

**TEST REPORT****IEC 61010-1****Safety requirements for electrical equipment for measurement,
control, and laboratory use****Part 1: General requirements**

Report Number..... : LCS220316049AS

Date of issue : 2022-04-27

Total number of pages : 73 pages

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preparing the Report : Shenzhen LCS Compliance Testing Laboratory Ltd.
Room 101, 201, Building A and Room 301, Building C, Juji
Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District,
Shenzhen, Guangdong, China

Applicant's name : Shenzhen Sonoff Technologies Co., Ltd.

Address : 1001, BLDG8, Lianhua Industrial Park, Shenzhen, GD, China

Test specification:

Standard : IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016

Test procedure..... : Type test

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

Test Report Form No. : IEC61010_1P

Test Report Form(s) Originator.... : N/A

Master TRF : 2021-04-12

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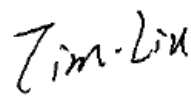




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Test item description	SONOFF Smart Stackable Power Meter (Main Unit+4-Relays)
Trade Mark	SONOFF
Manufacturer	Same as the Applicant
Model/Type reference.....	SPM-Main, SPM-4Relay
Ratings.....	SPM-Main: 100~240V~, 50/60Hz, 50mA Max SPM-4Relay: 100-240V~, 50/60Hz 20A/Gang 80A/Total Max

Testing procedure and testing location:

<input checked="" type="checkbox"/> Testing Laboratory:	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Testing location/ address	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China	
Tested by (name + signature)	Tim Liu / Test Engineer	
Reviewed by (name + signature) ..	Caps Li/ Project engineer	
Approved by (name + signature) ..	Hart Qiu/ Technical manager	

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

Document No.	Documents included / attached to this report (description)	Page No.
Attachment No.1	Photos	11

Documents referenced by this report (available on request):

Document Name or No.	Documents description	Page No.
--	--	--

Summary of testing:

Clause	Comment
N/A	N/A

Test Report History:

This report may consist of more than one report and is valid only with additional or previous issued reports:

Ref. No.	Item
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N/A	N/A
Tests performed (name of test and test clause): The submitted samples were found to comply with the requirements of: - IEC 61010-1:2010/AMD1:2016 - EN 61010-1:2010+A1:2019	Testing location: Shenzhen LCS Compliance Testing Laboratory Ltd. Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Summary of compliance with National Differences --	
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.	
<div><div><p>Sonoff Main Unit</p><p>Model: SPM-Main FCC ID: 2APN5SPMMAIN Input: 100-240V ~ 50/60Hz 50mA Max Wi-Fi: IEEE 802.11 b/g/n 2.4GHz Manufacturer: Shenzhen Sonoff Technologies Co., Ltd. 1001, BLDG8, Lianhua Industrial Park, shenzhen, GD, China MADE IN CHINA</p><p></p></div><div><p>Sonoff 4-Relays</p><p>Model: SPM-4Relay Input: 100-240V ~ 50/60Hz 20A/Gang 80A/Total Max Output: 100-240V ~ 50/60Hz 20A/Gang 80A/Total Max Manufacturer: Shenzhen Sonoff Technologies Co., Ltd. 1001, BLDG8, Lianhua Industrial Park, shenzhen, GD, China MADE IN CHINA</p><p></p></div></div>	
Remarks: 1. Name and address of the Importer and Manufacturer must be affixed on the product when the product placed on the EU market. 2. Minimum height of CE mark is 5mm, minimum height of WEEE mark is 7mm.	

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**Test item particulars:**

Type of item : ~~Measurement~~ / Control / ~~Laboratory~~

Description of equipment function..... :

Connection to MAINS supply : ~~Permanent~~ / Detachable cord set /
Non detachable cord set / None / ~~Battery operated~~

Overvoltage category : II / ~~III~~ / IV

POLLUTION DEGREE..... :

Means of protection : ~~Class I (PE connected)~~ / Class II (isolated)

Environmental conditions : Normal / ~~Extended (Specify):~~

For use in wet locations : ~~Yes~~ / No

Equipment mobility..... : ~~Portable~~ / ~~Hand-held~~ / ~~Floor standing~~ / ~~Fixed~~ / ~~Built-in~~

Operating conditions..... : Continuous / ~~Short-time~~ / ~~Intermittent~~

Overall size of equipment (W x D x H)..... : --

Mass of equipment (kg)..... : --

Marked degree of protection to IEC 60529 : --

Possible test case verdicts:

- Test case does not apply to the test object : N/A (Not Applicable)

- Test object does meet the requirement..... : P (Pass)

- Test object does not meet the requirement : F (Fail)

Testing:

Date of receipt of test item..... : 2022-03-16

Date (s) of performance of tests : From 2022-03-16 to 2022-03-21

General remarks:

The test results presented in this report relate only to the object tested.
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"(see ENCLOSURE #)" refers to additional information appended to the report.
"(see Form A.xx)" refers to a Table appended to the report.
Bottom lines for measurement Tables Forms A.xx are optional if used as record.

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

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

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... : ☐ Yes ☒ Not applicable

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

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Name and address of factory (ies) : Shenzhen Yindao Micro-electronics
5th floor, 7th floor, building 5, Jingsheng Industrial
Zone, huawang Road, Tongsheng community,
Dalang street, Longhua New District, Shenzhen

General product information and other remarks:

1. SPM-Main and SPM-4Relay are a set of control devices that work together, SPM-Main is the master control unit, and SPM-4Relay is the auxiliary unit.

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	TESTS		
4.4	Testing in single fault conditions		P
4.4.1	Fault tests	(see Form A.1)	P
4.4.2	Application of single fault conditions		P
4.4.2.1	single fault conditions not covered by 4.4.2.2 to 4.4.2.14	(see Form A.1)	—
4.4.2.2	Protective impedance		P
4.4.2.3	Protective conductor	(see Form A.6)	P
4.4.2.4	Equipment or parts for short-term or intermittent operation		N/A
4.4.2.5	Motors		—
	— stopped while fully energized		N/A
	— prevented from starting		N/A
	— one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		P
4.4.2.7	Mains transformers		N/A
4.4.2.7.2	Short circuit		P
4.4.2.7.3	Overload	(see Form A.26B and A.40)	N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A
4.4.2.10	Cooling	(see Form A.26A)	—
	— air holes closed		N/A
	— fans stopped		N/A
	— coolant stopped		N/A
	— loss of cooling liquid		N/A
4.4.2.11	Heating devices		N/A
	— timer overridden		N/A
	— temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests	(see Form A.1)	—
4.4.4	Conformity after application of fault conditions	(see Form A.1; A.6, A.18)	P
5	MARKING AND DOCUMENTATION		
5.1.1	Required equipment markings		—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- Visible from the exterior; or		P
	- Visible after removing cover or opening door		N/A
	- Visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		P
	Letter symbols (IEC 60027) used		P
	Graphic symbols (IEC 61010-1: Table 1) used		P
5.1.2	Identification		—
	Equipment is identified by:		—
	a) Manufacturer's or supplier's name or trademark	See the table	P
	b) Model number, name or other means	See the table	P
	Manufacturing location identified	Only one manufacturing location	N/A
5.1.3	Mains supply		P
	Equipment is marked as follows:		—
	a) Nature of supply:		—
	1) a.c. rated mains frequency or range of frequencies.....:		—
	2) d.c. with symbol 1		P
	b) rated supply voltage(s) or range.....:	100-240V	—
	c) Max. rated power (W or VA) or input current		—
	The marked value not less than 90 % of the maximum value	(see Form A.2)	P
	If more than one voltage range:		—
	Separate values marked; or		N/A
	Values differ by less than 20 %	(see Form A.2)	P
	a) operator-set for different rated supply voltages:		—
	Indicates the equipment set voltage		N/A
	Portable equipment indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
	b) Accessory mains socket-outlets accepting standard mains plugs are marked:		—
	With the voltage if it is different from the mains supply voltage.....:		—
	For use only with specific equipment		N/A
	If not marked for specific equipment it is marked with:		—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The maximum rated current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		P
	Operator replaceable fuse marking (see also 5.4.5).....:		—
5.1.5	Terminals, connections and operating devices		P
5.1.5.1	General		—
	Where necessary for safety, indication of purpose of terminals, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		P
	Push-buttons and actuators of emergency stop devices and indicators:		—
	used only to indicate a warning of danger or		N/A
	the need for urgent action		N/A
	coloured red		N/A
	coded as specified in IEC 60073		N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):		—
	to safety of persons; or		N/A
	safety of the environment		N/A
5.1.5.2	terminals		P
	Mains supply terminal identified		P
	Other terminal marking:		—
	a) functional earth terminals (symbol 5 used)		N/A
	b) protective conductor terminals:		—
	Symbol 6 is placed close to or on the terminal; or		N/A
	Part of appliance inlet		N/A
	c) terminals of control circuits (symbol 7 used)		N/A
	d) Hazardous live terminals supplied from the interior		N/A
	Standard mains socket outlet; or		N/A
	Ratings marked; or		N/A
	Symbol 14 used		N/A
5.1.6	Switches and circuit breakers	No such devices	N/A
	If disconnecting device, off position clearly marked		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If push-button used as power supply switch:		—
	Symbol 9 and 15 used for on-position		N/A
	Symbol 10 and 16 used for off-position		N/A
	Pair of symbols 9, 15 and 10, 16 close together		N/A
5.1.7	Equipment protected by double insulation or reinforced insulation		P
	Protected throughout (symbol 11 used)		P
	Only partially protected (symbol 11 not used)		N/A
5.1.8	Field-wiring terminal boxes		N/A
	If terminal or enclosure exceeds 60 °C:	(see Form A.26A)	—
	Cable temperature rating marked.....:		—
	Marking visible before and during connection or beside terminal		N/A
5.2	Warning markings		P
	Visible when ready for normal use		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour:		—
	a) symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background		P
	b) symbols and text moulded, stamped or engraved in material min. 2,0 mm high and		P
	0,5 mm depth or raised if not contrasting in colour		P
	If necessary marked with symbol 14		P
	Statement to isolate or disconnect if access by using a tool to hazardous live parts is permitted		N/A
5.3	Durability of markings		P
	The required markings remain clear and legible in normal use	(see Form A.3)	P
5.4	Documentation	English manual provided	P
5.4.1	General		P
	Equipment is accompanied by documentation for safety purposes for operator or responsible body		P
	Safety documentation for service personnel authorized by the manufacturer		P
	Documentation necessary for safe operation is provided in printed media or		P
	in electronic media if available at any time		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Documentation includes:		—
	a) intended use		P
	b) technical specification		P
	c) name and address of manufacturer or supplier		P
	d) information specified in 5.4.2 to 5.4.6		P
	e) information to mitigate residual risk (see also subclause 17)		N/A
	f) accessories for safe operation of the equipment specified		N/A
	g) guidance provided to check correct function of the equipment, if incorrect reading may cause a hazard from harmful or corrosive substances of hazardous live parts		P
	h) instructions for lifting and carrying	<18kg	N/A
	Warning statements and a clear explanation of warning symbols:		P
	Provided in the documentation; or		P
	Information is marked on the equipment		N/A
5.4.2	Equipment ratings		P
	Documentation includes:		—
	a) Supply voltage or voltage range	100-240V~	—
	Frequency or frequency range		—
	Power or current rating	20A	—
	b) Description of all input and output connections in accordance to 6.6.1 a)		P
	c) rating of insulation of external circuits in accordance to 6.6.1 b)		N/A
	d) Statement of the range of environmental conditions (see 1.4)		P
	e) Degree of protection (IEC 60529)	IPX0	N/A
	f) If impact rating less than 5 J:		—
	IK code in accordance to IEC 62262 marked or		N/A
	symbol 14 of table 1 marked, with		N/A
	rated energy level and test method stated		N/A
5.4.3	Equipment installation		P
	Documentation includes instructions for:		—
	a) assembly, location and mounting requirements		P
	b) protective earthing		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) connections to supply		P
	d) permanently connected equipment:		—
	1) Supply wiring requirements		N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) ventilation requirements		N/A
	f) special services (e. g. air, cooling liquid)		N/A
	g) instructions relating to sound level		N/A
5.4.4	Equipment operation		P
	Instructions for use include:		—
	a) identification and description of operating controls		P
	b) positioning for disconnection		N/A
	c) instructions for interconnection		P
	d) specification of intermittent operation limits		N/A
	e) explanation of symbols used		P
	f) replacement of consumable materials	Details see instructions	P
	g) cleaning and decontamination		P
	h) listing of any poisonous or injurious gases and quantities		N/A
	i) risk reduction procedures relating to flammable liquids (see 9.5)		N/A
	j) risk reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and Service		P
	Instructions for responsible body include:		—
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		—
	Instruction against the use of detachable mains supply cord with inadequate rating		P
	Specific battery type of user replaceable batteries		P
	Any manufacturer specified parts		P
	Rating and characteristics of fuses		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructions include following subjects permitting safe servicing and continued safety:		—
	a) product specific risks may affect service personnel		P
	b) protective measures for these risks		P
	c) verification of the safe state after repair		P
5.4.6	Integration into systems or effects resulting from special conditions		N/A
	Aspects described in documentation		N/A

