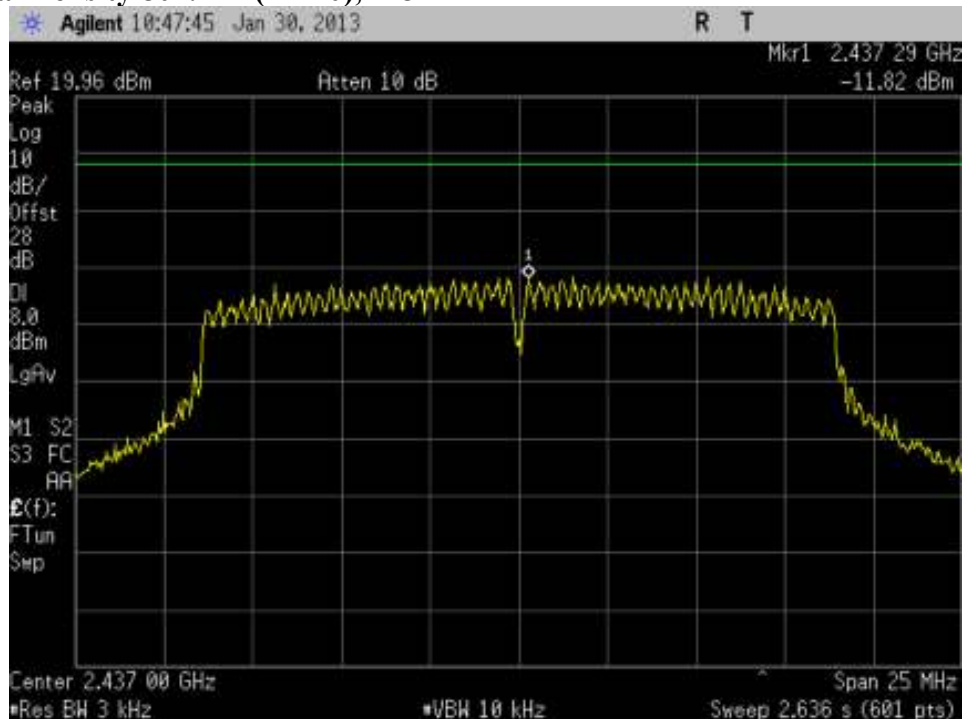
Power Spectral Density 802.11g, 2462 MHz



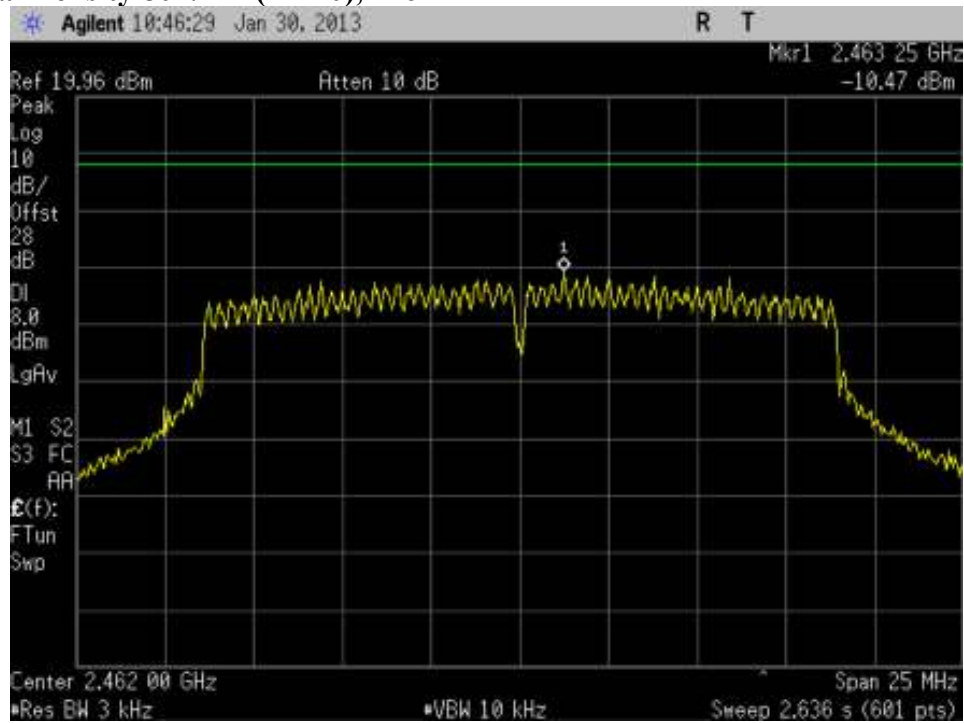
Power Spectral Density 802.11n (HT20), 2412 MHz



Power Spectral Density 802.11n (HT20), 2437 MHz

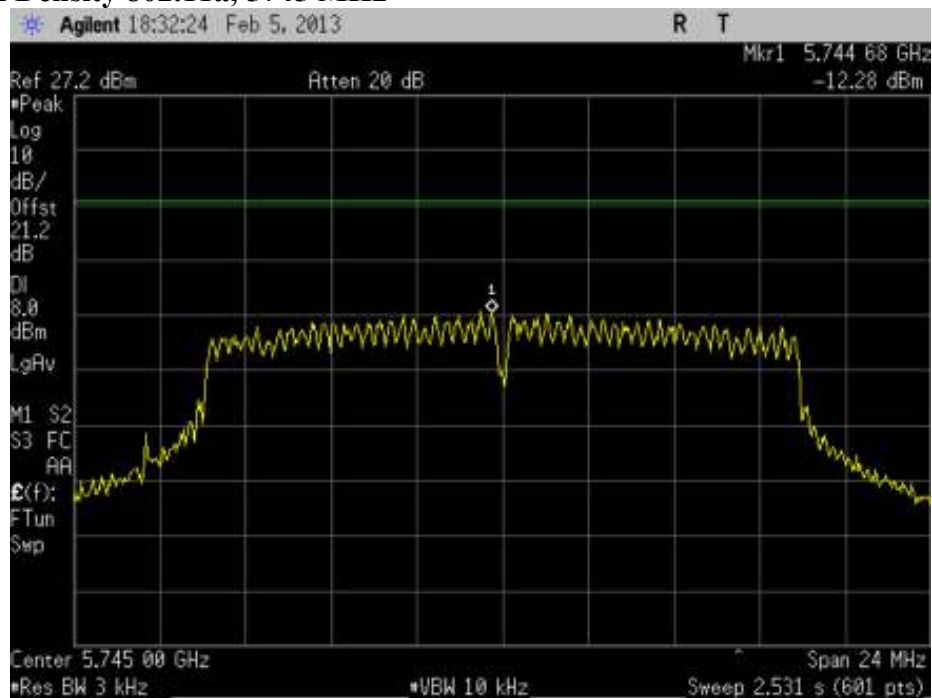


Power Spectral Density 802.11n (HT20), 2462 MHz

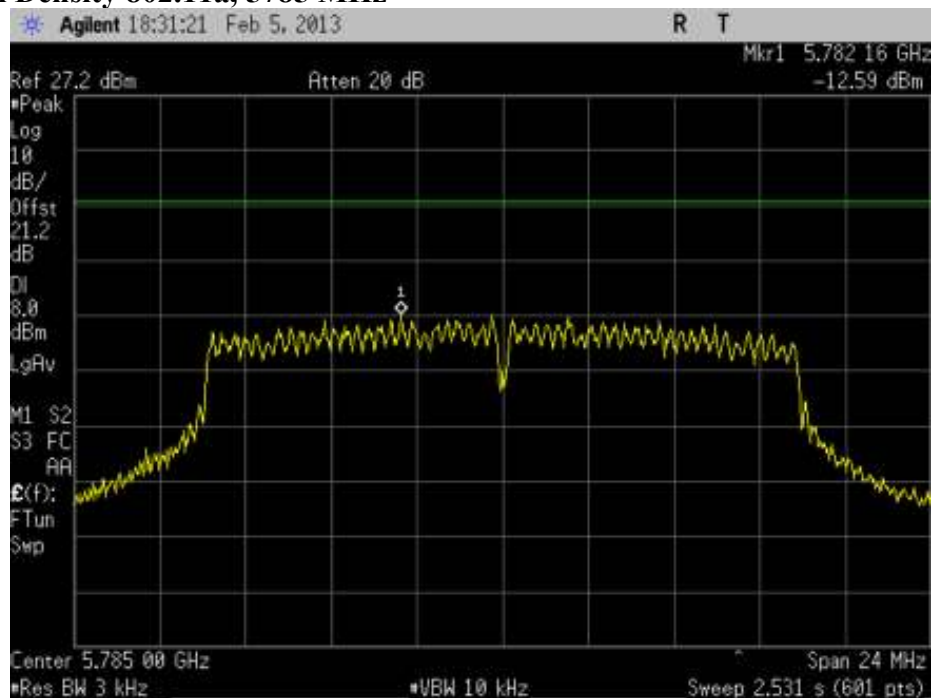


6.8.6.2 5GHz

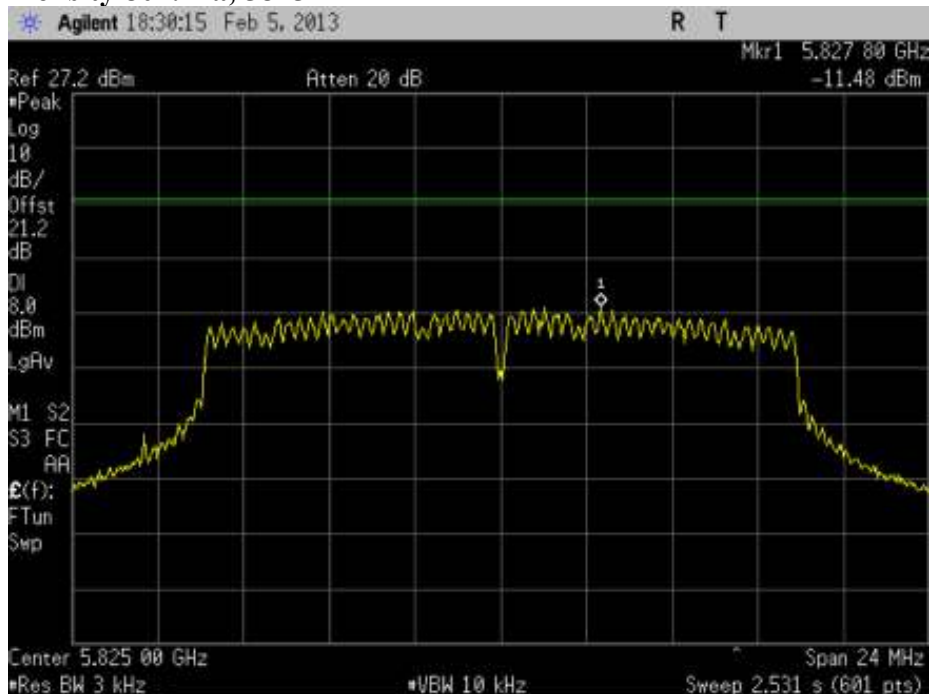
Power Spectral Density 802.11a, 5745 MHz



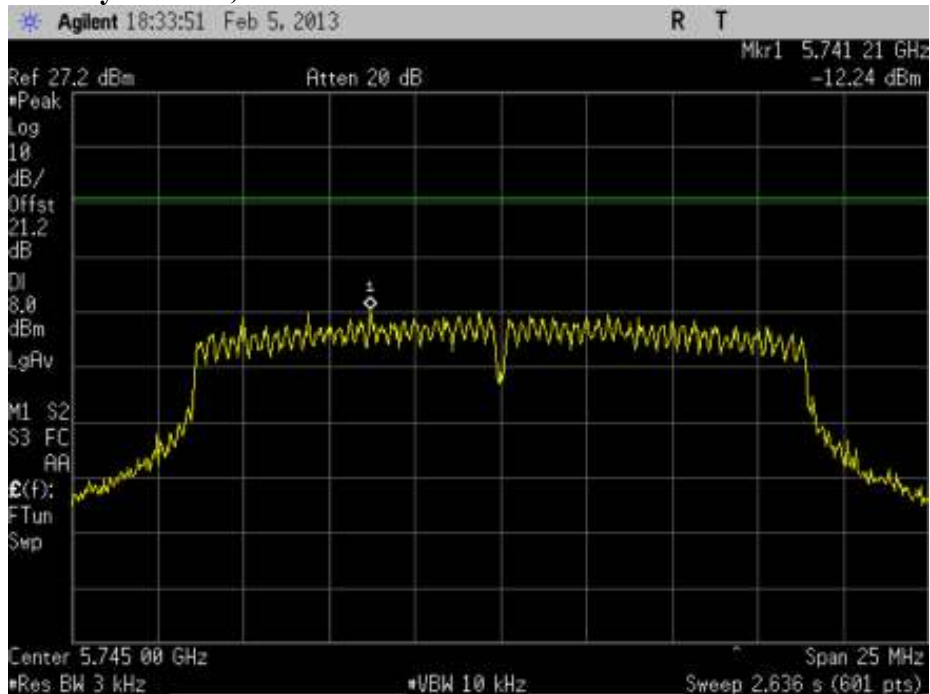
Power Spectral Density 802.11a, 5785 MHz



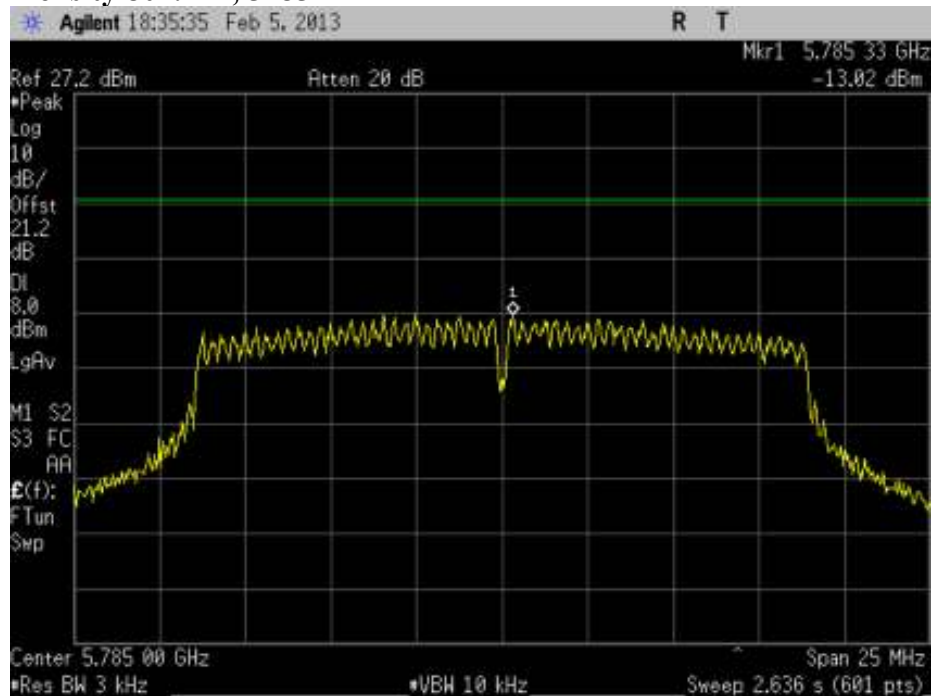
Power Spectral Density 802.11a, 5825 MHz



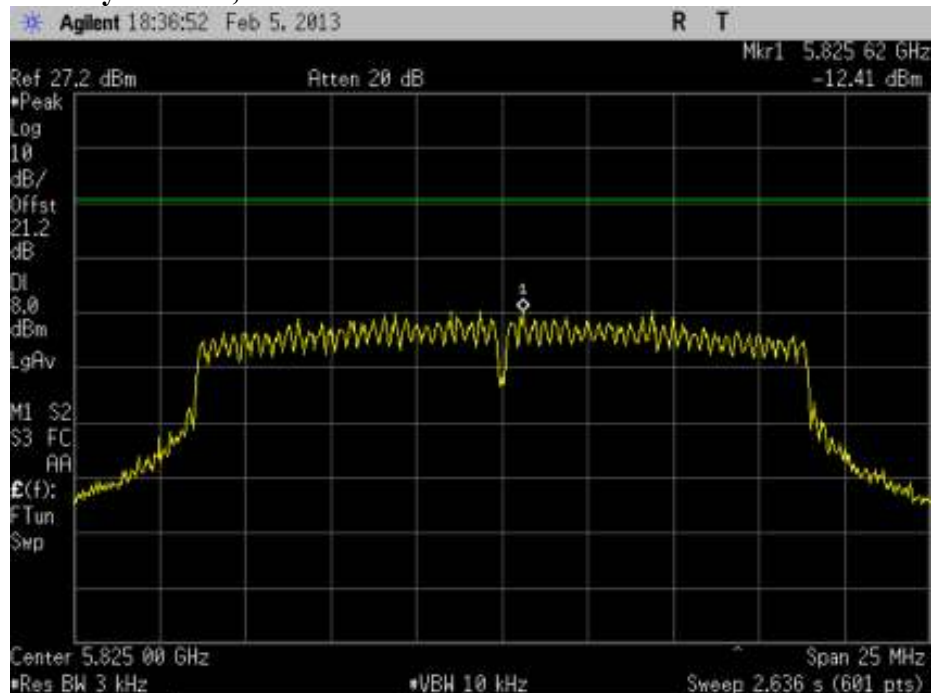
Power Spectral Density 802.11n, 5745 MHz



Power Spectral Density 802.11n, 5785 MHz



Power Spectral Density 802.11n, 5825 MHz



6.9 Unwanted Emissions into Non-Restricted Frequency Bands- Conducted

6.9.1 Reference and Limits:

§ 15.247 (d)

RSS-210 A8.5

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

-20dBc in the frequency range 30MHz- 25GHz.

6.9.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

Measurement Uncertainty: ±1.0 dB

6.9.3 Test Procedure:

Measurement according to FCC KDB 558074 D01 Meas Guidance v02, section 10.1 – Unwanted Emissions into Non-Restricted Frequency Bands

Spectrum Analyzer settings:

RBW=100 kHz, VBW=300 kHz, Detector: Peak- Max hold;

Sweep Time: Auto

Span=Full range

6.9.4 Test Result: 2.4 GHz Band

Conducted Spurious Emissions					
Channel	Frequency (MHz)	Amplitude (dBm)			Limits
		802.11b	802.11g	802.11n (HT20)	
Low	2412	7.73	5.86	4.61	
	Spurious	All other peaks >20dB below limit			-20dBc
Mid	2437	7.78	5.60	4.80	
	Spurious	All other peaks >20dB below limit			-20dBc
High	2462	7.66	6.08	5.59	
	Spurious	All other peaks >20dB below limit			-20dBc

6.9.4.1 Measurement Verdict:
 Pass.

6.9.5 Test Result: 5 GHz Band

	Conducted Spurious Emissions			
Channel	Frequency (MHz)	Amplitude (dBm)		Limits
		802.11a	802.11n (HT20)	
Low	5745	1.37	2.00	
	Spurious	All other peaks >20dB below limit		-20dBc
Mid	5785	1.00	1.17	
	Spurious	All other peaks >20dB below limit		-20dBc
High	5825	0.38	1.48	
	Spurious	All other peaks >20dB below limit		-20dBc
	Measurement Uncertainty: ±1.0 dB			

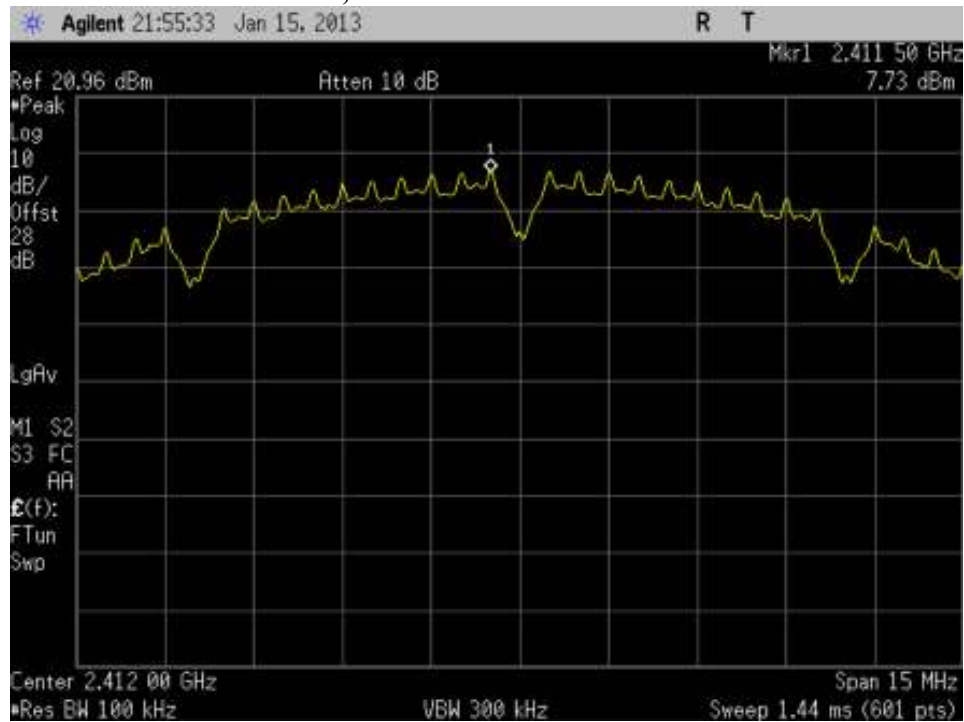
6.9.5.1 Measurement Verdict:
 Pass.

Note: Some of the plots include a signal from the LO of the Spectrum Analyzer at the beginning of the plot.

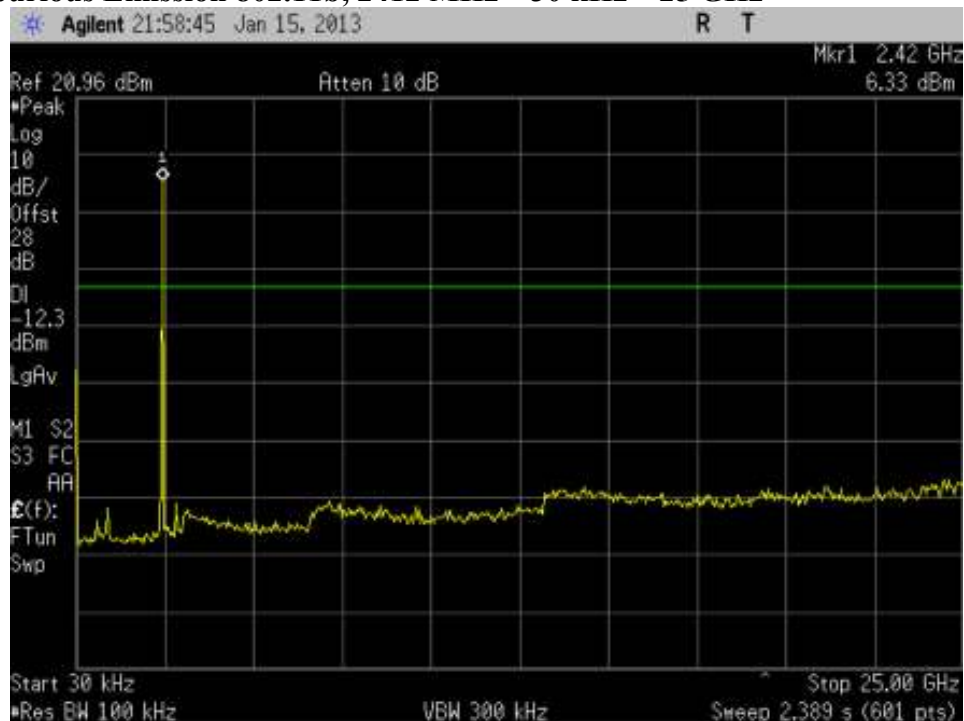
6.9.6 Test data/ plots:

6.9.6.1 2.4GHz

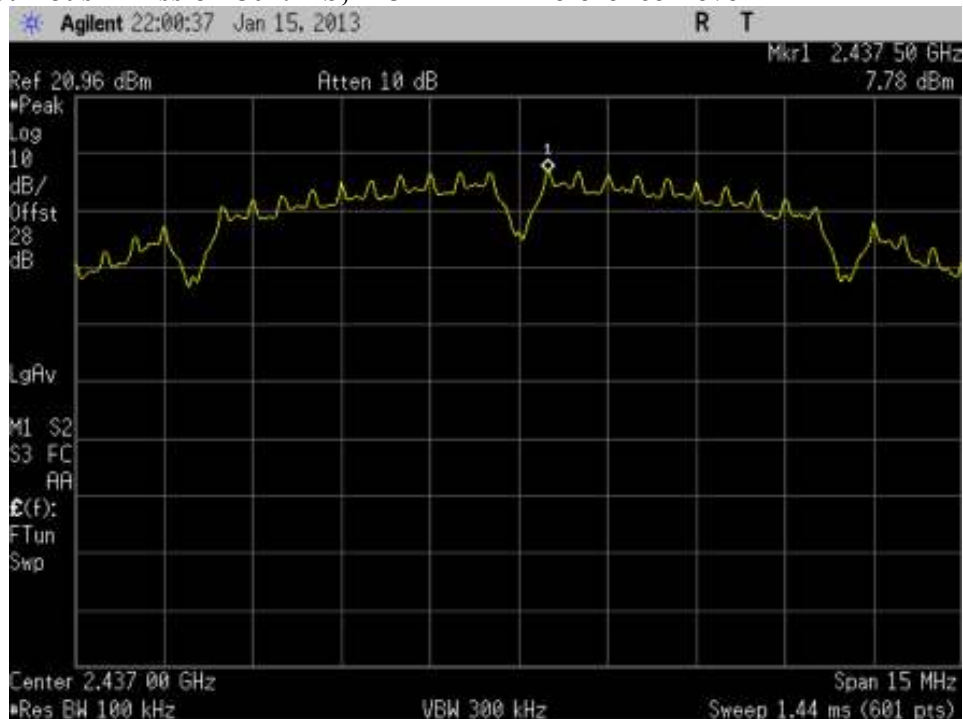
Conducted Spurious Emission 802.11b, 2412 MHz – Reference Level



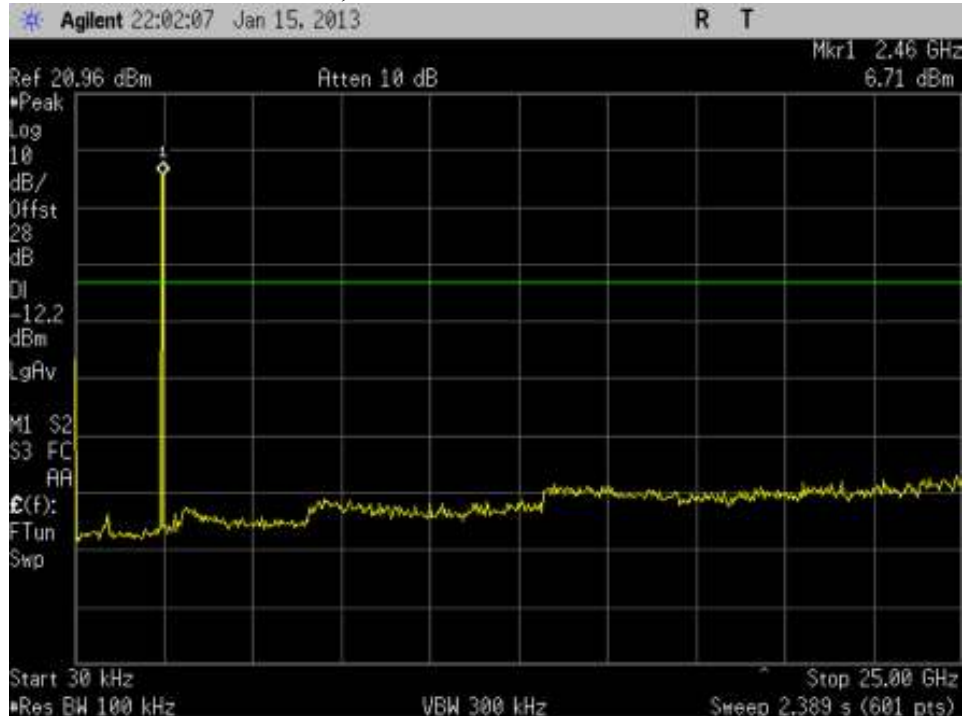
Conducted Spurious Emission 802.11b, 2412 MHz – 30 kHz – 25 GHz



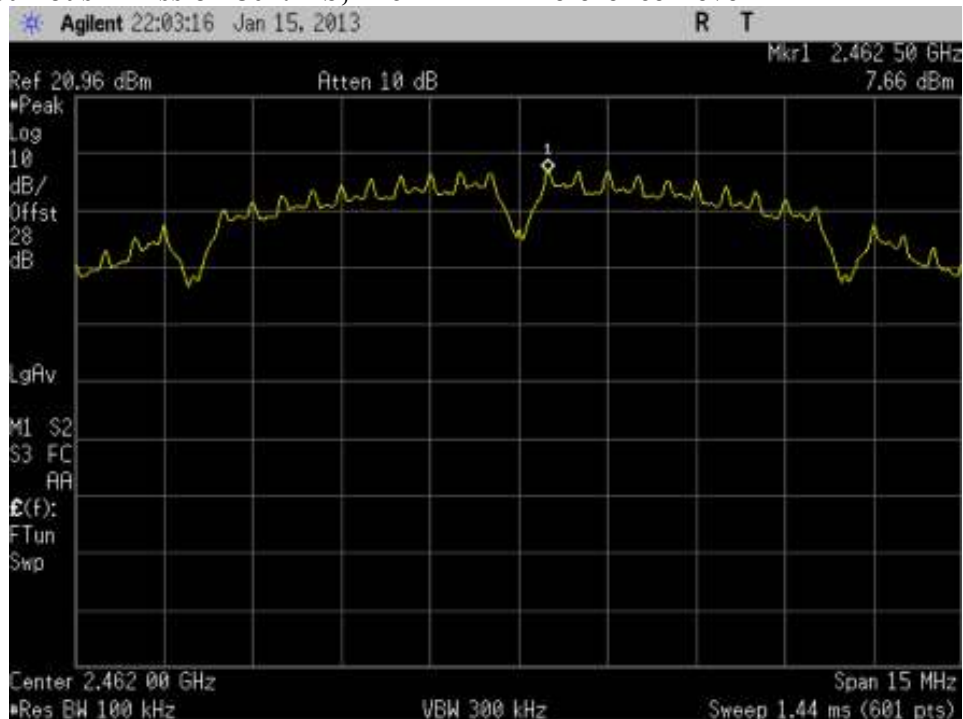
Conducted Spurious Emission 802.11b, 2437 MHz – Reference Level



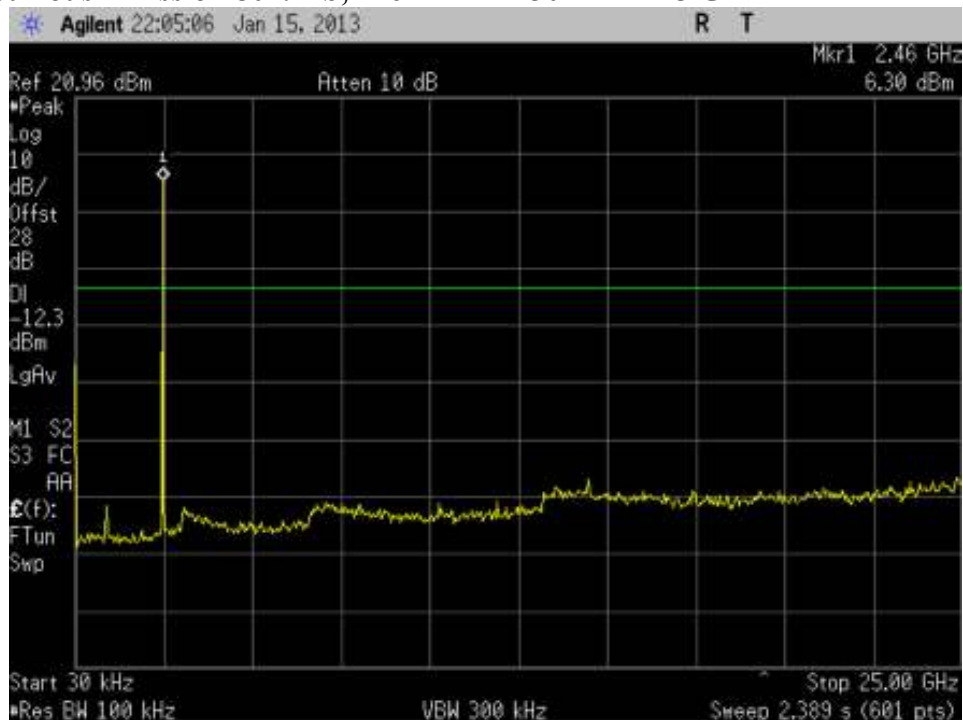
Conducted Spurious Emission 802.11b, 2437 MHz – 30 kHz – 25 GHz



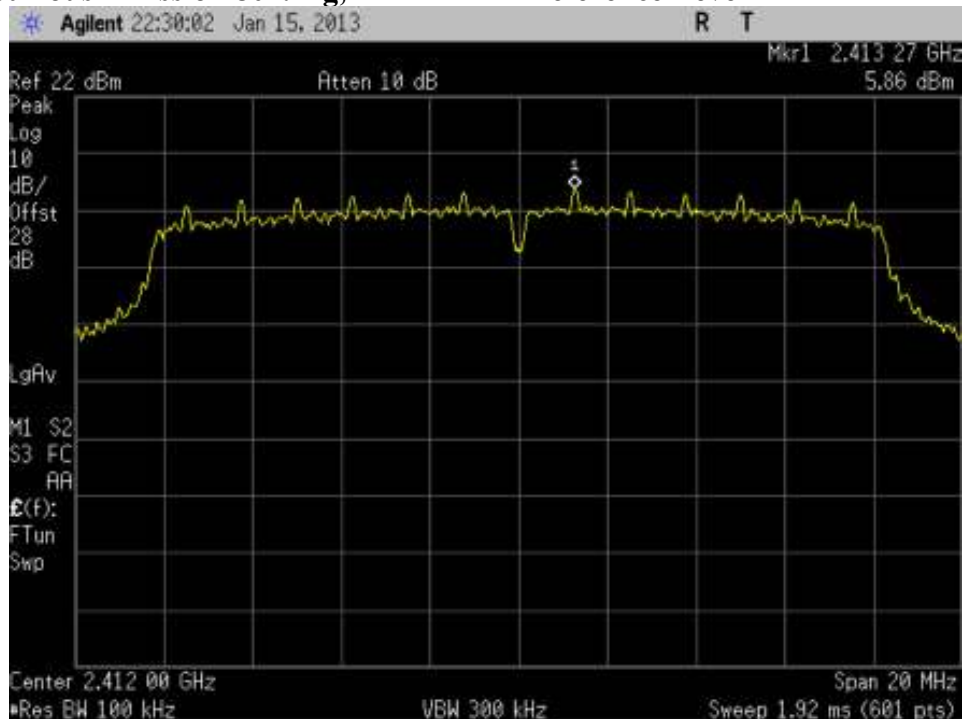
Conducted Spurious Emission 802.11b, 2462 MHz – Reference Level



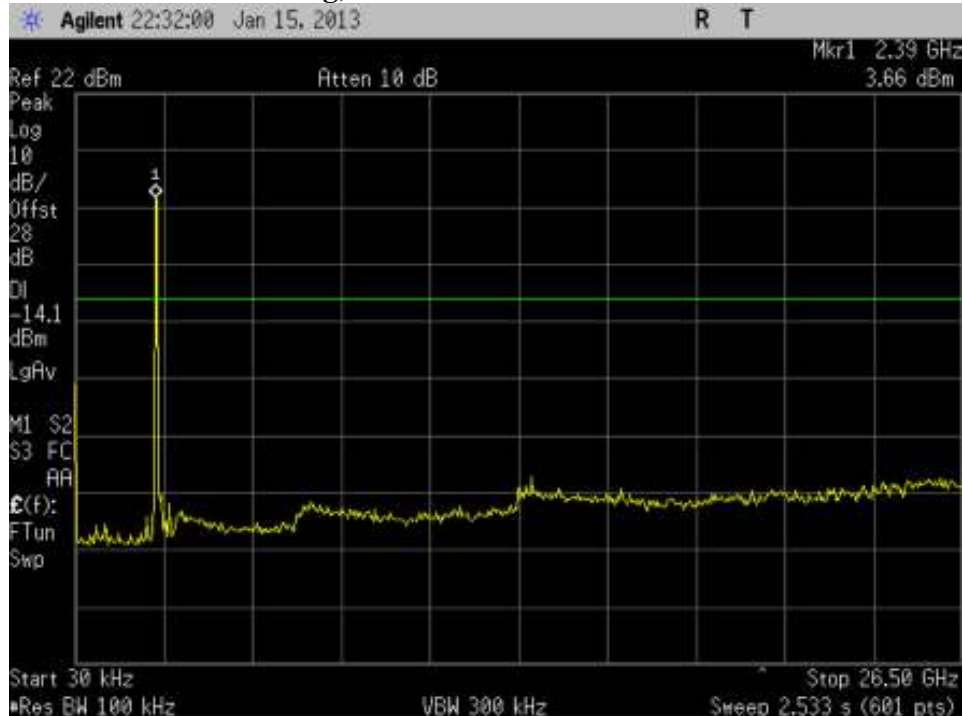
Conducted Spurious Emission 802.11b, 2462 MHz – 30 kHz – 25 GHz



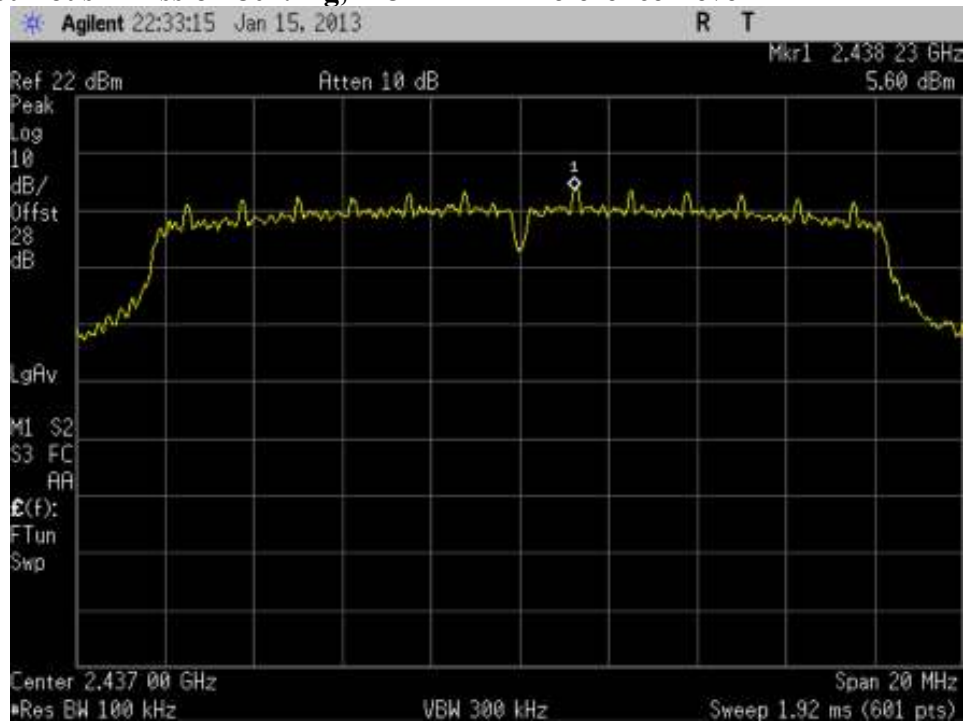
Conducted Spurious Emission 802.11g, 2412 MHz – Reference Level



