

MPE test report

According to the standard:

CFR 47 FCC PART 15

Equipment under test:

S-LYNKS NODE

FCC ID: KQ9-0A00A

Company:

SERCEL Inc

Distribution: Mr TIJOU

(Company: SERCEL NANTES)

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DESIGNATION OF PRODUCT: S-LYNKS NODE

Serial number (S/N): EDE567C20251E0001

Reference / model (P/N): NODE

Software version: SLBB_F V4 S36/20

MANUFACTURER: SERCEL Inc

COMPANY CERTIFYING THE PRODUCT:

Company: SERCEL Inc

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Responsible: Mr WENTZLER

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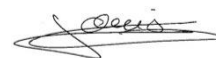
Responsible: Mr TIJOU

DATES OF TEST: From 8-Dec-20 to 14-Dec-20

TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE
FCC Accredited under US-EU MRA Designation Number: FR0009
Test Firm Registration Number: 873677

TESTED BY: S. LOUIS

VISA:



WRITTEN BY: S. LOUIS

CONTENTS

	<i>TITLE</i>	<i>PAGE</i>
1.	<i>INTRODUCTION</i>	<i>4</i>
2.	<i>PRODUCT DESCRIPTION</i>	<i>4</i>
3.	<i>NORMATIVE REFERENCE</i>	<i>6</i>
4.	<i>RF EXPOSURE.....</i>	<i>7</i>

1. INTRODUCTION

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

The device under test integrates/

- LoRa radio part not already certified,
- WiFi radio part not already certified,
- GNSS receiver.

2. PRODUCT DESCRIPTION

Class:	A
Utilization:	Industrial
Power source:	7.2Vdc Li-ion battery
<u>LoRa Radio part:</u>	
Antenna type and gain:	Integral antenna Gain at 903MHz => -0.01dBi Gain at 915MHz => +1.01dBi Gain at 927MHz => +2.93dBi
Operating frequency range:	From 902 MHz to 928 MHz
Frequencies tested:	903MHz, 915MHz, 927MHz
Number of channels:	41
Channel spacing:	600kHz
Modulation:	LoRa 500kHz / SF12
Power level adjusted to	+18dBm by software

WiFi Radio part:

Antenna type and gain: For mode b and g the product emit on chains one (SISO), however the mode n the product can emit on the chain one (SISO) or chain one and two (MIMO).

integral antenna

Antenna 1 Gain at 2412MHz => +1.53dBi

Antenna 1 Gain at 2437MHz => +2.07dBi

Antenna 1 Gain at 2462MHz => +2.20dBi

Antenna 2 Gain at 2412MHz => +2.78dBi

Antenna 2 Gain at 2437MHz => +2.28dBi

Antenna 2 Gain at 2462MHz => +2.29dBi

Operating frequency range: From 2400 MHz to 2483.5 MHz

Number of channels: 11

Channel spacing: 5MHz

Channel bandwidth: 20 MHz

Modulation: DBPSK
OFDM: BPSK
OFDM: 64-QAM

Channel tested: Channel 1: 2412 MHz
Channel 6: 2437 MHz
Channel 11: 2462 MHz

Mode tested: 802.11 b SISO
802.11 g SISO
802.11 n SISO and MIMO

Data rate: For 802.11b: 1Mbit/s
For 802.11g: 6Mbit/s
For 802.11n: MCS0

Correlated signal: For mode n the signals are considered as correlated, the mode cyclic delay diversity (CDD) is used. (IEEE 802.11)
The product is not using spatial multiplexing or intentional beamforming.

Power setting +16 dBm

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.

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 (2020) Radio Frequency Devices

ANSI C63.10 2013
Procedures for Compliance Testing of Unlicensed Wireless Devices.

447498 D01 General RF RF Exposure procedures and equipment authorization policies for mobile and
Exposure Guidance v06 portable equipment

OET BULLETIN 65 Evaluating Compliance with FCC Guidelines for Human Exposure to
Radiofrequency Electromagnetic Fields

4. RF EXPOSURE

LoRa radio part in standalone:

MPE

According Emitech test report n° RR051-20-104233-5-A Ed. 0:

Maximum measured power = 103.8 dBμV/m at 10 m = 80mW at 927 MHz
with $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3 \text{ m}$ and $G_p = 1$

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:

$$PSD = EIRP / (4 \times \pi \times R^2)$$

$$\Rightarrow 80 / (4 \times \pi \times (20 \text{ cm})^2) = 0.016 \text{ mW/cm}^2 \text{ (limit = 0.618 mW/cm}^2\text{)}$$

$$MPE \text{ RATIO} = 0.026$$

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

WiFi radio part in standalone:

MPE

According Emitech test report n° RR051-20-104233-6-A Ed. 0:

Maximum measured power = 116.70 dBμV/m at 3m = 140.32mW at 2437 MHz
Maximum measured power = 119.69 dBμV/m at 3m = 279.33mW at 2437 MHz
with $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3 \text{ m}$ and $G_p = 1$

Maximum measured power = 420 mW eirp at 2437 MHz (802.11.n – MIMO)

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:

$$PSD = EIRP / (4 \times \pi \times R^2)$$

$$\Rightarrow 420 / (4 \times \pi \times (20 \text{ cm})^2) = 0.084 \text{ mW/cm}^2 \text{ (limit = 1 mW/cm}^2\text{)}$$

$$MPE \text{ RATIO} = 0.084$$

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

$$\sum \text{ of MPE ratio} = \text{MPE ratio(LoRa)} + \text{MPE ratio(Wi-Fi)} = 0.026 + 0.084 = 0.11 \leq 1.0$$

The product meets the requirement for Simultaneous transmission MPE test exclusion from §7.2 of KDB 447498.