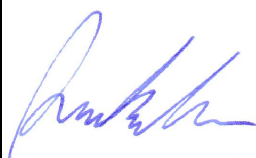
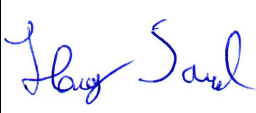
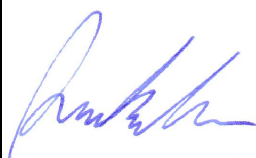
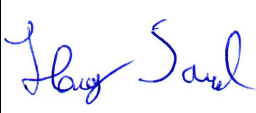
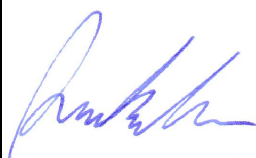
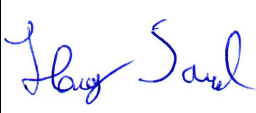


MAXIMUM PERMISSIBLE EXPOSURE REPORT

Test report #:	06112025_001A	Date of report:	3 rd of December 2025						
Test laboratory:	Etteplan Finland Oy	Client:	VILPE Oy						
Address:	Aholaidantie 3 FI-40320 Jyväskylä Finland		Kauppatie 9 65610 Mustasaari Finland						
Contact:	Anssi Kauhanen		Kimmo Kujala						
E-mail:	lab.eiot@etteplan.com		kimmo.kujala@vilpe.com						
Telephone:	+358 10 3070		+358 20 1233263						
Evaluation has been carried out in accordance with:	ANSI/IEEE C95.1-1992 ANSI/IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz OET Bulletin No. 65 Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields KDB 447498 D04 Interim General RF Exposure Guidance v01 KDB 447498 D01 General RF Exposure Guidance v06								
Device description:	VILPE CCU-2 (NA) is the gateway device of the system ("central communications unit"). It has two radios: an LTE-M modem and a 918.9 MHz local LoRaWAN radio. It can be connected to the Internet either via its modem or with Ethernet or both.								
Statement of Compliance:	Compliant								
EUT tested by:	Henry Sand								
Reported by:	Henry Sand								
Date and signatures:	<table border="1"> <tr> <td>  DN: cn=Kauhanen Anssi, o=Etteplan Finland Oy, email=anssi.kauhanen@etteplan.com, c=FI Date: 2025.12.03 08:49:15 +02'00' </td> <td>  DN: cn=Henry Sand, o=Etteplan Finland Oy, email=EXT-Henry.Sand@etteplan.com, c=FI Date: 2025.12.03 08:07:57 +02'00' </td> </tr> <tr> <td>Anssi Kauhanen</td> <td>Henry Sand</td> </tr> <tr> <td>Manager, EMC & RF Laboratory Operations</td> <td>Senior RF/EMC Designer</td> </tr> </table>			 DN: cn=Kauhanen Anssi, o=Etteplan Finland Oy, email=anssi.kauhanen@etteplan.com, c=FI Date: 2025.12.03 08:49:15 +02'00'	 DN: cn=Henry Sand, o=Etteplan Finland Oy, email=EXT-Henry.Sand@etteplan.com, c=FI Date: 2025.12.03 08:07:57 +02'00'	Anssi Kauhanen	Henry Sand	Manager, EMC & RF Laboratory Operations	Senior RF/EMC Designer
 DN: cn=Kauhanen Anssi, o=Etteplan Finland Oy, email=anssi.kauhanen@etteplan.com, c=FI Date: 2025.12.03 08:49:15 +02'00'	 DN: cn=Henry Sand, o=Etteplan Finland Oy, email=EXT-Henry.Sand@etteplan.com, c=FI Date: 2025.12.03 08:07:57 +02'00'								
Anssi Kauhanen	Henry Sand								
Manager, EMC & RF Laboratory Operations	Senior RF/EMC Designer								

Version	Date	Change history
A	03.12.2025	Results corrected according to updated parameters on chapter 3. This document replaces Test Report 06112025_001.

