

Hampton Products International Corporation

REVISED TEST REPORT FOR

ARRAY, WiFi™* SMART DEADBOLT
Model: 23500-125

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.247
(DTS 2400-2483.5 MHz)

Report No.: 100170-8A

Date of issue: October 27, 2017



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

* Wi-Fi® is a registered trademark of Wi-Fi Alliance®.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Foothill Ranch, CA 92610-3000

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REPORT PREPARED BY:

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Mariposa, CA 95338

Project Number: 100170

DATE OF EQUIPMENT RECEIPT:

September 27, 2017

DATE(S) OF TESTING:

September 27, 2017 -October 1, 2017

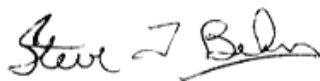
Revision History

Original: Testing of the ARRAY, WiFi™ SMART DEADBOLT, Model: 23500-125 to FCC Part 15 Subpart C Section(s) 15.247 (DTS 2400-2483.5 MHz)

Revision A: To clarify conducted Band Edge data, BE Summary table was revised and statement added over BE plots.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass

NA = Not Applicable

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

The following device/model has been tested by CKC Laboratories:

ARRAY, WiFi™ SMART DEADBOLT, Model: 23500-125

The manufacturer states that the following additional models are identical electrically to the one which was tested, or any differences between them do not affect their EMC characteristics, and therefore they meet the level of testing equivalent to the tested models.

Model Number	Style and Finish Description
23500-125	Cooper (modern style) in Polished Chrome
23500-119	Cooper (modern style) in Satin Nickel
23500-150	Cooper (modern style) in Tuscan Bronze
23501-119	Barrington (transitional style) in Satin Nickel
23501-125	Barrington (transitional style) in Polished Chrome
23501-150	Barrington (transitional style) in Tuscan Bronze

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
ARRAY, WiFi™ SMART DEADBOLT	Hampton Products International Corporation	23500-125	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	ASUS	UX330U	GAN0WU046001418
USB to Serial Interface	Skyworks	EN40-D405-001	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11b/g/n20
Operating Frequency Range:	2412MHz to 2462MHz
Modulation Type(s):	DSSS, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM
Maximum Duty Cycle:	>=98%
Number of TX Chains:	1
Antenna Type(s) and Gain:	PIFA, 2.1dBi
Beamforming Type:	N/A
Antenna Connection Type:	Integral
Nominal Input Voltage:	3.7Vdc
Firmware / Software used for Test:	Lock 1.42 WiFi™/Ayla 2.49

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 v04 April 5, 2017	Test Date(s):	9/27/2017
Configuration:	1		
Test Setup:	Frequency Range: 2412MHz to 2462MHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11b=17, 802.11g=15, 802.11n20=14 EUT Firmware: Lock 1.42 WiFi™/Ayla 2.49 Protocol /MCS/Modulation: DSSS, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM Antenna type: PIFA Antenna Gain: 2.1dBi. Duty Cycle: 802.11b=97.1, 802.11g=98.0, 802.11n20=97.9 Test Method: KDB 558074 D01 v04 D01 v04 April 5, 2017 Option 2 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT. Modifications added: None Setup: Site A control room		

Environmental Conditions			
Temperature (°C)	22	Relative Humidity (%):	40

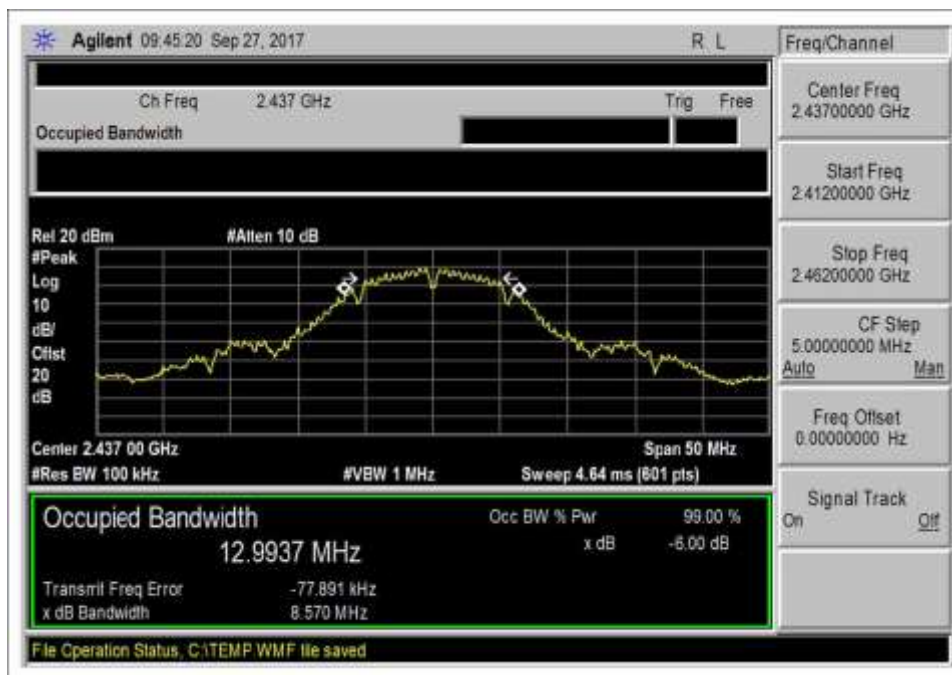
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2412	1	CCK	8600	≥500	Pass
2437	1	CCK	8600	≥500	Pass
2462	1	CCK	8600	≥500	Pass
2412	1	OFDM	16300	≥500	Pass
2437	1	OFDM	16400	≥500	Pass
2462	1	OFDM	16300	≥500	Pass
2412	1	BPSK	17300	≥500	Pass
2437	1	BPSK	17000	≥500	Pass
2462	1	BPSK	17300	≥500	Pass

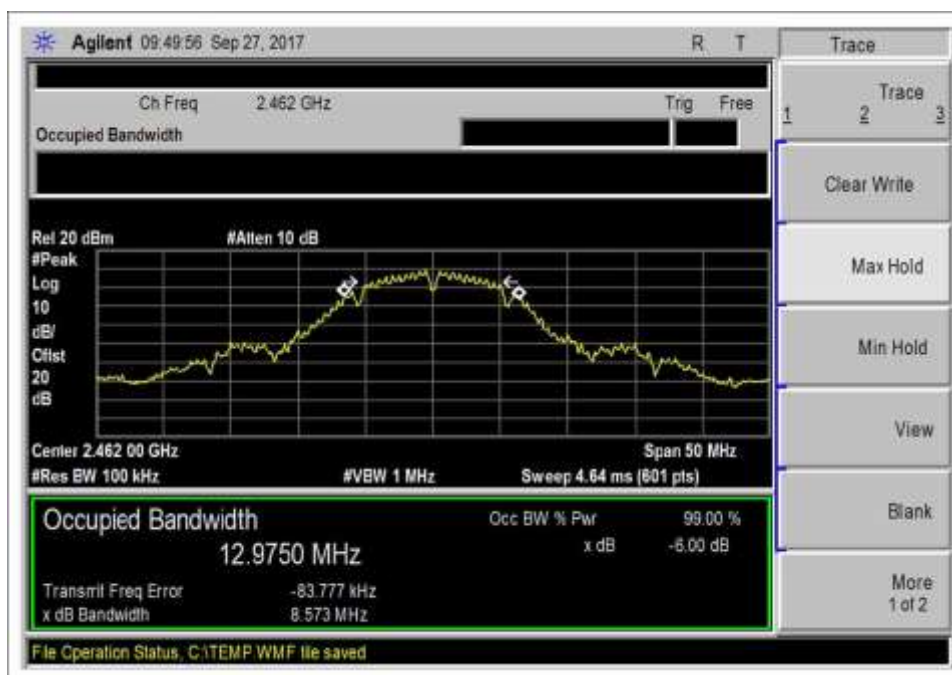
Plots



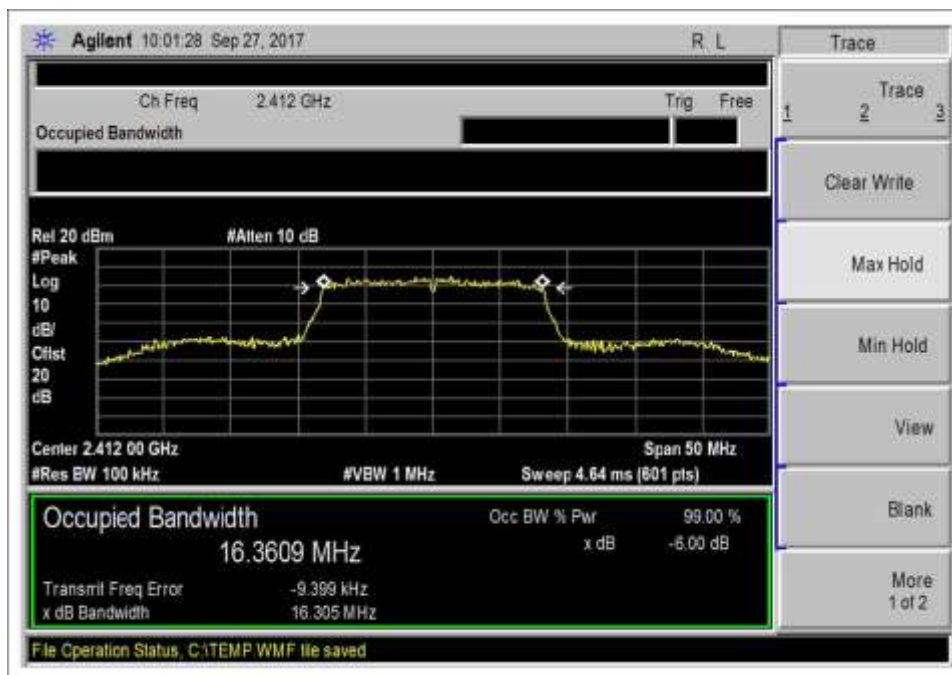
802.11b_DTS_BW_Low_CH1_2412MHz



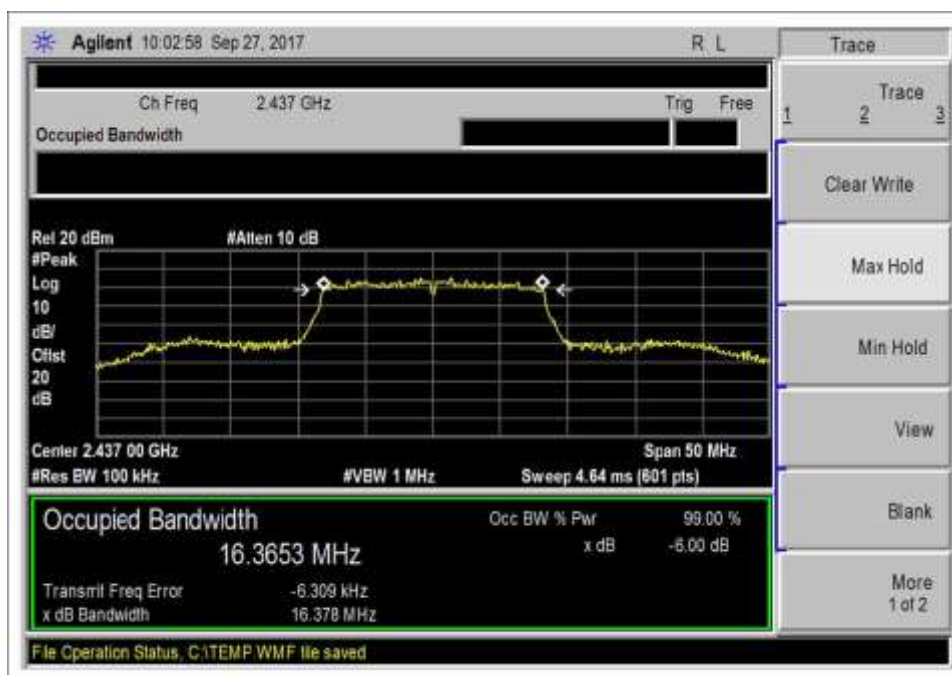
802.11b_DTS_BW_Middle_CH6_2437MHz



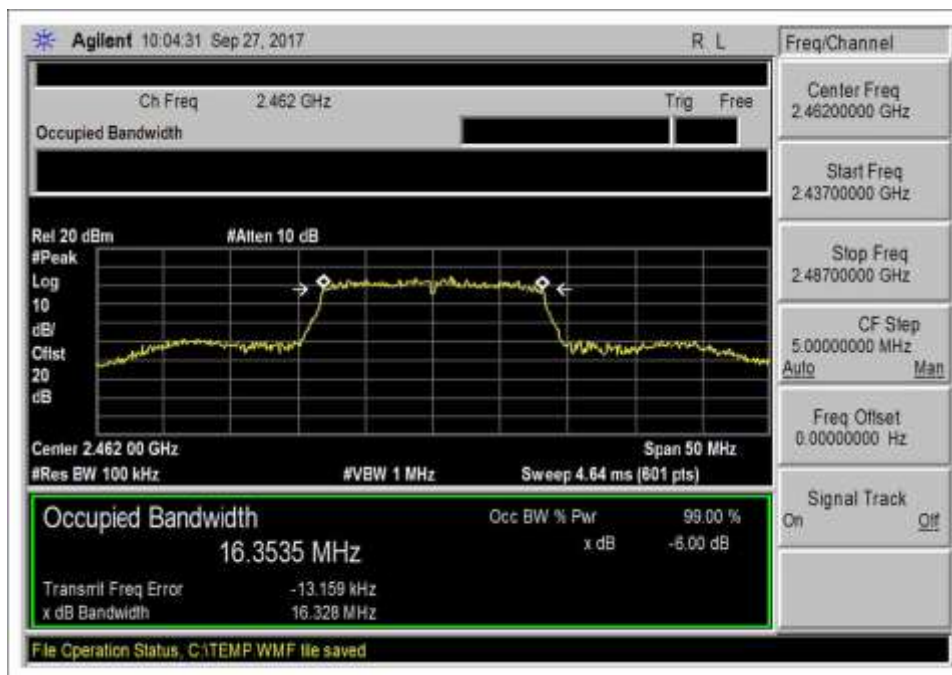
802.11b_DTS_BW_High_CH11_2462MHz



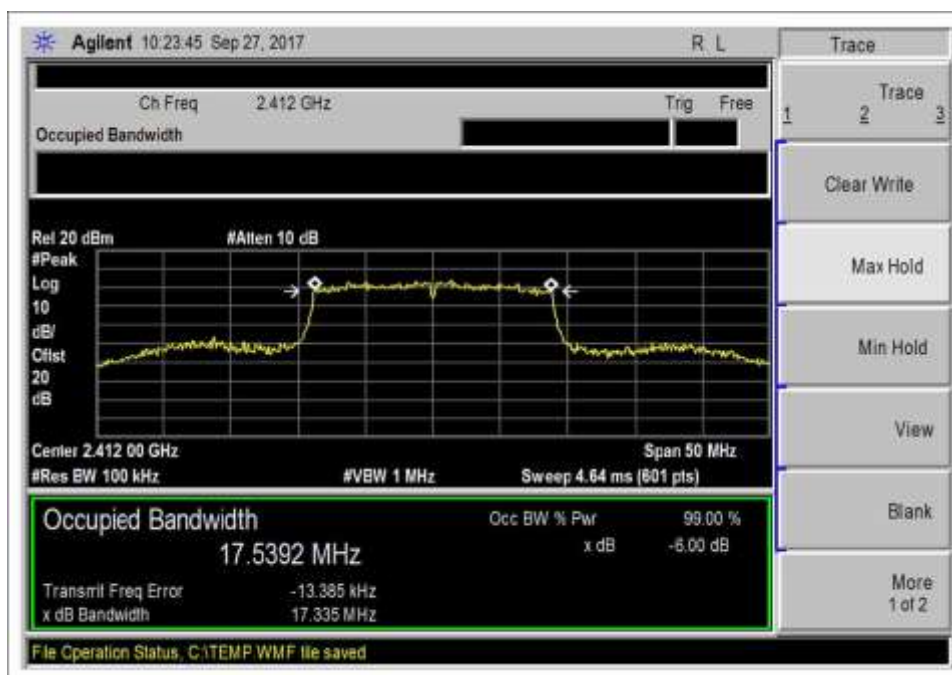
802.11g_DTS_BW_Low_CH1_2412MHz



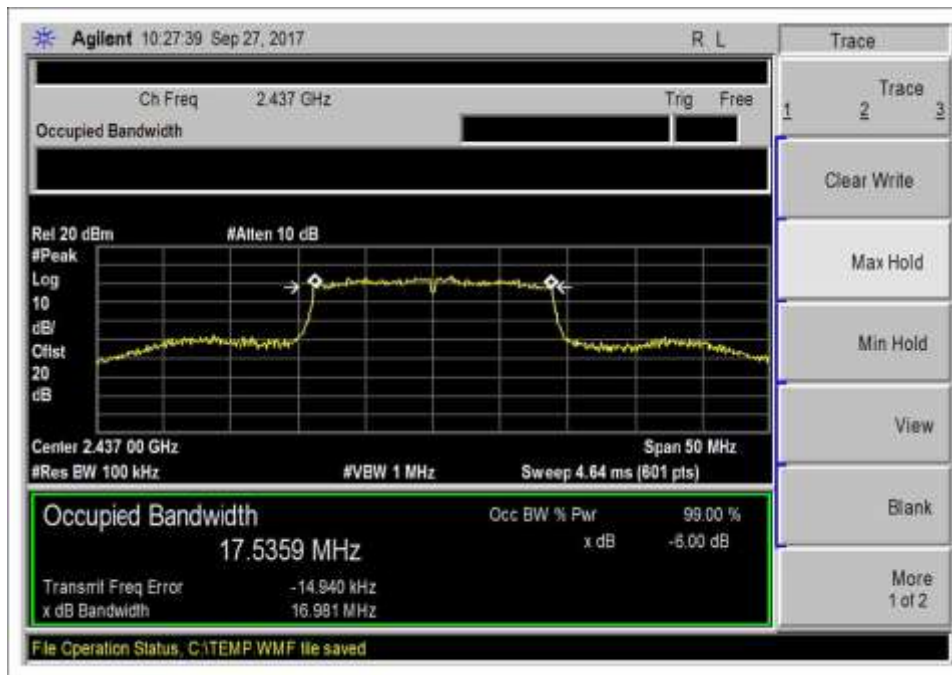
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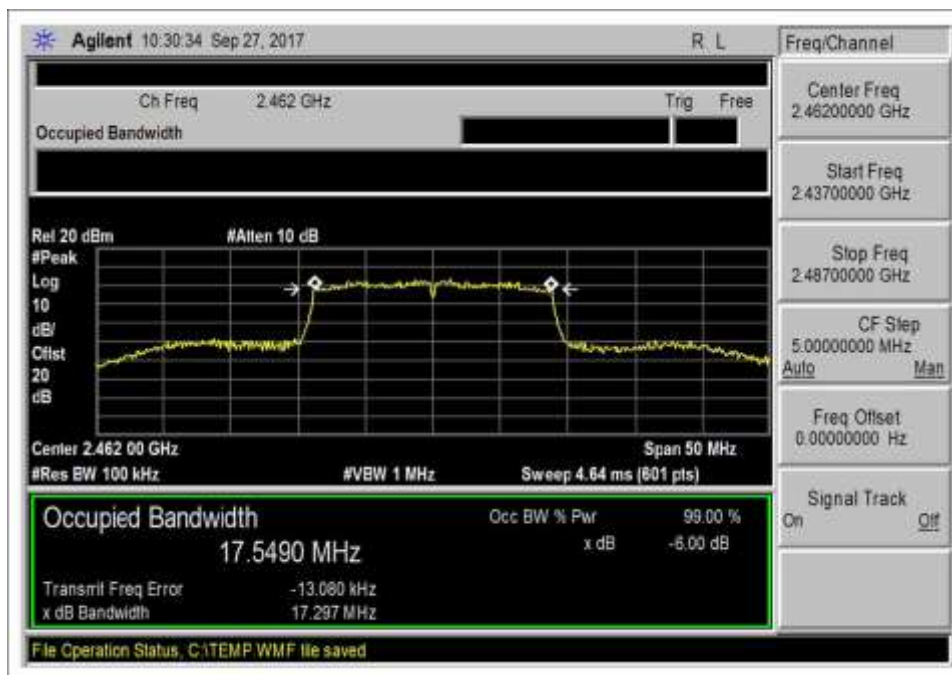
802.11g_DTS_BW_High_CH11_2462MHz



802.11n20_DTS_BW_Low_CH1_2412MHz



802.11n20_DTS_BW_Middle_CH6_2437MHz



802.11n20_DTS_BW_High_CH11_2462MHz

Test Setup Photo



15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 v04 April 5, 2017	Test Date(s):	9/27/2017
Configuration:	1		
Test Setup:	Frequency Range: 2412MHz to 2462MHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11b=17, 802.11g=15, 802.11n20=14 EUT Firmware: Lock 1.42 WiFi™/Ayla 2.49 Protocol /MCS/Modulation: DSSS, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM Antenna type: PIFA Antenna Gain: 2.1 dBi. Duty Cycle: 802.11b=97.1, 802.11g=98.0, 802.11n20=97.9 Test Method: KDB 558074 D01 v04 AVGSA-2 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT. Modifications added: None Setup: Site A control room		

Environmental Conditions			
Temperature (°C)	22	Relative Humidity (%):	40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBm)	V _{Nominal} (dBm)	V _{Maximum} (dBm)	Max Deviation from V _{Nominal} (dB)
2412	CCK / 1	NA	17.2	NA	0
2437	CCK / 1	NA	17.3	NA	0
2462	CCK / 1	NA	16.8	NA	0
2412	OFDM / 1	NA	14.9	NA	0
2437	OFDM / 1	NA	14.9	NA	0
2462	OFDM / 1	NA	14.3	NA	0
2412	BPSK / 1	NA	13.9	NA	0
2437	BPSK / 1	NA	13.9	NA	0
2462	BPSK / 1	NA	13.5	NA	0

Test performed using operational mode with the highest output power, representing worst case.

