MPE TEST REPORT

Applicant	UAB TELTONIKA TELEMATICS
FCC ID	2A3HUTAT141
Product	Asset Tracker
Brand	TELTONIKA TELEMATICS
Model	TAT141-Q3IB0
Report No.	R2306A0734-M1V1
Issue Date	November 22, 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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Prepared by: Wei Fangying   *Approved by: Fan Guangchang*

TA Technology (Shanghai) Co., Ltd.

Table of Contents

TA Technology (Shanghai) Co., Ltd.   **TA-MB-01-014S**   **Page 2 of 10**

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Version	Revision Description	Issue Date
Rev.0	Initial issue of report.	November 9, 2023
Rev.1	Update information.	November 22, 2023
Note: This revised report (Report No.: R2306A0734-M1V1) supersedes and replaces the previously issued report (Report No.: R2306A0734-M1). Please discard or destroy the previously issued report and dispose of it accordingly.		

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

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
City:	Shanghai
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
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	UAB TELTONIKA TELEMATICS
Applicant address	Saltoniskiu st. 9B-1, LT-08105, Vilnius, Lithuania
Manufacturer	UAB TELTONIKA TELEMATICS
Manufacturer address	Saltoniskiu st. 9B-1, LT-08105, Vilnius, Lithuania
Factory	UAB TELTONIKA EMS
Factory address	Ditvos st. 6, LT-02121, Vilnius, Lithuania

General Technologies

EUT Description			
Model	TAT141-Q3IB0		
SN	MPH22LH02033088		
Hardware Version	TAT141-20		
Software Version	FMB.Ver.55.00.16		
Frequency	Band	TX (MHz)	RX (MHz)
	GSM850	824 ~ 849	869 ~ 894
	GSM1900	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 2	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 4	1710 ~ 1755	2110 ~ 2155
	LTE-M Band 5	824 ~ 849	869 ~ 894
	LTE-M Band 12	699 ~ 716	729 ~ 746
	LTE-M Band 13	777 ~ 787	746 ~ 756
	NB-IoT Band 2	1850 ~ 1910	1930 ~ 1990
	NB-IoT Band 4	1710 ~ 1755	2110 ~ 2155
	NB-IoT Band 5	824 ~ 849	869 ~ 894
	NB-IoT Band 12	699 ~ 716	729 ~ 746
	NB-IoT Band 13	777 ~ 787	746 ~ 756
	Bluetooth LE	2400 ~ 2483.5	2400 ~ 2483.5
Date of Sample Received	June 27, 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.			

TA Technology (Shanghai) Co., Ltd.   **TA-MB-01-014S**   **Page 5 of 10**

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3 Maximum Output Power 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		Burst-Averaged output power (adjusted for tune up) (dBm)	Division Factors	Frame-Averaged output power (adjusted for tune up) (dBm)
GSM850	GSM	35.000	-9.03	25.97
GSM1900	GSM	32.000	-9.03	22.97
Note:				
Division Factors				
To average the power, the division factor is as follows:				
1Txslot = 1 transmit time slot out of 8 time slots				
=> conducted power divided by (8/1) => -9.03 dB				
2Txslots = 2 transmit time slots out of 8 time slots				
=> conducted power divided by (8/2) => -6.02 dB				
3Txslots = 3 transmit time slots out of 8 time slots				
=> conducted power divided by (8/3) => -4.26 dB				
4Txslots = 4 transmit time slots out of 8 time slots				
=> conducted power divided by (8/4) => -3.01 dB				

Band	Maximum Output Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
GSM850	25.970	395.367	-1.50	0.708
GSM1900	22.970	198.153	-1.50	0.708
LTE-M Band 2	22.000	158.489	1.10	1.288
LTE-M Band 4	22.000	158.489	1.10	1.288
LTE-M Band 5	22.000	158.489	-1.50	0.708
LTE-M Band 12	22.000	158.489	-1.50	0.708
LTE-M Band 13	22.000	158.489	-1.50	0.708
NB-IoT Band 2	22.000	158.489	1.10	1.288
NB-IoT Band 4	22.000	158.489	1.10	1.288
NB-IoT Band 5	22.000	158.489	-1.50	0.708
NB-IoT Band 12	22.000	158.489	-1.50	0.708
NB-IoT Band 13	22.000	158.489	-1.50	0.708
Bluetooth LE	6.480	4.446	1.24	1.330

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)
GSM 850	0.549
GSM 1900	1.000
LTE-M Band 2	1.000
LTE-M Band 4	1.000
LTE-M Band 5	0.549
LTE-M Band 12	0.466
LTE-M Band 13	0.518
NB-IoT Band 2	1.000
NB-IoT Band 4	1.000
NB-IoT Band 5	0.549
NB-IoT Band 12	0.466
NB-IoT Band 13	0.518
Bluetooth LE	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 Output power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm^2)	Limit Value (mW/cm^2)	The MPE Ratio
GSM 850	25.970	-1.50	24.470	279.898	0.056	0.549	**0.1014**
GSM 1900	22.970	-1.50	21.470	140.281	0.028	1.000	0.0279
LTE-M Band 2	22.000	1.10	23.100	204.174	0.041	1.000	0.0406
LTE-M Band 4	22.000	1.10	23.100	204.174	0.041	1.000	0.0406
LTE-M Band 5	22.000	-1.50	20.500	112.202	0.022	0.549	0.0407
LTE-M Band 12	22.000	-1.50	20.500	112.202	0.022	0.466	0.0479
LTE-M Band 13	22.000	-1.50	20.500	112.202	0.022	0.518	0.0431
NB-IoT Band 2	22.000	1.10	23.100	204.174	0.041	1.000	0.0406
NB-IoT Band 4	22.000	1.10	23.100	204.174	0.041	1.000	0.0406
NB-IoT Band 5	22.000	-1.50	20.500	112.202	0.022	0.549	0.0407
NB-IoT Band 12	22.000	-1.50	20.500	112.202	0.022	0.466	0.0479
NB-IoT Band 13	22.000	-1.50	20.500	112.202	0.022	0.518	0.0431
Bluetooth LE	6.480	1.24	7.720	5.916	0.001	1.000	0.0010
Note: **R** = 20cm $\quad$ **π** = 3.1416 $\quad$ The MPE Ratio = Mac Result ÷ Limit Value							

So the simultaneous transmitting antenna pairs as below:

∑of MPE Ratios=Main Antenna + Bluetooth LE =0.1014 + 0.0010= 0.1024 <1

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

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

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

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