



RADIO TEST REPORT

For

MODEL NO.: 1843

FCC ID: C3K1843

IC ID: 3048A-1843

Test Report No. R-TR525-FCCISED-WLAN-2

Issue Date: May 6, 2019

FCC CFR47 Part 15 Subpart C
Innovation, Science and Economic Development
Canada RSS-247 Issue 2

Prepared by
Microsoft EMC Laboratory
17760 NE 67th Ct,
Redmond WA, 98052, U.S.A.
425-421-9799



[illegible]

Table of Contents

1	Record of Revisions.....	2
2	Deviations from Standards	7
3	Facilities and Accreditations	7
3.1	Test Facility	7
3.2	Accreditations	7
3.3	Test Equipment	7
4	Measurement Uncertainty.....	7
5	Product Description	8
5.1	Test Configurations	8
5.2	Environmental Conditions.....	9
5.3	Antenna Requirements.....	9
5.3.1	Antenna Gain	9
5.4	Equipment Modifications	9
5.5	Dates of Testing	9
6	Test Results Summary	10
7	Test Equipment List	11
8	Test Site Description.....	13
8.1	Radiated Emissions Test Site.....	13
8.1.1	Radiated Measurements in 9kHz- 30 MHz.....	13
8.1.2	Radiated Measurements in 30 MHz - 1000 MHz	13
8.1.3	Radiated Measurements above 1GHz	13
8.2	Antenna port conducted measurements.....	13
8.3	Test Setup Diagrams.....	14
9	Test Results- Conducted	17
9.1	Duty Cycle	17
9.1.1	Test Requirement:.....	17
9.1.2	Test Method:	17
9.1.3	Limits:	17
9.1.4	Test Results:	17
9.1.5	Test Data:.....	18
9.2	DTS Bandwidth.....	22
9.2.1	Test Requirement:.....	22
9.2.2	Test Method:	22

9.2.3	Limits:	22
9.2.4	Test Results:	23
9.2.5	Test Data:	25
9.3	99% Bandwidth	45
9.3.1	Test Requirement:	45
9.3.2	Test Method:	45
9.3.3	Limit:	45
9.3.4	Test Results:	45
9.3.5	Test Data:	47
9.4	Output Power	67
9.4.1	Test Requirement:	67
9.4.2	Test Method:	67
9.4.3	Limits:	67
9.4.4	Test Results:	68
9.5	Power Spectral Density	70
9.5.1	Test Requirement:	70
9.5.2	Test Method:	70
9.5.3	Limits:	70
9.5.4	Test Results:	71
9.5.5	Test Data:	72
9.6	Conducted Spurious Emissions	92
9.6.1	Test Requirement:	92
9.6.2	Test Method:	92
9.6.3	Limits:	92
9.6.4	Test Result:	92
9.6.5	Test Data:	93
9.7	Conducted Band Edge Emissions	153
9.7.1	Test Requirement:	153
9.7.2	Test Method:	153
9.7.3	Limits:	153
9.7.4	Test Result:	153
9.7.5	Test Data:	154
9.8	Radiated Spurious and Band Edge Emissions	170

9.8.1	Test Requirement:	170
9.8.2	Test Method:	170
9.8.3	Limits:	173
9.8.4	Test Result:	173
9.8.5	Test Data:	174
9.9	AC Line Conducted Emissions	242
9.9.1	Test Requirements	242
9.9.2	Test Method	242
9.9.3	Limit	242
9.9.4	Test Result:	242
9.9.5	Test Data:	243

Test Report Attestation

Microsoft Corporation**Model:** 1843**FCC ID:** C3K1843**IC ID:** 3048A-1843**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 2, RSS-GEN Issue 5	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 pertain 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 test report number R-TR525-FCCISED-WLAN-2 issued 04/24/2019.



Written By: Vishwas

Radio Test Engineer



Reviewed/ Issued By: Daniel Salinas

RF Compliance Lab Technical
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 (9 kHz to 30 MHz)	5.32	dB
Radiated disturbance (30 MHz to 1 GHz)	5.99	dB
Radiated disturbance (1 GHz to 18 GHz)	5.12	dB
Radiated disturbance (18 GHz to 26.5 GHz)	4.86	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	°C
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:	Choon Sian Ooi
Functional Description of the EUT:	Smart display with 802.11a/b/g/n/ac 20/40/80/160MHz, Bluetooth 5.0, and 24.2 GHz Sensor Radios
Model:	1843
FCC ID:	C3K1843
IC ID:	3048A-1843
Radio under test:	IEEE 802.11 b/g/n MIMO Radio supporting 20 MHz and 40MHz Bandwidth (2412 MHz- 2472 MHz)
Modulation(s):	CCK, BPSK, OFDM, and QAM modulation
Antenna Information:	Integral Antenna. Manufacturer declared Antenna Gain: Chain A: 7.0dBi Chain B: 5.3dBi
EUT Classification:	DTS
Equipment Design State:	Prototype/Production Equivalent (EV4)
Equipment Condition:	Good
Test Sample Details:	RF Conducted Test Sample Asset no.: R-525-012219-01, S/N: 17566293000013M RF Radiated Test Sample Asset no.: R-525-021419-01, S/N: 000059790462 Asset no.: R-525-021419-02, S/N: 000052790462

5.1 Test Configurations

Test software “DRTU” (V 11.1846.0-08758) provided by the customer 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: HT0 and HT8

5.2 Environmental Conditions

Ambient air temperature of the test site was within the range of 10 °C to 40 °C (50 °F to 104 °F) 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	7	5.3	6.23

Simultaneous transmission on both transmit chains was observed to be the worst-case mode of operation for all test cases. Since OFDM transmit signals in CSD modes are correlated only over small bandwidths, and not over the entire signal bandwidth, the combined in-band gain for total power is considered as uncorrelated and calculated using the following formula as specified in KDB 662911 D01 Multiple Transmitter Output v02r01:

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

In the case that $G1 = 7\text{dBi}$, $G2 = 5.3\text{dBi}$:

$$\text{Uncorrelated Directional gain} = 10\log [(10^{G1/10} + 10^{G2/10})/N_{ANT}] = 10\log [(10^{2.81/10} + 10^{3.14/10})/2] = 6.23\text{dBi}$$

Since OFDM transmit signals in CSD modes are correlated over small bandwidths, the total gain will influence PSD measurements. The combined gain for PSD is considered to be correlated and calculated using the following formula as specified in KDB 662911 D01 Multiple Transmitter Output v02r01:

$$\text{Correlated Directional gain} = 10\log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/N_{ANT}] \text{dBi}$$

In the case that $G1 = 7\text{dBi}$, $G2 = 5.2\text{dBi}$:

$$\text{Correlated Directional gain} = 10\log [(10^{G1/20} + 10^{G2/20})^2/N_{ANT}] = 10\log [(10^{2.81/20} + 10^{3.14/20})^2/2] = 9.2\text{dBi}$$

5.4 Equipment Modifications

No modifications were made during testing.

5.5 Dates of Testing

Testing was performed from January 28th, 2019 to April 3rd, 2019.

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]	$\geq 500\text{kHz}$	Pass
Occupied Bandwidth	Reporting & Measurements	Reporting & Measurements Purposes only	N/A
Output Power	15.247 (b)(3) RSS-247 [5.4]	$\leq 1 \text{ Watt}$	Pass
Equivalent Isotropic Radiated Power	RSS-247 [5.4]	$\leq 4 \text{ Watt}$	Pass
Power Spectral Density	15.247 (e) RSS-247 [5.2]	$\leq 8\text{dBm}/3\text{kHz}$	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
Agilent	Spectrum Analyzer	N9030A	EMC-370	10/19/2019
Rohde & Schwarz	EMI Test Receiver	ESU40	RF-192	4/8/2019
Rohde & Schwarz	EMI Test Receiver	ESR26	RF-568	4/11/2019
Rohde & Schwarz	Open Switch and Control Unit	OSP130	RF-018	N/A
Rohde & Schwarz	Open Switch and Control Unit	OSP130	RF-019	N/A
Rohde & Schwarz	Open Switch and Control Unit	OSP130	RF-569	N/A
Rohde & Schwarz	Custom Filter Bank	SFUNIT RX	RF-322	N/A
ETS-Lindgren	Antenna - Double-Ridged Guide	3117-PA	EMC-858	10/8/2019
ETS-Lindgren	Antenna - Standard Gain	3160-09	RF-179	7/30/2019
Sunol Sciences	Antenna - Broadband Hybrid	JB6	EMC-639	8/17/2019
Pasternack	6dB Attenuator	PE7004-6	EMC-950	8/17/2019
Pasternack	10dB Attenuator	PE7087-10	EMC-653	1/21/2020
Pasternack	10dB Attenuator	PE7087-10	RF-125	9/18/2019
Utiflex	RF Cable	OSP120/DUT3	RF-872	10/4/2019
Utiflex	RF Cable	OSP120/DUT8	RF-869	10/4/2019
Mouser	RF Cable	CabS02	RF-937	11/15/2019
Rohde & Schwarz	Power Meter	NRP2	RF-237	04/10/2020
Rohde & Schwarz	Power Sensor	NRP-Z81	RF-282	04/09/2020
Rohde & Schwarz	Power Sensor	NRP-Z81	RF-653	04/10/2020

Equipment used for Radiated and Conducted Measurements				
Manufacturer	Description	Model #	Asset #	Calibration Due
Huber and Suhner	RF Cable	Sucoflex 100	RF-452	N/A
Micro-Coax	RF Cable	UFA210A-Q-2755-3005GU	EMC-648	N/A
Micro-Coax	RF Cable	UFB311A-1-0787-50U50U	EMC-351	N/A
Micro-Coax	RF Cable	UTI Flex	RF-359	N/A
Micro-Coax	RF Cable	UTI Flex	RF-647	N/A
Micro-Coax	RF Cable	UTI Flex	RF-646	N/A
Huber & Suhner	RF Cable	Sucoflex 102A	RF-269	N/A
Rohde & Schwarz	Pre-Amplifier	TS-PR26	RF-199	11/29/2019
PCE	Climate Meter	PCE-THB 40	EMC-1206	9/28/2019
Madge Tech	THP Monitor	PRHTemp2000	EMC-838	3/5/2019*
Madge Tech	THP Monitor	PRHTemp2000	EMC-170	10/18/2019

Equipment used for AC Line Conducted Emissions Measurement				
Manufacturer	Description	Model #	Asset #	Calibration Due
Rohde & Schwarz	Analyzer/Receiver	ESR3	EMC-669	4/8/2019
Teseq	EUT LISN	NNB 051	EMC-056	6/7/2019
Teseq	EUT LISN	NNB 051	EMC-057	8/9/2019
Micro-Coax	Cable	UFA210A-1-1800-50U50U	EMC-367	N/A
ETS-Lindgren	TILE Profile	Version 7.3.1.27	EMC-985	N/A
Fluke	Multimeter	87V	EMC-192	10/18/2019
MadgeTech	Environmental Monitor	PRHTemp2000	EMC-680	11/16/2019
Chroma	AC Power Source	61602	EMC-055	N/A

Note: Items with Calibration Due data marked as N/A are characterized before test, where applicable.

