

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

May 21, 2019

Openpath Security, Inc.
5840 Green Valley Cir,
Culver City, CA 90230

Dear Sam Goldstein,

Enclosed is the EMC Wireless test report for compliance testing of the Openpath Security, Inc., Smart Reader LF 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 MET Labs, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
EUROFINS MET LABS, INC.



Joel Huna
Technical Writer

Reference: (\Openpath Security, Inc.\EMCS101883-FCC15C Rev. 4)

Certificates and reports shall not be reproduced except in full, without the written permission of Eurofins MET Labs, Inc. While use of the A2LA logo in this report reflects MET accreditation under these programs, the report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the Federal Government. This letter of transmittal is not a part of the attached report.



Electromagnetic Compatibility Criteria Test Report

for the

**Openpath Security, Inc.
Smart Reader LF**

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

MET Report: EMCS101883-FCC15C Rev. 4

May 21, 2019

Prepared For:

**Openpath Security, Inc.
5840 Green Valley Cir,
Culver City, CA 90230**

Prepared By:
Eurofins MET Labs, Inc.
3162 Belick St,
Santa Clara, CA 95054

Electromagnetic Compatibility Criteria Test Report

for the

Openpath Security, Inc.
Smart Reader LF

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



James Borrott, Project Engineer
Electromagnetic Compatibility Lab



Joel Huna
Technical Writer

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 the FCC Rules Part 15C under normal use and maintenance.



Clifford Clarke,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	April 4, 2019	Initial Issue.
1	April 8, 2019	Editorial corrections.
2	April 23, 2019	Editorial corrections.
3	May 17, 2019	TCB Corrections.
4	May 21, 2019	TCB Corrections.

Table of Contents

I.	Executive Summary	1
A.	Purpose of Test	2
B.	Executive Summary	2
II.	Equipment Configuration	3
A.	Overview.....	4
B.	References.....	5
C.	Test Site	5
D.	Measurement Uncertainty	5
E.	Description of Test Sample.....	6
F.	Equipment Configuration.....	7
G.	Support Equipment	7
H.	Ports and Cabling Information.....	7
I.	Mode of Operation.....	8
J.	Method of Monitoring EUT Operation.....	8
K.	Modifications	8
a)	Modifications to EUT	8
b)	Modifications to Test Standard.....	8
L.	Disposition of EUT	8
III.	Electromagnetic Compatibility Criteria for Intentional Radiators.....	9
	§ 15.203 Antenna Requirement.....	10
	§ 15.207(a) Conducted Emissions Limits.....	11
	§ 2.1049 Occupied Bandwidth	14
	§ 15.209(d) Radiated Spurious Emissions Requirements and Band Edge	15
IV.	Test Equipment	22
V.	Certification & User's Manual Information.....	24
A.	Certification Information	25
B.	Label and User's Manual Information	29

List of Tables

Table 1. Executive Summary of EMC Part C Compliance Testing	2
Table 2. EUT Summary Table.....	4
Table 3. References	5
Table 4. Uncertainty Calculations Summary.....	5
Table 5. Equipment Configuration.....	7
Table 6. Support Equipment.....	7
Table 7. Ports and Cabling Information	7
Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)	11
Table 9. Conducted Emissions, Line, Test Results	12
Table 10. Conducted Emissions, Neutral, Test Results.....	13
Table 11. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)	15
Table 12. Radiated Spurious Emissions, 9kHz – 30 MHz,Test Results	19
Table 13. Radiated Spurious Emissions, 30-1000MHz ,Test Results	19
Table 14. Field Strength of Fundamental	19
Table 15. Test Equipment List	23

List of Plots

Plot 1. Conducted Emissions, Line.....	12
Plot 2. Conducted Emissions, Neutral	13
Plot 3. 20dB and 99% Bandwidth	14
Plot 4. Radiated Emissions, 9 kHz – 150 kHz, 0 degrees	16
Plot 5. Radiated Emissions, 9 kHz – 150 kHz, 90 degrees.....	16
Plot 6. Radiated Emissions, 150 – 490 kHz, 0 degrees	16
Plot 7. Radiated Emissions, 150 – 490 kHz, 90 degrees	17
Plot 8. Radiated Emissions, 490 kHz – 1.705 MHz, 0 degrees	17
Plot 9. Radiated Emissions, 490 kHz – 1.705 MHz, 90 degrees	17
Plot 10. Radiated Emissions, 1.705 – 30 MHz, 0 degrees.....	18
Plot 11. Radiated Emissions, 1.705 – 30 MHz, 90 degrees.....	18
Plot 12. Radiated Emissions, 30 - 1000 MHz.....	18

List of Figures

Figure 1. Block Diagram of Test Configuration.....	6
--	---

List of Photographs

Photograph 1. Radiated Emissions, 9kHz-150kHz Setup.....	20
Photograph 2. Radiated Emissions, 150kHz-30MHz Setup	20
Photograph 3. Radiated Emissions, 30 – 1000 MHz, Setup	21

List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB_μA	Decibels above one microamp
dB_μV	Decibels above one microvolt
dB_μA/m	Decibels above one microamp per meter
dB_μV/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μH	microhenry
μ	microfarad
μs	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane



MET Labs

Openpath Security, Inc.
Smart Reader LF

Electromagnetic Compatibility
Executive Summary
CFR Title 47, Part 15C

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Openpath Security, Inc. Smart Reader LF, with the requirements of Part 15, §15.209. 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 Smart Reader LF. Openpath Security, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Smart Reader LF, 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, §15.209, in accordance with Openpath Security, Inc., purchase order number PO-2004.