6	PROTECTION AGAINST ELECTRIC SHOCK		
6.1	General	(see Form A.14 and A.15)	P
6.1.1	Requirements		—
	Protection against electric shock maintained in normal condition and single fault condition		P
	accessible parts not hazardous live		P
	Voltage, current, charge or energy below the limits in normal condition and in single fault condition between:		—
	accessible parts and earth		P
	two accessible parts on same piece of the equipment within a distance of 1,8 m		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		P
6.1.2	Exceptions		N/A
	Following hazardous live parts may be accessible to an operator:		—
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts to be replaced by operator only by the use of tool and warning marking	Marked with symbol	P
	Those parts not hazardous live 10 s after interruption of supply		N/A
	Capacitance test if charge is received from internal capacitor		N/A
6.2	Determination of accessible parts		P
6.2.1	General		P
	Unless obviously determination of accessible parts as specified in 6.2.2 to 6.2.4		P
6.2.2	Examination		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- with jointed test finger (as specified B.2)		N/A
	- with rigid test finger (as specified B.1) and a force of 10 N		N/A
6.2.3	Openings above parts that are hazardous live		N/A
	- test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls		N/A
	- test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	Limit values for accessible parts		P
6.3.1	Levels in normal condition	(see Form A.5)	—
	a) Voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		P
	for wet locations voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.		N/A
	Voltages are not hazardous live the levels of:		—
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz	A.1	P
	for wet locations measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		—
	c) Levels of capacitive charge or energy less:		—
	1) 45 μ C for voltages up to 15 kV peak or d.c. or line A of Figure 3		P
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.		N/A
6.3.2	Levels in single fault condition	(see Form A.6)	—
	a) Voltage limits less than 55 V r.m.s. and 78 V peak or 140 V d.c.		P
	for wet locations voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		N/A
	Voltages are not hazardous live the levels of:		—
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz	A.1	P
	for wet locations measuring circuit A.4 used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		—
	c) Levels of capacitive charge or energy less line B of Figure 3		P
6.4	Primary means of protection		P
6.4.1	Accessible parts prevented from being hazardous live by one or more of following means:		—
	a) enclosures or protective barriers (see 6.4.2)		P
	b) basic insulation (see 6.4.3)		N/A
	c) Impedance (see 6.4.4)		P
6.4.2	enclosures or protective barriers	(see Form A.15 and A.16)	—
	- meet rigidity requirements of 8.1		P
	- meet requirements for basic insulation, if protection is provided by insulation		N/A
	- meet requirements of 6.7 for creepage and clearances between accessible parts and hazardous live parts, if protection is provided by limited access		P
6.4.3	Basic insulation	(see Form A.15 and A.16)	—
	- meet clearance, creepage distance and solid insulation requirements of 6.7		N/A
6.4.4	Impedance	(see Form A.12 and A.16)	—
	Impedance used as primary means of protection meets all of following requirements:		—
	a) limits current or voltage to level of 6.3.2	(see Form A.6)	P
	b) rated for maximum working voltage and the amount of power it will dissipate		P
	c) clearance, creepage distance between terminations of the impedance meet requirements of basic insulation of 6.7	(see Form A.15)	P
6.5	Additional means of protection in case of single fault condition		P
6.5.1	Accessible parts are prevented from becoming hazardous live by the primary means of protection and supplemented by one of:		—
	a) protective bonding (see 6.5.2)		N/A
	b) supplementary insulation (see 6.5.3)		N/A
	c) automatic disconnection of the supply (see 6.5.5)		N/A
	d) current- or voltage-limiting device (see 6.5.6)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Alternatively one of the single means of protection is used:		—
	e) reinforced insulation (see 6.5.3)		P
	f) protective impedance (see 6.5.4)		P
6.5.2	Protective bonding	(see Form A.7, A.8, A.9, A.10 or A.11)	P
6.5.2.1	Accessible conductive parts, may become hazardous live in single fault condition:		—
	Bonded to the protective conductor terminal; or		N/A
	Separated by conductive screen or barrier bonded to protective conductor terminal		N/A
6.5.2.2	Integrity of protective bonding		—
	a) protective bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		P
	b) Soldered connections:		—
	Independently secured against loosening		N/A
	Not used for other purposes		N/A
	c) Screw connections are secured		N/A
	d) protective bonding not interrupted; or		P
	exempted as removable part carries mains supply input connection		N/A
	e) Any movable protective bonding connection specifically designed, and meets 6.5.2.4		N/A
	f) No external metal braid of cables used (not regarded as protective bonding)		N/A
	g) If mains supply passes through:		—
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.2.4		N/A
	h) Protective conductors bare or insulated, if insulated, green/yellow		P
	Exceptions:		—
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
	terminal suitable for connection of a protective conductor, and meets 6.5.2.3		N/A
6.5.2.3	Protective conductor terminal		—
	a) Contact surfaces are metal		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Appliance inlet used		N/A
	c) For rewirable cords and permanently connected equipment, protective conductor terminal is close to mains supply terminals		P
	d) If no mains supply is required, any protective conductor terminal:		—
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to mains supply terminals		N/A
	f) If plug-in, makes first and breaks last		N/A
	g) If also used for other bonding purposes, protective conductor:		—
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing		N/A
	h) Protective conductor of measuring circuit:		—
	1) Current rating equivalent to measuring circuit terminal;		P
	2) protective bonding: not interrupted by any switch or interrupting device		N/A
	i) functional earth terminals allow independent connection		N/A
	j) If a binding screw used for Protective conductor terminal:		—
	Suitable size for bond wire		P
	Not smaller than M 4		P
	At least 3 turns of screw engaged		P
	Passes tightening torque test	(see Form A.8)	P
	k) Contact pressure not capable being reduced by deformation of materials		P
6.5.2.4	Impedance of protective bonding of plug-connected equipment	(see Form A.9)	—
	Impedance between protective conductor terminal and each accessible part where protective bonding is specified, is:		—
	less than 0,1 Ohm; or		P
	less than 0,2 Ohm if equipment is provided with non detachable cord		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.2.5	Bonding impedance of permanently connected equipment	(see Form A.10)	—
6.5.2.6	Transformer protective bonding screen	(see Form A.11)	—
	Transformer provided with screen for protective bonding:		—
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		N/A
	- Independently secured against loosening		N/A
	- Not used for other purposes		N/A
6.5.3	Supplementary and reinforced insulation	Reinforced insulation	P
	Meet clearance, creepage distance and solid insulation requirements of 6.7		P
6.5.4	Protective impedance	(see Form A.12)	P
	Limits current or voltage to level of 6.3.1 in normal and to level of 6.3.2 in single fault condition		P
	clearance, creepage distance between terminations of the impedance meet requirements of double or reinforced insulation of 6.7	(see Form A.15)	P
	The protective impedance consists of one or more of the following:	(see TABLE 1 and Form A.12)	—
	a) appropriate single component suitable for safety and reliability for protection, it is:		—
	1) rated twice the maximum working voltage		N/A
	2) resistor rated for twice the power dissipation for maximum working voltage		N/A
	b) combination of components		P
	Single electronic device not used as protective impedance		P
6.5.5	Automatic disconnection of the supply		N/A
	a) rated to disconnect the load within time specified in Figure 2		N/A
	b) rated for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices		N/A
	Device complies with all of:		—
	a) rated to limit the current or voltage to the level of 6.3.2		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) rated for the maximum working voltage; and		N/A
	rated for the maximum operational current if applicable		N/A
	c) clearance, creepage distance between terminations of the impedance meet requirements of supplementary insulation of 6.7		N/A
6.6	Connections to external circuits		P
6.6.1	Connections do not cause accessible parts of the following to become hazardous live in normal condition or single fault condition:		—
	- the external circuits		P
	- the equipment		P
	Protection achieved by separation of circuits; or		P
	short circuit of separation does not cause a hazard		N/A
	Instructions or markings for each terminal include:		—
	a) rated conditions for terminal		P
	b) Required rating of external circuit insulation		N/A
6.6.2	Terminals for external circuits		N/A
	Terminals which receive a charge from an internal capacitor are not hazardous live after 10 s of interrupting supply connection	(see Form A.5)	N/A
6.6.3	Circuits with terminals which are hazardous live		P
	These circuits are:		—
	Not connected to accessible conductive parts; or		P
	Connected to accessible conductive parts, but are not mains circuits and have one terminal contact at earth potential		N/A
	No accessible conductive parts are hazardous live		P
6.6.4	Accessible terminals for stranded conductors		N/A
	No risk of accidental contact because:		—
	Located or shielded		N/A
	Self-evident or marked whether or not connected to accessible conductive parts		N/A
	Accessible terminals will not work loose		N/A
6.7	Insulation requirements	(see Form A.14)	P
6.7.1	The nature of insulation		—

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.1.1	Insulation between accessible parts or between separate circuits consist of clearances, creepage distances and solid insulation if provided as protection against a hazard		P
6.7.1.2	Clearances		—
	Required clearances reflecting factors of 6.7.1.1	(see Form A.14, A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied	≤3000m	P
6.7.1.3	Creepage distances		—
	Required creepage distances reflecting factors of 6.7.1.1 a) to d)	(see Form A.14, A.15)	P
	CTI material group reflected by requirements		P
	CTI test performed		N/A
6.7.1.4	Solid insulation		—
	Required solid insulation reflecting factors of 6.7.1.1 a) to d)	(see Form A.14, A.15)	P
6.7.1.5	Requirements for insulation according to type of circuit	(see Form A.14, A.15)	—
	a) 6.7.2 mains circuits of overvoltage category II up to nominal supply voltage of 300 V		N/A
	b) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	c) K.1 mains circuits of overvoltage category III and IV or overvoltage category II over 300 V		N/A
	d) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	e) K.3 circuits having one or more of:		—
	1) maximum transient overvoltage is limited to known level below the level of mains circuit		P
	2) maximum transient overvoltage above the level of mains circuit		N/A
	3) Working voltage is the sum of more than one circuit or a mixed voltage		N/A
	4) Working voltage includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) Working voltage with a frequency above 30 kHz		N/A
6.7.2	Insulation for mains circuits of overvoltage category II with a nominal supply voltage up to 300 V		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.7.2.1	Clearances and creepage distances	(see Form A.14, A.15)	—
	Values for mains circuits of Table 4 are met		P
	Coatings to achieve reduction to pollution degree 1 comply with requirements of Annex H		N/A
6.7.2.2	Solid insulation		P
6.7.2.2.1	Withstands electrical and mechanical stresses in normal use and all rated environmental conditions of 1.4		—
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	N/A
	Complies as applicable:		—
	a) enclosure or protective barrier of Clause 8		P
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3		P
	d) thin-film insulation requirements of 6.7.2.2.4		P
6.7.2.2.2	Moulded and potted parts		—
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed		N/A
6.7.2.2.3	Inner insulating layers of printed wiring boards		—
	Separated by at least 0,4 mm between same two layers		P
	Reinforced insulation have adequate electric strength; one of following methods used:		—
	a) thickness of insulation is at least 0,4 mm		P
	b) insulation is assembled of minimum two separate layers, each rated for test voltage of Table 5 for basic insulation		N/A
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for reinforced insulation		P
6.7.2.2.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable clearances and creepage distance of 6.7.2.1		P
	Reinforced insulation have adequate electric strength; one of following methods used:		—
	a) thickness through the insulation at least 0,4 mm		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) insulation is assembled of min two separate layers, each rated for test voltage of Table 5 for basic insulation		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for reinforced insulation	(see Form A.18)	P
6.7.3	Insulation for secondary circuits derived from mains circuits of overvoltage category II up to 300 V	No such circuits	N/A
6.7.3.1	Secondary circuits where separation from mains circuits is achieved by a transformer providing:		—
	- reinforced insulation		P
	- double insulation		N/A
	- screen connected to the protective conductor terminal		N/A
6.7.3.2	Clearances		—
	a) meet the values of Table 6 for basic insulation and supplementary insulation; or		P
	twice the values of Table 6 for reinforced insulation		P
	or		—
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	—
	with following adjustments:		—
	1) values for reinforced insulation are 1,6 times the values for basic insulation		P
	2) if operating altitude is greater than 2000 m values of clearances multiplied with factor of Table 3		P
	3) minimum clearance is 0,2 mm for pollution degree 2 and 0,8 mm for pollution degree 3		P
6.7.3.3	Creepage distances		—
	Based on working voltage meets the values of Table 7 for basic and supplementary insulation		P
	Values for reinforced insulation are twice the values of basic insulation		P
	Coatings to achieve reduction to pollution degree 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		—
6.7.3.4.1	Withstands electrical and mechanical stresses in normal use and all rated environmental conditions of 1.4		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with values of Table 6 for basic and supplementary insulation	(see Form A.18)	P
	values for reinforced insulation are 1,6 times the values of basic insulation		P
	b) if working voltage exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for basic or supplementary insulation	(see Form A.18)	N/A
	value for reinforced insulation are twice the working voltage		N/A
	Complies as applicable:		—
	1) enclosure or protective barrier of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		—
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		—
	Separated by at least by applicable distances of Table 8 between same two layers		N/A
	Reinforced insulation have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each rated for test voltage of Table 6 for basic insulation		N/A
	c) insulation is assembled of min two separate layers, where the combination is rated for 1,6 times the test voltage of Table 6		N/A
6.7.3.4.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable clearances and creepage distance of 6.7.3.2 and 6.7.3.3		N/A
	Reinforced insulation have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) insulation is assembled of min two separate layers, each rated for test voltage of Table 6 for basic insulation		N/A
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	—
	a.c. test of 6.8.3.1; or		N/A
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	Procedure for dielectric strength tests	(see Form A.14 and A.18)	P
6.9	Constructional requirements for protection against electric shock		P
6.9.1	If a failure could cause a hazard:		—
	a) Security of wiring connections		P
	b) Screws securing removable covers		P
	c) Accidental loosening		P
	d) clearances and creepage distances not reduced below the values of basic insulation by loosening of parts or wires		P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		—
	a) Easily damaged materials not used		P
	b) Non-impregnated hygroscopic materials not used		P
6.9.3	Colour coding		P
	Green-and-yellow insulation shall not be used except:		—
	a) protective earth conductors;		P
	b) protective bonding conductors;		P
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	Connection to mains supply source and connections between parts of equipment		P
6.10.1	Mains supply cords		—
	rated for maximum equipment current (see 5.1.3 c)		P
	Cable complies with IEC 60227 or IEC 60245		P
	Heat-resistant if likely to contact hot parts		N/A
	Temperature rating (cord and inlet):		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Green/yellow used only for connection to protective conductor terminals		P
	Detachable cords with IEC 60320 mains connectors:		—
	Conform to IEC 60799; or		P
	Have the current rating of the mains connector		N/A
6.10.2	Fitting of non-detachable mains supply cords		—
6.10.2.1	Cord entry		—
	a) Inlet or bushing with a smoothly rounded opening; or		N/A
	b) Insulated cord guard protruding >5 D		N/A
6.10.2.2	Cord anchorage		—
	Protective earth conductor is the last to take the strain		N/A
	a) Cord is not clamped by direct pressure from a screw		N/A
	b) Knots are not used		N/A
	c) Cannot push the cord into the equipment to cause a hazard		N/A
	d) No failure of cord insulation in anchorage with metal parts		N/A
	e) Not to be loosened without a tool		N/A
	f) Cord replacement does not cause a hazard and method of strain relief is clear		N/A
	Push-pull and or torque test	(see Form A.19)	N/A
6.10.3	Plugs and connectors		P
	Mains supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		—
	Plugs of supply cords do not fit mains sockets above rated supply voltage		N/A
	Mains type plugs used only for connection to mains supply		N/A
	Plug pins which receive a charge from an internal capacitor	(see Form A.5)	N/A
	Accessory mains socket outlets:		—
	a) Marking if accepts a standard mains supply plug (see 5.1.3e)		N/A
	b) Input has a protective earth conductor if outlet has earth terminal contact		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.11	Disconnection from supply source	AC inlet	P
6.11.1	Disconnects all current-carrying conductors		P
6.11.2	Exceptions		N/A
6.11.3	Requirements according to type of equipment		—
6.11.3.1	Permanently connected equipment and multi-phase equipment		N/A
	Employs switch or circuit-breaker		N/A
	If switch or circuit-breaker is not part of the equipment, documentation requires:		—
	a) Switch or circuit-breaker to be included in building installation		N/A
	b) Suitable location easily reached		N/A
	c) Marking as disconnecting for the equipment		N/A
6.11.3.2	Single-phase cord-connected equipment		—
	Equipment is provided with one of the following:		P
	a) Switch or circuit-breaker		P
	b) Appliance coupler (disconnectable without tool)		N/A
	c) Separable plug (without locking device)		N/A
6.11.4	Disconnecting devices		P
6.11.4.1	Disconnecting device part of equipment		P
	Electrically close to the supply		N/A
	Power-consuming components not electrically located between the supply source and the disconnecting device		N/A
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device		N/A
6.11.4.2	Switches and circuit-breakers		P
	When used as disconnection device:		—
	Meets IEC 60947-1 and IEC 60947-3		P
	Marked to indicate function		—
	Not incorporated in mains cord		N/A
	Does not interrupt protective earth conductor		N/A
6.11.4.3	Appliance couplers and plugs		P
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		—
	Readily identifiable and easily reached by the operator		P

