Nalloy, LLC

TEST REPORT FOR

A2D0US

Tested to The Following Standards:

FCC Part 15 Subpart E Section(s)

15.207 & 15.407
(NII 5.15 – 5.25GHz)

Report No.: 106407-34

Date of issue: February 7, 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

This report contains a total of 114 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc.

TABLE OF CONTENTS

Administrative Information 3
Test Report Information 3
Report Authorization 3
Test Facility Information 4
Software Versions 4
Site Registration & Accreditation Information 4
Summary of Results 5
Modifications During Testing 5
Conditions During Testing 5
Equipment Under Test 6
General Product Information 7
FCC Part 15 Subpart E 9
15.215 Occupied Bandwidth 9
15.407(a) Output Power 25
15.407(a) Power Spectral Density 34
15.407(b) Radiated Emissions & Band Edge 54
15.207 AC Conducted Emissions 105
Supplemental Information 113
Measurement Uncertainty 113
Emissions Test Details 113

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Nalloy, LLC
2301 5th Avenue
Seattle, WA 98108

Representative: Naga Suryadevara
Customer Reference Number: 2D-07350222

REPORT PREPARED BY:

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

Project Number: 106407

DATE OF EQUIPMENT RECEIPT: December 6, 2021
DATE(S) OF TESTING: December 6-10, 16, 21,& 23, 2021
January 5-7, 10-13, 17-21 & 24-28, 2022
Feburary 2, 2022

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.
Canyon Park
22116 23rd Drive S.E., Suite A
Bothell, WA 98021

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 E - 15.407 (NII)

Test Procedure	Description	Modifications	Results
15.215	Occupied Bandwidth	NA	PASS
15.407(a)(1)	Output Power	NA	PASS
15.407(a)(1)	Power Spectral Density	NA	PASS
15.407(a)(1)(iii)	EIRP at >30º Elevation	NA	NA1
15.407(b)	Radiated Emissions & Band Edge	NA	PASS
15.407(g)	Frequency Stability	NA	NP1
15.207	AC Conducted Emissions	NA	PASS

NA = Not Applicable
NA1 = Not applicable because EUT is not an outdoor access point.
NP1 = CKC was not contracted to perform the required testing.

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
No modifications were made during testing.

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 106407-34_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 Tested:

Device	Manufacturer	Model #	S/N
None	Nalloy, LLC	A2D0US	G3A1VF021386000B

Support Equipment:

Device	Manufacturer	Model #	S/N
Headphones	Poly	C5220T	NA
Laptop	HP	14-fq0032od	5CD12654D3
None	Nalloy, LLC	Gala	XXX
None	Nalloy, LLC	Gala	XXX
USB to Ethernet Adapter	Amazon	Gigabit Ethernet Adapter	0050B6E212BA
AC Adapter	Delta Electronics, Inc.	MDS-030AAC15	NA

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
None	Nalloy, LLC	A2D0US	G3A1VF021386000G

Support Equipment:

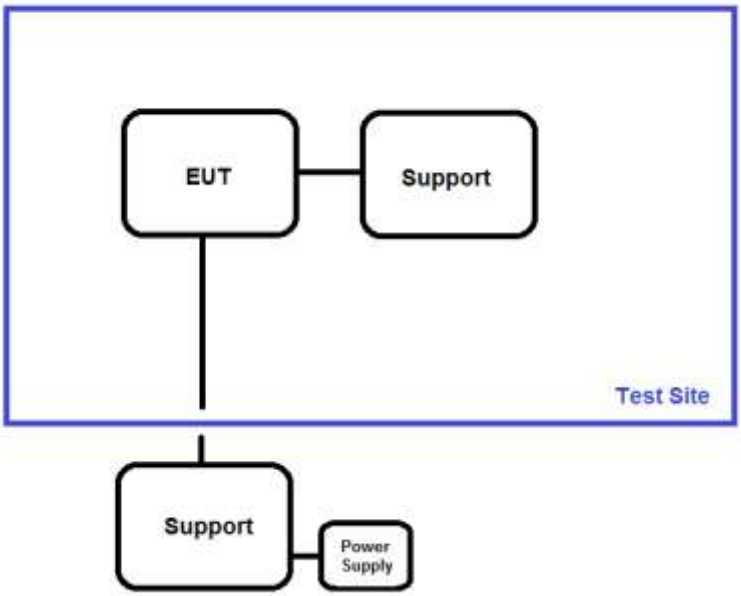
Device	Manufacturer	Model #	S/N
Headphones	Sony	WH-1000X M3	NA
Laptop	ASUS	E210M	M9N0CX21R750387
None	Nalloy, LLC	Gala	XXX
None	Nalloy, LLC	Gala	XXX
USB to Ethernet Adapter	Amazon	Gigabit Ethernet Adapter	0050B6E212BA
AC Adapter	Delta Electronics, Inc.	MDS-030AAC15	NA

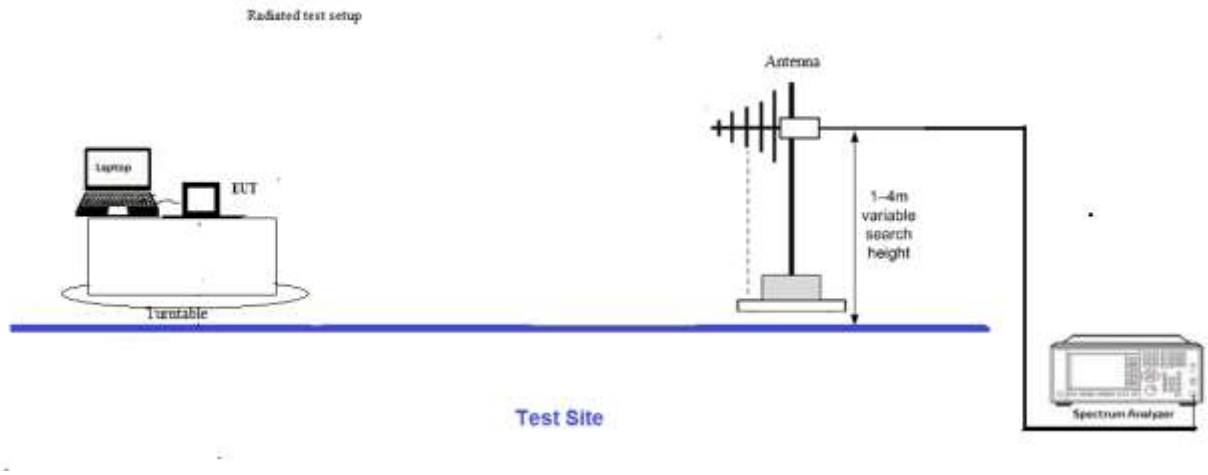
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11a, 802.11ac (20, 40 and 80 MHz), 802.11n (20 and 40MHz BW)
Operating Frequency Range:	5180-5240 MHz
Modulation Type(s):	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
Maximum Duty Cycle:	100% Modulated (tested worst-case)
Number of TX Chains:	1
Antenna Type(s) and Gain:	Omnidirectional / 3.8dBi
Beamforming Type:	N/A
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	120VAC
Firmware / Software used for Test:	mainline-1.0.2137.0 Bin file- Golden 082621 Qualcomm radio control toolkit v4.0
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)

Test Setup Block Diagram





Rev C

FCC Part 15 Subpart E

15.215 Occupied Bandwidth

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	S. Pittsford
Test Method:	ANSI C63.10 (2013), KDB 789033 KDB 662911 (v02r01 10/31/2013)	Test Date(s):	1/18/2022
Configuration:	2		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through the antenna port connector and is attached to the spectrum analyzer.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	45

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	Agilent	E4440A	11/29/2021	11/29/2023
P07229	Attenuator	Pasternack	PE7004-20	8/9/2021	8/9/2023
P07796	Cable	Andrews	Heliax	7/7/2021	7/7/2023

6dB Occupied Bandwidth

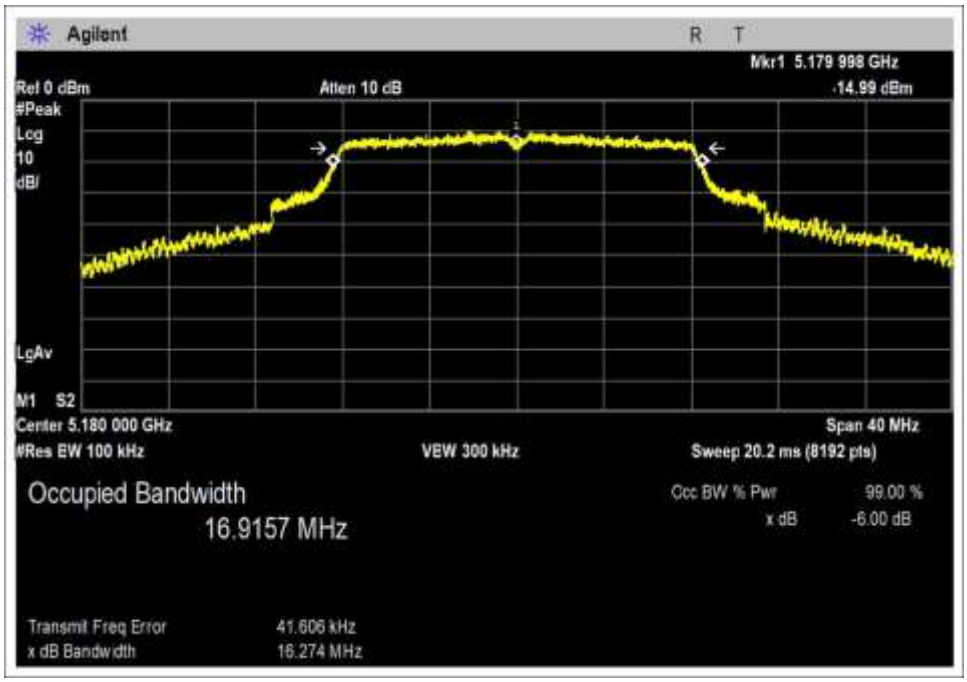
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (MHz)	Limit (MHz)	Results
5180	0	802.11a	16274	None	N/A
5210	0	802.11a	15361		
5240	0	802.11a	15259		
5180	0	802.11n20	15974	None	N/A
5210	0	802.11n20	16576		
5240	0	802.11n20	14154		
5190	0	802.11n40	35710	None	N/A
5230	0	802.11n40	35352		
5180	0	802.11ac20	15952	None	N/A
5210	0	802.11ac20	16356		
5240	0	802.11ac20	15913		
5190	0	802.11ac40	35468	None	N/A
5230	0	802.11ac40	35058		
5210	0	802.11ac80	75116		

99% Occupied Bandwidth

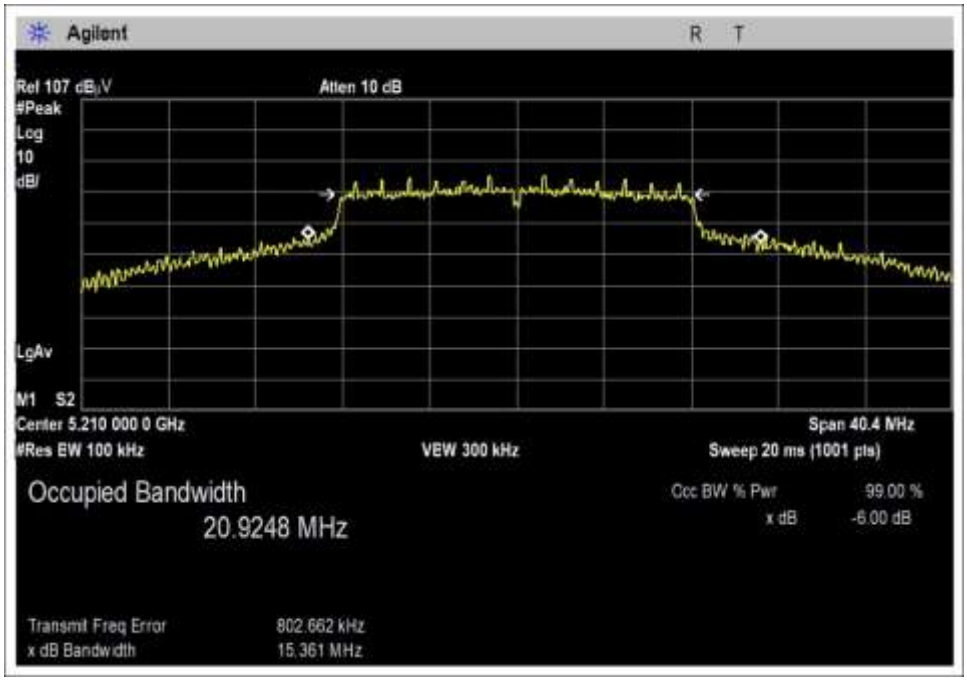
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (MHz)	Limit (MHz)	Results
5180	0	802.11a	18123.9	None	N/A
5210	0	802.11a	23731.4		
5240	0	802.11a	17886.4		
5180	0	802.11n20	19962.6	None	N/A
5210	0	802.11n20	23521.8		
5240	0	802.11n20	18785.3		
5190	0	802.11n40	38264.1	None	N/A
5230	0	802.11n40	37801.4		
5180	0	802.11ac20	19981.2	None	N/A
5210	0	802.11ac20	23290.0		
5240	0	802.11ac20	18836.2		
5190	0	802.11ac40	38159.6	None	N/A
5230	0	802.11ac40	37810.5		
5210	0	802.11ac80	76677.0		

Plot(s)

