EMC
TEST REPORT

Report No. : **150700288TWN-001**
Model No. : **H2R**
Issued Date : **Oct. 08, 2015**

Applicant: **ASRock Incorporation**
4F., No. 37, Sec. 2, Jhongyang S.Rd., Beitou District, Taipei City 112, Taiwan

Test Method/ Standard: **47 CFR FCC Part 15.247 & ANSI C63.10 2013**
KDB 558074 D01 v03r03
KDB 662911 D01 v02r01

Registration No.: **: 93910**
Test By: **Intertek Testing Services Taiwan Ltd.**
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Revision History

Report No.	Issue Date	Revision Summary
150700288TWN-001	Oct. 08, 2015	Original report

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1. Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Minimum 6 dB Bandwidth	15.247(a)(2)	Pass
Maximum Peak Conducted Output Power	15.247(b)(3)	Pass
Power Spectral Density	15.247(e)	Pass
Emissions In Non-Restricted Frequency Bands	15.247(d)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

2. General Information

2.1 Identification of the EUT

Product:	HDMI 2 in 1 Router
Model No:	H2R
FCC ID:	2AFEB-H2R
Manufacturer:	Edimax Technology Co., Ltd
Address:	6F., No. 3, Wu-Chuan 3rd Road, Wu-Gu, New Taipei City 24891, Taiwan
Operating Frequency:	1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20 2. 2422 MHz ~ 2452 MHz for 802.11n HT40
Channel Number:	1. 11 channels for 2412 MHz ~ 2462 MHz 2. 7 channels for 2422 MHz ~ 2452 MHz
Frequency of Each Channel:	1. 2412+5 k, k＝0 ~ 10 for 802.11b, 802.11g, 802.11n HT20 2. 2422+5 k, k＝0~6 for 802.11n HT40
Access scheme:	DSSS, OFDM
Rated Power:	DC 5 V
Power Cord:	N/A
Sample Received:	Jun. 22, 2015
Test Date(s):	Jul. 08, 2015 ~ Sep. 23, 2015
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Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.2 Description of EUT

Modulation mode	Transmit path	
	Chain 0/Main	Chain 1/AUX
802.11b	V	V
802.11g	V	V
802.11 n (HT20)	V	V
802.11 n (HT40)	V	V

2.3 Antenna description

(1). Antenna 1

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2.04 dBi
Antenna Type : PIFA Antenna
Connector Type : I-PEX

(1). Antenna 2

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 3.43 dBi
Antenna Type : PIFA Antenna
Connector Type : I-PEX

2.4 Additional information of EUT

Product SW version: 13785
Product HW version: 1.0A
Test SW Version: rtl8188EUS_linux_v4.3.0.6_12167.20140828

2.5 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	Compaq nc2400	CNF6413CGN	Specific USB cable 0.3 meter × 1

2.6 Operation mode

The EUT was supplied with DC 5 V.
TX-MODE is based on a specific test program "Realteak 11n 8192EU USB WLAN NIC MassProduction Kit", and the program can select different frequency and modulation.

With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n(HT20) mode and 13.5 Mbps data rate for 802.11n(HT40) mode, the final tests were executed under these conditions recorded in this report individually.

The final tests were executed under these conditions recorded in this report individually.

802.11b ch6 chain0		**802.11b ch6 chain1**	
Data rate (Mbps)	**AV (dBm)**	**Data rate (Mbps)**	**AV (dBm)**
1	19.02	1	19.91
2	18.81	2	19.73
5.5	18.72	5.5	19.61
11	18.65	11	19.55

802.11g ch6 chain0		802.11g ch6 chain1	
Data rate (Mbps)	**AV(dBm)**	**Data rate (Mbps)**	**AV(dBm)**
6	23.77	6	23.27
9	23.58	9	23.09
12	23.46	12	22.87
18	23.41	18	22.74
24	23.3	24	22.69
36	23.22	36	22.53
48	23.16	48	22.47
54	23.08	54	22.35

802.11n HT20 ch6 chain0		802.11n HT20 ch6 chain1		802.11n HT20 ch6 chain1+chain0	
Data rate (Mbps)	**AV (dBm)**	**Data rate (Mbps)**	**AV (dBm)**	**Data rate (Mbps)**	**AV (dBm)**
MCS0	23.69	MCS0	23.15	MCS0	26.44
MCS1	23.51	MCS1	23.06	MCS1	26.30
MCS2	23.44	MCS2	22.94	MCS2	26.21
MCS3	23.36	MCS3	22.81	MCS3	26.10
MCS4	23.21	MCS4	22.69	MCS4	25.97
MCS5	23.14	MCS5	22.53	MCS5	25.86
MCS6	23.02	MCS6	22.44	MCS6	25.75
MCS7	22.91	MCS7	22.37	MCS7	25.66

802.11n HT40 ch6 chain0		802.11n HT40 ch6 chain1		802.11n HT40 ch6 chain1+chain0	
Data rate (Mbps)	**AV (dBm)**	**Data rate (Mbps)**	**AV (dBm)**	**Data rate (Mbps)**	**AV (dBm)**
MCS0	19.86	MCS0	19.38	MCS0	22.6369
MCS1	19.71	MCS1	19.25	MCS1	22.4964
MCS2	19.63	MCS2	19.13	MCS2	22.3975
MCS3	19.55	MCS3	19.07	MCS3	22.3269
MCS4	19.44	MCS4	18.92	MCS4	22.1981
MCS5	19.38	MCS5	18.87	MCS5	22.1428
MCS6	19.26	MCS6	18.73	MCS6	22.0134
MCS7	19.11	MCS7	18.65	MCS7	21.8964

2.7 Applied test modes and channels

Test items	Mode	Data Rate (Mbps)	Channel	Antenna
Minimum 6 dB Bandwidth	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0/Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0/Chain1
Maximum peak conducted output power	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0+Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0+Chain1
Power Spectral Density	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0+Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0+Chain1
RF Antenna Conducted Spurious	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0/Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0/Chain1
Radiated spurious Emission 9kHz~1GHz	Normal Link			
Radiated Spurious Emission 1GHz~10th Harmonic	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0+Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0+Chain1
Emission on the Band Edge	802.11 b	1	1, 6 , 11	Chain0
	802.11 g	6	1, 6, 11	Chain0
	802.11 n (HT20)	6.5	1, 6, 11	Chain0+Chain1
	802.11 n (HT40)	13.5	3, 6, 9	Chain0+Chain1
AC Power Line Conducted Emission	Normal Link			

2.8 Power setting of test software

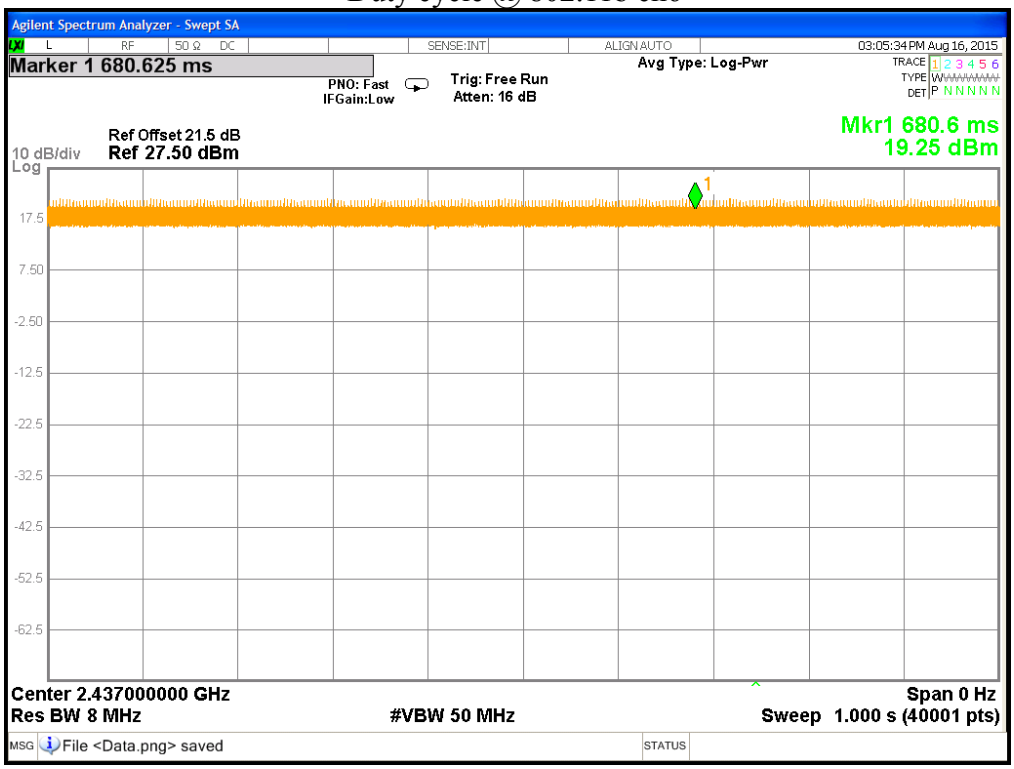
Channels & power setting software provided by the client was used to change the operating channels as well as the output power level and is going to be installed in the final end product.

Mode	Channel	Frequency	Power setting
802.11b (chain0)	1	2412	36
	6	2437	40
	11	2462	36
802.11b (chain1)	1	2412	38
	6	2437	42
	11	2462	38
802.11g (chain0)	1	2412	44
	6	2437	63
	11	2462	44
802.11g (chain1)	1	2412	42
	6	2437	63
	11	2462	42
802.11n (HT20)	1	2412	40
	6	2437	63
	11	2462	40
802.11n (HT40)	3	2422	36
	6	2437	52
	9	2452	36

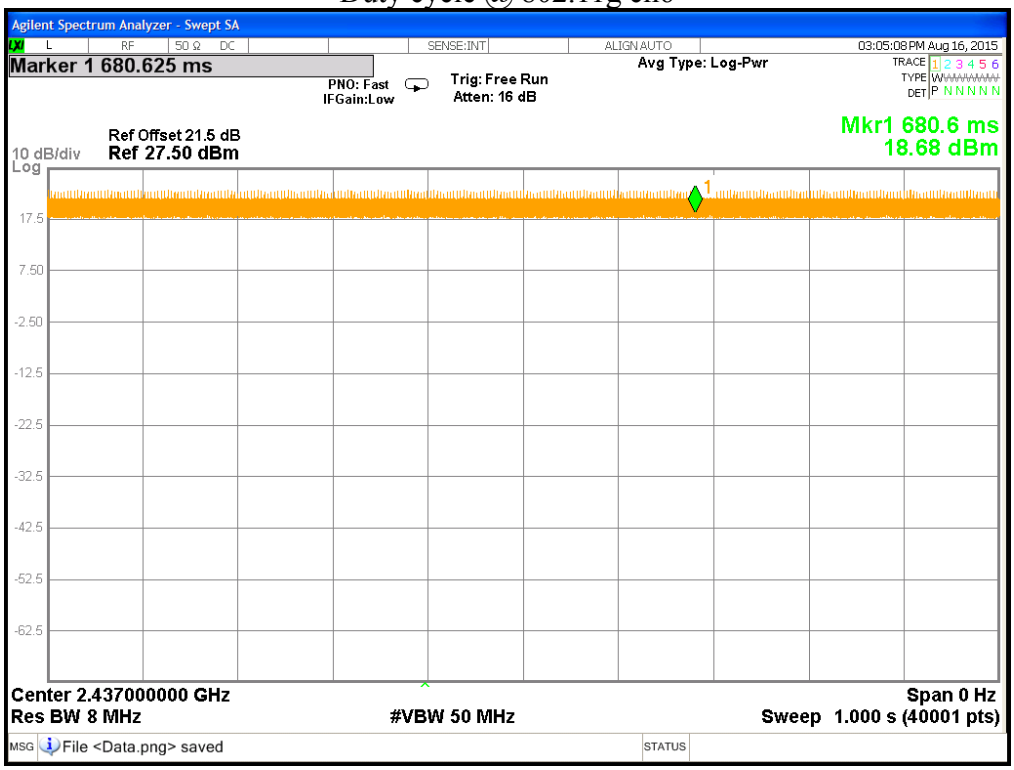
Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Mode	Channel	Frequency (MHz)	Data rate	Signal on time(s)	Total signal transmit time(s)	Duty cycle	Duty Cycle factor
802.11b	6	2437	1	1	1	1.000	0.000
802.11g	6	2437	6	1	1	1.000	0.000
802.11n HT20	6	2437	6.5	1	1	1.000	0.000
802.11n HT40	6	2437	13.5	1	1	1.000	0.000

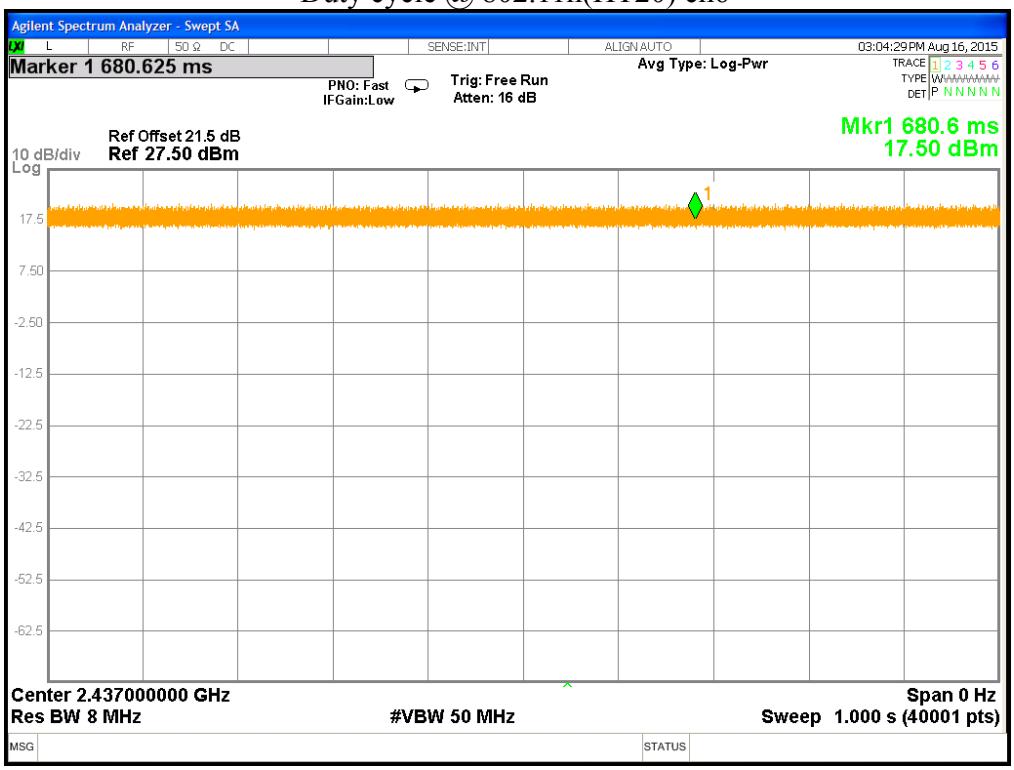
Duty cycle @ 802.11b ch6



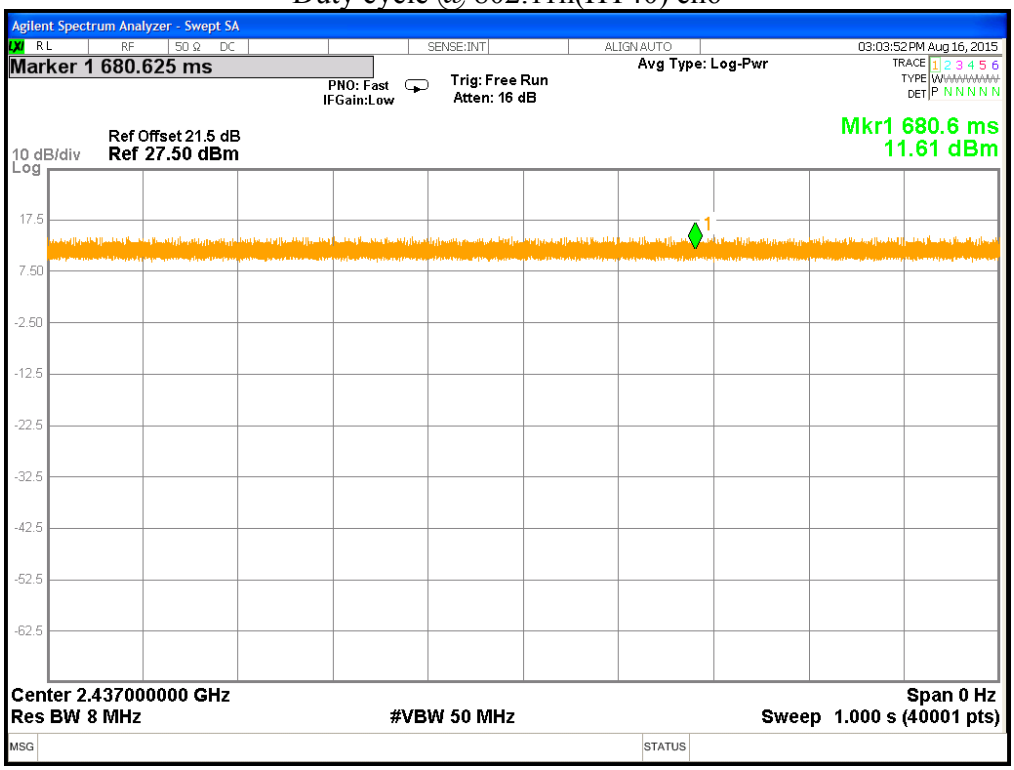
Duty cycle @ 802.11g ch6



Duty cycle @ 802.11n(HT20) ch6



Duty cycle @ 802.11n(HT40) ch6



3. Minimum 6 dB Bandwidth

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.247(a)(2) KDB 558074 D01 v03r03	

3.2 Limit for minimum 6dB bandwidth

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

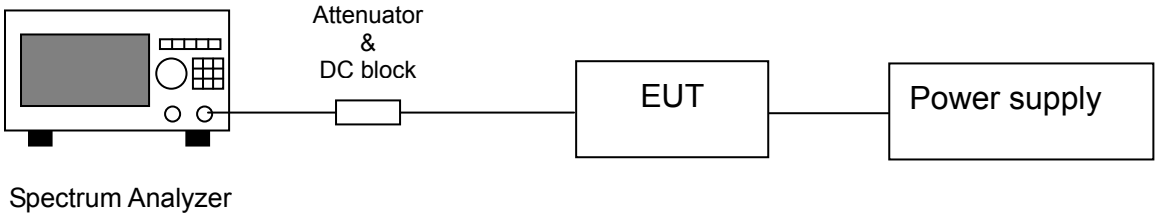
3.3 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	100kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

3.4 Test procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Test was performed in accordance with clause 8.1 option1 of KDB 558074 D01
3. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.5 Test diagram



3.6 Test results

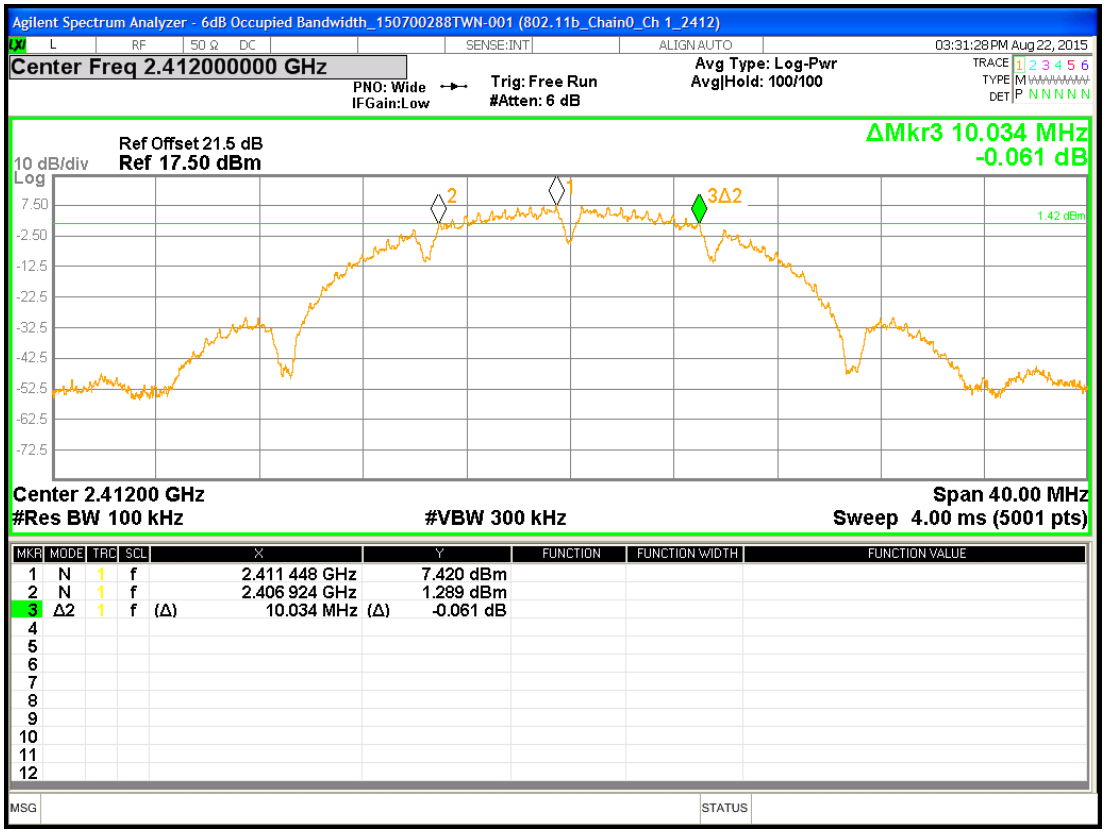
Single TX

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
802.11b (chain0)	1	2412	10.034	0.5	Pass
	6	2437	10.070	0.5	Pass
	11	2462	9.554	0.5	Pass
802.11b (chain1)	1	2412	10.072	0.5	Pass
	6	2437	10.065	0.5	Pass
	11	2462	10.075	0.5	Pass
802.11g (chain0)	1	2412	16.560	0.5	Pass
	6	2437	16.554	0.5	Pass
	11	2462	16.562	0.5	Pass
802.11g (chain1)	1	2412	16.579	0.5	Pass
	6	2437	16.554	0.5	Pass
	11	2462	16.584	0.5	Pass

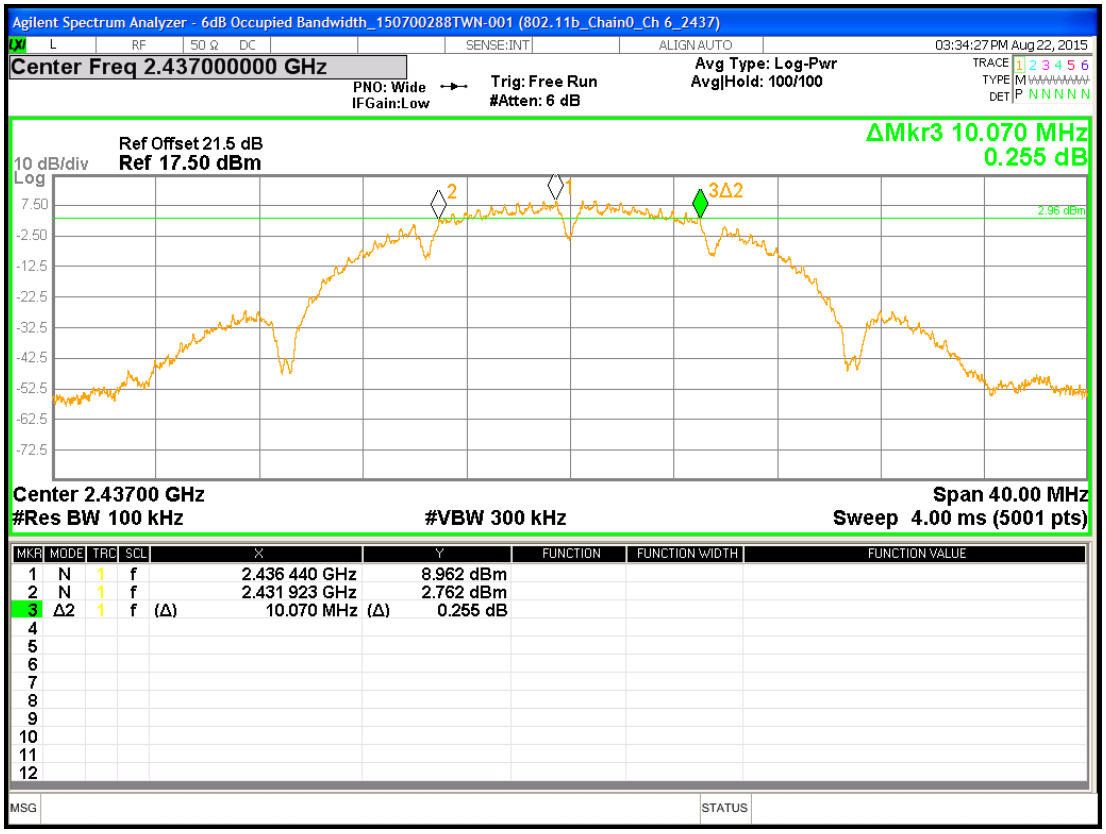
2TX

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)	Pass/Fail
			chain0	chain1		
802.11n (HT20)	1	2412	17.788	17.714	0.5	Pass
	6	2437	17.799	16.498	0.5	Pass
	11	2462	17.807	17.735	0.5	Pass
802.11n (HT40)	3	2422	36.415	36.364	0.5	Pass
	6	2437	36.451	36.356	0.5	Pass
	9	2452	36.403	36.404	0.5	Pass

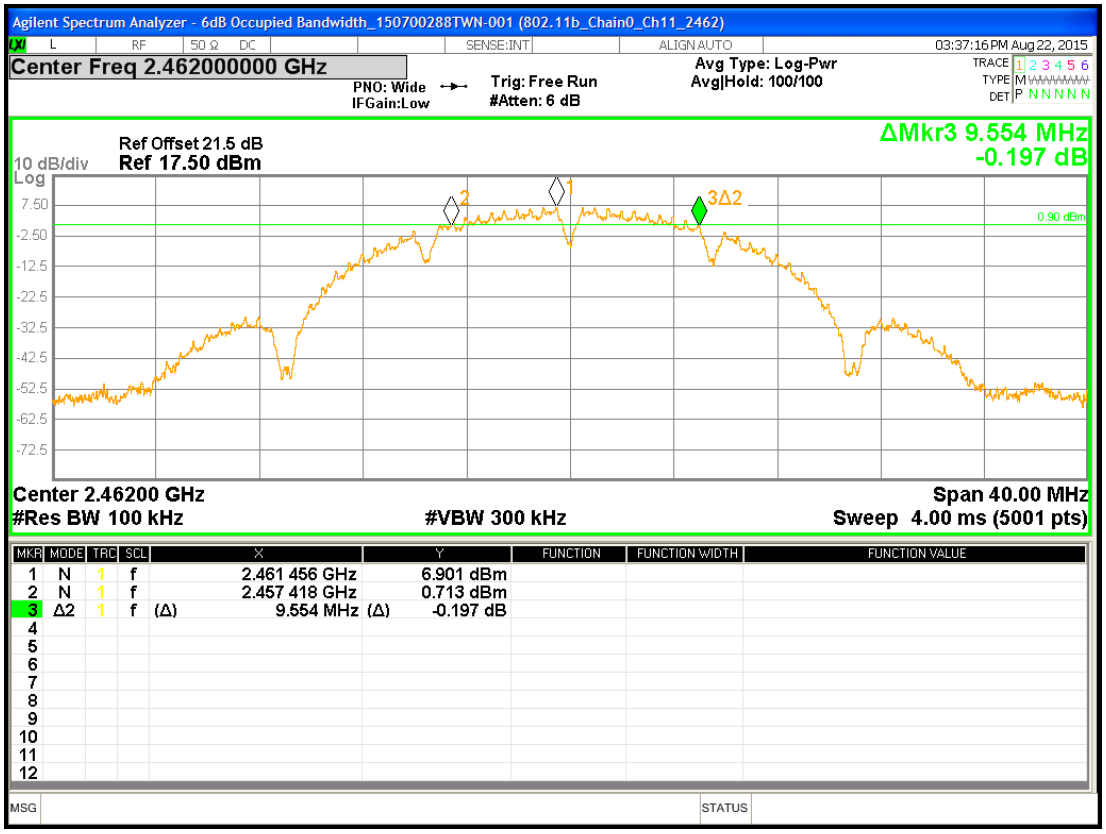
Chain0 : 6dB Bandwidth @ 802.11b mode Ch 1



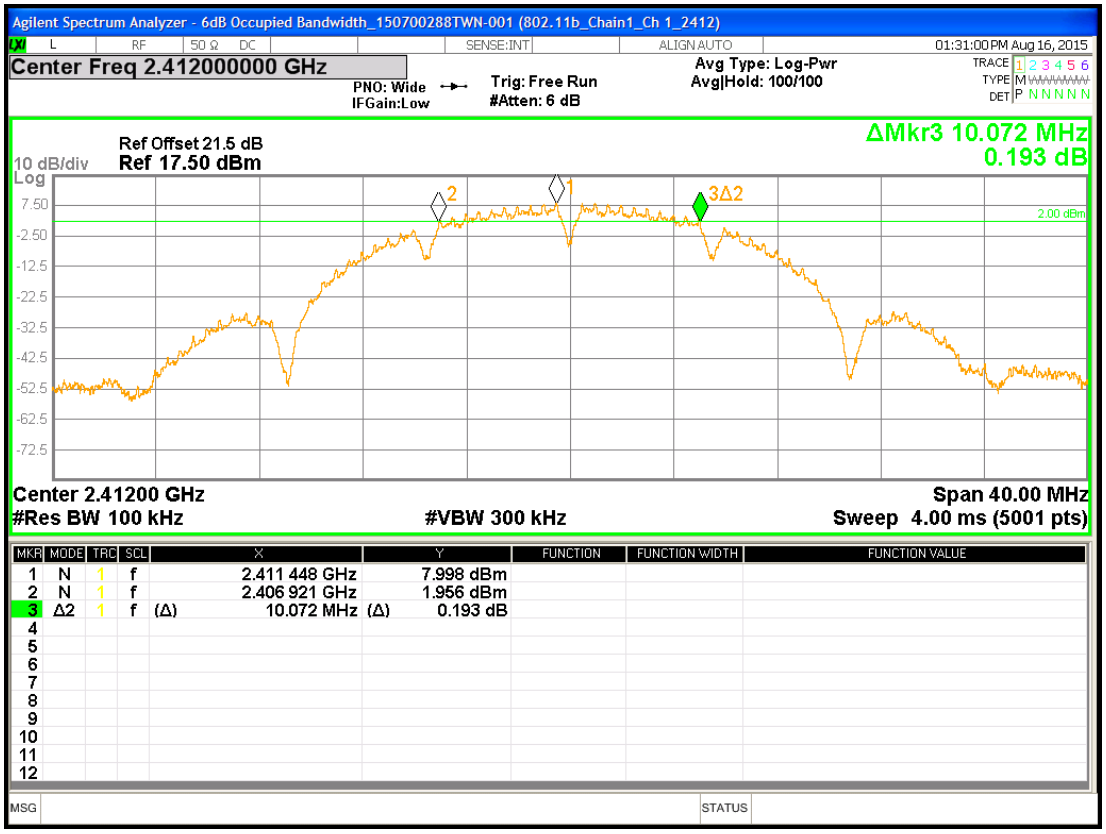
Chain0 : 6dB Bandwidth @ 802.11b mode Ch 6



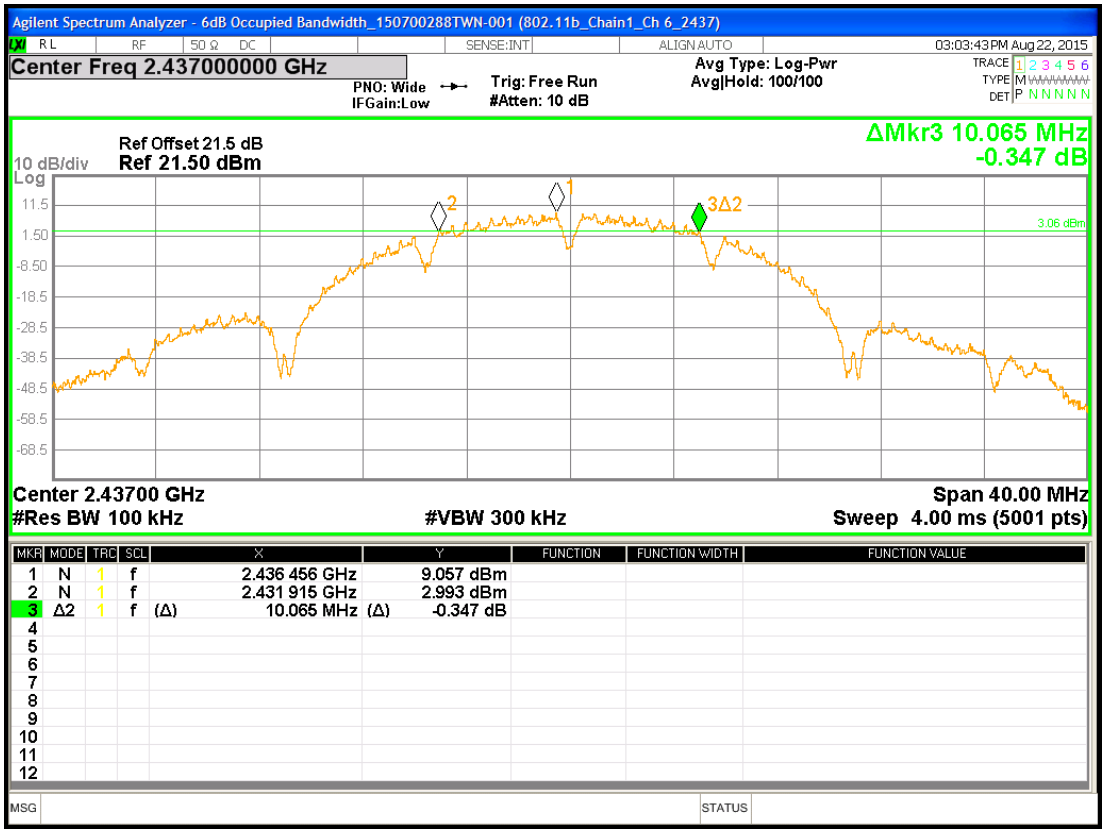
Chain0 : 6dB Bandwidth @ 802.11b mode Ch11



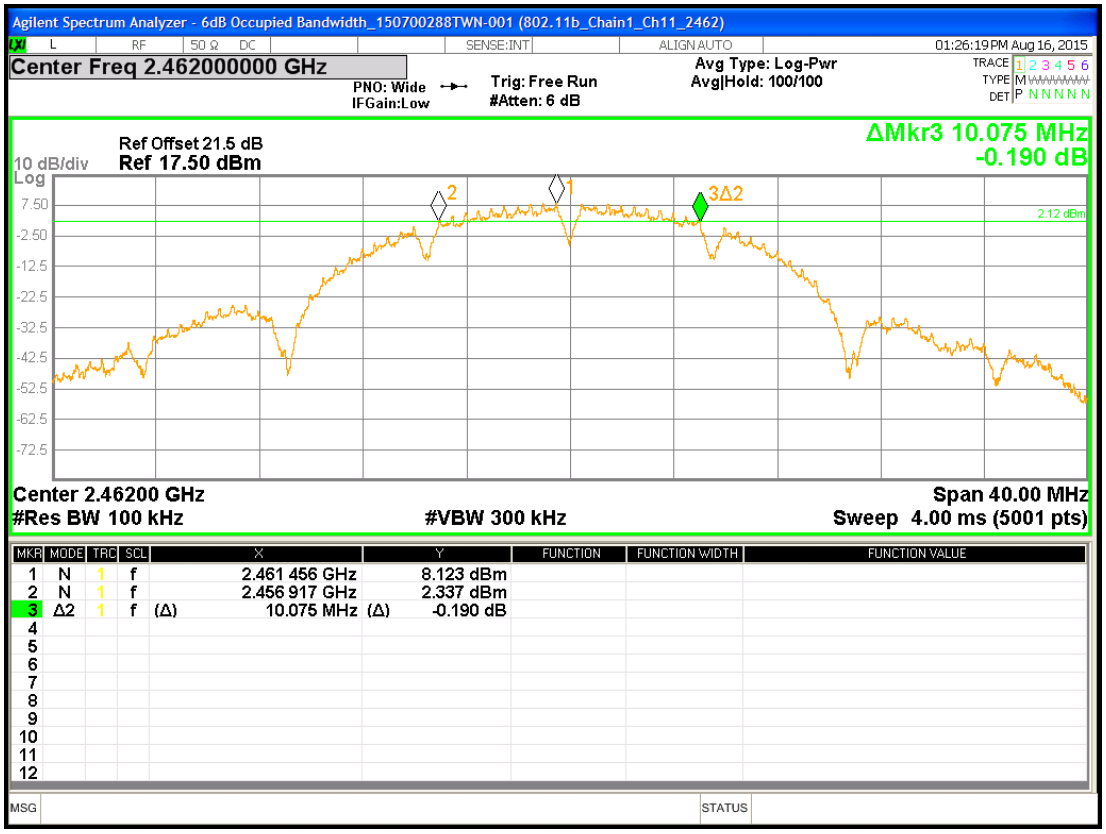
Chain1 : 6dB Bandwidth @ 802.11b mode Ch 1



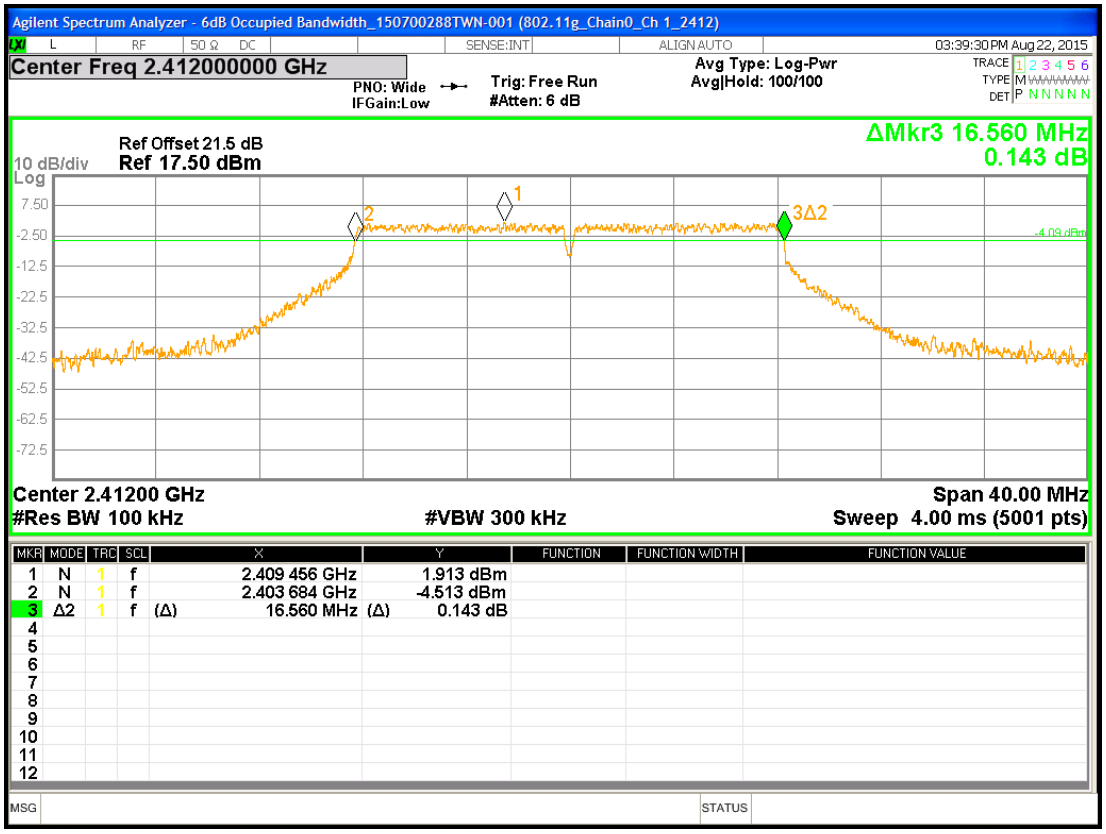
Chain1 : 6dB Bandwidth @ 802.11b mode Ch 6



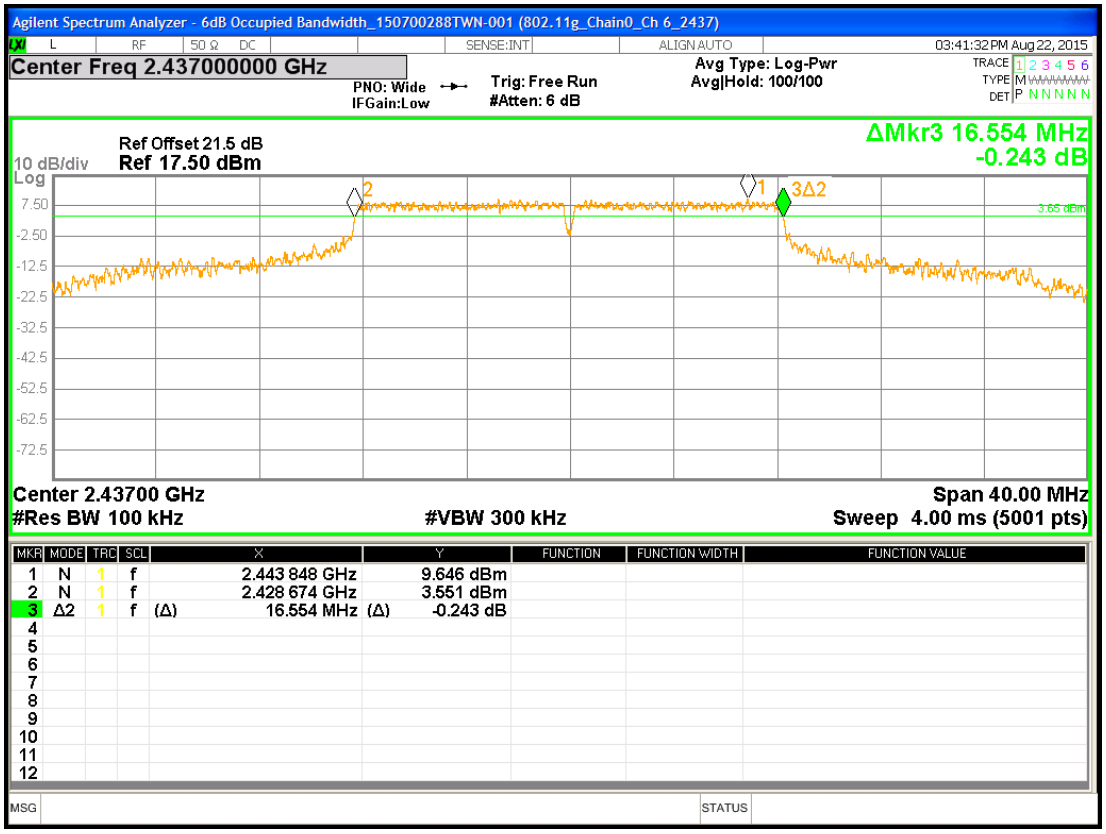
Chain1 : 6dB Bandwidth @ 802.11b mode Ch11



