
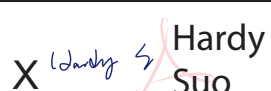


Prüfbericht-Nr.: <i>Test report no.:</i>	DE22OBEH 001	Auftrags-Nr.: <i>Order no.:</i>	168382800 P00257162	Seite 1 von 10 <i>Page 1 of 10</i>	
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2022-06-22		
Auftraggeber: <i>Client:</i>	KERLINK SA 1, Rue Jacqueline Auriol 35235 Thorigne-Fouillard FRANCE				
Prüfgegenstand: <i>Test item:</i>	Wirnet™ iZeptoCell				
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	PDTIOT-IZEE900 (Trademark: Kerlink)				
Auftrags-Inhalt: <i>Order content:</i>	Test Report				
Prüfgrundlage: <i>Test specification:</i>	47 CFR FCC Part 2.1091		RSS-102 Issue 5		
Wareneingangsdatum: <i>Date of sample receipt:</i>	2022-06-27		Please refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003273434-001~002				
Prüfzeitraum: <i>Testing period:</i>	2022-07-28 to 2022-08-12				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von: <i>tested by:</i>	 Andy Yan		genehmigt von: <i>authorized by:</i>	 Hardy Suo	
Datum: <i>Date:</i>	2022-09-07		Ausstellungsdatum: <i>Issue date:</i>	2022-09-09	
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / Other:	FCC ID: 2AFYS-KLKZEE900 IC: 20637-KLKZEE900 HVIN: PDTIOT-IZEE900				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

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Prüfbericht - Nr.: DE220BEH 001
Test Report No.:

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TEST SUMMARY

5.1.1 ELECTROMAGNETIC FIELDS

RESULT: Pass

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1. GENERAL REMARKS

1.1 COMPLEMENTARY MATERIALS

None.

1.2 List of Document Change

No.	Report No.	Description
1	DE22OBEH 001	First release.

2. TEST SITES

2.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

Address: No. 362, Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China

A2LA accreditation certification number: 5162.01

2.2 TEST DATE

Date of test: 2022-07-28 to 2022-08-12

2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

☑ Radio Spectrum Testing (TS8997-R&S)					
Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
G1825794	Wireless Connectivity Tester	R&S	CMW270	101375	02.08.2023
G1825795	Signal Analyzer	R&S	FSV 40	101441	01.08.2023
G1825796	Vector Signal Generator	R&S	SMBV100A	263301	01.08.2023
G1825797	Signal Generator	R&S	SMB100A	115186	01.08.2023
G1825798	OSP	R&S	OSP 150	101017	02.12.2022

G1825799	Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
G1825800	Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
G1825801	Power Meter	R&S	NRP2	107105	02.12.2022
G1829620	Power Sensor	R&S	NRP-Z81	105677	01.08.2023
G1826483	Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	02.04.2023
G1826431	Shielding Room 8#	Albatross	SR8	APC17151 -SR8	22.06.2024

2.4 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at No. 362, Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. GENERAL PRODUCT INFORMATION

3.1 GENERAL DESCRIPTION

The Wirnet™ iZeptoCell Ethernet is the ideal gateway to support you in your smart city, smart building or every smart project that requests dedicated indoor coverage and/or network densification, providing both a unique superior LoRa® coverage and operational excellence with Ethernet backhaul.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 TECHNICAL DATA

Table 2: Rating of EUT

General Information of EUT	Description
Kind of Equipment	Wirnet™ iZeptoCell gateway
Type Designation	PDTIOT-IZEE900
Trademark	Kerlink
FCC ID	2AFYS-KLKZEE900
IC	20637-KLKZEE900
Operating Temperature Range	0 °C ~ 55 °C
Operating Voltage	DC 5V via USB interface
Contains Certified Module	None
Module's Model	N/A
FCC ID:	N/A
IC:	N/A

Table 3: Technical Specification of EUT

Technical Specification of Wireless - LoRA	
Frequency Band	902 to 928 MHz
Operating frequency	923.3 MHz to 927.5 MHz 903.9 Mhz to 905.3 MHz
Rated Output (Conducted)	27 dBm for DTS, 24 dBm for Hybrid
OCW	500 kHz for DTS, 125 kHz for Hybrid
Type of modulation	Lora CSS
Data Rate	SF7 – SF12 / DR 8 – DR13, SF9 / DR1
Type of antenna	Integral antenna, Ceramic Antenna
Antenna gain	2 dBi

3.3 INDEPENDENT OPERATION MODES

The basic operation modes are:

- A. On, Lora transmitting mode (DTS & Hybrid)
 - 1) Low channel
 - 2) Middle channel
 - 3) High channel
- B. On, Transmitting on Hopping channel (Hybrid)
- C. On, Normal working
- D. Off

3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS

Refer to the Circuit Diagram.

