

REM-EMIESS24C779SMA-02Av0

MPE test report

According to the standard:

CFR 47 FCC PART 15

Equipment under test:

COLD LOCATION TRACKER – LC04

FCC ID: ***2BLRQLC03LC042K24***

Company:

SMADE

Distribution: Mr ANDRE Sébastien

(Company: SMADE)

Number of pages: 7

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			Name and Function	Visa
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This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

Information in italics are declared by the manufacturer/customer and are under his responsibility

DESIGNATION OF PRODUCT: *COLD LOCATION TRACKER – LC04*

Serial number (S/N): Radiated sample: *LC0405-2350-002345*
Conducted sample: *LC0405-2350-002346*

Reference / model (P/N): *LC03 and LC04*

Firmware version: *ATM: 1.16.0 / NRF: 1.19.3 / ESP:1.0.0*

MANUFACTURER: *SMADE*

COMPANY SUBMITTING THE PRODUCT:

Company: SMADE

Address: 77 boulevard de Stalingrad,
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Mr RAQIOUI Abdessamad (second day)
Mr PRESUMEY Yannick (Third day)

DATE(S) OF TEST: From 16-Jul-24 to 18-Jul-24

TESTING LOCATION: EMITECH LYON laboratory at CHASSIEU (69) FRANCE

FCC Accredited under US-EU MRA Designation Number: FR0013
Test Firm Registration Number: 807590

TESTED BY: T. LEDRESSEUR

VISA:



WRITTEN BY: T. LEDRESSEUR

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REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	29-Jul-24	/	Creation

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **LC04**, in accordance with normative reference.

The equipment under test integrates:

- LTE-M,transceiver radio module already certified, (NRF9160)
- WiFi 2.4 GHz transceiver radio function not already certified,

2. PRODUCT DESCRIPTION

Class:	B
Power source:	Internal battery 3.6 Vdc
<u>W-Fi</u>	
Antenna type and gain:	3.8 dBi / ¼-wave integral antenna
Operating frequency range:	From 2412 MHz to 2462 MHz
Number of channels:	11
Channel spacing:	5 MHz
Channel bandwidth:	20 MHz
Modulation:	DBPSK OFDM: BPSK OFDM: 64-QAM
Mode tested:	802.11b 802.11g 802.11n
Data rate tested:	For 802.11b: 1Mbit/s For 802.11g: 6Mbit/s For 802.11n: MCS0
Channel tested:	Channel 1: 2412 MHz Channel 6: 2437 MHz Channel 11: 2462 MHz

Correlated signal: The product possess only 1 antenna (SISO)

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product and the circuit boards are joined with this file.

LTE-M

Operating frequency range: From 1850 MHz to 1910 MHz (LTE Band 2)
From 1710 MHz to 1755 MHz (LTE Band 4)
From 824 MHz to 849 MHz (LTE Band 5)
From 699 MHz to 716 MHz (LTE Band 12)
From 777 MHz to 787 MHz (LTE Band 13)
From 1850 MHz to 1915 MHz (LTE Band 25)
From 814 MHz to 849 MHz (LTE Band 26)
From 1710 MHz to 1780 MHz (LTE Band 66)

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below.
They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 (2024)	Radio Frequency Devices
ANSI C63.10	2013 Procedures for Compliance Testing of Unlicensed Wireless Devices.
447498 D04 Interim General RF Exposure Guidance v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

4. RF EXPOSURE**Wi-Fi standalone:**

Only the worst case was considered for this report.

Maximum EIRP measured = 0.029 W = 14.55 dBm at 2472 MHz

$$\text{PSD} = \text{EIRP} / (4 * \pi * R^2)$$

$$\Rightarrow 0.029 / (4 * \pi * (20 \text{ cm})^2) = 0.005672 \text{ mW/cm}^2 \text{ (limit = 1 mW/cm}^2 \text{ for } f > 1500 \text{ MHz)}$$

The equipment fulfils the requirements on power density for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310.

$$\text{MPE ratio(Wi-Fi)} = \frac{0.0000000017243}{0.98} = 0.005672$$

NRF9160 in standalone

⇒ limit = 1 mW/cm² if f > 1500 MHz
or f / 1500 if 300 < f < 1500 MHz

The results are extracted from GRANT of the module and calculated with the antenna used.

Frequency (MHz)	Conducted power (W)	Conducted power (dBm)	Gain (dBi)	Radiated power (dBm)	Radiated power (mW)	Power density at 20cm (mW/cm ²)	Limit (mW/cm ²)	MPE ratio
699.0 - 716.0	0.188	22.740	2.6	25.340	341.976	0.068	0.466	0.146
699.0 - 716.0	0.148	21.710	2.6	24.310	269.771	0.054	0.466	0.115
777.0 - 787.0	0.179	22.540	2.6	25.140	326.582	0.065	0.518	0.125
777.0 - 787.0	0.183	22.620	2.6	25.220	332.660	0.066	0.518	0.128
788.0 - 798.0	0.226	23.540	2.6	26.140	411.143	0.082	0.525	0.156
788.0 - 798.0	0.184	22.640	2.6	25.240	334.188	0.066	0.525	0.127
814.0 - 849.0	0.199	22.990	2.6	25.590	362.248	0.072	0.543	0.133
814.0 - 849.0	0.155	21.890	2.6	24.490	281.198	0.056	0.543	0.103
823.3 - 824.7	0.199	22.980	2.6	25.580	361.411	0.072	0.549	0.131
823.3 - 824.7	0.154	21.870	2.6	24.470	279.906	0.056	0.549	0.101
1710.0 - 1780.0	0.207	23.150	4.4	27.550	568.858	0.113	1.000	0.113
1710.0 - 1780.0	0.171	22.320	4.4	26.720	469.899	0.093	1.000	0.093
1850.0 - 1915.0	0.199	22.990	4.4	27.390	548.284	0.109	1.000	0.109
1850.0 - 1915.0	0.158	21.990	4.4	26.390	435.499	0.087	1.000	0.087
699.0 - 716.0	0.208	23.190	2.6	25.790	379.317	0.075	0.466	0.162
777.0 - 787.0	0.212	23.260	2.6	25.860	385.485	0.077	0.518	0.148
814.0 - 849.0	0.216	23.340	2.6	25.940	392.637	0.078	0.543	0.144
823.9 - 824.1	0.207	23.170	2.6	25.770	377.570	0.075	0.549	0.137
1710.0 - 1780.0	0.218	23.390	4.4	27.790	601.165	0.120	1.000	0.120
1850.0 - 1915.0	0.245	23.890	4.4	28.290	674.538	0.134	1.000	0.134

The equipment fulfils the requirements on power density for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310.

Calculus for simultaneous transmission

Only the worst critical case for the WAN module is taken into account for this analysis

$$\sum \text{ of MPE ratio} = \text{MPE ratio(Wi-Fi)} + \text{MPE ratio(LTE-M)} = 0.005672 + 0.162 = 0.167672 \leq 1.0$$

The product meet the requirement for Simultaneous transmission MPE test exclusion from §2.2 of KDB 447498