EQUIPMENT UNDER TEST (EUT)

EUT type:	CCU-2 (NA)
EUT ID:	CCU-2 (NA)
HW version:	V2.4a
SW version:	V1.2.0
FCC ID:	2BOAS-T20107
Product description:	The CCU-2 (NA) is the gateway device ("central communications unit") of the VILPE system. It connects the MCU-2 (NA) and RHT-2 (NA) to the internet. It connects to the internet via its LTE-M radio or with Ethernet. For communicating with the other local devices it has a 918.9 MHz LoRa radio. Furthermore it has an RS-485 port for communicating with a building automation system. The device is powered with an XP Power VFL05-US-UB plug-in power supply, which is connected at factory.
Device category: (Portable/Mobile/Fixed)	Fixed
Environment:	General population/Uncontrolled
Additional information:	-

ADDITIONAL NOTES

The test results and statements apply only to the tested item(s) as received. EUT information is provided by manufacturer. Etteplan is not responsible for any further propositions of applicability on the basis of the test results in this report. This test report shall only be reproduced in full. No partial reproduction of the report is allowed without written approval of the test laboratory. This report is valid when digitally signed and protected by a strong password.

TABLE OF CONTENTS

Equipment Under Test (EUT).....	2
Additional Notes	2
1 General description.....	4
1.1 EUT Description.....	4
1.2 Specification of the EUT	4
2 RF Exposure Evaluation.....	5
2.1 Assessment method	5
2.2 Maximum Permissible Exposure.....	5
3 RF Exposure calculations.....	6
3.1 Assessment.....	6
3.2 Exposure from sources with multiple frequencies.....	6
3.3 Results	7
4 Antennas	8

1 General description

1.1 EUT Description

The following EUT models were tested:

Table 1 - Product details

Brand	Model	Description
VILPE	CCU-2 (NA)	is the gateway device of the system with wireless network cellular 4G connection with LoRaWAN sensor connections. RF Modules: 4G (LTE): Telit Cinterion: ME310M1-W1

1.2 Specification of the EUT

Table 2 - Antenna details

Antenna	Antenna brand/model	Antenna type	Info
Internal	Pulse/Domino/ W3796	PCB, SMD	LTE Cellular
Internal	Custom antenna	PCB	915 MHz LoRaWAN

Details declared by the manufacturer.

Table 3 - Cellular and Lora RF details

Operating band	Frequency	Max. Time Slots/Duty Cycle	Max. conducted TX power		Tune-Up	Antenna Max. Gain	Min. cable loss	EIRP	
	[MHz]		[dBm]	[mW]				[dBm]	[mW]
LTE B2	1850-1910	100 %	25	316	0	3.6	0	28.6	725
LTE B4	1710-1785	100 %	25	316	0	3	0	28	631
LTE B5	824-849	100 %	25	316	0	1	0	26	399
LTE B12	699-716	100 %	25	316	0	0	0	25	317
LTE B13	777-787	100 %	25	316	0	0	0	25	317
LoRa 915 MHz	902-928	100 %	4.8	3.0	1	2.5	0	8.3	6.8
Notes!	- Only worst-case values reported - Details declared by the manufacturer.								

2 RF Exposure Evaluation

2.1 Assessment method

Method 2 - calculation was used. The evaluation was performed in accordance with the following standard and documents:

- Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (OET Bulletin No. 65)
- KDB 447498 D04 Interim General RF Exposure Guidance v01
- KDB 447498 D01 General RF Exposure Guidance v06

2.2 Maximum Permissible Exposure

Table 4 – Limits for Occupational/Controlled Exposure, § 1.1310(e)(1)

Frequency Range f [MHz]	E-Field Strength [V/m]	H-Field Strength [A/m]	Equivalent plane wave power density Seq [mW/cm ²]	Averaging time [minutes]
0.3-3.0	614	1.63	100	≤6
3.0-30	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

Table 5 – Limits for General Population/Uncontrolled Exposure, § 1.1310(e)(1)

Frequency Range f [MHz]	E-Field Strength [V/m]	H-Field Strength [A/m]	Equivalent plane wave power density Seq [mW/cm ²]	Averaging time [minutes]
0.3-3.0	614	1.63	100	<30
3.0-30	1842/f	4.89/f	180/f²	<30
30-300	61.4	0.163	0.2	<30
300-1500	-	-	f/1500	<30
1500-100 000	-	-	1	<30

Notes:

1. Occupational/controlled exposure 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. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. In situations when an untrained person is transient through a location where occupational/controlled limits apply, he or she must be made aware of the potential for exposure and be supervised by trained personnel pursuant to § 1.1307(b)(2) where use of time averaging is required to ensure compliance with the general population exposure limit. The phrase *exercise control* means that an exposed person is allowed and also knows how to reduce or avoid exposure by administrative or engineering work practices, such as use of personal protective equipment or time averaging of exposure.
2. General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. For example, RF sources intended for consumer use shall be subject to the limits for general population/uncontrolled exposure in this section.

