RF TEST REPORT

Test item	:	Cellular/PCS GPRS and Cellular WCDMA/HSDPA/HSUPA Wireless Router with WLAN
Model No.	:	L-02F
Order No.	:	DEMC1309-02886
Date of receipt	:	2013-09-16
Test duration	:	2013-10-02 ~ 2013-10-10
Date of issue	:	2013-10-28
Use of report	:	FCC Original Grant

Applicant : LG Electronics MobileComm USA, Inc.
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea

Test specification	:	FCC Part 15 Subpart C 247 KDB558074 v03r01
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:	Witnessed by:	Reviewed by:
Engineer JaeJin Lee	N/A	Deputy General Manager WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1310-1019	Oct. 28, 2013	Initial issue

Table of Contents

1. GENERAL INFORMATION

Applicant	:	LG Electronics MobileComm USA, Inc.
Address	:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID	:	ZNFL02F
EUT	:	Cellular/PCS GPRS and Cellular WCDMA/HSDPA/HSUPA Wireless Router with WLAN
Model	:	L-02F
Additional Model(s)	:	N/A
Data of Test	:	2013-10-02 ~ 2013-10-10
Contact person	:	Tae-Sung LEE

2. EUT DESCRIPTION

Product	Cellular/PCS GPRS and Cellular WCDMA/HSDPA/HSUPA Wireless Router with WLAN
Model Name	L-02F
Power Supply	DC 3.7 V
Frequency Range	2.4GHz Band ▪ 802.11b/g/n(20MHz): 2412 MHz ~ 2462 MHz ▪ 802.11n(40MHz): 2422 MHz ~ 2452 MHz
Max. RF Output Power	2.4GHz Band ▪ 802.11b: 15.73 dBm ▪ 802.11g: 21.69 dBm ▪ 802.11n (HT20): 21.33 dBm ▪ 802.11n (HT40): 21.21 dBm
Modulation Type	802.11b: DSSS/CCK 802.11g/n: OFDM
Antenna Specification	Antenna type: Internal Antenna Antenna gain: Chain 1 : -1.00 dBi & Chain 2 : - 1.40 dBi Directional Antenna gain for MIMO with uncorrelated signals : -1.20 Antenna configuration ▪ 802.11b/g: Single Transmitting (chain 1 or 2) ▪ 802.11n(MCS0 ~ 7) : Single Transmitting (chain 1 or 2) ▪ 802.11n(MCS8 ~ 15): Multiple Transmitting (chain 1 and 2)

3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.247(a)	RSS-210 [A8.2]	6 dB Bandwidth	> 500 kHz	Conducted	**C**
15.247(b)	RSS-210 [A8.4]	Transmitter Output Power	< 1Watt		**C**
15.247(d)	RSS-210 [A8.5]	Out of Band Emissions / Band Edge	20dBc in any 100kHz BW		**C**
15.247(e)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz		**C**
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	RSS-Gen(4.6.1)		**NA**
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits	Radiated	**C**Note2
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	**C**
15.203	-	Antenna Requirements	FCC 15.203	-	**C**

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: This test item was performed in each axis and the worst case data was reported.

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB558074 v03r1. 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 engineering 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 v03r1. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

The EUT is placed on the turntable, 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 v03r1. 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 v03r1.

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate360 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 forstaying 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 683-3, Yubang-Dong, Yongin-Si, Gyunggi-Do, 449-080, South Korea. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number : 678747

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 [7.1.2]:

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 internal antenna is attached on the main PCB using the special spring tension.

Therefore this E.U.T Complies with the requirement of §15.203

7.2 Directional Antenna Gain for MIMO :

Bands	Chain 1 [dBi]	Chain 2 [dBi]	Directional Gain for uncorrelated signals [dBi]
2.4 G	-1.00	-1.40	-1.20 < 6

Directional gain = 10 log[($10^{G1/10}$ + $10^{G2/10}$ + … + $10^{GN/10}$) /N_{ANT}] dBi for MIMO uncorrelated signals

8. TEST RESULT

8.1 6dB 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 v03r1**.

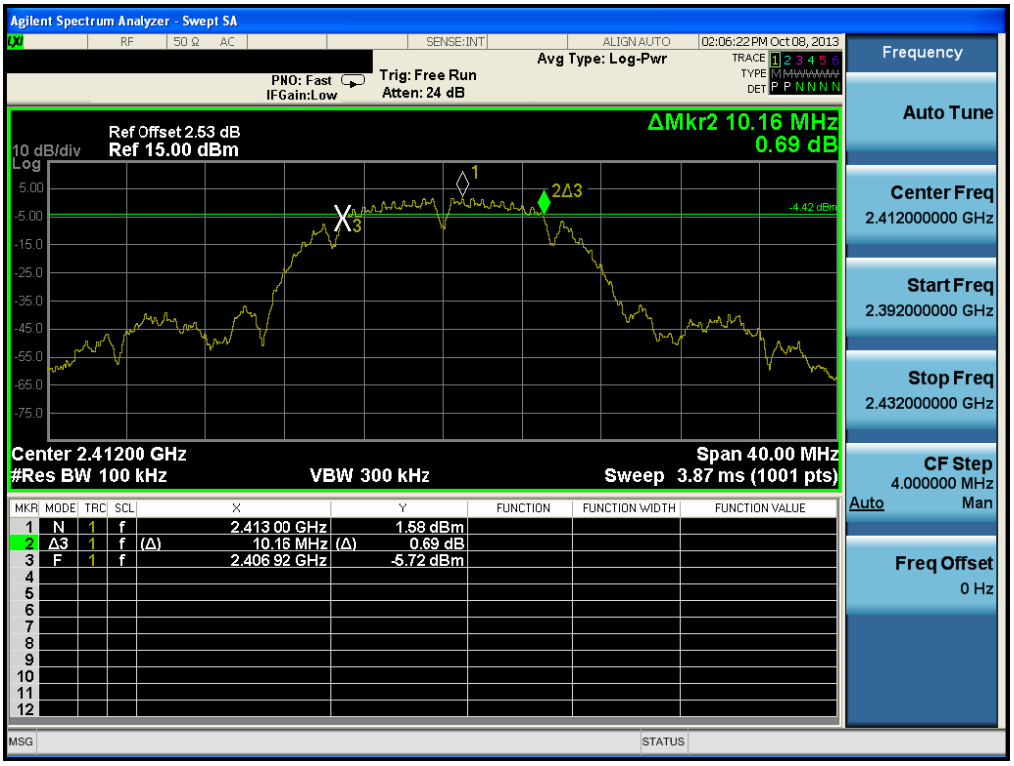
1. Set resolution bandwidth (RBW) = 100 KHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
   (RBW:100KHz/VBW:300KHz)
3. Detector = **Peak**.
4. Trace mode = **max hold**.
5. Sweep = **auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the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

▣TEST RESULTS: Comply

Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]	
			Chain 1	Chain 2
802.11b	1Mbps	2412	10.160	10.160
		2437	10.160	10.120
		2462	10.160	10.160
802.11g	6Mbps	2412	16.360	16.400
		2437	16.440	16.440
		2462	16.480	16.440
802.11n (HT20)	MCS 8	2412	17.160	17.600
		2437	17.440	17.240
		2462	17.640	17.680
802.11n (HT40)	MCS 8	2422	35.440	35.680
		2437	35.680	35.280
		2452	35.840	35.840

▣ RESULT PLOTS

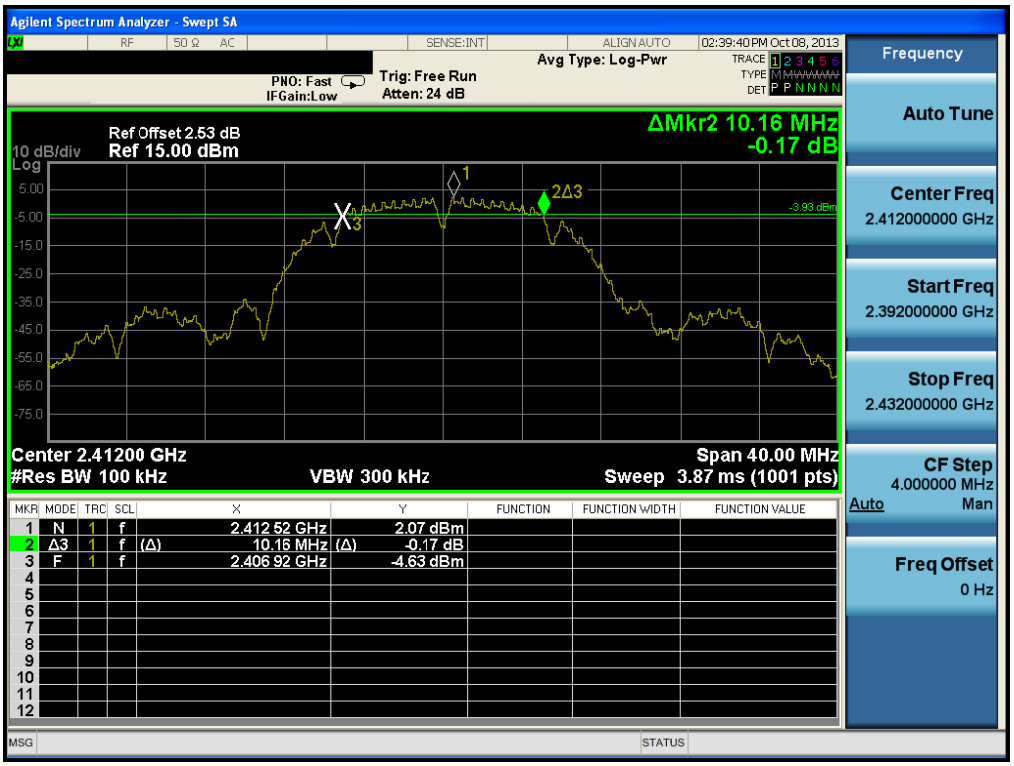
6 dB Bandwidth Test Mode: Chain 1 & 802.11b & 1Mbps & 2412MHz



6 dB Bandwidth Test Mode: Chain 1 & 802.11b & 1Mbps & 2437MHz

6 dB Bandwidth Test Mode: Chain 1 & 802.11b & 1Mbps & 2462MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11b & 1Mbps & 2412MHz



6 dB Bandwidth Test Mode: Chain 2 & 802.11b & 1Mbps & 2437MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11b & 1Mbps & 2462MHz

6 dB Bandwidth Test Mode: Chain 1 & 802.11g & 6Mbps & 2412MHz

6 dB Bandwidth Test Mode: Chain 1 & 802.11g & 6Mbps & 2437MHz

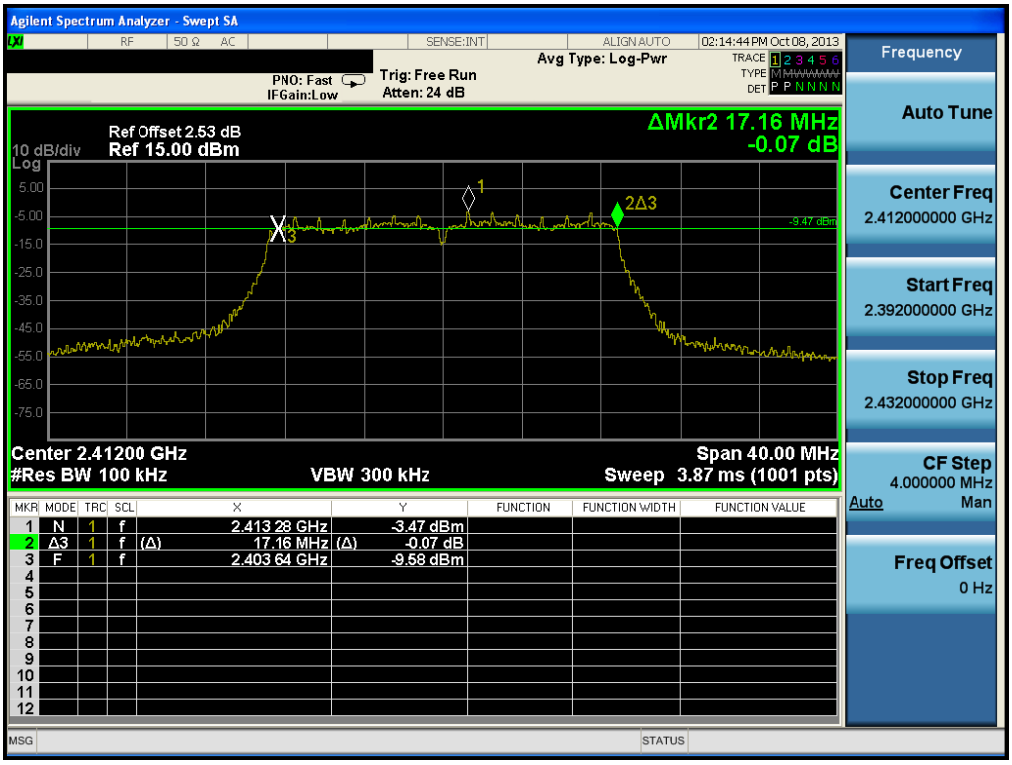
6 dB Bandwidth Test Mode: Chain 1 & 802.11g & 6Mbps & 2462MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11g & 6Mbps & 2412MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11g & 6Mbps & 2437MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11g & 6Mbps & 2462MHz

6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2412MHz

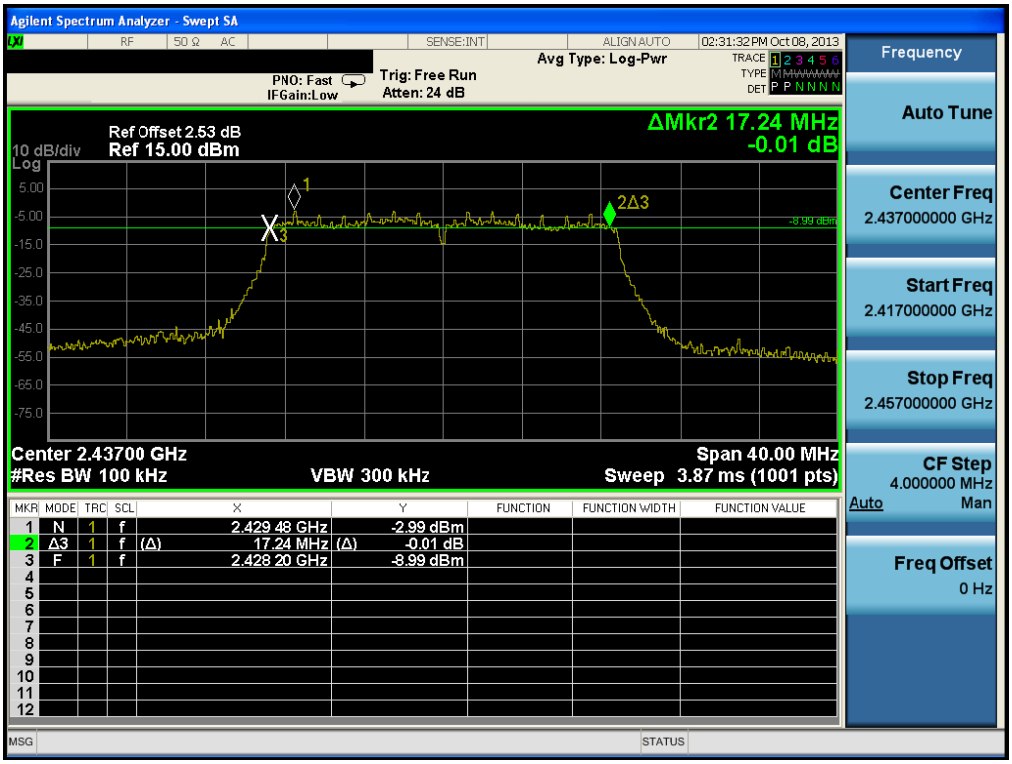


6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2437MHz

6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2462MHz

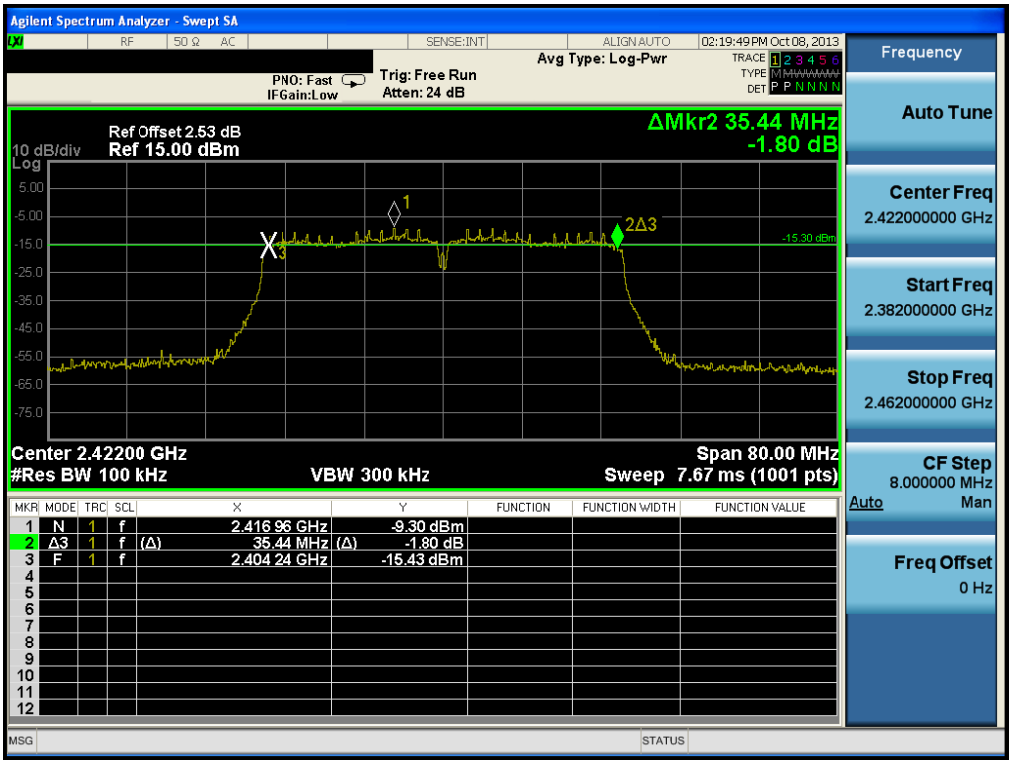
6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2412MHz

