RADIO TEST REPORT

For

MODEL NO.: 1707
FCC ID: C3K1707
IC ID: 3048A-1707

Test Report No. R-TR371-FCCIC-WLAN-3
Issue Date: 24 Oct 2016

FCC CFR47 Part 15 Subpart C
Innovation, Science and Economic Development
Canada RSS-247 Issue 1

Prepared by
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ACCREDITED
TESTING CERT #3472.01

1 Record of Revisions

Revision	Date	Section	Page(s)	Summary of Changes	Author/Revised By:
1.0	09/23/2016	All	All	Version 1.0	Daniel Salinas
2.0	10/14/2016	5 7	8 12	Updated Product description. Corrected Equipment list details for CE Test.	Daniel Salinas
3.0	10/24/2016	7	11	Corrected typo with Murata and MegaPhase RF Cable details.	Daniel Salinas

Table of Contents

Test Report Attestation

Microsoft Corporation
Model: 1707
FCC ID: C3K1707
IC ID: 3048A-1707

Applicable Standards

Specification	Test Result
FCC 47CFR Rule Parts 15.207, 15.209, 15.247	Pass
Innovation, Science and Economic Development Canada RSS-247 Issue 1, RSS-GEN Issue 4	Pass

Microsoft EMC Laboratory attests that the product model identified in this report has been tested to and meets the requirements identified in the above standards. The test results in this report solely pertains to the specific sample tested, under the conditions and operating modes as provided by the customer.

This report shall not be used to claim product certification, approval, or endorsement by A2LA or any agency of any Government. Reproduction, duplication or publication of extracts from this test report is prohibited and requires prior written approval of Microsoft EMC Laboratory.

This report replaces the previously issued report #R-TR371-FCCIC-WLAN-2 issued by Microsoft EMC Labs on 10/14/2016.

Written By: Daniel Salinas

Radio Test Lead

Reviewed/ Issued By: Sajay Jose

EMC/RF Compliance Lab Manager

2 Deviations from Standards

None.

3 Facilities and Accreditations

3.1 Test Facility

All test facilities used to collect the test data are located at
Microsoft EMC Laboratory,
17760 NE 67th Ct,
Redmond WA, 98052, USA

3.2 Accreditations

The lab is established and follows procedures as outlined in IEC/ISO 17025 and A2LA accreditation requirements.
A2LA Accredited Testing Certificate Number: 3472.01
FCC Registration Number: US1141
IC Site Registration Numbers: 3048A-3, 3048A-4

3.3 Test Equipment

The site and related equipment are constructed in conformance with the requirements of ANSI C63.4:2014 and other equivalent applicable standards.
Test site requirements for measurements above 1 GHz are in accordance with ANSI C63.4:2014.
ANSI C63.10:2013 and the appropriate KDB test methods were followed.

4 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the product, as specified in ETSI TR 100 028. This represents an expanded uncertainty expressed at 95% confidence level using a coverage factor k=2. These levels are for reference only and not included to determine product compliance.
Expanded uncertainty calculations are available upon request.

Test item	Uncertainty	Unit
Radiated disturbance (30 MHz to 1 GHz)	5.99	dB
Radiated disturbance (1 GHz to 18 GHz)	5.12	dB
Conducted Disturbance at Mains Port	3.31	dB
Uncertainty for Conducted Power test	1.277	dB
Uncertainty for Conducted Spurious emission test	2.742	dB
Uncertainty for Bandwidth test	83	kHz
Uncertainty for DC power test	0.05	%
Uncertainty for test site temperature	0.5	ºC
Uncertainty for test site Humidity	3	%
Uncertainty for time	0.189	%

5 Product Description

Company Name:	Microsoft Corporation
Address:	One Microsoft Way
City, State, Zip:	Redmond, WA 98052-6399
Customer Contact:	Jennifer Liu
Functional Description of the EUT:	PC with IEEE 802.11a/b/g/n/ac MIMO supporting 20/40/80 MHz bandwidths, Bluetooth and additional 802.11n Radio.
Model:	1707
FCC ID:	C3K1707
IC ID:	3048A-1707
Radio under test:	IEEE 802.11 b/g/n supporting 20 MHz Bandwidth 2.4 GHz- 2.4835 GHz.
Modulation(s):	CCK, BPSK, OFDM, and QAM modulation
Antenna Information:	Internal Antenna. **Manufacturer declared Antenna Gain:** Chain A: 6.2 dBi Chain B: 5.75 dBi
EUT Classification:	DTS
Equipment Design State:	Prototype/Production Equivalent
Equipment Condition:	Good
Test Sample Details:	RF Conducted Test Sample SN: 000074361258 RF Radiated Test Sample SN: 000266762258

5.1 Test Configurations

Test software “WiFi Tool” (V2.7.3) provided by the customer and “Lab Tool” (V2.0.0.77) from the module vendor was used to program the EUT to transmit continuously.
All modes of operation were investigated initially with full testing performed on the worst-case modes. This report contains data from the following worst-case modes of operation:
802.11b: 1Mbps
802.11g: 6Mbps
802.11n: MCS0

5.2 Environmental Conditions

Ambient air temperature of the test site was within the range of 10 ºC to 40 ºC (50 ºF to 104 ºF) unless the EUT specified testing over a different temperature range. Humidity levels were in the range of 10% to 90% relative humidity. Testing conditions were within tolerance and any deviations required from the EUT are reported.

5.3 Antenna Requirements

The antennas are permanently attached and there are no provisions for connection to an external antenna.

5.3.1 Antenna Gain

Antenna Gain			
Frequency Band (MHz)	**Chain A MIMO Wi-Fi Antenna Peak Gain (dBi)**	**Chain B Main Antenna Wi-Fi Peak Gain (dBi)**	**Total Antenna Gain (dBi)**
2400 – 2483.5	6.2	5.75	5.98

Simultaneous transmission on both transmit chains was observed to be the worst case mode of operation for all test cases. Since the transmit signals are completely uncorrelated, the combined gain is calculated using the following formula as specified in KDB 662911 D01 Multiple Transmitter Output v02r01:

Directional gain = 10log $[(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})/N_{ANT}]$ dBi

In the case that G1 =6.2dBi, G2=5.75dBi:

Directional gain = 10log$[(10^{G1/10} + 10^{G2/10})/N_{ANT}]$ = 10log$[(10^{6.2/10} + 10^{5.75/10})/2]$ = 5.98 dBi

5.4 Equipment Modifications

No modifications were made during testing.

5.5 Dates of Testing

Testing was performed from June 16th to June 29th, 2016.

6 Test Results Summary

Test Description	FCC CFR 47/ ISED Rule Part	Limit	Test Result
Duty Cycle	Reporting & Measurements	Reporting & Measurements Purposes only	N/A
6dB Bandwidth	15.247 (a)(2) RSS-247 [5.2]	≥ 500kHz	Pass
Occupied Bandwidth	Reporting & Measurements	Reporting & Measurements Purposes only	N/A
Output Power	15.247 (b)(3) RSS-247 [5.4]	≤ 1 Watt	Pass
Equivalent Isotropic Radiated Power	15.247 (b)(3) RSS-247 [5.4]	≤ 4 Watt	Pass
Power Spectral Density	15.247 (e) RSS-247 [5.2]	≤ 8dBm/3kHz	Pass
Conducted Band Edge/Spurious Emissions	15.247 (d) RSS-247 [5.5]	At least 20dBc	Pass
Radiated Spurious Emissions/ Restricted Band Emissions	15.205, 15.209 RSS-247 [5.5] RSS-Gen [8.9]	FCC CFR 47 15.209 limits RSS-Gen [8.9]	Pass
AC Power line Conducted Emissions	15.207 RSS-Gen [8.8]	FCC CFR 47 15.207 limits RSS-Gen [8.8]	Pass

7 Test Equipment List

Equipment used for Radiated and Conducted Measurements				
Manufacturer	**Description**	**Model #**	**Asset #**	**Calibration Due**
Rohde & Schwarz	EMI Test Receiver	ESU40	RF-192	4/13/2017
Rohde & Schwarz	EMI Test Receiver	ESU40	EMC-607	05/26/2017
Rohde & Schwarz	Signal Analyzer	FSV40	RF-228	4/12/2017
Rohde & Schwarz	Power Meter	NRP-Z91	RF-211	4/113/2017
Sunol Sciences	Antenna - Broadband Hybrid	JB6	EMC-640	9/29/2016
ETS-Lindgren	Antenna	3117	RF-137	2/25/2017
ETS-Lindgren	Antenna – Standard Gain	3160-09	RF-037	3/15/2017
Rohde & Schwarz	Custom Filter Bank+PreAmp	SFUNIT RX	RF-323	12/10/2016
Rohde & Schwarz	Pre-Amp	TS-PR26	RF-199	12/15/2016
Rohde & Schwarz	Switch and Control Unit	OSP130	RF-249	12/10/2016
Rohde & Schwarz	Switch and Control Unit	OSP130	RF-018	12/18/2016
Rohde & Schwarz	Switch and Control Unit	OSP150	RF-250	12/10/2016
Rohde & Schwarz	Switch and Control Unit	OSP150	RF-019	12/18/2016
Murata	RF Cable	MXHQ87WA3000	RF-415	11/09/2016
MegaPhase	RF Cable	EMC3-N1N1-394	EMC-1034	06/21/2017
Huber & Suhner	RF Cable	SucoFlex 100	RF-350	12/10/2016
Huber & Suhner	RF Cable	SucoFelx 100	RF-352	12/10/2016
Huber & Suhner	RF Cable	SucoFlex 100	RF-350	12/10/2016
Huber & Suhner	RF Cable	SucoFelx 100	RF-352	12/10/2016

Manufacturer	Description	Model #	Asset #	Calibration Due
Huber & Suhner	RF Cable	Sucoflex 102A	RF-269	12/16/2016
Madge Tech	THP Monitor	PRH Temp 2000	EMC-681	11/19/2016
Micro-Coax	RF Cable	UFA210A-0-0787-300300	RF-292	11/10/2016
Micro-Coax	RF Cable	UTI Flex	RF-354	12/10/2016
Pasternack	Attenuator	PE7087-3	RF-337	01/26/2017
Pasternack	3dB Attenuator	PE7087-3	RF-338	01/29/2017
Pasternack	6dB Attenuator	PE7087-6	RF-432	01/27/2017

Equipment used for Line Conducted Emissions Measurement				
Manufacturer	**Description**	**Model #**	**Asset #**	**Calibration Due**
Rohde & Schwarz	EMI Test Receiver	ESR 3	EMC-669	4/14/2017
Teseq	AE LISN	NNB 51	EMC-187	9/25/2016*
Teseq	Test LISN	NNB 51	EMC-642	11/24/2016
Micro-Coax	RF Cable	UFA210A-1-1800-50U50U	EMC-367	8/6/2016*
Madge Tech	THP Monitor	PRHTemp2000	EMC-169	8/18/2016*
ETS	TILE SW	Ver 7.1.3.22	N/A	N/A
Fluke	Multimeter	189	EMC-231	8/31/2016*

*Note- all equipment in valid calibration status at the time of test- Jun 29, 2016.

8 Test Site Description

8.1 Radiated Emissions Test Site

Radiated measurements are performed in a 3m semi-anechoic chamber, which meets NSA requirements for the frequency range of 30MHz to 1000MHz. For measurements above 1 GHz, absorbers are laid out on the ground plane between the receiving antenna and the EUT to meet Site VSWR requirements in accordance with ANSI C63.4:2014.

8.1.1 Radiated Measurements in 30 MHz - 1000 MHz

The EUT is positioned on a turntable at a height of 80cm using a non-conducting table. A linearly polarized broadband antenna is positioned at 3m from the EUT periphery. The turntable is rotated 360 degrees and the antenna height varied from 1m to 4m to determine the highest emissions. This is repeated for both Horizontal and Vertical polarizations of the measurement antenna. All possible orientations of the EUT were investigated for emissions and the vertical standing mode was identified as the worst case configuration.

8.1.2 Radiated Measurements above 1GHz

The EUT is positioned on a Turntable at a height of 150cm. A linearly polarized antenna is positioned at 3m from the EUT periphery. Guidelines in ANSI C63.10:2013 were followed with respect to maximizing the emissions. The turntable is rotated 360 degrees and the antenna height varied from 1m to 4m (with antenna bore-sighting enabled) to determine the highest emissions. This is repeated for both Horizontal and Vertical polarizations of the measurement antenna. Measurements above 18GHz were performed at a distance of 3m.

8.2 Antenna port conducted measurements

All antenna port conducted measurements were performed on a bench-top setup consisting of a spectrum analyzer, power meter (as necessary), splitters/combiners (as necessary), attenuators, and pre-characterized RF cables.

The correction factors between the EUT and the spectrum analyzer were added internally in the analyzer settings, where applicable. The plots displayed takes into account these correction factors.

