

Test Report issued under the responsibility of:



TEST REPORT
EMC
Electromagnetic compatibility of multimedia equipment

Report Number. : **AE21-0062220-01**

Date of issue : **2021-03-19**

Total number of pages : **61**

Name of Testing Laboratory preparing the Report : **IMQ S.p.A. Via Quintiliano, 43 – 20138 – Milano (MI) – Italy**

Applicant's name : **4BOX S.r.l.**

Address : **Via Filippo Brunelleschi, 16 IT- 20146 Milano**

Test specification:

Standard : **EN 55032:2015, EN55024: 2010+A1:2015, EN 61000-3-2:2019, EN 61000-3-3: 2013+A1:2019**

Test procedure..... :

Non-standard test method..... : **N/A**

Test Report Form No...... : **IECCISPR32&24_IEC61000_3_2&3A**

Test Report Form(s) Originator.... : **LCIE**

Master TRF : **Dated 2016-12**

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1. Program details

Test item description..... :	USB power supply	
Trade Mark..... :		
Manufacturer	4BOX S.r.l. - Via Filippo Brunelleschi, 16 IT- 20146 Milano	
Model/Type reference..... :	See "General product information"	
Ratings..... :	1\N~ 100-230V~, 50/60Hz, 0.35A; Output: 5V  , 3A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> CB Testing Laboratory:	IMQ S.p.A. – Milano	
Testing location/ address	Via Quintiliano, 43 – 20138 – Milano (MI) – Italy	
Tested by (name, function, signature)..... :	Massimiliano Strada [Laboratory technician]	
Approved by (name, function, signature) .. :	Giovanni Di Turi [Laboratory manager]	
Testing procedure: CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature) .. :		
Testing procedure: CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Testing procedure: CTF Stage 3:		
Testing procedure: CTF Stage 4:		
Testing location/ address		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):
Summary of testing:
Tests performed (name of test and test clause):
EMISSION

Conducted continuous emissions

Radiated emissions

IMMUNITY

Electrostatic discharges

Radio frequency electromagnetic fields, and Proximity Wireless fields

Electrical fast transients/bursts

Surges

Injected currents, 0.15 to 80 MHz

Voltage dips and interruptions

Power frequency magnetic field, 50 Hz

Testing location:
EMISSION

EMC Laboratory

Semi anechoic chamber (CSSA)

IMMUNITY

EMC Laboratory

Semi anechoic chamber (CSSA)

EMC Laboratory

EMC Laboratory

EMC Laboratory

EMC Laboratory

EMC Laboratory

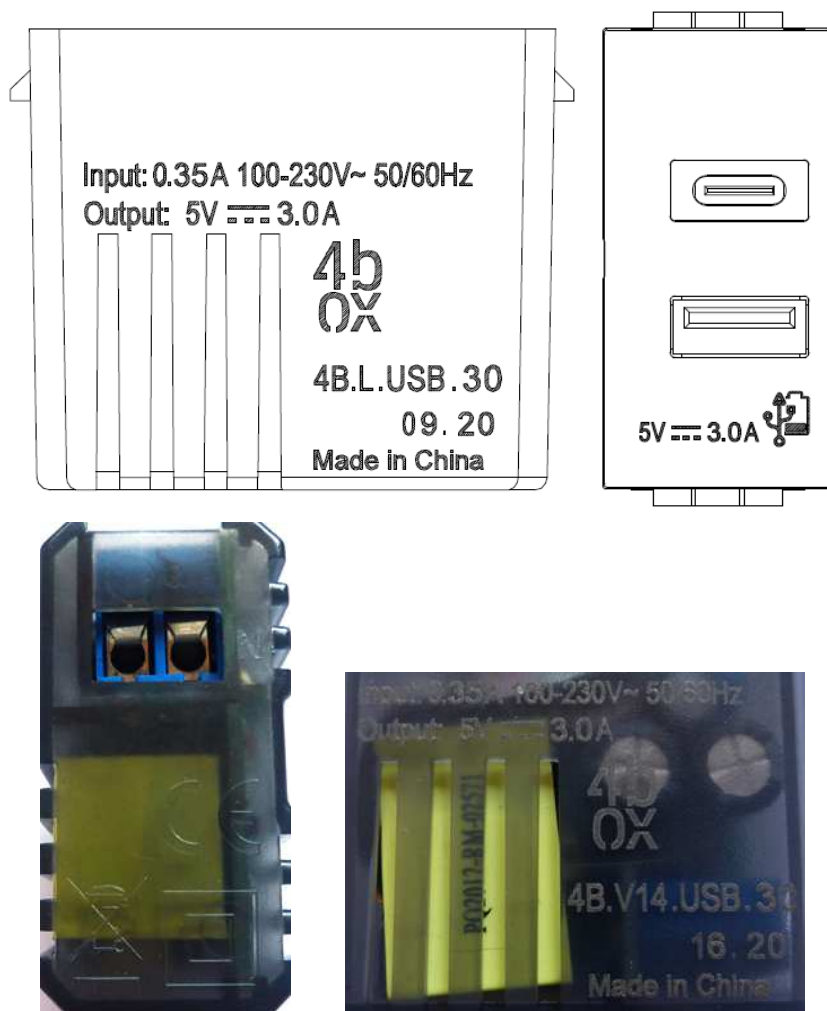
Summary of compliance with National Differences (List of countries addressed):

None

☐ The product fulfils the requirements of the special condition/deviation of the National Standard Reference required by all the countries addressed (No deviation from CB Bulletin)


Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Label put on the package.



Test item particulars..... :	
Classification of installation and use..... :	Class B (according to EN 55032)
Supply Connection	1N~ 100-230V~, 50/60Hz, 0.35A; Output: 5V  , 3A
..... :	
Possible test case verdicts:	
- test case does not apply to the test object..... : N/A	
- test object does meet the requirement..... : P (Pass)	
- test object does not meet the requirement..... : F (Fail)	
Testing..... :	
Date of receipt of test item	2020-05-12 (IMQ Ref. No. BEM 99408) item sampled and sent by applicant
Date (s) of performance of tests : 2021-03-08 ÷ 2021-03-12	

**General remarks:**

"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001, IO-LAB-004 and IO-LAB-009.

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

All instrumentation used for immunity tests is calibrated and within the specifications required by the basic standards (IEC 61000-4-X).

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided

☐ Yes

☒ Not applicable

When differences exist; they shall be identified in the General product information section.

Name and address of factory : LUMI LEGEND ELECTRICAL Co., LTD
No. 18, LANE 239, BEIHAI ROAD, JIANGBEI,
NINGBO 315032, P.R. CHINA

General product information:**Product Description –**

The EUT is a USB power unit, provided with two USB output, one provided with type "A" connector and one provided with type "C" connector, with a total current of 3.0A. it's designed for a flush mounting.

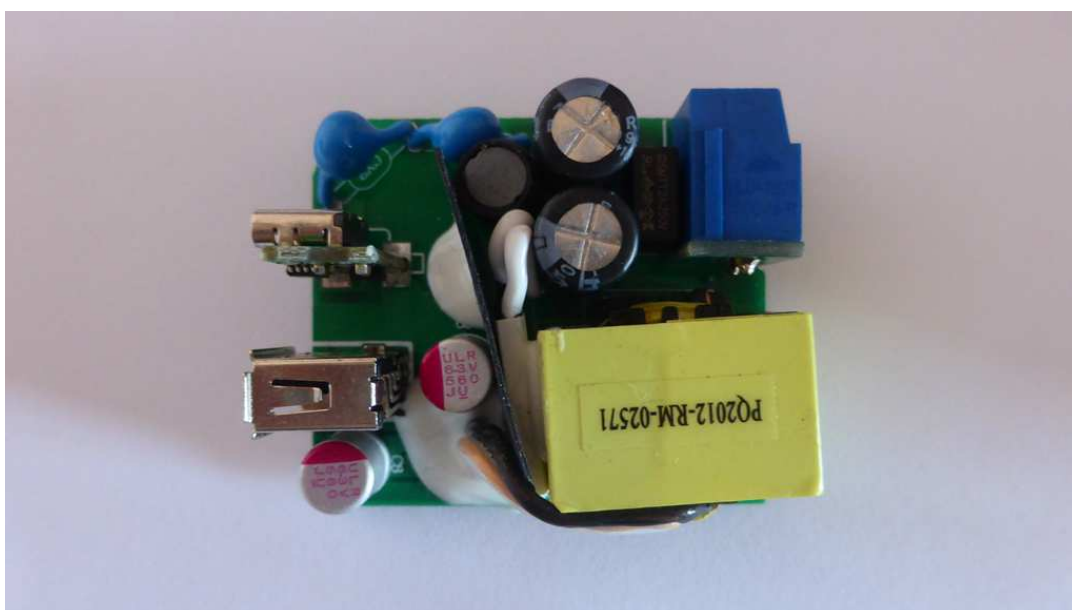
It can be marketed with the following codes:

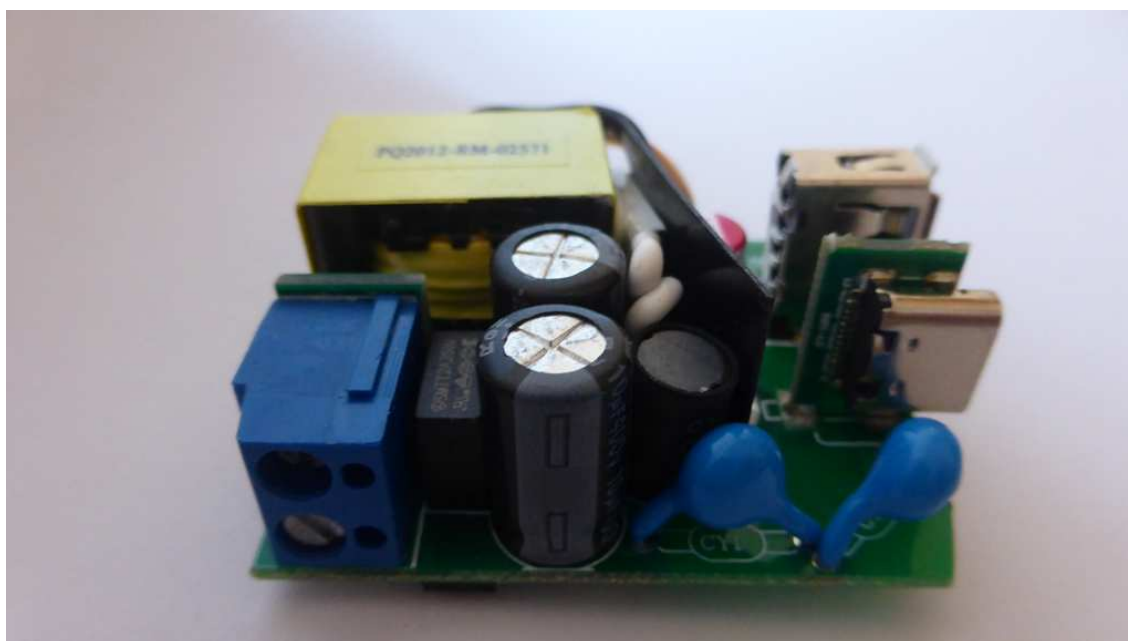
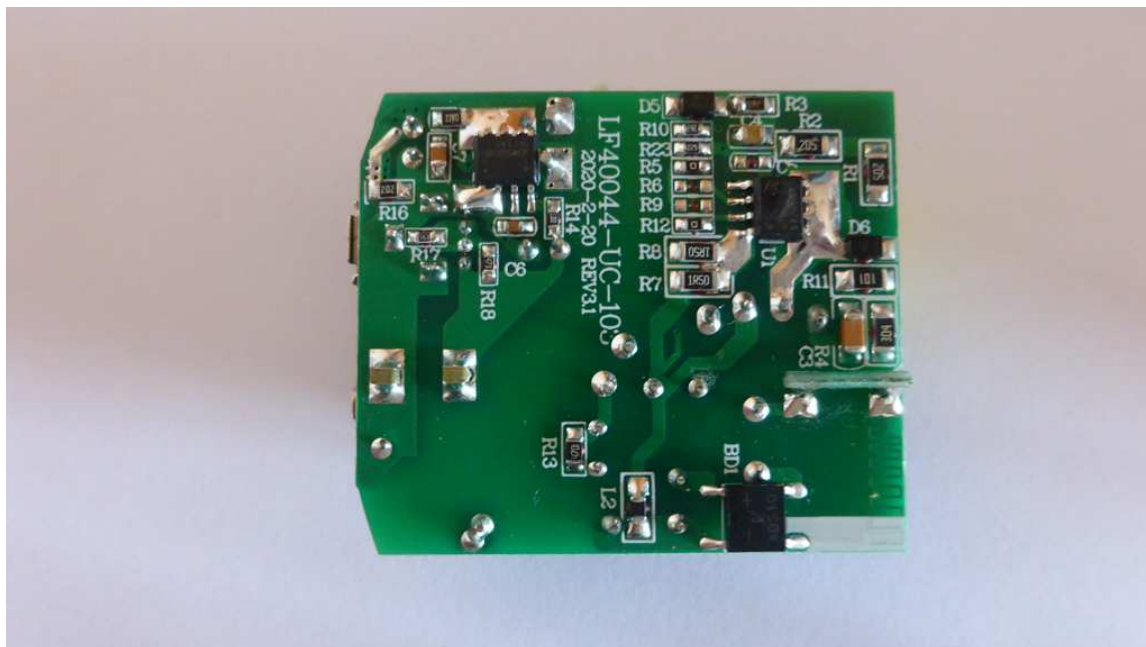
- 1) Type 4B.AM.USB.30 for Bticino series MATIX (WHITE)
- 2) Type 4B.G14.USB.30 for Gewiss series CHORUS (SILVER)
- 3) Type 4B.G10.USB.30 for Gewiss series CHORUS (WHITE)
- 4) Type 4B.G12.USB.30 for Gewiss series CHORUS (GRAY)
- 5) Type 4B.HC.USB.30 for Bticino series AXOLUTE (SILVER)
- 6) Type 4B.HD.USB.30 for Bticino series AXOLUTE (WHITE)
- 7) Type 4B.HS.USB.30 for Bticino series AXOLUTE (GRAY)
- 8) Type 4B.K.USB.30 for Bticino series LIVING NOW (BLACK, WHITE, SAND)
- 9) Type 4B.L.USB.30 for Bticino series LIVING LIGHT (GRAY)
- 10) Type 4B.N.USB.30 for Bticino series LIVING LIGHT (WHITE)
- 11) Type 4B.NT.USB.30 for Bticino series LIVING LIGHT (SILVER)
- 12) Type 4B.V14.USB.30 for VIMAR series PLANA (WHITE)
- 13) Type 4B.V14SL.USB.30 for VIMAR series PLANA (SILVER)
- 14) Type 4B.V20.USB.30 for VIMAR series EIKON (GRAY)
- 15) Type 4B.V20B.USB.30 for VIMAR series EIKON (WHITE)
- 16) Type 4B.V20N.USB.30 for VIMAR series EIKON (SILVER)
- 17) Type 4B.V19.USB.30 for VIMAR series ARKE' (GRAY)
- 18) Type 4B.V19B.USB.30 for VIMAR series ARKE' (WHITE)