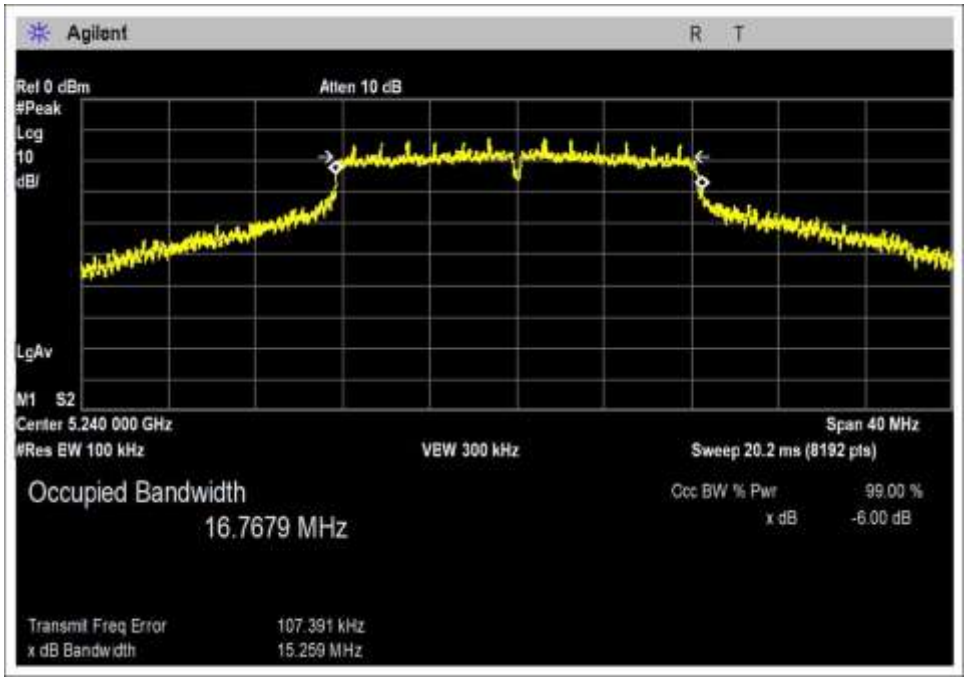
6dB Occupied Bandwidth, a



Low Channel

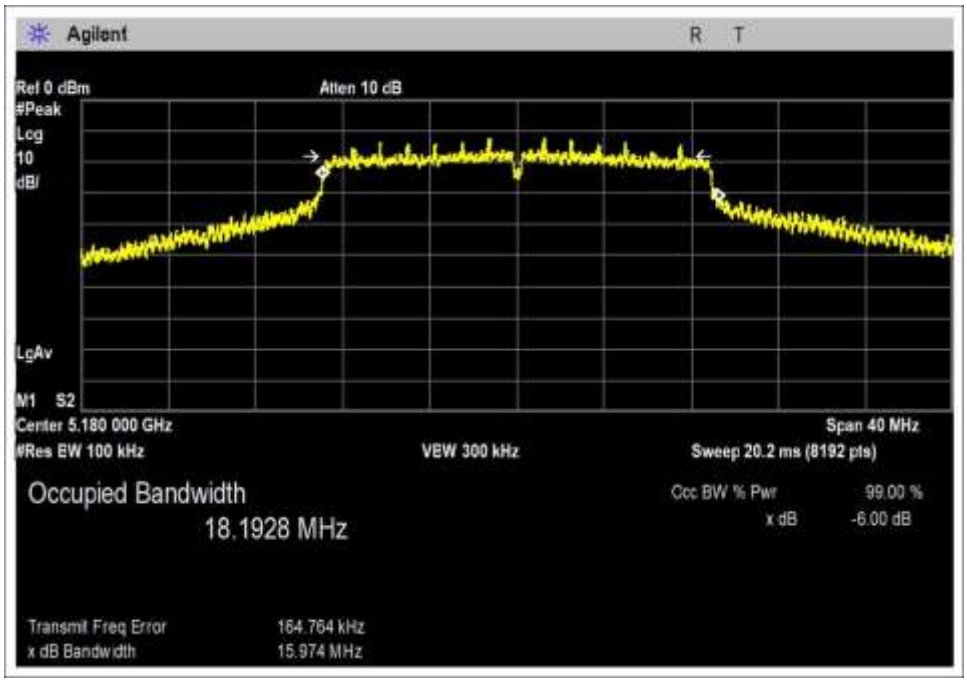


Middle Channel

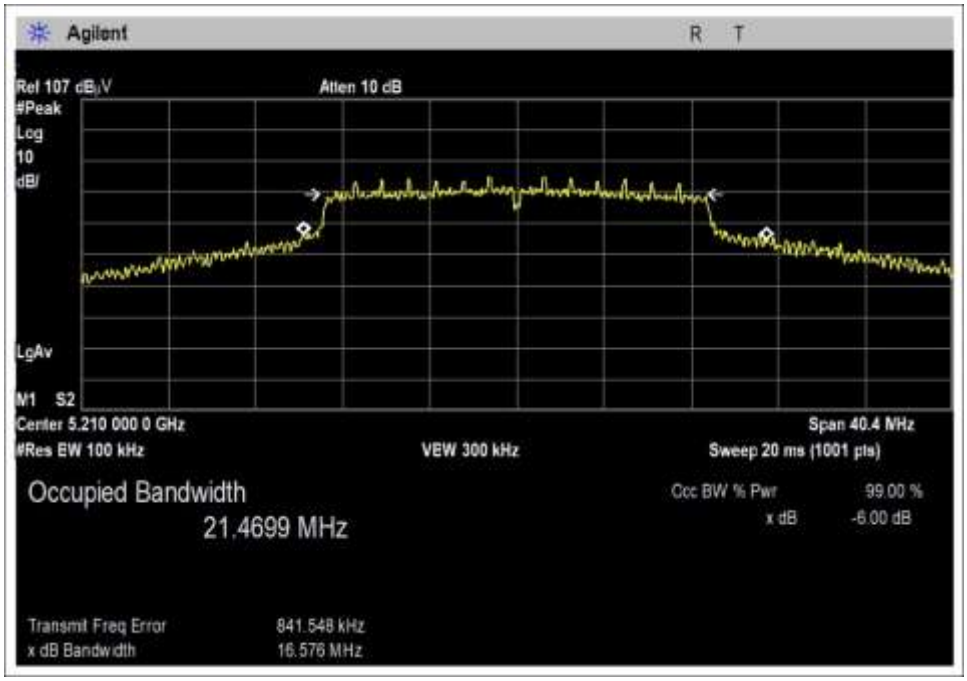


High Channel

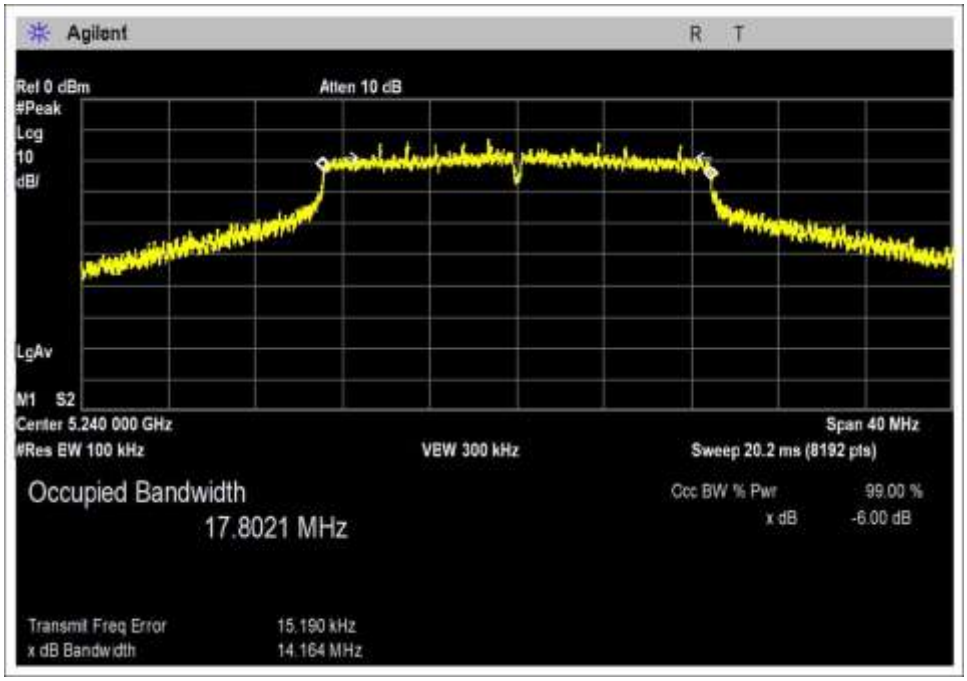
<u>6dB Occupied Bandwidth, n20</u>



Low Channel

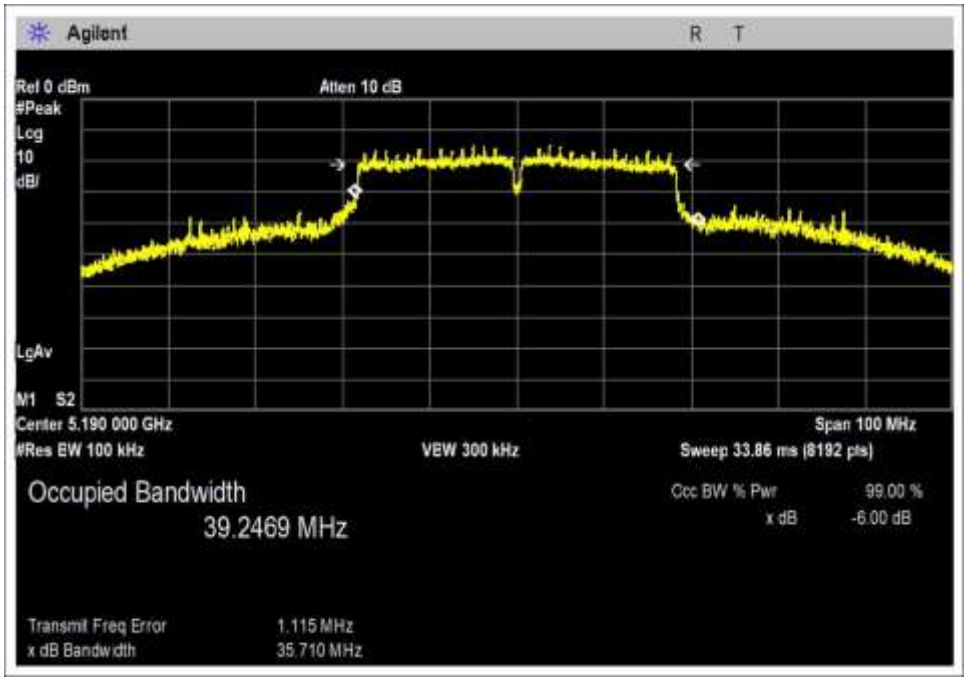


Middle Channel

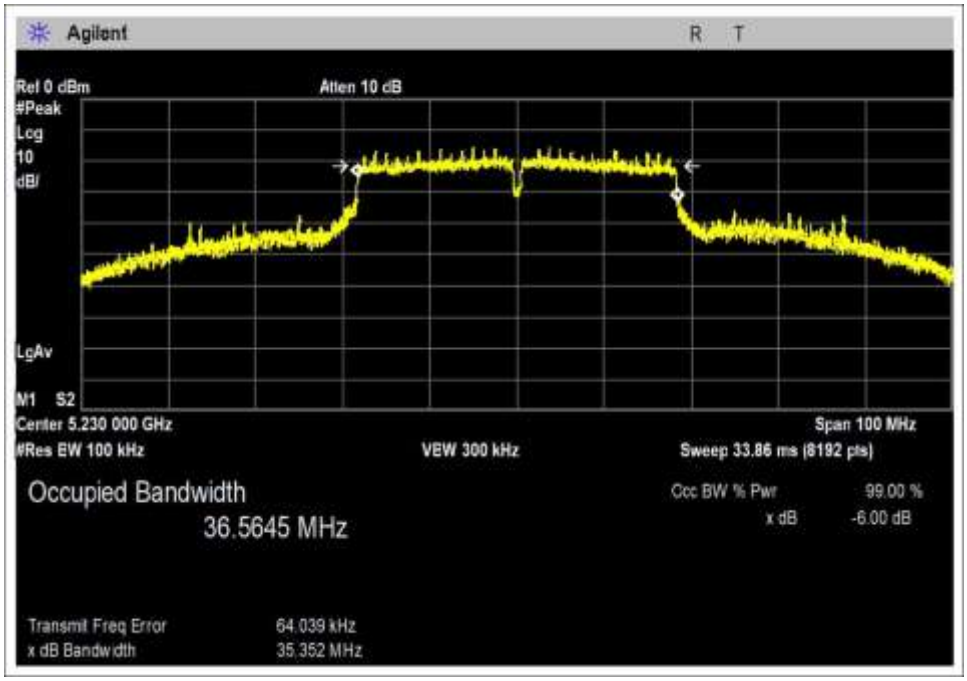


High Channel

6dB Occupied Bandwidth, n40

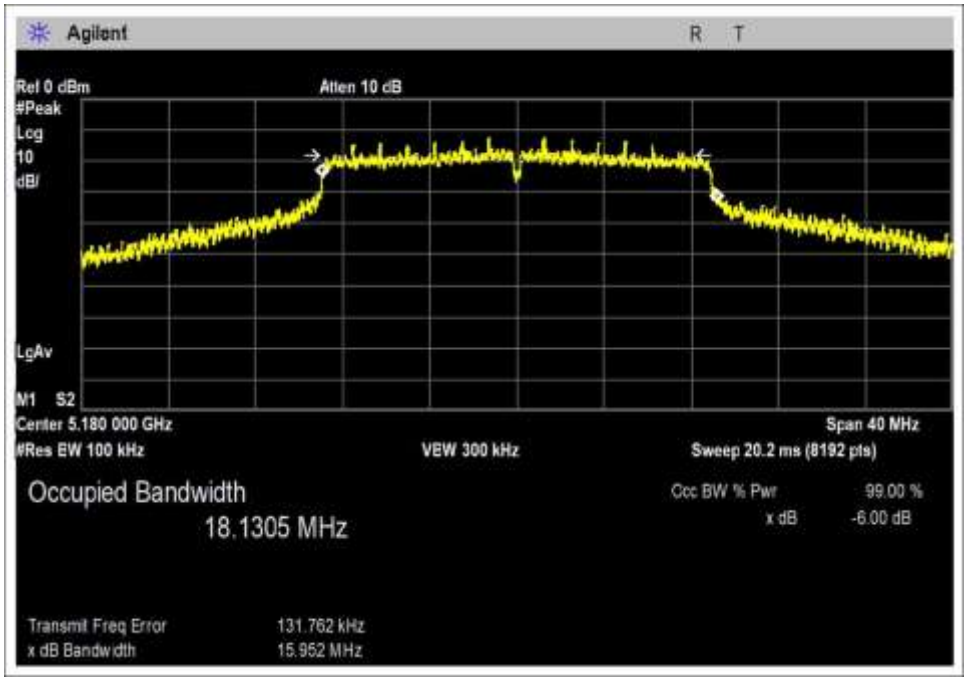


Low Channel

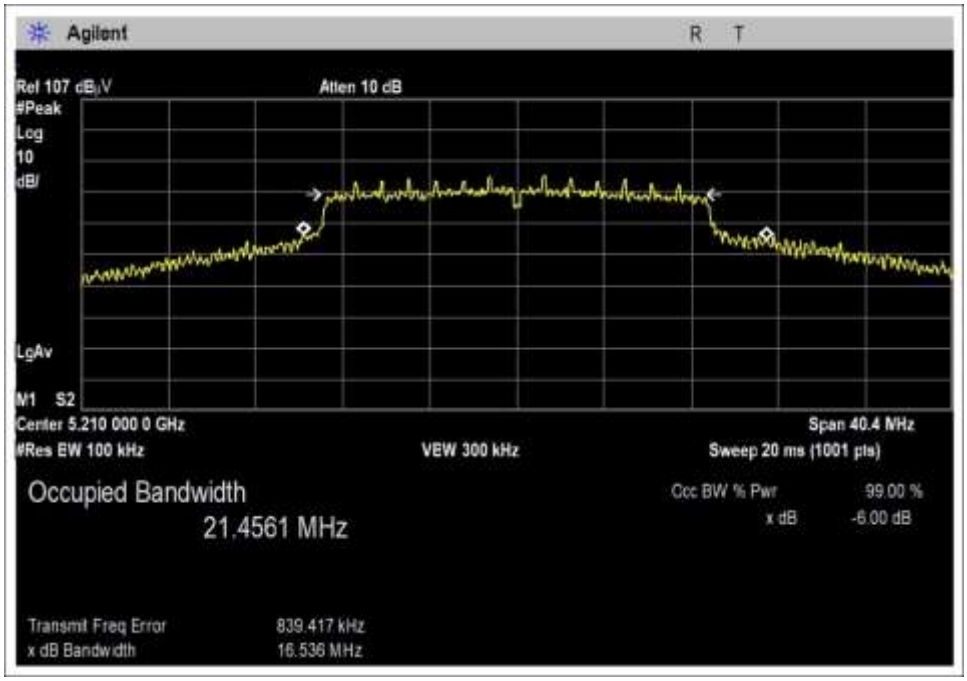


High Channel

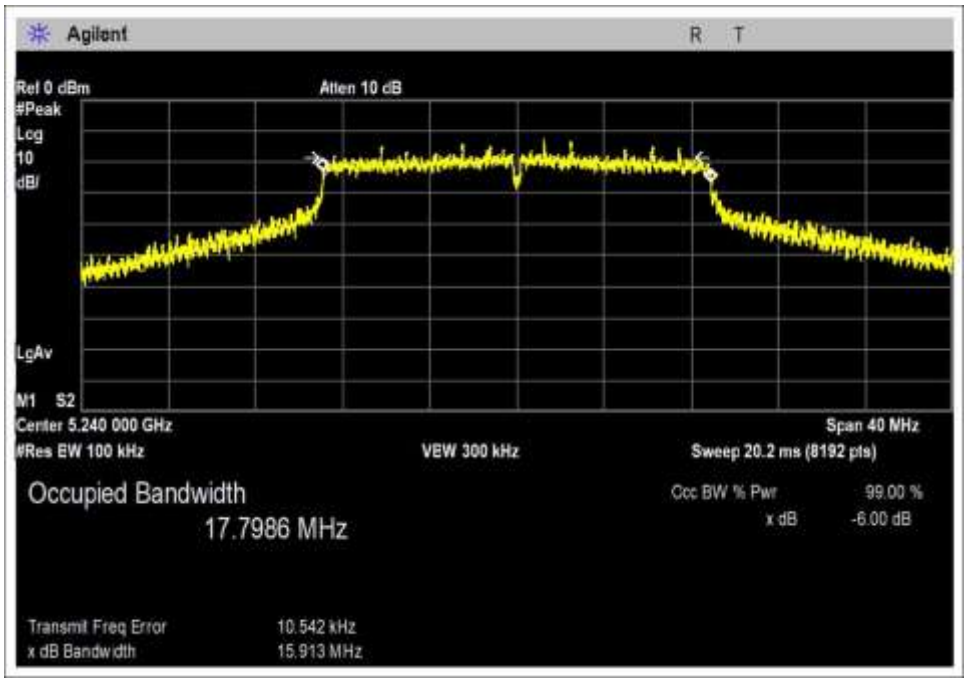
6dB Occupied Bandwidth, ac20



Low Channel

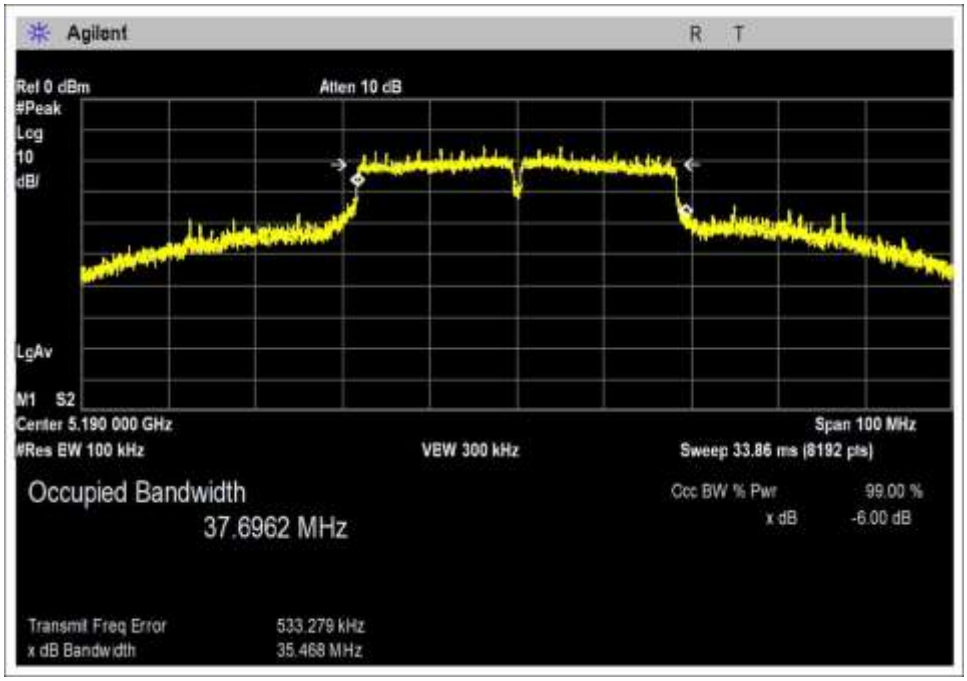


Middle Channel

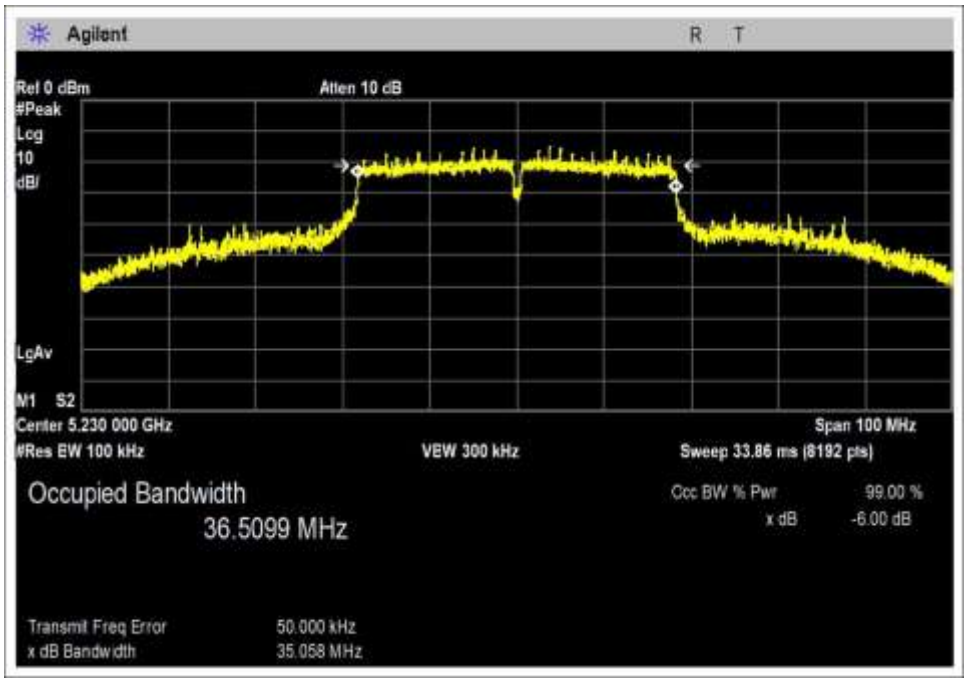


High Channel

<u>6dB Occupied Bandwidth, ac40</u>

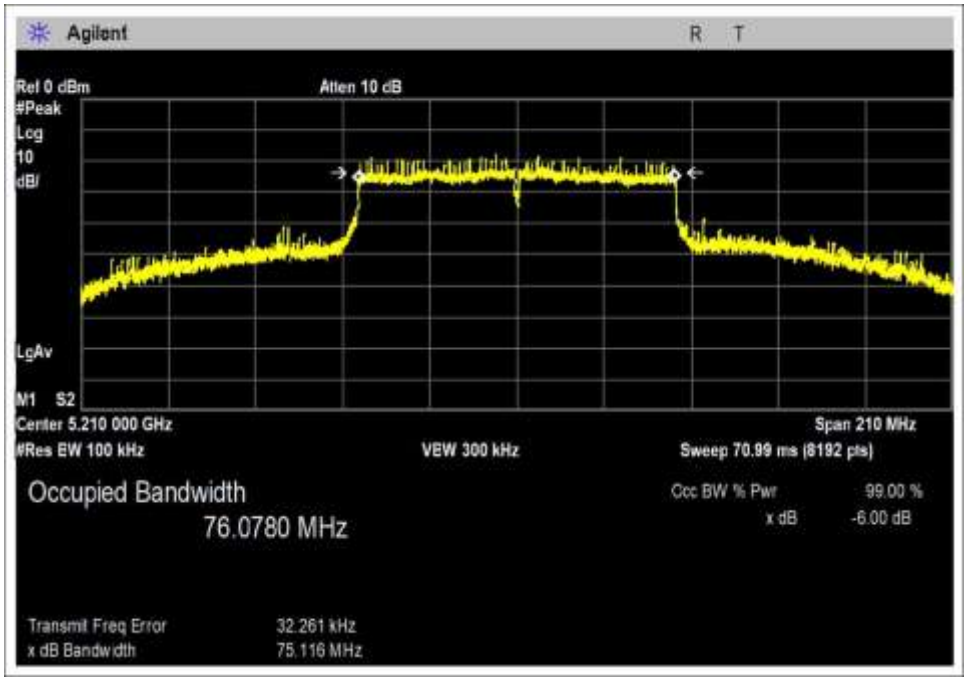


Low Channel

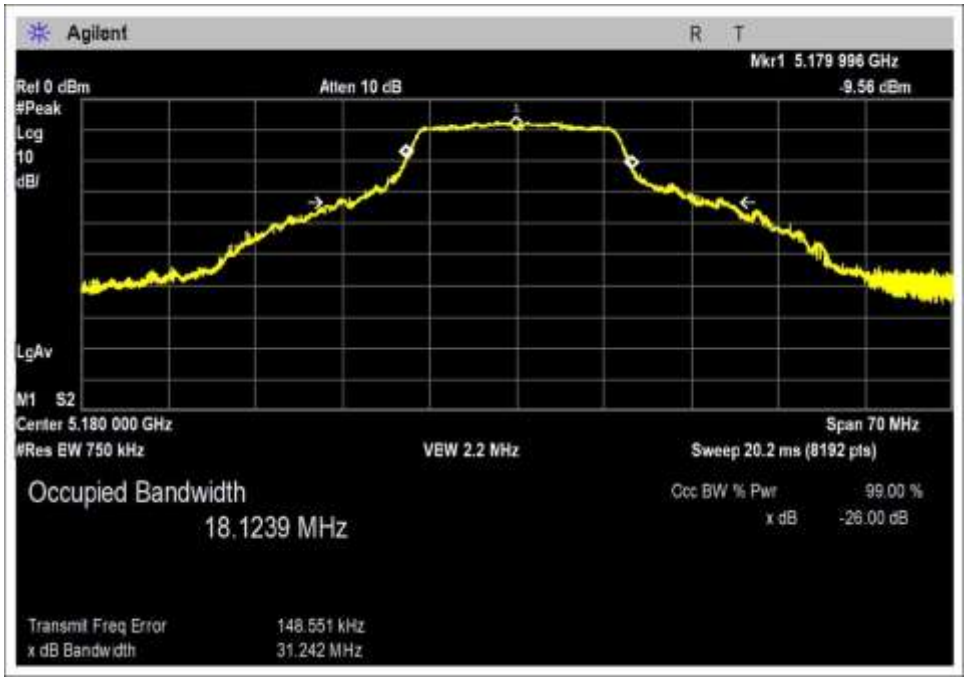


High Channel

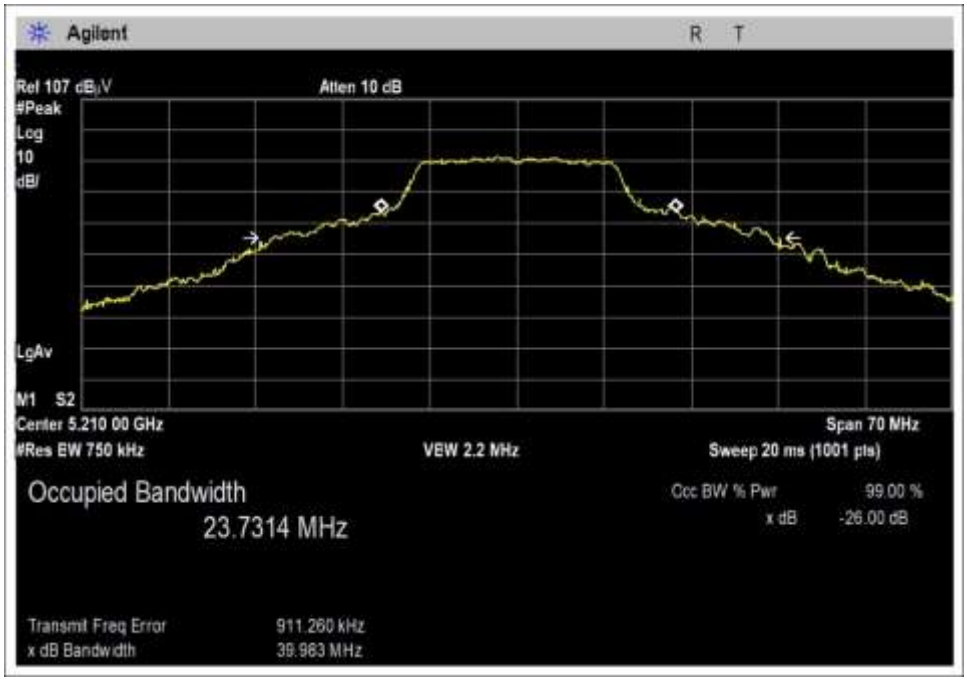
<u>6dB Occupied Bandwidth, ac80</u>



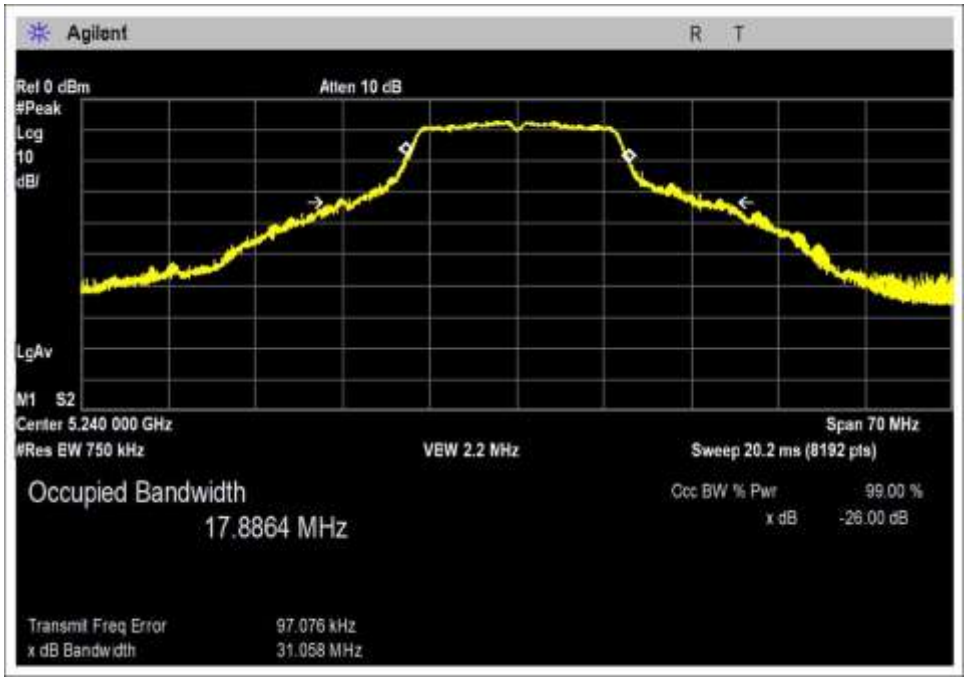
99% Occupied Bandwidth, a



Low Channel

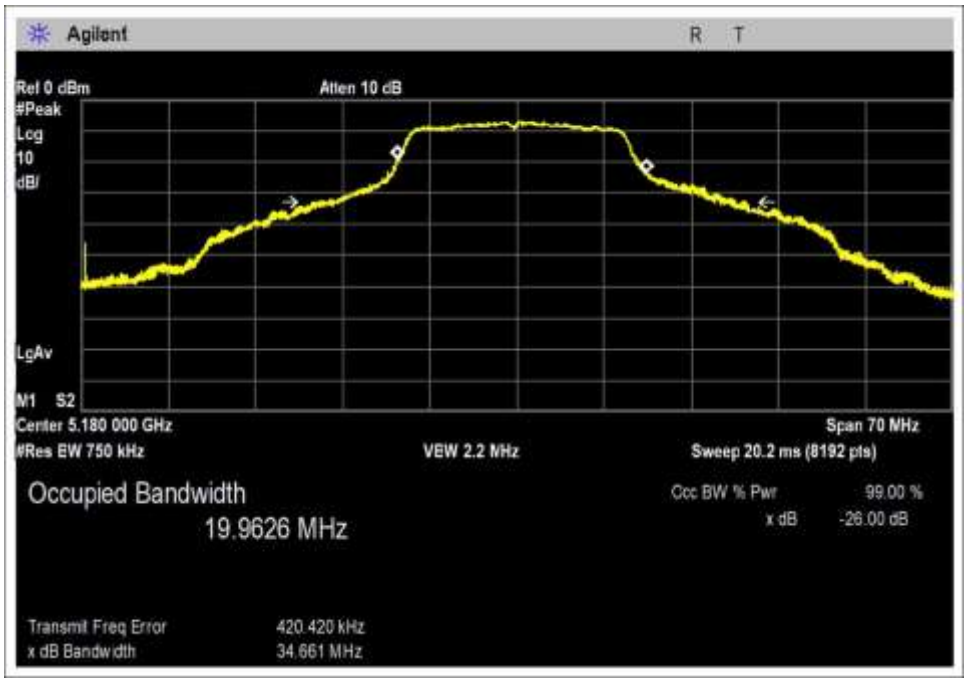


Middle Channel

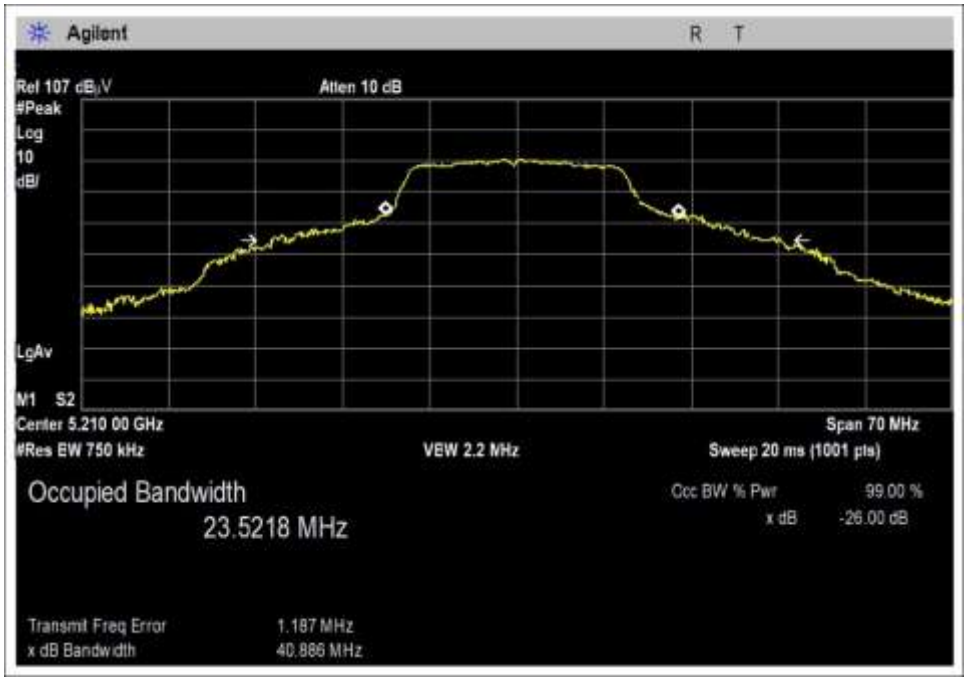


High Channel

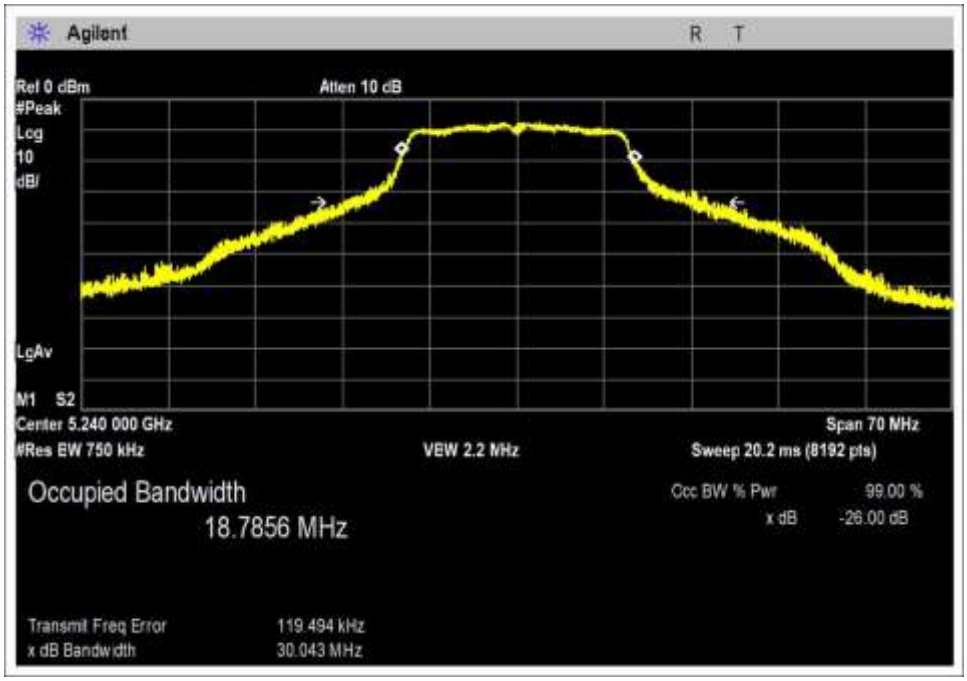
<u>99% Occupied Bandwidth, n20</u>



Low Channel

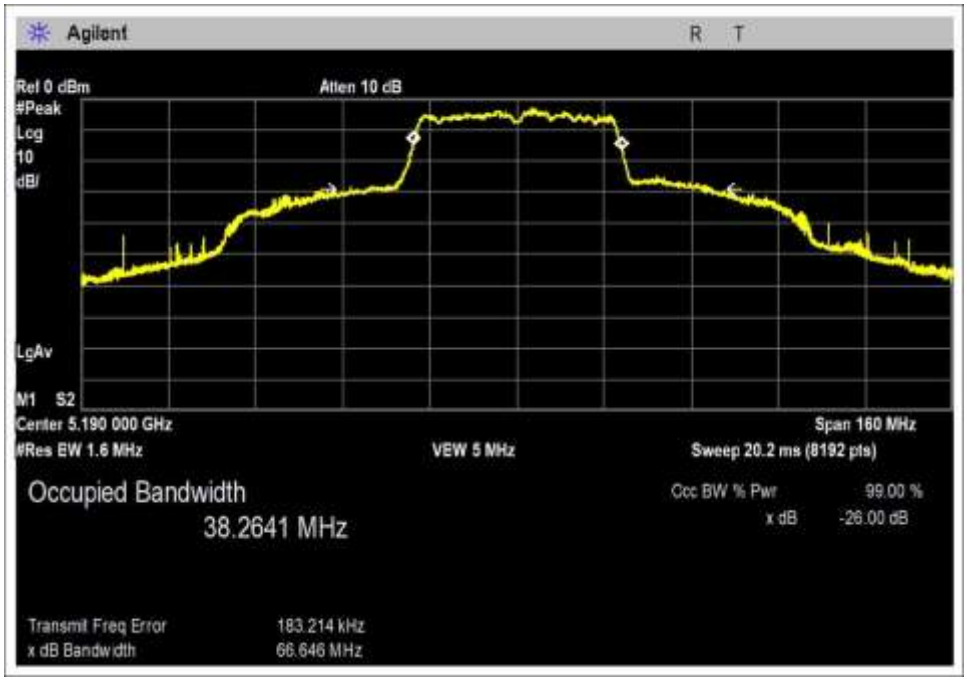


Middle Channel

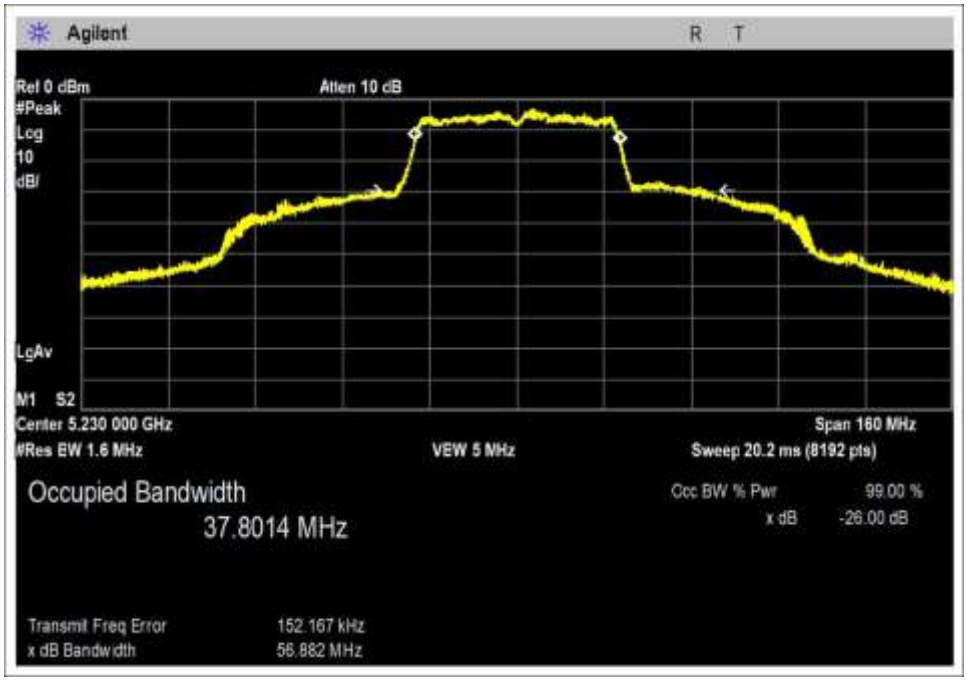


High Channel

99% Occupied Bandwidth, n40

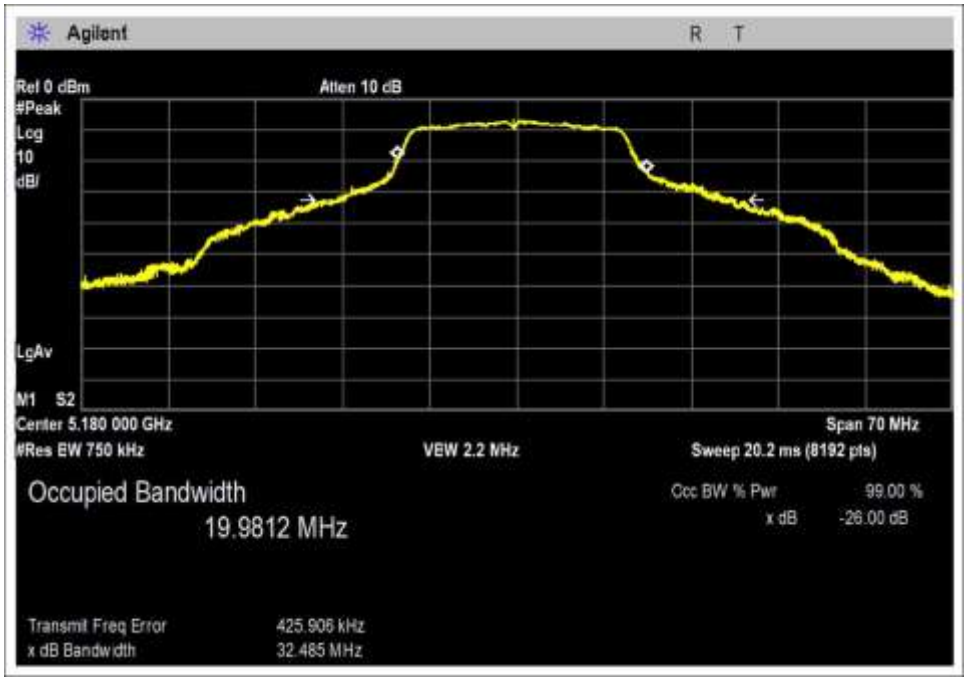


Low Channel

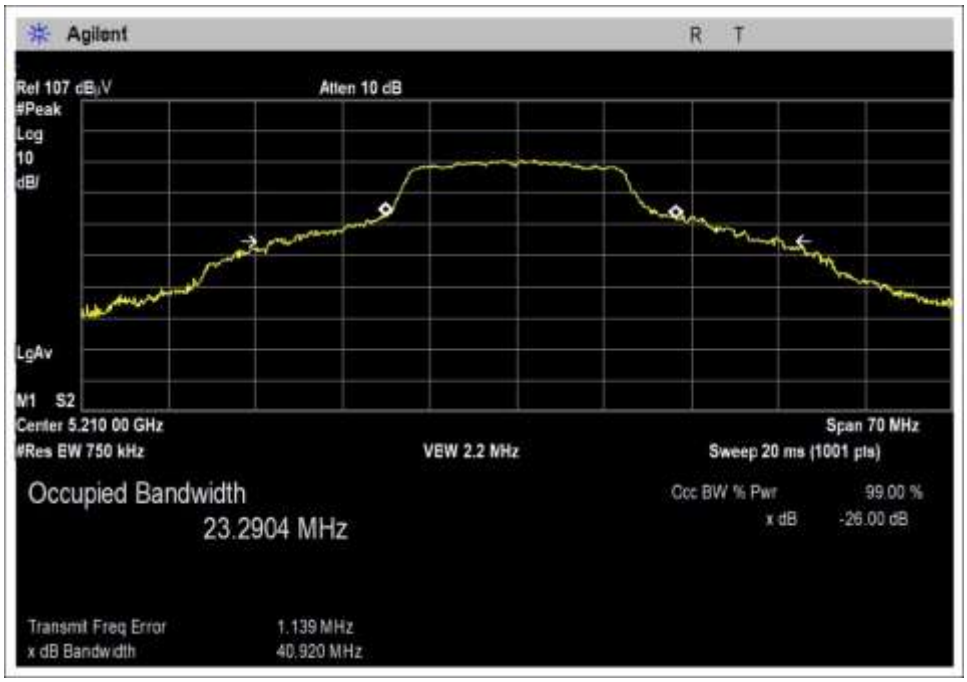


High Channel

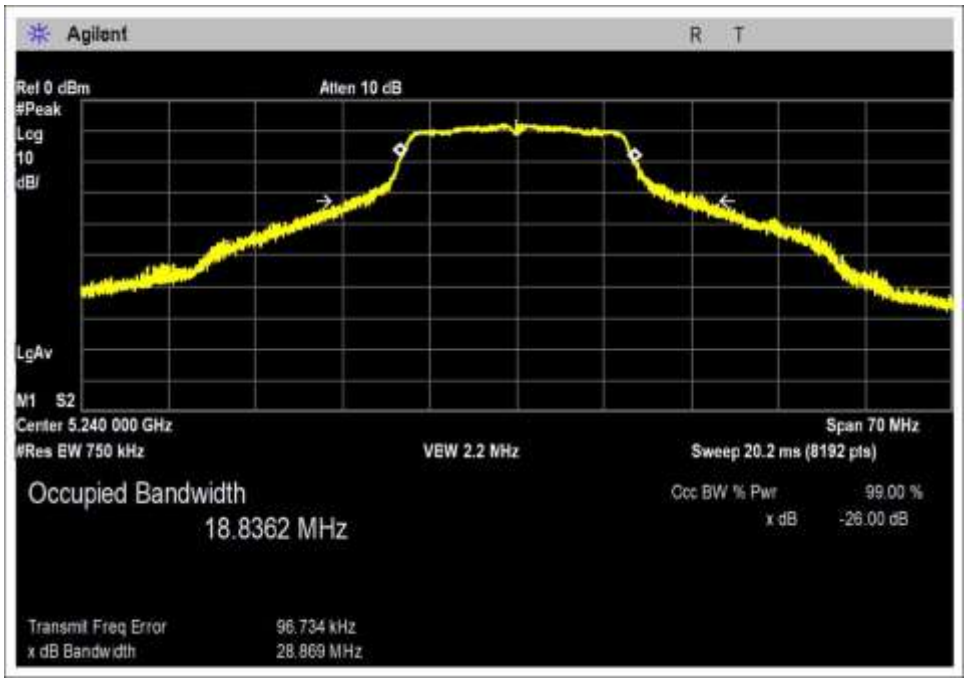
99% Occupied Bandwidth, ac20



Low Channel

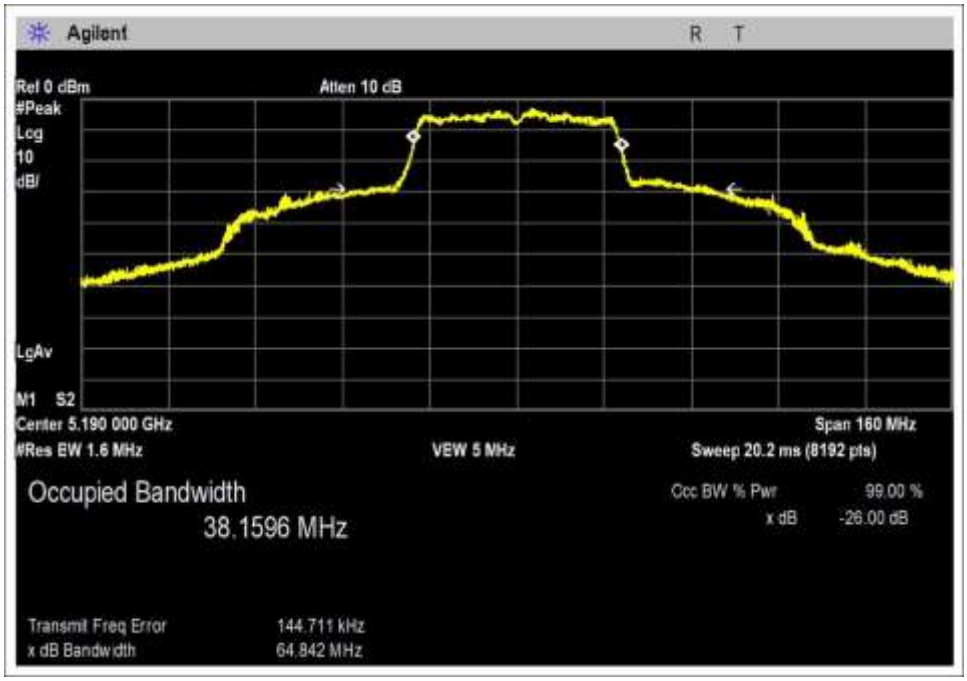


Middle Channel

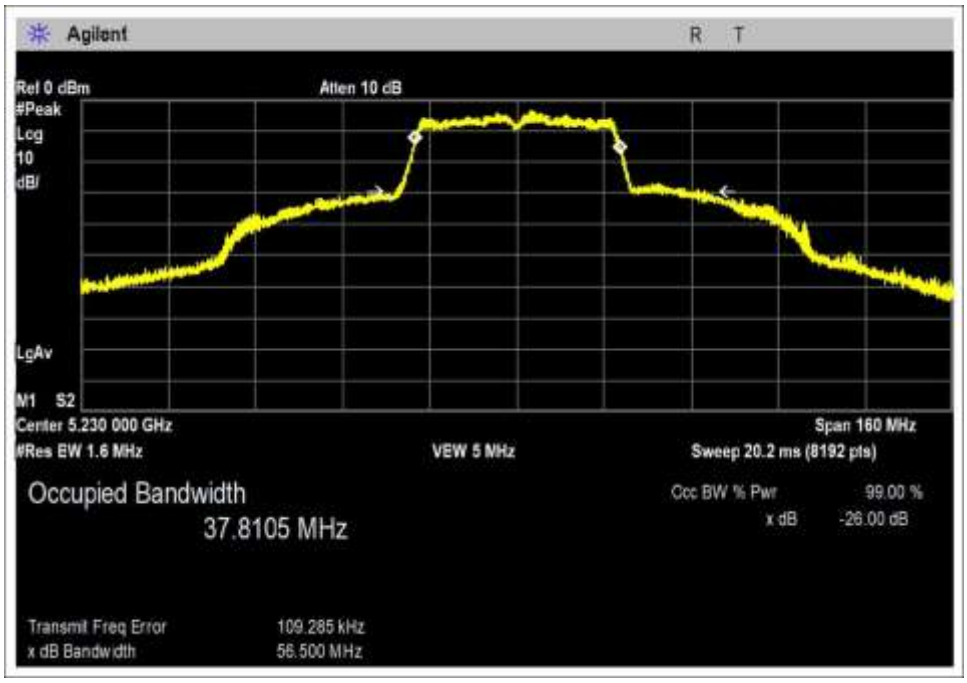


High Channel

<u>99% Occupied Bandwidth, ac40</u>

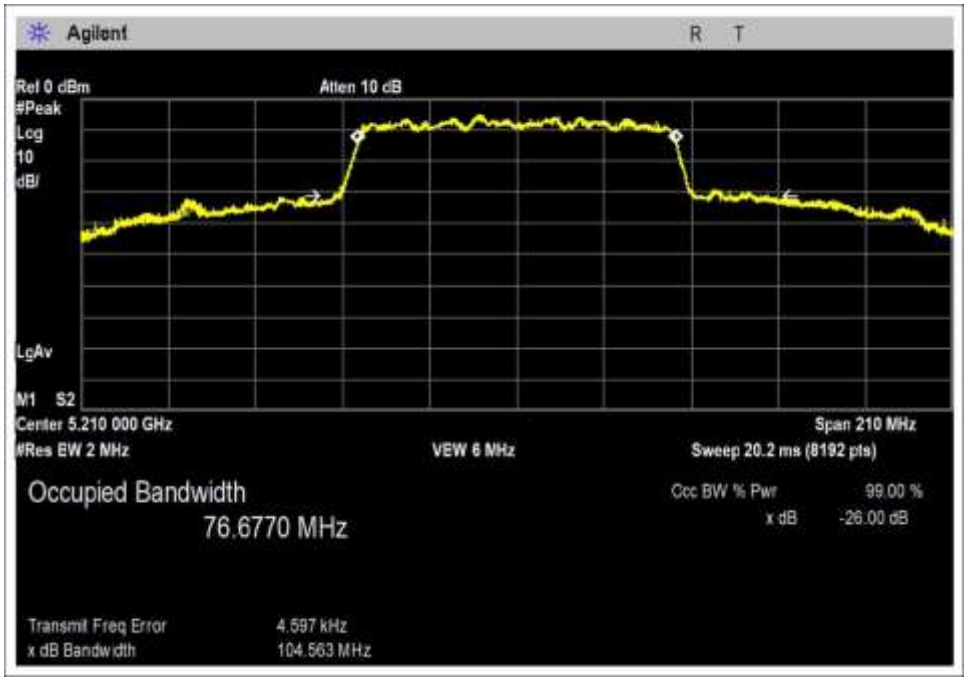


Low Channel



High Channel

<u>99% Occupied Bandwidth, ac80</u>



15.407(a) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033	Test Date(s):	1/26/2022
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through a temporary connection to antenna port connector via UFL adapter and is attached to the spectrum analyzer. The UFL adapter has a declared manufacturer loss of 0.9dB and will be accounted for in the measurement.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	45