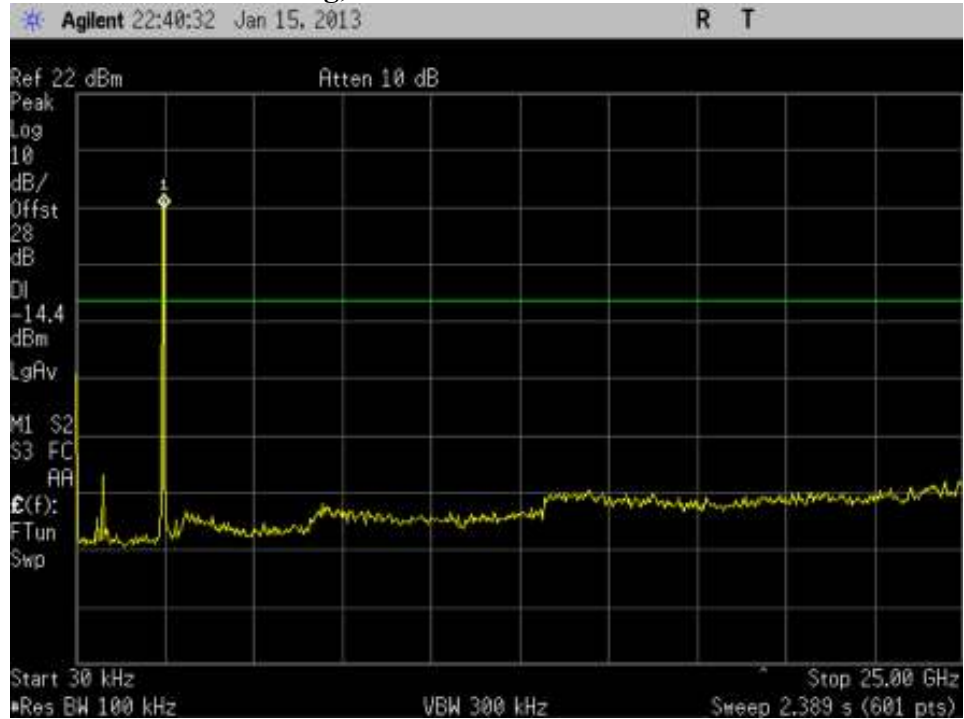
Conducted Spurious Emission 802.11g, 2412 MHz – 30 kHz – 25 GHz



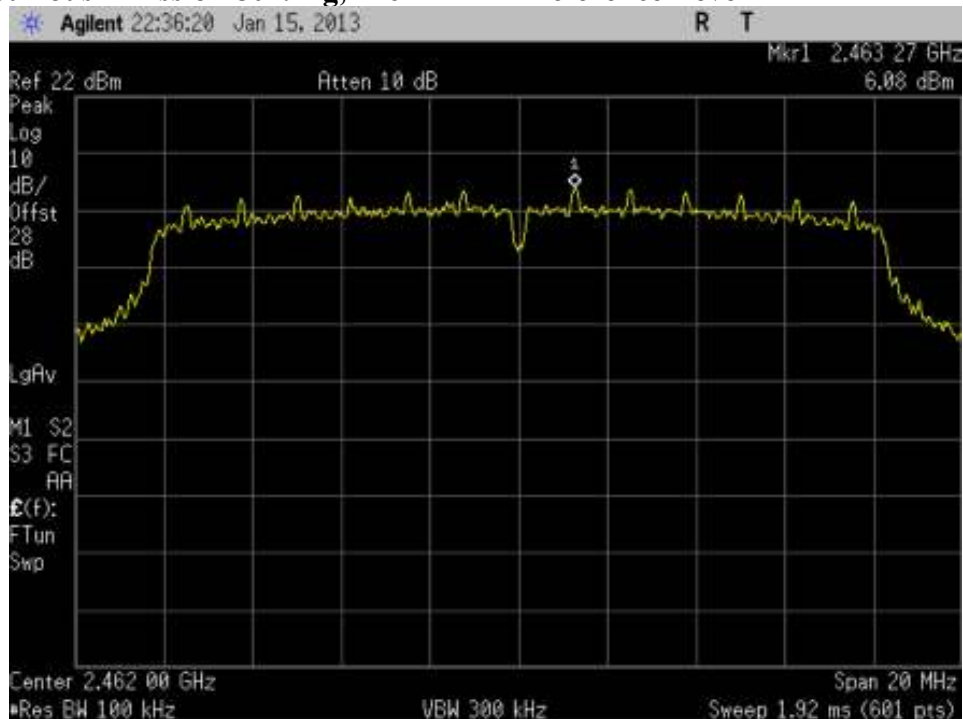
Conducted Spurious Emission 802.11g, 2437 MHz – Reference Level



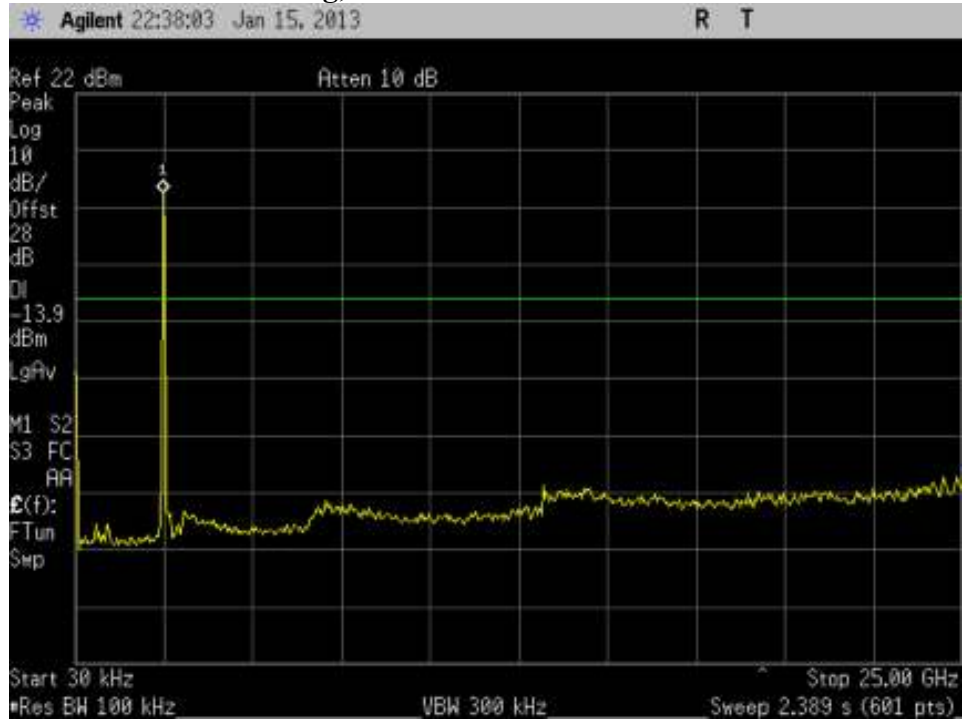
Conducted Spurious Emission 802.11g, 2437 MHz – 30 kHz – 25 GHz



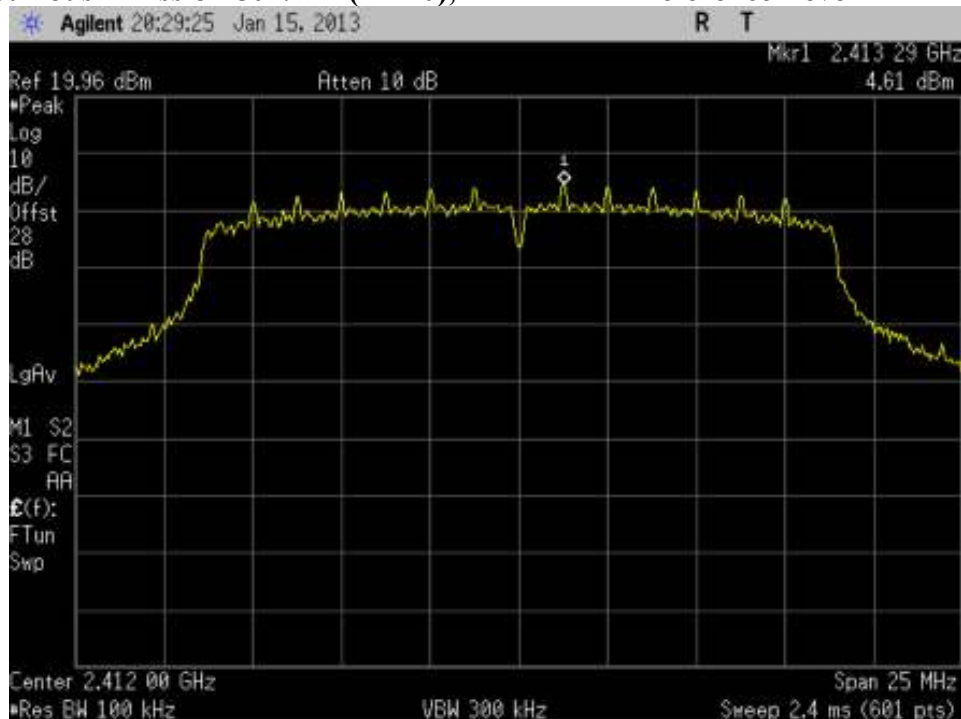
Conducted Spurious Emission 802.11g, 2462 MHz – Reference Level



Conducted Spurious Emission 802.11g, 2462 MHz – 30 kHz – 25 GHz



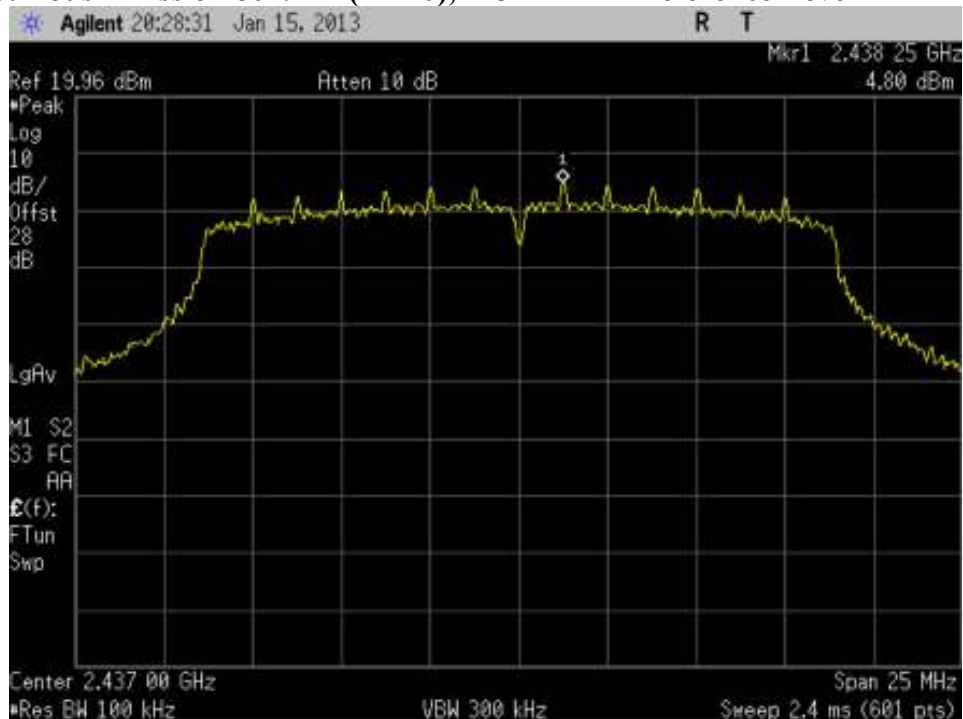
Conducted Spurious Emission 802.11n (HT20), 2412 MHz – Reference Level



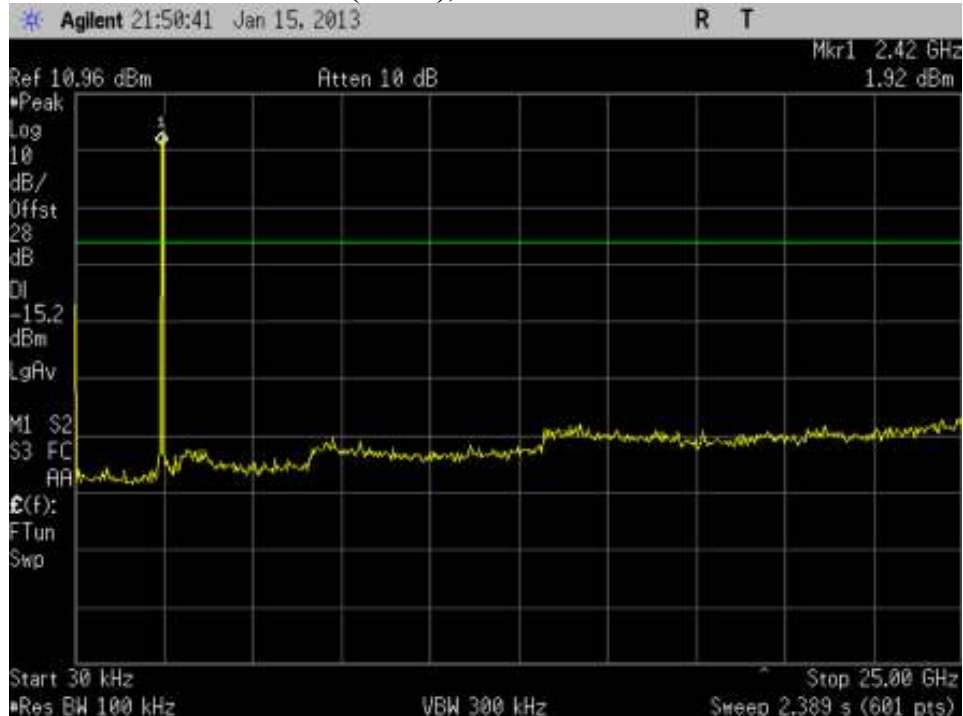
Conducted Spurious Emission 802.11n (HT20), 2412 MHz – 30 kHz – 25 GHz



Conducted Spurious Emission 802.11n (HT20), 2437 MHz – Reference Level



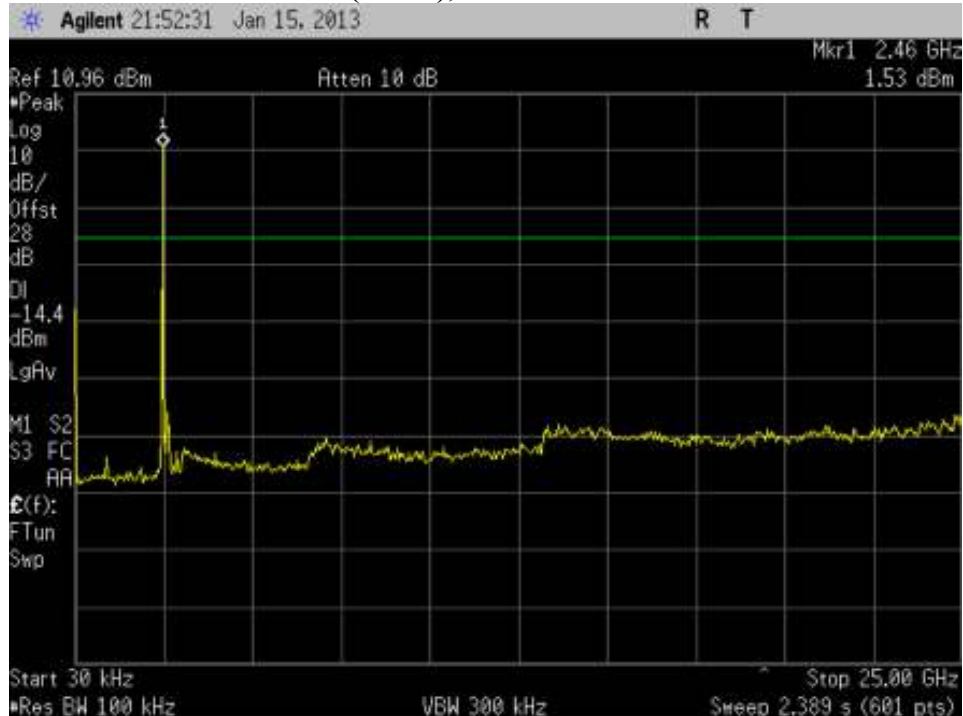
Conducted Spurious Emission 802.11n (HT20), 2437 MHz – 30 kHz – 25 GHz



Conducted Spurious Emission 802.11n (HT20), 2462 MHz – Reference Level

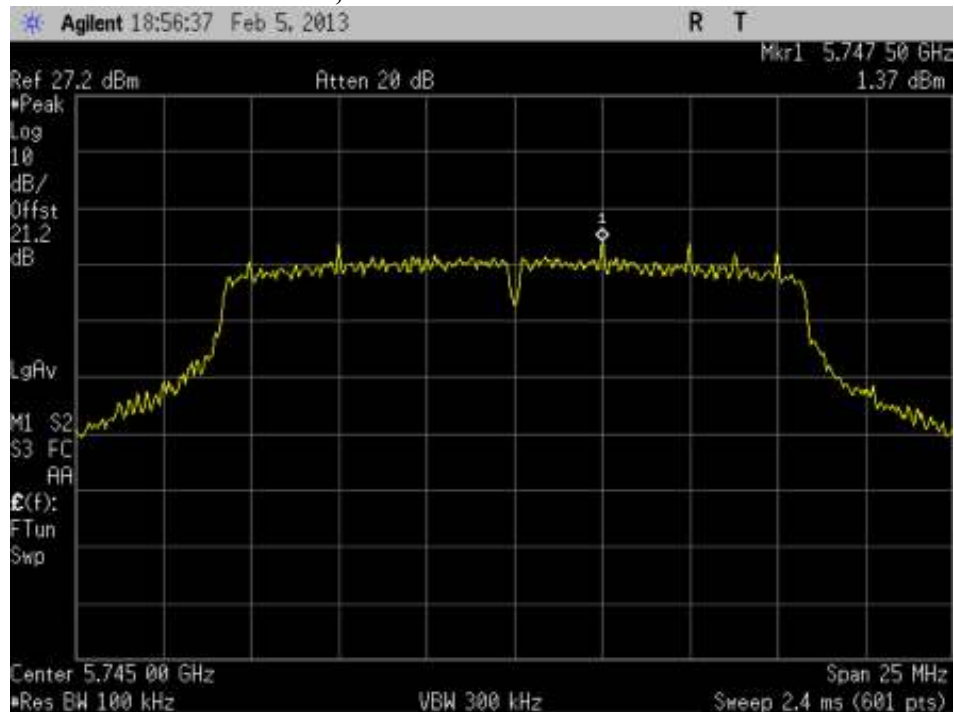


Conducted Spurious Emission 802.11n (HT20), 2462 MHz – 30 kHz – 25 GHz

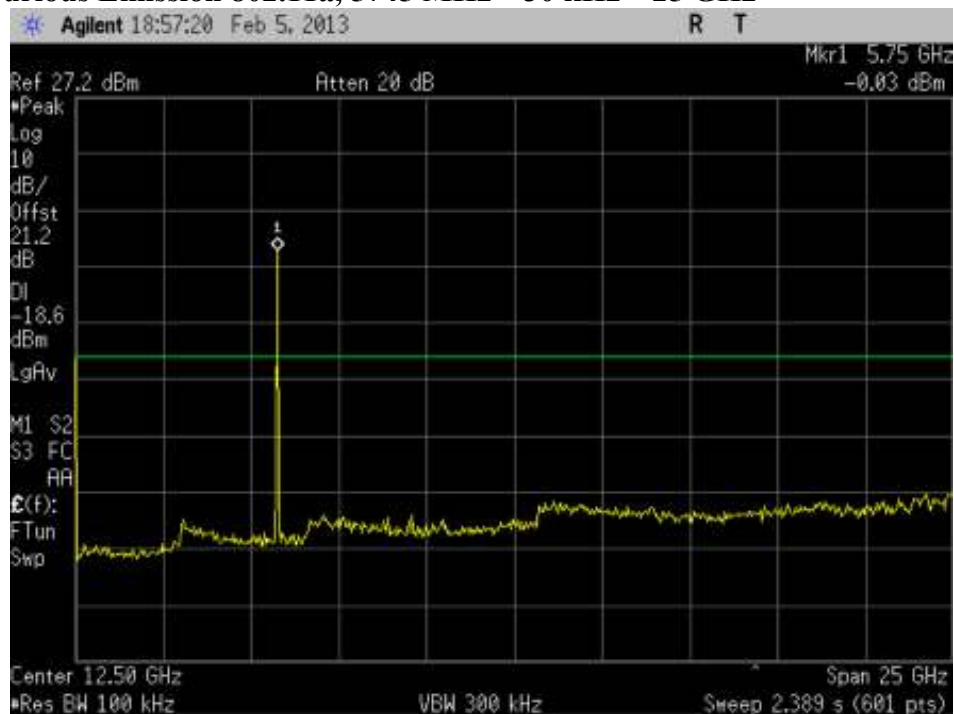


6.9.6.2 5GHz

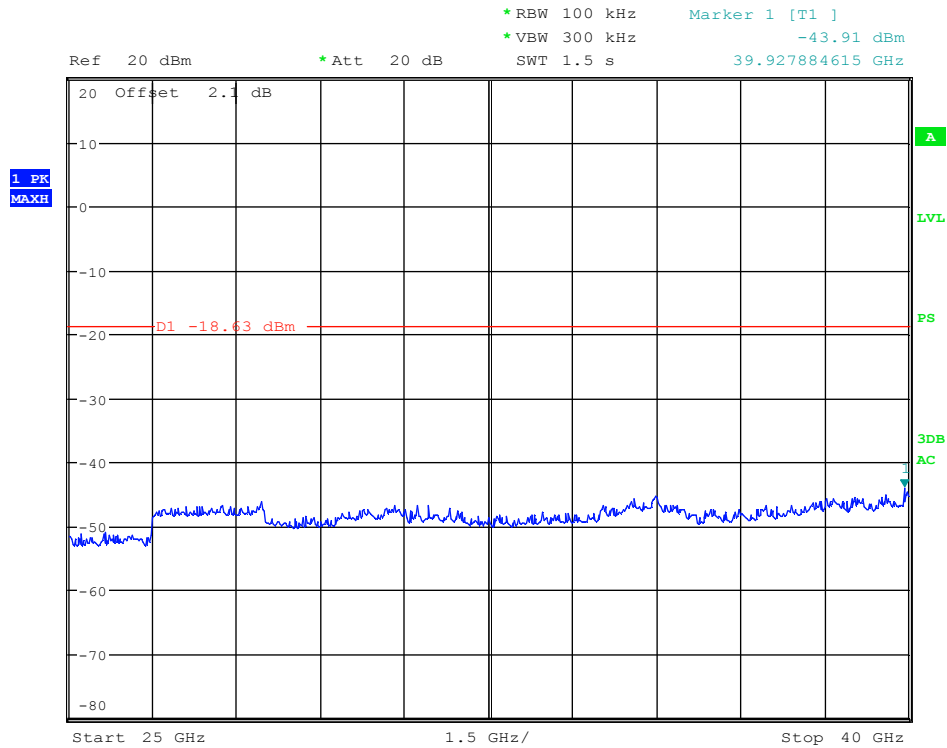
Conducted Spurious Emission 802.11a, 5745 MHz – Reference Level



