

APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model(s): RM090/15X, RM060/10X, PM15X, RM045/15X

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

**Prepared By : EMTEK (Shenzhen) Co., Ltd.
Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China
Tel: +86-755-26954280
Fax: +86-755-26954282**

TEST REPORT IEC 62040-1 Uninterruptible power systems (UPS) – Part 1: General and safety requirements for UPS	
Report Reference No.....	ES160229036S
Compiled by (name + signature).....	James Dan
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	5# 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_1C
Test Report Form(s) Originator.....	TÜV Rheinland Japan Ltd.
Master TRF	Dated 2014-01
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Test item description	Uninterruptible Power Systems
Trade Mark	INVT
Manufacturer	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address	5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055
Model/Type reference	RM090/15X, RM060/10X, PM15X, RM045/15X
Ratings	For model: RM090/15X AC Input: 380/400/415V~, 3φ+N+PE, 50/60Hz, 180A Max. Batt. Input: ±240V---, 240Amax AC output: 380/400/415VAC,



3 ϕ +N+PE, 50/60Hz, 90KVA/90KW
Icw: 10KA

For model: RM090/15

AC Input: 380/400/415V \sim , 3 ϕ +N+PE, 50/60Hz, 30A Max.

Batt. Input: \pm 240V --- , 39A Max.

AC output: 380/400/415V \sim ,

3 ϕ +N+PE, 50/60Hz, 15KVA/15KW

Icw: 10KA

For Model: RM060/10X

AC Input: 380/400/415VAC, 3 ϕ +N+PE, 50Hz/60Hz 120Amax

Output: 380/400/415VAC, 3 ϕ +N+PE, 50Hz/60HZ 60KVA/60KW

Battery input: \pm 240VDC, 160Amax

Icw:10kA

For model: RM045/15X

Input: AC Input: 380/400/415VAC, 3 ϕ +N+PE, 50Hz/60Hz 90Amax

Output: 380/400/415VAC, 3 ϕ +N+PE, 50Hz/60HZ 45KVA/45KW

Battery input: \pm 240VDC, 120Amax

Icw:10kA

Test item particulars	
Equipment mobility	<input type="checkbox"/> movable <input checked="" type="checkbox"/> stationary <input type="checkbox"/> for building-in
Connection to the mains.....	<input type="checkbox"/> pluggable equipment <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord
Operating condition	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
Access location	<input checked="" type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location
Over voltage category (OVC)	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
Mains supply tolerance (%) or absolute mains supply values	-20%, +10.8%
Tested for IT power systems	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
IT testing, phase-phase voltage (V)	--
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Not classified
Pollution degree (PD)	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
IP protection class	IP20
Altitude during operation (m)	Up to 2000
Altitude of test laboratory (m)	below 2000
Mass of equipment (kg)	Approx. 151 Kg
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	November 01, 2015
Date(s) of performance of tests	November 01, 2015 to November 05, 2015
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 60950-1:2013, which is referred to in this TRF as "RD".

General product information:

1. The equipment is an Uninterruptible Power Systems 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, battery, control circuits to the RS232 of the PC interface are dimensioned for reinforced insulation and suitable distance through insulation. The test samples are pre-productin without any serial number.

3. Model difference description:

All models are designed with same control logic, constructions, PCB Layout except for UPS module, model name and ratings.


Summary of testing:

The product has been tested according to standard EN 62040-1: 2008+A1: 2013.


- 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 RM090/15X.

Uninterruptible Power Systems	lcv: 10KA
Model: RM090/15X	
Input: AC Input: 380/400/415VAC, 3φ+N+PE, 50Hz/60Hz 180Amax	
Output: 380/400/415VAC, 3φ+N+PE, 50Hz/60HZ 90KVA/90KW	
Battery input:±240VDC, 240Amax	
	
Made in China	
Manufacturer:	
INVT POWER SYSTEM(SHENZHEN)CO., LTD	
5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055	
Importer: xxxxxx	
Address: xxxxxx	
Battery must be recycled.	
WARNING! Risk of electric shock.	


2. Rating label for model PM15X

Uninterruptible Power Systems	lcv: 10KA
Model: PM15X	
Input: AC Input: 380/400/415VAC, 3φ+N+PE, 50Hz/60Hz 30Amax	
Output: 380/400/415VAC, 3φ+N+PE, 50Hz/60HZ 15KVA/15KW	
Battery input:±240VDC, 39Amax	
	
Made in China	
Manufacturer:	
INVT POWER SYSTEM(SHENZHEN)CO., LTD	
5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055	
Importer: xxxxxx	
Address: xxxxxx	
Battery must be recycled.	
WARNING! Risk of electric shock.	



3. Rating label for model **RM060/10X**

<p>Uninterruptible Power Systems Icw:10kA</p> <p>Model: RM060/10X</p> <p>Input: AC Input: 380/400/415VAC, 3φ+N+PE, 50Hz/60Hz 120Amax</p> <p>Output: 380/400/415VAC, 3φ+N+PE, 50Hz/60HZ 60KVA/60KW</p> <p>Battery input:±240VDC, 160Amax</p> <div style="text-align: center;">  </div> <p>Made in China Manufacturer: INVT POWER SYSTEM(SHENZHEN)CO., LTD 5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055 Importer: xxxxxx Address: xxxxxx Battery must be recycled. WARNING! Risk of electric shock.</p>
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4. Rating label for model **RM045/15X**

<p>Uninterruptible Power Systems Icw:10kA</p> <p>Model: RM045/15X</p> <p>Input: AC Input: 380/400/415VAC, 3φ+N+PE, 50Hz/60Hz 90Amax</p> <p>Output: 380/400/415VAC, 3φ+N+PE, 50Hz/60HZ 45KVA/45KW</p> <p>Battery input:±240VDC, 120Amax</p> <div style="text-align: center;">  </div> <p>Made in China Manufacturer: INVT POWER SYSTEM(SHENZHEN)CO., LTD 5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055 Importer: xxxxxx Address: xxxxxx Battery must be recycled. WARNING! Risk of electric shock.</p>

5. Warning label on outer enclosures

<p>⚠ WARNING</p> <p>CHARGED CAPACITORS DISCHARGE TIME 5 MINUTES AFTER DISCONNECTION OF UPS AND BATTERY.</p> <hr/> <p>⚠ CAUTION</p> <ul style="list-style-type: none"> ■ HIGH LEAKAGE CURRENT, EARTH CONNECTION ESSENTIAL BEFORE CONNECTING UPS. ■ DO NOT REMOVE COVERS. THIS SYSTEM IS TO BE SERVICED BY QUALIFIED SERVICE PERSONNEL ONLY. ■ HAZARDOUS LIVE PARTS INSIDE THIS UPS ARE ENERGIZED FROM THE BATTERY SUPPLY EVEN WHEN THE AC INPUT POWER IS DISCONNECTED. ■ SEE USER MANUAL FOR INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS. <hr/> <p>OPERATION INSTRUCTION</p> <ul style="list-style-type: none"> ■ BATTERY VOLTAGE&CONNECTION MUST COMPLY WITH UPS SPECIFICATION. ■ MANUAL BATTERY DISCHARGE RECOMMENDED FOR EVERY 3 MONTHS CONTINUOUS OPERATION WITHOUT ANY BATTERY DISCHARGE. ■ DISCONNECTION OF THE AC SOURCE AND THE DC SOURCE IS REQUIRED FOR COMPLETE LOAD POWER OFF. ■ WARRANTY VOID IF SERIAL NO.PLATE IS DAMAGED. 	<p>⚠ CAUTION</p> <ul style="list-style-type: none"> ■ CONFIRM UPS IS ON BYPASS MODE BEFORE CLOSE Q2. FOR MORE DETAILS PLEASE REFER TO THE USER MANUAL. ■ PRESS THE "OFF" BUTTON ON POWER MODULE BEFORE PULL OUT IT. DO NOT REMOVE MODULE'S COVER UNTIL 10 MINUTES AFTER IT IS PULLED OUT. ■ CONFIRM UPS IS ON MAINTENANCE MODE OR POWER OFF MODE BEFORE PULL OUT THE MONITORING MODULE.
	<p>③ 尺寸:60x30mm</p>
	<p>⚠ DANGER</p> <p>RISK OF ELECTRIC SHOCK.DO NOT TOUCH UNINSULATED BATTERY TERMINAL.</p>
	<p>④ 尺寸:20x20mm</p>
	<p>R1  R1 </p>

EN 62040-1: 2008+A1: 2013			
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 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

EN 62040-1: 2008+A1: 2013

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)	See rating label	P
	Input rated current/range (A).....	See rating label	P
	Input symbol for nature of supply (d.c.)	===	P
	Input rated frequency/range (Hz)	50/60Hz	P
	Number of Input phases and neutral.....	380/400/415V~	P
	Output rated voltage/range (V)	Not marked.	P
	Output rated current/range (A)	3Ø	N
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current)	See rating label	N
	Number of output phases and neutral.....	See rating label	P
	Output rated active power (W)	AC output	P
	Output rated apparent power (VA)	50/60Hz	P
	Output symbol for nature of supply (d.c.)		N
	Output rated frequency/range (Hz)	INVT	P
	Ambient operating temperature range (°C).....	0-40°C	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	Class I equipment.	N
	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

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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)	Marking near holders for fuses.	P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1/RD	Protective earthing and bonding terminals	Polarity of battery terminals is indicated according to IEC 60417(+ and -) on the batteries. Indicated with red cooler (+) for positive side and black color (-) for negative side.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors		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 LCD 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		N
4.7.12	Protection in building installation		N
	Rated short-time withstand current (/cw)		N
	Rated conditional short circuit current (/cc)		N
	a) If higher Icp stated ≤ 10 kA		N
	a) If higher Icp stated > 10 kA		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 User's Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N