8.3 Test Setup Diagrams

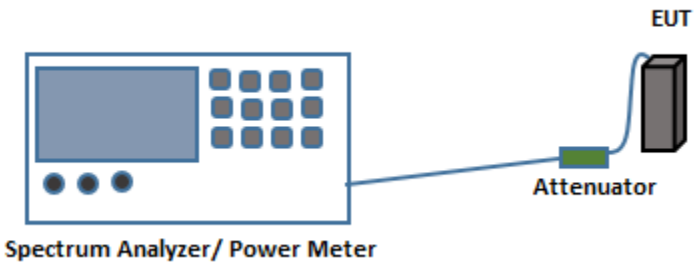


Fig.1. Test Setup for Antenna port conducted measurements

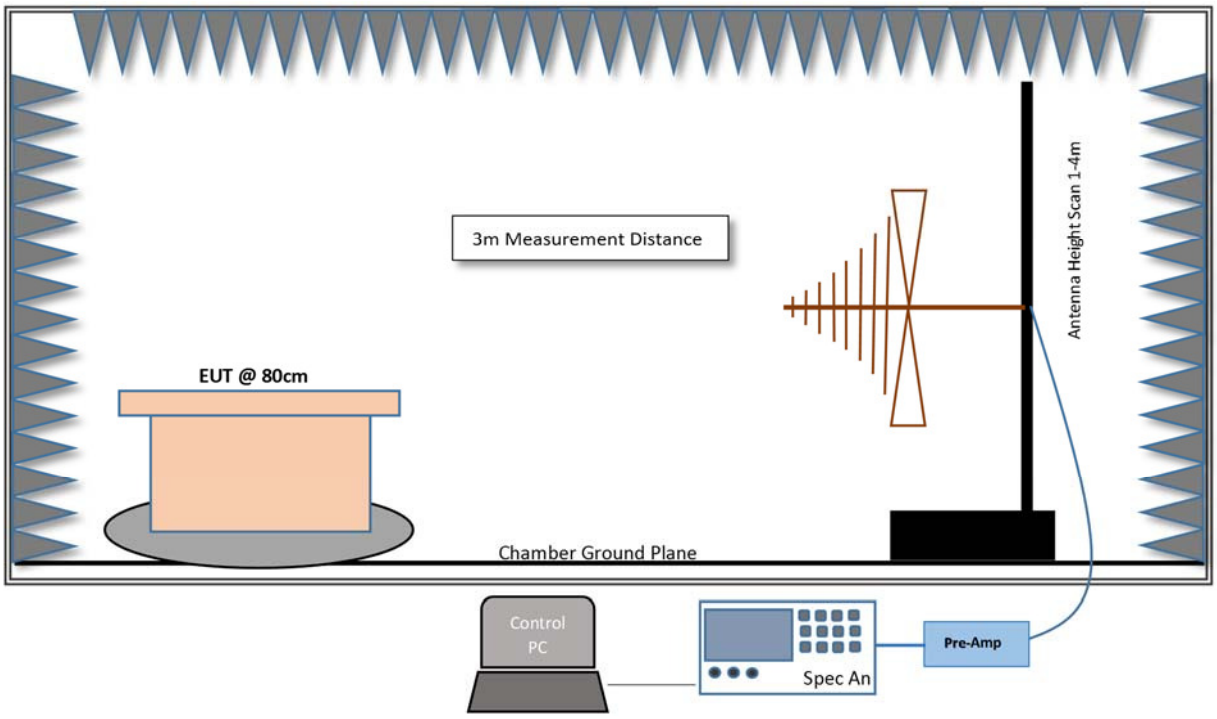


Fig.2. Test Setup for Radiated measurements in 30MHz- 1GHz Range

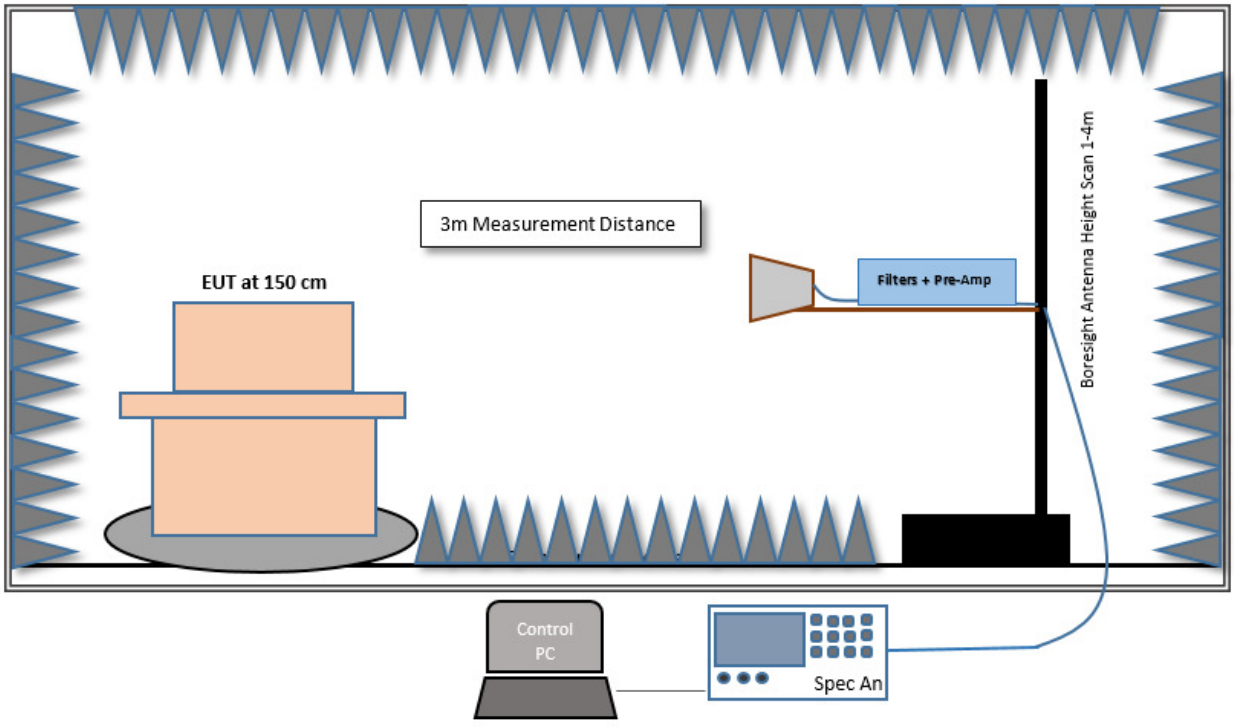


Fig.3. Test Setup for Radiated measurements in 1GHz- 18GHz Range

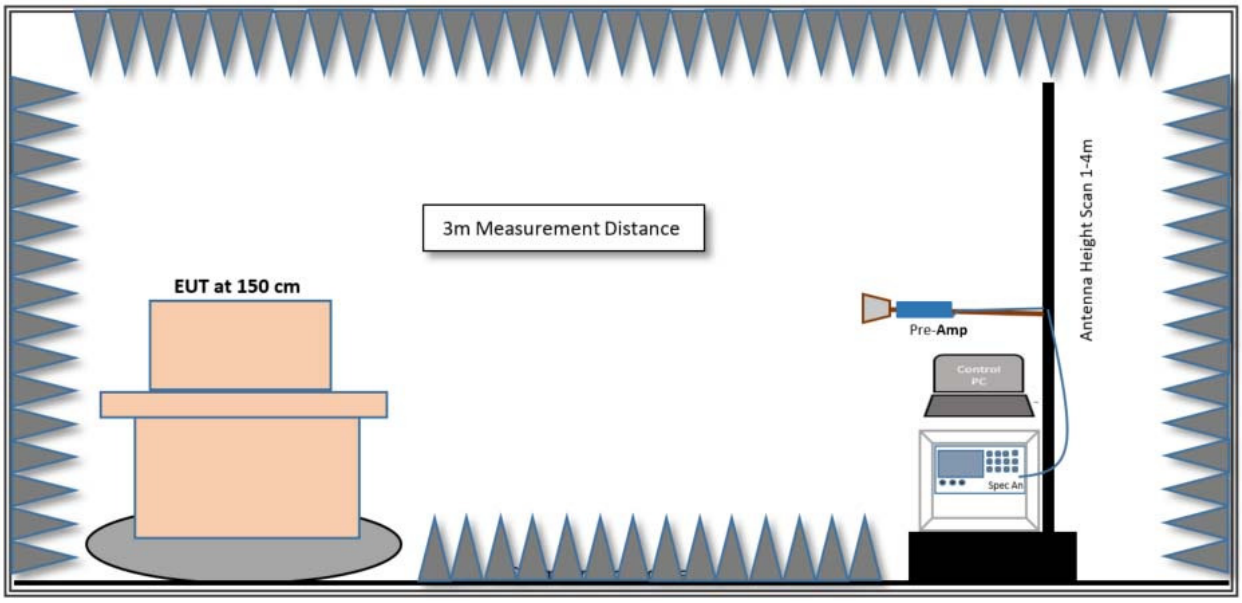


Fig.4. Test Setup for Radiated measurements >18GHz

9 Test Results- Conducted

9.1 Duty Cycle

9.1.1 Test Requirement:

Reporting and measurement purposes only.

9.1.2 Test Method:

Measurements were performed according to the procedure defined in ANSI C63.10 (2013) American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices.

Spectrum Analyzer Settings:
RBW ≥ Occupied Bandwidth if possible; otherwise, set RBW to the largest available value
VBW ≥ RBW ≥ Signal Period
Detector = Peak
Span = 0 Hz
Sweep points > 100

9.1.3 Limits:

Reporting and measurement purposes only.

9.1.4 Test Results:

Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	10	10	100	0.00
802.11g	10	10	100	0.00
802.11n	10	10	100	0.00

9.1.5 Test Data:

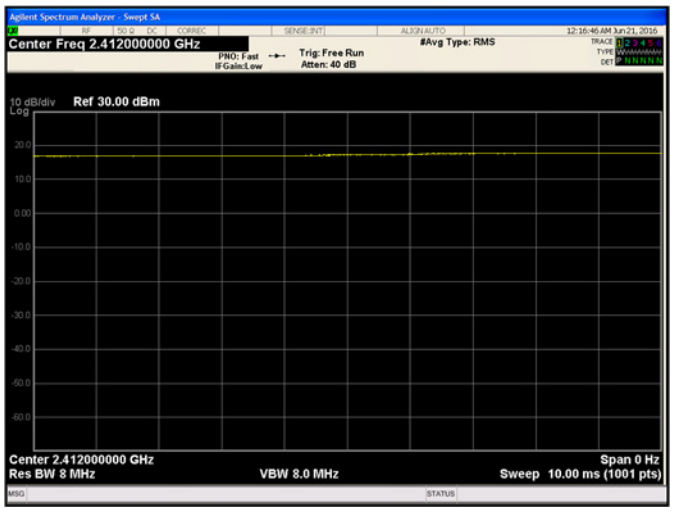


Figure 9-1. Duty Cycle 802.11b

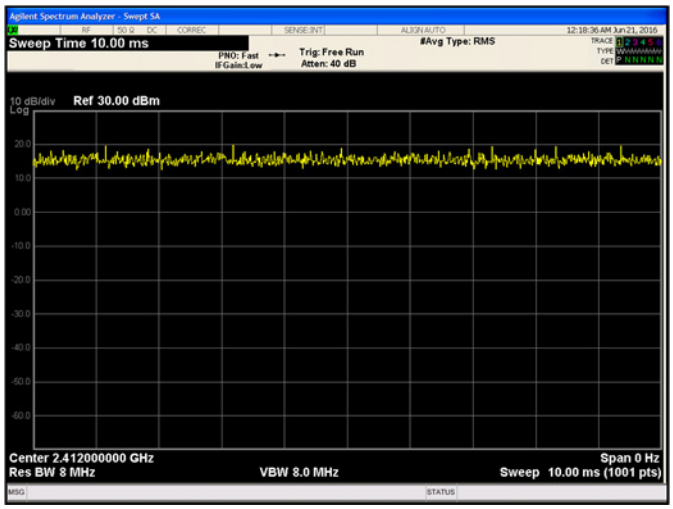


Figure 9-2. Duty Cycle 802.11g

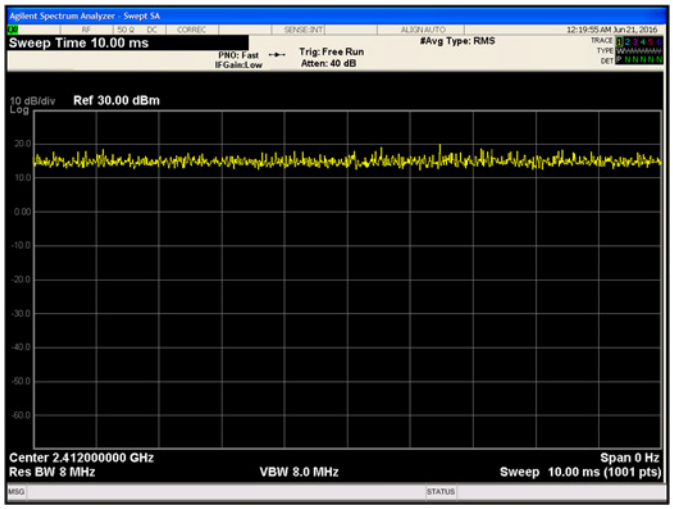


Figure 9-3. Duty Cycle 802.11n

9.2 DTS Bandwidth

9.2.1 Test Requirement:

FCC CFR 47 Rule Part 15.247 (a)(2)

ISED RSS-247 [5.2]

9.2.2 Test Method:

Measurements were performed according to the procedure defined in KDB 558074- Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 V03R05 and ANSI C63.10 (2013) American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices.

Spectrum Analyzer Settings:
RBW= 100 kHz
VBW≥ 3 × RBW
Detector = Peak
Span = 30MHz
Trace Mode= Max Hold
Sweep time= Auto Couple
The in-built functionality of the Spectrum Analyzer is used to measure the 6-dB bandwidth.

