TEST REPORT
IEC 62040-1
Uninterruptible power systems (UPS) – Part 1: General and safety requirements for UPS

Report Number. .....:	ES180408103S
Date of issue .....:	June 24, 2018
Total number of pages.....	71 pages
Name of Testing Laboratory preparing the Report.....:	EMTEK (Shenzhen) Co., Ltd.
Applicant's name.....:	INVT POWER SYSTEM(SHENZHEN) CO., LTD
Address .....:	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China,
Test specification:	
Standard.....:	IEC 62040-1:2008 (First Edition) + Am 1: 2013
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
Test Report Form No.....:	IEC62040_1D
Test Report Form(s) Originator ....:	TÜV Rheinland Japan Ltd.
Master TRF.....:	Dated 2016-08

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description .....:	Uninterruptible Power System(UPS)
Trade Mark .....:	INVT
Manufacturer.....:	Same as applicant
Model/Type reference .....:	HT3110XL, HT3108XL, HT3106XL, HT3110XS, HT3108XS, HT3106XS
Ratings .....:	See rating label

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☐ **CB Testing Laboratory:**	EMTEK (Shenzhen) Co., Ltd.	
Testing location/ address.....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
☐ **Associated CB Testing Laboratory:**		
Testing location/ address.....:		
Tested by (name, function, signature).....:	Gary Zhang / Engineer	
Approved by (name, function, signature)...:	William Guo / Manager	
☐ **Testing procedure: CTF Stage 1:**		
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)...:		
☐ **Testing procedure: CTF Stage 2:**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)...:		
☐ **Testing procedure: CTF Stage 3:**		
☐ **Testing procedure: CTF Stage 4:**		
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)...:		
Supervised by (name, function, signature) :		

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

- Attachment 1: National difference for IEC 62040-1:2008 (3 pages)
- Photo document (9 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
• Tests performed on the bench • Maximum ambient temperature: +40°C • Tested for moderate conditions. • EUT is designed for altitudes not exceeding 2000m. • Installation category II is specified in installation manual for this product. • Pre-production sample without serial number. • Test on model: HT3110XL can represent other models. For model differences refer to page 6. • The EUTs pass the tests.	EMTEK (Shenzhen) Co., Ltd. Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

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

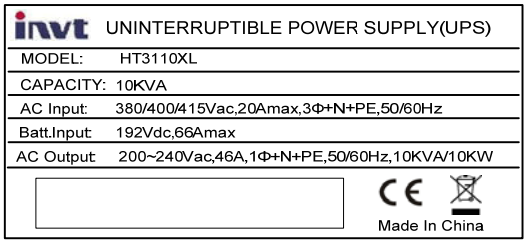
List of countries addressed: Group differences and national differences for CENELEC countries were checked.

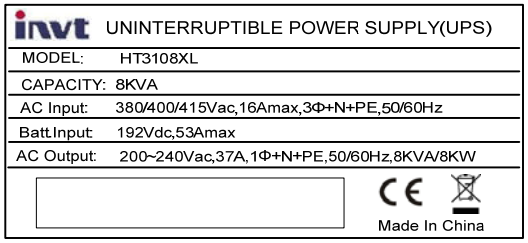
☒ **The product fulfils the requirements of EN 62040-1: 2008+A1: 2013.**

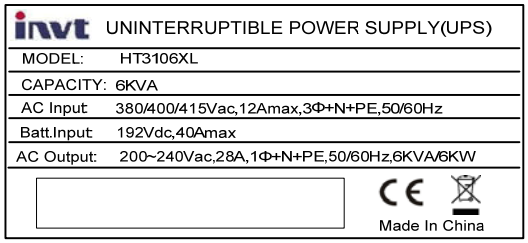
Copy of marking plate:

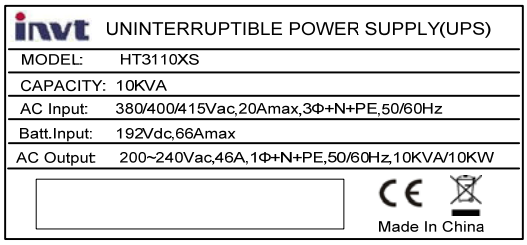
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

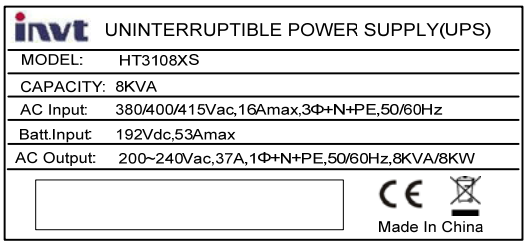
1. Rating label for model RT33025KE:

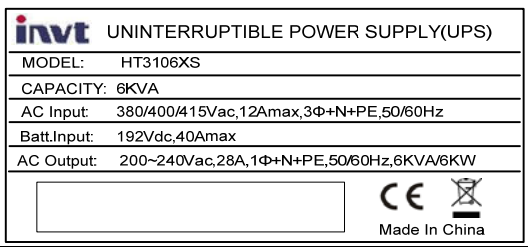








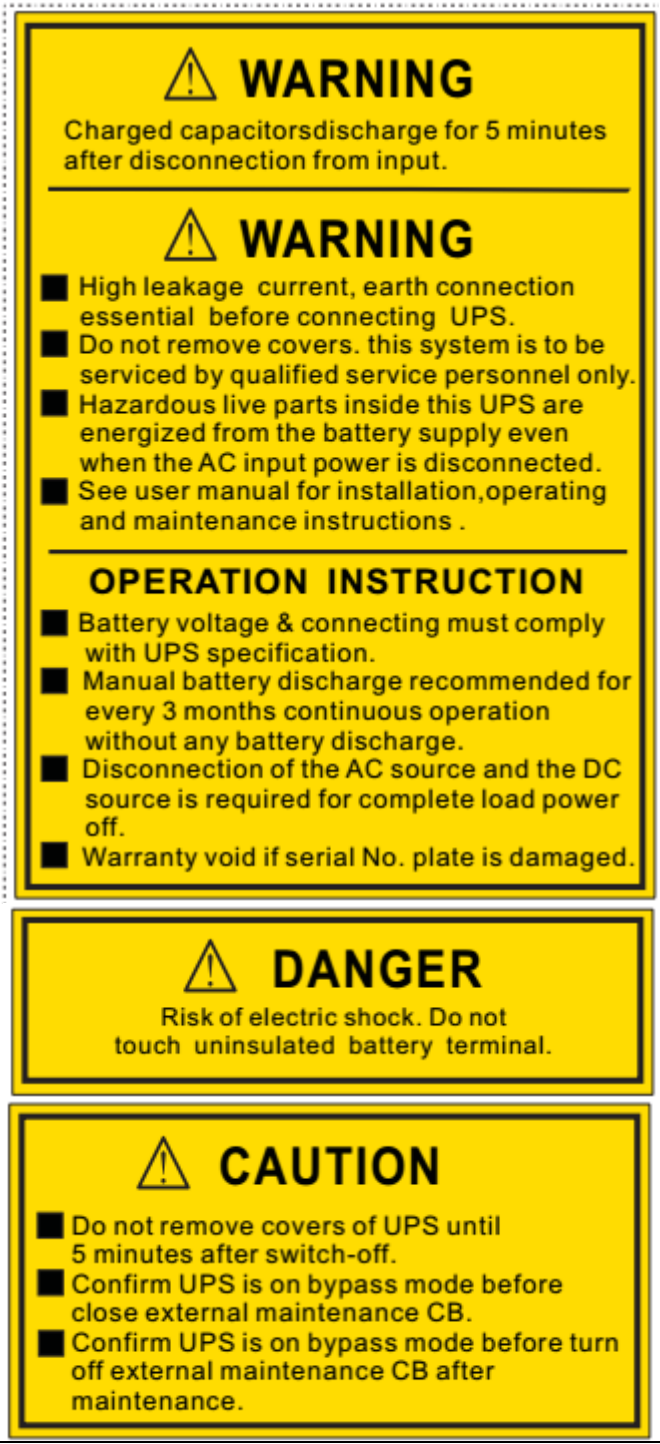




2. Copy of Manufacturer and importer mark

Manufacturer: INVT POWER SYSTEM(SHENZHEN) CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing,
Nanshan District, Shenzhen, China,
Importer: xxx
Address: xxx

3. Warning label on outer enclosures



Start-Up
Step 1： Switch On external Output CB.
Step 2： Switch On external Bypass CB.
Step 3： Switch On external Main CB.
Shutdown
Step 1： Switch Off external Main CB.
Step 2： Switch Off external Bypass CB.
Step 3： Switch Off external Output CB.
Maintenance
Step 1: Transfer to Bypass manually (Form LCD panel).
Step 2: After load on static bypass, Turn On external Maintenance CB.
Step 3: Switch Off external Main CB, external Battery CB, external Bypass CB, external Output CB
Step 4: Doing Maintenance.
Step 5: After Maintenance, Switch On external Bypass CB, external Main CB, external Output CB
Step 6: After load on static bypass, Turn Off external Maintenance CB .

Before working on this circuit
- Isolate Uninterruptible Power System (UPS)
-Then check for Hazardous Voltage between all terminals including the protrctive earth

Risk of Voltage Backfeed

Remark:

- The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
- The CE marking and WEEE symbol should be at least 5.0 mm and 7.0 mm respectively in height.

Test item particulars.....:	
Classification of installation and use.....:	[x] User [] Service Personal
Supply Connection.....:	[] pluggable equipment [] type A [] type B [x] permanent connection [] detachable power supply cord [] non-detachable power supply cord
Equipment mobility.....:	[] movable [] transportable [x] stationary [] for building-in
Operation condition.....:	[x] continuous [] rated operating / resting time:
Access location.....:	[x] operator accessible [] restricted access location
Over voltage category (OVC).....:	[] OVC I [x] OVC II [] OVC III [] OVC IV
Mains supply tolerance (%) or absolute mains supply values.....:	380/400/415Vac+10%,-15% (declared by client)
Tested for IT power systems.....:	[] Yes [x] No
IT testing, phase-phase voltage (V).....:	
Class of equipment.....:	[x] Class I [] Class II []Not classified
Considered current rating of protective device as part of the building installation (A).....:	16A
Pollution degree (PD).....:	[] PD 1 [x] PD 2 [] PD 3
IP protection class.....:	IP20
Elevation during operation (m).....:	Up to 2000m
Elevation of test laboratory (m).....:	Below 2000m
Mass of equipment (kg).....:	20kg for model HT3110XL，HT3108XL,HT3106XL 60kg for model HT3110XS,HT3108XS,HT3106XS
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	N/A
Date (s) of performance of tests.....:	N/A
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... : Same as applicant	

General product information:

1. The equipment models HT3110XL series are on line type uninterruptible power supplies with sine wave o/p for general use.

2. The input and output circuits and battery circuits of these UPS are considered as primary circuits and isolated from SELV circuit, RS232 port, SNP (optional) and parallel port by either double/reinforced insulation.

3. The enclosure consists of metal parts and thermoplastic front panel that is fixed to the metal chassis by screws. The front panel cannot be removed by operator/laymen without tools. Double/reinforced insulation provided where the primary LCD display (plastic cover with min. thickness of 0.4mm used) may be touched and basic insulation provided between primary parts and the reliably earthed metal. The front panel is considered as operator accessible area.

4. Suitable back feed protect device according to operating instruction should be provided before installation.

5. All models are designed with same control logic, constructions, PCB Layout except for the quantity of UPS module, model name and ratings. All tests were performed on model HT3110XL which means the typical model.

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

4	**GENERAL CONDITIONS FOR TESTS**		**P**
4.5	**Components**		**P**
	Comply with IEC 62040-1 or relevant component standard	Components, which were found to affect safety aspects, comply with the requirements of this standard or within the safety aspects of the relevant IEC component standards. (see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Components, which are certified to IEC and/or national standards, are applied correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3/RD	Thermal controls	Thermal control not used	N/A
1.5.4/RD	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard and particularly Annex C.	P
1.5.5/RD	Interconnecting cables	Not provided.	N/A
1.5.6/RD	Capacitors bridging insulation	Capacitors between primary X2 type capacitor according to IEC 60384-14 used for bridging functional insulation.	P
1.5.7/RD	Resistors bridging insulation		P
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation	Resistors only bridging functional insulation	P
1.5.7.2/RD	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		N/A
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N/A
1.5.8/RD	Components in equipment for IT power systems		N/A
4.6	**Power interface**		**P**
1.6.1/RD	AC power distribution systems	TN power system	P
1.6.2/RD	Input current	Highest normal load for this equipment is the charging of empty battery and operation with the maximum specified output load (see appended table 4.6)	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.6 1.6.4/RD	Neutral conductor	Basic insulation for rated voltage between earthed parts and line and neutral conductors. O/p neutral is not isolated from the I/p neutral.	P
4.7	**Marking and instructions**		**P**
4.7.1	General		P
4.7.2 1.7.1/RD	Power rating	All required markings are affixed on labels located on the enclosure of UPS	P
	Input rated voltage/range (V) ..... :	See rating label for details	P
	Input rated current/range (A)..... :	See rating label for details	P
	Input symbol for nature of supply (d.c.)..... :	See rating label for details	N/A
	Input rated frequency/range (Hz)..... :	50/60 Hz	P
	Number of Input phases and neutral ..... :	Three phase, 3Ø+N+PE	P
	Output rated voltage/range (V) ..... :	See rating label for details	P
	Output rated current/range (A)..... :	See rating label for details	P
	Output rated power factor, if less than unity, or active power and apparent power or active power and rated current..... :	The active power and apparent power are marked on rating label.	P
	Number of output phases and neutral..... :	Three phase, 3Ø+N+PE	P
	Output rated active power (W or kW)..... :	See rating label for details	P
	Output rated apparent power (VA or kVA)..... :	See rating label for details	P
	Output symbol for nature of supply (d.c.)..... :	AC outlet provided.	N/A
	Output rated frequency/range (Hz)..... :	50/60Hz	P
	Ambient operating temperature range (°C)..... :	Not shown (0-40°C declared by the client)	N/A
	Rated short-time withstand current (I_{cw}) or rated conditional short-circuit current (I_{cc})	Icc: 6kA	P
	Manufacturer's name or trademark or identification mark ..... :	See page 1 for details	P
	Type/model or type reference ..... :	See page 1 for details	P
	Symbol for Class II equipment only..... :	Class I equipment	N/A
	Other symbols ..... :	Additional symbols or markings do not give rise to misunderstanding.	P
	Certification marks ..... :	To be evaluated when subjected to national approval	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructions for units with automatic bypass/maintenance bypass, additional input a.c. supply, or external batteries, having text "See installation instructions before connecting to the supply" ..... :	Instruction provided. See copy of marking plate	P
4.7.3	Safety instructions	See below	P
4.7.3.1	General	"User manual" with directions regarding the maximum ambient temperature, electrical ratings, operation, description of interfaces, connection to the mains. Service personnel installable and to be operated by laymen. Appropriate statements provided in the "User Manual".	P
4.7.3.2	Installation ..... :	Installation instructions are available to the user in User's Manual.	P
	Location in a restricted access location only ..... :		N/A
	Permanent connector UPS ..... :	Installation person and disconnect device instructions are available to the user in User's Manual.	P
	Pluggable type A or Pluggable type B UPS ..... :		N/A
4.7.3.3	Operation ..... :	The suitable information list in the user manual when operate the UPS.	P
4.7.3.4	Maintenance ..... :	The instruction of maintenance is only included in the service manual.	P
4.7.3.5	Distribution related backfeed ..... :		N/A
4.7.4 1.7.4/RD	Main voltage adjustment ..... :	Single input voltage range	N/A
	Methods and means of adjustment; reference to installation instructions ..... :		N/A
4.7.5 1.7.5/RD	Power outlets ..... :	No power outlets used in the equipment.	N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.6 1.7.6/RD	Fuse identification (marking, special fusing characteristics, cross-reference)..... :	All fuses and circuit breakers are not located in operator accessible area. Fuse rating placed on the relevant PCB layout and metal enclosure which is nearby the fuse body. Fuse identifications for internal use and other detailed information.	P
4.7.7 1.7.7/RD	Wiring terminals	See below	P
1.7.7.1/RD	Protective earthing and bonding terminals..... :	Only PE of "Normal AC supply" with symbol 60417-1-IEC-5019, others with symbol 60417-1-IEC-5017.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors ..... :	Terminals provided. Capital letters L1, L2, L3 and N are used to identify input and output phase.	P
1.7.7.3/RD	Terminals for d.c. mains supply conductors ..... :		P
4.7.8	Battery terminals ..... :	Symbol “+” and “-” are used to indicate the polarity of battery connection near the battery terminals.	P
4.7.9 1.7.8/RD	Controls and indicators	See below	P
1.7.8.1/RD	Identification, location and marking ..... :	LCD display provided, located on the front panel to indicate status of UPS, not relevant to safety.	P
1.7.8.2/RD	Colours ..... :	See above. Colours are acceptable due to only used for information (no safety involved even if disregarded).	P
1.7.8.3/RD	Symbols ..... :		N/A
1.7.8.4/RD	Markings using figures..... :	Not used.	N/A
4.7.10 1.7.9/RD	Isolation of multiple power sources ..... :	Different connecting method for AC mains and external battery cabinet used, not likely to misconnect. Disconnecting all input (mains connection and battery input) is specified in caution label and user manual	P
4.7.11 1.7.2.4/RD	IT power systems		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.12	Protection in building installation	Protection against electric shock does not rely on residual current devices.	P
	Rated short-time withstand current (*I*cw) ..... :		N/A
	Rated conditional short circuit current (*I*cc) ..... :	Icc: 6kA	P
	a) If higher Icp stated ≤ 10 kA	Icc: 6kA	P
	a) If higher Icp stated > 10 kA		N/A
4.7.13 5.1/RD	High leakage current (mA) ..... :	Leakage current of the equipment does not exceed 3.5 mA. However due to the connected load has influence on the overall earth leakage current a corresponding statement was provided in the user's manual.	N/A
4.7.14 1.7.10/RD	Thermostats and other regulating devices	Neither thermostats nor other regulating devices provided.	N/A
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) ..... :	User Manual and markings are both in English. Local language versions will be made available during national approval.	—
4.7.16 1.7.11/RD	Durability of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 s and then again for 15 s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was neither curling nor lifting of the label edge.	P
4.7.17 1.7.12/RD	Removable parts	No required markings placed on removable parts.	P
4.7.18 1.7.13/RD	Replaceable batteries	Warning label used	P
	Language(s) ..... :		—
4.7.19 1.7.2.5/RD	Operator access with a tool..... :	Operator is not instructed to use a tool in order to gain access to operator access areas.	N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.20	Battery	UPS's batteries will be located in the external battery cabinet. Specific requirements stated in installation manual.	P
	Clearly legible information ..... :	Information clearly legible.	P
	Battery type (lead-acid, NiCd, etc.) and number of blocks or cells..... :	Detailed information regarding to the battery used will be provided in the instruction manual.	P
	Nominal voltage of total battery (V) ..... :	240Vdc	P
	Nominal capacity of total battery (optional)..... :		N/A
	Warning label ..... :	Considered	P
	Instructions ..... :	Instructions of the UPS with information: • Maintenance and disposal instructions • "Caution" statements regarding battery hazards • Remark that servicing shall be performed by personnel knowledgeable of batteries	P
2.1.1.5/RD	Protection against energy hazards	No risk of energy hazard in operator access area. Hazardous area restricted with metal plate	P
4.7.21 1.7.2.4/RD	Installation instructions	Detailed information regarding external interfaces and connection of supply and loads provided in the user's manual	P

