

RF Exposure evaluation

Product Name : Auto Water Turn-Off System
Brand Name : AWTOS
Model : AW100WV02
Series Model : AW075WV02
FCC ID : 2BPRH-AW100WV02
Applicant : **Orion180 Technologies LLC**
Address : 930 S.Harbor City Blvd., Suite 500 Melbourne, FL 32901
Manufacturer : **Orion180 Technologies LLC**
Address : 930 S.Harbor City Blvd., Suite 500 Melbourne, FL 32901
Standard(s) : 47CFR §1.1310, 47CFR §2.1091
KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt : Apr. 25, 2025
Date of Test : Apr. 26, 2025~ May. 13, 2025
Issued Date : May. 13, 2025

Issued By: **Guangdong Asia Hongke Test Technology Limited**
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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Guangdong Asia Hongke Test Technology Limited. If there is a need to alter or revise this document, the right belongs to Guangdong Asia Hongke Test Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.



Report Revise Record

Report Version	Issued Date	Notes
M1	May. 13, 2025	Initial Release

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1 GENERAL INFORMATION

1.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

1.2 General Description of EUT

Product Name:	Auto Water Turn-Off System
Model/Type reference:	AW100WV02
Serial Model:	AW075WV02
Different modes:	Except for the different models, everything else is the same.
Power Rating:	Input: DC 5V
Adapter:	Mode: CW0502000US Input: 100-240V~50/60Hz 0.4AMAX Output: 5.0V/0.2A
Hardware Version:	N/A
Software Version:	N/A
Sample(s) Status:	AiTSZ-250425002 -1(Normal sample) AiTSZ-250425002 -2(Engineer sample)
Bluetooth :	
Supported type:	Bluetooth BLE 1M
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	2MHz
Antenna type:	Dual copper tube antenna
Antenna gain:	0.65dBi
2.4G WIFI:	
Supported type:	802.11b/802.11g /802.11n(HT20)/802.11n(HT40)
Modulation:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7
Channel separation:	5MHz
Antenna type:	Dual copper tube antenna
Antenna gain:	0.65dBi

5G WIFI:				
Supported type:	20MHz system	40MHz system	80MHz system	160MHz system
	802.11a 802.11n	802.11n	N/A	N/A
Operation frequency:	5180-5240MHz 5745-5825MHz	5190-5230MHz 5755-5795MHz	N/A	N/A
Modulation:	OFDM	OFDM	N/A	N/A
Channel number:	9	4	N/A	N/A
Channel separation:	20MHz	40MHz	N/A	N/A
Antenna type:	Dual copper tube antenna			
Antenna gain:	5.2G WIFI:1.40 dBi 5.8G WIFI:1.36 dBi			

1.3 Test Facility

Test Laboratory:

Guangdong Asia Hongke Test Technology Limited

B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:

FCC-Registration No.: 251906 Designation Number: CN1376

Guangdong Asia Hongke Test Technology Limited 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.

IC —Registration No.: 31737 CAB identifier: CN0165

The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01

Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Guangdong Asia Hongke Test Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	150KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30Hz ± 3.10 dB	(1)
Radiated Emission	9KHz~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz~40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	$\pm 1^{\circ}\text{C}$	(1)
Humidity	$\pm 3\%$	(1)
DC and low frequency voltages	$\pm 1.5\%$	(1)
Time	$\pm 2\%$	(1)
Duty cycle	$\pm 2\%$	(1)
Bandwidth	$\pm 1.5 \times 10^{-6}$	(1)

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

2 Method of measurement

2.1 Applicable Standard

According to §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.

According to §1.1310 and §2.1091 RF exposure is calculated.

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures

2.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f)*	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

2.3 MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to 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

2.4 Manufacturing Tolerance

Frequency (MHz)	BLE-1M(Peak)		
	2402	2440	2480
Target (dBm)	1.5	1.0	1.0
Tolerance ± (dB)	1	1	1
Frequency (MHz)	BLE-2M(Peak)		
	2402	2440	2480
Target (dBm)	1.5	1.0	1.0
Tolerance ± (dB)	1	1	1

Frequency (MHz)	2.4G WIFI-IEEE 802.11b (Peak)		
	2412	2437	2462
Target (dBm)	15.0	16.0	15.5
Tolerance ± (dB)	1	1	1
Frequency (MHz)	2.4G WIFI-IEEE 802.11g (Peak)		
	2412	2437	2462
Target (dBm)	17.0	17.0	16.5
Tolerance ± (dB)	1	1	1
Frequency (MHz)	2.4G WIFI-IEEE 802.11n_20 (Peak)		
	2412	2437	2462
Target (dBm)	16.0	17.0	17.0
Tolerance ± (dB)	1	1	1
Frequency (MHz)	2.4G WIFI-IEEE 802.11n_40 (Peak)		
	2412	2437	2462
Target (dBm)	17.0	17.0	16.0
Tolerance ± (dB)	1	1	1

Frequency (MHz)	5.2G WIFI- IEEE 802.11a		
	5180	5200	5240
Target (dBm)	7.0	7.5	8.5
Tolerance ± (dB)	1	1	1
Frequency (MHz)	5.2G WIFI- IEEE 802.11n_20		
	5180	5200	5240
Target (dBm)	9.0	9.0	8.5
Tolerance ± (dB)	1	1	1
Frequency (MHz)	5.2G WIFI- IEEE 802.11n_40		
	5190	5230	/
Target (dBm)	8.5	8.5	/
Tolerance ± (dB)	1	1	/

Frequency (MHz)	5.8G WIFI- IEEE 802.11a		
	5745	5785	5825
Target (dBm)	10.0	10.0	10.0
Tolerance \pm (dB)	1	1	1
Frequency (MHz)	5.8G WIFI- IEEE 802.11n 20		
	5745	5785	5825
Target (dBm)	9.0	9.5	10.0
Tolerance \pm (dB)	1	1	1
Frequency (MHz)	5.8G WIFI- IEEE 802.11n 40		
	5825	5755	/
Target (dBm)	9.0	9.5	/
Tolerance \pm (dB)	1	1	/

2.5 Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna is refer to section 4, the RF power density can be obtained.

Modulation Type	Output power with tune_up		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
2.4G BLE	2.5	1.78	0.65	1.16	0.0004	1
2.4G WIFI	18	63.10	0.65	1.16	0.0082	1
5G WIFI	11	12.95	1.36	1.37	0.0035	1

Remark:

1. Output power (Peak) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

2.6 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

***** End of Report *****