

RF Exposure

Applicant: Dragino Technology Co., Limited

Address of Applicant: Room 202, Block B, BaoChengTai industrial park, No.8
CaiYunRoad LongCheng Street, LongGang District, Shenzhen
518116,China

Manufacturer/Factory: Dragino Technology Co., Limited

Address of Manufacturer/Factory: Room 202, Block B, BaoChengTai industrial park, No.8
CaiYunRoad LongCheng Street, LongGang District, Shenzhen
518116,China

Equipment Under Test (EUT)

Product Name: LoRa IoT Gateway

Model No.: LG02, LG01-N

Applicable standards: EN 62311:2008

Date of sample receipt: March 04, 2019

Date of Test: March 05-21, 2019

Date of report issue: March 22, 2019

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.



Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	March 22, 2019	Original

Prepared By:

Bill. Yuan

Date:

March 22, 2019

Project Engineer

Check By:

Robinson

Date:

March 22, 2019

Reviewer

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4 General Information

4.1 General Description of EUT

Product Name:	LoRa IoT Gateway																
Model No.:	LG02, LG01-N																
Test Model No:	LG02																
<p>Remark: All above models are identical in the same PCB layout and electrical circuits. The differences are shown in the table below:</p> <table border="1"> <thead> <tr> <th>Model name</th> <th>Module</th> <th>Antenna</th> </tr> </thead> <tbody> <tr> <td rowspan="3">LG02</td> <td>Module 1: 868MHz</td> <td>Antenna 1: 868MHz(TX)</td> </tr> <tr> <td>Module 2: 868MHz</td> <td>Antenna 2: 868MHz(RX)</td> </tr> <tr> <td>Module 3: WIFI 2.4G</td> <td>Antenna 3: WIFI 2.4G(TX/RX)</td> </tr> <tr> <td rowspan="2">LG01-N</td> <td>Module 1: 868MHz</td> <td>Antenna 1: 868MHz(TX/RX)</td> </tr> <tr> <td>Module 2: WIFI</td> <td>Antenna 2: WIFI 2.4G(TX/RX)</td> </tr> </tbody> </table>			Model name	Module	Antenna	LG02	Module 1: 868MHz	Antenna 1: 868MHz(TX)	Module 2: 868MHz	Antenna 2: 868MHz(RX)	Module 3: WIFI 2.4G	Antenna 3: WIFI 2.4G(TX/RX)	LG01-N	Module 1: 868MHz	Antenna 1: 868MHz(TX/RX)	Module 2: WIFI	Antenna 2: WIFI 2.4G(TX/RX)
Model name	Module	Antenna															
LG02	Module 1: 868MHz	Antenna 1: 868MHz(TX)															
	Module 2: 868MHz	Antenna 2: 868MHz(RX)															
	Module 3: WIFI 2.4G	Antenna 3: WIFI 2.4G(TX/RX)															
LG01-N	Module 1: 868MHz	Antenna 1: 868MHz(TX/RX)															
	Module 2: WIFI	Antenna 2: WIFI 2.4G(TX/RX)															
Power Supply:	AC/DC ADAPTER Model:TP12-120100E Input: AC 100-240V, 50/60Hz, 0.5A Max Output: DC 12V, 1.0A																
WIFI 2.4G																	
Operation Frequency:	2412MHz~2472MHz(802.11b/802.11g/802.11n(HT20)) 2422MHz~2462MHz(802.11n(HT40))																
Channel Numbers:	13 for 802.11b/802.11g/802.11n(HT20) 9 for 802.11n(HT40)																
Channel Separation:	5MHz																
Modulation Type: (IEEE 802.11b)	Direct Sequence Spread Spectrum(DSSS)																
Modulation Type: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)																
Antenna Type:	Integral Antenna																
Antenna gain:	3.30dBi(Declared by applicant)																
868MHz																	
Operation Frequency:	863MHz~870MHz																
Channel numbers:	35																
Channel separation:	200kHz																
Occupied bandwidth	200kHz(Declared by manufacturer)																
Modulation type:	FSK																
Antenna type:	External antenna																
Antenna Gain:	3.35dBi(Declared by applicant)																

4.2 Test Facility

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

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

4.3 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 Technical Requirements Specification in EN 62311

