FCC Part 15B and ISED TEST REPORT

Report Number	031/25/04823/FCC	Rev. 00
Date of document	2025-01-28	
Total number of pages	Pag. 18	
OBJECT	FCC Part15B and RSS	
CUSTOMER	Stoerk-Tronic, Stoerk GmbH & Co. KG	
EQUIPMENT UNDER TEST	Wireless communication bridge with mesh functionality, where serial communication is transferred between Air Connect devices (2.4 GHz)	
MODEL	Air Connect Commander Air Connect Unit	

SUMMARY

Tested by *(Name + Signature)*	MARCO NICOLE' *Test engineer*	
Verified by *(Name + Signature)*	ANDREA CUPIDO *Lab Manager*	
Approved and issued by *(Name + Signature)*	ALESSANDRO ZUCCATO *Lab Director*	

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.
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City :	35127 Padova - ITALY
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FCC Designation number:	**IT0016**
ISED CAB Identifier:	**IT0007**

2.2 Customer

Customer:	Stoerk-Tronic, Stoerk GmbH & Co. KG
Street:	Untere Waldplaetze 6
City:	Stuttgart
Phone:	+(49) 711 68661 54
Refer to :	M. Wróblewski (technical Director)

3 EQUIPMENT UNDER TEST (EUT)

3.1 EUT identification (declared under responsibility of the customer)

EUT Description: Wireless communication bridge with mesh functionality, where serial communication is transferred between Air Connect devices (2.4 GHz)

Model:	Air Connect Commander Air Connect Unit
Code:	900229.001 - Air Connect Unit 900229.002 - Air Connect Commander
Serial N°:	250117-00001
Software release:	V1.0
Size:	80 x55 x 34 [mm] excluding flanges and antenna
Manufacturer:	Stoerk-Tronic, Stoerk GmbH & Co. KG
Supply voltage:	12 Vdc
Rated Electrical Power:	0.6 W
Rated input current:	50 mA
FCC ID:	2BNLE-AIRCONNECT Contains FCC ID: 2AC7Z-ESPS3WROOM1U

Note: Air Connect Commander and Air Connect Unit have the same PCB and the same components (see pics for details)

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	2025-01-20
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	Dc input cable with external power supply (**not used during the tests**)	☐	☒ none ☐ ≤ 1m ☐ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	type of power source: ☐ Internal Power Supply ☒ External Power Supply or AC/DC adapter ☐ Battery ☐ Other: __
Telecommunication port	Ethernet cable contains power supply and serial communication (**used during the test**)	☒	☐ none ☐ ≤ 1m ☒ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	RJ45 connector Cable connected to Commander box (AE01)

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 AE N°01

Description : Commander Box
Model: 900333.0XX
Manufacturer: Stoerk-Tronic, Stoerk GmbH & Co. KG

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 2	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 Range 30÷1000 MHz	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 2			
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 2			
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 powered at 12 Vdc with AE01 (AE N°01 was powered with 120V @60Hz) • was not activated the radio transmission

7 Environmental test conditions

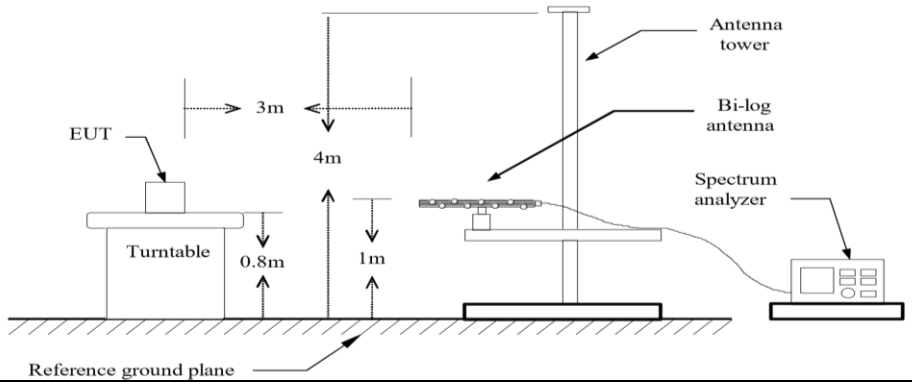
The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

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.

