

# RF TEST REPORT

Test item : NETWORK IP CAMERA  
Model No. : MNC-H200  
Order No. : DTNC1502-00787  
Date of receipt : 2015-02-24  
Test duration : 2015-03-19 ~ 2015-04-10  
Date of issue : 2015-04-15  
Use of report : FCC Original Grant

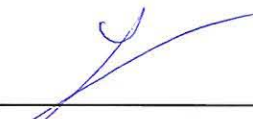
Applicant : MCNEX CO., LTD.  
Hanshin IT Tower 2, 60-18, Gasan-dong, Geumcheon-gu, Seoul, Korea

Test laboratory : DT&C Co., Ltd.  
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification : FCC Part 15 Subpart C 247  
Test environment : See appended test report  
Test result : ☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



Engineer  
KwiCheol Yeom

Reviewed by:



Technical Manager  
Bongjin Kim

## Test Report Version

Test Report No.	Date	Description
DRTFCC1504-0084	Apr. 15, 2015	Initial issue

# Table of Contents

<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
<b>2. EUT DESCRIPTION .....</b>	<b>4</b>
<b>3. SUMMARY OF TESTS .....</b>	<b>5</b>
<b>4. TEST METHODOLOGY .....</b>	<b>6</b>
4.1 EUT CONFIGURATION .....	6
4.2 EUT EXERCISE .....	6
4.3 GENERAL TEST PROCEDURES .....	6
4.4 DESCRIPTION OF TEST MODES .....	6
<b>5. INSTRUMENT CALIBRATION .....</b>	<b>7</b>
<b>6. FACILITIES AND ACCREDITATIONS .....</b>	<b>7</b>
6.1 FACILITIES .....	7
6.2 EQUIPMENT .....	7
<b>7. ANTENNA REQUIREMENTS .....</b>	<b>7</b>
<b>8. TEST RESULT .....</b>	<b>8</b>
8.1 6 dB Bandwidth .....	8
8.2 Maximum Peak Conducted Output Power .....	21
8.3 Maximum Power Spectral Density .....	24
8.4 Out of Band Emissions at the Band Edge / Conducted Spurious Emissions .....	37
8.5 Radiated Spurious Emissions .....	86
8.6 Power-line conducted emissions .....	94
8.7 Occupied bandwidth .....	99
<b>9. LIST OF TEST EQUIPMENT .....</b>	<b>100</b>
<b>APPENDIX I .....</b>	<b>101</b>
<b>APPENDIX II .....</b>	<b>102</b>

## 1. GENERAL INFORMATION

**Applicant** : MCNEX CO., LTD.  
**Address** : Hanshin IT Tower 2, 60-18, Gasan-dong, Geumcheon-gu, Seoul, Korea  
**FCC ID** : 2ABC6MNC-H200  
**EUT** : NETWORK IP CAMERA  
**Model** : MNC-H200  
**Additional Model(s)** : MNC-H200W, MNC-H200P,  
MNC-H201, MNC-H202, MNC-H203, MNC-H204, MNC-H205,  
MNC-H206, MNC-H207, MNC-H208, MNC-H209, MNC-H210  
**Date of Test** : 2015-03-19 ~ 2015-04-10  
**Contact person** : Gi-ho Kim

## 2. EUT DESCRIPTION

<b>Product</b>	NETWORK IP CAMERA
<b>Model Name</b>	MNC-H200, MNC-H200W, MNC-H200P, MNC-H201, MNC-H202, MNC-H203, MNC-H204, MNC-H205, MNC-H206, MNC-H207, MNC-H208, MNC-H209, MNC-H210
<b>Power Supply</b>	DC 5 V DC 48 V (PoE)
<b>Frequency Range</b>	2.4GHz Band ▪ 802.11b/g/n(20 MHz): 2412 MHz ~ 2462 MHz
<b>Max. RF Output Power</b>	DC 5V ▪ 802.11b: 18.31 dBm ▪ 802.11g: 22.86 dBm ▪ 802.11n (HT20): 22.01 dBm DC 48V (PoE) ▪ 802.11b: 18.29 dBm ▪ 802.11g: 22.58 dBm ▪ 802.11n (HT20): 21.99 dBm
<b>Modulation Type</b>	802.11b: DSSS/CCK 802.11g/n: OFDM
<b>Antenna Specification</b>	Internal Antenna (1TX ,1RX) ▪ 2.4GHz Band Max. peak gain : -3.54 dBi

### 3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
<b>I. Transmitter Mode (TX)</b>					
15.247(a)	RSS-210 [A8.2]	6 dB Bandwidth	> 500 kHz	Conducted	<b>C</b>
15.247(b)	RSS-210 [A8.4]	Transmitter Output Power	< 1 Watt		<b>C</b>
15.247(d)	RSS-210 [A8.5]	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW		<b>C</b>
15.247(e)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8 dBm / 3 kHz		<b>C</b>
-	RSS-Gen [6.6]	Occupied Bandwidth (99%)	RSS-Gen(6.6)		<b>NA</b>
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	<FCC 15.209 limits	Radiated	<b>C</b> <sup>Note 2</sup>
15.207	RSS-Gen [8.8]	AC Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	<b>C</b>
15.203	RSS-Gen [6.7]	Antenna Requirements	FCC 15.203	-	<b>C</b>
<p>Note 1: <b>C</b>=Comply    <b>NC</b>=Not Comply    <b>NT</b>=Not Tested    <b>NA</b>=Not Applicable</p> <p>Note 2: This test item was performed in each axis and the worst case data was reported.</p>					

## 4. TEST METHODOLOGY

Generally the tests were performed according to the KDB558074 v03r2. And ANSI C63.10-2009 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing

### 4.1 EUT CONFIGURATION

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

### 4.2 EUT EXERCISE

The EUT was operated in the test mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

### 4.3 GENERAL TEST PROCEDURES

#### Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB 558074 v03r2. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15MHz and 30MHz using CISPR Quasi-peak and Average detector.

#### Radiated Emissions

Basically the radiated tests were performed with KDB 558074 v03r2. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB 558074 v03r2.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes..

### 4.4 DESCRIPTION OF TEST MODES

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics. A test program is used to control the EUT for staying in continuous transmitting mode.

## 5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

## 6. FACILITIES AND ACCREDITATIONS

### 6.1 FACILITIES

The open area test site (OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- **Semi anechoic chamber registration Number: 165783**

### 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 7. ANTENNA REQUIREMENTS

### 7.1 According to FCC 47 CFR §15.203& RSS-Gen [6.7]:

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

**The antenna is permanently attached.**

**Therefore this module Complies with the requirement of §15.203**

## 8. TEST RESULT

### 8.1 6 dB Bandwidth

#### Test Requirements and limit, §15.247(a) & RSS-210 [A8.2]

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

**The minimum permissible 6dB bandwidth is 500 kHz.**

#### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB558074 v03r2**.

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.  
**(RBW:100kHz/VBW:300 kHz)**
3. Detector = **Peak**.
4. Trace mode = **max hold**.
5. Sweep = **auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outer most amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### ■ TEST RESULTS: **Comply**

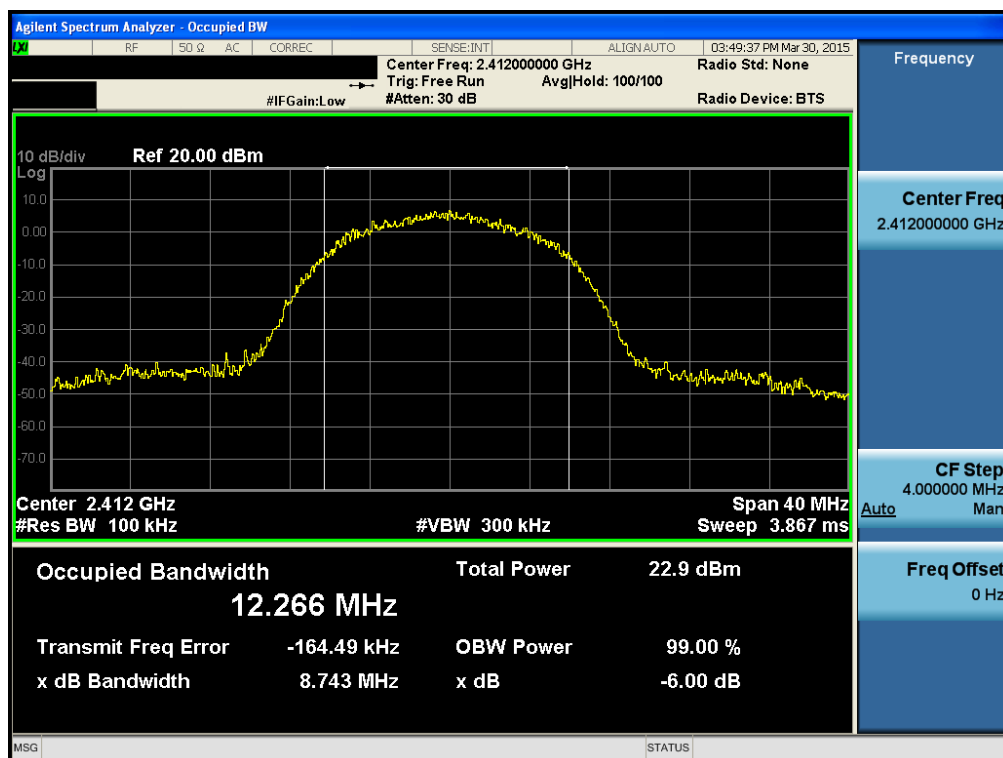
Power Supply	Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]
DC 5V	802.11b	11 Mbps	2412	8.743
			2437	8.696
			2462	8.088
	802.11g	54 Mbps	2412	15.740
			2437	15.470
			2462	15.760
	802.11n (20 MHz)	MCS 7	2412	16.720
			2437	17.260
			2462	16.330
DC 48V (PoE)	802.11b	11 Mbps	2412	7.667
			2437	7.281
			2462	7.033
	802.11g	54 Mbps	2412	15.690
			2437	15.690
			2462	16.290
	802.11n (20 MHz)	MCS 7	2412	16.040
			2437	16.360
			2462	16.180



## ■ RESULT PLOTS (DC 5V)

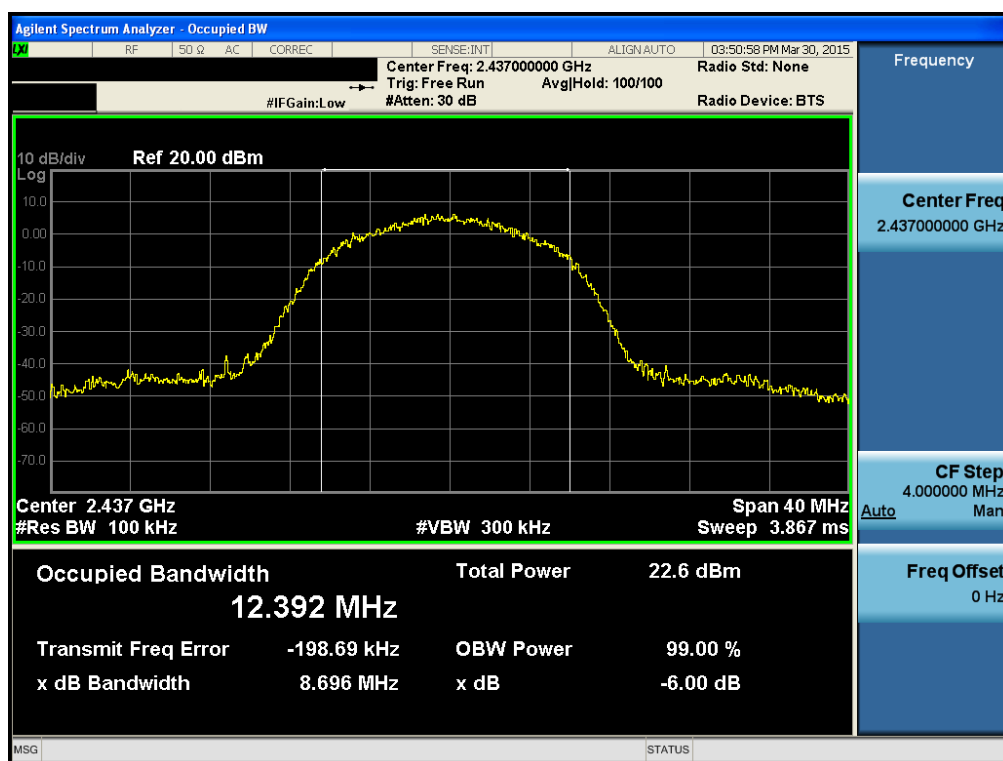
6 dB Bandwidth

Test Mode: 802.11b &amp; 11 Mbps &amp; 2412 MHz



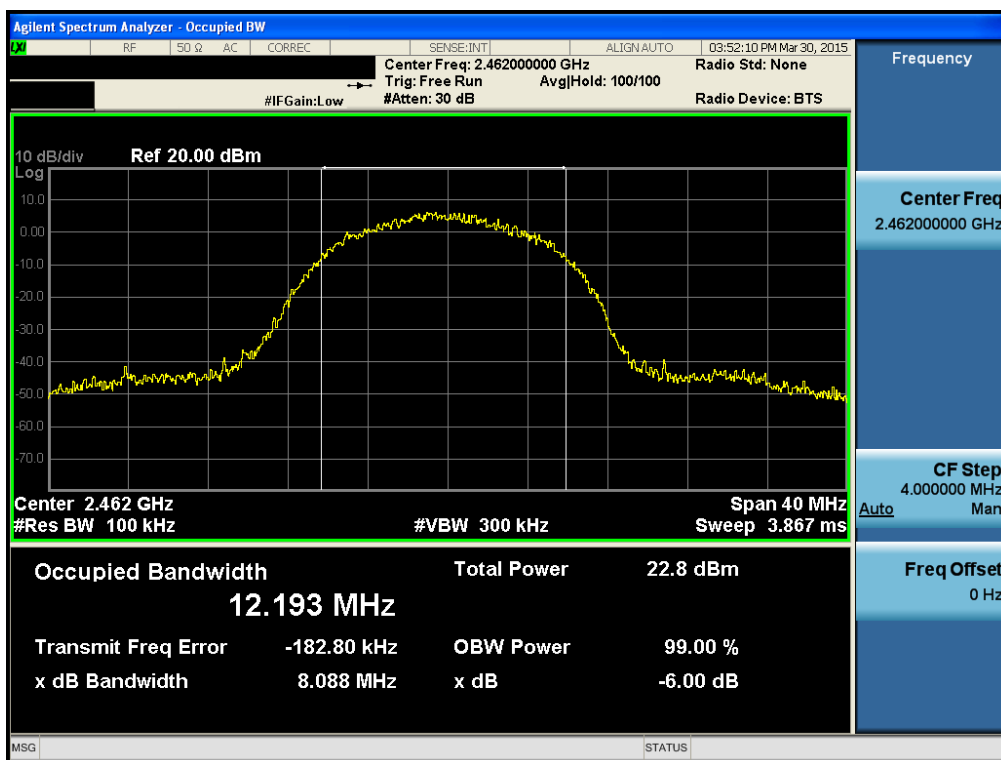
6 dB Bandwidth

Test Mode: 802.11b &amp; 11 Mbps &amp; 2437 MHz



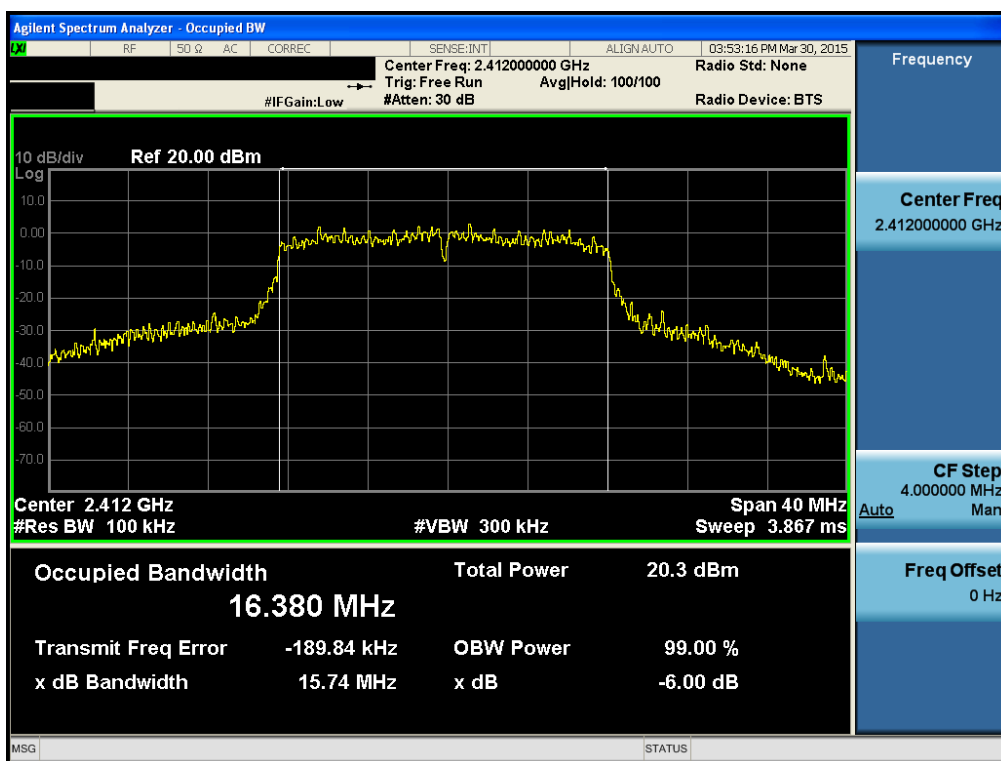
## 6 dB Bandwidth

Test Mode: 802.11b &amp; 11 Mbps &amp; 2462 MHz



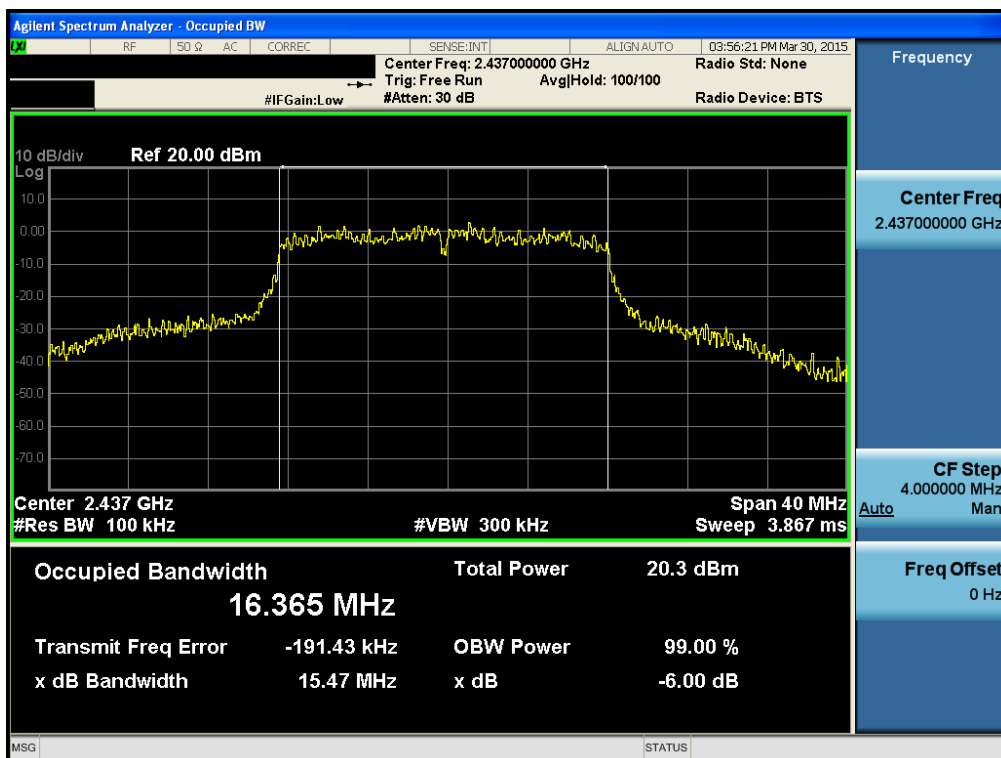
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2412 MHz



