
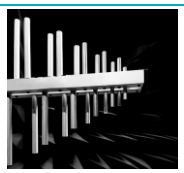
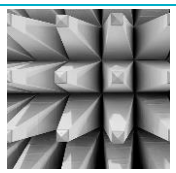

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test Report No.: 1-5287/22-01-03

Testing Laboratory

cetecom advanced GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/GERMANY
Phone: + 49 681 5 98 - 0
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Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

Applicant

Unisto AG
Seestrasse 7
9326 Horn/SWITZERLAND
Phone: +41 71 844 24 24
Contact: Anita Schellenberg
e-mail: anita.schellenberg@unisto.com

Manufacturer

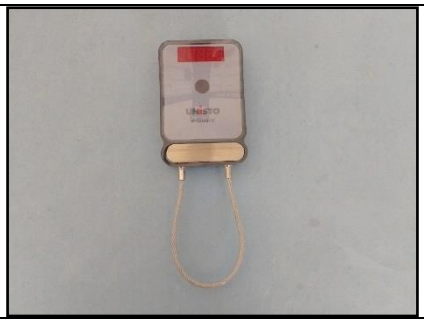
Unisto AG
Seestrasse 7
9326 Horn/SWITZERLAND
Phone: +41 71 844 24 24
Contact: Anita Schellenberg

Test Standard/s

FCC - Title 47 CFR Part 15: 2023-07	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
ICES-003, Issue 7: 2020-10	ICES-003 — Information Technology Equipment (including Digital Apparatus)

Test Item

Kind of test item: **Electronic Security Seal**
Model name: **Unisto e-Guard Data trans**
detailed information see chapter 6.1 and 6.2 of this test report



This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test report authorised:

cn=Uli Kraus, o=cetecom advanced GmbH, ou=EMC-8459, email=uli.kraus@cetecomadvanced.com, c=DE
2023.09.18 12:51:04 +02'00'

Uli Kraus
Supervisor EMC Services
EMC Labs

Test performed:

cn=Jan Schöner, o=cetecom advanced, ou=EMC Labs, email=jan.schoener@cetecomadvanced.com, c=DE
2023.09.18 12:48:29 +02'00'

Jan Schöner
Testing Manager
EMC Labs

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. Cetecom advanced GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of cetecom advanced GmbH.
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In no case this test report can be considered as a Letter of Approval.

The present test report can only be used for the sDOC procedure in the USA if the „Responsible Party" (located in USA) or an official of the responsible party confirms the report in writing, as designated in FCC§2.938.

This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2023-04-20
Date of receipt of test item:	2023-07-05
Start of test[1)]:	2023-07-11
End of test[1)]:	2023-07-11

[1)] Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

3 Test standard/s:

Test Standard	Test Standard Description
FCC - Title 47 CFR Part 15: 2023-07	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
ICES-003, Issue 7: 2020-10	ICES-003 — Information Technology Equipment (including Digital Apparatus)
ANSI C63.4a: 2017	American National Standard for Methods of Measurement of RadioNoise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz Amendment 1: Test Site Validation

4 Test Environment

Temperature:	15°C – 35°C
Relative humidity content:	30 % - 60 %
Air pressure:	860 – 1060 hPa
Power supply of measurement equipment:	230 V / 50 Hz

5 Test Laboratories sub-contracted

---

6 Information about Test Conditions

6.1 Test Item

Kind of test item :	**Electronic Security Seal**		
Type identification :	**Unisto e-Guard Data trans**		
Equipment classification:	Equipment for portable use		
Environment classification:	Residential, commercial and light industry		
Supply voltage :	Battery powered DC 3,6V		
Ports : **(maximum cable lengths declared by manufacturer)**	**Description**	**Direction**	**Length**
	No ports		
Is mounting position / usual operating position defined?	no		
Additional information:			
Test set-up / cabling / operating modes of EUT during tests according to customer. - this is a class B digital device: the instructions furnished the user shall include a statement according to §15.105 of the used FCC rules the build in radio parts are not part of this test report and are already tested			

6.2 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short descrip-tion*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	Electronic Security Seal	Unistro e-Guard Data Trans	241116	2731735 rev d & 2731734 rev c	04.92.13

*) EUT short description is used to simplify the identification of the EUT in this test report.

6.3 EUT Set-up(s)

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A	- / -

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

6.4 EUT Operating Modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	Test mode 6	BLE idle, processor stressed

*) EUT operating mode no. is used to simplify the test report.

7 Summary of Test Results

☒ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 15 Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 Class B	passed

7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15– 30 MHz	FCC Part 15 Class B	NA2

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz
NA7	Not tested because the device is for vehicular use

7.2 Measurement and Test Set-up

Note: Test set-up / cabling / operating modes of EUT during tests according to customer.

7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

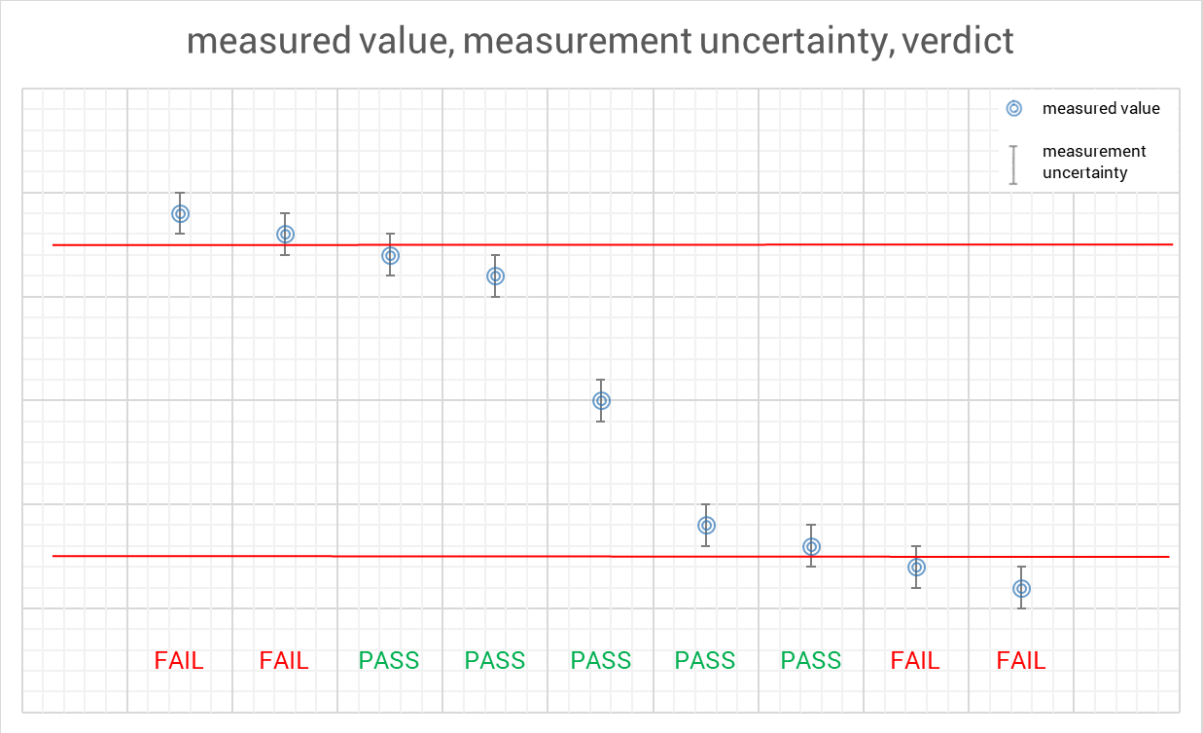
The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 4m ∅.

The table below shows the measurement uncertainties for each measurement method. The expended uncertainty (k=2 or 95%) was calculated with worst case values.

Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Radiated Emission FCC part 15 B, ANSI C63.4	< 1 GHz > 1 GHz	Field strength [dBµV/m]	± 4.64 dB ± 4.92 dB
Conducted Emission FCC part 15 B, ANSI C63.4	9 kHz – 30 MHz	Voltage [dBµV]	± 3.49 dB

7.4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.
The measurement uncertainty is mentioned in this test report, see chapter above, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



8 Detailed test results - Emission

8.1 Electromagnetic Radiated Emissions (Distance 10 m)

8.1.1 Instrumentation for Test (see equipment list)

F 1	F 2	F 4b	F 5	F 6	F 7	F 8					

8.1.2 Test Plan

EUT set-up	set 1		
Operating mode	**Application**	**Limit**	**Result**
op 1	Enclosure	FCC part 15 B Class B	passed

Remarks:	Battery powered (DC 3,6V)

8.1.3 Radiated Limits

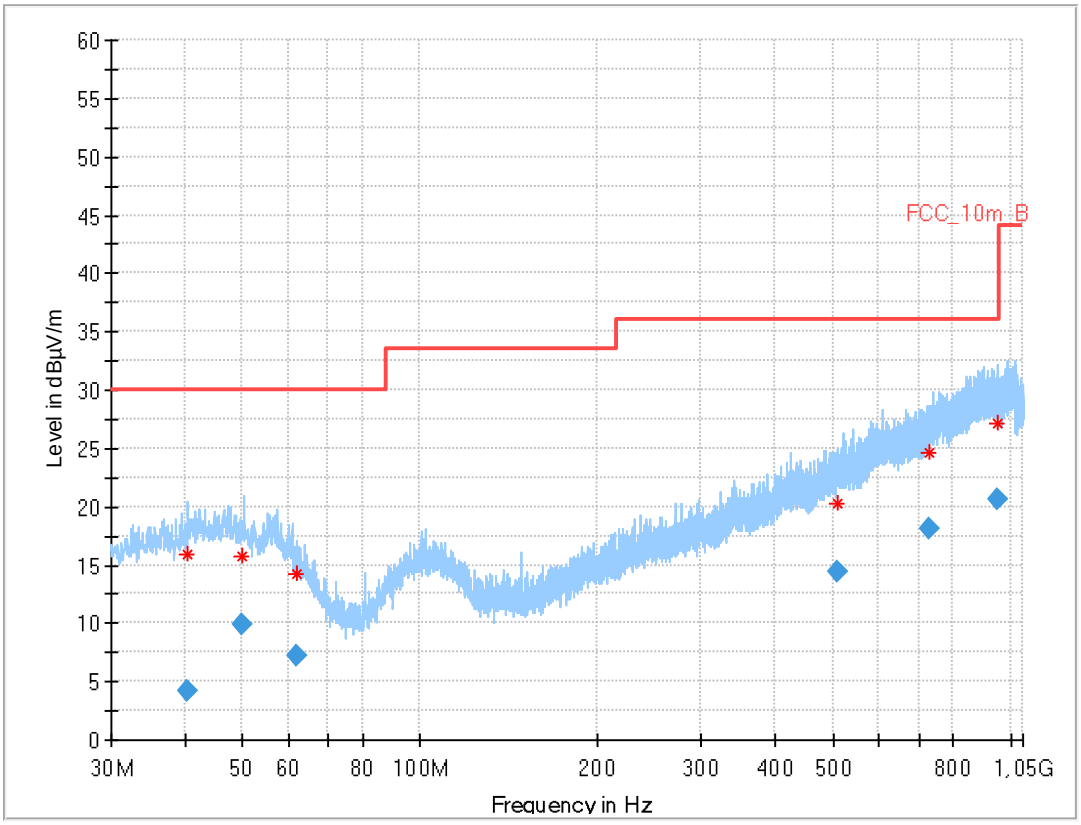
Frequency- range	FCC part 15 B Class B @ 10 m	FCC part 15 B Class A @ 10 m
30 MHz – 88 MHz	**30 dBµV/m**	39,1 dBµV/m
88 MHz – 216 MHz	**33,5 dBµV/m**	43,5 dBµV/m
216 MHz – 960 MHz	**36 dBµV/m**	46,4 dBµV/m
above 960 MHz	**44 dBµV/m**	49,5 dBµV/m
	*** This values are recalculated from the class B limits at 3 m antenna distance in §15.109 (g 2) of the FCC rules**	.

8.1.4 Calibration Information

Device	Serial number	Internal Number	Calibration valid until	Calibration interval
ESR 3	1316.3003K03-102587-ct	300005771	12 / 2023	12 month
Trilog Antenna	9163-1029	300005379	08 / 2023	24 month
Remarks: System check of all relevant devices and the chamber (weekly)				

8.1.5 Test Results

EUT:	Set 1
Serial number:	24116
Test description:	FCC part 15 B class B
Operating condition:	Op 1
Operator name:	SCR
Comment:	Battery powered (3,6V)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.520	4.26	30.0	25.7	1000	120.0	107.0	V	154	15
49.844	9.84	30.0	20.2	1000	120.0	200.0	V	150	16
61.950	7.25	30.0	22.8	1000	120.0	185.0	V	193	13
510.355	14.34	36.0	21.7	1000	120.0	200.0	V	66	20
727.154	18.05	36.0	18.0	1000	120.0	195.0	H	135	23
950.693	20.55	36.0	15.5	1000	120.0	203.0	H	45	25

8.1.6 Hardware Set-up

Frequency Range:	30 MHz - 2 GHz
Receiver:	ESR 3 [ESR 3]
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable]
Software version:	EMC32 V10.59.0

8.1.7 Sequence of testing

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a nonconducting table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.1.8 Signal strength calculation

Calculation formula:
$SS = U_R + CL + AF$

List of abbreviations:

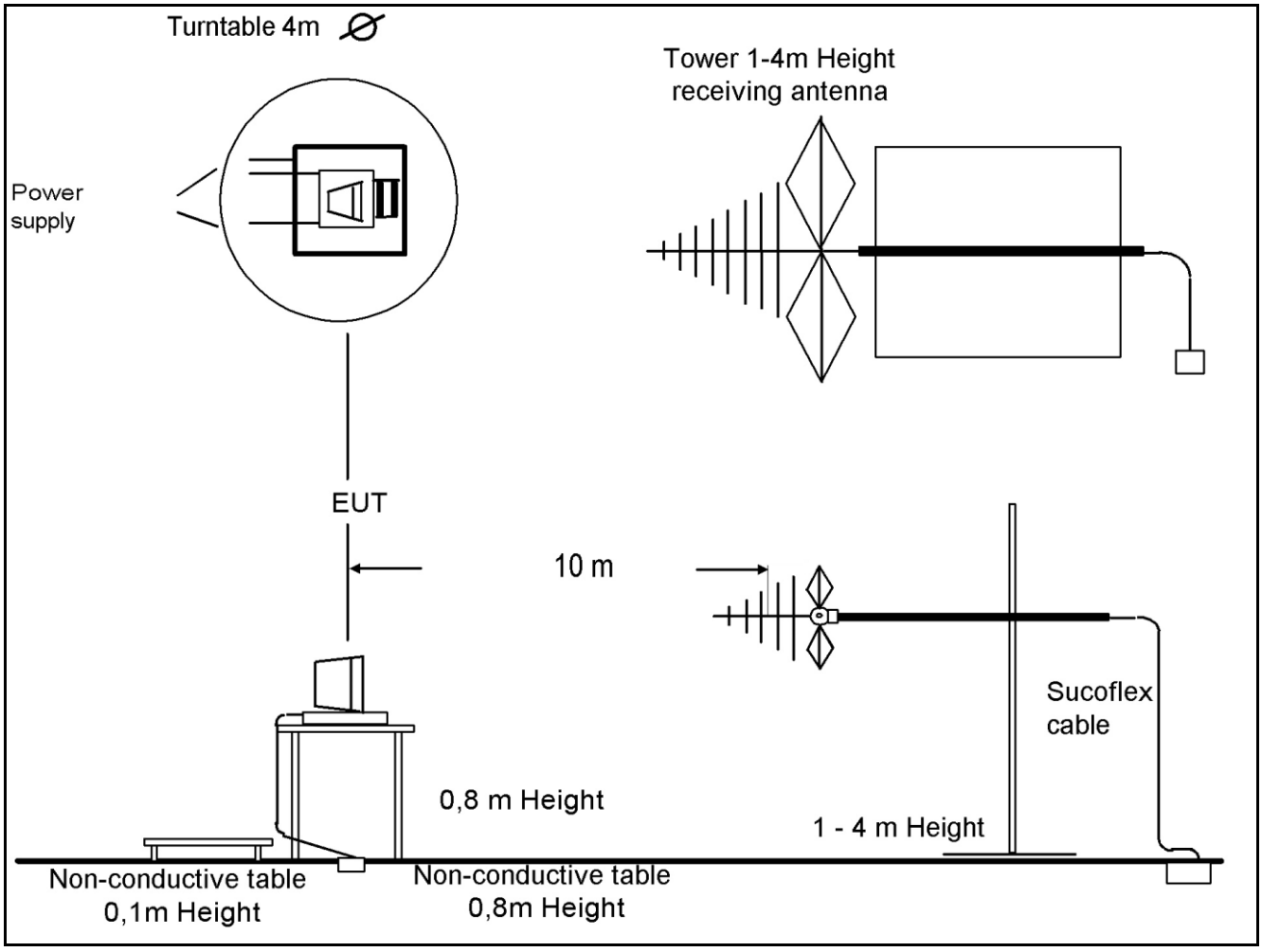
SS	▶	signal strength
U_R	▶	voltage at the receiver
CL	▶	loss of the cable
AF	▶	antenna factor

List with correction factors:

Frequency [MHz]	CL [dB]	AF [1/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

Example calculation:
For example at 500,000 000 MHz the measured Voltage (U_R) is 12,35 dBµV, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dB (m^{-1}) the final result will be calculated:
SS [dBµV/m] = 12,35 [dBµV] + 1,90 [dB] + 16,80 [dB (m^{-1})] = 31,05 [dBµV/m] (35,69 µV/m)

8.1.9 Test Set-up



8.2 Electromagnetic Radiated Emissions (Distance 5 m)

8.2.1 Instrumentation for Test (see equipment list)

F 1	F 6	F 30	F 32	F 33							

8.2.2 Test Plan

EUT set-up	set 1		
Operating mode	**Application**	**Limit**	**Result**
op 1	Enclosure	FCC part 15 B Class B	passed

Remarks:	The measured values are recalculated from 5m to 3m distance Battery powered (3,6V)

8.2.3 Radiated Limits

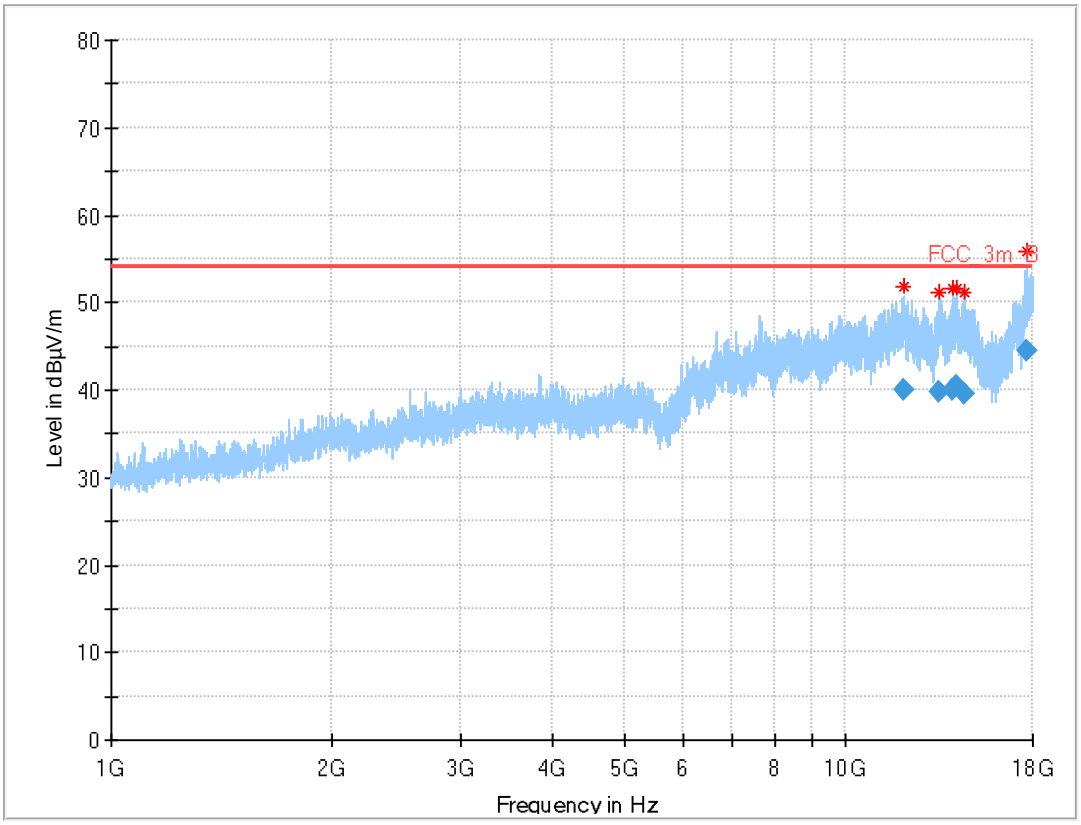
Frequency- range	47CFR15: (FCC part 15 B) Class B @ 3 m	47CFR15: (FCC part 15 B) Class A @ 3 m*
above 1GHz	54 dBµV/m	59,5 dBµV/m
		* This values are recalculated from the class A limits at 10 m antenna distance in §15.109 (g 2) of the FCC rules.

8.2.4 Calibration Information

Device	Serial number	Internal Number	Calibration valid until	Calibration interval
FSU 26	200809	300003874	12/2023	12 month
Horn Antenna	9709-5289	300000213	07/2024	24 month
Remarks: System check of all relevant devices and the chamber (weekly)				

8.2.5 Test Results

EUT:	Set 1
Serial number:	241116
Test description:	FCC part 15 B class B
Operating condition:	Op 1
Operator name:	SCR
Comment:	Battery powered (3,6V)



Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
12007.049	39.93	54.0	14.1	1000	1000.0	V	197	10	
13424.423	39.82	54.0	14.2	1000	1000.0	H	275	11	
13996.413	39.92	54.0	14.1	1000	1000.0	H	229	12	
14150.259	40.40	54.0	13.6	1000	1000.0	V	124	12	
14503.436	39.66	54.0	14.3	1000	1000.0	V	273	12	
17631.233	44.51	54.0	9.5	1000	1000.0	V	349	17	

8.2.6 Hardware Set-up

Frequency Range:	1 GHz - 18 GHz
Receiver:	FSU 26 [FSU 26]
Signal Path:	1_6_EN
Antenna:	Horn Antenna EMCO 3115
Turntable:	Turntable [EMCO Turntable]
Software version:	EMC32 V10.59.0

8.2.7 Sequence of testing

Setup

- The Equipment was setup to simulate a typical usage like described in the user manual / or described by manufacturer.
- If the EUT is a tabletop system, a nonconducting table with 0,8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is: (see ANSI C 63.4)
  < 18 GHz = 5 m
  The EUT was set into operation.

