



<p align="center"><b>TEST REPORT</b>  <b>IEC 62368-1</b>  <b>Audio/video, information and communication technology equipment</b>  <b>Part 1: Safety requirements</b></p>	
<p><b>Report reference No.</b> ..... : 19CH-00862.S01  <b>Date of issue</b> ..... : 2019-12-18  <b>Total number of pages</b> ..... : 82  <b>CB Testing Laboratory</b> ..... : Eurofins Electric &amp; Electronic Product Testing AG  <b>Address</b> ..... : Luppenstrasse 3, 8320 Fehraltorf  SWITZERLAND</p>	
<p><b>Applicant's name</b> ..... : NetModule AG  <b>Address</b> ..... : Maulbeerstrasse 10, 3011 Bern  SWITZERLAND</p>	
<p><b>Test specification</b> ..... :  <b>Standard</b> ..... : IEC 62368-1:2014 (Second Edition)  <b>Test procedure</b> ..... : Type testing for CE  <b>Non-standard test method</b> ..... : N/A</p>	
<p><b>Test Report Form No.</b> ..... : IEC62368_1B  <b>Test Report Form(s) Originator</b> ..... : UL(US)  <b>Master TRF</b> ..... : 2014-03</p>	
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<b>Test Item description</b> .....	Wireless Router
<b>Trade Mark</b> .....	NetModule
<b>Manufacturer</b> .....	NetModule AG Maulbeerstrasse 10, 3011 Bern SWITZERLAND
<b>Model/Type reference</b> .....	NB2800
<b>Ratings</b> .....	12 - 48 V <sub>~</sub> , 1.7 A, 20 W

<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	Eurofins Electric & Electronic Product Testing AG
Testing location/ address .....		Luppenstrasse 3, 8320 Fehraltorf SWITZERLAND
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
Testing location/ address .....		
Tested by (name + signature) .....		Robert Kaufmann Project Engineer
Approved by (name + signature) .....		Walter Fäh Project Engineer
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1	
Testing location/ address .....		
Tested by (name + signature) .....		
Approved by (name + signature) .....		
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2	
Testing location/ address .....		
Tested by (name + signature) .....		
Witnessed by (name + signature) .....		
Approved by (name + signature) .....		
<input type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4	
Testing location/ address .....		
Tested by (name + signature) .....		
Approved by (name + signature) .....		
Supervised by (name + signature) .....		

**List of Attachments (including a total number of pages in each attachment):**

- Appendix List of Test Equipment: 1 page
- ATTACHMENT TO TEST REPORT IEC 62368-1, EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES: 9 pages
- Appendix Photo Documentation: 13 pages

**Summary of testing:**

**The equipment complies with this standard.**

Tests performed (name of test and test clause):	Testing location:
<p><b>Complete test performed</b></p> <p>4.1.2.....:List of critical components</p> <p>5.2.....: Classification of electrical energy sources</p> <p>5.4.1.4.....: Temperature measurements</p> <p>5.4.2/.3.....: Minimum Clearances/Creepage distance</p> <p>5.4.9.....:Electric strength tests</p> <p>6.2.2.....:Electrical power sources (PS) measurements for classification</p> <p>6.2.3.....:Determination of Potential Ignition Sources</p> <p>B.2.5.....: Input test</p> <p>B.3.....:Abnormal operating condition tests</p> <p>B.4.....:Fault condition tests</p> <p>T.2/.3/.4/.5...:Steady force test</p> <p>T.6/.9.....:Impact tests</p>	<p>Electrosuisse Albislab Albisriederstrasse 199, 8047 Zürich SWITZERLAND</p> <p>(SAS accreditation no. STS 0001)</p>
<p><b>History of changes</b></p> <p>The test report No. 18-EL-0356.S01 replaces the test report No. 16-EL-0105.S02, dated 2016-11-24.</p> <p>Changes dated 2018-11-19:</p> <ul style="list-style-type: none"> <li>- Product Description: Block diagram updated</li> <li>- Model Differences: Additional variants added</li> <li>- List of critical components: Mini PCIe PTT Module as well as its components added</li> <li>- Tables 5.2, 5.4.2/.3, 5.4.9, 6.2.2 completed</li> </ul> <p>The test report No. 18-EL-0356.S02 replaces the test report No. 18-EL-0356.S01, dated 2018-11-19</p> <p>Changes dated 2019-02-22:</p> <ul style="list-style-type: none"> <li>- Product Description: Block diagram updated</li> <li>- Model Differences: Additional variants added</li> <li>- List of critical components: Mini PCIe DIO Module as well as its components added</li> <li>- Tables 5.2, 5.4.2/.3, 5.4.9, 6.2.2 completed</li> </ul> <p>This test report No. 19CH-00862.S01 replaces the test report No. 18-EL-0356.S02, dated 2019-02-27</p> <p>Changes dated 2019-12-16:</p> <ul style="list-style-type: none"> <li>- Product Description: Block diagram updated</li> <li>- Model Differences: Additional variants added</li> <li>- List of critical components: NB2810 specific components added</li> <li>- Tables 5.4.2/.3, 5.4.9, B.2.5 verified/retested with NB2810</li> </ul>	<p>Eurofins Electrosuisse Product Testing AG Albisriederstrasse 199, 8047 Zürich SWITZERLAND</p> <p>(SAS accreditation no. STS 0001)</p> <p>Eurofins Electrosuisse Product Testing AG Albisriederstrasse 199, 8047 Zürich SWITZERLAND</p> <p>(SAS accreditation no. STS 0001)</p> <p>Eurofins Electric &amp; Electronic Product Testing AG Albisriederstrasse 199, 8047 Zürich SWITZERLAND</p> <p>(SAS accreditation no. STS 0001)</p>

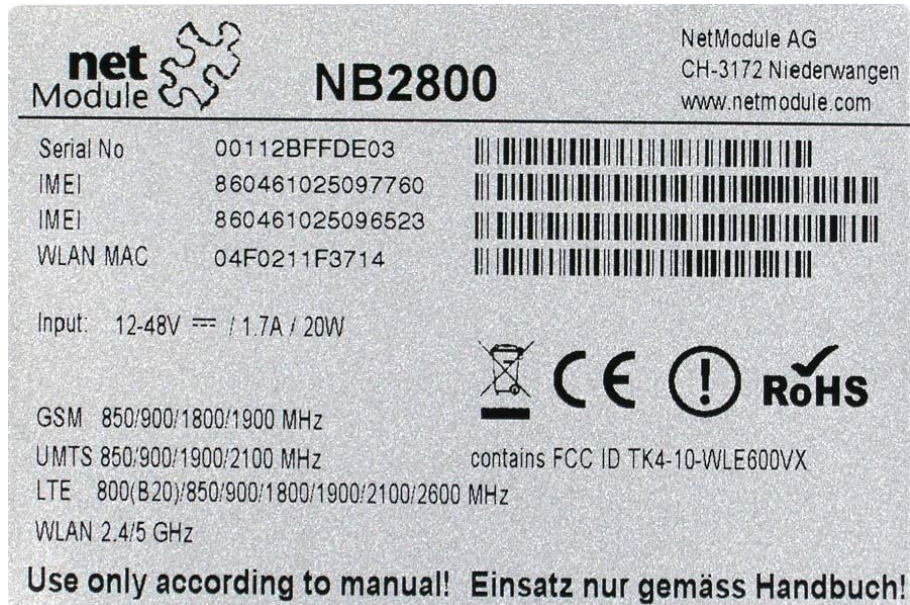
**Summary of compliance with National Differences:**

List of countries addressed: CENELEC

☒ The product fulfils the requirements of EN 62368-1:2014+A11:2017

**Copy of marking plate:**

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



Type label of NB2800



Type label of NB2810

Note: Depending on the implemented radio modules, additional letters and numbers may be added to "NB2800" or "NB2810".

TEST ITEM PARTICULARS:	
Classification of use by .....	<input checked="" type="checkbox"/> Ordinary person <input type="checkbox"/> Instructed person <input type="checkbox"/> Skilled person <input type="checkbox"/> Children likely to be present
Supply Connection .....	<input type="checkbox"/> AC Mains <input checked="" type="checkbox"/> DC Mains <input type="checkbox"/> External Circuit - not Mains connected - <input checked="" type="checkbox"/> ES1 <input type="checkbox"/> ES2 <input type="checkbox"/> ES3
Supply % Tolerance .....	<input type="checkbox"/> +10 %/-10 % <input type="checkbox"/> +20 %/-15 % <input checked="" type="checkbox"/> +25 %/-25 % <input type="checkbox"/> None
Supply Connection – Type .....	<input type="checkbox"/> pluggable equipment type A - <input type="checkbox"/> non-detachable supply cord <input type="checkbox"/> appliance coupler <input type="checkbox"/> direct plug-in <input type="checkbox"/> mating connector <input type="checkbox"/> pluggable equipment type B - <input type="checkbox"/> non-detachable supply cord <input type="checkbox"/> appliance coupler <input type="checkbox"/> permanent connection <input checked="" type="checkbox"/> mating connector <input type="checkbox"/> other: _____
Considered current rating of protective device as part of building or equipment installation.....	4 A; Installation location: <input type="checkbox"/> building; <input checked="" type="checkbox"/> equipment
Equipment mobility .....	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in <input type="checkbox"/> rack-mounting <input type="checkbox"/> wall-mounted
Over voltage category (OVC) .....	<input checked="" type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other: _____
Class of equipment .....	<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III
Access location .....	<input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> N/A
Pollution degree (PD) .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
Manufacturer's specified maximum operating ambient	70 °C
IP protection class .....	<input type="checkbox"/> IPX0 <input checked="" type="checkbox"/> IP40, with SIM cover
Power Systems .....	<input type="checkbox"/> TN <input type="checkbox"/> TT <input type="checkbox"/> IT - ____ V <sub>L-L</sub>
Altitude during operation (m) .....	<input type="checkbox"/> 2000 m or less <input checked="" type="checkbox"/> 4000 m
Altitude of test laboratory (m) .....	<input checked="" type="checkbox"/> 2000 m or less <input type="checkbox"/> ____ m
Mass of equipment (kg) .....	<input checked="" type="checkbox"/> 1.11 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)
TESTING:	
Date of receipt of test item .....	2019-10-30
Date (s) of performance of tests .....	2019-10-30 to 2019-12-18

**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.

**Manufacturer's Declaration per sub-clause 4.2.5 of IEC60060-2:**

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

☐ Yes  
☒ Not applicable

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

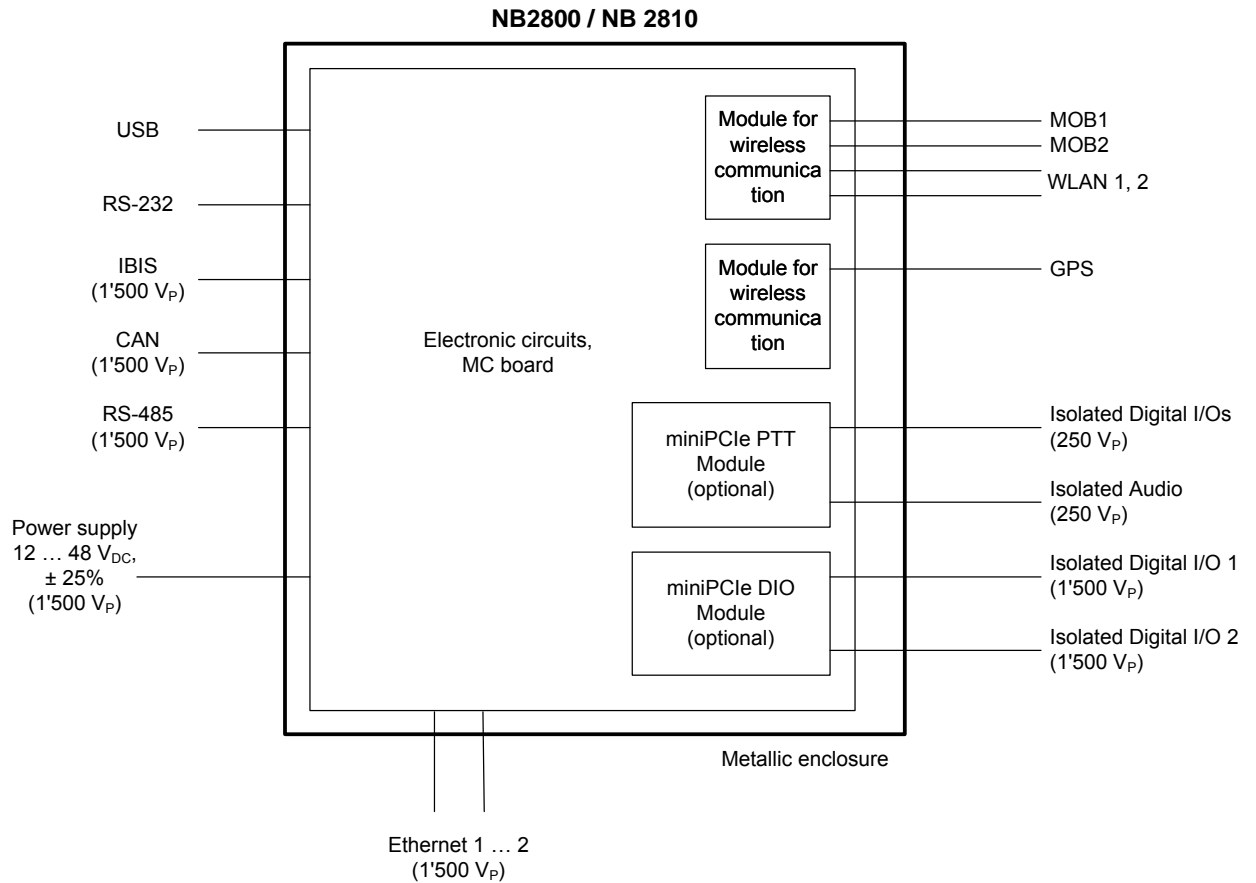
**Name and address of factory (ies) .....**

NetModule AG  
Maulbeerstrasse 10  
3011 Bern  
SWITZERLAND



**GENERAL PRODUCT INFORMATION:****Product Description –**

The EUT is a versatile router for a multiplicity of communication interfaces (wired and radio interfaces). It is intended to be used especially in vehicle applications.