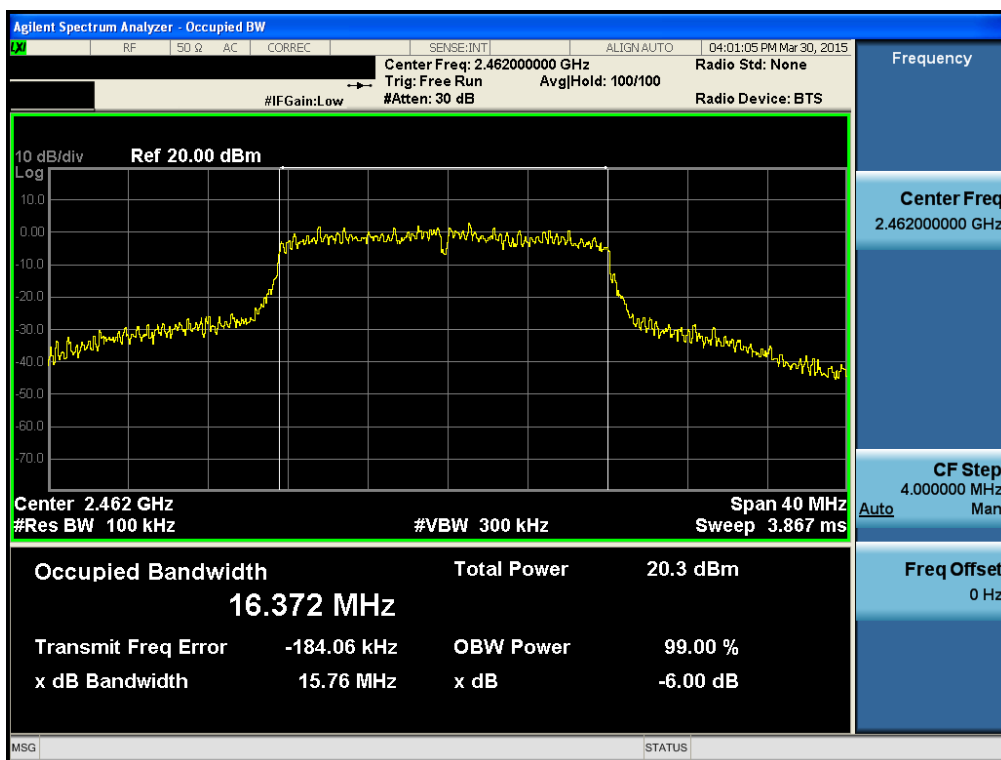
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2437 MHz



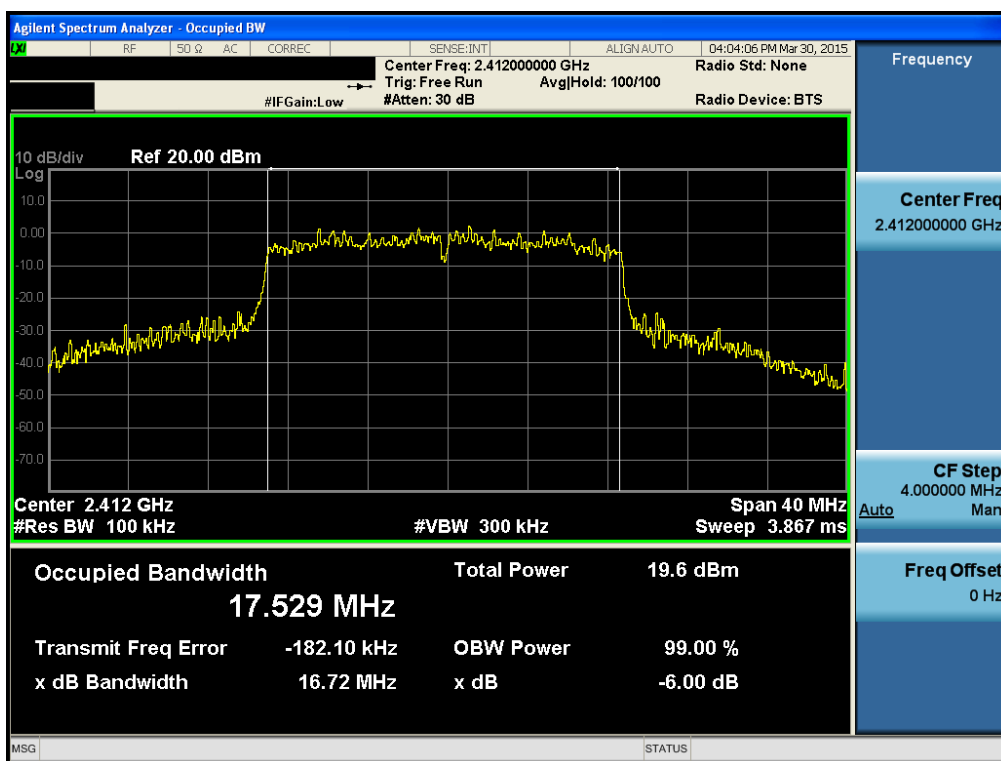
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2462 MHz



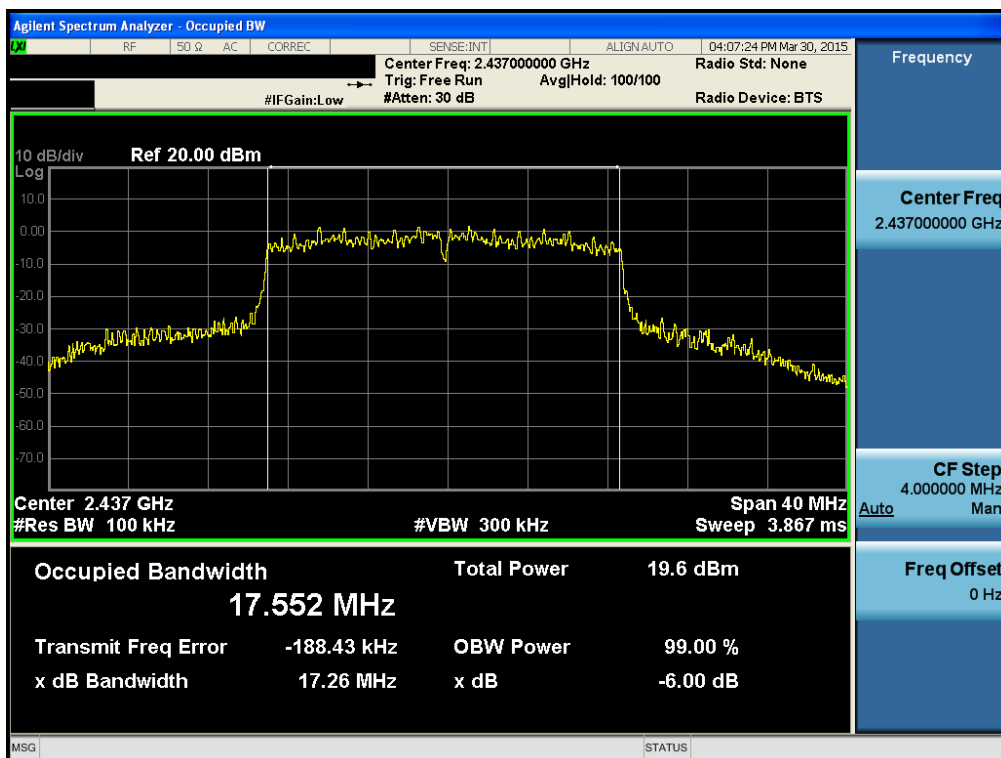
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2412 MHz



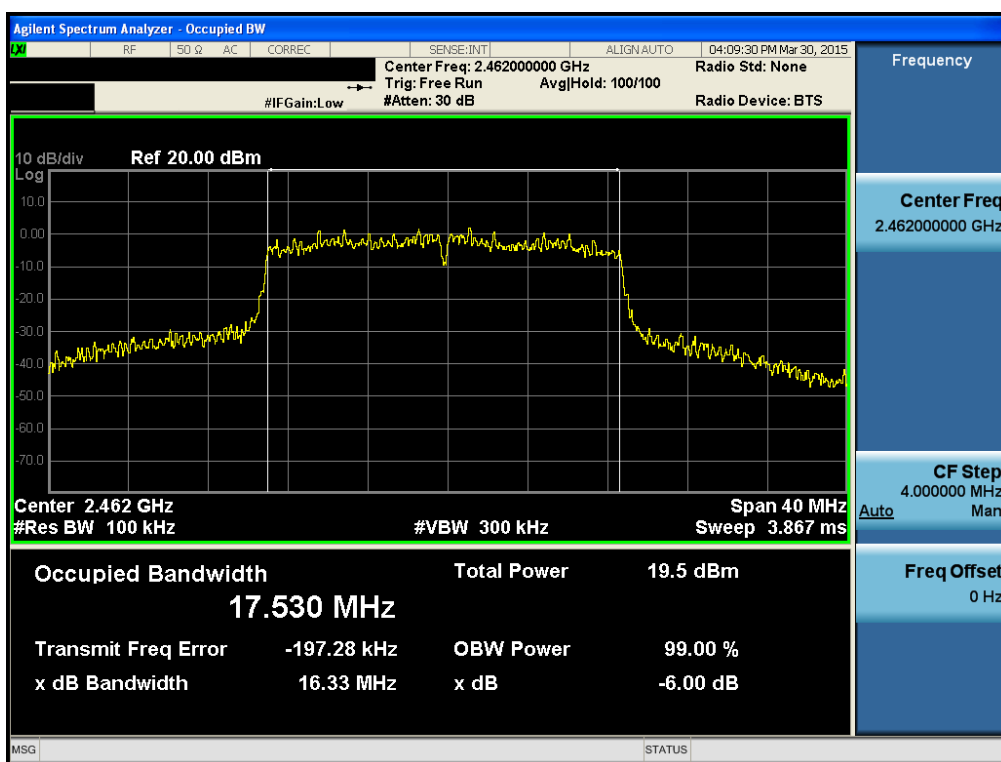
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2437 MHz



## 6 dB Bandwidth

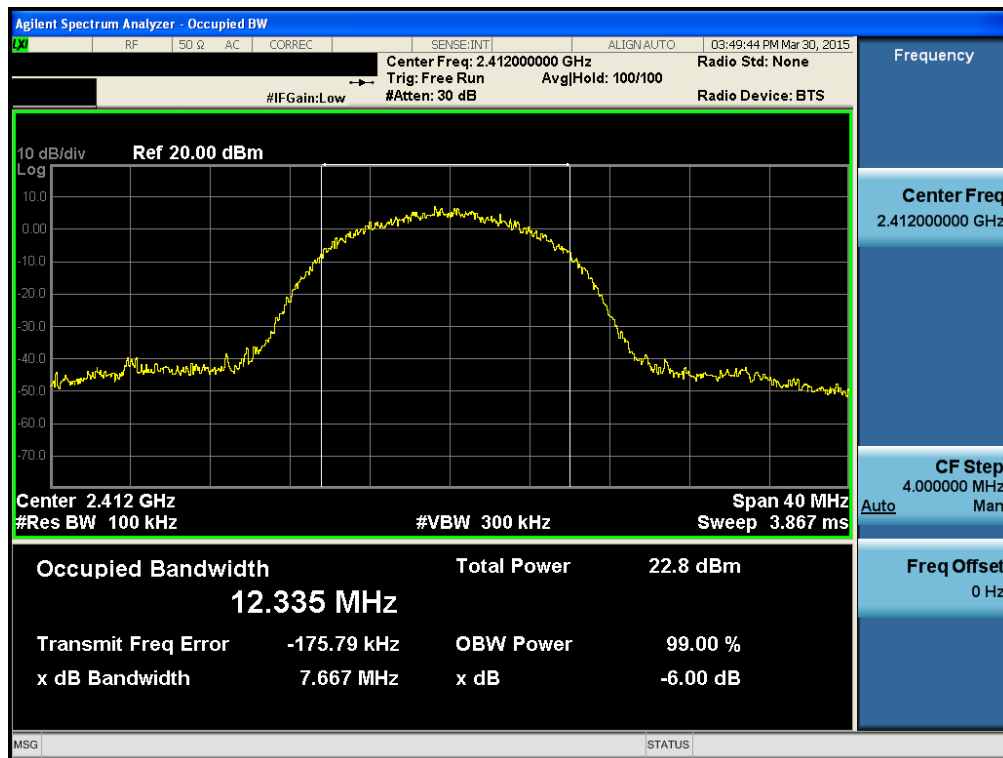
Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2462 MHz



## ■ RESULT PLOTS (DC 48V(PoE))

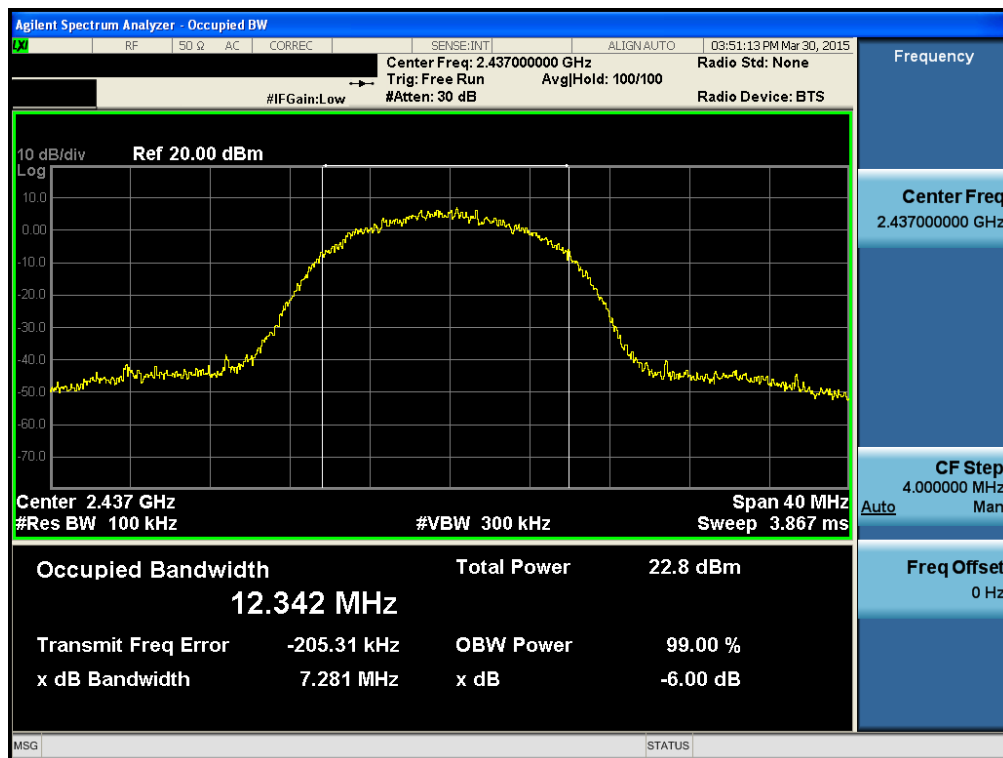
6 dB Bandwidth

Test Mode: 802.11b &amp; 11 Mbps &amp; 2412 MHz



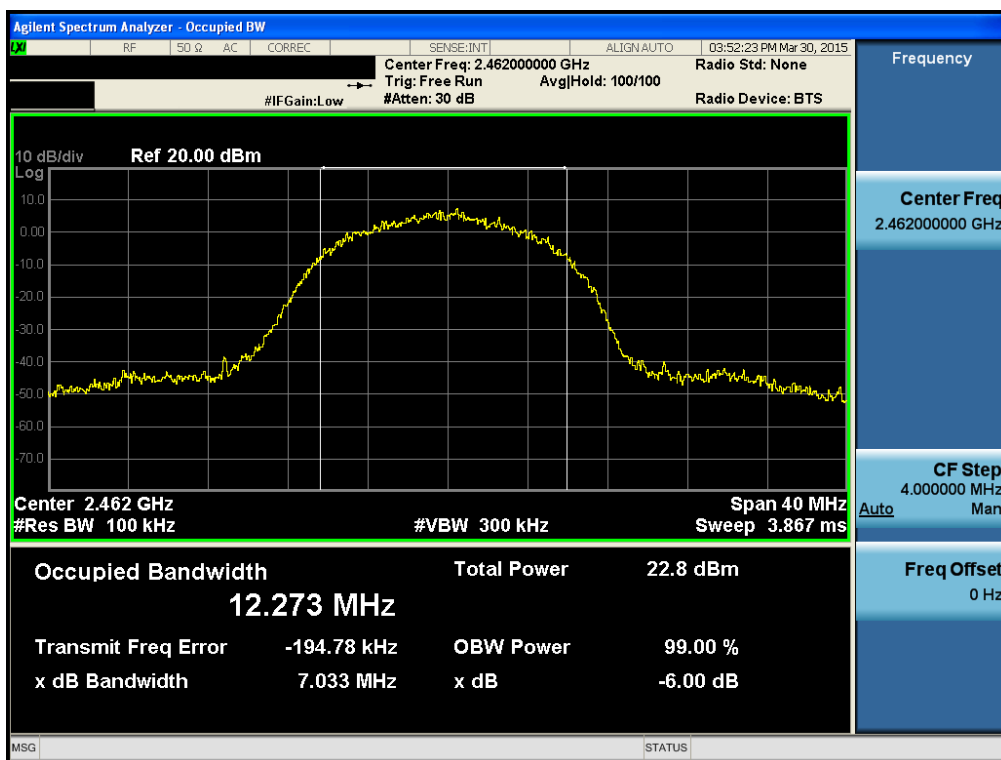
6 dB Bandwidth

Test Mode: 802.11b &amp; 11 Mbps &amp; 2437 MHz



## 6 dB Bandwidth

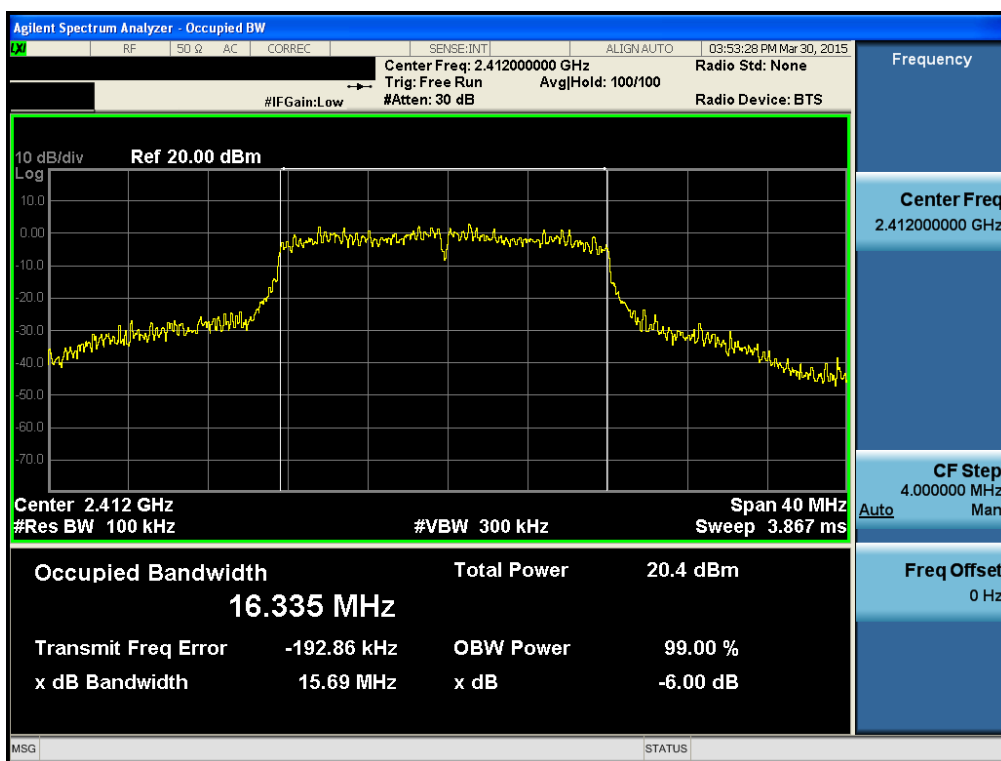
Test Mode: 802.11b &amp; 11 Mbps &amp; 2462 MHz





