APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model(s): HR1100.8L, HR1100.8S, HR1101L, HR1101S

Prepared For : **INVT POWER SYSTEM (SHENZHEN) CO., LTD**
5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen 518055, China

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TEST REPORT

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

Report Reference No.....:	ES160629002S
Compiled by (name + signature).....:	Gary Zhang
Approved by (name + signature).....:	William Guo
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Testing Laboratory .....:	EMTEK (Shenzhen) CO., LTD.
Address .....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location / address .....:	Same as above
Applicant's name.....:	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address .....:	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Test specification:	
Standard.....:	IEC 62040-1:2008 (First Edition) + Am 1:2013
Test procedure .....:	Compliance with IEC 62040-1:2008 (First Edition) + Am 1:2013
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62040_1A
Test Report Form(s) Originator.....:	TÜV Rheinland Japan Ltd.
Master TRF .....:	Dated 2014-01

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.

Test item description .....:	Uninterruptible Power Systems
Trade Mark.....:	INVT
Manufacturer .....:	INVT Power System (Shenzhen) Co., LTD
Address .....:	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Model/Type reference .....:	HR1100.8L,HR1100.8S,HR1101L,HR1101S
Ratings .....:	See the rating labels.

Test item particulars ..... :	
Equipment mobility ..... :	[X] movable [] stationary [] for building-in
Connection to the mains..... :	[] pluggable equipment [X] permanent connection [] detachable power supply cord [] non-detachable power supply cord
Operating 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 [] other:
Mains supply tolerance (%) or absolute mains supply values ..... :	200Vac(-10%), 240Vac(+10%) of input voltage considered
Tested for IT power systems ..... :	[x] Yes [] No
IT testing, phase-phase voltage (V) ..... :	N/A
Class of equipment ..... :	[X] Class I [] Class II [] Not classified
Considered current rating (A) ..... :	900A
Pollution degree (PD) ..... :	[] PD 1 [X] PD 2 [] PD 3
IP protection class ..... :	IP20
Altitude during operation (m) ..... :	Up to 2000
Altitude of test laboratory (m) ..... :	below 2000
Mass of equipment (kg) ..... :	>7Kg
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A N equal to 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:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(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.
Standard EN 62040-1:2008+A1:2013 is to be used in conjunction with EN 60950-1:2006, which is referred to in this TRF as "RD".

General product information:

This report is amended from previous report ES130130241S-2, dated January 24, 2014, due to below amendments:

- **Update standard: EN 62040-1:2008+A1:2013**
- **Updated LVD directive.**

1. The equipment is an on-line type of Uninterruptible Power Supply for general use with information

technology equipment.

2. The UPS is designed as primary, therefore, clearances, creepage distances and distances through insulation from input, output, control circuits to the RJ45/RS232 port of the PC interface are dimensioned for reinforced insulation and suitable distance through inulation. Therefore, the Optocoupler U8, U9, U10, U11 and U12 on COM PCB are reinforced insulation.

3. Model difference description:
All models are designed with same control logic and constructions. Unless otherwise stated, all tests were performed on model HR1101S which means the typical model.

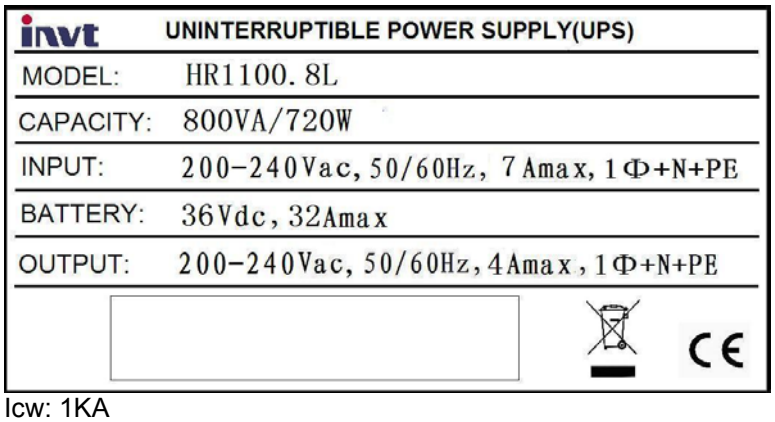
Summary of testing:

The product has been tested according to standard EN 62040-1: 2008.

- Tests performed on the bench
- Maximum ambient temperature: 40°C
- Tested for moderate conditions
- EUT is designed for altitudes not exceeding 2000 m.

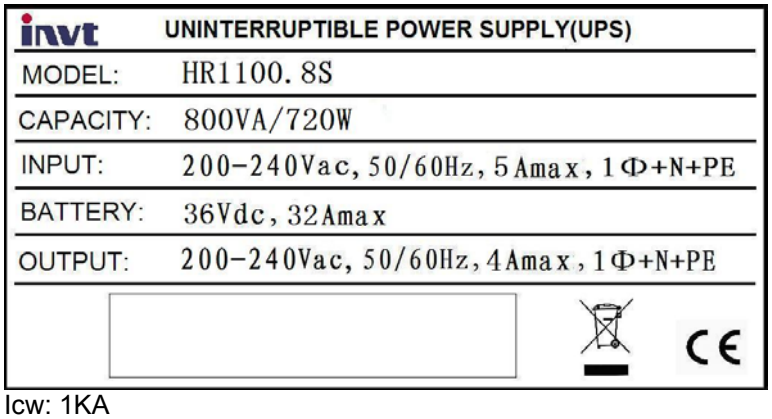
Copy of marking plate:

1. Rating label for model HR1100.8L:



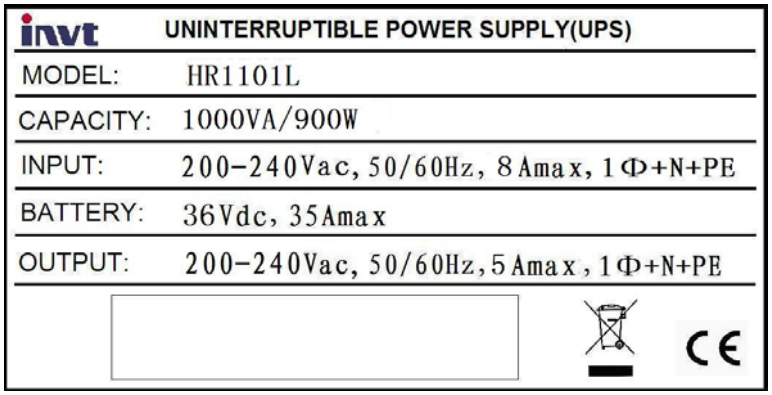
Icw: 1KA
Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx

2. Rating label for model HR1100.8S:



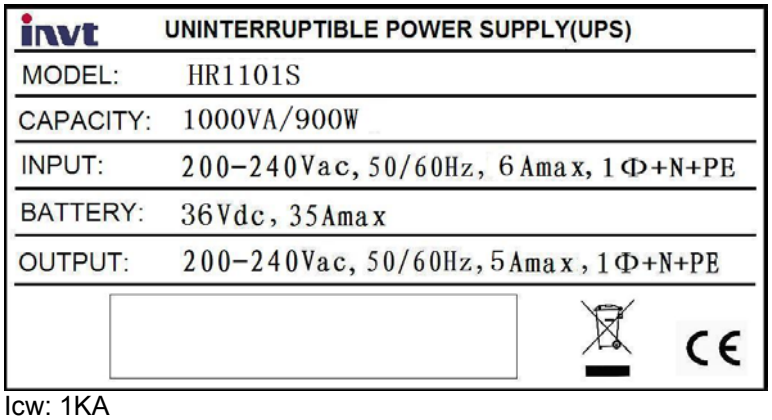
Icw: 1KA
Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx

3. Rating label for model HR1101L:



Icw: 1KA
Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx

4. Rating label for model HR1101L:



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Manufacturer: INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address: 5th Floor, 1#Building, Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx

5. Warning label on outer enclosures:

Caution:

- For operation read user manual including safety warnings first!
- This unit may be opened by authorized technicians only!
- Lead acid battery in the inside of the enclosure!
- The battery may present a risk of electric shock and energy hazards.
- Risk of explosion if battery replaced by an incorrect type. For battery information, see user's manual.
- For disposal instructions of the battery, see user's manual.
- See installation instructions before connecting to the supply.

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.3	Components		P
1.5.1/RD	General		
	Comply with IEC 62040-1 or relevant component standard	(see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 60950-1 and the relevant component standard. Components, for which no relevant IEC-standard exists, have been tested under the conditions occurring in the equipment, using applicable parts of IEC 60950-1.	P
1.5.3/RD	Thermal controls	No thermal control.	N
1.5.4/RD	Transformers	No safety isolating transformer.	N
1.5.5/RD	Interconnecting cables	The interconnecting cable to PC is carrying only SELV voltage on a low energy level.	P
1.5.6/RD	Capacitors bridging insulation	Between lines: X2 capacitor according to IEC 60384-14: 1993 with 21 days damp heat test was used.	P
1.5.7/RD	Resistors bridging insulation	Refer to below:	P
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation		P
1.5.7.2/RD	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	No resistors bridging double or reinforced insulation.	N
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	No antenna or coaxial cable.	N
1.5.8/RD	Components in equipment for IT power systems	230V considered, for Norway only	P
4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.6)	P
4.6 1.6.4/RD	Neutral conductor	Neutral is insulated from earth with basic insulation throughout the equipment. O/P neutral is not isolated from I/P neutral.	P