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Clause	Requirement + Test	Result - Remark	Verdict
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.	
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
	Warning label	Warning language with information: Caution: Lead-acid battery inside the enclosure, it may cause chemical hazard. The battery may presents a risk of electric shock and energy hazards. For disposal instructions for the battery, see user's manual.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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 (RS232 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
	Working voltage (V _{peak} or V _{rms}); 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 RS-232 and RJ45 ports are isolated from the hazardous energy level of the battery inside the UPS.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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 > 0.1 μF, 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	Not for restricted access area	N
	Hazardous energy level		N
5.1.4	Backfeed protection	See below	--
	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)	--
	Description of the construction:	Backfeed protection was provided externally to the UPS in the a.c. input line.	P
	Air gap is employed for backfeed protection		P
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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
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 μ F) :		
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 :	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		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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)		
	Current rating of overcurrent protective device (A)		
	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	Screw terminal used.	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 employed.	N
2.6.3/RD	Protective earthing and protective bonding conductors	Through approved enclosure.	P
2.6.3.1/RD	General	Compliance checked.	P
2.6.3.2/RD	Size of protective earthing conductors	See below.	P
	Rated current (A), cross-sectional area (mm ²), AWG :	According to table 3B.	
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 (mm ²), 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
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) :		

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Clause	Requirement + Test	Result - Remark	Verdict
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		P
2.6.5.4/RD	Parts that can be removed by an operator		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	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

5.4	AC and d.c. power isolation		P
5.4.1	General	Only one external supply of hazardous voltage or energy (via appliance inlet).	P
3.4/RD	Disconnection from the mains supply		P
3.4.1/RD	General requirement		P
3.4.2/RD	Disconnect devices		N
3.4.3/RD	Permanently connected equipment		P
3.4.4/RD	Parts which remain energized	Adequate protection provided to service personnel during backup and maintenance mode.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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 equipment	Three-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 input breaker.	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
5.5.2	Basic requirements	Equipment relies on fuse protection of the building installation in regard to L to N short-circuits. Over current protection is provided by the built-in circuit 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

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Clause	Requirement + Test	Result - Remark	Verdict
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	Icw: 10KA	P
5.5.4.1	General		N
5.5.4.2	Modes of operation		N
5.5.4.3	Test procedure		N
5.5.4.3.1	General application		N
	Rated UPS output current/(r.m.s) (A)		N
	Prospective test current/(r.m.s) (A)		N
	Typical power factor		N
	Initial asymmetric peak current ration (I_{pk} / I_{cw}) ..		N
	Minimum duration of prospective test current (cycles 50/60 Hz)		N
5.5.4.3.2	Exemption from testing		N
5.6	Protection of personnel – Safety interlocks <i>(No safety interlock provided for operator protection since there are no liable hazards capable of harming the operator during operation).</i>		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

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Clause	Requirement + Test	Result - Remark	Verdict
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 functional insulation	See 5.3.4.	N
2.10.1.4/RD	Intervening unconnected conductive parts	No such part.	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.	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.2/RD	Determination of working voltage		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. 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) 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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	Approved optocoupler complies to IEC 60747-5-2 with $d_{ti} \geq 0.4\text{mm}$ used.	P
2.10.5.5/RD	Cemented joints	No cemented joint.	N
2.10.5.6/RD	Thin sheet material – General	At least layers	P
2.10.5.7/RD	Separable thin sheet material	AC 3000V for each layer of insulation (See appended table 5.8)	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		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		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 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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	(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	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	Pollution Degree 2	N
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	All internal wires are UL recognized wiring which is PVC insulated. Rated VW-1, 600V, minimum 105°C. Internal wiring gauge is suitable for current intended to be carried. Internal wiring for primary power distribution protected against overcurrent by built-in input fuse.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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
3.1.9/RD	Termination of conductors	All conductors are reliably 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	Sleeving used to provide supplementary/ reinforce insulation.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Only one 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/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.	N
3.2.5.1/RD	AC power supply cords		N
	Type		--
	Rated current (A), cross-sectional area (mm ²), AWG		--
3.2.5.2/RD	DC power supply cords	Not connected to 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 :		P
	More than one supply connection :	Single voltage range supply connection.	N

6.3	Wiring terminals for external power conductors		P
3.3/RD	Wiring terminals for connection of external conductors		N
3.3.1/RD	Wiring terminals		P
3.3.2/RD	Connection of non-detachable power supply cords		P
3.3.3/RD	Screw terminals		N

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Clause	Requirement + Test	Result - Remark	Verdict
3.3.4/RD	Conductor sizes to be connected		N
	Rated current (A), cord/cable type, cross-sectional area (mm ²)		
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) :	800N applied to UPS.	P

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		N
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

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Clause	Requirement + Test	Result - Remark	Verdict
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 :		N
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 loosening of any knobs.	N
4.3.3/RD	Adjustable controls	No hazardous adjustable controls.	N
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		P
4.4.1/RD	General	DC fan located at primary 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		N
4.4.5.1/RD	General		N
	Not considered to cause pain or injury. a) :		N
	Is considered to cause pain, not injury. b) :		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Considered to cause injury. c) :		N
4.4.5.2	Protection for users		N
	Use of symbol or warning :		N
4.4.5.3	Protection for service persons		N
	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
	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	(See appended table 4.3)	P

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Clause	Requirement + Test	Result - Remark	Verdict
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 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		N
7.6.3	Distance		N
7.6.4	Case insulation	No Ni-Cd battery used inside.	N
7.6.5	Wiring	The protection of connecting wiring complies with subclause 6, details see there.	P
7.6.6	Electrolyte spillage		N
7.6.7	Ventilation		N
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		P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P

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Clause	Requirement + Test	Result - Remark	Verdict
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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
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		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		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		N
6.2.1/RD	Separation requirements		N

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Clause	Requirement + Test	Result - Remark	Verdict
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		N
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
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)	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

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Clause	Requirement + Test	Result - Remark	Verdict
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	Ringling 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 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)		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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)		P
B.1/RD	General requirements	All fans are separately certified, see list of critical components. Only fan block test performed, for temperature, see fault condition tests	P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
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 :	No isolating transformer.	N
	Manufacturer :		N
	Type :		N
	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
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F/RD	Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD)		P
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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

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Clause	Requirement + Test	Result - Remark	Verdict
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
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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

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Clause	Requirement + Test	Result - Remark	Verdict
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 relevant tests.	P
L.5	Reference non-linear load		N
L.5.1	Test method		N
L.5.2	Connection of the non-linear reference load		
L.5.3	Connection of the non-linear reference load		N

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
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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
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Clause	Requirement + Test	Result - Remark	Verdict
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⁾
Whole unit					
Enclosure	Various	Steel/Aluminium			
Breaker	LS	LS-ABE203b	225A 3P	IEC60947-2	--
DC fan	NMB-MAT	3110KL05WB8 9B00	DC24V, 0.23A, 5.52W	--	UL:E89936 LR65829 1507300
Material of Front panel	Chi-Mei	PA-757	--	--	UL:E56070
Insulation sheet	FORMEX	Formex GK-10	--	--	UL:E256266/E1 21855
wire	Various	Various	---	---	UL:E314168
ON PS1504_KY1					
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1203_CT1					
Y2 capacitor (C265,C266,C 267)	Various	CD16- E2GA472MYG S	250VAC/ 4700pF	IEC 60384- 14	VDE:124321
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1502_DR1 board					
DC capacitor (C167,C168)	Jianghai	CD293 450V/100uf	450V, 100uF	--	UL
PFC inductor (L4,L5,L6,L7,L 8,L9)	various	UMX3315L1	Class F	--	Test with appliance
inductor (L1,L2,L3)	various	UMX3315L4	Class F		Test with appliance
current transformer(T 2,T3,T5,T6)	various	UMX33CT1	Class B		Test with appliance
fuse (F1,F2,F3)	various	ABC-V30-R 0324030.MXP	30A, 250VAC		UL E19180 CSA 53787
Fuse (F4,F6,F7,F8)	various	GBH- V030A6FR 0505030.MEX P	30A, 500VAC		UL E56412 UL E10480

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1410_DR2					
Y2 capacitor (C83)	TDK	CS11-E2GA222MYNS	250VAC/2200Pf	IEC 60384-14	VDE:124321
DC capacitor (C19,C21,C22,C23)	Jianghai	CD293-820Uf ± 20%/450V/85°C/35*60	820Uf ± 20%/450V/85°C/35*60		UL
IGBT (Q1,Q2,Q3,Q4,Q5,Q6)	infineon	IKW50N65H5	50A/650V		
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1410_DR3					
PCB	Various	Various	V-0, 130°C	--	UL
IGBT (Q1,Q2,Q3,Q4,Q5,Q6)	infineon	IKW25N120T2	25A,1200V		
IGBT (Q7, Q8, Q9, Q10, Q11, Q12)	infineon	IKW40N60H3	40A,600V		
Y capacitor (C18, C19, C20, C21)	TDK	CD16-E2GA472MYGS	250VAC, 4700pF	IEC 64+IEC384-14	BS EN 226495 EN132400
ON PS1506_DR4					
Inductor(L1,L2,L3)	Various	UMX3315L2	Class F	--	Test with appliance
Optocouplers (U7)	NEC	PS2561L-1-V-F3-A-L	--	--	UL:E72422,
Transformer (T2)	Various	UMX3310T1	Class B		Test with appliance
Transformer	Various	UMS33P1T2	Class B		Test with appliance
fuse (F1,F2,F3)	various	ABC-V30-R 0324030.MXP	30A, 250VAC		UL E19180 CSA 53787
Y capacitor (C107,C108,C109,C110,C111,C112)	TDK	CD16-E2GA472MYGS	250VAC, 4700pF	IEC 64+IEC384-14	BS EN 226495 EN132400
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1410_TF3					