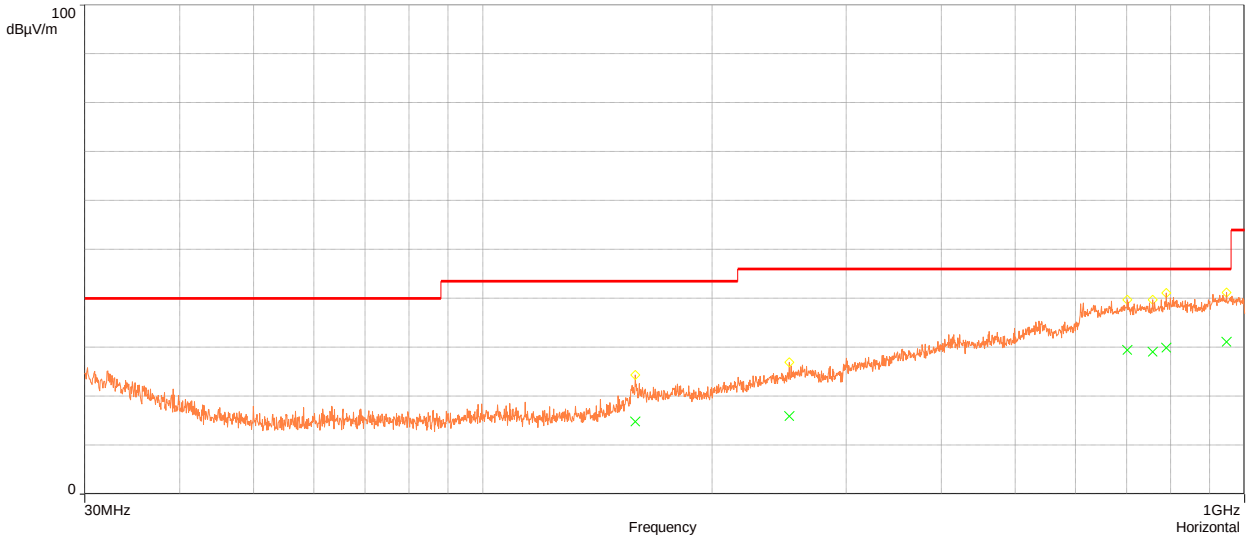
8 TEST RESULT

Test method:	**FCC part 15, subpart B, sez. 15.109** **ICES-003 Issue 7 & ICES-Gen Issue 2** **ANSI C63.4** **Measurement of Radiated Emissions (30 MHz ÷ 1 GHz)** For details see par. 5 of this report	
Operator	Marco Nicolè	
Test Date	2025-01-21	
EUT Classification	Class: **B**	
Electrical wiring	*Cable*	*Length [m]*
	AC input cable (AE01)	1.5
	Ethernet cable (that included power supply cables)	3.0
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	
Test set up		
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	

