HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

July 12, 2024

Neology, Inc
13520 Evening Creek Drive N., Suite 460
San Diego, CA 92128

Dear Dave Missimer,

Enclosed is the EMC Wireless test report for compliance testing of the Neology, Inc, RFID Reader 7204 , tested to the requirements of Title 47 of the Code of Federal Regulations (CFR), Part 90 Subpart M for Land Mobile Radio Services.

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

Sincerely yours,
Eurofins Electrical and Electronic Testing NA, Inc.

Michelle Tawmging
Documentation Department

Reference: (\Neology, Inc\WIR110053-FCC90M CIIPC Rev. 1)

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Electromagnetic Compatibility Criteria Test Report

For the

Neology, Inc
RFID Reader 7204

Tested under

The FCC Verification Rules
Contained in Title 47 of the CFR, Part 90, Subpart M
for Private Land Mobile Radio Services

Report: WIR110053-FCC90M CIIPC Rev. 1

July 12, 2024

Prepared For:
Neology, Inc
13520 Evening Creek Drive N., Suite 460
San Diego, CA 92128

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

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July 12, 2024

Donald Salguero
WIR Laboratory Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. 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 of Part 90, Subpart M of the FCC Rules under normal use and maintenance.

Michael Griffiths
Manager, Wireless Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
0	June 25, 2024	Initial issue.
1	July 12, 2024	Updated testing summary.

Table of Contents

All references to section numbers are taken directly from the standard/specification used. Only sections requiring testing or evaluation are included.

List of Tables

List of Figures

List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

Executive Summary

Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90, Subpart M. All tests were conducted using measurement procedure ANSI C63.26-2015.

Title 47 of the CFR, Part 90, Subpart M, and FCC 04-265 Reference and Test Description	Compliance / Comments
90.205 RF Power Output	Not tested, See WIR11053-FCC90M Rev.3 of Original FCC ID: 2AKNF7204 Report
90.209 Bandwidth Limitation	Compliant
90.210 Occupied Bandwidth (Emission Mask)	Compliant
90.210 Spurious at Antenna Port	Not tested, See WIR11053-FCC90M Rev.3 of Original FCC ID: 2AKNF7204 Report
90.210 Field Strength Spurious Emissions	Not tested, See WIR11053-FCC90M Rev.3 of Original FCC ID: 2AKNF7204 Report
90.213 Frequency Stability	Not tested, See WIR11053-FCC90M Rev.3 of Original FCC ID: 2AKNF7204 Report
90.214 Transient Frequency Behavior	Not Applicable. EUT operates on 900MHz band
90.221 Adjacent Channel power	Not Applicable. EUT operates on 900MHz band
2.1091 RF Exposure	Compliant

Note: No hardware modifications (only firmware changes) have been made to the product to accomplish this. Additionally, the Equipment Class remains the same and there is no increase in output power rating. So only 90.209 Bandwidth limitation and 90.210 emission mask were retested.

Equipment Configuration

Equipment Configuration

Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Neology, Inc to perform testing on the RFID Reader 7204 under purchase order number 5990-00.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Neology, Inc, RFID Reader 7204.

An EMC Wireless evaluation to determine compliance of the RFID Reader 7204 with the requirements of Part 90, Subpart M, was conducted. (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 RFID Reader 7204. Neology, Inc should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been **permanently** discontinued. The results obtained relate only to the item(s) tested.

Model(s) Tested:	RFID Reader 7204	
Model(s) Covered:	RFID Reader 7204	
EUT Specifications:	Primary Power Source: 110-240V AC/DC converter; 18-30V DC side	
	FCC ID: 2AKNF7204	
	Type of Modulations:	DSB-ASK or PR-ASK
	Max Peak and Output Power:	Conducted: 34.77dBm ERP: 44.30dBm
	Equipment Code:	LMS
	EUT Frequency Ranges:	902.75-903.25 MHz 911.25-920.25 MHz*
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature (15-35º C):	
	Relative Humidity (30-60%):	
	Barometric Pressure (860-1060 mbar):	
Evaluated by:	Donald Salguero	
Report Date(s):	July 12, 2024	

*
T21 protocol limited to 911.75 MHz – 919.25 MHz
ISOB 80K protocol limited to 912.25 MHz – 919.75 MHz