Note*: Equipment was within calibration during test.

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 placed on the ground plane between the receiving antenna and the EUT to meet Site VSWR requirements in accordance with ANSI C63.4:2014. Measurements below 30 MHz were performed on a site demonstrating equivalence to an open field site per KDB 414788 D01.

8.1.1 Radiated Measurements in 9kHz- 30 MHz

The EUT is positioned as a floor standing device with center of the EUT aligned with the center of the turntable. A loop antenna is positioned at 3m from the EUT periphery at 1m height from the ground. The turntable is rotated 360 degrees to determine the highest emissions. This is repeated for two orientations of the measurement antenna- parallel and perpendicular. All possible orientations of the EUT were investigated for emissions and the landscape orientation was identified as the worst-case configuration.

8.1.2 Radiated Measurements in 30 MHz - 1000 MHz

The EUT is positioned as a floor standing device with center of the EUT aligned with the center of the turntable. 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 landscape standing orientation was identified as the worst-case configuration.

8.1.3 Radiated Measurements above 1GHz

The EUT is positioned as a floor standing device with center of the EUT aligned with the center of the turntable. A linearly polarized antenna is positioned 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 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 3m distance. Near field scanning is performed to identify suspect frequencies above 1GHz.

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 take these correction factors into account.

8.3 Test Setup Diagrams

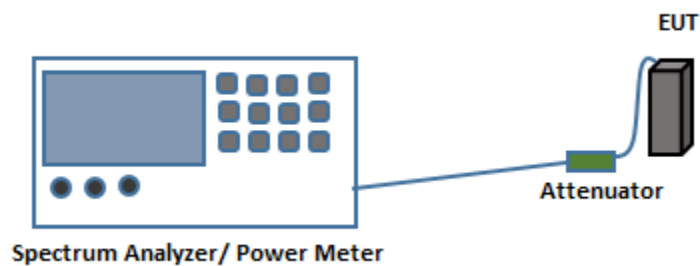


Fig.1. Test Setup for Antenna port conducted measurements

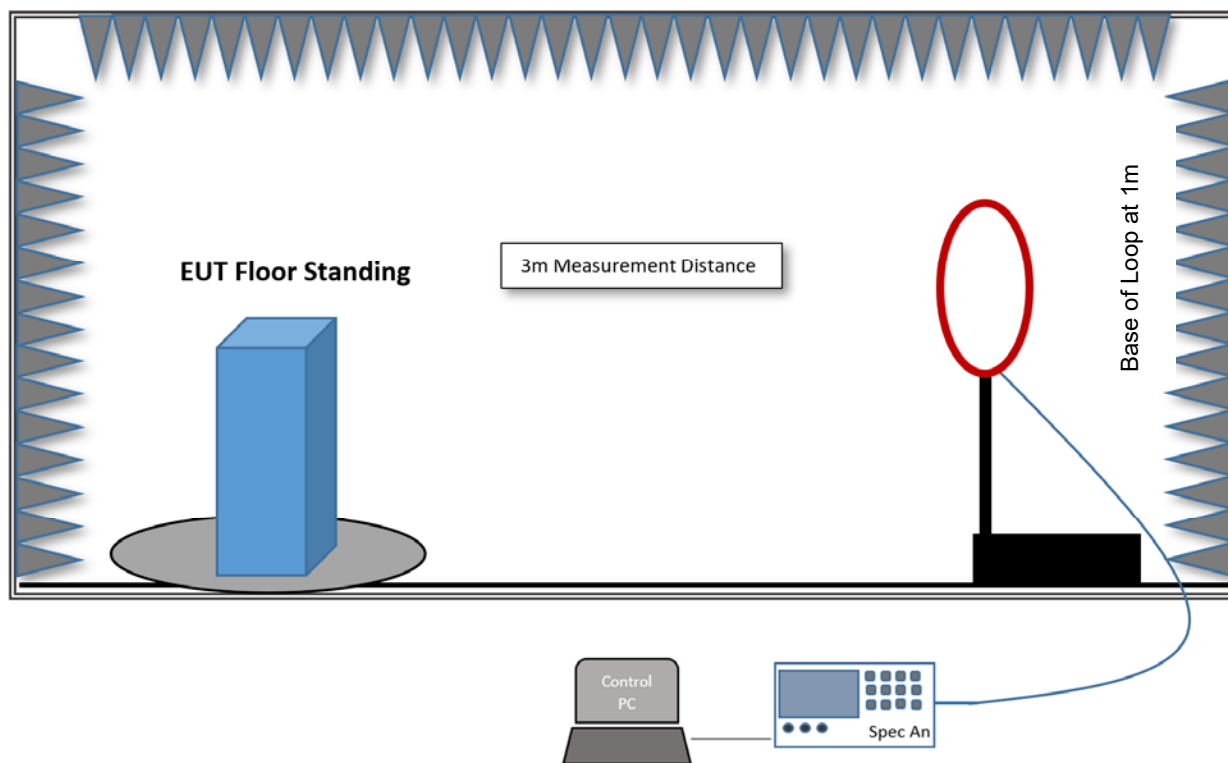


Fig.2. Test Setup for Radiated measurements in 9kHz - 30MHz Range

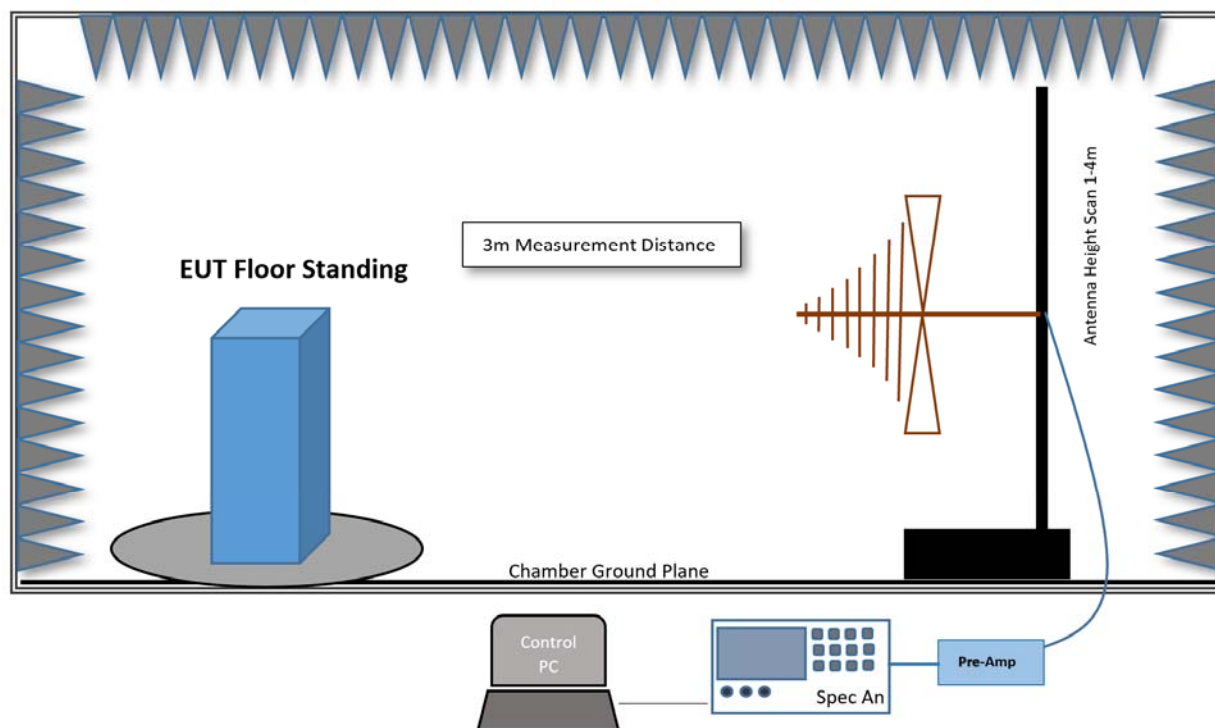


Fig.3. Test Setup for Radiated measurements in 30MHz- 1GHz Range

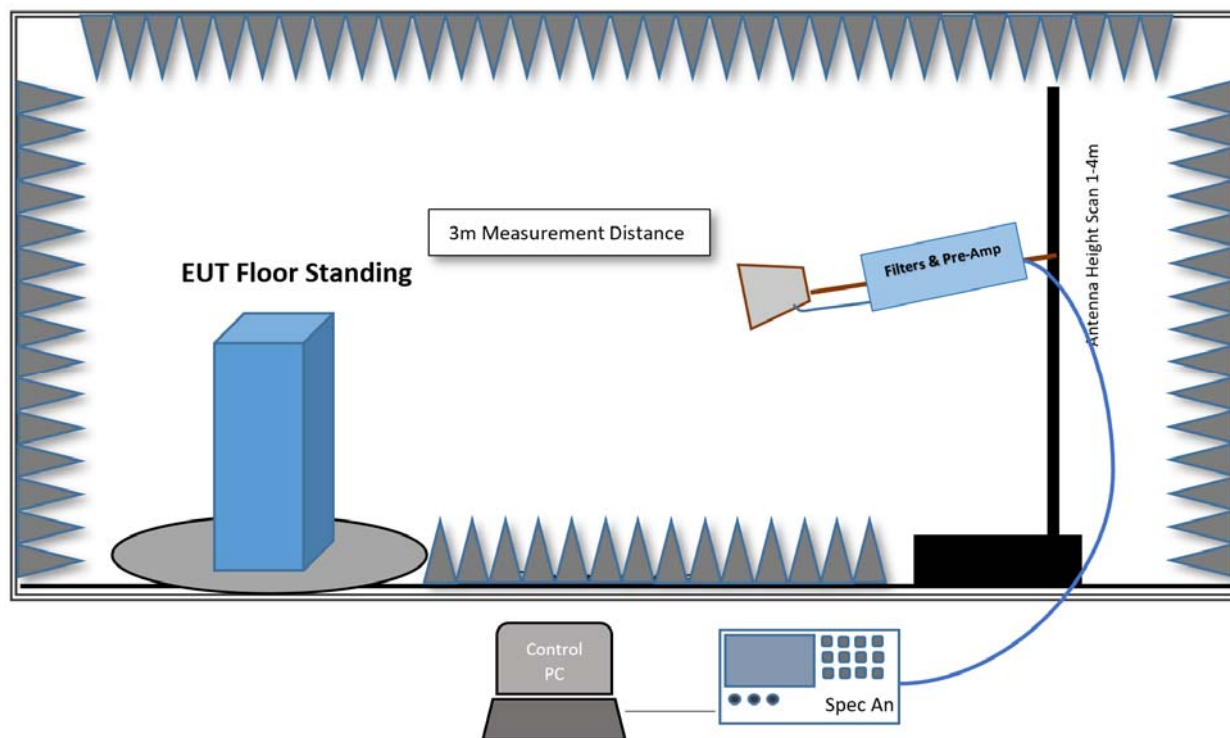


Fig.4. Test Setup for Radiated measurements in 1GHz- 18GHz Range

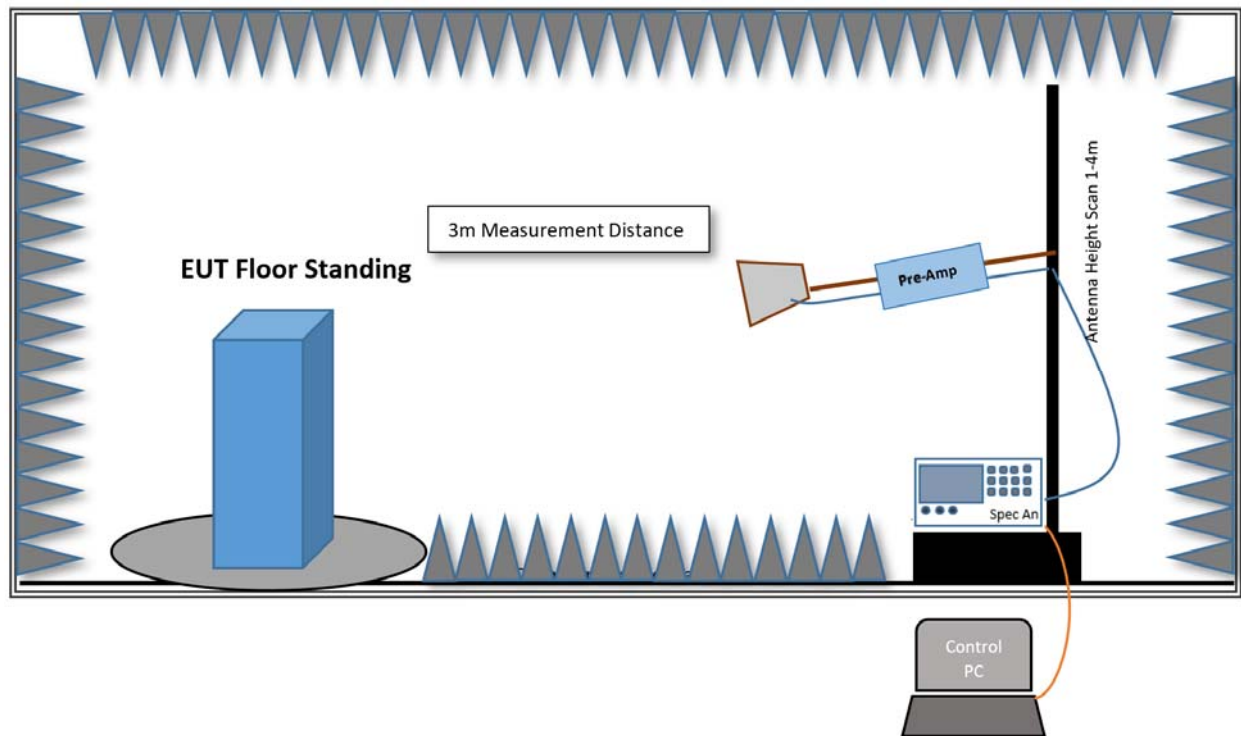


Fig.5. Test Setup for Radiated measurements >18GHz

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.

Spectrum Analyzer Settings:

RBW $\geq$ Occupied Bandwidth if possible; otherwise, set RBW to the largest available value

VBW $\geq$ RBW $\geq$ Signal Period

Detector = Peak

Span = 0 Hz

Sweep points > 100

9.1.3 Limits:

Reporting and measurement purposes only. Duty Cycles > 98% are considered to have a Duty Cycle Correction Factor = 0 dB.

9.1.4 Test Results:

Mode	Path A/B	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	A	12.320	12.460	98.88	0.049
802.11b	B	12.320	12.460	98.88	0.049
802.11g	A	2.048	2.080	98.46	0.067
802.11g	B	2.048	2.080	98.46	0.067
802.11n20	A	0.976	1.016	96.06	0.174
802.11n20	B	0.976	1.106	96.06	0.174
802.11n40	A	0.492	0.531	92.66	0.331
802.11n40	B	0.492	0.531	92.66	0.331