Overall size of NB2800 and NB2810 (W x D x H): 190 mm x 150 mm x 59 mm

**Model Differences –**

Note: Depending on the implemented radio modules, additional letters and numbers may be added to “NB2800” or “NB2810”

Tested Equipment	Covered Variants	Explanation <sup>1)</sup>
NB2800-2LWacDf-G NB2800-2LWacC-G NB2800-2LWacAp-G NB2800-2LWac2D-G NB2810 2LWacCDf-G	NB2800-H <sub>1</sub> ...H <sub>n</sub> -S <sub>1</sub> ...S <sub>n</sub> NB2810-H <sub>1</sub> ...H <sub>n</sub> -S <sub>1</sub> ...S <sub>n</sub>	<p>There are two Mainboards available. One with RJ-45 Connectors for NB2800 and one with M12 Connectors for NB2810. The electronic behind is the same.</p> <p>They can host up to four communication and other interface modules. These modules can even include a GPS module. There can be up to 9 antenna connectors.</p> <p>The wireless communication modules applied have been CE and FCC certified in an independent way of the tested equipment.</p> <p>‘H<sub>1</sub>...H<sub>n</sub>’ is a sequence of the following letters that identify the communication modules included:</p> <p>R: none, router only            Ed: 2G = GPRS/EDGE            U: 3G+ = 2G+UMTS/HSPA/HSPA+            Ub: UMTS / CDMA US            L: 4G = 3G+ + LTE            La: LTE 450MHz            Lb: LTE US            Lc: LTE Advanced Asia            Ld: LTE Advanced Europe            Le: LTE Advanced South America            Lf: LTE South America            Ca: CDMA450            Ga: GNSS Advanced            Gd: GNSS Untethered Dead Reckoning            W: WLAN a/b/g/n Client &amp; Access Point            Wac : WiFi a/b/g/n/ac 2.4 / 5 GHz            A: Audio in/out            Ap: PTT-Audio            C: CAN-bus            2D: Digital in/out            Da: Data Storage 32 GB            Db: Data Storage 64 GB            Dc: Data Storage 128 GB            Dd: Data Storage 256 GB            De: Data Storage 512 GB            Df: Data Storage 1 TB            I: IBIS-bus            Js: SMA Connector            Sa: RS-485 (on the same module as CAN)            Sb: RS-232 (on the same module as IBIS)            ... (more to follow)</p> <p>‘S<sub>1</sub>...S<sub>n</sub>’ indicate the software options activated:</p> <p>G: GPS            V: Voice gateway            M: Mobile IP (Client)            S: Server</p>

Tested Equipment	Covered Variants	Explanation <sup>1)</sup>
NB2800-2LWacDf-G NB2800-2LWacC-G NB2800-2LWacAp-G NB2800-2LWac2D-G NB2810 2LWacCDf-G	NB2800-H <sub>1</sub> ...H <sub>n</sub> -S <sub>1</sub> ...S <sub>n</sub> NB2810-H <sub>1</sub> ...H <sub>n</sub> -S <sub>1</sub> ...S <sub>n</sub>	<p>The following NB2800 variants are currently available or planned. In below order codes 'NB2800' can be replaced with 'NB2810' for the option with M12 connectors:</p> <p>             NB2800-R              NB2800-Wac              NB2800-2Wac              NB2800-UA-V              NB2800-UWacA-GV              NB2800-UWac-G              NB2800-U2Wac              NB2800-U2Wac-G              NB2800-2U              NB2800-2U-G              NB2800-2UWac              NB2800-2UWac-G              NB2800-L              NB2800-L-G              NB2800-LDa-G              NB2800-L-GV              NB2800-LWac              NB2800-LWac-G              NB2800-LWacA-GV              NB2800-L2Wac              NB2800-L2Wac-G              NB2800-2L              NB2800-2L-G              NB2800-2LWac              NB2800-2LWac-G              NB2800-2LWacGe              NB2800-2LWacDf-G              NB2800-3L-G           </p>
<sup>1)</sup> according to information of the customer and not verified by Eurofins Electric & Electronic Product Testing AG		
<b>Additional application considerations – (Considerations used to test a component or sub-assembly)</b> –		

**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)
All circuits	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)
Power input circuits	PS3
Isolated Digital I/Os	PS2
+5V0, USB, +3V3 circuits	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
N/A	N/A
---	---

**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 & corners	MS1
Fixed device	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)
Accessible 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)
LED indicators	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)
Ordinary	ES1: All circuits	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
All combustible materials within equipment fire enclosure	PS3: Power input circuits	No excessive temp.	Suitable material	N/A
All combustible materials within equipment fire enclosure	PS2 : Isolated Digital I/Os	No excessive temp.	Suitable material	N/A
All materials within equipment fire enclosure	PS1 : +5V0, USB, +3V3 circuits	N/A	N/A	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
---	---	---	---	---
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS1: Sharp edges & corners	N/A	N/A	N/A
Ordinary	MS1: Fixed device	N/A	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Accessible surfaces	N/A	N/A	N/A
---	---	---	---	---
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	RS1: LED indicators	N/A	N/A	N/A
Ordinary	RS1: WLAN module	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				

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Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>GENERAL REQUIREMENTS</b>		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components		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.4, T.5)	P
4.4.4.3	Drop tests.....	(See Annex T.7)	P
4.4.4.4	Impact tests.....	(See Annex T.6)	P
4.4.4.5	Internal accessible safeguard enclosure and barrier tests .....	No such parts (See Annex T.3)	N/A
4.4.4.6	Glass Impact tests .....	(See Annex T.9, Annex U)	N/A
4.4.4.74	Thermoplastic material tests.....	(See Annex T.8)	N/A
4.4.4.8	Air comprising a safeguard .....	(See Annex T)	P
4.4.4.9	Accessibility and safeguard effectiveness		P
4.5	Explosion		N/A
4.6	Fixing of conductors		P
4.6.1	Fix conductors not to defeat a safeguard		P
4.6.2	10 N force test applied to .....	Internal wire or components	P
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		N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction	No battery	N/A
	Means to reduce the possibility of children removing the battery .....	---	—
4.8.4	Battery Compartment Mechanical Tests .....	(See Table 4.8.4)	N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object .....	No openings apart from small SIM card slots, can't be entry (See Annex P)	P

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Clause	Requirement + Test	Result - Remark	Verdict
<b>5</b>	<b>ELECTRICALLY-CAUSED INJURY</b>		<b>P</b>
5.2.1	Electrical energy source classifications .....	ES1: All circuits (See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits		P
5.2.2.2	Steady-state voltage and current .....	See appended table 5.2)	P
5.2.2.3	Capacitance limits.....	(See appended table 5.2)	N/A
5.2.2.4	Single pulse limits .....	(See appended table 5.2)	N/A
5.2.2.5	Limits for repetitive pulses .....	(See appended table 5.2)	N/A
5.2.2.6	Ringing signals .....	(See Annex H)	N/A
5.2.2.7	Audio signals .....	(See Clause E.1 )	N/A
5.3	Protection against electrical energy sources		P
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		P
5.3.2.1	Accessibility to electrical energy sources and safeguards		P
5.3.2.2	Contact requirements		P
	a) Test with test probe from Annex V.....	ES1 voltages less than 60 VDC	P
	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		P
5.4.1.2	Properties of insulating material		P
5.4.1.3	Humidity conditioning.....	No hygroscopic material (See sub-clause 5.4.8)	N/A
5.4.1.4	Maximum operating temperature for insulating materials .....	Considered to be class 130 (B) (See appended table 5.4.1.4)	P
5.4.1.5	Pollution degree .....	2	—
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		P
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 .....	(See appended table 5.4.1.10.2)	N/A
5.4.1.10.3	Ball pressure .....	(See appended table 5.4.1.10.3)	N/A



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Clause	Requirement + Test	Result - Remark	Verdict
5.4.2	Clearances		P
5.4.2.2	Determining clearance using peak working voltage	(See appended table 5.4.2.2)	P
5.4.2.3	Determining clearance using required withstand voltage .....	(See appended table 5.4.2.3)	P
	a) a.c. mains transient voltage..... :	---	—
	b) d.c. mains transient voltage .....	1'500 V <sub>peak</sub>	—
	c) external circuit transient voltage..... :	1'500 V <sub>peak</sub> (Ethernet, CAN, RS-485, IBIS, Digital I/Os of DIO module)	—
	d) transient voltage determined by measurement... :	---	—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test	(See appended table 5.4.2.4)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages .....	Up to 4'000 m.a.s.l.	P
5.4.3	Creepage distances..... :	(See appended table 5.4.3)	P
5.4.3.1	General		P
5.4.3.3	Material Group .....	IIIb	—
5.4.4	Solid insulation		P
5.4.4.2	Minimum distance through insulation .....	(See appended table 5.4.4.2)	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) .....	---	N/A
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 .....	(See appended Table 5.4.9)	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..... :	(See appended Table 5.4.4.9)	N/A
5.4.5	Antenna terminal insulation	Certified WLAN & WWAN modules	N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ)..... :		—
5.4.6	Insulation of internal wire as part of supplementary safeguard .....	(See appended table 5.4.4.2)	N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Relative humidity (%).....:	---	—
	Temperature (°C) .....	---	—
	Duration (h) .....	---	—
5.4.9	Electric strength test .....	(See appended table 5.4.9)	P
5.4.9.1	Test procedure for a solid insulation type test		P
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit		P
5.4.10.1	Parts and circuits separated from external circuits	(See appended table 5.4.9)	P
5.4.10.2	Test methods		P
5.4.10.2.1	General		P
5.4.10.2.2	Impulse test.....:	(See appended table 5.4.9)	N/A
5.4.10.2.3	Steady-state test.....:	(See appended table 5.4.9)	P
5.4.11	Insulation between external circuits and earthed circuitry.....:	(See appended table 5.4.9)	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 $\Delta U_{sa}$ .....	---	—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ .....	---	—
5.5	Components as safeguards		P
5.5.1	General		P
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 .....	(See appended table 5.5.2.2)	N/A
5.5.3	Transformers	(See Annex G.5.3)	N/A
5.5.4	Optocouplers	(See sub-clause 5.4 or Annex G.12)	P
5.5.5	Relays	(See Annex G.2)	P
5.5.6	Resistors	(See Annex G.10)	N/A
5.5.7	SPD's	(See Annex G.8)	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 .....	(See Annex G.10.3)	N/A
5.6	Protective conductor		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.2	Requirement for protective conductors		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 <sup>2</sup> ) ..... :	---	—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm <sup>2</sup> ). ..... :	---	—
	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 <sup>2</sup> ), nominal thread diameter (mm)..... :	---	N/A
5.6.5.2	Corrosion		P
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)..... :	(See appended table 5.6.6.2)	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..... :	(See appended table 5.7.4)	N/A
5.7.2.2	Measurement of prospective touch voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
	System of interconnected equipment (separate connections/single connection)..... :	---	—
	Multiple connections to mains (one connection at a time/simultaneous connections) ..... :	---	—
5.7.4	Earthed conductive accessible parts ..... :	(See appended Table 5.7.4)	N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V)..... :	---	—
	Measured current (mA)..... :	---	—
	Instructional Safeguard..... :	(See F.4 and F.5)	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

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Equipment with earthed external circuits Measured current (mA)..... :	---	N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA) ..... :	---	N/A
<b>6</b>	<b>ELECTRICALLY- CAUSED FIRE</b>		<b>P</b>
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		P
6.2.2	Power source circuit classifications		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 ..... :	+5V0, USB, +3V3 circuits (See appended table 6.2.2)	P
6.2.2.5	PS2 ..... :	Isolated Digital I/Os (See appended table 6.2.2)	P
6.2.2.6	PS3 ..... :	Power input circuits (See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS ..... :	No arcing PIS (See appended table 6.2.3.1)	P
6.2.3.2	Resistive PIS ..... :	All PIS within fire enclosure (See appended table 6.2.3.2)	P
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		N/A
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method		P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		P
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		P
6.4.3.1	General		P
6.4.3.2	Supplementary Safeguards		P
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions..... :	(See appended table 6.4.3)	P
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		P
6.4.5.2	Supplementary safeguards ..... :	(See appended tables 4.1.2 and Annex G)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.6	Control of fire spread in PS3 circuit		P
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.1	General .....	(See tables 6.2.3.1 and 6.2.3.2)	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		P
6.4.8.1	Fire enclosure and fire barrier material properties		P
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure	Metal	P
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		P
6.4.8.3.1	Fire enclosure and fire barrier openings		P
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....	No openings	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) .....	No openings	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).....	No door or cover that can be opened	N/A
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	No int. wiring in PS3 circuits, ext. wiring not part of the EUT	N/A
6.5.2	Cross-sectional area (mm <sup>2</sup> ) .....	---	—
6.5.3	Requirements for interconnection to building wiring :	(See Annex Q.)	N/A
6.6	Safeguards against fire due to connection to additional equipment		N/A
	External port limited to PS2 or complies with Clause Q.1		N/A
<b>7</b>	<b>INJURY CAUSED BY HAZARDOUS SUBSTANCES</b>		N/A
7.2	Reduction of exposure to 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).....	---	—

