FCC RF EXPOSURE REPORT

FCC ID: 2A3BD-OSRDP01

Project No.	:	2403C222A
Equipment	:	AI Service Robot
Brand Name	:	ORIONSTAR
Test Model	:	OS-R-DP01
Series Model	:	N/A
Applicant	:	Beijing Orion Star Technology Co., Ltd
Address	:	Room A-2570, 2nd Floor, No. 30, Shixing Street, Shijingshan District, Beijing, P.R. China
Manufacturer	:	Beijing Orion Star Technology Co., Ltd
Address	:	Room A-2570, 2nd Floor, No. 30, Shixing Street, Shijingshan District, Beijing, P.R. China
Factory	:	Guangdong Mingji Hi-Tech Electronics Co.,Ltd
Address	:	No.12 Changfu Road,Qinghutou,Tangxia Town,Dongguan,Guangdong, China
Date of Receipt	:	May 16, 2024
Date of Test	:	Jun. 11, 2024 ~ Jul. 25, 2024
Issued Date	:	Oct. 30, 2024
Report Version	:	R01
Test Sample	:	Engineering Sample No.: DG20240516219-3
Standard(s)	:	FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091 FCC Title 47 Part 2.1091 & KDB 447498 D01 v06

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-3-2403C222A	R00	Original Report.	Jul. 31, 2024	Invalid
BTL-FCCP-3-2403C222A	R01	Modified the comments.	Oct. 16, 2024	Valid

1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

where:
S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

2. ANTENNA SPECIFICATION

For 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	SPEED	N/A	FPC	N/A	0.37
2	SPEED	N/A	FPC	N/A	1.32

Note:
1) This EUT supports CDD, and all antenna gains are not equal, Directional gain = G_{ANT}+Array Gain. For power measurements, Array Gain=0dB ($N_{ANT} \leq 4$), so the Directional gain=1.32.
2) The antenna gain is provided by the manufacturer.

For 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	SPEED	N/A	FPC	N/A	1.55
2	SPEED	N/A	FPC	N/A	2.88

Note:
1) This EUT supports CDD, and all antenna gains are not equal, Directional gain = G_{ANT}+Array Gain. For power measurements, Array Gain=0dB ($N_{ANT} \leq 4$), so the Directional gain=2.88.
2) The antenna gain is provided by the manufacturer.

3. TABLE FOR ANTENNA CONFIGURATION

For 2.4GHz:

Operating Mode / TX Mode	2TX
IEEE 802.11b	V(Ant. 1 + Ant. 2)
IEEE 802.11g	V(Ant. 1 + Ant. 2)
IEEE 802.11n(HT20)	V(Ant. 1 + Ant. 2)

For 5GHz:

Operating Mode / TX Mode	2TX
IEEE 802.11a	V (Ant. 1 + Ant. 2)
IEEE 802.11n(HT20)	V (Ant. 1 + Ant. 2)
IEEE 802.11n(HT40)	V (Ant. 1 + Ant. 2)
IEEE 802.11ac(VHT20)	V (Ant. 1 + Ant. 2)
IEEE 802.11ac(VHT40)	V (Ant. 1 + Ant. 2)
IEEE 802.11ac(VHT80)	V (Ant. 1 + Ant. 2)

4. CALCULATED RESULT

For RF Module Model: Thundersoft TurboX D845 SOM

For 2.4GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.32	1.3552	23.77	238.2319	0.06426	1	Complies

For 5GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2.88	1.9409	14.33	27.1019	0.01047	1	Complies

For the max simultaneous transmission MPE:

Ratio		Total	Limit of Ratio	Test Result
2.4GHz	5GHz			
0.06426	0.01047	0.07473	1	Complies

For RF Module Model: ESPWROOM32UE

For BT:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2.33	1.7100	6	0.00204	1	Complies

For LE:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2.33	1.7100	3	0.00095	1	Complies

For 2.4GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2.33	1.7100	261	0.08233	1	Complies

Note:
(1) The calculated distance is 20 cm.
(2) RF Module Model: Thundersoft TurboX D845 SOM and RF Module Model: ESPWROOM32UE cannot work at the same time.

End of Test Report