RF Exposure Evaluation Declaration

Product Name	:	Smart Construction Rover
Trade Name	:	LANDLOG
Model No.	:	SC Rover
FCC ID	:	2AXNO-SCROVER-01

Applicant : LANDLOG Ltd.

Address : 12F Sumitomofudosan Shibadaimon 2chome Building 2-11-8 Shibadaimon, Minato-ku, Tokyo 105-0012 Japan

Date of Receipt	:	Sep. 28, 2020
Date of Declaration	:	Jan. 08, 2021
Report No.	:	2090945R-E3032410101
Report Version	:	V1.0

Testing Laboratory
3024

RF Exposure Evaluation Declaration

Issued Date : Jan. 08, 2021

Report No. : 2090945R-E3032410101

Product Name	:	Smart Construction Rover
Applicant	:	LANDLOG Ltd.
Address	:	12F Sumitomofudosan Shibadaimon 2chome Building 2-11-8 Shibadaimon, Minato-ku, Tokyo 105-0012 Japan
Manufacturer	:	AKASAKA TEC INC.
Address	:	3F. Marina Plaza 4-2, Shiraho, Kanazawa-ku, Yokohama-shi, Kanagawa, 236-0007 Japan
Trade Name	:	LANDLOG
Model No.	:	SC Rover
FCC ID	:	2AXNO-SCROVER-01
EUT Voltage	:	DC 12V
Testing Voltage	:	DC 12V
Applicable Standard	:	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Tested By : Lion Wang

(Lion Wang / Engineer)

Approved By : Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jan. 08, 2021

1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	Peak Output Power	15 - 35	1
Humidity (%RH)		25 - 75	

Note: Test site information refers to Laboratory Information.

USA	**:**	**FCC Registration Number: TW3024**
Canada	**:**	**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
Email address	info.tw@dekra.com
Website	http://www.dekra.com.tw

1.2. List of Test Equipment

Peak Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	2019/12/02	2020/12/01
Pulse Power Sensor	Anritsu	MA2411B	1531044	2019/12/02	2020/12/01
Power Meter	Keysight	8990B	MY51000248	2020/05/20	2021/05/19
Power Sensor	Keysight	N1923A	MY57240005	2020/05/20	2021/05/19

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.3. Uncertainty

Test item	Uncertainty
Peak Output Power	± 2.26 dB

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: 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)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ f	-	6**
1.29-10	193/ f 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ f 0.25	0.3444/ f 0.25	44.72/ f 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 f 0.25	0.04138 f 0.25	0.6455f0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ f 1.2
150000-300000	0.354 f 0.5	9.40 x 10-4 f 0.5	3.33 x 10-4 f	616000/ f 1.2
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

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/cm^2 . 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.

2.2. Test Procedure

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

2.3. Test Result of RF Exposure Evaluation

Product	Smart Construction Rover		
Test Mode	Transmit Mode		
Test Condition	RF Exposure Evaluation		
Date of Test	2020/11/14	Test Site	SR12-H
Temperature(°C)	22	Humidity (%RH)	63

Antenna Gain: The maximum antenna gain is 3.79dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

WLAN 2.4GHz

Mode	Frequency (MHz)	Maximum Conducted Output Power		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
		dBm	mW		
802.11b	2412	17.010	50.234	0.024	1
	2437	16.520	44.875	0.021	1
	2462	13.240	21.086	0.010	1
802.11g	2412	11.310	13.521	0.006	1
	2437	20.020	100.462	0.048	1
	2462	12.640	18.365	0.009	1
802.11n (20MHz)	2412	11.320	13.552	0.006	1
	2437	20.030	100.693	0.048	1
	2462	11.740	14.928	0.007	1

BT 4.0

Mode	Frequency (MHz)	Maximum Conducted Output Power		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
		dBm	mW		
GFSK	2402	2.390	1.734	0.001	1
	2440	2.670	1.849	0.001	1
	2480	1.410	1.384	0.001	1

Note:

1. The antenna information is from the customer declaration.
2. The EUT description is from the customer declaration.
3. The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.
4. The results are evaluated using the maximum power.