APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

GUANGDONG EAST POWER CO., LTD.

Uninterruptible Power Supply

Model(s): EA99500, EA99400

Prepared For : **Guangdong East Power Co., Ltd.**
No.6 Northern Industry Road, Songshan Lake SCI & TECH industry park, Dongguan City, Guangdong Province, China.

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TEST REPORT

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

Report Reference No......:	ES140331285S
Compiled by (name + signature).....:	James Dan
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Testing Laboratory.....:	SHENZHEN EMTEK CO., LTD.
Address.....:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location / address.....:	Same as above
Applicant's name.....:	Guangdong East Power Co., Ltd.
Address.....:	No.6 Northern Industry Road, Songshan Lake SCI & TECH industry park, Dongguan City, Guangdong Province, China.
Test specification:	
Standard.....:	EN 62040-1: 2008
Test procedure.....:	Compliance with EN 62040-1: 2008
Non-standard test method.....:	N/A
Test Report Form No......:	IEC62040_1A
Test Report Form(s) Originator.....:	TÜV Rheinland Japan Ltd.
Master TRF.....:	Dated 2011-10

Test item description.....:	Uninterruptible Power Supply
Trade Mark.....:	EAST
Manufacturer.....:	GUANGDONG EAST POWER CO., LTD.
Address.....:	No.6 Northern Industry Road, Songshan Lake SCI & TECH industry park, Dongguan City, Guangdong Province, China.
Model/Type reference.....:	EA99500, EA99400
Ratings.....:	See the rating labels.

Test item particulars.....:	
Equipment mobility .....:	[] movable [X] stationary [] for building-in
Connection to the mains.....:	[] pluggable equipment [X] permanent connection [] detachable power supply cord [] non-detachable power supply cord
Operating condition .....:	[X] continuous [] rated operating / resting time:
Access location .....:	[X] operator accessible [] restricted access location
Over voltage category (OVC) .....:	[] OVC I [X] OVC II [] OVC III [] OVC IV [] other
Mains supply tolerance (%) or absolute mains supply values .....:	380Vac(-10%), 415Vac(+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) .....:	836A
Pollution degree (PD) .....:	[] PD 1 [X] PD 2 [] PD 3
IP protection class .....:	IP20
Altitude during operation (m) .....:	Up to 2000
Altitude of test laboratory (m) .....:	below 2000
Mass of equipment (kg) .....:	>18Kg
Possible test case verdicts:	
- test case does not apply to the test object .....:	N
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	March 21, 2014
Date(s) of performance of tests.....:	March 21, 2014, 2014 to April 23, 2014

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 IEC/EN 62040-1:2008 is to be used in conjunction with EN 60950-1:2006, which is referred to in this TRF as "RD".

General product information:

1. The equipment is uninterruptible power supply for general use with information technology equipment.

2. Model difference description:

All models have the same constructions, circuit diagram and PCB layout. Only model name, appearance and the parameter of some parts are different. Unless otherwise stated, all tests were performed on model Power

EA99500 which means the typical model.
Summary of testing: The product has been tested according to standard EN 62040-1: 2008.

Copy of marking plate:

1. Rating label for model EA99500:

EAST
Uninterruptible Power Supply
Model: EA99500
INPUT: 380/400/415V~; 50/60Hz; 836Amax; 3Φ+PE
OUTPUT: 380/400/415V~; 50/60Hz; 500KVA/450KW; 3Φ+N+PE
Bypass Input: 380/400/415VAC~, 50/60Hz, 1140Amax
Batt. Input: 600VDC; 967A

Made In China

2. Rating label for model EA99400:

EAST
Uninterruptible Power Supply
Model: EA99400
INPUT: 380/400/415V~; 50/60Hz; 669Amax; 3Φ+PE
OUTPUT: 380/400/415V~; 50/60Hz; 400KVA/360KW; 3Φ+N+PE
Bypass Input: 380/400/415VAC~, 50/60Hz, 912Amax
Batt. Input: 600VDC; 774A

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!
- See installation instructions before connecting to the supply.

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.5	Components		P
	Comply with IEC 62040-1 or relevant component standard	(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 609501 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	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		N
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. Between Line and PE: Y2 capacitors according to IEC 60384-14 with 21 days damp heat test was used.	P
1.5.7/RD	Resistors bridging insulation		N
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation		N
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

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 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	Power rating	The required marking is located on the outside surface of the equipment.	P
	Input rated voltage/range (V) .....:	380/400/415Vac	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 and neutral.....:	3Φ+N+PE	P
	Output rated voltage/range (V) .....:	380/400/415Vac	P
	Output rated current/range (A) .....:	See rating label	P
	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 and neutral.....:	3Φ+N+PE	P
	Output rated active power (W) .....:	See rating label	P
	Output rated apparent power (VA) .....:	See rating label	P
	Output symbol for nature of supply (d.c.) .....:	No d.c. output.	N
	Output rated frequency/range (Hz) .....:	See rating label	P
	Ambient operating temperature range (°C).....:	25°C	P
	Manufacturer's name or trademark or identification mark .....:	See rating label	P
	Type/model or type reference .....:	See rating label	P
	Symbol for Class II equipment only .....:	The equipment is Class I.	N

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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 .....:		P
	Pluggable type A or Pluggable type B UPS ....:		N
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.....:		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) .....:		P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P
1.7.7.1/RD	Protective earthing and bonding terminals .....:	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P

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Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.2/RD	Terminals for a.c. mains supply conductors	Appliance terminal block used.	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 :	LCD display provided, located on the front panel for functional purpose only.	N
1.7.8.2/RD	Colours :	See above. Colours are acceptable due to used for information only (no safety involved even if disregarded).	P
1.7.8.3/RD	Symbols according to IEC 60417 :		N
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 protection does rely upon building installation.	P
4.7.13 5.1/RD	High leakage current (mA) .....:	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) .....:	Instructions and markings shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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 required markings placed on 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 markings are in English.	P
4.7.19 1.7.2.5/RD	Operator access with a tool.....:	All areas containing hazard(s) are inaccessible to the operator.	P
4.7.20	Battery		N
	Clearly legible information .....:		N
	Battery type .....:		N
	Nominal voltage of total battery (V) .....:		N
	Nominal capacity of total battery (optional) .....:		N
	Warning label .....:		N
	Instructions .....:		N
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) 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