6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2437MHz

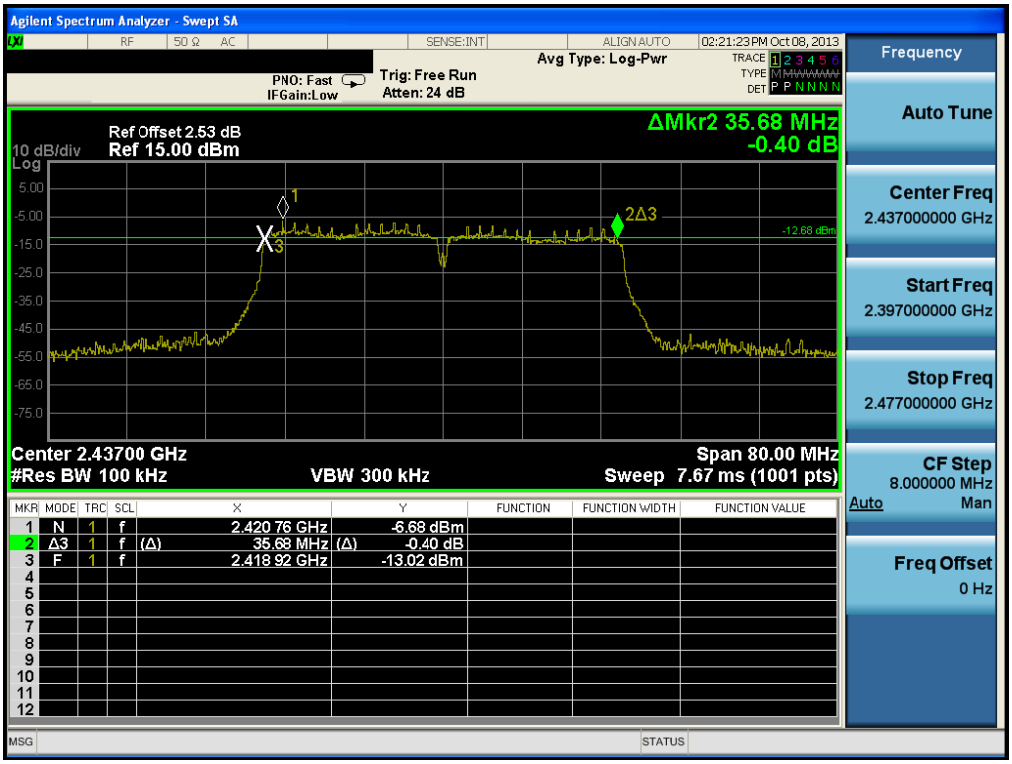


6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2462MHz

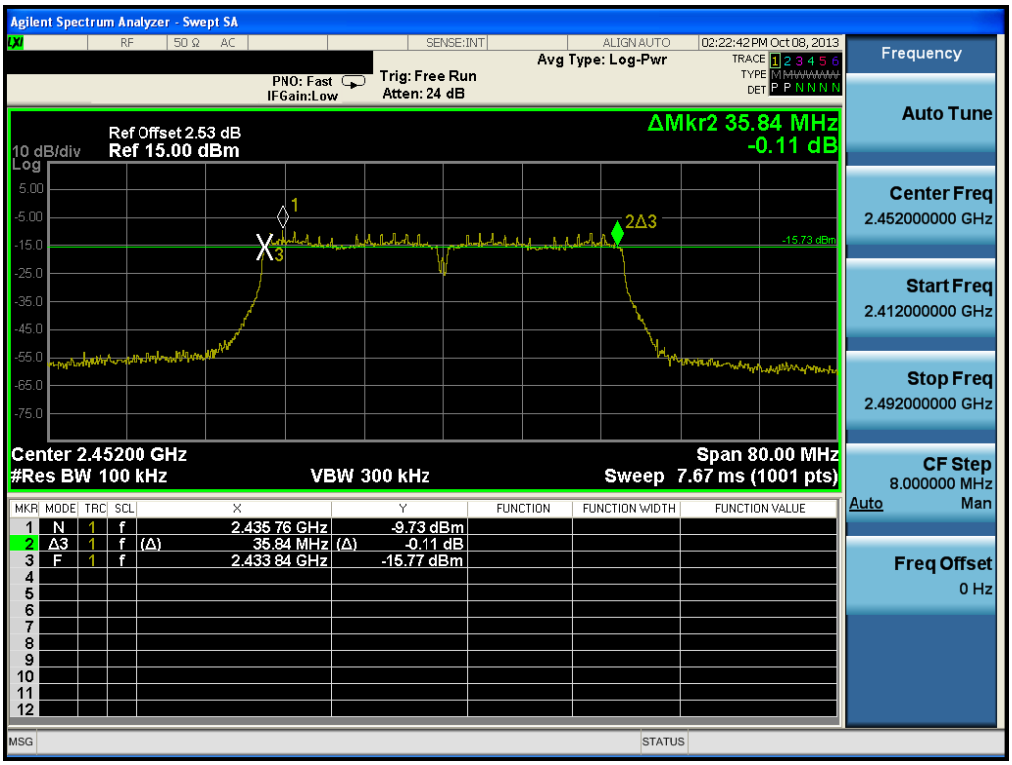
6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2422MHz



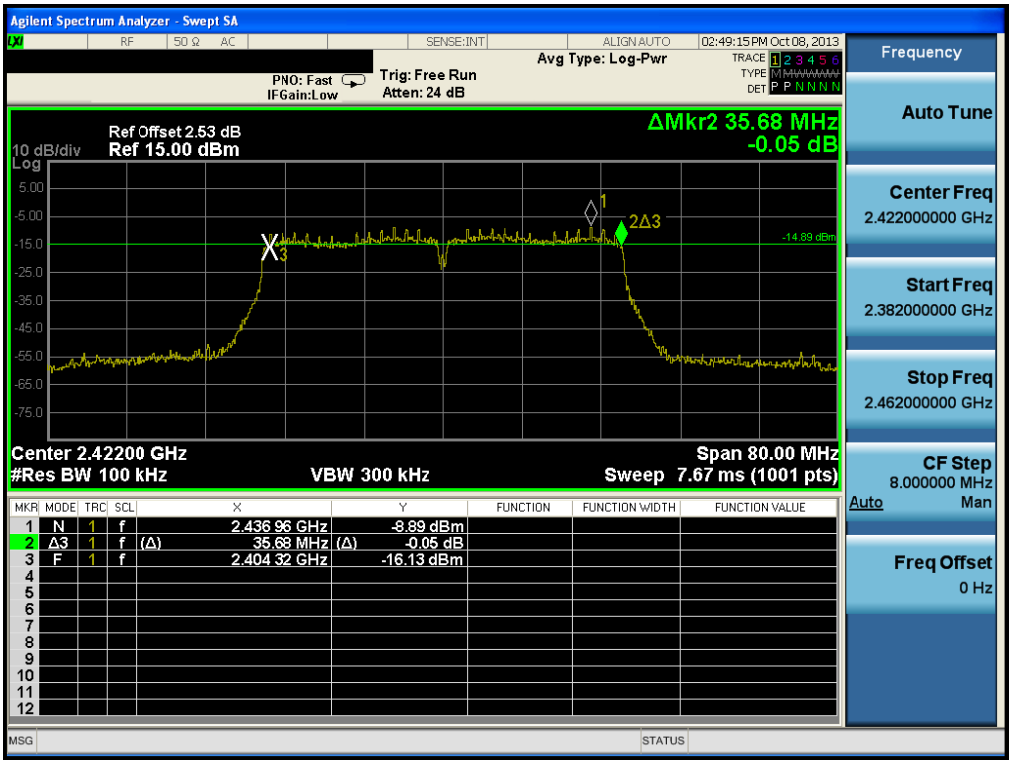
6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2437MHz



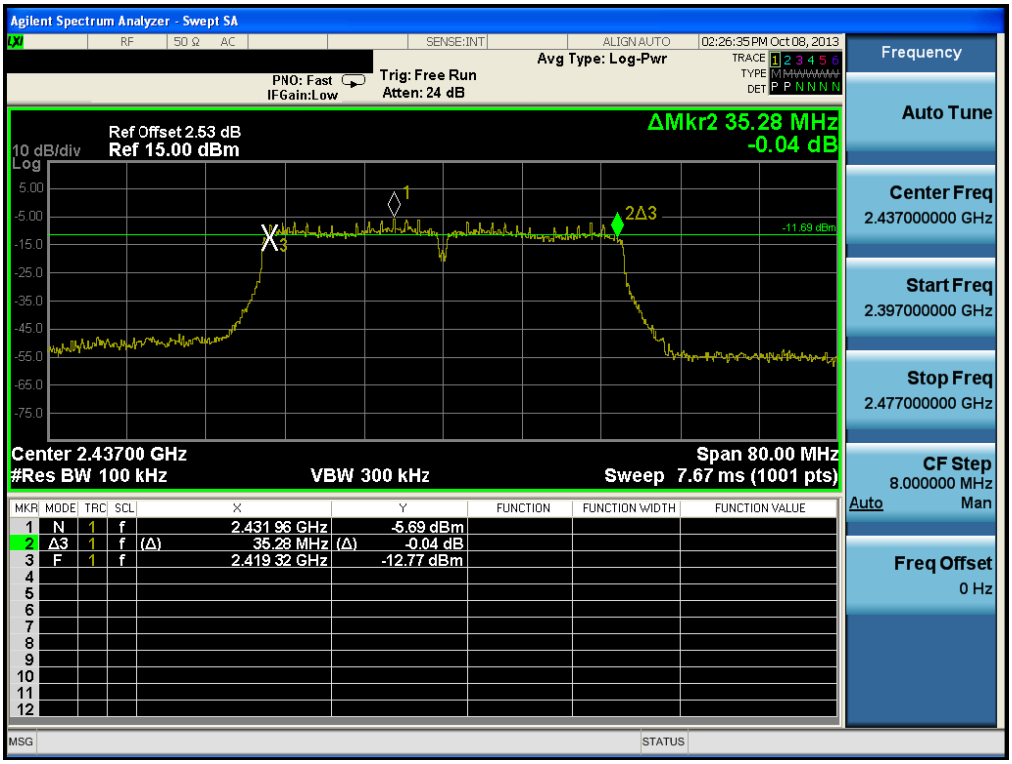
6 dB Bandwidth Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2452MHz



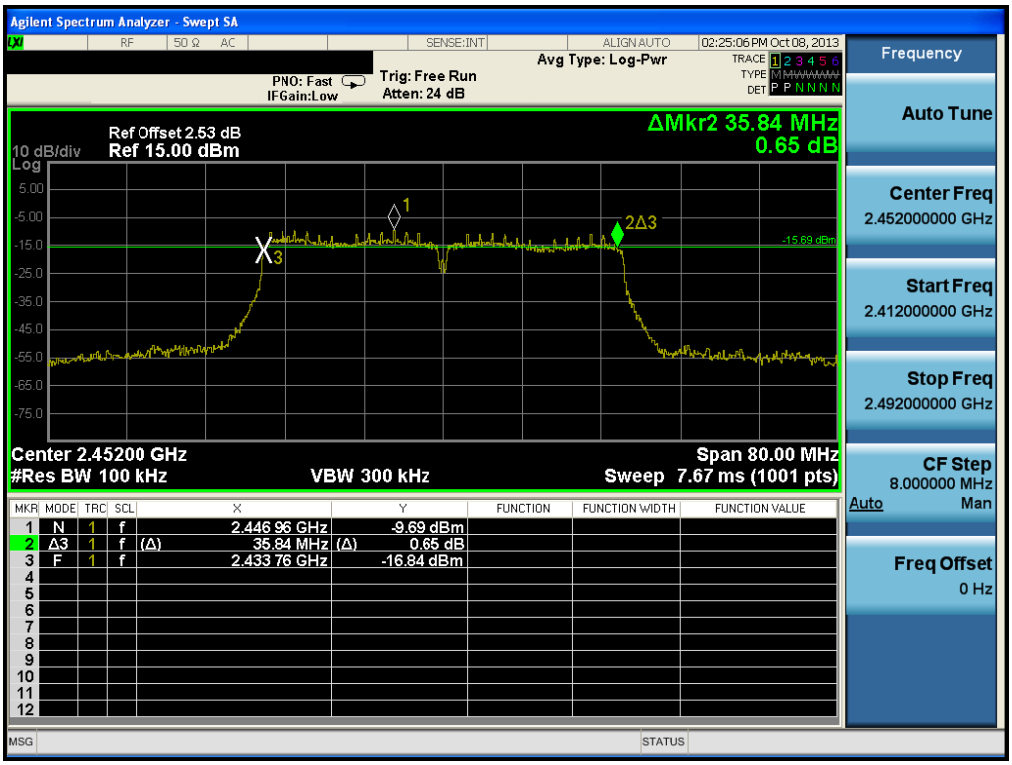
6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2422MHz



6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2437MHz



6 dB Bandwidth Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2452MHz

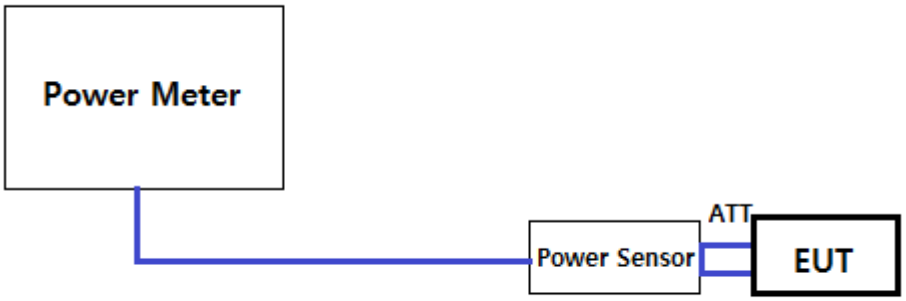


8.2 Maximum Peak Conducted Output Power

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 v03r1**
   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 v03r1**
   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 Mode: 802.11b

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [Mbps]							
					1	2	5.5	11	N/A	N/A	N/A	N/A
802.11b	1	1	2412	PK	14.47	14.28	14.44	14.33	-	-	-	-
				AV	11.28	11.12	10.93	10.71		-	-	-
		6	2437	PK	15.34	15.32	15.28	14.84	-	-	-	-
				AV	11.98	11.93	11.90	11.84	-	-	-	-
		11	2462	PK	**15.73**	15.46	15.09	15.05	-	-	-	-
				AV	12.40	12.28	12.17	12.13	-	-	-	-
	2	1	2412	PK	14.76	14.60	14.54	14.26	-	-	-	-
				AV	11.57	11.38	11.17	11.03		-	-	-
		6	2437	PK	15.17	15.15	14.55	14.42	-	-	-	-
				AV	11.97	11.72	11.28	11.19	-	-	-	-
		11	2462	PK	15.35	15.34	14.91	14.93	-	-	-	-
				AV	12.12	12.12	11.85	11.62	-	-	-	-

Test Mode: 802.11g

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [Mbps]							
					6	9	12	18	24	36	48	54
802.11g	1	1	2412	PK	21.41	21.11	21.12	21.39	21.03	21.15	21.09	20.98
				AV	10.95	10.94	10.94	10.95	10.40	10.47	10.59	10.47
		6	2437	PK	**21.69**	21.59	21.20	21.08	21.06	21.43	21.01	21.08
				AV	11.33	11.12	10.95	11.04	11.04	11.17	10.84	10.71
		11	2462	PK	21.32	21.00	21.28	21.04	21.11	21.20	21.05	20.73
				AV	10.82	10.72	10.67	10.66	10.47	10.59	10.49	10.36
	2	1	2412	PK	21.32	20.90	20.73	20.74	21.22	20.80	21.25	20.84
				AV	10.73	10.72	10.69	10.52	10.65	10.31	10.64	10.33
		6	2437	PK	21.64	21.56	21.29	21.11	21.39	21.07	21.38	21.23
				AV	11.16	11.12	11.07	11.15	11.00	10.96	10.99	10.63
		11	2462	PK	20.90	20.87	20.64	20.52	20.75	20.57	20.83	20.72
				AV	10.38	10.36	10.30	10.15	10.18	9.95	10.08	9.77

Test Mode: 802.11n(HT20) / MCS0~7 (1TX)

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [MCS]							
					0	1	2	3	4	5	6	7
802.11n (HT20)	1	1	2412	PK	20.47	20.13	20.18	20.10	20.05	20.06	20.29	20.32
				AV	9.57	9.39	9.50	9.43	9.49	9.54	9.49	9.30
		6	2437	PK	21.04	21.02	20.93	20.77	20.51	20.60	20.57	20.47
				AV	10.34	10.15	10.27	10.22	10.11	10.21	10.05	9.97
		11	2462	PK	20.42	20.31	20.02	19.99	20.09	20.14	20.40	20.31
				AV	9.67	9.45	9.41	9.21	9.46	9.65	9.62	9.41
	2	1	2412	PK	19.65	19.26	19.35	19.25	19.20	19.21	19.55	19.43
				AV	8.77	8.51	8.62	8.61	8.62	8.65	8.74	8.42
		6	2437	PK	20.91	20.82	20.49	20.49	20.56	20.47	20.71	20.56
				AV	9.88	9.66	9.73	9.73	9.79	9.85	9.83	9.63
		11	2462	PK	20.05	19.94	19.63	19.42	19.51	19.63	19.70	19.61
				AV	9.08	8.94	9.05	8.82	8.95	8.92	8.67	8.64

Test Mode: 802.11n(HT40) / MCS0~7 (1TX)

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [MCS]							
					0	1	2	3	4	5	6	7
802.11n (HT40)	1	3	2422	PK	18.37	18.10	18.20	18.25	18.11	18.27	18.21	18.37
				AV	7.57	7.39	7.47	7.41	7.45	7.58	7.11	7.14
		6	2437	PK	20.72	20.45	20.65	20.19	20.40	20.41	20.53	20.34
				AV	9.96	9.71	9.60	9.54	9.76	9.82	9.87	9.73
		9	2452	PK	17.71	17.26	17.53	17.60	17.50	17.24	17.03	17.29
				AV	6.51	6.50	6.56	6.09	6.49	6.41	6.53	6.56
	2	3	2422	PK	18.88	18.69	18.54	18.77	18.24	18.54	18.43	18.66
				AV	7.93	7.97	7.68	7.60	7.78	7.81	7.84	7.83
		6	2437	PK	20.24	19.84	20.12	20.02	19.73	19.71	20.14	20.24
				AV	9.38	9.14	9.09	8.90	9.07	9.35	9.38	9.36
		9	2452	PK	18.05	18.03	17.81	18.01	17.75	17.87	17.81	17.92
				AV	6.90	6.78	6.85	6.86	6.85	6.91	6.78	6.46

Test Mode: 802.11n(HT20) / MCS8~15 (2TX)

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [MCS]							
					8	9	10	11	12	13	14	15
802.11n (HT20)	1	1	2412	PK	18.09	17.34	17.22	17.01	17.66	17.80	17.82	17.41
				AV	6.90	6.74	6.97	6.97	7.08	6.55	6.54	6.59
		6	2437	PK	18.08	17.53	17.31	17.22	17.45	17.63	17.66	17.52
				AV	7.45	7.59	7.42	7.42	7.50	7.01	6.93	6.94
		11	2462	PK	18.26	17.71	17.08	17.62	17.61	18.01	17.76	17.24
				AV	7.23	7.24	6.74	6.88	6.54	6.71	6.83	6.95
	2	1	2412	PK	18.15	17.65	18.00	17.84	17.24	18.09	17.91	17.37
				AV	7.40	7.20	7.33	7.22	6.96	7.06	7.11	7.15
		6	2437	PK	18.55	18.42	18.61	18.35	18.09	18.55	18.39	18.20
				AV	7.65	7.44	7.65	7.53	7.48	7.57	7.57	7.59
		11	2462	PK	17.70	17.37	17.93	17.76	17.52	17.89	17.70	17.47
				AV	6.99	6.91	7.06	7.22	7.22	7.12	7.13	6.86
	1+2 (Sum)	1	2412	PK	21.13	20.51	20.64	20.46	20.47	20.96	20.88	20.40
				AV	10.17	9.99	10.16	10.11	10.03	9.82	9.84	9.89
		6	2437	PK	**21.33**	21.01	21.02	20.83	20.79	21.12	21.05	20.88
				AV	10.56	10.53	10.55	10.49	10.50	10.31	10.27	10.29
		11	2462	PK	21.00	20.55	20.54	20.70	20.58	20.96	20.74	20.37
				AV	10.12	10.09	9.91	10.06	9.90	9.93	9.99	9.92

Test Mode: 802.11n(HT40) / MCS8~15 (2TX)

Mode	Chain	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
					DATA RATE [MCS]							
					8	9	10	11	12	13	14	15
802.11n (HT40)	1	3	2422	PK	15.98	15.27	15.49	15.69	15.77	15.91	15.61	15.85
				AV	4.47	4.34	4.45	4.49	4.42	4.42	4.56	4.48
		6	2437	PK	18.11	17.65	18.05	17.73	18.15	18.07	17.60	17.72
				AV	6.95	7.09	6.87	6.88	7.12	6.96	6.92	6.76
		9	2452	PK	15.39	15.02	15.27	15.31	15.21	15.29	15.33	15.13
				AV	3.97	3.87	3.69	3.74	3.48	3.64	3.74	3.53
	2	3	2422	PK	16.35	16.30	16.34	16.23	16.11	15.98	15.78	15.91
				AV	5.42	5.43	5.08	4.93	4.84	4.92	4.85	4.57
		6	2437	PK	18.29	18.01	18.00	17.68	17.86	17.87	17.63	17.48
				AV	7.30	7.03	7.36	7.07	7.04	7.09	7.14	7.09
		9	2452	PK	15.16	15.11	14.74	15.04	15.11	14.34	14.95	14.89
				AV	3.84	3.79	3.65	3.71	3.54	3.45	3.55	3.53
	1+2 (Sum)	3	2422	PK	19.18	18.83	18.95	18.98	18.95	18.96	18.71	18.89
				AV	7.98	7.93	7.79	7.73	7.65	7.69	7.72	7.54
		6	2437	PK	**21.21**	20.84	21.04	20.72	21.02	20.98	20.63	20.61
				AV	10.14	10.07	10.13	9.99	10.09	10.04	10.04	9.94
		9	2452	PK	18.29	18.08	18.02	18.19	18.17	17.85	18.15	18.02
				AV	6.92	6.84	6.68	6.74	6.52	6.56	6.66	6.54

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:

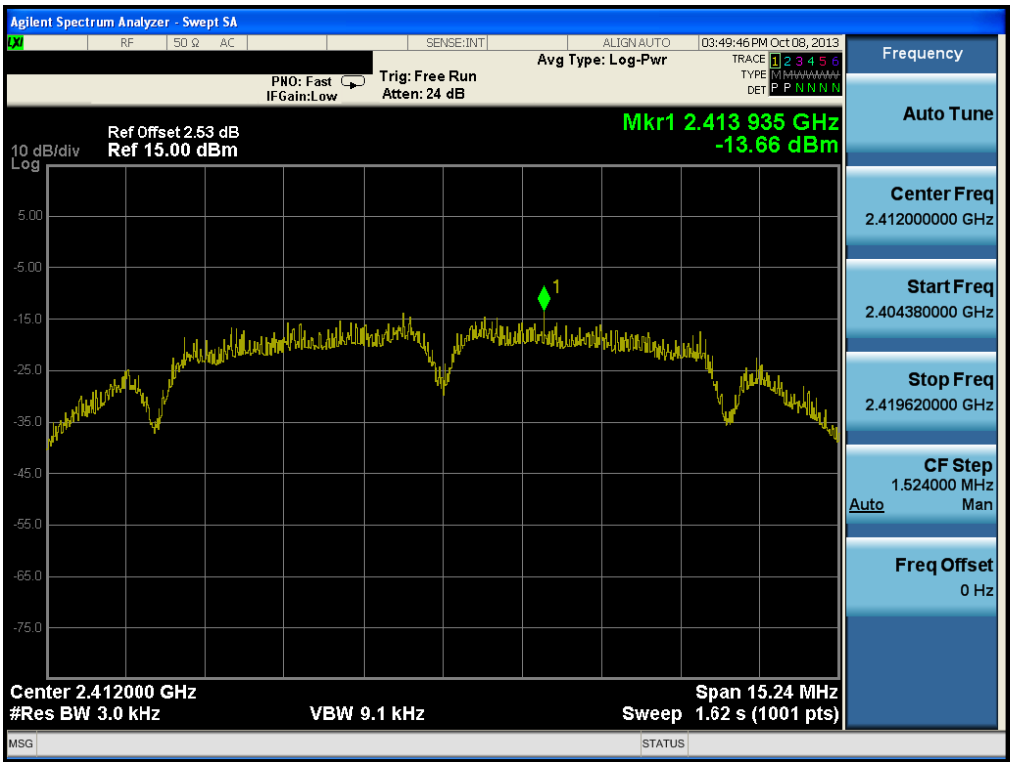
The Measurement Procedure **Method PKPSD of KDB558074 v03r1** is used.
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to: **3 kHz ≤ RBW ≤ 100 kHz**.
4. Set the VBW ≥ **3 x RBW.**
5. Detector = **peak.**
6. Sweep time = **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

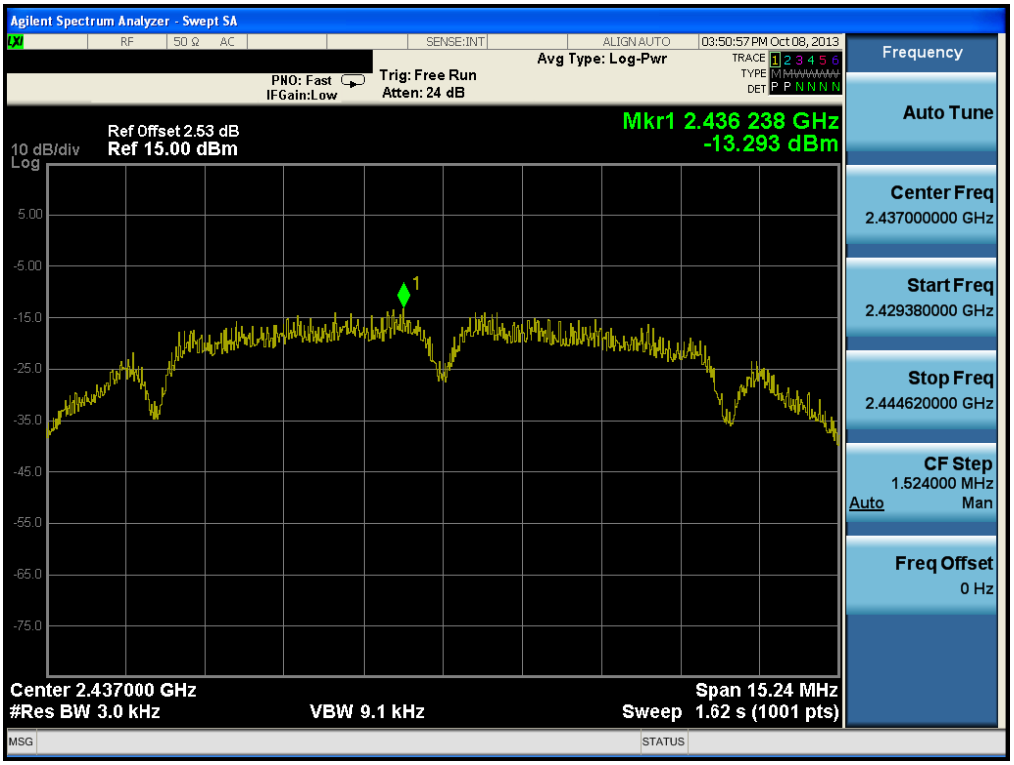
Test Mode	Data Rate	Frequency [MHz]	RBW	PKPSD[dBm]		
				Chain 1	Chain 2	Chain1+2 (Sum)
802.11b	1Mbps	2412	3 kHz	- 13.66	- 14.04	-
		2437	3 kHz	- 13.29	- 12.60	-
		2462	3 kHz	- 12.59	- 13.48	-
802.11g	6Mbps	2412	3 kHz	- 15.41	- 15.80	-
		2437	3 kHz	- 15.95	- 16.12	-
		2462	3 kHz	- 16.70	- 17.03	-
802.11n (HT20)	MCS 8	2412	3 kHz	- 19.71	- 18.87	- 16.26
		2437	3 kHz	- 18.66	- 18.86	- 15.75
		2462	3 kHz	- 19.61	- 18.35	- 15.92
802.11n (HT40)	MCS 8	2422	3 kHz	- 23.77	- 23.89	- 20.82
		2437	3 kHz	- 21.96	- 20.94	- 18.41
		2452	3 kHz	- 25.77	- 23.98	- 21.77

▣RESULT PLOTS

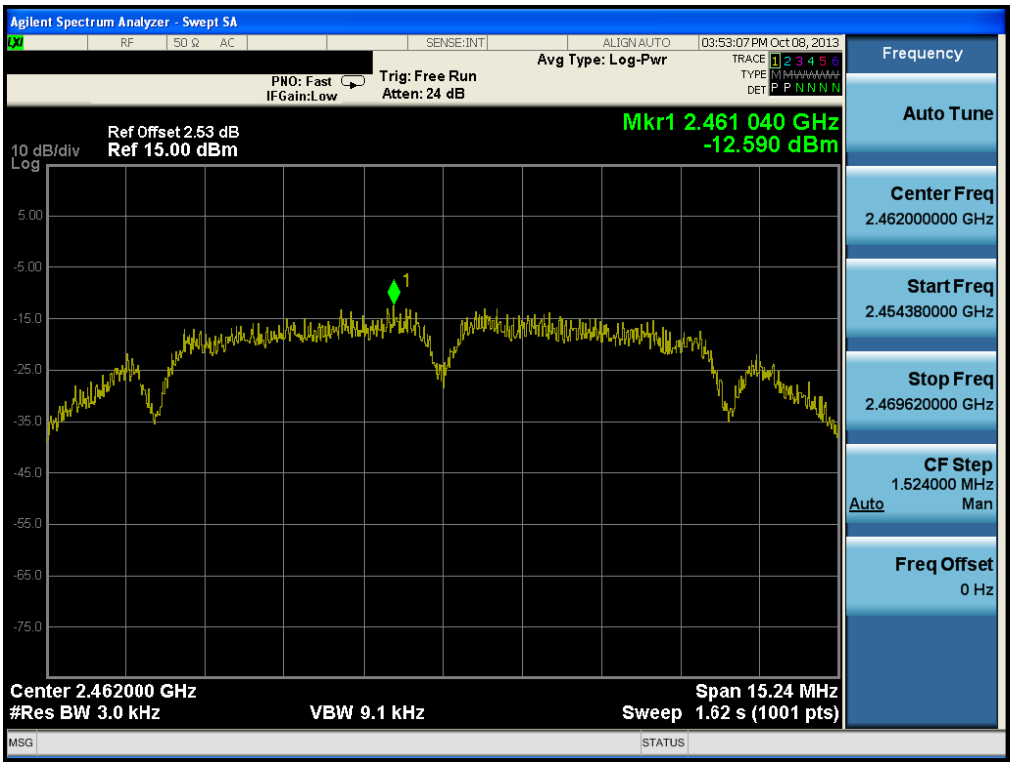
Maximum PPSD Test Mode: Chain 1 & 802.11b & 1Mbps & 2412MHz



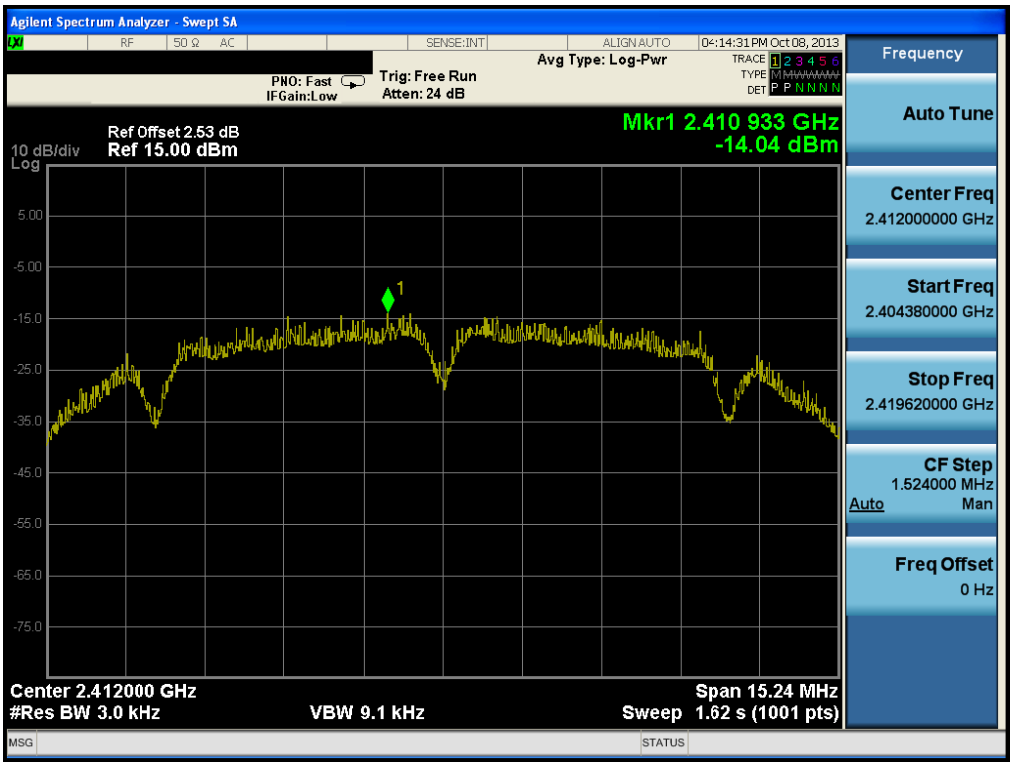
Maximum PPSD Test Mode: Chain 1 & 802.11b & 1Mbps & 2437MHz



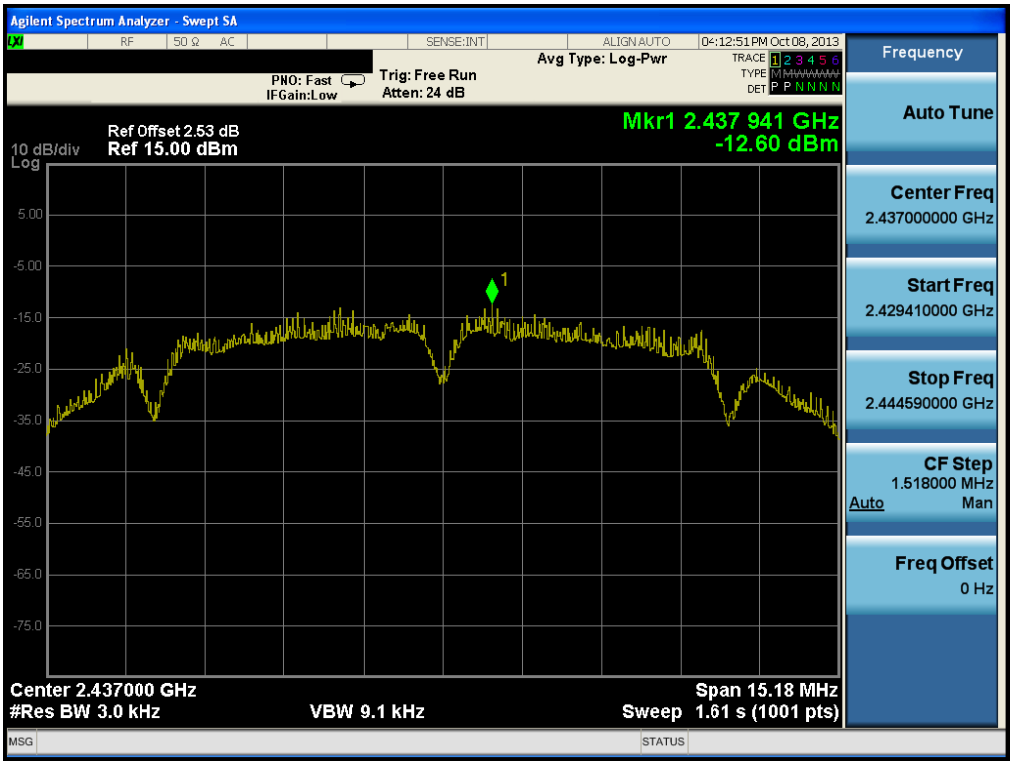
Maximum PPSD Test Mode: Chain 1 & 802.11b & 1Mbps & 2462MHz



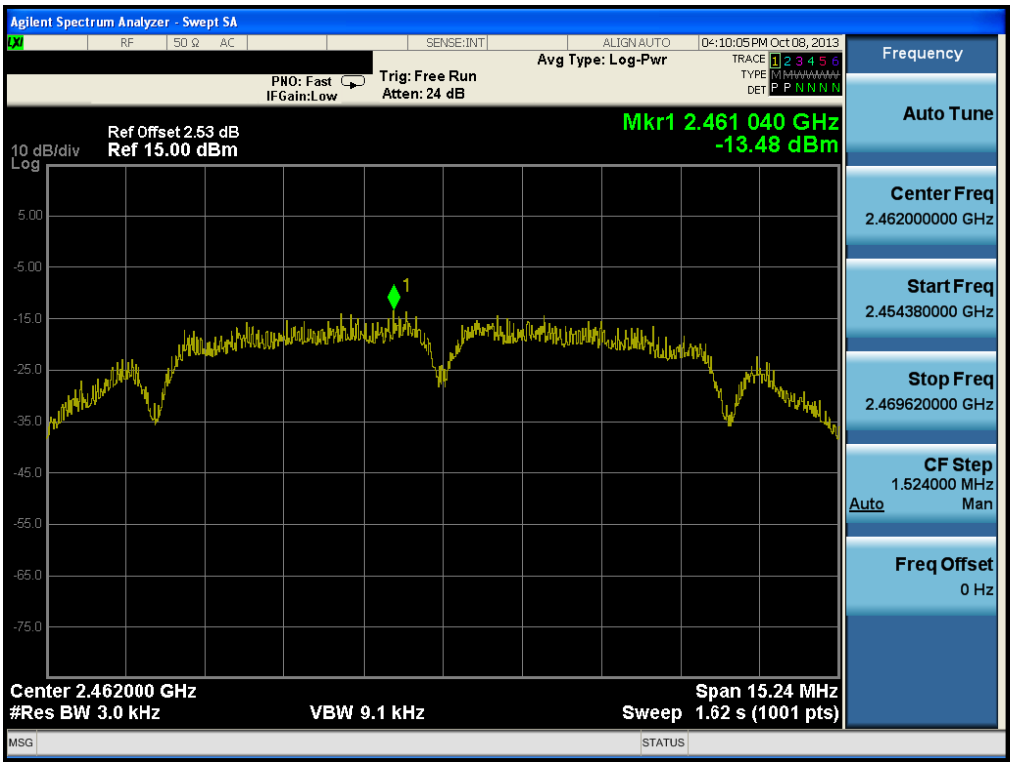
Maximum PPSD Test Mode: Chain 2 & 802.11b & 1Mbps & 2412MHz



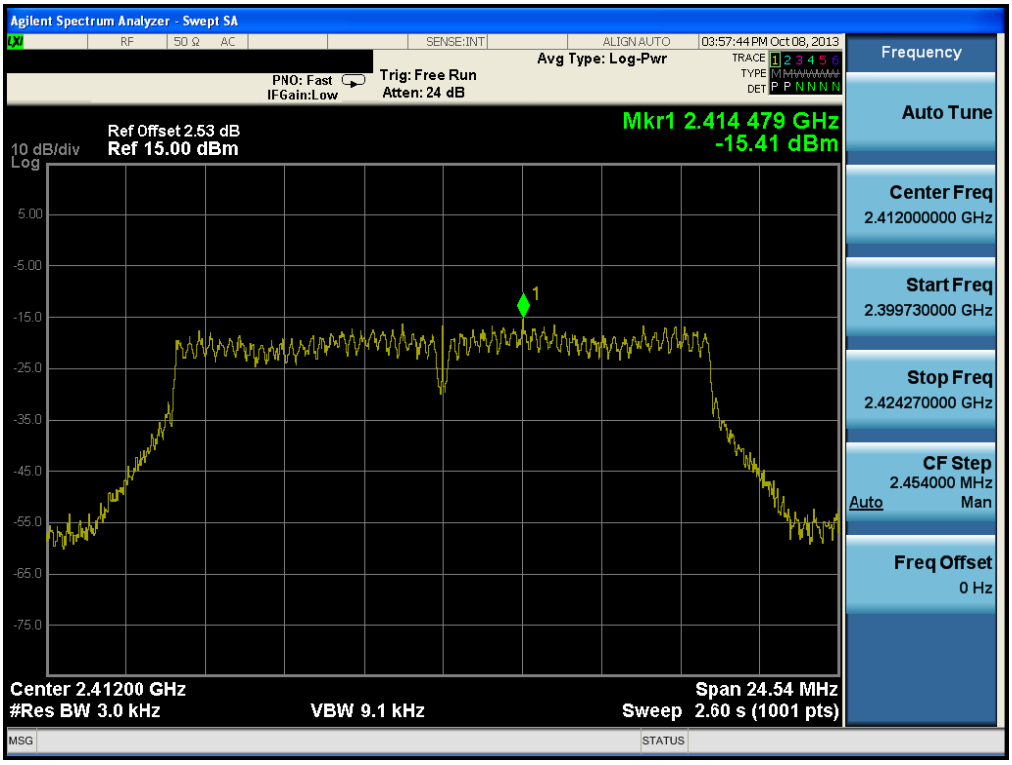
Maximum PPSD Test Mode: Chain 2 & 802.11b & 1Mbps & 2437MHz



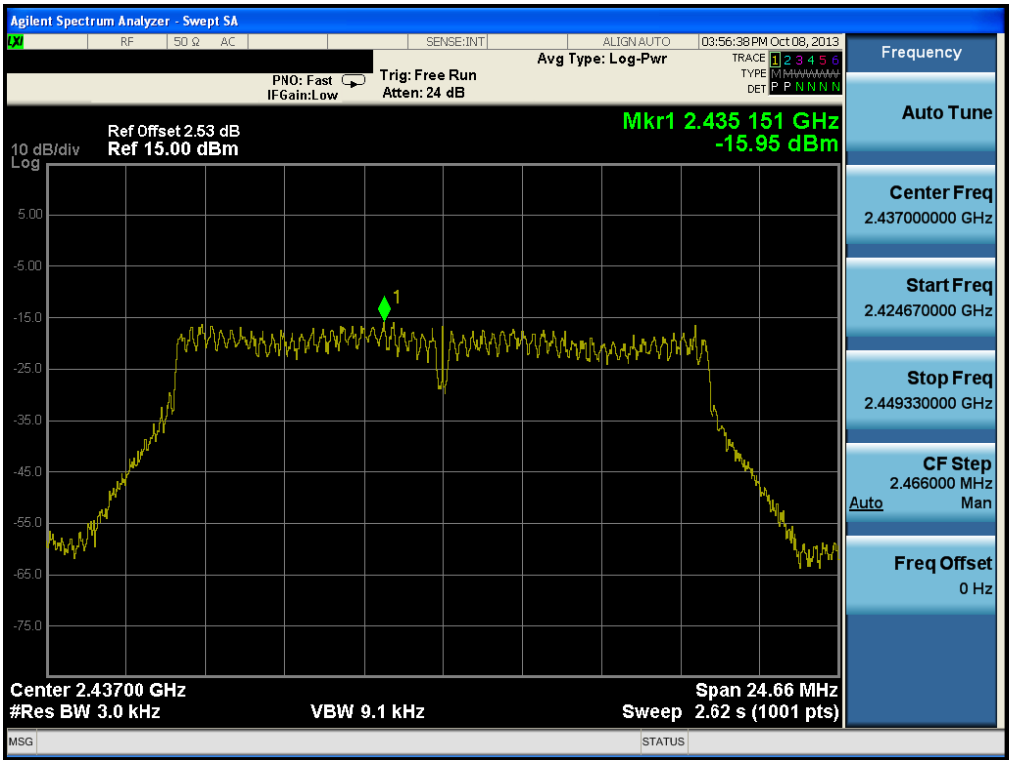
Maximum PPSD Test Mode: Chain 2 & 802.11b & 1Mbps & 2462MHz