Conducted Spurious Emission 802.11a, 5745 MHz – 30 kHz – 25 GHz

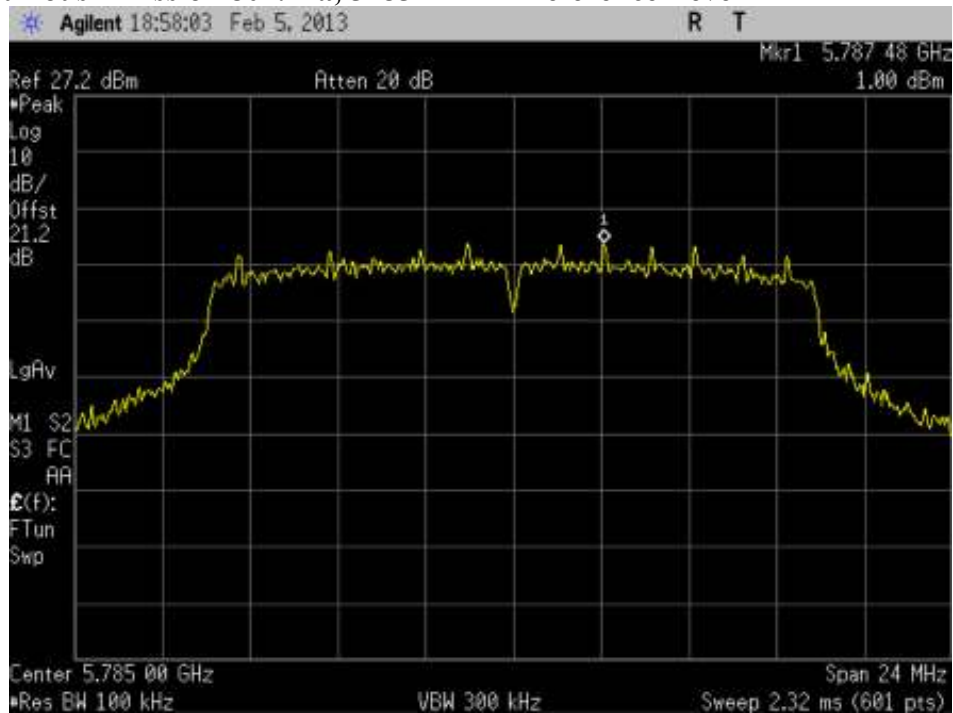


Conducted Spurious Emission 802.11a, 5745 MHz – 25 GHz – 40 GHz

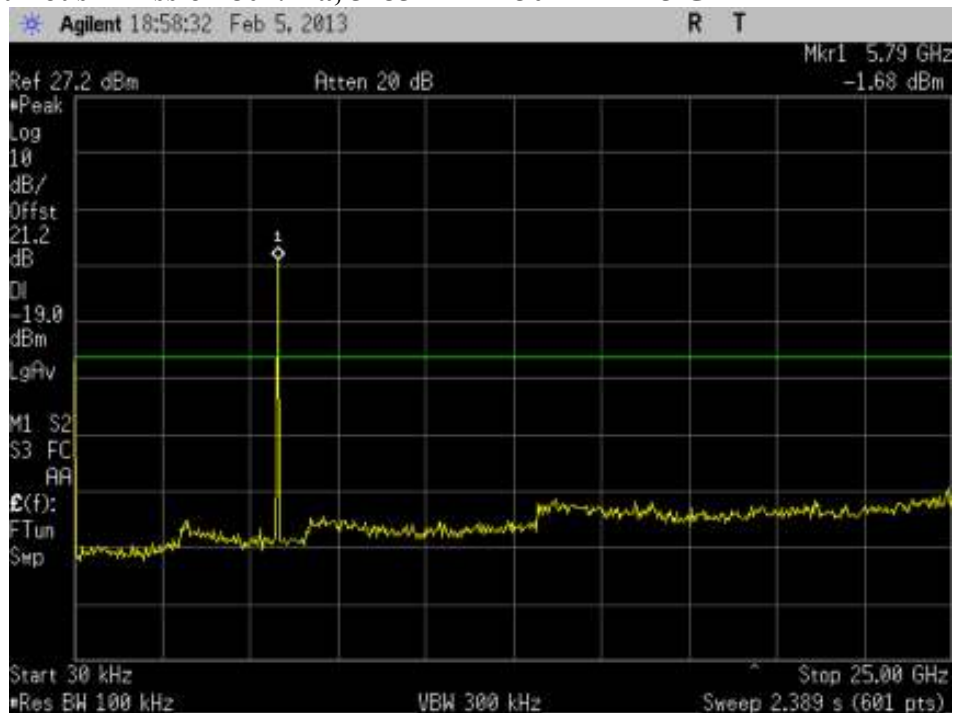


Date: 1.MAR.2013 18:40:36

Conducted Spurious Emission 802.11a, 5785 MHz – Reference Level



Conducted Spurious Emission 802.11a, 5785MHz – 30 kHz – 25 GHz

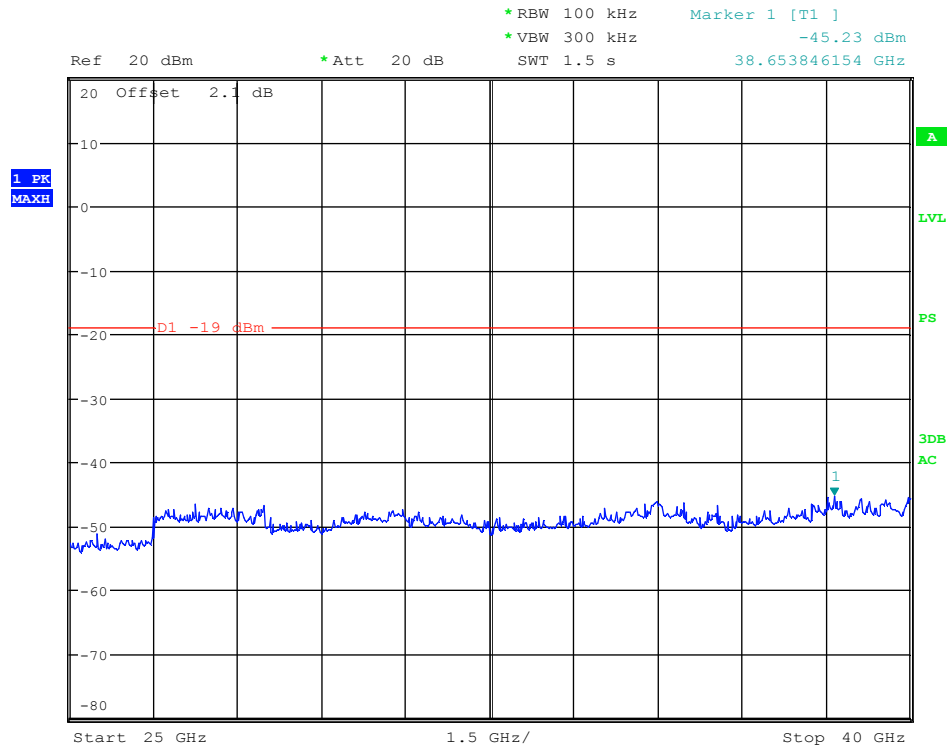


Test Report #: EMC_HONEY_095_12003_70eLGN_DTS
Date of Report : 2013-05-28

FCC ID: HD570ELGN
IC ID: 1693B-70E1

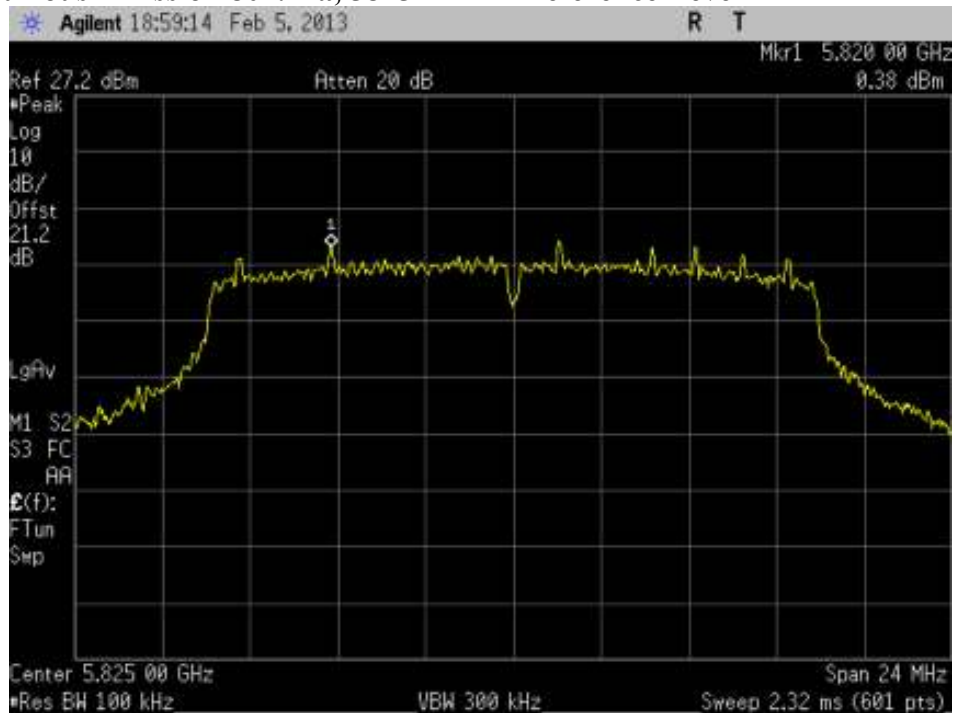


Conducted Spurious Emission 802.11a, 5785MHz – 25 GHz – 40 GHz

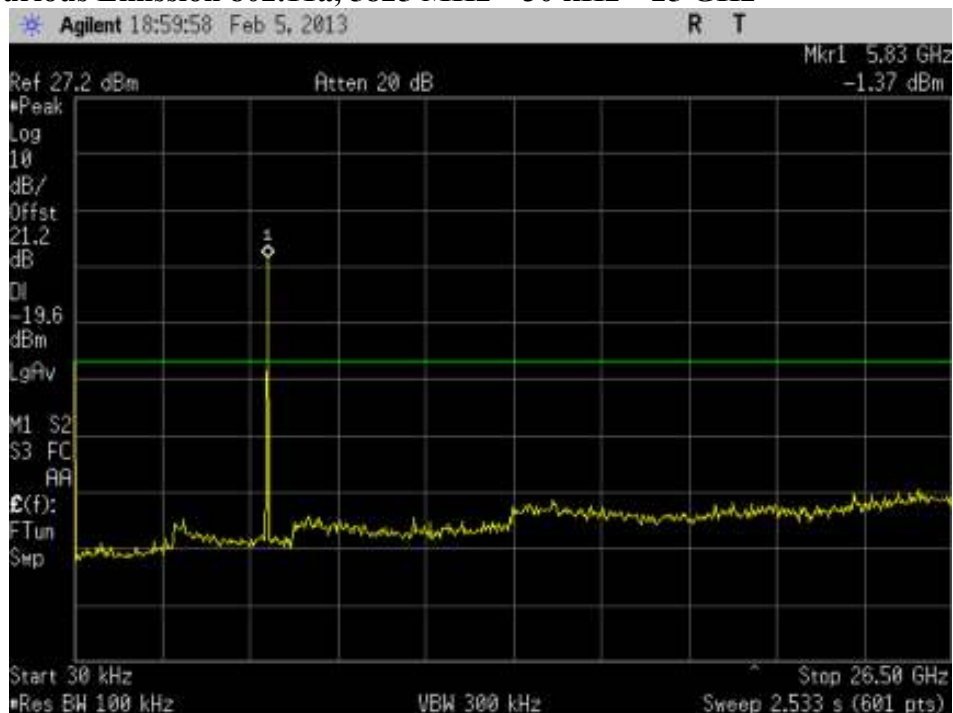


Date: 1.MAR.2013 18:41:28

Conducted Spurious Emission 802.11a, 5825 MHz – Reference Level



Conducted Spurious Emission 802.11a, 5825 MHz – 30 kHz – 25 GHz

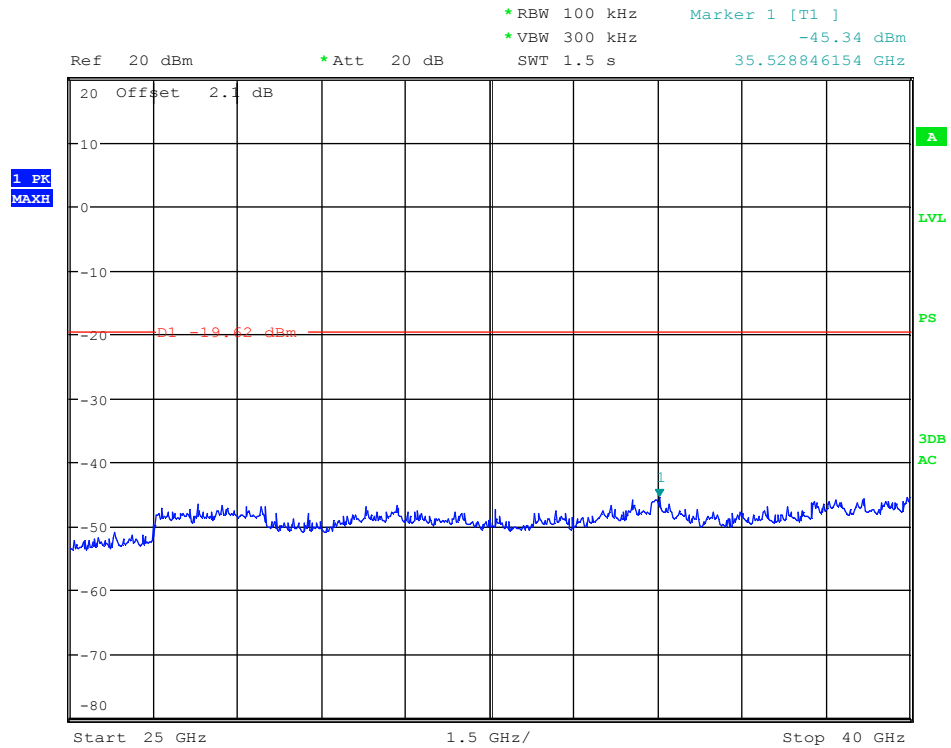


Test Report #: EMC_HONEY_095_12003_70eLGN_DTS
Date of Report : 2013-05-28

FCC ID: HD570ELGN
IC ID: 1693B-70E1

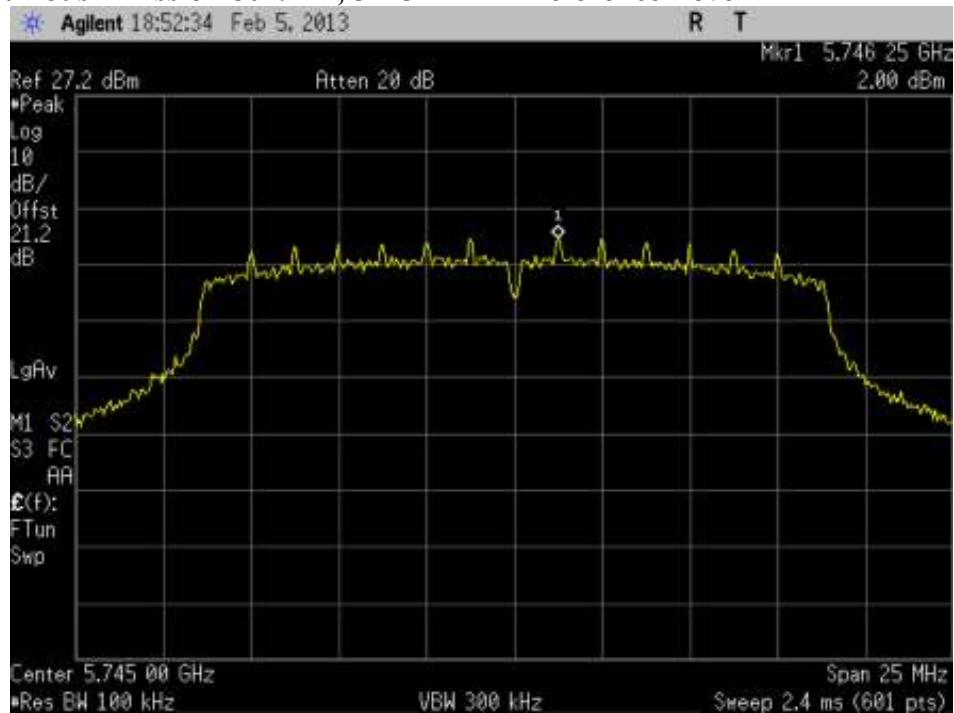


Conducted Spurious Emission 802.11a, 5825 MHz – 25 GHz – 40 GHz

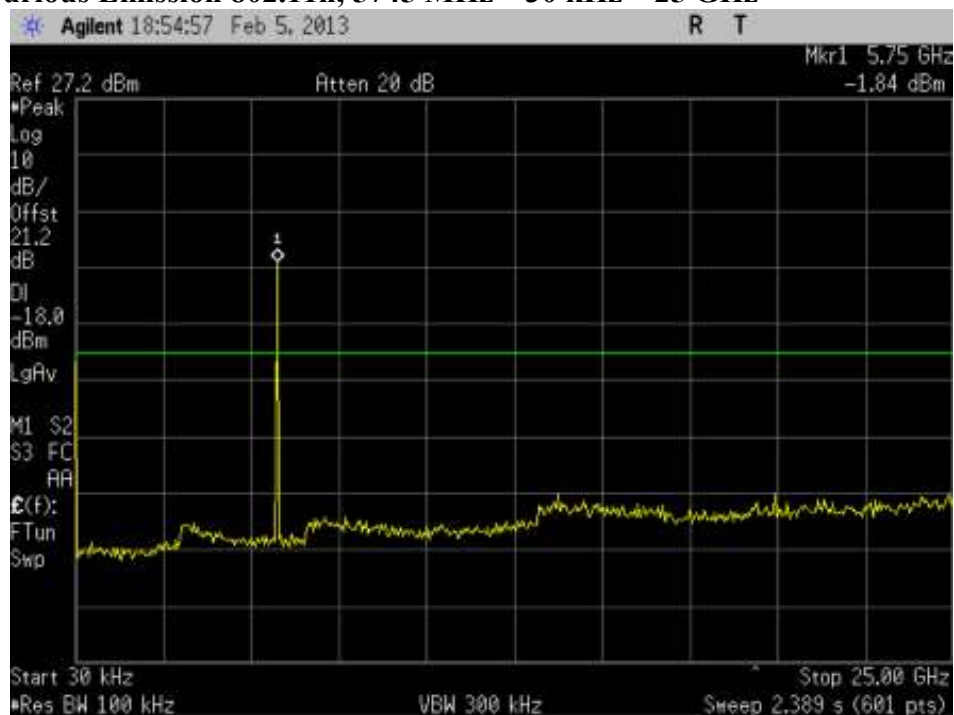


Date: 1.MAR.2013 18:42:17

Conducted Spurious Emission 802.11n, 5745 MHz – Reference Level

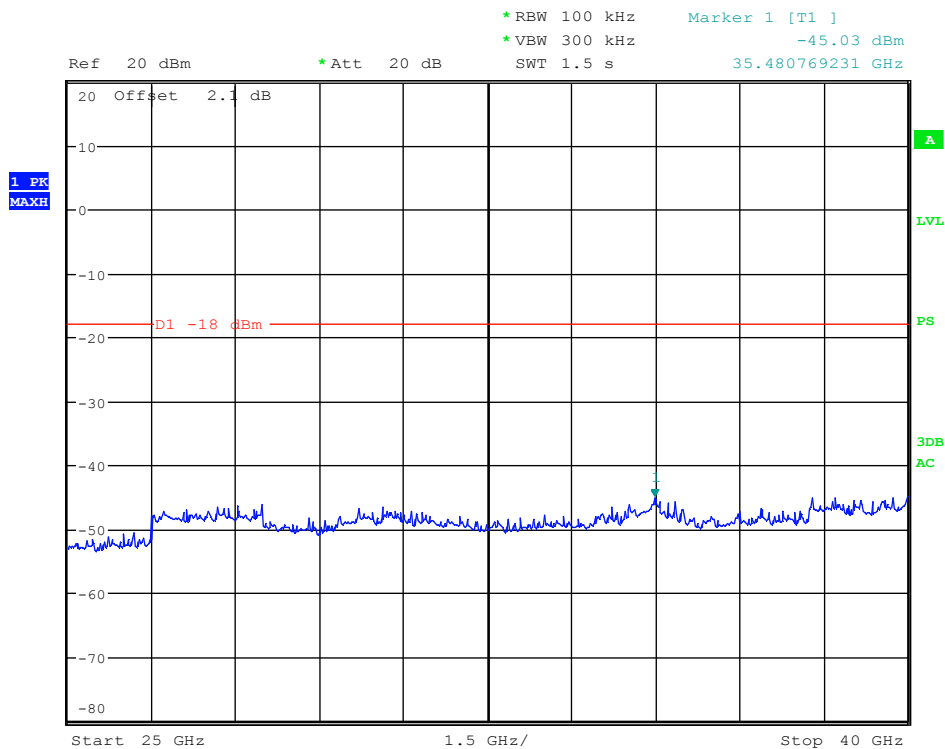


Conducted Spurious Emission 802.11n, 5745 MHz – 30 kHz – 25 GHz



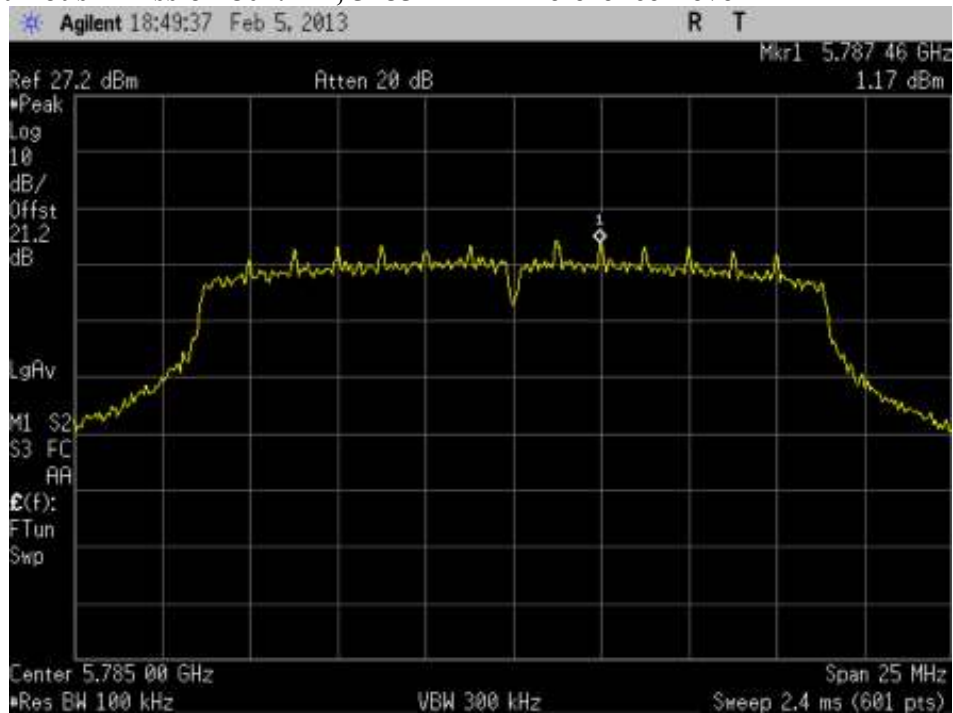


Conducted Spurious Emission 802.11n, 5745 MHz – 25 GHz – 40 GHz

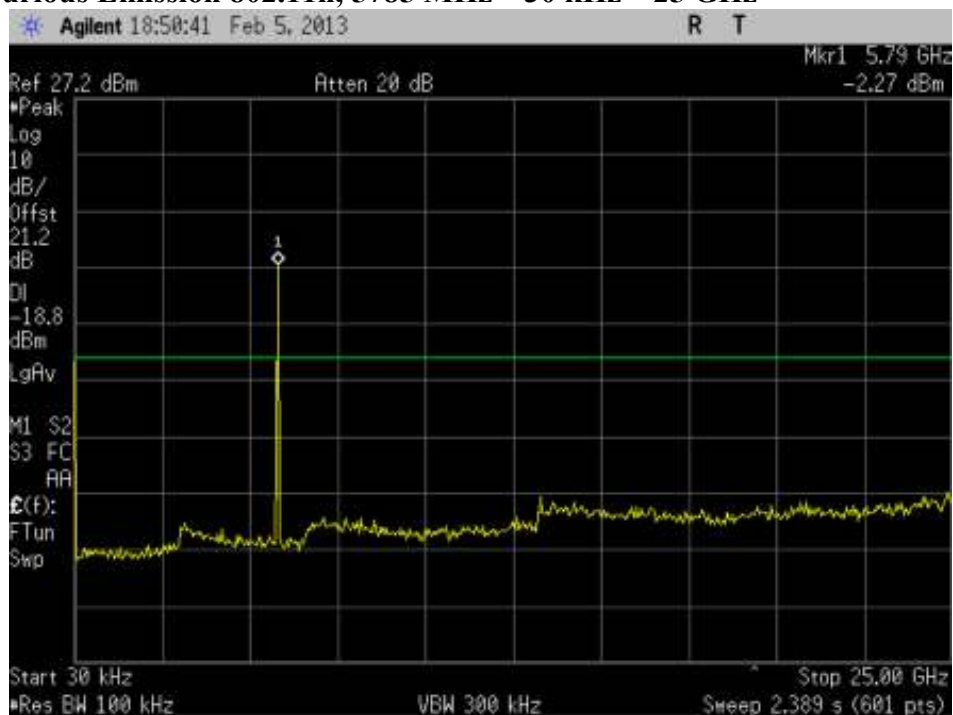


Date: 1.MAR.2013 18:44:02

Conducted Spurious Emission 802.11n, 5785 MHz – Reference Level

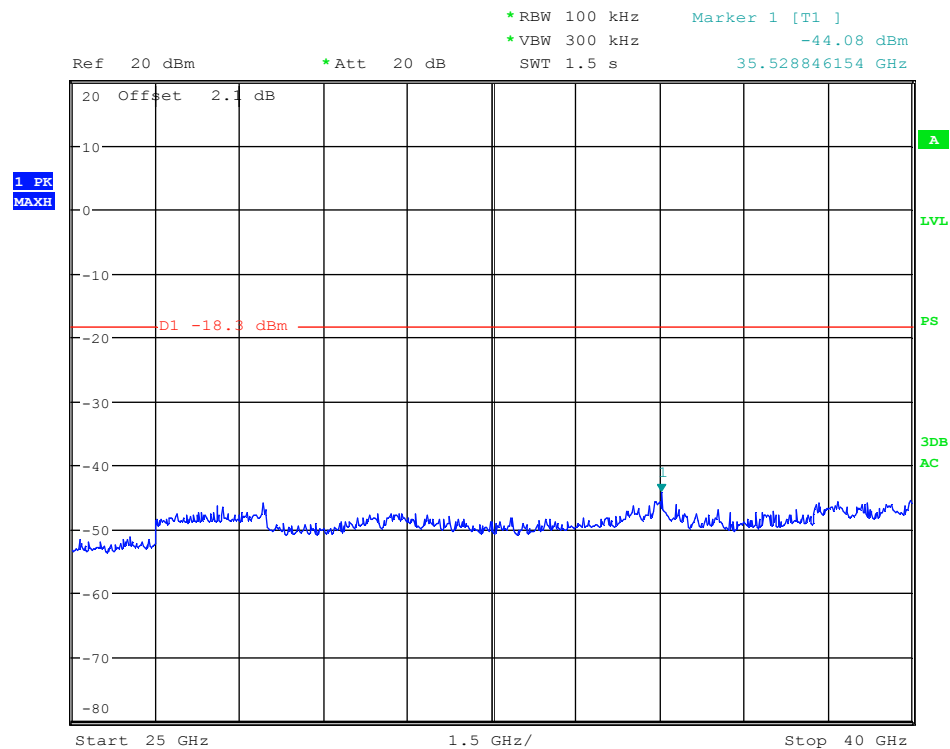


Conducted Spurious Emission 802.11n, 5785 MHz – 30 kHz – 25 GHz



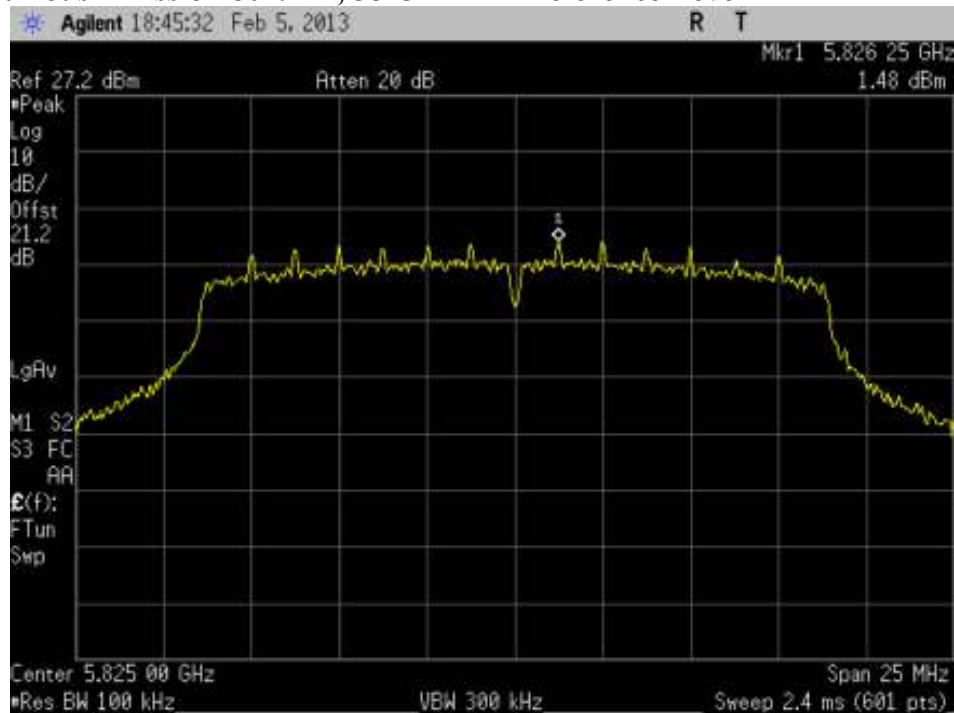


Conducted Spurious Emission 802.11n, 5785 MHz – 25 GHz – 40 GHz

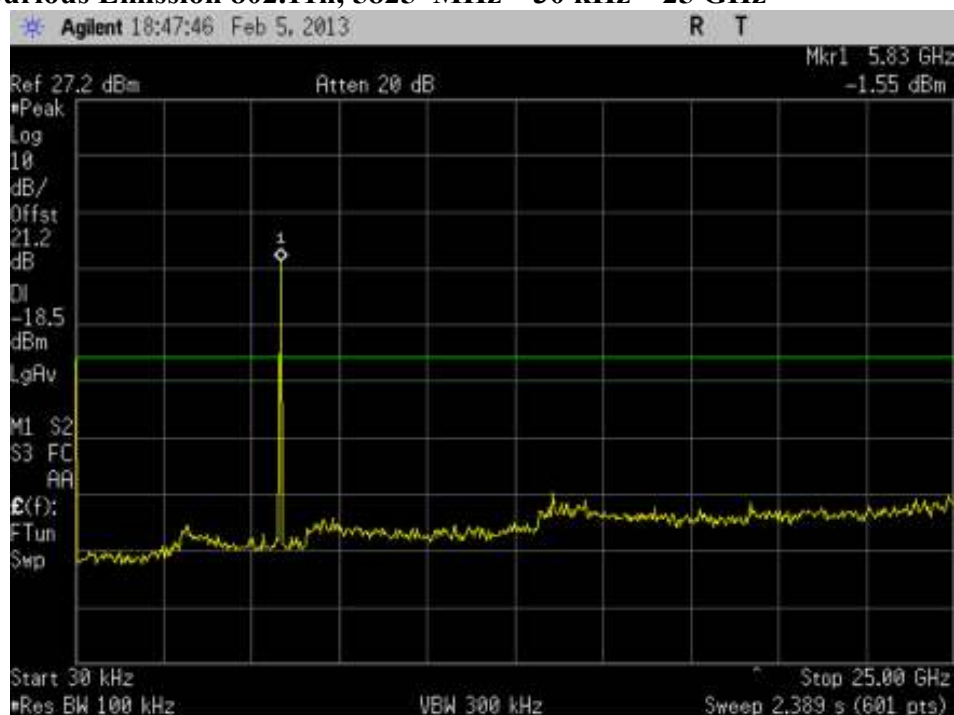


Date: 1.MAR.2013 18:44:47

Conducted Spurious Emission 802.11n, 5825 MHz – Reference Level



Conducted Spurious Emission 802.11n, 5825 MHz – 30 kHz – 25 GHz

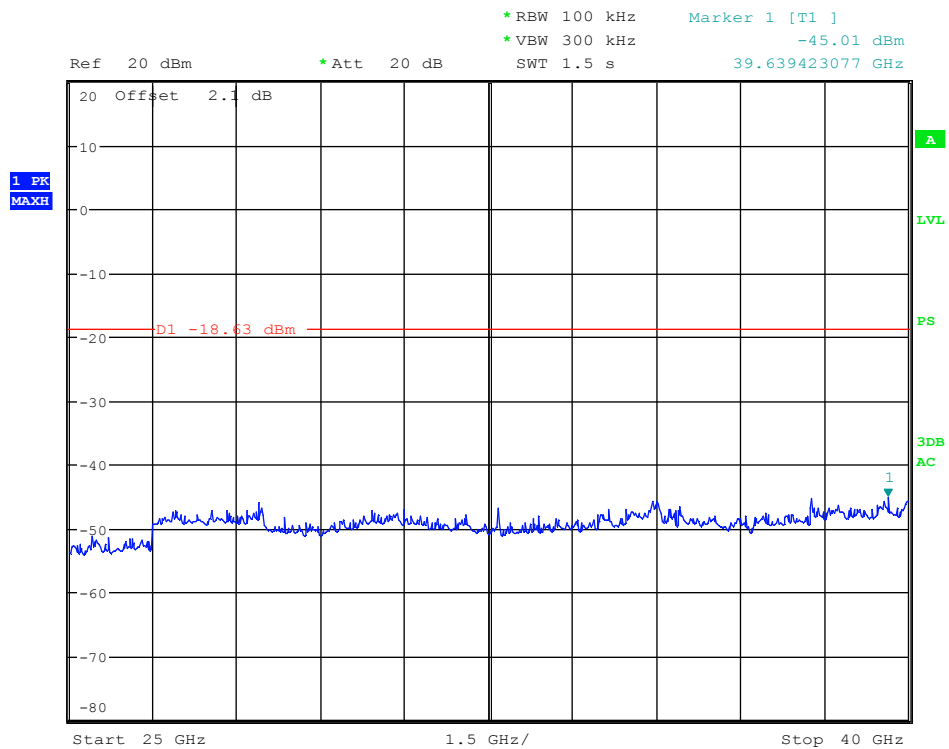


Test Report #: EMC_HONEY_095_12003_70eLGN_DTS
Date of Report : 2013-05-28

FCC ID: HD570ELGN
IC ID: 1693B-70E1



Conducted Spurious Emission 802.11n, 5825 MHz – 25 GHz – 40 GHz



Date: 1.MAR.2013 18:45:36

6.10 Unwanted Emissions into Restricted Frequency Bands – Conducted

6.10.1 Limits: §15.247/15.205

15.247 (d) In any 100 kHz Bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in a 100 kHz Bandwidth.

6.10.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

Measurement uncertainty= ± 1 dB

6.10.3 Test Procedure:

Peak measurements are made using a peak detector and RBW= 100 kHz.

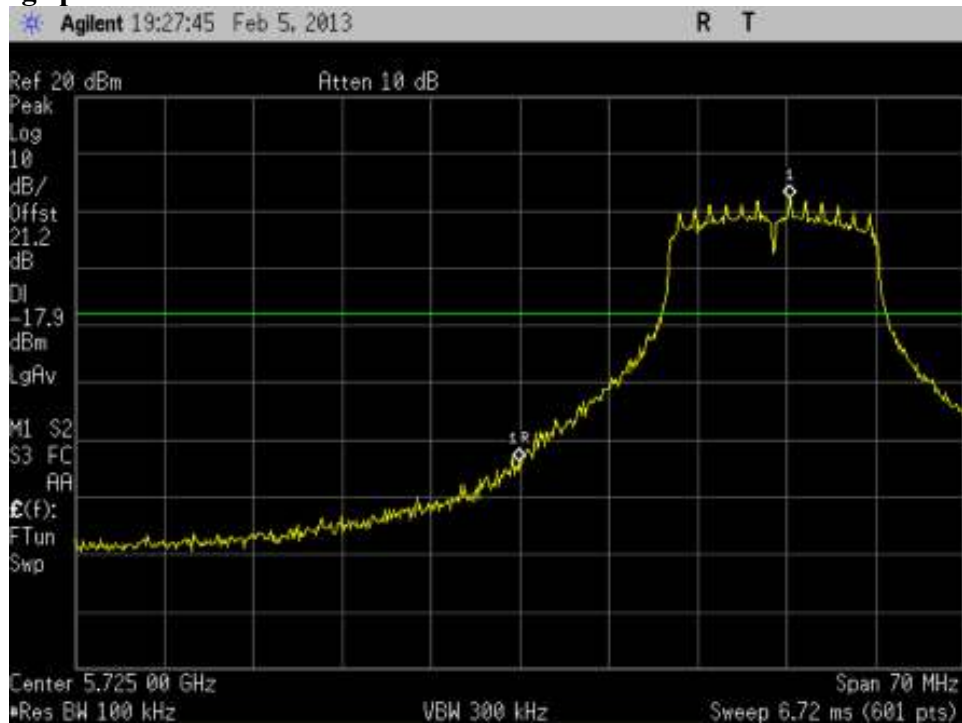
Average measurements performed using an RMS detector RBW = 100 kHz

6.10.3.1 Measurement Results

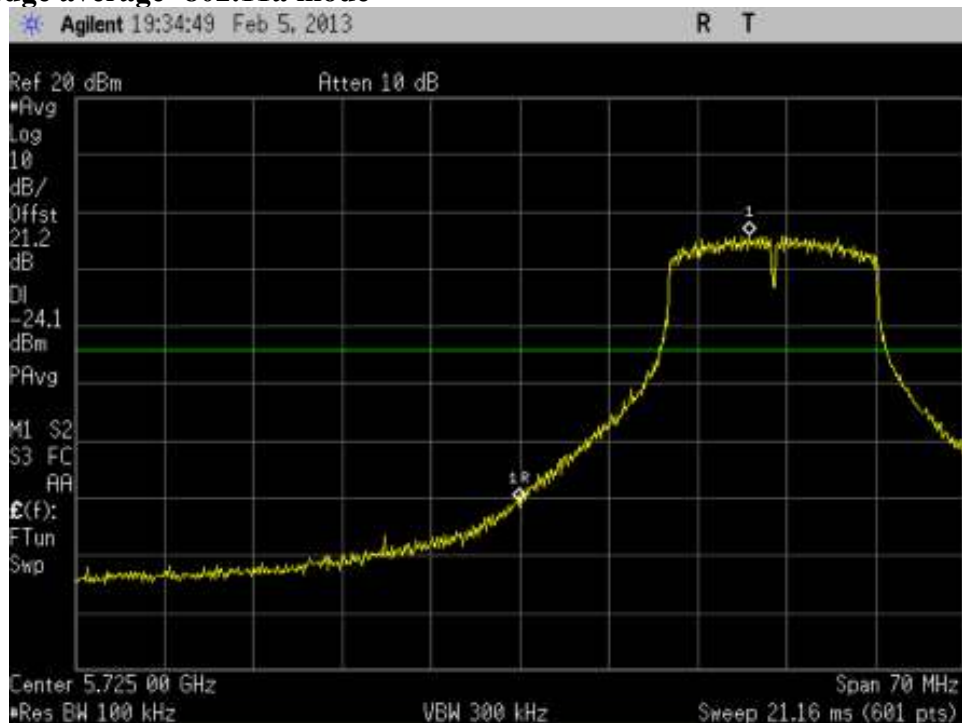
Pass

6.10.4 Test Data/Plots:

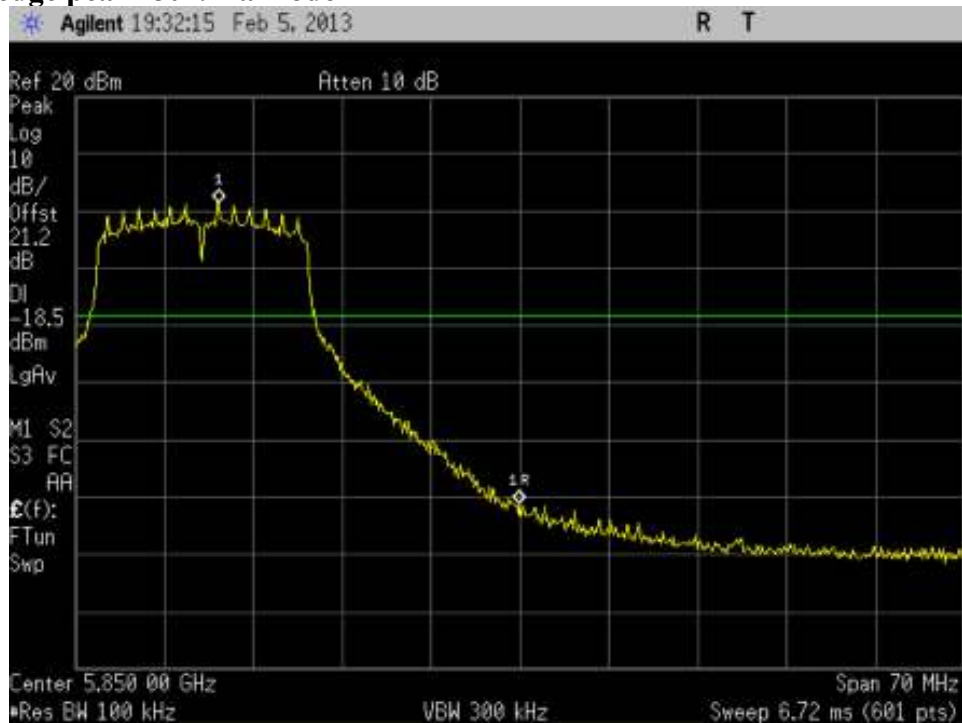
Lower band edge peak -802.11a mode



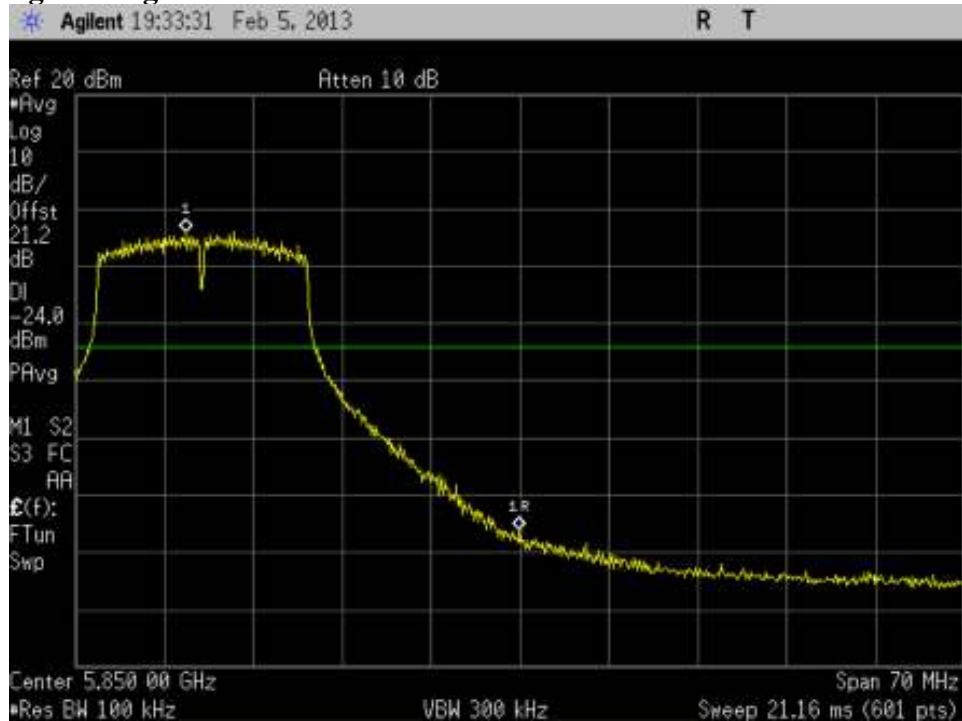
Lower band edge average -802.11a mode



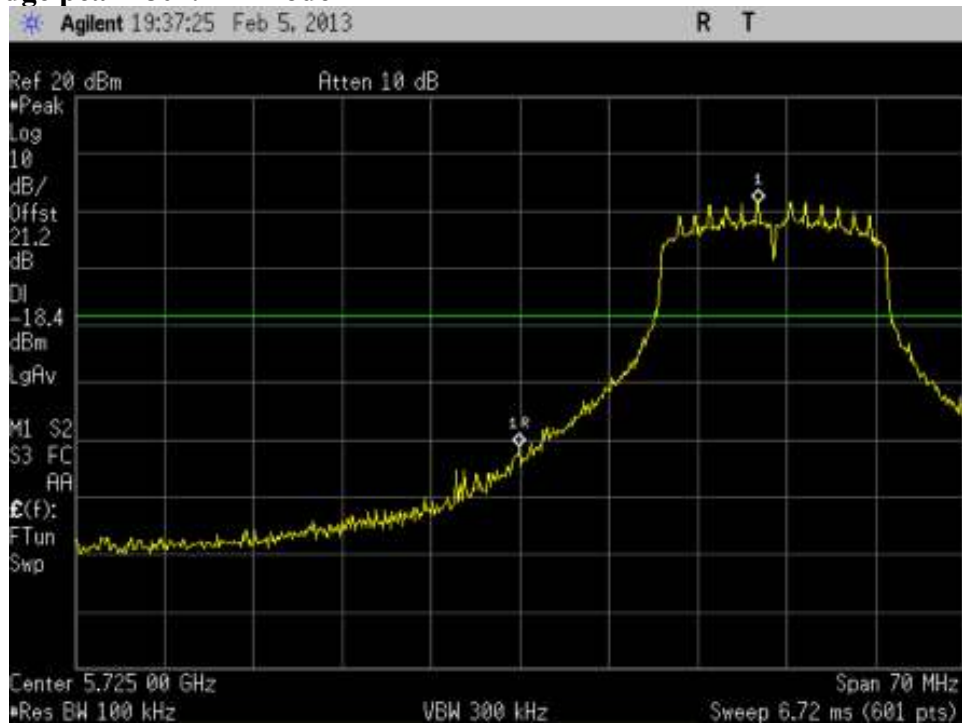
Higher band edge peak -802.11a mode



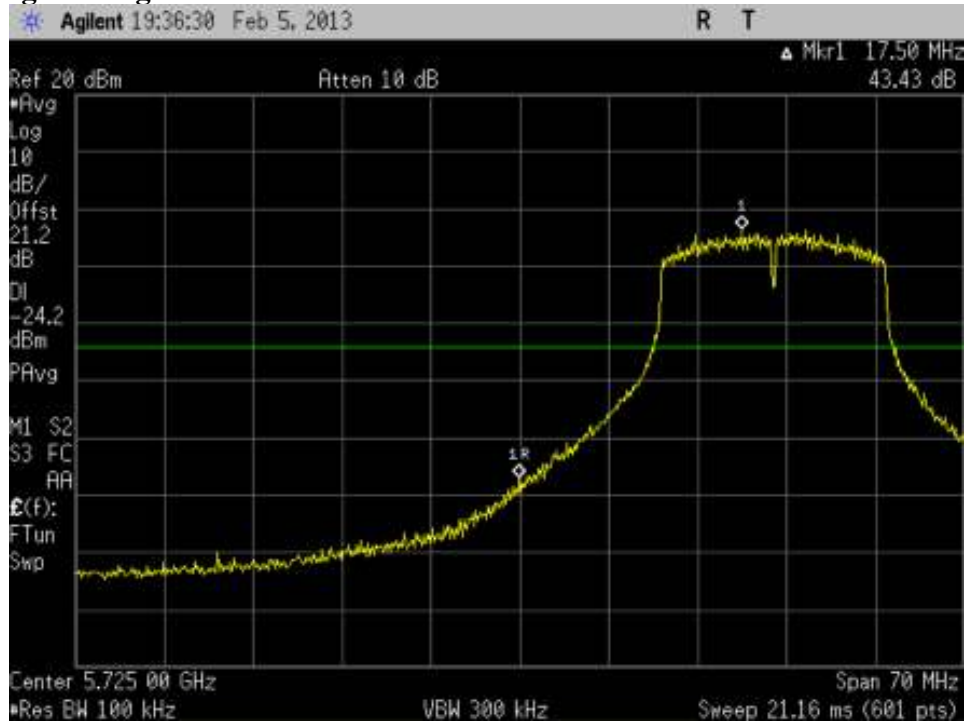
Higher band edge average -802.11a mode



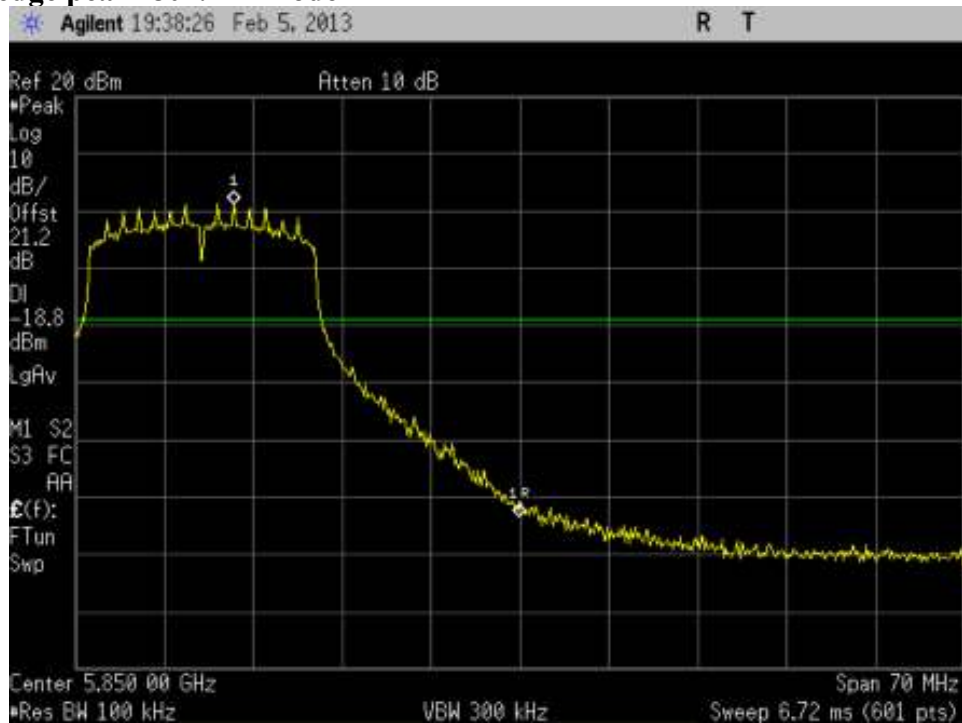
Lower band edge peak -802.11n mode



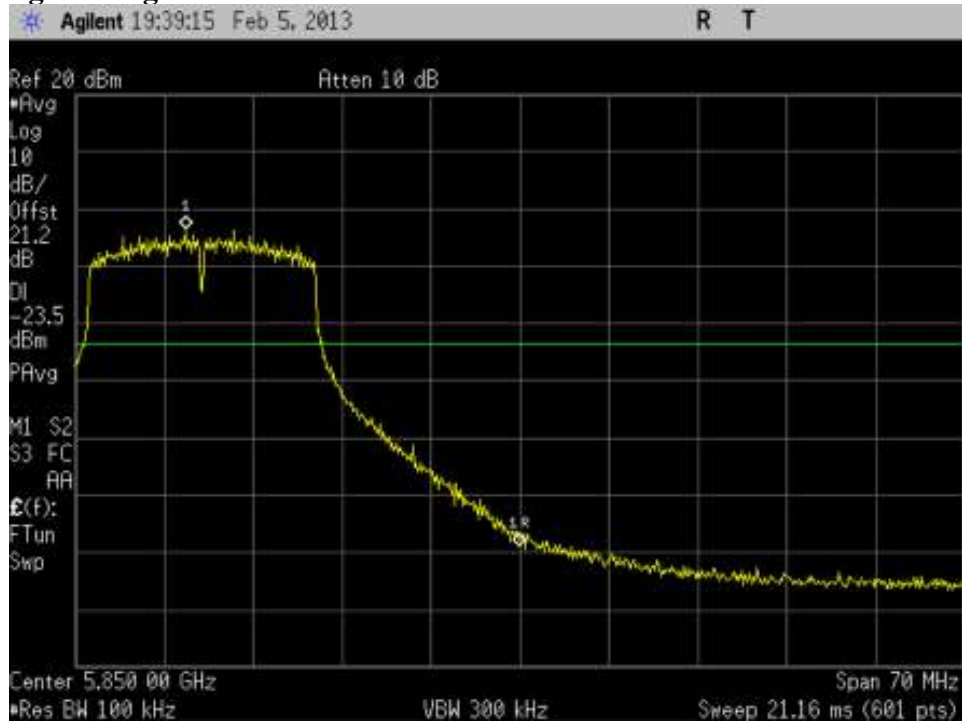
Lower band edge average -802.11n mode



Higher band edge peak -802.11n mode



Higher band edge average -802.11n mode



6.11 Unwanted Emissions into Restricted Frequency Bands- Radiated

6.11.1 Limits:

§15.247/15.205/15.209

RSS-210 A8.5

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

15.205 (a) Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

15.209 (a) Emission Limits:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (m)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	100 (40dBμV/m)	30
30–88	150 (43.5 dBμV/m)	3
88–216	200 (46 dBμV/m)	3
216–960	500 (54 dBμV/m)	3
Above 960	100 (40dBμV/m)	3

6.11.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

6.11.3 Test Procedure:

Peak measurements are made using a peak detector and RBW=1MHz.

*PEAK LIMIT= 74dB μ V/m

Average measurements performed using a peak detector and according to video averaging procedure with RBW=1MHz and VBW=10Hz.