FCC Reference 47 CFR Part 15C	Description	Compliance
§15.203	Antenna Requirement	Compliant
§15.207	Conducted Emission Limits	Complaint.
§15.215	20dB Occupied Bandwidth	Compliant
§15.209	Radiated Emissions Limits; General Requirements	Compliant

Table 1. Executive Summary of EMC Part C Compliance Testing

II. Equipment Configuration

A. Overview

Eurofins MET Labs, Inc. was contracted by Openpath Security, Inc. to perform testing on the Smart Reader LF, under Openpath Security, Inc.'s purchase order number PO-2004.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Openpath Security, Inc., Smart Reader LF.

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

Model(s) Tested:	Smart Reader LF
Model(s) Covered:	Smart Reader LF
EUT Specifications:	Primary Power: 12 VDC
	FCC ID: 2APJVOPRLF
	Type of Modulations: ASK
	Equipment Code: DCD
	Peak Field Strength: 2.79 dBuV/m @ 300m
	EUT Frequency Ranges: 125kHz
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:	James Borrott
Report Date(s):	May 21, 2019

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

Table 3. References

C. Test Site

All testing was performed at Eurofins MET Labs, Inc., 3162 Belick St, Santa Clara, CA 95054. 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 MET Laboratories.

D. 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 4. Uncertainty Calculations Summary

E. Description of Test Sample

The Openpath Security, Inc. Smart Reader LF, Equipment Under Test (EUT), is a contactless smart card and mobile-enabled access control reader. It is an RFID card reader, BLE beacon and interface for BLE-enabled smartphones, and a touch sensor in order to allow entry to the secure location. It communicates over RS-485 to the Openpath Smart Hub in order to authenticate users, and receives 12V power from the Smart Hub. It is intended to be used by anyone that accesses the secured location's entrance/exit.

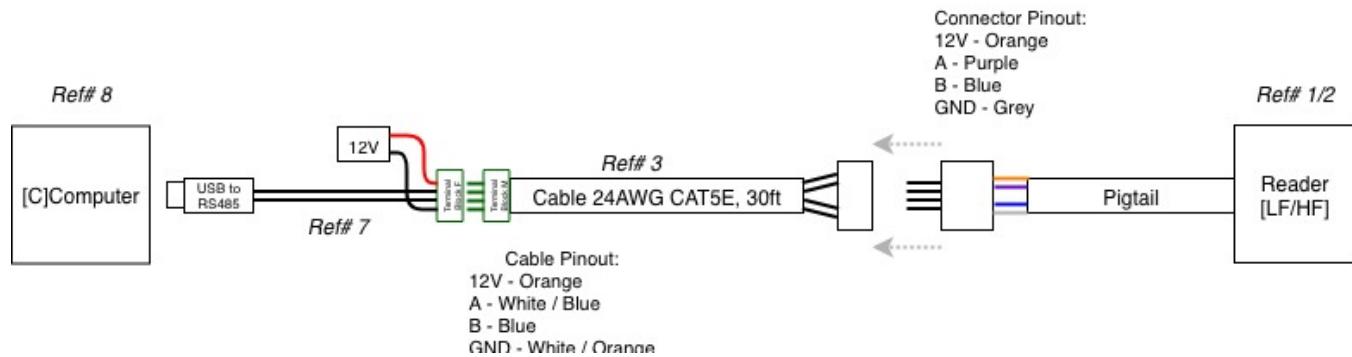


Figure 1. Block Diagram of Test Configuration

F. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Slot #	Name / Description	Model Number	Part Number (White / Light Almond)	Serial Number
2		Mullion Smart Reader LF		OP-ASSY-RDRL-002	ENG 5 -LF

Table 5. Equipment Configuration

G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number
8	Computer		
	Prox Card (LF)		
	Phone		

Table 6. Support Equipment

H. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)
8	Computer				8	Computer
	Prox Card (LF)					Prox Card (LF)
	Phone					Phone

Table 7. Ports and Cabling Information

I. Mode of Operation

The Openpath Smart Reader can be tested in either production mode or test mode depending on which unit is tested.

The production mode unit will need to be wired to the Openpath Smart Hub in order to operate normally. It will allow the operator to scan RFID cards: one Reader will be configured to read 13.56MHz cards and another will be configured to read 125kHz cards. The Readers will also broadcast a BLE beacon and attempt to pair with nearby smartphones running Openpath software.