Frequency Range (MHz)		Emission Designator	Protocol
911.25	920.25	158KK1D	ISOC
902.75	903.25	158KK1D	ISOC
911.25	920.25	124KK1D	ISOB
902.75	903.25	124KK1D	ISOB
911.25	920.25	5K77N0N	ISO10374
902.75	903.25	3K51N0N	ISO10374
911.25	920.25	32K6K1D	Flex
911.75	919.25	786KK1D	T21
912.25	919.75	543KK1D	ISOB_80K
914.25	915.75	498KK1D	PS111
914.25	915.75	2M70K1D	ASTMV6

EUT Specifications by Protocol Table

Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 West Patapsco Ave., 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 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..

Description of Test Sample

The Neology, Inc RFID Reader 7204 , Equipment Under Test (EUT), is a four port RFID reader is a multi-protocol, multi-regional Radio Frequency Identification (RFID) system that operates in the 902-928MHz UHF frequency band. All antenna ports operate sequentially with only one port transmitting at a given time from a single transmit source. The RF path is internally switched between selected ports. Product is typically used in vehicle applications to acquire transponder information from target vehicle from one or more antennas and is professionally installed. Product is both FCC Part90 and Part15 capable/certified.

Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
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 1. Uncertainty Calculations Summary

Support Equipment

Neology, Inc supplied support equipment necessary for the operation and testing of the RFID Reader 7204. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name/Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
	AC/DC power converter	CUI, Inc.	PDRC-75-24-2	NA
	Laptop	Dell, Inc.	To be supplied	NA
	RF Antenna	Neology, Inc.		NA
	RFID Reader 7204	Neology, Inc.	7204	NA

Table 2. Support Equipment

Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Desc. or reason for none	QTY	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
-	18-30V	DC power cable	1	-	100	Yes	-
-	Antenna 4 symbol	RF coaxial cable	1	-	-	Yes	-
-	Ethernet symbol	Ethernet data cable	1	-	100	Yes	-
-	Antenna 3 symbol	RF coaxial cable	1	-	-	Yes	-
-	I/O symbol	product synchronization	1	-	-	Yes	-
-	Antenna 2 symbol	RF coaxial cable	1	-	-	Yes	-
-	AUX	unused (for diagnostic/test or additional I/O if needed)	0	-	-	Yes	-
-	Antenna 1 symbol	RF coaxial cable	1	-	-	Yes	-

