APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

VOLTRONIC POWER UPS

Report Number : LVD-E20120215S

Model/Type : IMPERIAL 1500
IMPERIAL 2000

Prepared For : VOLTRONIC POWER TECHNOLOGY CORP.

1st Floor, Building 1, HengchangRong Industrial Park, Private Industrial Zone, Shilongzai Community, Shiyan Street, Baoan District, Shenzhen, China

Prepared By : VOLTRONIC POWER TECHNOLOGY CORP.

1st Floor, Building 1, HengchangRong Industrial Park, Private Industrial Zone, Shilongzai Community, Shiyan Street, Baoan District, Shenzhen, China

Tel： +86-755-29182809
Fax：+86-755-29182982

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

Report Reference No	LVD-E20120215S
Complied by (name+signature)	Jinming
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Testing Laboratory ……..	VOLTRONIC POWER TECHNOLOGY CORP.
Address……..	1st Floor, Building 1, HengchangRong Industrial Park, Private Industrial Zone, Shilongzai Community, Shiyan Street, Baoan District, Shenzhen, China
Testing location/address……...	Same as above
Applicant's name ……	VOLTRONIC POWER TECHNOLOGY CORP.
Address…….	1st Floor, Building 1, HengchangRong Industrial Park, Private Industrial Zone, Shilongzai Community, Shiyan Street, Baoan District, Shenzhen, China
Test specification: Standard ……... Test procedure…… Non- Standard test method…….	 EN 62040-1:2008 Compliance with EN 62040-1:2008 N/A
Test item description……	Uninterruptible Power Supply
Trade Mark……..	N/A
Manufacturer……	VOLTRONIC POWER TECHNOLOGY CORP.
Address……	1st Floor, Building 1, HengchangRong Industrial Park, Private Industrial Zone, Shilongzai Community, Shiyan Street, Baoan District, Shenzhen, China
Model/Type reference ……	IMPERIAL 1500; IMPERIAL 2000
Ratings……..	Model: IMPERIAL 1500VA Input: 220Vac-240Vac,50/60Hz,9.9A Max,1Φ Output: 220Vac-240Vac,50/60Hz,6.5A max,1Φ Capacity: 1500VA/1000W Model: IMPERIAL 2000VA Input: 220Vac-240Vac,50/60Hz,10A max,1Φ Output: 220Vac-240Vac,50/60Hz, 8.7A max,1Φ Capacity: 2000VA/1400W

ADDITIONAL INFORMATION	
TESTED ACCORDING TO NATIONAL REQUIREMENTS FOR THE FOLLOWING COUNTRIES:	
CENELEC	
LIST OF APPENDIXES / ENCLOSURES TO THE TEST REPORT	
● Copy of warning label (Appendix I) ● Photos (Appendix II)	
Test item particulars	
Equipment mobility…… Connection to the mains……. Operating condition…… Access location ……. Over voltage category(OVC)…… Mains supply tolerance (%) or absolute mains supply Values……..	[x] movable [ ]stationary [ ] for building-in [ ]Pluggable equipment [] permanent connection [x] detachable power supply cord [ ] non-detachable power supply cord [x] continuous [ ] rated operating/resting time [x]operator accessible [ ]restricted access location []OVC Ⅰ [x]OVC Ⅱ []OVCⅢ []OVC Ⅳ []other 220Vac(-10%), 240Vac(+10%)of input voltage considered
Tested for IT power systems	[] Yes [x] No
IT testing, phase-phase voltage (V)	NA
Class of equipment	[x] Class Ⅰ [ ]Class Ⅱ [ ] not classified
Considered current rating (A)	16 A
Pollution degree(PD)	[ ] PD 1 [x] PD 2 [ ] PD 3
IP protection class	IP20
Altitude of during operation (m)	Up to 2000m
Altitude of test laboratory (m)	Below 2000m
Mass of equipment (kg)	11.6 kg for IMPERIAL 1500 12.25 kg for IMPERIAL 2000
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)

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 table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.
Standard EN 62040-1:2008 is to be used in conjunction with EN 609501:2006+A11:2009+A1:2010, which is referred to in this TRF as " RD".

General product information:

1、the equipment is an off-line type of Uninterruptible Power Supply for general use with information technology equipment.
2、The test samples are pre-production without any serial number.

Summary of testing:

The report 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 2000m.

This series of UPS generally uses the same circuit diagrams, therefore, input tests, heating tests and abnormal tests were conducted on models IMPERIAL 1500 and IMPERIAL 2000 with different converter transformers, MOSFET etc. Unless otherwise specified , the tests are conducted on model IMPERIAL 2000 considered the worst condition.

Copy of marking plate:

1、Rating label for model IMPERIAL 1500

Model: IMPERIAL 1500
Input: 220Vac-240Vac,50/60Hz,9.9A max,1Φ
Output: 220Vac-240Vac,50/60Hz,6.5A max,1Φ
Capacity: 1500VA,1000W

Made In China

2、Rating label for model IMPERIAL 2000

Model: IMPERIAL 2000
Input: 220Vac-240Vac,50/60Hz,10A max,1Φ
Output: 220Vac-240Vac,50/60Hz,8.7A max,1Φ
Capacity: 2000VA/1400W

Made In China

3、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.

WARNING

- ISOLATE UNINTERRUPTIBLE POWER SUPPLY (UPS) BEFORE WORKING ON THIS CIRCUIT.