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02872	Spectrum Analyzer	Agilent	E4440A	11/29/2021	11/29/2023
P06011	Cable	Andrew	Heliax	8/7/2020	8/7/2022
03514	Multimeter	Fluke	87	12/3/2020	12/3/2022
01505B	AC Power Supply	PPS	345AMXT-UPC32	6/15/2021	6/15/2023

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)
5210	802.11a	18.8	18.8	18.8	0.0
5210	802.11n20	18.7	18.7	18.7	0.0
5230	802.11n40	18.9	19.0	19.0	0.1
5210	802.11ac20	18.7	18.7	18.7	0.0
5230	802.11ac40	19.0	19.0	19.0	0.0
5210	802.11ac80	15.0	15.1	15.1	0.1

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

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	120
$V_{Minimum}$:	102
$V_{Maximum}$:	138

Test Data Summary - RF Conducted Measurement					
Measurement Option: AVGSA-1					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
5180	802.11a	Omnidirectional / 3.8dBi	18.3	≤24	Pass
5210	802.11a	Omnidirectional / 3.8dBi	18.8	≤24	Pass
5240	802.11a	Omnidirectional / 3.8dBi	18.5	≤24	Pass
5180	802.11n20	Omnidirectional / 3.8dBi	18.1	≤24	Pass
5210	802.11n20	Omnidirectional / 3.8dBi	18.7	≤24	Pass
5240	802.11n20	Omnidirectional / 3.8dBi	18.4	≤24	Pass
5190	802.11n40	Omnidirectional / 3.8dBi	17.3	≤24	Pass
5230	802.11n40	Omnidirectional / 3.8dBi	19.0	≤24	Pass
5180	802.11ac20	Omnidirectional / 3.8dBi	18.1	≤24	Pass
5210	802.11ac20	Omnidirectional / 3.8dBi	18.7	≤24	Pass
5240	802.11ac20	Omnidirectional / 3.8dBi	18.4	≤24	Pass
5190	802.11ac40	Omnidirectional / 3.8dBi	15.4	≤24	Pass
5230	802.11ac40	Omnidirectional / 3.8dBi	19.0	≤24	Pass
5210	802.11ac80	Omnidirectional / 3.8dBi	15.1	≤24	Pass

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

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

For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

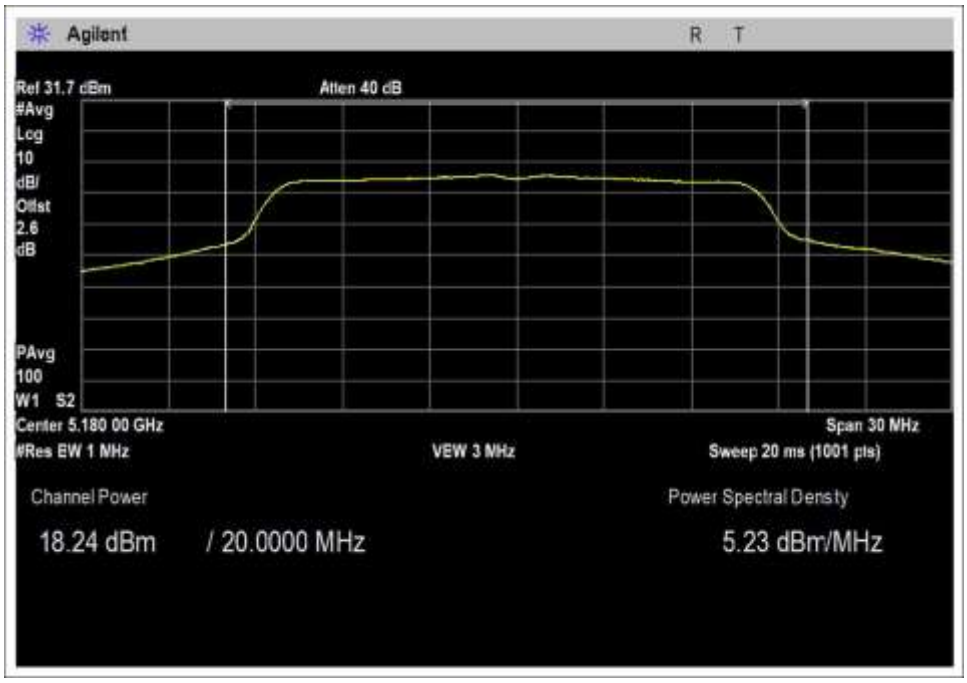
$$Limit = 30 - Roundup(G - 23)$$

For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

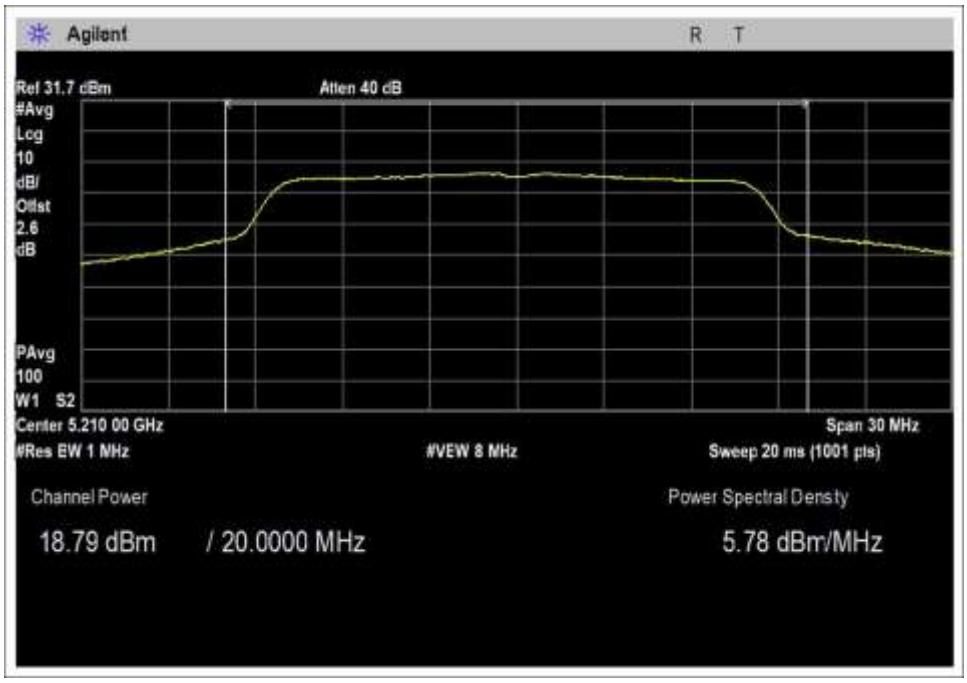
$$Limit = 24 - Roundup(G - 6)$$

Plot(s)

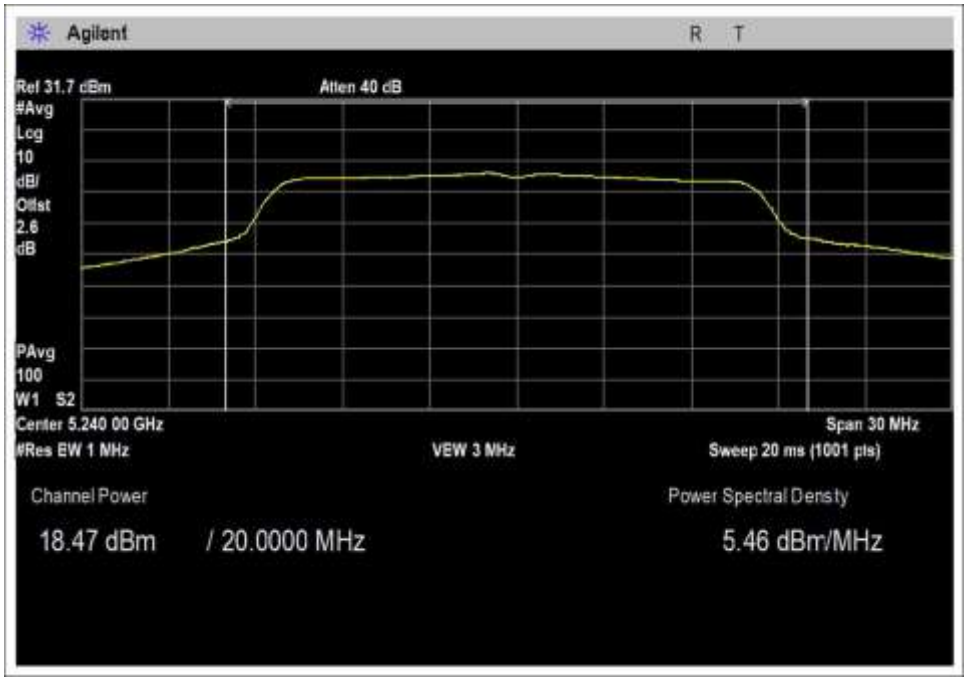
Output Power 802.11a



Low Channel

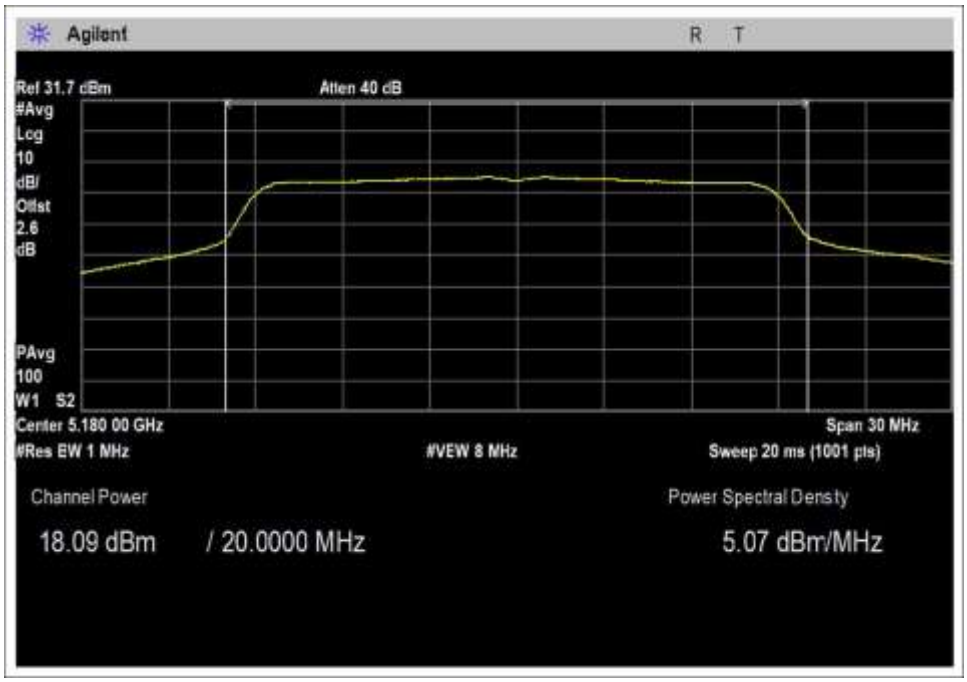


Middle Channel

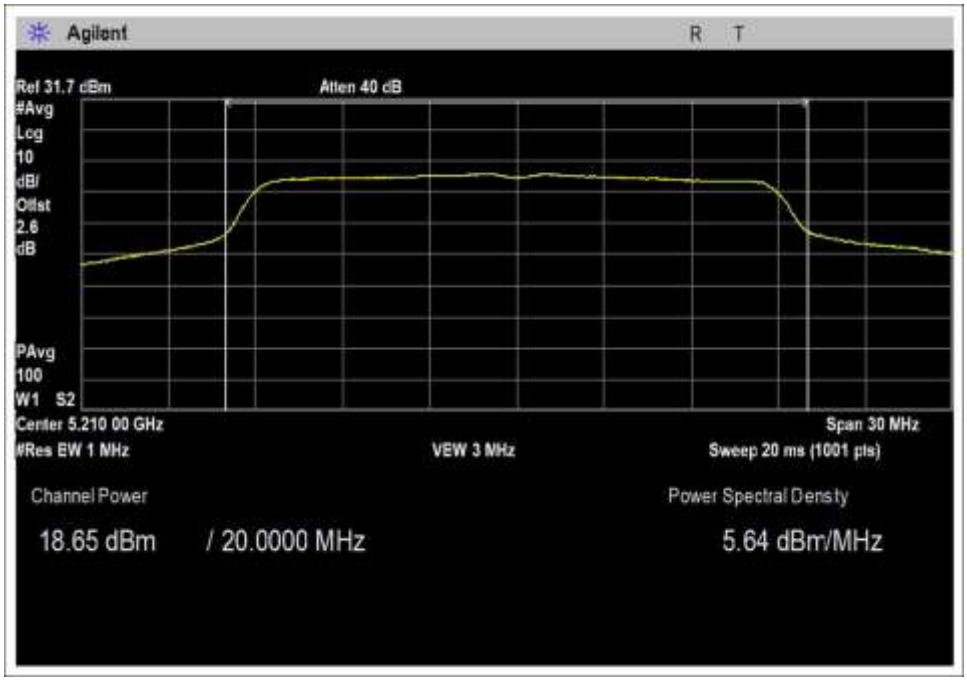


High Channel

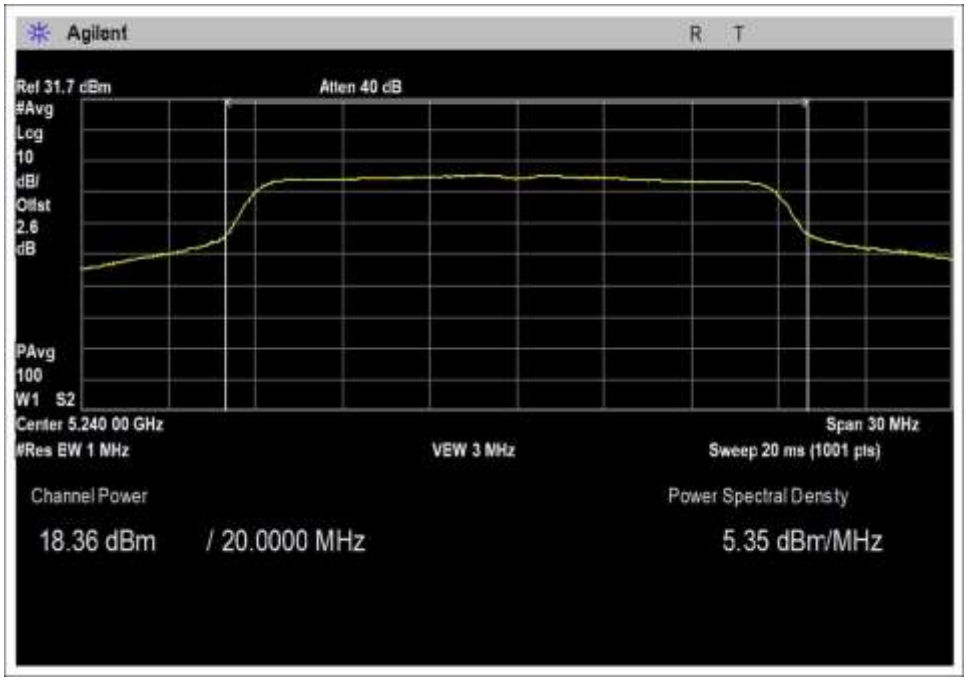
<u>Output Power 802.11n20</u>



Low Channel

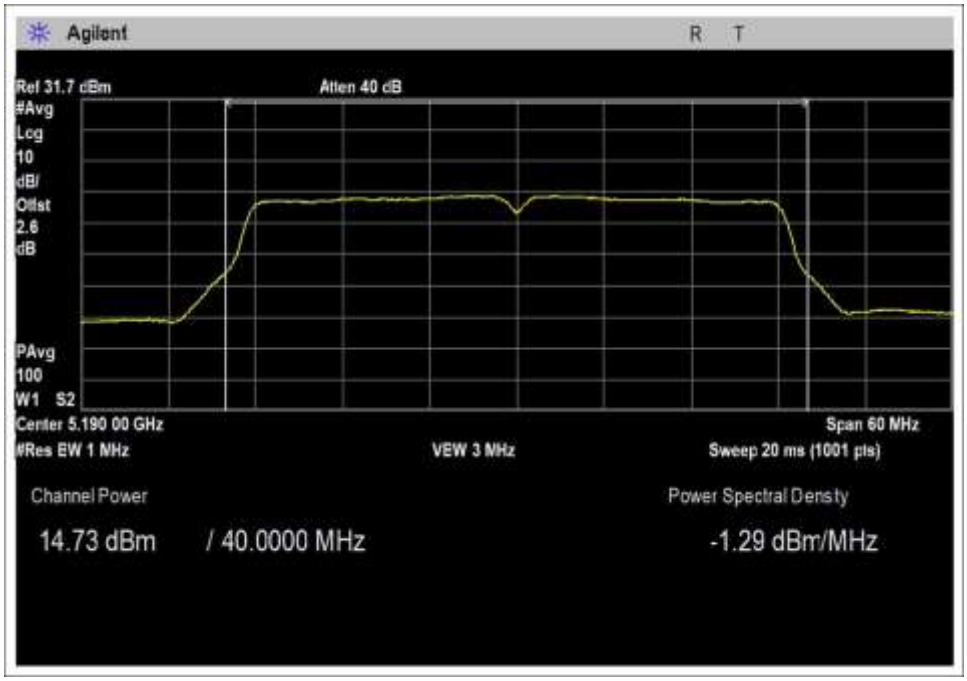


Middle Channel

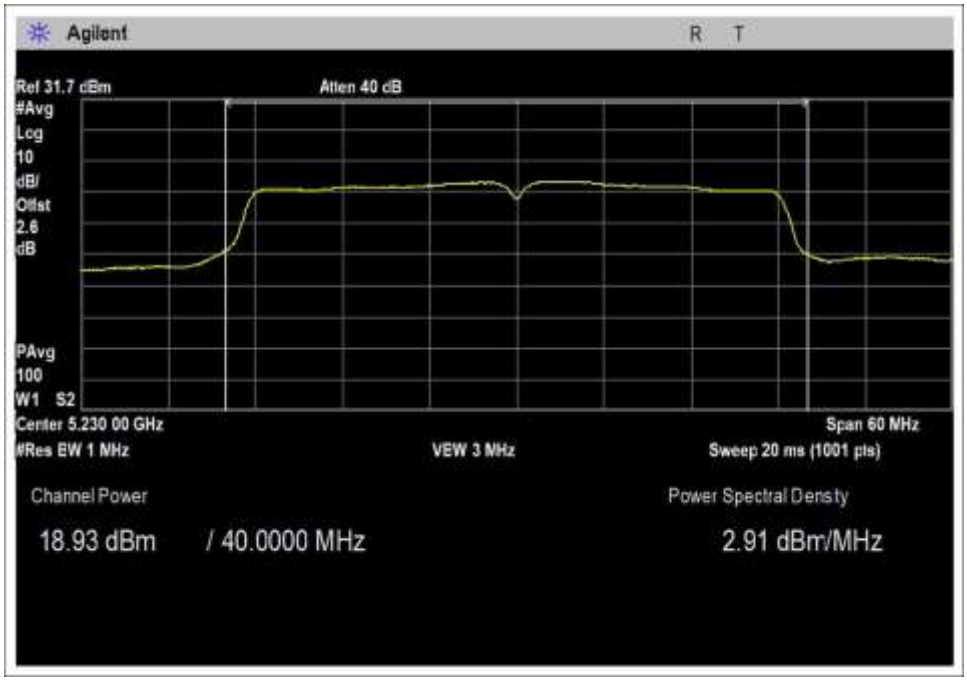


High Channel

Output Power 802.11n40

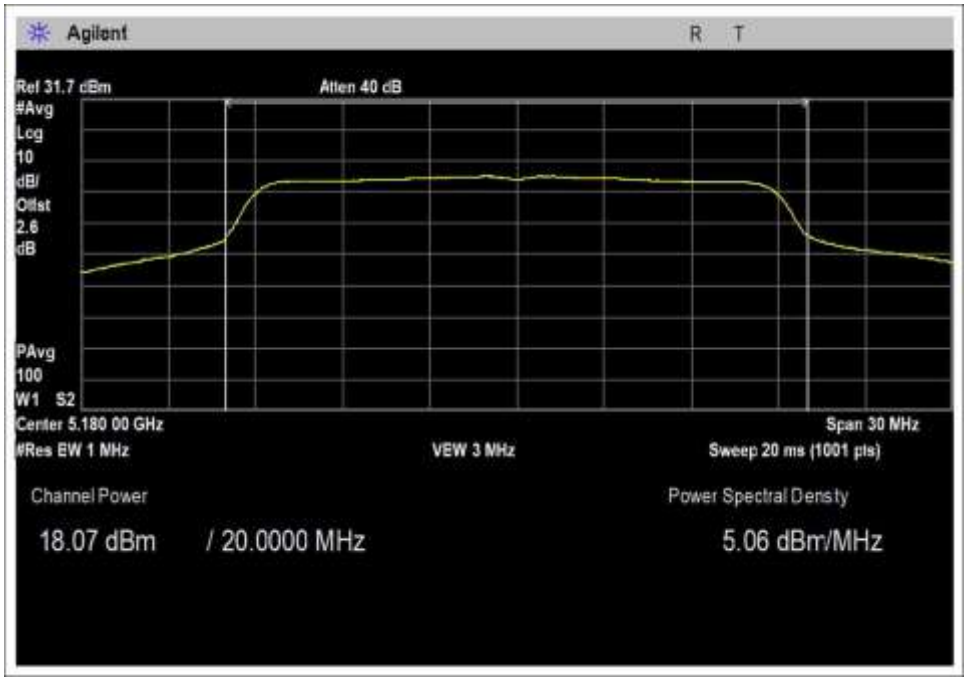


Low Channel

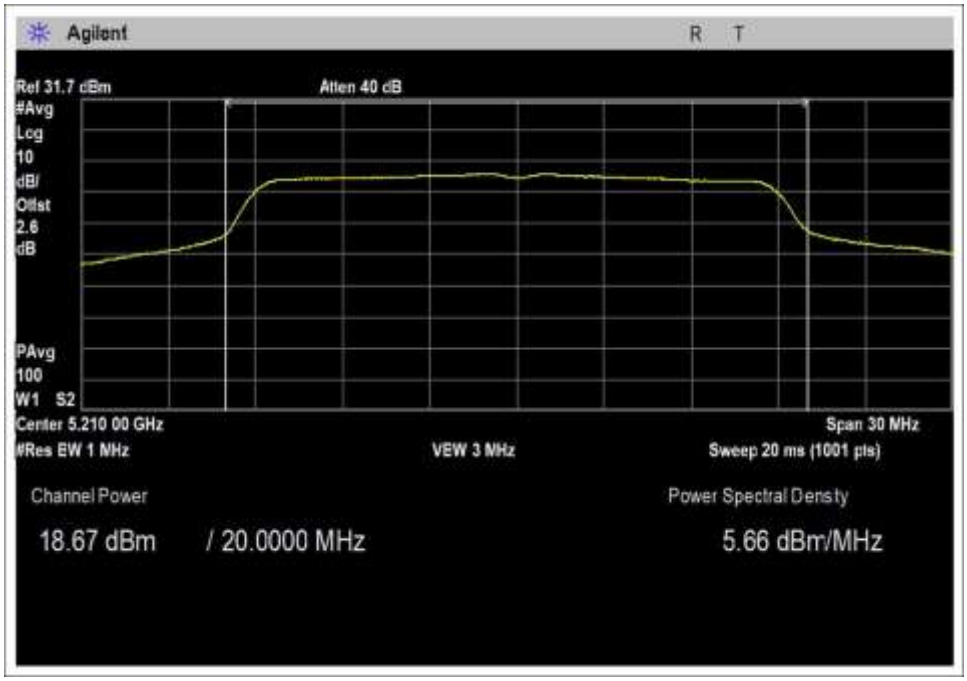


High Channel

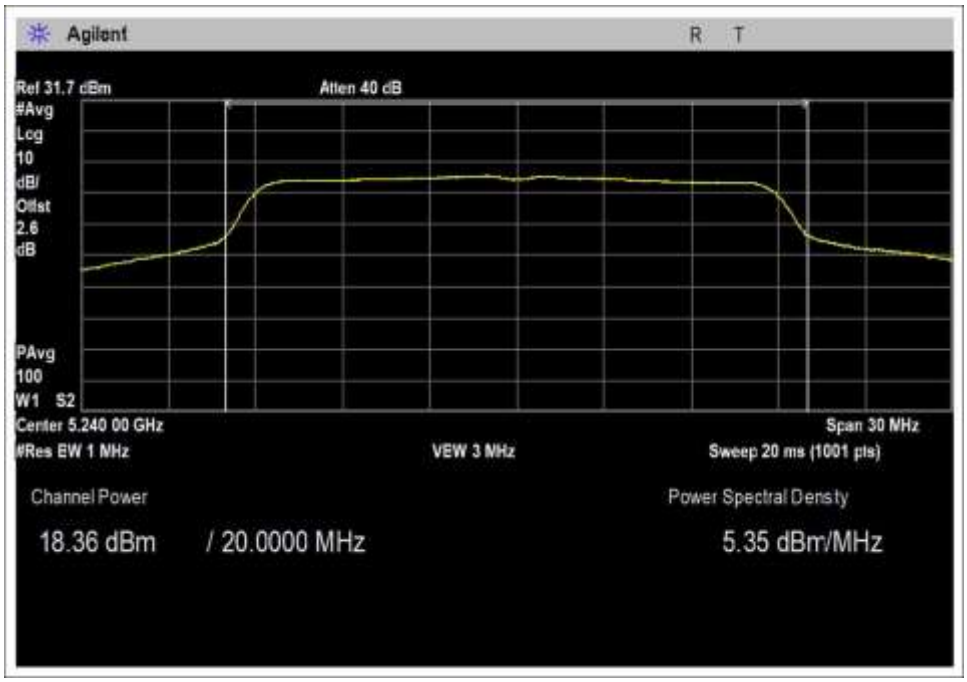
Output Power 802.11ac20



Low Channel

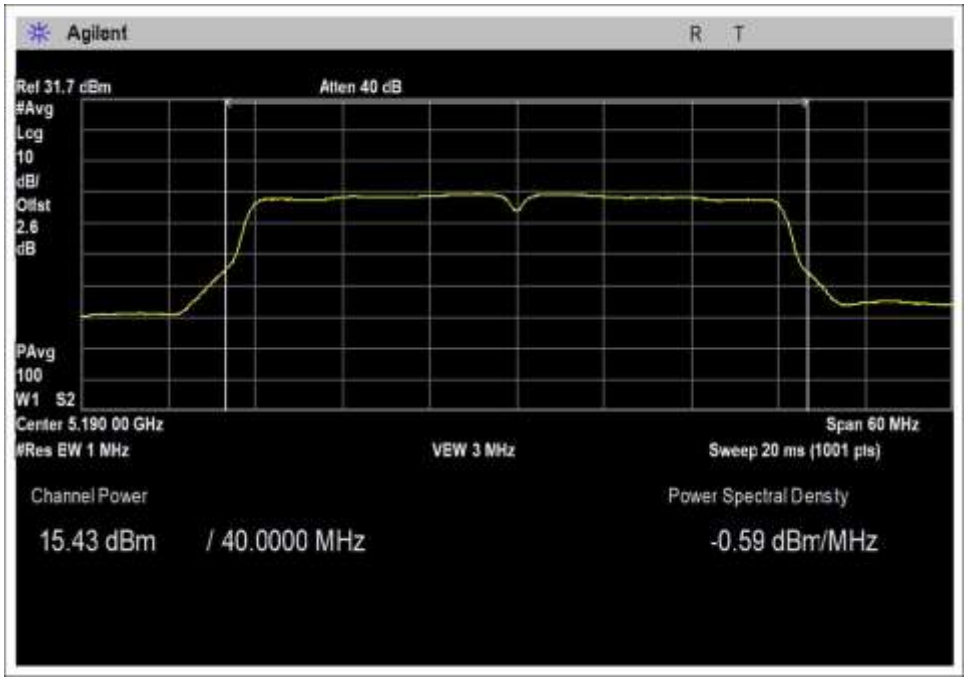


Middle Channel

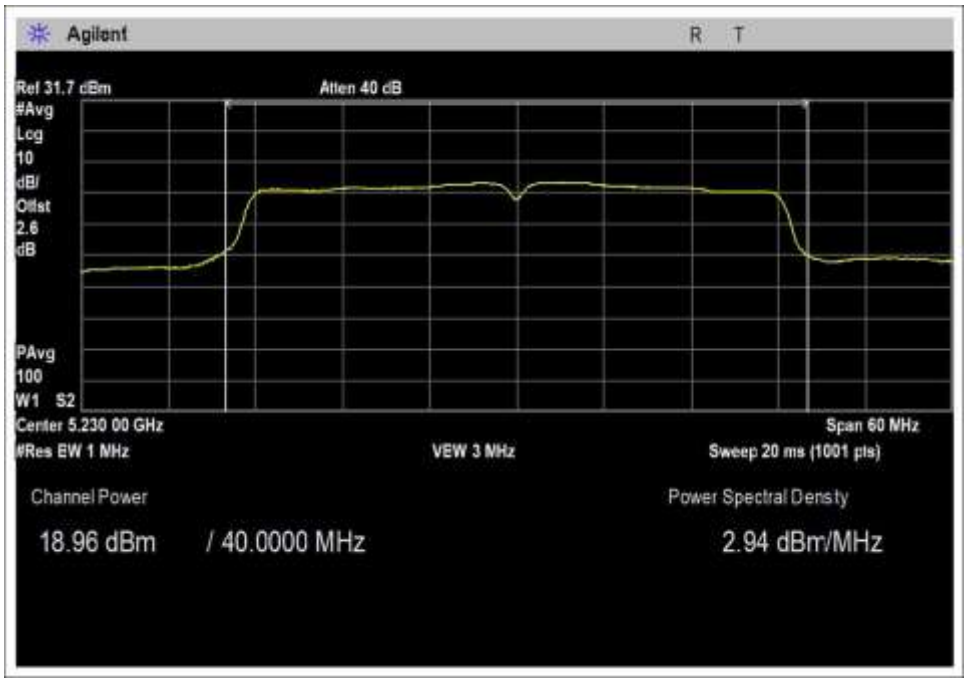


High Channel

<u>Output Power 802.11ac40</u>

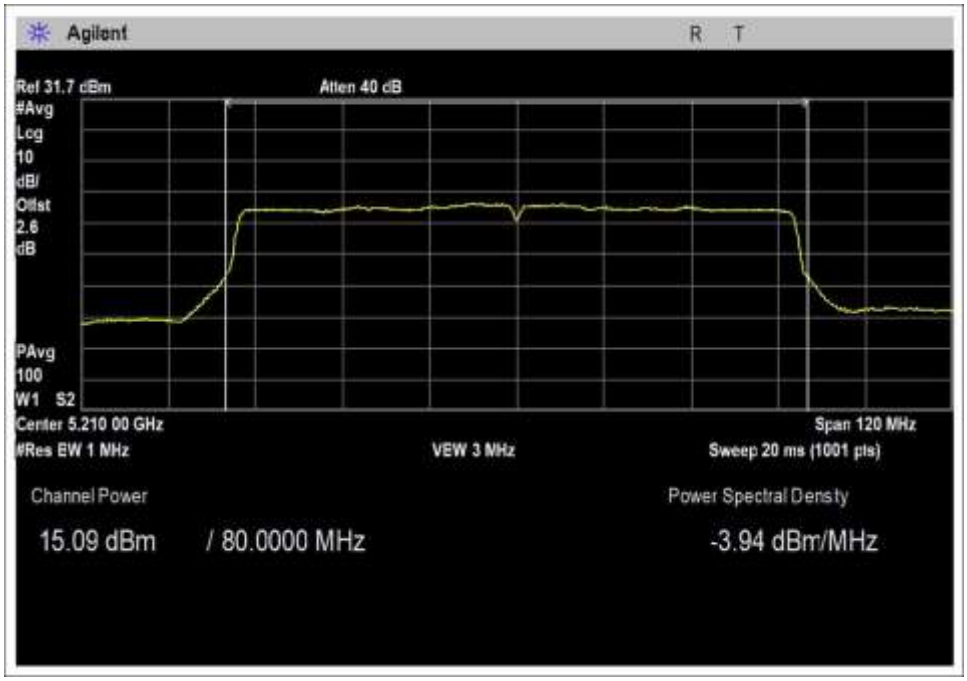


Low Channel



High Channel

<u>Output Power 802.11ac80</u>



15.407(a) Power Spectral Density

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033	Test Date(s):	1/27/2022
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through a temporary connection to antenna port connector via UFL adapter and is attached to the spectrum analyzer. The UFL adapter has a declared manufacturer loss of 0.9dB and will be accounted for in the measurement.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	45