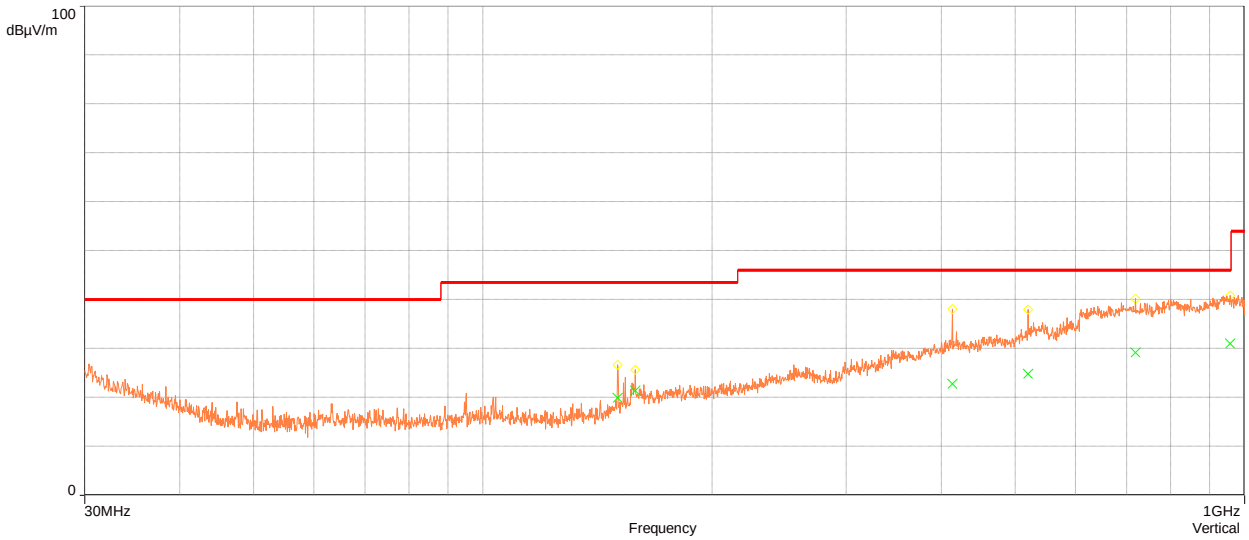
TEST GRAPHS AND MEASUREMENTS

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 obtain 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



Frequency (MHz)	SR	Peak (dBµV/m)	QPeak (dBµV/m)	LimQPeak (dBµV/m)	Delta (dB)	Polarization	Height (m)	Angle (deg)	Conversion Factor
158.515	1	24.38	14.82	43.52	-28.70	Horizontal	2.56	369.90	15.83
252.475	1	26.97	15.91	46.00	-30.09	Horizontal	1.05	170.80	19.18
701.3955	1	39.73	29.46	46.00	-16.54	Horizontal	3.96	20.40	30.35
756.8955	1	39.75	29.08	46.00	-16.92	Horizontal	3.36	220.70	30.09
788.875	1	41.09	29.92	46.00	-16.08	Horizontal	3.95	20.40	31.03
947.395	1	41.21	31.09	46.00	-14.91	Horizontal	1.45	220.70	33.17
150.2955	2	26.66	19.92	43.52	-23.60	Vertical	1.05	50.80	14.97
158.395	2	25.64	21.37	43.52	-22.15	Vertical	1.23	20.10	15.85
413.1555	2	38.03	22.76	46.00	-23.24	Vertical	1.12	369.80	24.29
519.415	2	37.93	24.82	46.00	-21.18	Vertical	1.96	80.40	26.75
719.215	2	40.23	29.19	46.00	-16.81	Vertical	3.13	170.30	29.95
957.1155	2	40.84	31.04	46.00	-14.96	Vertical	3.86	50.80	32.98

TEST PHOTOGRAPHS

Measurement of radio disturbance characteristics:
Table position = 0 deg.
Range: 30 MHz ÷ 1GHz

Measurement of radio disturbance characteristics:
Table position = 0 deg.
Range: 30 MHz ÷ 1GHz