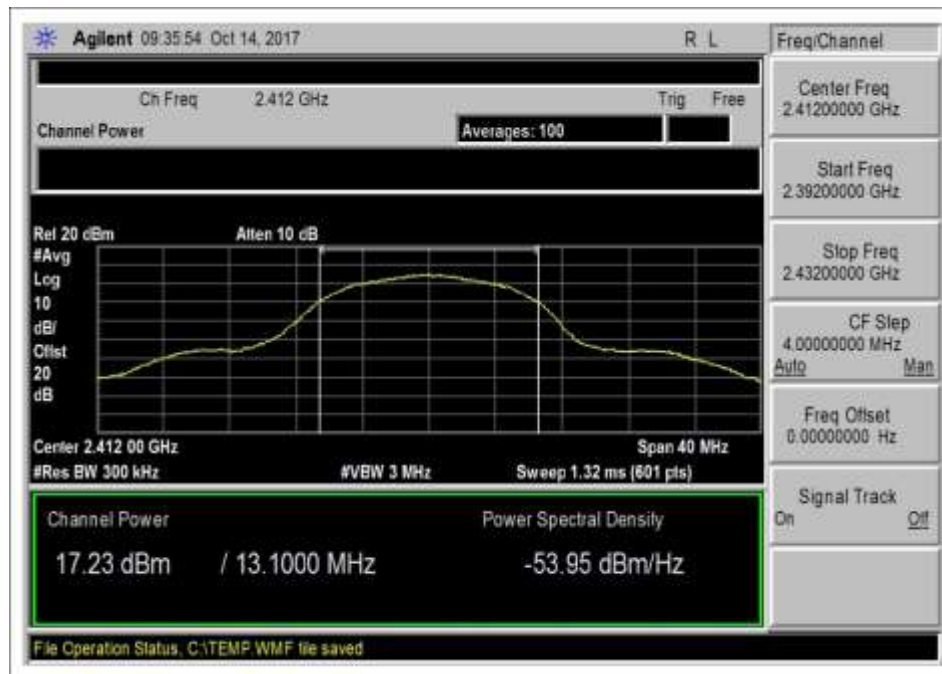
Test Data Summary - Voltage Variations

This equipment is battery powered and manufacturer declares the equipment cannot operate while charging. The battery is separated from the product during charge cycle.

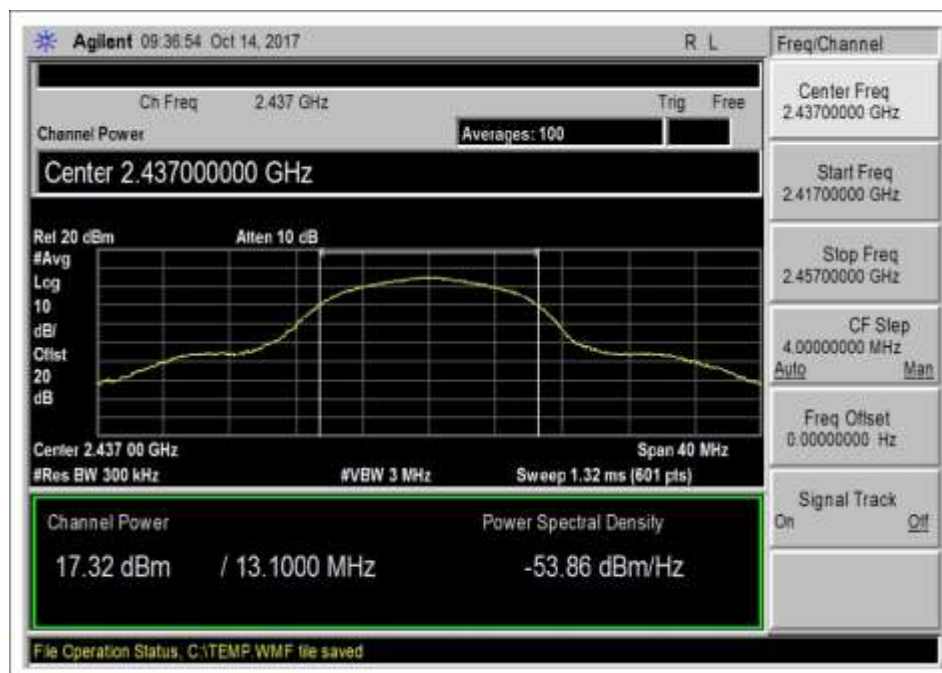
Power output tests were performed using a fresh battery.

Power Output Test Data Summary - RF Conducted Measurement						
Measurement Option: AVGSA-2						
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	DCCF (dB)	Limit (dBm)	Results
2412	CCK	PIFA / 2.1	17.2	0.1	≤ 30	Pass
2437	CCK	PIFA / 2.1	17.3	0.1	≤ 30	Pass
2462	CCK	PIFA / 2.1	16.8	0.1	≤ 30	Pass
2412	OFDM	PIFA / 2.1	14.9	0	≤ 30	Pass
2437	OFDM	PIFA / 2.1	14.9	0	≤ 30	Pass
2462	OFDM	PIFA / 2.1	14.3	0	≤ 30	Pass
2412	BPSK	PIFA / 2.1	13.9	0.1	≤ 30	Pass
2437	BPSK	PIFA / 2.1	13.9	0.1	≤ 30	Pass
2462	BPSK	PIFA / 2.1	13.5	0.1	≤ 30	Pass