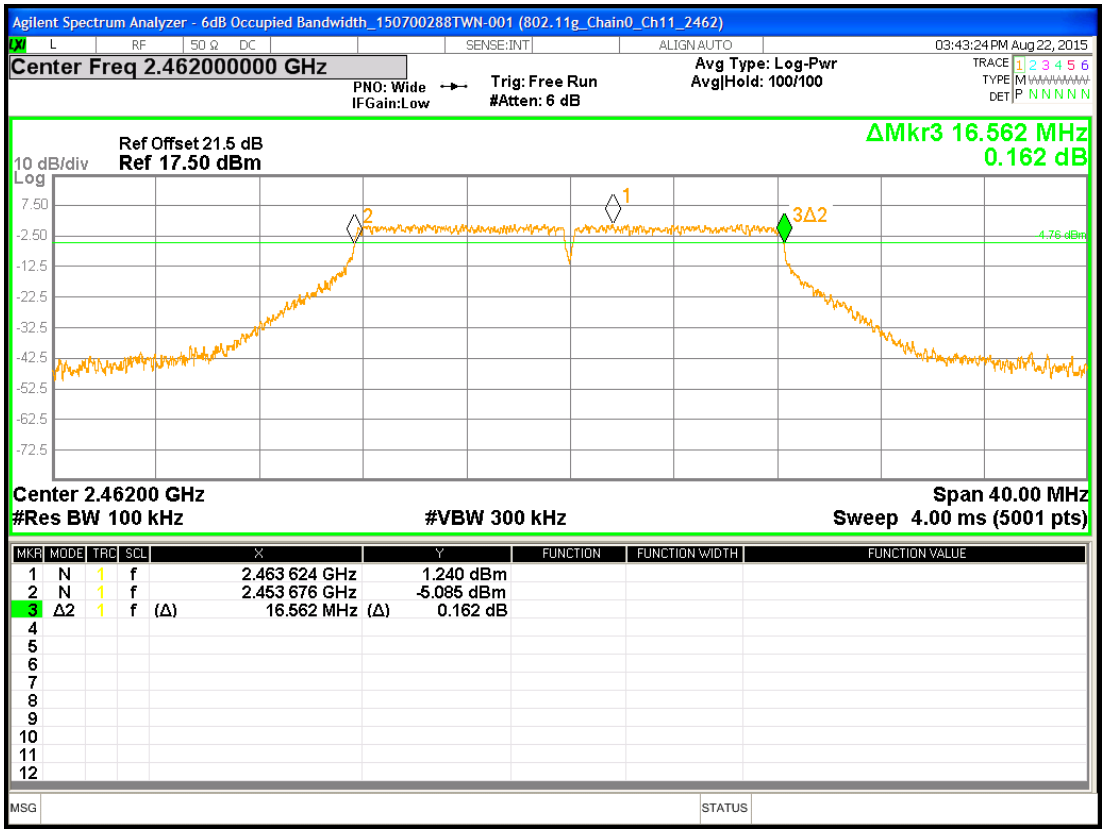
Chain0 : 6dB Bandwidth @ 802.11g mode Ch 1



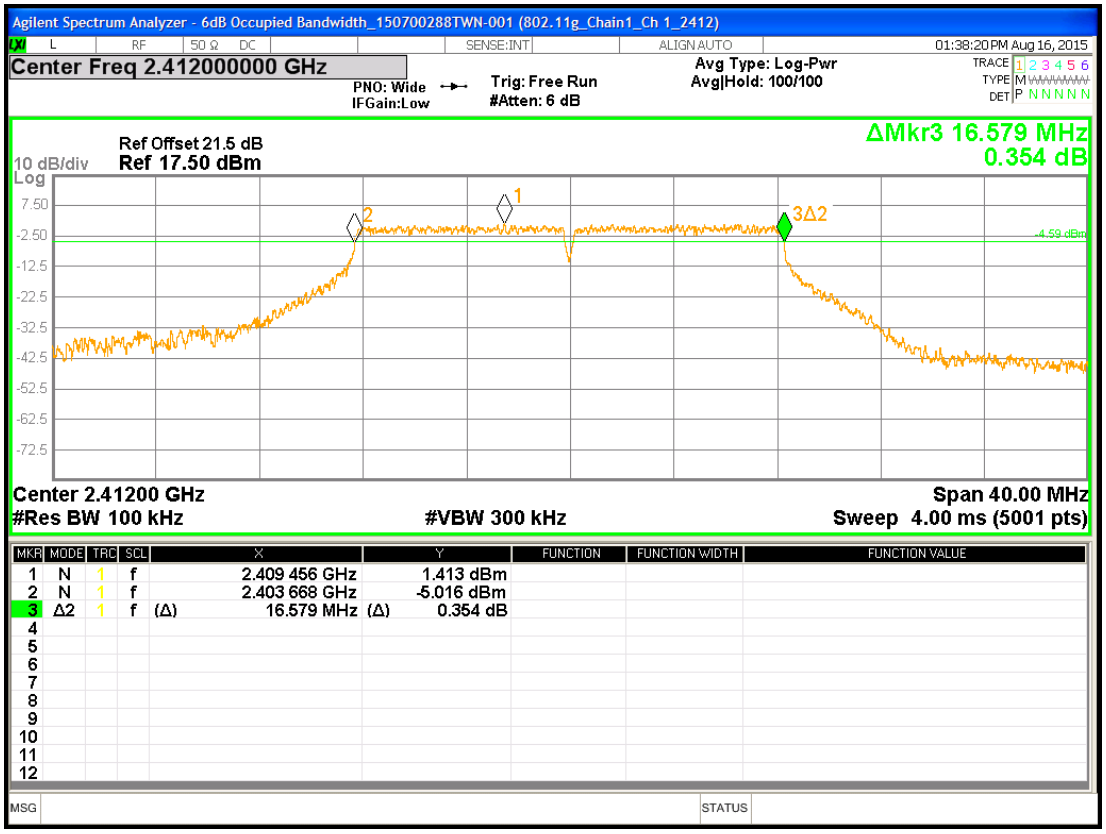
Chain0 : 6dB Bandwidth @ 802.11g mode Ch 6



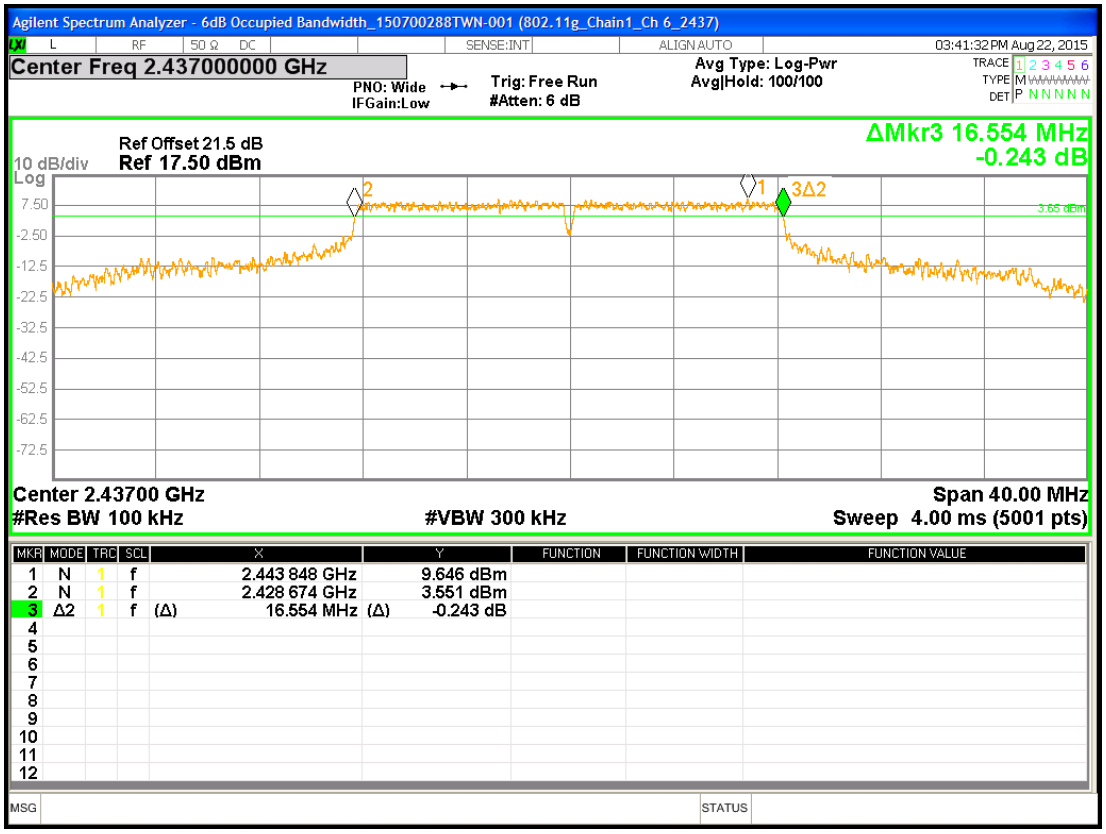
Chain0 : 6dB Bandwidth @ 802.11g mode Ch11



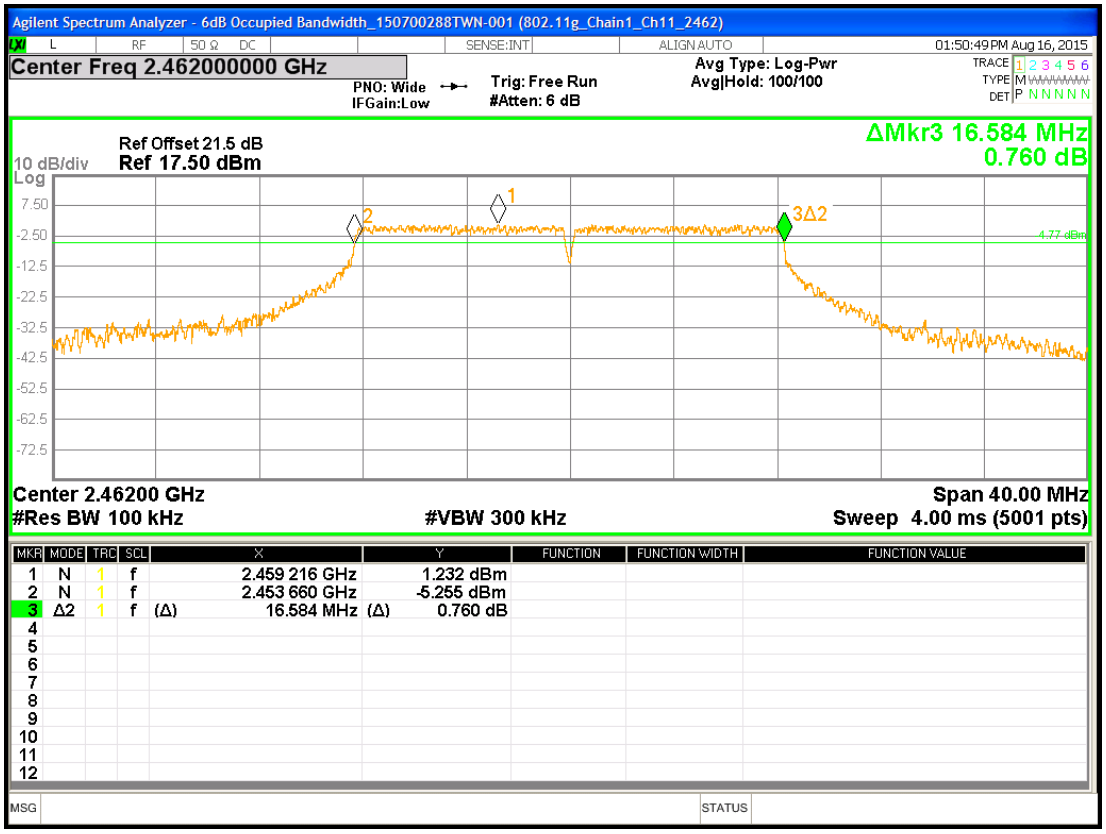
Chain1 : 6dB Bandwidth @ 802.11g mode Ch 1



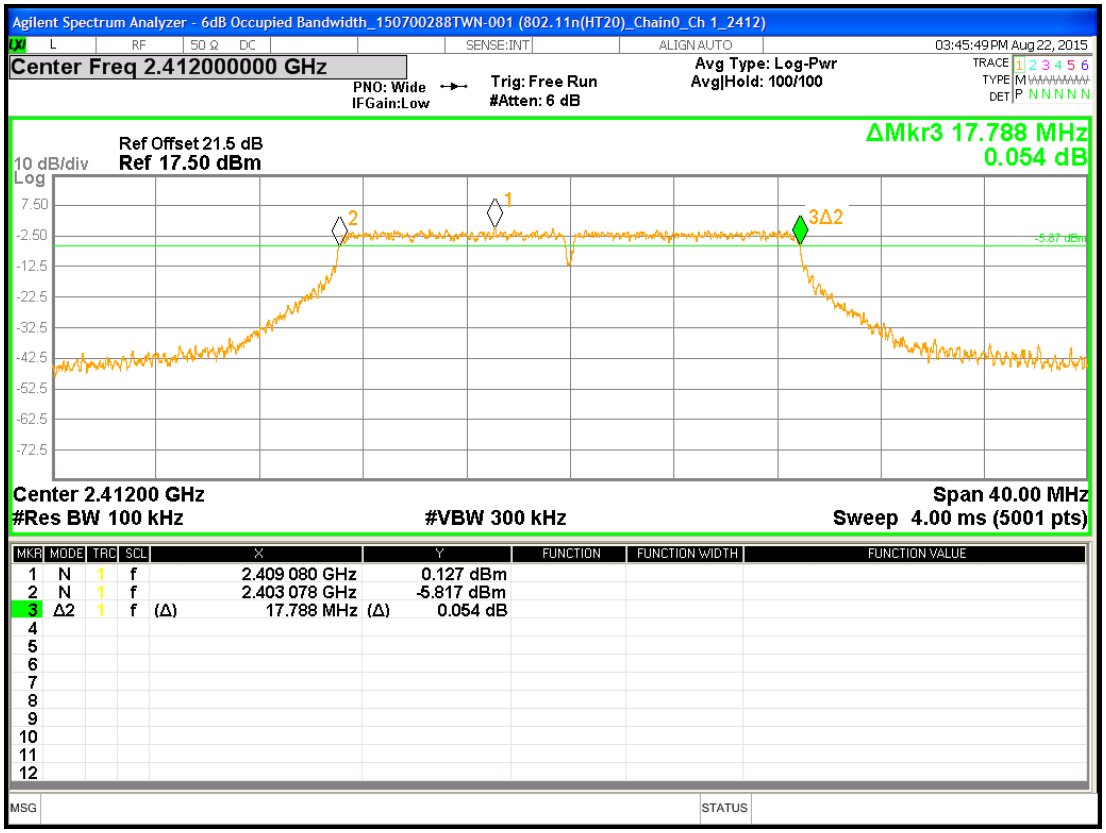
Chain1 : 6dB Bandwidth @ 802.11g mode Ch 6



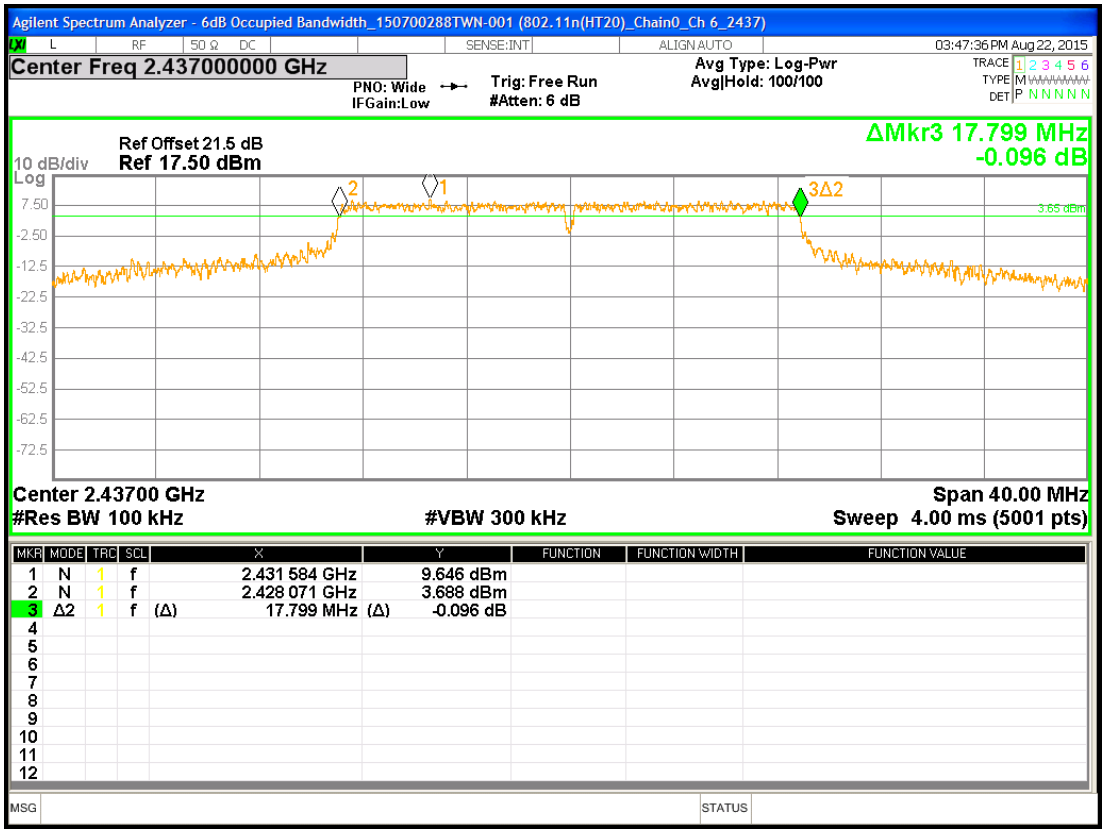
Chain1 : 6dB Bandwidth @ 802.11g mode Ch11



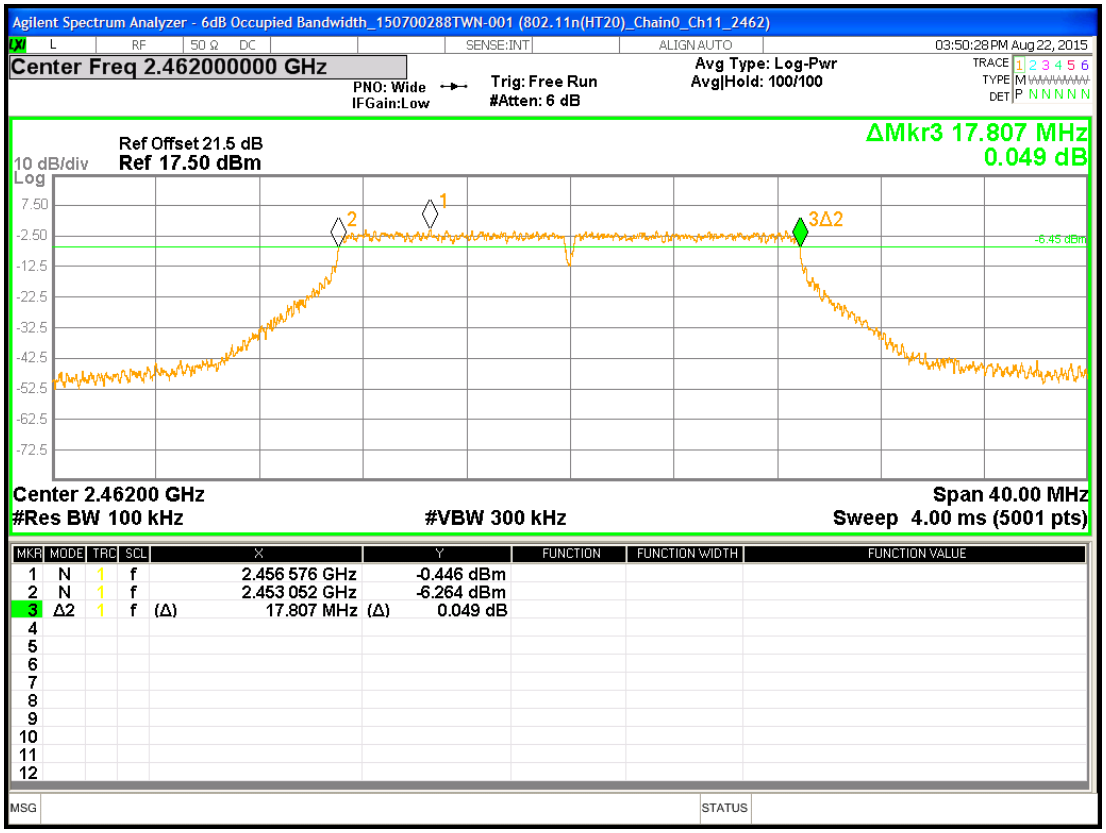
Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 1



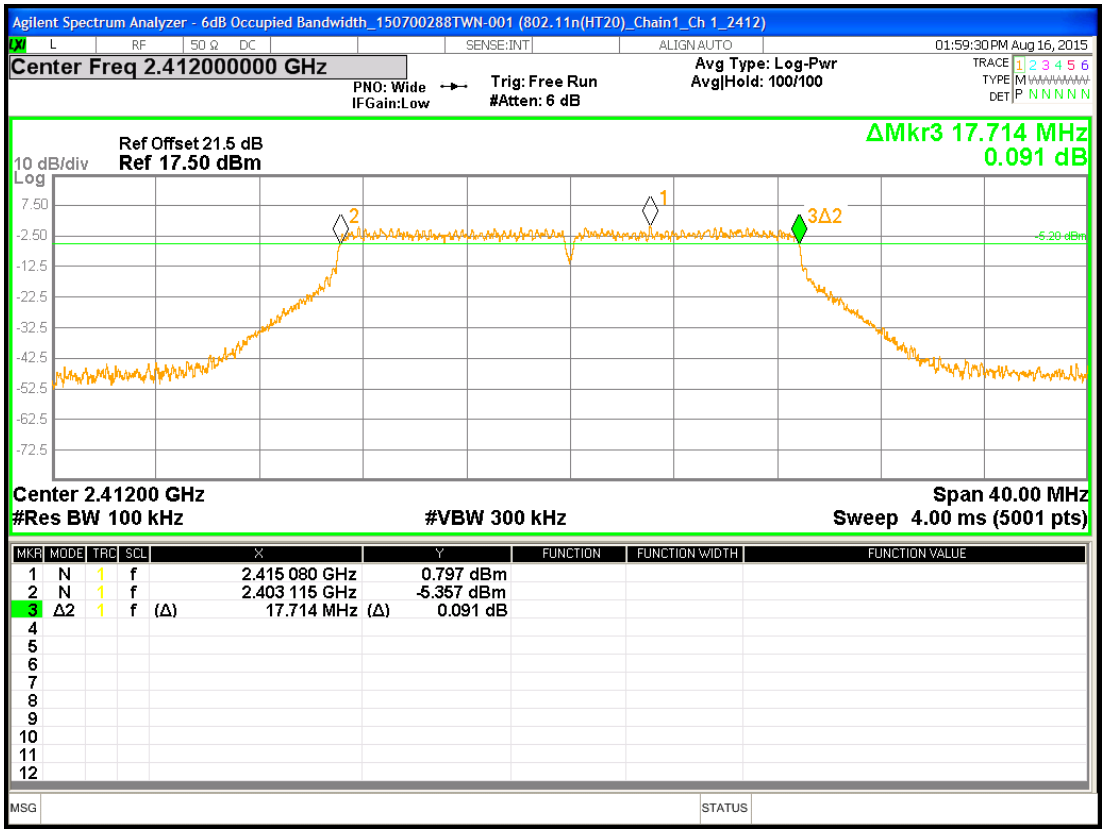
Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 6



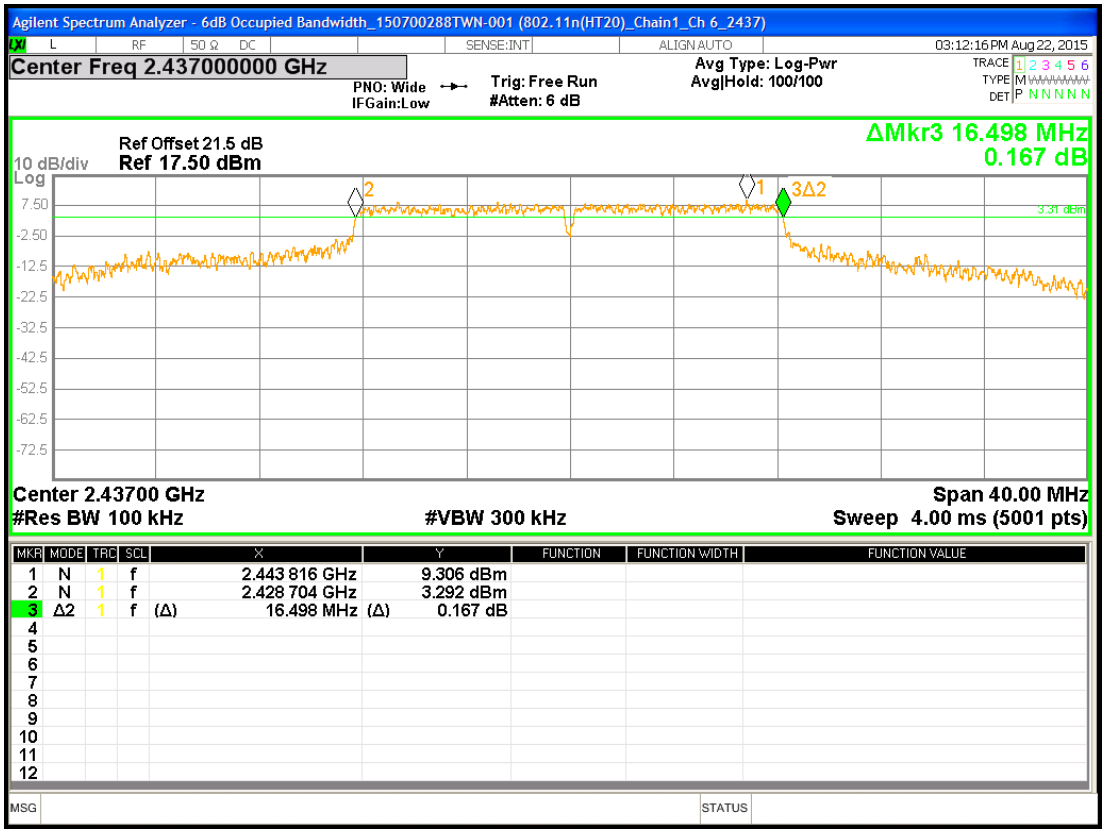
Chain0 : 6dB Bandwidth @ 802.11n(HT20) mode Ch11



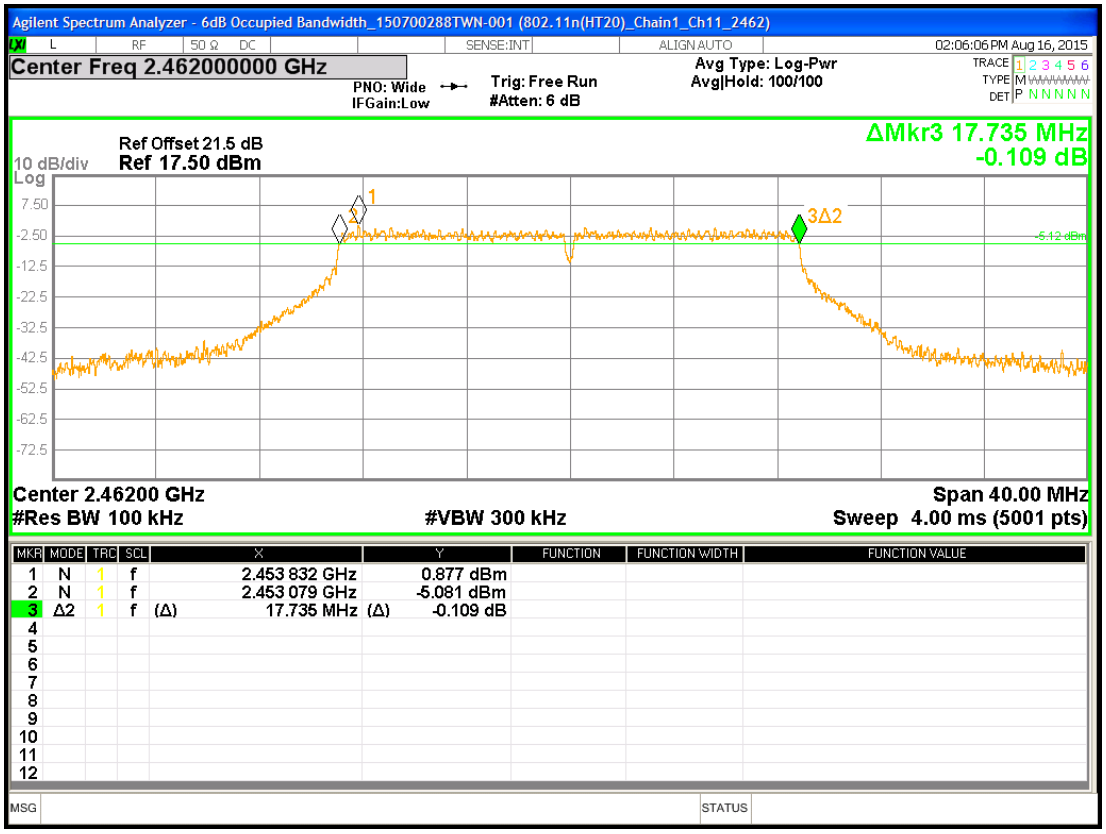
Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 1



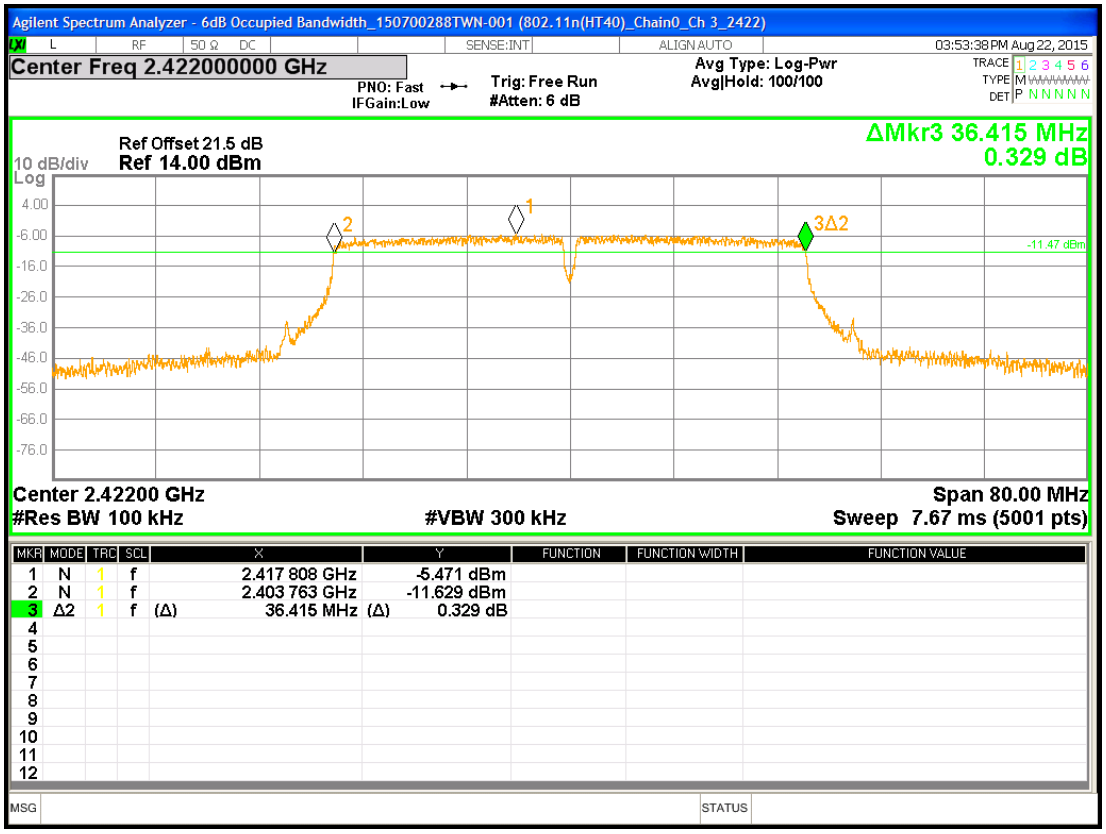
Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch 6



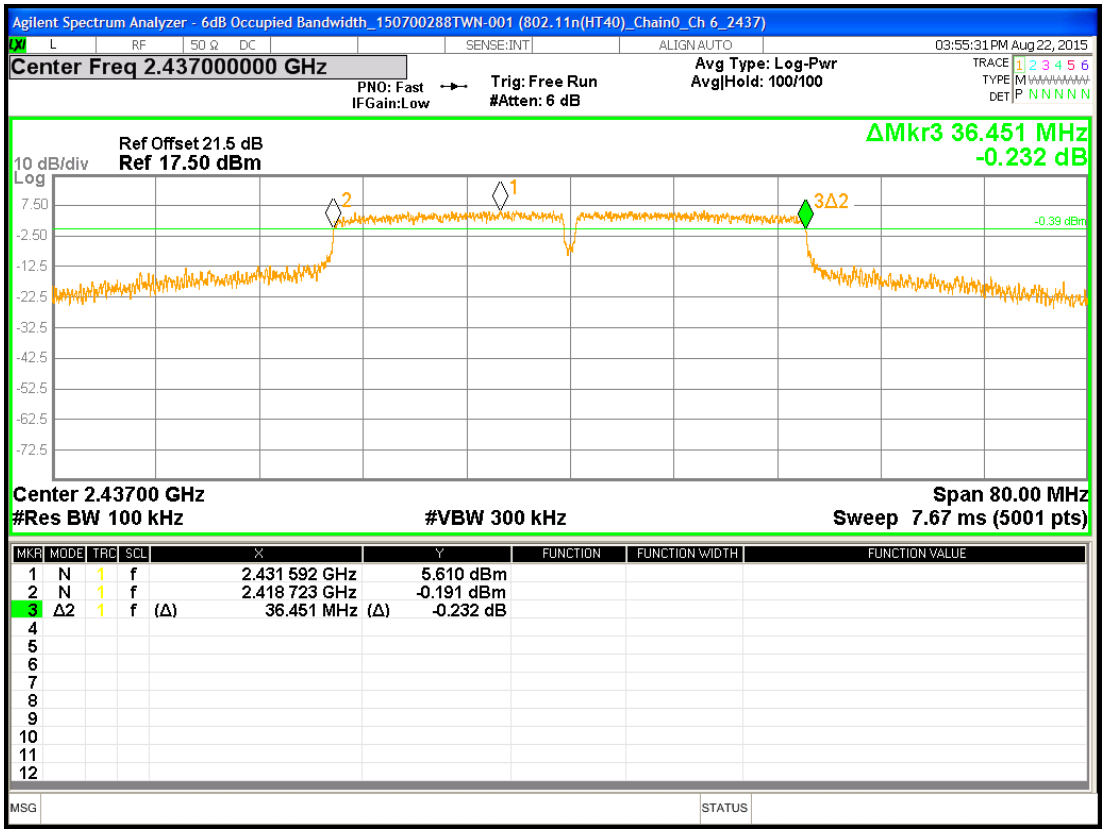
Chain1 : 6dB Bandwidth @ 802.11n(HT20) mode Ch11



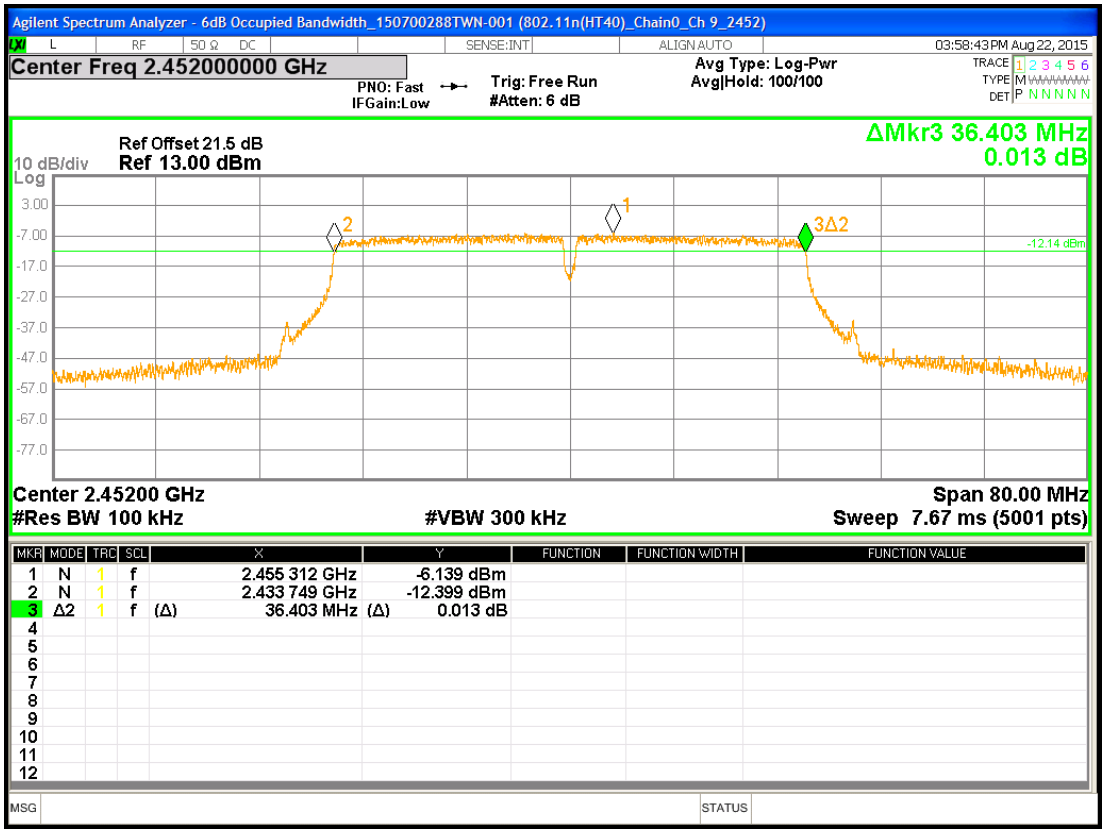
Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 3



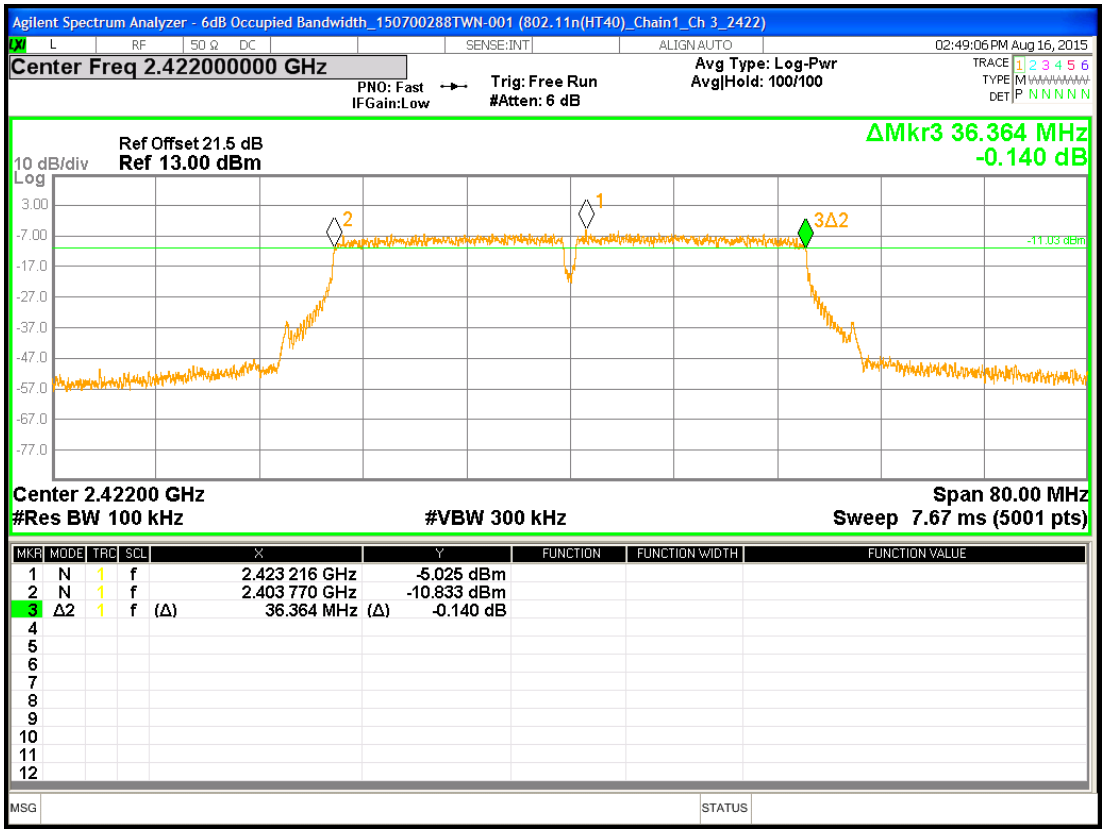
Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 6



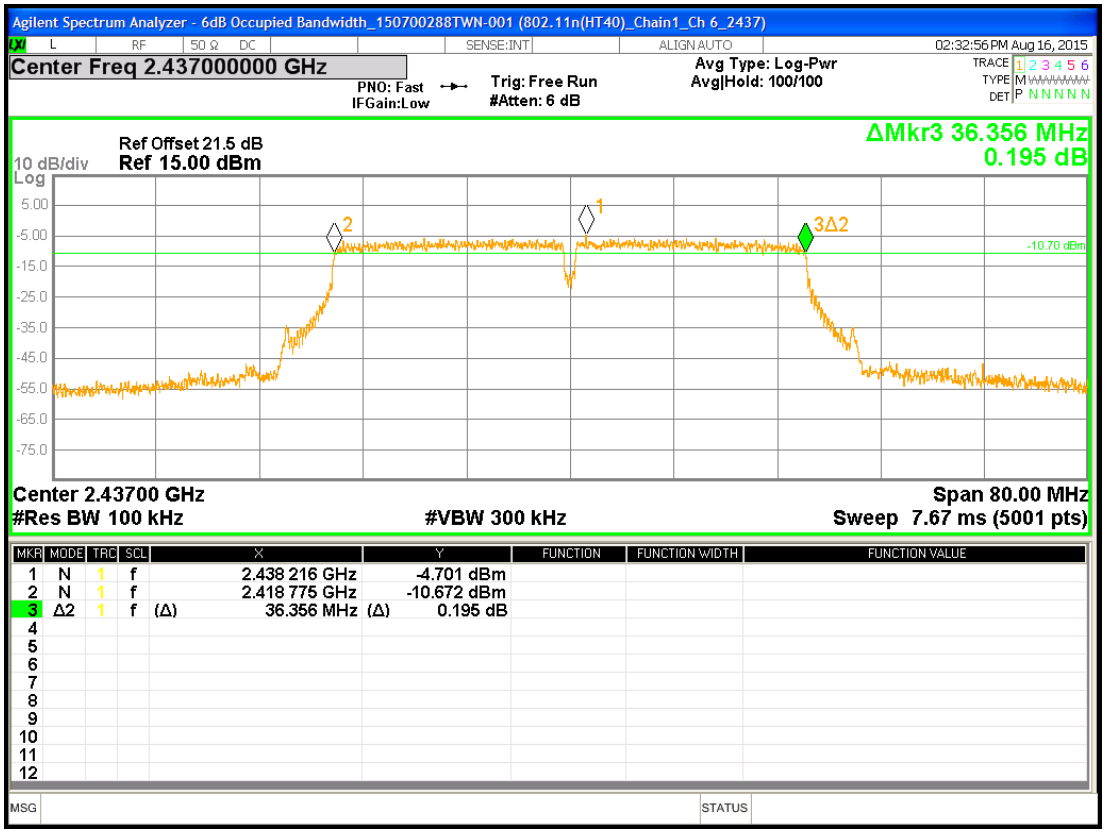
Chain0 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 9



