Tonal

TEST REPORT FOR

Trainer
Model: T1522

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 2400-2483.5 MHz)
Wi-Fi 2.4GHz for Hydra Board for Main System

Report No.: 105488-32

Date of issue: February 15, 2022

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 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.

Test Certificate # 803.01

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Tonal
617 Bryant Street
San Francisco, CA 94107

Representative: Lars Gilstrom
Customer Reference Number: PO1203

REPORT PREPARED BY:

Lisa Bevington
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 105488

DATE OF EQUIPMENT RECEIPT: December 8, 2021
DATE(S) OF TESTING: December 8 - 21, 2021

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, 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.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

*CKC's list of NIST designated countries can be found at: https://standards.gov/cabs/designations.html

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(d)	RF Conducted Emissions & Band Edge	NA	PASS
15.247(d)	Radiated Emissions & Band Edge	Mods. #1, #2, #3 #4, #5, #6	PASS
15.247(e)	Power Spectral Density	NA	PASS
15.207	AC Conducted Emissions	NA	PASS

NA = Not Applicable

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

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

Summary of Conditions
Radiated Emissions only; Configurations: 1 & 3 Mod. #1 = Copper tape between microphone PCBA gold-plated pads and chassis. Mod. #2 = Screws on hydra backplane mounting bracket. Mod. #3 = Copper tape on hydra backplane to display backplane. Mod. #4 = Ferrite (1 each) 742-712-21 on upper lead to shunt. Mod. #5 = Door bonding replaced with three (3) lug-to-lug wire strap. Mod. #6 = Set display mode into spread spectrum.

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
The Test Setup Photos are incorporated by reference 105488-32_Test Setup_Photos

EQUIPMENT UNDER TEST (EUT)

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 Under Test* (* = EUT):**

Device Name	Manufacturer	Model #	S/N
Trainer	Tonal System	T1522	02016558
Hydra Board	Tonal System	500-0801 Rev 008	080100702000476
Internal Power Supply	Artesyn Embedded Tech.	LCM1500W-T	K510UN001BBVC-8-416 Revision: BV Firmware 6/2/2021
Direct Bond 2312 Touch screen display	BOE	380-0015 Rev. 1-1 CJ238FSB-TG21	00000015

Support Equipment:

Device Name	Manufacturer	Model #	S/N
None			

Configuration 3

***Equipment Under Test* (* = EUT):**

Device Name	Manufacturer	Model #	S/N
Trainer	Tonal System	T1522	02016558
Hydra Board	Tonal System	500-0801 Rev 008	080100702000476
Internal Power Supply	Artesyn Embedded Tech.	LCM1500W-T	K510UN001BBVC-8-416 Revision: BV Firmware 6/2/2021
Direct Bond 2312 Touch screen display	BOE	380-0015 Rev. 1-1 CJ238FSB-TG21	00000015

Support Equipment:

Device Name	Manufacturer	Model #	S/N
Laptop	Lenovo	X1 Carbon Gen 9	PF-37KBYM
Laptop Power Supply	Lenovo	SA10R16922	8SSA10R16922C2TJ-19M0G0G

Configuration 9

***Equipment Under Test* (* = EUT):**

Device Name	Manufacturer	Model #	S/N
Hydra Board	Tonal System	500-0801 Rev 008	080100702000476

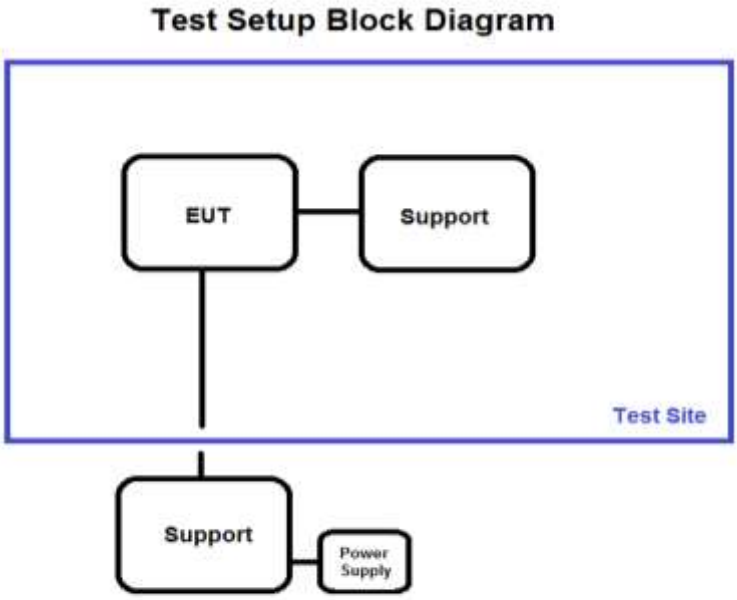
Support Equipment:

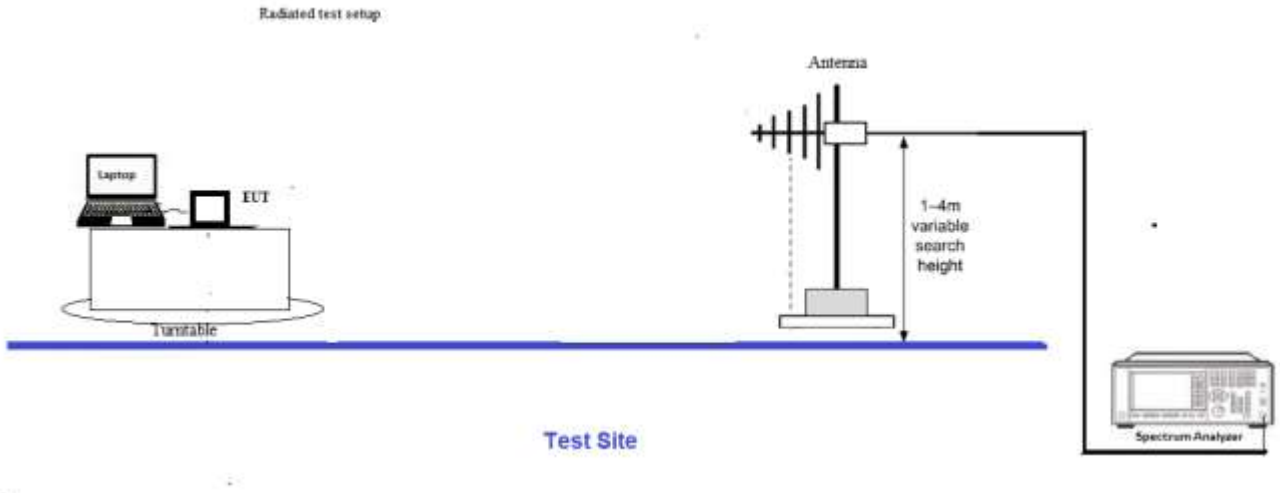
Device Name	Manufacturer	Model #	S/N
Laptop	Lenovo	X1 Carbon Gen 9	PF-37KBYM
Laptop Power Supply	Lenovo	SA10R16922	8SSA10R16922C2TJ-19M0G0G

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Wi-Fi 2.4GHz for Hydra Board for Main System
Operating Frequency Range:	2412-2462MHz
Modulation Type(s):	b/g/n HT20 and HT40
Maximum Duty Cycle:	100%
Number of TX Chains:	2
Antenna Type(s) and Gain:	External 3.77dBi
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	15VDC
Firmware / Software used for Test:	QRCT (Qualcomm Radio Control Toolkit) Version 4
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

Block Diagram of Test Setup(s)





FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

Test Setup/Conditions			
Test Location:	Fremont Lab C3	Test Engineer:	Hoang Cao
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 15.247 Meas Guidance v05r02	Test Date(s):	12/8/2021
Configuration:	9		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer.		

Environmental Conditions			
Temperature (ºC)	22.5	Relative Humidity (%):	45

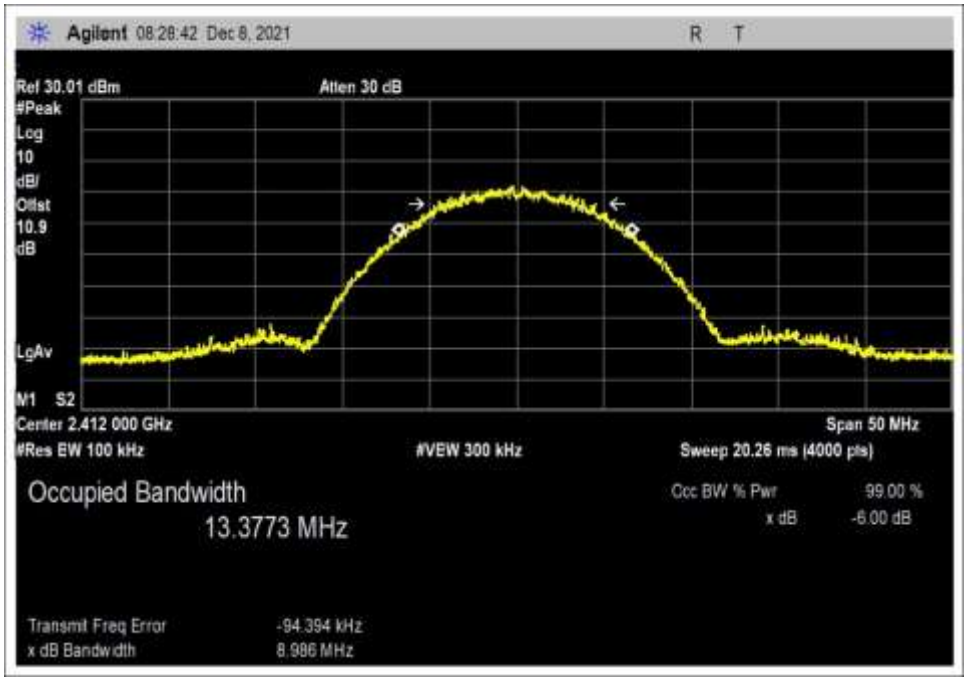
Test Equipment					
Asset# / Serial#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03360	Cable	Astrolab	32022-2-29094-36TC	4/9/2020	4/9/2022
P06239	Attenuator	Weinschel	54A-10	6/17/2020	6/17/2022
03471	Spectrum Analyzer	Agilent	E4440A	2/11/2020	2/11/2022

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2412	1	802.11b	8986	≥500	Pass
2447	1	802.11b	8997	≥500	Pass
2462	1	802.11b	9015	≥500	Pass
2412	1	802.11g	15386	≥500	Pass
2447	1	802.11g	19839	≥500	Pass
2462	1	802.11g	15728	≥500	Pass
2412	1	802.11n HT20	16014	≥500	Pass
2447	1	802.11n HT20	16327	≥500	Pass
2462	1	802.11n HT20	16343	≥500	Pass
2422	1	802.11n HT40	35415	≥500	Pass
2447	1	802.11n HT40	35105	≥500	Pass
2452	1	802.11n HT40	35079	≥500	Pass

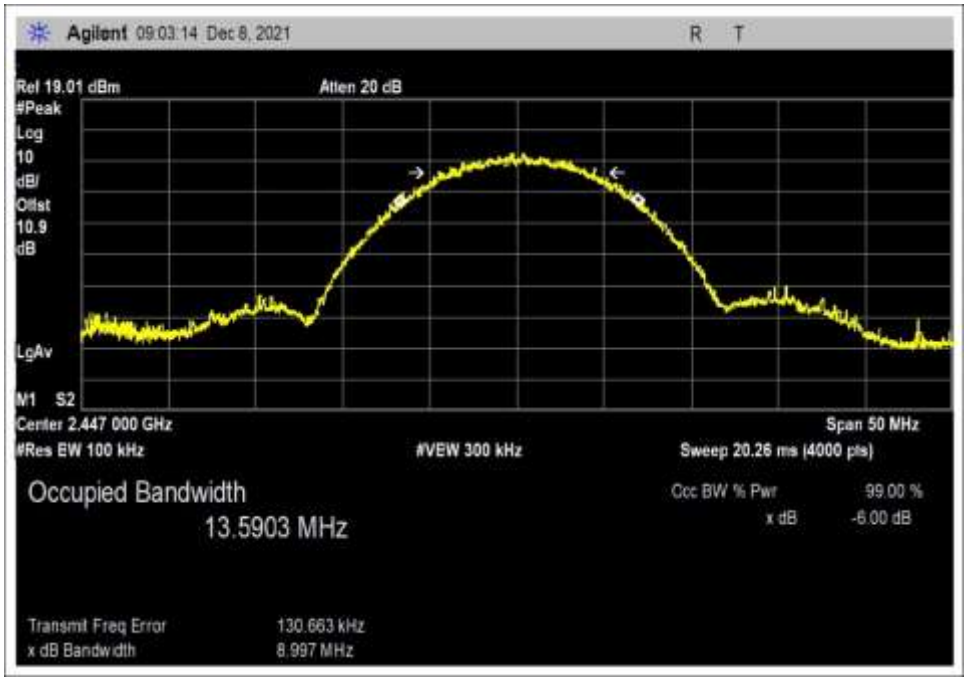
Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2412	2	802.11b	7791	≥500	Pass
2447	2	802.11b	8154	≥500	Pass
2462	2	802.11b	7317	≥500	Pass
2412	2	802.11g	15345	≥500	Pass
2447	2	802.11g	16025	≥500	Pass
2462	2	802.11g	15408	≥500	Pass
2412	2	802.11n HT20	156555	≥500	Pass
2447	2	802.11n HT20	16391	≥500	Pass
2462	2	802.11n HT20	16005	≥500	Pass
2422	2	802.11n HT40	35108	≥500	Pass
2447	2	802.11n HT40	36027	≥500	Pass
2452	2	802.11n HT40	35121	≥500	Pass

Plot(s)

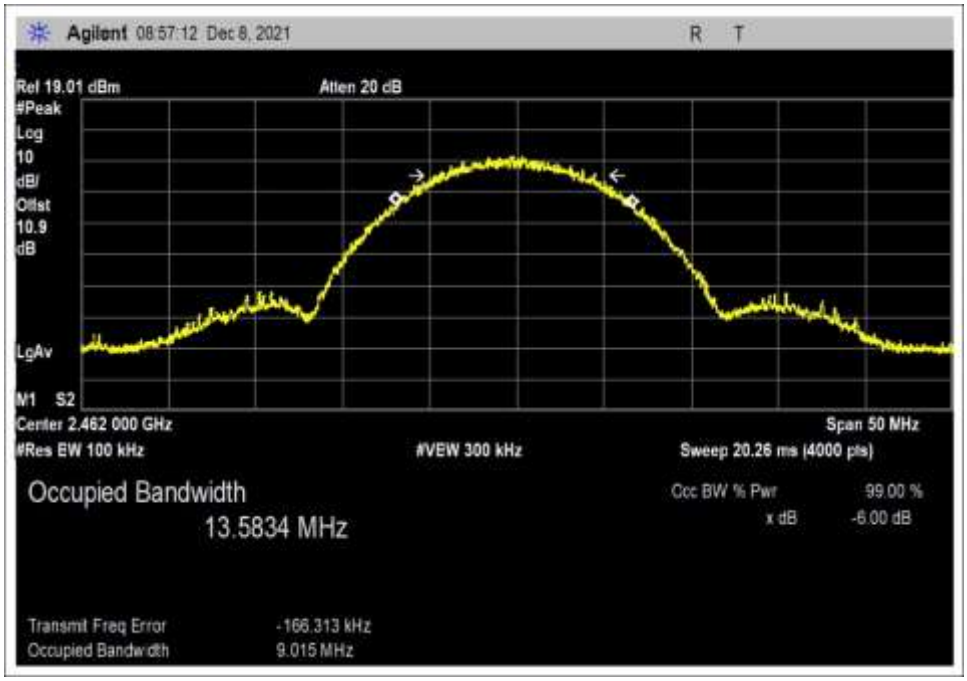
Chain 0, 802.11 b



Low Channel

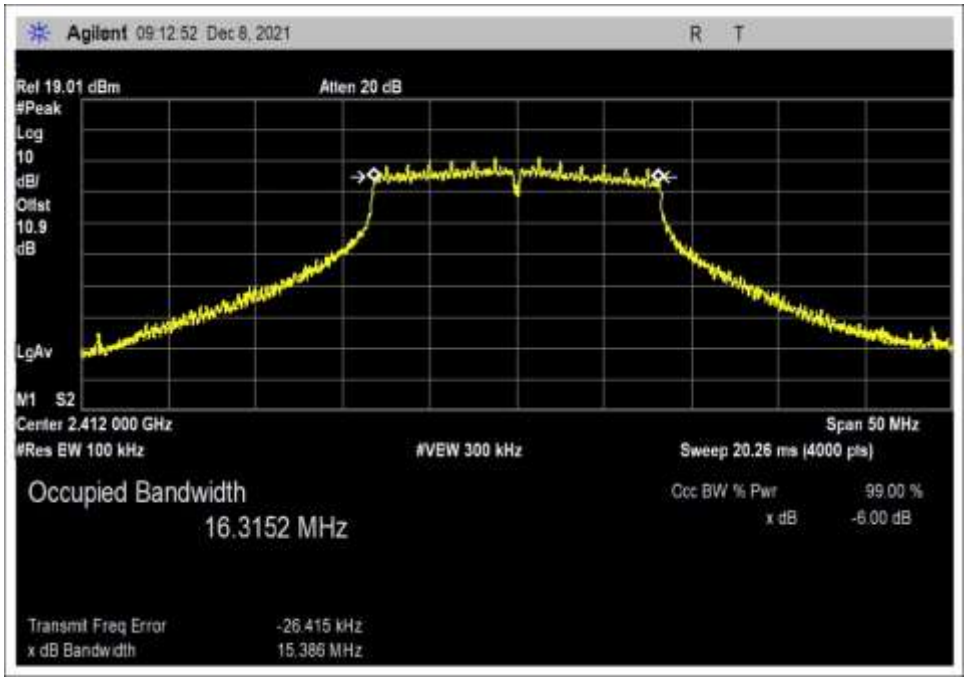


Middle Channel



High Channel

Chain 0, 802.11 g



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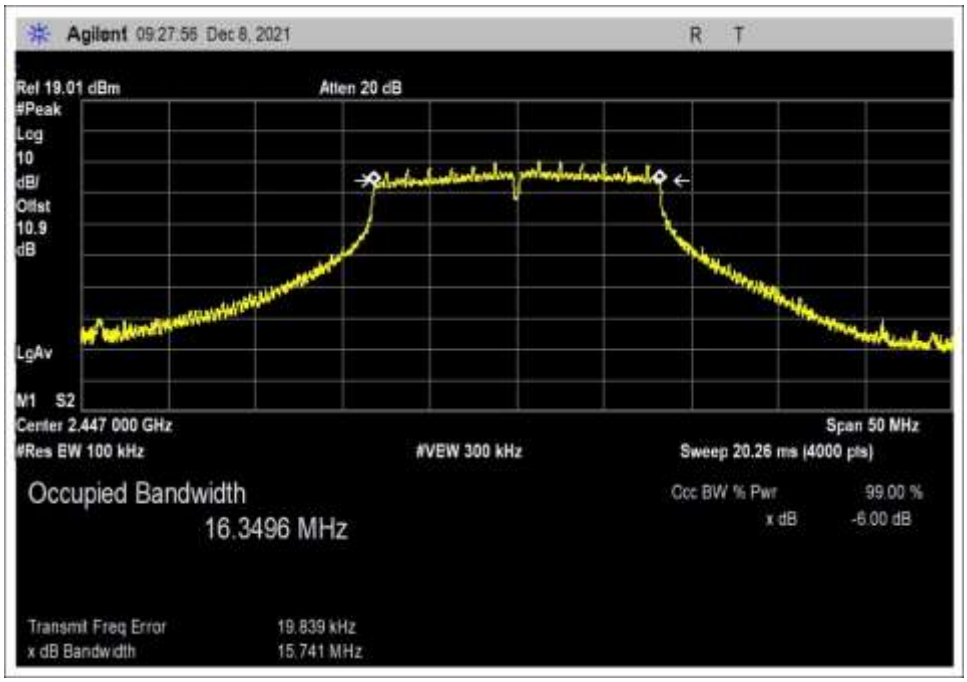

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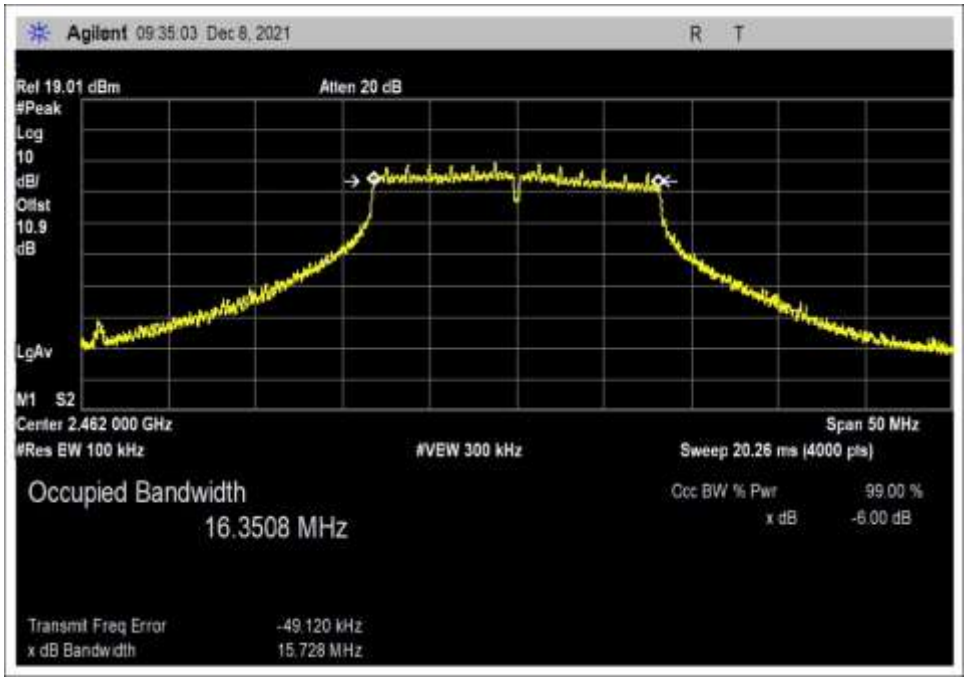
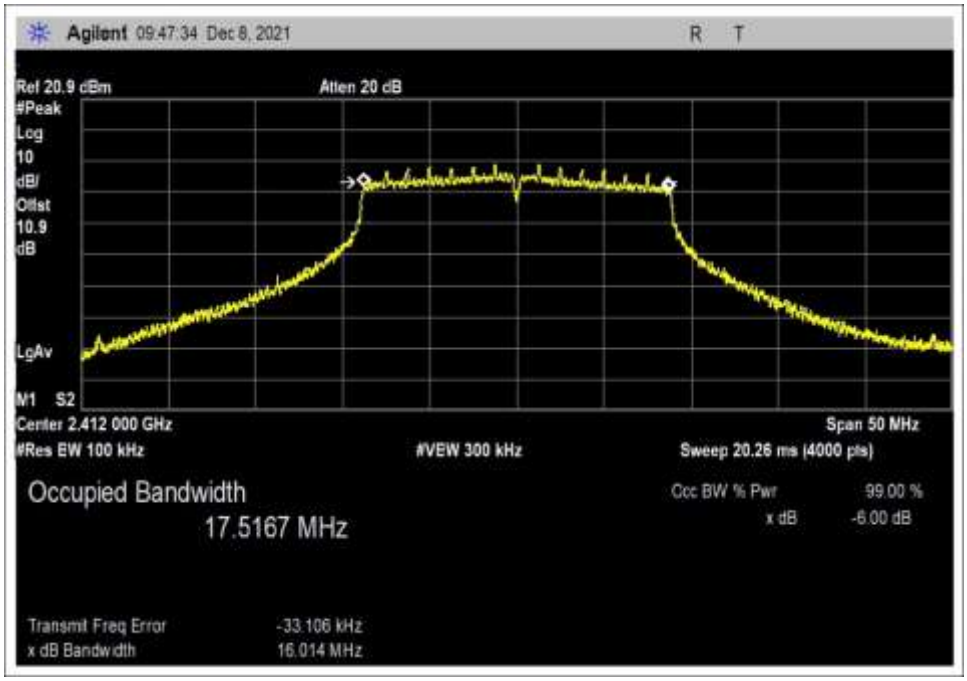


High Channel

Chain 0, 802.11 n, 20MHz



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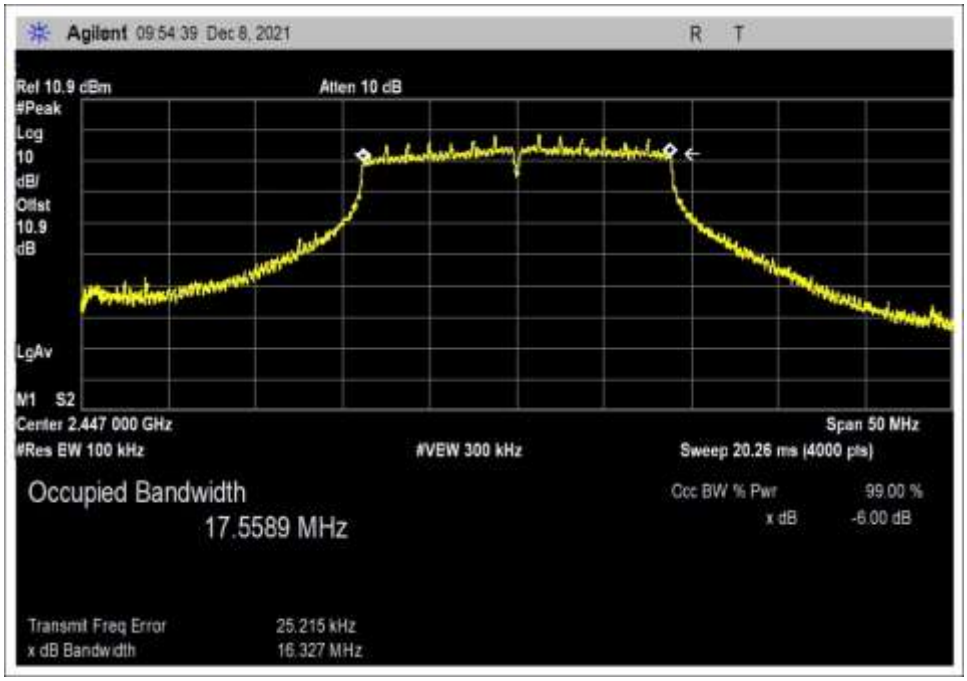
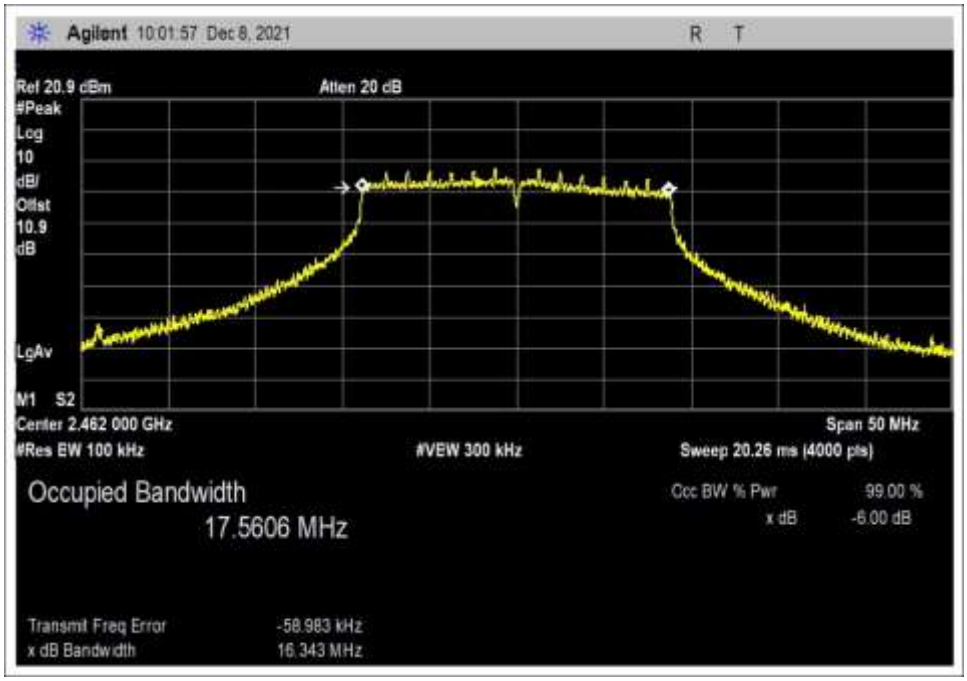
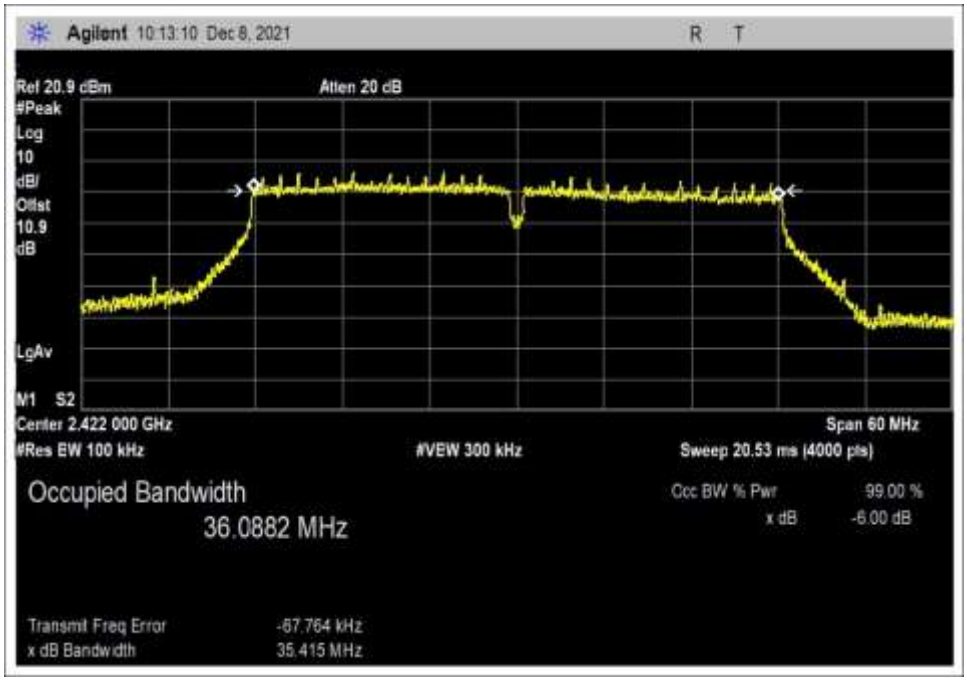


Middle Channel

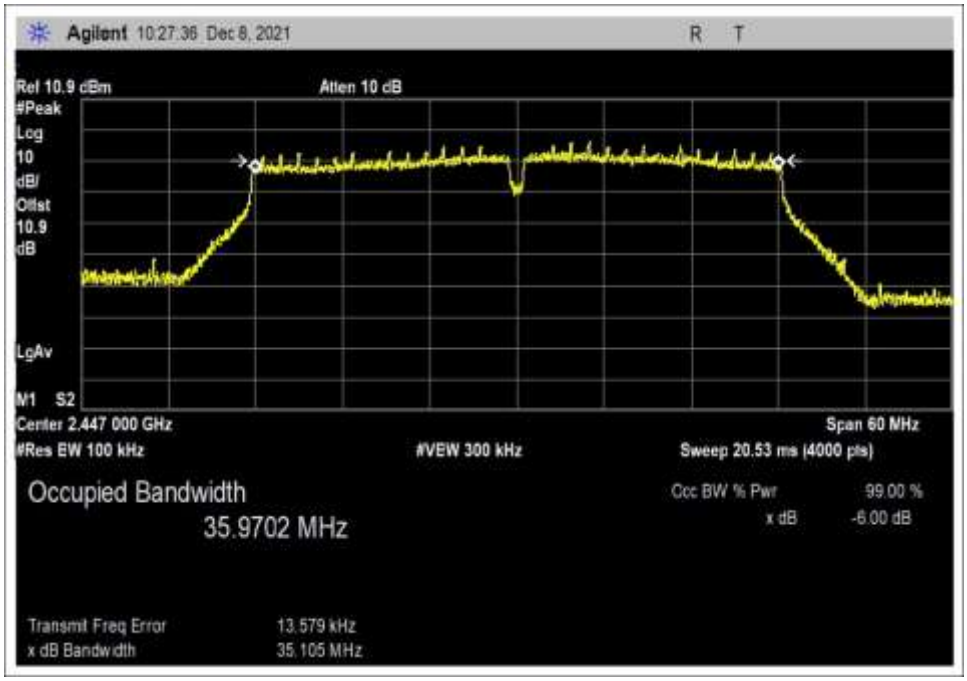


High Channel

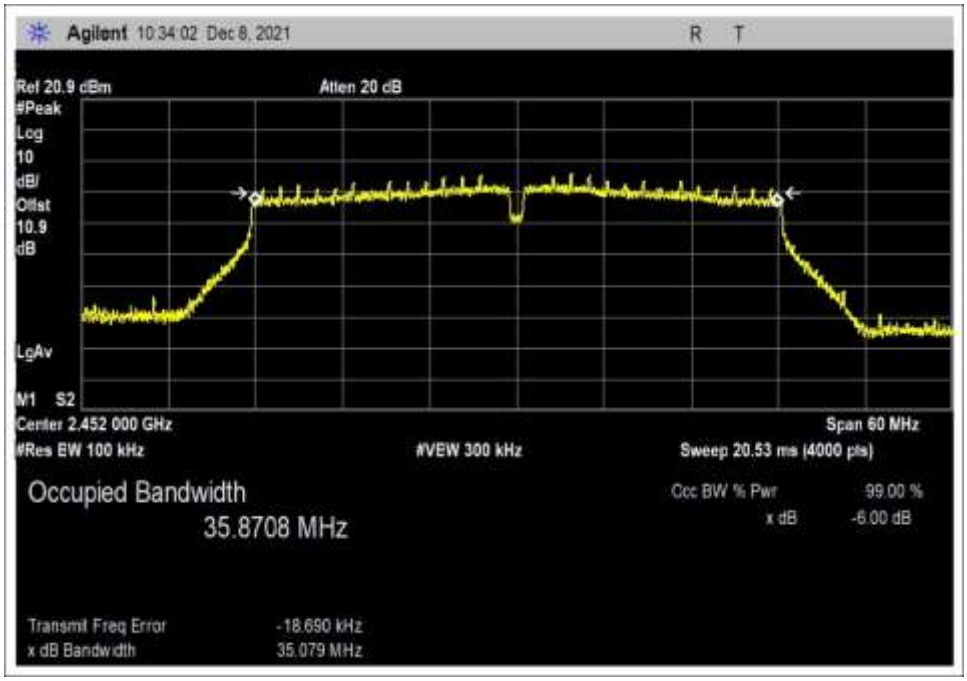
Chain 0, 802.11 n, 40MHz



Low Channel

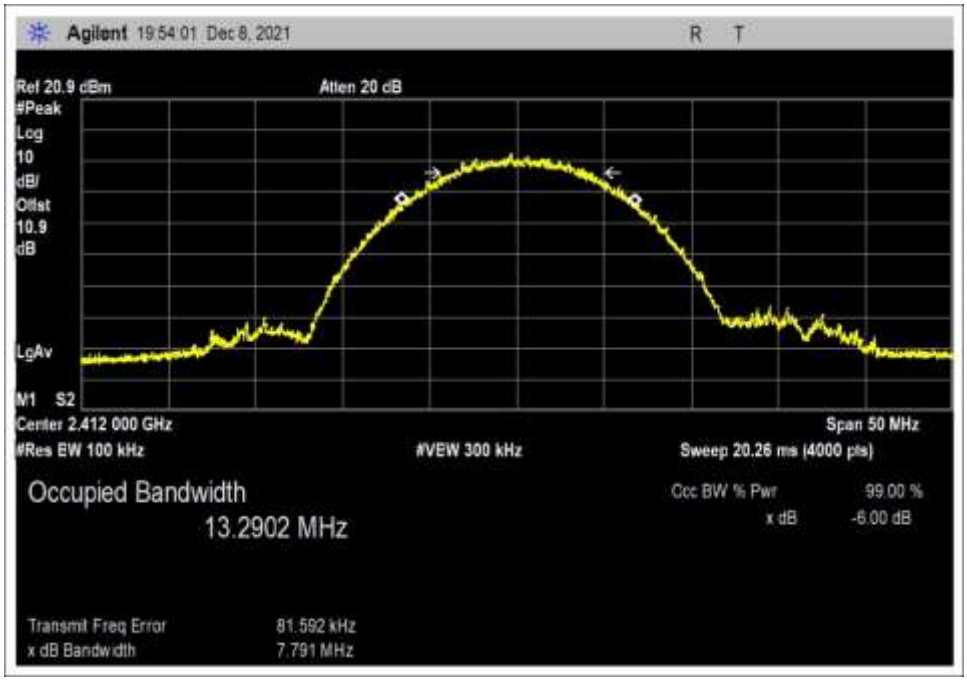


Middle Channel

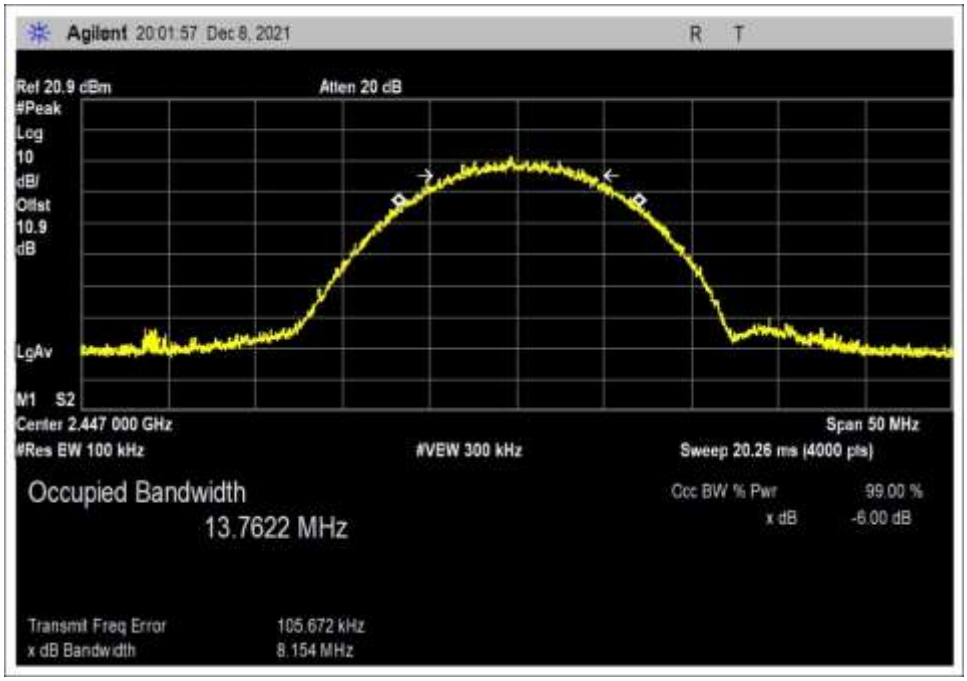


High Channel

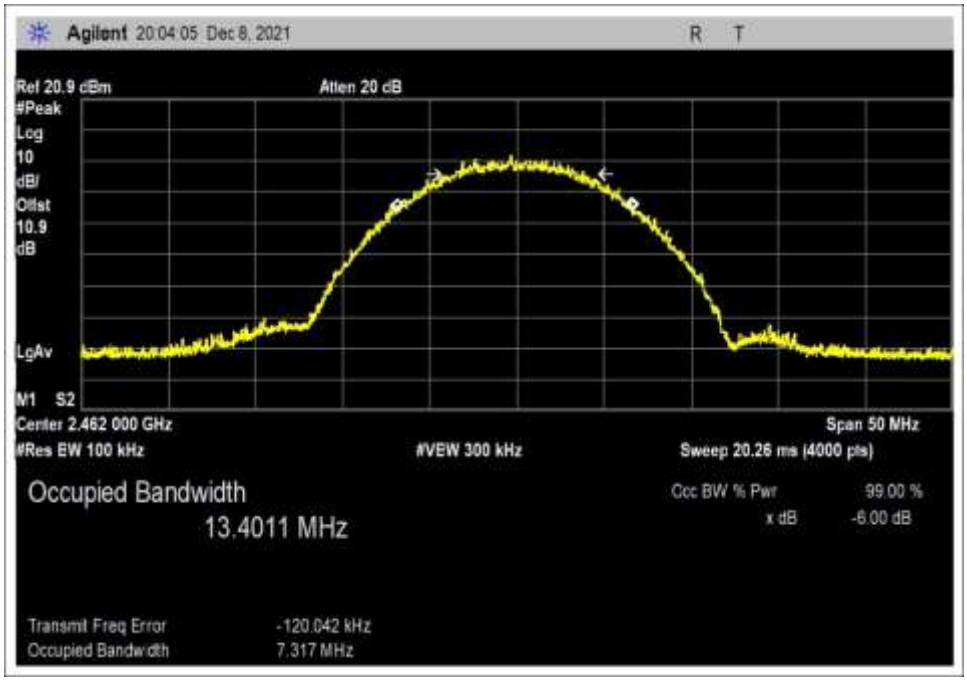
Chain 1, 802.11 b



Low Channel

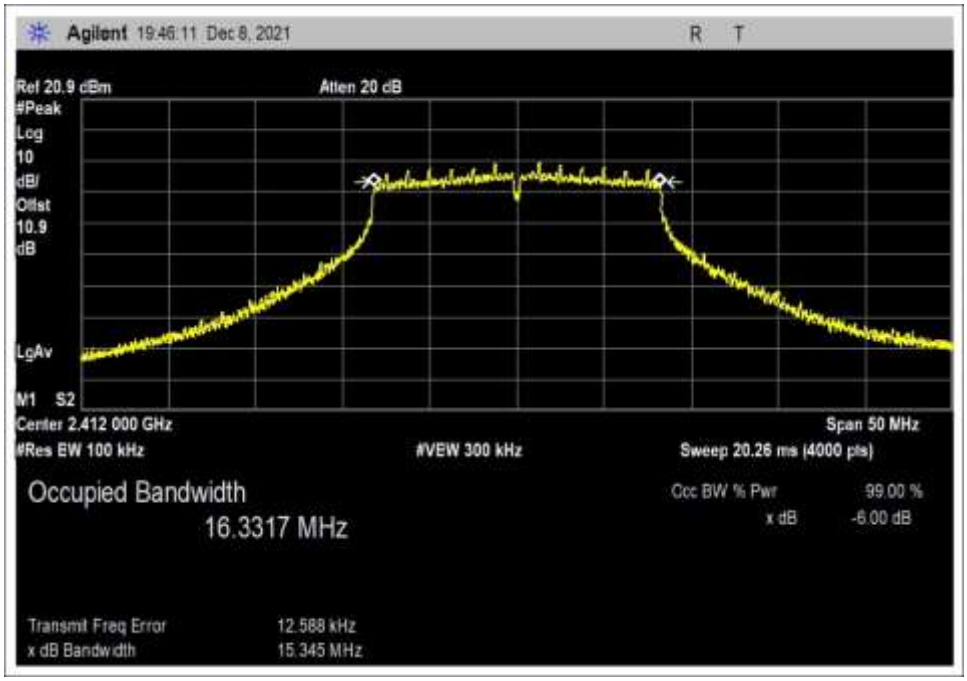


Middle Channel

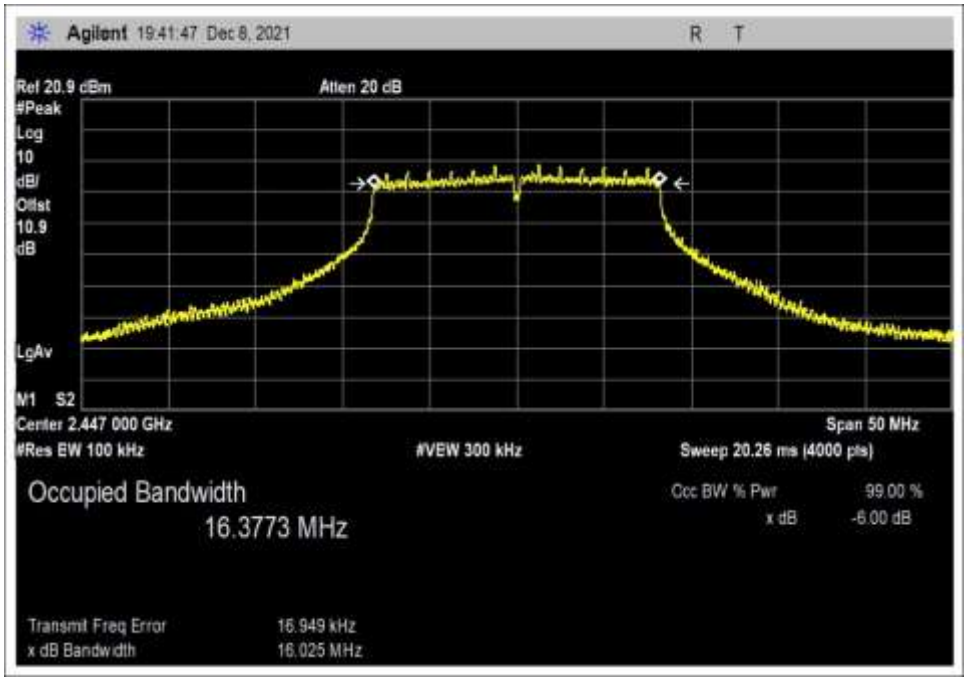


High Channel

Chain 1, 802.11 g



Low Channel



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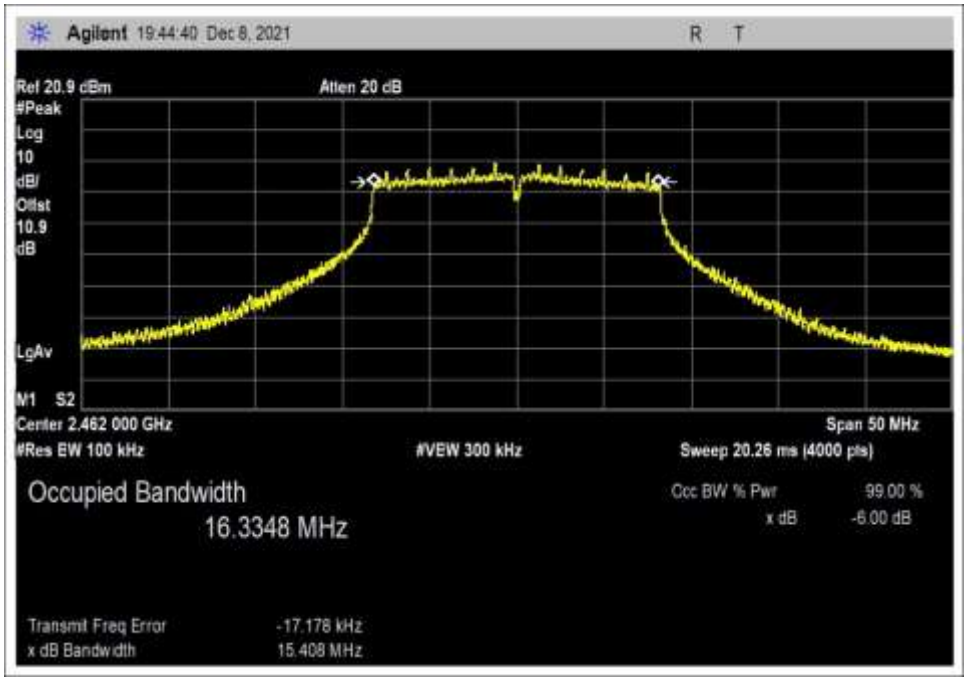
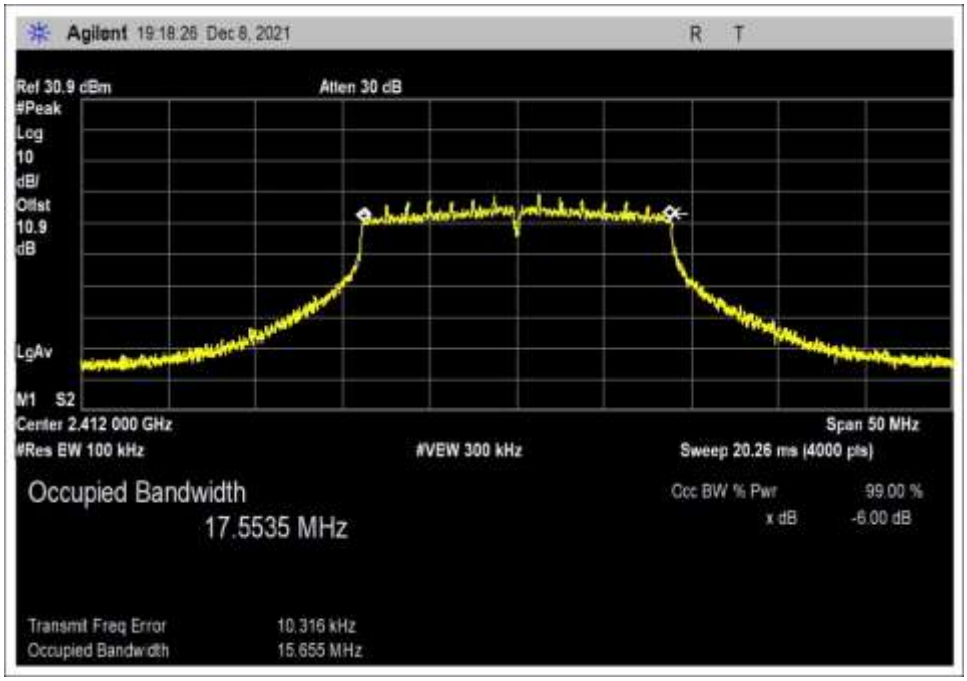
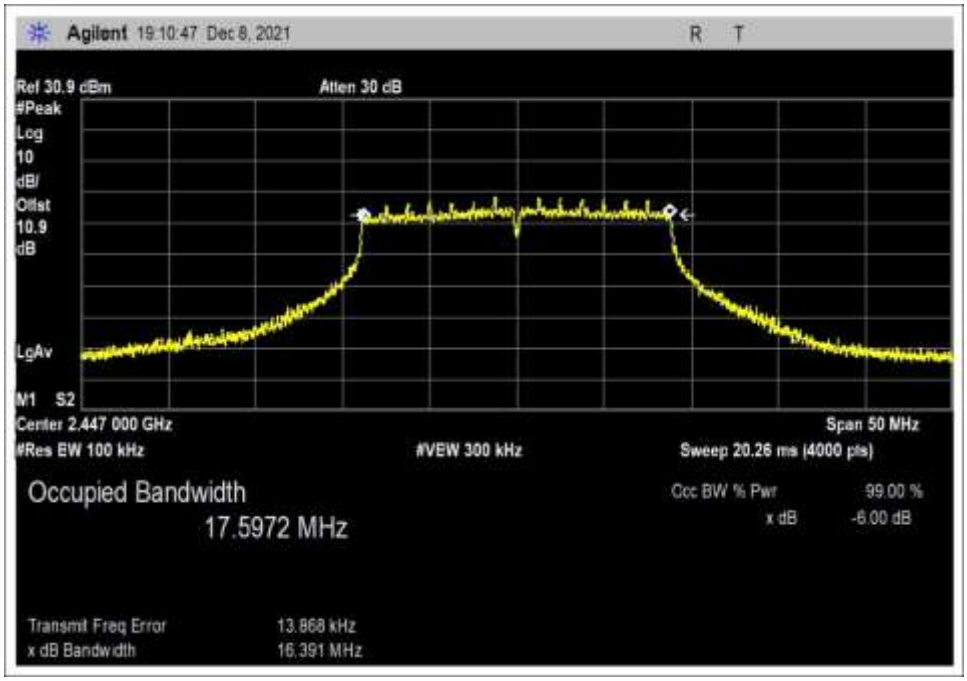