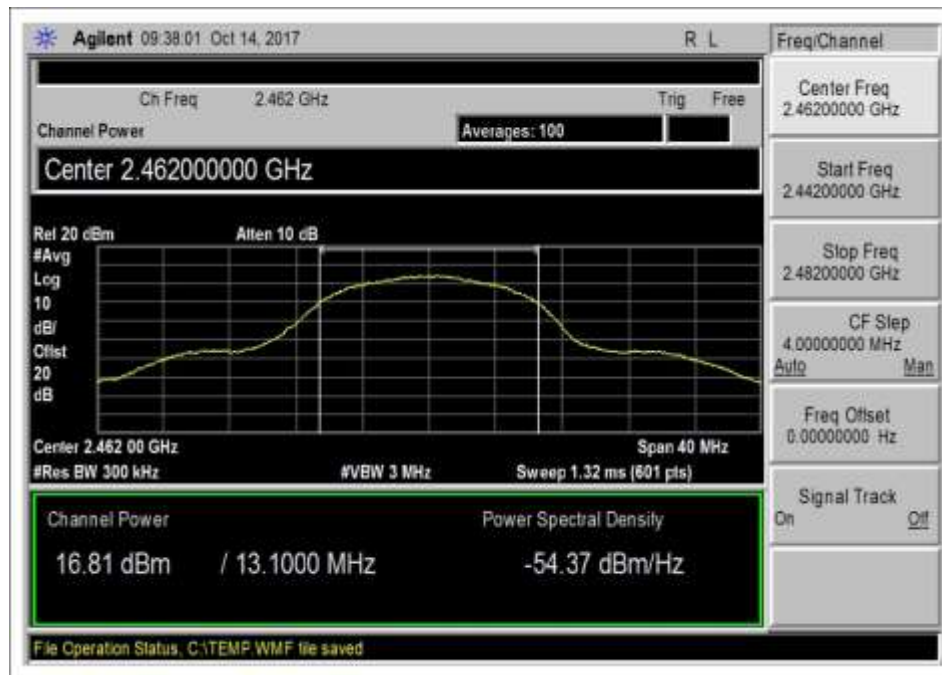
Plots



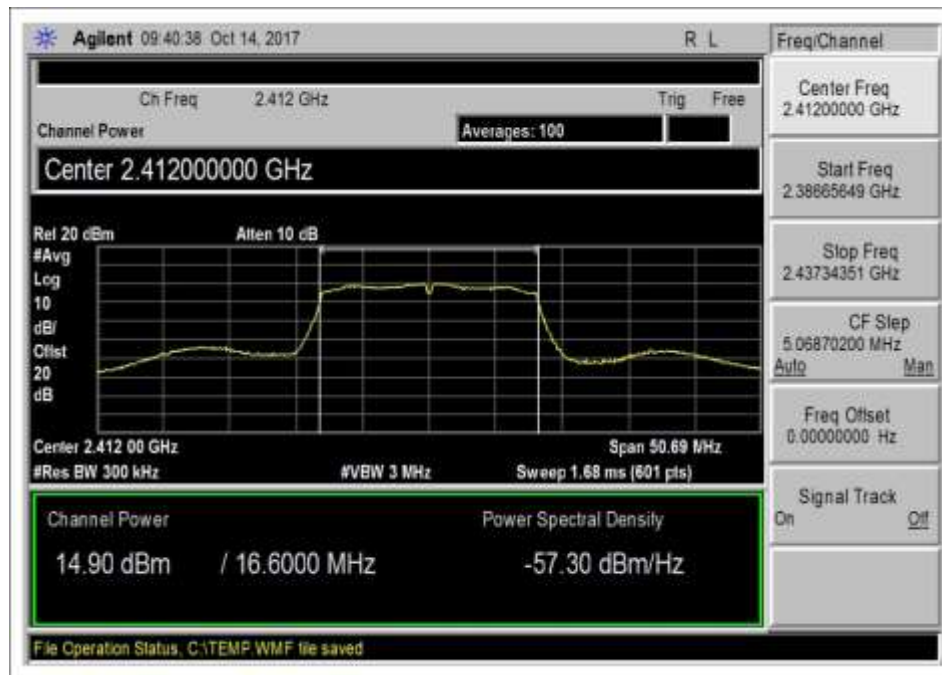
802.11b_Power_Low_CH1_2412MHz



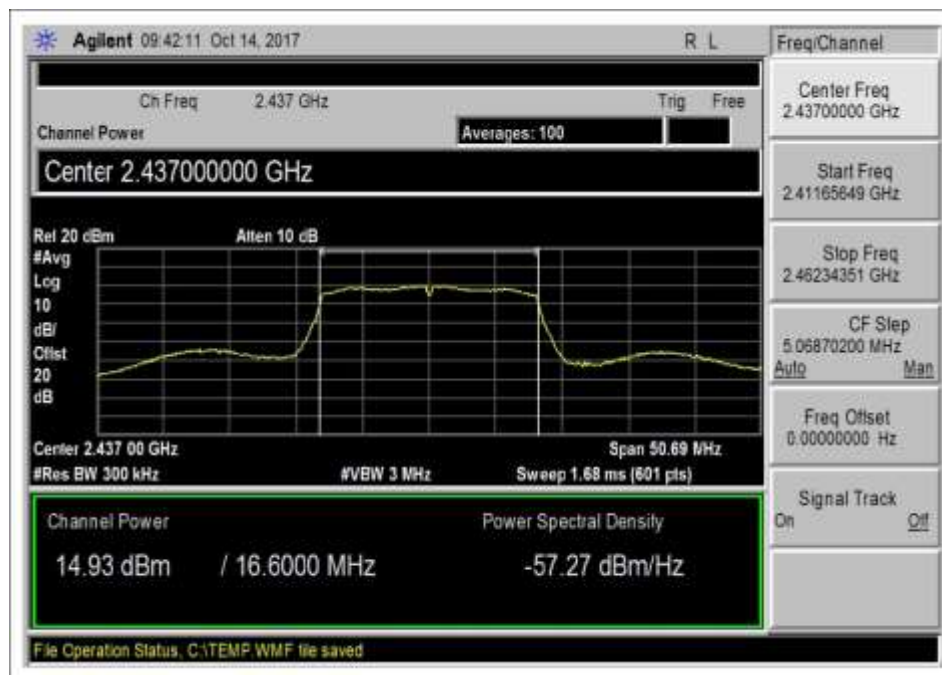
802.11b_Power_Middle_CH6_2437MHz



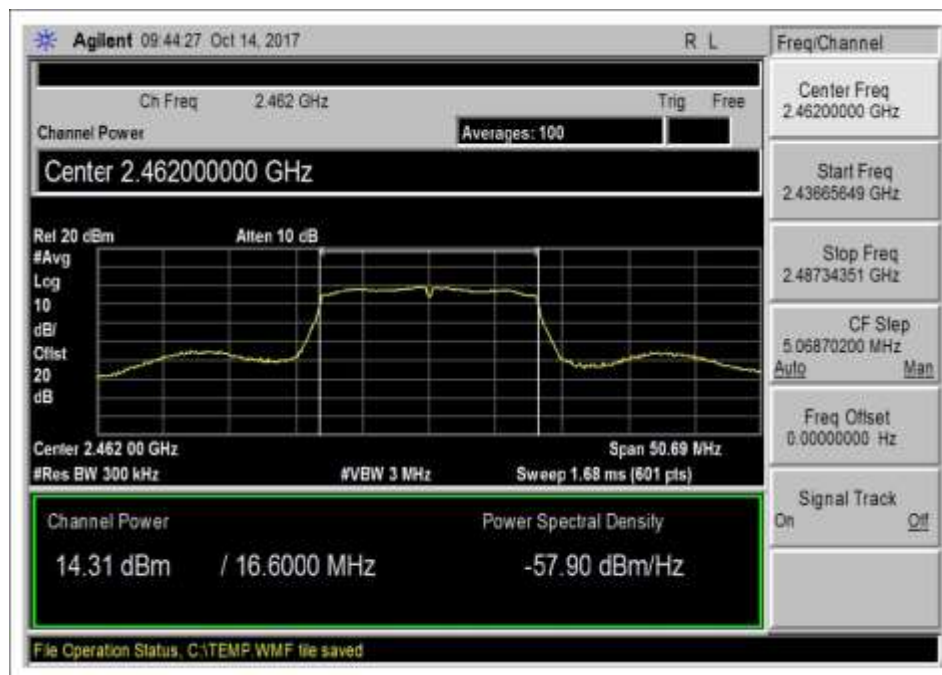
802.11b_Power_High_CH11_2462MHz



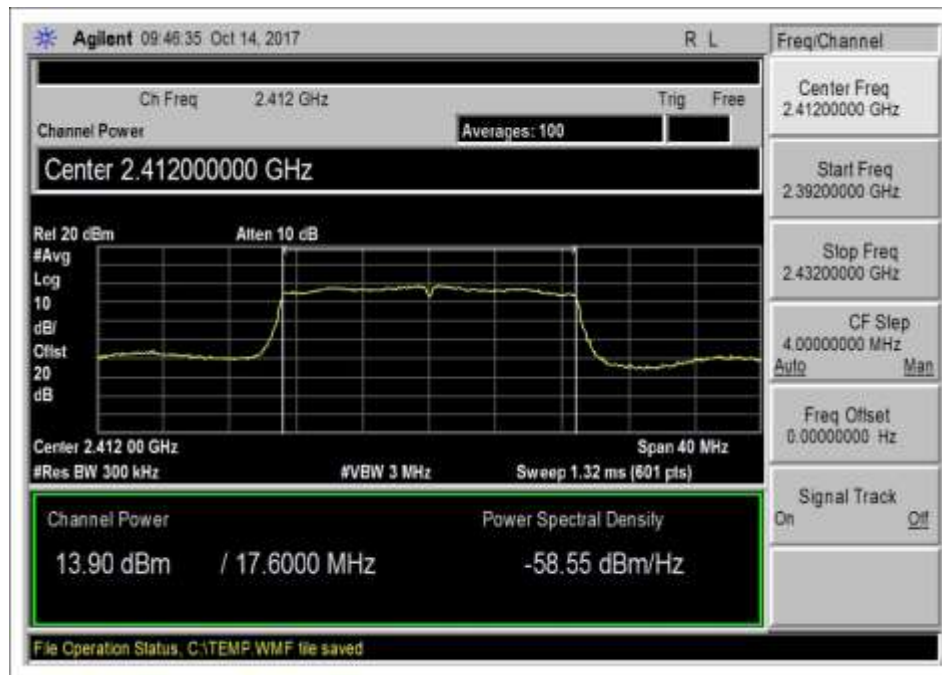
802.11g_Power_Low_CH1_2412MHz



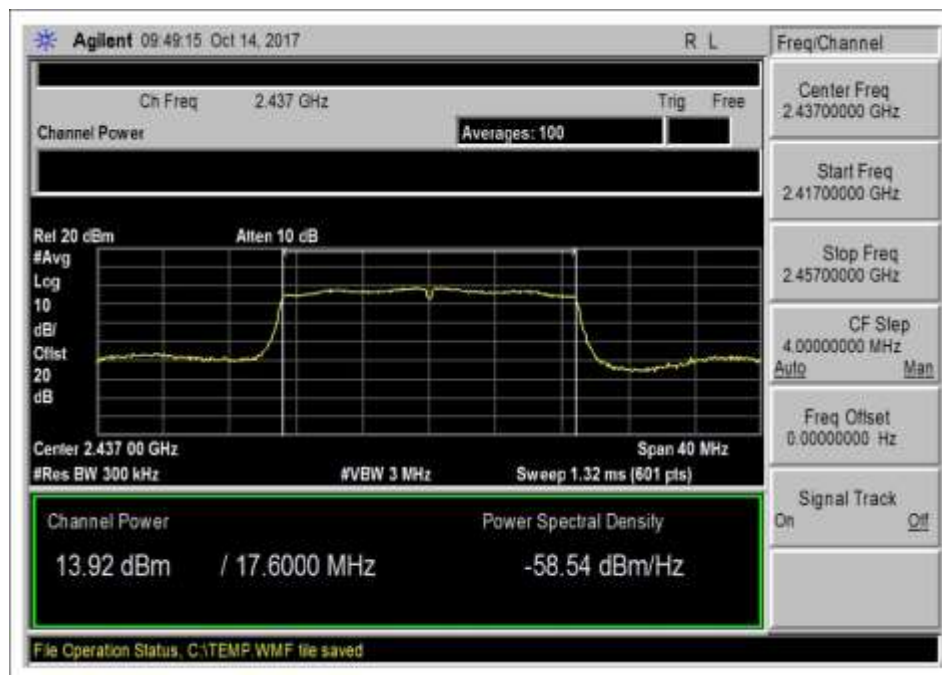
802.11g_Power_Middle_CH6_2437MHz



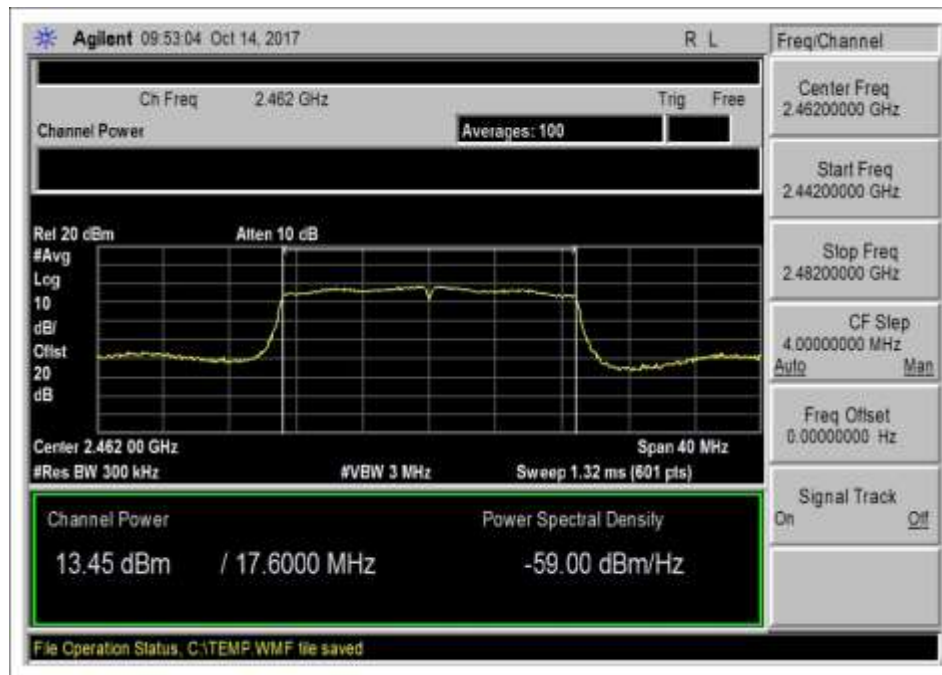
802.11g_Power_High_CH11_2462MHz



802.11n20_Power_Low_CH1_2412MHz



802.11n20_Power_Middle_CH6_2437MHz



802.11n20_Power_High_CH11_2462MHz

Test Setup Photo



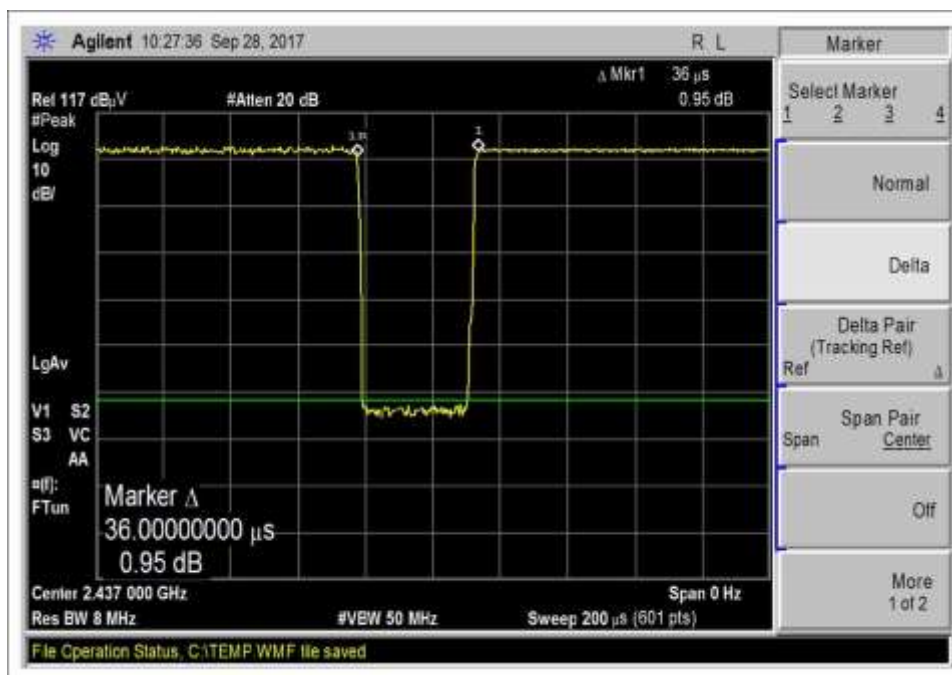
15.35(c) Duty Cycle Correction Factor

Duty Cycle Summary				
Wideband system	Measured Off Time (us)	Measured Total Time (ms)	Duty Cycle X (%)	Calculated DCCF (dB)
802.11b	36.0	1.24	97.1	0.1
802.11g	41.0	2.1	98.0	0
802.11n20	41.0	1.95833	97.9	0.1

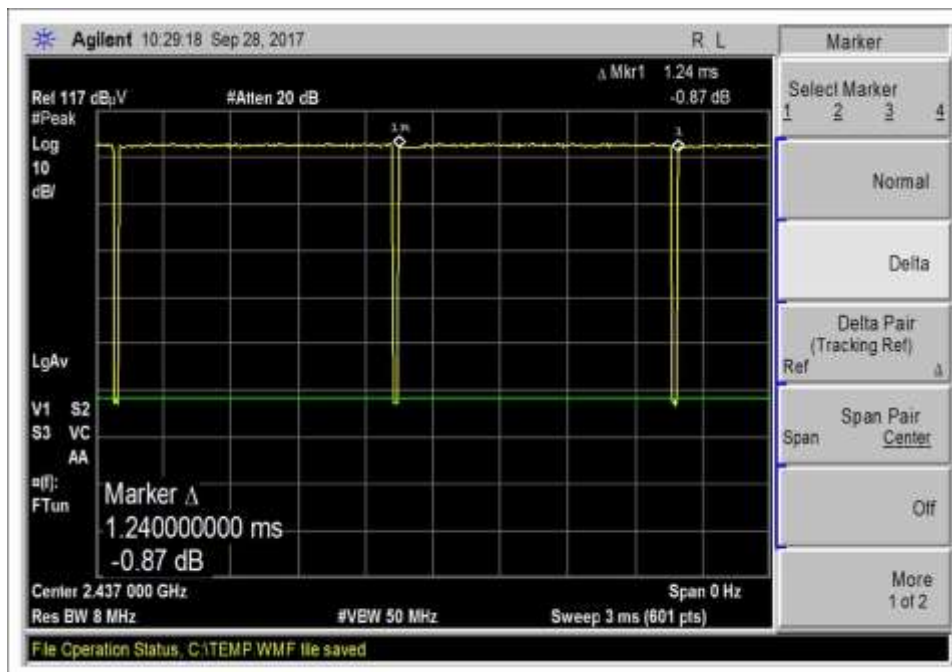
In accordance with section 9.2.2.4

$$DCCF = 10 \cdot \text{Log} \left(\frac{1}{X} \right)$$

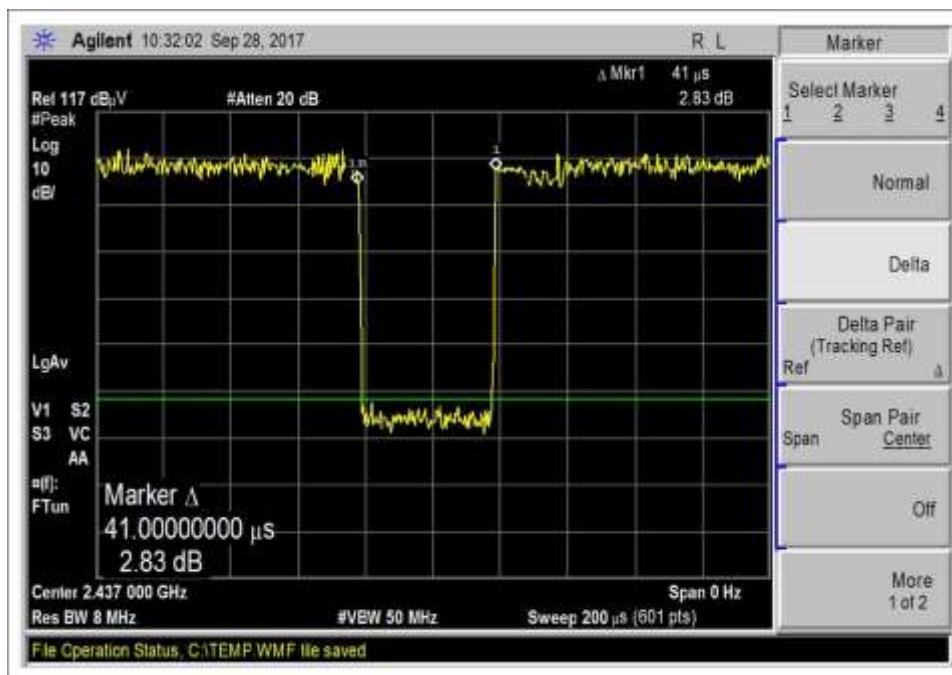
Plots



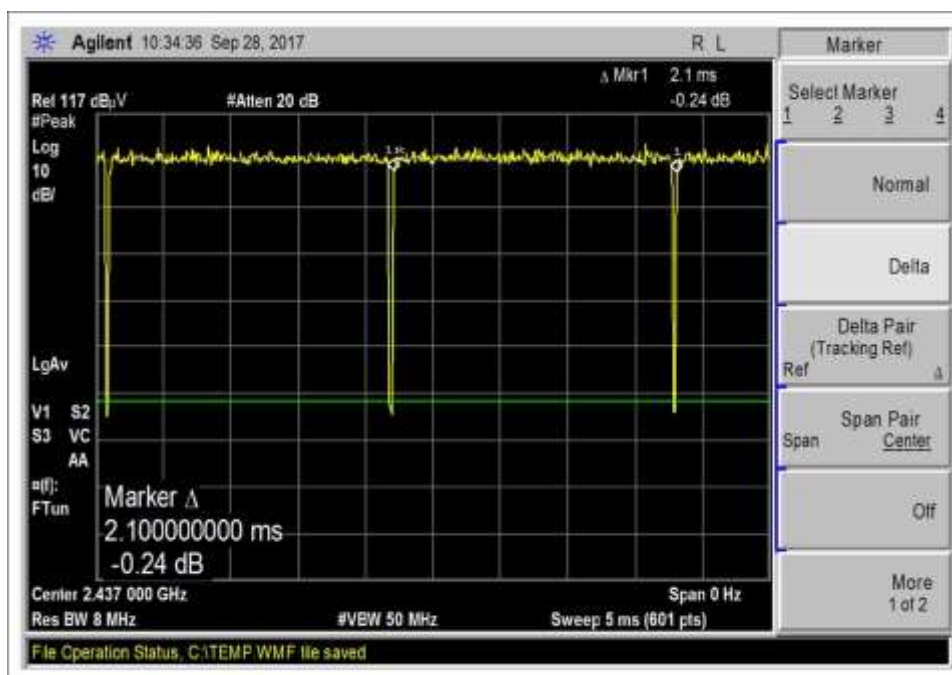
802.11b_DutyCycle_OffTime



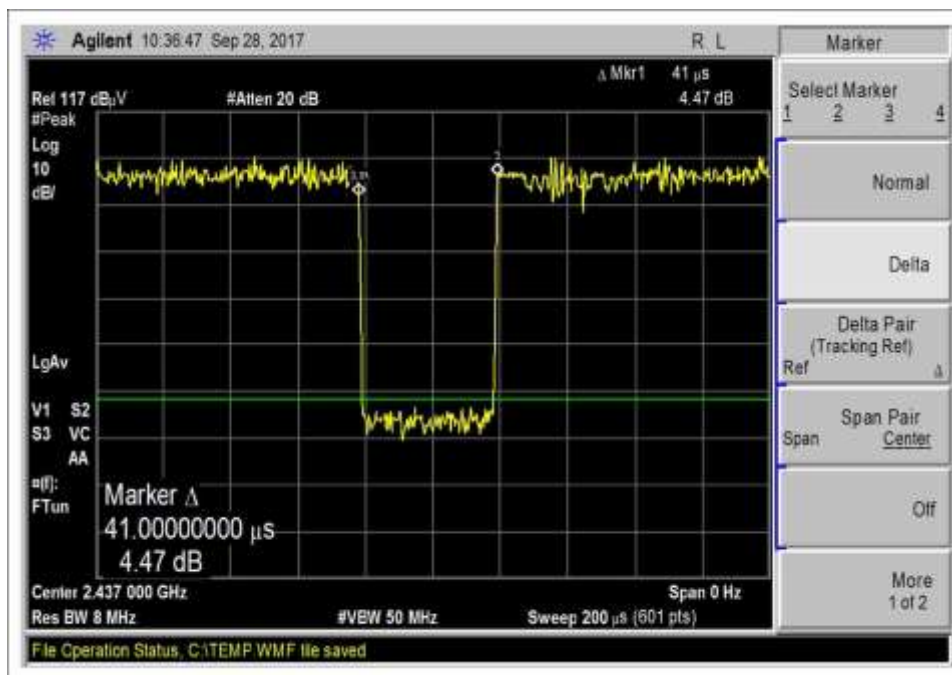
802.11b_DutyCycle_TotalTime



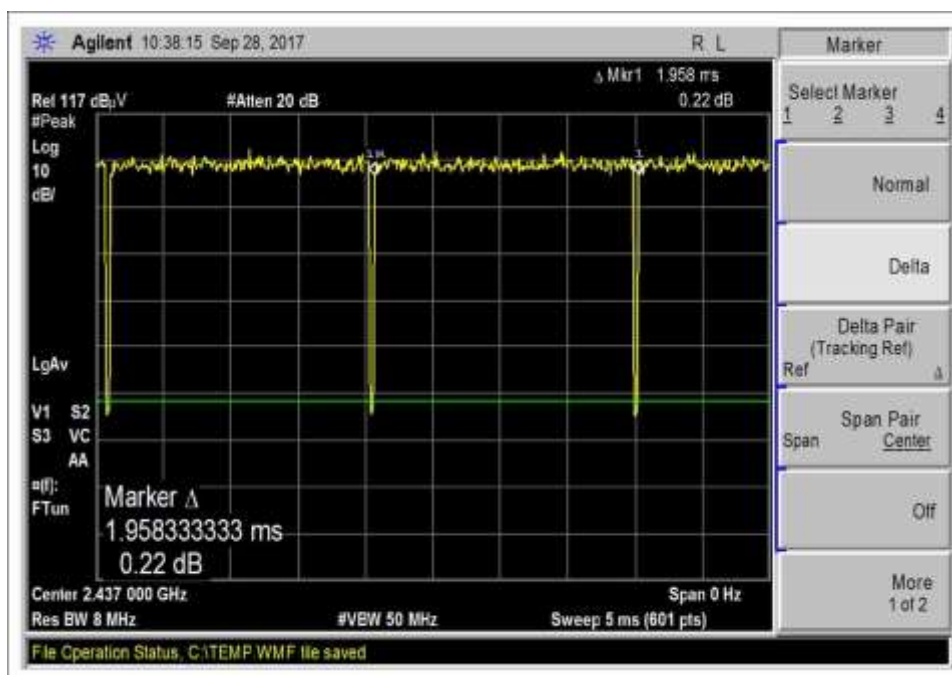
802.11g_DutyCycle_OffTime



802.11g_DutyCycle_TotalTime



802.11n20_DutyCycle_OffTime



802.11n20_DutyCycle_TotalTime

Test Setup Photo



15.247(e) Power Spectral Density

Test Setup / Conditions / Data			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 v04 April 5, 2017	Test Date(s):	9/27/2017
Configuration:	1		
Test Setup:	Frequency Range: 2412MHz to 2462MHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11b=17, 802.11g=15, 802.11n20=14 EUT Firmware: Lock 1.42 WiFi™/Ayla 2.49 Protocol /MCS/Modulation: DSSS, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM Antenna type: PIFA Antenna Gain: 2.1 dBi. Duty Cycle: 802.11b=97.1, 802.11g=98.0, 802.11n20=97.9 Test Method: KDB 558074 D01 v04 April 5, 2017 PKPSD Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT. Modifications added: None Setup: Site A control room		

Environmental Conditions			
Temperature (°C)	22	Relative Humidity (%):	40

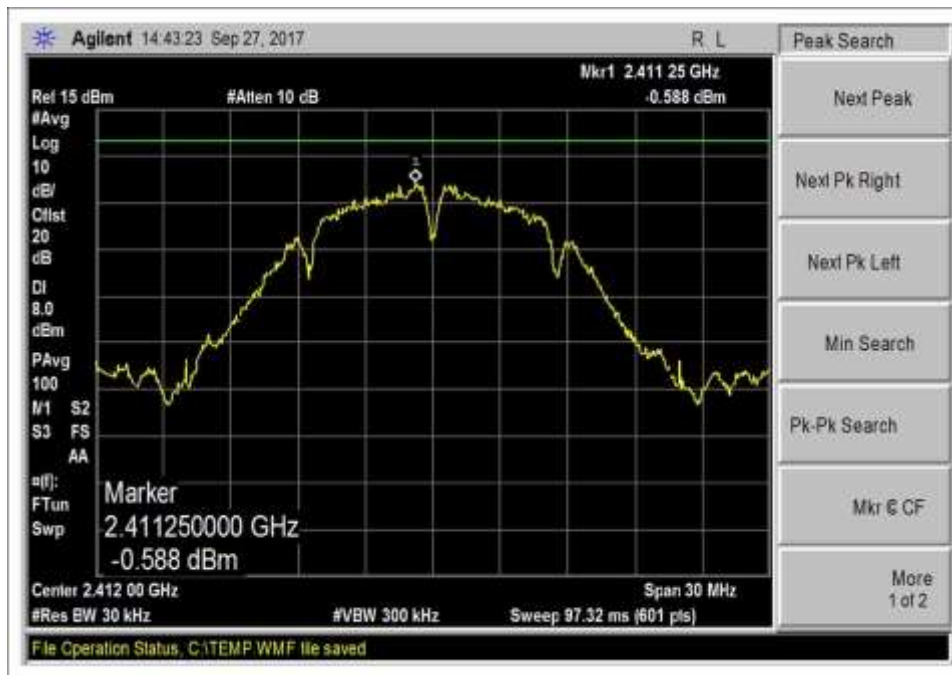
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017

PSD Test Data Summary - RF Conducted Measurement

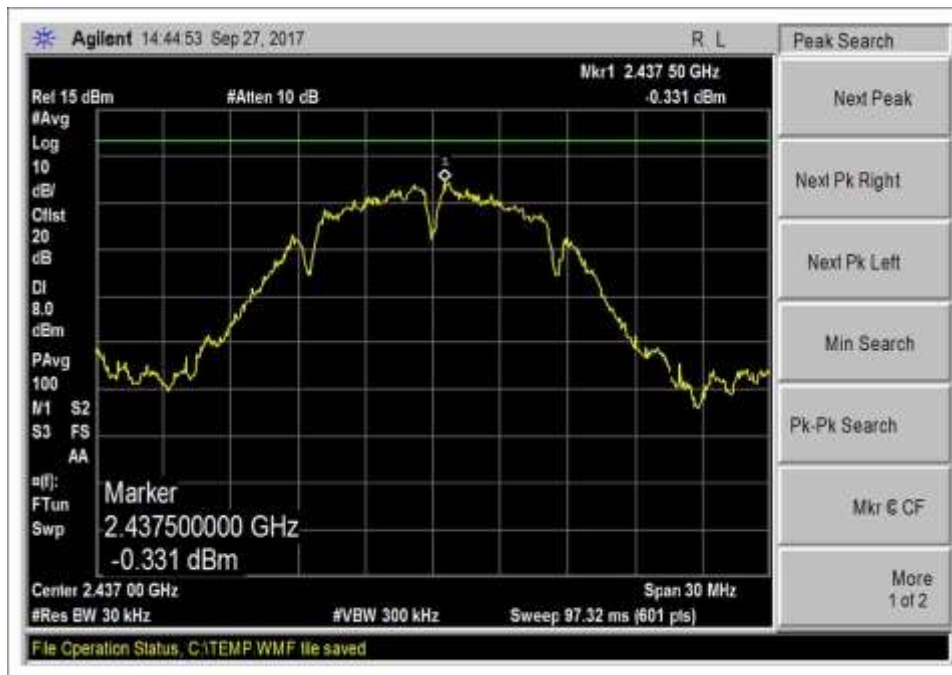
Measurement Method: PKPSD

Frequency (MHz)	Modulation	Measured (dBm/30kHz)	Limit (dBm/3kHz)	Results
2412	CCK	-0.6	≤8	Pass
2437	CCK	-0.3	≤8	Pass
2462	CCK	-0.6	≤8	Pass
2412	OFDM	-5.3	≤8	Pass
2437	OFDM	-5.3	≤8	Pass
2462	OFDM	-6.0	≤8	Pass
2412	BPSK	-6.9	≤8	Pass
2437	BPSK	-5.8	≤8	Pass
2462	BPSK	-6.7	≤8	Pass