Premeasurement

- The turntable rotates continuous from 0° to 360°
- The antenna is polarized vertical and horizontal.
- In accordance to the antenna beam and the size of the EUT the antenna height changes in 30 cm steps, start at 1 meter. If it is not possible to tilt the emissions will be checked with a manually tilted antenna from top side.
- The analyzer scans quickly to find the maximum emissions of the EUT

Final measurement

- The final measurement will be performed with minimum the six highest peaks (depends on emissions and number of measured points below 1 GHz)
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°).
- The final measurement will be done with AV (Average / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit, and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

8.2.8 Signal strength calculation

Calculation formula:
SS = U_R + CL + AF + PA + DC

List of abbreviations:

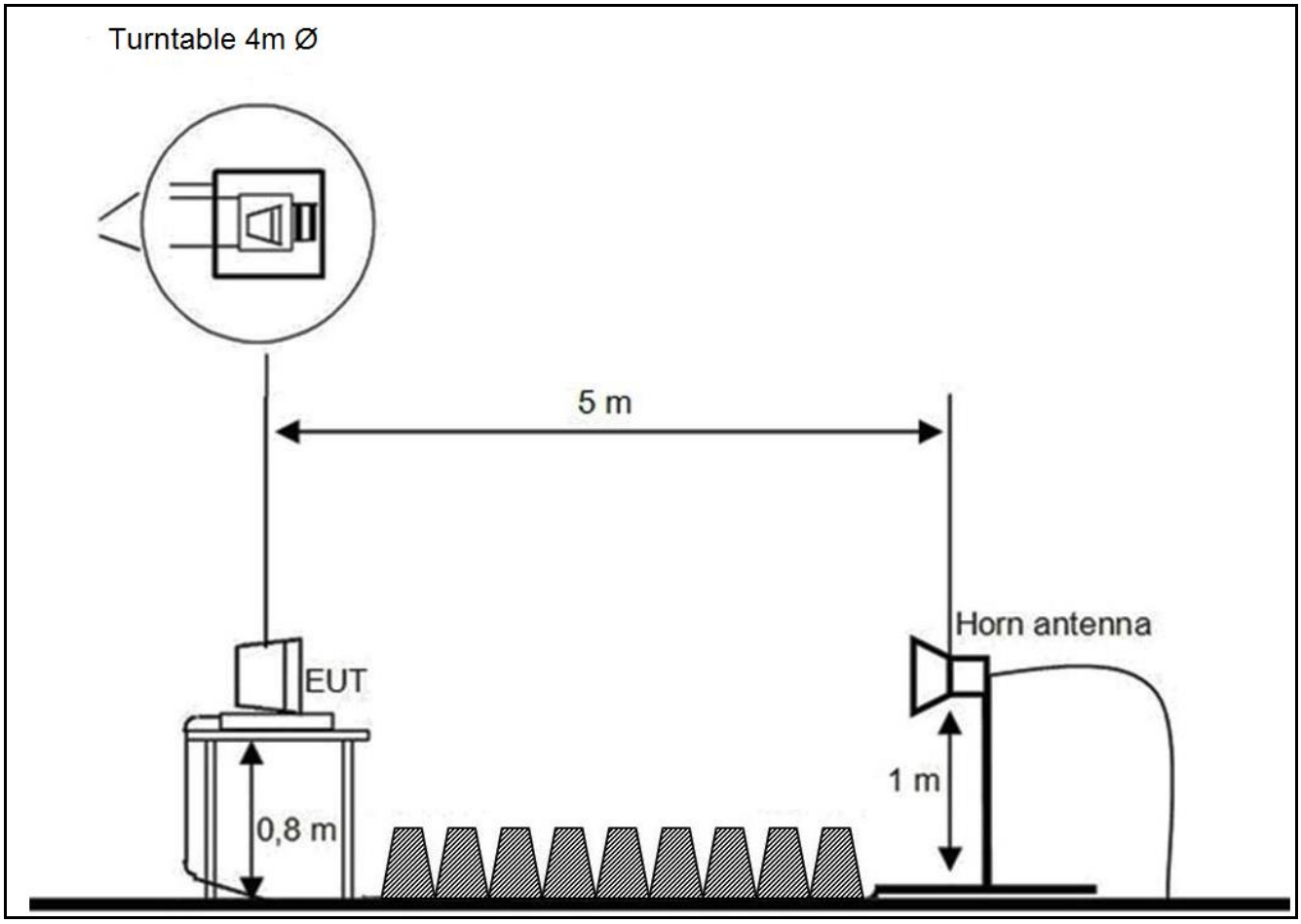
SS	▶	signal strength
U_R	▶	voltage at the receiver
CL	▶	loss of the cable and gain of the preamp
AF	▶	antenna factor
DC	▶	distance correction (results measured on 5 m calculated to 3 m)

List with correction factors: column CL in table contains cable factor and preamplifier correction

Frequency [GHz]	CL [dB]	AF [dB1/m]	DC [dB]
1,000	-35,50	24,40	4,40
1,500	-35,20	25,10	4,40
2,000	-35,10	27,40	4,40
2,500	-35,00	28,50	4,40
3,000	-34,70	30,20	4,40
3,500	-34,80	31,20	4,40
4,000	-35,00	32,60	4,40
4,500	-34,90	32,50	4,40
5,000	-34,80	33,40	4,40
5,500	-34,35	34,10	4,40
6,000	-34,00	34,40	4,40
6,500	-33,50	34,50	4,40
7,000	-33,10	35,50	4,40
7,500	-33,40	36,50	4,40
8,000	-33,80	36,90	4,40
8,500	-33,75	37,20	4,40
9,000	-33,70	37,40	4,40
9,500	-33,50	37,50	4,40
10,000	-33,40	37,90	4,40
11,000	-35,90	38,30	4,40
12,000	-34,40	39,10	4,40
13,000	-37,30	39,30	4,40
14,000	-36,20	41,30	4,40
15,000	-36,90	40,10	4,40
16,000	-34,90	37,60	4,40
17,000	-35,60	40,80	4,40
18,000	-35,70	45,70	4,40

Example calculation:
For example at 4,000 000 000 GHz the measured Voltage (UR) is 46,13 dBµV, the loss of the cable (CL) is -35,00 dB, the antenna factor (AF) is 32,60 dB(m-1) and the distance correction (DC) is 4,40 dB the final result will be calculated:
SS [dBµV/m] = 46,13 [dBµV] + (-35,00) [dB] + 32,60 [dB(m-1)] + 4,4 [dB] = 48,13 [dBµV/m] (202,53 µV/m)

8.2.9 Test Set-up



9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Radiated emission in chamber F				
F-1	Control Computer	F+W		2934939v001	300005258
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-1029	300005379
F-4b	Switch	Netgear	GS108P	26V12A3H50336	300000368
F-5	EMI Test receiver	R&S	ESR	1316.3003K03-102587-ct	300005771
F-6	Turntable Interface-Box	EMCO / ETS-LINDGREN	Model 105637	44583	300003747
F-7	Tower/Turntable Controller	EMCO / ETS-LINDGREN	Model 2090	64672	300003746
F-8	Tower	EMCO / ETS-LINDGREN	Model 2175	64762	300003745
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
	Radiated immunity in chamber F				
F-10	Control Computer	F+W		2934939v001	300005258
F-11	Signal Generator	R&S	SMB 100A	1406.6000k02-113856	300005266
F-13	RF-Amplifier	Bonn	BLWA 0860-250/100D	035491	300003210
F-14	Stacked Logper Antenna	Schwarzbeck	STLP 9129	200	300006249
F-14a	Bicon-Antenna	EMCO	3109	8906-2309	300000575
F-14b	Bicon-Antenna	Schwarzbeck	Balun VHBD 9134	3011	300005385
			elements BBFA 9146	0057	
F-15	RF-Amplifier	ar	1000LM20	20562	-/-
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-16a	Directional coupler	emv	DC 2000	9401-1677	300000592
F-18	Power Meter	R&S	NRP2	104973	300005114
F-19	Power sensor	R&S	NRP-Z91	103332	300005114-1
F-20	Power sensor	R&S	NRP-Z91	103333	300005114-2
F-35	RF- Amplifier	Bonn	BLMA 2060-5	097392A	300003908
F-36	Stacked Microwave Log.-Per. Antenna	Schwarzbeck	STLP9149	9149-044	300003919
	Harmonics and flicker in front of chamber F				
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300003314
F-21a	Power Supply	HBS Electronic	ACS-1600-PS	2002-001247-0	300006074
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580
	Radiated emission in chamber F > 1GHz				
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B	188	300003896
F-30	Amplifier	ProNova	0518C-138	005	F 024
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379
F-32	Horn antenna	EMCO	3115	9709-5289	300000213
F-33	Spectrum Analyzer	R&S	FSU26	200809	300003874
F-34	Loop antenna	EMCO	6502	8905-2342	300000256

10 Observations

No observations, exceeding those reported with the single test cases, have been made.

Annex A Photographs of the test set-up

Photo 1: radiated emission <1 GHz

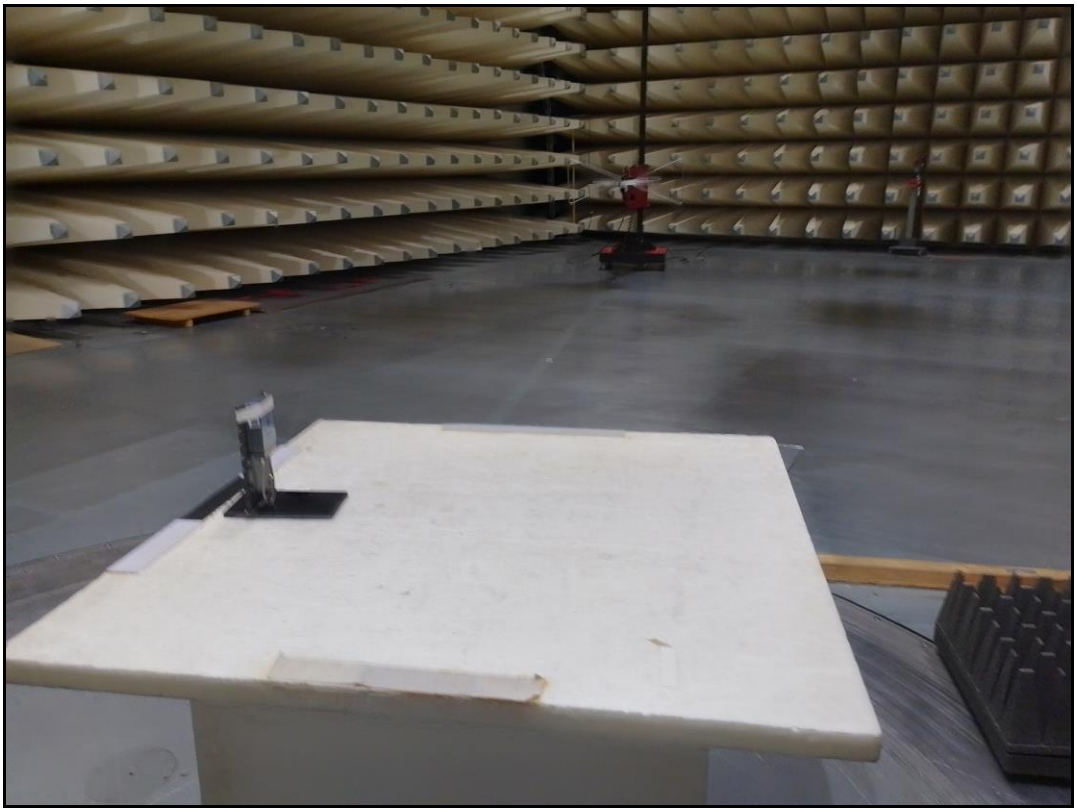


Photo 2: radiated emission >1 GHz

Annex B Photographs of the EUT

Photo 3: EUT front side

Photo 4: EUT left-handed side view

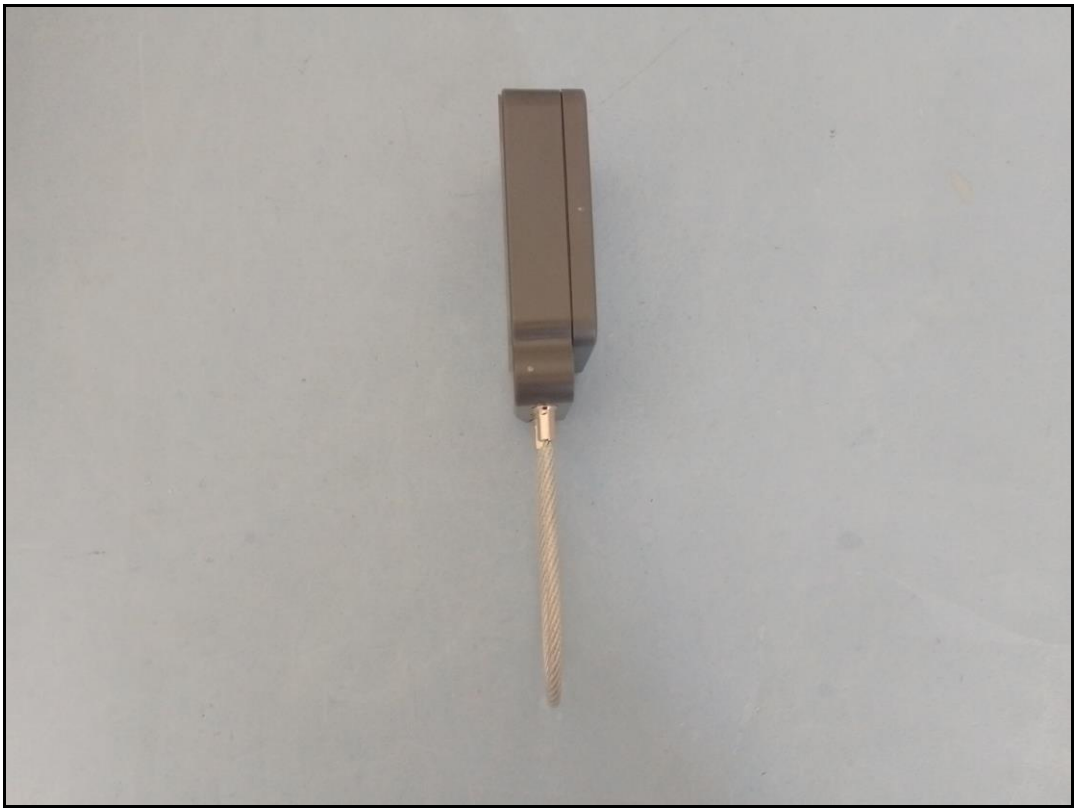


Photo 5: EUT rear view

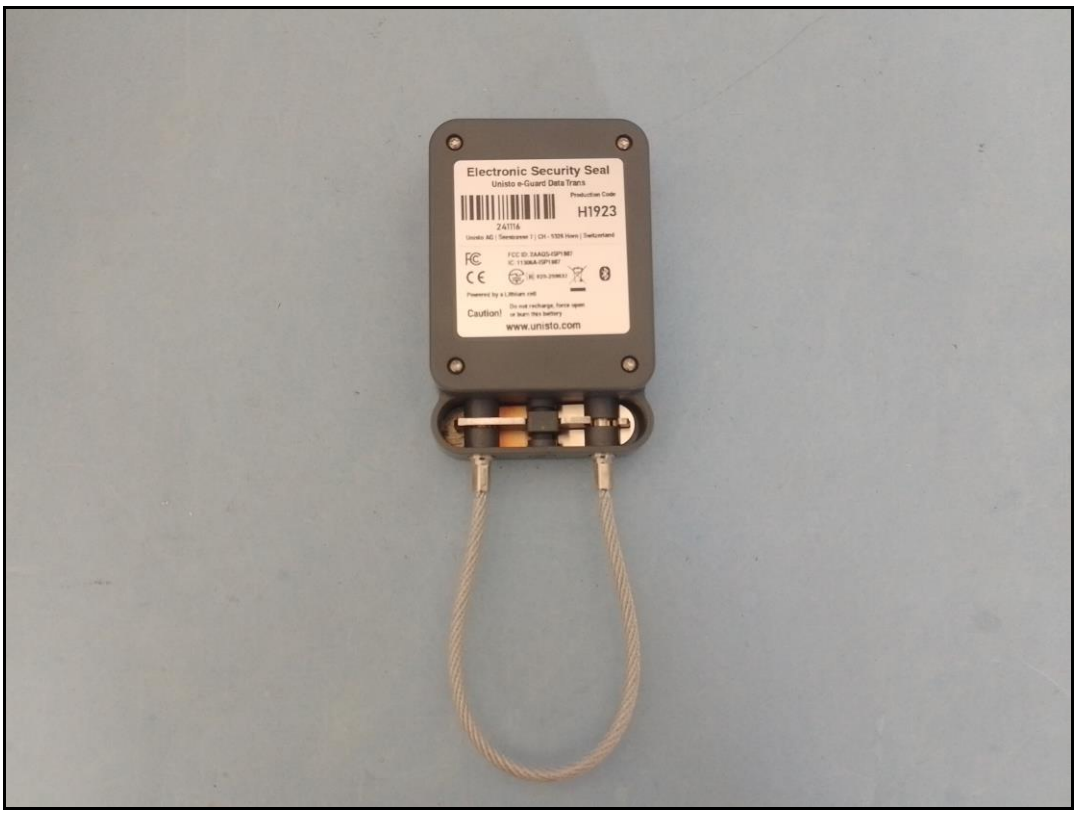


Photo 6: EUT right-handed side view

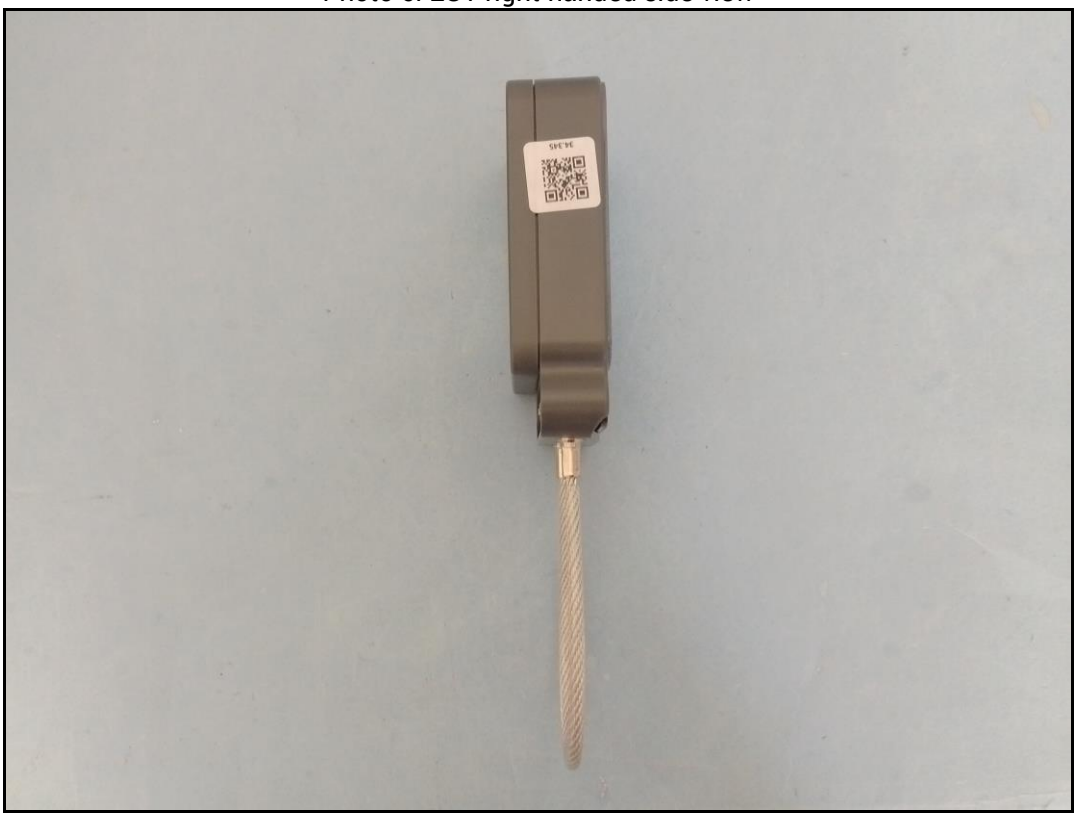


Photo 7: EUT downside of EUT

Photo 8: EUT top view

Photo 9: EUT detailed view of label

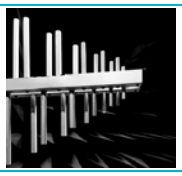
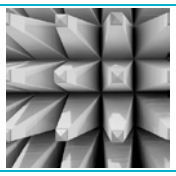
Annex C Document history

Version	Applied changes	Date of release
- / -	Initial release	2023-09-18

Annex D Further information

Glossary

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software

TEST REPORT

Test Report No.: 1-5287/22-01-02

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing Laboratory

cetecom advanced GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/GERMANY
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://www.cetecomadvanced.com
e-mail: mail@cetecomadvanced.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

Unisto AG
Seestrasse 7
9326 Horn/SWITZERLAND
Phone: +41 71 844 24 24
Contact: Anita Schellenberg
e-mail: anita.schellenberg@unisto.com
Phone: +41 71 844 24 24

Manufacturer

Unisto AG
Seestrasse 7
9326 Horn/SWITZERLAND

Test Standard/s

ETSI EN 301 489-1 V2.2.3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-17 V3.2.5 (Draft)	Part 17:Specific conditions for Broadband and Wideband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

Test Item

Kind of product:	**Digital Security cradle Bluetooth**
Product name:	**Unisto e-Guard**
Serial number:	*see chapter 6.2*
Hardware version:	*see chapter 6.2*
Software version:	*see chapter 6.2*
Firmware version:	*see chapter 6.2*

This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test report authorised:

p.o.
cn=Thomas Merten, o=cetecom advanced GmbH, ou=MET-230602, email=Thomas.Merten@cetecomadvanced.com, c=DE
2023.08.22 08:56:32 +02'00'

Christopher Schramm
Lab Manager
EMC Labs

Test performed:

cn=Felix Schorr, o=cetecom advanced GmbH, ou=SOR-230606, email=felix.schorr@cetecomadvanced.com, c=DE
2023.08.22 08:33:19 +02'00'

Felix Schorr
Testing Manager
EMC Labs

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of cetecom advanced GmbH.
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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2023-04-20
Date of receipt of test item:	2023-07-28
Start of test:	2023-07-28
End of test:	2023-07-31

3 Test standard/s:

Test standard	Test description
ETSI EN 301 489-1 V2.2.3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-17 V3.2.5 (Draft)	Part 17:Specific conditions for Broadband and Wideband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

4 Test environment

Temperature:	15 °C – 35 °C
Relative humidity content:	30 % – 60 %
Air pressure:	860 hPa – 1060 hPa
Power supply of measurement equipment:	230 V / 50 Hz

5 Test Laboratories sub-contracted

---

6 Information about test item

6.1 Test item

Radio equipment EUT A

Kind of product	:	Digital Security cradle Bluetooth		
Product name	:	Unisto e-Guard		
Equipment classification:		equipment for fixed use (according to EN 301 489-1, clause 3.1)		
Environment classification:		residential, commercial and light industry environment (according to EN 301 489-1, clause 1)		
Operating frequency range:		Bluetooth LE (2402 – 2480 MHz)		
Power supply	:	battery powered		
Supply voltage	:	DC 3,6 V		
Ports (maximum cable lengths declared by manufacturer)	:	**Classification and description**	**Direction**	**Length**
		--	--	--
Is mounting position / usual operating position defined?			Mounted on truck door	
Additional information:				
Test set-up / cabling / operating modes of EUT during tests according to customer.				

