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April 30, 2024

Intellian Technologies USA Inc
2600 Tower Oaks Boulevard, Suite 400
Rockville, MD 20852

Dear Christopher Goodman,

Enclosed is the EMC Wireless test report for compliance testing of the Intellian Technologies USA Inc, CNX-WiFi with 450 Watt AC Adapter as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. Please contact me if you have any questions regarding these results or if Eurofins E&E can be of further service to you.

Sincerely,

Michelle Tawmging

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Intellian Technologies USA Inc\WIR128375-FCC247 DTS Rev. 3)

A2LA ACCREDITED TESTING CERT #0591.01

Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

Electromagnetic Compatibility Criteria Test Report

for the

Intellian Technologies USA Inc
CNX-WiFi with 450 Watt AC Adapter

Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators

Report: WIR128375-FCC247 DTS Rev. 3

April 30, 2024

Prepared For:

Intellian Technologies USA Inc
2600 Tower Oaks Boulevard, Suite 400
Rockville, MD 20852

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
914 W. Patapsco Avenue
Baltimore, MD 21230

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Donald Salguero
Wireless Laboratory Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements.

Michael Griffiths
Manager, Wireless Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	February 7, 2024	Initial Issue.
1	February 22, 2024	Updated EUT name throughout; Updated Section A; Updated Section E; Updated § 15.247(e) Power Spectral Density test procedure.
2	April 3, 2024	Removed MPE section.
3	April 30, 2024	Updated Table 4; Updated Table 5.

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Executive Summary

A. Purpose of Test

An EMC Wireless evaluation was performed to determine compliance of the Intellian Technologies USA Inc CNX-WiFi with 450 Watt AC Adapter, with the requirements of Part 15, §15.247. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the CNX-WiFi with 450 Watt AC Adapter. Intellian Technologies USA Inc should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the CNX-WiFi with 450 Watt AC Adapter, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with Intellian Technologies USA Inc, purchase order number 4200001300. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(2)	6dB Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Compliant
N/A	Duty Cycle	Compliant
Title 47 of the CFR, Part 15 §15.247(c)	Spurious Emissions in Non-restricted Bands	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	Peak Power Spectral Density	Compliant

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting

Equipment Configuration

A. Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Intellian Technologies USA Inc to perform testing on the CNX-WiFi with 450 Watt AC Adapter, under Intellian Technologies USA Inc's purchase order number 4200001300.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Intellian Technologies USA Inc, CNX-WiFi with 450 Watt AC Adapter.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	CNX-WiFi with 450 Watt AC Adapter	
Model(s) Covered:	CNX-WiFi with 450 Watt AC Adapter	
EUT Specifications:	Primary Power: 100-240 VAC	
	FCC ID: XXZ-BL5008	
	Type of Modulations:	BPSK,QPSK,QAM
	Equipment Code:	DTS
	Conducted Output Power:	21.32 dBm; 0.136 W
	EUT Frequency Ranges:	2412 – 2462 MHz; 2422 – 2452 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Donald Salguero	
Report Date(s):	April 30, 2024	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
KDB 558074 v05r02	Guidance For Performing Compliance Measurements On Digital Transmission Systems (DTS) Operating Under Section 15.247

Table 3. References

C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 W. Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins Electrical and Electronic Testing NA, Inc.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.20	2	95%
Radiated Emissions, (1 GHz – 6 GHz)	±2.52	2	95%
Conducted Emission Voltage	±2.03	2	95%
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Table 4. Uncertainty Calculations Summary

