SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

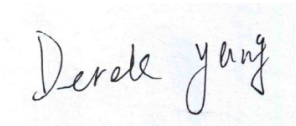
No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

RF Exposure Evaluation Report

Application No.:	SZEM1803001689RG
Applicant:	Neutron Holdings, Inc.
Manufacturer:	Neutron Holdings, Inc.
Product Name:	Tracking device
Model No.(EUT):	LBCAT-B/LBCAT-H/LBCAT-E
Trade Mark:	LimeBike
FCC ID:	2APB2LBCAT
Standards:	47 CFR Part 2
	47 CFR Part 15, Subpart C
	47 CFR Part 22 subpart H
	47 CFR Part 24 subpart E
	47 CFR Part 27 subpart C
Date of Receipt:	2018-03-29
Date of Test:	2018-04-02 to 2018-05-13
Date of Issue:	2018-05-16
Test Result:	**PASS***

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

Authorized Signature:



Derek Yang
Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2018-05-16		*Original*

Authorized for issue by:				
				2018-05-16
		Mike Hu /Project Engineer		
				2018-05-16
		Jim Huang /Reviewer		

Contents

3 General Information

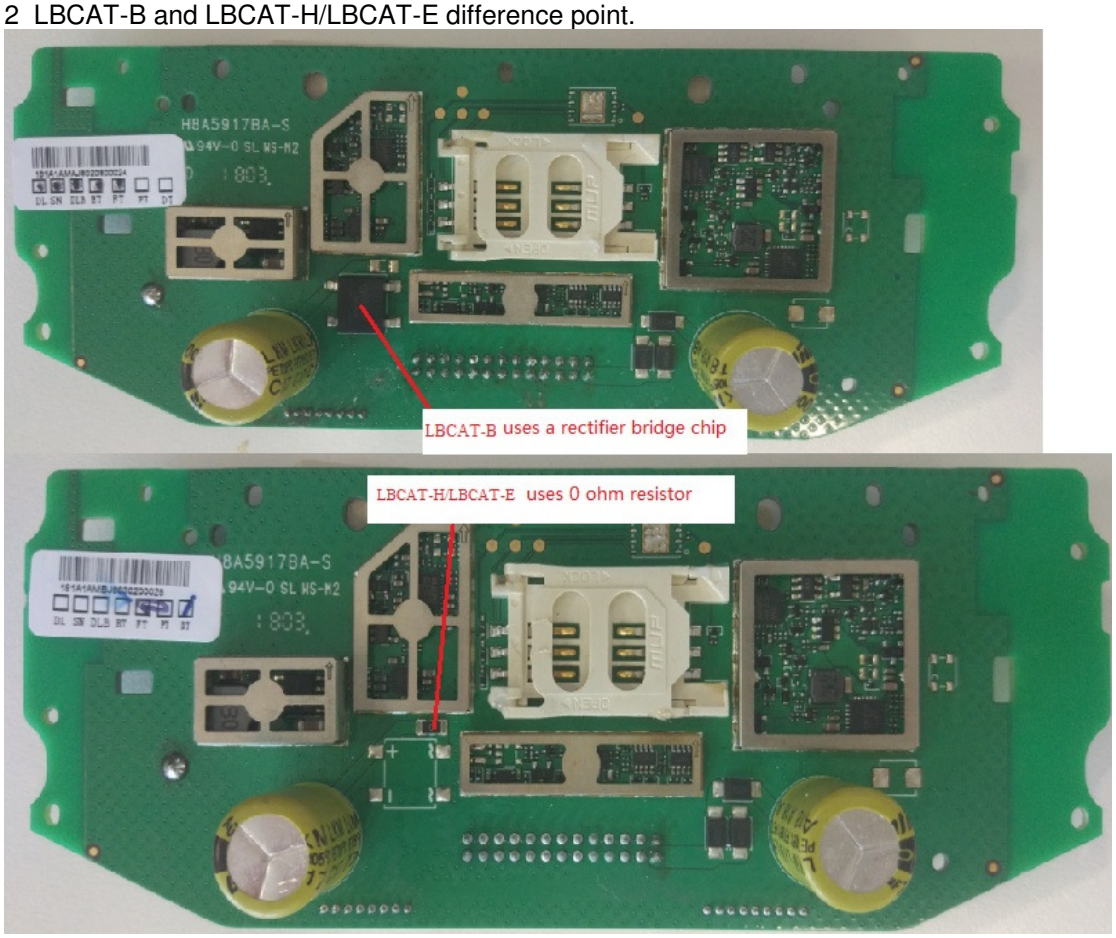
3.1 Client Information

Applicant:	Neutron Holdings, Inc.
Address of Applicant:	2121 S El Camino real, suite B-100, San Mateo, CA 94403 USA
Manufacturer:	Neutron Holdings, Inc.
Address of Manufacturer:	2121 S El Camino real, suite B-100, San Mateo, CA 94403 USA

