SERTIKA

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TEST REPORT

LST EN 62368-1:2015

Audio/video information and communication technology equipment - Part 1: Safety requirements

LIETUVOS NACIONALINIS AKREDITACIJOS BIURAS

BANDYMAI ISO/IEC 17025 Nr. LA.01.007

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Approved by	Benas Beklešovas (Head of testing laboratory) (Signature)
Date of issue	2020-04-30
Contract and contract annex No.	Contract No. L20-01/02 Contract annex No. P2
Testing laboratory	UAB „**Sertika**“
Address	Savanoriu av. 271-253, LT-50131 Kaunas, Lithuania Tel./fax.: +370 37 314 434 E-mail: sertika@sertika.lt Internet: http://www.sertika.lt
Testing location	Savanoriu av. 271-253, LT-50131 Kaunas, Lithuania
Test methods	LST EN 62368-1:2015+AC:2015+A11:2017
Methods deviation	Not applied
Non-standard test methods	Not applied
Applicant	UAB „Ruptela“
Address	Perkunkiemio str. 6, LT-12130 Vilnius, Lithuania
Name of test object	**GPS TRACKERS**
Trademark	Ruptela Transport Telematics
Type/model	HCV5-2G-GL-BT; HCV5-3G-GL-BT; HCV5-LTM-GL-BT; LCV5-2G-GL-BT; LCV5-3G-GL-BT; LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-2G-GL; PRO5-2G-GL-BT; PRO5-3G-GL-BT; PRO5-LTM-GL-BT
Serial No.	001-20 (HCV5-2G-GL-BT); 002-20 (HCV5-3G-GL-BT); 003-20 (HCV5-LTM-GL-BT); 004-20 (LCV5-2G-GL-BT); 005-20 (LCV5-3G-GL-BT); 006-20 (LCV5-LTM-GL-BT); 007-20 (LCV5-LTM-GL-BT-CS1); 008-20 (PRO5-2G-GL); 009-20 (PRO5-2G-GL-BT); 010-20 (PRO5-3G-GL-BT); 011-20 (PRO5-LTM-GL-BT) (assigned by Sertika)
Manufacturer	UAB „Ruptela“
Made in	Lithuania
Rating	Input: 9-32 VDC, 0,55 A; Battery: Li-ion 3,7 V, 1050mAh
Example of marking plate	See Annex 1

NOTES:

1. This Test Report shall not be reproduced except in full without the written permission of the Testing Laboratory.
2. The test results relate only to the object tested.

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Description of test object function	GPS trackers for all types of vehicles – trucks, busses, agriculture, vans, cars and other special machinery. It is designed for vehicle tracking and can perform advanced tasks – read on-board computer data (CANbus), monitor driver behavior, manage fuel, etc.
Classification	
Classification of use by	Ordinary person
Operation conditions	Continuous
Connection to mains supply	Not intended to be connected to the mains
Supply connection - Type	Other: Not intended for permanently connection and does not have ordinary non-detachable power supply cord
Consider current rating of protective device as part of building or equipment installation	Equipment
Access location	Service acces location
Equipment mobility	Building-in
Overvoltage category	Other: DC source
Class of equipment	Class III
Pollution degree	2
Degree of protection according IEC 529	--
Altitude during operation (m)	2000m or less
Mass of equipment (kg)	HCV5-2G-GL-BT; HCV5-3G-GL-BT; HCV5-LTM-GL-BT; LCV5-2G-GL-BT; HCV5-3G-GL-BT; LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-2G-GL; PRO5-2G-GL-BT; PRO5-3G-GL-BT; PRO5-LTM-GL-BT: 0,128 kg
Date of receipt of test item Initiation of the tests Conclusion of the tests	2020-04-09 2020-04-10 2020-04-30
Tests environmental conditions: environmental temperature a relative humidity an air pressure	 (+20 ÷ +25) °C (33 ÷ 48) % (999 ÷ 1009) hPa
Statement of conformity decision rule: Expanded measurement uncertainty = guard band (w = U) (according ILAC-G8:09/2019) – expanded measurement is added to measured value and this result is compared with value specified in testing method. If sum of measurement and expanded measurement uncertainty is above or below limit specified in testing method, then statement of conformity is assigned as fail. Otherwise conformity is stated as pass. For statement of conformity Pass/Fail rule is used.	
The assigned expanded measurement uncertainty is described as measured value multiplied by coverage factor k = 2, which corresponds to a coverage of approximately 95% in normal distribution.	
Possible test case verdicts P - the equipment complies with the requirement; F - the equipment does not meet the requirement; N.A. - the test does not apply to the equipment; -- - there is no information, the parameter is not tested.	
Photos of equipment under test: See Annex 1	

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 a bility 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)**
Secondary circuit 9-32 VDC	ES1
Battery output 3,7 VDC	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)**
Secondary circuit <15 W	PS1
Battery output <15 W	PS1
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
Battery (Complied with Annex M)	Li-ion
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)**
Edges and corners of enclosure	MS1
Mass of the unit	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)**
All accessible parts	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 light	RS1

OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazzard**			
5.1	**Electrically-caused injury**			
Body Part (e.g. Ordinary)	**Energy Source (ES3: Primary Filter circuit)**	**Safeguards**		
		Basic	**Supplementary**	**Reinforced (Enclosure)**
Ordinary	ES1: Secondary circuit	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**
Secondary circuit	PS1: secondary circuit, <15W	No excessive temperature	PCB is classified as V-0 material	N.A.
Battery	PS1: secondary circuit, <15W	No excessive temperature	N.A.	N.A.
7.1	**Injury caused by hazardous substances**			
Body Part (e.g. Ordinary)	**Energy Source (hazardous material)**	**Safeguards**		
		Basic	**Supplementary**	**Reinforced**
Battery complies with Annex M	Li-ion battery	N.A.	N.A.	N.A.
8.1	**Mechanically-caused injury**			
Body Part (e.g. Ordinary)	**Energy Source (MS3:High Pressure Lamp)**	**Safeguards**		
		Basic	**Supplementary**	**Reinforced (Enclosure)**
Ordinary	MS1: sharp edges and corners	N.A.	N.A.	N.A.
Ordinary	MS1: equipment's mass	N.A.	N.A.	N.A.
9.1	**Thermal Burn**			
Body Part (e.g. Ordinary)	**Energy Source (TS2)**	**Safeguards**		
		Basic	**Supplementary**	**Reinforced**
Ordinary	TS1: enclosure	No excessive temperature	Enclosure is classified as V-0 material	N.A.
10.1	**Radiation**			
Body Part (e.g. Ordinary)	**Energy Source (Output from audio port)**	**Safeguards**		
		Basic	**Supplementary**	**Reinforced**
Ordinary	RS1: LED light	N.A.	N.A.	N.A.

THE RESULTS OF THE TESTS AND EXAMINATIONS			
Clause	**Requirements and parameters to be verified**	**The results of the tests and verifications**	**Ver-dict**
1	2	3	4
4	**General Requirements**		
4.1.1	Acceptance of materials, components and subassemblies	See attached Table 1	P
4.1.2	Use of components	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
4.1.3	Equipment design and construction	No accessible parts which could cause injury	P
4.1.15	Markings and instructions	See Annex F	P
4.4	Safeguards		
4.4.4	Where a solid safeguard is accessible to an ordinary person or to an instructed person, the safeguard shall comply with the relevant robustness tests as specified in 4.4.4.2 to 4.4.4.9	See below	P
4.4.4.2	Steady force tests	See Annex T	P
4.4.4.3	Drop tests	Build-in equipment	N.A.
4.4.4.4	Impact tests	Build-in equipment	N.A.
4.4.4.5	Internal accessible safeguard enclosure and barrier tests	No internal accessible safeguard	N.A.
4.4.4.6	Glass impact tests	No glass materials	N.A.
4.4.4.7	Thermoplastic material tests	Solid safeguard is accessible. Stress relief test is not required	N.A.
4.4.4.8	Air comprising a safeguard	Enclosure comply with mechanical strength tests specified in Annex T	P
4.4.4.9	Accessibility and safeguard effectiveness	After tests safeguards remain effective	P
4.5	Explosion		
4.5.2	During normal operating conditions and abnormal operation conditions, an explosion shall not occur	Explosions did not occur during normal and single fault conditions	P
4.6	Fixing of conductors		
4.6.1	Conductors shall be such that displacement cannot defeat a safeguard	Conductors connected by soldering and securely hooked in before soldering	P
4.6.2	10 N force test	Connections remain fixed securely	P
4.7	Equipment for direct insertion into mains socket - outlets		
4.7.2	Mains plug shall comply with the relevant standard for the mains plug	Not intended to be connected to the mains	N.A.
4.7.3	The additional torque that has to be applied to the socket-outlet to maintains the engagement face in the vertical plane shall not exceed 0,25 Nm	Not intended to be connected to the mains	N.A.
4.8	Products containing coin/button cell batteries		
4.8.1	These requirements apply to equipment, including remote controls, that are likely to be accessible to children and include lithium coin/button cell batteries	No coin/button cell batteries	N.A.
4.8.2	Equipment containing one or more lithium coin/button cell batteries shall have instructional safeguard	No coin/button cell batteries	N.A.
4.8.3	Equipment having a battery compartment door/cover shall be designed to reduce the possibility of children	No coin/button cell batteries	N.A.

1	2	3	4
	removing the battery		
4.8.4.2	Stress relief test according to T.8. clause	No coin/button cell batteries	N.A.
4.8.4.3	Battery compartment shall be opened and closed and battery removed and replaced 10 times.	No coin/button cell batteries	N.A.
4.8.4.4	Portable equipment having a mass of 7 kg or less are subjected to three drops from a height of 1 meter in accordance with clause T.7.	No coin/button cell batteries	N.A.
4.8.4.5	The battery compartment door/cover shall be subjected to three impacts in accordance with clause T.6.	No coin/button cell batteries	N.A.
4.8.4.6	Crush test	No coin/button cell batteries	N.A.
4.9	Likelihood of fire or shock due to entry of conductive object	No openings. See Annex P	N.A.
5	**Electrically-caused injury**		
5.2.2	Electrical energy source ES1, ES2 and ES3 limits		
5.2.2.2	An electrical energy source class is determined from both the voltage and the current under normal operating conditions, abnormal operating conditions, and single fault conditions	Voltage does not exceed ES1 voltage level. See Table 2	N.A.
5.2.2.3	Where the electrical energy source is a capacitor, the energy source is classified from both the charge voltage and the capacitance.	No such source	N.A.
5.2.2.4	Where the electrical energy source is a single pulse, the energy source is classified from both the voltage and the duration or from both the current and the duration.	No such source	N.A.
5.2.2.5	Except for pulses covered in Annex H, a repetitive pulse electrical energy source class is determined from either the available voltage or the available current.	No such source	N.A.
5.2.2.6	Where the electrical energy source is an analogue telephone network ringing signal as defined in Annex H, the energy source class is considered ES2.	No such source	N.A.
5.2.2.7	For electrical energy sources comprised of audio signals, see Clause E.1.	No audio signals	N.A.
5.3	Protection against electrical energy sources		
5.3.2.1	For ordinary persons, the following shall not be accessible: -bare parts at ES2, except for the pins of connectors. -bare parts at ES3; and an ES3 basic safeguard.	ES1 classification	N.A.
	For instructed persons, the following shall not be accessible: -bare parts at ES3; and -an ES3 basic safeguard.	ES1 classification	N.A.
5.3.2.2	Contact requirements		
	For ES3 voltages up to 420 V peak, the appropriate test probe from Annex V shall not contact a bare internal conductive part.	ES1 classification	N.A.
	For ES3 voltages above 420 V peak, the appropriate test probe from Annex V shall not contact a bare internal conductive part and shall have an air gap from that part	ES1 classification	N.A.
	The air gap shall either: a) pass an electric strength test in accordance with 5.4.9.1 at a test voltage (d.c. or peak a.c.) b) have a minimum distance according Table 9.	No accessible bare internal conductive parts	N.A.
5.3.2.4	Terminals for connecting stripped wire that are intended	No such terminals that are intended to	N.A.