4.7	Marking and instructions		P
4.7.1	General	See below.	P
4.7.2 1.7.1/RD	Power rating	The required marking is located on the outside surface of the equipment.	P
	Input rated voltage/range (V) .....:	220-240Vac	P
	Input rated current/range (A).....:	See rating labels	P
	Input symbol for nature of supply (d.c.) .....:		P
	Input rated frequency/range (Hz) .....:	50/60Hz	P
	Number of Input phases and neutral.....:	1Φ with Neutral	P
	Output rated voltage/range (V) .....:	200/208/220/230/240VAC	P
	Output rated current/range (A) .....:	Not marked.	N
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current) .....:		N
	Number of output phases and neutral.....:	1Φ with Neutral	P
	Output rated active power (W) .....:	See rating label	P
	Output rated apparent power (VA) .....:	See rating label	P
	Output symbol for nature of supply (d.c.) .....:	No d.c. output.	N
	Output rated frequency/range (Hz) .....:	See rating label	P
	Ambient operating temperature range (°C).....:	0-40°C	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	Icw: 1KA	P
	Manufacturer's name or trademark or identification mark .....:	See rating label	P
	Type/model or type reference .....:	See rating label	P
	Symbol for Class II equipment only .....:	The equipment is Class I.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Other symbols .....:	The additional marking does not give rise to misunderstandings.	P
	Certification marks .....:	CE	P
	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" .....:	See caution label	P
4.7.3	Safety instructions	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
4.7.3.1	General	Considered	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 ...:	Instruction manual provided. Not for restricted access location.	P
	Permanent connector UPS .....:	Instruction manual provided.	P
	Pluggable type A or Pluggable type B UPS ....:	Pluggable equipment type A	P
4.7.3.3	Operation.....:	The suitable information list in the user manual when operate the UPS. Not for restricted access location.	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.....:	Not permanently connected UPS.	N
4.7.4 1.7.4/RD	Main voltage adjustment .....:	No voltage selector	N
	Methods and means of adjustment; reference to installation instructions .....:	No voltage selector	N
4.7.5 1.7.5/RD	Power outlets.....:	Relevant information provided on the marking that is affixed near the outlets.	P
4.7.6 1.7.6/RD	Fuse identification (marking, special fusing characteristics, cross-reference) ..... :	Same markings used for all models as below: Marking near holders for fuses: input breaker: 16A/250V Fuse on Charger board: F2: 10AH/250Vac and F3: 25AH/250Vac	P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1/RD	Protective earthing and bonding terminals .....:	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors	L, N symbol is marked near the AC inlet.	P
1.7.7.3/RD	Terminals for d.c. mains supply conductors	AC main supplied	N
4.7.8	Battery terminals :	The terminal of batteries is marked with standard symbol (IEC 60417, No. 5005 and No. 5006).	P
4.7.9 1.7.8/RD	Controls and indicators	See below	P
1.7.8.1/RD	Identification, location and marking :	The function of controls affecting safety is obvious without knowledge of language etc.	P
1.7.8.2/RD	Colours :	For LED provided, located on the front panel	P
1.7.8.3/RD	Symbols according to IEC 60417 :	The function switch is marked " " (IEC 60417-1 No. 5010).	P
1.7.8.4/RD	Markings using figures :	No controls affecting safety are using figures.	N
4.7.10 1.7.9/RD	Isolation of multiple power sources :	Only one external supply of hazardous voltage of energy (via appliance inlet).	N
4.7.11 1.7.2.4/RD	IT power systems	For 230V IT power system only	P
4.7.12	Protection in building installation	The protection does not rely upon building installation. The protection is provided by input fuse used in AC inlet.	P
	Rated short-time withstand current (*I*cw) .....:	The protection does rely upon building installation.	P
	Rated conditional short circuit current (*I*cc) .....:	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P
	a) If higher Icp stated ≤ 10 kA		N
	a) If higher Icp stated > 10 kA		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.13 5.1/RD	High leakage current (mA) .....:	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) .....:	Instructions and markings shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	P
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 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking of 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 such parts.	N
4.7.18 1.7.13/RD	Replaceable batteries	The battery is not placed in an operator access area. The required warning is in the safety manual.	P
	Language(s) .....:	Instructions and markings are in English.	
4.7.19 1.7.2.5/RD	Operator access with a tool.....:	No operator accessible area that needs to be accessed by the use of a tool.	N
4.7.20	Battery	Pluggable equipment type A UPS with integral batteries.	P
	Clearly legible information .....:	Warning label attached on the outside surface of External battery pack. Information clearly legible	P
	Battery type .....:	Lead-Acid	P
	Nominal voltage of total battery (V) .....:	Stated on rating user's manual.	P
	Nominal capacity of total battery (optional) .....:	Stated on rating user's manual.	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Warning label .....:	Warning language with information: Caution: Lead-acid battery inside the enclosure, it may cause chemical hazard. The battery may present a risk of electric shock and energy hazards. For disposal instructions for the battery, see user's manual.	P
	Instructions .....:	The sufficient information about the battery was given in the user's manual.	P
2.1.1.5/RD	Protection against energy hazards	No energy hazard in operator access area. Checked by means of the test finger.	P
4.7.21 1.7.2.4/RD	Installation instructions	Detailed information regarding external interfaces (TNV circuit, TVSS port) and modem / phone line connection) 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	Refer below:	P
2.1.1.1/RD	Access to energized parts	There is adequate protection against operator contact with bare parts at ELV or hazardous voltage or parts separated from these with basic or functional insulation only (except protective earth). No hazardous voltages exceeding 1000V a.c. or 1500V d.c. Checked by test finger, test probe and test pin.	P
	Test by inspection :	Complies	P
	Test with test finger (Figure 2A) :	Complies	P
	Test with test pin (Figure 2B) :	Complies	P
	Test with test probe (Figure 2C) :	No TNV circuits	N
2.1.1.2/RD	Battery compartments	Inside the battery compartment only primary circuits.	N
2.1.1.3/RD	Access to ELV wiring	No internal wiring at ELV accessible to the operator.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No operator accessible hazardous voltage circuit wiring.	N
2.1.1.5/RD	Energy hazards :	The user accessible TVS Sand TNV phone line ports are isolated from the hazardous energy level of the battery inside the UPS.	P
2.1.1.6/RD	Manual controls	Operator only has access to bare parts of SELV circuits.	P
2.1.1.7/RD	Discharge of capacitors in equipment	The capacitance of the input circuits>0.1uF, refer to list of critical components.	P
	Measured voltage (V); time-constant (s) :	(See appended table 5.1.1)	--
2.1.1.8/RD	Energy hazards – d.c. mains supply	The equipment is not connected to d.c. mains supply	N
	a) Capacitor connected to the d.c. mains supply :		N
	b) Internal battery connected to the d.c. mains supply :		N
2.1.1.9/RD	Audio amplifiers :	No such parts.	N
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas	Checked by inspection, unintentional contact is unlikely during service operations.	N
	Hazardous energy level		N
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas		N
	Hazardous energy level		N
5.1.4	Backfeed protection		—
	Shock hazard after de-energization of a.c. input for UPS	No shock hazard	P
	Measured voltage (V); time-constant (s) :	(see appended table 5.8)	P
	Description of the construction:	Backfeed protection provided by relay RLY2 plus corresponding control circuit. The relay provides a contact gap of 3.0 mm minimum between each contact gap. The backfeed protection circuit works reliably in normal and single-fault condition.	P
	Air gap is employed for backfeed protection	Not mandatory for pluggable UPS.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.5	Emergency switching device	Not mandatory for pluggable UPS.	N
5.2	Requirements for auxiliary circuits		P
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV	See below:	P
2.2.1/RD	General requirements	SELV limits are not exceeded under normal condition.	P
2.2.2/RD	Voltages under normal conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P
2.2.4/RD	Connection of SELV circuits to other circuits .. :	SELV circuits are only connected to other SELV and protective earth.	P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	Refer below:	N
2.3.1/RD	Limits	No TNV circuits, cl. 2.3/RD	N
	Type of TNV circuits :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed :		
2.3.5/RD	Test for operating voltages generated externally		N
5.2.3 2.4/RD	Limited current circuits	No limited current circuits, cl. 2.4/RD.	N
2.4.1/RD	General requirements		N
2.4.2/RD	Limit values		
	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

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2.4 3.5/RD	External signalling circuits	Refer to below:	P
3.5.1/RD	General requirements	Considered.	P
3.5.2/RD	Types of interconnection circuits :	SELV circuits.	P
3.5.3/RD	ELV circuits as interconnection circuits	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment	A data port (RJ45 and RS232) is signal port only, no test required.	N
5.2.5 2.5/RD	Limited power source	No limited power source.	N
	a) Inherently limited output		N
	b) Impedance limited output		N
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. Output voltage (V), max. Output current (A), max. apparent power (VA) ..... :		N
	Current rating of overcurrent protective device (A)		N
	Use of integrated circuit (IC) current limiters		N

5.3	Protective earthing and bonding		P
5.3.1	General	See below.	P
2.6/RD	Provisions for earthing and bonding	See below.	P
2.6.1/RD	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal (via green/yellow insulated wires).	P
2.6.2/RD	Functional earthing	No functional earthing.	N
2.6.3/RD	Protective earthing and protective bonding conductors		P
2.6.3.1/RD	General	Compliance checked.	P
2.6.3.2/RD	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG :	(see appended tabel 4.5)	P
2.6.3.3/RD	Size of protective bonding conductors	Refer to 2.6.3.4/RD.	P
	Rated current (A), cross-sectional area (mm^2), AWG :	Refer to 2.6.3.4/RD.	—
	Protective current rating (A), cross-sectional area (mm2), AWG :	Refer to 2.6.3.4/RD.	—
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