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
Fuse (F1-F4)	various	GBH-V030A6FR 0505030.MEX P	30A, 500VAC		UL E56412 UL E10480
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1410_TF4					
PCB	Various	Various	V-0, 130°C	--	UL
Y2 capacitor(C3)	TDK	CS11-E2GA222MYN S	250VAC/ 2200Pf	IEC 60384-14	VDE:124321
ON PS1203_PW5					
Optocouplers (U1)	Various	PC123X5YIP0 F-UL	--	EN60747-5-2 EN60065 EN60950	VDE 40008087
Inductor (L1)	Various	UMS33C3L1			Test with appliance
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1312_DR7					
Y capacitor (C4, C5)	TDK	CS11-E2GA222MYN S	250VAC/ 2200Pf	IEC 60384-14	VDE:124321
Transformer	Various	UMS33P1T2	-		
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1203_PW3					
Y capacitor (C68)	TDK	CS11-E2GA222MYN S	250VAC/ 2200Pf	IEC 60384-14	VDE:124321
PCB	Various	Various	V-0, 130°C	--	UL
ON PS1203_TF3					
Optocouplers (U6-U13,U19)	Various	PC123X5YIP0 F-UL	--	EN60747-5-2 EN60065 EN60950	VDE 40008087
Relay (RLY1,RLY2, RLY3,RLY4)	Various	892-1CC-C-24VDC			CSA 1245129 TUV R50006512 VDE 40006318 UL E88991
ON PS1203_MN1					

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
PCB	Various	Various	V-0, 130°C	--	UL
Optocouplers (U12,U13,U14 ,U15,U16,U25 ,U29)	Various	PC123X5YIP0 F-UL	--	EN60747-5-2 EN60065 EN60950	VDE 40008087
Inductor (L1,L2,L3)	Various	UMS33P1L2	Class B		Test with appliance
Inductor (L5)	Various	UMS33C3L1	Class B		Test with appliance
ON PS1502_CV3					
PCB	Various	Various	V-0, 130°C	--	UL
Y2 capacitor(C23 -C26)	TDK	CS11-E2GA222MYN S	250VAC/ 2200Pf	IEC 60384-14	VDE:124321
Y capacitor (C7,C9-C12)	TDK	CD16-E2GA472MYG S	250VAC, 4700pF	IEC 64+IEC384-14	BS EN 226495 EN132400
MOV(R1-R7)	Brightking	821kd20	820Vdc±10%- D20mm-6500A	IEC61051-1,IEC61051-2	40027827
Thermal fuse (F1-F7)	Tamura	T3F115	250V,2A,115c		VDE,UL
ON PS1203_TF4					
PCB	Various	Various	V-0, 130°C	--	UL
¹) an asterisk indicates a mark which assures the agreed level of surveillance.					

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Clause	Requirement + Test	Result - Remark	Verdict

4.4 1.6.2/RD	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	I _{rated} (A)	P (W)	Fuse #	P (VA)	Condition/status
Tested on model RM090/15X						
Input breaker	--	304V/50H Z	70796	71100	135	Charging of empty batteries and rated output load 90KVA/90KW.
Input breaker	136	380V/50H Z	86448	86880	132	Ditto
Input breaker	136	400V/50H Z	86200	86775	126	Ditto
Input breaker	136	415V/50H Z	85560	86362	120	Ditto
Input breaker	--	460V/50H Z	85614	86045	108	Ditto
Input breaker	--	304V/60H Z	70790	71100	135	Ditto
Input breaker	136	380V/60H Z	88026	88458	134	Ditto
Input breaker	136	400V/60H Z	87945	88348	128	Ditto
Input breaker	136	415V/60H Z	87922	88260	123	Ditto
Input breaker	--	57880/581 60	86820	87240	110	Ditto
Tested on model RM090/15						
Input breaker	--	304V/50H Z	94394	94800	180	Charging of empty batteries and rated output load 15KVA/15KW.
Input breaker	180	380V/50H Z	115260	115840	176	Ditto
Input breaker	180	400V/50H Z	114912	115700	167	Ditto
Input breaker	180	415V/50H Z	114080	115150	160	Ditto
Input breaker	--	460V/50H Z	114160	114726	144	Ditto
Input breaker	--	304V/60H Z	94394	94800	180	Ditto

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Clause	Requirement + Test	Result - Remark	Verdict

4.4 1.6.2/RD	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	I _{rated} (A)	P (W)	Fuse #	P (VA)	Condition/status
Input breaker	180	380V/60Hz	117368	117944	179	Ditto
Input breaker	180	400V/60Hz	117260	117798	170	Ditto
Input breaker	180	415V/60Hz	117230	117680	164	Ditto
Input breaker	--	460V/50Hz	115760	116320	146	Ditto
Supplementary information:						

5.1.1 and 2.1.1.7/RD	TABLE: discharge of capacitors in the primary circuit				P
Condition	τ _{calculated} (s)	τ _{measured} (s)	t _{u→0V} (s)	Comments	
Tested on model RM090/15X					
Power switch on (L1-N)	--	8	12	Vi= 376 V _p , 37% of Vi= 139 V _p , No load applied	
Power switch on (L2-N)	--	8	12	Vi= 376 V _p , 37% of Vi= 139 V _p , No load applied	
Power switch on (L3-N)	--	8	12	Vi= 376 V _p , 37% of Vi= 139 V _p , No load applied	
Power switch on (N-PE)	--	<1V	12	Vi= 376 V _p , 37% of Vi= 139 V _p , No load applied	
Note(s):					
1. Relevant discharge resistance: discharged through circuit					

5.1.2	TABLE: distance through insulation measurements			P
distance through insulation di at/of:	Up (V)	test voltage (V)	required di(mm)	di (mm)
Optocoupler	<420	3000V _{a.c.}	0.4	>0.4 ¹⁾

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Clause	Requirement + Test	Result - Remark	Verdict

Note(s):

1). Approved component. For details refer to table 4.3.

5.1.4	TABLE: Backfeed protection test			P
Condition	Voltage measured (V)/current (mA)			Comments
	L-N	L-G	N-G	
Tested on model RM090/15X				
No load	6V	5.6V	0.3V	Battery mode. Normal
Full load	4.2V	6.8V	0.5V	Battery mode. Normal
Note(s):				

5.2 2.2.2/RD	TABLE: insulation / hazardous voltage measurement			N
Transformer	Location	max. Voltage		Voltage Limitation component
		V peak	V d.c.	
Note(s):				

5.2 2.2.3/RD	TABLE: insulation / SEL voltage measurement		N
Location	Voltage measured (V)	Comments	
Note(s):			

5.2.3 and 2.4.2/RD	TABLE: Limited current circuit measurement					N
Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments	
Supplementary information:						

5.2.5 and 2.5/RD	TABLE: Limited power source measurement		N
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Clause	Requirement + Test	Result - Remark	Verdict
	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 (mΩ) / voltage drop(V)	Comments
Tested on model RM090/15X		
I/P earth →O/P earth	1V	Test current of ___320___A for _8_ min.
I/P earth →metal enclosure	1V	Ditto
I/P earth →earth on PCB	1V	Ditto
Supplementary information:		

7.5 and 8.3	TABLE: fault condition tests						P	
	ambient temperature (°C)						25°C, if not otherwise stated	--
	model/type of power supply						See below	--
	manufacturer of power supply						See nameplate for details	--
	rated markings of power supply						See nameplate for details	--
No	component No.	fault	test voltage (V)	test time (s)	fuse no.	fuse current (A)	Result	
Tested on model RM090/15X								
On 1506 DR4 PCB								
1	U7 pri	s-c	415	10min	F1, F2, F3	0	Unit shutdown and no output. No hazard.	
2	U7 sec	s-c	415	10min	F1, F2, F3	0	Unit shutdown and no output. No hazard.	

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Clause	Requirement + Test					Result - Remark	Verdict
3	D54	s-c	415	10min	F1, F2, F3	20.5	Systems operated normally. Display screen show "Communication module fault". No any hazards.
4	D55	s-c	415	10min	F1, F2, F3	20.1	Systems operated normally. Display screen show "Communication module fault". No any hazards.
5	Q15	s-c	415	10min	F1, F2, F3	0	Unit shutdown and no output. No hazard.
6	Q16	s-c	415	10min	F1, F2, F3	0	Unit shutdown and no output. No hazard.
7	C37	s-c	415	10min	F1, F2, F3	0	UPS transfer to bypass mode, alarms "output shorted", "overload timeout", "Load on bypass"
8	D83	s-c	415	10min	F1, F2, F3	0	The power module will be shutdown and the LEDs will be dark, and red after seconds, and then dark again.
9	D82	s-c	415	10min	F1, F2, F3	0	The power module will be shutdown and the LEDs will be dark, and red after seconds, and then dark again.
10	C65	s-c	415	10min	F1, F2, F3	19.8	Systems operated normally. LBS communication abnormal. No any hazards.
11	C66	s-c	415	10min	F1, F2, F3	20.1	Systems operated normally. LBS communication abnormal. No any hazards.
12	T2 (pin8-9)	s-c	415	60min	F1, F2, F3	0	The power module will be shutdown and the LEDs will be dark, and red after seconds, and then dark again.
13	T2 (pin11-12)	s-c	415	60min	F1, F2, F3	0	The power module will be shutdown and the LEDs will be dark, and red after seconds, and then dark again.
14	T2 (pin13-14)	s-c	415	60min	F1, F2, F3	0	The power module will be shutdown and the LEDs will be dark, and red after seconds, and then dark again.
On whole unit							