High Channel

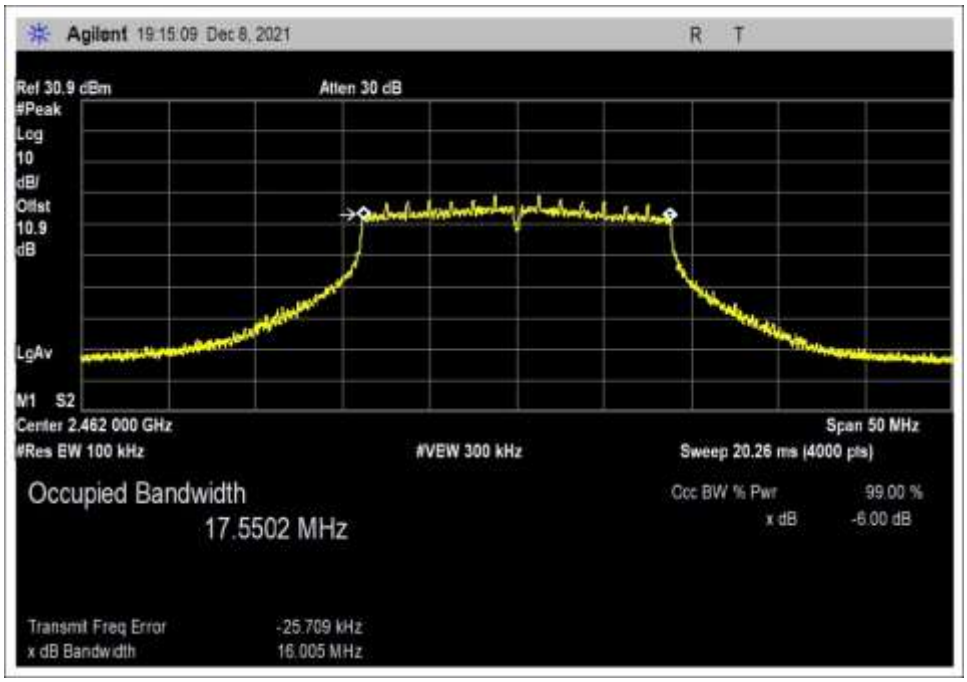
Chain 1, 802.11 n 20MHz



Low Channel

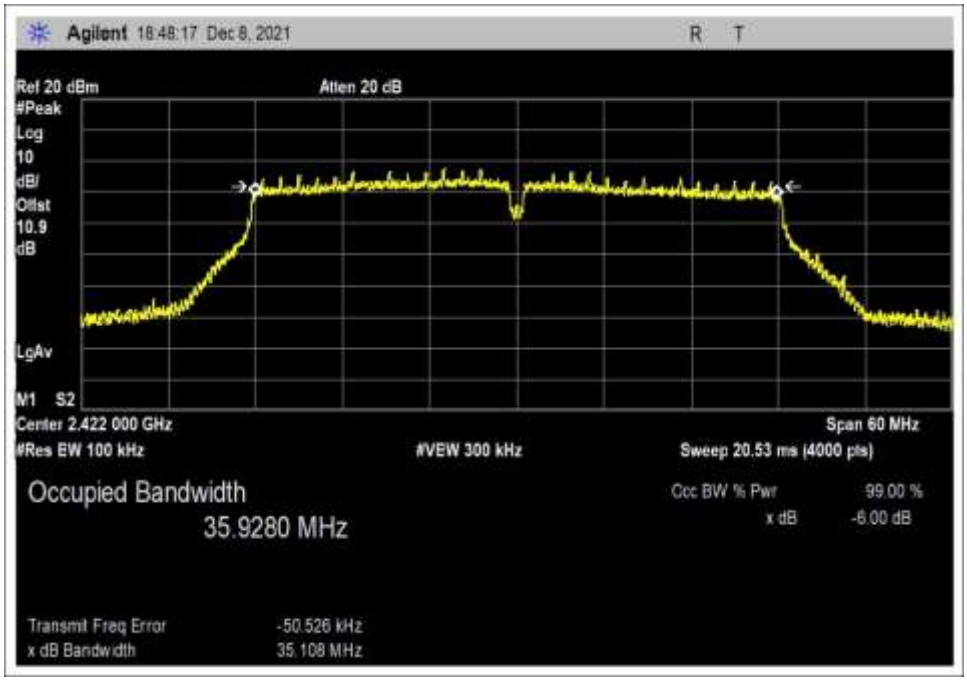


Middle Channel

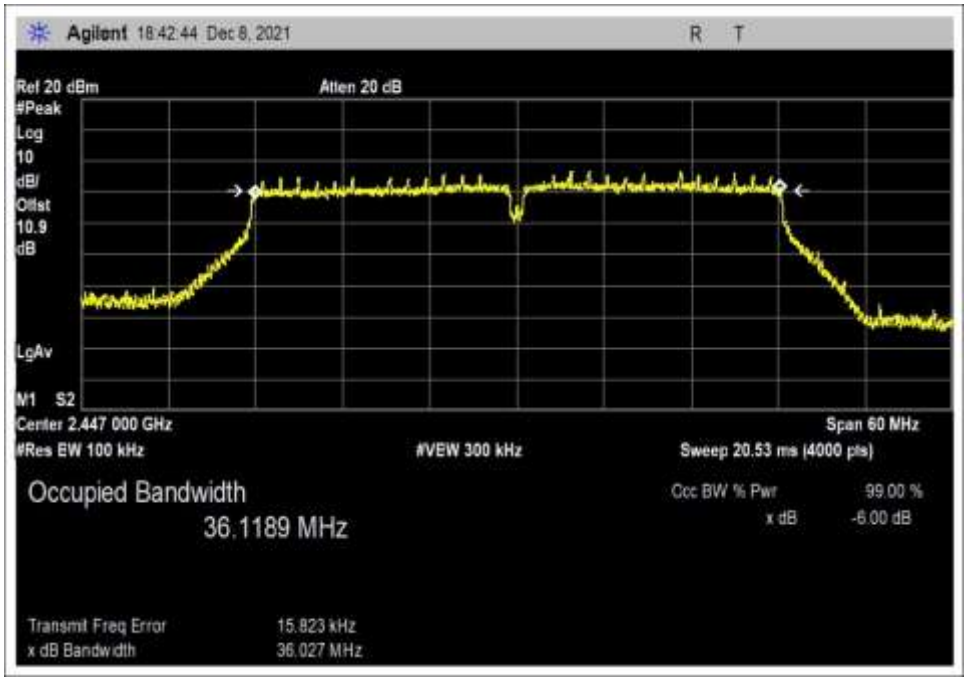


High Channel

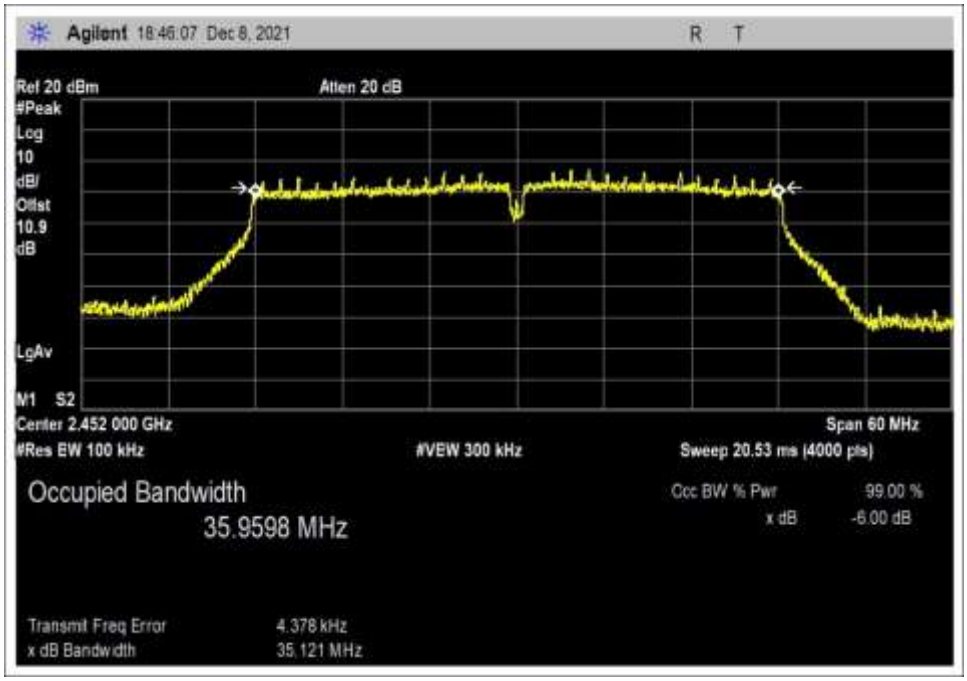
Chain 1, 802.11 n 40MHz



Low Channel



Middle Channel



High Channel

15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Fremont Lab C3	Test Engineer:	Hoang Cao
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 15.247 Meas Guidance v05r02	Test Date(s):	12/8/2021
Configuration:	9		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer.		

Environmental Conditions			
Temperature (ºC)	22.5	Relative Humidity (%):	45

Test Equipment					
Asset# / Serial#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03360	Cable	Astrolab	32022-2-29094-36TC	4/9/2020	4/9/2022
P06239	Attenuator	Weinschel	54A-10	6/17/2020	6/17/2022
03471	Spectrum Analyzer	Agilent	E4440A	2/11/2020	2/11/2022

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	802.11g	14.85	14.86	14.82	0.04
2447	802.11g	14.82	14.88	14.85	0.06
2462	802.11g	14.85	14.84	14.81	0.04

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

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	15 VDC
$V_{Minimum}$:	12.75 VDC
$V_{Maximum}$:	17.25 VDC

Test Data Summary - RF Conducted Measurement – Chain 0					
Measurement Option: AVGSA-1					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2412	802.11b	External Connector /3.77	14.02	≤30	Pass
2447	802.11b	External Connector /3.77	13.32	≤30	Pass
2462	802.11b	External Connector /3.77	12.66	≤30	Pass
2412	802.11g	External Connector /3.77	14.86	≤30	Pass
2447	802.11g	External Connector /3.77	14.10	≤30	Pass
2462	802.11g	External Connector /3.77	13.52	≤30	Pass
2412	802.11n HT20	External Connector /3.77	14.74	≤30	Pass
2447	802.11n HT20	External Connector /3.77	13.98	≤30	Pass
2462	802.11n HT20	External Connector /3.77	13.45	≤30	Pass
2422	802.11n HT40	External Connector /3.77	10.72	≤30	Pass
2447	802.11n HT40	External Connector /3.77	9.33	≤30	Pass
2452	802.11n HT40	External Connector /3.77	9.43	≤30	Pass

Test Data Summary - RF Conducted Measurement – Chain 1					
Measurement Option: AVGSA-1					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2412	802.11b	External Connector /3.77	14.03	≤30	Pass
2447	802.11b	External Connector /3.77	13.31	≤30	Pass
2462	802.11b	External Connector /3.77	13.65	≤30	Pass
2412	802.11g	External Connector /3.77	14.92	≤30	Pass
2447	802.11g	External Connector /3.77	14.83	≤30	Pass
2462	802.11g	External Connector /3.77	14.96	≤30	Pass
2412	802.11n HT20	External Connector /3.77	14.99	≤30	Pass
2447	802.11n HT20	External Connector /3.77	14.62	≤30	Pass
2462	802.11n HT20	External Connector /3.77	14.77	≤30	Pass
2422	802.11n HT40	External Connector /3.77	9.89	≤30	Pass
2447	802.11n HT40	External Connector /3.77	9.77	≤30	Pass
2452	802.11n HT40	External Connector /3.77	9.88	≤30	Pass

For fixed point-to-point antennas, the limit is calculated in accordance with 15.247(c)(1):

$$Limit = 30 - Roundup\left(\frac{G-6}{3}\right)$$

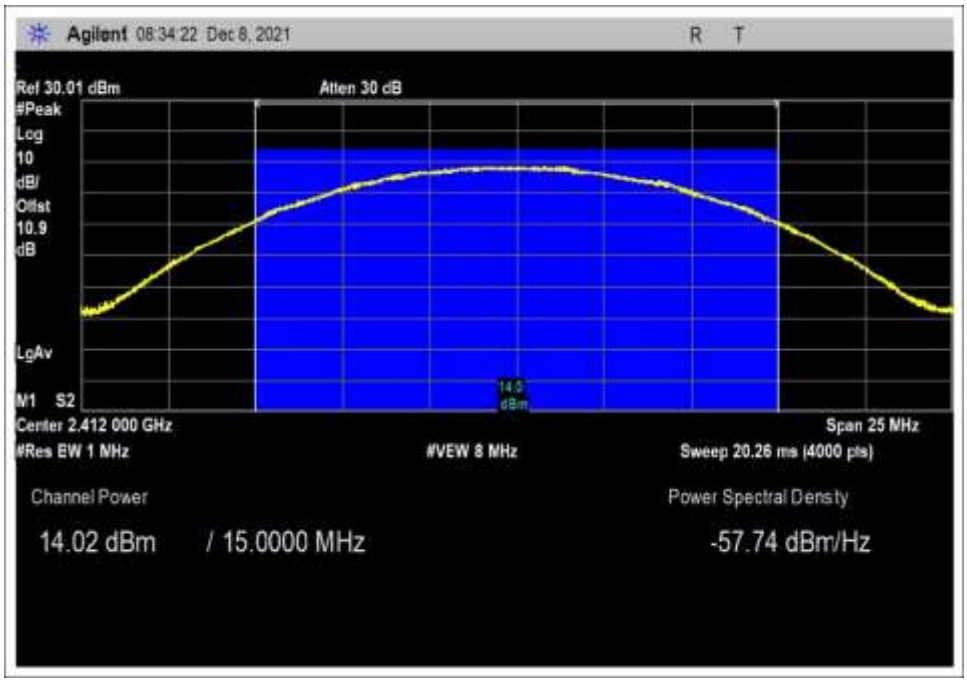
For directional beamforming antennas, the limit is calculated in accordance with 15.247(c)(2) and KDB 662911.

For all other antennas, the limit is calculated according to a maximum of 1W (30 dBm) conducted power with a maximum of 6dBi gain antenna in accordance with 15.247(b)