*AVG. LIMIT= 54dB μ V/m

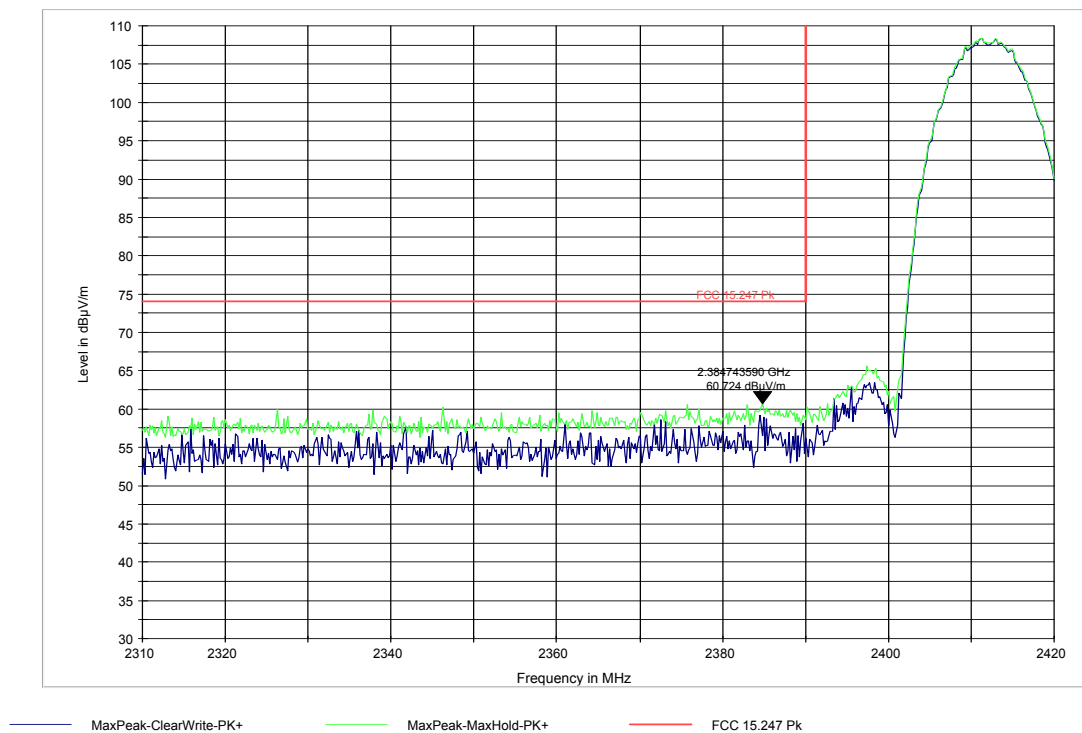
Measurement distance: 3m

Measurement Uncertainty: ± 3.0 dB

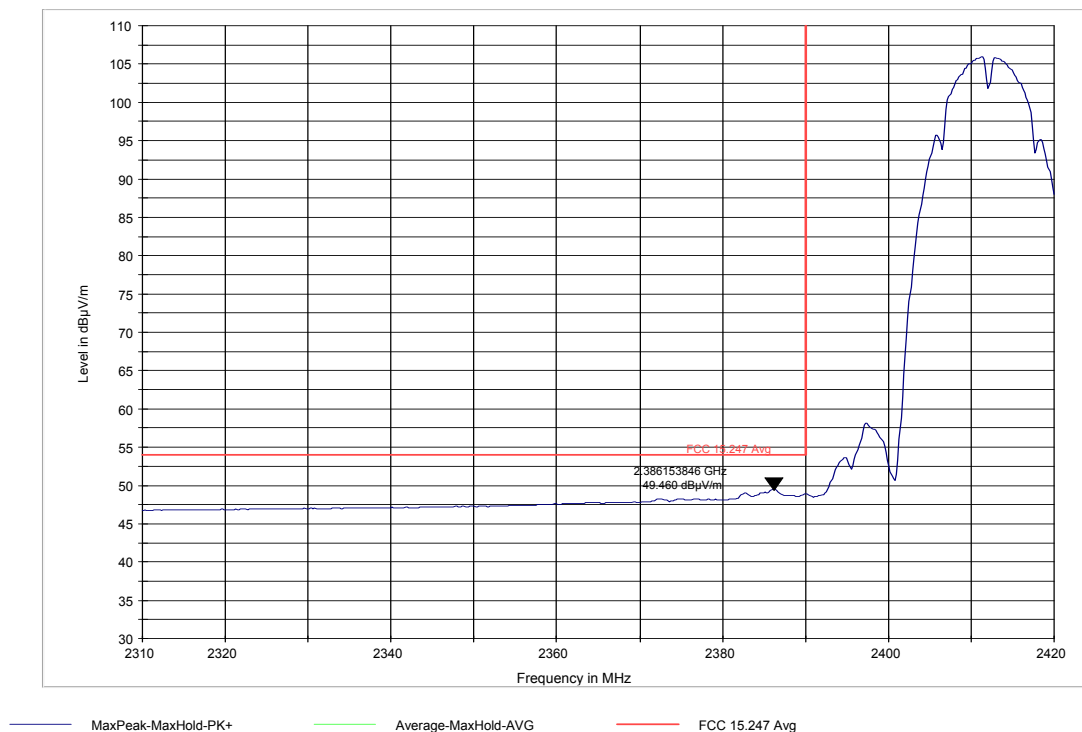
6.11.3.1 Measurement Result

Pass.

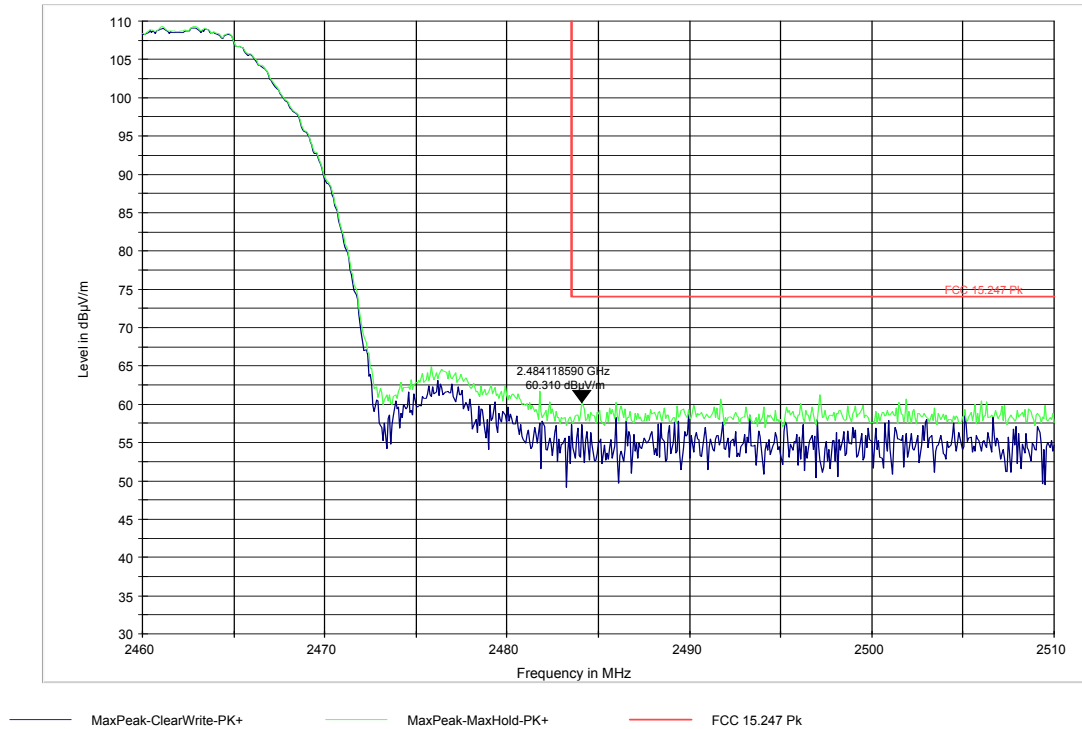
6.11.4 Test Data/plots: Lower band edge peak -802.11b mode



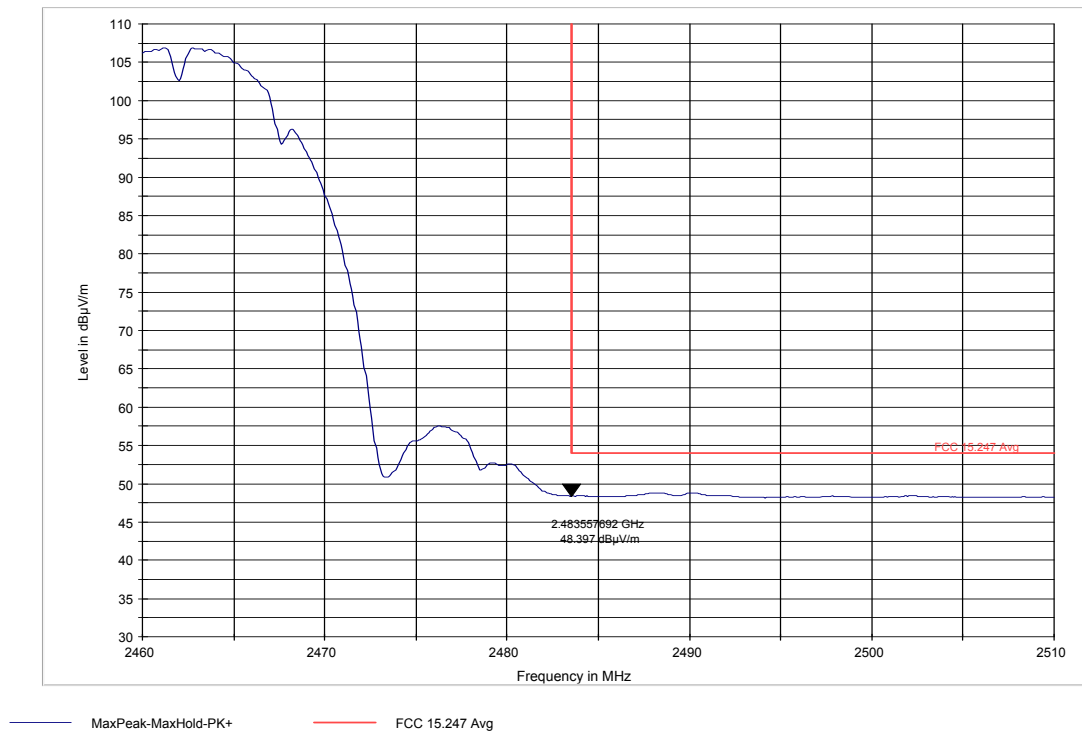
Lower band edge average -802.11b mode



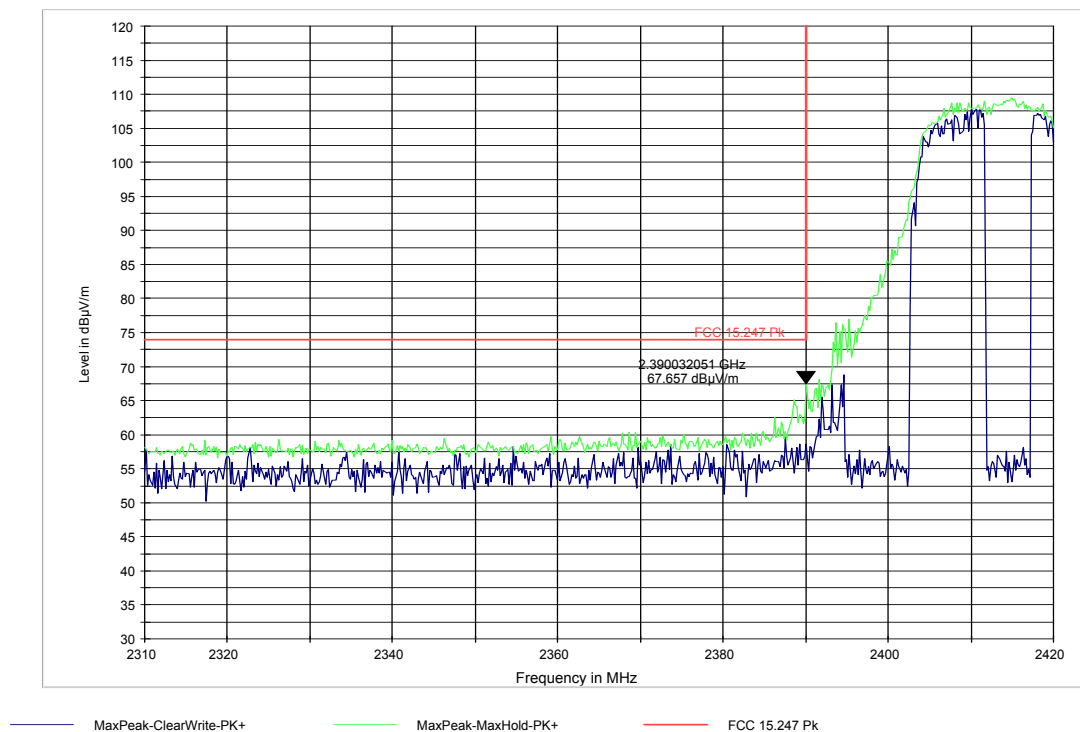
Higher band edge peak -802.11b mode



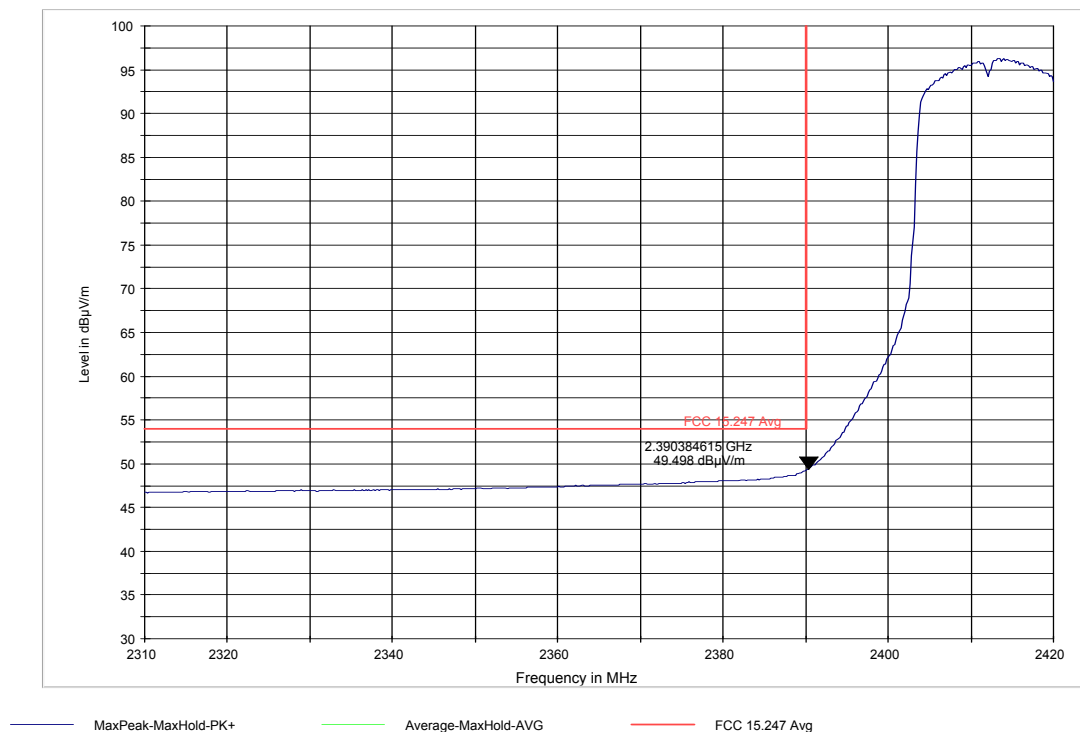
Higher band edge average -802.11b mode



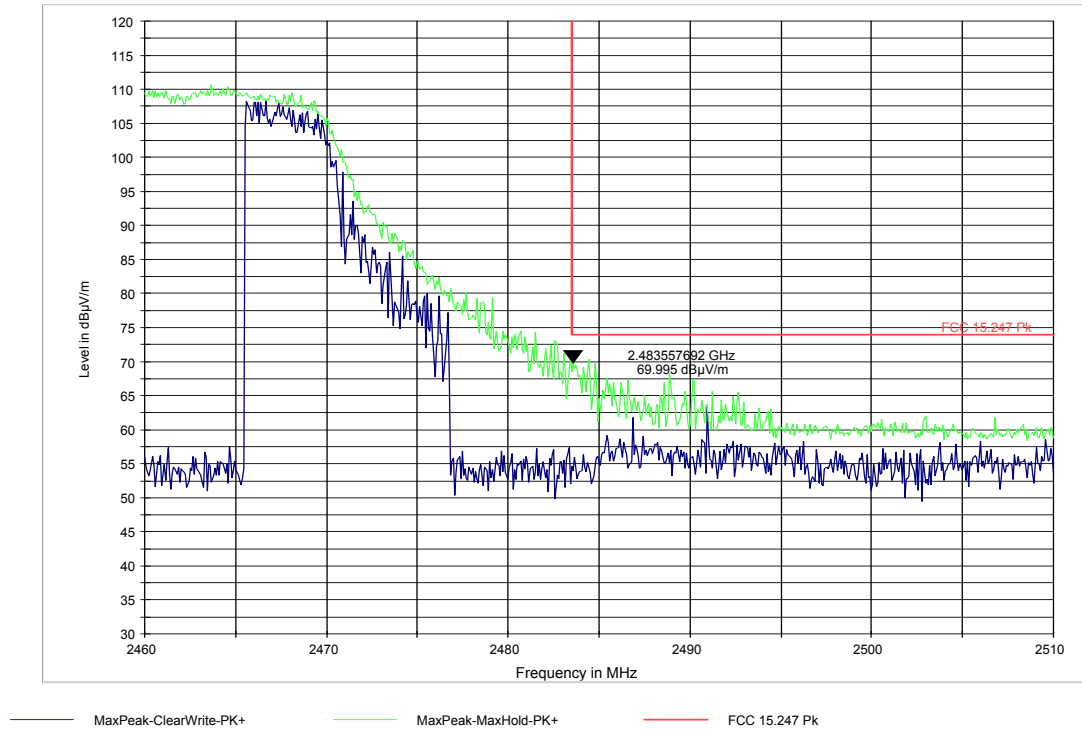
Lower band edge peak – 802.11g mode



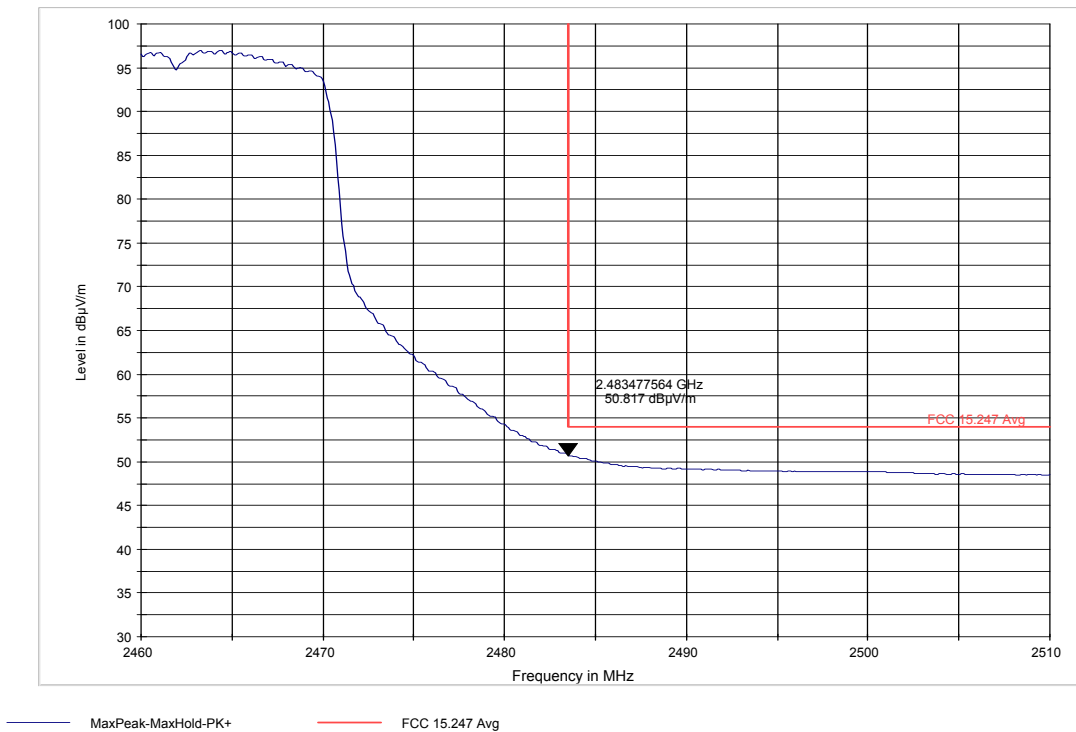
Lower band edge average -802.11g mode



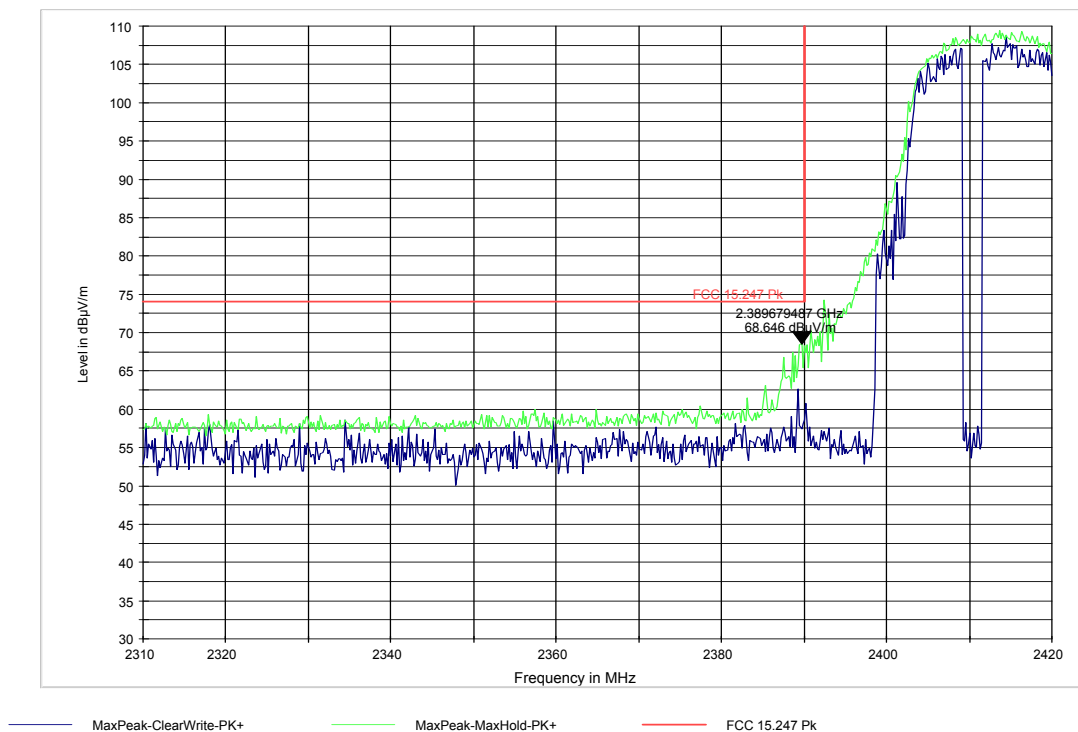
Higher band edge peak -802.11g mode



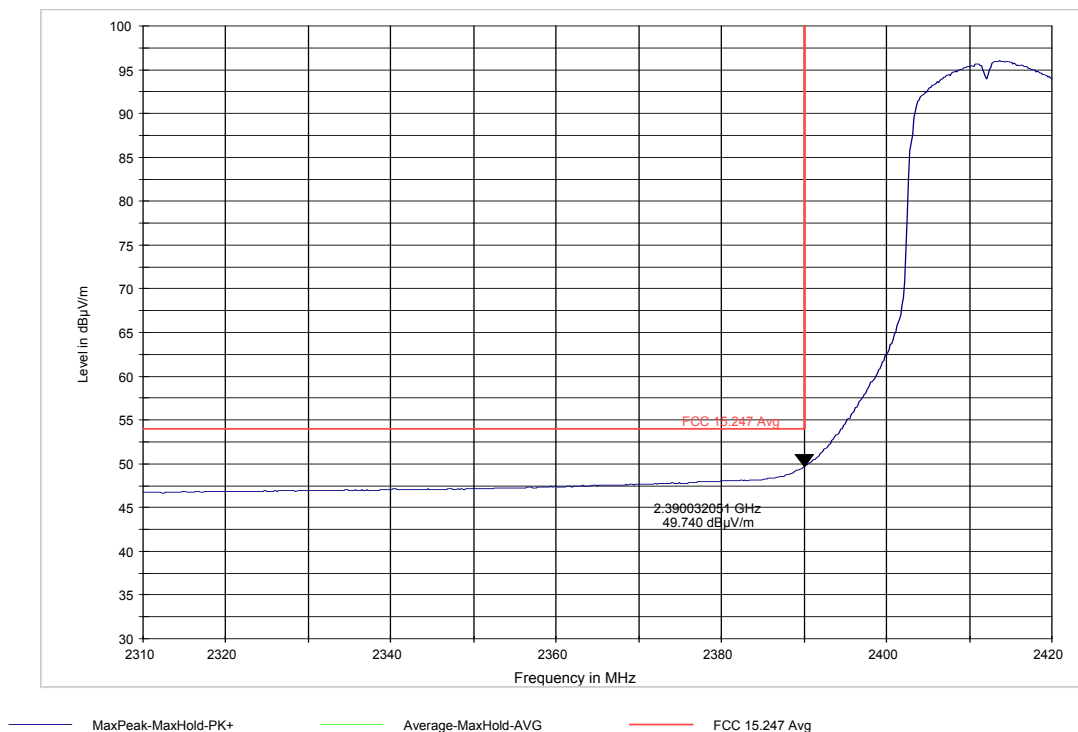
Higher band edge average- 802.11g mode



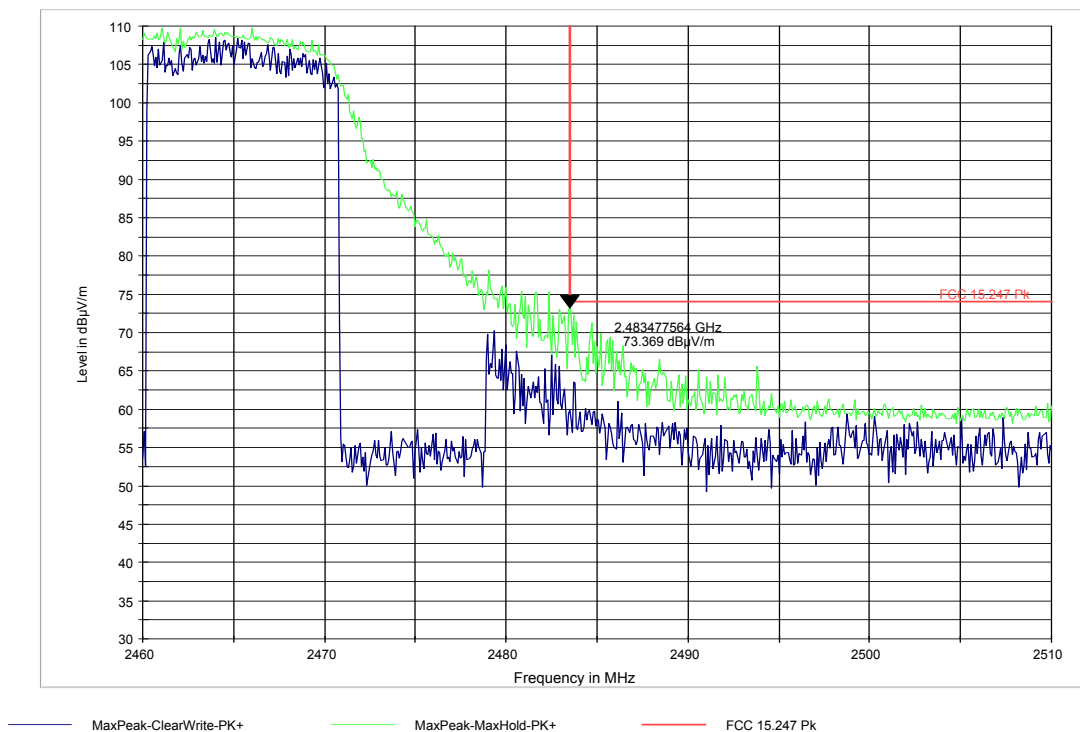
Lower band edge peak – 802.11n (HT20) mode



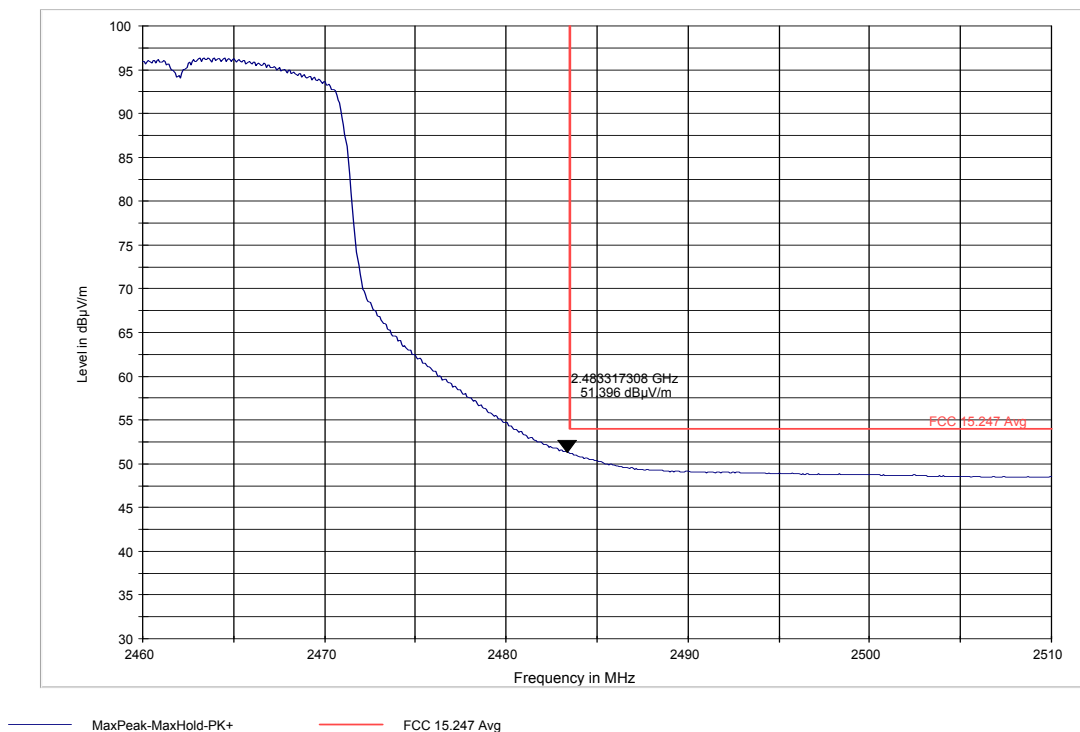
Lower band edge average -802.11n (HT20) mode



Higher band edge peak -802.11n (HT20) mode



Higher band edge average- 802.11n (HT20) mode



6.12 Transmitter Spurious Emissions- Radiated

6.12.1 Limits:

§15.247/15.205/15.209
RSS-210 A8.5

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (m)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30 (29.5 dB μ V/m)	30
30–88	100 (40dB μ V/m)	3
88–216	150 (43.5 dB μ V/m)	3
216–960	200 (46 dB μ V/m)	3
Above 960	500 (54 dB μ V/m)	3

6.12.2 Test Conditions:

Tnom: 20°C; Vnom: 3.6 VDC

6.12.3 Test Result:

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT.

Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

Measurement distance: 3m.

Measurement Uncertainty: ± 3.0 dB

6.12.4 Testing Notes

The following plots show the worst case per frequency range out of all tested modes of operation.

For the measurement range up to 30 MHz in the following plots the field strength results from 3m distance measurement are extrapolated to 300m and 30m distance respectively, by 40dB/decade, according to part 15.31(f)(2), per antenna factor scaling.

The red limit line shows the 300 m limit up to 490 kHz, the 30m limit up to 30 MHz and 3m limit above 30MHz.

6.12.4.1 Measurement Verdict

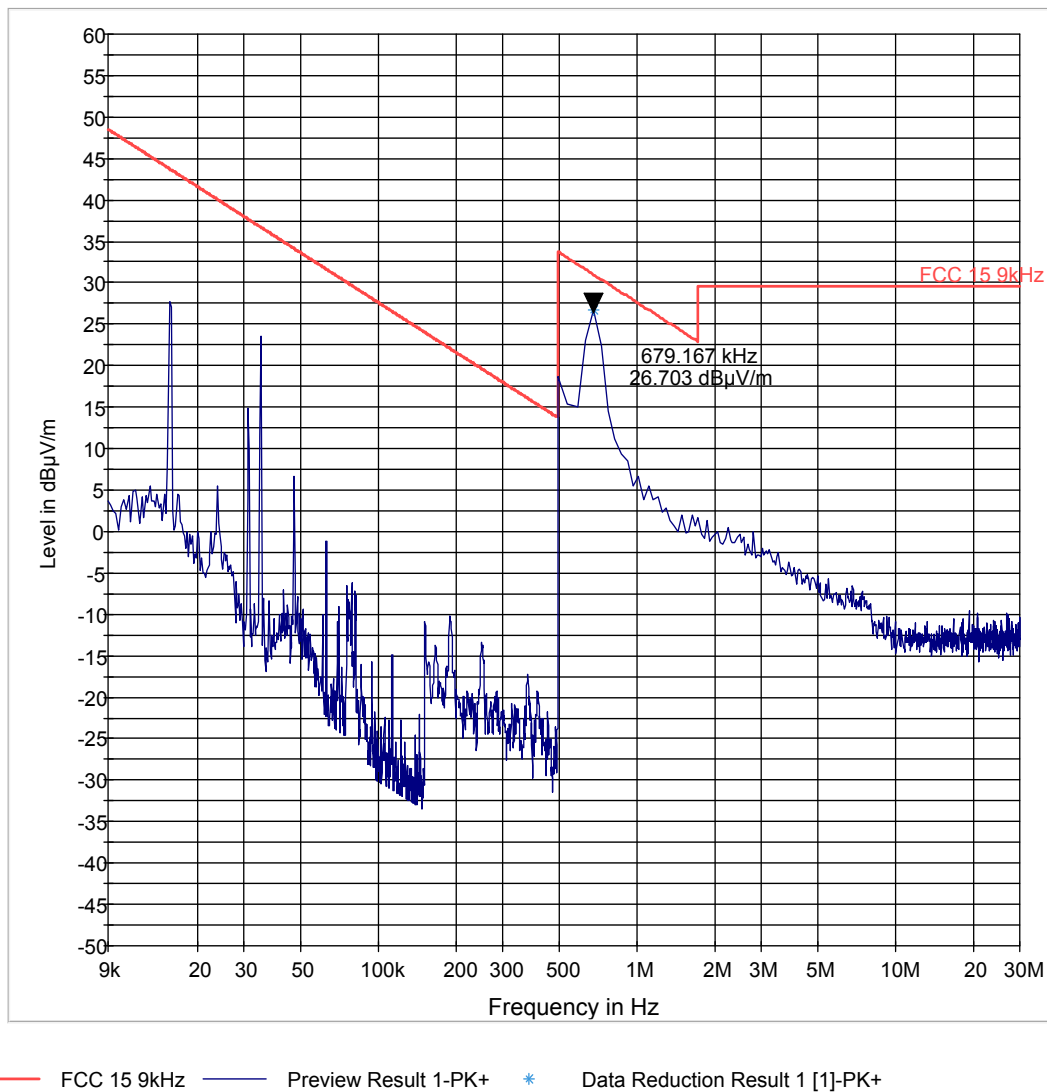
Pass.

6.12.5 Test data/ plots:

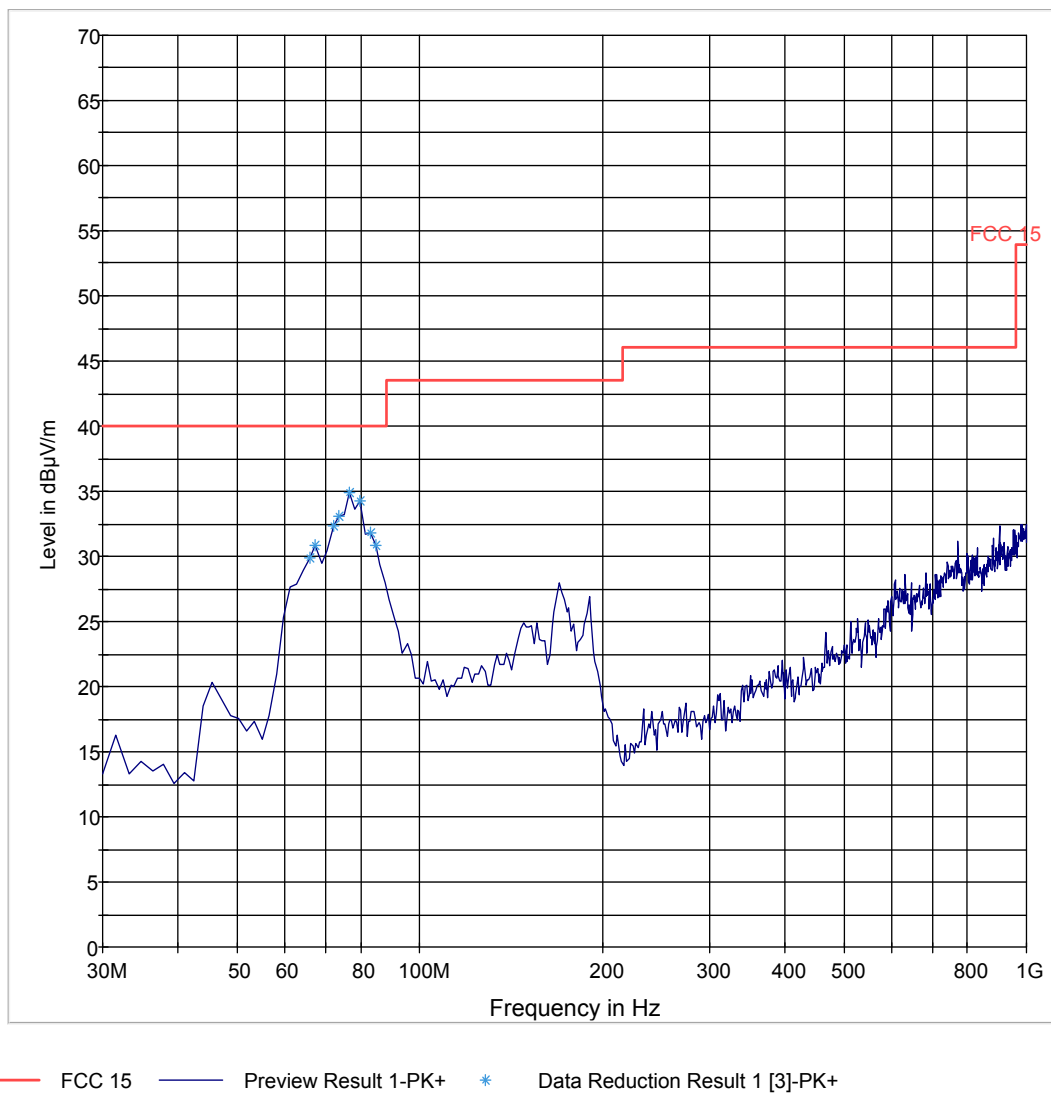
6.12.5.1 Wi-Fi 2.4GHz

Transmitter Radiated Spurious Emission- 802.11b; <30MHz

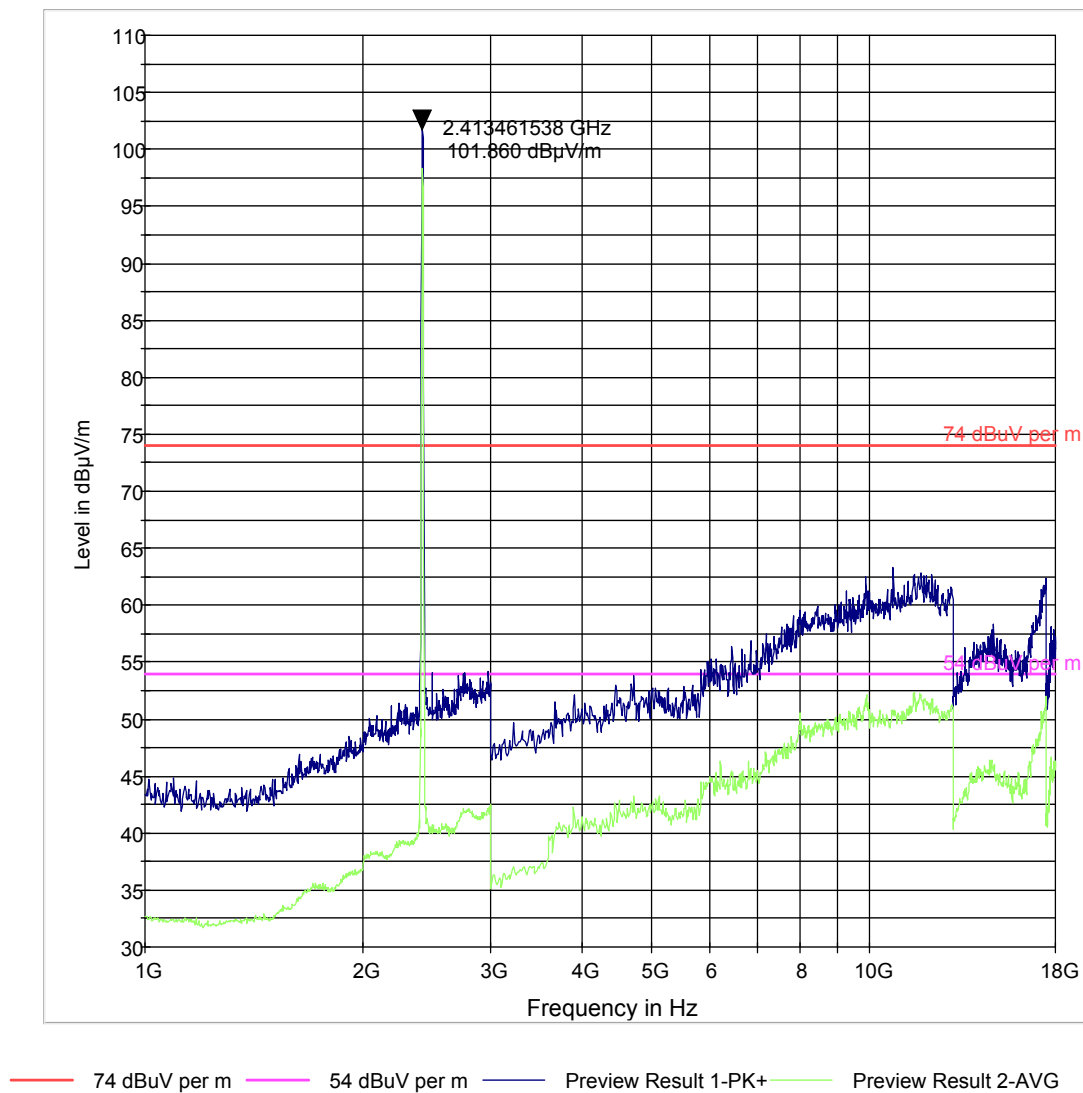
Note: Worst case representation for all modes of operation in this frequency range.