9.1.5 Test Data:

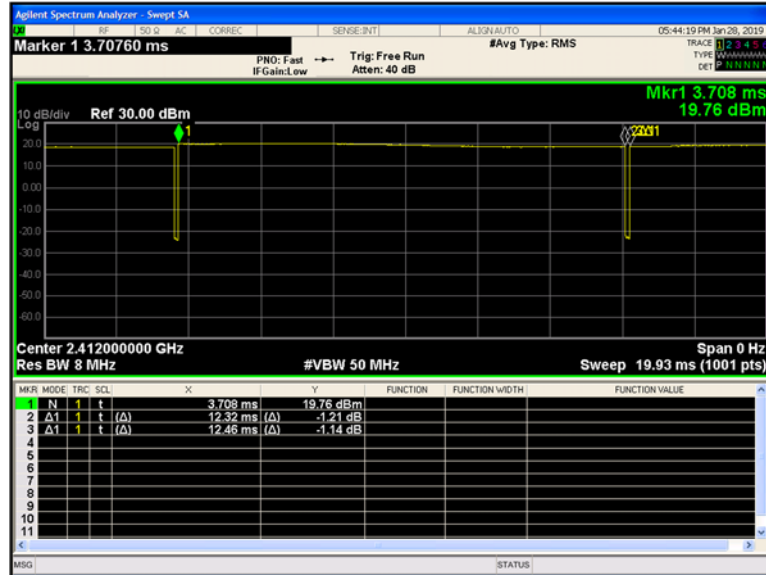


Figure 9-1. Duty Cycle 802.11b -Path A

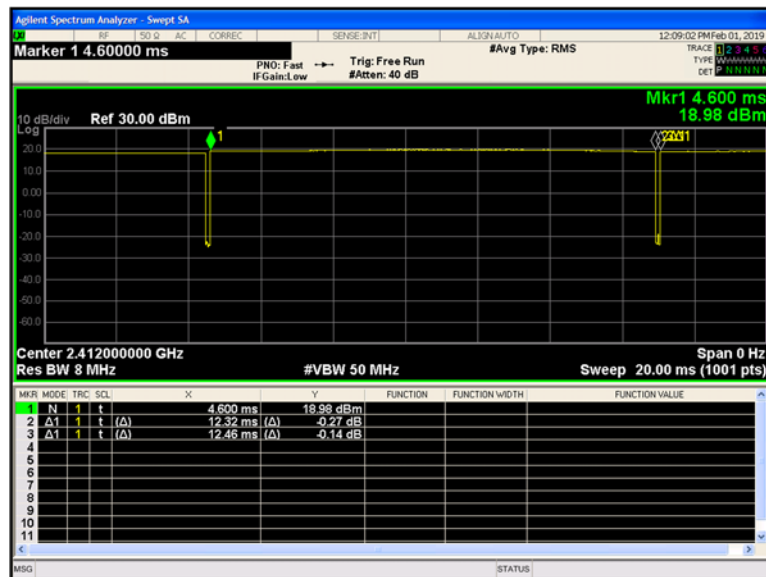


Figure 9-2. Duty Cycle 802.11b- Path B

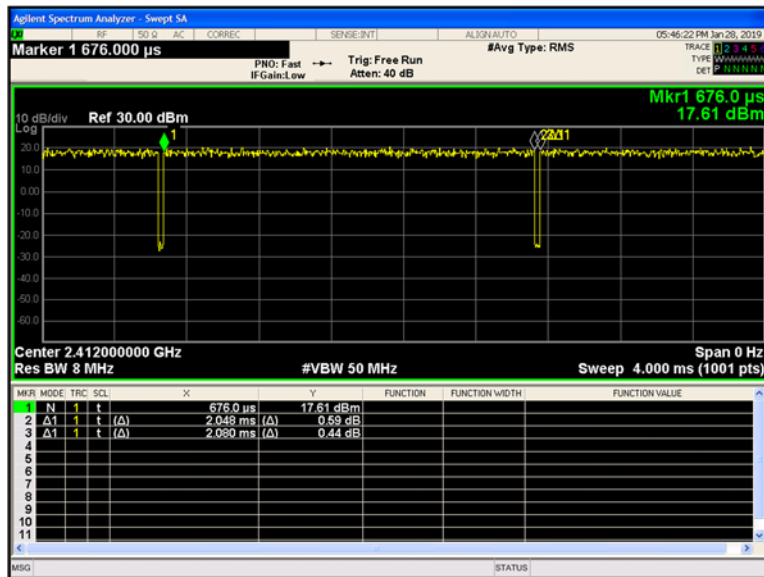


Figure 9-3. Duty Cycle 802.11g- Path A

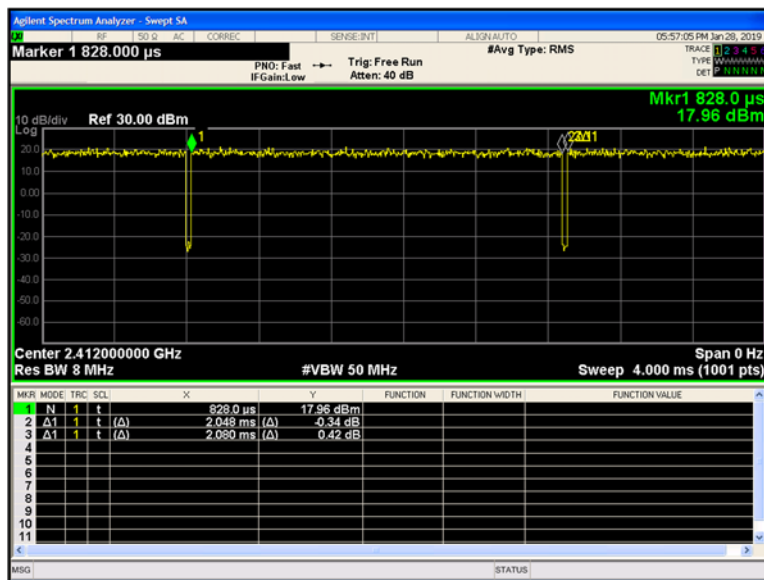


Figure 9-4. Duty Cycle 802.11g-Path B

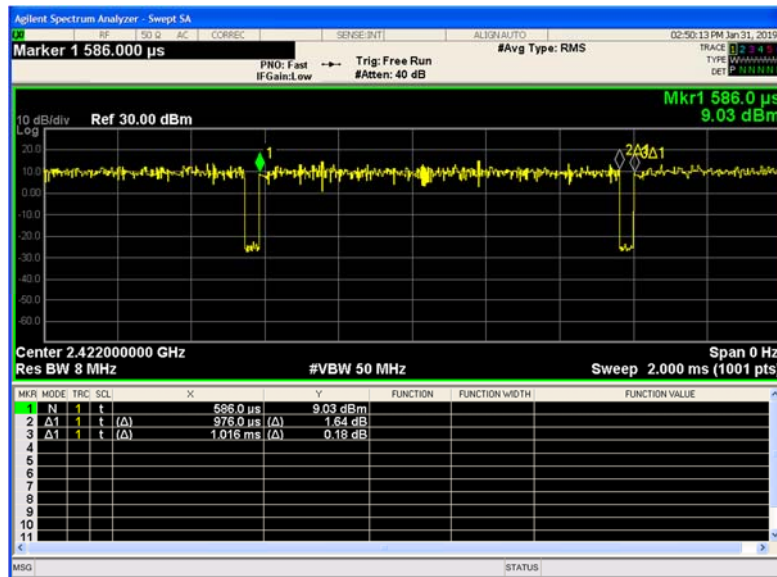


Figure 9-5. Duty Cycle 802.11n20 -Path A

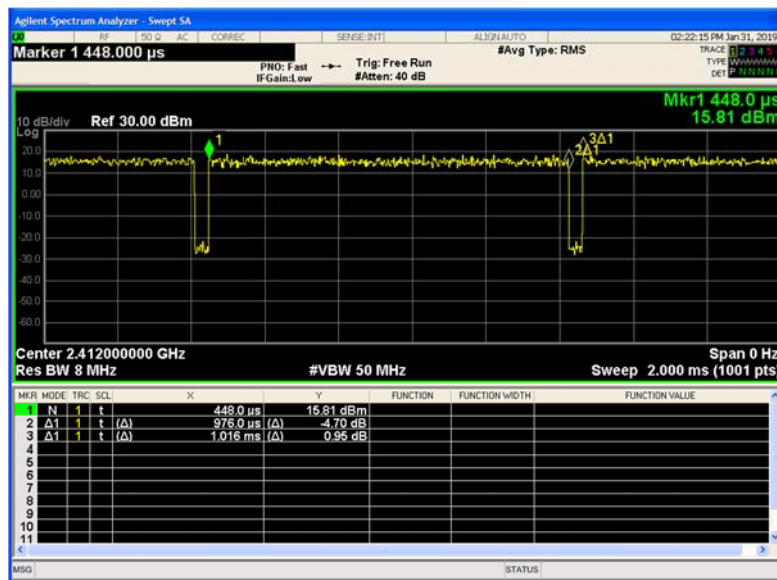


Figure 9-6. Duty Cycle 802.11n20 -Path B

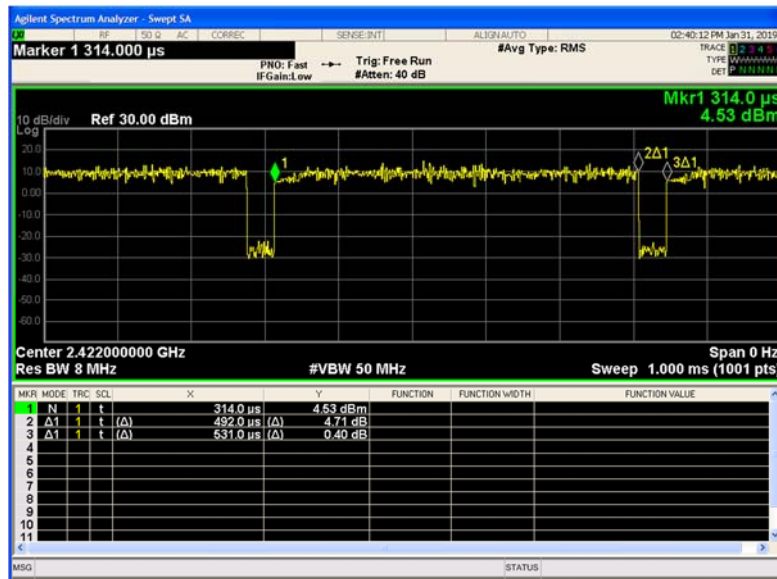


Figure 9-7. Duty Cycle 802.11n40-Path A

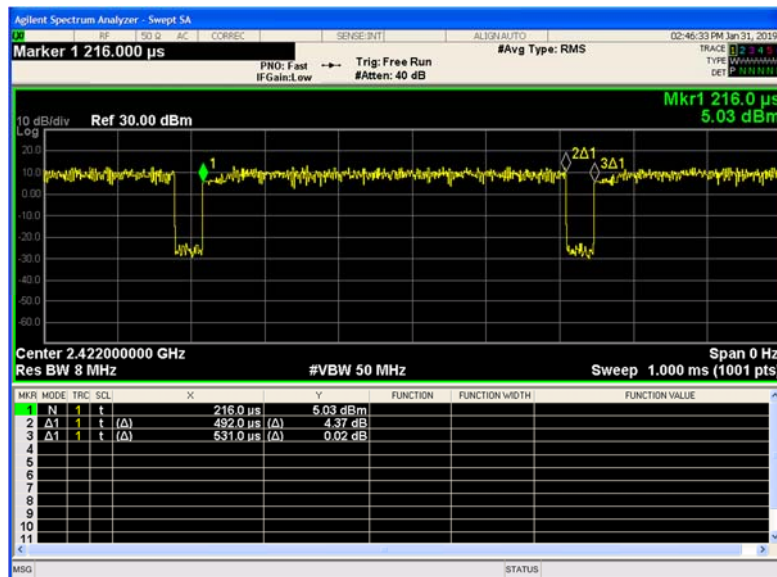


Figure 9-8. Duty Cycle 802.11n40-Path B

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 V05 and ANSI C63.10: 2013.

Spectrum Analyzer Settings:

RBW= 100 kHz

VBW $\geq$ 3 $\times$ RBW

Detector = Peak

Span = 1.5*Nominal bandwidth

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	10.13	≥ 0.5	Pass
6	2437	10.14	≥ 0.5	Pass
11	2462	10.14	≥ 0.5	Pass
12	2467	10.14	≥ 0.5	Pass
13	2472	10.15	≥ 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	16.40	≥ 0.5	Pass
6	2437	16.40	≥ 0.5	Pass
11	2462	16.38	≥ 0.5	Pass
12	2467	16.38	≥ 0.5	Pass
13	2472	16.38	≥ 0.5	Pass
Chain A 802.11n20 6-dB Emission Bandwidth				
Channel No.	Frequency (MHz)	6-dB Emission Bandwidth (MHz)	Limit (MHz)	Result
1	2412	17.62	≥ 0.5	Pass
6	2437	17.62	≥ 0.5	Pass
11	2462	17.62	≥ 0.5	Pass
12	2467	17.62	≥ 0.5	Pass
13	2472	17.63	≥ 0.5	Pass