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Clause	Requirement + Test	Result - Remark	Verdict
2.6.3.5/RD	Colour of insulation :	All insulated protective earth conductors are used colored green and yellow.	P
2.6.4/RD	Terminals	See below.	P
2.6.4.1/RD	General	See below.	P
2.6.4.2/RD	Protective earthing and bonding terminals	Adequate protective earth connection, see also Sub-clause 2.6.3.4/RD and 3.3/RD	P
	Rated current (A), type, nominal thread diameter (mm) :		—
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Separate PE and protective bonding conductor used.	N
2.6.5/RD	Integrity of protective earthing	See below.	P
2.6.5.1/RD	Interconnection of equipment	The unit has its own earthing connection. PE terminals of outlets reliably connected to PE terminal of unit	P
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3/RD	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains	P
2.6.5.4/RD	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
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	No risk of corrosion	P
2.6.5.7/RD	Screws for protective bonding	No such screw	N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system	Protective earthing is not rely on cable distribution system.	N
5.3.2 2.6.1/RD	Protective earthing	Accessible conductive parts are reliably connected to protective earth terminal	P
2.10/RD	Clearances, creepage distances and distances through insulation	See clause 5.7	P
4.2/RD	Mechanical strength	See clause 7.3	P
5.2/RD	Electric strength	See clause 8.2	P
5.3.3	Protective bonding	Refer also to 2.6.3.4/RD	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.4	AC and d.c. power isolation		P
5.4.1	General	Only one external supply of hazardous voltage or energy	P
3.4/RD	Disconnection from the mains supply	Plug used disconnect device.	P
3.4.1/RD	General requirement	Considered	P
3.4.2/RD	Disconnect devices		P
3.4.3/RD	Permanently connected equipment		N
3.4.4/RD	Parts which remain energized	Adequate protection provided to service personnel during backup and maintenance mode.	P
3.4.5/RD	Switches in flexible cords	No such construction.	N
3.4.6/RD	Number of poles - single-phase and d.c. equipment	The plug / appliance inlet and coupler disconnected both poles simultaneously.	P
3.4.7/RD	Number of poles - three-phase equipment	Single-phase only.	N
3.4.8/RD	Switches as disconnect devices		N
3.4.9/RD	Plugs as disconnect devices		N
3.4.10/RD	Interconnected equipment	SELV circuits connect only to SELV circuits and Hazardous Voltage circuits to Hazardous circuits.	P
3.4.11/RD	Multiple power sources		N
5.4.2	Disconnect devices	Refer to cl. 3.4.2/RD.	N
5.5	Overcurrent and earth fault protection		P
5.5.1	General	See below.	P
2.7.3/RD	Short-circuit backup protection	Pluggable equipment with type A. Building installation is considered as providing short circuit backup protection.	P
2.7.4/RD	Number and location of protective devices …….:	Over current protection by one built-in input fuse. Protection devices in the building installation considered as providing sufficient protection against earth faults.	P
2.7.5/RD	Protection by several devices	Only one protective device provided.	P
2.7.6/RD	Warning to service personnel :	No double-pole fusing inside this pluggable equipment type A UPS.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.2	Basic requirements	Equipment relies on circuit breaker of the wall outlet installation protection of the building installation in regard to L, N short circuit and for L to PE earth fault. Over current protection is provided by the built-in device breaker.	P
5.5.3	Battery circuit protection	Ungrounded batteries inside the UPS. Protection against overcurrent by three fuses in parallel in the plus pole of the battery supply circuit of the UPS or battery cabinet.	P
5.5.3.1	Overcurrent and earth fault protection	See below.	P
5.5.3.2	Location of protective device	The fuses are directly located behind the supply wire of the battery. The charger circuit is located in the battery circuit before the fuses. For the charger circuit there are no hazardous conditions under any simulated fault conditions. See appended table.	P
5.5.3.3	Rating of protective device	The rating of the fuses inside the UPS provides adequate safety protection during abnormal and/or fault conditions.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current		P
5.5.4.1	General		P
5.5.4.2	Modes of operation		P
5.5.4.3	Test procedure		P
5.5.4.3.1	General application		P
	Rated UPS output current/(r.m.s) (A) ..... :	See product specification	P
	Prospective test current/(r.m.s) (A) ..... :	See product specification	P
	Typical power factor ..... :	See product specification	P
	Initial asymmetric peak current ration (*I*pk / *I*cw) . :	Icw: 1KA	P
	Minimum durating of prospective test current (cycles 50/60 Hz) ..... :	50Hz	P
5.5.4.3.2	Exemption from testing		P

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Clause	Requirement + Test	Result - Remark	Verdict

5.6	Protection of personnel – Safety interlocks *(No safety interlock provided for operator protection since there are no liable hazards capable of harming the operator during operation).*		P
5.6.1	Operator protection	See below	N
2.8/RD	Safety interlocks	No safety interlocks.	N
2.8.1/RD	General principles		N
2.8.2/RD	Protection requirements		N
2.8.3/RD	Inadvertent reactivation		N
2.8.4/RD	Fail-safe operation		N
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches and relays		N
2.8.7.1/RD	Contact gaps (mm) :		N
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection	See below.	P
5.6.2.1	Introduction	Considered	P
5.6.2.2	Covers	It is unlikely that during the removal of any covers service personnel may touch hazardous voltage or energy.	P
5.6.2.3	Location and guarding of parts	Only the exchange of the battery is considered as possible servicing. A risk of injury is unlikely for the service personnel.	P
5.6.2.4	Parts on doors	The UPS is designed with only screwed enclosure parts.	P
5.6.2.5	Component access	No component access during operation mode necessary.	N
2.8.3/RD	Inadvertent reactivation	No servicing in operation mode necessary.	N
5.6.2.6	Moving parts	No hazardous moving parts.	N
5.6.2.7	Capacitor banks	The capacitors provided can produce energy level way below 20 joules.	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.2.8	Internal batteries	The terminals of the battery connections are isolated and covered so that it is unlikely to bridge the terminals of the battery during servicing or its replacement.	P
5.7 2.10/RD	Clearances, creepage distances and distances through insulation		P
2.10.1/RD	General	See below.	P
2.10.1.1/RD	Frequency ..... :	Considered.	P
2.10.1.2/RD	Pollution degrees ..... :	II	P
2.10.1.3/RD	Reduced values for functional insulation	The functional insulations comply with 5.3.4/RD a) and c)	N
2.10.1.4/RD	Intervening unconnected conductive parts	Considered.	N
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6/RD	Special separation requirements	No TNV	N
2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit generating starting pulses.	N
2.10.2/RD	Determination of working voltage	(See appended table 5.7)	P
2.10.2.1/RD	General	The rms and the peak voltage were measured with unit connected to a 240V 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.	P
2.10.3.1/RD	General	See below.	P
2.10.3.2/RD	Mains transient voltages	See below.	P
	a) AC mains supply ..... :	Equipment is Overvoltage Category II.	P
	b) Earthed d.c. mains supplies ..... :	Not intended for d.c. mains supplies	N
	c) Unearthed d.c. mains supplies :	Not intended for d.c. mains supplies	N
	d) Battery operation :	Dedicated battery used.	P
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.3.5/RD	Clearances in circuits having starting pulses	No such circuit generating starting pulses.	N
2.10.3.6/RD	Transients from a.c. mains supply :	Considered.	P
2.10.3.7/RD	Transients from d.c. mains supply :	Not connected to d.c. mains supply.	N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :	No TNV circuits	N
2.10.3.9/RD	Measurement of transient voltage levels	Measurement not relevant	N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	
2.10.4.3/RD	Minimum creepage distances	(see appended table 5.7)	P
2.10.5 /RD	Solid insulation	Considered.	P
2.10.5.1/RD	General	See below.	P
2.10.5.2/RD	Distances through insulation	(see appended table 5.8)	P
2.10.5.3/RD	Insulating compound as solid insulation	Approved opto-couplers, see appended table 4.5	P
2.10.5.4/RD	Semiconductor devices	Approved optocoupler complies to IEC 60747-5-2 with dti≥0.4mm used.	P
2.10.5.5/RD	Cemented joints		N
2.10.5.6/RD	Thin sheet material – General	See below.	P
2.10.5.7/RD	Separable thin sheet material	Used in transformer and over heatsink	P
	Number of layers (pcs).		—
2.10.5.8/RD	Non-separable thin sheet material	Not used.	N
2.10.5.9/RD	Thin sheet material – standard test procedure		N
2.10.5.10 /RD	Thin sheet material – (Alternative) test procedure		—
	Electric strength test		N
2.10.5.11 /RD	Insulation in wound components		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.5.12 /RD	Wire in wound components	Triple insulated wiring is not used for supplementary or reinforced insulation.	N
	Working voltage :	No wound components.	N
	a) Basic insulation not under stress :		—
	b) Basic, supplementary, reinforced insulation :		N
	c) Compliance with Annex U :		N
	Two wires in contact inside wound component; angle between 45º and 90º :		N
2.10.5.13 /RD	Wire with solvent-based enamel in wound components		N
	Electric strength test	No wire with solvent-based enamel in wound components.	N
	Routine test	(see appended table 8.2)	—
2.10.5.14 /RD	Additional insulation in wound components		N
	Working voltage :	No additional insulation used.	N
	- Basic insulation not under stress :		—
	- Supplementary, reinforced insulation :		N
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 such part.	N
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board	No such part.	N
2.10.6.4/RD	Insulation between conductors on different layers of a printed board	No such part.	N
	Distance through insulation	PCB layout does not serve as insulation barrier.	N
	Number of insulation layers (pcs) :		N
2.10.7/RD	Component external terminations	No such part.	N
2.10.8/RD	Tests on coated printed boards and coated components	No such part.	N
2.10.8.1/RD	Sample preparation and preliminary inspection	No such part.	N
2.10.8.2/RD	Thermal conditioning		N
2.10.8.3/RD	Electric strength test		N
2.10.8.4/RD	Abrasion resistance test		—
2.10.9/RD	Thermal cycling		N
2.10.10/RD	Test for Pollution Degree 1 environment and insulating compound	Pollution Degree 2	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.11/RD	Tests for semiconductor devices and cemented joints	Approved optocoupler used. No other parts to be tested.	P
2.10.12/RD	Enclosed and sealed parts	No hermetically sealed component.	N
6	Wiring, connections and supply		P
6.1	General	Considered.	P
6.1.1	Introduction	Considered.	P
3.1/RD	General	See below.	P
3.1.1/RD	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring and interconnecting cables.	P
3.1.2/RD	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3/RD	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4/RD	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5/RD	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6/RD	Screws for electrical contact pressure	Electrical and earthing connections screwed two or more complete threads into metal. No screws of insulating material for electrical and earthing connections, or where supplementary or reinforced insulation could be impaired by a metal replacement.	P
3.1.7/RD	Insulating materials in electrical connections	All current carrying and safety earthing connections are metal to metal.	P
3.1.8/RD	Self-tapping and spaced thread screws	Self-tapping screws provided in inverter circuit and earthing bonding.	P