E. Equipment Overview and Test Configuration

Name of EUT/Model:	CNX-WiFi with 450 Watt AC Adapter
Description of EUT and Intended Use:	CNX (Customer Network Exchange) is an integral component of a OneWeb User Terminal (UT) that provides the network interface, WiFi and Ethernet, for connecting User Devices to the OneWeb Network. CNX also provides power to the OneWeb UT using a coax cable that multiplexes power and data.
Selected Operation Mode(s):	CNX Bridged Mode • CNX operates as a Layer-2 device • SSID: APN1 and SSID: APN_2 are disabled • Devices connected to LAN port MGNT obtain IP addresses via DHCP from the SSM • Devices connected to SSID: Intellian obtain IP addresses via DHCP from the SSM
Rational for the selection of the Operation Mode(s):	Intellian SSID/MGMT port for Management - data load testing between client and server
Susceptibility Criteria:	iPerf traffic loss for data load CNX-WifI reboot due to excessive current draw by electronic load
Monitoring Method(s):	Performing as intended: • The CNX-WiFi functioning with an electronic load of 56VDC at 7.5A Failure conditions: • CNX reboot due to excessive current draw by electronic load
Emissions Class Declaration:	Class B
Configurations:	Please refer to Testing document.
Rated Power Input	
Input Voltage Range:	100-240 VAC
AC or DC:	AC
Voltage Frequency:	50-60 HZ
Number of Phases:	1
Current:	5.3 A Max
Uses an external AC/DC Adapter:	True
Manufacturer:	Adapter Technology Co Ltd
Model #:	ATM450A2-P560
Part #:	Not Applicable

Serial #:	Not Applicable
The EUT can be battery powered:	False
Power Input Under Test	
Input Voltage:	230 VAC
Frequency:	50 Hz
Physical Description	
EUT Arrangement:	Table Top
System with Multiple Chassis?	False
Size (HxWxD) inches:	8.3x6.8x3.1
Weight (lbs.):	1.5
Highest Internal Frequency (MHz):	5.95
Other Info	
EUT Software (Internal to EUT):	MoCA version 2.20.5
Support Software (used by support PC to exercise EUT):	iPerf Version 2.0.9, QDART, Windows 11
Firmware:	Version 13
Transmitter Parameters	
Description of your unit:	OFDM, OFDMA
Modulation Type:	BPSK,QPSK,DBPSK,DQPS
Number of Channels:	20
Frequency Range (MHz):	2412 – 2462; 5180 – 5240; 5260 – 5320; 5500 -5720; 5745 – 5825
Antenna Type:	MU-MIMO
Antenna Gain (dB):	2
PMN:	CNX-WiFi
HVIN:	V 04
FVIN:	420.204.1-009
HMN:	CNX-WiFi
Data Rates:	20 MHz -1xSS: MCS0 - MCS11 2xSS: MCS0 - MCS11 | 40MHZ -1xSS: MCS0 - MCS11 2xSS: MCS0 - MCS11
Expected Power Level:	23 dBm
Number of Antenna:	4
Number of Intentional Transmitters:	4
Number of Certified Intentional Transmitter Modules:	0
FCC ID:	XXZ-BL5008
IC ID:	26236-BL5008

Table 5. Equipment Details

Name/Description	Model Number	Part Number	Serial Number	Rev. #
CNX Wi-Fi	BL5008	N/A	5008232900005	V 0.4
450 Watt AC Adapter	ATM450A2-P560	N/A	N/A	N/A

Table 6. EUT List

Port Name on EUT	Cable Desc. or reason for none	3 Meters or Longer	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
MGMT	Ethernet Cable	Yes	3.048	100	No	Laptop
COAX	For Power and Ethernet	Yes	3.048	80	Yes	SSM
Power	Integrated Power Cable	No	1	1	No	450W PSU
LAN 3	Disabled	No	N/A	N/A	No	N/A
LAN 2	Not needed for testing	No	N/A	N/A	No	N/A
LAN 1	Not needed for testing	No	N/A	N/A	No	N/A

Table 7. Ports and Cabling

Name/Description	Manufacturer	Model Number	Serial Number	*Customer Supplied Calibration Data
Laptop	Dell	N/A	N/A	N/A
DC Load	BK Precision	8510B	N/A	N/A
Test Jig	Intellian	N.A.	N/A	N/A