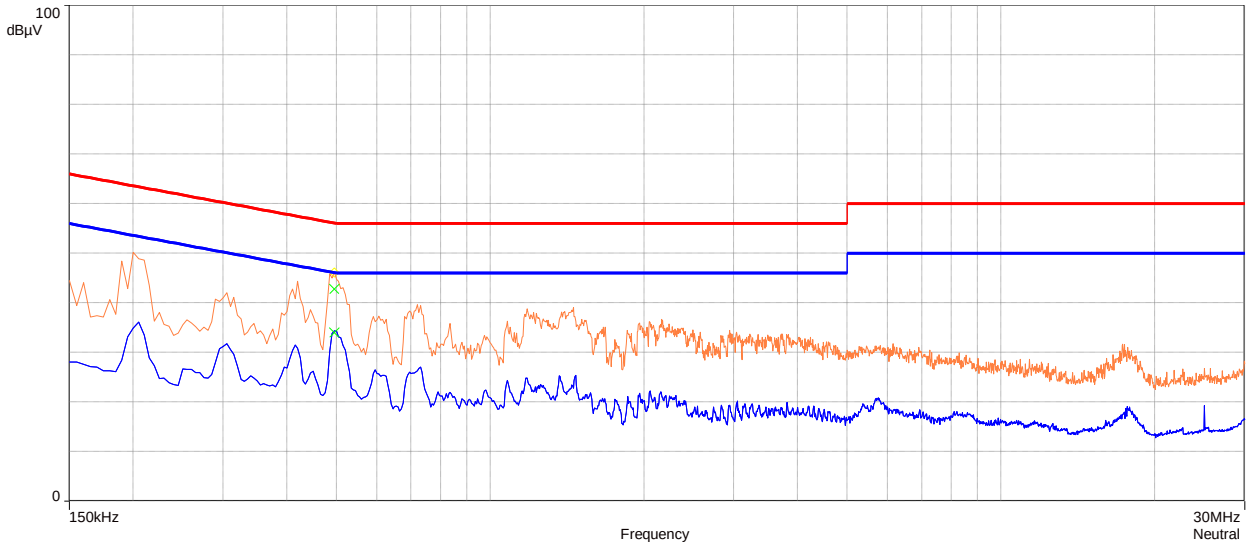
Test method:	**FCC part 15, subpart B, sez. 15.107** **ICES-003 Issue 7 & ICES-Gen Issue 2** **ANSI C63.4** **AC Power Line Conducted Emissions** For details see par. 5 of this report	
Operator	Marco Nicolè	
Test Date	2025-01-21	
EUT Classification	Class: **B**	
Electrical wiring	*Cable*	*Length [m]*
	AC input cable (AE01)	1.5
	Ethernet cable (that included power supply cables)	3.0
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 (AE01) - LISN measurements	
Test instrumentations	See Annex B	
Measurement Uncertainty (k=2)	See Annex F	
EUT modification during this test	None	
Result	**COMPLIES**	
Note	The difference between the emission of AE01 with and without the EUT connected, is not relevant.	

TEST GRAPHS AND MEASUREMENTS

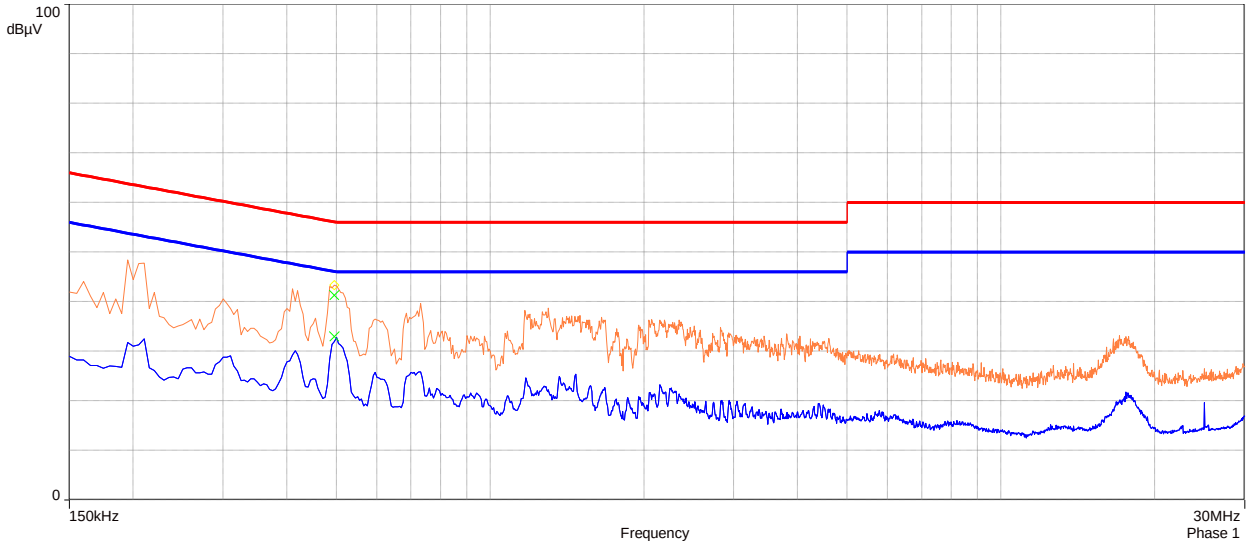
All traces have been acquired with PK Peak detector (orange trace) and AVG Average detector (blue trace)
If PK trace exceeds QP Quasi-Peak limit, QP measurements are performed at discrete frequencies where the limit is exceeded. Measurement time for QP measurements is 15 s.
If the general level of the 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 obtain consider the value read in the receiver minus the value of the column “Conversion Factor”.