The test mode Smart Reader will have a test suite giving the operator full control of the BLE radios through a serial interface. The test mode will allow the operator to configure the two BLE radios independently to: fixed channels at maximum duty cycle, power control, and turn them on or off.

J. Method of Monitoring EUT Operation

The Openpath Smart Reader can be tested in either production mode or test mode depending on which unit is tested.

The production mode unit will need to be wired to the Openpath Smart Hub in order to operate normally. It will allow the operator to scan RFID cards: one Reader will be configured to read 13.56MHz cards and another will be configured to read 125kHz cards. The Readers will also broadcast a BLE beacon and attempt to pair with nearby smartphones running Openpath software.

The test mode Smart Reader will have a test suite giving the operator full control of the BLE radios through a serial interface. The test mode will allow the operator to configure the two BLE radios independently to: fixed channels at maximum duty cycle, power control, and turn them on or off.

K. 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.

L. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Intentional Radiators

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.

Results:

The EUT as tested is compliant the criteria of §15.203. The antenna is installed inside the device and is not removable.

Test Engineer(s): James Borrott

Test Date(s): March 26, 2019

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 μ H/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 (dB μ V)	
	Quasi-Peak	Average
* 0.15- 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure:

The EUT was placed on a 0.8 m-high non-conductive 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 μ H 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 C63.4-2014 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω /50 μ H LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results:

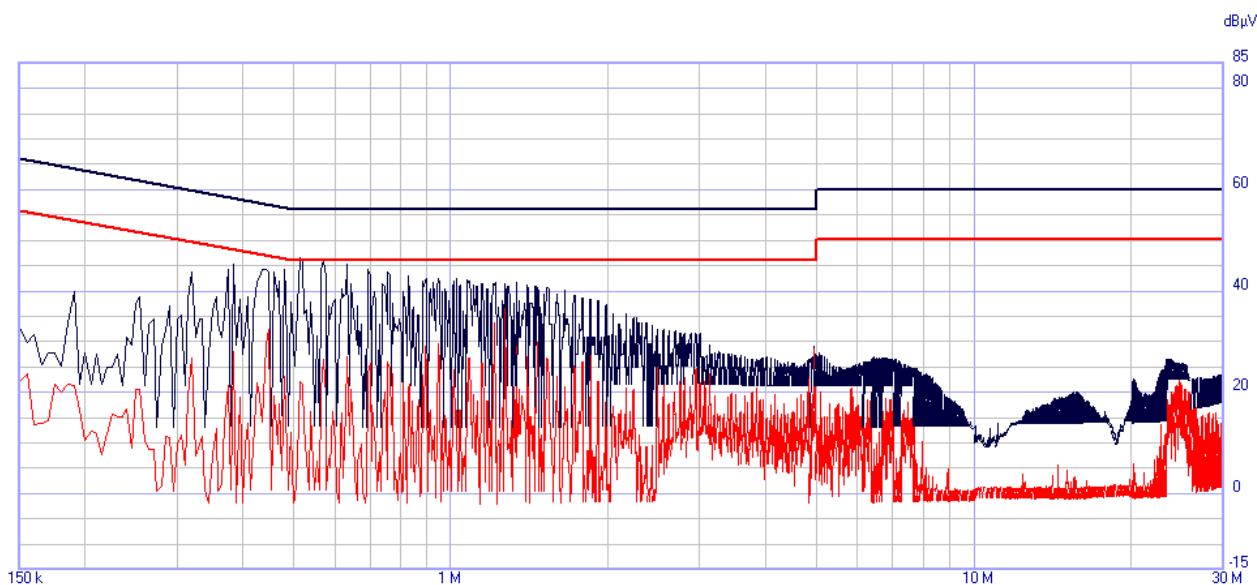
The EUT as tested is compliant with the requirements of this section. Measured emissions were within applicable limits.

Test Engineer:

James Borrott

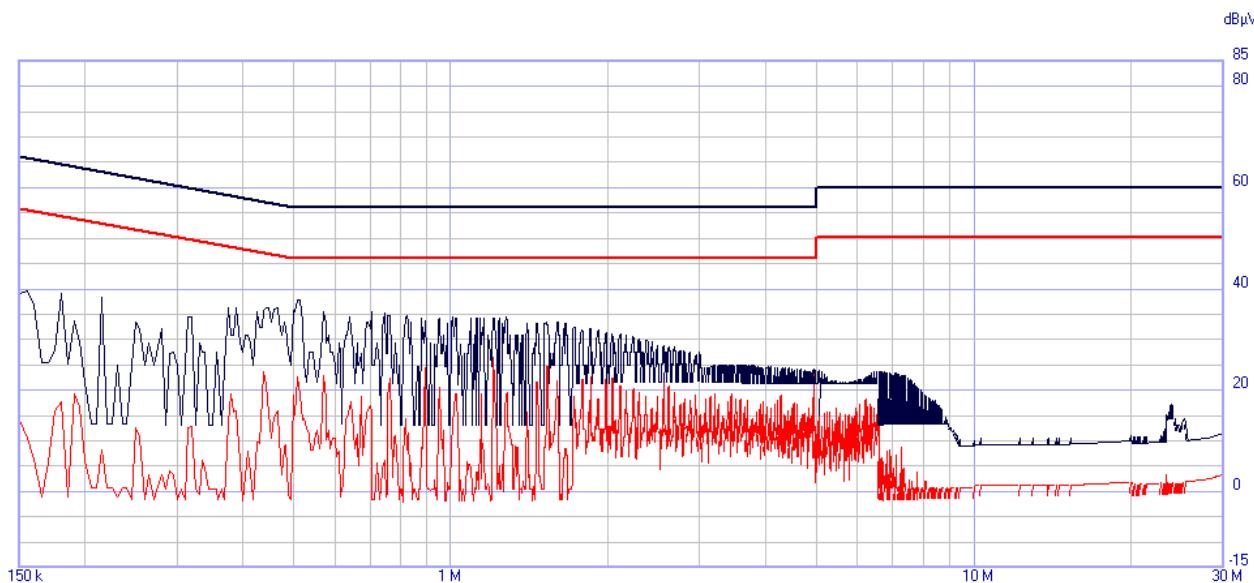
Test Date:

May 9, 2019


Plot 1. Conducted Emissions, Line

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass	Notes
Line	.515	50.52	56	-5.48	Pass	33.68	46	-12.32	Pass	
Line	.57	50.41	56	-5.59	Pass	32.75	46	-13.25	Pass	
Line	.635	50.34	56	-5.66	Pass	33.81	46	-12.19	Pass	
Line	.48	50.38	56.349	-5.969	Pass	31.64	46.349	-14.709	Pass	
Line	.385	50.14	58.192	-8.052	Pass	32.65	48.192	-15.542	Pass	
Line	.375	50.14	58.41	-8.27	Pass	31.89	48.41	-16.52	Pass	

Table 9. Conducted Emissions, Line, Test Results


Plot 2. Conducted Emissions, Neutral

Line	Freq (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass	Notes
Neutral	.515	38.98	56	-17.02	Pass	30.79	46	-15.21	Pass	
Neutral	.445	38.72	56.993	-18.273	Pass	30.62	46.993	-16.373	Pass	
Neutral	.39	38.71	58.085	-19.375	Pass	30.61	48.085	-17.475	Pass	
Neutral	.215	38.87	63.018	-24.148	Pass	30.77	53.018	-22.248	Pass	
Neutral	.18	39.07	64.49	-25.42	Pass	30.97	54.49	-23.52	Pass	
Neutral	.155	39.22	65.728	-26.508	Pass	31.12	55.728	-24.608	Pass	

Table 10. Conducted Emissions, Neutral, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.215 Occupied Bandwidth

Test Requirement(s): Occupied Bandwidth of the Device must be measured and recorded for reporting purposes.

Test Procedures: The EUT was tested according to relative measurement procedure of ANSI C63.10 -2013. The OBW measurement function of the spectrum analyzer was used. Measurement was performed radiated in a semi anechoic chamber.

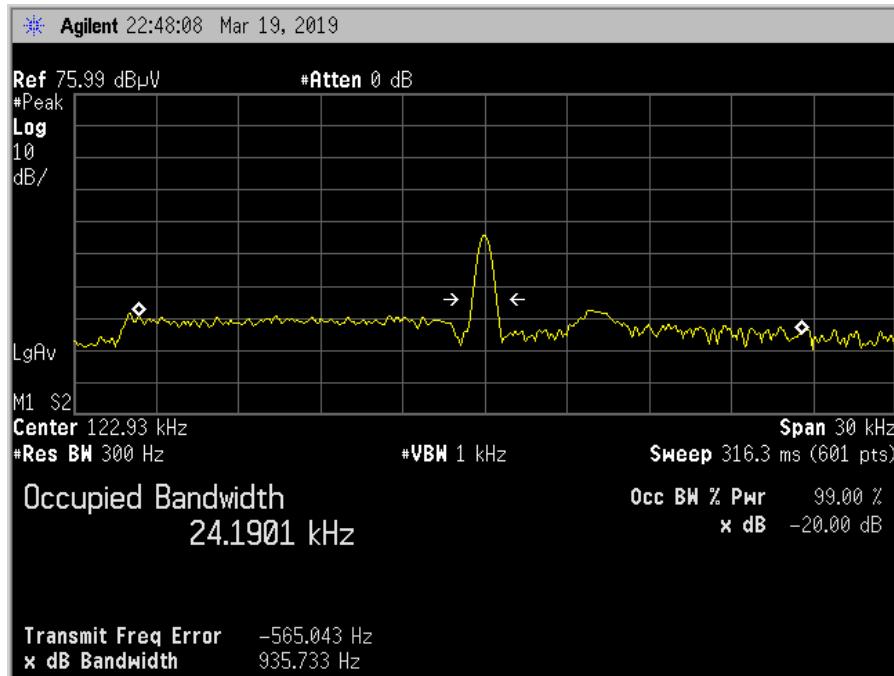
Test Results The 20dB and 99% BW of the EUT was measured and reported.