IEC 62040-1							
Clause	Requirement + Test					Result - Remark	Verdict
15	Output (L1-N)	o-l	415	75min	Output breaker	--	The UPS transfer to bypass and alarms“overload timeout“. Then alarms“bypass over load“.
16	Output (L1-N)	o-l	Battery mode	75min	DC fuse	--	UPS shutdown and alarms“UPS overload“ “overload timeout“.
17	Output (L1-N)	s-c	415	1s	Output breaker	--	The UPS transfer to bypass and alarms“output shorted“. Then bypass input breaker trips. Alarms“bypass abnormal“
18	Output (L1-N)	s-c	Battery mode	1s	DC fuse	--	UPS shutdown and alarms “output shorted”
19	Ventilation openings (front and rear)	Blocked	415	80min	Input breaker	--	UPS alarms“rectifier over temp““inverter over temp““rectifier fail““inverter fail“ and then transfer to bypass. UPS alarms“bypass over temp“ after several minutes and then shutdown, alarms“load on none“
20	Ventilation openings (front)	Blocked	Battery mode	80min	DC fuse	--	UPS alarms“rectifier over temp““inverter over temp““rectifier fail““inverter fail“ and then transfer to bypass. UPS alarms“bypass over temp“ after several minutes and then shutdown, alarms“load on none“
<p>Note(s):</p> <p>All faults are started during normal operation unless otherwise stated; and after each fault condition, a electric strength test is followed, the unit not breakdown.</p> <p>s-c: short circuit; o-c: open circuit; o-l: overload</p>							

5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements						P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)	
Whole unit							
PS1506_DR1 PCB							
PE (H1)-J5 Pin 1	<420	<250	2.0	7.6	2.5	5.8	
PS1506_DR4 PCB							
PE (H1)-R39 Pin 1	<420	<250	2.0	6.8	2.5	6.8	

IEC 62040-1						
Clause	Requirement + Test	Result - Remark				Verdict
5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
PE (H3)-C90 Pin 1	<420	<250	2.0	5.2	2.5	5.2
PE (H2)-RLY3 Pin 1	<420	<250	2.0	7	2.5	7
PE (H4)-C110 Pin 2	<420	<250	2.0	7	2.5	7
RLY2 Pin-bottom metal enclosure (PE)	<420	<250	2.0	6.5	2.5	56
Primary trace-secondary trace under optocouplers (U7)	<420	<250	4.0	5.3	5.0	6.1
Primary trace-secondary trace under Transformer (T2)	<420	<250	4.0	18.1	5.0	18.1
Primary trace-secondary trace under Transformer (T1)	<420	<250	4.0	9	5.0	9
PS1410_MN1 PCB						
PE (H1)- C20 Pin 1	<420	<250	2.0	7.8	2.5	7.8
PE (H4)- J21 Pin 1	<420	<250	2.0	8.5	2.5	5.7
PE (H3)- D18 Pin 3	<420	<250	2.0	5.6	2.5	5.6
PS1203 PW3 PCB						
PE (H1)-C61 Pin 1	<420	<250	2.0	5.2	2.5	5.2
PE (H2)-C12 Pin 1	<420	<250	2.0	5.2	2.5	5.2
PE (H3)-C3 Pin 1	<420	<250	2.0	7.9	2.5	7.6
PE (H4)-R75 Pin 1	<420	<250	2.0	5.6	2.5	8.3
Primary trace-secondary trace under Transformer (T2)	<420	<250	4	5.3	5.0	5.3
Primary trace-secondary trace under Transformer (T3)	<420	<250	4	6	5.0	6
Primary trace-secondary trace under optocouplers (U2)	<420	<250	4.0	5.3	5.0	6.1
Under C60 traces	<420	<250	4.0	7	5.0	7
PS1410_DR3 PCB						
PE(H5)-J11 Pin 5	<420	<250	2.0	5.5	2.5	5.5
PE(H8)-J6 Pin 1	<420	<250	2.0	4.6	2.5	4.6
PE(H3)-C19 Pin 2	<420	<250	2.0	8.6	2.5	8.6
PS1410_PW1 PCB						

IEC 62040-1						
Clause	Requirement + Test	Result - Remark				Verdict
5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Primary trace-secondary trace under optocouplers (U1)	<420	<250	4.0	5.3	5.0	6.1
PS1410_DR2 PCB						
PE(H8)-J4 Pin 1	<420	<250	2.0	5.3	2.5	5.3
PE(H3)-J1 Pin 1	<420	<250	2.0	5.9	2.5	5.9
PE(H6)-J10 Pin 1	<420	<250	2.0	5.3	2.5	5.3
PE (H5)-J18 Pin 1	<420	<250	2.0	3.5	2.5	3.5
PE (H3)-C83 Pin 2	<420	<250	2.0	5.6	2.5	5.6
PS1410_DR3 PCB						
PE(H5)-J11 5	<420	<250	2.0	5.5	2.5	5.5
PE(H8)-J6 1	<420	<250	2.0	4.6	2.5	4.6
PE(H3)-C18 2	<420	<250	2.0	8.6	2.5	8.6
PS1203_CT1 PCB						
PE(H1)-J20 Pin 2	<420	<250	2.0	7.5	2.5	7.5
PE(H2)-C26 Pin 1	<420	<250	2.0	7.4	2.5	7.4
PE(H5)-C226 Pin 1	<420	<250	2.0	7	2.5	7
PE(H6)-C267 Pin 1	<420	<250	2.0	7.2	2.5	7.2
PE(H4)-J17 Pin 1	<420	<250	2.0	8.3	2.5	8.3
PS1502_CV3						
PE(H5)-C12 Pin 1	<420	<250	2.0	7.5	2.5	7.5
PE(H9)-C10 Pin 1	<420	<250	2.0	7.4	2.5	7.4
PE(H13)-C9 Pin 1	<420	<250	2.0	7	2.5	7
PE(H7)-C25 Pin 1	<420	<250	2.0	5.5	2.5	5.5
PE(H8)-J9 Pin 1	<420	<250	2.0	5.5	2.5	5.5
PE(H6)-C23 Pin 1	<420	<250	2.0	5.2	2.5	5.2
Supplementary information:						
<ol style="list-style-type: none"> 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. All internal wires soldered on PCB are additionally crimped with connectors for soldering. Shrink tubings are used to cover the tab connectors. 						

IEC 62040-1						
Clause	Requirement + Test	Result - Remark	Verdict			
5.8, 2.1.1.3/RD and 2.10.5.1 /RD	TABLE: Distance through insulation measurements				P	
Distance through insulation (DTI) at/of:		U peak (V)	U r.m.s. (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Optocoupler (reinforced insulation)		<420	3000Va.c.	0.4	>0.4 ¹⁾	>0.4 ¹⁾
Supplementary information: * See appended table 4.5.						

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	
All models					
Primary to Secondary (mains input & output conductor to sub-D connector)		3000Va.c.	No	No	
Primary to earth (mains input & output conductor to earth)		1500Va.c.	No	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)		≤ 2 mm			
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	None	No openings.		
Front	6.5mm round openings	Ventilation openings provided. No hazardous parts within 5° angles.		

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
Back	9.6*24.8mm	Ventilation openings provided. No hazardous parts within 5° angles.	
Supplementary information:			

7.5	Table: Resistance to fire					P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence	
Material of Front panel	CHI MEI CORPORATION	PA-765A(+)	Min, thickness 2.1mm	5VA		
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 dT of part/at:	dT (K)			required dT	
	304V/50Hz	460V/50Hz	0V (Battery mode)		
Tested on model RM090/15X					
Whole unit					
Input wire (phase A/ battery)	18.8	10.3	/	105-40	
Battery wire '+'	2.9	3.4	22.7	105-40	
Fan	4.3	5.6	4.5	70-40	
Top enclosure	4.6	5.2	5.8	70-40	
Front panel	1	1.2	1.2	95-40	
Input breaker	/	/	/	70-40	
Output breaker	/	/	/	70-40	
SCR (Phase R)	/	/	/	130-40	
On PS1502_DR1 PCB					
T2 winding	26.2	32.8	/	70	
T3 winding	23.1	34.7	/	70	
T5 winding	28.3	32.4	/	70	
T6 winding	28.7	38.5	/	70	
PFC inductor coil (L8)	73.6	50.3	67.2	130-40	
PCB near D90	34.5	33.7	29	130-40	
On PS1506_DR4 PCB					

IEC 62040-1					
Clause	Requirement + Test		Result - Remark		Verdict
L1 coil	82.2	--	--	--	130-40
T1 winding	35.6	--	--	--	70
T2 winding	46.8	--	--	--	70
PCB near Q15	23.7	--	--	--	130-40
Y capacitor C108	8.2	--	--	--	100-40
On PS1410_DR5 PCB					
Y Capacitor (C1)	7.3	--	--	--	125-40
PCB Near Q3	25.8	--	--	--	130-40
PCB Near Q2	26.7	--	--	--	130-40
PCB Near Q1	13.8	--	--	--	130-40
On SNT_PCB_3320_DY PCB					
T1 winding	35.6	28.4	31.2	70	
T2 winding	35.2	34.8	33.7	70	
PCB near D22	23.6	22.9	23	130-40	
PCB near Q1	21.8	21.2	21.2	130-40	
U2 body	25.3	23	21.2	100-40	
On PS1203_MN1 PCB					
T1 Winding	43.1	44.2	44.5	70	
U15 body	30.2	29.8	32	100-40	
U16 body	25.8	24.8	24.5	100-40	
U29 body	26.7	25.7	26.8	100-40	
PCB near U11	13.3	12.1	13.5	130-40	
Ambient	43.2	43.2	41.1	--	
Temperature T of winding:	R1 (Ω)	R2 (Ω)	T1 (°C)	Allowed Tmax (°C)	Insulation class
--	--	--	--	--	--
--	--	--	--	--	--

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

Note(s):
 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.