The limit applied in this test report is shown in bold letters

3 RF Exposure calculations

3.1 Assessment

Under normal use of condition, this device has a separation distance of at least 20 cm between the antenna and the body of the user. A radiation exposure statement "this equipment should be installed and operated with minimum distance between the antenna and your body" is shown on the user manual, so human exposure to the electromagnetic field of this product is at far-field region under normal use.

Power Density Calculation Formula:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

S=power density (mW/cm²)

P = power input to the antenna (mW)

G = antenna gain relative to an isotropic antenna

r = distance to the center of radiation of the antenna (cm)

EIRP=equivalent (or effective) isotropically radiated power

3.2 Exposure from sources with multiple frequencies

In situations where simultaneous exposure to fields of different frequencies occurs, the possibility that these exposures will be additive in their effects must be considered. Calculations based on such additivity should be performed separately for each effect; thus separate evaluations should be made for thermal and electrical stimulation effects on the body.

Summary of Simultaneous Exposure relation to limit, relevant from 100 kHz:

$$S_{SE} = \sum_{i=100 \text{ kHz}}^{10 \text{ GHz}} \frac{S_i}{S_L} \leq 1$$

Where:

S_{SE} = Summary of Simultaneous Exposure relation to limit

S_i = Power density caused by exposure at frequency i

S_L = Power density basic restriction given

Table 5.

3.3 Results

Table 6 – Results: Actual power density

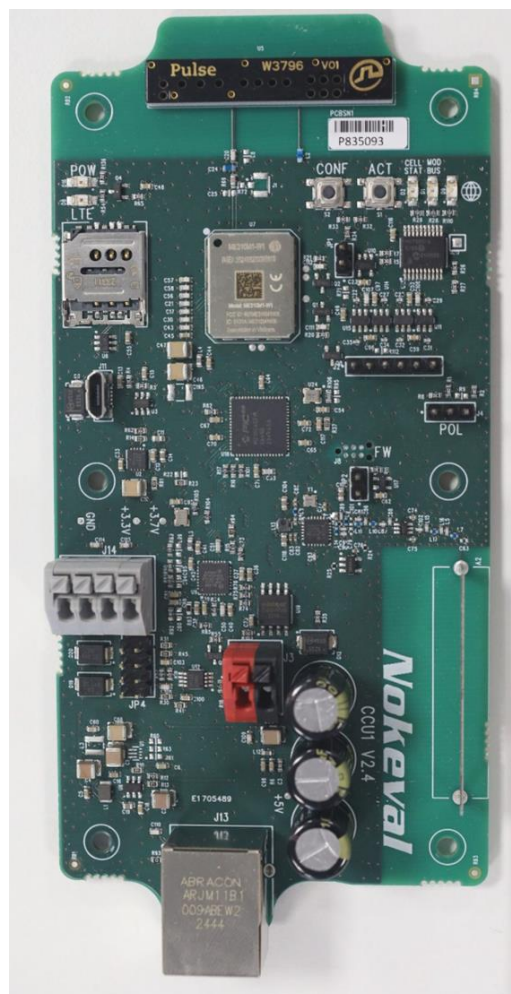
System	Operating band	Frequency	Distance	Actual power density $S_{\text{a}}@20\text{ cm}$	Limit S_{L}	Relative power density $S_{\text{i}}/S_{\text{L}}$ @minimum distance	Verdict
			antenna to surface				
		[MHz]	[cm]	[mW/cm ²]	[mW/cm ²]		
LTE	LTE B2	1850-1910	1	0.131	1	0.131	PASS
	LTE B4	1710-1755	1	0.114	1	0.114	PASS
	LTE B5	824-849	1	0.072	0.55	0.131	PASS
	LTE B12	699-716	1	0.057	0.47	0.121	PASS
	LTE B13	777-787	1	0.057	0.52	0.110	PASS
LoRaWAN	915 MHz ISM	902-928	0.8	0.001	0.6	0.002	PASS
Notes:	Only worst case reported						

Cellular and Lora modules are capable of simultaneously transmitting.

Table 7 – Results: Summary of Simultaneous Exposure relation to limit

System	Actual power density: S _i	Limit: S _L	Relative power density S _i /S _L	Relative power density S _i /S _L	Verdict
	[mW/cm ²]	[mW/cm ²]			
LoRaWAN (915 MHz)	0.001	0.6	0.0021	Limit	
LTE B2	0.131	1	0.1307		
Summary of Simultaneous Exposure relation to limit			0.1328	≤1	
S _{SE}					

4 Antennas



Cellular-antenna

Lora-antenna

Image 1 - Antennas

-- End of Etteplan Test Laboratory RF Exposure Report --