Photo of the EUT









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1.1 Equipment Description

The EUT is a USB power unit, provided with two USB output, one provided with type "A" connector and one provided with type "C" connector, with a total current of 3.0A. it's designed for a flush mounting.

Electromagnetically relevant components list declared by the manufacturer.

See annex A for details "List of critical components"

1.2 Equipment Marking Plate

See Copy of marking plate on page 6

1.3 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	USB power unit	4 BOX	--	-
AE	Smartphone	Samsung	A41	--
AE	Resistor	--	--	--
Abbreviations: EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)				

1.4 Input / Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC	no	no	None
2	USB type A	I/O	no	no	None
3	USB type C	I/O	no	no	None

*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
 I/O = Signal Input or Output Port (Not Involved in Process Control)
 TP = Telecommunication Ports

1.5 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
95KHz	Primary side power switch	--	--

1.6 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
AC mains	1\N~ 100/230 V	-	-	50/60	1	

1.7 EUT Operation Modes:

Mode #	Description
1	EUT supplied at nominal voltage with USB A output connected to a resistor (10ohm) USB C output connected to a smartphone turn off in charge mode

1.8 EUT Configuration Modes:

Mode #	Description
1	EUT working in its main operation modes powered at the nominal power supply voltage as specified on the label.

1.9 Result Summary

CISPR 32:2015 Edition 2.0			
Index	Requirement – Test	Result	Verdict
	Classification Class (A or B)	B	—
2.1	Limits of mains terminal port disturbance voltage		P
2.2	Limits of conducted common mode (asymmetric mode) disturbance – Ethernet interface		N/A
2.3	Limits of conducted differential voltage disturbance		N/A
2.4	OUTDOOR UNITS – Limits of conducted disturbance between 1 GHz to 18 GHz		N/A
2.5	Limits for radiated disturbance below and above 1GHz (OATS/SAC + FSOATS)		P
2.6	Limits for radiated disturbance below and above 1GHz (FAR + FSOATS)		N/A
2.7 2.8 2.9	OUTDOOR UNITS – Limits for radiated disturbance between 1 GHz to 18 GHz (FSOATS)		N/A
CISPR 24:2010 Edition 2.0 + A1 of 2015			
Index	Requirement – Test	Result	Verdict
3.3	Electrostatic discharges (ESD)		P
3.4	Electrical fast transients (EFT)		P
3.5	Continuous radiated disturbances		P
3.6	Continuous conducted disturbances		P
3.7	Power-frequency magnetic fields		P
3.8	Surges		P
3.9	Voltage dips and interruptions		P
IEC 61000-3-2:2014			
Index	Requirement – Test	Result	Verdict
3.1	Harmonic current emissions		P
IEC 61000-3-3: 2013			
Index	Requirement – Test	Result	Verdict
3.2	Voltage Fluctuations and Flicker		P

1.10 Performance Criteria

1.10.1 General

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

1.10.2 Product Specific Performance Criteria

During the test the EUT shall continue to perform as intended and as standard required

The following parameter/event are monitoring:

- Verify the continuous charging of AE connected (by visual observations)



2.1 Test Conditions and Results – Limits of mains terminal disturbance voltage

CISPR 32	TEST: Limits of mains terminal disturbance voltage			Verdict
Tested by	Massimiliano Strada			P
Test date	2021-03-08			
Test Location	IMQ testing lab			
Operating mode(s) used during test	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3			
Method: The AMN placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN (IMQ operational instruction IO-80-P14).				
Laboratory Parameters		Required prior to the test		During the test
Ambient Temperature		10 to 40 °C		22.0 °C
Relative Humidity		10 to 90 %		44.0 %
Fully configured sample scanned over the following frequency range		Frequency range on each side of line		Measurement Point
		150kHz to 30MHz		Mains
Equipment mode		Power interface mode		230 V~, 50Hz
		EUT configurations mode		1
		Operation mode		1
Limits – Class B				
Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Result*	Average	Result*
0.15 to 0.50	66 to 56	See graphical representations	56 to 46	See graphical representations
0.50 to 5	56	See graphical representations	46	See graphical representations
5 to 30	60	See graphical representations	50	See graphical representations
Supplementary information: * - The result in tables may be a minimum margin to the limit. EUT powered at one of the nominal input voltages and frequencies 230V 50Hz. Test results could be extended to the other supply voltage because represents the worst testing configuration				

2.2 Test Conditions and Results – Limits of conducted common mode disturbance

CISPR 32	TEST: Limits of conducted common mode (asymmetric mode) disturbance			Verdict		
Tested by				N/A		
Test date						
Test Location						
EUT Operating mode used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3					
Method: All power was connected to the system through Artificial Mains Network (AMN). All tested telecommunications lines were connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines were made at the output of the AAN. Where an AAN was not appropriate or available measurements were made using a Capacitive Voltage Probe and Current probe (IMQ operational instruction IO-80-P14)						
Method A11.1. or A12.1. <input type="checkbox"/>		Method A11.2. or A12.2. <input type="checkbox"/>		Method A11.1. or A12.3. <input type="checkbox"/>		
Parameters required prior to the test		Laboratory Ambient Temperature		10 to 40 °C		
		Relative Humidity		10 to 90 %		
Parameters recorded during the test		Laboratory Ambient Temperature				
		Relative Humidity				
		Frequency range on each side of line		Measurement Point		
Fully configured sample scanned over the following frequency range		150kHz to 30MHz		Telecommunication ports		
Limits - Class B Applicable to wired network ports, optical fibre ports with metallic shield or tension members, antenna ports and broadcast receiver tuner ports.						
Frequency (MHz)	Voltage Limits dB (µV)			Current Limits dB (µA)		
	Quasi-Peak	Average	Result *	Quasi-Peak	Average	Result*
0.15 to 0.50	84 to 74	74 to 64	See graphical representations	40 to 30	30 to 20	
0.50 to 30	74	64	See graphical representations	30	20	
Supplementary information:						

2.3 Test Conditions and Results - Limits of conducted differential voltage disturbance

CISPR 32	TEST: Limits of conducted differential voltage disturbance		Verdict
Tested by			N/A
Test date			
Test Location			
Operating mode(s) used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
Method: All power was connected to the system through Artificial Mains Network (AMN). All tested telecommunications lines were connected to an Asymmetric Artificial Network (AAN). The port of the EUT shall be connected in the input of the measurement device by means of coaxial cables.			
Method C.4.2. <input type="checkbox"/>		Method C.4.3. <input type="checkbox"/>	
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C	
	Relative Humidity	10 to 90 %	
Parameters recorded during the test	Laboratory Ambient Temperature	°C	
	Relative Humidity	%	
	Frequency range on each side of line	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz to 2150MHz	Tuner ports	

2.4 Test Conditions and Results – Limits of conducted disturbance between 1 GHz to 18 GHz

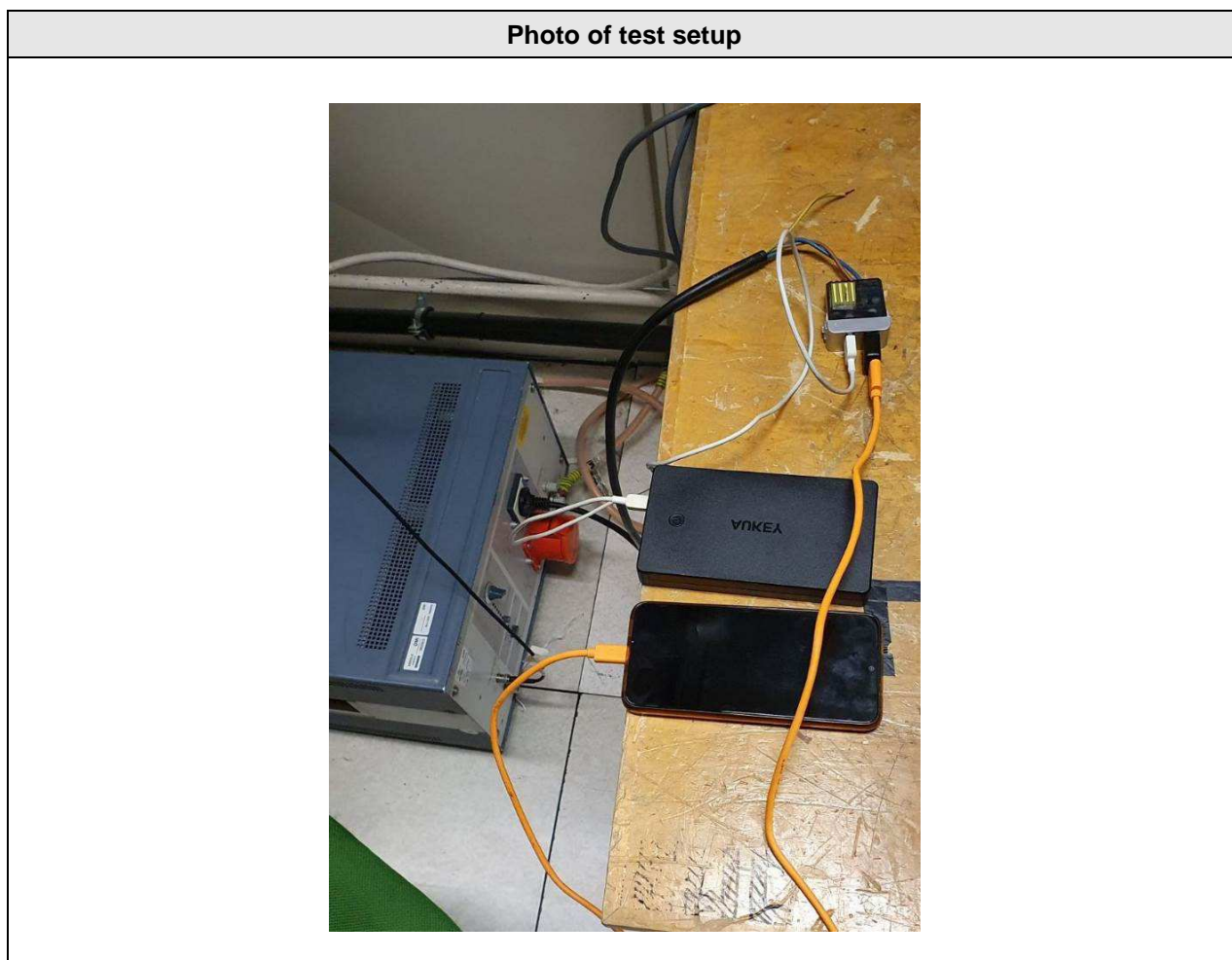
CISPR 32	TEST: OUTDOOR UNITS – Limits of conducted disturbance between 1 GHz to 18 GHz		Verdict
Tested by			N/A
Test date			
Test Location			
Operating mode(s) used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
Method H4: The amplitude can be directly by a power measurement at the feed horn interface or suitable interface.			
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C	
	Relative Humidity	10 to 90 %	
Parameters recorded during the test	Laboratory Ambient Temperature	°C	
	Relative Humidity	%	
	Frequency range on each side of line	Measurement Point	
Fully configured sample scanned over the following frequency range	1 to 18 GHz	LNB ports	
Limits			
Frequency (GHz)	Power Limits dB (pW)		
	Average	Result *	
1 to 18	30		
Supplementary information: The result in this table may be a minimum margin to the limit.			