With a specified ambient temperature of 40°C, the maximum temperature rise is calculated as follows:
 Winding components:
 - T1, T2 of class B → .dT max = 95K - 10K - (40-25)K = 70K
 - transformer of class B → .dT max = 95K - 10K - (40-25)K = 70K

Relay components with:
 - Relay of 130°C → .dT max = 130°C – 40°C = 90K

Capacitor components with:
 - 105°C → .dT max = 105°C – 40°C = 65K
 - X capacitor of 100°C → .dT max = 100°C – 40°C = 60K

Others components:
 - PCB of 130°C → .dT max = 130°C – 40°C = 90K
 - Input wire and internal wire of 105°C → .dT max = 105°C – 40°C = 65K
 - Touchable plastic enclosure material → .dT max = 95°C – 40°C = 55K
 - Touchable metal enclosure material → .dT max = 70°C – 40°C = 30K
 - Battery of 55°C and occasional reaching 70°C → .dT max = 55/70°C – 40°C = 15/30K

8.1, 5.1.1/ RD	TABLE: Touch current measurement					P
Condition	L→terminal A	N→terminal A	Freq. (Hz)	Limit (mA)	Comments	
Tested on model RM090/15X						
Unit on	13.78mA	13.63mA	60	--	Switch "e" open, L to PE, no load	
Unit on	3.35mA	3.41mA	60	--	Switch "e" open, N to PE, no load	
Unit on	1.35mA	1.39mA	60	0.25	Switch "e" close, L to RS232 port	
Unit on	1.28mA	1.31mA	60	0.25	Switch "e" close, N to RS232 port.	
Note(s) : Test voltage: 460V/60Hz						

M	Ventilation of battery compartments	P
	The required dimension for the ventilation openings will be calculated with the following formula:	
	$A > K1 * Q$	
	with $Q = (0.054 \text{ m}^3/\text{Ah}) * n * I * C$	

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	where: K1 : constant factor of $28 \text{ h} \cdot \text{cm}^2/\text{m}^3$ 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 :2 (3 cells per battery) C :7 Ah $A > 28 \text{ h} \cdot \text{cm}^2/\text{m}^3 \cdot (0.054 \text{ m}^3/\text{Ah}) \cdot n \cdot 0.2 \text{ A}/100 \text{ Ah} \cdot C$ $A > 0.127\text{cm}^2$		
		Verdict	
	The size of ventilation openings in battery cabinet exceeds the required airflow by far.		

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	<p>NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS</p> <p>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.</p> <p>Note: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD Applies.</p> <table border="1"> <thead> <tr> <th>Publication</th> <th>Year</th> <th>Title</th> <th>EN/HD</th> <th>Year</th> </tr> </thead> <tbody> <tr> <td>IEC 60364-4-42</td> <td>-¹⁾</td> <td>Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60417</td> <td>Data-base</td> <td>Graphical symbols for use on equipment</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60529</td> <td>-¹⁾</td> <td>Degrees of protection provided by enclosures (IP Code)</td> <td>EN 60529 + corr. May</td> <td>1991²⁾ 1993</td> </tr> <tr> <td>IEC 60664</td> <td>Series</td> <td>Insulation coordination for equipment within low-voltage systems</td> <td>EN 60664</td> <td>Series</td> </tr> <tr> <td>IEC/TR 60755</td> <td>-¹⁾</td> <td>General requirements for residual current operated protective devices</td> <td>-</td> <td>-</td> </tr> <tr> <td>IEC 60950-1 (mod)</td> <td>2005</td> <td>Information technology equipment - Safety - Part 1: General requirements</td> <td>EN 60950-1</td> <td>2006</td> </tr> <tr> <td>IEC 61000-2-2</td> <td>-¹⁾</td> <td>Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems</td> <td>EN 61000-2-2</td> <td>2002²⁾</td> </tr> <tr> <td>IEC 61008-1 (mod)</td> <td>-¹⁾</td> <td>Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules</td> <td>EN 61008-1 + A11</td> <td>2004²⁾ 2007</td> </tr> <tr> <td>IEC 61009-1 (mod)</td> <td>-¹⁾</td> <td>Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules</td> <td>EN 61009-1 + corr. July + A11</td> <td>2004²⁾ 2006 2008</td> </tr> <tr> <td>IEC 62040-2</td> <td>2005</td> <td>Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements</td> <td>EN 62040-2 + corr. November</td> <td>2006 2006</td> </tr> <tr> <td>IEC 62040-3 (mod)</td> <td>1999</td> <td>Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements</td> <td>EN 62040-3</td> <td>2001</td> </tr> </tbody> </table> <p>¹⁾ Undated reference. ²⁾ Valid edition at date of issue.</p>	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		—
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European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
ZB ANNEX (normative)			
SPECIAL NATIONAL CONDITIONS (EN)			
<p>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: <i>"National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD."</i></p> <p>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.</p> <p>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</p>			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	<p>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.</p> <p>The marking text in the applicable countries shall be as follows:</p> <p>In Finland: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"</p> <p>In Norway: "Apparatet må tilkoples jordet stikkontakt"</p> <p>In Sweden: "Apparaten skall anslutas till jordat uttag"</p>		P
4.7.11	<p>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 tilkøpling til et IT forsyningsnett"</p>		P
9	<p>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>		P