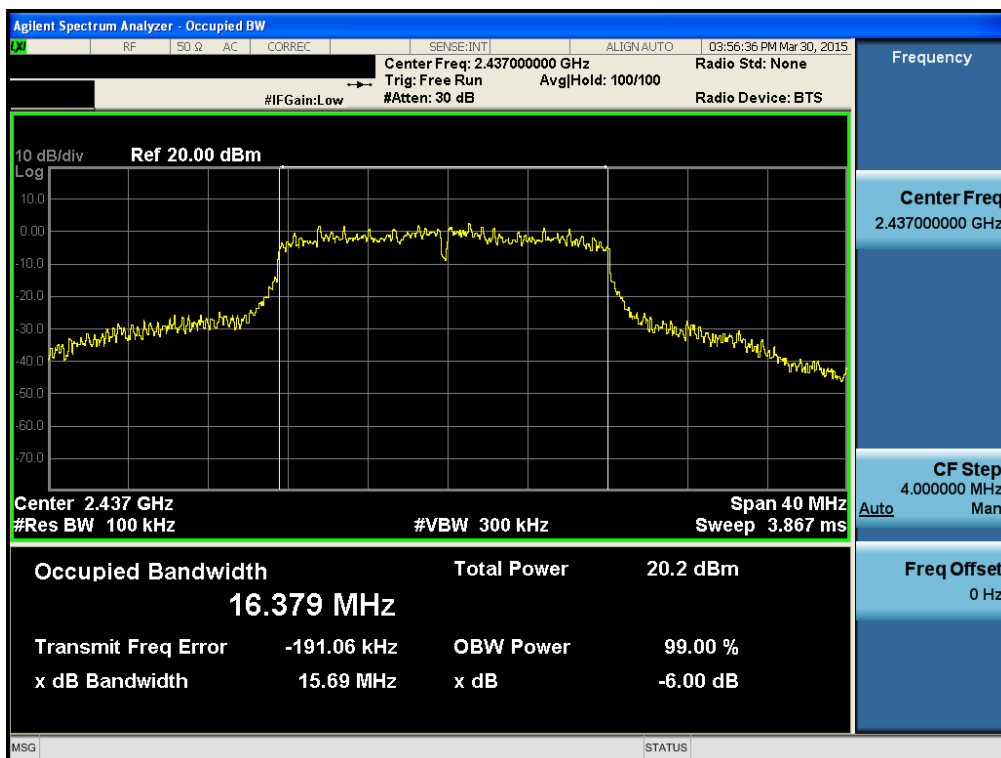
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2412 MHz



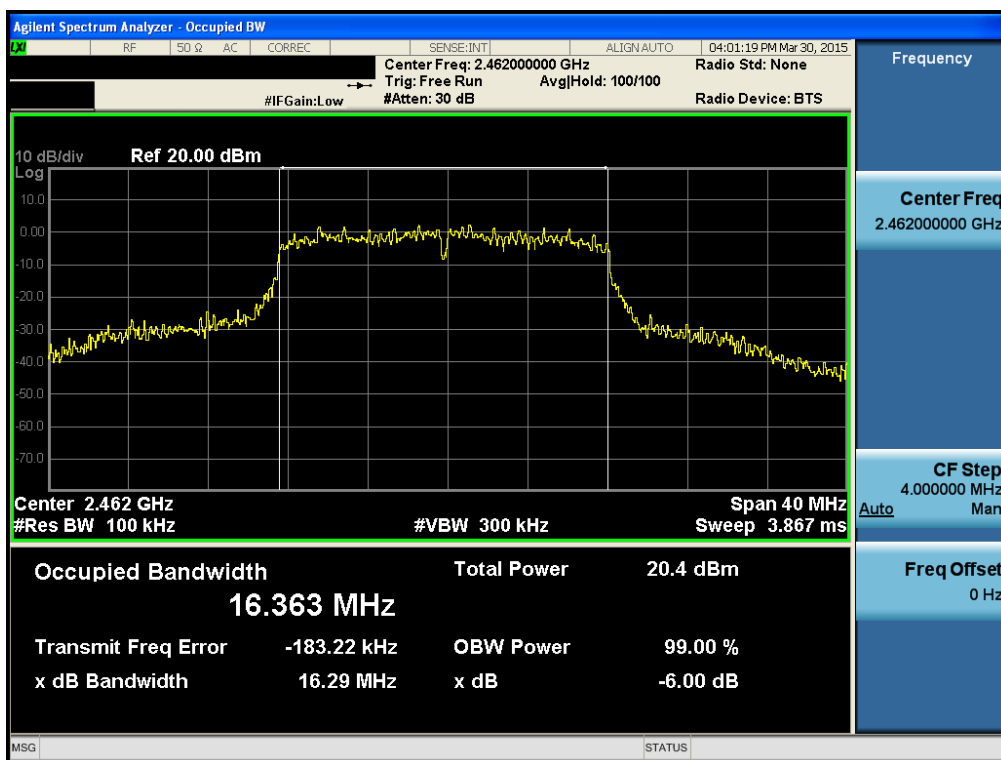
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2437 MHz



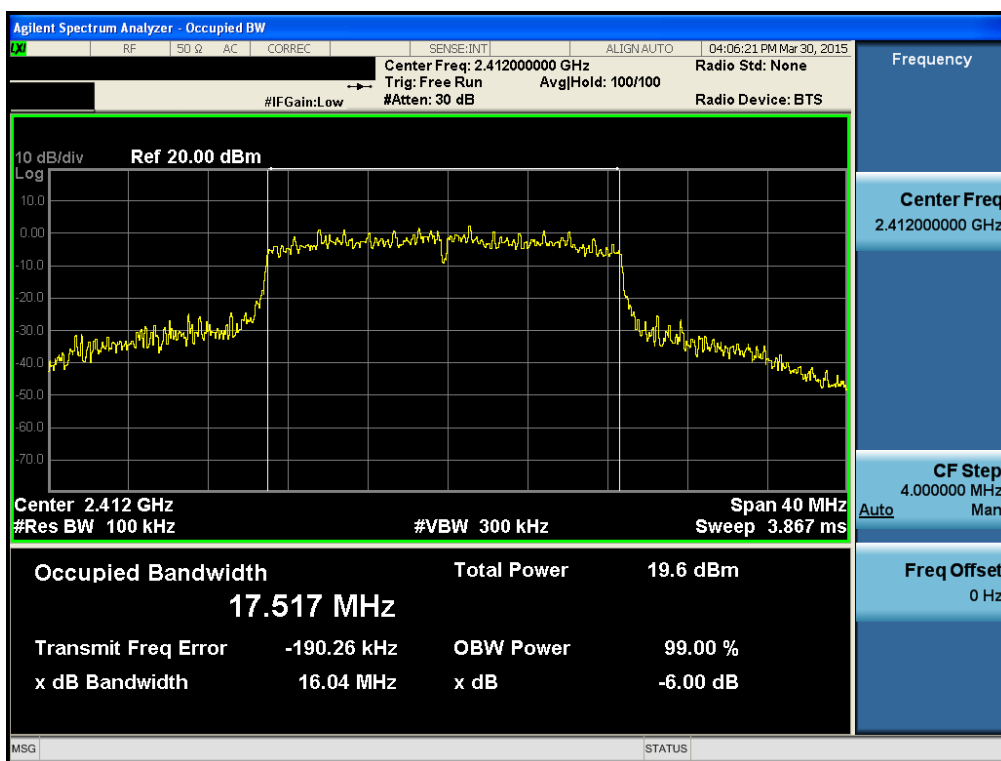
## 6 dB Bandwidth

Test Mode: 802.11g &amp; 54 Mbps &amp; 2462 MHz



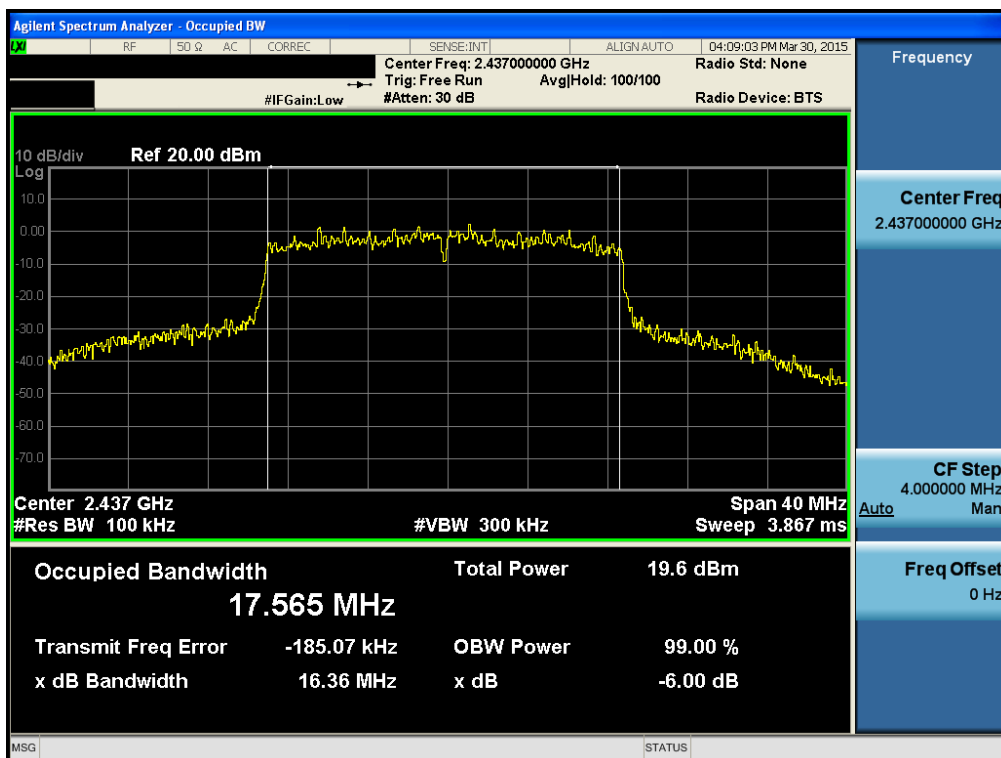
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2412 MHz



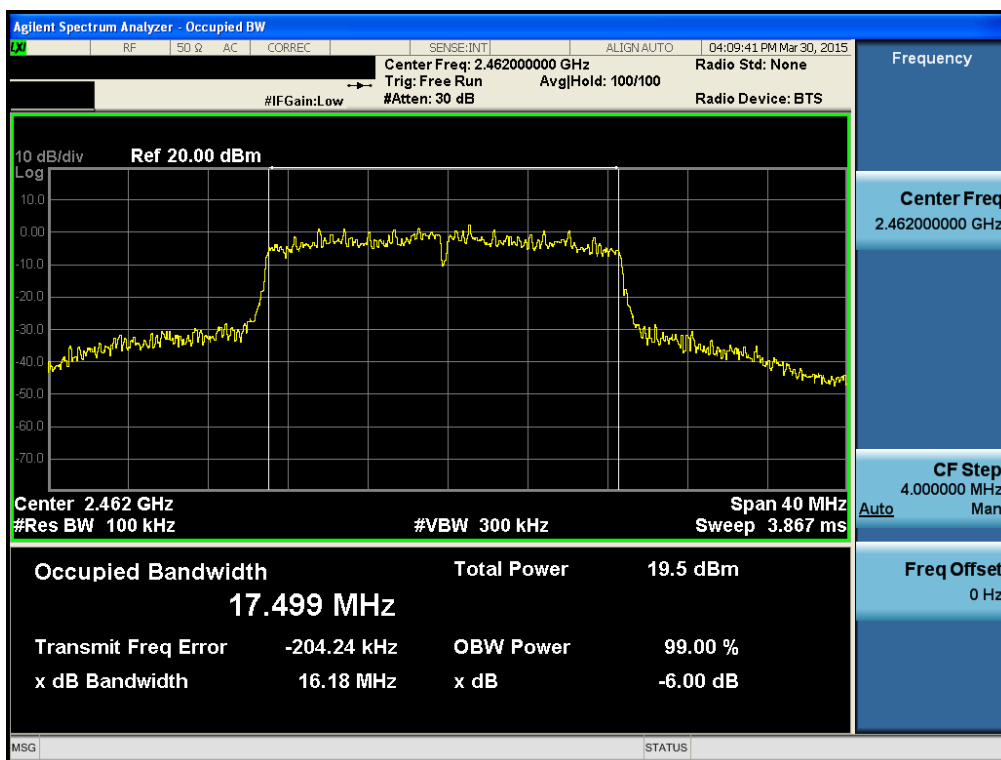
## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2437 MHz



## 6 dB Bandwidth

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2462 MHz

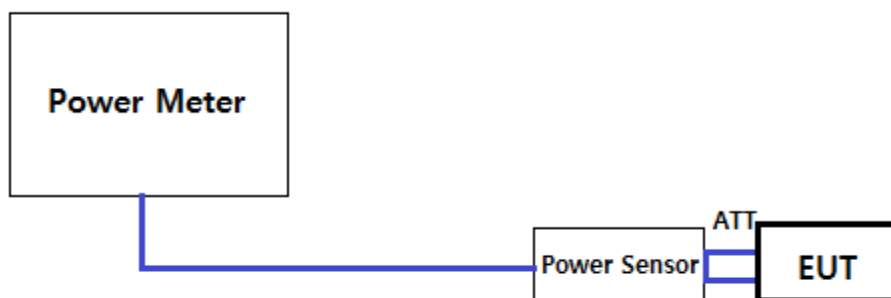


## 8.2 Maximum Peak Conducted Output Power

### Test Requirements and limit, §15.247(b) & RSS-210 [A8.4]

The maximum permissible conducted output power is **1 Watt**.

#### ■ TEST CONFIGURATION



#### ■ TEST PROCEDURE:

##### 1. PKPM1 Peak power meter method of KDB558074 v03r2

The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

##### 2. Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 v03r2

The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

■ TEST RESULTS: **Comply**- Measurement Data: **Comply**

## - Test Results (DC 5V)

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				1	2	5.5	11	NA	NA	NA	NA
802.11b	1	2412	PK	18.24	18.27	18.28	<b>18.31</b>	-	-	-	-
			AV	15.17	15.22	15.28	15.32	-	-	-	-
	6	2437	PK	18.12	18.16	18.12	18.10	-	-	-	-
			AV	15.09	15.07	15.04	15.01	-	-	-	-
	11	2462	PK	18.13	18.16	18.12	18.14	-	-	-	-
			AV	15.12	15.09	15.08	15.09	-	-	-	-

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	1	2412	PK	21.34	21.41	21.58	21.87	22.01	22.31	22.45	<b>22.86</b>
			AV	13.09	13.11	13.18	13.17	13.24	13.23	13.33	13.44
	6	2437	PK	21.47	21.49	21.55	21.75	21.97	22.23	22.46	22.58
			AV	13.05	13.13	13.11	13.18	13.22	13.25	13.24	13.27
	11	2462	PK	21.15	21.24	21.31	21.57	21.83	22.01	22.29	22.35
			AV	13.01	13.04	13.05	13.09	13.12	13.14	13.15	13.15

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [MCS]							
				0	1	2	3	4	5	6	7
802.11n (HT20)	1	2412	PK	20.34	20.56	20.84	20.93	21.34	21.54	21.89	<b>22.01</b>
			AV	12.19	12.28	12.35	12.44	12.59	12.68	12.79	12.85
	6	2437	PK	20.24	20.43	20.61	20.72	20.87	21.16	21.35	21.69
			AV	12.29	12.34	12.39	12.51	12.58	12.63	12.71	12.74
	11	2462	PK	20.13	20.31	20.56	20.75	20.98	21.19	21.38	21.56
			AV	12.09	12.18	12.25	12.31	12.34	12.42	12.48	12.54

**- Test Results (DC 48V(PoE))**

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				1	2	5.5	11	NA	NA	NA	NA
802.11b	1	2412	PK	18.18	18.24	18.27	18.29	-	-	-	-
			AV	15.20	15.23	15.24	15.29	-	-	-	-
	6	2437	PK	18.08	18.12	18.15	18.18	-	-	-	-
			AV	15.04	15.06	15.08	15.10	-	-	-	-
	11	2462	PK	18.11	18.15	18.16	18.18	-	-	-	-
			AV	15.05	15.09	15.13	15.17	-	-	-	-

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	1	2412	PK	21.28	21.34	21.49	21.59	21.76	21.98	22.24	22.56
			AV	13.05	13.04	13.09	13.12	13.18	13.21	13.24	13.33
	6	2437	PK	21.38	21.45	21.51	21.67	21.84	22.03	22.23	22.43
			AV	13.01	13.04	13.08	13.12	13.18	13.24	13.25	13.28
	11	2462	PK	21.04	21.11	21.18	21.22	21.34	21.67	21.84	22.58
			AV	13.05	13.09	13.13	13.19	13.21	13.23	13.24	13.29

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [MCS]							
				0	1	2	3	4	5	6	7
802.11n (HT20)	1	2412	PK	20.25	20.42	20.76	20.99	21.13	21.34	21.81	21.99
			AV	12.20	12.24	12.29	12.34	12.41	12.55	12.61	12.75
	6	2437	PK	20.18	20.26	20.55	20.68	20.76	20.94	21.34	21.45
			AV	12.18	12.26	12.35	12.41	12.51	12.62	12.74	12.72
	11	2462	PK	20.11	20.23	20.41	20.53	20.67	20.84	21.03	21.34
			AV	12.01	12.04	12.09	12.15	12.24	12.27	12.31	12.33