Test Data Summary - RF Conducted Measurement

Measurement Option: AVGSA-1

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm/MHz)	Limit (dBm/MHz)	Results
5180	802.11a	Omnidirectional / 3.8dBi	5.9	≤11	Pass
5210	802.11a	Omnidirectional / 3.8dBi	6.6	≤11	Pass
5240	802.11a	Omnidirectional / 3.8dBi	7.1	≤11	Pass
5180	802.11n20	Omnidirectional / 3.8dBi	6.5	≤11	Pass
5210	802.11n20	Omnidirectional / 3.8dBi	7.0	≤11	Pass
5240	802.11n20	Omnidirectional / 3.8dBi	7.4	≤11	Pass
5190	802.11n40	Omnidirectional / 3.8dBi	0.2	≤11	Pass
5230	802.11n40	Omnidirectional / 3.8dBi	4.9	≤11	Pass
5180	802.11ac20	Omnidirectional / 3.8dBi	5.9	≤11	Pass
5210	802.11ac20	Omnidirectional / 3.8dBi	6.6	≤11	Pass
5240	802.11ac20	Omnidirectional / 3.8dBi	7.1	≤11	Pass
5190	802.11ac40	Omnidirectional / 3.8dBi	0.8	≤11	Pass
5230	802.11ac40	Omnidirectional / 3.8dBi	4.8	≤11	Pass
5210	802.11ac80	Omnidirectional / 3.8dBi	-1.8	≤11	Pass

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

$$Limit = 17 - Roundup(G - 6)$$

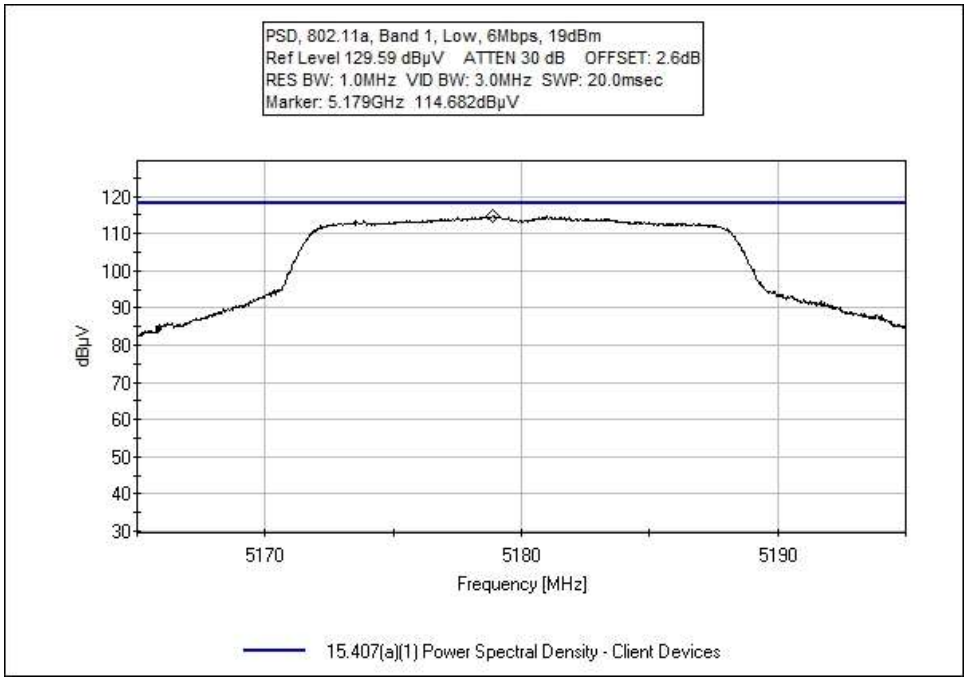
For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

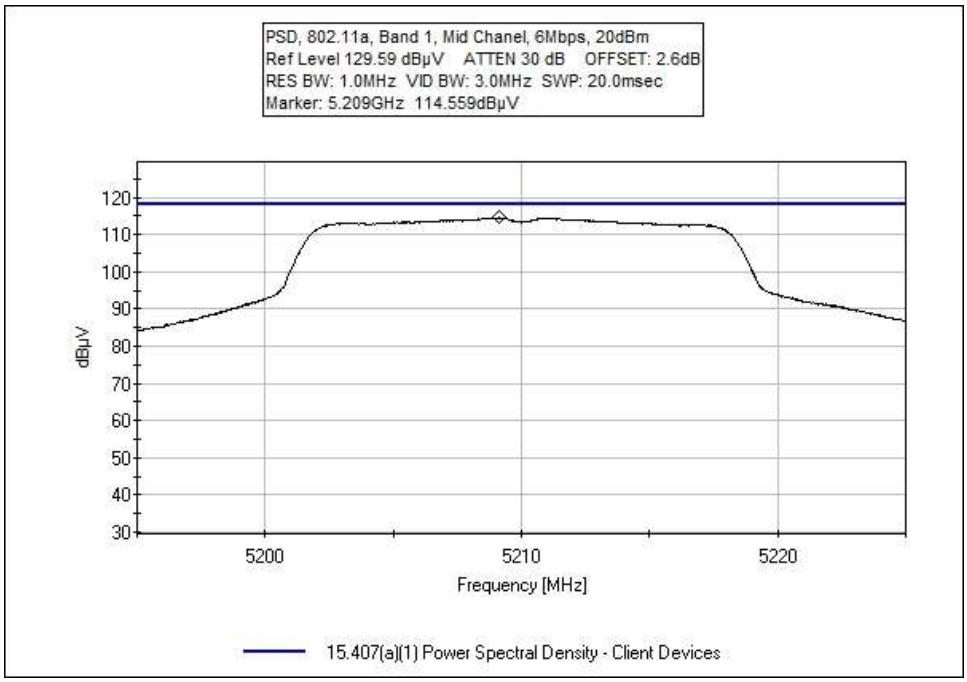
$$Limit = 17 - Roundup(G - 23)$$

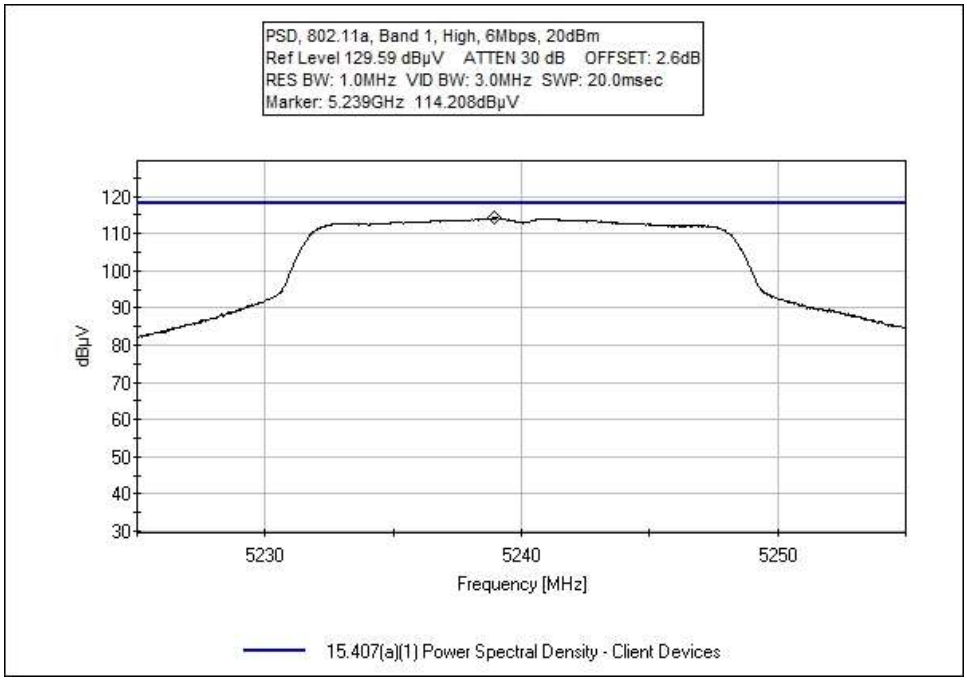
For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

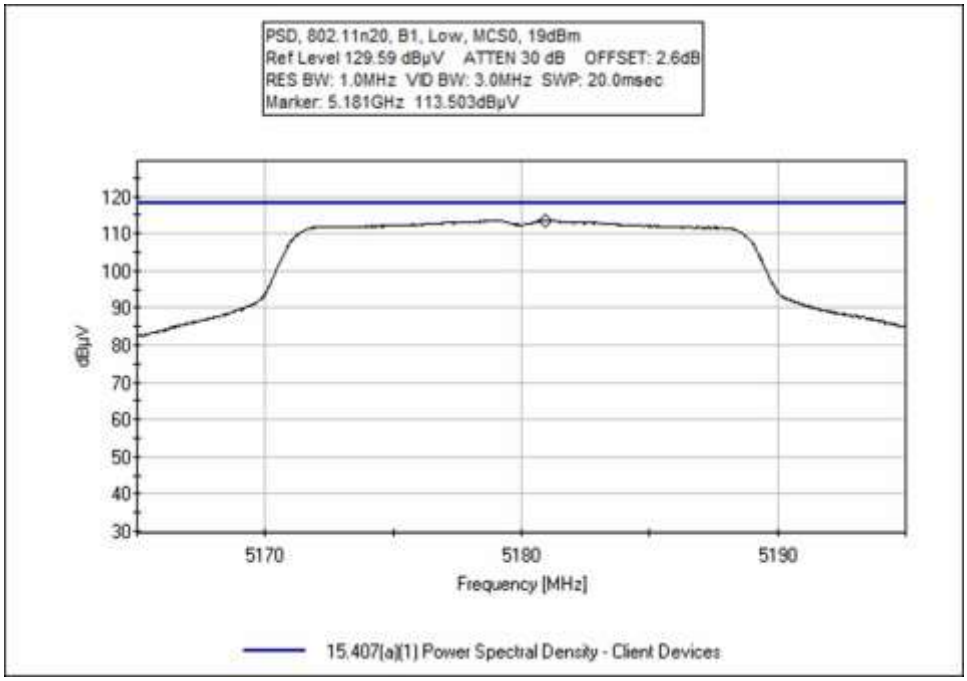
$$Limit = 11 - Roundup(G - 6)$$

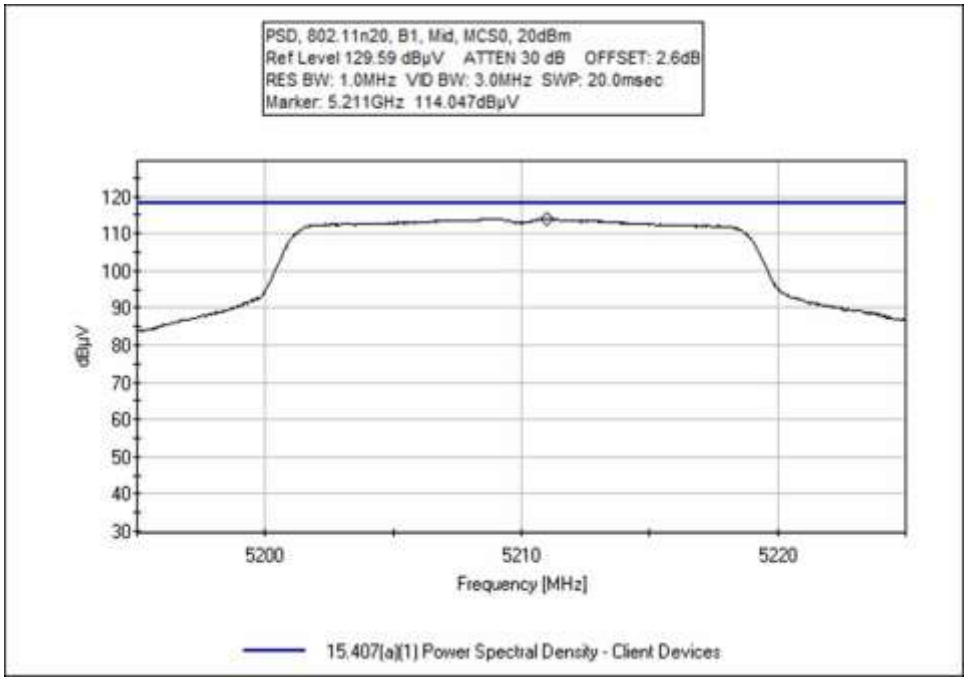
Plots

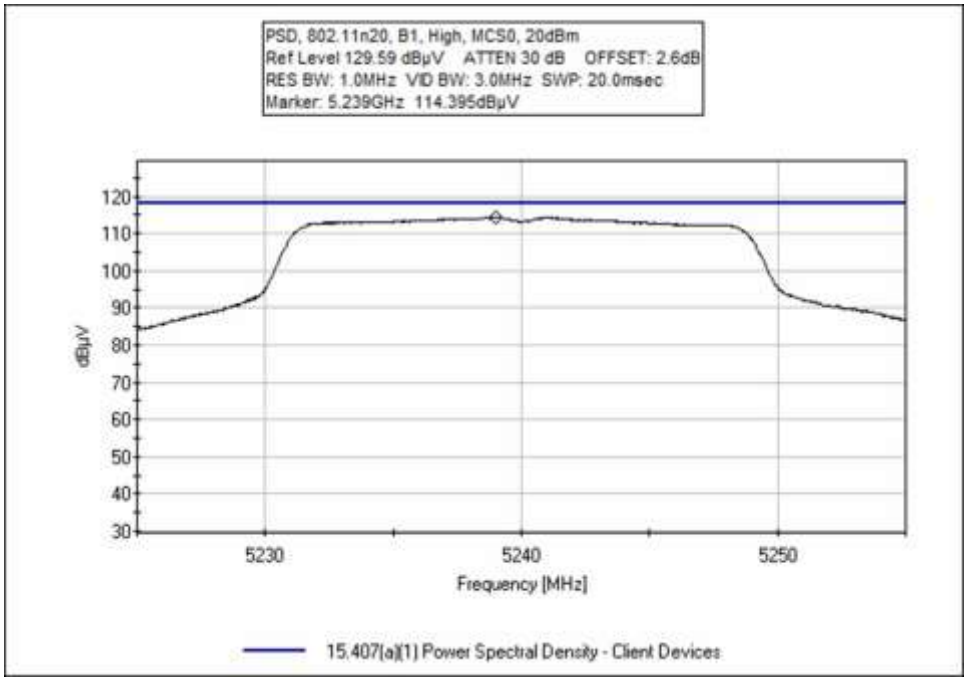

PSD, 802.11a, Band 1, Low, 6Mbps, 19dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.179GHz 114.682dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5170
5180
5190
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

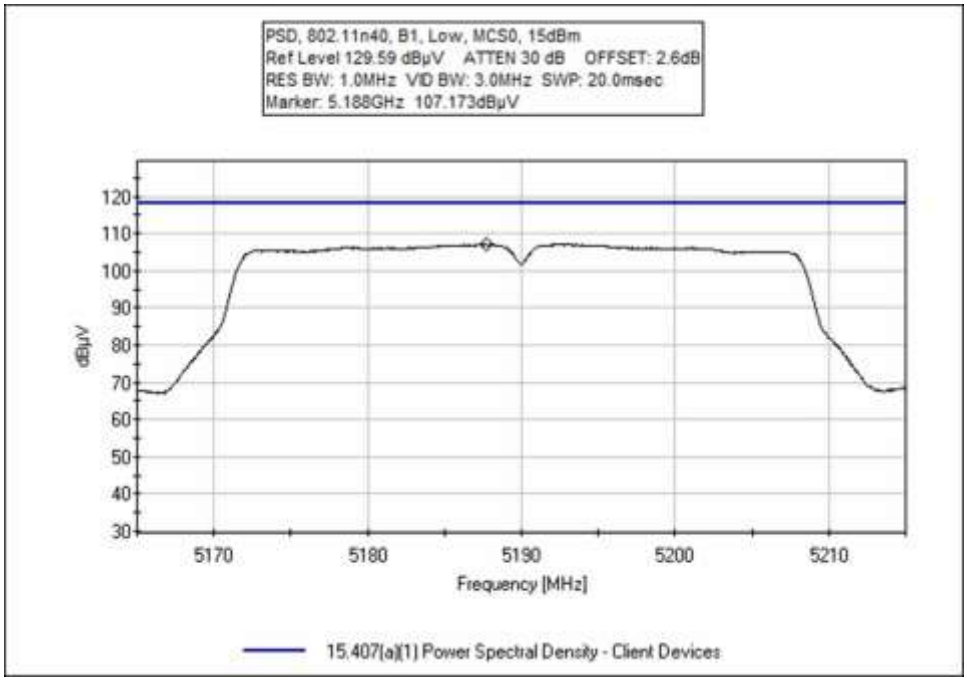

PSD, 802.11a, Band 1, Mid Chanel, 6Mbps, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.209GHz 114.559dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5200
5210
5220
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

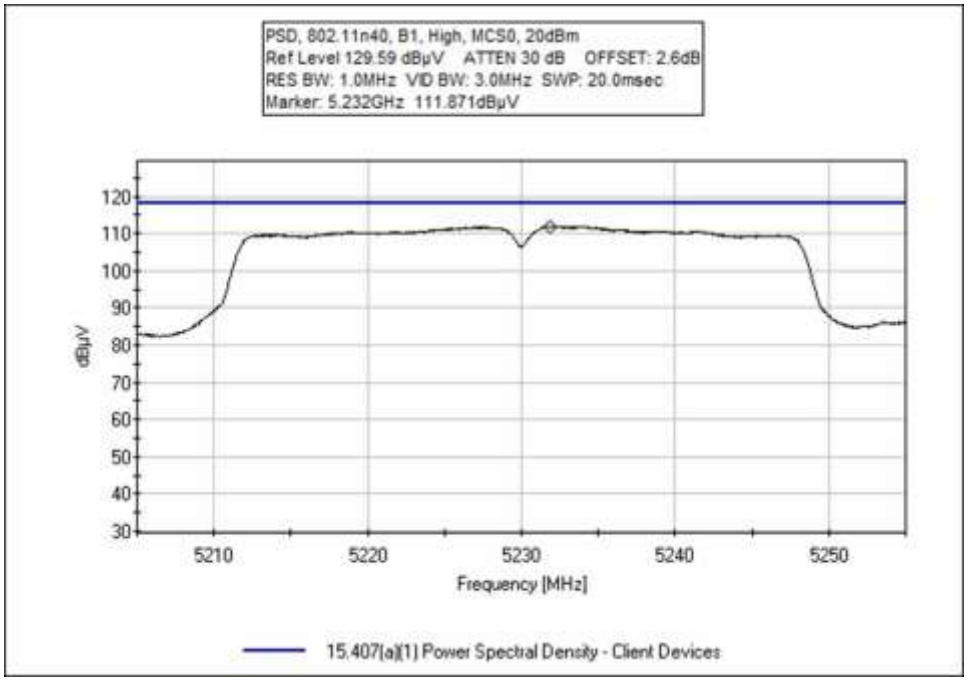

PSD, 802.11a, Band 1, High, 6Mbps, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.239GHz 114.208dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5230
5240
5250
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

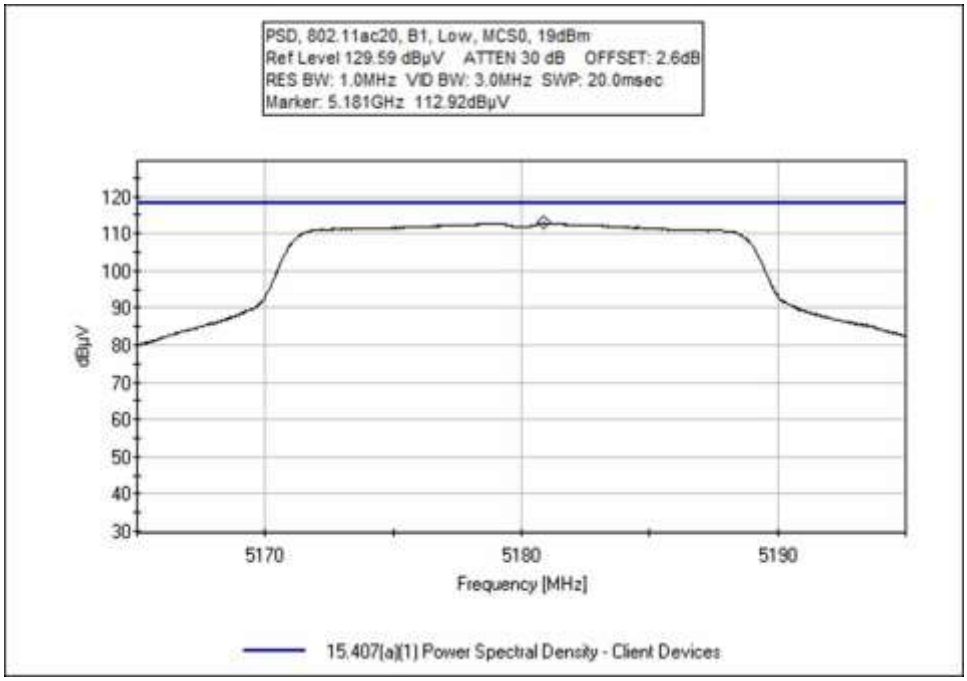

PSD, 802.11n20, B1, Low, MCS0, 19dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.181GHz 113.503dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5170
5180
5190
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

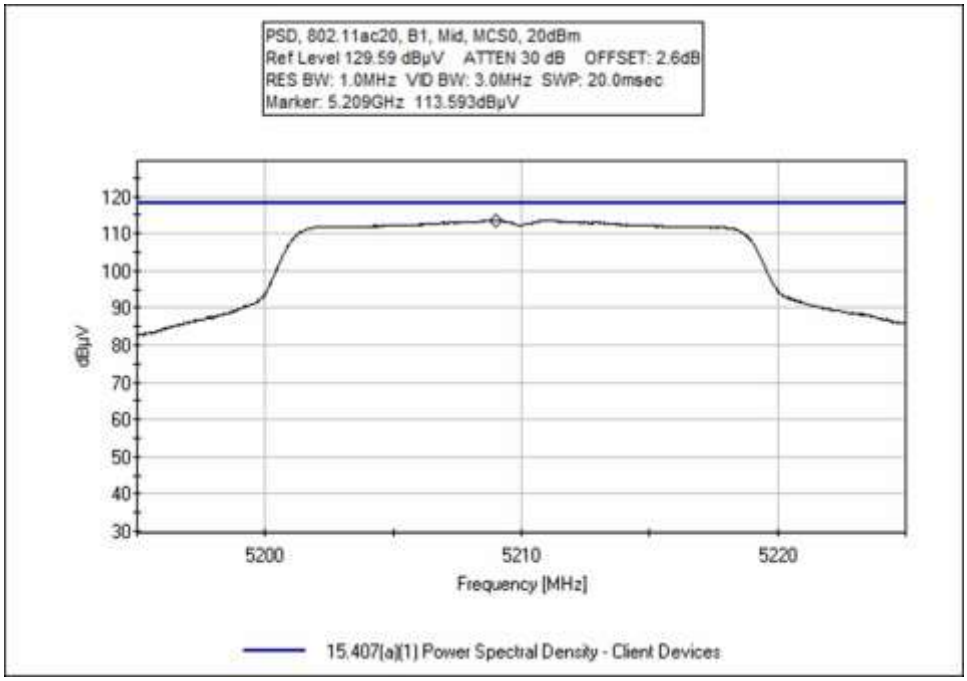

PSD, 802.11n20, B1, Mid, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.211GHz 114.047dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
5200
5210
5220
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

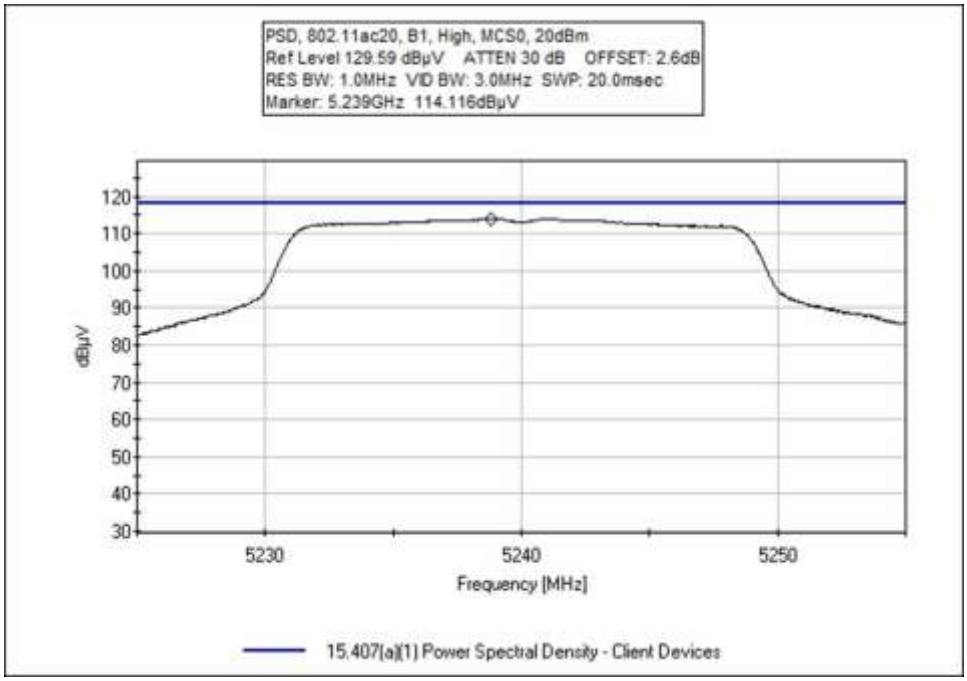

PSD, 802.11n20, B1, High, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.239GHz 114.395dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
5230
5240
5250
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

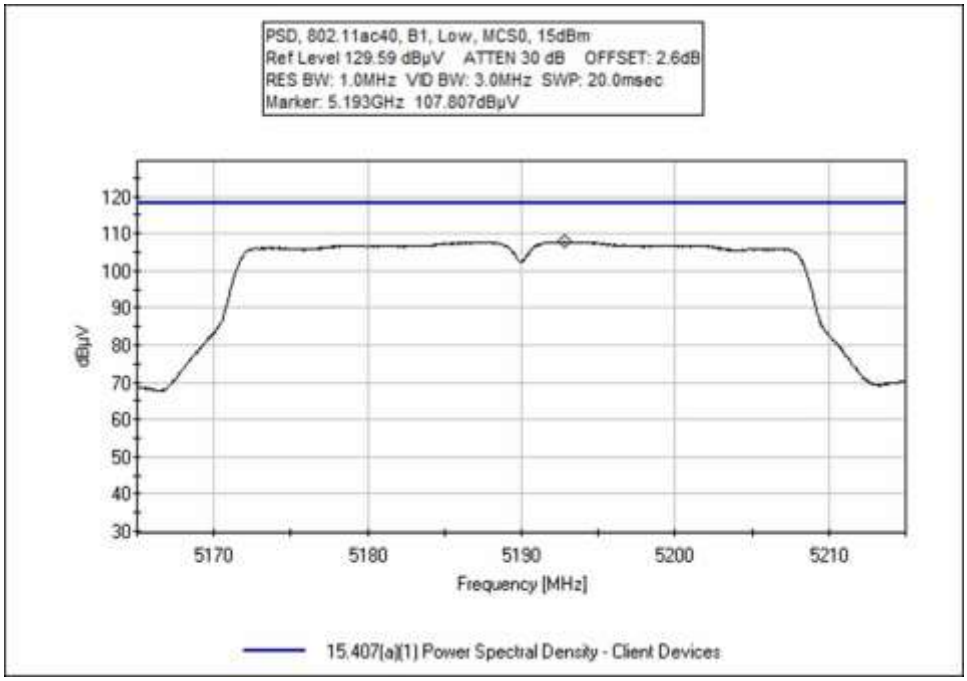

PSD, 802.11n40, B1, Low, MCS0, 15dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.188GHz 107.173dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5170
5180
5190
5200
5210
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