5	**FUNDAMENTAL DESIGN REQUIREMENTS**		**P**
5.1	**Protection against electric shock and energy hazards**		P
5.1.1 2.1.1/RD	Protection for UPS intended to be used in operator access areas	No hazardous voltage circuit wiring can be accessed by operator.	P
2.1.1.1/RD	Access to energized parts	No hazardous voltage circuit wiring can be accessed by operator.	P
	Test by inspection ..... :		P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test with test finger (Figure 2A)..... :	The test pin can not touch hazardous voltage through any seams within the appliance.	P
	Test with test pin (Figure 2B)..... :	The test probe cannot touch contacts of LINE port.	P
	Test with test probe (Figure 2C)..... :		N/A
2.1.1.2/RD	Battery compartments	No TNV circuits exist inside battery compartments	N/A
2.1.1.3/RD	Access to ELV wiring	No ELV wiring in operator accessible area.	N/A
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		—
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No any hazardous voltage circuit wiring operator accessible.	P
2.1.1.5/RD	Energy hazards..... :	No energy hazard at operator accessible area. No energy hazard during battery replacement for service person due to shape of battery terminals.	P
2.1.1.6/RD	Manual controls	No conductive controls or handles or alike provided.	N/A
2.1.1.7/RD	Discharge of capacitors in equipment		P
	Measured voltage (V); time-constant (s)..... :	(See appended table 5.1.1 and 2.1.1.7/RD)	—
2.1.1.8/RD	Energy hazards – d.c. mains supply		N/A
	a) Capacitor connected to the d.c. mains supply ... :		N/A
	b) Internal battery connected to the d.c. mains supply ..... :		N/A
2.1.1.9/RD	Audio amplifiers in information technology equipment..... :		N/A
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas		N/A
	Hazardous energy level..... :		N/A
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas		N/A
	Hazardous energy level..... :		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.4	Backfeed protection	Backfeed protection such as contactor will be provided external to the UPS in the final installation which is also specified in installation manual	N/A
	Shock hazard after de-energization of a.c. input for UPS		N/A
	Measured voltage (V); time-constant (s) ..... :		—
	Description of the construction ..... :		N/A
	Air gap is employed for backfeed protection		N/A
5.1.5	Emergency switching (disconnect) device	REPO dry contactor provided, which is used to shut down the UPS in case of emergency.	P
5.2	**Requirements for auxiliary circuits**		P
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV	EPO and RS232 port is considered as SELV circuit	P
2.2.1/RD	General requirements	All SELV circuits within limits.	P
2.2.2/RD	Voltages under normal conditions (V) ..... :	(See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V) ..... :	(See appended table 5.2.1)	P
2.2.4/RD	Connection of SELV circuits to other circuits..... :	To SELV only	P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	No TNV circuit.	N/A
2.3.1/RD	Limits		N/A
	Type of TNV circuits ..... :		—
2.3.2/RD	Separation of TNV circuits from other circuits and from accessible parts		N/A
2.3.2.1/RD	General requirements		N/A
2.3.2.2/RD	Protection by basic insulation		N/A
2.3.2.3/RD	Protection by earthing		N/A
2.3.2.4/RD	Protection by other constructions ..... :		N/A
2.3.3/RD	Separation from hazardous voltages		N/A
	Insulation employed..... :		—
2.3.4/RD	Connection of TNV circuits to other circuits		N/A
	Insulation employed..... :		—
2.3.5/RD	Test for operating voltages generated externally		N/A
5.2.3 2.4/RD	Limited current circuits		N/A
2.4.1/RD	General requirements		N/A
2.4.2/RD	Limit values		—

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Frequency (Hz) ..... :		—
	Measured current (mA) ..... :		—
	Measured voltage (V) ..... :		—
	Measured circuit capacitance (nF or µF) ..... :		—
2.4.3/RD	Connection of limited current circuits to other circuits		N/A
5.2.4 3.5/RD	External signaling circuits	EPO and RS232 port is considered as SELV circuit	P
3.5.1/RD	General requirements		P
3.5.2/RD	Types of interconnection circuits ..... :	See above.	P
3.5.3/RD	ELV circuits as interconnection circuits		N/A
3.5.4/RD	Data ports for additional equipment	See above.	N/A
5.2.5 2.5/RD	Limited power source		N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output under normal operating and single fault condition		N/A
	d) Overcurrent protective device limited output		N/A
	Max. output voltage (V), max. output current (A), max. apparent power (VA) ..... :		—
	Current rating of overcurrent protective device (A) :		—
	Use of integrated circuit (IC) current limiters		—
5.3	**Protective earthing and bonding**		**P**
5.3.1	General		P
2.6/RD	Provisions for earthing and bonding	See below	P
2.6.1/RD	Protective earthing	Reliable connection from the protective bonding terminal on outlet to the PE terminal (AC plug) via green/yellow insulated wires.	P
2.6.2/RD	Functional earthing		N/A
2.6.3/RD	Protective earthing conductors and protective bonding conductors	See below	P
2.6.3.1/RD	General	See subclause 2.6.3.3/RD	P
2.6.3.2/RD	Size of protective earthing conductors	Permanent connection. For input terminals, the size of protective earthing conductor shall be selected according to installation manual.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Rated current (A), cross-sectional area (mm^2), AWG ..... :		—
2.6.3.3/RD	Size of protective bonding conductors	UPS metal frame works as protective bonding conductor, is considered to be sufficient (comply with table 3B of 3.2.5/RD) for the current under earth fault.	P
	Rated current (A), cross-sectional area (mm^2), AWG ..... :		—
	Protective current rating (A), cross-sectional area (mm^2), AWG ..... :		—
2.6.3.4/RD	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) ..... :	(See appended table 5.3.1)	P
2.6.3.5/RD	Colour of insulation ..... :	Green/yellow	P
2.6.4/RD	Terminals	See above	P
2.6.4.1/RD	General		P
2.6.4.2/RD	Protective earthing and bonding terminals	See instruction manual for the details configuration	P
	Rated current (A), type, nominal thread diameter (mm)..... :		—
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Protective bonding conductor is used form the input terminal to the metal chassis, separate bonding terminal used to connect the bonding conductor between different output terminals and metal frame of the UPS.	P
2.6.5/RD	Integrity of protective earthing	See below	P
2.6.5.1/RD	Interconnection of equipment	This unit has it's own earthing connection. PE terminals of outlets reliably connected to earthing pin of inlet.	P
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors	No switch or overcurrent protective device in protective bonding conductors.	P
2.6.5.3/RD	Disconnection of protective earth	Permanently equipment no disconnection.	P
2.6.5.4/RD	Parts that can be removed by an operator	Permanent connection, no parts can be removed by operator.	N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.5/RD	Parts removed during servicing	It is not necessary to disconnect earthing except for the removal of the earthed part itself.	P
2.6.5.6/RD	Corrosion resistance	All safety earthing connections in compliance with Annex J.	P
2.6.5.7/RD	Screws for protective bonding	Protective bonding conductors connected to metal chassis via ring-type lugs fixed to metal studs (ISO thread type M10, with nut and star-washer provided	P
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N/A
5.3.2 2.6.1/RD	Protective earthing	See 2.6.3/RD and 2.6.4/RD.	P
2.10/RD	Clearances, creepage distances and distances through insulation	(see appended table 5.7)	P
4.2/RD	Mechanical strength		P
5.2/RD	Electric strength	(see appended table 8.2)	P
5.3.3	Protective bonding	See above	P
5.4	**AC and d.c. power isolation**		**P**
5.4.1	General		P
3.4/RD	Disconnection from the mains supply		P
3.4.1/RD	General requirement		P
3.4.2/RD	Disconnect devices	For permanent connection type, according to installation instruction, suitable circuit breaker external to the UPS will be installed as disconnect device.	P
3.4.3/RD	Permanently connected equipment	External disconnect should be provide.	P
3.4.4/RD	Parts which remain energized	Adequate protection provided to service personnel during backup mode.	P
3.4.5/RD	Switches in flexible cords	None provided.	N/A
3.4.6/RD	Number of poles - single-phase and d.c. equipment	Three phase equipment	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
3.4.7/RD	Number of poles - three-phase equipment	3 pole switch will be used as disconnected device for whole system and it is optional to the UPS, Adequate disconnection information regarding the disconnection switch for the configuration without the integrated disconnection switch for whole unit was already stated in the final installation	P
3.4.8/RD	Switches as disconnect devices	Relevant indication provided on the body of disconnection switch	P
3.4.9/RD	Plugs as disconnect devices		N/A
3.4.10/RD	Interconnected equipment	Hazardous Voltage circuits to Hazardous circuits.	P
3.4.11/RD	Multiple power sources	Instructions provided at every switch, see" Copies of markings and warnings".	P
5.4.2	Disconnect devices		P
5.5	**Overcurrent and earth fault protection**		**P**
5.5.1	General		P
2.7.3/RD	Short-circuit backup protection	Over current protection by built-in fuses in each of 3 phases. Permanently Connected Equipment. Building Installation is provide short-circuit backup protection.	P
2.7.4/RD	Number and location of protective devices ..... :	Over current protector provided in live conductor	P
2.7.5/RD	Protection by several devices	Three fuse in parallel protection device provided. No protective device in neutral.	P
2.7.6/RD	Warning to service personnel ..... :	No double-pole fusing inside this pluggable equipment type A UPS.	N/A
5.5.2	Basic requirements	Equipment relies on fuse or circuit breaker of the wall outlet protection of the building installation in regard to L to N short-circuit. Over current protection is provided by the built-in fuse.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.3	Battery circuit protection	External battery cabinet is not provided with UPS. Protection shall be provided in battery cabinet.	P
5.5.3.1	Overcurrent and earth fault protection	Battery fuses are directly located behind the supply wire terminals to the external battery cabinets The charger circuit is located in front of the fuse. For the charger circuit there are no hazardous situations under any simulated fault conditions. (see appended table 8.3).	P
5.5.3.2	Location of protective device	See above.	P
5.5.3.3	Rating of protective device	Protection against overcurrent by Fuse.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current	Icc: 6kA	N/A
5.5.4.1	General		N/A
5.5.4.2	Modes of operation		N/A
5.5.4.3	Test procedure		N/A
5.5.4.3.1	General application		N/A
	Rated UPS output current/(r.m.s) (A) ..... :		—
	Prospective test current/(r.m.s) (A)..... :		—
	Typical power factor ..... :		—
	Initial asymmetric peak current ration (*I*pk / *I*cw) .... :		—
	Minimum durating of prospective test current (cycles 50/60 Hz) ..... :		—
5.5.4.3.2	Exemption from testing	Specified Icc/ Icw not exceed 10kA, no test necessary.	P
5.6	**Protection of personnel – Safety interlocks**		**P**
5.6.1	Operator protection	No hazardous voltage levels in operator accessible areas.	P
2.8/RD	General principles		N/A
2.8.1/RD	Protection requirements		N/A
2.8.2/RD	Inadvertent reactivation		N/A
2.8.3/RD	Fail-safe operation		N/A
2.8.4/RD	Protection against extreme hazard		N/A
2.8.5/RD	Moving parts		N/A
2.8.6/RD	Overriding		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.8.7/RD	Switches, relays and their related circuits		N/A
2.8.7.1/RD	Separation distances for contact gaps and their related circuits ..... :		N/A
2.8.7.2/RD	Overload test		N/A
2.8.7.3/RD	Endurance test		N/A
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N/A
2.8.8/RD	Mechanical actuators		N/A
5.6.2	Service person protection		N/A
5.6.2.1	Introduction		N/A
5.6.2.2	Covers		N/A
5.6.2.3	Location and guarding of parts		N/A
5.6.2.4	Parts on doors		N/A
5.6.2.5	Component access		N/A
2.8.3/RD	Fail-safe operation		N/A
5.6.2.6	Moving parts		N/A
5.6.2.7	Capacitor banks		N/A
5.6.2.8	Internal batteries	Risk of short-circuiting minimized by design of used battery source and corresponding terminals and wiring methods used.	P
5.7 2.10/RD	**Clearances, creepage distances and distances through insulation**		P
2.10.1/RD	General	See 2.10.3, 2.10.4 and 2.10.5.	P
2.10.1.1/RD	Frequency..... :	Considered	P
2.10.1.2/RD	Pollution degrees ..... :	2	P
2.10.1.3/RD	Reduced values for functional insulation	See 5.3.4.	N/A
2.10.1.4/RD	Intervening unconnected conductive parts	No such part.	N/A
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	N/A
2.10.1.6/RD	Special separation requirements		P
2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit.	N/A
2.10.2/RD	Determination of working voltage		P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.2.1/RD	General	The rms and the peak voltage were measured with unit connected to a 240V/415V (Three phase) TN power system. Pollution Degree 2 and Overvoltage Category II considered.	P
2.10.2.2/RD	RMS working voltage	(See appended table 5.7)	P
2.10.2.3/RD	Peak working voltage	(See appended table 5.7)	P
2.10.3/RD	Clearances	See below and advantage of annex G is not considered.	P
2.10.3.1/RD	General	Considered.	P
2.10.3.2/RD	Mains transient voltages		P
	a) AC mains supply..... :	240V a.c. and Overvoltage Category II	P
	b) Earthed d.c. mains supplies ..... :		N/A
	c) Unearthed d.c. mains supplies ..... :		N/A
	d) Battery operation ..... :		N/A
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	Sub-clause 5.3.4 considered.	P
2.10.3.5/RD	Clearances in circuits having starting pulses		N/A
2.10.3.6/RD	Transients from a.c. mains supply..... :	Normal transient voltage considered (overvoltage category II for primary circuit).	P
2.10.3.7/RD	Transients from d.c. mains supply..... :		N/A
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems ..... :		N/A
2.10.3.9/RD	Measurement of transient voltage levels		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply ..... :		N/A
	For a d.c. mains supply ..... :		N/A
	b) Transients from a telecommunication network... :		N/A
2.10.4/RD	Creepage distances	(see appended table 5.7)	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.4.1/RD	General		P
2.10.4.2/RD	Material group and comparative tracking index		P
	CTI tests ..... :	Material group IIIb is assumed to be used.	P
2.10.4.3/RD	Minimum creepage distances	(see appended table 5.7)	P
2.10.5 /RD	Solid insulation		P
2.10.5.1/RD	General	See below	P
2.10.5.2/RD	Distances through insulation	(see appended table 5.7)	P
2.10.5.3/RD	Insulating compound as solid insulation		N/A
2.10.5.4/RD	Semiconductor devices	Approved optocoupler used.	P
2.10.5.5/RD	Cemented joints	No such construction.	N/A
2.10.5.6/RD	Thin sheet material – General	Ref. to sub-clause 2.10.5.1/RD and Annex C	P
2.10.5.7/RD	Separable thin sheet material		P
	Number of layers (pcs) ..... :		—
2.10.5.8/RD	Non-separable thin sheet material		N/A
2.10.5.9/RD	Thin sheet material – standard test procedure		N/A
	Electric strength test		—
2.10.5.10 /RD	Thin sheet material – alternative test procedure		P
	Electric strength test	(See appended table 5.8)	—
2.10.5.11 /RD	Insulation in wound components		N/A
2.10.5.12 /RD	Wire in wound components	No wound components used.	N/A
	Working voltage ..... :		—
	a) Basic insulation not under stress ..... :		N/A
	b) Basic, supplementary, reinforced insulation..... :		N/A
	c) Compliance with Annex U ..... :		N/A
	Two wires in contact inside wound component; angle between 45° and 90° ..... :		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.13 /RD	Wire with solvent-based enamel in wound components	No such construction.	N/A
	Electric strength test		—
	Routine test		N/A
2.10.5.14 /RD	Additional insulation in wound components	No such construction.	N/A
	Working voltage ..... :		—
	- Basic insulation not under stress..... :		N/A
	- Supplementary, reinforced insulation..... :		N/A
2.10.6/RD	Construction of printed boards	See below	P
2.10.6.1/RD	Uncoated printed boards	(See appended table 5.7)	P
2.10.6.2/RD	Coated printed boards	No coated printed boards.	N/A
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board	No multi-layer PCBs provided.	N/A
2.10.6.4/RD	Insulation between conductors on different layers of a printed board	No multi-layer PCBs provided.	N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs) ..... :	Single layer PCB	N/A
2.10.7/RD	Component external terminations	(See appended table 5.7)	P
2.10.8/RD	Tests on coated printed boards and coated components	No such boards and components	N/A
2.10.8.1/RD	Sample preparation and preliminary inspection		N/A
2.10.8.2/RD	Thermal conditioning		N/A
2.10.8.3/RD	Electric strength test	(see appended table 8.2)	—
2.10.8.4/RD	Abrasion resistance test		N/A
2.10.9/RD	Thermal cycling		N/A
2.10.10/RD	Test for Pollution Degree 1 environment and insulating compound		N/A
2.10.11/RD	Tests for semiconductor devices and cemented joints	See only 2.10.5.4/RD regards approved optocouplers	N/A
2.10.12/RD	Enclosed and sealed parts	No hermetically sealed component.	N/A

