TEST REPORT

Reference No.	:	WTF22D09183192W005
FCC ID	:	2A6J9E120-FCWP
Applicant	:	Bkav Corporation
Address	:	2nd Floor, HH1 Building, Yen Hoa Ward, Cau Giay District, Ha Noi, 100000 Vietnam
Manufacturer	:	Bkav Corporation
Address	:	2nd Floor, HH1 Building, Yen Hoa Ward, Cau Giay District, Ha Noi, 100000 Vietnam
Product	:	AI Box
Model(s)	:	E120-FCWP
Standards	:	47CFR FCC Part 2 Subpart J Section 2.1091
Date of Receipt sample	:	2022-09-13
Date of Test	:	2022-09-13 to 2022-10-08
Date of Issue	:	2022-10-09
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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2. Contents

Page

1 COVER PAGE 1
2. CONTENTS 2
3. REVISION HISTORY 3
4. GENERAL INFORMATION 4
4.1. General Description of E.U.T. 4
4.2. Details of E.U.T. 4
4.3. Test Facility 5
4.4. Subcontracted 5
4.5. Abnormalities from Standard Conditions 5
5. TEST SUMMARY 6
6. RF EXPOSURE 7
6.1. Requirements 7
6.2. The procedures / limit 7
6.3. MPE Calculation Method 7
6.4. Radio Frequency Radiation Exposure Evaluation 7

3. Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF22D09183192W005	2022-09-13	2022-09-13 to 2022-10-08	2022-10-09	Original	-	Valid

4. General Information

4.1. General Description of E.U.T.

Product:	AI Box
Model(s):	E120-FCWP
Model Description:	N/A
Bluetooth Version:	Bluetooth v5.0 with BLE
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40 5G-802.11a/ n(HT20/40)/ac (HT20/40/80)
Hardware Version:	V2.0.1
Software Version:	1.0.0.5

4.2. Details of E.U.T.

Operation Frequency:	Bluetooth: 2402-2480MHz, 79 Channels BLE: 2402-2480MHz, 40 Channels 2.4G Wi-Fi: 802.11b/g/n (HT20), 2412-2462MHz 11CH 802.11n (HT40), 2422-2452MHz 7CH 5G Wi-Fi: U-NII-1 802.11a/n(HT20)/ac (HT20), 5180-5240MHz 4CH 802.11n(HT40)/ac (HT40), 5190-5230MHz 2CH 802.11ac (HT80), 5210MHz 1CH U-NII-3 802.11a/n(HT20)/ac (HT20), 5745-5825MHz 5CH 802.11n(HT40)/ac (HT40), 5755-5795MHz 2CH 802.11ac (HT80), 5775MHz 1CH
Max. RF output power:	Bluetooth: 1.24dBm, BLE: 5.98dBm 2.4G Wi-Fi: Ant. 1 15.48dBm, Ant.2 15.24dBm, Total: 17.77dBm Max. 5G Wi-Fi: Ant. 1 16.43, Ant.2 16.38, Total: 19.34dBm Max.
Modulation Technology:	Bluetooth: GFSK, π/4DQPSK, 8DPSK BLE: GFSK Wi-Fi: 802.11b: DBPSK, DQPSK, CCK 802.11a/g: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Antenna installation:	External antenna with RP-SMA connector
Antenna Gain:	Bluetooth/BLE/2.4G Wi-Fi: Max. peak 2.2dBi, 5G Wi-Fi: Max. peak 3.7dBi
Ratings:	DC12V 1A/PoE
Adapter:	Manufacturer: XING YUAN ELECTRONICS CO., LTD Model No.: XY12J-1201000Q-UW Input: 100-240VAC, 0.5A Max. 50/60Hz Output: 12V ⎓ 1.0A

4.3. Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.4. Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.5. Abnormalities from Standard Conditions

None.