EN 62040-1			
clause	Requirement—Test	Result—Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.5	Components		P
	Comply with IEC62040-1 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 components 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 controls	P
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/RD	P
1.5.5/RD	Interconnecting cables	No interconnecting cable provided.	N
1.5.6/RD	Capacitors bridging insulation	Between line:X2 capacitor according to IEC 60384-14: 1993 with 21 days damp heat test was used	P
1.5.7/RD	Resistors bridging insulation	Photo-coupler U3 is used and complies with the relevant requirements of the standard.	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 bridging resistors	N
1.5.8/RD	Components in equipment for IT power systems	TN power system.	N

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 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 insulation from earth with basic insulation throughout the equipment.	P
4.7	Marking and instructions		P
4.7.1	General	See below	P
4.7.2	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 label	P
	Input symbol for nature of supply (d.c.)	Not connected to DC supply	N
	Input rated frequency/range (Hz)	50/60Hz	P
1.7.1/RD	Number of input phases (1φ - 3φ) and neutral	1φ With Neutral	P
	output rated voltage/range (V)	220-240Vac	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
1.7.1/RD	Number of output phases (1φ - 3φ) and neutral	1φ With Neutral	P
	Output rated active power (W)	See rating label	N
	Output rated apparent power (VA)	See rating label	
	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
	Manufacturer's name or trademark or identification mark	See rating label	P
	Type/model type reference	See rating label	P
	Symbol for Class II equipment only	The equipment is Class I	N
	Other symbols	The additional marking does not give rise to misunderstanding.	P
	Certification marks:	CE	P
	Instructions for units with automatic bypass/maintenance bypass, additional input	Equipment has no such function.	N

	a. c. supply, or external batteries, having text "See installation instructions before connecting to the supply"		
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	Backfeed protection provided externally to the UPS	P
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)	AC Fuse in rear panel. Marked by: 250VAC, 10A for IMPERIAL 1500 250VAC, 15A for IMPERIAL 2000	P
4.7.7 1.7.7/RD	Wiring terminals	Appliance inlet used.	N
1.7.7.1/RD	Protective earthing and bonding terminals		N
1.7.7.2/RD	Terminals for a.c. mains supply conductors		N
1.7.7.3/RD	Terminals for d.c. mains supply conductors	AC main supplied	N
4.7.8	Battery terminals	The terminal of battery 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	P

		affecting safety is obvious without knowledge of language etc.	
1.7.8.2/RD	Colours	For LED or LCD provided, located on the front panel	P
1.7.8.3/RD	Symbols according to IEC 60417	The function switch is marked according to 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	TN power system.	N
4.7.12	Protection in building installation	The equipment is of pluggable type A.	N
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 Users Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No Thermostats other regulating devices	N
4.7.15 1.7.2.1/RD And 1.7.8.1/RD	Language(s)	Instructions and marking shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	
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	Marking is not on the removable parts	P
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 marking are in	

		English	
4.7.19 1.7.2.5/RD	Operator access with a tool	All area containing hazard(s) are inaccessible to the operator.	P
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
	Warning label	Warning language with information: Caution: Lead-acid battery inside the enclosure, it may cause chemical hazard. The battery presents 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
2.1.2.5/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 was 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.	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	Battery compartment is not operator access area.	N
2.1.1.3/RD	Access to ELV wiring	No internal wiring at ELV	N

		accessible to the operator.	
	Working voltage (V peak 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	No energy hazards in operator accessible location.	N
2.1.1.6/RD	Manual controls	No conductive controls, handles or alike provided	
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)	P
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 2.1.1.5c)/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 2.1.1.5c)/RD	Protection for UPS intended to be used in restricted access areas	Nor for restricted access area	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	The backfeed protection is achieved through the backfeed relay RY1,RY5 boost \buck \ output relay RY2, RY3, RY4, the current transformer CT1, and the AVR/inverter transformer TX which provides reinforce insulation between the primary and secondary circuits.	P
5.1.5	Emergency switching device	Not mandatory for pluggable UPS.	N
5.2	Requirements for auxiliary circuits		N
5.2.1 2.2/RD	Safety extra low voltage circuit0- SELV	No SELV circuits placed outside the enclosure	N
2.2.1/RD	General requirements		N

2.2.2/RD	Voltages under normal conditions (V)		N
2.2.3/RD	Voltages under fault conditions (V)		N
2.2.4/RD	Connection of SELV circuits to other circuits		N
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
	Test with test probe (figure 2C):		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 uF):		
2.4.3/RD	Connection of limited current circuits to other circuits		N
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		N
3.5.3 /RD	ELV circuits as interconnection circuits	No ELV interconnection	N
3.5.4/RD	Data ports for additional equipment	Data ports are signal port only, no test required.	P
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) Over current protective device limited output		N
	Max. output voltage(V), max. output current (A), max. apparent power (VA)		
	Current rating of over current protective device(A)		