1	2	3	4
	to be used by an ordinary person shall not result in contact with ES2 or ES3	be used by an ordinary person	
5.4	Insulation materials and requirements		
5.4.1.2	Properties of insulating material shall take into account the needs for electrical strength, mechanical strength, dimension, frequency of the working voltage and other properties for the working environment	See attached Table 1	P
5.4.1.4	Maximum operating temperatures for materials, components, and systems		
	Under normal operating conditions, insulating material temperatures shall not exceed the temperature limit of the EIS, including insulating materials of components. or the maximum temperature limit of the insulation system as given in Table 10.	See attached Table 6	P
5.4.1.5	The different degrees of pollution of the operating or micro-environment for products covered by this standard are given below	Pollution degree 2	P
5.4.1.5.2	A sample is subjected to the thermal cycling sequence of 5.4.1.5.3. It is allowed to cool to room temperature and is then subjected to the humidity conditioning of 5.4.8.	Pollution degree 2	N.A.
	If the test is conducted for verification of the insulating compound forming solid insulation as required by 5.4.4. 3, the conditioning is immediately followed by the electric strength test of 5.4.9.1.		N.A.
	For printed boards, compliance is checked by external visual inspection. There shall be no delamination which affects the creepage distances required to fulfil the requirements of pollution degree 1		N.A.
	For other than printed boards, compliance is checked by inspection of the cross-sectional area, and there shall be no visible voids, gaps or cracks in the insulating material.		N.A.
5.4.1.7	Insulation in circuits generating starting pulses		
	For circuits generating starting pulses exceeding ES1 (for example, to ignite a discharge lamp), the requirements for basic insulation, supplementary insulation and reinforced insulation apply to creepage distances and distances through insulation.	No such circuits	N.A.
	The clearances are determined by one of the following methods: determine the minimum clearance in accordance with 5.4.2; or		N.A.
	Conduct one of the following electric strength tests, with the connection terminals of the starting pulse circuit (for example, a lamp) shorted together: • the test given in 5.4.9.1, or • apply 30 pulses having an amplitude equal to the required test voltage given in 5.4.9.1 generated by an external pulse generator.		N.A.
	During the test, the insulation shall show no breakdown or flashover.		N.A.
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted shall be sufficiently resistant to heat if softening of the plastic could result in the failure of a safeguard.	No conductive metallic parts are directly mounted on thermoplastic parts	N.A.

1	2	3	4
	After the ballpressure test, imprint diameter shall not exceed 2 mm.		N.A.
5.4.2	Clearances		
5.4.2.1	Clearances shall be so dimensioned that the likelihood of breakdown due to: - temporary overvoltages, and - transient voltages that may enter the equipment, and - peak working voltages that are generated within the equipment, and - frequencies that are generated within the equipment is reduced.	See attached Table 7	P
5.4.2.3.2.2	For equipment to be supplied from the a.c. mains, the value of the mains transient voltage depends on the overvoltage category and the a.c. mains voltage and is given in Table 13.	Not supplied from the mains	N.A.
5.4.2.3.2.3	If an earthed d.c. power distribution system is entirely with in a single building, the transient voltage is selected according to earthing and length of the system.	No such power distribution	N.A.
5.4.2.3.2.4	The applicable value of the transient voltage that may occur on an external circuit shall be determined using Table 14.	No external circuits	N.A.
5.4.2.3.3	The required withstand voltage is equal to the transient voltage as determined in 5.4.2.3.2, except for the following cases: -If a circuit isolated from the mains is connected to a main protective earthing terminal that complies with 5.6.7 -In a circuit isolated from the mains supplied by a d.c. source with capacitive filtering, and connected to protective earth, the required withstand voltage shall be assumed to be equal to the peak value of the d.c. voltage of the source, or the peak working voltage of the circuit isolated from the mains, whichever is higher. -If equipment is supplied from a dedicated battery that has no provision for charging from the main supply without removal from the equipment, the transient voltage is zero and the required withstand voltage is equal to the peak working voltage.	Peak working voltage method was used	N.A.
5.4.2.3.4	Each clearance shall comply with the relevant value of Table 15.	Peak working voltage method was used	N.A.
5.4.2.4	The clearances shall withstand an electric strength test		N.A.
5.4.3	Creepage distances		
5.4.3.1	Creepage distances shall be so dimensioned that, for a given r.m.s. working voltage, pollution degree and material group, no flashover or breakdown of insulation (for example, due to tracking) will occur.	See attached Table 7	P
5.4.4	Solid insulation		
5.4.4.1	Solid insulation shall not break down: -due to overvoltages, including transients; and -due to pinholes in thin layers of insulation.	No requirements for ES1 class equipment	N.A.
	Solid insulation shall either: -comply with minimum distances through insulation in accordance with 5.4.4.2; or -meet the requirements and pass the tests in 5.4.4.3 to 5.4.4.7, as applicable.	No requirements for ES1 class equipment	N.A.

1	2	3	4
5.4.4.2	Except where another subclause of Clause 5 applies, distances through insulation shall be dimensioned according to the application of the insulation and as follows: -if the working voltage does not exceed ES2 voltage limits, there is no requirement; -if the working voltage exceeds ES2 voltage limits: -for basic insulation, no minimum distance through insulation is specified; -for supplementary insulation or reinforced insulation comprised of a single layer – 0,4 mm; -for supplementary insulation or reinforced insulation comprised of multiple layers, the minimum distance through insulation shall comply with 5.4.4.6.	No requirements for ES1 class equipment	N.A.
5.4.4.3	There is no minimum internal clearance or creepage distance required if: -the insulating compound completely fills the casing of a component or subassembly; and -the component or subassembly meets the minimum distances through insulation of 5.4.4.2; and -single sample passes the tests of 5.4.1.5.2.	No insulating compound forming solid insulation	N.A.
5.4.4.4	Solid insulation in semiconductor devices		
	There is no minimum internal clearance or creepage distance, and no minimum distance through insulation for supplementary insulation or reinforced insulation consisting of an insulating compound completely filling the casing of a semiconductor component provided that the component:		
	passes the type tests and inspection criteria of 5.4. 7; and passes routine tests for electric strength during manufacturing, using the appropriate test in 5.4.9.1; or		N.A.
	complies with Clause G.12.		N.A.
	Such constructions containing cemented joints shall also comply with 5.4.4 .5.		N.A.
5.4.4.5	Where the path between conductive parts is filled with insulating compound, and the insulating compound forms a cemented joint between two non-conductive parts or between a non-conductive part and itself, one of the following a), b) or c) applies.		
	a) The distance along the path between the two conductive parts shall be not less than the minimum clearances and creepage distances for pollution degree 2	No requirements for functional insulation	N.A.
	b) The distance along the path between the two conductive parts shall not be less than the minimum clearances and creepage distances for pollution degree 1	Pollution degree 2	N.A.
	c) The requirements for distance through insulation of 5.4.4.2 apply between the conductive parts along the joint.	Working voltage does not exceeds ES2 limits	N.A.
5.4.4.6	Thin sheet material		
5.4.4.6.1	Insulation in thin sheet materials may be used for supplementary insulation and reinforced insulation, irrespective of the distance through insulation, provided that: -two or more layers are used; and -the insulation is within the equipment enclosure; and -the insulation is not subject to handling or abrasion during ordinary person or instructed person servicing; and -the requirements and tests of 5.4.4.6.2 (for separable	No thin sheet materials	N.A.

1	2	3	4
	layers) or 5.4.4.6.3 (for nonseparable layers) are met.		
5.4.4.6.2	For separable thin sheet material in addition to the requirements of 5.4.4.6.1, for supplementary insulation or reinforced insulation it shall pass respective electric strength test.	No thin sheet materials	N.A.
5.4.4.6.3	For insulation consisting of non-separable thin sheet materials, in addition to the requirements of 5.4.4.6.1, the test procedures in Table 20 are applied.		N.A.
5.4.4.6.4	For non-separable layers, electric strength tests are applied in accordance with 5.4.9.1 to all layers together.		N.A.
5.4.4.7	Basic insulation, supplementary insulation, or reinforced insulation in a wound component may be provided by: -the insulation on wound components (see Clause G.5); or -the insulation on other wire (see Clause G.6); or -a combination of the two.		N.A.
	Wound components containing cemented joints shall also comply with 5.4.4.5.	No requirements for functional insulation	N.A.
	Planar transformers shall comply with the requirements of Clause G.13.	No planar transformers	N.A.
5.4.4.9	Solid insulation requirements at frequencies higher than 30 kHz.		N.A.
5.4.6	Insulation of internal wire as a part of a supplementary safeguard		
	Where wire insulation is used as part of a supplementary insulation system and the wire insulation is accessible to an ordinary person: -the wire insulation does not need to be handled by the ordinary person; and -the wire is placed such that the ordinary person is unlikely to pull on it, or the wire shall be so fixed that the connecting points are relieved from strain; and -the wire is routed and fixed such as not to touch unearthed accessible conductive parts; and -the wire insulation passes the electric strength test of 5.4.9.1 for supplementary insulation; and -the distance through the wire insulation shall be at least as given in Table 25	No accessible wires to an ordinary person	N.A.
5.4.7	Tests for semiconductor components and for cemented joints	No requirements for functional insulation	N.A.
	The three samples are then tested as follows: - one of the samples is subjected to the electric strength test of 5.4.9.1, - the other samples are subjected to the relevant electric strength test of 5.4.9.1 after the humidity conditioning of 5.4.8,		N.A.
	Except for cemented joints on the same inner surface of a printed board, compliance is checked by inspection of the cross-sectional area, and there shall be no visible voids, gaps or cracks in the insulating material.		N.A.
5.4.8	Humidity conditioning	Conditioned at 30 °C; RH 93%; 48h	P
5.4.9	Electric strength test	Not required for functional insulation	N.A.
5.4.10	Safeguards against transient voltages from external circuits		
5.4.10.1	Adequate electrical separation shall be provided between external circuits of equipment as indicated in Table 14, ID number 1, Figure 30 and:		P

1	2	3	4
	a) non-conductive parts and unearthed conductive parts of the equipment expected to be held or otherwise maintained in continuous contact with the body during normal use		N.A.
	b) accessible parts and circuitry, except for the pins of connectors. However, such pins shall not be accessible under normal operating conditions by the blunt probe of Figure V.3;	Adequate electrical separation is provided. Passed 1,0±0,040kV steady state voltage test between antenna terminal and enclosure.	P
	c) another ES1 or ES2 part separated from the external circuit. The requirement for separation applies whether or not the ES1 or ES2 part is accessible.		N.A.
5.4.10.2.2	The electrical separation is subjected to ten impulses of alternating polarity. The interval between successive impulses is 60 s with a voltage as given in Table 29.	Steady state voltage method was used	N.A.
5.4.10.2.3	The electrical separation is subjected to an electric strength test according to 5.4.9.1, with a voltage as given in Table 29.	1,0±0,040kV voltage was applied	P
5.4.10.3	During the tests of 5.4.10.2.2 and 5.4.10.2.3: - there shall be no insulation breakdown; and - a surge suppressor shall not operate, or a sparkover shall not occur within a GDT.	No insulation breakdown occurred	P
5.4.11	Separation between external circuits and earth		
5.4.11.1	These requirements apply only to equipment intended to be connected to external circuits indicated in Table 14, ID numbers 1 and 2.	No such external circuits	N.A.
5.4.11.3	Compliance is checked by inspection and by the electric strength test of 5.4.9.1. Components that are left in place during the test shall not be damaged.	No such external circuits	N.A.
5.5	Components as safeguards	See Annex G	P
5.5.1	A component used as a safeguard shall: -comply with all the applicable requirements for that safeguard; and -be used within its rating.	See Annex G	P
5.5.2	Capacitors and RC units		
5.5.2.1	Capacitors and RC units that serve as (electrical) safeguards shall comply with IEC 60384-14. RC units may consist of discrete components.	No such safeguards	N.A.
	Capacitors or RC units with one or multiple capacitors shall: -comply with Clause G.11, -pass the electric strength test of 5.4.9.1		N.A.
5.5.2.2	Where a capacitor voltage becomes accessible upon disconnection of a connector the accessible voltage measured 2 s after disconnection of the connector, shall comply with: - the ES1 limits of Table 5 under normal operating conditions for an ordinary person; and - the ES2 limits of Table 5 under normal operating conditions for an instructed person; and - the ES2 limits of Table 5 under single fault conditions for both an ordinary person and an instructed person.	No such voltage	N.A.
5.5.3	Transformers used as a safeguard shall comply with G.5.3. - Insulation test from clause 5; and - overcharge test.	No such transformers	N.A.