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Clause	Requirement + Test	Result - Remark	Verdict
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	No TNV circuits exist inside battery compartments	N
2.1.1.3/RD	Access to ELV wiring	No ELV wiring in operator accessible area due to the parallel connection ports are covered by metal during normal use.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		N
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 hazard at operator accessible SELV interfaces (RS232).	P
2.1.1.6/RD	Manual controls	Operator only has access to bare parts of SELV circuits.	P
2.1.1.7/RD	Discharge of capacitors in equipment	The capacitance of the input circuits>0.1uF, refer to list of critical components.	P
	Measured voltage (V); time-constant (s) :	(See appended table 5.1.1)	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

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Clause	Requirement + Test	Result - Remark	Verdict
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		N
	Shock hazard after de-energization of a.c. input for UPS	No shock hazard	N
	Measured voltage (V); time-constant (s) :	(see appended table 5.8)	N
	Description of the construction :	The backfeed protection is achieved through the current transformer, and the converter transformer which provides reinforce insulation between the primary and secondary circuits.	N
5.1.5	Emergency switching device		P
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	All SELV circuits within limits.	P
2.2.2/RD	Voltages under normal conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P
2.2.4/RD	Connection of SELV circuits to other circuits .. :	SELV circuits are only connected to other SELV and protective earth.	P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	Refer below:	N
2.3.1/RD	Limits	No TNV circuits, cl. 2.3/RD	N
	Type of TNV circuits :		--
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions :		N

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Clause	Requirement + Test	Result - Remark	Verdict
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 :		N
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		N
	Frequency (Hz) :		N
	Measured current (mA) :		N
	Measured voltage (V) :		N
	Measured circuit capacitance (nF or µF) :		N
2.4.3/RD	Connection of limited current circuits to other circuits		N
5.2.4 3.5/RD	External signalling circuits	See only above regarding RS232s.	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	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment		N
5.2.5 2.5/RD	Limited power source		N
	a) Inherently limited output		N
	b) Impedance limited output		N
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA) ..... :		N
	Current rating of overcurrent protective device (A)		N
5.3	Protective earthing and bonding		P
5.3.1	General		P
2.6/RD	Provisions for earthing and bonding	See below.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	Functional earthing on PCB board is separated by basic insulation from primary circuit.	P
2.6.3/RD	Protective earthing and protective bonding conductors	See below.	P
2.6.3.1/RD	General	See subclause 2.6.3.3	P
2.6.3.2/RD	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG :	(see appended tabel 4.5)	P
2.6.3.3/RD	Size of protective bonding conductors	Refer to 2.6.3.4/RD.	P
	Rated current (A), cross-sectional area (mm^2), AWG :	Refer to 2.6.3.4/RD.	P
	Protective current rating (A), cross-sectional area (mm2), AWG :	Refer to 2.6.3.4/RD.	P
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) :		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.1/RD	Interconnection of equipment	This UPS has its own earthing connection. Any other units connected via a signal cable to the PC by RS232 port shall provide SELV only. Additionally the parallel connection port only connected to the same type port of other UPS units which was classified as primary circuits in the product and reinforced insulated signal wire will be used. Connection for outputs and battery supply have their own earth connections which are mounted on the internal metal enclosure.	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	Protective bonding conductors connected to metal chassis via ring-type lugs fixed to metal bolts (ISO thread type M4), with nut and star-washer provided.	P
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

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1	General	See below	P
3.4/RD	Disconnection from the mains supply	Breaker used disconnect device.	P
3.4.1/RD	General requirement		P
3.4.2/RD	Disconnect devices	Appliance breaker used	P
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
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	Breaker used disconnect device.	P
3.4.7/RD	Number of poles - three-phase equipment		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	Single mains power source provided.	N
5.4.2	Disconnect devices	Appliance breaker used	N
5.5	Overcurrent and earth fault protection		P
5.5.1	General	See below.	P
2.7.3/RD	Short-circuit backup protection	Building installation is considered as providing short circuit backup protection.	P
2.7.4/RD	Number and location of protective devices …….:	Over current protection by one built-in input fuse. Protection devices in the building installation considered as providing sufficient protection against earth faults.	P
2.7.5/RD	Protection by several devices	Only one protective device provided.	P

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Clause	Requirement + Test	Result - Remark	Verdict
2.7.6/RD	Warning to service personnel :	With for the mains socket being of non-reversible type, hazard may be still present in the equipment after the input circuit 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		P
5.5.3	Battery circuit protection	Ungrounded battery inside the UPS. Required fuses against - overcurrent: 1 - earth fault: 1 Protection against overcurrent by DC fuse in the positive pole of the battery. However earth faults will be covered by devices in the building installation.	P
5.5.3.1	Overcurrent and earth fault protection	See below.	P
5.5.3.2	Location of protective device	The fuses are directly located behind the supply wire of the battery. The charger circuit is located in the battery circuit before the fuses. For the charger circuit there are no hazardous conditions under any simulated fault conditions. See appended table.	P
5.5.3.3	Rating of protective device	The rating of the fuses inside the UPS provides adequate safety protection during abnormal and/or fault conditions.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.6	Protection of personnel – Safety interlocks		P
5.6.1	Operator protection	No hazardous parts in operator access areas	N
2.8/RD	Safety interlocks		N
2.8.1/RD	General principles		N
2.8.2/RD	Protection requirements		N
2.8.3/RD	Inadvertent reactivation		N

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Clause	Requirement + Test	Result - Remark	Verdict
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		N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection		N
5.6.2.1	Introduction		N
5.6.2.2	Covers		N
5.6.2.3	Location and guarding of parts		N
5.6.2.4	Parts on doors	No such parts.	N
5.6.2.5	Component access	No hazard likely when access breakers	N
2.8.3/RD	Inadvertent reactivation		N
5.6.2.6	Moving parts		N
5.6.2.7	Capacitor banks	No means of discharge provided. The installation manual states that the enclosure shall not be opened for 5 minutes after all supplies have been disconnected.	P
5.6.2.8	Internal batteries		N
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	The functional insulations comply with 5.3.4/RD a) and c)	N
2.10.1.4/RD	Intervening unconnected conductive parts	Considered.	N
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6/RD	Special separation requirements	No TNV	N
2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit generating starting pulses.	N
2.10.2/RD	Determination of working voltage	(See appended table 5.7)	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	Sub-clause 5.3.4 considered.	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 :	Normal transient voltage considered (overvoltage category II for primary circuit).	N
2.10.3.7/RD	Transients from d.c. mains supply :		N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :		N
2.10.3.9/RD	Measurement of transient voltage levels		N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	P
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