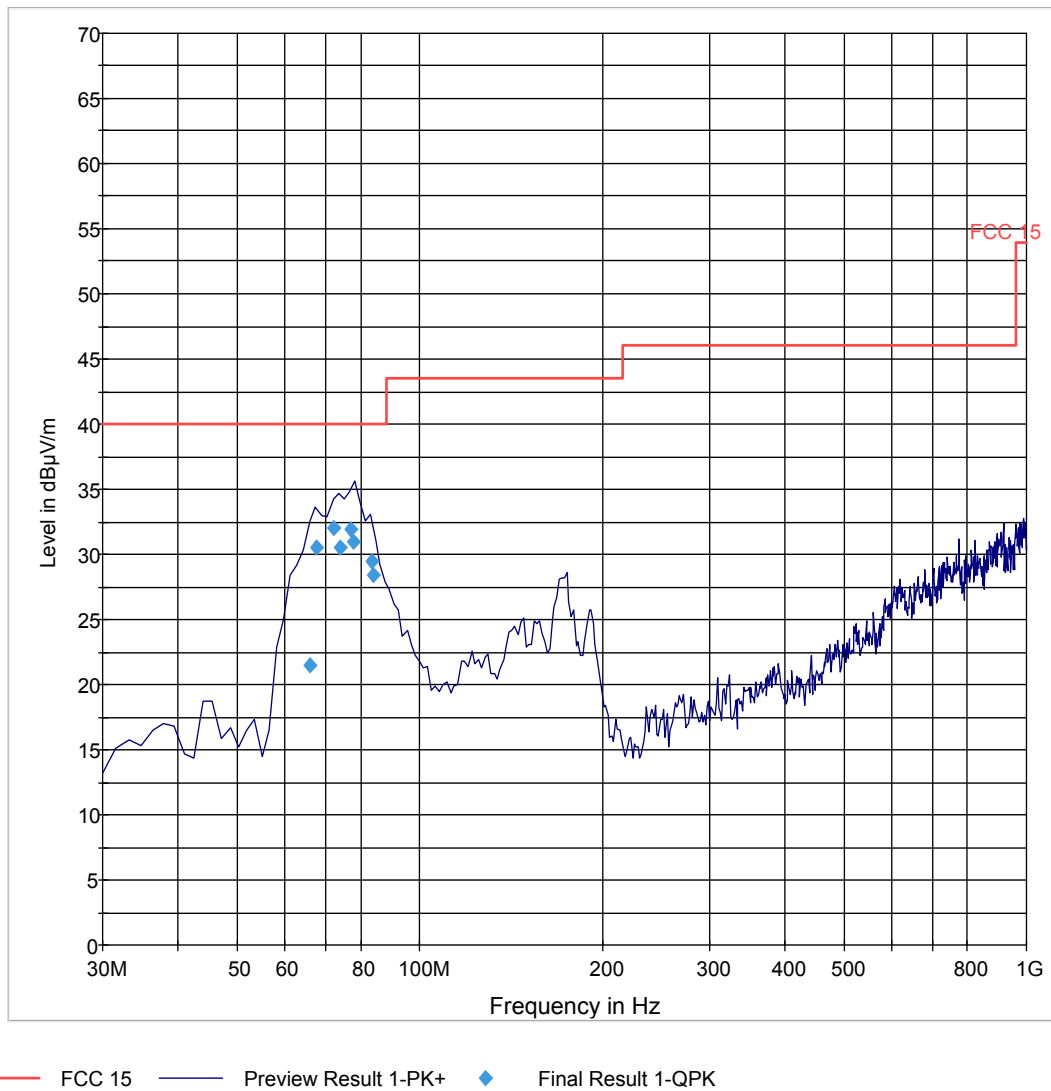
Transmitter Radiated Spurious Emission- 802.11b; Ch1- 30M-1GHz



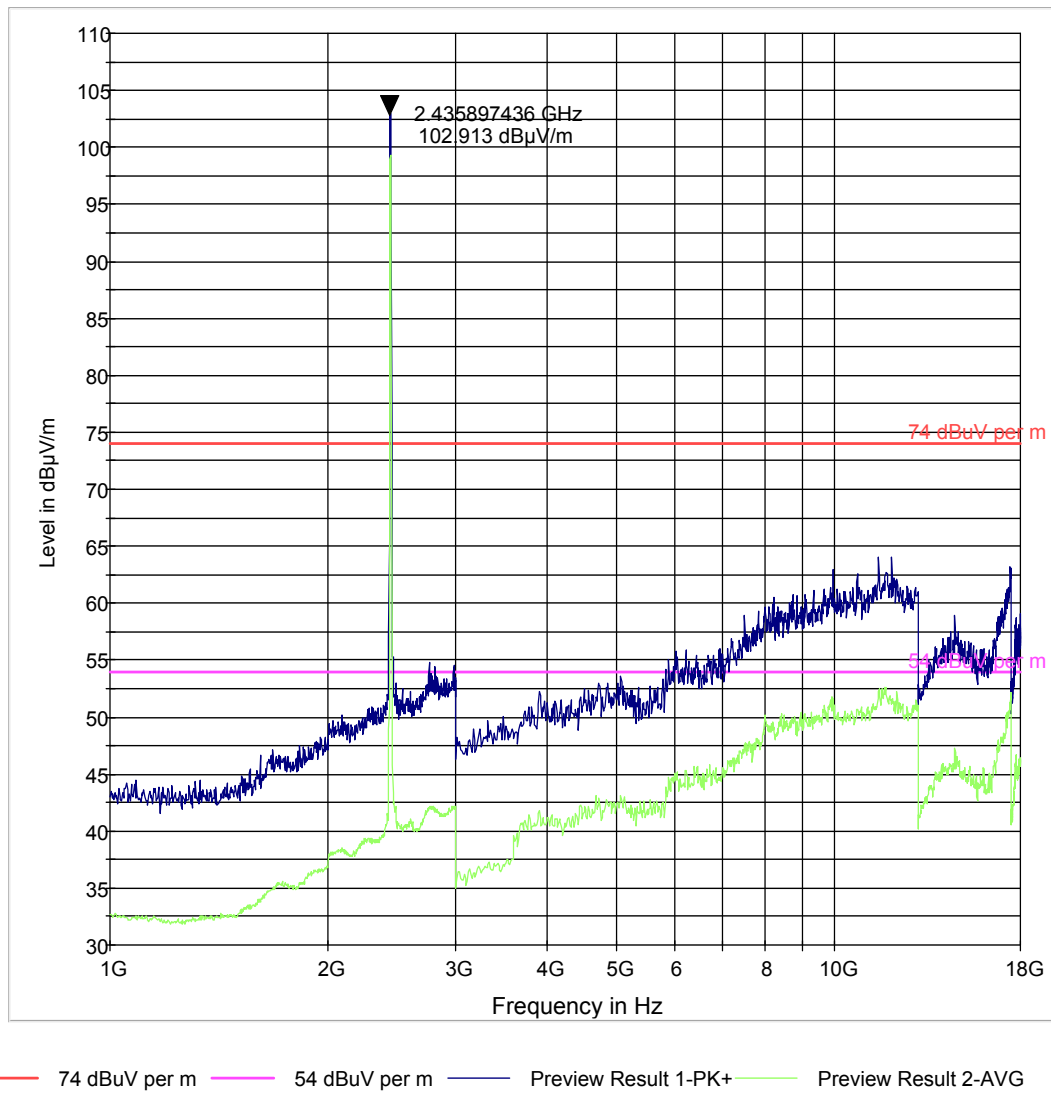
Transmitter Radiated Spurious Emission- 802.11b; Ch1- 1G-18GHz



Transmitter Radiated Spurious Emission- 802.11b; Ch6- 30M-1GHz

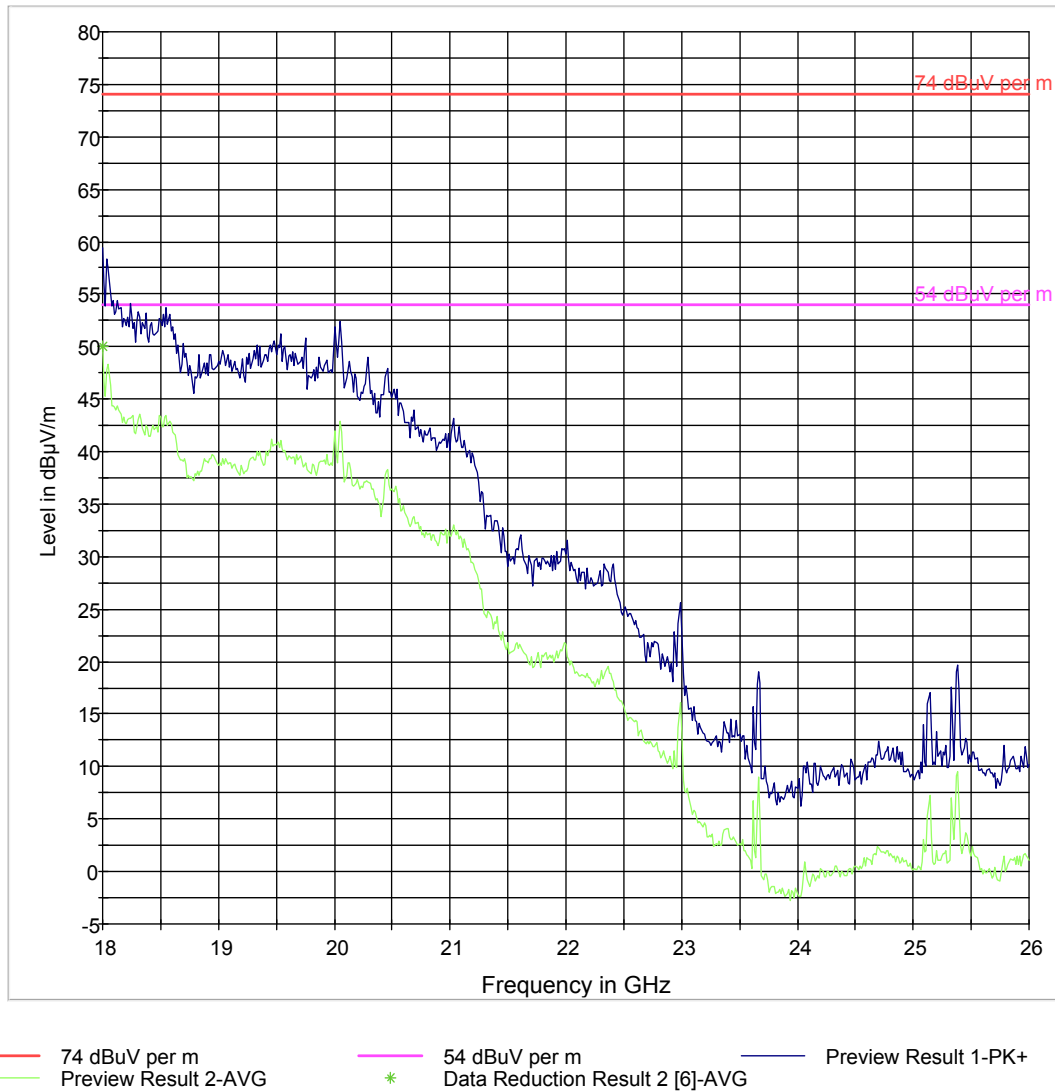


Transmitter Radiated Spurious Emission- 802.11b; Ch6- 1G-18GHz

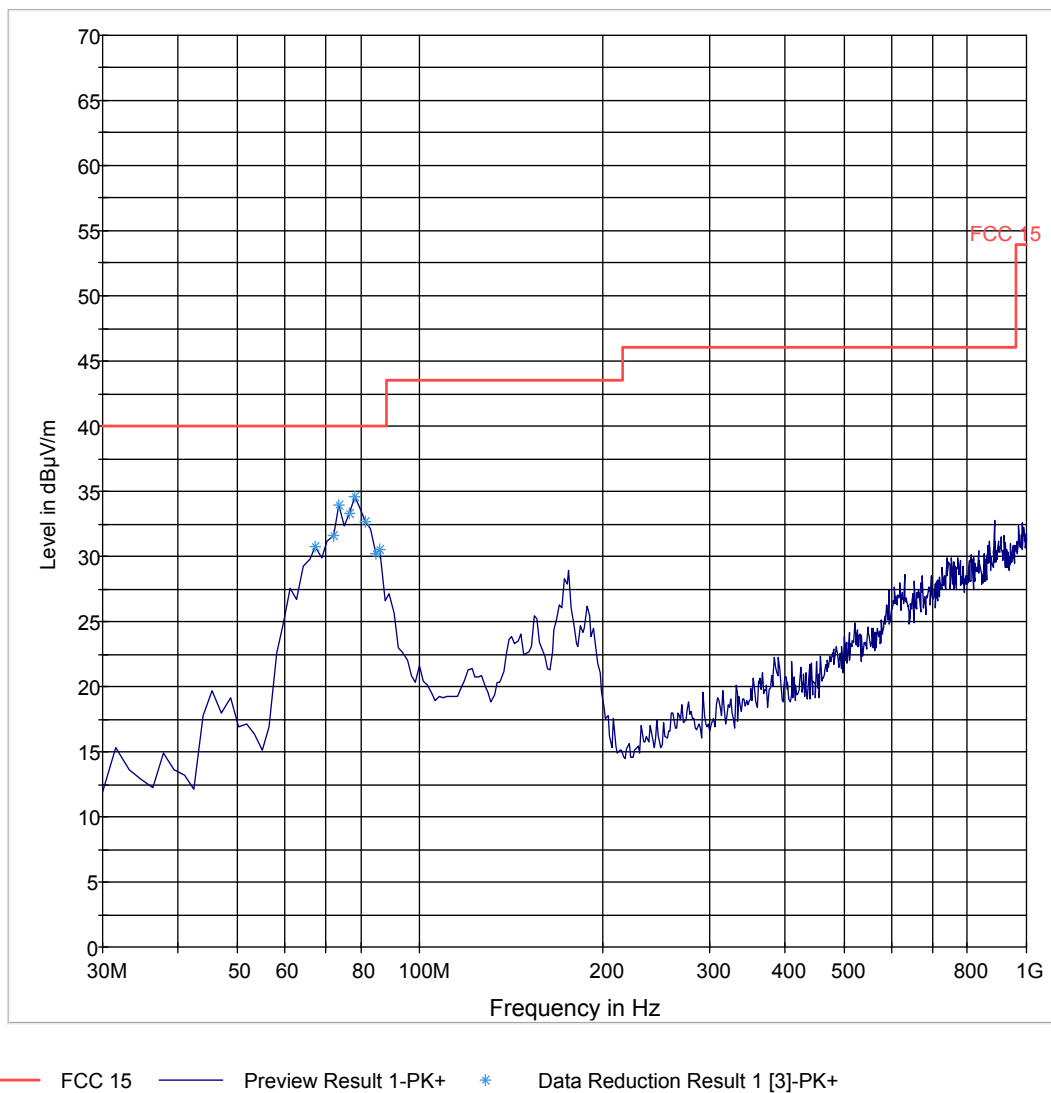


Transmitter Radiated Spurious Emission- 802.11b; Ch6- 18G-26GHz

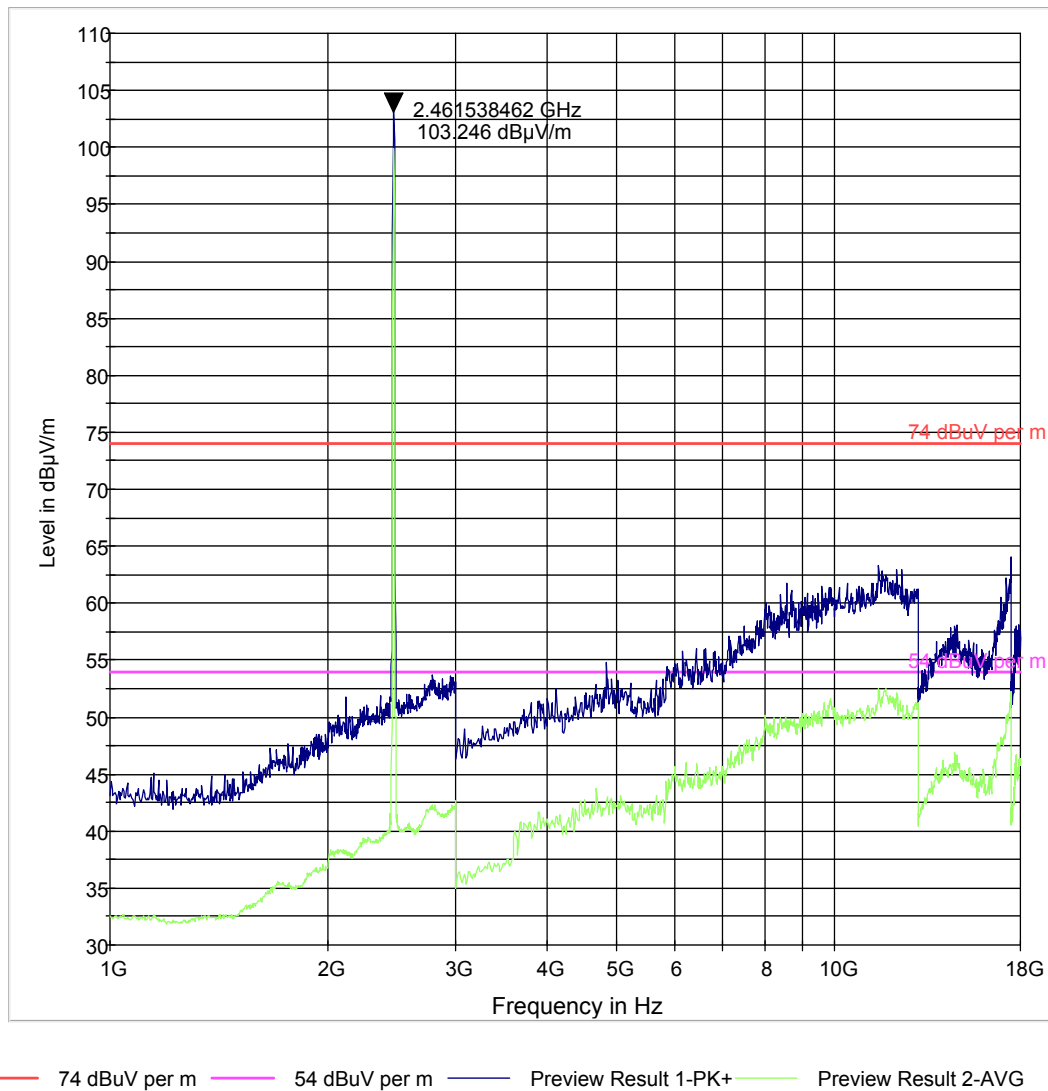
NOTE: Worst case for all channels operation in this frequency band.



Transmitter Radiated Spurious Emission- 802.11b; Ch11- 30M-1GHz

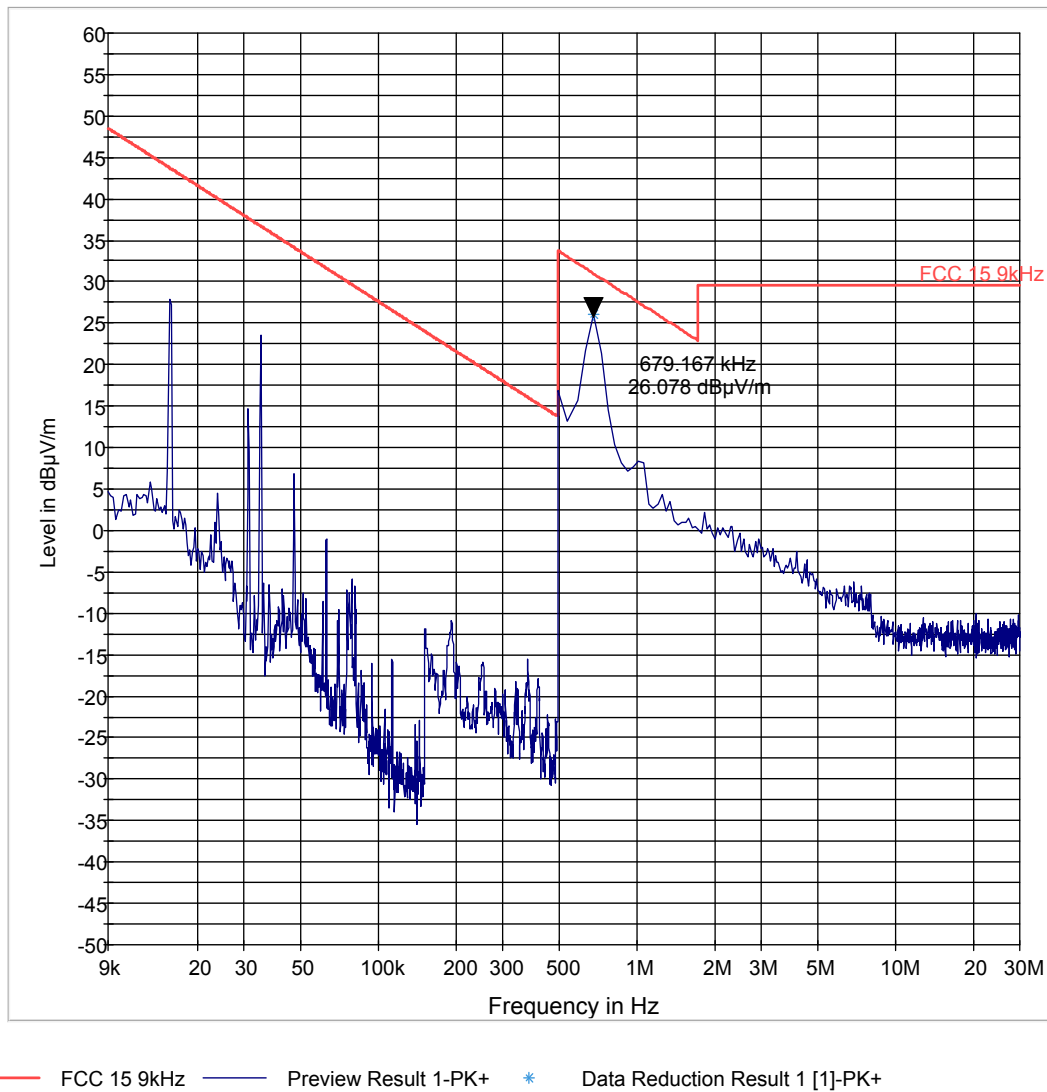


Transmitter Radiated Spurious Emission- 802.11b; Ch11- 1G-18GHz

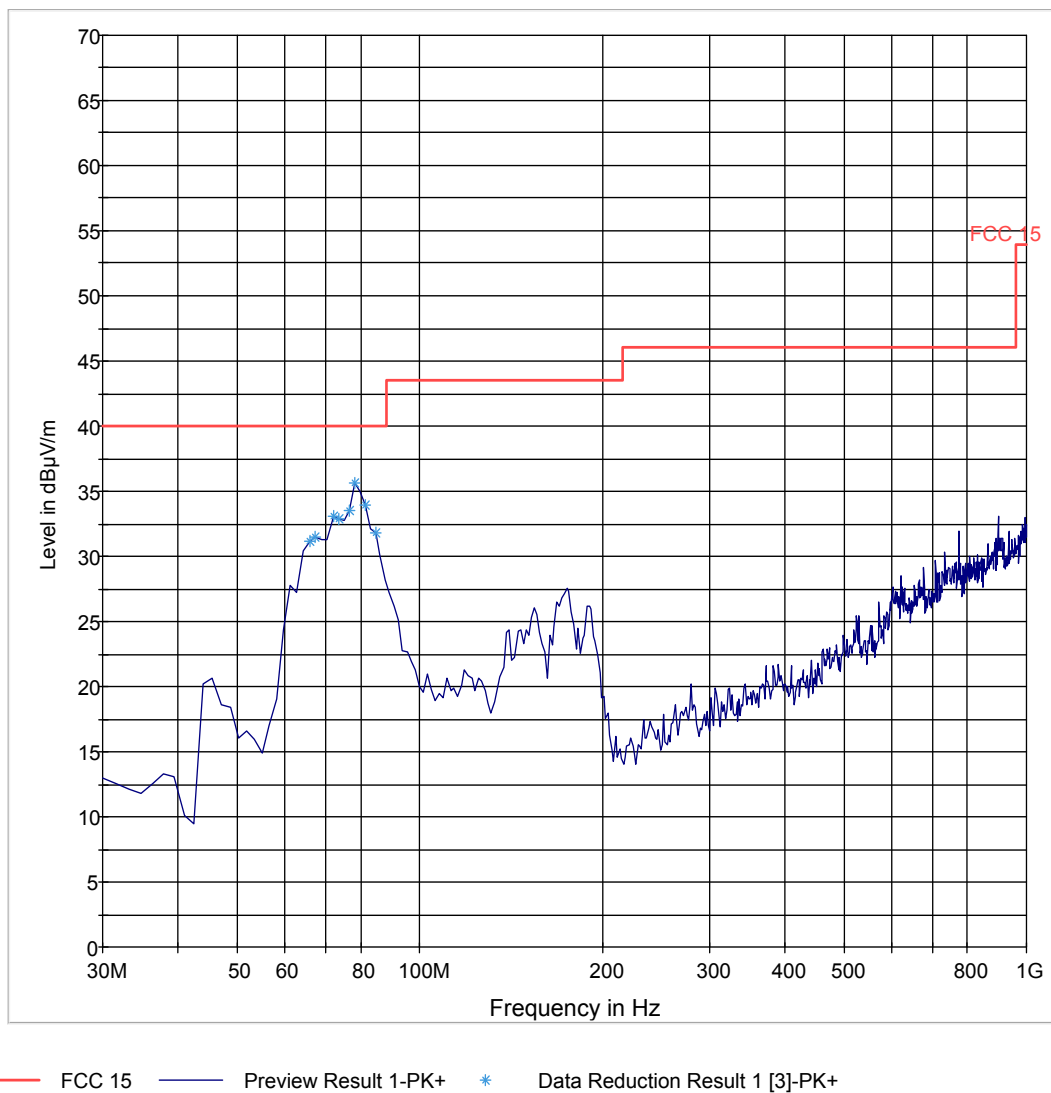


Transmitter Radiated Spurious Emission- 802.11g; <30MHz

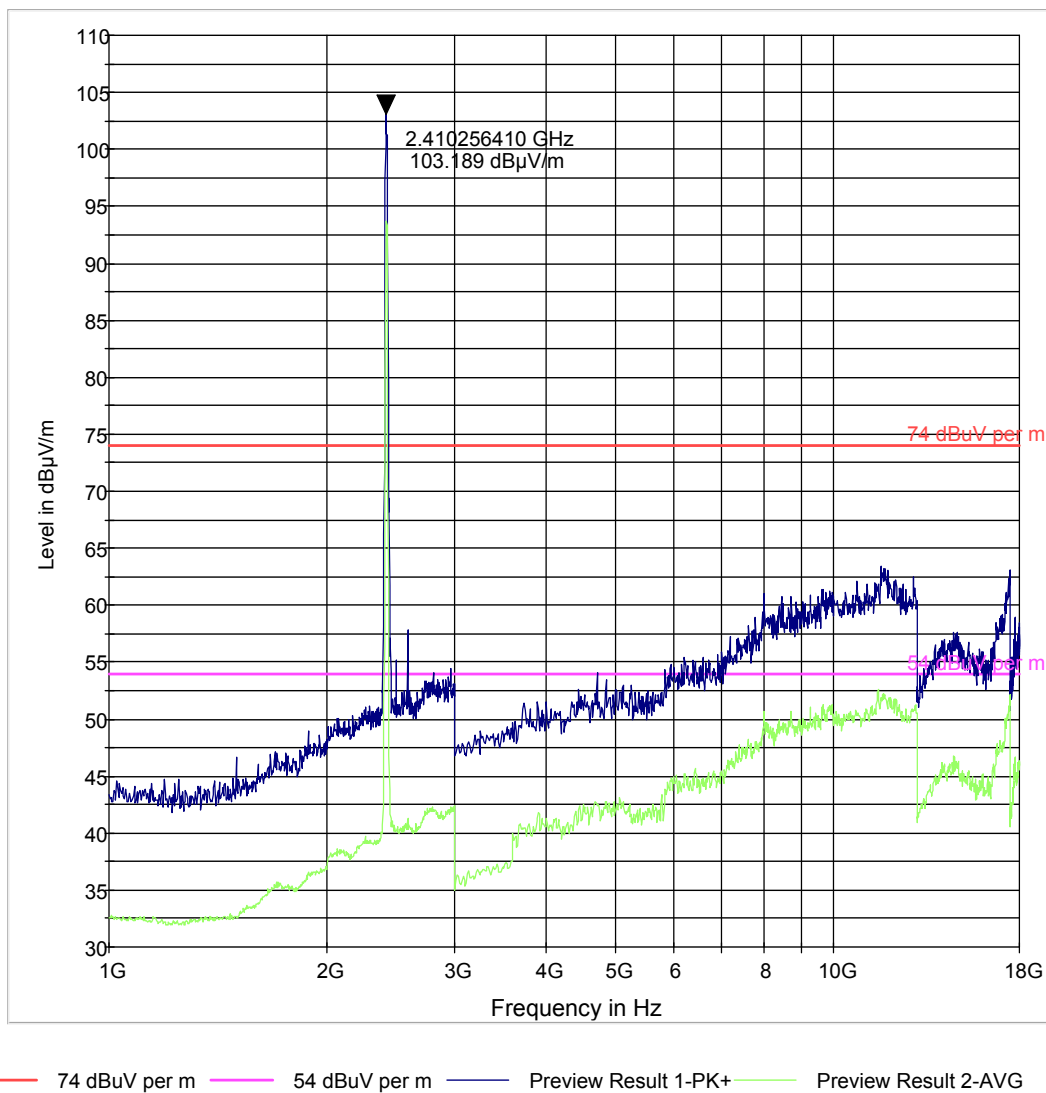
Note: Worst case representation for all modes of operation in this frequency range.



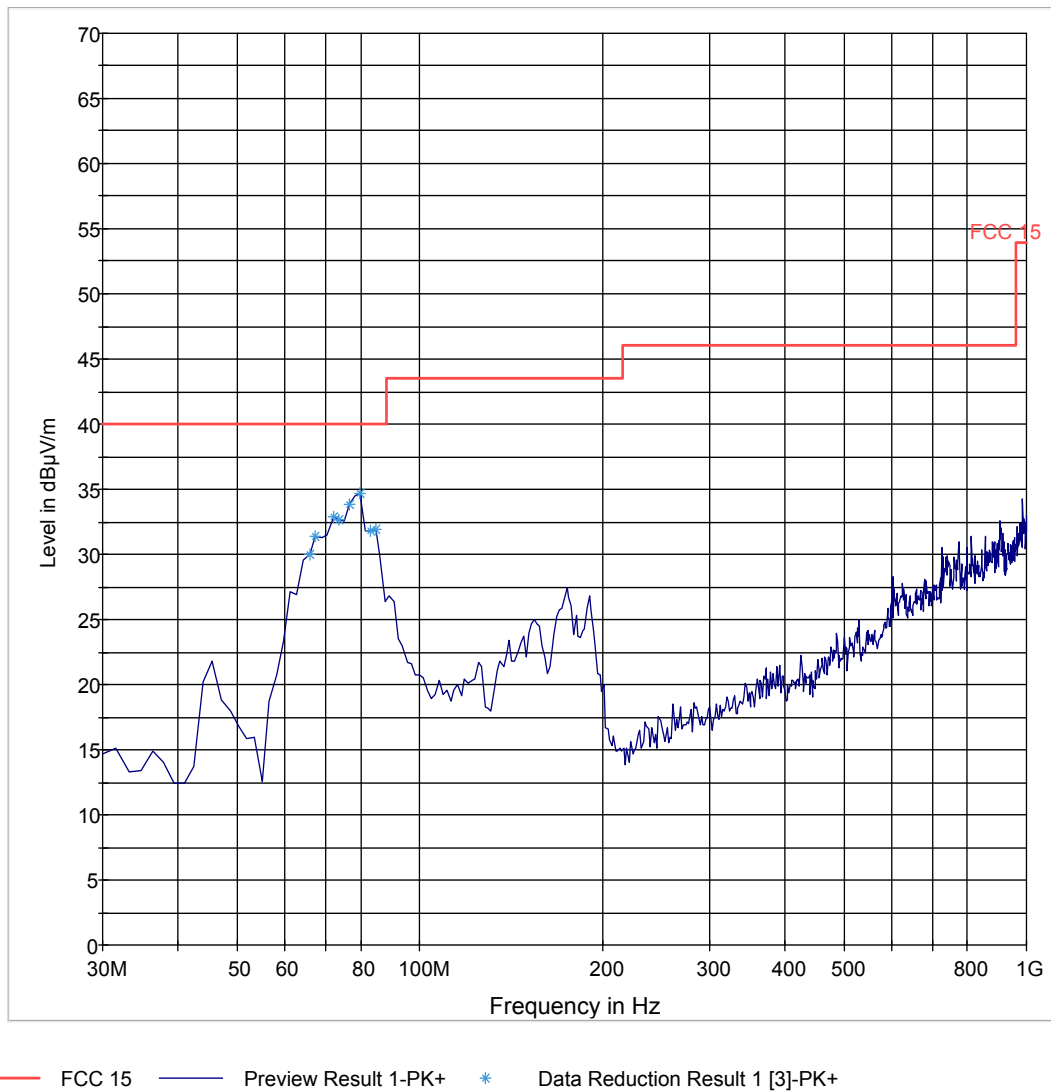
Transmitter Radiated Spurious Emission- 802.11g; Ch1- 30M-1GHz



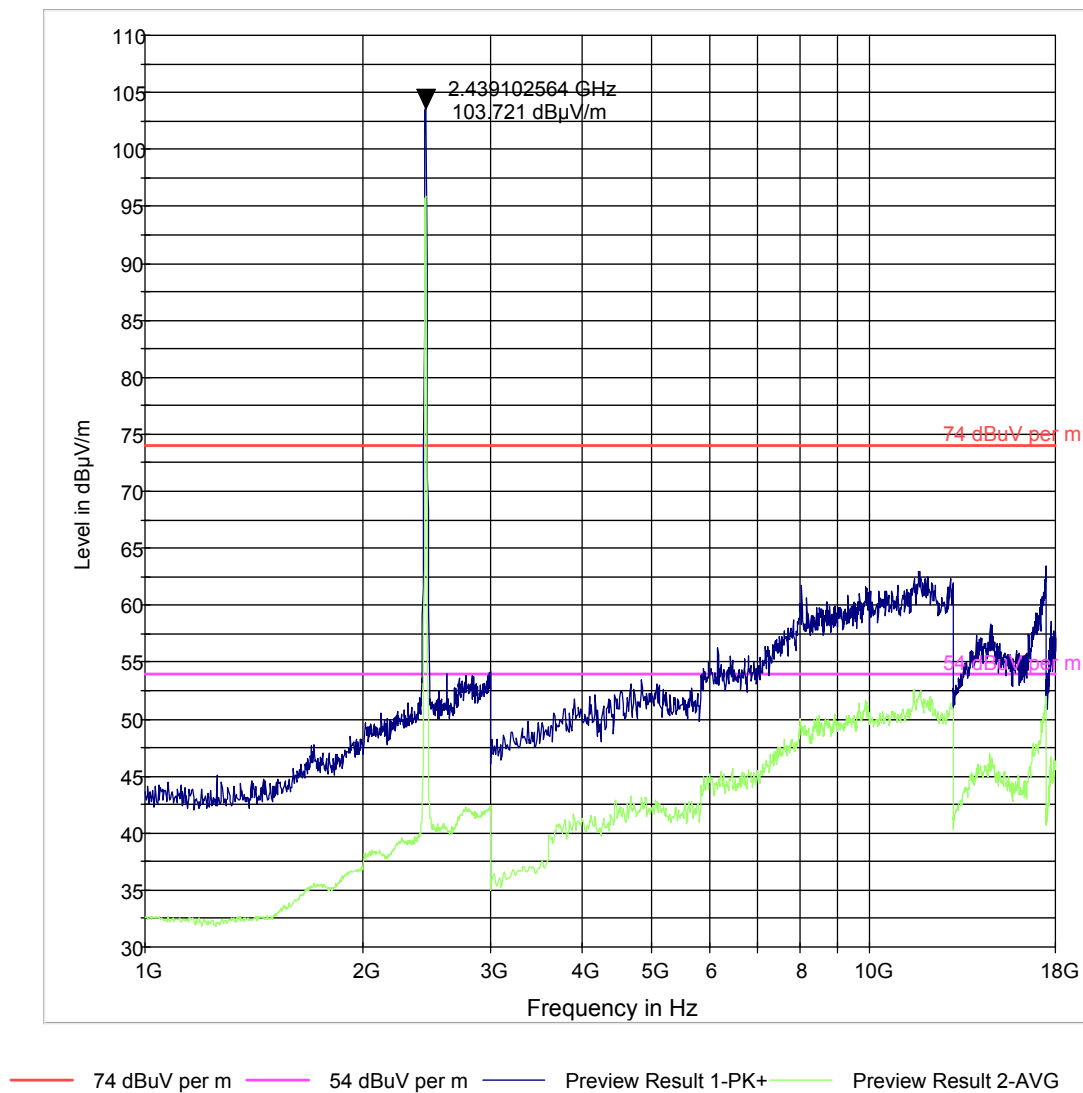
Transmitter Radiated Spurious Emission- 802.11g; Ch1- 1G-18GHz