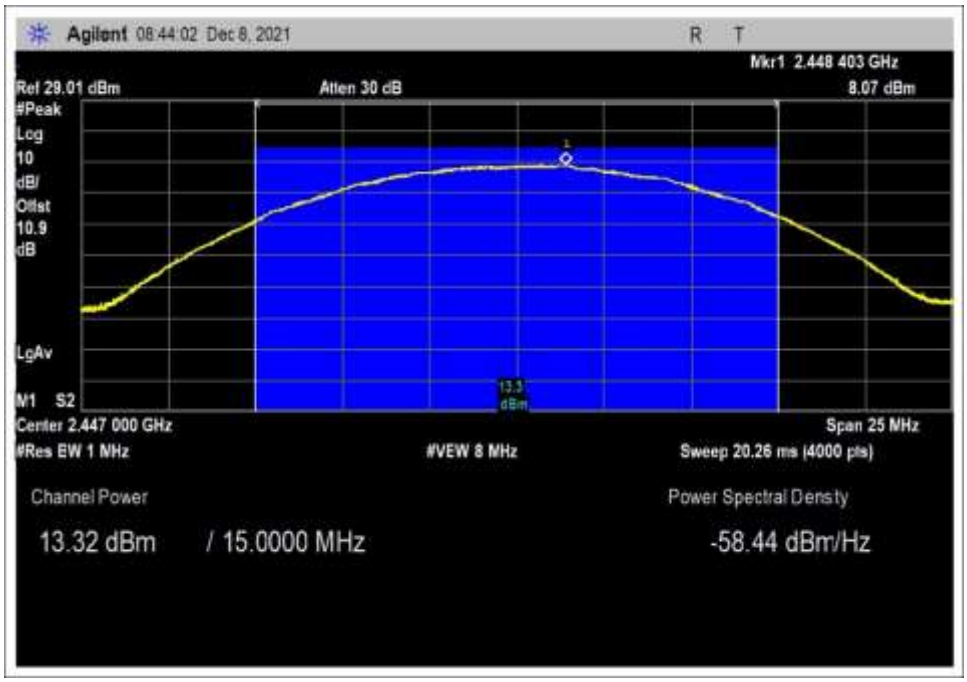
$$Limit = 30 - Roundup(G - 6)$$

Plots

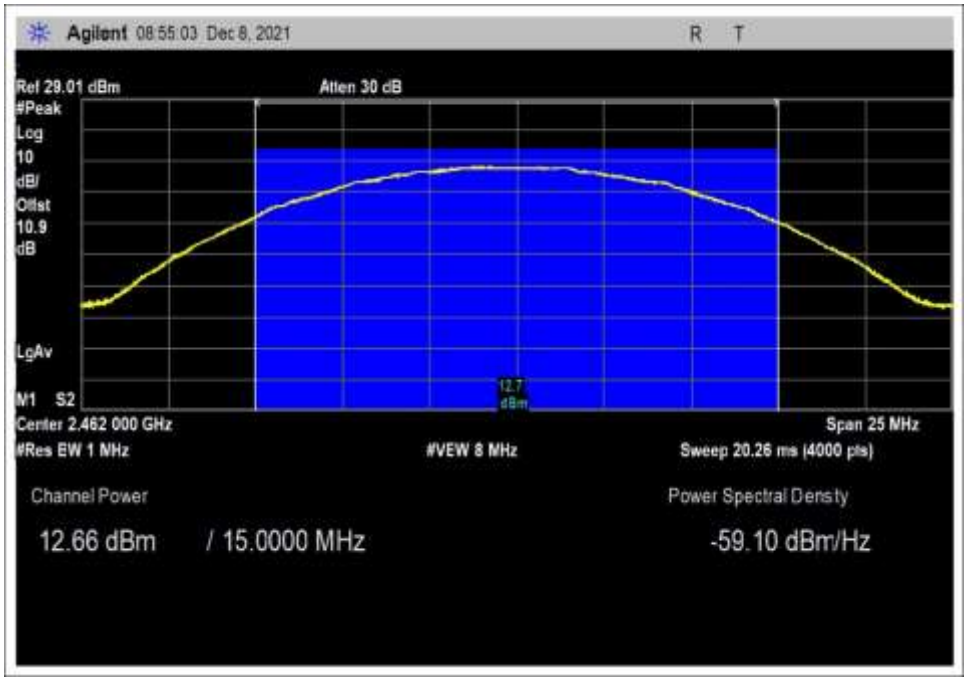
Chain 0, 802.11 b



Low Channel

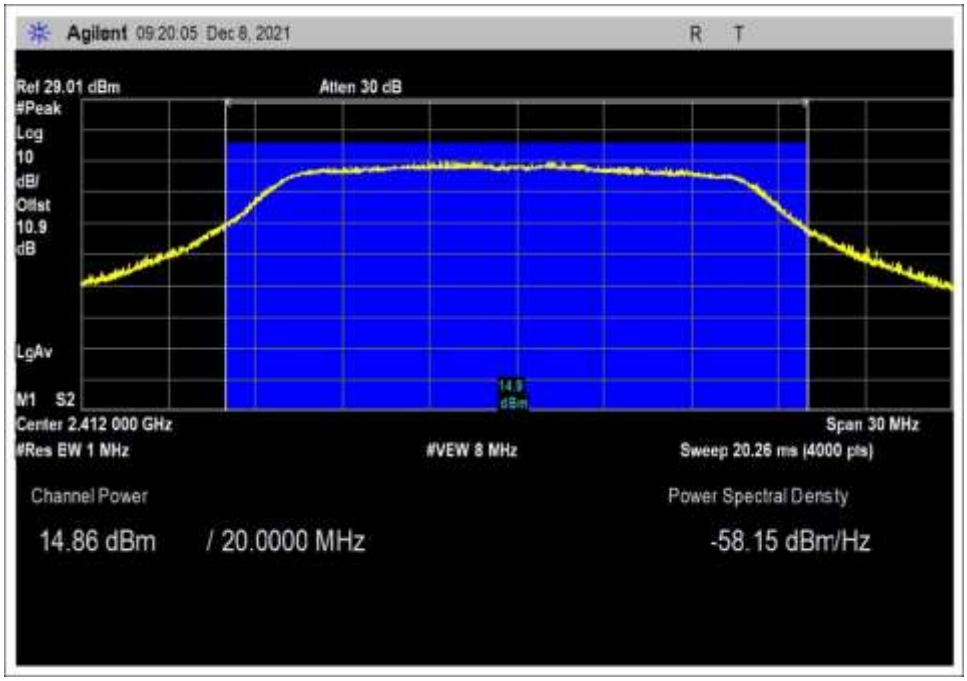


Middle Channel

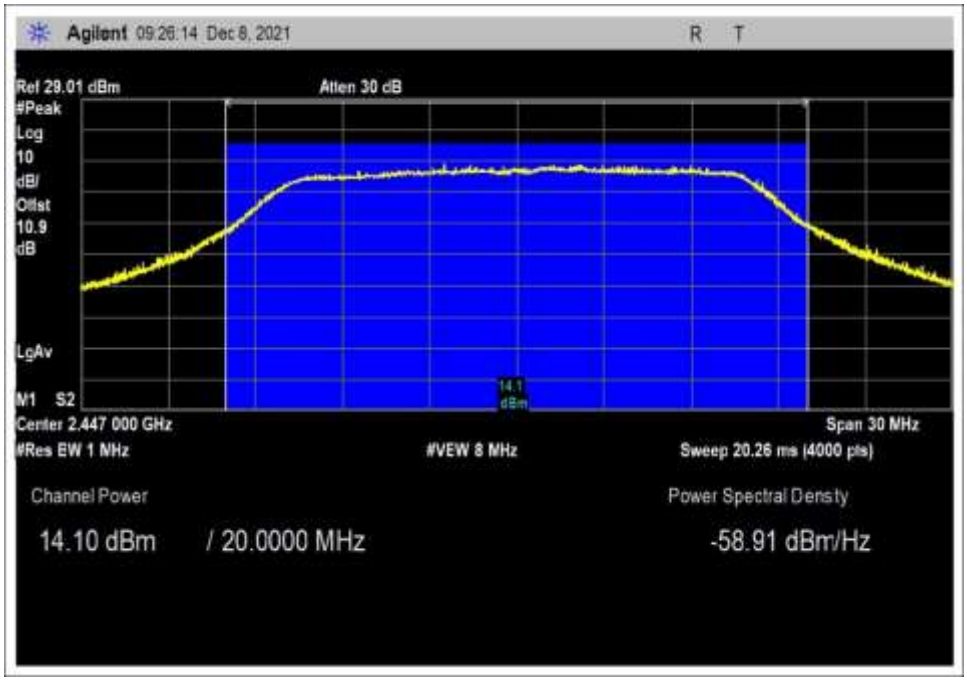


High Channel

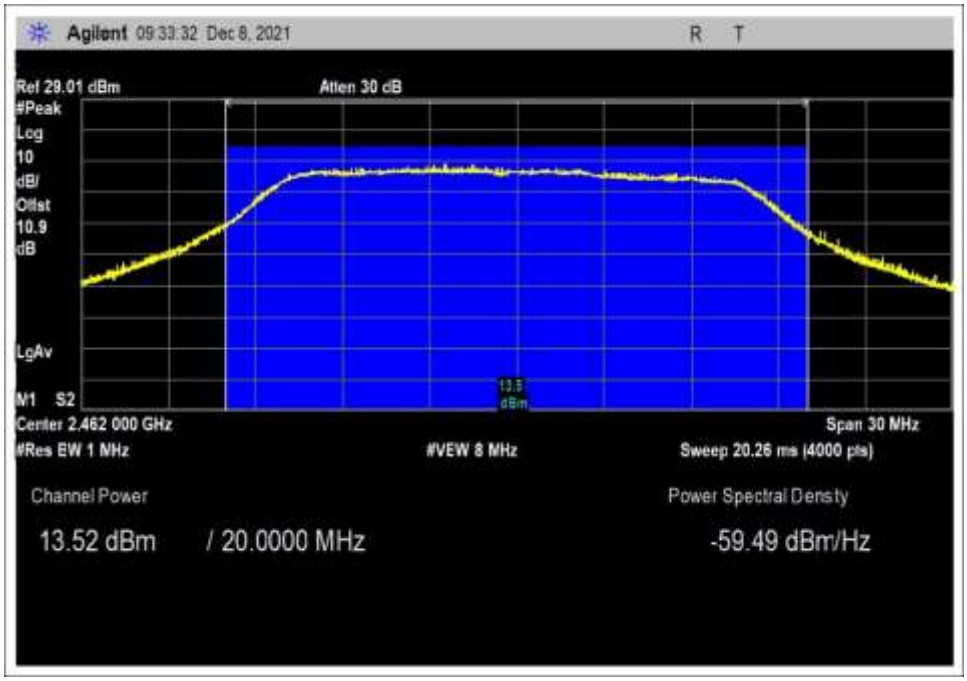
Chain 0, 802.11 g



Low Channel

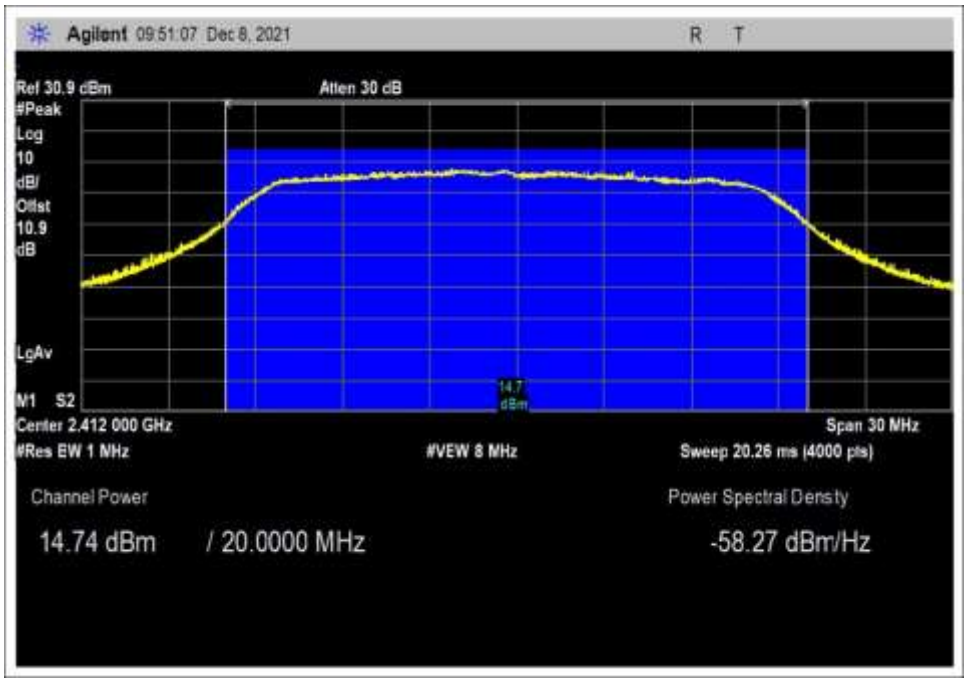


Middle Channel

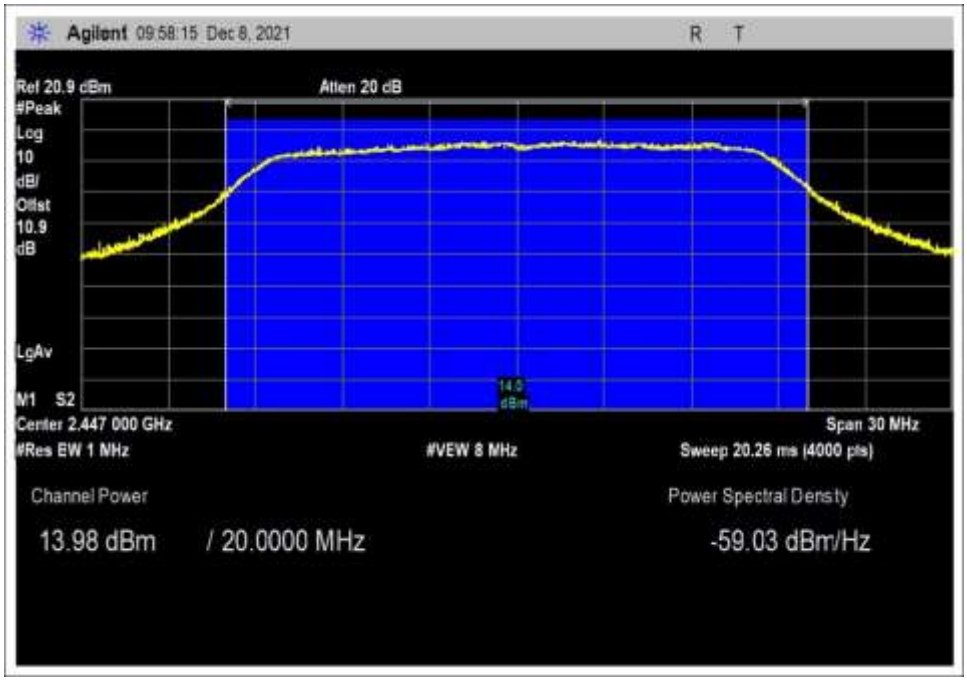


High Channel

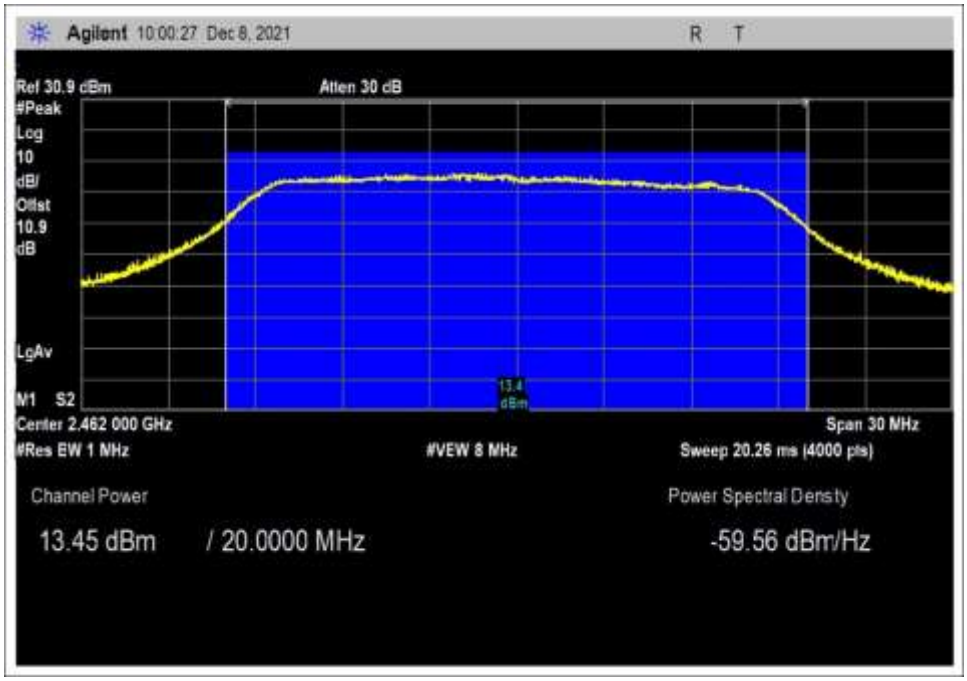
Chain 0, 802.11 n, 20MHz



Low Channel

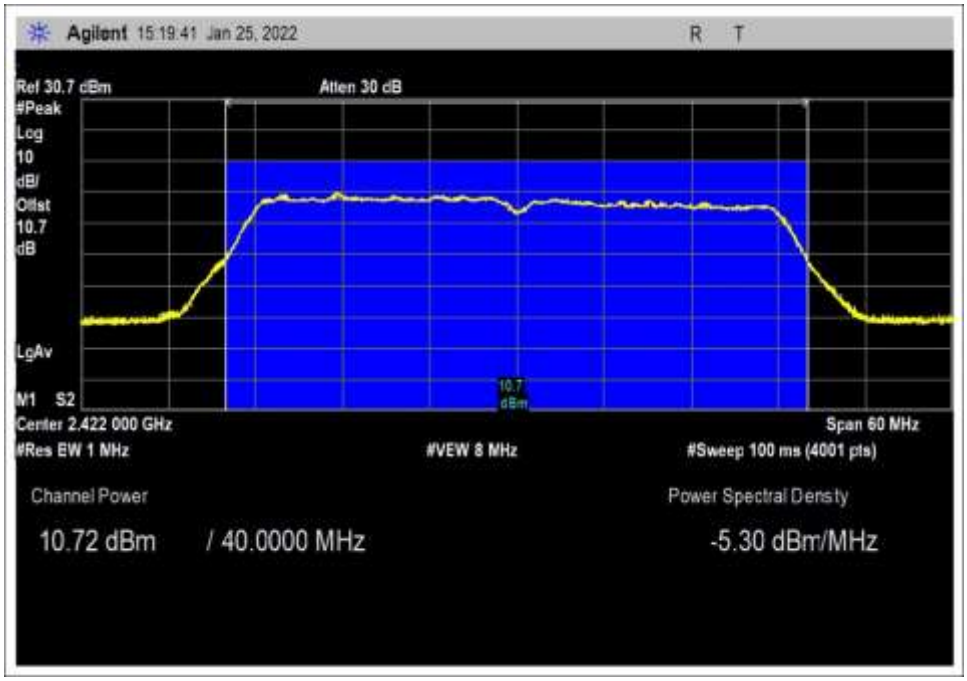


Middle Channel

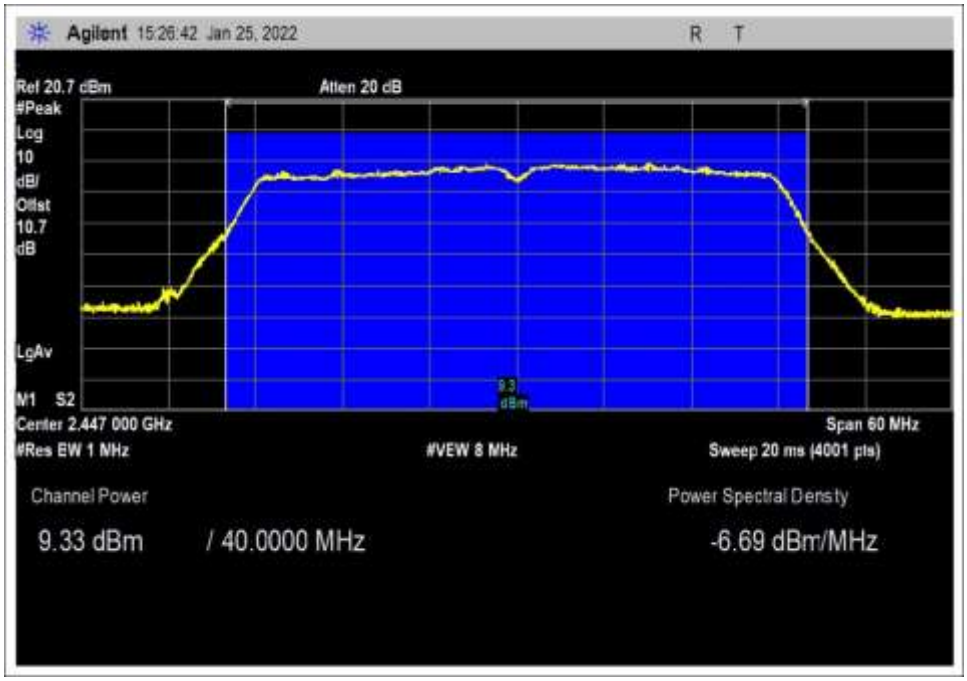


High Channel

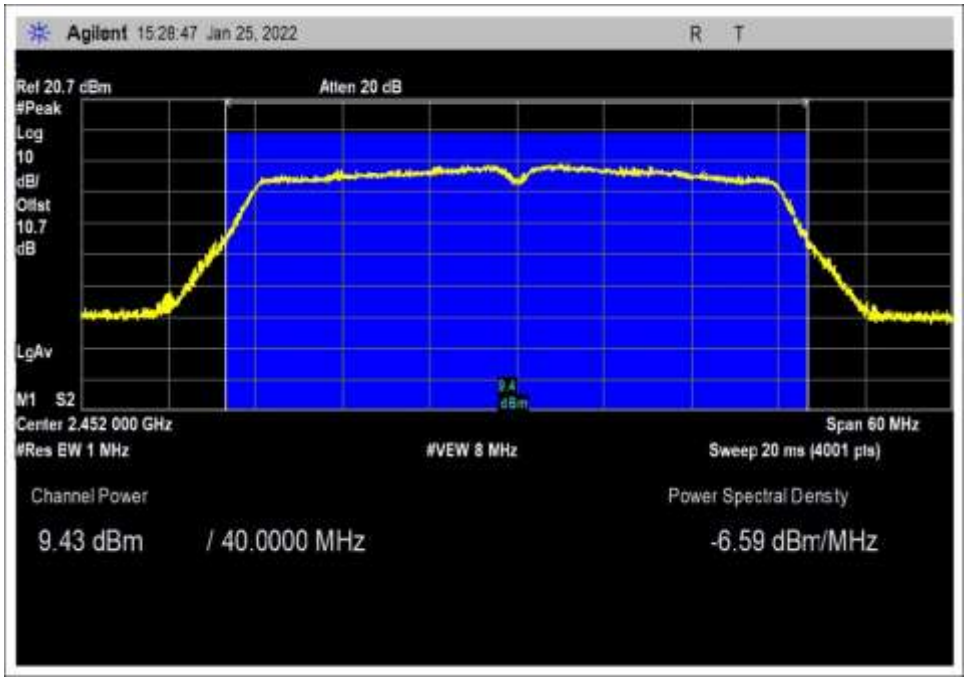
Chain 0, 802.11 n, 40MHz



Low Channel

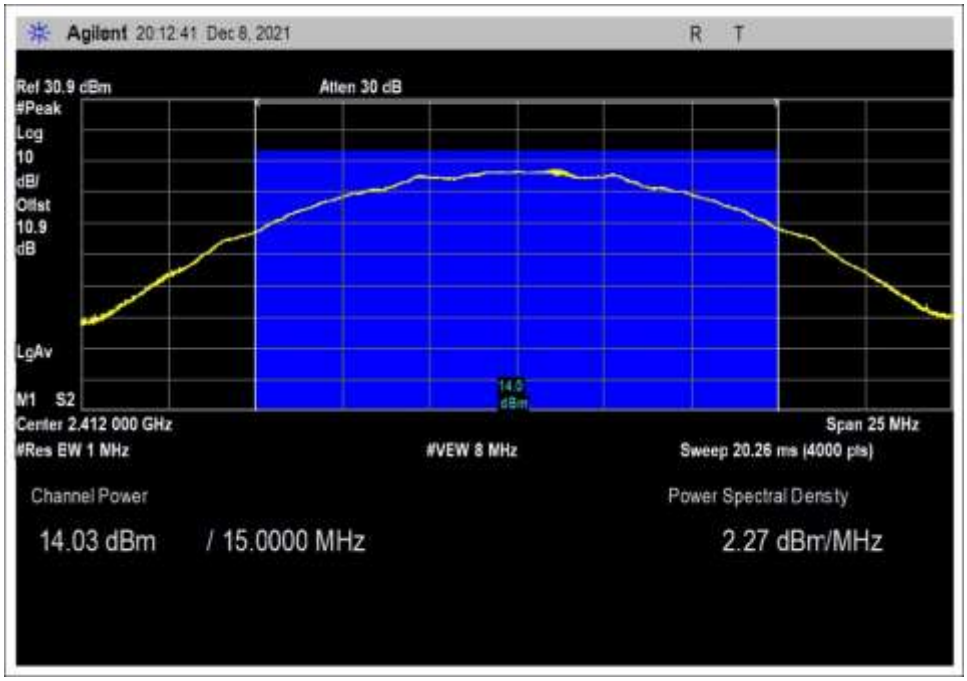


Middle Channel

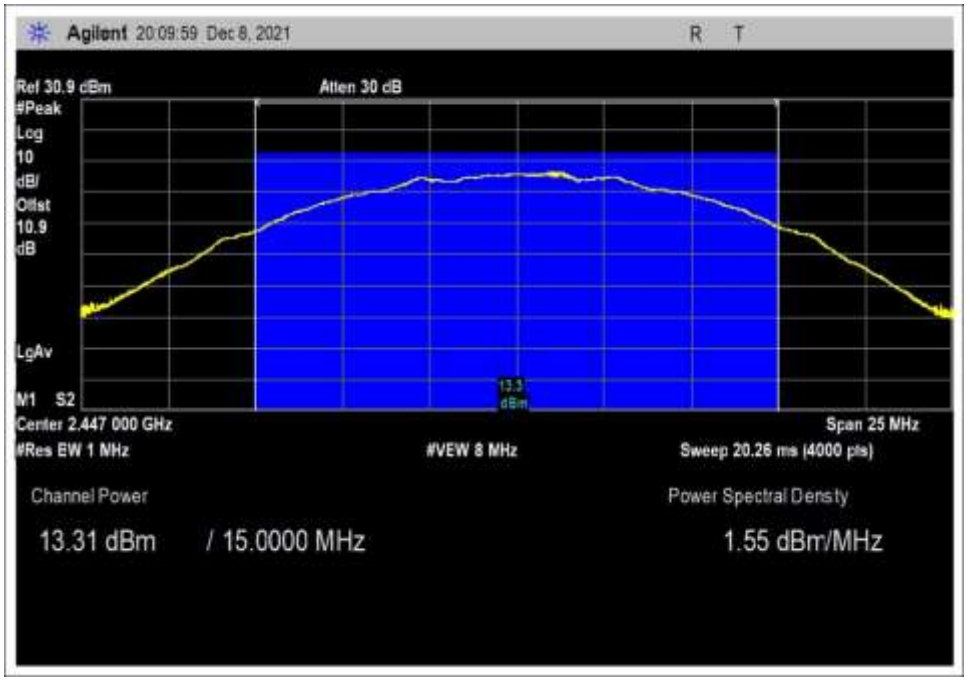


High Channel

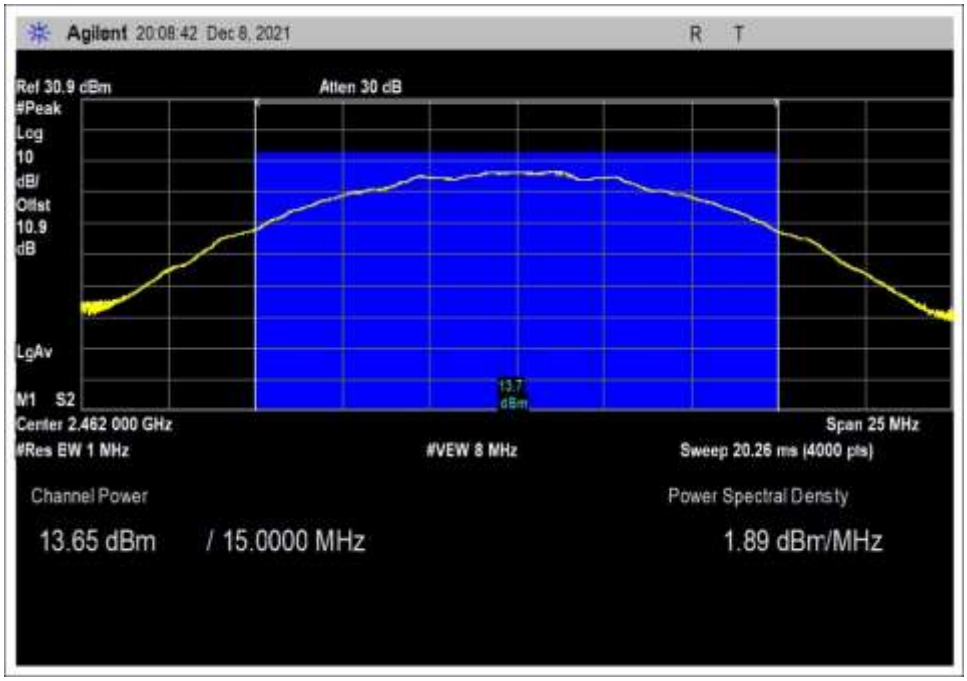
Chain 1, 802.11 b



Low Channel

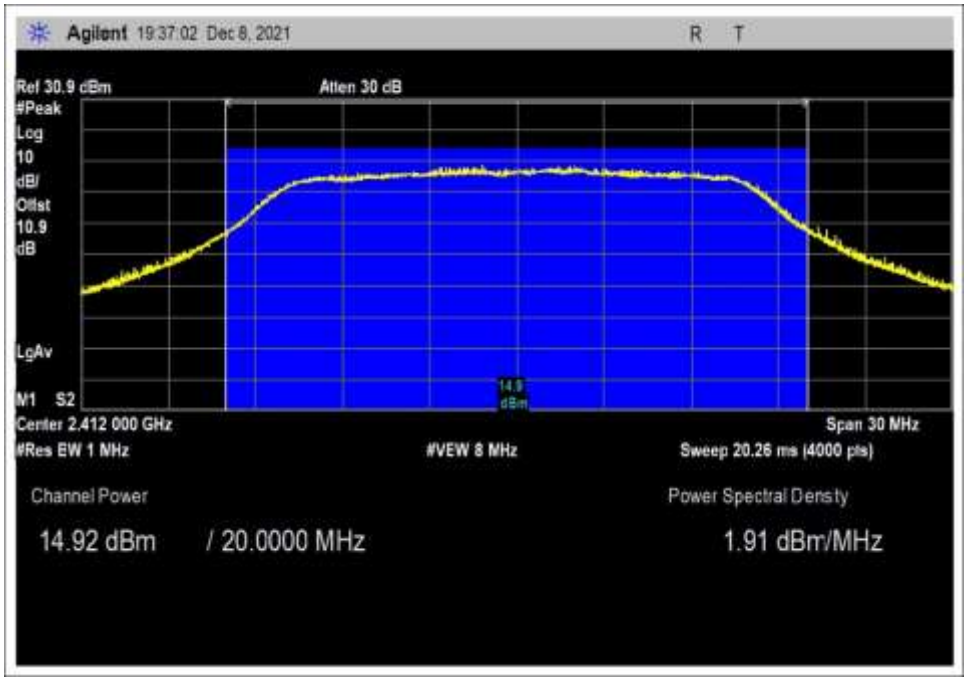


Middle Channel

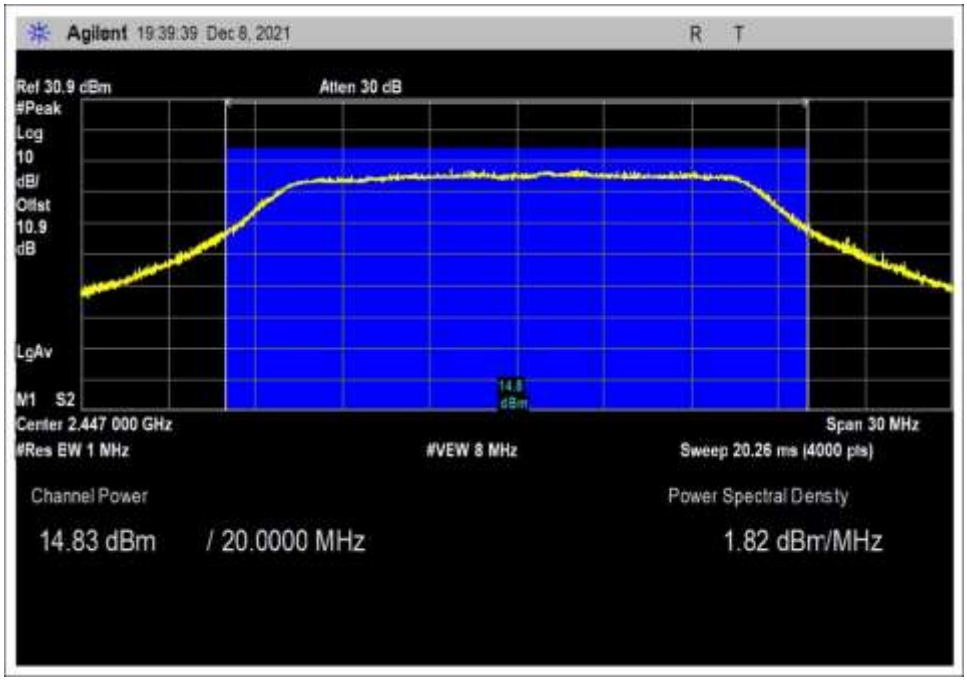


High Channel

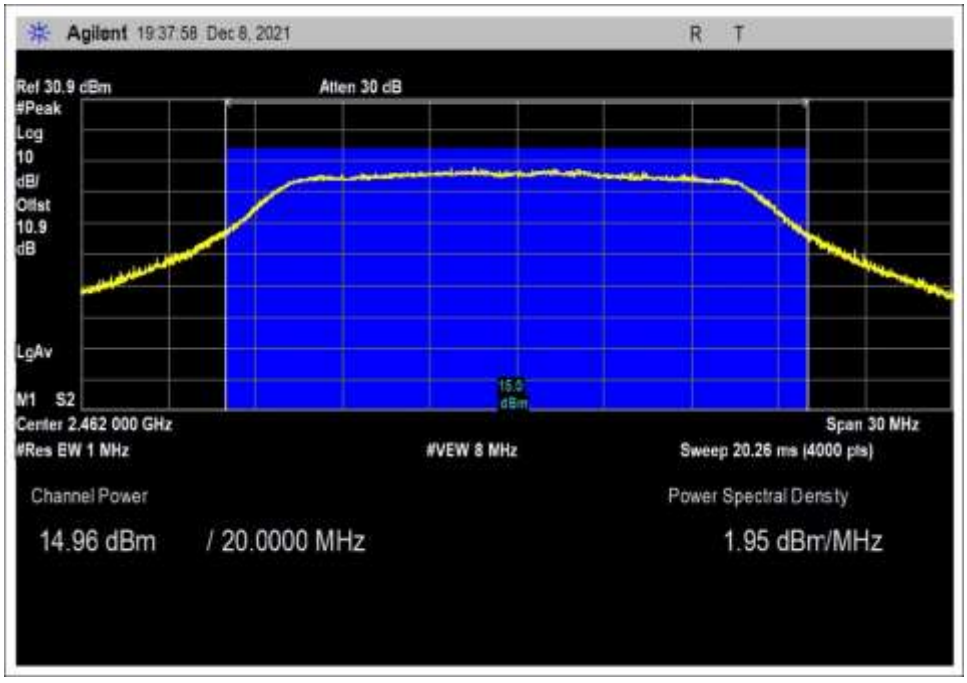
Chain 1, 802.11 g



Low Channel

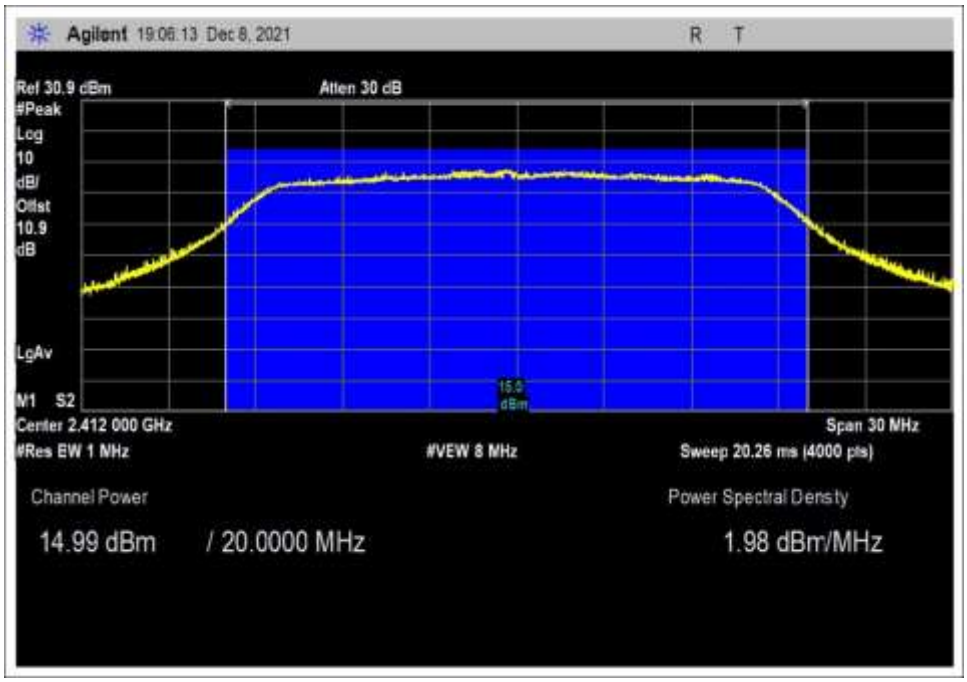


Middle Channel

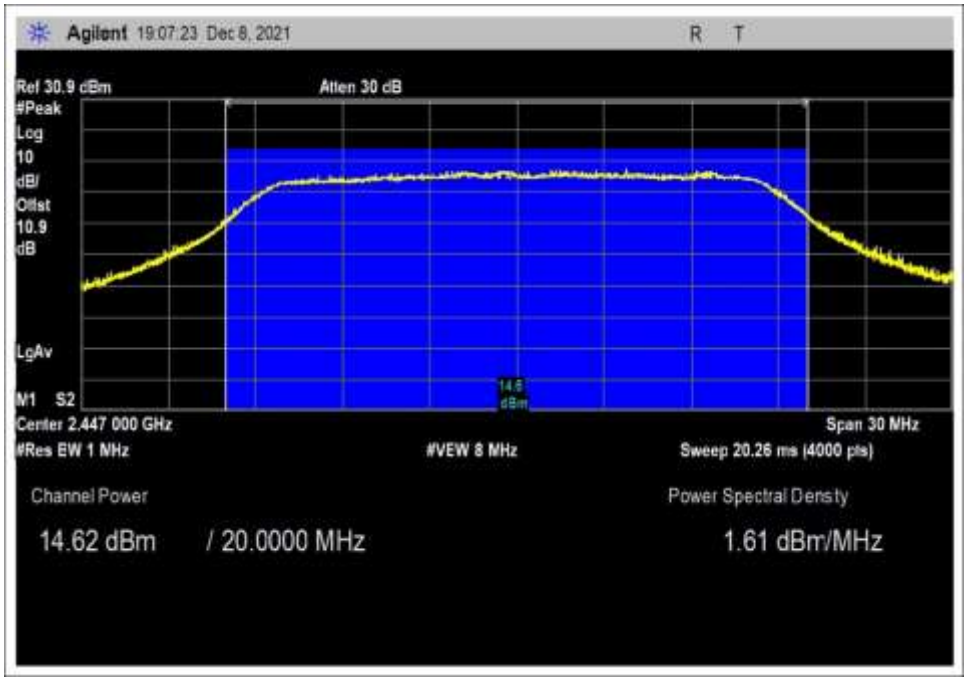


High Channel

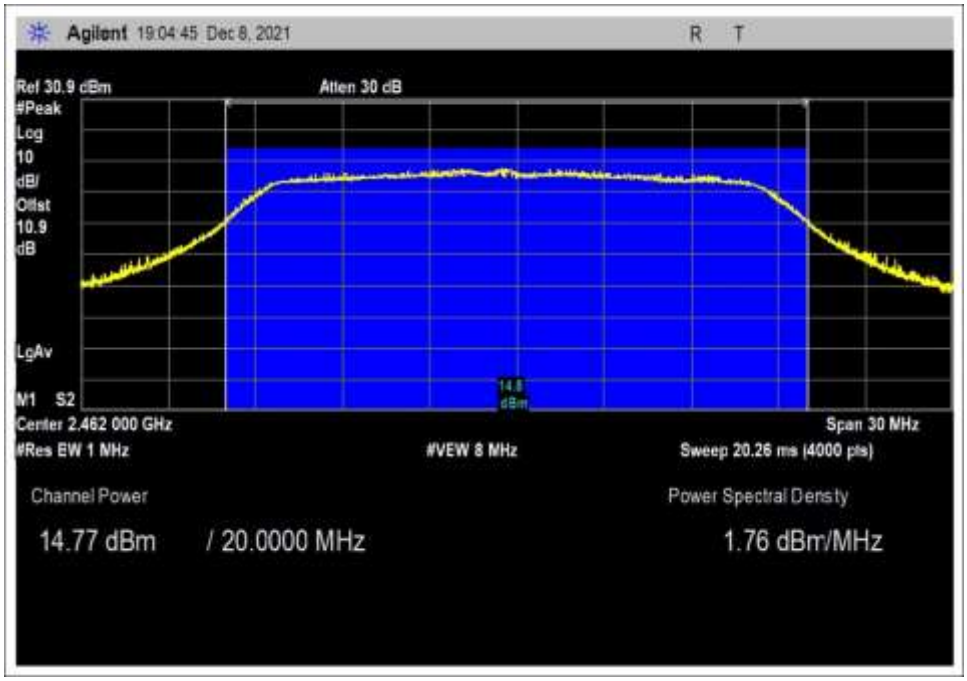
Chain 1, 802.11 n, 20MHz



Low Channel

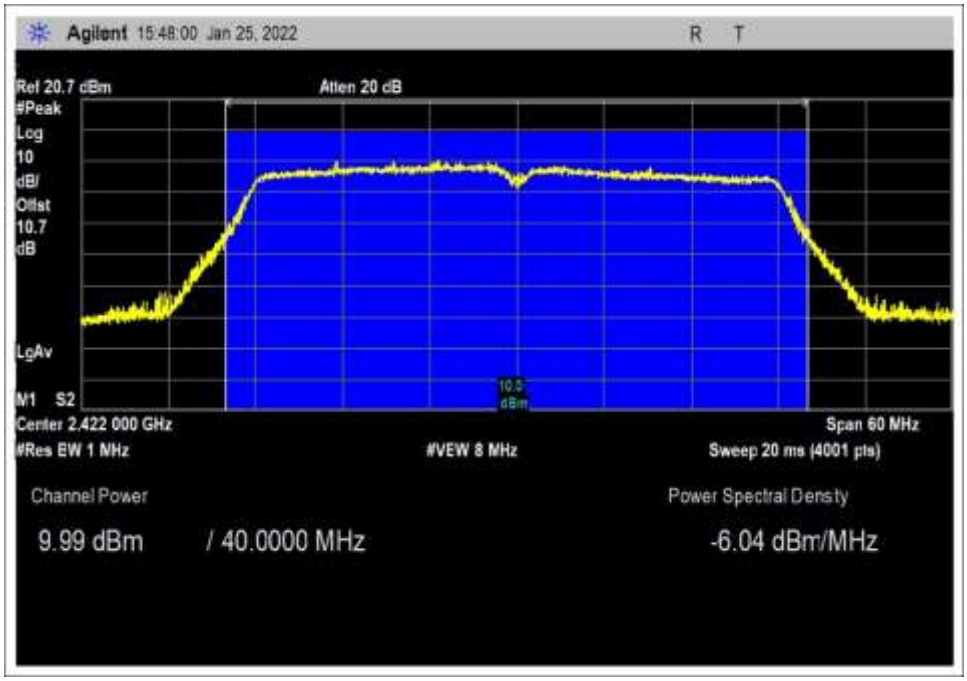


Middle Channel

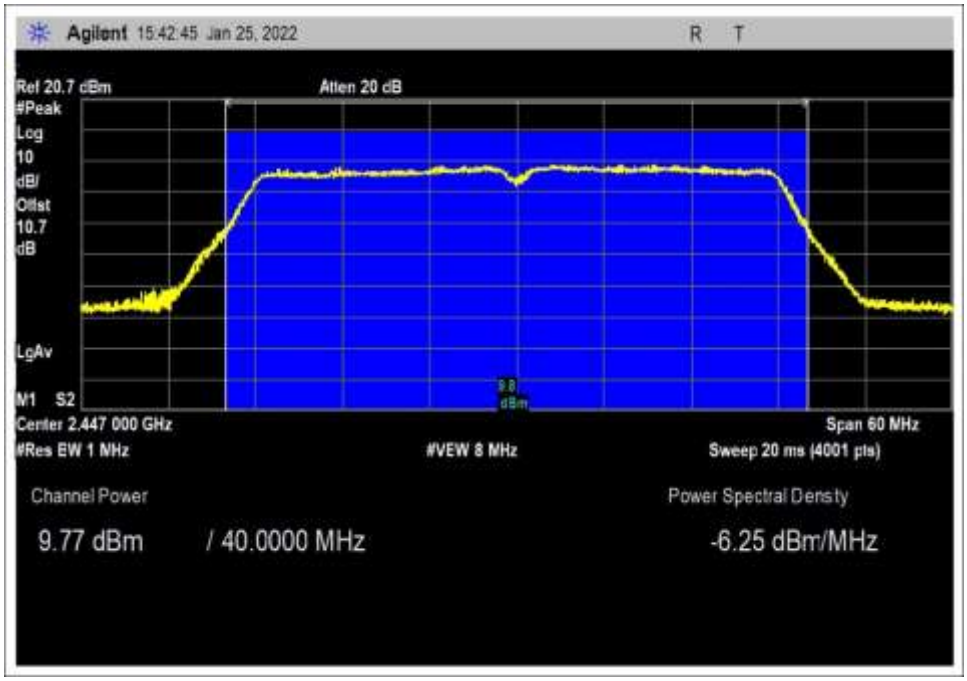


High Channel

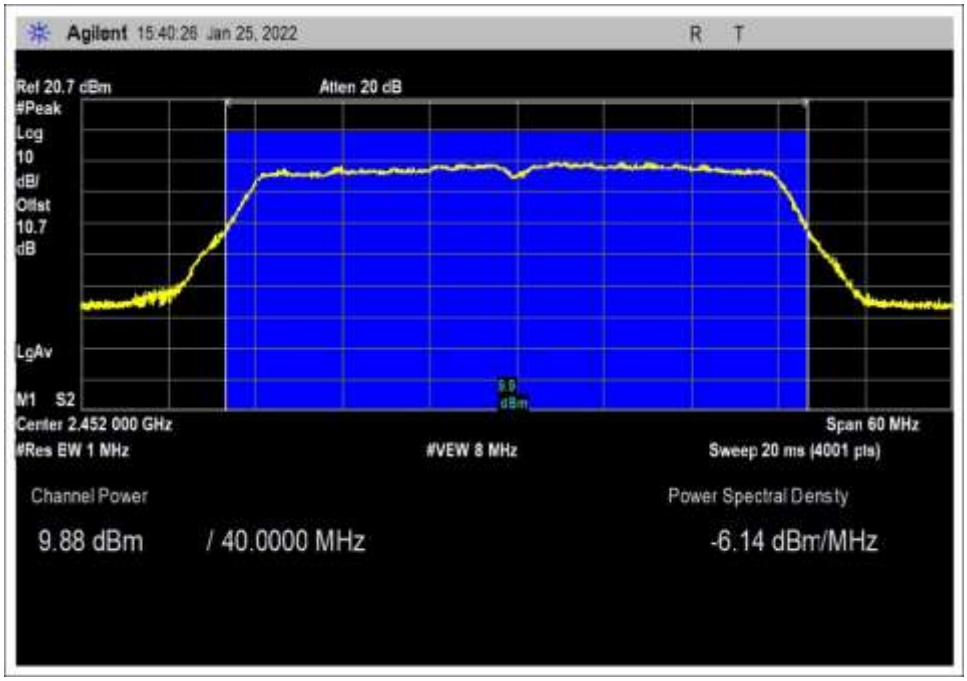
Chain 1, 802.11 n, 40MHz



Low Channel



Middle Channel



High Channel

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	1:02:37 PM
Tested By:	Hoang Cao	Sequence#:	19
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

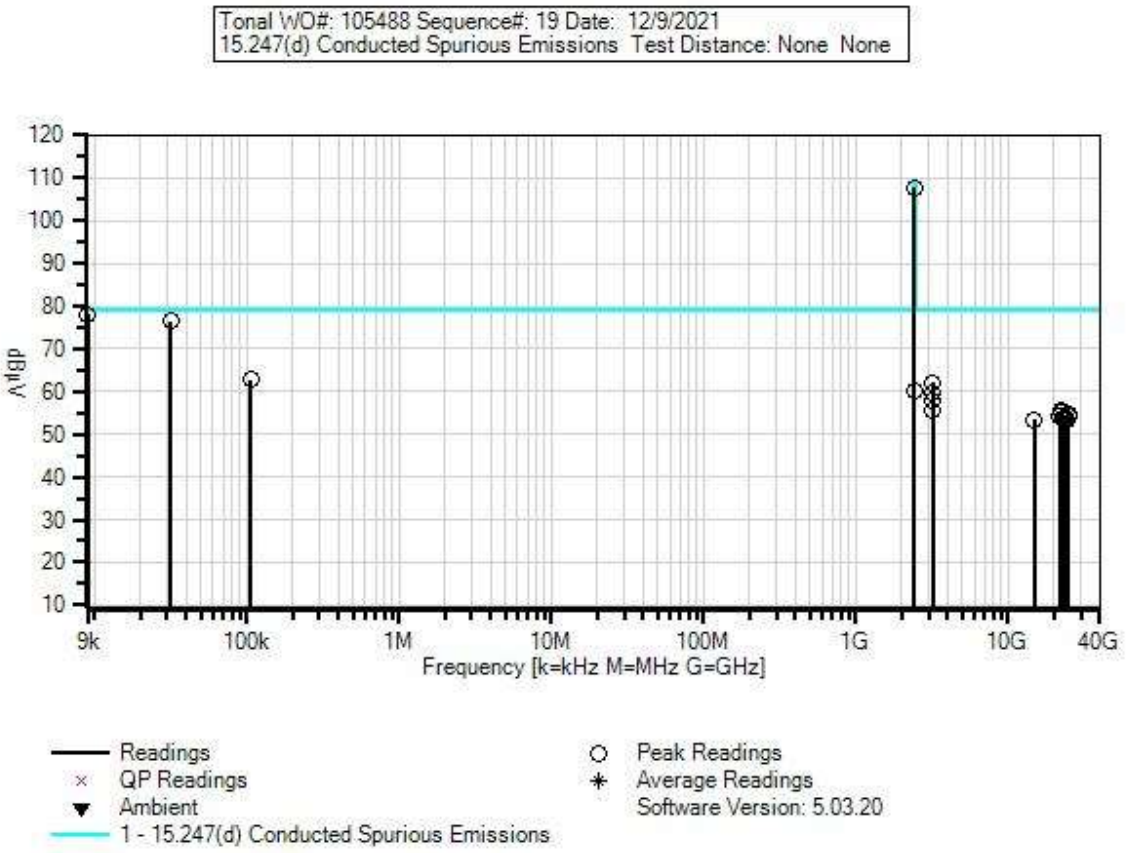
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11b
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.000k	68.5	+9.7	+0.0			+0.0	78.2	79.0	-0.8	None
2	2412.735M	97.1	+9.9	+0.8			+0.0	107.8	109.0	-1.2	None
3	31.671k	66.9	+9.7	+0.0			+0.0	76.6	79.0	-2.4	None
4	106.707k	53.0	+9.7	+0.0			+0.0	62.7	79.0	-16.3	None
5	3196.749M	51.3	+9.9	+0.9			+0.0	62.1	79.0	-16.9	None
6	2397.773M	49.6	+9.9	+0.8			+0.0	60.3	79.0	-18.7	None
7	3211.711M	49.1	+9.9	+0.9			+0.0	59.9	79.0	-19.1	None
8	3178.794M	47.2	+9.9	+0.9			+0.0	58.0	79.0	-21.0	None
9	3166.824M	44.6	+9.9	+0.9			+0.0	55.4	79.0	-23.6	None
10	21908.682 M	42.9	+10.1	+2.4			+0.0	55.4	79.0	-23.6	None
11	22317.365 M	42.6	+10.1	+2.4			+0.0	55.1	79.0	-23.9	None
12	24696.108 M	41.8	+10.1	+2.6			+0.0	54.5	79.0	-24.5	None
13	21667.664 M	41.9	+10.0	+2.4			+0.0	54.3	79.0	-24.7	None
14	21730.538 M	41.7	+10.0	+2.4			+0.0	54.1	79.0	-24.9	None
15	24832.335 M	41.4	+10.1	+2.6			+0.0	54.1	79.0	-24.9	None
16	22893.712 M	41.1	+10.0	+2.5			+0.0	53.6	79.0	-25.4	None

17	23375.748 M	41.0	+10.1	+2.5		+0.0	53.6	79.0	-25.4	None
18	23658.682 M	41.0	+10.1	+2.5		+0.0	53.6	79.0	-25.4	None
19	14751.495 M	41.6	+10.0	+1.9		+0.0	53.5	79.0	-25.5	None
20	24402.694 M	40.9	+10.1	+2.5		+0.0	53.5	79.0	-25.5	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	1:08:49 PM
Tested By:	Hoang Cao	Sequence#:	20
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

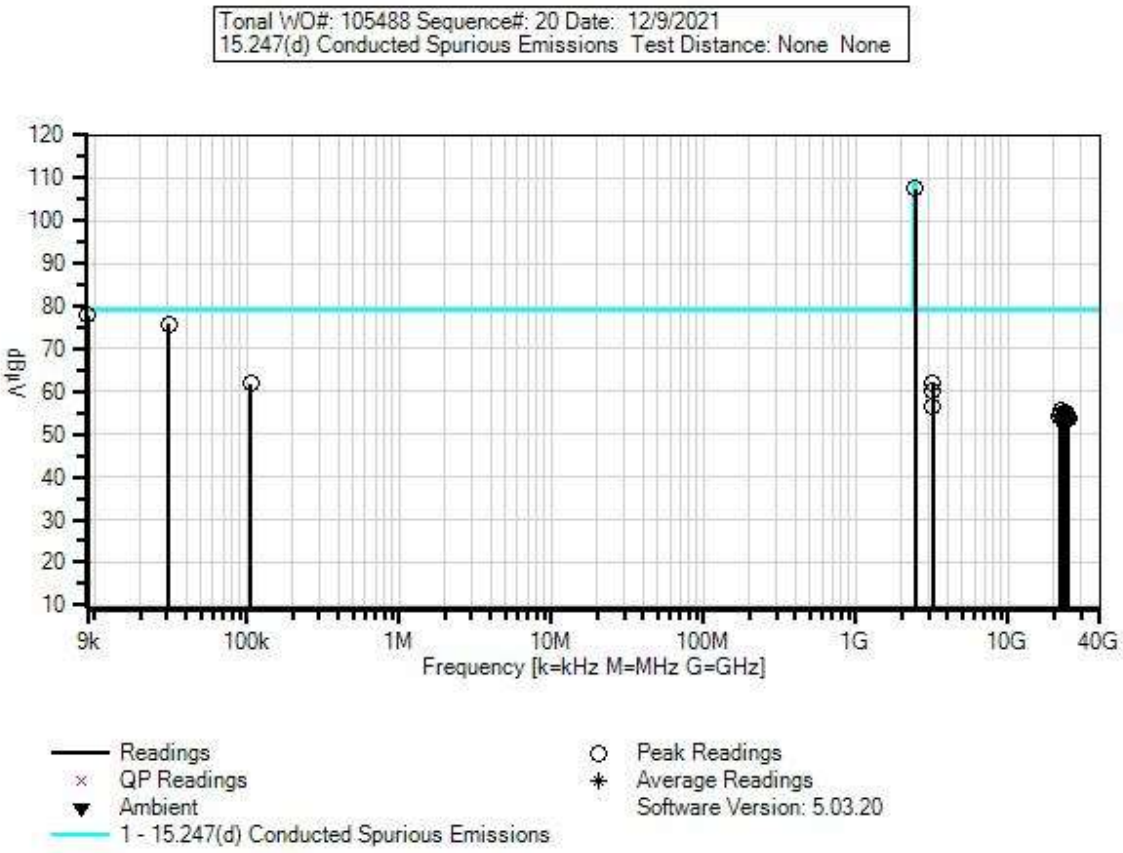
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11b
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.042k	68.1	+9.7	+0.0			+0.0	77.8	79.0	-1.2	None
2	2445.652M	96.9	+9.9	+0.8			+0.0	107.6	109.0	-1.4	None
3	30.990k	66.1	+9.7	+0.0			+0.0	75.8	79.0	-3.2	None
4	3196.749M	51.2	+9.9	+0.9			+0.0	62.0	79.0	-17.0	None
5	106.967k	52.1	+9.7	+0.0			+0.0	61.8	79.0	-17.2	None
6	3211.711M	49.2	+9.9	+0.9			+0.0	60.0	79.0	-19.0	None
7	3178.794M	45.6	+9.9	+0.9			+0.0	56.4	79.0	-22.6	None
8	22044.910 M	43.2	+10.1	+2.4			+0.0	55.7	79.0	-23.3	None
9	23208.083 M	42.4	+10.1	+2.5			+0.0	55.0	79.0	-24.0	None
10	22411.676 M	42.4	+10.1	+2.4			+0.0	54.9	79.0	-24.1	None
11	24182.635 M	41.9	+10.1	+2.5			+0.0	54.5	79.0	-24.5	None
12	21646.706 M	41.9	+10.0	+2.4			+0.0	54.3	79.0	-24.7	None
13	21678.143 M	41.8	+10.0	+2.4			+0.0	54.2	79.0	-24.8	None
14	23595.808 M	41.5	+10.1	+2.5			+0.0	54.1	79.0	-24.9	None
15	23365.269 M	41.2	+10.1	+2.5			+0.0	53.8	79.0	-25.2	None
16	24109.281 M	41.2	+10.1	+2.5			+0.0	53.8	79.0	-25.2	None

17	24821.856 M	41.0	+10.1	+2.6		+0.0	53.7	79.0	-25.3	None
18	23407.185 M	41.0	+10.1	+2.5		+0.0	53.6	79.0	-25.4	None
19	23050.898 M	40.9	+10.0	+2.5		+0.0	53.4	79.0	-25.6	None
20	23323.353 M	40.7	+10.1	+2.5		+0.0	53.3	79.0	-25.7	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	1:16:15 PM
Tested By:	Hoang Cao	Sequence#:	21
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

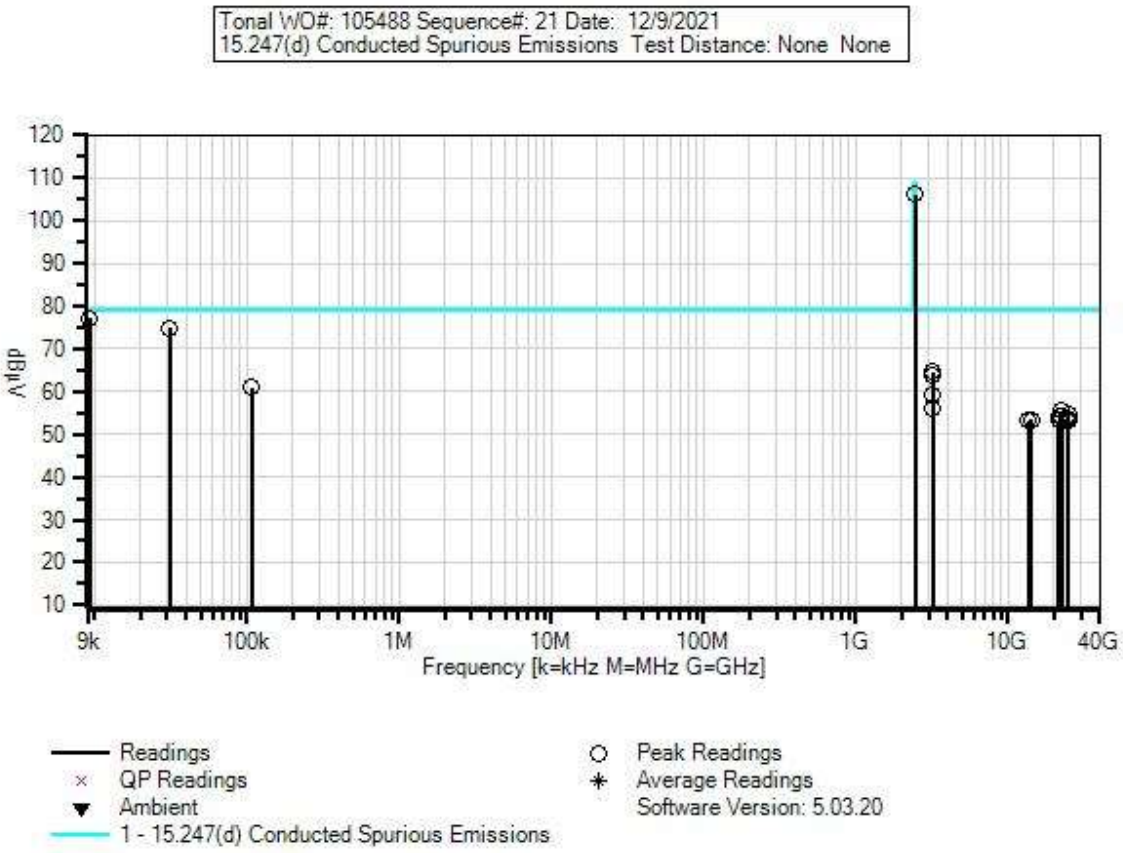
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11b
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.306k	67.4	+9.7	+0.0			+0.0	77.1	79.0	-1.9	None
2	2460.614M	95.5	+9.9	+0.8			+0.0	106.2	109.0	-2.8	None
3	31.217k	65.3	+9.7	+0.0			+0.0	75.0	79.0	-4.0	None
4	3190.764M	53.8	+9.9	+0.9			+0.0	64.6	79.0	-14.4	None
5	3199.741M	53.2	+9.9	+0.9			+0.0	64.0	79.0	-15.0	None
6	107.228k	51.2	+9.7	+0.0			+0.0	60.9	79.0	-18.1	None
7	3178.794M	48.4	+9.9	+0.9			+0.0	59.2	79.0	-19.8	None
8	3166.824M	45.2	+9.9	+0.9			+0.0	56.0	79.0	-23.0	None
9	22023.952 M	42.9	+10.1	+2.4			+0.0	55.4	79.0	-23.6	None
10	24811.377 M	41.8	+10.1	+2.6			+0.0	54.5	79.0	-24.5	None
11	22474.550 M	42.0	+10.0	+2.4			+0.0	54.4	79.0	-24.6	None
12	21688.622 M	41.8	+10.0	+2.4			+0.0	54.2	79.0	-24.8	None
13	22369.760 M	41.6	+10.1	+2.4			+0.0	54.1	79.0	-24.9	None
14	24255.988 M	41.3	+10.1	+2.5			+0.0	53.9	79.0	-25.1	None
15	14139.716 M	41.6	+10.0	+1.9			+0.0	53.5	79.0	-25.5	None
16	21636.227 M	41.1	+10.0	+2.4			+0.0	53.5	79.0	-25.5	None
17	24381.736 M	40.8	+10.1	+2.5			+0.0	53.4	79.0	-25.6	None
18	24612.275 M	40.7	+10.1	+2.5			+0.0	53.3	79.0	-25.7	None

19	13593.615 M	41.4	+10.0	+1.8		+0.0	53.2	79.0	-25.8	None
20	21248.502 M	40.7	+10.0	+2.4		+0.0	53.1	79.0	-25.9	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	1:58:11 PM
Tested By:	Hoang Cao	Sequence#:	22
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

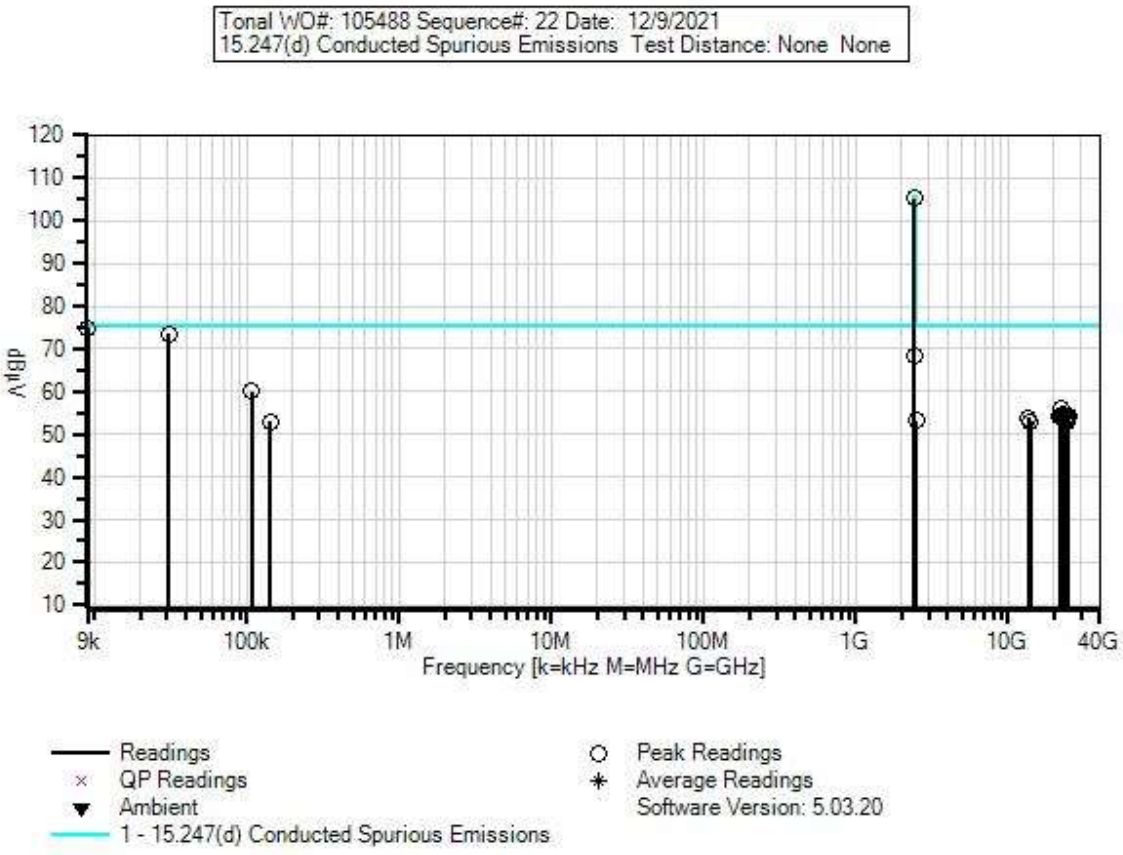
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11g
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2406.750M	94.6	+9.9	+0.8			+0.0	105.3	105.5	-0.2	None
2	9.000k	65.3	+9.7	+0.0			+0.0	75.0	75.5	-0.5	None
3	30.990k	63.9	+9.7	+0.0			+0.0	73.6	75.5	-1.9	None
4	2397.773M	57.8	+9.9	+0.8			+0.0	68.5	75.5	-7.0	None
5	108.271k	50.3	+9.7	+0.0			+0.0	60.0	75.5	-15.5	None
6	22002.993 M	43.6	+10.1	+2.4			+0.0	56.1	75.5	-19.4	None
7	22642.215 M	42.2	+10.0	+2.4			+0.0	54.6	75.5	-20.9	None
8	21793.413 M	42.0	+10.0	+2.4			+0.0	54.4	75.5	-21.1	None
9	24800.898 M	41.7	+10.1	+2.6			+0.0	54.4	75.5	-21.1	None
10	22893.712 M	41.8	+10.0	+2.5			+0.0	54.3	75.5	-21.2	None
11	22422.155 M	41.7	+10.1	+2.4			+0.0	54.2	75.5	-21.3	None
12	22118.263 M	41.6	+10.1	+2.4			+0.0	54.1	75.5	-21.4	None
13	24434.132 M	41.4	+10.1	+2.5			+0.0	54.0	75.5	-21.5	None
14	23690.120 M	41.3	+10.1	+2.5			+0.0	53.9	75.5	-21.6	None
15	13603.919 M	41.9	+10.0	+1.9			+0.0	53.8	75.5	-21.7	None
16	2484.553M	42.6	+9.9	+0.8			+0.0	53.3	75.5	-22.2	None
17	24161.676 M	40.7	+10.1	+2.5			+0.0	53.3	75.5	-22.2	None
18	143.467k	43.3	+9.7	+0.0			+0.0	53.0	75.5	-22.5	None

19	13985.159 M	41.1	+10.0	+1.9		+0.0	53.0	75.5	-22.5	None
20	23941.617 M	40.3	+10.1	+2.5		+0.0	52.9	75.5	-22.6	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	2:56:54 PM
Tested By:	Hoang Cao	Sequence#:	23
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

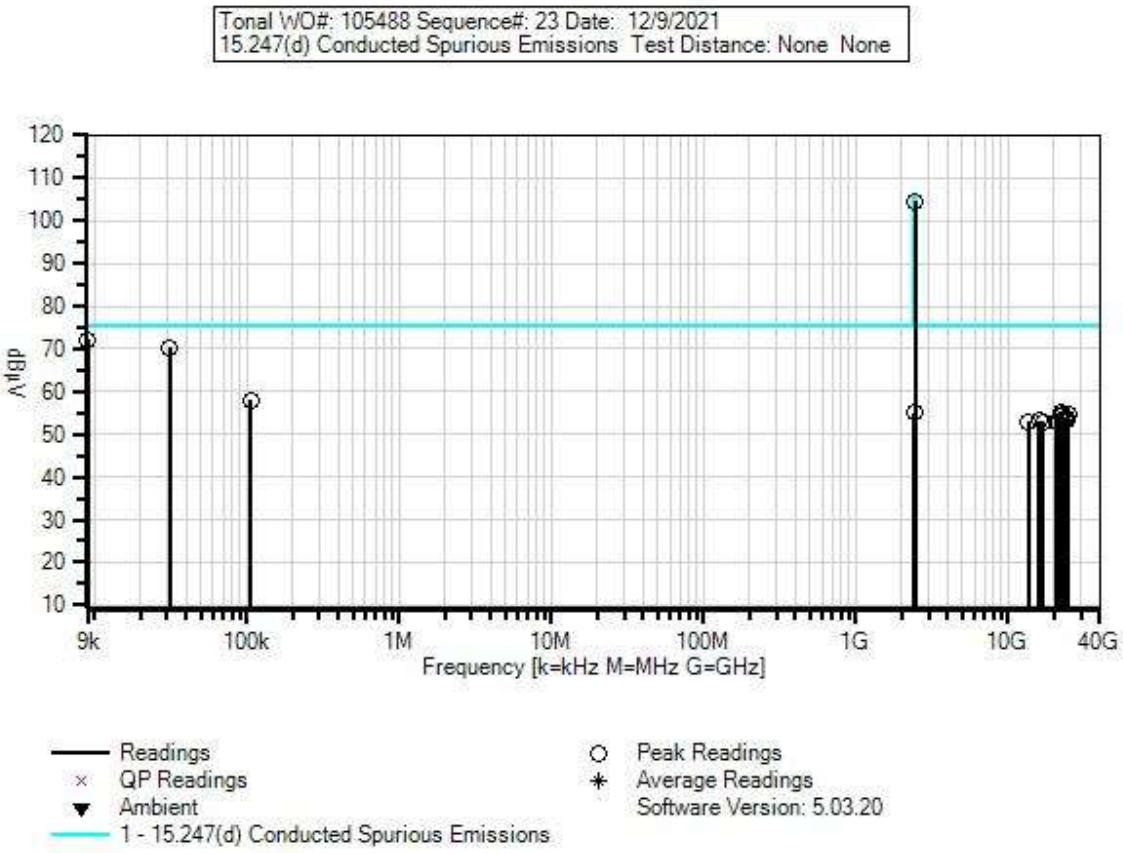
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11g
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2448.644M	93.9	+9.9	+0.8			+0.0	104.6	105.5	-0.9	None
2	9.021k	62.4	+9.7	+0.0			+0.0	72.1	75.5	-3.4	None
3	31.065k	60.7	+9.7	+0.0			+0.0	70.4	75.5	-5.1	None
4	106.967k	48.3	+9.7	+0.0			+0.0	58.0	75.5	-17.5	None
5	22013.472 M	42.7	+10.1	+2.4			+0.0	55.2	75.5	-20.3	None
6	2397.773M	44.3	+9.9	+0.8			+0.0	55.0	75.5	-20.5	None
7	22526.946 M	42.3	+10.0	+2.4			+0.0	54.7	75.5	-20.8	None
8	24811.377 M	42.0	+10.1	+2.6			+0.0	54.7	75.5	-20.8	None
9	22485.029 M	41.6	+10.0	+2.4			+0.0	54.0	75.5	-21.5	None
10	24130.239 M	41.3	+10.1	+2.5			+0.0	53.9	75.5	-21.6	None
11	23375.748 M	41.0	+10.1	+2.5			+0.0	53.6	75.5	-21.9	None
12	23910.179 M	41.0	+10.1	+2.5			+0.0	53.6	75.5	-21.9	None
13	24046.407 M	41.0	+10.1	+2.5			+0.0	53.6	75.5	-21.9	None
14	23857.784 M	40.8	+10.1	+2.5			+0.0	53.4	75.5	-22.1	None
15	15841.316 M	41.2	+10.0	+2.0			+0.0	53.2	75.5	-22.3	None
16	23952.096 M	40.6	+10.1	+2.5			+0.0	53.2	75.5	-22.3	None
17	13624.526 M	41.0	+10.0	+1.9			+0.0	52.9	75.5	-22.6	None

18	16868.262 M	40.7	+10.0	+2.2		+0.0	52.9	75.5	-22.6	None
19	20892.215 M	40.4	+10.0	+2.4		+0.0	52.8	75.5	-22.7	None
20	23082.335 M	40.3	+10.0	+2.5		+0.0	52.8	75.5	-22.7	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	3:03:45 PM
Tested By:	Hoang Cao	Sequence#:	24
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

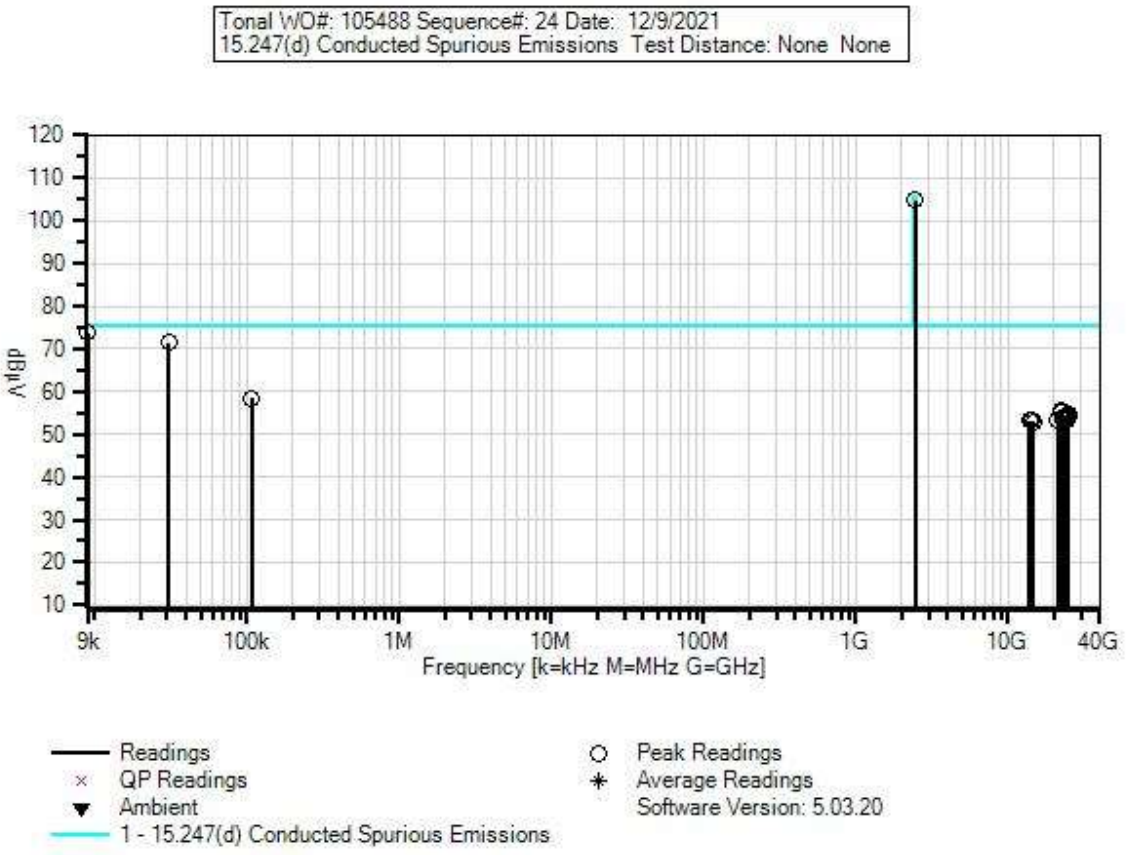
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11g
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2460.614M	94.2	+9.9	+0.8			+0.0	104.9	105.5	-0.6	None
2	9.064k	64.1	+9.7	+0.0			+0.0	73.8	75.5	-1.7	None
3	30.990k	61.7	+9.7	+0.0			+0.0	71.4	75.5	-4.1	None
4	107.489k	48.7	+9.7	+0.0			+0.0	58.4	75.5	-17.1	None
5	22013.472 M	43.2	+10.1	+2.4			+0.0	55.7	75.5	-19.8	None
6	22118.263 M	42.7	+10.1	+2.4			+0.0	55.2	75.5	-20.3	None
7	24811.377 M	42.1	+10.1	+2.6			+0.0	54.8	75.5	-20.7	None
8	24895.210 M	41.7	+10.1	+2.6			+0.0	54.4	75.5	-21.1	None
9	24245.509 M	41.4	+10.1	+2.5			+0.0	54.0	75.5	-21.5	None
10	23438.622 M	41.3	+10.1	+2.5			+0.0	53.9	75.5	-21.6	None
11	23218.563 M	41.0	+10.1	+2.5			+0.0	53.6	75.5	-21.9	None
12	23291.916 M	41.0	+10.1	+2.5			+0.0	53.6	75.5	-21.9	None
13	23920.658 M	40.9	+10.1	+2.5			+0.0	53.5	75.5	-22.0	None
14	22946.107 M	40.7	+10.0	+2.5			+0.0	53.2	75.5	-22.3	None
15	13634.830 M	41.3	+10.0	+1.9			+0.0	53.2	75.5	-22.3	None
16	23333.832 M	40.6	+10.1	+2.5			+0.0	53.2	75.5	-22.3	None
17	23134.730 M	40.6	+10.1	+2.5			+0.0	53.2	75.5	-22.3	None

18	14067.589 M	41.2	+10.0	+1.9		+0.0	53.1	75.5	-22.4	None
19	21143.712 M	40.7	+10.0	+2.4		+0.0	53.1	75.5	-22.4	None
20	14531.435 M	41.1	+10.0	+1.9		+0.0	53.0	75.5	-22.5	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	3:24:38 PM
Tested By:	Hoang Cao	Sequence#:	25
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

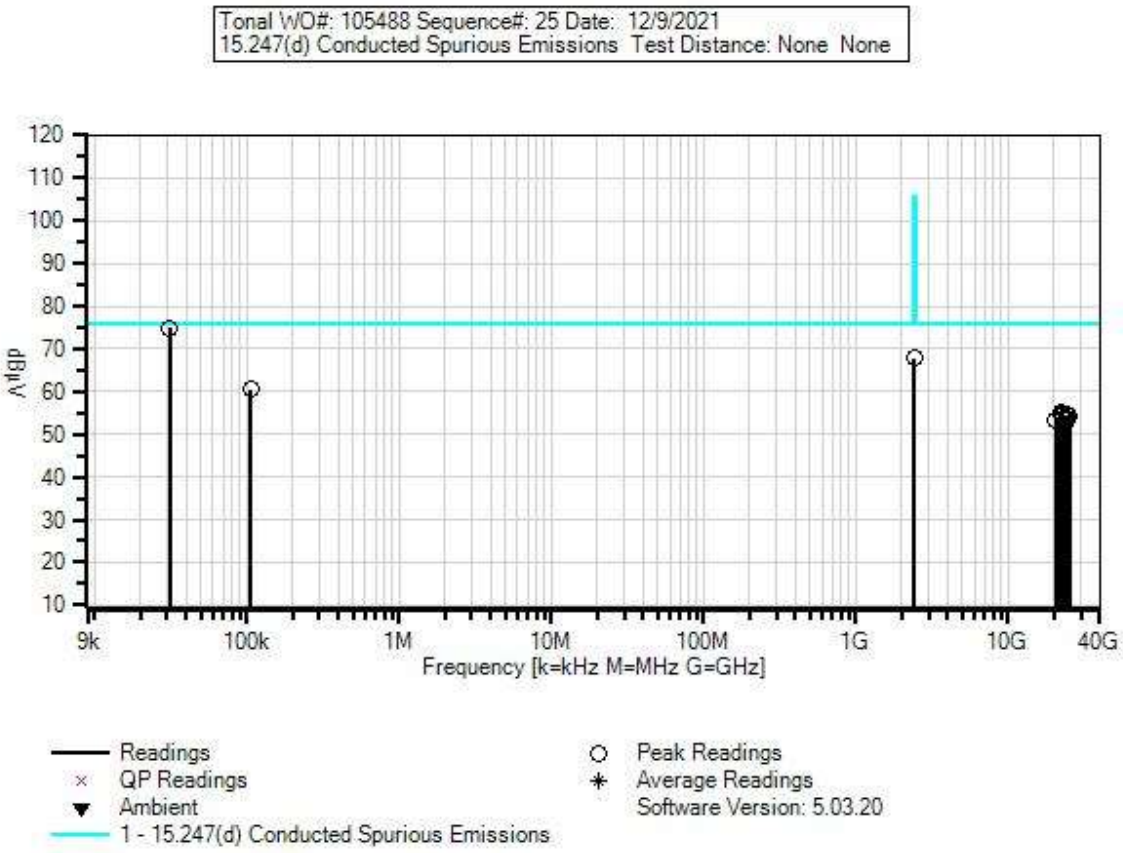
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11n 20MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	31.065k	65.1	+9.7	+0.0			+0.0	74.8	75.7	-0.9	None
2	2397.773M	57.1	+9.9	+0.8			+0.0	67.8	75.7	-7.9	None
3	106.707k	50.9	+9.7	+0.0			+0.0	60.6	75.7	-15.1	None
4	22044.910 M	42.8	+10.1	+2.4			+0.0	55.3	75.7	-20.4	None
5	22715.568 M	42.5	+10.0	+2.4			+0.0	54.9	75.7	-20.8	None
6	22097.305 M	42.3	+10.1	+2.4			+0.0	54.8	75.7	-20.9	None
7	24130.239 M	42.0	+10.1	+2.5			+0.0	54.6	75.7	-21.1	None
8	24958.084 M	41.5	+10.1	+2.6			+0.0	54.2	75.7	-21.5	None
9	22988.024 M	41.4	+10.0	+2.5			+0.0	53.9	75.7	-21.8	None
10	22767.964 M	41.5	+10.0	+2.4			+0.0	53.9	75.7	-21.8	None
11	24371.257 M	41.2	+10.1	+2.5			+0.0	53.8	75.7	-21.9	None
12	23260.479 M	40.9	+10.1	+2.5			+0.0	53.5	75.7	-22.2	None
13	23449.102 M	40.9	+10.1	+2.5			+0.0	53.5	75.7	-22.2	None
14	23491.018 M	40.9	+10.1	+2.5			+0.0	53.5	75.7	-22.2	None
15	23187.125 M	40.8	+10.1	+2.5			+0.0	53.4	75.7	-22.3	None

16	24339.820 M	40.8	+10.1	+2.5		+0.0	53.4	75.7	-22.3	None
17	24538.922 M	40.8	+10.1	+2.5		+0.0	53.4	75.7	-22.3	None
18	20357.784 M	40.7	+10.1	+2.4		+0.0	53.2	75.7	-22.5	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	3:34:32 PM
Tested By:	Hoang Cao	Sequence#:	26
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

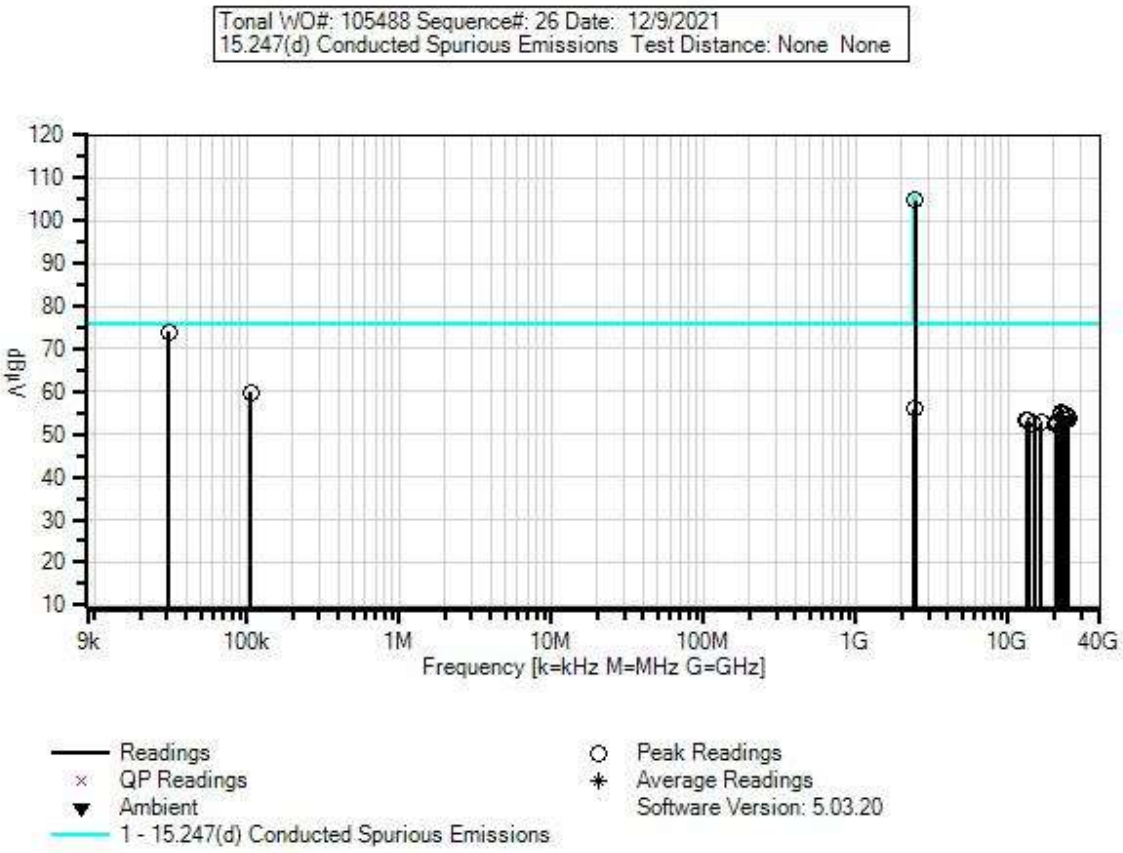
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11n 20MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2448.644M	94.1	+9.9	+0.8			+0.0	104.8	105.7	-0.9	None
2	30.990k	64.2	+9.7	+0.0			+0.0	73.9	75.7	-1.8	None
3	106.967k	50.2	+9.7	+0.0			+0.0	59.9	75.7	-15.8	None
4	2397.773M	45.2	+9.9	+0.8			+0.0	55.9	75.7	-19.8	None
5	22044.910 M	42.7	+10.1	+2.4			+0.0	55.2	75.7	-20.5	None
6	22128.742 M	42.2	+10.1	+2.4			+0.0	54.7	75.7	-21.0	None
7	23742.515 M	41.9	+10.1	+2.5			+0.0	54.5	75.7	-21.2	None
8	24140.718 M	41.5	+10.1	+2.5			+0.0	54.1	75.7	-21.6	None
9	24779.940 M	41.2	+10.1	+2.6			+0.0	53.9	75.7	-21.8	None
10	23480.539 M	40.9	+10.1	+2.5			+0.0	53.5	75.7	-22.2	None
11	13573.007 M	41.4	+10.0	+1.8			+0.0	53.2	75.7	-22.5	None
12	13202.071 M	41.3	+10.0	+1.8			+0.0	53.1	75.7	-22.6	None
13	24182.635 M	40.5	+10.1	+2.5			+0.0	53.1	75.7	-22.6	None
14	20630.239 M	40.3	+10.1	+2.4			+0.0	52.8	75.7	-22.9	None
15	16470.058 M	40.6	+10.0	+2.1			+0.0	52.7	75.7	-23.0	None