3.5 SUBMITTED DOCUMENTS

- | | |
|---|--|
| <input checked="" type="checkbox"/> User Manual | <input checked="" type="checkbox"/> Rating Label |
| <input checked="" type="checkbox"/> Circuit Diagram | <input checked="" type="checkbox"/> PCB Layout |
| <input checked="" type="checkbox"/> Block Diagram | <input checked="" type="checkbox"/> Photo Document |
| <input checked="" type="checkbox"/> Schematics | <input checked="" type="checkbox"/> Parts List |
| <input type="checkbox"/> Model Difference Letter | |

4. TEST SET-UP AND OPERATION MODES

4.1 PRINCIPLE OF CONFIGURATION SELECTION

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 TEST OPERATION AND TEST SOFTWARE

Test operation refers to test setup in chapter 5.

4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

The EUT was tested together with the following accessories:

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop PC	Dell	E5430	9V28XY1
Wirnet iFemtoCell-evolution 915	Kerlink	PDTIOT-IFE04	005DGa010003
AC/DC power supply	CUI	SMI10-5-V-I38	/
3m USB-A extender cable	Assmann WSW	A-USB30AM-30AF-300	/
3m USB-A to USB-C cable	ACAL BFI	ACCA-21186	/
3m S/FTP Ethernet cable	RS PRO	411-497	/

4.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE

The test sample, which has been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

5. TEST RESULTS

5.1 ESSENTIAL REQUIREMENTS OF HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

5.1.1 ELECTROMAGNETIC FIELDS

RESULT:
Pass

Test date	:	2022-07-28 to 2022-08-12
Test standard	:	47 CFR FCC Part 2.1091 RSS-102 Issue 5
Limit	:	Table 1 of 47 CFR FCC Part 1.1310 Table 4 of RSS-102 Issue 5
Kind of test site	:	Shielded room

Test Setup

Date of testing	:	2022-07-28 to 2022-08-12
Input Voltage	:	DC 5V via USB
Operation mode	:	A&B
Test conditions	:	<input checked="" type="checkbox"/> Normal conditions
Ambient temperature	:	24.3 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm. Therefore RF exposure evaluation or computational modeling should be used to determine compliance.

Compliance Evaluation

MPE Calculation is based on the conducted power, and considering maximum power and antenna gain. The following formula is used to MPE evaluation.

$$Pd = \frac{P_{out} * G}{4R^2\pi}$$

Where

P_d = power density in mW/cm² or W/m²

P_{out} = output power to antenna in mW or W

G_{num} = Antenna gain in numeric

π = 3.14159

R = Distance between observation point and the center of radiator in cm or m

For single or multiple RF sources, the calculated power density should comply with following:

$$\sum_i \frac{Pd_i}{Pd_{Limit,i}} \leq 1$$

Where:

Pd_i = the power density when the f is i .

$Pd_{Limit,i}$ = the reference level requirement for power density when f is i .

Table 5: Evaluation Results of Single Source

Operation Mode	Frequency (MHz)	P (dBm)	Gain (dBi)	R (cm)	P (mW) (mW)	$G_{(\theta,\phi)}$	FCC_Pd (mW/cm ²)	ISED_Pd (W/m ²)	FCC_Limit (mW/cm ²)	ISED_Limit (W/m ²)	Result
LoRa DTS 923.3 to 927.5	925.70	26.48	2.00	20.00	444.63	1.58	0.14	1.40	0.62	2.79	Pass
LoRa Hybrid 903.9 to 905.3	903.90	22.31	2.00	20.00	170.22	1.58	0.05	0.54	0.60	2.74	Pass

Note:

1. P is maximum input power of antenna with tolerance.

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