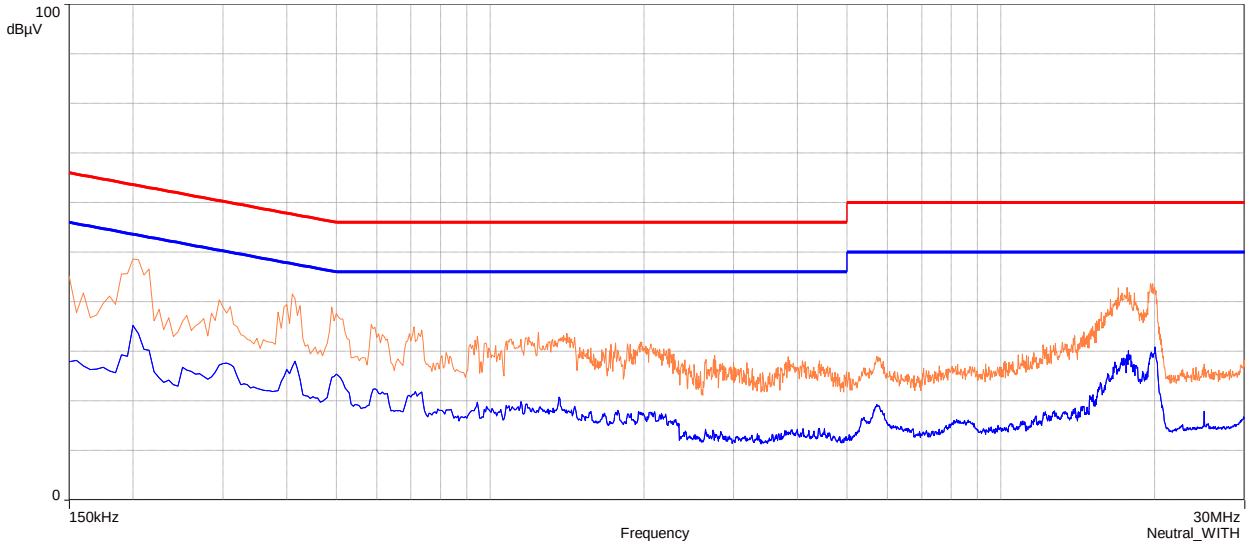
Measurement 01
A.C. Input (AE01) - LISN measurements
Line: Neutral
Operating Condition: OC01



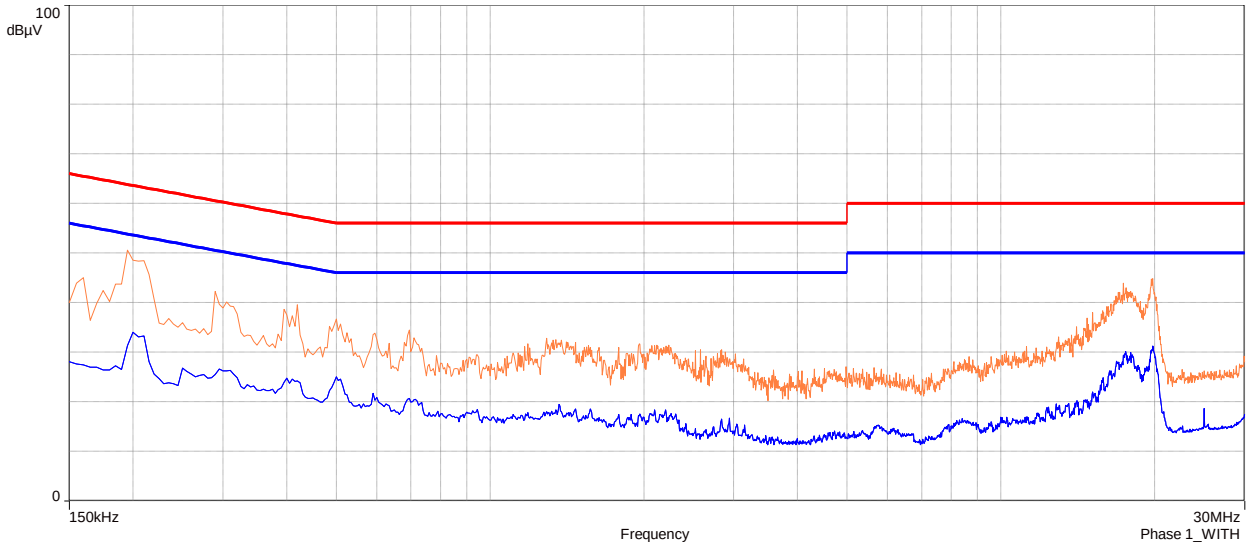
Measurement 02
A.C. Input (AE01) - LISN measurements
Line: Phase 1
Operating Condition: OC01