Chain A 802.11n40 6-dB Emission Bandwidth				
Channel No.	Frequency (MHz)	6-dB Emission Bandwidth (MHz)	Limit (MHz)	Result
3	2422	36.36	≥ 0.5	Pass
7	2442	36.36	≥ 0.5	Pass
9	2452	36.36	≥ 0.5	Pass
10	2457	36.36	≥ 0.5	Pass
11	2462	36.36	≥ 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	10.14	≥ 0.5	Pass
6	2437	10.14	≥ 0.5	Pass
11	2462	10.15	≥ 0.5	Pass
12	2467	10.14	≥ 0.5	Pass
13	2472	10.14	≥ 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	16.38	≥ 0.5	Pass
6	2437	16.38	≥ 0.5	Pass
11	2462	16.38	≥ 0.5	Pass
12	2467	16.38	≥ 0.5	Pass
13	2472	16.38	≥ 0.5	Pass
Chain B 802.11n20 6-dB Emission Bandwidth				
Channel No.	Frequency (MHz)	6-dB Emission Bandwidth (MHz)	Limit (MHz)	Result
1	2412	17.64	≥ 0.5	Pass
6	2437	17.64	≥ 0.5	Pass
11	2462	17.64	≥ 0.5	Pass
12	2467	17.64	≥ 0.5	Pass
13	2472	17.65	≥ 0.5	Pass
Chain B 802.11n40 6-dB Emission Bandwidth				
Channel No.	Frequency (MHz)	6-dB Emission Bandwidth (MHz)	Limit (MHz)	Result
3	2422	36.44	≥ 0.5	Pass
7	2442	36.43	≥ 0.5	Pass
9	2452	36.44	≥ 0.5	Pass
10	2457	36.43	≥ 0.5	Pass
11	2462	36.43	≥ 0.5	Pass

9.2.5 Test Data:



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



Plot 9-10 Chain A DTS Bandwidth 802.11b mode - Ch.6 (2437 MHz)



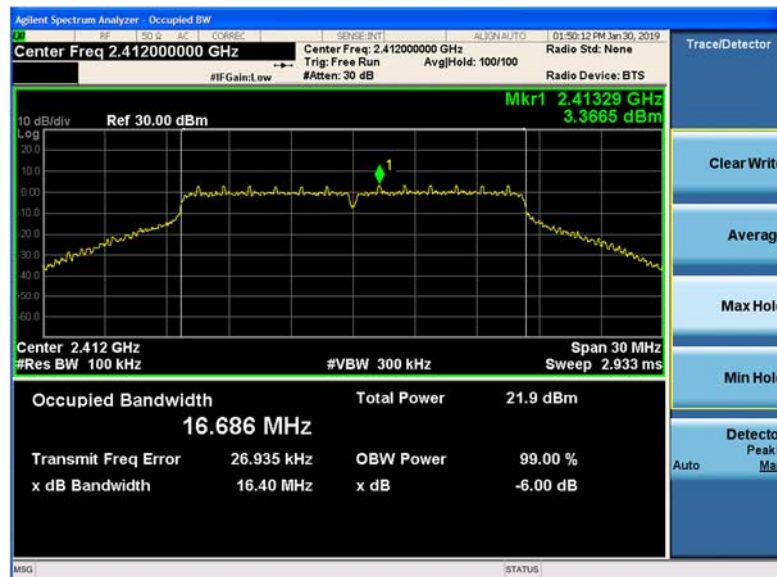
Plot 9-11 Chain A DTS Bandwidth 802.11b mode - Ch.11 (2462 MHz)



Plot 9-12 Chain A DTS Bandwidth 802.11b mode - Ch.12 (2467 MHz)



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



Plot 9-14 Chain A DTS Bandwidth 802.11g mode - Ch.1 (2412 MHz)