9.2.3 Limits:

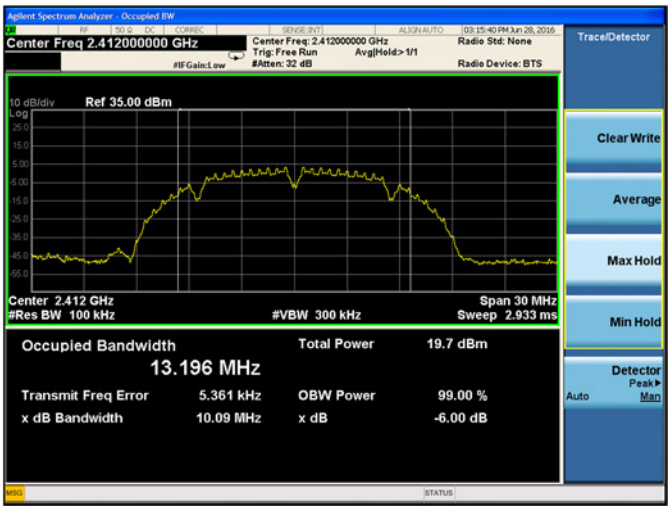
The 6-dB bandwidth shall be at least 500 kHz

9.2.4 Test Results:

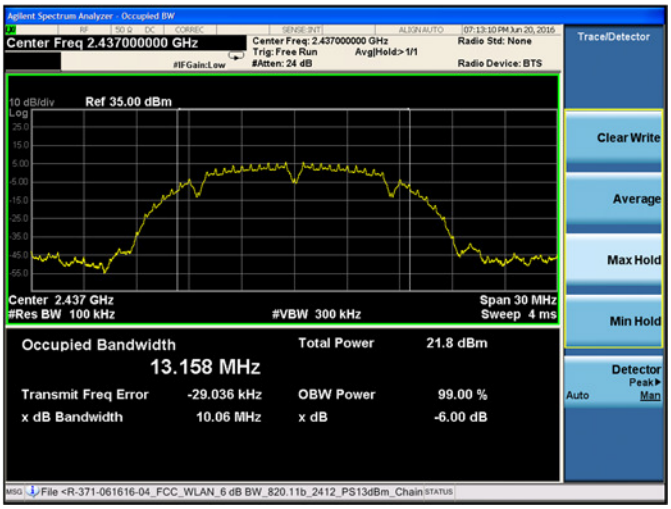
Chain A 802.11b 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	10.09	≥ 0.5	Pass
6	2437	10.06	≥ 0.5	Pass
11	2462	10.10	≥ 0.5	Pass
13	2472	10.07	≥ 0.5	Pass
Chain A 802.11g 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	16.35	≥ 0.5	Pass
6	2437	16.38	≥ 0.5	Pass
11	2462	16.34	≥ 0.5	Pass
13	2472	16.39	≥ 0.5	Pass
Chain A 802.11n 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	17.56	≥ 0.5	Pass
6	2437	17.62	≥ 0.5	Pass
11	2462	17.54	≥ 0.5	Pass
13	2472	17.54	≥ 0.5	Pass

Chain B 802.11b 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	10.10	≥ 0.5	Pass
6	2437	10.04	≥ 0.5	Pass
11	2462	10.10	≥ 0.5	Pass
13	2472	10.11	≥ 0.5	Pass
Chain B 802.11g 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	16.34	≥ 0.5	Pass
6	2437	16.40	≥ 0.5	Pass
11	2462	16.37	≥ 0.5	Pass
13	2472	16.41	≥ 0.5	Pass
Chain B 802.11n 6-dB Emission Bandwidth				
Channel No.	**Frequency (MHz)**	**6-dB Emission Bandwidth (MHz)**	**Limit (MHz)**	**Result**
1	2412	17.57	≥ 0.5	Pass
6	2437	17.59	≥ 0.5	Pass
11	2462	17.57	≥ 0.5	Pass
13	2472	17.58	≥ 0.5	Pass

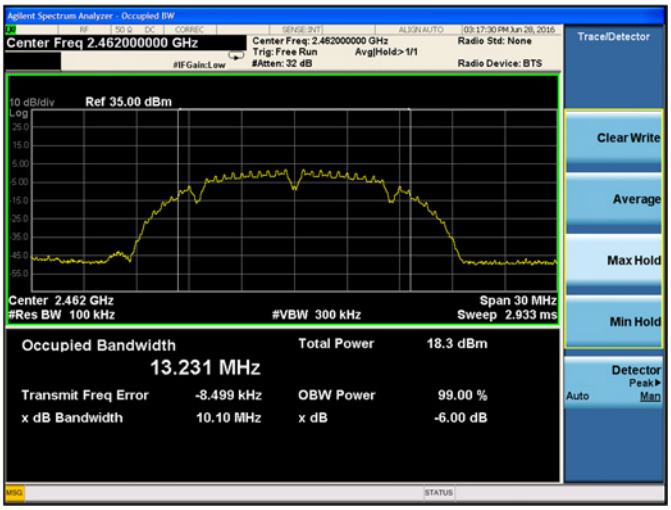
9.2.5 Test Data:



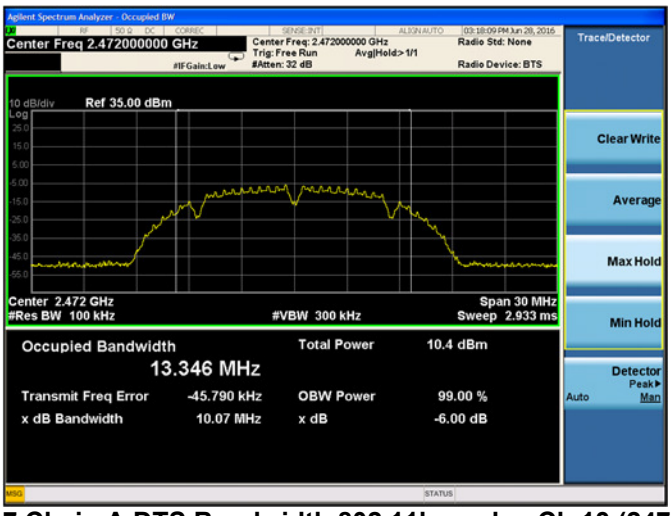
Plot 9-4 Chain A DTS Bandwidth 802.11b mode - Ch.1 (2412 MHz)



Plot 9-5 Chain A DTS Bandwidth 802.11b mode - Ch.6 (2437 MHz)

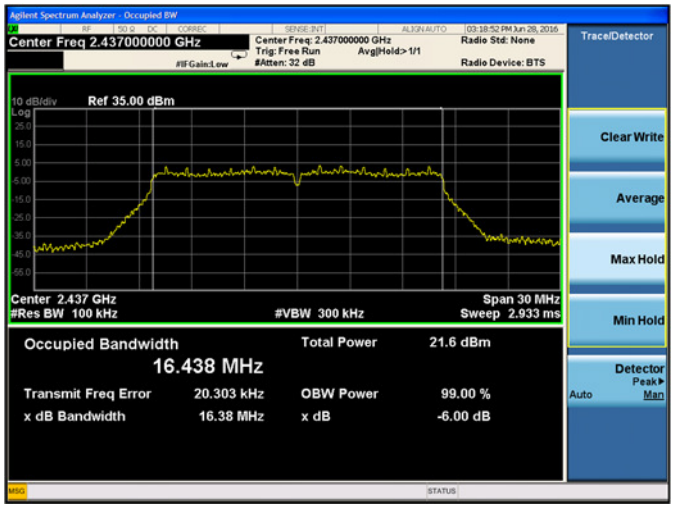


Plot 9-6 Chain A DTS Bandwidth 802.11b mode - Ch.11 (2462 MHz)

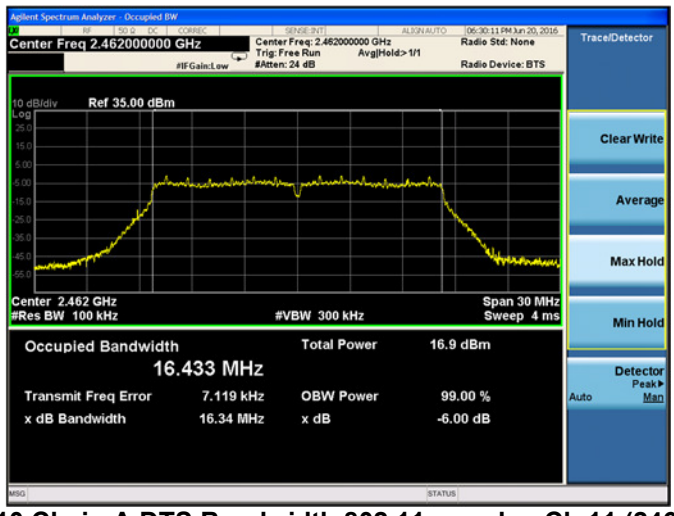


Plot 9-7 Chain A DTS Bandwidth 802.11b mode - Ch.13 (2472 MHz)

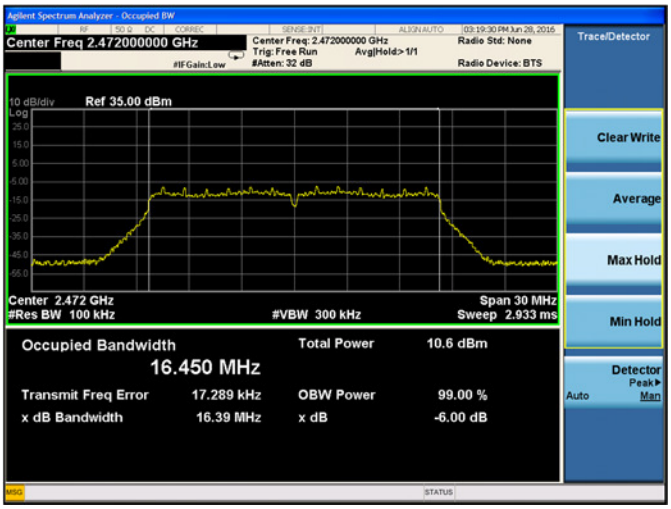
Plot 9-8 Chain A DTS Bandwidth 802.11g mode - Ch.1 (2412 MHz)



Plot 9-9 Chain A DTS Bandwidth 802.11g mode - Ch.6 (2437 MHz)

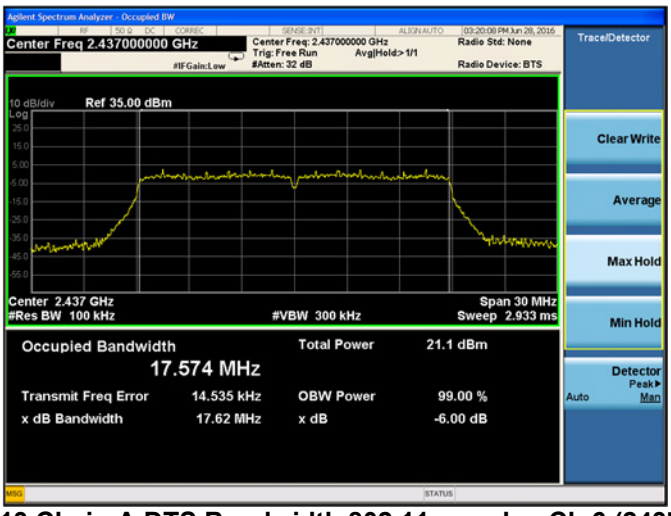


Plot 9-10 Chain A DTS Bandwidth 802.11g mode - Ch.11 (2462 MHz)

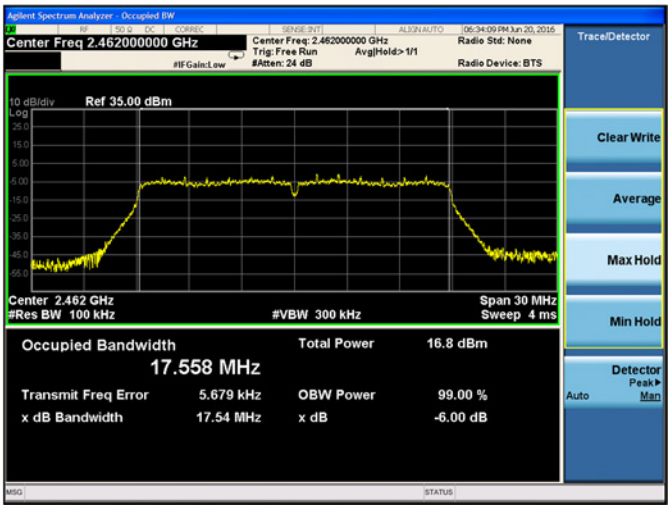


Plot 9-11 Chain A DTS Bandwidth 802.11g mode - Ch.13 (2472 MHz)

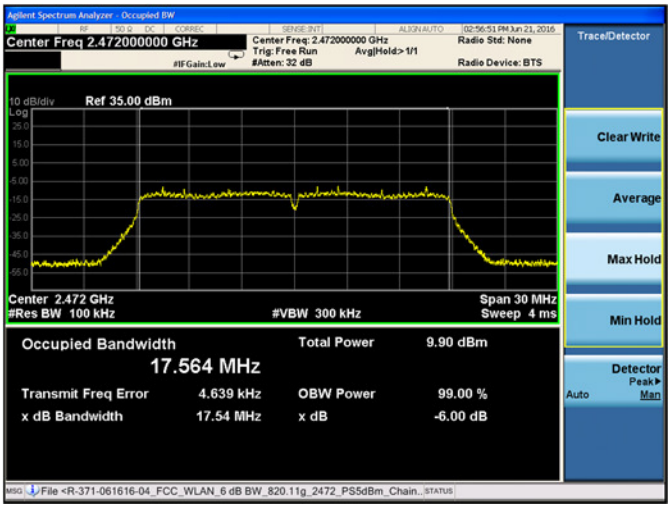
Plot 9-12 Chain A DTS Bandwidth 802.11n mode - Ch.1 (2412 MHz)



