MPE TEST REPORT

Applicant	UAB TELTONIKA TELEMATICS
FCC ID	2A3HUFMM650
Product	Fleet Management System
Brand	TELTONIKA TELEMATICS
Model	FMM650-Q3X50
Report No.	R2410A1467-M1
Issue Date	November 26, 2024

Eurofins 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

This report shall not be reproduced in full or partial, without the written approval of **Eurofins 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)

Eurofins 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:	Eurofins 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	UAB TELTONIKA TELEMATICS
Applicant address	Saltoniskiu st. 9B-1, Vilnius, Lithuania
Manufacturer	UAB TELTONIKA TELEMATICS
Manufacturer address	Saltoniskiu st. 9B-1, Vilnius, Lithuania

General Technologies

EUT Description			
Model	FMM650-Q3X50		
IMEI	866088074999416		
Hardware Version	FMM650_24		
Software Version	03.00.06.Rev.200		
Frequency	Band	TX (MHz)	RX (MHz)
	GSM 850	824 ~ 849	869 ~ 894
	GSM 1900	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
	LTE-M Band 25	1850 ~ 1915	1930 ~ 1995
	LTE-M Band 66	1710 ~ 1780	2110 ~ 2180
	LTE-M Band 85	698 ~ 716	728 ~ 746
	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
	NB-IoT Band 25	1850 ~ 1915	1930 ~ 1995
	NB-IoT Band 66	1710 ~ 1780	2110 ~ 2180
	NB-IoT Band 71	663 ~ 698	617 ~ 652
	NB-IoT Band 85	698 ~ 716	728 ~ 746
	Bluetooth LE	2400 ~ 2483.5	2400 ~ 2483.5

Date of Testing	October 17, 2024 ~ November 13, 2024
Date of Sample Received	October 10, 2024

Note:
1. The EUT is sent from the applicant to Eurofins 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 Eurofins 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.

3 Maximum Output Power/ 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)

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

Each Tx slots maximum tune up use the most strictest factor for evaluation by making calculation.

Band		Burst-Averaged output power (adjusted for tune up) (dBm)	Division Factors	Frame-Averaged output power (adjusted for tune up) (dBm)
GSM850	GSM	35.00	-9.03	25.97
	1 Txslot	35.00	-9.03	25.97
	2 Txslots	35.00	-6.02	28.98
	3 Txslots	33.20	-4.26	28.94
	4 Txslots	32.00	-3.01	**28.99**
GSM1900	GSM	32.00	-9.03	22.97
	1 Txslot	32.00	-9.03	22.97
	2 Txslots	32.00	-6.02	**25.98**
	3 Txslots	30.20	-4.26	25.94
	4 Txslots	29.00	-3.01	25.99

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 Tune up Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
GSM 850	28.99	792.501	2.00	1.585
GSM 1900	25.98	396.278	2.00	1.585
LTE-M Band 2	22.00	158.489	2.00	1.585
LTE-M Band 4	22.00	158.489	2.00	1.585
LTE-M Band 5	22.00	158.489	2.00	1.585
LTE-M Band 12	22.00	158.489	2.00	1.585
LTE-M Band 13	22.00	158.489	2.00	1.585
LTE-M Band 25	22.00	158.489	2.00	1.585
LTE-M Band 66	22.00	158.489	2.00	1.585
LTE-M Band 85	22.00	158.489	2.00	1.585
NB-IoT Band 2	22.00	158.489	2.00	1.585
NB-IoT Band 4	22.00	158.489	2.00	1.585
NB-IoT Band 5	22.00	158.489	2.00	1.585
NB-IoT Band 12	22.00	158.489	2.00	1.585
NB-IoT Band 13	22.00	158.489	2.00	1.585
NB-IoT Band 25	22.00	158.489	2.00	1.585
NB-IoT Band 66	22.00	158.489	2.00	1.585
NB-IoT Band 71	22.00	158.489	2.00	1.585
NB-IoT Band 85	22.00	158.489	2.00	1.585
Band	Maximum Output Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
Bluetooth LE	7.83	6.067	2.60	1.820

4 MPE Limit

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)
GSM850	0.549
GSM1900	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
LTE-M Band 25	1.000
LTE-M Band 66	1.000
LTE-M Band 85	0.465
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
NB-IoT Band 25	1.000
NB-IoT Band 66	1.000
NB-IoT Band 71	0.442
NB-IoT Band 85	0.465
Bluetooth LE	1.000

5 RF Exposure Evaluation Result

RF exposure evaluation method is based on KDB 447498 D01，this calculation is based on the conducted power, maximum power and antenna gain with provides the minimum separation distance. The formula shown below is from OET Bulletin 65 Edition 97-01 Per KDB 447498 D01:

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

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
GSM 850	28.99	2.00	30.990	1256.030	0.250	0.549	**0.455**
GSM 1900	25.98	2.00	27.980	628.058	0.125	1.000	0.125
LTE-M Band 2	22.00	2.00	24.000	251.189	0.050	1.000	0.050
LTE-M Band 4	22.00	2.00	24.000	251.189	0.050	1.000	0.050
LTE-M Band 5	22.00	2.00	24.000	251.189	0.050	0.549	0.091
LTE-M Band 12	22.00	2.00	24.000	251.189	0.050	0.466	0.107
LTE-M Band 13	22.00	2.00	24.000	251.189	0.050	0.518	0.096
LTE-M Band 25	22.00	2.00	24.000	251.189	0.050	1.000	0.050
LTE-M Band 66	22.00	2.00	24.000	251.189	0.050	1.000	0.050
LTE-M Band 85	22.00	2.00	24.000	251.189	0.050	0.465	0.107
NB-IoT Band 2	22.00	2.00	24.000	251.189	0.050	1.000	0.050
NB-IoT Band 4	22.00	2.00	24.000	251.189	0.050	1.000	0.050
NB-IoT Band 5	22.00	2.00	24.000	251.189	0.050	0.549	0.091
NB-IoT Band 12	22.00	2.00	24.000	251.189	0.050	0.466	0.107
NB-IoT Band 13	22.00	2.00	24.000	251.189	0.050	0.518	0.096
NB-IoT Band 25	22.00	2.00	24.000	251.189	0.050	1.000	0.050
NB-IoT Band 66	22.00	2.00	24.000	251.189	0.050	1.000	0.050
NB-IoT Band 71	22.00	2.00	24.000	251.189	0.050	0.442	0.113
NB-IoT Band 85	22.00	2.00	24.000	251.189	0.050	0.465	0.107

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 LE	7.83	2.60	10.430	11.041	0.002	1.000	**0.002**

Note: **R** = 20cm
π= 3.1416
The MPE Ratio = Mac Result÷Limit Value

So the simultaneous transmitting antenna pairs as below:
∑of MPE ratios=Main Antenna + Bluetooth =0.455 + 0.002 = 0.457 <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 ********