1	2	3	4
5.5.4	Insulation of optocouplers used as a safeguard shall comply with the requirements of 5.4 or with Clause G.12.		N.A.
5.5.5	Insulation of relays used as a safeguard shall comply with the requirements of 5.4.	No relays used as a safeguard	N.A.
5.5.6	The requirements below apply to resistors: - used as a safeguard; or - that bridge basic insulation, supplementary insulation or reinforced insulation.	No such components	N.A.
	A single resistor or a group of resistors shall comply with clearance and creepage distance requirements of 5.4 .2 and 5.4.3		N.A.
	A single resistor used as a reinforced safeguard or bridging a reinforced insulation shall comply with G.10.1 and the test of G.10.2.		N.A.
5.5.7	SPDs		
5.5.7.1	Where a varistor is used between the mains and earth: - the earth connection shall comply with 5.6.7; and - the varistor shall comply with Clause G.8.	No varistors	N.A.
	G.8.2, If varistor protects against shock, it shall comply with impulse test		N.A.
	G.8.3 If varistor protects against fire, it shall comply with overvoltage tests.		N.A.
5.5.7.2	Where an SPD is used between the mains and protective earth, it shall consist of a varistor and a GOT connected in series, where the following applies: - the varistor shall comply with Clause G.8; - the GOT shall comply with: • the electric strength test of 5.4.9.1 for basic insulation; and • the external clearance and creepage distance requirements of 5.4.2 and 5.4.3 respectively for basic insulation.	No varistors	N.A.
5.5.8	The insulation between the mains and the connection to a coaxial cable, including any resistor in parallel with this insulation, shall be able to withstand surges from the external circuit and from the mains	No such connections	N.A.
5.6	Protective conductor		
5.6.2.1	Protective conductors shall not contain switches, current limiting devices or overcurrent protective devices.	No protective conductors	N.A.
	The current-carrying capacity of protective conductors shall be adequate for the duration of the fault current under single fault conditions.		N.A.
	The connections for the protective conductors shall make earlier and shall break later than the supply connections in each of the following:		
	a connector (on a cable) or a connector attached to a part or a subassembly that can be removed by other than a skilled person;		N.A.
	a plug on a power supply cord;		N.A.
	an appliance coupler.		N.A.
5.6.2.2	The insulation of the protective earthing conductor shall be green-and-yellow.	No protective earthing	N.A.
5.6.3	Protective earthing conductors shall comply with the minimum conductor sizes in Table G.5.	No protective earthing	N.A.

1	2	3	4
	A protective earthing conductor serving as a reinforced safeguard may be used on pluggable equipment type B or on permanently connected equipment only and shall: - be included in and protected by a sheathed supply cord that complies with G.7.1 and which is not lighter than heavy duty; or - have a minimum conductor size not less than 4 mm^2 if not protected from physical damage; or - have a minimum conductor size not less than 2,5 mm^2 if protected from physical damage; or - be protected by a conduit intended to be connected to the equipment and have a minimum size in accordance with Table 30.		N.A.
5.6.4.1	Protective bonding conductors of parts required to be earthed for safety purposes shall comply with one of the following:		
	the minimum conductor sizes in Table G.5; or		N.A.
	the requirements of 5.6.6 and, if the rated current of the equipment or the protective current rating of the circuit is more than 25 A, with the minimum conductor sizes in Table 31; or	No protective earthing	N.A.
	the requirements of 5.6.6 and, if the rated current of the equipment or the protective current rating of the circuit does not exceed 25 A; either • with the minimum conductor sizes in Table 31; or • with the limited short-circuit test of Annex R;		N.A.
	for components only, be not smaller than the conductors supplying power to the component.		N.A.
5.6.4.3	The current limiting device shall not be connected in parallel with any other component that could fail to a low-resistance state.	Fuse is not connected in parallel with any other component	P
5.6.5	Terminals for protective conductors		
5.6.5.1	Terminals for connecting protective earthing conductors shall comply with the minimum terminal sizes in Table 32 and one of the following:		
	the minimum terminal sizes in Table 32; or	No protective conductors	N.A.
	the requirements of 5.6.6 and, if the rated current of the equipment or the protective current rating of the circuit is more than 25 A, with the minimum conductor sizes in Table 32; or		N.A.
	the requirements of 5.6.6 and, if the rated current of the equipment or the protective current rating of the circuit does not exceed 25 A; either • with the minimum conductor sizes in Table 32; or • with the limited short-circuit test of Annex R;		N.A.
	for components only, be not smaller than the conductors supplying power to the component.		N.A.
5.6.5.2	Conductive parts in contact at the main protective earthing terminal, protective bonding terminals and connections shall be selected in accordance with Annex N so that the potential difference between any two different metals is 0,6 V or less.	No protective earthing	N.A.
5.6.6	Resistance of the protective bonding system		
5.6.6.1	Protective bonding conductors that meet the minimum conductor sizes in Table G.5 throughout their length and whose terminals all meet the minimum sizes in Table 32 are considered to comply without test.	No protective conductors	N.A.

1	2	3	4
	Where the protective current rating is less than 25 A, the resistance of the protective bonding system, calculated from the voltage drop, shall not exceed 0,1 Ω.		N.A.
5.6.7	For cord connected mains equipment, earthing is also considered to be reliable for: - pluggable equipment type B; or - stationary pluggable equipment type A, • that is intended to be used in a location having equipotential bonding (such as a telecommunication centre, a dedicated computer room, or a restricted access area); and • has installation instructions that require verification of the protective earthing connection of the socket-outlet by a skilled person; or - stationary pluggable equipment type A that has provision for a permanently connected protective earthing conductor, including instructions for the installation of that conductor to building earth by a skilled person.	No protective earthing	N.A.
5.7	Prospective touch voltage, touch current and protective conductor current		
5.7.3	The equipment set-up, equipment supply connections and equipment earthing shall be in accordance with Clause 4, 5.3 and 5.4 of I EC 60990: 1999.		N.A.
5.7.4	At least one earthed accessible conductive part shall be tested for touch current following supply connection faults in accordance with 6.1 and 6.2.2 of IEC 60990:1999	No protective earth	N.A.
5.7.5	The protective conductor current shall not exceed the ES2 limits in 5.2.2.2, unless all the following conditions are met: -the current shall not exceed 5 % of the input current measured under normal operating condttions; - the construction of the protective conductor circuit and its connections shall have: • a protective earthing conductor serving as a reinforced safeguard or two independent protective earthing conductors serving as double safeguard as specified in 5.6.3, and • a reliable earthing as specified in 5.6.7.	No protective conductor	N.A.
	The elements of the instructional safeguard shall be as follows: - element 1 IEC 60417-6042, and IEC 60417-6173, and IEC 60417-5019 - element 2: "Caution" or equivalent word or text, and "High touch current" or equivalent text - element 3: optional - element 4: "Connect to earth before connecting to supply" or equivalent text		N.A.
5.7.6	Prospective touch voltage and touch current due to external circuits		
5.7.6.1	For external circuits connected to a coaxial cable, the manufacturer shall provide instructions to connect the shield of the coaxial cable to building earth in accordance with 6.2 g) and 6.2 I) of IEC 60728-11:2005.	No such external circuits connected to building earth	N.A.

1	2	3	4
5.7.6.2	For external circuits ID 1 of Table 14: - the prospective touch voltage shall comply with ES2; or - the touch current shall not exceed 0,25 mA	No such external circuits	N.A.
5.7.7	Summation of touch currents from external circuits		
	The summation of touch currents from equipment that provides multiple external circuits, shall not exceed the limits for ES2 (see Table 4).	No such external circuits	N.A.
	The following requirements, a) or b) as applicable, shall be met:		
	a) Equipment with earthed external circuit. For equipment in which each external circuit is connected to a terminal for the protective earthing conductor of the equipment, the following items 1), and 2) shall be considered: 1) If S(I1) (not including 12) exceeds ES2 limits of Table 4: - the equipment shall have provision for a permanent connection to protective earth in addition to the protective earthing conductor in the power supply cord of pluggable equipment type A or pluggable equipment type B; and - the installation instructions shall specify the provision of a permanent connection to protective earth with a cross-sectional area of not less than 2,5 mm^2, if mechanically protected, or otherwise 4,0 mm^2; and - provide a marking in accordance with 5.7.5 and Clause F.3.	No such external circuits connected to building earth	N.A.
	b) Equipment whose external circuit have no reference to protective earth. - If each external circuit does not have a common connection, the touch current for each external circuit shall not exceed ES2 limits of Table 4. - If all external circuits or any groups of such ports have a common connection, the total touch current from each common connection shall not exceed ES2 limits of Table 4.	External circuit pin connections are not accessible during normal use	N.A.
6	**Electrically-caused fire**		
6.1	To reduce the likelihood of injury or property damage due to an electrically-caused fire originating within the equipment, equipment shall be provided with the safeguards specified in Clause 6.	No risk of electrically-caused fire in PS1 equipment	N.A.
6.2.2.1	The electrical power source classification shall be determined by measuring the maximum power under each of the following conditions: - for load circuits: a power source under normal operating conditions as specified by the manufacturer into a worst-case fault (see 6.2.2.2); - for power source circuits: a worst-case power source fault into the specified normal load circuit (see 6.2 .2.3).		P
6.2.2.2	Power measurement for worst-case fault	See attached Table 15	P
6.2.2.3	Power measurement for worst-case power source fault	See attached Table 15	P
6.2.2.4	Circuit power source class PS1	Secondary circuit. See attached Table 15	P
6.2.2.5	Circuit power source class PS2	No such circuits	N.A.
6.2.2.6	Circuit power source class PS3	No such circuits	N.A.
6.2.3	Classification of potential ignition sources		

1	2	3	4
6.2.3.1	Arcing PIS	Arcing PIS does not exist in PS1 circuit	N.A.
6.2.3.2	Resistive PIS	Resistive PIS does not exist in PS1 circuit	N.A.
6.3	Safeguards against fire under normal operating conditions and abnormal operating conditions		
	Under normal operating conditions and abnormal operating conditions, the following basic safeguards are required: - ignition shall not occur; and - no part of the equipment shall attain a temperature value greater than 90 % of the spontaneous ignition temperature limit; and -combustible materials for components and other parts outside fire enclosures, shall have a material flammability class of at least: HB75, HB40 or HBF	See attached Table 6 for temperature measurements. See attached Table 1 for materials flammability class	P
6.4	Safeguards against fire under single fault conditions		
6.4.1	There are two methods of providing protection. Either method may be applied to different circuits of the same equipment under the following conditions:		
	Reduce the likelihood of ignition: Equipment is so designed that under single fault conditions no part shall have sustained flaming.	No supplementary safeguards are needed for protection against PS1. PS1 is not considered to contain enough energy to result in ignition	N.A.
	Control fire spread: Selection and application of supplementary safeguards for components, wiring, materials and constructional measures that reduce the spread of fire and, where necessary, by the use of a second supplementary safeguard.	No supplementary safeguards are needed for protection against PS1. PS1 is not considered to contain enough energy to result in ignition	N.A.
6.4.3.2	For PS2 and PS3 circuits, the likelihood of ignition can be reduced by using the following supplementary safeguards as applicable:		
	providing separation from an arcing PIS or a resistive PIS as specified in 6.4.7;	Classified as PS1 circuit	N.A.
	using protective devices that comply with G.3.1 to G.3.4 or the relevant IEC component standards for such devices;		N.A.
	using components that comply with G.5.3, G.5.4 or the relevant IEC component standard;		N.A.
	for components associated with the mains, using components that comply with the relevant IEC component standards and requirements of other parts of this standard.		N.A.
6.4.3.3	If the temperature is limited by a fuse, under a single fault condition: - a fuse complying with the IEC 60127 series shall open within 1 s; or - a fuse not complying with the IEC 60127 series shall open within 1 s for three consecutive times; or - the fuse shall comply with the following test.	Temperature is not limited by a fuse	N.A.
6.4.5	Control of fire spread in PS2 circuits		
6.4.5.2	For conductors and devices that constitute a PIS the following apply: - printed boards shall be made of V-1 class material or VTM-1 class material; - wire insulation and tubing shall comply with IEC 60332-1-2, IEC 60332-1-3, IEC 60332-2-2 or IEC/TS 60695-11-21;	No PS2 circuits	N.A.
	All other components in a PS2 circuit shall:	Classified as PS1 circuit	N.A.

