

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

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 CCIS 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 | 27 Dec., 2019 | Original |
| | | |
| | | |
| | | |
| | | |

Tested by:

Carey Chen

Test Engineer

Date:

27 Dec., 2019

Reviewed by:

Winner Zhang

Project Engineer

Date:

27 Dec., 2019

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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-----