Table 3. Ports and Cabling

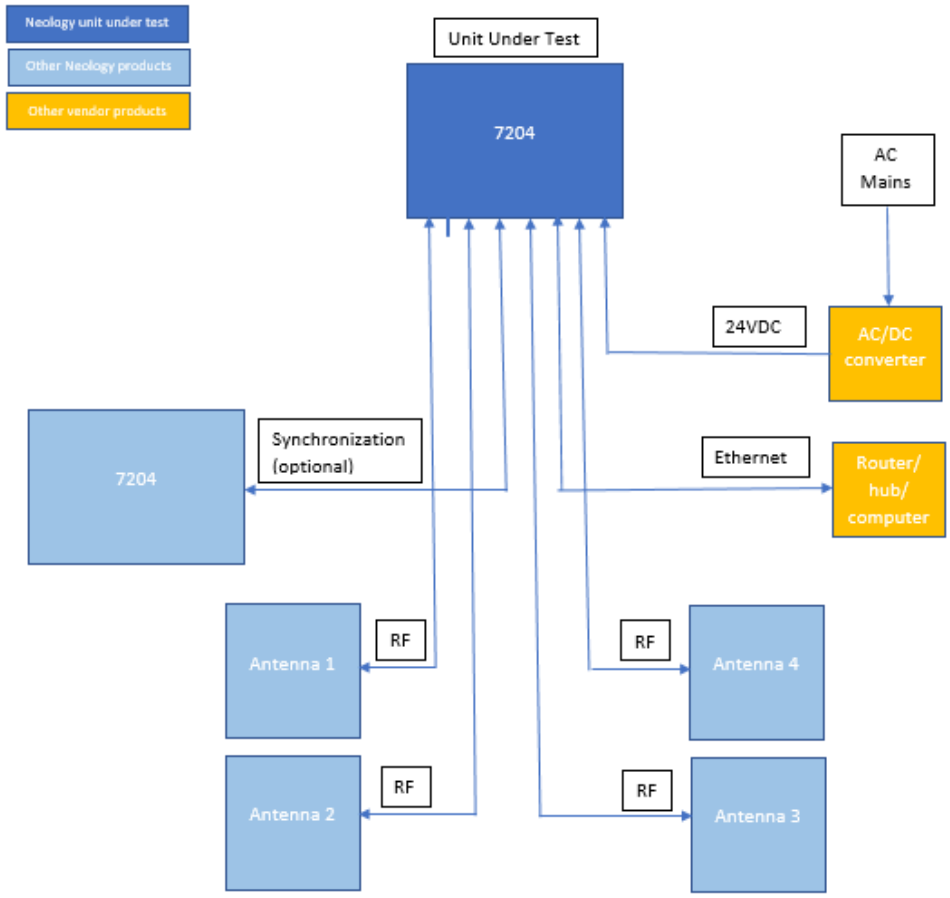

Figure 1. Block Diagram of Test Configuration

Mode of Operation

The product is a UHF Wireless radio which supports communications over eight different wireless protocols. Each protocol uses amplitude shift keying modulation but the data rates and encoding will vary by protocol. The device has two operational modes: STANDBY where RF transmission is disabled, and ACTIVE where RF transmissions are produced continuously. The product is designed for worldwide regulatory compliance. Under FCC it supports both unlicensed Part15.247 operation with frequency hopping, and licensed Part90.231 operation with fixed frequency.. Normal product operation is with ACTIVE mode. Specific antenna and protocol usage must be configured. Neology will provide appropriate instruction and utilities to ease transition between selections.

Method of Monitoring EUT Operation

The product has an external LED to indicate RF transmissions. If this LED is off, no RF transmissions are occurring. If this LED is on solid, then RF transmissions are occurring but there is not a 2 way communication with another device. If this LED is on and flickering off and on, then RF transmissions are occurring with an external device. In addition, the product will be supplied with a GUI application which can display status of RF activity.

Modifications

Modifications to EUT

No modifications were made to the EUT.

Modifications to Test Standard

No modifications were made to the test standard.

Disposition of EUT

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

Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility RF Power Output Requirements

RF Power Output

Test Requirement(s): **§90.205 Power and antenna height limits.**

(l) 902-928 MHz. LMS systems operating pursuant to subpart M of this part in the 902-927.25 MHz band will be authorized a maximum of 30 watts ERP. LMS equipment operating in the 927.25-928 MHz band will be authorized a maximum of 300 watts ERP. ERP must be measured as peak envelope power. Antenna heights will be as specified in §90.353(h).

Test Procedures: As required by 47 CFR 2.1046, *RF power output measurements* were made at the RF output terminals using a Spectrum Analyzer. Procedure 5.2.3.3 from ANSI C63.26-2015 was used to perform the measurements.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer via an attenuator to measure the Peak power. The EUT power was adjusted enough to produce maximum output power as specified in the owner's manual. Measurements were made at the low, mid and high channels.

Test Results: Not Tested, see WIR110053-FCC90M Rev. 3 for results.

Electromagnetic Compatibility Occupied Bandwidth Requirements

Occupied Bandwidth

Test Requirement(s): **§2.1049 and §90.209**

The 99% Occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1% to 5% of the occupied bandwidth (OBW). These measurements shall also be performed at normal test conditions.

The maximum authorized bandwidth shall be 12 MHz for non-multilateration LMS operations in the band 909.75-921.75 MHz and 2 MHz in the band 902.00-904.00 MHz. The maximum authorized bandwidth for multilateration LMS operations shall be 5.75 MHz in the 904.00-909.75 MHz band; 2 MHz in the 919.75-921.75 MHz band; 5.75 MHz in the 921.75-927.25 MHz band and its associated 927.25-927.50 MHz narrowband forward link; and 8.00 MHz if the 919.75-921.75 MHz and 921.75-927.25 MHz bands and their associated 927.25-927.50 MHz and 927.50-927.75 MHz narrowband forward links are aggregated.