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.9/RD	Termination of conductors	All conductors are reliable secured by the use of solder pins or glue or other mechanical fixing means. No risk of stranded conductors coming loose.	P
	10 N pull test	Considered	P
3.1.10/RD	Sleeving on wiring	Sleeves can only be removed by breaking or cutting.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections		N
3.2.3/RD	Permanently connected equipment	Pluggable equipment type A	N
	Number of conductors, diameter of cable and conduits (mm) ..... :		—
3.2.4/RD	Appliance inlets	The appliance inlet complies with IEC 60320-1 or other national standards. The power cord can be inserted without difficulties and does not support the unit.	P
3.2.5/RD	Power supply cords	See below.	P
3.2.5.1/RD	AC power supply cords	Approved power cord set with suitable electrical ratings for use in the UPS.	P
	Type ..... :	PVC insulated power cord type H05VV-F or IEC 60227 (designation 60227 IEC 53	—
	Rated current (A), cross-sectional area (mm²), AWG ..... :		—
3.2.5.2/RD	DC power supply cords	Not used.	N
3.2.6/RD	Cord anchorages and strain relief		N
	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. Enclosure without sharp edges.	P
3.2.8/RD	Cord guards		N
	Diameter or minor dimension D (mm); test mass (g) ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Radius of curvature of cord (mm)..... :		—
6.2.2	Means of connection :	Appliance inlet.	P
	More than one supply connection :	Single voltage range supply connection.	N
6.3	Wiring terminals for external power conductors *(No wiring terminals for external power conductors)*		N
3.3/RD	Wiring terminals for connection of external conductors		N
3.3.1/RD	Wiring terminals		N
3.3.2/RD	Connection of non-detachable power supply cords		N
3.3.3/RD	Screw terminals		N
3.3.4/RD	Conductor sizes to be connected		N
	Rated current (A), cord/cable type, cross-sectional area (mm2) ..... :		N
3.3.5/RD	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) ..... :		—
3.3.6/RD	Wiring terminal design		N
3.3.7/RD	Grouping of wiring terminals		N
3.3.8/RD	Stranded wire		N
7	Physical requirements		P
7.1	Enclosure	Adequate protection against risk of fire, electric shock, injury to persons and hazardous energy level.	P
7.2 4.1/RD	Stability		P
	Angle of 10	All models of the UPS do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) :		N
7.3 4.2/RD	Mechanical strength		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.1/RD	General	Tests performed and passed. Results see below. After the tests, unit complied with the requirements of sub-clauses 2.1.1/RD, 2.6.1/RD, 2.10/RD and 4.4.1/RD.	P
4.2.2/RD	Steady force test, 10 N	10 N applied to components.	P
4.2.3/RD	Steady force test, 30 N		N
4.2.4/RD	Steady force test, 250 N	No hazard. The test is performed on all sides of enclosure.	P
4.2.5/RD	Impact test	See below.	P
	Fall test	No hazard as result from the steel sphere fall test.	P
	Swing test	No hazard as result from the steel sphere swing test.	P
4.2.6/RD	Drop test; height (mm):	Drop test not applicable	N
4.2.7/RD	Stress relief test	Test is carried out at 70°C / 7h. No risk of shrinkage or distortion on enclosures due to release of internal stresses.	P
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment.	N
	Picture tube separately certified :		—
4.2.9/RD	High pressure lamps	No high pressure lamps in the equipment.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N) :	No wall or ceiling mounted equipment	N

7.4	Construction details		P
7.4.1	Introduction	Considered.	P
4.3.1/RD	Edges and corners	All edges and corners are rounded and/or smoothed.	P
4.3.2/RD	Handles and manual controls; force (N) ..... :	No handles	N
4.3.3/RD	Adjustable controls	No hazardous adjustable controls.	P
4.3.4/RD	Securing of parts	No loosening of parts impairing creepage distances or clearances is likely to occur.	P
4.3.5/RD	Connection by plugs and sockets	No mismatch of connectors, plugs or sockets possible.	P
4.3.7/RD	Heating elements in earthed equipment	No heating elements provided.	N
4.3.11/RD	Containers for liquids or gases	The equipment does not contain flammable liquids or gases.	N

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Clause	Requirement + Test	Result - Remark	Verdict
4.4/RD	Protection against hazardous moving parts		P
4.4.1/RD	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2/RD	Protection in operator access areas :	See 4.4.1	P
4.4.3/RD	Protection in restricted access locations :	Not for restricted access locations.	N
4.4.4/RD	Protection in service access areas	See 4.4.1	P
4.4.5/RD	Protection against moving fan blades	Considered	P
4.4.5.1/RD	General	See below.	P
	Not considered to cause pain or injury. a) ..... :	(See appended table 7.7)	P
	Is considered to cause pain, not injury. b) ..... :		N
	Considered to cause injury. c) ..... :		N
4.4.5.2	Protection for users	(See appended table 7.7)	P
	Use of symbol or warning ..... :		N
4.4.5.3	Protection for service persons	(See appended table 7.7)	P
	Use of symbol or warning ..... :		N
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L :		
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 :		P
7.4.2	Openings	(See appended table 7.4.2)	P
7.4.3	Gas Concentration	The ventilation by openings exceeds the required airflow. Refer to Annex M.	P
7.4.4	Equipment movement		N
7.5 4.7/RD	Resistance to fire		P
4.7.1/RD	Reducing the risk of ignition and spread of flame	Use of materials with the required flammability classes	P
	Method 1, selection and application of components wiring and materials	Method 1 is used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Method 2, application of all of simulated fault condition tests		N
4.7.2/RD	Conditions for a fire enclosure	See below.	P
4.7.2.1/RD	Parts requiring a fire enclosure	Will having the following parts: Components in primary The fire enclosure is required.	P
4.7.2.2/RD	Parts not requiring a fire enclosure	The fire enclosure is required to cover all parts.	N
4.7.3/RD	Materials	See below.	P
4.7.3.1/RD	General	PCB rated V-0. See appended table.	P
4.7.3.2/RD	Materials for fire enclosures	Metal enclosure. (See appended table 4.3)	P
4.7.3.3/RD	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	N
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	Internal components except small parts are V-2, HF-2 or better.	P
4.7.3.5/RD	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6/RD	Materials used in high-voltage components	No parts exceeding 4kV.	N

7.6	Battery location		P
7.6.1	Battery location and installation	Batteries are located inside the UPS enclosure.	P
7.6.2	Accessibility and maintainability	Maintenance free battery. The battery is connected by quick connect terminals (no necessary tightening).	P
7.6.3	Distance	The temperature of the electrolyte and the gas emission are within the limits of this standard.	P
7.6.4	Case insulation	No Ni-Cd battery used inside.	N
7.6.5	Wiring	The protection of connecting wiring complies with sub clause 6, details see there.	P
7.6.6	Electrolyte spillage	Sealed maintenance free battery, the emission of electrolyte is unlikely.	P
7.6.7	Ventilation	Comply with Annex M.2	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.6.8	Charging voltage	Protective circuit to prevent excessive charging voltages occurring under any single fault condition. See sub-clause 8.3	P
7.7	Temperature rise		P
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L ..... :		—
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
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General	Test conducted in accordance with Sub-clause 8.1	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		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	Considered.	P
5.3.1/RD	Protection against overload and abnormal operation	(See appended table 8.3)	P
5.3.2/RD	Motors	No motors	N
5.3.3/RD	Transformers	No isolating transformer.	N
5.3.4/RD	Functional insulation :	Complies with a) and c).	P
5.3.5/RD	Electromechanical components	No electromechanical components in secondary circuits.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	No fire or molten metal occurred and no deformation of enclosure during the tests. No reduction of clearance and creepage distances. Electric strength test is made on basic, supplementary and reinforced insulation.	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	(See appended table 8.3)	P
8.3.3	Conditions for tests	(See appended table 8.3)	P
9 6/RD	Connection to telecommunication networks		P
6.1/RD	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1/RD	Protection from hazardous voltages		N
6.1.2/RD	Separation of the telecommunication network from earth		N
6.1.2.1/RD	Requirements		N
	Supply voltage (V) ..... :		
	Current in the test circuit (mA) ..... :		
6.1.2.2/RD	Exclusions ..... :		N
6.2/RD	Protection of equipment users from overvoltages on telecommunication networks		P
6.2.1/RD	Separation requirements		N
6.2.2/RD	Electric strength test procedure		N
6.2.2.1/RD	Impulse test		N
6.2.2.2/RD	Steady-state test		N
6.2.2.3/RD	Compliance criteria		N
6.3/RD	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A) ..... :		
3.5/RD	Interconnection of equipment		P
3.5.1/RD	General requirements	This power supply is not considered for connection to TNV.	P
3.5.2/RD	Types of interconnection circuits ..... :	Interconnection circuits of SELV through the connector. No ELV interconnection circuits.	P
3.5.3/RD	ELV circuits as interconnection circuits		N

