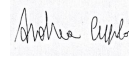


FCC Part 15B and ISED TEST REPORT

Report Number	327/24/04335/FCC	Rev. 00
Date of document	2024-07-18	
Total number of pages	Pag. 22	
OBJECT	FCC Part15B and ICES-003 Issue 7 and ICES-Gen Issue 1	
CUSTOMER	pro-micron GmbH	
EQUIPMENT UNDER TEST	WIFI Gateway	
MODEL	readFlex	
SUMMARY		
1	OBJECTIVE OF THE TESTS	3
2	IDENTIFICATION	3
3	EQUIPMENT UNDER TEST (EUT)	3
4	REFERENCE STANDARDS	4
5	TEST METHODS	4
6	EUT OPERATING CONDITIONS DURING TESTS	5
7	Environmental test conditions	5
8	Test RESULT	6
9	EUT MODIFICATIONS	16
Annex B	Test Instrumentations	02 pag
Annex D	Auxiliary Instrumentations	01 pag
Annex F	Judgment of compliance and measurements uncertainty	03 pag
Tested by (Name + Signature)	MARCO NICOLE' <i>Test engineer</i>	 Documento firmato da: NICOLE' MARCO 30.08.2024 14:44:59 UTC
Verified by (Name + Signature)	ANDREA CUPIDO <i>Lab Manager</i>	 Documento firmato da: CUPIDO ANDREA 30.08.2024 14:54:51 UTC
Approved and issued by (Name + Signature)	ALESSANDRO ZUCCATO <i>Lab Director</i>	 Documento firmato da: ZUCCATO ALESSANDRO 03.09.2024 12:08:42 UTC

History sheet of test Report

Report Number	Rev.	Date	Description of modification

1 OBJECTIVE OF THE TESTS

The objective of the tests is the evaluation of the conformity of the EUT to the requirements of the standards and test methods specified on par. 4 & 5 of present Test Report.

2 IDENTIFICATION

2.1 Laboratory

Name : Kiwa Creiven S.r.l.
 Street: Corso Spagna, 12
 City : 35127 Padova - ITALY
 Phone : +39.049.8704036
 Fax: +39.049.8707037
 E-mail : info.creiven@kiwa.com

FCC Designation number: IT0016

ISED CAB Identifier: IT0007

2.2 Customer

Manufacturer: pro-micron GmbH
 Street: Gottlieb-Daimler Str. 6
 City: 87600 Kaufbeuren
 Phone: +49 8341 9560 50
 Refer to: Mr Marco Lombardini

3 EQUIPMENT UNDER TEST (EUT)

3.1 EUT identification (declared under responsibility of the customer)

EUT Description: WIFI Gateway
 Model: readFlex
 Code: 61000466
 Serial N°: 0x0064
 Software release: 69000112_connect_basic_v2.0.6088.hex
 Size: Ø100x40mm
 Manufacturer: pro-micron GmbH
 Supply voltage: 5Vdc USB
 Rated Electrical Power: 2.5 W
 Rated Input Current: 0.5 A

3.1.2 EUT additional information

Object	Descriptions
Classification of installation and use	☐ Stand-alone ☒ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment) ☐ Plug-in radio device (Equipment intended for a variety of host systems) ☐ Other
Means for connection to the supply:	☒ Supply cord fitted with a plug ☐ Supply cord without plug (for permanently connection to fixed wiring) ☐ Appliance inlet ☐ Appliance provided with a set of terminals allowing the connection of cables or fixed wiring
Date of receipt of test item	2024-06-24
Date(s) of performance of tests	See the data specified in test results details

3.2 EUT cables

The EUT has been configured by the manufacturer with the following input / output cables:

Classification	Description	Cable		note
		Shielded	Specified max. length	
DC power port	d.c. input cable	☐	☐ none ☐ ≤ 1m ☒ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	type of power source: ☐ Internal Power Supply ☒ External Power Supply or AC/DC adapter ☐ Battery ☐ Other

3.3 EUT Auxiliary Equipments (AEs)

To ensure the correct functioning of the EUT, it has been necessary to make use of the following auxiliary equipment (AE):

Auxiliary Equipment AE01

Description : AC/DC adapter
 Model: S005AYB0500100
 Manufacturer: I.T.E.

3.4 EUT Sampling and adopted criteria

Equipment used for testing was selected by the customer. Sampling criteria adopted by the customer is unknown to Kiwa Creiven laboratory.

4 REFERENCE STANDARDS

4.1 Reference standards

DOCUMENT	DATE	OBJECT
FCC Title 47- Telecommunication part 15, subpart B	2022-10	CHAPTER I-FEDERAL COMMUNICATIONS COMMISSION PART 15--RADIO FREQUENCY DEVICES FCC part 15, subpart B, sez. 15.109 (Measurement of Radiated Emissions) FCC part 15, subpart B, sez. 15.107 (Measurement of AC power Line Conducted Emissions)
ICES-003	Issue 7	Conducted limits
ICES-Gen	Issue 1	Radiated emission limits

4.1.1 Emission summary

The following table specifies the tests required by the reference standard and test performed on EUT.