Transmitter Radiated Spurious Emission- 802.11g; Ch6- 30M-1GHz

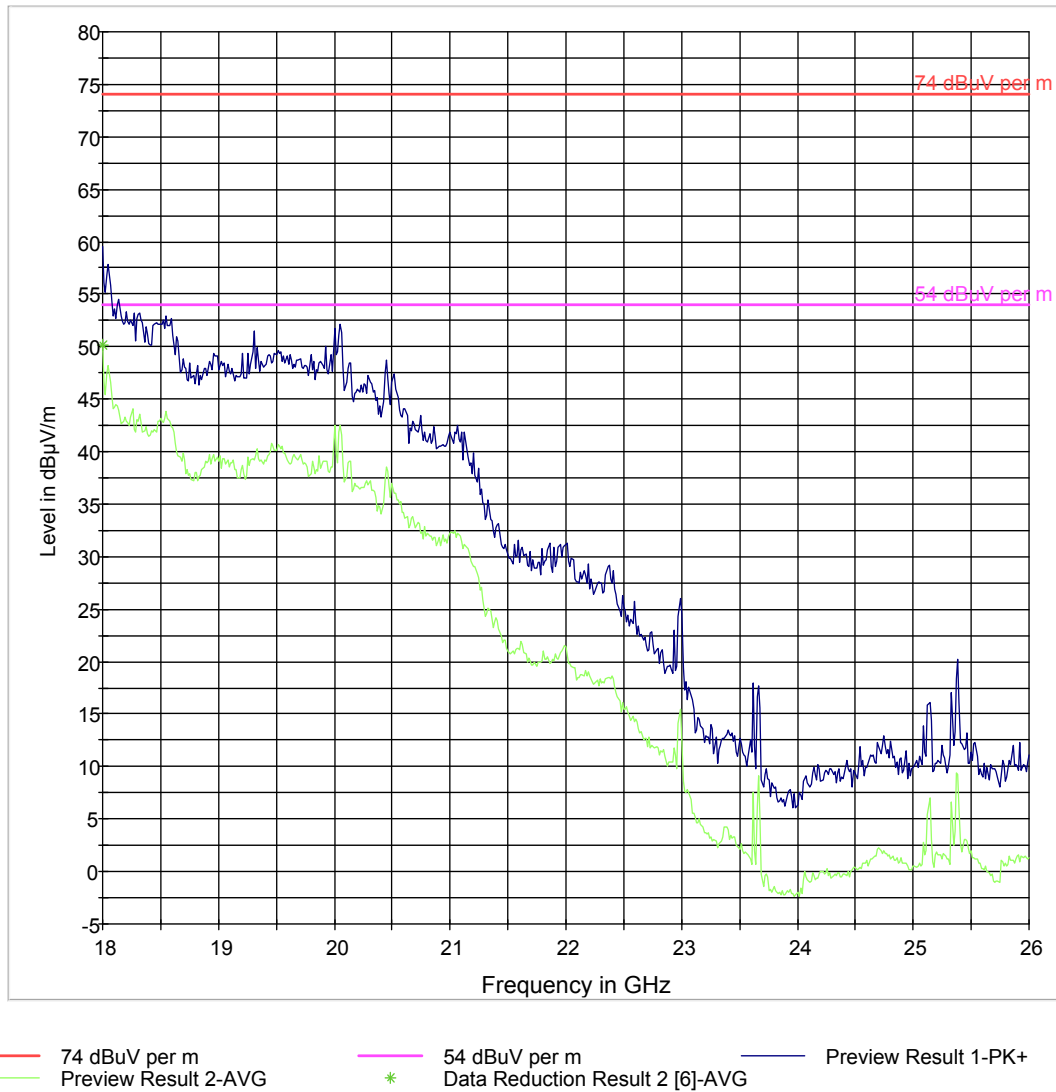


Transmitter Radiated Spurious Emission- 802.11g; Ch6- 1G-18GHz

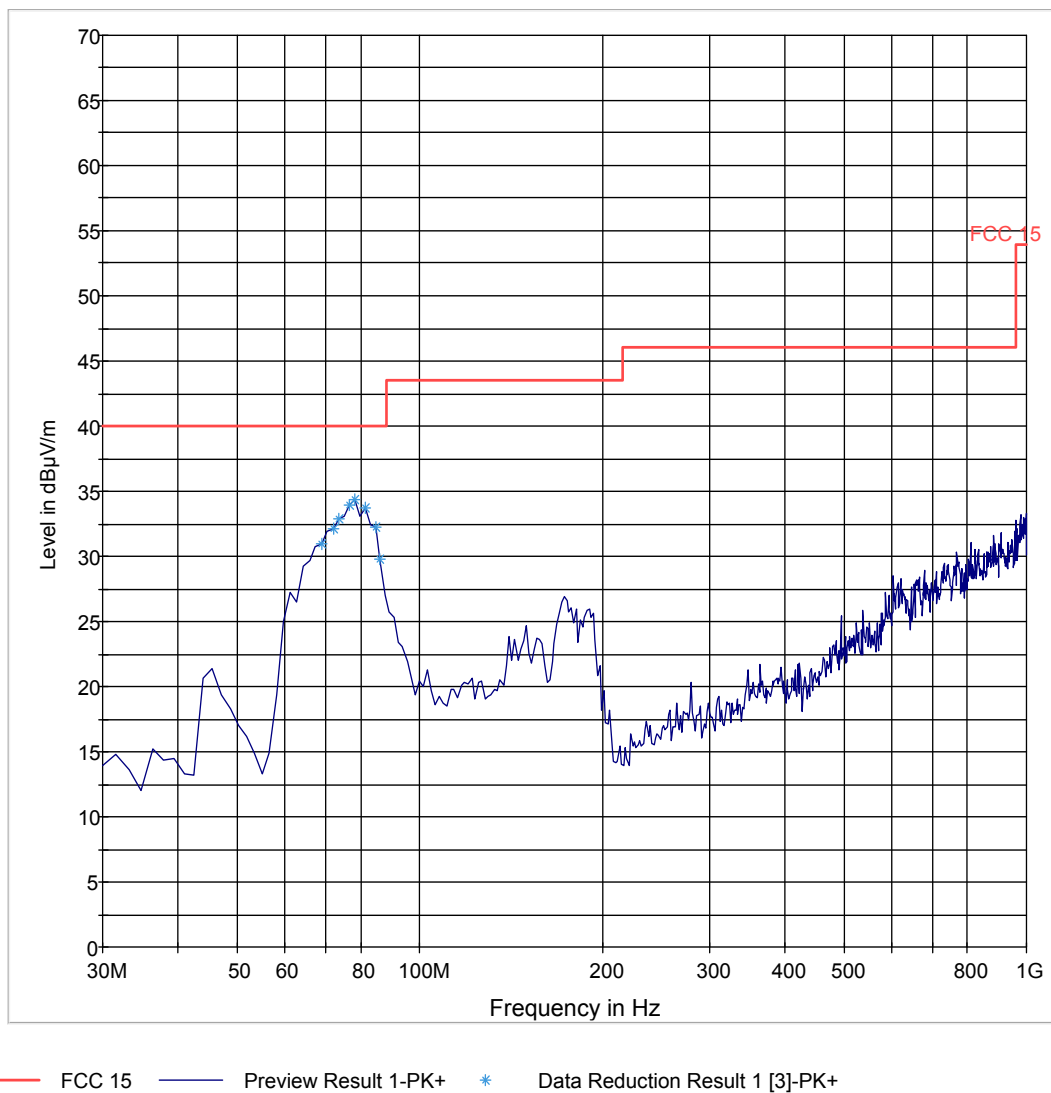


Transmitter Radiated Spurious Emission- 802.11g; Ch6- 18G-26GHz

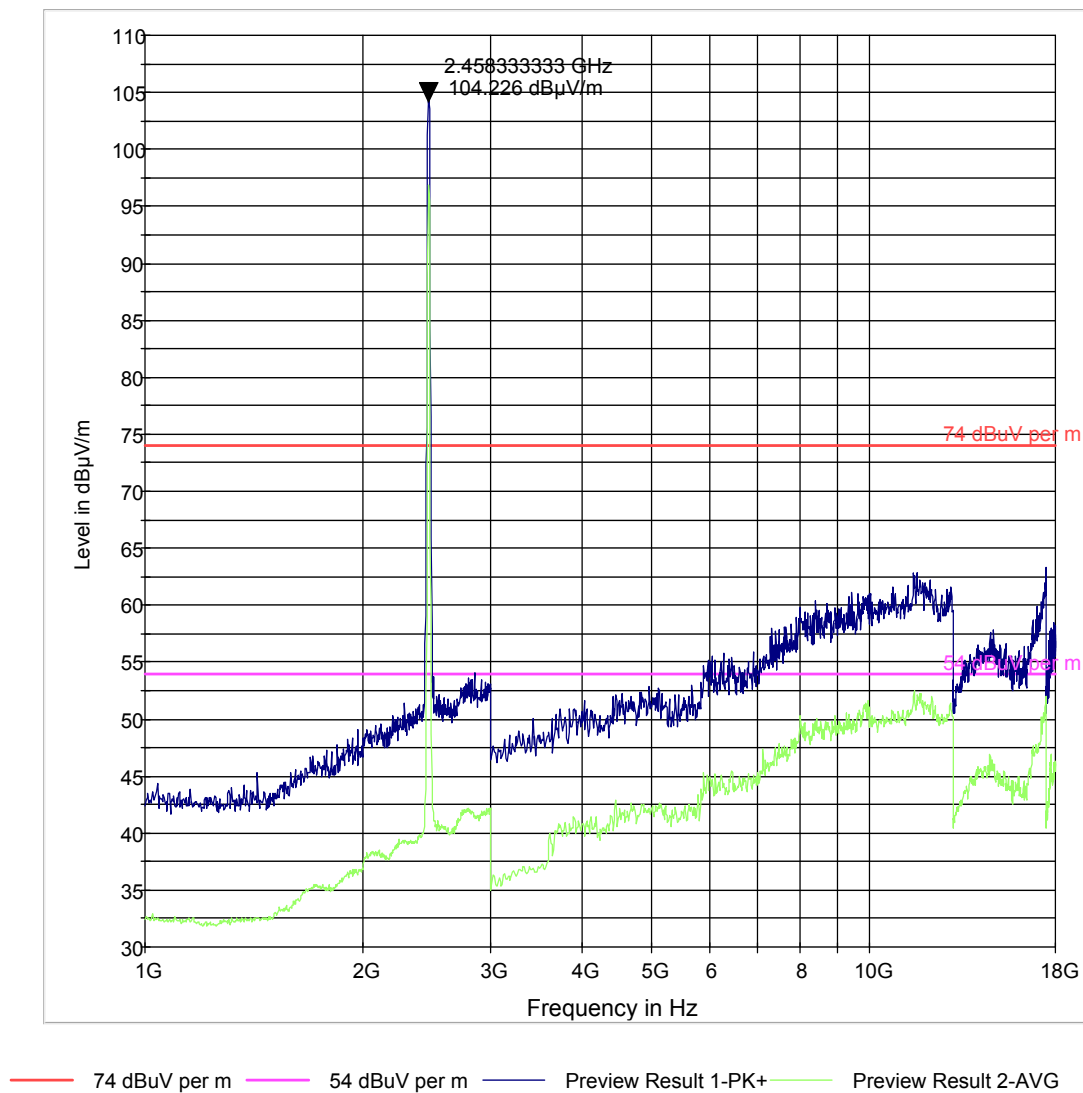
NOTE: Worst case for all channels in this frequency band.



Transmitter Radiated Spurious Emission- 802.11g; Ch11- 30M-1GHz

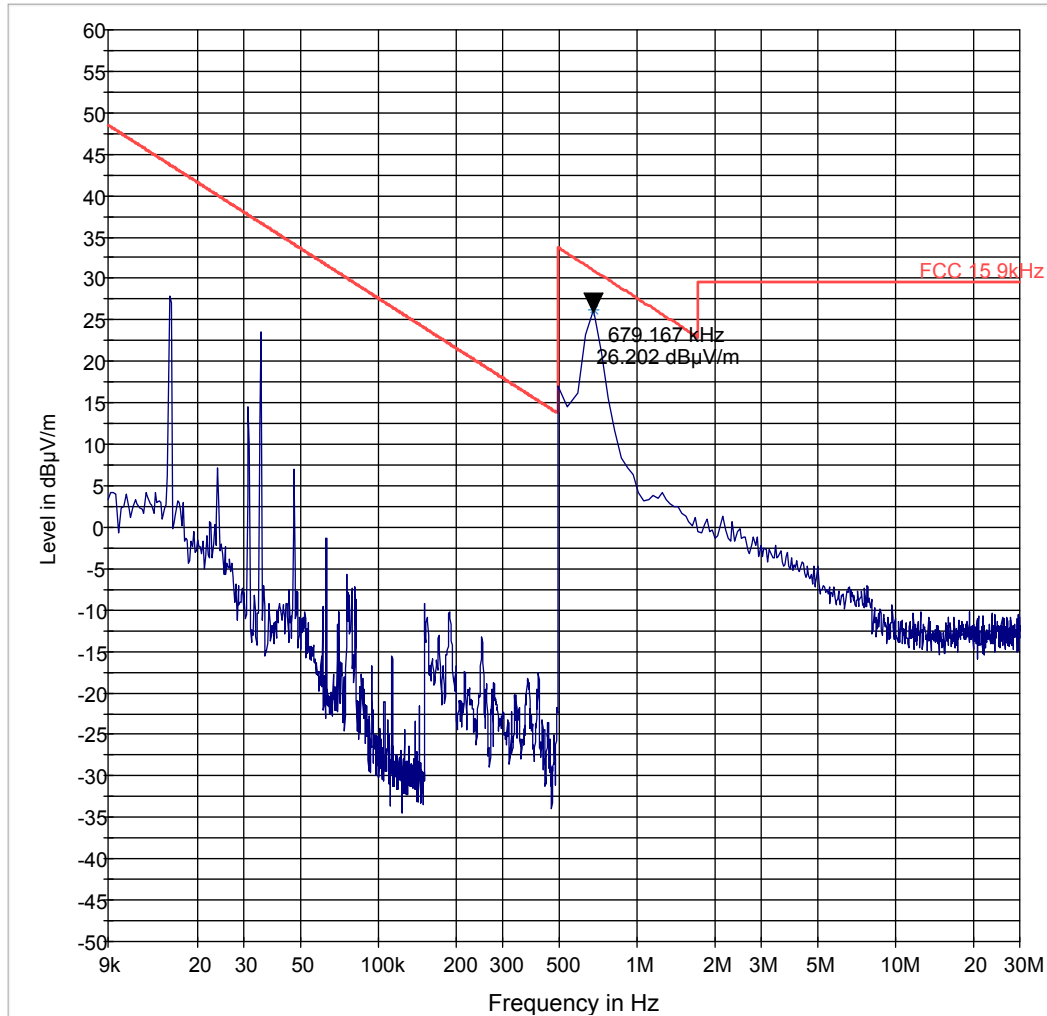


Transmitter Radiated Spurious Emission- 802.11g; Ch11- 1G-18GHz



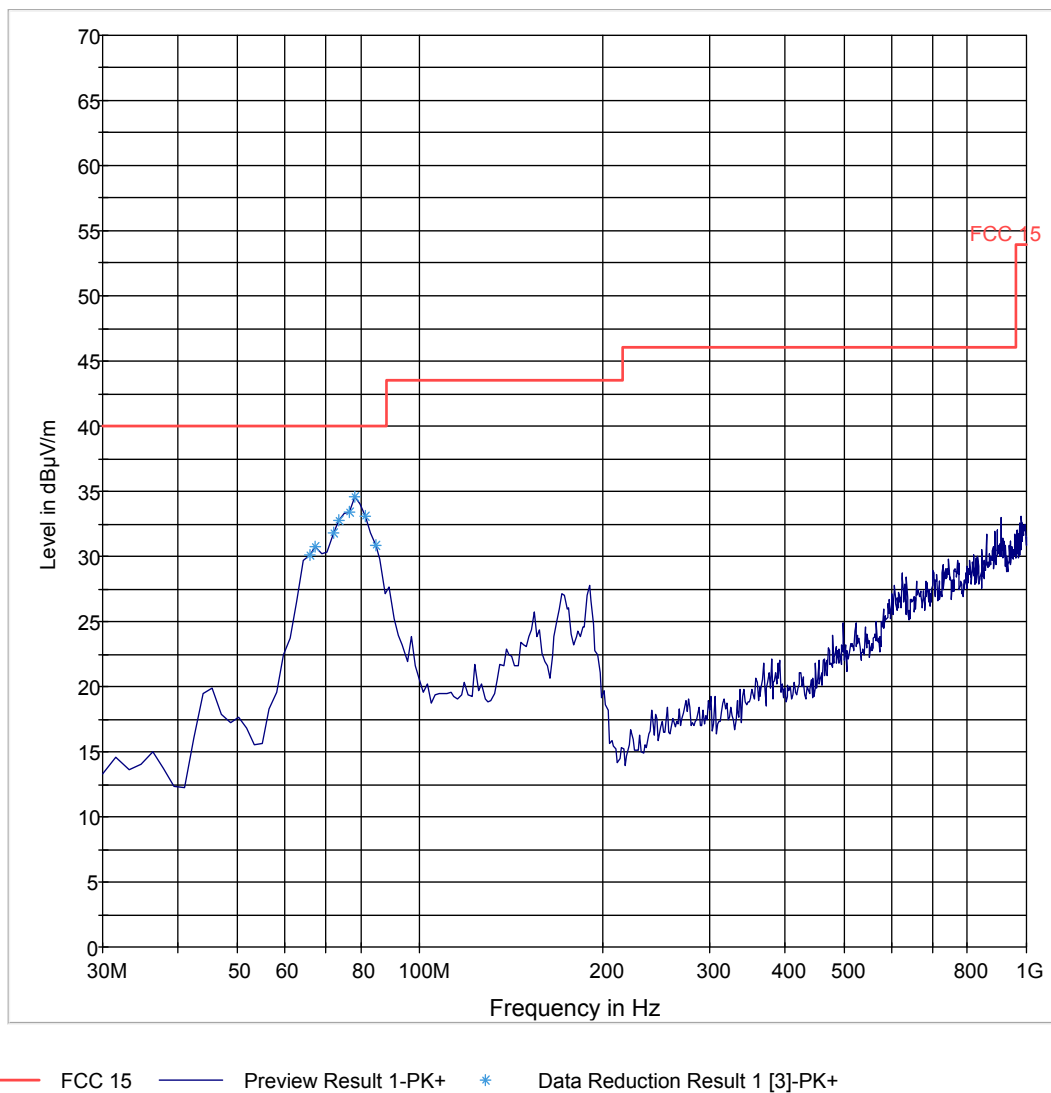
Transmitter Radiated Spurious Emission- 802.11n; <30MHz

Note: Worst case representation for all modes of operation in this frequency range.

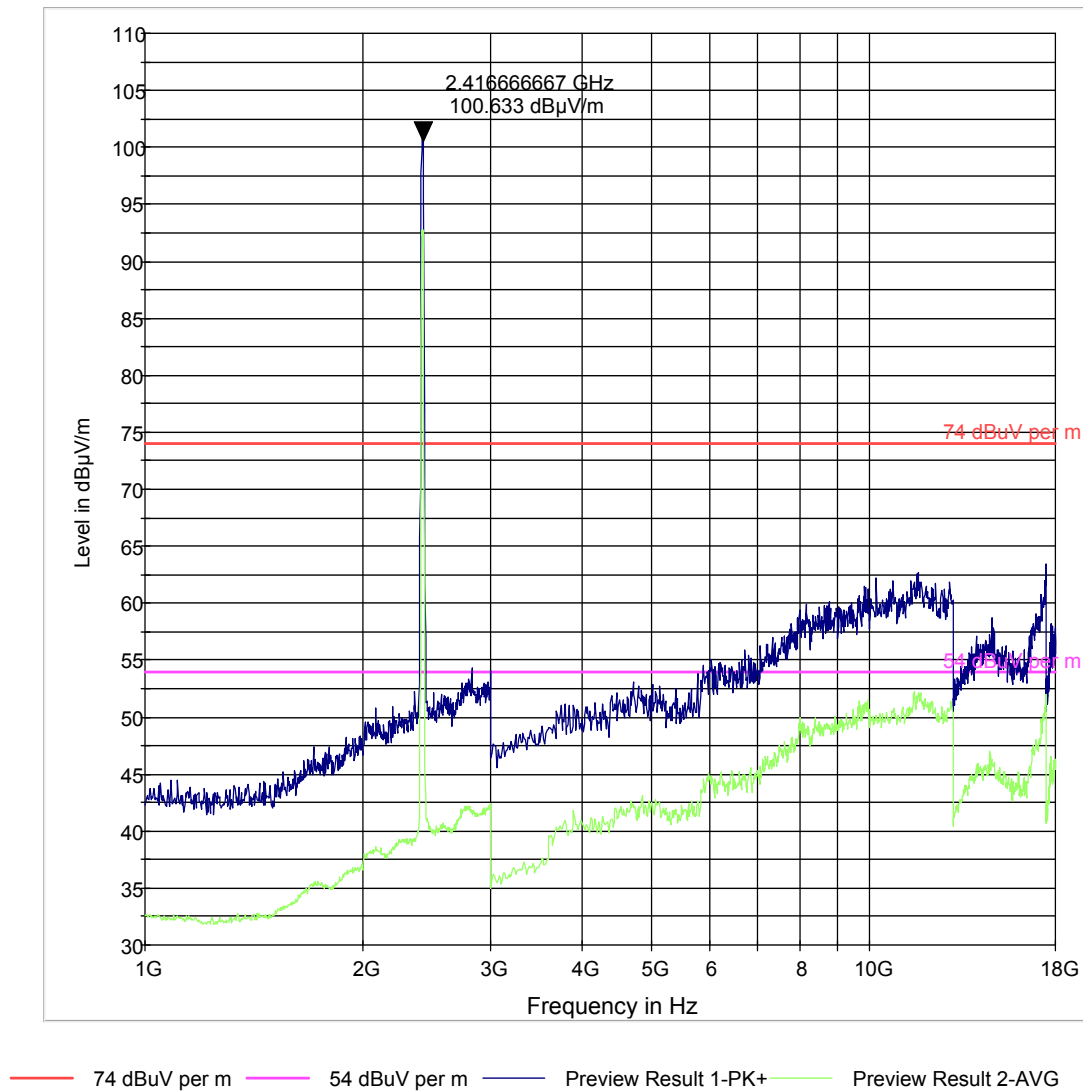


— FCC 15.9kHz — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

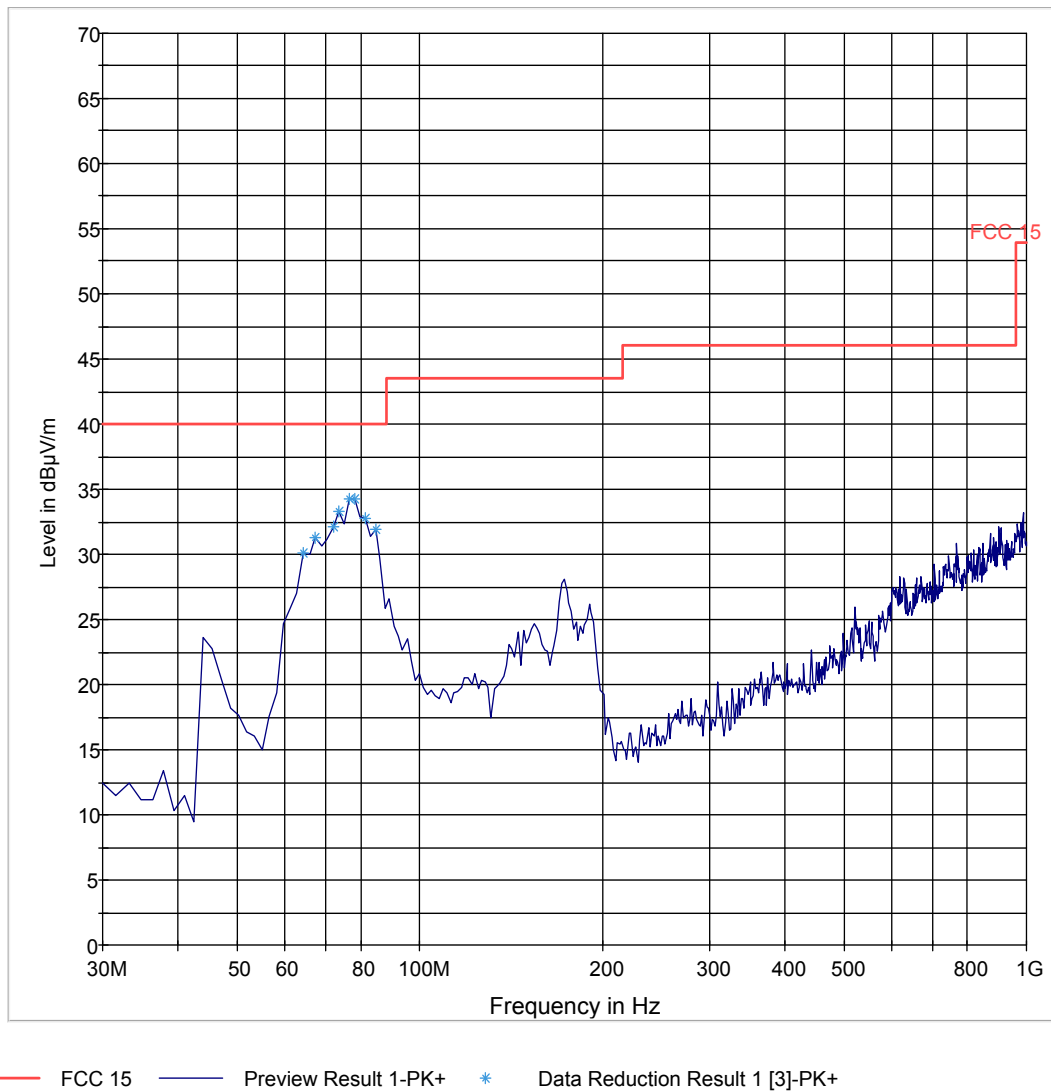
Transmitter Radiated Spurious Emission- 802.11n; Ch1- 30M-1GHz



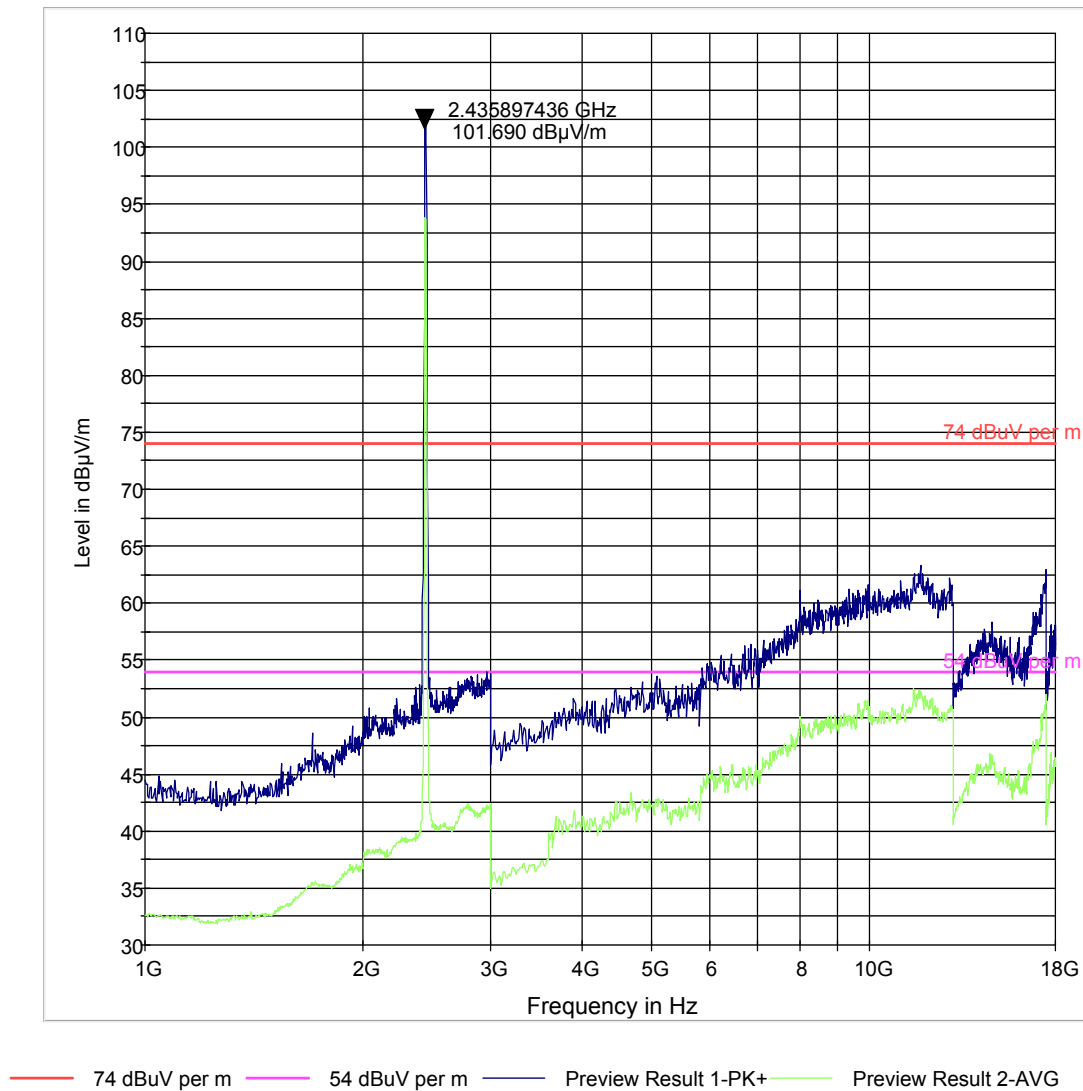
Transmitter Radiated Spurious Emission- 802.11n; Ch1- 1G-18GHz



Transmitter Radiated Spurious Emission- 802.11n; Ch6- 30M-1GHz

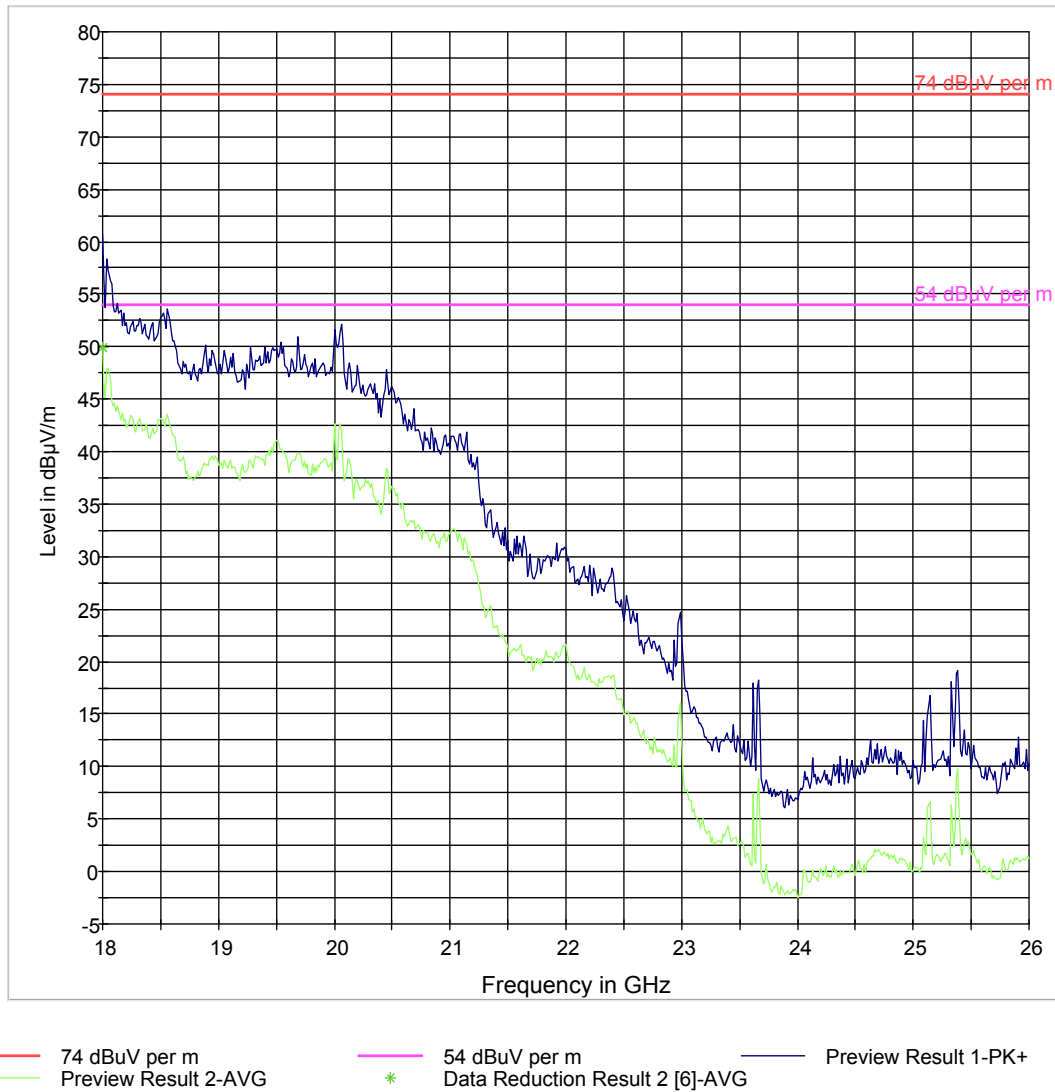


Transmitter Radiated Spurious Emission- 802.11n; Ch6- 1G-18GHz

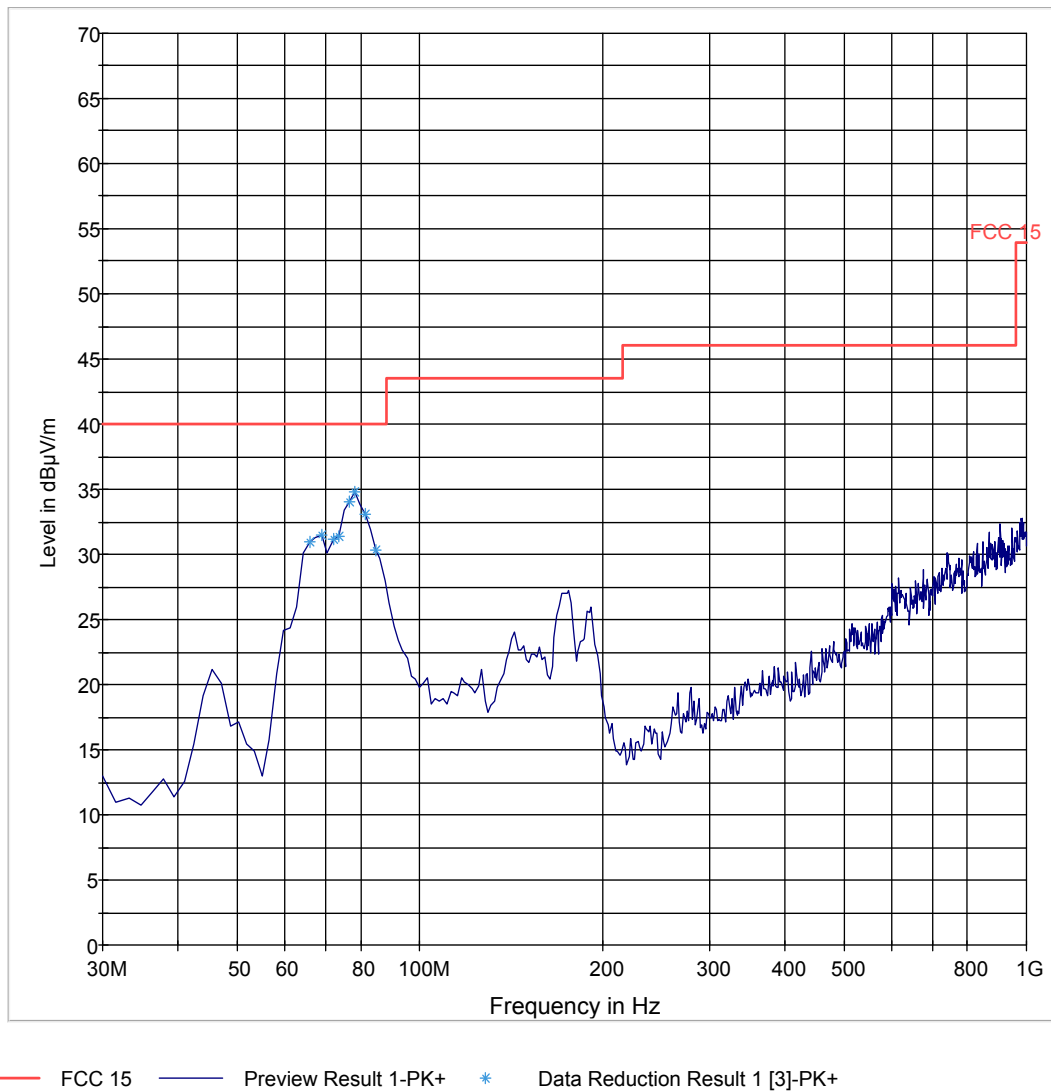


Transmitter Radiated Spurious Emission- 802.11n; Ch6- 18G-26GHz

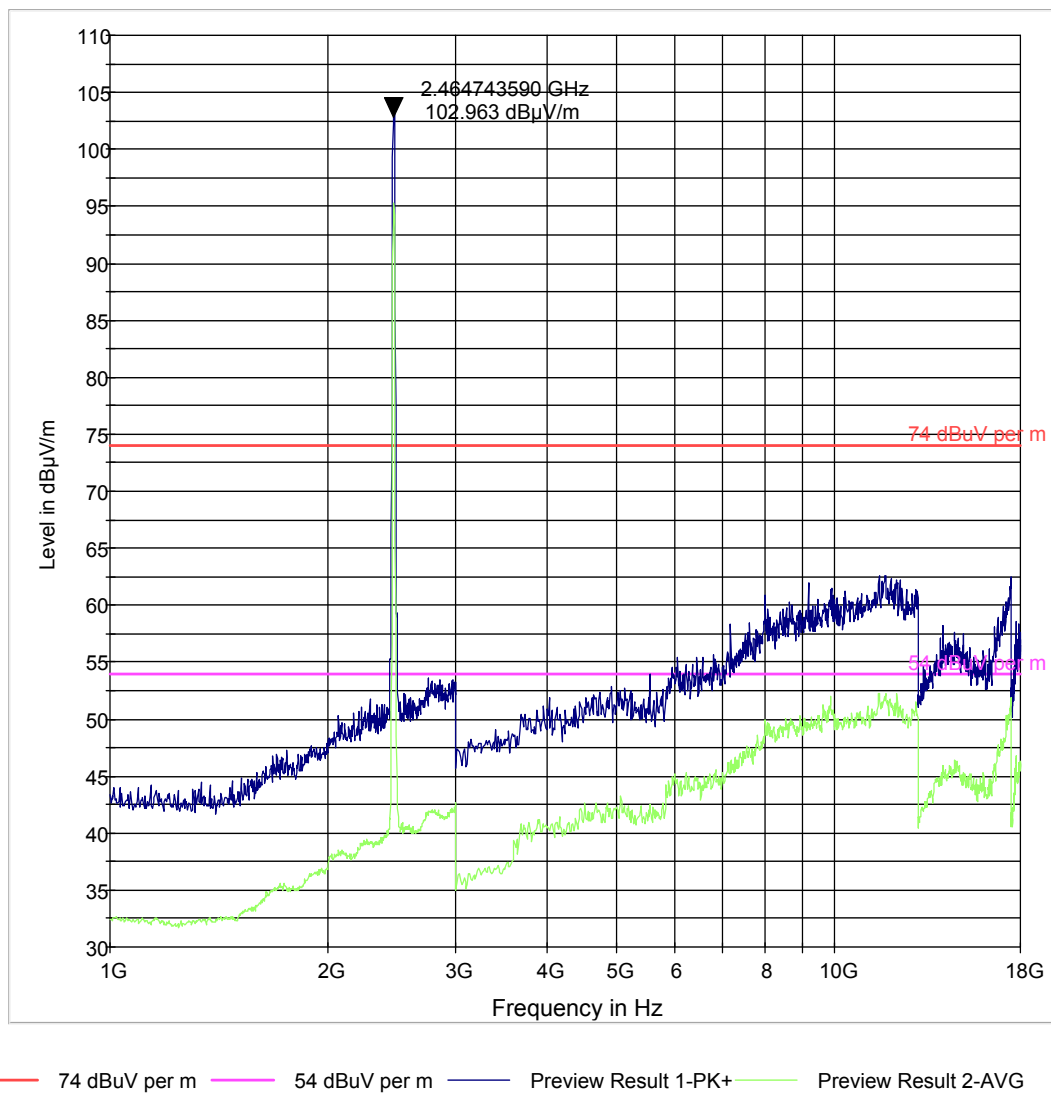
NOTE: Worst case for all channels in this frequency band.