Table 8. Support Equipment

Photograph 1. CNX-WiFi, Front Side

Photograph 2. CNX-WiFi, Right Side

Photograph 3. CNX-WiFi, Left Side

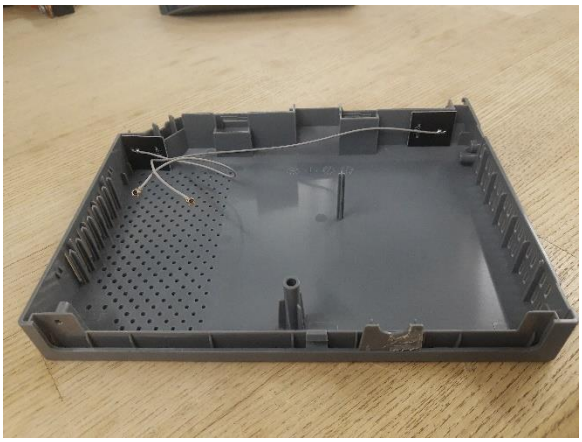
Photograph 4. CNX-WiFi, Rear Side

Photograph 5. CNX-WiFi, Top Side

Photograph 6. CNX-WiFi, Bottom Side

Photograph 7. CNX-WiFi, Internal Board, Side 1

Photograph 8. CNX-WiFi, Internal Board, Side 2



Photograph 9. CNX-WiFi, Internal 2.4 GHz Antenna Position

Photograph 10. CNX-WiFi, Internal 5 GHz Antenna Position

Photograph 11. 450 Watt AC Adapter

F. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

G. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Intellian Technologies USA Inc upon completion of testing.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Test Results: The EUT was **compliant** with the requirements of this section. EUT uses internal antennas that connect to main board thru U.Fl connector

Ant0: 3.64dBi @ 2410MHz
3.56dBi @ 2440MHz
3.63dBi @ 2460MHz

Ant1: 3.53dBi @ 2410MHz
3.69dBi @ 2440MHz
3.94dBi @ 2460MHz

Test Engineer(s): Donald Salguero

Test Date(s): September 13, 2023

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBµV)	
	Quasi-Peak	Average
* 0.15- 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Table 9. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 µH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 µH LISN as the input transducer to an EMC/field intensity meter.

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): January 22, 2024

Conducted Emissions Datasheet			
METrak Number	128375	Test Specification	FCC Part 15, Subpart B, Section 15.107; ICES-003, Section 3.2.1
Customer	Intellian Technologies USA Inc	Equipment Class	B
EUT Name	CNX-WiFi	Engineer	Donald Salguero
Model/Part Number	BL5008	Test Date(s)	10/19/2023
Serial Number	5008232900005	Temperature	19.4°C
Mode of Operation	Active	Relative Humidity	54%
Notes:120V60Hz			
Start Frequency	150 kHz	Stop Frequency	30 MHz
Line Under Test	Line		

Frequency	Quasi-Peak Measurement	Correction Factor	Corrected Measurement	Quasi-Peak Limit	Margin	Result
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail
0.154	36.48	10.48	46.96	65.88	-18.92	PASS
0.63	36.6	10.03	46.63	56	-9.37	PASS
0.809	36.99	10.03	47.01	56	-8.99	PASS
0.989	36.75	10.02	46.77	56	-9.23	PASS
1.168	36.31	10.02	46.33	56	-9.67	PASS
1.351	35.79	10.02	45.81	56	-10.19	PASS
Frequency	**Average Measurement**	**Correction Factor**	**Corrected Measurement**	**Average Limit**	**Margin**	**Result**
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail
0.154	27.18	10.48	37.66	55.88	-18.22	PASS
0.2	23.53	10.26	33.79	54.57	-20.775	PASS
0.45	22.51	10.05	32.56	47.42	-14.858	PASS
0.63	23.95	10.03	33.98	46	-12.019	PASS
0.813	23.12	10.03	33.15	46	-12.85	PASS
18.243	22.1	10.23	32.33	50	-17.668	PASS

Table 10. CEV Data [Line, 120V60Hz]

Conducted Emissions Datasheet			
METrak Number	128375	Test Specification	FCC Part 15, Subpart B, Section 15.107; ICES-003, Section 3.2.1
Customer	Intellian Technologies USA Inc	Equipment Class	B
EUT Name	CNX-WiFi	Engineer	Donald Salguero
Model/Part Number	BL5008	Test Date(s)	10/19/2023
Serial Number	5008232900005	Temperature	19.4°C
Mode of Operation	Active	Relative Humidity	54%
Notes:120V60Hz			
Start Frequency	150 kHz	Stop Frequency	30 MHz
Line Under Test	Neutral		