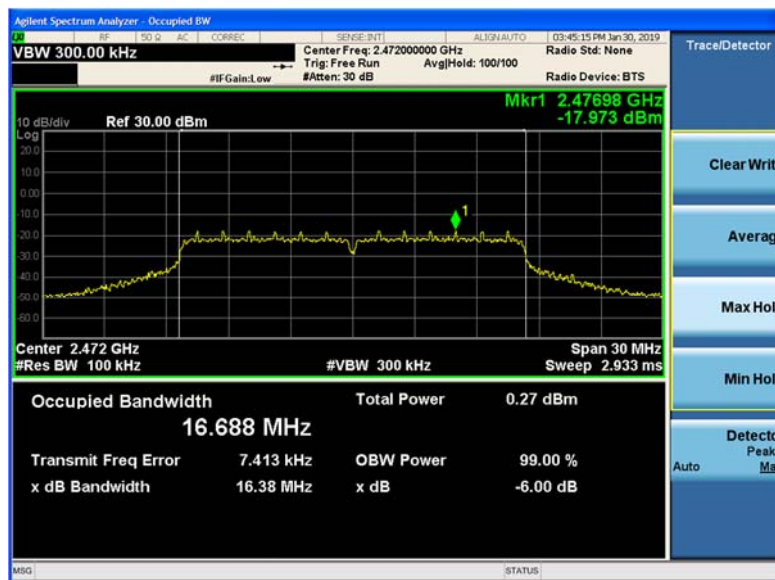
Plot 9-15 Chain A DTS Bandwidth 802.11g mode - Ch.6 (2437 MHz)



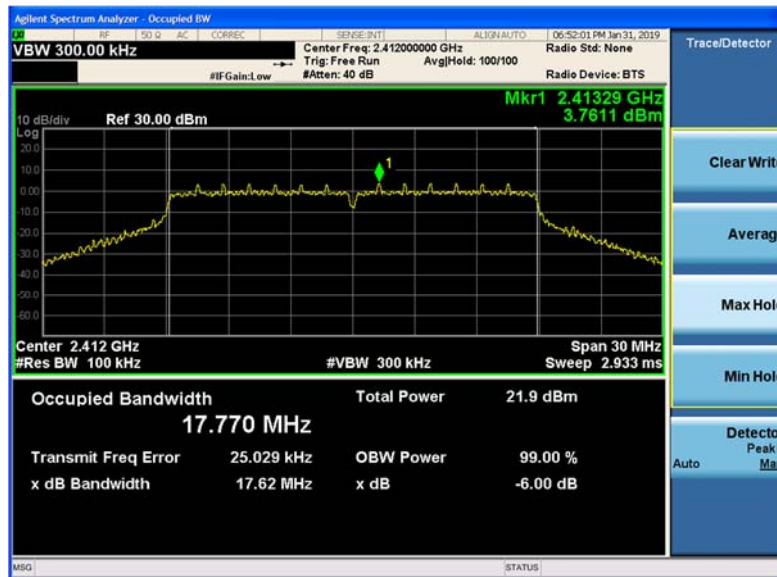
Plot 9-16 Chain A DTS Bandwidth 802.11g mode - Ch.11 (2462 MHz)



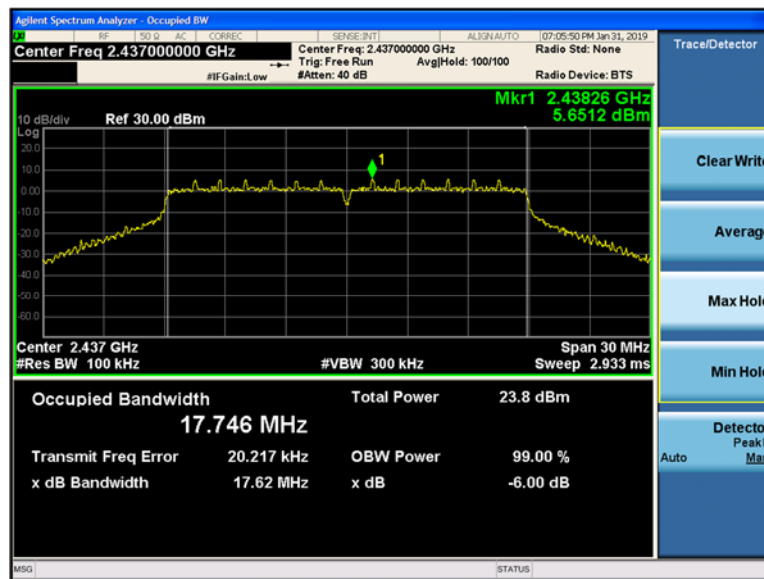
Plot 9-17 Chain A DTS Bandwidth 802.11g mode - Ch.12 (2467 MHz)



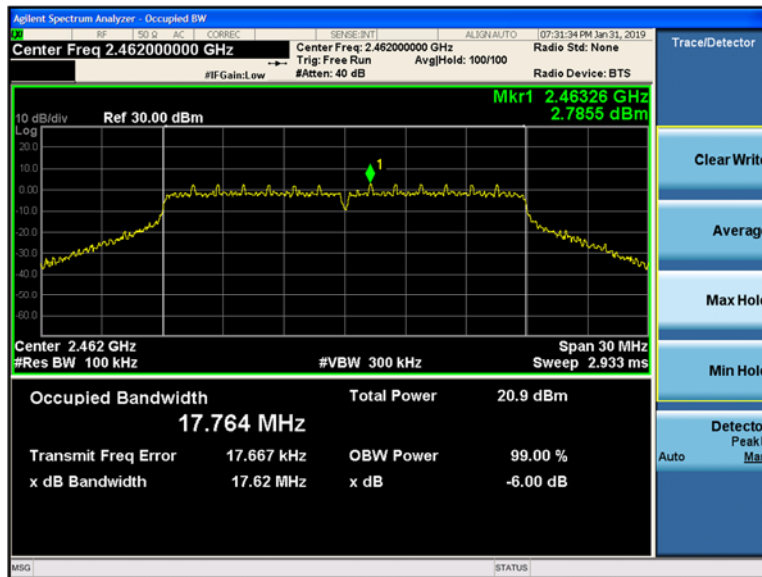
Plot 9-18 Chain A DTS Bandwidth 802.11g mode - Ch.13 (2472 MHz)



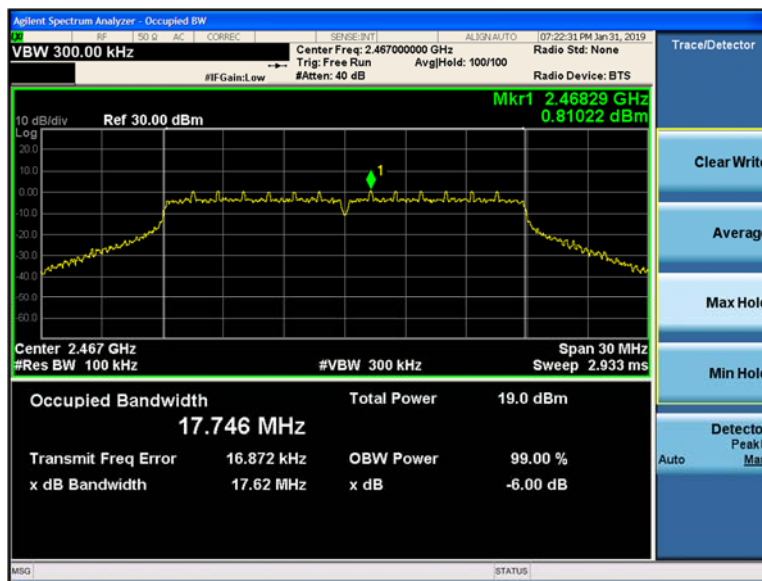
Plot 9-19 Chain A DTS Bandwidth 802.11n20 mode - Ch.1 (2412 MHz)



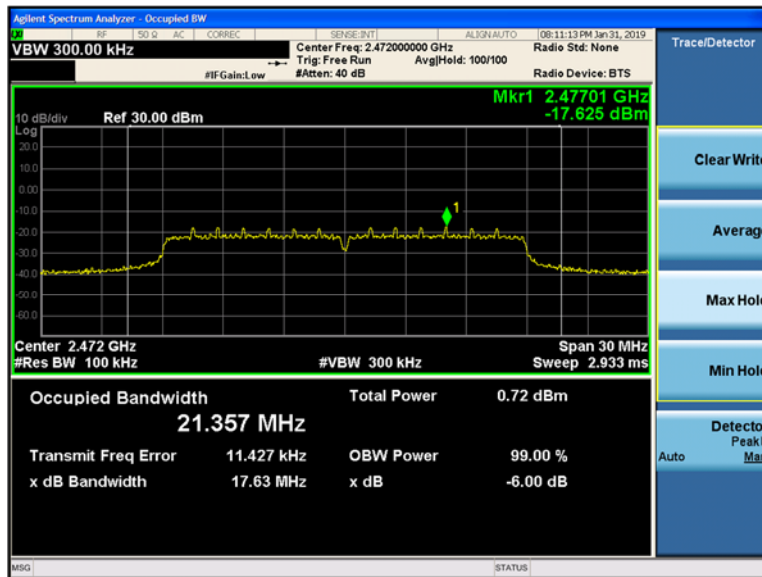
Plot 9-20 Chain A DTS Bandwidth 802.11n mode - Ch.6 (2437 MHz)



Plot 9-21 Chain A DTS Bandwidth 802.11n mode - Ch.11 (2462 MHz)



Plot 9-22 Chain A DTS Bandwidth 802.11n mode - Ch.12 (2467 MHz)



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



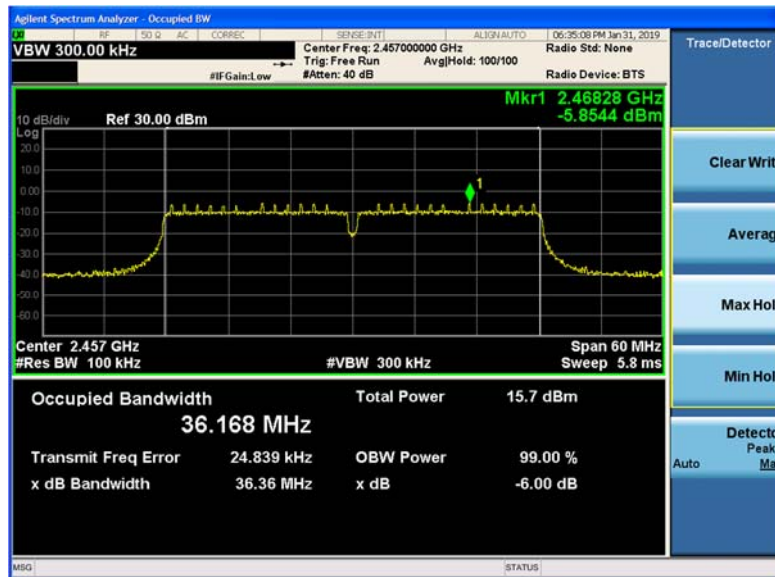
Plot 9-24 Chain A DTS Bandwidth 802.11n40 mode - Ch.3 (2422 MHz)