N

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Clause	Requirement + Test	Result - Remark	Verdict
3.5.4/RD	Data ports for additional equipment	Data ports (RJ45 and USB) is signal port only, no test required.	N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits ..... :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions ..... :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed ..... :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed ..... :		
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.4/RD	Creepage distances		P
2.10.4.1/RD	General		P
2.10.4.2/RD	Material group and comparative tracking index		P
	CTI tests ..... :		
2.10.4.3/RD	Minimum creepage distances		P
M/RD	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)		N
M.1/RD	Introduction		N
M.2 /RD	Method A		N
M.3/RD	Method B		N
M.3.1/RD	Ringing signal		N
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
M.3.2.1/RD	Conditions for use of a tripping device or a monitoring voltage		

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Clause	Requirement + Test	Result - Remark	Verdict
M.3.2.2/RD	Tripping device		N
M.3.2.3/RD	Monitoring voltage (V) ..... :		N
A/RD	Annex A, Tests for resistance to heat and fire		N
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.1.1/RD	Samples ..... :		
	Wall thickness (mm)..... :		
A.1.2/RD	Conditioning of samples; temperature (°C) ..... :		N
A.1.3/RD	Mounting of samples ..... :		N
A.1.4/RD	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D ..... :		
A.1.5/RD	Test procedure		N
A.1.6/RD	Compliance criteria		N
	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.2.1/RD	Samples, material..... :		
	Wall thickness (mm)..... :		
A.2.2/RD	Conditioning of samples; temperature (°C) ..... :		N
A.2.3/RD	Mounting of samples ..... :		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C ..... :		
A.2.5/RD	Test procedure		N
A.2.6/RD	Compliance criteria		N
	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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
A.3.1/RD	Mounting of samples		N
A.3.2/RD	Test procedure		N
A.3.3/RD	Compliance criterion		N
B/RD	Annex B, Motor tests under abnormal conditions (see 4.7.2.2/RD and 5.3.2/RD)		N
B.1/RD	General requirements	No motors	N
	Position ..... :		N
	Manufacturer ..... :		N
	Type ..... :		N
	Rated values ..... :		N
B.2/RD	Test conditions		N
B.3/RD	Maximum temperatures		N
B.4/RD	Running overload test		N
B.5/RD	Locked-rotor overload test		N
	Test duration (days) ..... :		N
	Electric strength test: test voltage (V) ..... :		N
B.6/RD	Running overload test for d.c. motors in secondary circuits		N
B.6.1/RD	General		N
B.6.2/RD	Test procedure		N
B.6.3/RD	(Alternative) test procedure		N
B.6.4/RD	Electric strength test; test voltage (V) ..... :		N
B.7/RD	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1/RD	General		N
B.7.2/RD	Test procedure		N
B.7.3/RD	(Alternative) test procedure		N
B.7.4/RD	Electric strength test; test voltage (V) ..... :		N
B.8/RD	Test for motors with capacitors		N
B.9/RD	Test for three-phase motors		N
B.10/RD	Test for series motors		N
	Operating voltage (V) ..... :		N
C/RD	Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)		N
	Position ..... :		—
	Manufacturer ..... :		—
	Type ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated values ..... :		—
	Method of protection ..... :		—
C.1/RD	Overload test		N
C.2/RD	Insulation		N
	Protection from displacement of windings ..... :		N
D/RD	Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)		P
D.1/RD	Measuring instrument		P
D.2/RD	(Alternative) measuring instrument		N
E/RD	Annex E, Temperature rise of a winding (see 1.4.13/RD)		N
F/RD	Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD)		P
G/RD	Annex G, (Alternative) method for determining minimum clearances		N
G.1/RD	Clearances		N
G.1.1/RD	General		N
G.1.2/RD	Summary of the procedure for determining minimum clearances		N
G.2/RD	Determination of mains transient voltage (V)		N
G.2.1/RD	AC mains supply ..... :		N
G.2.2/RD	Earthed d.c. mains supplies ..... :		N
G.2.3/RD	Unearthed d.c. mains supplies ..... :		N
G.2.4/RD	Battery operation ..... :		N
G.3/RD	Determination of telecommunication network transient voltage (V) ..... :		N
G.4/RD	Determination of required withstand voltage (V)		N
G.4.1/RD	Mains transients and internal repetitive peaks :		N
G.4.2/RD	Transients from telecommunication networks . :		N
G.4.3/RD	Combination of transients		N
G.4.4/RD	Transients from cable distribution systems		N
G.5/RD	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		N
	For an a.c. mains supply		N
	For a d.c. mains supply		N
	b) Transients from a telecommunication network		N
G.6/RD	Determination of minimum clearances ..... :		N

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Clause	Requirement + Test	Result - Remark	Verdict
H	Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)		N
I	Annex I, Backfeed protection test		P
I.1	General		P
I.2	Test for pluggable UPS	Backfeed relay provided.	P
I.3	Test for permanently connected UPS		N
I.4	Load-induced change of reference potential		N
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
J/RD	Annex J, Table of electrochemical potentials (see 2.6.5.6/RD)		P
	Metal(s) used ..... :	Copper plated with tin and soldering lead.	
K/RD	Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD)		N
K.1/RD	Making and breaking capacity		N
K.2 /RD	Thermostat reliability; operating voltage (V) ... :		N
K.3/RD	Thermostat endurance test; operating voltage (V) ..... :		N
K.4/RD	Temperature limiter endurance; operating voltage (V) ..... :		N
K.5/RD	Thermal cut-out reliability		N
K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P
L.2	Reference resistive load		N
L.3	Reference inductive-resistive load		N
L.4	Reference capacitive-resistive loads	Worst case power factors as specified by the manufacturer maintained during the relevanttests.	P
L.5	Reference non-linear load		N
L.5.1	Test method		N
L.5.2	Connection of the non-linear reference load		N
L.5.3	Connection of the non-linear reference load		N

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Clause	Requirement + Test	Result - Remark	Verdict
M	Annex M, Ventilation of battery compartments		P
M.1	General	Sufficient openings and a suitable arrangement of components (relays) 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 M.1 above.	P
M.3	Blocked conditions	See appended table 8.3.	P
M.4	Overcharge conditions		N
N	Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)		N
U/RD	Annex U, Insulated winding wires for use without interleaved insulation (see 2.10.5.4/RD)		N
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	See sub-clause 1.6.1/RD.	P
V.3/RD	TT power distribution systems		P
V.4/RD	IT power distribution systems		P

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Clause	Requirement + Test	Result - Remark	Verdict

4.5	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Battery (two provided)	INVT	MF7-12	12V, 7.0Ah	UL 1989	UL
Input Fuse	LITTELFUSE INC	218 Series	15A,250Vac	IEC60127-2	VDE 40016604
Appliance inlet	RONG FENG INDUSTRIAL CO LTD	RF-2004	6.3A, 250VAC	EN 60320-1	VDE 40029087
Appliance outlet	RICH BAY CO LTD	R-302G4	10A, 250V	EN 60320-2-2 EN60320-1	VDE 40029358
All enclosure	LG CHEMICAL LTD	AF312C	V-1or better Min:thickness 1.6mm	UL 94 UL 746C	UL E67171
Battery wire	Various	1015	VW-1, 10AWG 105℃ Min.300 V	UL 758	UL
Internal wire	Various	1015	VW-1,105℃, Min.300 V	UL 758	UL
Heat-shrinkable tube	Various	Various	VW-1, 600V, 125℃	UL 224	UL
All PCB	Various	Various	V-0, 130°C	UL 796	UL
Fan	NMB	2806KL04WB69	12VDC/80*25mm, 0.4A	IEC/EN 60950-1	CE or TUV
-Alt.	NMB	3110SB04WB79	12VDC/70*25mm, 0.4A	IEC/EN 60950-1	CE or TUV
-Alt.	YStech	FD127025MB(2R5)-D200	12VDC/70*15mm, 0.25A	IEC/EN 60950-1	CE or TUV
Main board					
Input Relay (RLY3)	SHENZHEN GOLDEN ELECTRICAL APPLIANCES CO LTD	GH-1A-12LF-G	12VDC 10A/277VAC	UL 508, EN 61810	UL E321783 TUV
Output Relay (RLY2)	SONG CHUAN	793 series	12VDC 10A/250VAC Min	--	TUV:R50056914
Battery Fuse (F2, F3)	SUN electric.	6CP-25A	10AH/250Vac, 25AH/250Vac	--	VDE

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-Alt.	HOLLY	65NM（P	10AH/250Vac, 25AH/250Vac	--	VDE
X capacitor (C47)	FARAD ELECTRONICS CO LTD	PXK	0.47uF, 275V, 100°C	IEC 60384-14, UL 1414	VDE 40014111, UL E247953
Inverter MOSFETS (Q3, Q4, Q5, Q6, Q7)	Various	Various	≥70A, 30V	--	Test in the equipment
Com board					
Optocoupler (U8, U9, U10, U11, U12)	COSMO Electronics Corporation	KP1010	Dti>0.4mm	IEC 60950-1	VDE 101347
Transformer (T1)	Boulder,Sidna	USS11T5	Class B	--	Test in the equipment
Power cord set					
Cable	Yong Hao Electricity Industry Co., Ltd	H05VV-F	0.75mm^{2}x3G	VDE 0281-5	VDE 40027125
Plug	Yong Hao Electricity Industry Co., Ltd	YH-E-007	10A, 250V	VDE 0620	VDE 40031369
Connector	Yong Hao Electricity Industry Co., Ltd	YH-E-006	10A, 250V	EN 60320-1	VDE 40029606
[1]) An asterisk indicates a mark which assures the agreed level of surveillance.					