6.2 EUT: Type, S/N etc. and short descriptions used in this test report

	Radio equipment	Product name	Serial number	Hardware version	Software version
EUT A	Digital Security cradle Bluetooth	Unisto e-Guard	241116	H1923	04.92.13
Note: EUT short description is used to simplify the identification of the EUT in this test report.					

6.3 Auxiliary equipment (AE): Type, S/N etc. and short descriptions

	Auxiliary equipment	Type	Serial number	Hardware version	Software version
AE 1	Smartphone	--	--	--	--
NOTE: AE short description is used to simplify the identification of the auxiliary equipment in this test report.					

6.4 EUT set-up(s)

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A + AE 1	--

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

6.5 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	cont. BLE communication with smartphone (nRF-Connect read), cont. testmode (touch and hall sensor checking)	--

*) EUT operating mode no. is used to simplify the test report.

7 Summary of test results

☒ All of the performed measurements are passed
☐ At least one of the performed measurements is failed

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated interference field strength	30 – 1000 MHz	EN 55032 Class B	**NA1**
EMI Phenomenon	**Frequency range**	**Basic standard**	**Result**
Radiated interference field strength	1000 – 6000 MHz	EN 55032 Class B	**NA1**

Note: The spurious emission tests need to be performed according to the radio standard(s).

7.1.2 AC Mains power Input/Output ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15 – 30 MHz	EN 55032 Class B	**NA2**
Harmonic current emission	0 – 2 kHz	EN 61000-3-2	**NA2**
Voltage fluctuations and flicker		EN 61000-3-3	**NA2**

7.1.3 DC power Input/Output ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15 – 30 MHz	EN 55032 Class A	**NA2**

7.1.4 Wired network port

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15 – 30 MHz	EN 55032 Class B	**NA2**

7.2 Immunity

7.2.1 Enclosure

EMS Phenomenon	Frequency range	Basic standard	Result
Electrostatic discharge		EN 61000-4-2	**passed**
Radio frequency electromagnetic field	80 – 6000 MHz	EN 61000-4-3	**passed**

7.2.2 AC Mains power Input/Output ports

EMS Phenomenon	Frequency range	Basic standard	Result
Fast transients, common mode		EN 61000-4-4	**NA2**
Surges		EN 61000-4-5	**NA2**
Radio frequency, common mode	0,15 – 80 MHz	EN 61000-4-6	**NA2**
Voltage dips, interruptions, and fluctuations		EN 61000-4-11	**NA2**

7.2.3 DC power Input/Output ports

EMS Phenomenon	Frequency range	Basic standard	Result
Fast transients, common mode		EN 61000-4-4	**NA2**
Radio frequency, common mode	0,15 – 80 MHz	EN 61000-4-6	**NA2**
Transients and surges, vehicular environment		ISO 7637-2:2004	**NA2**

7.2.4 Signal/Control port

EMS Phenomenon	Frequency range	Basic standard	Result
Fast transients, common mode		EN 61000-4-4	**NA2**
Radio frequency, common mode	0,15 – 80 MHz	EN 61000-4-6	**NA2**

7.2.5 Wired network port

EMS Phenomenon	Frequency range	Basic standard	Result
Fast transients, common mode		EN 61000-4-4	**NA2**
Surges		EN 61000-4-5	**NA2**
Radio-frequency, common mode	0,15 – 80 MHz	EN 61000-4-6	**NA2**

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exist
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	For equipment with a rated power of ≤75 W, other than lighting equipment, no limits are specified in this edition of the standard.
NA7	No test shall be made on equipment which is unlikely to produce significant voltage fluctuations or flicker.
NA8	Not performed, because highest internal frequency < 108 MHz
NA9	Not performed, because test only applicable to equipment containing devices intrinsically susceptible to magnetic fields.

7.3 Performance assessment and reaction of the EUT

In case of Immunity testing (EMS): Observing or/and recording following functions:

Monitoring during continuous phenomena

- The Bluetooth LE communication link with a mobile phone was observed
- The testmode (touch and hall sensor check) was observed

Monitoring during transient phenomena

- The Bluetooth LE communication link with a mobile phone was observed
- The testmode (touch and hall sensor check) was observed

Reaction(s) of the EUT during immunity testing (EMS):

R1
-Cont. Bluetooth LE communication with the mobile phone
-No unintended reaction of the hall and touch sensor

The above mentioned criteria are NOT compulsory the criteria of the used standard. The assessment of the reaction according to the used standard is shown by the passed/failed column of each test in chapter 7.2.

7.4 Measurement and test set-up

Note: Test set-up / cabling / operating modes of EUT during tests according to customer.

7.5 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 4m ∅.

Measurement uncertainty calculations are on file and available from the test laboratory upon request.

The table below shows the measurement uncertainties for each measurement method.
The expended uncertainty (k=2 or 95%) was calculated with worst case values.

	Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Emission	**Radiated** **EN 55032/11, ANSI C63.4**	< 1 GHz > 1 GHz	Field strength [dBµV/m]	± 4.64 dB ± 4.92 dB
	Conducted **EN 55032/11, ANSI C63.4**	9 kHz – 30 MHz	Voltage [dBµV]	± 3.49 dB
	Power line communication apparatus used in low-voltage installations **EN 50561-1**	- / -	Voltage [dBµV]	± 3.49 dB
	Harmonic current **EN 61000-3-2**	2...40 x f_n f_n= 50 Hz	Voltage [V] Current [A]	± 0.05 % ± 0.06 %
	Voltage changes, voltage fluctuations and flicker **EN 61000-3-3**	f_n = 50 Hz	Voltage [V]	± 1 %
Immunity	**Electrostatic discharge** **EN 61000-4-2**	- / -	Voltage [kV]	± 39.40 %
	Radiated, radio-frequency, electromagnetic field **EN 61000-4-3**	20 MHz -6 GHz	Field strength [V/m]	± 1.78 dB
	Electrical fast transient/burst **EN 61000-4-4**	5kHz/50ns or 100kHz/50ns	Voltage [V]	± 4.95 %
	Surge **EN 61000-4-5**	- / -	Surge voltage [V] Surge current [A]	± 5.67 % ± 3.70 %
	Conducted disturbances, induced by radio-frequency fields **EN 61000-4-6**	150 kHz – 230 MHz	Voltage [V]	± 6.36 %
	Power frequency magnetic field **EN 61000-4-8**	DC ... 60 Hz	Field strength [A/m]	± 3.82 %
	Impulse magnetic field **EN 61000-4-9**	- / -	Field strength [A/m]	± 5.67 %
	Voltage dips, short interruptions and voltage variations **EN 61000-4-11**	- / -	Voltage [V]	± 0.17 %
	Conducted, common mode disturbances **EN 61000-4-16**	0 Hz – 150 kHz	Voltage [V]	± 1.32 %
	Radiated fields in close proximity **EN 61000-4-39**	9 kHz – 26 MHz 380 MHz – 6000 MHz	Field strength [A/m] Field strength [V/m]	± 1.12 dB ± 2.16 dB

8 Immunity – Detailed test results

8.1 Radio frequency electromagnetic field (80 MHz to 6 GHz)

8.1.1 Instrumentation for test (see equipment list)

B 1	B 2	B 3	B 4	B 5	B 6	B 8	B 9	B 10	B 11	B 16	

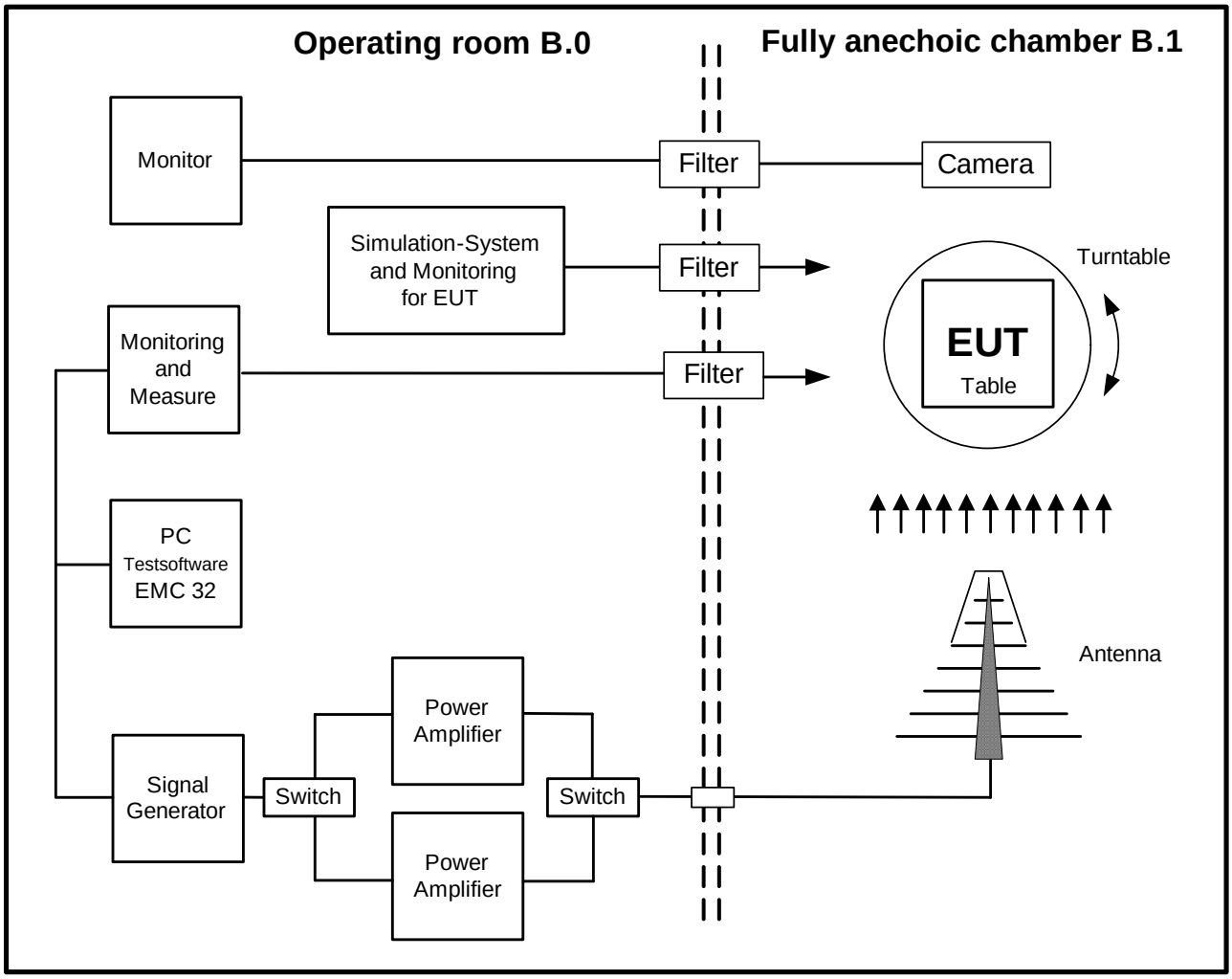
8.1.2 Test plan

EUT set-up	set. 1				
Operating mode	op. 1				
Test condition					
Dwell time	**Field strength (unmod., rms)**	**Start frequency**	**Stop frequency**	**Frequency step**	**Modulation**
1 s	3 V/m	80 MHz	6000 MHz	log 1%	1 kHz, AM 80%
View to EUT surface	**Antenna position**		**Reaction of EUT (please refer to chapter 7.3)**		**Within specification(s) during and after test**
front side	horizontal		R1		yes
	vertical		R1		yes
left side	horizontal		R1		yes
	vertical		R1		yes
rear side	horizontal		R1		yes
	vertical		R1		yes
right side	horizontal		R1		yes
	vertical		R1		yes

Remarks:	Frequencies around the operating frequency were excluded from the measurement according to EN 301 489-17, clause 4.3.

8.1.3 Test set-up

According to EMC basic standard **EN 61000-4-3**



8.2 Electrostatic discharge

8.2.1 Instrumentation for test (see equipment list)

I 1	I 2	I 3									

8.2.2 Test plan

EUT set-up	set. 1					
Operating mode	op. 1					
	Contact discharge to conducted surfaces and to coupling planes				**Air discharge to insulating surfaces**	
	Direct contact discharge		**Indirect contact discharge**			
Test voltage	**Reaction of EUT (please refer to chapter 7.3)**	**Within specification(s) during and after test**	**Reaction of EUT (please refer to chapter 7.3)**	**Within specification(s) during and after test**	**Reaction of EUT (please refer to chapter 7.3)**	**Within specification(s) during and after test**
+ 2 kV -2 kV	R1	yes	R1	yes	R1	yes
+ 4 kV - 4 kV	R1	yes	R1	yes	R1	yes
+ 8 kV - 8 kV	*not applicable*	---	*not applicable*	---	R1	yes

Remark:	10 Single impulses at each test point and for each test voltage.
	Direct contact discharge was performed to the Green Points on the pictures of the ESD test set-up. *Air discharge was performed to the Blue Points on the pictures of the ESD test set-up.*

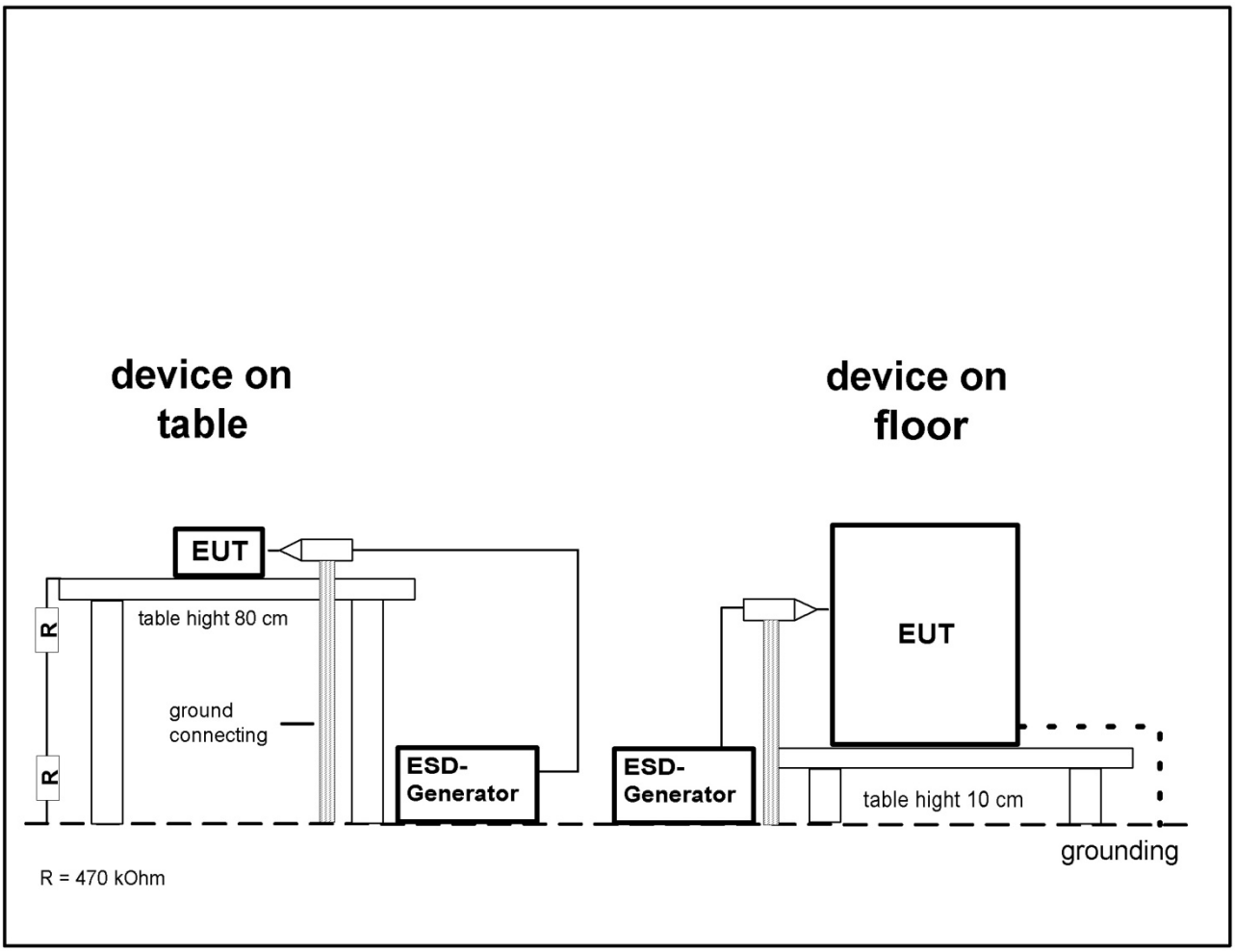
8.2.3 Climatic conditions

-	Ambient temperature:	25,5	°C	Ambient Temperature range:	15 °C to 35 °C
-	Relative humidity:	52,1	%	Relative humidity range:	30% to 60%
-	Atmospheric pressure:	1015	hPa	Atmospheric pressure range	860 hPa to 1060 hPa

8.2.4 Test set-up

According to the requirements given in **EN 61000-4-2**

This test is intended to demonstrate the immunity of the device to a discharge caused by operators.



9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal-No.
	Radiated immunity in chamber B				
B-1	Fully anechoic chamber B	Frankonia			
B-2	Control computer	Tecline	DT6/400H1300PII	FW09910190	400000211
B-3	Software	Rohde & Schwarz	EMC 32 V10.35.02	100026/100096	300003909
B-4	Position control unit	INNCO	CO2000-P	508/22090309/L	300003923
B-5	Antenna positioner	INNCO	AS2000 P-15kg		
B-6	Stacked Log.-Per. Antenna (70 MHz – 10 GHz)	Schwarzbeck	STLP 9129	00007	300005059
B-7	Isotropic Field Probe Laser Data Interface	ETS Lindgren	HI-6105USB HI-6113	00082705 00082790	300003906b 300003906
B-8	Bi-Directional Coaxial Coupler	narda	3020A	36520	
B-9	Amplifier 80 MHz-1GHz	BONN Elektronik	BLWA 0810-250	129100	300004536
B-10	Amplifier Rack 1- 6 GHz Amplifier 1-6 GHz Power Meter Power Sensor A Power Sensor B	 BONN Elektronik Rohde & Schwarz Rohde & Schwarz Rohde & Schwarz	 BLMA 1060-100DS NRP NRP-Z91 NRP-Z91	 1510383 102066 100834 100841	 300005064 300003908 300003908.01 300003908.02
B-11	Signal generator (9 kHz – 6 GHz)	Rohde & Schwarz	SMB 100A	100108	300003795
B-12	Power meter	Rohde & Schwarz	URV 5	833658/005	300002238
B-13	Power Sensor, Insertion unit A	Rohde & Schwarz	NRV-Z2	829445/004	300002234
B-14	Power Sensor, Insertion unit B	Rohde & Schwarz	NRV-Z2	829445/008	300002235
B-15	Relay matrix	Rohde & Schwarz	RSU	316790/001	300002236
B-16	DC power supply	HP	6032A	2846A04063	300001511
	Other observation equipment in chamber B				
B-20	Voltmeter	Rohde & Schwarz	UDS5	881178/086	300000846
B-21	Radio comm. Service Monitor	Rohde & Schwarz	CMS54	100848	300003531
B-22	RF Receiver	Rohde & Schwarz	ESVP	891752/005	300002224
B-23	Relay matrix	Rohde & Schwarz	PSN	829065/003	300002221
B-24	Pneumatic controller	Heiden	2004-300	001502	300001631
B-25	Spectrum analyzer	Rohde & Schwarz	FSIQ 26	835540/018	300002681-0005
B-26	Radio Test Set	Rohde & Schwarz	CMA180	103478	300006349
	Observation equipment, audio rack 1 in chamber B				
B-29	Band pass	IMD	EWR-QBF	2610101	300003506
B-30	Measurement amplifier	B&K	2636	1537486	300000190.01
B-31	Optical fibre microphone system	Sennheiser		keine	300003100
B-32	Artificial mouth with AF transformer	B&K	4227	1536875	300002314
B-33	sound calibrator	CR511F	CYRRUS	034689	400000205
B-34	Pneumatic Controller	Heiden	2004-300	001502	300001631
B-35	Relay matrix	Rohde & Schwarz	PSN	892176/002	300001149
B-36	Switch Control	HP	3488A	none	300001143
B-37	Selective Level Meter	HP	3586A	2509A01542	300000395
B-38	Microphone	B&K	2669	2298171	400000208
B-39	Signal generator	Rohde & Schwarz	SPN	880968/086	300001465

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal-No.
	ESD in room 006				
I-1	ESD- Generator	Schlöder	SESD 30000	402125	300003223
I-2	Pistol	Schlöder	SESD 30000	402125	300003223a
I-3	Module set	Schlöder	SESD 30000	402125	300003223b

10 Observations

No observations, exceeding those reported with the single test cases, have been made.