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Clause	Requirement + Test	Result - Remark	Verdict

	Single-phase portable equipment cord length not more than 3 m		N/A
	Protective earth conductor connected first and disconnected last		P

7	PROTECTION AGAINST MECHANICAL HAZARDS		
7.1	Equipment does not cause a mechanical hazard in normal nor in single fault condition		P
	Conformity is checked by 7.2 to 7.7		P
7.2	Sharp edges		P
	Easily touched parts are smooth and rounded		P
	Do not cause injury during normal use and		P
	Do not cause injury during single fault condition		P
7.3	Moving parts	No moving part	N/A
7.3.1	Hazards from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	Risk assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to hazardous moving parts permitted under following circumstances:		—
	a) obviously intended to operate on parts or materials external of the equipment		N/A
	inadvertent touching of moving parts minimized by equipment design (e.g. guards or handles)		N/A
	b) If operator access is unavoidable outside normal use following precautions have been taken:		—
	1) Access requires tool		N/A
	2) Statement about training in the instructions		N/A
	3) Warning markings on covers prohibiting access by untrained operators		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	Risk assessment for mechanical hazards to body parts		N/A
	Risk is reduced to a tolerable level by protective measures as specified in table 12		N/A
	Minimum protective measures:		—
	A. Low level measures		N/A
	B. Moderate measures		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure	(see Form A.20)	N/A
	Following levels are met in normal and single fault condition:		—
	Continuous contact pressure below 50 N / cm ² with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm ² for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts		N/A
7.3.5.1	Access normally allowed		—
	If levels of 7.3.4 exceeded and body part may be inserted minimum gap as specified in table 13 assured in normal and in single fault condition		N/A
7.3.5.2	Access normally prevented		—
	Maximum gap as specified in table 14 assured in normal and in single fault condition		N/A
7.4	Stability		P
	Equipment not secured to building structure is physical stable		P
	Stability maintained after opening of drawers etc. by automatic means, or		N/A
	warning marking requires the application of means		N/A
	Compliance checked by following tests as applicable:		—
	a) 10° tilt test for other than handheld equipment		P
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg		N/A
	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support that supports greatest load		N/A
	e) castor or support that supports greatest load removed from equipment		N/A
7.5	Provisions for lifting and carrying	<18kg	N/A
7.5.1	Equipment more than 18 kg :		—
	Has means for lifting or carrying; or		N/A
	Directions in documentation		N/A
7.5.2	Handles and grips		—
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		—
	Rated for maximum load; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	tested with four times maximum static load		N/A
7.6	Wall mounting		P
	Mounting brackets withstand four times weight		P
7.7	Expelled parts		P
	Equipment contains or limits the energy		P
	Protection not removable without the aid of a tool		P

8	RESISTANCE TO MECHANICAL STRESSES		
8.1	Equipment does not cause a hazard when subjected to mechanical stresses in normal use		P
	Normal protection level is 5 J		P
	Levels below 5 J but not less than 1 J are acceptable if all of following criteria are met:		—
	a) lower level justified by risk assessment of manufacturer		N/A
	b) equipment installed in its intended application is not easily touched		N/A
	c) only occasional access during normal use		N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation		N/A
	For non-metallic enclosures rated below 2 °C ambient temperature value chosen for minimum rated temperature		N/A
	Impact energies between IK values, the IK code marked for nearest lower value		N/A
	Conformity is checked by performing following tests:		—
	1) static test of 8.2.1		P
	2) impact test of 8.2.2 with 5 J except for hand-held equipment		P
	if impact energy not selected to 5 J alternate method of IEC 62262 used		N/A
	3) drop test of 8.3.1 or 8.3.2 except for fixed equipment and equipment with mass over 100 kg		N/A
	Equipment rated with an impact rating of IK 08 that obviously meets the criteria		P
	After the tests inspection with following results:		—
	- hazardous live parts above the limits of 6.3.2 not accessible		P
	- insulation pass the voltage tests of 6.8	(see Form A.30)	P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

	i) no leaks of corrosive and harmful substances		P
	ii) enclosure shows no cracks resulting in a hazard		P
	iii) clearances not less than their permitted values		P
	iv) insulation of internal wiring remains undamaged		P
	v) protective barriers not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) no damage which could cause spread of fire		P
8.2	Enclosure rigidity test		P
8.2.1	Static test	(see Form A.21A)	P
	- 30 N with 12 mm rod to each part of enclosure		P
	- in case of doubt test conducted at maximum rated ambient temperature		P
8.2.2	Impact test	(see Form A.21A)	N/A
	Impact applied to any part of enclosure causing a hazard if damaged		N/A
	Impact energy level and corresponding IK code :		—
	Non-metallic enclosures cooled to minimum rated ambient temperature if below 2 °C		N/A
8.3	Drop test	(see Form A.21)	P
8.3.1	Other than hand-held and direct-plug-in equipment		N/A
	Tests conducted with a drop height or angle of..... :		—
8.3.2	hand-held and direct-plug-in equipment		—
	Non-metallic enclosures cooled to minimum rated ambient temperature if below 2 °C		P

	Drop test conducted with an height of 1 m		P
9	PROTECTION AGAINST THE SPREAD OF FIRE		
9.1	No spread of fire in normal and single fault condition		P
	Mains supplied equipment meets requirements of 9.6 additionally		P
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	—
	a) Single Fault test of 4.4; or	(see Form A.1)	P
	b) Application of 9.2 (eliminating or reducing the sources of ignition); or		N/A
	c) Application of 9.3 (containment of fire within the equipment)		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.2	Eliminating or reducing the sources of ignition within the equipment		P
	a) 1) Limited-energy circuit (see 9.4); or		N/A
	2) basic insulation provided for parts of different potential; or		N/A
	Bridging the insulation does not cause ignition		N/A
	b) Surface temperature of liquids and parts (see 9.5)		N/A
	c) No ignition in circuits designed to produce heat		P
9.3	Containment of the fire within the equipment, should it occur		P
9.3.1	Spread of fire outside equipment reduced to a tolerable level if:		—
	a) Energizing of the equipment is controlled by an operator held switch		N/A
	b) Enclosure is conform with constructional requirements of 9.3.2; and		P
	Requirements of 9.5 are met		N/A
9.3.2	Constructional requirements		—
	a) Connectors and insulating material have flammability classification V-2 or better	(see TABLE 1 or Form A.23)	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	(see TABLE:1 or Form A.23)	P
	c) Enclosure meets following requirements:	(see Form A.22)	—
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		—
	i) no openings; or		N/A
	ii) perforated as specified in Table 16; or		N/A
	iii) metal screen with a mesh; or		N/A
	iv) baffles as specified in Figure 12		N/A
	2) Material of enclosure and any baffle or flame barrier is made of:		—
	Metal (except magnesium); or		P
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1 or Form A.22)	N/A
	3) Enclosure and any baffle or flame barrier have adequate rigidity		P
9.4	Limited-energy circuit	(see Form A.24)	N/A
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V dc		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Current limited by one of following means:		—
	1) Inherently or by impedance (see Table 17); or		N/A
	2) Overcurrent protective device (see Table 18); or		N/A
	3) A regulating network limits also in single fault condition (see Table 17)		N/A
	c) Is separated by at least basic insulation		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
9.5	Requirements for equipment containing or using flammable liquids		N/A
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire	(see Form A.25)	N/A
	Risk is reduced to a tolerable level :		—
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
	b) The quantity of liquid is limited		N/A
	c) Flames are contained within the equipment		N/A
	Detailed instructions for risk-reduction provided		N/A
9.6	Over current protection		P
9.6.1	Mains supplied equipment protected		P
	Basic insulation between mains parts of opposite polarity provided		P
	Devices not in the protective conductor		N/A
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		P
9.6.2	permanently connected equipment		—
	Overcurrent protection device:		N/A
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		—
	Protection within the equipment		N/A

10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		--
10.1	Surface temperature limits for protection against burns		P
	Easily touched surfaces within the limits in normal and in single fault condition:	(see Form A.26A)	—

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- at an specified ambient temperature of 40 °C		N/A
	- for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		P
	Heated surfaces necessary for functional reasons exceeding specified values:		—
	Are recognizable as such by appearance or function; or		N/A
	Are marked with symbol 13		N/A
	Guards are not removable without tool		N/A
10.2	Temperatures of windings		P
	Limits not exceeded in:	(see Form A.26B)	—
	normal condition		P
	single fault condition		P
10.3	Other temperature measurements		P
	Following measurements conducted if applicable:	(see Form A.26A)	—
	a) Value of 60 °C of field-wiring terminal box not exceeded		N/A
	b) Surface of flammable liquids and parts in contact with this liquids		N/A
	c) Surface of non-metallic enclosures		N/A
	d) Parts made of insulating material supporting parts connected to mains supply		N/A
	e) Terminals carrying a current more than 0,5 A		N/A
10.4	Conduct of temperature tests		P
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions	(see Form A.26A)	P
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner	(see Form A.26A)	N/A
10.4.3	Equipment intended for installation in a cabinet or wall		P
	Equipment built in as specified in installation instructions	(see Form A.26A)	P
10.5	Resistance to heat		P
10.5.1	Integrity of clearance and creepage distances	(see Form A.16)	P
10.5.2	Non-metallic enclosures		N/A
	Within 10 min after treatment:		—
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.3	Insulating material		P
	a) Parts supporting parts connected to mains supply		P
	b) Terminals carrying a current more than 0,5 A		P
	Examination of material data; or		P
	in case of doubt:		P
	1) Ball pressure test; or	(see Form A.28)	P
	2) Vicat softening test of ISO 306		N/A

11	PROTECTION AGAINST HAZARDS FROM FLUIDS		
11.1	Protection to operators and surrounding area provided by equipment		N/A
	All fluids specified by manufacturer considered		N/A
11.2	Cleaning		N/A
11.3	Spillage		N/A
11.4	Overflow		N/A
11.5	Battery electrolyte		N/A
	Battery electrolyte leakage presents no hazard		N/A
11.6	Specially protected equipment		N/A
11.7	Fluid pressure and leakage		N/A
11.7.1	Maximum pressure :		—
	Maximum pressure of any part does not exceed Prated		N/A
11.7.2	Leakage and rupture at high pressure		—
	Fluid-containing parts subjected to hydraulic test if:		—
	a) product of pressure and volume > 200 kPa; and		N/A
	b) pressure > 50 kPa		N/A
	Parts of refrigerating systems meets pressure-related requirements of IEC 60335-24 or IEC 60335-2-89		N/A
11.7.3	Leakage from low-pressure parts		N/A
11.7.4	Overpressure safety device		N/A
	Does not operate in normal use		N/A
	a) Connected as close as possible to parts intended to be protected		N/A
	b) Easy access for inspection, maintenance and repair		N/A
	c) Adjustment only with tool		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	d) No discharge towards person		N/A
	e) No hazard from deposit of discharged material		N/A
	f) Adequate discharge capacity		N/A
	No shut-off valve between overpressure safety device and protected parts		N/A