The Occupied Bandwidth was determined from the plot on the following pages.

Test Engineer(s): James Borrott

Test Date(s): March 26, 2019

Occupied Bandwidth Test Results



Plot 3. 20dB and 99% Bandwidth

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 (a) Radiated emission limits; general requirements.

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 11.

Frequency (MHz)	§ 15.209(a), Radiated Emission Limits ($\mu\text{V/m}$)	Measurement Distance (Meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Table 11. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedures:

The transmitter was turned on. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to the appropriate limit line. All plots are prescans using a peak detector, plots shown are worse case. Any frequencies of interested were investigated using the appropriate detector1 and distance correction factor and reported in Tables 10, 11, and 12.

Measurements were made at a distance of 3m. If necessary, results were corrected to the appropriate distance, either 30m or 300m using the correction factor of $40\log(x/3m)$ where x is the distance to be measured at in meters.

Frequencies of interest were investigated using a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz, which used an Average detector.

Test Results:

The EUT was compliant with the Radiated Spurious Emission limits of § 15.209(a).

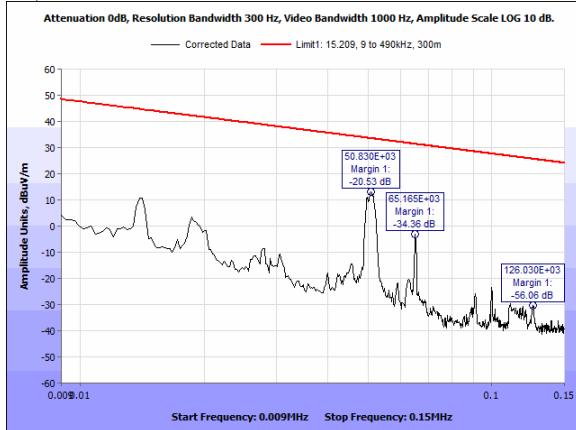
Test Engineer(s):

James Borrott

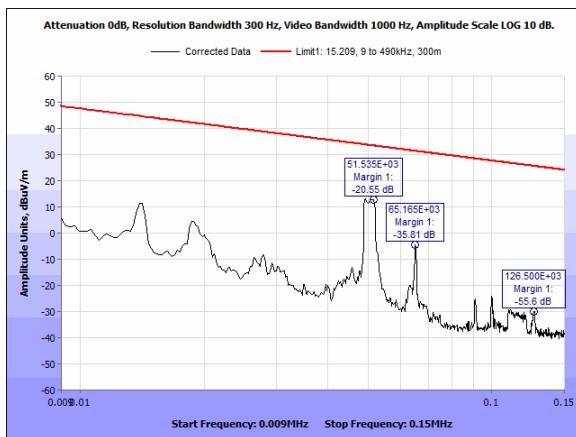
Test Date(s):

March 26, 2019

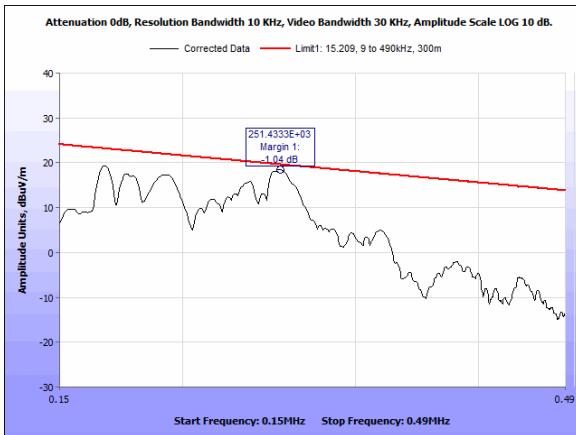
Radiated Spurious Emissions, Test Results