Annex A: Photographs of the test set-up

Photo 1: Radiated immunity test setup

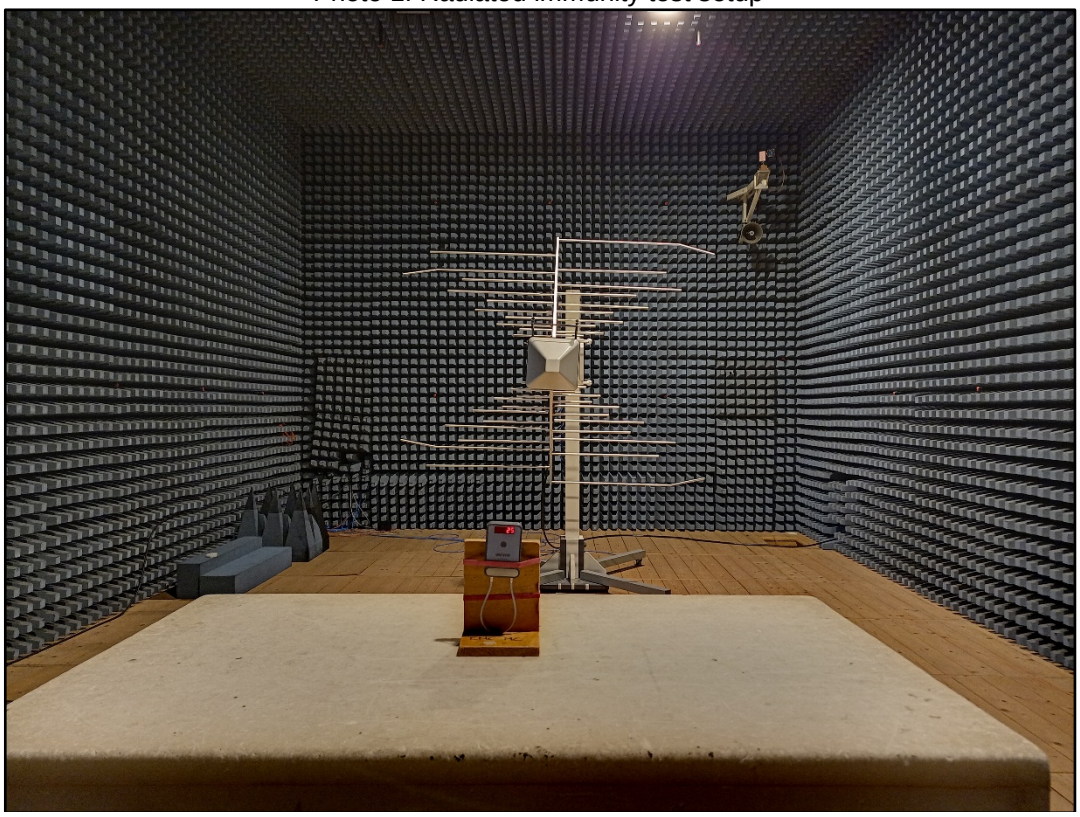


Photo 2: Example of indirect contact discharge (horizontal)

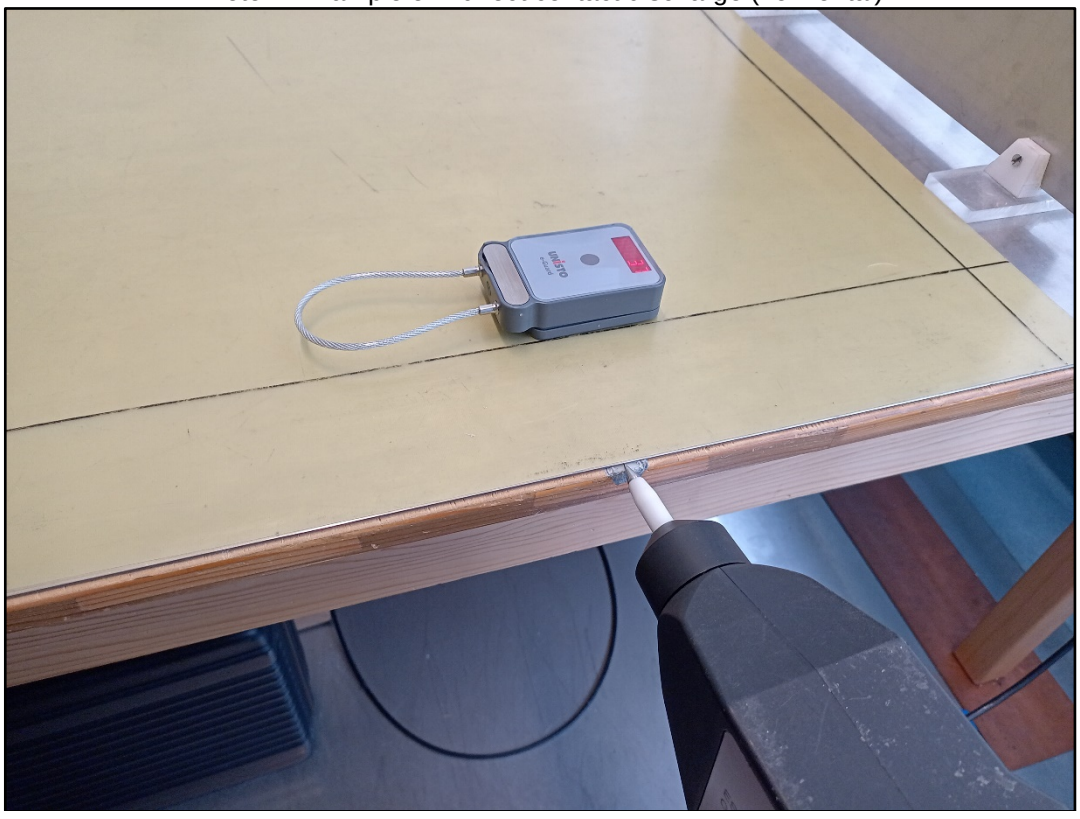


Photo 3: Example of indirect contact discharge (vertical)

Photo 4: Contact discharge (green), air discharge (blue)

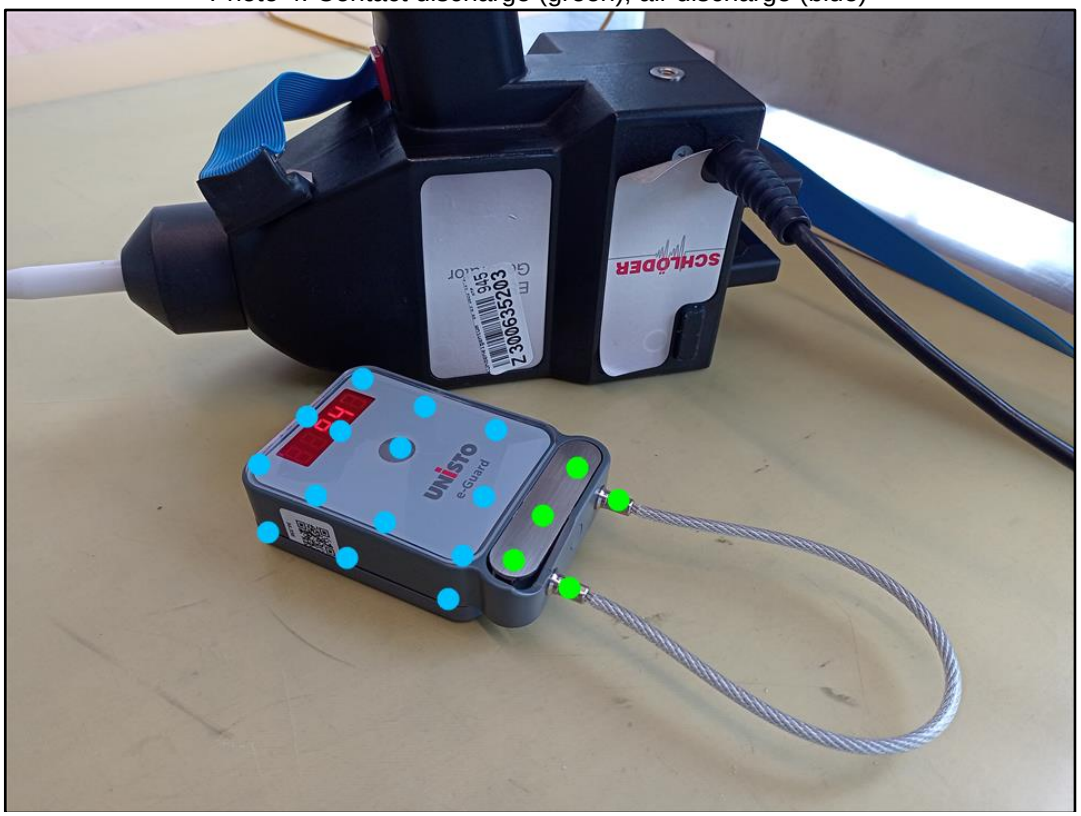
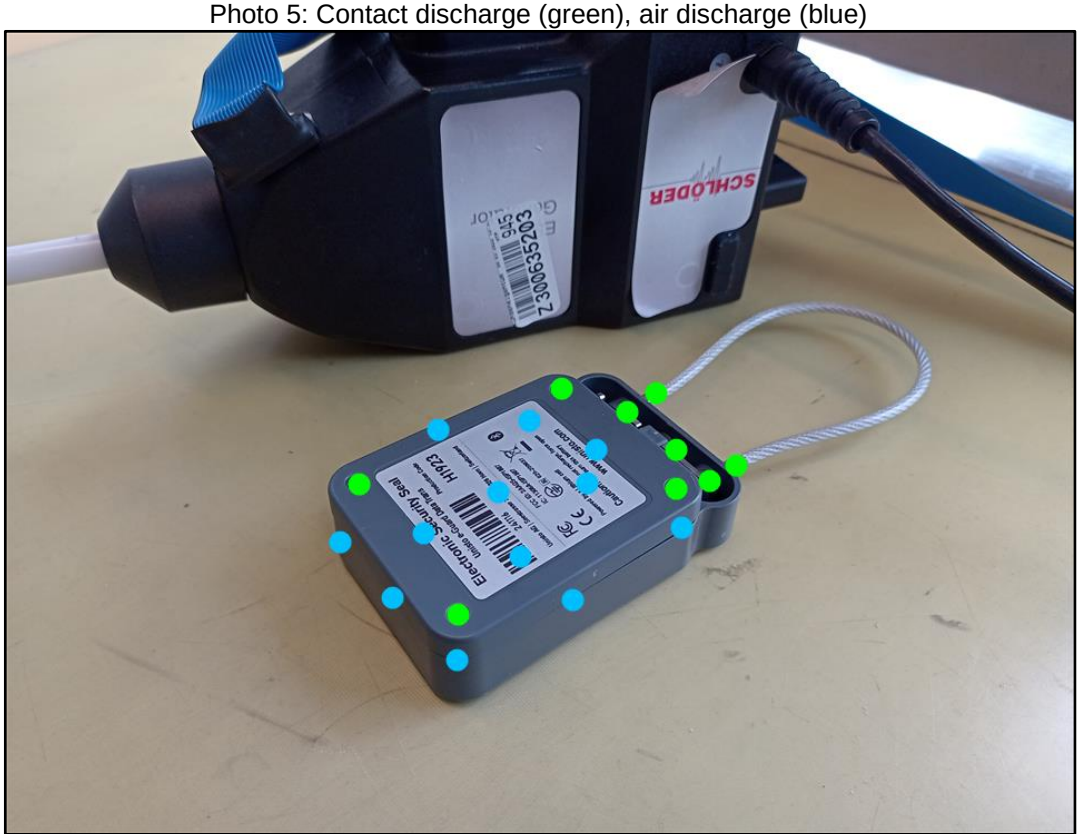


Photo 5: Contact discharge (green), air discharge (blue)



Annex B: Photographs of the EUT

Photo 6: Front side of EUT

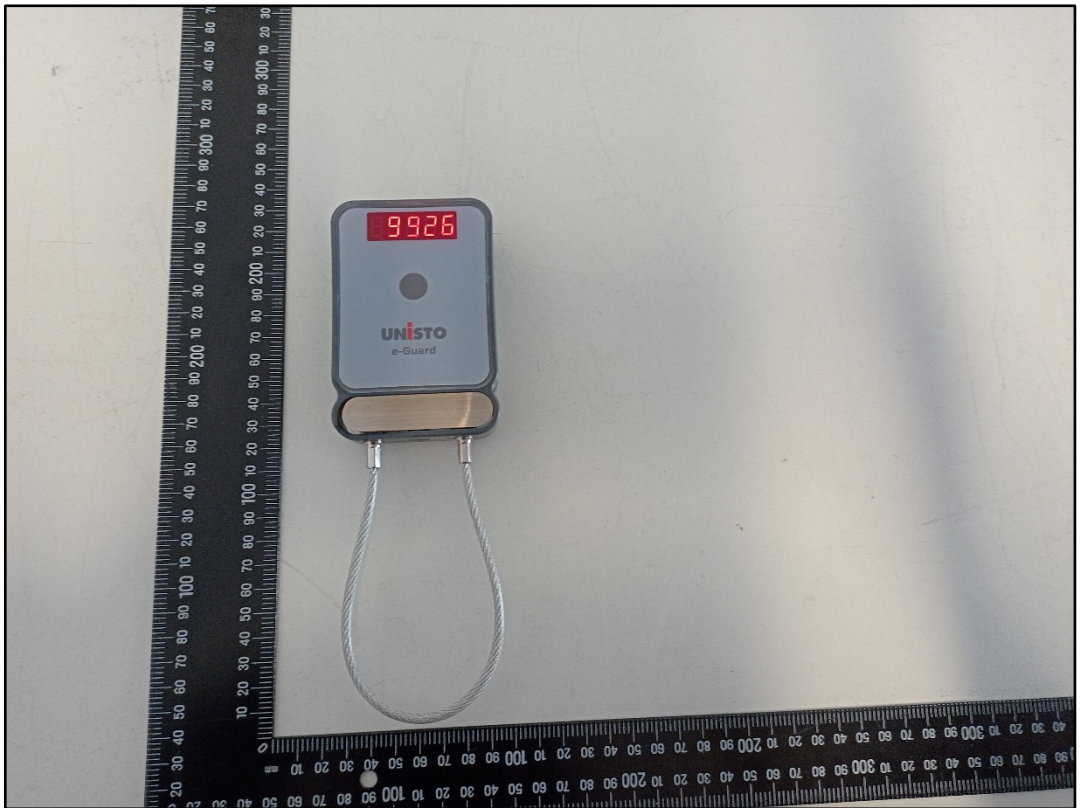
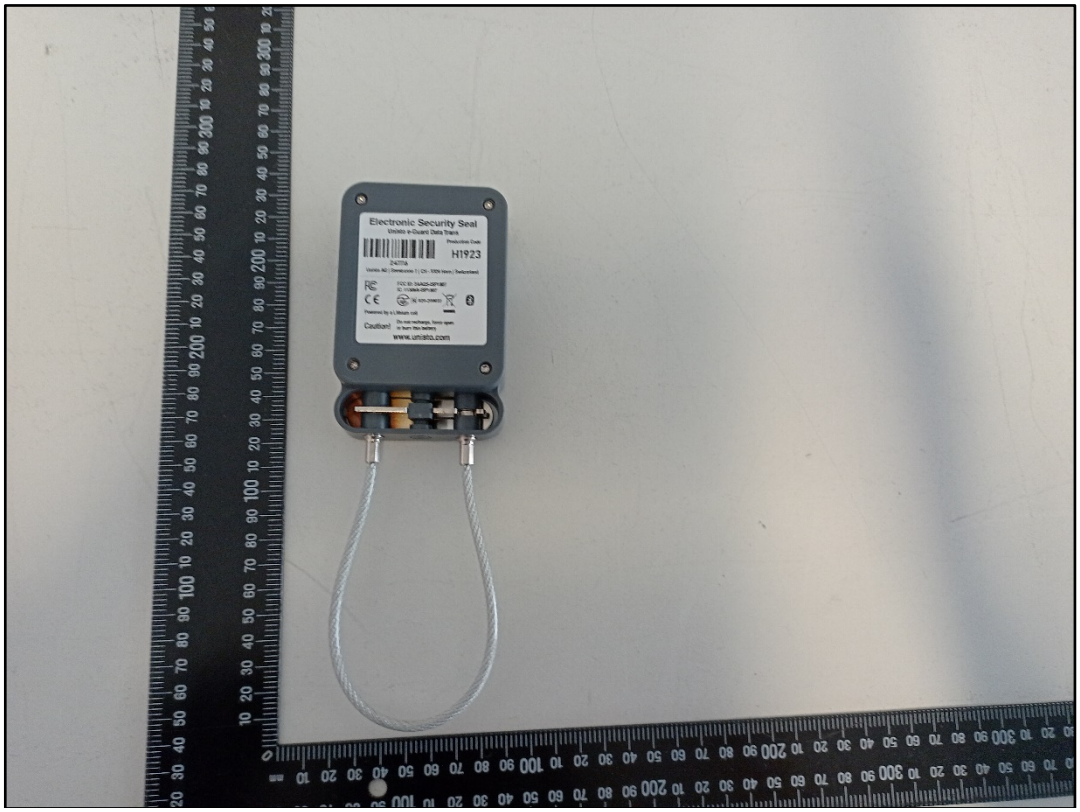


Photo 7: Back side of EUT



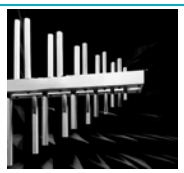
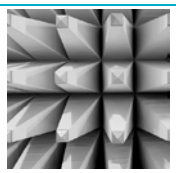
Annex C: Document history

Version	Applied changes	Date of release
---	Initial release	2023-08-22

Annex D: Further information

Glossary

BT	-	Bluetooth
DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
ME	-	Medical electrical
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software

TEST REPORT

Test report no.: 1-5287_22-01-04

Testing laboratory

cetecom advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://cetecomadvanced.com
e-mail: mail@cetecomadvanced.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-03

Applicant

Unisto AG
Seestrasse 7
9326 Horn / SWITZERLAND
Phone: +41 71 844 24 24
Contact: Anita Schellenberg
e-mail: anita.schellenberg@unisto.com

Manufacturer

Unisto AG
Seestrasse 7
9326 Horn / SWITZERLAND

Test standard/s

ETSI EN 300 328 V2.2.2	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**Digital Security cradle Bluetooth**
Model name:	**Unisto e-Guard**
Frequency:	2400 MHz to 2483.5 MHz
Technology tested:	Bluetooth® LE
Antenna:	Integrated antenna
Power supply:	3.6 V DC by Lithium Battery
Temperature range:	-30°C to +65°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:

cn=Joerg Warken, o=CTC advanced GmbH, ou=WAK-211130, email=joerg.warken@ctcadvanced.com, c=DE
2023.07.21 14:00:50 +02'00'

Joerg Warken
Lab Manager
Radio Labs

Test performed:

cn=Michael Dorongovski, o=cetecom advanced GmbH, ou=DOR-230601, email=michael.dorongovski@cetecomadvanced.com, c=DE
2023.07.21 13:22:41 +02'00'

Michael Dorongovski
Lab Manager
Radio Labs

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of cetecom advanced GmbH.
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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2023-04-20
Date of receipt of test item:	2023-07-05
Start of test:*	2023-07-11
End of test:*	2023-07-11
Person(s) present during the test:	-/-

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

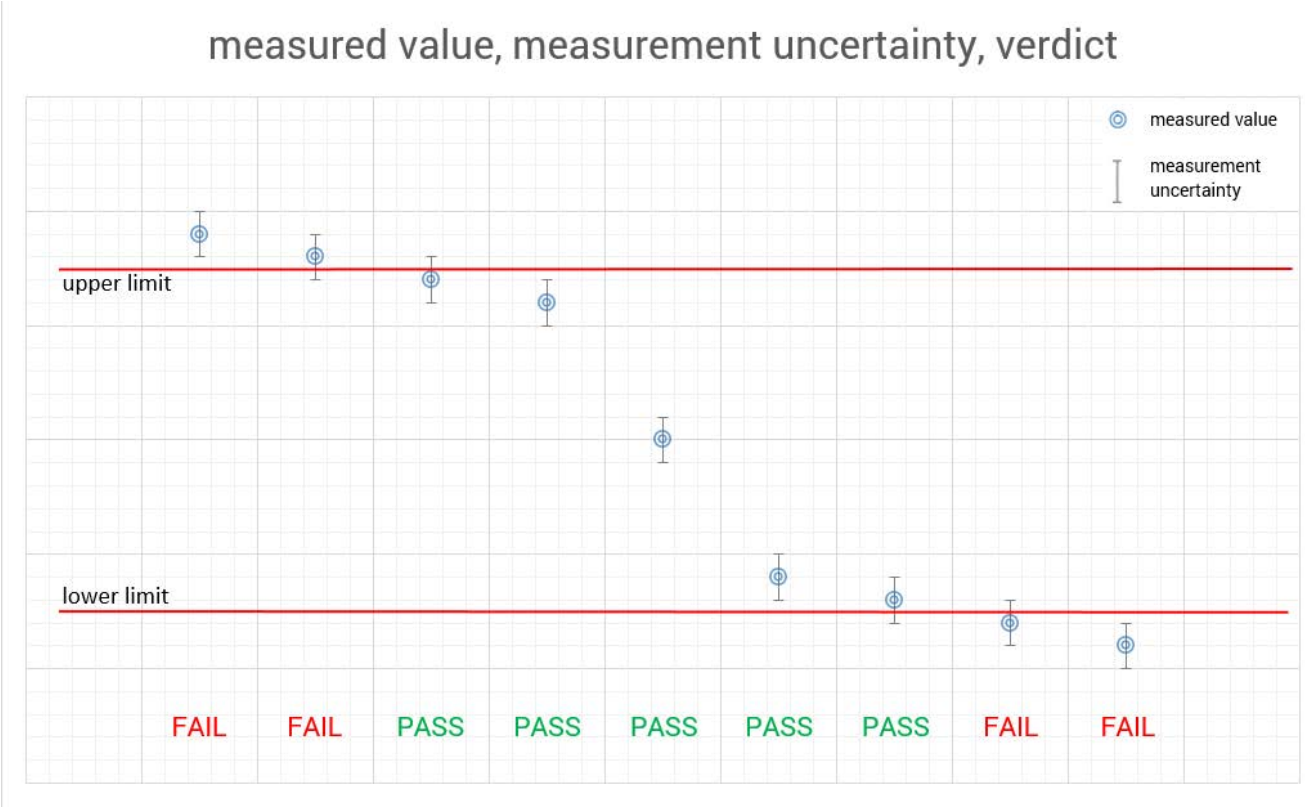
None

3 Test standard/s

Test standard	Date	Description
ETSI EN 300 328 V2.2.2	2019-07	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.
The measurement uncertainty is mentioned in this test report, see chapter 12, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



5 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests No tests under extreme temperature conditions performed. No tests under extreme temperature conditions performed.
Relative humidity content	:		55 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V_{nom} V_{max} V_{min}	3.6 V DC by Lithium Battery No tests under extreme voltage conditions required. No tests under extreme voltage conditions required.