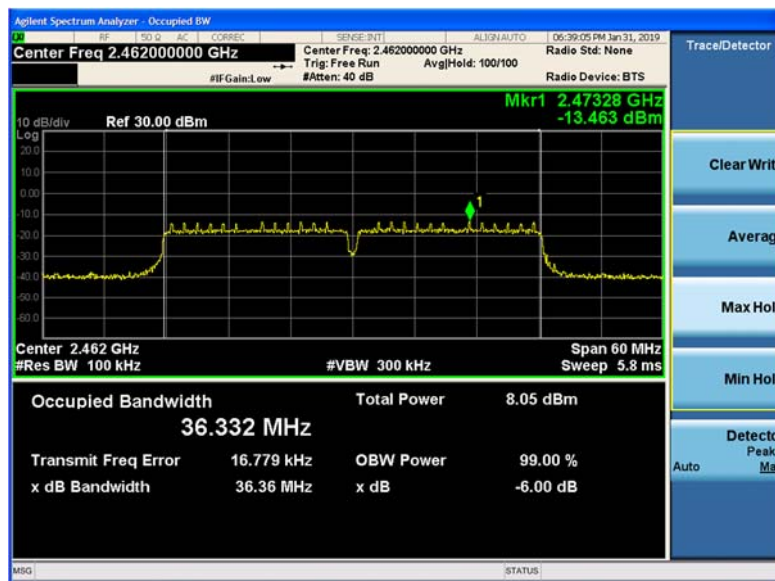
Plot 9-25 Chain A DTS Bandwidth 802.11n40 mode - Ch.7 (2442 MHz)



Plot 9-26 Chain A DTS Bandwidth 802.11n40 mode - Ch.9 (2452 MHz)



Plot 9-27 Chain A DTS Bandwidth 802.11n40 mode - Ch.10 (2457 MHz)



Plot 9-28 Chain A DTS Bandwidth 802.11n40 mode - Ch.11 (2462 MHz)



Plot 9-29 Chain B DTS Bandwidth 802.11b mode - Ch.1 (2412 MHz)



Plot 9-30 Chain B DTS Bandwidth 802.11b mode - Ch.6 (2437 MHz)



Plot 9-31 Chain B DTS Bandwidth 802.11b mode - Ch.11 (2462 MHz)



Plot 9-32 Chain B DTS Bandwidth 802.11b mode - Ch.12 (2467 MHz)



Plot 9-33 Chain B DTS Bandwidth 802.11b mode - Ch.13 (2472 MHz)



Plot 9-34 Chain B DTS Bandwidth 802.11g mode - Ch.1 (2412 MHz)



Plot 9-35 Chain B DTS Bandwidth 802.11g mode - Ch.6 (2437 MHz)



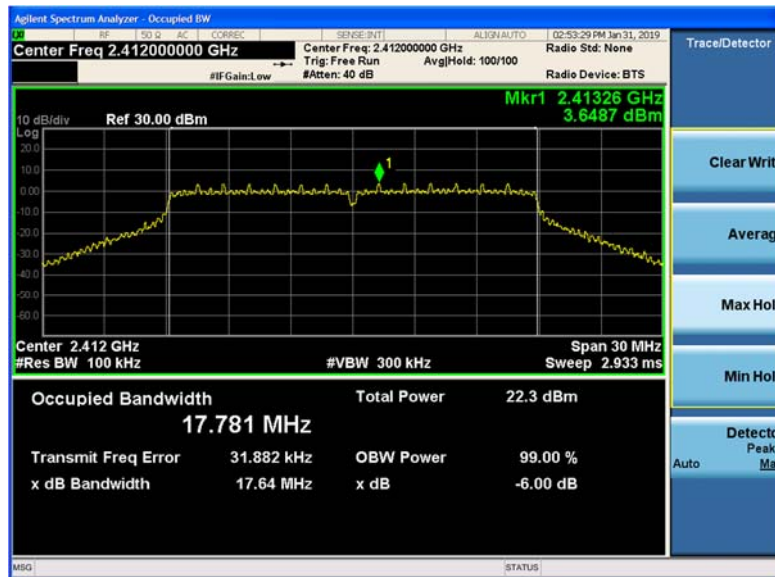
Plot 9-36 Chain B DTS Bandwidth 802.11g mode - Ch.11 (2462 MHz)



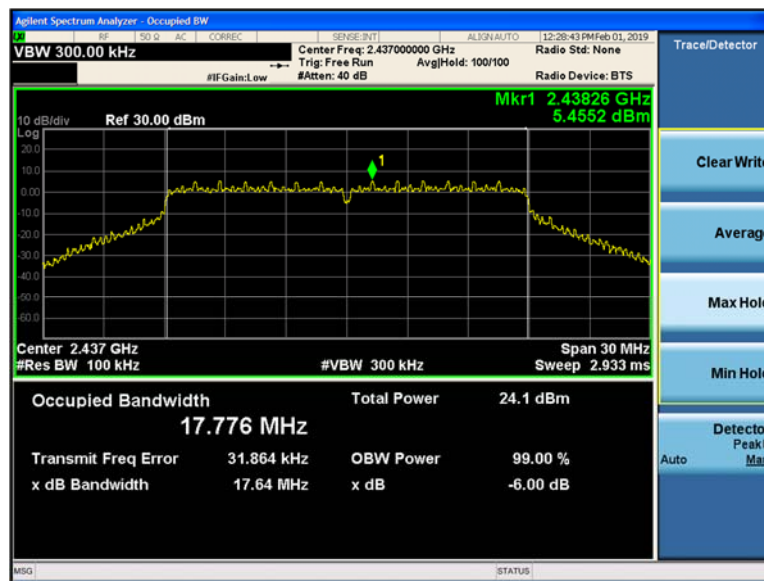
Plot 9-37 Chain B DTS Bandwidth 802.11g mode - Ch.12 (2467 MHz)



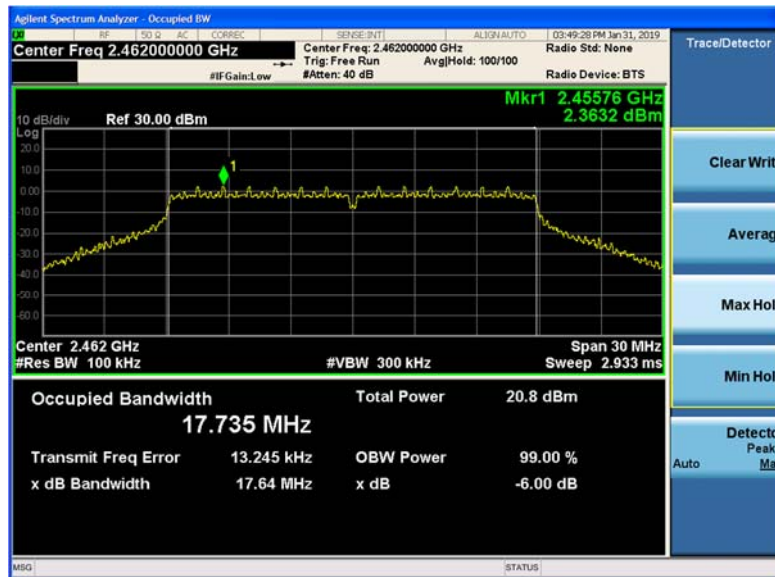
Plot 9-38 Chain B DTS Bandwidth 802.11g mode - Ch.13 (2472 MHz)



Plot 9-39 Chain B DTS Bandwidth 802.11n20 mode - Ch.1 (2412 MHz)



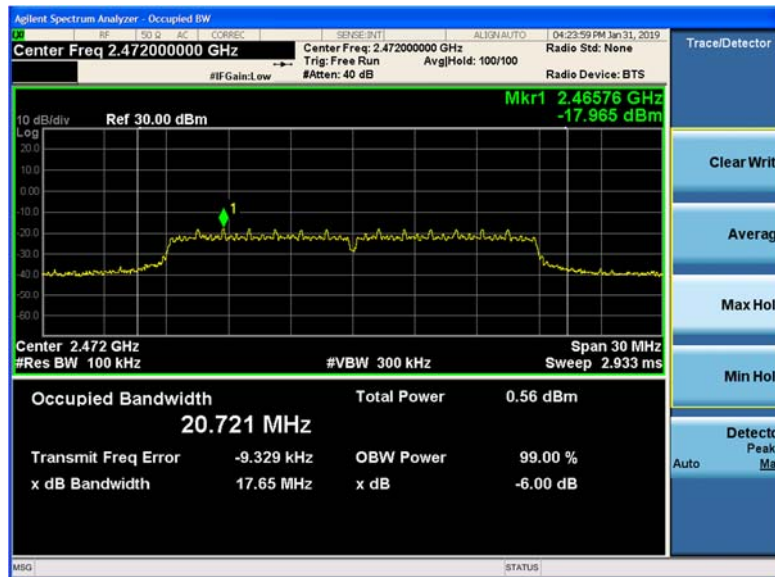
Plot 9-40 Chain B DTS Bandwidth 802.11n20 mode - Ch.6 (2437 MHz)



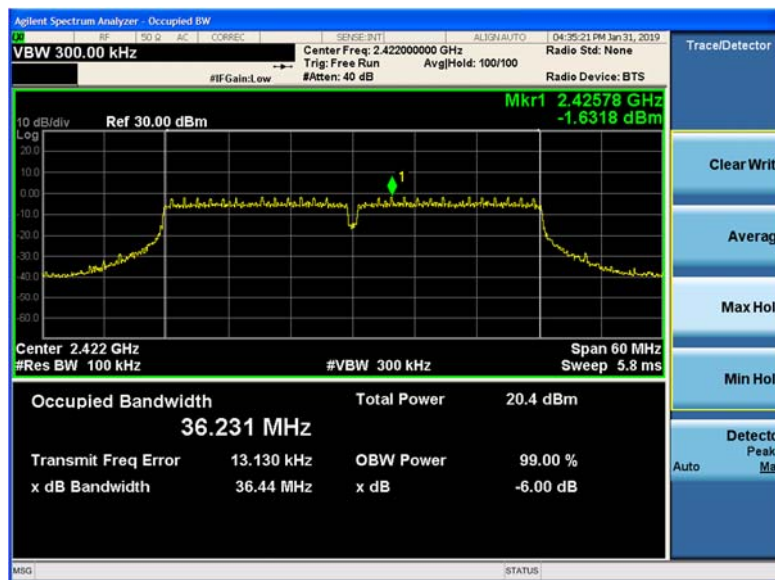
Plot 9-41 Chain B DTS Bandwidth 802.11n20 mode - Ch.11 (2462 MHz)