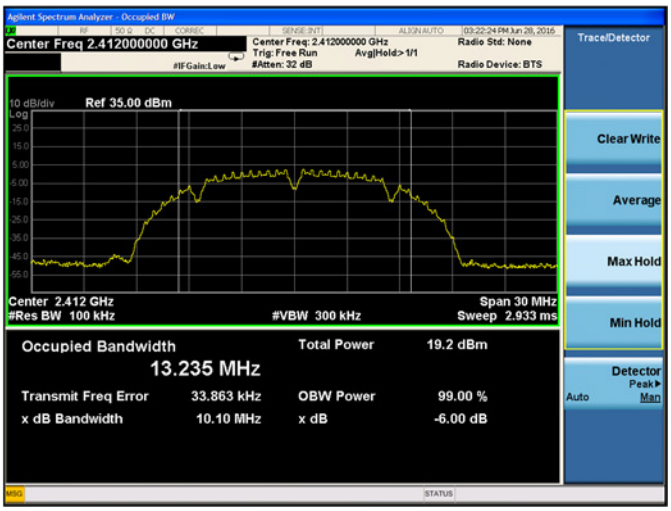
Plot 9-13 Chain A DTS Bandwidth 802.11n mode - Ch.6 (2437 MHz)



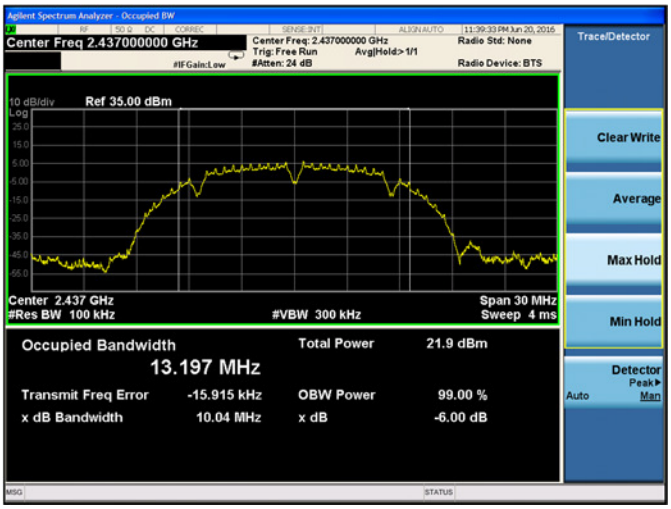
Plot 9-14 Chain A DTS Bandwidth 802.11n mode - Ch.11 (2462 MHz)



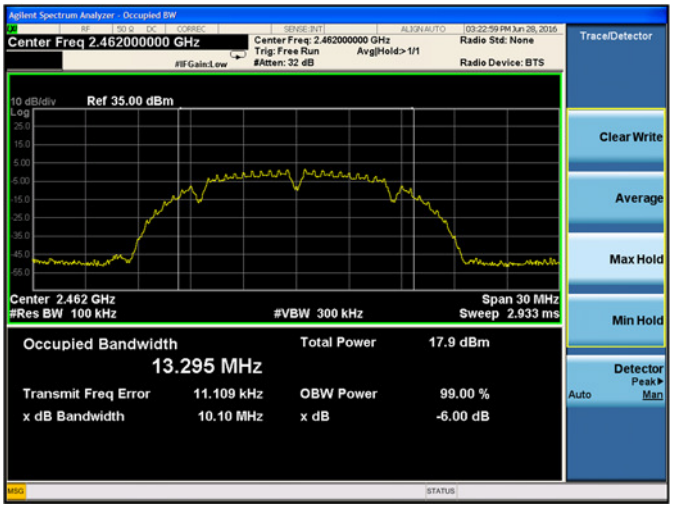
Plot 9-15 Chain A DTS Bandwidth 802.11n mode - Ch.13 (2472 MHz)



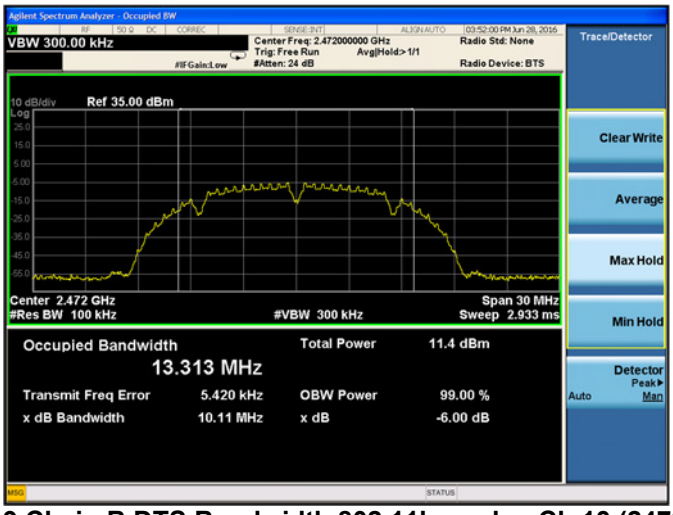
Plot 9-16 Chain B DTS Bandwidth 802.11b mode - Ch.1 (2412 MHz)



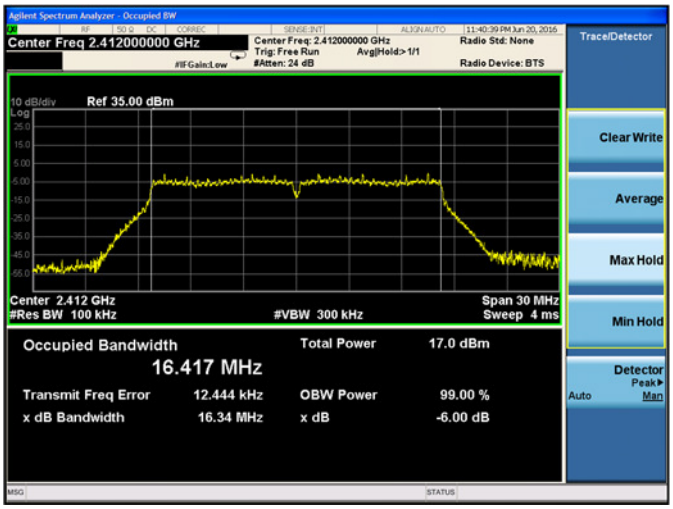
Plot 9-17 Chain B DTS Bandwidth 802.11b mode - Ch.6 (2437 MHz)



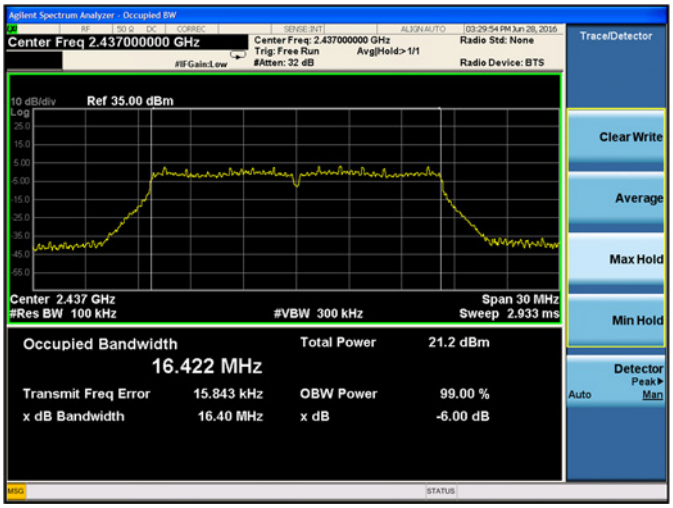
Plot 9-18 Chain B DTS Bandwidth 802.11b mode - Ch.11 (2462 MHz)



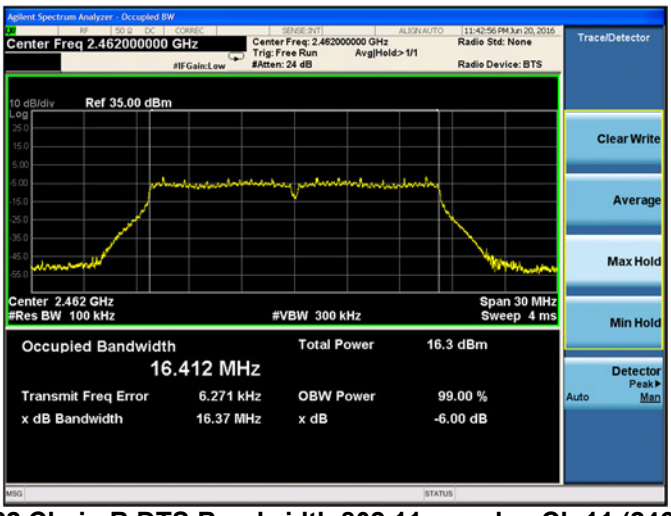
Plot 9-19 Chain B DTS Bandwidth 802.11b mode - Ch.13 (2472 MHz)



Plot 9-20 Chain B DTS Bandwidth 802.11g mode - Ch.1 (2412 MHz)



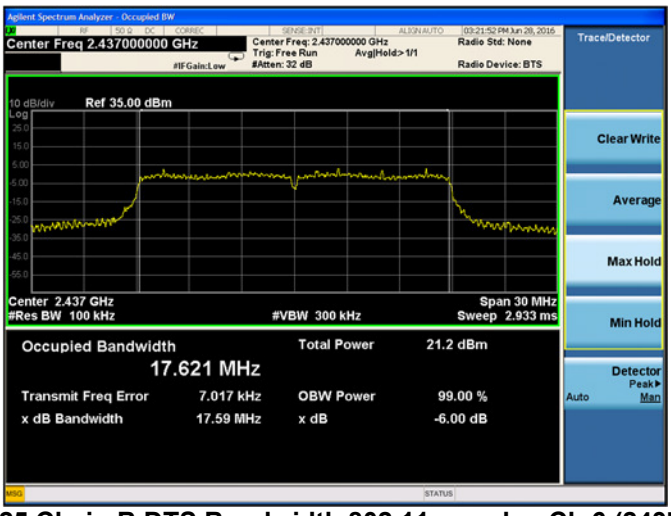
Plot 9-21 Chain B DTS Bandwidth 802.11g mode - Ch.6 (2437 MHz)



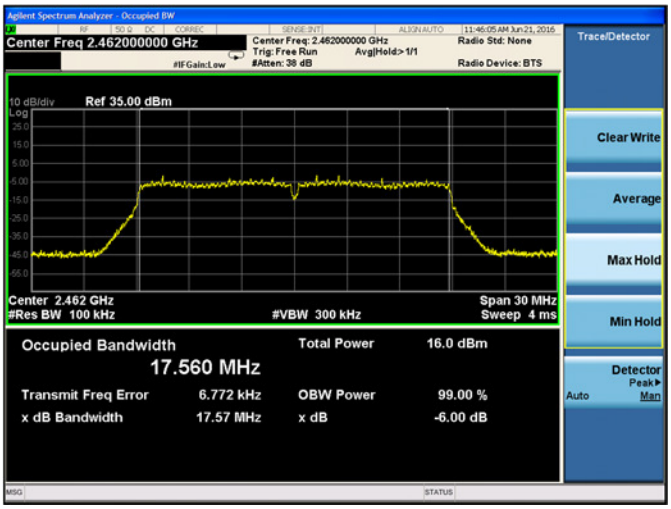
Plot 9-22 Chain B DTS Bandwidth 802.11g mode - Ch.11 (2462 MHz)

Plot 9-23 Chain B DTS Bandwidth 802.11g mode - Ch.13 (2472 MHz)

Plot 9-24 Chain B DTS Bandwidth 802.11n mode - Ch.1 (2412 MHz)



Plot 9-25 Chain B DTS Bandwidth 802.11n mode - Ch.6 (2437 MHz)



Plot 9-26 Chain B DTS Bandwidth 802.11n mode - Ch.11 (2462 MHz)

Plot 9-27 Chain B DTS Bandwidth 802.11n mode - Ch.13 (2472 MHz)

9.3 99% Bandwidth

9.3.1 Test Requirement:

Reporting and measurement purposes only.

9.3.2 Test Method:

Measurements were performed according to the procedure defined in ANSI C63.10 (2013) American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices.

Spectrum Analyzer settings:

Set analyzer center frequency to the nominal EUT channel frequency
Span set to between 1.5 and 5.0 times the DTS bandwidth
RBW to: 1% to 5% of the OBW
VBW ≥ 3 RBW
Detector = Peak
Sweep time = auto couple
Trace mode = max hold
Use the 99% power bandwidth function of the instrument.

9.3.3 Limit:

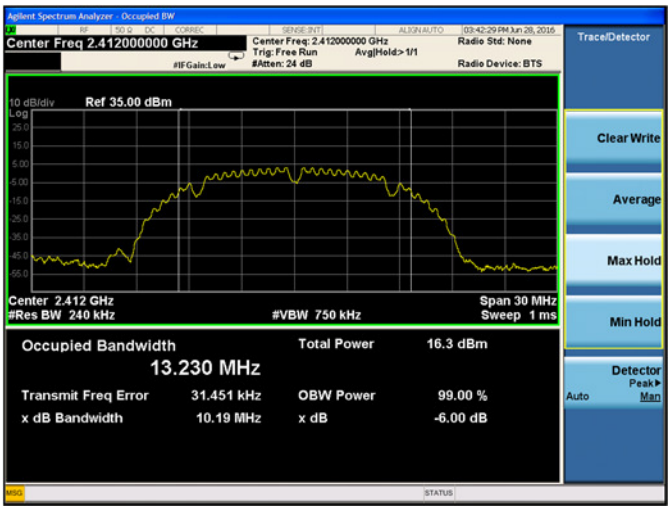
Reporting and measurement purposes only.