12	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure		
12.1	Equipment provides protection		N/A
12.2	Equipment producing ionizing radiation		N/A
12.2.1	Ionizing radiation	(see Form A.33)	N/A
12.2.1.1	Equipment meets the following requirements:		—
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A
	tested, classified and marked in accordance to IEC 60405		N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		—
	Effective dose rate of radiation measured :		—
	If dose rate exceeds 5 $\mu\text{Sv/h}$ marked with the following:		—
	a) Symbol 17 (ISO 361)		N/A
	b) Abbreviations of the radionuclides :		—
	c) With maximum dose at 1 m; or :		—
	with dose rate value between 1 $\mu\text{Sv/h}$ and 5 $\mu\text{Sv/h}$ in m :		—
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	—
	Limit for unintended stray radiation of 1 $\mu\text{Sv/h}$ at any easily reached point kept :		—
12.2.2	Accelerated electrons		—
	Compartments opened only by the use of a tool		N/A
12.3	Ultraviolet (UV) radiation		N/A
	No unintentional hazardous escape of UV radiation:		—
	- checked by inspection; and		N/A
	- evaluation of risk assessment documentation		N/A
12.4	Microwave radiation		N/A
	Power density does not exceed 10 W/m ² :		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
12.5	Sonic and ultrasonic pressure		N/A
12.5.1	Sound level		N/A
	No hazardous sound emission		—
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1		N/A
	Instruction describes measures for protection		N/A
12.5.2	Ultrasonic pressure		N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	Equipment intended to emit ultrasound:		N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	If inside useful beam above values exceeded:		—
	Marked with Symbol 14 of table 1		N/A
	and following information in the documentation:		—
	a) dimensions of useful beam		N/A
	b) area where ultrasonic pressure exceed 110 dB		N/A
	c) maximum sound pressure inside beam area		N/A
12.6	Laser sources		N/A
	Equipment meets requirements of IEC 60825-1		N/A

13	PROTECTION AGAINST LIBERATED GASES AND SUBSTANCES, EXPLOSION AND IMPLOSION		
13.1	Poisonous and injurious gases and substances		N/A
	No poisonous or injurious gases or substances liberated in normal condition		N/A
	Attached data/test reports demonstrate conformity		N/A

13.2	Explosion and implosion		P
13.2.1	Components		P
	Components liable to explode:		—
	Pressure release device provided; or		P
	Apparatus incorporates operator protection (see also 7.7)		P
	Pressure release device:		—
	Discharge without danger		P
	Cannot be obstructed		P

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Clause	Requirement + Test	Result - Remark	Verdict

13.2.2	Batteries and battery charging		—
	If explosion or fire hazard could occur:		—
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No hazard; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test		N/A
13.2.3	Implosion of cathode ray tubes		N/A
	If maximum face dimensions > 160 mm :		—
	Intrinsically protected and correctly mounted; or		N/A
	enclosure provides protection:		N/A
	If non-intrinsically protected:		—
	Screen not removable without tool		N/A
	If glass screen, not in contact with surface of tube		N/A

14	COMPONENTS AND SUBASSEMBLIES		
14.1	Where safety is involved, components and subassemblies meet relevant requirements	(see TABLE 1)	P
14.2	Motors		N/A
14.2.1	Motor temperatures		N/A
	Does not present a hazard when stopped or prevented from starting; or		N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A
	Connected direct to device, if overspeeding causes a hazard		N/A
14.3	Overttemperature protection devices		P

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Clause	Requirement + Test	Result - Remark	Verdict

	Devices operating in a single fault condition	(see Form A.38)	P
	d) Reliable function is ensured		P
	e) Rated to interrupt maximum current and voltage		P
	f) Does not operate in normal use		P
	If self-resetting device used to prevent a hazard, protected part requires intervention before restarting		P
14.4	Fuse holders		P
	No access to hazardous live parts		P
14.5	Mains voltage selecting devices		P
	Accidental change not possible		P
14.6	Mains transformers tested outside equipment		N/A
14.7	Printed circuit boards		P
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	Min. V-1	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better		N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	Circuits or components used as transient overvoltage limiting devices		N/A
	Test conducted between each pair of mains supply terminals		N/A
	No hazard resulting from rupture or overheating of the component:		—
	- no bridging of safety relevant insulation		N/A
	- no heat to other parts above the self-ignition points		N/A

15	PROTECTION BY INTERLOCKS		
15.1	Interlocks are designed to remove a hazard before operator exposed	No interlocks	N/A

15.2	Prevention of reactivation		N/A
15.3	Reliability		N/A
	Single fault unlikely to occur; or		N/A
	Cannot cause a hazard		N/A

16	HAZARDS RESULTING FROM APPLICATION		
16.1	Reasonably foreseeable misuse		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

	No hazards arising from settings not intended and not described in the instructions		P
	Other cases of reasonably foreseeable misuse addressed by risk assessment		P
16.2	Ergonomic aspects		—
	Factors giving rise to a hazard the risk assessment is reflecting those aspects:		P
	a) limitation of body dimensions		P
	b) displays and indicators		P
	c) accessibility and conventions of controls		P
	d) arrangement of terminals		P

17	RISK ASSESSMENT		N/A
	Risk assessment conducted, if hazard might arise and not covered by Clauses 6 to 16		N/A
	Tolerable risk achieved by iterative documented process covering the following:		—
	a) Risk analysis		N/A
	Identifies hazards and estimates risk		N/A
	b) Risk evaluation		N/A
	Plan to judge acceptability of resulting risk level based on the estimated severity and likelihood of a risk		N/A
	c) Risk reduction		N/A
	Initial risk reduced by counter measures;		N/A
	Repeated risk evaluation without new risks introduced		N/A
	Risks remaining after risk assessment addressed in instructions to responsible body:		—
	Information contained how to mitigate these risks		N/A
	Following principles in methods of risk reduction applied by manufacturer in given order:		—
	1) Risks eliminated or reduced as far as possible		N/A
	2) Protective measures taken for risks that cannot be eliminated		N/A
	3) User information about residual risk due to any defect of the protective measures		N/A
	Indication of particular training is required		N/A

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Specification of the need for personal protective equipment		N/A
	Conformity checked by evaluation of the risk assessment documentation		N/A
ANNEX F	ROUTINE TESTS		N/A
	Manufacturer's declaration		N/A
ANNEX H	QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION		
H.1	General		N/A
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	Technical properties		N/A
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N/A
	b) rated operating temperature include the temperature range of the indicated application;		N/A
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N/A
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N/A
	e) Flammability rating of the coating is at least the required flammability rating of the applied PWB.		N/A
H.3	Qualification of coatings		N/A
	Coating complies with the conformity requirements.		N/A
ANNEX K	INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7		P

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IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

IEC61010_1P ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT IEC 61010-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (Electrical Equipment For Measurement, Control, and Laboratory Use; Part1: General Requirements)			
Differences according to: EN 61010-1:2010/A1			
Attachment Form No.: EU_GD_IEC61010_1P			
Attachment Originator: TÜV Rheinland LGA Products GmbH			
Master Attachment: Date 2021-04-12			
Copyright © 2021 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	CENELEC COMMON MODIFICATIONS (EN)		P
	Procedure for voltage tests		P
6.8.3.1	The a.c. voltage test Replace the first sentence by the following sentence: The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.		P
Annex ZA (normative)	The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		P
Annex ZZ (informative)	Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered		P

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4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results				Form A.1	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4	
4.4	1	DB1 (S-C)	10s	After SC, F1 opened. No damage, no hazard.	Yes	
	2	CE1 (S-C)	10s	After SC, F1 opened. No damage, no hazard.	Yes	
	3	T1 (S-C)	10min	After SC, unit shutdown. No damage, no hazard.	Yes	
	4	U1 pin4-5 (S-C)	10min	After SC, unit shutdown. No damage, no hazard.	Yes	
NOTE Td = Test duration in hh:mm:ss Record dielectric strength test on Form A.18 and temperature tests on Form A.26A and or A.26 B. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.						
Supplementary information: SC: short circuit						

5.1.3c)	TABLE: MAINS supply				Form A.2	P
	Marked rating..... :		100-240 V			—
	Phase..... :		Single-phase			—
	Frequency :		50/60 Hz			—
	Current :		0.03 A			—
	Power :		-- W			—
	Power :		- VA			—
Test	Voltage	Frequency	Current	Power	Power	Comments
No.	V	Hz	A	W	VA	
1	100	50	0.016	--	--	Normal operation
2	100	60	0.017	--	--	Normal operation
3	240	50	0.019	--	--	Normal operation
4	240	60	0.019	--	--	Normal operation
NOTE – Measurements are only required for marked ratings.						
Supplementary information:						

5.3	TABLE: Durability of markings	Form A.3	P
Marking method (see NOTE)		Agent	
1) Adhesive label		A Water	
2) Ink printed		B Isopropyl alcohol	
3) Laser marked		C (specify agent)	
4) Film-coated (plastic foil control panel)		D (specify agent)	
5) Imprinted on plastic (moulded in)		E (specify agent)	

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NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location			Marking method (see above)		
Identification (5.1.2)			1)		
MAINS supply (5.1.3)			1)		
Fuses (5.1.4)			1)		
Terminals and operating devices (5.1.5.2)			N/A		
Switches and circuit breakers (5.1.6)			1)		
Double/reinforced equipment (5.1.7)			1)		
Field wiring Terminal boxes (5.1.8)			N/A		
Warning marking (5.2)			1)		
Battery charging (13.2.2)			N/A		
Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
1)	A, B	Yes	--	--	30s, pass
Supplementary information:					

6.2	TABLE: List of accessible parts			Form A.4	P
6.1.2	Exceptions				—
6.2	Determination of ACCESSIBLE parts				—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)		
1	Enclosure	Visual	-		
NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2) NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2) NOTE 3 – Parts are considered to be accessible if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4). NOTE 4 – Capacitor test may be required (see Form A.5). NOTE 5 – The determination methods are: V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.					
Supplementary information:					

6	TABLE: Values in normal condition				Form A.5	P
6.1.2	Exceptions		11.2 Cleaning and decontamination		—	
6.3.1	Values in NORMAL CONDITION (see NOTE 1)		11.3 Spillage		—	
6.6.2	Terminals for external circuit		11.4 Overflow		—	
6.10.3	Plugs and connections				—	
Item	Voltage	Current	Capacitance	10 s / 5 s test (NOTE)		Comments

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(see Form A.4)	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μ C	mJ	V	μ C	mJ	
1	130 mV	-	-	A1	0.02	-	-	-	-	-	-	-	-
2	96 mV	-	-	A1	0.02	-	-	-	-	-	-	-	-
3	126 mV	-	-	A1	0.02	-	-	-	-	-	-	-	-
4	87 mV	-	-	A1	0.02	-	-	-	-	-	-	-	-
5	243 mV	-	-	-	-	-	-	-	-	0	-	-	After 10s

NOTE – A 10 s test is specified in 6.1.2 a) b). A. 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

Supplementary information:

6.3.2	TABLE: Values in single fault condition											Form A.6	P
Item	Subclause and	Voltage			Transient (see NOTE)		Current				Capacitance	Comments	
(see Form A.4)	fault No. (see Form A.1)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μ F (see NOTE)		
1	1-4	138 mV	-	-	-	-	A1	0.02	-	-	-	-	-
2	1-4	96 mV	-	-	-	-	A1	0.02	-	-	-	-	-
3	1-4	123 mV	-	-	-	-	A1	0.02	-	-	-	-	-
4	1-4	94 mV	-	-	-	-	A1	0.02	-	-	-	-	-
5	1-4	-	-	-	-	-	-	-	-	-	-	0V after 10s.	

NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.

Supplementary information:

6.5.2.2	TABLE: Cross-sectional area of bonding conductors											Form A.7	P
Conductor location								CROSS-SECTIONAL AREA mm ²				Verdict	
Protect bonding connected to PCB								0.75				Pass	

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Supplementary information:

6.5.2.3	TABLE: Tightening torque test	Form A.8	N/A
Conductor location	Size of screw	Tightening torque [Nm]	Verdict
Supplementary information:			

6.5.2.4	TABLE: Bonding impedance of plug connected equipment			Form A.9	N/A
ACCESSIBLE part under test		Test current A	Voltage attained after 1 min V	Calculated resistance (Maximum 0,1 or 0,2 Ω) [Ω] (NOTE 1)	Verdict
NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each part shall not exceed 0,2 Ohm.					ACCESSIBLE
Supplementary information:					

6.5.2.5	TABLE: Bonding impedance of permanently connected equipment	Form A.10	N/A
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict
Supplementary information:			

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6.5.2.6	TABLE: Transformer PROTECTIVE BONDING screen			Form A.11	N/A
ACCESSIBLE part under test		Test current (see NOTE) A	Voltage attained after 1 min (maximum 10 V) V	Calculated resistance (maximum 0,1 Ω) Ω	Verdict
NOTE – Test current must be twice the value of the overcurrent protection means of the winding. Test is specified in 6.5.2.6 a) or b).					
Supplementary information:					

6.5.4	TABLE: protective impedance						Form A.12	N/A
A single component								
Component	Location	Measured		Calculated	Rated		Verdict	Comments
		Working voltage V	Current A	Power dissipation W	Working voltage V	Power dissipation W		
A combination of components								
Component				Location			Comments	
RESISTORS				R1, R3				
NOTE – A PROTECTIVE IMPEDANCE shall not be a single electronic device that employs electron conduction in a vacuum, gas or semiconductor.								
Supplementary information:								

6.5.6	TABLE: Current- or voltage-limiting device					Form A.13	N/A
Component	Location	Measured		Rated		Verdict	Comments
		Working voltage V	Current A	Working voltage V	Current A		
Supplementary information:							