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made at the RF output terminals using a Spectrum Analyzer. The procedures of ANSI C63.26 - 2015 Section 5.4.3 and 5.4.4 were used.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer via attenuator. The measured highest Average Power was set relative to zero dB reference. The RBW of the Spectrum Analyzer was set to at least 1% of the channel bandwidth. The EUT power was adjusted at the maximum output power level. Measurements were carried out at the low, mid and high channels of the TX band.

Test Results: Equipment is **compliant** with Section 2.1049 and 90.209

While the EUT does have 4 RF ports, they are controlled by a RF switch, and they never transmit at the same time. It was found that ‘Port 2’ exhibits the worst case/higher emissions. Data shown belongs to worst case output on ‘Port 2’

Test Engineer(s): Donald Salguero

Test Date(s): September 11, 2023

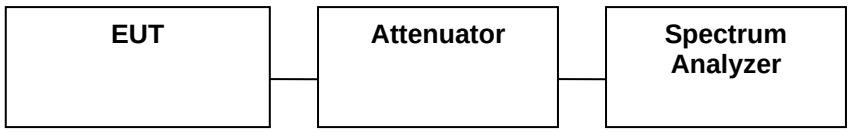

Figure 2. Occupied Bandwidth Test Setup

Protocol	Band	Center Frequency (MHz)	25dB Bandwidth (kHz)	99% Bandwidth (kHz)
ISOC	FCC Part90 Dense	911.25	161.89	157.6158
		915.75	161.883	157.682
		920.25	162.172	157.8306
	FCC Part90 Lowband	902.75	161.08	157.6258
		903.25	160.885	157.3462
ISOB	FCC Part90 Dense	911.25	124.398	123.8493
		915.75	124.338	123.3072
		920.25	124.277	123.9401
	FCC Part90 Lowband	902.75	123.833	122.6657
		903.25	117.779	123.4037
ISO10374	FCC Part90 Dense	911.25	1.738	4.2838
		915.75	1.724	4.9182
		920.25	1.696	5.7799
	FCC Part90 Lowband	902.75	1.729	3.5116
		903.25	1.689	3.147
Flex	FCC Part90 Dense	911.25	29.081	32.5656
		915.75	29.021	30.4151
		920.25	29.023	30.8619
T21	FCC Part90 Dense	911.75	725.421	782.4225
		915.75	726.51	785.5816
		919.25	724.741	781.9668
ISOB_80K	FCC Part90 Dense	912.25	503.589	541.5036
		915.75	503.21	542.0014
		919.75	503.09	541.4551
PS111	FCC Part90 Dense	914.25	513.02	497.976
		915.75	512.392	496.5895
ASTMV6	FCC Part90 Dense	914.25	3,415	2,586.50
		915.75	3,308	2,697.90

Table 4. OBW - Results

Transmit Spectrum Mask

Test Requirement(s): **§2.1049 and §90.210**

(k) Emission Mask K:
(3) Other transmitters. For all other transmitters authorized under subpart M that operate in the 902-928 MHz band, the peak power of any emission shall be attenuated below the power of the highest emission contained within the licensee's sub-band in accordance with the following schedule:

(i) On any frequency within the authorized bandwidth: Zero dB.

(ii) On any frequency outside the licensee's sub-band edges: 55 + 10 log(P) dB, where (P) is the highest emission (watts) of the transmitter inside the licensee's sub-band.

(4) In the 902-928 MHz band, the resolution bandwidth of the instrumentation used to measure the emission power shall be 100 kHz, except that, in regard to paragraph (2) of this section, a minimum spectrum analyzer resolution bandwidth of 300 Hz shall be used for measurement center frequencies with 1 MHz of the edge of the authorized subband. The video filter bandwidth shall not be less than the resolution bandwidth.

(5) Emission power shall be measured in peak values.

(6) The LMS sub-band edges for non-multilateration systems for which emissions must be attenuated are 902.00, 904.00, 909.5 and 921.75 MHz.

Test Procedures: RBW=100 kHz, VBW=3xRW were used to take transmit spectrum mask measurements.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer via attenuator. The measured highest Average Power was set relative to zero dB reference. The EUT power was adjusted at the maximum output power level. Measurements were carried out at the low, mid and high channels of the TX band.