5.3	Protective earthing and bonding		P
5.3.1	General	See below	P
2.6/RD	Provisions for earthing and bonding	Approved appliance inlet and outlets used	P
2.6.1/RD	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal of appliance inlet (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	Through appliance inlet and outlets used	P
2.6.3.1/RD	General	Compliance checked	P
2.6.3.2/RD	Size of protective earthing conductors	Appliance inlet used	P
	Rated current (A) , cross-sectional area (mm^2), AWG	See appended table 4.5	
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 (A) , cross-sectional area (mm^2), AWG	Refer to 2.6.3.4/RD	
2.6.3.4/RD	Resistance of earthing conductors and their terminations; Resistance(), voltage drop (V), test current (A), duration (min)	See appended table 5.3.1	P
2.6.3.5/RD	Colour of insulation	Protective earthing conductor is green with yellow stripe.	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	Appliance inlet used.	N
	Rated current (A), type and 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 over current protective device in protective earthing or bonding conductor.	P
2.6.5.3/RD	Disconnection of protective earth	Appliance inlet provided.	P
2.6.5.4/RD	Parts that can be removed by an operator	Appliance plug or inlet, earthing connected before and disconnected after hazardous voltage. No other operator removable parts.	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	All safety earthing connections in compliance with Annex J	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	No protective earthing of TNV circuits.	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
5.4	AC and d.c. power isolation		N
5.4.1	General	Only one external supply of hazardous voltage or energy (via appliance inlet).	N
3.4/RD	Disconnection from the mains supply	Appliance coupler used disconnect device	N
3.4.1/RD	General requirement		N
3.4.2/RD	Disconnect devices		N
3.4.3/RD	Permanently connected equipment		N
3.4.4/RD	Parts which remain energized	No parts remain energized after the disconnect device is pull out	N
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		N
3.4.7/RD	Number of poles- three-phase and d.c. 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		N
3.4.11/RD	Multiple power sources		N
5.4.2	Disconnect devices	Refer to cl. 3.4.2/RD	N
5.5	Over current 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	No over current protection provided	N
2.7.5/RD	Protection by several devices	No over current protection provided	N
2.7.6/RD	Warning to service personnel	With for the mains socket being of reversible type, hazard may be still present in the equipment after the input fuse opens. However, as it is considered that the plug to the mains will be disconnected during service work. No markings were needed.	N
5.5.2	Basic requirements	Equipment relies on 16A rated input fuse or circuit F1 of the wall outlet installation protection of the building installation in regard to L, N short circuit and for L to PE earth fault. Cover current protection is provided by the build-in device AC fuse	P
5.5.3	Battery circuit protection	Ungrounded battery inside the UPS. Required fuses against Over current: 1 Earth fault: 1 Protection against overcurrent by trace. However earth faults will be covered by devices in the building installation.	P
5.5.3.1	Over current and earth fault protection	See below	P
5.5.3.2	Location of protective device	For the charger circuit there are no hazardous conditions under any simulated fault conditions.	N
5.5.3.3	Rating of protective device	No over current protection provided	N
5.3.1/RD	Protection against overload and abnormal operation	See appended table 8.3	P
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).		N
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
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 2.10.3/RD, 2.10.4/RD and 2.10.5/RD.	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 function insulation	The functional insulations comply with 5.3.4/RD a) and c)	P
2.10.1.4/RD	Intervening unconnected conductive parts	Considered	P
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used	N
2.10.1.6/RD	Special separation requirements	Special separation is not used	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	See below	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. Annex G/RD was not considered	P
2.10.3.1/RD	General	Annex F/RD and minimum Clearances considered	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
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) transient 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 |||b 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	Solid or laminated insulating materials having adequate thickness are provided.	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	No semiconductor devices	N
2.10.5.5/RD	Cemented joints	No Cemented joint	N
2.10.5.6/RD	Thin sheet material-general	See below	P
2.10.5.7/RD	Separable thin sheet material		N
	Number of layers (pcs)		--
	Electric strength test	AC 1500V for each layer of insulation (see appended table 5.8)	
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		N
	Electric strength test		
2.10.5.11/RD	Insulation in wound components	See cl.2.10.5.12/RD	N
2.10.5.12/RD	Wire in wound components	Triple insulated wiring is not used for supplementary or reinforced insulation.	N
	Working voltage:		
	a) basic insulation not under stress:		N
	b) basic, supplementary, reinforced insulation:		N
	c)compliance with Annex U:		N
	Two wires in contact inside wound component; angle between 45° and 90°	Insulation sheets and tapes used to relieve mechanical Stress s at crossover points.	N
2.10.5.13/RD	Wire with solvent-based enamel in wound components	No wire with solvent-based enamel in wound components	N
	Electric strength test	(see appended table 8.2)	
	Routine test		N
2.10.5.14/RD	Additional insulation in wound components	No additional insulation used	N
	Working voltage:		
	Basic insulation not under stress:		N
	Supplementary, reinforced insulation:		N
2.10.6/RD	Construction of printed boards	See below	P
2.10.6.1/RD	Uncoated printed boards	No special coating used.	P
2.10.6.2/RD	Coated printed boards	No special coating used.	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	PCB layout does not serve as insulation barrier	N
	Distance through insulation		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		N
2.10.8.2/RD	Thermal conditioning		N
2.10.8.3/RD	Electric strength test		
2.10.8.4/RD	Abrasion resistance test		N
2.10.9/RD	Thermal cycling		N
2.10.10/RD	Test for pollution degree 1 environment and insulating compound	Approved opto-couplers, see appended table 4.5	P
2.10.11/RD	Tests for semiconductor devices and cemented joints	No such device used	N
2.10.12/RD	Enclosed and sealed parts	Approved photo-couplers, see	P

		appended table 4.5	
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 over current protection	All internal wires are UL recognized wiring which is PVC insulated. Rated VW-1, 300V, minimum 105°C. Internal wiring gauge is suitable for current intended to be carried. Internal wiring for primary power distribution protected against over current by built-in input fuse.	P
3.1.2/RD	Protection against mechanical damage	Wires 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 terminal 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	No screws used to provide electrical contact pressure.	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	No self-tapping screws provided in inverter circuit and earthing bonding	N
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	Break away or pivot on its terminal is unlikely	P
3.1.10/RD	Sleeving on wiring	Sleevings on wiring reliable kept in position by cable ties or by the	P