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Clause	Requirement + Test	Result - Remark	Verdict

4.6	TABLE: electrical data (in normal conditions)					P
Fuse#	Irated(A)	U(V)	P(W)	I(A)	P(VA)	Condition/status
180/50Hz	5.94	--	1070	Input breaker	1172	Charging of empty batteries and rated output load.
180/60Hz	5.96	--	1072	Input breaker	1173	Ditto
200/50Hz	5.31	6	1064	Input breaker	1106	Ditto
200/60Hz	5.32	6	1065	Input breaker	1107	Ditto
240/50Hz	4.81	6	1058	Input breaker	1097	Ditto
240/60Hz	4.82	6	1059	Input breaker	1098	Ditto
254.4/50Hz	4.38	--	1047	Input breaker	1087	Ditto
254.4/60Hz	4.39	--	1048	Input breaker	1089	Ditto
Note(s): Please measure the input currents with normal load.						

5.1.3	TABLE: discharge of capacitors in the primary circuit			P
Condition	τcalculated (s)	τmeasured (s)	t u→ 0V(s)	Comments
L-N	--	0.75	--	Vi=372V, 37% of Vi=137.64V, No load applied
Note(s): 1. Relevant discharge resistance: discharged through circuit				

5.1.4	TABLE: Backfeed protection test			P
Condition	Voltage measured (V)/current (mA)			Comments
	L1-N	L1-G	N-G	
No load	0.040mA	0.048mA	0.050mA	Battery mode, Normal
Full load	0.041mA	0.065mA	0.050mA	Ditto
No load	0.045mA	0.055mA	0.035mA	Battery mode, Abnormal condition (_Q9 D-S_ short circuit)

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Full load	0.040mA	0.056mA	0.048mA	Battery mode, Abnormal condition (_Q9 G-D_ short circuit)
Note(s):				

5.1 2.2.2/RD	TABLE: insulation / hazardous voltage measurement			P
Transformer	Location	max. Voltage		Voltage Limitation component
		V peak	V d.c.	
T1	pin 8- pin 9	55.6V	--	
	After D34	--	10.2V	
T1	pin 10- pin 9	46.2V	--	
	After D32	--	8.78V	
Note(s):				

5.2.1 and 2.2.2/RD	TABLE: distance through insulation measurements			N
distance through insulation di at/of:	Up (V)	test voltage (V)	required di(mm)	di (mm)
Note(s): 1). Approved component. For details refer to table 4.3. Tested on model RM600/30X				

5.2.1 and 2.2.3/RD	TABLE: insulation / SELV voltage measurement	P
Location	Voltage measured (V)	Comments
T1 Pin 6-7	7.2V	
T1 Pin 6-8	11.2V	
T1 Pin 6-9	2.8V	
T1 Pin 6-10	13.6V	
T1 Pin 7-8	10.8V	
T1 Pin 7-9	2.4V	
T1 Pin 7-10	14.4V	
Note(s): No any voltage in RS232 circuit side exceeding SELV limits during normal / abnormal operation. No test necessary.		

5.2.3and 2.4.2/RD	TABLE: limited current circuit measurement	N

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Clause	Requirement + Test	Result - Remark	Verdict

condition	Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
Note(s): test during battery mode. Output measured with a 2 kΩ resistor as load.						

5.2.5 and 2.5/RD	TABLE: Limited power source measurement		N
	Limits	Measured	Verdict

5.3.1 and 2.6.3.4/RD	TABLE: provisions for protective earthing	P
Location	Resistance measured(mΩ) / voltage drop(V)	Comments
I/P earth (inlet)→O/P earth (outlet)	50mΩ	Test current of 32A for 120s
Note:		

5.5 and 8.3	TABLE: Abnormal operating and fault conditions		P
	ambient temperature (°C)	See below	
	model/type of power supply	Integral part of equipment.	
	manufacturer of power supply	See below	
	rated markings of power supply	See page 4	

No.	component No.	fault	test voltage (V)	test time	fuse no.	fuse current (A)	Result
1	Q5 d-s on PFC PCB	s-c	240V	1 sec	Input breaker	0	Unit shutdown. F1 opened, Q4, Q6 and Q8 damaged. No hazards.
2	D5 on charger PCB	s-c	240V	10 min	Input breaker	6	Unit Alarm, output normal, F1 opened. No hazards.
3	Q2 d-c on charger PCB	s-c	240V	10 min	Input breaker	6	Unit Alarm, output normal, F1 opened, Q1 damaged. No hazards.
4	D3 on charger PCB	s-c	240V	10 min	Input breaker	6	Unit Alarm, output normal, F1 opened, D4 damaged. No hazards.
5	Q4 d-s on charger PCB	s-c	240V	10 min	Input breaker	6	Charger is portected. Output normal. No hazards.

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No.	component No.	fault	test voltage (V)	test time	fuse no.	fuse current (A)	Result
6	Q2 d-s on CNV PCB	s-c	Battery mode	1 sec	F4	0	F4 opened, PFC mosfets Q3, Q5, Q7 damaged. No hazards.
7	Transformer TX1 pin8-9 on control PCB	s-c	240	10 min	Input breaker	6	Fuse on control PCB opened, output normal. No hazards.
8	Transformer TX1 pin10-9 on control PCB	s-c	240	10 min	Input breaker	6	Fuse on control PCB opened, unit is normal. No hazard.
9	Transformer TX1 pin8-9 on control PCB	o-l	240	2 hr	Input breaker	Max 6.2A	The max overload current is 0.4A. after the test. Fuse on control PCB opened, unit is normal. No hazard. Measured of Control PCB TX1 winding is 82.5℃, TX1 core is 68.3℃. Ambient is 25.4℃.
10	Optocoupler (C21) pin1-2	s-c	240	10 min	Input breaker	6	Normal operation. No hazards
11	Optocoupler (U21) pin3-4	s-c	240	10 min	Input breaker	6	Normal operation. No hazards
12	Optocoupler (U22) pin1-2	s-c	240	10 min	Input breaker	6	Normal operation. No hazards
13	Optocoupler (U22) pin3-4	s-c	240	10 min	Input breaker	6	Normal operation. No hazards
14	Optocoupler (C19) pin3-4	s-c	240	1 sec	Input breaker	0	Unit shut down. No output. No Hazards
15	Optocoupler (C19) pin1-2	s-c	240	10 min	Input breaker	20.8	Normal operation. No hazards
16	AC- Output	o-l	240	1 hr	Input breaker	6.2	EUT shut down within 30s at condition of overload 169%. Measured of Control PCB T4 winding is 40.6℃, Ambient is 25.5℃.
17	AC- Output	o-l	Battery mode	47 min 36 sec	Input breaker	--	EUT shutdown immediately within 5s at condition of overload 105%. No hazard. Measured of Control PCB TX1 winding is 34.3℃, TX1 core is 35.3℃. Ambient is 23.2℃.
18	AC-Input	s-c	220	Imme	Input breaker	-	Input breaker opened.EUT turn to battery mode immediately. Recoverable.

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No.	component No.	fault	test voltage (V)	test time	fuse no.	fuse current (A)	Result
18	AC- Output	s-c	240	Imme	Input breaker	0	EUT shutdown. recoverable
19	AC- Output	s-c	Battery mode	Imme	Input breaker	--	EUT shutdown. recoverable
20	Ventilation openings	Blocked	240	6min	Input breaker	6.0	After 6 minutes, EUT is protected by thermal control and turn to bypass. No hazard. Measured of Control PCB T4 winding is 71.0℃.Ambient is 25.5℃.
21	Ventilation openings	Blocked	Battery mode	10min	F4	--	After 10 minutes, EUT is protected by thermal control. No hazard. Measured of Control PCB TX1 winding is 47.0℃, TX1 core is 47.5℃. Ambient is 23.7℃.
22	Fan	Locked	240	1hr 7min	Input breaker	6.0	After 5 minutes, EUT alarm for fan and turn to by pass. Recoverable after fault removed. No hazard. Measured of Control PCB TX1 winding is 35.9℃, TX1 core is 35.8℃. Ambient is 23.4℃.
23	Fan	Locked	Battery mode	3min 20sec	F4	--	EUT alarm and EUT is protected by thermal control. No hazard. Measured of Control PCB TX1 winding is 42.0℃, TX1 core is 42.0℃. Ambient is 24.2℃.

Note(s):

S-c means short circuit. O-l means overload. O-c means open circuit.