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6.7	TABLE: Insulation requirements- Block diagram of system						Form A.14	P
Pollution degree : 2								
Overvoltage category.....:								
Area	Location	Insulation type	WORKING VOLTAGE			Test voltage	Comments (NOTE 3)	
		(NOTE 1)	RMS V	Peak V	Frequency kHz	(NOTE 2) V		
A	Primary components live parts to enclosure PE on PCB	BI	240	-	--	240V	Limit: CAT II 240V: Cl: 2.5, Cr:3.0; Measured: 3.5.	
NOTE 1 – Type of insulation: BI = BASIC INSULATION DI = DOUBLE INSULATION PI = PROTECTIVE IMPEDANCE RI = Reinforced INSULATION SI = Supplementary INSULATION see also Form A.15 for further details		NOTE 2 - Types of voltage Peak impulse test voltage (pulse) r.m.s. d.c. peak			NOTE 3 - OVERVOLTAGE CATEGORIES or POLLUTION DEGREES which differ should be shown under "Comments"			
Supplementary Information:								

6.7	TABLE: Insulation requirements- Clearances and Creepages										Form A.15	P
6.2.2	Examination					6.5.4	Protective impedance				—	
6.4.2	Enclosures and protective barriers					6.5.6	Current- or voltage-limiting device				—	
6.4.4	Impedance					9.6.1	Basic insulation between opposite polarity				—	
Area	Location	Insulation type	WORKING VOLTAGE (NOTE 2)			Clearance		Creepage		CTI	Verdict	Comments
	(See Form A.14)	(NOTE 1)	RMS V	Peak V	Frequency kHz	Required mm	Measured mm	Required mm	Measured mm			
A	Primary components live parts to enclosure on PCB	BI	240	-	--	2.5	3.5	3.0	3.5	175	P	
NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram required insulation (see Form A.14)												
NOTE 2 – to be used for definition of												
Input supply voltage.....:		V	Hz									
Supplementary information:												

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6.7	TABLE: Insulation requirements- Clearances and Creepages										Form A.16	P
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS								9.6.1	Overcurrent protection basic insulation between MAINS parts		—
8	Mechanical resistance to shock and impact								10.5.1	Integrity of CLEARANCES and CREEPAGE distances		—
Area	Location	Insulation type	Mechanical tests (NOTE)					Test at max.	Measured after test (if required)		Verdict	Comments
	(See Form A.14)		Applied force	Rigidity (8.2)		Drop (8.3)		RATED ambient	Clearance	Creepage distance		
			N	Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/Plug-in	(10.5.1)	mm	mm		
A	Primary components live parts to enclosure	BI	Yes	30N	1m	N/A	N/A	40	3.5	3.5	P	

NOTE – Refer to Form A.18 for dielectric strength tests following the above tests.

Supplementary information:

6.7.2.2.2	TABLE: Reliability of potted components	Form A.17	N/A
14.1 b)	Components and subassemblies		N/A

Temperature Cycling Test				
Manufacturer				
Type				
Construction				
Potting compound				
CREEPAGE distances measured				
CLEARANCES measured				
Thickness through insulation				
Adhesive test Pass/Fail.....				
Test temperature T °C				
Cycles at U= AC 500 V			Leakage current (500 V) Ma	
Number of cycles	Date		68 h / 125 °C	1 h / 25 °C
			2 h / 0 °C	1 h / 25 °C

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1. Cycle from		to					
2. Cycle from		to					
3. Cycle from		to					
4. Cycle from		to					
5. Cycle from		to					
6. Cycle from		to					
7. Cycle from		to					
8. Cycle from		to					
9. Cycle from		to					
10. Cycle from		to					

After Cycling Test :

Humidity conditioning	48 h	
Requirements for dielectric strength (s. insulation diagram)	Test voltage V r.m.s	Verdict
Basic insulation _____ V r.m.s.		
Supplementary insulation _____ V r.m.s.		
Reinforced insulation _____ V r.m.s.		
NOTE – to be used for evaluation of components containing insulation through solid insulation, when the component standard require thermal cycling test. Ref Clause 14.1 and Figure 15, option b)		
Supplementary information:		

6.8	TABLE: Dielectric strength tests					Form A.18	P
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS ¹						P
6.4	Primary means of protection ²						P
6.6	Connections to external circuits						P
6.7.	Insulation requirements ² (see Annex K)						P
6.10.2	Fitting of non-detachable MAINS supply cords ¹						N/A
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment						N/A
9.4 c)	Limited-energy circuit						N/A
9.6.1	Overcurrent protection basic insulation between MAINS – parts						N/A
	Test site altitude..... :				500 m		—
	Test voltage correction factor (see table 10) :				1.12		—
Location or references from Forms A.1 and A.14		Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/ d.c.	Comments (NOTE)	Verdict

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¹ Record the fault, test or treatment applied before the dielectric strength test. ² Humidity preconditioning required. NOTE: Test duration may be recorded.						
Supplementary information:						

6.10.2	TABLE: Cord anchorage					Form A.19	N/A
Location		Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment
Dielectric strength test for 1 min. (6.8.3.1)				V r.m.s.			
Supplementary information:							

7.	TABLE: Protection against mechanical HAZARDS													Form A.20	N/A
7.3.4	Limitation of force and pressure													—	
7.3.5	Gap limitations between moving parts													—	
Part / Location	Clause 7.3.4		Clause 7.3.5.1								Clause 7.3.5.2		Verdict	Comments	
	Continuous	Temporary	Minimum gaps [mm]								Maximum gaps [mm]				
	Contact pressure max. 50 N /cm² @ max. 150 N	max. 250 N / 3 cm² @ max. 0,75 s	Torso 500	Head 300	Leg 180	Foot 120	Toe 50	Arm 120	Hand 100	Finger 25	Head 120	Foot 35	Finger 4		
Supplementary information:															

8.2	ENCLOSURE rigidity test	Form A.21A		P
8.2.1	Static test			P
	Material of enclosure..... :	Non-Metal		—
	Preparation for the test:	-		—
	Operated at ambient temperature..... :	- ° C	- h	—
Location		Comments		Verdict

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1) Enclosure	30N force. No damage.	P
Supplementary information: For sender		
8.2.2	Dynamic test	N/A
	Material of enclosure.....: Metal	—
	Corresponding IK-code.....:	—
	Preparation for the test: --	—
	Cooled to (temperature).....: -- °C	—
Location		Verdict
Supplementary information:		

8.3	Drop test	Form A.21B	P
8.3.1	Other equipment		N/A
Location		Raised up to	Comments
--		500mm 30 °	—
			—
Supplementary information: For sender			
8.3.2	Hand-held EQUIPMENT and direct plug-in equipment		P
	Material of enclosure.....: non-metallic		—
	Preparation for the test: 10mins		—
	Cooled to (temperature).....: 24.5		—
Location		Comments	Verdict
1) Side		No damage	P
2) Edge		No damage	P
3) Corner		No damage	P
Supplementary information:			

9	TABLE: Protection against the spread of fire			Form A.22	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9.1 a, b or c)	Protection details		Verdict

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9	TABLE: Protection against the spread of fire			Form A.22	P
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9.1 a, b or c)	Protection details	Verdict	
1	Internal circuits	9a	See form A.1 for details.	P	
2	Internal circuits	9c	See form A.1 for details.	P	
Supplementary information:					

9.3.2	TABLE: Constructional requirements					Form A.23		P	
14.7	Printed circuit boards							P	
No test need, PCB V-1 or better									
Material tested.....:								—	
Generic name.....:								—	
Material manufacturer								—	
Type								—	
Colour.....:								—	
Conditioning details.....:								—	
				Sample					
				1	2	3	4	5	6
Thickness of specimen		mm							
Duration of flaming after first Application		s							
Duration of flaming plus glowing After second application		s							
Specimen burns to holding clamp		Yes/No							
Cotton ignited		Yes/No							
Sample result		Pass/Fail							
Supplementary information:									

9.4	TABLE: Limited-energy circuit					Form A.24	N/A
Item	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments	
or Location (see Form A.22)	Maximum potential in circuit voltage r.m.s./d.c. V	Maximum available current A	Overload protection after 120 s A	Circuit separation	Yes/No		

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9.4	TABLE: Limited-energy circuit					Form A.24	N/A
Item	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments	
or Location (see Form A.22)	Maximum potential in circuit voltage r.m.s./d.c. V	Maximum available current A	Overload protection after 120 s A	Circuit separation	Yes/No		
NOTE – Maximum values see Tables 17 and 18. of 61010-1							
Supplementary information:							

9.5	TABLE: Requirements for equipment containing or using flammable liquids Form A.25			N/A
Type of liquid		9.5 Flammable liquids		Verdict
	b) Quantity	c) Containment		
Supplementary information:				

10.	TABLE : Temperature Measurements				Form A.26A	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION					N/A
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION					N/A
10.3	Other temperature measurements					P
Operating conditions:		Normal operation				
Frequency		60 Hz	Test room ambient temperature (ta)...		55.0 °C	
Voltage		240 V	Test duration.....		01 h 34 min	
Part / Location		t_m °C (measure)	t_c °C (K+40)	t_{max} °C (limit)	Verdict	Comments
Termination		62.3	--	--	P	
RV1 body		67.4	--	85	P	
CX1 body		66.8	--	110	P	
CE1 body		65.3	--	105	P	
L7 winding		72.2	--	110	P	
T1 winding		75.6	--	110	P	
CY1 body		70.1	--	125	P	
PCB near DB1		78.6	--	130	P	

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10.	TABLE : Temperature Measurements				Form A.26A	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION					N/A
10.2	Temperature of windings- NORMAL CONDITION and / or SINGLE FAULT CONDITION					N/A
10.3	Other temperature measurements					P
Operating conditions:		Normal operation				
Frequency		60 Hz	Test room ambient temperature (ta)...		55.0 °C	
Voltage		240 V	Test duration.....		01 h 34 min	
Part / Location		t_m °C (measure)	t_c °C (K+40)	t_{max} °C (limit)	Verdict	Comments
PCB near U7		72.3		130		
Plastic enclosure inside		59.8	--	--	P	
Plastic enclosure outside		58.9	--	95	P	
Ambient		55.0	--	--	--	
<p>NOTE 1 - t_m = measured temperature t_c = t_m corrected ($t_m - t_a + 40$ °C or max. RATED ambient) t_{max} = maximum permitted temperature</p> <p>NOTE 2 - see also 14.1 with reference to component operating conditions</p> <p>NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary</p> <p>NOTE 4 - see Form A.26B for details of winding temperature measurements</p>						
Supplementary information:						

10.2	TABLE: Temperature of windings						Form A.26B	N/A	
Resistance method Temperature Measurements									
4.4.2.7	MAINS transformers								
14.2.1	Motor temperatures								
Operating conditions ...:									
Frequency		Hz	Test room ambient temperature (ta1/ta2) ..				/ °C (initial / final)		
Voltage		V	Test duration				h min		
Part / Designation		Rcold Ω	Rwarm Ω	Current A	tr K	tc °C	tmax °C	Verdict	Comments
<p>NOTE 1- R_{cold} = initial resistance t_r = temperature rise t_{max} = maximum permitted temperature</p> <p>R_{warm} = final resistance $t_c = t_r$ corrected ($t_c = t_r - \{ t_{a2} - t_{a1} \} + [40$ °C or max RATED ambient])</p> <p>NOTE 2 - Indicate insulation class (IEC 60085) under comments (optional)</p> <p>NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary</p>									
Supplementary information:									

10.5.2	TABLE: Resistance to heat of non-metallic ENCLOSURES		Form A.27	N/A
Test method used:		a)		—

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	Non operative treatment..... : []		N/A
	Empty ENCLOSURE : []		N/A
	Operative treatment..... : []		N/A
	Temperature during tests :		—
Description	Material	Comments	Verdict
	Dielectric strength test (6.8)	V	r.m.s.
			N/A
NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.			
Supplementary information:			

10.5.3	TABLE: Insulating Materials	Form A.28	P
10.5.3 1)	Ball-pressure test		P
	Max. allowed impression diameter : 2 mm		—
Part	Test temperature °C	Impression Diameter (mm)	Verdict
PCB	125	0.6	P
Enclosure	125	1.0	P
Transformer bobbin	125	0.6	P
Supplementary information:			
10.5.3 2)	Vicat softening test (ISO 306)	Form A.29	N/A
Part	Vicat softening temperature °C	Thickness of sample (mm)	Verdict
Supplementary information:			

8	TABLE: Mechanical resistance to shock and impact	Form A.30	P
11	Protection against HAZARDS from fluids		P
Voltage tests can be carried out once after performing the tests of clause 8 and clause 11. However, if voltage tests are carried out separately after each set of tests, two forms can be used.			
	Clause 8 tests	Clause 11 tests	

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Location (see Form A.14)	Static (8.2.1) 30 N	Impact (8.2.2)	Normal (8.3.1)	Handheld Plug-in	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)	Working voltage V	Test voltage V	Verdict	Comments
Enclosure top	Yes	1m	-	-	-	-	-	-	3	3000 VAC	P	
Enclosure bottom	Yes	1m	-	-	-	-	-	-	3	3000 VAC	P	
Enclosure side	Yes	1m	-	-	-	-	-	-	3	3000 VAC	P	
NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.												
Supplementary information:												

11.7.2	TABLE: Leakage and rupture at high pressure					Form A.31	N/A
Part	Maximum permissible working pressure Mpa	Test pressure MPa	Leakage Yes / No	Deformation Yes / No	Burst Yes / No	Comments	
NOTE – see also Annex G with requirements for USA and Canada.							
Supplementary information:							

12.2.1	TABLE: Ionizing radiation			Form A.33	N/A
12.2.1.2	Equipment intended to emit radiation				
Locations tested		Measured values μSv/h	Verdict	Comments	
Supplementary information:					
12.2.1.3	Equipment not intended to emit radiation			Form A.34	N/A
	Max. allowed effective dose rate at 100 mm.....:		1 μSv/h	—	
Locations tested		Measured values μSv/h	Verdict	Comments	
Supplementary information:					