		use of heat shrunk sleeving.	
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	Single supply connection.	P
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/EN 60320.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 IEC53)	
	Rated current (A), cross-sectional area (mm2),AWG	3G 0.75mm^2 with a rating of at least 10A.	
3.2.5.2/RD	DC power supply cords	Not connected to be DC power supply cords.	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	Appliance inlet and outlets used	N
	Diameter or minor dimension D(mm); test mass (g)		
	Radius of curvature of cord (mm)		
6.2.2	Means of connection	With power supply cord	P
	More than one supply connection	Single voltage supply connection.	N
6.3	Wiring terminals for external power conductors (No wiring terminals for external power conductors)		N
3.3/RD	Wiring terminal for connection for 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).		
3.3.5/RD	Wiring terminal sizes		N
	Rated current (A), type and nominal thread diameter (mm)		
3.3.6/RD	Wiring terminals 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	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
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	30 N applied to parts inside the UPS.	P
4.2.4/RD	Steady force test, 250 N	250 N applied to outer enclosure. No energy or other hazards.	P
4.2.5/RD	Impact test	No hazard as a result from steel ball impact test.	P
	Fall test	No hazard as a result from steel ball impact test.	P
	Swing test	No hazard as result from steel sphere ball swung 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	P

		distortion on enclosures due to release of internal stresses.	
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment	N
	Picture tube separately certified		N
4.2.9/RD	High pressure lamps	No high pressure lamp provided.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N)	Not for 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 of the enclosure are rounded/smoothed	P
4.3.2/RD	Handles and manual controls; force (N)	No loosening of any knobs.	P
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
4.4/RD	Protection against hazardous moving parts	No 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	P
4.4.4/RD	Protection in service access areas	See 4.4.1	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		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.	P

		refer to Annex M	
7.4.4	Equipment movement		P
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	Method 1 is used. No excessive temperatures. No easily burning materials employed, safety relevant components used within their specified temperature limits.	P
	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	With having the following parts: - components with windings - wiring - semiconductor devices, transistors, diodes, integrated circuits - resistors, capacitors, inductors 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	Plastic enclosure. (see appended table 4.3)	P
4.7.3.3/RD	Materials for components and other parts outside fire enclosures	See sub-clause 4.7.2/RD	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 provided.	N
4.7.3.6/RD	Materials used in high-voltage components	No high voltage components provided.	N
7.6	Battery location		P
7.6.1	Battery location	Battery is 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	P

		electrolyte and the gas emission are within the limits of this standard.	
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 batteries provided, unlikely emission of electrolyte.	P
7.6.7	Ventilation	Comply with Annex M.2	P
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	Genera	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	Not provided	N
5.3.3/RD	Transformers	(See appended Annex C)	P

5.3.4/RD	Functional insulation	Complies with a) and c).	P
5.3.5/RD	Electromechanical components	No electromechanical components in secondary circuit.	N
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	Compliance checked. No fire propagated beyond the equipment. No molten metal was emitted. Electric strength tests primary to PE was passed.	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		N
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	Basic insulation provided	P
	Supply voltage (V)		
	Current in the test circuit (mA)		
6.1.2.2/RD	Exclusions		N
6.2/RD	Protection of equipment users from over voltages on telecommunication networks		N
6.2.1/RD	Separation requirements	No telecommunication networks	N
6.2.2/RD	Electric strength test procedure	See sub-clause 6.2.2.2/RD	P
6.2.2.1/RD	Impulse test		N
6.2.2.2/RD	Steady-state test	For details see sub-clause 6.1.2.1/RD	P
6.2.2.3/RD	Compliance criteria	Complied for test of sub-clause 6.2.2.2/RD	P
6.3/RD	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A)		
3.5/RD	Interconnection of equipment		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits .		N
3.5.3/RD	ELV circuits as interconnection circuits		N
3.5.4/RD	Data ports for additional equipment		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)	N
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.4/RD	Creepage distances		N
2.10.4.1/RD	General		N
2.10.4.2/RD	Material group and comparative tracking index		N
	CTI tests		
2.10.4.3/RD	Minimum creepage distances		N
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		
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		P
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass		N

	exceeding 18 kg , and of stationary equipment (see 4.7.3.2/RD)		
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)		P
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
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		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)		P
	Position	1.) AVR/Inverter transformer TX 2.) Current transformer CT1	P
	Manufacturer		--
	Type		--
	Rated values		N
	Method of protection		N
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
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		
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		
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-clause1.6.1/RD.	P

EN 62040-1			
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])
Whole unit					
Battery (two provided, Model: IMPERIAL 1500)	YUASA	NPW45-12	12V, 45W	__	UL
Alternative	Ritar	RT1290	12V, 9Ah	—	UL
Alternative	MINHUA	MH9-12	12V, 9Ah	—	UL
Alternative	CSB	HR1234W	12V,34W	—	UL
Alternative	SHENZHEN LEOCH BATTERIES Technology Co.,Ltd	DJW12-9 .0	12V,9Ah	—	UL
Alternative	YUASA	NPH9-12	12V,9Ah		UL
Alternative	TOPLITE (GUANG ZHOU)	NPW45-12	12V,45W	—	UL
Alternative	SHEN ZHEN CENTER POWER Technology Co.,Ltd	HP12-45W	12V,45W	—	UL
Battery (two provided, Model: IMPERIAL 2000)	YUASA	NPW53-12	12V, 53W	__	UL
Alternative	CSB	NH14533(N)	12V, 54W	__	UL
Alternative	MINHUA	MH9-12	12V, 9Ah	—	UL
Alternative	SHENZHEN LEOCH BATTERIES Technology Co.,Ltd	DJW12-9 .0	12V,9Ah	—	UL
Alternative	Ritar	RT1290	12V, 9Ah	—	UL
Appliance outlet	RONG FENG	742W-2P-15-C3NA	15A250V Min	__	UL，VDE
Alternative	RICHBAY	Various	15A250V Min	__	VDE
Alternative	Shenzhen Delikang	Various	15A250V Min	__	VDE
Appliance inlet	RICHBAY	Various	10A250V Min	__	VDE
Alternative	RONG FENG	RF2004E4.8C14	10A250V	__	VDE