2.4.1 Test equipment used

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
EMI receiver	AFJ	FFT 3010	S07265	2020-08-17	2021-08-31
Artificial mains v-network	AFJ	type LT 32-C	S05050	2019-11-14	2021-04-30(**)
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	S02153	2019-11-14	2021-04-30(**)
coaxial cable			S05489	2020-06-23	2021-06-30

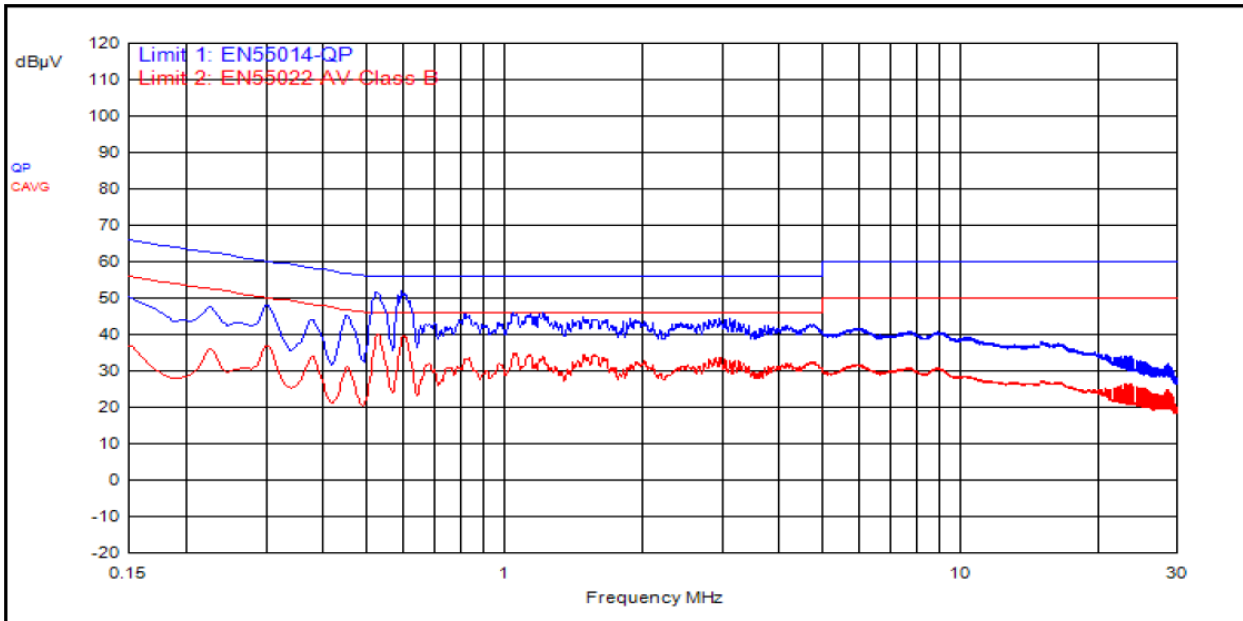
(**) Calibration interval may be extended based on sufficient calibration data and experience of use (see IEC61010-1:2019 clause 8.2.5)

2.4.2 Photo of test setup



2.4.3 Graphical representation of Conducted Emissions

Graphical representation of Conducted Emissions: Limits of mains terminal disturbance voltage





2.4 Test Conditions and Results – Radiated Emissions - Limits for radiated disturbance 30 MHz –1 GHz (OATS/SAC + FSOATS)

CISPR 32	TEST: Limits for radiated disturbance 30 MHz –1 GHz (SAC)		Verdict
Tested by	Massimiliano Strada		P
Test date	2021-03-09		
Test Location	IMQ testing lab		
Operating mode(s) used during test	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
<u>Method:</u> Measurements were made in a 3-meter semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (quasi-peak detector below 1GHz and average detector above 1GHz) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable (IMQ operational instruction IO-80-P10 + IO-80-P11).			
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		10 to 40 °C	21.2 °C
Relative Humidity		10 to 90 %	45.0 %
Fully configured sample scanned over the following frequency range	Frequency range		Measurement Point
	30MHz – 1GHz		3 m measurement distance
	1GHz – 6GHz		N/A
Equipment mode	Power interface mode		230 V~, 50Hz
	EUT configurations mode		1
	Operation mode		1
Limits – Class A			
Frequency (MHz)	Limit dB (µV/m)		
	Detector	Results *	
30 to 230	40 Quasi-Peak	See graphical representations	
230 to 1000	47 Quasi-Peak	See graphical representations	
1000 to 3000	56 Average, 76 Peak	N/A	
3000 to 6000	60 Average, 80 Peak	N/A	
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies.			
* - The result in this table may be a minimum margin to the limit.			
EUT powered at one of the nominal input voltages and frequencies 230V 50Hz.			
Test results could be extended to the other supply voltage because represents the worst testing configuration			



2.5 Test Conditions and Results – Radiated Emissions - Limits for radiated disturbance 30 MHz –XX GHz** (FAR + FSOATS)

CISPR 32	TEST: Limits for radiated disturbance 30 MHz –XX GHz** (FAR + FSOATS)		Verdict
Tested by			N/A
Test date			
Test Location			
Operating mode(s) used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
<u>Method:</u> Measurements were made in a 10-meter FAR Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° with the receive antenna located in horizontal and vertical polarities. Final measurements (quasi-peak detector below 1GHz and average detector above 1GHz) were then performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.			
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		10 to 40 °C	°C
Relative Humidity		10 to 90 %	%
Fully configured sample scanned over the following frequency range		Frequency range	Measurement Point
		30MHz – 1GHz	10 m measurement distance
		1GHz – 6GHz	3 m measurement distance
Equipment mode		Power interface mode	
		EUT configurations mode	
		Operation mode	



2.6 Test Conditions and Results – Radiated Emissions - Limits for radiated disturbance 30 MHz –XX GHz** (FAR + FSOATS)

CISPR 32	TEST: Limits for radiated disturbance 30 MHz –XX GHz** (FAR + FSOATS)		Verdict
Tested by			N/A
Test date			
Test Location			
Operating mode(s) used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
<u>Method:</u> Measurements were made in a 3-meter FAR Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° with the receive antenna located in horizontal and vertical polarities. Final measurements (quasi-peak detector below 1GHz and average detector above 1GHz) were then performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.			
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		10 to 40 °C	°C
Relative Humidity		10 to 90 %	%
Fully configured sample scanned over the following frequency range		Frequency range	Measurement Point
		30MHz – 1GHz	3 m measurement distance
		1GHz – 6GHz	3 m measurement distance
Equipment mode		Power interface mode	
		EUT configurations mode	
		Operation mode	



2.7 Test Conditions and Results – Radiated Emissions - OUTDOOR UNITS – Limits for radiated disturbance between 1 GHz to 18 GHz (FSOATS)

CISPR 32	TEST: OUTDOOR UNITS – Limits for radiated disturbance between 1 GHz to 18 GHz (FSOATS)		Verdict
Tested by			N/A
Test date			
Test Location			
Operating mode(s) used during test	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
Method: Measurements were made in a 3-meter Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter above 1GHz. The EUT was rotated 360° with the receive antenna located in horizontal and vertical polarities. Final measurements (average detector above 1GHz) were then performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.			
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		10 to 40 °C	°C
Relative Humidity		10 to 90 %	%
Fully configured sample scanned over the following frequency range		Frequency range	Measurement Point
		1GHz – 18GHz	3 m measurement distance
Equipment mode		Power interface mode	
		EUT configurations mode	
		Operation mode	
Limits – LO leakage and spurious radiated emissions from the EUT, in the region outside +/- 7° of the main beam axis.			
Frequency (GHz)		Limit dB (µV/m)	
		Detector	Results *
1 to 2.5		50 Average	
2.5 to 18		64 Average	
Limits – LO leakage from the EUT, in the region within +/- 7° of the main beam axis.			
Frequency (GHz)		Limit dB (µV/m)	
		Detector	Results *
1 to 18		37 Average	
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies.			
* - The result in this table may be a minimum margin to the limit.			

2.7.1 TEST Equipment Used

Radiated disturbances					
Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
EMI receiver	ROHDE & SCHWARZ	ESW44	S07965	2020-06-04	2021-06-30
Bilog antenna	SCHWARZBECK	VULB9160	S06463	2019-07-03	2022-07-31
N-N RF cable	IMQ	RG-214/U	S09024	2020-11-27	2021-11-30
Coaxial cable	MICRO- COAX ROSENBERGER	UFB311A	S05041	2020-11-23	2021-11-31
Shielded semianechoic chamber	SIDT EUROPE	—	P01709	2020-10-29	2021-10-31
Position controller	Frankonia	FCTAM01	P02486/02488	—	—
Software	R&S	EMC32.Ink	—	—	—

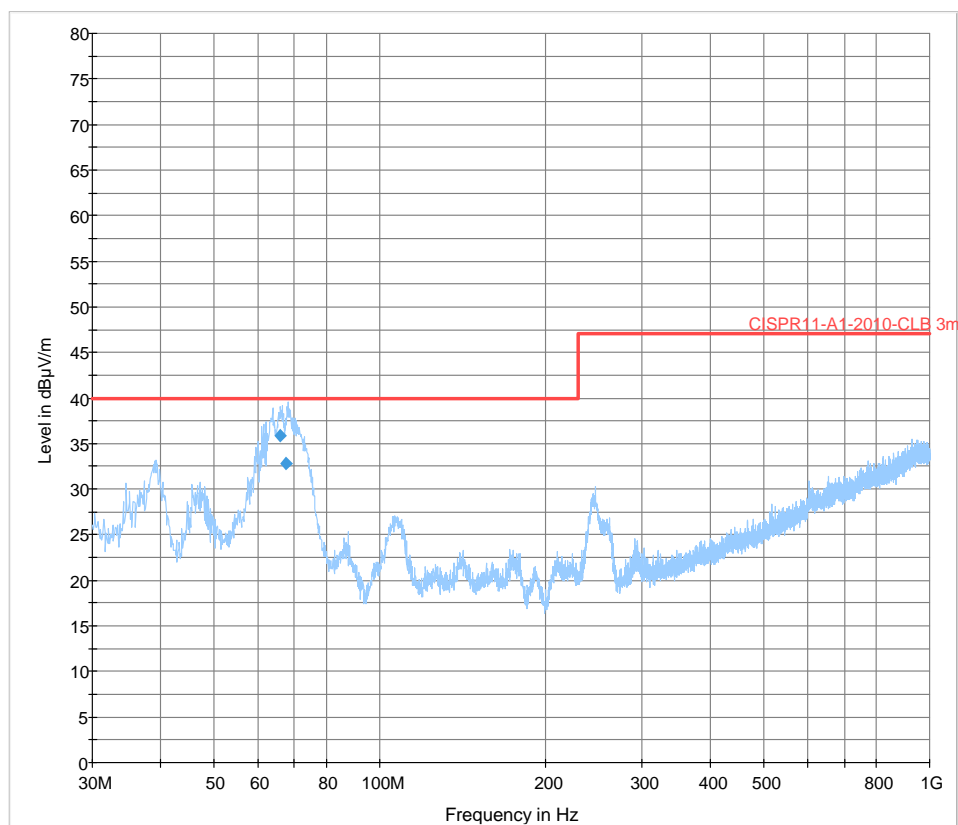
2.7.2 Photo of test setup for Radiated Disturbance