6 Test item

6.1 General description

Kind of test item	:	Digital Security cradle Bluetooth
Model name:	:	Unisto e-Guard
S/N serial number	:	Rad. Not available
Hardware status	:	2731735 rev d
Software status	:	04.92.13
Firmware status	:	na
Frequency band	:	2400 MHz to 2483.5 MHz
Type of radio transmission **Use of frequency spectrum**	: :	Other than FHSS
Type of modulation	:	GFSK
Number of channels	:	40 (1 Msps) 37 (2 Msps)
Channel bandwidth (B)	:	1 MHz
Channel spacing	:	2 MHz
Receiver category	:	2
Antenna	:	Integrated antenna
Power supply	:	3.6 V DC by Lithium Battery
Temperature range	:	-30°C to +65°C

6.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report: 1-5287_22-01-01_AnnexA
1-5287_22-01-01_AnnexB
1-5287_22-01-01_AnnexC

7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

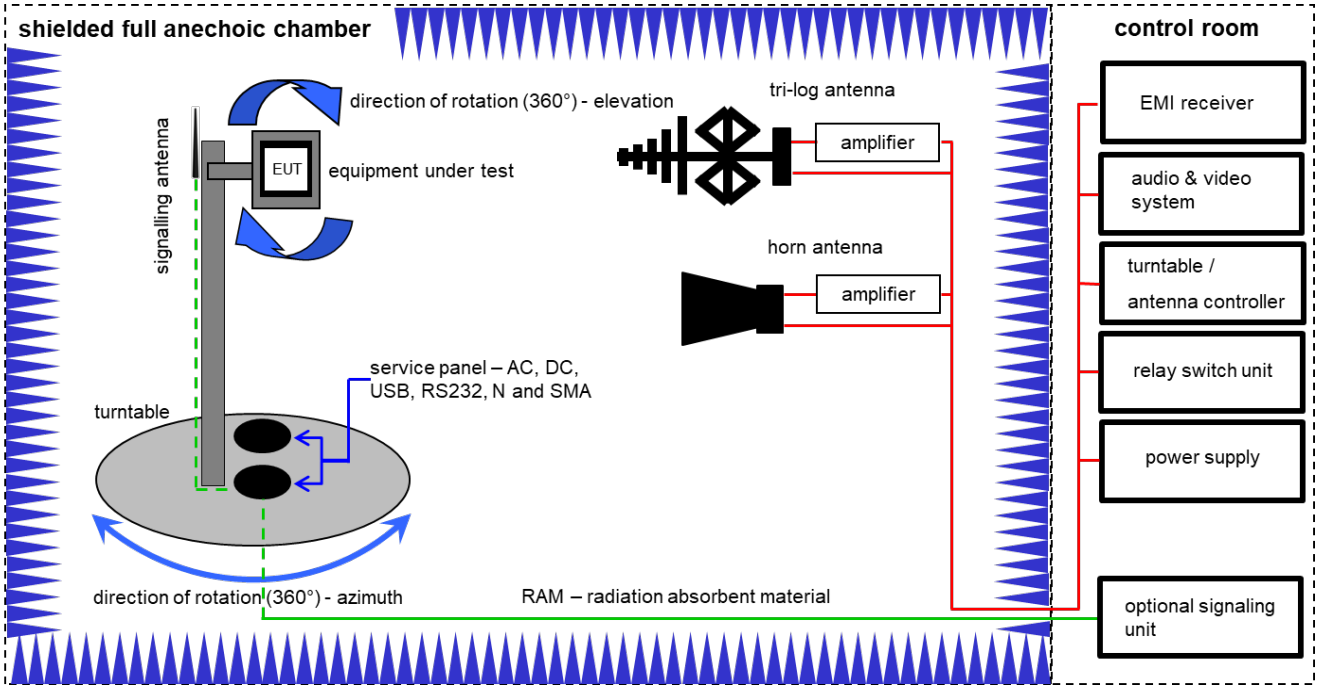
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter

OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3089	300000307	vIKI!	11.02.2022	29.02.2024
2	A, B	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
3	B	Band Reject Filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	26	300003792	ne	-/-	-/-
4	A, B	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	01029	300005379	vIKI!	18.08.2021	30.08.2023
5	A, B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
6	A, B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
7	A, B	Computer	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A5421	300004591	ne	-/-	-/-
8	A, B	Highpass Filter	WHKX2.6/18G-10SS	Wainwright	12	300004651	ne	-/-	-/-
9	A, B	NEXIO EMV-Software	BAT EMC V3.22.0.13	Nexio	-/-	300004682	ne	-/-	-/-
10	A, B	Anechoic chamber	-/-	TDK	-/-	300003726	ne	-/-	-/-
11	A, B	EMI Test Receiver 9kHz-26,5GHz	ESR26	Rohde & Schwarz	101376	300005063	k	13.12.2022	31.12.2023
12	A, B	RF-Amplifier	AMF-6F06001800-30-10P-R	NARDA-MITEQ Inc	2011571	300005240	ev	-/-	-/-

8 Summary of measurement results

☐	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description			verdict		date			Remark
RF-Testing	ETSI EN 300 328 V2.2.2 (2019-07)			See table		2023-07-21			Tests according to customer demand
Test specification clause	**Test case**	**temperature conditions**	**power source voltages**	**Mode**	**C**	**NC**	**NA**	**NP**	**Remark**
4.3.2.2 5.4.2	RF output power	Nominal	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	-/-
		Low	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	
		High	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	
4.3.2.3 5.4.2	Power spectral density	Nominal	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	-/-
4.3.2.4, 4.3.2.5 5.4.3	Duty cycle, Tx-sequence, Tx-gap, medium utilization	Nominal	Nominal	-/-	☐	☐	☒	☐	-/-
5.4.4	Accumulated transmit time, freq. occupation and hopping sequence	Nominal	Nominal	-/-	☐	☐	☒	☐	-/-
5.4.5	Hopping frequency separation	Nominal	Nominal	-/-	☐	☐	☒	☐	-/-
4.3.2.6 5.4.6	Adaptivity	Nominal	Nominal	-/-	☐	☐	☒	☐	-/-
4.3.2.7 5.4.7	Occupied channel bandwidth	Nominal	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	-/-
4.3.2.8 5.4.8	Transmitter unwanted emissions in the out-of-band domain	Nominal	Nominal	1 Msps 2 Msps	☐	☐	☐	☒	-/-
4.3.2.9 5.4.9	Transmitter unwanted emissions in the spurious domain (rad.)	Nominal	Nominal	1 Msps 2 Msps	☒	☐	☐	☐	-/-
4.3.2.10 5.4.10	Receiver spurious emissions (rad.)	Nominal	Nominal	1 Msps	☒	☐	☐	☐	-/-
4.3.2.11 5.4.11	Receiver blocking	Nominal	Nominal	1 Msps	☐	☐	☐	☒	-/-
4.3.2.12	Geo-location	Nominal	Nominal	-/-	☐	☐	☒	☐	-/-

C	Compliant	NC	Not compliant
NA	Not applicable	NP	Not performed

9 Additional comments

The Bluetooth® word mark and logos are owned by the Bluetooth SIG Inc. and any use of such marks by CTC advanced GmbH is under license.

Reference documents: Bluetooth® Core Specification 5.1

Special test descriptions: None

Configuration descriptions:

Bluetooth Low Energy	
Longest Supported payload (37 – 255 Byte)	Tx: 255, RX: 255
LE 1M PHY supported	Yes
LE 2M PHY supported	Yes
Stable Modulation Index supported (SMI)	No
LE Coded PHY supported (S=2)	No
LE Coded PHY supported (S=8)	No

Test mode:

☒ Bluetooth direct test mode enabled
(EUT is controlled via CBT/CMW)

☐ Special software is used.
EUT is transmitting pseudo random data by itself

EUT selection:

☒ Only one device available

☐ Devices selected by the customer

☐ Devices selected by the laboratory (Randomly)

10 EUT classification

Type of equipment:

- ☒ stand alone equipment
- ☐ plug in radio equipment
- ☐ combined equipment

Modulation types:

- ☒ Wide band modulation (none hopping – e.g. DSSS, OFDM)
- ☐ Frequency hopping spread spectrum (FHSS)

Adaptive equipment:

- ☐ Yes, LBT-based
- ☒ Yes, non-LBT-based
- ☐ Yes (but can be disabled)
- ☐ No

Antennas and transmission operating modes:

- ☒ Operating mode 1 (single antenna)
  - Equipment with 1 antenna,
  - Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,
  - Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)
- ☐ Operating mode 2 (multiple antennas, no beamforming)
  - Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.
- ☐ Operating mode 3 (multiple antennas, with beamforming)
  - Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming.
    In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.

11 Measurement results

11.1 Radiated output power

Measurement parameters (radiated)	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace mode	Max hold
Additional EUT parameters:	Longest supported packet Pattern: PRBS 9
Test setup	See sub clause 7.1 - A
Measurement uncertainty	See sub clause 12

Limits:

20 dBm

Results:

	Low channel (2402 MHz)	Mid channel (2440 MHz)	High channel (2480 MHz)
Radiated power [dBm] Measured with GFSK modulation (1 Msps)	2.2	0.3	-0.3

NOTE: These results are only informational.

11.2 Transmitter unwanted emissions in the spurious domain

Description:

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain when the equipment is in transmit mode.

Pre-scan:

Measurement parameters (radiated)	
Detector	Peak
Sweep time	5ms/MHz
Resolution bandwidth	Below 1 GHz: 100 kHz / above 1MHz
Video bandwidth	Below 1 GHz: 300 kHz / above 3MHz
Detector	Peak
Test setup	See sub clause 7.1 - B
Measurement uncertainty	See sub clause 12

Any emissions identified during the sweeps in the pre-scan and that fall within the 6 dB range below the applicable limit, shall be individually measured using the procedure “retest”.

Retest:

Measurement parameters (radiated)	
Detector	RMS
Measurement mode	Time domain power
Sweep time	30 ms
Resolution bandwidth	Below 1 GHz: 100 kHz / above 1MHz
Video bandwidth	Below 1 GHz: 300 kHz / above 3MHz
Span	Zero span
Trace mode	Single sweep
Test setup	See sub clause 7.1 - B
Measurement uncertainty	See sub clause 12

Performed: ☐ Conducted
☒ Radiated

Limits:

State	Max. spurious level		
	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 694 MHz	Other frequencies ≤ 1000 MHz	All frequencies > 1000 MHz
Operating	4.0 nW (-54 dBm)	250 nW (-36 dBm)	1.00 µW (-30 dBm)
Receiver / Idle	2.0 nW (-57 dBm)	2.0 nW (-57 dBm)	20.0 nW (-47 dBm)

Results: radiated, 1 Msps

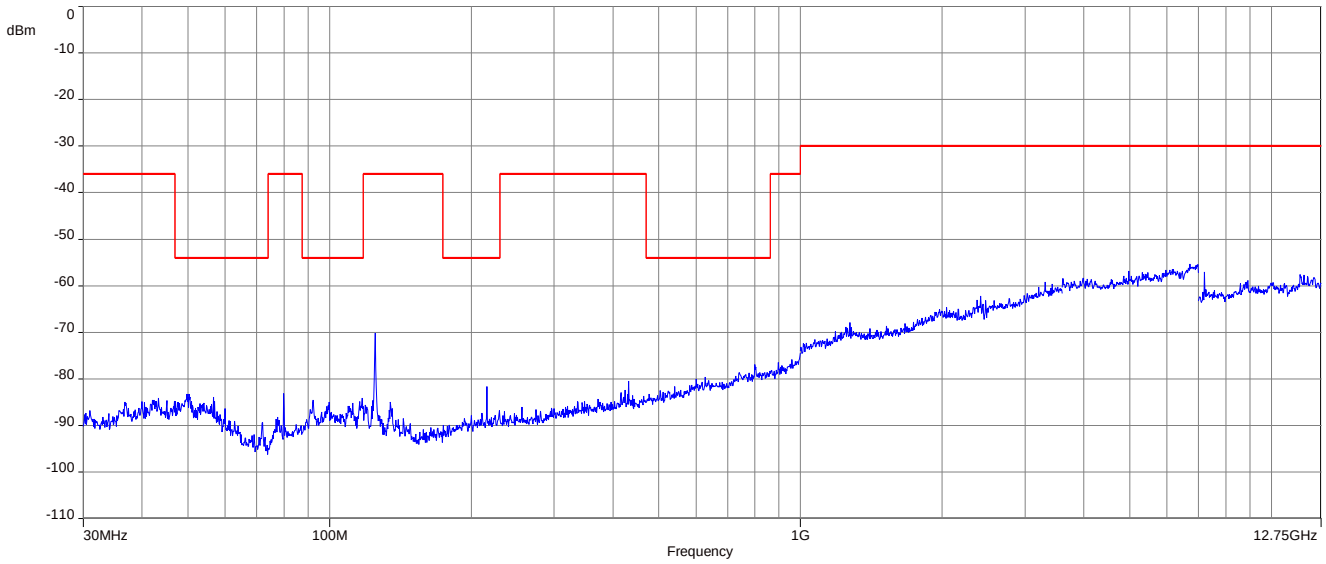
Low channel			High channel		
f [MHz]	Detector Peak/RMS	Level [dBm]	f [MHz]	Detector Peak/RMS	Level [dBm]
All detected peaks are more than 6 dB below the limit			All detected peaks are more than 6 dB below the limit		

Results: radiated, 2 Msps

Low channel			High channel		
f [MHz]	Detector Peak/RMS	Level [dBm]	f [MHz]	Detector Peak/RMS	Level [dBm]
All detected peaks are more than 6 dB below the limit			All detected peaks are more than 6 dB below the limit		

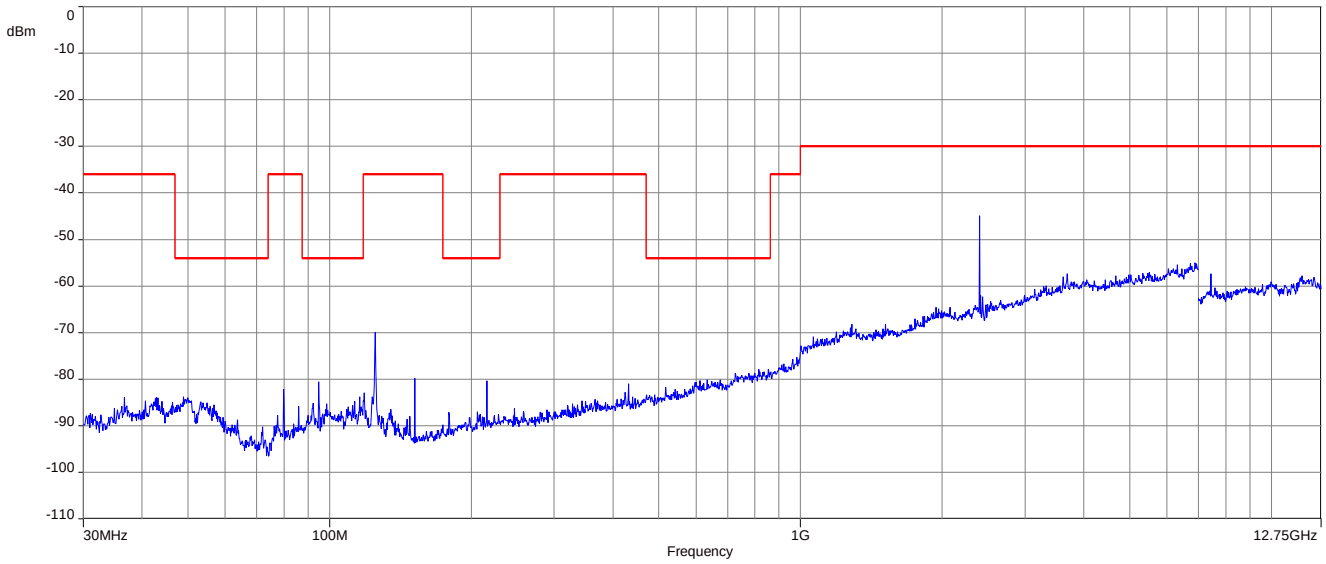
Plots: Radiated

Plot 1: 30 MHz to 12.75 GHz, Low channel, 1 Msps



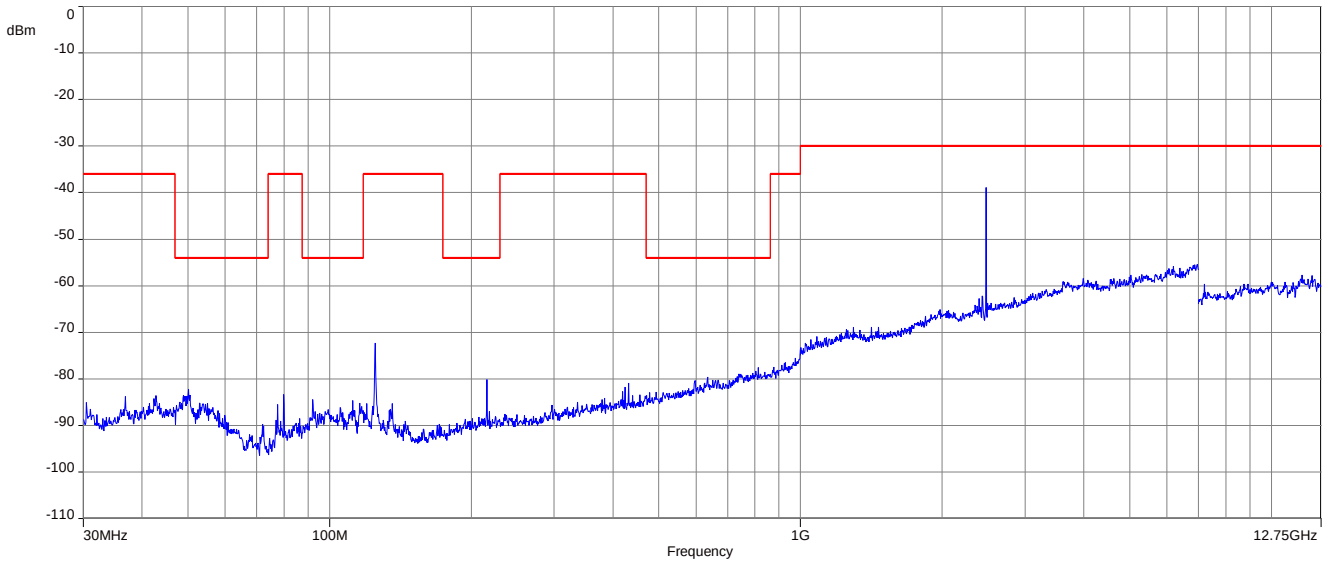
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: 30 MHz to 12.75 GHz, High channel, 1 Msps



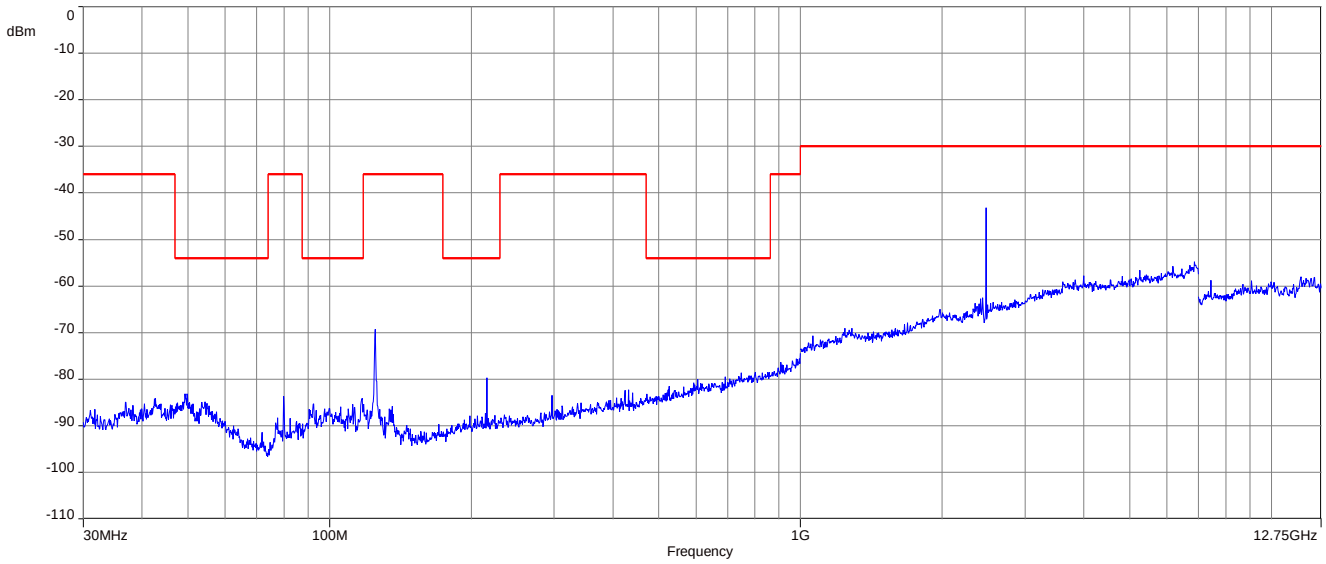
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 30 MHz to 12.75 GHz, Low channel, 2 Msps



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 30 MHz to 12.75 GHz, High channel, 2 Msps



The carrier signal is notched with a 2.4 GHz band rejection filter.