9.3.4 Test Results:

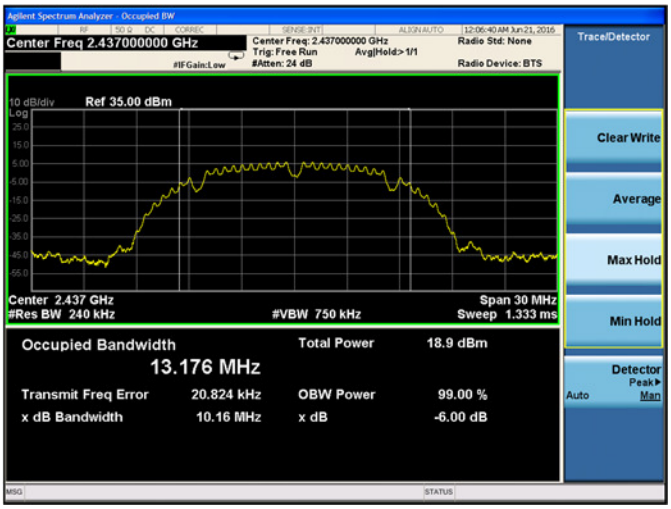
Chain A 802.11b 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	13.23
6	2437	13.18
11	2462	13.27
13	2472	13.33
Chain A 802.11g 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	16.58
6	2437	16.63
11	2462	16.60
13	2472	16.63
Chain A 802.11n 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	17.60
6	2437	17.62
11	2462	17.61
13	2472	17.60

Chain B 802.11b 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	13.26
6	2437	13.21
11	2462	13.27
13	2472	13.32
Chain B 802.11g 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	16.55
6	2437	16.57
11	2462	17.00
13	2472	16.58
Chain B 802.11n 99% Bandwidth (MHz)		
Channel No.	**Frequency (MHz)**	**99% Bandwidth (MHz)**
1	2412	17.61
6	2437	17.62
11	2462	17.60
13	2472	17.61

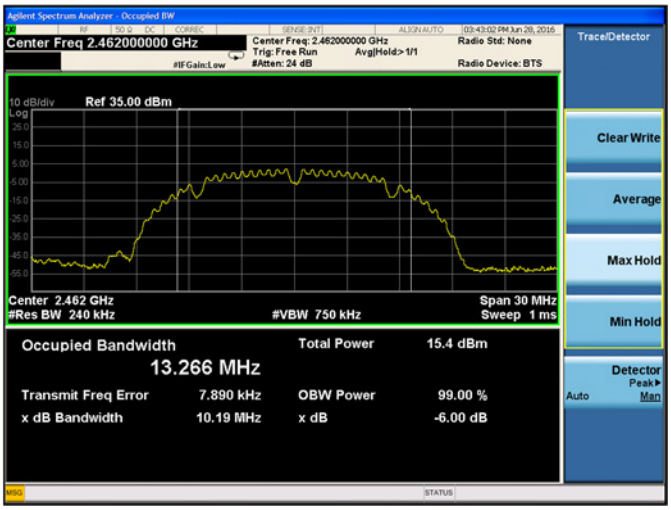
9.3.5 Test Data:



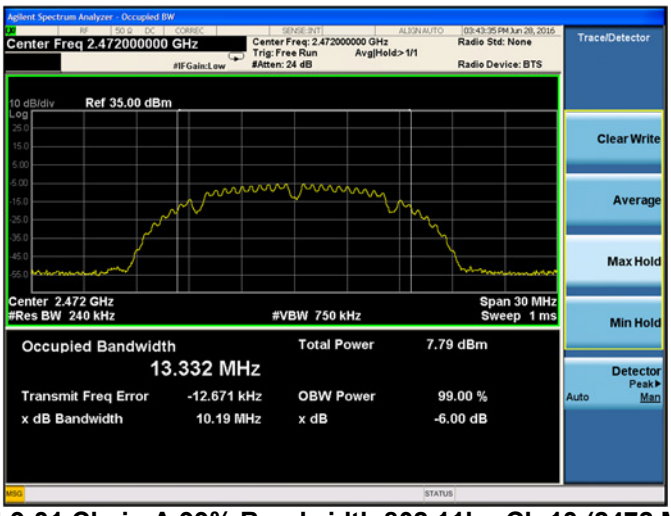
Plot 9-28 Chain A 99% Bandwidth 802.11b - Ch.1 (2412 MHz)



Plot 9-29 Chain A 99% Bandwidth 802.11b - Ch.6 (2437 MHz)



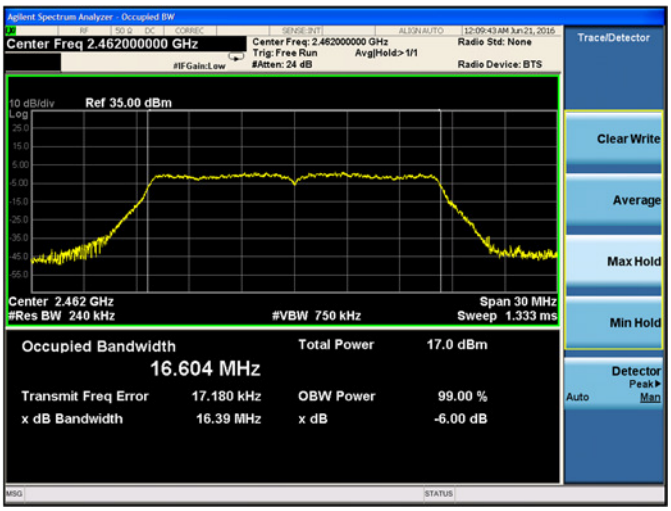
Plot 9-30 Chain A 99% Bandwidth 802.11b - Ch.11 (2462 MHz)



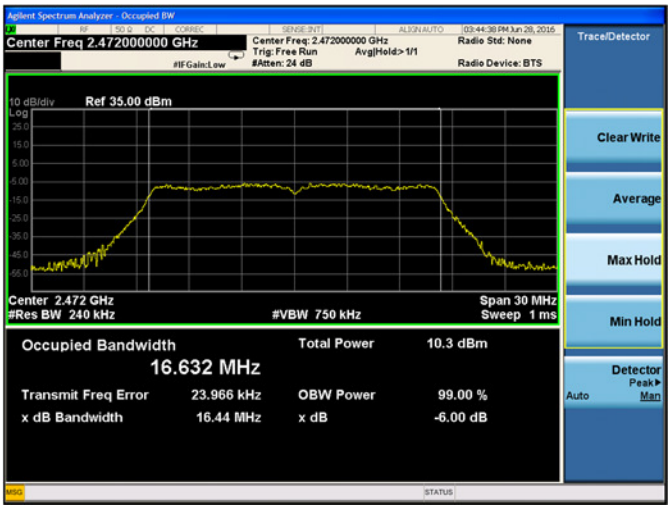
Plot 9-31 Chain A 99% Bandwidth 802.11b - Ch.13 (2472 MHz)

Plot 9-32 Chain A 99% Bandwidth 802.11g - Ch.1 (2412 MHz)

Plot 9-33 Chain A 99% Bandwidth 802.11g - Ch.6 (2437 MHz)

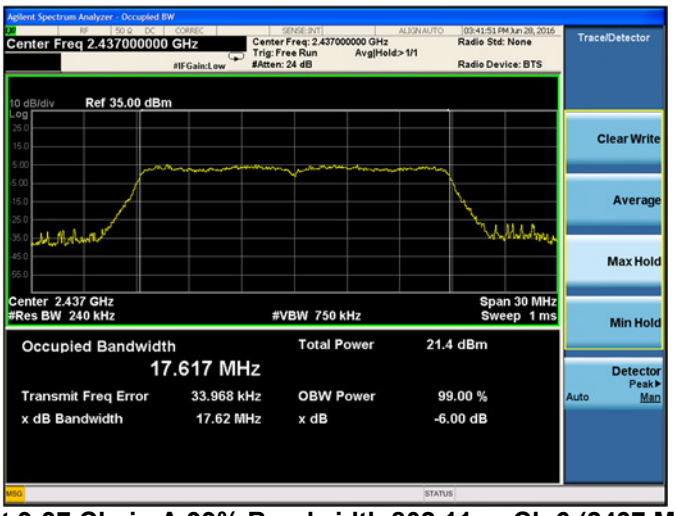


Plot 9-34 Chain A 99% Bandwidth 802.11g - Ch.11 (2462 MHz)



Plot 9-35 Chain A 99% Bandwidth 802.11g - Ch.13 (2472 MHz)

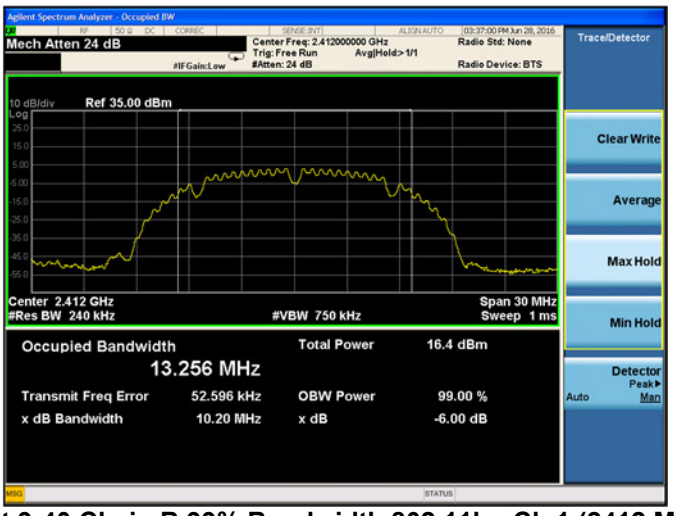
Plot 9-36 Chain A 99% Bandwidth 802.11n - Ch.1 (2412 MHz)



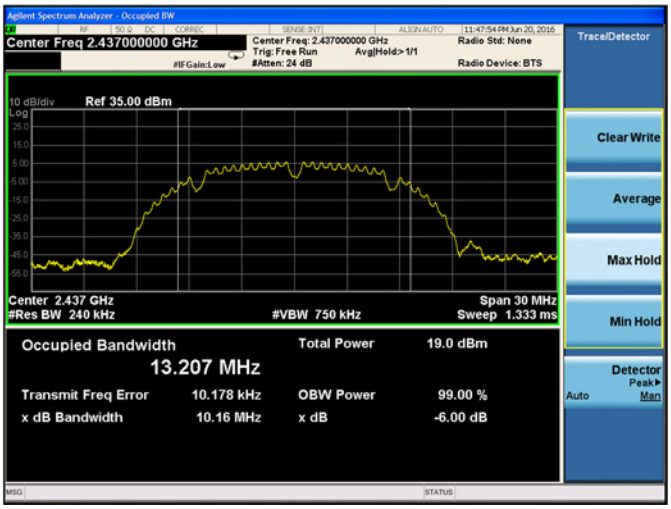
Plot 9-37 Chain A 99% Bandwidth 802.11n - Ch.6 (2437 MHz)

Plot 9-38 Chain A 99% Bandwidth 802.11n - Ch.11 (2462 MHz)

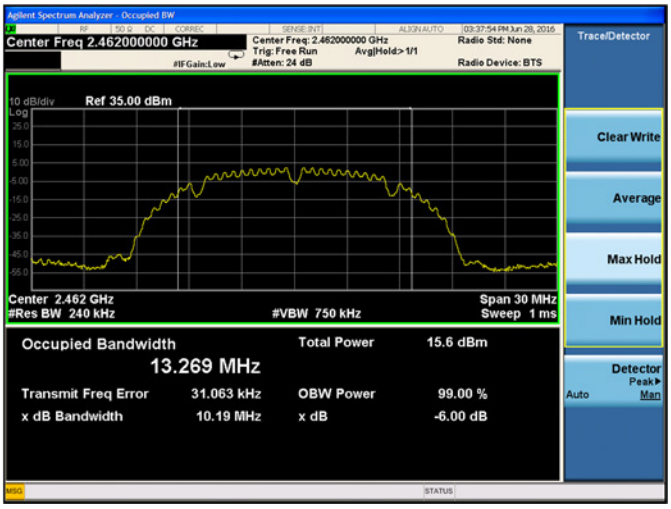
Plot 9-39 Chain A 99% Bandwidth 802.11n - Ch.13 (2472 MHz)



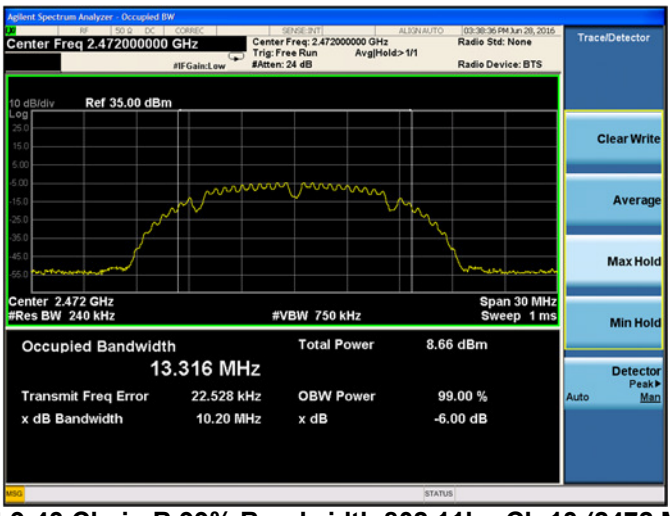
Plot 9-40 Chain B 99% Bandwidth 802.11b - Ch.1 (2412 MHz)



Plot 9-41 Chain B 99% Bandwidth 802.11b - Ch.6 (2437 MHz)