EUT PORT	Requirement of reference standard	Tested	Note	Results
Enclosure	Radiated Emissions	YES	---	Complies
Ac. mains port	AC Power Line Conducted Emissions	YES	---	Complies

5 TEST METHODS

5.1 Test methods

DOCUMENT	DATE	METHOD	ACCREDIA accreditation	Test Sequence (See Note 1)
FCC part 15, subpart B, sez. 15.109 ANSI C63.4	2022-10	Measurement of Radiated Emissions	Yes	01
ICES-003	Issue 7			
ICES-Gen	Issue 1			
FCC part 15, subpart B, sez. 15.107 ANSI C63.4	2022-10	Measurement of AC power Line Conducted Emissions	Yes	02
ICES-003	Issue 7			
ICES-Gen	Issue 1			
Note : 1) The tests have been carried out in the order specified in this column				

5.2 Deviation from test methods

None.

6 EUT OPERATING CONDITIONS DURING TESTS

The EUT is set to function as indicated in Table below, in compliance with the manufacturer's prescriptions and with that which is stated in the applied standards, test methods and procedures.

OPERATING CONDITION	DESCRIPTION OF FUNCTIONING DURING THE TEST
OC01	EUT details : during the test the EUT • was in recharge mode (AE N°01 powered with 120V @60Hz) • AE details : during the test the Auxiliary Equipment (AE), connected to EUT, was : • EUT connected via USB to AE N°01

7 Environmental test conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

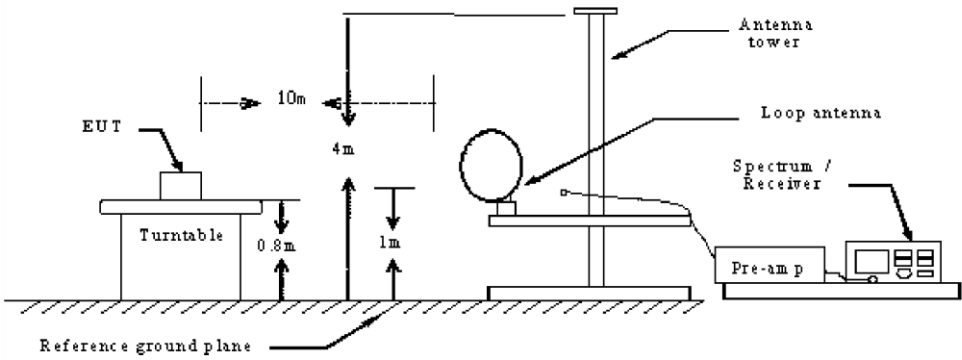
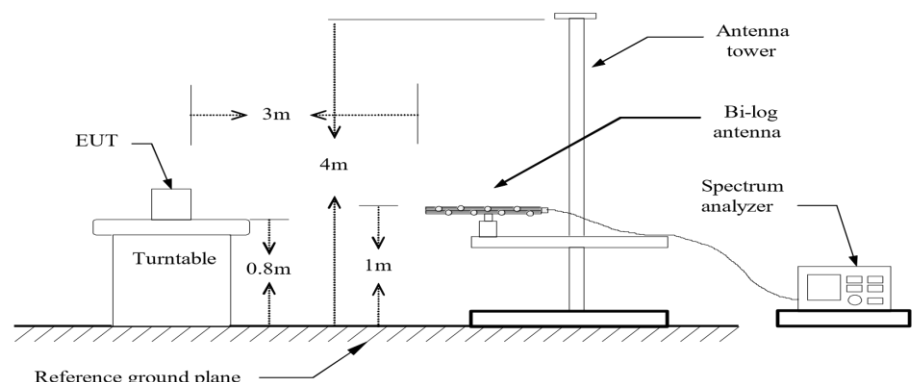
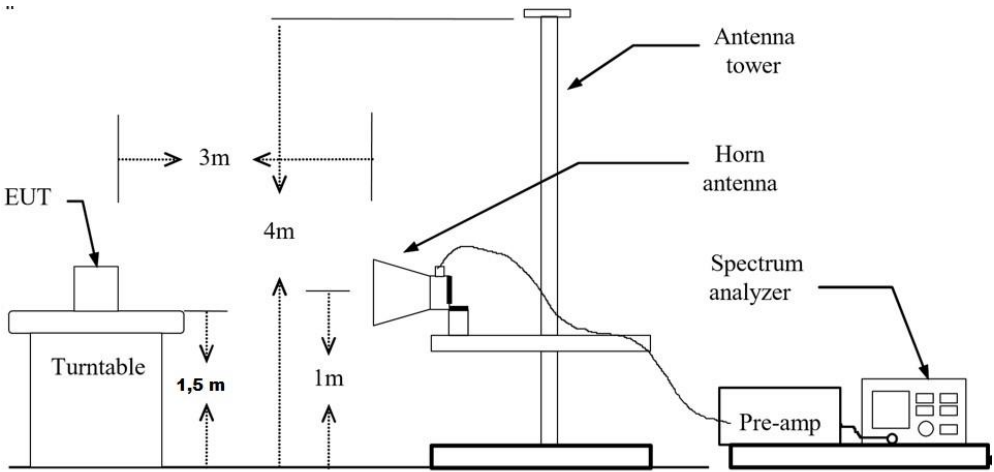
The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C ÷ 30 °C	30 % ÷ 60 %	800 hPa ÷ 1060 hPa

If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.