Transmitter Radiated Spurious Emission- 802.11n; Ch11- 30M-1GHz



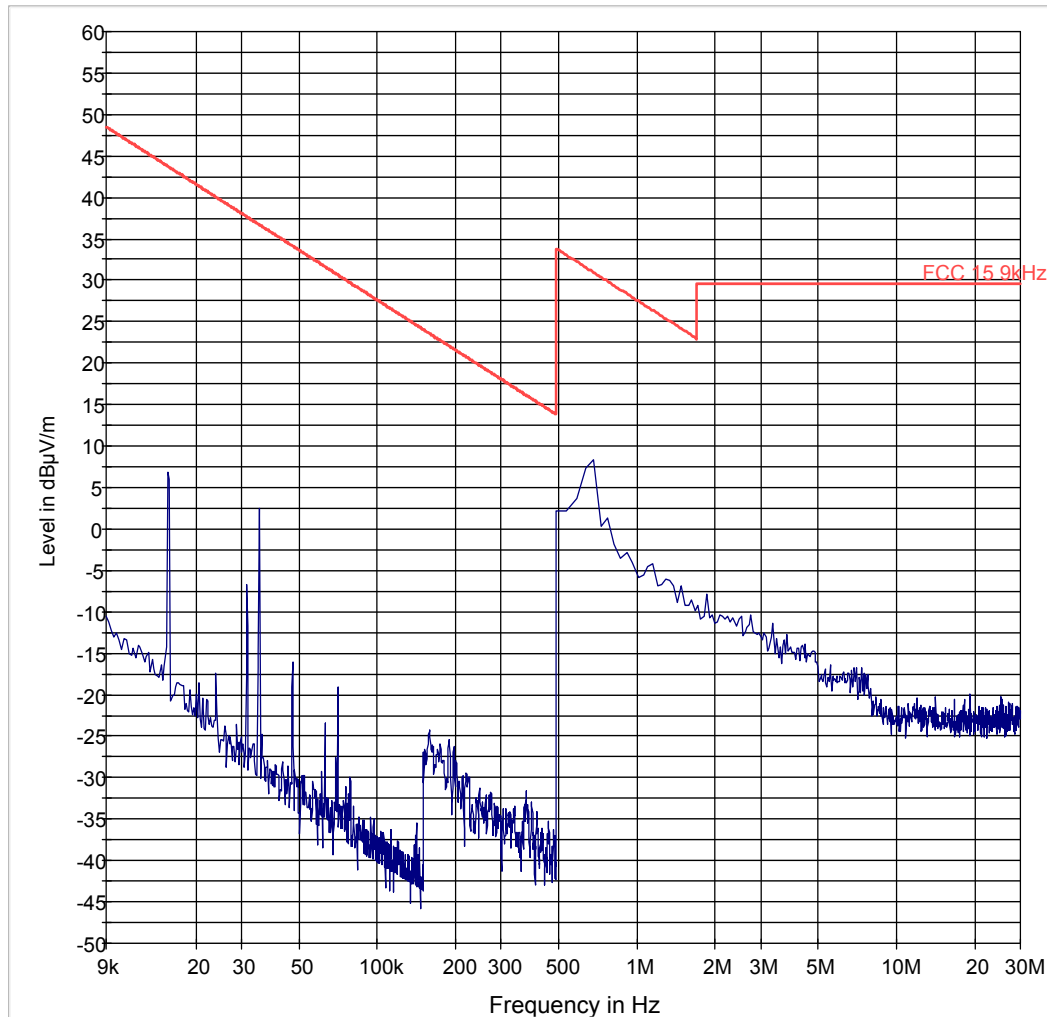
Transmitter Radiated Spurious Emission- 802.11n; Ch11- 1G-18GHz



6.12.5.2 Wi-Fi 5GHz

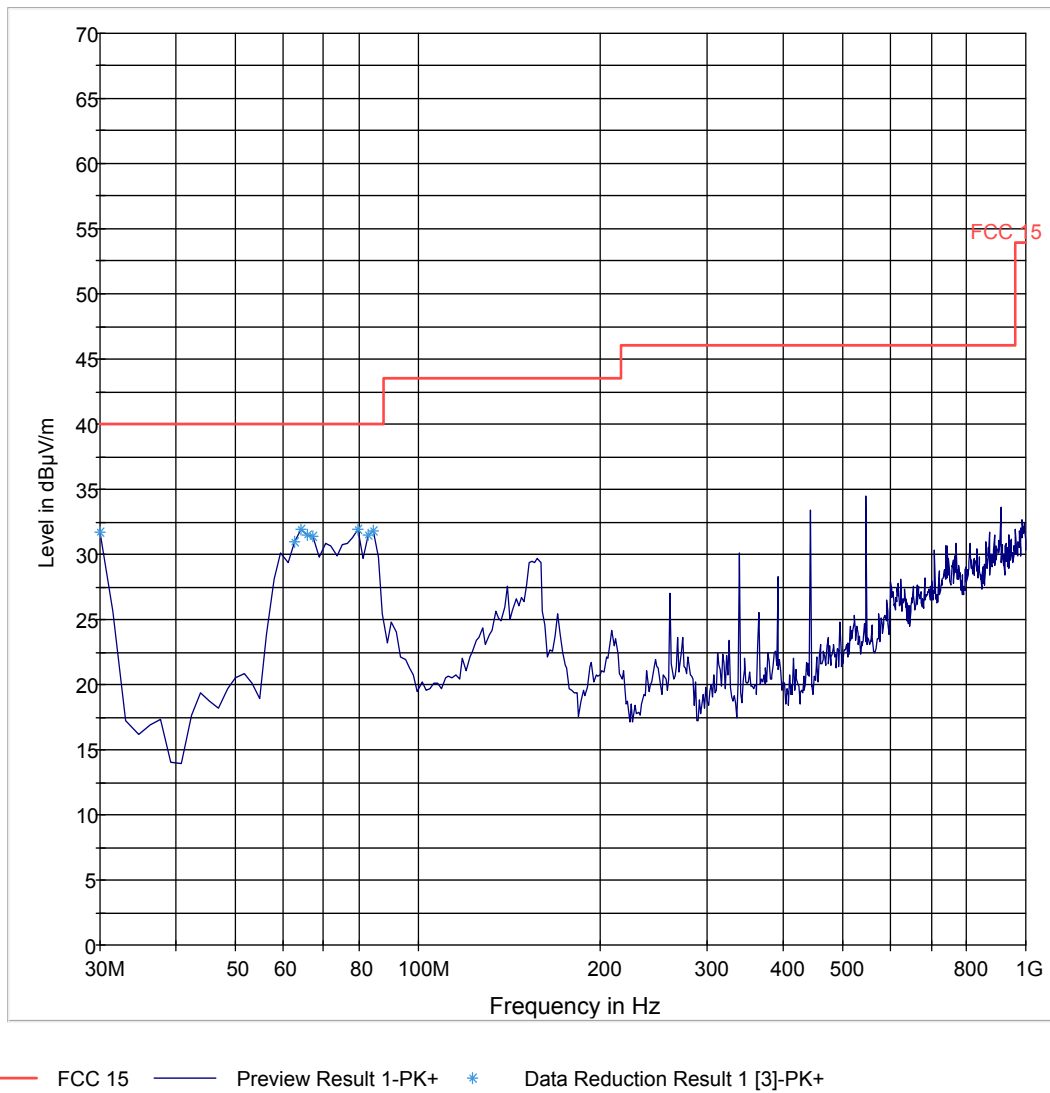
Transmitter Radiated Spurious Emissions – 802.11a; <30 MHz

Note: Worst case representation for all modes of operation in this frequency range.

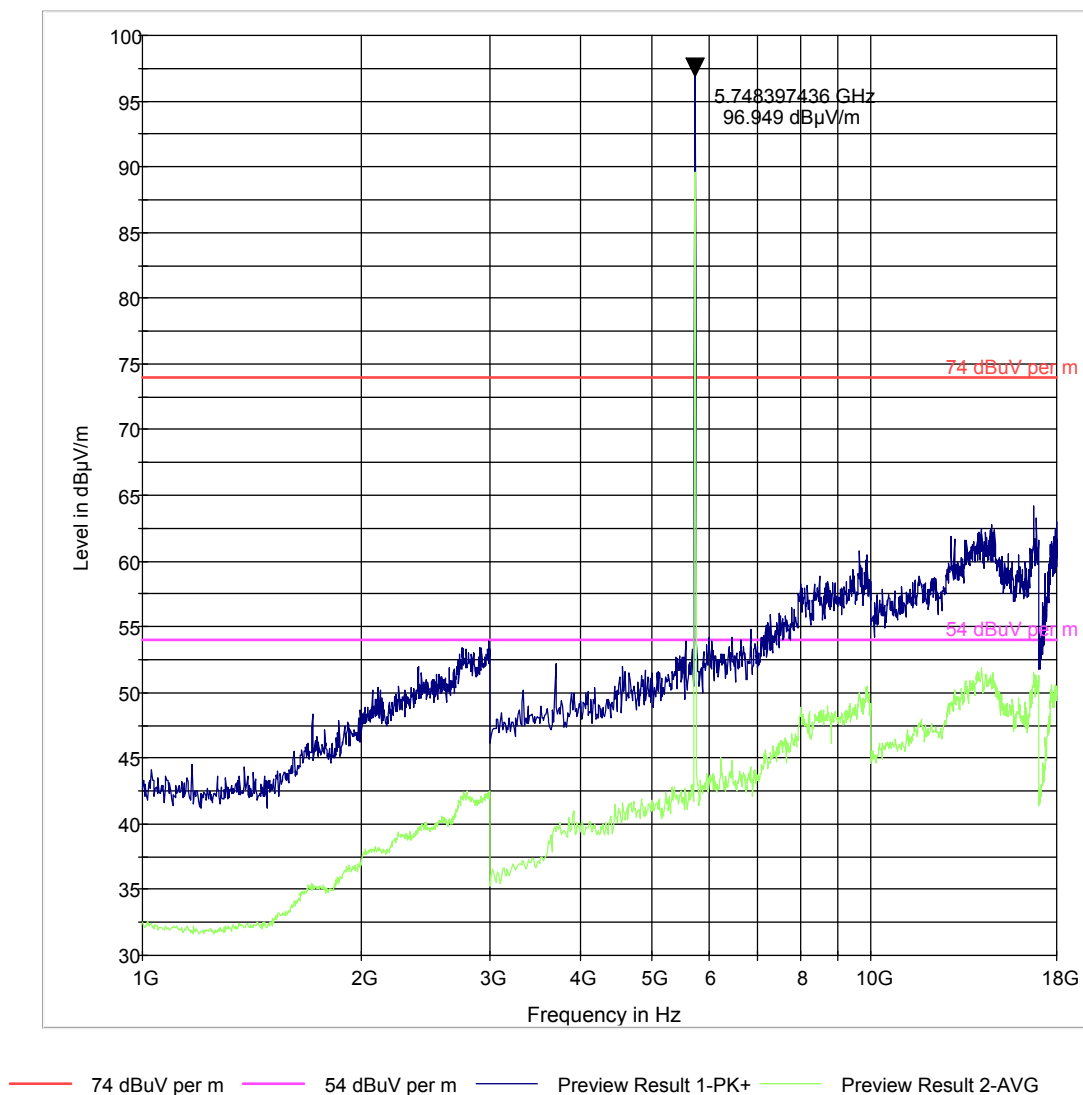


— FCC 15.9kHz — Preview Result 1-PK+

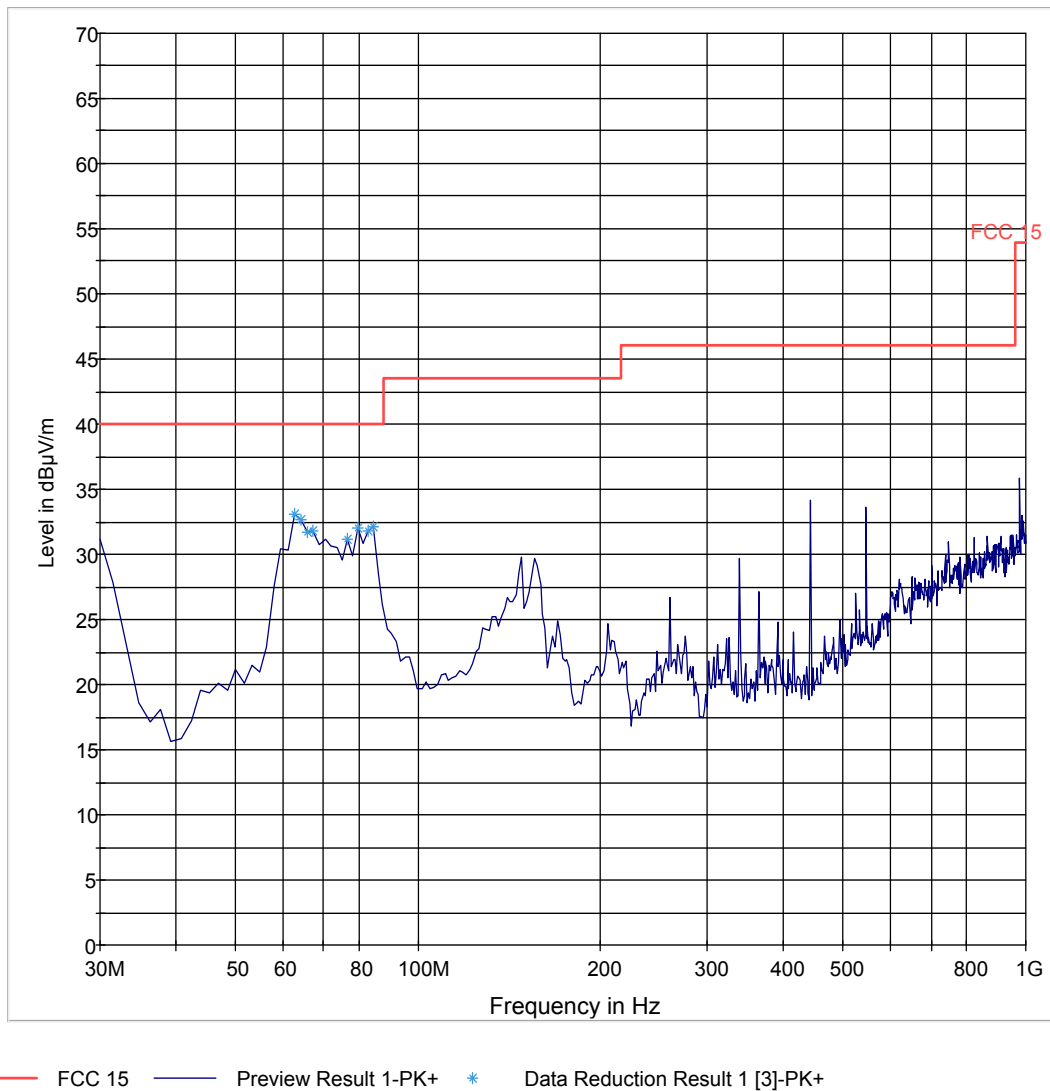
Transmitter Radiated Spurious Emissions – 802.11a Ch149; 30M – 1GHz



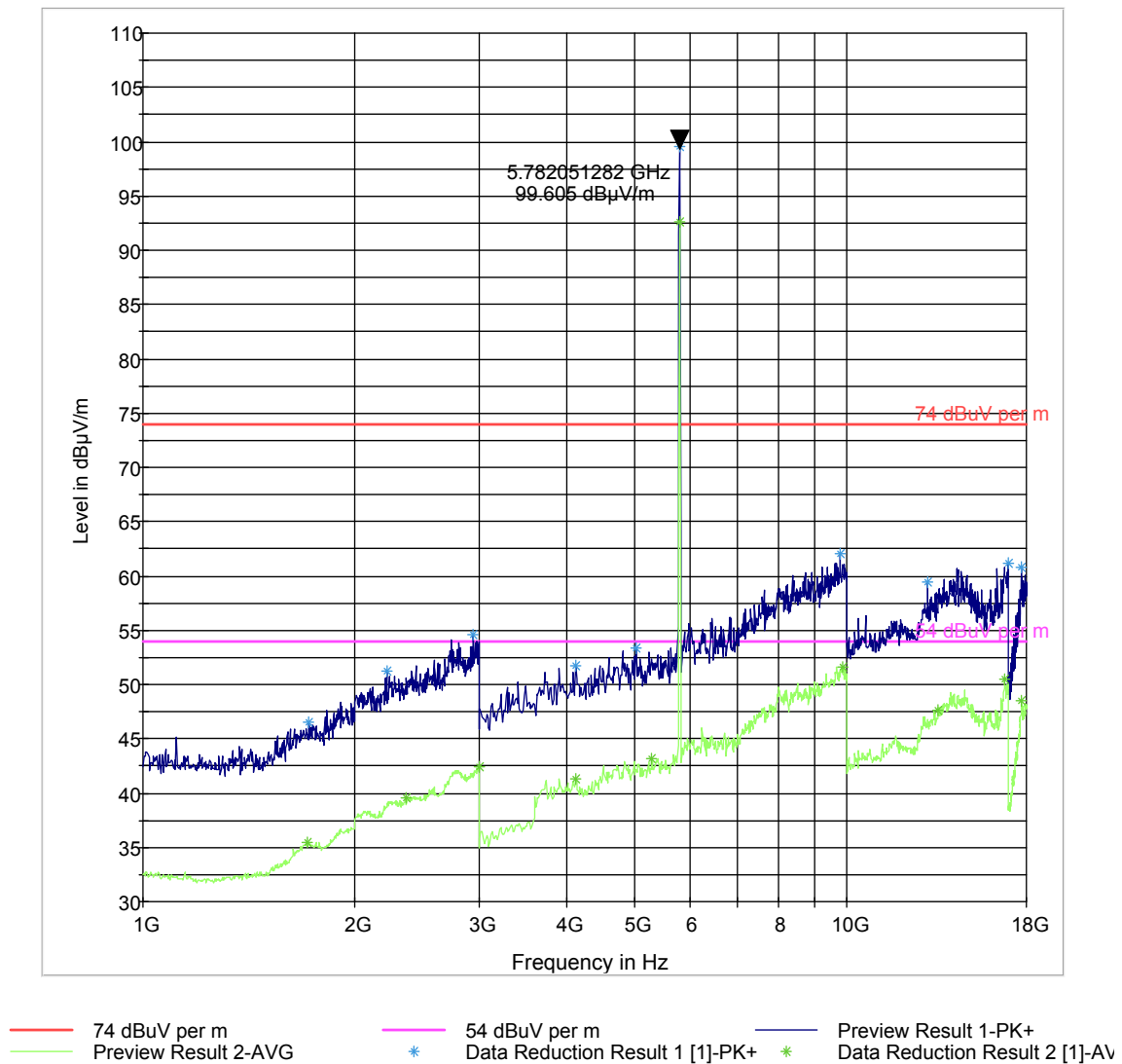
Transmitter Radiated Spurious Emissions – 802.11a Ch149; 1G – 18GHz



Transmitter Radiated Spurious Emissions – 802.11a Ch157; 30M – 1GHz

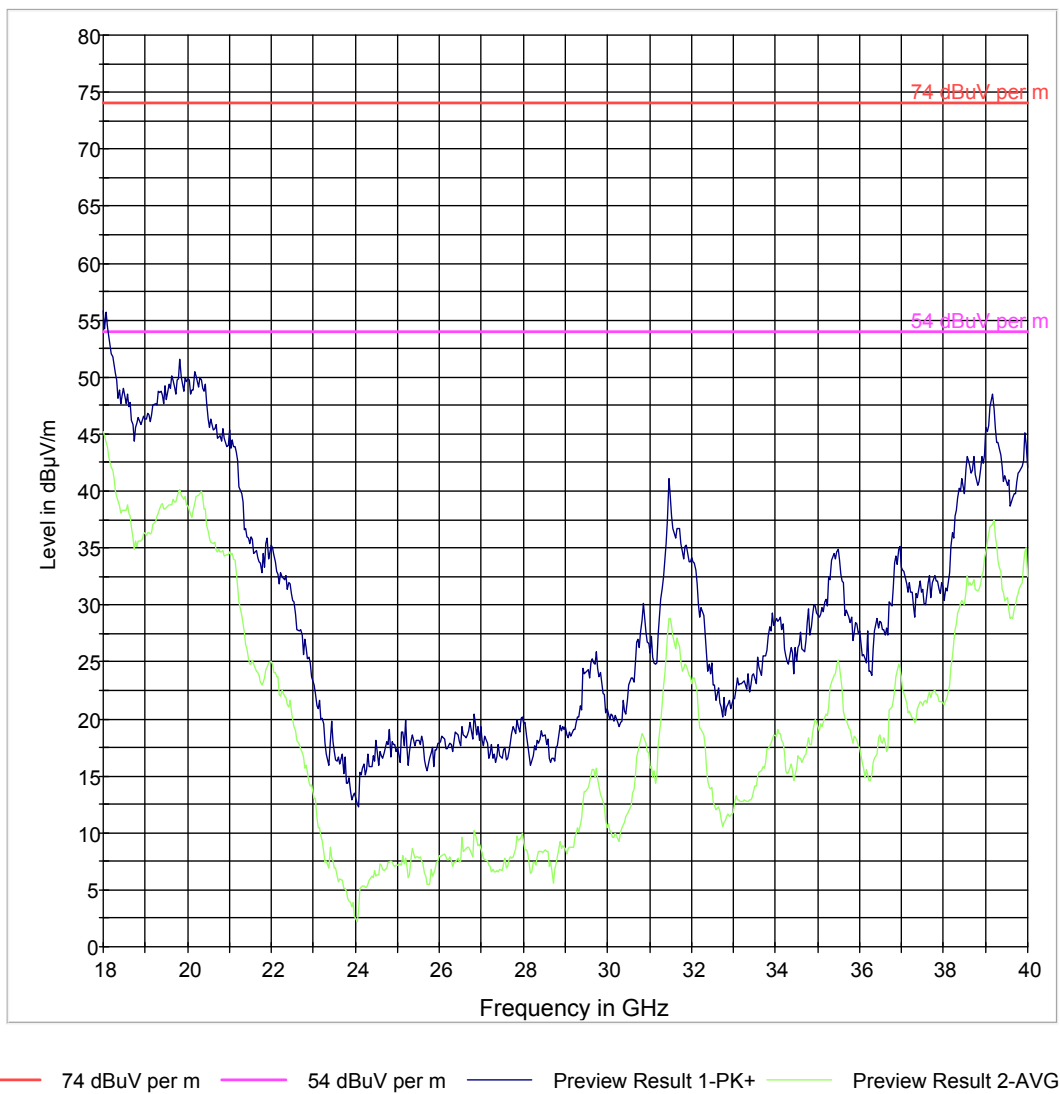


Transmitter Radiated Spurious Emissions – 802.11a Ch157; 1G – 18GHz

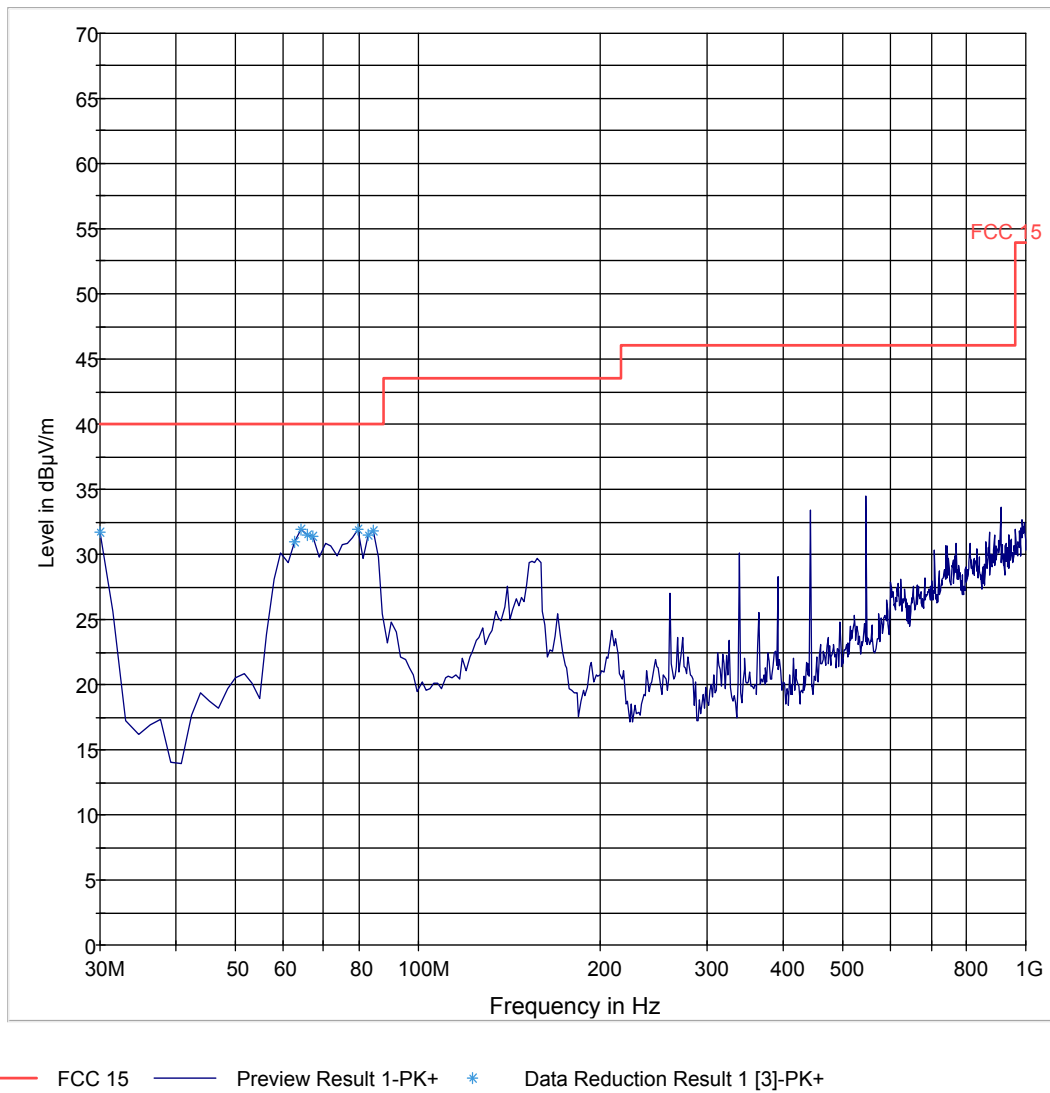


Transmitter Radiated Spurious Emissions – 802.11a – Ch 157; 18G –40GHz

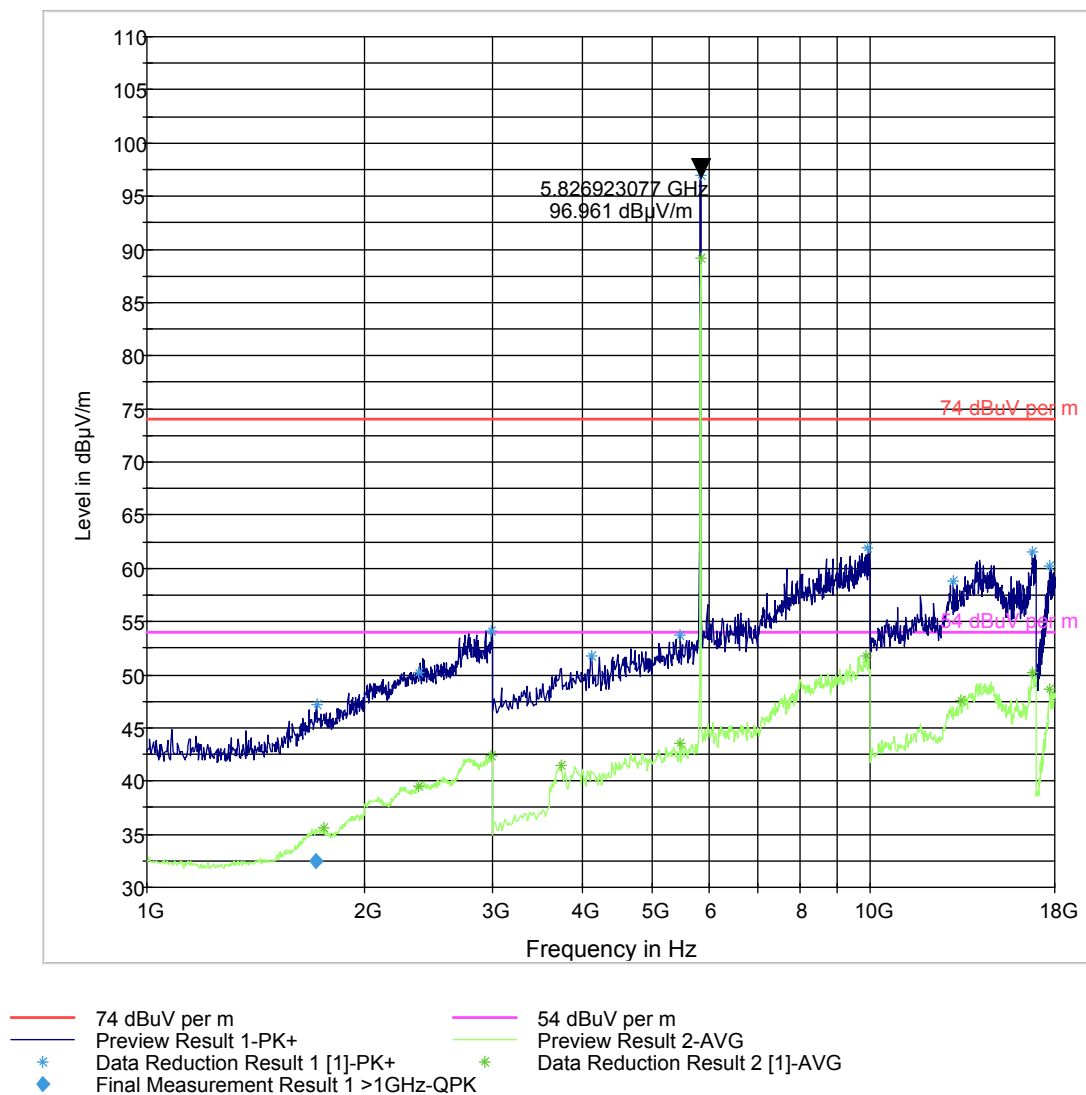
NOTE: Worst case for all channels in this frequency band



Transmitter Radiated Spurious Emissions – 802.11a Ch165; 30M – 1GHz

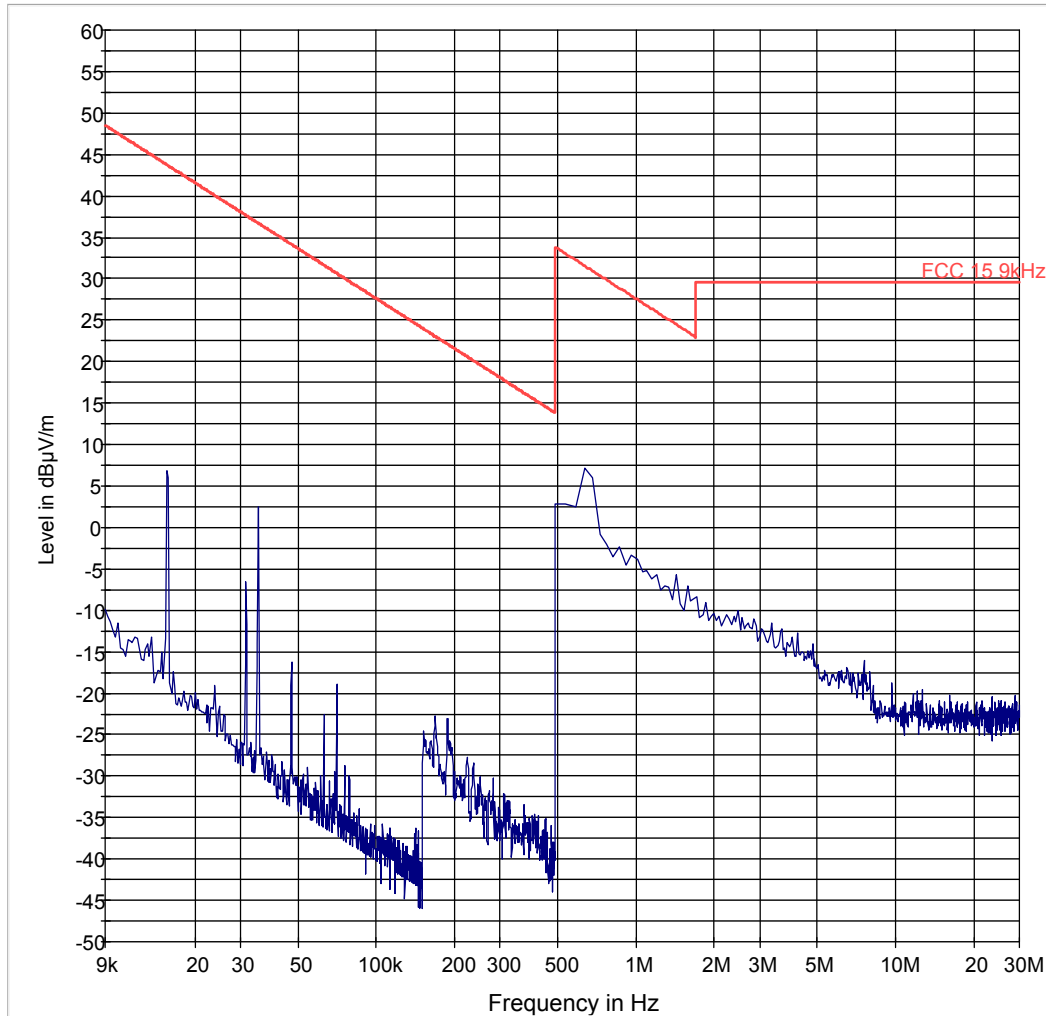


Transmitter Radiated Spurious Emissions – 802.11a Ch165; 1G – 18GHz



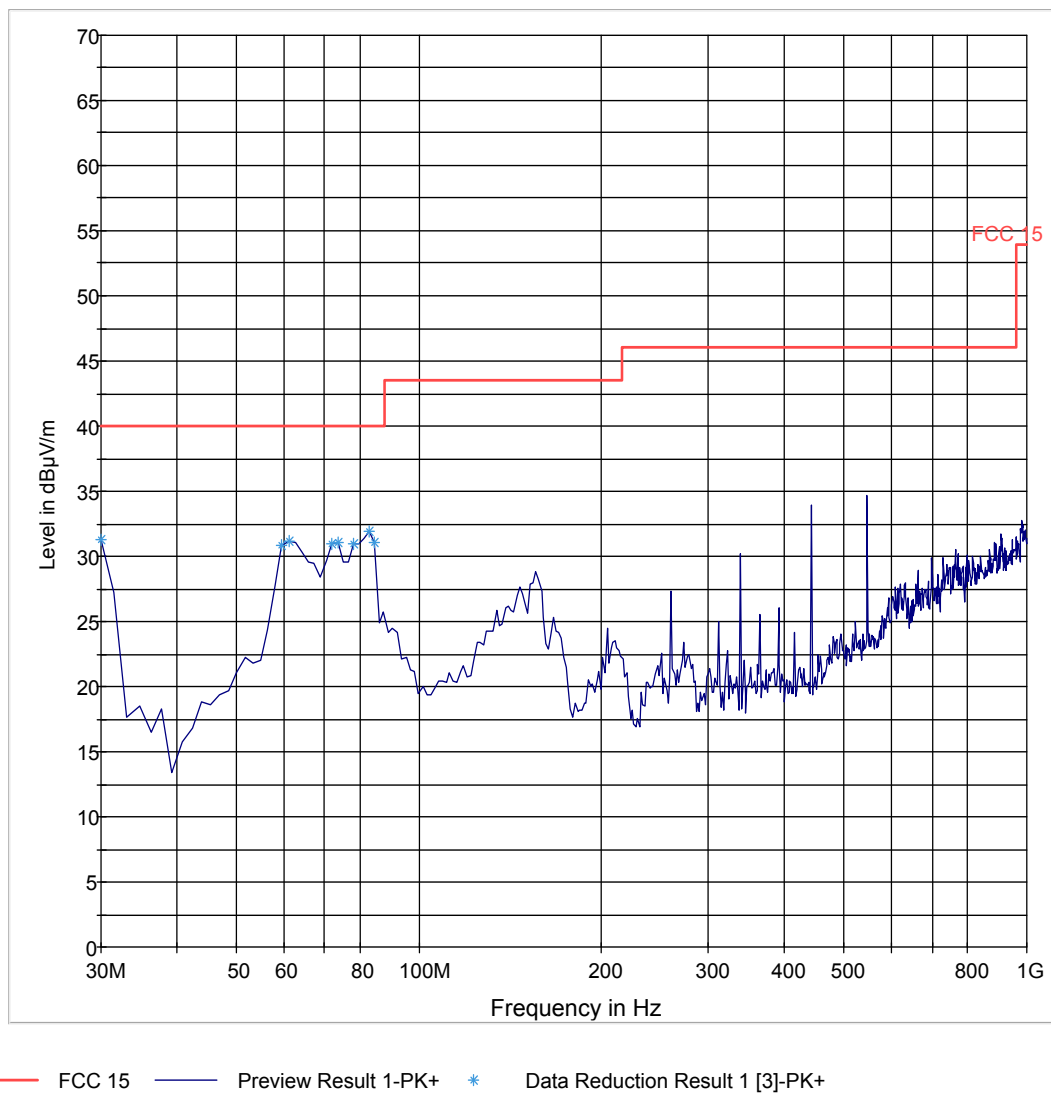
Transmitter Radiated Spurious Emissions – 802.11n; <30 MHz

Note: Worst case representation for all modes of operation in this frequency range.