6	**Wiring, connections and supply**	**P**
6.1	**General**	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.1	Introduction		P
3.1/RD	General		P
3.1.1/RD	Current rating and overcurrent protection	Internal wires are UL recognized wiring which is PVC insulated, rated VW-1 or FT-1, and having gauge suitable for current intended to be carried.	P
3.1.2/RD	Protection against mechanical damage	Wires do not touch sharp edges which could damage the insulation and cause hazard.	P
3.1.3/RD	Securing of internal wiring	Internal wires are secured by solder pins, cable ties and quick connect terminals so that a loosening of the terminal connection is unlikely.	P
3.1.4/RD	Insulation of conductors	The insulation of the individual conductors is suitable for the application and the working voltage. For the insulation material see subclause 3.1.1/RD.	P
3.1.5/RD	Beads and ceramic insulators	Not used.	N/A
3.1.6/RD	Screws for electrical contact pressure	No such screws provided.	N/A
3.1.7/RD	Insulating materials in electrical connections	All current carrying connections are metal to metal.	P
3.1.8/RD	Self-tapping and spaced thread screws	Not used.	N/A
3.1.9/RD	Termination of conductors	All conductors are reliable secured.	P
	10 N pull test	Force of 10 N applied to the termination points of the conductors.	P
3.1.10/RD	Sleeving on wiring	Heat shrinkable tube used on the wire connector point.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		N/A
6.2	**Connection to power**		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Terminals for permanent connection.	P
3.2.3/RD	Permanently connected equipment	For permanent connection type, terminals for permanent connection to supply.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Number of conductors, diameter of cable and conduits (mm) ..... :	4+PE	—
3.2.4/RD	Appliance inlets	Not used.	N/A
3.2.5/RD	Power supply cords	No power supply cord is supplied.	N/A
3.2.5.1/RD	AC power supply cords		N/A
	Type ..... :		—
	Rated current (A), cross-sectional area (mm²), AWG ..... :		—
3.2.5.2/RD	DC power supply cords		N/A
3.2.6/RD	Cord anchorages and strain relief		N/A
	Mass of equipment (kg), pull (N)..... :		—
	Longitudinal displacement (mm)..... :		—
3.2.7/RD	Protection against mechanical damage	No parts under this unit likely to damage the power supply cord. No sharp edge	P
3.2.8/RD	Cord guards		N/A
	Diameter or minor dimension D (mm); test mass (g) ..... :		—
	Radius of curvature of cord (mm) ..... :		—
6.2.2	Means of connection ..... :	Wiring terminals used.	P
	More than one supply connection..... :	AC mains and external battery cabinet used. Terminals for the battery not compatible with AC mains.	P
6.3	**Wiring terminals for external power conductors**		P
3.3/RD	Wiring terminals for connection of external conductors		P
3.3.1/RD	Wiring terminals		P
3.3.2/RD	Connection of non-detachable power supply cords		N/A
3.3.3/RD	Screw terminals	Screws and nuts conforming to ISO 261 or ISO 262 input terminal	P
3.3.4/RD	Conductor sizes to be connected	Conductor size will be connected according to installation manual.	P
	Rated current (A), cord/cable type, cross-sectional area (mm^2)..... :	For Phase/Neutral/Battery/PE conductors. See instruction manual for the configuration for all models	—

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
3.3.5/RD	Wiring terminal sizes		P
	Rated current (A), type, nominal thread diameter (mm)..... :		—
3.3.6/RD	Wiring terminal design		N/A
3.3.7/RD	Grouping of wiring terminals		N/A
3.3.8/RD	Stranded wire		N/A

7	**Physical requirements**		**P**
7.1	**Enclosure**	Plastic enclosure. Enclosure completely enclosing hazardous parts.	P
7.2 4.1/RD	**Stability**		P
	Angle of 10°	The UPS does not overturn when: tilted to an angle of 10° use a constant downward force of 800N a force of 20% of the weight is applied from any direction.	P
	Test force (N) ..... :	See above	P
7.3 4.2/RD	**Mechanical strength**		P
4.2.1/RD	General	Tests performed and passed. Results see below. After tests, unit complied with the requirements of sub-clauses 2.1.1/RD, 2.6.1/RD and 2.10/RD.	P
4.2.2/RD	Steady force test, 10 N	10 N applied to all components other than enclosure.	—
4.2.3/RD	Steady force test, 30 N		N/A
4.2.4/RD	Steady force test, 250 N	250 N applied to outer enclosure.	P
4.2.5/RD	Impact test	See below	P
	Fall test	No hazard as result from steel ball fall test.	P
	Swing test	No hazard as result from steel ball swing test.	P
4.2.6/RD	Drop test; height (mm)..... :	Not required for this equipment.	N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.2.7/RD	Stress relief test	Tested at temperature of 70°C. No distortion of enclosure observed and no hazards.	—
4.2.8/RD	Cathode ray tubes	No CRT in the unit.	N/A
	Picture tube separately certified ..... :		—
4.2.9/RD	High pressure lamps	No high pressure lamp provided.	N/A
4.2.10/RD	Wall or ceiling mounted equipment; force (N) ..... :	Not wall mounted equipment.	N/A
7.4	**Construction details**		**P**
7.4.1	Introduction		P
4.3.1/RD	Edges and corners	Edges and corners of the enclosure are rounded.	P
4.3.2/RD	Handles and manual controls; force (N)..... :	No handles or manual controls provided. No axial pull applied to push-buttons.	N/A
4.3.3/RD	Adjustable controls		N/A
4.3.4/RD	Securing of parts	Mechanical fixings in such a way designed that they will withstand mechanical stress occurring in normal use.	P
4.3.5/RD	Connection by plugs and sockets	No mismating of connectors, plugs or sockets possible.	P
4.3.7/RD	Heating elements in earthed equipment		N/A
4.3.11/RD	Containers for liquids or gases		N/A
4.4/RD	Protection against hazardous moving parts		N/A
4.4.1/RD	General	Fan for skilled person only, cannot be touched.	P
4.4.2/RD	Protection in operator access areas..... :	See above	P
4.4.3/RD	Protection in restricted access locations..... :	See above	P
4.4.4/RD	Protection in service access areas	See above	P
4.4.5/RD	Protection against moving fan blades		N/A
4.4.5.1/RD	General		N/A
	Not considered to cause pain or injury. a) ..... :		N/A
	Is considered to cause pain, not injury. b) ..... :		N/A
	Considered to cause injury. c) ..... :	Considered	P
4.4.5.2	Protection for users		N/A
	Use of symbol or warning..... :		N/A
4.4.5.3	Protection for service persons		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Use of symbol or warning..... :	Instructed in the service instructions	N/A
4.5/RD	Thermal requirements	See clause 7.7	P
4.5.1/RD	General		P
4.5.2/RD	Temperature tests		P
	Normal load condition per Annex L ..... :	Equipment loaded with rated output power.	P
4.5.3/RD	Temperature limits for materials	(see appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(see appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat ..... :	(see appended table 7.4)	P
7.4.2	Openings	See appended table 7.4.2	P
7.4.3	Gas Concentration	For the ventilation of the lead-acid battery refer to table M	P
7.4.4	Equipment movement	No castors provided.	N/A
7.5 4.7/RD	**Resistance to fire**		**P**
4.7.1/RD	Reducing the risk of ignition and spread of flame		P
	Method 1, selection and application of components wiring and materials	(see appended table 7.5)	P
	Method 2, application of all of simulated fault condition tests	(see appended table 7.5)	P
4.7.2/RD	Conditions for a fire enclosure		P
4.7.2.1/RD	Parts requiring a fire enclosure	With having the following components: a) Components in primary circuits c) Insulated wiring Semiconductor devices, transistors, diodes, integrated circuits d) Resistors, capacitors, inductors The fire enclosure is required.	P
4.7.2.2/RD	Parts not requiring a fire enclosure		N/A
4.7.3/RD	Materials		P
4.7.3.1/RD	General	See below	P
4.7.3.2/RD	Materials for fire enclosures	Metal enclosure with plastic front panel.	P
4.7.3.3/RD	Materials for components and other parts outside fire enclosures		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	PCB rated V-0 or better. See appended table 4.5 for details. Internal components except small parts are V-2 or better.	P
4.7.3.5/RD	Materials for air filter assemblies	No air filters provided.	N/A
4.7.3.6/RD	Materials used in high-voltage components	No high voltage components provided.	N/A
7.6	**Battery location**		**P**
7.6.1	Battery location and installation	Battery location and installation of the external battery cabinet and internal battery are described in detail.	P
7.6.2	Accessibility and maintainability	No requirements declared by the battery manufacturer.	N/A
7.6.3	Distance	The temperature of the electrolyte and the gas emission are within the limits of this standard (see appropriate subclauses).	P
7.6.4	Case insulation	No Ni-Cd battery used inside.	N/A
7.6.5	Wiring	The protection of connection wiring complies with subclause 3/RD.	P
7.6.6	Electrolyte spillage	Sealed maintenance free batteries provided with an unlikely emission of electrolyte (VRLA type).	P
7.6.7	Ventilation	For the ventilation of the lead-acid battery refer to table M.	P
7.6.8	Charging voltage	See appended table 8.3.	P
7.7	**Temperature rise**		**P**
4.5/RD	Thermal requirements		P
4.5.1/RD	General		P
4.5.2/RD	Temperature tests	(see appended table 7.7)	P
	Normal load condition per Annex L ..... :		P
4.5.3/RD	Temperature limits for materials	(see appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(see appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat ..... :	Phenolic material	P

8	**Electrical requirements and simulated abnormal conditions**	**P**
8.1	**General provisions for earth leakage**	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.1/RD	General	Total touch current is depending on interconnected equipment	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA	Warning label used	P
8.2 5.2/RD	**Electric strength**		P
5.2.1/RD	General	(see appended table 8.2)	P
5.2.2/RD	Test procedure	(see appended table 8.2)	P
8.3	**Abnormal operating and fault conditions**		**P**
8.3.1	General		P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.3.2/RD	Motors	Approved DC fans used. Also test in appliance	P
5.3.3/RD	Transformers	(see appended Annex C)	P
5.3.4/RD	Functional insulation ..... :	By short-circuited, results see appended table 8.3.	P
5.3.5/RD	Electromechanical components	No electromechanical component (except for approved relays) provided.	P
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	No fire propagated beyond the equipment. No molten metal was emitted. Electric strength tests from primary to SELV and primary to PE were passed.	P
5.3.9.1/RD	During the tests		P
5.3.9.2/RD	After the tests		P
8.3.2	Simulation of faults	No fire or molten metal occurred and no deformation of enclosure during the tests.	P
8.3.3	Conditions for tests	No reduction of clearance and creepage distance. Electric strength test is made on basic, supplementary and reinforced insulation after test.	P