8 TEST RESULT

Test method:	FCC part 15, subpart B, sez. 15.109 ICES-003 Issue 7 & ICES-Gen Issue 1 ANSI C63.4 Measurement of Radiated Emissions For details see par. 5 of this report	
Operator	Marco Nicolè	
Test Date	2024-07-12	
EUT Classification	Class: B	
Electrical wiring	Cable	Length [m]
	USB cable	1.0
Operating conditions	OC01 See par. 6 of this report	
Auxiliary equipment (AE)	See par. 3.4 of this report	
Frequency range	30 MHz ÷ 1 GHz	
	1 GHz ÷ 12.75 GHz	

Test set up	Radiated Spurious Measurement: below 30MHz  Radiated Spurious Measurement: below 1GHz  Radiated Spurious Measurement: above 1GHz 
Measuring distance	3 m
Limits	See graph below
Test instrumentations	See Annex B
Measurement Uncertainty (k=2)	See Annex F
EUT modification during this test	None
Result	COMPLIES

Note	The worst condition between X, Y and Z axis was checked
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TEST GRAPHS AND MEASUREMENTS

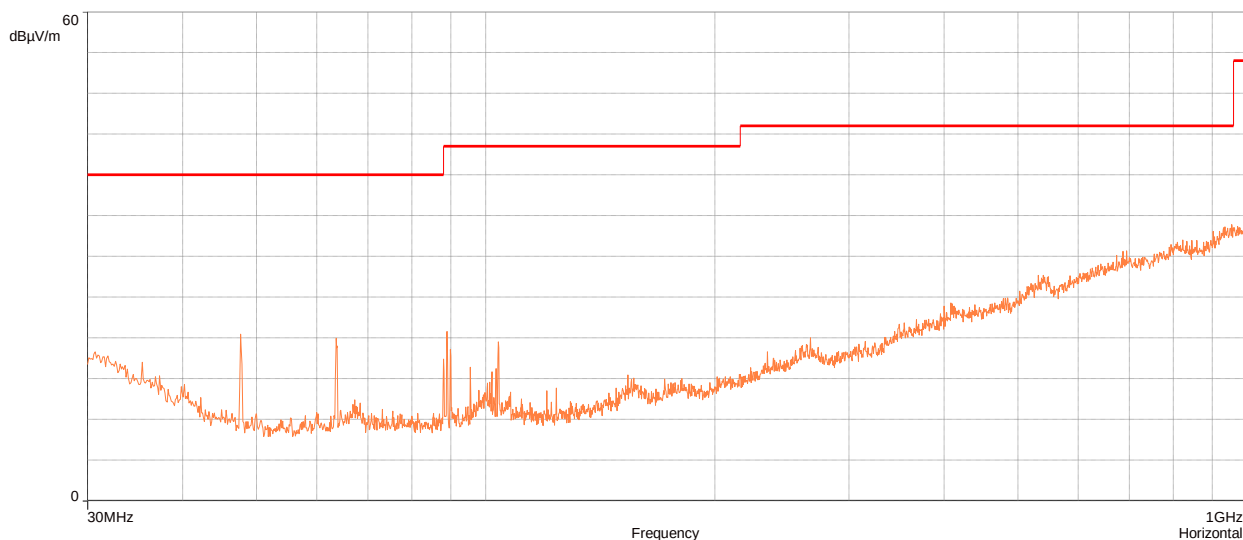
All traces have been acquired with Peak detector in Max-Hold mode (Maximum-Hold allows to record the maximum values of the spectra)
The final measurements are obtained consider the value read in the receiver minus the value of the column "Conversion Factor".