			Min Min		
Alternative	Shenzhen Delikang	Various	10A250V Min	__	VDE
All enclosure	POLYYES	Various	HB or better, thickness min 1.57mm	__	UL
Alternative	WEALFORM	Various	HB or better, thickness min 1.57mm	__	UL
Alternative	ENLY	Various	HB or better, thickness min 1.57mm	__	UL
Alternative	LG CHEMICAL LTD	Various	HB or better, thickness min 1.57mm	__	UL
Alternative	CHIMEI	Various	HB or better, thickness min 1.57mm	__	UL
Heat-shrinkable tube	Various	Various	VW-1,300V, 125° C	__	UL
All PCB	Various	Various	94V-0	__	UL
Input Relay (RY1 ,RY5)	GOLDEN	Various	16A, 250Vac Min	__	UL
Alternative	SONG CHUAN	793-P－1C	16A, 250Vac Min	__	UL
Alternative	HONGFA	Various	16A, 250Vac Min	__	UL
Alternative	Sunway	Various	16A, 250Vac Min	__	UL
Alternative	PINHENG	Various	16A, 250Vac Min	__	UL
Booster, Buck and Output Relays (RY2, RY3,RY4)	GOLDEN	Various	16A, 250Vac Min	__	UL
Alternative	SONG CHUAN	793-P－1C	16A, 250Vac Min	__	UL
Alternative	HONGFA	Various	16A, 250Vac Min	__	UL
Alternative	Sunway	Various	16A, 250Vac Min	__	UL
Alternative	PINHENG	Various	16A, 250Vac Min	__	UL
Current Transformer (CT1)	Lion	Various	CLASS B	__	UL
Alternative	CLICK	Various	CLASS B	__	UL
AVR Transformer (for	Dar Plus	Various	CLASS B	__	Test in the equipment

IMPERIAL 1500)					
Alternative	Mylar	Various	CLASS B	—	Test in the equipment
Alternative	CHUAN SHUN	Various	CLASS B	—	Test in the equipment
Alternative	GuangHua	Various	CLASS B	—	Test in the equipment
Alternative	NRE	Various	CLASS B	—	Test in the equipment
AVR Transformer (for IMPERIAL 2000)	Dar Plus	Various	CLASS B	—	Test in the equipment
Alternative	Mylar	Various	CLASS B	—	Test in the equipment
Alternative	CHUAN SHUN	Various	CLASS B	—	Test in the equipment
Alternative	GuangHua	Various	CLASS B	—	Test in the equipment
Alternative	NRE	Various	CLASS B	—	Test in the equipment
X capacitor （C2）	FARAD	Various	0.47UF275V Min X2 type	IEC 60384-14	VDE
Alternative	WINDAY ELECTRONIC INDUSTRIAL CO.,LTD	MPX	0.47UF275V Min X2 type	IEC 60384-14	VDE
Alternative	SHENZHEN JINGHAO CAPACITOR CO.,LTD	CBB62B	0.47UF275V Min X2 type	IEC 60384-14	VDE
Inverter MOSFETS （Q11~Q14; Q17~Q20）	Various	Various	≥75A, 30V	—	Test in the equipment
CNTL board					
Power cord set					
cable	Dura Hexa trans Co (DHT)	H05VV-F	0.75mm^2*3 G	—	VDE
Alternative	Yong Hao Electrical Industry Co.,Ltd	H05VV-F	0.75mm^2*3 G	—	VDE
Connector	Dura Hexatrans Co (DHT)	DHT35	10A 250V	—	VDE
Alternative	Dura Hexatrans Co (DHT)	VH3.96	10A 250V	—	VDE
Alternative	Yong Hao	YH-E-006	10A 250V	—	VDE

	Electrical Industry Co.,Ltd				
Plug	Dura Hexatrans Co (DHT)	DHT33	16A 250V	—	VDE
Alternative	Yong Hao Electrical Industry Co.,Ltd	YH-E-005	16A 250V	—	VDE
Alternative	Dura Hexatrans Co (DHT)	DHT33	10A 250V	—	VDE
Alternative	Dura Hexatrans Co (DHT)	DHT86	10A 250V	—	VDE
Alternative	Yong Hao Electrical Industry Co.,Ltd	YH-E-005	10A 250V	—	VDE
Supplementary information: An asterisk indicates a mark that assures the agreed level of surveillance.					

4.4 1.6.2/RD	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse#	P (VA)	Condition/status
Tested model IMPERIAL 1500						
220V/50Hz	6.5	9.9A	1050	--	1500	Normal load and with empty battery
220V/60Hz	6.09	9.9A	980	--	1400	Ditto
240V/50Hz	6.28	9.9A	1012	--	1445	Ditto
240V/60Hz	6.96	9.9A	1120	--	1600	Ditto
Tested model IMPERIAL 2000						
220V/50Hz	8.69	10A	1400	--	2000	Normal load and with empty battery
220V/60Hz	8.26	10A	1330	--	1900	Ditto
240V/50Hz	8.45	10A	1362	--	1945	Ditto
240V/60Hz	9.13	10A	1470	--	2100	Ditto
Supplementary information:						

5.1.1 and 2.1.1.7/RD	TABLE: discharge of capacitors in the primary circuit				N
Condition	τ calculated (s)	τ measured (s)	t u→ 0V (s)	Comments	
Note(s):					

5.1.4	TABLE: backfeek protection test			N
Condition	Voltage measured(V)/current(mA)			Comments
	L-N	L-G	N-G	
Note(s):				

5.2.1 and 2.2.2/RD	TABLE: SELV measurement (under normal conditions)			N
Transformer	Location	Voltage (max.) (V)		Voltage Limitation Component
		V peak	V d.c	
Supplementary information:				

