RF Exposure Report

Application No.:	SZCR2310003474AT
Applicant:	Mammotion Technology Co., Limited
Address of Applicant:	UNIT 89 3/F YAU LEE CENTRE NO.45 HOI YUEN ROAD, KWUN TONG KL HONG KONG China
Manufacturer:	Mammotion Technology Co., Limited
Address of Manufacturer:	UNIT 89 3/F YAU LEE CENTRE NO.45 HOI YUEN ROAD, KWUN TONG KL HONG KONG China
Factory:	Huizhou BYD Electronic Co., Ltd.
Address of Factory:	Daya Bay Economic and Technological Development Zone, Huizhou City
Equipment Under Test (EUT):	
EUT Name:	Luba 2 AWD
Model No.:	1000, 3000, 5000, 10000, 1000H, 3000H, 5000H, 10000H ♣
♣	Please refer to section 2.1 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	Mammotion
FCC ID:	2A8QJ-LUBA2AWD
Standard(s) :	FCC Rules 47 CFR §2.1091 KDB 447498 D04 interim General RF Exposure Guidance v01
Date of Receipt:	2023-10-31
Date of Test:	2023-11-09 to 2024-01-05
Date of Issue:	2024-01-09
Test Result:	**Pass***

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

Keny Xu
EMC Laboratory Manager

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

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2024-01-09		Original

Authorized for issue by:				
		Darren Yuan **Darren Yuan/Project Engineer**		
		Eric Fu **Eric Fu/Reviewer**		

1 Contents

Page

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2 General Information

2.1 General Description of E.U.T.

Product Type:	☐ Portable device
	☒ Mobile device
	☐ Fixed device

2.2 Details of E.U.T.

Power supply:	Powered by Rechargeable Li-ion Battery. Battery information 1# Rated Voltage: 21.6VDC Rated Capacity: 9.6Ah/207.36Wh Battery information 2# Rated Voltage: 21.6VDC Rated Capacity: 4.5Ah/97.2Wh Charging station information Model: CHG0002, CHG0003 Input: 25.2VDC, 176.4W Output: 22.6VDC, 7.0A Charging station adapter information Model: GQ180-2520700-E4 Input: 100-240VAC, 50/60Hz 2.5A Max Output: 25.2VDC, 7.0A, 176.4W
Lora:	
Frequency Range:	902.5-926.8MHz
Modulation Type:	CSS
Number of Channels:	26
Antenna Type:	PIFA Antenna
Antenna Gain:	1.5dBi

BLE:

Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	2.5dBi

2.4G Wi-Fi:

Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2472MHz, 802.11n(HT40): 2422MHz to 2462MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	5MHz
Number of Channels:	802.11b/g/n(HT20): 13, 802.11n(HT40):9
Antenna Type:	PIFA Antenna
Antenna Gain:	2.5dBi

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5G Wi-Fi:

Operation Frequency (20MHz):	U-NII-2C: 5500MHz-5700MHz U-NII-3: 5745MHz -5825MHz
Operation Frequency (40MHz):	U-NII-2C: 5510MHz-5670MHz U-NII-3: 5755MHz -5795MHz
Channel number (20MHz):	U-NII-2C: 11, U-NII-3: 5
Channel number (40MHz):	U-NII-2C: 5, U-NII-3: 2
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing:	802.11a/n(HT20): 20MHz 802.11n(HT40): 40MHz
DFS Function:	Slave without Radar detection
TPC Function:	Without TPC function
Antenna Type:	PIFA Antenna

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LTE Module (FCC ID: ZMONL668AM00, this module has got certified)

WCDMA

Frequency band:	Band	Tx (MHz)	Rx (MHz)
	BAND II	1850-1910	1930-1990
	BAND IV	1710-1755	2110-2155
	BAND V	824-829	869-894
Type of Modulation:	UL QPSK DL QPSK		
Antenna Gain:	Band II: 7.0dBi, Band IV: 5.0dBi, Band V: 7.0dBi		