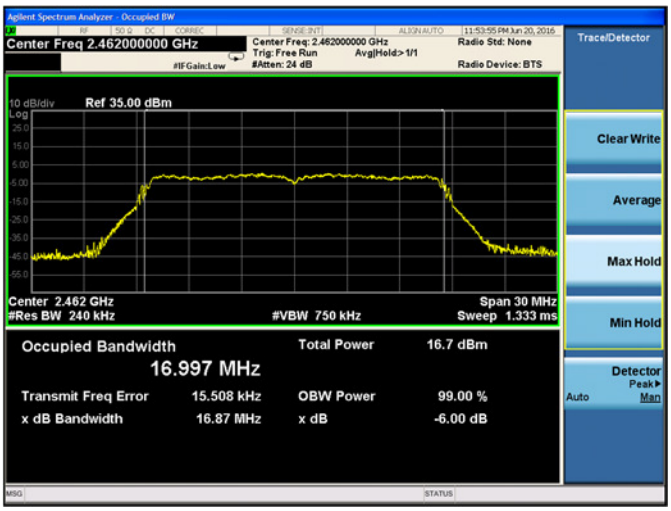
Plot 9-42 Chain B 99% Bandwidth 802.11b - Ch.11 (2462 MHz)



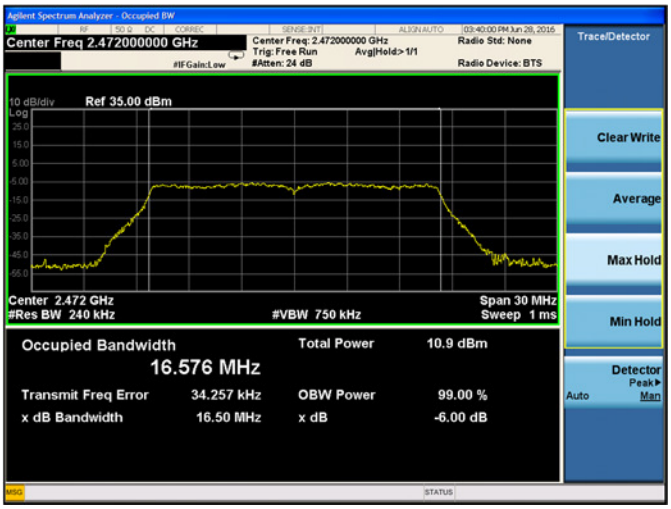
Plot 9-43 Chain B 99% Bandwidth 802.11b - Ch.13 (2472 MHz)

Plot 9-44 Chain B 99% Bandwidth 802.11g - Ch.1 (2412 MHz)

Plot 9-45 Chain B 99% Bandwidth 802.11g - Ch.6 (2437 MHz)

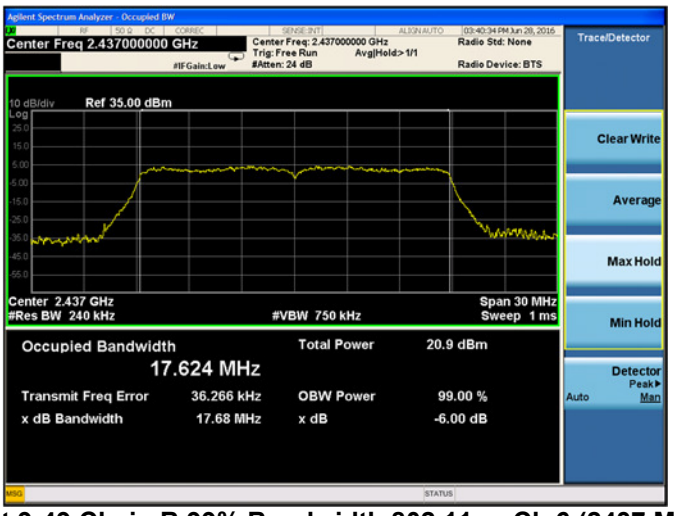


Plot 9-46 Chain B 99% Bandwidth 802.11g - Ch.11 (2462 MHz)



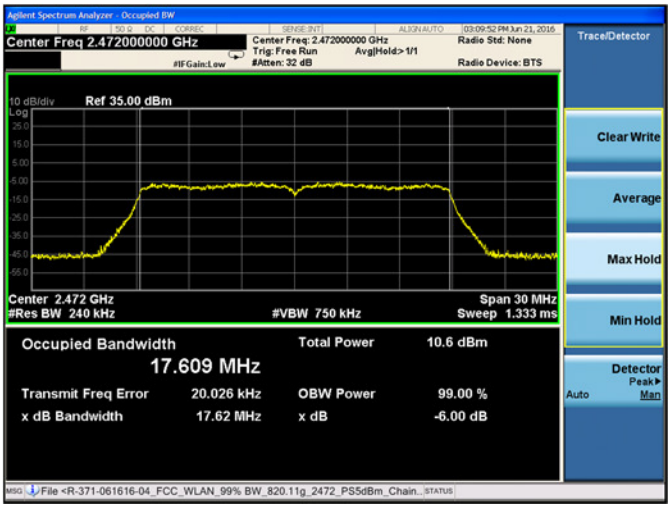
Plot 9-47 Chain B 99% Bandwidth 802.11g - Ch.13 (2472 MHz)

Plot 9-48 Chain B 99% Bandwidth 802.11n - Ch.1 (2412 MHz)



Plot 9-49 Chain B 99% Bandwidth 802.11n - Ch.6 (2437 MHz)

Plot 9-50 Chain B 99% Bandwidth 802.11n - Ch.11 (2462 MHz)



Plot 9-51 Chain B 99% Bandwidth 802.11n - Ch.13 (2472 MHz)

9.4 Output Power

9.4.1 Test Requirement:

FCC CFR 47 Rule Part 15.247 (b)(3)

ISED RSS-247 [5.4]

9.4.2 Test Method:

Measurements were performed according to the procedure defined in KDB 558074- Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 V03R05 and ANSI C63.10 (2013) American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices.

Power Meter Settings:

Peak Power:

The maximum peak conducted output power was measured using a broadband peak RF power meter. The power meter had a video bandwidth that is greater than or equal to the DTS bandwidth and utilized a fast-responding diode detector.

9.4.3 Limits:

15.247: The maximum permissible peak output power is 30 dBm (1 W)

RSS-247: The maximum peak conducted output power shall not exceed 30dBm (1 W) and the maximum radiated output power shall not exceed 36dBm (4 W) EIRP.

9.4.4 Test Results:

802.11 mode	Freq (MHz)	Path A Conducted Output power (dBm)	Path B Conducted Output Power (dBm)	Total Peak Cond Power (dBm)	FCC/ISED Conducted Limit (dBm)	Margin (dB)	Result
b	2412	15.42	14.92	18.19	30.00	-11.81	Pass
b	2417	17.37	18.22	20.82	30.00	-9.20	Pass
b	2437	18.25	19.06	21.68	30.00	-8.32	Pass
b	2457	17.84	17.85	20.85	30.00	-9.16	Pass
b	2462	14.04	13.78	16.92	30.00	-13.08	Pass
b	2467	8.58	8.80	11.70	30.00	-18.32	Pass
b	2472	6.45	7.18	9.84	30.00	-20.16	Pass
g	2412	22.46	22.83	25.66	30.00	-4.34	Pass
g	2417	25.08	24.68	27.89	30.00	-2.13	Pass
g	2437	25.07	25.02	28.06	30.00	-1.94	Pass
g	2457	24.66	25.09	27.89	30.00	-2.13	Pass
g	2462	21.07	21.65	24.37	30.00	-5.63	Pass
g	2467	18.65	17.79	21.25	30.00	-8.77	Pass
g	2472	15.24	16.27	18.80	30.00	-11.20	Pass
n	2412	21.68	22.75	25.26	30.00	-4.74	Pass
n	2417	25.40	25.00	28.21	30.00	-1.81	Pass
n	2437	25.42	25.82	28.63	30.00	-1.37	Pass
n	2457	25.17	24.84	28.02	30.00	-2.00	Pass
n	2462	21.64	22.38	25.03	30.00	-4.97	Pass
n	2467	18.94	17.88	21.45	30.00	-8.57	Pass
n	2472	16.97	16.85	19.92	30.00	-10.08	Pass

802.11 mode	Frequency (MHz)	Total Peak Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ISED EIRP Limit (dBm)	Margin (dB)	Result
b	2412	18.19	5.98	24.17	36.00	-11.83	Pass
b	2417	21.68	5.98	27.67	36.00	-8.33	Pass
b	2437	16.92	5.98	22.90	36.00	-13.10	Pass
b	2457	9.84	5.98	15.82	36.00	-20.18	Pass
b	2462	25.66	5.98	31.64	36.00	-4.36	Pass
b	2467	28.06	5.98	34.04	36.00	-1.96	Pass
b	2472	24.37	5.98	30.36	36.00	-5.64	Pass
g	2412	18.80	5.98	24.78	36.00	-11.22	Pass
g	2417	25.26	5.98	31.24	36.00	-4.76	Pass
g	2437	28.63	5.98	34.61	36.00	-1.39	Pass
g	2457	25.03	5.98	31.02	36.00	-4.98	Pass
g	2462	19.92	5.98	25.90	36.00	-10.10	Pass
g	2467	20.82	5.98	26.80	36.00	-9.20	Pass
g	2472	20.85	5.98	26.84	36.00	-9.16	Pass
n	2412	11.70	5.98	17.68	36.00	-18.32	Pass
n	2417	27.89	5.98	33.87	36.00	-2.13	Pass
n	2437	27.89	5.98	33.87	36.00	-2.13	Pass
n	2457	21.25	5.98	27.23	36.00	-8.77	Pass
n	2462	28.21	5.98	34.19	36.00	-1.81	Pass
n	2467	28.02	5.98	34.00	36.00	-2.00	Pass
n	2472	21.45	5.98	27.43	36.00	-8.57	Pass

9.5 Power Spectral Density

9.5.1 Test Requirement:

FCC CFR 47 Rule Part 15.247 (e)
ISED RSS-247 Issue 1 [5.2]

9.5.2 Test Method:

Measurements were performed according to the procedure defined in KDB 558074- Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 V03R05 and ANSI C63.10 (2013) American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices.

Spectrum Analyzer settings:
Set analyzer center frequency to DTS channel center frequency.
Span to 1.5 times the DTS bandwidth
RBW to: 3 kHz ≤ RBW ≤ 100 kHz
VBW ≥ 3 RBW
Detector = Peak
Sweep time = auto couple
Trace mode = max hold
Use the peak marker function to determine the maximum amplitude level within the RBW
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

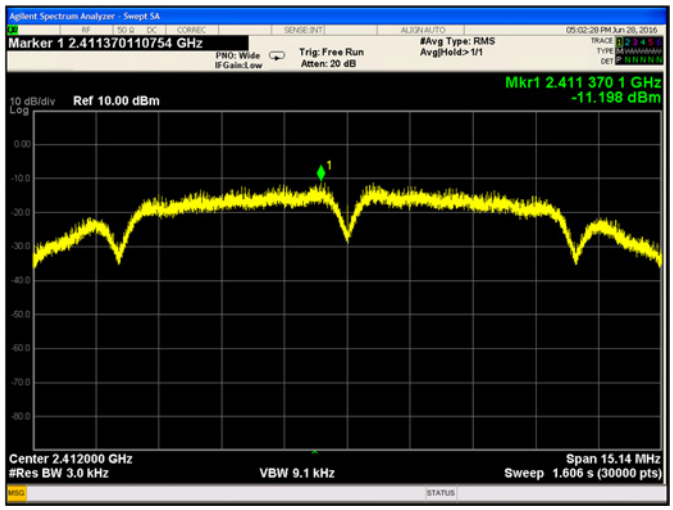
9.5.3 Limits:

The maximum permissible power density is 8 dBm/3kHz.

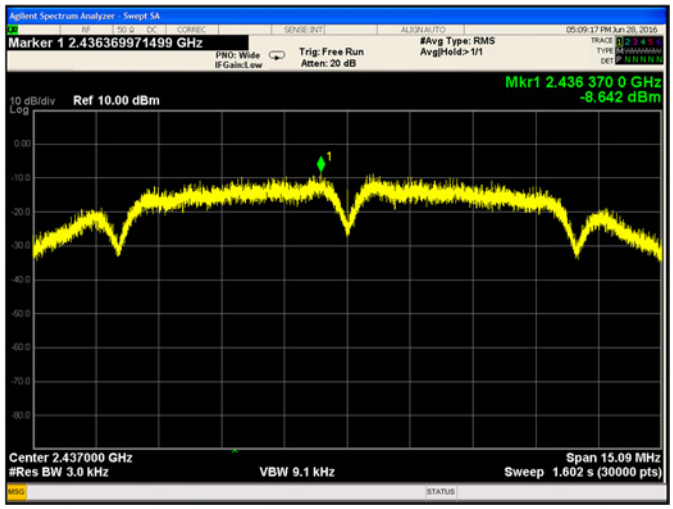
9.5.4 Test Results:

802.11 mode	Frequency (MHz)	Path A Power Spectral Density (dBm/3kHz)	Path B Power Spectral Density (dBm/3kHz)	Total Power Spectral Density Limit (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Pass/Fail
b	2412	-11.20	-11.02	-8.10	8.00	-16.10	Pass
b	2437	-8.64	-7.96	-5.28	8.00	-13.28	Pass
b	2462	-12.58	-12.30	-9.43	8.00	-17.43	Pass
b	2472	-20.75	-19.80	-17.24	8.00	-25.24	Pass
g	2412	-14.31	-13.35	-10.79	8.00	-18.79	Pass
g	2437	-12.12	-11.81	-8.95	8.00	-16.95	Pass
g	2462	-16.08	-15.67	-12.86	8.00	-20.86	Pass
g	2472	-22.12	-21.35	-18.70	8.00	-26.70	Pass
n	2412	-14.46	-14.59	-11.51	8.00	-19.51	Pass
n	2437	-9.89	-10.80	-7.31	8.00	-15.31	Pass
n	2462	-14.83	-15.06	-11.93	8.00	-19.93	Pass
n	2472	-21.43	-20.94	-18.17	8.00	-26.17	Pass