### 8.3 Maximum Power Spectral Density

#### Test requirements and limit, §15.247(e) & RSS-210[A8.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

**Minimum Standard – specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz Band segment within the fundamental EBW during any time interval of continuous transmission.**

#### ■TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■TEST PROCEDURE:

**Method PKPSD of KDB558074 v03r2** is used.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to: **3 kHz ≤ RBW ≤ 100 kHz**.
4. Set the VBW ≥ **3 x RBW**.
5. Detector = **peak**.
6. Sweep time = **auto couple**.
7. Trace mode = **max hold**.
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### ■TEST RESULTS: **Comply**

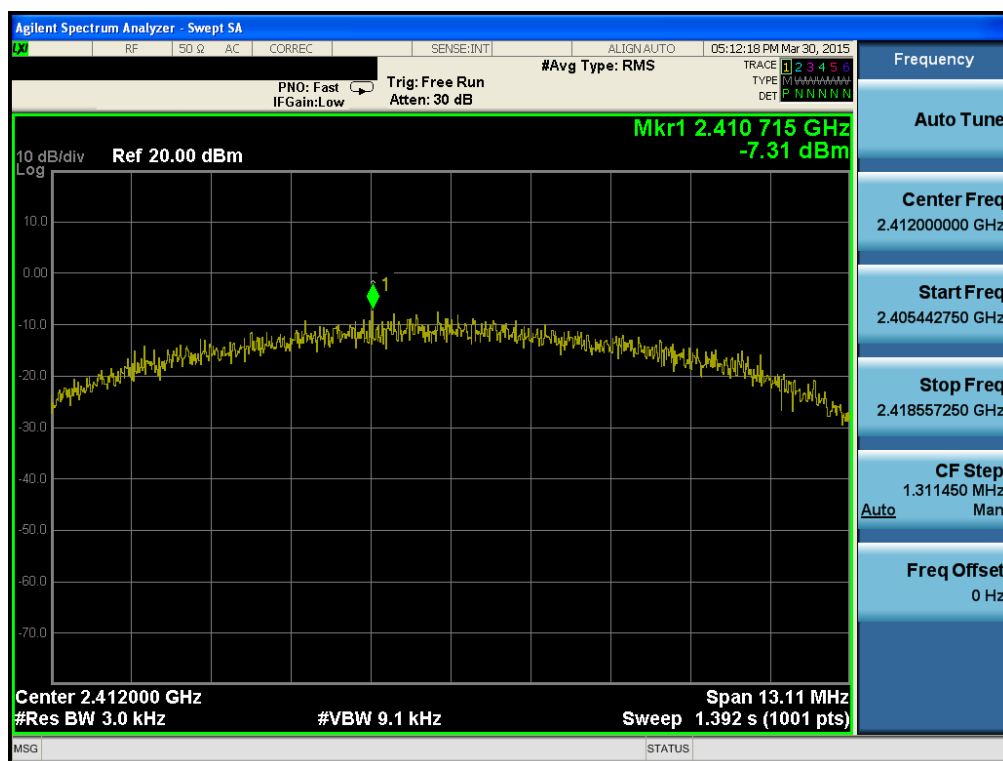
Power Supply	Test Mode	Data Rate	Frequency [MHz]	RBW	PKPSD [dBm]
DC 5V	802.11b	11 Mbps	2412	3 kHz	-7.31
			2437	3 kHz	-7.42
			2462	3 kHz	-6.99
	802.11g	54 Mbps	2412	3 kHz	-11.00
			2437	3 kHz	-10.76
			2462	3 kHz	-12.04
	802.11n HT20	MCS 7	2412	3 kHz	-12.70
			2437	3 kHz	-13.14
			2462	3 kHz	-11.84
DC 48V (PoE)	802.11b	11 Mbps	2412	3 kHz	-8.03
			2437	3 kHz	-7.28
			2462	3 kHz	-8.54
	802.11g	54 Mbps	2412	3 kHz	-11.62
			2437	3 kHz	-12.01
			2462	3 kHz	-11.94
	802.11n HT20	MCS 7	2412	3 kHz	-12.76
			2437	3 kHz	-11.76
			2462	3 kHz	-11.19



## ■ RESULT PLOTS (DC 5V)

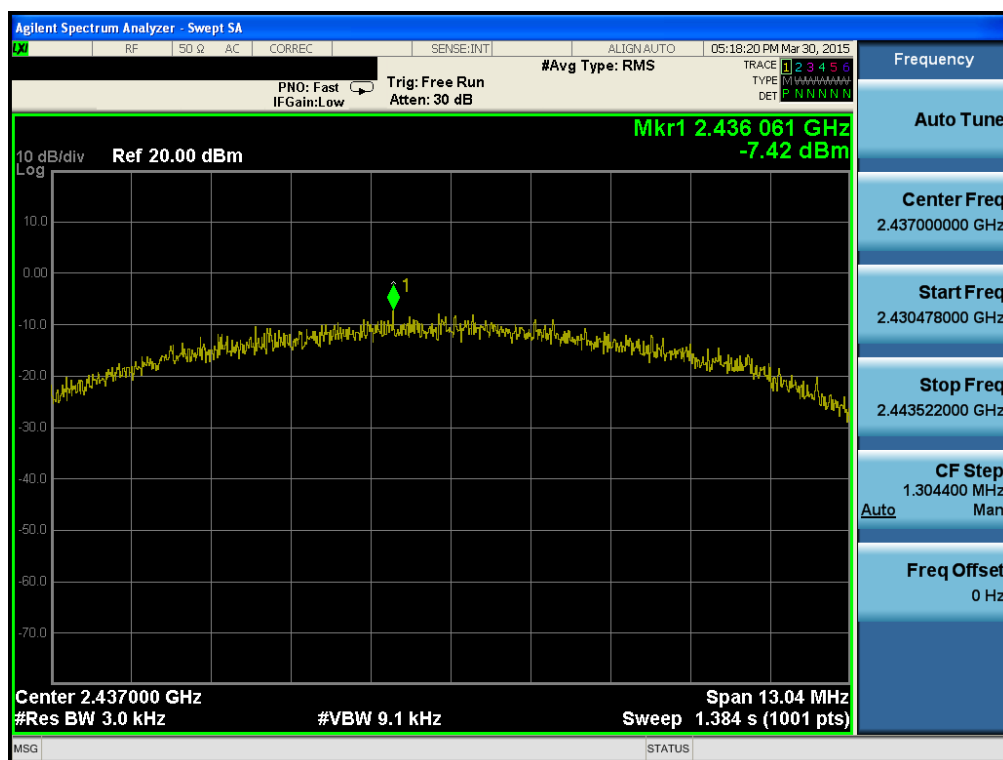
## Maximum PKPSD

Test Mode: 802.11b &amp; 11 Mbps &amp; 2412 MHz



## Maximum PKPSD

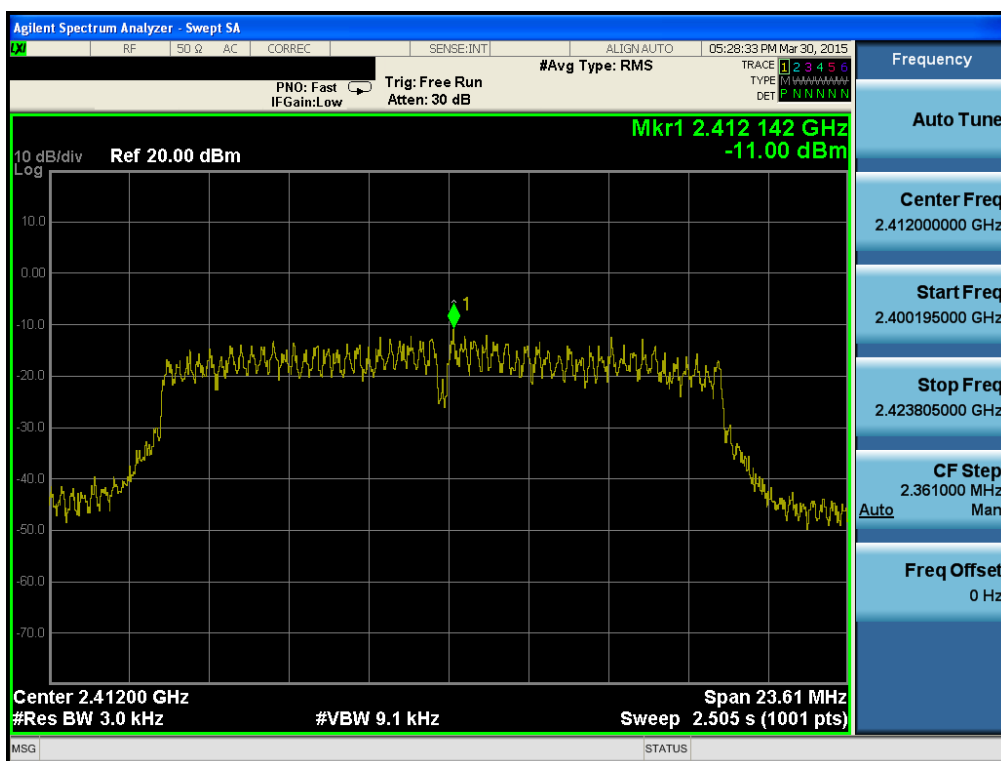
Test Mode: 802.11b &amp; 11 Mbps &amp; 2437 MHz



