



TEST REPORT

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR20-SRF0280-A

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KCTL

1. Client

- Name : ATTOWAVE Co., Ltd.
- Address : 1005, 10F Leader's Tower, 60-15 Gasan-dong, Gumchun-gu, Seoul, 153-801 Korea
- Date of Receipt : 2020-09-21

2. Use of Report : Certification

3. Name of Product and Model : Bluetooth Module / BTM0

4. Manufacturer and Country of Origin : ATTOWAVE Co., Ltd. / Korea

5. FCC ID : W75-BTM0

6. Date of Test : 2020-09-25 to 2020-10-13

7. Test Standards : 47 CFR Part 1.1310

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Hosung Lee  (Signature)	Name : Heesu Ahn  (Signature)

2020-11-12

KCTL Inc.

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
2020-11-09	Originally issued	-
2020-11-12	Updated host device information	4

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General remarks for test reports

Nothing significant to report.



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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
 Industry Canada Registration No. : 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	ODIN C-497	QKK-ODN

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

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 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	1.23 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 ²]	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 ²	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 ²	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

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 [mW/cm^2]

P = Power input to antenna [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 [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 ²]	Limit [mW/cm ²]
BLE/1 Mbps	2 480	-1.00	0.79	-0.10	0.000 15	1.000 00

Note.

- 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 mW/cm^2 .

End of test report