16	21112.275 M	40.3	+10.0	+2.4		+0.0	52.7	75.7	-23.0	None
17	14824.848 M	40.7	+10.0	+1.9		+0.0	52.6	75.7	-23.1	None
18	20326.346 M	40.0	+10.1	+2.4		+0.0	52.5	75.7	-23.2	None
19	20860.778 M	40.1	+10.0	+2.4		+0.0	52.5	75.7	-23.2	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	3:40:34 PM
Tested By:	Hoang Cao	Sequence#:	27
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

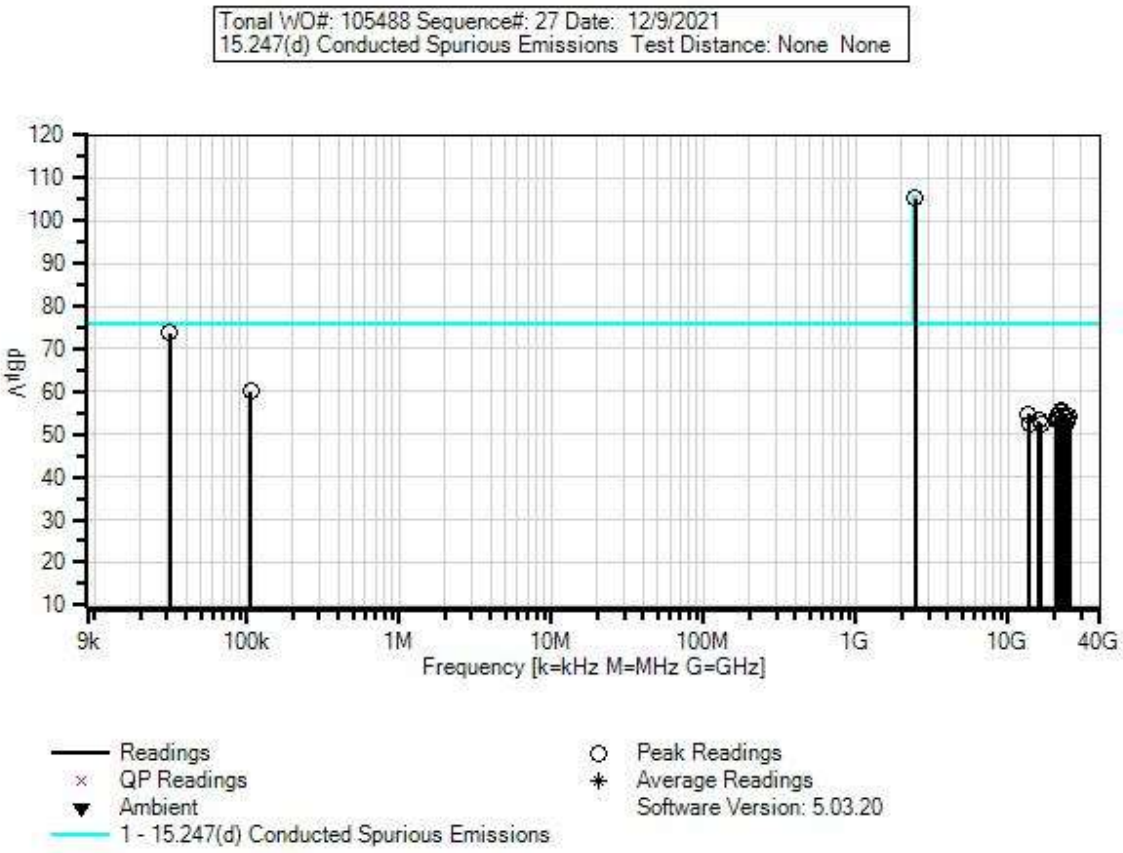
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11n 20MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2460.614M	94.5	+9.9	+0.8			+0.0	105.2	105.7	-0.5	None
2	31.065k	64.1	+9.7	+0.0			+0.0	73.8	75.7	-1.9	None
3	106.967k	50.4	+9.7	+0.0			+0.0	60.1	75.7	-15.6	None
4	22233.532 M	43.3	+10.1	+2.4			+0.0	55.8	75.7	-19.9	None
5	21919.161 M	42.6	+10.1	+2.4			+0.0	55.1	75.7	-20.6	None
6	13603.919 M	42.8	+10.0	+1.9			+0.0	54.7	75.7	-21.0	None
7	22684.131 M	42.0	+10.0	+2.4			+0.0	54.4	75.7	-21.3	None
8	21185.628 M	41.8	+10.0	+2.4			+0.0	54.2	75.7	-21.5	None
9	24979.042 M	41.4	+10.1	+2.6			+0.0	54.1	75.7	-21.6	None
10	24811.377 M	41.4	+10.1	+2.6			+0.0	54.1	75.7	-21.6	None
11	20850.299 M	41.6	+10.0	+2.4			+0.0	54.0	75.7	-21.7	None
12	24371.257 M	41.2	+10.1	+2.5			+0.0	53.8	75.7	-21.9	None
13	24214.072 M	41.0	+10.1	+2.5			+0.0	53.6	75.7	-22.1	None
14	20640.718 M	41.0	+10.1	+2.4			+0.0	53.5	75.7	-22.2	None
15	15841.316 M	41.2	+10.0	+2.0			+0.0	53.2	75.7	-22.5	None
16	21573.353 M	40.8	+10.0	+2.4			+0.0	53.2	75.7	-22.5	None
17	24035.928 M	40.1	+10.1	+2.5			+0.0	52.7	75.7	-23.0	None

18	13820.298 M	40.7	+10.0	+1.9		+0.0	52.6	75.7	-23.1	None
19	16281.435 M	40.4	+10.0	+2.1		+0.0	52.5	75.7	-23.2	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	4:04:23 PM
Tested By:	Hoang Cao	Sequence#:	28
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

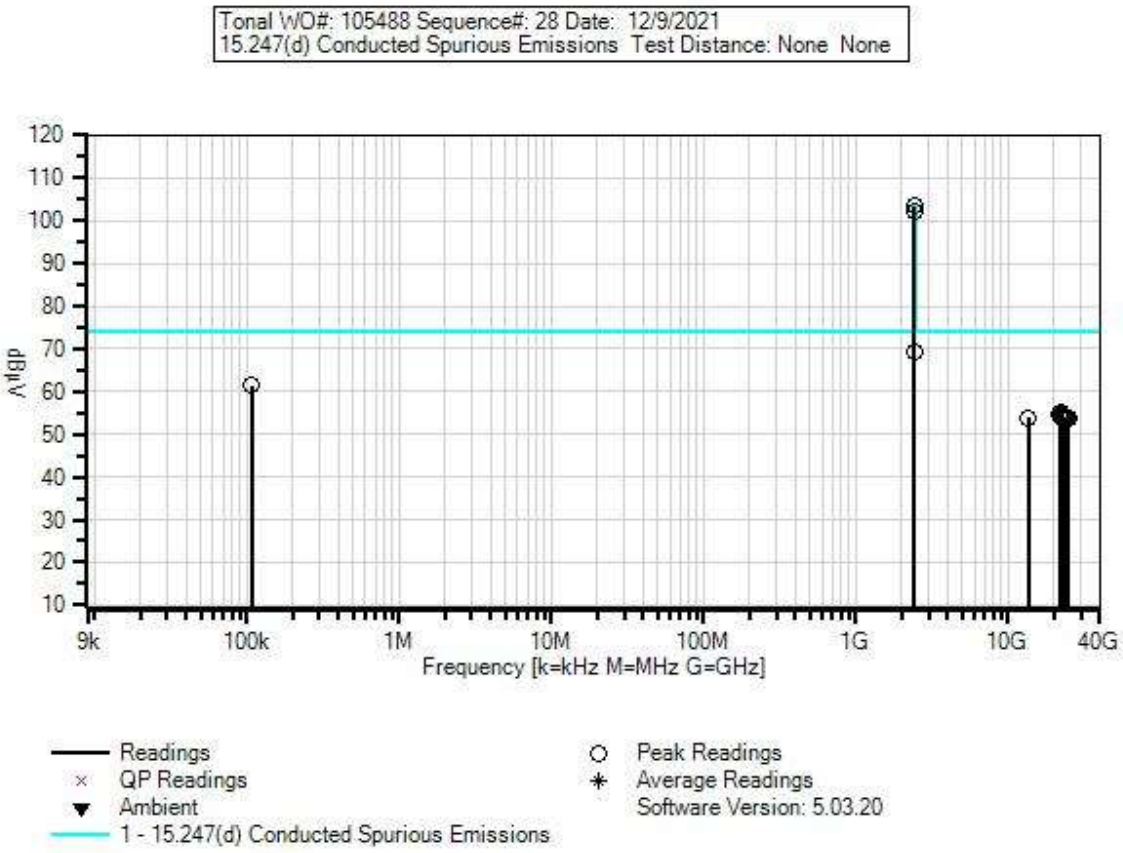
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11n 40MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2415.727M	92.8	+9.9	+0.8			+0.0	103.5	103.9	-0.4	None
2	2424.705M	91.5	+9.9	+0.8			+0.0	102.2	103.9	-1.7	None
3	2397.773M	58.8	+9.9	+0.8			+0.0	69.5	73.9	-4.4	None
4	107.228k	51.8	+9.7	+0.0			+0.0	61.5	73.9	-12.4	None
5	21908.682 M	42.5	+10.1	+2.4			+0.0	55.0	73.9	-18.9	None
6	21845.808 M	42.4	+10.0	+2.4			+0.0	54.8	73.9	-19.1	None
7	22202.095 M	42.3	+10.1	+2.4			+0.0	54.8	73.9	-19.1	None
8	22275.449 M	42.0	+10.1	+2.4			+0.0	54.5	73.9	-19.4	None
9	22359.281 M	41.7	+10.1	+2.4			+0.0	54.2	73.9	-19.7	None
10	22872.754 M	41.5	+10.0	+2.5			+0.0	54.0	73.9	-19.9	None
11	24077.844 M	41.3	+10.1	+2.5			+0.0	53.9	73.9	-20.0	None
12	13614.222 M	41.9	+10.0	+1.9			+0.0	53.8	73.9	-20.1	None
13	24947.605 M	41.1	+10.1	+2.6			+0.0	53.8	73.9	-20.1	None
14	23040.419 M	41.2	+10.0	+2.5			+0.0	53.7	73.9	-20.2	None
15	24413.174 M	41.1	+10.1	+2.5			+0.0	53.7	73.9	-20.2	None

16	24748.503 M	41.0	+10.1	+2.6		+0.0	53.7	73.9	-20.2	None
17	23438.622 M	41.0	+10.1	+2.5		+0.0	53.6	73.9	-20.3	None
18	24098.802 M	41.0	+10.1	+2.5		+0.0	53.6	73.9	-20.3	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	4:11:09 PM
Tested By:	Hoang Cao	Sequence#:	29
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

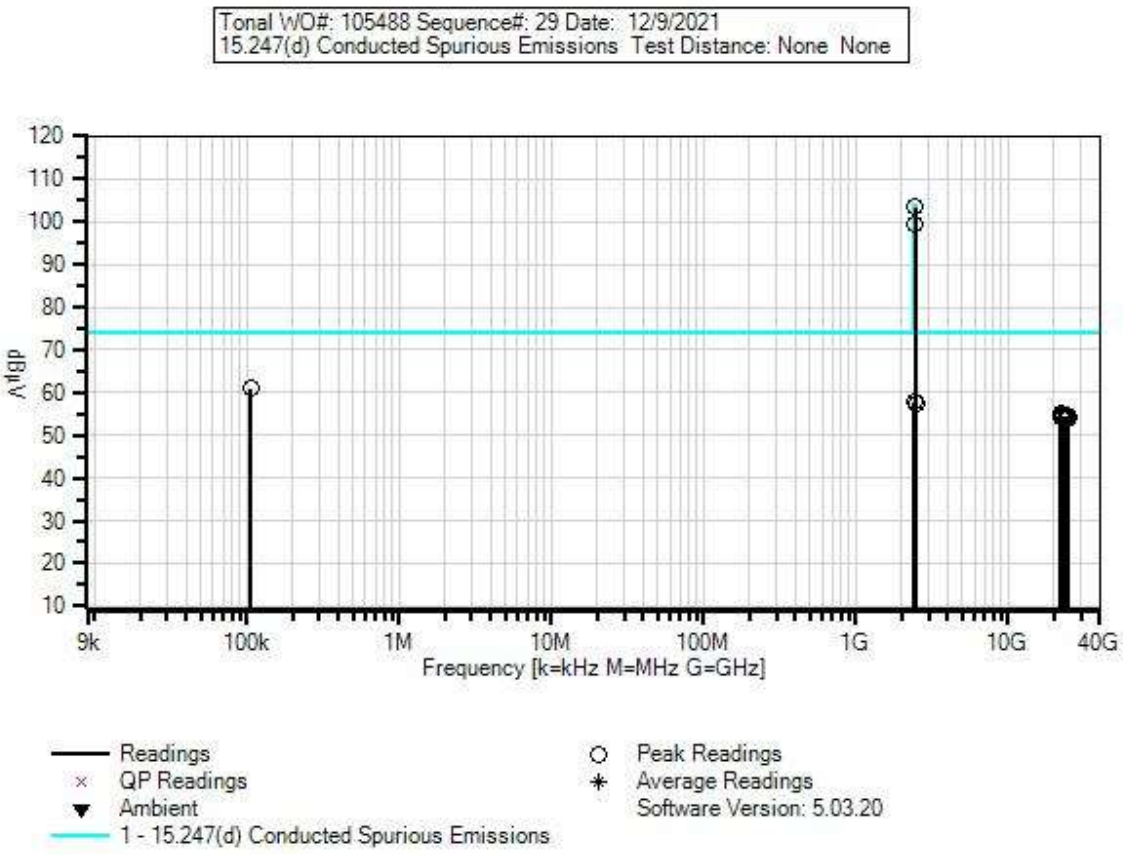
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11n 40MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2451.636M	92.8	+9.9	+0.8			+0.0	103.5	103.9	-0.4	None
2	2430.690M	88.8	+9.9	+0.8			+0.0	99.5	103.9	-4.4	None
3	106.707k	51.2	+9.7	+0.0			+0.0	60.9	73.9	-13.0	None
4	2397.773M	47.1	+9.9	+0.8			+0.0	57.8	73.9	-16.1	None
5	2484.553M	46.7	+9.9	+0.8			+0.0	57.4	73.9	-16.5	None
6	22149.700 M	42.8	+10.1	+2.4			+0.0	55.3	73.9	-18.6	None
7	22034.431 M	42.7	+10.1	+2.4			+0.0	55.2	73.9	-18.7	None
8	21866.766 M	42.3	+10.1	+2.4			+0.0	54.8	73.9	-19.1	None
9	21898.203 M	42.2	+10.1	+2.4			+0.0	54.7	73.9	-19.2	None
10	24193.114 M	41.9	+10.1	+2.5			+0.0	54.5	73.9	-19.4	None
11	23176.646 M	41.7	+10.1	+2.5			+0.0	54.3	73.9	-19.6	None
12	24832.335 M	41.6	+10.1	+2.6			+0.0	54.3	73.9	-19.6	None
13	22411.676 M	41.5	+10.1	+2.4			+0.0	54.0	73.9	-19.9	None
14	24088.323 M	41.4	+10.1	+2.5			+0.0	54.0	73.9	-19.9	None

15	23491.018 M	41.3	+10.1	+2.5		+0.0	53.9	73.9	-20.0	None
16	24444.611 M	41.3	+10.1	+2.5		+0.0	53.9	73.9	-20.0	None
17	23470.060 M	41.1	+10.1	+2.5		+0.0	53.7	73.9	-20.2	None
18	23595.808 M	41.1	+10.1	+2.5		+0.0	53.7	73.9	-20.2	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	4:17:35 PM
Tested By:	Hoang Cao	Sequence#:	30
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

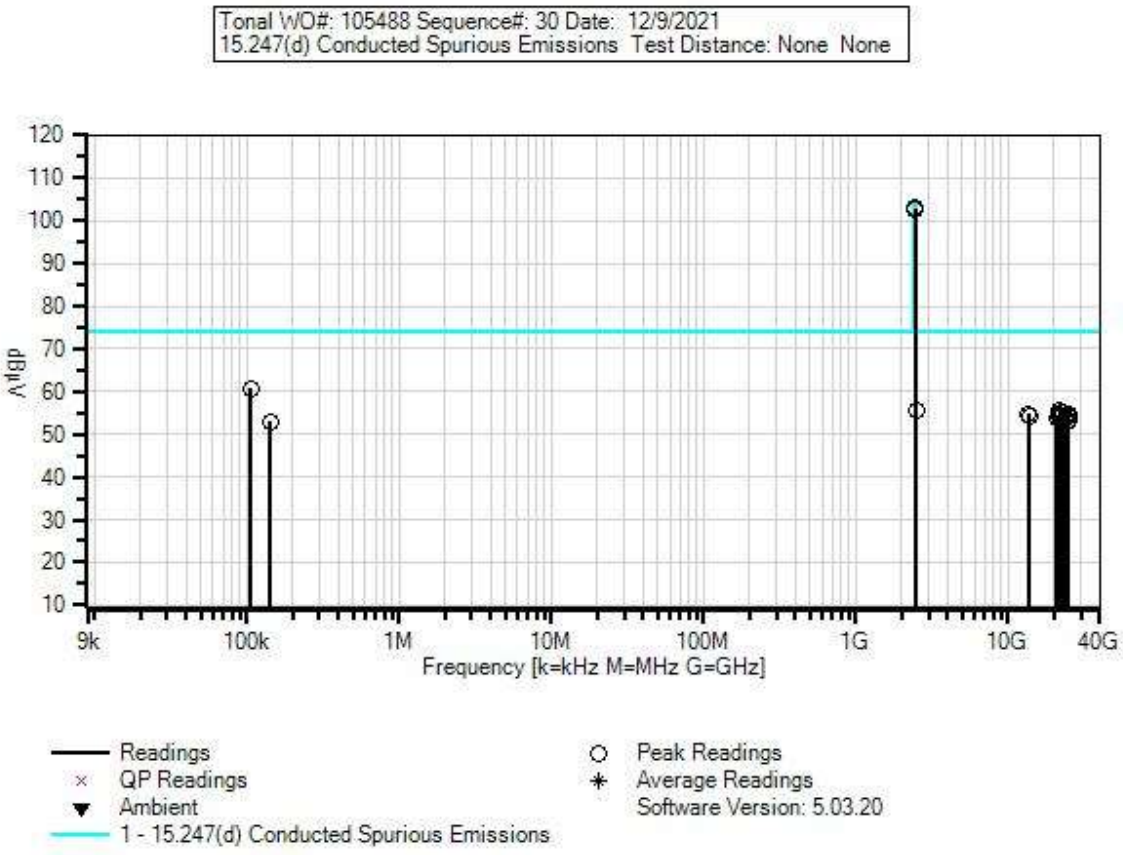
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11n 40MHz
Chain 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2454.629M	92.3	+9.9	+0.8			+0.0	103.0	103.9	-0.9	None
2	2448.644M	91.9	+9.9	+0.8			+0.0	102.6	103.9	-1.3	None
3	106.707k	51.1	+9.7	+0.0			+0.0	60.8	73.9	-13.1	None
4	2484.553M	45.1	+9.9	+0.8			+0.0	55.8	73.9	-18.1	None
5	21845.808 M	43.3	+10.0	+2.4			+0.0	55.7	73.9	-18.2	None
6	22002.993 M	42.8	+10.1	+2.4			+0.0	55.3	73.9	-18.6	None
7	22600.299 M	42.7	+10.0	+2.4			+0.0	55.1	73.9	-18.8	None
8	13593.615 M	42.9	+10.0	+1.8			+0.0	54.7	73.9	-19.2	None
9	21646.706 M	42.2	+10.0	+2.4			+0.0	54.6	73.9	-19.3	None
10	24193.114 M	41.9	+10.1	+2.5			+0.0	54.5	73.9	-19.4	None
11	24790.419 M	41.8	+10.1	+2.6			+0.0	54.5	73.9	-19.4	None
12	13655.438 M	42.5	+10.0	+1.9			+0.0	54.4	73.9	-19.5	None
13	24758.982 M	41.6	+10.1	+2.6			+0.0	54.3	73.9	-19.6	None
14	21772.454 M	41.7	+10.0	+2.4			+0.0	54.1	73.9	-19.8	None

15	20609.281 M	41.3	+10.1	+2.4		+0.0	53.8	73.9	-20.1	None
16	24622.754 M	40.5	+10.1	+2.5		+0.0	53.1	73.9	-20.8	None
17	143.467k	43.3	+9.7	+0.0		+0.0	53.0	73.9	-20.9	None
18	24476.048 M	40.4	+10.1	+2.5		+0.0	53.0	73.9	-20.9	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:22:59 AM
Tested By:	Hoang Cao	Sequence#:	7
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

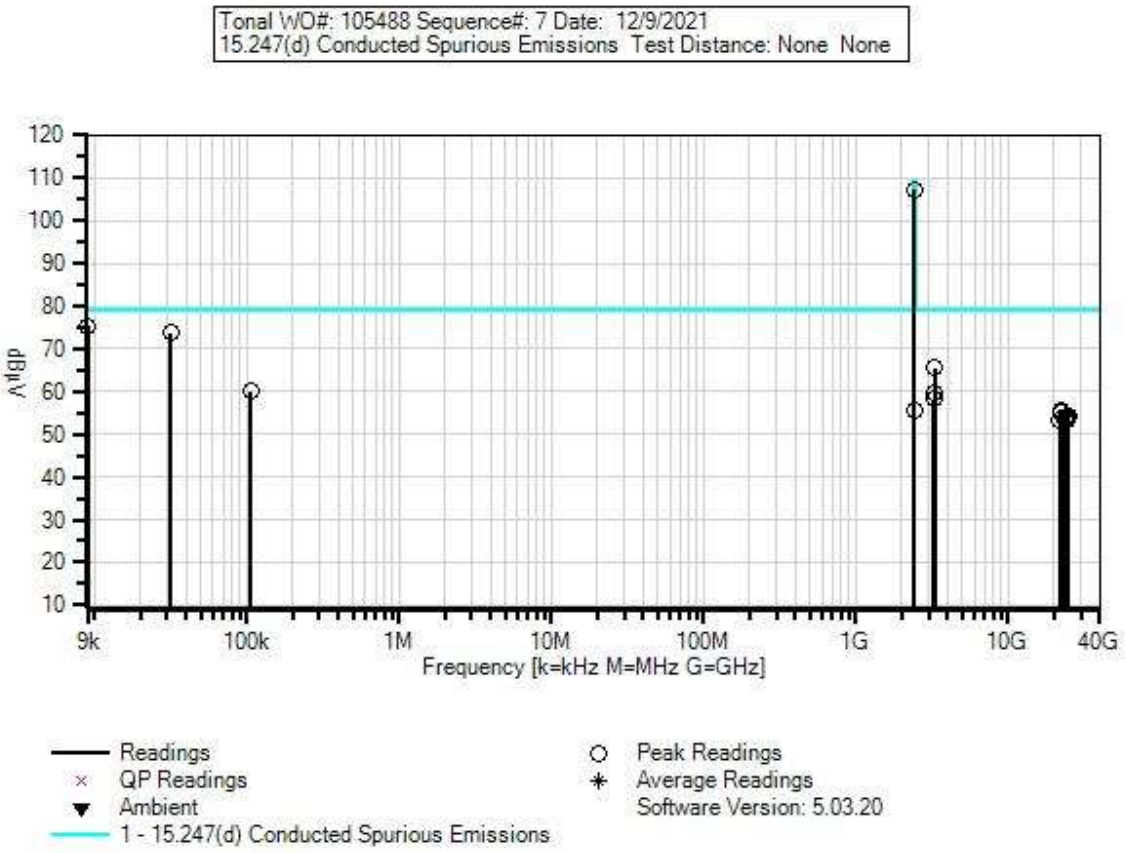
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11b
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2412.735M	96.6	+9.9	+0.8			+0.0	107.3	109.3	-2.0	None
2	9.042k	65.6	+9.7	+0.0			+0.0	75.3	79.3	-4.0	None
3	31.898k	64.0	+9.7	+0.0			+0.0	73.7	79.3	-5.6	None
4	3274.552M	54.7	+9.9	+0.9			+0.0	65.5	79.3	-13.8	None
5	106.967k	50.4	+9.7	+0.0			+0.0	60.1	79.3	-19.2	None
6	3289.514M	48.9	+9.9	+0.9			+0.0	59.7	79.3	-19.6	None
7	3259.589M	47.4	+9.9	+0.9			+0.0	58.2	79.3	-21.1	None
8	21992.514 M	43.3	+10.1	+2.4			+0.0	55.8	79.3	-23.5	None
9	2397.773M	44.8	+9.9	+0.8			+0.0	55.5	79.3	-23.8	None
10	22401.197 M	43.0	+10.1	+2.4			+0.0	55.5	79.3	-23.8	None
11	22181.137 M	42.7	+10.1	+2.4			+0.0	55.2	79.3	-24.1	None
12	24151.197 M	41.8	+10.1	+2.5			+0.0	54.4	79.3	-24.9	None
13	24863.772 M	41.6	+10.1	+2.6			+0.0	54.3	79.3	-25.0	None
14	24255.988 M	41.1	+10.1	+2.5			+0.0	53.7	79.3	-25.6	None
15	23952.096 M	41.0	+10.1	+2.5			+0.0	53.6	79.3	-25.7	None
16	24182.635 M	41.0	+10.1	+2.5			+0.0	53.6	79.3	-25.7	None
17	24088.323 M	40.7	+10.1	+2.5			+0.0	53.3	79.3	-26.0	None
18	24339.820 M	40.7	+10.1	+2.5			+0.0	53.3	79.3	-26.0	None

19	21636.227 M	40.8	+10.0	+2.4		+0.0	53.2	79.3	-26.1	None
20	23711.078 M	40.5	+10.1	+2.5		+0.0	53.1	79.3	-26.2	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:09:37 AM
Tested By:	Hoang Cao	Sequence#:	8
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

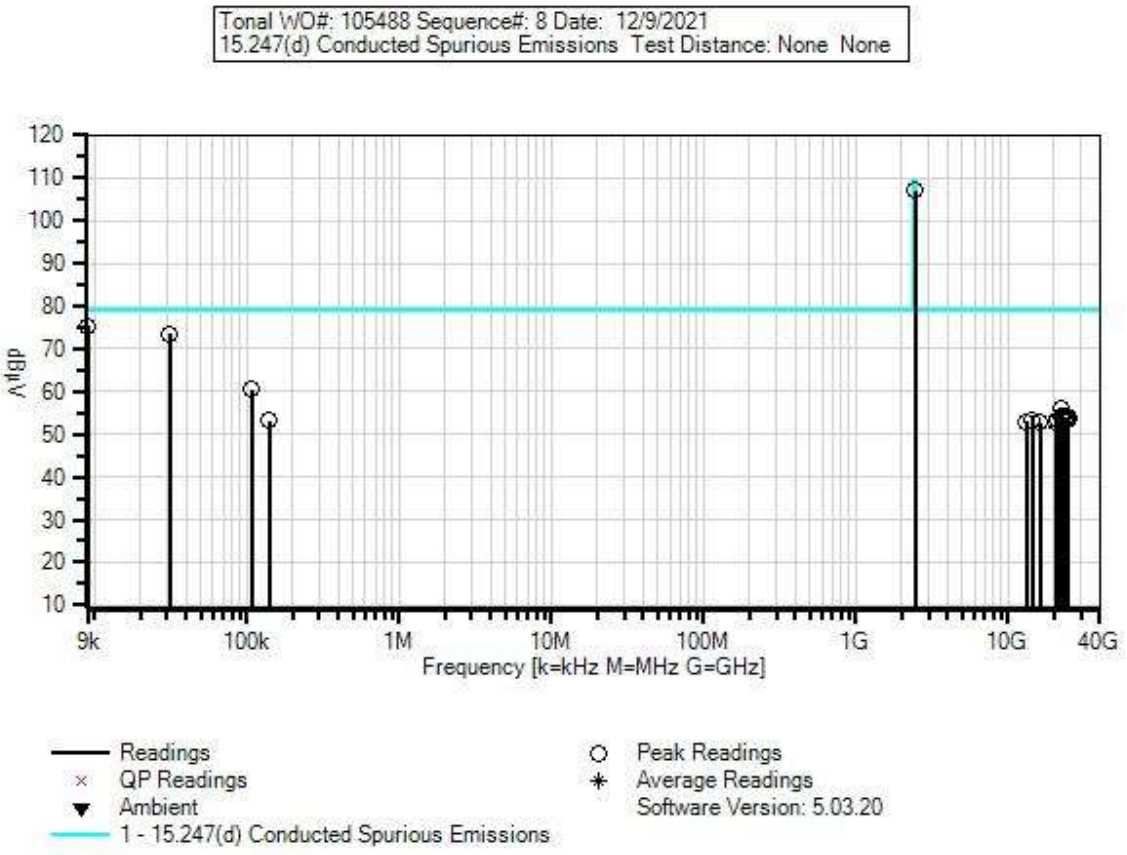
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11b
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2445.652M	96.4	+9.9	+0.8			+0.0	107.1	109.3	-2.2	None
2	9.064k	65.6	+9.7	+0.0			+0.0	75.3	79.3	-4.0	None
3	31.141k	63.9	+9.7	+0.0			+0.0	73.6	79.3	-5.7	None
4	108.010k	50.7	+9.7	+0.0			+0.0	60.4	79.3	-18.9	None
5	21940.119 M	43.5	+10.1	+2.4			+0.0	56.0	79.3	-23.3	None
6	22767.964 M	42.0	+10.0	+2.4			+0.0	54.4	79.3	-24.9	None
7	22809.880 M	41.9	+10.0	+2.4			+0.0	54.3	79.3	-25.0	None
8	24444.611 M	41.6	+10.1	+2.5			+0.0	54.2	79.3	-25.1	None
9	22411.676 M	41.6	+10.1	+2.4			+0.0	54.1	79.3	-25.2	None
10	23092.814 M	41.6	+10.0	+2.5			+0.0	54.1	79.3	-25.2	None
11	23522.455 M	41.3	+10.1	+2.5			+0.0	53.9	79.3	-25.4	None
12	24779.940 M	41.2	+10.1	+2.6			+0.0	53.9	79.3	-25.4	None
13	24203.593 M	40.8	+10.1	+2.5			+0.0	53.4	79.3	-25.9	None
14	20955.089 M	40.9	+10.0	+2.4			+0.0	53.3	79.3	-26.0	None
15	139.817k	43.4	+9.7	+0.0			+0.0	53.1	79.3	-26.2	None
16	14294.273 M	41.2	+10.0	+1.9			+0.0	53.1	79.3	-26.2	None
17	24350.299 M	40.5	+10.1	+2.5			+0.0	53.1	79.3	-26.2	None

18	13202.071 M	41.2	+10.0	+1.8		+0.0	53.0	79.3	-26.3	None
19	16092.813 M	40.7	+10.0	+2.1		+0.0	52.8	79.3	-26.5	None
20	20368.263 M	40.2	+10.1	+2.4		+0.0	52.7	79.3	-26.6	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:16:14 AM
Tested By:	Hoang Cao	Sequence#:	9
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

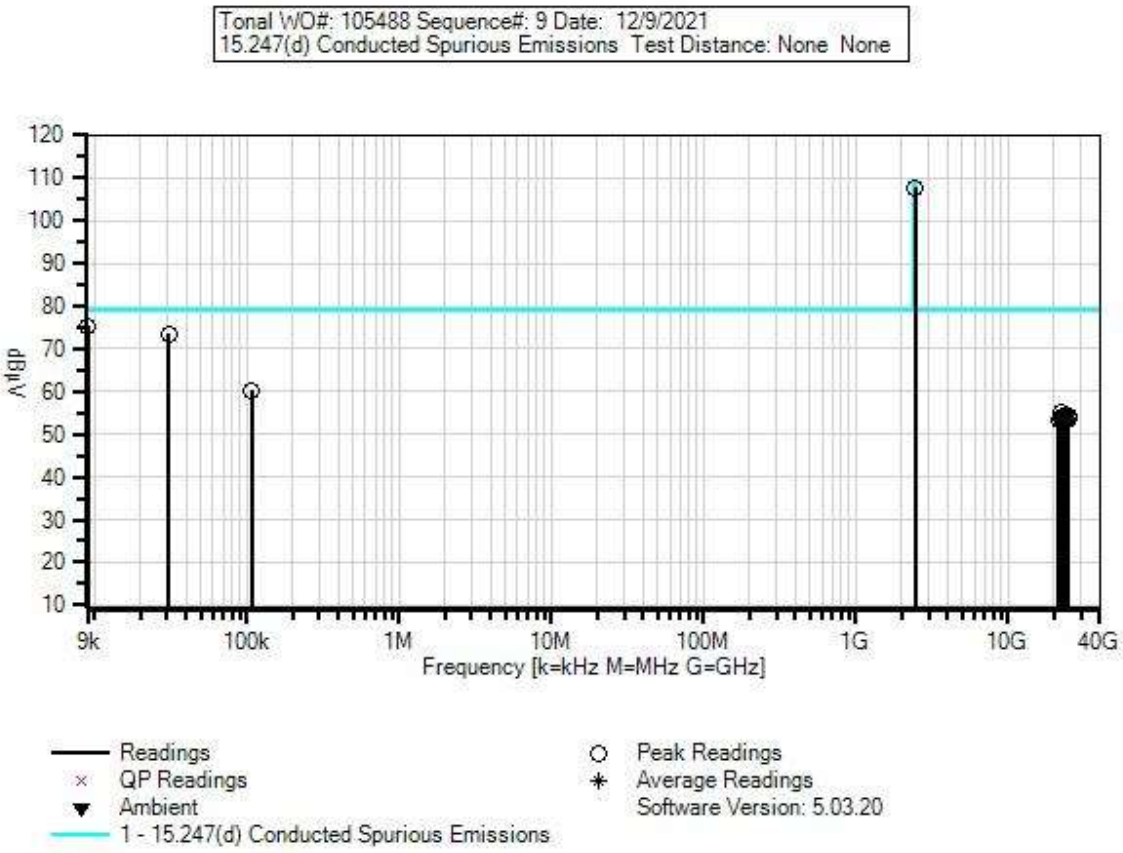
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11b
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2460.614M	97.1	+9.9	+0.8			+0.0	107.8	109.3	-1.5	None
2	9.130k	65.6	+9.7	+0.0			+0.0	75.3	79.3	-4.0	None
3	30.990k	63.9	+9.7	+0.0			+0.0	73.6	79.3	-5.7	None
4	107.489k	50.5	+9.7	+0.0			+0.0	60.2	79.3	-19.1	None
5	21898.203 M	42.7	+10.1	+2.4			+0.0	55.2	79.3	-24.1	None
6	23029.940 M	41.8	+10.0	+2.5			+0.0	54.3	79.3	-25.0	None
7	24727.545 M	41.5	+10.1	+2.6			+0.0	54.2	79.3	-25.1	None
8	22767.964 M	41.5	+10.0	+2.4			+0.0	53.9	79.3	-25.4	None
9	23208.083 M	41.3	+10.1	+2.5			+0.0	53.9	79.3	-25.4	None
10	24811.377 M	41.2	+10.1	+2.6			+0.0	53.9	79.3	-25.4	None
11	22495.509 M	41.2	+10.0	+2.4			+0.0	53.6	79.3	-25.7	None
12	23553.892 M	41.0	+10.1	+2.5			+0.0	53.6	79.3	-25.7	None
13	23124.251 M	41.0	+10.0	+2.5			+0.0	53.5	79.3	-25.8	None
14	23470.060 M	40.9	+10.1	+2.5			+0.0	53.5	79.3	-25.8	None
15	23417.664 M	40.8	+10.1	+2.5			+0.0	53.4	79.3	-25.9	None
16	24214.072 M	40.8	+10.1	+2.5			+0.0	53.4	79.3	-25.9	None
17	24287.425 M	40.7	+10.1	+2.5			+0.0	53.3	79.3	-26.0	None

18	21227.544 M	40.8	+10.0	+2.4		+0.0	53.2	79.3	-26.1	None
19	24098.802 M	40.6	+10.1	+2.5		+0.0	53.2	79.3	-26.1	None
20	24402.694 M	40.5	+10.1	+2.5		+0.0	53.1	79.3	-26.2	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	9:46:48 AM
Tested By:	Hoang Cao	Sequence#:	10
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

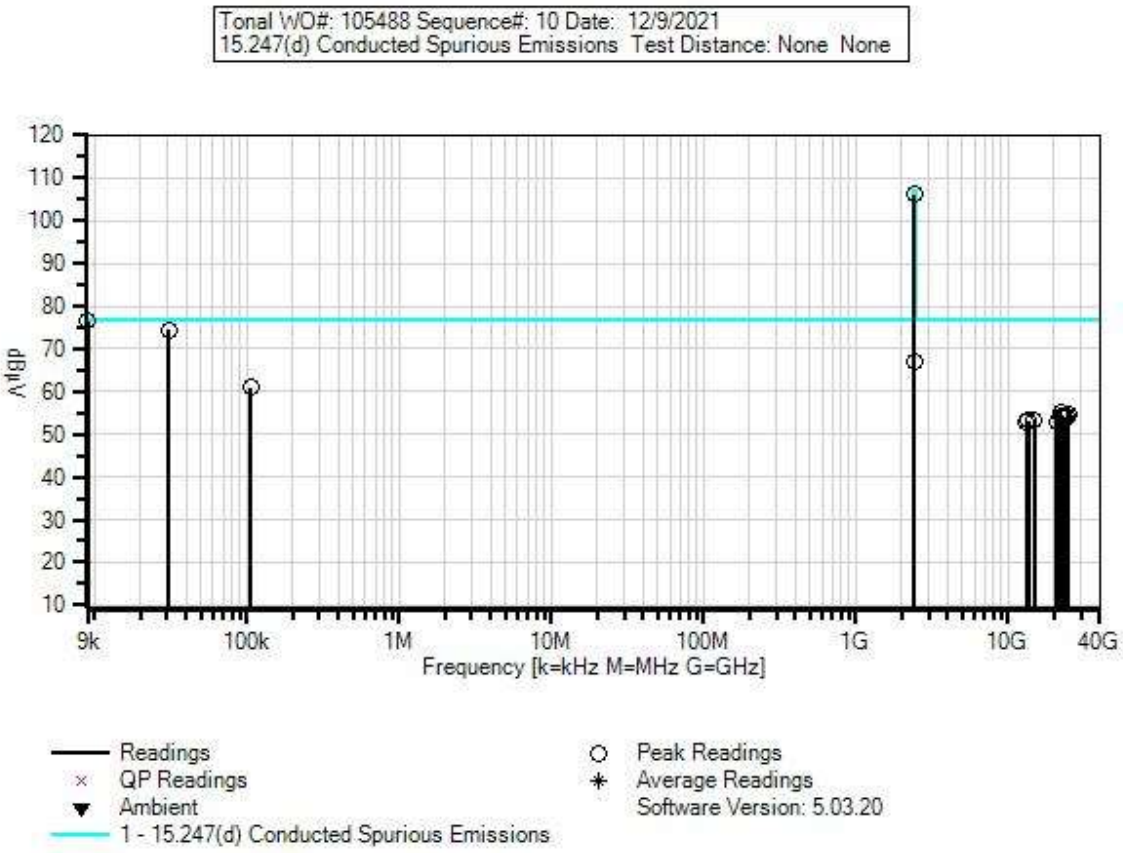
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11g
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.043k	66.7	+9.7	+0.0			+0.0	76.4	76.9	-0.5	None
2	2412.735M	95.4	+9.9	+0.8			+0.0	106.1	106.9	-0.8	None
3	30.990k	64.8	+9.7	+0.0			+0.0	74.5	76.9	-2.4	None
4	2397.773M	56.1	+9.9	+0.8			+0.0	66.8	76.9	-10.1	None
5	106.967k	51.2	+9.7	+0.0			+0.0	60.9	76.9	-16.0	None
6	21992.514 M	42.7	+10.1	+2.4			+0.0	55.2	76.9	-21.7	None
7	24758.982 M	42.0	+10.1	+2.6			+0.0	54.7	76.9	-22.2	None
8	22485.029 M	41.9	+10.0	+2.4			+0.0	54.3	76.9	-22.6	None
9	22736.527 M	41.8	+10.0	+2.4			+0.0	54.2	76.9	-22.7	None
10	24130.239 M	41.5	+10.1	+2.5			+0.0	54.1	76.9	-22.8	None
11	22453.592 M	41.7	+10.0	+2.4			+0.0	54.1	76.9	-22.8	None
12	22380.239 M	41.5	+10.1	+2.4			+0.0	54.0	76.9	-22.9	None
13	23176.646 M	41.4	+10.1	+2.5			+0.0	54.0	76.9	-22.9	None
14	24172.156 M	41.4	+10.1	+2.5			+0.0	54.0	76.9	-22.9	None
15	23637.724 M	41.3	+10.1	+2.5			+0.0	53.9	76.9	-23.0	None
16	22631.736 M	41.4	+10.0	+2.4			+0.0	53.8	76.9	-23.1	None
17	14741.016 M	41.5	+10.0	+1.9			+0.0	53.4	76.9	-23.5	None

18	13624.526 M	41.2	+10.0	+1.9		+0.0	53.1	76.9	-23.8	None
19	13212.374 M	41.2	+10.0	+1.8		+0.0	53.0	76.9	-23.9	None
20	20640.718 M	40.5	+10.1	+2.4		+0.0	53.0	76.9	-23.9	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	9:54:23 AM
Tested By:	Hoang Cao	Sequence#:	11
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

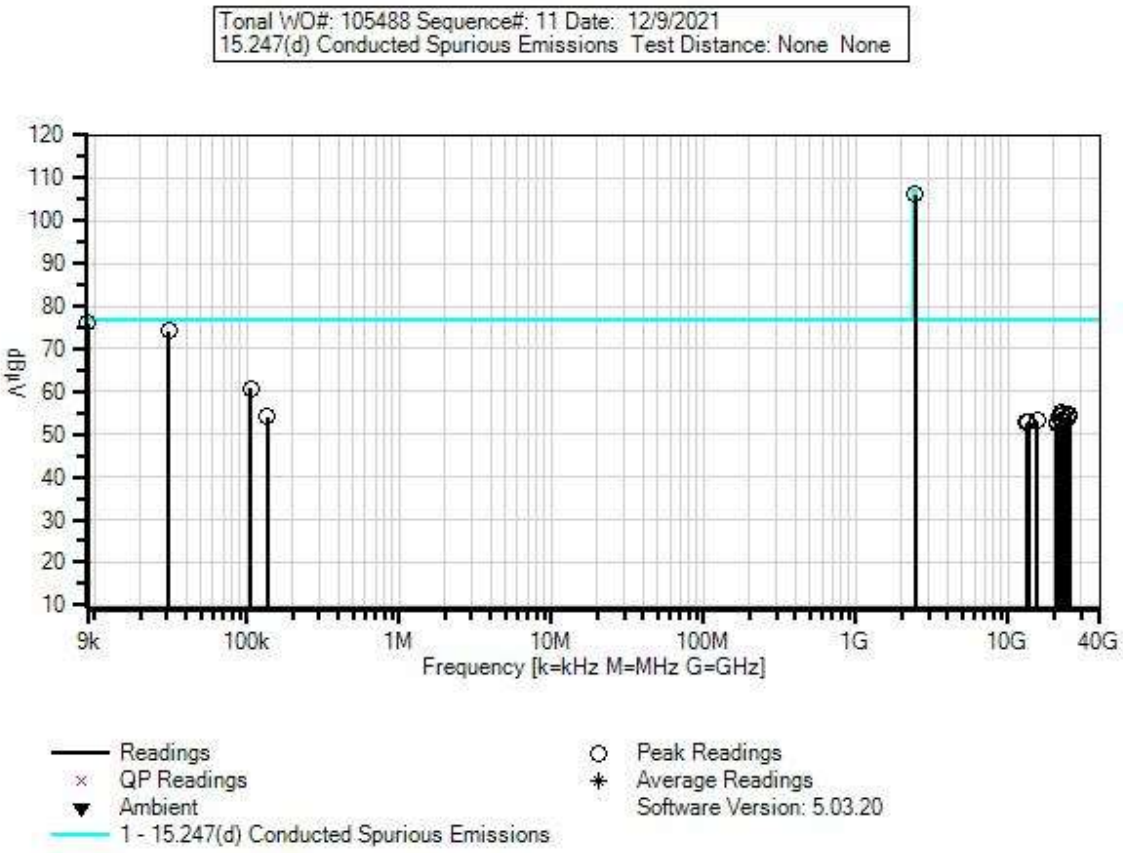
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11g
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2448.644M	95.4	+9.9	+0.8			+0.0	106.1	106.9	-0.8	None
2	9.042k	66.3	+9.7	+0.0			+0.0	76.0	76.9	-0.9	None
3	30.990k	64.5	+9.7	+0.0			+0.0	74.2	76.9	-2.7	None
4	106.967k	51.0	+9.7	+0.0			+0.0	60.7	76.9	-16.2	None
5	21961.077 M	42.7	+10.1	+2.4			+0.0	55.2	76.9	-21.7	None
6	24800.898 M	42.2	+10.1	+2.6			+0.0	54.9	76.9	-22.0	None
7	22767.964 M	42.1	+10.0	+2.4			+0.0	54.5	76.9	-22.4	None
8	21824.850 M	42.0	+10.0	+2.4			+0.0	54.4	76.9	-22.5	None
9	137.471k	44.3	+9.7	+0.0			+0.0	54.0	76.9	-22.9	None
10	24968.563 M	41.3	+10.1	+2.6			+0.0	54.0	76.9	-22.9	None
11	24182.635 M	41.3	+10.1	+2.5			+0.0	53.9	76.9	-23.0	None
12	23155.688 M	40.8	+10.1	+2.5			+0.0	53.4	76.9	-23.5	None
13	15359.280 M	41.2	+10.0	+2.0			+0.0	53.2	76.9	-23.7	None
14	13583.311 M	41.2	+10.0	+1.8			+0.0	53.0	76.9	-23.9	None
15	22998.503 M	40.4	+10.0	+2.5			+0.0	52.9	76.9	-24.0	None
16	13232.982 M	40.9	+10.0	+1.8			+0.0	52.7	76.9	-24.2	None
17	20881.736 M	40.3	+10.0	+2.4			+0.0	52.7	76.9	-24.2	None

18	21049.400 M	40.3	+10.0	+2.4		+0.0	52.7	76.9	-24.2	None
19	20808.382 M	40.2	+10.0	+2.4		+0.0	52.6	76.9	-24.3	None
20	20661.676 M	40.0	+10.1	+2.4		+0.0	52.5	76.9	-24.4	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:02:48 AM
Tested By:	Hoang Cao	Sequence#:	12
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

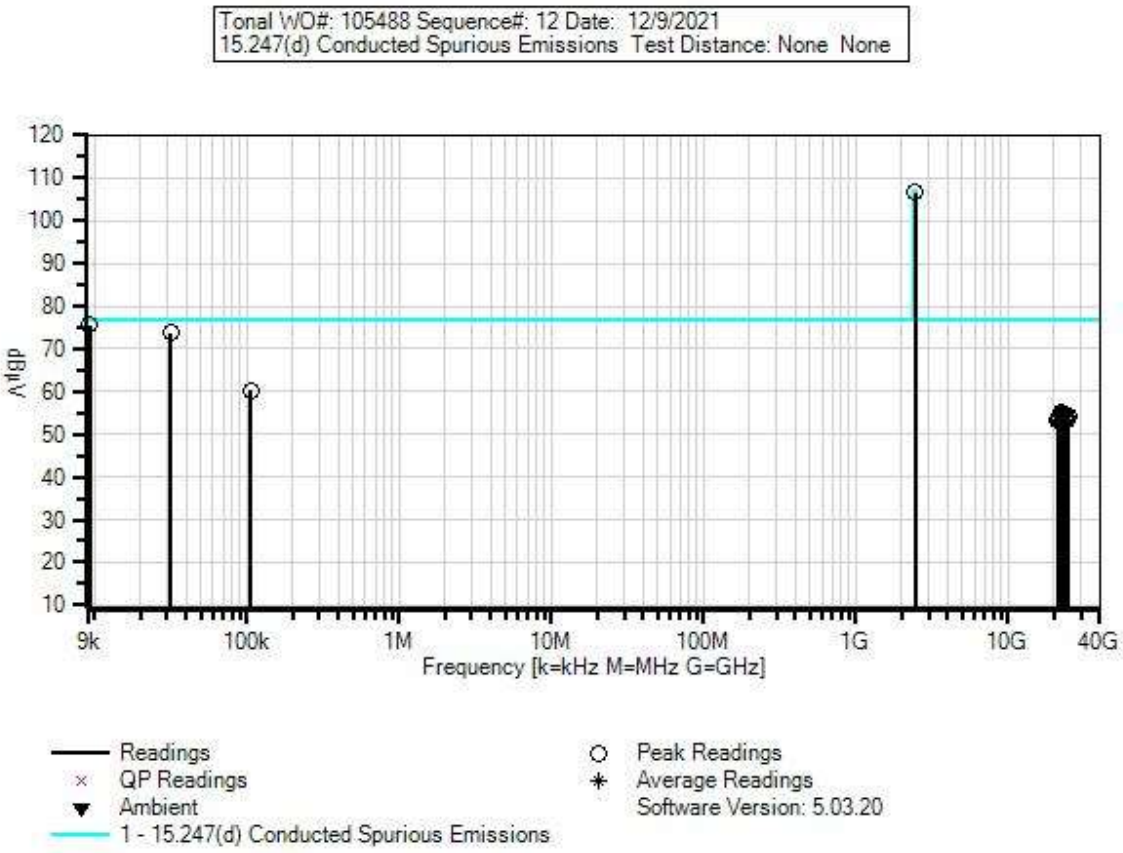
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11g
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2460.614M	95.9	+9.9	+0.8			+0.0	106.6	106.9	-0.3	None
2	9.328k	65.8	+9.7	+0.0			+0.0	75.5	76.9	-1.4	None
3	31.671k	64.1	+9.7	+0.0			+0.0	73.8	76.9	-3.1	None
4	106.707k	50.5	+9.7	+0.0			+0.0	60.2	76.9	-16.7	None
5	22275.449 M	42.8	+10.1	+2.4			+0.0	55.3	76.9	-21.6	None
6	21961.077 M	42.3	+10.1	+2.4			+0.0	54.8	76.9	-22.1	None
7	21772.454 M	42.0	+10.0	+2.4			+0.0	54.4	76.9	-22.5	None
8	24863.772 M	41.7	+10.1	+2.6			+0.0	54.4	76.9	-22.5	None
9	23627.245 M	41.5	+10.1	+2.5			+0.0	54.1	76.9	-22.8	None
10	24507.485 M	41.3	+10.1	+2.5			+0.0	53.9	76.9	-23.0	None
11	21667.664 M	41.4	+10.0	+2.4			+0.0	53.8	76.9	-23.1	None
12	23836.826 M	41.0	+10.1	+2.5			+0.0	53.6	76.9	-23.3	None
13	24444.611 M	40.9	+10.1	+2.5			+0.0	53.5	76.9	-23.4	None
14	21510.478 M	41.0	+10.0	+2.4			+0.0	53.4	76.9	-23.5	None
15	21604.790 M	41.0	+10.0	+2.4			+0.0	53.4	76.9	-23.5	None
16	23994.012 M	40.8	+10.1	+2.5			+0.0	53.4	76.9	-23.5	None
17	21426.646 M	40.9	+10.0	+2.4			+0.0	53.3	76.9	-23.6	None

