Test Report

Verified code: 816382

Report No.: E202208181964-3

Customer:	Blueiot (Beijing) Technology Co., Ltd.
Address:	10/F,Tower A,TusPark Innovation Plaza, Haidian District, Beijing, China
Sample Name:	Blueiot RTLS Tag
Sample Model:	BT1000-d
Receive Sample Date:	Aug.30,2022
Test Date:	Aug.31,2022 ~ Oct.31,2022
Reference Document:	CFR 47, FCC Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices.
Test Result:	Pass

Prepared by: Reviewed by: Wu Haoting Approved by:

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-12-19

GUANGZHOU GRG METROLOGY & TEST CO., LTD.
Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel：（+86）400-602-0999 FAX：（+86）020-38698685 Web：http://www.grgtest.com

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.

2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.

5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

---------- **The following blanks** ----------

TABLE OF CONTENTS

---------- The following blanks ----------

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202208181964-3	Original Issue	2022-11-03

---------- The following blanks ----------

1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name:	Blueiot (Beijing) Technology Co., Ltd.
Address:	10/F,Tower A,TusPark Innovation Plaza, Haidian District, Beijing, China

1.2 MANUFACTURER

Name:	Blueiot (Beijing) Technology Co., Ltd.
Address:	10/F,Tower A,TusPark Innovation Plaza, Haidian District, Beijing, China

1.3 FACTORY

Name:	Blueiot (Beijing) Technology Co., Ltd.
Address:	10/F,Tower A,TusPark Innovation Plaza, Haidian District, Beijing, China

1.4 BASIC DESCRIPTIONOF EQUIPMENTUNDER TEST

Equipment:	Blueiot RTLS Tag
Model No.:	BT1000-d
Adding Model:	/
Trade Name:	Blueiot
FCC ID:	2AZOM-BT1000D
Power Supply:	DC 3.0V power supplied by battery
Battery Specification:	Model: CR2032 Nominal Voltage:3.0Vdc
Frequency Band:	2402MHz to 2480MHz
Modulation type:	GFSK
Antenna Specification:	PCB printed antenna 1 with 0dBi gain (Max.), antenna 2 with 0dBi gain (Max.)
Temperature Range:	-20℃~+70℃
Hardware Version:	V0.1.1
Software Version:	V1020
Sample No:	E202208181964-0002
Note:	/

2. LABORATORY & ACCREDITATIONS

2.1 ACCREDITATIONS

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add.:	No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China.
P.C.:	518110
Tel :	0755-61180008
Fax:	0755-61180008

2.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:2017.

USA	A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	ISED (Company Number: 24897，CAB identifier:CN0069)
USA	FCC (Registration Number: 759402，Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site, http://www.grgtest.com

---------- **The following blanks** ----------

3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

Exposure category: General population/uncontrolled environment
EUT Type: Production Unit
Device Type: Portable Device
According to the KDB 447498 D04 Interim General RF Exposure Guidance v01:
SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time averaged power or maximum time-averaged ERP, whichever is greater. If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of λ/4. As for devices with antennas of length greater than λ/4 where the gain is not well defined, but always less than that of a half-wave dipole (length λ/2), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known. The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna. The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW). This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula as below:

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,\text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and ERP20cm is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

$$P_{\text{th}}\,(\text{mW}) = ERP_{20\,\text{cm}}\,(\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \qquad \text{(B. 1)}$$

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

---------- **The following blanks** ----------

4. ESTIMATION RESULT

4.1 MEASUREMENT RESULTS

Table 1 Antenna Specification

Frequency Band	Antenna type	Internal Identification	Maximum antenna gain (dBi)
BLE	PCB printed antenna 1	Antenna 1	0
BLE	PCB printed antenna 2	Antenna 2	0

Note: They are from the same BLE RF IC module divide to two antennas and they can not transmitting at the same time.

Table 2 Transmit Power for ERP & Maximum Conducted Output Average Power

Antenna type	Maximum Conducted output peak Power (dBm)	Maximum Conducted Output Average Power (dBm)	ERP (dBm)	Target Maximum Conducted Output Average Power (dBm)	Tolerance (dB)	Maximum Tune-up Maximum Conducted Output Average Power (dBm)
PCB printed antenna 1	6.15	3.45	1.30	3.0	±1	4.0
PCB printed antenna 2	8.09	2.93	0.78	2.0	±1	3.0

ERP of PCB printed antenna 1= Maximum Conducted Output Average Power + antenna gain -2.15= 3.45+0-2.15=1.30dBm

ERP of Ceramic chip antenna 2= Maximum Conducted Output Average Power + antenna gain -2.15= 2.93+0-2.15=0.78dBm

STANDALONE MPE

Mode	Antenna type	Frequency (MHz)	Maximum Tune-up Maximum Conducted Output Average Power (dBm)	Maximum Tune-up Maximum Conducted Output Average Power (mW)	Exemption Limit (mW)	Verdict
BLE	PCB printed antenna 1	2402	4.0	2.51	2.79	PASS
BLE	PCB printed antenna 2	2402	3.0	2.00	2.79	PASS

Remark:

1. Threshold Maximum Conducted Output Average Power (mW)=$(0.5/20)^{-\log(60/3060/\sqrt{f})}$= $(0.5/20)^{-\log(60/3060/\sqrt{2.402})}$=2.79mW.

5. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure of portable device.

---------- End of Report ----------