TEST REPORT

Product Name	**:**	**Control Box**
Model Number	**:**	**CB002**
FCC ID	**:**	**2BH8P-CB0XY**

Prepared for	:	Bluewater Sweden AB
Address	:	Danderydsgatan 11 11426 Stockholm Sweden
Prepared by	:	EMTEK (DONGGUAN) CO., LTD.
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Report Number	:	EDG2407290154E01203R
Date(s) of Tests	:	July 29, 2024 to September 06, 2024
Date of issue	:	September 06, 2024

Table of Contents

1. TEST RESULT CERTIFICATION

Applicant	:	Bluewater Sweden AB
Address	:	Danderydsgatan 11 11426 Stockholm Sweden
Manufacturer	:	Dongguan Filba Water Purification Technology Co., Ltd
Address	:	No. 5, Lian Xin Rd,Shang Jiao District, Chang’an Town, Dongguan City, Guangdong Province, China
EUT	:	Control Box
Model Name	:	CB002
Trademark	:	Bluewater

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
§ 15.247(i), § 2.1093,1.1307(b)(1)	**PASS**

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules FCC § 15.247(i), § 2.1093, 1.1307(b)(1).
The test results of this report relate only to the tested sample identified in this report

Date of Test : July 29, 2024 to September 06, 2024

Prepared by : Warren Deng /Editor

Reviewer : Galen Xiao /Supervisor

Approve & Authorized Signer : Sam Lv /Manager

Modified History

Version	Report No.	Revision Date	Summary
	EDG2407290154E01203R	/	Original Report

2. EUT Specification

Characteristics	Description
Product:	Control Box
Model Number:	CB002
Sample:	2#
Device Type:	BLE & SRD
Modulation:	GFSK for BLE GFSK for SRD
Operating Frequency Range(s) :	2405-2480 MHz for SRD 2402-2480 MHz for BLE
Number of Channels:	1 channel for SRD 40 channels for BLE
Transmit Power Max:	88.41dBuV@3m for SRD -2.37 dBm(0.000579 W) for BLE
Antenna Gain:	4.77 dBi for BLE 1.6 dBi for SRD
Power supply:	DC12V from Adapter
Evaluation applied:	☒ MPE Evaluation ☐ SAR Evaluation

3. Test Requirement:

RF EXPOSURE EVALUATION

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/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	**--**	**--**	**F/300**	**6**
1500-100000	**--**	**--**	**5**	**6**
(B) Limits for General Population/Uncontrol Exposures				
300-1500	**--**	**--**	**F/1500**	**6**
1500-100000	**--**	**--**	**1**	**30**

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= Numeric gain of the antenna relative to isotropic antenna

Pi=3.1416

R= distance between observation point and center of the radiator in cm

Pd the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the nd total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

According to ANSI C63.10-2013
9.5 Equations to calculate EIRP
Calculate the EIRP from the radiated field strength in the far field using Equation (22):
EIRP = E + 20log (d) −104.7 (22)
where
EIRP is the equivalent isotropically radiated power, in dBm
E is the field strength of the emission at the measurement distance, in dBμV/m
d is the measurement distance, in m

4. Measurement Result

Antenna gain:
BLE: 4.77 dBi
SRD: 1.6 dBi

BLE

Mode	Frequency (MHz)	Output Power(dBm)	E.I.R.P(dBm)	Target Power W/tolerance (dBm)	Max tune up power(dBm) tolerance	Max tuneup power(mW) tolerance	Power Density at R=20cm (mW/cm2)	Limit (mW/cm2)
1M	2402	-2.37	2.4	2±1	3	2.00	0.001190	1
	2440	-2.77	2.0	2±1	3	2.00	0.001190	1
	2480	-3.56	1.21	1±1	2	1.58	0.000946	1
2M	2402	-2.38	2.39	2±1	3	2.00	0.001190	1
	2440	-2.71	2.06	2±1	3	2.00	0.001190	1
	2480	-3.82	0.95	0±1	1	1.26	0.000751	1

According to KDB 447498, no stand-alone required for BLE antenna, and no simultaneous SAR measurement is required.

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,[30] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[31]
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following (also illustrated in Appendix B):[32]

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):[33]

1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/$f_{(MHz)}$)]

2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

3) SAR measurement procedures are not established below 100 MHz.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to quality for TCB approval.
One antenna is available for the EUT. The minimum separation distance is 5mm.

According to ANSI C63.10-2013
9.5 Equations to calculate EIRP
Calculate the EIRP from the radiated field strength in the far field using Equation (22):
EIRP = E + 20log (d) −104.7 (22)
where
EIRP is the equivalent isotropically radiated power, in dBm
E is the field strength of the emission at the measurement distance, in dBμV/m
d is the measurement distance, in m

2.4G SRD

Channel Freq. (MHz)	Max Field Strength (dBuV/m)	peak output power (dBm)	Tune upPower (dBm)	Max tune up power(dBm)	Calculation Result (mW/cm2)	Limit (mW/cm2)
2440	88.41	-5.75	-6±1	-5	0.00007920	1

Simultaneous launch

MAX Power Density at R=20cm (mW/cm2)

Wireless specification	BLE	2.4G SRD	2.4G WIFI	5GWIFI
MAX Power Density at R=20cm (mW/cm2)	0.001190	0.00007920		
business accounting	0.0012692	Limit (mW/cm2)	1	
Verdict	Pass			

According to KDB 447498 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines

*** End of Report ***