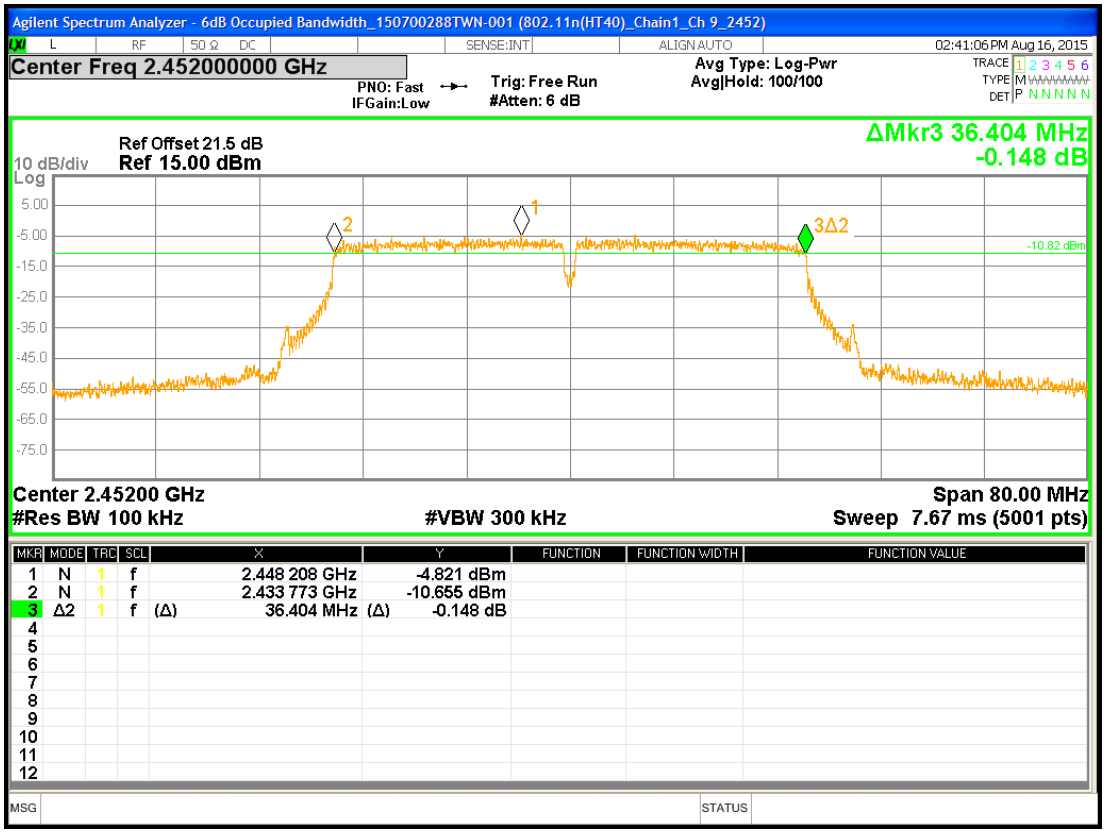
Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 3



Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 6



Chain1 : 6dB Bandwidth @ 802.11n(HT40) mode Ch 9



4. Maximum Peak Conducted Output Power

4.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.247(b)(3) KDB 558074 D01 v03r03	

4.2 Limit for maximum peak conducted output power

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

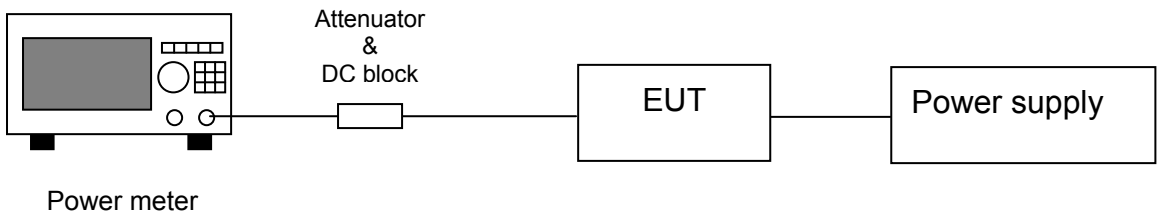
4.3 Measuring instrument setting

Power meter	
Power meter	**Setting**
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

4.4 Test procedure

Test procedures refer to clause 9.1.2 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

4.5 Test diagram



4.6 Test result

Single TX

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
11b(chain0)	1	2412	1	19.45	88.10	30	-10.55
	6	2437		21.06	127.64	30	-8.94
	11	2462		19.13	81.85	30	-10.87
11b(chain1)	1	2412	1	20.08	101.86	30	-9.92
	6	2437		21.8	151.36	30	-8.20
	11	2462		19.96	99.08	30	-10.04
11g(chain0)	1	2412	6	21.44	139.32	30	-8.56
	6	2437		27.32	539.51	30	-2.68
	11	2462		21.21	132.13	30	-8.79
11g(chain1)	1	2412	6	23.69	233.88	30	-6.31
	6	2437		26.71	468.81	30	-3.29
	11	2462		23.54	225.94	30	-6.46

2TX

Mode	Ch.	Freq. (MHz)	Data Rate (Mbps)	Output Power (dBm)		Output Power (mW)		Total Power (dBm)		Limit (dBm)	Margin (dB)
				Chain 0	Chain 1	Chain 0	chain 1	PK			
				PK	PK	PK	PK	0+1 (mW)	0+1 (dBm)		
802.11n (HT20)	1	2412	6.5	23.52	22.54	224.91	179.47	404.38	26.07	30	-3.93
	6	2437		26.52	26.11	448.75	408.32	857.06	29.33	30	-0.67
	11	2462		23.02	22.5	200.45	177.83	378.28	25.78	30	-4.22
802.11n (HT40)	3	2422	13.5	20.2	19.65	104.71	92.26	196.97	22.94	30	-7.06
	6	2437		26.43	25.67	439.54	368.98	808.52	29.08	30	-0.92
	9	2452		19.67	19.56	92.68	90.36	183.05	22.63	30	-7.37

5. Power Spectral Density

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.247(e) KDB 558074 D01 v03r03	

5.2 Limit for power spectrum density

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

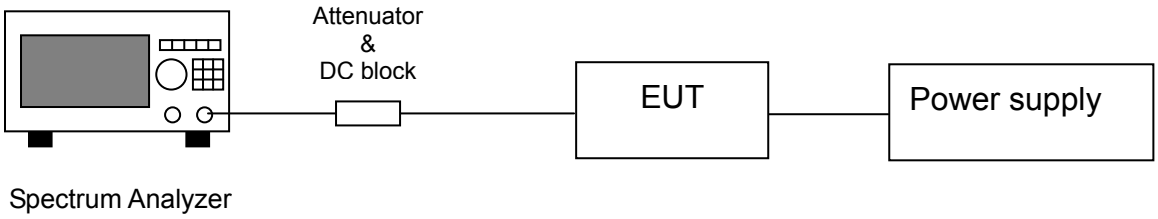
5.3 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Average
RBW	≧3 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Max hold
Span	1.5 times x 6dB bandwidth
Attenuation	Auto

5.4 Test procedure

1. Test procedure refer to clause 10.3 method AVPSD (average PSD) of KDB 558074 D01 and clause E) 2) c) “Measure and add 10 log (n ANT) dB, where n is the number of outputs” of KDB 662911 D01.
2. Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Use the peak marker function to determine the maximum amplitude level within the RBW.

5.5 Test diagram



5.6 Test results

Single TX

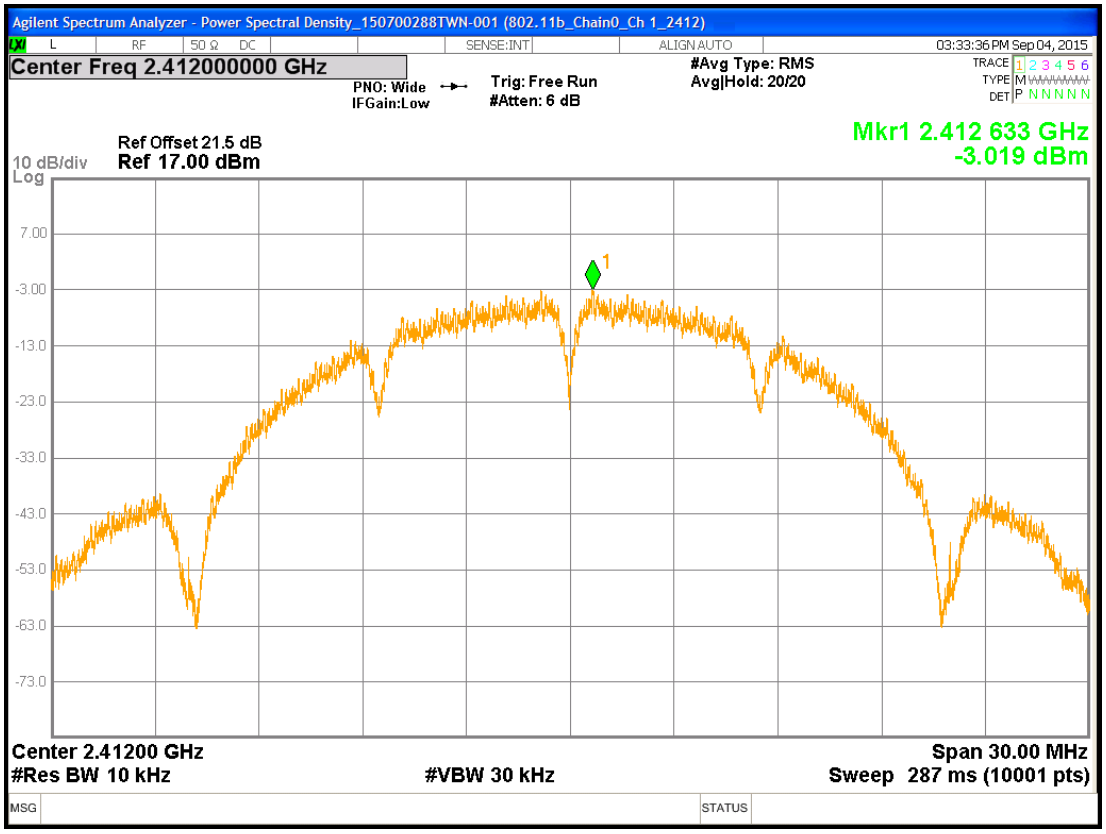
Mode	Channel	Frequency (MHz)	PSD		Limit (dBm)	Margin (dB)
			(dBm)	(mw)		
802.11b (chain0)	1	2412	-3.019	0.50	8	-11.02
	6	2437	-1.336	0.74	8	-9.34
	11	2462	-3.114	0.49	8	-11.11
802.11b (chain1)	1	2412	-3.033	0.50	8	-11.03
	6	2437	-1.387	0.73	8	-9.39
	11	2462	-2.757	0.53	8	-10.76
802.11g (chain0)	1	2412	-5.753	0.27	8	-13.75
	6	2437	1.52	1.42	8	-6.48
	11	2462	-6.011	0.25	8	-14.01
802.11g (chain1)	1	2412	-7.914	0.16	8	-15.91
	6	2437	0.401	1.10	8	-7.60
	11	2462	-5.508	0.28	8	-13.51

2TX

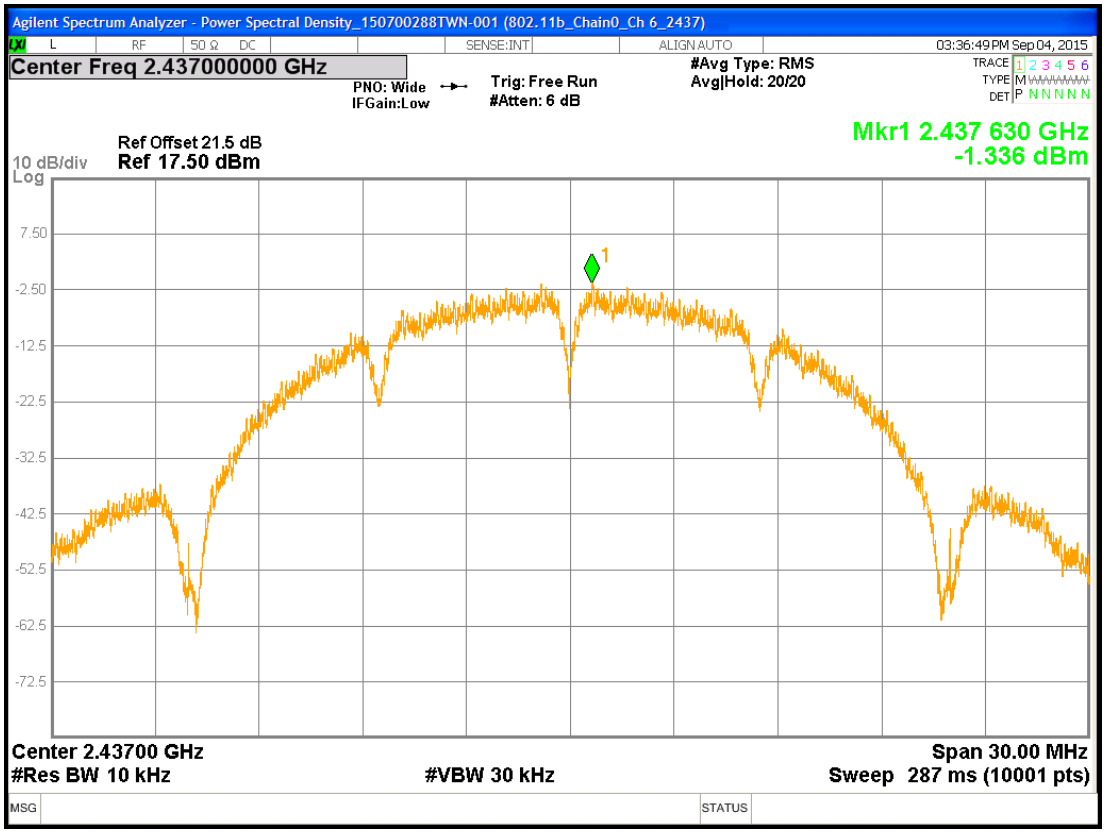
Mode	Ch.	Freq. (MHz)	PSD (dBm/3kHz)		Total PSD		MIMO Correction	Result	Limit (dBm/3kHz)	Margin (dB)
			chain0	chain1	mW	(dBm/3kHz)				
802.11n (HT20)	1	2412	-4.115	-4.164	0.77	-1.13	10Log(2)	-1.13	8	-9.13
	6	2437	-1.279	3.946	3.23	5.09	10Log(2)	5.09	8	-2.91
	11	2462	-3.792	-2.128	1.03	0.13	10Log(2)	3.14	8	-4.86
802.11n (HT40)	3	2422	-9.732	-9.199	0.23	-6.45	10Log(2)	-3.44	8	-11.44
	6	2437	-2.099	-3.119	1.10	0.43	10Log(2)	3.44	8	-4.56
	9	2452	-9.851	-8.831	0.23	-6.30	10Log(2)	-3.29	8	-11.29

Note: MIMO Correction: 10log(Nant)

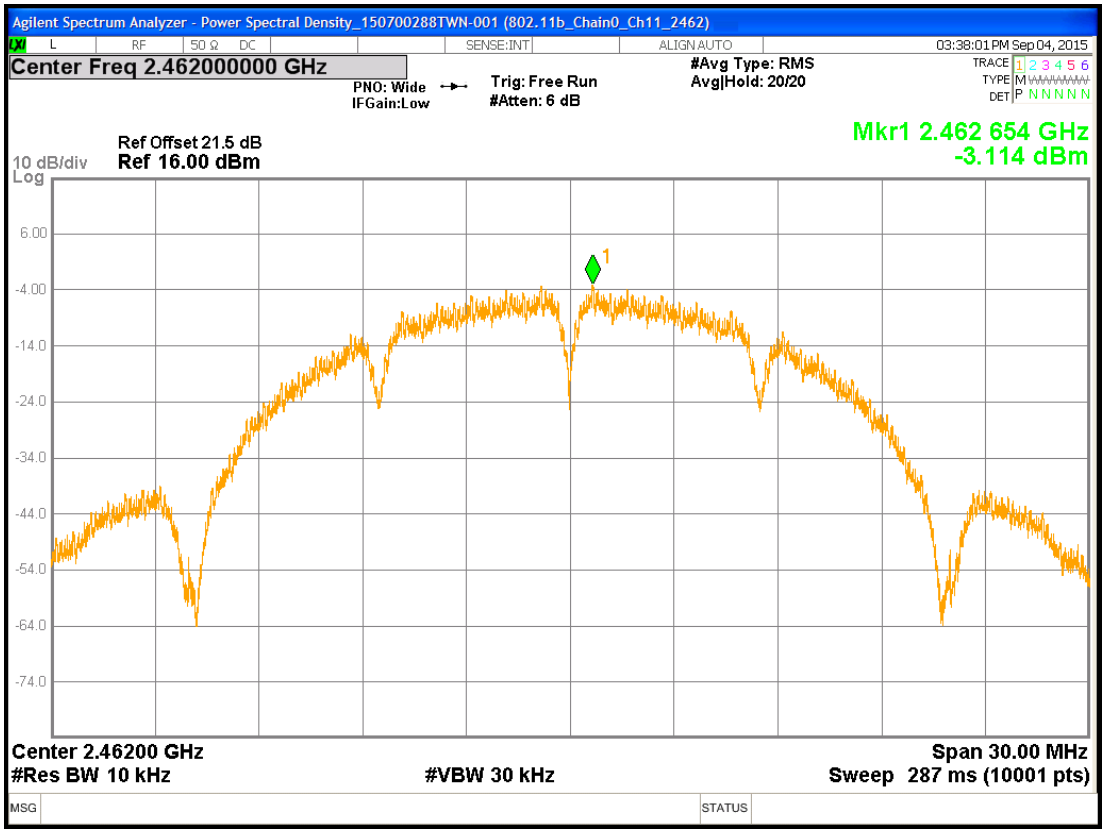
Chain0 : Power Spectral Density @ 802.11b mode Ch 1



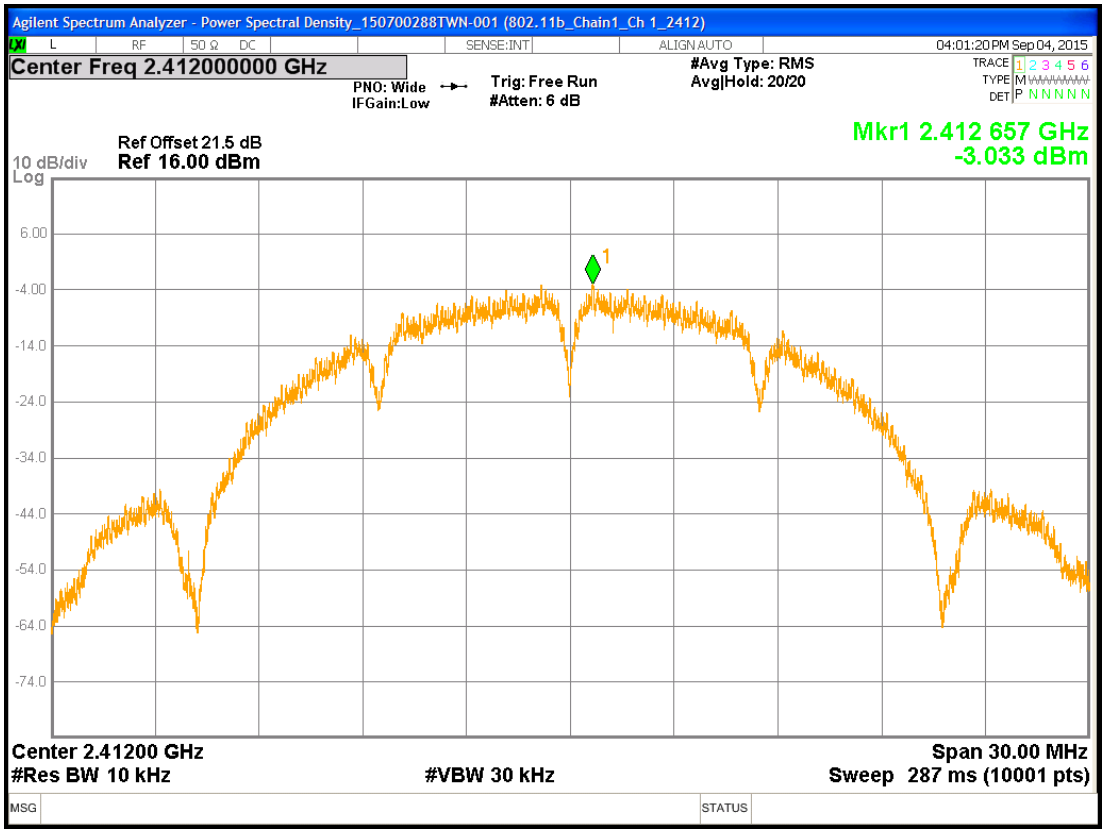
Chain0 : Power Spectral Density @ 802.11b mode Ch 6



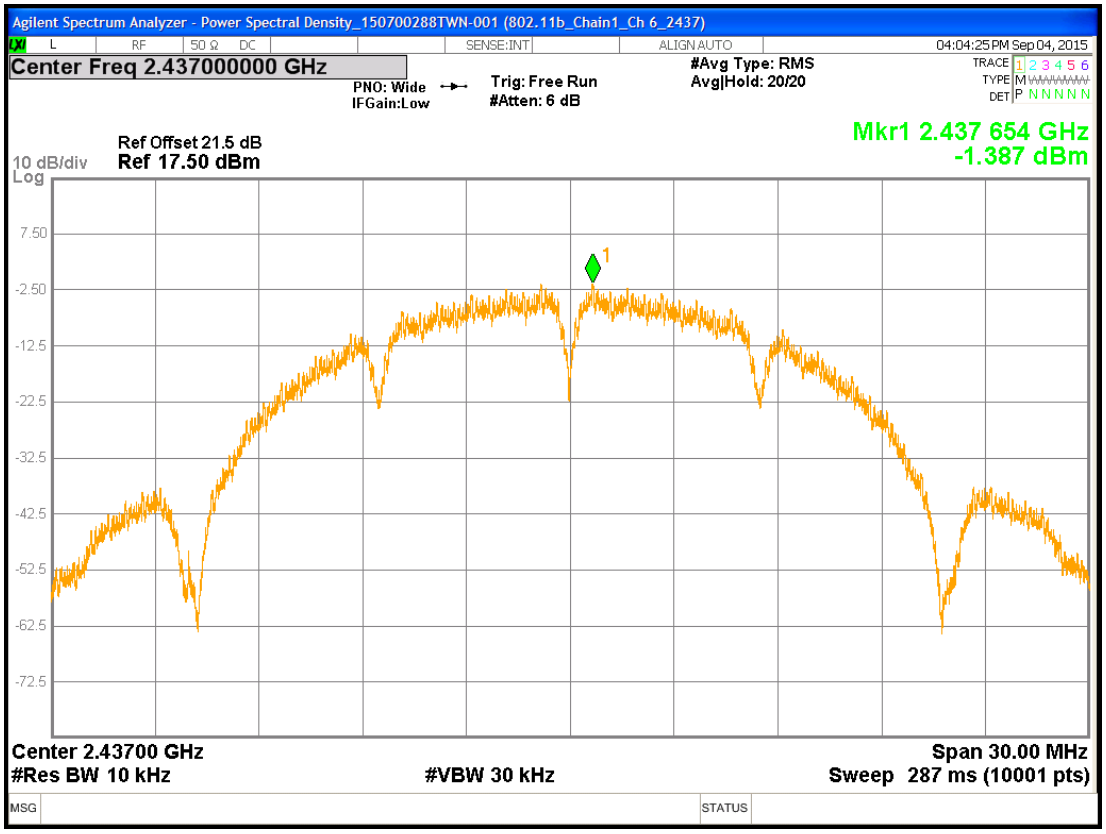
Chain0 : Power Spectral Density @ 802.11b mode Ch11



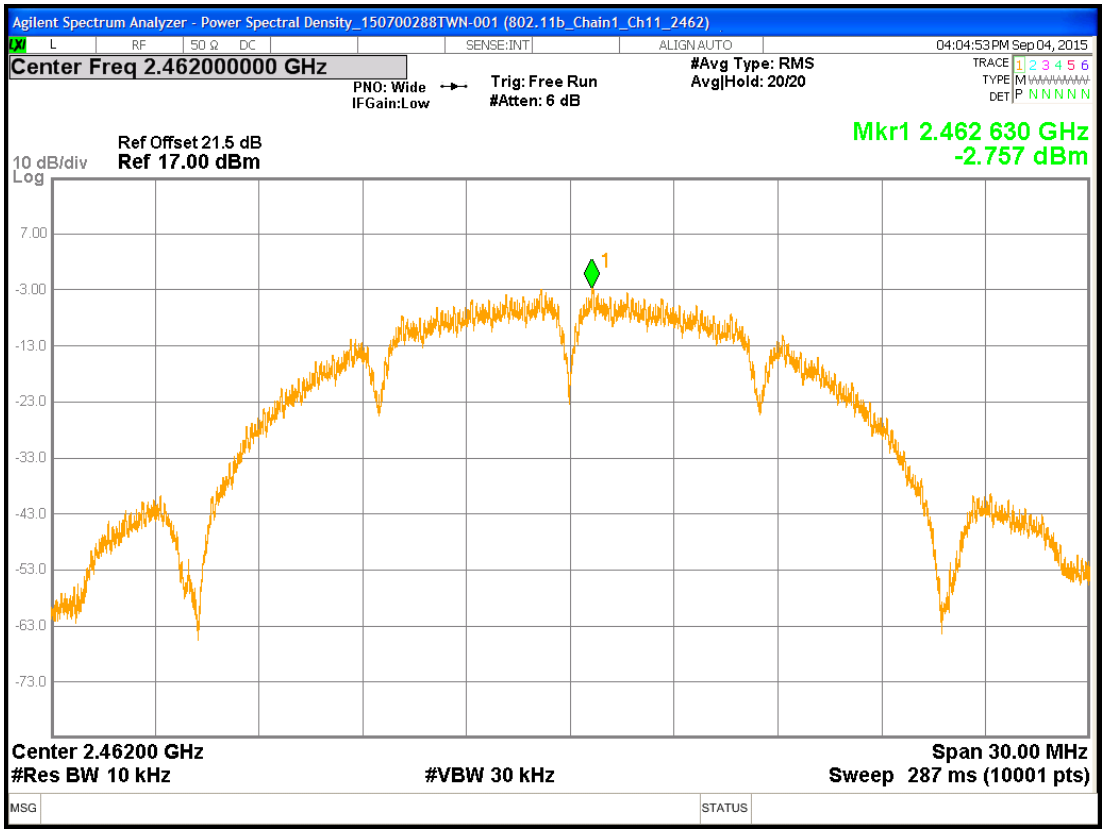
Chain1 : Power Spectral Density @ 802.11b mode Ch 1



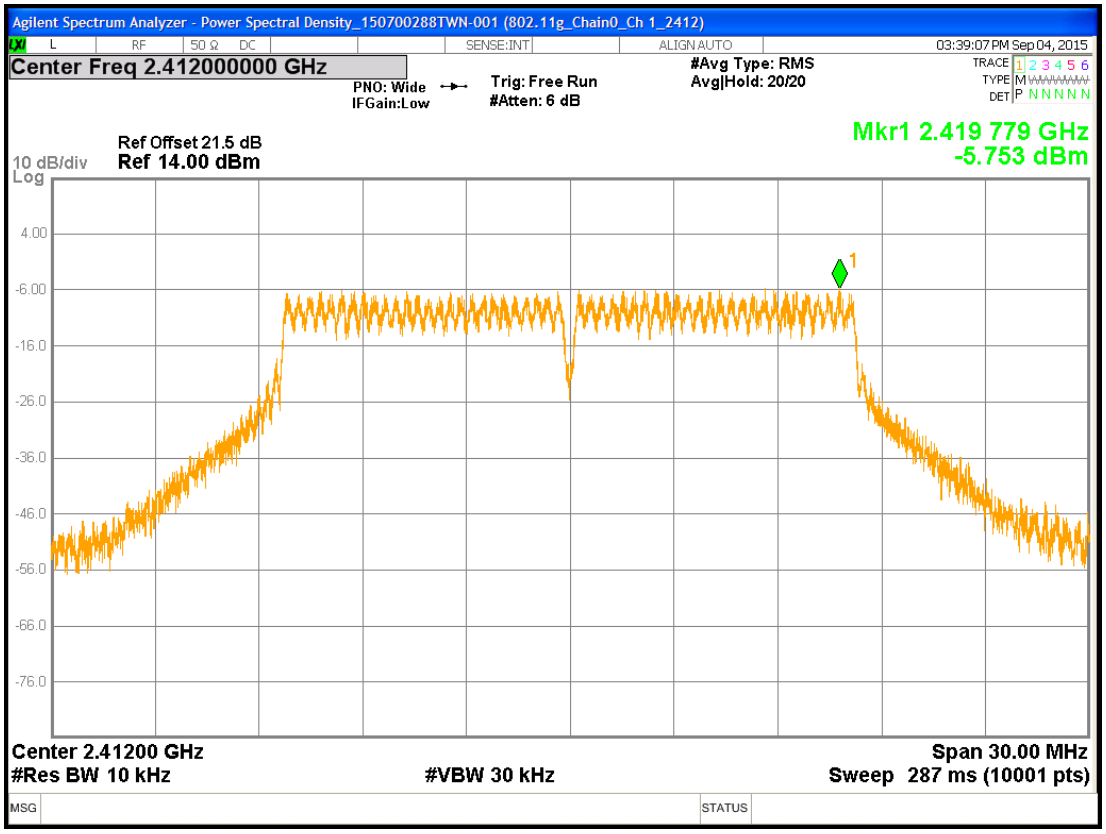
Chain1 : Power Spectral Density @ 802.11b mode Ch 6



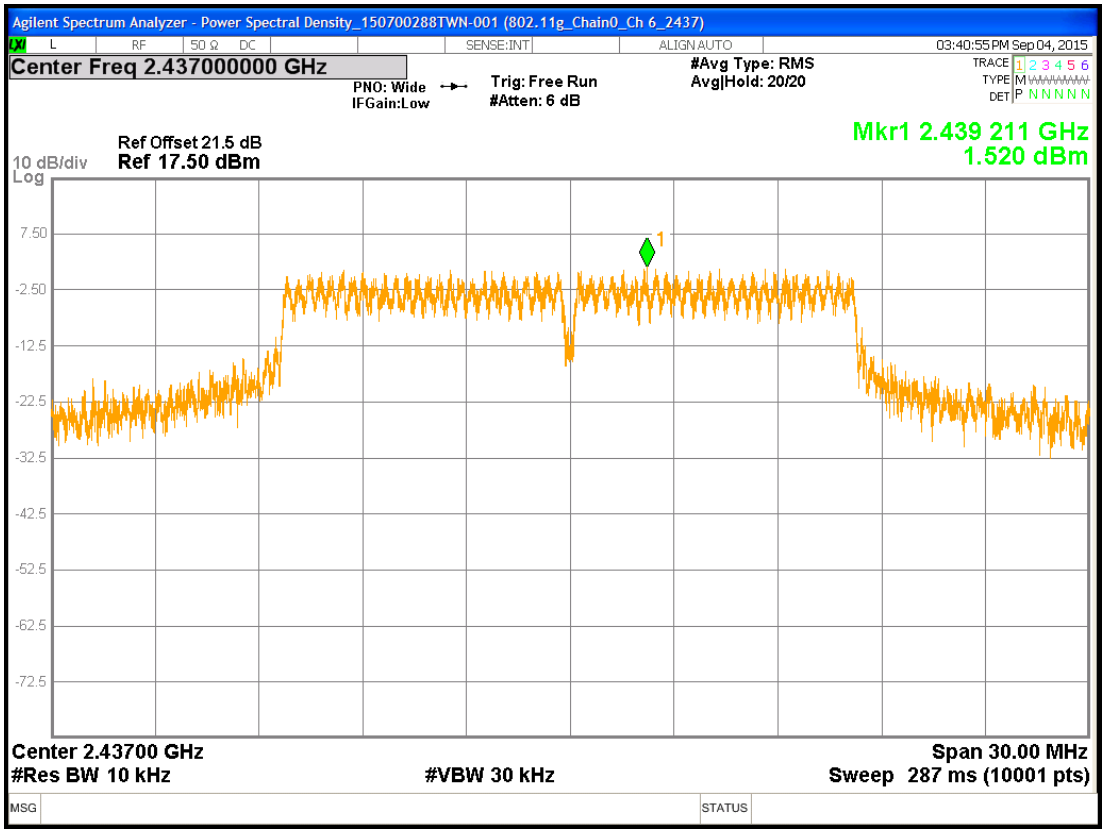
Chain1 : Power Spectral Density @ 802.11b mode Ch11



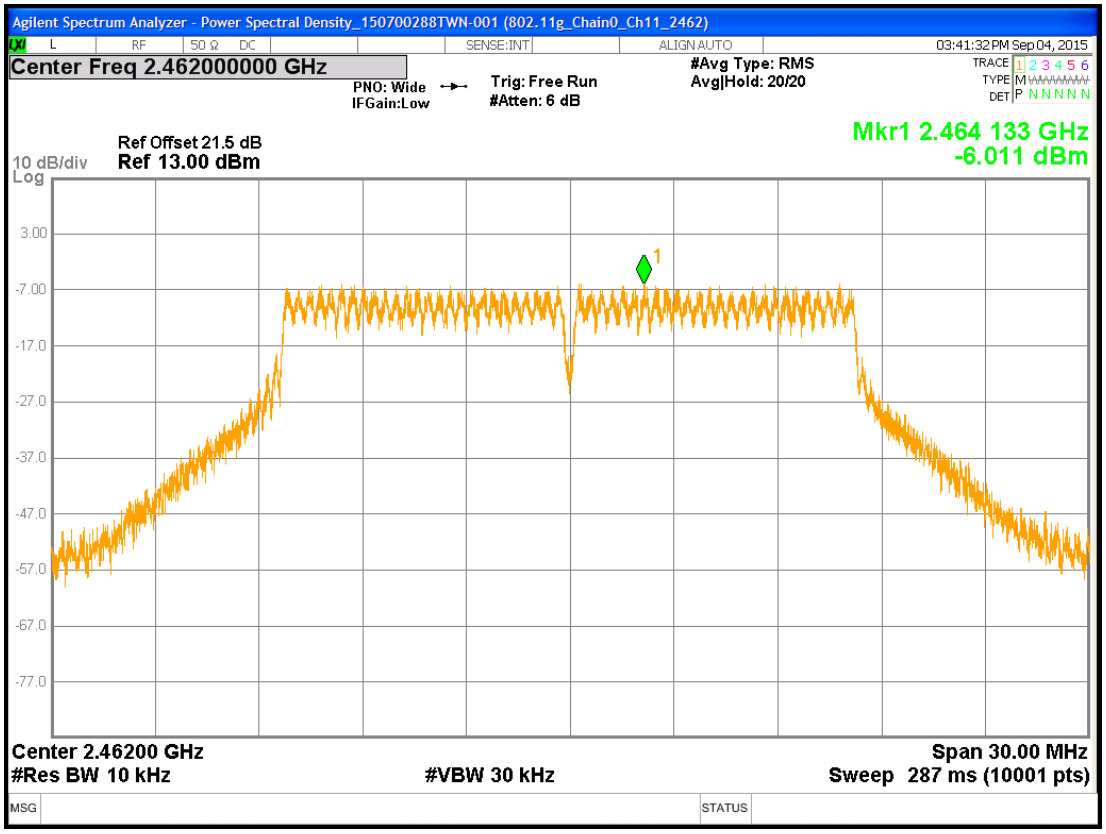
Chain0 : Power Spectral Density @ 802.11g mode Ch 1



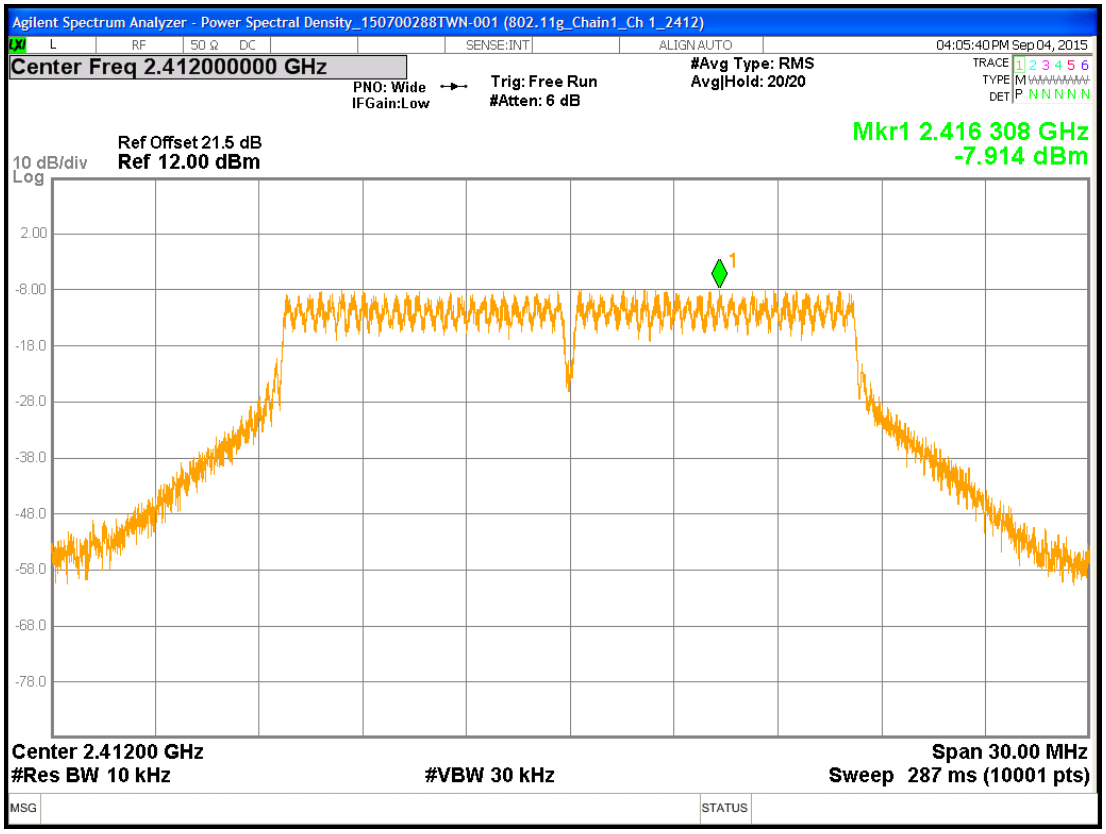
Chain0 : Power Spectral Density @ 802.11g mode Ch 6



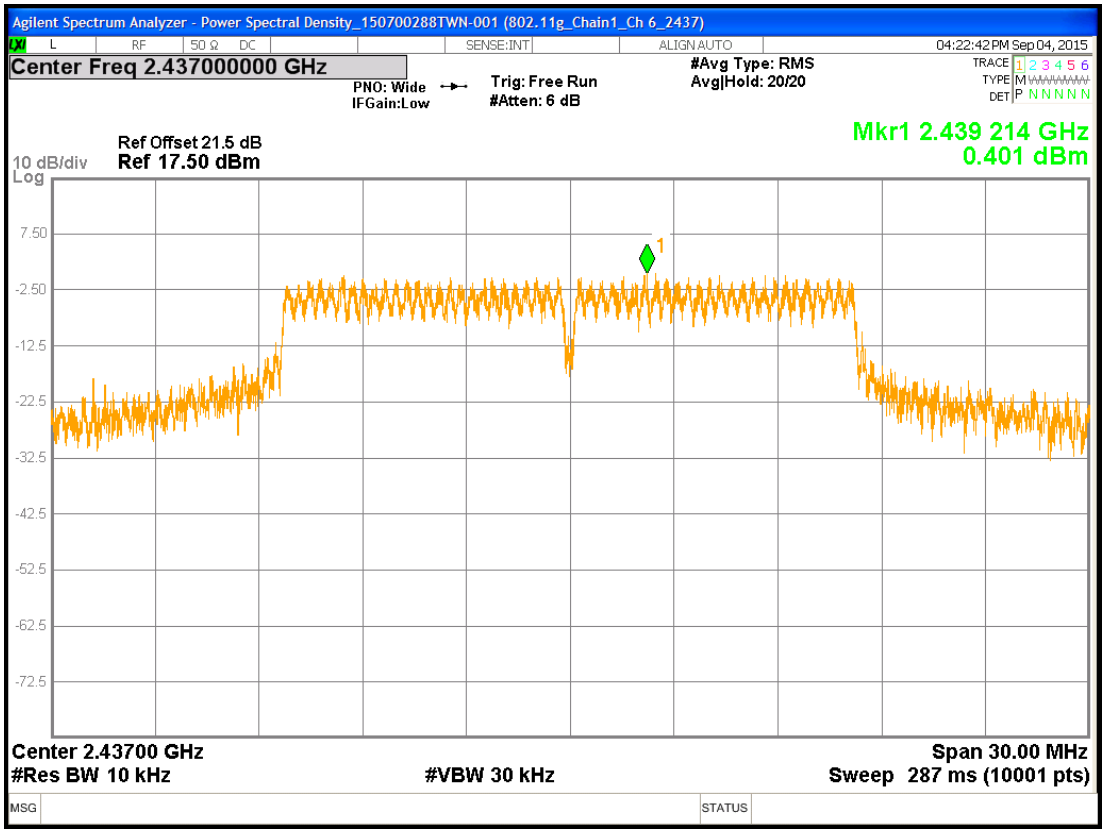
Chain0 : Power Spectral Density @ 802.11g mode Ch11



