

FCC RF EXPOSURE EVALUATION REPORT

Product Name: LP-M0 Series Industrial IoT module
Trade Mark: LP SENSOR TECHNOLOGY
Model No.: LP-M01
Add. Model No.: N/A
Report Number: 2210132087RFC-2
Test Standards: FCC 47 CFR Part 1 Subpart I
FCC ID: 2A8PY-MIOW001
Test Result: PASS
Date of Issue: February 2, 2023

Prepared for:

LP SENSOR TECHNOLOGY LLC
149 Silverado, Irvine, CA, 92618

Prepared by:

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UTTR-RF-FCCPART1-V1.1

Version

Version No.	Date	Description
V1.0	February 2, 2023	Original

DRAFT

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	LP SENSOR TECHNOLOGY LLC
Address of Applicant:	149 Silverado, Irvine, CA, 92618
Manufacturer:	LP SENSOR TECHNOLOGY LLC
Address of Manufacturer:	149 Silverado, Irvine, CA, 92618

1.2 EUT INFORMATION

Product Name:	LP-M0 Series Industrial IoT module	
Model No.:	LP-M01	
Add. Model No.:	N/A	
Trade Mark:	LP SENSOR TECHNOLOGY	
DUT Stage:	Production Unit	
EUT Supports Function: (Provided by the customer)	General 915MHz Technique	902.5 MHz to 914.9 MHz 903.0 MHz to 914.2 MHz
Sample Received Date:	October 9, 2022	
Sample Tested Date:	November 4, 2022 to November 15, 2022	
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.		

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Band:	902 MHz to 915 MHz
Frequency Range:	902 MHz to 915 MHz
Modulation Technique:	General 915MHz Technique
Type of Modulation:	LoRa
Number of Channels:	63 channels for 125kHz Bandwidth 8 channels for 500kHz Bandwidth
Channel Separation:	200kHz for 125kHz Bandwidth 1.6MHz for 500kHz Bandwidth
Antenna Type:	Rod Antenna
Antenna Gain: (Provided by the customer)	4 dBi
Maximum Field Strength:	93.78 dBμV/m
Normal Test Voltage:	30 VDC

1.4 OTHER INFORMATION

Test channels for LoRa				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
LoRa (Bandwidth=125kHz)	902.5 MHz to 914.9 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 1	Channel 31	Channel 63
		902.5 MHz	908.5 MHz	914.9 MHz
LoRa (Bandwidth=500kHz)	903.0 MHz to 914.2 MHz	Channel 1	Channel 5	Channel 8
		903.0 MHz	909.4 MHz	914.2 MHz

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I

All test items have been performed and recorded as per the above standards

1.6 TEST LOCATION

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109

Telephone: +86 (0) 755 2823 0888

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1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

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1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.

DRAFT

3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalent power density.

3.2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3.3 MPE CALCULATION METHOD

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.4.1 For LoRa

For LoRa function, operating at 902.5 MHz to 914.9 MHz for 125kHz Bandwidth and operating at 903.0 MHz to 914.2 MHz for 500kHz Bandwidth.

3.4.1.1 Antenna Type:

Rod Antenna

3.4.1.2 Antenna Gain:

4dBi

3.4.1.3 Results for LoRa

Operating Mode	Freq.	EIRP		Power Density @ 20cm	MPE Limit	Result
	(MHz)	(dBm)	(mW)	(mW/cm ²)	(mW/cm ²)	
LoRa (125kHz Bandwidth)	902.5	-1.53	0.70	0.000140	0.6017	Compliant
	908.5	-1.99	0.63	0.000126	0.6057	Compliant
	914.9	-1.45	0.72	0.000143	0.6099	Compliant
LoRa (500kHz Bandwidth)	903.0	-1.99	0.63	0.000126	0.6020	Compliant
	909.4	-2.18	0.61	0.000120	0.6063	Compliant
	914.2	-2.86	0.52	0.000103	0.6095	Compliant

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