Test Results: Equipment is **compliant** with Section 2.1049 and 90.210 The EUT does not exceed the Transmit Spectrum limit.

Test Engineer(s): Donald Salguero

Test Date(s): September 11, 2023

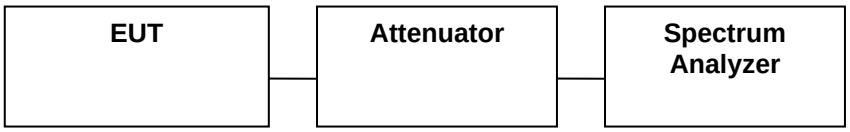

Figure 3. Transmit Spectrum Mask Test Setup

Protocol	Band	Center Frequency (MHz)	Band Edge Frequency (MHz)	Conducted Measurement (dBm)	Limit (dBm)	Margin (dB)
ISOC	FCC Part90 Dense	911.25	909.5	-41.75	-25	-16.75
		920.25	921.75	-39.35	-25	-14.35
	FCC Part90 Lowband	902.75	902	-34.99	-25	-9.99
		903.25	904	-32.82	-25	-7.82
ISOB	FCC Part90 Dense	911.25	909.5	-44.24	-25	-19.24
		920.25	921.75	-42.61	-25	-17.61
	FCC Part90 Lowband	902.75	902	-38.48	-25	-13.48
		903.25	904	-37.98	-25	-12.98
ISO10374	FCC Part90 Dense	911.25	909.5	-42.99	-25	-17.99
		920.25	921.75	-43.23	-25	-18.23
	FCC Part90 Lowband	902.75	902	-41.62	-25	-16.62
		903.25	904	-41.61	-25	-16.61
Flex	FCC Part90 Dense	911.25	909.5	-30.46	-25	-5.46
		920.25	921.75	-25.60	-25	-0.6
T21	FCC Part90 Dense	911.75	909.5	-35.57	-25	-10.57
		919.25	921.75	-32.93	-25	-7.93
ISOB_80K	FCC Part90 Dense	912.25	909.5	-29.04	-25	-4.04
		919.75	921.75	-28.34	-25	-3.34
PS111	FCC Part90 Dense	914.25	909.5	-33.01	-25	-8.01
		915.75	921.75	-42.31	-25	-17.31
ASTMV6	FCC Part90 Dense	914.25	909.5	-25.04	-25	-0.04
		915.75	921.75	-38.13	-25	-13.13

Table 5. Transmit Spectrum Mask – Results

Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

Spurious Emissions at Antenna Terminals

Test Requirement(s): **§2.1051 and §90.210**

(k) Emission Mask K:
(3) Other transmitters. For all other transmitters authorized under subpart M that operate in the 902-928 MHz band, the peak power of any emission shall be attenuated below the power of the highest emission contained within the licensee's sub-band in accordance with the following schedule:

(i) On any frequency within the authorized bandwidth: Zero dB.

(ii) On any frequency outside the licensee's sub-band edges: 55 + 10 log(P) dB, where (P) is the highest emission (watts) of the transmitter inside the licensee's sub-band.

(4) In the 902-928 MHz band, the resolution bandwidth of the instrumentation used to measure the emission power shall be 100 kHz, except that, in regard to paragraph (2) of this section, a minimum spectrum analyzer resolution bandwidth of 300 Hz shall be used for measurement center frequencies with 1 MHz of the edge of the authorized subband. The video filter bandwidth shall not be less than the resolution bandwidth.

(5) Emission power shall be measured in peak values.

Test Procedures: As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a Spectrum Analyzer. Test procedures from ANSI C63.26-2015, clause 5.7 were used.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer and a Power Meter to monitor the output power level. The Spectrum Analyzer was set to sweep 30 MHz and up to 10th harmonic of the fundamental or 40GHz whichever is the lesser. Measurements were made at the low, mid and high channels.

Test Results: Not Tested, see WIR110053-FCC90M Rev. 3 for results.