Test Mode: 802.11b &amp; 11 Mbps &amp; 2462 MHz

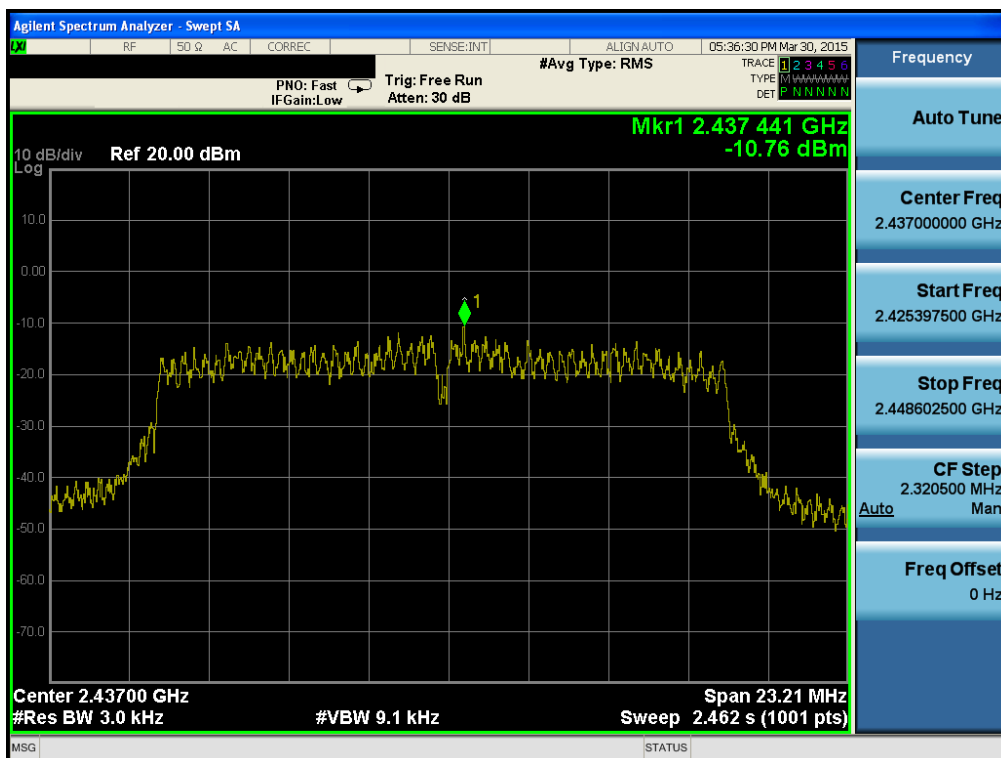
## Maximum PKPSD

Test Mode: 802.11g &amp; 54 Mbps &amp; 2412 MHz

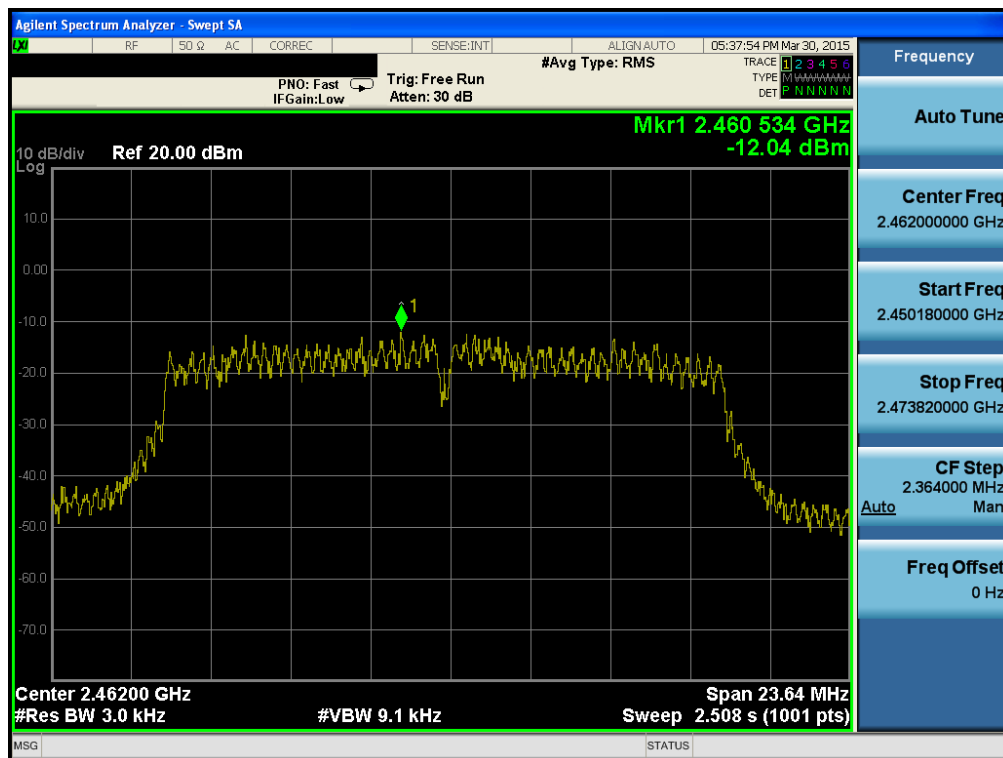


## Maximum PKPSD

Test Mode: 802.11g &amp; 54 Mbps &amp; 2437 MHz

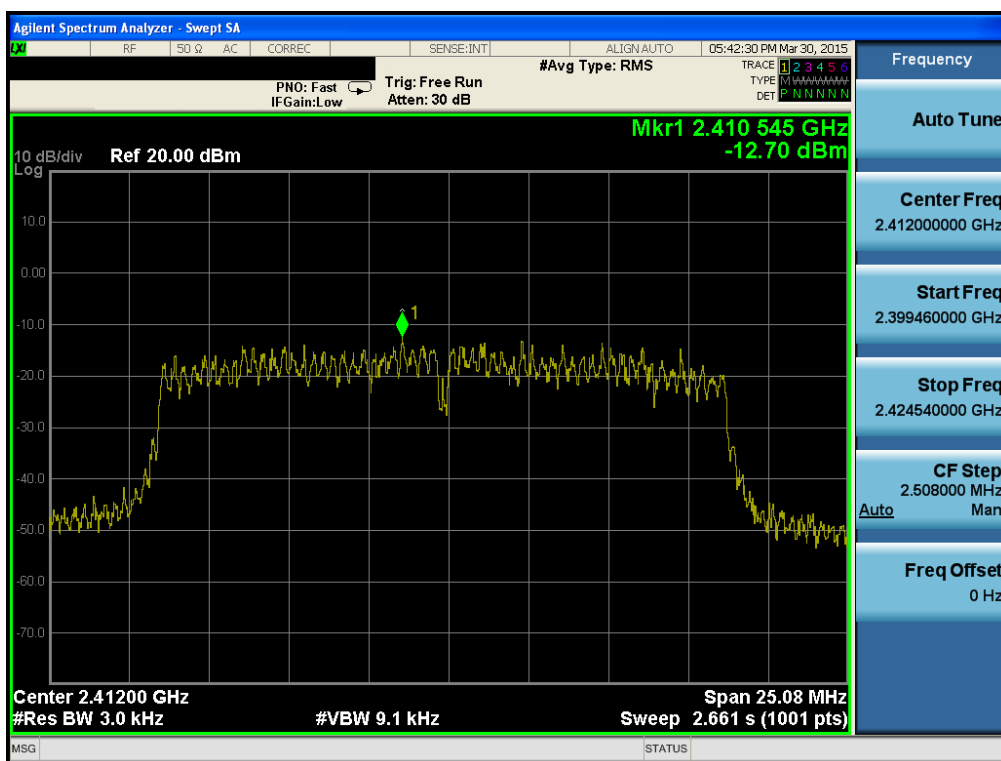


Test Mode: 802.11g & 54 Mbps & 2462 MHz



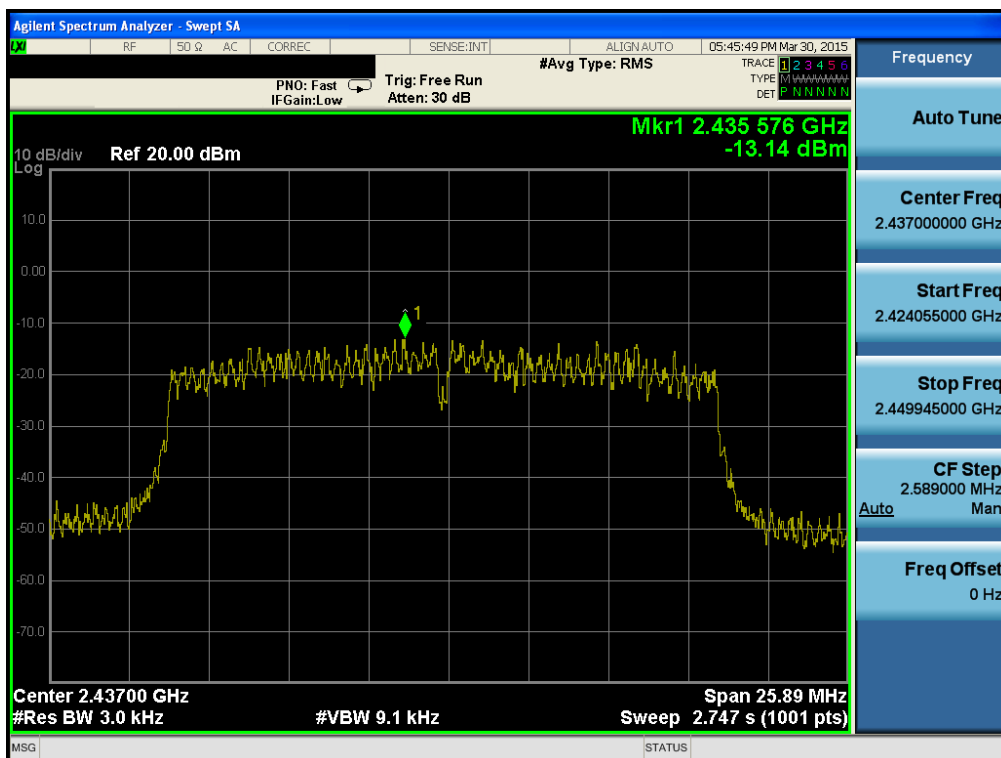
## Maximum PKPSD

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2412 MHz



## Maximum PKPSD

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2437 MHz

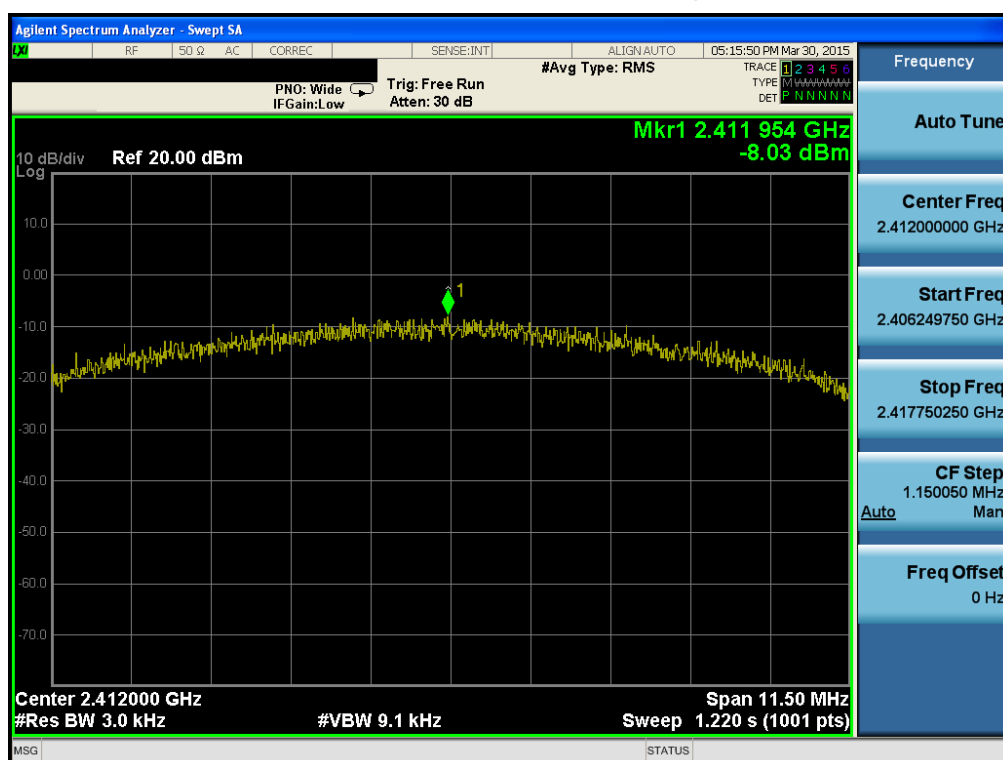


Test Mode: 802.11n(HT20) & MCS 7 & 2462 MHz

## ■ RESULT PLOTS (DC 48V(PoE))

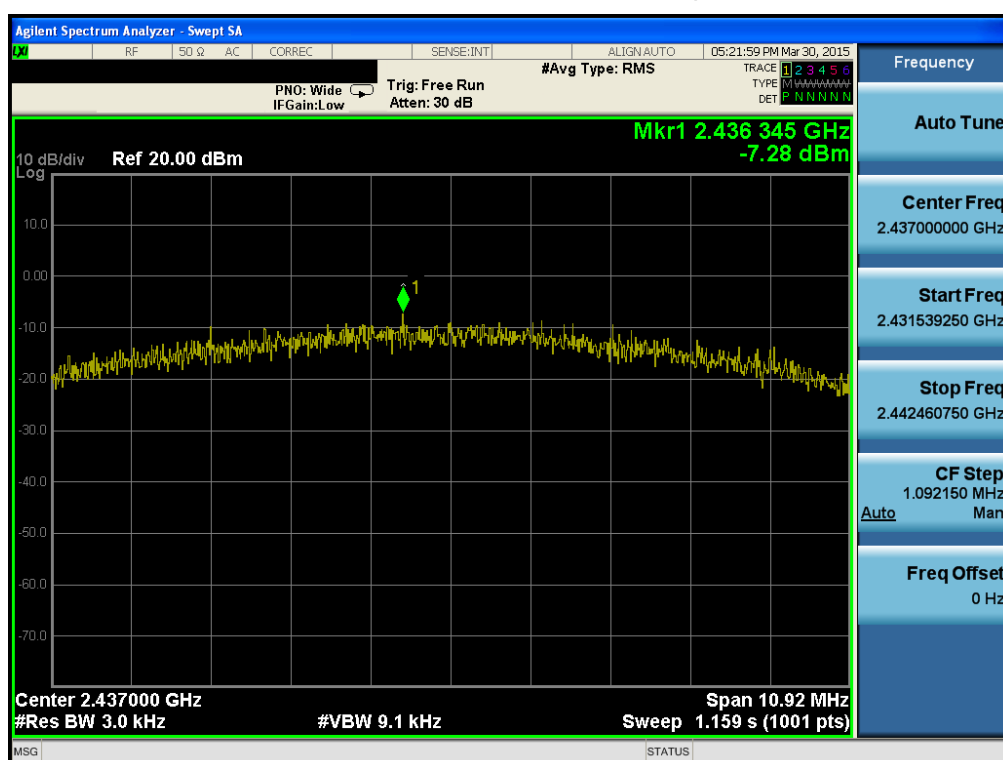
## Maximum PKPSD

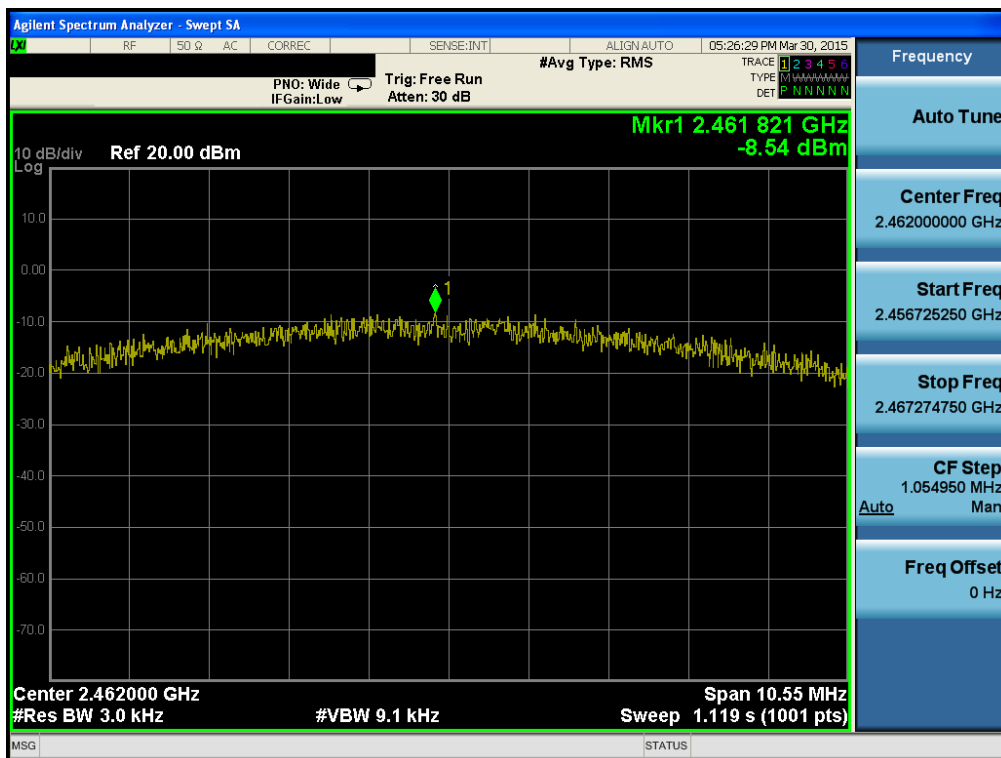
Test Mode: 802.11b &amp; 11 Mbps &amp; 2412 MHz



## Maximum PKPSD

Test Mode: 802.11b &amp; 11 Mbps &amp; 2437 MHz

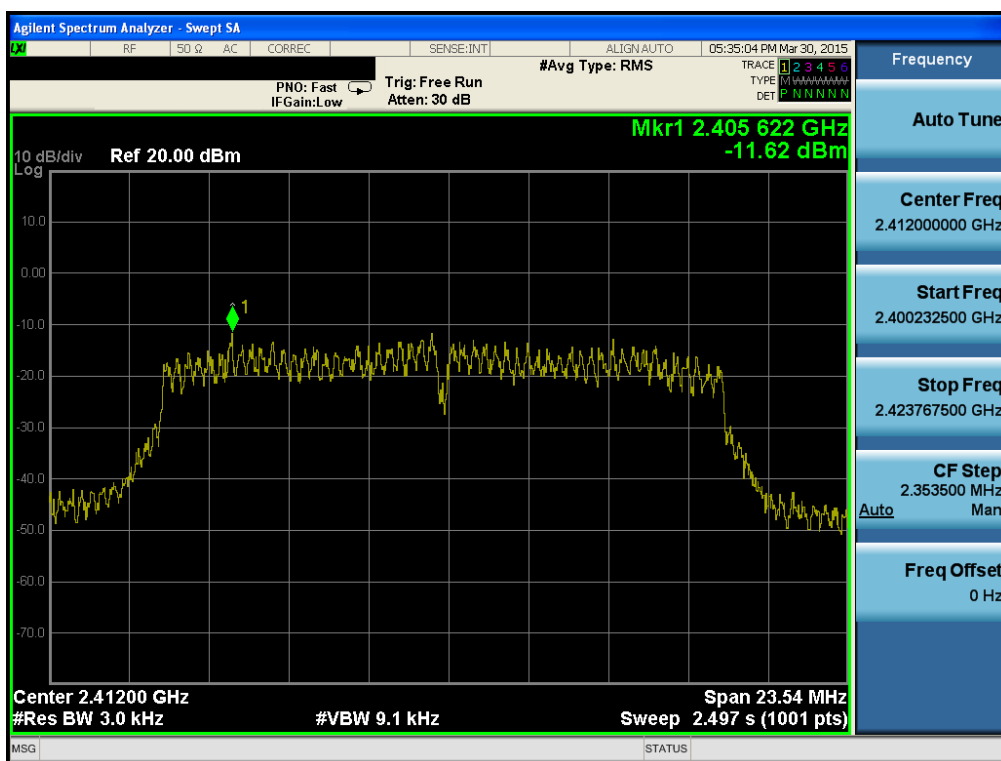






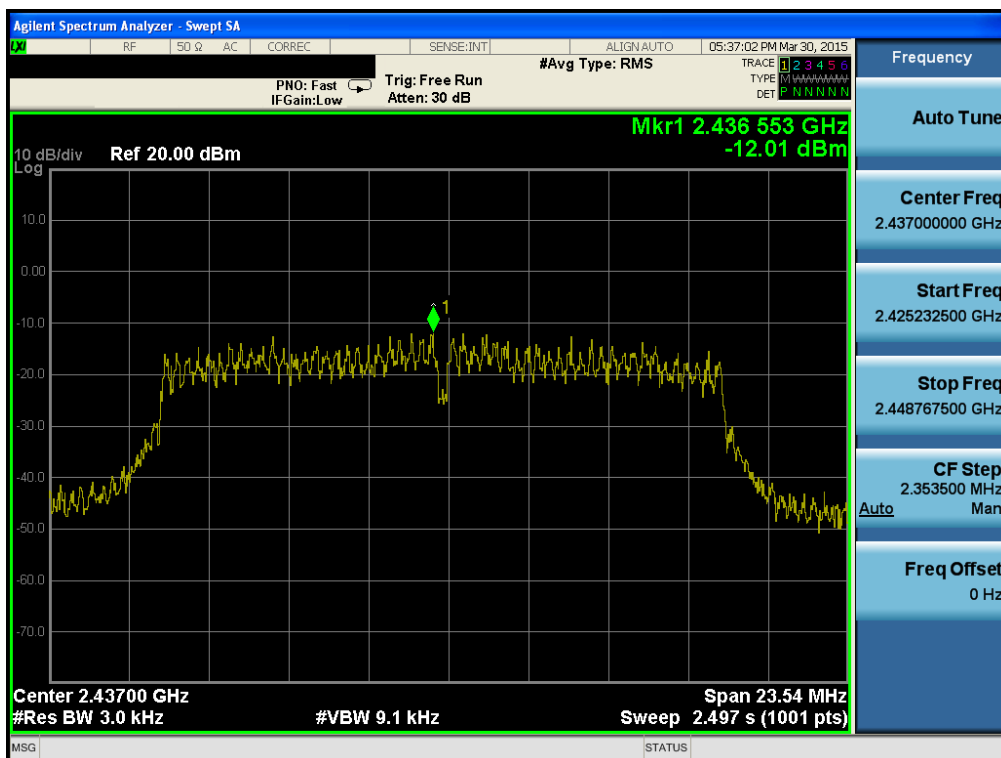
## Maximum PKPSD

Test Mode: 802.11g &amp; 54 Mbps &amp; 2412 MHz



## Maximum PKPSD

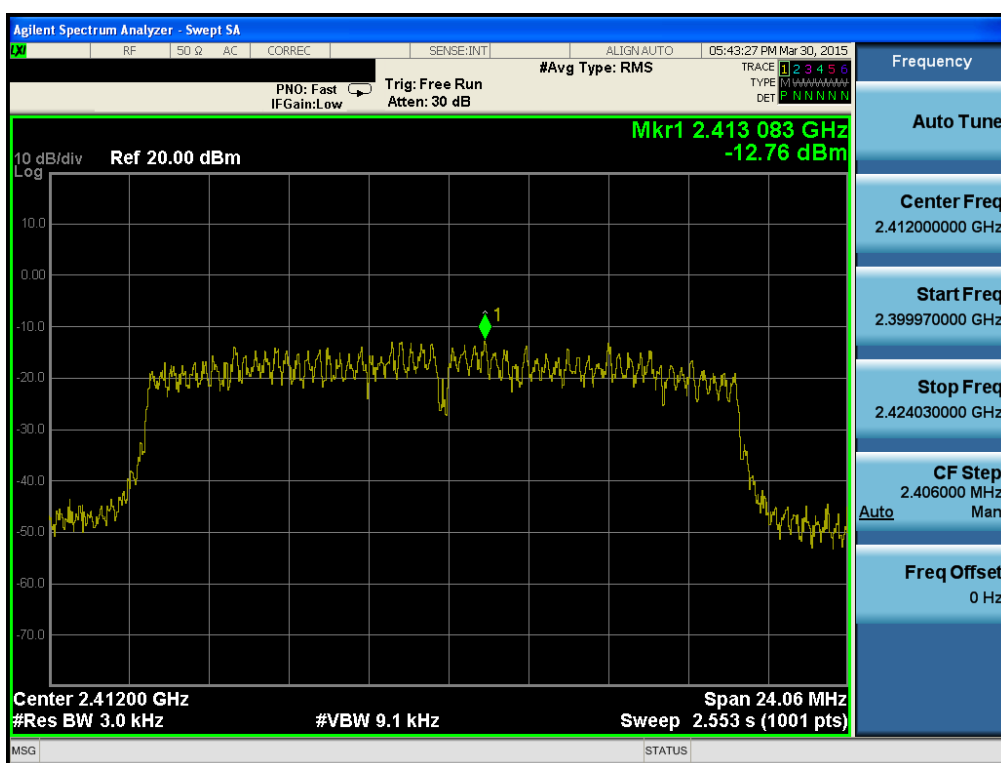
Test Mode: 802.11g &amp; 54 Mbps &amp; 2437 MHz





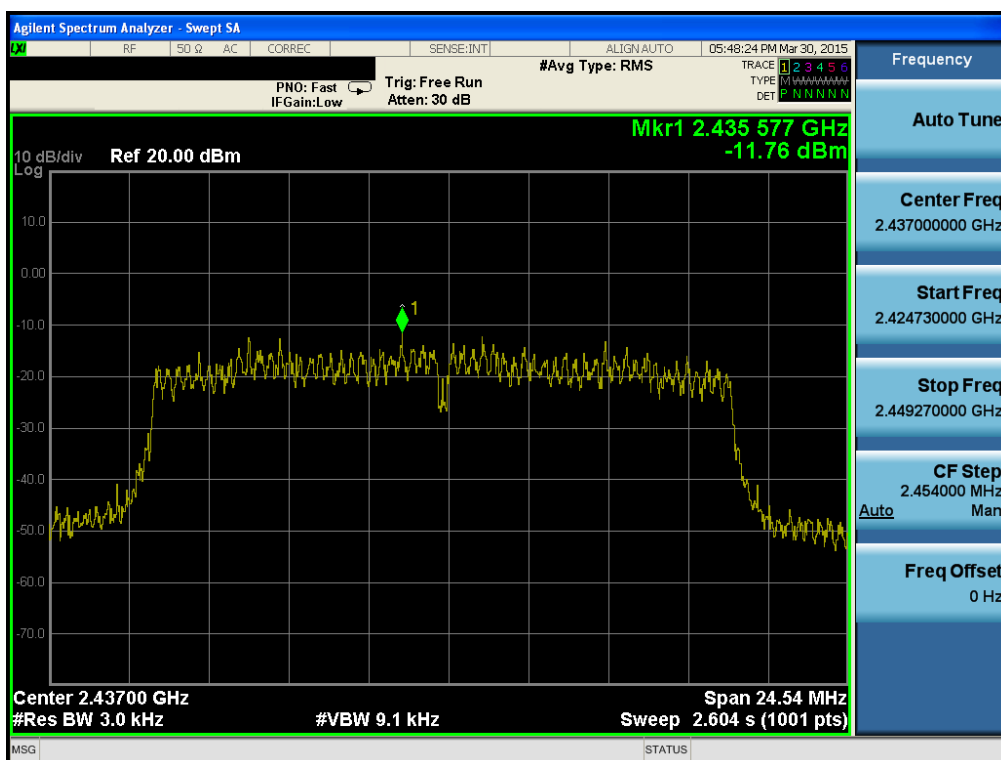
## Maximum PKPSD

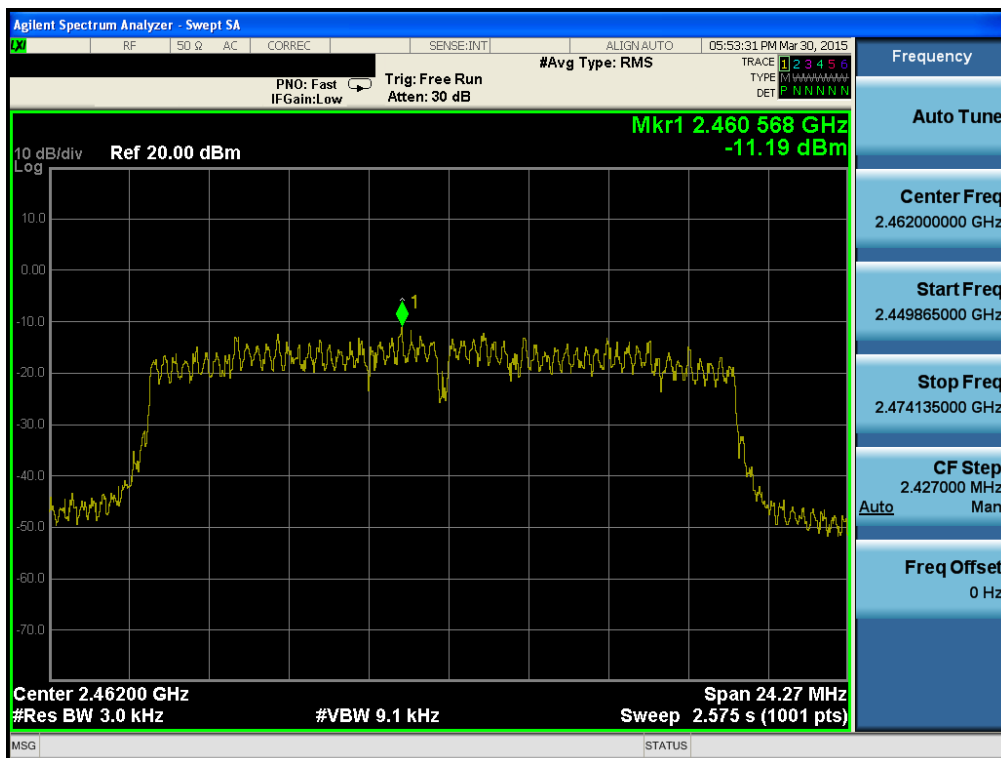
Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2412 MHz



## Maximum PKPSD

Test Mode: 802.11n(HT20) &amp; MCS 7 &amp; 2437 MHz





## 8.4 Out of Band Emissions at the Band Edge / Conducted Spurious Emissions

### Test requirements and limit, §15.247(d) & RSS-210 [A8.5]

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If the **peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

### ■ TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

#### - Measurement Procedure 1 – Reference Level

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to  $\geq 1.5$  times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW  $\geq 3 \times$  RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level

#### - Measurement Procedure 2 - Unwanted Emissions

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz.** (Actual 1 MHz , See below note)
3. Set the VBW  $\geq 3 \times$  RBW. (Actual 3 MHz, See below note)
4. Detector = **peak**.
5. Ensure that the number of measurement points  $\geq$  span/RBW
6. Sweep time = **auto couple**.
7. Trace mode = **max hold**.
8. **Allow the trace to stabilize** (this may take some time, depending on the extent of the span).
9. Use the peak marker function to determine the maximum amplitude level.