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Clause	Requirement + Test	Result - Remark	Verdict
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 with dti≥0.4mm used.	P
2.10.5.5/RD	Cemented joints	No cemented joint.	N
2.10.5.6/RD	Thin sheet material – General		P
2.10.5.7/RD	Separable thin sheet material	See below.	P
	Number of layers (pcs).	A. 3 layers B. 2 layers	--
	Electric strength test	AC 3000V for each layer of insulation (See appended table 5.8)	N
2.10.5.8/RD	Non-separable thin sheet material	Not used.	N
2.10.5.9/RD	Thin sheet material – standard test procedure		P
2.10.5.10 /RD	Thin sheet material – (Alternative) test procedure		N
	Electric strength test		N
2.10.5.11 /RD	Insulation in wound components	See cl. 2.10.5.12/RD	P
2.10.5.12 /RD	Wire in wound components	Triple insulated wiring is not used for supplementary or reinforced insulation.	N
	Working voltage :		N
	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 45º and 90º :		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)	N
	Routine test		N
2.10.5.14 /RD	Additional insulation in wound components	No additional insulation used.	N
	Working voltage :		N
	- Basic insulation not under stress :		N
	- Supplementary, reinforced insulation :		N
2.10.6/RD	Construction of printed boards	See below.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	(see appended table 2.10.3 and 2.10.4)	P
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		N
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 opto-couplers, see appended table 4.5	P
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 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	Sleeving used to provide supplementary/ reinforce insulation.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		N

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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		P
3.2.3/RD	Permanently connected equipment		P
	Number of conductors, diameter of cable and conduits (mm) ..... :		
3.2.4/RD	Appliance inlets		N
3.2.5/RD	Power supply cords		N
3.2.5.1/RD	AC power supply cords		N
	Type ..... :		
	Rated current (A), cross-sectional area (mm²), 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		N
3.2.8/RD	Cord guards		N
	Diameter or minor dimension D (mm); test mass (g) ..... :		
	Radius of curvature of cord (mm)..... :		
6.2.2	Means of connection :		N
	More than one supply connection :		N
6.3	Wiring terminals for external power conductors *(No wiring terminals for external power conductors)*		P
3.3/RD	Wiring terminals for connection of external conductors		P
3.3.1/RD	Wiring terminals		P
3.3.2/RD	Connection of non-detachable power supply cords		N
3.3.3/RD	Screw terminals		P
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, nominal thread diameter (mm) ..... :		--

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Clause	Requirement + Test	Result - Remark	Verdict
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	The unit does not overbalance (both installation orientation stated in the safety instruction considered)	P
	Test force (N) :	250N	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	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	70℃, no hazards.	P
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment.	N
	Picture tube separately certified :		N

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Clause	Requirement + Test	Result - Remark	Verdict
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	No moving parts.	N
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.	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. Refer to Annex M.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	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	With having the following components: - Components in primary circuits - Insulated 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	Metal 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 in the equipment.	N
4.7.3.6/RD	Materials used in high-voltage components	No parts exceeding 4kV.	N
7.6	Battery location		N
7.6.1	Battery location and installation		N

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Clause	Requirement + Test	Result - Remark	Verdict
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	Sealed maintenance free battery, the emission of electrolyte is unlikely.	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	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L ..... :		—
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat ..... :	(See appended table 7.4)	P
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General	Test conducted in accordance with Sub-clause 8.1	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P
8.2 5.2/RD	Electric strength		P
5.2.1/RD	General	(see appended table 8.2)	P
5.2.2/RD	Test procedure	(see appended table 8.2)	P
8.3	Abnormal operating and fault conditions		P
8.3.1	General	Considered.	P
5.3.1/RD	Protection against overload and abnormal operation	(See appended table 8.3)	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.3.2/RD	Motors		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 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
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
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		N
3.5.2/RD	Types of interconnection circuits ..... :		N
3.5.3/RD	ELV circuits as interconnection circuits		N

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Clause	Requirement + Test	Result - Remark	Verdict
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)	N
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

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Clause	Requirement + Test	Result - Remark	Verdict
M.3.2.3/RD	Monitoring voltage (V) ..... :		N
A/RD	Annex A, Tests for resistance to heat and fire		N
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2/RD)		N
A.1.1/RD	Samples ..... :		--
	Wall thickness (mm)..... :		--
A.1.2/RD	Conditioning of samples; temperature (C) ... :		N
A.1.3/RD	Mounting of samples ..... :		N
A.1.4/RD	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D ..... :		--
A.1.5/RD	Test procedure		N
A.1.6/RD	Compliance criteria		N
	Sample 1 burning time (s)..... :		--
	Sample 2 burning time (s)..... :		--
	Sample 3 burning time (s)..... :		--
A.2/RD	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2/RD and 4.7.3.4/RD)		N
A.2.1/RD	Samples, material..... :		--
	Wall thickness (mm)..... :		--
A.2.2/RD	Conditioning of samples; temperature (°C) ..... :		N
A.2.3/RD	Mounting of samples ..... :		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C ..... :		--
A.2.5/RD	Test procedure		N
A.2.6/RD	Compliance criteria		N
	Sample 1 burning time (s)..... :		--
	Sample 2 burning time (s)..... :		--
	Sample 3 burning time (s)..... :		--
A.2.7/RD	(Alternative) test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s)..... :		--
	Sample 2 burning time (s)..... :		--
	Sample 3 burning time (s)..... :		--
A.3/RD	Hot flaming oil test (see 4.6.2/RD)		N
A.3.1/RD	Mounting of samples		N

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Clause	Requirement + Test	Result - Remark	Verdict
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 ..... :	Transformer.（T1 on CNTL PCB）	—
	Manufacturer ..... :	See appended table 4.5	—
	Type ..... :	See appended table 4.5	—