Note:

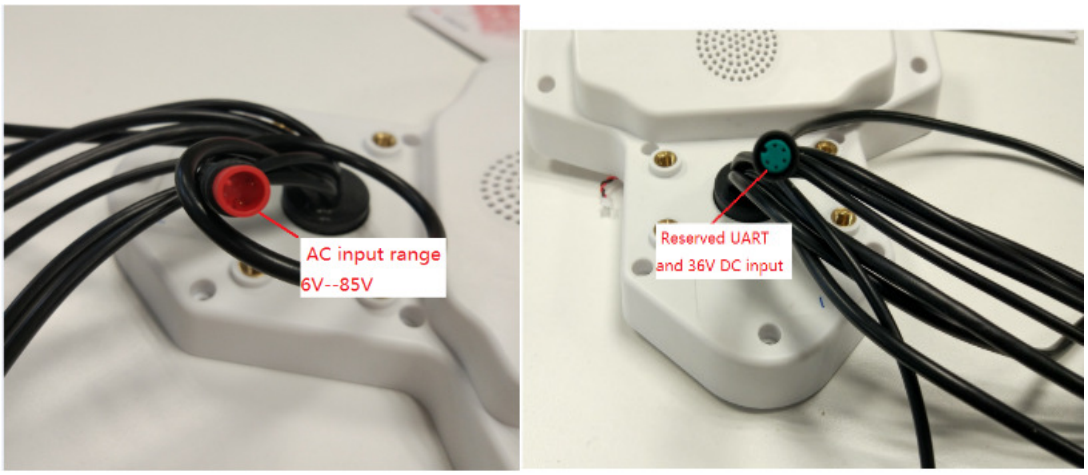
1 LBCAT-B and LBCAT-H/LBCAT-E share a mainboard PCB, achieve different functional requirements of the tow projects through bom refueling.

2 LBCAT-B and LBCAT-H/LBCAT-E difference point.



The difference between the above two differences corresponds to the whole 26PIN line as follows:

LBCAT-B LBCAT-H/LBCAT-E



According to the declaration from the applicant, the Model LBCAT-H/LBCAT-E was tested fully, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. So the data of LBCAT-B can refer to LBCAT-H/LBCAT-E

3.2 General Description of EUT

Product Name:	Tracking device
Model No.:	LBCAT-B/LBCAT-H/LBCAT-E
Trade Mark:	LimeBike
Sample Type:	Portable production
Antenna Type:	Monopole
Antenna Gain:	WCDMA B2:3dBi; WCDMA B4:3dBi; WCDMA B5:3dBi LTE B2:3dBi; LTE B4:3dBi; LTE B5:3dBi; LTE B13:3dBi; LTE B17: 3dBi

3.3 Test Mode

Test Mode	Test Modes Description
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
UMTS/TM2	UMTS system, WCDMA, 16QAM modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation (only for 1.4MHz,3MHz,5MHz)

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

3.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

3.5 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical 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 our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

3.6 Deviation from Standards

None.

3.7 Abnormalities from Standard Conditions

None.

3.8 Other Information Requested by the Customer

None.

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

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
F=frequency in MHz *=Plane-wave equivalent power density RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).				

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R 2)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

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

4.1.3 EUT RF Exposure Evaluation

For WCDMA Band 2/4/5 & LTE Band 2/4/12/13/17/BLE

Antenna Gain:3 dBi / 3 dBi /3 dBi ;3 dBi/3 dBi/3 dBi/3 dBi/3 dB/3 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 / 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Operating Band	Frequency (MHz)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Result
WCDMA Band 2	1852.4	24	251.1886432	0.0997	1.0	PASS
WCDMA Band 4	1712.4	24	251.1886432	0.0997	1.0	PASS
WCDMA Band 5	826.4	24	251.1886432	0.0997	0.5509	PASS
LTE Band 2	1850.7	24	251.1886432	0.0997	1.0	PASS
LTE Band 4	1710.7	24	251.1886432	0.0997	1.0	PASS
LTE Band 12	699.7	24	251.1886432	0.0997	0.4465	PASS
LTE Band 13	779.5	24	251.1886432	0.0997	0.5197	PASS
LTE Band 17	706.5	24	251.1886432	0.0997	0.4710	PASS
BLE	2402	5	3.1623	0.0012	1.0	PASS

Note: Refer to report No. SZEM180300168901 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.