

RF Exposure Evaluation Report

Date of Report	14/06/2022	Client's Contact person:	Juha Hämäläinen
Number of pages:	5	Responsible Test engineer:	Ilari Kinnunen
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Tested devices	Flex2-LWNA		
Related reports:	-		
Testing has been carried out in accordance with:	47CFR §2.1091 Radiofrequency Radiation Exposure Evaluation: Mobile Devices FCC published RF exposure KDB procedures		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory		
Test Results:	The DUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document		

Date and signatures: 14.06.2022

For the contents:

Laboratory Manager

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Device under Test (DUT):

Product:	Flex2-LWNA
Manufacturer:	Nokeval Oy
Model:	Flex2-LWNA-T-P Flex2-LWNA-T-RH-P Flex2-LWNA-CS-P Flex2-LWNA-ES-P Flex2-LWNA-nSens-P
Hardware Version:	Flex2Lorawan V1.0
FCC ID:	2A3B4FLEX21
Document ID:	FCC SAR test report_Nokeval Flex2_ID5224_14062022.docx
Document History/changes	This report replaces FCC SAR test report_Nokeval Flex2_ID5224_25052022. Antenna gain changed.
FCC Test Firm Designation Number	FI00005

1.2 Evaluation Results

The device conforms to the requirements of the standards when the maximum ERP is less than or equal to the Test Exclusion Threshold Limit.

Regulator	System	MPE-Based Exemption threshold at 20cm separation [mW]	Maximum ERP [mW]	Result
FCC	LoRaWAN	462	61.0	PASS

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is an indoor air temperature and humidity transmitter. Flex2 series has several measurement modules, the applicable module must be chosen according to the measured quantities. Each Flex2 series transmitter consists of two detachable parts or halves: a measurement (or bottom) module, and a radio (or top) module. The results are transmitted wirelessly to a LoRaWAN gateway using the US915 band. The DUT is typically mounted on a wall so that users will have a minimum separation distance of 20cm.

Exposure Environment	General population, uncontrolled
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2.1 Supported Frequency Bands and Operational Modes

Bands	Modes of Operation	Transmitter Frequency Range (MHz)
US915	LoRaWAN	902.3 – 914.9

2.2 Test Exclusions

FCC MPE-based Exemption thresholds in 447498 D04 Interim General RF Exposure Guidance v01 are shown in a table below.

**TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION**

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2 R^2$
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

3. OUTPUT POWER

3.1 Maximum defined Output Power

Transmission mode	Maximum Specified Output Power [dBm]	Antenna Gain [dBi]	Maximum ERP [dBm]	Maximum ERP [mW]
LoRaWAN	20.0	0	17.85	61.0

4. RESULTS

According to Table B.1 in 447498 D04 Interim General RF Exposure Guidance v01, FCC MPE-based Exemption threshold can be calculated according to formula:

$$0.0128 * R^2 * f = 0.0128 * 0.2^2 * 902.3 = 462\text{mW}.$$

where:

Separation distance R (m) = 0.2

Frequency f (MHz) = 902.3

The maximum ERP of the DUT is 61mW thus it is below the 462mW MPE-Based Exemption threshold.