Plots



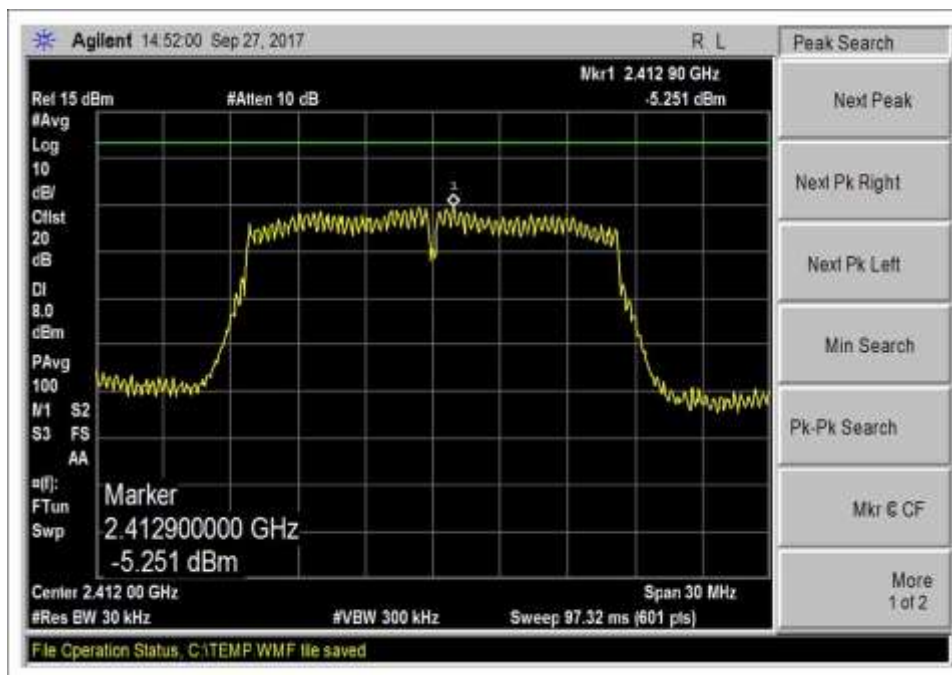
802.11b_PSD_Low_CH1_2412MHz



802.11b_PSD_Middle_CH6_2437MHz



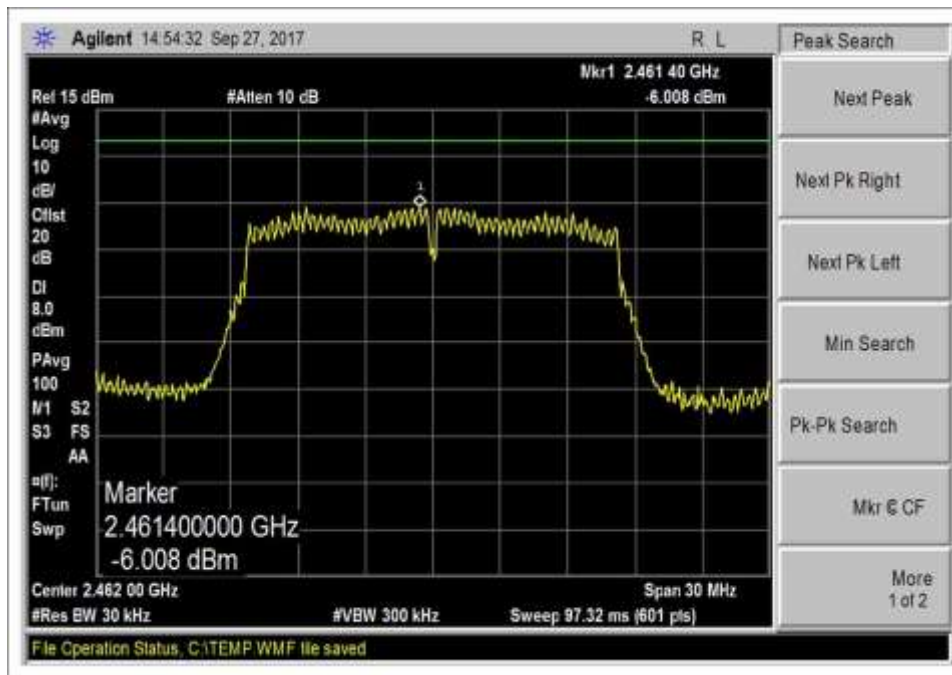
802.11b_PSD_High_CH11_2462MHz



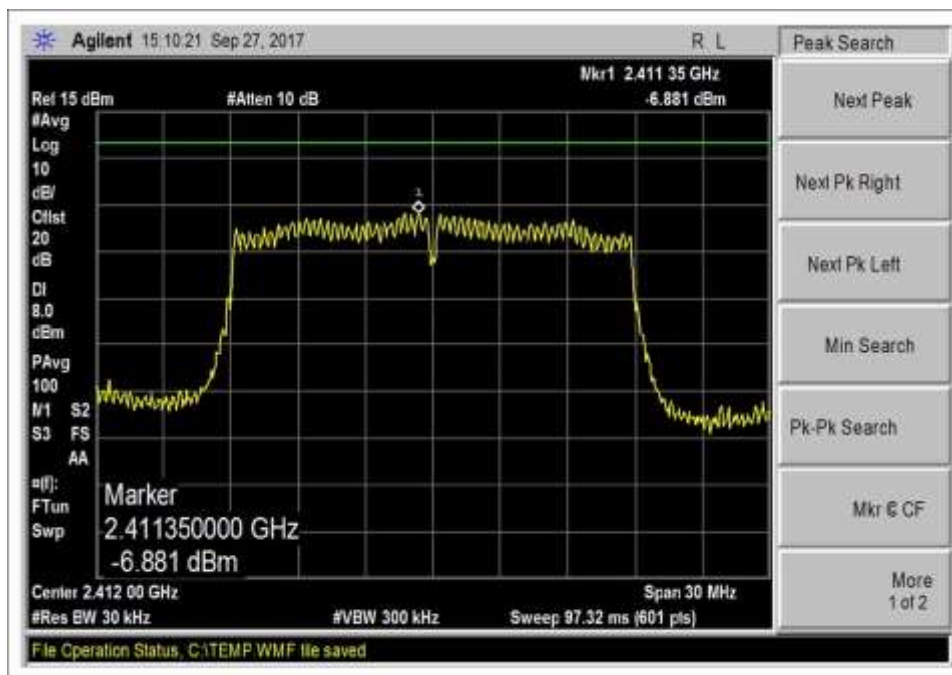
802.11g_PSD_Low_CH1_2412MHz



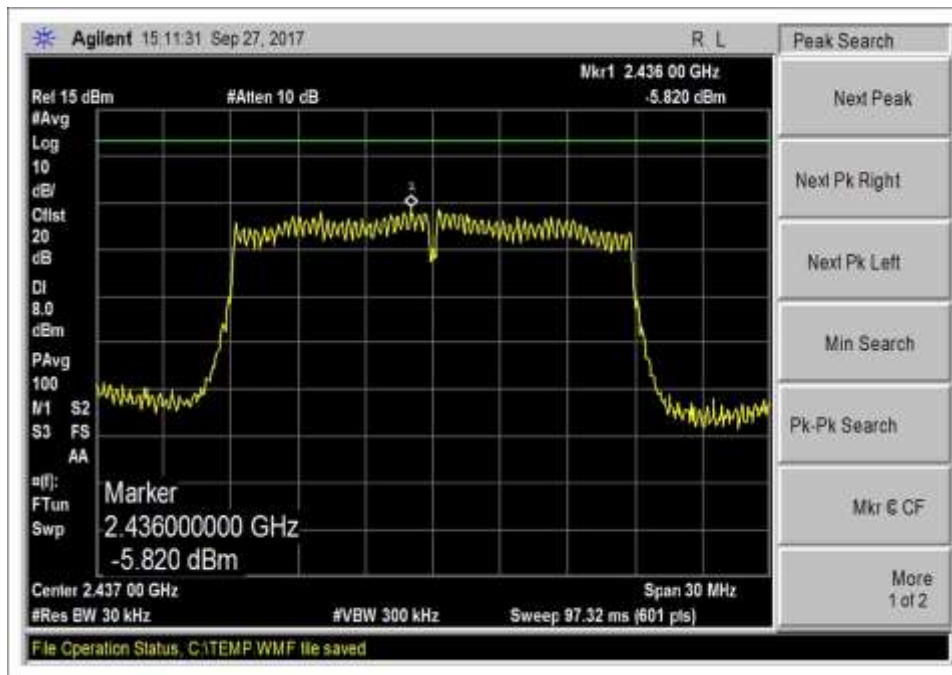
802.11g_PSD_Middle_CH6_2437MHz



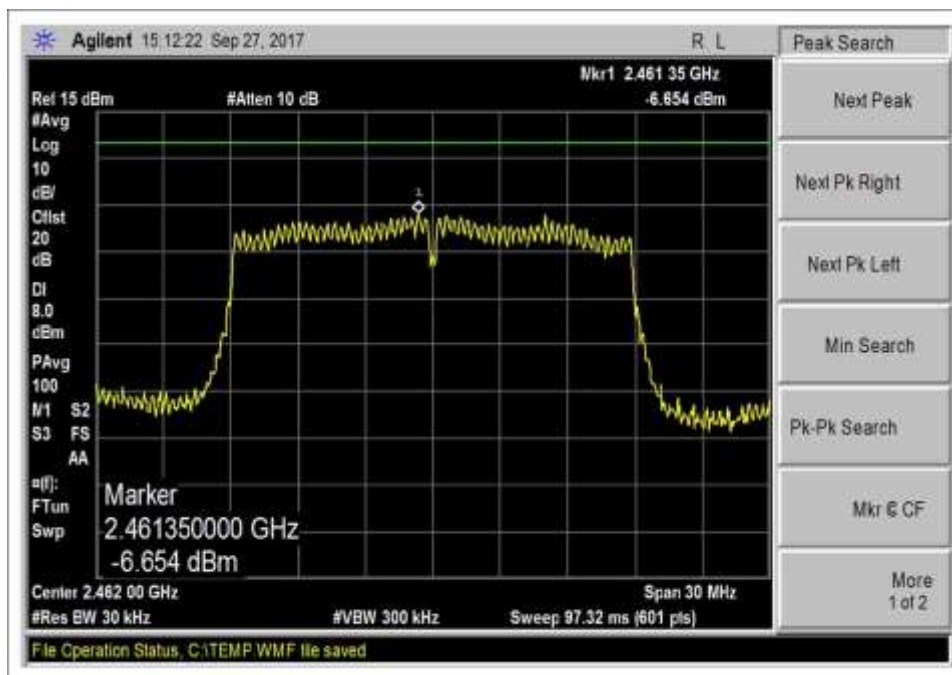
802.11g_PSD_High_CH11_2462MHz



802.11n20_PSD_Low_CH1_2412MHz



802.11n20_PSD_Middle_CH6_2437MHz



802.11n20_PSD_High_CH11_2462MHz

Test Setup Photo



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Hampton Products International Corporation**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **100170** Date: 9/28/2017
 Test Type: **Conducted Emissions** Time: 09:15:58
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02 3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

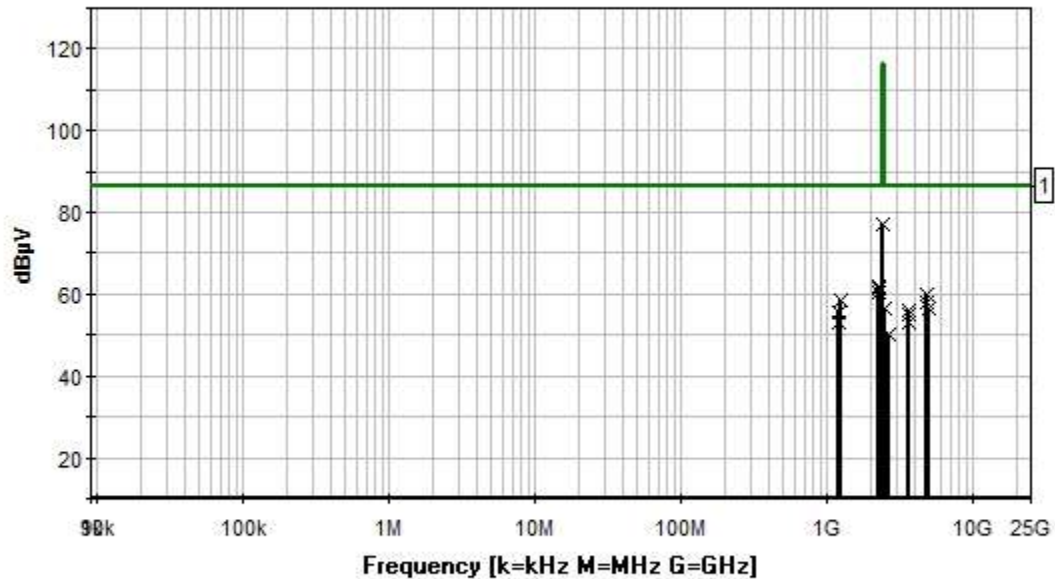
Frequency Range: 9kHz to 25GHz
 Frequency tested: 2412MHz, 2437MHz, 2462MHz
 Firmware power setting: 802.11b=17
 Duty Cycle: 802.11b=97.1
 Test Method: KDB 558074 D01 v04 April 5, 2017/
 ANSI C63.10 2013
 Test Mode: Continuous transmit

Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT.

Temperature (°C) 23
 Relative Humidity (%):43

Modifications added: None
 Setup: Site A control room

Hampton Products International Corporation WO#: 100170 Sequence#: 1 Date: 9/28/2017
 15.247(d) Conducted Spurious Emissions Test Lead: 3.7V Battery Antenna Port



— Readings
 x Peak Readings

— 1 - 15.247(d) Conducted Spurious Emissions
 Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	AN03431	Attenuator	89-20-21	11/2/2015	11/2/2017
T2	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB		Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2399.875M	57.2	+19.3	+0.7		+0.0	77.2	86.5	-9.3	Anten
2	2277.030M	41.8	+19.3	+0.6		+0.0	61.7	86.5	-24.8	Anten
3	2302.000M	41.5	+19.3	+0.6		+0.0	61.4	86.5	-25.1	Anten
4	2252.000M	40.7	+19.3	+0.6		+0.0	60.6	86.5	-25.9	Anten
5	4824.020M	39.4	+19.5	+1.0		+0.0	59.9	86.5	-26.6	Anten
6	1231.000M	38.5	+19.3	+0.5		+0.0	58.3	86.5	-28.2	Anten
7	4874.017M	37.4	+19.5	+1.0		+0.0	57.9	86.5	-28.6	Anten
8	2484.650M	36.7	+19.3	+0.7		+0.0	56.7	86.5	-29.8	Anten
9	4924.000M	35.8	+19.5	+1.0		+0.0	56.3	86.5	-30.2	Anten
10	3618.000M	35.6	+19.4	+0.8		+0.0	55.8	86.5	-30.7	Anten
11	1218.000M	35.6	+19.3	+0.5		+0.0	55.4	86.5	-31.1	Anten
12	3655.530M	34.8	+19.4	+0.8		+0.0	55.0	86.5	-31.5	Anten
13	1206.000M	33.5	+19.3	+0.5		+0.0	53.3	86.5	-33.2	Anten
14	3693.000M	32.8	+19.4	+0.8		+0.0	53.0	86.5	-33.5	Anten
15	2622.000M	30.2	+19.3	+0.7		+0.0	50.2	86.5	-36.3	Anten



Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Hampton Products International Corporation**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **100170** Date: 9/28/2017
 Test Type: **Conducted Emissions** Time: 09:40:34
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02 3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

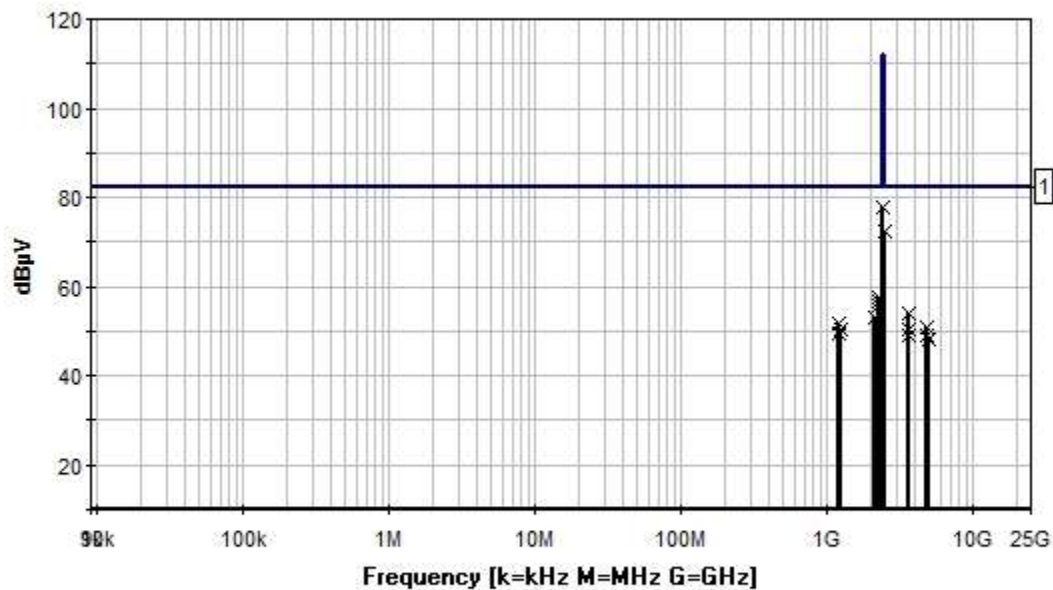
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz to 25GHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11g=15 Duty Cycle: 802.11b=98.0 Test Method: KDB 558074 D01 v04 April 5, 2017 ANSI C63.10 2013 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT. Temperature (°C) 23 Relative Humidity (%):43 Modifications added: None Setup: Site A control room

Hampton Products International Corporation WO#: 100170 Sequence#: 1 Date: 9/28/2017
 15.247(d) Conducted Spurious Emissions Test Lead: 3.7V Battery Antenna Port



— Readings
 × Peak Readings

— 1 - 15.247(d) Conducted Spurious Emissions
 Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	AN03431	Attenuator	89-20-21	11/2/2015	11/2/2017
T2	ANP06544	Cable	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB		Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2394.470M	58.0	+19.3	+0.7		+0.0	78.0	82.1	-4.1	Anten
2	2483.555M	52.6	+19.3	+0.7		+0.0	72.6	82.1	-9.5	Anten
3	2302.000M	37.6	+19.3	+0.6		+0.0	57.5	82.1	-24.6	Anten
4	2272.000M	36.6	+19.3	+0.6		+0.0	56.5	82.1	-25.6	Anten
5	2253.300M	36.0	+19.3	+0.6		+0.0	55.9	82.1	-26.2	Anten
6	3618.000M	33.8	+19.4	+0.8		+0.0	54.0	82.1	-28.1	Anten
7	2160.000M	33.4	+19.3	+0.6		+0.0	53.3	82.1	-28.8	Anten
8	1219.770M	31.9	+19.3	+0.5		+0.0	51.7	82.1	-30.4	Anten
9	4823.030M	30.4	+19.5	+1.0		+0.0	50.9	82.1	-31.2	Anten
10	3654.530M	30.2	+19.4	+0.8		+0.0	50.4	82.1	-31.7	Anten
11	1232.250M	30.6	+19.3	+0.5		+0.0	50.4	82.1	-31.7	Anten
12	1205.000M	29.9	+19.3	+0.5		+0.0	49.7	82.1	-32.4	Anten
13	4874.670M	28.4	+19.5	+1.0		+0.0	48.9	82.1	-33.2	Anten
14	3692.670M	28.7	+19.4	+0.8		+0.0	48.9	82.1	-33.2	Anten
15	4922.170M	27.5	+19.5	+1.0		+0.0	48.0	82.1	-34.1	Anten



Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
Customer: **Hampton Products International Corporation**
Specification: **15.247(d) Conducted Spurious Emissions**
Work Order #: **100170** Date: 9/28/2017
Test Type: **Conducted Emissions** Time: 09:55:10
Tested By: S. Yamamoto Sequence#: 1
Software: EMITest 5.03.02 3.7V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

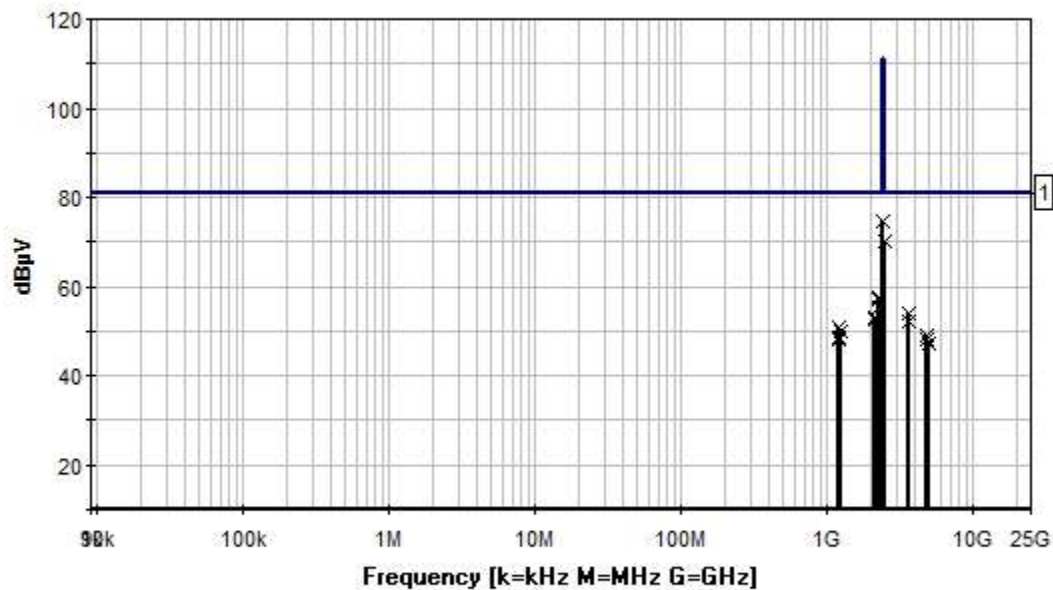
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz to 25GHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11n20=14 Duty Cycle: 802.11b=97.9 Test Method: KDB 558074 D01 v04 April 5, 2017 ANSI C63.10 2013 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) output is connected to the spectrum analyzer using a coaxial cable and attenuator. A laptop is connected to the EUT in order to set the EUT to specific settings required for testing. A new battery is installed in the EUT. Temperature (°C) 23 Relative Humidity (%):43 Modifications added: None Setup: Site A control room

Hampton Products International Corporation WO#: 100170 Sequence#: 1 Date: 9/28/2017
 15.247(d) Conducted Spurious Emissions Test Lead: 3.7V Battery Antenna Port



— Readings
 x Peak Readings

1 - 15.247(d) Conducted Spurious Emissions
 Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	AN03431	Attenuator	89-20-21	11/2/2015	11/2/2017
T2	ANP06544	Cable	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB		Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2395.080M	54.7	+19.3	+0.7		+0.0	74.7	81.0	-6.3	Anten
2	2484.920M	50.0	+19.3	+0.7		+0.0	70.0	81.0	-11.0	Anten
3	2277.000M	37.8	+19.3	+0.6		+0.0	57.7	81.0	-23.3	Anten
4	2302.000M	37.1	+19.3	+0.6		+0.0	57.0	81.0	-24.0	Anten
5	2253.330M	35.6	+19.3	+0.6		+0.0	55.5	81.0	-25.5	Anten
6	3618.000M	33.8	+19.4	+0.8		+0.0	54.0	81.0	-27.0	Anten
7	2160.000M	33.1	+19.3	+0.6		+0.0	53.0	81.0	-28.0	Anten
8	2160.000M	33.1	+19.3	+0.6		+0.0	53.0	81.0	-28.0	Anten
9	2160.000M	32.6	+19.3	+0.6		+0.0	52.5	81.0	-28.5	Anten
10	3655.500M	32.2	+19.4	+0.8		+0.0	52.4	81.0	-28.6	Anten
11	1212.250M	31.1	+19.3	+0.5		+0.0	50.9	81.0	-30.1	Anten
12	1231.670M	30.0	+19.3	+0.5		+0.0	49.8	81.0	-31.2	Anten
13	4829.500M	28.7	+19.5	+1.0		+0.0	49.2	81.0	-31.8	Anten
14	1204.670M	28.8	+19.3	+0.5		+0.0	48.6	81.0	-32.4	Anten
15	4871.830M	27.8	+19.5	+1.0		+0.0	48.3	81.0	-32.7	Anten
16	1216.830M	28.3	+19.3	+0.5		+0.0	48.1	81.0	-32.9	Anten
17	4934.330M	26.8	+19.5	+1.0		+0.0	47.3	81.0	-33.7	Anten

Band Edge

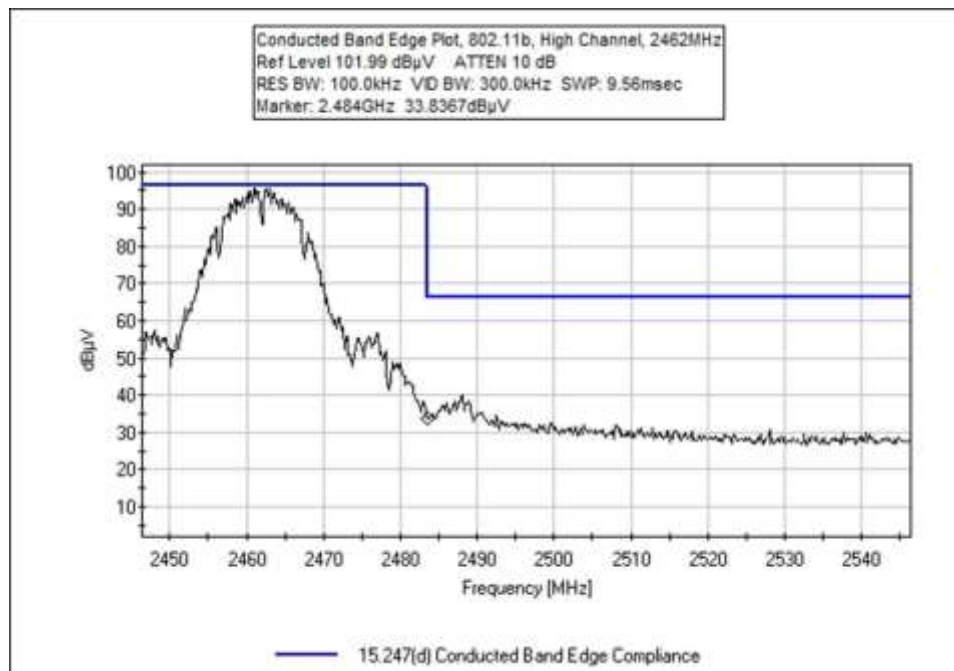
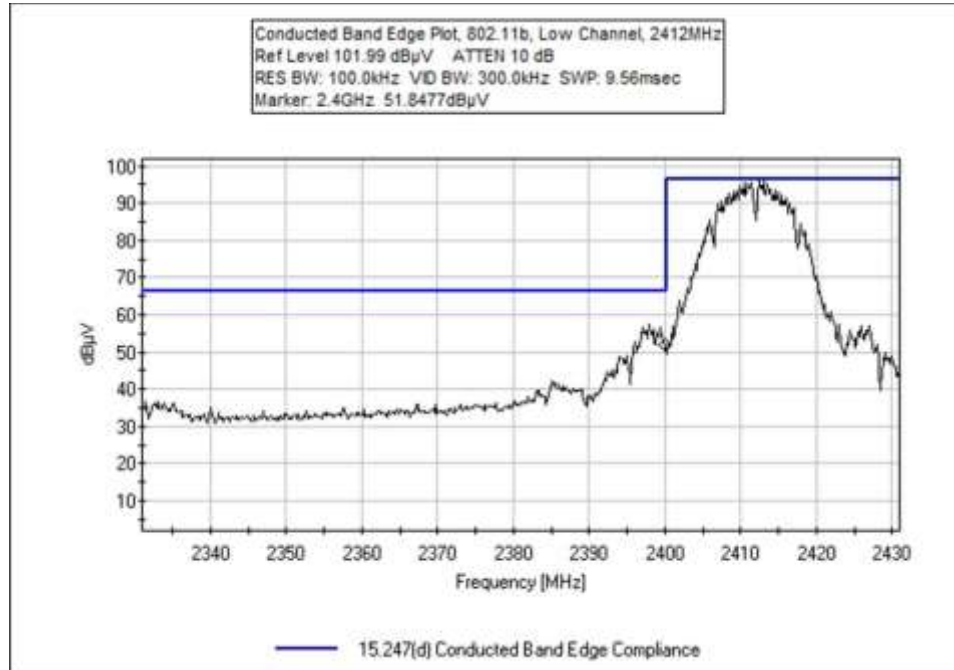
Band Edge Summary

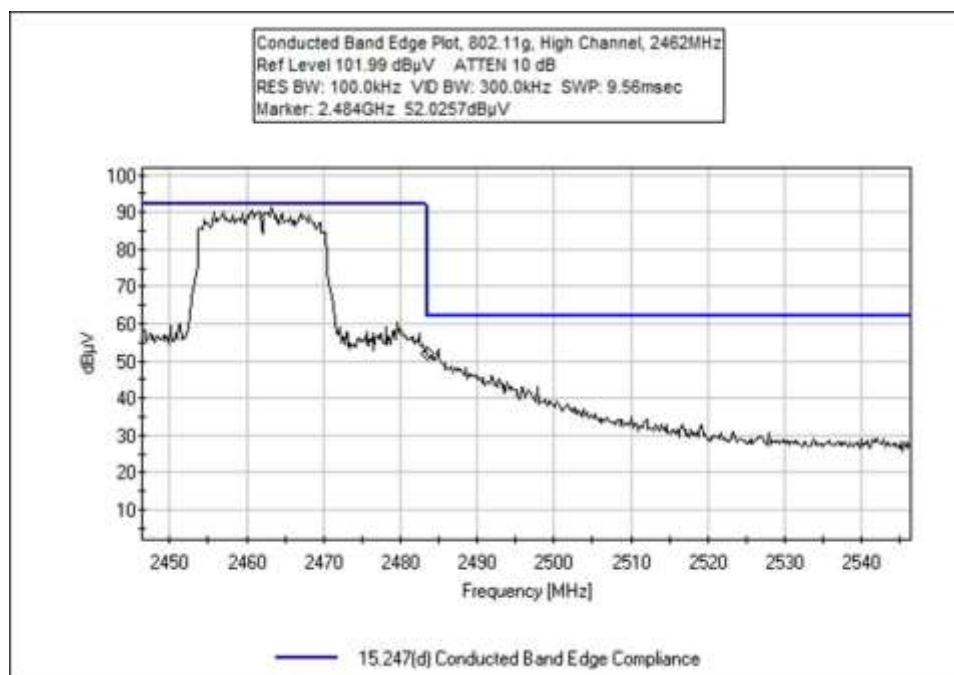
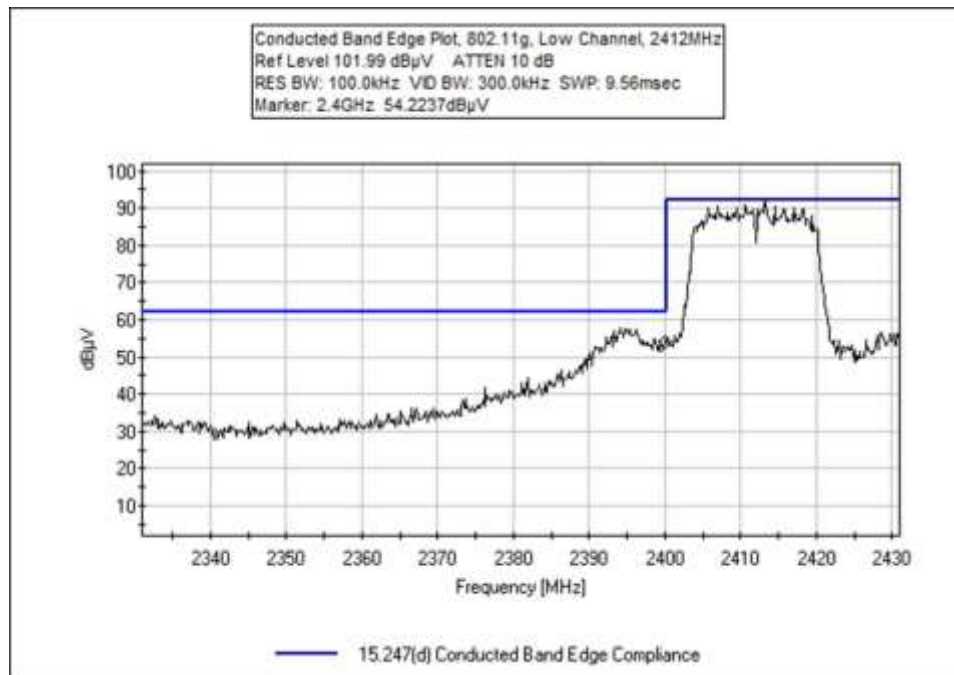
Limit applied: Max Power/100kHz - 30dB (When average power limit is applied).

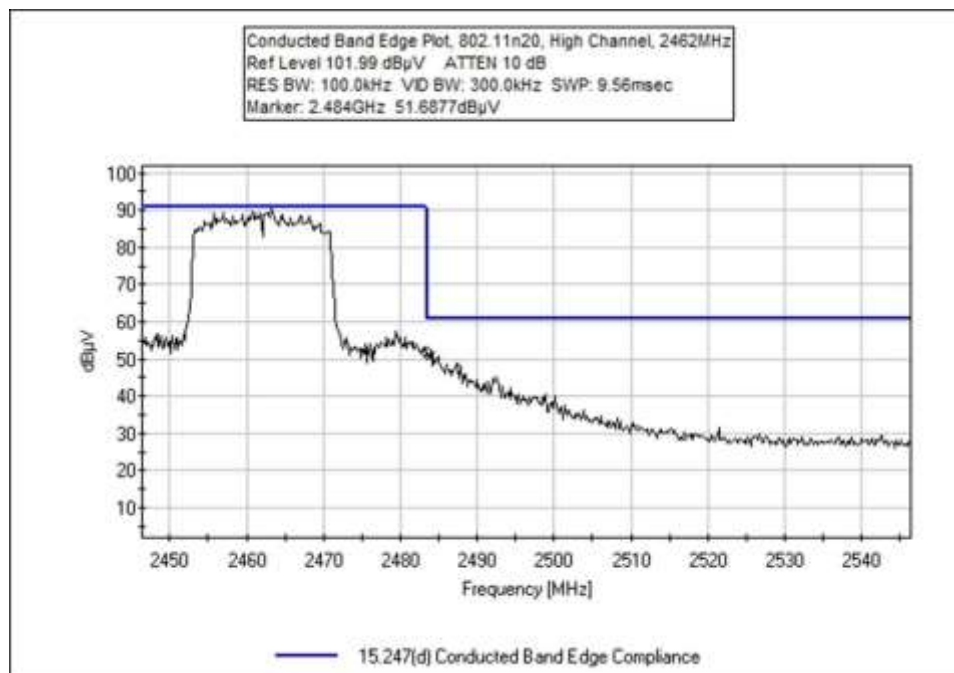
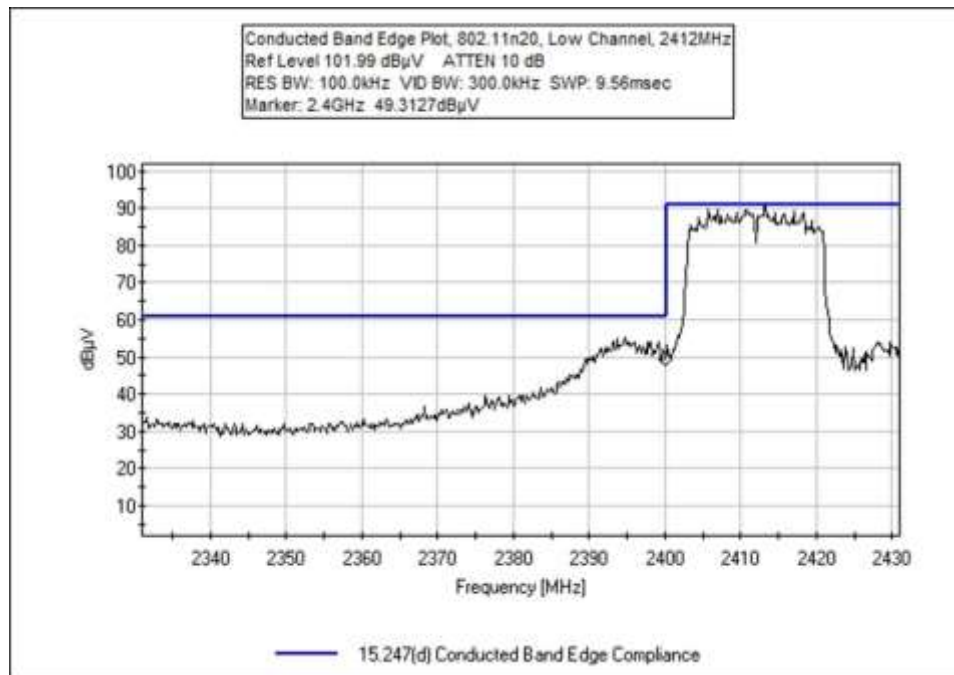
Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
2400.0	CCK	71.8	< 86.5	Pass
2483.5	CCK	53.8	< 86.5	Pass
2400.0	OFDM	74.2	< 82.1	Pass
2483.5	OFDM	72.0	< 82.1	Pass
2400.0	BPSK	69.3	< 81.0	Pass
2483.5	BPSK	71.7	< 81.0	Pass

Band Edge Plots

Limit lines shown below include correction factors applied for proper comparison







Test Setup Photo



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Hampton Products International Corporation**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100170** Date: 10/1/2017
 Test Type: **Maximized Emissions** Time: 09:25:54
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

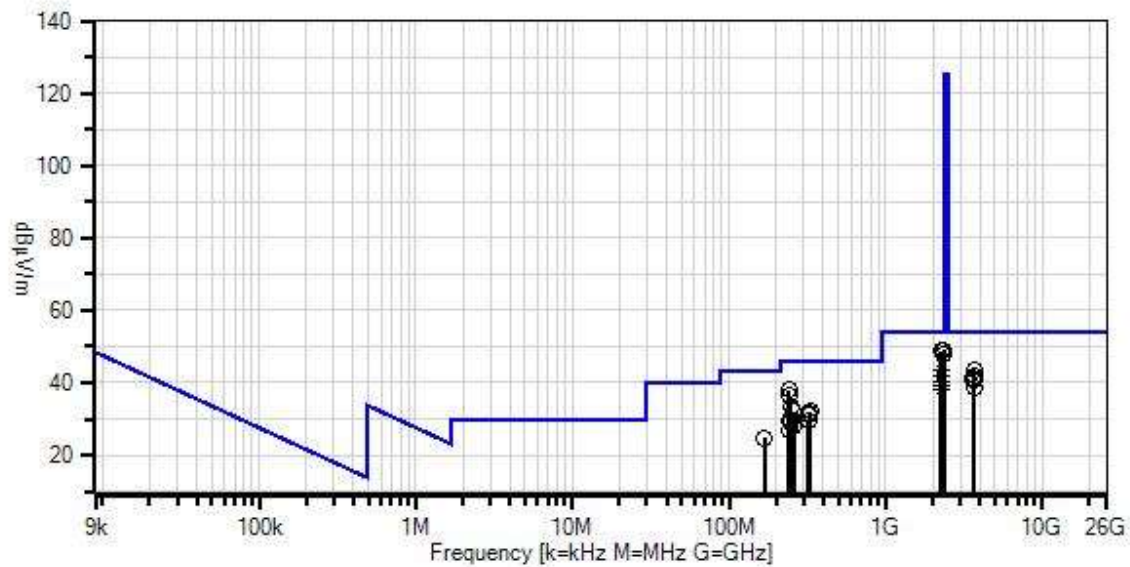
Frequency Range: 9kHz to 25GHz
 Frequency tested: 2412MHz, 2437MHz, 2462MHz
 Firmware power setting: 802.11b=17
 Duty Cycle: 802.11b=97.1
 Test Method: KDB 558074 D01 v04 April 5, 2017
 ANSI C63.10 2013
 Test Mode: Continuous transmit

Test Setup: The equipment under test (EUT) is stand alone on the Styrofoam table top. A laptop is connected to the EUT in order to set it to specific settings required for testing and then disconnected and removed from the test area. A new battery is installed in the EUT.