Photo of test setup for Radiated Disturbance



2.7.3 Graphical representation of Radiated Disturbance Measurement

Graphical representation of Radiated Disturbance Measurement



Frequency MHz	QuasiPeak dBμV/m	Meas. Time ms	Bandwidth kHz	Height cm	Polarization	Azimuth deg	Corr. dB	Margin dB	Limit dBμV/m
65,991250	35,9	1000,0	120,000	141,0	H	188,0	12,1	4,10	40,00
67,511750	32,8	1000,0	120,000	99,9	H	189,0	11,8	7,20	40,00



3.1 Harmonic current emissions

	TEST: Harmonic current emissions		Verdict
Tested by	Massimiliano Strada		P
Test date	2021-03-08		
Test Location	IMQ testing lab		
EUT Operating mode used during test	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
Test set-up description	This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation (IMQ operational instruction IO-80-P12).		
Operating modes of EUT	<input type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3		
Limit classification in accordance with the standard	<input checked="" type="checkbox"/>	Class A	
	<input type="checkbox"/>	Class B	
	<input type="checkbox"/>	Class C with active input power > 25 W	
	<input type="checkbox"/>	Class C with active input power ≤ 25 W (First requirement, Table 3 column 2)	
	<input type="checkbox"/>	Class C with active input power ≤ 25 W (Second requirement)	
	<input type="checkbox"/>	Class D	
Observation period	Description	Period selected T_{obs}	
	<input checked="" type="checkbox"/>	Quasi stationary	2.5 min
	<input type="checkbox"/>	Short cyclic	$T_{obs} \geq 10 \text{ cycles} =$
	<input type="checkbox"/>	Random	$T_{obs} =$
	<input type="checkbox"/>	Long cyclic	Full program cycle or 2.5 min. with highest THC $T_{obs} =$
Version of measurement instrument standard used IEC 61000-4-7 (Clause 7)	<input type="checkbox"/>	IEC 61000-4-7:1991	
	<input checked="" type="checkbox"/>	IEC 61000-4-7:2002 + A1:2008	
Control principle used in the sample	The EUT contains no power control for the active input power. The limit values according to the classification are applicable.		
Supplementary information	AC mains voltage during test: 230V - 50 Hz– Ambient temperature: 23 °C		

3.1.1 Photo of test setup

Photo of test setup





3.1.2 Tabled representation of the harmonic currents as given by the measurement equipment

Tabled representation of the harmonic currents as given by the measurement equipment

Name: Herr Mustermann

Department: Fertigung

Company: SMS

Test report no: 1

Device: B10

Specimen: Test 1234

Manufacturer: SMS

Type:

Serial no: 1234

Operating mode: normal

Comment1: --

Comment2: --

Comment3: --

Comment4: --

Date: 08.03.2021

Test date: 08.03.2021

Maximum RMS current and corresponding values in time window 1:

Voltage: 231.12 Vrms

Current: 0.167 Arms

Power: 17.4 W

Power factor: 0.449

THD=0.02 %

I765 Adc=17.4 W

P1=17.4 W

CosPhi: 0.970

THV=0.040 V

THD=18990 %

38.6 VA

FOHV=0.014 V

FOHC=0.044 A

PAVHD=0.04 %

PAVHD=354.32 %

Test conditions:

EN 61000-3-2:2018 I-B Hz, Phase-L1, Range=0.00 A

Time window=10.12 (200ms) Grouping: >2nd harm = on

No Z test selected

harmonic currents < 0.6 % of I or < 5 mA are disregarded for calc. of THD, THC, FOHC, PAVHD

HARMONIC ANALYSIS: Test PASS

Tabs = entire measurement: FOHC: avg=0.04 A, limit=0.25 A

Iavg=0.163 Arms

Har	Entire measurement (2.6 min = 763 time windows)							Max at 2.6 min		Average		P A S S	F A I L
	Minimum	Window	EN 61000-3-2 Class A, r1 tab	Margin in Max/Min	100 to 150%	150 to 200%	Exceeded	100 to 150%	Exceeded	Value	Exceeded		
DC	0.0067 A	772	-----	-----	0	0	0	n.e.	n.e.	0.0067 A	0	--	
1	0.0774 A	1	-----	-----	0	0	0	n.e.	n.e.	0.0747 A	0	X	
2	0.0002 A	383	1.0300 A	-100.0 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
3	0.0741 A	1	2.3000 A	-96.0 %	0	0	0	n.e.	n.e.	0.0717 A	0	X	
4	0.0003 A	121	0.4300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
5	0.0676 A	1	1.1400 A	-94.1 %	0	0	0	n.e.	n.e.	0.0666 A	0	X	
6	0.0003 A	120	0.3000 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
7	0.0502 A	1	0.7700 A	-92.3 %	0	0	0	n.e.	n.e.	0.0577 A	0	X	
8	0.0003 A	120	0.2300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
9	0.0002 A	1	0.4000 A	-87.7 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
10	0.0003 A	120	0.1640 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
11	0.0360 A	1	0.3900 A	-89.2 %	0	0	0	n.e.	n.e.	0.0367 A	0	X	
12	0.0003 A	121	0.1533 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
13	0.0259 A	619	0.2100 A	-86.7 %	0	0	0	n.e.	n.e.	0.0266 A	0	X	
14	0.0004 A	121	0.1314 A	-99.7 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
15	0.0231 A	719	0.1900 A	-84.6 %	0	0	0	n.e.	n.e.	0.0230 A	0	X	
16	0.0004 A	121	0.1160 A	-99.7 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
17	0.0000 A	70	0.1324 A	-86.6 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
18	0.0004 A	120	0.1322 A	-99.6 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
19	0.0000 A	9	0.1161 A	-85.0 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
20	0.0005 A	120	0.0820 A	-99.6 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
21	0.0000 A	1	0.1071 A	-83.6 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
22	0.0005 A	120	0.0336 A	-99.5 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
23	0.0000 A	67	0.0976 A	-82.4 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
24	0.0004 A	120	0.0767 A	-99.4 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
25	0.0000 A	67	0.0900 A	-82.0 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
26	0.0004 A	120	0.0709 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
27	0.0000 A	732	0.0833 A	-82.1 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
28	0.0004 A	121	0.0567 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
29	0.0000 A	733	0.0776 A	-82.3 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
30	0.0003 A	121	0.0513 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
31	0.0000 A	742	0.0726 A	-82.5 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
32	0.0003 A	121	0.0576 A	-99.4 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
33	0.0000 A	741	0.0582 A	-82.2 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
34	0.0003 A	121	0.0541 A	-99.4 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
35	0.0000 A	64	0.0543 A	-81.5 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
36	0.0004 A	121	0.0511 A	-99.3 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
37	0.0000 A	71	0.0508 A	-80.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
38	0.0004 A	121	0.0484 A	-99.2 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
39	0.0000 A	220	0.0577 A	-80.8 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
40	0.0004 A	120	0.0460 A	-99.1 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	

average value < 0.6 % of Iavg or < 5 mA

n.e. = not evaluated

Tests: 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Tabled representation of the harmonic currents as given by the measurement equipment													
Name:		Herr Mustermann				Serial no:		1234					
Department:		Fertigung				Operating modes:		normal					
Company:		SPS				Comment1:		--					
Test report no:		1				Comment2:		--					
Device:		B10				Comment3:		--					
Specimen:		Test 1234				Comment4:		--					
Manufacturer:		SPS				Data:		19.03.2021					
Type:						Test date:		19.03.2021					
Maximum RMS current and corresponding values in time window 644:													
Voltage:		230.75 Vrms		THD=0.02 %		THV=0.047 V		POHV=0.021 V		P/THD=0.006 %			
Current:		0.166 Arms		THD=205.89 %		THC=0.151 A		POHC=0.048 A		P/THD=414.40 %			
Power:		16.5 W		P1=16.5 W		39.8 VA							
Power factor:		0.426		CosPhi1: 0.977									
Test conditions:		B4 61000-3-2:2010 f=60 Hz, Phase=L1, Range=0.80 A Time window=10-12 (200ms), Grouping (>2nd harm.)=on No Ztest selected harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, P/THD											
HARMONIC ANALYSIS: Test PASS													
Tobs = entire measurement; POHC: a.g=0.05 A, limit=0.25 A Iavg=0.166 Arms													
Har	Entire measurement (2.5 min = 750 time windows)						1st 2.5 min		Average		P A S S	F A I L	
	Maximum	Window	B4 61000-3-2 Class A, Tab 1	Margin in Max/Min	100 to 150%	Ex- ceeded	100 to 150%	Ex- ceeded	Value	Ex- ceeded			
DC	0.0081 A	486	-----	-----	0	0	0	n.e.	n.e.	0.0048 A	0	X	
1	0.0734 A	644	-----	-----	0	0	0	n.e.	n.e.	0.0716 A	0	X	
2	0.0003 A	488	1.0800 A	-100.0 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
3	0.0710 A	644	2.3000 A	-96.9 %	0	0	0	n.e.	n.e.	0.0692 A	0	X	
4	0.0004 A	178	0.4300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
5	0.0663 A	644	1.1400 A	-94.2 %	0	0	0	n.e.	n.e.	0.0648 A	0	X	
6	0.0004 A	178	0.3000 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
7	0.0598 A	644	0.7700 A	-92.2 %	0	0	0	n.e.	n.e.	0.0589 A	0	X	
8	0.0004 A	178	0.2300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
9	0.0520 A	644	0.4000 A	-87.0 %	0	0	0	n.e.	n.e.	0.0511 A	0	X	
10	0.0004 A	178	0.1840 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
11	0.0435 A	644	0.3300 A	-86.8 %	0	0	0	n.e.	n.e.	0.0428 A	0	X	
12	0.0004 A	178	0.1533 A	-99.8 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
13	0.0352 A	644	0.2100 A	-83.2 %	0	0	0	n.e.	n.e.	0.0348 A	0	X	
14	0.0004 A	178	0.1314 A	-99.7 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
15	0.0279 A	750	0.1500 A	-81.4 %	0	0	0	n.e.	n.e.	0.0278 A	0	X	
16	0.0004 A	178	0.1150 A	-99.6 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
17	0.0223 A	720	0.1324 A	-83.2 %	0	0	0	n.e.	n.e.	0.0223 A	0	X	
18	0.0005 A	178	0.1022 A	-99.5 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
19	0.0191 A	644	0.1184 A	-83.8 %	0	0	0	n.e.	n.e.	0.0190 A	0	X	
20	0.0005 A	178	0.0920 A	-99.4 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
21	0.0181 A	644	0.1071 A	-83.1 %	0	0	0	n.e.	n.e.	0.0178 A	0	X	
22	0.0005 A	178	0.0836 A	-99.3 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
23	0.0181 A	644	0.0978 A	-81.5 %	0	0	0	n.e.	n.e.	0.0177 A	0	X	
24	0.0007 A	178	0.0767 A	-99.1 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
25	0.0181 A	644	0.0900 A	-79.8 %	0	0	0	n.e.	n.e.	0.0178 A	0	X	
26	0.0007 A	178	0.0708 A	-99.1 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
27	0.0177 A	644	0.0633 A	-78.7 %	0	0	0	n.e.	n.e.	0.0174 A	0	X	
28	0.0007 A	178	0.0657 A	-99.0 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
29	0.0187 A	750	0.0776 A	-78.5 %	0	0	0	n.e.	n.e.	0.0184 A	0	X	
30	0.0005 A	178	0.0613 A	-98.9 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
31	0.0182 A	749	0.0726 A	-79.0 %	0	0	0	n.e.	n.e.	0.0148 A	0	X	
32	0.0005 A	178	0.0575 A	-98.9 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
33	0.0138 A	750	0.0682 A	-80.0 %	0	0	0	n.e.	n.e.	0.0133 A	0	X	
34	0.0005 A	178	0.0541 A	-99.0 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
35	0.0120 A	750	0.0643 A	-81.3 %	0	0	0	n.e.	n.e.	0.0117 A	0	X	
36	0.0005 A	178	0.0511 A	-99.0 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
37	0.0108 A	644	0.0608 A	-82.3 %	0	0	0	n.e.	n.e.	0.0104 A	0	X	
38	0.0005 A	178	0.0484 A	-99.0 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
39	0.0098 A	644	0.0577 A	-82.9 %	0	0	0	n.e.	n.e.	0.0094 A	0	X	
40	0.0004 A	178	0.0460 A	-99.1 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
average a: value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated													
Test: 19.03.2021 12:34:56 Rev: 1.0000, Measurement Date: 19.03.2021 12:34:56, Device: B10, 1.0000													