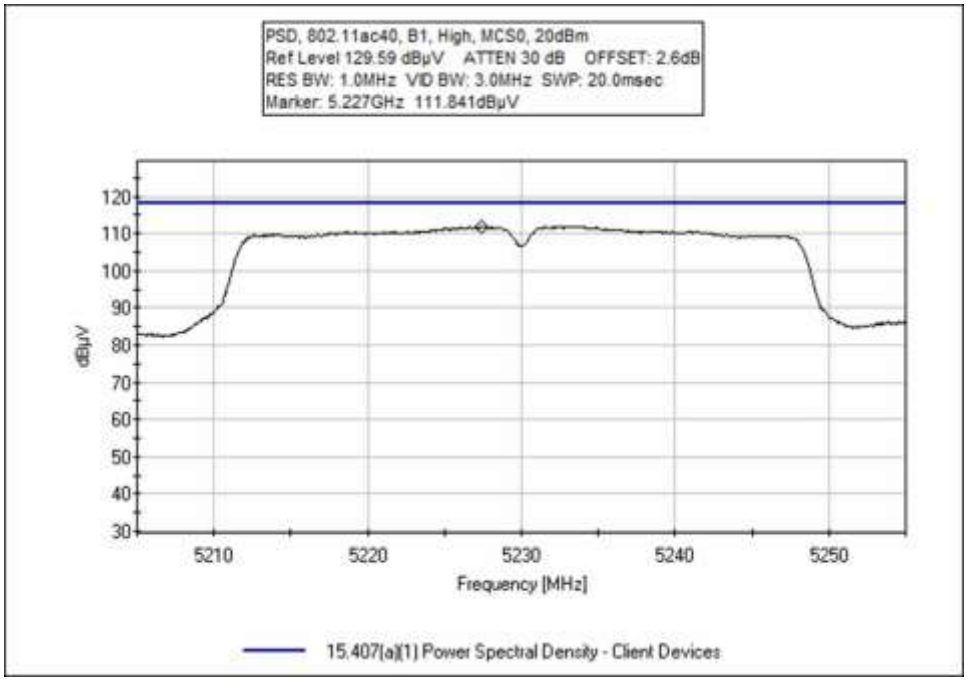

PSD, 802.11n40, B1, High, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.232GHz 111.871dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5210
5220
5230
5240
5250
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

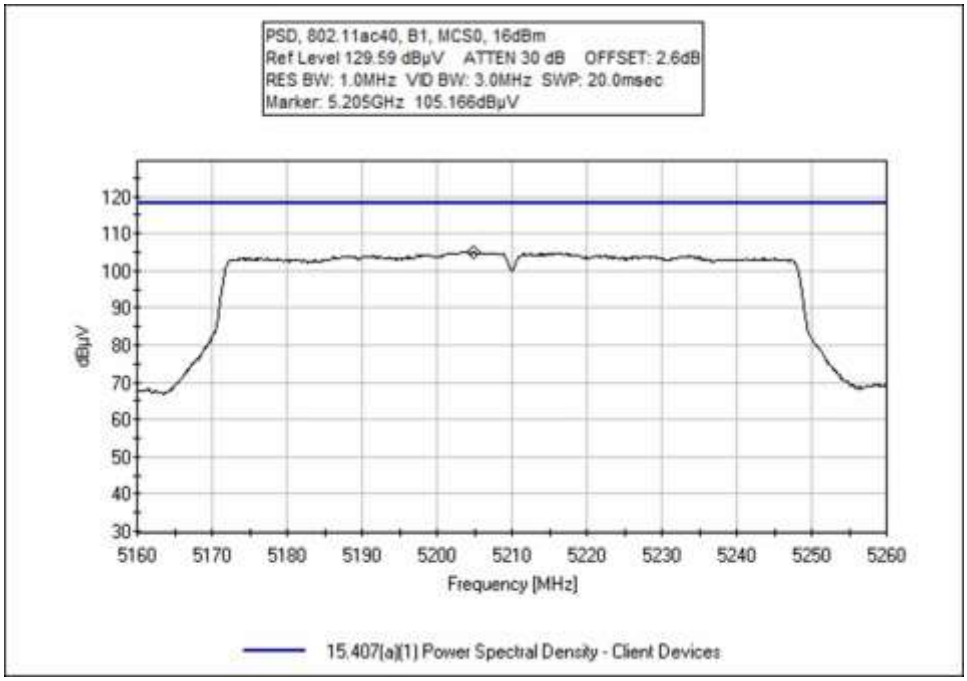

PSD, 802.11ac20, B1, Low, MCS0, 19dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.181GHz 112.92dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
5170
5180
5190
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices


PSD, 802.11ac20, B1, Mid, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.209GHz 113.593dBµV
120
110
100
90
80
70
60
50
40
30
dBµV
5200
5210
5220
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices


PSD, 802.11ac20, B1, High, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.239GHz 114.116dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5230
5240
5250
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices


PSD, 802.11ac40, B1, Low, MCS0, 15dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.193GHz 107.807dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5170
5180
5190
5200
5210
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices


PSD, 802.11ac40, B1, High, MCS0, 20dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.227GHz 111.841dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5210
5220
5230
5240
5250
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices


PSD, 802.11ac40, B1, MCS0, 16dBm
Ref Level 129.59 dBµV ATTEN 30 dB OFFSET: 2.6dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.205GHz 105.166dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
5160
5170
5180
5190
5200
5210
5220
5230
5240
5250
5260
Frequency [MHz]
15.407(a)(1) Power Spectral Density - Client Devices

Test Data - RF Conducted

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	08:30:59
Tested By:	M. Harrison	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:

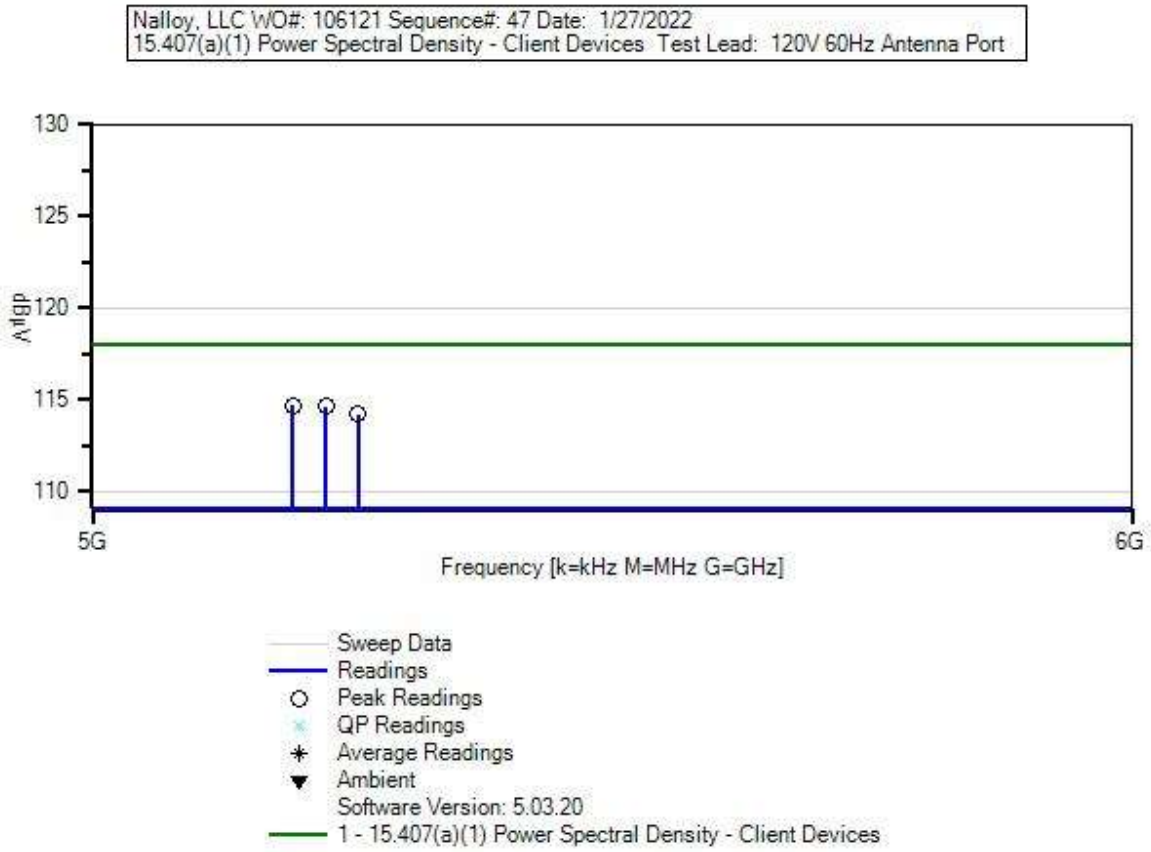
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5180-5240 MHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11a Band 1
Rate: 6-54MBps
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5178.890M	114.7	+0.0				+0.0	114.7	118.0	-3.3	Anten
									6Mbps, 19dBm		
2	5209.100M	114.6	+0.0				+0.0	114.6	118.0	-3.4	Anten
									6Mbps, 20dBm		
3	5238.950M	114.2	+0.0				+0.0	114.2	118.0	-3.8	Anten
									6Mbps, 20dBm		

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	08:55:46
Tested By:	M. Harrison	Sequence#:	48
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:

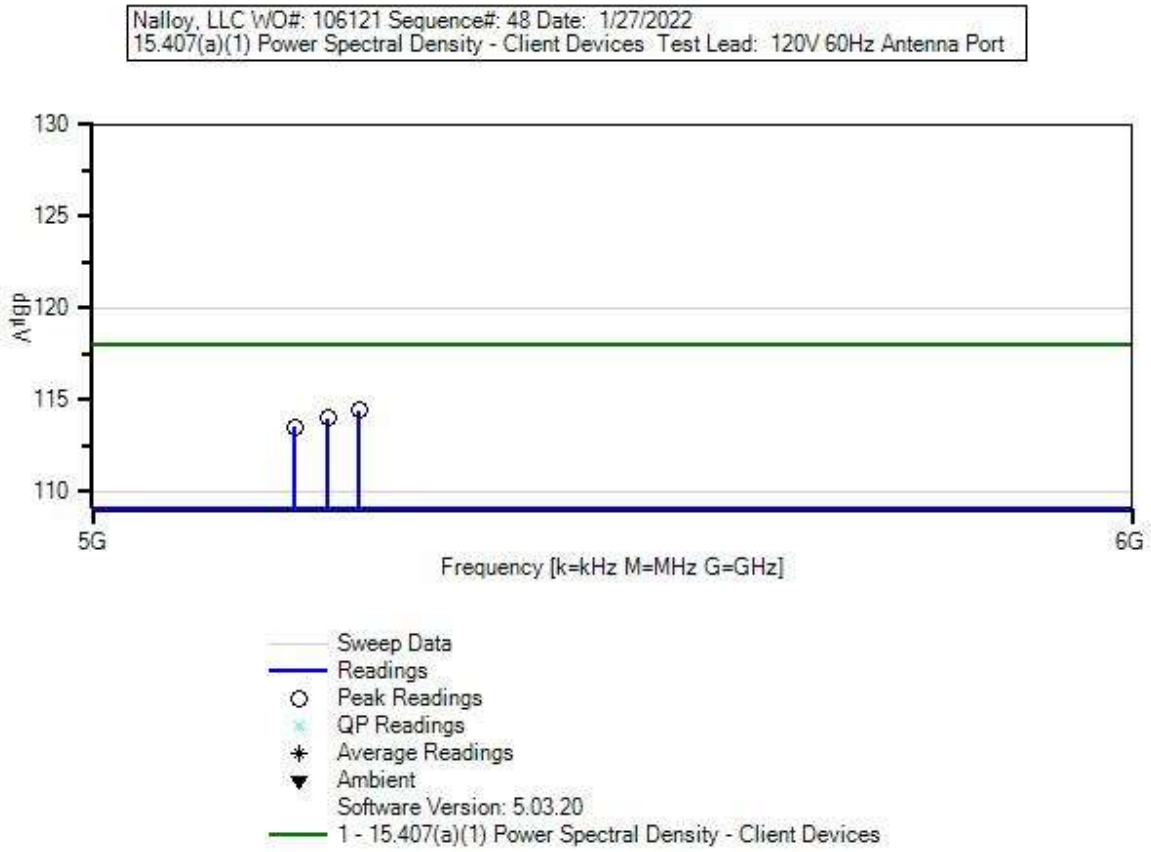
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5180-5240 MHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11n20 Band 1
Rate: MCS0-7
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5239.010M	114.4	+0.0				+0.0	114.4	118.0 MCS0, 20dBm	-3.6	Anten
2	5211.020M	114.0	+0.0				+0.0	114.0	118.0 MCS0, 20dBm	-4.0	Anten
3	5180.960M	113.5	+0.0				+0.0	113.5	118.0 MCS0, 19dBm	-4.5	Anten

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	09:26:25
Tested By:	M. Harrison	Sequence#:	50
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:

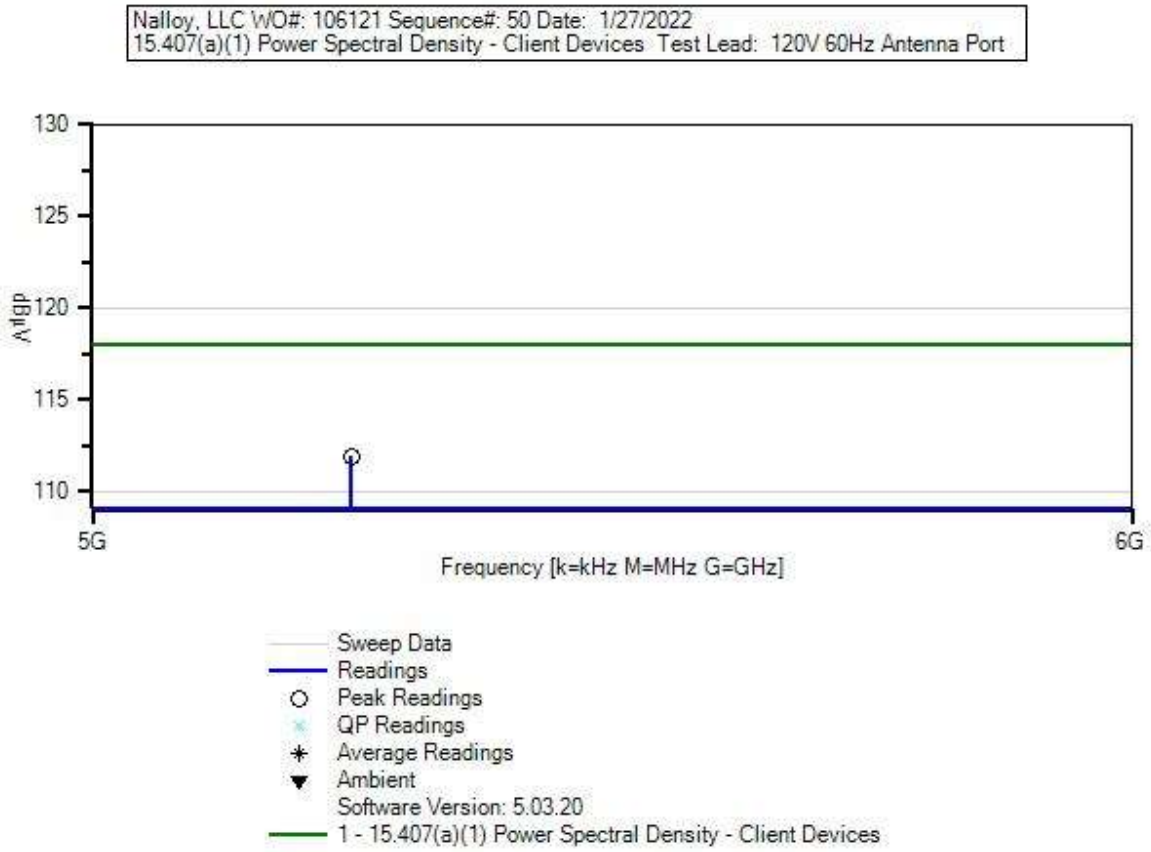
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5190-5230 MHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11n40 Band 1
Rate: MCS0-7
PWR Output: Low 15 dBm, High: 20dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5231.900M	111.9	+0.0				+0.0	111.9	118.0	-6.1	Anten
									MCS0, 20dBm		
2	5187.700M	107.2	+0.0				+0.0	107.2	118.0	-10.8	Anten
									MCS0, 15dBm		

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	09:11:38
Tested By:	M. Harrison	Sequence#:	49
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:

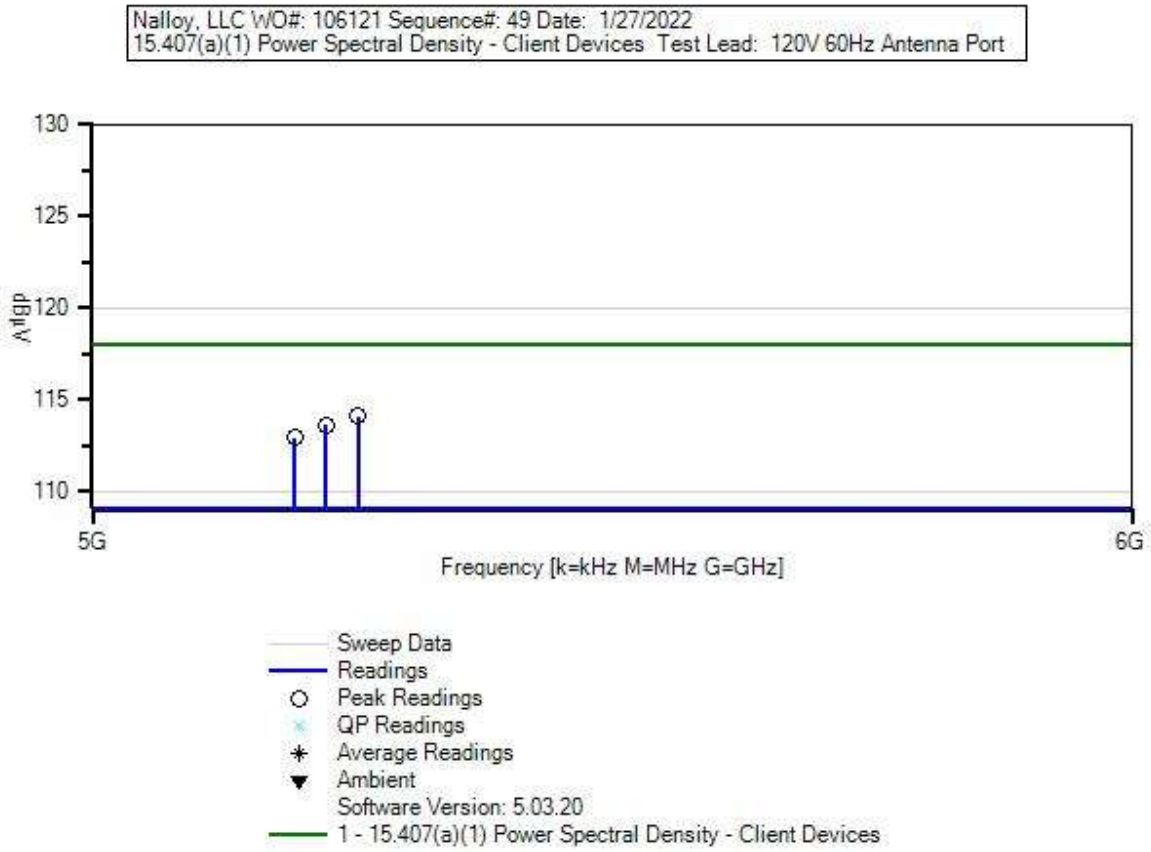
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5180-5240 MHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11ac20 Band 1
Rate: MCS0-8
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5238.800M	114.1	+0.0				+0.0	114.1	118.0	-3.9	Anten
									MCS0, 20dBm		
2	5208.980M	113.6	+0.0				+0.0	113.6	118.0	-4.4	Anten
									MCS0, 20dBm		
3	5180.870M	112.9	+0.0				+0.0	112.9	118.0	-5.1	Anten
									MCS0, 19dBm		

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	10:47:37
Tested By:	M. Harrison	Sequence#:	51
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:

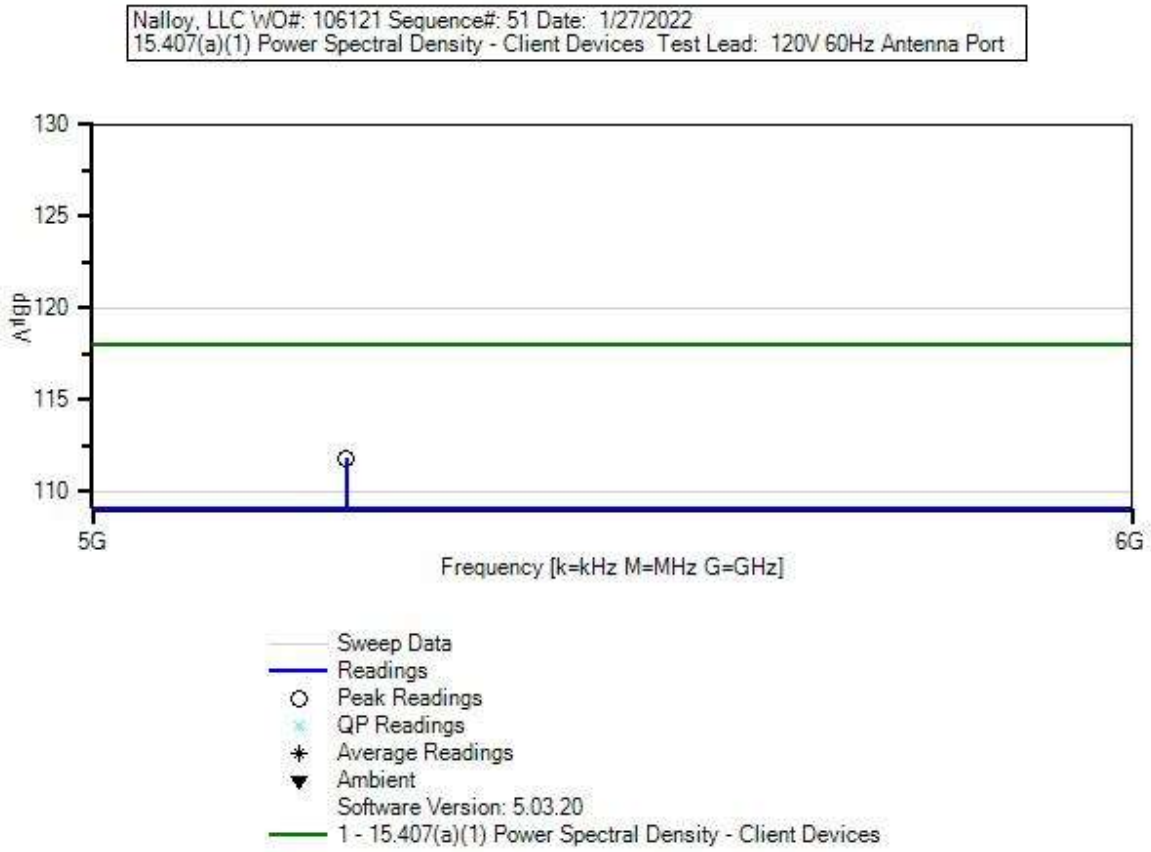
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5190-5230 MHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11ac40 Band 1
Rate: MCS0-9
PWR Output: Low 15 dBm, High: 20dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5227.450M	111.8	+0.0				+0.0	111.8	118.0	-6.2	Anten
									MCS0, 20dBm		
2	5192.800M	107.8	+0.0				+0.0	107.8	118.0	-10.2	Anten
									MCS0, 15dBm		

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(a)(1) Power Spectral Density - Client Devices**		
Work Order #:	**106407**	Date:	1/27/2022
Test Type:	**Conducted Emissions**	Time:	10:44:41
Tested By:	M. Harrison	Sequence#:	52
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:

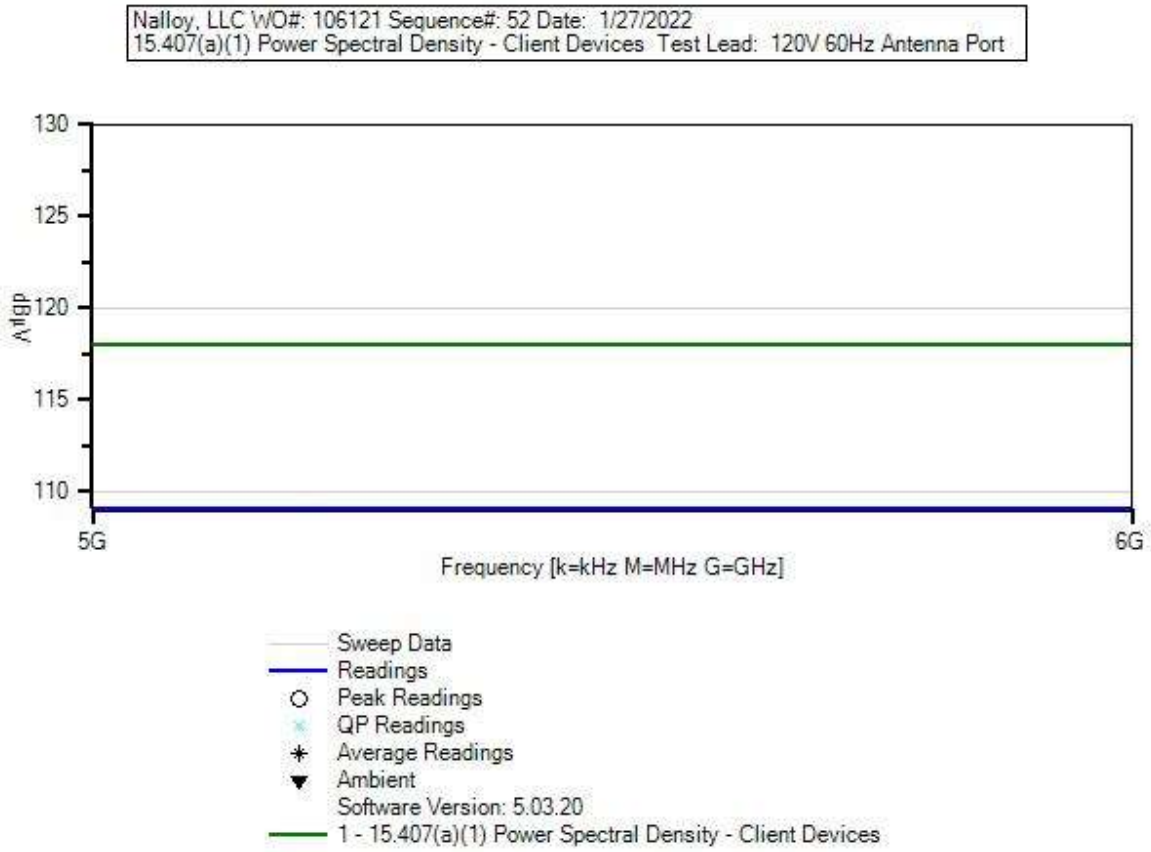
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5210 MHz

Setup:
Antenna 0
Channels: 5210 MHz
802.11ac80
Rate: MCS0-9
PWR Output: 16 dBm
100% Duty Cycle

Notes:
PSD Measurements were performed with corresponding correction factors applied as an offset in the Spectrum Analyzer.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANUFL Adapter	Test Data Adjustment		1/14/2022	1/14/2024
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	5204.800M	105.2	+0.0				+0.0	105.2	118.0	-12.8	Anten
									MCS0, 16dBm		

15.407(b) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	08:06:08
Tested By:	M. Harrison	Sequence#:	47
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:

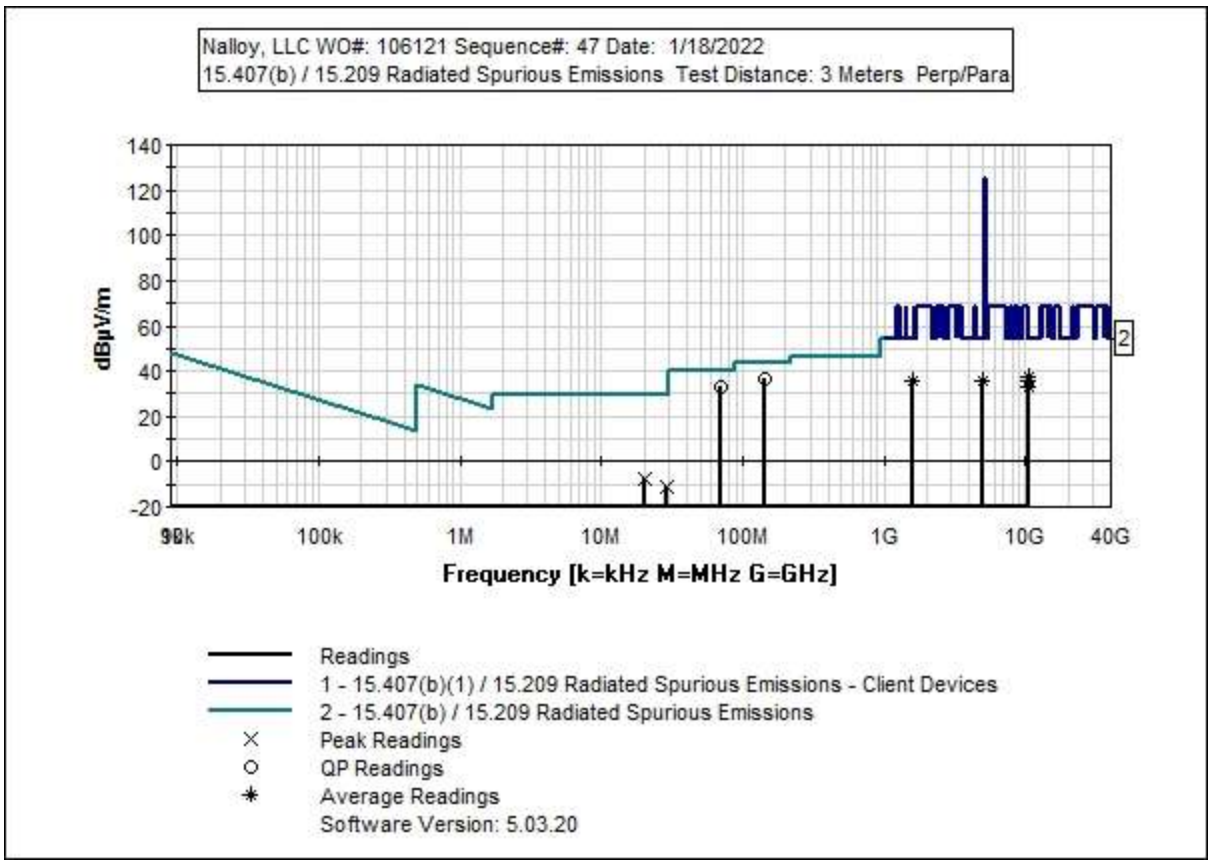
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11a Band 1
Rate: 6-54MBps
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 47 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
90k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	143.302M QP	49.1	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.0	43.5	-6.5	Horiz
^	143.302M	51.6	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	39.5	43.5	-4.0	Horiz
3	69.070M QP	47.1	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	33.3	40.0	-6.7	Horiz
^	69.070M	52.3	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	38.5	40.0	-1.5	Horiz
5	4978.880M Ave	29.6	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	36.0	54.0	-18.0	Vert
^	4978.880M	48.2	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.6	54.0	+0.6	Vert
7	1581.600M Ave	41.6	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.0 +0.0	+0.0	35.4	54.0	-18.6	Vert
^	1581.600M	57.4	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.0 +0.0	+0.0	51.2	54.0	-2.8	Vert
9	10480.800 M Ave	41.6	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	37.6	68.2	-30.6	Horiz
^	10480.800 M	56.3	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	52.3	68.2	-15.9	Horiz
11	10420.000 M Ave	40.2	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	36.0	68.2	-32.2	Horiz
^	10420.000 M	53.6	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	49.4	68.2	-18.8	Horiz
13	10362.850 M Ave	37.6	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	33.4	68.2	-34.8	Horiz

^	10362.850 M	51.1	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	46.9	68.2	-21.3	Horiz
15	20.358M	24.6	+0.0 +0.0 +0.0	+0.2 +0.0 +7.2	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-8.0	29.5	-37.5	Perp/
16	28.687M	23.4	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-11.4	29.5	-40.9	Perp/

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	08:13:52
Tested By:	M. Harrison	Sequence#:	48
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:

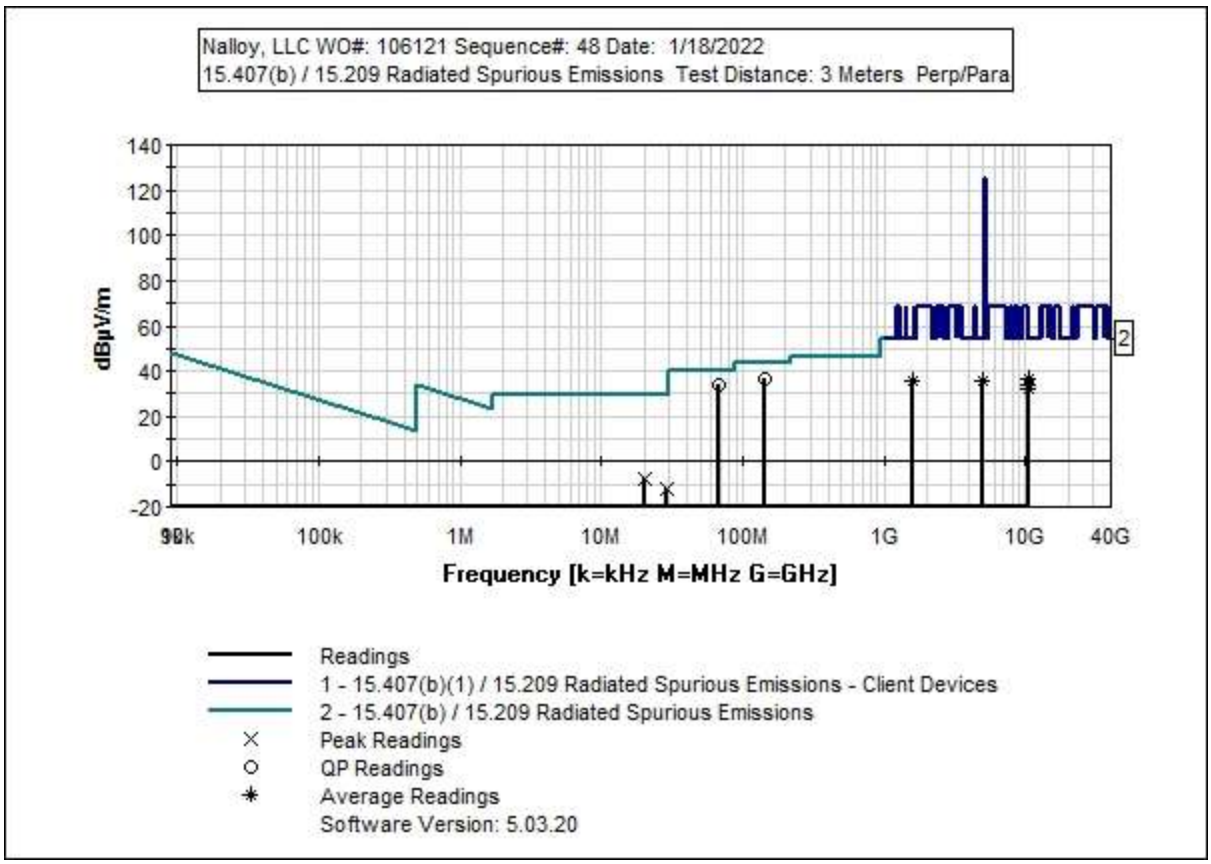
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11n20 Band 1
Rate: MCS0-7
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 48 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
90k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	68.480M QP	47.5	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	33.7	40.0	-6.3	Vert
^	68.480M	51.9	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	38.1	40.0	-1.9	Vert
3	143.304M QP	49.1	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.0	43.5	-6.5	Vert
^	143.304M	51.6	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	39.5	43.5	-4.0	Vert
5	4980.660M Ave	29.3	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	35.7	54.0	-18.3	Vert
^	4980.660M	48.5	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.9	54.0	+0.9	Vert
7	1576.000M Ave	41.6	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	35.3	54.0	-18.7	Vert
^	1576.000M	56.4	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	50.1	54.0	-3.9	Vert
9	10477.920 M Ave	40.5	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	36.5	68.2	-31.7	Vert
^	10477.920 M	56.9	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	52.9	68.2	-15.3	Vert
11	10418.040 M Ave	38.3	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	34.1	68.2	-34.1	Vert
^	10418.040 M	54.3	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	50.1	68.2	-18.1	Vert
13	10358.120 M Ave	36.1	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	31.9	68.2	-36.3	Vert

^	10358.120 M	52.5	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	48.3	68.2	-19.9	Vert
15	20.269M	25.3	+0.0 +0.0 +0.0	+0.2 +0.0 +7.3	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-7.2	29.5	-36.7	Perp/
16	28.687M	23.0	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-11.8	29.5	-41.3	Perp/

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	08:30:16
Tested By:	M. Harrison	Sequence#:	49
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:

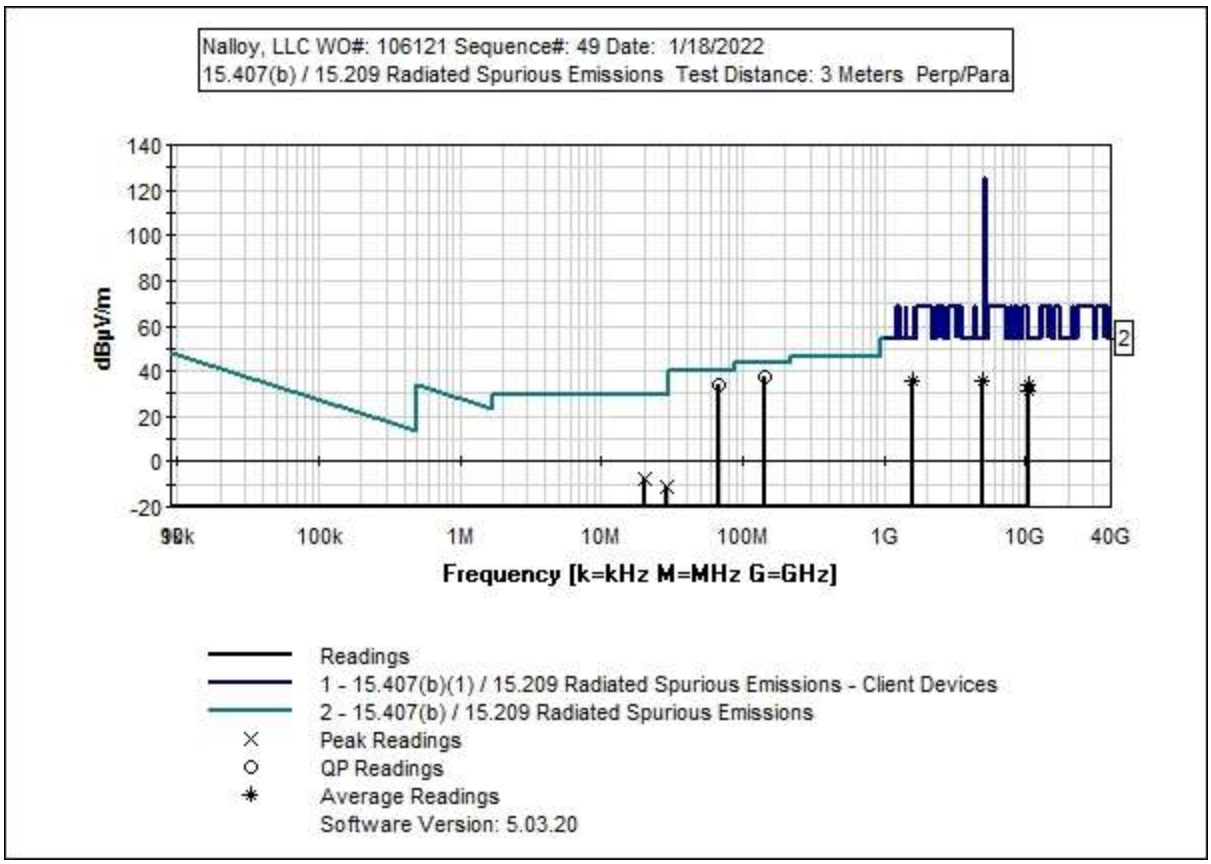
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11n40 Band 1
Rate: MCS0-7
PWR Output: Low 15 dBm, High: 20dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 49 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
90k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	143.304M QP	49.2	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.1	43.5	-6.4	Vert
^	143.304M	51.8	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	39.7	43.5	-3.8	Vert
3	68.430M QP	47.3	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	33.5	40.0	-6.5	Vert
^	68.430M	52.5	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	38.7	40.0	-1.3	Vert
5	4985.960M Ave	29.5	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	35.9	54.0	-18.1	Vert
^	4985.960M	47.7	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.1	54.0	+0.1	Vert
7	1594.984M Ave	41.6	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.5 +0.0 +0.0	-35.0 +0.0	+0.0	35.3	54.0	-18.7	Vert
^	1594.984M	57.0	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.5 +0.0 +0.0	-35.0 +0.0	+0.0	50.7	54.0	-3.3	Vert
9	10456.600 M Ave	37.7	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	33.7	68.2	-34.5	Vert
^	10456.600 M	52.5	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	48.5	68.2	-19.7	Vert
11	20.329M	25.1	+0.0 +0.0 +0.0	+0.2 +0.0 +7.2	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-7.5	29.5	-37.0	Perp/
12	10372.050 M Ave	35.3	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	31.1	68.2	-37.1	Vert
^	10372.050 M	50.1	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	45.9	68.2	-22.3	Vert
14	28.687M	23.9	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-10.9	29.5	-40.4	Perp/

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	08:56:29
Tested By:	M. Harrison	Sequence#:	50
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:

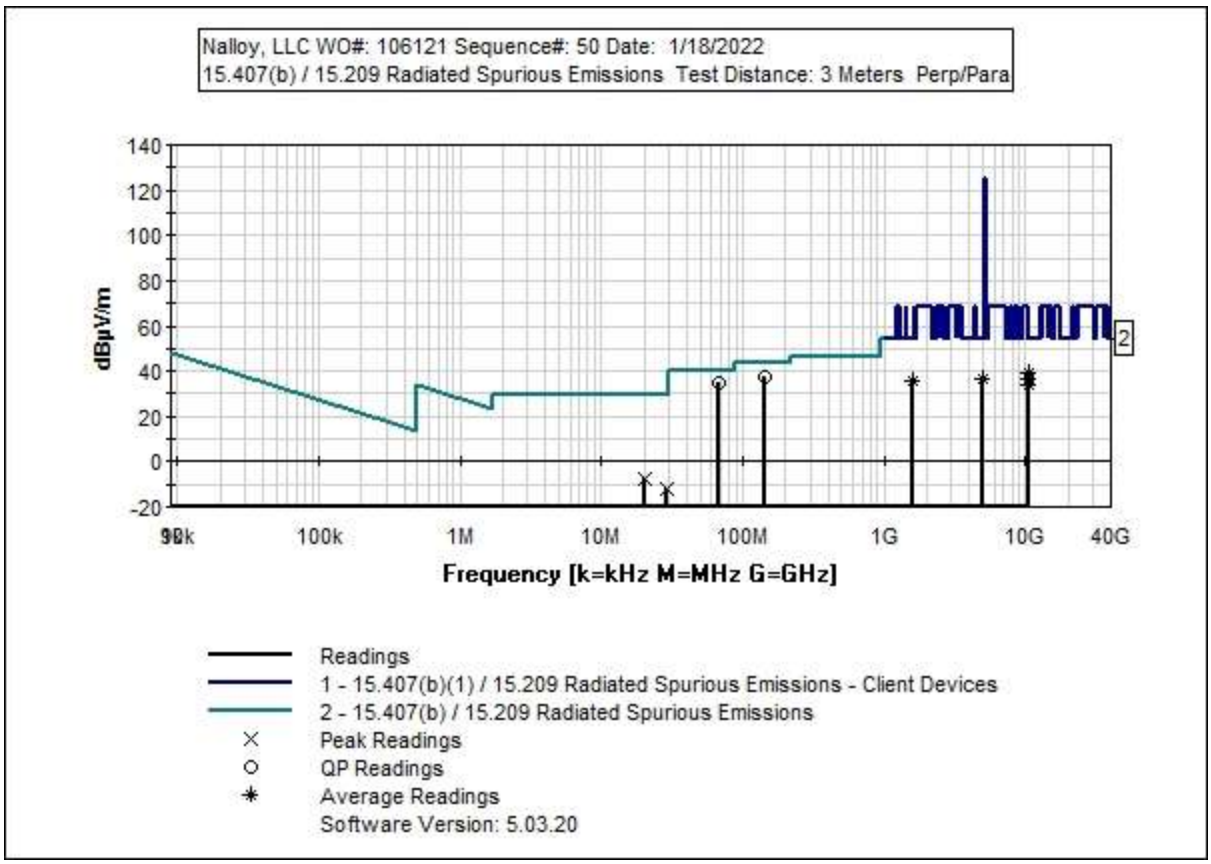
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5180, 5220, 5240 MHz
802.11ac20 Band 1
Rate: MCS0-7
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 50 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	68.470M QP	48.5	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	34.7	40.0	-5.3	Vert
^	68.470M	53.0	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	39.2	40.0	-0.8	Vert
3	143.320M QP	49.5	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.4	43.5	-6.1	Vert
^	143.320M	52.5	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	40.4	43.5	-3.1	Vert
5	4982.260M Ave	29.9	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	36.3	54.0	-17.7	Vert
^	4982.260M	48.4	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.8	54.0	+0.8	Vert
7	1572.184M Ave	42.3	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	36.0	54.0	-18.0	Vert
^	1572.184M	57.3	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	51.0	54.0	-3.0	Vert
9	10478.000 M Ave	42.9	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	38.9	68.2	-29.3	Vert
^	10478.000 M	59.2	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	55.2	68.2	-13.0	Vert
11	10438.050 M Ave	40.5	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	36.5	68.2	-31.7	Vert
^	10438.050 M	57.1	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	53.1	68.2	-15.1	Vert

13	10357.920 M Ave	38.4	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	34.2	68.2	-34.0	Vert
^	10357.920 M	55.4	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	51.2	68.2	-17.0	Vert
15	20.329M	24.9	+0.0 +0.0 +0.0	+0.2 +0.0 +7.2	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-7.7	29.5	-37.2	Perp/
16	28.687M	23.0	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-11.8	29.5	-41.3	Perp/

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	09:07:17
Tested By:	M. Harrison	Sequence#:	51
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:

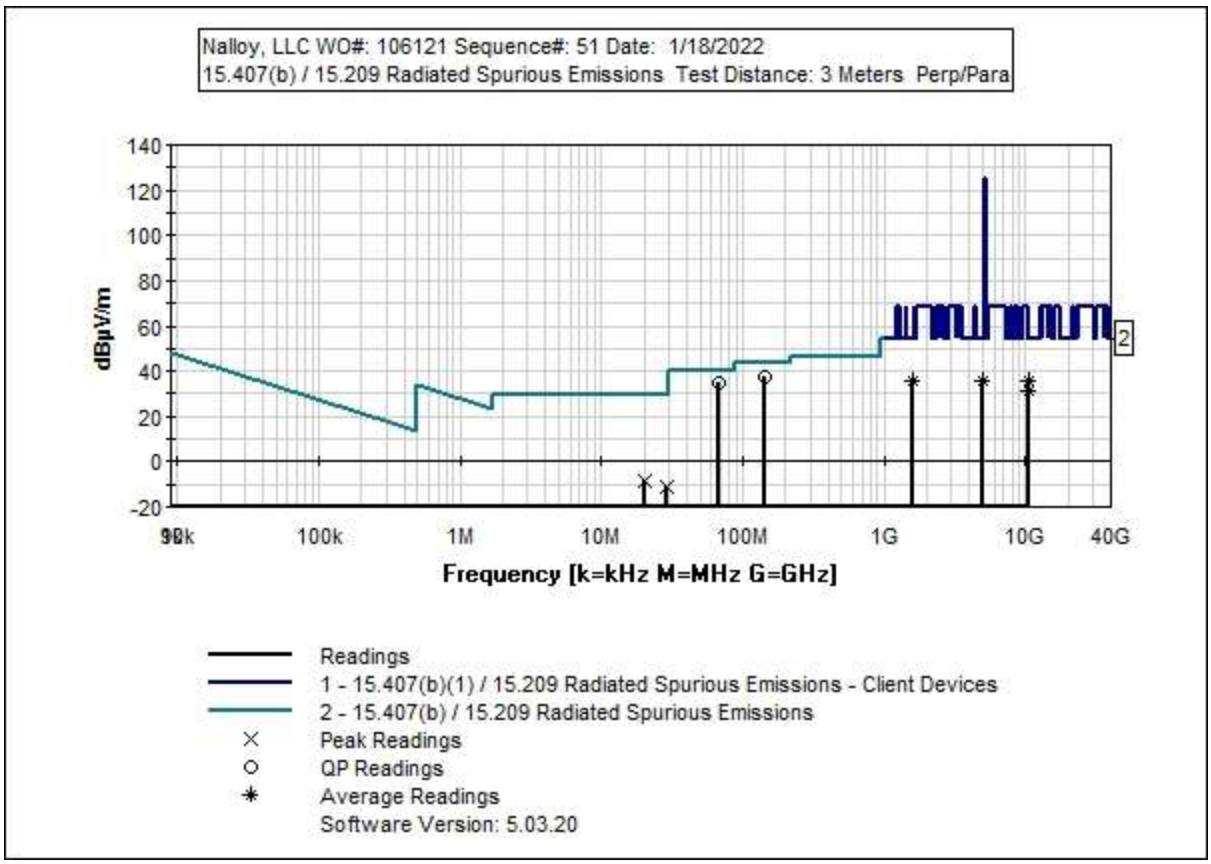
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11ac40 Band 1
Rate: MCS0-7
PWR Output: Low: 15 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 51 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
90k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	68.210M QP	48.7	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	34.9	40.0	-5.1	Vert
^	68.210M	52.2	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	38.4	40.0	-1.6	Vert
3	143.310M QP	49.9	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.8	43.5	-5.7	Vert
^	143.310M	52.8	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	40.7	43.5	-2.8	Vert
5	4989.005M Ave	29.7	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	36.1	54.0	-17.9	Vert
^	4989.005M	48.1	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.5	54.0	+0.5	Vert
7	1571.768M Ave	42.2	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	35.9	54.0	-18.1	Vert
^	1571.768M	57.0	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.1 +0.0	+0.0	50.7	54.0	-3.3	Vert
9	10457.500 M Ave	39.6	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	35.6	68.2	-32.6	Vert
^	10457.500 M	54.7	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	50.7	68.2	-17.5	Vert
11	10380.100 M Ave	35.4	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	31.2	68.2	-37.0	Vert
^	10380.100 M	48.8	+2.0 +0.0 +0.0	+6.1 -12.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	44.6	68.2	-23.6	Vert
13	20.388M	24.2	+0.0 +0.0 +0.0	+0.2 +0.0 +7.2	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-8.4	29.5	-37.9	Perp/
14	28.687M	23.9	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-10.9	29.5	-40.4	Perp/

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**106407**	Date:	1/18/2022
Test Type:	**Maximized Emissions**	Time:	09:11:47
Tested By:	M. Harrison	Sequence#:	52
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:

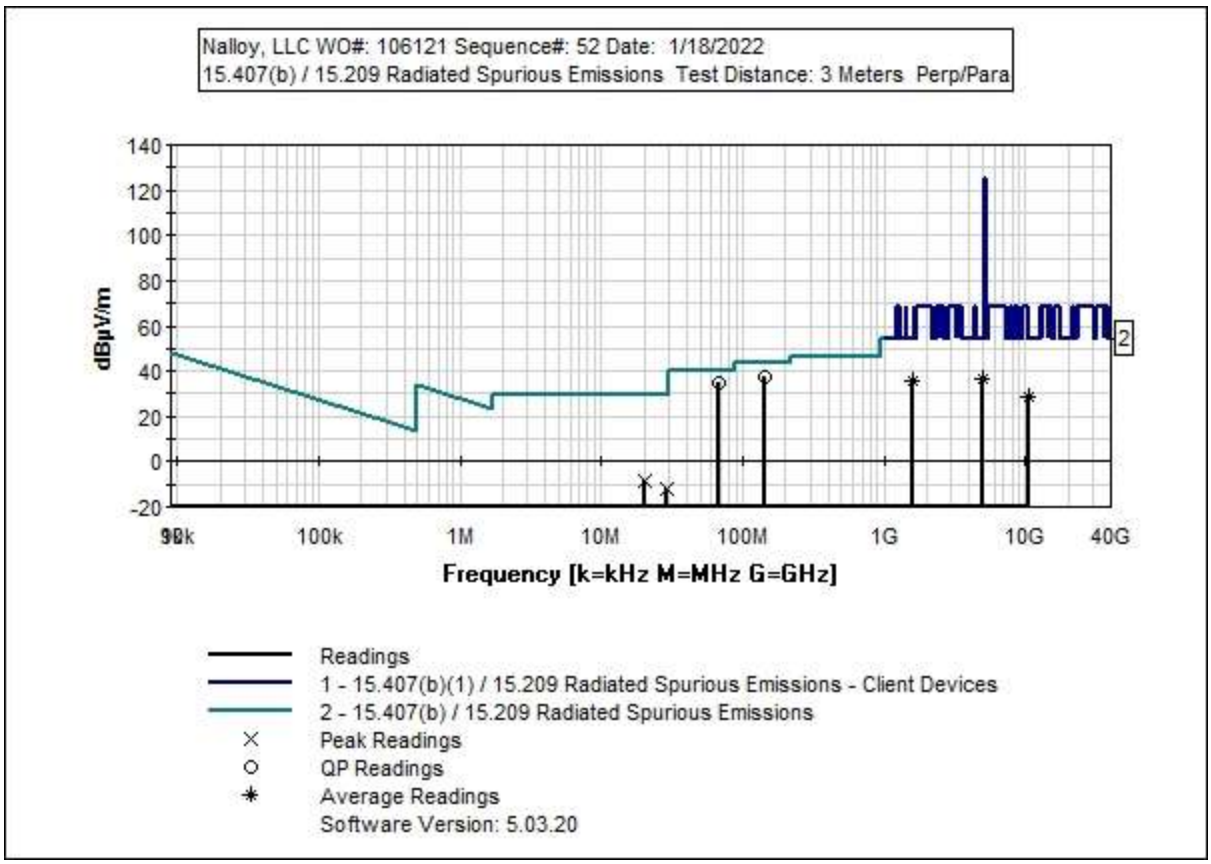
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 9k-40 GHz

Setup:
Antenna 0
Channels: 5210 MHz
802.11ac80
Rate: MCS0-9
PWR Output: 16 dBm
100% Duty Cycle

Notes:
No EUT Emissions found within 20 dB of the limit above 18GHz


Nalloy, LLC WO#: 106121 Sequence#: 52 Date: 1/18/2022
15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Perp/Para
dBµV/m
140
120
100
80
60
40
20
0
-20
90k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
2
Readings
1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices
2 - 15.407(b) / 15.209 Radiated Spurious Emissions
Peak Readings
QP Readings
Average Readings
Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
T5	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	5/13/2021	5/13/2023
	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	11/11/2020	11/11/2022
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	5/11/2021	5/11/2023
	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
	AN02764-70	Waveguide	Multiple	4/28/2020	4/28/2022
	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
	ANP07211	Cable	32026-29801-29801-18	6/16/2021	6/16/2023
	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T7	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T8	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T9	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T10	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T11	ANP06011	Cable	Heliax	8/7/2020	8/7/2022

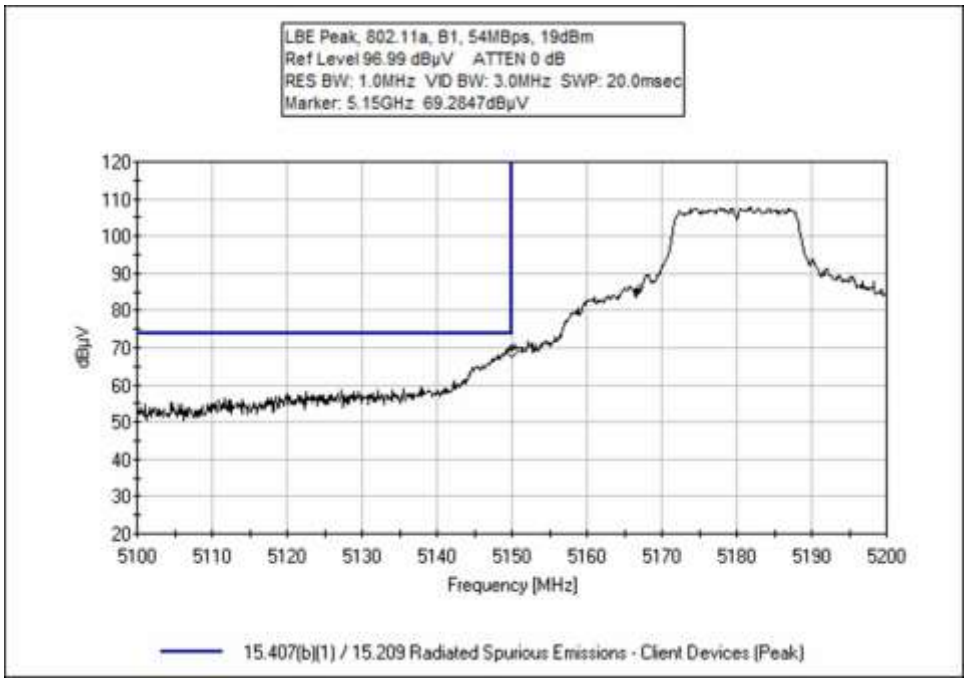
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

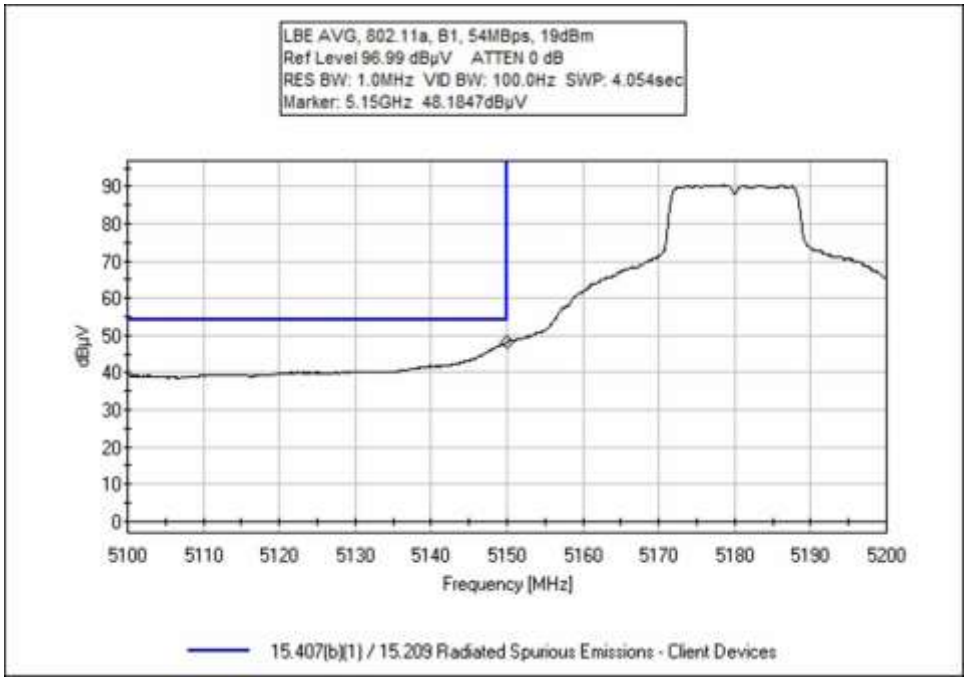
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	68.480M QP	48.5	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	34.7	40.0	-5.3	Vert
^	68.480M	52.4	+0.2 +0.0 +0.5	+0.4 +0.0 +0.0	+0.0 -27.8 +0.0	+0.0 +12.9	+0.0	38.6	40.0	-1.4	Vert
3	143.285M QP	49.6	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	37.5	43.5	-6.0	Vert
^	143.285M	51.9	+0.3 +0.0 +0.7	+0.6 +0.0 +0.0	+0.0 -27.6 +0.0	+0.0 +13.9	+0.0	39.8	43.5	-3.7	Vert
5	4986.560M Ave	30.1	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	36.5	54.0	-17.5	Vert
^	4986.560M	48.3	+1.7 +0.5 +0.0	+3.8 +0.0 +0.0	+33.8 +0.0 +0.0	-33.4 +0.0	+0.0	54.7	54.0	+0.7	Vert
7	1583.100M Ave	41.9	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.0 +0.0	+0.0	35.7	54.0	-18.3	Vert
^	1583.100M	56.8	+0.8 +0.2 +0.0	+2.2 +0.0 +0.0	+25.6 +0.0 +0.0	-35.0 +0.0	+0.0	50.6	54.0	-3.4	Vert
9	20.418M	24.5	+0.0 +0.0 +0.0	+0.2 +0.0 +7.2	+0.0 +0.0 +0.0	+0.0 +0.0	-40.0	-8.1	29.5	-37.6	Perp/
10	10447.400 M Ave	32.7	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	28.7	68.2	-39.5	Vert
^	10447.400 M	50.3	+2.0 +0.0 +0.0	+6.2 -12.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	46.3	68.2	-21.9	Vert
12	28.687M	22.4	+0.0 +0.0 +0.0	+0.3 +0.0 +4.8	+0.0 +0.0 +0.1	+0.0 +0.0	-40.0	-12.4	29.5	-41.9	Perp/

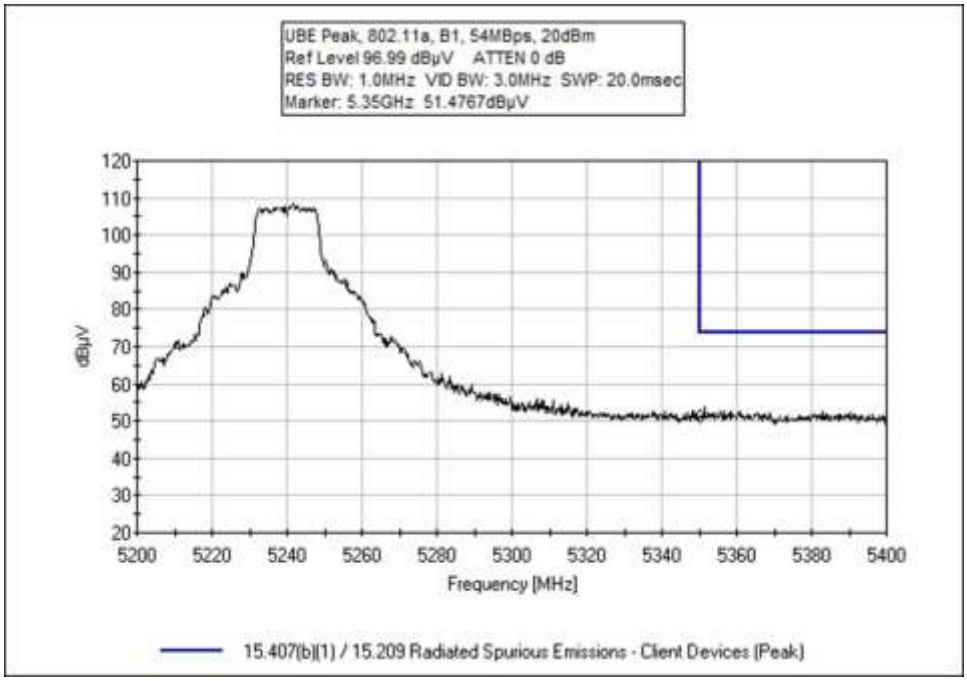
Band Edge Summary					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
5150*	802.11a	Omnidirectional	48.2	< 54.0 Av	Pass
5150*	802.11a	Omnidirectional	69.3	< 74.0 Pk	Pass
5350*	802.11a	Omnidirectional	51.5	< 74.0 Pk	Pass
5350*	802.11a	Omnidirectional	38.9	< 54.0 Av	Pass
5150*	802.11n20	Omnidirectional	48.6	< 54.0 Av	Pass
5150*	802.11n20	Omnidirectional	70.1	< 74.0 Pk	Pass
5350*	802.11n20	Omnidirectional	54.7	< 74.0 Pk	Pass
5350*	802.11n20	Omnidirectional	42.1	< 54.0 Av	Pass
5150*	802.11n40	Omnidirectional	51.0	< 54.0 Av	Pass
5150*	802.11n40	Omnidirectional	69.3	< 74.0 Pk	Pass
5350*	802.11n40	Omnidirectional	53.3	< 74.0 Pk	Pass
5350*	802.11n40	Omnidirectional	42.3	< 54.0 Av	Pass
5150*	802.11ac20	Omnidirectional	48.2	< 54.0 Av	Pass
5150*	802.11ac20	Omnidirectional	69.6	< 74.0 Pk	Pass
5350*	802.11ac20	Omnidirectional	50.6	< 74.0 Pk	Pass
5350*	802.11ac20	Omnidirectional	38.8	< 54.0 Av	Pass
5150*	802.11ac40	Omnidirectional	51.0	< 54.0 Av	Pass
5150*	802.11ac40	Omnidirectional	70.7	< 74.0 Pk	Pass
5350*	802.11ac40	Omnidirectional	50.3	< 74.0 Pk	Pass
5350*	802.11ac40	Omnidirectional	38.9	< 54.0 Av	Pass
5150*	802.11ac80	Omnidirectional	49.2	< 54.0 Av	Pass
5150*	802.11ac80	Omnidirectional	70.1	< 74.0 Pk	Pass
5350*	802.11ac80	Omnidirectional	51.7	< 74.0 Pk	Pass
5350*	802.11ac80	Omnidirectional	38.8	< 54.0 Av	Pass