9 6/RD	**Connection to telecommunication networks**	**N/A**
6.1/RD	**Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment**	N/A
6.1.1/RD	Protection from hazardous voltages	N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.2/RD	Separation of the telecommunication network from earth		N/A
6.1.2.1/RD	Requirements		N/A
	Supply voltage (V) ..... :		—
	Current in the test circuit (mA)..... :		—
6.1.2.2/RD	Exclusions ..... :		N/A
6.2/RD	**Protection of equipment users from overvoltages on telecommunication networks**		N/A
6.2.1/RD	Separation requirements		N/A
6.2.2/RD	Electric strength test procedure		N/A
6.2.2.1/RD	Impulse test		N/A
6.2.2.2/RD	Steady-state test		N/A
6.2.2.3/RD	Compliance criteria		N/A
6.3/RD	**Protection of the telecommunication wiring system from overheating**		N/A
	Max. output current (A)..... :		—
3.5/RD	Interconnection of equipment		N/A
3.5.1/RD	General requirements		N/A
3.5.2/RD	Types of interconnection circuits ..... :		N/A
3.5.3/RD	ELV circuits as interconnection circuits		N/A
3.5.4/RD	Data ports for additional equipment		N/A
2.1.3/RD	Protection in restricted access locations		N/A
2.3.1/RD	Limits		N/A
	Type of TNV circuits ..... :		—
2.3.2/RD	Separation from other circuits and from accessible parts		N/A
2.3.2.1/RD	General requirements		N/A
2.3.2.2/RD	Protection by basic insulation		N/A
2.3.2.3/RD	Protection by earthing		N/A
2.3.2.4/RD	Protection by other constructions ..... :		N/A
2.3.3/RD	Separation from hazardous voltages		N/A
	Insulation employed..... :		—
2.3.4/RD	Connection of TNV circuits to other circuits		N/A
	Insulation employed..... :		—
2.3.5/RD	Test for operating voltages generated externally		N/A
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.3.3/RD	Clearances in primary circuits		N/A
2.10.3.4/RD	Clearances in secondary circuits		N/A
2.10.4/RD	Creepage distances		N/A
2.10.4.1/RD	General		N/A
2.10.4.2/RD	Material group and comparative tracking index		N/A
	CTI tests ..... :		—
2.10.4.3/RD	Minimum creepage distances		N/A
M/RD	**Annex M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)**		N/A
M.1/RD	Introduction		N/A
M.2 /RD	Method A		N/A
M.3/RD	Method B		N/A
M.3.1/RD	Ringing signal		N/A
M.3.1.1/RD	Frequency (Hz) ..... :		—
M.3.1.2/RD	Voltage (V) ..... :		—
M.3.1.3/RD	Cadence; time (s), voltage (V) ..... :		—
M.3.1.4/RD	Single fault current (mA)..... :		—
M.3.2/RD	Tripping device and monitoring voltage ..... :		N/A
M.3.2.1/RD	Conditions for use of a tripping device or a monitoring voltage		—
M.3.2.2/RD	Tripping device		N/A
M.3.2.3/RD	Monitoring voltage (V) ..... :		N/A

A/RD	**Annex A, Tests for resistance to heat and fire**		**P**
A.1/RD	**Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2/RD)**		N/A
A.1.1/RD	Samples..... :		—
	Wall thickness (mm) ..... :		—
A.1.2/RD	Conditioning of samples; temperature (°C)..... :		N/A
A.1.3/RD	Mounting of samples ..... :		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
A.1.4/RD	Test flame (see IEC 60695-11-3)		N/A
	Flame A, B, C or D..... :		—
A.1.5/RD	Test procedure		N/A
A.1.6/RD	Compliance criteria		N/A
	Sample 1 burning time (s)..... :		—
	Sample 2 burning time (s)..... :		—
	Sample 3 burning time (s)..... :		—
A.2/RD	**Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2/RD and 4.7.3.4/RD)**		N/A
A.2.1/RD	Samples, material..... :		—
	Wall thickness (mm)..... :		—
A.2.2/RD	Conditioning of samples; temperature (°C)..... :		N/A
A.2.3/RD	Mounting of samples..... :		N/A
A.2.4/RD	Test flame (see IEC 60695-11-4)		N/A
	Flame A, B or C..... :		—
A.2.5/RD	Test procedure		N/A
A.2.6/RD	Compliance criteria		N/A
	Sample 1 burning time (s)..... :		—
	Sample 2 burning time (s)..... :		—
	Sample 3 burning time (s)..... :		—
A.2.7/RD	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		N/A
	Sample 1 burning time (s)..... :		—
	Sample 2 burning time (s)..... :		—
	Sample 3 burning time (s)..... :		—
A.3/RD	Hot flaming oil test (see 4.6.2/RD)		N/A
A.3.1/RD	Mounting of samples		N/A
A.3.2/RD	Test procedure		N/A
A.3.3/RD	Compliance criterion		N/A

B/RD	**Annex B, Motor tests under abnormal conditions (see 4.7.2.2/RD and 5.3.2/RD)**		**P**
B.1/RD	**General requirements**	Approved DC fan used. See appended table 4.5	N/A
	Position..... :		—
	Manufacturer..... :		—

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Type ..... :		—
	Rated values ..... :		—
B.2/RD	**Test conditions**		N/A
B.3/RD	**Maximum temperatures**		N/A
B.4/RD	**Running overload test**		N/A
B.5/RD	**Locked-rotor overload test**		N/A
	Test duration (days)..... :		—
	Electric strength test: test voltage (V)..... :		—
B.6/RD	**Running overload test for d.c. motors in secondary circuits**		N/A
B.6.1/RD	General		N/A
B.6.2/RD	Test procedure		N/A
B.6.3/RD	Alternative test procedure		N/A
B.6.4/RD	Electric strength test; test voltage (V)..... :		N/A
B.7/RD	**Locked-rotor overload test for d.c. motors in secondary circuits**		N/A
B.7.1/RD	General		N/A
B.7.2/RD	Test procedure		N/A
B.7.3/RD	Alternative test procedure		N/A
B.7.4/RD	Electric strength test; test voltage (V)..... :		N/A
B.8/RD	Test for motors with capacitors		N/A
B.9/RD	Test for three-phase motors		N/A
B.10/RD	Test for series motors		N/A
	Operating voltage (V) ..... :		—

C/RD	**Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)**		**P**
	Position ..... :	T1 transformer on PS1603-CT1 board	—
	Manufacturer ..... :	(see appended table 4.5)	—
	Type ..... :	(see appended table 4.5)	—
	Rated values ..... :	(see appended table 4.5)	—
	Method of protection..... :	Circuit design (inherently)	—
C.1/RD	Overload test	(see appended table 8.3 and 5.3/RD)	P
C.2/RD	Insulation	(see appended table C.2/RD and Sub-clause 8.2)	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Protection from displacement of windings ..... :	Secured by tubing and insulation tape. See appended table C.2/RD	P

D/RD	**Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)**		**P**
D.1/RD	**Measuring instrument**	Measuring instrument according to figure D.1 was used.	P
D.2/RD	**Alternative measuring instrument**		N/A

E/RD	**Annex E, Temperature rise of a winding (see Annex E/RD)**	**N/A**

F/RD	**Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD)**	**N/A**

G/RD	**Annex G, Alternative method for determining minimum clearances**		**N/A**
G.1/RD	**Clearances**		N/A
G.1.1/RD	General		N/A
G.1.2/RD	Summary of the procedure for determining minimum clearances		N/A
G.2/RD	**Determination of mains transient voltage (V)**		N/A
G.2.1/RD	AC mains supply ..... :		N/A
G.2.2/RD	Earthed d.c. mains supplies ..... :		N/A
G.2.3/RD	Unearthed d.c. mains supplies ..... :		N/A
G.2.4/RD	Battery operation..... :		N/A
G.3/RD	**Determination of telecommunication network transient voltage (V) ..... :**		N/A
G.4/RD	**Determination of required withstand voltage (V)**		N/A
G.4.1/RD	Mains transients and internal repetitive peaks ..... :		N/A
G.4.2/RD	Transients from telecommunication networks ..... :		N/A
G.4.3/RD	Combination of transients		N/A
G.4.4/RD	Transients from cable distribution systems		N/A
G.5/RD	**Measurement of transient voltages (V)**		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply		N/A
	For a d.c. mains supply		N/A
	b) Transients from a telecommunication network		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.6/RD	**Determination of minimum clearances..... :**		N/A

H	**Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)**		**N/A**

I	**Annex I, Backfeed protection test**		**N/A**
I.1	**General**		N/A
I.2	**Test for pluggable UPS**		N/A
I.3	**Test for permanently connected UPS**		N/A
I.4	**Load-induced change of reference potential**		N/A
I.5	**Solid-state backfeed protection (see clause 7.1-7.5 of IEC 62040-2 and clause 7.1-7.2 of IEC 62040-3)**		N/A

J/RD	**Annex J, Table of electrochemical potentials (see 2.6.5.6/RD)**		**P**
	Metal(s) used ..... :	Copper and steel.	—

K/RD	**Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD)**		**N/A**
K.1/RD	**Making and breaking capacity**		N/A
K.2 /RD	**Thermostat reliability; operating voltage (V) ..... :**		N/A
K.3/RD	**Thermostat endurance test; operating voltage (V) ..... :**		N/A
K.4/RD	**Temperature limiter endurance; operating voltage (V) ..... :**		N/A
K.5/RD	**Thermal cut-out reliability**		N/A
K.6/RD	**Stability of operation**		N/A

L	**Annex L, Reference loads**		**P**
L.1	**General**		P
L.2	**Reference resistive load**		P
L.3	**Reference inductive-resistive load**		—
L.4	**Reference capacitive-resistive loads**		P
L.5	**Reference non-linear load**		P
L.5.1	General		P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
L.5.2	Test method		P
L.5.3	Connection of the non-linear reference load		—

M	**Annex M, Ventilation of battery compartments**		**P**
M.1	**General**	Sufficient openings and a suitable arrangement of components (circuit breaker) are provided in such a way that a local concentration of hydrogen and oxygen is not possible. No requirement regarding the separation of operational arcing parts from battery vents/valves.	P
M.2	**Normal conditions**	See appended table M	P
M.3	**Blocked conditions**	Block test applied, see appended table 8.3	P
M.4	**Overcharge conditions**	See appended table M.	P

N	**Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)**		**N/A**

U/RD	**Annex U, Insulated winding wires for use without interleaved insulation (see 2.10.5.4/RD)**		**N/A**

V/RD	**Annex V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1/RD)**		**P**
V.1/RD	Introduction		P
V.2/RD	TN power distribution systems		P
V.3/RD	TT power distribution systems		N/A
V.4/RD	IT power distribution systems		N/A

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.6, 1.6.2/RD	TABLE: Electrical Data (in normal conditions)	P

fuse #	I rated (A)	U (V)	P (kW) L1/L2/L3	I (A) L1/L2/L3	I fuse (A) L1/L2/L3	condition/status
Input break	--	198V/50Hz	3.61/3.65/3.70	16.60/16.73/17.10	16.60/16.73/17.10	Rated 100% output load.
Ditto	--	198V/60Hz	3.63/3.63/3.80	18.67/18.62/19.68	18.67/18.62/19.68	
Ditto	20	220V/50Hz	3.61/3.65/3.70	16.60/16.73/17.10	16.60/16.73/17.10	
Ditto	20	220V/60Hz	3.61/3.62/3.73	16.53/16.56/17.31	16.53/16.56/17.31	
Ditto	20	230V/50Hz	3.60/3.63/3.72	15.78/15.90/16.38	15.78/15.90/16.38	
Ditto	20	230V/60Hz	3.60/3.61/3.74	15.78/15.79/16.50	15.78/15.79/16.50	
Ditto	20	240V/50Hz	3.59/3.64/3.73	15.04/15.19/15.72	15.04/15.19/15.72	
Ditto	20	240V/60Hz	3.59/3.59/3.74	15.07/15.06/15.76	15.07/15.06/15.76	
Ditto	--	264V/50Hz	3.65/3.63/3.64	13.91/13.80/13.92	13.91/13.80/13.92	
Ditto	--	264V/60Hz	3.58/3.60/3.72	13.64/13.69/14.26	13.64/13.69/14.26	

Supplementary information:

5.1.1 2.1.1.5/RD	TABLE: Max. V, A, VA Test	N/A

Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
--	--	--	--	--

Supplementary information:

5.1.1 2.1.1.5/RD	TABLE: Stored Energy	N/A

Capacitance C (μF)	Voltage U (V)	Energy E (J)
--	--	--

Supplementary information:

5.1.1 2.1.1.7/ RD	TABLE: discharge of capacitors in the primary circuit	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.1.1 2.1.1.7/ RD	**TABLE: discharge of capacitors in the primary circuit**	**P**

Condition	τ calculated (s)	τ measured (s)	t u→ 0V (s)	Comments
Input L1-N	--	0.48	1.92	Tested at online mode with batteries
Input L2-N	--	0.44	1.76	
Input L3-N	--	0.44	1.76	
Input L1-PE	--	0.46	1.84	
Input L2-PE	--	0.44	1.76	
Input L3-PE	--	0.42	1.68	
Input N-PE	--	0	0	
BAT+-PE		0.21	0.84	Battery mode
BAT--PE		0.23	0.92	
Input L1-N	--	0.25	1.0	Tested at bypass mode without batteries
Input L2-N	--	0.23	0.92	
Input L3-N	--	0.25	1.0	
Input L1-PE	--	0.48	1.92	
Input L2-PE	--	0.5	2.0	
Input L3-PE	--	0.5	2.0	
Input N-PE	--	0	0	
Supplementary information:				

5.2.1 2.2/RD	**TABLE: Evaluation Of Voltage Limiting Components In SELV Circuits**	**P**

Component (measured between)	Max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	
For PS1603-CT1 board			
T1 After pin 9 to D1	--	11.4	--
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
--	--		
Supplementary information: s-c=Short circuit			

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.2.3 2.4.2/RD	**Table: Limited current circuit measurement**					**N/A**
Location	Voltage (mV)	Current (mA)	Freq. (kHz)	Limit (mAp)	Comments	
Supplementary information:						

5.3.1 and 2.6.3.4/RD	**Table: Resistance of earthing measurement**			**P**
Location	Resistance measured (mΩ)	Voltage drop measured (V)	Comments	
Input PE to earthed enclosure	--	1.2	40A/2 min Limit value: ≤2.5V	
Supplementary information:				

5.5.4	**Table: Short-time withstand current test**			**N/A**
Rated max. output current	Announced withstand current	Test current	Comments	
--	--	--	--	
Supplementary information: Specified Icc not exceed 10kA, no test necessary.				

5.2.5 2.5/RD	**TABLE: Limited Power Sources**						**N/A**
Circuit output tested:							
Note: Measured Uoc (V) with all load circuits disconnected:							
Components	Test condition (Single fault)	Uoc (V)	Isc (A)		VA		
			Meas.	Limit	Meas.	Limit	
--	--	--	--	--	--	--	
Supplementary information: Sc=Short circuit, Oc=Open circuit							

5.7 2.10.2/RD	**Table: Working Voltage Measurement**			**P**
Location	RMS voltage (V)	Peak voltage (V)	Comments	
For PS1603-CT1 board				
T1 Pin2--6	27	38		

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

T1 Pin2--7	32	46	
T1 Pin2--9	30	40	
T1 Pin2--10	27	38	
T1 Pin4--6	32	**50**	**Maximum Vpeak**
T1 Pin4--7	27	42	
T1 Pin4--9	27	38	
T1 Pin4--10	**34**	50	**Maximum Vrms**
Supplementary information: Sc=Short circuit, Oc=Open circuit			

5.7, 2.10.3/RD	**TABLE: Clearance And Creepage Distance Measurements**					**P**
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Whole unit						
Metal enclosure to bare pin of battery terminal	<420	<240	2.0	5.5	2.5	5.5
Primary pin to earthed metal plate on Input EMI PCB	<420	<240	2.0	5.0	2.5	>5.0
Primary pin to earthed metal enclosure on Output EMI PCB	<420	<240	2.0	8.0	2.5	>8.0
Primary trace to Plastic panel	<420	<250	4.0	7.5	5.0	7.5
For PS1603-CT1 board						
Primary to secondary of Opto-coupler (U22, U19, U20)	<420	<250	4.0	5.7	5.0	5.7
Primary to secondary under T1	<420	<250	4.0	8.2	5.0	8.2
Supplementary information: *FI=Functional insulation, BI=Basic insulation, RI=Reinforced insulation. Unless otherwise specified, the worst conditions of Cl. & Cr. In above mentioned locations have been considered and listed. Test with model HT3110XL						

5.7, 2.10.5.2/ RD	**TABLE: Distance Through Insulation Measurements**			**P**
Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)
Optocouplers (U22, U19, U20)	250	AC 3000	0.4	>0.4*

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Plastic panel	250	AC 3000	2.5	2.5
Supplementary information: *see information in table 4.5 for details.				