12.5.1	TABLE: Sound level		Form A.35	N/A
Locations tested		Measured maximum sound pressure level Db(A)	Calculated maximum sound power level	
At operator's normal position and at bystanders' positions				

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12.5.1	TABLE: Sound level		Form A.35	N/A
Locations tested		Measured maximum sound pressure level Db(A)	Calculated maximum sound power level	
a)				
b)				
c)				
d)				
e)				
f)				
Supplementary information:				
12.5.2	Ultrasonic pressure		Form A.36	N/A
Locations tested		Measured values	Comments	
		dB	kHz	
At operator's normal position				
At 1 m from the ENCLOSURE				
a)				
b)				
c)				
d)				
e)				
NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 μ Pa is under consideration for applicable frequencies between 20 kHz and 100 kHz.				
Supplementary information:				

13.2.2	TABLE: Batteries		Form A.37	N/A
Battery load and charging circuit diagram:				
Battery type			—	
Battery manufacturer/model/catalogue No.....			—	
Battery ratings			—	
Reverse polarity instalment test			N/A	
Single component failures		Verdict		
Component		Open circuit	Short circuit	

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13.2.2	TABLE: Batteries	Form A.37	N/A
	Battery load and charging circuit diagram:		
Supplementary information:			

14.3	TABLE: Over temperature protection devices	Form A.38	N/A
Reliability test			
Component	Type (NOTE)	Verdict	Comments
NOTE: NSR = non-self-resetting (10 times) NR = non-resetting (1 time) SR = self-resetting (200 times)			
Supplementary information:			

4.4.2.7	TABLE: MAINS transformer	Form A.39	N/A
4.4.2.7.2	Short circuit		N/A
14.6	MAINS transformers tested outside equipment		N/A
Type	/		—
Manufacturer	/		—
Test in equipment			--
Test on bench			N/A
Test repeated inside equipment (see 14.6)			N/A
Optional – Insulation class (IEC 60085) of the lowest rated winding			—
Winding identification			
Type of Protector for winding (NOTE 1)			
Elapsed time			
Current, A	primary		
	secondary		
Winding temperature, °C	primary		
(see NOTE 2)	secondary		
Tissue paper / cheesecloth OK ? (Pass / Fail)			
Voltage tests (see NOTE 3)			
Primary to secondary	3000 V		

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4.4.2.7	TABLE: MAINS transformer				Form A.39	N/A
Primary to core	1500	V	_____			
Secondary to core	1500	V	_____			
Verdict						
NOTE 1:	Primary fuse		- PF / ()	A		
	Secondary fuse		- SF / ()	A		
	Overtemperature protection		- OP / ()	°C		
	Impedance protection		- Z			
NOTE 2:	Indicate method of measurement		TC = with thermocouple R = resistance method			
NOTE 3:	If resistance method is used, record resistance in cold and warm condition in FormA.26B! Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown					
Supplementary information:						

4.4.2.7	TABLE: MAINS transformer				Form A.40	N/A
4.4.2.7.3	Overload tests (for MAINS transformers)					
14.6	MAINS transformers tested outside equipment					
Type						—
Manufacturer						—
Test in equipment						
Test on bench						
Test repeated inside equipment (see 14.6)						
Optional – Insulation class (IEC 60085) of the lowest rated winding						—
Winding identification						
Type of Protector for winding (NOTE 1)						
Elapsed time						
Current, A	primary					
	secondary					
Winding temperature, °C	primary					
(see NOTE 2)	secondary					
Tissue paper / cheesecloth OK ? (Pass / Fail)						
Voltage tests (see NOTE 3)						
Primary to secondary	NB					
Primary to core	NB					
Secondary to core	NB					
Verdict		P				
NOTE 1:	Primary fuse		- PF / ()	A		
	Secondary fuse		- SF / ()	A		
	Overtemperature protection		- OP / ()	°C		
	Impedance protection		- Z			
NOTE 2:	Indicate method of measurement		TC = with thermocouple			

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4.4.2.7	TABLE: MAINS transformer	Form A.40	N/A
4.4.2.7.3	Overload tests (for MAINS transformers)		
14.6	MAINS transformers tested outside equipment		
NOTE 3: R = resistance method If resistance method is used, record resistance in cold and warm condition in FormA.26B! Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown			
Supplementary information:			

14.8	TABLE: Transient overvoltage limiting devices								Form A.41	N/A
Component / Designation	Overvoltage Category	MAINS voltage V rms	Test voltage V	t _m °C	t _c °C	t _{max} °C	Rupture Yes / No	Circuit breaker tripped	Verdict	Comments
Test room ambient temperature			°C							
NOTE - t _m = measured temperature t _c = t _m corrected (t _m -t _a + 40 °C or max. RATED ambient) t _{max} = maximum permitted temperature										
Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).										
Supplementary information:										

Annex H	TABLE: Qualification of conformal coating for protection against pollution	Form A.42	N/A
----------------	-----------------------------------------------------------------------------------	------------------	-----

Technical properties											
Manufacturer										—	
Type										—	
Meet requirements of ANSI / UL 746E				[yes / no]							
Manufacturer declaration of coating material :				[yes / no]							
Operating temperature of coating				[] °C							
Comparative tracking index (CTI)				[]							
Insulation resistance				[] Ω							
Dielectric strength				[] V							
UV resistance (if required)				[yes / no]							
Flammability rating											
Preparation of the test specimens conducted:				[yes / no]							
Item	Test conditioning	Parameter	Td h	Samples						Verdict	Comments
				1	2	3	4	5	6		
1	Scratch resistance										

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	Visual inspection										
2	Cold		24								
3	Dry heat		48								
4	Rapid temp. change										
5	Damp heat		24								
6	Adhesion of coating	5 N									
	Visual inspection										
7	Humidity		48								
8	Insulation resistance	$\geq 100 \Omega$									
	Visual inspection										

NOTE Td = Test duration time

Supplementary information:

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TABLE 1: - List of components and circuits relied on for safety					P
Object / part No	Manufacturer / trademark (NOTE 1)	Type / model	Technical data (NOTE 2)	Standard	Mark(s) of conformity1)
Plastic enclosure	SABIC INNOVATIVE PLASTICS US L L C	940(f1)	V-0, 120°C, min. thickness 1.5mm	UL 94 UL 746	UL E121562
PCB	SHENZHEN BESTMAN ELECTRONIC CO LTD	YX-11	V-0, 130°C	UL 94 UL 796	UL E302201
(Alternative)	Shenzhen Qunhui Precision Technology Co Ltd	QH-D	V-0, 130°C	UL 796 UL 94	UL E506706
Varistor (RV1)	Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd.	10D471K, 10D471K-H	Min. 300Vac, 85°C, V-0 coating, combination pulse 6KV/3KA complied	EN 61051-1 EN 61051-2 EN 61051-2-2	VDE 40023049
(Alternative)	Hongzhi Enterprises Ltd.	HEL10D471K	Min. 300Vac, 85°C, V-0 coating, combination pulse 6KV/3KA complied	EN 61051-1 EN 61051-2 EN 61051-2-2	VDE 40037512
Fuse (F1)	Dongguan Reomax Electronics Technology Co., Ltd.	MTS	T1A, 250V	IEC/EN 60127-1 IEC/EN 60127-3	VDE 40039420
Y-Capacitor (CY1, CY2, CY3)	Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd.	CD-Series	Min.250V, 1nF, 125°C, Y1 Type	IEC/EN 60384-14	VDE 40025754
(Alternative)	Dongguan Cigu Electronic Technology Co Ltd	CD-Series	Min.250V, 1nF, 125°C, Y1 Type	IEC/EN/UL 60384-14	UL E481614 VDE 40043434
(Alternative)	Hongzhi Enterprises Ltd.	Y1 Series	400V, 1nF, 125°C, Y1 Type	IEC/EN 60384-14	VDE 40038760
Relay (K1, K2, K3, K4)	Zhejiang Fanhar Electronics Co., Ltd.	W35L-2AT-L2	DC5V 20A 250VAC	UL 60947-1, UL 60947-4-1 IEC/EN 61810-1	UL E475405 TUV R 50407003
X-Capacitor (CX1)	SURETOP TECHNOLOGY Co.Ltd.	MPX	min.275V, 0.047uF, 105oC, X2	IEC/EN/UL 60384-14	VDE 40034508
(Alternative)	Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd.	MPX	min.275V, 0.047uF, 110oC, X2	IEC/EN/UL 60384-14	UL E208107 VDE 40034679
Bridge Diode (DB1)	Shangdong Jingdao Microelectronics Co.,Ltd	ABS8-12	Min. 2A, min.600V	IEC/EN62368-1	Test with appliance
(Alternative)	Interchangeable	Interchangeable	Min. 2A, min.600V	IEC/EN62368-1	Test with appliance
Transformer (T1)	Shenzhen Xinchuang Long Electronic Technology Co., Ltd	EE16	1.8mH 5V/1000mA KP2010	IEC/EN62368-1	Test with appliance
(Alternative)	Dongguan aeromagnetic Electronics Co., LTD	EE16	1.8mH 5V/1000mA KP2010	IEC/EN62368-1	Test with appliance

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TABLE 1: - List of components and circuits relied on for safety					P
Object / part No	Manufacturer / trademark (NOTE 1)	Type / model	Technical data (NOTE 2)	Standard	Mark(s) of conformity1)
- Bobbin	CHANGSHU SOUTH-EAST PLASTIC CO LTD	PF2A5-151J	V-0, 150°C, Min. thickness: 0.89mm	UL 94	UL E136137
-Triple insulated wire	Shenzhen Darun Science and Technology Co., Ltd	DRTIW-B	130°C	UL 2353 IEC/EN 62368-1	UL E349174 VDE 40032470
-Tube	Fluotech Industrial (Huizhou) Co Ltd	TFT	200°C, 300V, VW-1	UL 224	UL E175982
- Insulation tape	SUZHOU MAILADUONA ELECTRIC MATERIAL CO LTD	JY313#	130°C	UL 510	UL E188295
-Winding	SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD	xUEW/130, QA-x/130	130°C	UL 1446	UL E239508
(Alternative)	Interchangeable	Interchangeable	130°C	UL 1446	UL
-Varnish	ZHUHAI CHANGXIAN NEW MATERIALS TECHNOLOGY CO LTD	E962	130 °C	UL 1446	UL E335405
<p>NOTE → 1 List all different manufacturers of the above components → 2 May include electrical, mechanical values → 3 List licence no or method of acceptance → 4 asterisk indicates mark assuring agreed level of surveillance s</p>					