Pictures



Fig. 1 – overview



Fig. 2 –Overview

Pictures



Fig. 3 –Overview



Fig. 4 –Overview

Pictures

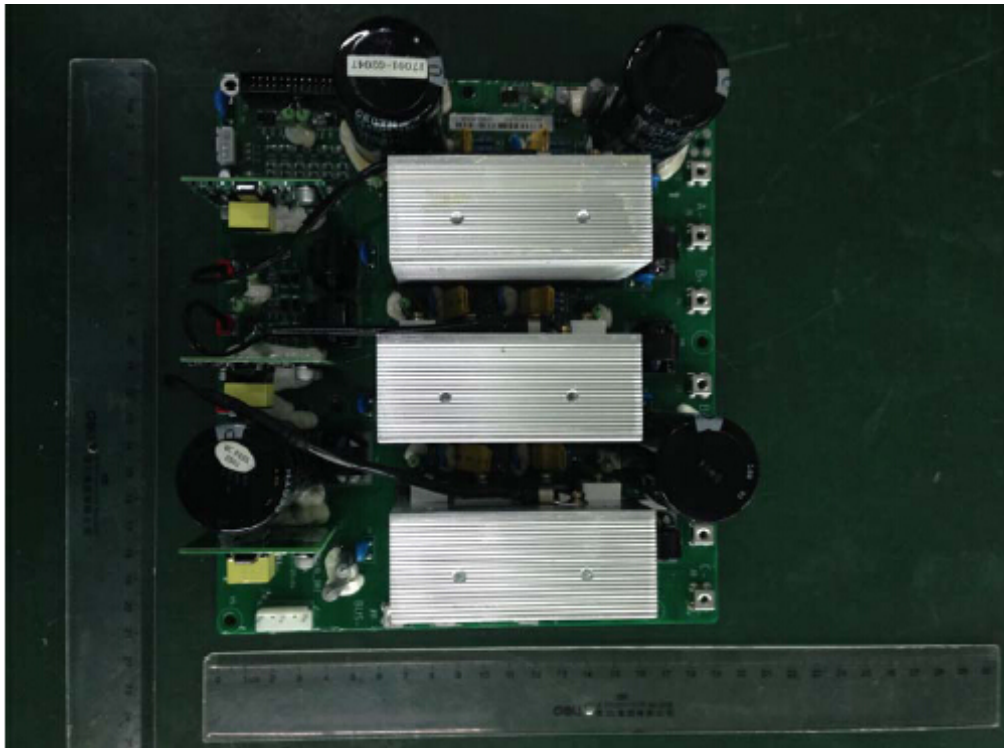


Fig.5 –components side view

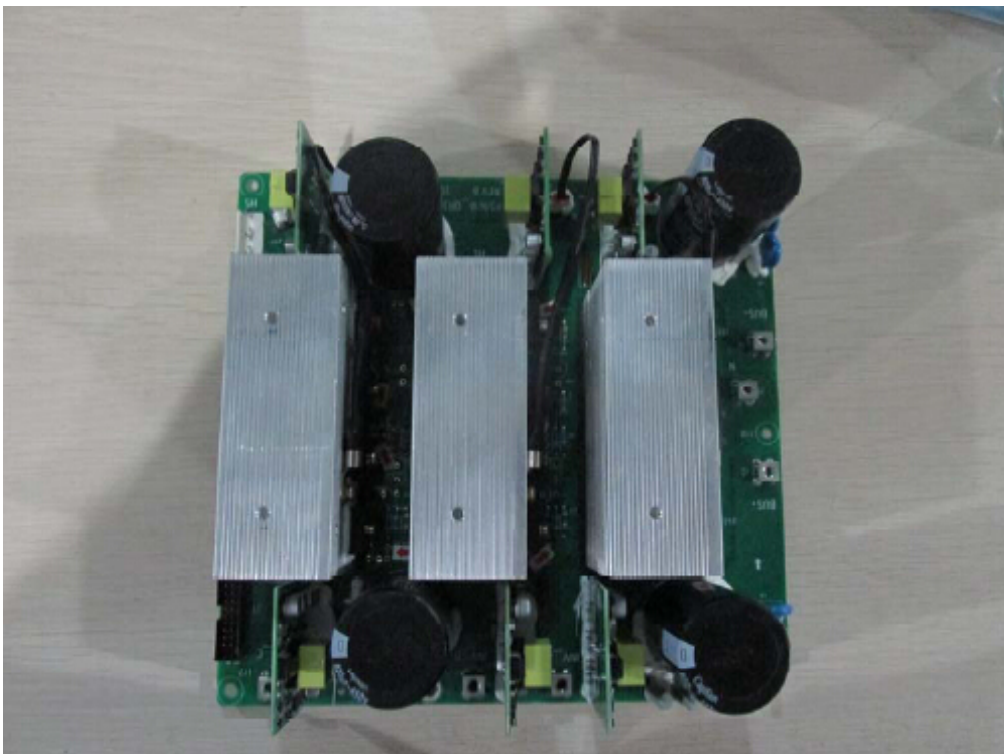


Fig.6 – components side view

Pictures

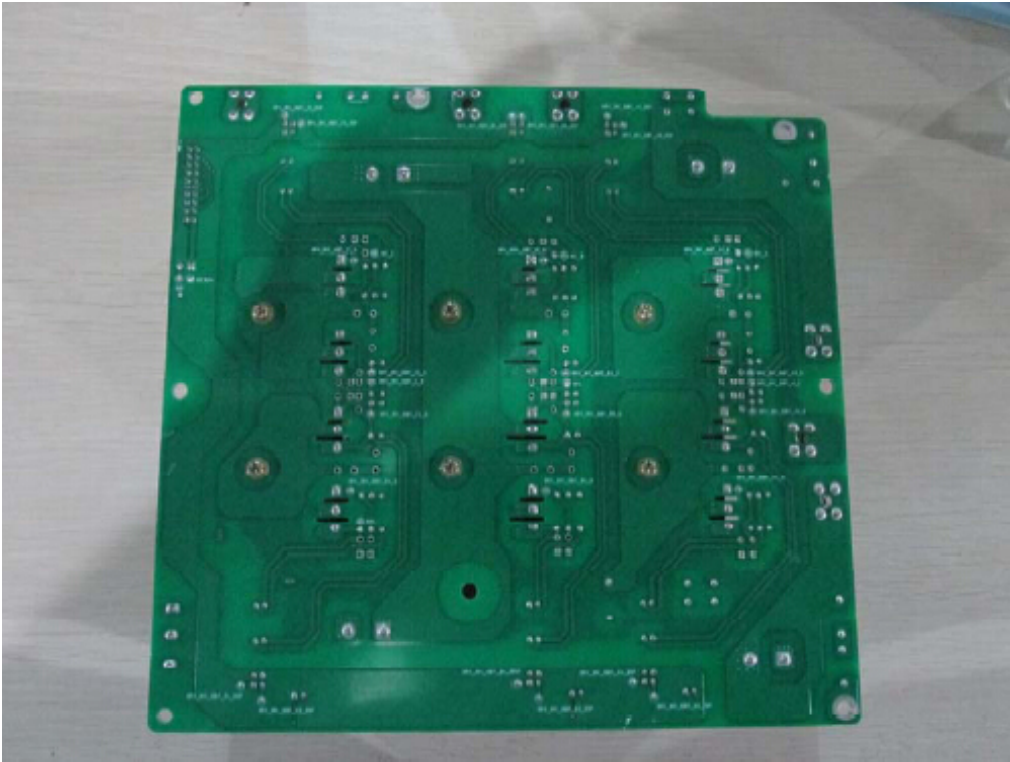


Fig.7 –traces side view

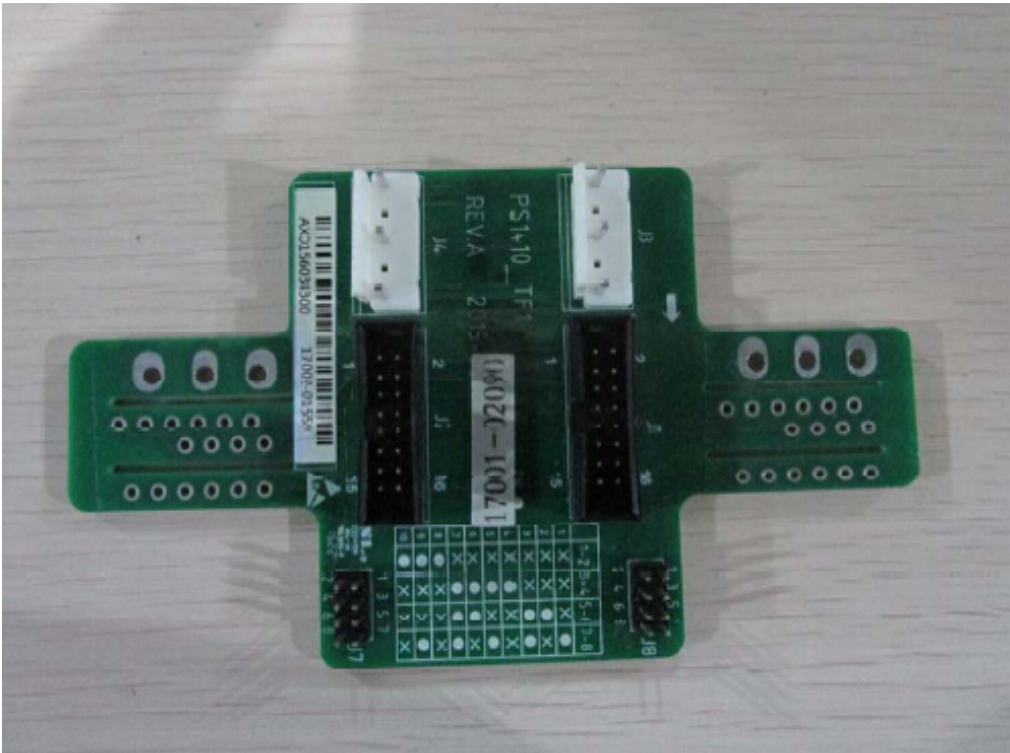


Fig.8 – components side view

Pictures