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated values ..... :	Class B	—
	Method of protection ..... :	Circuit design	—
C.1/RD	Overload test	See appended table 7.5 and 8.3	P
C.2/RD	Insulation	See appended table C.2	P
	Protection from displacement of windings ..... :	See appended table C.2	P
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

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	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		N
I.1	General		N
I.2	Test for pluggable UPS		N
I.3	Test for permanently connected UPS		P
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		P
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		P
L.5.1	Test method		P

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L.5.2	Connection of the non-linear reference load		N
M	Annex M, Ventilation of battery compartments		P
M.1	General		P
M.2	Normal conditions	See appended table M	P
M.3	Blocked conditions		P
M.4	Overcharge conditions		N
N	Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)		N
U/RD	Annex U, Insulated winding wires for use without interleaved insulation (see 2.10.5.4/RD)		N
			--
V/RD	Annex V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1/RD)		P
V.1/RD	Introduction		P
V.2/RD	TN power distribution systems	See sub-clause 1.6.1/RD.	P

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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	--	--	--
Material of Front panel	Chi Mei	PA-757	HB, 80℃	--	UL: E56070
Disconnectors 1	ABB	OT800E12	800A/690V	IEC/EN60947-3	VDE
Disconnectors 2	ABB	OT1000E12	1000A/690V	IEC/EN60947-3	VDE
Disconnectors 3	ABB	OT63F3 3P	63A	IEC/EN60947-3	VDE
AC contactor 1	ABB	AF 750-30-11 1000A-AC1-3P	AC220V		VDE
AC contactor 2	ABB	EK-1000-40-11	1000A/690VAC 220-240VAC		VDE
AC capacitor 1	EACO	SRP-300-200-MS	200uf,±5%,300V,59A ,P=32mm	UL	UL:E346002
AC capacitor 2	EACO	SRE-300-400-MSJ	400uf,±5%,300V,65A ,P=32mm	UL	UL:E346002
AC capacitor 3	EACO	SCD-500-5.0-40F8	1200V 5UF ±10% P=52±1mm	UL	UL:E346002
AC capacitor 4	Faratronic	C383L205J202011	2uf,1200v	UL	--
AC fan 1	FANS-TECH	DH146A1-AG5-27	220V-240V 0.08A	--	VDE TUV
AC fan 2	EBM	W2E200-HK38-C01	230VAC 64/80W	--	VDE TUV
AC fan 3	SANJU	SJ1755	230VAC 0.18A	--	VDE TUV
SCR 1	SEMIKRON	SKKT570/16E	1600V/570A	UL	UL:E63532
SCR 2	SEMIKRON	SKET800/18GH4,	1800V 800A	UL	UL:E63532
IGBT 1	INFINEON	IGBT module,FF450R12ME4	1200V,450A	UL	UL:E83335
IGBT2	INFINEON	IGBT module,FF600R12ME4	1200V,600A,2PS	UL	UL:E83335
IGBT 3	INFINEON	FZ900R12KE4	900A/1200V	UL	UL:E83335
Inductor 1	EAST	EA990Ⅱ-400K	CLASS H	--	Test with appliance
Inductor 2	EAST	EA990Ⅱ-500K	CLASS H	--	Test with appliance
Transformer 1	EAST	EA990Ⅱ-400K	CLASS H	--	Test with appliance
Transformer 2	EAST	EA990Ⅱ-500K	CLASS H	--	Test with appliance
Transformer 3 (CT)	EAST	YDBH 0.66-100II 3000:1 0.2	CLASS B	--	Test with appliance

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Fuse 1	BUSSMANN	C10G32	32A, 400V	EN60127	VDE
Fuse 2	BUSSMANN	170M646	900A, 690V	EN60127	VDE
Fuse 3	BUSSMANN	170M6466	1250A, 690V	EN60127	VDE
DC capacitor	Aluminum Capacitor	M(+/-20%)Φ77*143 P(K)=32mm - 40℃～+85℃	450V 3900uF	--	VDE
PCB	Various	Various	V-0, 130℃	--	
Heat-Shrinkable Tubing	Various	Various	300V, 125℃	--	UL: E209436
On MAIN-C1 board					
Transformer (T1)	DAZHONG	EE16	Class B	--	Test with appliance
Inductor (L10、L11)	JEPULS	LC9-116	E3HPPL2 Class B	--	Test with appliance
Inductor (L3)	DAZHONG	LB09I271	200uH,1A, Class B	--	Test with appliance
Inductor (L6、L7、L8、L9)	Gausstek	PI52X45JM10UX	10uH,1.44A, Class B	--	Test with appliance
Inductor (L1、L2)	Gausstek	PS12X08IM22 UX	22uH,4A, Class B	--	Test with appliance
Inductor (L4、L5)	Gausstek	BN05Y354S10 0R	100ohm/100MHz,0.1ohm/DC,500mA, Class B	--	Test with appliance
Optical isolator (U76,U77,U78)	LITEON	LTV-816S-TA1(C)	5000Vac	--	UL No.E113898 VDE No.094722
On AUX-POWER-C2 board					
Y1 CAP (C2、C3、C4、C5)	Various	Various	250VAC, 4700pF	IEC 60384-14/1993	VDE
Y2 CAP (C52、C53)	Various	Various	250VAC, 2200pF	IEC 60384-14/1993	VDE
X2 CAP (C17、C18)	Various	Various	275VAC, 0.47uF	IEC 60384-14/1993	VDE
Transformer (T1)	EAST	E3HPPT2	Class B	--	Test with appliance
Transformer (T2)	EAST	EA200T1	Class B	--	Test with appliance
Inductor (L1)	EAST	E3HPPL1	Class B	--	Test with appliance
Inductor (L5)	EAST	E3HPPL3	Class B	--	Test with appliance

