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RF Exposure Evaluation Report

Report No. :	CQASZ20210701182E-02
Applicant:	Shenzhen Inkbird Technology Co., Ltd.
Address of Applicant:	Floor 4th East, Building 713, Pengji Industrial Zone, LianTang ,Luohu District, Shenzhen, PRC.
Equipment Under Test (EUT):	
Product:	Bluetooth Pool Thermometer
Model No.:	IBS-T1, IBS-P01B, IBS-P02B, IBS-P03B
Test Model No.	IBS-P01B
Brand Name:	INKBIRD
FCC ID:	2AYZD-IBSP01B
Standards:	47 CFR Part 1.1307 47 CFR Part 2.1093 KDB447498D01 General RF Exposure Guidance v06
Date of Receipt:	2021-7-28
Date of Test:	2021-7-28 to 2021-8-5
Date of Issue:	2021-8-5
Test Result :	**PASS***

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

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Rock Huang

(Rock Huang)

Approved By:

(Jack Ai)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210701182E-02	Rev.01	Initial report	2021-8-5

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3 General Information

3.1 Client Information

Applicant:	Shenzhen Inkbird Technology Co., Ltd.
Address of Applicant:	Floor 4th East, Building 713, Pengji Industrial Zone, LianTang , Luohu District, Shenzhen, PRC.
Manufacturer:	Shenzhen Inkbird Technology Co., Ltd.
Address of Manufacturer:	Floor 4th East, Building 713, Pengji Industrial Zone, LianTang , Luohu District, Shenzhen, PRC.
Factory:	Shenzhen Inkbird Technology Co., Ltd.
Address of Factory:	Floor 4th East, Building 713, Pengji Industrial Zone, LianTang , Luohu District, Shenzhen, PRC.

3.2 General Description of EUT

Product Name:	Bluetooth Pool Thermometer
Model No.:	IBS-T1, IBS-P01B, IBS-P02B, IBS-P03B
Test Model No.:	IBS-P01B
Trade Mark:	INKBIRD
Hardware Version:	REV 2.0
Software Version:	REV 2.2
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.0
Modulation Type:	GFSK
Transfer Rate:	1Mbps, 2Mbps
Number of Channel:	40
Product Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	DhyPluskit
Antenna Type:	Integral antenna
Antenna Gain:	2.5dBi
EUT Power Supply:	This test EUT is powered by 2*AAA size batteries.

Note:

Model No.: IBS-T1, IBS-P01B, IBS-P02B, IBS-P03B
Only the model IBS-P01B was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 MPE Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure Evaluation standalone operations

1) For BT Classic (for CSR chip)

Antenna Gain: 2.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.778 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.49	1.5±1	2.5	1.778
Middle(2441MHz)	3.19	2.5±1	3.5	2.239
Highest(2480MHz)	3.59	3.0±1	4	2.512
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.64	2±1	3	1.995
Middle(2441MHz)	3.36	2.5±1	3.5	2.239
Highest(2480MHz)	3.34	3.5±1	3.5	2.239

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
2.512	2.5	0.00089	1.0	PASS

Note: 1) Refer to report No. CQASZ20210701124-01E for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(2.512*1.778)/(4*3.1416*20^2)=0.00089mW/cm^2$