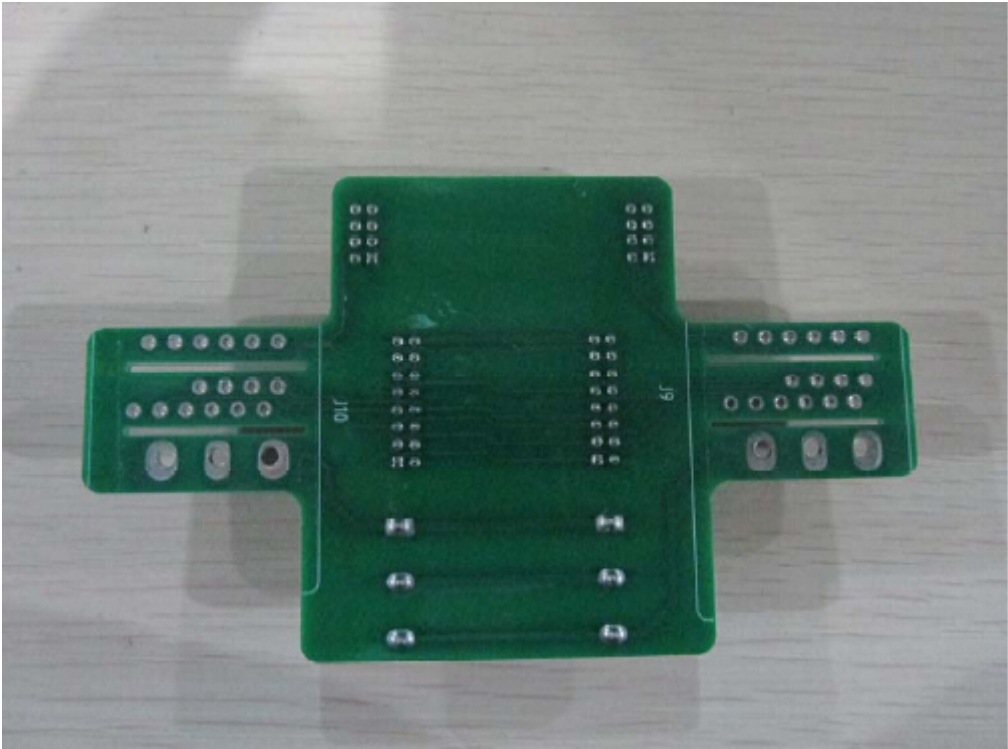


Fig. 9 –traces side view



Fig. 10 –components side view

Pictures

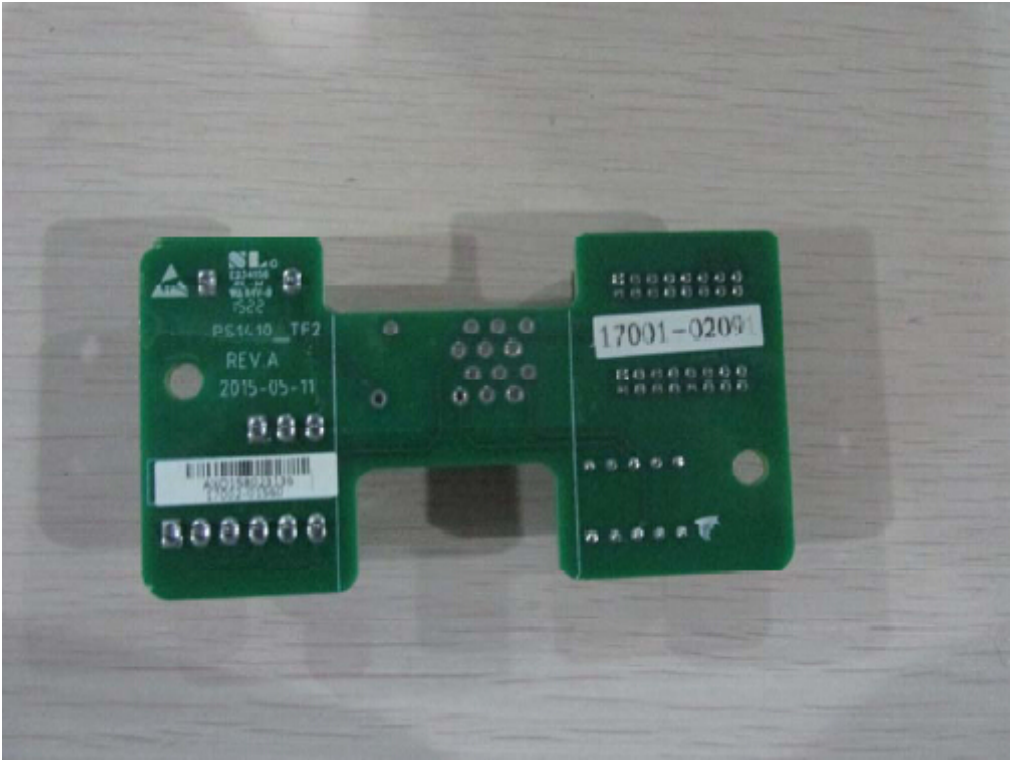


Fig.11 –traces side view



Fig.12 –components side view

Pictures

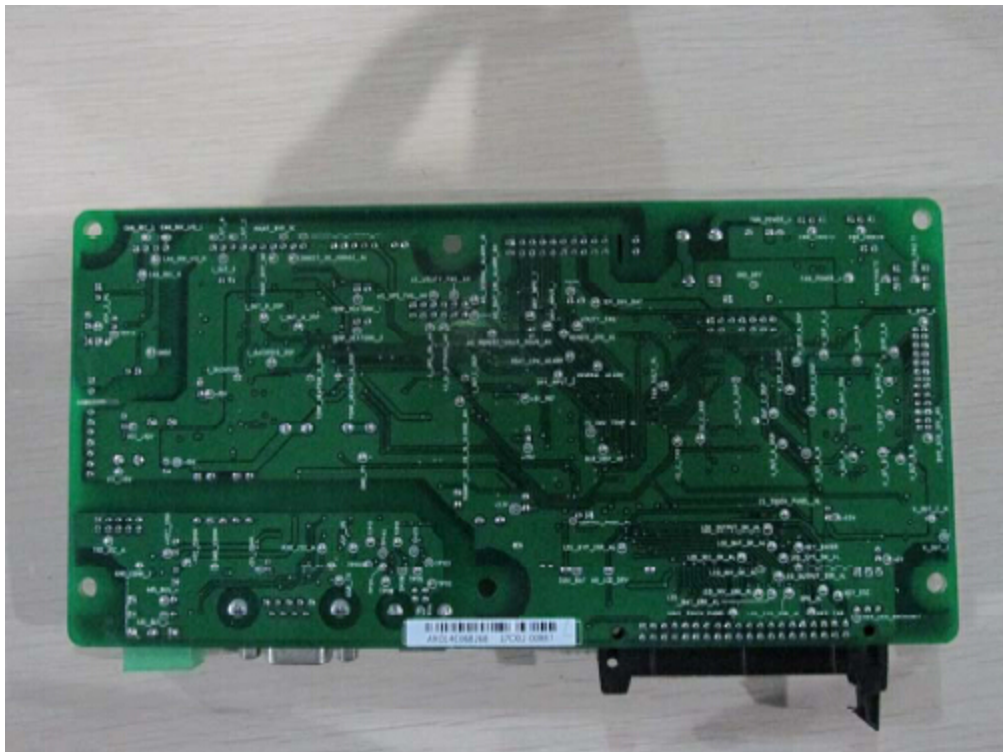


Fig.13 –traces side view

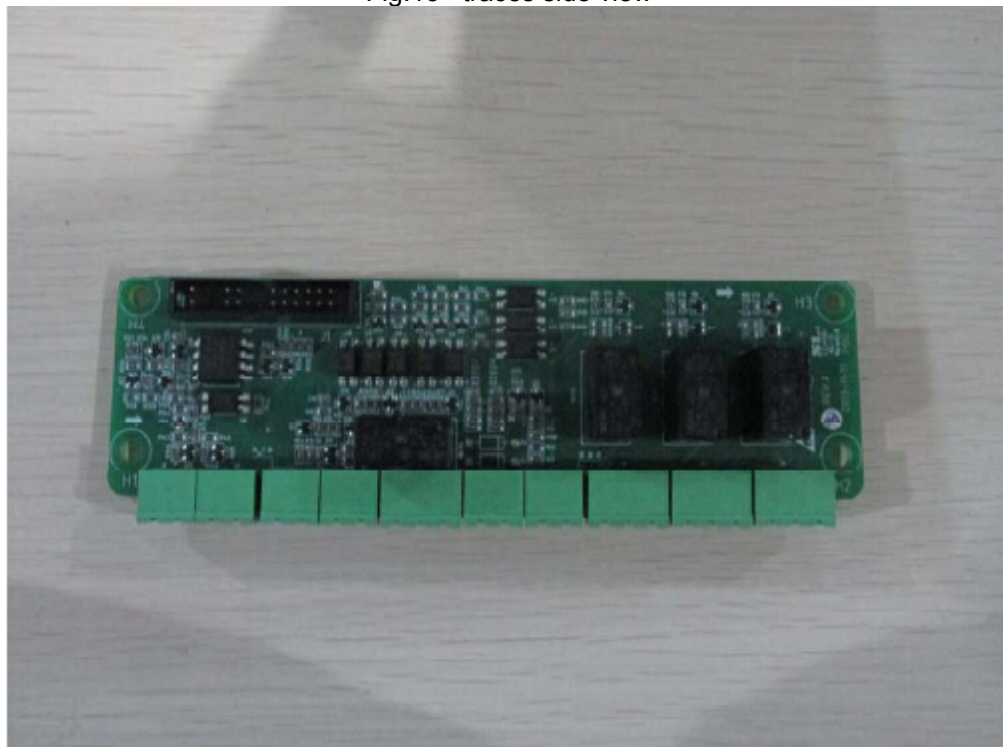


Fig.14 - component side view

Pictures



Fig.15 – trace side view

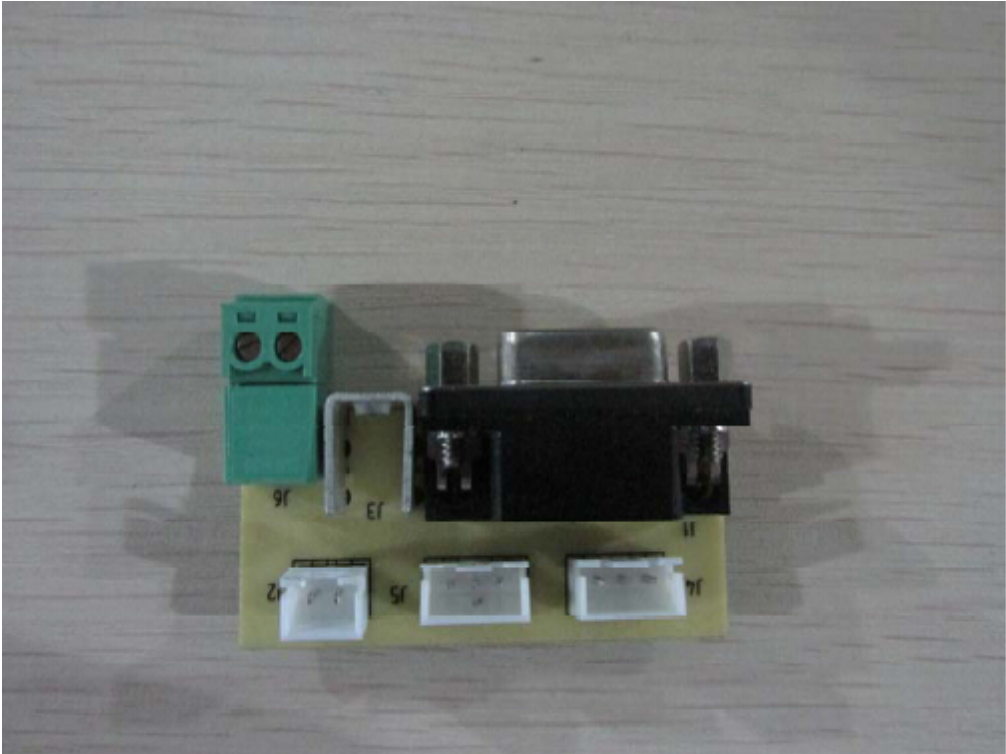