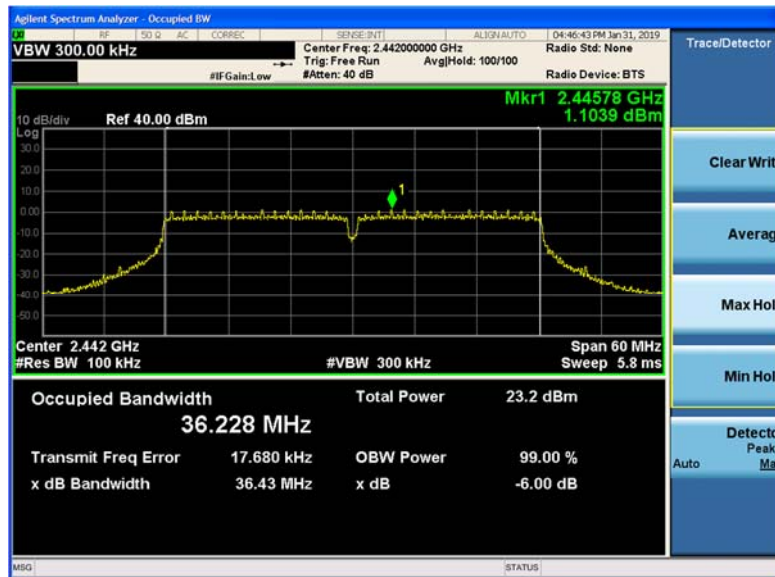
Plot 9-42 Chain B DTS Bandwidth 802.11n20 mode - Ch.12 (2467 MHz)



Plot 9-43 Chain B DTS Bandwidth 802.11n20 mode - Ch.13 (2472 MHz)



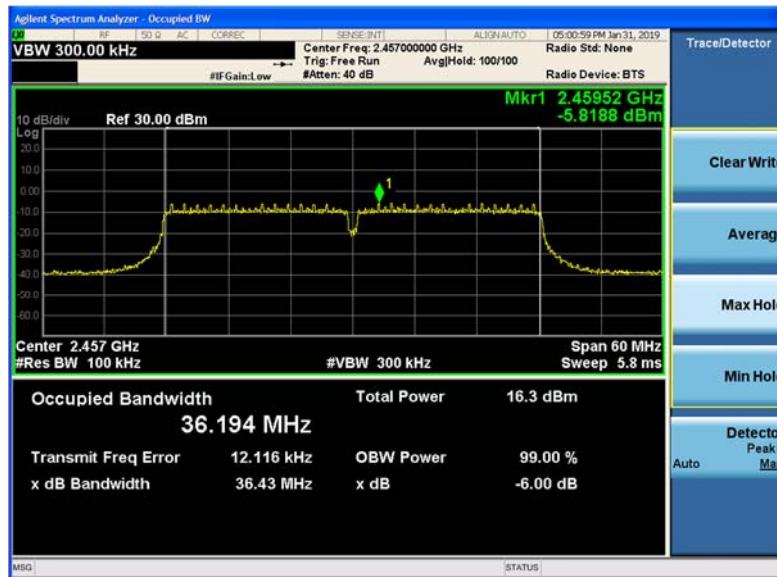
Plot 9-44 Chain B DTS Bandwidth 802.11n40 mode - Ch.3 (2422 MHz)



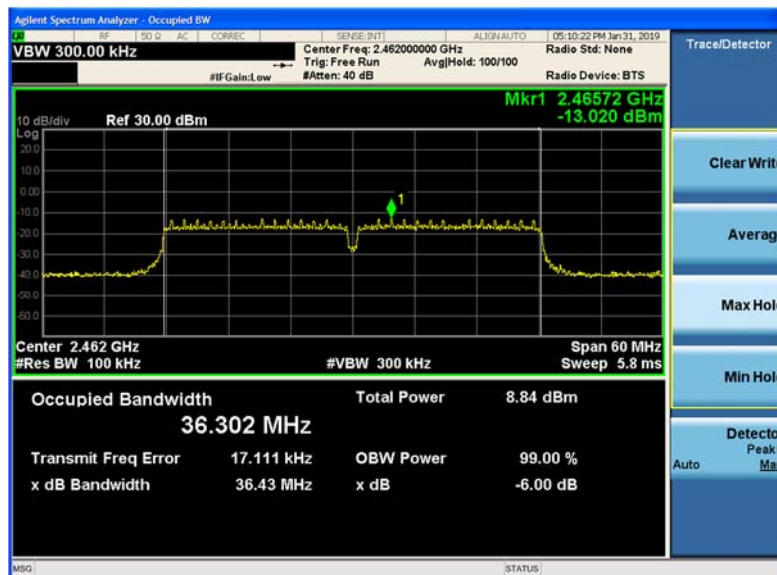
Plot 9-45 Chain B DTS Bandwidth 802.11n40 mode - Ch.7 (2442 MHz)



Plot 9-46 Chain B DTS Bandwidth 802.11n40 mode - Ch.9 (2452 MHz)



Plot 9-47 Chain B DTS Bandwidth 802.11n40 mode - Ch.10 (2457 MHz)



Plot 9-48 Chain B DTS Bandwidth 802.11n40 mode - Ch.11 (2462 MHz)

9.3 99% Bandwidth

9.3.1 Test Requirement:

The 99% Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal. This test is performed for reporting and measurement purposes only.

9.3.2 Test Method:

Measurements were performed according to the procedure defined in ANSI C63.10:2013.

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: 1% to 5% of the OBW

VBW $\geq$ 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	13.43
6	2437	13.47
11	2462	13.43
12	2467	13.40
13	2472	13.43
Chain A 802.11g 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	17.14
6	2437	17.13
11	2462	17.10
12	2467	17.09
13	2472	17.20
Chain A 802.11n20 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	18.18
6	2437	18.20
11	2462	18.19
12	2467	18.18
13	2472	18.27

Chain A 802.11n40 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
3	2422	37.03
7	2442	37.07
9	2452	37.05
10	2457	37.05
11	2462	37.36

Chain B 802.11b 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	13.42
6	2437	13.53
11	2462	13.51
12	2467	13.58
13	2472	13.45
Chain B 802.11g 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	17.11
6	2437	17.15
11	2462	17.05
12	2467	17.10
13	2472	17.14
Chain B 802.11n20 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
1	2412	18.01
6	2437	18.04
11	2462	18.04
12	2467	18.05
13	2472	18.13
Chain B 802.11n40 99% Bandwidth (MHz)		
Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
3	2422	36.78
7	2442	36.75
9	2452	36.73
10	2457	36.71
11	2462	36.96

9.3.5 Test Data:



Plot 9-49 Chain A 99% Bandwidth 802.11b - Ch.1 (2412 MHz)



Plot 9-50 Chain A 99% Bandwidth 802.11b - Ch.6 (2437 MHz)



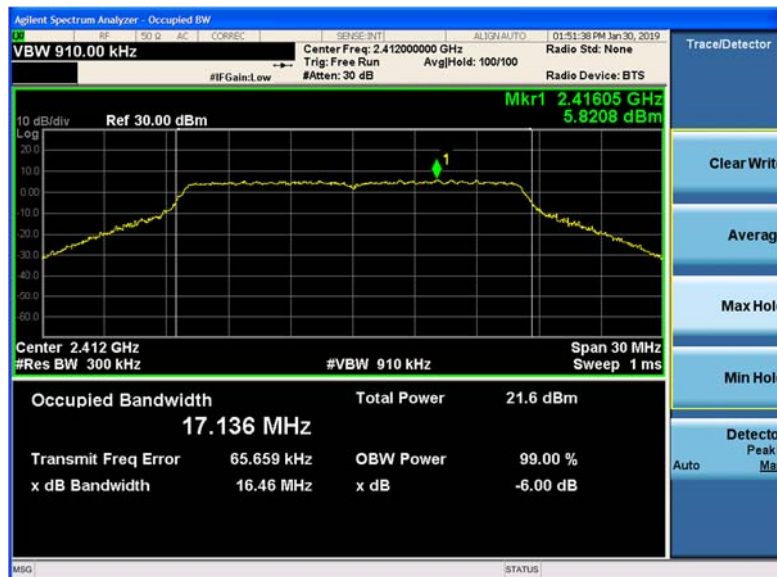
Plot 9-51 Chain A 99% Bandwidth 802.11b - Ch.11 (2462 MHz)



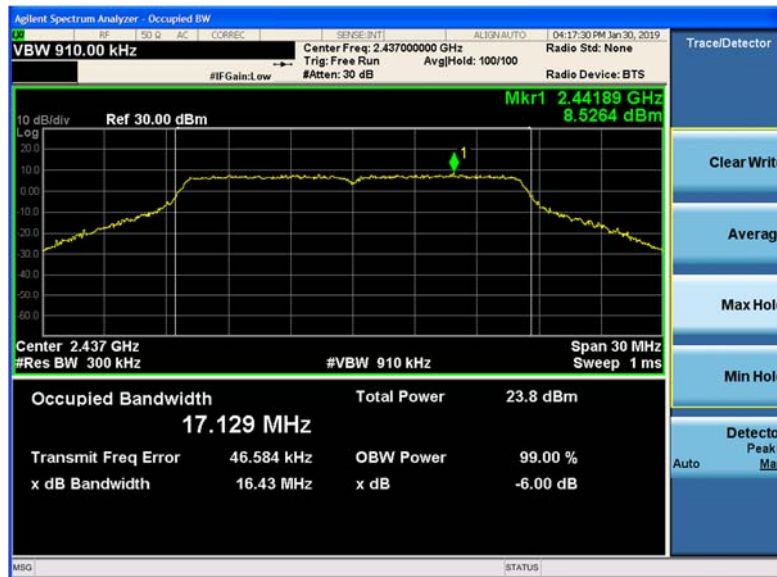
Plot 9-52 Chain A 99% Bandwidth 802.11b - Ch.12 (2467 MHz)



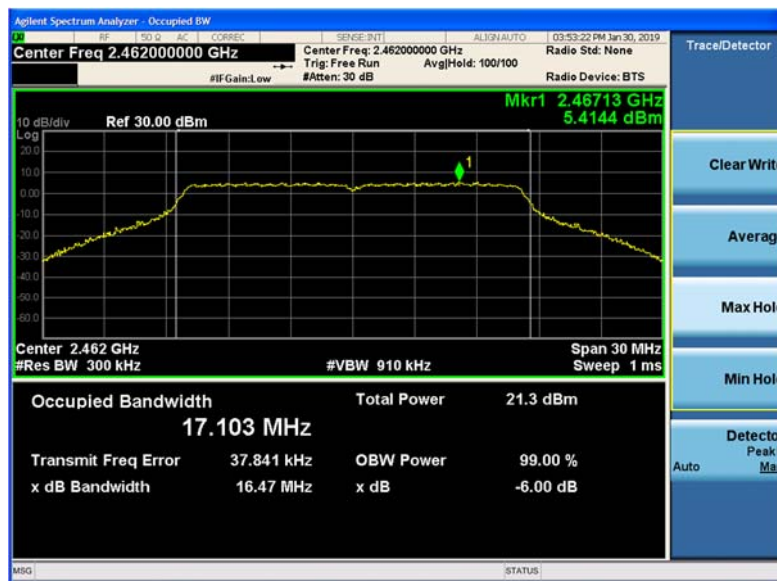
Plot 9-53 Chain A 99% Bandwidth 802.11b - Ch.13 (2472 MHz)



Plot 9-54 Chain A 99% Bandwidth 802.11g - Ch.1 (2412 MHz)



Plot 9-55 Chain A 99% Bandwidth 802.11g - Ch.6 (2437 MHz)



