

RF EXPOSURE REPORT

FOR

Applicant	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.
Equipment under Test	:	Modem
Model No.	:	Modem v5.1
Trade Mark	:	/
FCC ID	:	2AL2L-MODEM51
Manufacturer	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park,
Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, **E-mail:** ddt@dgddt.com, <http://www.dgddt.com>

REPORT

Table of Contents

	Test report declares.....	3
1.	General Information	5
1.1.	Description of equipment	5
1.2.	Antenna specifications	5
1.3.	Assess laboratory	5
2.	RF Exposure Evaluation	5
2.1.	Requirement.....	5
2.2.	Calculation method.....	6
2.3.	Estimation result.....	6

Test Report Declare

Applicant	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.
Equipment under Test	:	Modem
Model No.	:	Modem v5.1
Trade mark	:	/
Manufacturer	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.

Standard Used: KDB447498 D01 General RF Exposure Guidance v06

We Declare:

The equipment described above is assessed by Dongguan Dongdian Testing Service Co., Ltd and in the configuration assessed the equipment complied with the standards specified above. The assessed results are contained in this report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these assess.

After evaluation, our opinion is that the equipment In Accordance with above standard.

Report No:	DDT-R20081303-1E3		
Date of Receipt:	Aug. 24, 2020	Date of Test:	Aug. 24, 2020 ~ Oct. 29, 2020

Prepared By:

Sam Li

Sam Li/Engineer

Approved By:



Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Oct. 29, 2020	

1. General Information

1.1. Description of equipment

EUT* Name	: Modem
Model Number	: Modem v5.1
EUT function description	: Please reference user manual of this device
Power Supply	: DC 5V
Operation frequency	: For 38 kbps: 902.2-927.6 MHz : For 153 kbps & 400 kbps: 902.6-927.2 MHz
Modulation	: GFSK
Transfer Rate	: 38 kbps, 153 kbps, 400 kbps
Serial Number	: N/A

1.2. Antenna specifications

Antenna Type	Gain (dBi)
Helical antenna	0
Helical antenna	6

1.3. Assess laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City,
Guangdong Province, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Registration No. CNAS L6451; A2LA Certificate Number: 3870.01;

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada Site Registration Number: 10288A-1

2. RF Exposure Evaluation

2.1. Requirement

Systems operating under the provisions of FCC 47 CFR 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.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2 m normally can be maintained between the user and

the device, and below RF Permissible Exposure limit shall comply with.

Limits for General Population/Uncontrolled Exposure

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	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

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2. Calculation method

$$E(\text{V/m}) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } S(\text{mW/cm}^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)=

d = Separation distance between radiator and human body (m)

The formula can be changed to

We can change the formula to:

$$S = \frac{30 \times P \times G}{377 \times d^2} \quad \text{or, } d = \sqrt{\frac{30 \times P \times G}{377 \times S}}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2 m, as well as the gain of the used antenna, the RF power density can be obtained.

2.3. Estimation result

Mode	PK Output power (dBm)	Output power (mW)	Antenna Gain (dBi)	Antenna Gain (linear)	MPE Values (mW/cm ²)	MPE Limit (mW/cm ²)
Bluetooth Max power	13	19.95	6	3.98	0.016	0.601

Note: The estimation distance is 20 cm

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