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Inductor (L2、L3、L4)	EAST	E3HPPL2	Class B	--	Test with appliance
Optical isolator (U6)	TOSHIBA	TLP781	Dti>0.4mm	EN60747-5-2	VDE 40021173
FUSE (F1、F2、F3、F4、F5、F6)	MINRONG	RS58	500VAC 5A	IEC60269-4	VDE
On SOFTSTART-C3 board					
Transformer (T1、T2)	EAST	HXT00280A	Class B	--	Test with appliance
On E3HPC4 board					
Transformer (T1)	DAZHONG	E3HPU2T1	Class B	--	Test with appliance
Optical isolator (U79,U84,U85)	FAIRCHILD	6N136	2500Vac	EN 60747-5-5	UL No. E52744 VDE 0884
Inductor (L1,L2,L3)	Gausstek	PI52X45JM10UX	10uH,1.44A, Class B	--	Test with appliance
Inductor(L4)	Gausstek	PS12X08IM22UX	22uH,4A, Class B	--	Test with appliance
Inductor(L6)	Gausstek	BN05Y354S100R	100ohm/100MHz,0.1ohm/DC,500mA, Class B	--	Test with appliance
Optical isolator (U41,U42,U43, U44,U46,U47, U48,U49,U50, U51,U52,U53, U54,U55,U56, U57,U58,U60, U61,U102)	LITEON	LTV-816S	5000Vac	--	UL No.E113898 VDE No.094722
Y1 CAP (C18、C82、C83、C84、C85、C86、C87、C184)	Various	Various	250VAC, 4700pF	IEC 60384-14/1993	VDE

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FUSE (F1、F2、F3)	Various	Various	250VAC 15A	--	VDE
On SAMPLE-C5 board					
Transformer (T1、T2、T3)	EAST	HXT00280A	Class B	--	Test with appliance
X2 CAP (C1、C2、C3)	Faratronic	C42P2225KBSC4000	275VAC,2.2 uF	EN 60384-14:2005	VDE No.40000358
Y2 CAP (C7)	Faratronic	C43Q1223M61C000	300VAC,22 nF	IEC 60384-14	ENEC No. V4160
On State Test-C6 board					
Relay (RLY1~RLY12)	SONGCHUAN	892-1CC-C	12VDC NO：5A 250VAC NC：3A 250VAC	--	TUV No. R50006512 VDE No.40006318
On Parllel-Isolated-C7 board					
Transformer (T1~T6)	EAST	E3HPC5-T1	Class B	--	Test with appliance
Relay (RLY1、RLY2)	SONGCHUAN	502N1-2C-S	12VDC/125VAC 0.5A	--	UL No.E74321
Transformer (T7)	EAST	E3HPC5-T1	Class B	--	Test with appliance
Inductor (L1、L3)	EAST	E3HPU1-L1	Class B	--	Test with appliance
Y1 CAP (C23、C24、C25)	Various	Various	250VAC, 4700pF	IEC 60384-14/1993	VDE
Optical isolator (U7、U8、U9、U10、U11、U12、U13、U14、U15、U16、U17、U18、U56、U57)	FAIRCHILD	6N136	2500Vac	EN 60747-5-5	UL No. E52744 VDE 0884
Optical isolator (U1、U2)	FAIRCHILD	6N137	2500Vac	--	UL No. E90700

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Optical isolator (U30、U31、U58、U59、U60、U61)	LITEON	LTV-816S	5000Vac	--	UL No.E113898 VDE No.094722
On E3HPK1 board					
Y1 CAP (C2)	Various	Various	250VAC, 4700pF	IEC 60384-14/1993	VDE
On STS-Control-C9 board					
FUSE (F1、F2、F3、F4、F5、F6)	MINRONG	RS58	500VAC 5A	IEC60269-4	VDE
Optical isolator (U5、U6、U7、U8、U9、U10)	TOSHIBA	TLP781	5000Vac	EN60747-5-2	VDE 40021173
On IGBT-Drive-D1 board					
Transformer (T1)	EAST	E3HP-IGBT-T1	Class B	--	Test with appliance
Optical isolator (U4、U5)	Agilent	Hcpl-316J	Optocoupler-Single-IGBT Drive Outputtp0.3/0.32us-2.0A output-3750Vac-SOP16	--	UL: E55361 VDE 0884
On STSMJ-D2 board					
Transformer (T1、T2)	EAST	E3HPPT2	Class B	--	Test with appliance
On BYP&OUT-SAMPLE-C13 board					
Transformer (T1、T2、T3、T4、T5、T6)	EAST	HXT00280A	Class B	--	Test with appliance
X2 CAP (C1、C2、C3、 C4、C5、C6)	Faratronic	C42P2225KBSC4000	275VAC, 2.2 uF	EN 60384-14:2005	VDE No.40000358
Y2 CAP (C7、C8)	Faratronic	C43Q1223M61C000	300VAC, 22 nF	IEC 60384-14	ENEC No. V4160
On Filter-C14 board					

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X2 CAP (C3, C4、C9, C10、C15, C16、C21, C22、C35, C36、C41, C42)	Surong	MP2104K3D2G0	280Vac 0.1uF	--	VDE
Y2 CAP (C45~C76)	Faratronic	C43Q1224MB0C400	300Vac 0.22uF	EN 60384-14:2005	ENEC-SEMKO No.: SE/0366-2B
[1]) an asterisk indicates a mark which assures the agreed level of surveillance					
Remark					

4.4	TABLE: electrical data (in normal conditions)					P
Fuse#	Irated(A)	U(V)	P(W)	P(VA)	I(A)	Condition/status
Model: EA99500						Charging of empty batteries and rated output load.
--	--	342V/50Hz	550000	550000	840	
--	--	342V/60Hz	550000	550000	840	
--	836	380V/50Hz	550000	550000	835.6	
--	836	380V/60Hz	550000	550000	835.6	
	836	415V/50Hz	550000	550000	765.2	
--	836	415V/60Hz	550000	550000	765.2	
--	--	456V/50Hz	550000	550000	696.4	
--	--	456V/60Hz	550000	550000	696.4	
Model: EA99400						Charging of empty batteries and rated output load.
--	--	342V/50Hz	440000	440000	670	
--	--	342V/60Hz	440000	440000	670	
--	669	380V/50Hz	440000	440000	668.5	
--	669	380V/60Hz	440000	440000	668.5	
	669	415V/50Hz	440000	440000	612	
--	669	415V/60Hz	440000	440000	612	
--	--	456V/50Hz	440000	440000	557	
--	--	456V/60Hz	440000	440000	557	
Note(s): Please measure the input currents with normal load.						

