RF EXPOSURE REPORT

For

AKUVOX (XIAMEN) NETWORKS CO., LTD.

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FCC ID: 2AHCR-PH81

Report Type:	**Product Name:**
Original Report	HyPanel Ultra

Report Number:	2407T76694E-RF-05
Report Date:	2024-12-30
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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	2407T76694E-RF-05	R1V1	2024-12-30	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:	HyPanel Ultra
Tested Model:	PH81
Power Supply:	DC 12-24V
Maximum Output Power:	**Classic BT:** 5.45dBm **BLE:** 6.18dBm **2.4G WIFI:** 21.77dBm **Zigbee:** 8.16 dBm **5G WIFI:** 14.97 dBm in 5150-5250 MHz Band; 15.31 dBm in 5250-5350 MHz Band; 13.38 dBm in 5470-5725 MHz Band; 9.95 dBm in 5725-5850 MHz Band
Operating Band/Frequency:	**Classic BT:** 2402-2480 MHz **BLE:** 2402-2480MHz **2.4G WIFI:** 802.11b/g/n20: 2412-2462 MHz; 802.11n40: 2422-2452 MHz **Zigbee:** 2405-2480 MHz **5G WIFI:** **Band1:** 5180-5240 MHz (802.11a/n ht20/ac vht20) 5190-5230 MHz(802.11n ht40/ac vht40) 5210 MHz(802.11ac vht80) **Band2:** 5260-5320 MHz (802.11a/n ht20/ac vht20) 5270-5310 MHz(802.11n ht40/ac vht40) 5290 MHz(802.11ac vht80) **Band3:** 5500-5720 MHz (802.11a/n ht20/ac vht20) 5510-5710 MHz(802.11n ht40/ac vht40) 5530-5690MHz(802.11ac vht80) **Band4:** 5745-5825 MHz (802.11a/n ht20/ac vht20) 5755-5795 MHz(802.11n ht40/ac vht40) 5775 MHz(802.11ac vht80)
Antenna Type:	FPC Antenna
★Maximum Antenna Gain:	**Classic BT:** -3.5 dBi **BLE:** -3.5dBi **2.4G WIFI:** -3.5dBi **Zigbee:** -3.0dBi **5G WIFI:** Band1: 1.4dBi Band2: 0.3dBi Band3: -2.8dBi Band4: -3.6dBi
EUT Received Status:	Good

Note:
1. The Maximum Antenna Gain was declared by manufacturer.
2. All measurement and test data in this report was gathered from production sample serial number: 2LM0-1. (Assigned by the BACL(Xiamen). The EUT supplied by the applicant was received on 2024-05-20)

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to FCC §1.1307(b)(1) & §2.1091, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Limits for Maximum Permissible Exposure (MPE)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
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; * = Plane-wave equivalent power density;
According to §1.1307(b)(1) & §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input 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);

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data

Mode	Frequency (MHz)	Antenna Gain		Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limt (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G Wi-Fi	2412-2472	-3.5	0.45	22	158.49	20	0.0142	1
BLE	2402-2480	-3.5	0.45	6.5	4.47	20	0.0004	1
BT	2402-2480	-3.5	0.45	5.5	3.55	20	0.0003	1
Zigbee	2405-2480	-3.0	0.50	8.5	7.08	20	0.0007	1
5.2G Wi-Fi	5150-5250	1.4	1.38	15	31.62	20	0.0088	1
5.3G Wi-Fi	5250-5350	0.3	1.07	15.5	35.48	20	0.0076	1
5.5G Wi-Fi	5470-5725	-2.8	0.52	13.5	22.39	20	0.0023	1
5.8G Wi-Fi	5725-5850	-3.6	0.44	10	10	20	0.0009	1

Note: 1. The Tune-up output power was declared by the Manufacturer.

Simulatneous transmission:

Zigbee and Bluetooth/BLE/2.4G Wi-Fi/5G Wi-Fi can transmit simultaneously.

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

$= S_{Zigbee} / S_{limit\text{-}Zigbee} + S_{2.4G\ Wi\text{-}Fi} / S_{limit\text{-}2.4G\ Wi\text{-}Fi}$

=0.0007/1+0.0142/1

=0.0149

＜1.0

Result: The device meets MPE at distance 20cm.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

******* END OF REPORT *******