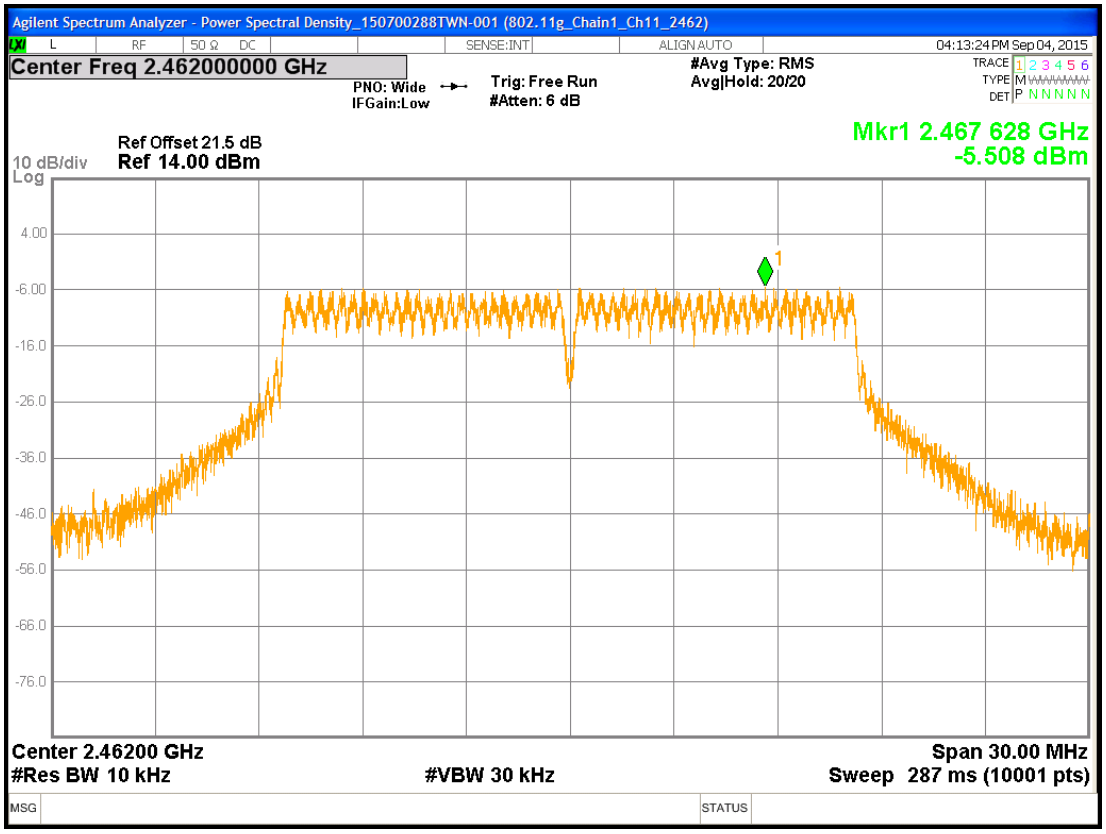
Chain1 : Power Spectral Density @ 802.11g mode Ch 1



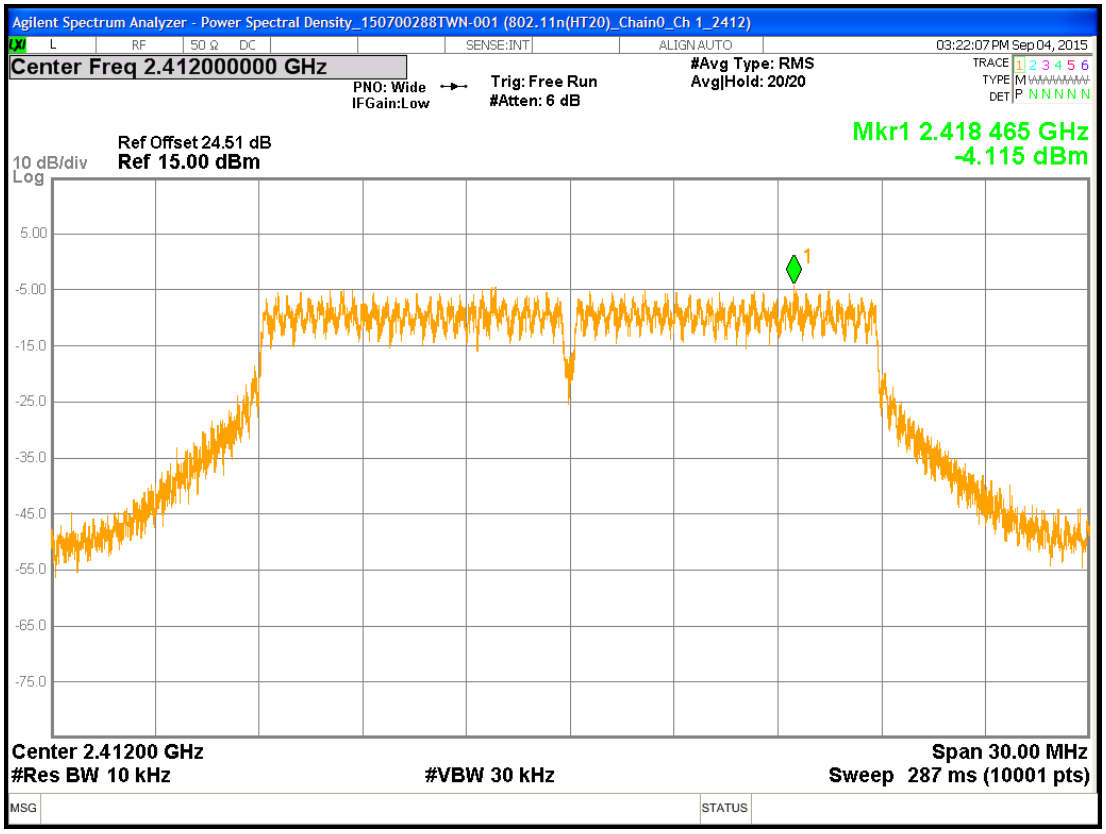
Chain1 : Power Spectral Density @ 802.11g mode Ch 6



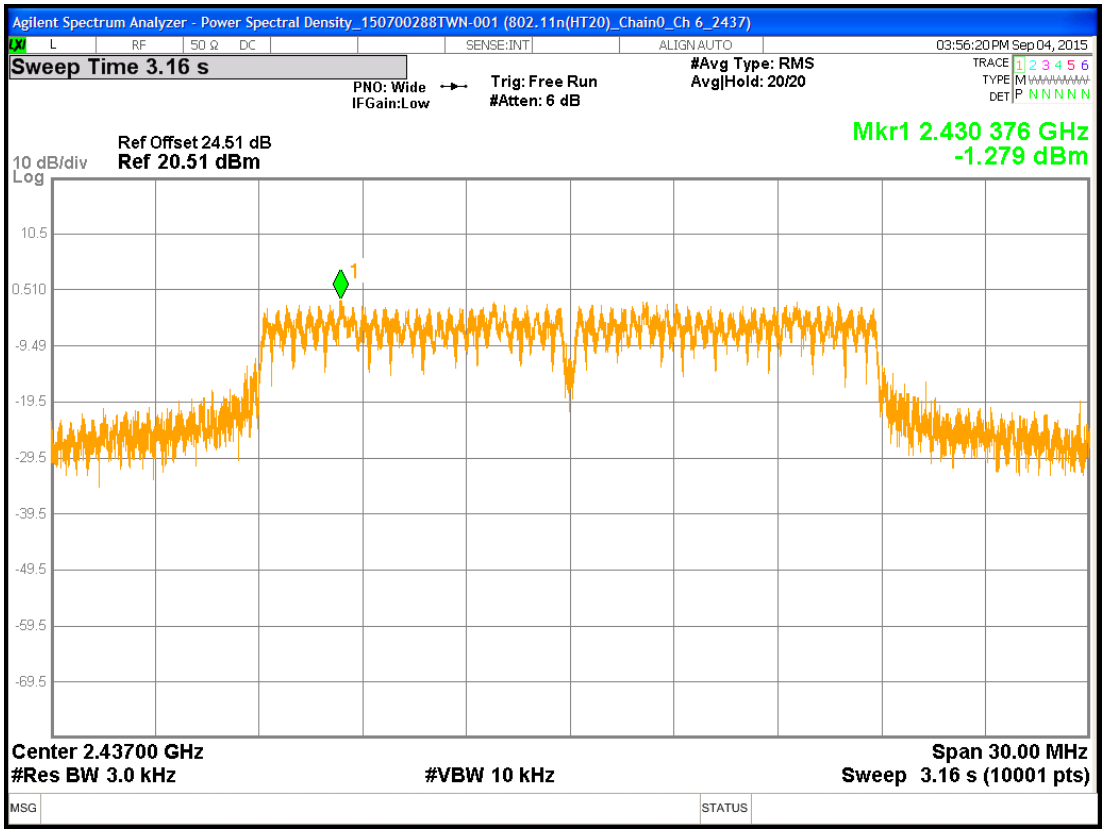
Chain1 : Power Spectral Density @ 802.11g mode Ch11



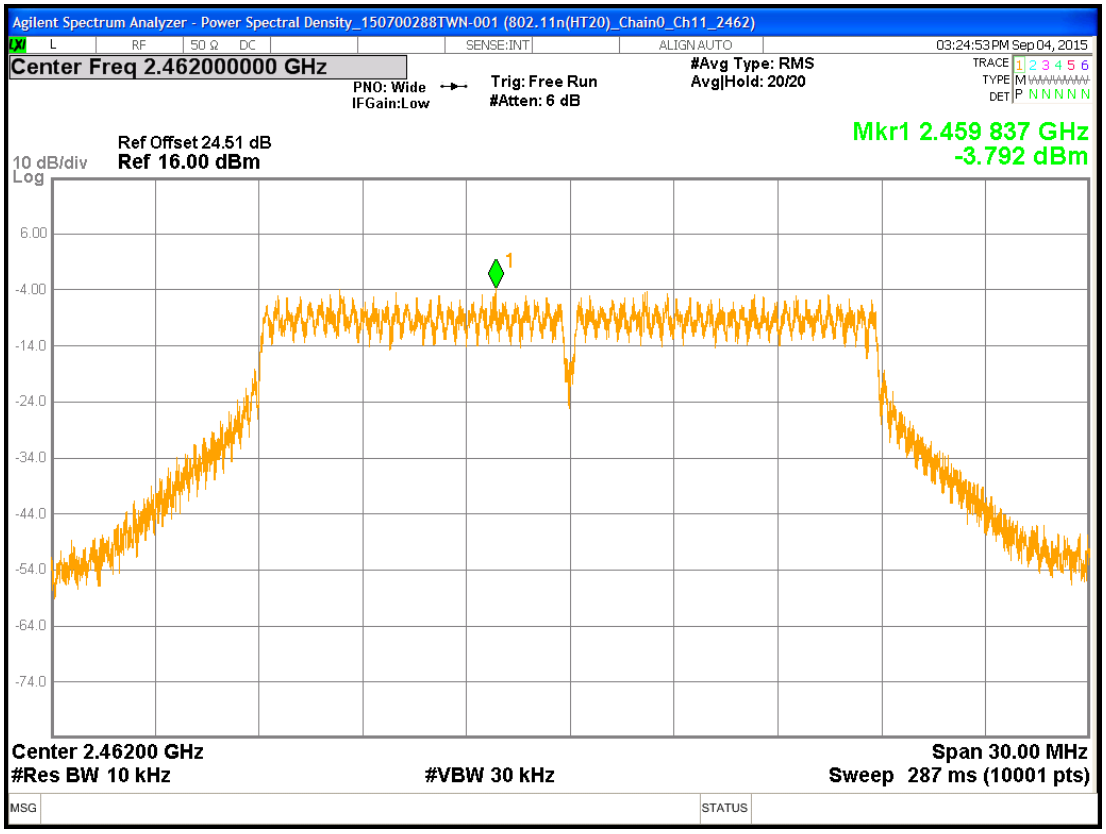
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch 1



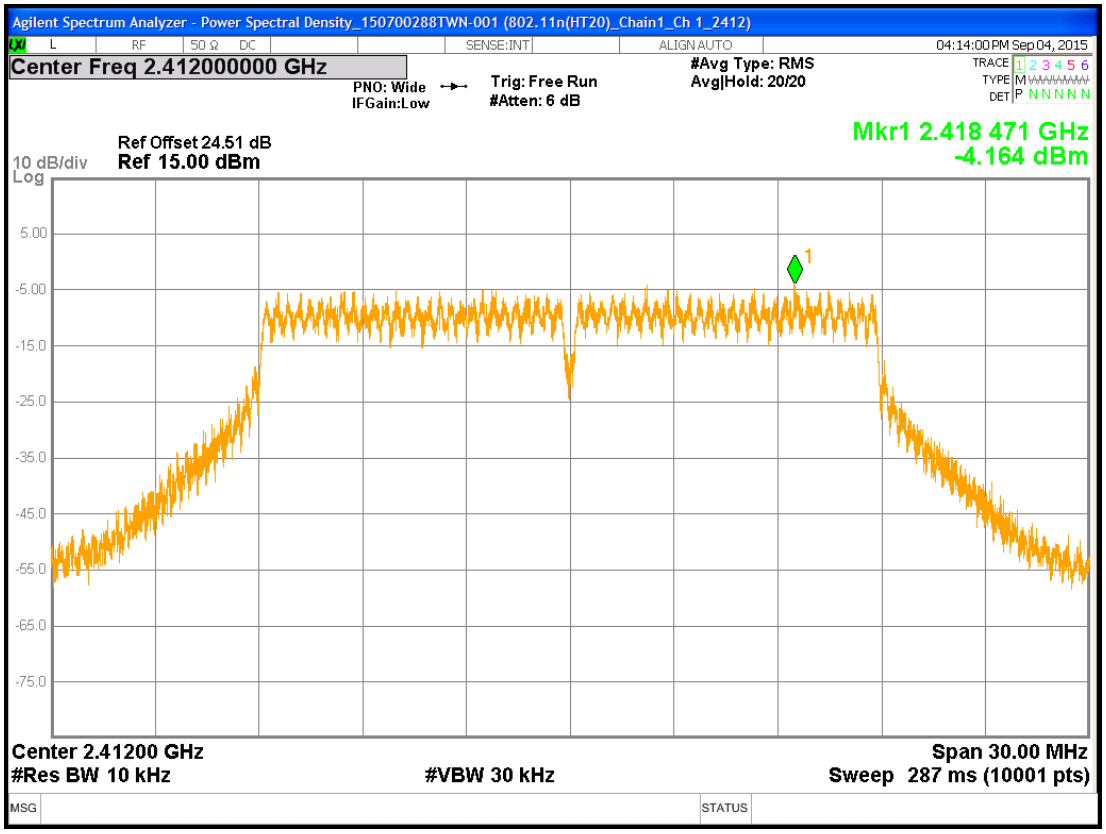
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch 6



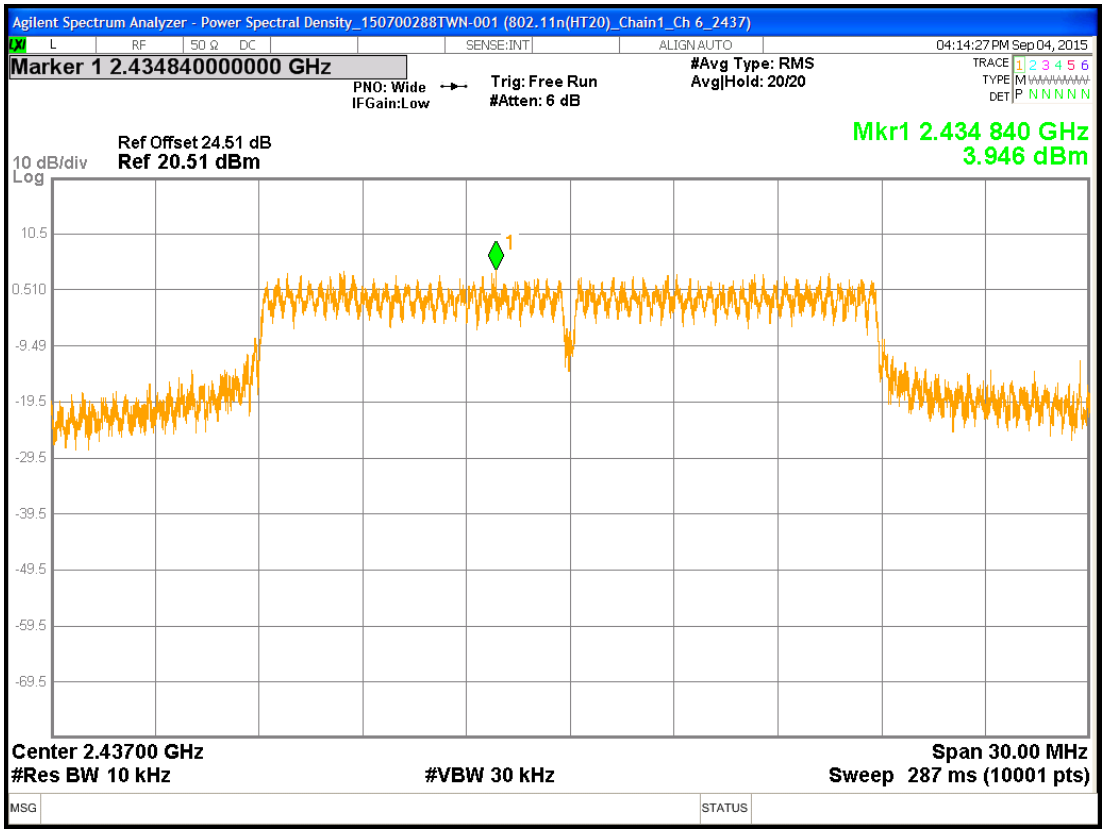
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch11



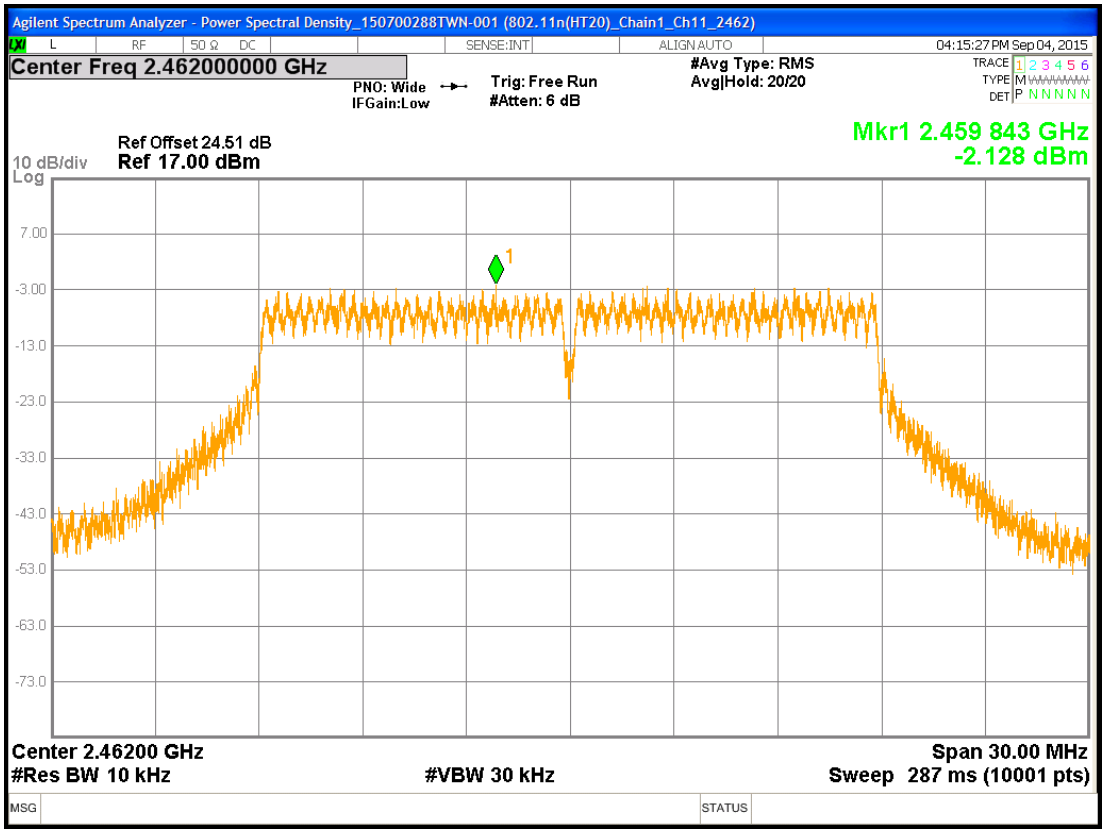
Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch 1



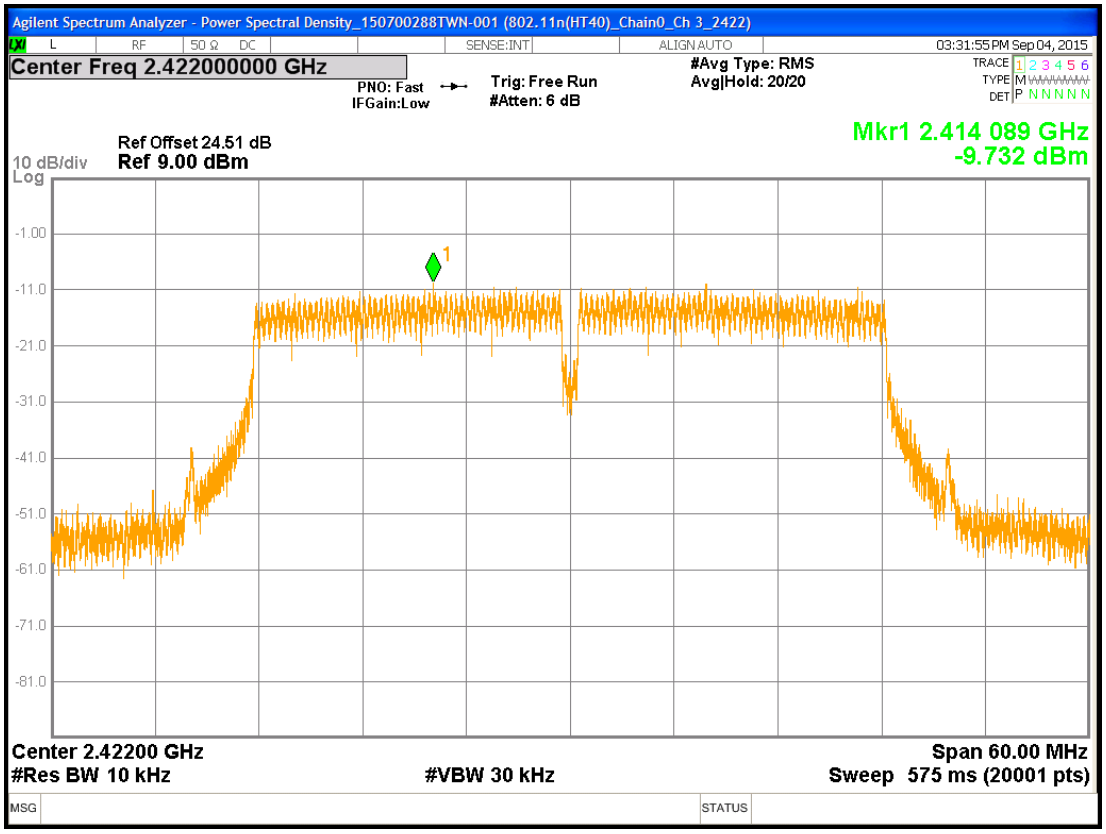
Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch 6



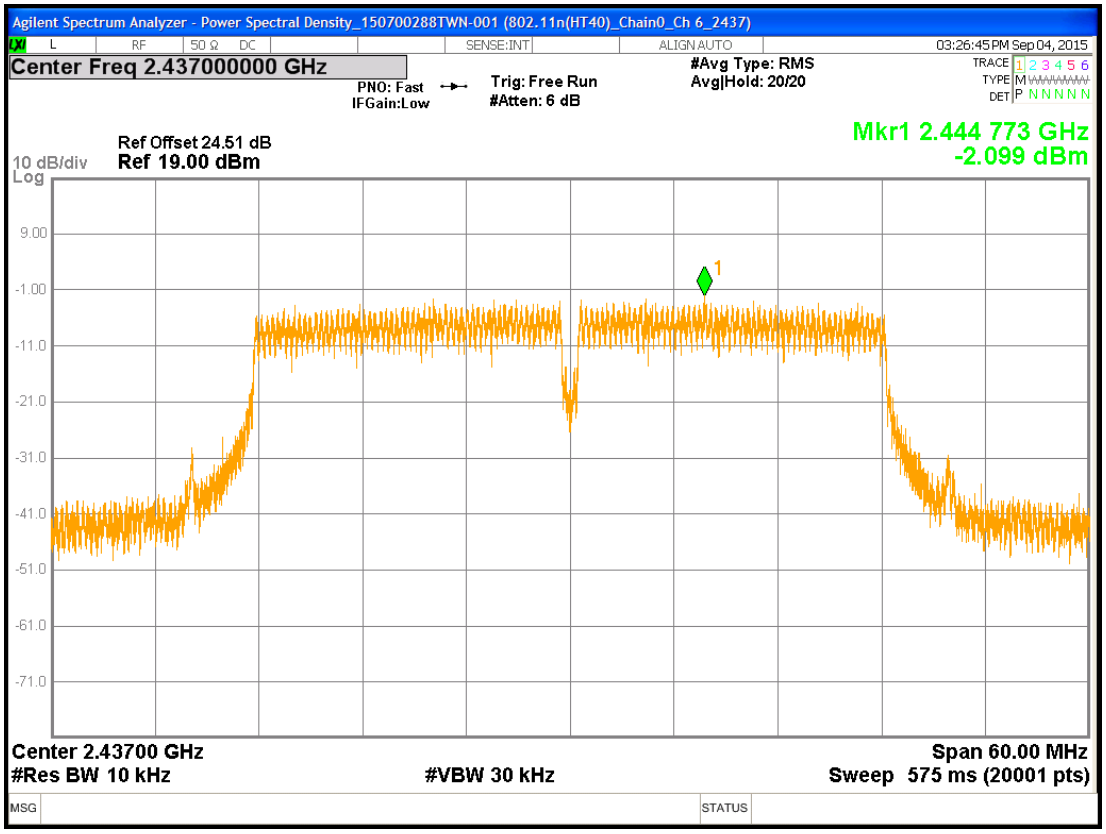
Chain1 : Power Spectral Density @ 802.11n(HT20) mode Ch11



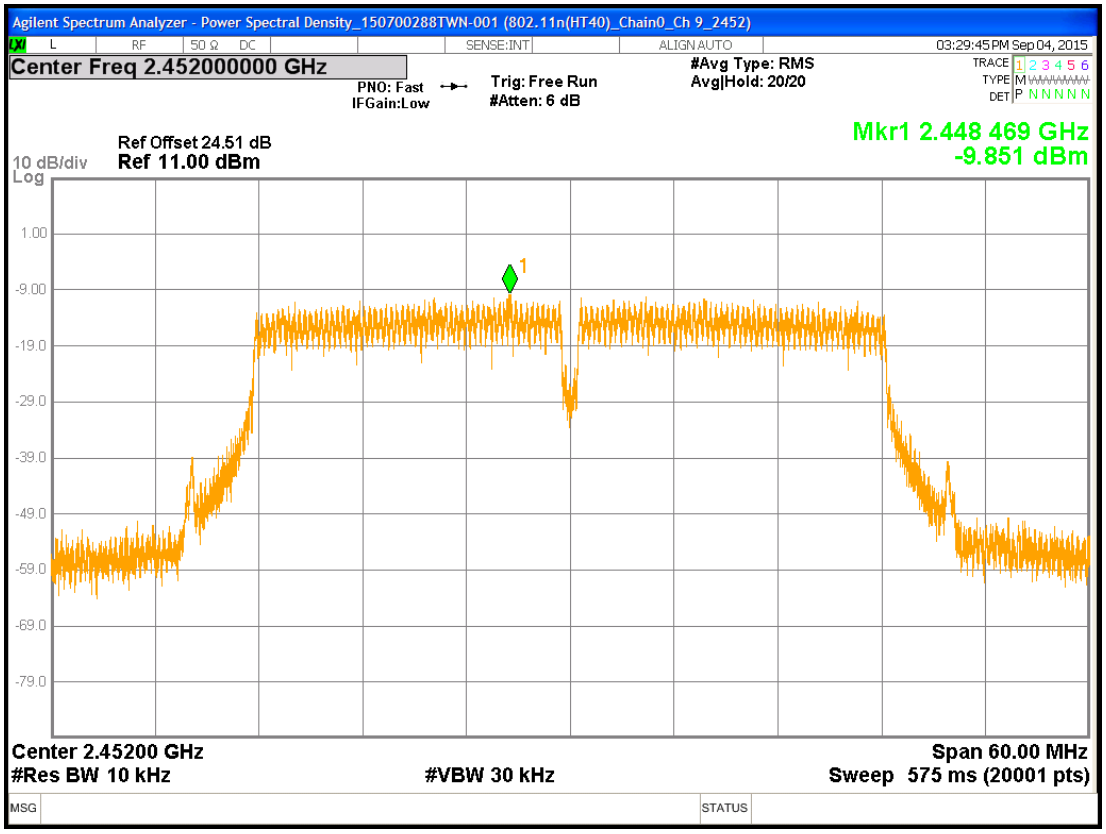
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 3



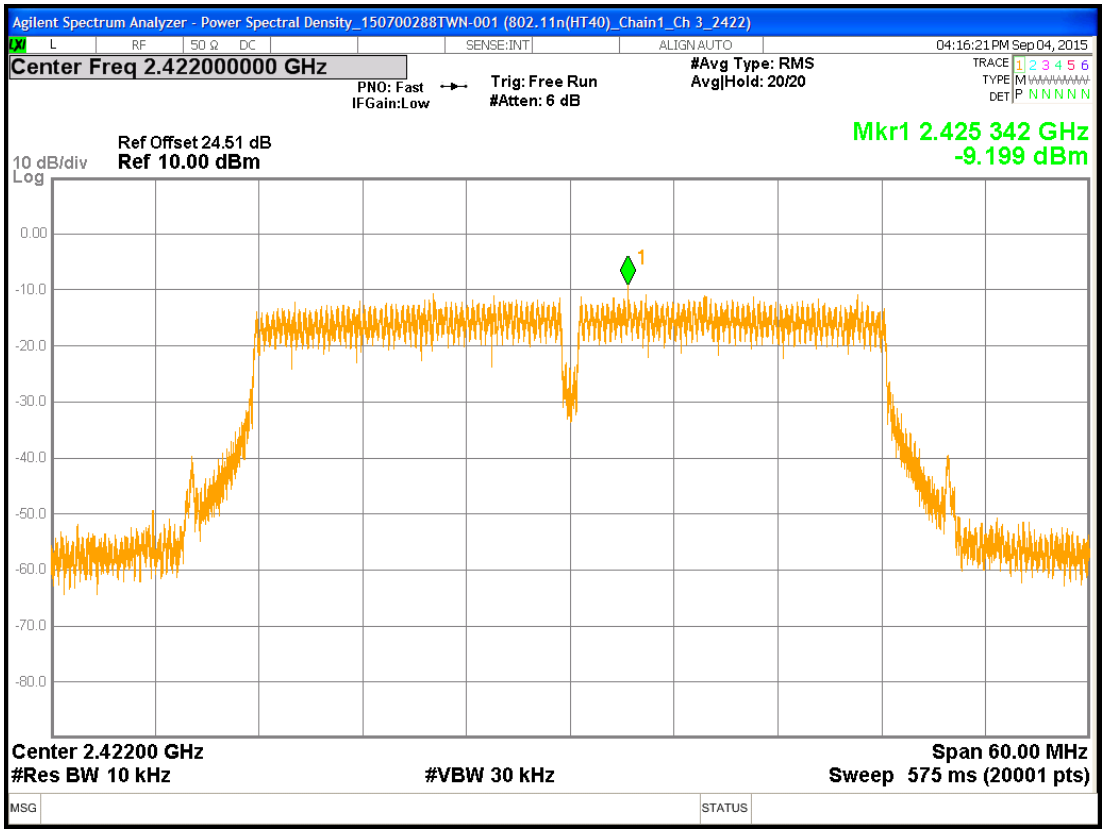
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 6



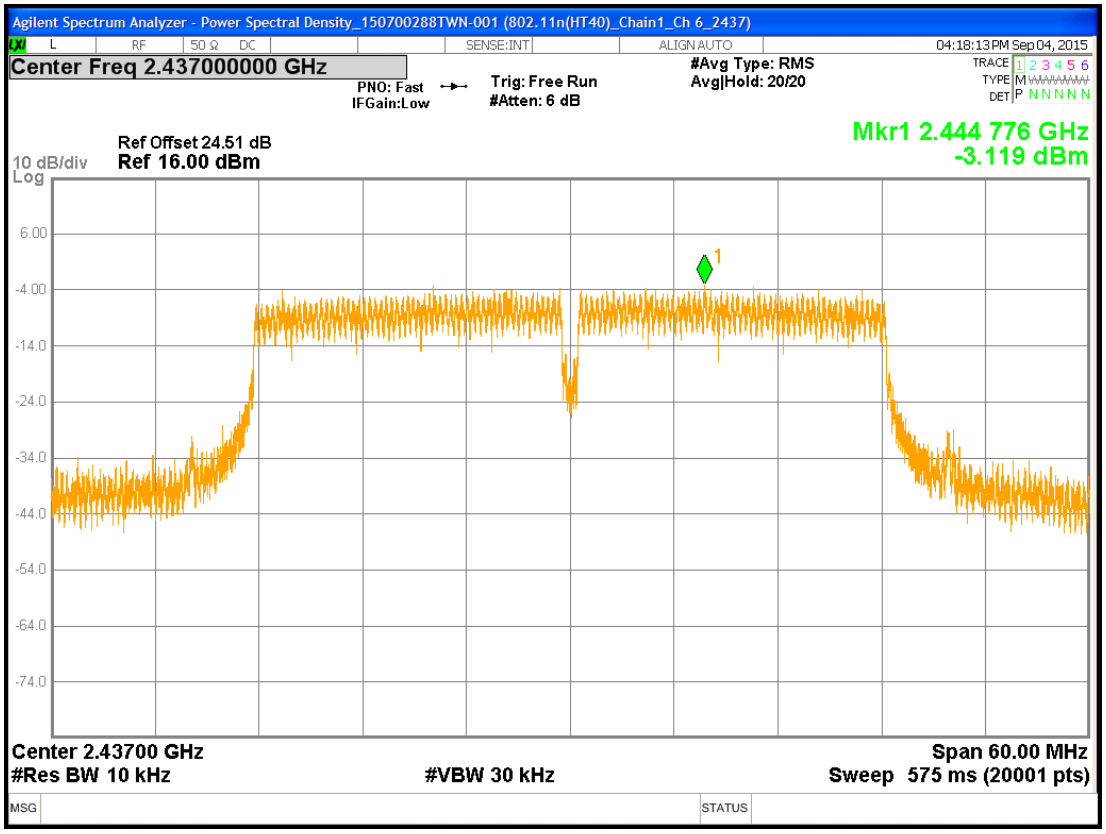
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch 9



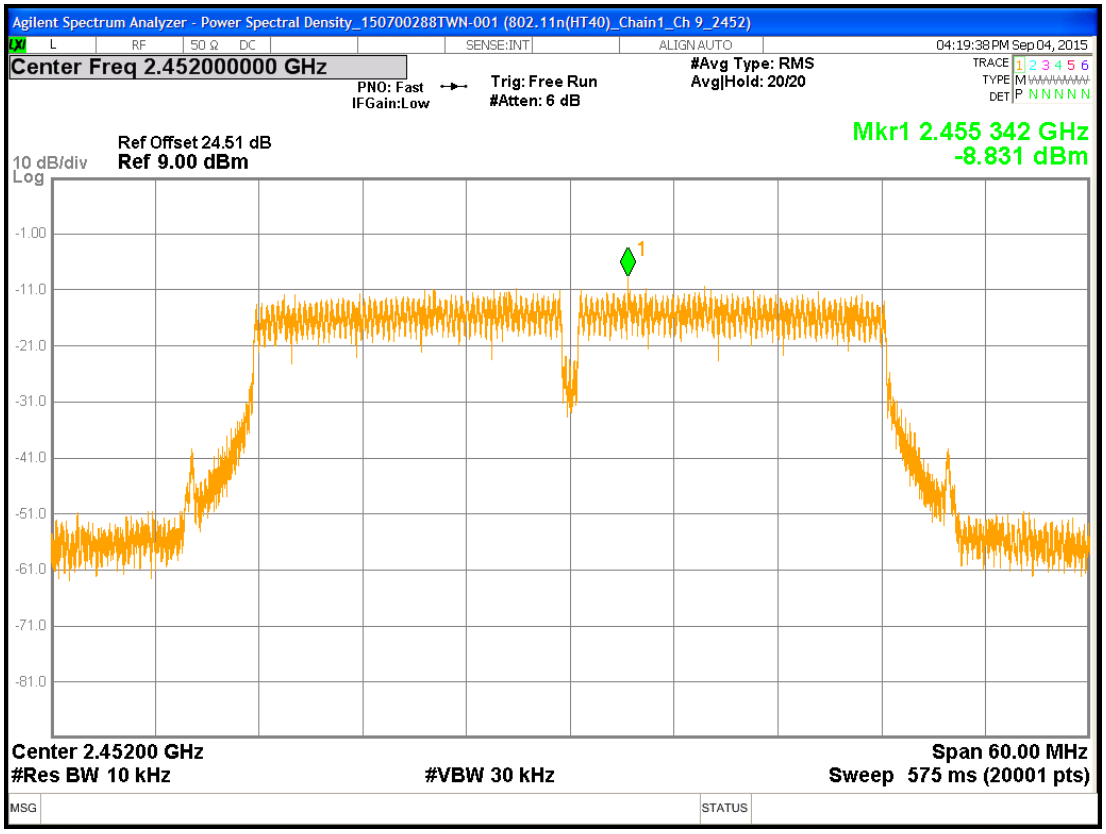
Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 3



Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 6



Chain1 : Power Spectral Density @ 802.11n(HT40) mode Ch 9



6. Emissions In Non-Restricted Frequency Bands

6.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement	15.247(d)	
Channel number	1、6、11	

6.2 Limit for emissions in non-restricted frequency bands

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

6.3 Measuring instruments setting

Reference level measurement

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	≧100 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Max hold
Span	≧1.5 time 6dB bandwidth
Attenuation	Auto

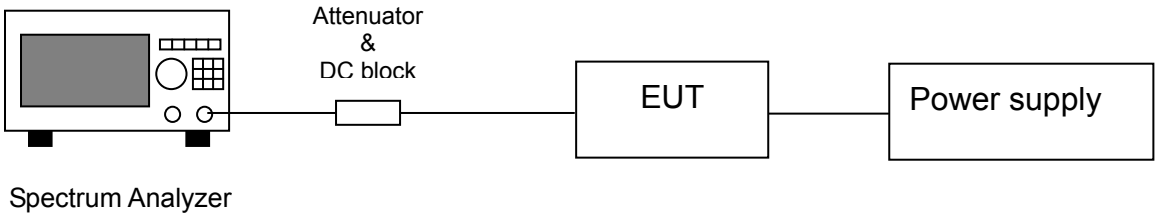
Emission level measurement

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	≧100 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Max hold
Attenuation	Auto

6.4 Test procedure

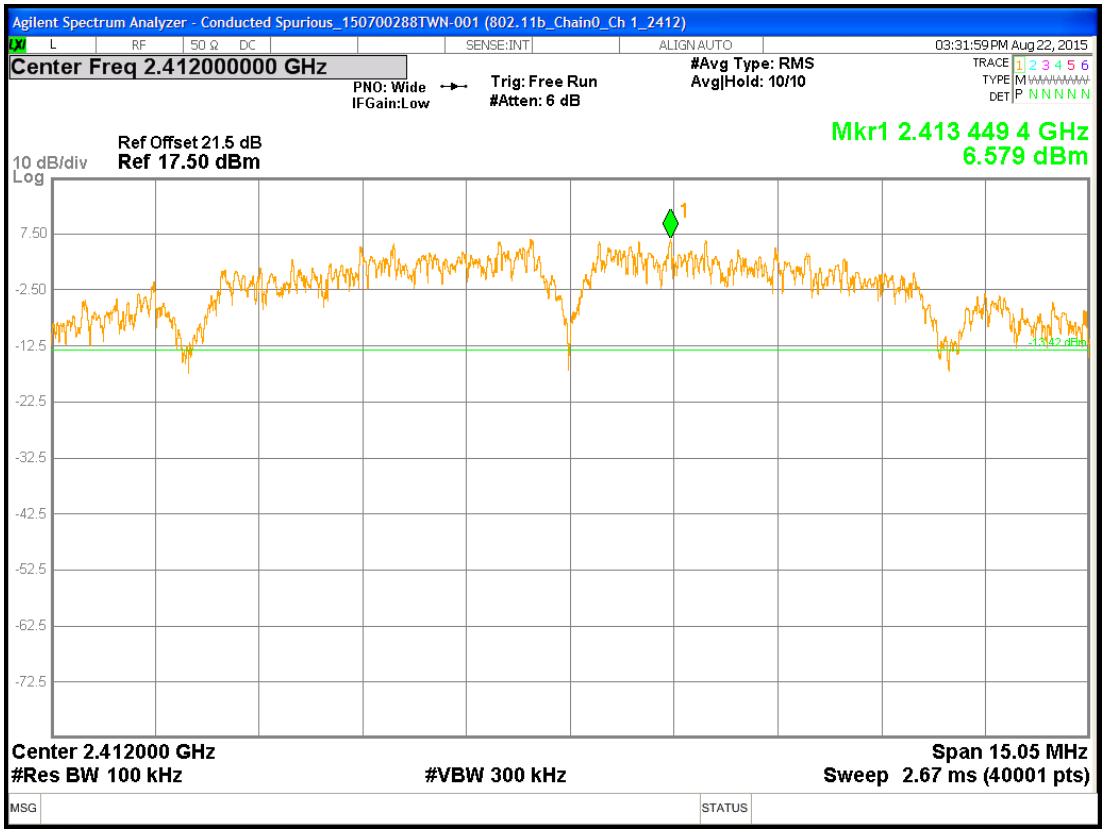
1. The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
2. Set instrument center frequency to center frequency
3. Use the parameter configured in clause 6.3 to measure
4. Use the peak marker function to determine the maximum amplitude level.