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Clause	Requirement + Test	Result - Remark	Verdict

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
Power switch on (L1-N)	--	8	12	Vi=388V, 37% of Vi=143.56V, No load applied
Power switch on (L2-N)	--	8	12	Vi=388V, 37% of Vi=143.56V, No load applied
Power switch on (L3-N)	--	8	12	Vi=388V, 37% of Vi=143.56V, No load applied
Note(s):				

5.1.4	TABLE: Backfeed protection test			P
Condition	Voltage measured (V)/current (mA)			Comments
	A-N	A-G	N-G	
No load	0.019mA	0.026 mA	0.021 mA	Battery mode, Normal
Full load	0.022mA	0.106 mA	0.106 mA	Ditto
No load	0.016mA	0.021 mA	0.019 mA	Battery mode, Abnormal condition (__IGBT 1 c-e_ short circuit)
Full load	0.016mA	0.102 mA	0.104 mA	Battery mode, Abnormal condition (__IGBT 1 c-e__ short circuit)
Note(s):				

5.2.1 and 2.2.2/RD	TABLE: insulation / hazardous voltage measurement			P
Transformer	Location	Max. voltage		Voltage limitation component
		V peak	V d.c.	
On CNTL board				
T1C winding	Pin(5-6)	35.6	23.2	--
T1D winding	Pin(4-5)	34.5	19.4	--
T2G winding	Pin(7-8)	16.2	10.5	--
Note(s):				

5.2.1 and 2.2.3/RD	TABLE: SELV measurement (under fault conditions)	N

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Clause	Requirement + Test	Result - Remark	Verdict

Location	Voltage (max.) (V)	Comments
Supplementary information:		

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		
	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 (V)	Comments
I/P earth →O/P earth	1.03	Test current of __882__A for __600__s.
Supplementary information:		

7.5 and 8.3	TABLE: fault condition tests						P
	ambient temperature (°C) ……:						
	model/type of power supply ……:						
	manufacturer of power supply ……:						
	rated markings of power supply ……:						
component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	

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Model: EA99500						
Output （L1-N）	o-l	415	70 min	--	--	UPS shutdown the output in 10 mins at load of 110% load and turn to bypass. No any hazards. Measured max temperatures: SCR=82.3℃ IGBT=92.5℃ T1(IGBT-Drive-D1) winding=49.6℃, T1(AUX-POWER-C2) winding=49.9℃ T1 winding(E3HPC4)=53.8℃, T1 core (E3HPC4)=51.5℃ Ambient=23.6.
Output （L1-N）	o-l	Battery mode	70 min	--	--	UPS shutdown the output in 10 mins at load of 110% load and turn to by pass. No any hazards. Measured max temperatures: SCR=71.6℃ IGBT=82.3℃ T1(IGBT-Drive-D1)winding=39.6℃, T1(AUX-POWER-C2) winding=41℃ T1 winding (E3HPC4)=41.1℃, T1 core (E3HPC4)=38℃ Ambient=23.1.
Output （L1-N）	s-c	415	1 S	--	--	UPS transfer to fault mode .The output shutdown immediately. And the UPS display warning: “Output short”. No any hazards.
Output （L1-N）	s-c	Battery mode	1 S	--	--	UPS transfer to fault mode .The output shutdown immediately. And the UPS display warning: “Output short”. No any hazards.
Ventilation openings	Block-ed	415	2 hours	--	--	After blocked the openings, the temperature increased, When the heat sink temperature reached about 80 ℃, the UPS output switch to bypass. And the UPS display warning: “Heat sink overtemp”. SCR:81.9℃ IGBT:92.3℃ Input Inductor:106.9℃ Output Transformer:121℃ T1(AUX-POWER) winding=64.1℃ Ambient=25.1℃. No any hazards.

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Clause	Requirement + Test					Result - Remark	Verdict
Ventilation openings	Block-ed	Battery mode	1 hour	--	--	After blocked the openings, the temperature increased, When the heat sink temperature reached about 80 ℃, the UPS output switch to bypass. And the UPS display warning: “Heat sink overtemp”. SCR:77.9℃ IGBT:86.8℃ Input Inductor:102.2℃ Output Transformer:115.2℃ T1(AUX-POWER) winding=60.1℃ Ambient=24.6℃. No any hazards.	
T1 secondary(E3HPC4)	s-c	415	60min	--	--	After short circuit, the temperature of T1 (on E3HPC4) increased, about 3 mins later T1 winding temperature reached about 64℃, the LCD power off and the temperature decreased. But the input and output have no noticeable change. No any hazards.	
REC-IGBT (+ - ~)	s-c	415	5us	--	--	IGBT overcurrent protective device operated. Rectifier shutdown. Display screen show “Rectifier failure”. No any hazards.	
INV-IGBT (+ - ~)	s-c	415	5us	--	--	IGBT overcurrent protective device operated. Rectifier and inverter shutdown. Display screen show “inverter overcurrent”. No any hazards.	
BYP SCR (A-K)	s-c	415	10ms	--	--	UPS switch to bypass. Rectifier and inverter shutdown. Display screen show “Bypass SCR fault”. No any hazards.	
Fan	locked	415	20mins	--	--	After locked all fans, the temperature increased, when the heat sink temperature reached about 80 ℃, the UPS output 0V/0A. And the UPS display warning: “Heat sink overtemp”. SCR:79℃ IGBT:88℃ Input Inductor:106℃ Output Transformer:119℃ T1(AUX-POWER) winding=61.2℃ Ambient=25.2℃. No any hazards.	

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Clause	Requirement + Test	Result - Remark	Verdict

Fan	locked	Battery mode	20mins	--	--	After locked all fans, the temperature increased, when the heat sink temperature reached about 80 ℃, the UPS output 0V/0A. And the UPS display warning: “Heat sink overtemp”. SCR:81.1℃ IGBT:89.5℃ Input Inductor:107.3℃ Output Transformer:121.2℃ T1(AUX-POWER) winding=61.4℃ Ambient=24.7℃. No any hazards.
CNTL PCB						
U47 pin1-pin2	s-c	415	10 min	--	--	Normal operation, no hazardous.
U47 pin3-pin4	s-c	415	10 min	--	--	Normal operation, no hazardous.
U47 pin1	o-c	415	10 min	--	--	Normal operation, no hazardous.
U47 pin3	o-c	415	10 min	--	--	Normal operation, no hazardous.
U41 pin1-pin2	s-c	415	10 min	--	--	Normal operation, no hazardous.
U41 pin3-pin4	s-c	415	10 min	--	--	Normal operation, no hazardous.
U41 pin1	o-c	415	10 min	--	--	Normal operation, no hazardous.
U41 pin3	o-c	415	10 min	--	--	Normal operation, no hazardous.
U43 pin1-pin2	s-c	415	10 min	--	--	Normal operation, no hazardous.
U43 pin3-pin4	s-c	415	10 min	--	--	Normal operation, no hazardous.
U43 pin1	o-c	415	10 min	--	--	Normal operation, no hazardous.
U43 pin3	o-c	415	10 min	--	--	Normal operation, no hazardous.
U49 pin1-pin2	s-c	415	10 min	--	--	Normal operation, no hazardous.
U49 pin3-pin4	s-c	415	10 min	--	--	Normal operation, no hazardous.