Electromagnetic Compatibility Radiated Emissions Requirements

Radiated Emissions

Test Requirement(s): **§2.1053 and §90.210**

(k) Emission Mask K:
(3) Other transmitters. For all other transmitters authorized under subpart M that operate in the 902-928 MHz band, the peak power of any emission shall be attenuated below the power of the highest emission contained within the licensee's sub-band in accordance with the following schedule:

(i) On any frequency within the authorized bandwidth: Zero dB.

(ii) On any frequency outside the licensee's sub-band edges: 55 + 10 log(P) dB, where (P) is the highest emission (watts) of the transmitter inside the licensee's sub-band.

(4) In the 902-928 MHz band, the resolution bandwidth of the instrumentation used to measure the emission power shall be 100 kHz, except that, in regard to paragraph (2) of this section, a minimum spectrum analyzer resolution bandwidth of 300 Hz shall be used for measurement center frequencies with 1 MHz of the edge of the authorized subband. The video filter bandwidth shall not be less than the resolution bandwidth.

(5) Emission power shall be measured in peak values.

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of ANSI C63.26-2015

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber. The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360^0 and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10^{th} or 40GHz, which ever was the lesser, were investigated.

Test Results: Not Tested, see WIR110053-FCC90M Rev. 3 for results.

Electromagnetic Compatibility Frequency Stability Requirements

Frequency Stability

Test Requirement(s): **§2.1055 and §90.213**

The EUT must be tested within the -30 to +50º C range. Voltage variation will be set to +,-15%, ±2.5 PPM

Test Procedures: As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Directional Coupler through a Spectrum Analyzer and Power Meter. Test procedures followed ANSI C63.26 - 2015 clauses 5.6.4 and 5.6.5.

The EUT was placed in the Environmental Chamber and support equipments are outside the chamber on a table. The EUT was set to transmit a CW signal corresponding to the low, mid and high Channels for 10MHz Bandwidth. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations. The frequency drift was investigated for every 10° C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50^{C}.

Voltage supplied to EUT is 120 VAC reference temperature was done at 20 ^{C}. The voltage was varied by ± 15 % of nominal.

Test Results: Not Tested, see WIR110053-FCC90M Rev. 3 for results.

RF Exposure Requirements

RF Exposure Requirements: **§1.1307(b)(1):** Requirements.

(i) With respect to the limits on human exposure to RF provided in § 1.1310 of this chapter, applicants to the Commission for the grant or modification of construction permits, licenses or renewals thereof, temporary authorities, equipment authorizations, or any other authorizations for radiofrequency sources must either:

(A) Determine that they qualify for an exemption pursuant to §1.1307(b)(3);

(B) Prepare an evaluation of the human exposure to RF radiation pursuant to §1.1310 and include in the application a statement confirming compliance with the limits in § 1.1310; or

(C) Prepare an Environmental Assessment if those RF sources would cause human exposure to levels of RF radiation in excess of the limits in §1.1310.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Result: Not Tested, see WIR110053-FCC90M Rev. 3 for 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 Number	Serial Number	Calibration Date	Calibration Due Date
1T8744	Spectrum Analyzer (PSA)	Agilent Technologies	E4440A	US40420612	5/2/2023	5/2/2024

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

Certification & User's Manual Information

Certification Label & User's Manual Information

Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Marketing, as used in this section, includes sale or lease, or offering for sale or lease, including advertising for sale or lease, or importation, shipment, or distribution for the purpose of selling or leasing or offering for sale or lease.

(b) General rule. No person may market a radio frequency device unless:

(1) For devices subject to authorization under certification, the device has been authorized in accordance with the rules in subpart J of this chapter and is properly identified and labeled as required by § 2.925 and other relevant sections in this chapter; or

(2) For devices subject to authorization under Supplier's Declaration of Conformity in accordance with the rules in subpart J of this part, the device complies with all applicable technical, labeling, identification and administrative requirements; or

(3) For devices that do not require a grant of equipment authorization under subpart J of this chapter but must comply with the specified technical standards prior to use, the device complies with all applicable, technical, labeling, identification and administrative requirements.

(c) Exceptions. The following marketing activities are permitted prior to equipment authorization:

(1) Activities conducted under market trials pursuant to subpart H of part 5 of this chapter or in accordance with a Spectrum Horizons experimental radio license issued pursuant to subpart I of part 5.

