

RF Exposure Evaluation Report

Applicant: Neutron Holdings, Inc.

Address of Applicant: 85 2nd St, San Francisco, CA 94105 USA

Equipment Under Test (EUT)

Product Name: Central controller

Model No.: Lime-4.0-US

Trade mark: Lime

FCC ID: 2APB2LIME-V4-US

Applicable standards: FCC CFR Title 47 Part 2 Subpart J Section 2.1091

Date of sample receipt: 08 May, 2021

Date of Test: 08 May, to 04 Jun., 2021

Date of report issue: 04 Jun., 2021

Test Result: PASS*

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	04 Jun., 2021	Original

Tested by: YT Yang
Test Engineer

Date: 04 Jun., 2021

Reviewed by: Winner Zhang
Project Engineer

Date: 04 Jun., 2021

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4 General Information

4.1 Client Information

Applicant:	Neutron Holdings, Inc.
Address:	85 2nd St, San Francisco, CA 94105 USA
Manufacturer:	Quectel Wireless Solutions Co., Ltd.
Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Factory:	MeiG Smart Technology Co., Ltd.
Address:	1/2/3F A, Building A, B, No.5 Lingxia Road, 4th Fenghuang Industrial Park, Fuyong Street, Baoan District, Shenzhen, Guangdong, China

4.2 General Description of E.U.T.

Product Name:	Central controller
Model No.:	Lime-4.0-US
Operation Frequency:	WCDMA Band V: 826.4MHz-846.6MHz WCDMA Band II: 1852.4 MHz-1907.6 MHz LTE Band 2: TX: 1850MHz-1910MHz RX: 1930MHz-1990MHz LTE Band 4: TX: 1710MHz-1755MHz RX: 2110MHz-2155MHz LTE Band 12: TX: 699MHz-716MHz RX: 729MHz-746MHz LTE Band 13: TX: 777 MHz-787 MHz RX: 746 MHz-756 MHz LTE Band 17: TX: 704MHz-716MHz RX: 734MHz-746MHz BLE: 2402MHz~2480MHz
Modulation technology:	WCDMA: QPSK,16QAM LTE: QPSK,16QAM, 64QAM BLE : GFSK
Antenna Type:	Internal Antenna
Antenna gain:	WCDMA Band V: 2.0 dBi, WCDMA Band II: 2.0 dBi, LTE Band 2: 2.0 dBi, LTE Band 4: 2.0 dBi, LTE Band 12: 2.0 dBi LTE Band 13: 2.0 dBi, LTE Band 17: 2.0 dBi BLE: 2.0dBi
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Operating Modes

Operating mode	Detail description
BLE mode	Keep the EUT in continuously transmitting in BLE mode
WCDMA mode	Keep the EUT in continuously transmitting in WCDMA mode
LTE mode	Keep the EUT in continuously transmitting in LTE mode

4.4 Additions to, deviations, or exclusions from the method

No

4.5 Laboratory Facility

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

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

4.6 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info@ccis-cb.com, Website: <http://www.ccis-cb.com>

5 Technical Requirements Specification in FCC CFR Title 47 Part 2.1091

5.1 Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

5.2 Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

5.3 Result

Frequency (MHz)	Maximum Output power (dBm)	Maximum Output power (mW)	Antenna Gain (dBi)	Antenna Gain (numeric)	Distance (cm)	Result (mW/cm ²)	Limits for General Population/ Uncontrolled Exposure (mW/cm ²)
WCDMA 850							
826.40	23.57	227.51	2	1.58	20.00	0.092	0.55
WCDMA 1900							
1907.60	23.31	214.29	2	1.58	20.00	0.067	1.0
LTE Band 2							
1909.30	24.45	278.61	2	1.58	20.00	0.088	1.0
LTE Band 4							
1754.30	24.91	309.74	2	1.58	20.00	0.098	1.0
LTE Band 12							
707.50	24.54	284.45	2	1.58	20.00	0.090	0.47
LTE Band 13							
782.00	24.75	298.54	2	1.58	20.00	0.094	0.52
LTE Band 17							
710	24.63	290.40	2	1.58	20.00	0.092	0.47
BLE							
2442.00	-1.45	0.72	2	1.58	20.00	0.0002	1.00
2.4G Wi-Fi							
2437.00	12.66	18.45	2	1.58	20.00	0.0058	1.00

BLE Result/Limits + LTE band 4 Result/Limit 2.4G Wi-Fi Result/limits < 1.0

0.0002/1 + 0.098/1 + 0.0058/1= 0.104 < 1.0

Note: Just the worst case mode was shown in report.

5.4 Conclusion

The device is exempt from the RF exposure evaluation.

-----End of report-----