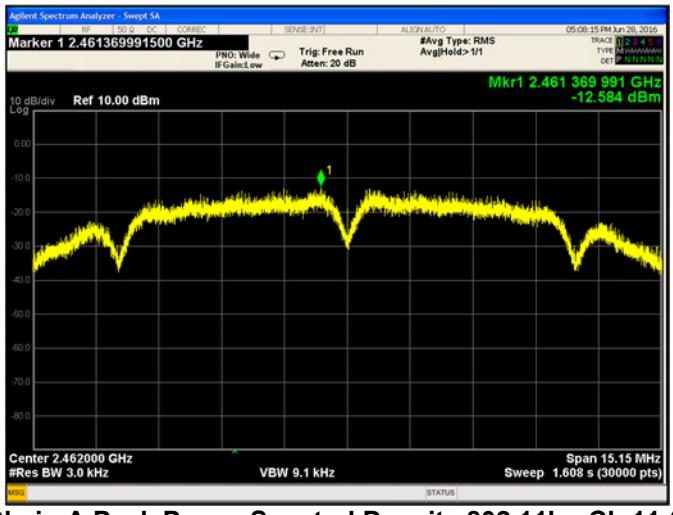
9.5.5 Test Data:



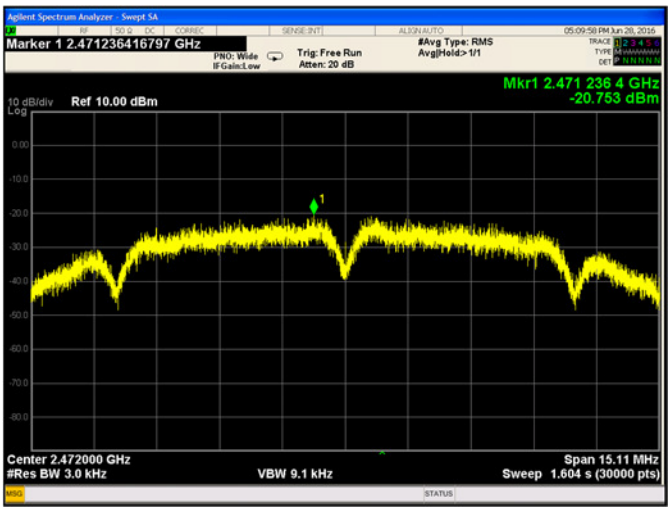
Plot 9-52 Chain A Peak Power Spectral Density 802.11b - Ch.1 (2412 MHz)



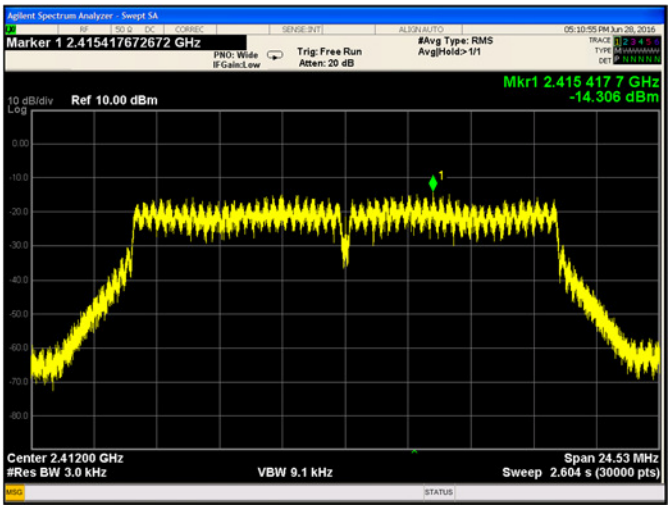
Plot 9-53 Chain A Peak Power Spectral Density 802.11b - Ch.6 (2437 MHz)



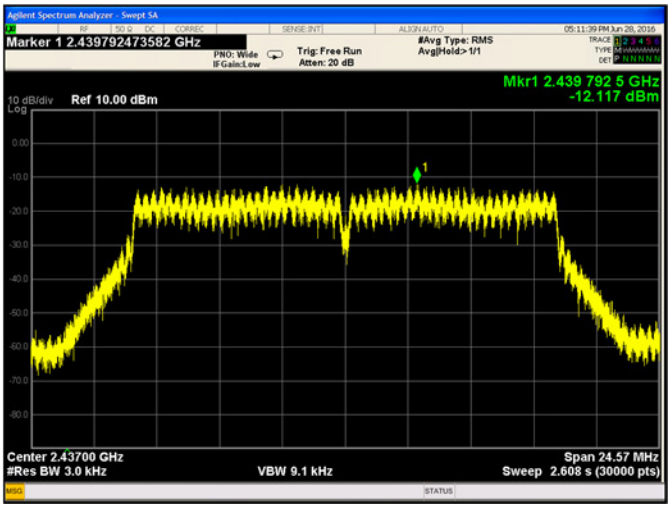
Plot 9-54 Chain A Peak Power Spectral Density 802.11b - Ch.11 (2462 MHz)



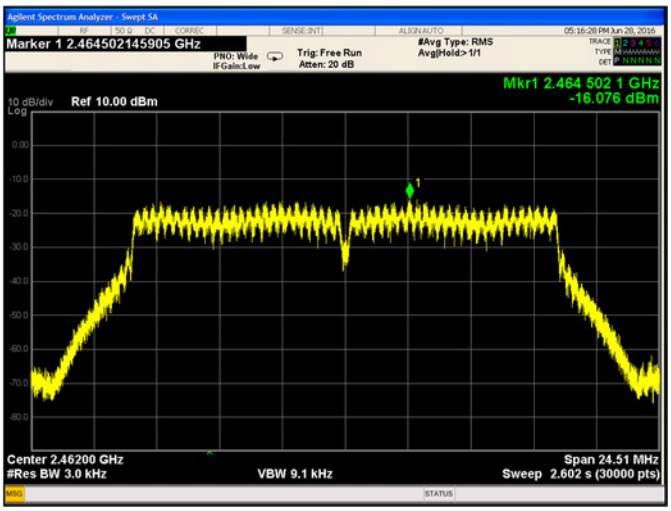
Plot 9-55 Chain A Peak Power Spectral Density 802.11b - Ch.13 (2472 MHz)



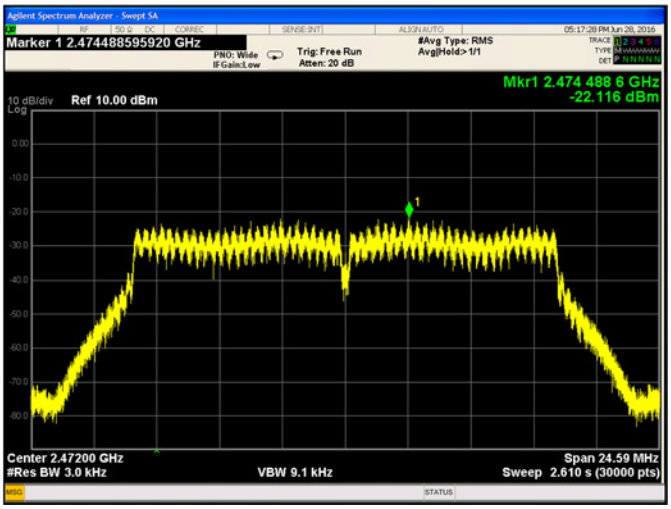
Plot 9-56 Chain A Peak Power Spectral Density 802.11g - Ch.1 (2412 MHz)



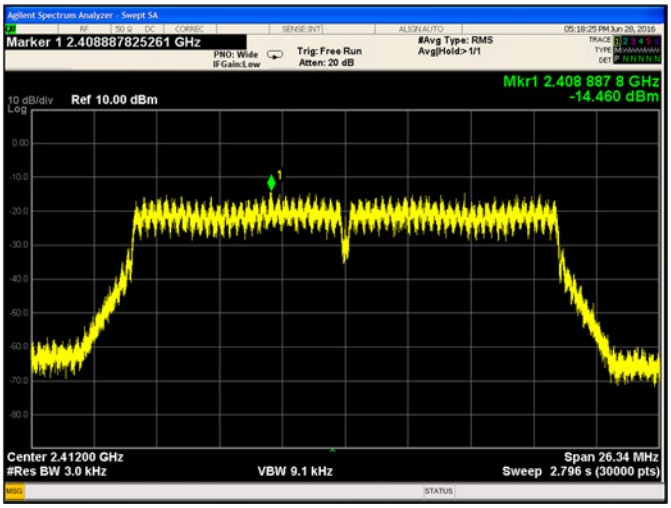
Plot 9-57 Chain A Peak Power Spectral Density 802.11g - Ch.6 (2437 MHz)



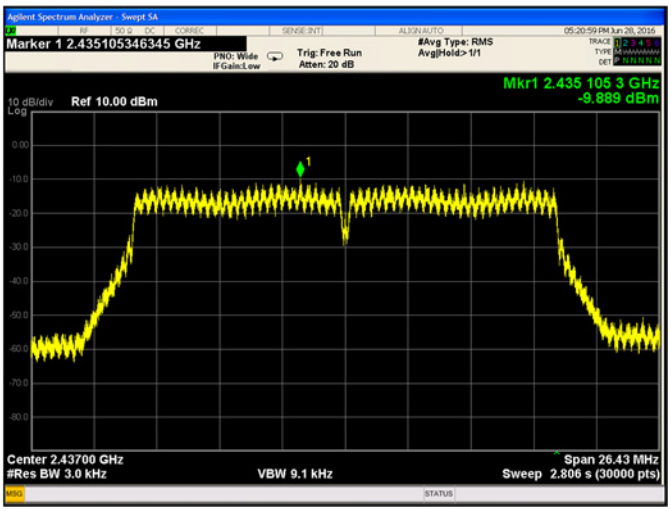
Plot 9-58 Chain A Peak Power Spectral Density 802.11g - Ch.11 (2462 MHz)



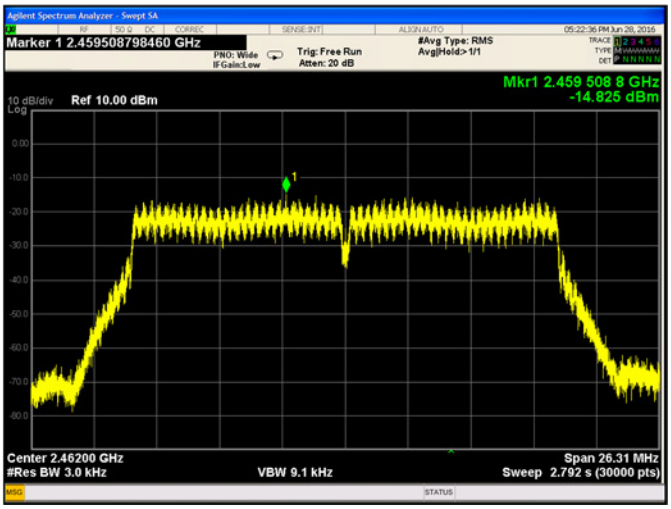
Plot 9-59 Chain A Peak Power Spectral Density 802.11g - Ch.13 (2472 MHz)



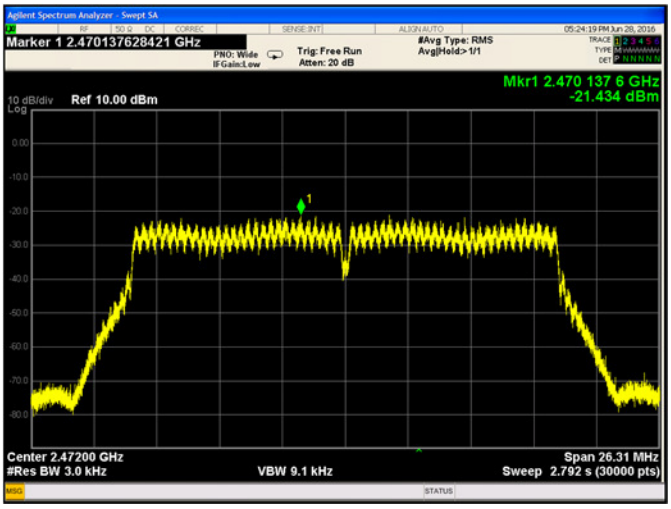
Plot 9-60 Chain A Peak Power Spectral Density 802.11n - Ch.1 (2412 MHz)



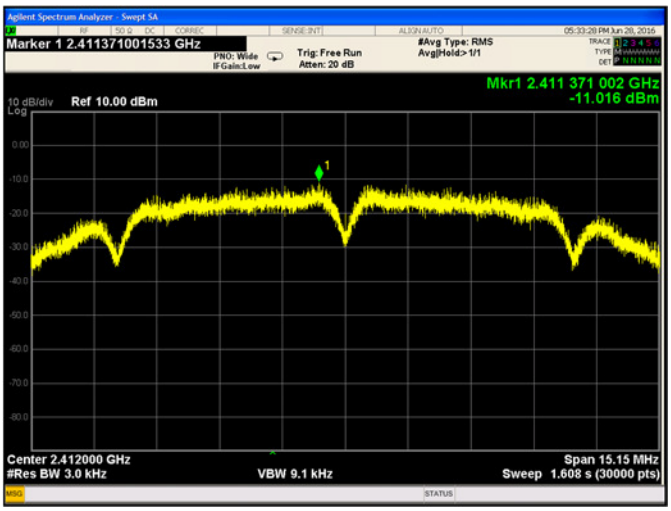
Plot 9-61 Chain A Peak Power Spectral Density 802.11n - Ch.6 (2437 MHz)