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Clause	Requirement + Test	Result - Remark	Verdict
7.6	Batteries.....:	(See Annex M)	N/A
<b>8</b>	<b>MECHANICALLY-CAUSED INJURY</b>		<b>P</b>
8.1	General		P
8.2	Mechanical energy source classifications	MS1: Fixed device	P
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners		N/A
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
8.5.4.2.1	Safeguards and Safety Interlocks .....	(See Annex F.4 and Annex K)	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.....:	(See appended table 8.5.5.2)	N/A
8.6	Stability	Fixed device	N/A
8.6.1	Product classification		N/A
	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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
8.8.1	Classification		N/A
8.8.2	Applied Force .....	---	N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.1	Classification		N/A
8.9.2	Applied force .....	---	—
8.10	Carts, stands and similar carriers		N/A
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		N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable <i>N</i> .....	---	N/A
8.11.4	Mechanical strength test 250N, including end stops	---	N/A
8.12	Telescoping or rod antennas.....	(See Annex T)	N/A
	Button/Ball diameter (mm).....	---	—
<b>9</b>	<b>THERMAL BURN INJURY</b>		<b>P</b>
9.2	Thermal energy source classifications	TS1: Accessible surfaces	P
9.3	Safeguard against thermal energy sources		N/A
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....	---	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>10</b>	<b>RADIATION</b>		P
10.2	Radiation energy source classification	RS1: LED indicators	P
10.2.1	General classification		P
10.3	Protection against laser radiation		N/A
	Laser radiation that exists equipment:		—
	Normal, abnormal, single-fault.....:	---	N/A
	Instructional safeguard .....	---	—
	Tool .....	---	—
10.4	Protection against visible, infrared, and UV radiation		N/A
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 :		N/A
10.4.1.d)	Normal, abnormal, single-fault conditions .....	(See appended table B.3 & B.4)	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		N/A
10.5.1	X- radiation energy source that exists equipment :	(See appended table B.3 & B.4)	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.....:	(See appended table B.3 & B.4)	N/A
	Maximum radiation (pA/kg).....:	---	N/A
10.6	Protection against acoustic energy sources	No portable device	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



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Clause	Requirement + Test	Result - Remark	Verdict
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 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>B</b>	<b>NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS</b>		<b>P</b>
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.....:	(See Annex E)	N/A
B.2.3	Supply voltage and tolerances		P
B.2.5	Input test .....	(See appended table B.2.5)	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		N/A
B.3.3	D.C. mains polarity test		P
B.3.4	Setting of voltage selector .....	No such parts	N/A
B.3.5	Maximum load at output terminals.....:	USB (X1700)	P
B.3.6	Reverse battery polarity		N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.		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
B.4.3	Motor tests		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature .....	(See Clause G.5)	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 ....	(See Annex M)	N/A
<b>C</b>	<b>UV RADIATION</b>		N/A
C.1	Protection of materials in equipment from 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
<b>D</b>	<b>TEST GENERATORS</b>		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
<b>E</b>	<b>TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS</b>		N/A
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) .....	---	---
	Rated load impedance ( $\Omega$ ) .....	---	---
E.2	Audio amplifier abnormal operating conditions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>F</b>	<b>EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS</b>		<b>P</b>
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		P
F.2.2	Graphic symbols IEC, ISO or manufacturer specific	See marking plate	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 .....	NetModule	—
F.3.2.2	Model identification .....	NB2800	—
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		P
F.3.3.3	Nature of supply voltage .....	==	—
F.3.3.4	Rated voltage .....	12 - 48 V==	—
F.3.3.4	Rated frequency .....	---	—
F.3.3.6	Rated current or rated power .....	1.7 A / 20 W	—
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	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 .....	Not replaceable by user	N/A
F.3.5.4	Replacement battery identification marking .....	---	N/A
F.3.5.5	Terminal marking location		P
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I 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)		N/A
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 .....	---	—

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.8	External power supply output marking		N/A
F.3.9	Durability, legibility and permanence of marking		P
F.3.10	Test for permanence of markings		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		P
	c) Equipment intended to be fastened in place		P
	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		P
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
j)	j) Replaceable components or modules providing safeguard function		N/A
F.5	Instructional safeguards		N/A
	Where "instructional safeguard" is referenced in the test report it specifies the required elements, location of marking and/or instruction		N/A
<b>G</b>	<b>COMPONENTS</b>		<b>P</b>
<b>G.1</b>	<b>Switches</b>		<b>N/A</b>
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
<b>G.2</b>	<b>Relays</b>		<b>N/A</b>
G.2.1	General requirements	No PS3 circuits	N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
<b>G.3</b>	<b>Protection Devices</b>		<b>P</b>
G.3.1	Thermal cut-offs		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

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Clause	Requirement + Test	Result - Remark	Verdict
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 ( $\Omega$ ) . :	---	—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		P
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	Not replaceable by user	N/A
G.3.5.2	Single faults conditions ..... :	(See appended Table B.4)	N/A
<b>G.4</b>	<b>Connectors</b>		P
G.4.1	Spacings		P
G.4.2	Mains connector configuration ..... :	No mains	N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
<b>G.5</b>	<b>Wound Components</b>		N/A
G.5.1	Wire insulation in wound components .....	(See Annex J)	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)..... :	---	—
	Temperature (°C)..... :	---	—
G.5.2.3	Wound Components supplied by mains		N/A
<b>G.5.3</b>	<b>Transformers</b>		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1) .....	---	N/A
	Position .....	---	—
	Method of protection .....	---	—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings .....	---	—
G.5.3.3	Overload test..... :	(See appended table B.3)	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
<b>G.5.4</b>	<b>Motors</b>		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.5.4.1	General requirements		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
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage .....	---	—
<b>G.6</b>	<b>Wire Insulation</b>		P
G.6.1	General		P
G.6.2	Solvent-based enamel wiring insulation		N/A
<b>G.7</b>	<b>Mains supply cords</b>		N/A
G.7.1	General requirements	No mains	N/A
	Type .....	---	—
	Rated current (A) .....	---	—
	Cross-sectional area (mm <sup>2</sup> ), (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

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Clause	Requirement + Test	Result - Remark	Verdict
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..... :	(See appended table 5.4.11.1)	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
<b>G.8</b>	<b>Varistors</b>		N/A
G.8.1	General requirements		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..... :	(See appended table B.3)	N/A
G.8.3.3	Temporary overvoltage ..... :	(See appended table B.3)	N/A
<b>G.9</b>	<b>Integrated Circuit (IC) Current Limiters</b>		P
G.9.1 a)	Manufacturer defines limit at max. 5A.	Certified component (N1701)	P
G.9.1 b)	Limiters do not have manual operator or reset		P
G.9.1 c)	Supply source does not exceed 250 VA ..... :	4.29 W	—
G.9.1 d)	IC limiter output current (max. 5A)..... :	3.2 A (0.97 A with R1708: 25.5 kΩ)	—
G.9.1 e)	Manufacturers' defined drift ..... :	0.91 A ... 1.07 A	—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
<b>G.10</b>	<b>Resistors</b>		N/A
G.10.1	General requirements		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
<b>G.11</b>	<b>Capacitor and RC units</b>		N/A
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.11.3	Rules for selecting capacitors		N/A
<b>G.12</b>	<b>Optocouplers</b>		P
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results) .....	EN 60747-5-5	P
	Type test voltage Vini .....	3'750 VAC	—
	Routine test voltage, Vini,b .....	---	—
<b>G.13</b>	<b>Printed boards</b>		P
G.13.1	General requirements		P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		P
	Compliance with cemented joint requirements (Specify construction) .....	---	—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation .....	(See appended table 5.4.4.5)	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
<b>G.14</b>	<b>Coating on components terminals</b>		N/A
G.14.1	Requirements .....	(See G.13)	N/A
<b>G.15</b>	<b>Liquid filled components</b>		N/A
G.15.1	General requirements		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



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Clause	Requirement + Test	Result - Remark	Verdict
<b>G.16</b>	<b>IC including capacitor discharge function (ICX)</b>		N/A
a)	Humidity treatment in accordance with sc5.4.8 – 120 hours		N/A
b)	Impulse test using circuit 2 with $U_c =$ 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 .....	---	—
D3)	Resistance .....	---	—
<b>H</b>	<b>CRITERIA FOR TELEPHONE RINGING SIGNALS</b>		N/A
H.1	General		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) .....	---	—
<b>J</b>	<b>INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION</b>		N/A
	General requirements	(See separate test report)	N/A
<b>K</b>	<b>SAFETY INTERLOCKS</b>		N/A
K.1	General requirements		N/A
K.2	Components of safety interlock safeguard mechanism .....	(See Annex G)	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 .....	(See appended table B.4)	N/A
K.6	Mechanically operated safety interlocks		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 ..... :	(See appended table 5.4.11)	N/A
<b>L</b>	<b>DISCONNECT DEVICES</b>		P
L.1	General requirements	Plug	P
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		P
L.8	Multiple power sources		N/A
<b>M</b>	<b>EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS</b>		N/A
M.1	General requirements		N/A
M.2	Safety of batteries and their cells		N/A
M.2.1	Requirements		N/A
M.2.2	Compliance and test method (identify method).. :	---	N/A
M.3	Protection circuits		N/A
M.3.1	Requirements		N/A
M.3.2	Tests		N/A
	- Overcharging of a rechargeable battery		N/A
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery		N/A
	- Excessive discharging rate for any battery		N/A
M.3.3	Compliance ..... :	(See appended Tables and Annex M and M.4)	N/A
M.4	Additional safeguards for equipment containing secondary lithium battery		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..... :	(See Table M.4)	—

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Clause	Requirement + Test	Result - Remark	Verdict
M.4.2.2 b)	Single faults in charging circuitry .....	(See Annex B.4)	—
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
	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		N/A
M.6.1	Short circuits		N/A
M.6.1.1	General requirements		N/A
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) .....	---	N/A
M.6.2	Leakage current (mA) .....	---	N/A
M.7	Risk of explosion from 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		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 $V_z$ (m <sup>3</sup> /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) .....	---	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>N</b>	<b>ELECTROCHEMICAL POTENTIALS</b>		<b>P</b>
	Metal(s) used .....	Pollution degree considered	—
<b>O</b>	<b>MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES</b>		<b>P</b>
	Figures O.1 to O.20 of this Annex applied.....	---	—
<b>P</b>	<b>SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS</b>		<b>P</b>
P.1	General requirements		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	No 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 .....	(See G.13.6.2)	N/A
P.4.2 c)	Mechanical strength testing .....	(See Annex T)	N/A
<b>Q</b>	<b>CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING</b>		<b>P</b>
Q.1	Limited power sources		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9	Certified component (N1701)	P
Q.1.2	Compliance and test method		P
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) ..... :	---	—
	Current limiting method..... :	---	—
<b>R</b>	<b>LIMITED SHORT CIRCUIT TEST</b>		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
<b>S</b>	<b>TESTS FOR RESISTANCE TO HEAT AND FIRE</b>		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	Metal	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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
S.5	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 (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
<b>T</b>	<b>MECHANICAL STRENGTH TESTS</b>		<b>P</b>
T.1	General requirements		P
T.2	Steady force test, 10 N .....	(See appended table T.2)	P
T.3	Steady force test, 30 N .....	(See appended table T3)	P
T.4	Steady force test, 100 N .....	(See appended table T4)	N/A
T.5	Steady force test, 250 N .....	(See appended table T5)	P
T.6	Enclosure impact test	(See appended table T6)	P
	Fall test		P
	Swing test		N/A
T.7	Drop test .....	Fixed device (See appended table T7)	N/A
T.8	Stress relief test .....	(See appended table T8)	N/A
T.9	Impact Test (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.....	(See sub-clause 4.4.4.9)	N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) .....	---	---
<b>U</b>	<b>MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION</b>		<b>N/A</b>
U.1	General requirements		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
<b>V</b>	<b>DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)</b>		P
V.1	Accessible parts of equipment	Enclosure & interface connectors	P
V.2	Accessible part criterion		P