18	21206.586 M	40.8	+10.0	+2.4		+0.0	53.2	76.9	-23.7	None
19	23281.437 M	40.6	+10.1	+2.5		+0.0	53.2	76.9	-23.7	None
20	24130.239 M	40.6	+10.1	+2.5		+0.0	53.2	76.9	-23.7	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:44:21 AM
Tested By:	Hoang Cao	Sequence#:	13
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

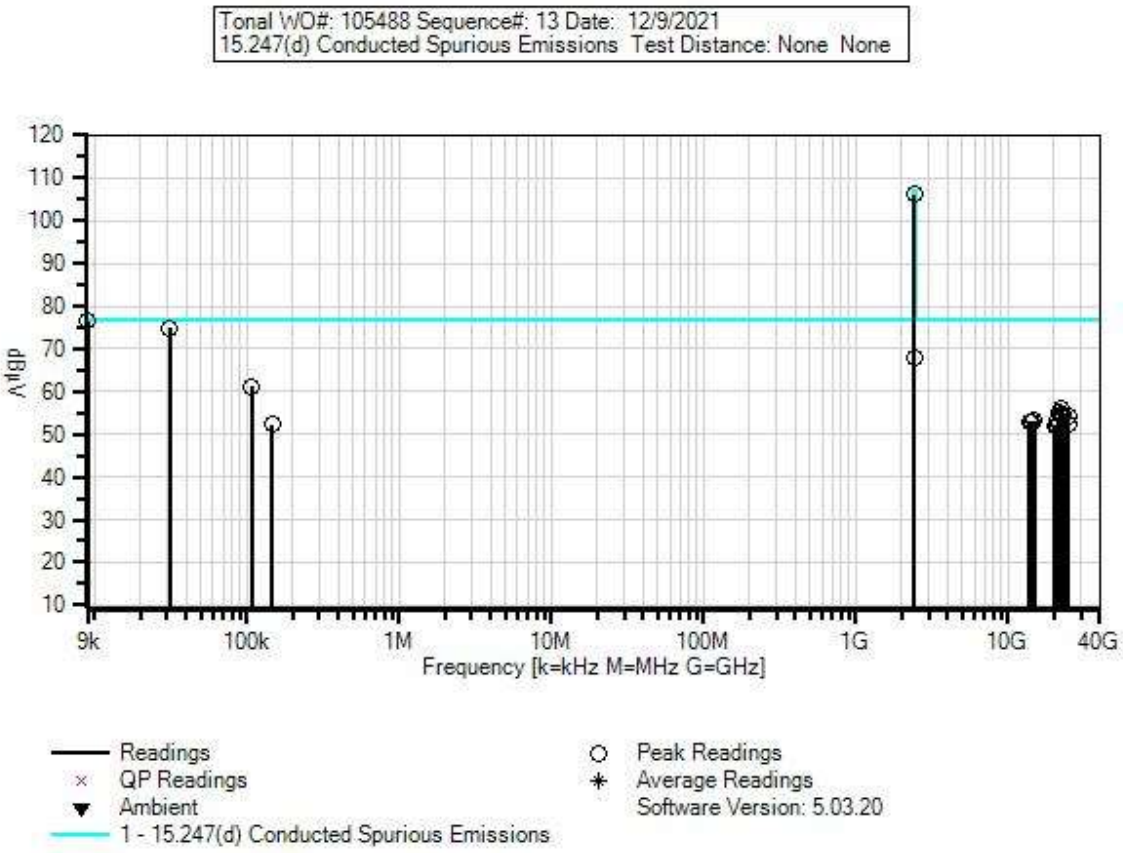
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11n 20MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.000k	66.9	+9.7	+0.0			+0.0	76.6	76.8	-0.2	None
2	2409.743M	95.4	+9.9	+0.8			+0.0	106.1	106.8	-0.7	None
3	31.141k	65.2	+9.7	+0.0			+0.0	74.9	76.8	-1.9	None
4	2397.773M	57.4	+9.9	+0.8			+0.0	68.1	76.8	-8.7	None
5	107.228k	51.5	+9.7	+0.0			+0.0	61.2	76.8	-15.6	None
6	22013.472 M	43.4	+10.1	+2.4			+0.0	55.9	76.8	-20.9	None
7	21772.454 M	42.9	+10.0	+2.4			+0.0	55.3	76.8	-21.5	None
8	22715.568 M	42.3	+10.0	+2.4			+0.0	54.7	76.8	-22.1	None
9	22422.155 M	42.0	+10.1	+2.4			+0.0	54.5	76.8	-22.3	None
10	24811.377 M	41.6	+10.1	+2.6			+0.0	54.3	76.8	-22.5	None
11	22883.233 M	41.6	+10.0	+2.5			+0.0	54.1	76.8	-22.7	None
12	21164.670 M	40.8	+10.0	+2.4			+0.0	53.2	76.8	-23.6	None
13	14835.327 M	41.2	+10.0	+1.9			+0.0	53.1	76.8	-23.7	None
14	14283.969 M	41.1	+10.0	+1.9			+0.0	53.0	76.8	-23.8	None
15	21499.999 M	40.6	+10.0	+2.4			+0.0	53.0	76.8	-23.8	None
16	13676.045 M	41.0	+10.0	+1.9			+0.0	52.9	76.8	-23.9	None
17	24643.713 M	40.0	+10.1	+2.5			+0.0	52.6	76.8	-24.2	None

18	146.857k	42.6	+9.7	+0.0		+0.0	52.3	76.8	-24.5	None
19	20221.556 M	39.6	+10.1	+2.4		+0.0	52.1	76.8	-24.7	None
20	20871.257 M	39.7	+10.0	+2.4		+0.0	52.1	76.8	-24.7	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:51:43 AM
Tested By:	Hoang Cao	Sequence#:	14
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

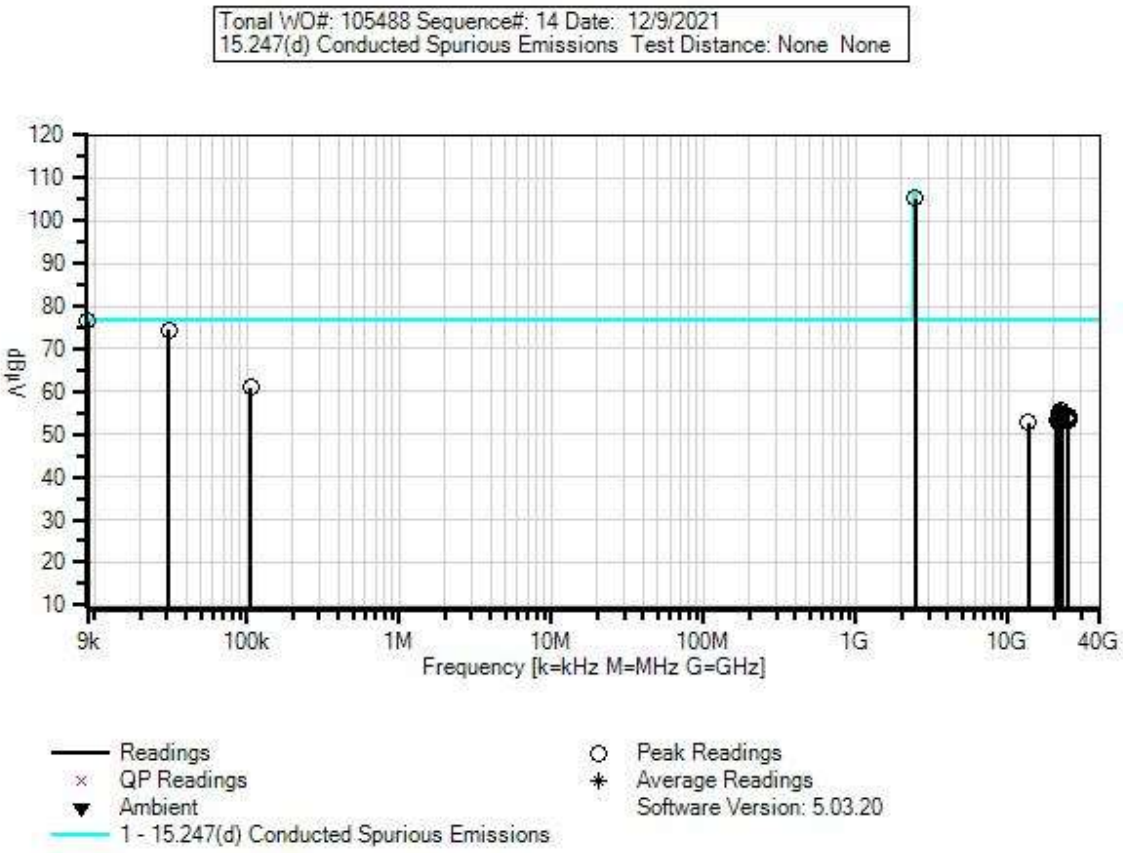
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11n 20MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.086k	66.7	+9.7	+0.0			+0.0	76.4	76.8	-0.4	None
2	2448.644M	94.6	+9.9	+0.8			+0.0	105.3	106.8	-1.5	None
3	30.990k	64.7	+9.7	+0.0			+0.0	74.4	76.8	-2.4	None
4	106.707k	51.3	+9.7	+0.0			+0.0	61.0	76.8	-15.8	None
5	22065.868 M	43.3	+10.1	+2.4			+0.0	55.8	76.8	-21.0	None
6	22149.700 M	42.9	+10.1	+2.4			+0.0	55.4	76.8	-21.4	None
7	21793.413 M	42.7	+10.0	+2.4			+0.0	55.1	76.8	-21.7	None
8	21835.329 M	42.1	+10.0	+2.4			+0.0	54.5	76.8	-22.3	None
9	21499.999 M	41.9	+10.0	+2.4			+0.0	54.3	76.8	-22.5	None
10	24895.210 M	41.4	+10.1	+2.6			+0.0	54.1	76.8	-22.7	None
11	22411.676 M	41.5	+10.1	+2.4			+0.0	54.0	76.8	-22.8	None
12	24423.653 M	41.4	+10.1	+2.5			+0.0	54.0	76.8	-22.8	None
13	22485.029 M	41.4	+10.0	+2.4			+0.0	53.8	76.8	-23.0	None
14	24937.126 M	40.8	+10.1	+2.6			+0.0	53.5	76.8	-23.3	None
15	20829.341 M	41.0	+10.0	+2.4			+0.0	53.4	76.8	-23.4	None
16	24486.527 M	40.6	+10.1	+2.5			+0.0	53.2	76.8	-23.6	None
17	21458.083 M	40.7	+10.0	+2.4			+0.0	53.1	76.8	-23.7	None

18	24654.192 M	40.5	+10.1	+2.5		+0.0	53.1	76.8	-23.7	None
19	21258.981 M	40.5	+10.0	+2.4		+0.0	52.9	76.8	-23.9	None
20	13583.311 M	41.0	+10.0	+1.8		+0.0	52.8	76.8	-24.0	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	10:58:21 AM
Tested By:	Hoang Cao	Sequence#:	15
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

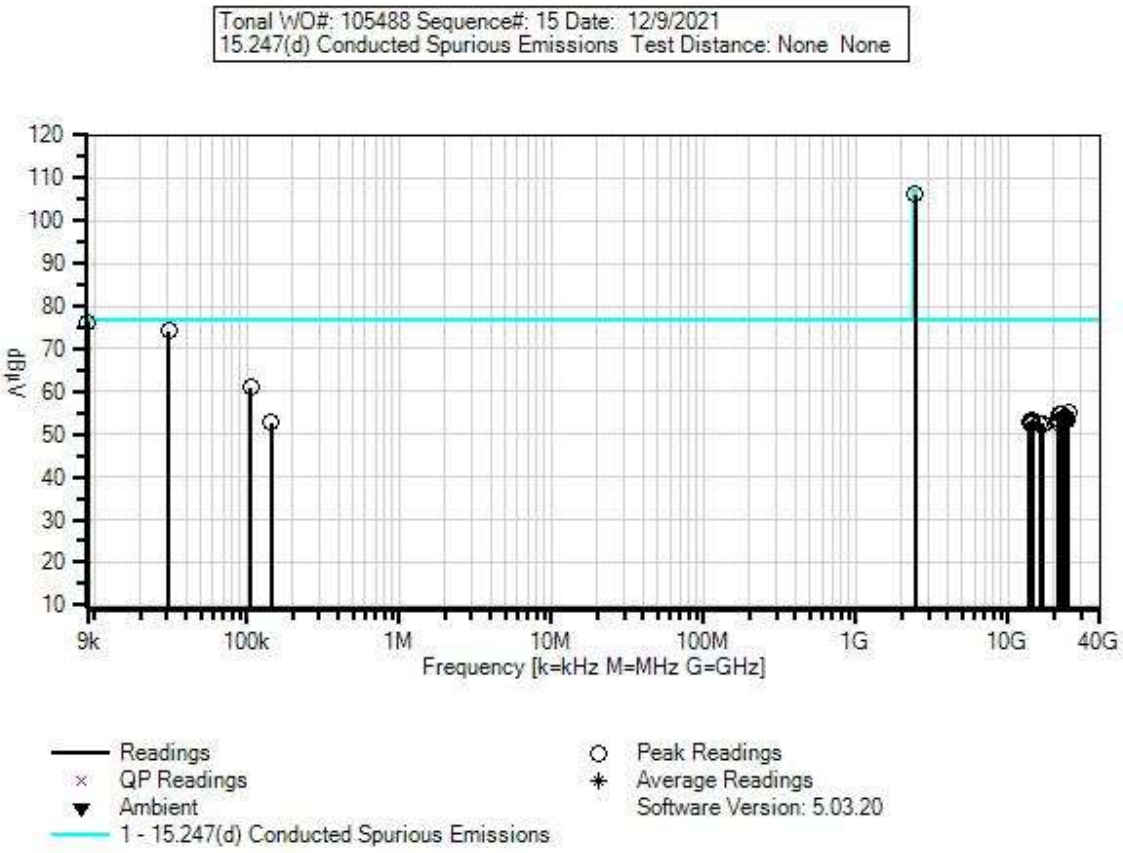
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11n 20MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.064k	66.5	+9.7	+0.0			+0.0	76.2	76.8	-0.6	None
2	2463.606M	95.5	+9.9	+0.8			+0.0	106.2	106.8	-0.6	None
3	30.990k	64.4	+9.7	+0.0			+0.0	74.1	76.8	-2.7	None
4	106.707k	51.3	+9.7	+0.0			+0.0	61.0	76.8	-15.8	None
5	24821.856 M	42.3	+10.1	+2.6			+0.0	55.0	76.8	-21.8	None
6	21741.017 M	42.5	+10.0	+2.4			+0.0	54.9	76.8	-21.9	None
7	22002.993 M	42.3	+10.1	+2.4			+0.0	54.8	76.8	-22.0	None
8	23449.102 M	41.3	+10.1	+2.5			+0.0	53.9	76.8	-22.9	None
9	23899.700 M	41.3	+10.1	+2.5			+0.0	53.9	76.8	-22.9	None
10	23061.377 M	41.1	+10.0	+2.5			+0.0	53.6	76.8	-23.2	None
11	14263.361 M	41.6	+10.0	+1.9			+0.0	53.5	76.8	-23.3	None
12	24402.694 M	40.8	+10.1	+2.5			+0.0	53.4	76.8	-23.4	None
13	21541.916 M	40.7	+10.0	+2.4			+0.0	53.1	76.8	-23.7	None
14	13655.438 M	41.1	+10.0	+1.9			+0.0	53.0	76.8	-23.8	None
15	20944.610 M	40.5	+10.0	+2.4			+0.0	52.9	76.8	-23.9	None
16	144.250k	43.0	+9.7	+0.0			+0.0	52.7	76.8	-24.1	None
17	14376.703 M	40.8	+10.0	+1.9			+0.0	52.7	76.8	-24.1	None

18	14108.804 M	40.6	+10.0	+1.9		+0.0	52.5	76.8	-24.3	None
19	16826.346 M	40.2	+10.0	+2.2		+0.0	52.4	76.8	-24.4	None
20	16134.729 M	40.2	+10.0	+2.1		+0.0	52.3	76.8	-24.5	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	11:21:41 AM
Tested By:	Hoang Cao	Sequence#:	16
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

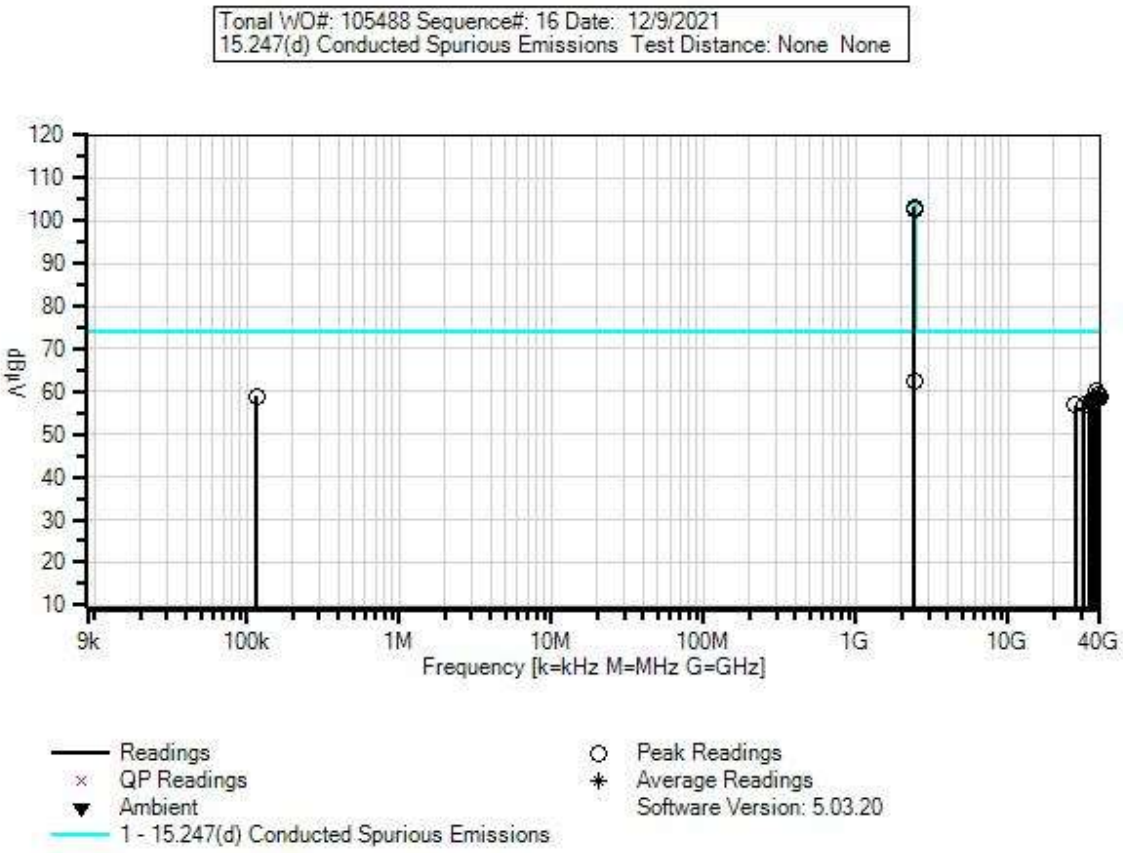
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Low Channel
802.11n 40MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2419.057M	92.6	+9.9	+0.8			+0.0	103.3	103.9	-0.6	None
2	2426.167M	92.0	+9.9	+0.8			+0.0	102.7	103.9	-1.2	None
3	2397.727M	51.7	+9.9	+0.8			+0.0	62.4	73.9	-11.5	None
4	37609.857 M	46.1	+10.6	+3.3			+0.0	60.0	73.9	-13.9	None
5	39151.164 M	45.1	+10.7	+3.5			+0.0	59.3	73.9	-14.6	None
6	38414.017 M	45.1	+10.6	+3.4			+0.0	59.1	73.9	-14.8	None
7	116.295k	49.3	+9.7	+0.0			+0.0	59.0	73.9	-14.9	None
8	39932.987 M	44.7	+10.7	+3.6			+0.0	59.0	73.9	-14.9	None
9	38793.760 M	44.3	+10.7	+3.5			+0.0	58.5	73.9	-15.4	None
10	36984.399 M	44.5	+10.6	+3.4			+0.0	58.5	73.9	-15.4	None
11	37207.777 M	44.4	+10.6	+3.3			+0.0	58.3	73.9	-15.6	None
12	36157.901 M	44.2	+10.5	+3.3			+0.0	58.0	73.9	-15.9	None
13	35979.199 M	44.1	+10.4	+3.3			+0.0	57.8	73.9	-16.1	None
14	34482.567 M	43.9	+10.4	+3.2			+0.0	57.5	73.9	-16.4	None
15	35376.079 M	43.8	+10.4	+3.3			+0.0	57.5	73.9	-16.4	None

16	27356.815 M	44.0	+10.2	+2.7		+0.0	56.9	73.9	-17.0	None
17	31355.278 M	43.5	+10.3	+3.0		+0.0	56.8	73.9	-17.1	None
18	31422.291 M	43.5	+10.3	+3.0		+0.0	56.8	73.9	-17.1	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	11:39:39 AM
Tested By:	Hoang Cao	Sequence#:	17
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

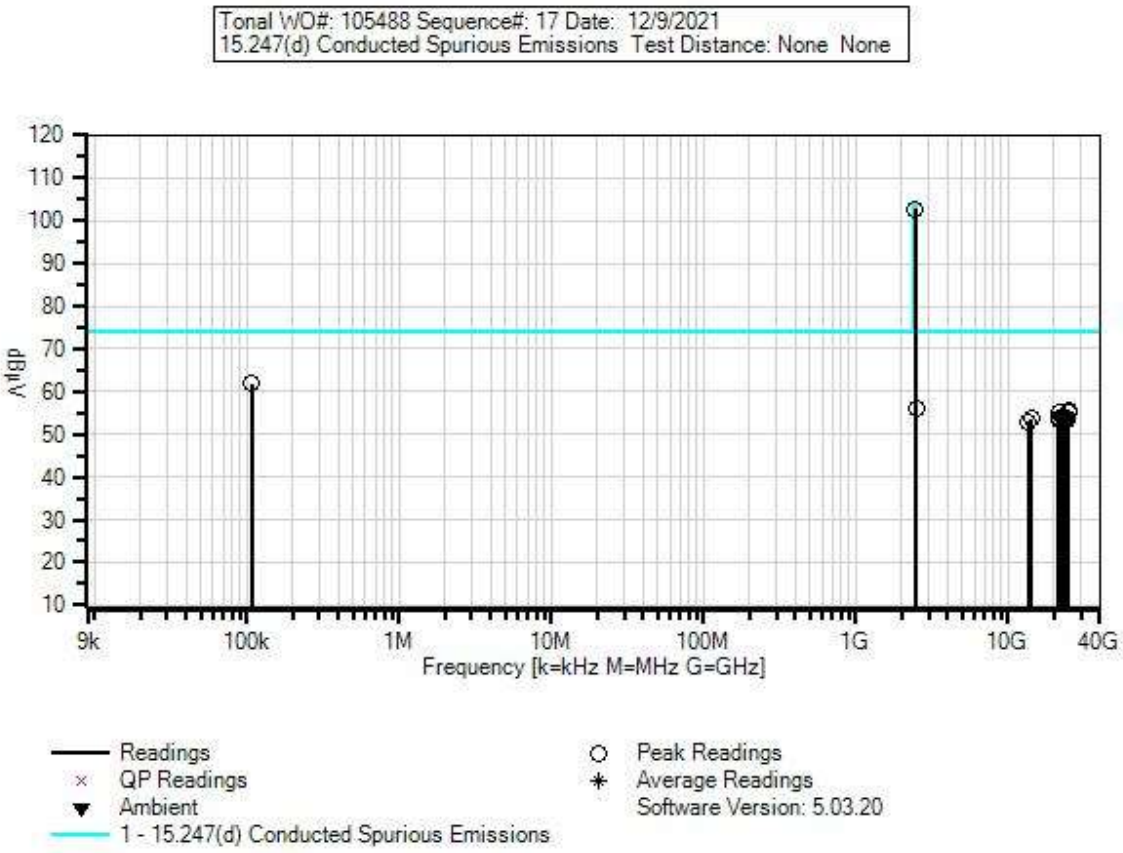
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
Middle Channel
802.11n 40MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2451.636M	92.1	+9.9	+0.8			+0.0	102.8	103.9	-1.1	None
2	107.489k	52.2	+9.7	+0.0			+0.0	61.9	73.9	-12.0	None
3	2484.553M	45.2	+9.9	+0.8			+0.0	55.9	73.9	-18.0	None
4	24800.898 M	42.8	+10.1	+2.6			+0.0	55.5	73.9	-18.4	None
5	21835.329 M	42.8	+10.0	+2.4			+0.0	55.2	73.9	-18.7	None
6	24821.856 M	42.3	+10.1	+2.6			+0.0	55.0	73.9	-18.9	None
7	22652.694 M	41.7	+10.0	+2.4			+0.0	54.1	73.9	-19.8	None
8	22694.610 M	41.5	+10.0	+2.4			+0.0	53.9	73.9	-20.0	None
9	23952.096 M	41.2	+10.1	+2.5			+0.0	53.8	73.9	-20.1	None
10	23616.766 M	41.2	+10.1	+2.5			+0.0	53.8	73.9	-20.1	None
11	14150.020 M	41.8	+10.0	+1.9			+0.0	53.7	73.9	-20.2	None
12	21217.065 M	41.3	+10.0	+2.4			+0.0	53.7	73.9	-20.2	None
13	22914.670 M	41.1	+10.0	+2.5			+0.0	53.6	73.9	-20.3	None
14	23910.179 M	40.9	+10.1	+2.5			+0.0	53.5	73.9	-20.4	None
15	24182.635 M	40.9	+10.1	+2.5			+0.0	53.5	73.9	-20.4	None

16	24109.281 M	40.8	+10.1	+2.5		+0.0	53.4	73.9	-20.5	None
17	21531.436 M	40.8	+10.0	+2.4		+0.0	53.2	73.9	-20.7	None
18	13603.919 M	41.1	+10.0	+1.9		+0.0	53.0	73.9	-20.9	None

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 5102491170		
Customer:	**Tonal**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**105488**	Date:	12/9/2021
Test Type:	**Conducted Scan**	Time:	11:46:17 AM
Tested By:	Hoang Cao	Sequence#:	18
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

Conducted Spurious Emission
Frequency Range: 9kHz to 25GHz

Environmental Conditions:
Temperature: 21.8ºC
Humidity: 47%
Atmospheric Pressure: 101.5kPa

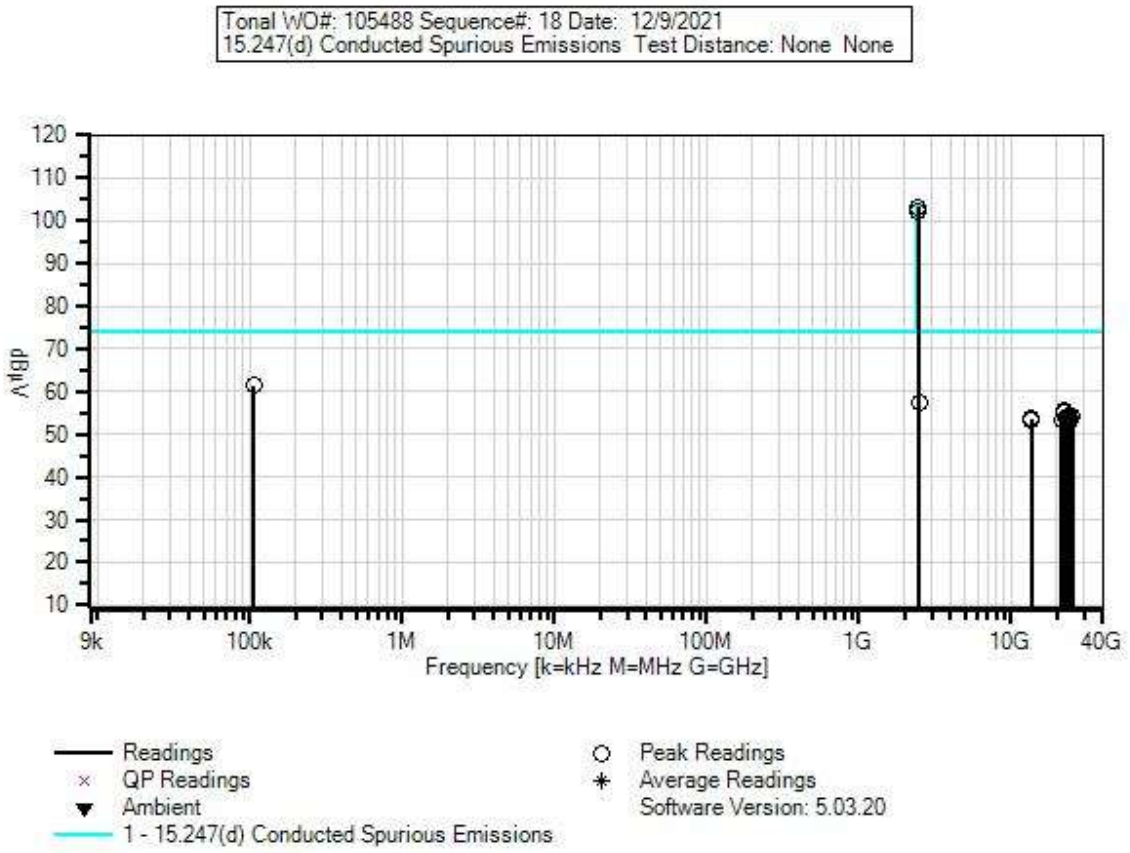
Highest Generated Frequency: 2.48GHz

Method: ANSI C63.10 2013

The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer. A laptop is used to send the command to the EUT.

RF output power: PL10

Note:
High Channel
802.11n 40MHz
Chain 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07365	Attenuator	54A-10	5/26/2021	5/26/2023
T2	ANP06904	Cable	32022-29094K-29094K-36TC	1/7/2020	1/7/2022
	AN03471	Spectrum Analyzer	E4440A	2/11/2020	2/11/2022

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2454.629M	92.5	+9.9	+0.8			+0.0	103.2	103.9	-0.7	None
2	2448.644M	91.3	+9.9	+0.8			+0.0	102.0	103.9	-1.9	None
3	106.967k	51.8	+9.7	+0.0			+0.0	61.5	73.9	-12.4	None
4	2484.553M	46.8	+9.9	+0.8			+0.0	57.5	73.9	-16.4	None
5	22055.389 M	43.1	+10.1	+2.4			+0.0	55.6	73.9	-18.3	None
6	22212.574 M	42.5	+10.1	+2.4			+0.0	55.0	73.9	-18.9	None
7	24811.377 M	41.7	+10.1	+2.6			+0.0	54.4	73.9	-19.5	None
8	24958.084 M	41.6	+10.1	+2.6			+0.0	54.3	73.9	-19.6	None
9	23742.515 M	41.5	+10.1	+2.5			+0.0	54.1	73.9	-19.8	None
10	23459.581 M	41.5	+10.1	+2.5			+0.0	54.1	73.9	-19.8	None
11	23113.772 M	41.4	+10.0	+2.5			+0.0	53.9	73.9	-20.0	None
12	23417.664 M	41.3	+10.1	+2.5			+0.0	53.9	73.9	-20.0	None
13	23260.479 M	41.2	+10.1	+2.5			+0.0	53.8	73.9	-20.1	None
14	13603.919 M	41.8	+10.0	+1.9			+0.0	53.7	73.9	-20.2	None
15	23920.658 M	41.0	+10.1	+2.5			+0.0	53.6	73.9	-20.3	None

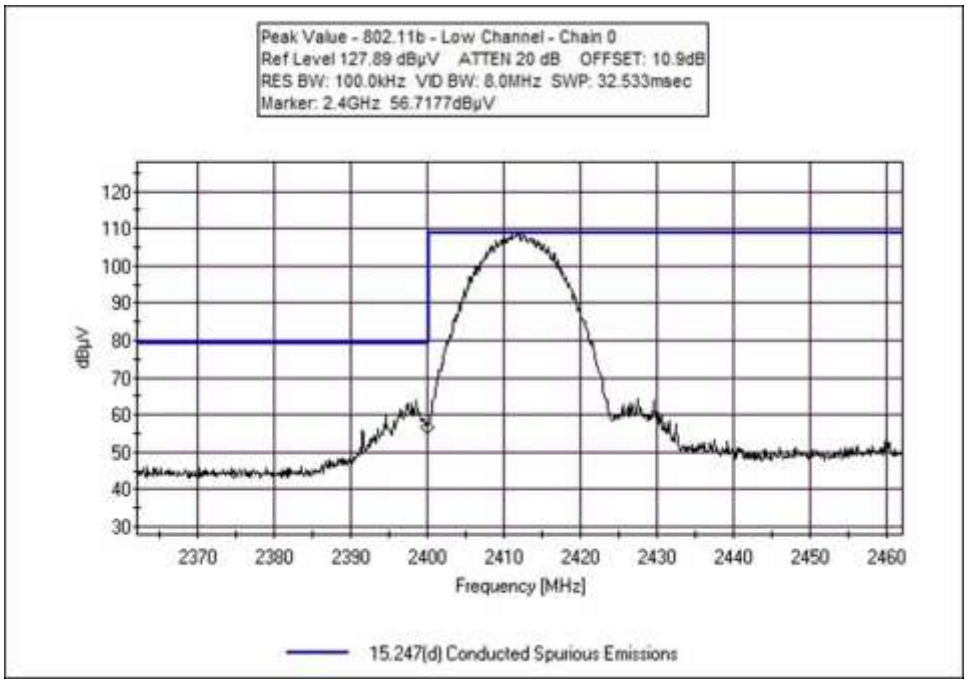
16	13573.007 M	41.7	+10.0	+1.8		+0.0	53.5	73.9	-20.4	None
17	21374.251 M	41.1	+10.0	+2.4		+0.0	53.5	73.9	-20.4	None
18	23889.221 M	40.6	+10.1	+2.5		+0.0	53.2	73.9	-20.7	None

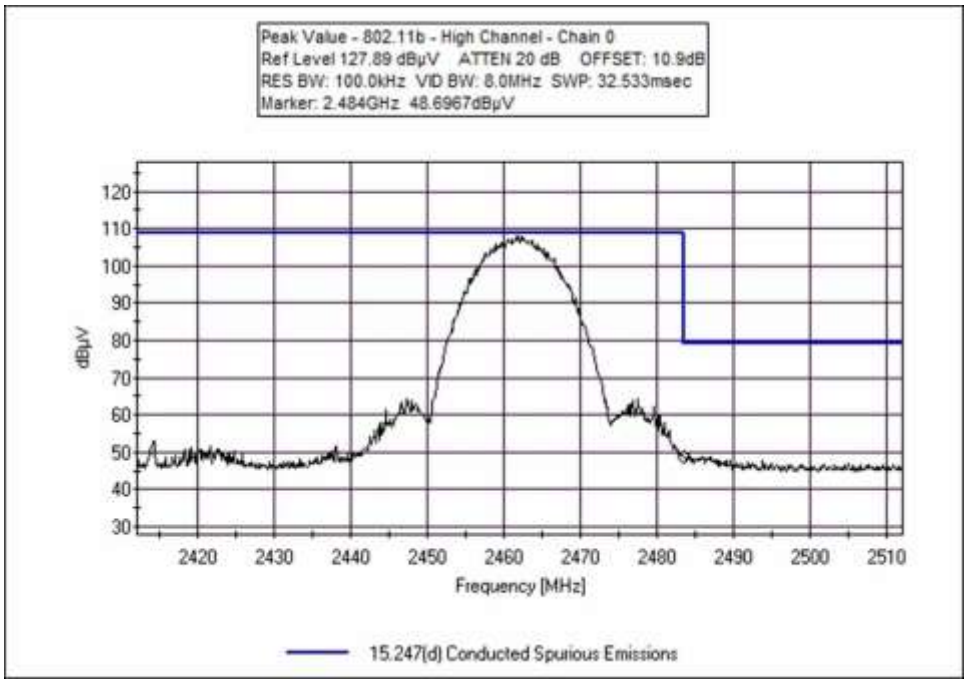
Band Edge

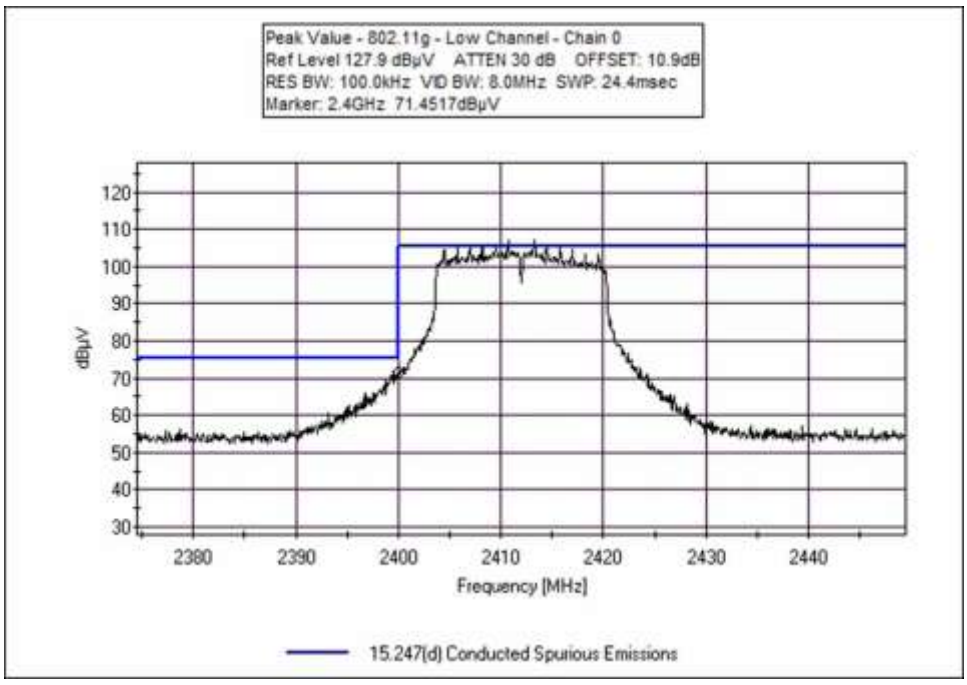
Band Edge Summary – Chain 0				
Limit applied: Max Power/100kHz - 30dB (When average power limit is applied).				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2400.0	802.11b	56.7177	<79.00	Pass
2483.5	802.11b	48.6967	<79.00	Pass
2400.0	802.11b	71.4517	<75.50	Pass
2483.5	802.11g	55.6497	<75.50	Pass
2400.0	802.11g	70.6467	<75.70	Pass
2483.5	802.11g	51.0457	<75.70	Pass
2400.0	802.11n HT20	66.3697	<73.90	Pass
2483.5	802.11n HT20	57.3467	<73.90	Pass

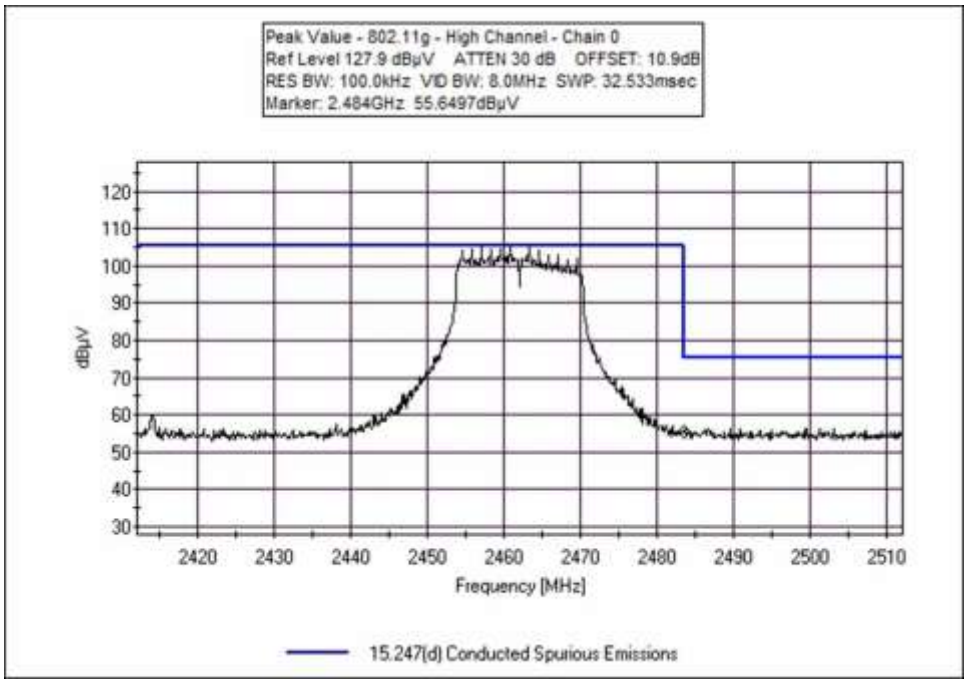
Band Edge Summary – Chain 1				
Limit applied: Max Power/100kHz - 30dB (When average power limit is applied).				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
2400.0	802.11b	51.8147	<79.30	Pass
2483.5	802.11b	47.6117	<79.30	Pass
2400.0	802.11b	70.9817	<76.9	Pass
2483.5	802.11g	50.1527	<76.9	Pass
2400.0	802.11g	71.5997	<76.80	Pass
2483.5	802.11g	50.7217	<76.80	Pass
2400.0	802.11n HT20	67.6617	<73.90	Pass
2483.5	802.11n HT20	54.2517	<73.90	Pass

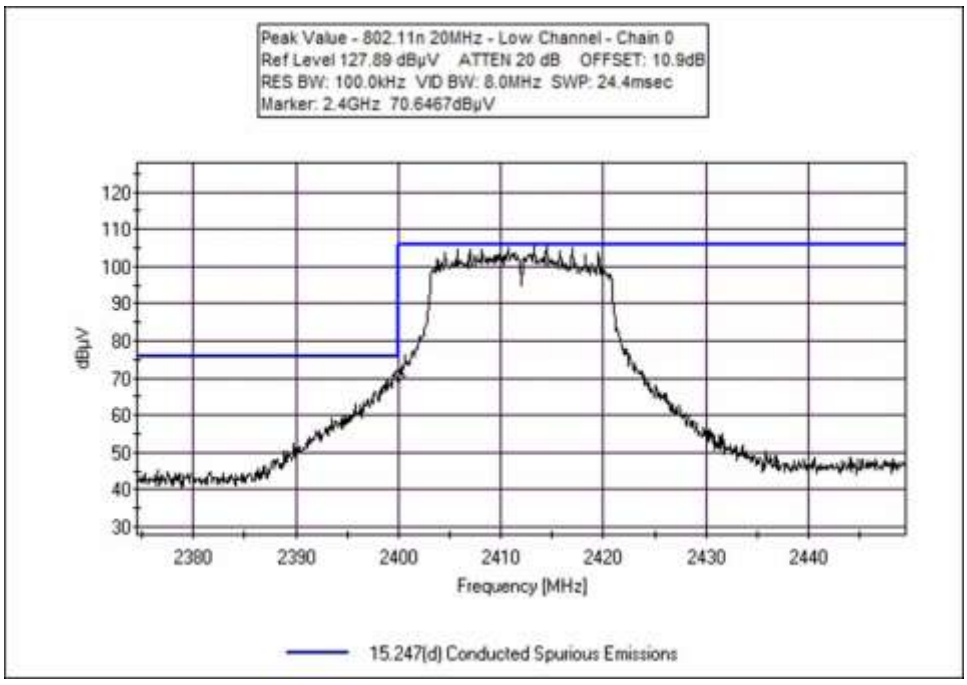
Band Edge Plots

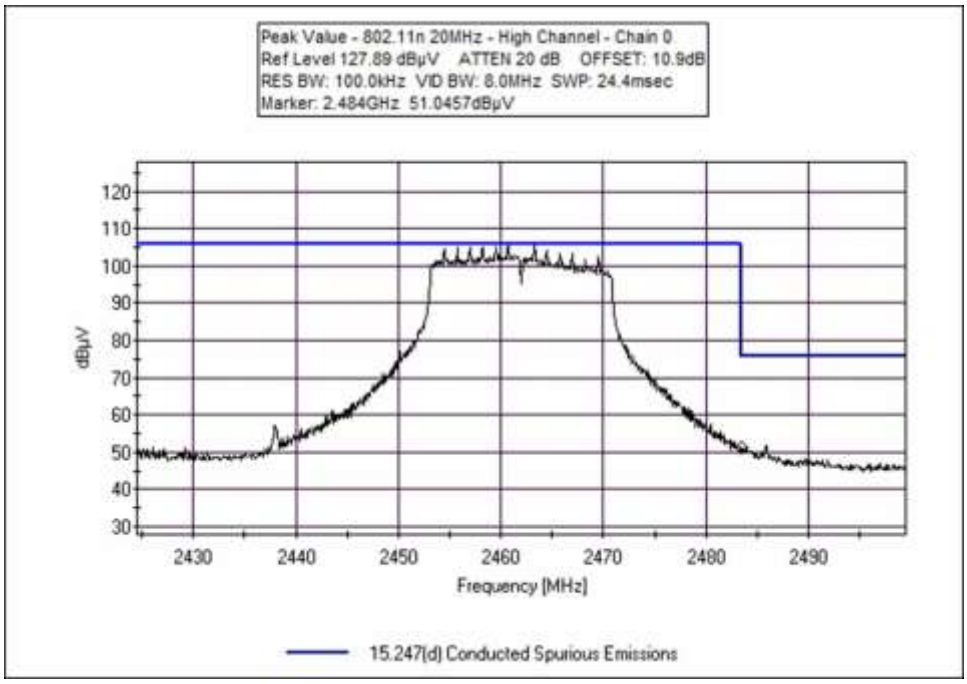


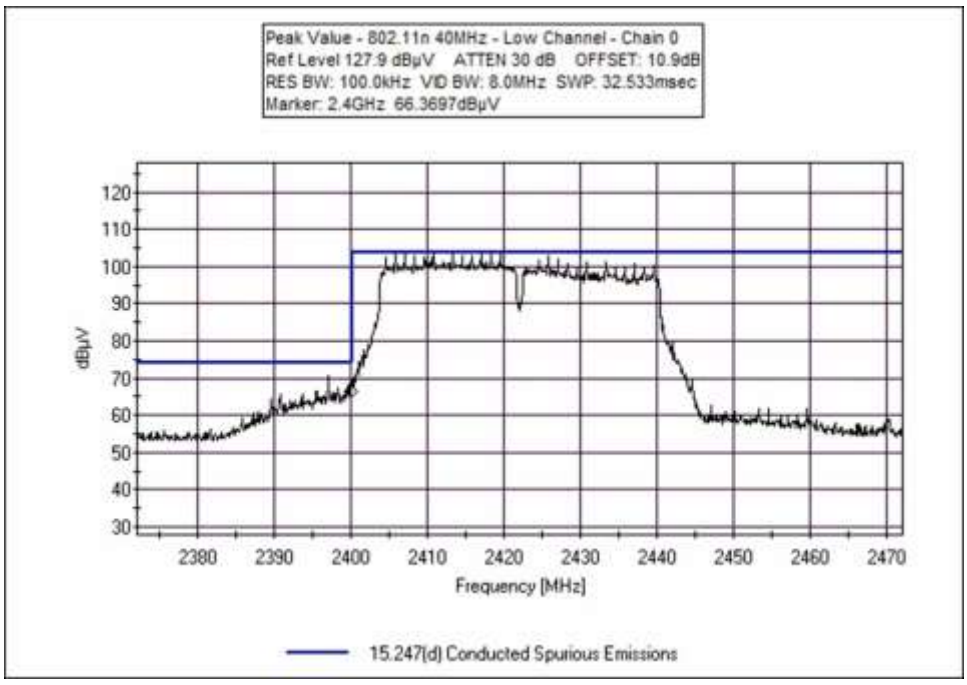


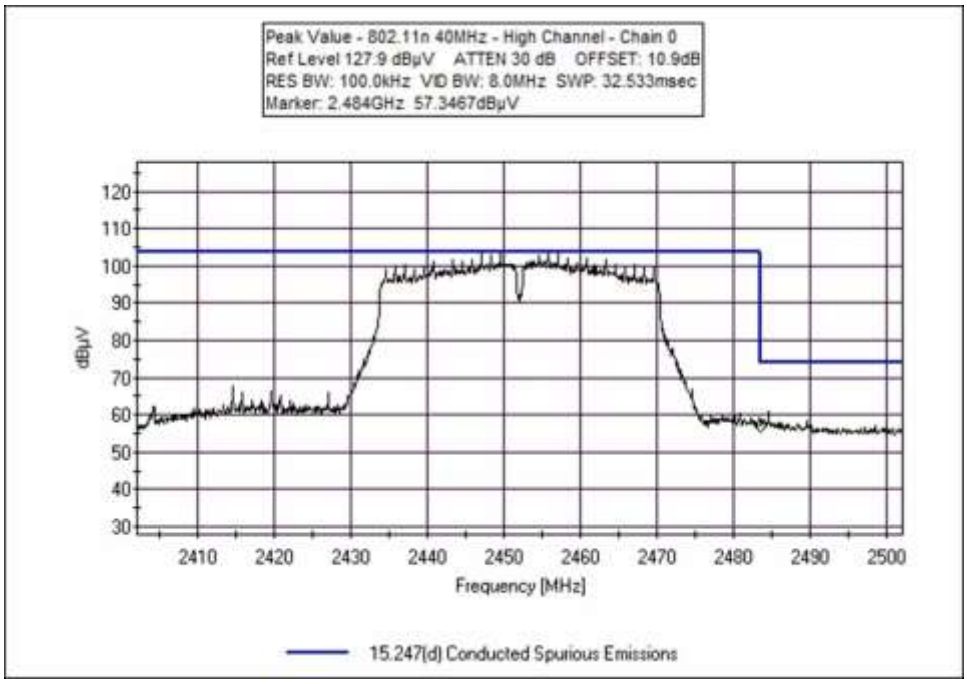

Peak Value - 802.11g - Low Channel - Chain 0
Ref Level 127.9 dBµV ATTEN 30 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 24.4msec
Marker: 2.4GHz 71.4517dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2380
2390
2400
2410
2420
2430
2440
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

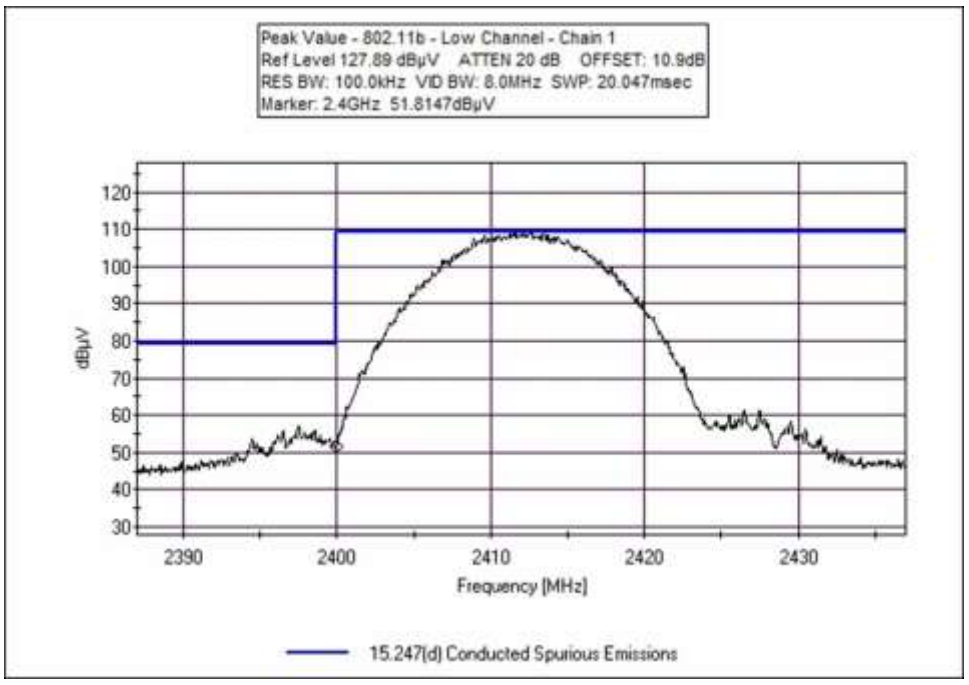

Peak Value - 802.11g - High Channel - Chain 0
Ref Level 127.9 dBµV ATTEN 30 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.484GHz 55.6497dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2420
2430
2440
2450
2460
2470
2480
2490
2500
2510
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