1	2	3	4
	- be mounted on V-1 class material or VTM-1 class material; or - be made of V-2 class material, VTM-2 class material or HF-2 class foamed material; or - have a mass of combustible material of less than 4 g, provided that when the part is ignited, the fire does not spread to another part; or - be separated from PIS by the requirements of 6.4.7; or - not ignite during single fault conditions as specified in 6.4 .3.3; or - comply with the requirements of the relevant IEC component standard; or - comply with G.5.4 for motors; or - comply with G.5.3 for transformers; or - be in a sealed enclosure of 0,06 m^3 or less, consisting totally of non-combustible material and having no ventilation openings.		
6.4.6	Control of fire spread in a PS3 circuit		
	Fire spread in PS3 circuits shall be controlled by applying all of the following supplementary safeguards:		
	conductors and devices within a PS3 circuit shall meet the requirements of 6.4.5;	Classified as PS1 circuit	N.A.
	devices subject to arcing or changing contact resistance (for example, pluggable connectors) shall comply with one of the following: • have materials made of V-1 class material, or • comply with the flammability requirements of the relevant IEC component standard, or • be mounted on material made of V-1 class material and be of a volume not exceeding 1 750 mm^3;	No such components	N.A.
	by providing a fire enclosure as specified in 6.4.8		N.A.
6.4.7	Separation of combustible materials from a PIS		
6.4.7.1	The minimum separation requirements between a PIS and combustible materials. To reduce the likelihood of sustained flaming or spread of fire, may be achieved by either separation by distance or separation by a barrier.	No arcing or resistive PIS in PS1 circuit	N.A.
6.4.7.2	Separation by distance		
	Combustible material, except the material on which the PIS is mounted, shall be separated from an arcing PIS or a resistive PIS according to Figure 37, Figure 38, Figure 39 and Figure 40.	No arcing or resistive PIS in PS1 circuit	N.A.
	When the distance between a PIS and combustible materials is less than specified in Figure 37, Figure 38 and Figure 39 as applicable, the combustible materials shall: - have a mass of less than 4 g provided that when the part is ignited, the fire does not spread to another part; or - requirements of the relevant IEC component standard; or - be made of V-1 class material, VTM-1 class material or HF-1 class foamed material, or comply with IEC 60695-11-5		N.A.

1	2	3	4
6.4.7.3	Separation by a fire barrier: Combustible material shall be separated from an arcing PIS or a resistive PIS by a fire barrier	No arcing or resistive PIS in PS1 circuit	N.A.
	Printed boards can be considered to be a fire barrier against a resistive PIS provided that the following conditions are met:		N.A.
	the printed board shall: • comply with the flammability test Clause S.1 as used in the application; or • be made of V-1 class material, VTM-1 class material or HF-1 class foamed material;		N.A.
	within the restricted volume, no materials rated less than V-1 class material shall be mounted on the same side of a printed board as the resistive PIS;		N.A.
	within the restricted volume, the printed board shall have no PS2 conductors or PS3 conductors.		N.A.
6.4.8	Fire enclosures and fire barriers		
6.4.8.2.1	A fire barrier shall comply with the requirements of Clause S.1. Or made of non-combustible material.	No fire barrier	N.A.
6.4.8.2.2	For circuits where the available power does not exceed 4 000 W, a fire enclosure shall comply with the requirements of Clause S.1. Or made of non-combustible material.	Circuit does not have potential ignition sources, therefore fire enclosure is unnecessary	N.A.
	For circuits where the available power exceeds 4 000 W, a fire enclosure shall comply with the requirements of Clause S.5.	Power does not exceed 4000 W	N.A.
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		
6.4.8.3.1	Openings in a fire enclosure or in a fire barrier shall be of such dimensions that fire and products of combustion passing through the openings are not likely to ignite material on the outside of the enclosure or on the side of a fire barrier opposite to the PIS.		N.A.
6.4.8.3.2	A fire barrier shall have dimensions sufficient to prevent ignition of the edges of the barrier. The edges of the fire barriers shall extend to beyond the fire cone.	No fire barrier	N.A.
6.4.8.3.3	Top opening properties of a fire enclosure and a fire barrier shall apply to openings above a PIS.	No PIS in PS1 circuit	N.A.
	No test is required provided that the openings do not exceed: - 5 mm in any dimension, or - 1 mm in width regardless of length.		N.A.
6.4.8.3.4	Bottom opening properties of a fire enclosure and a fire barrier shall apply to openings that are located in the volume.	No PIS in PS1 circuit	N.A.
	Bottom openings shall comply with Clause S.3.		N.A.
	No test is necessary provided that dimensions are sufficient		N.A.
6.4.8.3.5	Integrity of the fire enclosure		
	If part of a fire enclosure consists of a door or cover that can be opened by an ordinary person, the door or cover shall comply with one of:	Circuit does not have potential ignition sources, therefore fire enclosure is unnecessary	N.A.
	a) the door or cover shall be interlocked and comply with the safety interlock requirements;		N.A.

1	2	3	4
	b) a door or cover, intended to be routinely opened by the ordinary person, shall not be removable from other parts of the fire enclosure by the ordinary person and it shall be provided with a means to keep it closed during normal operating conditions;		N.A.
	c) a door or cover intended only for occasional use by the ordinary person, such as for the installation of accessories, may be removable if an instructional safeguard is provided for correct removal and reinstallation of the door or cover.		N.A.
6.4.8.4	A fire enclosure or fire barrier made of combustible material shall: - have a minimum distance of 13 mm to an arcing PIS; and - have a minimum distance of 5 mm to a resistive PIS.	No arcing or resistive PIS in PS1 circuit	N.A.
6.5	Internal and external wiring		
	For conductors with a cross-sectional area of 0,5 mm^2 or greater, the test methods in IEC 60332-1-2 and IEC 60332-1-3 shall be used.	No requirements for conductors in PS1 circuit	N.A.
	If cross-sectional area is less than 0,5 mm^2, the test methods in IEC 60332-2-2 shall be used.	No requirements for conductors in PS1 circuit	N.A.
6.5.3	Requirements for interconnection to building wiring		
	Equipment intended to provide power over the wiring system to remote equipment shall limit the output current to a value that does not cause damage to the wiring system, due to overheating, under any external load condition.	Not intented to supply power to other equipment	N.A.
	PS2 circuits or PS3 circuits that provide power and that are intended to be compatible with LPS to external circuits shall have their output power limited to values that reduce the likelihood of ignition within building wiring or external devices located in a different room.		N.A.
6.6	Where it is unknown that the connected equipment or accessories are likely to comply with this standard, the delivered power shall be limited to PS2 or shall comply with Clause Q.1.	Not intented to supply power to other equipment	N.A.
7	**Injury caused by hazardous substances**		
7.1	To reduce the likelihood of injury due to exposure to hazardous substances, equipment shall be provided with the safeguards specified in Clause 7.	No hazardous substances within the equipment	N.A.
7.2	The exposure to hazardous substances shall be reduced.	No hazardous substances within the equipment	N.A.
	Reduction of exposure to hazardous substances shall be controlled by using containment of the hazardous substances.		N.A.
	Containers shall be sufficiently robust and shall not be damaged or degraded by the contents over the lifetime of the product.		N.A.
7.3	For equipment that produces ozone, the installation and operating instructions shall indicate that precaution shall be taken to ensure that the concentration of ozone is limited to a safe value.	Equipment does not produce ozone	N.A.
7.4	Where safeguards, such as containment of a chemical, are not practical, a personal safeguard and its use shall be specified in the instructions that are provided with	No hazardous substances within the equipment	N.A.

1	2	3	4
	the equipment.		
7.5	Where a hazardous substance is capable of causing an injury, instructional safeguards and instructions shall be applied to the equipment.	No hazardous substances within the equipment	N.A.
7.6.	Batteries and their protection circuits shall comply with Annex M.	Complies with Annex M	P
8	**Mechanically-caused injury**		
8.1	To reduce the likelihood of injury due to exposure to mechanical hazards, equipment shall be provided with the safeguards specified in Clause 8.	Safeguards are provided	P
8.2	Mechanical energy source class	Sharp edges and corners classified as MS1; Equipment mass is classified as MS1;	P
8.3	An instructional safeguard shall be provided for MS2 that is not obvious to an instructed person or for MS3 that is not obvious to a skilled person.	Classified as MS1	N.A.
8.4	Safeguards against parts with sharp edges and corners		
	Where a sharp edge or corner is required to be accessible for the function of the equipment: - any potential exposure shall not be life threatening; and - the sharp edge or corner shall be obvious to an ordinary person or an instructed person when exposed; and - the sharp edge shall be guarded as much as practicable; and - an instructional safeguard shall be provided.	Accessible edges and corners of the equipment are rounded and are classified as MS1	P
	The elements of the instructional safeguard shall be as follows: - symbol IEC 60417-6043; - text "Sharp edges" or equivalent; - "do not touch" or equivalent text.		N.A.
8.5.1	Safeguards against moving parts		
	If a safety interlock is used as safeguard, it shall comply with Annex K. The movement of the part shall be reduced to MS1 before the part is accessible.	No moving parts	N.A.
	Where the likelihood exists that fingers, jewellery, clothing, hair, etc., can come into contact with moving MS2 or MS3 parts, an equipment safeguard shall be provided to prevent entry of body parts or entanglement of such items.		N.A.
	If a moving MS2 part is required to be accessible for the function of the equipment to an ordinary person or a moving MS3 part to an ordinary person or an instructed person:		
	- any exposure shall not be life threatening; and - the moving part shall be obvious when exposed; and - the moving part shall be guarded as much as practicable; and - an instructional safeguard as given in 8.5.2 shall be used; and - for MS3, a manually activated stopping device shall be clearly visible and placed in a prominent position within 750 mm of the MS3 part.	No moving parts	N.A.
	Moving MS3 parts: - that are only accessible to a skilled person; and - where the MS3 moving part is not obvious (for		N.A.

1	2	3	4
	example, a device having intermittent movement), shall have an instructional safeguard as given in 8.5.2.		
8.5.2	An instructional safeguard shall be provided to reduce the likelihood of unintentional contact with a moving part.	No moving parts	N.A.
	The elements of the instructional safeguard shall be as follows: - symbols IEC 60417-6056 and IEC 60417-6057, where applicable - "Moving parts" or "Moving fan blade" as applicable, or equivalent text - "Keep body parts away from moving parts" as applicable, or equivalent text		N.A.
8.5.4.2	Equipment having an electromechanical device for destruction of media		
	Equipment shall be provided with safeguards so that MS3 moving parts are not accessible to the appropriate jointed test probe	No moving parts	N.A.
8.5.4.2.2	For equipment installed where children may be present, an instructional safeguard shall be provided	No moving parts	N.A.
	The elements of the instructional safeguard shall be as follows: - symbol IEC 60417-6057 - "This equipment is not intended for use by ch ildren" and "Avoid touching the media feed open ing with the hands, clothing or hair" and "Unplug this equipment when not in use for an extended period of time" or equivalent text		N.A.
8.5.4.2.3	An isolating switch complying with Annex L shall be provided to disconnect power to MS3 moving parts.	No moving parts	N.A.
8.5.4.2.5	The test probe shall not contact any moving part when tested.	No moving parts	N.A.
8.5.5	The containment mechanism for high pressure lamps that are considered MS3, shall have adequate strength to contain an explosion of the lamp so as to reduce the likelihood of injury to an ordinary person or instructed person during normal use, or lamp assembly replacement, as appropriate.	No high pressure lamps	N.A.
8.6	Stability of equipment		
8.6.1	Equipment shall comply with the requirements and tests given in 8.6.2, 8.6.3, 8.6.4 and 8.6.5.	No stability requirements for MS1 equipment	N.A.
	MS2 and MS3 television sets shall have an instructional safeguard		N.A.
	The elements of the instructional safeguard shall be as follows: - “Stability Hazard" or equivalent word - "The television set may fall, causing serious personal injury or death" or equivalent text - “Never place a television set in an unstable location” or similar text		N.A.
8.6.2	Static stability		
8.6.2.2	Equipment shall not tip over when a force applied in any direction, except upwards, to any point on the equipment in such a way as to produce the maximum overturning moment.	No stability requirements for MS1 equipment	N.A.
8.6.2.3	Equipment shall not tip over when a force applied		N.A.

