

June 23, 2022

Lat-Lon, LLC
Benjamin Jull
2300 S. Jason St.
Denver, CO 90223

Dear Mr. Jull,

Enclosed is the RF Wireless test report for compliance testing of the, Lat-Lon X15500 as tested to the requirements of the

FCC Part §2.1053, §24.238(a), §27.53(a)(4), §27.53(c)(2), §27.53(f), §27.53(g)
RSS-GEN Issue 5, April 2018 + Amendment 1 (March 2019) + Amendment 2 (February 2021)
RSS-130 Issue 2 February 2019
RSS-133 Issue 6 January 2018
RSS-139 Issue 3 July 2015

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 yours,



Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.



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Report: WIR117636-FCC_ISED_GEOTAB_LTE © 2022, Eurofins Electrical and Electronic Testing NA, Inc.
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FCC/ ISED Test Report**Applicant name: Lat-Lon, LLC****Manufacturer name: Lat-Lon, LLC****Product: Lat-Lon X15500****Report: WIR117437-FCC _ISED_ GEOTAB _LTE****Applicant Address:****2300 S. Jason St.
Denver, CO 90223****Manufacturer Address:****2300 S Jason St
Denver, CO 80223**

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
3162 Belick St.
Santa Clara CA, 95054

Applicant name: Lat-Lon, LLC

Product: Lat-Lon X15500

Standard

47 CFR Part 2, 24, 27

RSS-GEN Issue 5, April 2018 + Amendment 1 (March 2019) + Amendment 2 (February 2021)

RSS-130 Issue 2 February 2019

RSS-133 Issue 6, January 2018

RSS-139 Issue 3 July 2015

Alberto Saldiver

Alberto Saldiver

Test Engineer, Wireless Laboratory

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 FCC and ISSED Rules under normal use and maintenance.

Gary Chou

Gary Chou

Wireless Engineering Manager, Wireless Laboratory

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	June 23, 2022	Initial Issue.

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I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Lat-Lon X15500, with the requirements of 47 CFR FCC CFR Part 2, 24, 27, RSS-GEN Issue 5 April 2018 + Amendment 1 (March 2019) + Amendment 2 (February 2021), RSS-130 Issue 2 February 2019, RSS-133 Issue 6 January 2018, RSS-139 Issue 6 July 2015. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with PVG-04 technical requirements, the following data is presented in support of the Certification of the Lat-Lon X15500. Lat-Lon, LLC should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Lat-Lon X15500, 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 47 CFR FCC CFR Part 2, 24, 27, RSS-Gen Issue 5 2018, RSS-130 Issue 2 February 2019, RSS-133 Issue 6 January 2018, RSS-139 Issue 6 July 2015. All tests were conducted using measurement procedure.

FCC ISED Clause	Description	Compliance
§2.1053 §24.238 §27.53(l)(4)(6)	Radiated Spurious Emissions	Compliant
RSS-133§6.5 RSS-130§4.6 RSS-139§6.6	Radiated Spurious Emissions	Compliant

Note: For other test items please refer to
FCC ID report: RI7ME910C1NA
ISED ID Report:5131A-ME910C1NA

Rationale:

Per KDB 996369 D04 “Modular Transmitter Integration Guide – Guidance for Host Product Manufacturers” only spot checks are reported in this filing.

Per ANSI C63.26: 2015 section 5.1.2.2, the results include worst case modulation only.

II. Equipment Information

A. Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Geotab, Inc to perform testing on the Geotab, Inc, Lat-Lon X15500.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of Geotab, Inc, X15500, Lat-Lon X15500.

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

EUT Summary Table

Model(s) Tested:	X15500	
EUT Specifications:	Primary Power: Battery/ Solar Voltage: 3.3 Vdc	
	Type of Modulations:	QPSK, 16QAM
	Modulation Technology	OFDM
	Technology:	LTE CAT-M
	Operating Frequency :	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz
	Product:	Lat-Lon X15500
	Brand:	Lat-Lon, LLC
	FCC ID :	FCC ID report: W54-X15500M
	ISED ID	ISED ID Report: 21325-X15500M
	Antenna Type:	Flexible PCB Antenna
	Antenna Gain:	698 MHz -798 MHz : 3.5 dBi 1710 MHz - 2170 MHz : 3.8dBi 2300 MHz - 2400 MHz : 4.5 dBi 2500 MHz – 2690 MHz : 4.5 dBi
	Antenna Port:	IPEX
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:	Alberto Saldiver	
Date(s):	June 21, 2022	