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
- Description <sup>2)</sup> :	NB28x0 Mainboard, common parts					
Fuse F1901 with fuse holder	Schurter	OMF63 3402.0016	4 A F, 63 V	UL 248-14 CSA C22.2 No. 248.14	cURus E41599	
Choke	Schaffner EMV AG	RN 114-3/02	250 VAC 3 A 1'500 VAC	UL 1283	VDE UL E64388	
Transient voltage suppressor D1900, D1904	Diodes Inc	SMCJ60CA	Bidirectional, 64 V	UL 497B	UR E156346	
	Taiwan Semiconductor Co Ltd	SMCJ60CA	Bidirectional, 64 V	UL1557	UR E326243	
	Pan Jit Electronics Co Ltd	SMCJ60CA	Bidirectional, 64 V	UL 497B	UR E210467	
Ethernet Transformer T850-1A, T850-2A	Halo	TG111-E12	1000Base-T 1'500 VAC	IEC/EN 62368-1	Tested in appliance	
Capacitor C885-1, C885-2	AVX	1210GC102M AT1A	1 nF 2'000 V	IEC/EN 62368-1	Tested in appliance	
Current limiter N1701	Diodes Inc	AP2553	5.5 VDC, 3.2 A	IEC 60950-1 UL 2367	CB UR E322375	
- Description <sup>2)</sup> :	NB2800 Mainboard, specific parts					
PCB NBHW_17 Mainboard Rev. 1.1	Wuerth Elektronik GmbH & Co	50	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796 CSA C22.2 No. 0.17	cURus E76251	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UL listed	
Connector X100	Phoenix Contact GmbH & Co	MSTBA 2.5/6- G	250 V, 12 A 6-pol.	UL 1059 CSA C22.2 No. 158	VDE cURus E60425	
Ethernet connector X850-1, X850-2	Amphenol Canada Corp	RJE73-188- 00451	125 VAC, 1 A 8-pol. 1'000 VAC	UL1863	UR E135615	
- Description <sup>2)</sup> :	NB2810 Mainboard, specific parts					
PCB NBHW_17 Mainboard 2xM12 Rev. 1.1.2	China Circuit Technology (Shantou) Corp	2BL	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UR E99006	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UL listed	



4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
Connector X100	Phoenix Contact GmbH & Co	MC 1.5/ 6-GF- 3.5	250 V, 8 A 6-pol.	UL 1059 CSA C22.2 No. 158	VDE cURus E60425	
Ethernet connector X850-1, X850-2	Phoenix Contact GmbH & Co	SACC-CI- M12FSX- 8CON-L90	50 VAC / 60 VDC 0.5 A 8-pol. 1'500 VDC	IEC 61076-2-109 IEC/EN 62368-1	Tested in appliance	
- Description <sup>2)</sup> :	Mini PCIe CAN/RS-485 Module					
Capacitor Cc210, Cc211, Cr310, Cr311	Johanson Dielectrics Inc	202R18W102 KV4E	1 nF 2'000 VDC	IEC/EN 62368-1	Tested in appliance	
Isolated CAN Transceiver Uc200	Analog Devices Inc	ADM3053	424 VAC single protection 2'500 VAC	UL 1577 CSA C22.2 60950-1	UR E214100 CSA 205078	
Isolated RS-485 Transceiver Ur300	Analog Devices Inc	ADM2587E	single protection 2'500 VAC	UL 1577	UR E214100	
- Description <sup>2)</sup> :	Mini PCIe IBIS/RS-232 Module					
Capacitor C200, C202, C203, C205	AVX	1206GC101K AT1A	100 pF 2'000 V	IEC/EN 62368-1	Tested in appliance	
Capacitor C304, C305	Kemet	C1206C102K GRACU	1 nF 2'000 VAC	IEC/EN 62368-1	Tested in appliance	
Photocoupler U200	Toshiba Corp, Semiconductor Co Discrete Semiconductor Div	TLP187	single protection 3'750 VAC	UL 1577	cURus E67349	
Photocoupler U201	Toshiba Corp, Semiconductor Co Discrete Semiconductor Div	TLP291GB	double protection 3'750 VAC	EN 60950-1 UL 1577	SEMKO 1200315 BSI 9037 cURus E67349	
Isolated RS-232 Transceiver U300	Linear Technology PTE Ltd	LTM2882	400 VAC, single protection 2'500 VAC	UL 1577	cURus E151738	
- Description <sup>2)</sup> :	Mini PCIe PTT Module					
PCB Mini PCIe PTT Rev. 1.2	Multi-V Electronics (Far East) Co Ltd	MV-07	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796 CSA C22.2 No. 0.17	cURus E331410	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UL listed	

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
Opto coupler U201, U301	Toshiba Electronic Devices & Storage Corporation	TLP293GB	double prot. 3'750 VAC	EN 60747-5-5 UL 1577	VDE cURus E67349	
Integrated DC/DC converter N201	Analog Devices Inc	ADuM5010	single prot. 2'500 VAC	UL 1577	UR E214100	
Relay K300	EM Devices Corporation	EE2 3NUH	220 VDC/ 250 VAC 2 A, 60 W/125 VA single prot. 1'000 VAC	EN 61810-1 UL 508 CSA-C22.2 No. 14-13	TÜV R9751153 UR E73266 CSA LR46266	
Capacitor C207	TDK Corporation	C4532X7R2E 474K230KA	470 nF 250 V	IEC/EN 62368-1	Tested in appliance	
Capacitor C208	TDK Corporation	CKG45NX7S2 A106M500JJ	10 uF 100 V	IEC/EN 62368-1	Tested in appliance	
Capacitor C202, C203, C206	Kemet	C1210C104K CRACTU	100 nF 500 V	IEC/EN 62368-1	Tested in appliance	
Capacitor C212	TDK Corporation	C3216C0G2J 471J085AA	470 pF 630 V	IEC/EN 62368-1	Tested in appliance	
- Description <sup>2)</sup> :	Mini PCIe DIO Module					
PCB Mini PCIe DIO Rev. 1.0	Gatema A.S.	ML1	FR-4 UL94 V-0 1.0 mm 130 °C	UL 796 CSA C22.2 No. 0.17	cURus E254630	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.0 mm 130 °C	UL 796	UL listed	
Photocoupler U201, U203	Toshiba Corp, Semiconductor Co Discrete Semiconductor Div	TLP293GB	double prot. 3'750 VAC	EN 60747-5-5 UL 1577	VDE cURus E67349	
Relay K300, K301	EM Devices Corporation	EE2 3NUH	220 VDC/ 250 VAC 2 A, 60 W/125 VA single prot. 1'500 VAC	EN 61810-1 UL 508 CSA-C22.2 No. 14-13	TÜV R9751153 UR E73266 CSA LR46266	
- Description <sup>2)</sup> :	RJ45 Extension Connector					
PCB RJ45 EC Rev. 1.0	Wuerth Elektronik GmbH & Co	50	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796 CSA C22.2 No. 0.17	cURus E76251	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UL listed	

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
Capacitor C1, C2	AVX	1210GC102M AT1A	1 nF 2'000 V	IEC/EN 62368-1	Tested in appliance	
Connector X2	Amphenol Canada Corp	RJCSE-5380	125 VAC, 1 A 8-pol. 1'000 VAC	UL1863 CSA-C22.2 No. 182.4	cURus E135615	
- Description <sup>2)</sup> :	M12 Extension Connector					
PCB M12_Ext_Con Rev. 1.1.2	Wuerth Elektronik GmbH & Co	50	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796 CSA C22.2 No. 0.17	cURus E76251	
	Interchangeable	Interchange- able	FR-4 UL94 V-0 1.6 mm 130 °C	UL 796	UL listed	
Connector X5	Phoenix Contact GmbH & Co	SACC-CI- M12FS- 8CON-L90	30 V, 2 A 8-pol. 1'500 VDC	IEC 61076-2-101 IEC/EN 62368-1	Tested in appliance	
- Description <sup>2)</sup> :	Other components NB2800					
Internal wiring	Alpha Wire Co	78118 Style 21460	300 V 8x 26 AWG 80 °C VW-1	UL 758	CE cURus E163869	
Solide State Drive (optional)	Transcend	TSxxSSD420I	SATA III 6 Gb/s 5 VDC, 1.5 A	EN 60950-1	CE FCC Manu- facturers declaration	
WWAN module	Huawei Technologies	ME909u-521	compliant with communication standards	LTE, UMTS, GSM, GPRS, EDGE	CE0682 FCC	
WLAN module	Compex Systems	WLE600VX	compliant with communication standards	Dual-band 802.11ac	CE0678 FCC	
Enclosure	NetModule AG	NB2800	Aluminium min. 1.4	IEC/EN 62368-1	Tested in appliance	
- Description <sup>2)</sup> :	Other components NB2810					
Internal wiring	Alpha Wire Co	78113 Style 21460	300 V 3x 26 AWG 80 °C VW-1	UL 758	CE cURus E163869	
Solide State Drive (optional)	Transcend	TSxxSSD420I	SATA III 6 Gb/s 5 VDC, 1.5 A	EN 60950-1	CE FCC Manu- facturers declaration	

4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
WWAN module	ublox	TOBY-L210	compliant with communication standards	LTE, UMTS, GSM, GPRS, EDGE	CE FCC	
WLAN module	Compex Systems	WLE600VX	compliant with communication standards	Dual-band 802.11ac	CE0678 FCC	
Enclosure	NetModule AG	NB2810	Aluminium min. 1.4	IEC/EN 62368-1	Tested in appliance	
Supplementary information:						
<sup>1)</sup> Provided evidence ensures the agreed level of compliance. See OD-CB2039.						
<sup>2)</sup> Description line content is optional. Main line description needs to clearly detail the component used for testing						

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
			1	
			2	
			3	
4.8.4.5	TABLE: Impact			—
Impacts per surface		Surface tested	Impact energy (Nm)	Comments

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

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 (A <sub>pk</sub> or A <sub>rms</sub> )	Hz	
1	60 VDC	Power input circuits	Normal	60 VDC	---	---	ES1
			Abnormal	60 VDC	---	---	
			Single fault – OC/SC	60 VDC / 0 VDC	---	---	
2	60 VDC	+5V0 circuits, USB output	Normal	5.08 VDC	---	---	ES1
			Abnormal	5.08 VDC	---	---	
			Single fault – OC/SC	5.08 VDC / 0 VDC	---	---	
3	60 VDC	+3V3 circuits	Normal	3.32 VDC	---	---	ES1
			Abnormal	3.32 VDC	---	---	
			Single fault – OC/SC	3.32 VDC / 0 VDC	---	---	
4	60 VDC	Isolated Digital I/Os (PTT Module)	Normal	60 VDC	---	---	ES1
			Abnormal	60 VDC	---	---	
			Single fault – OC/SC	60 VDC / 0 VDC	---	---	
5	60 VDC	Isolated Digital I/Os (DIO Module)	Normal	60 VDC	---	---	ES1
			Abnormal	60 VDC	---	---	
			Single fault – OC/SC	60 VDC / 0 VDC	---	---	

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 Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				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=Open Circuit							

5.4.1.4, 6.3.2, 9.0, B.2.6	TABLE: Temperature measurements						P	
	Supply voltage (V) .....	60 VDC	---	---	---	---		
	Ambient T <sub>min</sub> (°C) .....	25.8	---	---	---	---		
	Ambient T <sub>max</sub> (°C) .....	26.1	---	---	---	---		
	Tma (°C) .....	70	---	---	---	---		
Maximum measured temperature T of part/at:		T (°C)				Allowed T <sub>max</sub> (°C)		
Surface temperatures:								
Enclosure (cooling fins)		47	---	---	---	70		
Power connector		41	---	---	---	60		
Component temperatures:								
L2003		62	---	---	---	---		
PCB		58	---	---	---	130		
SSD		51	---	---	---	---		
Inner air temperature		47	---	---	---	---		
Supplementary information: Slightly higher temperatures measured at a supply voltage of 60 VDC (in comparison with 9 VDC)								
Note: This test covers only safety aspects; functional failures due to the temperatures are not considered								
Temperature T of winding:		t <sub>1</sub> (°C)	R <sub>1</sub> (Ω)	t <sub>2</sub> (°C)	R <sub>2</sub> (Ω)	T (°C)	Allowed T <sub>max</sub> (°C)	Insulation class
---		---	---	---	---	---	---	---
Supplementary information: Note 1: Tma should be considered as directed by applicable requirement Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)								

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm) .....			—
Object/ Part No./Material	Manufacturer/t rademark	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:				

<b>5.4.2.2, 5.4.2.4 and 5.4.3</b>	<b>TABLE: Minimum Clearances/Creepage distance</b>						P
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz) <sup>1</sup>	Required cl (mm)	cl (mm) <sup>2</sup>	Required <sup>3</sup> cr (mm)	cr (mm)
P_IN to P_GND Power input before fuse F1901	1'500	60	---	1.0 <sup>1)</sup>	1.3	1.25	1.3
Isolated Digital I/Os, Audio (PTT Module) to internal circuits	100	60	---	0.26 <sup>1)</sup>	1.25	1.25	1.25
Isolated Digital I/Os (DIO Module) to internal circuits	1'500	60	---	1.0 <sup>1)</sup>	1.5	1.25	1.5
Supplementary information: <sup>1)</sup> For operating up to 4'000 m sea level (multiplication factor = 1.29, see 5.4.2.5) 0.2 mm * 1.29 = 0.258 mm => 0.26 mm clearance 0.76 mm * 1.29 = 0.98 mm => 1.0 mm clearance  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							

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage			P
	Overvoltage Category (OV):			I
	Pollution Degree:			2
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)
Ethernet to enclosure (including USB, RS-232, power supply)		1'500 Vp	0.65 <sup>1)</sup>	0.65
CAN/RS-485 to enclosure (including USB, power supply)		1'500 Vp	0.65 <sup>1)</sup>	1.2
IBIS to enclosure (including USB, power supply)		1'500 Vp	0.65 <sup>1)</sup>	1.2
Isolated Digital I/Os (DIO Module) to internal circuits		1'500 Vp	0.65 <sup>1)</sup>	1.5
Supplementary information: <sup>1)</sup> For operating up to 4'000 m sea level (multiplication factor = 1.29, see 5.4.2.5) 0.5 mm * 1.29 = 0.645 mm => 0.65 mm clearance				