Fig.16–component side view

Pictures



Fig.17 –traces side view



Fig.18 –component side view

Pictures

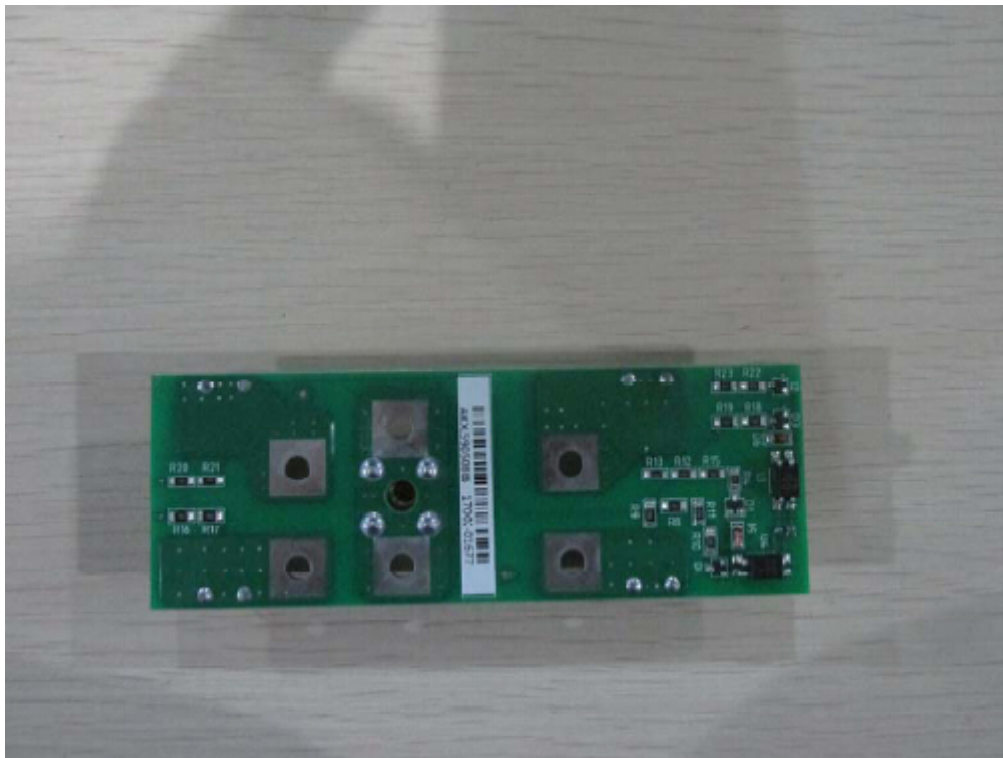


Fig.21 –traces side view



Fig.22 –component side view

Pictures

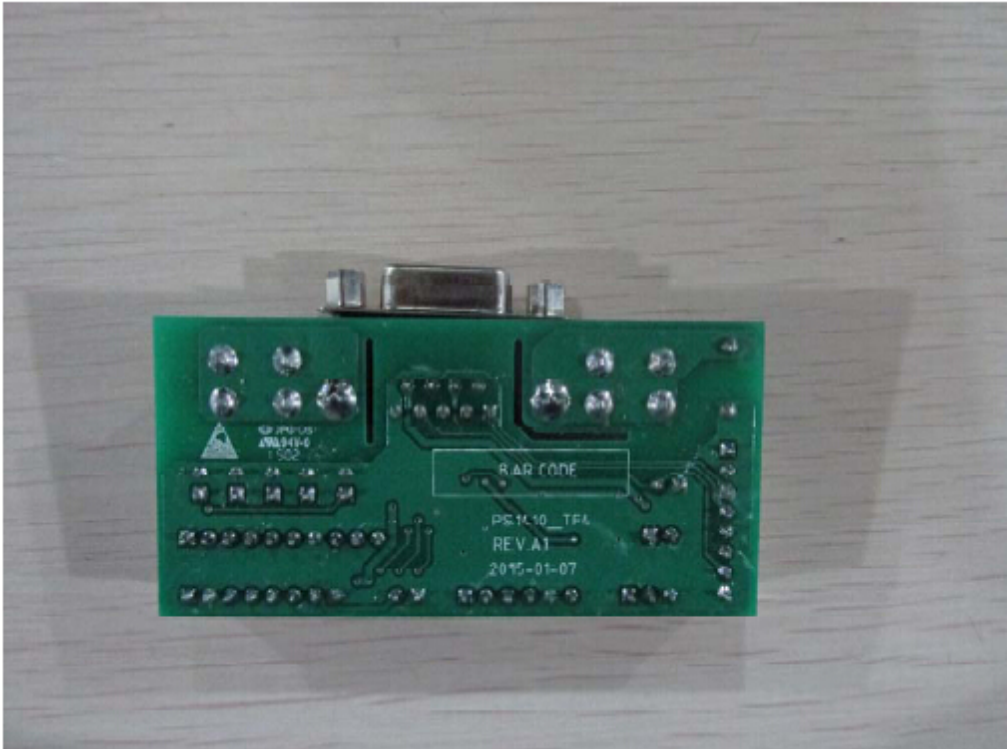


Fig.23 –traces side view

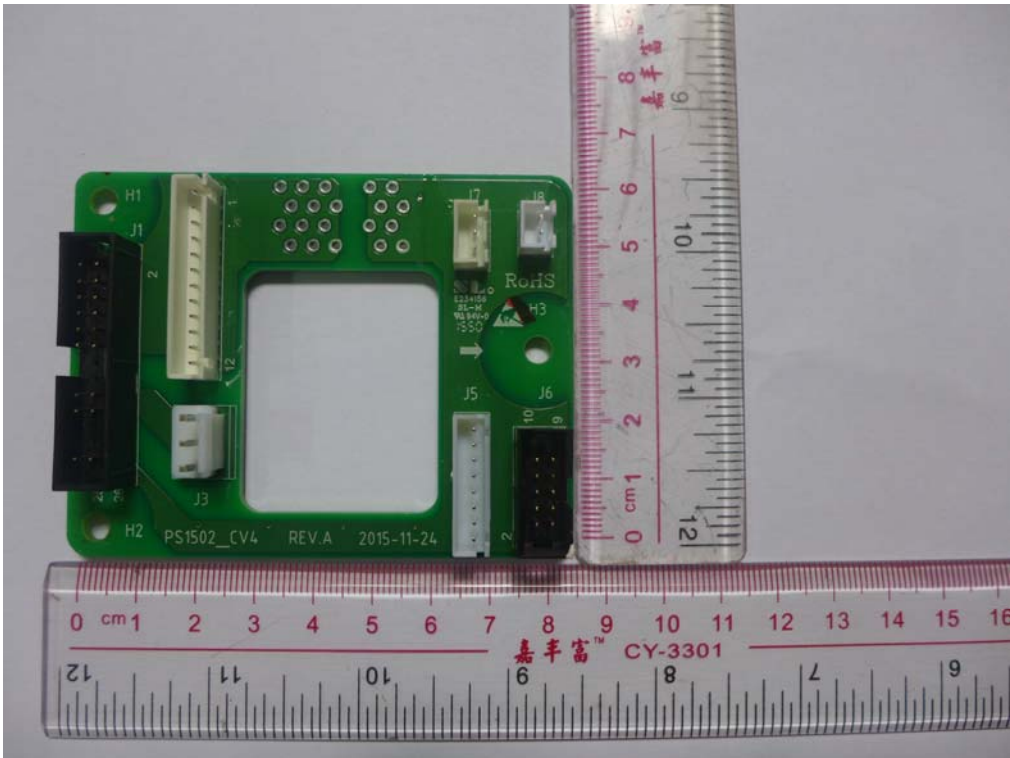


Fig.24 –component side view

Pictures

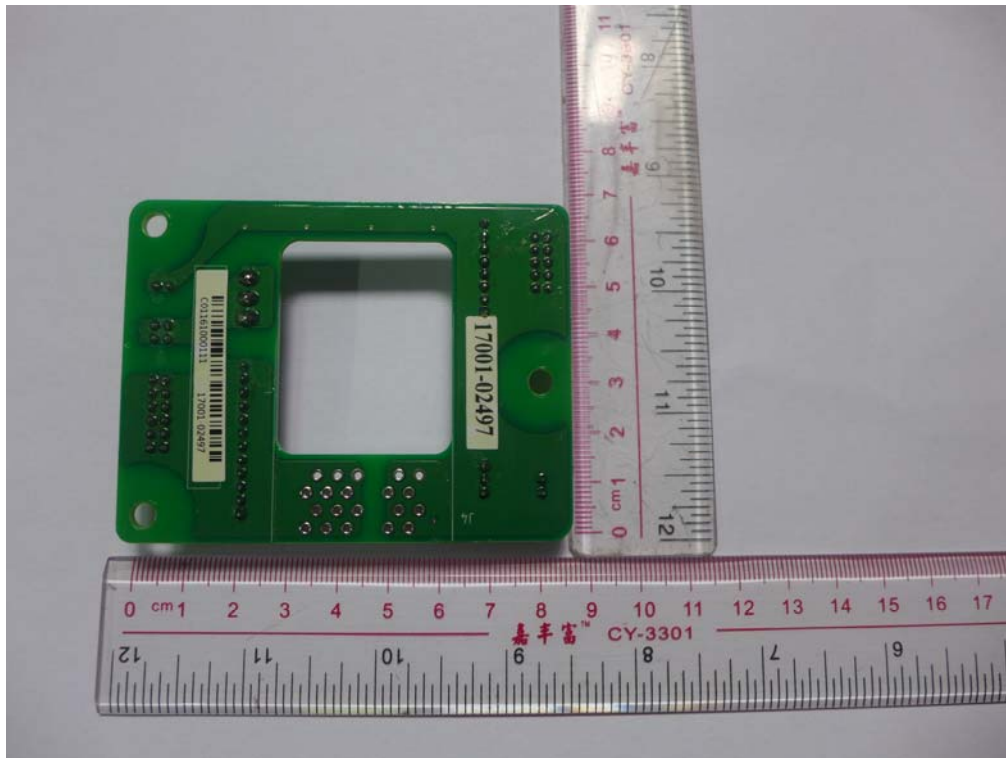


Fig.25 –traces side view