6.5 Test diagram

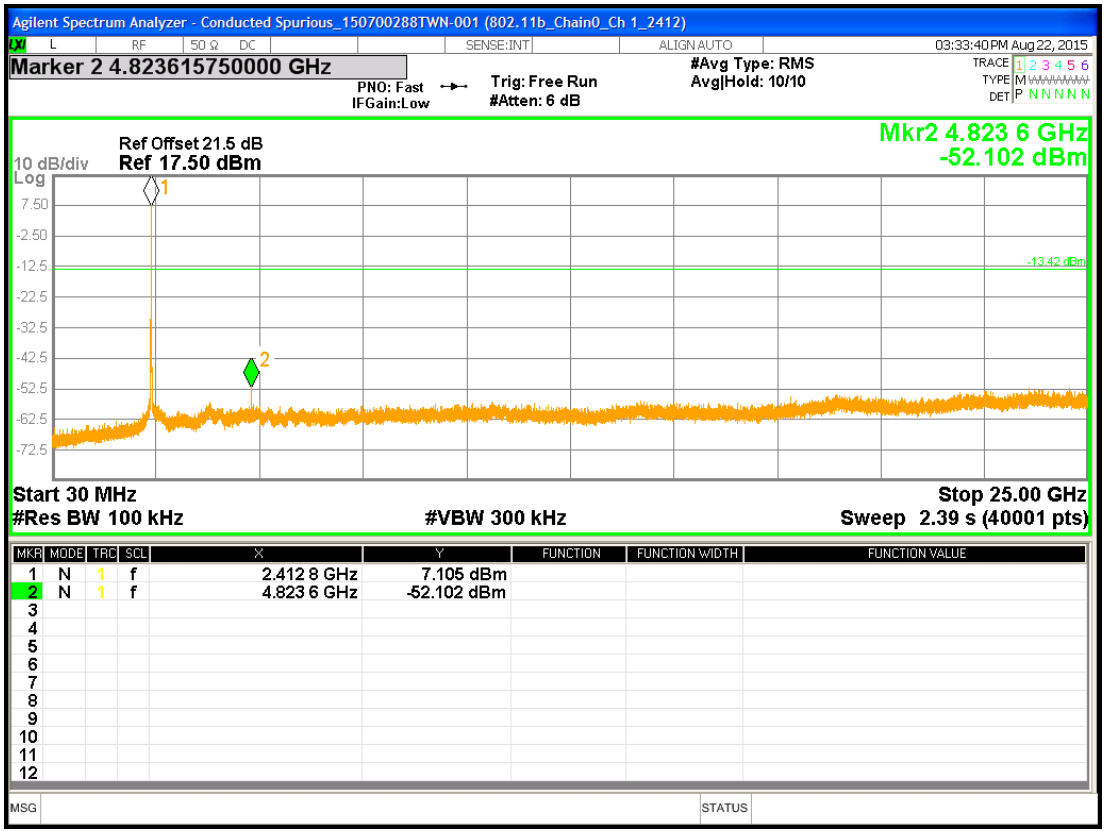


6.6 Test results

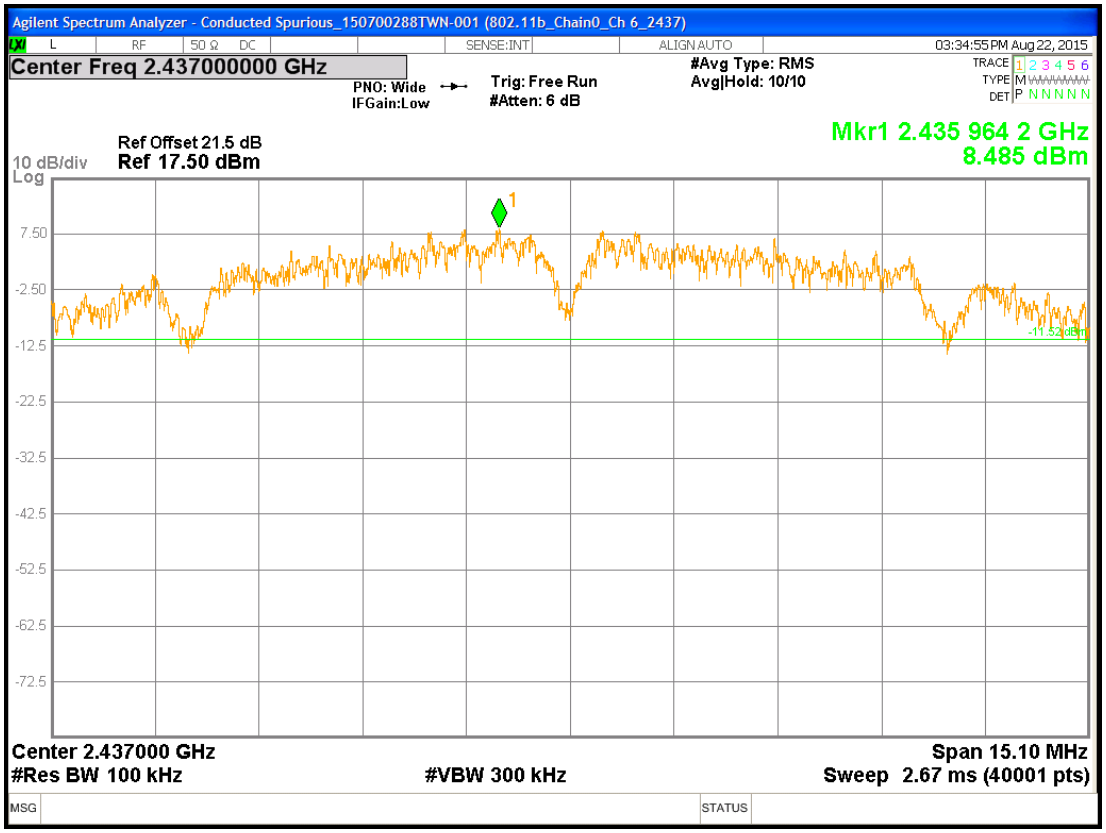
Chain0 : Conducted Spurious @ 802.11b mode Ch 1



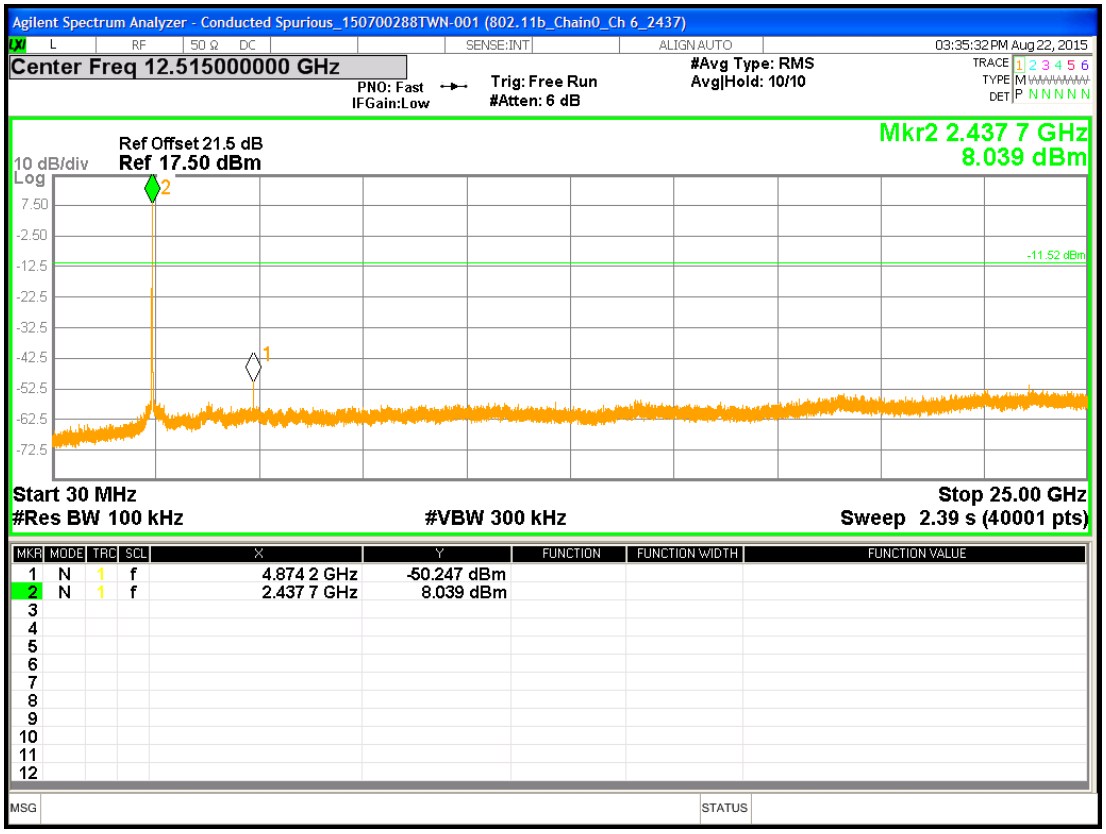
Chain0 : Conducted Spurious @ 802.11b mode Ch 1



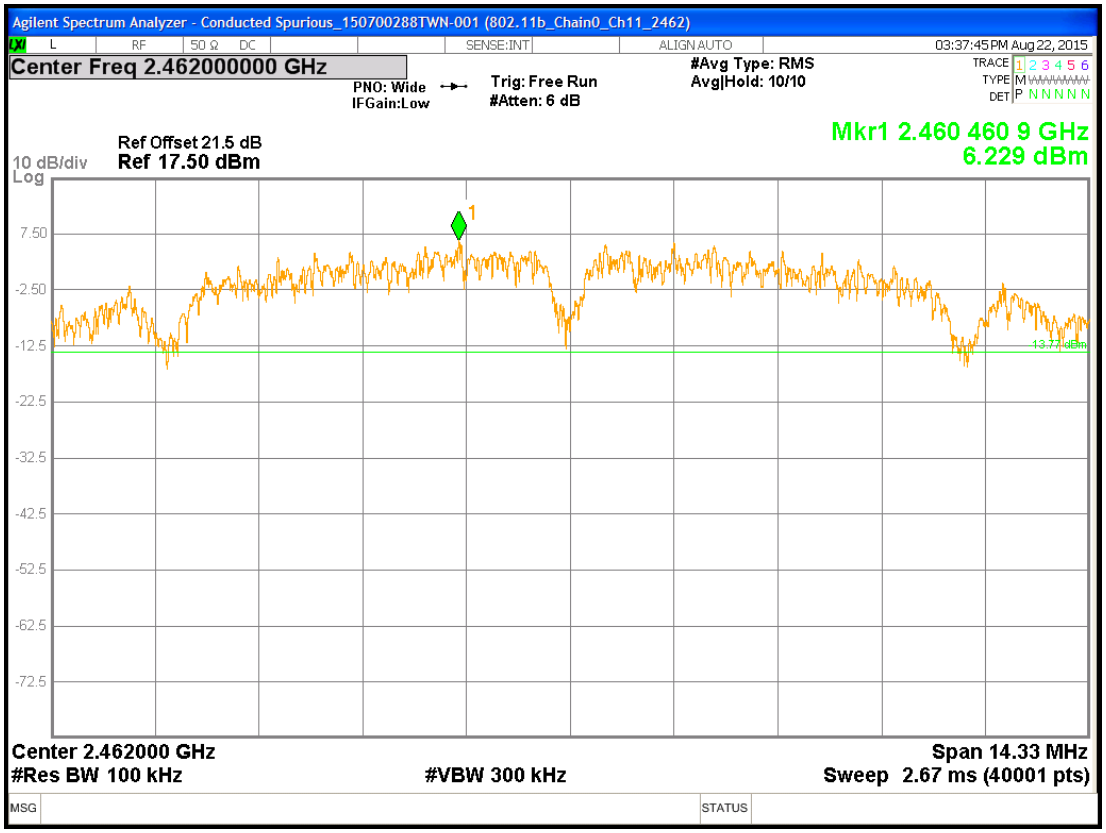
Chain0 : Conducted Spurious @ 802.11b mode Ch 6



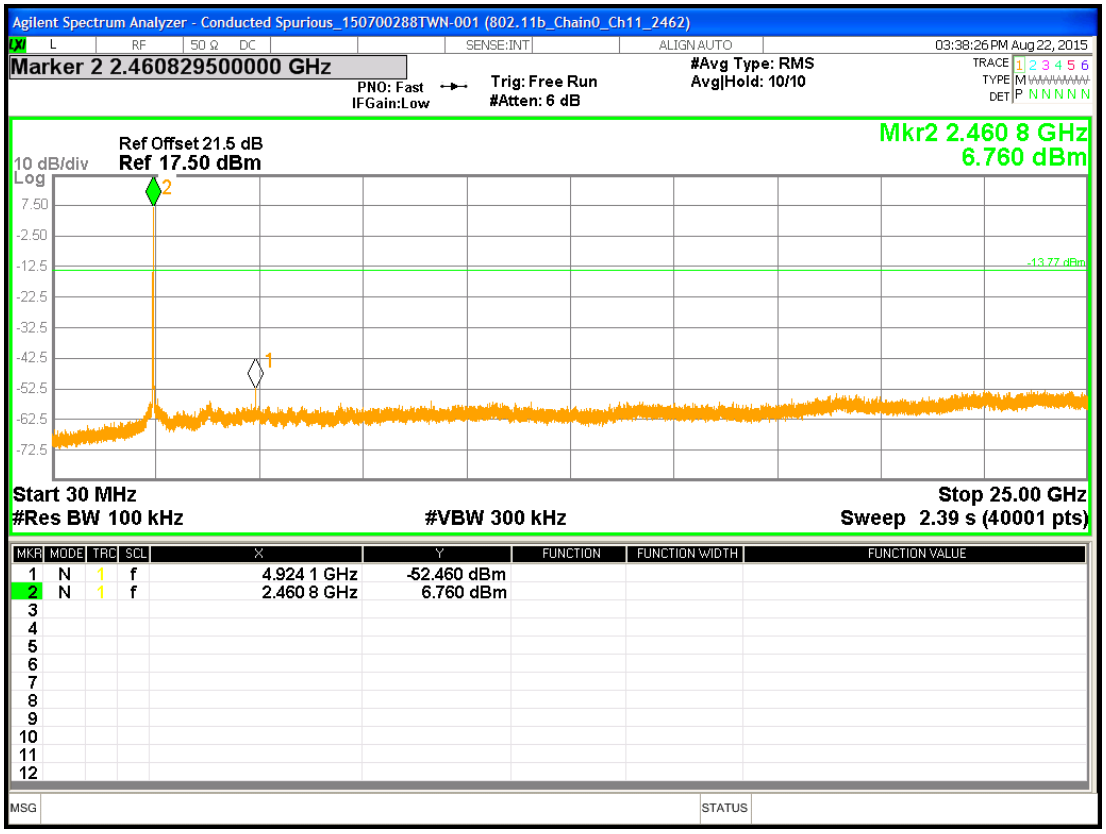
Chain0 : Conducted Spurious @ 802.11b mode Ch 6



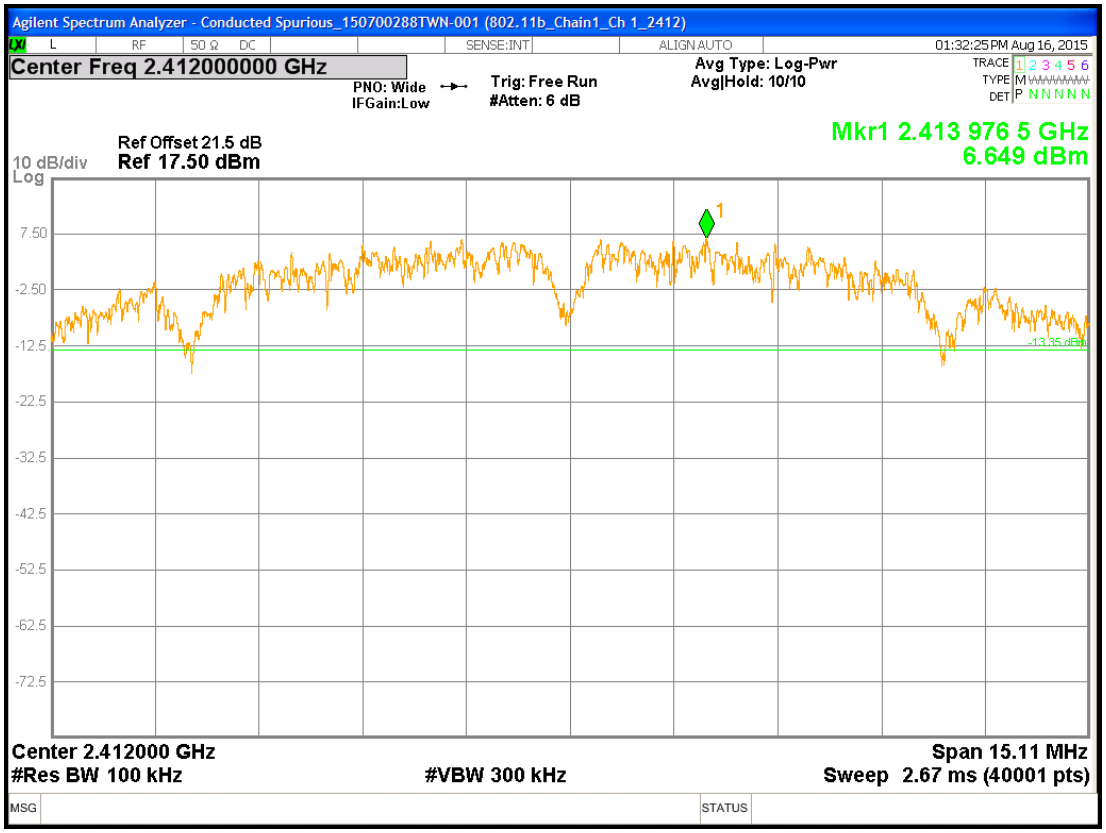
Chain0 : Conducted Spurious @ 802.11b mode Ch11



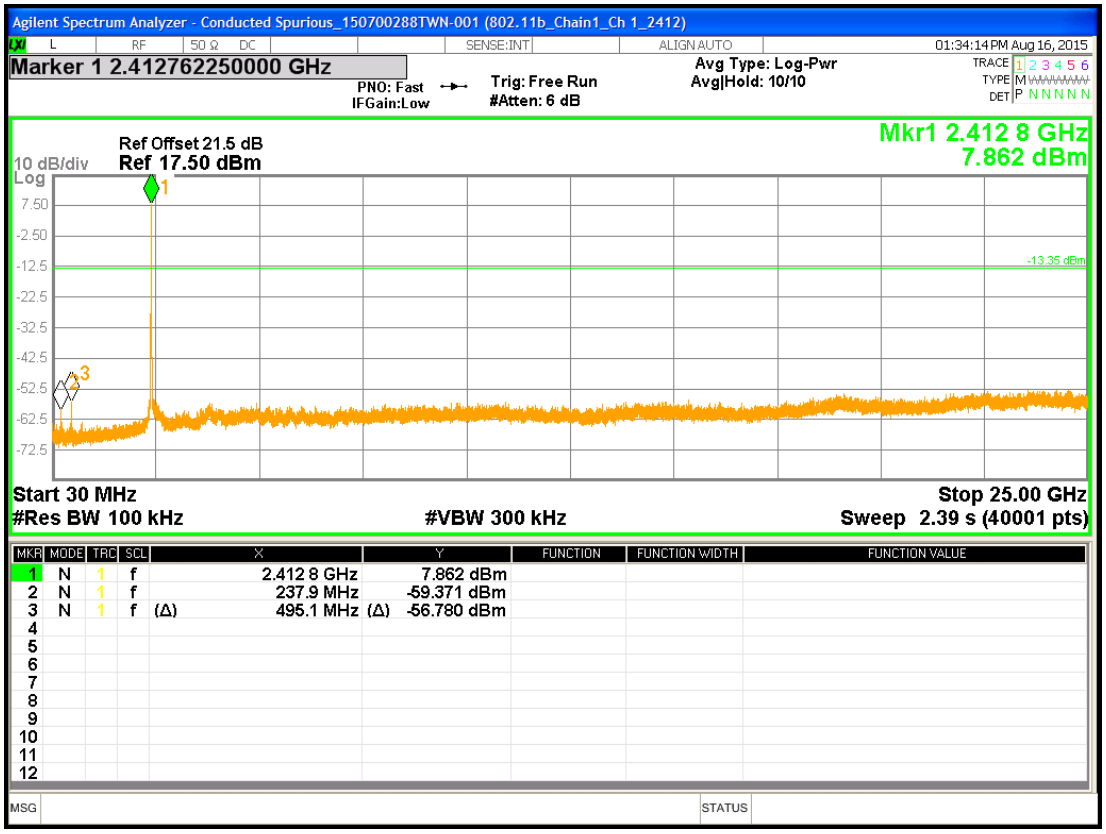
Chain0 : Conducted Spurious @ 802.11b mode Ch11



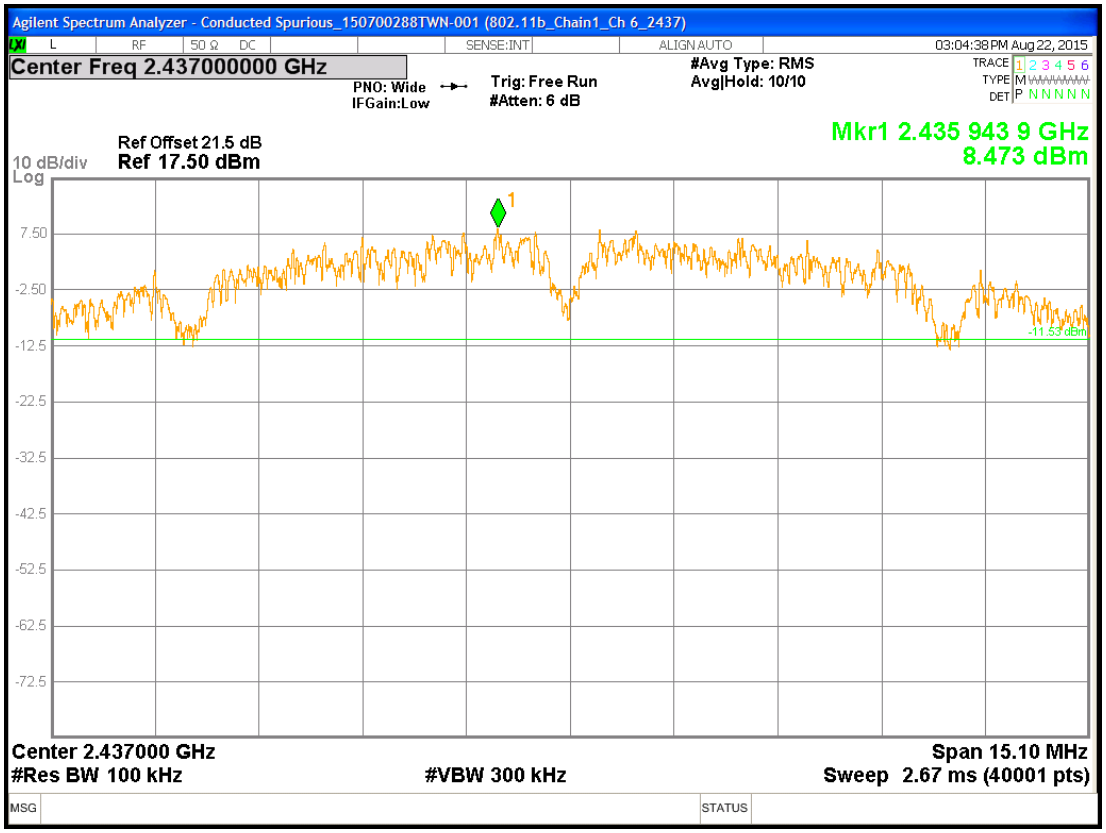
Chain1 : Conducted Spurious @ 802.11b mode Ch 1



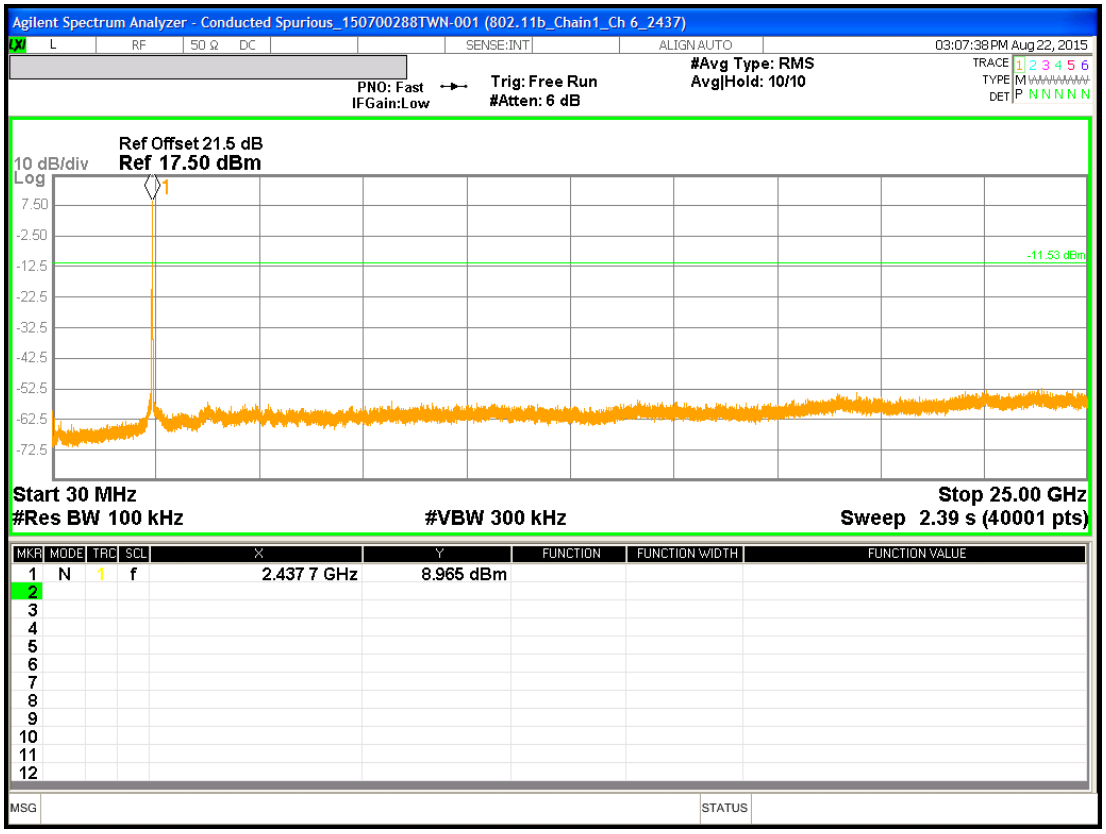
Chain1 : Conducted Spurious @ 802.11b mode Ch 1



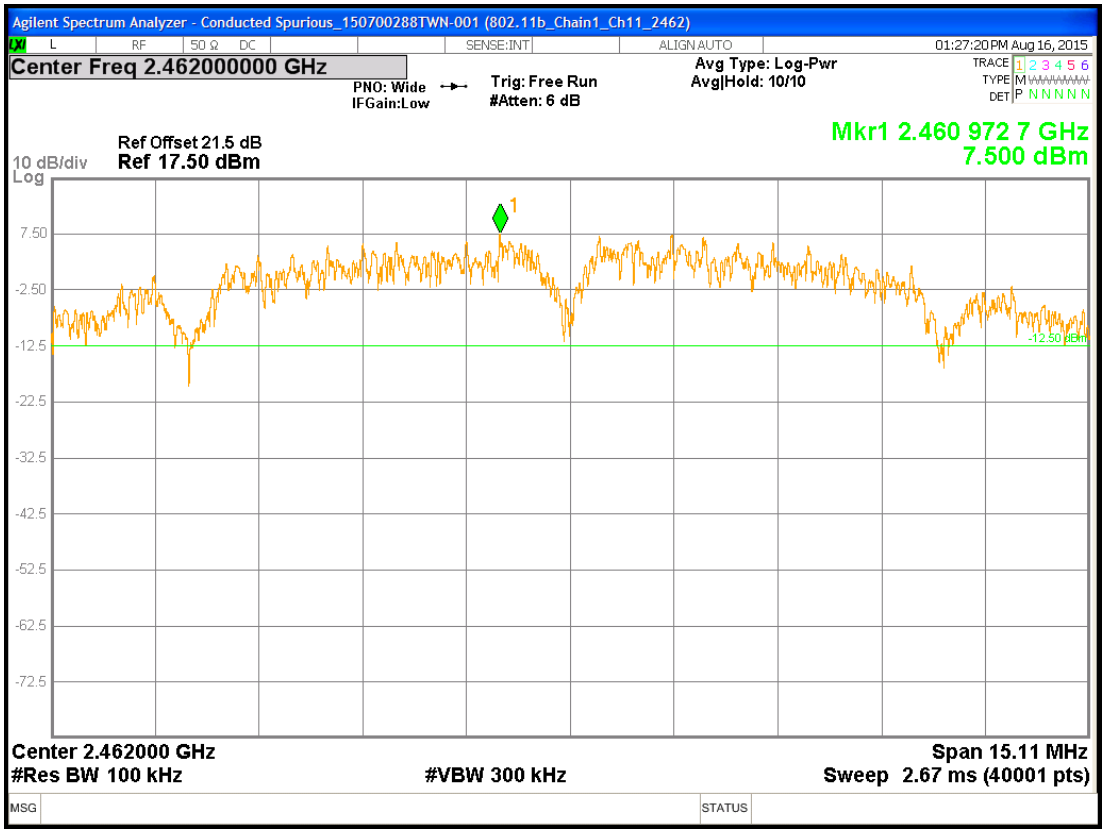
Chain1 : Conducted Spurious @ 802.11b mode Ch 6



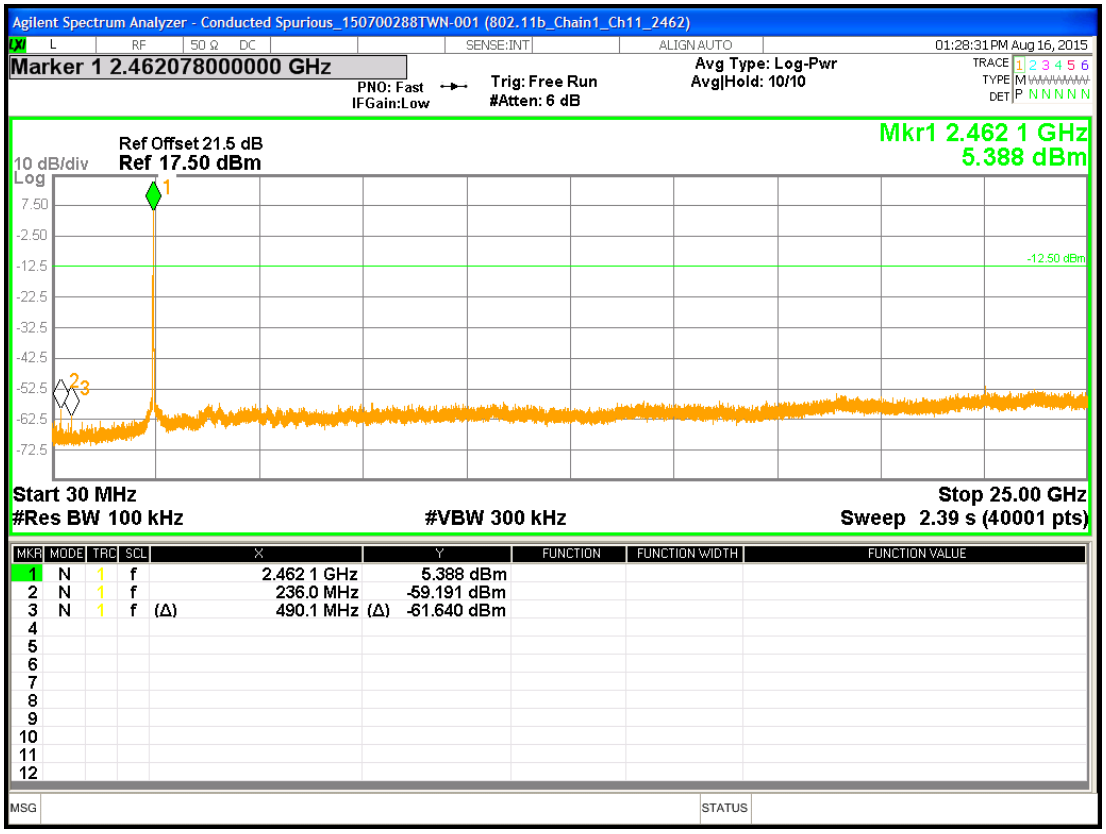
Chain1 : Conducted Spurious @ 802.11b mode Ch 6



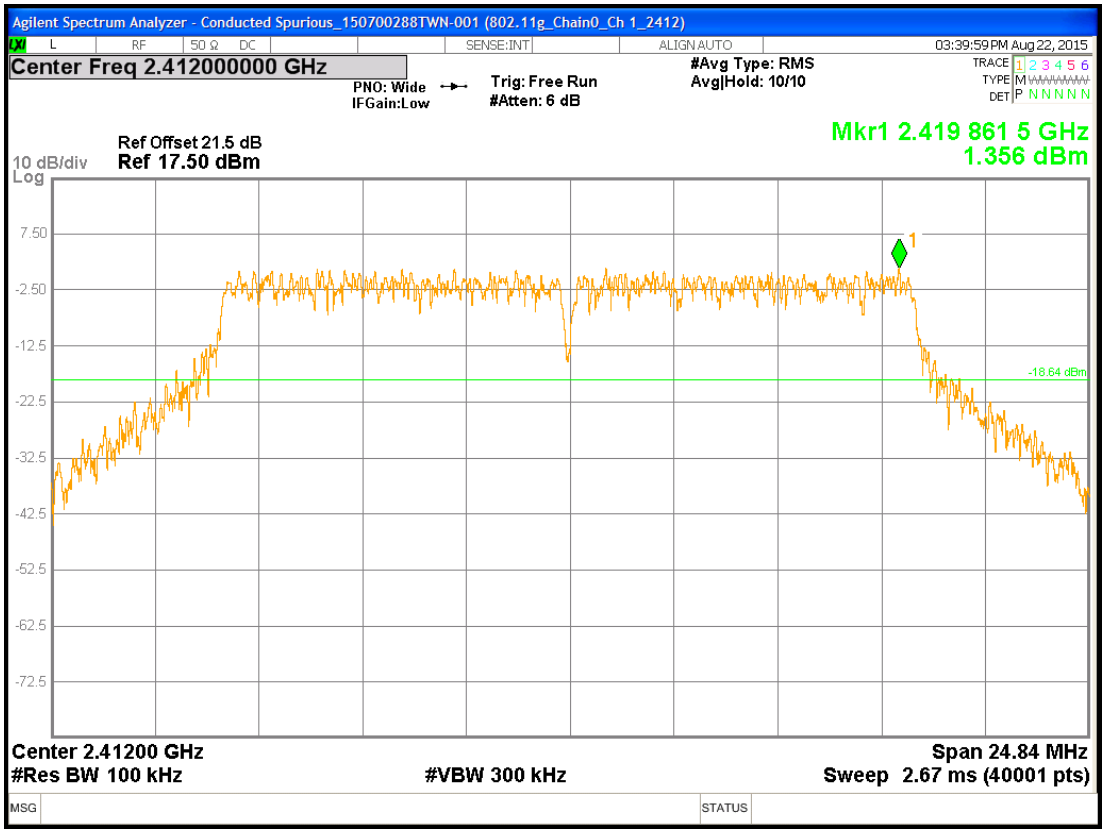
Chain1 : Conducted Spurious @ 802.11b mode Ch11



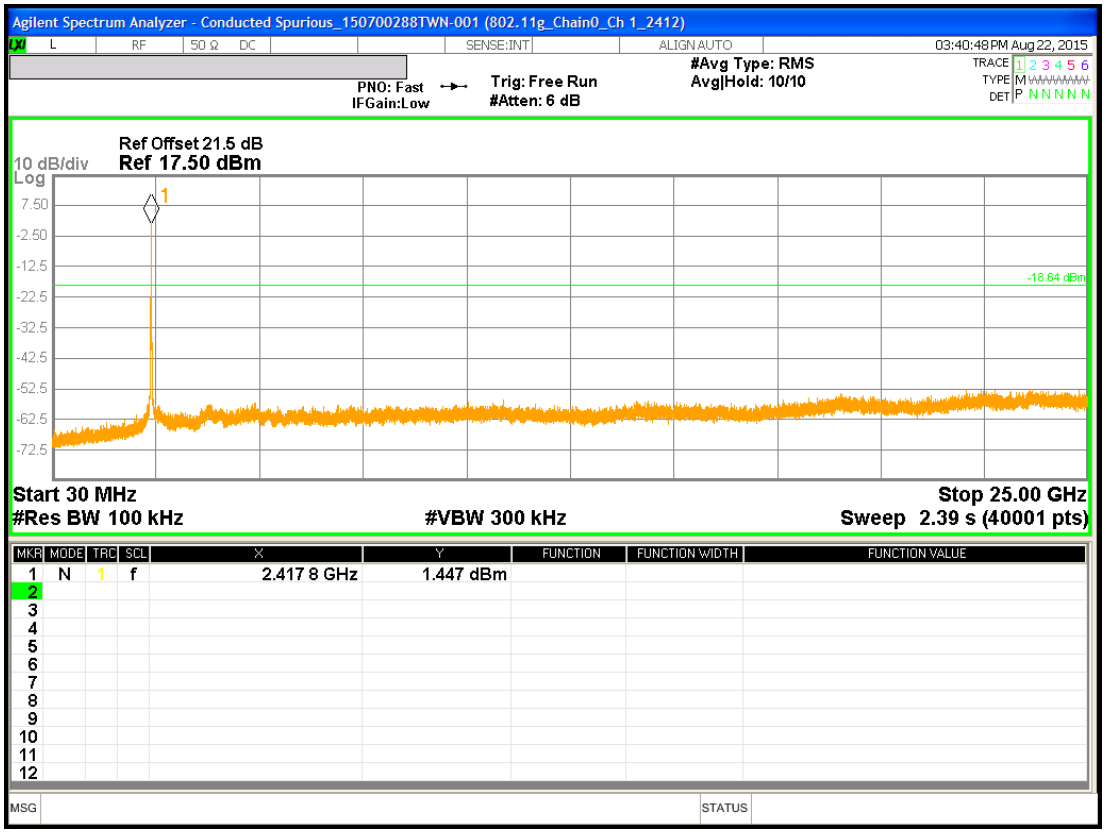
Chain1 : Conducted Spurious @ 802.11b mode Ch11



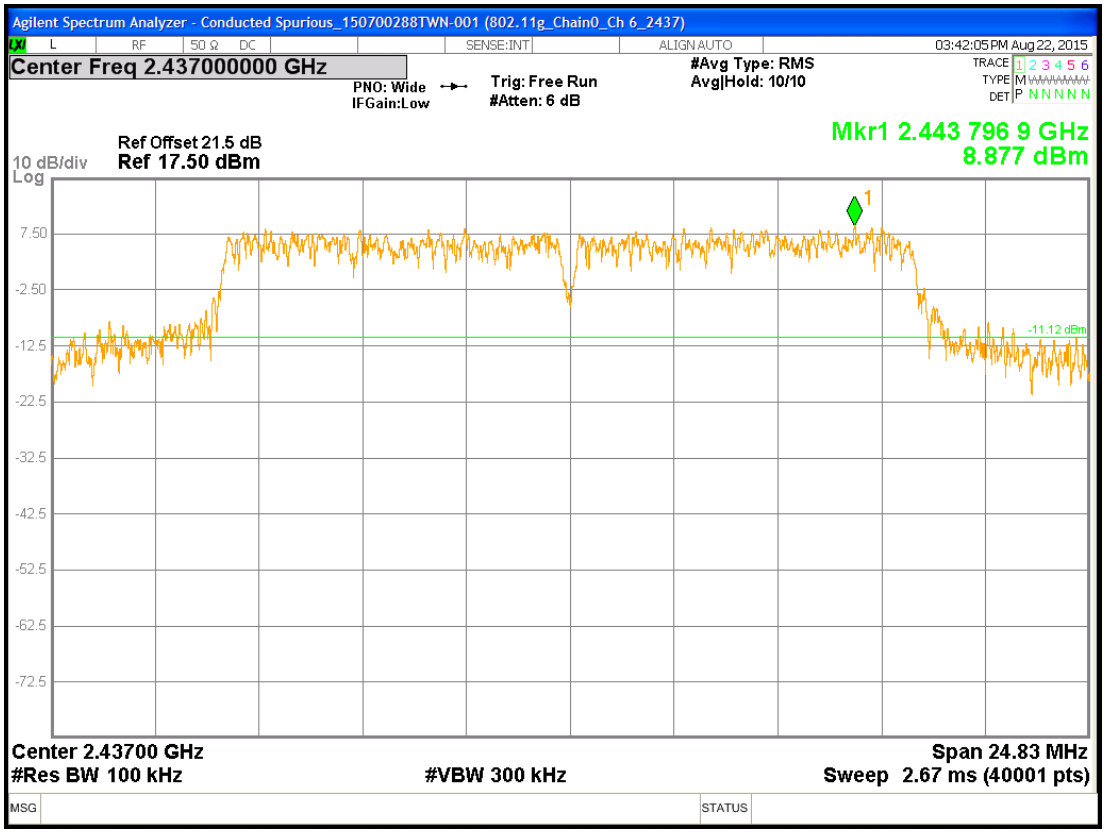
Chain0 : Conducted Spurious @ 802.11g mode Ch 1



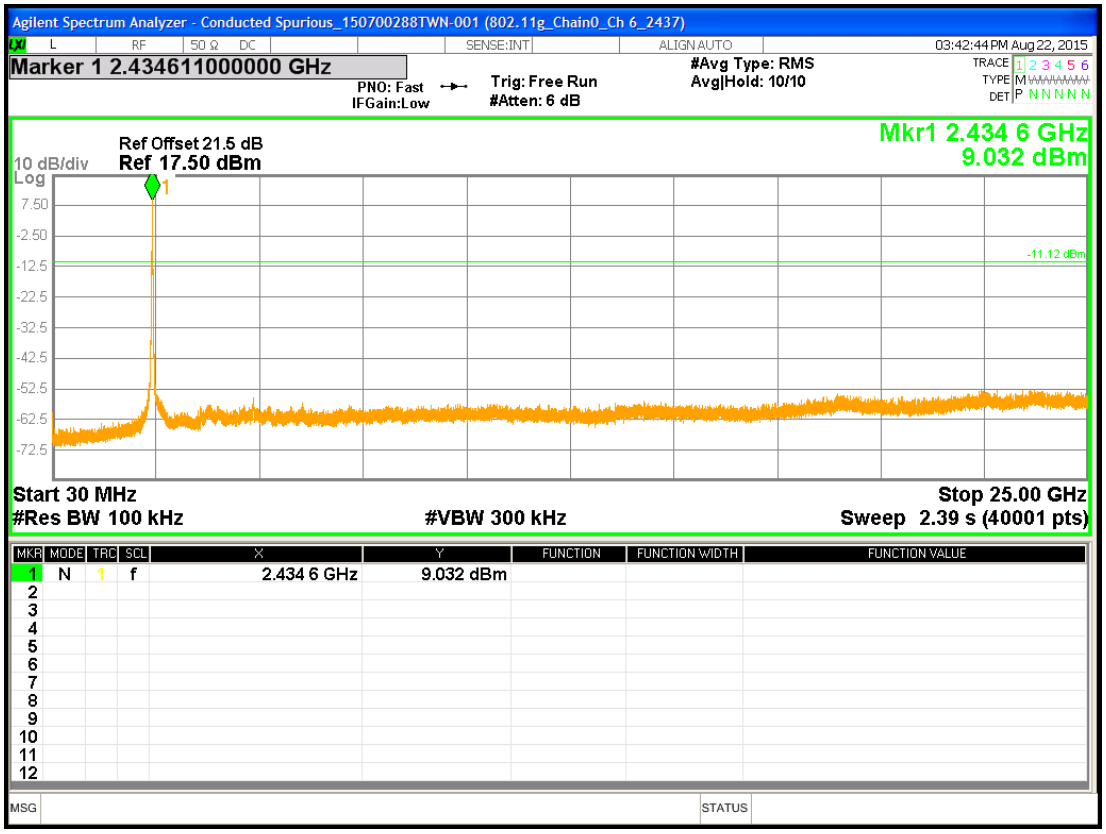
Chain0 : Conducted Spurious @ 802.11g mode Ch 1