7.4, 4.5.5/RD	TABLE: Ball Pressure Test of Thermoplastics		N/A
Allowed impression diameter (mm) ..... :			—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)
--	--	--	--
Supplementary information: Phenolic material bobbin used in Transformer and Line Choke without test.			

7.4.2 4.6/RD	TABLE: Openings		P
Location	Size (mm)	Comments	
Front	Diameter=3mm	Numerous oblong opening for ventilation	
Rear	Diameter=3mm	Numerous hole for ventilation	
Side	None	--	
Top/bottom	None	--	
Supplementary information:			

7.5 4.7/RD	TABLE: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
Plastic panel	SABIC JAPAN L L C	C2950(GG)(C)	2.5 mm	5VB	UL
PCB	Interchangeable	Interchangeable	2.0 mm	V-0	UL
Supplementary information: see appended table 4.5					

7.7, 4.5/RD	TABLE: Heating Test					P
	Test voltage (V).....	323V/60Hz	457V/50Hz	Battery Mode	--	—
	Ambient (°C).....	40	40	40	--	—

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Thermocouple Locations	Max. temperature measured, (°C)				Max. temperature limit, (°C)
UPS internal					
Input wire	80.3	75.2	67.9	--	80
EM-J13 body	81.5	80.7	69.2	--	85
Air switch	80.0	74.5	68.1	--	Ref.
CB1-5 body	82.8	77.6	70.2	--	130
PS1603-EM1 board					
C19 body	79.7	76.1	70.5	--	85
C28 body	80.4	77.7	71.1	--	85
C21 body	78.4	76.6	70.9	--	85
C27 body	79.9	77.7	72.3	--	85
MPX1 body	79.0	74.5	68.2	--	100
PS1509-PW3 board					
J1 body	73.1	70.6	75.4	--	85
PCB near HS4	75.0	71.8	78.7	--	130
RLY1 body	75.8	72.6	79.5	--	85
C34 body	74.6	71.4	78.3	--	105
L2 coil	75.8	70.8	77.6	--	130
L1 coil	73.1	71.6	74.9	--	130
PCB near D67	71.5	72.0	79.3	--	130
PCB near Q10	77.4	74.2	78.1	--	130
T2 coil	72.9	69.7	73.2	--	110
T1 coil	75.5	72.3	75.4	--	110
C33 body	72.0	68.8	73.1	--	105
T5 body	71.0	69.9	72.4	--	130
PS1603-DR2 board					
C209 body	96.7	93.2	86.1	--	85
PCB near HS2	101.8	95.6	88.9	--	130
L7 coil	98.9	92.7	86.0	--	130
L8 coil	97.1	91.8	84.6	--	130
L9 coil	98.9	93.6	86.4	--	130
L6 coil	101.7	96.4	89.2	--	130

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
L5 coil	98.4	92.1	87.4	--	130
L4 coil	99.8	96.2	91.1	--	130
PS1506-DR6 board					
C243 body	91.7	88.5	92.8	--	105
C247 body	93.4	90.8	93.9	--	105
RLY6 body	95.1	92.5	95.6	--	85
T9 coil	93.3	90.7	93.8	--	110
T5 Winding	92.8	89.6	94.6	--	130
L1 body	96.4	93.2	98.2	--	130
J60 body	92.0	90.0	94.7	--	Ref.
HS3 body	93.0	89.5	95.1	--	Ref.
T10 Winding	94.3	90.2	96.3	--	130
HS2 body	92.9	88.8	94.9	--	Ref.
L4 coil	95.3	91.2	97.3	--	130
C156 body	97.0	92.9	99.0	--	105
T13 Winding	72.9	69.7	73.2	--	130
HS1 body	75.5	72.3	75.4	--	Ref.
C201 body	72.0	68.8	73.1	--	105
J4 body	71.0	69.9	72.4	--	Ref.
J34 body	75.8	70.8	77.6	--	Ref.
PS1509-DR3 board					
T1 winding	111.4	106.2	97.7	--	130
PS1603-CT1 board					
T1 coil	60.6	67.1	61.5	--	110
T1 core	68.8	66.2	60.2	--	110
U19 body	69.7	67.5	62.1	--	100
U23 body	69.3	64.4	68.1	--	100
17001-02826 board					
U13 body	62.0	60.0	64.7	--	100
T1 coil	63.0	69.5	65.1	--	110
T1 core	64.3	60.2	66.3	--	110
C46 body	62.9	68.8	64.9	--	105
PS1509-DR3 board					
T1 winding	71.7	68.5	72.8	--	130

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict

C3 body	73.4	70.8	73.9	--	105
J4 body	75.1	72.5	75.6	--	Ref.
noise filter	73.3	70.7	73.8	--	130
Ambient	40.0	40.0	40.0	--	--

Supplementary information:

1. The temperatures were measured under the worst case normal mode defined in 1.2.2.1/RD and as described in sub-clause 4.6 at voltages as described above.
2. With a specified ambient temperature of 40°C.
3. Test for model HT3110XL and output loading with 240V, 48A, 10kW

7.7, 4.5/RD	**TABLE: Heating test, resistance method**				**N/A**
	Test voltage (V) ..... :				—
	Ambient, t_1 (°C) ..... :				—
	Ambient, t_2 (°C) ..... :				—

Temperature rise of winding	R_1 (Ω)	R_2 (Ω)	ΔT (K)	Max. dT (K)	Insulation class
--	--	--	--	--	--

Supplementary information:

8 5.1/RD	**TABLE: touch current measurement**	**P**

Measured between:	Measured (mA)	Limit (mA)	Comments/conditions
Unit on	0.9 / 0.9	3.5	Switch “e” open, L/N to PE, no load
Unit on	0.005 / 0.005	0.25	Switch “e” close, L/N to front panel (with foil)
Unit on	0.005 / 0.005	0.25	Switch “e” close, L/N to RS232 port

Supplementary information:

8.2 5.2/RD	**TABLE: Dielectric Strength**	**P**

Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)
Primary to Secondary interface (interface of Port for MCU interface board and CSB board)	DC 4242	No

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Input/output R/S/T to earth	DC 2121	No
Battery +/- to earth	DC 2121	No
Primary to secondary in safety isolation transformers (T1 of PS1603-CT1 board)	DC 4242	No
Supplementary information:		

8.3 5.3/RD	**TABLE: Fault condition tests**		**P**
	Ambient temperature (°C) :	See below	—
	Power source for EUT: Manufacturer, model/type, output rating :		—

Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Opening	Blocked	240	2hr02mins	Input breaker	15.07/15.06/15.76	The maximun temperature were: L1 winding=104.5°C, L3 winding =103.7°C,L4 winding=103.9°C, Ambient=25.3°C, no damage, no hazards.
Opening	Blocked	Battery mode	1hr01mins	Input breaker	--	The maximun temperature were: L1 winding=107.6°C, L3 winding =107.5°C,L4 winding=108.4°C, Ambient=25.1°C, no damage, no hazards.
Output	Overload	240	1hr01mins	Input breaker	18.33/18.24/18.71	When load add to 110%,UPS work for 1hour and turn to bypass mode. The maximun temperature were: L1 winding=107.5°C, L3 winding =106.3°C,L4 winding=108.7°C, Ambient=25.5°C, no damage, no hazards.
Output	Overload	Battery mode	1hr01mins	Input breaker	--	When load add to 110%,UPS work for 1hour and shut down. The maximun temperature were: L1 winding=109.2°C, L3 winding =108.8°C,L4 winding=110.6°C, Ambient=25.3°C, no damage, no hazards.

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Fan	Locked	240	2hr07mins	Input breaker	16.12/16.22/16.26	The maximun temperature were: L1 winding=106.7C, L3 winding =107.3°C, L4 winding=108.1°C, Ambient=25.2°C, no damage, no hazards.
Fan	Locked	Battery mode	1hr12mins	Input breaker	--	The maximun temperature were: L1 winding=108.7°C, L3 winding =109.3°C,L4 winding=110.5°C, Ambient=25.2°C, no damage, no hazards.
Output s-c	S-C	240	1min	Input breaker	0.54	Unit shut down, no damage, no hazards
Output s-c	S-C	Battery mode	1min	F1,F2	--	Unit shut down, no damage, no hazards
D1	S-C	240	1S	Input breaker	0	Input Breaker open, no damage, no hazards
D3	S-C	240	1S	Input breaker	0	Input Breaker open, no damage, no hazards
Q5 Pin G to S	S-C	240	10mins	Input breaker	0.36	Unit shut down, no damage, no hazards
Q5 Pin D to S	S-C	240	1S	Input breaker	0.59	Input Breaker open, no damage, no hazards
Q5 Pin G to D	S-C	240	1S	Input breaker	0.64	Input Breaker open, no damage, no hazards
Q30 Pin G to S	S-C	240	10mins	Input breaker	0.98	Unit shut down, no damage, no hazards
Q30 Pin D to S	S-C	240	1S	Input breaker	0.42	Input Breaker open, no damage, no hazards
Q30 Pin G to D)	S-C	240	1S	Input breaker	0.44	Input Breaker open, no damage, no hazards
D1	S-C	Battery mode--	1S	Input breaker	0.59	Input Breaker open, no damage, no hazards
D3	S-C	Battery mode	1S	Input breaker	1.09	Input Breaker open, no damage, no hazards
Q5 Pin G to S	S-C	Battery mode	10mins	Input breaker	0.33	Unit shut down, no damage, no hazards
Q5 Pin D to S	S-C	Battery mode	1S	Input breaker	0.49	Input Breaker open, no damage, no hazards
Q5 Pin G to D	S-C	Battery mode	1S	Input breaker	0.53	Input Breaker open, no damage, no hazards
Q30 Pin G to S	S-C	Battery mode	10mins	Input breaker	0.18	Unit shut down, no damage, no hazards

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Q30 Pin D to S	S-C	Battery mode	1S	Input breaker	0.23	Input Breaker open, no damage, no hazards
Q30 Pin G to D	S-C	Battery mode	1S	Input breaker	0.36	Input Breaker open, no damage, no hazards

Supplementary information: s-c: short circuit, o-c: open circuit, o-l: over load

1. SELV outputs did not exceed 42.4 Vpeak or 60 Vdc and did not exceed the limit of 71 Vpeak or 120 Vdc within 0.2 second after abnormal conditions were applied.

2. The Electric Strength Tests were successfully conducted after the completion of fault.

3. Transformer winding and core temperature limit is 164°C (175-10-(40-39))

4. Test with model RT33025KE

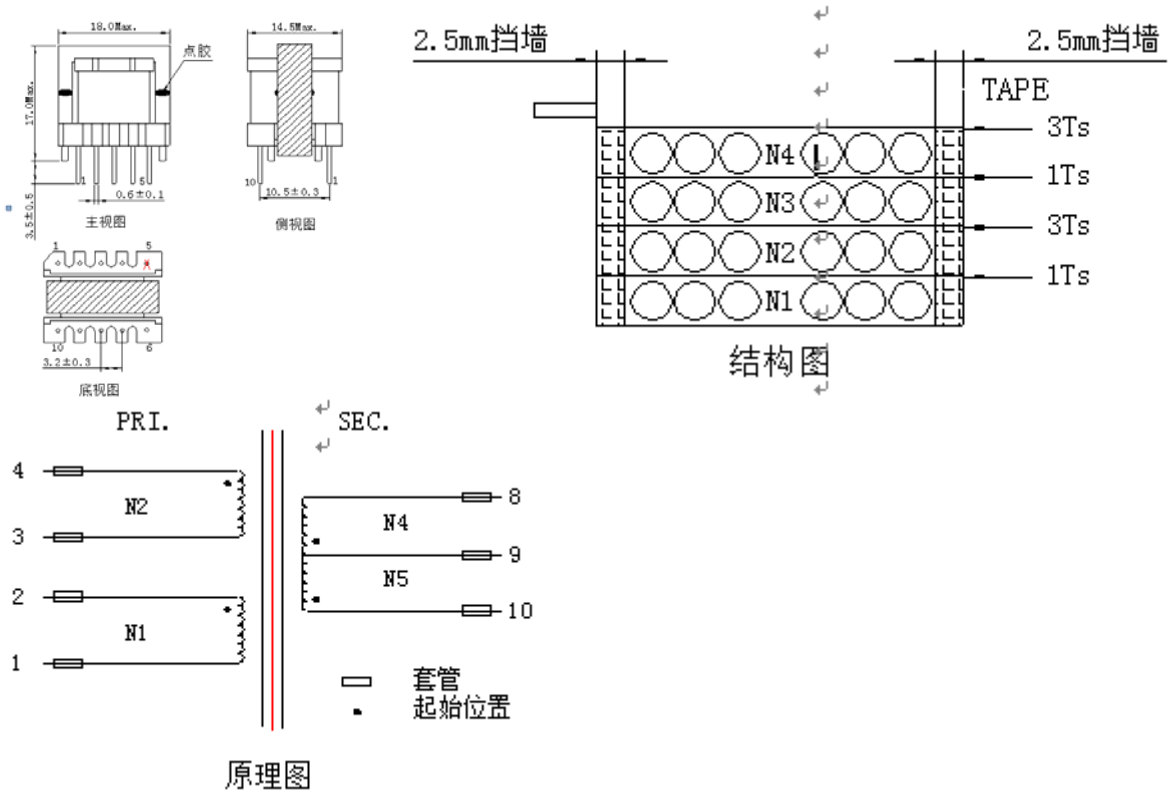
C.2/RD	**TABLE: transformers**						**P**
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
T1 of PS1603 -CT1 board	Transformer primary winding to secondary winding	420	250	3000VAC	2.2	4.2	*
T1 of PS1603 -CT1 board	Transformer primary to core	420	250	1500VAC	2.0	2.5	*
T1 of PS1603 -CT1 board	Transformer secondary to core	420	250	1500VAC	2.0	2.5	*
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
T1 of PS1603 -CT1 board	Transformer primary winding to secondary winding			3000VAC	6.5	6.5	*
T1 of PS1603 -CT1 board	Transformer primary to core			1500VAC	4.2	4.5	*

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
T1 of PS1603 -CT1 board	Transformer secondary to core	1500VAC	4.2	4.5	*

Supplementary information:
*) 2 layers or 3 layers or Annex U
All transformer sources are identical except manufacturer.

C.2/RD	TABLE: transformers	P

Transformer: T1 of PS1603-CT1 board
Construction / winding diagram



M	Ventilation of battery compartments	N/A

The required dimension for the ventilation openings will be calculated with the following formula:

$A \geq Q/360$ [m²]

with $Q = 0.054 * n * I * C$

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

where:
Q : airflow in m³/h
n : number of battery cells
I : constant factor (0,2A/100Ah for valve regulated lead acid batteries)
C : is the battery nominal capacity in Ah at the 10h discharge rate

With the specific data for the UPS the following dimension for the ventilation openings is required:

n :
C :

A ≥ (0.054 * n * 0.2 A/100 Ah * C)/360

A ≥

Verdict

The size of ventilation openings in battery cabinet exceeds the required airflow by far (as well as the UPS).