Temperature (°C): 22
 Relative Humidity (%): 41

Modifications added: None
 Setup: Site A OATS

Hampton Products International Corporation W/O#: 100170 Sequence#: 1 Date: 10/1/2017
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
* Average Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T2	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T3	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T4	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T5	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/2/2017	6/2/2019
	AN01413	Horn Antenna	84125-80008	10/7/2016	10/7/2018
T6	AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
T7	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T8	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
T9	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T10	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T11	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
	AN00314	Loop Antenna	6502	5/20/2016	5/20/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dB μ V	T9	T10	T11		Table	dB μ V/m	dB μ V/m	dB	Ant
1	2357.170M	47.7	+4.0	-38.2	+0.6	+24.9	+0.0	49.1	54.0	-4.9	Vert
			+0.0	+10.1	+0.0	+0.0					
			+0.0	+0.0	+0.0						
2	2252.117M	47.7	+3.9	-38.3	+0.6	+24.8	+0.0	48.8	54.0	-5.2	Vert
			+0.0	+10.1	+0.0	+0.0					
			+0.0	+0.0	+0.0						
3	2357.430M	46.5	+4.0	-38.2	+0.6	+24.9	+0.0	47.9	54.0	-6.1	Horiz
			+0.0	+10.1	+0.0	+0.0					
			+0.0	+0.0	+0.0						
4	241.650M	45.1	+0.0	+0.0	+0.0	+0.0	+0.0	38.0	46.0	-8.0	Horiz
			+0.0	+0.0	-28.0	+12.0					
			+6.0	+0.2	+2.7						
5	244.275M	43.2	+0.0	+0.0	+0.0	+0.0	+0.0	36.3	46.0	-9.7	Horiz
			+0.0	+0.0	-28.0	+12.1					
			+6.0	+0.2	+2.8						
6	3693.147M	47.8	+4.7	-37.9	+0.8	+27.8	+0.0	43.7	54.0	-10.3	Horiz
			+0.5	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
7	2302.000M	42.2	+3.9	-38.2	+0.6	+24.9	+0.0	43.5	54.0	-10.5	Vert
	Ave		+0.0	+10.1	+0.0	+0.0			nr		
			+0.0	+0.0	+0.0						
^	2302.000M	52.6	+3.9	-38.2	+0.6	+24.9	+0.0	53.9	54.0	-0.1	Vert
			+0.0	+10.1	+0.0	+0.0			nr		
			+0.0	+0.0	+0.0						

9	2276.967M Ave	40.8	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	41.9	54.0	-12.1	Vert
^	2276.967M	52.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	53.1	54.0	-0.9	Vert
11	3655.520M	46.0	+4.6 +0.5 +0.0	-37.9 +0.0 +0.0	+0.8 +0.0 +0.0	+27.7 +0.0	+0.0	41.7	54.0	-12.3	Horiz
12	3618.042M	46.1	+4.5 +0.6 +0.0	-38.0 +0.0 +0.0	+0.8 +0.0 +0.0	+27.5 +0.0	+0.0	41.5	54.0	-12.5	Horiz
13	246.900M	39.8	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.8	+0.0 +12.3	+0.0	33.1	46.0	-12.9	Horiz
14	3655.317M	45.3	+4.6 +0.5 +0.0	-37.9 +0.0 +0.0	+0.8 +0.0 +0.0	+27.7 +0.0	+0.0	41.0	54.0	-13.0	Vert
15	3617.820M	45.5	+4.5 +0.6 +0.0	-38.0 +0.0 +0.0	+0.8 +0.0 +0.0	+27.5 +0.0	+0.0	40.9	54.0	-13.1	Vert
16	2302.000M Ave	39.0	+3.9 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+24.9 +0.0	+0.0	40.3	54.0	-13.7	Horiz
^	2302.000M	50.7	+3.9 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+24.9 +0.0	+0.0	52.0	54.0	-2.0	Horiz
18	260.025M	38.2	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.9	+0.0 +12.7	+0.0	32.0	46.0	-14.0	Horiz
19	330.913M	36.2	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -27.9 +3.3	+0.0 +14.2	+0.0	32.0	46.0	-14.0	Horiz
20	2277.017M Ave	38.3	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	39.4	54.0	-14.6	Horiz
^	2277.017M	50.1	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	51.2	54.0	-2.8	Horiz
22	328.370M	35.7	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -27.9 +3.3	+0.0 +14.1	+0.0	31.4	46.0	-14.6	Horiz

23	325.710M	35.5	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -27.9 +3.3	+0.0 +14.0	+0.0	31.1	46.0	-14.9	Horiz
24	3693.025M	42.7	+4.7 +0.5 +0.0	-37.9 +0.0 +0.0	+0.8 +0.0 +0.0	+27.8 +0.0	+0.0	38.6	54.0	-15.4	Vert
25	2252.000M Ave	37.1	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	38.2	54.0	-15.8	Horiz
^	2252.000M	48.6	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+24.8 +0.0	+0.0	49.7	54.0	-4.3	Horiz
27	249.525M	36.1	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.8	+0.0 +12.5	+0.0	29.6	46.0	-16.4	Horiz
28	323.143M	34.0	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +3.2	+0.0 +13.9	+0.0	29.3	46.0	-16.7	Horiz
29	241.430M	36.4	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.7	+0.0 +12.0	+0.0	29.3	46.0	-16.7	Vert
30	254.530M	34.0	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.8	+0.0 +12.6	+0.0	27.6	46.0	-18.4	Vert
31	167.960M	34.5	+0.0 +0.0 +6.0	+0.0 +0.0 +0.1	+0.0 -28.0 +2.2	+0.0 +10.0	+0.0	24.8	43.5	-18.7	Vert
32	244.010M	33.5	+0.0 +0.0 +6.0	+0.0 +0.0 +0.2	+0.0 -28.0 +2.8	+0.0 +12.1	+0.0	26.6	46.0	-19.4	Vert

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Hampton Products International Corporation**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100170** Date: 10/1/2017
 Test Type: **Maximized Emissions** Time: 09:40:26
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

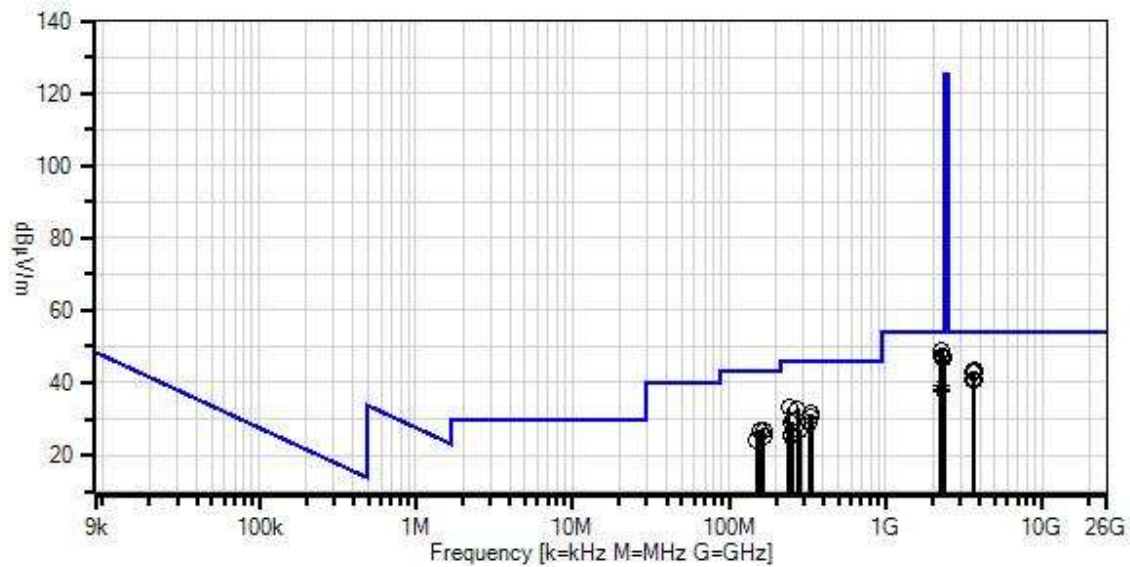
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz to 25GHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11g=15 Duty Cycle: 802.11g=98.0 Test Method: KDB 558074 D01 v04 April 5, 2017 ANSI C63.10 2013 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) is stand alone on the Styrofoam table top. A laptop is connected to the EUT in order to set it to specific settings required for testing and then disconnected and removed from the test area. A new battery is installed in the EUT. Temperature (°C): 22 Relative Humidity (%): 41 Modifications added: None Setup: Site A OATS
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Hampton Products International Corporation W/O#: 100170 Sequence#: 1 Date: 10/1/2017
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
* Average Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T3	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T4	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T5	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T6	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/2/2017	6/2/2019
T7	AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
	AN01413	Horn Antenna	84125-80008	10/7/2016	10/7/2018
T8	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T9	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
T10	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T11	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T12	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	2252.017M	47.9	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	49.0	54.0	-5.0	Vert
2	2277.100M	47.7	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.8	54.0	-5.2	Horiz
3	2252.042M	46.4	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	47.5	54.0	-6.5	Horiz
4	2357.025M	46.0	+0.0 +24.9 +0.0	+4.0 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	47.4	54.0	-6.6	Horiz
5	2357.017M	45.3	+0.0 +24.9 +0.0	+4.0 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	46.7	54.0	-7.3	Vert
6	2320.000M	45.2	+0.0 +24.9 +0.0	+3.9 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	46.5	54.0	-7.5	Vert
7	3655.458M	47.6	+0.0 +27.7 +0.0	+4.6 +0.5 +0.0	-37.9 +0.0 +0.0	+0.8 +0.0 +0.0	+0.0	43.3	54.0	-10.7	Horiz
8	3692.875M	47.2	+0.0 +27.8 +0.0	+4.7 +0.5 +0.0	-37.9 +0.0 +0.0	+0.8 +0.0 +0.0	+0.0	43.1	54.0	-10.9	Horiz

9	3617.997M	47.5	+0.0	+4.5	-38.0	+0.8	+0.0	42.9	54.0	-11.1	Horiz
			+27.5	+0.6	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
10	3655.758M	45.3	+0.0	+4.6	-37.9	+0.8	+0.0	41.0	54.0	-13.0	Vert
			+27.7	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
11	242.325M	40.1	+0.0	+0.0	+0.0	+0.0	+0.0	33.0	46.0	-13.0	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.0	+6.0	+0.2	+2.7					
12	276.450M	38.8	+0.0	+0.0	+0.0	+0.0	+0.0	32.9	46.0	-13.1	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.9	+6.0	+0.2	+3.0					
13	3692.750M	44.9	+0.0	+4.7	-37.9	+0.8	+0.0	40.8	54.0	-13.2	Vert
			+27.8	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
14	3617.942M	45.2	+0.0	+4.5	-38.0	+0.8	+0.0	40.6	54.0	-13.4	Vert
			+27.5	+0.6	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
15	334.483M	35.6	+0.0	+0.0	+0.0	+0.0	+0.0	31.5	46.0	-14.5	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.3	+6.0	+0.2	+3.3					
16	2302.070M Ave	38.0	+0.0	+3.9	-38.2	+0.6	+0.0	39.3	54.0	-14.7	Vert
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	2302.070M	50.8	+0.0	+3.9	-38.2	+0.6	+0.0	52.1	54.0	-1.9	Vert
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
18	329.210M	34.9	+0.0	+0.0	+0.0	+0.0	+0.0	30.6	46.0	-15.4	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.1	+6.0	+0.2	+3.3					
19	331.870M	34.7	+0.0	+0.0	+0.0	+0.0	+0.0	30.5	46.0	-15.5	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.2	+6.0	+0.2	+3.3					
20	2302.100M Ave	36.7	+0.0	+3.9	-38.2	+0.6	+0.0	38.0	54.0	-16.0	Horiz
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	2302.100M	49.9	+0.0	+3.9	-38.2	+0.6	+0.0	51.2	54.0	-2.8	Horiz
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
22	2277.000M Ave	36.6	+0.0	+3.9	-38.3	+0.6	+0.0	37.7	54.0	-16.3	Vert
			+24.8	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	2277.000M	49.2	+0.0	+3.9	-38.3	+0.6	+0.0	50.3	54.0	-3.7	Vert
			+24.8	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
24	166.540M	36.6	+0.0	+0.0	+0.0	+0.0	+0.0	27.0	43.5	-16.5	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+10.1	+6.0	+0.1	+2.2					
25	255.450M	35.8	+0.0	+0.0	+0.0	+0.0	+0.0	29.4	46.0	-16.6	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.6	+6.0	+0.2	+2.8					

26	156.170M	35.7	+0.0	+0.0	+0.0	+0.0	+0.0	26.8	43.5	-16.7	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+10.9	+6.0	+0.1	+2.1					
27	252.825M	35.6	+0.0	+0.0	+0.0	+0.0	+0.0	29.1	46.0	-16.9	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.5	+6.0	+0.2	+2.8					
28	326.667M	33.4	+0.0	+0.0	+0.0	+0.0	+0.0	29.0	46.0	-17.0	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.0	+6.0	+0.2	+3.3					
29	166.568M	34.9	+0.0	+0.0	+0.0	+0.0	+0.0	25.3	43.5	-18.2	Vert
			+0.0	+0.0	+0.0	-28.0					
			+10.1	+6.0	+0.1	+2.2					
30	281.850M	32.8	+0.0	+0.0	+0.0	+0.0	+0.0	27.0	46.0	-19.0	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+13.0	+6.0	+0.2	+3.0					
31	150.880M	32.7	+0.0	+0.0	+0.0	+0.0	+0.0	24.1	43.5	-19.4	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+11.2	+6.0	+0.1	+2.1					
32	253.030M	32.0	+0.0	+0.0	+0.0	+0.0	+0.0	25.5	46.0	-20.5	Vert
			+0.0	+0.0	+0.0	-28.0					
			+12.5	+6.0	+0.2	+2.8					
33	250.380M	31.9	+0.0	+0.0	+0.0	+0.0	+0.0	25.4	46.0	-20.6	Vert
			+0.0	+0.0	+0.0	-28.0					
			+12.5	+6.0	+0.2	+2.8					
34	247.840M	31.9	+0.0	+0.0	+0.0	+0.0	+0.0	25.3	46.0	-20.7	Vert
			+0.0	+0.0	+0.0	-28.0					
			+12.4	+6.0	+0.2	+2.8					

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Hampton Products International Corporation**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100170** Date: 10/1/2017
 Test Type: **Maximized Emissions** Time: 10:11:51
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

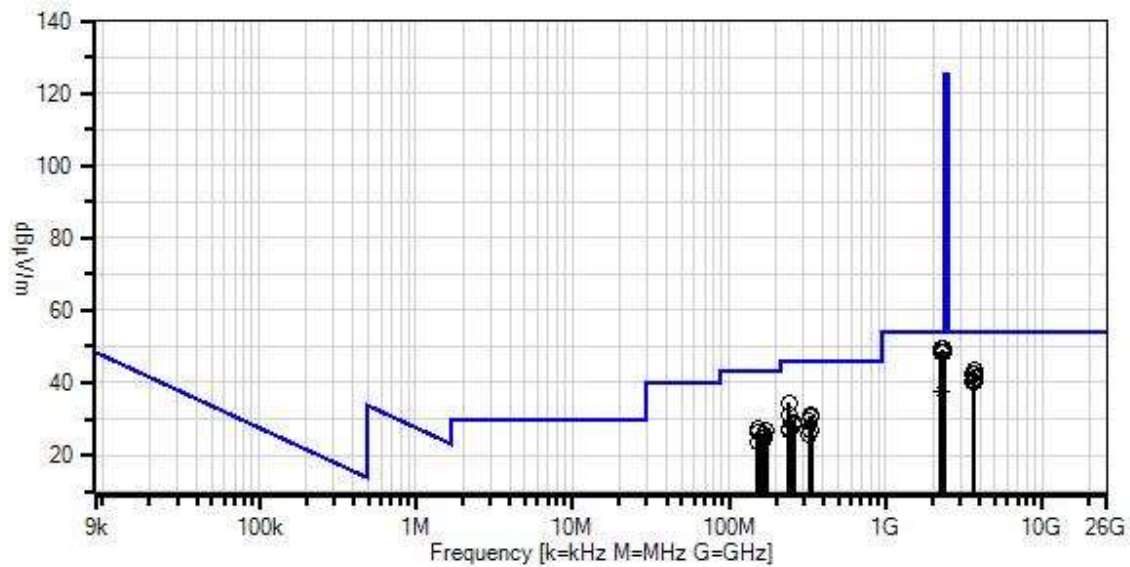
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz to 25GHz Frequency tested: 2412MHz, 2437MHz, 2462MHz Firmware power setting: 802.11n20=14 Duty Cycle: 802.11b=97.9 Test Method: KDB 558074 D01 v04 April 5, 2017 ANSI C63.10 2013 Test Mode: Continuous transmit Test Setup: The equipment under test (EUT) is stand alone on the Styrofoam table top. A laptop is connected to the EUT in order to set it to specific settings required for testing and then disconnected and removed from the test area. A new battery is installed in the EUT. Temperature (°C): 22 Relative Humidity (%): 41 Modifications added: None Setup: Site A OATS
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Hampton Products International Corporation W/O#: 100170 Sequence#: 1 Date: 10/1/2017
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



— Readings
 × QP Readings
 ▼ Ambient
 — 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
 * Average Readings
 Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T3	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T4	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T5	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T6	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/2/2017	6/2/2019
T7	AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
	AN01413	Horn Antenna	84125-80008	10/7/2016	10/7/2018
T8	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T9	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
T10	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T11	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T12	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	2320.125M	48.1	+0.0 +24.9 +0.0	+3.9 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	49.4	54.0	-4.6	Vert
2	2277.063M	48.1	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	49.2	54.0	-4.8	Vert
3	2358.292M	47.2	+0.0 +24.9 +0.0	+4.0 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.6	54.0	-5.4	Vert
4	2252.500M	47.4	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.5	54.0	-5.5	Horiz
5	2277.080M	47.3	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.4	54.0	-5.6	Horiz
6	2358.042M	46.9	+0.0 +24.9 +0.0	+4.0 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.3	54.0	-5.7	Horiz
7	2252.517M	47.1	+0.0 +24.8 +0.0	+3.9 +0.0 +0.0	-38.3 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.2	54.0	-5.8	Vert
8	2319.883M	46.8	+0.0 +24.9 +0.0	+3.9 +0.0 +0.0	-38.2 +10.1 +0.0	+0.6 +0.0 +0.0	+0.0	48.1	54.0	-5.9	Horiz