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ATTACHMENT 1

Photo Documentation



Figure 1 External View



Figure 2 External View

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Photo Documentation

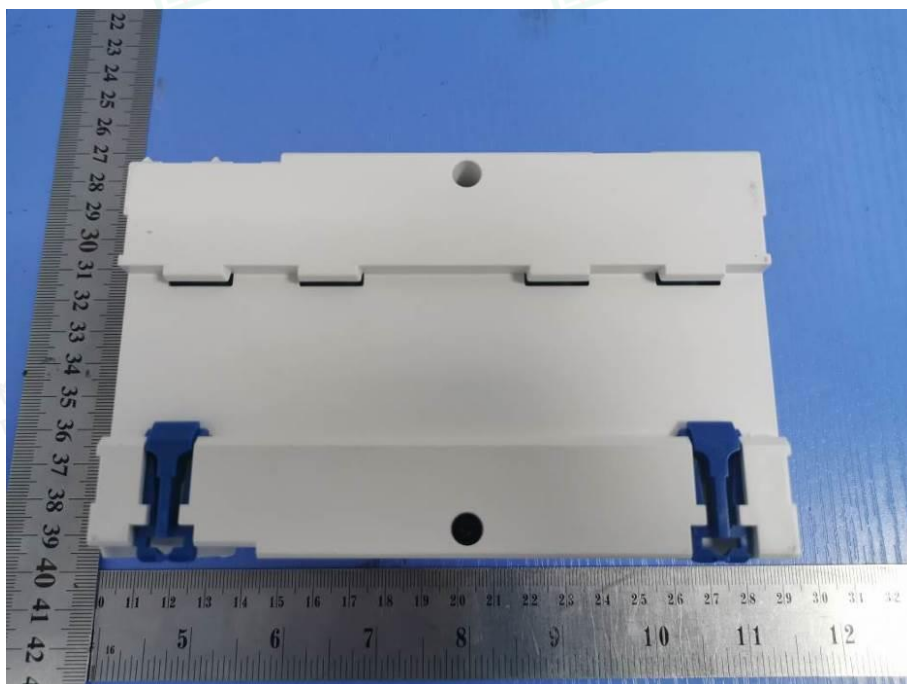


Figure 3 External View



Figure 4 External View

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Figure 5 External View

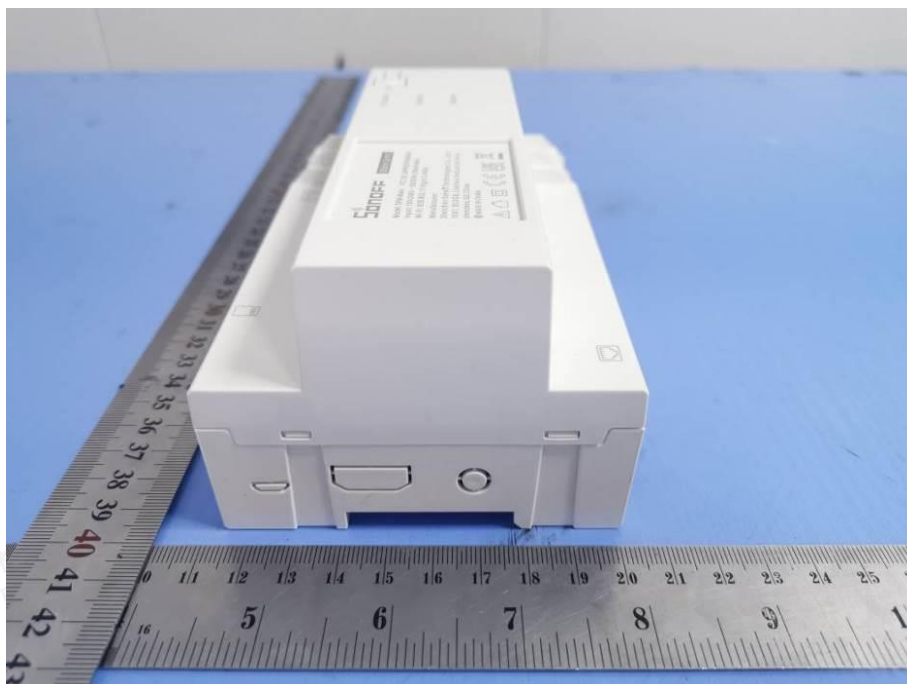


Figure 6 External View

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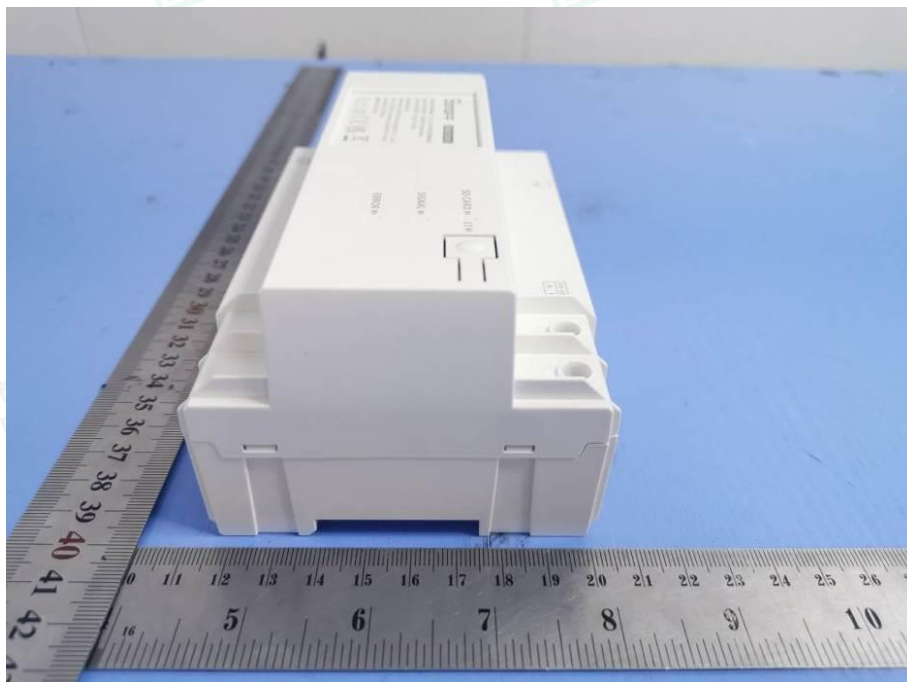


Figure 7 External View



Figure 8 External View

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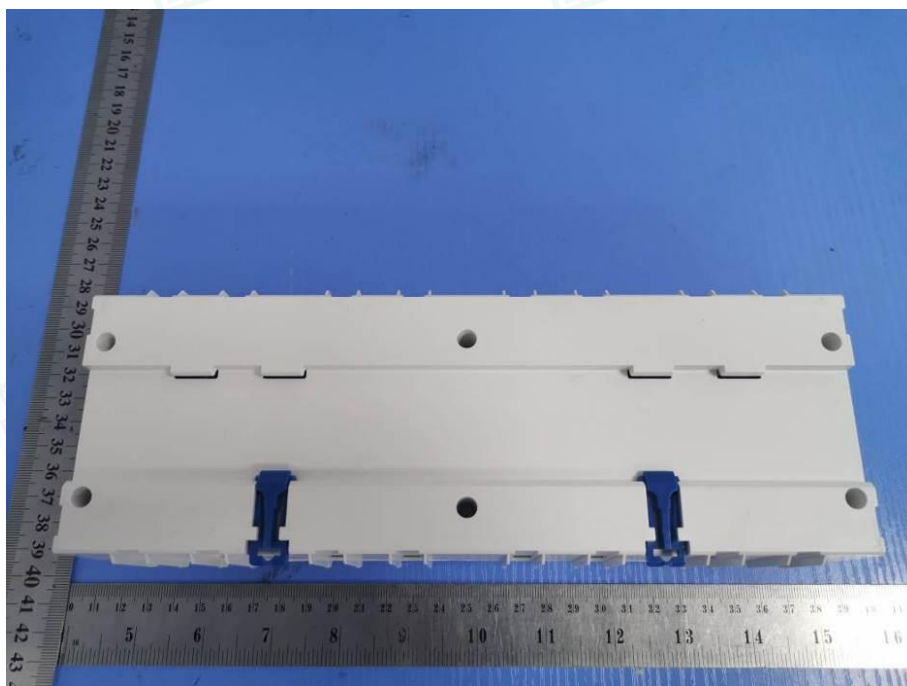


Figure 9 External View



Figure 10 External View

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Figure 11 External View

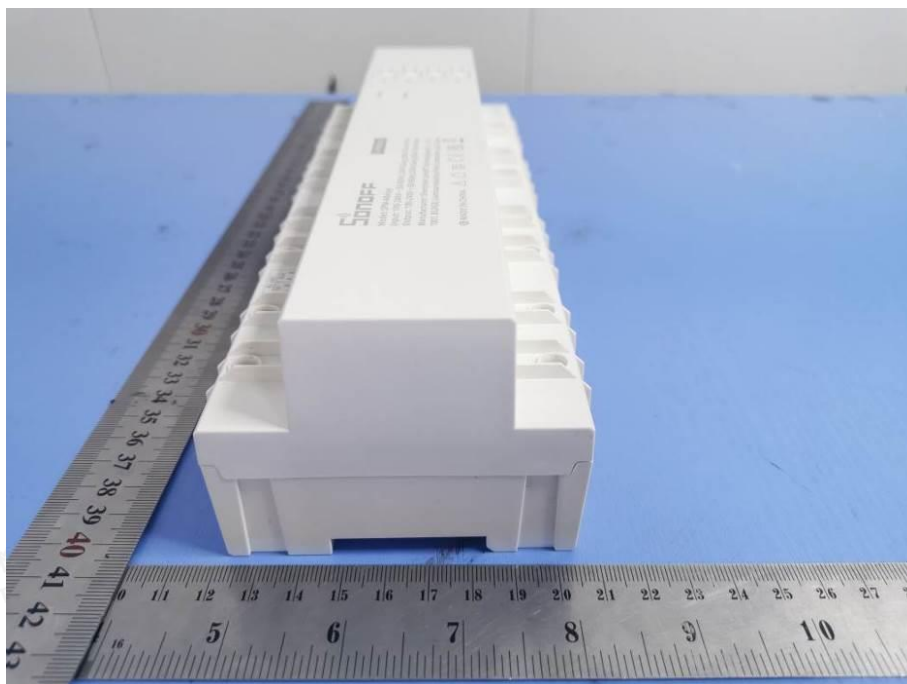


Figure 12 External View

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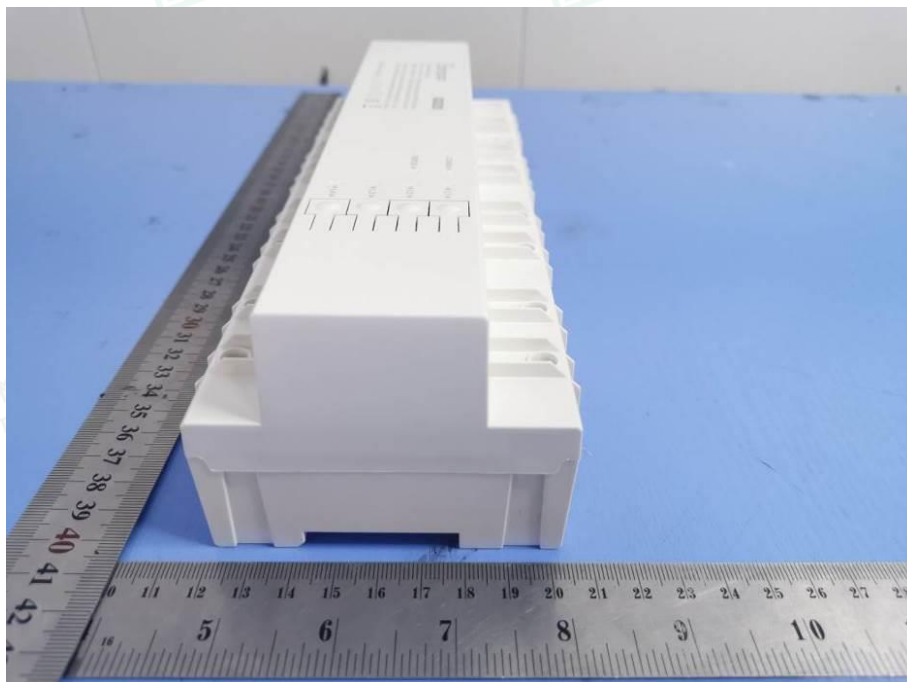


Figure 13 External View

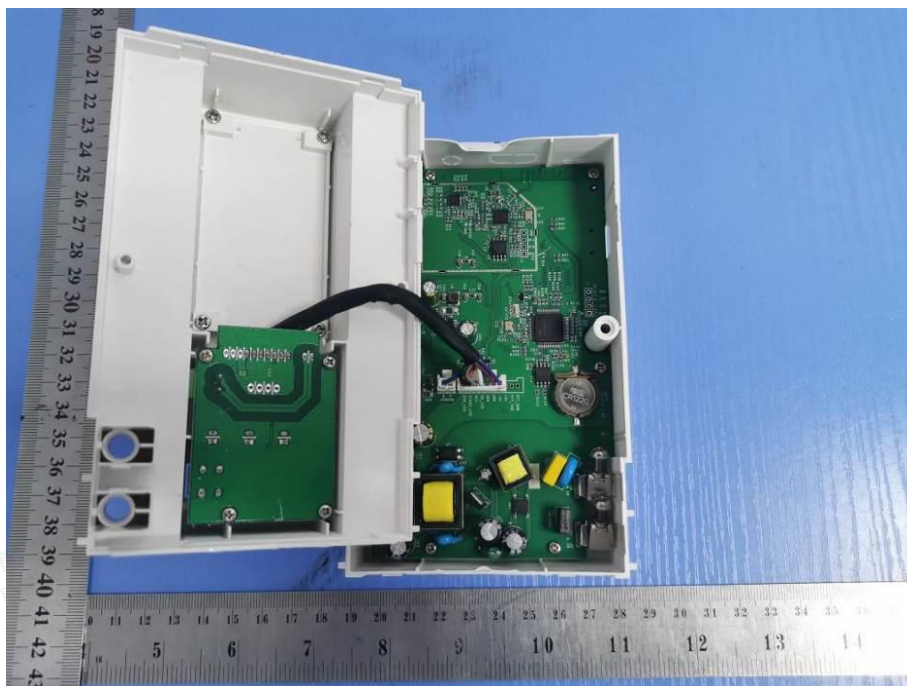


Figure 14 Internal View

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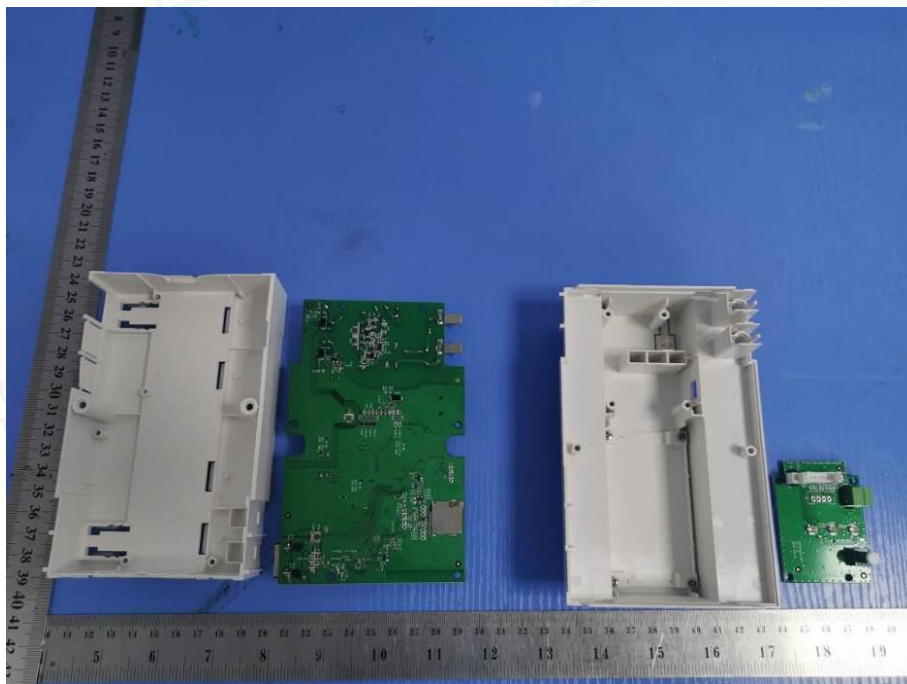