4.5	TABLE: Critical components information				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1])
Whole unit					
Front panel	SABIC JAPAN L L C	C2950 (GG)(C)	5VB, 85°C, Min. thickness 2.5mm	UL 746D	UL E207780
DC fan	NMB-MAT	3110KL-05W-B89-B00	DC24V, 0.18A	UL 507 IEC 60335-2-80	UL: E89936 VDE: 1507300
DC fan	NMB-MAT	3110KL-05W-B89-B01	DC24V, 0.18A	UL 507 IEC 60335-2-80	UL: E89936 VDE: 1507300
DC fan	ADDA	AD0824VB-A72GP	DC24V, 0.38A	UL 507 IEC 60335-2-80	UL TUV:R50068602
Circuit Breaker	LS	BK63N 1P C63	AC230/400V,63A	IEC:60898-1	TUV: 15031180004
Alt.	DELIXI	CDB6i1C63	AC230/400V,63A	IEC:60898-1	TUV: R50303319

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Alt.	LS	BK63N 3P C32	AC230/400V,32A	IEC:60898-1	TUV: 150311800004
Alt.	DELIXI	CDB9N63 3C32	AC230/400V,32A	IEC60898-1	TUV: R50303319
Fuse	BUSSMANN	100FE-UL	690VAC/500VDC,100A	UL 248-1 UL 248-14	UL: E91958
Connector	OULU	TR60-05-10P-BK-T2-T(f)	AC600V, 65A	IEC60998-2-1; UL1059; UL486E	UL: E332956; CE: LBT1006C-196S
Alt.	SHENZHEN CONNECTION ELECTRONIC CO LTD	DRTB16-10-RST-BK	AC600V, 65A	IEC947-7-1	UL: E304128
Alt.	OULU	PLTB1.5-02-BF-3.81	AC300V, 8A	IEC:60998-2-1; UL 1059; UL 486E	UL: E332956; CE: LBT1006C-196S
Alt.	OULU	TR60-05-10P-BK-T2-T(f)	AC600V, 65A	IEC:60998-2-1; UL 1059; UL 486E	UL: E332956; CE: LBT1006C-196S
Insulation sheet	ITW ELECTRONICS COMPONENTS/ PRODUCTS (SHANGHAI) CO LTD	Formex GK-10	minimum thickness 0.4 mm, V-0, 115°C	UL 94 UL 746C	UL: E256266
Alternative	FORMEX, DIV OF ILLINOIS TOOL WORKS INC, FORMERLY	Formex GK-10	minimum thickness 0.4 mm, V-0, 115°C	UL 94 UL 746C	UL: E121855
Wire	Interchangeable	Interchangeable	--	UL758	UL: E314168
PS1603_EM1					

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Varistor	CNJU	20D821K	AC510V; DC670V	UL1414, UL1449	UL: E165143; UL: E316325; VDE: 40008220
X2 Capacitor	XIAMEN FARATRONIC CO LTD	MKP62	275Vac/305Vac	UL 60384-14 EN 60384-14	UL: E186662; UL: E186600L VDE: 40000358
Alt.	SHENZHEN SURONG CAPACITORS CO LTD	MP2225K 3F2G0	280Vac	UL 60384-14 EN 60384-14	UL: E314875; VDE: 5001984-4670-0001
Y2 Capacitor	XIAMEN FARATRONIC CO LTD	MKP63	300Vac;10nF	UL 60384-14 EN 60384-14	UL: E186662; UL: E186600 ENEC:SE/0366-2A
Alt.	EPCOS	B32021	300Vac;10nF	UL 60384-14 EN 60384-14	UL: E97863; UL:E301966; ENEC:40018909
Alt.	TDK	XB9-1102-431C(00)	400VAC;2200pF	UL 60384-14 EN 60384-14	UL: E37861; VDE: 122006
Y1 Capacitor	MURATA	DE1E3KX 472M	250VAC;4700pF	UL 60384-14 EN 60384-14	UL: E37921; VDE: 40002831
Fuse	TAMURA	T3F	AC250V,2A,115℃	IEC/EN60127-1, IEC/EN60127-3 UL 248-1 UL 248-14	VDE: 2183900; UL: E73591

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Alt.	ZHANGZHOU AUPO ELECTRONICS CO LTD	P2-F	AC250V,2A,115℃	IEC/EN60127-1, IEC/EN60127-3 UL 248-1 UL 248-14	VDE: 1951300; UL: E140847
Connector	OULU	AO-15/4J-N2	80A	IEC 998-2-1 IEC 947-7-1 UL 1059 UL 486E	UL: E332956; CE: LBT1006 C-196S
Connector	OULU	AO-10/4J-K3	40A	IEC 998-2-1 IEC 947-7-1 UL 1059 UL 486E	UL: E332956; CE: LBT1006 C-196S
Connector	SHENZHEN SHINNING ELECTRONIC CO LTD	1343-041-020-1	3A, 250V	UL1977	UL: E241307
PS1603_DR1					
X2 Capacitor	XIAMEN FARATRONIC CO LTD	MKP62	275Vac/305Vac	UL 60384-14 EN 60384-14	UL: E186662; UL: E186600L VDE:40000358;
Alt.	SHENZHEN SURONG CAPACITORS CO LTD	MP2225K3F2G0	280Vac	UL 60384-14 EN 60384-14	UL: E314875; VDE: 5001984-4670-0001
Y1 Capacitor	MURATA	DE1E3KX472M	250VAC;4700pF	UL 60384-14 EN60384-14	UL:E37921;VDE:40002831
Optocouplers	LITE-ON	LTV-816S	5000Vrms	EN60747-5-2 UL1577	UL: E113898; VDE: 40015248

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Alt.	SHARP	PC123X5YI	5000Vrms	EN60747-5-2 UL1577	UL: E64380; VDE: 40008087
Alt.	NEC	PS2561L-1-V-F3-A-L	5000Vrms	EN60747-5-2 UL1577	UL: E72422; VDE: 40008862
Optocouplers	AVAGO	ACPL-C790-500E	5000 Vrms/1min	EN60747-5-2 UL1577	UL:E55261;CSA:CA88324
Alt.	TI	AMC1301DWVR	5000 Vrms/1min	EN60747-5-2 UL1577	UL;VDE
Relay	TYCO	T92SD12-24	277VAC,30A	UL 508 UL 60947-1 IEC 61810-1	UL: E22575; VDE:5386
Alt.	XIAMEN HONGFA ELECTROACOUSTIC CO LTD	HF92F-024D-2A12F	277VAC,30A	UL 508 UL 60947-1 IEC 61810-1	UL: E134517; VDE: 40016109
Current Transformer	INVT	USS11CT1	Class B	EN62040-1	Test with appliance
Current Transformer	INVT	UMX33CT1	Class B	EN62040-1	Test with appliance
Current Transformer	INVT	HTX11L1	Class F	EN62040-1	Test with appliance
PS1603_DR2					
Connector	OULU	AO-10/4J-K3	40A	IEC 998-2-1 IEC 947-7-1 UL 1059 UL 486E	UL: E332956; CE: LBT1006 C-196S
Connector	OULU	AO-15/4J-N2	80A	IEC 998-2-1 IEC 947-7-1 UL 1059 UL 486E	UL: E332956; CE: LBT1006 C-196S
Current Transformer	INVT	UMX3315L2	Class F	EN62040-1	Test with appliance

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Current Transformer	INVT	UMS33D2 T1	Class B	EN62040-1	Test with appliance
PS1509_PW3					
Y1 Capacitor	MURATA	DE1E3KX 472M	250VAC;4700pF	UL 60384-14 EN60384-14	UL: E37921; VDE: 40002831
Optocouplers	AVAGO	ACPL-W340	5000Vrms	EN60747-5-2 UL1577	UL;CSA
Relay	TE	OJE-SS-112HMF	30VDC, 250VAC	UL 508 UL 60947-1 IEC 61810-1	VDE: 40007630 UL: E82292
Fuse	HOLLY	30N-050H1/H2/L	5A	UL 248-1 UL 248-14	UL: E156471;
Current Transformer	INVT	HTX11CT 1	Class B	EN62040-1	Test with appliance
Inductor	Interchangeable	Interchangeable	Class F	EN62040-1	Test with appliance
Connector	SHENZHEN SHINNING ELECTRONIC CO LTD	1344-041-110-2	7A, 250V	UL1977	UL: E241307
PS1509_PW1					
Y2 Capacitor	TDK	XB9-1102-431C(00)	400VAC; 2200pF	UL 60384-14 EN60384-14	UL: E37861; VDE: 122006
Optocouplers	LITE-ON	LTV-816S	5000Vrms	EN60747-5-2 UL1577	UL: E113898; VDE: 40015248
Alt.	SHARP	PC123X5YI	5000Vrms	EN60747-5-2 UL1577	UL: E64380; VDE: 40008087

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

Alt.	NEC	PS2561L-1-V-F3-A-L	5000Vrms	EN60747-5-2 UL1577	UL: E72422; VDE:40008862
Fuse	HOLLY	30N-100H1/H2/L	10A	UL 248-1 UL 248-14	UL: E156471;
Alt.	HOLLY	30TS025H1/H2/L	2.5A	UL 248-1 UL 248-14	UL: E156471;
PS1509_PW2					
Y2 Capacitor	TDK	XB9-1102-431C(00)	400VAC;2200pF	UL 60384-14 EN60384-14	UL: E37861; VDE: 122006
Optocouplers	AVAGO	ACPL-W340	5000Vrms	EN60747-5-2 UL1577	UL VDE
Fuse	HOLLY	30N-020H1/H2/L	2A	UL 248-1 UL 248-14	UL: E156471;
Current Transformer	INVT	HTX11CT1	Class B	EN62040-1	Test with appliance
Inductor	INVT	HTX11L4	Class F	EN62040-1	Test with appliance
PS1509_TF2					
Connector	OULU	AO-15/4J-N2	80A	IEC 998-2-1 IEC 947-7-1 UL 1059 UL 486E	UL: E332956; CE: LBT1006 C-196S
Supplementary information: [1)] Provided evidence ensures the agreed level of compliance. See OD-2039.					

IEC 62040-1_1A - ATTACHMENT 1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62040-1

EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

Uninterruptible power systems (UPS) –

Part 1: General and safety requirements for UPS

Differences according to.....:	EN 62040-1:2008
Attachment Form No. .....:	EU_GD_IEC62040_1A
Attachment Originator.....:	Nemko
Master Attachment.....:	Date (2010-06)

EN 62040-1:2008 – CENELEC COMMON MODIFICATIONS

EN 62040-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions		N/A

IEC 62040-1_1A - ATTACHMENT 1			
Clause	Requirement + Test	Result - Remark	Verdict

ZA — **NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.
Note: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD Applies.

Publication	Year	Title	EN/HD	Year
IEC 60364-4-42	-[1)]	Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects	-	-
IEC 60417	Data-base	Graphical symbols for use on equipment	-	-
IEC 60529	-[1)]	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991[2)] 1993
IEC 60664	Series	Insulation coordination for equipment within low-voltage systems	EN 60664	Series
IEC/TR 60755	-[1)]	General requirements for residual current operated protective devices	-	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
IEC 61000-2-2	-[1)]	Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems	EN 61000-2-2	2002[2)]
IEC 61008-1 (mod)	-[1)]	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules	EN 61008-1 + A11	2004[2)] 2007
IEC 61009-1 (mod)	-[1)]	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules	EN 61009-1 + corr. July + A11	2004[2)] 2006 2008
IEC 62040-2	2005	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN 62040-2 + corr. November	2006 2006
IEC 62040-3 (mod)	1999	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements	EN 62040-3	2001

[1)] Undated reference.
[2)] Valid edition at date of issue.

IEC 62040-1_1A - ATTACHMENT 1			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative)
SPECIAL NATIONAL CONDITIONS (EN)

The FI, NO and SE - SNCs originate from IEC 60950-1 2nd Edition, which is the reference document (RD) for IEC 62040-1. The national requirements are included in IEC 62040-1 through the following statement in the scope of the standard:
"National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD."

The national requirements have not been specifically listed in the EN 62040-1:2008.
If demanded, CLC/TC 22X will be requested to take proper measures to complete EN 62040-1 with Annexes ZB containing the SNCs as presented below.

EN 62040-1:2008 supersedes EN 62040-1-1:2003. As a reference, see also SNCs for Finland, Norway and Sweden as included in the earlier EN 62040-1-1:2003

Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	In Finland, Norway and Sweden, when safety relies upon connection to the safety earth (see 5.3), a pluggable equipment type A UPS shall have a marking on the equipment, stating that the UPS must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Finland: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In Norway: "Apparatet må tilkoples jordet stikkontakt" In Sweden: "Apparaten skall anslutas till jordat uttag"		N/A
4.7.11	In Norway, because of a widely used IT power system, equipment shall be designed or modified for connection to such a system and shall be marked by a label with the following wording in Norwegian: "Apparatet er egnet for tilkopling til et IT forsyningsnett"		N/A
9	In Finland, Norway and Sweden requirements of 6.1.2.1 and 6.1.2.2 in Annex ZB of EN 60950-1:2001 apply.		N/A