1	2	3	4
	downwards in such a way as to produce the maximum overturning moment.		
8.6.3	Relocation stability test		
8.6.3.2	The equipment shall not tip over during the test when tilted or rotated.	No stability requirements for MS1 equipment	N.A.
8.6.4	Glass slide test		
	Equipment shall be so constructed that it will not slide or tip over on a supporting surface made of glass.	No stability requirements for MS1 equipment	N.A.
8.6.5	Horizontal force test and compliance criteria		
	The equipment is to be placed on a horizontal non-skid surface and external force is applied to the point on the equipment that will result in the least stability	No stability requirements for MS1 equipment	N.A.
8.7	Equipment mounted to a wall or ceiling		
8.7.2	The test force applied to single or multiple attachment points. If attachment points are threaded, torque shall be used.	No requirements for MS1 equipment	N.A.
8.7.3	The equipment or its associated mounting means shall not become dislodged and shall remain mechanically intact and secure during the test.	No requirements for MS1 equipment	N.A.
8.8	Handle strength		
8.8.2	A handle that is declared by the manufacturer for the purpose of lifting or carrying the equipment shall comply with the weight load tests.	No handles	N.A.
	As a result of the test, the handle, its securing means, or that portion of the enclosure to which it is secured, shall not break, crack, or detach from the equipment.		N.A.
8.9	Wheels or casters attachment requirements		
	The likelihood of MS3 and some MS2 equipment, including carts, stands and similar carriers that support the equipment, from tipping over during movement shall be reduced.	No wheels or casters	N.A.
8.9.2	During the pull force test, the wheels or casters shall not be damaged or pull free from its securing means.	No wheels or casters	N.A.
8.10	Carts, stands, and similar carriers		
8.10.1	The equipment shall be stable with the cart, stand or similar carrier.	No carts or stands	N.A.
8.10.2	A cart, stand or similar carrier shall be provided with an instructional safeguard	No carts or stands	N.A.
	The elements of the instructional safeguard shall be as follows: - "Caution" or equivalent text - "This (cart, stand, or carrier) is intended for use only with (manufacturer's name), (model number or series), (equipment name)." or equivalent text - "Use with other equipment may result in instability causing injury" or equivalent text		N.A.
8.10.3	A cart, stand or carrier shall be constructed so that permanent deformation or damage that is capable of resulting in injury to a person, does not occur when it is subjected to a force	No carts or stands	N.A.
8.10.4	When tested to impact as described below, a cart, stand or carrier shall not produce a risk of injury to persons.	No carts or stands	N.A.
8.10.5	A cart, stand or carrier, including floor standing types, shall be subjected to mechanical tests. The equipment	No carts or stands	N.A.

1	2	3	4
	and cart or stand shall not tip over.		
8.10.6	An equipment, cart, stand or carrier using thermoplastic materials in its construction shall withstand the stress relief test without any shrinkage, warpage, or other distortion of the thermoplastic materials that results in the equipment failing to comply with 8.10.3, 8.10.4 and 8.10.5.	No carts or stands	N.A.
8.11	Mounting means for rack mounted equipment		
8.11.3	Mounting means for rack mounted equipment shall wiothstand mechanical strength test. A marking shall be provided on the shelf to indicate the maximum weight that can be added to the shelf.	Not rack mounted equipment	N.A.
8.11.4	Mounting means for rack mounted equipment shall wiothstand mechanical strength test. including end stops.	Not rack mounted equipment	N.A.
8.11.5	The mounting means shall not bend or buckle to any extent that could introduce an injury. End stops shall retain the SRME in a safe position and shall not allow the SRME to slide past the end of the slide-rails.	Not rack mounted equipment	N.A.
8.12	Telescoping or rod antennas		
	A telescoping or rod antenna shall be provided with a minimum 6,0 mm diameter button or ball on the end. An antenna end piece and the sections of a telescoping antenna shall be secured in such a manner as to prevent removal.	No telescoping or rod antennas	N.A.
9	**Thermal burn injury**		
9.1	To reduce the likelihood of painful effects and injury due to thermal burns, equipment shall be provided with the safeguards specified in Clause 9.	Safeguards are provided	P
9.2	Thermal energy source classifications	All accessible surfaces are classified as TS1. See attached Table 6	P
9.2.6	Touch temperature levels	See attached Table 6	P
9.3	For protection of an ordinary person against TS2, an instructional safeguard in accordance with 9.4.2 may be used as basic safeguard.	Accessible surfaces classified as TS1	N.A.
	Parts and surfaces classed TS3 shall be provided with an equipment safeguard or provided with an instructional safeguard so that unintentional contact with such parts and surfaces during service operations is unlikely to cause the skilled person to recoil into other class 3 energy sources		N.A.
9.4.2	An instructional safeguard shall be provided		
	The elements of the instructional safeguard shall be as follows: - IEC 60417-5041 - "CAUTION" and "Hot surface" or equivalent word or text - "Do not touch" or equivalent text	Accessible surfaces classified as TS1	N.A.
B	**Normal operating condition tests, abnormal operating condition tests and single fault condition tests**		
B.2	Normal Operating Conditions		
B.2.1	General requirements	The most unfavourable normal operating condition supply voltage was applied	P
B.2.3	Supply voltage and tolerances	9 VDC is the most unfavourable supply voltage	P

1	2	3	4
B.2.5	*Input test (non-accredited test method)*	See attached Table 19	P
B.3	Simulated abnormal operating conditions		
B.3.1	General requirements	No abnormal operating conditions	N.A.
B.3.2	Covering of ventilation openings	No ventilation openings	N.A.
B.3.3	DC mains polarity test	Not intended to be connected to DC mains	N.A.
B.3.4	Setting of voltage selector	No voltage selector	N.A.
B.3.5	Maximum load at output terminals	No output terminals supplying power	N.A.
B.3.6	Reverse battery polarity	Not possible to insert battery with reversed polarity	N.A.
B.3.7	Audio amplifier abnormal operation conditions		N.A.
B.3.8	Safeguards functional during and after abnormal operating conditions	No abnormal operating conditions	N.A.
B.4	Simulated single fault conditions		
B.4.3	Motor tests	No motors	N.A.
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature	No motors	N.A.
B.4.4	Short circuit for functional insulation	No hazards arise. See Table 21	P
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	No hazards arise when capacitor is short-circuited. See Table 21	P
B.4.7	Continuous operation of components	No such components	N.A.
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions	ES1 circuit is within limits during and after single fault conditions	P
B.4.9	Battery charging under single fault conditions	Comply with Annex M requirements	P
D	**Test generators**		N.A.
E	**Test conditions for equipment containing audio amplifiers**	No audio amplifiers	N.A.
F	**Equipment markings, instructions, and instructional safeguards**		
F.1	General requirements	See the following details	P
F.2	Letter symbols and graphical symbols		
F.2.1	Letter symbols according to IEC 60027-1	Letter symbols comply with IEC 60027-1	P
F.2.2	Graphical symbols	Proper graphical symbols	P
F.3	Equipment markings	Complies with the requirements	P
F.3.1	Equipment marking locations	Complies with the requirements	P
F.3.2	Equipment identification markings	Proper identification markings	P
F.3.2.1	Manufacturer identification	Manufacturer is identifed	P
F.3.2.2	Model identification	Identified	P
F.3.3	Equipment rating markings	Markings are provided	P
F.3.3.1	Equipment with direct connection to mains	Not intended to be connected to mains	N.A.
F.3.3.2	Equipment without direct connection to mains	Equipment does not have direct connection to mains. Marked rated current is in compliance with B.2.5 cl.	P
F.3.3.3	Nature of supply voltage	DC	P
F.3.3.4	Rated voltage	9-32 VDC	P
F.3.3.4	Rated frequency	Direct current	N.A.
F.3.3.6	Rated current or rated power	0,55 A	P
F.3.3.7	Equipment with multiple supply connections	No such connections	N.A.
F.3.4	Voltage setting device	No such device	N.A.
F.3.5	Terminals and operating devices	No terminals	N.A.
F.3.5.1	Mains appliance outlet and socket-outlet	No socket-outlets	N.A.

1	2	3	4
	markings		
F.3.5.2	Switch position identification marking	No such device	N.A.
F.3.5.3	Replacement fuse identification and rating markings	No replaceable fuses	N.A.
F.3.5.4	Replacement battery identification marking	Battery is not intended to be replaced	N.A.
F.3.5.5	Terminal marking location	No such terminals	N.A.
F.3.6	Equipment markings related to equipment classification	Class III equipment	N.A.
F.3.6.1	Class I Equipment	Class III equipment	N.A.
F.3.6.1.1	Protective earthing conductor terminal	No protective earthing	N.A.
F.3.6.1.2	Neutral conductor terminal	No neutral conductor in DC circuit	N.A.
F.3.6.1.3	Protective bonding conductor terminals	No protective bonding conductor	N.A.
F.3.6.2	Class II equipment (IEC60417-5172)	Class III	N.A
F.3.6.2.1	Class II equipment with or without functional earth	Class III	N.A.
F.3.6.2.2	Class II equipment with functional earth terminal marking	Class III	N.A.
F.3.7	Equipment IP rating marking	No IP classification	N.A.
F.3.8	External power supply output marking	No external power supply	N.A.
F.3.9	Durability, legibility and permanence of marking	Markings are durable	P
F.3.10	Test for permanence of markings	Markings are durable	P
F.4	Instructions:		
	a) Equipment for use in locations where children not likely to be present - marking		N.A.
	b) Instructions given for installation or initial use	Instructions are provided	P
	c) Equipment intended to be fastened in place	Instructions are provided	P
	d) Equipment intended for use only in restricted access area	No such equipment	N.A.
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1	Not an audio equipment	N.A.
	f) Protective earthing employed as safeguard	No protective earthing	N.A.
	g) Protective earthing conductor current exceeding ES2 limits	Not exceeding ES2 limits	N.A.
	h) Symbols used on equipment	Symbols are explained	P
	i) Permanently connected equipment not provided with all-pole mains switch	Not permanently connected equipment	N.A.
	j) Replaceable components or modules providing safeguard function	No replaceable components	N.A.
F.5	Instructional safeguards		
	Where "instructional safeguard" is referenced in the test report it specifies the required elements, location of marking and/or instruction		P
G	**Components**		
G.1	Switches	No switches	N.A.
G.3	Protection devices		P
G.3.1	Thermal cut-offs	No thermal cut-offs	N.A.
G.3.1.1 a) & b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N.A.
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N.A.
G.3.1.2	Thermal cut-off connections maintained and secure		N.A.
G.3.3	PTC Thermistors	No PTC thermistors	N.A.
G.3.4	Overcurrent protection devices	Non-replaceable fuse is used. See	P