11.3 Receiver spurious emissions

Description:

Receiver/idle unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain when the equipment is in receiver/idle mode.

Pre-scan:

Measurement parameters (radiated)	
Detector	Peak
Sweep time	5ms/MHz
Resolution bandwidth	Below 1 GHz: 100 kHz / above 1MHz
Video bandwidth	Below 1 GHz: 300 kHz / above 3MHz
Detector	Peak
Test setup	See sub clause 7.1 - A
Measurement uncertainty	See sub clause 12

Any emissions identified during the sweeps in the pre-scan and that fall within the 6 dB range below the applicable limit, shall be individually measured using the procedure “retest”.

Retest:

Measurement parameters (radiated)	
Detector	RMS
Measurement mode	Time domain power
Sweep time	30 ms
Resolution bandwidth	Below 1 GHz: 100 kHz / above 1MHz
Video bandwidth	Below 1 GHz: 300 kHz / above 3MHz
Span	Zero span
Trace mode	Single sweep
Test setup	See sub clause 7.1 - A
Measurement uncertainty	See sub clause 12

Performed: ☐ Conducted
☒ Radiated

Limits:

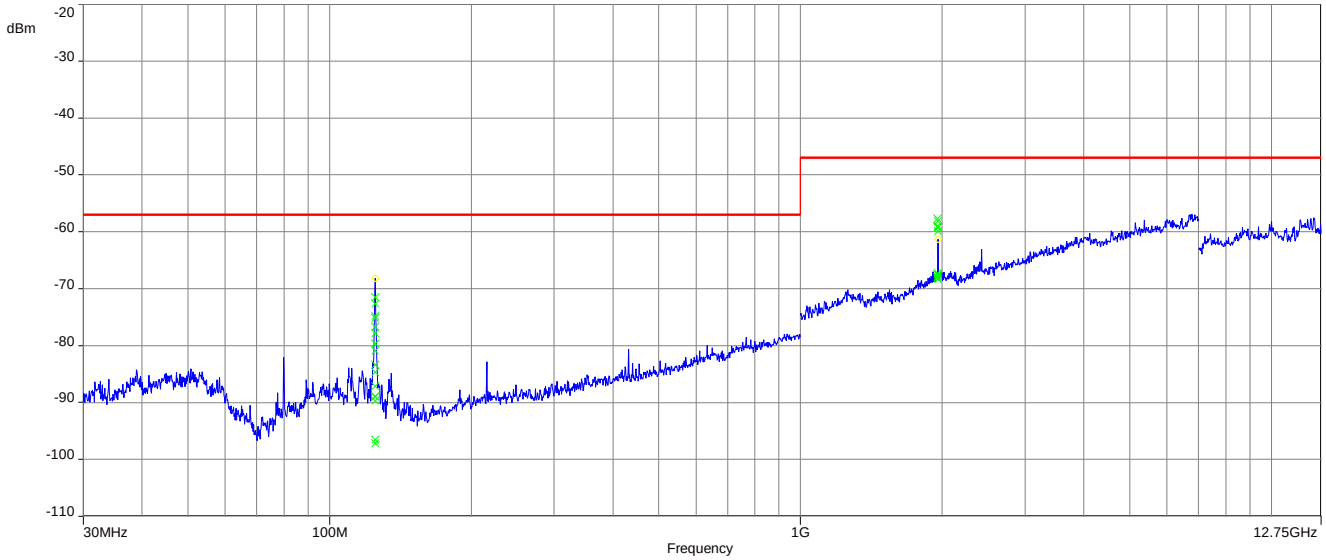
State	Max. spurious level		
	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 694 MHz	Other frequencies ≤ 1000 MHz	All frequencies > 1000 MHz
Operating	4.0 nW (-54 dBm)	250 nW (-36 dBm)	1.00 µW (-30 dBm)
Receiver/idle	2.0 nW (-57 dBm)	2.0 nW (-57 dBm)	20.0 nW (-47 dBm)

Results: radiated, 1 Msps

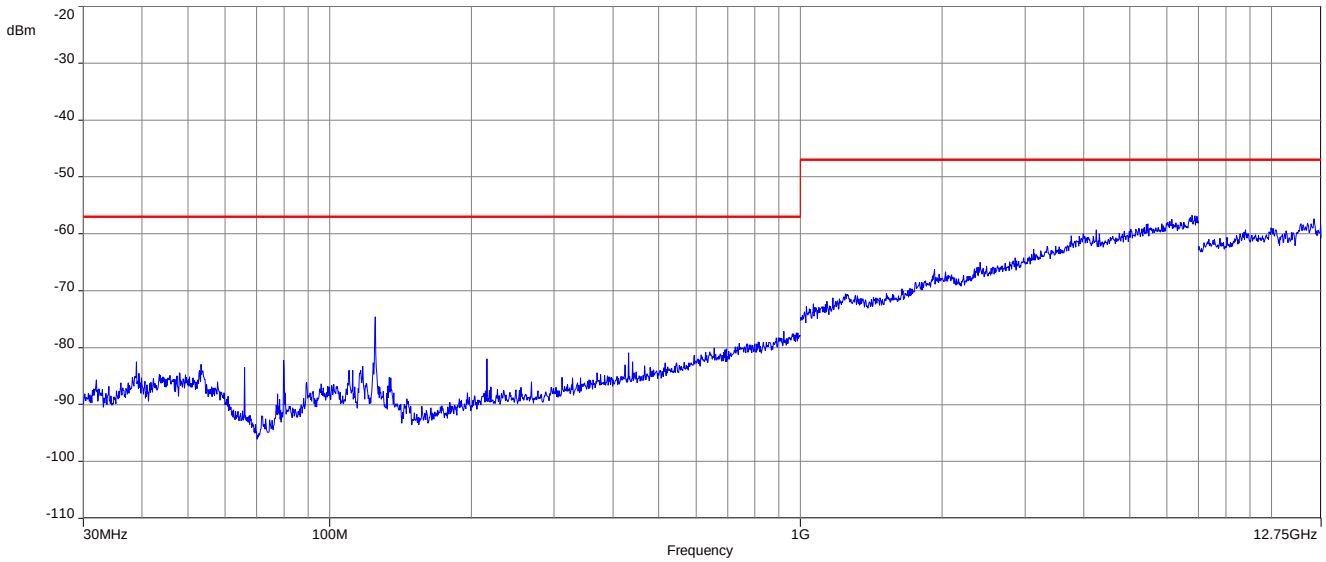
Low channel			High channel		
f [MHz]	Detector Peak/RMS	Level [dBm]	f [MHz]	Detector Peak/RMS	Level [dBm]
All detected peaks are more than 6 dB below the limit			All detected peaks are more than 6 dB below the limit		

Plots: Radiated

Plot 1: Receiver, 30 MHz to 12.75 GHz, Low channel, 1 Msps



Plot 2: Receiver, 30 MHz to 12.75 GHz, High channel, 1 Msps



12 Measurement uncertainty

Measurement uncertainty	
Occupied channel bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power spectral density, conducted	±3 dB
Unwanted emissions, conducted	±3 dB
All emissions, radiated	±3 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Duty cycle	±5 %

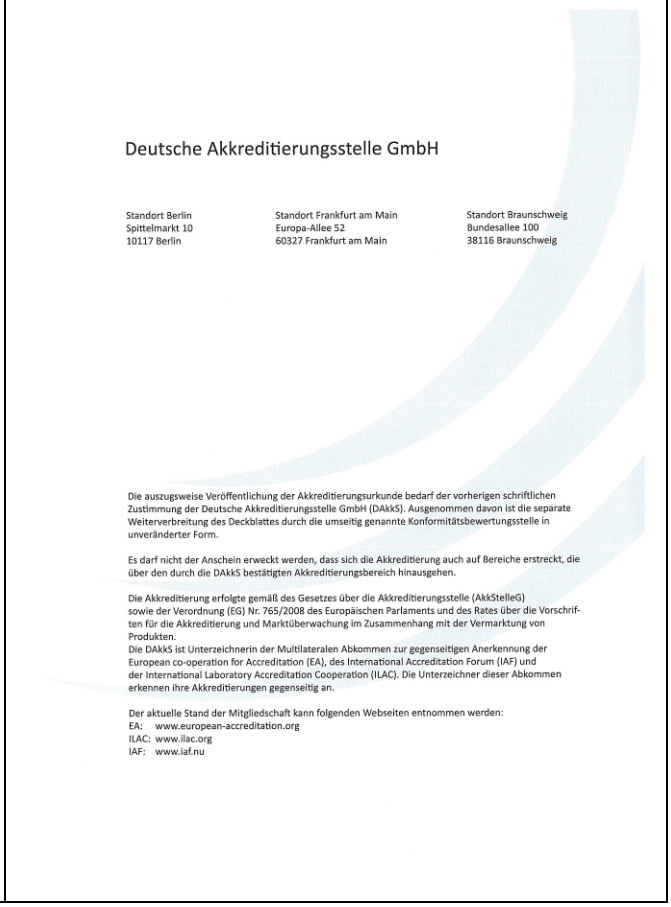
13 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N_0	Carrier to noise-density ratio, expressed in dB-Hz

14 Document history

Version	Applied changes	Date of release
-/-	Initial release	2023-07-21

15 Accreditation Certificate – D-PL-12076-01-03

first page	last page
	

Note: The current certificate annex is published on the websites (link see below).

https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-03.pdf
or
https://cetecomadvanced.com/files/pdfs/d-pl-12076-01-03_tk.pdf

################################ END OF TEST REPORT ################################

cetecom advanced GmbH

Im Teelbruch 116
DE-45219 Essen

Laboratory for Product Safety

Accredited testing laboratory

DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01

TEST REPORT

IEC/EN 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety – Requirements

Report Reference No. ..... :	1-5287/22-01-05
Test Item ..... :	e-Guard Data Trans
Test result ..... :	The test item passed

Remark: This test report is electronically signed and valid without handwriting signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

Tested by (printed name and signature) ..... :	Mike Mierau (Testing Manager)

Digital signiert von: Mike Mierau

Approved by (printed name and signature) ..... :	Sebastien Scheidler (Head of Safety Labs)

Sébastien Scheidler
cn=Sébastien Scheidler, o=cetecom advanced GmbH, ou=SHE-230816, email=sebastien.scheidler@cetecomadvanced.com, c=DE
2023.08.29 15:03:32 +02'00'

Date of issue ..... :	2023-08-29
Testing Laboratory ..... :	cetecom advanced GmbH
Address ..... :	Im Teelbruch 116 DE-45219 Essen
Applicant's name ..... :	Unisto AG
Address ..... :	Seestrasse 7 9326 Horn Switzerland
Manufacturer's name ..... :	Unisto AG
Address ..... :	Seestrasse 7 9326 Horn Switzerland
Test specification .....:	
Standard ..... :	IEC 62368-1: 2014 (2.Edition) and Cor. 1: 2015 EN 62368-1: 2014/AC: 2015/A11: 2017/AC:2017

Test procedure..... :	CE, AA WC 34
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	SAF-CE62368-2V3
Test Report Form(s) Originator ..... :	cetecom advanced GmbH
Master TRF..... :	Dated 2022-04-14

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Notes and Disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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Accredited Testing Laboratory

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12047-01-01.

Accreditation Certificate

Note: The current certificate including annex is published on our website or may be received from cetecom advanced on request.

Test item description .....:	electronic security seal for trucks, trailers and vans
Trade Mark ..... :	Unisto AG
Model/Type reference..... :	e-Guard Data Trans
Ratings..... :	3.6 VDC nominal

Additional information:

The EUT was tested under the following conditions:

- Temperature in the range of 15 – 35°C unless otherwise specified
- A relevant humidity in the range of 25-75% r.H.
- An air pressure in range of 86kPa to 106kPa

Summary of testing:
The sample(s) tested complies with the requirements of IEC 62368-1: 2014 (2. Ed.)/Cor.1:2015 and EN 62368-1: 2014/AC: 2015/A11: 2017/AC: 2017.

Summary of compliance with National Differences:
The following group and/or national deviations were considered: EU, EFTA

Country abbreviations according to ISO 3166-1:

AR	Argentina	AT	Austria	AU	Australia
BE	Belgium	BG	Bulgaria	BR	Brazil
CA	Canada	CH	Switzerland	CN	China
CY	Cyprus	CZ	The Czech Republic	DE	Germany
DK	Denmark	EE	Estonia	ES	Spain
FI	Finland	FR	France	GB	United Kingdom
GR	Greece	HU	Hungary	HR	Croatia
IE	Ireland	IL	Israel	IT	Italy
IS	Iceland	IN	India	JP	Japan
KR	Rep. of Korea	LI	Liechtenstein	LT	Lithuania
LV	Latvia	LU	Luxembourg	MT	Malta
MY	Malaysia	NL	Netherlands	NO	Norway
NZ	New Zealand	PL	Poland	PT	Portugal
RS	Serbia	RU	Russian federation	SE	Sweden
SG	Singapore	SK	Slovakia	SI	Slovenia
TR	Turkey	UA	Ukraine	AE	United Arab Emirates
US	United States of America	ZA	South Africa		

Other country abbreviations:

EU	European Union	(AT, BE, BG, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, LT, LV, LU, MT, IE, IT, NL, PL, PT, RS, SE, SK, SI)
EFTA	European Free Trade Association	(NO, CH, IS, LI)

The following abbreviations were used in this test report:

AC: Alternating Current	DC: Direct Current	PE: Protective earth
PRI: Primary circuit	SEC: Secondary circuit	PS: Power Supply
GND: Ground	PCB: Printed circuit board	BAT: Battery
EUT: Equipment under Test	OC: Open Circuit	SC: Short Circuit
PIS: Potential Ignition Source	PIS-A: PIS arcing	PIS-R: PIS resistive
PABX: Private Automatic Branch eXchange		PoE: Power over Ethernet
ID: According table 14		

Copy of marking plates:

Type label draft

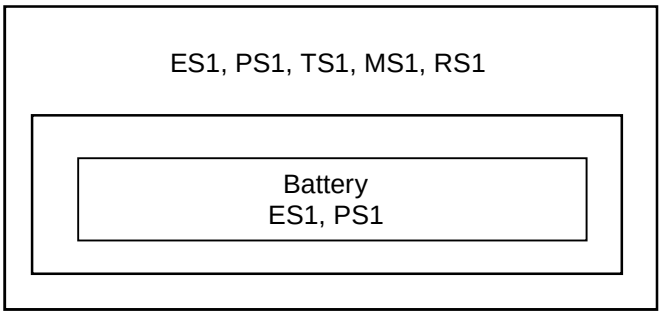
TEST ITEM PARTICULARS:	
Classification of use by .....:	☒ Ordinary person ☒ Instructed person ☐ Skilled person ☐ Children likely to be present
Supply Connection .....:	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance .....:	☐ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☒ none
Supply Connection – Type .....:	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: powered from internal lithium battery
Considered current rating of protective device as part of building or equipment installation .....:	_____ A; Installation location: ☐ building; ☐ equipment; ☒ N/A
Equipment mobility .....:	☐ movable ☐ hand-held ☐ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☒ wall-mounted
Over voltage category (OVC) .....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ none
Class of equipment .....:	☐ Class I ☐ Class II ☒ Class III ☐ Class II with functional earthing ☐ Not classifed
Access location .....:	☐ restricted access area ☒ N/A
Pollution degree (PD) .....:	☐ PD 1 ☐ PD 2 ☒ PD 3
Manufacturer's specified maxium operating ambient.....:	65 °C
IP protection class .....:	☐ IPX0 ☒ IP65
Power Systems .....:	☐ TN ☐ TT ☐ IT - ____ V $_{L-L;}$ ☐ dc mains ☒ N/A
Altitude during operation (m) .....:	☒ 2000 m or less ☐ _____ m
Altitude of test laboratory (m) .....:	☒ 2000 m or less ☐ _____ m
Mass of equipment (kg) .....:	☒ 0.275 kg

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)
The decision whether PASS / FAIL is based on detailed results of measurements performed with calibrated measuring equipment. The measurement uncertainty is taken into account in accordance to ILAC-G9: 09/2019 chapter 4.2.2, the guard band is taken as 1x the measurement uncertainty
Testing.....:
Date of receipt of test item .....: 2023-07-03
Date (s) of performance of tests.....: 2023-08-07 to 2023-08-29
General remarks:
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**
General product information and other remarks: The EUT is a reusable, electronic security seal for trucks, trailers and vans. The EUT is powered from an internal lithium non-rechargeable battery pack with 3.6 V. **The following Attachments are integral part of this test report:** - Annex 1: Photo documentation

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	**Corresponding classification (ES)**
Battery	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
Battery	PS1
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
Battery	Lithium
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	**Corresponding classification (MS)**
Sharp edges and corners	MS1
Mass of equipment	MS1
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	**Corresponding classification (TS)**
Touchable surfaces	TS1
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	**Corresponding classification (RS)**
laser	RS1

ENERGY SOURCE DIAGRAM
Indicate which energy sources are included in the energy source diagram. Insert diagram below

☒ **ES** ☒ **PS** ☒ **MS** ☒ **TS** ☒ **RS**



OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
instructed	ES1: battery	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Whole device	PS1: battery	Material temp < 300 °C, enclosure material min. HB	N/A	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
instructed	Lithium	Meets requirements of Annex M.3	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
instructed	MS1: sharp edges and corners	No sharp edges and corners	N/A	N/A
instructed	MS1: mass of equipment	mass of equipment ≤ 7 kg	N/A	N/A
instructed	MS1: wall-mounted	mass of equipment ≤ 1 kg mounted ≤ 2 m	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
instructed	TS1: touchable surfaces	within TS1 limits	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
instructed	RS1: Low energy LED's and 7 segment displays	N/A	N/A	N/A
Supplementary Information:				
(1) See attached energy source diagram for additional details. (2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	(see appended table 4.1.2)	P
4.1.3	Equipment design and construction		P
4.1.15	Markings and instructions ..... :	(See Annex F)	P
4.4.4	Safeguard robustness		P
4.4.4.2	Steady force tests ..... :	(See Annex T.5)	P
4.4.4.3	Drop tests ..... :		N/A
4.4.4.4	Impact tests ..... :	(See Annex T.6)	P
4.4.4.5	Internal accessible safeguard enclosure and barrier tests ..... :		N/A
4.4.4.6	Glass Impact tests..... :		N/A
4.4.4.7	Thermoplastic material tests ..... :	(See Annex T.8)	P
4.4.4.8	Air comprising a safeguard ..... :		N/A
4.4.4.9	Accessibility and safeguard effectiveness		N/A
4.5	Explosion		N/A
4.6	Fixing of conductors	Only ES1	N/A
4.6.1	Fix conductors not to defeat a safeguard		N/A
4.6.2	10 N force test applied to ..... :		N/A
4.7	Equipment for direct insertion into mains socket - outlets	No mains	N/A
4.7.2	Mains plug part complies with the relevant standard ..... :		N/A
4.7.3	Torque (Nm) ..... :		N/A
4.8	Products containing coin/button cell batteries	No coin cells	N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery ..... :		—
4.8.4	Battery Compartment Mechanical Tests..... :		N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object ..... :	(See Annex P)	P

