



# TEST REPORT

<b>KCTL Inc.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a>	Report No.: KR21-SRF0169 Page (1) of (7)	
<b>1. Client</b>		
<ul style="list-style-type: none"> <li>◦ Name : ATTOWAVE Co., Ltd.</li> <li>◦ Address : 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801 Korea</li> <li>◦ Date of Receipt : 2021-07-02</li> </ul>		
<b>2. Use of Report</b> : Class II Permissive change		
<b>3. Name of Product / Model</b> : Bluetooth Module / BTM0		
<b>4. Manufacturer / Country of Origin</b> : ATTOWAVE Co., Ltd. / Korea		
<b>5. FCC ID</b> : W75-BTM0		
<b>6. Date of Test</b> : 2021-08-04 to 2021-08-06		
<b>7. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)		
<b>8. Test method used</b> : FCC Part 15 Subpart C, 15.247		
<b>9. Test Result</b> : Refer to the test result in the test report		
Affirmation	Tested by  Name : Yoonsuk Choi (Signature)	Technical Manager  Name : Heesu Ahn (Signature)
<div style="text-align: right;">2021-08-09</div>		
<div style="text-align: center;"><b>KCTL Inc.</b></div>		
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 KCTL Inc.		

**Report revision history**

Date	Revision	Page No
2021-08-09	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 : ATTOWAVE Co., Ltd.  
 Address : 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801  
 Korea  
 Manufacturer : ATTOWAVE Co., Ltd.  
 Address : 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801  
 Korea  
 Laboratory : KCTL Inc.  
 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 : Bluetooth Module  
 Model : BTM0  
 Frequency range : 2 402 MHz ~ 2 480 MHz (Bluetooth (BLE))  
 Modulation technique : Bluetooth(BLE)\_GFSK  
 Number of channels : Bluetooth(BLE)\_40ch  
 Power source : DC 3.3 V  
 Antenna specification : Micro-strip Antenna  
 Antenna gain : -0.106 dBi  
 Software version : V1.00  
 Hardware version : B  
 Test device serial No. : N/A  
 Operation temperature : -30 °C ~ 85 °C

### 2.1. Host device information

Product Name	Model Name	FCC ID
RADAR DETECTOR <sup>1)</sup>	DS1	2AZ4TDS1
RADAR DETECTOR <sup>2)</sup>	R4	AMWUA2101

**Note:** The EUT is authorized for use in specific End-product.

1) Host1

2) Host2

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**KCTL****2.2. Frequency/channel operations**

This device contains the following capabilities:

Bluetooth Low Energy

Ch.	Frequency (MHz)
00	2 402
.	.
19	2 442
.	.
39	2 480

Table 2.2.1. Bluetooth Low Energy

**3. Measurement uncertainty**

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 indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  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

### FCC

#### 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]
(A) 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
(B) 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

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100 kHz

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### 4.1. Test results

#### FCC

#### 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 (FCC)

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 [mW/cm <sup>2</sup> ]	Limit [mW/cm <sup>2</sup> ]
BLE/1 Mbps	2 480	-1.00	1.00	-0.106	0.000 15	1.000 00

#### Note.

1. The power density  $P_d$  (5th column) 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**