Measurement 01

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Horizontal

Range: 30MHz÷ 1GHz

Operating Condition: OC01

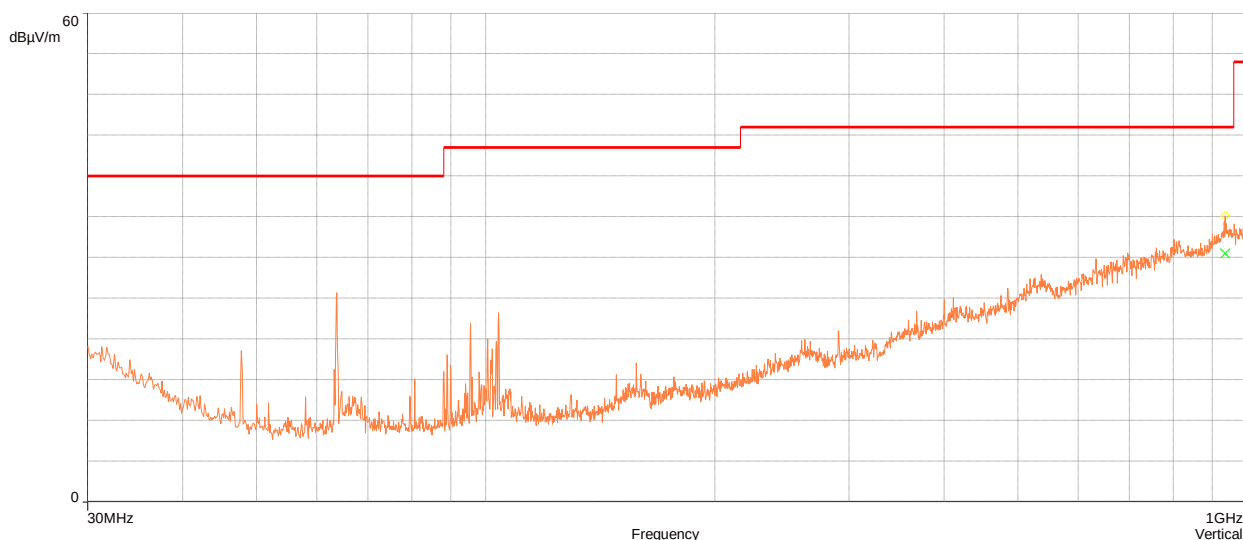


Measurement 02

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Vertical

Range: 30MHz÷ 1GHz

Operating Condition: OC01



TEST GRAPHS AND MEASUREMENTS

All traces have been acquired with Peak detector in Max-Hold mode (Maximum-Hold allows to record the maximum values of the spectra)

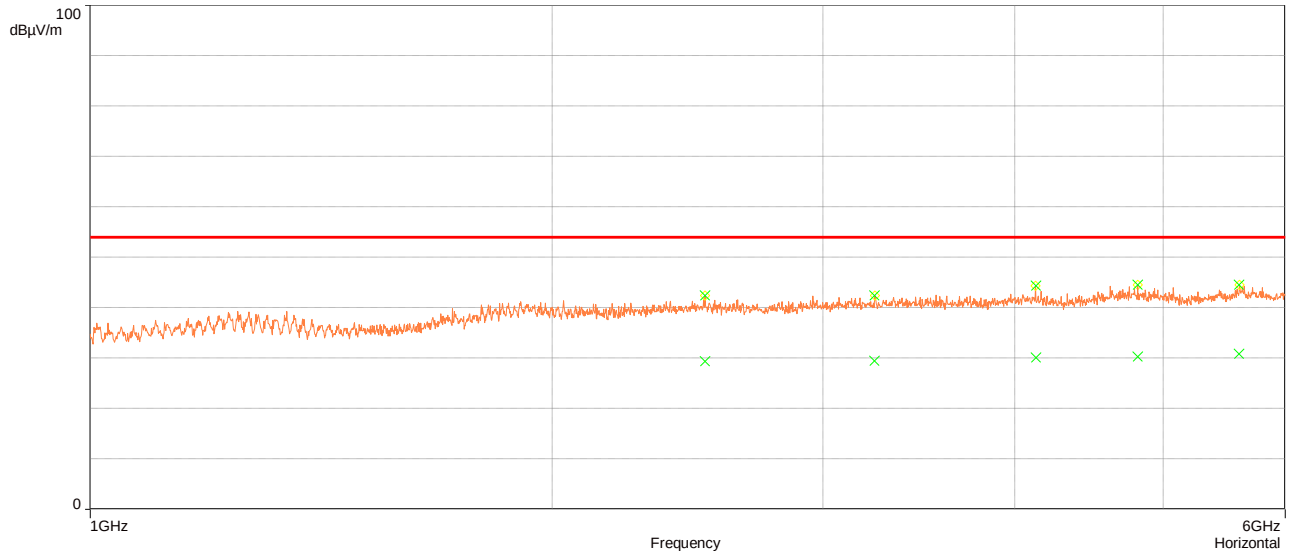
The final measurements are obtained consider the value read in the receiver minus the value of the column "Conversion Factor".