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	**ELECTRICALLY-CAUSED INJURY**		P
5.2.1	Electrical energy source classifications ..... :	(See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits	ES1	P
5.2.2.2	Steady-state voltage and current ..... :	See appended table 5.2)	P
5.2.2.3	Capacitance limits..... :	No hazardous capacitive energy sources	N/A
5.2.2.4	Single pulse limits ..... :	No hazardous single pulses	N/A
5.2.2.5	Limits for repetitive pulses ..... :	No hazardous repetitive pulses	N/A
5.2.2.6	Ringing signals ..... :	No ringing signals	N/A
5.2.2.7	Audio signals ..... :	No audio signals	N/A
5.3	Protection against electrical energy sources	No hazardous energy sources	N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
5.3.2.2	Contact requirements		N/A
	a) Test with test probe from Annex V..... :		N/A
	b) Electric strength test potential (V) ..... :		N/A
	c) Air gap (mm) ..... :		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		N/A
5.4.1.2	Properties of insulating material	No hazardous energy sources	N/A
5.4.1.3	Humidity conditioning ..... :		N/A
5.4.1.4	Maximum operating temperature for insulating materials ..... :		N/A
5.4.1.5	Pollution degree ..... :		—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature ..... :		N/A
5.4.1.10.3	Ball pressure ..... :		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.2	Clearances	Only functional insulation required	N/A
5.4.2.2	Determining clearance using peak working voltage		N/A
5.4.2.3	Determining clearance using required withstand voltage ..... :		N/A
	a) a.c. mains transient voltage..... :		—
	b) d.c. mains transient voltage ..... :		—
	c) external circuit transient voltage..... :		—
	d) transient voltage determined by measurement..... :		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages..... :		N/A
5.4.3	Creepage distances..... :	Only functional insulation required	N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group ..... :		—
5.4.4	Solid insulation	No solid insulation	N/A
5.4.4.2	Minimum distance through insulation ..... :		N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs) ..... :		—
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material..... :		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz ..... :		N/A
5.4.5	Antenna terminal insulation	No antenna insulation	N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ) ..... :		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.6	Insulation of internal wire as part of supplementary safeguard ..... :	No such insulation	N/A
5.4.7	Tests for semiconductor components and for cemented joints	No such components	N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%) ..... :		—
	Temperature (°C) ..... :		—
	Duration (h) ..... :		—
5.4.9	Electric strength test ..... :		N/A
5.4.9.1	Test procedure for a solid insulation type test		N/A
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit	Battery operation	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test ..... :		N/A
5.4.10.2.3	Steady-state test ..... :		N/A
5.4.11	Insulation between external circuits and earthed circuitry ..... :	Battery operation	N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Rated operating voltage U_{op} (V) ..... :		—
	Nominal voltage U_{peak} (V) ..... :		—
	Max increase due to variation U_{sp} ..... :		—
	Max increase due to ageing ΔU_{sa} ..... :		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ ..... :		—
5.5	Components as safeguards		N/A
5.5.1	General	No components used as safeguards	N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector ..... :		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPD's		N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable.....:		N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors	No protective conductor	N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) .....:		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2).....:		—
	Protective current rating (A) ..... :		—
5.6.4.3	Current limiting and overcurrent protective devices		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Requirement		N/A
	Conductor size (mm^2), nominal thread diameter (mm). .....:		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method Resistance (Ω) .....:		N/A
5.6.7	Reliable earthing		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current .....:	No hazardous touch currents	N/A
5.7.2.2	Measurement of prospective touch voltage	No hazardous touch voltages	N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
	System of interconnected equipment (separate connections/single connection) .....:		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Multiple connections to mains (one connection at a time/simultaneous connections).....:		—
5.7.4	Earthed conductive accessible parts.....:		N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V) .....:		—
	Measured current (mA) .....:		—
	Instructional Safeguard .....:		N/A
5.7.6	Prospective touch voltage and touch current due to external circuits		N/A
5.7.6.1	Touch current from coaxial cables		N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.7	Summation of touch currents from external circuits		N/A
	a) Equipment with earthed external circuits Measured current (mA) .....:		—
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA).....:		—

6	**ELECTRICALLY- CAUSED FIRE**		P
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		P
6.2.2	Power source circuit classifications	PS1	P
6.2.2.1	General		P
6.2.2.2	Power measurement for worst-case load fault....:	(See appended table 6.2.2)	P
6.2.2.3	Power measurement for worst-case power source fault .....:	(See appended table 6.2.2)	P
6.2.2.4	PS1 .....:	(See appended table 6.2.2)	P
6.2.2.5	PS2 .....:		N/A
6.2.2.6	PS3 .....:		N/A
6.2.3	Classification of potential ignition sources	Only PS1, no PIS possible	P
6.2.3.1	Arcing PIS .....:		N/A
6.2.3.2	Resistive PIS .....:		N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials.....:	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	P
6.3.1 (b)	Combustible materials outside fire enclosure	Plastic materials have at least flammability rating of HB	P
6.4	Safeguards against fire under single fault conditions		P

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.1	Safeguard Method	Control of spread of fire	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	General		N/A
6.4.3.2	Supplementary Safeguards		N/A
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions ..... :		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits	No supplementary safeguards required	P
6.4.5	Control of fire spread in PS2 circuits	No PS2 circuits	N/A
6.4.5.2	Supplementary safeguards .....:		N/A
6.4.6	Control of fire spread in PS3 circuit	No PS3 circuits	N/A
6.4.7	Separation of combustible materials from a PIS	Only PS1, No PIS	N/A
6.4.7.1	General .....:		N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers		N/A
6.4.8.1	Fire enclosure and fire barrier material properties		N/A
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure		N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....:		N/A
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) .....:		N/A
	Flammability tests for the bottom of a fire enclosure .....:		N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c).....:		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating .....:		N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements	Only PS1 circuits, no requirements	N/A
6.5.2	Cross-sectional area (mm2) .....:		—
6.5.3	Requirements for interconnection to building wiring.....:		N/A
6.6	Safeguards against fire due to connection to additional equipment	No connection to additional circuits	N/A
	External port limited to PS2 or complies with Clause Q.1		N/A
7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		P
7.2	Reduction of exposure to hazardous substances	No hazardous substances	N/A
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions .....:		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010).....:		—
7.6	Batteries.....:	(See Annex M)	P
8	***MECHANICALLY-CAUSED INJURY***		P
8.1	General		P
8.2	Mechanical energy source classifications	MS1	P
8.3	Safeguards against mechanical energy sources		P
8.4	Safeguards against parts with sharp edges and corners	no sharp edges and corners, MS1 according to line 1 table 35	P
8.4.1	Safeguards		N/A
8.5	Safeguards against moving parts	No moving parts	N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard ..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.5.4.2.1	Safeguards and Safety Interlocks ..... :		N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard ..... :		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N) ..... :		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test ..... :	No high pressure lamps	N/A
8.6	Stability		P
8.6.1	Product classification	Mass of equipment ≤ 7 kg MS1 only according to line 5 table 35	P
	Instructional Safeguard ..... :		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force..... :		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt ..... :		—
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force) ..... :		N/A
	Position of feet or movable parts ..... :		—
8.7	Equipment mounted to wall or ceiling	Mass of equipment ≤ 1 kg and mounted ≤ 2 m (note in user manual) MS1 according to line 6 table 35	P
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) ..... :		N/A
8.7.2	Direction and applied force ..... :		N/A
8.8	Handles strength	No handles	N/A
8.8.1	Classification		N/A
8.8.2	Applied Force ..... :		N/A
8.9	Wheels or casters attachment requirements	No wheels or casters attachment	N/A
8.9.1	Classification		N/A
8.9.2	Applied force..... :		—
8.10	Carts, stands and similar carriers	No carts, stands and similar carriers	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
	Instructional Safeguard .....:		—
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Applied force.....:		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Applied horizontal force (N).....:		—
8.10.6	Thermoplastic temperature stability (°C) .....:		N/A
8.11	Mounting means for rack mounted equipment	No such device	N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable *N* .....:		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas	No telescoping or rod antennas	N/A
	Button/Ball diameter (mm) .....:		—

9	**THERMAL BURN INJURY**		P
9.2	Thermal energy source classifications	TS1	P
9.3	Safeguard against thermal energy sources	Within TS1 limits at single fault conditions (see appended table B.4)	P
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....:		N/A

10	**RADIATION**		P
10.2	Radiation energy source classification	RS1	P
10.2.1	General classification		P
10.3	Protection against laser radiation	No lasers	N/A
	Laser radiation that exists in the equipment:		—
	Normal, abnormal, single-fault .....:		N/A
	Instructional safeguard.....:		—
	Tool .....:		—
10.4	Protection against visible, infrared, and UV		P

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	radiation		
10.4.1	General		N/A
10.4.1.a)	RS3 for Ordinary and instructed persons..... :		N/A
10.4.1.b)	RS3 accessible to a skilled person ..... :		N/A
	Personal safeguard (PPE) instructional safeguard ..... :		—
10.4.1.c)	Equipment visible, IR, UV does not exceed RS1:	Low energy LED's and 7 segment displays, for indication only	P
10.4.1.d)	Normal, abnormal, single-fault conditions ..... :		N/A
10.4.1.e)	Enclosure material employed as safeguard is opaque ..... :		N/A
10.4.1.f)	UV attenuation..... :		N/A
10.4.1.g)	Materials resistant to degradation UV..... :		N/A
10.4.1.h)	Enclosure containment of optical radiation:		N/A
10.4.1.i)	Exempt Group under normal operating conditions ..... :		N/A
10.4.2	Instructional safeguard..... :		N/A
10.5	Protection against x-radiation	No x-radiation	N/A
10.5.1	X- radiation energy source that exists equipment ..... :		N/A
	Normal, abnormal, single fault conditions		N/A
	Equipment safeguards ..... :		N/A
	Instructional safeguard for skilled person .....:		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation..... :		—
	Abnormal and single-fault condition.....:		N/A
	Maximum radiation (pA/kg) .....:		N/A
10.6	Protection against acoustic energy sources	No acoustic energy sources	N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A) .....:		N/A
	Output voltage, unweighted r.m.s. .....:		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards .....:		N/A
	Equipment safeguard prevent ordinary person to RS2 .....:		—
	Means to actively inform user of increase sound		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	pressure .....:		
	Equipment safeguard prevent ordinary person to RS2 .....:		—
10.6.5	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) L_{Aeq} acoustic pressure output .....:		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A).....:		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A).....:		—

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		P
B.2	Normal Operating Conditions		P
B.2.1	General requirements..... :	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers ..... :	No such device	N/A
B.2.3	Supply voltage and tolerances	No mains, powered from internal lithium cells	N/A
B.2.5	Input test..... :		P
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements..... :	(See appended table B.3)	P
B.3.2	Covering of ventilation openings	No ventilation openings	N/A
B.3.3	D.C. mains polarity test	No mains	N/A
B.3.4	Setting of voltage selector..... :	No voltage selector	N/A
B.3.5	Maximum load at output terminals ..... :	No output terminals	N/A
B.3.6	Reverse battery polarity	Not possible, prevented through battery connector	P
B.3.7	Abnormal operating conditions as specified in Clause E.2.	No such device	N/A
B.3.8	Safeguards functional during and after abnormal operating conditions		P
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited ..... :	(See appended table B.4)	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.4.3	Motor tests	No motors	N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature ..... :		N/A
B.4.4	Short circuit of functional insulation		P
B.4.4.1	Short circuit of clearances for functional insulation		P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors		N/A
B.4.6	Short circuit or disconnect of passive components		P
B.4.7	Continuous operation of components		P
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		P
B.4.9	Battery charging under single fault conditions ... :	Charging not possible, EUT is powered through non-rechargeable batteries	N/A
C	**UV RADIATION**		N/A
C.1	Protection of materials in equipment from UV radiation	No UV radiation	N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure apparatus		N/A
C.2.4	Xenon-arc light exposure apparatus		N/A
D	**TEST GENERATORS**		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		N/A
E.1	Audio amplifier normal operating conditions	No audio amplifiers	N/A
	Audio signal voltage (V) ..... :		—
	Rated load impedance (Ω) ..... :		—
E.2	Audio amplifier abnormal operating conditions		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		P
F.1	General requirements		P
	Instructions – Language .....:	english	—
F.2	Letter symbols and graphical symbols		P
F.2.1	Letter symbols according to IEC60027-1		N/A
F.2.2	Graphic symbols IEC, ISO or manufacturer specific		P
F.3	Equipment markings		P
F.3.1	Equipment marking locations		P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification .....:	Unisto AG	—
F.3.2.2	Model identification .....:	e-Guard Data Trans	—
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains	No mains	N/A
F.3.3.2	Equipment without direct connection to mains	Battery operation	P
F.3.3.3	Nature of supply voltage.....:	DC	—
F.3.3.4	Rated voltage .....:	3.6 V (only stated on battery label)	—
F.3.3.5	Rated frequency.....:		—
F.3.3.6	Rated current or rated power .....:		—
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device	No voltage setting device	N/A
F.3.5	Terminals and operating devices		P
F.3.5.1	Mains appliance outlet and socket-outlet markings ..... :		N/A
F.3.5.2	Switch position identification marking ..... :		N/A
F.3.5.3	Replacement fuse identification and rating markings ..... :		N/A
F.3.5.4	Replacement battery identification marking ..... :	Note in user manual	P
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment	Class III equipment	N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)	Class III equipment	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking .....:	IP65 marking is on type label (IP65 see report 2248078KAU001)	P
F.3.8	External power supply output marking		N/A
F.3.9	Durability, legibility and permanence of marking	The marking of EUT is considered to be legible and easily discernable	P
F.3.10	Test for permanence of markings	15 s test with water and petroleum spirit	P
F.4	Instructions		P
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use	Note in user manual	P
	c) Equipment intended to be fastened in place		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1		N/A
	f) Protective earthing employed as safeguard		N/A
	g) Protective earthing conductor current exceeding ES 2 limits		N/A
	h) Symbols used on equipment		N/A
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
	j) Replaceable components or modules providing safeguard function	Note in user manual	P
F.5	Instructional safeguards		P
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction	Given in user manual and on type label	P
G	**COMPONENTS**		N/A
G.1	**Switches**		N/A
G.1.1	General requirements	No switches	N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	**Relays**		N/A
G.2.1	General requirements	No relays	N/A
G.2.2	Overload test		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
G.3	**Protection Devices**		N/A
G.3.1	Thermal cut-offs	No protection devices as safeguards	N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) ..... :		—
	Single Fault Condition ..... :		—
	Test Voltage (V) and Insulation Resistance (Ω). :		—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions.....:		N/A
G.4	**Connectors**		N/A
G.4.1	Spacings	No connectors used as safeguards	N/A
G.4.2	Mains connector configuration .....:		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	**Wound Components**		N/A
G.5.1	Wire insulation in wound components.....	No wound components	N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°		N/A
G.5.1.2 b)	Construction subject to routine testing		N/A
G.5.2	Endurance test on wound components		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Time (s) .....:		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Temperature (°C) ..... :		—
G.5.2.3	Wound Components supplied by mains		N/A
G.5.3	**Transformers**		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1) ..... :	No transformers	N/A
	Position ..... :		—
	Method of protection ..... :		—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings..... :		—
G.5.3.3	Overload test ..... :		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	**Motors**		N/A
G.5.4.1	General requirements	No motors	N/A
	Position ..... :		—
G.5.4.2	Test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days) ..... :		—
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A
	Electric strength test (V) ..... :		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h) ..... :		N/A
	Electric strength test (V) ..... :		—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature ..... :		N/A
	Electric strength test (V) ..... :		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) ..... :		N/A
	Electric strength test (V) ..... :		N/A
G.5.4.7	Motors with capacitors		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage .....:		—
G.6	**Wire Insulation**		N/A
G.6.1	General	No wire insulation preforming safeguard function	N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	**Mains supply cords**		N/A
G.7.1	General requirements	No mains	N/A
	Type.....:		—
	Rated current (A).....:		—
	Cross-sectional area (mm^2), (AWG)..... :		—
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) .....:		—
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)....:		—
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry ..... :		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Mass (g) ..... :		—
	Diameter (m) .....:		—
	Temperature (°C) .....:		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
G.8	**Varistors**		N/A
G.8.1	General requirements	No varistors	N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test .....:		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.8.3.3	Temporary overvoltage .....:		N/A
G.9	**Integrated Circuit (IC) Current Limiters**		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.	No IC current limiters evaluated to G.9	N/A
G.9.1 b)	Limiters do not have manual operator or reset		N/A
G.9.1 c)	Supply source does not exceed 250 VA .....:		—
G.9.1 d)	IC limiter output current (max. 5A) .....:		—
G.9.1 e)	Manufacturers' defined drift .....:		—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
G.10	**Resistors**		N/A
G.10.1	General requirements	No resistors preforming safeguard function	N/A
G.10.2	Resistor test		N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable		N/A
G.10.3.1	General requirements		N/A
G.10.3.2	Voltage surge test		N/A
G.10.3.3	Impulse test		N/A
G.11	**Capacitor and RC units**		N/A
G.11.1	General requirements	No capacitors or RC units preforming safeguard function	N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		N/A
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:	No optocouplers	N/A
	Type test voltage Vini .....:		—
	Routine test voltage, Vini,b .....:		—
G.13	**Printed boards**		N/A
G.13.1	General requirements	PCB for functional insulation only	N/A
G.13.2	Uncoated printed boards		N/A
G.13.3	Coated printed boards		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation.....:		N/A
	Number of insulation layers (pcs) .....:		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2a)	Thermal conditioning		N/A
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements ..... :	No coating on components terminals	N/A
G.15	**Liquid filled components**		N/A
G.15.1	General requirements	No liquid filled components	N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A
a)	Humidity treatment in accordance with sc 5.4.8 – 120 hours	No ICX	N/A
b)	Impulse test using circuit 2 with Uc = to transient voltage .....:		N/A
C1)	Application of ac voltage at 110% of rated voltage for 2.5 minutes		N/A
C2)	Test voltage .....:		—
D1)	10,000 cycles on and off using capacitor with smallest capacitance resistor with largest resistance specified by manufacturer		N/A
D2)	Capacitance .....:		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
D3)	Resistance .....:		—
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		N/A
H.1	General	No ringing signals	N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) .....:		—
H.3.1.2	Voltage (V) .....:		—
H.3.1.3	Cadence; time (s) and voltage (V) .....:		—
H.3.1.4	Single fault current (mA):.....:		—
H.3.2	Tripping device and monitoring voltage .....:		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V) .....:		—
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
	General requirements		N/A
K	**SAFETY INTERLOCKS**		N/A
K.1	General requirements	No safety interlocks	N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....:		N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method .....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....:		N/A
K.7.2	Overload test, Current (A).....:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test .....:		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
L	**DISCONNECT DEVICES**		N/A
L.1	General requirements	No mains	N/A
L.2	Permanently connected equipment		N/A
L.3	Parts that remain energized		N/A
L.4	Single phase equipment		N/A
L.5	Three-phase equipment		N/A
L.6	Switches as disconnect devices		N/A
L.7	Plugs as disconnect devices		N/A
L.8	Multiple power sources		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		P
M.1	General requirements		P
M.2	Safety of batteries and their cells		P
M.2.1	Requirements		P
M.2.2	Compliance and test method (identify method) .. :	(see appended table 4.1.2)	P
M.3	Protection circuits		P
M.3.1	Requirements		P
M.3.2	Tests		P
	- Overcharging of a rechargeable battery		N/A
	- Unintentional charging of a non-rechargeable battery	Not possible, battery powered	P
	- Reverse charging of a rechargeable battery		N/A
	- Excessive discharging rate for any battery		P
M.3.3	Compliance .....:	(See appended Tables and Annex M.3)	P
M.4	Additional safeguards for equipment containing secondary lithium battery	No secondary lithium batteries	N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Charging operating limits		N/A
M.4.2.2a)	Charging voltage, current and temperature .....:		—
M.4.2.2 b)	Single faults in charging circuitry .....:		—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation		N/A
M.4.4.3	Drop and charge/discharge function tests		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Drop		N/A
	Charge		N/A
	Discharge		N/A
M.4.4.4	Charge-discharge cycle test		N/A
M.4.4.5	Result of charge-discharge cycle test		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current		P
M.6.1	Short circuits	(See appended table B.4 and M.3)	P
M.6.1.1	General requirements		P
M.6.1.2	Test method to simulate an internal fault		N/A
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) ..... :	(see appended table B.4)	P
M.6.2	Leakage current (mA) ..... :		N/A
M.7	Risk of explosion from lead acid and NiCd batteries	No lead acid and NiCd batteries	N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A
M.8	Protection against internal ignition from external spark sources of lead acid batteries	No lead acid batteries	N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume *Vz* (m^3/s)..... :		—
M.8.2.3	Correction factors..... :		—
M.8.2.4	Calculation of distance *d* (mm) ..... :		—
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing) ..... :	Note in user manual and on type label	P
N	**ELECTROCHEMICAL POTENTIALS**		N/A
	Metal(s) used ..... :	Pollution degree considered	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
	Figures O.1 to O.20 of this Annex applied ..... :		—
P	**SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS**		P
P.1	General requirements	No openings	P
P.2.2	Safeguards against entry of foreign object		P
	Location and Dimensions (mm) ..... :	No openings	—
P.2.3	Safeguard against the consequences of entry of foreign object		N/A
P.2.3.1	Safeguards against the entry of a foreign object		N/A
	Openings in transportable equipment		N/A
	Transportable equipment with metalized plastic parts ..... :		N/A
P.2.3.2	Openings in transportable equipment in relation to metallized parts of a barrier or enclosure (identification of supplementary safeguard) ..... :		N/A
P.3	Safeguards against spillage of internal liquids		N/A
P.3.1	General requirements		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Safeguards effectiveness		N/A
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	Tc (°C)..... :		—
	Tr (°C) ..... :		—
	Ta (°C)..... :		—
P.4.2 b)	Abrasion testing ..... :		N/A
P.4.2 c)	Mechanical strength testing ..... :		N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
Q.1	Limited power sources	No interconnection with building wiring	N/A
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output		N/A
	- Regulating network limited output under normal operating and simulated single fault condition		N/A
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
Q.1.2	Compliance and test method		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) .....:		—
	Current limiting method.....:		—
R	**LIMITED SHORT CIRCUIT TEST**		N/A
R.1	General requirements		N/A
R.2	Determination of the overcurrent protective device and circuit		N/A
R.3	Test method Supply voltage (V) and short-circuit current (A)). .....:		N/A
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		N/A
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	Test specimen does not show any additional hole		N/A
S.3	Flammability test for the bottom of a fire enclosure		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Cheesecloth did not ignite		N/A
S.4	Flammability classification of materials		N/A
S.5	Flammability test for fire enclosure materials of equipment with a steady-state power exceeding 4000 W		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (test condition), (°C).....:		—
	Test flame according to IEC 60695-11-20 with conditions as set out		N/A
	After every test specimen was not consumed completely		N/A
	After fifth flame application, flame extinguished within 1 min		N/A
T	**MECHANICAL STRENGTH TESTS**		P
T.1	General requirements		P
T.2	Steady force test, 10 N .....:		N/A
T.3	Steady force test, 30 N .....:		N/A
T.4	Steady force test, 100 N .....:		N/A
T.5	Steady force test, 250 N .....:	(see appended table T.5)	P
T.6	Enclosure impact test	(see appended table T.6)	P
	Fall test		P
	Swing test		P
T.7	Drop test .....:	Wall-mounted	N/A
T.8	Stress relief test .....:	(see appended table T.8)	P
T.9	Impact Test (glass)	No glass	N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J).....:		—
	Height (m) .....:		—
T.10	Glass fragmentation test .....:		N/A
T.11	Test for telescoping or rod antennas	No telescoping or rod antennas	N/A
	Torque value (Nm) .....:		—
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFECTS OF IMPLOSION**		N/A
U.1	General requirements	No cathode ray tubes	N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen .....:	(See Annex T)	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