Supplementary information:

3.1.3 Test Equipment Used

Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S05573	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07866	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07867	2020-08-28	2021-08-31
Digital flickermeter and harmonic analyzer and Line impedance simulating network	SPITZENBERGER + SPIES	ARS 16/3	S05571	2020-08-28	2021-08-31
System controller	SPITZENBERGER + SPIES	SY Core	S05570	2020-08-28	2021-08-31

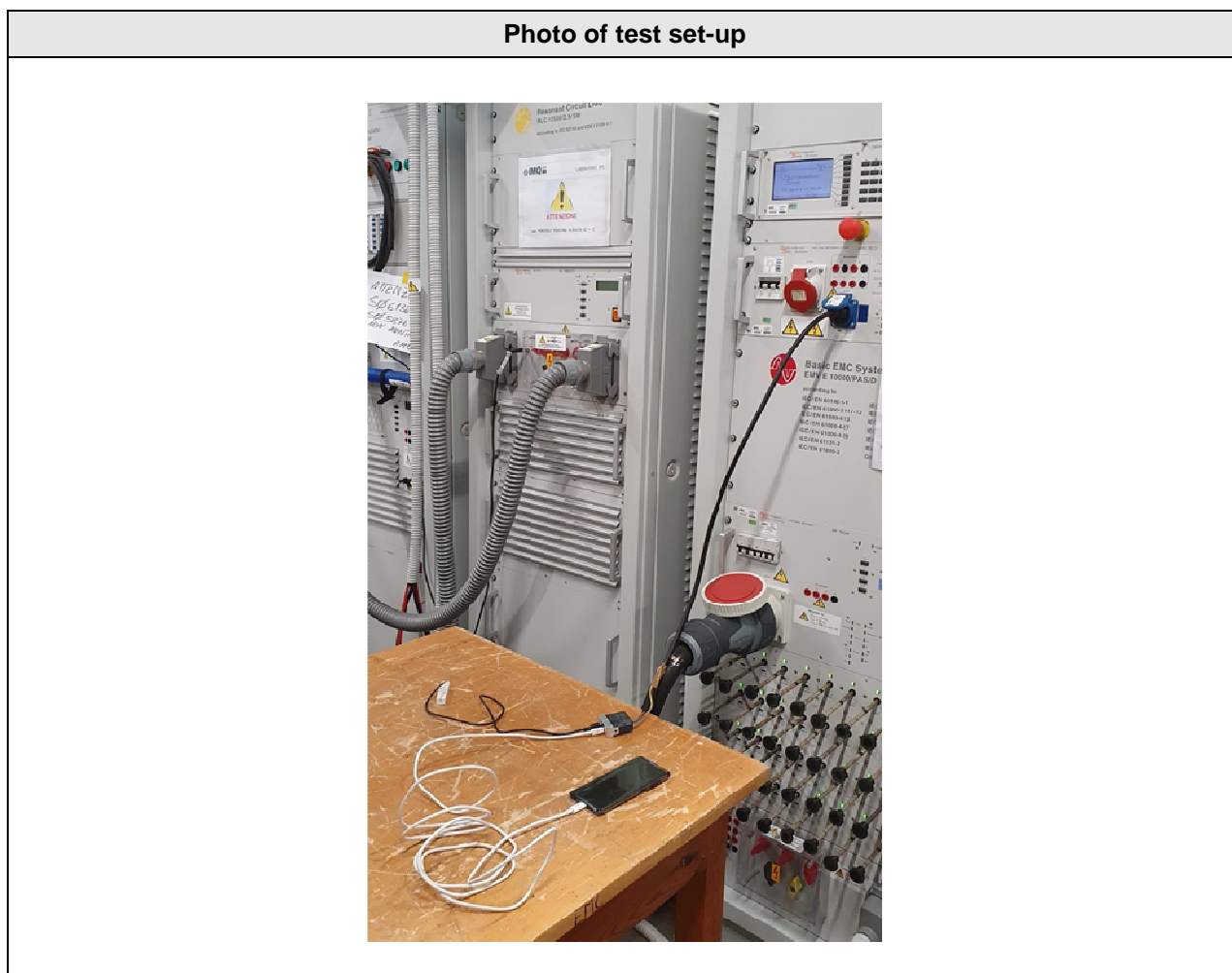


3.2 Voltage changes, voltage fluctuations and flicker

	TEST: Voltage changes, voltage fluctuations and flicker	Verdict
Tested by	Massimiliano Strada	P
Test date	2021-03-08	
Test location	IMQ testing lab	
EUT Operating mode used during test	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3	
Test set up description	Voltage fluctuations test in accordance to sub-clause 6.6 of IEC 61000-3-3. See photographic section (IMQ operational instruction IO-80-P13).	
Observation time selected	10 minutes	
Limit for d_{\max} applied	4 %	
AC mains voltage during test	230V - 50 Hz	
Supplementary information	/	
Ambient temperature	23 °C	

Tabled representation of the flicker values as generated by the measurement equipment

3.2.2 Photo of test set-up



3.2.3 Test Equipment Used

Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S05573	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07866	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07867	2020-08-28	2021-08-31
Digital flickermeter and harmonic analyzer and Line impedance simulating network	SPITZENBERGER + SPIES	ARS 16/3	S05571	2020-08-28	2021-08-31
System controller	SPITZENBERGER + SPIES	SY Core	S05570	2020-08-28	2021-08-31

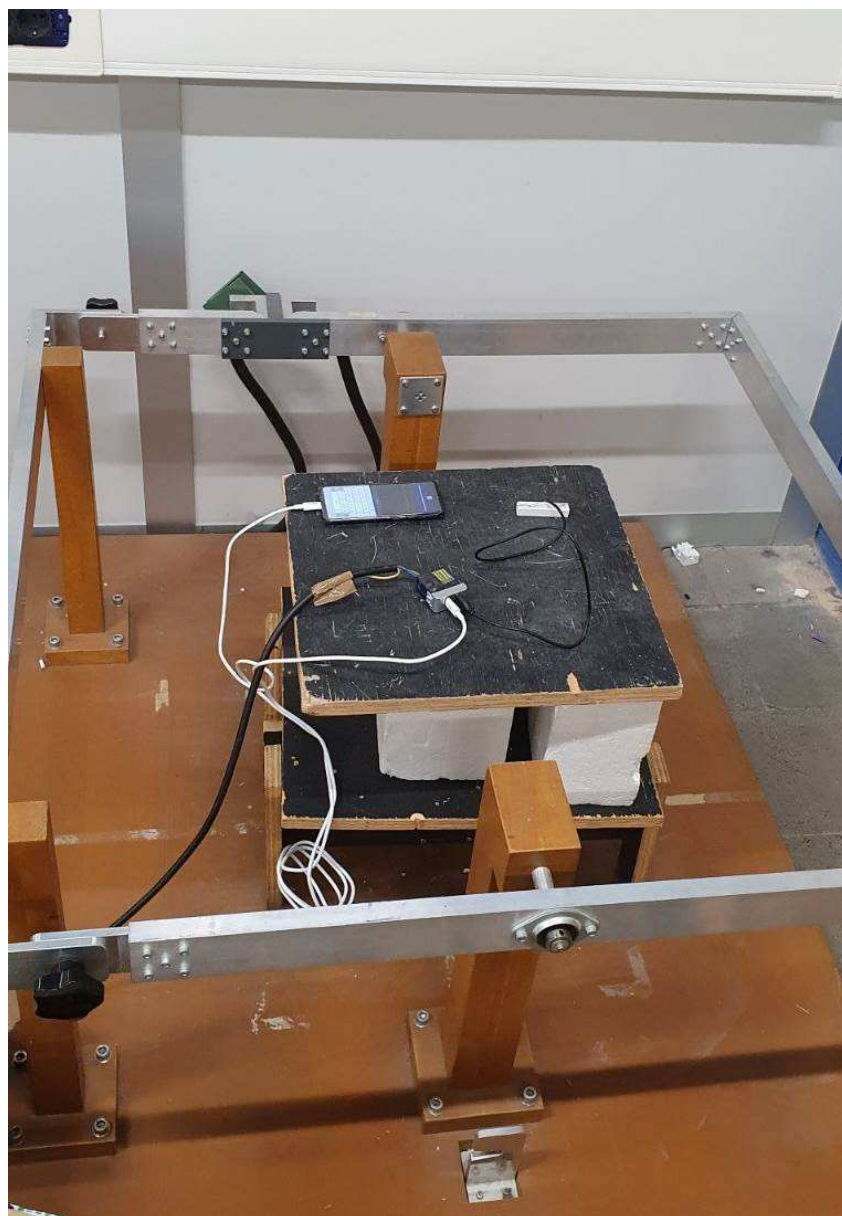
3.3 Test Conditions and Results – POWER-FREQUENCY MAGNETIC FIELDS

CISPR 24	TEST: Power-frequency magnetic field immunity		Verdict
Tested by	Massimiliano Strada		P
Test date	2021-03-10		
Test Location	IMQ testing lab		
Method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. The EUT was located 80cm above the reference ground plane and the indicated field was pre-calibrated prior to placement of the system under test (IMQ operational instruction IO-80-P31).		—
Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C	
	Relative Humidity	10 to 90 %	
Parameters recorded during the test	Laboratory Ambient Temperature	23	°C
	Relative Humidity	47	%
	Air pressure	995	mbar
	Frequency	Application Point	
Fully configured sample tested at the power line frequency	50Hz	Enclosure	
Basic Standard	IEC 61000-4-8:2009		
Test Level		Performance Criteria	
Frequency (Hz)	A/m		
50	1	A	
Supplementary information: Applicable only to equipment containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electro-dynamic microphones, magnetic field sensors, etc.			