Frequency	Quasi-Peak Measurement	Correction Factor	Corrected Measurement	Quasi-Peak Limit	Margin	Result
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail
0.634	37.18	10.07	47.25	56	-8.753	PASS
0.755	36.77	10.06	46.83	56	-9.173	PASS
0.813	37.67	10.06	47.72	56	-8.277	PASS
0.997	37.51	10.03	47.54	56	-8.46	PASS
1.176	37.23	10.04	47.27	56	-8.728	PASS
1.36	36.77	10.05	46.82	56	-9.184	PASS
Frequency	**Average Measurement**	**Correction Factor**	**Corrected Measurement**	**Average Limit**	**Margin**	**Result**
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail
0.154	29.7	10.51	40.21	55.88	-15.669	PASS
0.45	25.67	10.09	35.76	47.42	-11.663	PASS
0.588	24.88	10.08	34.95	46	-11.045	PASS
0.63	26.65	10.07	36.72	46	-9.275	PASS
0.813	26.28	10.06	36.34	46	-9.66	PASS
0.993	25.06	10.04	35.09	46	-10.906	PASS

Table 11. CEV Data [Neutral, 120V60Hz]

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(2) 6 dB Bandwidth

Test Requirements: **§ 15.247(a)(2):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and an attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels for all its bandwidths. The 6dB bandwidth was measured according to measurement method 11.8.2 Option 2 of ANSI C63.10-2013.

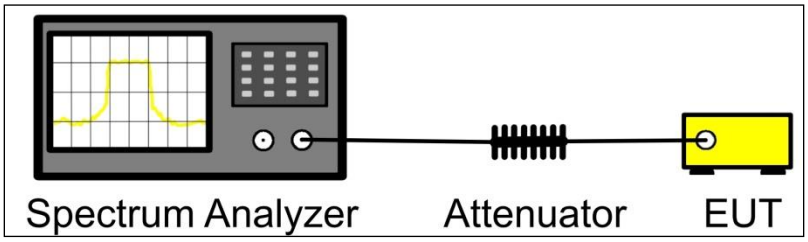


Figure 1. Block Diagram, Occupied Bandwidth Test Setup

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): September 1, 2023

Mode	Frequency (MHz)	6dB Bandwidth (MHz)		99% Bandwidth (MHz)	
		Chain0	Chain1	Chain0	Chain1
802.11g	2412	15.732	11.357	16.4814	16.4412
	2437	11.509	11.401	16.4735	16.4909
	2462	15.14	12.776	16.519	16.4771
802.11n HT20	2412	17.815	17.791	18.1249	18.1434
	2437	17.875	17.825	18.1128	18.1731
	2462	17.835	17.825	18.072	18.1725
802.11n HT40	2422	27.539	32.852	35.9075	35.9636
	2437	32.065	34.543	35.906	35.9271
	2452	35.094	34.925	35.9	35.9222
802.11ax HE20	2412	12.216	18.454	18.8628	18.8611
	2437	17.149	16.991	18.8918	18.8435
	2462	17.416	17.383	18.8967	18.9592
802.11ax HE40	2422	33.887	34.794	37.5566	37.497
	2437	36.628	36.412	37.6141	37.6948
	2452	35.711	26.899	37.5575	37.6661

Table 12. Occupied Bandwidth, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

Duty Cycle

Test Procedure: The EUT was connected to a spectrum analyzer and was ran at the maximum achievable duty cycle for all modes. The duty cycle was measured in accordance with section 11.6 of ANSI C63.10-2013.

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): September 1, 2023

Mode	On Time (mS)	Period (mS)	Duty Cycle (%)	DCCF	1/T (Hz)
802.11g	0.9917	1.592	62.29	2.06	628
802.11n HT20	5.400	5.800	93.10	0.31	172
802.11ax HE20	5.433	5.933	91.57	0.38	169
802.11n HT40	5.450	5.867	92.89	0.32	170
802.11ax HE40	5.400	5.833	92.58	0.33	171

Table 13. Duty Cycle, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Conducted Power Output

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247(b)(3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247(c)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and an attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels for all its bandwidths at maximum power. Power was measured according to measurement method AVGSA-2, as described in ANSI C63.10-2013, section 11.9.2.2.4. Attenuator, cable loss, and duty factor were programmed into the spectrum analyzer.