FCC/IC/ RF Testing Units Setting

Model	Hardware (FW) Rev.	Firmware (FW) Rev.	FW operation verification and Instruction
X15500	REVC	56001	Verify by Spectrum Analyzer

B. General Description of Applied Standards

References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

- FCC 47 CFR Part 2
- FCC 47 CFR Part 24(E)
- FCC 47 CFR Part 27
- RSS-GEN Issue 5, April 2018 + Amendment 1 (March 2019) + Amendment 2 (February 2021)
- RSS-130 Issue 2, February 2019
- RSS-133 Issue 6, January 2018
- RSS-139 Issue 3 July 2015
- ANSI/TIA/EIA-603-E 2016
- ANSI 63.26 2015

C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, 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.

Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.02) in accordance with ISO/IEC 17025:2017.

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

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%

Uncertainty Calculations Summary

E. 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.

F. Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to Lat-Lon, LLC upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Radiated Emission Measurement

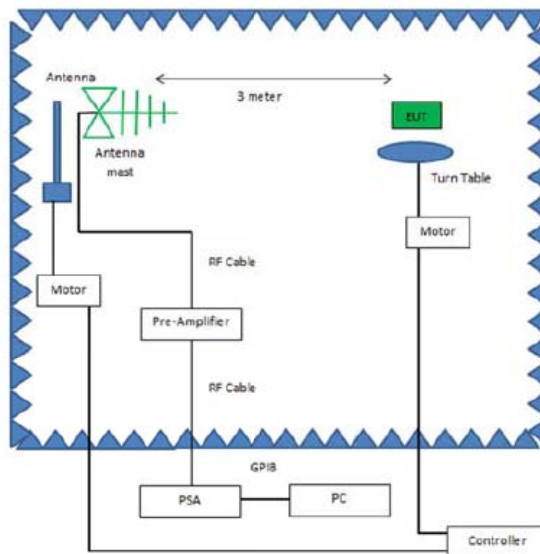
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

Test Procedures:

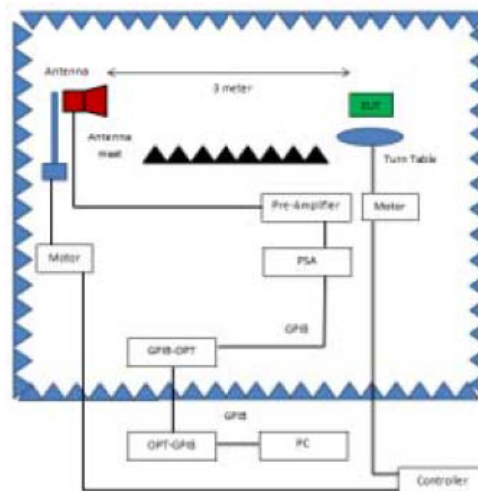
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi.}$

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

Deviation from Test Standard
No deviation.



Radiated Emissions, Below 1GHz, Test Setup



Radiated Emissions, Above 1GHz, Test Setup

Test Engineer: Alberto Saldiver

Test Date(s): 06/15/2022

Note: The test data only shows worst cast result

Test Data:
Band 2 Bandwidth 5 MHz

Frequency Range	30 MHz ~ 1GHz	Operating Channel	Mid Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
68.8	V	-73.39	-13	-60.39
135.73	V	-74.86	-13	-61.86
408.3	V	-74.06	-13	-61.06
583.87	V	-72.20	-13	-59.2
640.13	V	-69.86	-13	-56.86
656.62	V	-70.99	-13	-57.99
132.534	H	-77.95	-13	-64.95
407.976	H	-73.66	-13	-60.66
639.998	H	-69.75	-13	-56.75
655.984	H	-69.90	-13	-56.9
671.936	H	-79.30	-13	-66.3

Band 2 Bandwidth 5 MHz

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Low Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3703	V	-38.83	-13	-25.83
5552.6	V	-44.47	-13	-31.47
3706.4	H	-40.47	-13	-27.47
5554.3	H	-43.88	-13	-30.88

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Middle Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3762.5	V	-41.67	-13	-28.67
5644.4	V	-39.71	-13	-26.71
3762.5	H	-40.90	-13	-27.90
5642.7	H	-40.79	-13	-27.79