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:						

<b>5.4.9</b>	<b>TABLE: Electric strength tests</b>			<b>P</b>
Test voltage applied between:		Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:				
---		---	---	---
Basic/supplementary:				
P_IN to P_GND Power input before fuse F1901		DC	1'725 <sup>1)</sup>	No
Ethernet to enclosure (including USB, RS-232, power supply)		DC	1'725 <sup>1)</sup>	No
CAN/RS-485 to enclosure (including USB, power supply)		DC	1'650 <sup>2)</sup>	No
IBIS to enclosure (including USB, power supply)		DC	1'650 <sup>2)</sup>	No
Isolated Digital I/Os, Audio (PTT Module) to internal circuits		DC	115 <sup>1)</sup>	No
Isolated Digital I/Os (DIO Module) to internal circuits		DC	1'725 <sup>1)</sup>	No
Reinforced:				
---		---	---	---
Routine Tests:				
---		---	---	---
Supplementary information: <sup>1)</sup> For operating up to 4'000 m sea level ( $\geq 1$ mm; multiplication factor = 1.15, see 5.4.2.5) $1'500 \text{ V} * 1.15 = 1'725 \text{ V}$ $100 \text{ V} * 1.15 = 115 \text{ V}$ <sup>2)</sup> For operating up to 4'000 m sea level ( $< 1$ mm; multiplication factor = 1.10, see 5.4.2.5) $1'500 \text{ V} * 1.10 = 1'650 \text{ V}$				

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	
<p>Supplementary information: X-capacitors installed for testing are:</p> <p><input type="checkbox"/> bleeding resistor rating:</p> <p><input type="checkbox"/> ICX:</p> <p>Notes:</p> <p>A. Test Location: Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth</p> <p>B. Operating condition abbreviations: N – Normal operating condition (e.g., normal operation, or open fuse); S – Single fault condition</p>						

<b>5.6.6.2</b>	<b>TABLE: Resistance of protective conductors and terminations</b>				N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance ( $\Omega$ )	
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.			

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 <sup>*)</sup>	PS Classification	
A	Power input circuits	Power (W) :	300	300	PS3	
		V <sub>A</sub> (V) :	60	60		
		I <sub>A</sub> (A) :	5	5		
B	USB output	Power (W) :	4.29	---	PS1	
		V <sub>A</sub> (V) :	4.42	---		
		I <sub>A</sub> (A) :	0.97	---		
C	Isolated Digital I/Os (PTT Module)	Power (W) :	60	60	PS2	
		V <sub>A</sub> (V) :	60	60		
		I <sub>A</sub> (A) :	1	1		
D	Isolated Digital I/Os (DIO Module)	Power (W) :	60	60	PS2	
		V <sub>A</sub> (V) :	60	60		
		I <sub>A</sub> (A) :	1	1		
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)				P
Location		Open circuit voltage After 3 s (V <sub>p</sub> )	Measured r.m.s current (I <sub>rms</sub> )	Calculated value (V <sub>p</sub> x I <sub>rms</sub> )	Arcing PIS? Yes / No
Power input circuits		60	0.242	14.52	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 <sub>p</sub> ) and normal operating condition rms current (I <sub>rms</sub> ) is greater than 15.					

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				P
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
Power input circuits	Normal	14.52	14.52	No	No
Power input circuits	Before fuse F1901 melts	480	480	No	Yes
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, <u>or</u> (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:			

B.2.5		TABLE: Input test						P
U (V)	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status	
9	1.474	1.7	13.27	20	F1901	4	Data transfer via wireless modules, access to SSD	
12	1.084	1.7	13.01	20	F1901	4	Data transfer via wireless modules, access to SSD	
48	0.295	1.7	14.16	20	F1901	4	Data transfer via wireless modules, access to SSD	
60	0.242	1.7	14.52	20	F1901	4	Data transfer via wireless modules, access to SSD	
Supplementary information: 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) .....					26			—
Power source for EUT: Manufacturer, model/type, output rating ...					See below			—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (min)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
X100	reverse polarity	60	30	---	---	---	---	Reverse polarity protection, no hazard
X1700	overload	60	30	---	---	---	---	Max. current: 0.97 A @ 4.42 V, certified thermal protected current limiter N1701, no hazard
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.								

<b>B.4</b>		<b>TABLE: Fault condition tests</b>						<b>P</b>
Ambient temperature (°C) .....					26			—
Power source for EUT: Manufacturer, model/type, output rating ...					See below			—
Component No.	Fault Condition	Supply voltage, (V)	Test time (min)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
D1900, C1901	short circuit after fuse F1901	60	---	F 1901	4 A	--	--	Fuse 1901 opened, no hazard
C2012	short circuit	60	60	---	---	--	--	Max. current: 8.2 A, N2001 up to 82 °C, current limited and thermal protected voltage regulator U2000, no hazard
C2027	short circuit	60	---	---	---	--	--	Current limited and thermal protected voltage regulator U2001, no hazard
X1700	short circuit	60	---	---	---	--	--	Certified thermal protected current limiter N1701, no hazard
Supplementary information: If no test time is declared test has not been carried out because considering the situation. All components within metallic enclosure without openings.								



Annex M	TABLE: Batteries								N/A		
The tests of Annex M are applicable only when appropriate battery data is not available									N/A		
Is it possible to install the battery in a reverse polarity position? .....								---		N/A	
	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											
Max. current during fault condition											
Test results:									Verdict		
- Chemical leaks											
- Explosion of the battery											
- Emission of flame or expulsion of molten metal											
- Electric strength tests of equipment after completion of tests											
Supplementary information:											

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 <sub>oc</sub> (V)	I <sub>sc</sub> (A)		S (VA)		
			Meas.	Limit	Meas.	Limit	
Supplementary Information: SC=Short circuit, OC=Open circuit							

T.2, T.3, T.4, T.5	TABLE: Steady force test					P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation	
Internal wire	PVC	---	10	5	No hazard	
Enclosure	Metal	Min. 1.4	30	5	No hazard	
Enclosure	Metal	Min. 1.4	250	5	No hazard	
Supplementary information:						

T.6, T.9	TABLE: Impact tests				P
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
Whole product	Metallic enclosure	Min. 1.4	1'300	No hazard	
Supplementary information:					

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

<b>T.8</b>	<b>TABLE: Stress relief test</b>					N/A
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Supplementary information:						

**List of test equipment used:**

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to TMP/CTF stage 1 or WMT/CTF stage 2 procedure has been used.

Clause	Measurement / testing	Testing / measuring equipment / material used	Inventory no	Last calibration	Calibration due
all	Ambient conditions	Comet Systems, PCE-T7610, Thermo-/Hygro-/Barometer	18.6632.04	03/2019	03/2020
5.2, 6.2, B.2.5, B.3, B.4	Electrical data, fault condition tests	Fluke, 189, Digital Multimeter	DV9992	10/2019	10/2020
5.2, 6.2, B.2.5, B.3, B.4	Electrical data, fault condition tests	Fluke, 87, Digital Multimeter	DV6681	05/2019	05/2020
5.4.1.4, 6.3.2, 9.0, B.2.6	Temperature measurements, fault condition tests	Fluke, 52, Digital Thermometer for K/J Thermocouples	18.6722.04	04/2019	04/2020
5.4.1.4, 6.3.2, 9.0, B.2.6	Temperature measurements, fault condition tests	Omega, TC-K 0.01, Thermocouples	18.6632.08.1, 18.6632.08.2, 18.6632.08.3, 18.6632.08.4, 18.6632.08.5	05/2018	05/2021
5.4.2, 5.4.3	Clearances, creepage distances	Etalon, 0 - 150 mm, Caliper Gauge	M9702	11/2019	11/2020
5.4.9, 5.5.10	Electric strength tests	ETL, ATS400, High Voltage Tester	14.6632.03	08/2019	08/2020

Measurements carried out during 12/2019.

<b>ATTACHMENT TO TEST REPORT</b> <b>IEC 62368-1</b> <b>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES</b> (Audio/video, information and communication technology equipment Part 1: Safety requirements)	
Differences according to :	EN 62368-1:2014+A11:2017
Attachment Form No. :	EU_GD_IEC62368_1B_II
<b>Attachment Originator :</b>	<b>Nemko AS</b>
Master Attachment:	Date 2017-09-22
<b>Copyright © 2017 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.</b>	

IEC62368_1B - ATTACHMENT																																										
Clause	Requirement + Test			Result - Remark		Verdict																																				
	<b>CENELEC COMMON MODIFICATIONS (EN)</b>																																									
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed “Z”.																																									
CONTENTS	<b>Add</b> 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																																									
	<b>Delete</b> all the “country” notes in the reference document (IEC 62368-1:2014) according to the following list: <table><tr><td>0.2.1</td><td>Note</td><td>1</td><td>Note 3</td><td>4.1.15</td><td>Note</td></tr><tr><td>4.7.3</td><td>Note 1 and 2</td><td>5.2.2.2</td><td>Note</td><td>5.4.2.3.2.2 Table 13</td><td>Note c</td></tr><tr><td>5.4.2.3.2.4</td><td>Note 1 and 3</td><td>5.4.2.5</td><td>Note 2</td><td>5.4.5.1</td><td>Note</td></tr><tr><td>5.5.2.1</td><td>Note</td><td>5.5.6</td><td>Note</td><td>5.6.4.2.1</td><td>Note 2 and 3</td></tr><tr><td>5.7.5</td><td>Note</td><td>5.7.6.1</td><td>Note 1 and 2</td><td>10.2.1 Table 39</td><td>Note 2, 3 and 4</td></tr><tr><td>10.5.3</td><td>Note 2</td><td>10.6.2.1</td><td>Note 3</td><td>F.3.3.6</td><td>Note 3</td></tr></table>					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	
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	For special national conditions, see Annex ZB.																																									
1	<b>Add</b> 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																																				

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.Z1	<p><b>Add</b> the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. <b>mains</b>, 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 <b>pluggable equipment type B</b> or <b>permanently connected equipment</b>, 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 <b>pluggable equipment type A</b> the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.</p>		N/A
5.4.2.3.2.4	<p><b>Add</b> the following to the end of this subclause: The requirement for interconnection with <b>external circuit</b> is in addition given in EN 50491-3:2009.</p>		P
10.2.1	<p><b>Add</b> the following to c) and d) in table 39: For additional requirements, see 10.5.1.</p>		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	<p><b>Add</b> the following after the first paragraph:  <i>For RS 1 compliance is checked by measurement under the following conditions:</i>  <i>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.</i>            NOTE Z1 Soldered joints and paint lockings are examples of adequate locking.  <i>The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm<sup>2</sup>, at any point 10 cm from the outer surface of the apparatus.</i>  <i>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.</i>  <i>For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.</i>            NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.</p>		N/A
10.6.1	<p><b>Add</b> the following paragraph to the end of the subclause:            EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.</p>		N/A
10.Z1	<p><b>Add</b> the following new subclause after 10.6.5.  <b>10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz</b>            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>	Due to the EMC tests	P
G.7.1	<p><b>Add</b> the following note:            NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.</p>		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Bibliography	<p><b>Add</b> the following standards:</p> <p><b>Add</b> the following notes for the standards indicated:</p> <p>IEC 60130-9 NOTE Harmonized as EN 60130-9.</p> <p>IEC 60269-2 NOTE Harmonized as HD 60269-2.</p> <p>IEC 60309-1 NOTE Harmonized as EN 60309-1.</p> <p>IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series.</p> <p>IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4.</p> <p>IEC 60664-5 NOTE Harmonized as EN 60664-5.</p> <p>IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified).</p> <p>IEC 61508-1 NOTE Harmonized as EN 61508-1.</p> <p>IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1.</p> <p>IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4.</p> <p>IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6.</p> <p>IEC 61643-1 NOTE Harmonized as EN 61643-1.</p> <p>IEC 61643-21 NOTE Harmonized as EN 61643-21.</p> <p>IEC 61643-311 NOTE Harmonized as EN 61643-311.</p> <p>IEC 61643-321 NOTE Harmonized as EN 61643-321.</p> <p>IEC 61643-331 NOTE Harmonized as EN 61643-331.</p>		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
<b>ZB</b>	<b>ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)</b>		N/A
4.1.15	<p><b>Denmark, Finland, Norway and Sweden</b></p> <p>To the end of the subclause the following is added:</p> <p><b>Class I pluggable equipment type A</b> 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 <b>accessible</b> parts, have a marking stating that the equipment shall be connected to an earthed <b>mains</b> socket-outlet.</p> <p>The marking text in the applicable countries shall be as follows:</p> <p>In <b>Denmark</b>: "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord."</p> <p>In <b>Finland</b>: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"</p> <p>In <b>Norway</b>: "Apparatet må tilkoples jordet stikkontakt"</p> <p>In <b>Sweden</b>: "Apparaten skall anslutas till jordat uttag"</p>		N/A
4.7.3	<p><b>United Kingdom</b></p> <p>To the end of the subclause the following is added:</p> <p>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.</p> <p>Also see Annex G.4.2 of this annex</p>		N/A



IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.2	<b>Denmark</b> After the 2nd paragraph add the following: A warning (marking <b>safeguard</b> ) for high <b>touch current</b> is required if the <b>touch current</b> exceeds the limits of 3,5 mA a.c. or 10 mA d.c		N/A
5.4.11.1 and Annex G	<b>Finland and Sweden</b> 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 <ul style="list-style-type: none"> <li>• two layers of thin sheet material, each of which shall pass the electric strength test below, or</li> <li>• one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below.</li> </ul> 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 <ul style="list-style-type: none"> <li>• 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</li> <li>• is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV.</li> </ul> It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> </ul>		N/A
5.5.2.1	<b>Norway</b> 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).		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.6	<b>Finland, Norway and Sweden</b> To the end of the subclause the following is added: Resistors used as <b>basic safeguard</b> or bridging <b>basic insulation</b> in <b>class I pluggable equipment type A</b> shall comply with G.10.1 and the test of G.10.2.		N/A
5.6.1	<b>Denmark</b> <b>Add</b> 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. <i>Justification:</i> In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	<b>Ireland and United Kingdom</b> After the indent for <b>pluggable equipment type A</b> , the following is added: – the <b>protective current rating</b> is taken to be 13 A, this being the largest rating of fuse used in the <b>mains</b> plug.		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 <sup>2</sup> to 1.5 mm <sup>2</sup> in cross-sectional area.		N/A
5.7.5	<b>Denmark</b> To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the <b>protective conductor current</b> exceeds the limits of 3.5 mA a.c. or 10 mA d.c.		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.7.6.1	<p><b>Norway and Sweden</b></p> <p>To the end of the subclause the following is added:</p> <p>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.</p> <p>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.</p> <p>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:</p> <p>“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)”</p> <p>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.</p> <p>Translation to Norwegian (the Swedish text will also be accepted in Norway):</p> <p>“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.”</p> <p>Translation to Swedish:</p> <p>”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.”</p>		N/A
5.7.6.2	<p><b>Denmark</b></p> <p>To the end of the subclause the following is added:</p> <p>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 .</p>		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
B.3.1 and B.4	<p><b>Ireland and United Kingdom</b></p> <p>The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of <b>direct plug-in equipment</b>, 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 <b>direct plug-in equipment</b>, until the requirements of Annexes B.3.1 and B.4 are met</p>		N/A
G.4.2	<p><b>Denmark</b></p> <p>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. 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 <i>Justification:</i> Heavy Current Regulations, Section 6c</p>		N/A
G.4.2	<p><b>United Kingdom</b></p> <p>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.</p>		N/A

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
G.7.1	<b>United Kingdom</b> 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.		N/A
G.7.1	<b>Ireland</b> 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		N/A
G.7.2	<b>Ireland and United Kingdom:</b> To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm <sup>2</sup> is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A

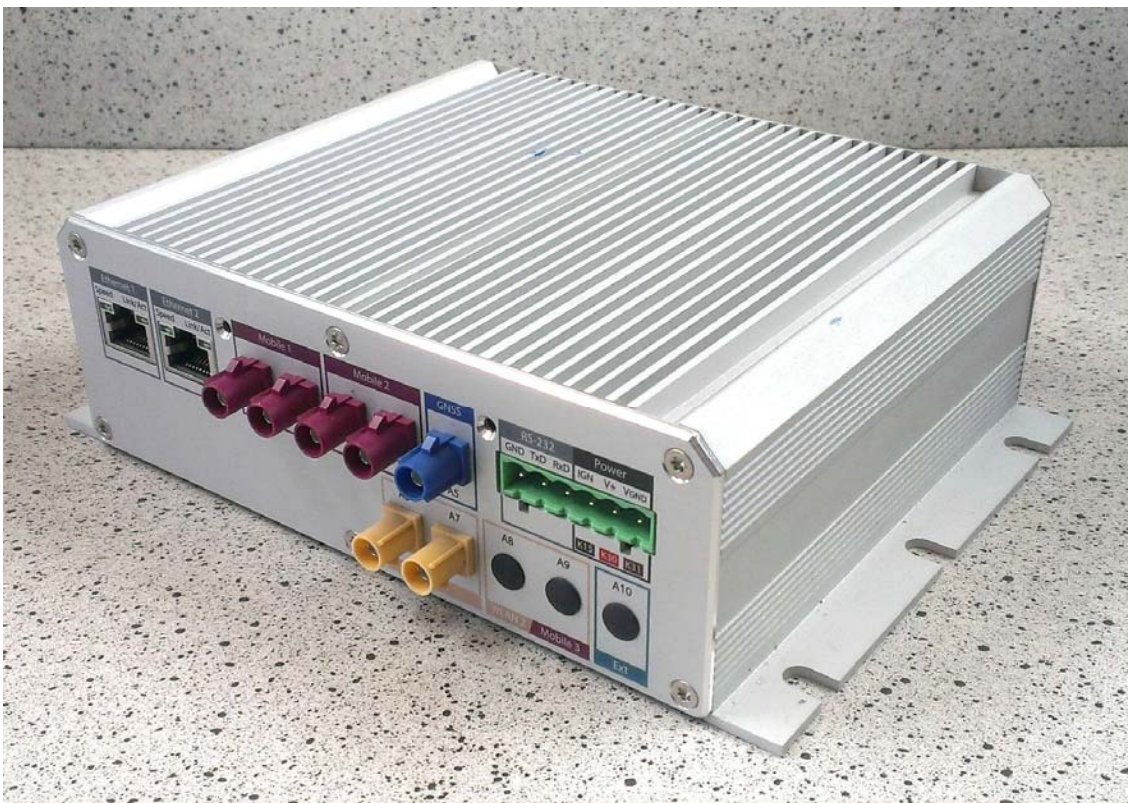
IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
<b>ZC</b>	<b>ANNEX ZC, NATIONAL DEVIATIONS (EN)</b>		N/A
10.5.2	<b>Germany</b> The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. <i>Justification:</i> German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. <b>NOTE</b> Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: <a href="http://www.ptb.de">http://www.ptb.de</a>		N/A