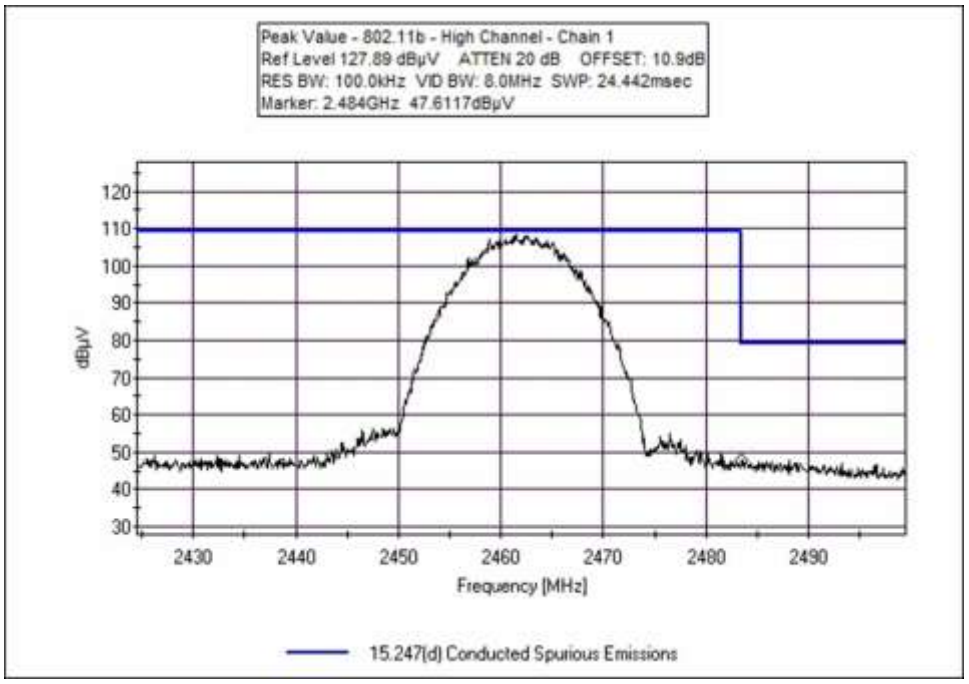

Peak Value - 802.11n 20MHz - Low Channel - Chain 0
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 24.4msec
Marker: 2.4GHz 70.6467dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2380
2390
2400
2410
2420
2430
2440
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

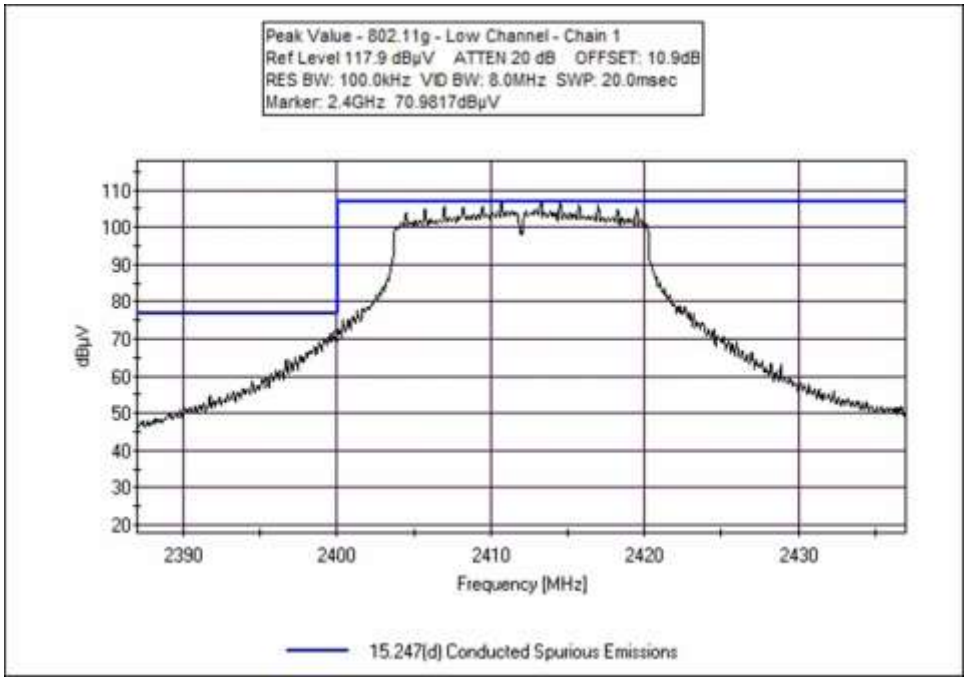

Peak Value - 802.11n 20MHz - High Channel - Chain 0
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 24.4msec
Marker: 2.484GHz 51.0457dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2430
2440
2450
2460
2470
2480
2490
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

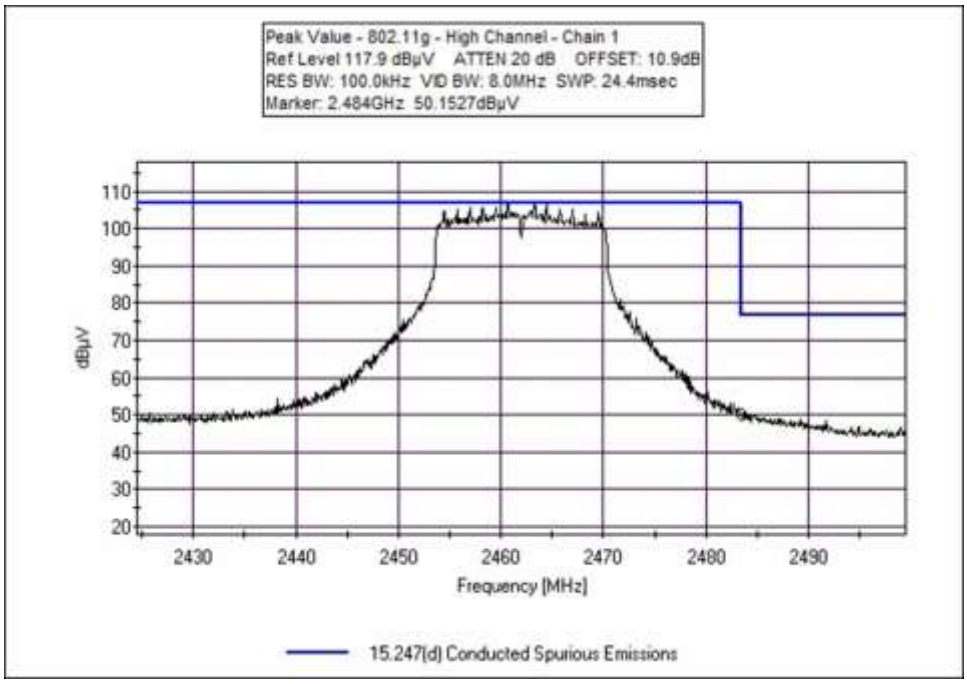

Peak Value - 802.11n 40MHz - Low Channel - Chain 0
Ref Level 127.9 dBµV ATTEN 30 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.4GHz 66.3697dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2380
2390
2400
2410
2420
2430
2440
2450
2460
2470
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

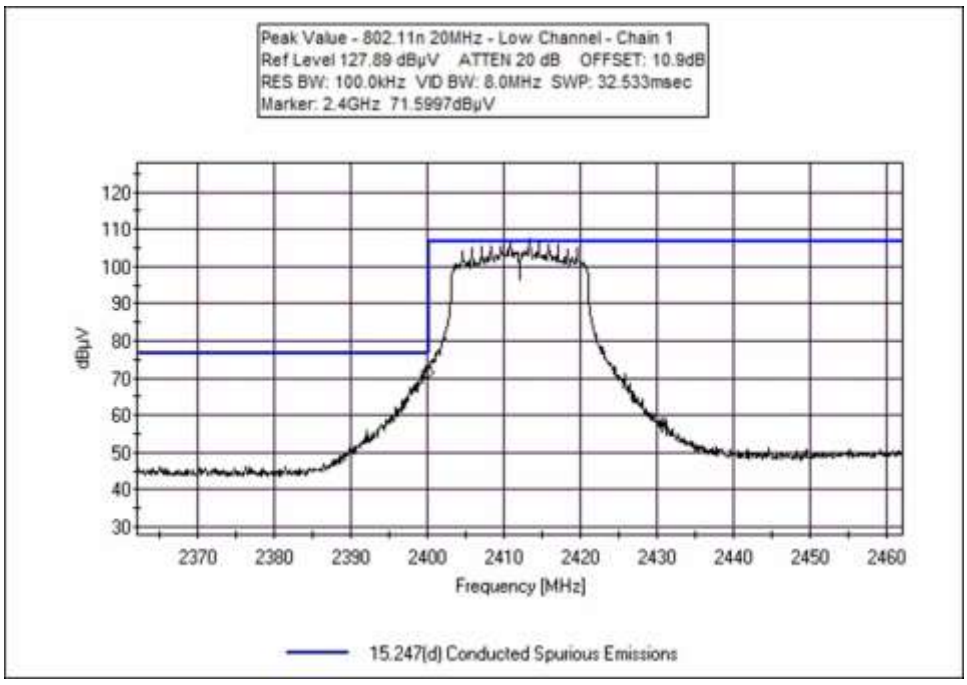

Peak Value - 802.11n 40MHz - High Channel - Chain 0
Ref Level 127.9 dBµV ATTEN 30 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.484GHz 57.3467dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2410
2420
2430
2440
2450
2460
2470
2480
2490
2500
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

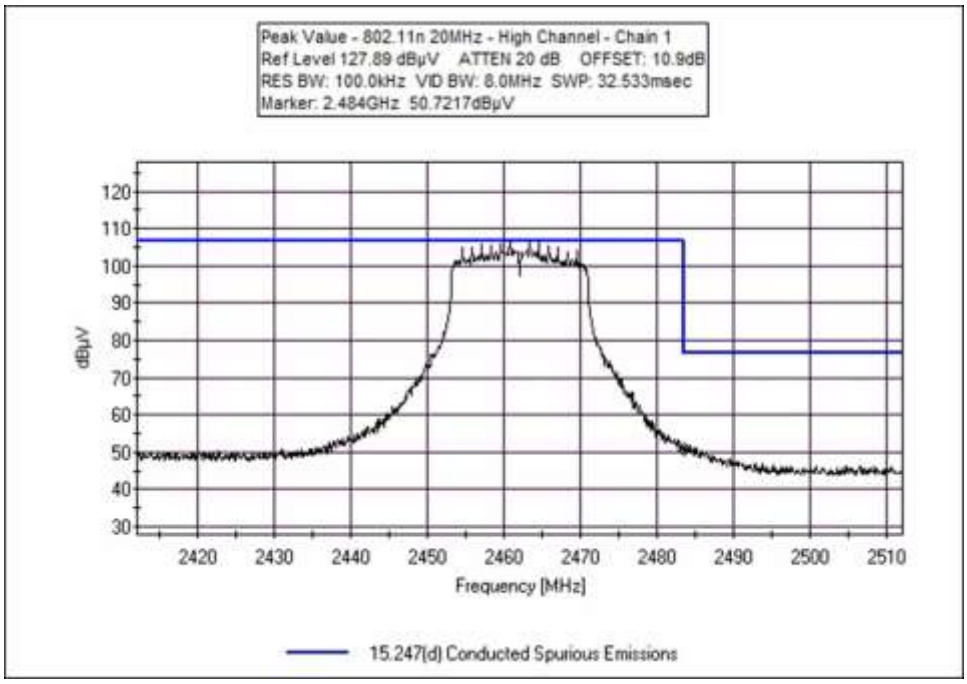

Peak Value - 802.11b - Low Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 20.047msec
Marker: 2.4GHz 51.8147dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2390
2400
2410
2420
2430
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

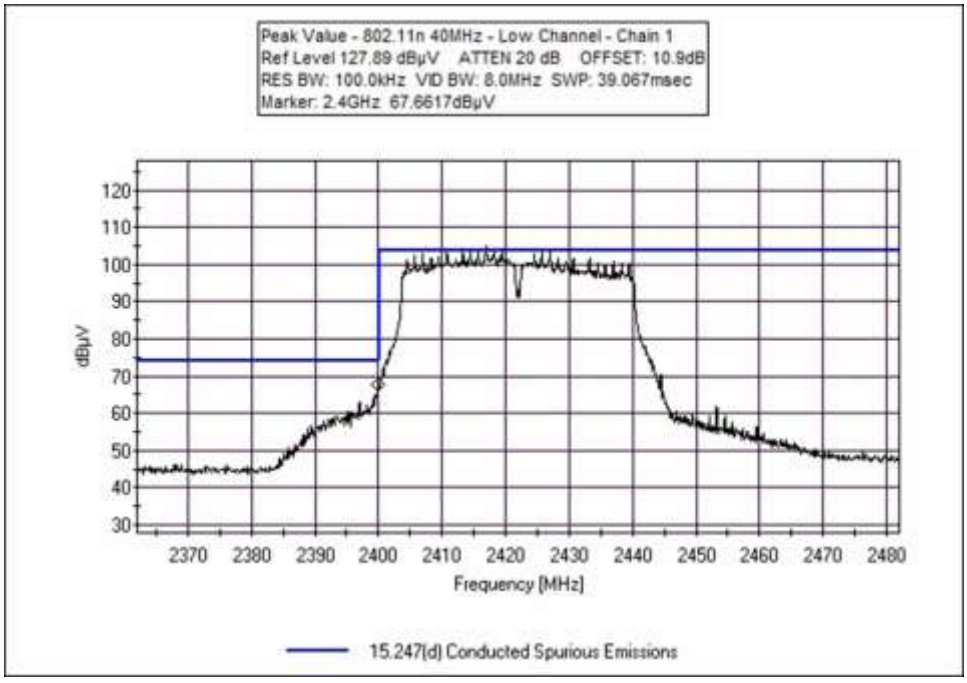

Peak Value - 802.11b - High Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 24.442msec
Marker: 2.484GHz 47.6117dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2430
2440
2450
2460
2470
2480
2490
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

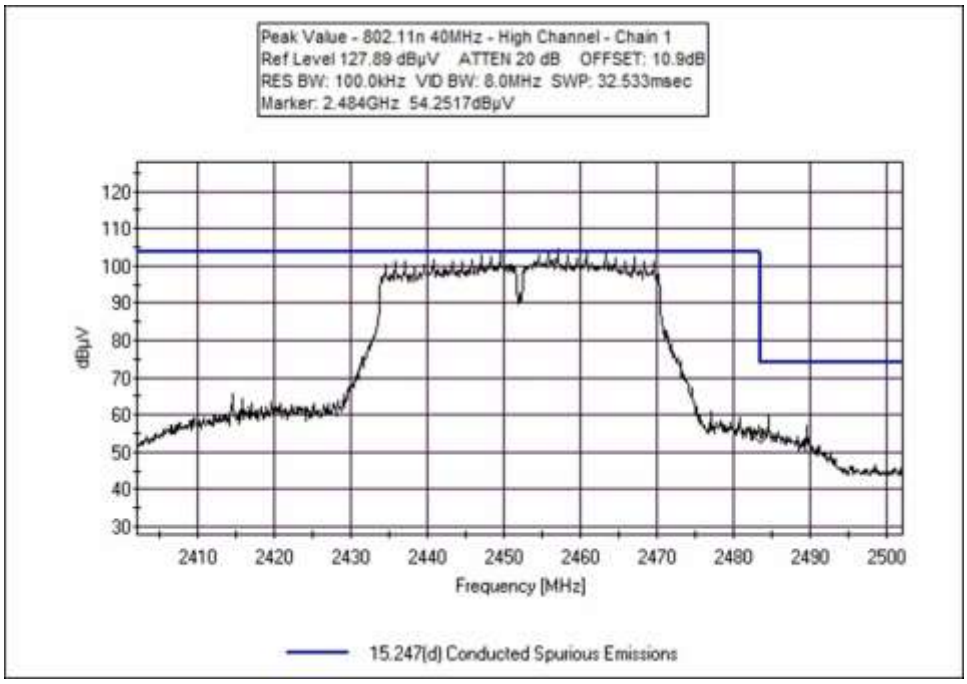

Peak Value - 802.11g - Low Channel - Chain 1
Ref Level 117.9 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 20.0msec
Marker: 2.4GHz 70.9817dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
2390
2400
2410
2420
2430
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Peak Value - 802.11g - High Channel - Chain 1
Ref Level 117.9 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 24.4msec
Marker: 2.484GHz 50.1527dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
2430
2440
2450
2460
2470
2480
2490
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Peak Value - 802.11n 20MHz - Low Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.4GHz 71.5997dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2370
2380
2390
2400
2410
2420
2430
2440
2450
2460
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Peak Value - 802.11n 20MHz - High Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.484GHz 50.7217dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2420
2430
2440
2450
2460
2470
2480
2490
2500
2510
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Peak Value - 802.11n 40MHz - Low Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 39.067msec
Marker: 2.4GHz 67.6617dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2370 2380 2390 2400 2410 2420 2430 2440 2450 2460 2470 2480
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Peak Value - 802.11n 40MHz - High Channel - Chain 1
Ref Level 127.89 dBµV ATTEN 20 dB OFFSET: 10.9dB
RES BW: 100.0kHz VID BW: 8.0MHz SWP: 32.533msec
Marker: 2.484GHz 54.2517dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
2410 2420 2430 2440 2450 2460 2470 2480 2490 2500
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Note: Chain 0 is the worst case based on the investigation on RF output power before measuring Radiated Spurious Emission.

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**105488**	Date:	12/18/2021
Test Type:	**Radiated Scan**	Time:	21:45:45
Tested By:	Randy Clark	Sequence#:	67
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emission
Frequency Range: 9kHz to 1GHz

Environmental Conditions:
Temperature: 21.4ºC
Humidity: 36%
Atmospheric Pressure: 101.9kPa

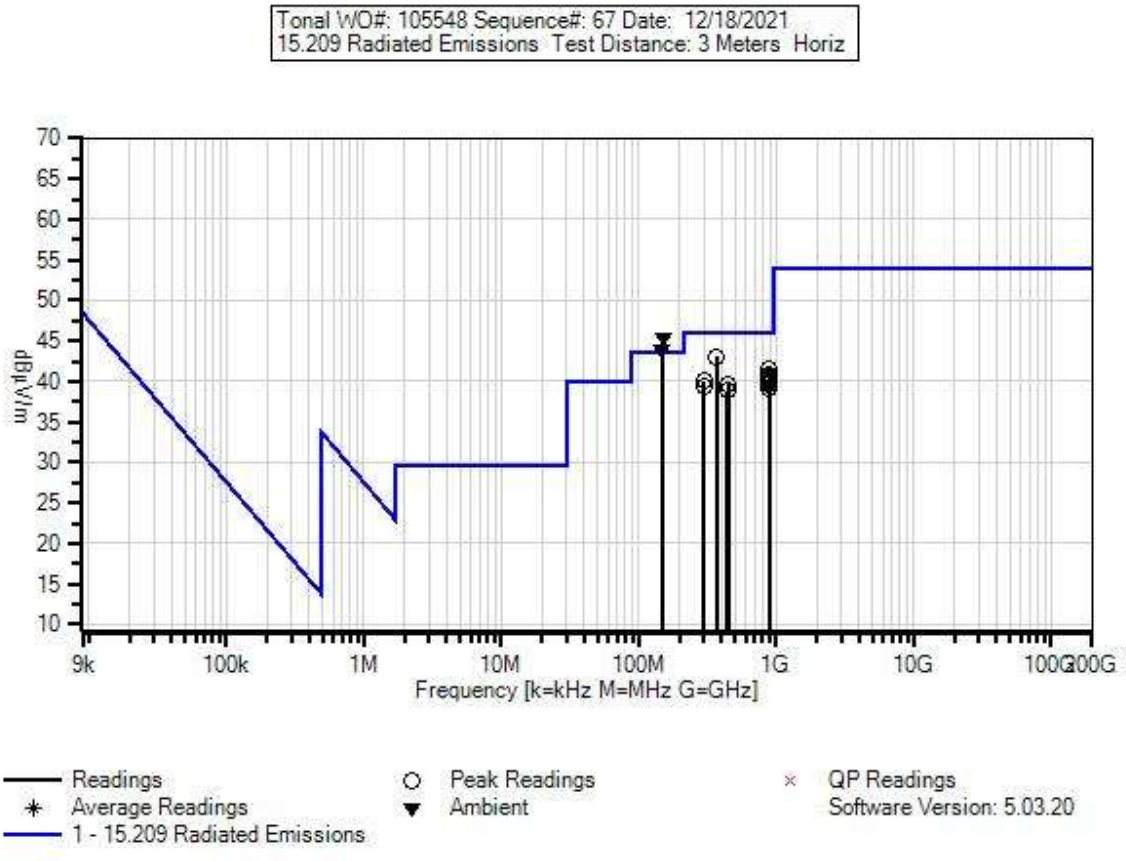
Method: ANSI C63.10 2013

The unit is mounted to a floor standing rack as to simulate typical wall mounted setup. One weight line is extended to the floor.
WiFi is set to 2447 MHz with CCK modulation type, 1MBPS at power level 10, chain 0 with repeating pattern of 0s and 1s with duty cycle at 98%.
Chain 0
Operational mode is representative of worst case.

Measurements marked as Unintentional have been evaluated with radios turned off and determined not to be radio emissions. Indicated emissions are ignored for the purposes of this report.

Notes:
Touch screen display: Direct bond 2312
Power Supply: Artesyn
Display is showing home screen

Modifications #1, #2, #3 #4, #5 and #6 were in place during testing.
No emissions from EUT has been found in 20dB tolerance in the frequency range 9kHz to 30MHz.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07508	Preamp	310N	7/9/2020	7/9/2022
T2	AN00852	Biconilog Antenna	CBL 6111C	4/14/2020	4/14/2022
T3	ANP06049	Attenuator	PE7002-6	5/11/2020	5/11/2022
T4	ANP01187	Cable	CNT-195	7/6/2020	7/6/2022
T5	ANP06691	Cable	PE3062-180	3/25/2020	3/25/2022
T6	ANP06694	Cable	PE3062-480	3/25/2020	3/25/2022
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
	AN00432	Loop Antenna	6502	7/19/2021	7/19/2023

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	149.402M Ambient	58.4	-32.0 +0.4	+11.5 +1.1	+5.9	+0.2	+0.0	45.5	43.5 Unintentional emissions	+2.0	Horiz
2	147.600M Ambient	56.9	-32.0 +0.4	+11.5 +1.1	+5.9	+0.2	+0.0	44.0	43.5 Unintentional emissions	+0.5	Horiz
3	370.302M	50.9	-31.9 +0.7	+15.0 +1.9	+6.0	+0.4	+0.0	43.0	46.0	-3.0	Horiz
4	884.656M	38.8	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	41.5	46.0	-4.5	Horiz
5	885.377M	38.2	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	40.9	46.0	-5.1	Horiz
6	888.740M	38.2	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	40.9	46.0	-5.1	Horiz
7	886.458M	38.0	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	40.7	46.0	-5.3	Horiz
8	886.098M	37.6	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	40.3	46.0	-5.7	Horiz
9	893.305M	37.3	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	40.1	46.0	-5.9	Horiz
10	297.870M	50.1	-31.9 +0.6	+13.2 +1.6	+6.0	+0.4	+0.0	40.0	46.0	-6.0	Horiz
11	894.146M	37.1	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.9	46.0	-6.1	Horiz
12	893.785M	37.0	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.8	46.0	-6.2	Horiz
13	446.699M	45.4	-31.9 +0.8	+16.9 +2.1	+5.9	+0.5	+0.0	39.7	46.0	-6.3	Horiz
14	448.621M	45.3	-31.9 +0.8	+17.0 +2.1	+5.9	+0.5	+0.0	39.7	46.0	-6.3	Horiz
15	897.389M	36.7	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.5	46.0	-6.5	Horiz
16	298.951M	49.5	-31.9 +0.6	+13.2 +1.6	+6.0	+0.4	+0.0	39.4	46.0	-6.6	Horiz
17	895.587M	36.4	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.2	46.0	-6.8	Horiz
18	896.548M	36.4	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.2	46.0	-6.8	Horiz
19	891.984M	36.4	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	39.1	46.0	-6.9	Horiz
20	444.416M	44.5	-31.9 +0.8	+16.9 +2.1	+5.9	+0.5	+0.0	38.8	46.0	-7.2	Horiz

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**15.209 Radiated Emissions**		
Work Order #:	**105488**	Date:	12/18/2021
Test Type:	**Radiated Scan**	Time:	9:22:35 PM
Tested By:	Randy Clark	Sequence#:	66
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emission
Frequency Range: 9kHz to 1GHz

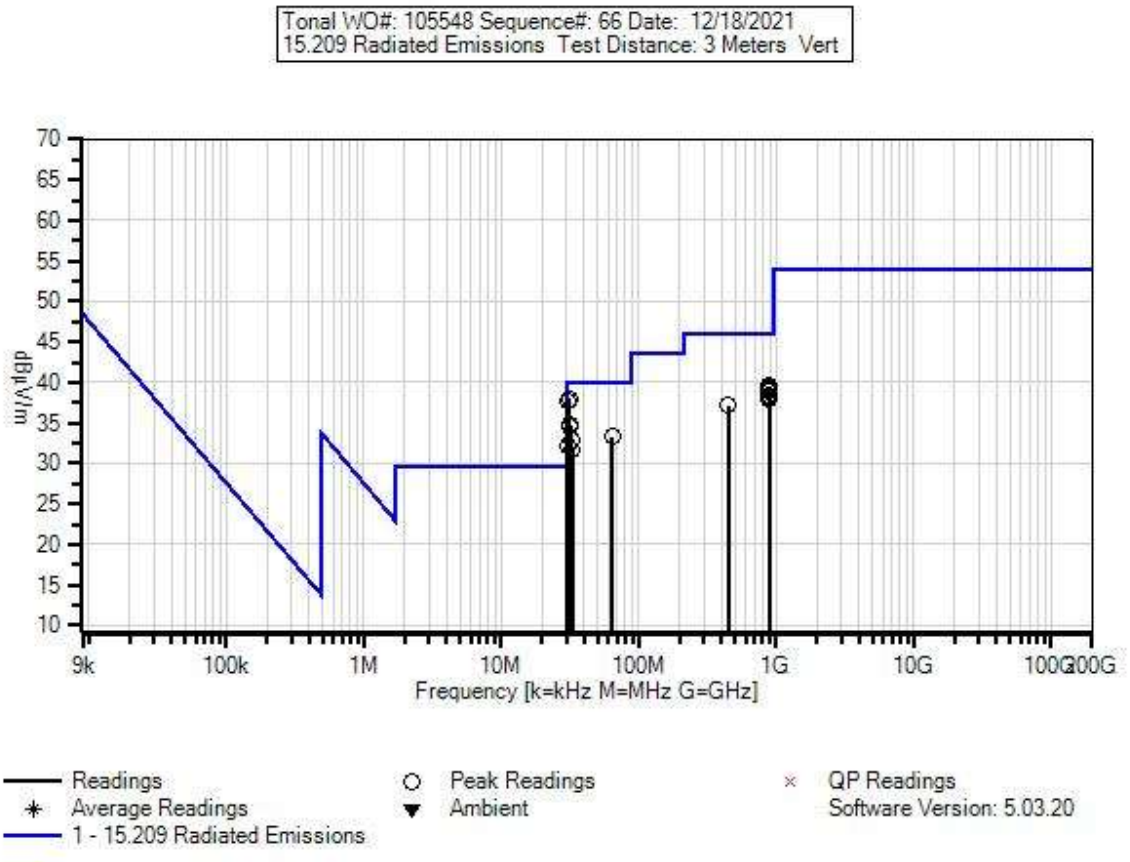
Environmental Conditions:
Temperature: 21.4ºC
Humidity: 36%
Atmospheric Pressure: 101.9kPa

Method: ANSI C63.10 2013

The unit is mounted to a floor standing rack as to simulate typical wall mounted setup. One weight line is extended to the floor.
WiFi is set to 2447 MHz with CCK modulation type, 1MBPS at power level 10, chain 0 with repeating pattern of 0s and 1s with duty cycle at 98%
Chain 0
Operational mode is representative of worst case.

Notes:
Touch screen display: Direct bond 2312
Power Supply: Artesyn
Display is showing home screen

Modifications #1, #2, #3 #4, #5 and #6 were in place during testing.
No emissions from EUT has been found in 20dB tolerance in the frequency range 9kHz to 30MHz.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07508	Preamp	310N	7/9/2020	7/9/2022
T2	AN00852	Biconilog Antenna	CBL 6111C	4/14/2020	4/14/2022
T3	ANP06049	Attenuator	PE7002-6	5/11/2020	5/11/2022
T4	ANP01187	Cable	CNT-195	7/6/2020	7/6/2022
T5	ANP06691	Cable	PE3062-180	3/25/2020	3/25/2022
T6	ANP06694	Cable	PE3062-480	3/25/2020	3/25/2022
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
	AN00432	Loop Antenna	6502	7/19/2021	7/19/2023

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	31.198M	45.4	-32.1 +0.2	+18.2 +0.4	+5.9	+0.0	+0.0	38.0	40.0	-2.0	Vert
2	30.532M	44.9	-32.1 +0.2	+18.5 +0.4	+5.9	+0.0	+0.0	37.8	40.0	-2.2	Vert
3	31.597M	42.5	-32.1 +0.2	+18.0 +0.4	+5.9	+0.0	+0.0	34.9	40.0	-5.1	Vert
4	32.130M	42.4	-32.1 +0.2	+17.8 +0.4	+5.9	+0.0	+0.0	34.6	40.0	-5.4	Vert
5	888.860M	36.8	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	39.5	46.0	-6.5	Vert
6	897.029M	36.7	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.5	46.0	-6.5	Vert
7	893.185M	36.6	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	39.4	46.0	-6.6	Vert
8	64.472M	52.0	-32.0 +0.2	+6.4 +0.7	+5.9	+0.1	+0.0	33.3	40.0	-6.7	Vert
9	888.260M	36.6	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	39.3	46.0	-6.7	Vert
10	885.137M	36.4	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	39.1	46.0	-6.9	Vert
11	884.896M	36.2	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	38.9	46.0	-7.1	Vert
12	32.263M	40.7	-32.1 +0.2	+17.7 +0.4	+5.9	+0.0	+0.0	32.8	40.0	-7.2	Vert
13	887.179M	35.8	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	38.5	46.0	-7.5	Vert
14	885.617M	35.6	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	38.3	46.0	-7.7	Vert
15	886.098M	35.6	-31.4 +1.2	+23.1 +3.2	+5.9	+0.7	+0.0	38.3	46.0	-7.7	Vert
16	30.200M	39.2	-32.1 +0.2	+18.6 +0.4	+5.9	+0.0	+0.0	32.2	40.0	-7.8	Vert
17	893.785M	35.3	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	38.1	46.0	-7.9	Vert
18	896.428M	35.1	-31.4 +1.2	+23.2 +3.2	+5.9	+0.7	+0.0	37.9	46.0	-8.1	Vert
19	33.194M	40.0	-32.1 +0.2	+17.3 +0.4	+5.9	+0.0	+0.0	31.7	40.0	-8.3	Vert
20	448.501M	42.8	-31.9 +0.8	+17.0 +2.1	+5.9	+0.5	+0.0	37.2	46.0	-8.8	Vert

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**105488**	Date:	12/21/2021
Test Type:	**Radiated Scan**	Time:	11:38:24
Tested By:	Hoang Cao	Sequence#:	103
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Radiated Emission
Frequency Range: 1 to 26GHz

Environmental Conditions:
Temperature: 22.6ºC
Humidity: 33%
Atmospheric Pressure: 101.8kPa

Method: ANSI C63.10 2013

The unit is mounted to a floor standing rack as to simulate typical wall mounted setup. One weight line is extended to the floor.
WiFi transmitting continuously with modulation type as listed with pattern of 0s and 1s at power level 10.

802.11g
Middle Channel

MIMO not enabled, manufacturer declares chain 0 and chain 1 transmit uncorrelated data.

Chain 0

Operational mode is representative of worst case.

Notes:
Touch screen display: Direct bond 2312
Power Supply: Artesyn
Display is showing home screen

Modifications #1, #2, #3 #4, #5 and #6 were in place during testing.

Support laptop included in this setup to control Wi-Fi operating mode; port is internal to the equipment for configuration only.
Unintentional emissions related to display and display controller increased due to external cable to laptop.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
T1	AN02812	Preamp	83017-69004	9/22/2020	9/22/2022
T2	AN02113	Horn Antenna-ANSI C63.5	3115	3/11/2021	3/11/2023
T3	AN03302	Cable	32026-29094K-29094K-72TC	1/9/2020	1/9/2022
T4	ANP01210	Cable	FSJ1P-50A-4A	11/2/2020	11/2/2022
T5	ANP06902	Cable	32022-29094K-29094K-36TC	8/13/2020	8/13/2022
	AN02693	Active Horn Antenna	AMFW-5F-12001800-20-10P	10/26/2021	10/26/2023
	AN02694	Horn Antenna	AMFW-5F-18002650-20-10P	10/26/2021	10/26/2023
	ANP00928	Cable	various	1/12/2022	1/12/2024
	ANP00929	Cable	various	1/12/2022	1/12/2024

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

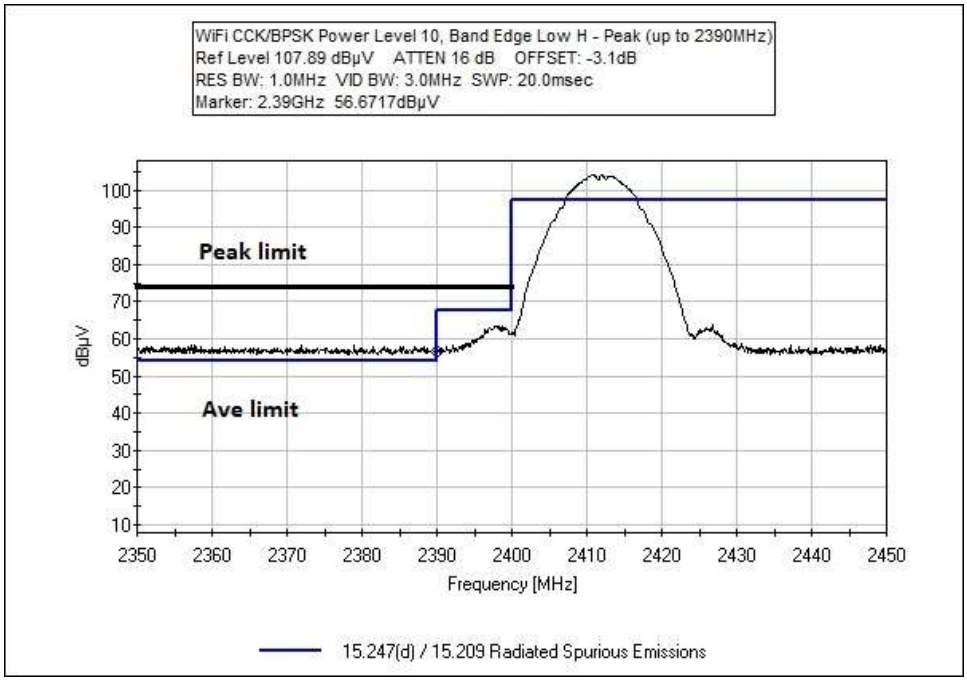
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2096.400M Ave	49.9	-30.9 +0.8	+27.6	+1.2	+2.4	+0.0	51.0	54.0	-3.0	Horiz
^	2096.400M	54.4	-30.9 +0.8	+27.6	+1.2	+2.4	+0.0	55.5	54.0	+1.5	Horiz
3	1422.590M Ave	47.8	-32.0 +0.6	+25.4	+0.9	+1.9	+0.0	44.6	54.0	-9.4	Horiz
^	1422.590M	54.6	-32.0 +0.6	+25.4	+0.9	+1.9	+0.0	51.4	54.0	-2.6	Horiz
5	4899.377M Ave	34.6	-29.9 +1.2	+32.4	+1.8	+3.7	+0.0	43.8	54.0	-10.2	Horiz
^	4899.377M	48.3	-29.9 +1.2	+32.4	+1.8	+3.7	+0.0	57.5	54.0	+3.5	Horiz
7	9788.000M Ave	23.9	-32.2 +1.7	+36.6	+2.6	+5.3	+0.0	37.9	54.0	-16.1	Horiz
^	9788.000M	36.7	-32.2 +1.7	+36.6	+2.6	+5.3	+0.0	50.7	54.0	-3.3	Horiz
9	7341.000M Ave	23.2	-31.5 +1.5	+35.0	+2.3	+4.6	+0.0	35.1	54.0	-18.9	Horiz
^	7341.000M	36.2	-31.5 +1.5	+35.0	+2.3	+4.6	+0.0	48.1	54.0	-5.9	Horiz

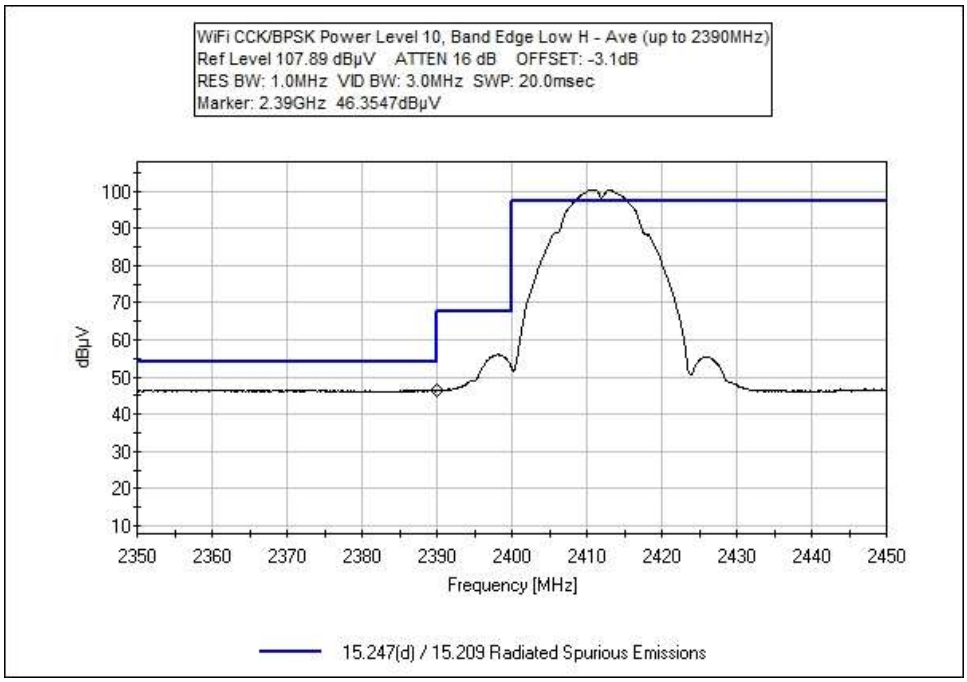
Note: Chain 0 is the worst case based on the investigation on RF output power before measuring Radiated Spurious Emission.

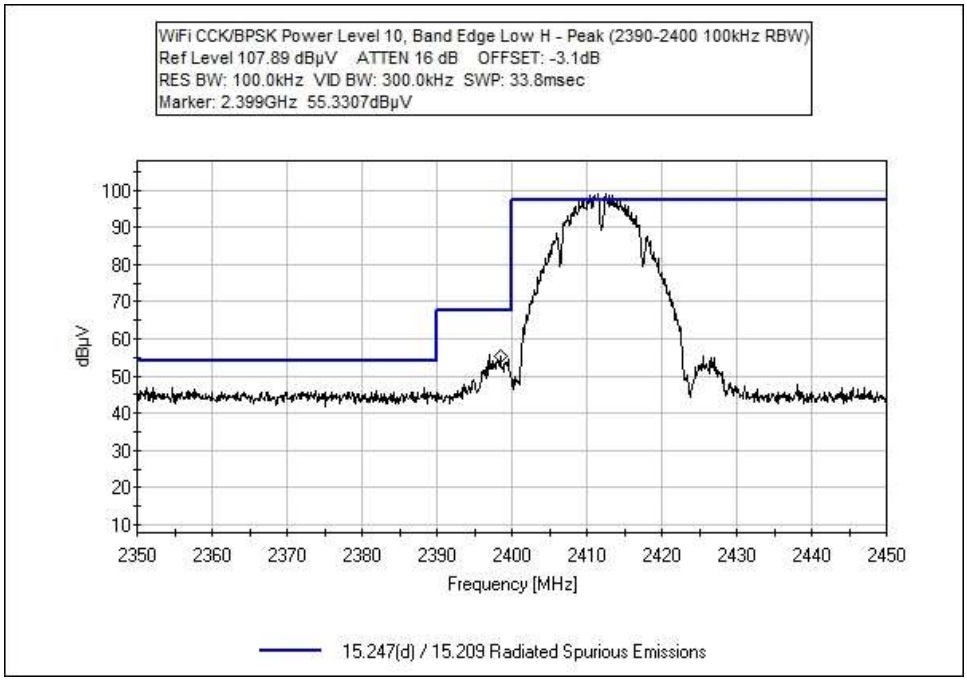
Band Edge

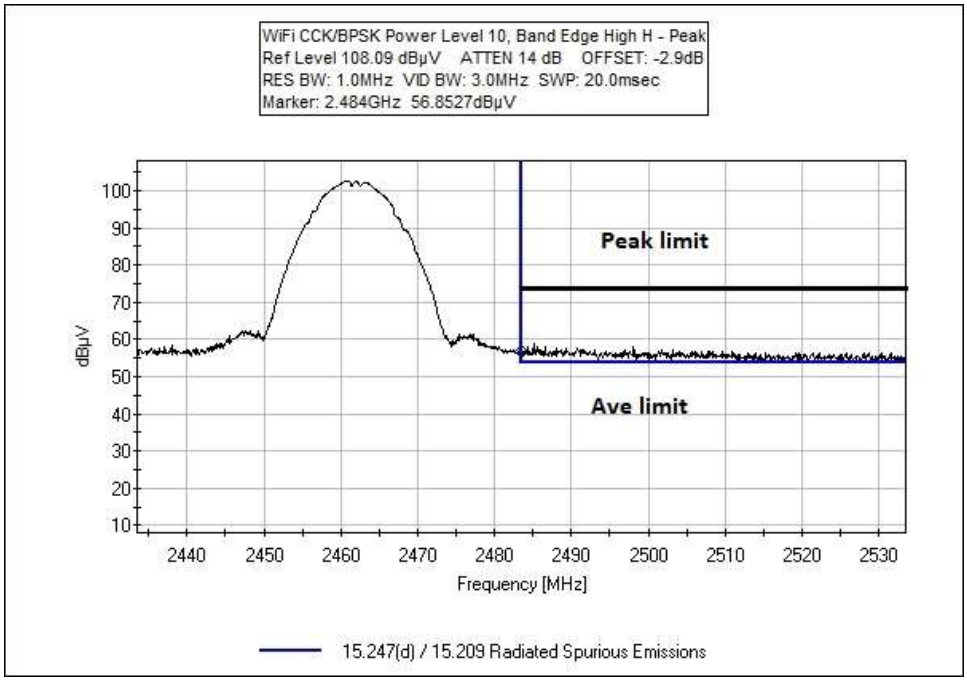
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	802.11b	External Connector	46.3547	<54	Pass
2400.0	802.11b	External Connector	55.3307	<78	Pass
2483.5	802.11b	External Connector	46.6457	<54	Pass
2390.0	802.11g	External Connector	53.6347	<54	Pass
2400.0	802.11g	External Connector	65.0997	<78	Pass
2483.5	802.11g	External Connector	51.0207	<54	Pass
2390.0	802.11n HT20	External Connector	52.6597	<54	Pass
2400.0	802.11n HT20	External Connector	62.2307	<78	Pass
2483.5	802.11n HT20	External Connector	51.1487	<54	Pass
2390.0	802.11n HT40	External Connector	52.0847	<54	Pass
2400.0	802.11n HT40	External Connector	59.2887	<78	Pass
2483.5	802.11n HT40	External Connector	49.0547	<54	Pass

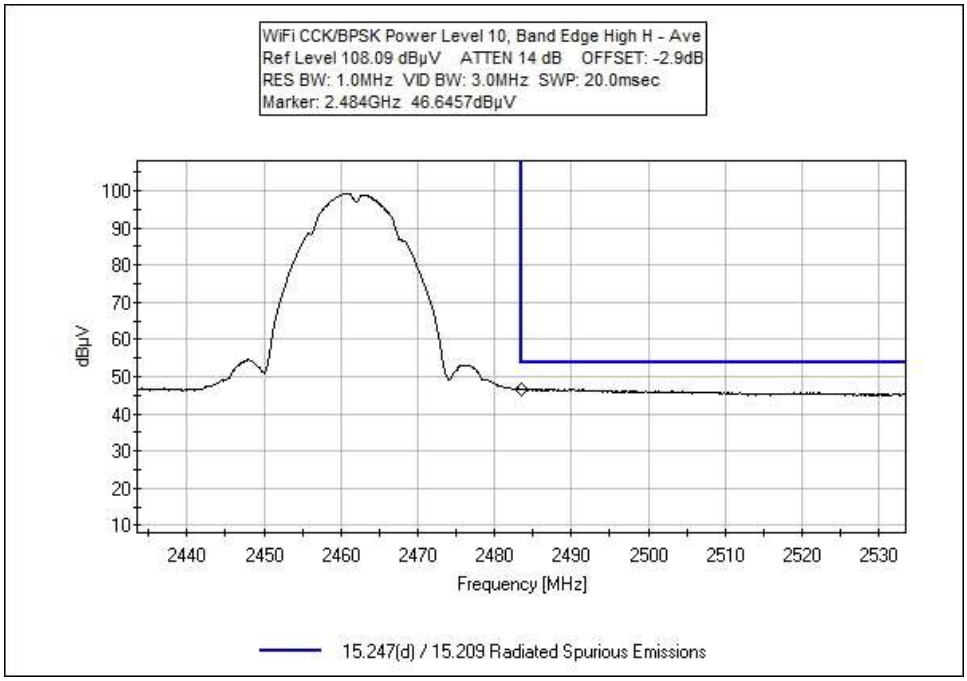
Band Edge Plots

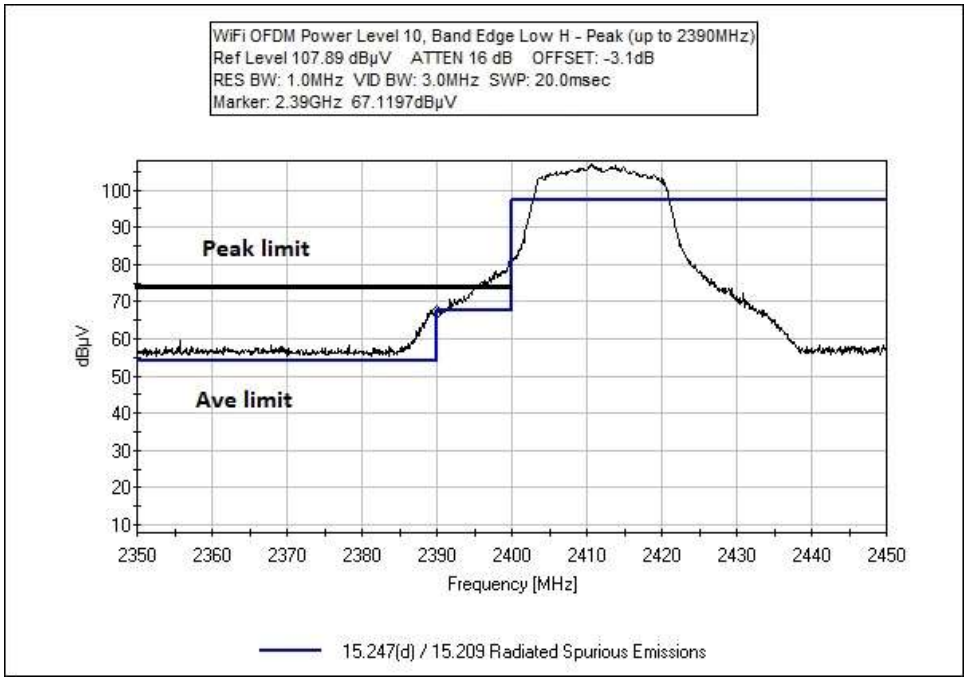


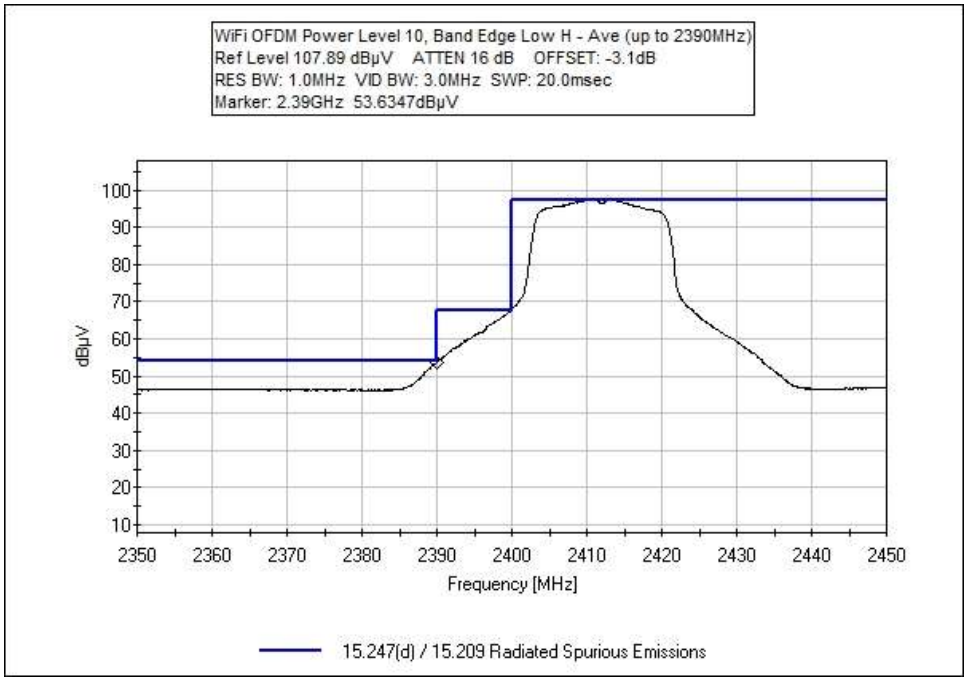


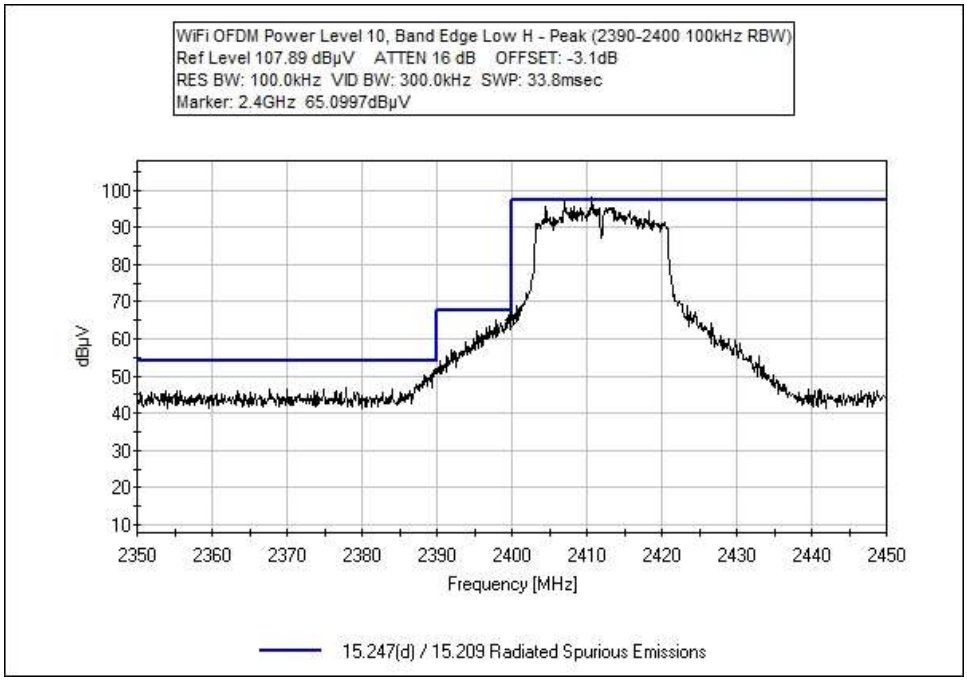

WiFi CCK/BPSK Power Level 10, Band Edge Low H - Peak (2390-2400 100kHz RBW)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 33.8msec
Marker: 2.399GHz 55.3307dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