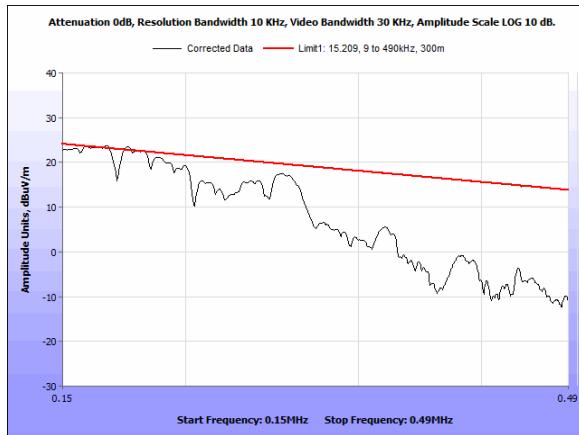
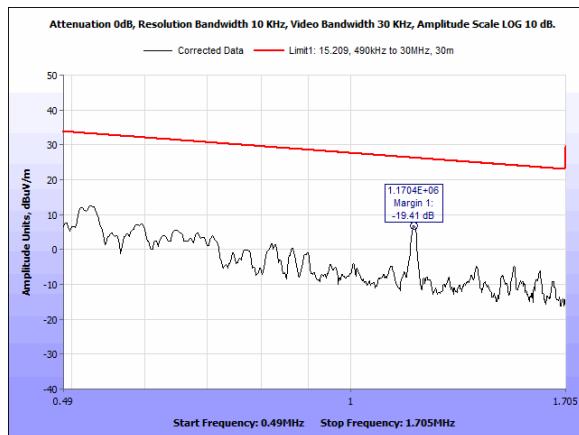
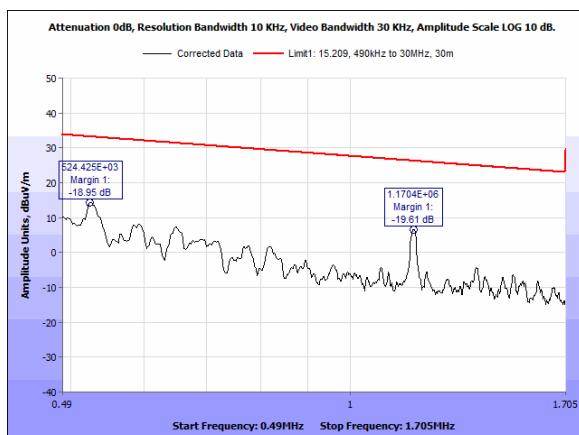
Plot 4. Radiated Emissions, 9 kHz – 150 kHz, 0 degrees

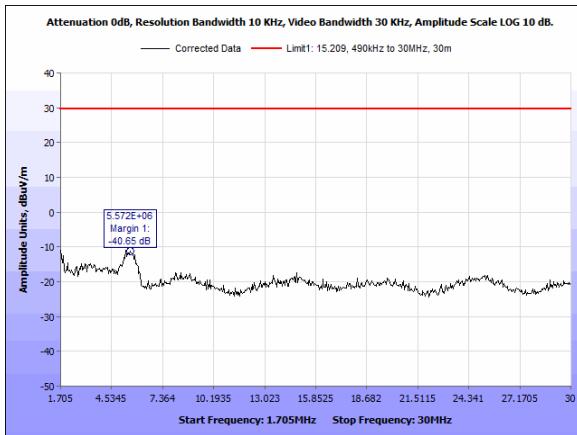
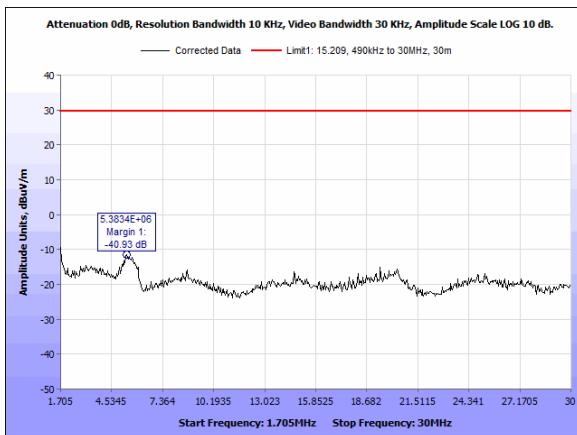
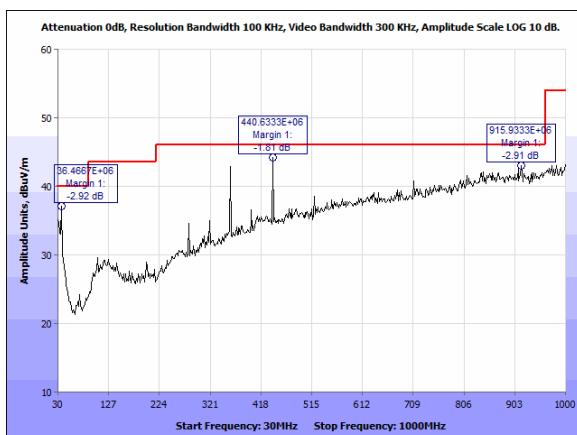


Plot 5. Radiated Emissions, 9 kHz – 150 kHz, 90 degrees



Plot 6. Radiated Emissions, 150 – 490 kHz, 0 degrees


Plot 7. Radiated Emissions, 150 – 490 kHz, 90 degrees

Plot 8. Radiated Emissions, 490 kHz – 1.705 MHz, 0 degrees

Plot 9. Radiated Emissions, 490 kHz – 1.705 MHz, 90 degrees


Plot 10. Radiated Emissions, 1.705 – 30 MHz, 0 degrees

Plot 11. Radiated Emissions, 1.705 – 30 MHz, 90 degrees

Plot 12. Radiated Emissions, 30 - 1000 MHz

Radiated Emissions, 9kHz – 30MHz, Test Results

Freq (MHz)	Polarization (Degrees)	Amplitude (dBuV/m)	Limit (dBuV/m)	Delta
0.25264	0	12.63	19.55	-6.92
0.19083	0	15.86	21.99	-6.13
0.1629	0	10.33	23.37	-13.04
0.1701	90	13.22	22.99	-9.77
0.1654	90	13.57	23.23	-9.66
0.16112	90	13.18	23.46	-10.28
0.2531	90	12.61	19.54	-6.93
0.12292	0	2.79	25.81	-23.02
0.1229	90	-30.25	25.81	-56.28