9	3692.988M	47.4	+0.0	+4.7	-37.9	+0.8	+0.0	43.3	54.0	-10.7	Horiz
			+27.8	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
10	3655.817M	46.9	+0.0	+4.6	-37.9	+0.8	+0.0	42.6	54.0	-11.4	Horiz
			+27.7	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
11	3618.000M	47.0	+0.0	+4.5	-38.0	+0.8	+0.0	42.4	54.0	-11.6	Horiz
			+27.5	+0.6	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
12	242.025M	41.5	+0.0	+0.0	+0.0	+0.0	+0.0	34.4	46.0	-11.6	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.0	+6.0	+0.2	+2.7					
13	3692.682M	45.3	+0.0	+4.7	-37.9	+0.8	+0.0	41.2	54.0	-12.8	Vert
			+27.8	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
14	3617.967M	45.0	+0.0	+4.5	-38.0	+0.8	+0.0	40.4	54.0	-13.6	Vert
			+27.5	+0.6	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
15	3655.425M	44.4	+0.0	+4.6	-37.9	+0.8	+0.0	40.1	54.0	-13.9	Vert
			+27.7	+0.5	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
16	244.725M	38.0	+0.0	+0.0	+0.0	+0.0	+0.0	31.2	46.0	-14.8	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.2	+6.0	+0.2	+2.8					
17	328.860M	35.3	+0.0	+0.0	+0.0	+0.0	+0.0	31.0	46.0	-15.0	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.1	+6.0	+0.2	+3.3					
18	334.110M	35.0	+0.0	+0.0	+0.0	+0.0	+0.0	30.8	46.0	-15.2	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.2	+6.0	+0.2	+3.3					
19	331.497M	35.0	+0.0	+0.0	+0.0	+0.0	+0.0	30.8	46.0	-15.2	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.2	+6.0	+0.2	+3.3					
20	155.670M	36.3	+0.0	+0.0	+0.0	+0.0	+0.0	27.4	43.5	-16.1	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+10.9	+6.0	+0.1	+2.1					
21	326.247M	34.1	+0.0	+0.0	+0.0	+0.0	+0.0	29.7	46.0	-16.3	Horiz
			+0.0	+0.0	+0.0	-27.9					
			+14.0	+6.0	+0.2	+3.3					
22	2301.967M Ave	36.4	+0.0	+3.9	-38.2	+0.6	+0.0	37.7	54.0	-16.3	Vert
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	2301.967M	51.4	+0.0	+3.9	-38.2	+0.6	+0.0	52.7	54.0	-1.3	Vert
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					

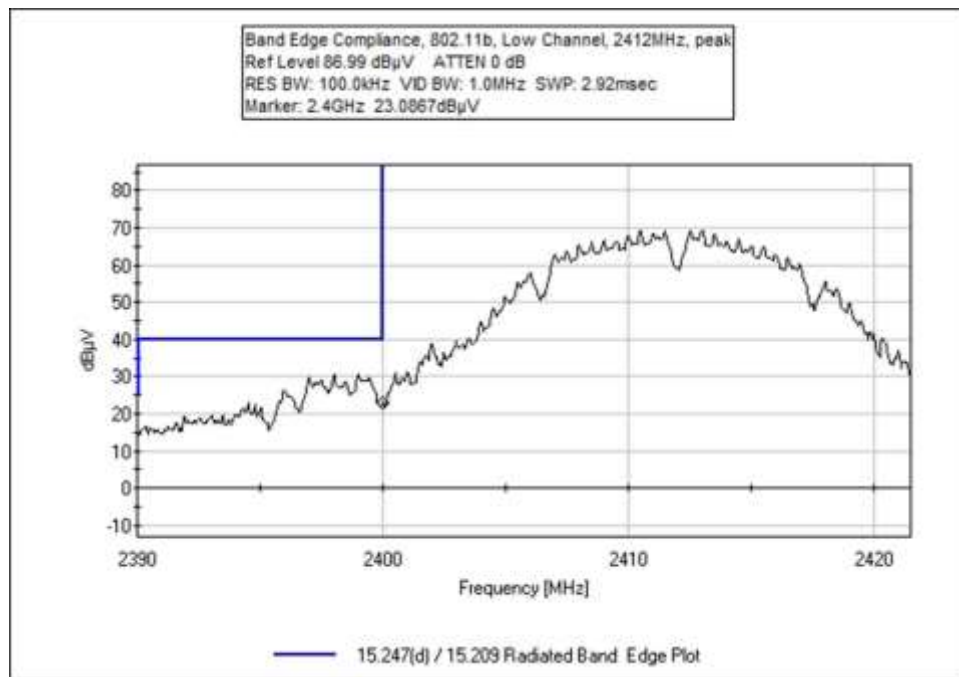
24	172.620M	36.9	+0.0	+0.0	+0.0	+0.0	+0.0	27.0	43.5	-16.5	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+9.7	+6.0	+0.1	+2.3					
25	2301.967M	36.1	+0.0	+3.9	-38.2	+0.6	+0.0	37.4	54.0	-16.6	Horiz
	Ave		+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	2301.967M	50.0	+0.0	+3.9	-38.2	+0.6	+0.0	51.3	54.0	-2.7	Horiz
			+24.9	+0.0	+10.1	+0.0					
			+0.0	+0.0	+0.0	+0.0					
27	257.775M	35.5	+0.0	+0.0	+0.0	+0.0	+0.0	29.2	46.0	-16.8	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.6	+6.0	+0.2	+2.9					
28	151.960M	35.1	+0.0	+0.0	+0.0	+0.0	+0.0	26.5	43.5	-17.0	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+11.2	+6.0	+0.1	+2.1					
29	260.400M	34.6	+0.0	+0.0	+0.0	+0.0	+0.0	28.4	46.0	-17.6	Horiz
			+0.0	+0.0	+0.0	-28.0					
			+12.7	+6.0	+0.2	+2.9					
30	166.580M	35.2	+0.0	+0.0	+0.0	+0.0	+0.0	25.6	43.5	-17.9	Vert
			+0.0	+0.0	+0.0	-28.0					
			+10.1	+6.0	+0.1	+2.2					
31	244.650M	34.2	+0.0	+0.0	+0.0	+0.0	+0.0	27.4	46.0	-18.6	Vert
			+0.0	+0.0	+0.0	-28.0					
			+12.2	+6.0	+0.2	+2.8					
32	167.880M	34.2	+0.0	+0.0	+0.0	+0.0	+0.0	24.5	43.5	-19.0	Vert
			+0.0	+0.0	+0.0	-28.0					
			+10.0	+6.0	+0.1	+2.2					
33	331.310M	31.2	+0.0	+0.0	+0.0	+0.0	+0.0	27.0	46.0	-19.0	Vert
			+0.0	+0.0	+0.0	-27.9					
			+14.2	+6.0	+0.2	+3.3					
34	241.875M	34.0	+0.0	+0.0	+0.0	+0.0	+0.0	26.9	46.0	-19.1	Vert
			+0.0	+0.0	+0.0	-28.0					
			+12.0	+6.0	+0.2	+2.7					
35	328.743M	30.9	+0.0	+0.0	+0.0	+0.0	+0.0	26.6	46.0	-19.4	Vert
			+0.0	+0.0	+0.0	-27.9					
			+14.1	+6.0	+0.2	+3.3					
36	154.330M	32.1	+0.0	+0.0	+0.0	+0.0	+0.0	23.3	43.5	-20.2	Vert
			+0.0	+0.0	+0.0	-28.0					
			+11.0	+6.0	+0.1	+2.1					
37	326.107M	30.0	+0.0	+0.0	+0.0	+0.0	+0.0	25.6	46.0	-20.4	Vert
			+0.0	+0.0	+0.0	-27.9					
			+14.0	+6.0	+0.2	+3.3					

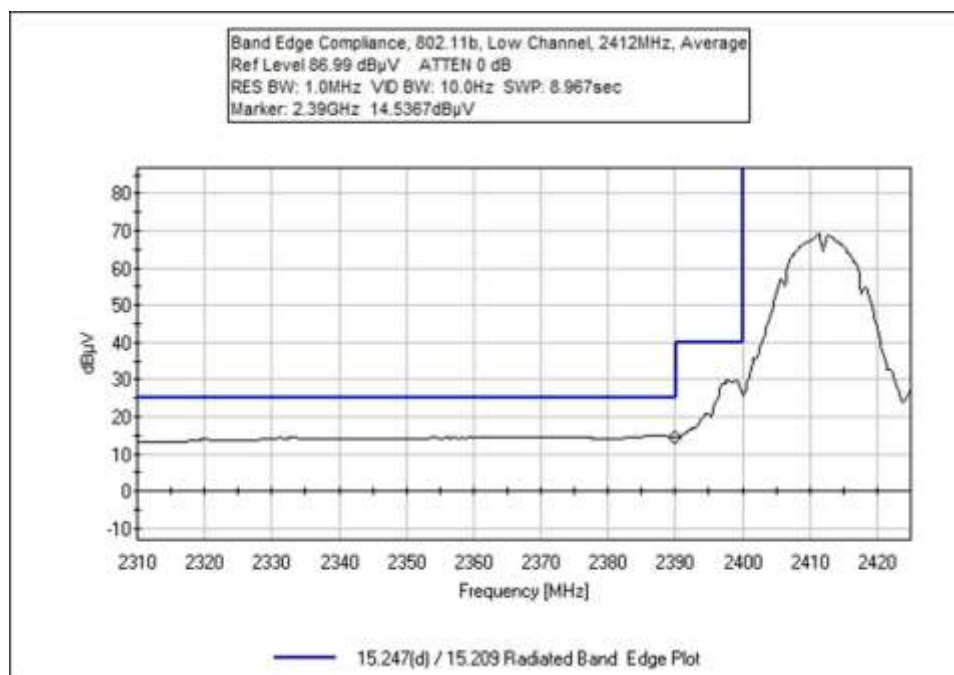
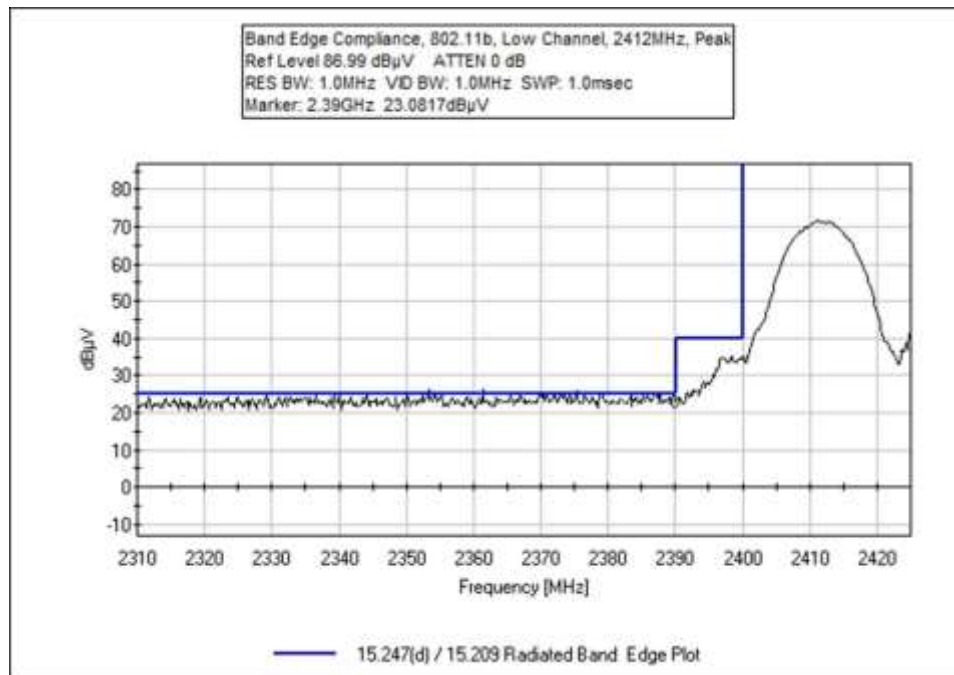
Band Edge

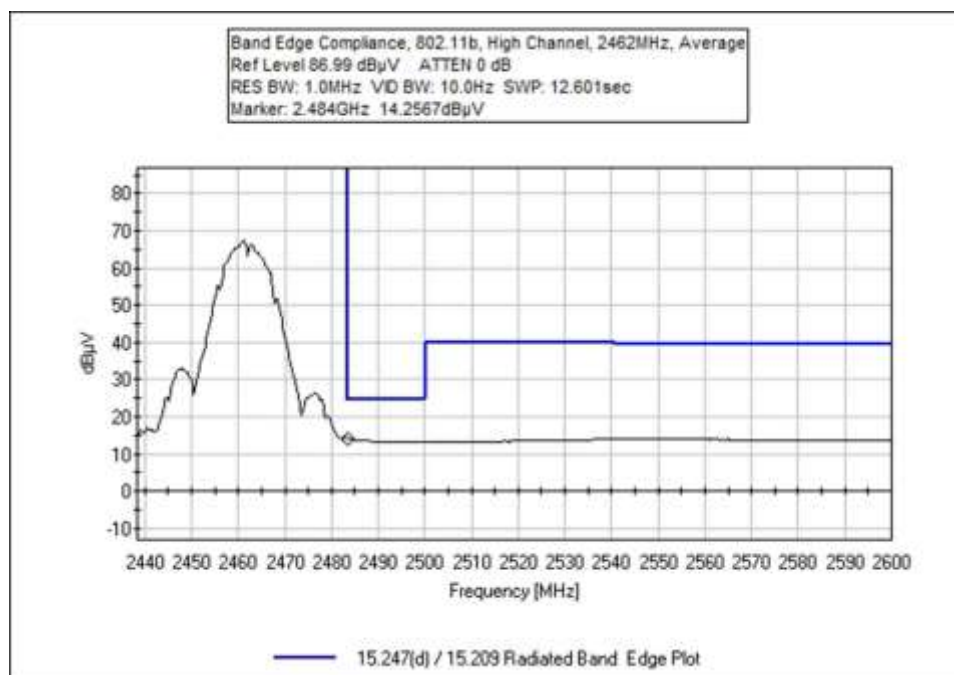
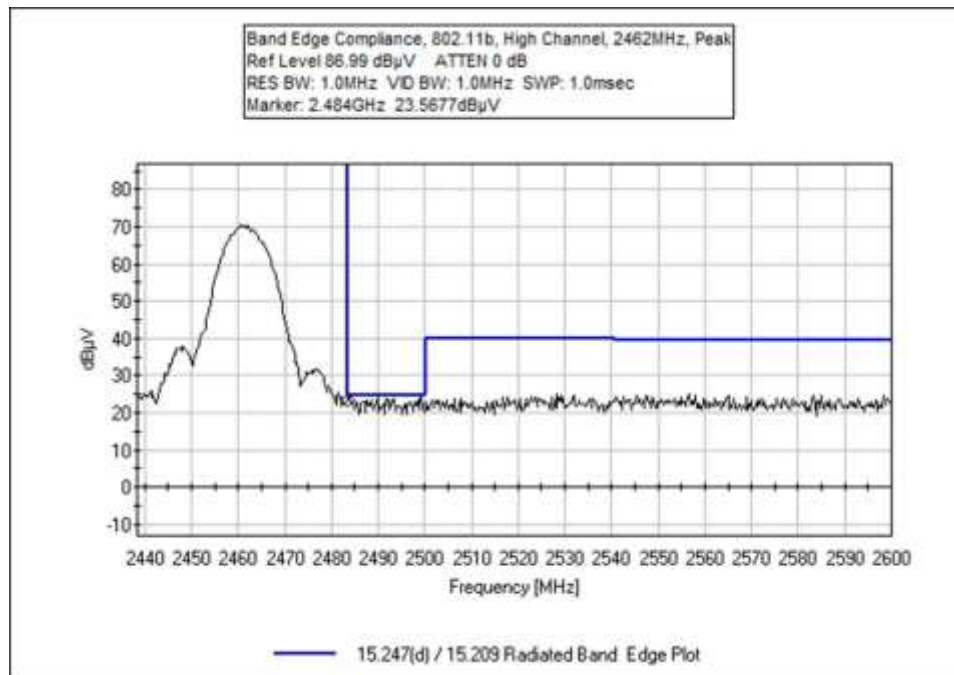
Band Edge Summary

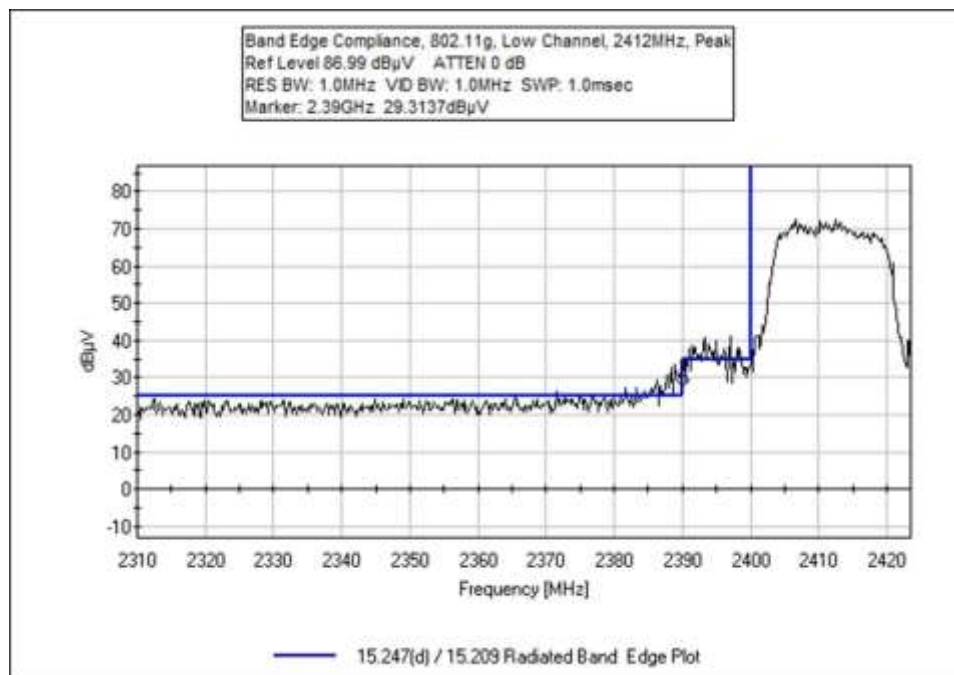
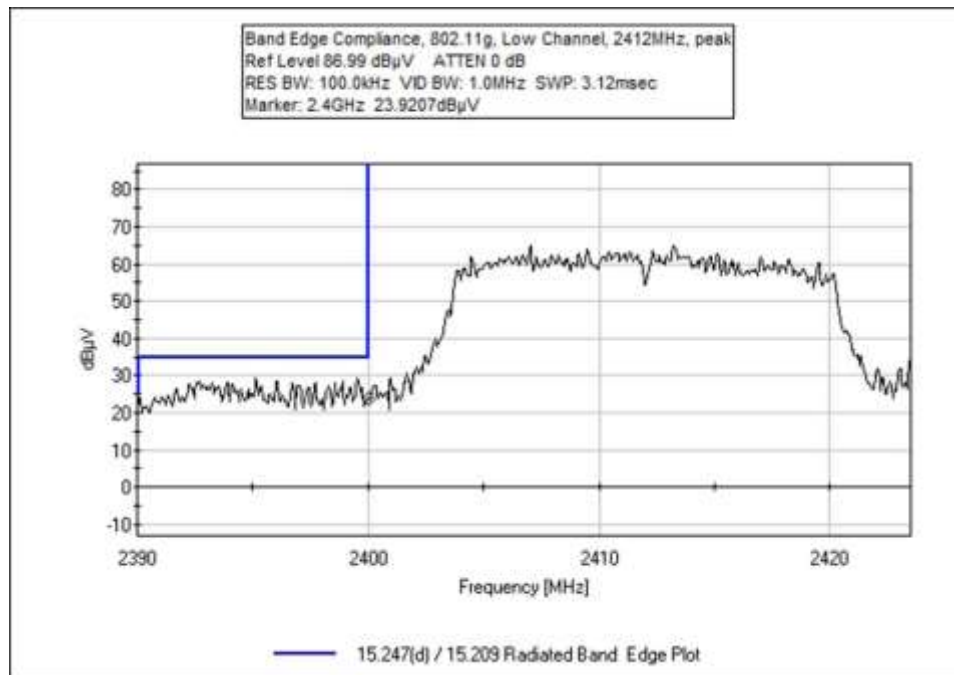
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2390.0	CCK	PIFA	43.8	< 54	Pass
2400.0	CCK	PIFA	52.1	< 69.0	Pass
2483.5	CCK	PIFA	43.4	< 54	Pass
2390.0	OFDM	PIFA	48.9	< 54	Pass
2400.0	OFDM	PIFA	52.9	< 64.0	Pass
2483.5	OFDM	PIFA	45.3	< 54	Pass
2390.0	BPSK	PIFA	48.2	< 54	Pass
2400.0	BPSK	PIFA	56.0	< 63.6	Pass
2483.5	BPSK	PIFA	45.3	< 54	Pass