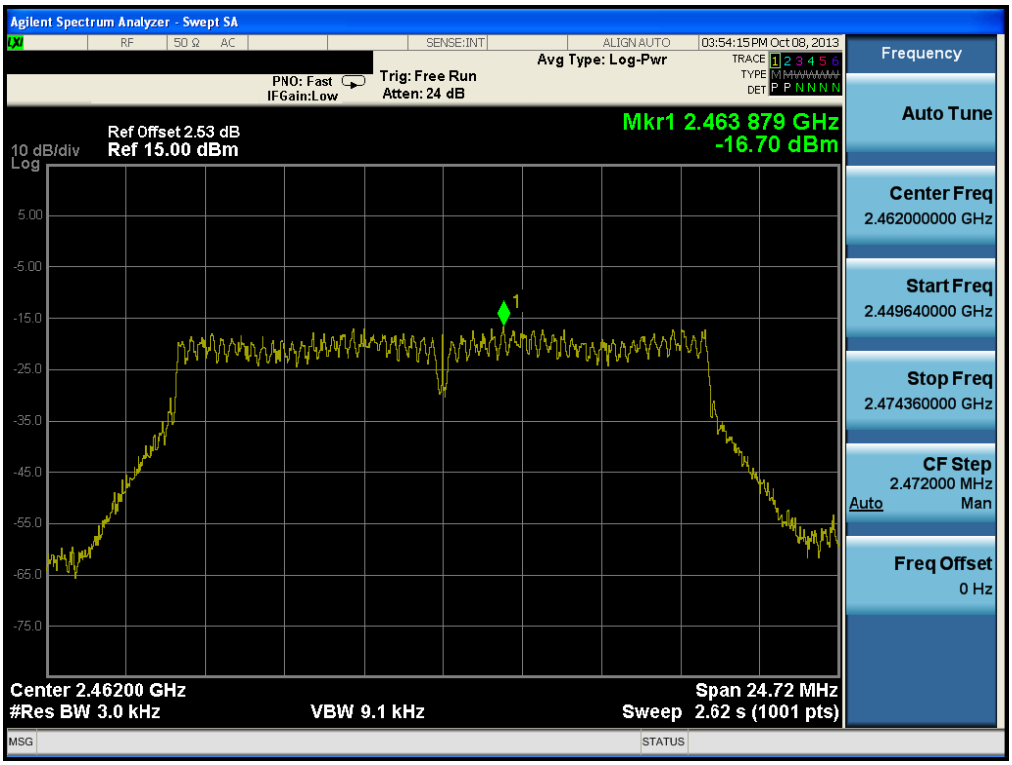
Maximum PPSD Test Mode: Chain 1 & 802.11g & 6Mbps & 2412MHz



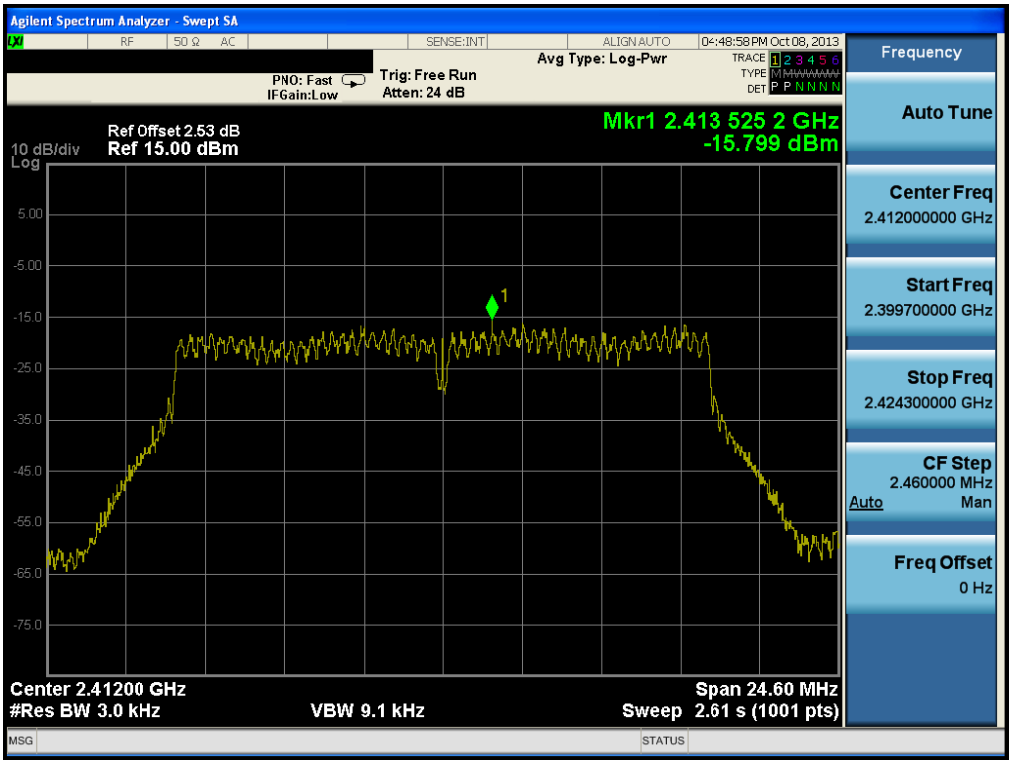
Maximum PPSD Test Mode: Chain 1 & 802.11g & 6Mbps & 2437MHz



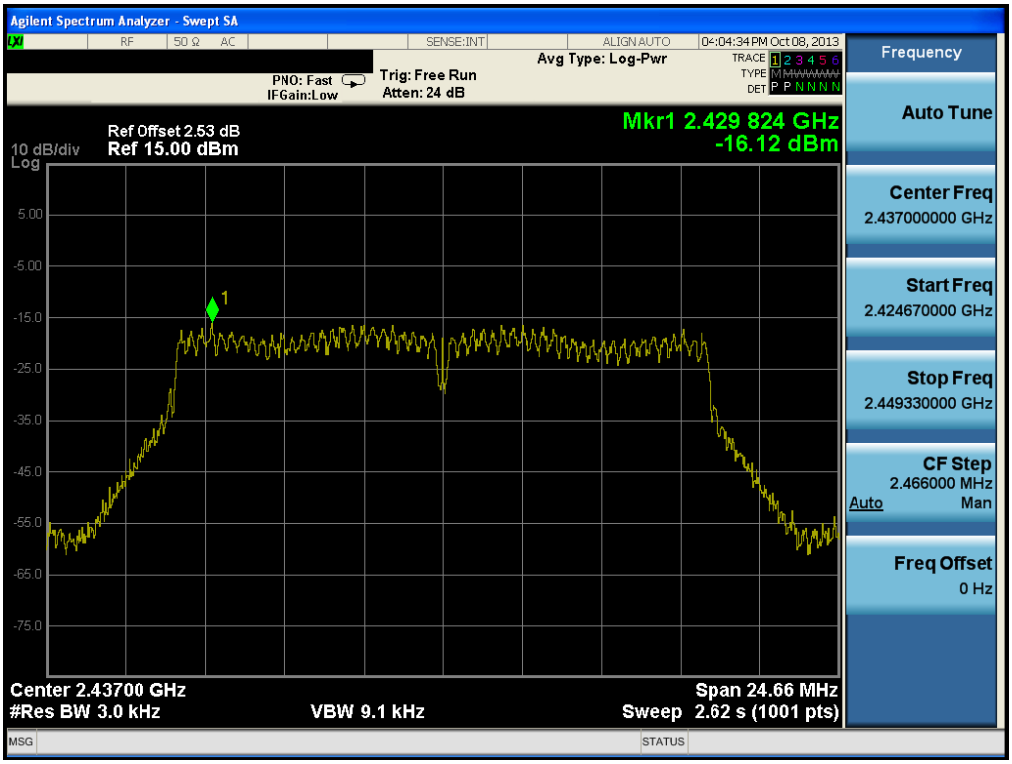
Maximum PPSD Test Mode: Chain 1 & 802.11g & 6Mbps & 2462MHz



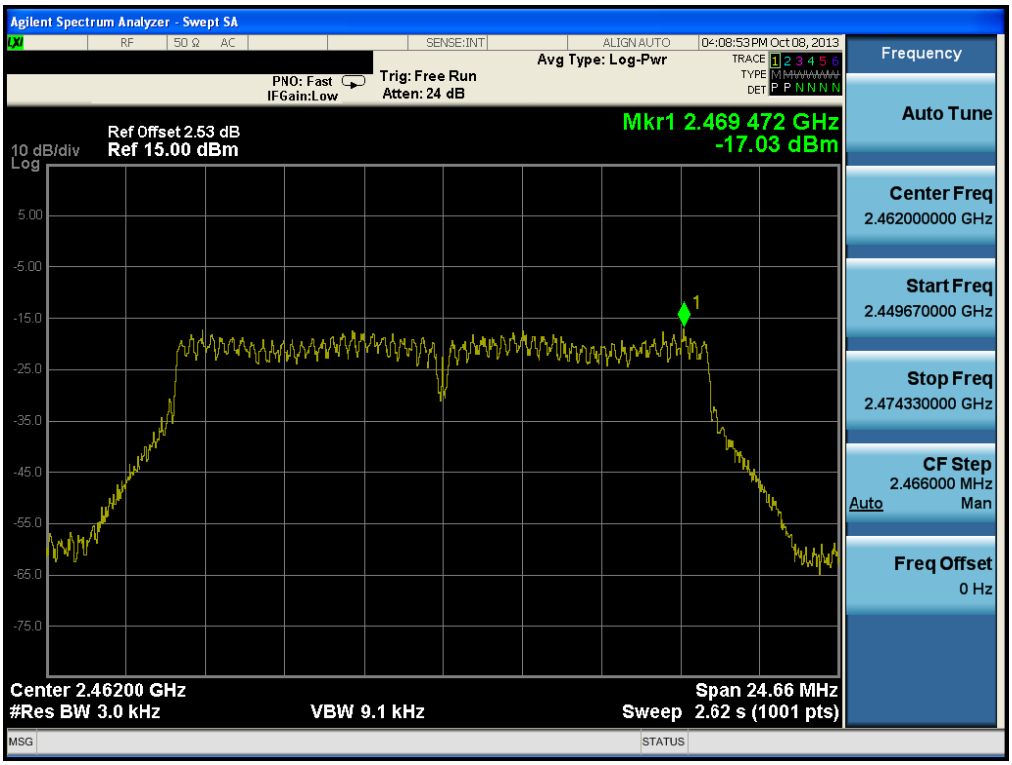
Maximum PPSD Test Mode: Chain 2 & 802.11g & 6Mbps & 2412MHz



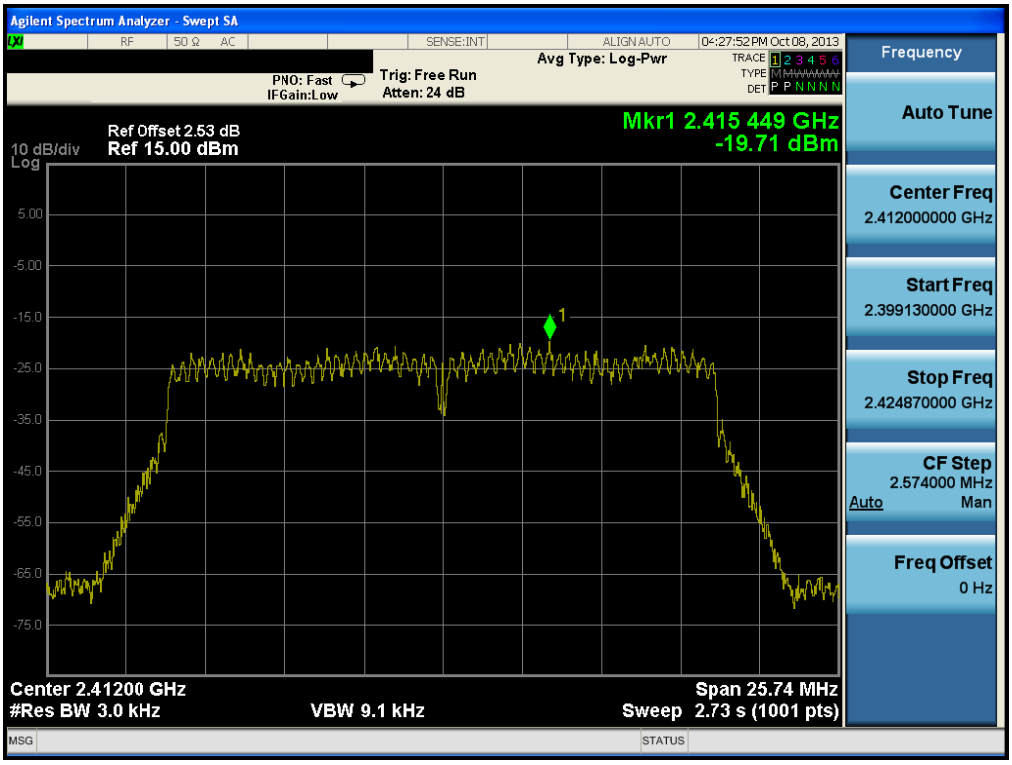
Maximum PPSD Test Mode: Chain 2 & 802.11g & 6Mbps & 2437MHz



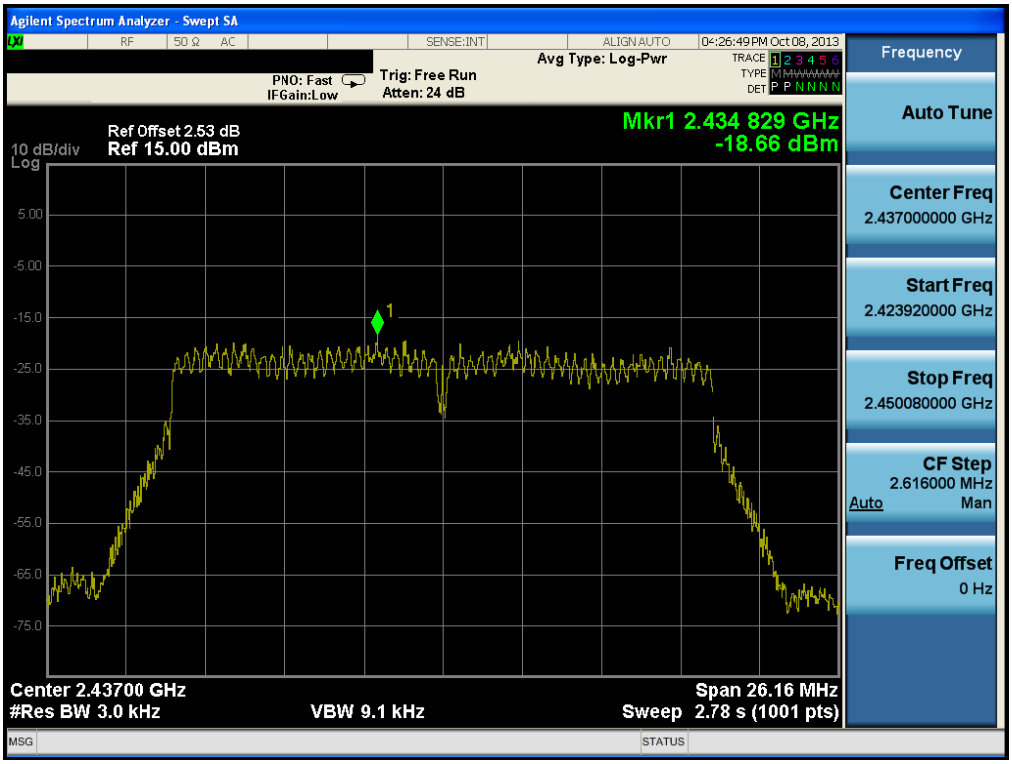
Maximum PPSD Test Mode: Chain 2 & 802.11g & 6Mbps & 2462MHz



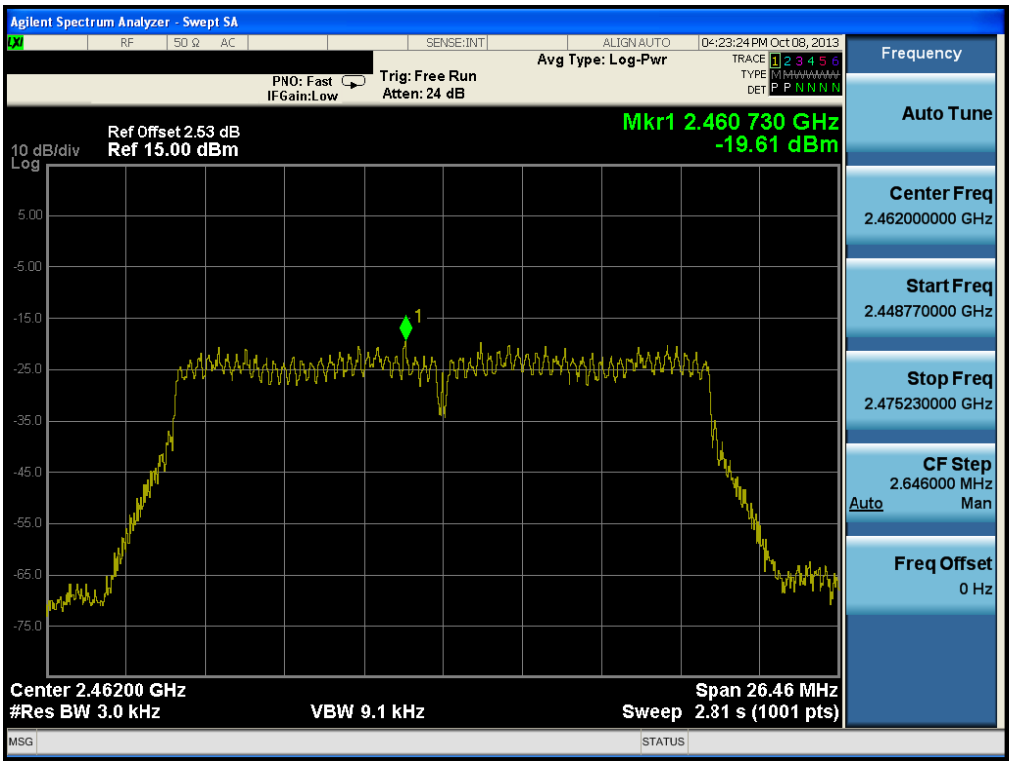
Maximum PPSD Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2412MHz