**Note :** The conducted spurious emission was tested with below settings.

**Frequency range: 9 kHz ~ 30 MHz**

**RBW= 100 kHz, VBW= 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT: 40001**

**Frequency range: 30 MHz ~ 10 GHz, 10 GHz~25 GHz**

**RBW= 1MHz, VBW= 3MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT: 40001**

**LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)**

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

Also the path loss for conducted measurement setup was used as described on the Appendix I of this test report.

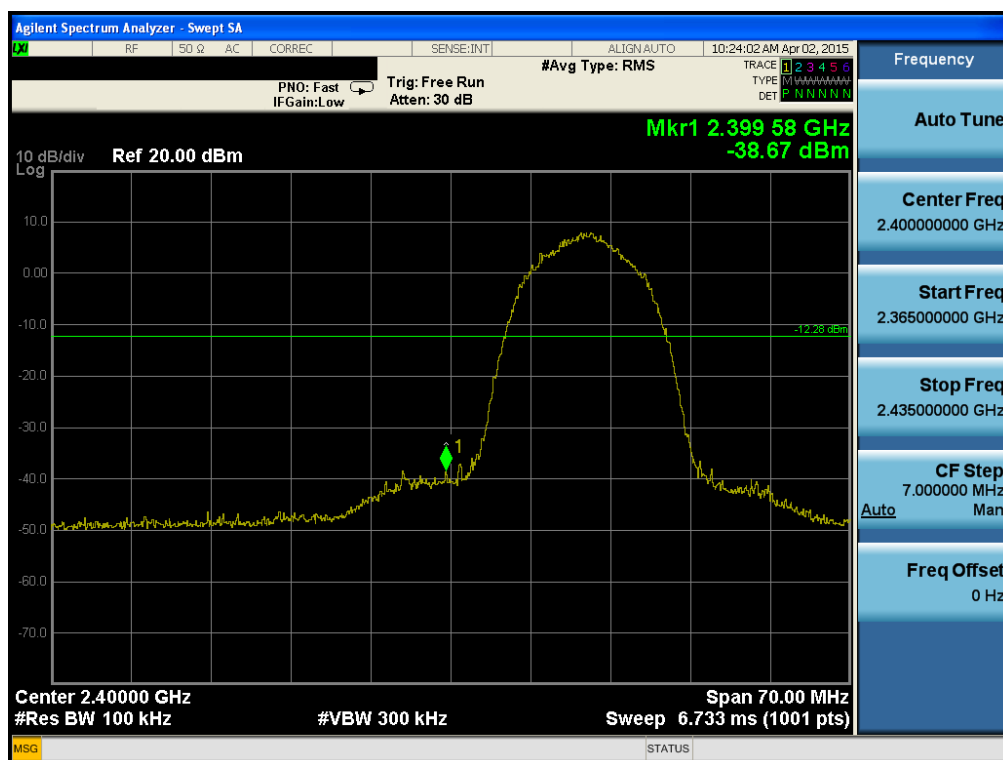
## ■ RESULT PLOTS (DC 5V)

802.11b &amp; 11 Mbps &amp; 2412 MHz

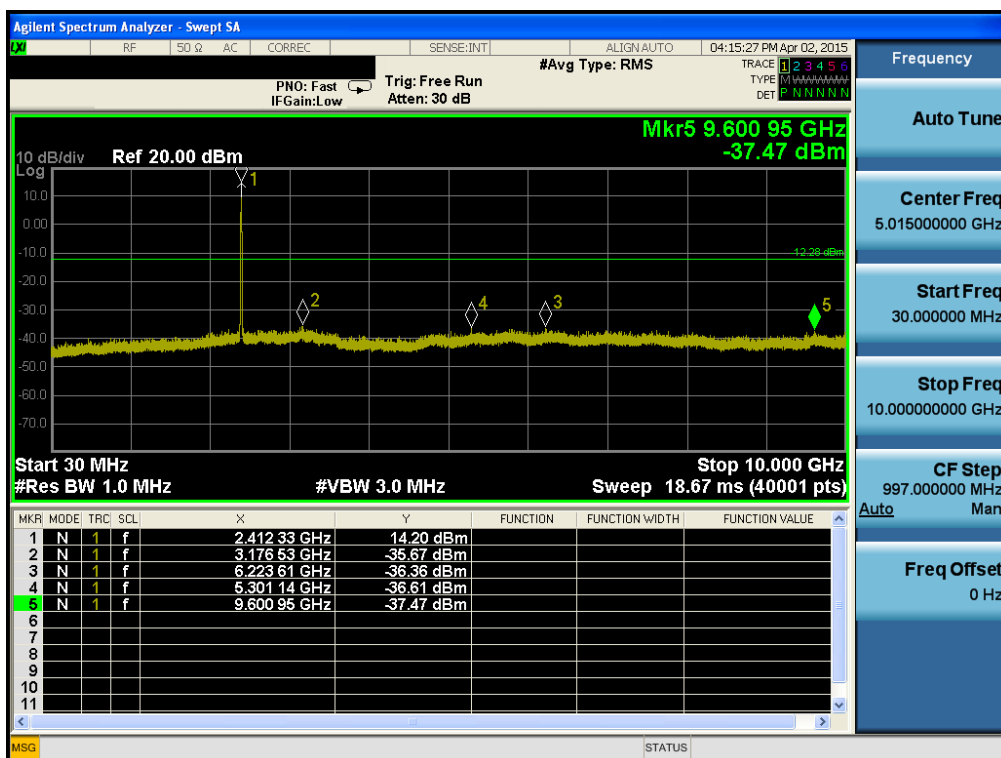
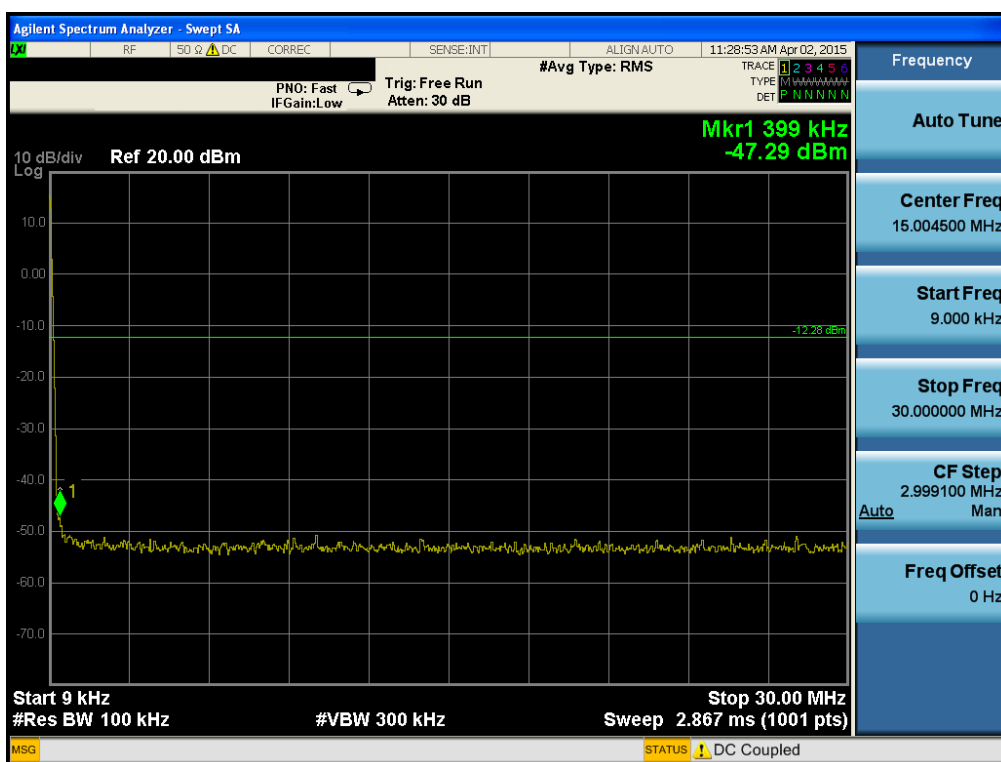
## Reference



## Low Band-edge



## Conducted Spurious Emissions



Agilent Spectrum Analyzer - Sweep SA

RF 50 Ω AC CORREC SENSE:INT ALIGN:AUTO 05:19:14 PM Apr 02, 2015

PN0: Fast IFGain:Low Trig: Free Run Atten: 30 dB #Avg Type: RMS

TRACE 1 2 3 4 5 6 TYPE M N P DET P N N N N N

10 dB/div Ref 20.00 dBm

Mkr5 21.298 000 GHz -29.58 dBm

Start 10.000 GHz #Res BW 1.0 MHz Stop 25.000 GHz #VBW 3.0 MHz Sweep 40.00 ms (40001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	24.747 625 GHz	-26.72 dBm			
2	N	1	f	23.824 750 GHz	-27.23 dBm			
3	N	1	f	23.239 000 GHz	-27.93 dBm			
4	N	1	f	22.271 500 GHz	-29.11 dBm			
5	N	1	f	21.298 000 GHz	-29.58 dBm			
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq 17.500000000 GHz

Start Freq 10.000000000 GHz

Stop Freq 25.000000000 GHz

CF Step 1.500000000 GHz

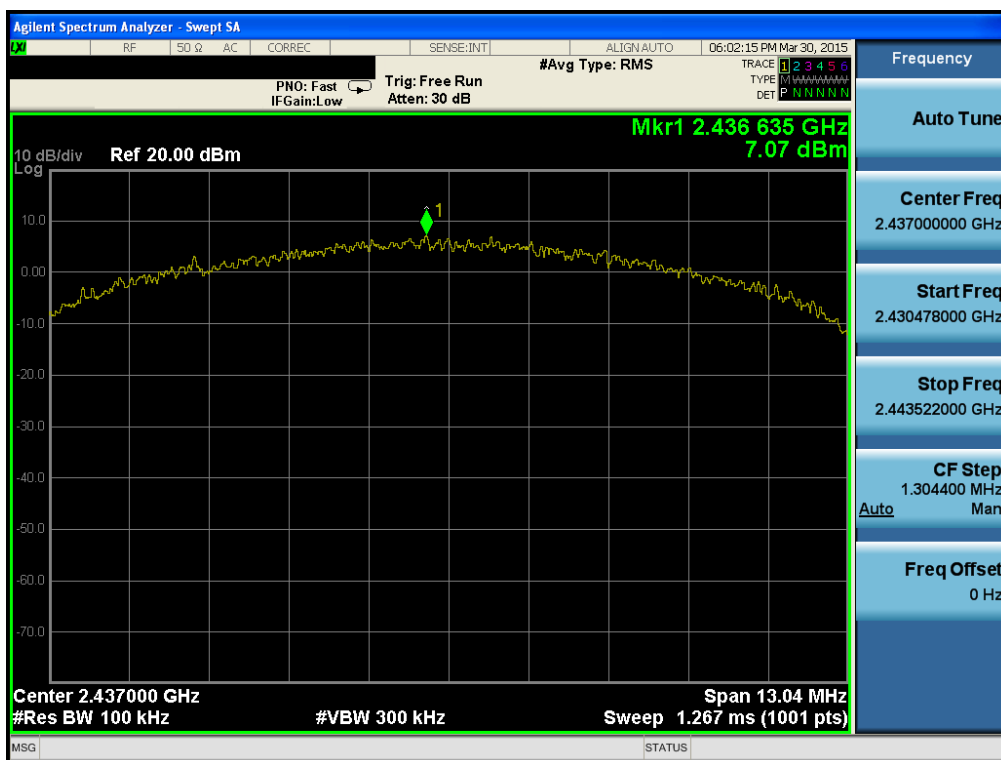
Auto Man

Freq Offset 0 Hz

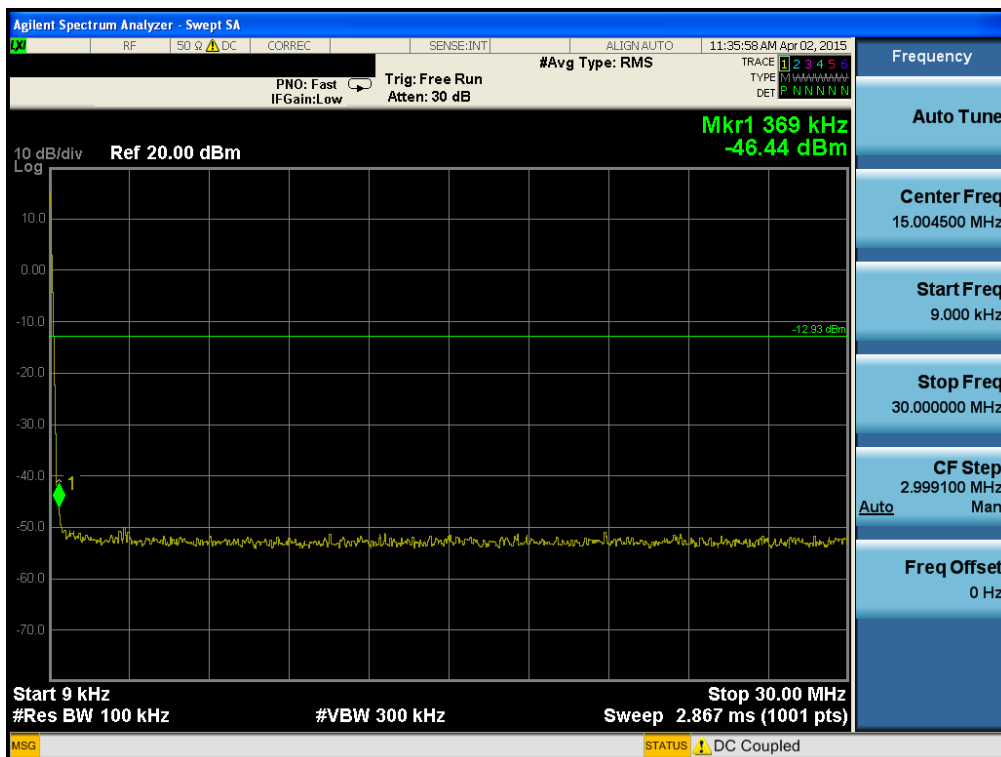


802.11b &amp; 11 Mbps &amp; 2437 MHz

## Reference



## Conducted Spurious Emissions



Agilent Spectrum Analyzer - Swept SA

RF SO R AC CORREC SENSE:INT ALIGN AUTO 04:19:09 PM Apr 02, 2015

#Avg Type: RMS

Trace 1 2 3 4 5 6  
Type P N N N N N  
Det P N N N N N

PNO: Fast IF Gain: Low Trig: Free Run Atten: 30 dB

10 dB/div Log Ref 20.00 dBm

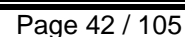
Mkr5 7.147 83 GHz -37.09 dBm

Start 30 MHz Stop 10.000 GHz  
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.67 ms (40001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.437 26 GHz	14.30 dBm			
2	N	1	f	6.226 36 GHz	-36.43 dBm			
3	N	1	f	6.773 97 GHz	-36.49 dBm			
4	N	1	f	3.373 19 GHz	-36.50 dBm			
5	N	1	f	7.147 83 GHz	-37.09 dBm			
6								
7								
8								
9								
10								
11								

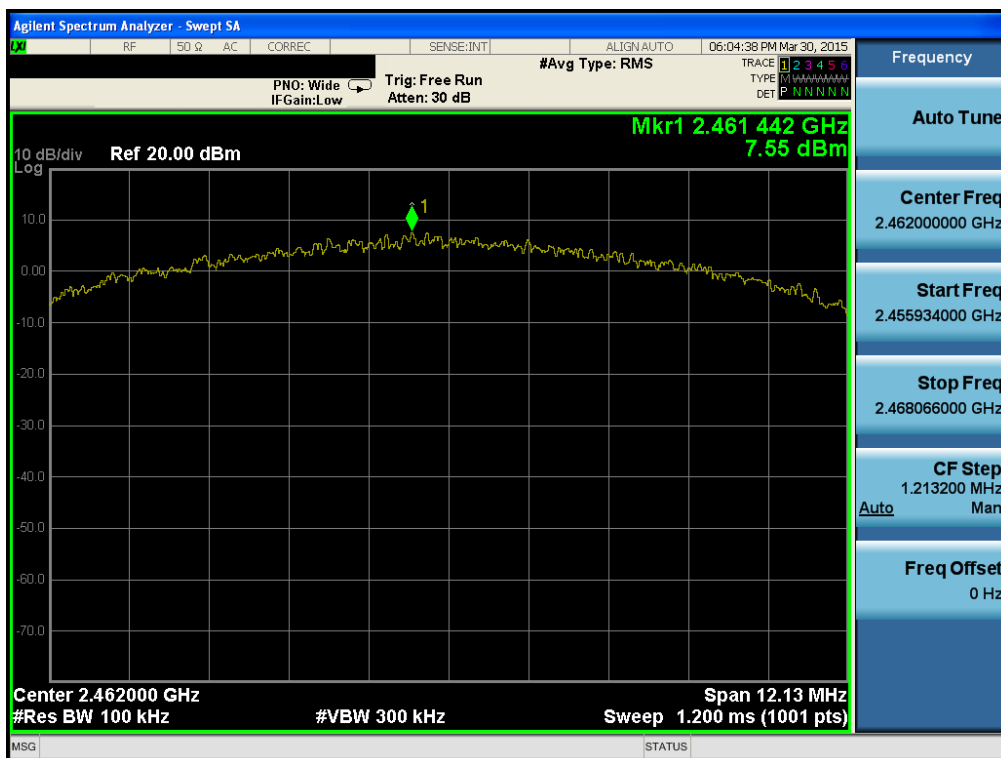
MSG STATUS

Frequency Auto Tune Center Freq 5.01500000 GHz Start Freq 30.000000 MHz Stop Freq 10.00000000 GHz CF Step 997.000000 MHz Man Freq Offset 0 Hz