Measurement 03
A.C. Input (AE01) - LISN measurements
Line: Neutral
Operating Condition: OC02



Measurement 04
A.C. Input (AE01) - LISN measurements
Line: Phase 1
Operating Condition: OC02



Frequency (MHz)	SR	QPeak (dBµV)	AVG (dBµV)	Lim AVG (dBµV)	Lim QPeak (dBµV)	AVG Margin (dB)	QPeak Margin (dB)	Line	Conversion Factor
0.2	1	50.17	34.88	53.61	63.61	18.73	13.44	Neutral	12.33
0.305	1	42.06	31.79	50.11	60.11	18.32	18.05	Neutral	10.91
0.42	1	44.36	30.88	47.45	57.45	16.57	13.09	Neutral	10.71
0.72	1	39.62	26.28	46.00	56.00	19.72	16.38	Neutral	10.40
1.455	1	39.12	22.78	46.00	56.00	23.22	16.88	Neutral	10.32
0.195	2	48.43	31.76	53.82	63.82	22.06	15.39	Phase 1	12.50
0.21	2	47.79	32.48	53.21	63.21	20.73	15.42	Phase 1	12.28
0.41	2	42.56	29.25	47.65	57.65	18.40	15.09	Phase 1	10.77
0.73	2	39.62	25.84	46.00	56.00	20.16	16.38	Phase 1	10.50
1.3	2	38.67	22.26	46.00	56.00	23.74	17.33	Phase 1	10.40
0.2	3	48.61	35.22	53.61	63.61	18.39	15.00	Neutral	12.33
0.41	3	41.57	26.88	47.65	57.65	20.77	16.08	Neutral	10.72
0.49	3	38.91	24.69	46.17	56.17	21.48	17.26	Neutral	10.59
1.245	3	33.83	17.65	46.00	56.00	28.35	22.17	Neutral	10.32
16.98	3	42.76	25.67	50.00	60.00	24.33	17.24	Neutral	10.99
19.615	3	43.63	27.60	50.00	60.00	22.40	16.37	Neutral	11.13
0.195	4	50.56	31.30	53.82	63.82	22.52	13.26	Phase 1	12.50
0.29	4	42.19	25.47	50.52	60.52	25.05	18.33	Phase 1	11.15
0.42	4	39.55	24.20	47.45	57.45	23.25	17.90	Phase 1	10.75
0.5	4	36.65	25.00	46.00	56.00	21.00	19.35	Phase 1	10.57
17.375	4	43.88	29.15	50.00	60.00	20.85	16.12	Phase 1	11.01
19.82	4	44.78	30.17	50.00	60.00	19.83	15.22	Phase 1	11.14

TEST PHOTOGRAPHS

AC Power Line Conducted Emissions

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 Rapporto 6277	2023-10-12	2026-10-11
RF Cable - N-N 5m	INTERCOND	M17/74 RG 213	225/LAB Rapporto 6599	2024-08-26	2025-08-26
RF Cable - N-N 1,8m	Siva Cables Italy	RG 58A/U	243/LAB Rapporto 6600	2024-08-26	2025-08-26
Filter PB	G. De PAOLI	BPF.0.15-30MHz	268/LAB Rapporto 6601	2024-08-26	2025-08-26
Pulse Limiter ESH3-Z2	ROHDE&SCHWARZ Gmbh	ESH3-Z2	528/LAB Rapporto 6602	2024-08-26	2025-08-26
Semianechoic Chamber	Albatross Projects GmbH		739/CA Rapporto 6029	2023-02-02	2025-02-01
EMI Receiver - PSA Spectrum Analyzer	Agilent Technologies	E4446A	740/LAB Rapporto 6622	2024-09-16	2025-09-16
LISN 32A	ROHDE&SCHWARZ	ESH2-Z5	033L/CS Rapporto 6609	2024-09-09	2025-09-09
Pre-Amplifier 18 GHz ÷ 40 GHz	Spin Electronics	PRE-1840-35	759/LAB Rapporto 6090	2023-05-15	2025-05-14
Software BAT-EMC	Nexio	BAT-EMC	1910/LAB	--	--

