

MPE TEST REPORT

Applicant	trackap
FCC ID	2BLTJ-PEPPINO
Product	IOT GNSS tracker
Brand	trackap
Model	PEPPINO
Report No.	R2410A1489-M1
Issue Date	November 20, 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.
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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	trackap
Applicant address	Place Pierre de Saintignon Euratechnologies, Lille, France, 59000
Manufacturer	trackap
Manufacturer address	Place Pierre de Saintignon Euratechnologies, Lille, France, 59000

General Technologies

EUT Description			
Model	PEPPINO		
IMEI	860016048977867		
Hardware Version	V8		
Software Version	8.2.0.7		
Frequency	Band	TX (MHz)	RX (MHz)
	LTE-M Band 2	1850 ~ 1910	1930 ~ 1990
	LTE-M Band 4	1710 ~ 1755	2110 ~ 2155
	LTE-M Band 12	699 ~ 716	729 ~ 746
	LTE-M Band 25	1850 ~ 1915	1930 ~ 1995
	LTE-M Band 26	824 ~ 849	869 ~ 894
	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	
Date of Sample Received	October 16, 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 Tune up and Antenna Gain

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

$$\text{Numeric gain (G)} = 10^{(\text{antenna gain}/10)}$$

Band		Maximum Tune up Power		Antenna Gain (dBi)	Numeric Gain
		(dBm)	(mW)		
LTE-M Band 2		25.0	316.228	2.10	1.622
LTE-M Band 4		24.0	251.189	2.30	1.698
LTE-M Band 12		25.0	316.228	1.50	1.413
LTE-M Band 25		25.0	316.228	2.10	1.622
LTE-M Band 26		26.0	398.107	2.40	1.738
NB-IoT Band 2		24.0	251.189	2.40	1.738
NB-IoT Band 4		22.0	158.489	2.30	1.698
NB-IoT Band 5		24.0	251.189	2.10	1.622
NB-IoT Band 12		24.0	251.189	1.50	1.413
2.4G	802.11b	20.0	100.000	3.96	2.489
	802.11g	19.0	79.433	3.96	2.489
	802.11n HT20	19.0	79.433	3.96	2.489
	802.11n HT40	18.5	70.795	3.96	2.489
Bluetooth (Low Energy)		6.0	3.981	3.96	2.489

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 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	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/f ²)	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/f ²)	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 12	0.466
LTE-M Band 25	1.000
LTE-M Band 26	0.543
NB-IoT Band 2	1.000
NB-IoT Band 4	1.000
NB-IoT Band 5	0.549
NB-IoT Band 12	0.466
Wi-Fi 2.4GHz	1.000
Bluetooth	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/cm²)

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	25.000	2.100	27.100	512.861	0.102	1.000	0.102
LTE-M Band 4	24.000	2.300	26.300	426.580	0.085	1.000	0.085
LTE-M Band 12	25.000	1.500	26.500	446.684	0.089	0.466	0.191
LTE-M Band 25	25.000	2.100	27.100	512.861	0.102	1.000	0.102
LTE-M Band 26	26.000	2.400	28.400	691.831	0.138	0.543	0.253
NB-IoT Band 2	24.000	2.400	26.400	436.516	0.087	1.000	0.087
NB-IoT Band 4	22.000	2.300	24.300	269.153	0.054	1.000	0.054
NB-IoT Band 5	24.000	2.100	26.100	407.380	0.081	0.549	0.148
NB-IoT Band 12	24.000	1.500	25.500	354.813	0.071	0.466	0.151
Wi-Fi 2.4GHz	802.11b	20.000	3.960	23.960	248.886	0.050	0.050
	802.11g	19.000	3.960	22.960	197.697	0.039	0.039
	802.11n HT20	19.000	3.960	22.960	197.697	0.039	0.039
	802.11n HT40	18.500	3.960	22.460	176.198	0.035	0.035
Bluetooth	6.000	3.960	9.960	9.908	0.002	1.000	0.002
Note: R = 20cm $\pi = 3.1416$ The MPE Ratio = Mac Result ÷ Limit Value							

So the simultaneous transmitting antenna pairs as below:

TER = WWAN Antenna MPE ratio + Wi-Fi 2.4G Antenna MPE ratio = 0.253 + 0.050 = 0.303 < 1

TER = WWAN Antenna MPE ratio + Bluetooth LE Antenna MPE ratio = 0.253 + 0.002 = 0.255 < 1

Bluetooth LE antenna and Wi-Fi 2.4G antenna a can't transmit simultaneously.

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 *****