Table 12. Radiated Spurious Emissions, 9kHz – 30 MHz, Test Results

Radiated Emissions, 30MHz-1000MHz, Test Results

Freq (MHz)	Polarization	Azimuth (deg)	Amplitude (dBuV/m)	Limit (dBuV/m)	Delta
440.0006	Vertical	0	43.56	46	-2.44

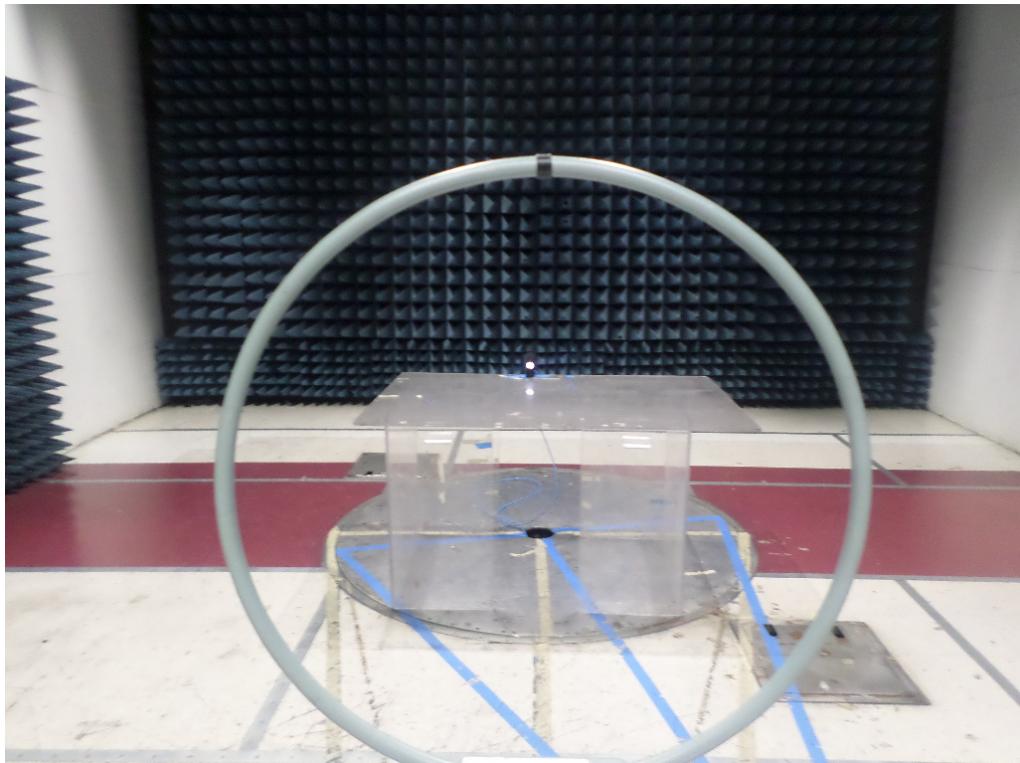
Table 13. Radiated Spurious Emissions, 30-1000MHz ,Test Results

Field Strength of Fundamental

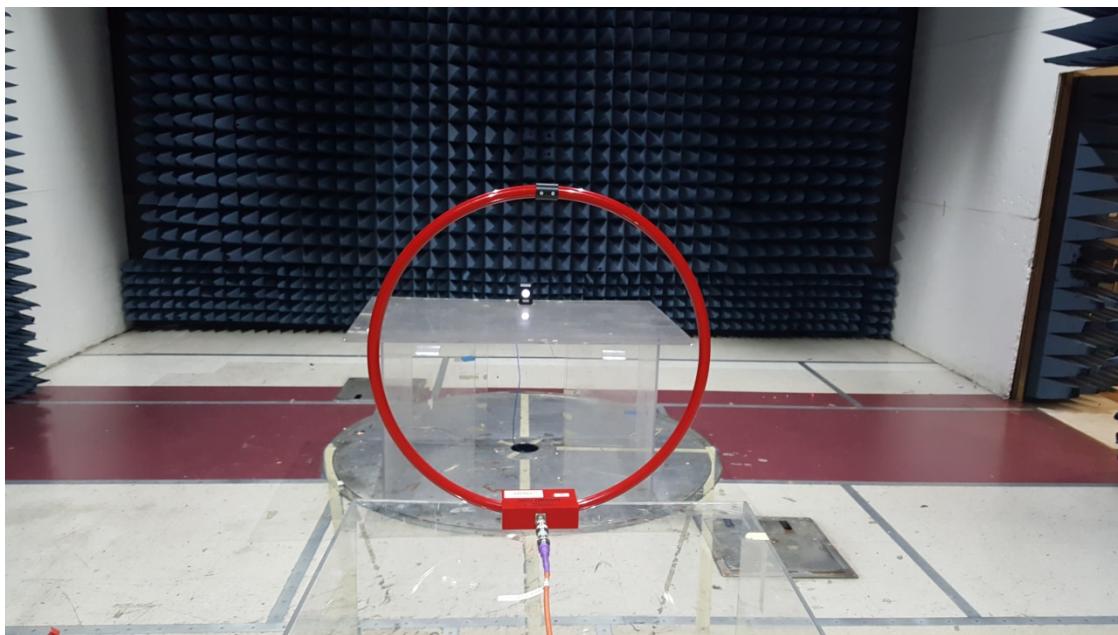
Freq (MHz)	Polarization (Degrees)	Detector	Amplitude (dBuV/m) At 300m	Limit (dBuV/m)	Delta
0.12292	0	Avg	2.79	25.81	-23.02