**ATTACHMENT TO TEST REPORT IEC 62368-1**  
**Pictures of the EUT**

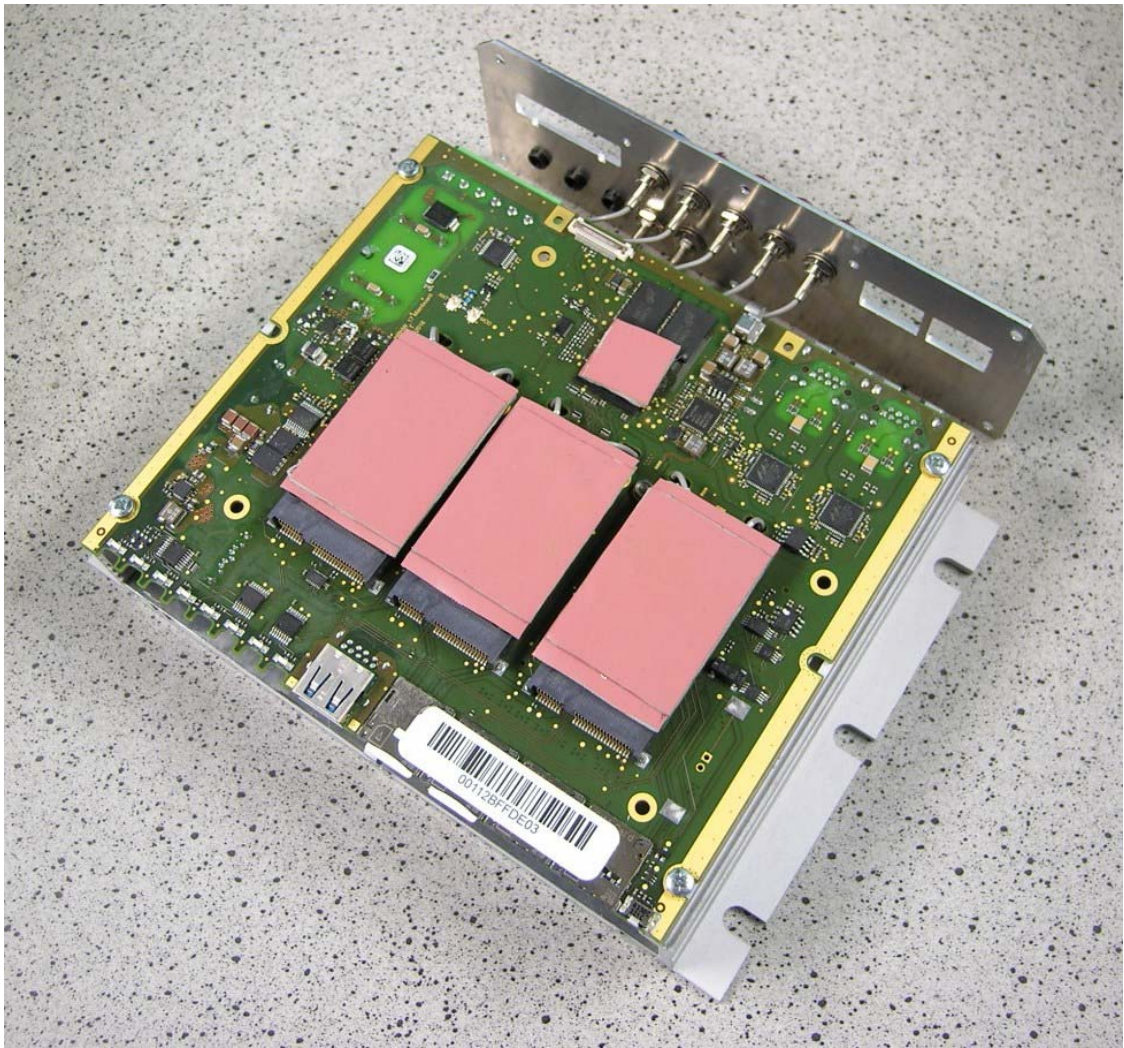


**NB2800, total view**



**NB2800, rear view**



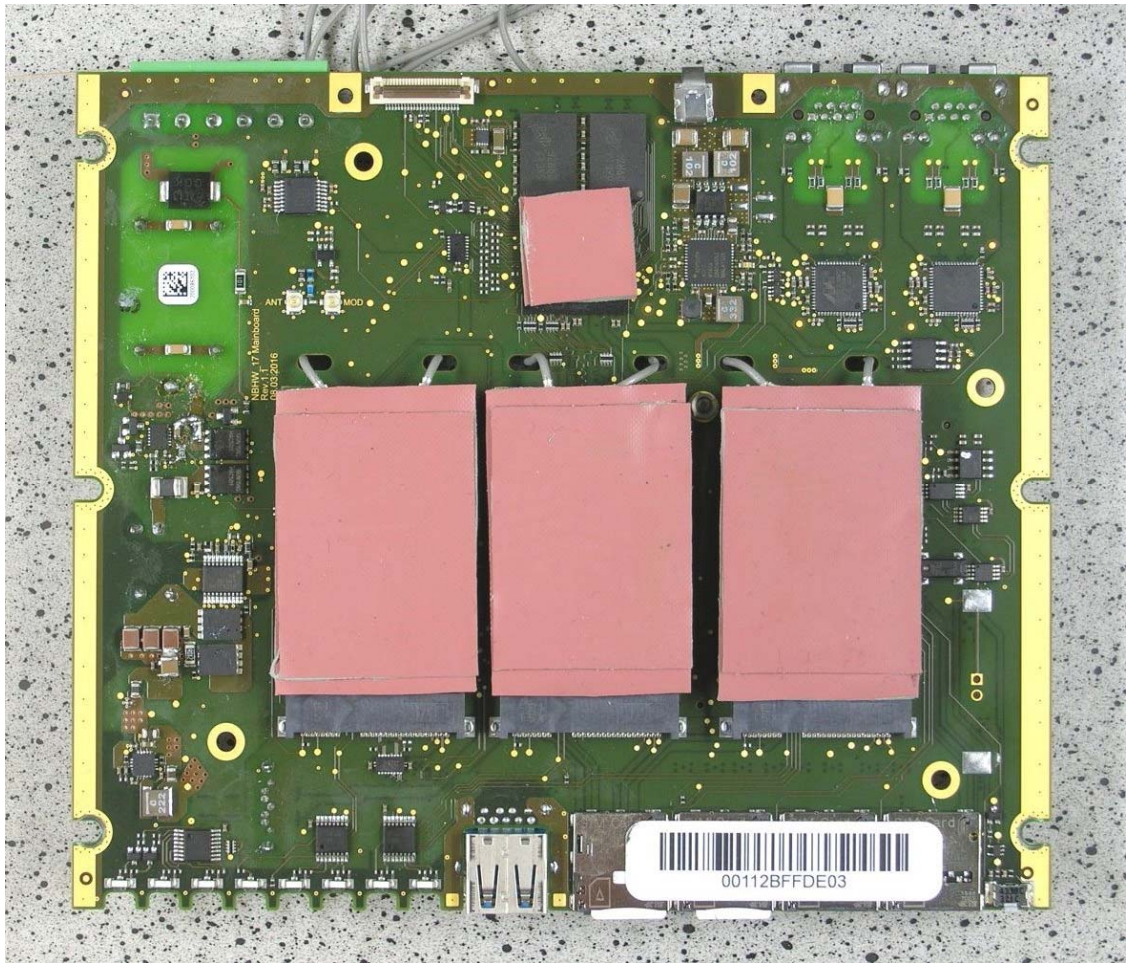


**NB2800, cover removed**



### Mainboard removed, solid state drive mounted on bottom plate



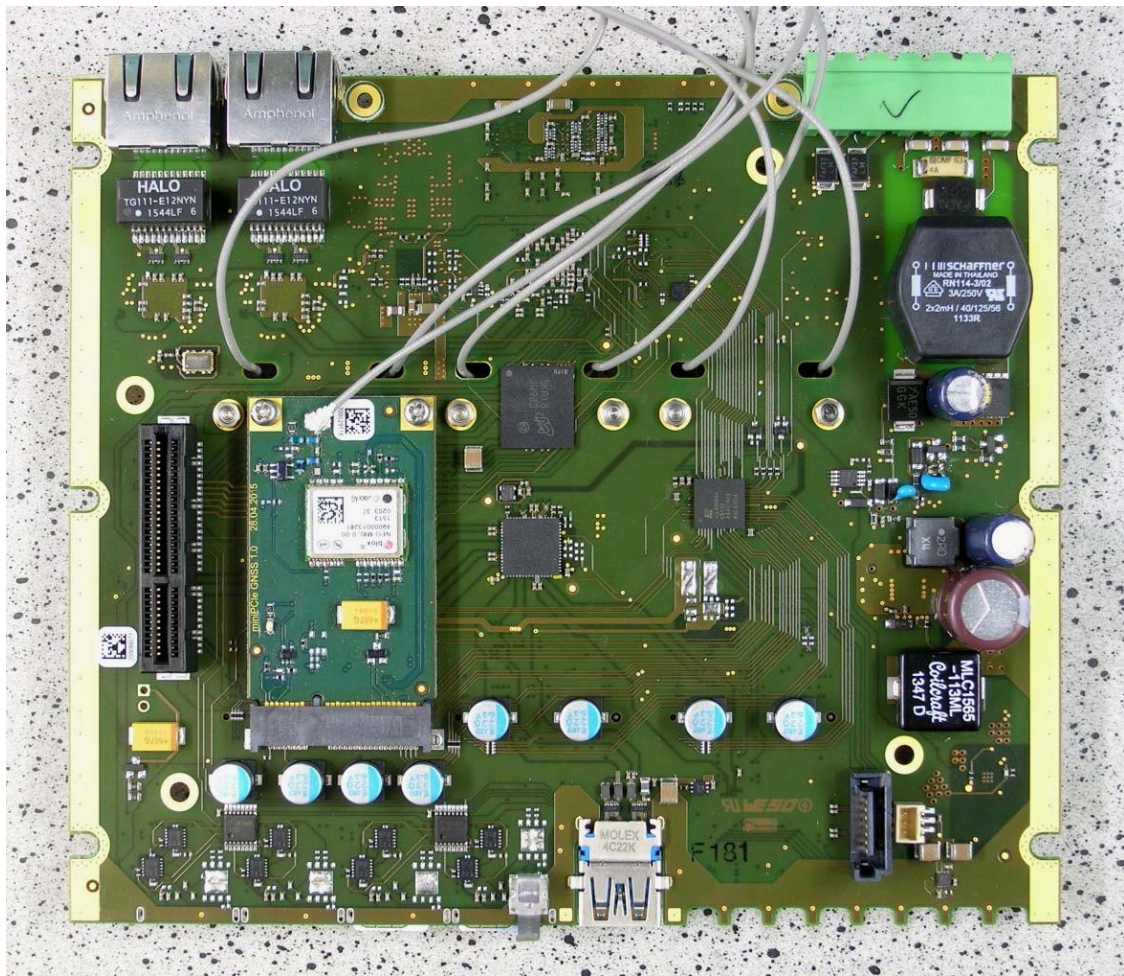


**NB 2800 Mainboard, top view**



**NB2800 Mainboard, detail view of ID's**





**NB2800 Mainboard, bottom view**



**NB 2800 Mainboard, detail view of markings**



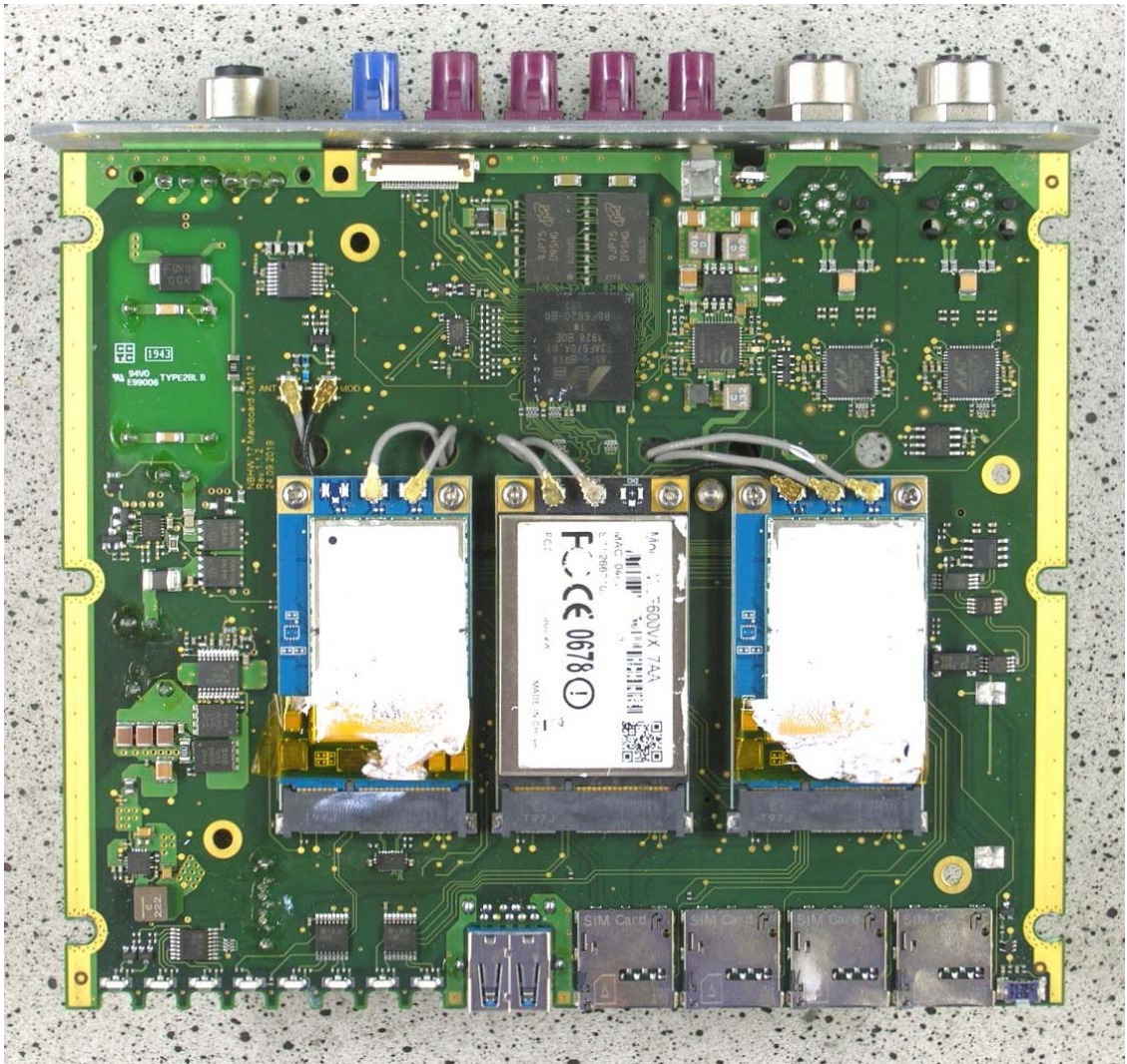


NB2810, total view



NB2810, rear view



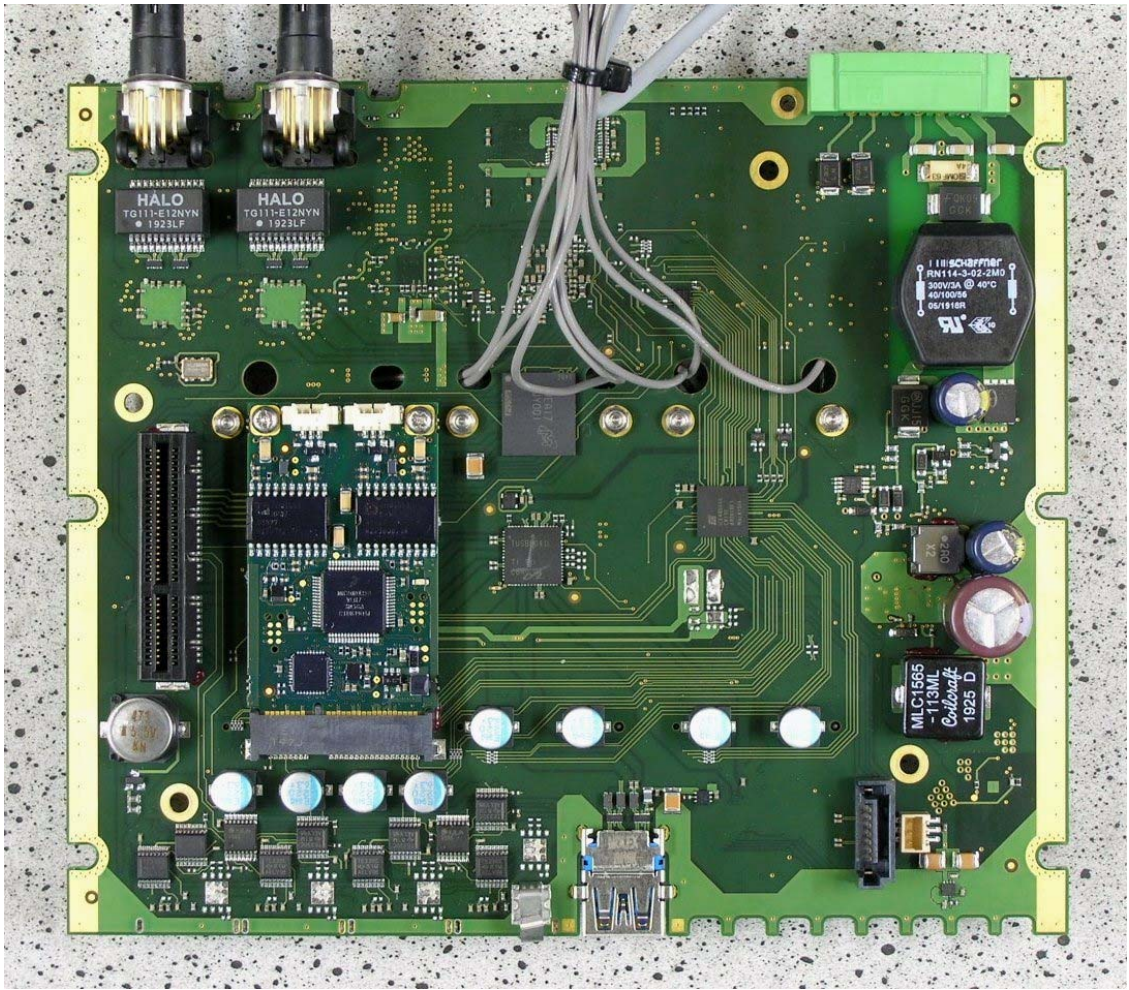


NB 2810 Mainboard, top view



NB2810 Mainboard, detail view of ID and markings





NB2810 Mainboard, bottom view