MIMO directional gain, 2 antenna with unequal gain (correlated):
$10\log[(10^{G1/20}+10^{G2/20})^2/2]$

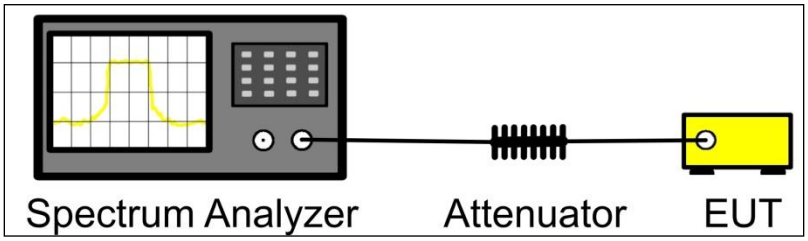


Figure 2. Power Output Test Setup

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): January 22, 2024

Mode	Frequency (MHz)	Conducted Power (dBm)		Sum Cond. Power (dBm)	Duty Cycle (dB)	Output Pwr (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
		Chain0	Chain1						
802.11g	2412	15.89	16.58	19.26	2.06	21.32	6.60	29.40	-8.08
	2437	13.34	14.79	17.14	2.06	19.2	6.64	29.36	-10.16
	2462	14.36	15.15	17.78	2.06	19.84	6.80	29.20	-9.36
802.11n HT20	2412	16.2	16.89	19.57	0.31	19.88	6.60	29.40	-9.52
	2437	15.37	16.76	19.13	0.31	19.44	6.64	29.36	-9.92
	2462	15.81	16.85	19.37	0.31	19.68	6.80	29.20	-9.52
802.11n HT40	2422	12.56	13.58	16.11	0.32	16.43	6.64	29.36	-12.93
	2437	12.69	14.05	16.43	0.32	16.75	6.64	29.36	-12.61
	2452	12.7	13.87	16.33	0.32	16.65	6.74	29.26	-12.61
802.11ax HE20	2412	15.3	15.76	18.55	0.38	18.93	6.60	29.40	-10.47
	2437	14.64	15.82	18.28	0.38	18.66	6.64	29.36	-10.70
	2462	14.86	15.76	18.34	0.38	18.72	6.80	29.20	-10.48
802.11ax HE40	2422	12.31	13.29	15.84	0.33	16.17	6.64	29.36	-13.19
	2437	12.43	13.67	16.1	0.33	16.43	6.64	29.36	-12.93
	2452	12.48	13.83	16.22	0.33	16.55	6.74	29.26	-12.71

Table 14. Conducted Output Power, Test Results

Mode	Frequency (MHz)	Output Pwr (dBm)	Directional Gain (dBi)	Sum EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)
802.11g	2412	21.32	6.60	27.92	36	-8.08
	2437	19.2	6.64	25.84	36	-10.16
	2462	19.84	6.80	26.64	36	-9.36
802.11n HT20	2412	19.88	6.60	26.48	36	-9.52
	2437	19.44	6.64	26.08	36	-9.92
	2462	19.68	6.80	26.48	36	-9.52
802.11n HT40	2422	16.43	6.64	23.07	36	-12.93
	2437	16.75	6.64	23.39	36	-12.61
	2452	16.65	6.74	23.39	36	-12.61
802.11ax HE20	2412	18.93	6.60	25.53	36	-10.47
	2437	18.66	6.64	25.3	36	-10.7
	2462	18.72	6.80	25.52	36	-10.48
802.11ax HE40	2422	16.17	6.64	22.81	36	-13.19
	2437	16.43	6.64	23.07	36	-12.93
	2452	16.55	6.74	23.29	36	-12.71

Table 15. EIRP, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110----------	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505----------	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905----------	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128----------	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775----------	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775----------	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218----------	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825----------	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225----------	123–138	2200–2300	14.47–14.5
8.291–8.294----------	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366----------	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675----------	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475----------	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293----------	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025----------	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725----------	322–335.4	3600–4400	([2])
13.36-13.41			

Table 16. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 17.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 17. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedures: Unwanted emissions measurements were performed at the antenna port as conducted measurements plus cabinet emissions measurements in a radiated setup. Guidance from section ANSI C63.10 section 11.12.2 were followed.