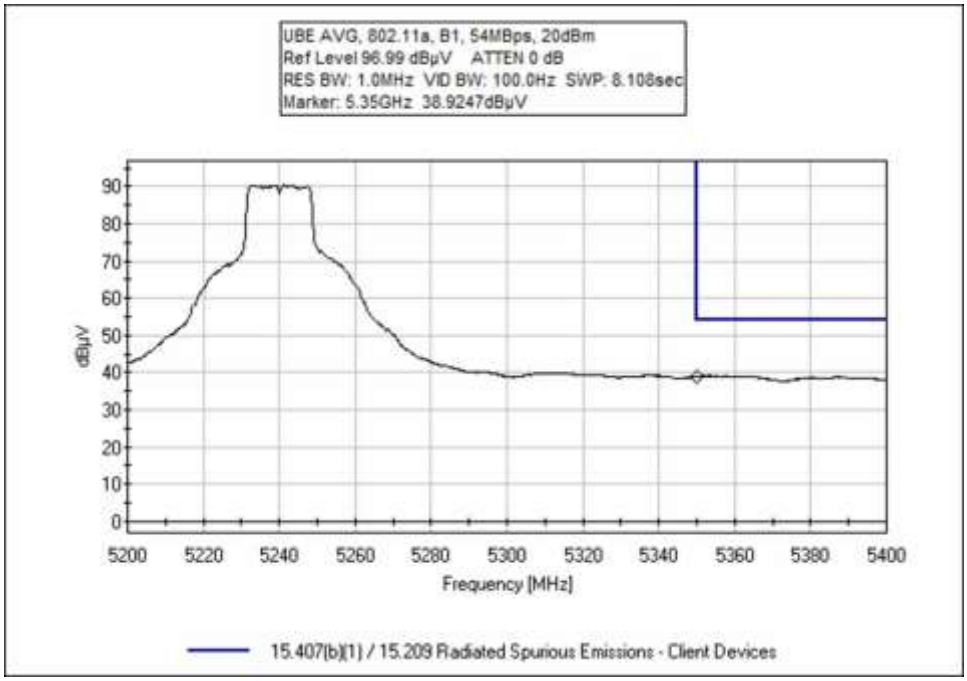
*Restricted band edge

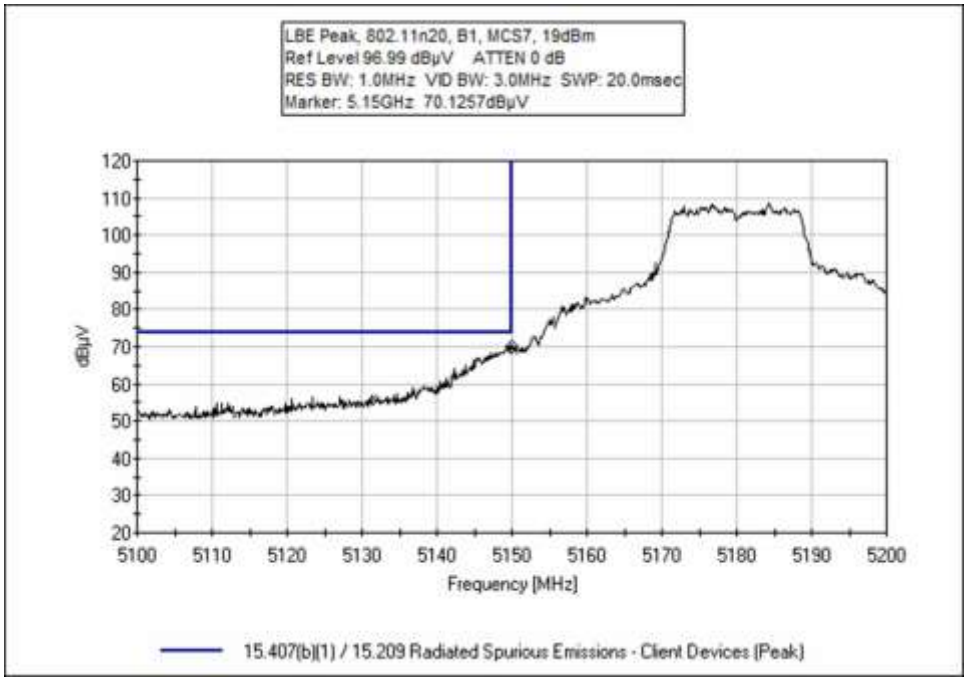
Band Edge Plots

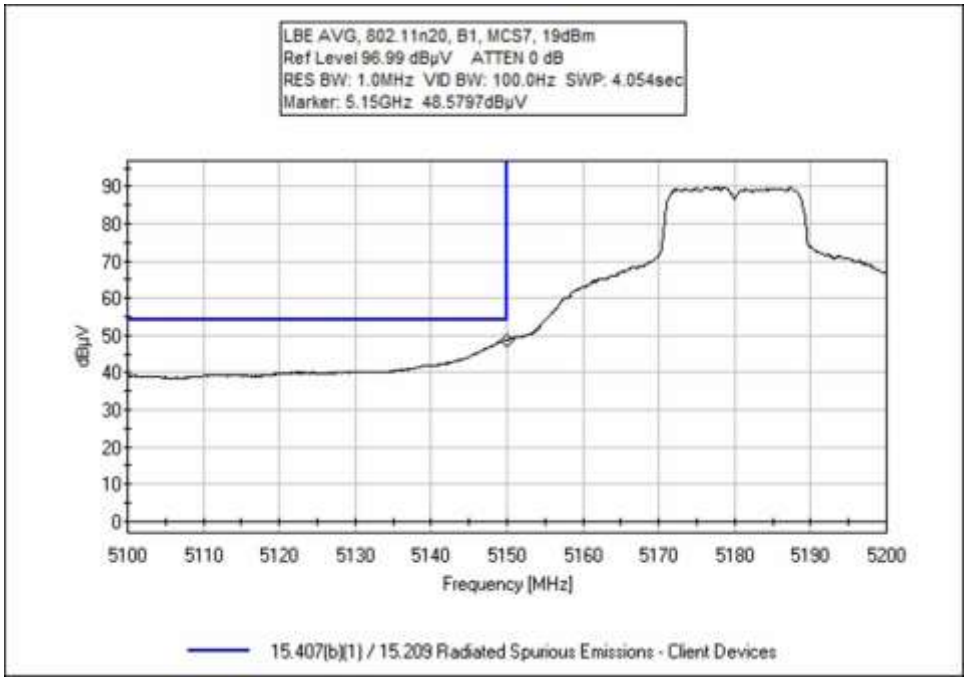


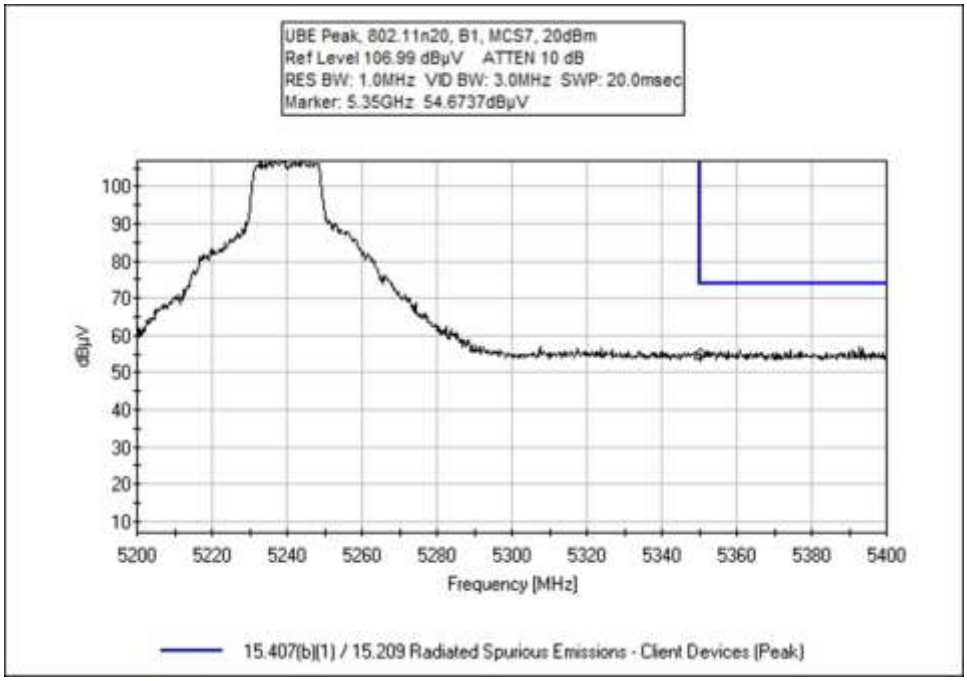


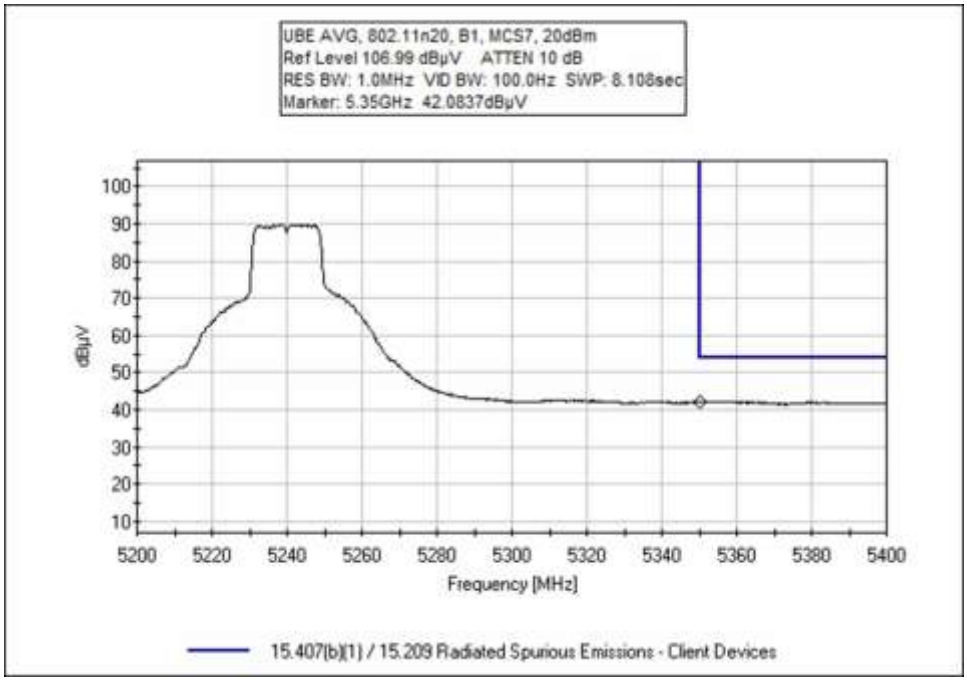

UBE Peak, 802.11a, B1, 54MBps, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.35GHz 51.4767dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

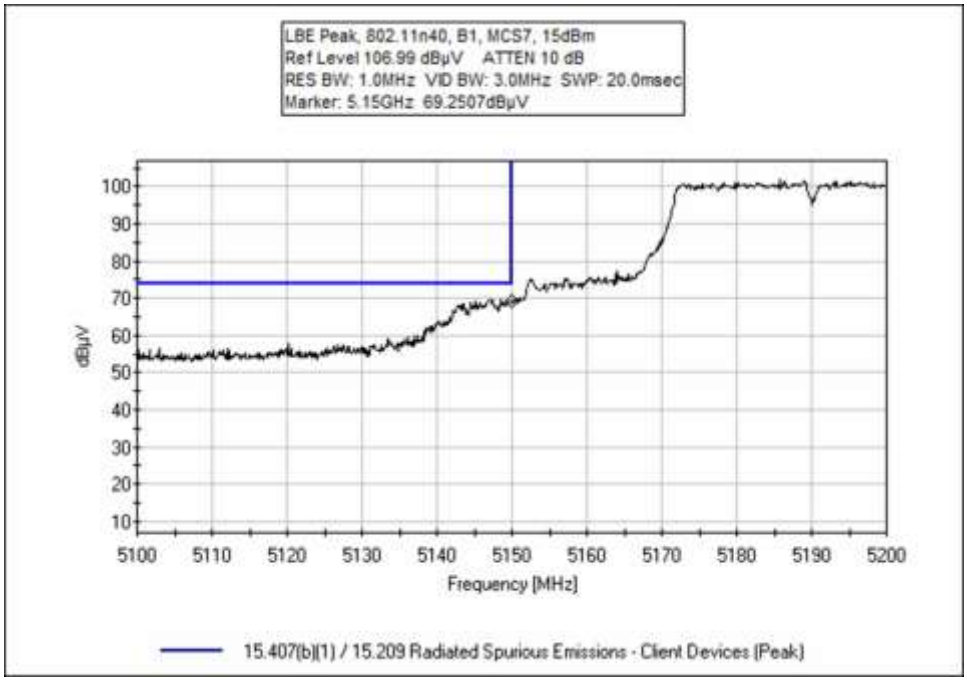

UBE AVG, 802.11a, B1, 54MBps, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 8.108sec
Marker: 5.35GHz 38.9247dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

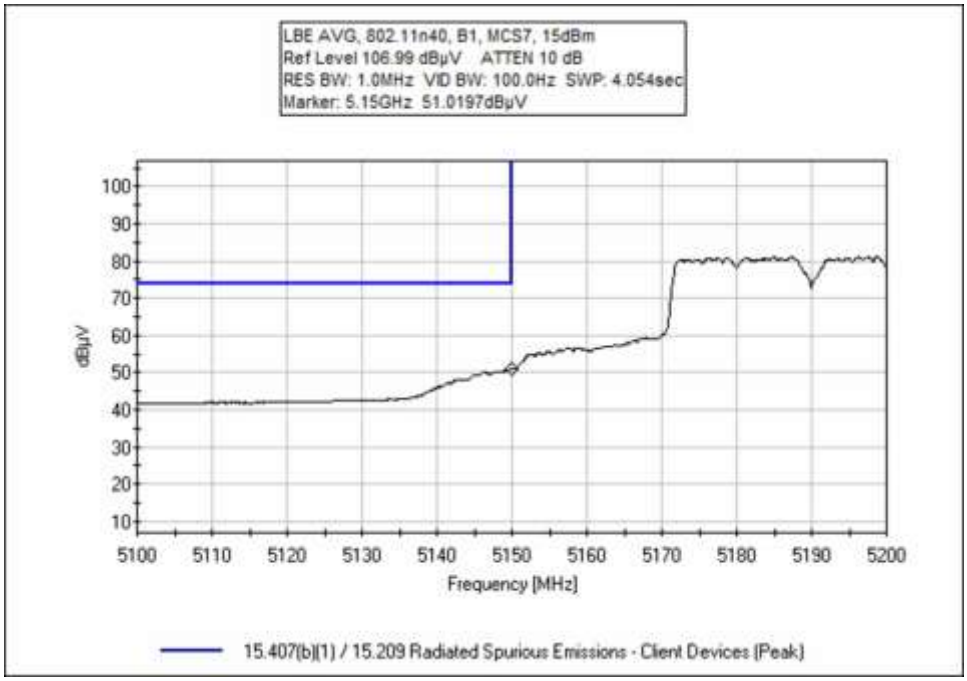

LBE Peak, 802.11n20, B1, MCS7, 19dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.15GHz 70.1257dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

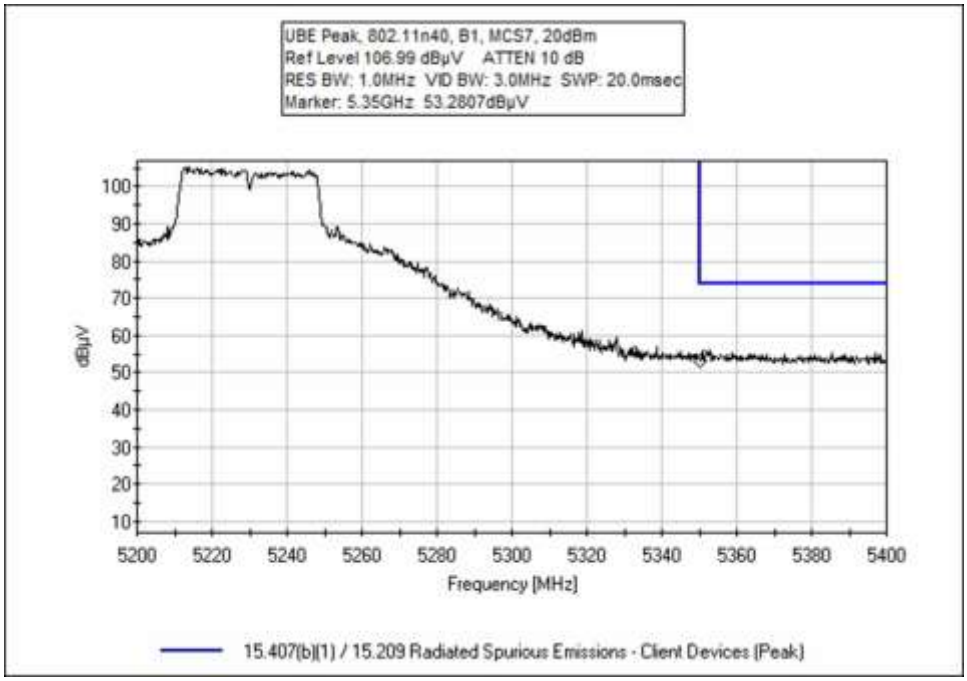

LBE AVG, 802.11n20, B1, MCS7, 19dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 4.054sec
Marker: 5.15GHz 48.5797dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

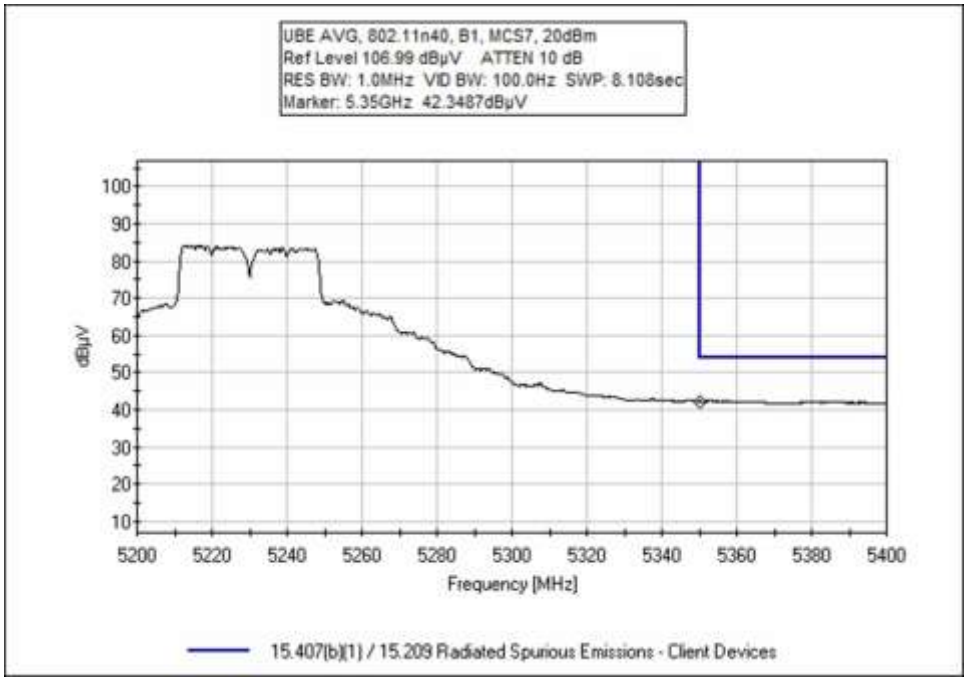

UBE Peak, 802.11n20, B1, MCS7, 20dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.35GHz 54.6737dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

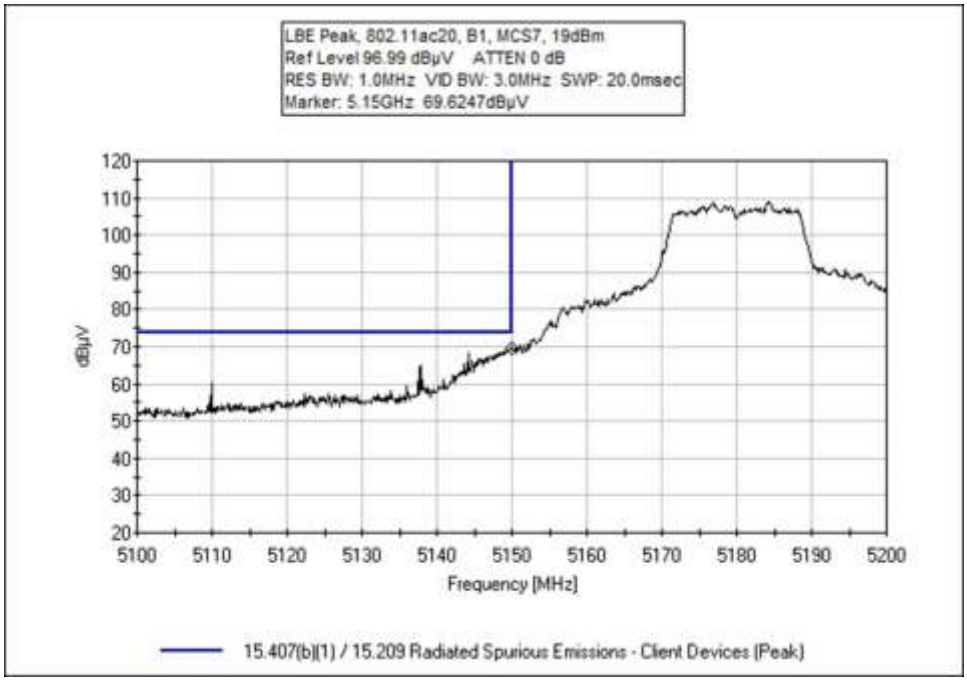

UBE AVG, 802.11n20, B1, MCS7, 20dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 8.108sec
Marker: 5.35GHz 42.0837dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

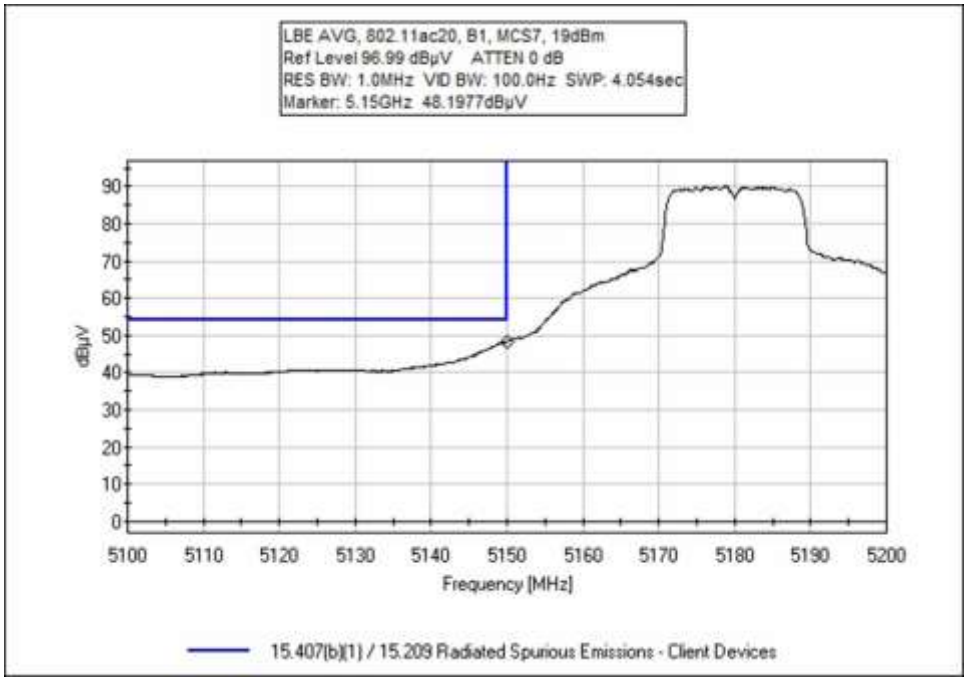

LBE Peak, 802.11n40, B1, MCS7, 15dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.15GHz 69.2507dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

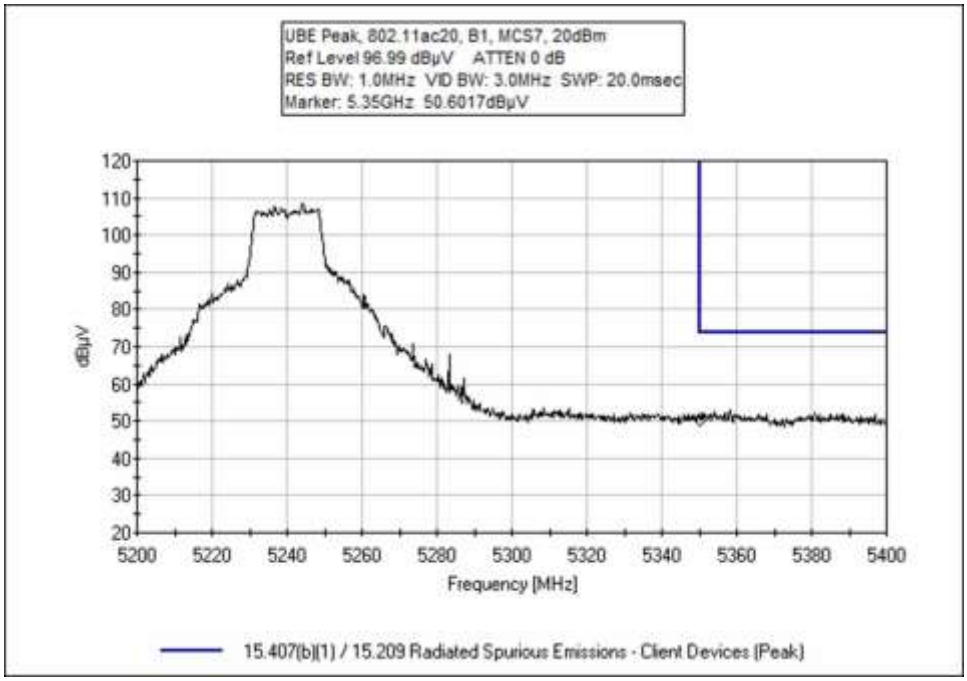

LBE AVG, 802.11n40, B1, MCS7, 15dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 4.054sec
Marker: 5.15GHz 51.0197dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

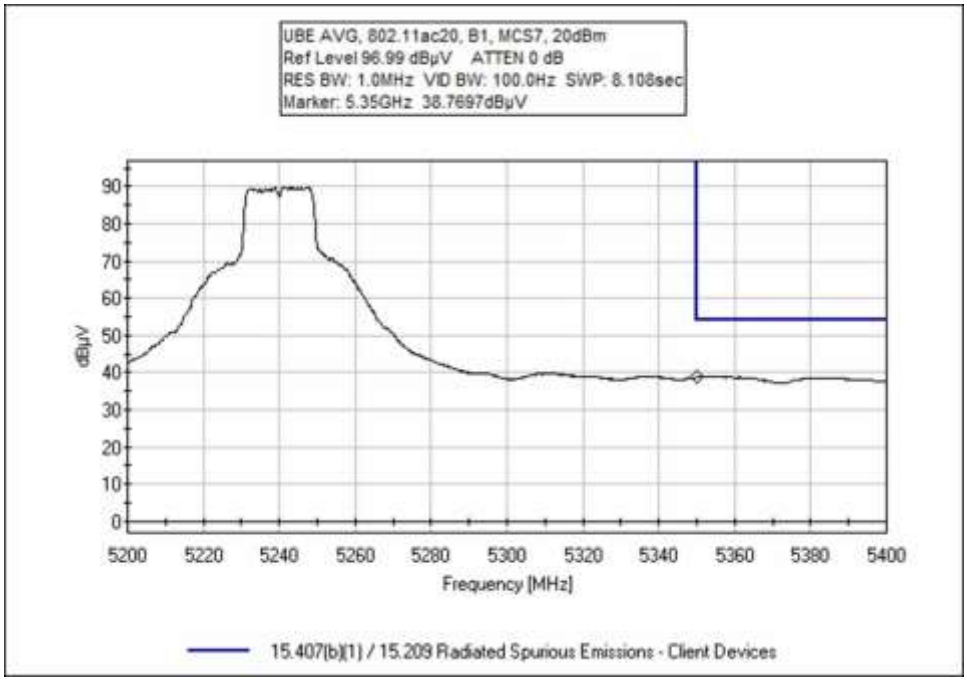

UBE Peak, 802.11n40, B1, MCS7, 20dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.35GHz 53.2807dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

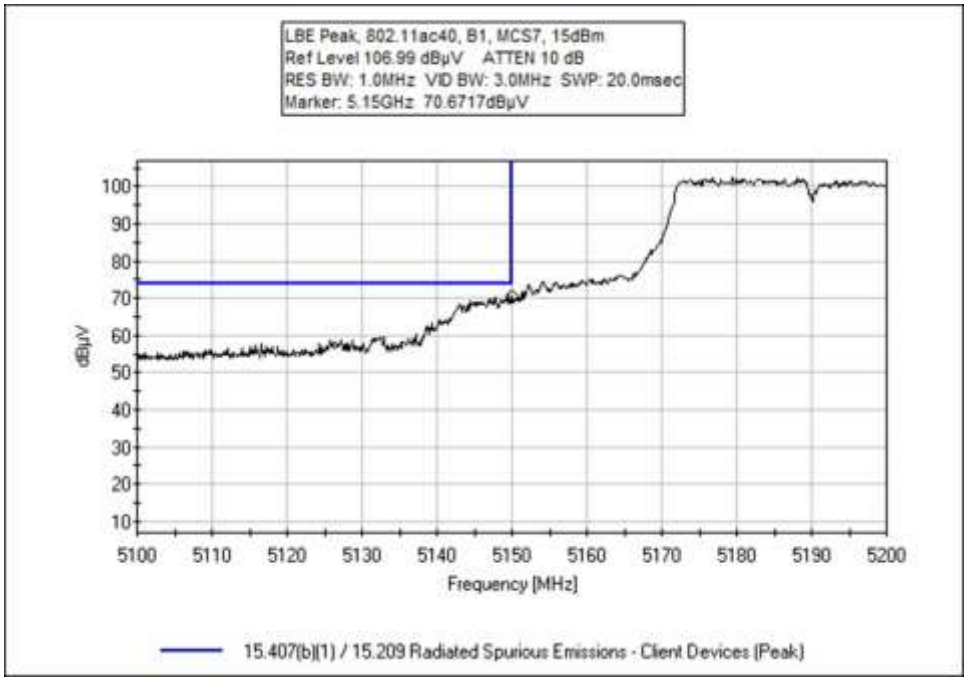

UBE AVG, 802.11n40, B1, MCS7, 20dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 8.108sec
Marker: 5.35GHz 42.3487dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

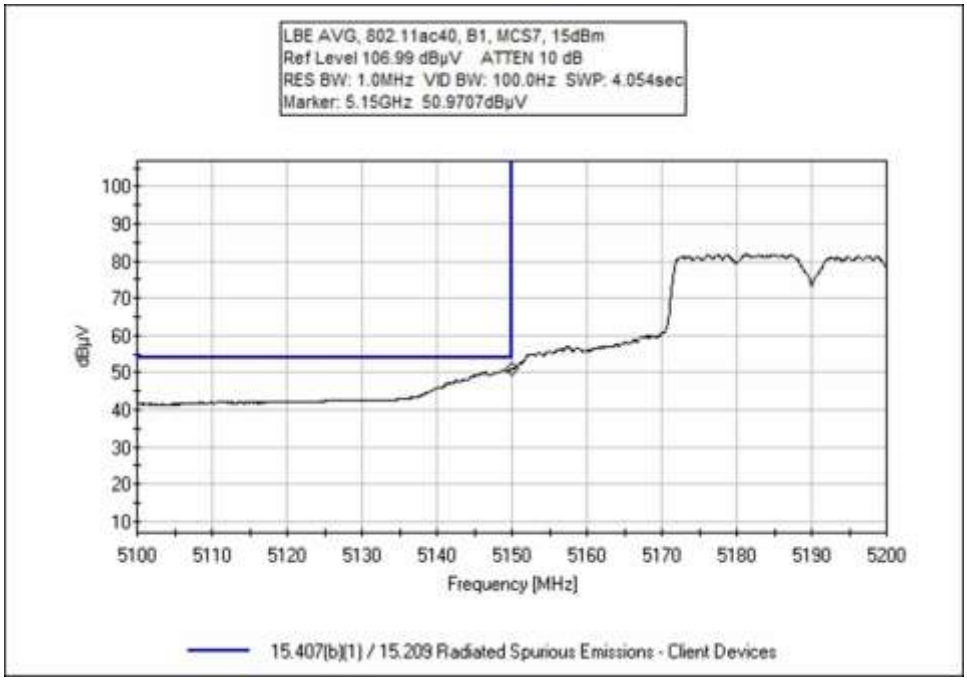

LBE Peak, 802.11ac20, B1, MCS7, 19dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.15GHz 69.6247dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