Measurement 01 Horizontal

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Horizontal

Range: 1GHz÷ 6GHz

Operating Condition: OC01

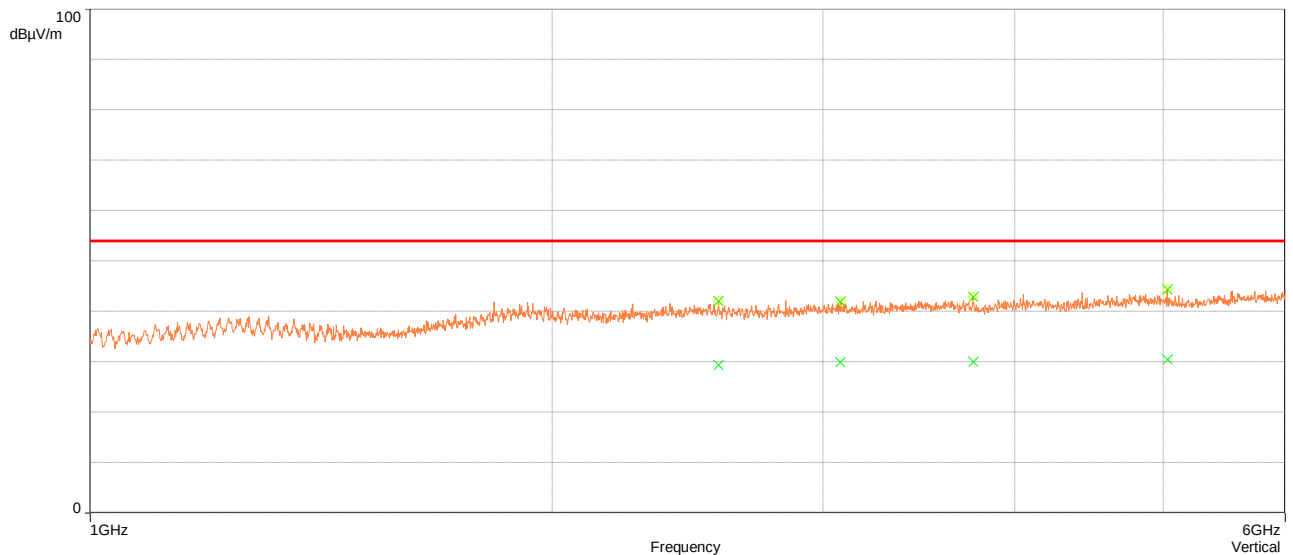


Measurement 02 Vertical

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Vertical

Range: 1GHz÷ 6GHz

Operating Condition: OC01



Frequency (MHz)	SR	Peak (dBμV/m)	CISPR Average(dBμV/m)	Limit Average (dBμV/m)	Delta (dB)	Polarization	Height (m)	Angle (deg)	Conversion Factor
2514.2	1	42.42	29.33	53.98	24.65	Horizontal	1.50	59.90	-5.37
3241.63	1	42.41	29.46	53.98	24.52	Horizontal	1.50	89.80	-4.48

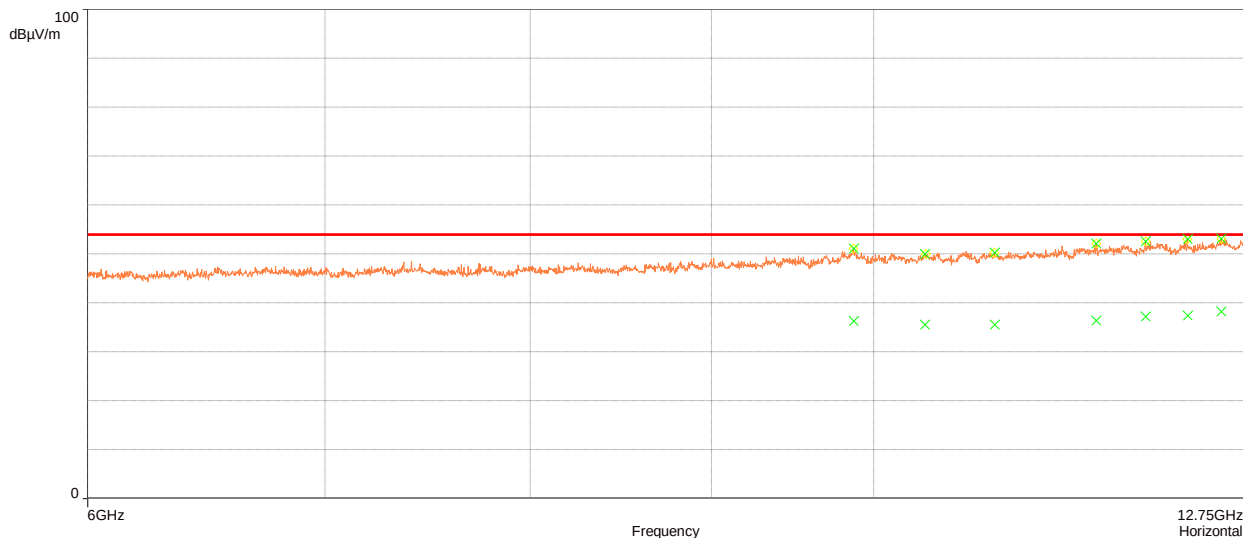
4128.67	1	44.38	30.15	53.98	23.83	Horizontal	1.50	359.90	-3.05
4811.14	1	44.57	30.33	53.98	23.65	Horizontal	1.50	150.00	-1.61
5598.03	1	44.53	30.89	53.98	23.09	Horizontal	1.50	240.40	0.73
2566.08	2	42.05	29.37	53.98	24.61	Vertical	1.50	330.10	-5.58
3080.34	2	41.93	29.88	53.98	24.10	Vertical	1.50	330.10	-4.66
3757.65	2	42.87	29.98	53.98	24.00	Vertical	1.50	89.80	-3.47
5030.3	2	44.33	30.48	53.98	23.50	Vertical	1.50	330.10	-1.57