For cabinet emissions measurements, the EUT was placed on a non-conducting stand on a turntable in a chamber. To find the maximum emission the EUT was set to transmit on low, mid, and high channels. Additionally, the turntable was rotated 360 degrees, the EUT was oriented through its three orthogonal axes, and the receive antenna height was varied in order to maximize emissions.

For frequencies from 30 MHz to 1 GHz, measurements were first made using a peak detector with a 100 kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120 kHz resolution bandwidth.

For emissions above 1 GHz and in restricted bands, measurements of the field strength were made with a peak detector and an average detector and compared with the limits of 15.209.

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): January 22, 2024

Mode	Channel Frequency (MHz)	Band Edge Frequency (MHz)	Band Edge Amplitude (dBuV)			AVG Limit (dBuV)	Margin (dB)
			Chain0	Chain1	Sum		
802.11g	2412	2390	50.05	51.11	53.62	54	-0.38
802.11n HT20	2412	2390	49.9	50.89	53.43	54	-0.57
802.11ax HE20	2412	2390	49.93	50.03	52.99	54	-1.01
802.11n HT40	2422	2390	49.19	51.32	53.39	54	-0.61
802.11ax HE40	2422	2390	49.22	51.2	53.33	54	-0.67

Mode	Channel Frequency (MHz)	Band Edge Frequency (MHz)	Band Edge Amplitude (dBm)			Peak Limit (dBm)	Margin (dB)
			Chain0	Chain1	Sum		
802.11g	2412	2390	61.55	63.8	65.83	74	-8.17
802.11n HT20	2412	2390	61.82	62.38	65.12	74	-8.88
802.11ax HE20	2412	2390	61.66	64.8	66.52	74	-7.48
802.11n HT40	2422	2390	59.88	61.14	63.57	74	-10.43
802.11ax HE40	2422	2390	58.55	61.14	63.05	74	-10.95

Table 18. Low Conducted Band Edge, Test Results

Mode	Channel Frequency (MHz)	Band Edge Frequency (MHz)	Band Edge Amplitude (dBuV)			AVG Limit (dBuV)	Margin (dB)
			Chain0	Chain1	Sum		
802.11g	2462	2483.5	48.38	49.55	52.01	54	-1.99
802.11n HT20	2462	2483.5	50.23	51.52	53.93	54	-0.07
802.11ax HE20	2462	2483.5	49.59	51.7	53.78	54	-0.22
802.11n HT40	2452	2483.5	49.02	51.64	53.53	54	-0.47
802.11ax HE40	2452	2483.5	50.85	51.03	53.95	54	-0.05

Mode	Channel Frequency (MHz)	Band Edge Frequency (MHz)	Band Edge Amplitude (dBm)			Peak Limit (dBm)	Margin (dB)
			Chain0	Chain1	Sum		
802.11g	2462	2483.5	60.81	62.36	64.66	74	-9.34
802.11n HT20	2462	2483.5	61.87	67.99	68.94	74	-5.06
802.11ax HE20	2462	2483.5	61.21	63.74	65.67	74	-8.33
802.11n HT40	2452	2483.5	60.16	62.15	64.28	74	-9.72
802.11ax HE40	2452	2483.5	61.48	61.22	64.36	74	-9.64