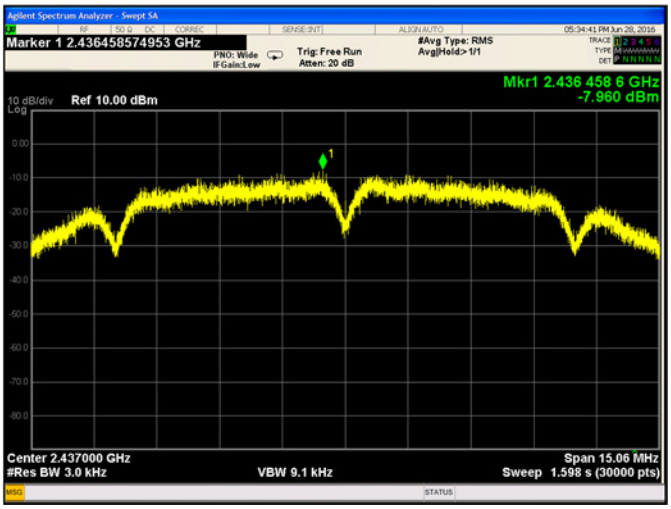
Plot 9-62 Chain A Peak Power Spectral Density 802.11n - Ch.11 (2462 MHz)



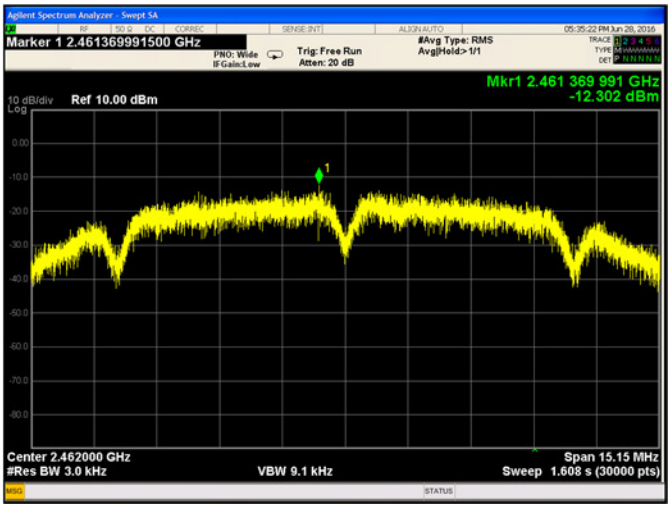
Plot 9-63 Chain A Peak Power Spectral Density 802.11n - Ch.13 (2472 MHz)



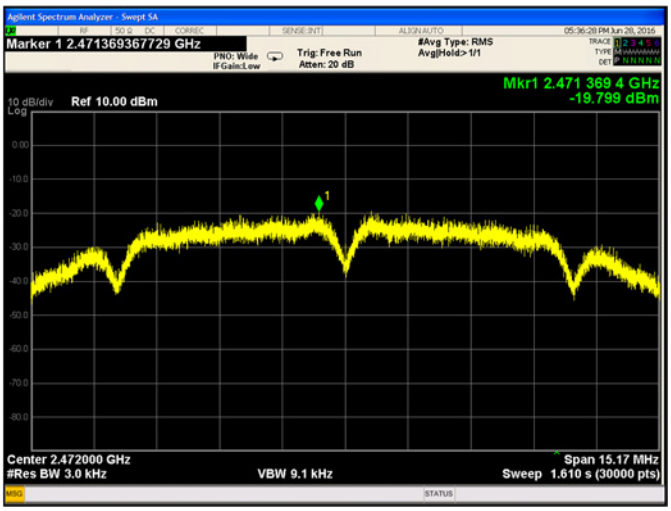
Plot 9-64 Chain B Peak Power Spectral Density 802.11b - Ch.1 (2412 MHz)



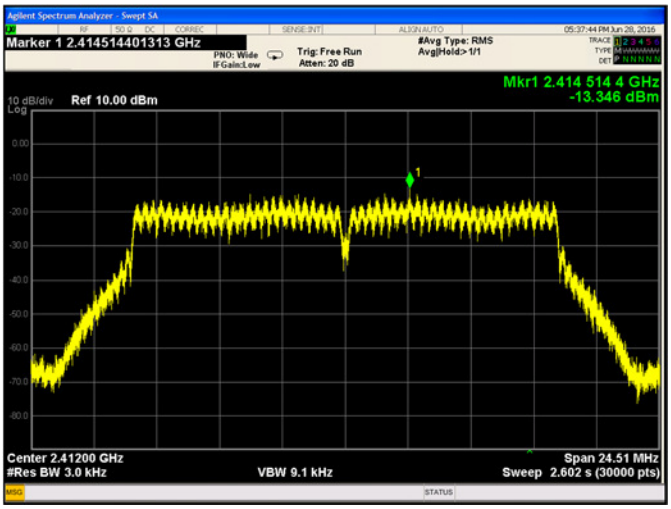
Plot 9-65 Chain B Peak Power Spectral Density 802.11b - Ch.6 (2437 MHz)



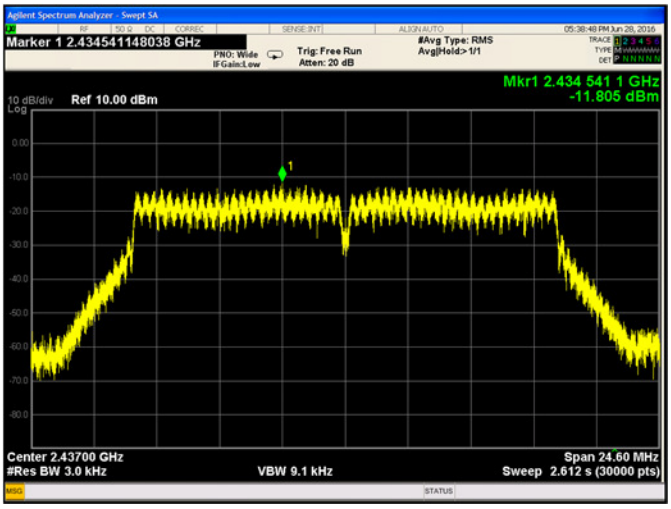
Plot 9-66 Chain B Peak Power Spectral Density 802.11b - Ch.11 (2462 MHz)



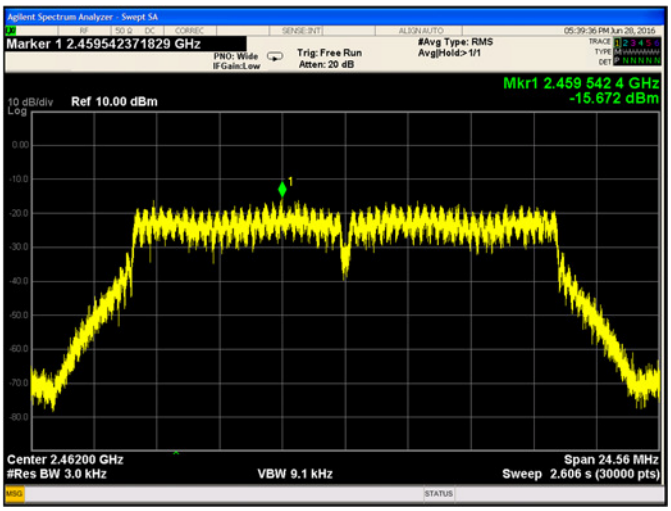
Plot 9-67 Chain B Peak Power Spectral Density 802.11b - Ch.13 (2472 MHz)



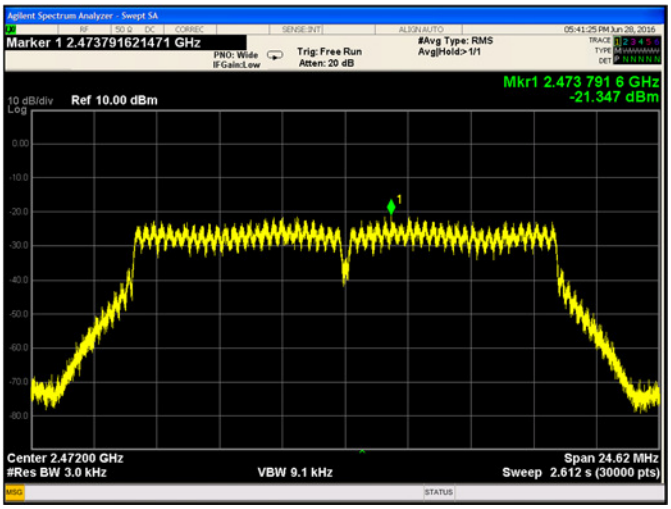
Plot 9-68 Chain B Peak Power Spectral Density 802.11g - Ch.1 (2412 MHz)



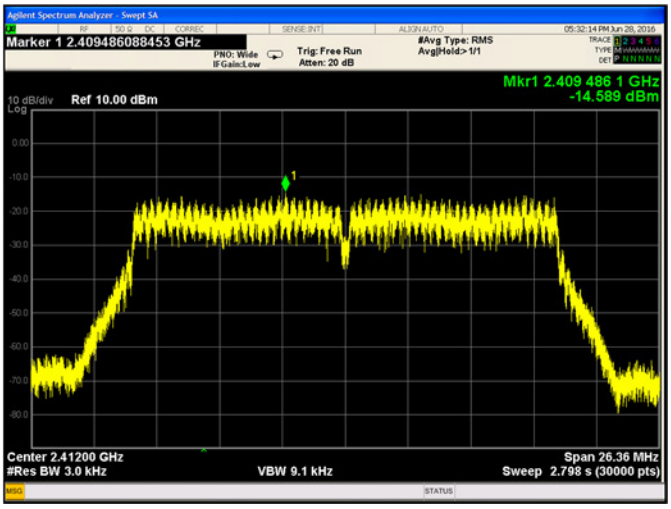
Plot 9-69 Chain B Peak Power Spectral Density 802.11g - Ch.6 (2437 MHz)



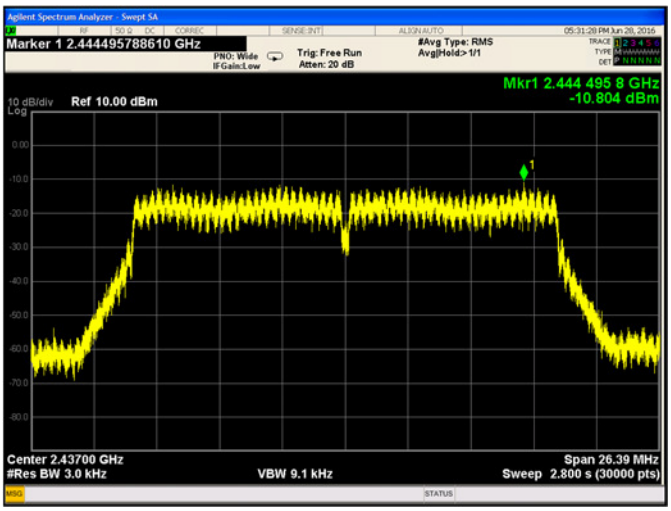
Plot 9-70 Chain B Peak Power Spectral Density 802.11g - Ch.11 (2462 MHz)



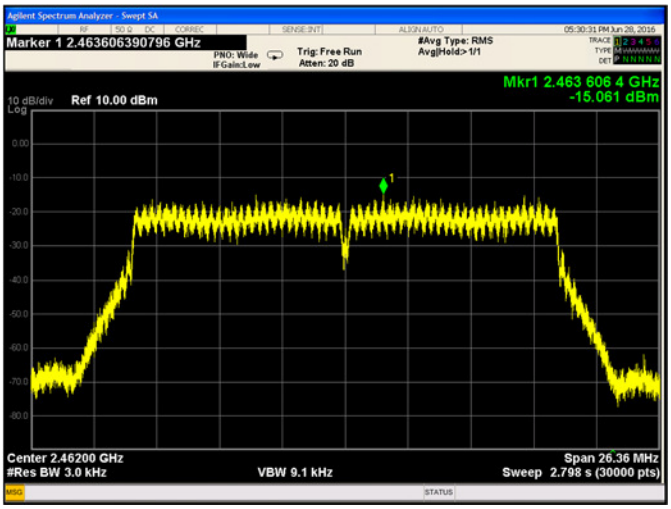
Plot 9-71 Chain B Peak Power Spectral Density 802.11g - Ch.13 (2472 MHz)



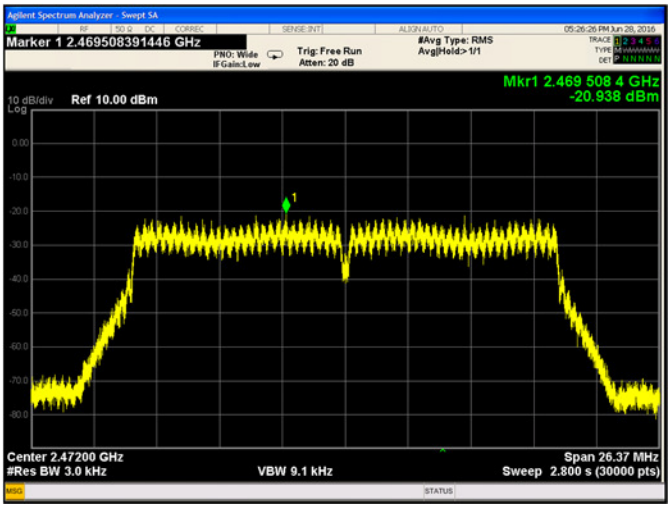
Plot 9-72 Chain B Peak Power Spectral Density 802.11n - Ch.1 (2412 MHz)



Plot 9-73 Chain B Peak Power Spectral Density 802.11n - Ch.6 (2437 MHz)



Plot 9-74 Chain B Peak Power Spectral Density 802.11n - Ch.11 (2462 MHz)



Plot 9-75 Chain B Peak Power Spectral Density 802.11n - Ch.13 (2472 MHz)