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U49 pin1	o-c	415	10 min	--	--	Normal operation, no hazardous.
U49 pin3	o-c	415	10 min	--	--	Normal operation, no hazardous.
U58 pin1-pin2	s-c	415	10 min	--	--	Normal operation, no hazardous.
U58 pin3-pin4	s-c	415	10 min	--	--	Normal operation, no hazardous.
U58 pin1	o-c	415	10 min	--	--	Normal operation, no hazardous.
U58 pin3	o-c	415	10 min	--	--	Normal operation, no hazardous.
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	P

Location	RMS voltage (V)	Peak voltage (V)	comments
Model: EA99500			
Tested on CNTL			
T1 Pin 1-6	225	339	Line mode and rated output load.
T1 Pin 1-7	215	326	Ditto
T1 Pin 1-8	222	324	Ditto
T1 PIN 1-9	224	331	Ditto
T1 Pin 1-10	225	339	Ditto
T1 Pin 2-6	215	326	Ditto
T1 Pin 2-7	218	398	Ditto
T1 Pin 2-8	214	331	Ditto
T1 PIN 2-9	213	356	Ditto
T1 Pin 2-10	221	383	Ditto
T1 Pin 3-6	204	316	Ditto
T1 Pin 3-7	212	354	Ditto
T1 Pin 3-8	211	320	Ditto
T1 PIN 3-9	214	316	Ditto

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Clause	Requirement + Test	Result - Remark	Verdict

T1 Pin 3-10	205	326	Ditto
T1 Pin 4-6	204	332	Ditto
T1 Pin 4-7	215	390	Ditto
T1 Pin 4-8	210	325	Ditto
T1 PIN 4-9	210	346	Ditto
T1 Pin 4-10	214	383	Ditto
U45 Pin 1-3	222	324	Ditto
U45 Pin 1-4	224	331	Ditto
U45 Pin 2-3	225	339	Ditto
U45 Pin 2-4	215	326	Ditto
U43 Pin 1-3	222	324	Ditto
U43 Pin 1-4	224	331	Ditto
U43 Pin 2-3	225	339	Ditto
U43 Pin 2-4	215	326	Ditto
U47 Pin 1-3	222	324	Ditto
U47 Pin 1-4	224	331	Ditto
U47 Pin 2-3	225	339	Ditto
U47 Pin 2-4	215	326	Ditto
U49 Pin 1-3	222	324	Ditto
U49 Pin 1-4	224	331	Ditto
U49 Pin 2-3	225	339	Ditto
U49 Pin 2-4	215	326	Ditto
U58 Pin 1-3	222	324	Ditto
U58 Pin 1-4	224	331	Ditto
U58 Pin 2-3	225	339	Ditto
U58 Pin 2-4	215	326	Ditto
Note:			

5.7 and 2.10.4/RD	TABLE: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Metal enclosure to bare pin of battery terminal	<420	<250V	2.0	12.2	2.5	>12.2

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

Primary pin to earthed metal plate on Input EMI PCB	<420	<250V	2.0	5.1	2.5	>5.1
Primary pin to earthed metal enclosure on Output EMI PCB	<420	<250V	2.0	8.9	2.5	>8.9
On CNTL PCB						
Primary trace to secondary trace under (U43)	<420	<250	4.0	6.2	5.0	6.2
Primary trace to secondary trace under T1	<420	<250	4.0	5.1	5.0	5.1
Primary winding to secondary winding of T1	<420	<250	4.0	5.0	5.0	5.0
Primary winding to core of T1	<420	<250	2.0	2.5	2.5	2.5
Secondary winding to core of T1	<420	<250	2.0	2.5	2.5	2.5
Note(s):						

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

test voltage applied between:	test voltage (V)	Breakdown Yes / No
Primary to Secondary (mains inlet&outlet conductor to RS232 port)	3000Va.c.	No
Primary to RS232 port	3000Va.c.	No
Primary to earth (mains inlet&outlet conductor to earth)	1500Va.c.	No
Primary winding to secondary winding of transformer T1 on CNTL PCB	3000Va.c.	No
Primary winding to core of transformer T1 on CNTL PCB	1500Va.c.	No
Secondary winding to core of transformer T1 on CNTL PCB	1500Va.c.	No
1 layer insulation tape used in transformer T1 on CNTL PCB	3000Va.c.	No
Supplementary information:		

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

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

Part	Test temperature (°C)	Impression diameter (mm)
Bobbin of converter transformer	125	0.9
Supplementary information:		

7.4.2,	Table: Enclosure opening measurements		P
Location	Size (mm)	Comments	
Front panel	3.0x12.5 mm	65 openings for ventilation	
Rear panel	Diameter=67mm	1 openings for DC fan ventilation protected by metal fan guard.	
Top/bottom	None	--	
Supplementary information:			

7.5	TABLE: resistance to fire			P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class
Supplementary information: see table 4.5				

7.7	TABLE: temperature rise measurements		P
	Test voltage (V) …….....:		—
	t1 (°C)……..... :	--	—
	t2 (°C)……..... :	--	—
Temperature rise dT of part/at:	T (℃)		required Tmax (℃)
Tested on model: EA99500			
Temperature rise dT of part/at:	342V/50Hz	456V/50Hz	Battery Mode	required Tmax(℃)
Disconnector	43	42	30	100
Input wire (phase A)	48	47	32	105
coil of A Input inductor	98	81	40	130
coil of B Input inductor	112	95	37	130
coil of C Input inductor	109	96	38	130
winding of A Input inductor	106	89	44	130