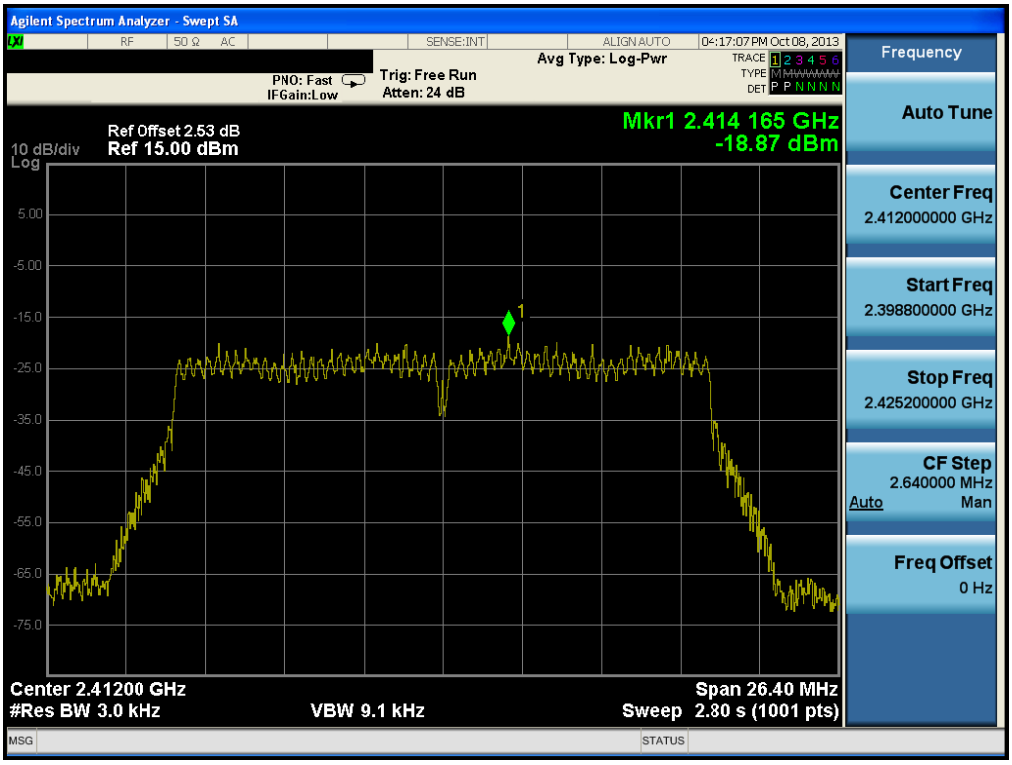
Maximum PPSD Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2437MHz



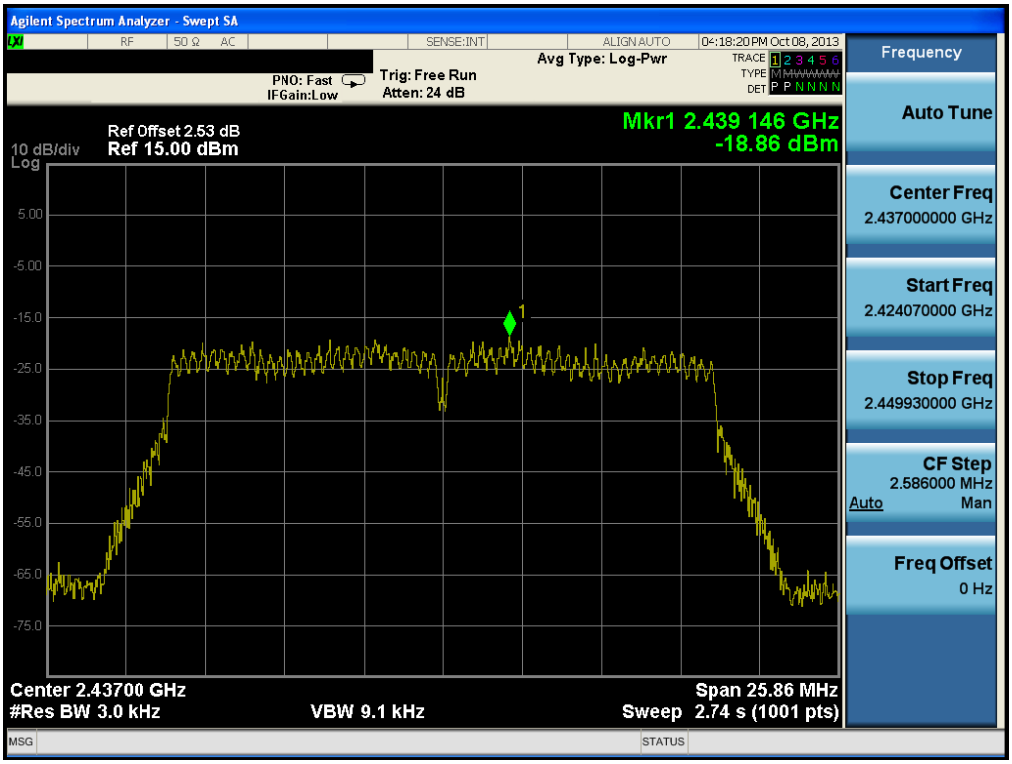
Maximum PPSD Test Mode: Chain 1 & 802.11n HT20 & MCS 8 & 2462MHz



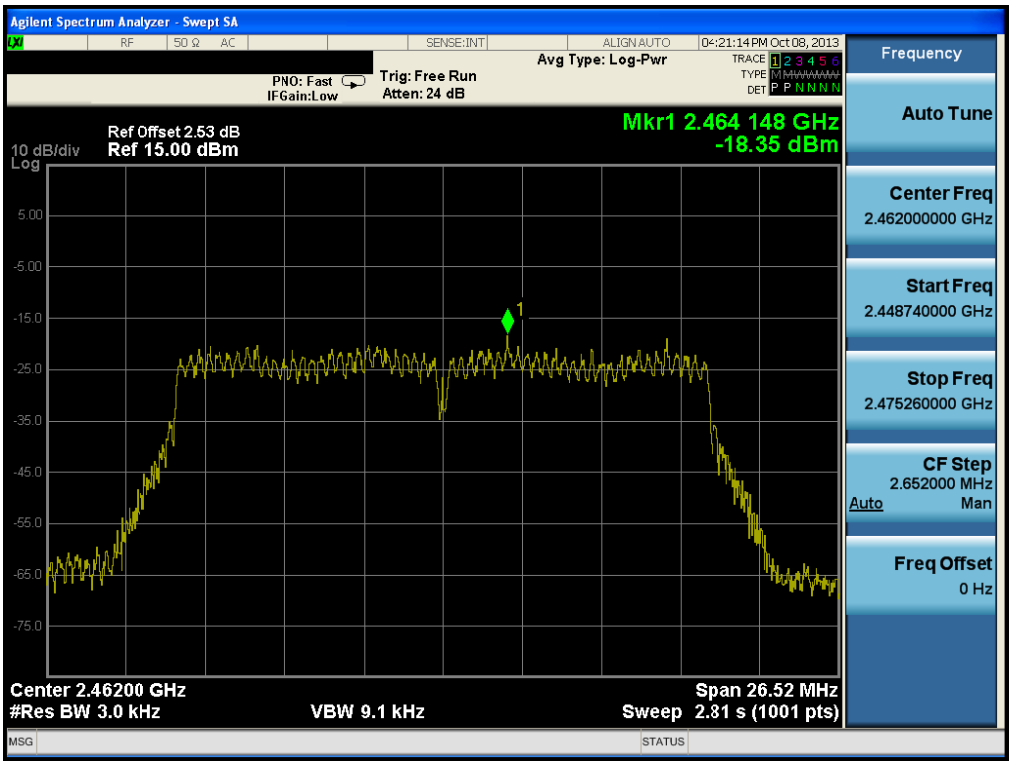
Maximum PPSD Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2412MHz



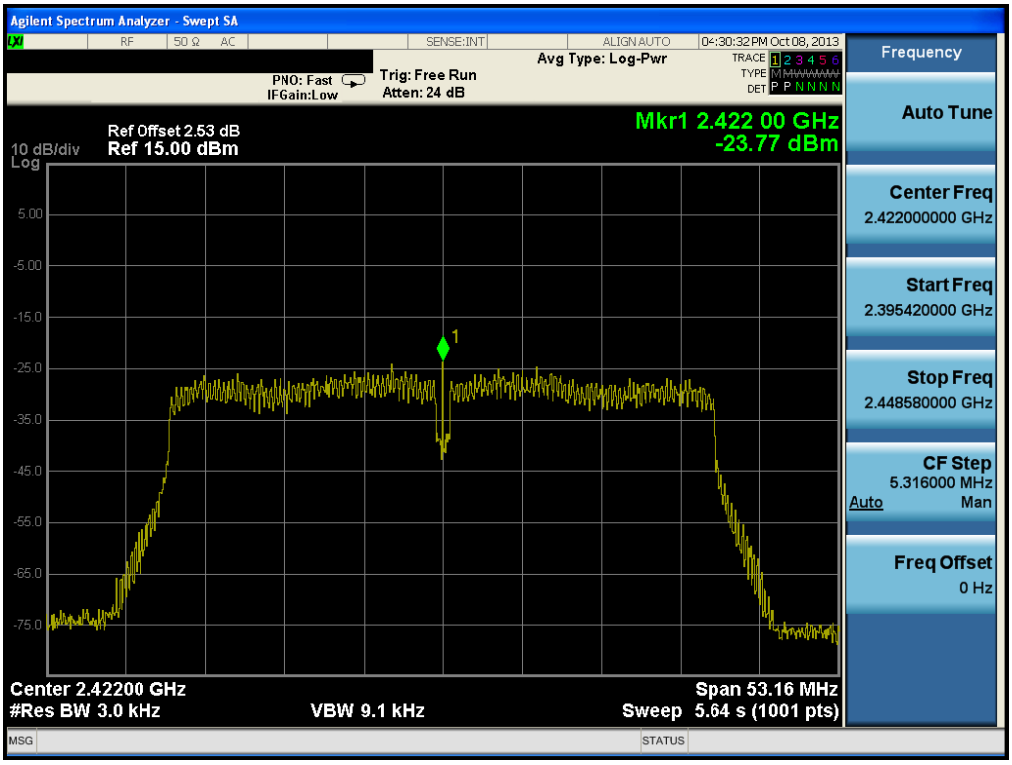
Maximum PPSD Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2437MHz



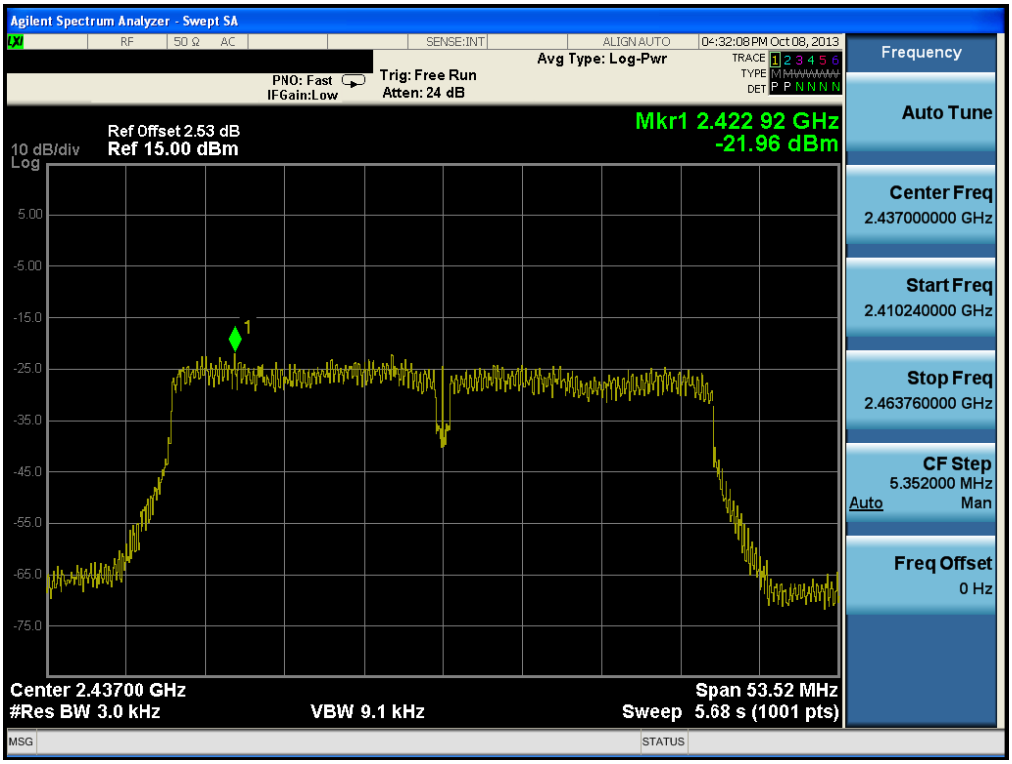
Maximum PPSD Test Mode: Chain 2 & 802.11n HT20 & MCS 8 & 2462MHz



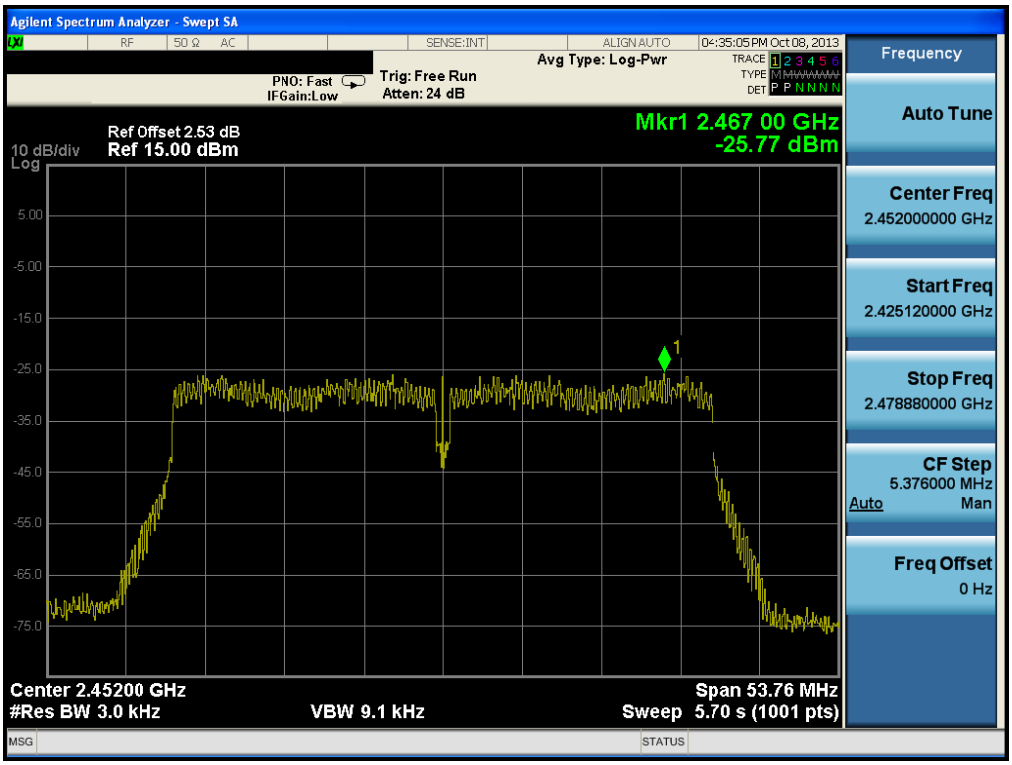
Maximum PPSD Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2422MHz



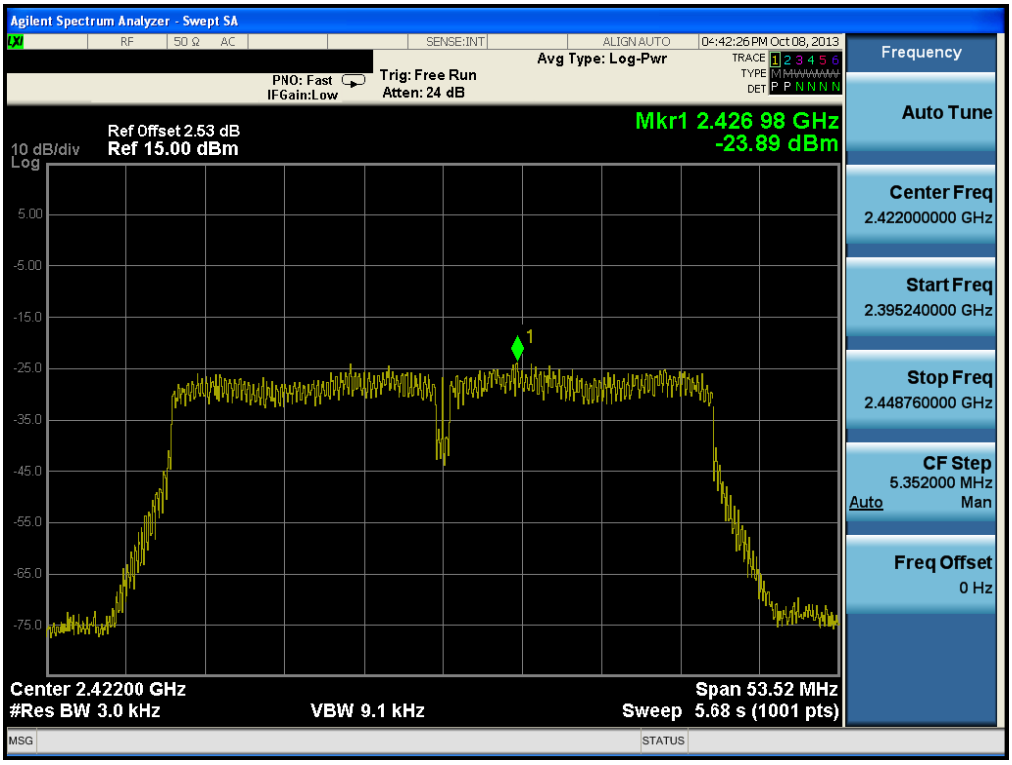
Maximum PPSD Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2437MHz



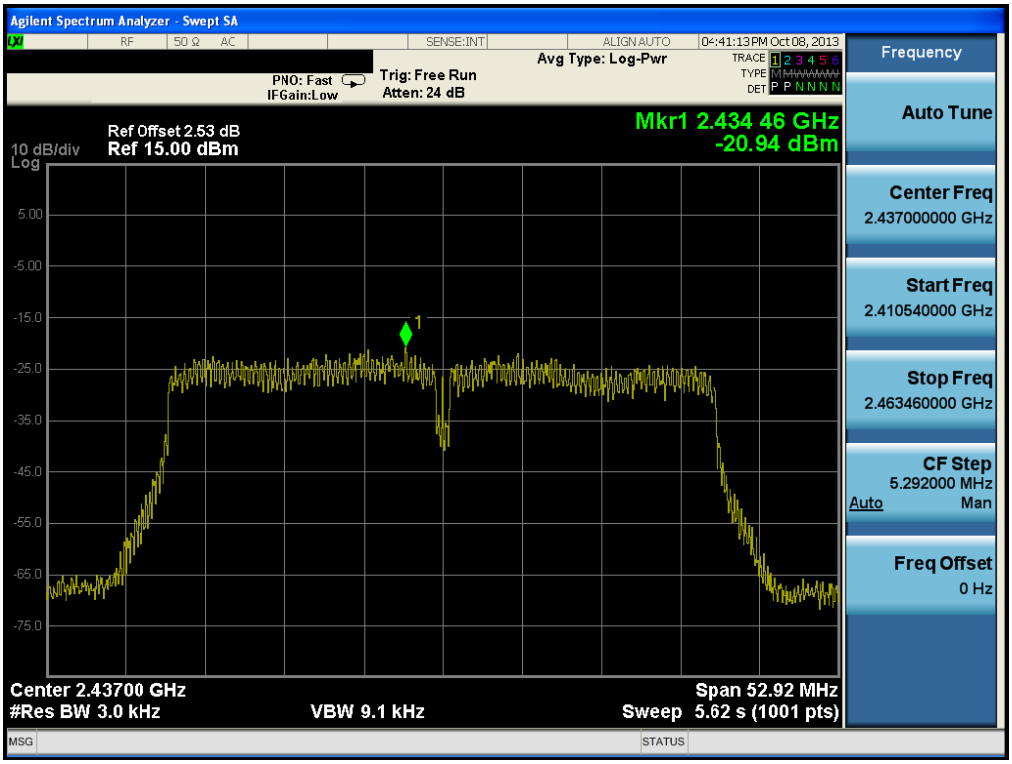
Maximum PPSD Test Mode: Chain 1 & 802.11n HT40 & MCS 8 & 2452MHz



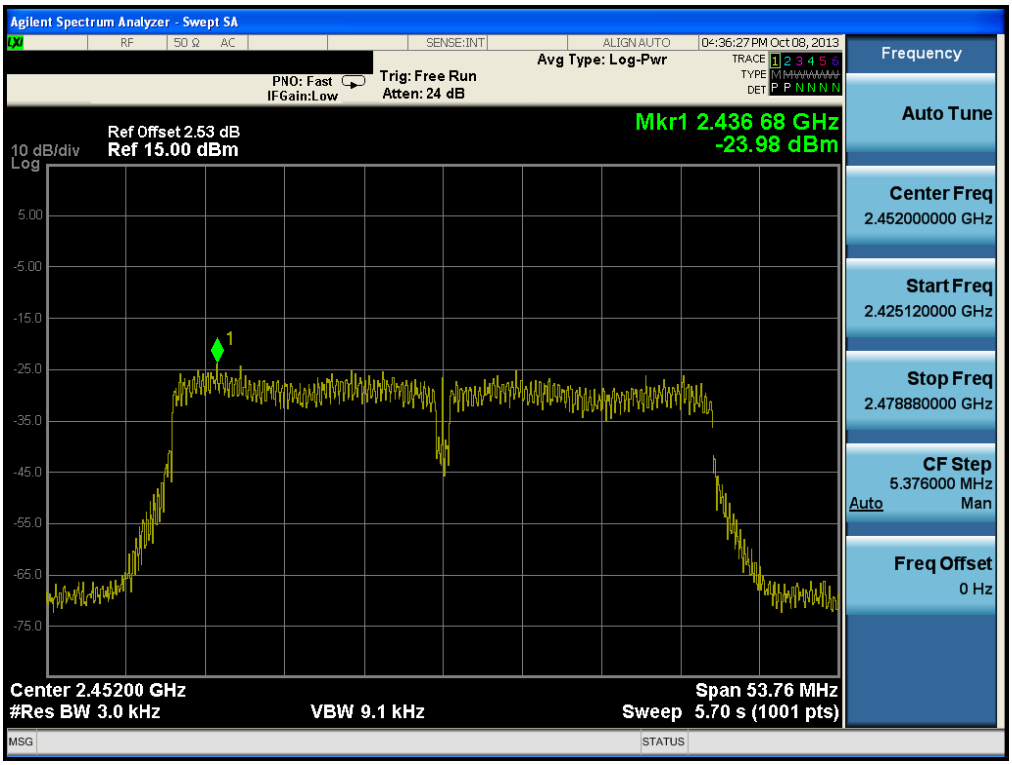
Maximum PPSD Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2422MHz



Maximum PPSD Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2437MHz



Maximum PPSD Test Mode: Chain 2 & 802.11n HT40 & MCS 8 & 2452MHz



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

Test requirements and limit, §15.247(d)

§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 ≥ 1.5 times the DTS bandwidth.
3. Set the 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 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 ≥ **3 x RBW.(Actual 3 MHz, See below note)**
4. Detector = **peak**.
5. Ensure that the number of measurement points ≥ 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 unwanted emission was tested using S/A's spurious measurement function with total 11 measurement sub ranges.
The each of the 11 measurement sub ranges of the S/A's spurious measurement function were set as below.