LTE			
Frequency band:	Band	Uplink (MHz)	Downlink (MHz)
	LTE band 2	1850-1910	1930-1990
	LTE band 4	1710-1755	2110-2155
	LTE band 5	824-829	869-894
	LTE band 12	699-716	729-746
	LTE band 13	777-787	746-756
	LTE band 17	704-716	734-746
	LTE band 66	1710-1780	2110-2200
	LTE band 71	663-698	617-652
Type of Modulation:	UL QPSK,16QAM DL QPSK,16QAM		
Antenna gain	LTE B2: 7.0dBi; LTE B4: 5.0dBi; LTE B5: 7.0dBi LTE B12: 7.0dBi; LTE B13: 7.0dBi; LTE B17: 7.0dBi LTE B66: 5.0dBi; LTE B71: 7.0dBi		

Declaration of EUT Family Grouping:

Model No.: 1000, 3000, 5000, 10000, 1000H, 3000H, 5000H, 10000H

Only the model 5000 was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on model No. and battery capacity.

Model	Battery Capacity
1000	21.6Vdc, 4.5Ah, 97.2Wh
3000	21.6Vdc, 9.6Ah, 207.36Wh
5000	21.6Vdc, 9.6Ah, 207.36Wh
10000	21.6Vdc, 9.6Ah, 207.36Wh
1000H	21.6Vdc, 4.5Ah, 97.2Wh
3000H	21.6Vdc, 9.6Ah, 207.36Wh
5000H	21.6Vdc, 9.6Ah, 207.36Wh
10000H	21.6Vdc, 9.6Ah, 207.36Wh

Considering to the difference, both batteries are pre-tested, Higher capacity battery is the worst-case, only the worst-case test data were recorded in this report.

Separation Distance

Minimum test separation distance:	20cm
Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.	

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2.3 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, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

2.4 Test Facility

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

• 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 (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

3 FCC Radiofrequency radiation exposure limits

According to§1.1310, the limit for general population/uncontrolled exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

4 Measurement and Calculation

Power density Calculation

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

1) P=Output Power at Antenna Terminals (mW)
2) R = distance to the center of radiation of antenna (in centimeter)
3) MPE limit = 1mW/cm²

Standalone Transmitter:

Mode	Frequency (MHz)	Maximum Conducted power (dBm)	Antenna Gain(dBi)	Power desity (mw/cm²)	Limit (mw/cm²)	MPE ratio	Result
Lora	916.125	20.79	1.5	0.034	0.611	0.055	Pass
BLE	2440	7.41	2.5	0.002	1.000	0.002	Pass
2.4G Wi-Fi	2462	17.85	2.5	0.022	1.000	0.022	Pass
5G Wi-Fi	5785	19.13	3.1	0.033	1.000	0.033	Pass
WCDMA BAND II	1852.4	24.5	7	0.281	1.000	0.281	Pass
WCDMA BAND IV	1712.5	24.5	5	0.177	1.000	0.177	Pass
WCDMA BAND V	826.4	24.5	7	0.281	0.551	0.510	Pass
LTE band 2	1850.7	24	7	0.251	1.000	0.251	Pass
LTE band 4	1710.7	24	5	0.158	1.000	0.158	Pass
LTE band 5	824.7	24	7	0.251	0.550	0.456	Pass
LTE band 12	699.7	24	7	0.251	0.466	0.537	Pass
LTE band 13	779.5	24	7	0.251	0.520	0.482	Pass
LTE band 17	706.5	24	7	0.251	0.471	0.532	Pass
LTE band 66	1710.7	24	5	0.158	1.000	0.158	Pass
LTE band 71	665.5	24	7	0.251	0.444	**0.565**	Pass

Note1: The Power Data for Lora is based on the RF Test report SZCR231000347402.

Note2: The Power Data for BLE is based on the RF Test report SZCR231000347403.

Note3: The Power Data for 2.4G Wi-Fi is based on the RF Test report SZCR231000347404.

Note4: The Power Data for 5G Wi-Fi is based on the RF Test report SZCR231000347405.

Note5: The power Date for WCDMA and LTE are based on the module MPE report: FA8O1914.

Simultaneous transmission

Test Mode	Lora	BLE	2.4G Wi-Fi	5G Wi-Fi	LTE Module	Total Ratio	Limit	Result
Ratio	0.055	0.002	0.022	0.033	0.565	N/A	N/A	N/A
Scenario 1	☑	☑			☑	0.622	1.0	Pass
Scenario 2	☑		☑		☑	0.642	1.0	Pass
Scenario 3	☑			☑	☑	0.653	1.0	Pass

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

--End of the Report--

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