5.7 2.10.2/ RD	TABLE: working voltage measurement	P

Location	RMS voltage (V)	Peak voltage (V)	comments
T1 Pin 1 to Pin 6	2.51	5.64	
T1 Pin 1 to Pin 7	2.38	5.68	
T1 Pin 1 to Pin 8	8.56	13.6	
T1 Pin 1 to Pin 9	5.04	12.4	
T1 Pin 1 to Pin 10	18.2	46.4	

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Clause	Requirement + Test	Result - Remark	Verdict

T1 Pin 2 to Pin 6	2.05	6.40	
T1 Pin 2 to Pin 7	2.31	7.20	
T1 Pin 2 to Pin 8	20.4	64.0	
T1 Pin 2 to Pin 9	7.24	20.4	
T1 Pin 2 to Pin 10	6.31	25.2	
T1 Pin 3 to Pin 6	2.10	6.81	
T1 Pin 3 to Pin 7	2.36	7.20	
T1 Pin 3 to Pin 8	2.5	64.0	
T1 Pin 3 to Pin 9	7.31	20.4	
T1 Pin 3 to Pin 10	6.57	25.6	
T1 Pin 4 to Pin 6	6.85	14.8	
T1 Pin 4 to Pin 7	7.28	16.0	
T1 Pin 4 to Pin 8	**33.6**	**85.2**	Max RMS Voltage, max peak Voltage
T1 Pin 4 to Pin 9	20.4	42.8	
T1 Pin 4 to Pin 10	7.29	23.6	
U8 Pin 1 to Pin 3	16.4	7.03	
U8 Pin 1 to Pin 4	16.4	6.90	
U8 Pin 2 to Pin 3	**19.6**	**6.94**	Max RMS Voltage, max peak Voltage
U8 Pin 2 to Pin 4	19.2	6.94	
Note: Input voltage: ___240___V, ___50__Hz			

5.7 and 2.10.4/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)
Unit						
Primary to PE	<420	<250V	2.0	4.0	2.5	4.0
PCB traces between contacts of backfeed relay RLY2	<420	<250V	1.9	3.0	2.5	3.0
LCD pins to LCD enclosure	<420	<250V	4.0	5.3	5.0	5.5
Com Board						
Primary trace to secondary trace under U8, U9, U10, U11, U12	<420	<250	4.0	4.3	5.0	>5.0

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Clause	Requirement + Test	Result - Remark	Verdict

Primary trace to secondary trace under T1	<420	<250	4.0	5.1	5.0	5.1
Primary winding to secondary winding of T1	<420	<250	4.0	5.1	5.0	5.1
Primary winding to iron core of T1	<420	<250	2.0	3.0	2.5	3.0
secondary winding to iron core of T1	<420	<250	2.0	3.0	2.5	3.0
Backfeed relay						
Coil to contacts for reinforce insulation	<420	<250	2.0	9.5	2.5	10
Contacts opening per pole for basic insulation	<420	<250	1.9	8.06	2.5	9.1
Note(s):						

5.8, 2.1.1.3/RDand 2.10.5.1 /RD	TABLE: electric strength tests, impulse tests and voltage surge tests	P

test voltage applied between:	test voltage (V)	Breakdown Yes / No
Heat-shrinkable tube	3000Va.c.	No
Plastic enclosure	3000Va.c.	No
Optocoupler (U8, U9, U10, U11, U12)	3000Va.c.	No
Supplementary information: All model		

6, 8.2 and 9	TABLE: Electric strength tests, impulse tests and voltage surge tests	P

Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No
Primary to secondary SELV circuits (mains inlet & outlet conductor to RJ45 and RS232 port)	AC	3000V	No
Primary to accessible part (mains inlet & outlet conductor to RS232 port)	AC	3000V	No
Primary to earth (mains inlet & outlet conductor to earth)	AC	1500V	No
Primary to plastic enclosure with metal foil	AC	3000V	No
LCD pins/ LCD enclosure with metal foil	AC	3000V	No
Supplementary information: Test after humidity treatment, heating test, and each fault condition test of 8.3.			

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Clause	Requirement + Test	Result - Remark	Verdict

7.4, 4.5.5/RD	TABLE: Ball pressure test of thermoplastic parts		P
	Allowed impression diameter (mm) .....:	≤ 2 mm	—

Part	Test temperature (°C)	Impression diameter (mm)
Bobbin of converter transformer	125	1.2
Note(s):		

7.4.2 4.6.1/RD and 4.6.2/RD	TABLE: openings	P

Location	Size (mm)	Comments
Top	None	No openings.
Bottom	None	No openings.
Side	None	No openings.
Front	None	No openings.
Rear	Width 1.0mm opening	6x7 provided.
Note(s):		

7.5	TABLE: resistance to fire		P

Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class
Supplementary information: see table 4.5				

7.7	TABLE A: maximum temperature rises		P
	test voltage (V) :	See below.	--
	T1 (°C) :	--	--
	T2 (°C) :	--	--

Temperature rise T of part/at:	T(°C) :			required T
	198V/50Hz	264V/50Hz	Battery mode	
Input L wire	48.3	49.4	46.5	80
Choke(L8) coil on PSDR	79.7	52.2	73.5	130
Choke(L3) coil on PSDR	71.5	53.5	66.6	130
Choke(L2) coil on PSDR	131.3	111.4	128.2	130

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Clause	Requirement + Test	Result - Remark	Verdict

Temperature rise T of part/at:	T(°C) :			required T
	198V/50Hz	264V/50Hz	Battery mode	
Input L wire	48.3	49.4	46.5	80
Choke(L8) coil on PSDR	79.7	52.2	73.5	130
Choke(L3) coil on PSDR	71.5	53.5	66.6	130
Choke(L2) coil on PSDR	131.3	111.4	128.2	130
X2- capacitor (C1) on PSDR	59.1	50.5	58.2	100
Y2- capacitor(C18) on PSDR	49.2	48.2	47.6	85
Transformer (T3) coil on PSDR	46.6	48.2	45.5	110
Transformer (T1) coil on Driver	73.2	70.9	67.7	110
E-capacitor (C2)body on PSDR	48	49.2	45	105
Transformer (T4) coil on PSDR	72.1	63.3	67	110
Transformer (T1) coil on CNTL	68.6	56.5	67.2	110
Optocoupler U8 on CNTL	42.3	41.2	42.1	100
Outlet	55.5	47.4	54.9	70
Battery body	46.1	47.6	48.2	70
Heatsik of Mosfet Q2 on PSDR	97.5	57.6	94	130
Varistor R212 on PSDR	49.8	47.3	49.7	85
Plastic enclosure in front	41.5	40.7	41.4	95
Metal enclosure near battery(outside)	45.1	40.6	44.9	70
Battery wire(+)	58.8	48.2	53.9	105
Ambient	40.0	40.2	40.2	--
Supplementary information:				

Temperature T of winding:	t1 (°C)	R1 (Ω)	t2 (°C)	R2 ((Ω)	T (°C)	Allowed Tmax (°C)	Insulation class
--	--	--	--	--	--	--	--

Supplementary information:

The temperatures were measured under worst case normal mode defined in 1.2.2.1/RD and as described in sub-clause 1.6.2/RD and at voltages as described above.

8.1, 5.1.1/RD	TABLE: Touch current measurement				P
Condition	L→terminal A	N→terminal A	Freq. (Hz)	Limit (mA)	Comments
Unit on	2.5	2.9	3.5	Switch “e” open, L/N to PE, no load	Switch “e” open, L to PE, no load

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Clause	Requirement + Test	Result - Remark	Verdict

Unit on	0.005	0.005	0.25	Switch “e” close, L/N to plastic enclosure (with foil)	Switch “e” open, N to PE, no load
Unit on	0.005	0.005	0.25	Switch “e” close, L/N to RJ45 and USB port	Switch “e” close, L to RS232 port
Unit on	0.005	0.005	0.25	Switch “e” close, L/N to RS232 port	Switch “e” close, N to RS232 port.
Note(s) : Supply with 302.5V/50Hz.					

C.2	Safety isolation transformer		P
	Construction details:		
Transformer part name: T1 on CNTL board			
Manufacturer: See appended table 1.5.1			
Type: See appended table 1.5.1			
Recurring peak voltage		420Vpeak	
Required clearance for reinforced insulation (from table 2H and 2J)		4.0mm	
Effective voltage rms		250Vrms	
Required creepage distance for reinforced insulation (from table 2L)		5.0mm	
Measured min. creepage distance			
Location		inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin		5.1	5.1
Primary winding/pin to core		3.0	3.0
Secondary winding/pin to core		3.0	3.0
Measured min. clearances			
Location		inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin		5.1	5.1
Primary winding/pin to core		3.0	3.0
Secondary winding/pin to core		3.0	3.0
Construction:			
Concentrically wound transformer design, core size EE-16. N1, N2 are primary winding which is wound around the internal side of the bobbin. 3 layers of mylar tapes are used to separate primary and secondary windings. N3, N4, N5 are secondary windings on outer side of bobbin. Margin tape with width of 2.8mm is used on both side of bobbin and each winding layer. Tubing is used on every winding exits to the bare pins on bobbin.			

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Clause	Requirement + Test	Result - Remark	Verdict

Pin numbers	
Prim.	1-6
Sec.	10-9, 8-9
Bobbin	
Material	See appended table 4.5
Thickness	See appended table 4.5
Electric strength test	
With 4242Vdc. after humidity treatment	
Result	Pass

M	Ventilation of battery compartments	P
	The required dimension for the ventilation will be calculated with the following formula:	
	A > K1 * Q with Q = (0.054 m³/Ah) * n * I * C where: K1 : constant factor of 28 h * cm²/m³ Q : airflow in m³/h n : number of battery cells I : constant factor (0.2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	Model: n : C : A > 28 * cm²/m³ * (0.054m³/Ah) * n * (0.2 A/100Ah) * C = cm²	
	Verdict	
	The size of the ventilation openings exceeds the required airflow by far (as well as the UPS).	

European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

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		P
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.