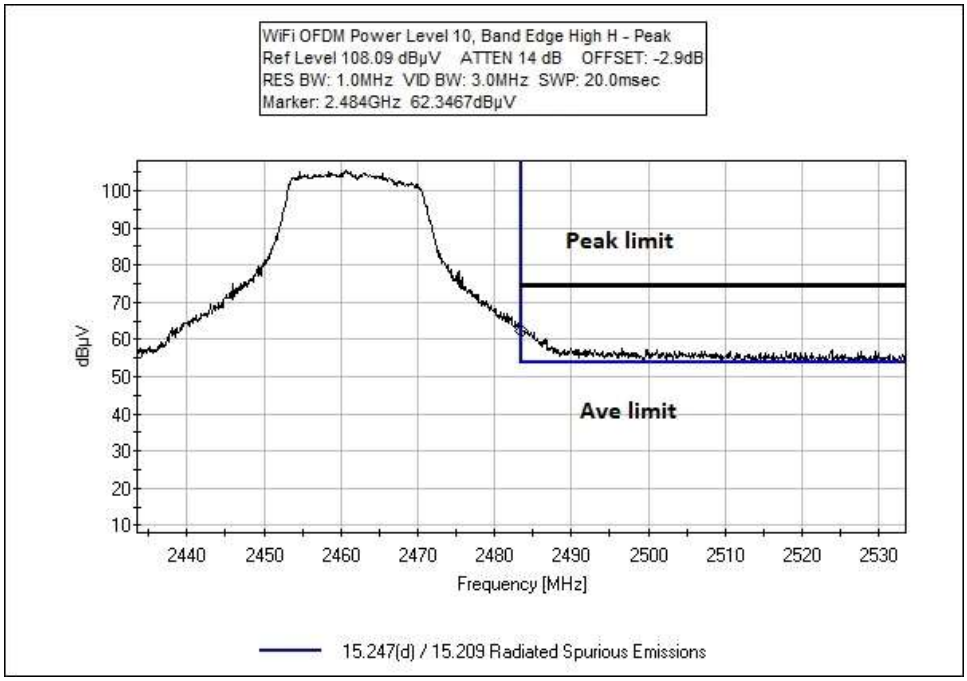

WiFi CCK/BPSK Power Level 10, Band Edge High H - Peak
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 56.8527dBµV
Peak limit
Ave limit
dBµV
100
90
80
70
60
50
40
30
20
10
2440
2450
2460
2470
2480
2490
2500
2510
2520
2530
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

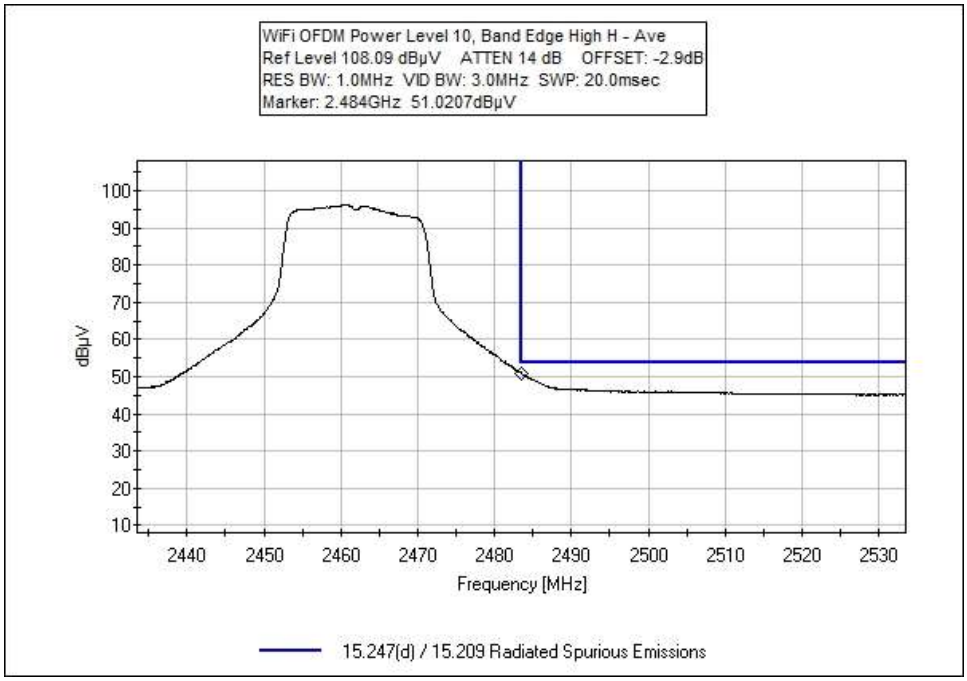

WiFi CCK/BPSK Power Level 10, Band Edge High H - Ave
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 46.6457dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

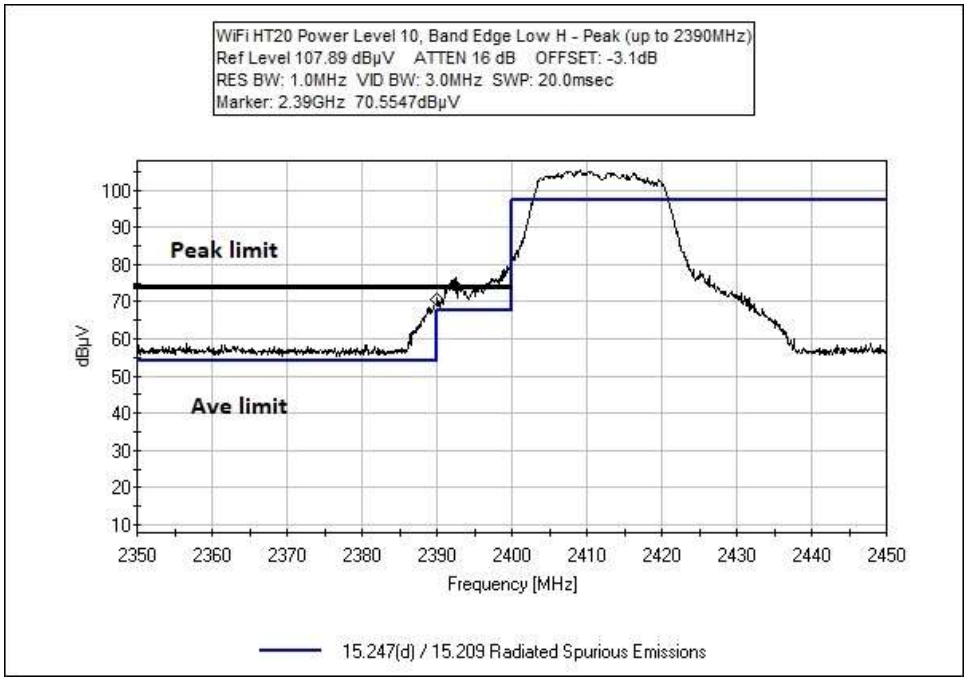

WiFi OFDM Power Level 10, Band Edge Low H - Peak (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 67.1197dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

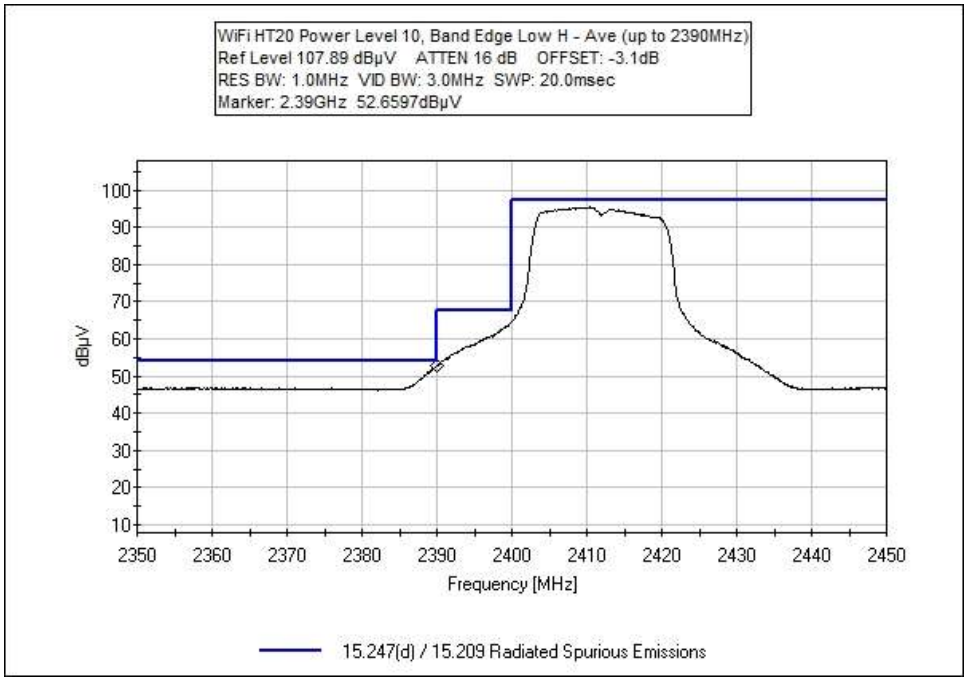

WiFi OFDM Power Level 10, Band Edge Low H - Ave (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 53.6347dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

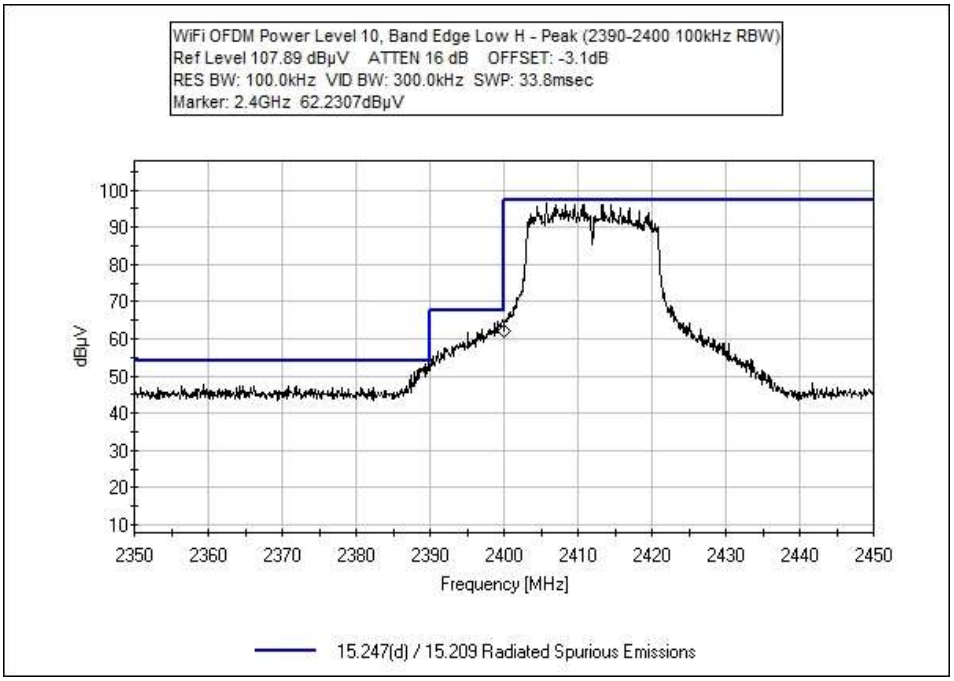

WiFi OFDM Power Level 10, Band Edge Low H - Peak (2390-2400 100kHz RBW)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 33.8msec
Marker: 2.4GHz 65.0997dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

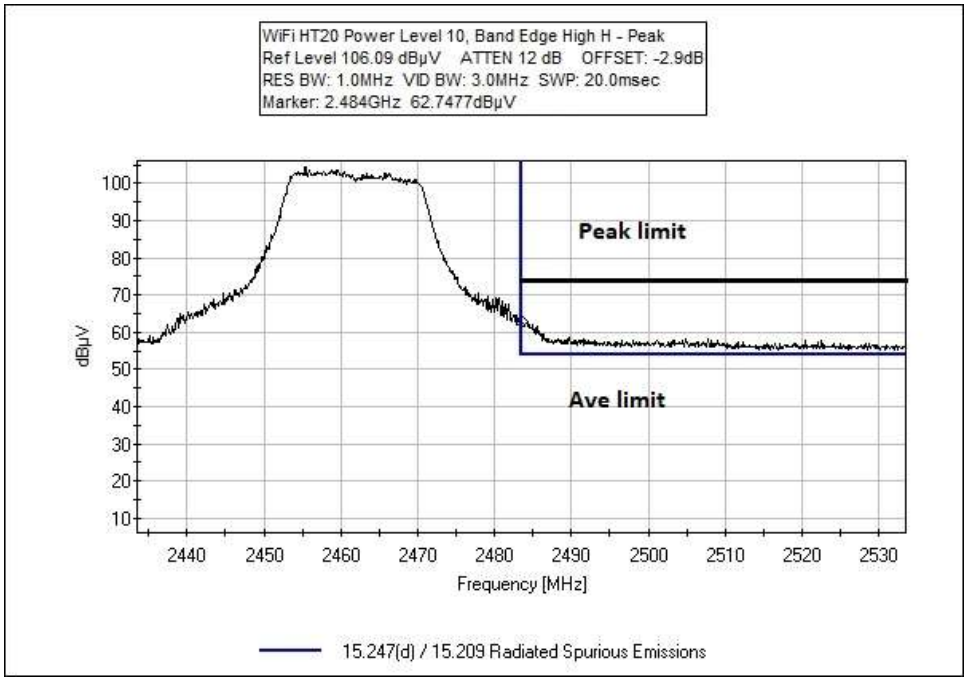

WiFi OFDM Power Level 10, Band Edge High H - Peak
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 62.3467dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

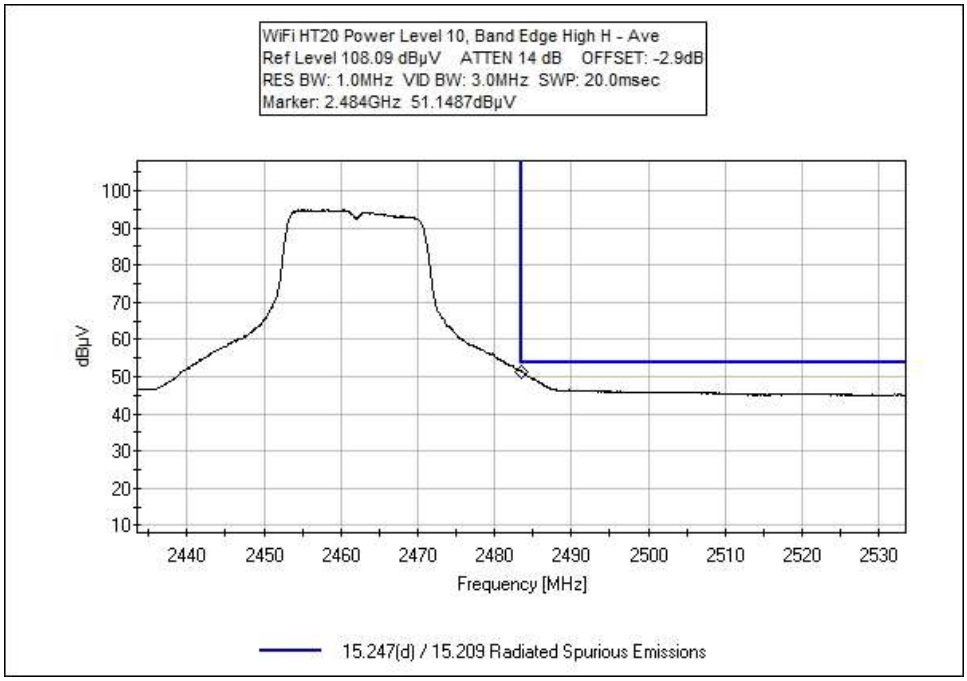

WiFi OFDM Power Level 10, Band Edge High H - Ave
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 51.0207dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

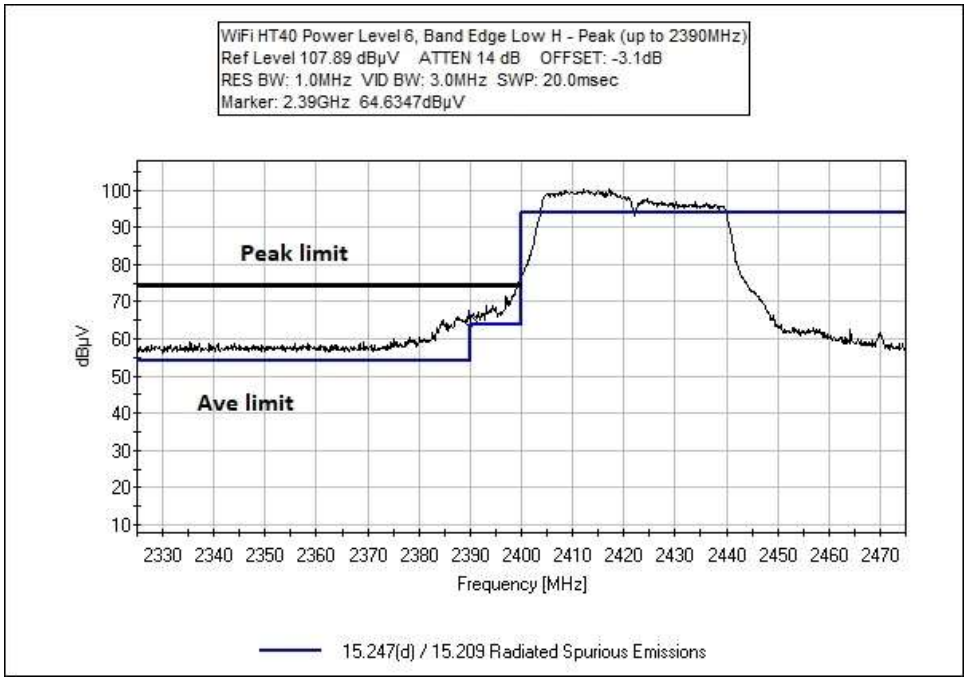

WiFi HT20 Power Level 10, Band Edge Low H - Peak (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 70.5547dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

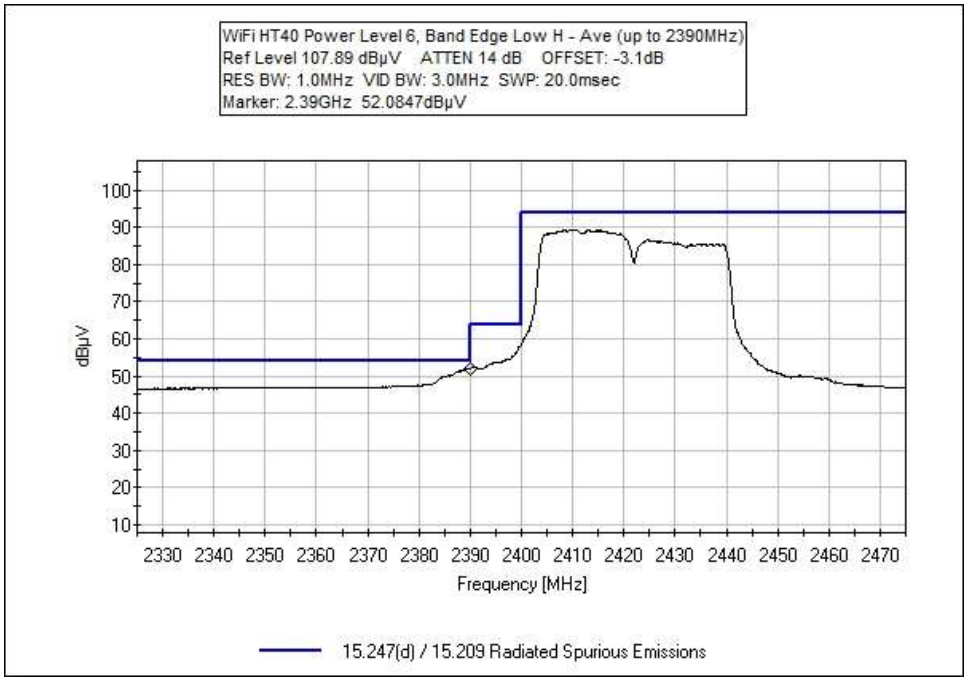

WiFi HT20 Power Level 10, Band Edge Low H - Ave (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 52.6597dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

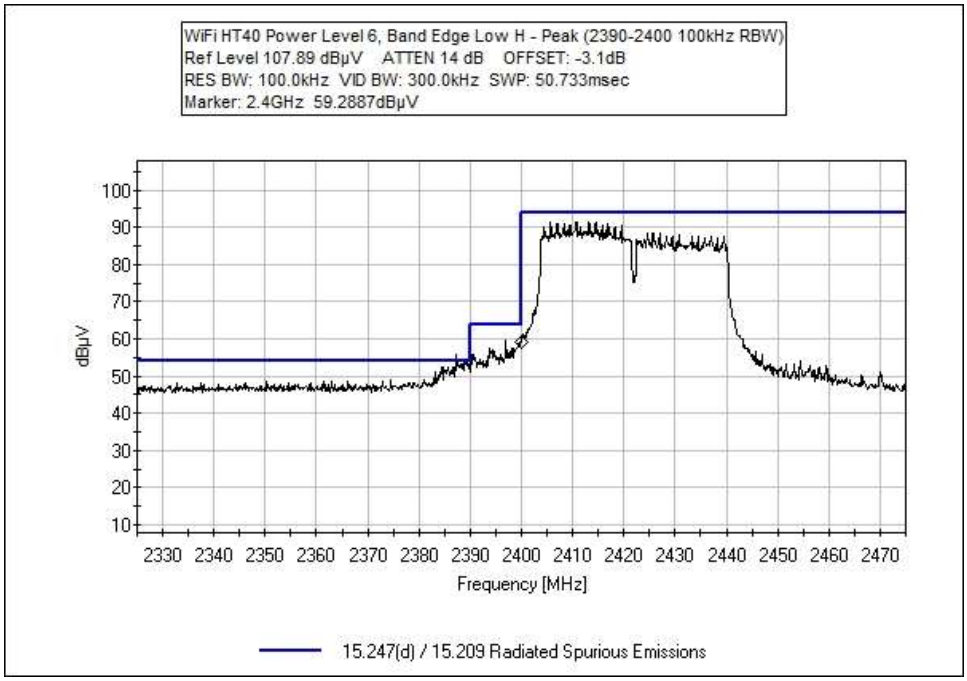

WiFi OFDM Power Level 10, Band Edge Low H - Peak (2390-2400 100kHz RBW)
Ref Level 107.89 dBµV ATTEN 16 dB OFFSET: -3.1dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 33.8msec
Marker: 2.4GHz 62.2307dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

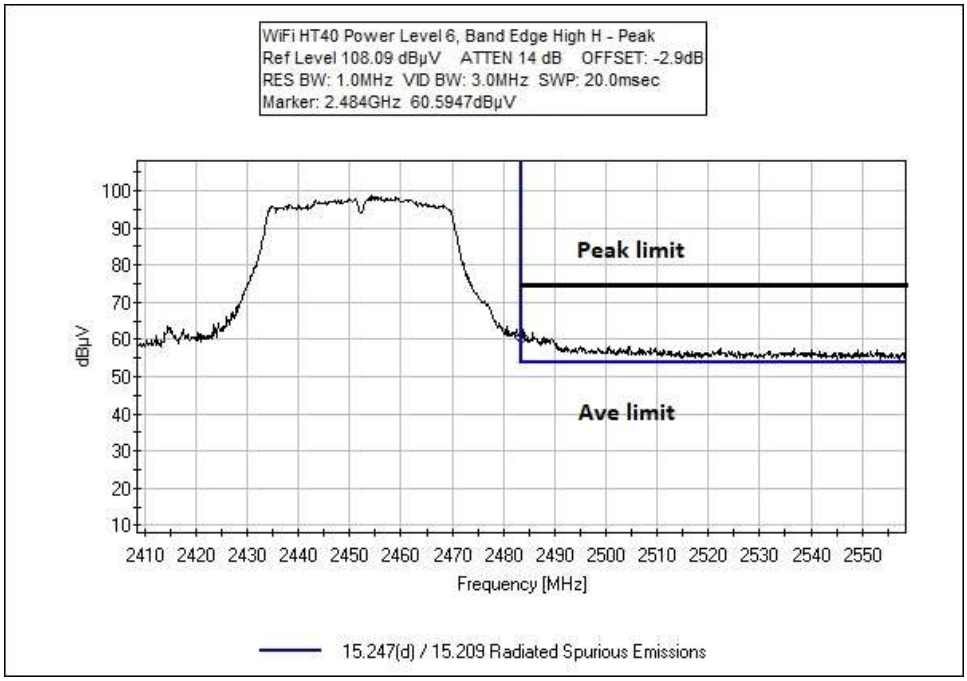

WiFi HT20 Power Level 10, Band Edge High H - Peak
Ref Level 106.09 dBµV ATTEN 12 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 62.7477dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

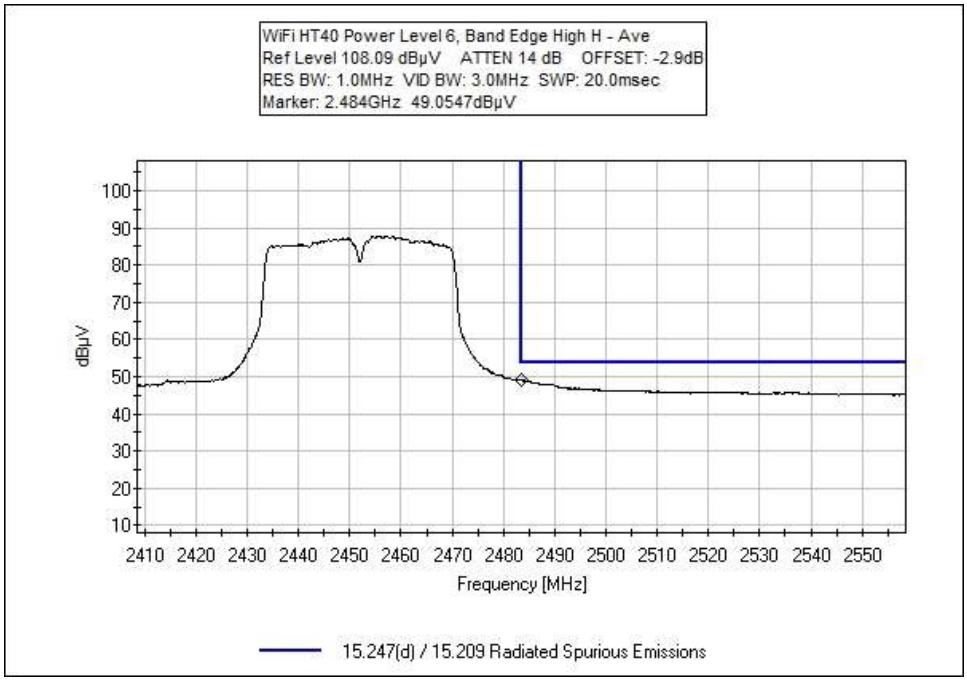

WiFi HT20 Power Level 10, Band Edge High H - Ave
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 51.1487dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


WiFi HT40 Power Level 6, Band Edge Low H - Peak (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 14 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 64.6347dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


WiFi HT40 Power Level 6, Band Edge Low H - Ave (up to 2390MHz)
Ref Level 107.89 dBµV ATTEN 14 dB OFFSET: -3.1dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.39GHz 52.0847dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430 2440 2450 2460 2470
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


WiFi HT40 Power Level 6, Band Edge Low H - Peak (2390-2400 100kHz RBW)
Ref Level 107.89 dBµV ATTEN 14 dB OFFSET: -3.1dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 50.733msec
Marker: 2.4GHz 59.2887dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430 2440 2450 2460 2470
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


WiFi HT40 Power Level 6, Band Edge High H - Peak
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 60.5947dBµV
Peak limit
Ave limit
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


WiFi HT40 Power Level 6, Band Edge High H - Ave
Ref Level 108.09 dBµV ATTEN 14 dB OFFSET: -2.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 2.484GHz 49.0547dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**Band Edge**		
Work Order #:	**105488**	Date:	12/19/2021
Test Type:	**Radiated Scan**	Time:	15:40:37
Tested By:	Randy Clark	Sequence#:	99
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

This file contains the test equipment list for all Wi-Fi 2.4 GHz BE testing:
Hydra board:
Chain0 / software chain 1
802.11b: CCK/BPSK
802.11g: OFDM
802.11n20: HT20
802.11n40: HT40

See BE data plots.

NOTE: all plots show CORRECTED data on plot

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
	AN03713	Preamp	01001800-221055-202525	5/24/2021	5/24/2023
	AN02113	Horn Antenna-ANSI C63.5	3115	3/11/2021	3/11/2023
	ANP01210	Cable	FSJ1P-50A-4A	11/2/2020	11/2/2022
	AN03302	Cable	32026-29094K-29094K-72TC	1/9/2020	1/9/2022
	ANP06902	Cable	32022-29094K-29094K-36TC	8/13/2020	8/13/2022
	AN01416	High Pass Filter	84300-80038	4/7/2020	4/7/2022
	ANP07775	Attenuator	SA18N-20	5/25/2021	5/25/2023

15.247(e) Power Spectral Density

Test Setup / Conditions / Data			
Test Location:	Fremont Lab C3	Test Engineer:	Hoang Cao
Test Method:	ANSI C63.10 (2013), KDB 558074 D01 15.247 Meas Guidance v05r02	Test Date(s):	12/7/2021
Configuration:	9		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended. It is connected straight to a Spectrum Analyzer.		

Environmental Conditions			
Temperature (ºC)	22.5	Relative Humidity (%):	45

Test Equipment					
Asset# / Serial#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03360	Cable	Astrolab	32022-2-29094-36TC	4/9/2020	4/9/2022
P06239	Attenuator	Weinschel	54A-10	6/17/2020	6/17/2022
03471	Spectrum Analyzer	Agilent	E4440A	2/11/2020	2/11/2022

Test Data Summary - RF Conducted Measurement – Chain 0				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
2412	802.11b	-12.46	≤8	Pass
2447	802.11b	-13.73	≤8	Pass
2462	802.11b	-14.03	≤8	Pass
2412	802.11g	-15.13	≤8	Pass
2447	802.11g	-16.04	≤8	Pass
2462	802.11g	-15.90	≤8	Pass
2412	802.11n HT20	-16.17	≤8	Pass
2447	802.11n HT20	-16.15	≤8	Pass
2462	802.11n HT20	-16.57	≤8	Pass
2422	802.11n HT40	-24.16	≤8	Pass
2447	802.11n HT40	-23.44	≤8	Pass
2452	802.11n HT40	-24.11	≤8	Pass

Test Data Summary - RF Conducted Measurement – Chain 1				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
2412	802.11b	-12.56	≤8	Pass
2447	802.11b	-13.75	≤8	Pass
2462	802.11b	-12.74	≤8	Pass
2412	802.11g	-14.16	≤8	Pass
2447	802.11g	-15.10	≤8	Pass
2462	802.11g	-14.69	≤8	Pass
2412	802.11n HT20	-14.72	≤8	Pass
2447	802.11n HT20	-15.37	≤8	Pass
2462	802.11n HT20	-15.16	≤8	Pass
2422	802.11n HT40	-24.07	≤8	Pass
2447	802.11n HT40	-23.68	≤8	Pass
2452	802.11n HT40	-23.61	≤8	Pass

Conducted RF output power calculated in accordance with ANSI C63.10.

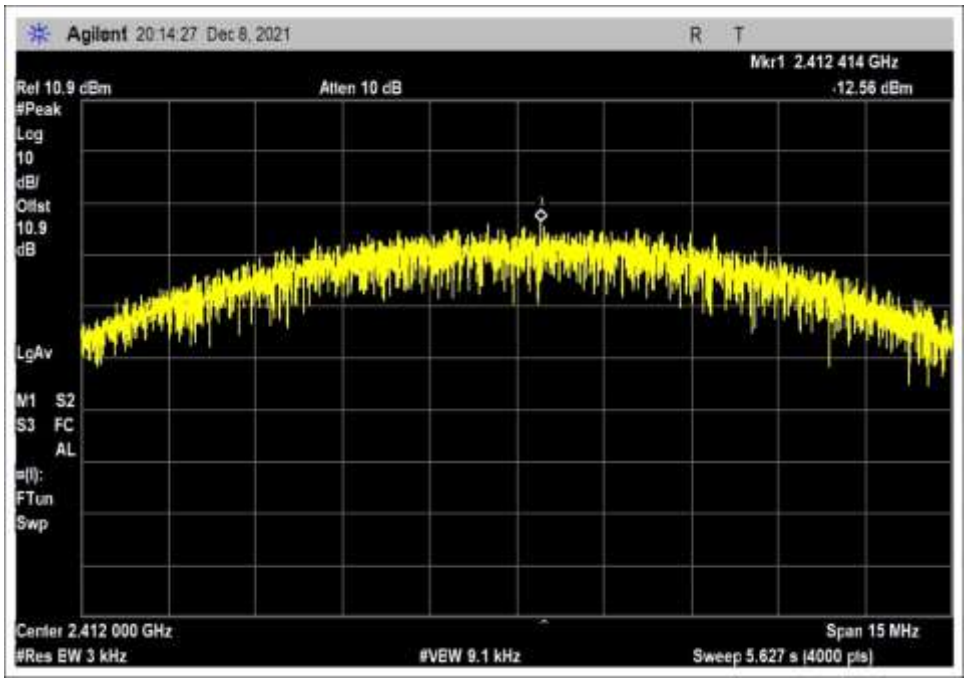
$$P(W) = \frac{(E \cdot d)^2}{30\ G}$$

Or equivalently, in logarithmic form:

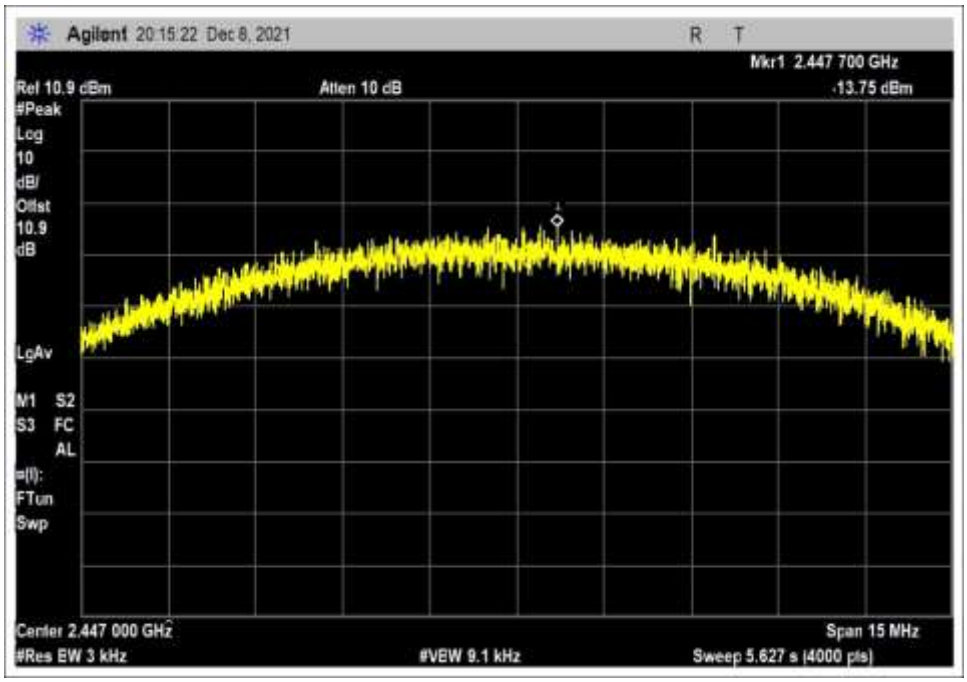
$$P(dBm) = E(dBuV/m) + 20LOG(d) - G\ - 104.77$$