3.3.1 Test Equipment Used

Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
Square loop for magnetic field generation (5 coils)	IMQ	MF-ICR-01	S06436	(a)	(a)
Electromagnetic field analyzer	HOLADAY INDUSTRIES	HI-3604	S02656	2020-08-27	2021-08-31
(a) verified by field analyser S02656 (che deve quindi essere inserito nell'elenco strumenti)					

Photo of test set-up





3.4 Test Conditions and Results –RADIATED RADIO-FREQUENCY DISTURBANCES

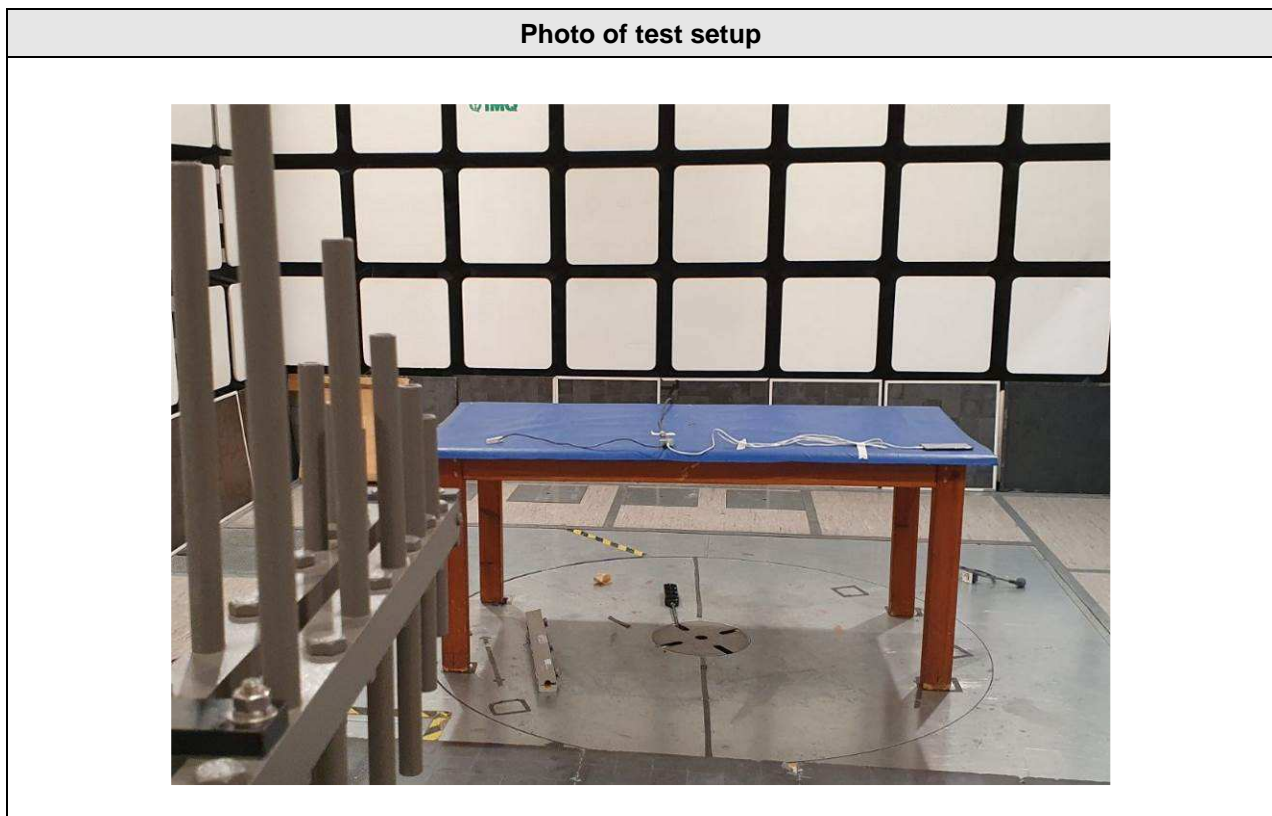
CISPR 24	TEST: Radiated radio-frequency electromagnetic field immunity			Verdict
Tested by	Luigi Panzeri			P
Test date	2018-05-29			
Test Location	IMQ testing lab			
Method	Measurements were made in a fully anechoic chamber and the indicated field strength was pre-calibrated prior to placement of the system under test. Tests were performed in both the horizontal and vertical polarities, where applicable. The antenna was placed 3 meters from the product under test. All sides of the EUT were investigated for anomalies (IMQ operational instruction IO-80-P21 + IO-80-P22).			—
Parameters required prior to the test		Laboratory Ambient Temperature	10 to 40 °C	
		Relative Humidity	10 to 90 %	
Parameters recorded during the test		Laboratory Ambient Temperature	21.3	°C
		Relative Humidity	43.8	%
		Air pressure	995	mbar
Basic Standard		IEC 61000-4-3:2006+A1:2007+A2:2010		
		Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range		80MHz – 1000MHz	Enclosure	
	Applied Field Strength		Performance Criteria	
Frequency (MHz)	(V/m)	Modulation		
80 - 1000	3	80% AM (1kHz)	A	
Supplementary information: None				

3.4.1 Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Shielded semi-anechoic chamber	SIDT	/	P01709	2020-10-29	2021-10-31
80MHz - 1GHz					
RF Amplifier	AMPLIFIER RESEARCH	200W1000M7A	S02390	2020-11-23	2021-11-30
Directional coupler	AMPLIFIER RESEARCH	DC6180	S02392	2020-11-23	2021-11-30
Directional coupler	HEWLETT & PACKARD	778d	S03524	2020-11-30	2021-11-30
Antenna log periodica	AMPLIFIER RESEARCH	AT 1080	S02386	/	/(b)
Common instruments					
RF Generator	R&S	SMB100A	S04601	2020-12-15	2021-12-31
Millivoltmeter	R&S	URV5	S00566	2020-08-05	2021-08-31

Power sensor	R&S	NRV-Z4	S04512	2020-08-05	2021-08-31
Power sensor	R&S	NRV-Z5	S04513	2020-08-05	2021-08-31
Coaxial cable	KABELMETAL	EMI 1	S05039	2020-10-29	2021-10-31
Coaxial cable	MICRO- COAX ROSENBERGER	UFB311A	S05042	2020-10-29	2021-10-31
Coaxial cable	MICRO- COAX ROSENBERGER	UFB311A 108000M5050	S05043	2020-10-29	2021-10-31
Coaxial cable	MICRO- COAX ROSENBERGER	UFB311A	S05044	2020-10-29	2021-10-31
Software	R&S	EMC32 v5.20.2	—	—	—

3.4.2 Test setup photo





3.4.3 Description of Product Performance

Description of Product Performance		
EUT Side	POLARITY	Results
Front	Horizontal	1
Front	Vertical	1
<p>Supplementary information:</p> <p>According to paragraph 8.2 of the 61000-4-3 (when technically justified, some EUTs can be tested by exposing fewer faces to the generating antenna), considering the position of wirings and components which are sensitive to electromagnetic fields, the test have been performed only to the front side of the system.</p>		

3.4.4 Results Descriptions:

X - Not performed or not required.
1 – Compliant - No observed response from EUT.
Note: Description should detail the observation during testing.



3.5 Test Conditions and Results – ELECTROSTATIC DISCHARGES (ESD)

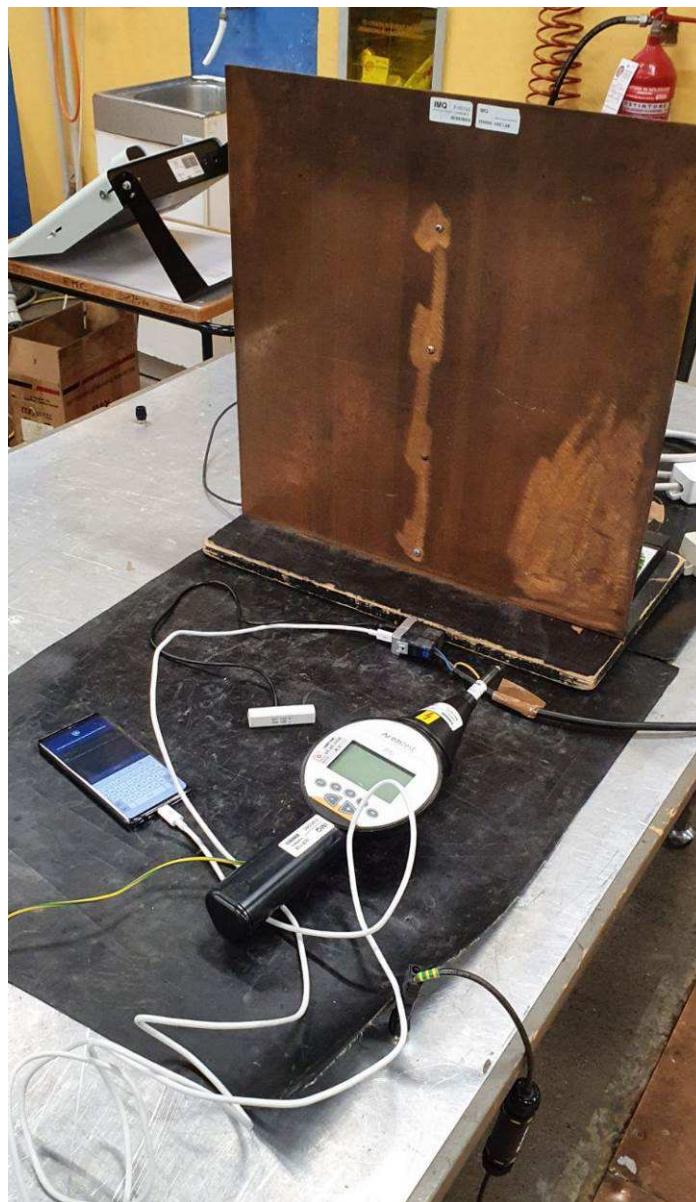
CISPR 24	TEST: Electrostatic Discharge Immunity				Verdict
Tested by	Massimiliano Strada				P
Test date	2021-03-12				
Test Location	IMQ testing lab				
Method	Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test and the minimum distance between the equipment under test and any laboratory walls or any other metallic surfaces shall be at least 1-meter. Air discharges were applied to non-metallic parts of the system. Contact discharges were applied to all accessible metallic parts. Discharges were also applied to the Horizontal and Vertical Coupling Planes, where applicable. Each discharge was applied at a rate of one (1) discharge per second (IMQ operational instruction IO-80-P03).				—
Parameters required prior to the test		Laboratory Ambient Temperature		15 to 35 °C	
		Relative Humidity		30 to 60 %	
Parameters recorded during the test		Laboratory Ambient Temperature		23	°C
		Relative Humidity		47	%
		Air pressure		995	mbar
Basic Standard		IEC 61000-4-2:2008			
		Measurement Point			
Fully configured sample subjected to the levels shown below.		Product Enclosure			
Test Levels				Performance Criteria	
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)		
	Positive	Negative			
Air – Direct	2, 4, 8	2, 4, 8	10	B	
Contact – Direct	2, 4	2, 4	25	B	
Contact – Indirect	2, 4	2, 4	25	B	
Supplementary information: None					

3.5.1 Test Equipment Used

Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
<input checked="" type="checkbox"/> ESD Generator	EM TEST	DITO	S-05108	2020-05-27	2021-05-31

3.5.2 Photo of test setup

Photo of test setup



3.5.3 Electrostatic Discharges – Contact Discharges

TEST: Results for Electrostatic Discharges – Contact Discharges				
Test Point	POSITIVE POLARITY		NEGATIVE POLARITY	
	2 kV	4 kV	2 kV	4 kV
Metallic parts connector and enclosure	1	1	1	1
VCP - Four Sides	1	1	1	1
HCP - Four Sides	1	1	1	1

3.5.4 Results Description

X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.
2 – Compliant - Discharge observed no observed response from EUT.
Note: Description should detail the observation during testing.