5. Test Summary

Test Items	Test Requirement	Result
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	FCC Part 2.1091	PASS

6. RF Exposure

Test Requirement: 47CFR FCC Part 2 Subpart J Section 2.1091
Evaluation Method: 47CFR FCC Part 1 Subpart I Section 1.1307
47CFR FCC Part 1 Subpart I Section 1.1310,
KDB 447498 D04 General RF Exposure Guidance v06

6.1. Requirements

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 levels in excess limit for maximum permissible exposure. In accordance with 47CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

6.2. Limit

Table 1 to § 1.1310(e)(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)
(i) Limits for Occupational/Controlled Exposure				
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	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

6.3. MPE Calculation Method

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = output power to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

From the peak EUT RF output power, the minimum mobile separation distance, R=20cm, as well as the gain of the used antenna, the RF power density can be obtained

6.4. Simultaneous transmissions Exemption Thresholds

47CFR Part 1.1307 determination of exemption, details three options to determine exemption from routine evaluation.

Option A
1.1307(b)(3)(i)(A): Available maximum time-averaged power is no more than 1 mW
Limitation–when there are simultaneously operating transmitters this exclusion only applies when ALL simultaneously operating transmitters meet this exemption.

Option B
1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= P_{th}.
P_{th} is calculated based on separation distance d cm from transmitter to person for the device operating at f GHz.

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

Where

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

and

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

d = the separation distance (cm);

Option C
1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ/ 2 π.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.
Note: R in meters, f in MHz	

According to 47CFR 1.1307(b)(3)(ii), the calculation formula is as follow:

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

6.5. Radiofrequency Radiation Exposure Evaluation

MPE of single source

Band	Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm^2)	Limit (mW/cm^2)
Blue-tooth (Ant. 1)	2.2	1.660	1.24	1.33	0.000439	1.0
BLE (Ant. 1)	2.2	1.660	5.98	3.96	0.001308	1.0
2.4G Wi-Fi (Ant. 1)	2.2	1.660	15.48	35.32	0.011661	1.0
2.4G Wi-Fi (Ant. 2)	2.2	1.660	15.24	33.42	0.011034	1.0
5G Wi-Fi (Ant. 1)	3.7	2.344	16.43	43.95	0.020498	1.0
5G Wi-Fi (Ant. 2)	3.7	2.344	16.38	43.45	0.020264	1.0

Simultaneous Transmissions Exemption Thresholds

Option B is applicable.

Description	Frequency GHz	Conducted Power dBm	Gain dBi	EIRP mW	ERP mW	Option B mW	Ratio of Option B
Blue-tooth (Ant. 1) GFSK TX	2.4020	1.24	2.20	2.21	1.35	3060.00	0.00044
BLE (Ant. 1) GFSK TX	2.4800	5.98	2.20	6.58	4.01	3060.00	0.00131
2.4G Wi-Fi (Ant. 2) 802.11b TX	2.4120	15.24	2.20	55.46	33.82	3060.00	0.01105
5G Wi-Fi (Ant. 2) 802.11a TX	5.2400	16.38	3.70	101.86	62.11	3060.00	0.02030
2.4G Wi-Fi (Ant. 1) 802.11n HT20 TX	2.4120	15.00	2.20	52.48	32.00	3060.00	0.01046
2.4G Wi-Fi (Ant. 2) 802.11n HT20 TX	2.4120	14.51	2.20	46.88	28.59	3060.00	0.00934
5G Wi-Fi (Ant. 1) 802.11n HT20 TX	5.2400	16.39	3.70	102.09	62.25	3060.00	0.02034
5G Wi-Fi (Ant. 2) 802.11n HT20 TX	5.2400	16.27	3.70	99.31	60.56	3060.00	0.01979

Description	Calculation	Limit
2.4GWi-Fi Ant. 1 + Ant. 2	0.02151	≤1.0
5GWi-Fi Ant. 1 + Ant. 2	0.04013	≤1.0
2.4GWi-Fi (Ant. 2) + Blue-tooth (Ant. 1)	0.00978	≤1.0
2.4GWi-Fi (Ant. 2) + BLE (Ant. 1)	0.01065	≤1.0
5GWi-Fi (Ant. 2) + Blue-tooth (Ant. 1)	0.02023	≤1.0
5GWi-Fi (Ant. 2) + BLE (Ant. 1)	0.02110	≤1.0

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. WLAN and Bluetooth/BLE share the same antenna (Ant. 1), and this antenna can't transmit WLAN and Bluetooth/BLE simultaneously.
4. 2.4G Wi-Fi and 5G Wi-Fi can't transmit simultaneously.

Conclusion:

RF Exposure is FCC compliant.

======End of Report======