Measurement 01

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Horizontal

Range: 6 GHz ÷ 12.75 GHz

Operating Condition: OC01

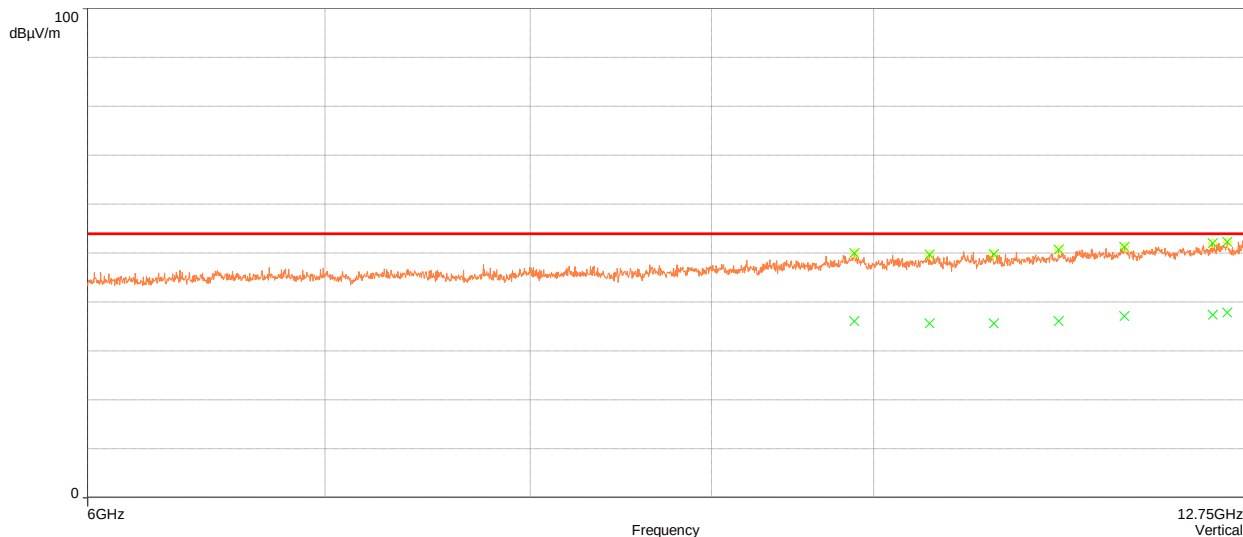


Measurement 02

EUT disposal: Complete rotation (360°) – **Antenna height:** 1 ÷ 4 m – **Antenna Pol.:** Vertical

Range: 6 GHz ÷ 12.75 GHz

Operating Condition: OC01



Frequency (MHz)	SR	Peak (dBμV/m)	CISPR Average(dBμV/m)	Limit Average (dBμV/m)	Delta (dB)	Polarization	Height (m)	Angle (deg)	Conversion Factor
9870.36	1	51.16	36.27	53.98	17.71	Horizontal	1.50	180.20	9.38
10338.81	1	50.04	35.61	53.98	18.37	Horizontal	1.50	60.50	9.07
10818.25	1	50.25	35.56	53.98	18.42	Horizontal	1.50	270.20	9.51
11555.88	1	52.12	36.38	53.98	17.6	Horizontal	1.50	240.40	9.78
11934.1	1	52.63	37.26	53.98	16.72	Horizontal	1.50	330.30	10.44
12263.98	1	53.07	37.41	53.98	16.57	Horizontal	1.50	300.60	11.56
12534.16	1	53.17	38.21	53.98	15.77	Horizontal	1.50	180.20	11.77
9876.06	2	49.99	36.13	53.98	17.85	Vertical	1.50	209.90	9.40
10368.4	2	49.69	35.65	53.98	18.33	Vertical	1.50	180.10	9.16
10810.36	2	49.86	35.70	53.98	18.28	Vertical	1.50	180.10	9.51
11278.58	2	50.71	36.14	53.98	17.84	Vertical	1.50	299.30	9.34
11769.54	2	51.29	37.16	53.98	16.82	Vertical	1.50	120.20	9.89
12466.14	2	52.00	37.44	53.98	16.54	Vertical	1.50	60.10	11.66
12583.58	2	52.35	37.87	53.98	16.11	Vertical	1.50	239.90	11.59

Test method:	FCC part 15, subpart B, sez. 15.107 ICES-003 Issue 7 & ICES-Gen Issue 1 ANSI C63.4 AC Power Line conducted emissions For details see par. 5 of this report	
Operator	Marco Nicolè	
Test Date	2024-07-09	
EUT Classification	Class: B	
Electrical wiring	Cable	Length [m]
	USB cable	1.0
Operating conditions	OC01 See par. 6 of this report	
Additional information	None	
Auxiliary equipment (AE)	See par. 3.4 of this report	
Frequency range	150 kHz ÷ 30 MHz	
Test set up	☐ Floor standing set up ☒ Table top set up	
Limits	In compliance with reference standard	
Port	AC. Input - LISN measurements	
Test instrumentations	See Annex B	
Measurement Uncertainty (k=2)	See Annex F	
EUT modification during this test	None	
Result	COMPLIES	
Note	---	