3.5.5 Results for Electrostatic Discharges – Air Discharges

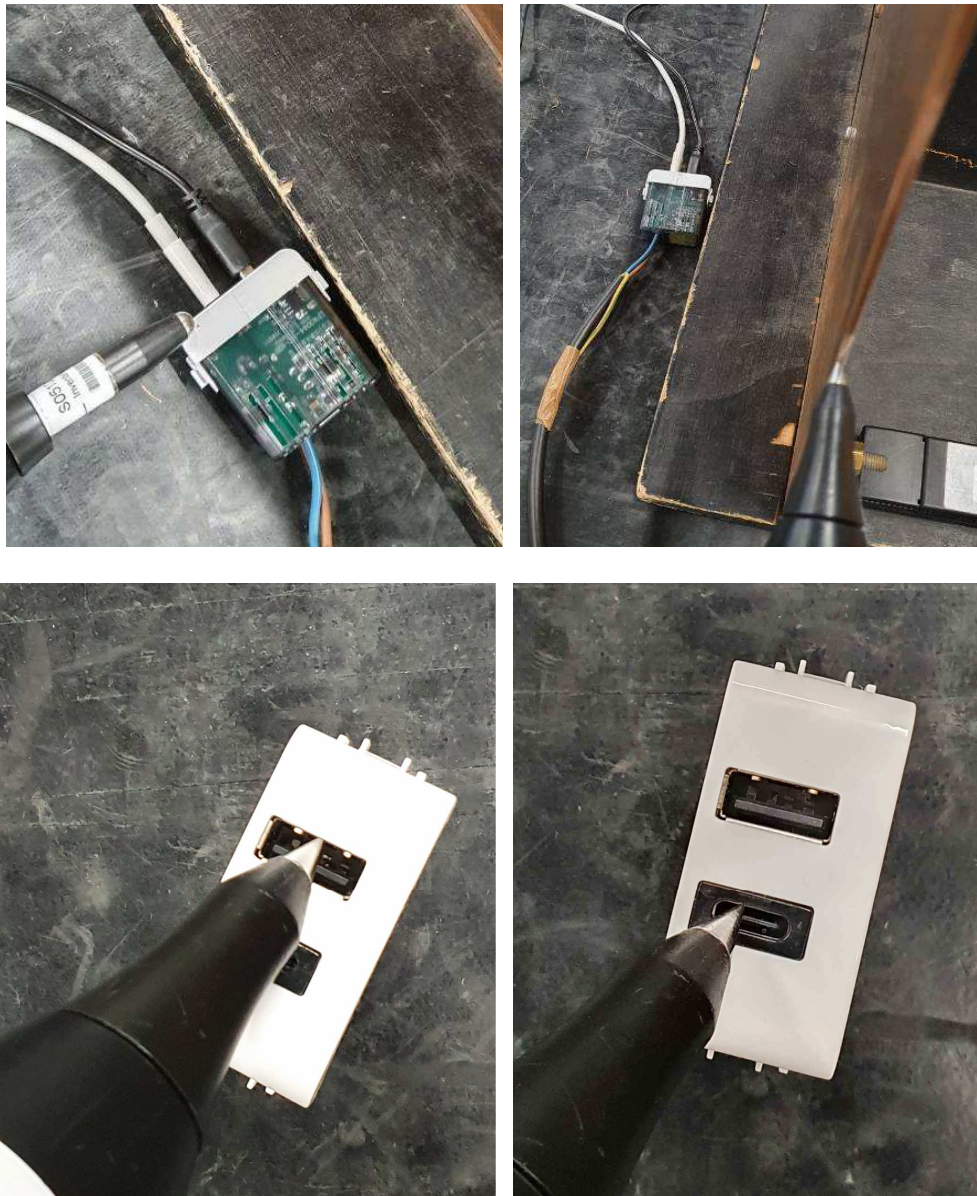
TEST: Results for Electrostatic Discharges – Air Discharges						
Test Point	POSITIVE POLARITY			NEGATIVE POLARITY		
	2 kV	4 kV	8 kV	2 kV	4 kV	8 kV
Plastic cover	1	1	1	1	1	1

3.5.6 Results Description

X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.
2 – Compliant - Discharge observed no observed response from EUT.
Note: Description should detail the observation during testing.

3.5.7 Photos of test point locations

Photo of test setup point locations





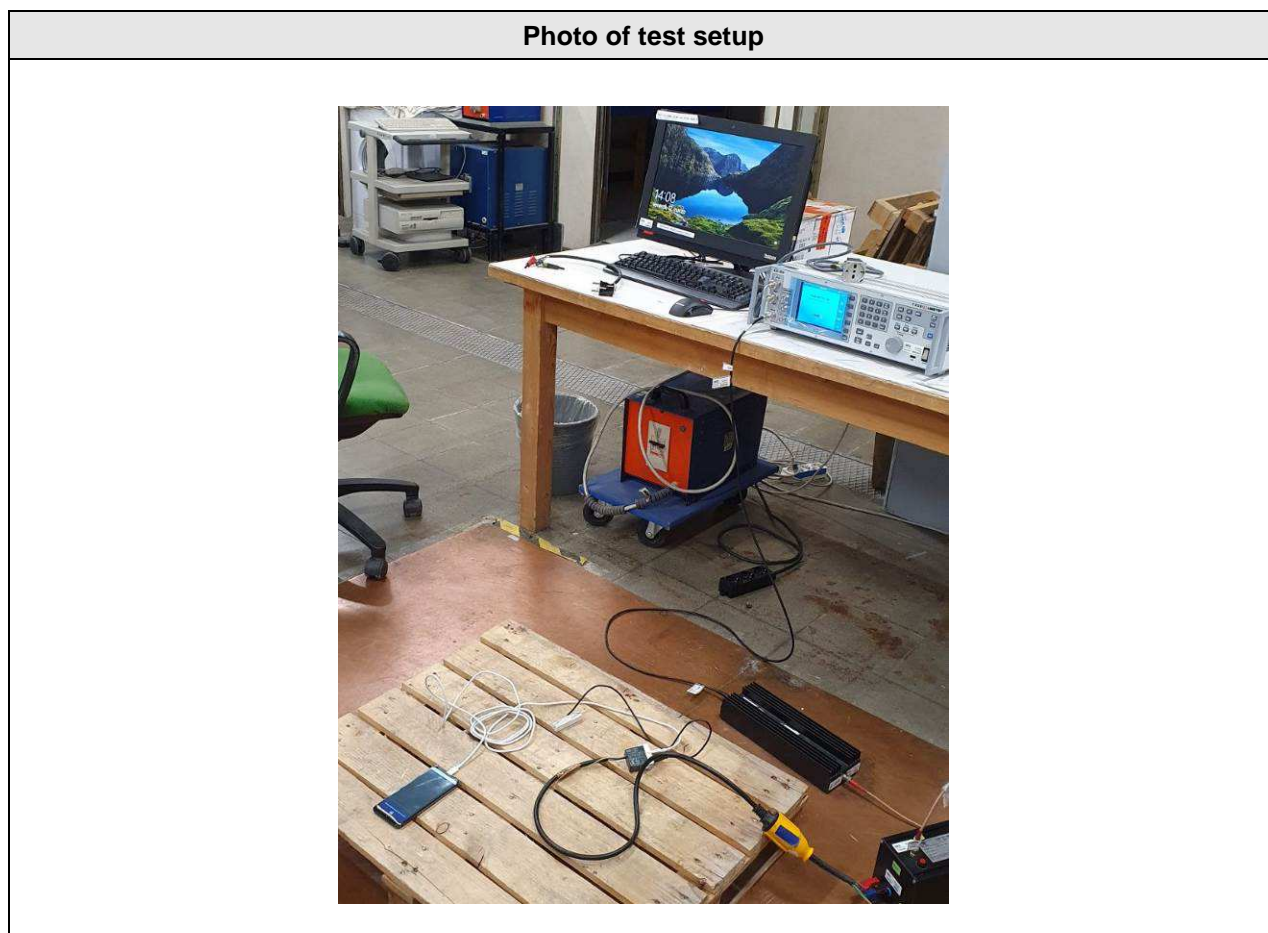
3.6 Test Conditions and Results – CONTINUOUS CONDUCTED DISTURBANCES

CISPR 24	TEST: Conducted Radio-Frequency Continuous Immunity			Verdict
Tested by	Massimiliano Strada			P
Test date	2021-03-10			
Test Location	IMQ testing lab			
Method	Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test. The EUT was located 10cm above the reference ground plane and any associated I/O cables attached to the EUT were located between 30mm and 50mm above the ground plane. The indicated field was pre-calibrated prior to placement of the system under test (IMQ operational instruction IO-80-P24 or IO-80-P25).			—
Parameters required prior to the test		Laboratory Ambient Temperature	10 to 40 °C	
		Relative Humidity	10 to 90 %	
Parameters recorded during the test		Laboratory Ambient Temperature	23	°C
		Relative Humidity	47	%
		Air pressure	995	mbar
Basic Standard		IEC 61000-4-6:2008		
		Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range		150kHz to 80MHz	Input A.C. Power Ports Input D.C. Power Ports Signal Ports Telecommunications Ports	
Applied Level			Performance Criteria	
Frequency (MHz)	(V rms)	Modulation		
0.150 – 80MHz	3	80% AM (1kHz)	A	
Supplementary information: None				

3.6.1 Test Equipment Used

Description	Manufacturer	Model	Identifier	Last Calibration date	Calibration due date
RF generator	TESEQ	NSG 4070C-80	S08996	2020-09-23	2021-09-30
Power attenuator	EM TEST	ATT 6/75	S04336	2020-06-18	2021-06-30
Coaxial cable	INTELLINET	RG58	S05904	2020-06-29	2021-06-30
CDN	MEB	M3-801-6	S01942	2021-02-15	2022-02-28

3.6.2 Photo of test setup



3.6.3 Continuous Conducted Disturbances

TEST: Results for continuous conducted disturbances	
Point of application	Results
AC Mains	1

3.6.4 Results Description

X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.
Note:



3.7 Test Conditions and Results – ELECTRICAL FAST TRANSIENTS

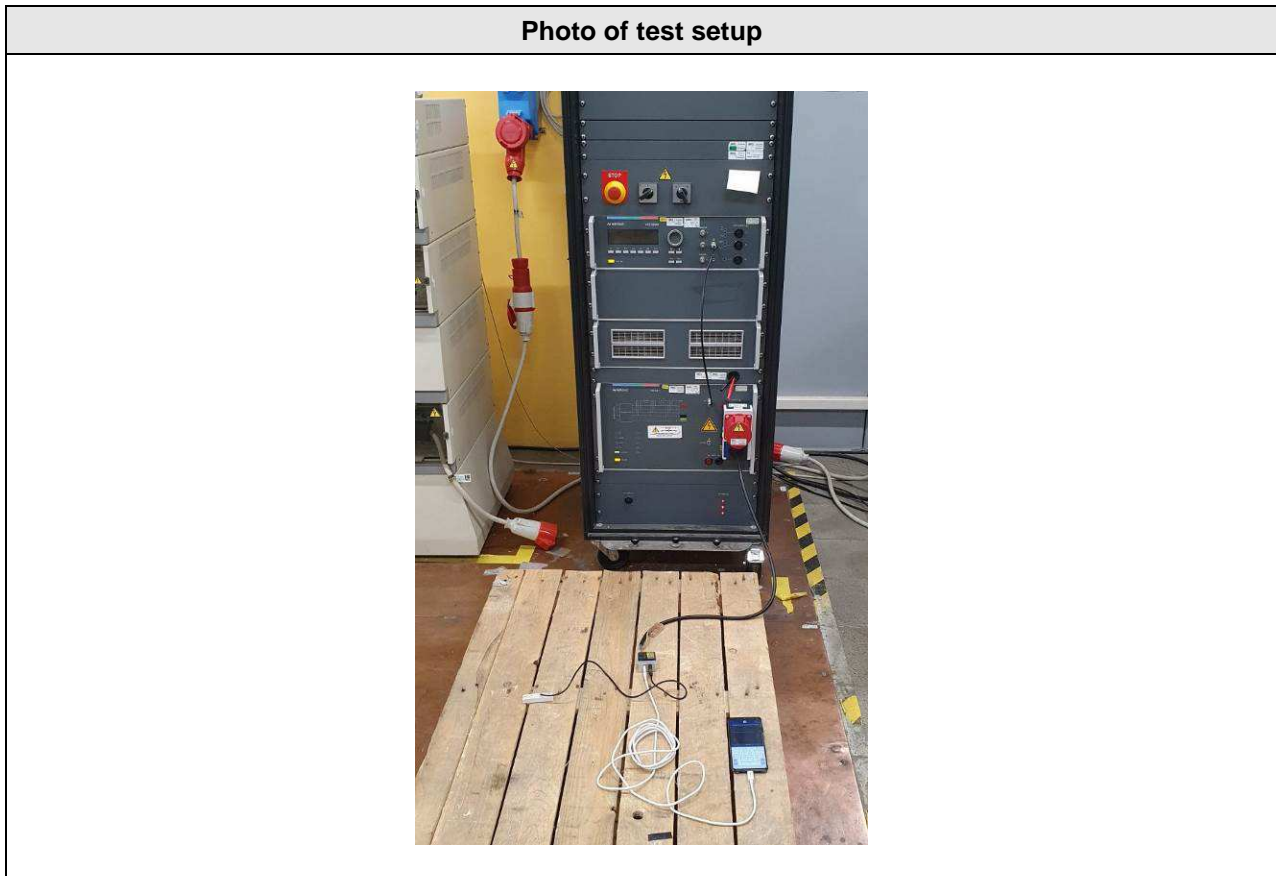
	TEST: Electrical Fast Transients			Verdict
Tested by	Massimiliano Strada			P
Test date	2021-03-11			
Test Location	IMQ testing lab			
Method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). One of each unique interface was tested for a period of one (1) minute per polarity (IMQ operational instruction IO-80-P26).			—
Parameters required prior to the test		Laboratory Ambient Temperature	10 to 40 °C	
		Relative Humidity	10 to 90 %	
Parameters recorded during the test		Laboratory Ambient Temperature	23	°C
		Relative Humidity	47	%
		Air pressure	995	mbar
Basic Standard		IEC 61000-4-4:2004		
		Measurement Point		
Fully configured sample subject to the levels shown below.		Input A.C. Power Ports		
Applied Level				Performance Criteria
Application Point	(kV)	Repetition Frequency (kHz)		
Input A.C. Power Ports	1	5		
Supplementary information:				

3.7.1 Test Equipment Used

	Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
<input checked="" type="checkbox"/>	Disturbance simulator	EM TEST	UCS 500N7.6	S06520	2019-11-19	2021-03-31(**)
<input checked="" type="checkbox"/>	CDN	EM TEST	CNI 503B7.5	S06521	2019-11-19	2021-03-31(**)

(**) Calibration interval may be extended based on sufficient calibration data and experience of use (see IEC 60511:2019 clause 8.2.5)

3.7.2 Photo of test setup



3.7.3 Electrical Fast Transients

	TEST: Results of fast transients	
Point of application	Results	
AC Mains	1	

3.7.4 Results Descriptions

X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.