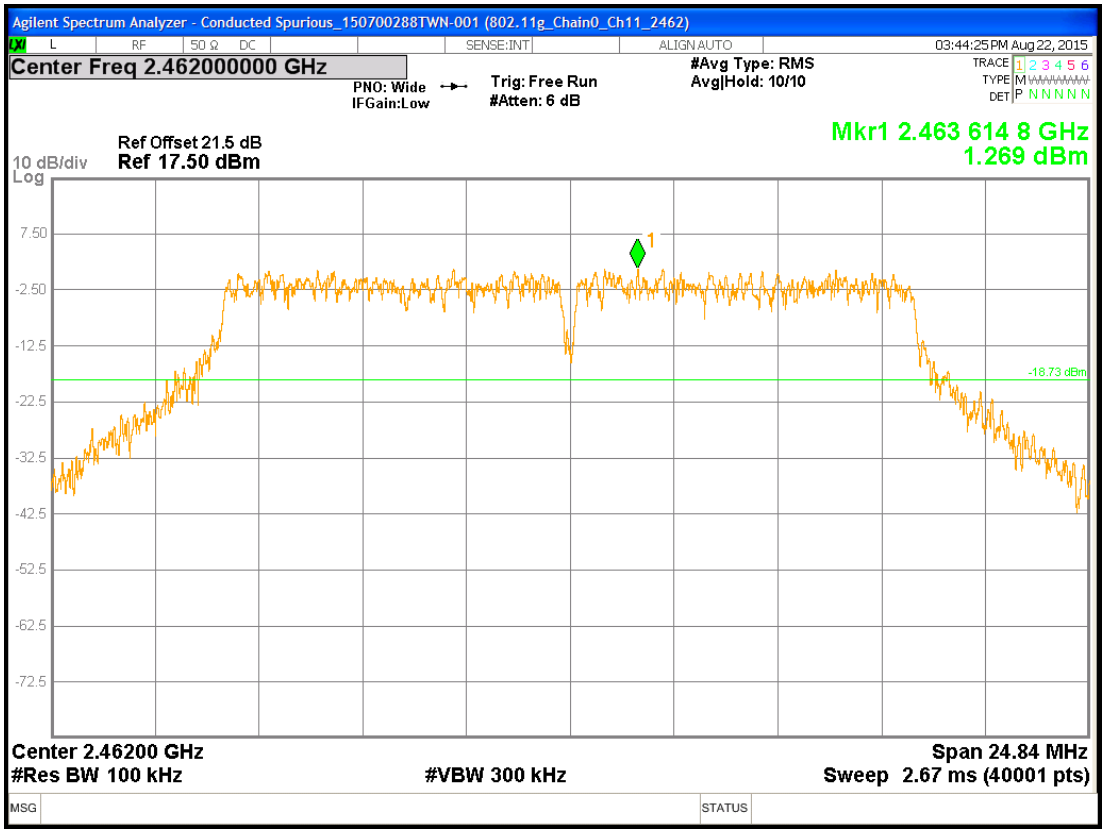
Chain0 : Conducted Spurious @ 802.11g mode Ch 6



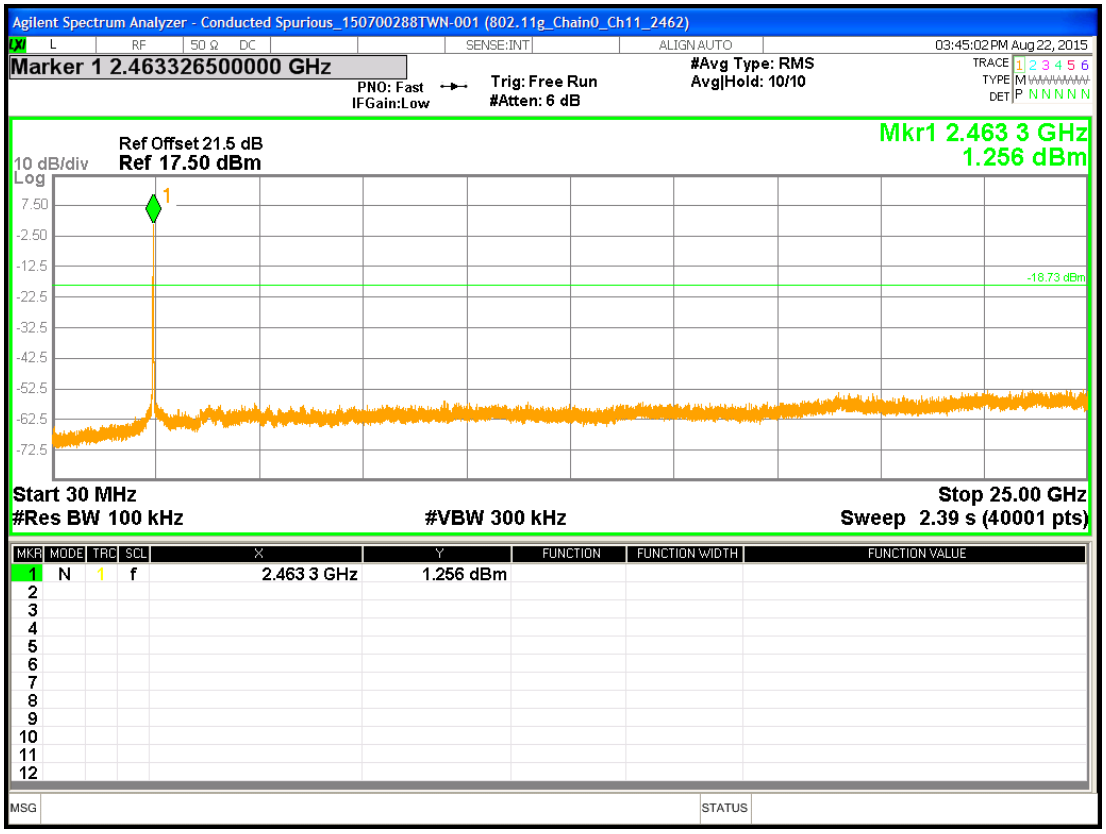
Chain0 : Conducted Spurious @ 802.11g mode Ch 6



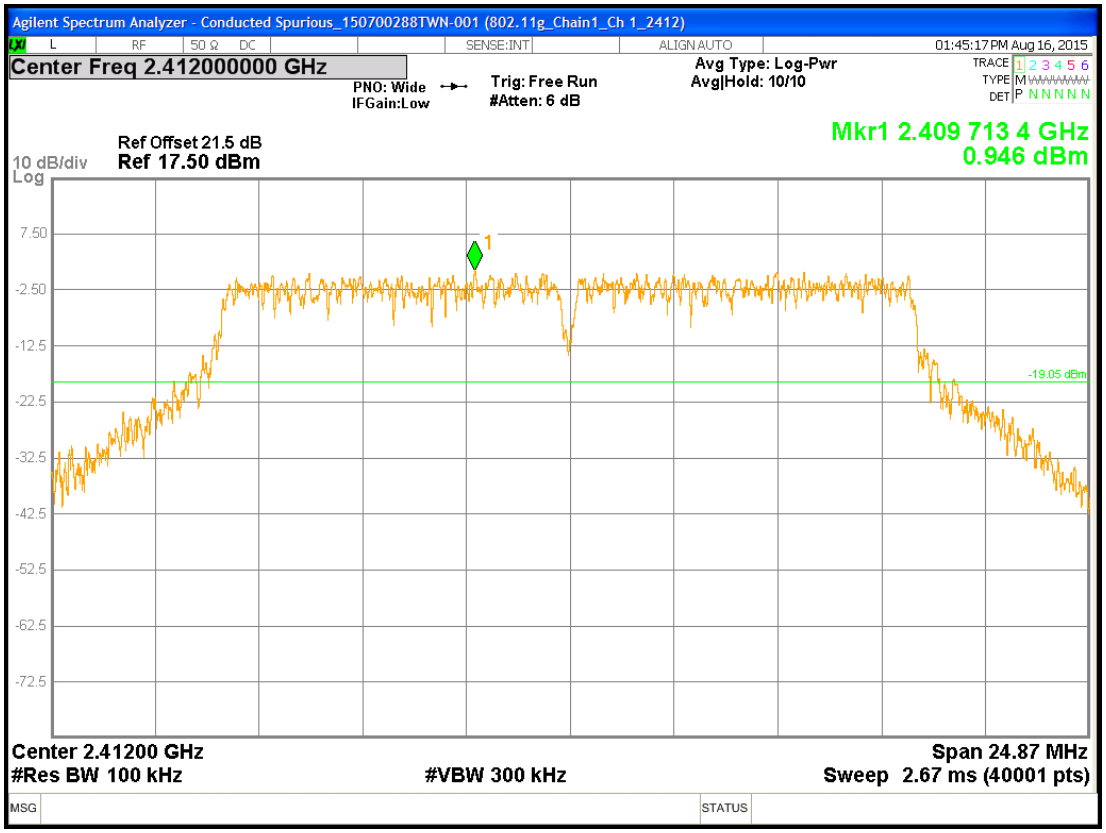
Chain0 : Conducted Spurious @ 802.11g mode Ch11



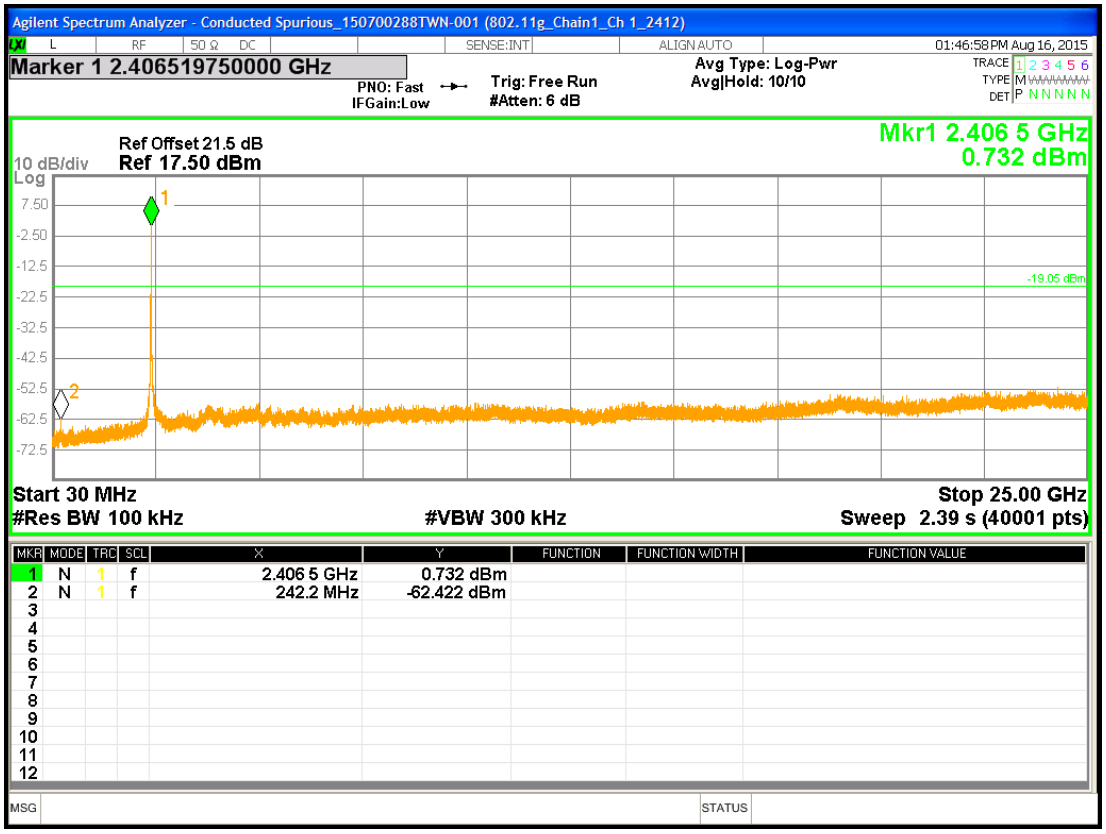
Chain0 : Conducted Spurious @ 802.11g mode Ch11



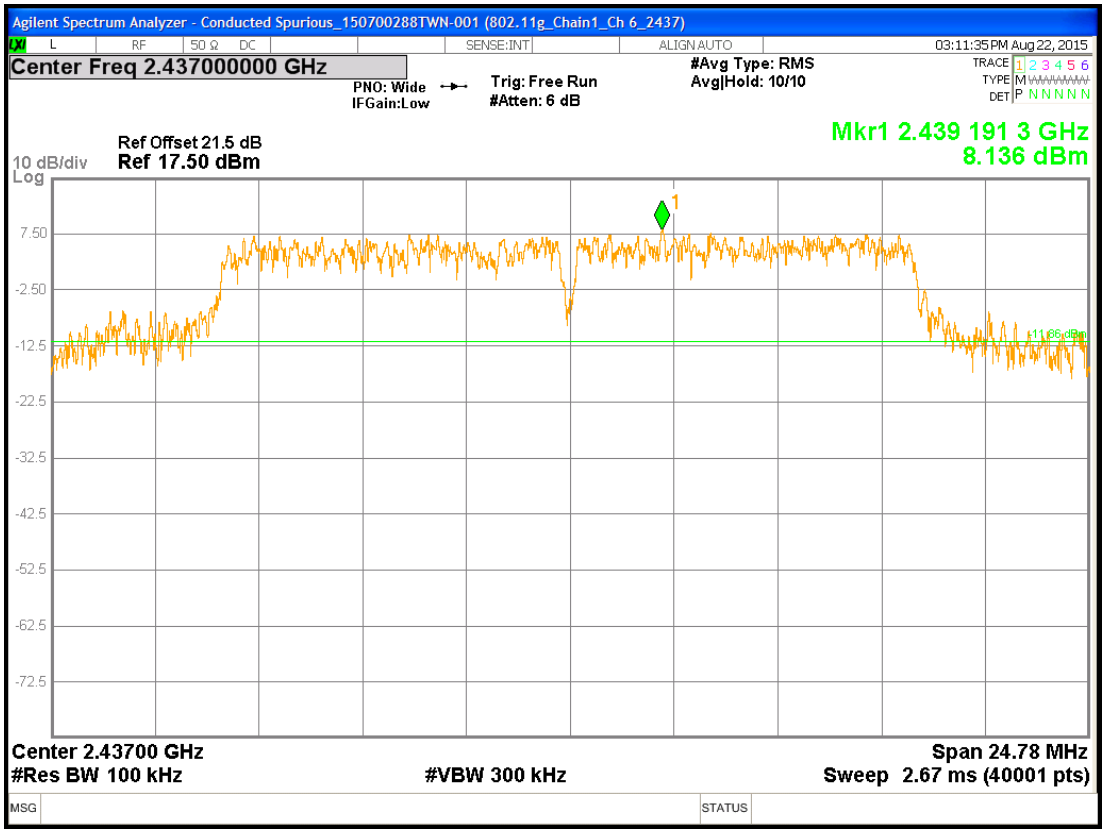
Chain1 : Conducted Spurious @ 802.11g mode Ch 1



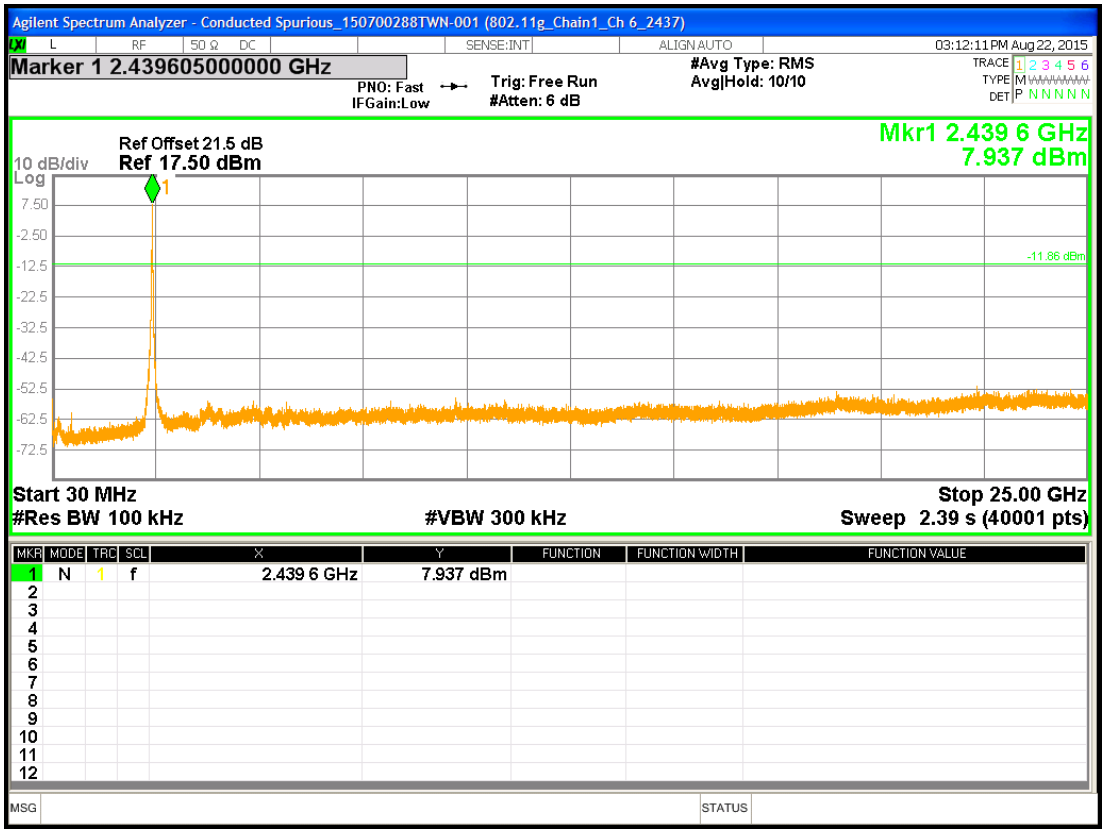
Chain1 : Conducted Spurious @ 802.11g mode Ch 1



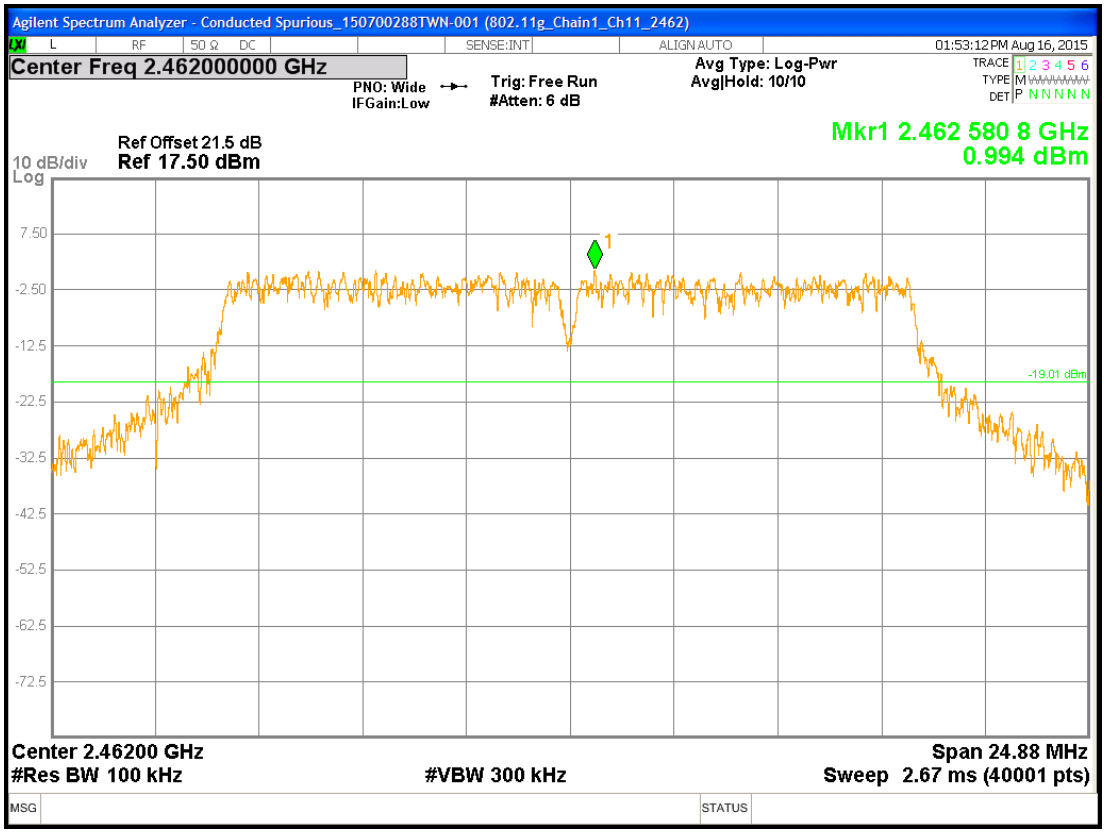
Chain1 : Conducted Spurious @ 802.11g mode Ch 6



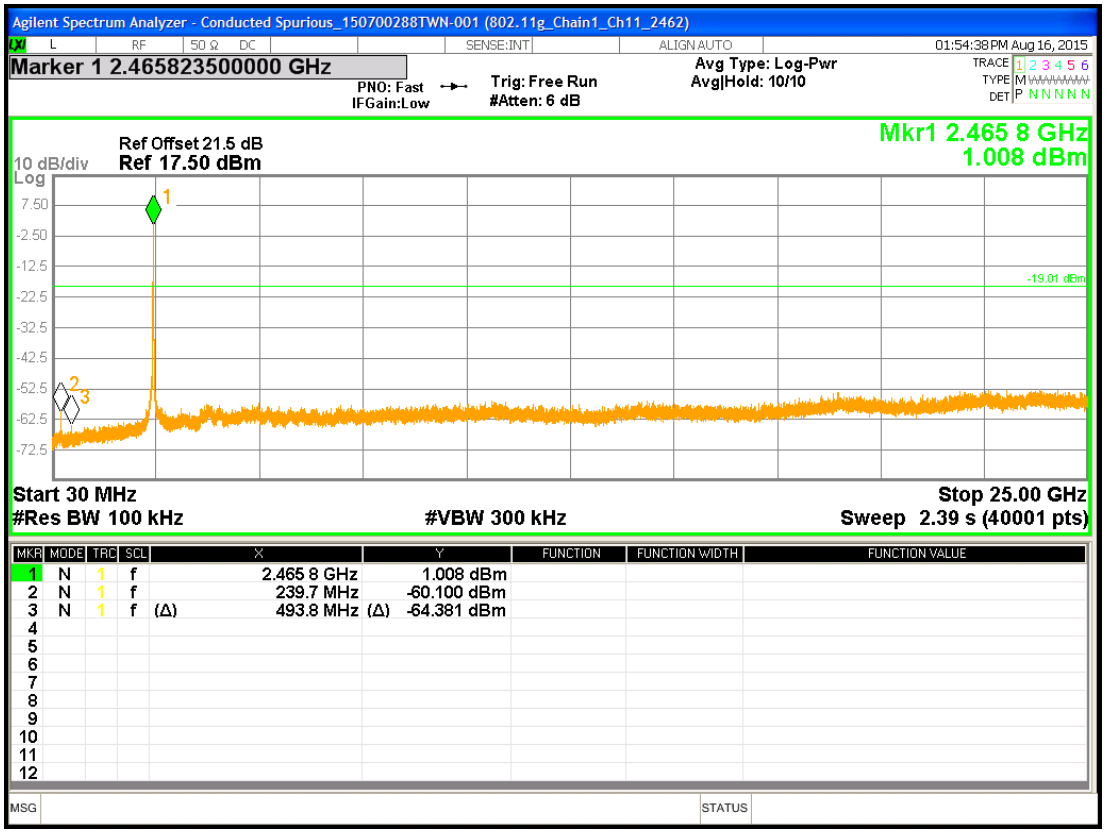
Chain1 : Conducted Spurious @ 802.11g mode Ch 6



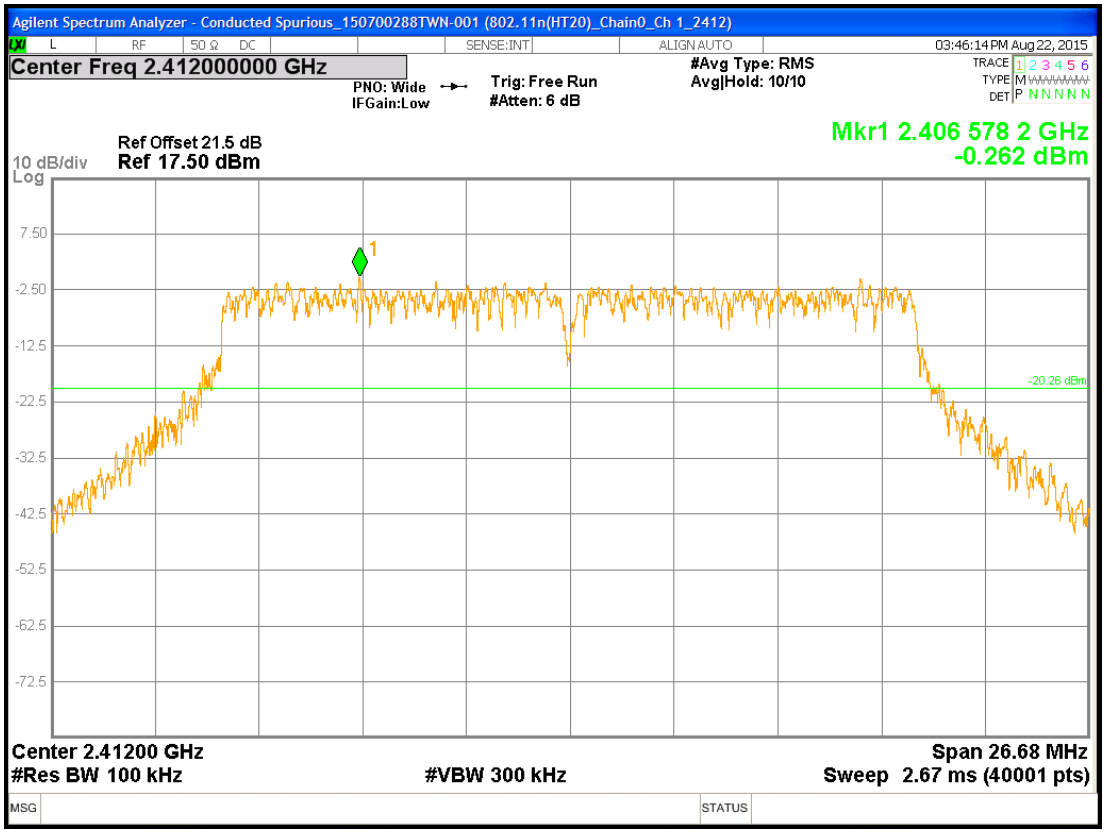
Chain1 : Conducted Spurious @ 802.11g mode Ch11



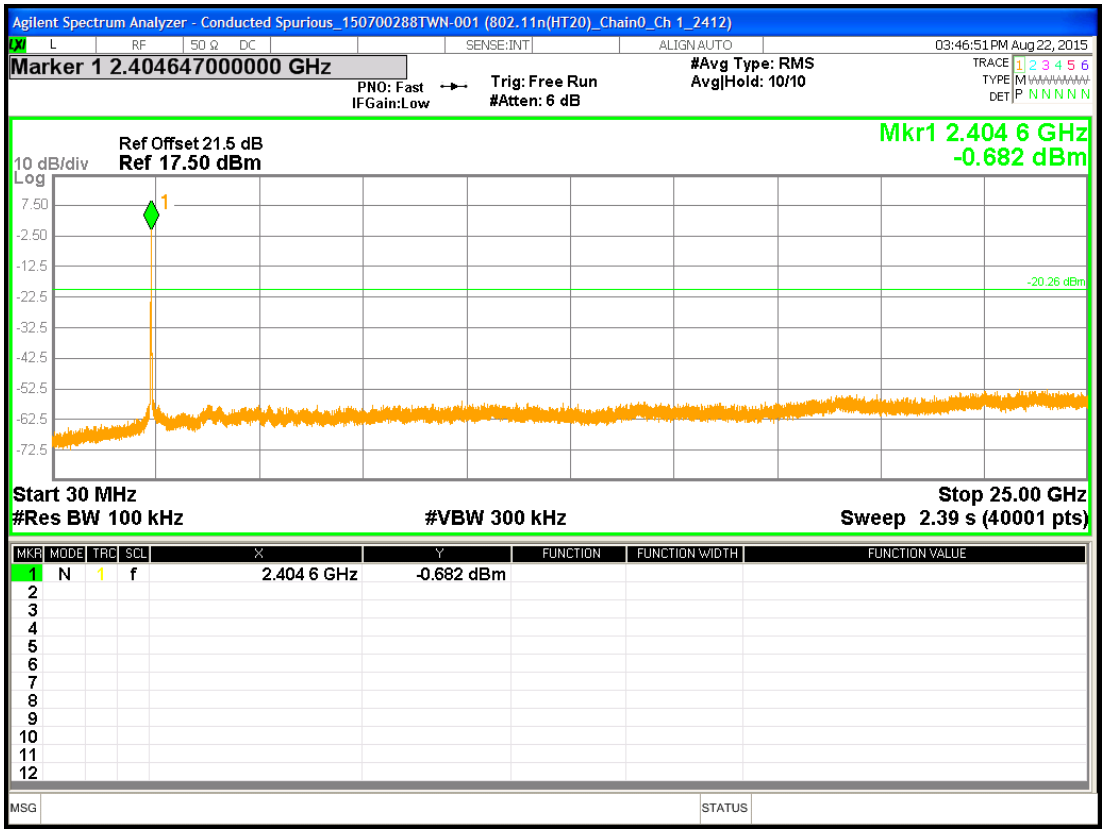
Chain1 : Conducted Spurious @ 802.11g mode Ch11



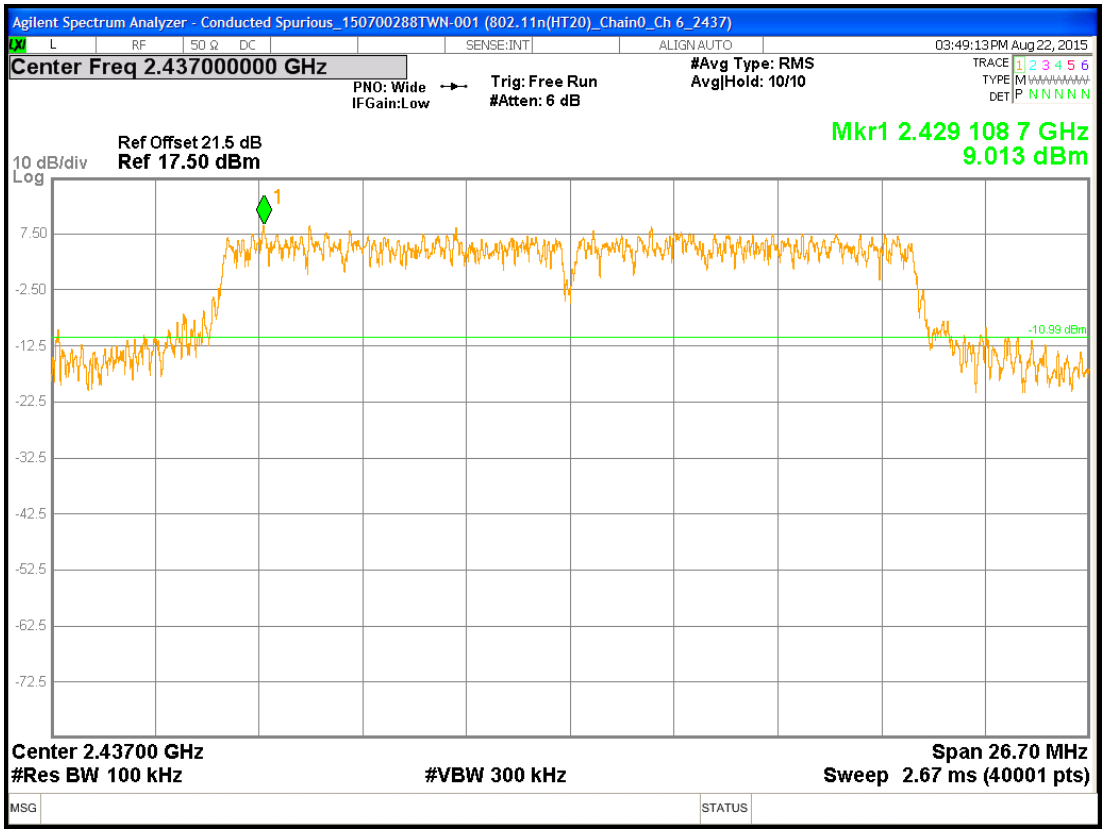
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



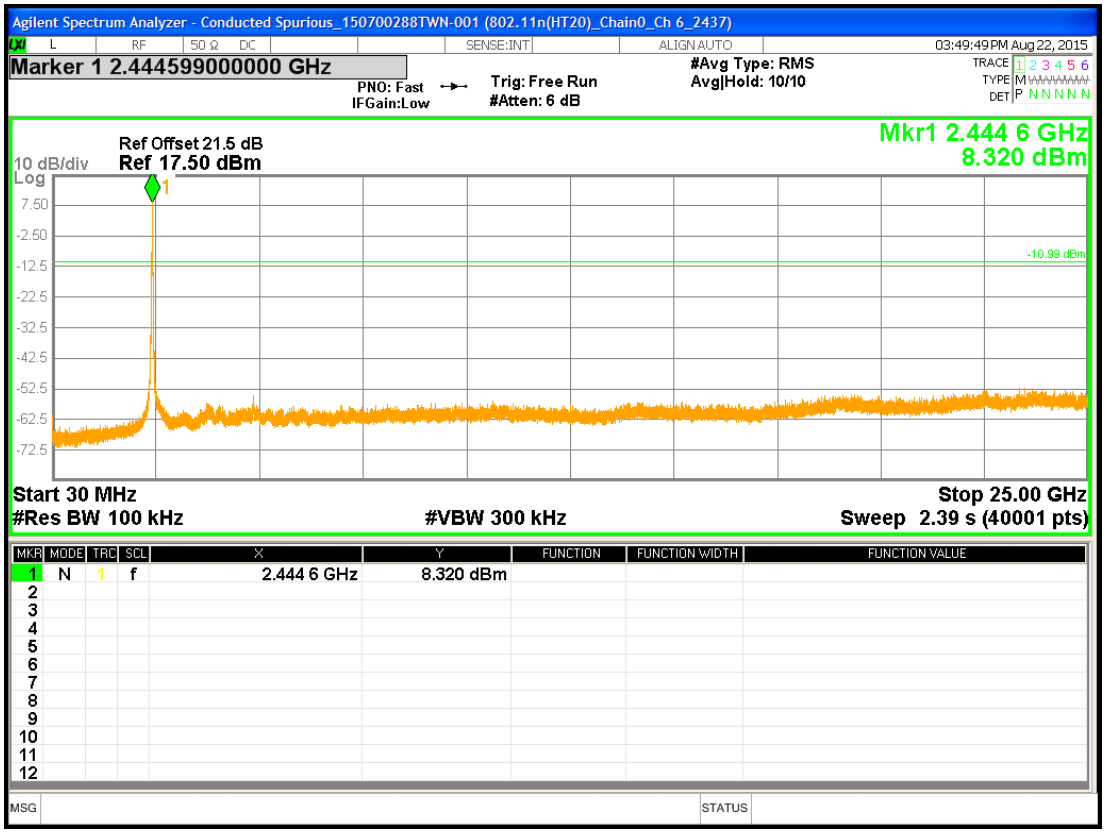
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



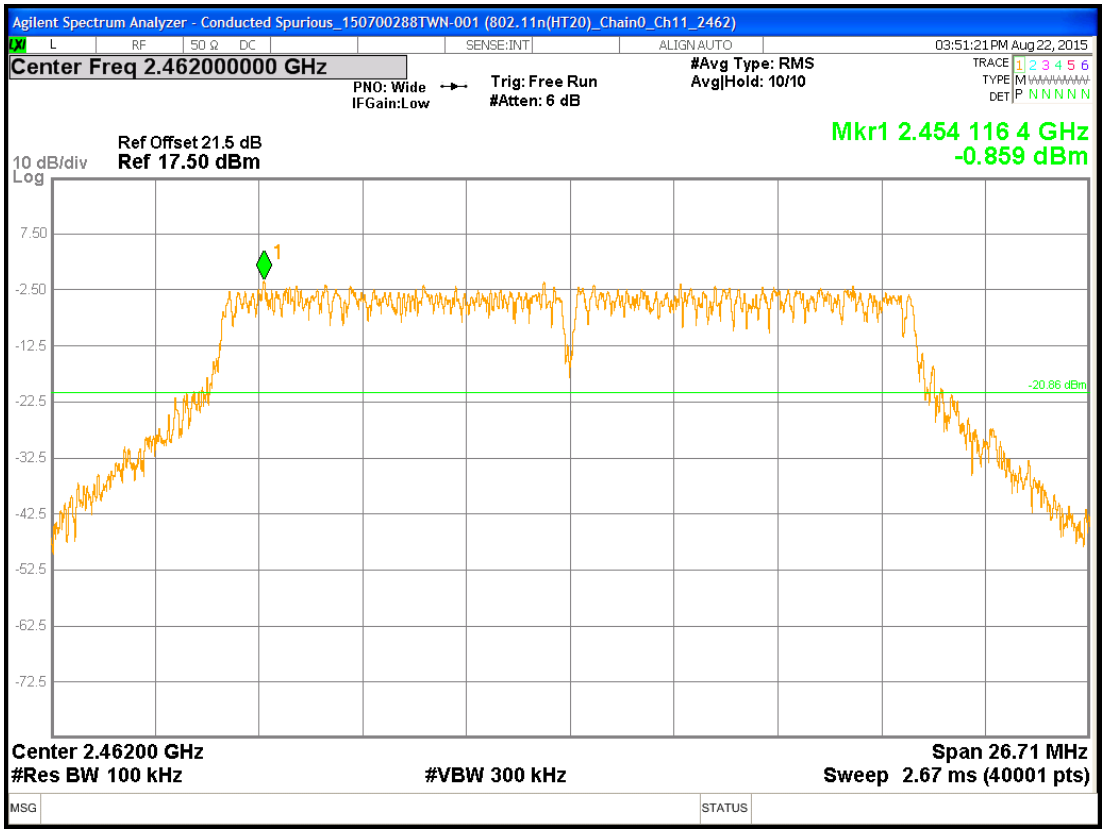
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



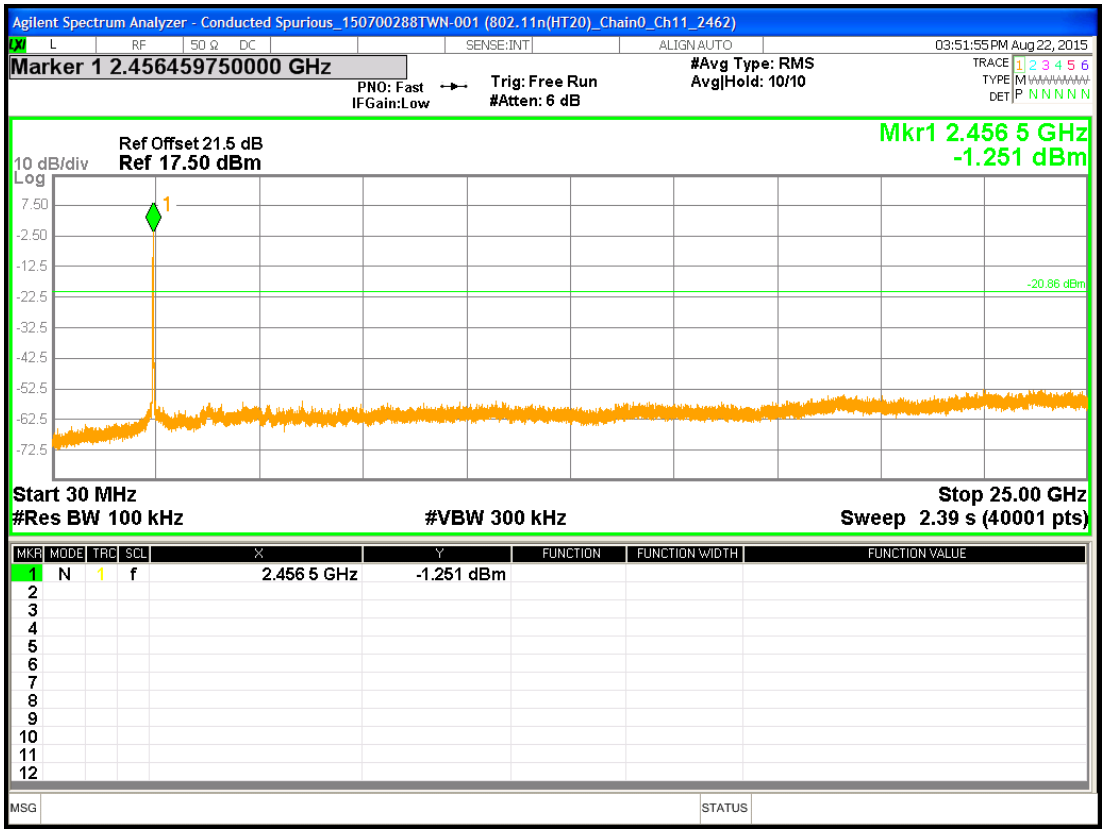
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



