RF Exposure Evaluation Report

Applicant:	Balena Ltd.
Address of Applicant:	6th Floor, One London Wall London, London, EC2Y 5EB United Kingdom
Equipment Under Test (EUT)	
Product Name:	balenaFin
Model No.:	v1.1
Trade mark:	balenaFin
FCC ID:	2APW6-FIN0110-CM2
Applicable standards:	FCC CFR Title 47 Part 2 Subpart J Section 2.1091
Date of sample receipt:	23 Aug., 2019
Date of Test:	24 Aug., to 26 Dec., 2019
Date of report issue:	27 Dec., 2019
Test Result:	PASS*

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*27 Dec., 2019*	*Original*

Tested by: Carey Chen ***Date:*** *27 Dec., 2019*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *27 Dec., 2019*

Project Engineer

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4 General Information

4.1 Client Information

Applicant:	Balena Ltd.
Address:	6th Floor, One London Wall London, London, EC2Y 5EB United Kingdom
Manufacturer:	Balena Ltd.
Address:	6th Floor, One London Wall London, London, EC2Y 5EB United Kingdom
Factory:	Fae Technology S.p.a.
Address:	Via C. Battisti, 136 Gazzaniga (BG) 24025 - Italia

4.2 General Description of E.U.T.

Product Name:	balenaFin
Model No.:	v1.1
Operation Frequency:	2.4G Wi-Fi: 2412MHz~2472MHz 5.2G Wi-Fi Band 1: 5180MHz~5240MHz 5.3G Wi-Fi Band 2: 5260MHz~5320MHz 5.6G Wi-Fi Band 3: 5500MHz~5700MHz 5.8G Wi-Fi Band 4: 5725MHz~5875MHz Bluetooth/ BLE: 2402MHz~2480MHz
Modulation technology:	802.11b: DSSS, 802.11a/g/n/ac: OFDM Bluetooth BDR /BLE: GFSK, Bluetooth EDR: π/4-DQPSK, 8DPSK
Antenna Type:	Internal Antenna External Antenna
Antenna gain:	Internal Antenna: 1dBi External Antenna: 2dBi
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
BT mode	Keep the EUT in continuously transmitting in BT mode
2.4G WIFI mode	Keep the EUT in continuously transmitting in 2.4G WIFI mode
5G WIFI mode	Keep the EUT in continuously transmitting in 5G WIFI 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**

Shenzhen Zhongjian Nanfang Testing 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 Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **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

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, 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

Internal Antenna:

Mode	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)
BT	2402	3.09	2.04	1	1.26	20.00	0.00051	1.0
BLE	2402	-1.11	0.77	1	1.26	20.00	0.00019	1.0
2.4G	2412	13.12	20.51	1	1.26	20.00	0.00514	1.0
5.2G	5180	4.65	2.92	1	1.26	20.00	0.00073	1.0
5.3G	5260	2.97	1.98	1	1.26	20.00	0.00050	1.0
5.6G	5700	3.37	2.17	1	1.26	20.00	0.00054	1.0

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

External antenna:

Mode	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)
BT	2402	3.09	2.04	2	1.58	20.00	0.00064	1.0
BLE	2402	-1.11	0.77	2	1.58	20.00	0.00024	1.0
2.4G	2412	13.12	20.51	2	1.58	20.00	0.00647	1.0
5.2G	5180	4.65	2.92	2	1.58	20.00	0.00092	1.0
5.3G	5260	2.97	1.98	2	1.58	20.00	0.00063	1.0
5.6G	5700	3.37	2.17	2	1.58	20.00	0.00069	1.0

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

Module 2(FCC ID: QOQBGM111)

Mode	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)
BLE	2402	3.09	2.04	1	1.26	20.00	0.01702	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------