V	**DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)**		P
V.1	Accessible parts of equipment	Only ES1	N/A
V.2	Accessible part criterion		N/A

	CENELEC COMMON MODIFICATIONS (EN)		P
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed "Z".		
CONTENTS	**Add** the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		P
	Delete all the "country" notes in the reference document (IEC 62368-1:2014) according to the following list:		P
	For special national conditions, see Annex ZB.		P
1	**Add** the following note: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.		P

0.2.1	Note	1	Note 3	4.1.15	Note
4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c
5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note
5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3
5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4
10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.Z1	**Add** the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. **mains**, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for **pluggable equipment type B** or **permanently connected equipment**, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for **pluggable equipment type A** the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		N/A
5.4.2.3.2.4	**Add** the following to the end of this subclause: The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
10.2.1	Add the following to [c] and [d] in table 39: For additional requirements, see 10.5.1.		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	**Add** the following after the first paragraph: *For RS 1 compliance is checked by measurement under the following conditions:* *In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made.* NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. *The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus.* *Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made.* *For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.* NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
10.6.1	**Add** the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		N/A
10.Z1	**Add** the following new subclause after 10.6.5. **10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is drawn to EN 50360 and EN 50566		P
G.7.1	**Add** the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Bibliography	**Add** the following standards: **Add** the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		P
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A
4.1.15	**Denmark, Finland, Norway** and **Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: “Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.” In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”	Class III equipment	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex	No mains	N/A
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking **safeguard**) for high **touch current** is required if the **touch current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.	No hazardous touch currents	N/A
5.4.11.1 and Annex G	**Finland and Sweden** To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2.	No telecommunication network	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		N/A
5.5.2.1	**Norway** After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).	No IT power system	N/A
5.5.6	**Finland, Norway** and **Sweden** To the end of the subclause the following is added: Resistors used as **basic safeguard** or bridging **basic insulation** in **class I pluggable equipment type A** shall comply with G.10.1 and the test of G.10.2.	Class III equipment	N/A
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.	No mains	N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.	No such device	N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.7.5	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.	No protective conductor	N/A
5.7.6.1	**Norway and Sweden** To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.”	No television distribution system	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		N/A
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .	No hazardous touch currents	N/A
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met	No direct plug-in equipment	N/A
G.4.2	**Denmark** To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2.	No mains	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a *Justification:* Heavy Current Regulations, Section 6c		N/A
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.	No mains	N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.	No mains	N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard	No mains	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.	No mains	N/A
ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		N/A
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. *Justification:* German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: http://www.ptb.de	No ionizing radiation	N/A
F.1	**Italy:** The following requirements shall be fulfilled: • The power consumption in Watts (W) shall be indicated on TV receivers and in their instruction for use (Measurement according to EN 60555-2). Note/Nota *EN 60555-2 has since been replaced by IEC 60107-1:1997.*	No TV	N/A
	• TV receivers shall be provided with an instruction for use, schematic diagrams and adjustments procedure in Italian language.		N/A
	• Marking for controls and terminals shall be in Italian language. Abbreviation and international symbols are allowed provided that they are explained in the instruction for use.		N/A
	• The ECC manufacturers are bound to issue a conformity declaration according to the above requirements in the instruction manual. The correct statement for conformity to be written in the instruction manual, shall be: *Questo apparecchio è fabbricato nella CEE nel rispetto delle disposizioni del* *D.M. marzo 1992 ed è in particolare conforme alle prescrizioni dell'art. 1 dello* *stesso D.M.*		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	• The first importers of TV receivers manufactured outside EEC are bound to submit the TV receivers for previous conformity certification to the Italian Post Ministry (PP.TT). The TV receivers shall have on the backcover the certification number in the following form: D.M. 26/03/1992 xxxxx/xxxxx/S or T or pT S for stereo T for Teletext pT for retrofitable teletext		N/A
	Justification: Ministerial Decree of 26 March 1992 : National rules for television receivers trade. NOTE/NOTA: *Ministerial decree above contains additional, but not safety relevant requirements*		—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1]**
-Description:	PCB				
Mainboard	Q & D CIRCUITS CO LTD	M2	FR-4, TG135 Flammability Rating: 94V-0 Maximum Operating Temperature: 130°C	UL94; UL 796DSR	UL ZPMV2.E251497
-Description:	Enclosure				
	Trinseo Europe GmbH	MAGNUM 3453	ABS Flammability class: HB @ 1 mm to 3 mm Vicat B/50: 97 °C	ANSI/UL 94 IEC 60695-11-10 UL 746A, B	UL QMFZ2.E162447
-Description:	Non rechargeable AA lithium battery				
BAT1	Tadiran Batteries GmbH	2SL-760	Li/SOC_2 3.6 V, 2.2 Ah Max. continuous discharge current: 60 mA Operating temperature: -55 °C to +85 °C	UL 1642	UL BBCV2.MH12827
-Description:					

Supplementary information:

[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A

(The following mechanical tests are conducted in the sequence noted.)

4.8.4.2	**TABLE: Stress Relief test**		—
Part	Material	Oven Temperature (°C)	Comments

4.8.4.3	**TABLE: Battery replacement test**	—
Battery part no. .....:		—
Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
	1	
	2	
	3	
	4	
	5	
	6	
	8	
	9	
	10	

4.8.4.4	**TABLE: Drop test**		—
Impact Area	Drop Distance	Drop No.	Observations

4.8.4.5	**TABLE: Impact**		—
Impacts per surface	Surface tested	Impact energy (Nm)	Comments

4.8.4.6	**TABLE: Crush test**		—
Test position	Surface tested	Crushing Force (N)	Duration force applied (s)

Supplementary information:

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A
(The following mechanical tests are conducted in the sequence noted.)		

4.8.5	**TABLE: Lithium coin/button cell batteries mechanical test result**		N/A
Test position	Surface tested	Force (N)	Duration force applied (s)
Supplementary information:			

5.2	**Table: Classification of electrical energy sources**						P
5.2.2.2 – Steady State Voltage and Current conditions							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	3.6 VDC	Battery	Normal	3.6 V	/	DC	ES1
			Abnormal	3.6 V	/	DC	
			Single fault – SC/OC	3.6 V	/	DC	
			Normal				
			Abnormal				
			Single fault – SC/OC				

5.2.2.3 - Capacitance Limits						
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				Capacitance, nF	Upk (V)	
			Normal			--
			Abnormal			
			Single fault – SC/OC			

5.2.2.4 - Single Pulses					
No.	Supply	Location (e.g.	Test conditions	Parameters	ES Class

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

	Voltage	circuit designation)		Duration (ms)	Upk (V)	Ipk (mA)	
			Normal				--
			Abnormal				
			Single fault – SC/OC				

5.2.2.5 - Repetitive Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
			Normal				--
			Abnormal				
			Single fault – SC/OC				

Test Conditions:

Normal –

Abnormal -

Supplementary information: SC=Short Circuit, OC=Short Circuit

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.4.1.4, 6.3.2, 9.0, B.2.6	**TABLE: Temperature measurements**					P
	Supply voltage (V) .....:	3.3				—
	Ambient T_{min} (°C) .....:	20.1				—
	Ambient T_{max} (°C) .....:	23.1				—
	Tma (°C) .....:	65.0*				—
Maximum measured temperature T of part/at:		T (°C)				Allowed T_{max} (°C)
On battery		66.5				85.0[1]
On bottom side of enclosure		26.4				60.0[2]
On top side of enclosure		26.1				60.0[2]
On left side of enclosure		25.8				60.0[2]
On right side of enclosure		26.5				60.0[2]

Supplementary information:

*: max load: Bluetooth switched on, processor works at full load. All components on the PCBs exclude display and touch button are complete potted

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

Supplementary information:

Note 1: Tma should be considered as directed by appliable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm)..... :			—
Object/ Part No./Material		Manufacturer/trademark	T softening (°C)
Supplementary information:			

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics		N/A
Allowed impression diameter (mm) ..... :		≤ 2 mm	—
Object/Part No./Material	Manufacturer/trademark	Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

5.4.2.2, 5.4.2.4 and 5.4.3	TABLE: Minimum Clearances/Creepage distance							N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz)[1]	Required cl (mm)	cl (mm)[2]	Required[3] cr (mm)	cr (mm)	
Supplementary information:								
Note 1: Only for frequency above 30 kHz Note 2: See table 5.4.2.4 if this is based on electric strength test Note 3: Provide Material Group								

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.4.2.3	**TABLE: Minimum Clearances distances using required withstand voltage**	N/A
	Overvoltage Category (OV):	
	Pollution Degree:	

Clearance distanced between:	Required withstand voltage	Required cl (mm)	Measured cl (mm)
Supplementary information:			

5.4.2.4	**TABLE: Clearances based on electric strength test**	N/A

Test voltage applied between:	Required cl (mm)	Test voltage (kV) peak/ r.m.s. / d.c.	Breakdown Yes / No
Supplementary information:			

5.4.4.2, 5.4.4.5 c) 5.4.4.9	**TABLE: Distance through insulation measurements**	N/A

Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)
Supplementary information:					

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.4.9	TABLE: Electric strength tests			N/A
Test voltage applied between:		Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:				
Basic/supplementary:				
Reinforced:				
Routine Tests:				
Supplementary information:				

5.5.2.2	TABLE: Stored discharge on capacitors					N/A
Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification	
Supplementary information:						
X-capacitors installed for testing are: [ ] bleeding resistor rating: [ ] ICX: Notes: A. Test Location: Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth B. Operating condition abbreviations: N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition						

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.6.6.2	TABLE: Resistance of protective conductors and terminations				N/A
Accessible part		Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
Supplementary information:					

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part		N/A
Supply voltage .....:			—
Location		Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7	Touch current (mA)
		1	
		2*	
		3	
		4	
		5	
		6	
		8	
Supplementary Information:			
Notes: [1] Supply voltage is the anticipated maximum Touch Voltage [2] Earthed neutral conductor [Voltage differences less than 1% or more] [3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3 [4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable. [5] (*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.			

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.2.2	Table: Electrical power sources (PS) measurements for classification				P
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s*)	PS Classification
A	Battery	Power (W) :	3.63	/	PS1
		V_A (V) :	3.3	/	
		I_A (A) :	1.1	/	
B		Power (W) :			
		V_A (V) :			
		I_A (A) :			
C		Power (W) :			
		V_A (V) :			
		I_A (A) :			
D		Power (W) :			
		V_A (V) :			
		I_A (A) :			
Supplementary Information:					
(*) Measurement taken only when limits at 3 seconds exceed PS1 limits					

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)			N/A
Location	Open circuit voltage After 3 s (Vp)	Measured r.m.s current (Irms)	Calculated value (V_p x I_{rms})	Arcing PIS? Yes / No
Supplementary information:				
An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V_p) and normal operating condition rms current (I_{rms}) is greater than 15.				

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				N/A
Circuit Location (x-y)	Operating Condition (Normal / Describe Single Fault)	Measured wattage or VA During first 30 s (W / VA)	Measured wattage or VA After 30 s (W / VA)	Protective Circuit, Regulator, or PTC Operated? Yes / No (Comment)	Resistive PIS? Yes/No

Supplementary Information:

A combination of voltmeter, VA and ammeter IA may be used instead of a wattmeter.

If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine Resistive PIS classification.

A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, or (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.

8.5.5	TABLE: High Pressure Lamp		N/A
Description		Values	Energy Source Classification
Lamp type ..... :			—
Manufacturer..... :			—
Cat no..... :			—
Pressure (cold) (MPa) ..... :			MS_
Pressure (operating) (MPa)..... :			MS_
Operating time (minutes)..... :			—
Explosion method ..... :			—
Max particle length escaping enclosure (mm). :			MS_
Max particle length beyond 1 m (mm) ..... :			MS_
Overall result ..... :			
Supplementary information:			

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

B.2.5	TABLE: Input test							P
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
3.6	DC	0.008	/	0.0288	/	/	/	max. load*
Supplementary information:								
max. load*: Bluetooth switched on, processor works at full load. Equipment may be have rated current or rated power or both. Both should be measured								

B.3	TABLE: Abnormal operating condition tests							P
Ambient temperature (°C) .....:								—
Power source for EUT: Manufacturer, model/type, output rating ..:								—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (min)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
Battery	B.3.6	3.6	10	/	0.000	/	/	No current flows in reversed battery
Supplementary information:								
Test table is provided to record abnormal and fault conditions for all applicable energy sources including Thermal burn injury. Column “Abnormal/Fault.” Specify if test condition by indicating “Abnormal” then the condition for a Clause B.3 test or “Single Fault” then the condition for Clause B.4.								

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

B.4	TABLE: Fault condition tests		P
Ambient temperature (°C) ..... :		20.0 to 22.1 °C	—
Power source for EUT: Manufacturer, model/type, output rating . :		Battery pack 2/SL760, 3.6 V, 2.2 Ah	—

Component No.	Fault Condition	Supply voltage, (V)	Test time (s)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
BAT cell 1	SC of C1	3.6	3600	/	/	Type K	92.3[1]	maximum current of 1.1 A decreased to 500 mA during test period, no fire, battery temperature ≤ 100 °C according to UL1642, no hazardous
BAT cell 2	SC of C1	3.6	3600	/	/	Type K	93.3[1]	maximum current of 1.1 A decreased to 500 mA during test period, no fire, battery temperature ≤ 100 °C according to UL1642, no hazardous
Top side of enclosure	SC of C1	3.6	3600	/	/	Type K	40.5[2]	within TS1 limits
C3	SC	3.6	600	/	/	/	/	Current increase to 100 mA, no abnormal temperatures, no hazardous
C4	SC	3.6	600	/	/	/	/	Current increase to 75 mA, no abnormal temperatures, no hazardous

Supplementary information:

Note 1: Tma of 65 °C should be considered as directed by appliable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Annex M.3	**TABLE: Batteries**									P
The tests of Annex M are applicable only when appropriate battery data is not available										
Is it possible to install the battery in a reverse polarity position? ..... :										no
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition	0.008 A	0.06 A	N/A	/	/	/	/	/	/	
Max. current during fault condition	1.1 A*	2.2 A	N/A	/	/	/	/	/	/	

Test results:		Verdict
- Chemical leaks	No	P
- Explosion of the battery	No	P
- Emission of flame or expulsion of molten metal	No	P
- Electric strength tests of equipment after completion of tests	Only ES1	N/A
Supplementary information:		
*: SC of C1		

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Annex M.4	**Table: Additional safeguards for equipment containing secondary lithium batteries**					N/A
Battery/Cell No.	Test conditions	Measurements			Observation	
		U	I (A)	Temp (C)		
	Normal					
	Abnormal					
	Single fault –SC/OC					
	Normal					
	Abnormal					
	Single fault – SC/OC					
Supplementary Information:						

Battery identification	Charging at T_{lowest} (°C)	Observation	Charging at $T_{highest}$ (°C)	Observation
Supplementary Information:				

Annex Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**						N/A
Note: Measured UOC (V) with all load circuits disconnected:							
Output Circuit	Components	U_{oc} (V)	I_{sc} (A)		S (VA)		
			Meas.	Limit	Meas.	Limit	
Supplementary Information:							
SC=Short circuit, OC=Open circuit							

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

T.5	TABLE: Steady force test					P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation	
Front side of enclosure	ABS	3.0	250 ± 10	5	no hazardous	
Rear side of enclosure	ABS	3.0	250 ± 10	5	no hazardous	
All other sides of enclosure	ABS	3.0	250 ± 10	5	no hazardous	
Supplementary information:						

T.6	TABLE: Impact tests				P
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
Front side of enclosure	ABS	3.0	1300 ± 10	no hazardous	
Rear side of enclosure	ABS	3.0	1300 ± 10	no hazardous	
Supplementary information:					

T.7	TABLE: Drop tests				N/A
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation	
Supplementary information:					

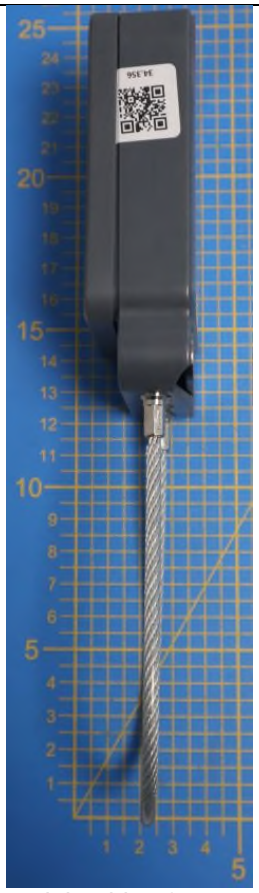
T.8	TABLE: Stress relief test					P
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
enclosure	ABS	3.0	70.0	7	No deformation, no shrinking	
Supplementary information:						

No.	Equipment	Inv. No.	Next Calibration
1	Digital Multimeter Model 2700	20674	05.2024
2	Digital Multimeter Model 2700	27214	05.2024
3	Climatic Chamber ClimeEvent C/1000/70a/5	20904	11.2023
4	Impact Test ball ITB-01	27187	07.2024
5	Steel tape measure 650700	27195	03.2024
6	Power Supply ZUP60-3.5	27289	without
7	Data Logger Switch Unit 34972A	27328	07.2024
8	Digital scale Parcel-Mini 30	27336	03.2024
9	Multiplexer Card 34901A	27346	07.2024
10	Micrometer (0-25mm)	27358	07.2024
11	Benzinum	27376	03.2025
12	Temperature sensor	27382	07.2024
13	Humidity sensor	27383	07.2024
14	Data logger 176 P1	27384	07.2024
15	Thermocouple Typ K	27388	01.2024
16	Thermocouple Typ K	27389	01.2024
17	Thermocouple Typ K	27390	01.2024
18	Thermocouple Typ K	27391	01.2024
19	Thermocouple Typ K	27392	01.2024
20	Slide gauge 150mm	27409	07.2024
21	Stopwatch Prisma 400	27412	05.2024
22	Digital Multimeter 2700	27415	05.2024
23	Portable Force Indicator PFI-1000 N	27417	09.2023

Annex 1: Photo documentation

Front side of EUT

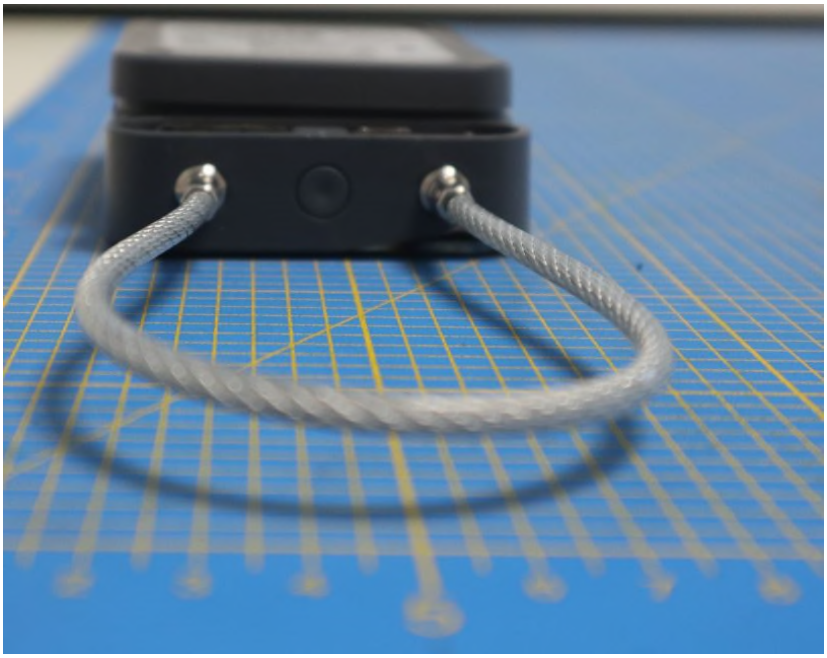
Rear side of EUT



Right side of EUT

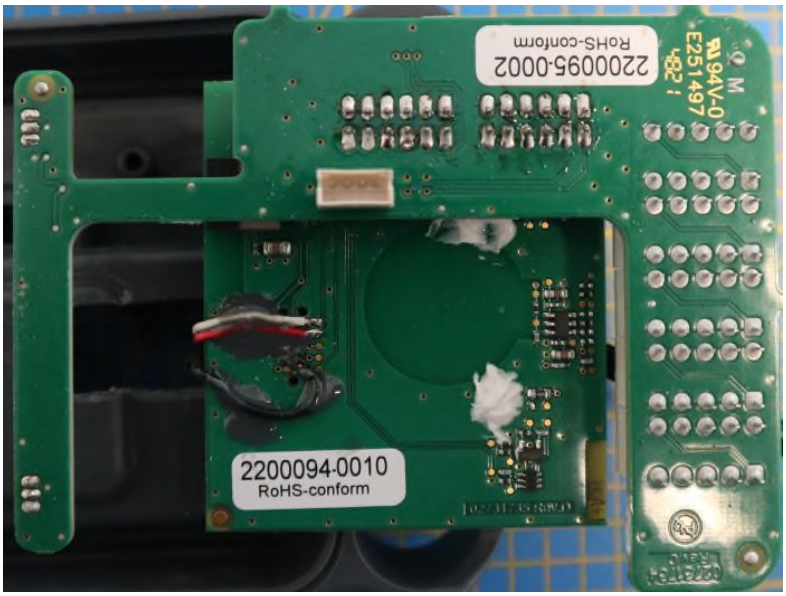
Left side of EUT

Top side of EUT



Bottom side of EUT

Top sides of PCBs



Bottom sides of PCBs

Bottom side of enclosure inside view

EUT without bottom side of enclosure

Battery pack 1

Battery pack 2

Battery pack 3