ATTACHMENT Photos

Figure 1: External view

Figure 2: External view

ATTACHMENT Photos

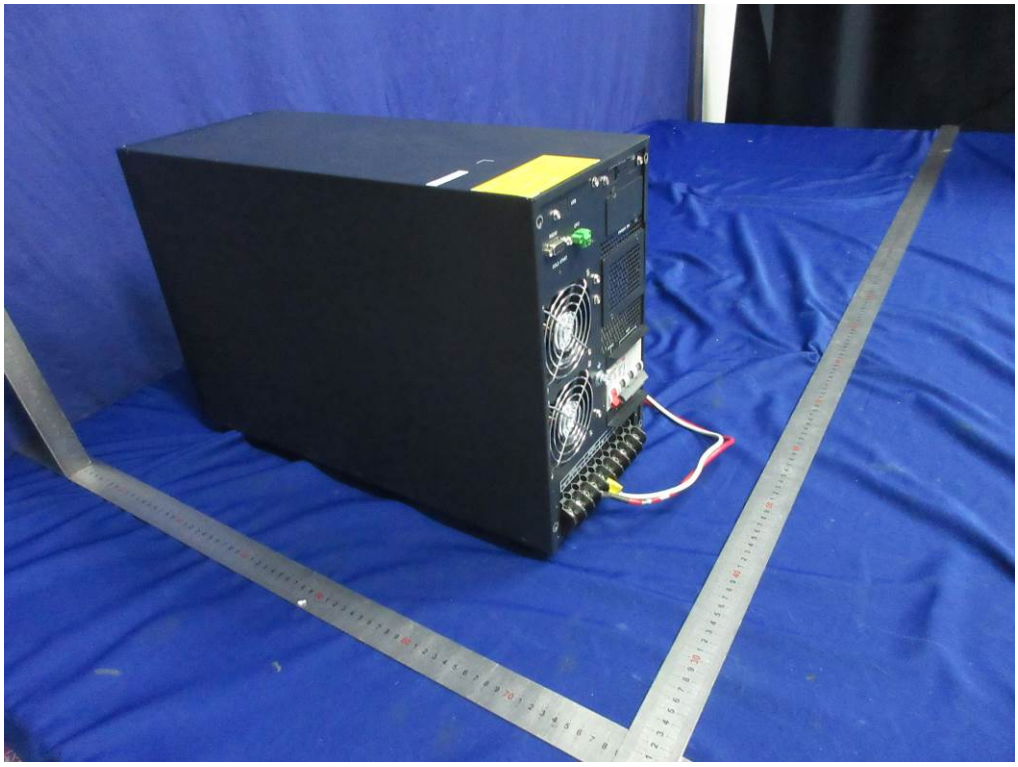


Figure 3: Rear view

Figure 4: Inlet view 1

ATTACHMENT Photos

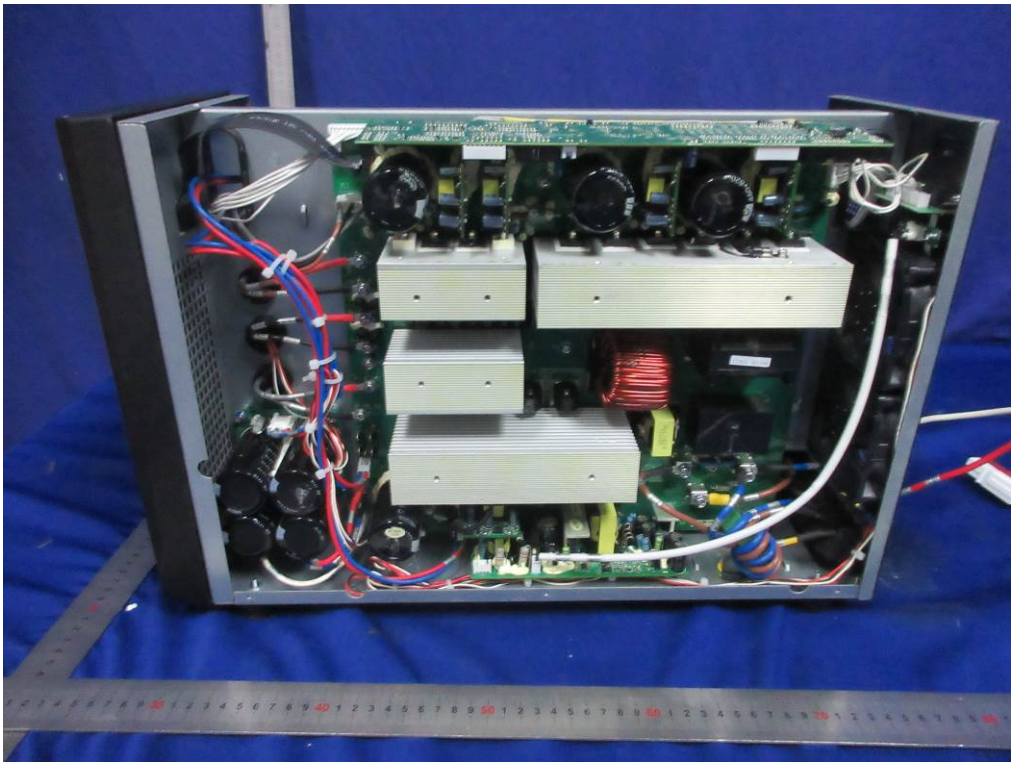


Figure 5: Inlet view 2

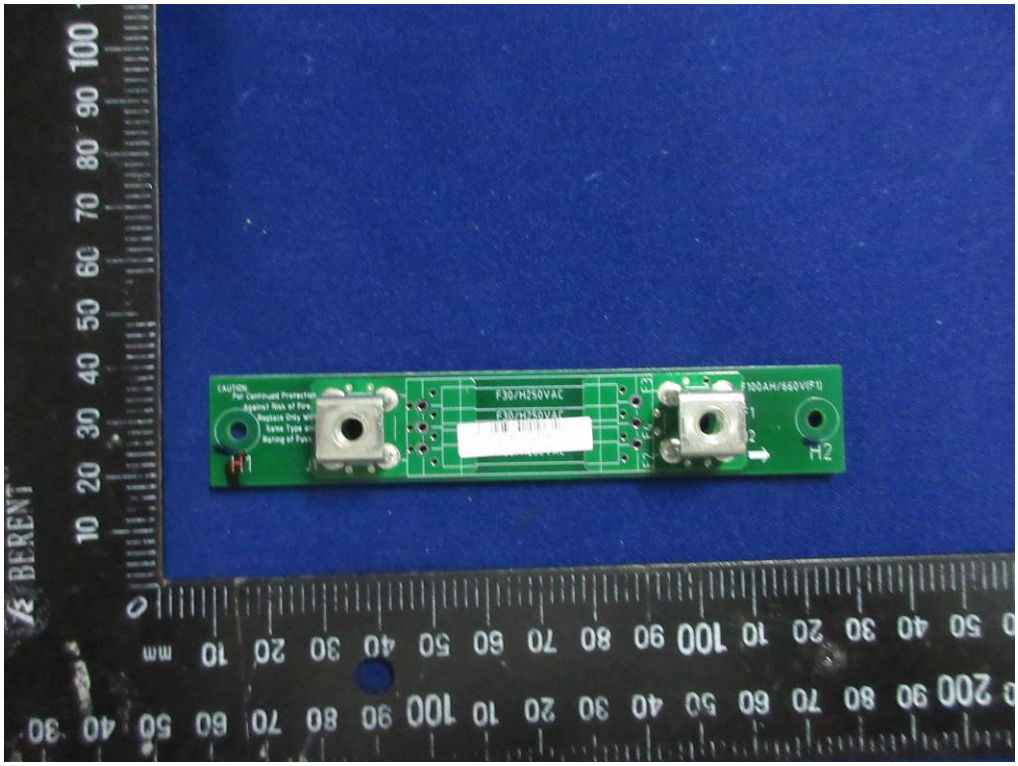


Figure 6: PCB view

ATTACHMENT Photos

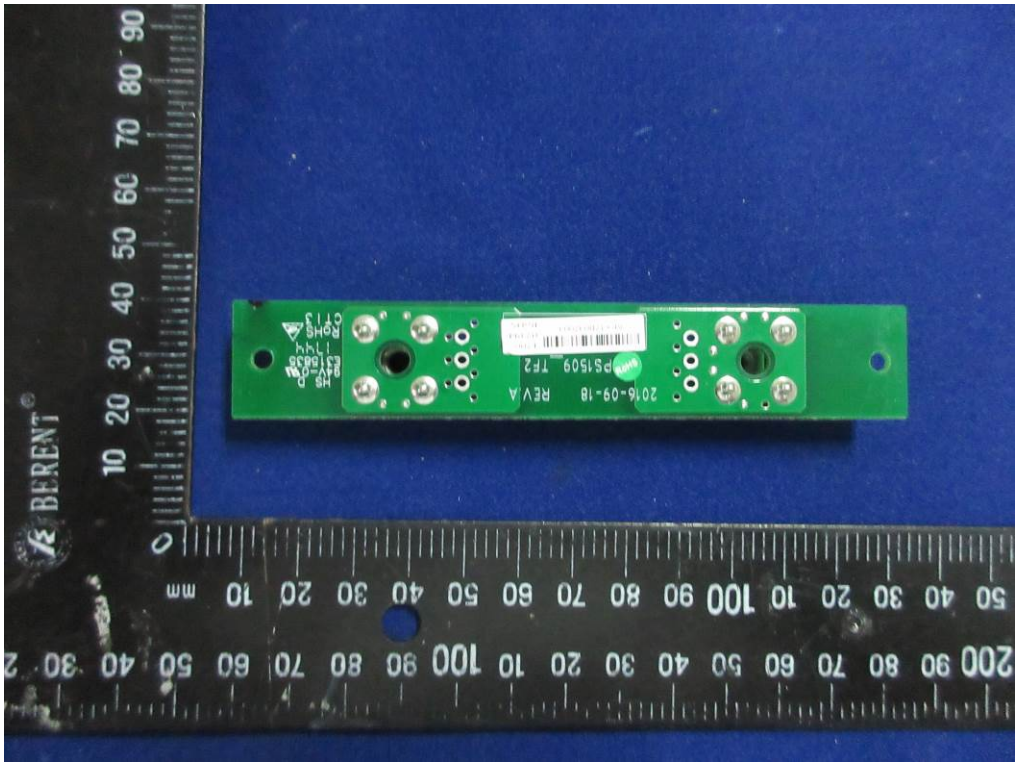


Figure 7: PCB trace view

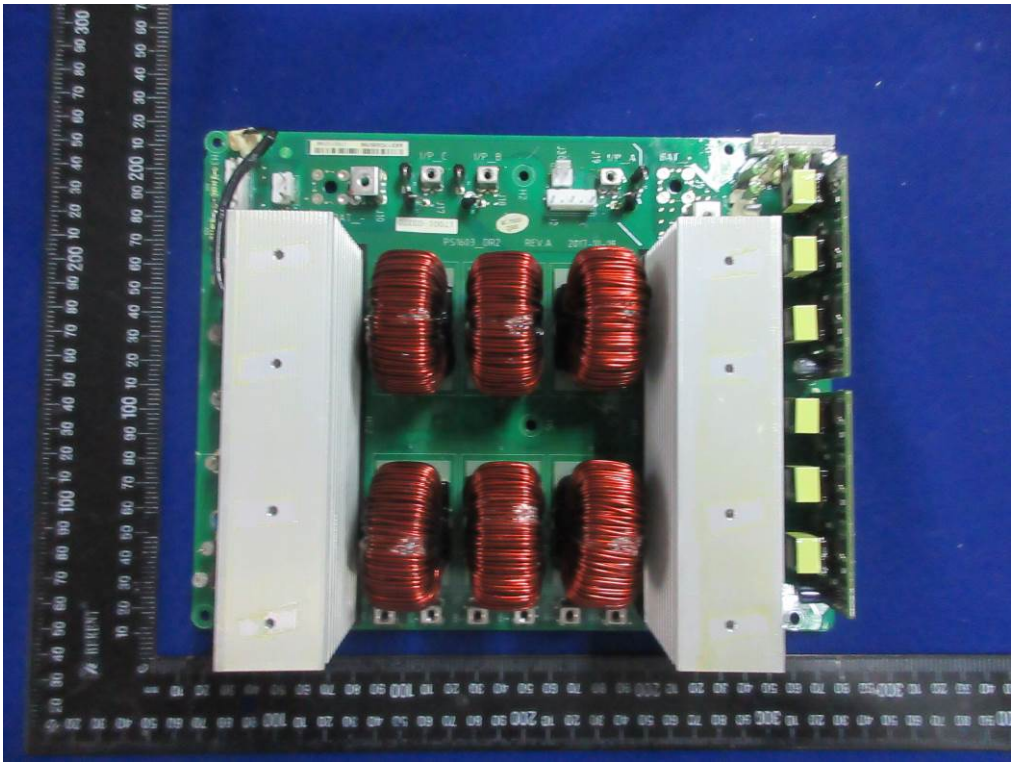


Figure 8: PCB component view

ATTACHMENT Photos

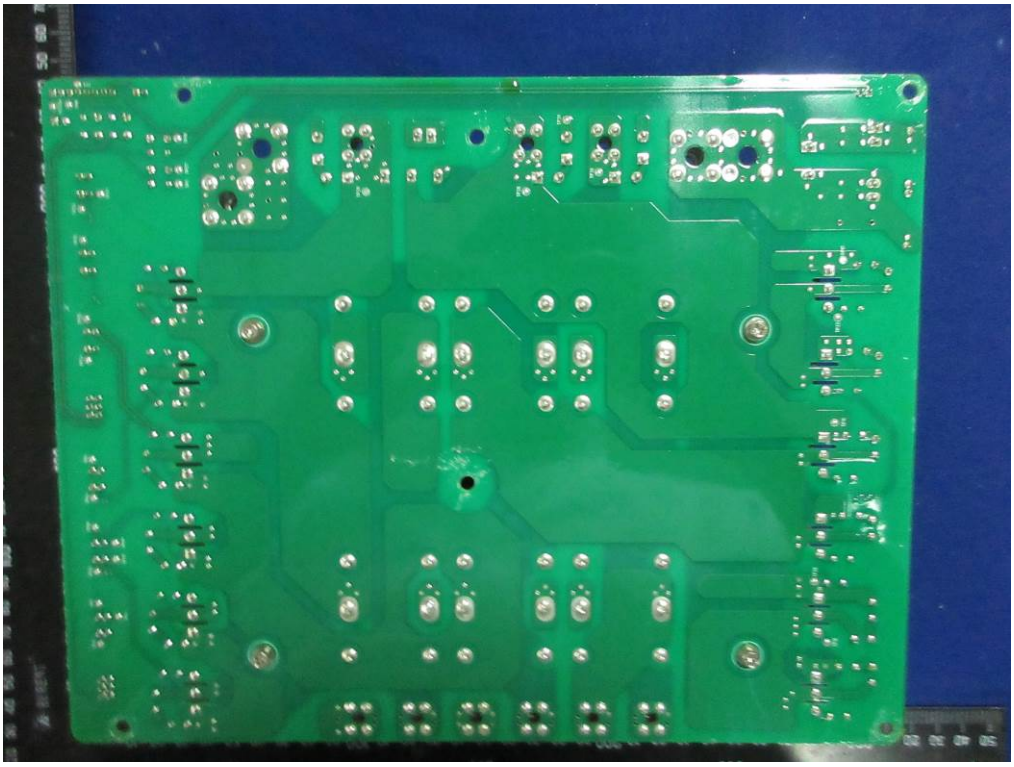


Figure 9: PCB trace view

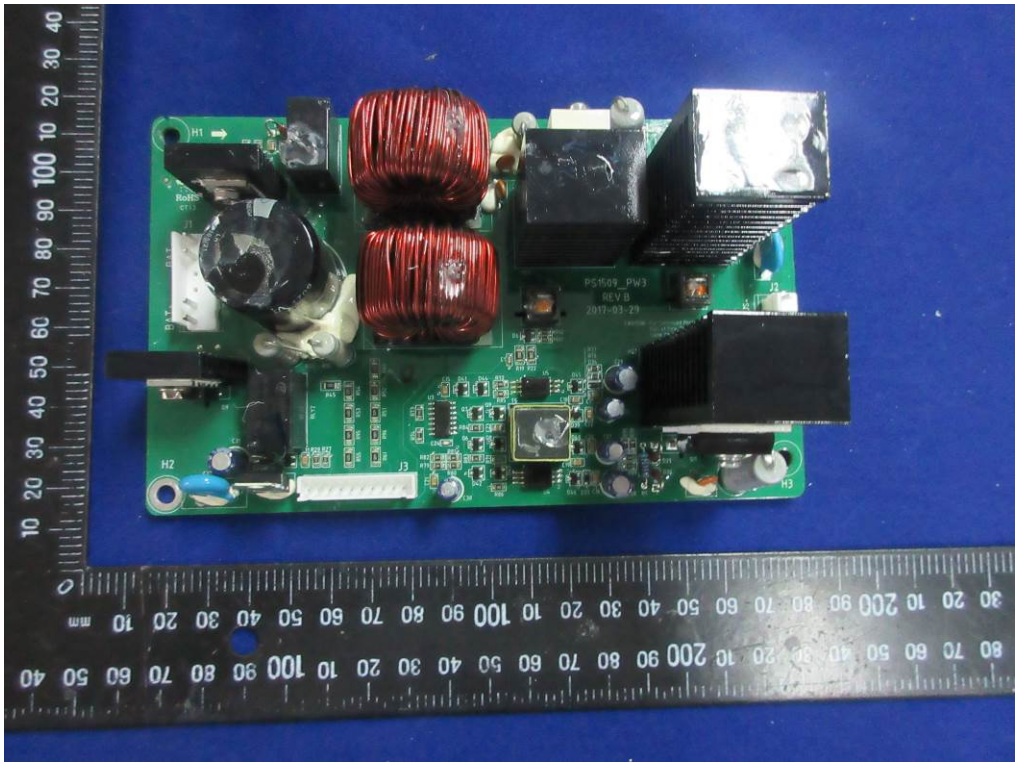