1	2	3	4
		attached Table 1	
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		
G.3.5.1	Non-resettable devices suitably rated and marking provided	Safety relies on external automotive 1A fuse	N.A.
G.3.5.2	Single faults conditions	See Clause B.4.	P
G.4	Connectors		
G.4.1	Spacings	No requirements for ES1 circuit	N.A.
G.4.2	Mains connector configuration		N.A.
G.4.3	Plug is shaped that insertion into mains socketoutlets or appliance coupler is unlikely		N.A.
G.5	Wound components		
G.5.2	Endurance test	Not required for functional insulation	N.A.
G.5.3	Transformers		
G.5.3.2	Insulation	No transformers	N.A.
G.5.3.3	Transformer overload tests		N.A.
G.5.4	Motors		
G.5.4.3	Running overload test	No motors	N.A.
G.5.4.4	Locked-rotor overload test		N.A.
G.5.4.5	Running overload test for DC motors in the secondary circuits		N.A.
G.5.4.6	Locked-rotor overload for DC motors		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.
G.6	Wire insulation	Peak working voltage does not exceed ES2 limits. No dimensional or constructional requirement.	N.A.
G.7	Mains supply cords		
G.7.1	General	No mains supply cord	N.A.
G.7.2	Cross sectional area		N.A.
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		
G.7.3.2.1	Cord strain relief requirements		N.A.
G.7.3.2.2	Strain relief mechanism failure		N.A.
G.7.3.2.3	Cord sheath or jacket position		N.A.
G.7.3.2.4	Strain relief comprised of polymeric material		N.A.
G.7.4	Cord entry	No requirements for ES1 circuit	N.A.
G.7.5	Non-detachable cord bend protection	Equipment is not intended to be moved while in operation	N.A.
G.7.6	Supply wiring space	No ordinary non-detachable power supply cord	N.A.
G.8	Varistors		N.A.
G.10.2	Resistor test	No such resistors according to 5.5.6 cl.	N.A.
G.11	Capacitor and RC units	No such RC units serving as safeguard	N.A.
G.12	Optocouplers		N.A.
G.13	Printed boards		
G.13.2	Uncoated printed boards	See attached Table 7	P
G.13.3	Coated printed boards	No coated PCB	N.A.
G.13.4	Insulation between conductors on the same inner surface	No requirements for functional insulation	N.A.
G.13.5	Insulation between conductors of different surfaces	No requirements for basic insulation	N.A.
G.13.6	Test on coated printed boards	No coated PCB	N.A.
G.14	Coatings on component terminals	No such coatings	N.A.
G.15	Pressurized liquid filled components		

1	2	3	4
G.15.3.1	Hydrostatic pressure test	No such components	N.A.
G.15.3.2	Creep resistance test		N.A.
G.15.3.3	Tubing and fittings compatibility test		N.A.
G.15.3.5	Thermal cycling test		N.A.
G.15.3.6	Force test		N.A.
H	**Criteria for telephone ringing signals**		
H.2	Method A	No telephone ringing signals	N.A.
H.3	Method B		N.A.
J	**Insulated winding wires for use without interleaved insulation**		N.A.
K	**Safety interlocks**		
K.2	Components of safety interlock safeguard mechanism	No safety interlocks	N.A.
K.3	Inadvertent change of operating mode		N.A.
K.4	Interlock safeguard override		N.A.
K.5	Fail-safe		N.A.
K.6	Mechanically operated safety interlocks		N.A.
K.7	Interlock circuit isolation		
K.7.2	Overload test	No safety interlocks	N.A.
K.7.3	Endurance test		N.A.
K.7.4	Electric strength test		N.A.
L	**Disconnect devices**		
L.1	General requirements	Not intended for permanently connection and does not have ordinary non-detachable power supply cord	N.A.
L.2	Permanently connected equipment	Not intended for permanently connection and does not have ordinary non-detachable power supply cord	N.A.
L.3	Parts that remain energized	No parts on supply side remain energized after disconnection	N.A.
L.4	Single phase equipment		N.A.
L.5	Three-phase equipment		N.A.
L.6	Switches as disconnect devices		N.A.
L.7	Plugs as disconnect devices		N.A.
L.8	Multiple power sources	Single power input	N.A.
M	**Equipment containing batteries and their protection circuits**		
M.1	General requirements		P
M.2	Safety of batteries and their cells	Comply with UN38.3	P
M.3	Protection circuits	Protection circuit is an integral part of the battery	N.A.
M.3.1	Requirements		N.A.
M.3.2	Tests:		
	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.
	Compliance		N.A.
M.4	Additional safeguards for equipment containing secondary lithium battery		
M.4.2.2	Charging safeguards	Measured charging current: 0,139A±0,00099A (Allowed: 0,190A) Measured charging voltage: 3,7V±0,00083V(Allowed: 4,2V) No fire or explosion occurred	P

1	2	3	4
M.4.3	Fire enclosure	Battery complies with PS1 circuit requirements. No requirements for PS1 circuit	N.A.
M.4.4	Drop test of equipment containing a secondary lithium battery	Not direct-plug in, hand-held or transportable equipment	N.A.
M.5	Risk of burn due to short-circuit during carrying	Battery is not designed to be carried with bare conductive terminals	N.A.
M.6.1	Short-circuits	Comply with UN38.3. See Table 1	N.A.
M.6.2	Leakage currents	Measured leakage current: 0,00mA±0,0052mA	P
M.7	Risk of explosion from lead acid and NiCd batteries	Lithium-ion battery is used	N.A.
M.8	Protection against internal ignition from external spark sources of batteries with aqueous electrolyte	Battery does not provide venting system	N.A.
M.9	Preventing electrolyte spillage	Equipment is constructed so that spillage on human body parts is unlikely	P
M.10	Instructions to prevent reasonably foreseeable misuse	Instructional safeguard is provided	P
N	**Electrochemical potentials**	No such risks	N.A.
O	**Measurement of creepage distances and clearances**	Considered	P
P	**Safeguards against conductive objects**		
P.1	General	No openings	N.A.
P.2.2	Safeguards against entry of a foreign object	No openings	N.A.
P.2.3	Safeguards against the consequences of entry of a foreign object	No openings	N.A.
P.3	Safeguards against spillage of internal liquids	No liquids are used within the equipment	N.A.
P.4	Metallized coatings and adhesives securing parts		N.A.
Q	**Circuits intended for interconnection with building wiring**		
Q.1	Limited power sources	See Table 18	P
Q.2	Test for external circuits – paired conductor cable		N.A.
T	**Mechanical strength tests**		
T.1	General requirements		P
T.2	Steady force test, 10 N		P
T.3	Steady force test, 30 N	No fire enclosure	N.A.
T.4	Steady force test, 100 N	Build-in equipment	N.A.
T.5	Steady force test, 250 N	See Table 22	P
T.6	Enclosure impact test	Build-in equipment	N.A.
T.7	Drop test	Build-in equipment	N.A.
T.8	Stress relief test	Solid safeguard is accessible. Stress relief test is not required	N.A.
T.9	Impact test	No glass surfaces	N.A.
T.10	Glass fragmentation test	No glass materials	N.A.
T.11	Test for telescoping or rod antennas	No telescoping or rod antennas	N.A.
V	Determination of accessible parts (fingers, probes and wedges)		
V.1	Accessible parts of equipment	No accessible parts	P
V.2	Accessible part criterion	No accessible parts	P

Clause 4.1.2	Table 1: **LIST OF THE COMPONENTS RELATED TO SAFETY**			P
Component	**Manufacturer**	**Type/model**	**Characteristics**	**Documentary evidence of acceptance**
Enclosure material	Prospector	LEXAN 143R	Polycarbonate; UL94 HB;	UL94
Fuse	Littlefuse	Series 468 0468003.NRHF	32 V≂; 2 A	UL 248-1; UL 248-14 cURus E10480
PCB	Bomin	FMP5	UL94 V-0; 105°C	UL94
Battery	MinMax Energy Technology Co. LTD.	LP603448-PCM-NTC-LD	3.7V 1050mAh	UN38.3

Clause 5.2.2.2	Table 2: **STEADY STATE VOLTAGE AND CURRENT CONDITIONS**						P
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U, V_{rms} or V_{pk}	I, A_{pk} or A_{rms}	Hz	
HCV5-2G-GL-BT (LCV5-2G-GL-BT; PRO5-2G-GL; PRO5-2G-GL-BT)							
1.	9 VDC	Secondary circuit	Normal	8,94 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	8,21 V_{rms}	--	--	
2.	3,7 VDC	Battery output	Normal	3,68 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	1,04 V_{rms}	--	--	
HCV5-3G-GL-BT (LCV5-3G-GL-BT; PRO5-3G-GL-BT)							
4.	9 VDC	Secondary circuit	Normal	8,94 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	8,26 V_{rms}	--	--	
5.	3,7 VDC	Battery output	Normal	3,68 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	1,04 V_{rms}	--	--	
HCV5-LTM-GL-BT (LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-LTM-GL-BT)							
7.	9 VDC	Secondary circuit	Normal	8,94 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	8,23 V_{rms}	--	--	
8.	3,7 VDC	Battery output	Normal	3,68 V_{rms}	--	--	ES1
			Abnormal	--	--	--	
			Single fault	1,04 V_{rms}	--	--	
Supplementary information: Measuring equipment uncertainty is ±0,00083V. Simulated single fault condition is capacitor C112 short-circuit.							

Clause 5.2.2.3	Table 3: **CAPACITANCE LIMITS**					N.A.
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				U, V_{rms} or V_{pk}	I, A_{pk} or A_{rms}	
1.			Normal			
			Abnormal			
			Single fault – SC			
Supplementary information: SC – short circuit						

Clause 5.2.2.4	Table 4: **SINGLE PULSES**						N.A.
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration, ms	U_{pk}, V	I_{pk}, mA	
1.							
Supplementary information:							

Clause 5.2.2.5	Table 5: **REPETATIVE PULSES**						N.A.
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time, ms	U_{pk}, V	I_{pk}, mA	
1.							
Supplementary information:							

Clause 5.4.1.4; 6.3.2; 9; B.2.6	Table 6: **TEMPERATURE LIMITS FOR MATERIALS, COMPONENTS AND SYSTEMS**		P
Supply voltage (VAC):	External DC power supply (9 VDC)	Discharging battery (3,7 VDC)	
Ambient temperature (°C):	20,9	20,8	
T_{ma} (°C):	60	60	
Insulation	**Measured temperature, (°C)**		**Allowed T_{max} (°C)**
HCV5-2G-GL-BT (LCV5-2G-GL-BT; PRO5-2G-GL; PRO5-2G-GL-BT)			
Battery	21,0± 0,083	21,5± 0,083	45
Enclosure (near to input connector)	27,3± 0,083	24,8± 0,083	94
PCB (near to microcontroller)	29,0± 0,083	26,5± 0,083	130
HCV5-3G-GL-BT (LCV5-3G-GL-BT; PRO5-3G-GL-BT)			
Battery	21,0 ± 0,083	21,5± 0,083	45
Enclosure (near to input connector)	26,3 ± 0,083	22,8± 0,083	94
PCB (near to microcontroller)	29,5± 0,083	25,0± 0,083	130
HCV5-LTM-GL-BT (LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-LTM-GL-BT)			
Battery	21,0± 0,083	21,5± 0,083	45
Enclosure (near to input connector)	27,6± 0,083	25,1± 0,083	94
PCB (near to microcontroller)	31,0± 0,083	26,6± 0,083	130

Clause 5.4.2.2 and 5.4.3	Table 7: **CLEARANCES AND CREEPAGE DISTANCES**					P
Pollution degree: 2 frequency: <30 kHz Material group: III						
Measuring place	**Peak working voltage, V**	**Type of insulation**	**Allowed clearance, mm**	**Measured clearance, mm**	**Allowed creepage, mm**	**Measured creepage, mm**
Battery +/- polarity	3,7	Basic	0,2	3,64 ± 0,028	0,4	3,64 ± 0,028
Supplementary information: Peak working voltage method was used						

Clause 5.4.2.3.4	Table 8: **DETERMINING CLEARANCES USING REQUIRED WITHSTAND VOLTAGE**			N.A.
Pollution degree: 2				
Measuring place	**Peak working voltage, V and required withstand voltage**	**Type of insulation**	**Allowed clearance, mm**	**Measured clearance, mm**
Supplementary information: Peak working voltage method was used				

Clause 5.4.2.4	Table 9: **DETERM ININGTHE ADEQUACY OF A CLEARANCE USING AN ELECTRIC STRENGTH TEST**	N.A.