(2) Limited marketing is permitted, as described in the following text, for devices that could be authorized under the current rules; could be authorized under waivers of such rules that are in effect at the time of marketing; or could be authorized under rules that have been adopted by the Commission but that have not yet become effective. These devices may not be operated unless permitted by § 2.805.

(i) Conditional sales contracts (including agreements to produce new devices manufactured in accordance with designated specifications), and advertisements for such sales, are permitted under the following conditions:

(A) The initiating party must provide to the prospective buyer at the time of marketing, through a prominent disclosure:

(1) Notification that the equipment is subject to the FCC rules and delivery to the end user is conditional upon successful completion of the applicable equipment authorization process;

(2) Notification that FCC rules do not address the applicability of consumer protection, contractual, or other provisions under federal or state law; and

(3) Notification of any responsibility of the initiating party to the buyer in the event that the applicable equipment authorization process is not successfully completed, including information regarding any applicable refund policy.

(B) For devices subject to Supplier Declaration of Conformity procedures under subpart J of this chapter, physical transfer of equipment from the initiating party to other entities, including delivery to the end user, prior to successful completion of the equipment authorization process is prohibited.

(C) For devices subject to Certification procedures under subpart J of this chapter, delivery to the end user prior to successful completion of the equipment authorization process is prohibited; transfer of physical possession of devices to other entities for the sole purpose of pre-sale activity is permitted only after compliance testing by an FCC-recognized accredited testing laboratory is completed and an application for Certification is submitted to an FCC-recognized Telecommunication Certification Body pursuant to § 2.911. Pre-sale activity includes packaging and transferring physical possession of devices to distribution centers and retailers. Pre-sale activity does not include display or demonstration of devices.

(1) Each device, or its packaging, physically transferred for the purpose of pre-sale activity must prominently display a visible temporary removable label stating: “This device cannot be delivered to end users, displayed, or operated until the device receives certification from the FCC. Under penalty of law, this label must not be removed prior to receiving an FCC certification grant.”

(2) The first party to initiate a conditional sales contract under paragraph (c)(2)(i) of this section or to physically transfer devices must have processes in place to retrieve the equipment in the event that the equipment is not successfully certified and must complete such retrieval immediately after a determination is made that the equipment certification cannot be successfully completed.

(D) Notwithstanding § 2.926, radiofrequency devices marketed pursuant to paragraph (c)(2)(i) of this section may include the expected FCC ID if obscured by the temporary label described in paragraph (c)(2)(i)(C)(1) of this section or, in the case of electronic labeling, if the expected FCC ID cannot be viewed prior to authorization.

(E) All radiofrequency devices marketed under paragraph (c)(2)(i) of this section must remain under legal ownership of the first party to initiate a conditional sales contract.

(F) The first party to initiate a conditional sales contract or any party that physically transfers devices under paragraph (c)(2)(i) of this section must maintain, for a period of sixty (60) months, records of each conditional sale contract. Such records must identify the device name and product identifier, the quantity conditionally sold, the date on which the device authorization was sought, the expected FCC ID number, and the identity of the conditional buyer, including contact information. The first party to initiate a conditional sales contract or any party that physically transfers devices under paragraph (c)(2)(i) of this section must provide these records upon the request of Commission personnel.

(ii) [Reserved]

(iii)

(A) A radio frequency device may be advertised or displayed, (e.g., at a trade show or exhibition) if accompanied by a conspicuous notice containing this language:

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased, until authorization is obtained.

(B) If the device being displayed is a prototype of a device that has been properly authorized and the prototype, itself, is not authorized due to differences between the prototype and the authorized device, this language may be used instead: Prototype. Not for Sale.

(iv) An evaluation kit as defined in § 2.1 may be sold provided that:

(A) Sales are limited to product developers, software developers, and system integrators;

(B) The following notice is included with the kit:

FCC NOTICE: This kit is designed to allow:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and

(2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

(C) The kit is labeled with the following legend: For evaluation only; not FCC approved for resale; and

(D) Any radiofrequency transmitter employed as part of an evaluation kit shall be designed to comply with all applicable FCC technical rules, including frequency use, spurious and out-of-band emission limits, and maximum power or field strength ratings applicable to final products that would employ the components or circuitry to be evaluated.