Figure 10: PCB component view

ATTACHMENT Photos

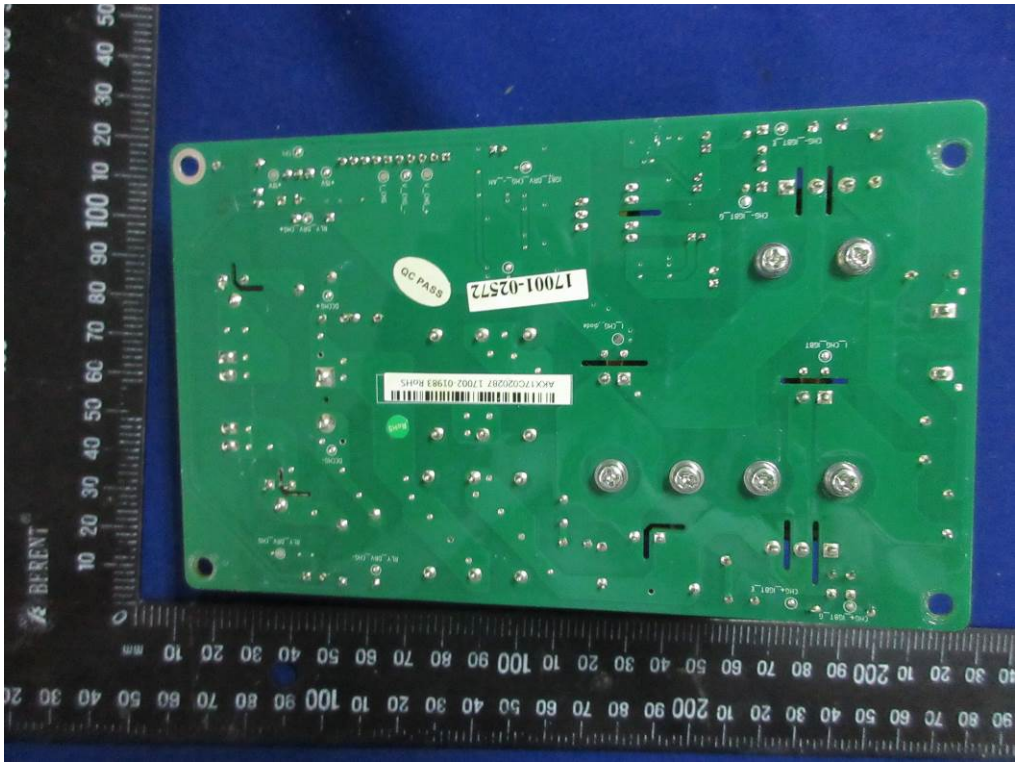


Figure 11: PCB trace view

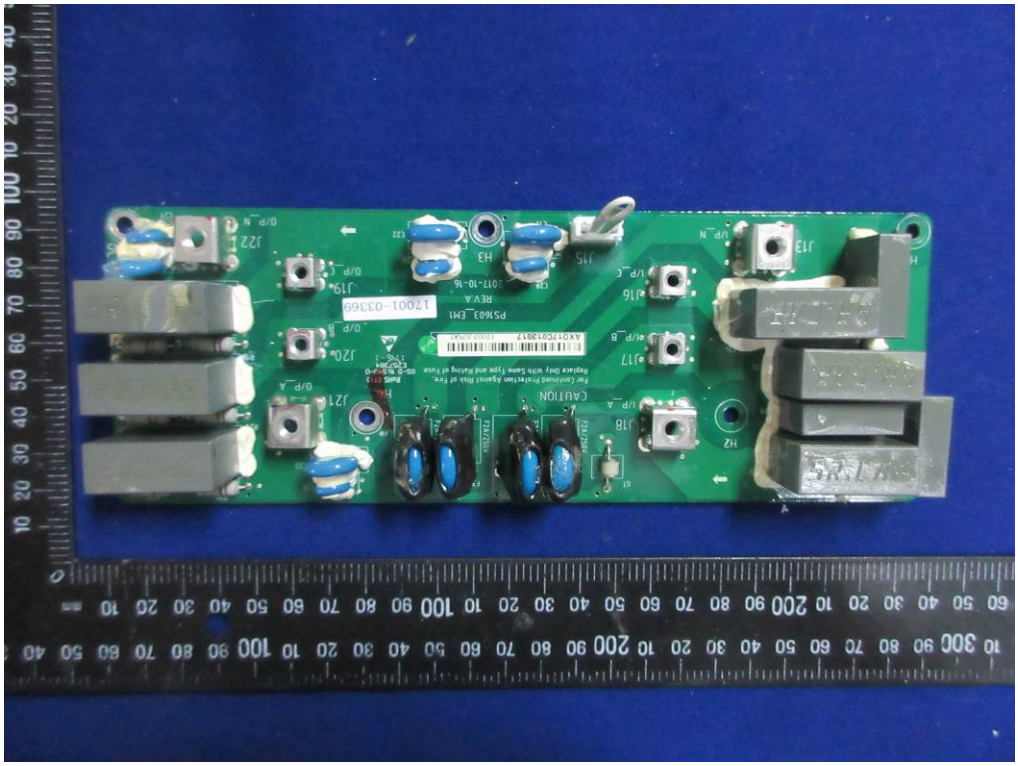


Figure 12: PCB component view

ATTACHMENT Photos

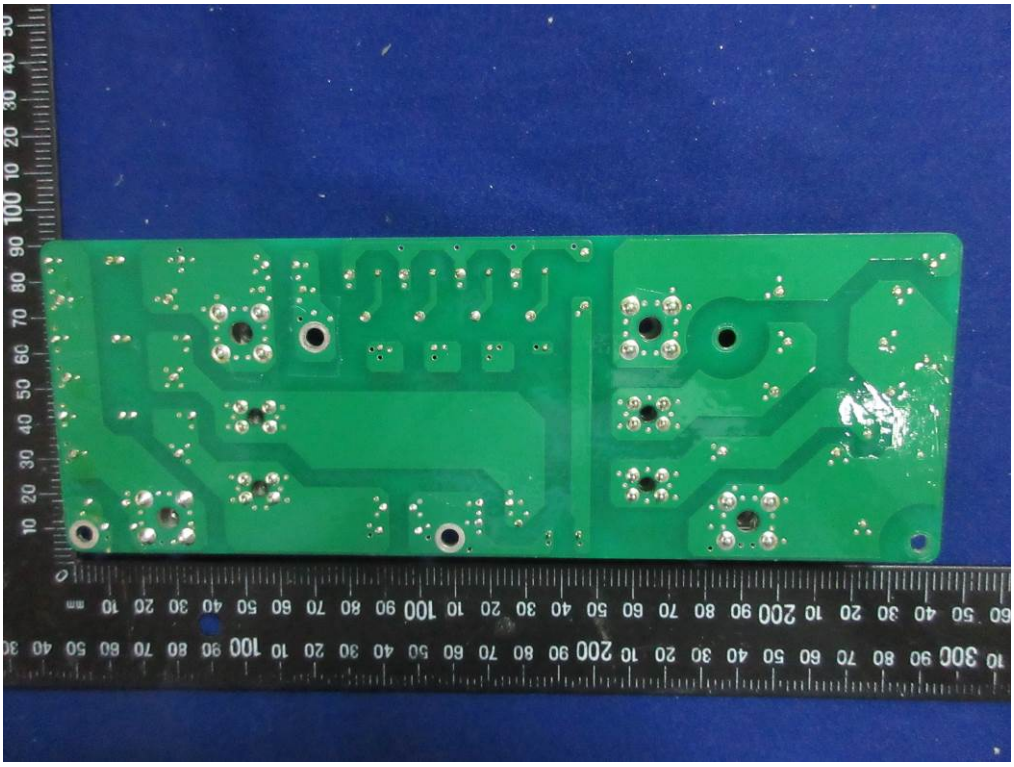


Figure 13: PCB trace view

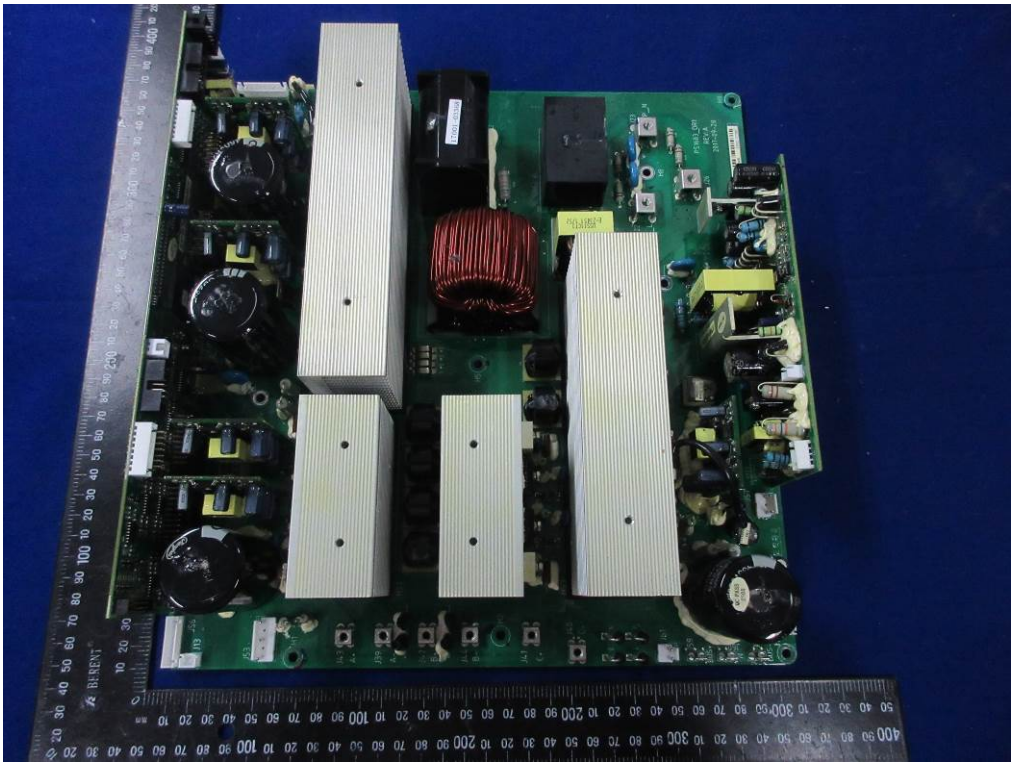


Figure 14: APS PCB component view

ATTACHMENT Photos

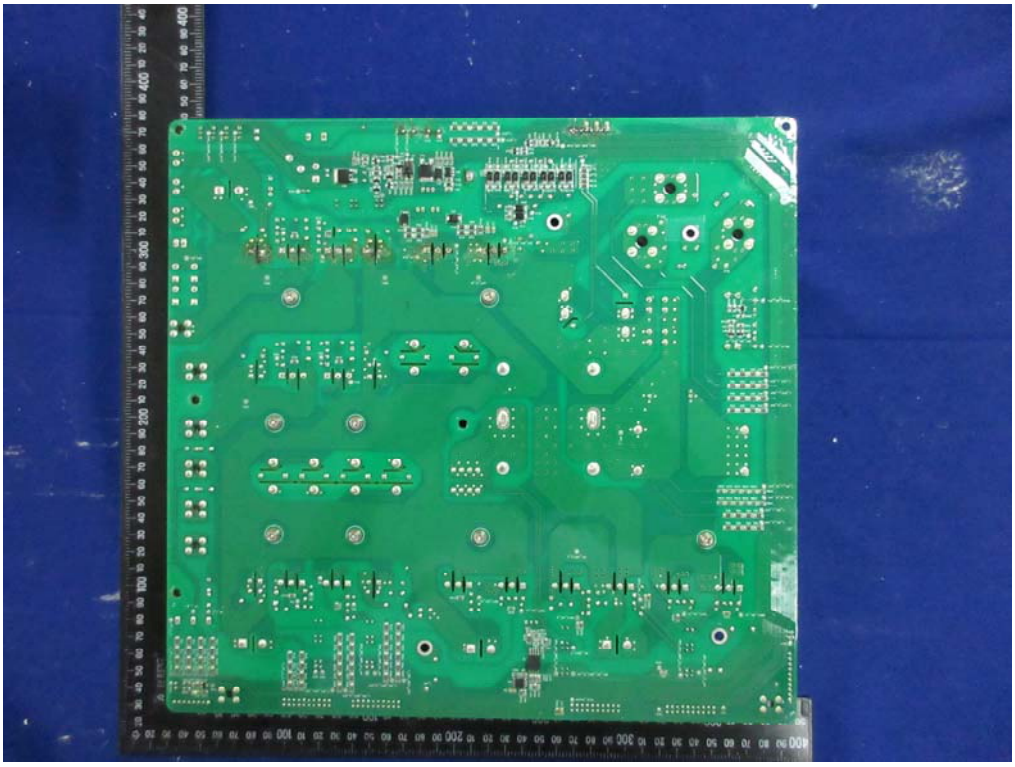


Figure 15: APS PCB trace view

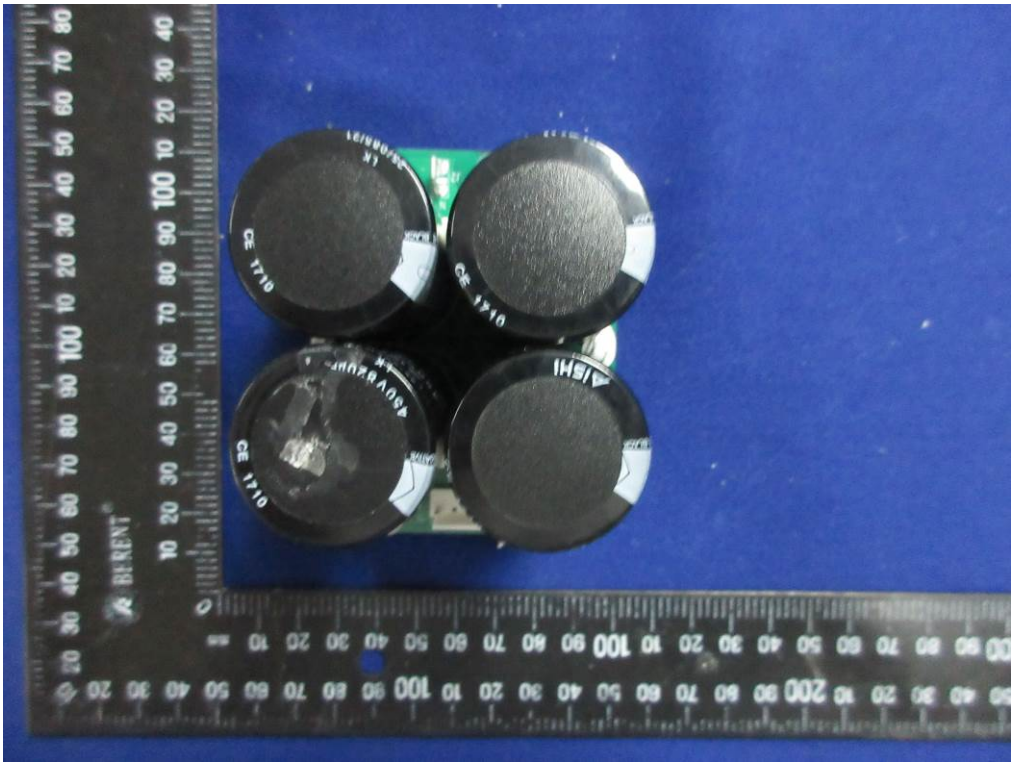


Figure 16: PCB component view

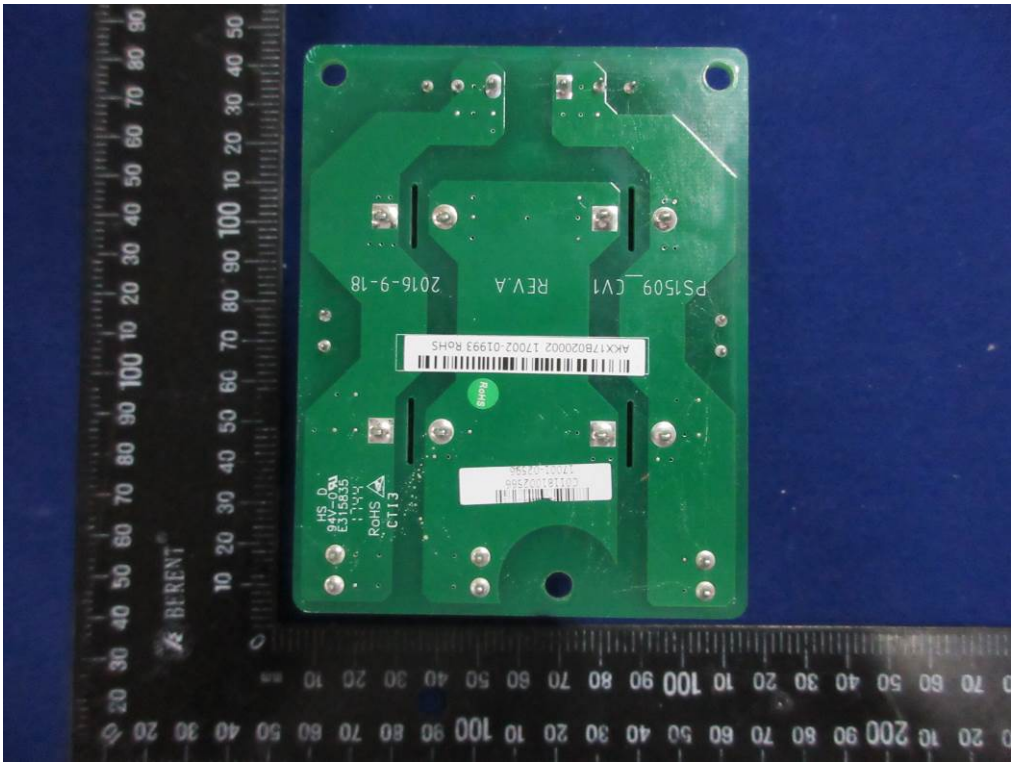


Figure 17: PCB trace view