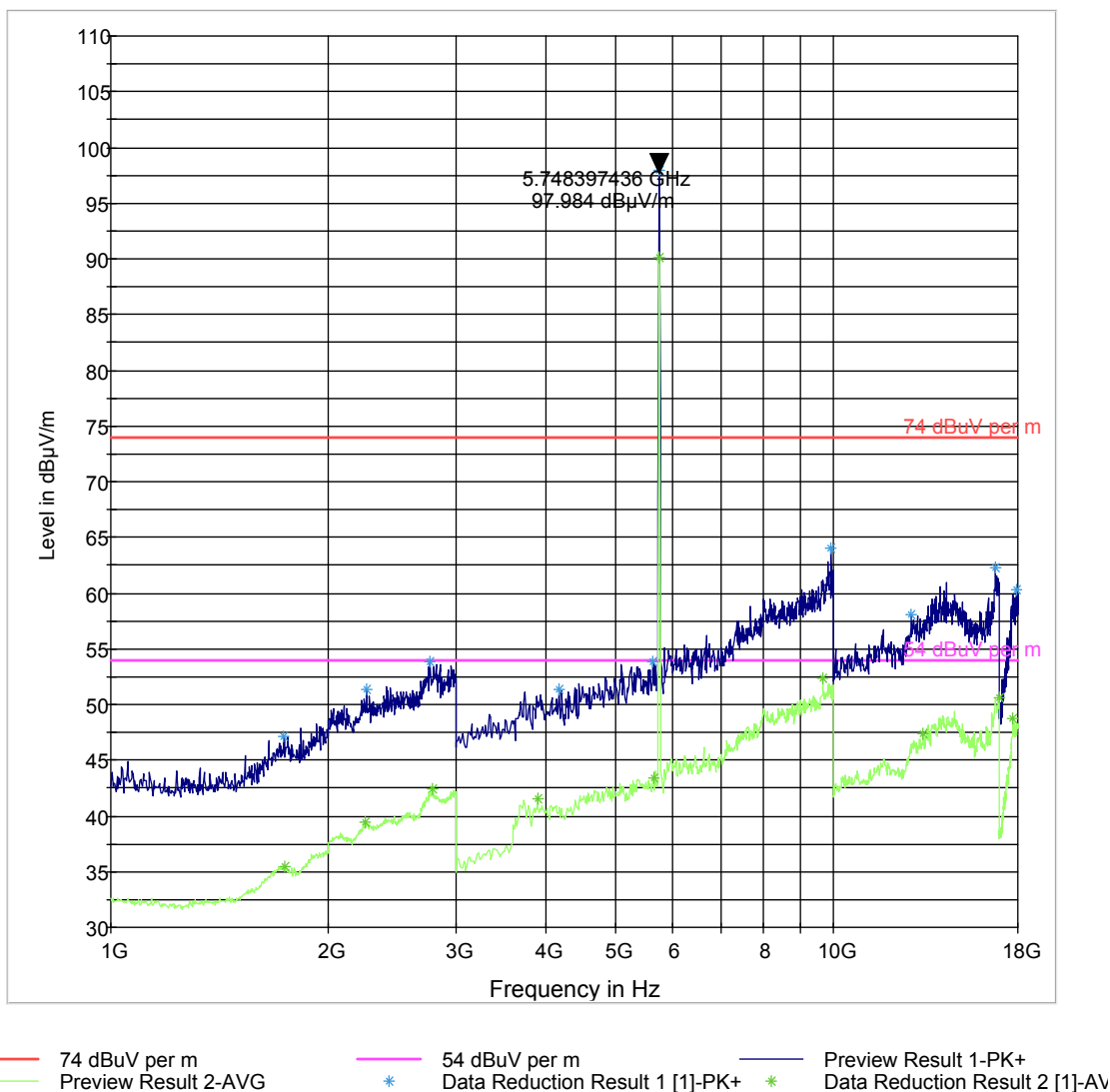


— FCC 15.9kHz — Preview Result 1-PK+

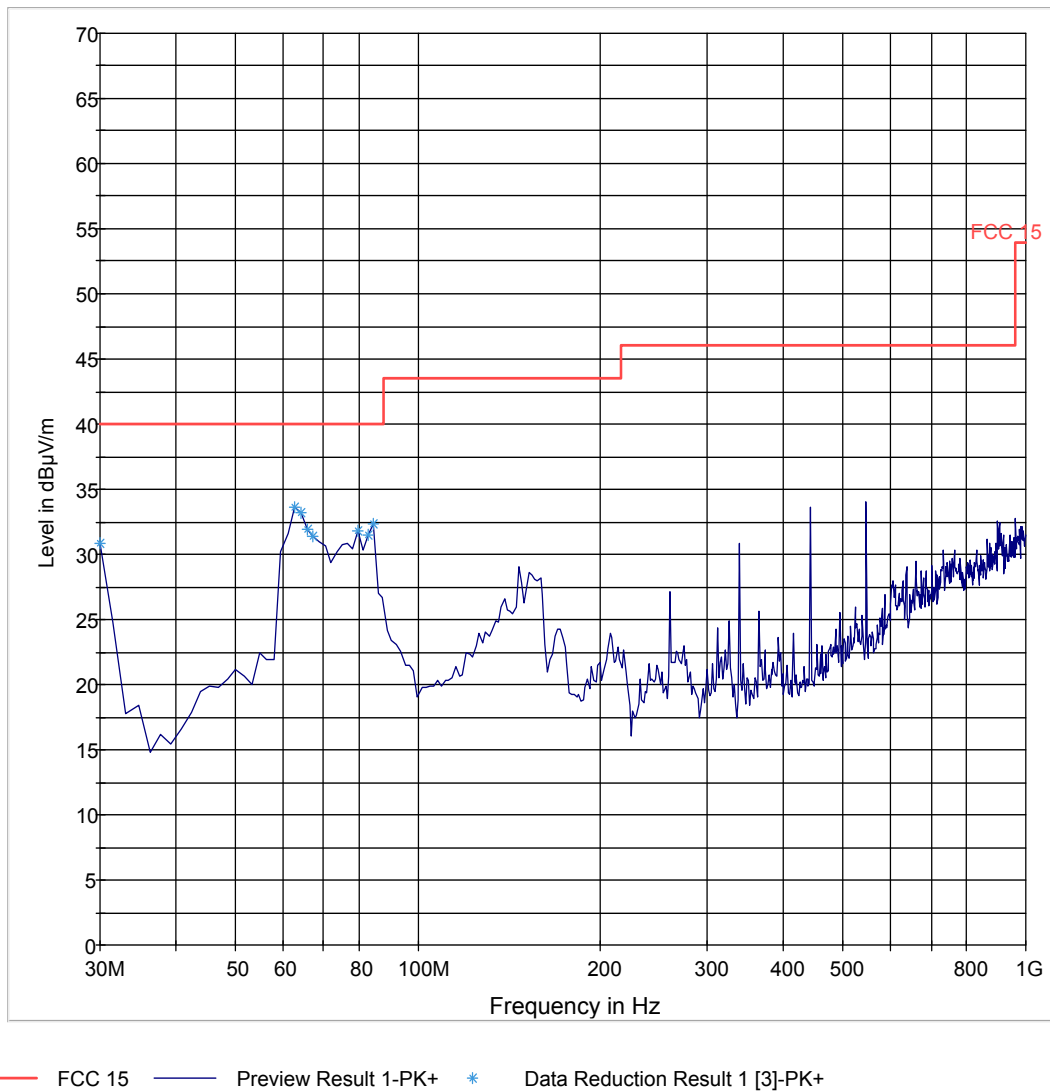
Transmitter Radiated Spurious Emissions – 802.11n Ch149; 30M – 1GHz



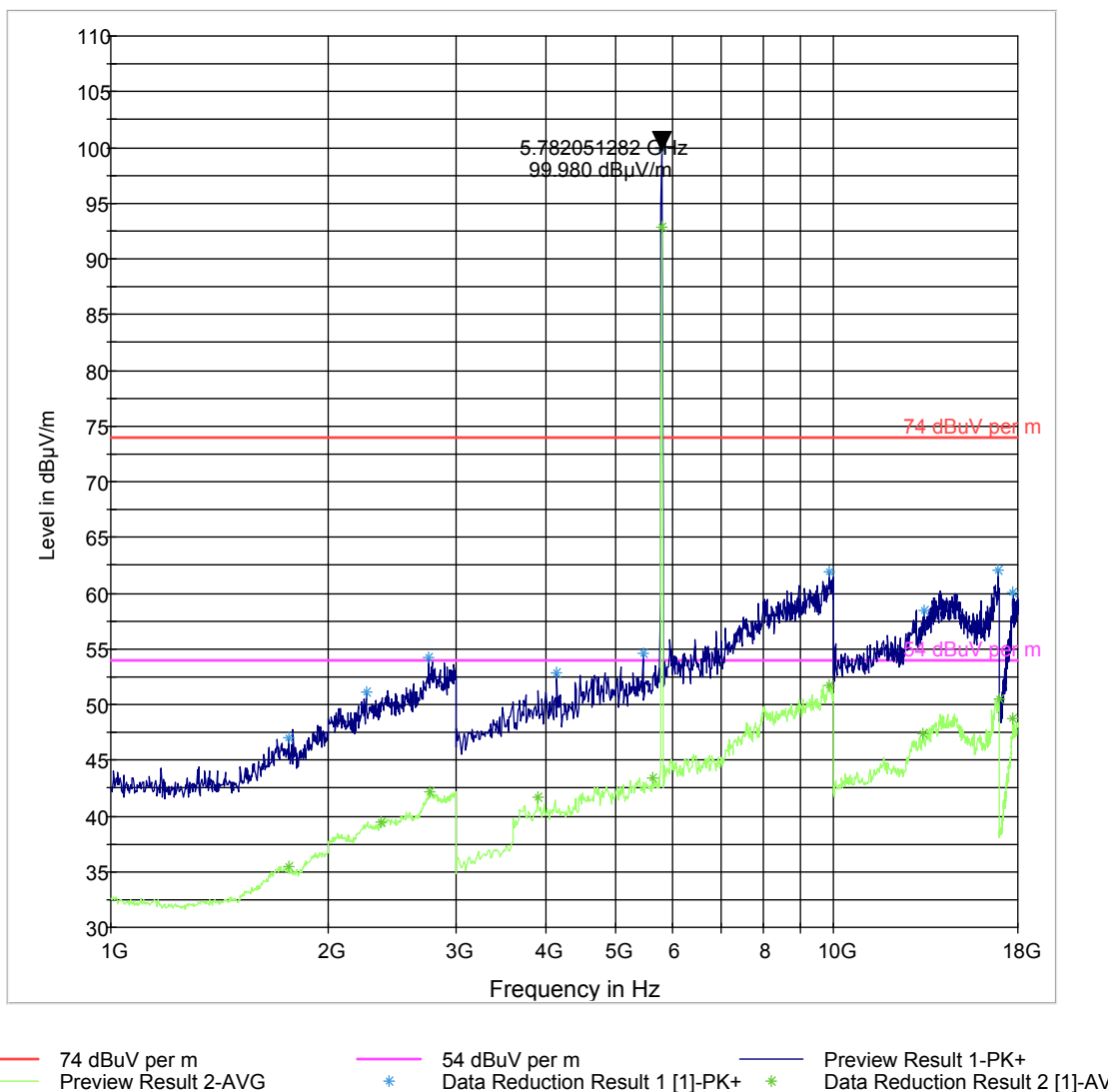
Transmitter Radiated Spurious Emissions – 802.11n Ch149; 1G – 18GHz



Transmitter Radiated Spurious Emissions – 802.11n Ch157; 30M – 1GHz

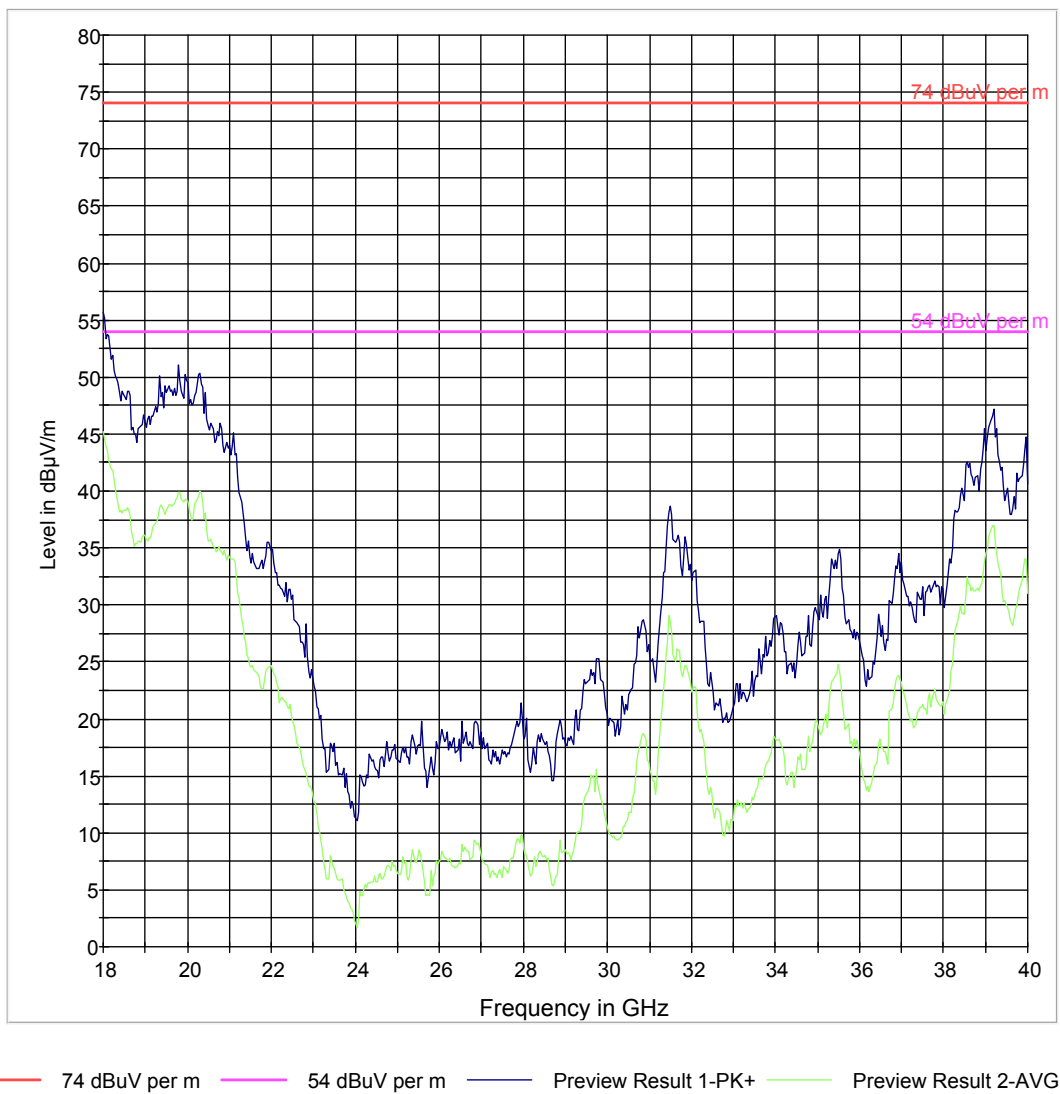


Transmitter Radiated Spurious Emissions – 802.11n Ch157; 1G – 18GHz

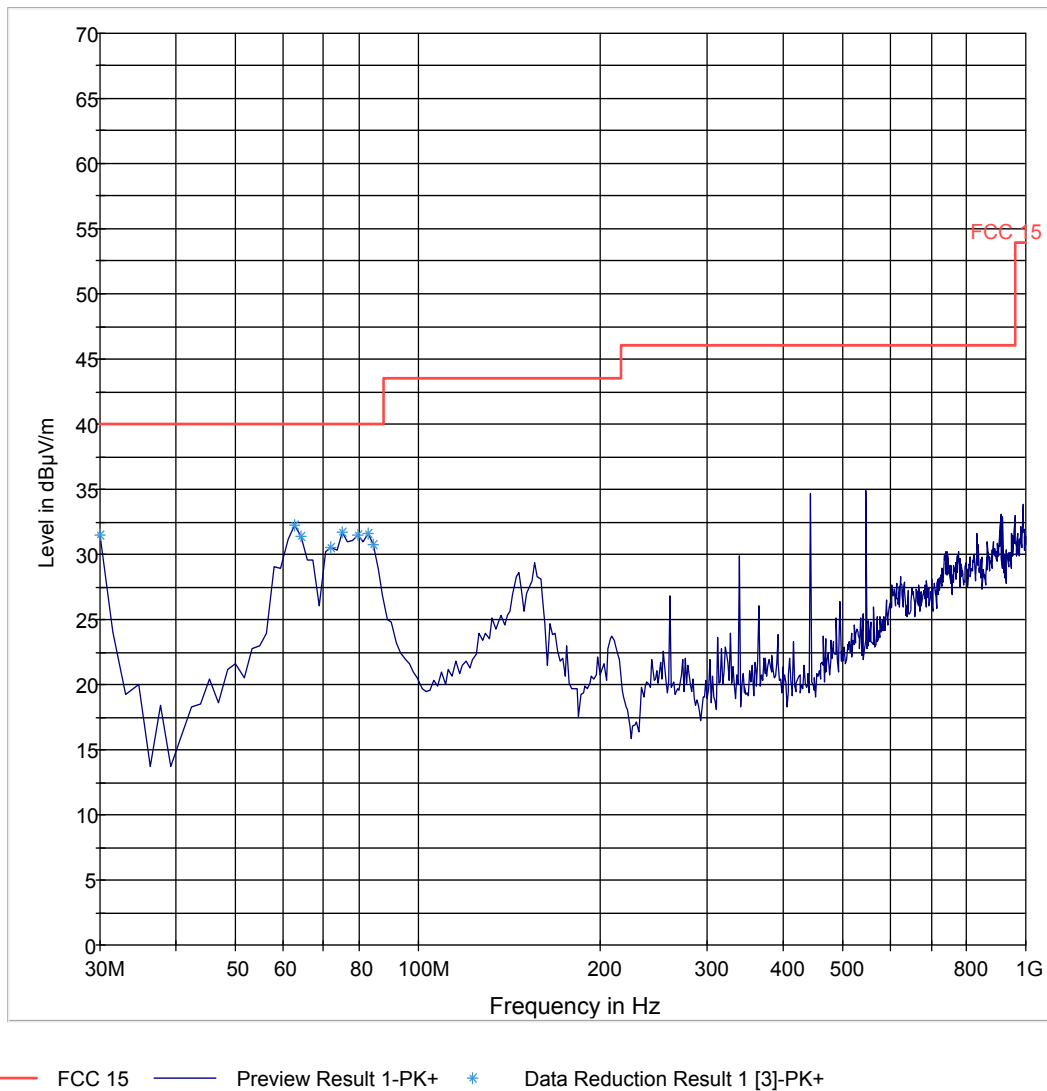


Transmitter Radiated Spurious Emissions – 802.11n – Ch 157; 26G –40GHz

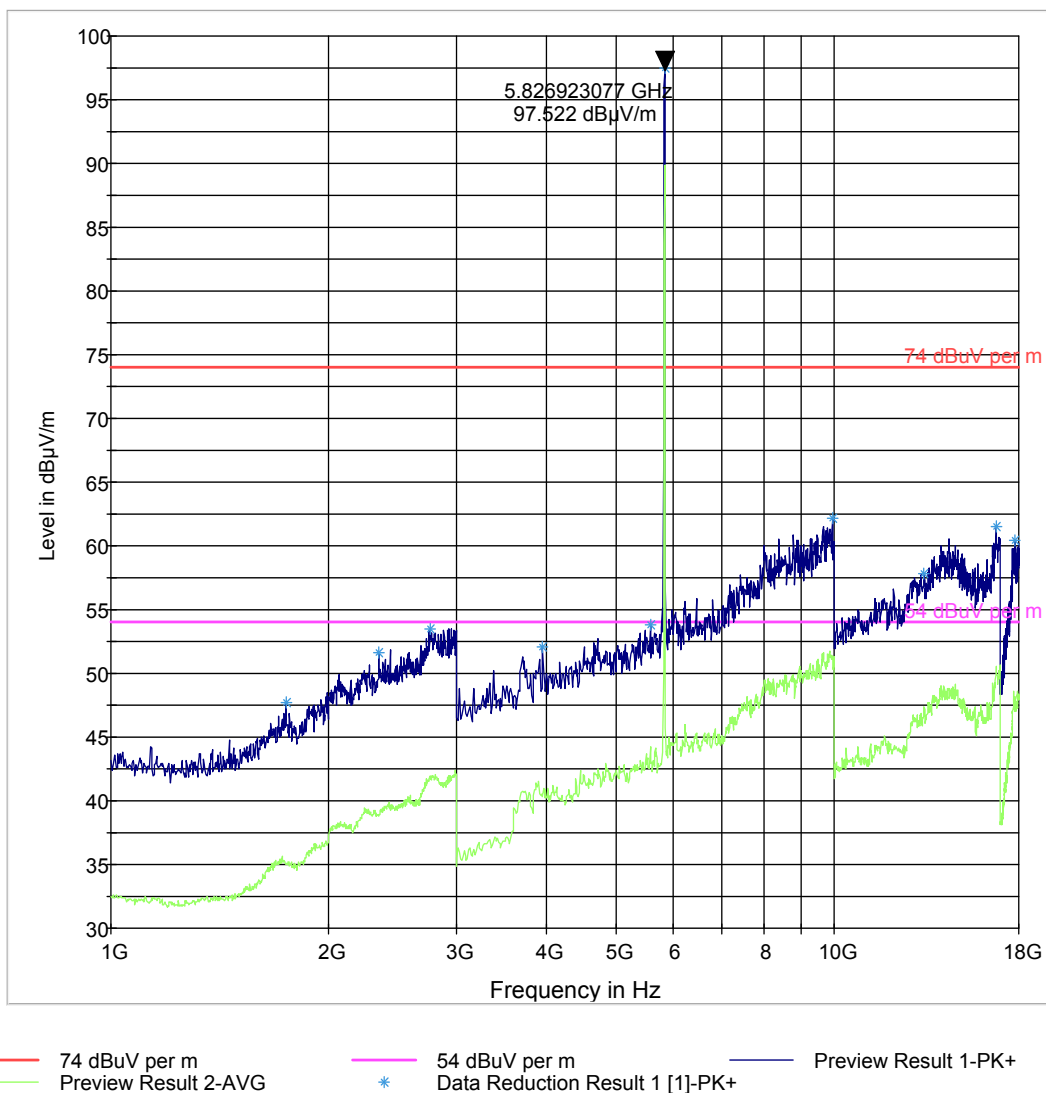
NOTE: Worst case for all channels in this frequency band



Transmitter Radiated Spurious Emissions – 802.11n Ch165; 30M – 1GHz



Transmitter Radiated Spurious Emissions – 802.11n Ch165; 1G – 18GHz



7 AC Power Line Conducted Emissions

7.1.1 References:

FCC: CFR Part 15.207

IC: RSS-Gen Section 7.2.2

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

7.1.2 Limits:

7.1.2.1 §15.207 Conducted limits- Intentional Radiators:

(a) Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator 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 (1), as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

7.1.2.2 RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown below. The tighter limit applies at the frequency range boundaries.

Table 1:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Analyzer Settings: CISPR Bandwidth- 9 KHz.

7.1.3 Test Conditions:

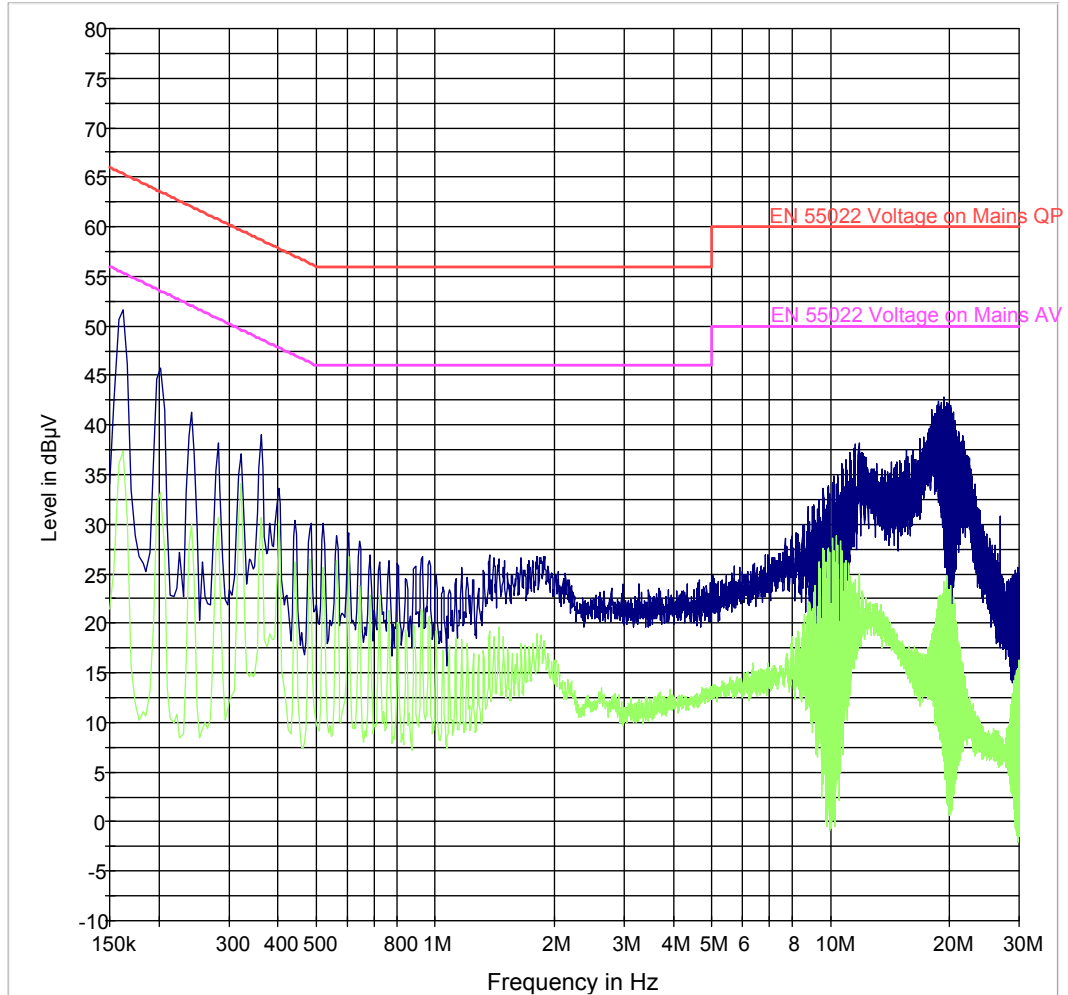
Modulation: 2.4 Ghz 802.11b mode and 5 GHz 802.11a mode.

Measurement Uncertainty: ± 3.0 dB

Note: Plots shown here represent the combined worse case emissions for power lines, phases and neutral line.

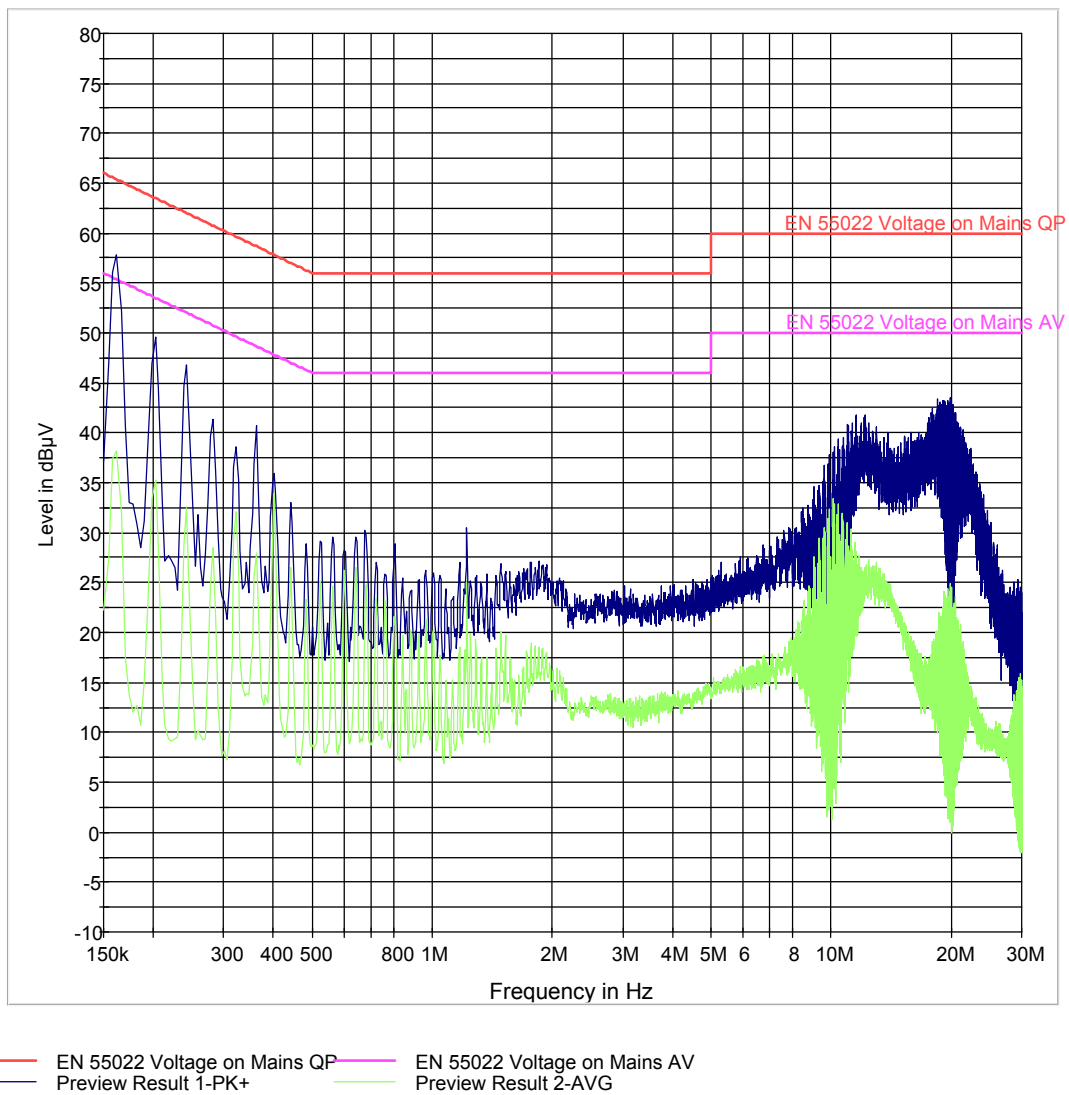
7.1.4 Test Results:

2.4GHz WLAN TX Mode:



— EN 55022 Voltage on Mains QP — EN 55022 Voltage on Mains AV
— Preview Result 1-PK+ — Preview Result 2-AVG

5GHz WLAN TX Mode:





8 Test Equipment and Ancillaries used for tests

No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer	Rohde&Schwarz	ESU 40	100251	May 2012	1 Year
	Spectrum Analyzer	Agilent	E4440A	MY46186445	Dec 2012	1 Year
	1500MHz HP Filter	Filtek	HP12/1700	14c48	N/A	N/A
	2800 MHz HP Filter	Filtek	HP12/2800	14C47	N/A	N/A
	Pre-Amplifier	Miteq	JS40010260	340125	N/A	N/A
	Binconilog Antenna	EMCO	3141	0005-1186	Apr 2012	3 Years
	Binconilog Antenna	ETS	3149	J000123908	Feb 2012	3 years
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
	LISN	FCC	50-25-2-08	08014	Jul 2012	1 Year
Ancillary equipment						
	Multimeter	Klein Tools	MM200	001	Apr 2011	2 Years
	Humidity Temperature Logger	Dickson	TM320	03280063	Mar 2012	1 Year
	Digital Barometer	VWR	35519-055	91119547	Nov 2011	2 Years
	DC Power Supply	HP	E3610A	KR83023316	N/A	N/A
	DC Power Supply	Protek	3003B	H012771	N/A	N/A
	Communication Antenna	IBP5-900/1940	Kathrein	N/A	N/A	N/A

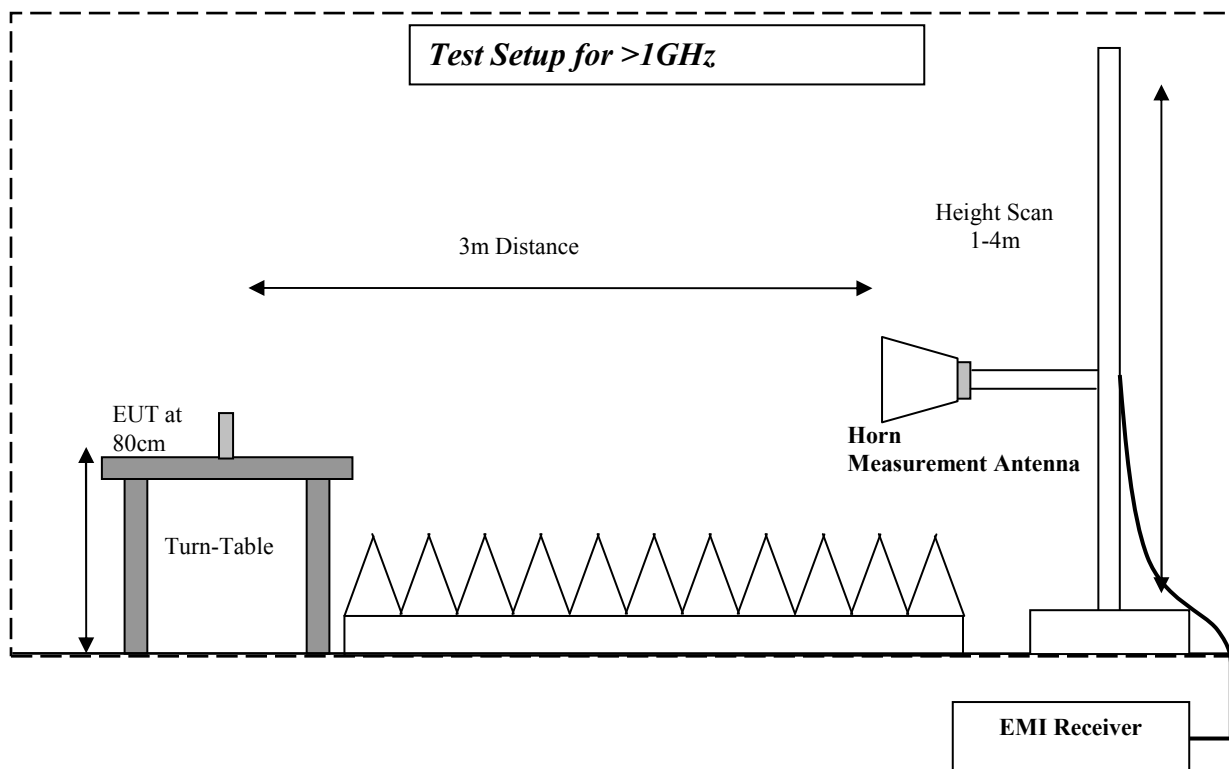
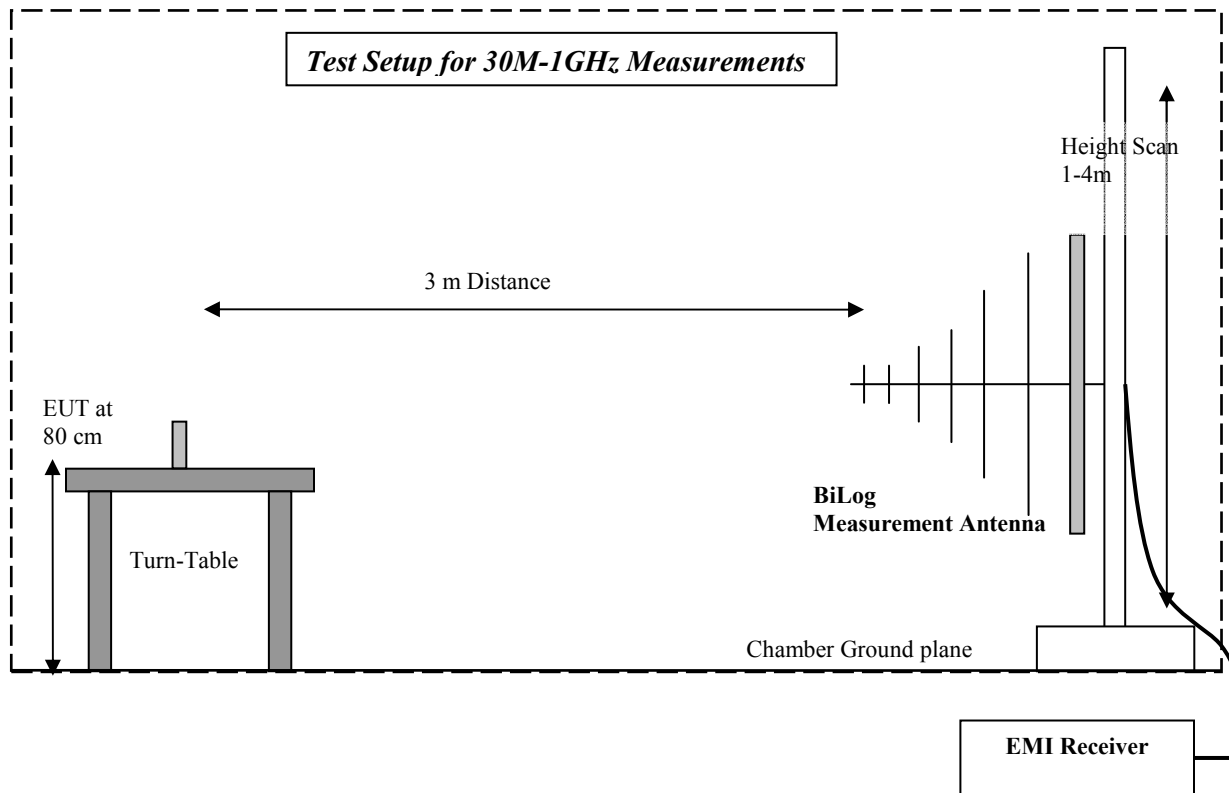
Calibration status valid at the time of testing.

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month.

Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

9 Test Setup Diagrams:



Test Report #: EMC_HONEY_095_12003_70eLGN_DTS

FCC ID: HD570ELGN

Date of Report : 2013-05-28

IC ID: 1693B-70E1



10 Revision History

Date	Report Name	Changes to report	Report prepared by
2013-05-28	EMC_HONEY-095-12003_70eLGN_DTS	First Version	Tunji Yusuf