5.2.1 and 2.2.3/RD	TABLE: SELV measurement (under fault conditions)		N
Location	Voltage (max.) (V)	Comments	
Supplementary information:			

5.2.3 and 2.4.2/RD		TABLE: Limited current circuit measurement				N
Condition	Location	Voltage (V)	Current (A)	Freq. (kHz)	Limit (mA)	Comments
Line mode	R9	0.35	0.175	60	0.7	Normal
Line mode	R13	0.34	0.175	60	0.7	Normal
Line mode	R9	0.38	0.190	60	0.7	R10 short
Line mode	R13	0.38	0.191	60	0.7	R14 short
Battery mode	L-N	0.04	0.02	60	0.7	Normal
Battery mode	N-PE	0.08	0.04	60	0.7	Normal
Battery mode	L-PE	0.08	0.04	60	0.7	Normal
Supplementary information:						

5.2.5 and 2.5/RD	TABLE: Limited power source measurement			N
	Limits		Measured	Verdict
According to Table 2B/2C (normal condition)				
current (in A)				
apparent power (in VA)				

According to Table 2B/2C (single fault condition)			
current (in A)			
apparent power (in VA)			
Supplementary information:			

5.3.1 and 2.6.3.4/RD	TABLE: Resistance of earthing measurement	P

Location	Resistance measured (m) / voltage drop(V)	Comments
Tested on model IMPERIAL 2000		
PE pin of input power cord's plug to PE contact of most distant outlet	53	Test current of 25A for 60s.
Supplementary information:		

7.5 and 8.3	TABLE: Abnormal operating and fault conditions					P
	ambient temperature (°C)			25° C， if not otherwise stated		
	model/type of power supply			See nameplate for details		
	manufacturer of power supply			See nameplate for details		
	rated markings of power supply			See nameplate for details		
Component No.	Fault	Test voltage (V)	Test time	Fuse No	Fuse current (A)	Observation
Output	s-c	240	3mins	Circuit Protector	--	UPS immediately fault, trace is open, no hazards. Output voltage: 0V Charger voltage: 27.2V Battery voltage: 25.8V
Output	s-c	Battery	3mins	--	--	UPS immediately fault, no hazards. Output voltage: 0V Battery voltage: 25.8V Recoverable when fault removed.
Output	o-l	240	4 h	Circuit Protector	--	UPS operation normally when load to 109%, No hazards. TX input coil=71.3℃, TX core=66.7℃, battery=50℃, TX output coil=59.8℃, enclosure of the UPS= 56.7℃, ambient=26.4℃.

						Unit shut down when loaded to 114% of rated output load, No hazards.
Output	o-l	Battery	1 min	--	--	Unit shut down when loaded to 105% of rated output load. No hazards
TX charge (red-blue)	S-C	240	4 mins	Circuit Protector	--	UPS immediately fault, charger shuttdown, no hazards. Output voltage: 0V Charger voltage: 0V Battery voltage: 25.8V Trace open
C29	S-C	Battery	2 mins	--	--	UPS immediately shutdown, no hazards. Output voltage: 0V Battery voltage: 25.8V Trace open.
Q20 D-S	S-C	240	3 mins	Circuit Protector	--	UPS immediately shutdown, no hazards. Output voltage: 0V Charger voltage: 0V Battery voltage: 25.8V Q12,Q14 damaged.
Q20 D-G	S-C	240	3 mins	Circuit Protector	--	UPS immediately shutdown, no hazards. Output voltage: 0V Charger voltage: 0V Battery voltage: 25.8V Q12,Q14 damaged.
Q20 S-G	S-C	240	5 mins	Circuit Protector		UPS fault, no hazards. Output voltage: 0V Charger voltage: 27.2V Battery voltage: 25.8V
Q3 D-S	s-c	Battery	4 mins	--	--	UPS immediately shutdown, no hazards. Output voltage: 0V Battery voltage: 25.8V Q18, Q20 damaged.
Q12 D-G	s-c	Battery	3 mins	--	--	UPS immediately shutdown, no hazards. Output voltage: 0V Battery voltage: 25.8V Q18, Q20damaged.
Q12 S-G	S-C	Battery	3 mins	--	--	UPS fault, no hazards. , no hazards. Output voltage: 0V Battery voltage: 25.8V

Note(s): s-c means short circuit. o-l means overload. o-p means open circuit.

5.7 and 2.10.2/RD	Table: Working voltage measurement		--
Location	RMS voltage (V)	Peak voltage (V)	Comments
--	--	--	--
--	--	--	--
--	--	--	--
Supplementary information:			

5.7 and 2.10.4/RD	ABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	Ur.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Primary circuit to SELV circuits through PCB	<420	<240	4.0	4.1	5.0	5.1
L/N to PE pole of appliance inlet/outlet	<420	<240	2.0	6	2.5	6
Supplementary information: 1. A minimum clearance of 2.0mm for each contact pair had been provided (required according to sub-clause 5.1.4: 1.4mm minimum). 2. The values in parentheses apply to BASIC INSULATION AUPPLEMENTARY INSULATION OR REINFORCED INSULATION if manufacturing is subjected to a quality control programme that provides at least the same level assurance as the example given in clause R.2 of Annex R.DOUBLE INSULATION and REINFORCED INSULATION shall be subjected to ROUTINE TESTS for electric strength. 3. All internal wires soldered on PCB are additional crimped with connectors for soldering. Shrink tubings are used to cover the tab connectors.						