Plots

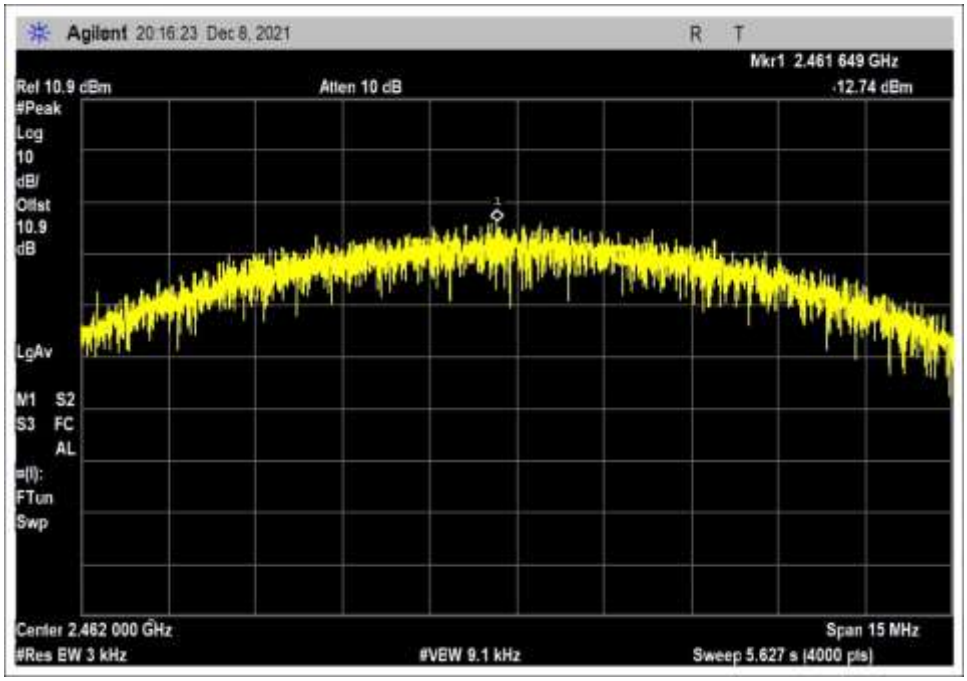
Chain 0, 802.11 b



Low Channel

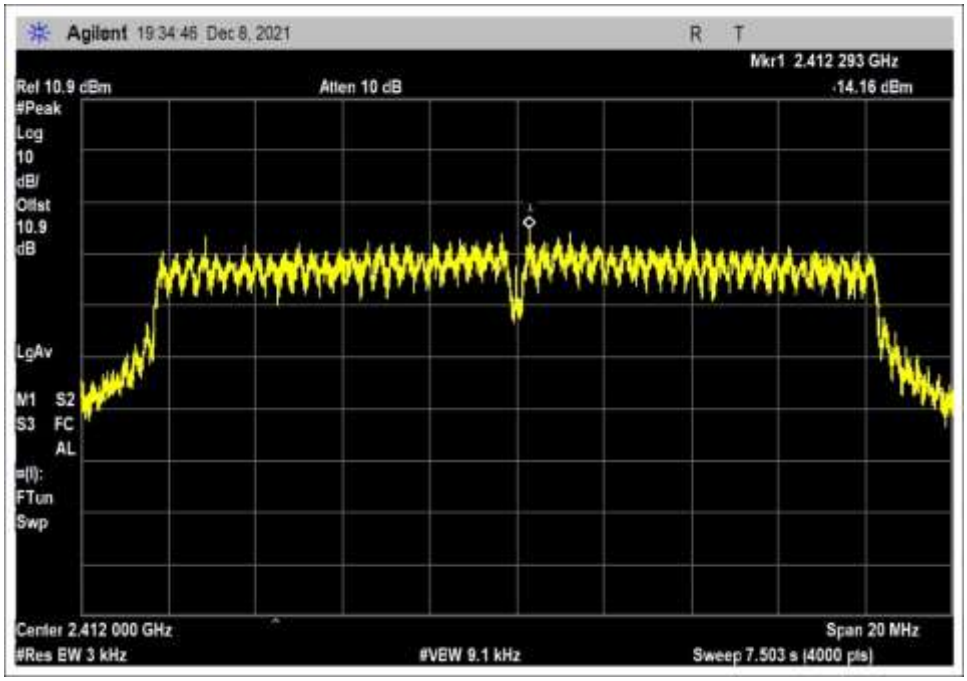


Middle Channel

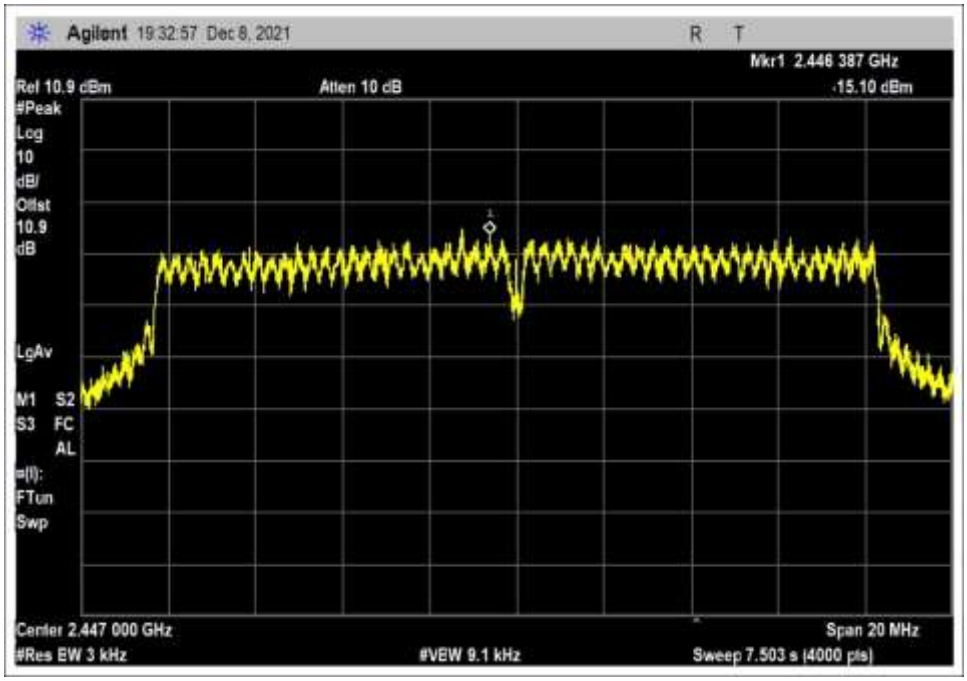


High Channel

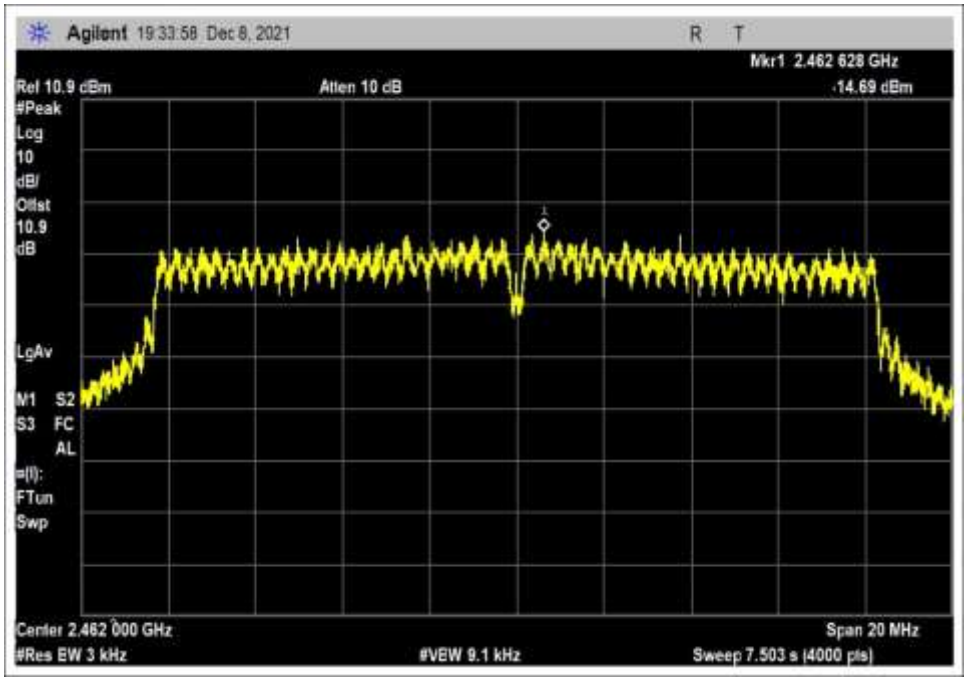
Chain 0, 802.11 g



Low Channel

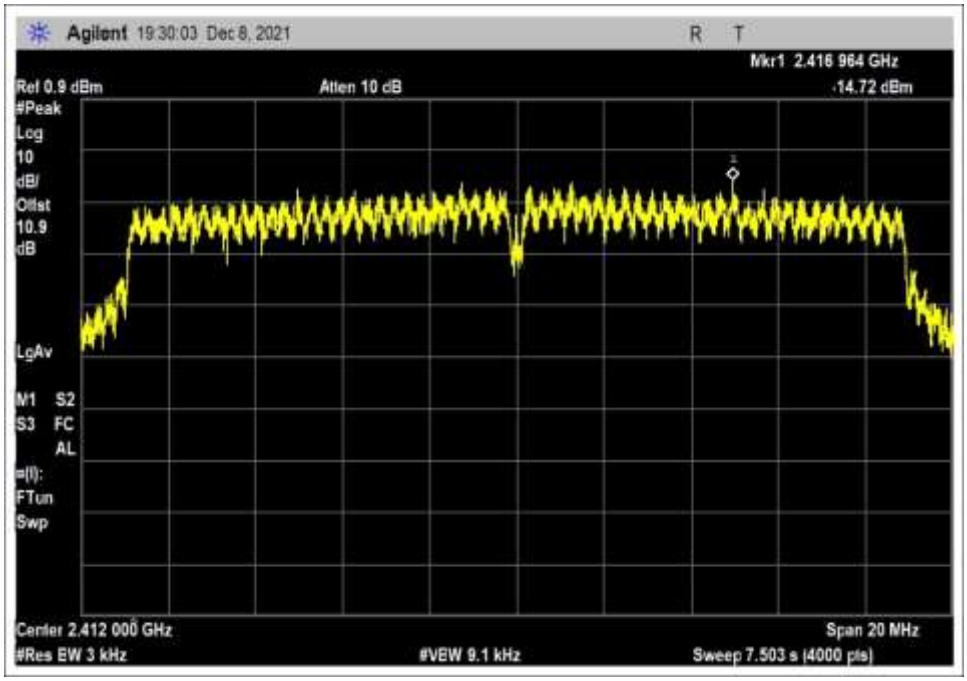


Middle Channel

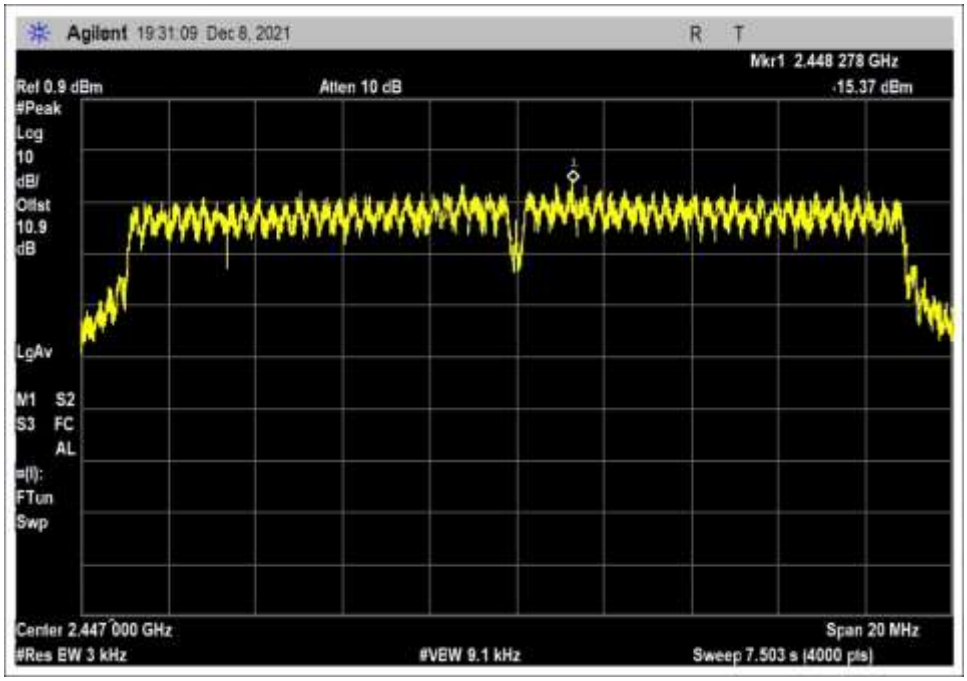


High Channel

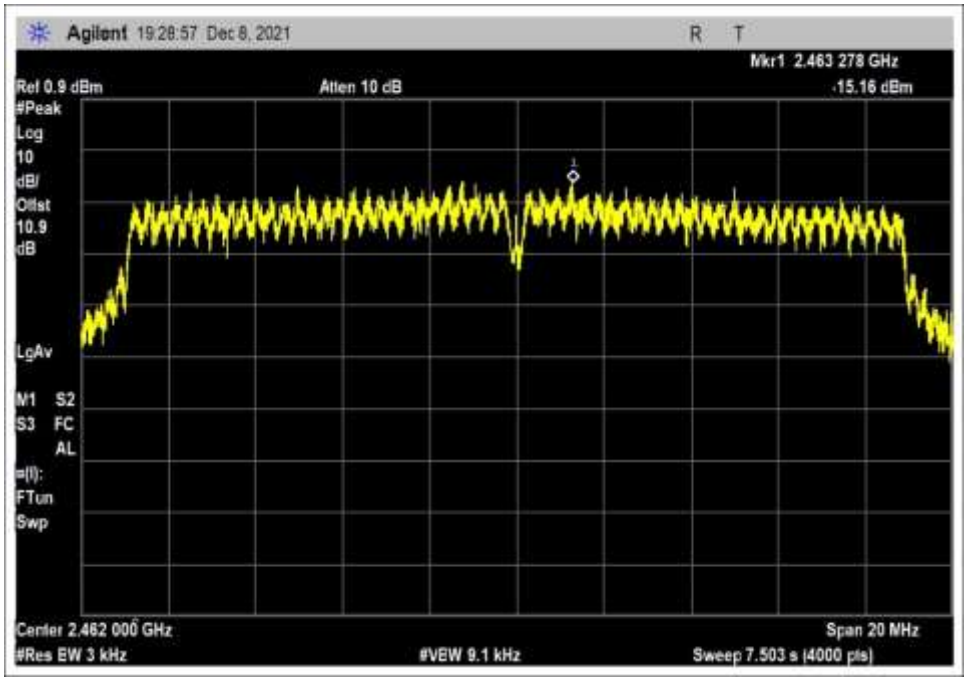
Chain 0, 802.11 n 20MHz



Low Channel

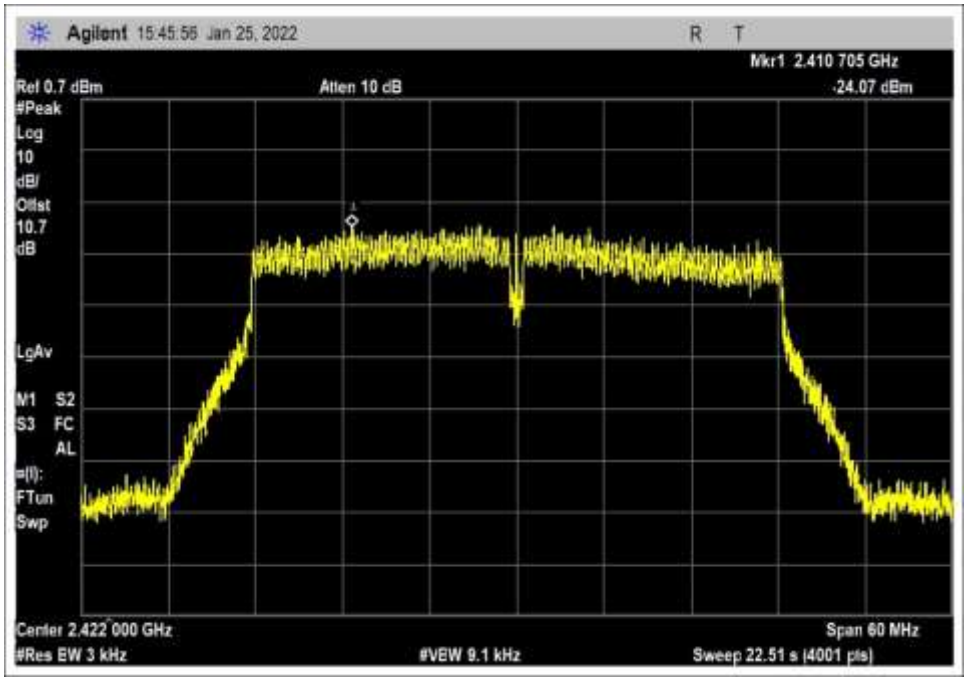


Middle Channel

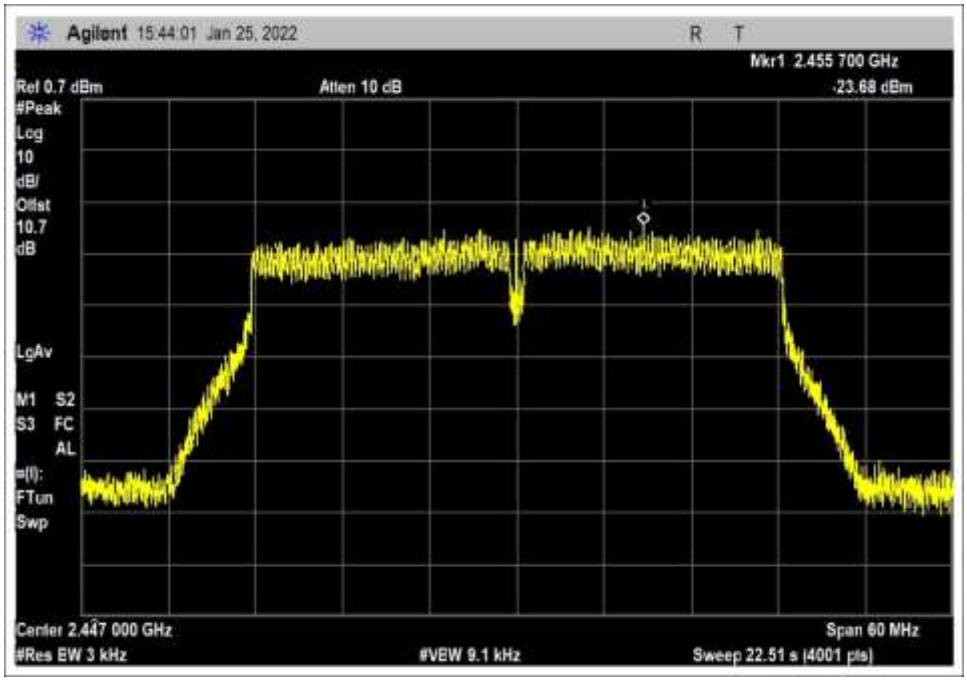


High Channel

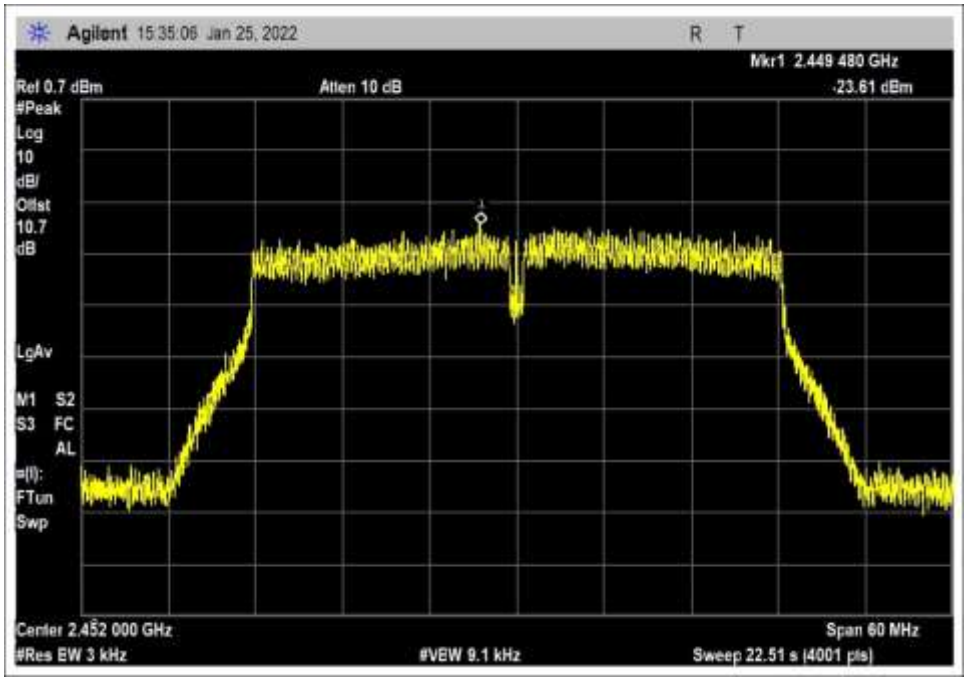
<u>Chain 0, 802.11 n 40MHz</u>



Low Channel

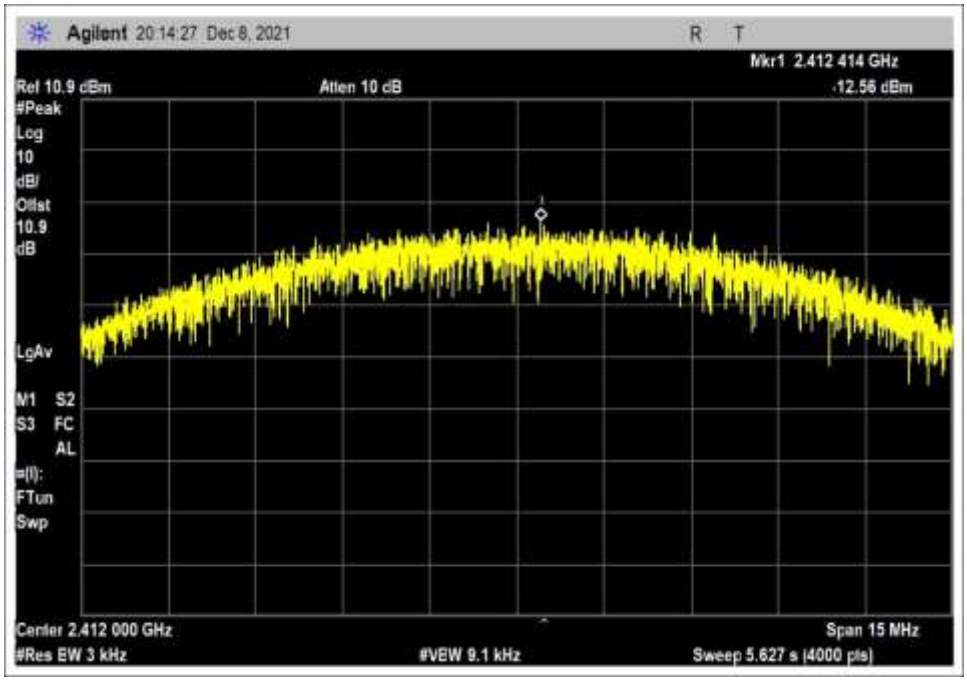


Middle Channel

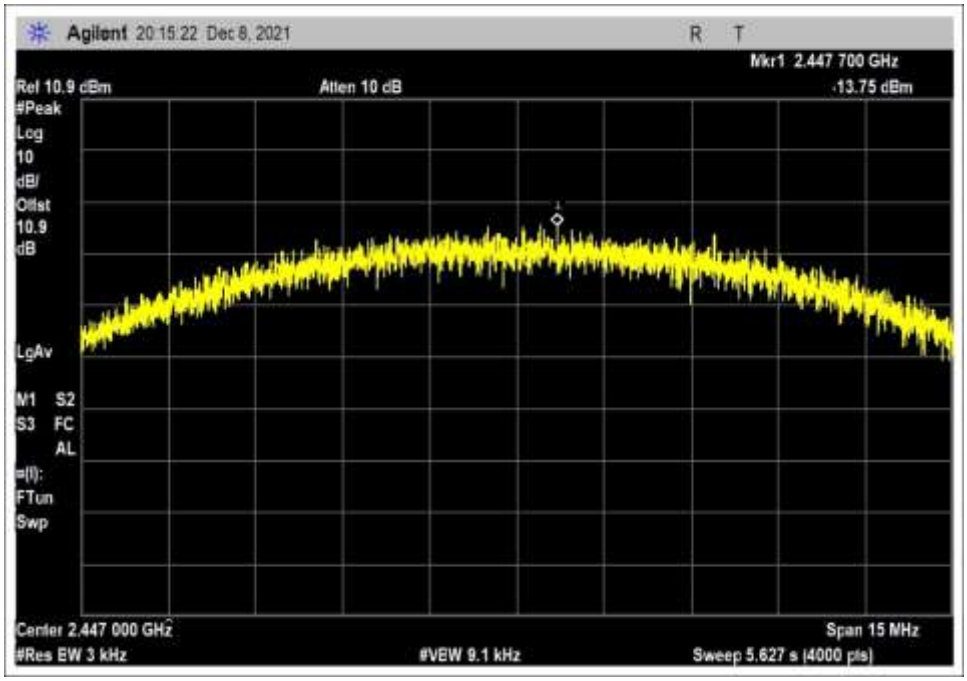


High Channel

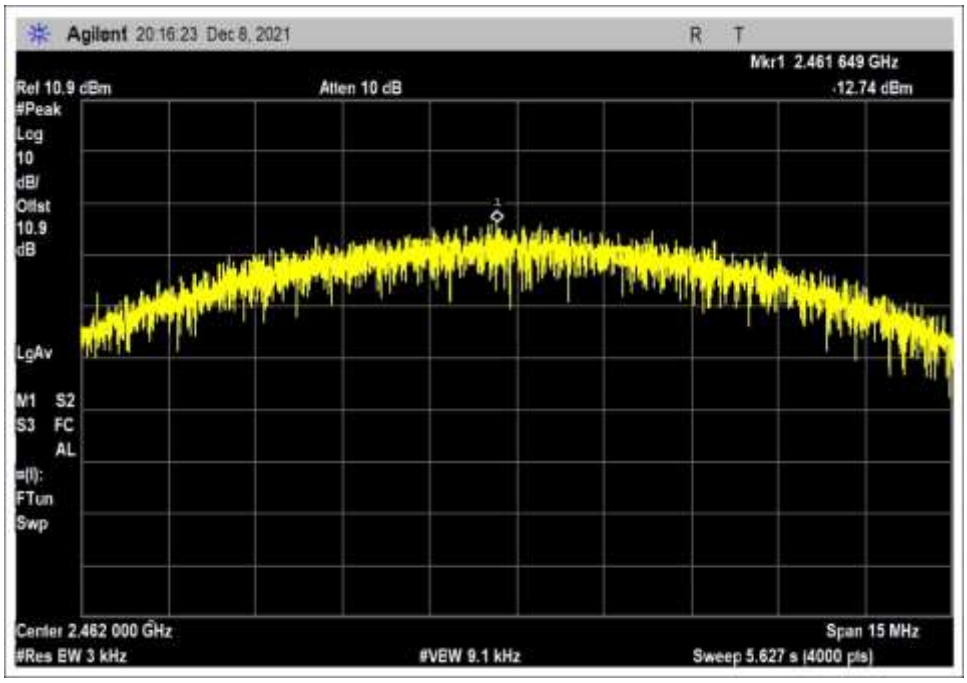
Chain 1, 802.11 b



Low Channel

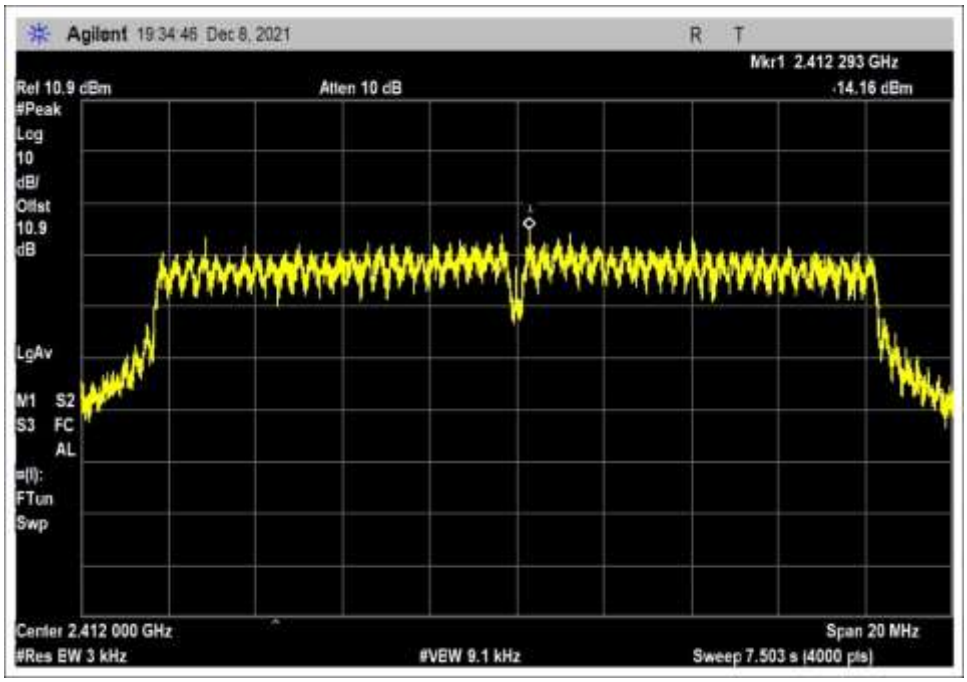


Middle Channel

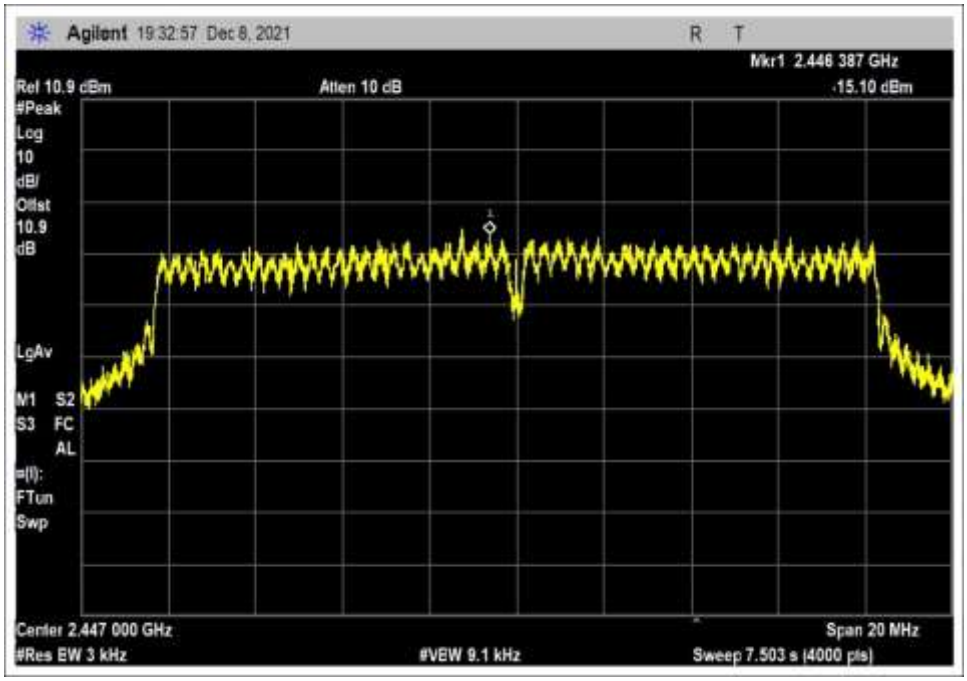


High Channel

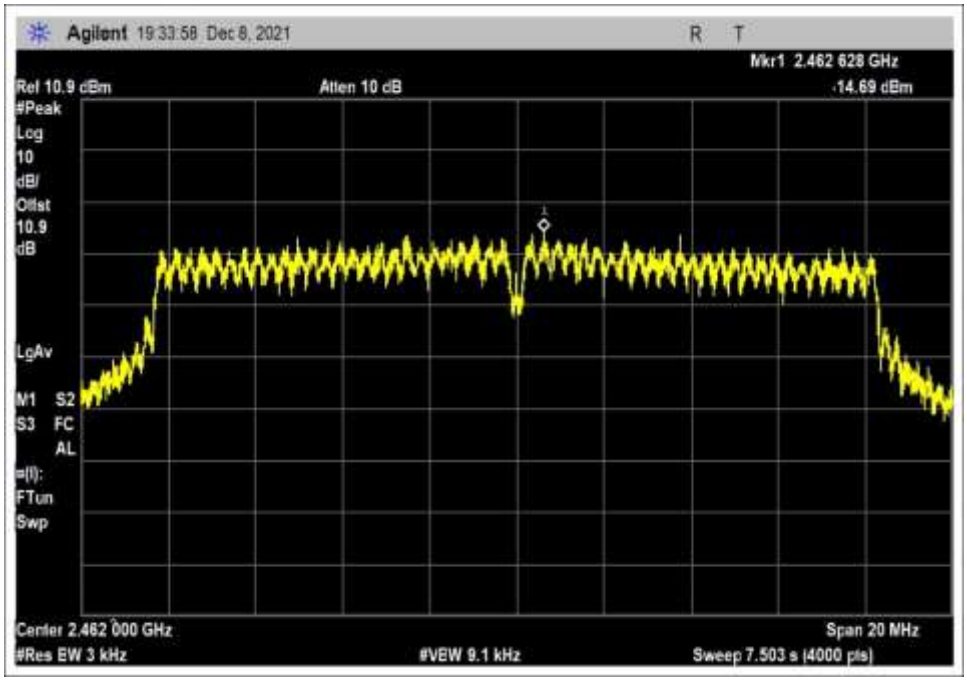
Chain 1, 802.11 g



Low Channel

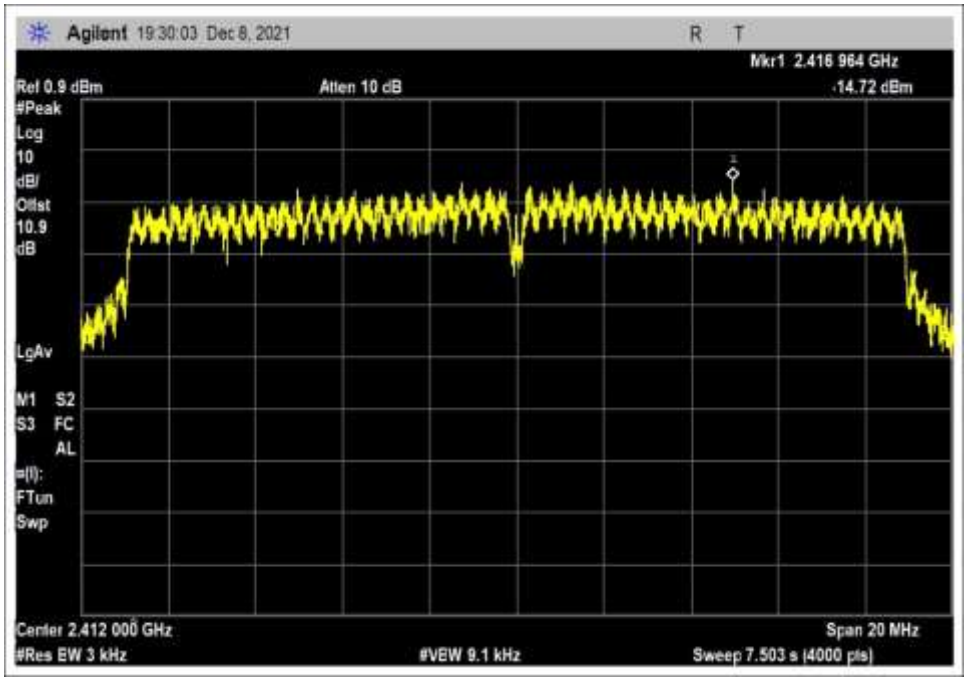


Middle Channel

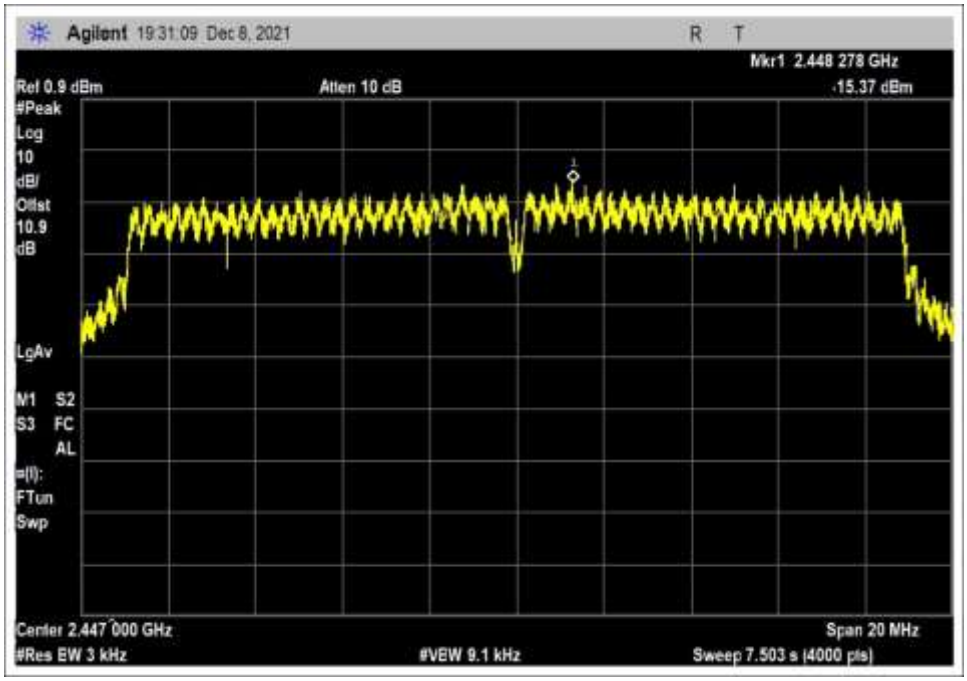


High Channel

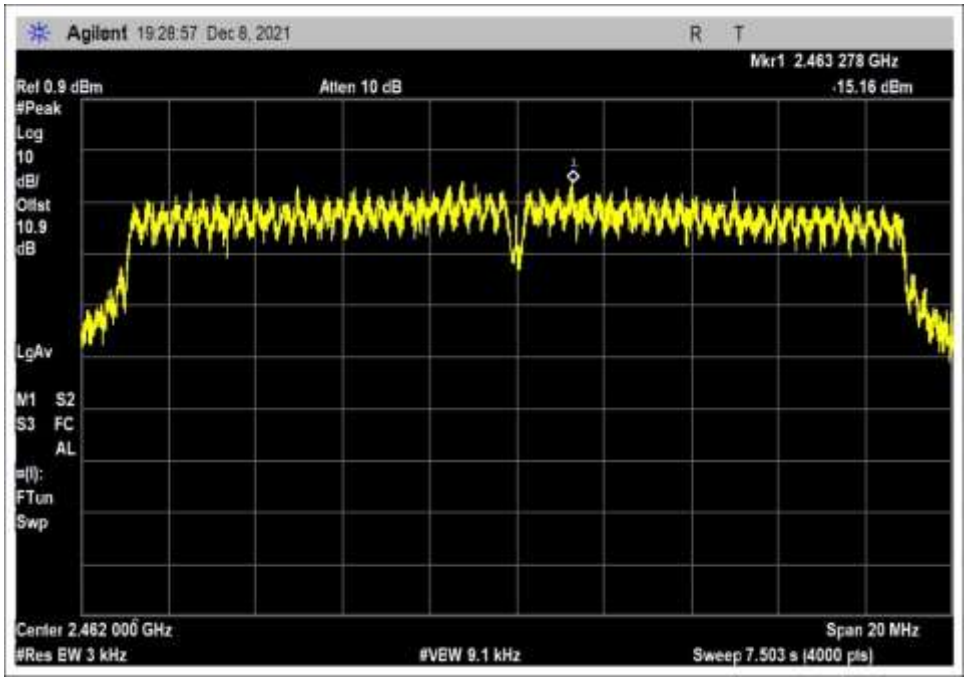
Chain 1, 802.11 n 20MHz



Low Channel

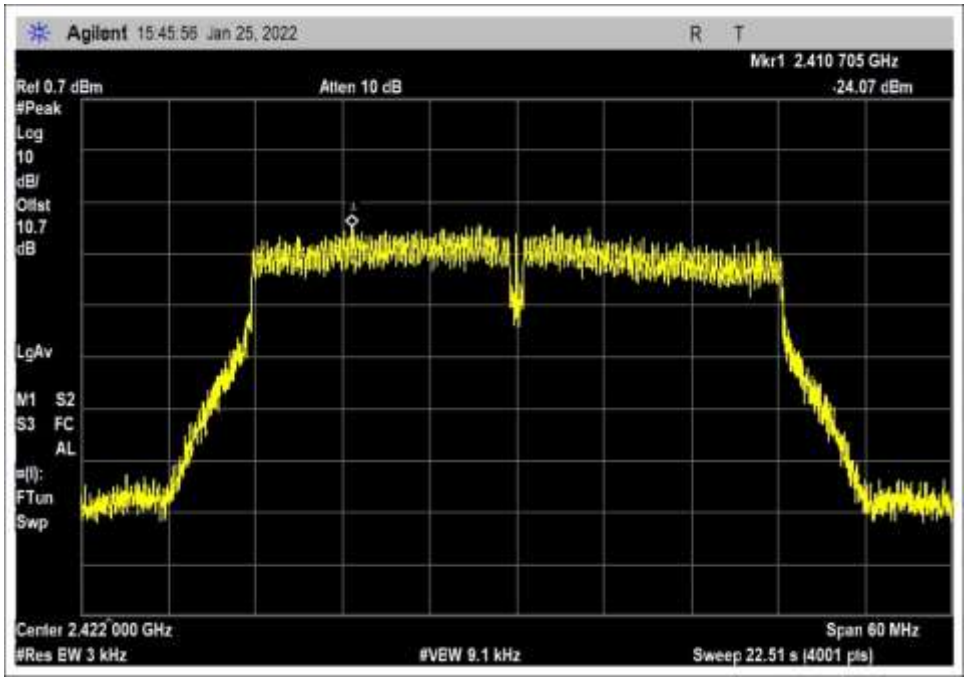


Middle Channel

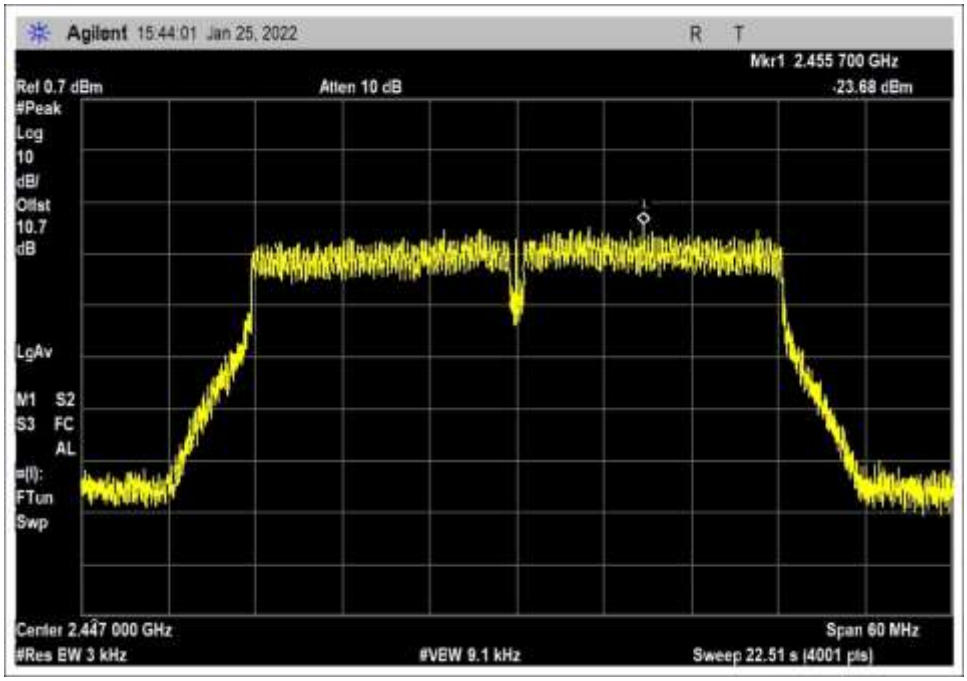


High Channel

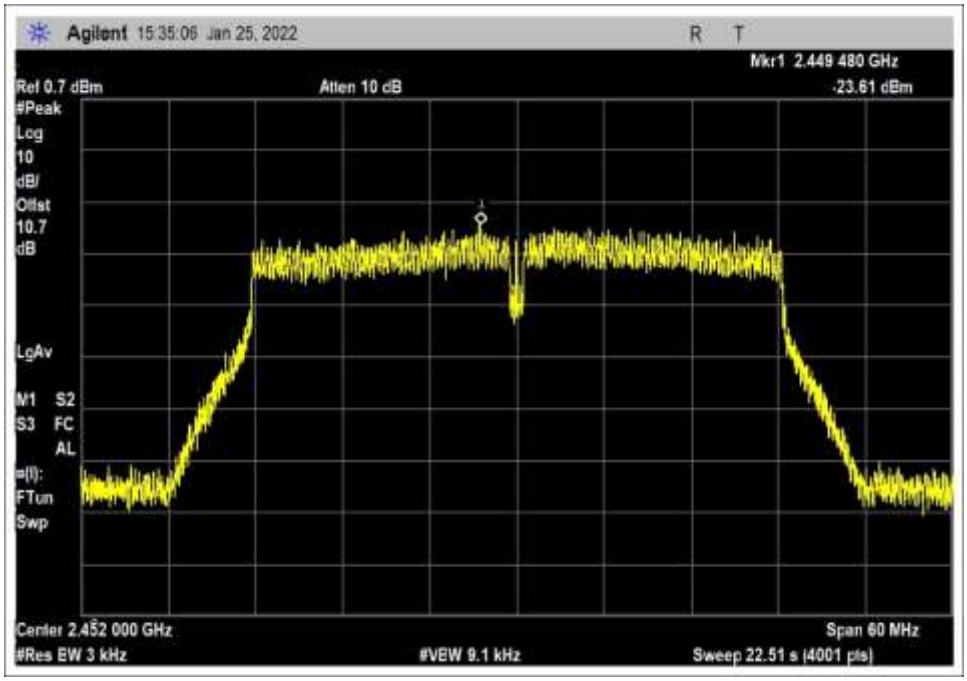
Chain 1, 802.11 n 40MHz



Low Channel



Middle Channel



High Channel

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**105488**	Date:	12/17/2021
Test Type:	**Conducted Emissions**	Time:	10:10:04
Tested By:	Hoang Cao	Sequence#:	46
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

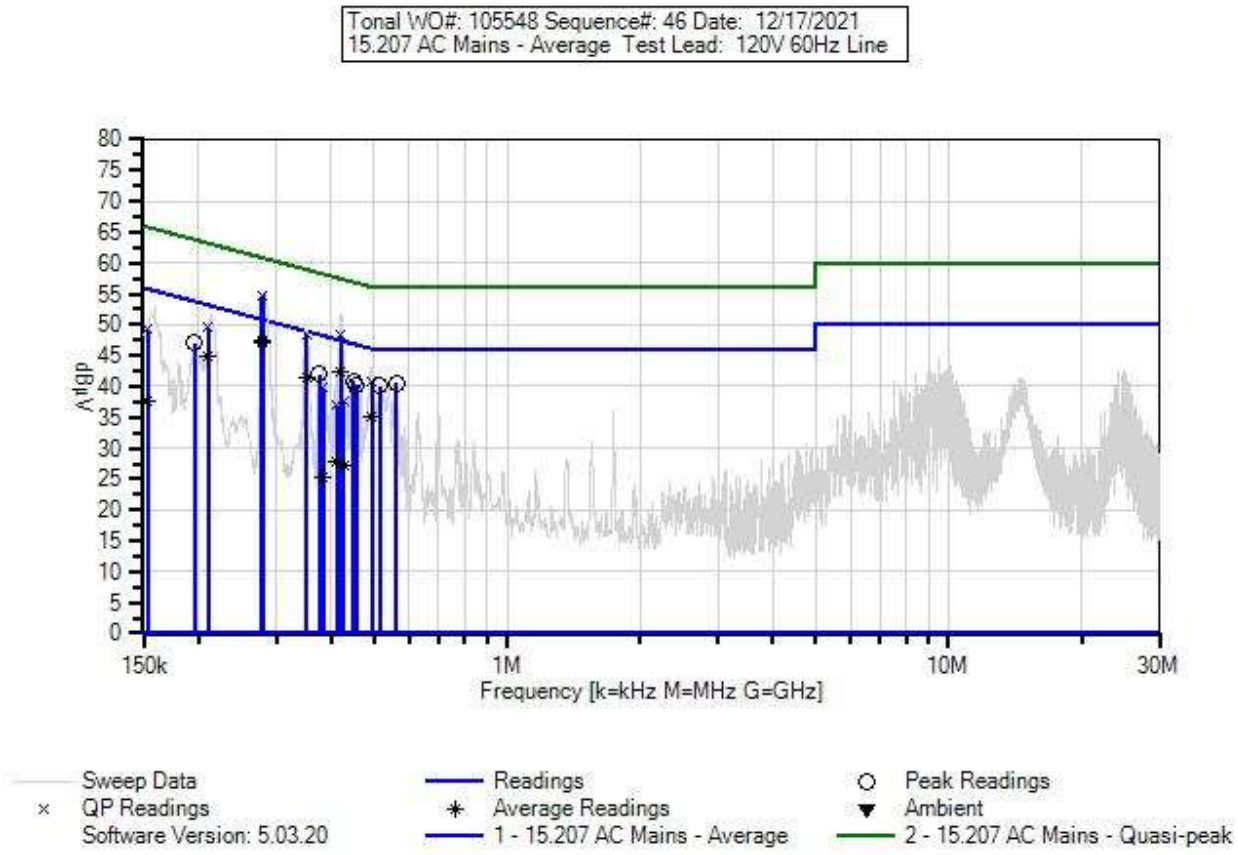
Conducted Emission
Frequency Range: 150kHz to 30MHz

Environmental Conditions:
Temperature: 21.8°C
Humidity: 47%
Atmospheric Pressure: 101.5kPa

Highest Generation Frequency: 5.8GHz
Method: ANSI C63.10 2013

The unit is mounted to a floor standing rack as to simulate typical wall mounted setup. It is set in a testing mode, lifting a weight on a loop.
All WIFI and Bluetooth modules are on.

Notes:
Touch screen display: Direct bond 2312
Power Supply: Artesyn



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/25/2021	2/25/2023
T2	ANP06691	Cable	PE3062-180	3/25/2020	3/25/2022
T3	ANP06694	Cable	PE3062-480	3/25/2020	3/25/2022
T4	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2021	3/11/2023
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2021	3/11/2023
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
T5	ANP05258	High Pass Filter	HE9615-150K-50-720B	7/6/2020	7/6/2022

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	280.316k	37.3	+9.9	+0.0	+0.0	+0.1	+0.0	47.4	50.8	-3.4	Line
	Ave		+0.1								
2	278.856k	37.1	+9.9	+0.0	+0.0	+0.1	+0.0	47.2	50.8	-3.6	Line
	Ave		+0.1								
3	420.747k	32.4	+9.9	+0.0	+0.0	+0.0	+0.0	42.4	47.4	-5.0	Line
	Ave		+0.1								
4	562.324k	30.3	+9.9	+0.0	+0.1	+0.1	+0.0	40.6	46.0	-5.4	Line
			+0.2								
5	515.783k	29.7	+9.9	+0.0	+0.1	+0.1	+0.0	40.0	46.0	-6.0	Line
			+0.2								
6	280.316k	44.6	+9.9	+0.0	+0.0	+0.1	+0.0	54.7	60.8	-6.1	Line
	QP		+0.1								
7	448.880k	30.7	+9.9	+0.0	+0.1	+0.0	+0.0	40.8	46.9	-6.1	Line
			+0.1								
8	278.856k	44.5	+9.9	+0.0	+0.0	+0.1	+0.0	54.6	60.8	-6.2	Line
	QP		+0.1								
^	280.316k	46.6	+9.9	+0.0	+0.0	+0.1	+0.0	56.7	50.8	+5.9	Line
			+0.1								
^	278.856k	46.5	+9.9	+0.0	+0.0	+0.1	+0.0	56.6	50.8	+5.8	Line
			+0.1								
11	375.432k	31.8	+9.9	+0.0	+0.0	+0.1	+0.0	41.9	48.4	-6.5	Line
			+0.1								
12	454.698k	30.1	+9.9	+0.0	+0.1	+0.0	+0.0	40.2	46.8	-6.6	Line
			+0.1								
13	195.812k	36.8	+9.9	+0.0	+0.0	+0.1	+0.0	47.0	53.8	-6.8	Line
			+0.2								
14	351.428k	31.4	+9.9	+0.0	+0.0	+0.0	+0.0	41.4	48.9	-7.5	Line
	Ave		+0.1								
15	209.905k	34.9	+9.9	+0.0	+0.0	+0.1	+0.0	45.0	53.2	-8.2	Line
	Ave		+0.1								
16	420.747k	38.3	+9.9	+0.0	+0.0	+0.0	+0.0	48.3	57.4	-9.1	Line
	QP		+0.1								
^	420.747k	43.2	+9.9	+0.0	+0.0	+0.0	+0.0	53.2	47.4	+5.8	Line
			+0.1								
18	351.428k	38.5	+9.9	+0.0	+0.0	+0.0	+0.0	48.5	58.9	-10.4	Line
	QP		+0.1								
^	351.428k	42.2	+9.9	+0.0	+0.0	+0.0	+0.0	52.2	48.9	+3.3	Line
			+0.1								
20	493.040k	24.9	+9.9	+0.0	+0.1	+0.1	+0.0	35.1	46.1	-11.0	Line
	Ave		+0.1								
21	209.905k	39.5	+9.9	+0.0	+0.0	+0.1	+0.0	49.6	63.2	-13.6	Line
	QP		+0.1								
^	209.905k	43.1	+9.9	+0.0	+0.0	+0.1	+0.0	53.2	53.2	+0.0	Line
			+0.1								
23	493.040k	30.7	+9.9	+0.0	+0.1	+0.1	+0.0	40.9	56.1	-15.2	Line
	QP		+0.1								

^	493.040k	35.1	+9.9 +0.1	+0.0	+0.1	+0.1	+0.0	45.3	46.1	-0.8	Line
25	153.270k QP	37.7	+9.9 +1.6	+0.0	+0.0	+0.1	+0.0	49.3	65.8	-16.5	Line
26	153.270k Ave	25.9	+9.9 +1.6	+0.0	+0.0	+0.1	+0.0	37.5	55.8	-18.3	Line
^	153.270k	44.2	+9.9 +1.6	+0.0	+0.0	+0.1	+0.0	55.8	55.8	+0.0	Line
28	383.373k QP	29.6	+9.9 +0.1	+0.0	+0.0	+0.1	+0.0	39.7	58.2	-18.5	Line
29	427.092k QP	27.5	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	37.5	57.3	-19.8	Line
30	411.207k Ave	17.7	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	27.7	47.6	-19.9	Line
31	427.092k Ave	17.3	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	27.3	47.3	-20.0	Line
^	427.092k	37.0	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	47.0	47.3	-0.3	Line
33	411.207k QP	26.9	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	36.9	57.6	-20.7	Line
^	411.207k	35.2	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	45.2	47.6	-2.4	Line
^	409.611k	32.4	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	42.4	47.7	-5.3	Line
36	383.373k Ave	15.2	+9.9 +0.1	+0.0	+0.0	+0.1	+0.0	25.3	48.2	-22.9	Line
^	383.373k	35.4	+9.9 +0.1	+0.0	+0.0	+0.1	+0.0	45.5	48.2	-2.7	Line
^	385.613k	32.5	+9.9 +0.1	+0.0	+0.0	+0.1	+0.0	42.6	48.2	-5.6	Line

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Pl • Fremont CA 94539 • 510-249-1170		
Customer:	**Tonal**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**105488**	Date:	12/17/2021
Test Type:	**Conducted Emissions**	Time:	10:28:13
Tested By:	Hoang Cao	Sequence#:	47
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

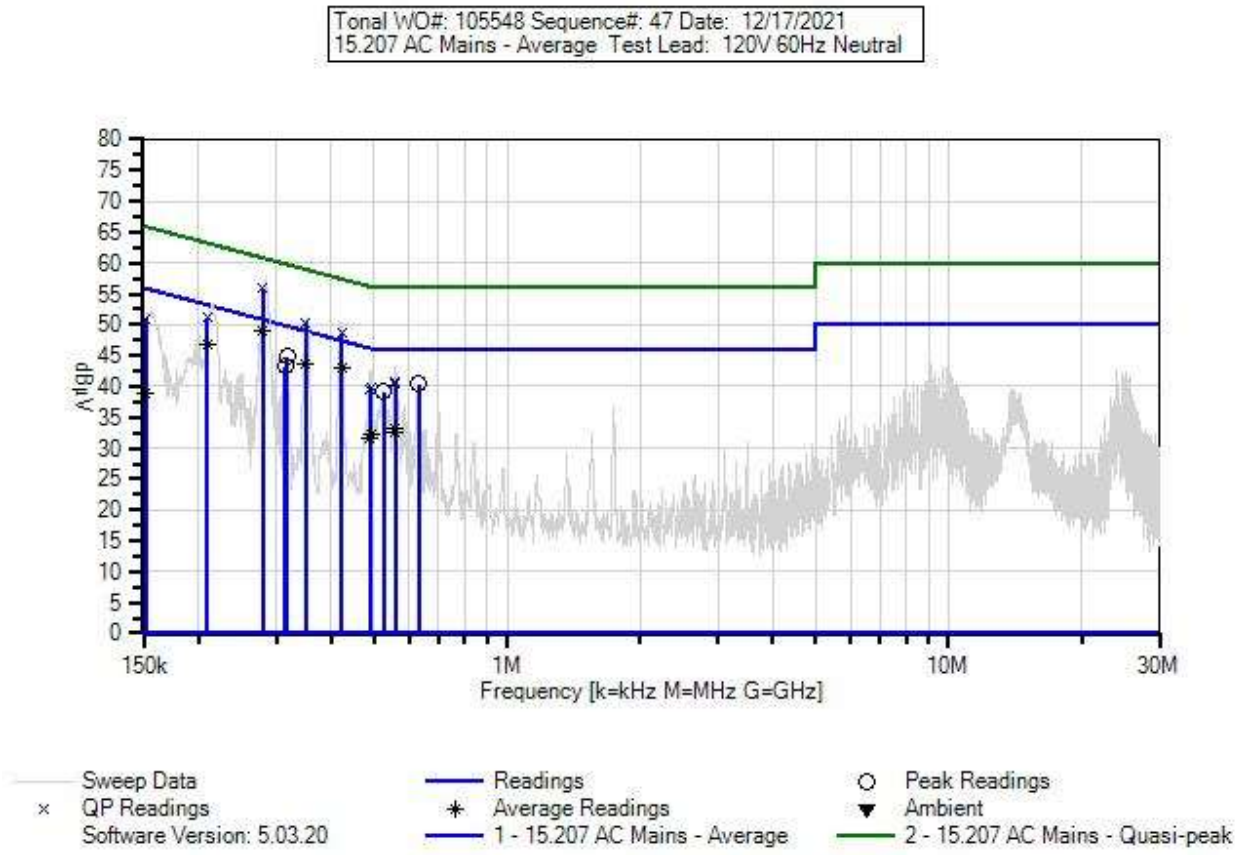
Conducted Emission
Frequency Range: 150kHz to 30MHz

Environmental Conditions:
Temperature: 21.8°C
Humidity: 47%
Atmospheric Pressure: 101.5kPa

Highest Generation Frequency: 5.8GHz
Method: ANSI C63.10 2013

The unit is mounted to a floor standing rack as to simulate typical wall mounted setup. It is set in a testing mode, lifting a weight on a loop.
All WIFI and Bluetooth modules are on.

Notes:
Touch screen display: Direct bond 2312
Power Supply: Artesyn



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/25/2021	2/25/2023
T2	ANP06691	Cable	PE3062-180	3/25/2020	3/25/2022
T3	ANP06694	Cable	PE3062-480	3/25/2020	3/25/2022
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/11/2021	3/11/2023
T4	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/11/2021	3/11/2023
	AN02660	Spectrum Analyzer	E4446A	12/4/2020	12/4/2022
T5	ANP05258	High Pass Filter	HE9615-150K-50-720B	7/6/2020	7/6/2022

Measurement Data: Reading listed by margin. Test Lead: Neutral

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	280.264k	38.9	+9.9	+0.0	+0.0	+0.0	+0.0	48.9	50.8	-1.9	Neutr
	Ave		+0.1								
2	421.660k	33.0	+9.9	+0.0	+0.0	+0.0	+0.0	43.0	47.4	-4.4	Neutr
	Ave		+0.1								
3	280.264k	45.9	+9.9	+0.0	+0.0	+0.0	+0.0	55.9	60.8	-4.9	Neutr
	QP		+0.1								
^	280.264k	47.7	+9.9	+0.0	+0.0	+0.0	+0.0	57.7	50.8	+6.9	Neutr
			+0.1								
5	317.256k	34.8	+9.9	+0.0	+0.0	+0.0	+0.0	44.8	49.8	-5.0	Neutr
			+0.1								
6	350.035k	33.5	+9.9	+0.0	+0.0	+0.0	+0.0	43.5	49.0	-5.5	Neutr
	Ave		+0.1								
7	630.682k	30.2	+9.9	+0.0	+0.1	+0.0	+0.0	40.4	46.0	-5.6	Neutr
			+0.2								
8	209.412k	36.7	+9.9	+0.0	+0.0	+0.0	+0.0	46.7	53.2	-6.5	Neutr
	Ave		+0.1								
9	315.074k	33.3	+9.9	+0.0	+0.0	+0.0	+0.0	43.3	49.8	-6.5	Neutr
			+0.1								
10	525.237k	29.0	+9.9	+0.0	+0.1	+0.0	+0.0	39.2	46.0	-6.8	Neutr
			+0.2								
11	350.035k	40.4	+9.9	+0.0	+0.0	+0.0	+0.0	50.4	59.0	-8.6	Neutr
	QP		+0.1								
^	350.035k	43.5	+9.9	+0.0	+0.0	+0.0	+0.0	53.5	49.0	+4.5	Neutr
			+0.1								
13	421.660k	38.6	+9.9	+0.0	+0.0	+0.0	+0.0	48.6	57.4	-8.8	Neutr
	QP		+0.1								
^	421.660k	43.9	+9.9	+0.0	+0.0	+0.0	+0.0	53.9	47.4	+6.5	Neutr
			+0.1								
15	209.412k	41.1	+9.9	+0.0	+0.0	+0.0	+0.0	51.1	63.2	-12.1	Neutr
	QP		+0.1								
^	209.412k	44.4	+9.9	+0.0	+0.0	+0.0	+0.0	54.4	53.2	+1.2	Neutr
			+0.1								
17	558.862k	23.0	+9.9	+0.0	+0.1	+0.0	+0.0	33.2	46.0	-12.8	Neutr
	Ave		+0.2								
18	558.003k	22.4	+9.9	+0.0	+0.1	+0.0	+0.0	32.6	46.0	-13.4	Neutr
	Ave		+0.2								
19	492.486k	22.0	+9.9	+0.0	+0.1	+0.0	+0.0	32.1	46.1	-14.0	Neutr
	Ave		+0.1								
20	488.923k	21.6	+9.9	+0.0	+0.1	+0.0	+0.0	31.7	46.2	-14.5	Neutr
	Ave		+0.1								
21	152.236k	38.8	+9.9	+0.0	+0.0	+0.1	+0.0	50.9	65.9	-15.0	Neutr
	QP		+2.1								
22	558.862k	30.4	+9.9	+0.0	+0.1	+0.0	+0.0	40.6	56.0	-15.4	Neutr
	QP		+0.2								
23	558.003k	30.3	+9.9	+0.0	+0.1	+0.0	+0.0	40.5	56.0	-15.5	Neutr
	QP		+0.2								

^	558.003k	33.6	+9.9 +0.2	+0.0	+0.1	+0.0	+0.0	43.8	46.0	-2.2	Neutr
^	558.862k	33.4	+9.9 +0.2	+0.0	+0.1	+0.0	+0.0	43.6	46.0	-2.4	Neutr
26	492.486k QP	29.9	+9.9 +0.1	+0.0	+0.1	+0.0	+0.0	40.0	56.1	-16.1	Neutr
27	488.923k QP	29.5	+9.9 +0.1	+0.0	+0.1	+0.0	+0.0	39.6	56.2	-16.6	Neutr
^	488.923k	33.9	+9.9 +0.1	+0.0	+0.1	+0.0	+0.0	44.0	46.2	-2.2	Neutr
^	492.486k	33.6	+9.9 +0.1	+0.0	+0.1	+0.0	+0.0	43.7	46.1	-2.4	Neutr
^	485.968k	30.0	+9.9 +0.1	+0.0	+0.1	+0.0	+0.0	40.1	46.2	-6.1	Neutr
31	152.236k Ave	26.9	+9.9 +2.1	+0.0	+0.0	+0.1	+0.0	39.0	55.9	-16.9	Neutr
^	152.236k	44.8	+9.9 +2.1	+0.0	+0.0	+0.1	+0.0	56.9	55.9	+1.0	Neutr

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 dBµV/m, the spectrum analyzer reading in dBµV 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	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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.