Table 19. Upper Conducted Band Edge, Test Results

Channel Freq MHz	Mode	Frequency MHz	Polarity	Measured dBuV	Factor dB	Corrected dBuV/m	Limit dBuV/m	Margin dB	Result
2422	802.11ax HE40	53.732	V	20.73	12.78	33.51	40	-6.49	PASS
2437	802.11ax HE40	45.456	V	19.42	15.17	34.59	40	-5.41	PASS
2437	802.11ax HE40	62.131	V	18.74	13.09	31.83	40	-8.17	PASS
2412	802.11ax HE20	45.459	V	20.24	15.17	35.41	40	-4.59	PASS
2437	802.11ax HE20	53.267	V	20.31	12.78	33.09	40	-6.91	PASS
2462	802.11ax HE20	45.155	V	19.92	15.31	35.24	40	-4.76	PASS
2412	802.11g	45.105	V	20.62	15.34	35.96	40	-4.04	PASS
2412	802.11g	53.813	V	22.06	12.78	34.84	40	-5.16	PASS
2437	802.11g	45.113	V	19.88	15.34	35.22	40	-4.78	PASS
2462	802.11g	45.613	V	20.18	15.09	35.27	40	-4.73	PASS
2422	802.11n HT40	45.012	V	19.46	15.38	34.85	40	-5.15	PASS
2437	802.11n HT40	44.779	V	20.36	15.5	35.86	40	-4.14	PASS
2452	802.11n HT40	44.969	V	19.98	15.41	35.38	40	-4.62	PASS
2412	802.11n HT20	63.437	V	20.93	13.11	34.04	40	-5.96	PASS
2437	802.11n HT20	45.068	V	18.88	15.36	34.23	40	-5.77	PASS
2437	802.11n HT20	63.083	V	21.06	13.1	34.16	40	-5.84	PASS
2462	802.11n HT20	46.063	V	17.22	14.88	32.09	40	-7.91	PASS

Table 20. Cabinet Radiated Emissions, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Spurious Emissions in Non-restricted Bands

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The EUT was connected to a spectrum analyzer through a cable and an attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels for all its bandwidths at maximum power. Conducted spurious emissions were measured according to sections 11.11.2 and 11.11.3 of ANSI C63.10-2013.

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): January 22, 2024

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and an attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels for all its bandwidths at maximum power. Power spectral density was measured according to measurement method PK-PSD, as described in ANSI C63.10-2013. Attenuator, cable loss, and duty factor were programmed into the spectrum analyzer.

Test Results: The EUT was **compliant** with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): January 22, 2024

Mode	Frequency (MHz)	Conducted PSD (dBm)		Sum Cond. PSD (dBm)
		Chain0	Chain1	
802.11g	2412	-2.85	-1.77	0.73
	2437	-3.87	-3.99	-0.92
	2462	-3.29	-3.19	-0.23
802.11n HT20	2412	-4.03	-3.13	-0.55
	2437	-4.76	-3.49	-1.07
	2462	-4.6	-3.67	-1.1
802.11n HT40	2422	-8.48	-8.12	-5.29
	2437	-9.85	-5.76	-4.33
	2452	-9.22	-8.19	-5.66
802.11ax HE20	2412	-3.31	-2.69	0.02
	2437	-4.69	-3.72	-1.17
	2462	-4.59	-3.49	-0.99
802.11ax HE40	2422	-11.01	-9.47	-7.16
	2437	-10.62	-8.73	-6.56
	2452	-10.91	-8.93	-6.8

Table 21. PSD, Test Results

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset Number	Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
1T4751	Antenna - Bilog	Sunol Sciences	JB6	A101910	6/1/2022	1/1/2024
1T4757	Antenna; Horn	ETS-Lindgren	3117	123516	7/24/2023	1/31/2025
1T4744	Antenna, Horn	ETS-Lindgren	3116	126519	12/16/2022	6/16/2024
1T8743	Preamplifier	A.H. Systems, Inc.	PAM-0118P	419	Func Verify	Func Verify
1T4752	Pre-Amplifier	Miteq	JS44-18004000-35-8P	1594792	Func Verify	Func Verify
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	NONE	8/31/2023	8/31/2025
1T4771	PSA Spectrum Analyzer	Agilent Technologies	E4446A	MY51100015	11/2/2023	5/31/2025
1T8744	Spectrum Analyzer (PSA)	Agilent Technologies	E4440A	US40420612	5/2/2023	5/2/2024

Table 22. Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

End of Report