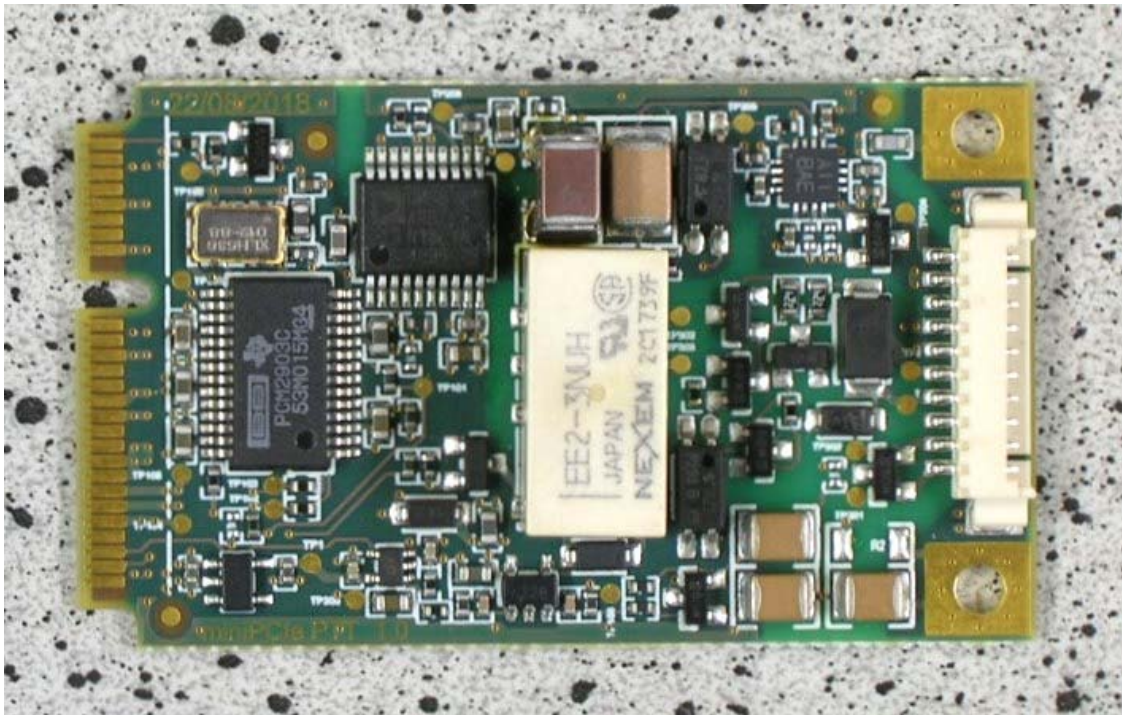


Detail view of optional equipped CAN/RS-485 module

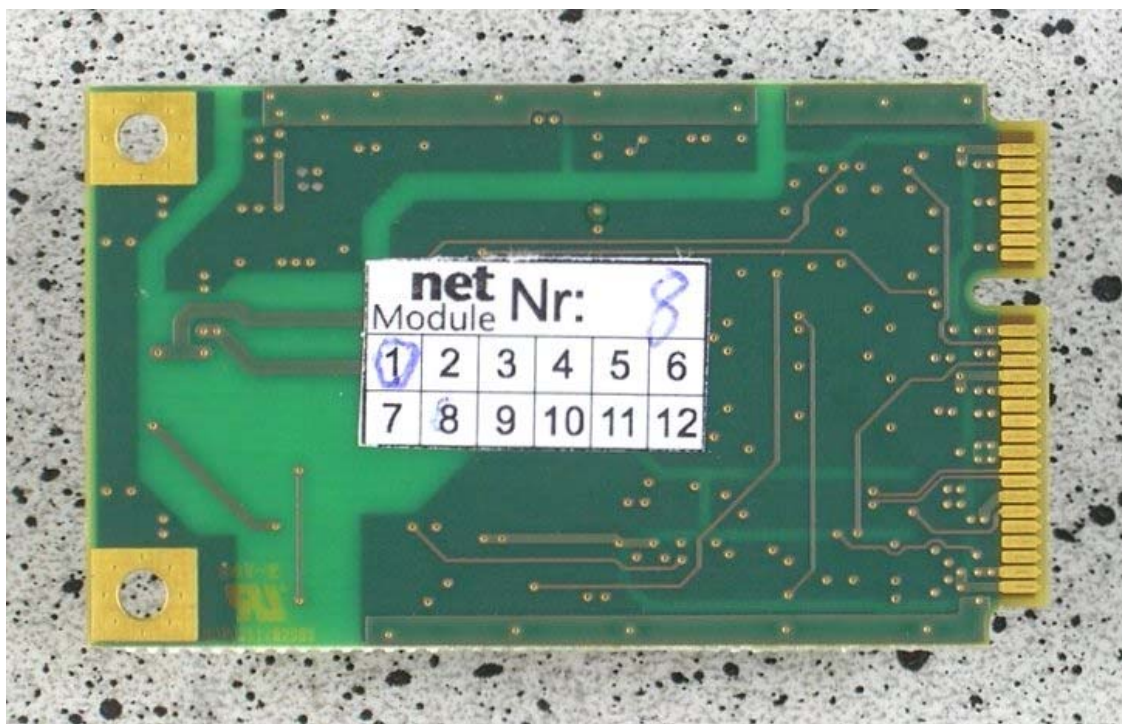


Detail view of optional equipped IBIS module



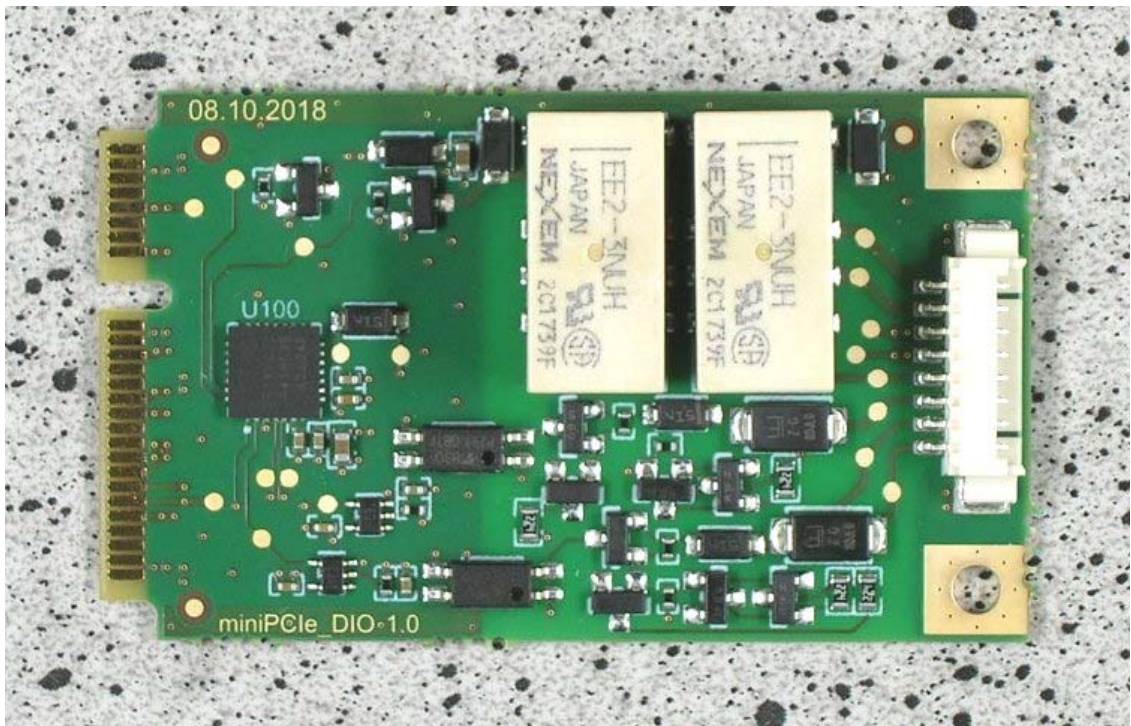


Detail view of optional equipped Mini PCIe PTT Module

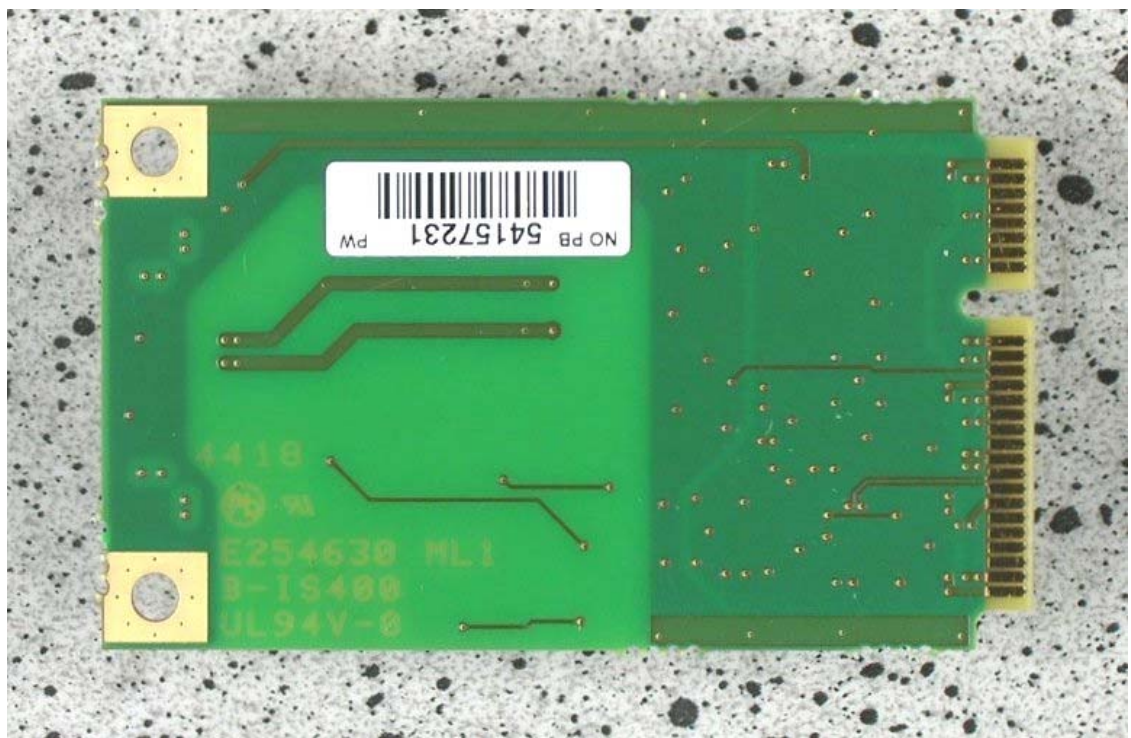


Detail view of optional equipped Mini PCIe PTT Module  
(PCB Rev. 1.1 depicted, layout data of Rev. 1.2 tested)



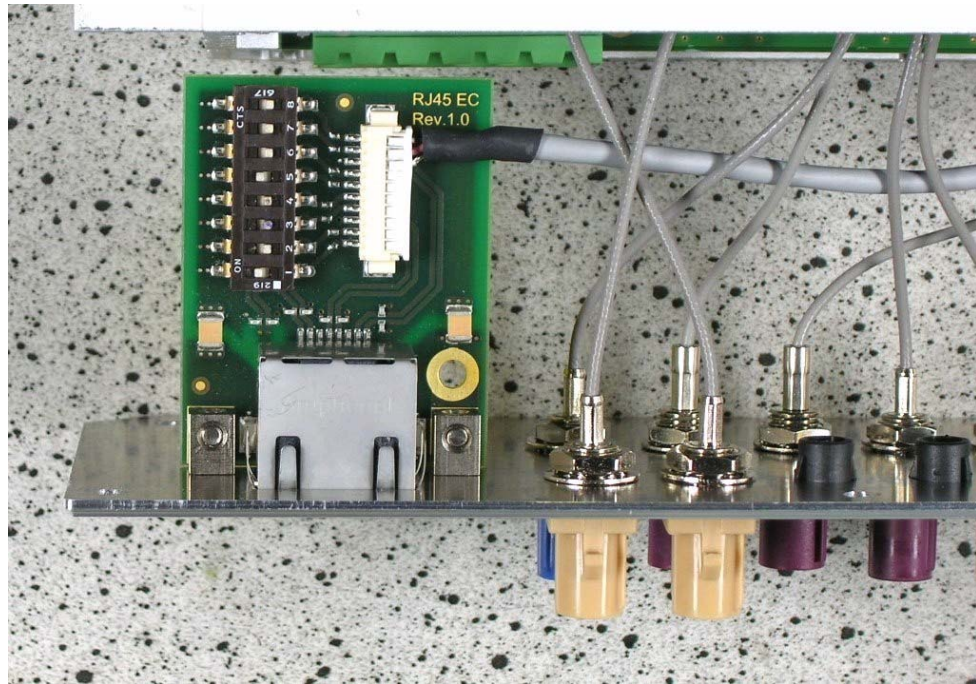


Top view of optional Digital I/O module

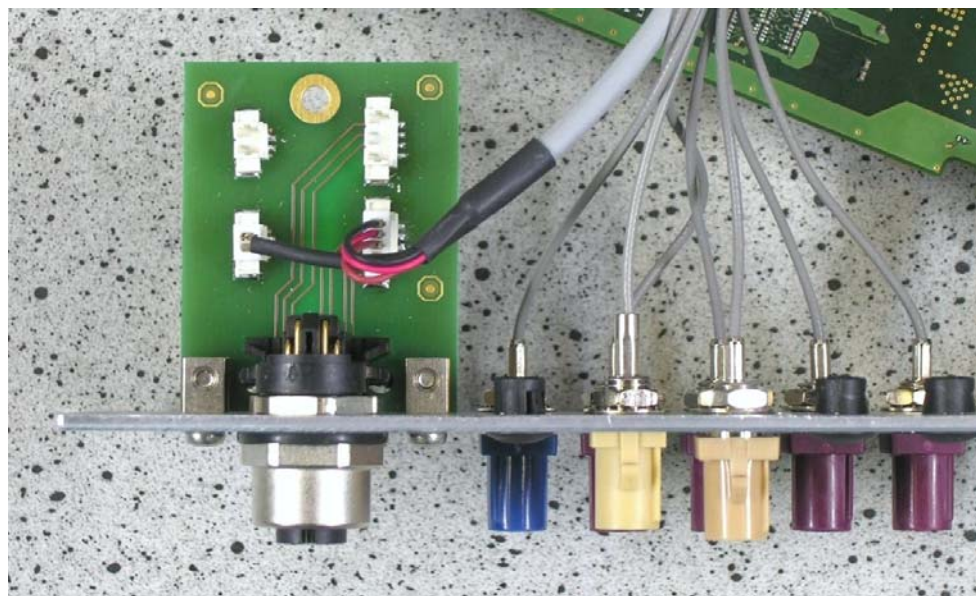


Bottom view of optional Digital I/O module with markings





**Detail view of RJ45 Extension connector (NB2800)**



**Detail view of M12 Extension connector (NB2810)**



Type label of optional solid state drive