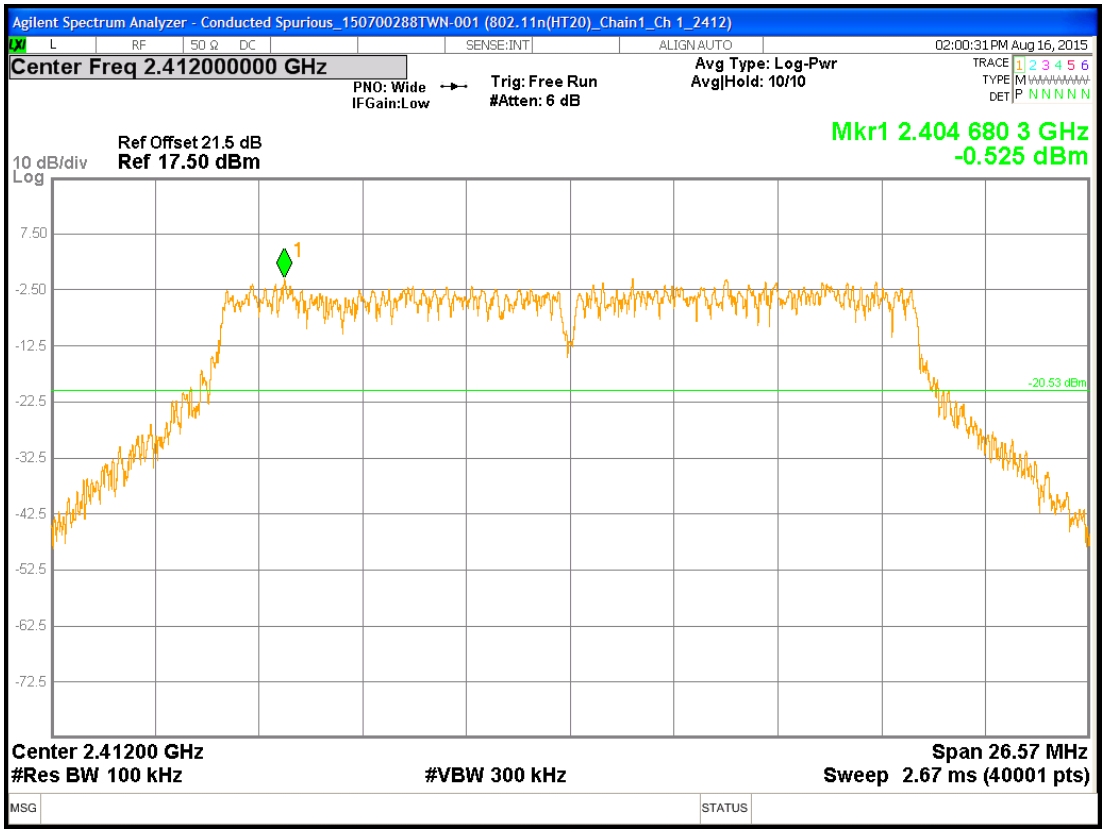
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch11



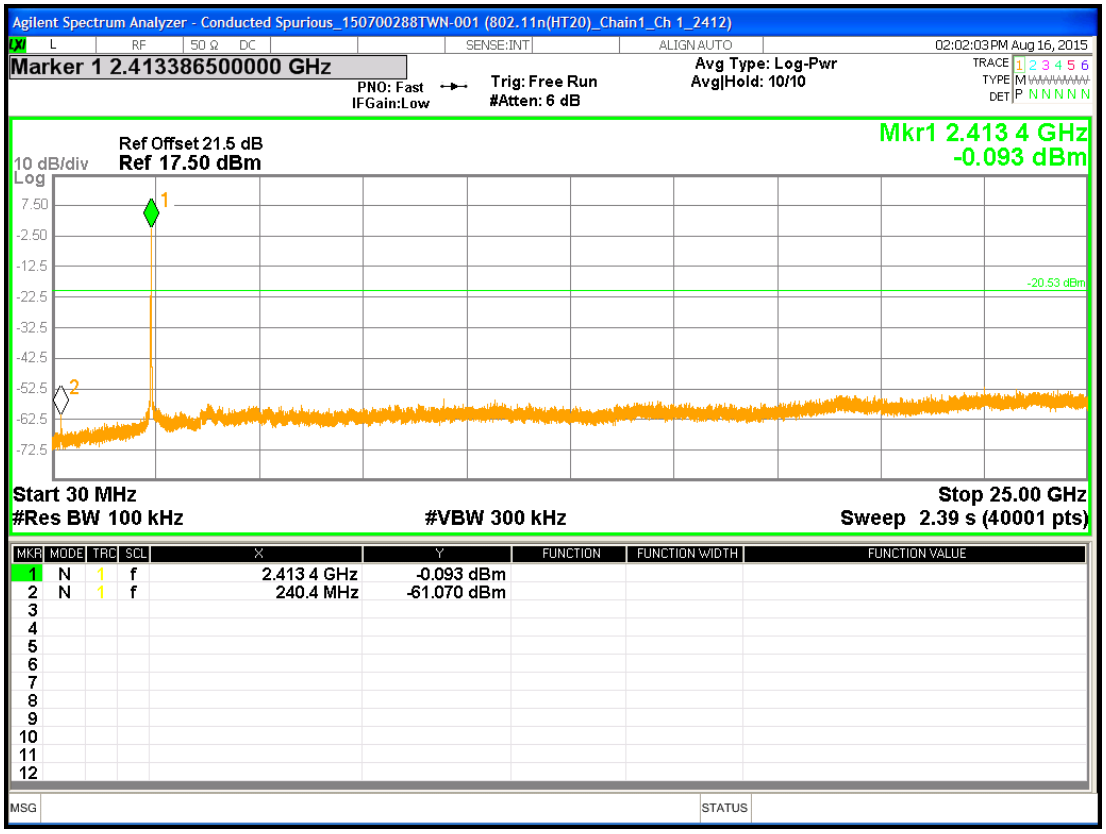
Chain0 : Conducted Spurious @ 802.11n(HT20) mode Ch11



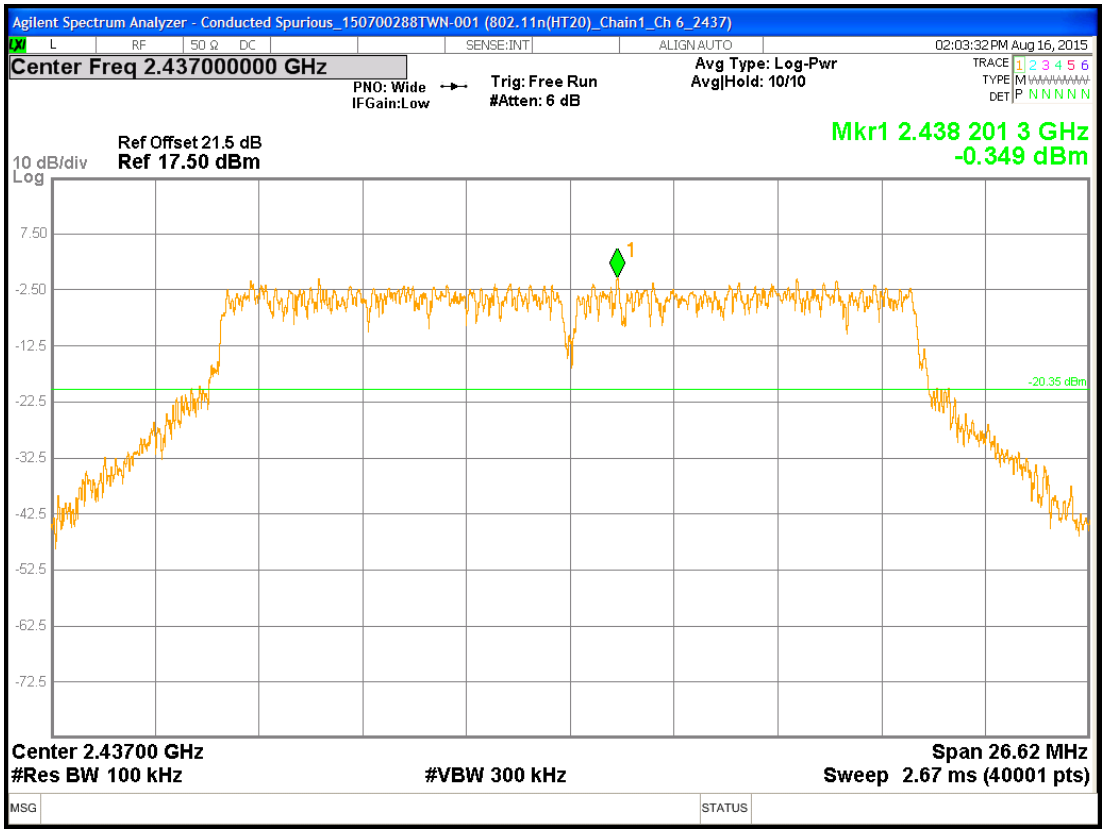
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



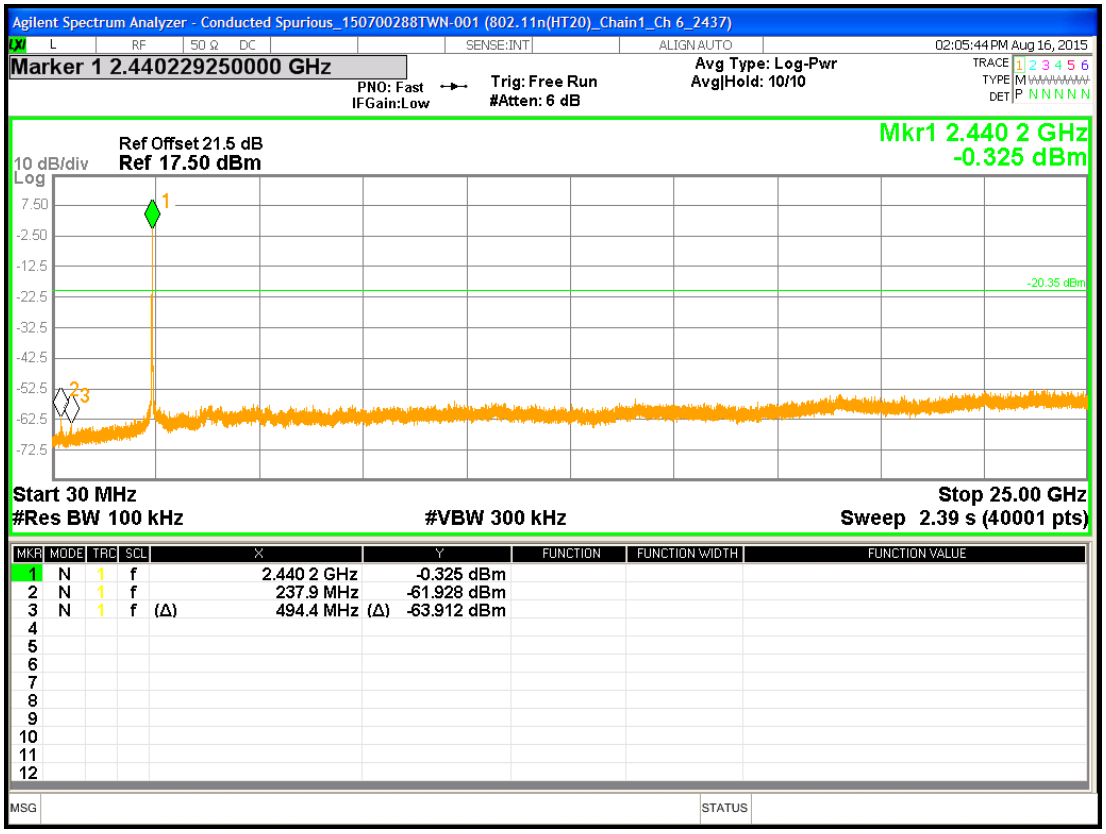
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 1



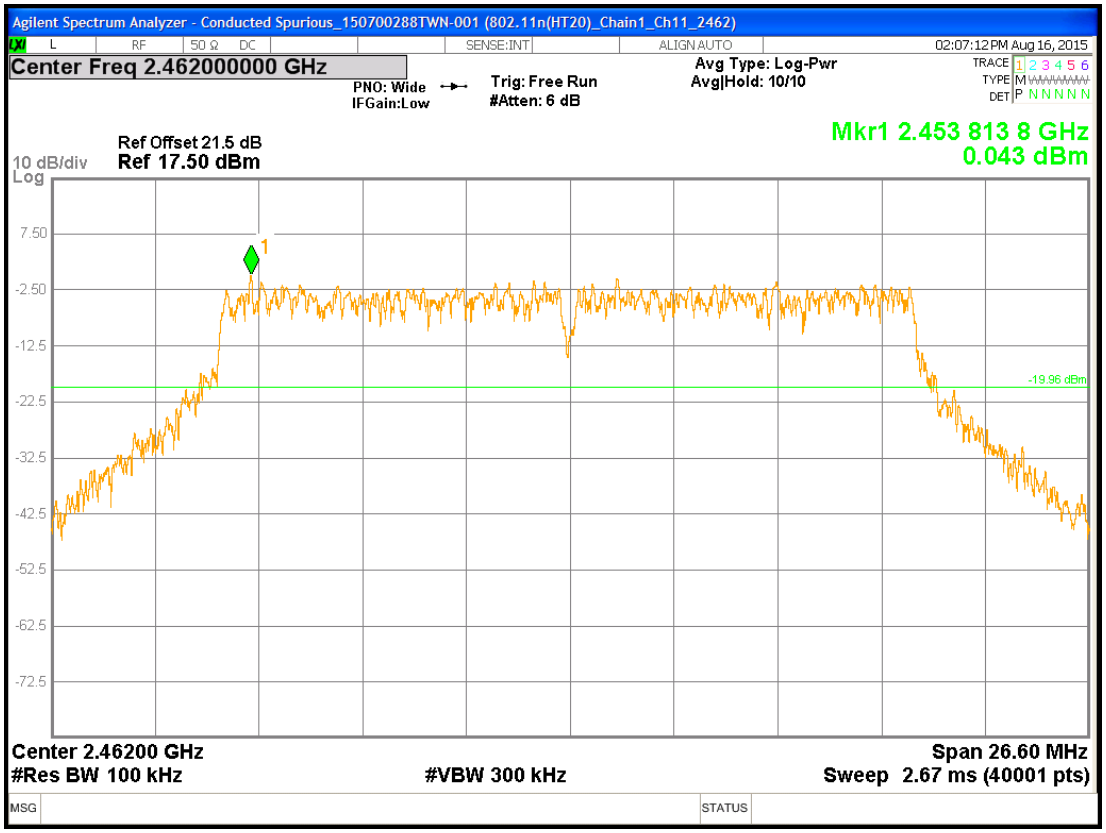
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



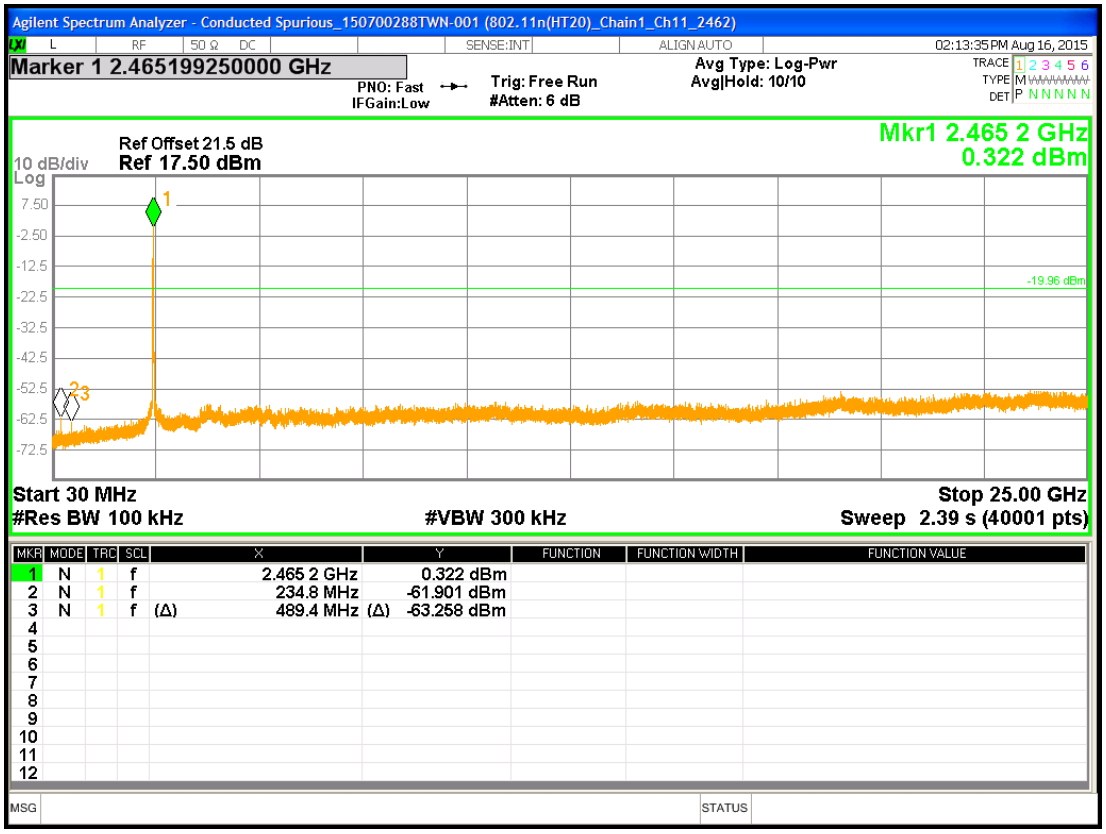
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch 6



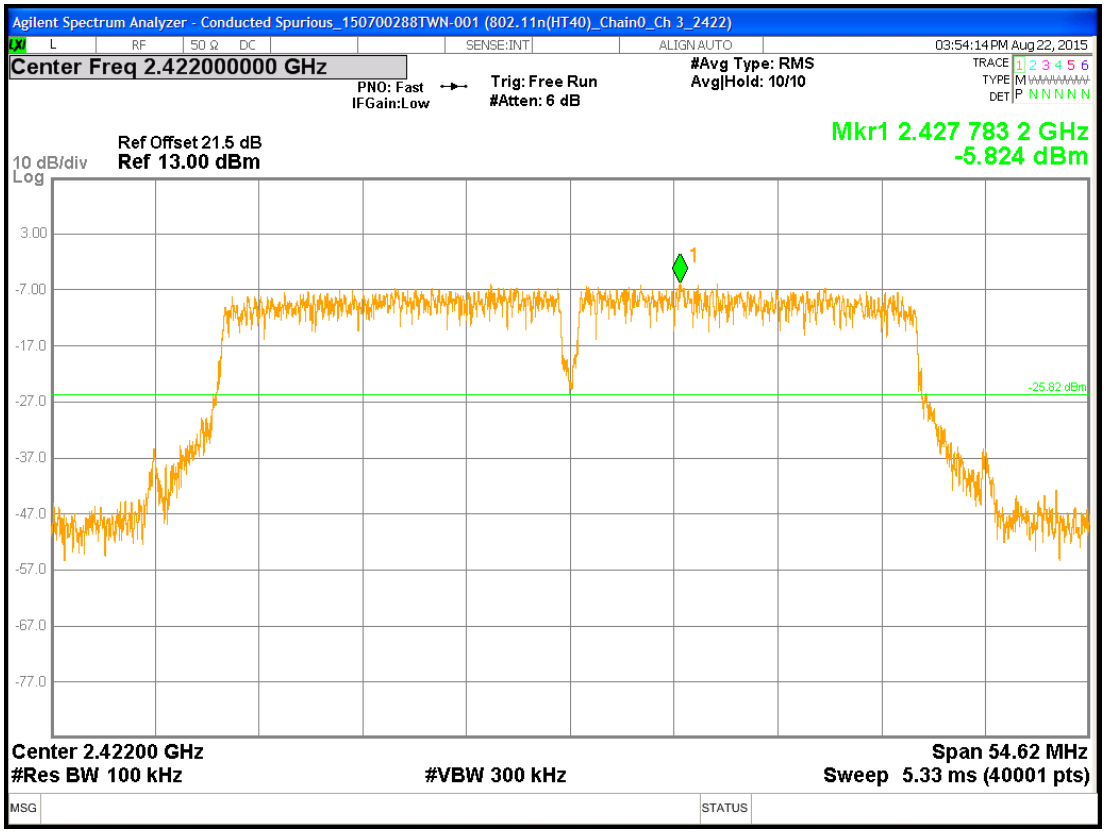
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch11



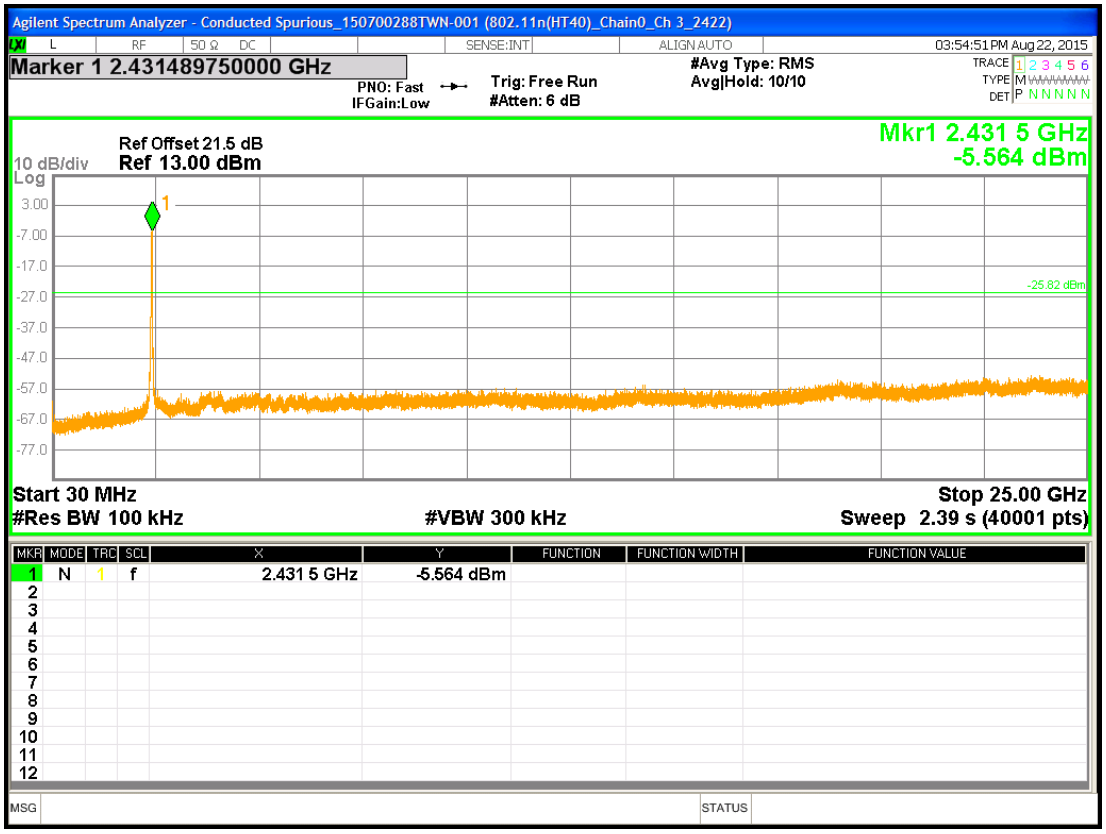
Chain1 : Conducted Spurious @ 802.11n(HT20) mode Ch11



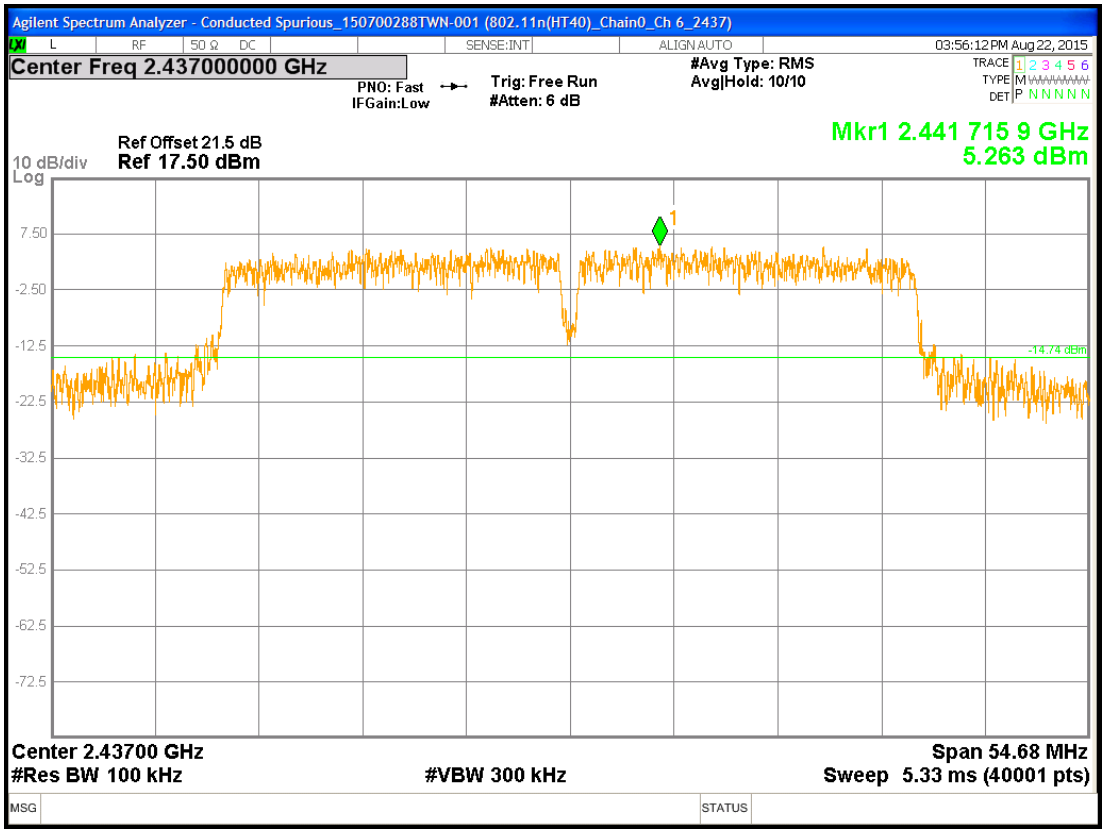
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



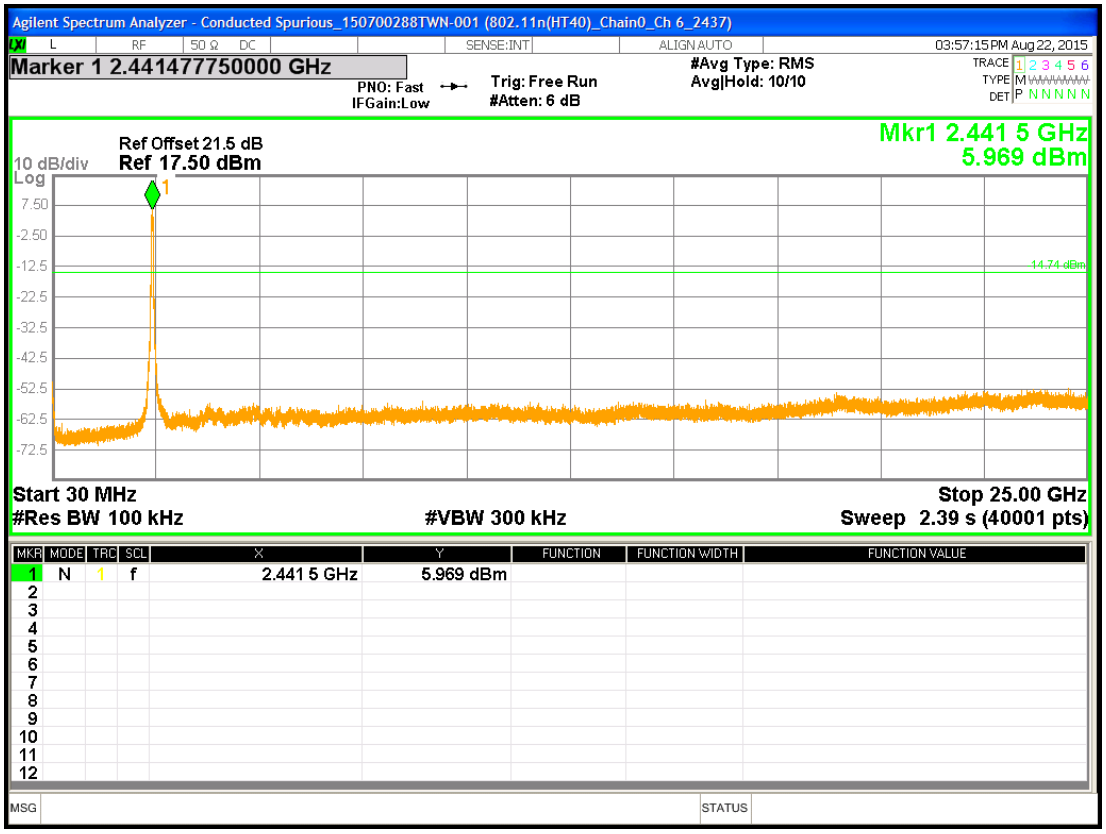
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



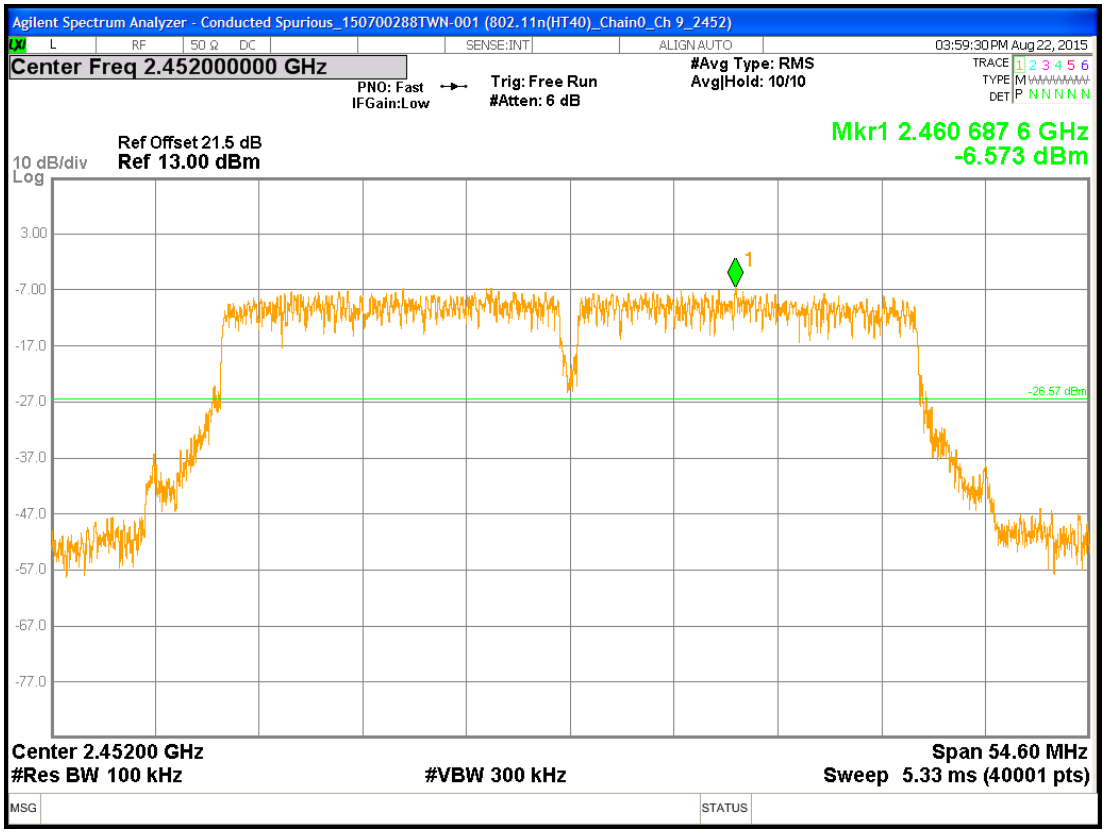
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



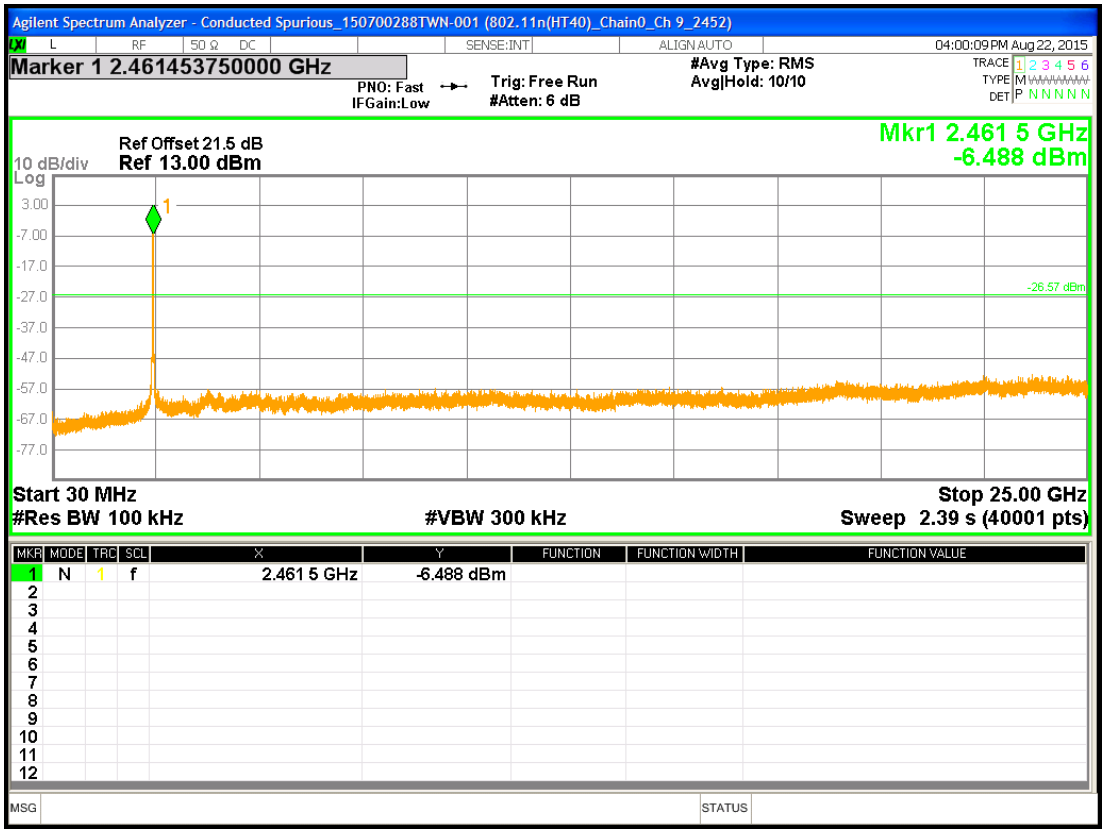
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



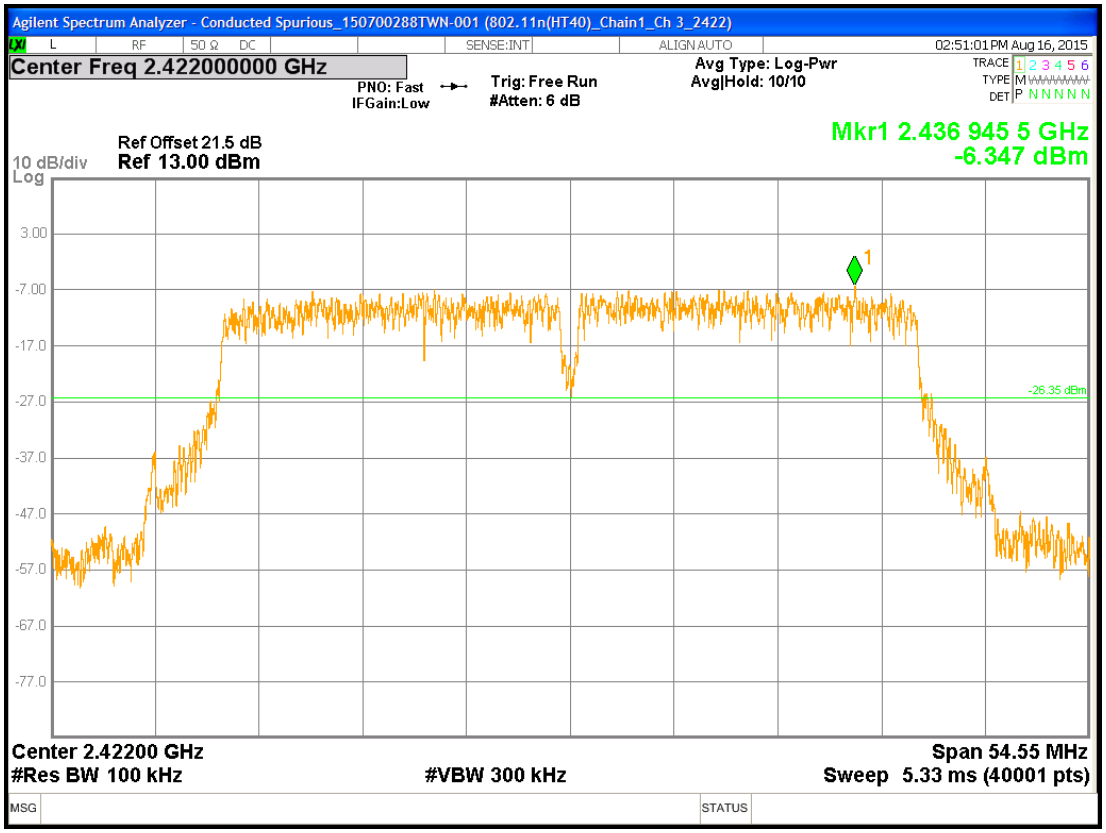
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



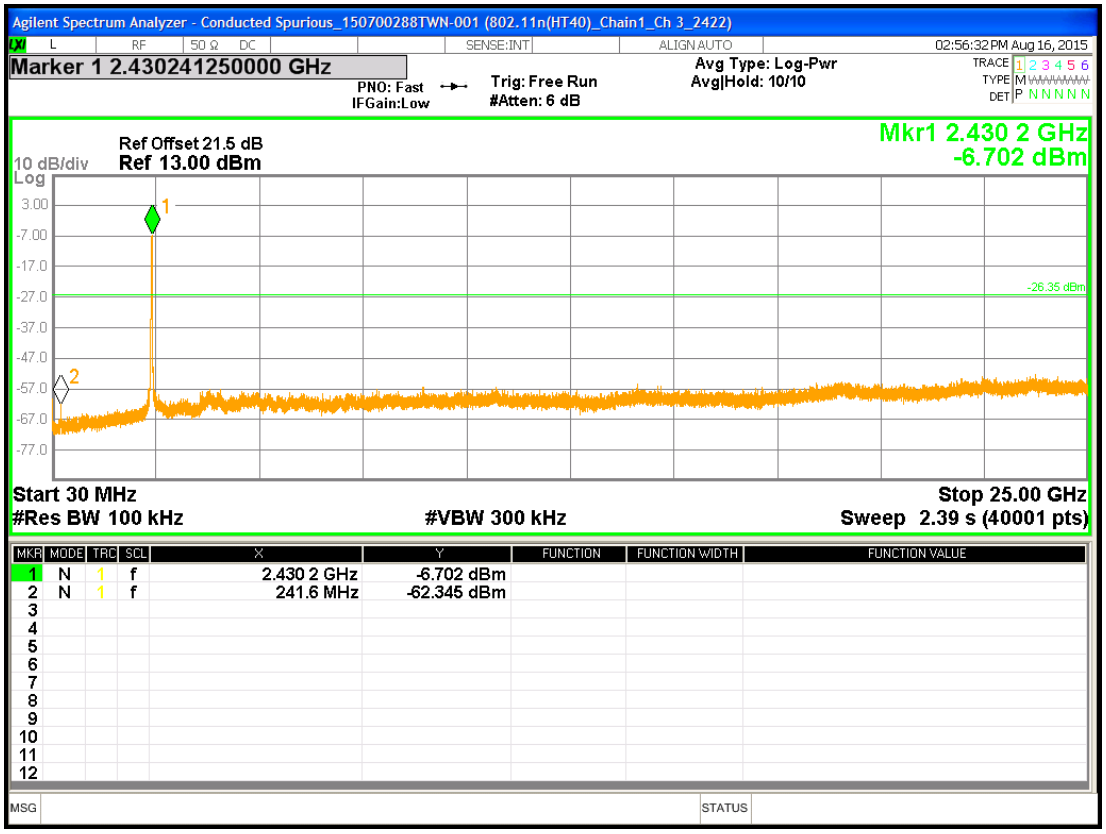
Chain0 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



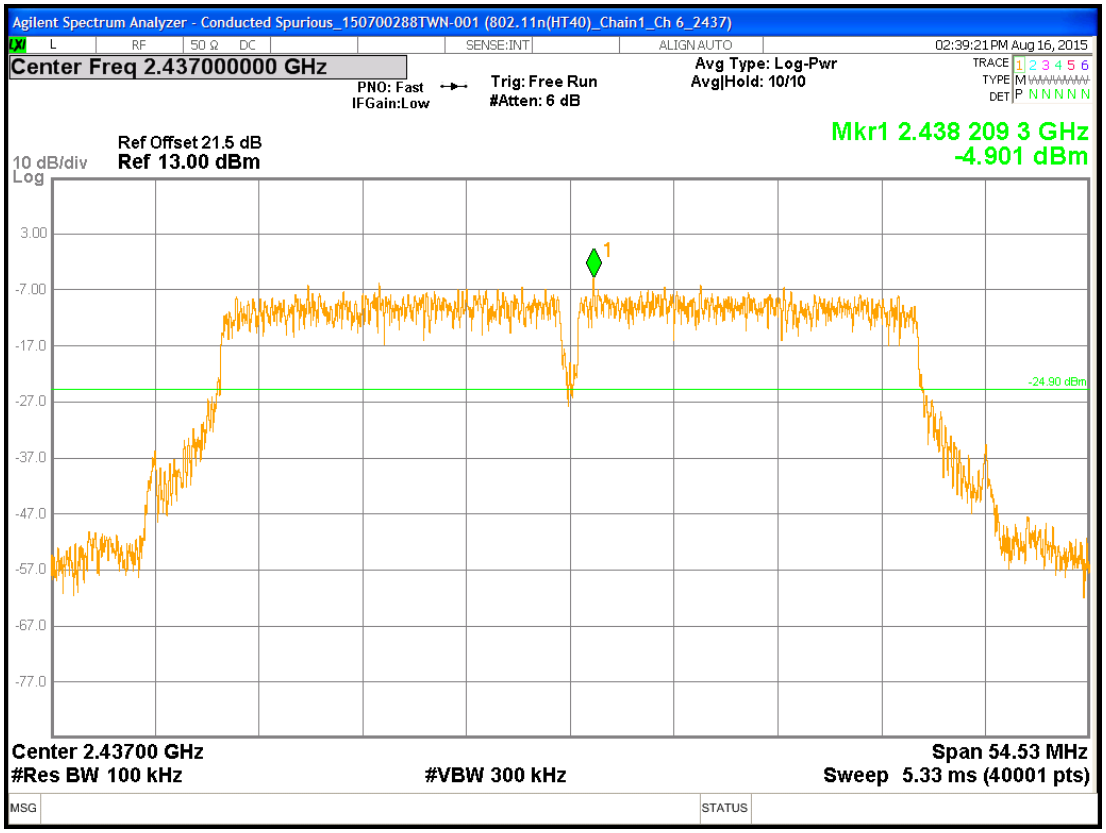
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