Figure 15 Internal View

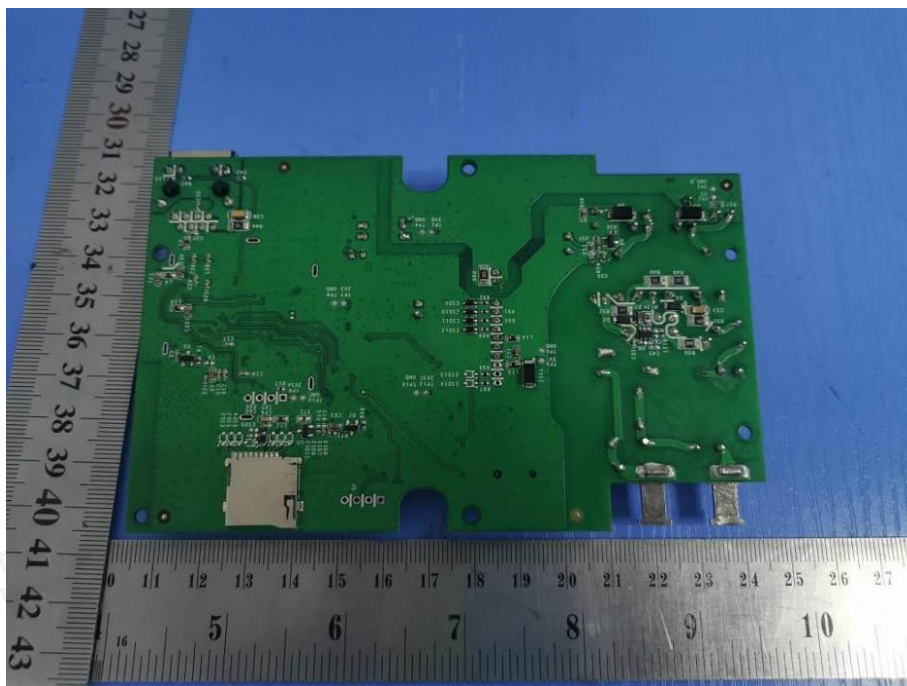


Figure 16 Internal View

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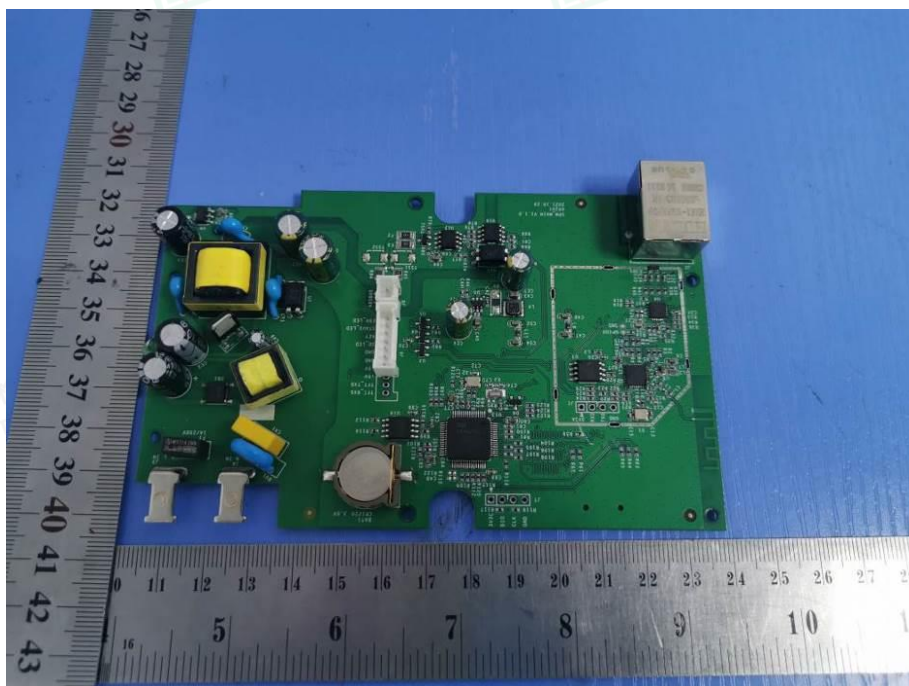


Figure 17 Internal View

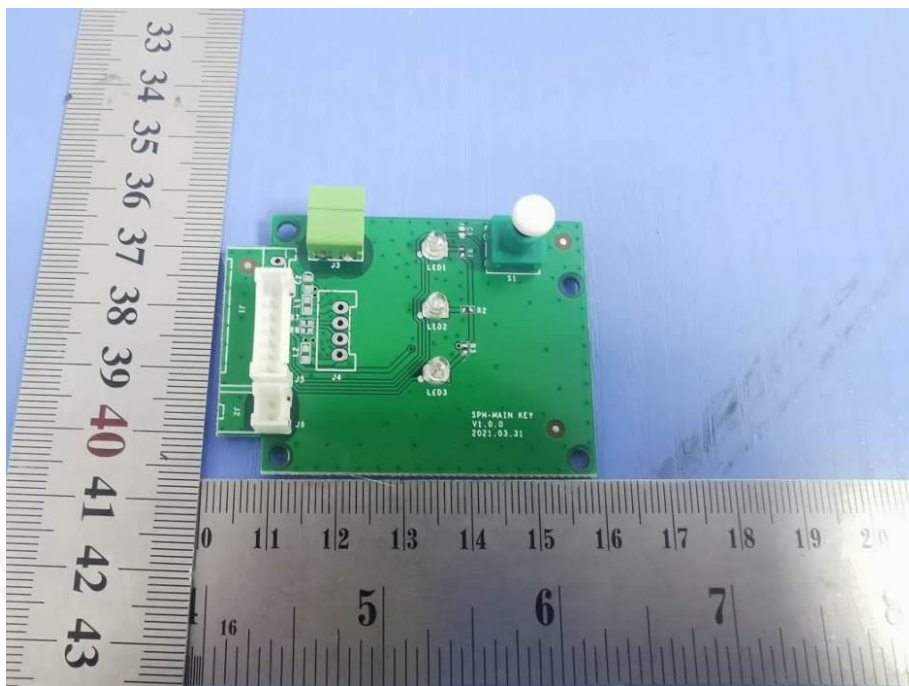


Figure 18 Internal View

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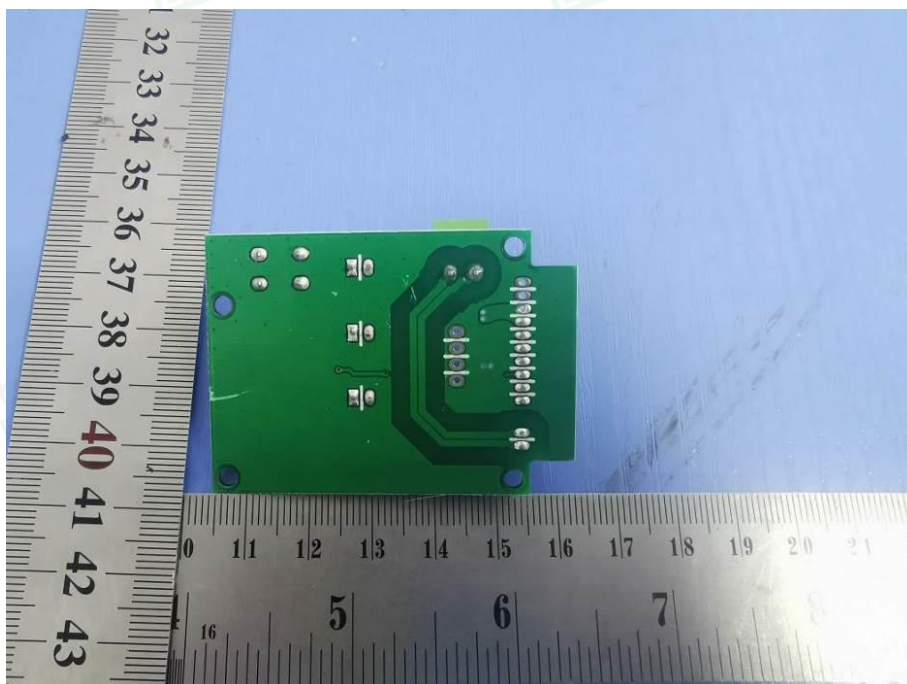


Figure 19 Internal View

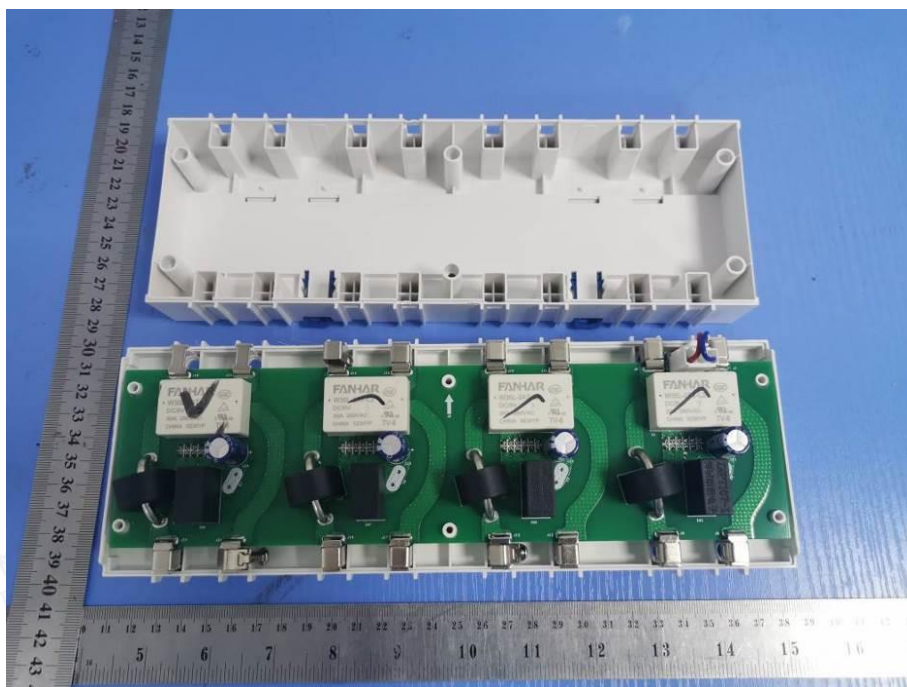


Figure 20 Internal View

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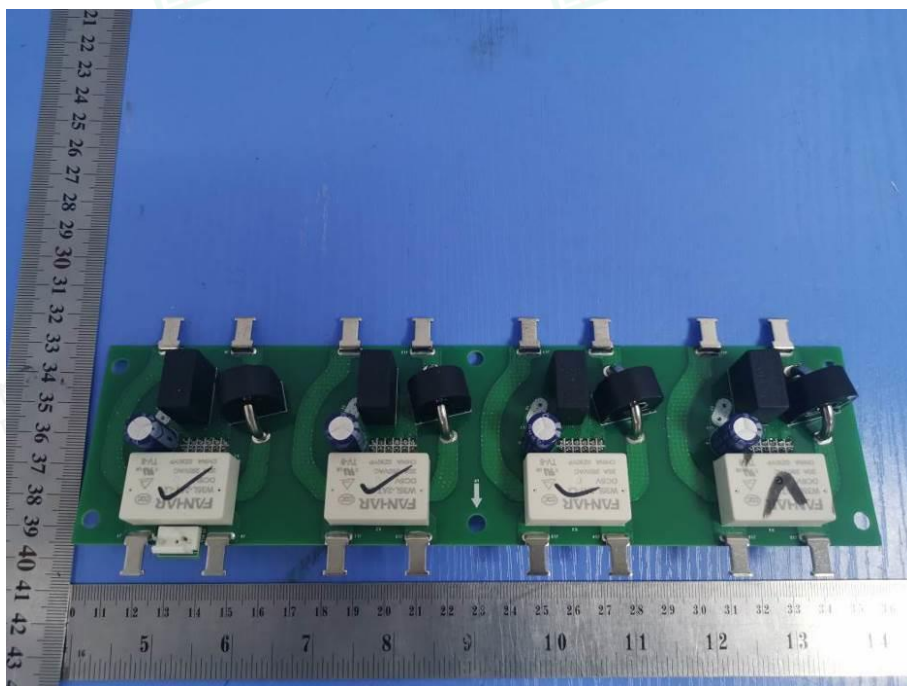


Figure 21 Internal View

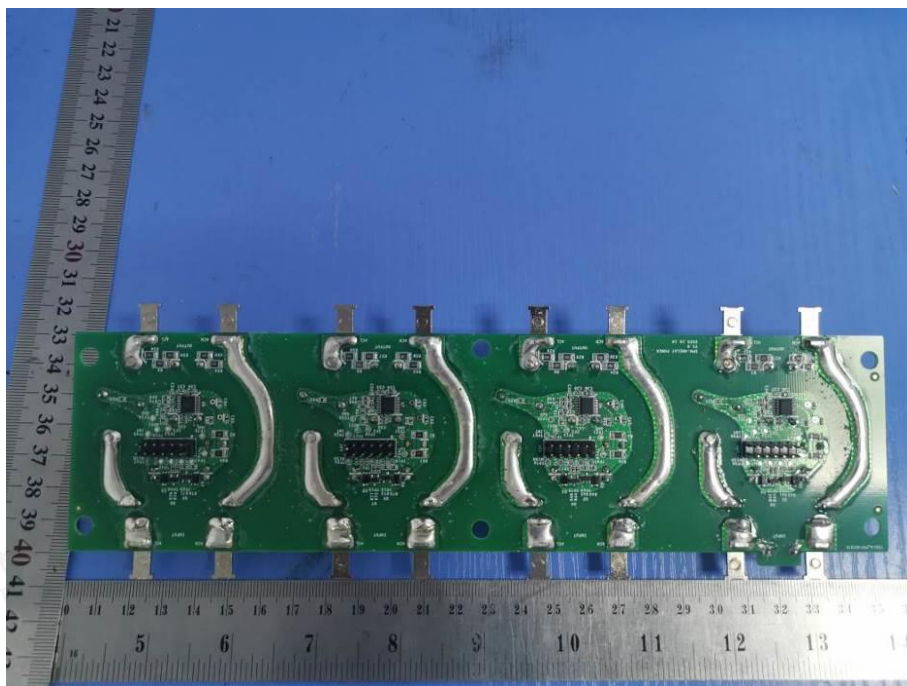


Figure 22 Internal View



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