5.8, 2.1.1.3/RD and 2.10.5.1 /RD	ABLE: Distance through insulation measurements				N
Distance through insulation (DTI) at/of:	Upeak (V)	U r.m.s. (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Supplementary information: * See appended table 4.5.					

6.8.2 and 9	ABLE: 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
Tested on model IMPERIAL 2000			
Primary to enclosure	--	AC 3000	NO
Primary to ground (mains inlet/outlet conductor to output grounding)	--	AC 1500	NO
All TX transformers primary windings to secondary windings (all types for basic insulation)	--	AC 1500	NO
All TX primary windings to core (all types for basic insulation)	--	AC 1500	NO
Supplementary information: Test after humidity treatment, heating test, and each fault condition test of 8.3.			

7.4, 4.5.5/RD	TABLE: Ball pressure test of thermoplastic parts		N
	Allowed impression diameter (mm)	≤2mm	
Part		Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

7.4.2	Table: Enclosure opening measurements	P
Location	Size (mm)	Comments
Top	None	No openings.
Bottom	None	No openings.
Side	Width 1.0mm openings	19x4 provided.
Front	None	No openings.
Back	--	No openings.
Supplementary information:		

7.5	Table: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence

enclosure	POLYYES	--	V-1 Thickness Min:1.57mm	--	UL
Alternative	Chi Mei	--	V-1 Thickness Min:1.57mm	--	UL
Alternative	WEALFORM	--	V-1 Thickness Min:1.57mm	--	UL
Alternative	ENLY	--	V-1 Thickness Min:1.57mm	--	UL
Alternative	POLYYES	--	V-2 Thickness Min:1.57mm	--	UL
Supplementary information:					

7.7	TABLE: Temperature test			P
	Supply voltage (V)	See below		--
	Ambient T1 ºC	See below		--
	Ambient t2 ºC	See below		--

temperature rise dT of part/at:	Tmax (ºC) T (ºC)			Requiped dT
	198V/60Hz	254V/60z	Battery mode	
Inlet	11.5	8.1	2.3	30
Outlet	8.0	8.2	10.3	30
Relay RY 01 coil	45.3	40.4	11.1	90
Relay RY 02 coil	45.3	45.7	34.9	90
Relay RY 03 coil	28	40.4	14.5	90
Relay RY 04 coil	44.5	28.7	11.5	90
Relay RY 05 coil	45.3	41.1	12.0	90
CT1 coil	35.2	37.8	30.4	70
Q13 Body	22.3	24.5	60.4	90
PCB near Q18	23.1	23.6	68.5	90
Battery wire	22.6	24.3	50.4	65
Battery	9.2	8.9	22.8	15/30
Main transformer core	45.1	50.7	51.1	70
Main transformer coil	39.5	52.6	54.7	70
Input L wire	23.6	20.4	10.3	65
Bottom enclosure under inverter AVR transformer	25.7	28.6	36.0	55
Ambient	31.1	31.8	31.4	--

Temperature T of winding:	R1 (Ω)	R 2(Ω)	T1 (°C)	T 2 (°C)	T (°C)	Allowed Tmax (°C)	Insulation class
Supplementary information:							

The maximum ambient temperature permitted by the manufacturer's specification is 40°C.

8.1	TABLE: earth leakage current				P
Condition	Location	Current (A)	Freq. (Hz)	Limit (mA)	Comments
Tested on model IMPERIAL 2000					
Unit on	L	0.001	50	3.5	To PE
Unit on	N	0.001	50	3.5	Ditto
Unit on	L	0.005	50	0.25	To Enclosure
Unit on	N	0.005	50	0.25	Ditto
Supplementary information: supply with 264V/50Hz					

C2.	Safety isolation transformer		N
Construction details:			
Transformer			
Mfr.: see table 1.5.1			
Type: see table 1.5.1			
All transformers are identical except for type designation, and wire gauge and number of turns in secondary winding.			
Recurring peak voltage			
Required clearance for reinforced			
Insulation (from table 2K and 2L)			
Effective voltage rms			
Required creepage for reinforced			
insulation (from table 2N)			
Measured min. creepages			
Location		inside (mm)	outside (mm)
prim-sec			
prim-core			
sec-core			
prim-prim		%	%
Measured min. clearances			
Location		inside (mm)	outside (mm)
prim-sec			
prim-core			
sec-core			
prim-prim		%	%
Construction:			
Concentric windings on EE16 type core. At least one layer insulation between primary and secondary windings. The primary windings and secondary winding were soldered to lead pins moulded in bobbin.			
Pin numbers			
Prim.			
Sec.			
Bobbin			
Material			

Thickness	
Electric strength test	
With AC 3000V after humidity treatment	
Result	

M	Ventilation of battery compartments	P
	The required dimension for the ventilation openings will be calculated with the following formula:	
	A > K1 * Q with Q = (0.054 m^3/Ah) * n * I * C where: K1： constant factor of 28 h * cm^2/m^3 Q： airflow in m^3/h n ： number of battery cells I ： constant factor (0,2A/100Ah for valve regulated lead acid batteries) C ： nominal capacity of the battery	
	with the specific data for the UPS the following dimension for the ventilation openings is required:	
	External battery pack N: 1 C: 9 A > 28 h * cm^2/m^3 * (0.054 m^3/Ah) * n * 0.2 A/100 Ah * C A > 0.027cm^2	
	Verdict	
	The size of ventilation openings in battery cabinet exceeds the required airflow by far.	