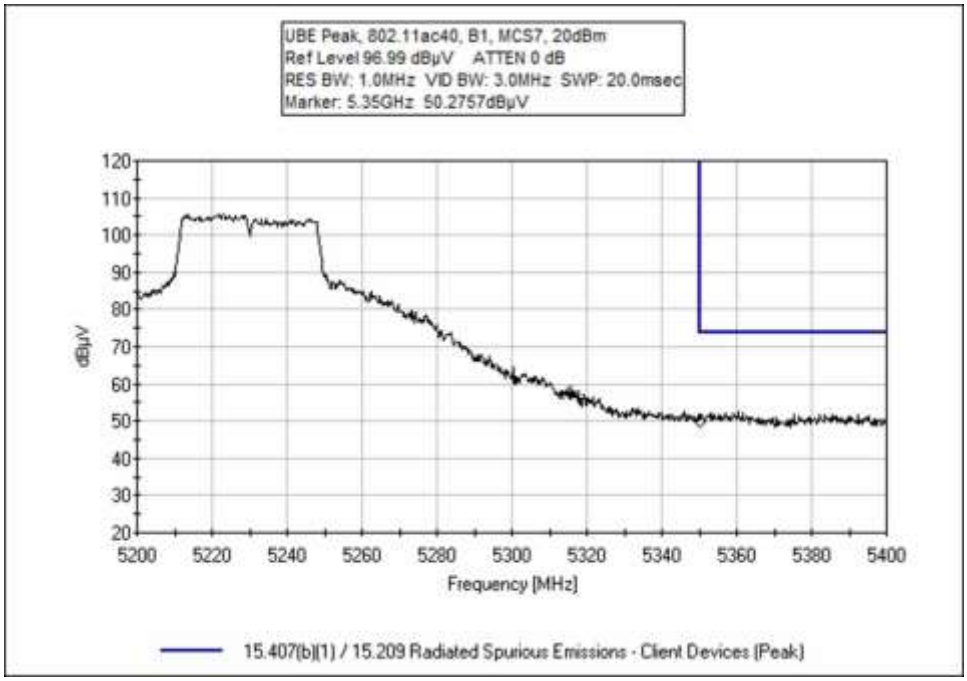

LBE AVG, 802.11ac20, B1, MCS7, 19dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 4.054sec
Marker: 5.15GHz 48.1977dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

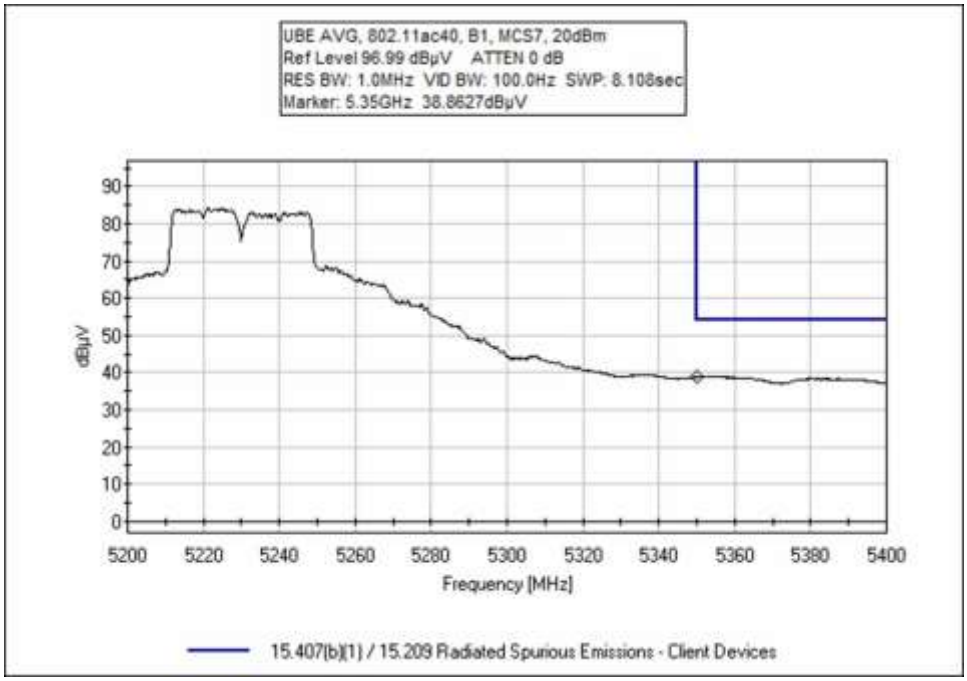

UBE Peak, 802.11ac20, B1, MCS7, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.35GHz 50.6017dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)

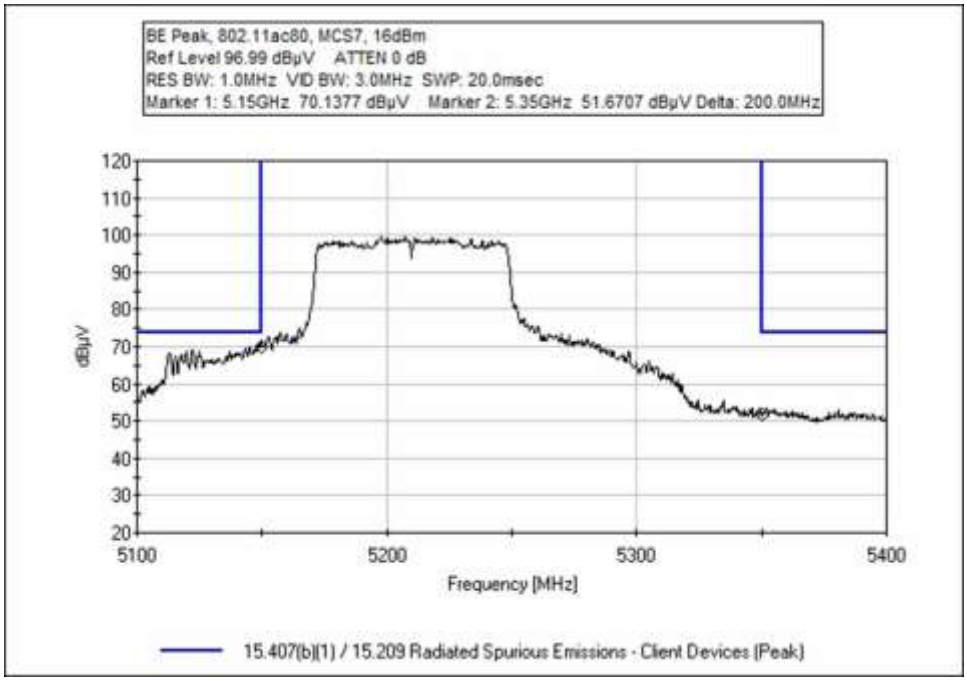

UBE AVG, 802.11ac20, B1, MCS7, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 8.108sec
Marker: 5.35GHz 38.7697dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

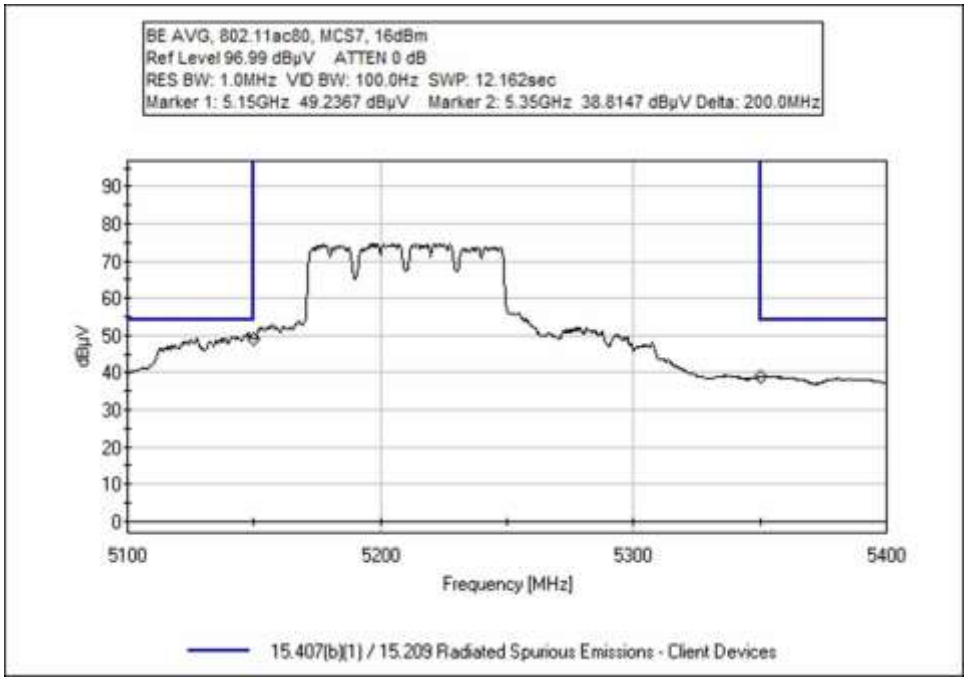

LBE Peak, 802.11ac40, B1, MCS7, 15dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.15GHz 70.6717dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)


LBE AVG, 802.11ac40, B1, MCS7, 15dBm
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 4.054sec
Marker: 5.15GHz 50.9707dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices


UBE Peak, 802.11ac40, B1, MCS7, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 5.35GHz 50.2757dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)


UBE AVG, 802.11ac40, B1, MCS7, 20dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 8.108sec
Marker: 5.35GHz 38.8627dBµV
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices


BE Peak, 802.11ac80, MCS7, 16dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker 1: 5.15GHz 70.1377 dBµV Marker 2: 5.35GHz 51.6707 dBµV Delta: 200.0MHz
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices (Peak)


BE AVG, 802.11ac80, MCS7, 16dBm
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 100.0Hz SWP: 12.162sec
Marker 1: 5.15GHz 49.2367 dBµV Marker 2: 5.35GHz 38.8147 dBµV Delta: 200.0MHz
dBµV
Frequency [MHz]
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/10/2021
Test Type:	**Maximized Emissions**	Time:	14:31:04
Tested By:	M. Harrison	Sequence#:	5
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5180, 5240 MHz
802.11a
Rate: 6-54MBps
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	48.2					+0.0	48.2	54.0 5180, 54MBps,19dBm	-5.8	Horiz
^	5150.000M	69.3					+0.0	69.3	74.0 5180, 54MBps,19dBm	-4.7	Horiz
3	5350.000M Ave	38.9					+0.0	38.9	54.0 5240, 54MBps,20dBm	-15.1	Horiz
^	5350.000M	51.5					+0.0	51.5	74.0 5240, 54MBps,20dBm	-22.5	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/10/2021
Test Type:	**Maximized Emissions**	Time:	15:05:16
Tested By:	M. Harrison	Sequence#:	6
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5180, 5240 MHz
802.11n20
Rate: MCS0-7
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	48.6	+0.0				+0.0	48.6	54.0 5180, MCS7, 19dBm	-5.4	Horiz
^	5150.000M	70.1	+0.0				+0.0	70.1	74.0 5180, MCS7, 19dBm	-3.9	Horiz
3	5350.000M Ave	42.1	+0.0				+0.0	42.1	54.0 5240, MCS7, 20dBm	-11.9	Horiz
^	5350.000M	54.7	+0.0				+0.0	54.7	74.0 5240, MCS7, 20dBm	-19.3	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/10/2021
Test Type:	**Maximized Emissions**	Time:	15:29:48
Tested By:	M. Harrison	Sequence#:	7
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11n40
Rate: MCS0-7
PWR Output: Low/Mid: 15 dBm, High: 20dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	51.0	+0.0				+0.0	51.0	54.0 5190, MCS7, 15dBm	-3.0	Horiz
^	5150.000M	69.3	+0.0				+0.0	69.3	74.0 5190, MCS7, 15dBm	-4.7	Horiz
3	5350.000M Ave	42.3	+0.0				+0.0	42.3	54.0 5230, MCS7, 20dBm	-11.7	Horiz
^	5350.000M	53.3	+0.0				+0.0	53.3	74.0 5230, MCS7, 20dBm	-20.7	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/16/2021
Test Type:	**Maximized Emissions**	Time:	07:18:27
Tested By:	M. Harrison	Sequence#:	8
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5180, 5240 MHz
802.11ac20
Rate: MCS0-8
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	48.2	+0.0				+0.0	48.2	54.0 5180, MCS7, 19dBm	-5.8	Horiz
^	5150.000M	69.6	+0.0				+0.0	69.6	74.0 5180, MCS7, 19dBm	-4.4	Horiz
3	5350.000M Ave	38.8	+0.0				+0.0	38.8	54.0 5240, MCS7, 20dBm	-15.2	Horiz
^	5350.000M	50.6	+0.0				+0.0	50.6	74.0 5240, MCS7, 20dBm	-23.4	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/16/2021
Test Type:	**Maximized Emissions**	Time:	08:08:52
Tested By:	M. Harrison	Sequence#:	9
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5190, 5230 MHz
802.11ac40
Rate: MCS0-9
PWR Output: Low: 15 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	51.0	+0.0				+0.0	51.0	54.0 5190, MCS7, 15dBm	-3.0	Horiz
^	5150.000M	70.7	+0.0				+0.0	70.7	74.0 5190, MCS7, 15dBm	-3.3	Horiz
3	5350.000M Ave	38.9	+0.0				+0.0	38.9	54.0 5230, MCS7, 20dBm	-15.1	Horiz
^	5350.000M	50.3	+0.0				+0.0	50.3	74.0 5230, MCS7, 20dBm	-23.7	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.407(b)(1) / 15.209 Radiated Spurious Emissions - Client Devices**		
Work Order #:	**106407**	Date:	12/16/2021
Test Type:	**Maximized Emissions**	Time:	08:45:16
Tested By:	M. Harrison	Sequence#:	10
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 5.15-5.35 GHz

Setup:
Antenna 0
Channels: 5210 MHz
802.11ac80
Rate: MCS0-9
PWR Output: 16 dBm
100% Duty Cycle

Notes:
All data rates explored, worst case provided.
Band Edge Measurements were performed with correct factors loaded into Spectrum Analyzer.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
	ANP05961	Cable	Heliax	6/9/2021	6/9/2023
	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
	AN03540	Preamp	83017A	5/14/2021	5/14/2023
	ANP06242	Attenuator	54A-10	1/27/2020	1/27/2022
	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5150.000M Ave	49.2	+0.0				+0.0	49.2	54.0 5210, MCS7, 16dBm	-4.8	Horiz
^	5150.000M	70.1	+0.0				+0.0	70.1	74.0 5210, MCS7, 16dBm	-3.9	Horiz
3	5350.000M Ave	38.8	+0.0				+0.0	38.8	54.0 5210, MCS7, 16dBm	-15.2	Horiz
^	5350.000M	51.7	+0.0				+0.0	51.7	74.0 5210, MCS7, 16dBm	-22.3	Horiz

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106407**	Date:	1/19/2022
Test Type:	**Conducted Emissions**	Time:	09:15:02
Tested By:	M. Harrison	Sequence#:	60
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:

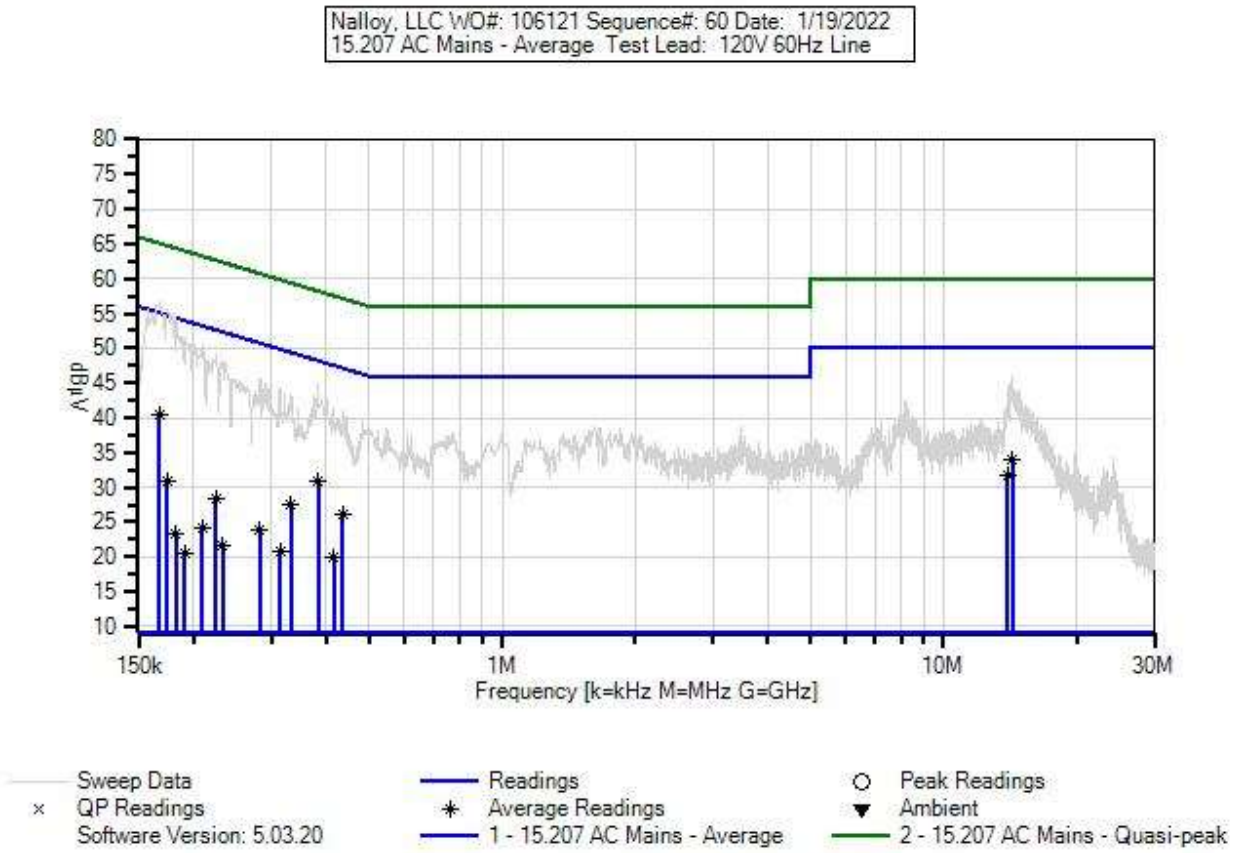
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 150k-30 MHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11a Band 1
Rate: 6-54MBps
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T2	ANP06011	Cable	Heliax	8/7/2020	8/7/2022
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	AN01311	50uH LISN-Line1 (L)	3816/2	2/24/2020	2/24/2022
	AN01311	50uH LISN-Line2 (N)	3816/2	2/24/2020	2/24/2022
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023

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	167.452k	29.3	+9.1	+0.0	+0.0	+1.6	+0.0	40.3	55.1	-14.8	Line
Ave			+0.3								
^	167.451k	45.7	+9.1	+0.0	+0.0	+1.6	+0.0	56.7	55.1	+1.6	Line
			+0.3								
3	14.337M	24.0	+9.1	+0.0	+0.2	+0.6	+0.0	33.9	50.0	-16.1	Line
Ave			+0.0								
^	14.337M	36.2	+9.1	+0.0	+0.2	+0.6	+0.0	46.1	50.0	-3.9	Line
			+0.0								
5	382.705k	21.1	+9.1	+0.0	+0.0	+0.5	+0.0	30.8	48.2	-17.4	Line
Ave			+0.1								
^	382.704k	35.3	+9.1	+0.0	+0.0	+0.5	+0.0	45.0	48.2	-3.2	Line
			+0.1								
7	13.968M	21.9	+9.1	+0.0	+0.2	+0.6	+0.0	31.8	50.0	-18.2	Line
Ave			+0.0								
^	13.968M	34.6	+9.1	+0.0	+0.2	+0.6	+0.0	44.5	50.0	-5.5	Line
			+0.0								
9	435.791k	16.3	+9.1	+0.0	+0.0	+0.5	+0.0	26.0	47.1	-21.1	Line
Ave			+0.1								
^	435.790k	31.3	+9.1	+0.0	+0.0	+0.5	+0.0	41.0	47.1	-6.1	Line
			+0.1								
11	333.255k	17.9	+9.1	+0.0	+0.0	+0.6	+0.0	27.6	49.4	-21.8	Line
Ave			+0.0								
^	333.254k	33.7	+9.1	+0.0	+0.0	+0.6	+0.0	43.4	49.4	-6.0	Line
			+0.0								
13	173.997k	20.0	+9.1	+0.0	+0.0	+1.5	+0.0	30.9	54.8	-23.9	Line
Ave			+0.3								
^	173.996k	44.7	+9.1	+0.0	+0.0	+1.5	+0.0	55.6	54.8	+0.8	Line
			+0.3								
15	224.901k	18.1	+9.1	+0.0	+0.0	+1.0	+0.0	28.3	52.6	-24.3	Line
Ave			+0.1								
^	224.901k	38.9	+9.1	+0.0	+0.0	+1.0	+0.0	49.1	52.6	-3.5	Line
			+0.1								
17	283.078k	14.1	+9.1	+0.0	+0.0	+0.8	+0.0	24.0	50.7	-26.7	Line
Ave			+0.0								
^	283.077k	36.0	+9.1	+0.0	+0.0	+0.8	+0.0	45.9	50.7	-4.8	Line
			+0.0								
19	415.429k	10.2	+9.1	+0.0	+0.0	+0.5	+0.0	19.9	47.5	-27.6	Line
Ave			+0.1								
^	415.429k	31.9	+9.1	+0.0	+0.0	+0.5	+0.0	41.6	47.5	-5.9	Line
			+0.1								
21	313.620k	11.1	+9.1	+0.0	+0.0	+0.7	+0.0	20.9	49.9	-29.0	Line
Ave			+0.0								
^	313.620k	34.4	+9.1	+0.0	+0.0	+0.7	+0.0	44.2	49.9	-5.7	Line
			+0.0								
23	209.630k	13.8	+9.1	+0.0	+0.0	+1.1	+0.0	24.1	53.2	-29.1	Line
Ave			+0.1								

^	209.629k	40.2	+9.1 +0.1	+0.0	+0.0	+1.1	+0.0	50.5	53.2	-2.7	Line
25	232.900k Ave	11.5	+9.1 +0.1	+0.0	+0.0	+1.0	+0.0	21.7	52.3	-30.6	Line
^	232.900k	37.9	+9.1 +0.1	+0.0	+0.0	+1.0	+0.0	48.1	52.3	-4.2	Line
27	181.996k Ave	12.4	+9.1 +0.3	+0.0	+0.0	+1.4	+0.0	23.2	54.4	-31.2	Line
^	181.996k	43.8	+9.1 +0.3	+0.0	+0.0	+1.4	+0.0	54.6	54.4	+0.2	Line
29	191.450k Ave	10.1	+9.1 +0.1	+0.0	+0.0	+1.3	+0.0	20.6	54.0	-33.4	Line
^	191.449k	40.8	+9.1 +0.1	+0.0	+0.0	+1.3	+0.0	51.3	54.0	-2.7	Line

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Nalloy, LLC**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106407**	Date:	1/19/2022
Test Type:	**Conducted Emissions**	Time:	09:03:25
Tested By:	M. Harrison	Sequence#:	59
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:

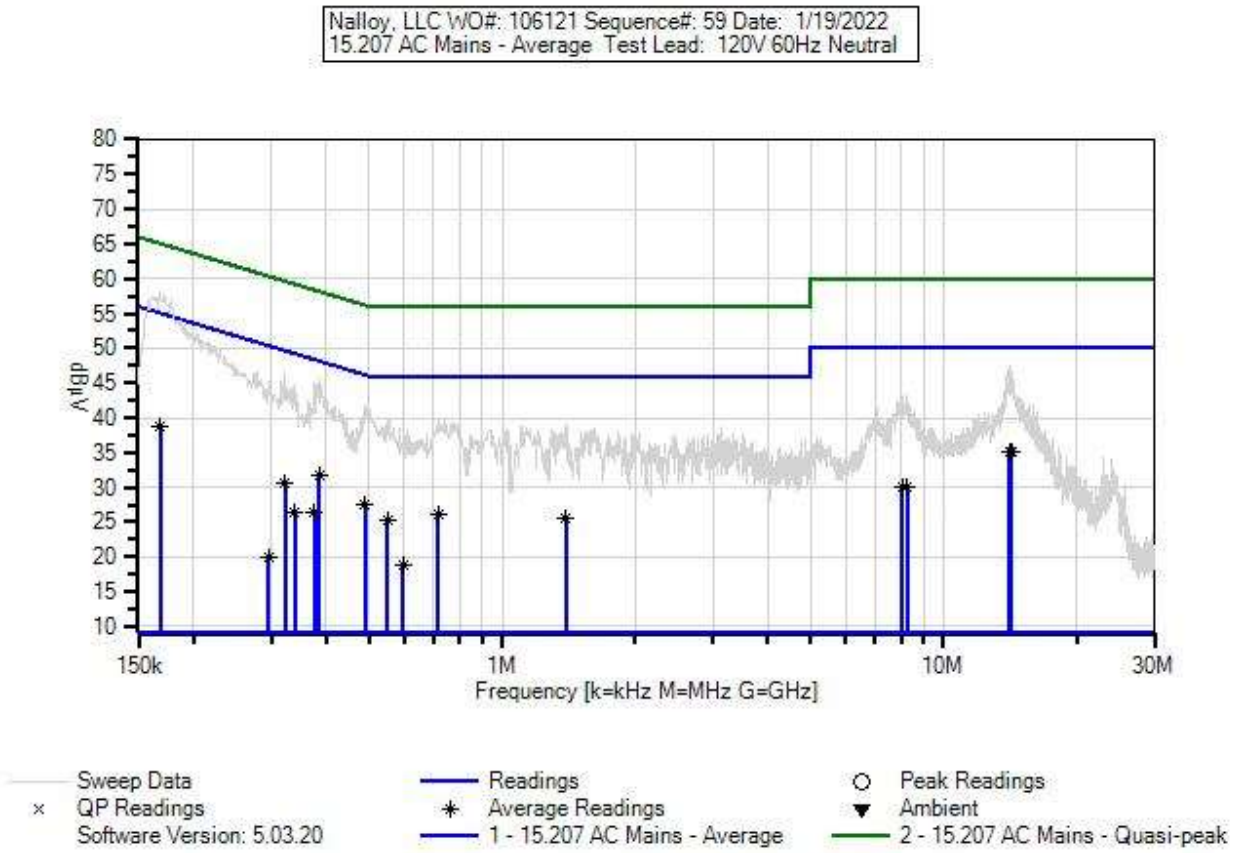
Environmental Conditions:
Temperature: 21°C
Humidity: 45%
Pressure: 101.2kPa

Method: ANSI C63.10: 2013

Frequency range: 150k-30 MHz

Setup:
Antenna 0
Channels: 5180, 5210, 5240 MHz
802.11a Band 1
Rate: 6-54MBps
PWR Output: Low: 19 dBm, Mid/High: 20dBm
100% Duty Cycle

Notes:



Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T2	ANP06011	Cable	Heliax	8/7/2020	8/7/2022
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
	AN01311	50uH LISN-Line1 (L)	3816/2	2/24/2020	2/24/2022
T4	AN01311	50uH LISN-Line2 (N)	3816/2	2/24/2020	2/24/2022
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023

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	14.130M	25.3	+9.1	+0.0	+0.2	+0.6	+0.0	35.2	50.0	-14.8	Neutr
	Ave		+0.0								
^	14.130M	37.5	+9.1	+0.0	+0.2	+0.6	+0.0	47.4	50.0	-2.6	Neutr
			+0.0								
3	14.256M	25.3	+9.1	+0.0	+0.2	+0.6	+0.0	35.2	50.0	-14.8	Neutr
	Ave		+0.0								
^	14.256M	36.7	+9.1	+0.0	+0.2	+0.6	+0.0	46.6	50.0	-3.4	Neutr
			+0.0								
5	168.180k	27.8	+9.1	+0.0	+0.0	+1.5	+0.0	38.7	55.0	-16.3	Neutr
	Ave		+0.3								
^	168.180k	47.3	+9.1	+0.0	+0.0	+1.5	+0.0	58.2	55.0	+3.2	Neutr
			+0.3								
7	384.888k	21.9	+9.1	+0.0	+0.0	+0.5	+0.0	31.6	48.2	-16.6	Neutr
	Ave		+0.1								
^	384.887k	35.9	+9.1	+0.0	+0.0	+0.5	+0.0	45.6	48.2	-2.6	Neutr
			+0.1								
9	490.332k	18.0	+9.1	+0.0	+0.0	+0.4	+0.0	27.6	46.2	-18.6	Neutr
	Ave		+0.1								
^	490.332k	32.2	+9.1	+0.0	+0.0	+0.4	+0.0	41.8	46.2	-4.4	Neutr
			+0.1								
11	321.621k	21.0	+9.1	+0.0	+0.0	+0.6	+0.0	30.7	49.7	-19.0	Neutr
	Ave		+0.0								
^	321.620k	37.0	+9.1	+0.0	+0.0	+0.6	+0.0	46.7	49.7	-3.0	Neutr
			+0.0								
13	8.058M	20.5	+9.1	+0.0	+0.1	+0.4	+0.0	30.1	50.0	-19.9	Neutr
	Ave		+0.0								
^	8.058M	33.5	+9.1	+0.0	+0.1	+0.4	+0.0	43.1	50.0	-6.9	Neutr
			+0.0								
15	8.265M	20.3	+9.1	+0.0	+0.1	+0.5	+0.0	30.0	50.0	-20.0	Neutr
	Ave		+0.0								
^	8.265M	33.6	+9.1	+0.0	+0.1	+0.5	+0.0	43.3	50.0	-6.7	Neutr
			+0.0								
17	716.493k	16.4	+9.1	+0.0	+0.0	+0.3	+0.0	26.0	46.0	-20.0	Neutr
	Ave		+0.2								
^	716.493k	30.4	+9.1	+0.0	+0.0	+0.3	+0.0	40.0	46.0	-6.0	Neutr
			+0.2								
19	1.396M	15.9	+9.1	+0.0	+0.0	+0.3	+0.0	25.4	46.0	-20.6	Neutr
	Ave		+0.1								
^	1.396M	29.6	+9.1	+0.0	+0.0	+0.3	+0.0	39.1	46.0	-6.9	Neutr
			+0.1								
21	549.963k	15.6	+9.1	+0.0	+0.0	+0.4	+0.0	25.2	46.0	-20.8	Neutr
	Ave		+0.1								
^	549.963k	30.0	+9.1	+0.0	+0.0	+0.4	+0.0	39.6	46.0	-6.4	Neutr
			+0.1								
23	375.434k	16.6	+9.1	+0.0	+0.0	+0.6	+0.0	26.4	48.4	-22.0	Neutr
	Ave		+0.1								

^	375.433k	35.1	+9.1 +0.1	+0.0	+0.0	+0.6	+0.0	44.9	48.4	-3.5	Neutr
25	339.074k Ave	16.6	+9.1 +0.0	+0.0	+0.0	+0.6	+0.0	26.3	49.2	-22.9	Neutr
^	339.073k	34.9	+9.1 +0.0	+0.0	+0.0	+0.6	+0.0	44.6	49.2	-4.6	Neutr
27	595.777k Ave	9.4	+9.1 +0.1	+0.0	+0.0	+0.4	+0.0	19.0	46.0	-27.0	Neutr
^	595.777k	29.9	+9.1 +0.1	+0.0	+0.0	+0.4	+0.0	39.5	46.0	-6.5	Neutr
29	296.168k Ave	10.2	+9.1 +0.0	+0.0	+0.0	+0.7	+0.0	20.0	50.3	-30.3	Neutr
^	296.168k	35.4	+9.1 +0.0	+0.0	+0.0	+0.7	+0.0	45.2	50.3	-5.1	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.