



# TEST REPORT

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**1. Client**

- Name : Uniden America Corporation
- Address : 301 International Parkway, Suite 460 Flower Mound, TX 75022
- Date of Receipt : 2023-11-15

**2. Use of Report** : Certification

**3. Name of Product / Model** : Wi-Fi Bluetooth Combo Module / WBM0

**4. Manufacturer / Country of Origin** : ATTOWAVE CO., LTD / Korea

**5. FCC ID** : AMWUA2404

**5. Date of Test** : 2023-11-27 to 2023-12-07

**6. Location of Test** :  Permanent Testing Lab  On Site Testing  
 (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

**7. Test method used** : Part 1.1310

**8. Test Result** : Refer to the test result in the test report

<p>Affirmation</p>	<p>Tested by                   Name : Narae Kang (Signature)</p>	<p>Technical Manager                   Name : Seungyong Kim (Signature)</p>
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2023-12-12

**Eurofins KCTL Co.,Ltd.**

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

**REPORT REVISION HISTORY**

Date	Revision	Page No
2023-12-12	Originally issued	-

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**General remarks for test reports**

**Statement concerning the uncertainty of the measurement systems used for the tests**

(may be required by the product standard or client)

**Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

**Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

**Statement not required by the standard or client used for type testing**

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## 1. General information

Client : Uniden America Corporation  
 Address : 301 International Parkway, Suite 460 Flower Mound, TX 75022  
 Manufacturer : ATTOWAVE CO., LTD  
 Address : 1005, 10F Leader's Tower, 286, Beotkkot-ro, Geumcheon-gu, South Korea 08511  
 Laboratory : Eurofins KCTL Co.,Ltd.  
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea  
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132  
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056  
 CAB Identifier: KR0040  
 ISED Number: 8035A  
 KOLAS No.: KT231

## 2. Device information

Equipment under test : Wi-Fi Bluetooth Combo Module  
 Model : WBM0  
 Modulation technique : Bluetooth(BLE) : GFSK  
 WIFI(802.11b/g/n) : DSSS, OFDM  
 Number of channels : BLE : 40 ch  
 2.4 GHz WALN : 11 ch (20 MHz), 7 ch (40 MHz)  
 Power source : DC 3.3 V  
 Antenna specification : PCB Antenna  
 Antenna gain : BLE/2.4 GHz WALN : 1.19 dBi  
 Frequency range : Bluetooth(BLE) : 2 402 MHz ~ 2 480 MHz  
 2.4 GHz WALN : 2 412 MHz ~ 2 462 MHz (802.11b/g/n\_HT20)  
 2 422 MHz ~ 2 452 MHz (802.11n\_HT40)  
 Software version : WBM0.SW.REV.1.3  
 Hardware version : WBM0.REV.B  
 Test device serial No. : N/A  
 Operation temperature : -20 °C ~ 80 °C

## 2.1. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BLE), WLAN 2.4 GHz(802.11b/g/n\_HT20/HT40)

Ch.	Frequency (MHz)
00	2 402
⋮	⋮
19	2 440
⋮	⋮
39	2 480

Table 2.1.1. Bluetooth Low Energy

Ch.	Frequency (MHz)
01	2 412
⋮	⋮
07	2 437
⋮	⋮
11	2 462

Table 2.1.2. 802.11b/g/n\_HT20 mode

Ch.	Frequency (MHz)
03	2 422
⋮	⋮
07	2 437
⋮	⋮
09	2 452

Table 2.1.3. 802.11n\_HT40 mode

### 3. Antenna requirement

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty ( $\pm$ )
Conducted RF power	0.9 dB

### 4. RF Exposure

#### Regulation

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(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 <sup>2</sup> ]	Averaging Time [minute]
(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 <sup>2</sup> )	<6
30 ~ 300	61.4	0.163	1.0	<6
300 ~ 1 500	/	/	f/300	<6
1 500 ~ 15 000	/	/	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 <sup>2</sup> )	<30
30 ~ 300	27.5	0.073	0.2	<30
300 ~ 1 500	/	/	f/1 500	<30
1 500 ~ 15 000	/	/	1.0	<30

$f$ =frequency in MHz,  $*$ = plane-wave equivalent power density

## 4.1. Test results

### MPE (Maximum Permissible Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad (\Rightarrow R = \sqrt{PG / 4\pi S})$$

S = power density [ $\text{mW}/\text{cm}^2$ ]

P = Power input to antenna [ $\text{mW}$ ]

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 [ $\text{cm}$ ]

### Calculation Result of RF exposure

Maximum tune-up tolerance

Mode	Frequency [MHz]	Max. Tune-up Power [dBm]	Max. Tune-up Power [mW]	Ant. Gain [dBi]	Power density at 20 cm [ $\text{mW}/\text{cm}^2$ ]	Limit [ $\text{mW}/\text{cm}^2$ ]
BLE	2 440	10.00	10.00	1.19	0.002 62	1.000 00
WIFI_802.11b	2 462	8.00	6.31		0.001 65	1.000 00
WIFI_802.11g	2 462	11.00	12.59		0.003 29	1.000 00
WIFI_802.11n HT20	2 462	12.00	15.85		0.004 15	1.000 00
WIFI_802.11n HT40	2 452	10.00	10.00		0.002 62	1.000 00

#### Note.

1. The power density  $P_d$  at a distance of 20 cm calculated from the friis transmission Formula is far below the limit of 1  $\text{mW}/\text{cm}^2$ .

**End of test report**