European group differences and national differences of EN 62040-1			
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"		P
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"		P
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.		P

Pictures

Fig. 1 – Overview (I)

Fig. 2 – Overview (II)

Pictures

Fig. 3 –Overview (III)

Fig. 4 – Inside view (I)

Pictures

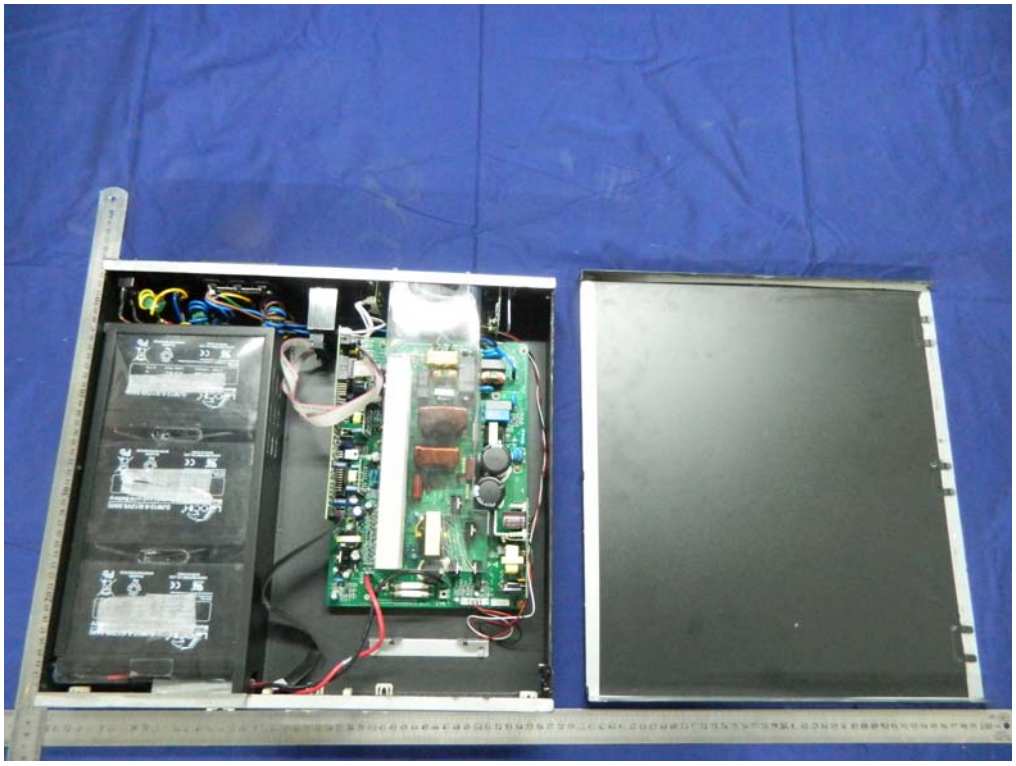

Fig. 5 – Inside view (II)

Fig. 6 – Mains board PCB, components side view

Pictures

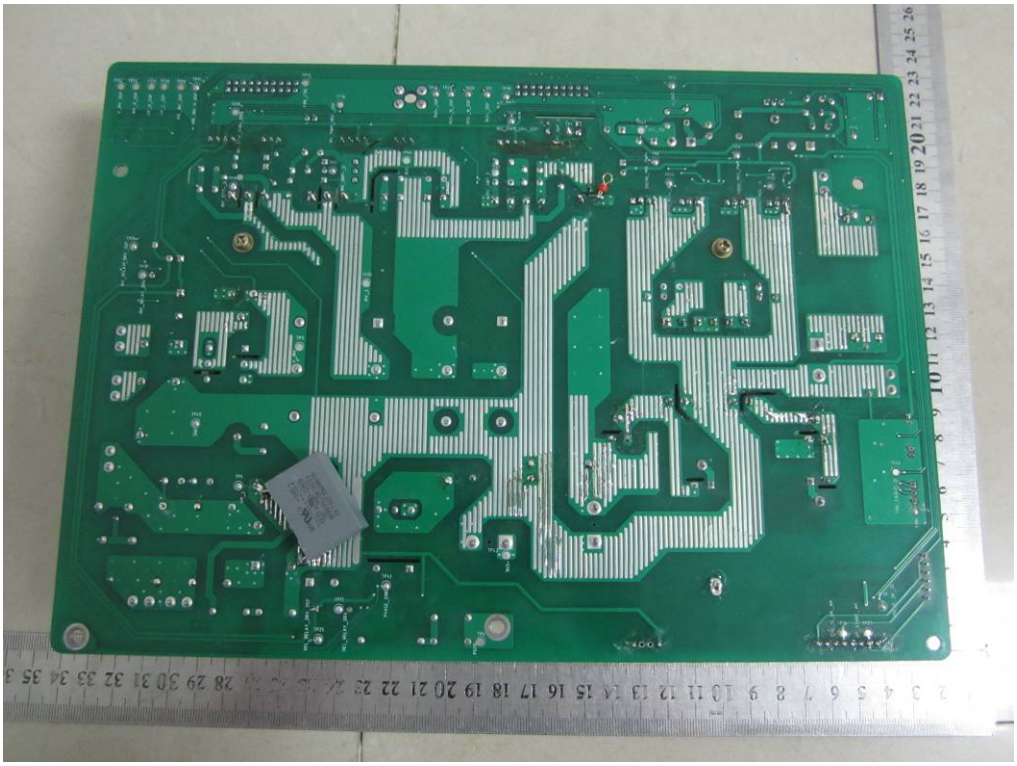

Fig.7 – Mains board PCB, trace side view

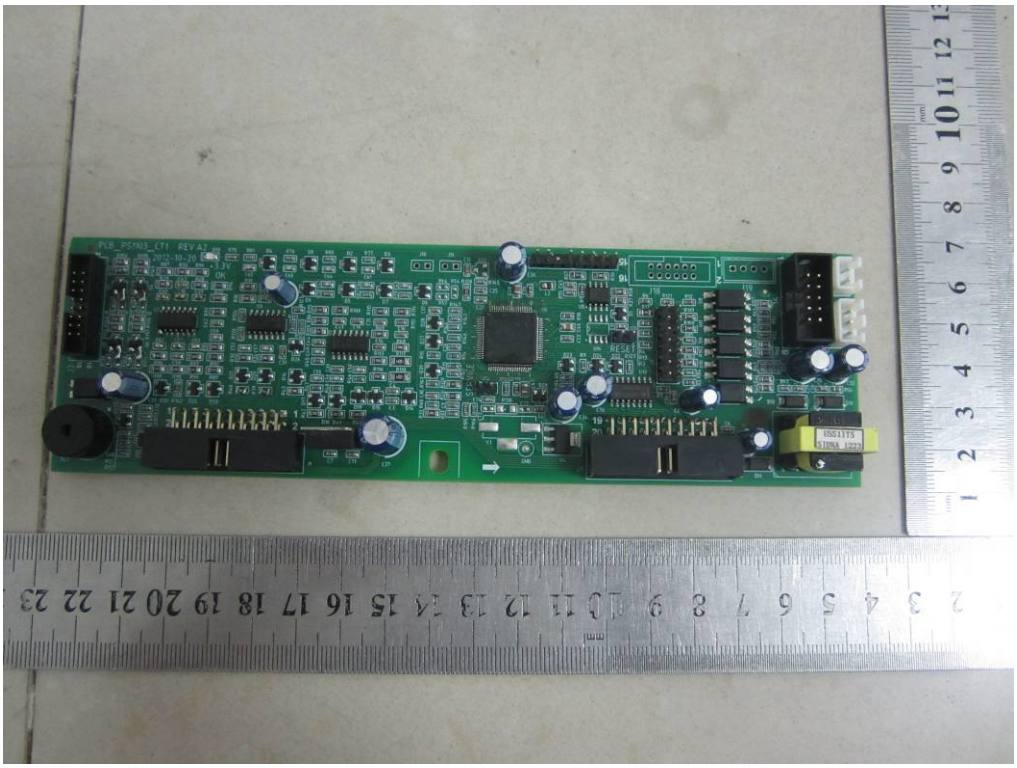

Fig.8 – Com board PCB, trace side view

Pictures

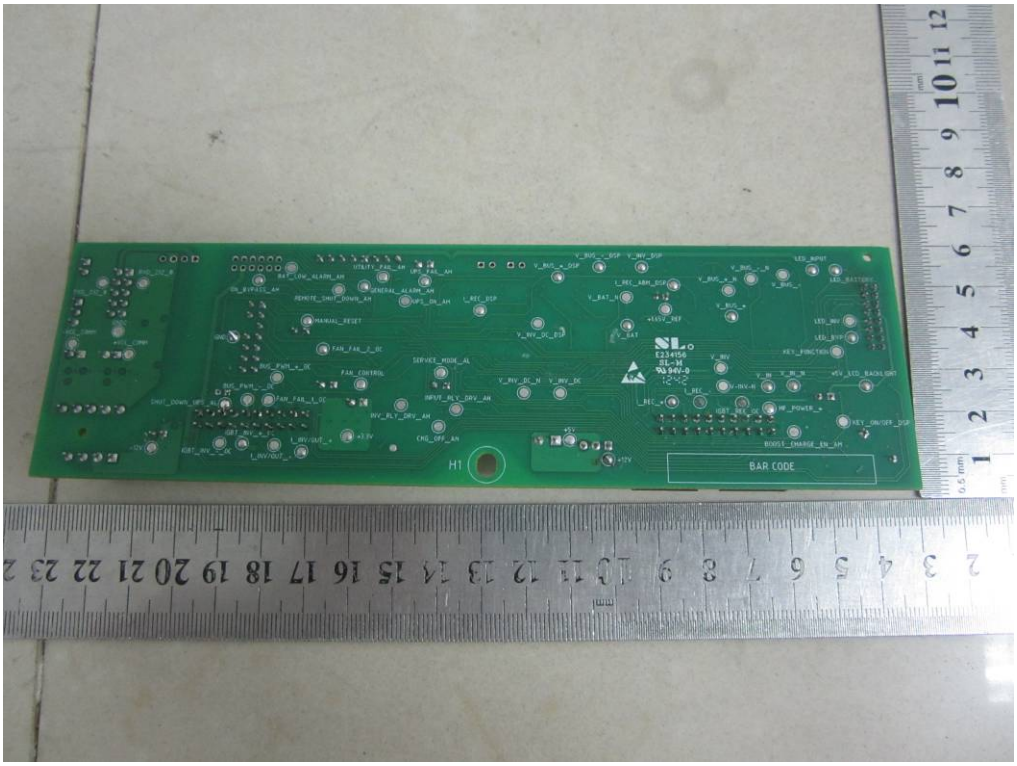

Fig.9 – Com board PCB, trace side view