APPENDIX I

Copy of the warning label:

APPENDIX II

Pictures

Fig.1 overview（Ⅰ）

Fig.2 overview（Ⅱ）

Pictures

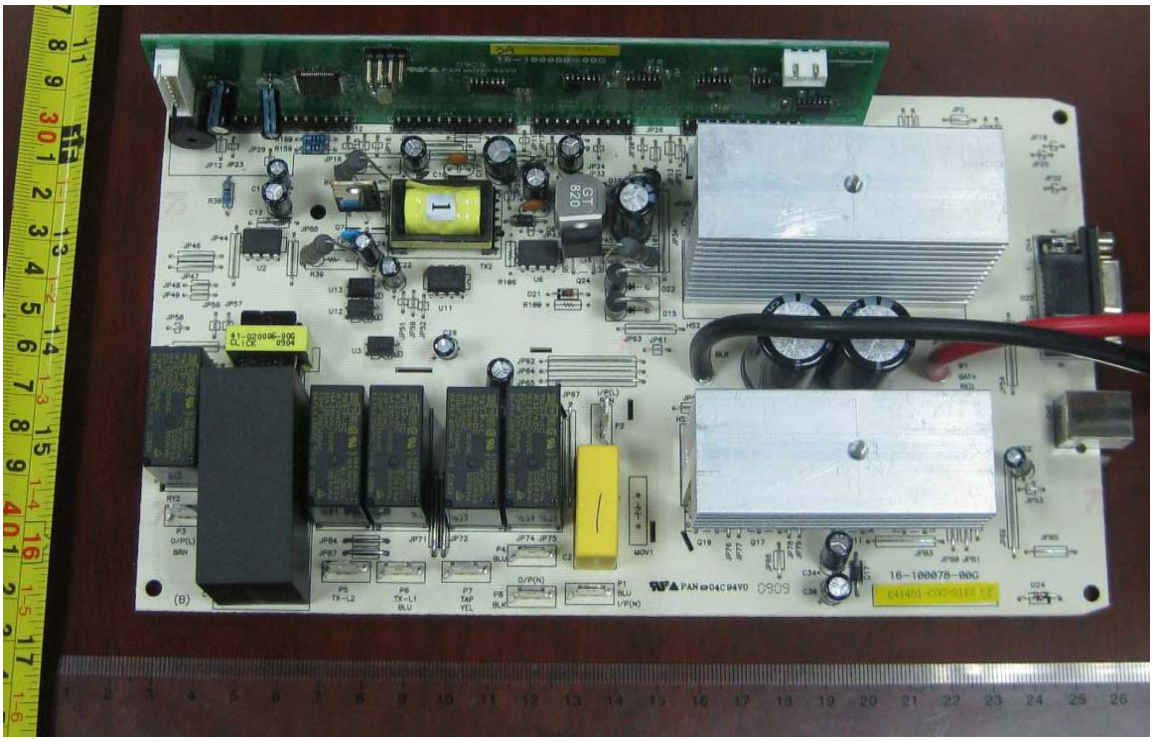

Fig.3 overview（III）

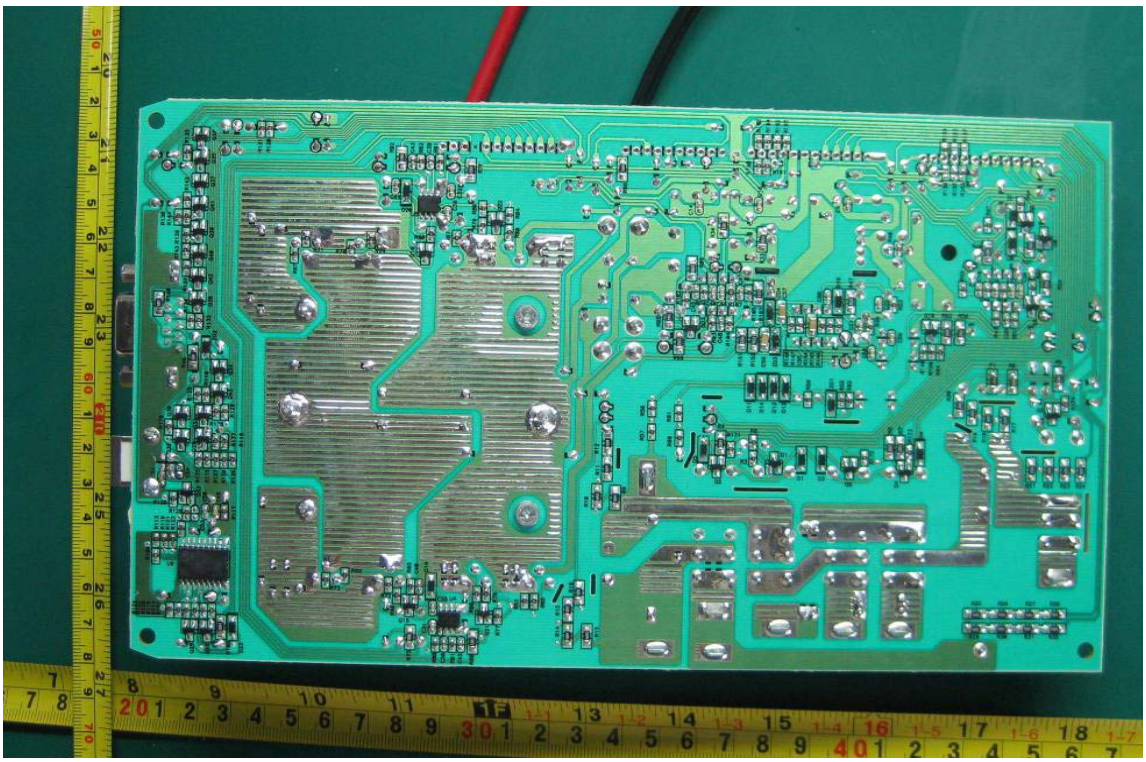

Fig.4 overview（IV）