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	High Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3815.2	V	-35.67	-13	-22.67
5724.3	V	-43.34	-13	-30.34
3818.6	H	-32.78	-13	-19.78
5724.3	H	-43.54	-13	-30.54

Band 4 Bandwidth 3 MHz

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Low Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3422.5	V	-33.61	-13	-20.61
5132.7	V	-39.57	-13	-26.57
3420.8	H	-33.18	-13	-20.18
5134.4	H	-43.21	-13	-30.21

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Middle Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3465	V	-34.07	-13	-21.07
5200.7	V	-40.31	-13	-27.31
6933	V	-46.67	-13	-33.67
3465	H	-36.35	-13	-23.35
5197.3	H	-42.00	-13	-29.00
6933	H	-46.19	-13	-33.19

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	High Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3510.9	V	-39.48	-13	-26.48
5265.3	V	-44.01	-13	-31.01
3509.2	H	-40.43	-13	-27.43
5263.6	H	-45.81	-13	-32.81

Band 12 Bandwidth 3 MHz

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Low Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1399.5	V	-27.33	-13	-14.33
2099.9	V	-35.95	-13	-22.95
2802	V	-44.07	-13	-31.07
3502.4	V	-47.43	-13	-34.43
1399.5	H	-26.57	-13	-13.57
2101.6	H	-33.31	-13	-20.31
2800.3	H	-42.86	-13	-29.86
3505.8	H	-48.65	-13	-35.65

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Middle Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1416.5	V	-29.77	-13	-16.77
2128.8	V	-31.93	-13	-18.93
2836	V	-40.49	-13	-27.49
1418.2	V	-26.74	-13	-13.74
2128.8	H	-34.82	-13	-21.82
2836	H	-40.34	-13	-27.34
3544.9	H	-48.01	-13	-35.01
4255.5	H	-44.61	-13	-31.61

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	High Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1433.5	V	-32.40	-13	-19.40
2145.8	V	-34.25	-13	-21.25
2859.8	V	-40.30	-13	-27.30
1430.1	H	-30.14	-13	-17.14
2144.1	H	-36.26	-13	-23.26
2861.5	H	-42.14	-13	-29.14

Band 13 Bandwidth 5 MHz

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Low Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1557.6	V	-29.21	-13	-16.21
2332.8	V	-34.12	-13	-21.12
3114.8	V	-49.03	-13	-36.03
3891.7	V	-43.07	-13	-30.07
1554.2	H	-30.16	-13	-17.16
2337.9	H	-33.25	-13	-20.25
3119.9	H	-44.25	-13	-31.25
3891.7	H	-43.95	-13	-30.95

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	Middle Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1567.8	V	-32.98	-13	-19.98
2351.5	V	-27.56	-13	-14.56
3138.6	V	-38.66	-13	-25.66
3924	V	-34.76	-13	-21.76
1564.4	H	-35.15	-13	-22.15
2349.8	H	-24.15	-13	-11.15
3138.6	H	-40.50	-13	-27.50
3924	H	-35.07	-13	-22.07

Frequency Range	1GHz ~ 26.5GHz	Operating Channel	High Channel
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1569.8	V	-32.72	-13	-19.72
2353.5	V	-27.87	-13	-14.87
3138	V	-38.81	-13	-25.81
1569.8	H	-34.66	-13	-21.66
2353.5	H	-23.54	-13	-10.54
3138	H	-40.51	-13	-27.51

Test Setup Photo

(Please refer to the attached file (Test Setup Photo))

Test Equipment List

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	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	10/08/2021	10/08/2022
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	Not Required	Not Required
1S2486	5 Meter Chamber Control Room	Panashield	5 Meter Control Room	Not Required	Not Required
1S2435	Horn Antenna	ETS-LINDGREN	3117	03/03/2021	03/09/2023
1S3826	Horn Antenna	ETS-LINDGREN	3117	03/09/2021	03/09/2023
N/A	Preamplifier	EMC Instrument	EMC118A45SE	Note 1	Note 1
1S2668	Preamplifier	Sonoma Instrument	310N	Note 1	Note 1
N/A	EXG Vector Signal Generator	Keysight	N5172B	07/08/2021	07/08/2022
1S2600	Antenna	TESEQ GmbH	D-12623	05/ 11/ 2021	05/ 11/ 2023
Note 1: Verified by calibrated instrumentation at the time of testing					

Table 1. Radiated Emission and Bandage Measurement, Test Equipment List

END OF REPORT