Pollution degree: 2

Measuring place	**Required withstand voltage, kV**	**Test voltage for electric strength for clearances for basic insulation or supplementary insulation, kV**

Supplementary information: Peak working voltage method was used

Clause 5.4.4.9	Table 10: **DISTANCE THROUGH INSULATION MEASUREMENTS**			N.A.
Material	**Peak voltage, V**	**Frequency, kHz**	**Required DTI, mm**	**DTI, mm**

Supplementary information:

Clause 5.4.9	Table 11: **ELECTRIC STRENGTH TEST**		N.A.
Measuring place	**Insultaion type**	**Test voltage, V**	**Result**

Supplementary information: Electric strength test is not required for functional insulation

Clause 5.5.2.2	Table 12: **SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR**			N.A.
Capacitance, nF	**Measured voltage (after 2 s), V**	**Test location**	**Operating condition**	**ES Classification**

Supplementary information:

Clause 5.5.6 (G.10.2)	Table 13: **RESISTORS**			N.A.
Temperature, °C	**Humidity, %**	**Duration, d**	**Resistance before, Ω**	**Resistance after, Ω**

Supplementary information:

Clause 5.6.5	Table 14: **TERMINALS FOR PROTECTIVE CONDUCTORS**				N.A.
Conductor size, mm^2	**Type**	**Minimal diameter, mm**	**Minimal area, mm^2**	**Measured diamter, mm**	**Measured area, mm^2**

Supplementary information:

Clause 6.2.2	Table 15: **ELECTRICAL POWER SOURCES (PS) MEASUREMENTS FOR CLASSIFICATION**				P
Source	Description	Measurement	Max. power after 3 s	Max. power after 5 s	PS Classification
HCV5-2G-GL-BT (LCV5-2G-GL-BT; PRO5-2G-GL; PRO5-2G-GL-BT)					
Secondary circuit	Supply input	Power (W):	1,78±0,01	--	PS1
		VA (V):	8,94±0,00083	--	
		IA (A):	0,200±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	4,17±0,011	--	PS1
		VA (V):	8,21±0,00083	--	
		IA (A):	0,508±0,00091	--	
Secondary circuit	Battery output	Power (W):	0,51±0,01	--	PS1
		VA (V):	3,68±0,00083	--	
		IA (A):	0,138±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	0,00	--	PS1
		VA (V):	1,04±0,00099	--	
		IA (A):	0,000	--	
HCV5-3G-GL-BT (LCV5-3G-GL-BT; PRO5-3G-GL-BT)					
Secondary circuit	Supply input	Power (W):	1,80±0,01	--	PS1
		VA (V):	8,94±0,00083	--	
		IA (A):	0,202±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	4,34±0,011	--	PS1
		VA (V):	8,26±0,00083	--	
		IA (A):	0,526±0,00091	--	
Secondary circuit	Battery output	Power (W):	0,51±0,01	--	PS1
		VA (V):	3,68±0,00083	--	
		IA (A):	0,139±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	0,00	--	PS1
		VA (V):	1,04±0,00083	--	
		IA (A):	0,000	--	
HCV5-LTM-GL-BT (LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-LTM-GL-BT)					
Secondary circuit	Supply input	Power (W):	1,77±0,01	--	PS1
		VA (V):	8,94±0,00083	--	
		IA (A):	0,198±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	4,22±0,011	--	PS1
		VA (V):	8,23±0,00083	--	
		IA (A):	0,513±0,00091	--	
Secondary circuit	Battery output	Power (W):	0,50±0,01	--	PS1
		VA (V):	3,68±0,00083	--	
		IA (A):	0,137±0,00099	--	
Secondary circuit	Supply input (SC capacitor C112)	Power (W):	0,00	--	PS1
		VA (V):	1,04±0,00083	--	
		IA (A):	0,000	--	
Supplementary information: Measurment after 5 seconds taken only when limits at 3 seconds exceed PS1 limits. Current from battery output during single fault condition is not flowing, therefore it is 0,000A and measuring uncertainity is not considered					

Clause 6.2.3.1	Table 16: **DETERMINATION OF POTENTIAL IGNITION SOURCES (ARCING PIS)**			N.A.
Location	Open circuit voltage after 3 s (V_p)	Measured r.m.s current (I_{rms})	Calculated value ($V_p \times I_{rms}$)	Arcing PIS? Yes / No
Secondary circuit	--	--	--	No
Supplementary information: Arcing PIS does not exist in PS1 circuit				

Clause 6.2.3.2	Table 17: **DETERMINATION OF POTENTIAL IGNITION SOURCES (RESISTIVE PIS)**				N.A.
Circuit location	Operating condition (Normal / described 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	Resistive PIS? Yes / No
Supplementary information: No resistive PIS					

Clause 6.5.3	Table 18: **POWER REQUIREMENTS FOR INTERCONNECTION TO BUILDING WIRING**	P
Voltage (Open-circuit) , V	**Current (Short-circuit), A**	**Power , W**
Allowed:		
$U_{oc} \leq 30$	$I_{sc} \leq 8$	$S \leq 100$
Measured:		
3,79±0,00083	1,56±0,0024A	5,912±0,037W
Supplementary information: Measured between battery +/- without circuit protection after 60s		

Clause B.2.5	*Table 19: **INPUT TEST (non-accredited test method)***							P
U (VDC)	**I (A)**	**f (Hz)**	**I rated (A)**	**P (W)**	**P rated (W)**	**Fuse No.**	**I fuse (A)**	**Conditions**
HCV5-2G-GL-BT (LCV5-2G-GL-BT; PRO5-2G-GL; PRO5-2G-GL-BT)								
9	0,200	--	0,55	1,80	--	--	0,200	Normal
30	0,068	--	0,55	2,04	--	--	0,068	Normal
HCV5-3G-GL-BT (LCV5-3G-GL-BT; PRO5-3G-GL-BT)								
9	0,202	--	0,55	1,82	--	--	0,202	Normal
30	0,072	--	0,55	2,16	--	--	0,072	Normal
HCV5-LTM-GL-BT (LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-LTM-GL-BT)								
9	0,198	--	0,55	1,78	--	--	0,198	Normal
30	0,066	--	0,55	1,98	--	--	0,066	Normal
Supplementary information: Measuring equipment DC current uncertainty is ±0,00099A; Power uncertainty is ±0,01W								

Clause B.3	Table 20: **ABNORMAL OPERATING CONDITION TESTS**							N.A.
Ambient temperature (°C):								
Power source for EUT: Manufacturer, model/type, output rating :					See below			
Component No.	**Abnormal Condition**	**Supply voltage (V)**	**Test time**	**Fuse no.**	**Fuse current (A)**	**T-couple**	**Temp. (°C)**	**Observation**
Supplementary information: No abnormal conditions								

Clause B.4.6	Table 21: **FAULT CONDITION TESTS**							P
Ambient temperature (°C):					21,3			
Power source for EUT: Manufacturer, model/type, output rating :					See below			
Component No.	**Fault Condition**	**Supply voltage (VDC)**	**Test time**	**Fuse no.**	**Fuse current (A)**	**T-couple**	**Temp. (°C)**	**Observation**
Passive component – capacitor(C1 12)	Short-circuit	9	10 min ± 0,15s		0,526 ±0,00091	--	52,7 ±0,083	No hazards arise. SFC simulated till thermal stability
Supplementary information: Classified as PS1 circuit, no risk of fire								

Clause T.5	Table 22: **STEADY FORCE TEST**				P
Part/Location	**Material**	**Thickness (mm)**	**Force (N)**	**Test Duration (sec)**	**Observation**
Top enclosure	Plastic	1,58 ±0,028 mm	250 ±0,24 %	5 ± 0,10 s	No damage
Side enclosure	Plastic	1,58 ±0,028 mm	250 ±0,24 %	5 ± 0,10 s	No damage
Supplementary information: All models enclosure properties are the same (thickness, flammability)					

Clause T.6	Table 23: **IMPACT TESTS**			N.A.
Part/Location	**Material**	**Thickness (mm)**	**Vertical distance (mm)**	**Observation**
Supplementary information:				

Table 24: **LIST OF TEST EQUIPMENT**					
Title of the test equipment	**Type**	**Equipment No**	**Calibration date**		**Comments**
			Last	**due**	
Multimeter	Uni-T UT71E	C173998433	2020-01-27	2022-01-27	
Timer	CDC np.1a-2	0542592	2019-02-22	2021-02-22	
Caliper	M07042	01	2017-09-21	2022-09-21	
Metal ruller	GOST 427-75	14	2017-04-05	2022-04-05	
Rigid test finger	-	9	2018-09-12	2023-09-12	
30 mm disc	-	43-1	2016-08-01	2021-08-01	
Force gauge	AFG 2500N	13-0369-09	2019-12-03	2022-12-03	
Thermometer	MiniTemp MT4	F02866	2018-09-18	2020-09-18	
Climatic test chamber	WK11-340/40	58226033560010	2018-10-05	2020-10-05	
Digital thermometer FLUKE with probe	53 II	74610029	2019-08-28	2021-08-28	
TESTO temperature and humidity measuring system	625	ITM0000208	2020-02-20	2023-02-20	
ALMEMO atmospheric pressure measuring system	MA2590-9 + FD A612-MA	H03010002G + 03050195	2019-02-26	2022-02-26	
Adjustable DC Power supply	HY3010	021602008	2019-03-01	2021-03-01	
Scales	HLD6000	HLD6000/T58191	2018-06-04	2020-06-04	
HIOKI automatic insulation resistance tester	3153	030129067	2019-08-28	2021-08-28	

ANNEX 1

PHOTOS OF EQUIPMENT UNDER TEST

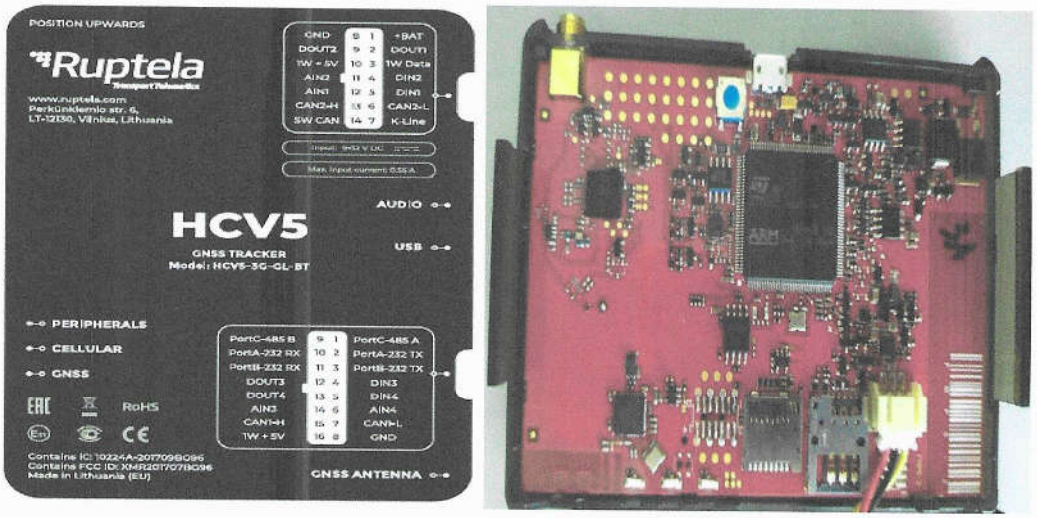

Fig. 1.1 Marking plate and inside view of HCV5-3G-GL-BT (LCV5-3G-GL-BT; PRO5-3G-GL-BT)