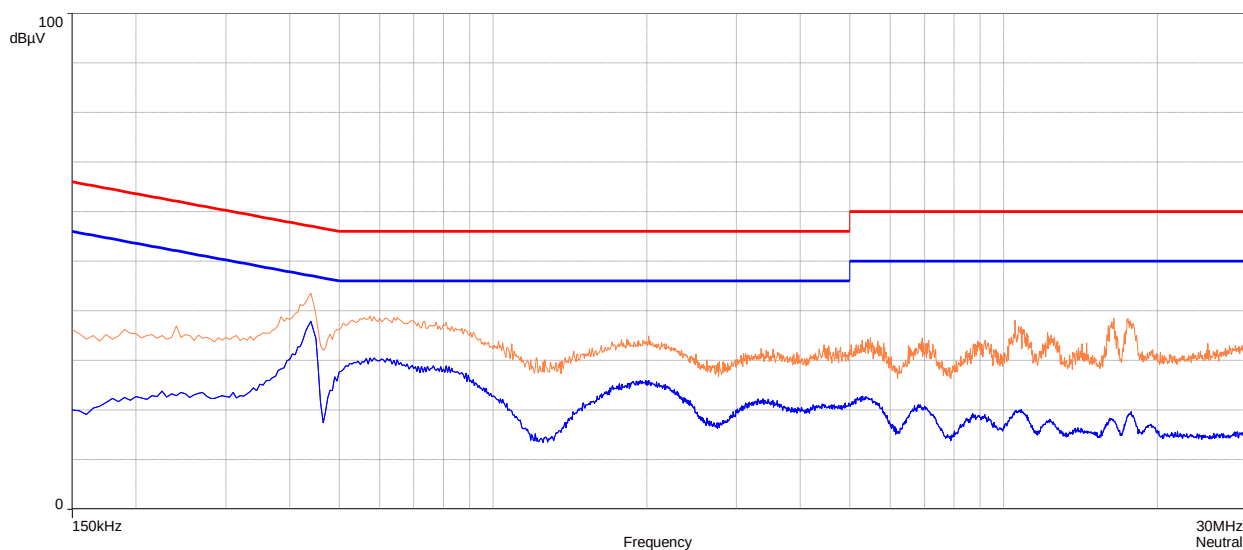
TEST GRAPHS AND MEASUREMENTS

All traces have been acquired with PK Peak detector (orange trace) and AVG Average detector (blue trace)
If PK trace exceeds QP Quasi-Peak limit, QP measurements are performed at discrete frequencies where the limit is exceeded. Measurement time for QP measurements is 15 s.

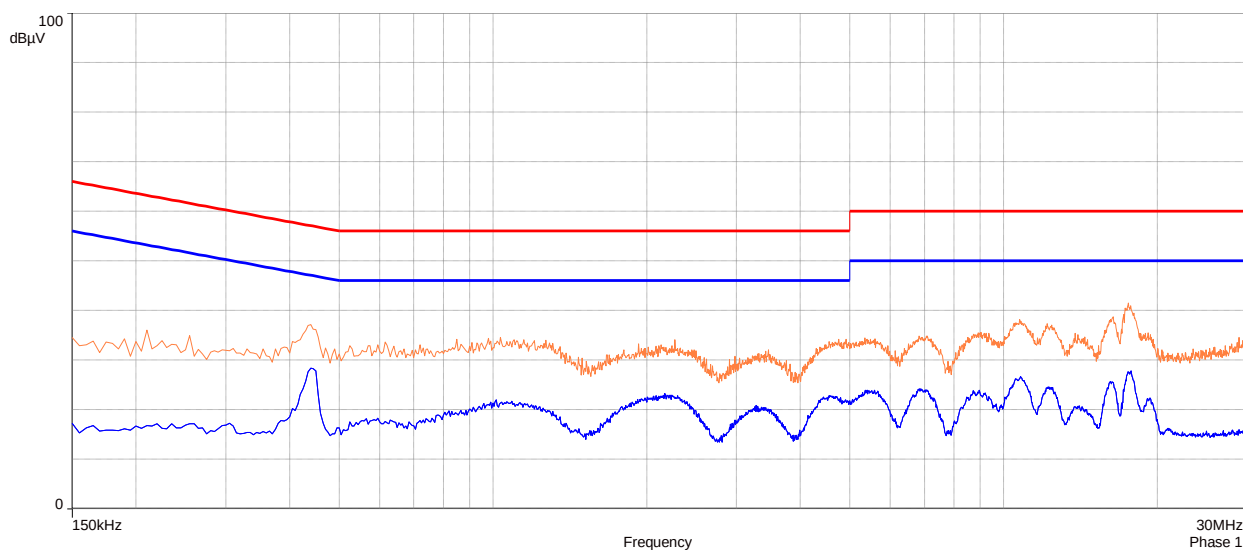
If the general level of the disturbance is not steady, also the AVG disturbance voltage level is observed for 15 s per frequency; results are reported in a specific table below the graph.

The final measurements are obtained consider the value read in the receiver minus the value of the column "Conversion Factor".

Measurement 01 LISN Measurement Line: Neutral Operating Condition: OC01



Measurement 02 LISN Measurement Line: Phase 1 Operating Condition: OC01



9 EUT MODIFICATIONS

None.

Annex B Test instrumentations

FCC Part15

Description	Manufacturer	Model	Identifier	Cal data	Cal due
Antenna - Horn Antenna 1 GHz ÷ 18 GHz	ETS-LINDGREN	3117	778/LAB	2023-10-12	2026-10-11
			Rapporto 6277		
Pre-Amplifier 18 GHz ÷ 40 GHz	Spin Electronics	PRE-1840-35	759/LAB	2023-05-15	2025-05-14
			Rapporto 6091		
Signal Generator	HEWLETT PACKARD	83640B	1388/LAB	2023-05-09	2025-05-08
			Rapporto 6092		
LISN 32A	ROHDE&SCHWARZ	ESH2-Z5	033L/CS	2023-07-10	2024-07-09
			Rapporto 6122		
EMI Receiver - PSA Spectrum Analyzer	Agilent Technologies	E4446A	740/LAB	2023-09-26	2024-09-25
			Rapporto 6190		
RF Cable - N-N 5m	INTERCOND	M17/74 RG 213	225/LAB	2023-09-01	2024-08-31
			Rapporto 6259		
RF Cable - N-N 1,8m	Siva Cables Italy	RG 58A/U	243/LAB	2023-09-01	2024-08-31
			Rapporto 6260		
Pre-Amplifier 18 GHz ÷ 40 GHz	Spin Electronics	PRE-1840-35	759/LAB	2023-05-15	2025-05-14
			Rapporto 6090		
Pulse Limiter ESH3-Z2	ROHDE&SCHWARZ GmbH	ESH3-Z2	528/LAB	2023-09-01	2024-08-31
			Rapporto 6263		
Semianechoic Chamber	Albatross Projects GmbH		739/CA	2023-02-06	2025-02-05
			Rapporto 6030		