Annex B Test instrumentations

Antenna - Horn Antenna 18 GHz ÷ 40 GHz	ETS-LINDGREN	3116	779/LAB	2023-10-18	2026-10-17
			Rapporto 6278		
RF cable - set of RF cables (771/LAB + 791/LAB + 937/LAB)			802/LAB	2024-01-26	2025-01-25
			Rapporto 6441		
RF Cable - set of RF cables 769/LAB + 791/LAB + 938/LAB + Pre-Amplifier 758/LAB with cables			803/LAB	2024-04-05	2025-04-05
			Rapporto 6498		
RF cable - set of RF cables (760/LAB + 804/LAB + 805/LAB)			806/LAB	2024-04-05	2025-04-05
			Rapporto 6606		
Signal Generator	HEWLETT PACKARD	83640B	1388/LAB	2023-05-09	2025-05-08
			Rapporto 6092		
EMI Receiver - MXE	Keysight Technologies	N9038A	1444/LAB	2024-02-27	2025-02-26
			Rapporto 6358		
Antenna - BiConiLog Antenna 30MHz÷ 6 GHz	ETS-LINDGREN	3142E	1508/LAB	2024-01-26	2027-01-25
			Rapporto 6348		
Pre-Amplifier 18 GHz ÷ 40 GHz	Spin Electronics	PRE-1840-35	759/LAB	2023-05-15	2025-05-14
			Rapporto 6091		

Annex D Auxiliary instrumentations

Application	*Description*	*Manufacturer*	*Model*	*Identifier*	*Cal. data*	*Cal. due*
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	Climatic Sensor (pri site) - 051L/CS Shielded Cham	HW group	HWg-STE	1300/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.	*Expanded Uncertainty (k=2 - coverage factor: 95%)*
4	**Power disturbance measurement**
Test Uncertainty [dB]	4.5
5	**Discontinuous terminal disturbance voltage measurement**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	3.4
7	**Harmonic current emission measurement**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [%]	7.5
8	**Voltage fluctuation and Flicker measurement up to 16A**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Uncertainty Dmax [%]	8.0
Uncertainty Dc [%]	8.0
Uncertainty Pst [%]	8.0
8	**Voltage fluctuation and Flicker measurement up to 75A**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Uncertainty Dmax< 3% [%]	8.0
Uncertainty Dmax 3% -> 7% [%]	8.0
Uncertainty Dmax > 7% [%]	8.0
34 - LISN DC	**Conducted emissions from components/modules - Voltage measurements**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	3.7
35 – Current Probe	**Conducted emissions from components/modules – Current measurements**
	Expanded Uncertainty (k=2 - coverage factor: 95%)

Annex F Compliance Decision Rule and measurements uncertainty

Test Uncertainty [dB]	4.8
36 – Radiated emission	**36 – Radiated emission from components/modules**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	5.4
47 - LISN 32A – 200A	**Terminal disturbance voltage measurements (LISN 32A – 200A)**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	3.4
47 – VP	**Terminal disturbance voltage measurements (Passive Voltage Probe)**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	2.9
47 - ISN T8	**Terminal disturbance voltage measurements (ISN T8)**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	5.0
51	**Emission: Radiated disturbance measurements 30-1000MHz**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty 30 MHz - 1 GHz [dB]	6.3
52	**Emission: Radiated disturbance measurements 18-40 GHz**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	6.5
61	**Emission: Radiated disturbance measurements 1-18 GHz**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty 1 – 6 GHz [dB]	5.2
Test Uncertainty 6 - 18 GHz [dB]	5.5
64	**Emission: Radiated Large Loop Antenna**
	Expanded Uncertainty (k=2 - coverage factor: 95%)
Test Uncertainty [dB]	3.6

--- End of test report ---