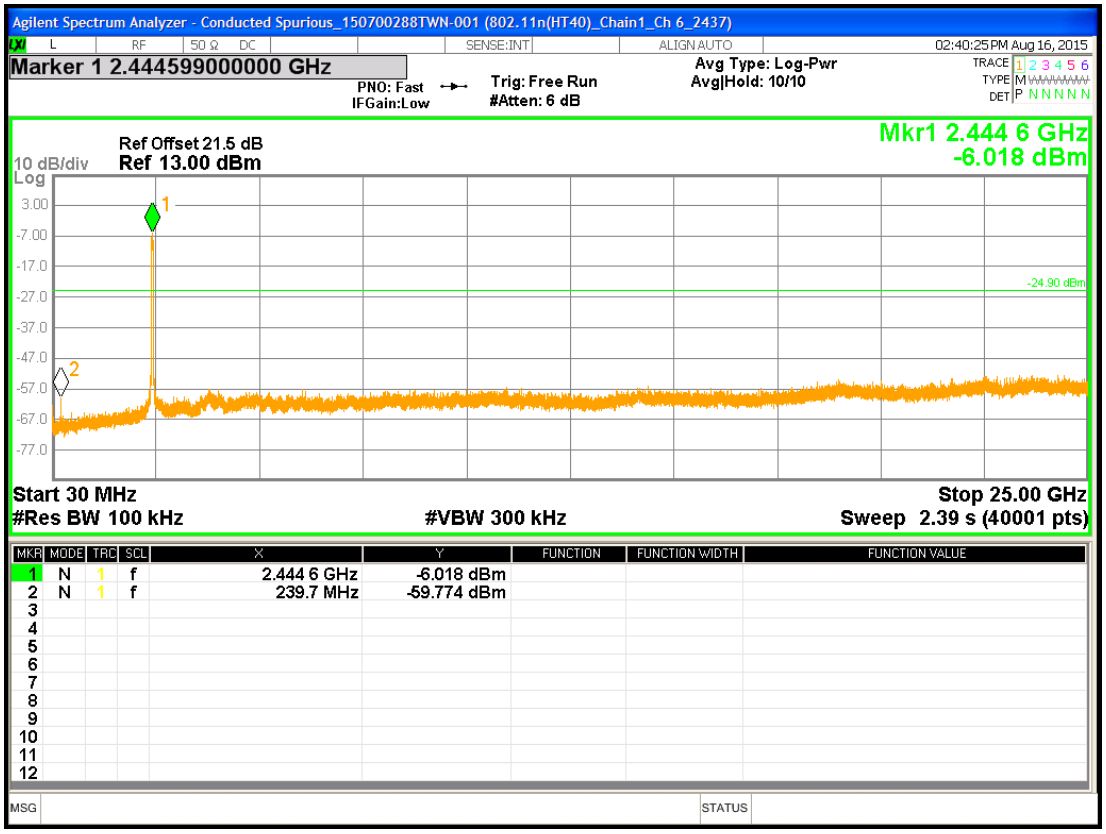
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 3



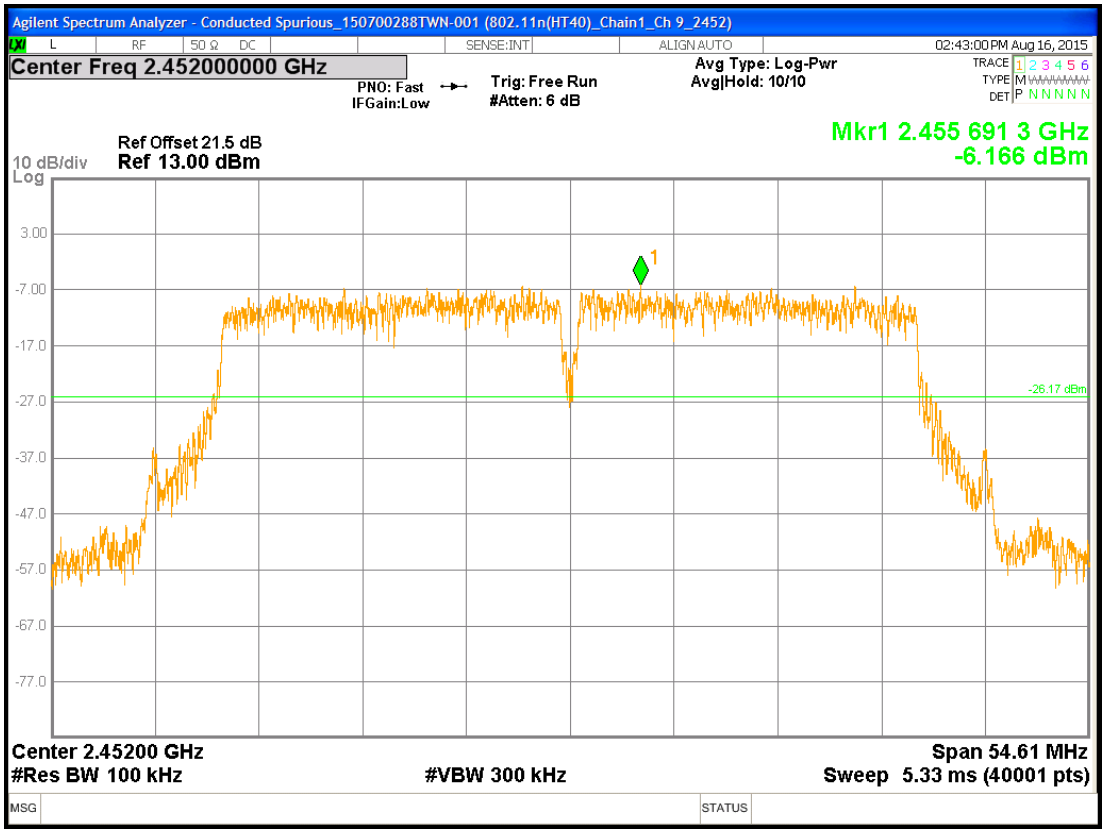
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



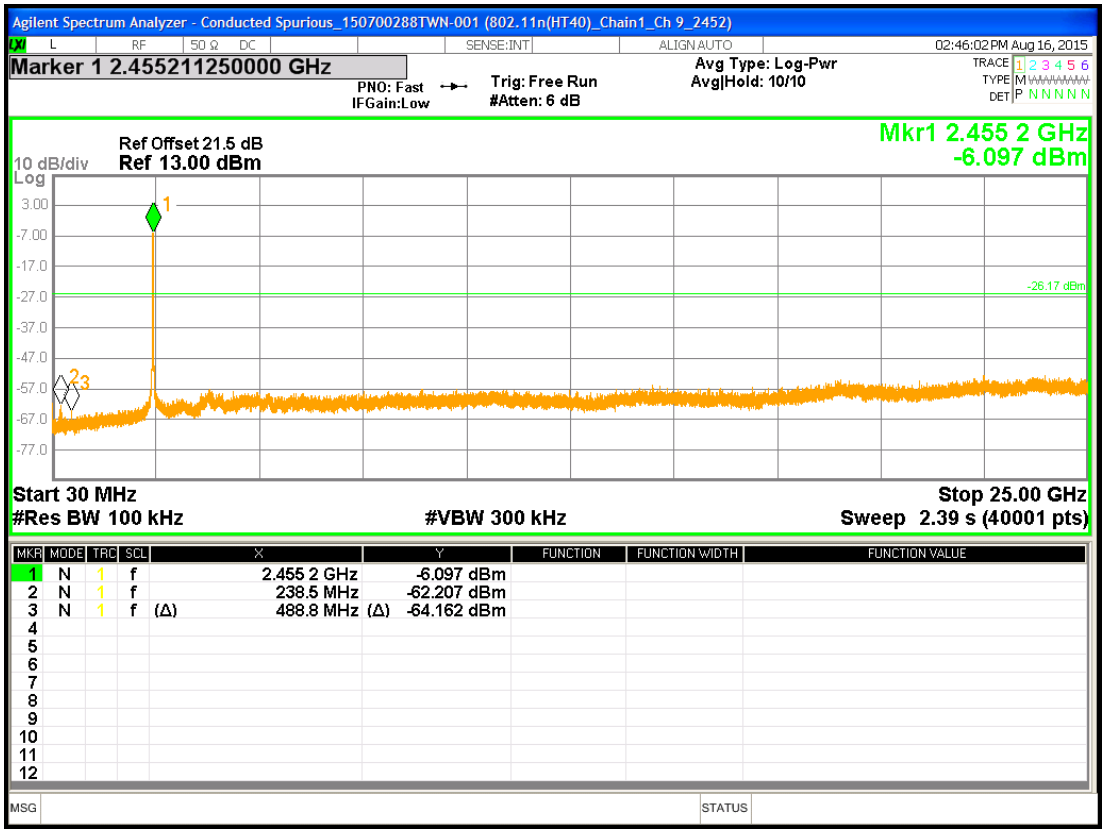
Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 6



Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



Chain1 : Conducted Spurious @ 802.11n(HT40) mode Ch 9



7. Emissions In Restricted Frequency Bands (Radiated emission measurements)

7.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement	15.247(d), 15.205, 15.209	

7.2 Limit for emission in restricted frequency bands (Radiated emission measurement)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	2400/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

7.3 Measuring instrument setting

Below 1GHz measurement

Receiver settings	
Receiver function	**Setting**
Detector	QP
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Attenuation	Auto

Above 1GHz measurement

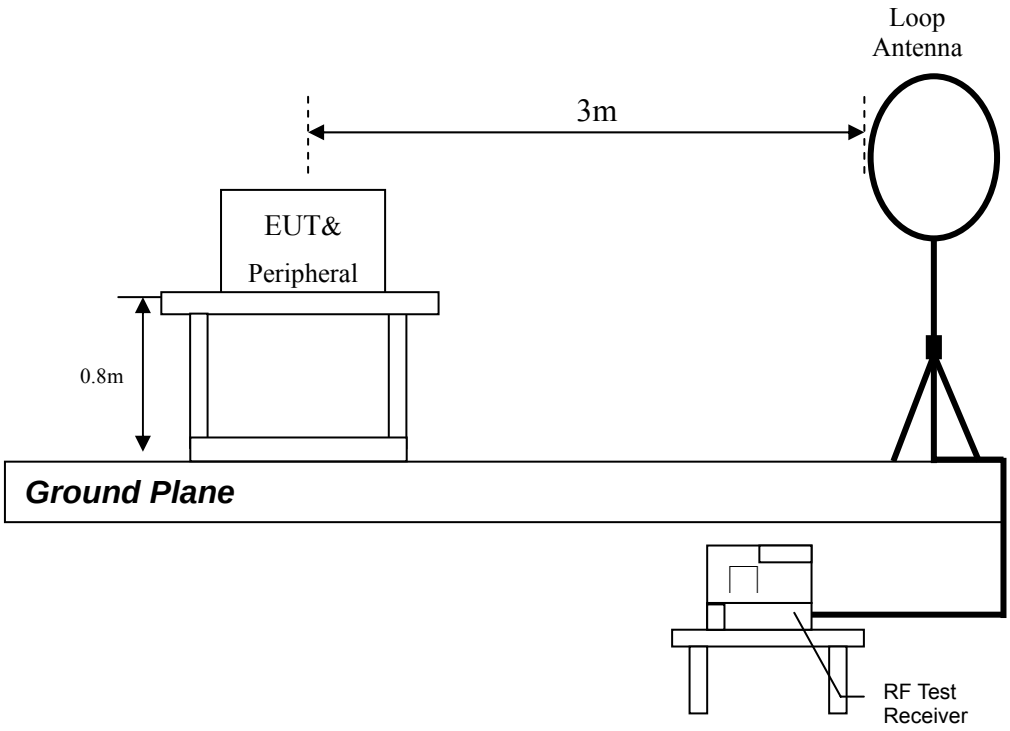
Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	1MHz
VBW	3MHz for Peak; 10Hz for Average
Sweep	Auto couple
Start Frequency	1GHz
Stop Frequency	Tenth harmonic
Attenuation	Auto

7.4 Test procedure

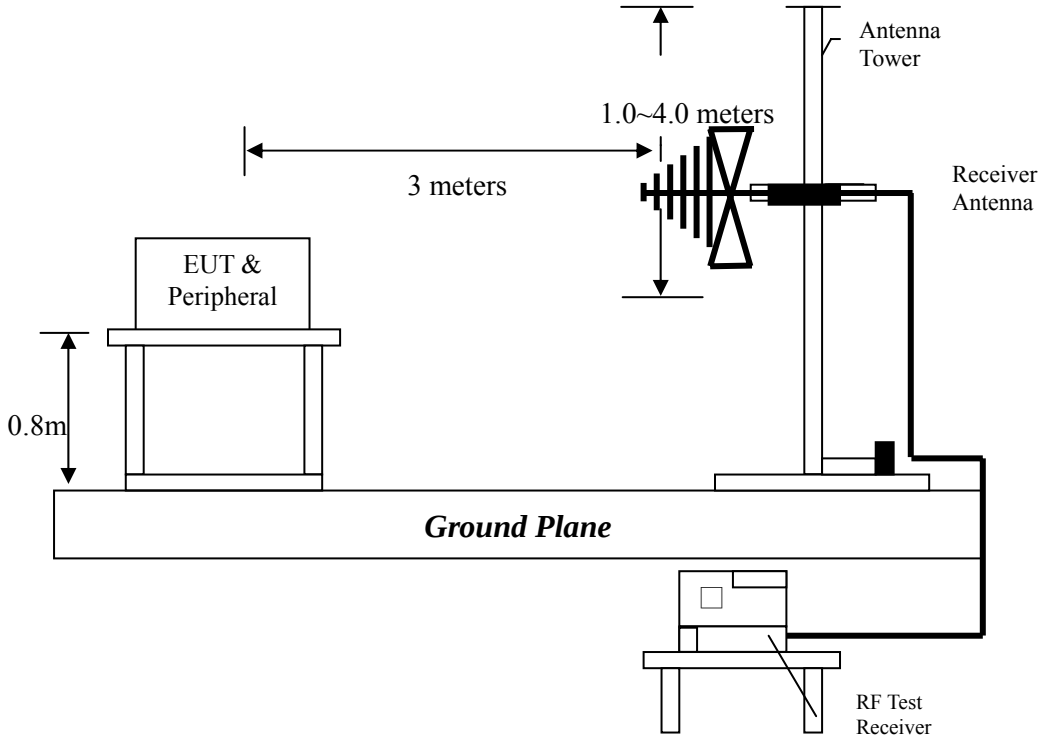
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
3. The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization
4. If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
5. Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
   Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
7. If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

7.5 Test configuration

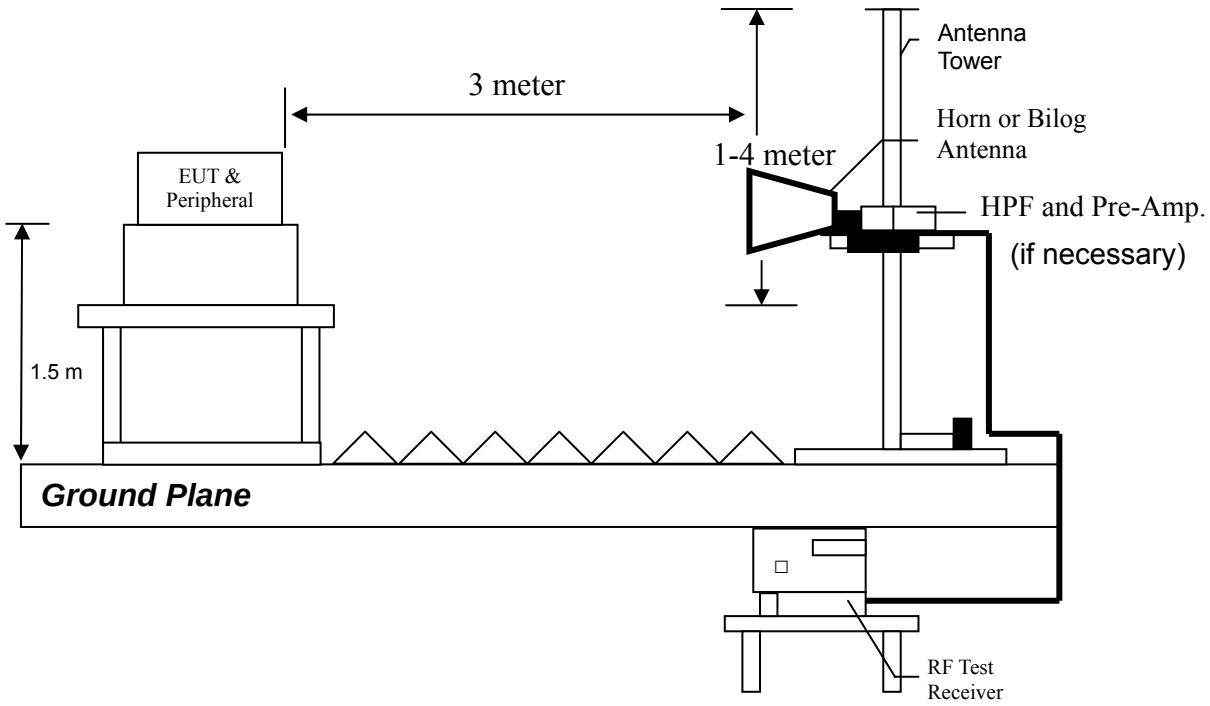
7.5.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



7.5.2 Radiated emission below 1GHz using Bilog Antenna



7.5.3 Radiated emission above 1GHz using Horn Antenna



This test is used for the transmitter output power values measurement.
Radiated emissions were invested cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency above 1 GHz using a spectrum analyzer RBW of 1MHz and 10 Hz VBW record Average reading, the Peak reading (1 MHz RBW/3MHz VBW) recorded also on the report.

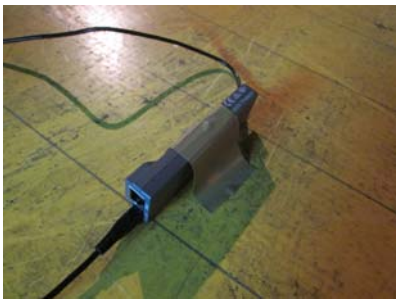
The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

For the radiated emission test above 1GHz, place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.

X plane



Y plane

Z plane

After verifying three axes, we found the maximum electromagnetic field was occurred at X-plane configuration. The final test data was executed under this configuration.

The EUT configuration, please refer to the “Spurious set-up photo.pdf”.

7.6 Test result

7.6.1 Measurement results: frequencies 9kHz to 30MHz

EUT : H2R
Test mode : 802.11b Tx channel High

Frequency (MHz)	Detection value	factor (dB/m)	Reading (dBμV)	value (dBμV/m)	Limit @ 3m (dBμV/m)	Tolerance (dB)
2.15	QP	21.39	30.30	51.69	69.54	-17.85
16.36	QP	22.24	8.99	31.23	69.54	-38.31
20.00	QP	22.19	3.15	25.34	69.54	-44.20

Remark: Corr. Factor = Antenna Factor + Cable Loss

7.6.2 Measurement results: frequencies below 1 GHz

The test was performed on EUT under 802.11b/g/n continuously transmitting mode. The worst case occurred at 802.11b Tx High Channel.

EUT : H2R
Worst Case : 802.11b Tx High Channel

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBµV)	Corrected Level (dBµV/m)	Limit @ 3 m (dBµV/m)	Margin (dB)
Vertical	37.76	QP	13.89	18.63	32.52	40.00	-7.48
Vertical	125.06	QP	12.45	19.71	32.16	43.50	-11.34
Vertical	214.30	QP	12.86	19.80	32.66	43.50	-10.84
Vertical	454.86	QP	19.81	13.15	32.96	46.00	-13.04
Vertical	532.46	QP	21.22	10.84	32.06	46.00	-13.94
Vertical	743.92	QP	25.25	11.64	36.89	46.00	-9.11
Horizontal	125.06	QP	12.45	24.25	36.70	43.50	-6.80
Horizontal	196.84	QP	11.99	28.11	40.10	43.50	-3.40
Horizontal	214.30	QP	12.86	29.53	42.39	43.50	-1.11
Horizontal	458.74	QP	19.87	17.52	37.39	46.00	-8.61
Horizontal	573.20	QP	22.20	14.22	36.42	46.00	-9.58
Horizontal	743.92	QP	25.25	14.43	39.68	46.00	-6.32

Remark: Corr. Factor = Antenna Factor + Cable Loss

7.6.3 Measurement results: frequency above 1GHz to 25GHz

EUT : H2R

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11b Ch Low Chain0	3180	PK	V	39.87	-3.75	48.76	45.01	74.00	-28.99
	4824	PK	V	40.10	-0.04	53.92	53.88	74.00	-20.12
	4824	AV	V	40.10	-0.04	53.18	53.14	54.00	-0.86
	4824	PK	H	40.10	-0.04	46.89	46.85	74.00	-27.15
802.11b Ch Middle Chain0	3180	PK	V	39.87	-3.75	49.70	45.95	74.00	-28.05
	3960	PK	V	40.36	-1.72	42.80	41.08	74.00	-32.92
	4874	PK	V	40.00	0.13	51.19	51.32	74.00	-22.68
	3180	PK	H	39.87	-3.75	43.85	40.10	74.00	-33.90
	3420	PK	H	40.00	-3.94	42.93	38.99	74.00	-35.01
	4874	PK	H	40.00	0.13	45.17	45.30	74.00	-28.70
802.11b Ch High Chain0	3180	PK	V	39.87	-3.75	47.61	43.86	74.00	-30.14
	3360	PK	V	39.96	-3.89	46.95	43.06	74.00	-30.94
	4924	PK	V	39.91	0.30	51.93	52.23	74.00	-21.77
	3180	PK	H	39.87	-3.75	42.52	38.77	74.00	-35.23
	4924	PK	H	39.91	0.30	46.06	46.36	74.00	-27.64
802.11b Ch Low Chain1	3180	PK	V	39.87	-3.75	48.57	44.82	74.00	-29.18
	3360	PK	V	39.96	-3.89	46.03	42.14	74.00	-31.86
	3990	PK	V	40.38	-1.57	41.64	40.07	74.00	-33.93
	4824	PK	V	40.10	-0.04	46.96	46.92	74.00	-27.08
	9648	PK	V	38.19	11.34	43.02	54.36	74.00	-19.64
	9648	AV	V	38.19	11.34	39.91	51.25	54.00	-2.75
	4824	PK	H	40.10	-0.04	41.72	41.68	74.00	-32.32

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11b Ch Middle Chain1	3180	PK	V	39.87	-3.75	47.51	43.76	74.00	-30.24
	3360	PK	V	39.96	-3.89	46.10	42.21	74.00	-31.79
	3990	PK	V	40.38	-1.57	41.52	39.95	74.00	-34.05
	4874	PK	V	40.00	0.13	46.41	46.54	74.00	-27.46
	9748	PK	V	38.33	11.24	40.94	52.18	74.00	-21.82
	3180	PK	H	39.87	-3.75	42.83	39.08	74.00	-34.92
	4874	PK	H	40.00	0.13	41.27	41.40	74.00	-32.60
802.11b Ch High Chain1	3180	PK	V	39.87	-3.75	46.62	42.87	74.00	-31.13
	3330	PK	V	39.95	-3.87	46.15	42.28	74.00	-31.72
	3960	PK	V	40.36	-1.72	42.06	40.34	74.00	-33.66
	4924	PK	V	39.91	0.30	44.86	45.16	74.00	-28.84
	9848	PK	V	38.47	11.14	39.94	51.08	74.00	-22.92
	4924	PK	H	39.91	0.30	40.97	41.27	74.00	-32.73
802.11g Ch Low Chain0	3180	PK	V	39.87	-3.75	46.84	43.09	74.00	-30.91
	3360	PK	V	39.96	-3.89	44.93	41.04	74.00	-32.96
	3960	PK	V	40.36	-1.72	41.28	39.56	74.00	-34.44
	4824	PK	V	40.10	-0.04	58.65	58.61	74.00	-15.39
	4824	AV	V	40.10	-0.04	46.88	46.84	54.00	-7.16
	7236	PK	V	38.08	8.19	39.21	47.40	74.00	-26.60
	4824	PK	H	40.10	-0.04	49.94	49.90	74.00	-24.10
802.11g Ch Middle Chain0	3360	PK	V	39.96	-3.89	45.71	41.82	74.00	-32.18
	3990	PK	V	40.38	-1.57	42.12	40.55	74.00	-33.45
	4874	PK	V	40.00	0.13	60.71	60.84	74.00	-13.16
	4874	AV	V	40.00	0.13	50.10	50.23	54.00	-3.77
	7311	PK	V	38.02	8.42	37.67	46.09	74.00	-27.91
	9748	PK	V	38.33	11.24	40.17	51.41	74.00	-22.59
	4874	PK	H	40.00	0.13	49.40	49.53	74.00	-24.47

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11g Ch High Chain0	3180	PK	V	39.87	-3.75	48.07	44.32	74.00	-29.68
	3330	PK	V	39.95	-3.87	45.51	41.64	74.00	-32.36
	3990	PK	V	40.38	-1.57	41.62	40.05	74.00	-33.95
	4924	PK	V	39.91	0.30	59.80	60.10	74.00	-13.90
	4924	AV	V	39.91	0.30	49.58	49.88	54.00	-4.12
	7386	PK	V	37.96	8.66	37.94	46.60	74.00	-27.40
	9848	PK	V	38.47	11.14	39.97	51.11	74.00	-22.89
	4924	PK	H	39.91	0.30	52.18	52.48	74.00	-21.52
802.11g Ch Low Chain1	3180	PK	V	39.87	-3.75	44.45	40.70	74.00	-33.30
	3330	PK	V	39.95	-3.87	45.93	42.06	74.00	-31.94
	4824	PK	V	40.10	-0.04	54.28	54.24	74.00	-19.76
	4824	AV	V	40.10	-0.04	41.69	41.65	54.00	-12.35
	9648	PK	V	38.19	11.34	46.10	57.44	74.00	-16.56
	9648	AV	V	38.19	11.34	34.94	46.28	54.00	-7.72
	4824	PK	H	40.10	-0.04	45.20	45.16	74.00	-28.84
802.11g Ch Middle Chain1	3180	PK	V	39.87	-3.75	46.97	43.22	74.00	-30.78
	3360	PK	V	39.96	-3.89	45.72	41.83	74.00	-32.17
	3990	PK	V	40.38	-1.57	41.52	39.95	74.00	-34.05
	4874	PK	V	40.00	0.13	55.49	55.62	74.00	-18.38
	4874	AV	V	40.00	0.13	42.62	42.75	54.00	-11.25
	9748	PK	V	38.33	11.24	45.17	56.41	74.00	-17.59
	9748	AV	V	38.33	11.24	34.05	45.29	54.00	-8.71
	12185	PK	V	38.67	13.18	42.56	55.74	74.00	-18.26
	12185	AV	V	38.67	13.18	33.35	46.53	54.00	-7.47
	4874	PK	H	40.00	0.13	45.00	45.13	74.00	-28.87

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11g Ch High Chain1	3180	PK	V	39.87	-3.75	46.78	43.03	74.00	-30.97
	4924	PK	V	39.91	0.30	53.17	53.47	74.00	-20.53
	9848	PK	V	38.47	11.14	46.16	57.30	74.00	-16.70
	9848	AV	V	38.47	11.14	34.12	45.26	54.00	-8.74
	12310	PK	V	38.57	13.18	44.39	57.57	74.00	-16.43
	12310	AV	V	38.57	13.18	33.50	46.68	54.00	-7.32
	4924	PK	H	39.91	0.30	45.15	45.45	74.00	-28.55
802.11n (HT20) Ch Low	3180	PK	V	39.87	-3.75	48.28	44.53	74.00	-29.47
	3360	PK	V	39.96	-3.89	45.97	42.08	74.00	-31.92
	4824	PK	V	40.10	-0.04	58.04	58.00	74.00	-16.00
	4824	AV	V	40.10	-0.04	48.56	48.52	54.00	-5.48
	7236	PK	V	38.08	8.19	39.45	47.64	74.00	-26.36
	9648	PK	V	38.19	11.34	42.69	54.03	74.00	-19.97
	9648	AV	V	38.19	11.34	31.80	43.14	54.00	-10.86
	3180	PK	H	39.87	-3.75	42.72	38.97	74.00	-35.03
	4824	PK	H	40.10	-0.04	52.95	52.91	74.00	-21.09
802.11n (HT20) Ch Middle	3330	PK	V	39.95	-3.87	45.74	41.87	74.00	-32.13
	3990	PK	V	40.38	-1.57	42.88	41.31	74.00	-32.69
	4874	PK	V	40.00	0.13	59.73	59.86	74.00	-14.14
	4874	AV	V	40.00	0.13	49.90	50.03	54.00	-3.97
	9748	PK	V	38.33	11.24	41.97	53.21	74.00	-20.79
	12185	PK	V	38.67	13.18	40.68	53.86	74.00	-20.14
	12185	AV	V	38.67	13.18	31.38	44.56	54.00	-9.44
	4874	PK	H	40.00	0.13	51.05	51.18	74.00	-22.82

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Mode	Frequency	Spectrum Analyzer	Ant. Pol.	Preamp. Gain	Correction Factor	Reading	Corrected Reading	Limit @ 3 m	Margin
	(MHz)	Detector	(H/V)	(dB)	(dB/m)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
802.11n (HT20) Ch High	3330	PK	V	39.95	-3.87	46.07	42.20	74.00	-31.80
	3990	PK	V	40.38	-1.57	41.30	39.73	74.00	-34.27
	4924	PK	V	39.91	0.30	61.77	62.07	74.00	-11.93
	4924	AV	V	39.91	0.30	51.74	52.04	54.00	-1.96
	9848	PK	V	38.47	11.14	41.55	52.69	74.00	-21.31
	12310	PK	V	38.57	13.18	41.05	54.23	74.00	-19.77
	12310	AV	V	38.57	13.18	32.49	45.67	54.00	-8.33
	3180	PK	H	39.87	-3.75	43.12	39.37	74.00	-34.63
	4924	PK	H	39.91	0.30	51.38	51.68	74.00	-22.32
802.11n (HT40) Ch Low	3180	PK	V	39.87	-3.75	46.34	42.59	74.00	-31.41
	3990	PK	V	40.38	-1.57	42.01	40.44	74.00	-33.56
	4380	PK	V	40.63	-1.20	41.86	40.66	74.00	-33.34
	4844	PK	V	40.06	0.03	42.99	43.02	74.00	-30.98
	4844	PK	H	40.06	0.03	39.68	39.71	74.00	-34.29
802.11n (HT40) Ch Middle	3330	PK	V	39.95	-3.87	46.13	42.26	74.00	-31.74
	3990	PK	V	40.38	-1.57	41.17	39.60	74.00	-34.40
	4874	PK	V	40.00	0.13	40.38	40.51	74.00	-13.49
	4874	PK	H	40.00	0.13	38.14	38.27	74.00	-15.73
802.11n (HT40) Ch High	3180	PK	V	39.87	-3.75	47.01	43.26	74.00	-30.74
	3360	PK	V	39.96	-3.89	45.30	41.41	74.00	-32.59
	3960	PK	V	40.36	-1.72	43.53	41.81	74.00	-32.19
	4904	PK	V	39.95	0.23	39.21	39.44	74.00	-34.56
	3180	PK	H	39.87	-3.75	44.05	40.30	74.00	-33.70
	4904	PK	H	39.95	0.23	38.83	39.06	74.00	-34.94

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

8. Emission On Band Edge

8.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement	15.247(d), 15.205,	

8.2 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	1MHz
VBW	3MHz for Peak; 10Hz for Average
Sweep	Auto couple
Restrict bands	2310~2390MHz
	2483.5 ~2500MHz
Attenuation	Auto

8.3 Test procedure

The test procedure is the same as clause 7.4

8.4 Test results

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b Chain 0	2344.72	PK	V	33.63	25.65	59.28	74	-14.72	2310~2390
	2386.32	AV	V	33.83	12.88	46.71	54	-7.29	
	2488.48	PK	V	34.32	25.77	60.09	74	-13.91	2483.5~2500
	2483.50	AV	V	34.30	12.98	47.28	54	-6.72	
802.11b Chain 1	2386.80	PK	V	33.84	28.34	62.18	74	-11.82	2310~2390
	2385.68	AV	V	33.83	17.34	51.17	54	-2.83	
	2487.96	PK	V	34.32	29.07	63.39	74	-10.61	2483.5~2500
	2488.80	AV	V	34.33	18.06	52.39	54	-1.61	
802.11g Chain 0	2389.04	PK	V	33.85	29.98	63.83	74	-10.17	2310~2390
	2390.00	AV	V	33.85	16.39	50.24	54	-3.76	
	2484.40	PK	V	34.31	31.51	65.82	74	-8.18	2483.5~2500
	2483.50	AV	V	34.30	17.11	51.41	54	-2.59	
802.11g Chain 1	2390.00	PK	V	33.85	34.38	68.23	74	-5.77	2310~2390
	2390.00	AV	V	33.85	19.13	52.98	54	-1.02	
	2484.58	PK	V	34.31	34.24	68.55	74	-5.45	2483.5~2500
	2483.50	AV	V	34.30	18.61	52.91	54	-1.09	
802.11n (HT20)	2388.48	PK	V	33.84	33.98	67.82	74	-6.18	2310~2390
	2390.00	AV	V	33.85	17.77	51.62	54	-2.38	
	2483.50	PK	V	34.30	35.77	70.07	74	-3.93	2483.5~2500
	2483.50	AV	V	34.30	18.82	53.12	54	-0.88	
802.11n (HT40)	2387.60	PK	V	33.84	30.86	64.70	74	-9.30	2310~2390
	2390.00	AV	V	33.85	16.84	50.69	54	-3.31	
	2483.50	PK	V	34.30	32.19	66.49	74	-7.51	2483.5~2500
	2483.50	AV	V	34.30	17.78	52.08	54	-1.92	

Remark: All of the antenna chains are on in the test mode of 802.11nHT20 & 802.11nHT40.

9. AC Power Line Conducted Emission

9.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Test Voltage	120V, 60Hz	
Requirement	15.207	
Date of test	Jul. 21, 2015	

9.2 Limit for AC power line conducted emission

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

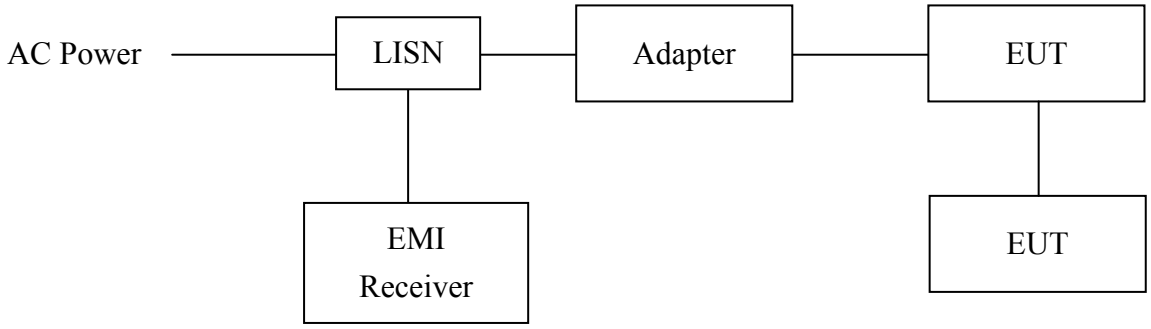
9.3 Measuring instrument setting

Receiver settings	
Receiver function	**Setting**
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

9.4 Test procedure

1. Configure the EUT according to ANSI C63.10. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
3. All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30MHz was searched
5. Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
6. The measurement has to be done between each power line and ground at the power terminal.

9.5 Test diagram



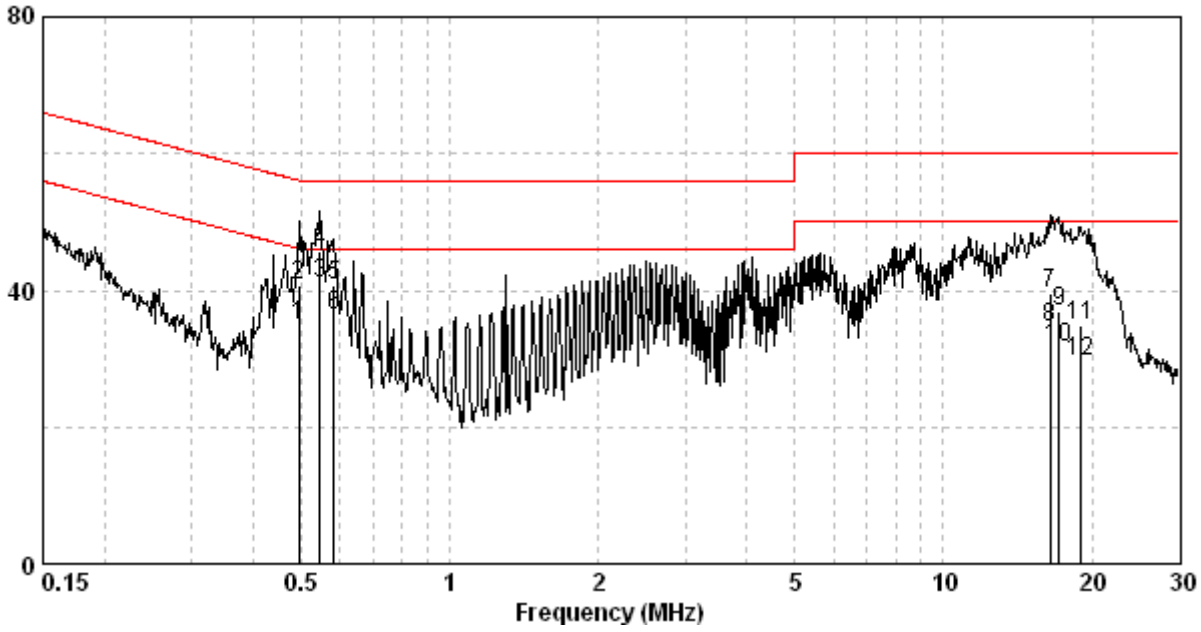
Note: The EUT was tested while in normal communication mode.

9.6 Test results

Phase : Line
EUT : H2R
Test Condition : 802.11b Channel High 2472MHz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Over Limit (dB) Qp	Over Limit (dB) Av
0.494	9.96	40.85	56.10	34.82	46.10	-15.25	-11.28
0.546	9.96	45.85	56.00	40.94	46.00	-10.15	-5.06
0.582	9.96	40.66	56.00	36.43	46.00	-15.34	-9.57
16.486	10.79	39.70	60.00	34.67	50.00	-20.30	-15.33
17.199	10.81	36.92	60.00	31.69	50.00	-23.08	-18.31
18.920	10.88	34.98	60.00	29.67	50.00	-25.02	-20.33

Remark:
1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)

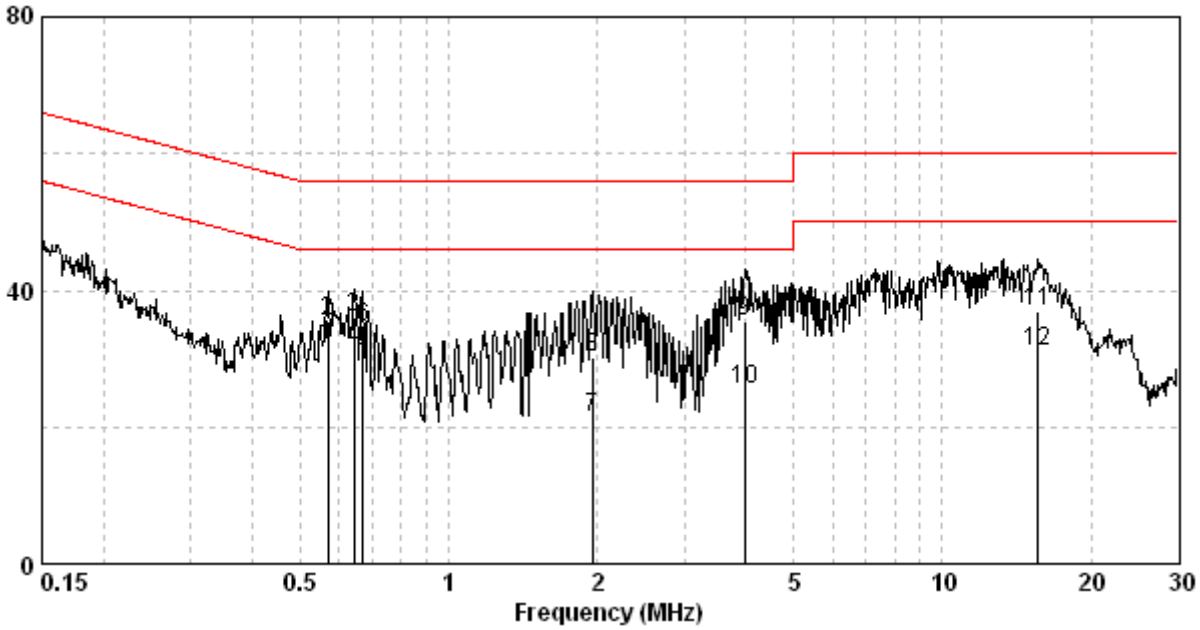


Phase : Neutral
EUT : H2R
Test Condition : 802.11b Channel High 2472MHz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Over Limit (dB) Qp	Over Limit (dB) Av
0.570	9.97	35.52	56.00	31.96	46.00	-20.48	-14.04
0.644	9.97	36.06	56.00	31.21	46.00	-19.94	-14.79
0.669	9.97	34.59	56.00	31.02	46.00	-21.41	-14.98
1.959	9.98	30.16	56.00	21.44	46.00	-25.84	-24.56
3.985	10.14	35.39	56.00	25.64	46.00	-20.61	-20.36
15.635	10.80	36.83	60.00	31.05	50.00	-23.17	-18.95

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)



Appendix A: Test equipment list

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2014/12/02	2015/12/01
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2015/01/14	2016/01/13
Horn Antenna (1-18G)	Schwarzbeck	BBHA 9120 D	9120D-456	2014/08/29	2017/08/27
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2014/09/16	2017/09/14
Broadband Antenna	Schwarzbeck	VULB 9168	9168-172	2013/08/08	2016/08/07
Loop Antenna	RolfHeine	LA-285	02/10033	2014/03/18	2016/03/16
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2014/09/15	2015/09/14
Power Meter	Anritsu	ML2495A	0844001	2014/11/12	2015/11/11
Power Senor	Anritsu	MA2411B	0738452	2014/11/12	2015/11/11
Two-Line V-Network	Rohde & Schwarz	ESH3-Z5	838979/014	2014/10/05	2015/10/04
Signal Analyzer	Agilent	N9030A	MY51380492	2014/09/19	2015/09/18
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2015/02/24	2016/02/23
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2015/05/06	2016/05/05
966-2(B) Cable 9kHz~26.5GHz	JUNFLON	SMA / J12J100880-00	AUG-26-08-002	2015/05/06	2016/05/05
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2015/05/06	2016/05/05

Brand	Software	Version
ADT	Radiated test system	7.5.14
Audix	e3	4.2004-1-12k

Appendix B: Measurement Uncertainty

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

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.15 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.23 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.19 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.3 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	4.19 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	4.3 dB
Conducted Output power	0.86 dB
Radiated electromagnetic disturbances in the frequency range from 9kHz to 30MHz	2.92 dB
Conducted disturbance measurements at a mains port from 9 kHz to 30 MHz using a 50 Ω/50 μH +5Ω artificial mains network (AMN)	2.5 dB