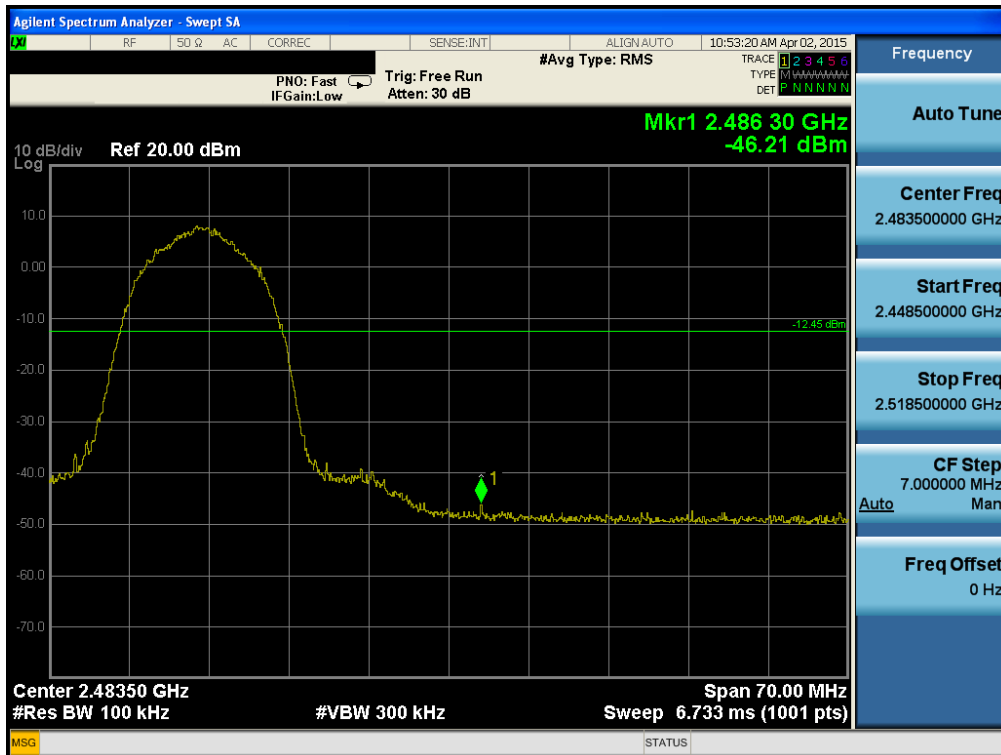


802.11b &amp; 11 Mbps &amp; 2462 MHz

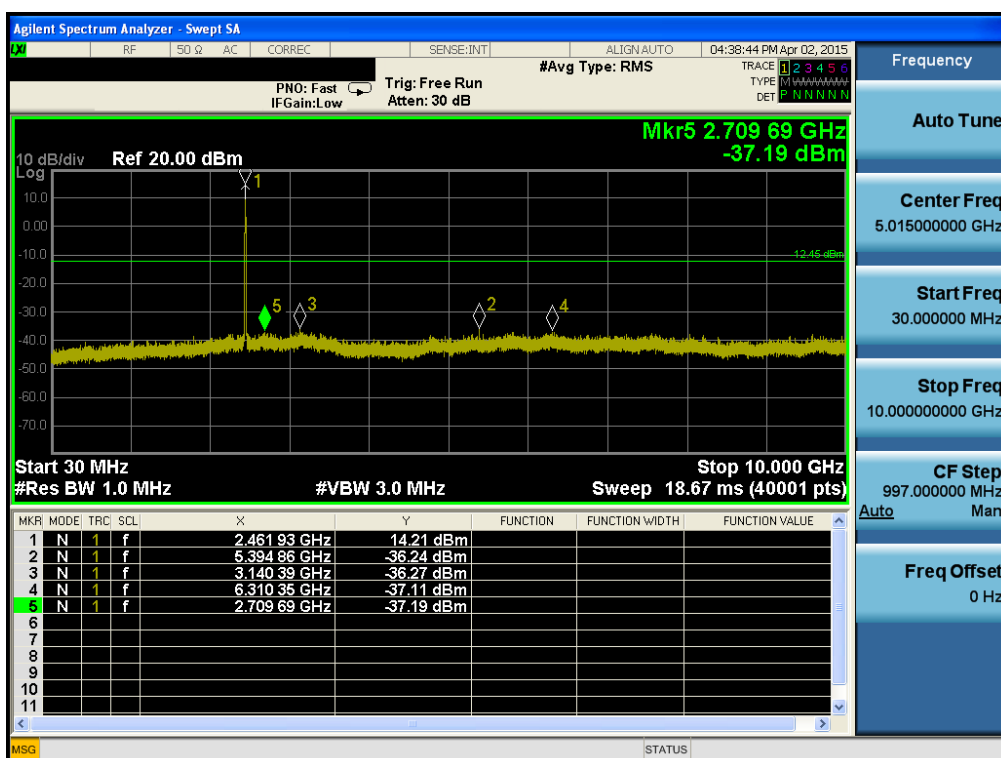
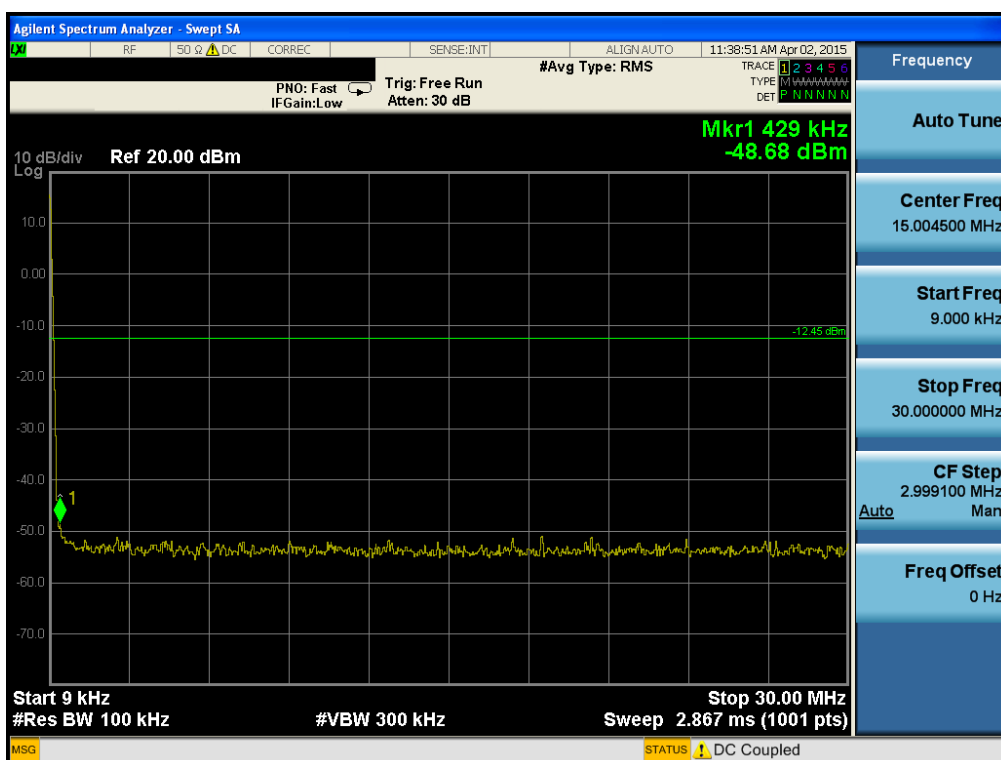
## Reference



## High Band-edge



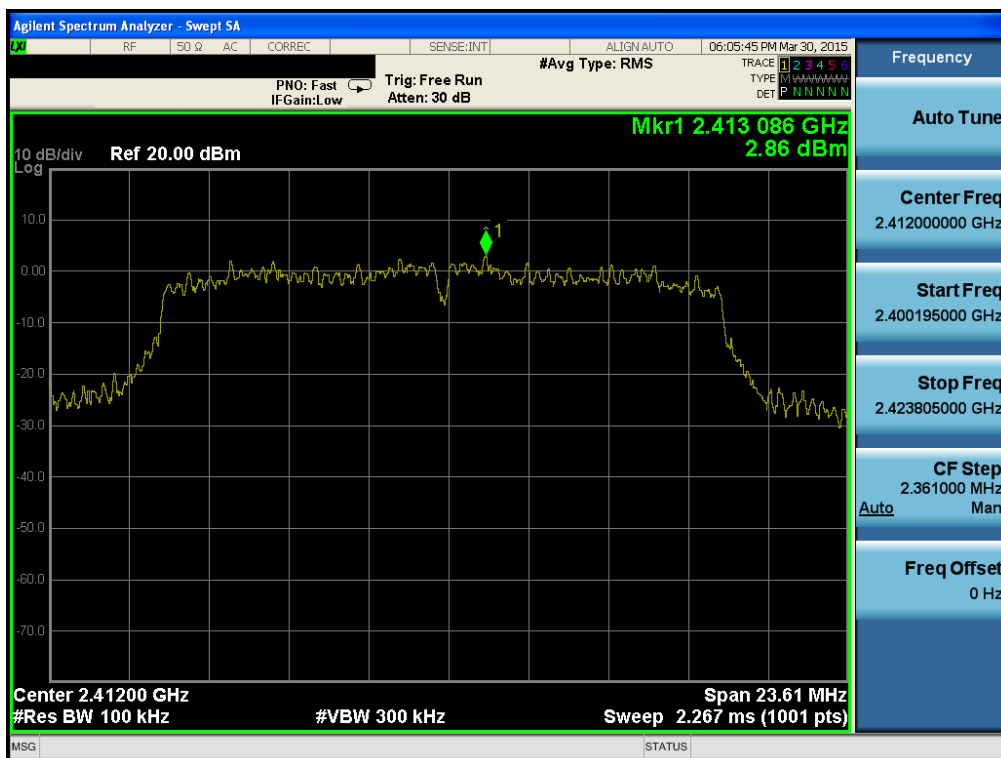
## Conducted Spurious Emissions



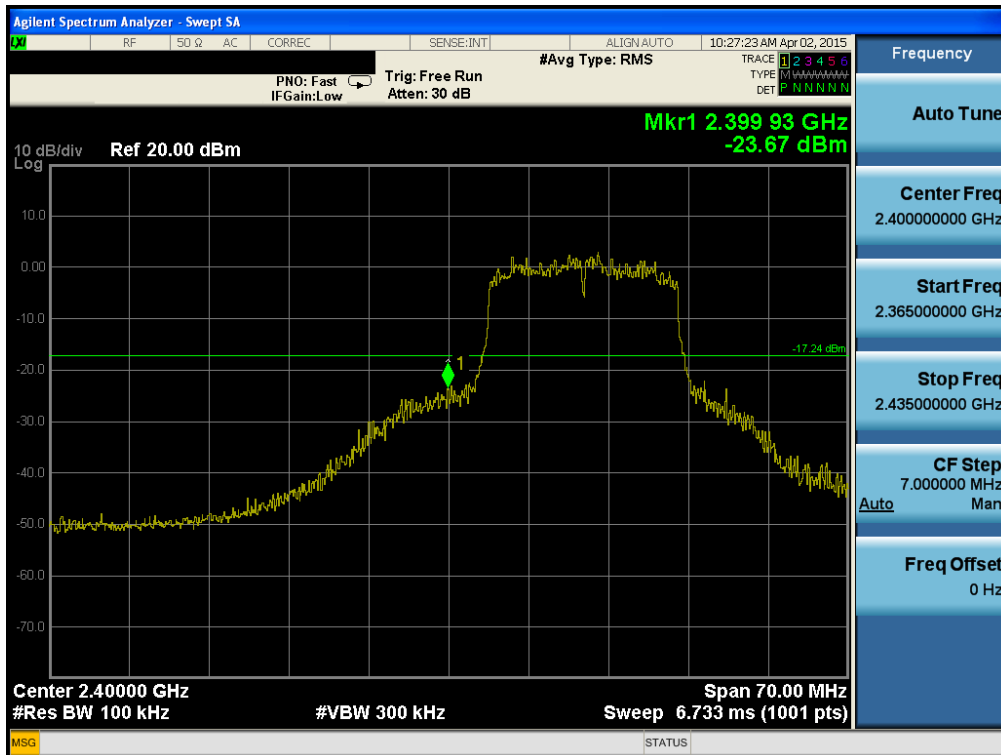
[illegible]

802.11g &amp; 54 Mbps &amp; 2412 MHz

## Reference



## Low Band-edge



Agilent Spectrum Analyzer - Swept SA

RF 50  $\Omega$  DC CORREC SENSE:INT ALIGN AUTO 11:40:19 AM Apr 02, 2015

#Avg Type: RMS

TRAC 2 3 4 5 6  
TYPE: P N N N N N N  
DET: P N N N N N N

PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB

10 dB/div Log Ref 20.00 dBm

Mkr1 369 kHz -48.62 dBm

Start 9 kHz Stop 30.00 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.867 ms (1001 pts)

MSG STATUS DC Coupled

Frequency

Auto Tune

Center Freq 15.004500 MHz

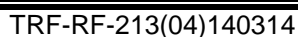
Start Freq 9.000 kHz

Stop Freq 30.000000 MHz

CF Step 2.999100 MHz

Auto Man

Freq Offset 0 Hz



Agilent Spectrum Analyzer - Sweep SA

RF 50 Ω AC CORREC SENSE:INT ALIGN:AUTO 07:28:39 PM Apr 02, 2015

#Avg Type: RMS

PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB

TRACE 1 2 3 4 5 6  
TYPE M N N N N N  
DET P N N N N N

10 dB/div Ref 20.00 dBm

Mkr4 21.915 250 GHz  
-28.02 dBm

Start 10.000 GHz Stop 25.000 GHz  
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 40.00 ms (40001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	24.862 000 GHz	-26.66 dBm			
2	N	1	f	24.331 750 GHz	-27.40 dBm			
3	N	1	f	24.272 500 GHz	-27.49 dBm			
4	N	1	f	21.915 250 GHz	-28.02 dBm			
5	N	1	f	21.660 625 GHz	-28.10 dBm			
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq 17.500000000 GHz

