MPE TEST REPORT

Applicant	Monimoto UAB
FCC ID	2AU3KMM9U-5
Product	GPS tracker
Brand	MONIMOTO
Model	MM9U-5
Report No.	R2310A1102-M1
Issue Date	December 12, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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1 Test Laboratory

1.1 Notes of the Test Report

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1.2 Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25°C
Relative humidity	Min. = 20%, Max. = 80%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment Under Test

Client Information

Applicant	Monimoto UAB
Applicant address	Sauletekio al. 15-1, Vilnius ,Lithuania,10224
Manufacturer	Monimoto UAB
Manufacturer address	Sauletekio al. 15-1, Vilnius ,Lithuania,10224

General Technologies

EUT Description		
Model	MM9U-5	
Lab internal SN	R2310A1102/S01	
Hardware Version	03	
Software Version	4.X.X.X	
	Band	TX (MHz)	RX (MHz)
	LTE-M Band 2	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 4	1710 ~ 1755	2110 ~ 2155
Frequency	LTE-M Band 5	824 ~ 849	869 ~ 894
	LTE-M Band 12	699 ~ 716	729 ~ 746
	Bluetooth	2400 ~ 2483.5	2400 ~ 2483.5
	Wi-Fi 2.4G	/	2400 ~ 2483.5
Date of Testing	October 25, 2023 ~ November 20, 2023	
Date of Sample Received	October 20, 2023	
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. 2. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.		

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3   Maximum Output Power (Measured) /Tune up and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by

Numeric gain (G)=10^(antenna gain/10)

Band	Maximum Tune up Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
LTE-M Band 2	25.00	316.228	-2.00	0.631
LTE-M Band 4	25.00	316.228	-4.00	0.398
LTE-M Band 5	25.00	316.228	-8.00	0.158
LTE-M Band 12	25.00	316.228	-8.00	0.158
Band	Maximum Output Power (Measured)		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
Bluetooth (Low Energy)	4.51	2.825	-0.60	0.871

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4 Test Result

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure

(MPE) are as following.

TABLE 1 – LIMITS FOR MAXIMUN PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0 ……… ………	614	1.63	*(100)	6
3-30 ………… ………	1842/f	4.89/f	*(900/f2)	6
30-300 ……… ………	61.4	0.163	1.0	6
300-1500 …… ………	………………	………………	f/300	6
1500-100,000 …… …..	………………	………………	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/f2)	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

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0. So

Band	The Maximum Permissible Exposure (mW/cm^2)
LTE-M Band 2	1.000
LTE-M Band 4	1.000
LTE-M Band 5	0.549
LTE-M Band 12	0.466
Bluetooth (Low Energy)	1.000

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

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

Where: S = power density (in appropriate units, e.g. mW/cm^2)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Tune up (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm^2)	Limit Value (mW/cm^2)	The MPE Ratio
LTE-M Band 2	25.00	-2.00	23.000	199.526	0.040	1.000	**0.040**
LTE-M Band 4	25.00	-4.00	21.000	125.893	0.025	1.000	0.025
LTE-M Band 5	25.00	-8.00	17.000	50.119	0.010	0.549	0.018
LTE-M Band 12	25.00	-8.00	17.000	50.119	0.010	0.466	0.021
Band	Maximum Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm^2)	Limit Value (mW/cm^2)	The MPE Ratio
Bluetooth (Low Energy)	4.51	-0.60	3.910	2.460	0.0005	1.000	**0.0005**
Note: **R** = 20cm							
π= 3.1416							
The MPE Ratio = Mac Result÷Limit Value							

So the simultaneous transmitting antenna pairs as below:

∑of MPE ratios=WWAN Antenna + Bluetooth Antenna =0.040+0.0005=0.0405<1

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

******END OF REPORT ******

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