RBW= 1 MHz, VBW= 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD,
SPAN = Max 3 GHz for each sub range below 15 GHz and Max 5 GHz for each sub range above 15 GHz ,
BINS = At least 9001 for each sub range below 15 GHz and At least 10001 for each sub range above 15 GHz,
Therefore BINS for each measurement sub range must be greater than 2 x SPAN/RBW.

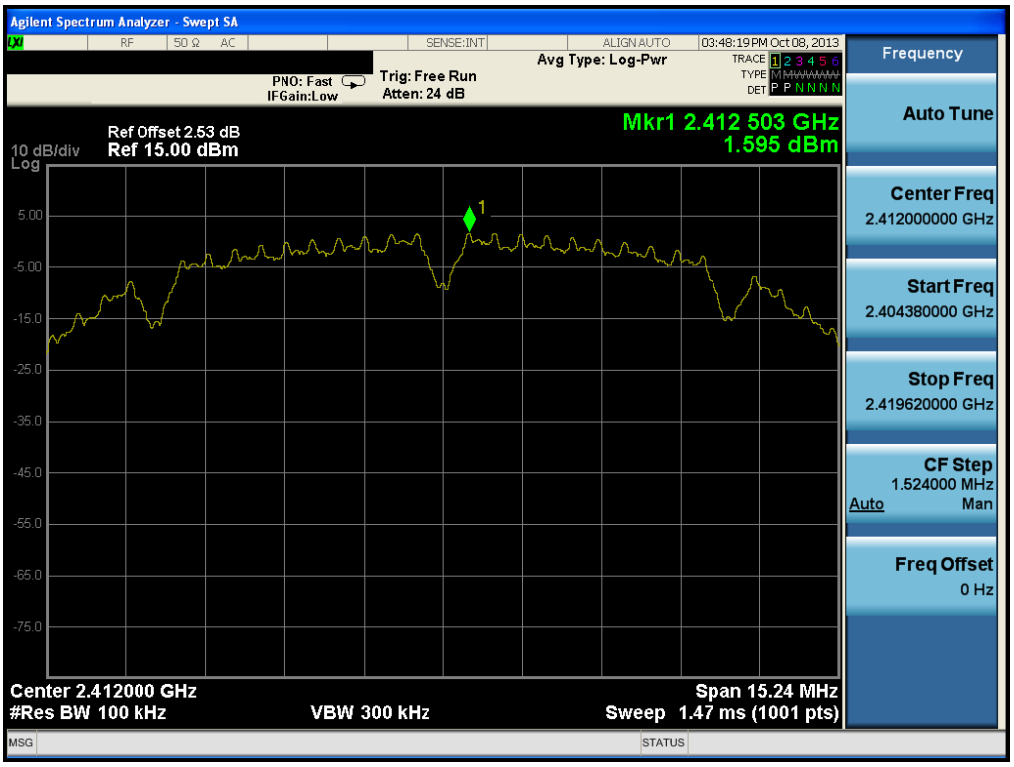
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 KHz, VBW = 300KHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 KHz BW.

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

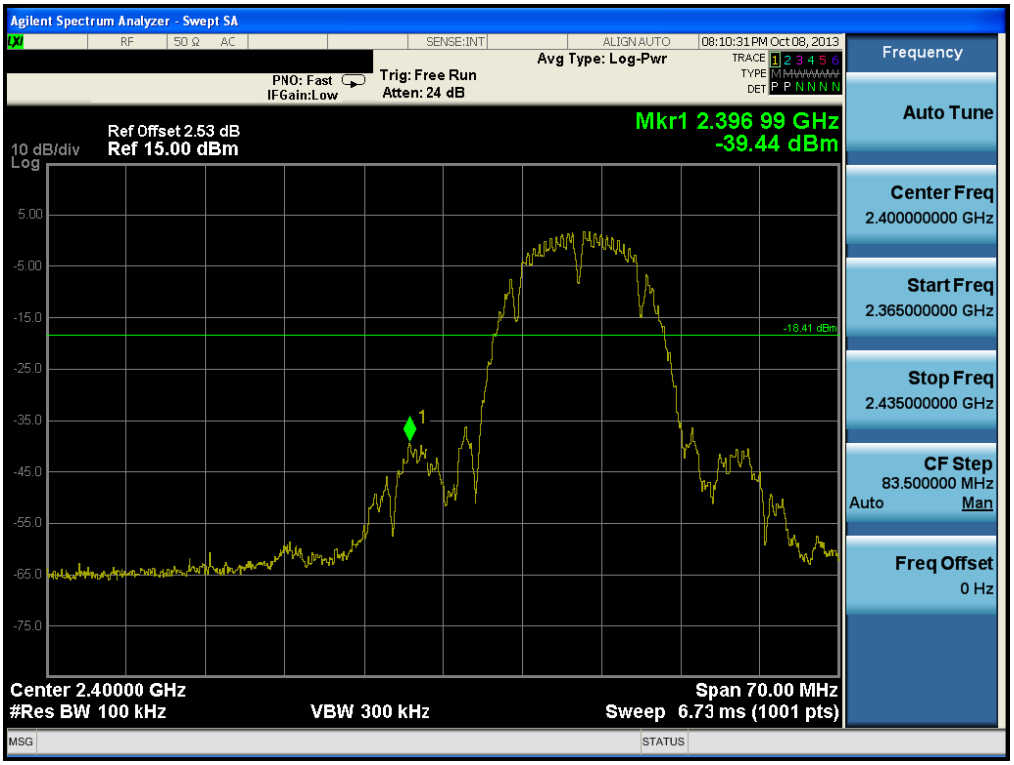
▣RESULT PLOTS

Test Mode: Chain 1 & 802.11b & 1Mbps & 2412MHz

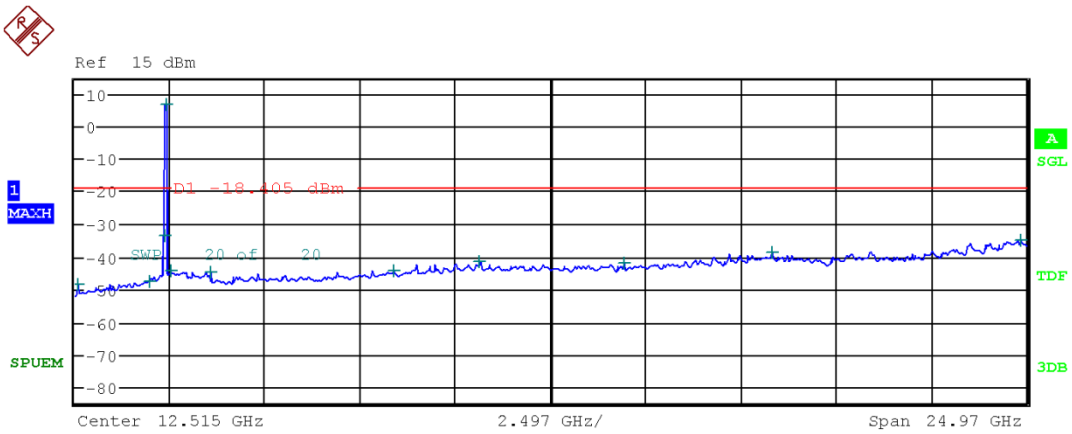
Reference



Low Band-edge



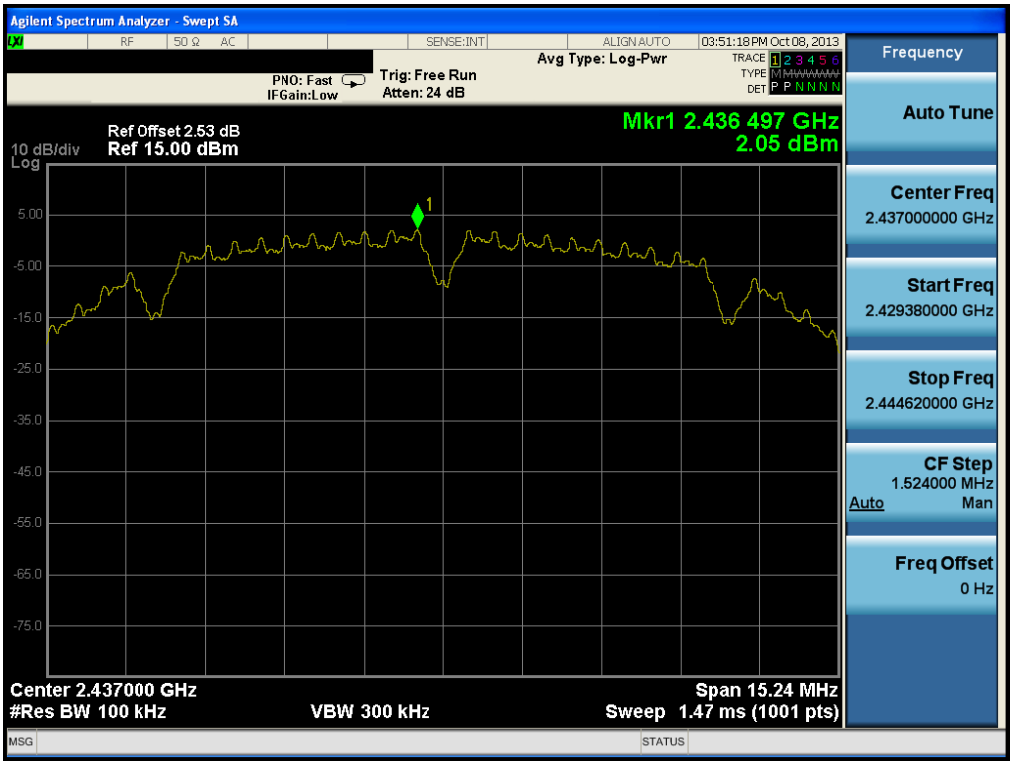
Conducted Spurious Emissions



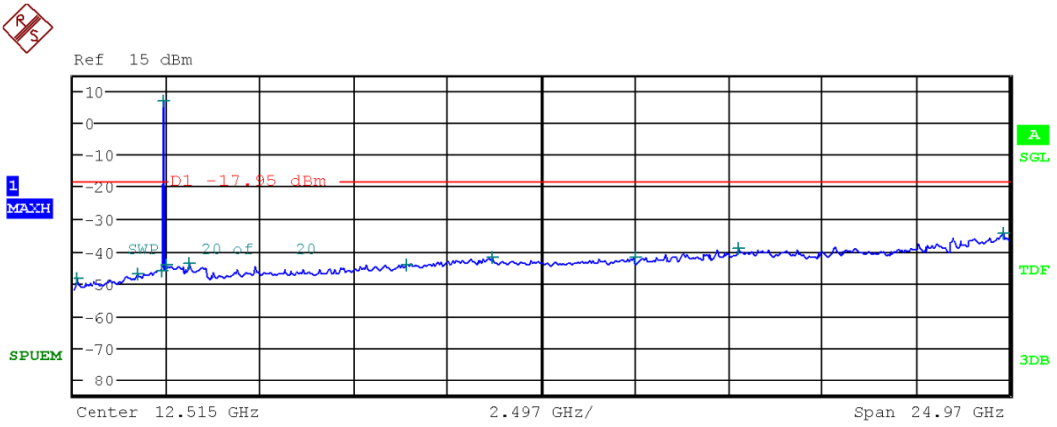
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	97.900000 M	-48.71
1.000 G	2.000 G	1.00 M	1.973667 G	-47.75
2.000 G	2.400 G	1.00 M	2.397120 G	-33.71
2.400 G	2.483 G	1.00 M	2.413318 G	6.85
2.483 G	3.000 G	1.00 M	2.544809 G	-44.41
3.000 G	6.000 G	1.00 M	3.587000 G	-45.04
6.000 G	9.000 G	1.00 M	8.382667 G	-44.16
9.000 G	12.000 G	1.00 M	10.654000 G	-41.59
12.000 G	15.000 G	1.00 M	14.430000 G	-41.88
15.000 G	20.000 G	1.00 M	18.308000 G	-38.54
20.000 G	25.000 G	1.00 M	24.856500 G	-34.95

Test Mode: Chain 1 & 802.11b & 1Mbps & 2437MHz

Reference



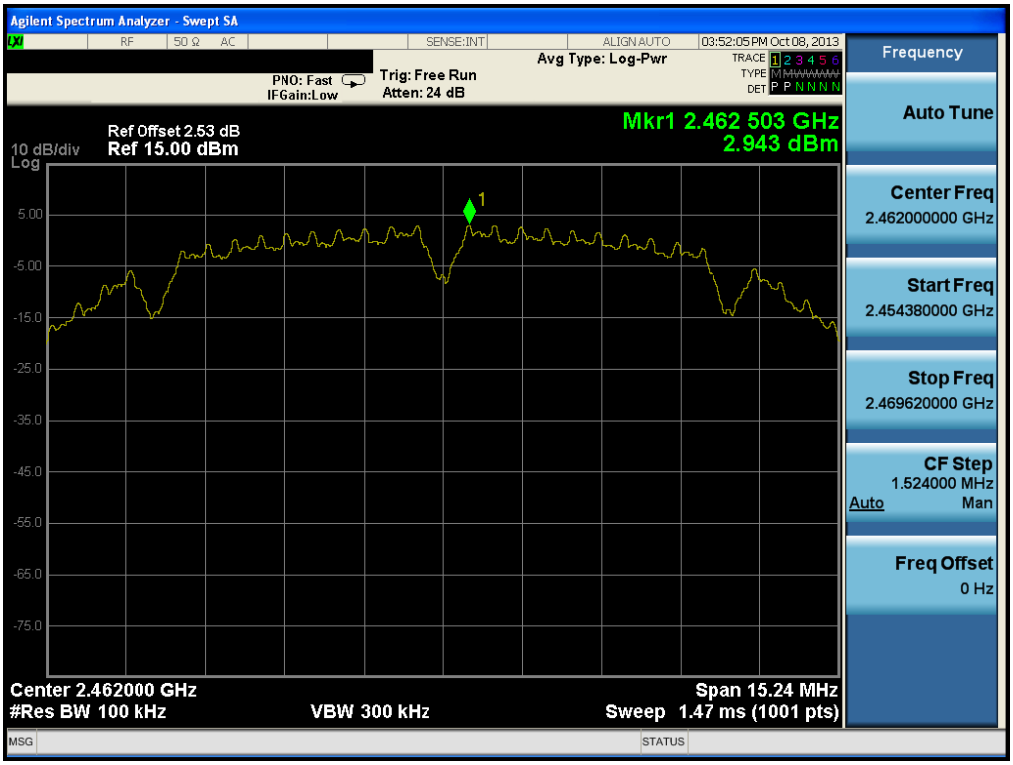
Conducted Spurious Emissions



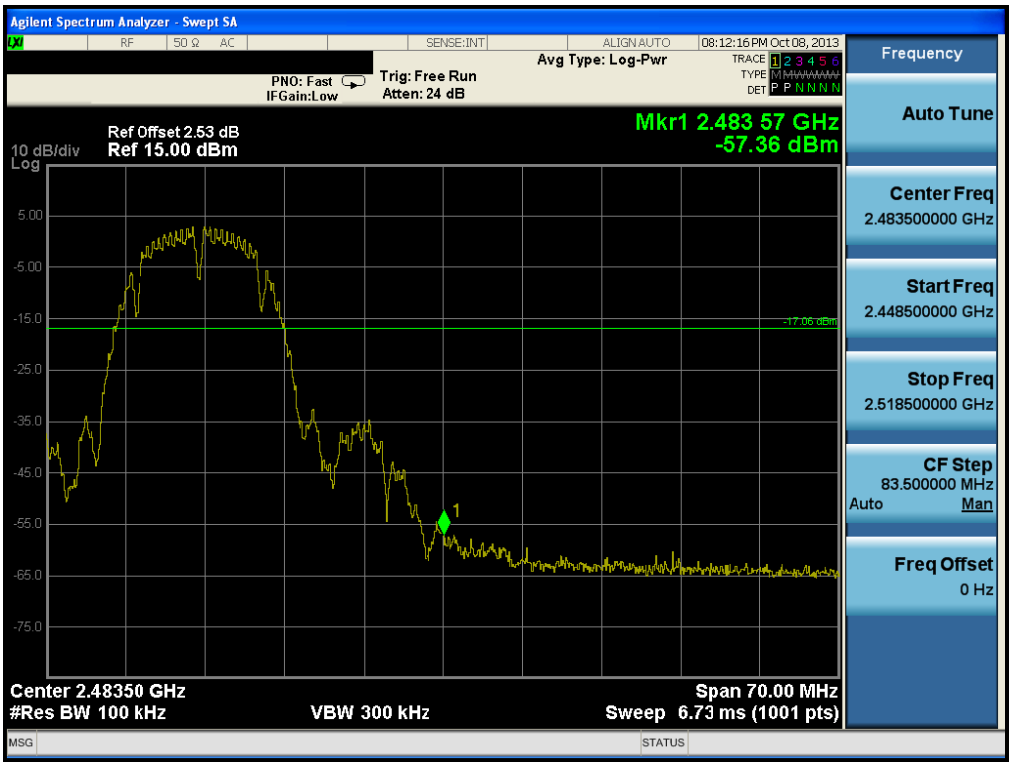
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	122.796667 M	-48.64
1.000 G	2.000 G	1.00 M	1.741333 G	-47.15
2.000 G	2.400 G	1.00 M	2.398520 G	-46.21
2.400 G	2.483 G	1.00 M	2.435513 G	6.69
2.483 G	3.000 G	1.00 M	2.508085 G	-44.20
3.000 G	6.000 G	1.00 M	3.103000 G	-43.97
6.000 G	9.000 G	1.00 M	8.930667 G	-44.19
9.000 G	12.000 G	1.00 M	11.194333 G	-42.15
12.000 G	15.000 G	1.00 M	14.997333 G	-42.07
15.000 G	20.000 G	1.00 M	17.768000 G	-39.15
20.000 G	25.000 G	1.00 M	24.835000 G	-34.73