Plot 9-56 Chain A 99% Bandwidth 802.11g - Ch.11 (2462 MHz)



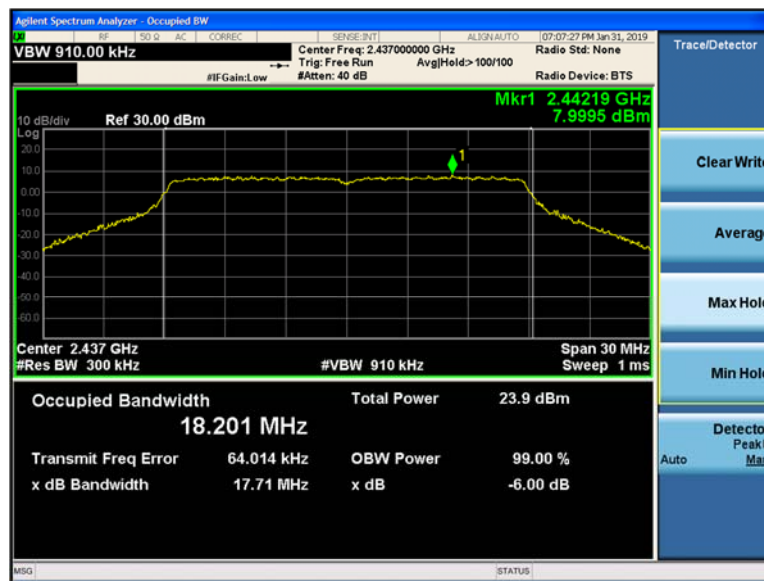
Plot 9-57 Chain A 99% Bandwidth 802.11g - Ch.12 (2467 MHz)



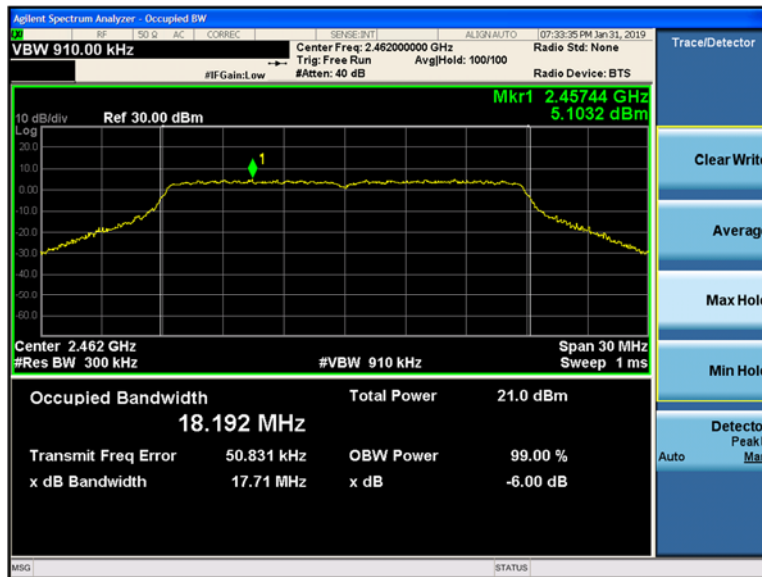
Plot 9-58 Chain A 99% Bandwidth 802.11g - Ch.13 (2472 MHz)



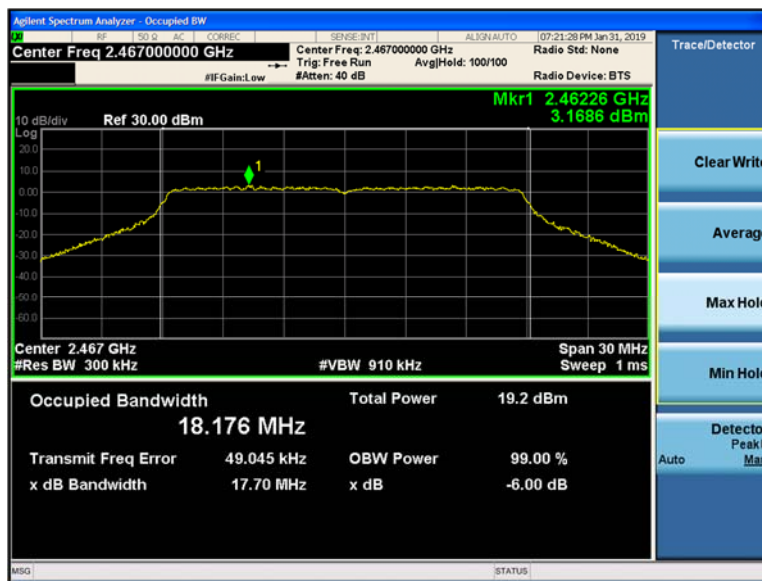
Plot 9-59 Chain A 99% Bandwidth 802.11n20 - Ch.1 (2412 MHz)



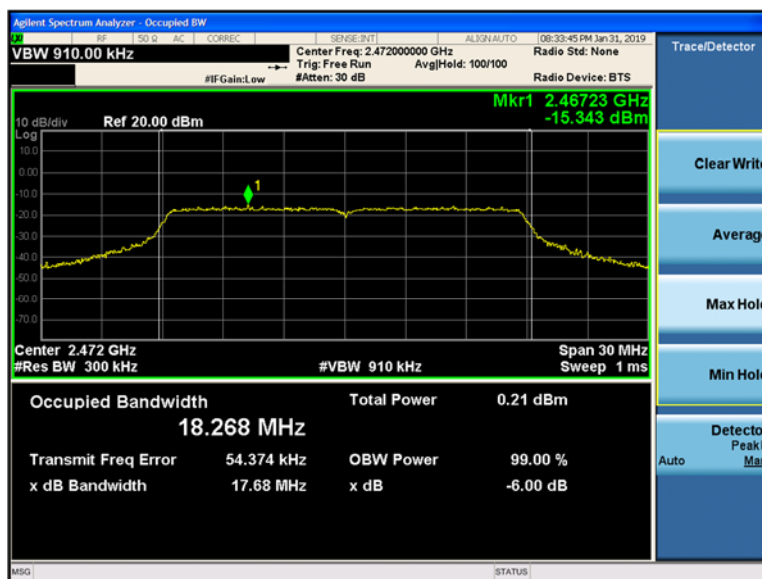
Plot 9-60 Chain A 99% Bandwidth 802.11n20 - Ch.6 (2437 MHz)



Plot 9-61 Chain A 99% Bandwidth 802.11n20 - Ch.11 (2462 MHz)



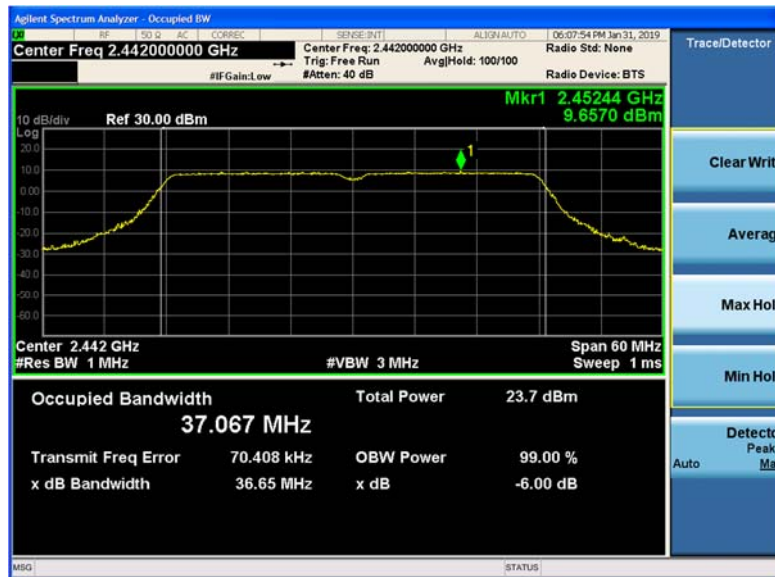
Plot 9-62 Chain A 99% Bandwidth 802.11n20 - Ch.12 (2467 MHz)



Plot 9-63 Chain A 99% Bandwidth 802.11n20 - Ch.13 (2472 MHz)



Plot 9-64 Chain A 99% Bandwidth 802.11n40 - Ch.3 (2422 MHz)



Plot 9-65 Chain A 99% Bandwidth 802.11n40 - Ch.7 (2442 MHz)



Plot 9-66 Chain A 99% Bandwidth 802.11n40 - Ch.9 (2452 MHz)



Plot 9-67 Chain A 99% Bandwidth 802.11n40 - Ch.10 (2457 MHz)



Plot 9-68 Chain A 99% Bandwidth 802.11n40 - Ch.11 (2462 MHz)



Plot 9-69 Chain B 99% Bandwidth 802.11b - Ch.1 (2412 MHz)



Plot 9-70 Chain B 99% Bandwidth 802.11b - Ch.6 (2437 MHz)



Plot 9-71 Chain B 99% Bandwidth 802.11b - Ch.11 (2462 MHz)



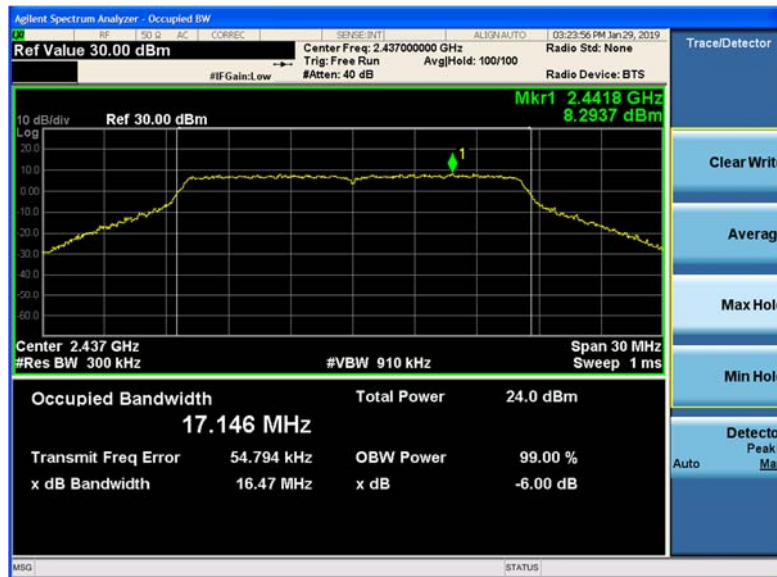
Plot 9-72 Chain B 99% Bandwidth 802.11b - Ch.12 (2467 MHz)



Plot 9-73 Chain B 99% Bandwidth 802.11b - Ch.13 (2472 MHz)



Plot 9-74 Chain B 99% Bandwidth 802.11g - Ch.1 (2412 MHz)



Plot 9-75 Chain B 99% Bandwidth 802.11g - Ch.6 (2437 MHz)



Plot 9-76 Chain B 99% Bandwidth 802.11g - Ch.11 (2462 MHz)