Test Requirement:	EN 62311																																																												
Test Method:	EN 62311																																																												
General Description of Applied Standards	EN 62311 Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz–300 GHz) is to demonstrate the compliance of apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields as well as induced and contact current.																																																												
Limit:	<p>According to EN 62311, the criteria listed in the below table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified table 2 of Council Recommendation 1999/519/EC.</p> <p style="text-align: center;">Reference levels for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz, unperturbed rms values)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Frequency range</th> <th style="text-align: center;">E-field strength (V/m)</th> <th style="text-align: center;">H-field strength (A/m)</th> <th style="text-align: center;">B-field (μT)</th> <th style="text-align: center;">Equivalent plane wave power density S_{eq} (W/m²)</th> </tr> </thead> <tbody> <tr> <td>0-1 Hz</td> <td style="text-align: center;">—</td> <td style="text-align: center;">$3,2 \times 10^4$</td> <td style="text-align: center;">4×10^4</td> <td style="text-align: center;">—</td> </tr> <tr> <td>1-8 Hz</td> <td style="text-align: center;">10 000</td> <td style="text-align: center;">$3,2 \times 10^4/f^2$</td> <td style="text-align: center;">$4 \times 10^4/f^2$</td> <td style="text-align: center;">—</td> </tr> <tr> <td>8-25 Hz</td> <td style="text-align: center;">10 000</td> <td style="text-align: center;">$4\ 000/f$</td> <td style="text-align: center;">$5\ 000/f$</td> <td style="text-align: center;">—</td> </tr> <tr> <td>0,025-0,8 kHz</td> <td style="text-align: center;">$250/f$</td> <td style="text-align: center;">$4/f$</td> <td style="text-align: center;">$5/f$</td> <td style="text-align: center;">—</td> </tr> <tr> <td>0,8-3 kHz</td> <td style="text-align: center;">$250/f$</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6,25</td> <td style="text-align: center;">—</td> </tr> <tr> <td>3-150 kHz</td> <td style="text-align: center;">87</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6,25</td> <td style="text-align: center;">—</td> </tr> <tr> <td>0,15-1 MHz</td> <td style="text-align: center;">87</td> <td style="text-align: center;">$0,73/f$</td> <td style="text-align: center;">$0,92/f$</td> <td style="text-align: center;">—</td> </tr> <tr> <td>1-10 MHz</td> <td style="text-align: center;">$87/f^{1/2}$</td> <td style="text-align: center;">$0,73/f$</td> <td style="text-align: center;">$0,92/f$</td> <td style="text-align: center;">—</td> </tr> <tr> <td>10-400 MHz</td> <td style="text-align: center;">28</td> <td style="text-align: center;">0,073</td> <td style="text-align: center;">0,092</td> <td style="text-align: center;">2</td> </tr> <tr> <td>400-2 000 MHz</td> <td style="text-align: center;">$1,375\ f^{1/2}$</td> <td style="text-align: center;">$0,0037\ f^{1/2}$</td> <td style="text-align: center;">$0,0046\ f^{1/2}$</td> <td style="text-align: center;">$f/200$</td> </tr> <tr> <td>2-300 GHz</td> <td style="text-align: center;">61</td> <td style="text-align: center;">0,16</td> <td style="text-align: center;">0,20</td> <td style="text-align: center;">10</td> </tr> </tbody> </table> <p>Notes: 1. f as indicated in the frequency range column.</p>	Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)	0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—	1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—	8-25 Hz	10 000	$4\ 000/f$	$5\ 000/f$	—	0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—	0,8-3 kHz	$250/f$	5	6,25	—	3-150 kHz	87	5	6,25	—	0,15-1 MHz	87	$0,73/f$	$0,92/f$	—	1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—	10-400 MHz	28	0,073	0,092	2	400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	$f/200$	2-300 GHz	61	0,16	0,20	10
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Test method:	<p>According to the Far field calculation formula:</p> <p style="text-align: center;">Far Field Calculation Formula</p> $E = \frac{\sqrt{30PG(\theta, \phi)}}{r}$ <p>G = antenna gain relative to an isotropic antenna θ, ϕ = elevation and azimuth angles to point of investigation r = distance from observation point to the antenna</p> <p>The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement of the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.</p>																																																												
Result:	Pass																																																												

Measurement Data:

WIFI mode(802.11b)					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
2412	16.21	41.78	5.60	61.00	Pass
2442	16.26	42.27	5.63		
2472	16.25	42.17	5.62		
868MHz mode					
Frequency (MHz)	Output Power (dBm)	Output Power (mW)	E Field Strength (V/m)	Limit (V/m)	Result
863.1	10.25	10.59	2.82	61.00	Pass
866.5	10.23	10.54	2.81		
869.9	10.31	10.74	2.84		

-----End-----