Test Mode: Chain 1 & 802.11b & 1Mbps & 2462MHz

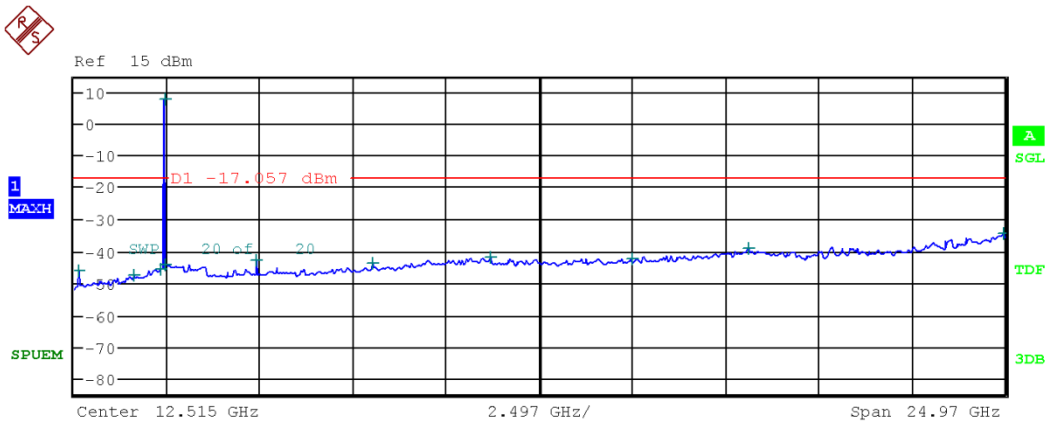
Reference



High Band-edge



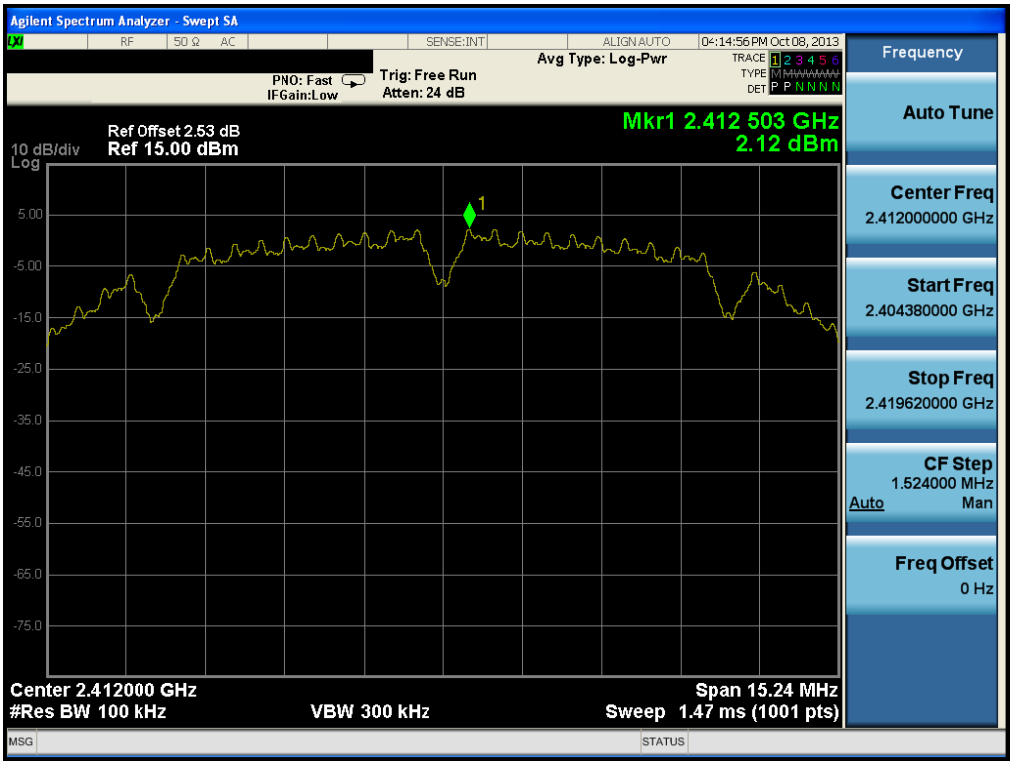
Conducted Spurious Emissions



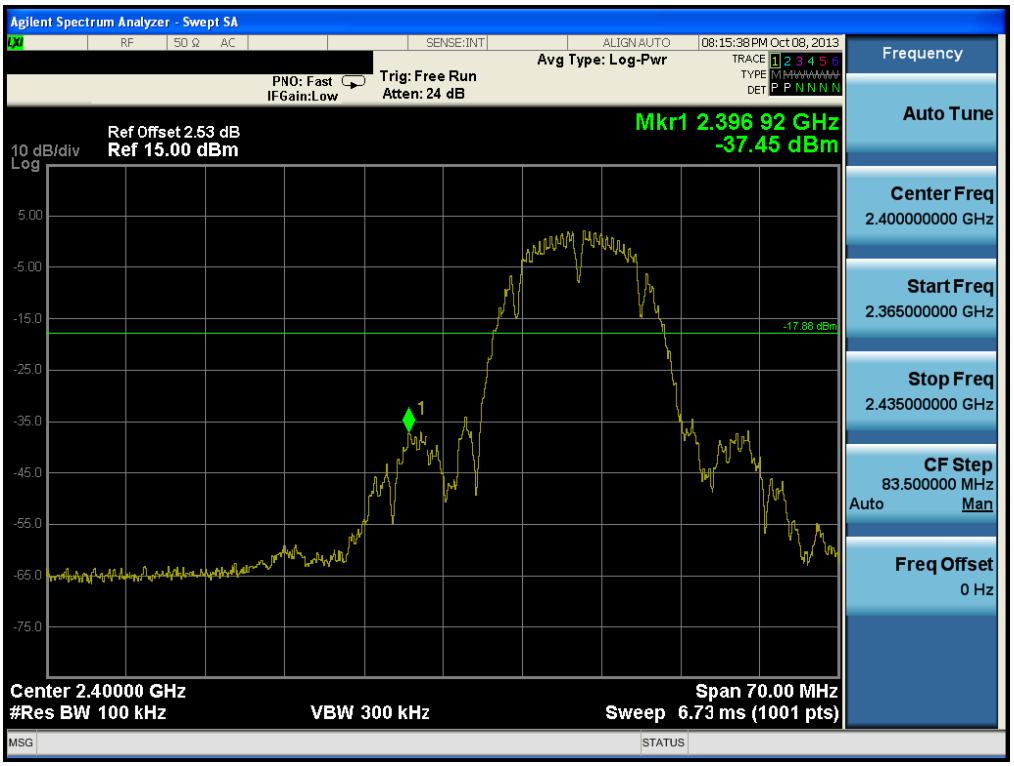
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	147.693333 M	-46.39
1.000 G	2.000 G	1.00 M	1.617333 G	-47.80
2.000 G	2.400 G	1.00 M	2.350560 G	-45.99
2.400 G	2.483 G	1.00 M	2.463402 G	7.58
2.483 G	3.000 G	1.00 M	2.486237 G	-44.30
3.000 G	6.000 G	1.00 M	4.924000 G	-43.21
6.000 G	9.000 G	1.00 M	8.025333 G	-43.97
9.000 G	12.000 G	1.00 M	11.189000 G	-42.01
12.000 G	15.000 G	1.00 M	14.995667 G	-42.44
15.000 G	20.000 G	1.00 M	18.126500 G	-39.35
20.000 G	25.000 G	1.00 M	24.964000 G	-34.69

Test Mode: Chain 2 & 802.11b & 1Mbps & 2412MHz

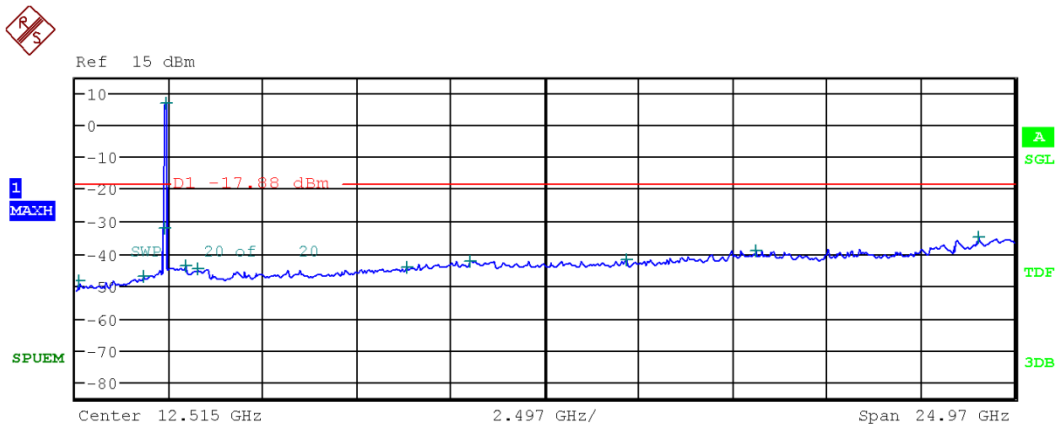
Reference



Low Band-edge



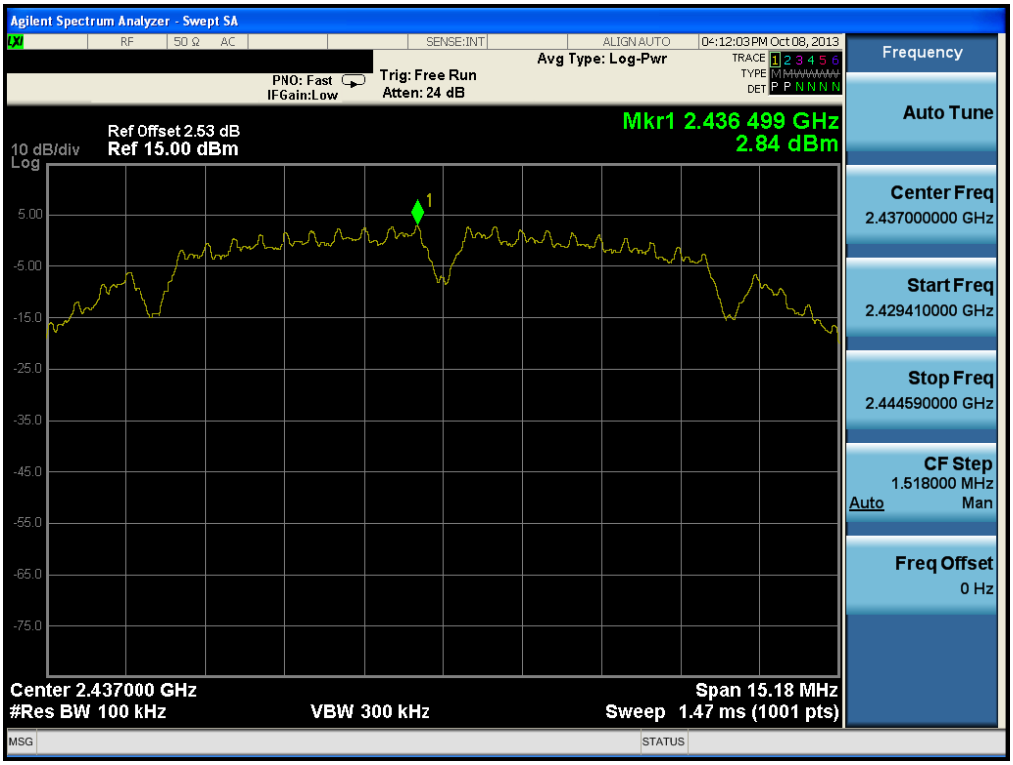
Conducted Spurious Emissions



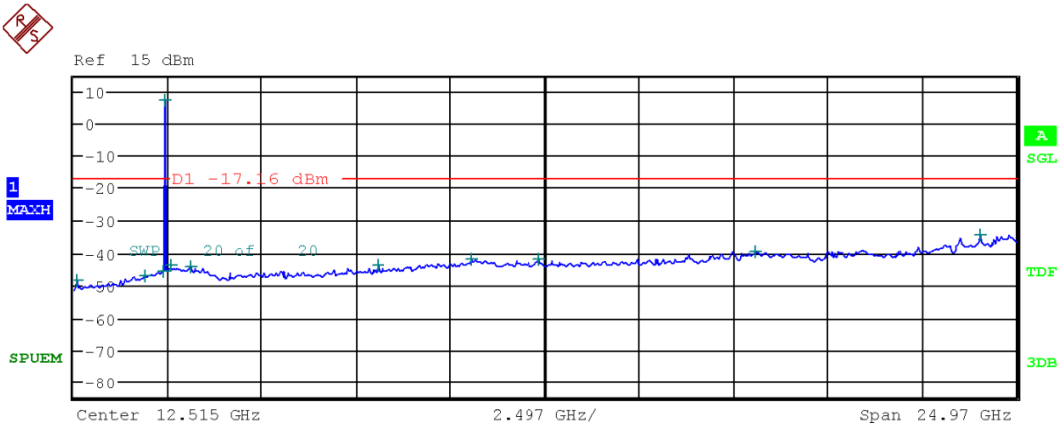
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	97.576667 M	-48.51
1.000 G	2.000 G	1.00 M	1.844333 G	-47.18
2.000 G	2.400 G	1.00 M	2.397280 G	-32.26
2.400 G	2.483 G	1.00 M	2.413569 G	6.92
2.483 G	3.000 G	1.00 M	2.949435 G	-44.08
3.000 G	6.000 G	1.00 M	3.285000 G	-44.92
6.000 G	9.000 G	1.00 M	8.831333 G	-44.59
9.000 G	12.000 G	1.00 M	10.503333 G	-42.54
12.000 G	15.000 G	1.00 M	14.690333 G	-42.27
15.000 G	20.000 G	1.00 M	18.125000 G	-39.09
20.000 G	25.000 G	1.00 M	24.033500 G	-35.06

Test Mode: Chain 2 & 802.11b & 1Mbps & 2437MHz

Reference



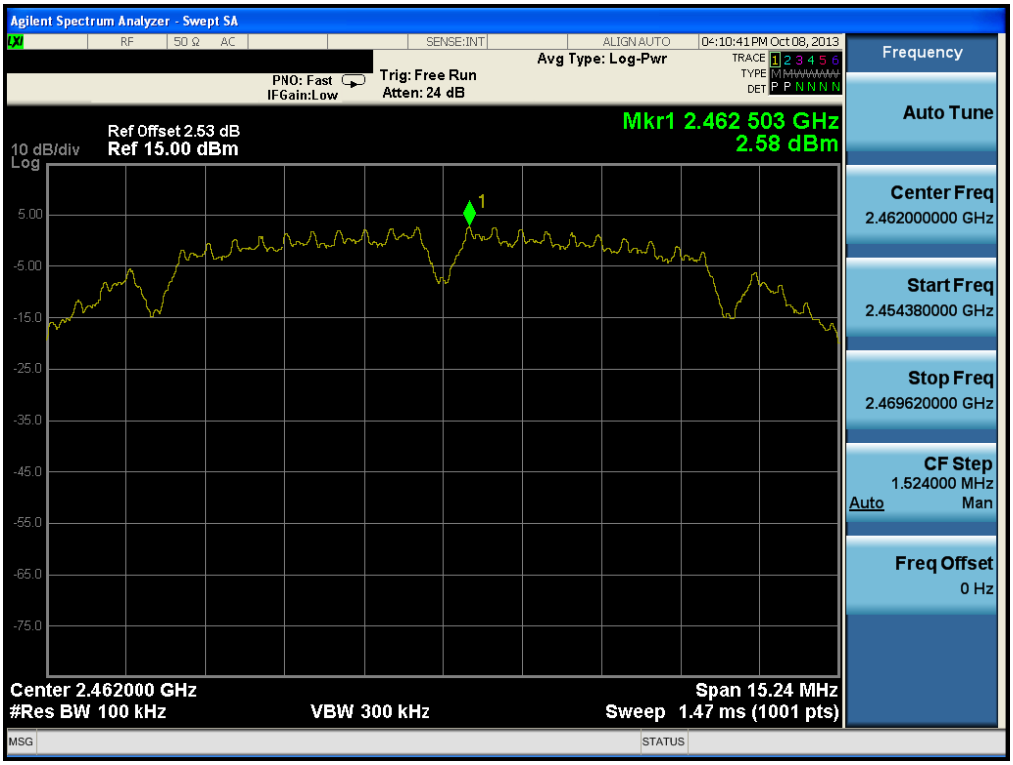
Conducted Spurious Emissions



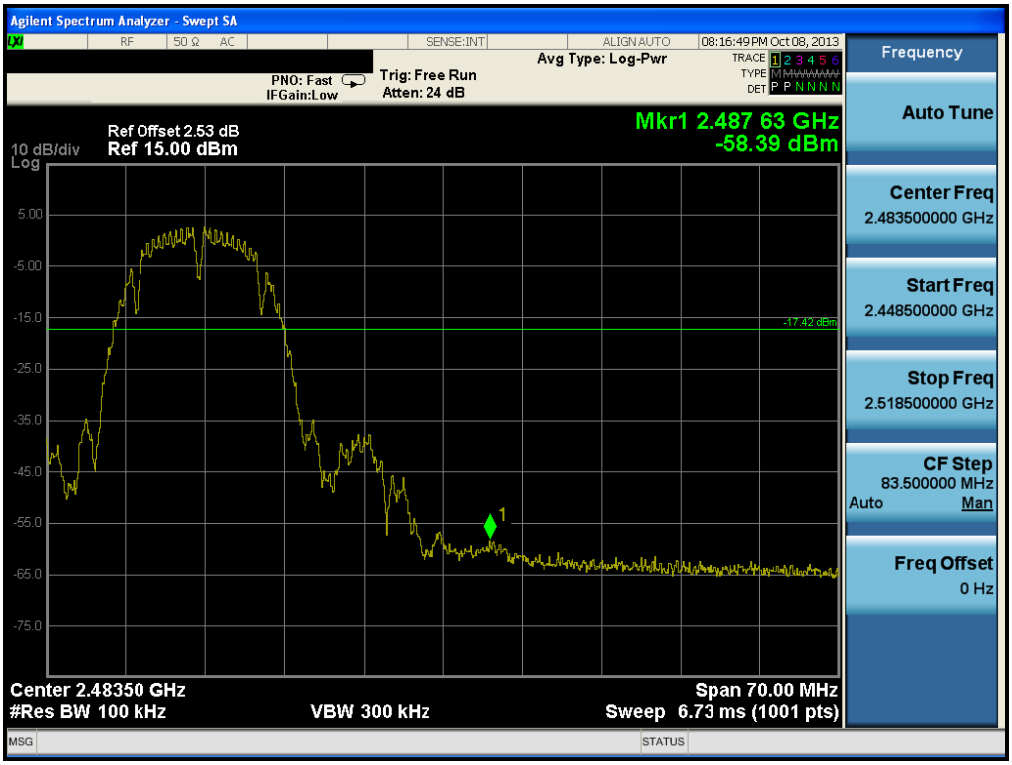
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	122.796667 M	-48.42
1.000 G	2.000 G	1.00 M	1.901333 G	-47.34
2.000 G	2.400 G	1.00 M	2.385480 G	-46.03
2.400 G	2.483 G	1.00 M	2.435529 G	7.17
2.483 G	3.000 G	1.00 M	2.571408 G	-43.97
3.000 G	6.000 G	1.00 M	3.122000 G	-44.29
6.000 G	9.000 G	1.00 M	8.092333 G	-44.15
9.000 G	12.000 G	1.00 M	10.570667 G	-42.27
12.000 G	15.000 G	1.00 M	12.336667 G	-42.14
15.000 G	20.000 G	1.00 M	18.084500 G	-39.83
20.000 G	25.000 G	1.00 M	24.029500 G	-34.46