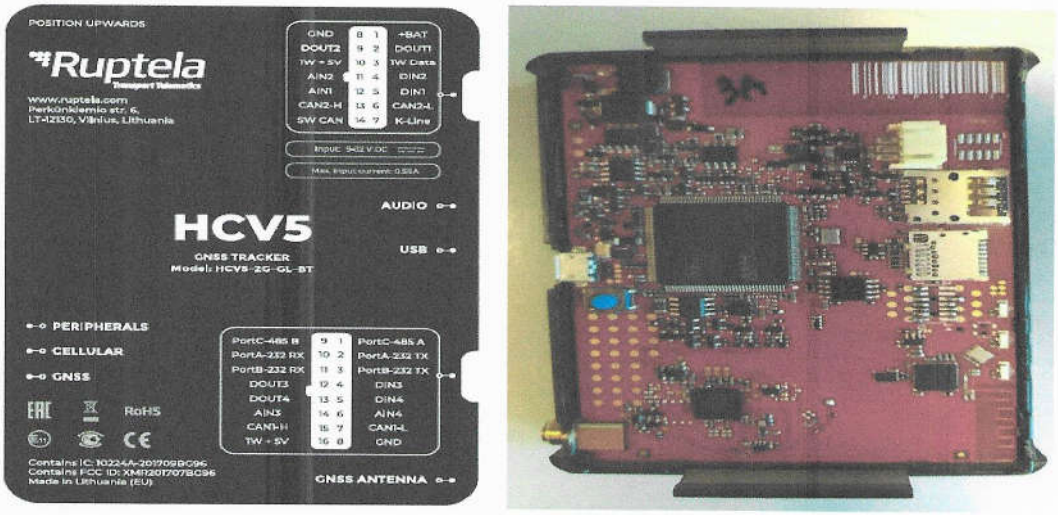

Fig. 1.2 Marking plate and inside view of HCV5-2G-GL-BT (LCV5-2G-GL-BT; PRO5-2G-GL; PRO5-2G-GL-BT)

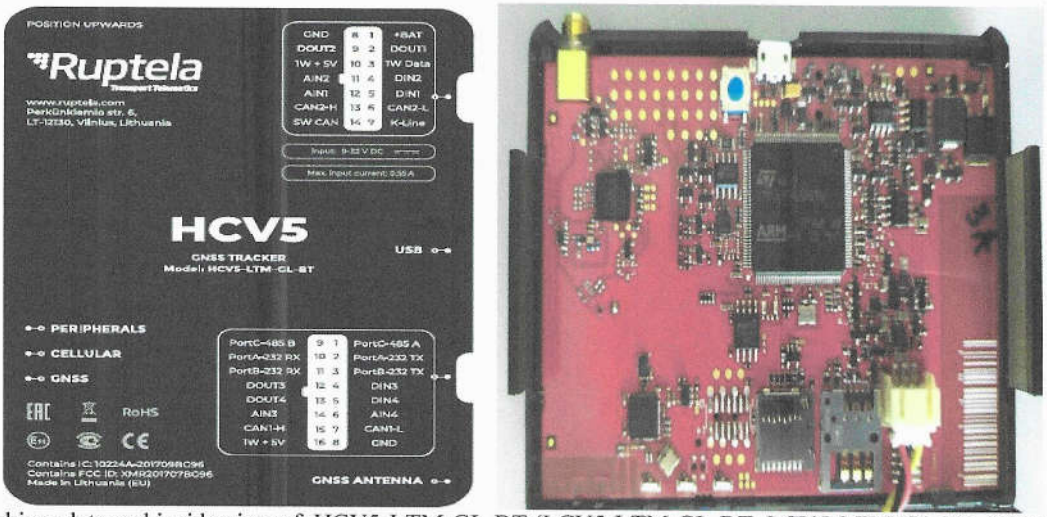

Fig. 1.3 Marking plate and inside view of HCV5-LTM-GL-BT (LCV5-LTM-GL-BT; LCV5-LTM-GL-BT-CS1; PRO5-LTM-GL-BT)

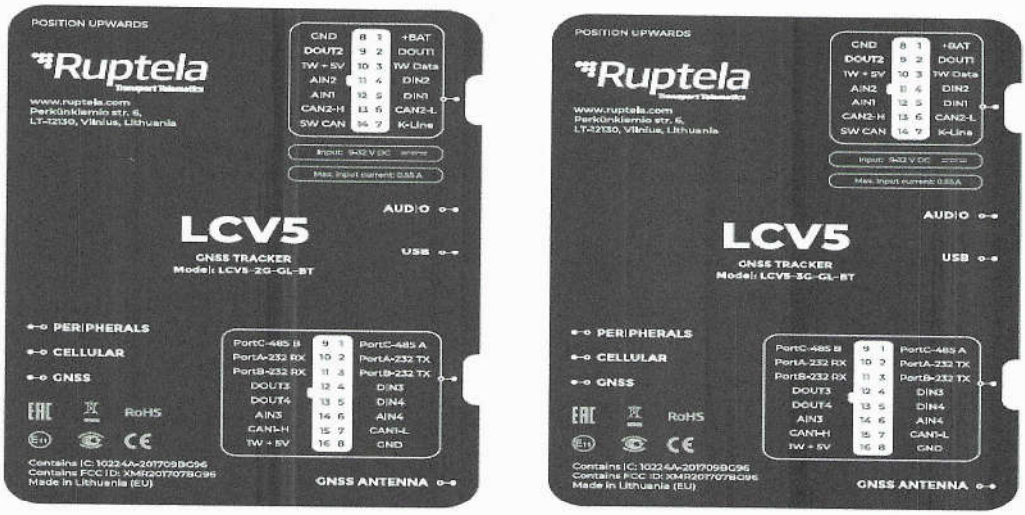

Fig. 1.4 Marking plates of LCV5-2G-GL-BT (left) and LCV5-3G-GL-BT (right)

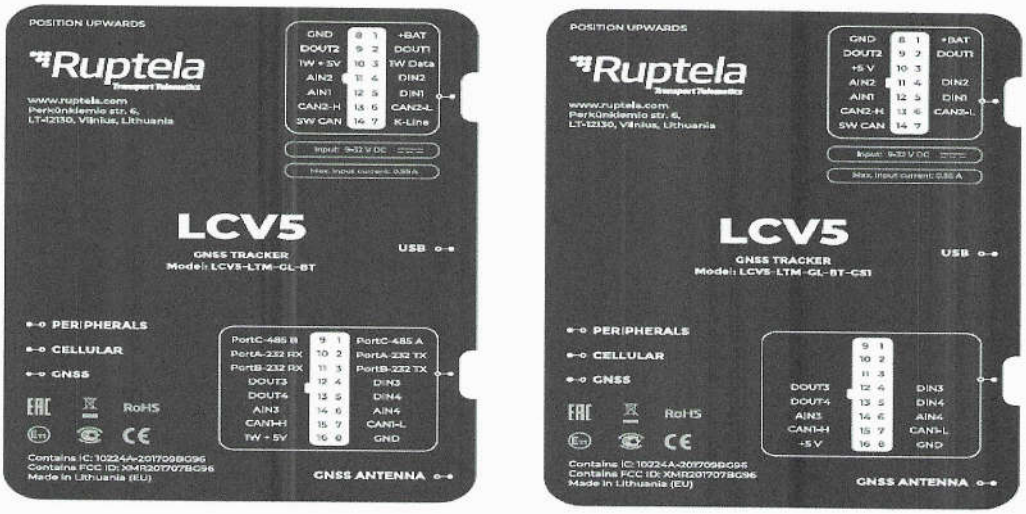

Fig. 1.5 Marking plates of LCV-LTM-GL-BT (left) and LCV5-LTM-GL-BT-CS1 (right)

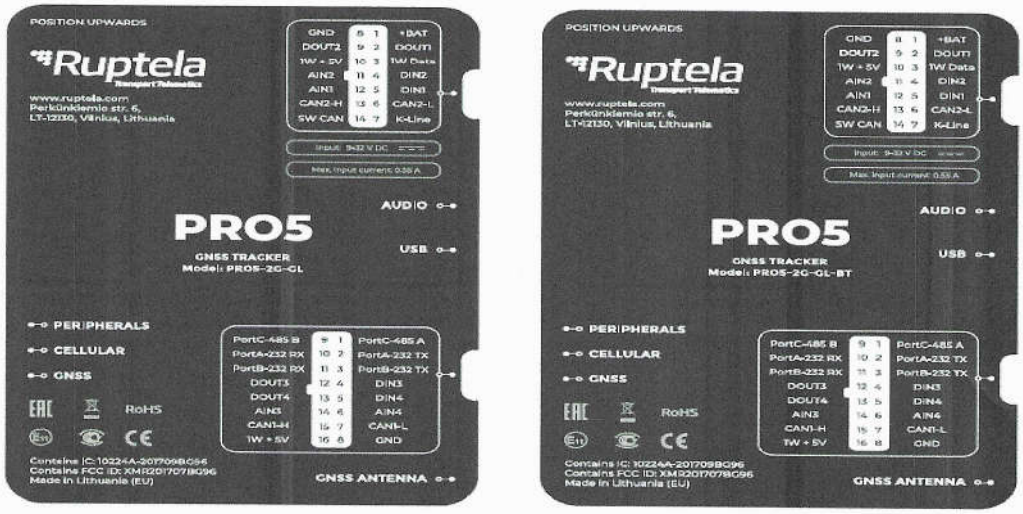

Fig. 1.6 Marking Plates of Pro5-2GL (left) and PRO5-2G-GL-BT (right)

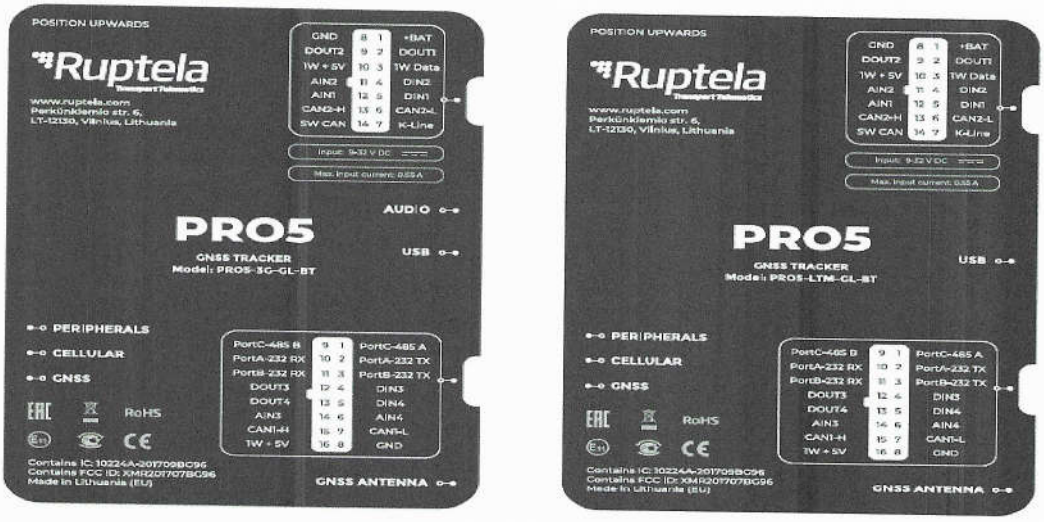

Fig. 1.7 Marking plates of PRO5-3G-GL-BT (left) and PRO5-LTM-GL-BT (right)

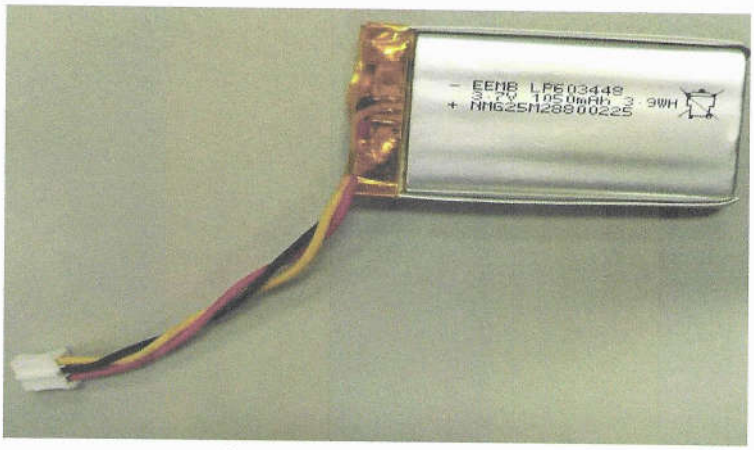

Fig. 1.8 General view of battery