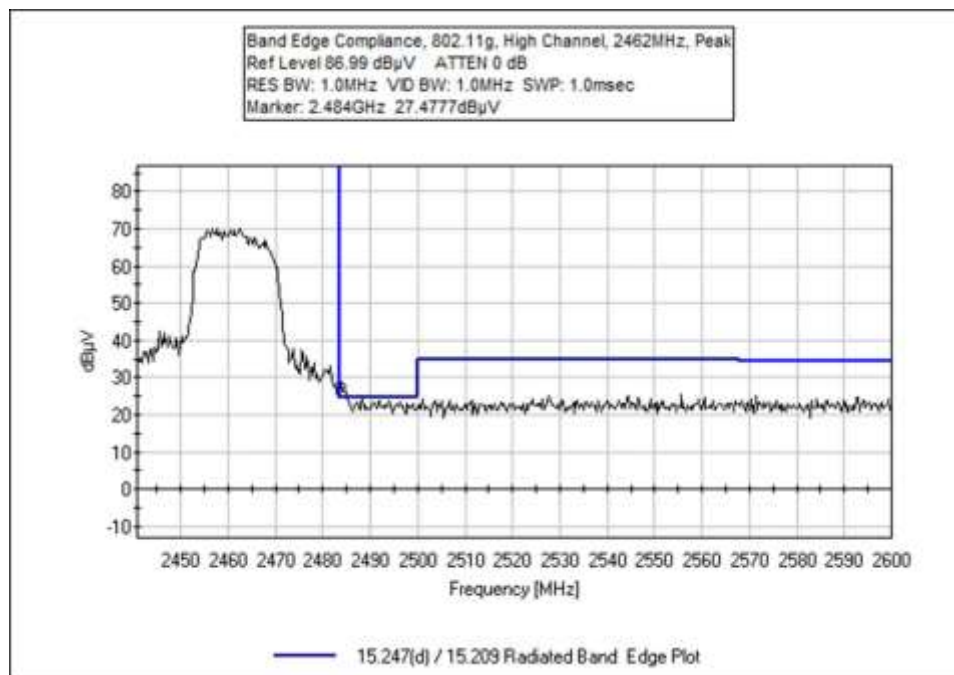
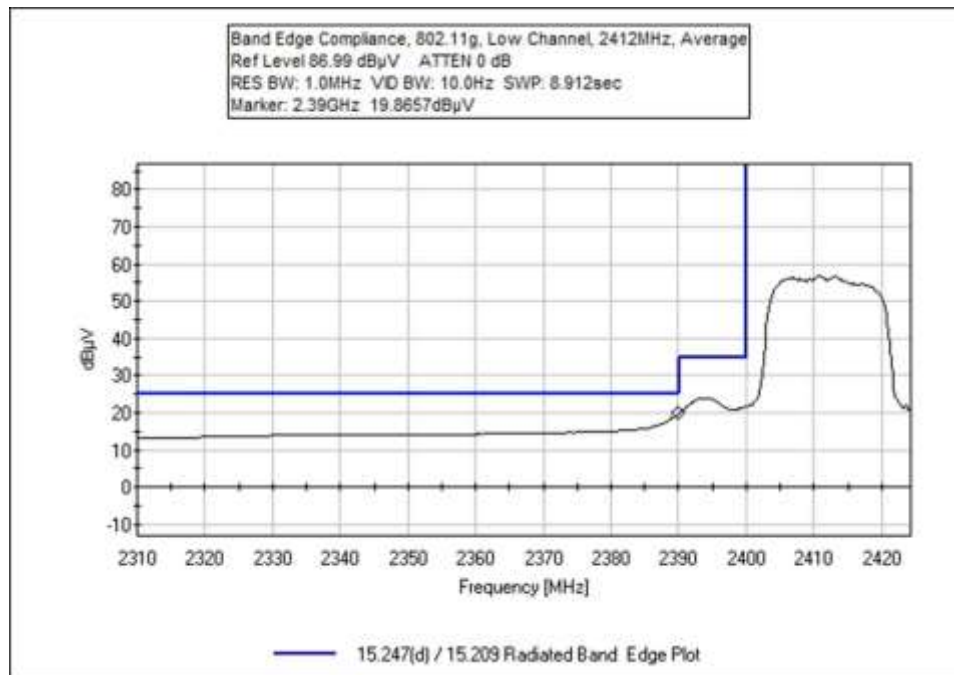
Band Edge Plots

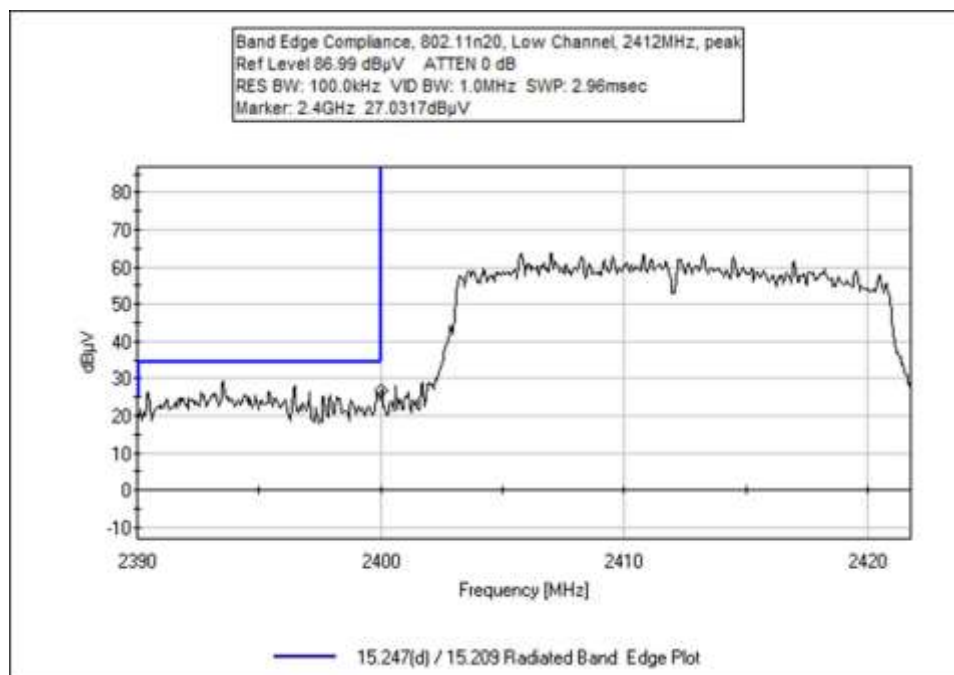
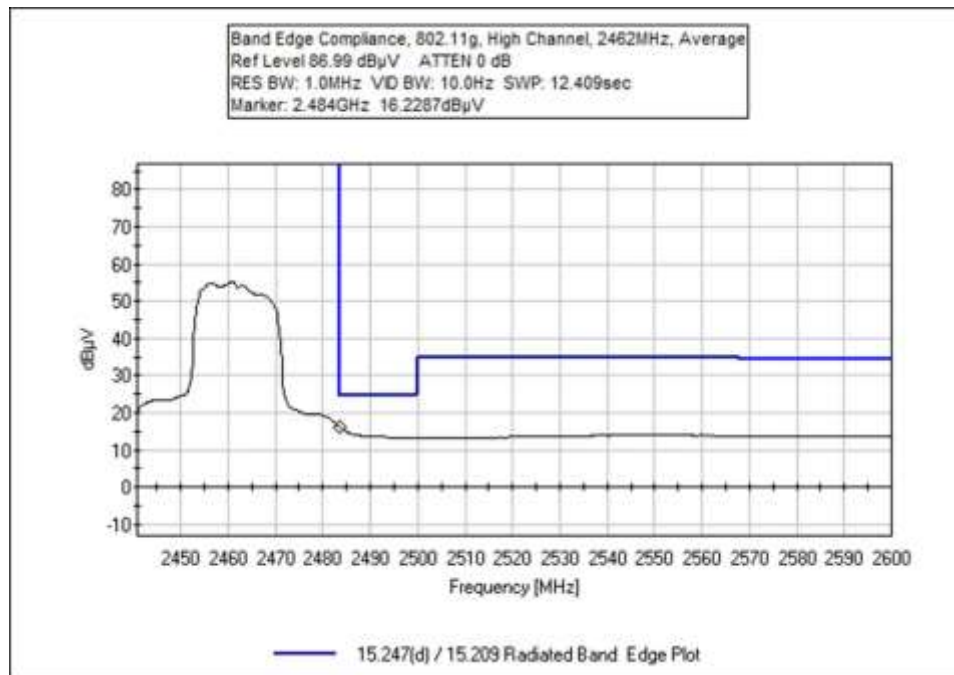


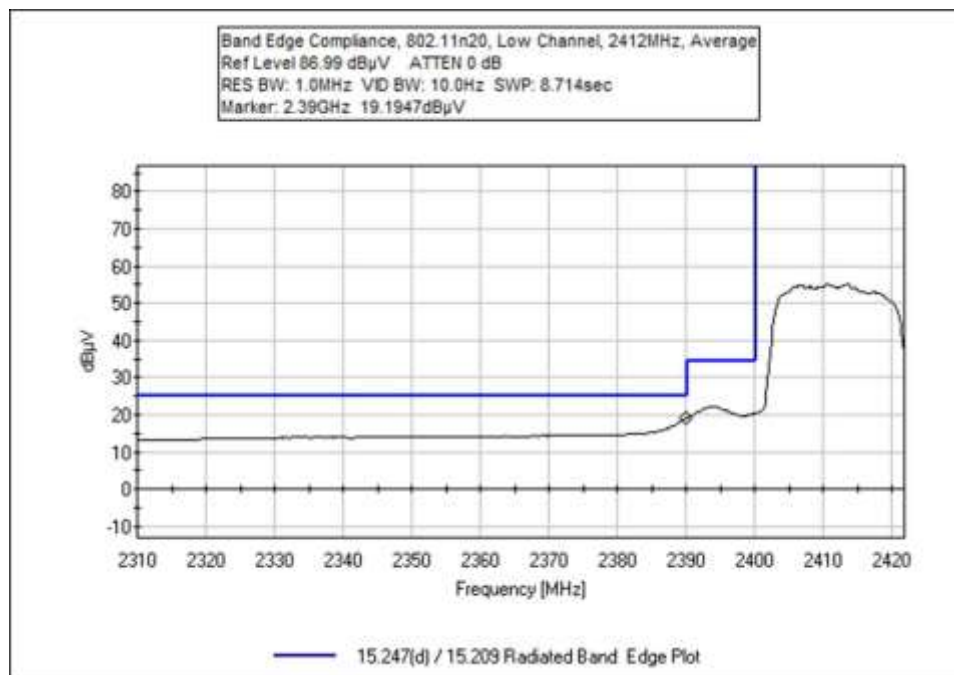
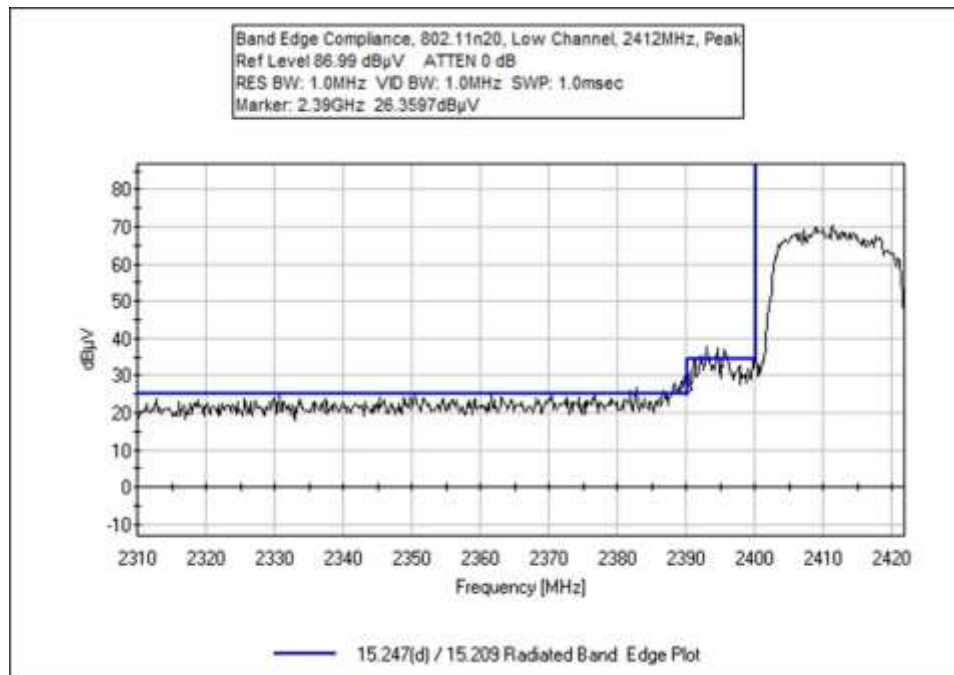


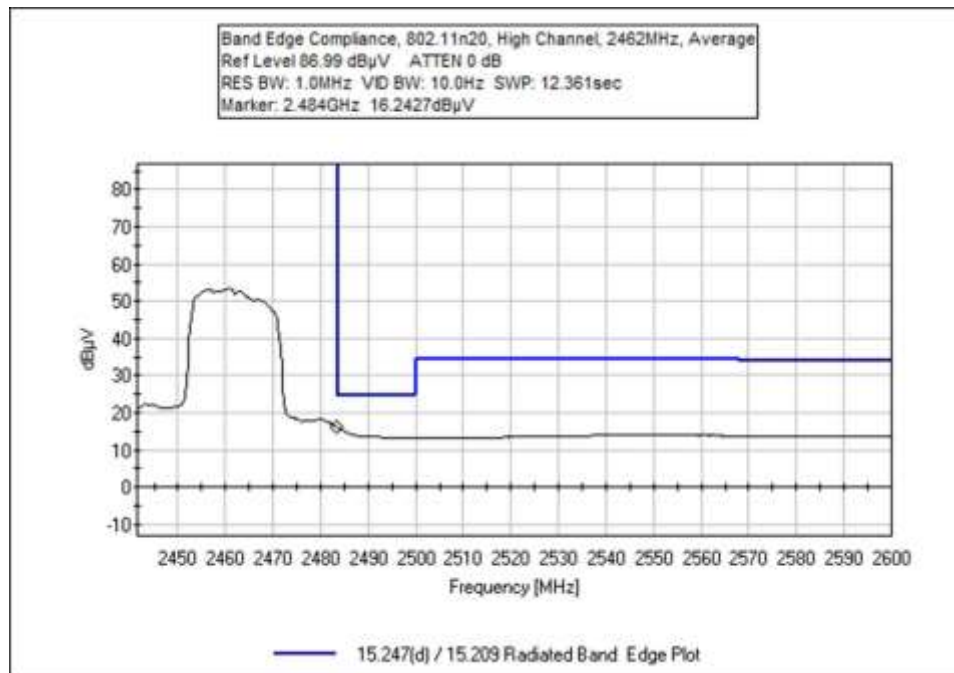
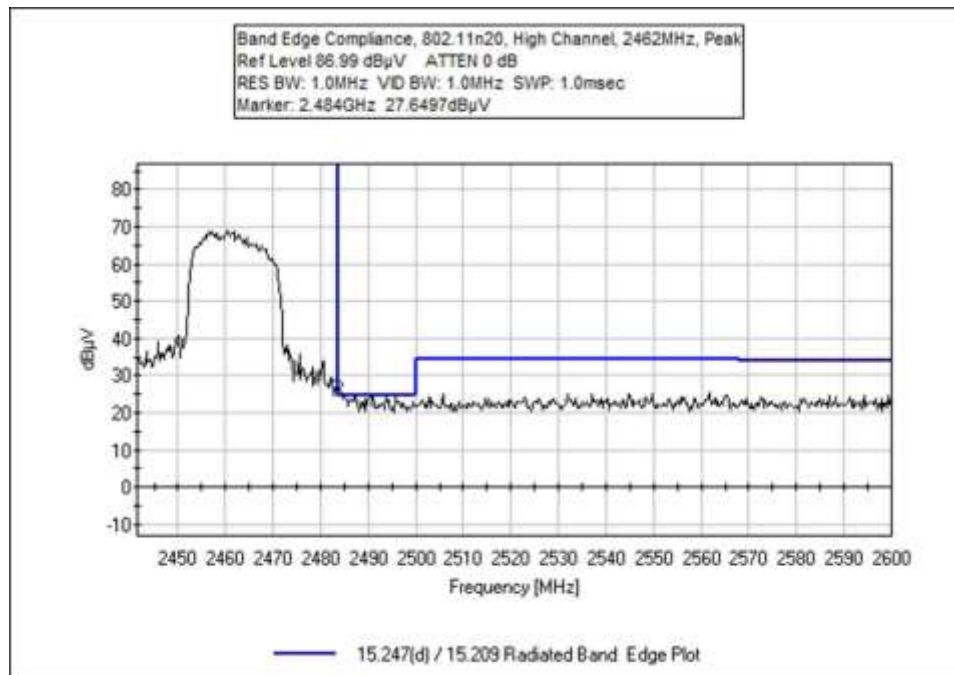












Test Setup Photos



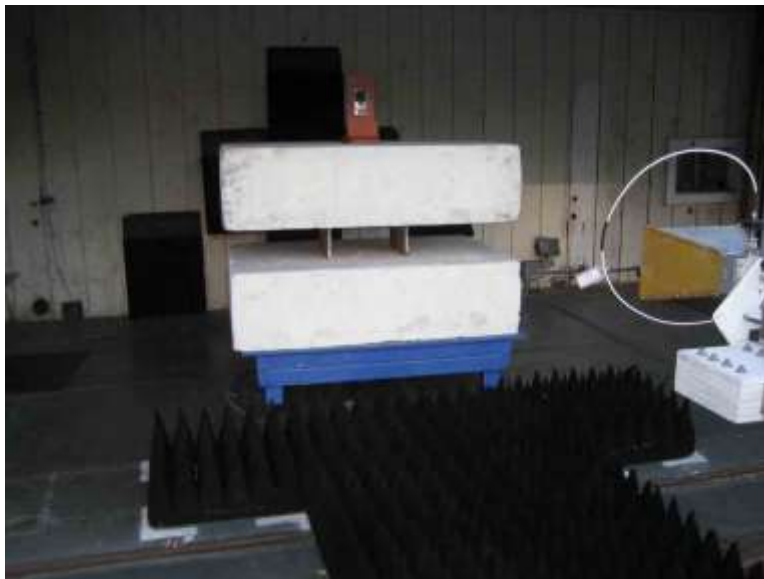
Below 1GHz, Inside



Above 1GHz, Inside



Below 1GHz, Outside



Above 1GHz, Outside

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.