Test Mode: Chain 2 & 802.11b & 1Mbps & 2462MHz

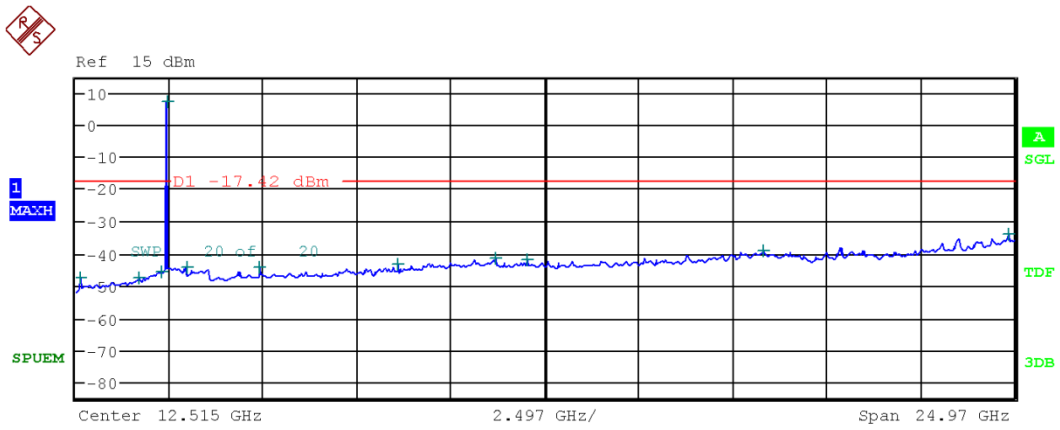
Reference



High Band-edge



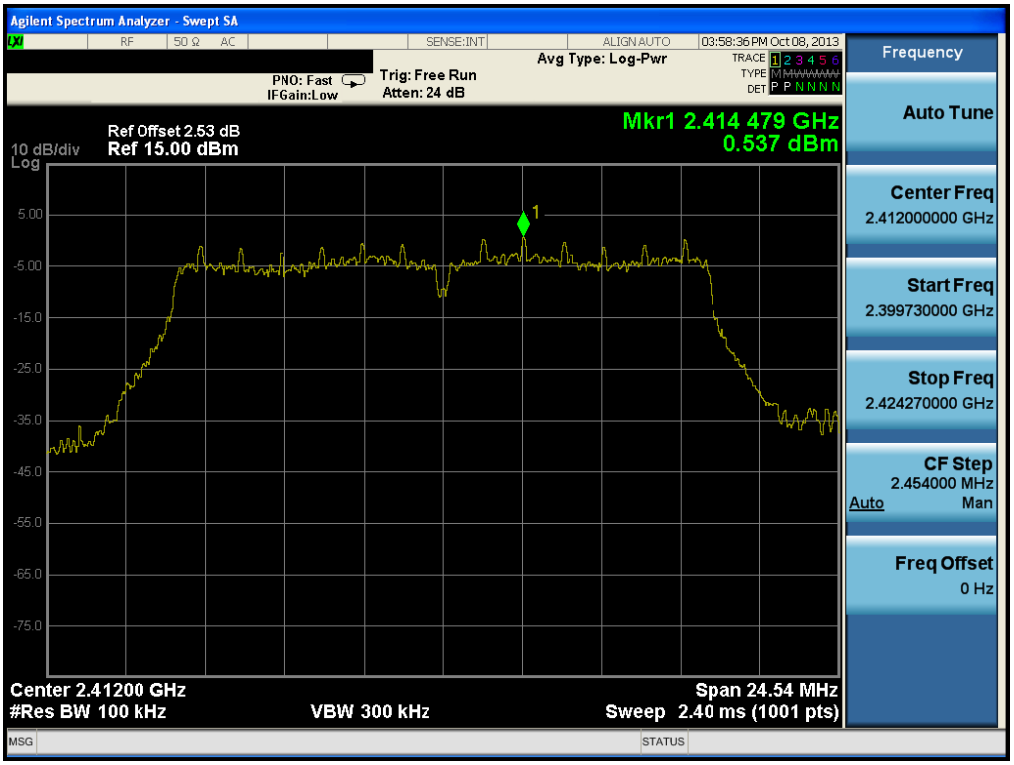
Conducted Spurious Emissions



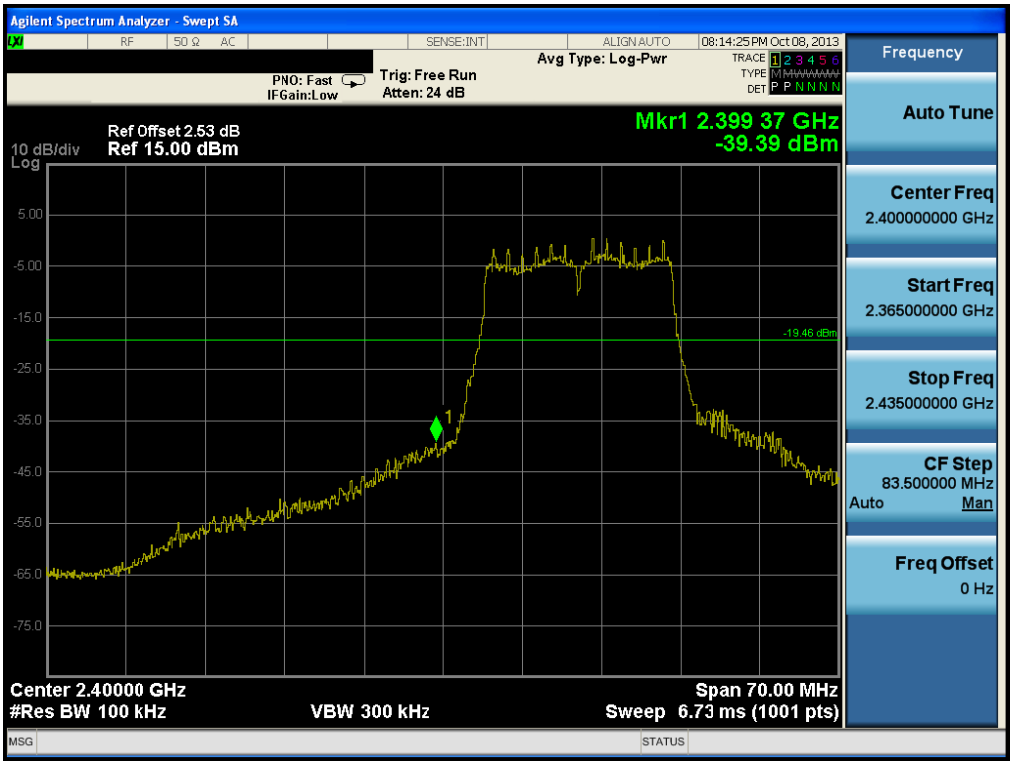
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	147.693333 M	-47.56
1.000 G	2.000 G	1.00 M	1.707000 G	-47.50
2.000 G	2.400 G	1.00 M	2.302880 G	-45.87
2.400 G	2.483 G	1.00 M	2.462892 G	7.28
2.483 G	3.000 G	1.00 M	2.987242 G	-44.25
3.000 G	6.000 G	1.00 M	4.924333 G	-44.54
6.000 G	9.000 G	1.00 M	8.598333 G	-43.51
9.000 G	12.000 G	1.00 M	11.177333 G	-41.69
12.000 G	15.000 G	1.00 M	12.039333 G	-42.24
15.000 G	20.000 G	1.00 M	18.322500 G	-39.35
20.000 G	25.000 G	1.00 M	24.834000 G	-33.89

Test Mode: Chain 1 & 802.11g & 6Mbps & 2412MHz

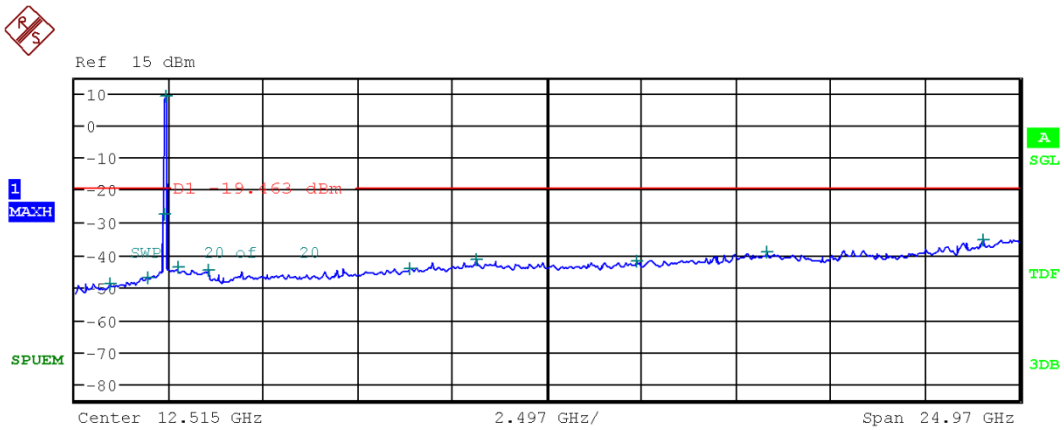
Reference



Low Band-edge



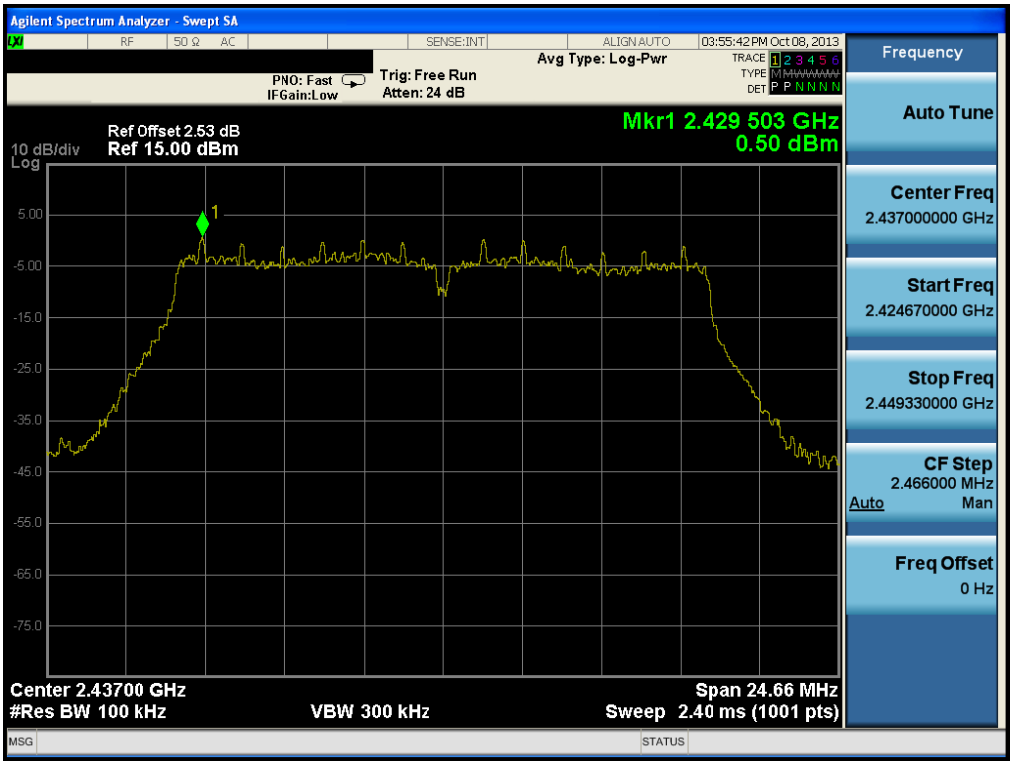
Conducted Spurious Emissions



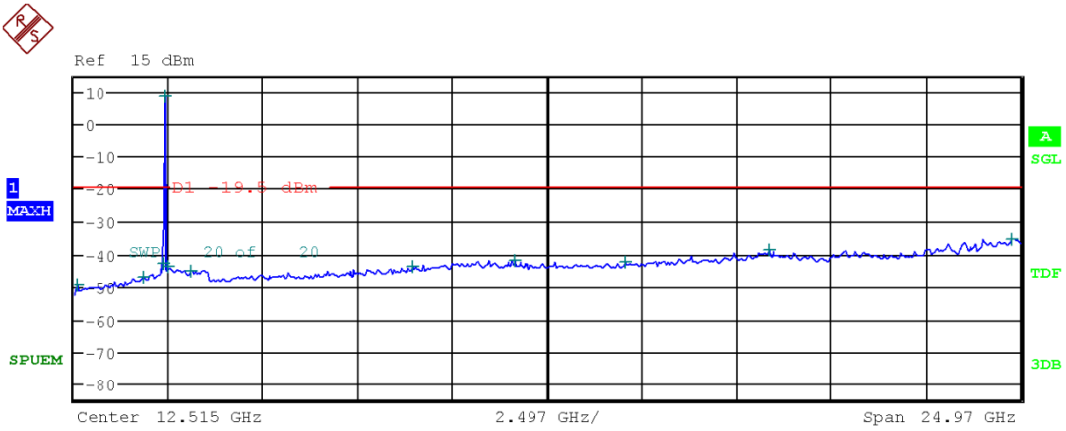
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	934.686667 M	-48.99
1.000 G	2.000 G	1.00 M	1.935667 G	-47.03
2.000 G	2.400 G	1.00 M	2.399520 G	-27.42
2.400 G	2.483 G	1.00 M	2.414446 G	8.98
2.483 G	3.000 G	1.00 M	2.763133 G	-43.91
3.000 G	6.000 G	1.00 M	3.555000 G	-44.76
6.000 G	9.000 G	1.00 M	8.884000 G	-44.17
9.000 G	12.000 G	1.00 M	10.615333 G	-41.66
12.000 G	15.000 G	1.00 M	14.890667 G	-42.22
15.000 G	20.000 G	1.00 M	18.336500 G	-39.00
20.000 G	25.000 G	1.00 M	24.046000 G	-35.27

Test Mode: Chain 1 & 802.11g & 6Mbps & 2437MHz

Reference



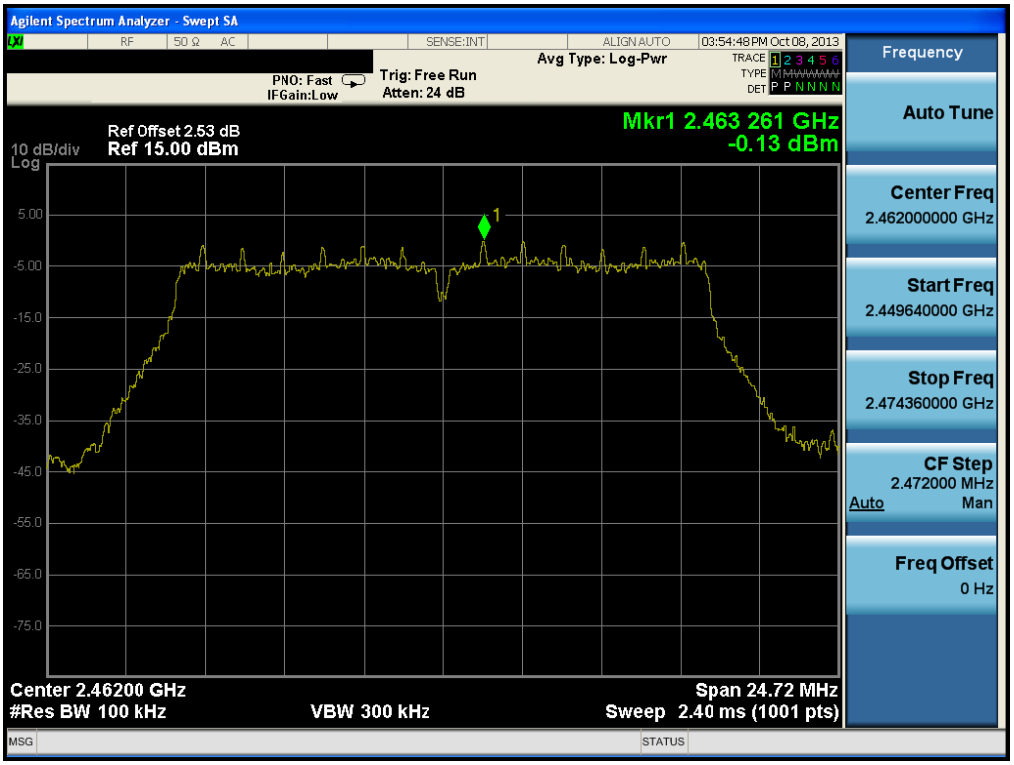
Conducted Spurious Emissions



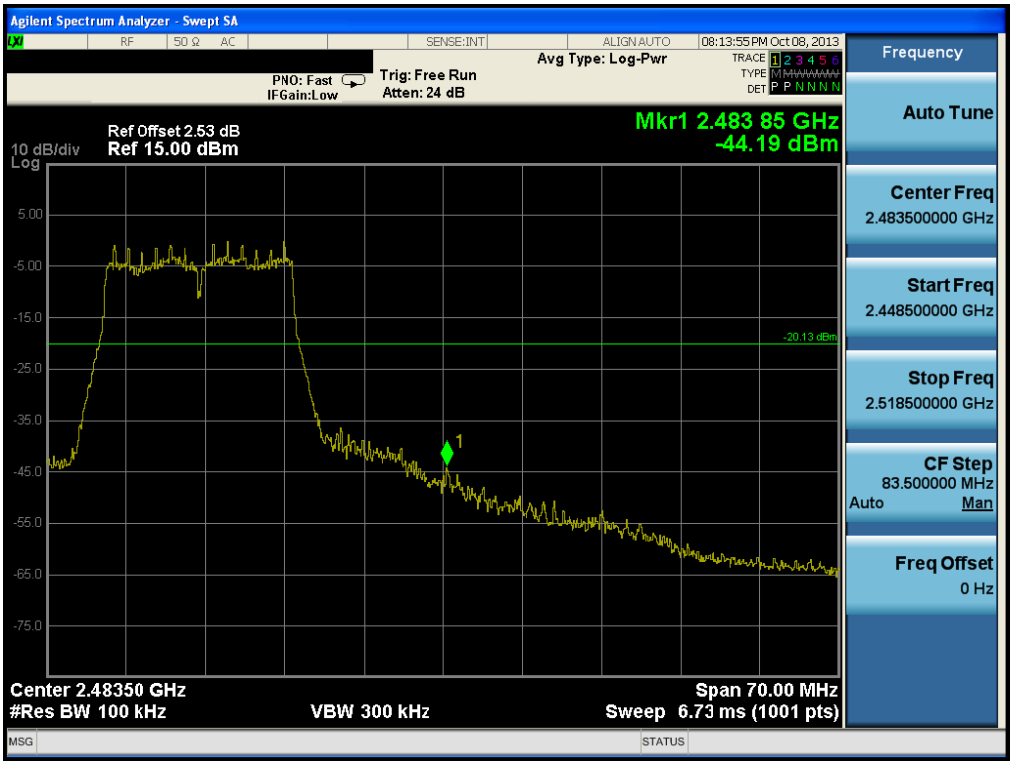
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	123.443333 M	-49.40
1.000 G	2.000 G	1.00 M	1.852000 G	-47.37
2.000 G	2.400 G	1.00 M	2.399040 G	-43.15
2.400 G	2.483 G	1.00 M	2.433818 G	8.86
2.483 G	3.000 G	1.00 M	2.495689 G	-43.93
3.000 G	6.000 G	1.00 M	3.111333 G	-45.18
6.000 G	9.000 G	1.00 M	8.958667 G	-44.09
9.000 G	12.000 G	1.00 M	11.626000 G	-41.91
12.000 G	15.000 G	1.00 M	14.565333 G	-42.37
15.000 G	20.000 G	1.00 M	18.361500 G	-38.72
20.000 G	25.000 G	1.00 M	24.751000 G	-35.25

Test Mode: Chain 1 & 802.11g & 6Mbps & 2462MHz

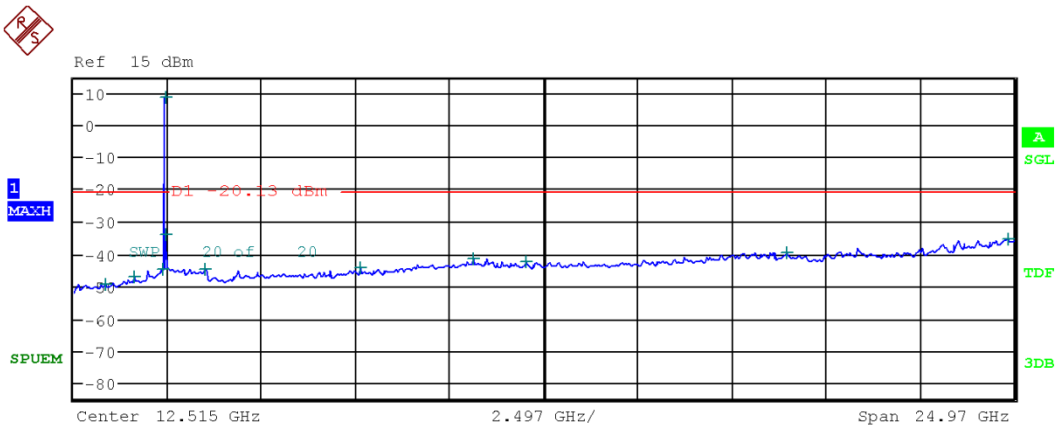
Reference



High Band-edge



Conducted Spurious Emissions



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	1.00 M	862.260000 M	-49.52
1.000 G	2.000 G	1.00 M	1.642667 G	-47.22
2.000 G	2.400 G	1.00 M	2.381440 G	-44.70
2.400 G	2.483 G	1.00 M	2.464637 G	8.82
2.483 G	3.000 G	1.00 M	2.485359 G	-34.27
3.000 G	6.000 G	1.00 M	3.510667 G	-44.96
6.000 G	9.000 G	1.00 M	7.618000 G	-44.61
9.000 G	12.000 G	1.00 M	10.623667 G	-41.55
12.000 G	15.000 G	1.00 M	12.042333 G	-42.74
15.000 G	20.000 G	1.00 M	18.965500 G	-39.57
20.000 G	25.000 G	1.00 M	24.850500 G	-35.33