Start Freq 10.000000000 GHz

Stop Freq 25.000000000 GHz

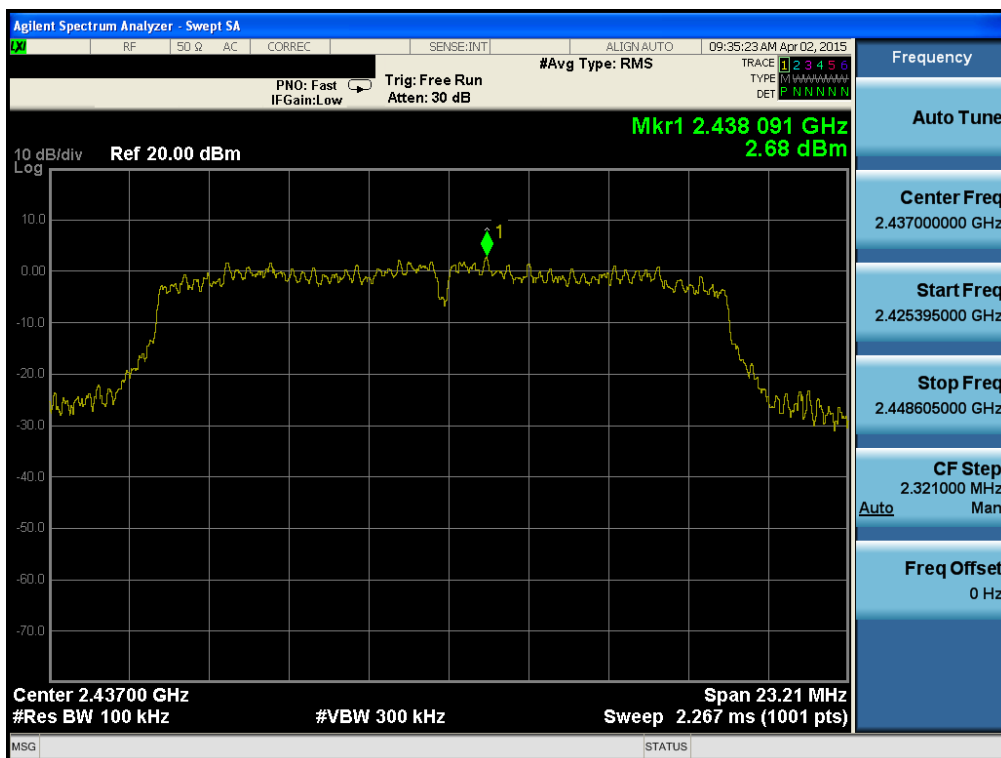
CF Step 1.500000000 GHz

Auto Man

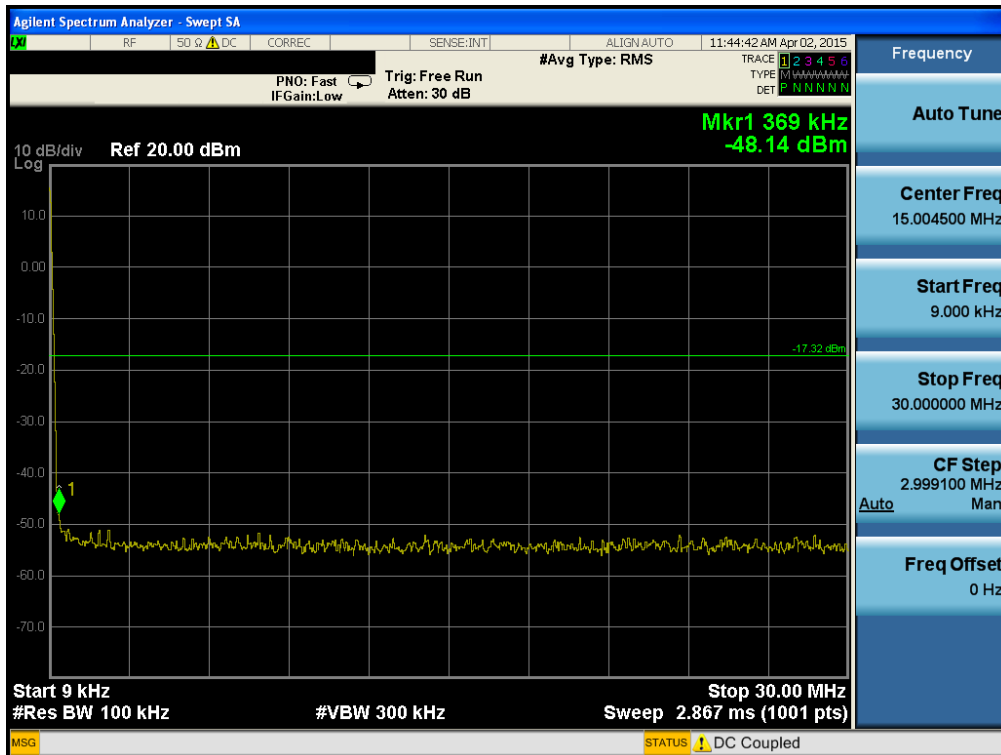
Freq Offset 0 Hz



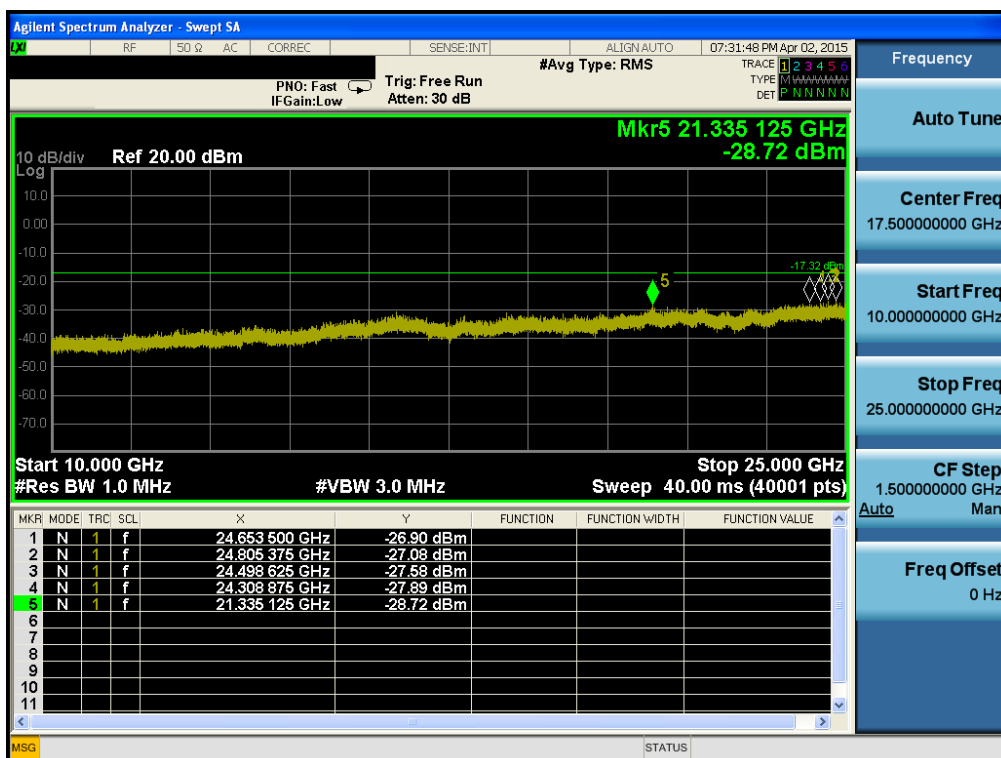
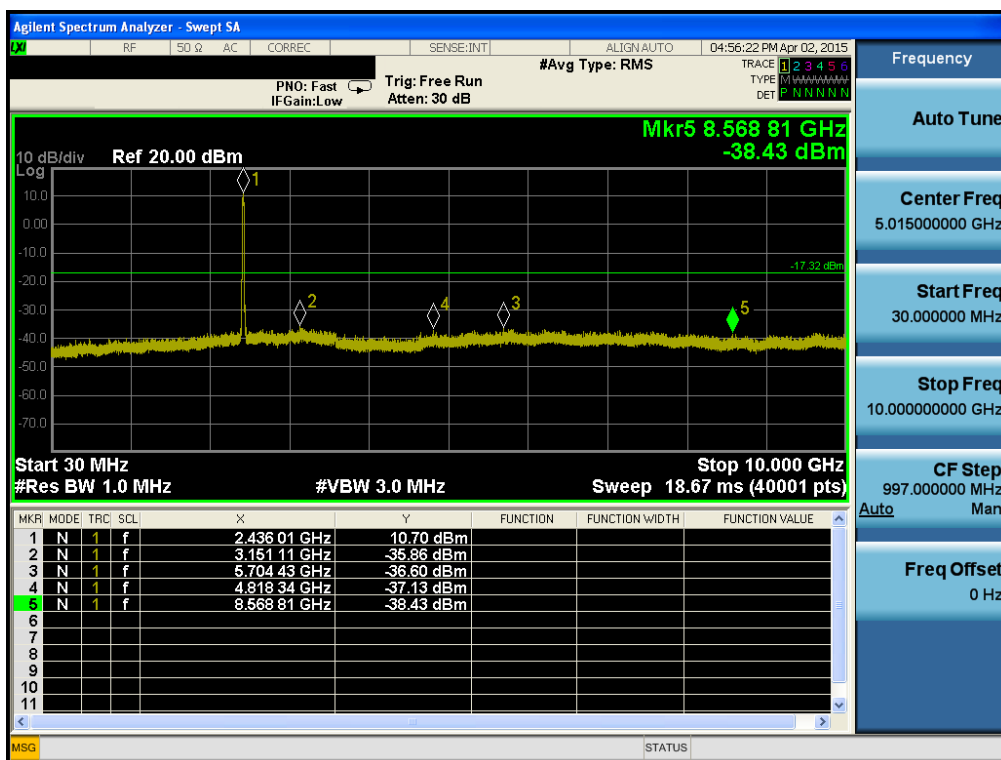
## Reference



## Conducted Spurious Emissions

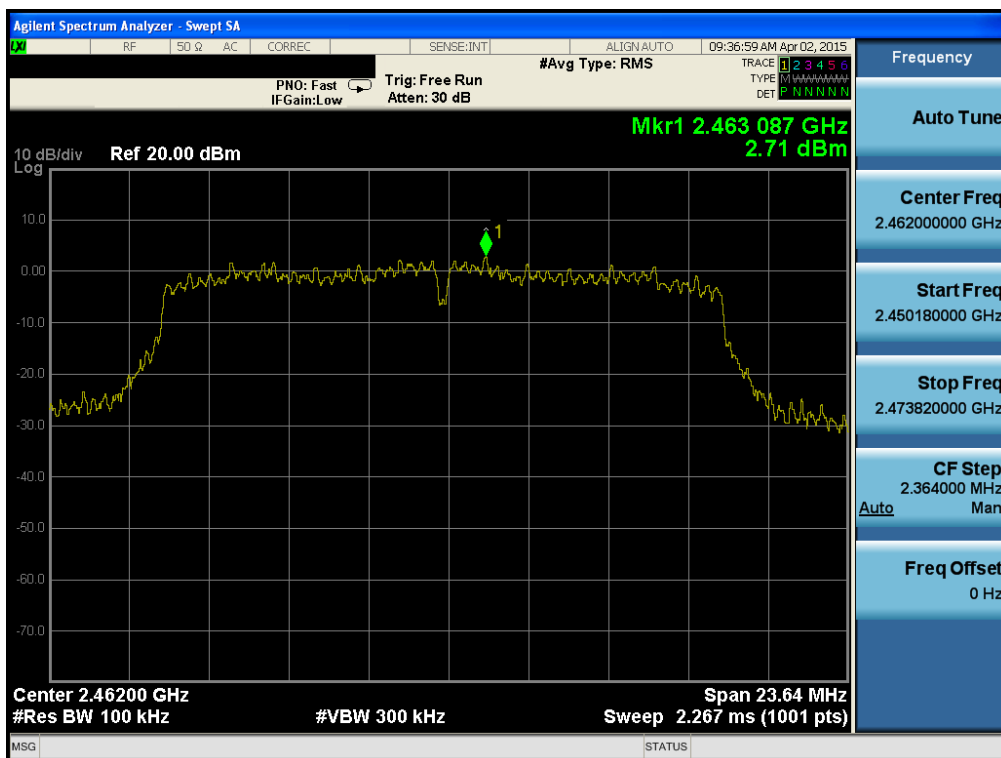


## Conducted Spurious Emissions

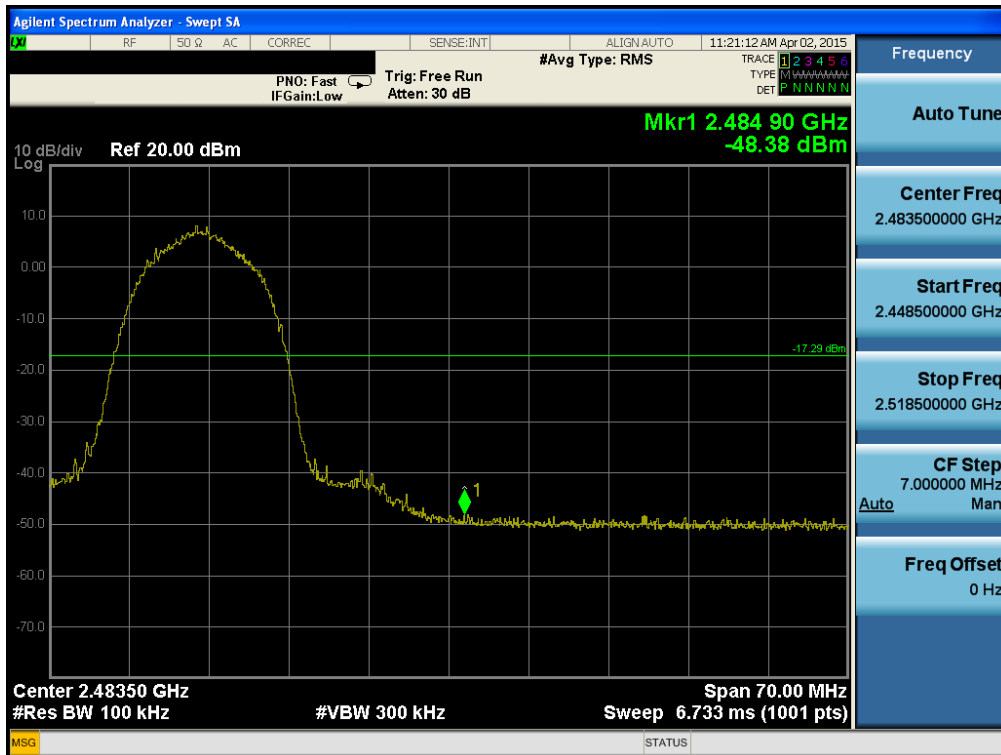


802.11g &amp; 54 Mbps &amp; 2462 MHz

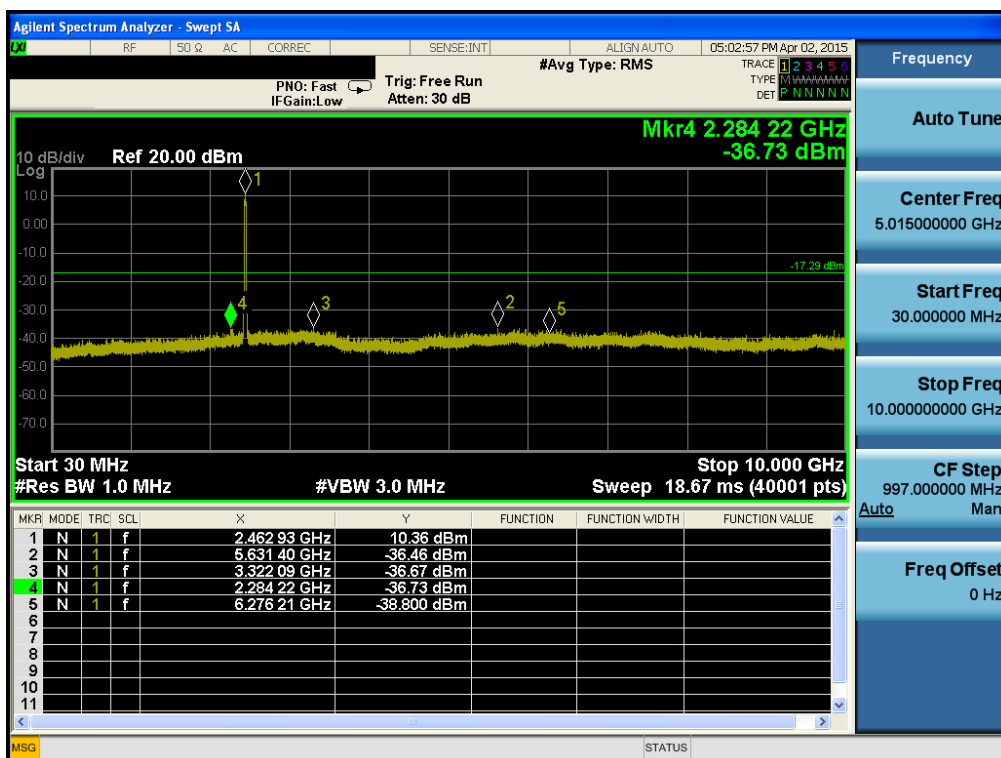
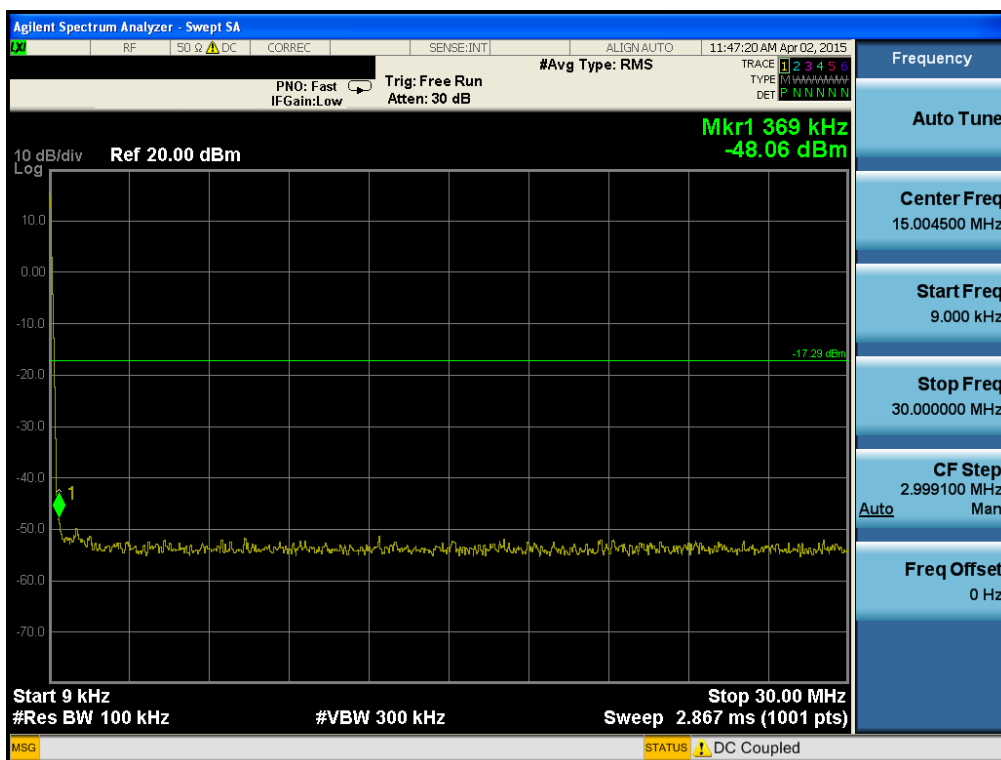
## Reference



## High Band-edge



## Conducted Spurious Emissions



Agilent Spectrum Analyzer - Swept SA

RF 50 Ω AC CORREC SENSE:INT ALIGN:AUTO 07:38:31 PM Apr 02, 2015

PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB #Avg Type: RMS

TRACE 1 2 3 4 5 6 TYPE M P N N N N N DET P N N N N N N

10 dB/div Ref 20.00 dBm

Mkr5 22.780 000 GHz -28.91 dBm

Start 10.000 GHz Stop 25.000 GHz  
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 40.00 ms (40001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	24.733 375 GHz	-26.64 dBm			
2	N	1	f	24.298 000 GHz	-26.69 dBm			
3	N	1	f	24.670 000 GHz	-27.13 dBm			
4	N	1	f	23.618 500 GHz	-28.51 dBm			
5	N	1	f	22.780 000 GHz	-28.91 dBm			
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq 17.500000000 GHz

Start Freq 10.000000000 GHz

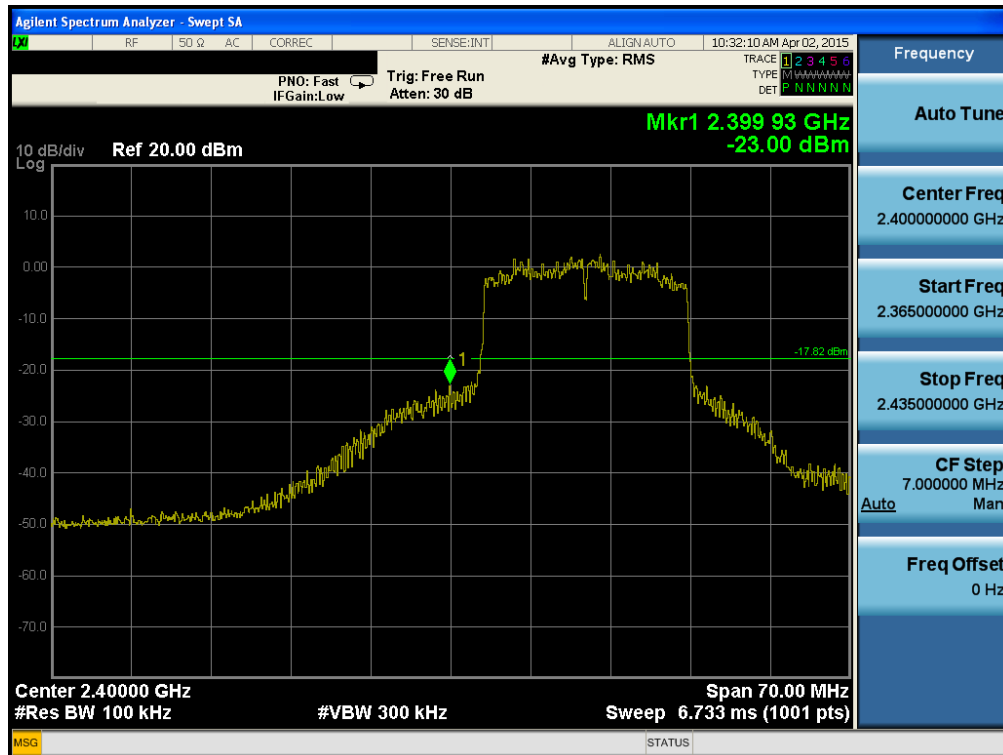
Stop Freq 25.000000000 GHz

CF Step 1.500000000 GHz

Auto Man

Freq Offset 0 Hz

## Reference



Conducted Spurious Emissions