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Code 326/24/04320/FCC



LAB N° 0259 L

Annex B Test instrumentations

Antenna - Horn Antenna 18 GHz ÷ 40 GHz	ETS-LINDGREN	3116	779/LAB	2023-10-18	2026-10-17	Rapporto 6278
Antenna - BiConiLog Antenna 30MHz÷ 6 GHz	ETS-LINDGREN	3142E	1508/LAB	2024-01-26	2027-01-25	Rapporto 6348
EMI Receiver - MXE	Keysight Technologies	N9038A	1444/LAB	2024-02-27	2025-02-26	Rapporto 6358
RF cable - set of RF cables (771/LAB + 791/LAB + 937/LAB)			802/LAB	2024-01-26	2025-01-25	Rapporto 6441
EMI Receiver	ROHDE&SCHWARZ	ESHS10 9kHz...30MHz	030L/CS	2024-07-05	2025-07-05	Rapporto 6472
Software BAT-EMC	Nexio	BAT-EMC	1910/LAB	--	--	
Filter PB	G. De PAOLI	BPF.0.15-30MHz	268/LAB	2023-09-01	2024-08-31	Rapporto 6261



Kiwa Creiven

Code 327/24/04335/FCC



LAB N° 0259 L

Annex D Auxiliary instrumentations

<i>Application</i>	<i>Description</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Identifier</i>	<i>Cal. data</i>	<i>Cal. due</i>
Monitoring of environmental conditions	Climatic Sensor (pri site) - 739/LAB Emission Anec	HW group	HWg-STE	1299/LAB	2023-08-10	2025-08-09
Monitoring of environmental conditions	Pressure Transducer	COMET	T7410	1530/LAB	2023-10-06	2025-10-05
Distance monitoring	Metro Laser	Leica	DISTO A2	1094/LAB	2023-11-10	2025-11-09

Annex F Compliance Decision Rule and measurements uncertainty

F1: Decision Rule

- A decision rule defines the role of uncertainty in assessing the conformity of measured values with respect to specification limits.
- The KIWA Creiven decision uses the “simple acceptance” rule, then the measure is assessed compliant with specifications if it is less or equal to the specification limit.
- The rule of simple acceptance is also called “shared risk” because the probability to be over the tolerance limit may be as high as 50% in the case when a measurement result is exactly on the tolerance limit (assuming a symmetric normal distribution of the measurements).
- This rule results in accordance with :
 - IEC Guide 115 Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector
 - ILAC-G8 Guidelines on the Reporting of Compliance with Specification
 - JGCM guide 106

F.2 Measurements uncertainty

Set Up N.	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
4	Power disturbance measurement
Test Uncertainty [dB]	4.5
5	Discontinuous terminal disturbance voltage measurement
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	3.4
7	Harmonic current emission measurement
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [%]	7.5
8	Voltage fluctuation and Flicker measurement up to 16A
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Uncertainty Dmax [%]	8.0
Uncertainty Dc [%]	8.0
Uncertainty Pst [%]	8.0
8	Voltage fluctuation and Flicker measurement up to 75A
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Uncertainty Dmax< 3% [%]	8.0
Uncertainty Dmax 3% -> 7% [%]	8.0
Uncertainty Dmax > 7% [%]	8.0
34 - LISN DC PMM	Conducted emissions from components/modules - Voltage measurements

Annex F Compliance Decision Rule and measurements uncertainty

	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	3.2
35 – Current Probe	Conducted emissions from components/modules – Current measurements
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	2.9
36 – Radiated emission	36 – Radiated emission from components/modules
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	7.6
47 - LISN 32A – 200A	Terminal disturbance voltage measurements (LISN 32A – 200A)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	3.4
47 – VP	Terminal disturbance voltage measurements (Passive Voltage Probe)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	2.9
47 - ISN T2	Terminal disturbance voltage measurements (ISN T2)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	4.2
47 - ISN T4	Terminal disturbance voltage measurements (ISN T4)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	4.6
47 - ISN T8	Terminal disturbance voltage measurements (ISN T8)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	5.0
47 - CVP	Terminal disturbance voltage measurements (CVP)
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	3.9
51	Emission: Radiated disturbance measurements 30-1000MHz
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty 30 MHz - 200 MHz [dB]	5.1
Test Uncertainty 200 MHz - 1 GHz [dB]	6.3
52	Emission: Radiated disturbance measurements 18-40 GHz
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	6.5

Annex F Compliance Decision Rule and measurements uncertainty

61	Emission: Radiated disturbance measurements 1-18 GHz
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty 1 – 6 GHz [dB]	5.2
Test Uncertainty 6 - 18 GHz [dB]	5.5
64	Emission: Radiated Large Loop Antenna
	<i>Expanded Uncertainty (k=2 - coverage factor: 95%)</i>
Test Uncertainty [dB]	3.3

--- End of test report ---