(d) Importation. The provisions of subpart K of this part continue to apply to imported radio frequency devices.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards and other requirements for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated. In addition to the technical standards provided, the rules governing the service may require that such equipment be authorized under Supplier's Declaration of Conformity or receive a grant of certification from a Telecommunication Certification Body.

(b) Sections 2.906 through 2.1077 describe the procedure for a Supplier's Declaration of Conformity and the procedures to be followed in obtaining certification and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization approved by the Commission or issued by a Telecommunication Certification Body (TCB) and authorized under the authority of the Commission, based on representations and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see § 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to § 2.1043.

(b) [Reserved]

(c) Any equipment otherwise eligible for authorization pursuant to the Supplier's Declaration of Conformity, or exempt from equipment authorization, produced by any entity identified on the Covered List, established pursuant to § 1.50002 of this chapter, as producing covered communications equipment must obtain equipment authorization through the certification process.

§ 2.948 Description of measurement facilities.

(a) Equipment authorized under the certification procedure shall be tested at a laboratory that is accredited in accordance with paragraph (e) of this section.

(b) A laboratory that makes measurements of equipment subject to an equipment authorization under the certification procedure or Supplier's Declaration of Conformity shall compile a description of the measurement facilities employed.

(1) The description of the measurement facilities shall contain the following information:

(i) Location of the test site.

(ii) Physical description of the test site accompanied by photographs that clearly show the details of the test site.

(iii) A drawing showing the dimensions of the site, physical layout of all supporting structures, and all structures within 5 times the distance between the measuring antenna and the device being measured.

(iv) Description of structures used to support the device being measured and the test instrumentation.

(v) List of measuring equipment used.

(vi) Information concerning the calibration of the measuring equipment, i.e., the date the equipment was last calibrated and how often the equipment is calibrated.

(vii) For a measurement facility that will be used for testing radiated emissions, a plot of site attenuation data taken pursuant to paragraph (d) of this section.

(2) The description of the measurement facilities shall be provided to a laboratory accreditation body upon request.

(3) The description of the measurement facilities shall be retained by the party responsible for authorization of the equipment and provided to the Commission upon request.

(i) The party responsible for authorization of the equipment may rely upon the description of the measurement facilities retained by an independent laboratory that performed the tests. In this situation, the party responsible for authorization of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) No specific site calibration data is required for equipment that is authorized for compliance based on measurements performed at the installation site of the equipment. The description of the measurement facilities may be retained at the site at which the measurements were performed.

(e) A laboratory that has been accredited with a scope covering the measurements required for the types of equipment that it will test shall be deemed competent to test and submit test data for equipment subject to certification. Such a laboratory shall be accredited by a Commission recognized accreditation organization based on the International Organization for Standardization/International Electrotechnical Commission International Standard ISO/IEC 17025, (incorporated by reference, see § 2.910). The organization accrediting the laboratory must be recognized by the Commission's Office of Engineering and Technology, as indicated in § 0.241 of this chapter, to perform such accreditation based on International Standard ISO/IEC 17011 (incorporated by reference, see § 2.910). The frequency for reassessment of the test facility and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization, but shall occur on an interval not to exceed two years.

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or Supplier's Declaration of Conformity shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:

"This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference."

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

"This device complies with part 15 of the FCC Rules for use with cable television service."

(3) All other devices shall bear the following statement in a conspicuous location on the device:

"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

(b)–(c) [Reserved]

(d) Consumer electronics TV receiving devices, including TV receivers, videocassette recorders, and similar devices, that incorporate features intended to be used with cable television service, but do not fully comply with the technical standards for cable ready equipment set forth in § 15.118, shall not be marketed with terminology that describes the device as "cable ready" or "cable compatible," or that otherwise conveys the impression that the device is fully compatible with cable service. Factual statements about the various features of a device that are intended for use with cable service or the quality of such features are acceptable so long as such statements do not imply that the device is fully compatible with cable service. Statements relating to product features are generally acceptable where they are limited to one or more specific features of a device, rather than the device as a whole. This requirement applies to consumer TV receivers, videocassette recorders and similar devices manufactured or imported for sale in this country on or after October 31, 1994.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

End of Report