3.7 Test Conditions and Results – SURGES

	TEST: Surges		Verdict
Tested by	Massimiliano Strada		P
Test date	2021-03-12		
Test Location	IMQ testing lab		
Method	Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). The test voltage was increased from the lowest indicated level up to the maximum level. Five (5) positive surges and five (5) negative surges were applied at each of phases of the A.C. waveform: 0°, 90°, 180° and 270°. Each surge was applied 60 seconds after the previous surge. Signal and Telecommunications ports were subject to five (5) positive and five (negative) surges applied through the appropriate Coupling/Decoupling Network (CDN), (IMQ operational instruction IO-80-P28).		—
Parameters required prior to the test		Laboratory Ambient Temperature	10 to 40 °C
		Relative Humidity	10 to 90 %
Parameters recorded during the test		Laboratory Ambient Temperature	23 °C
		Relative Humidity	47 %
		Air pressure	995 mbar
Basic Standard – Mains Basic Standard – Signal and Telecommunications Ports		IEC 61000-4-5:2005	
		Measurement Point	
Fully configured sample subject to the levels shown below.		Input A.C. Power Ports	
Applied Level			Performance Criteria
Application Point	(kV)	Required Surge Waveform	
Input A.C. Power Ports	1 (Line to Line)	Combination Wave (2µS x 50µS Voltage, 8µS x 20µS Current)	B
	2 (Line to Earth)	Combination Wave (2µS x 50µS Voltage, 8µS x 20µS Current)	

3.7.1 Test Equipment Used

	Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
<input checked="" type="checkbox"/>	Disturbance simulator	EM TEST	UCS 500N7.6	S06520	2019-11-19	2021-03-31(**)
<input checked="" type="checkbox"/>	CDN	EM TEST	CNI 503B7.5	S06521	2019-11-19	2021-03-31(**)

(**) Calibration interval may be extended based on sufficient calibration data and experience of use (see IEC61010-1:2019 clause 8.2.5)

3.7.2 Photo of test setup

Photo of test setup



3.7.3 Surges – Mains (A.C. or D.C.)

TEST: Results for Surges – Mains (A.C.)			
Mode of Application - Mains	Level	Polarity	Results
Line 1 to Line 2 (Differential mode)	0.5kV	Positive	1
		Negative	1
	1.0kV	Positive	1
		Negative	1

3.7.4 Results Descriptions

X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.
Note: Description should detail the observation during testing.

3.8 Test Conditions and Results – VOLTAGE DIPS AND INTERRUPTIONS

	TEST: Voltage Dips and Interruptions			Verdict
Tested by	Massimiliano Strada			P
Test date	2021-03-08			
Test Location	IMQ testing lab			
Method	The product was subjected to voltage dips and interruptions. Testing was performed with the product connected directly to a generator capable of simulating the voltage drops and interrupts as described (IMQ operational instruction IO-80-P27)			—
Parameters required prior to the test		Laboratory Ambient Temperature		10 to 40 °C
		Relative Humidity		10 to 90 %
Parameters recorded during the test		Laboratory Ambient Temperature		23 °C
		Relative Humidity		47 %
		Air pressure		995 mbar
Basic Standard		IEC 61000-4-11:2004		
		Measurement Point		
Fully configured subjected to the levels indicated below.		Input A.C. Power Ports		
Applied Levels			Performance Criteria	
Voltage Reduction	Period (Cycles)	Sync Angle (degrees)		
>95%	0.5	0	B	
30%	25	0	C	
>95%	250	0	C	
Supplementary information: 0 degrees is the crossover point of the voltage waveform.				

3.8.1 Test equipment used

Instrument	Manufacturer	Model	IMQ Ref.	Last cal. date	Cal. due date
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S05573	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07866	2020-08-28	2021-08-31
Amplifier	SPITZENBERGER + SPIES	Pass 10000	S07867	2020-08-28	2021-08-31
Digital flickermeter and armonic analyzer and Line impedance simulating network	SPITZENBERGER + SPIES	ARS 16/3	S05571	2020-08-28	2021-08-31
System controller	SPITZENBERGER + SPIES	SY Core	S05570	2020-08-28	2021-08-31

3.8.2 Photo of test setup

Photo of test setup













3.8.3 Voltage Dips and Interruptions

TEST: Results for Voltage Dips and Interruptions		
Point of application	Voltage reduction	Results
AC Mains	>95%, 0.5 cycles	1
AC Mains	30%, 25 cycles	1
AC Mains	>95%, 250 cycles	1
Supplementary information:		














3.8.4 Results description



X - Not performed
1 – Compliant - No perceived discharge, no observed response from EUT.
2 – Compliant -
Note: Description should detail the observation during testing.

ANNEX A: Electromagnetically relevant components list.

Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity
Mains terminal block	Ningbo Ulo Electronics Co Ltd	ULO-TB25	5A, 300V; 1.5mm ² , Temperature 105°C, Housing PA - UL94 V0	IEC/EN 60998-1, IEC/EN 60998-2-1 UL1059, C22.2 n°158	 Product Service (647241)  (E473472)
PCB (material)	Shanghai Global Electronic Material Ltd	GDM-R1## (ANSI Type FR- 4.0)	1.2mm Thick , UL94V-0, Single layer printed wiring boards, DS, max. Oper. Temp. 130°C.	ANSI/UL746E, ANSI/ UL 746F, UL94V-0	 (E224772)
Mains fuse (FU1)	Shenzhen Lanson Electronics Co Ltd	SMT T2A250V	T2A, 250V Standard sheet: 4	IEC 60127-1:2006 IEC 60127-1:2006/ AMD1:2011, IEC 60127-1:2006/ AMD2:2015, IEC 60127-3:2015, EN 60127-3:2015, EN 60127-1:2006+ A1:2011+A2:2015	 (40012592)
Thermal protector	Changzhou Desheng Henghui Electronics Co., Ltd.	BR-B2D	100°C	EN 60730-2- 2:2002+A1:2006+A11: 2005, EN 60730- 1:2011	 (40032370)
Coil (L1)	Ningbo Beilun Ky Electronics Electronic Co Ltd	DR2W0608L	1mH-S5.0mm	/	Tested In Appliance
Magnet wire	Dong Guan Xin You Lian Copper Co Ltd	2UEW	Temp 130°C	ANSI/UL 1446	 (E222363)
Tubing, Extruded Insulating	Shenzhen Woer Heat- Shrinkable Material Co Ltd	RSFR	Temp 125°C Flexible heat shrinkable Polyolefin tubing	ANSI/UL 224	 (E203950)
F2 (track fuse)	/	/	See Annex 2: drawings and track fuse	/	Tested in appliance.
Transformer T2	Ningbo Beilun Ky Electronics Electronic Co Ltd	PQ2012-RM- 02571	Switching Transformer Class A considered	/	Tested In Appliance
Bobbin	Chang Chun Plastics Co Ltd,,	type T375HF	color BK, BN, UL 94V-0, RTI Elect. 150°C, Min. thickness 0.45mm	ANSI/UL, 746A/C/D/H, UL94	 (E59481)
	or Sumitomo Bakelite Co Ltd,	type PM-9630,	color BK, BN, UL 94V-0, RTI Elect. 150°C	ANSI/UL, 746A/C/D/H, UL94 IEC 60695-11-10	 (E41429)
Secondary wire	Suzhou Yusheng Electronic Co Ltd or	type TIW-B	reinforced insulation; rated 130° C (Class B)	ANSI/UL 2353, ANSI/UL 60950-1, UL 60601-1, ANSI/UL 61800-5-1	 (E332529)



Primary wire	Furukawa Electric Co Ltd	type TEX-E	reinforced insulation; rated 130° C (Class B)	ANSI/UL 2353, ANSI/UL 60950-1, UL 60601-1, ANSI/UL 61800-5-1	 (E206440)
	or Totoku Electric Co Ltd	type TIW-2L	reinforced insulation; rated 130° C (Class B)	ANSI/UL 2353, ANSI/UL 60950-1, UL 60601-1, ANSI/UL 61800-5-1	 (E166483)
	Zhejiang Hongbo Technology Co Ltd	type xUEW/130, QA-x/130	MW 75-C; Temp. 130°C (Class B)	ANSI/UL 1446	 (E221719)
Tape	3M Company	1350F-1 (b)	temp 130°C, Flame Retardant, color Yellow	UL 510A	 (E17385)
	or Jingjiang Yahua Pressure Sensitive Glue Co Ltd	PZ* (b)	temp 130°C, Flame Retardant, color Yellow	UL 510A	 (E165111)
	or Jingjiang Jingyi Adhesive Product Co Ltd	JY25-A (b)	temp 130°C, Flame Retardant, color All except clear	UL 510A	 (E246950)
	or Jingjiang Jingyi Adhesive Product Co Ltd	WF310 (a)	temp 130°C, Flame Retardant, color White	UL 510A	 (E246950)
Tube	Great Holding Industrial Co Ltd	type TFL	Colors BL, NAT, , temp 200°C, Flame UL94VW- 1	ANSI/UL 224	 (E156256)
	or Shenzhen Woer Heat- Shrinkable Material Co Ltd	type WF	Colors NT, temp 200°C, Flame UL94VW-1	ANSI/UL 224	 (E203950)
	or Changyuan Electronics Group Co Ltd	type CB-TT-L	Colors ALL including clear, temp 200°C, Flame UL94VW-1	ANSI/UL 224	 (E180908)
Varnish	Suzhou Taihu Electric Advanced Material Co Ltd	type T-4260(a)	/	ANSI/UL 1446	 (E228349)
Y1 capacitors (CY1, CY2)	Jyh Chung Electronic Co., Ltd.	JD Series	1000 pF, 400V, X1,Y1	EN 60384- 14:2013/A1:2016 IEC 60384-14: 2013 IEC 60384-14: 2013/AMD1:2016	 (137027)
Insulation sheet	Chengdu Kanglongxin Plastics Co Ltd	KLX PP BK-10	Colour black, 0.5 mmThick measured, flame class UL94V-0, Temp. 110°C	ANSI/UL 94 EN/IEC 606952-10 to 13 Glow wire test 650°C (Tested in appliance)	 (E315185)

U1 (primary side regulation controller)	Shanghai On-Bright Electronic Co Ltd	OB2571TCP	Operating Ambient Temperature Ta: -20 to 85°C; MOSFET Drain-Source Breakdown Voltage 600V.	/	/
U2 (secondary synchronous rectifier)	Shanghai On-Bright Electronic Co Ltd	OB2005WCP	Operating Ambient Temperature Ta: -20 to 85°C; Vdd Supply voltage max 5.5V	/	/
USB Type-C Controller (U4)	Semi-High technology limited	UC2607	3.0V-5.5V, Support Type-C VBUS 3.0A Current, Temp - 40+85°C.	/	/
Front cover	Covestro Deutschland Ag [Pc Resins]	Material Dsg "Makrolon", type 2407 + (z)(f1)	1.6mmThick, Colour All, UI flame class UL94V-2, Temp. 125°C	ANSI/UL 94 EN/IEC 606952-10 to 13 Glow wire test 650°C (Tested in appliance)	 (UR E41613)
Frame/support	Covestro Deutschland Ag [Pc Resins]	Material Dsg "Makrolon", type 2407 + (z)(f1)	1.4mmThick, Colour All, UI flame class UL94V-2, Temp. 125°C	ANSI/UL 94 EN/IEC 606952-10 to 13 Glow wire test 650°C (Tested in appliance)	 (UR E41613)