Table 14. Field Strength of Fundamental

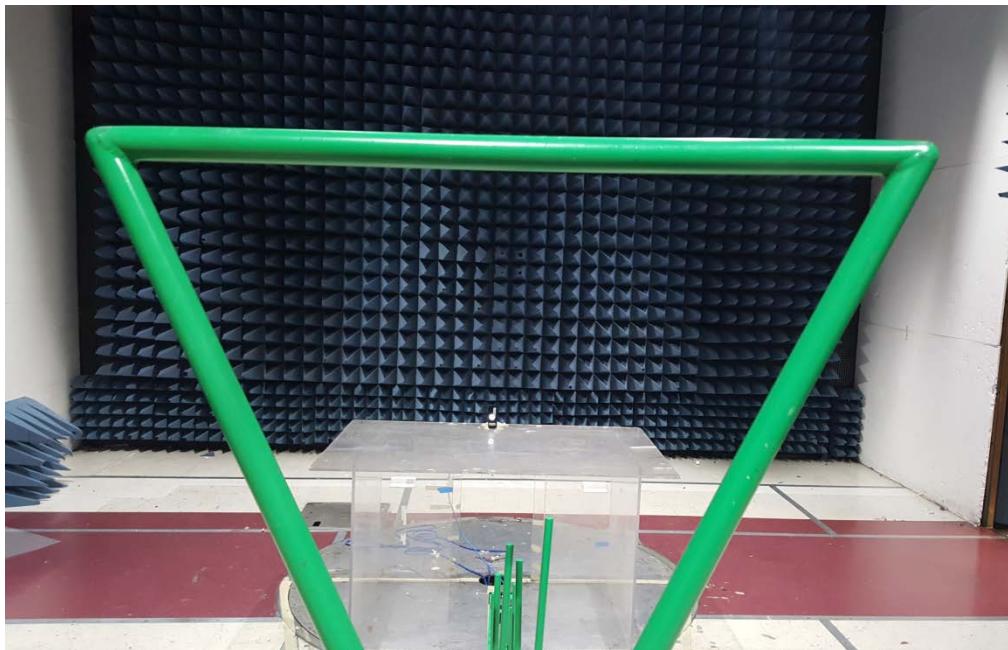
Radiated Spurious Emissions Test Setup



Photograph 1. Radiated Emissions, 9kHz-150kHz Setup



Photograph 2. Radiated Emissions, 150kHz-30MHz Setup



Photograph 3. Radiated Emissions, 30 – 1000 MHz, Setup

IV. Test Equipment

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	Equipment	Manufacturer	Model	Calibration Date	Calibration Due Date
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	See Note	
1S3892	Spectrum Analyzer	Agilent	E4407B	11/29/2018	11/29/2019
--	Loop	ELECTRO-METRICS	APL-51L	1/6/2019	1/6/2021
1S3983	Loop Antenna	ETS-LINDGREN	6512	06/19/2018	06/19/2019
1S2482	5 Meter Chamber (NSA)	Panashield	5 Meter Semi- Anechoic Chamber	See Note	
1S2668	amplifier	Sonoma Instruments	310 N	See Note	
1S2746	Bilog Antenna	Sunol Science	JB3	01/04/2019	01/04/2021
1S4764	EMI Receiver	Narda	PMM 9010	05/08/2019	11/08/2020
1S2678	LISN, Dual-Line V- Network	Teseq	NNB 51	08/01/2018	08/01/2019
1S4070	Digital Barometer	Control Co	6530	06/22/2018	06/22/2020
1S2636	Micro-Ohmmeter	NDB Technologie	DRM-1A	02/05/2019	08/05/2020

Table 15. Test Equipment List

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



MET Labs

Openpath Security, Inc.
Smart Reader LF

Electromagnetic Compatibility
Certification & User's Manual Information
CFR Title 47, Part 15C

V. Certification & User's Manual Information

Certification & User's Manual Information

A. 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) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) *Compliance testing;*
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

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 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.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer,* be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
- (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
- (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
- (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
- (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

1. 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 verification 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, 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 is verified to comply 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 not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The user's 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.

Verification & User's Manual Information

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 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.



MET Labs

Openpath Security, Inc.
Smart Reader LF

Electromagnetic Compatibility
End of Report
CFR Title 47, Part 15C

End of Report