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

winding of B Input inductor	107	99	35	130
winding of C Input inductor	107	102	43	130
coil of C Output Transformer	111	102	115	130
winding of A Output Transformer	116	119	115	130
X2 capacitor (EMI board)	36	42	37	100
Y2 capacitor (EMI board)	35.5	36	32.4	110
PCB（EMI board）	32	31.8	31.5	130
Photo-couple of IGBT-Drive-D1	40.2	--	--	100
winding of T1 (AUX-POWER-C2)	47	--	--	130
Winding of T1 (E3HPC4)	36.2	--	--	130
Heat sink of IGBT	74.8	72.1	60.8	130
Battery wire	36	35	45	105
Fan	54	46	45.5	70
Top enclosure	74	66	62.4	70
Front panel	39	36	34	95
Side enclosure	65	56	52	70
Rear panel	68	58	60	95
On CNTL Board				
U9 body（DSP）	62.5	64	58	100
T1 coil	42	45	39	110
T1 core	41	43	36	110
PCB	45	44	40	130
Ambient	29	28.1	28.5	--
Note(s):				

8.1	TABLE: earth leakage current			P
Condition	L1→ terminal A (mA)	N → terminal A (mA)	Limit (mA)	Comments
Unit on	2.47	3.4	3.5	Switch “e” open, L1/N to PE, no load

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

Unit on	0.005	0.005	0.25	Switch “e” close, L1/N to front panel (with foil)
Unit on	0.01	0.01	0.25	Switch “e” close, L1/N to RS232 port
Supplementary information:				

C.2	Safety isolation transformer	P
	Construction details:	
Transformer part name: T1 on CNTL PCB		
Manufacturer: See appended table 1.5.1		
Type: See appended table 1.5.1		
Recurring peak voltage	420Vpeak	
Required clearance for reinforced insulation (from table 2H and 2J)	4.0	
Effective voltage rms	250Vrms	
Required creepage distance for reinforced insulation (from table 2L)	5.0	
Measured min. creepage distance		
Location	inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin	5.6	10
Primary winding/pin to core	2.8	3.3
Secondary winding/pin to core	2.8	3.3
Measured min. clearances		
Location	inside (mm)	outside (mm)
Primary winding/pin to secondary winding/pin	5.6	10
Primary winding/pin to core	2.8	3.3
Secondary winding/pin to core	2.8	3.3
Construction:		

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

Concentrically wound transformer design, core size EE-16. N1, N2 are primary winding which is wound around the internal side of the bobbin. 3 layers of mylar tapes are used to separate primary and secondary windings. N3, N4, N5 are secondary windings on outer side of bobbin. Margin tape with width of 2.8mm is used on both side of bobbin and each winding layer. Tubing is used on every winding exits to the bare pins on bobbin.	
Pin numbers	
Prim.	1-2, 3-4
Sec.	6-7, 8-9-10
Bobbin	
Material	
Thickness	0.7mm
Electric strength test	
With 3000 V a.c. after humidity treatment	
Result	Pass

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 m³/Ah) * n * I * C	
	where: K1 : constant factor of 28 h * cm²/m³ Q : airflow in m³/h n : number of battery cells I : constant factor (0,2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	With the specific data for the UPS the following dimension for the ventilation openings is required:	
	External battery pack n : C :	
	A > h * cm²/m³ * (0.054 m³/Ah) * n * 0.2 A/100 Ah * C	
	A > cm²	
	Verdict	
	The size of ventilation openings in battery cabinet exceeds the required airflow by far.	

Product photos

Fig. 1 – Overview (I) of UPS

Fig. 2 – Overview (II) of UPS

Product photos

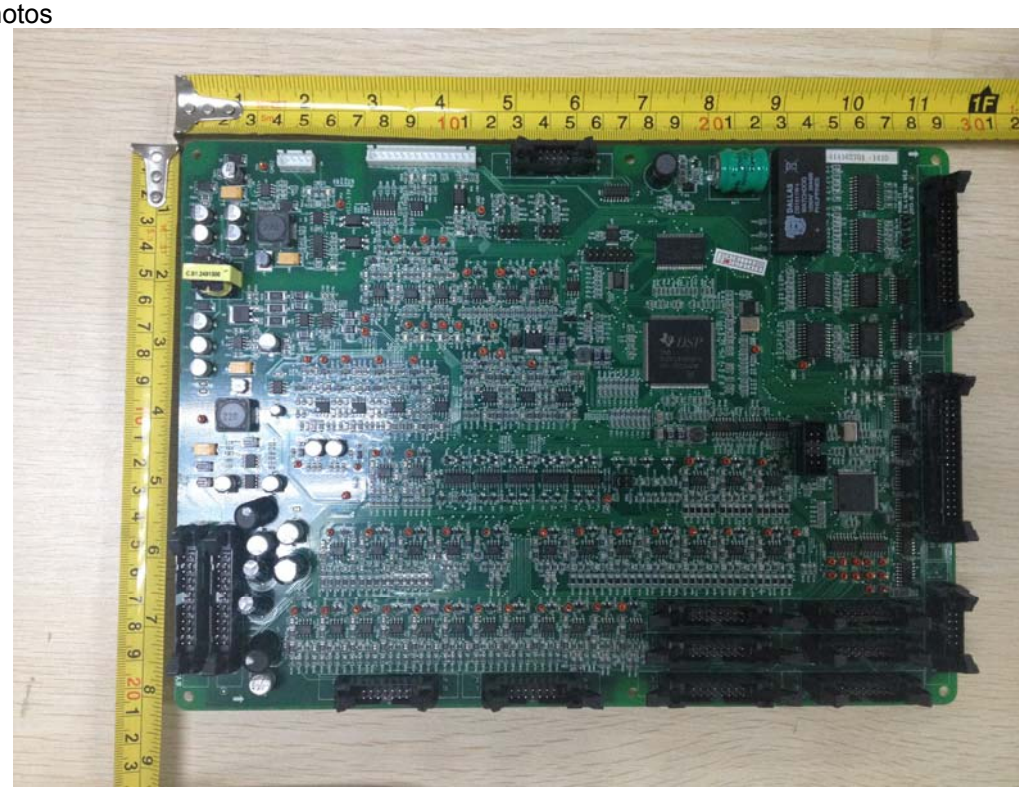

Fig. 3 – Main-C1 board component view

Fig. 4 – Main board trace view

Product photos

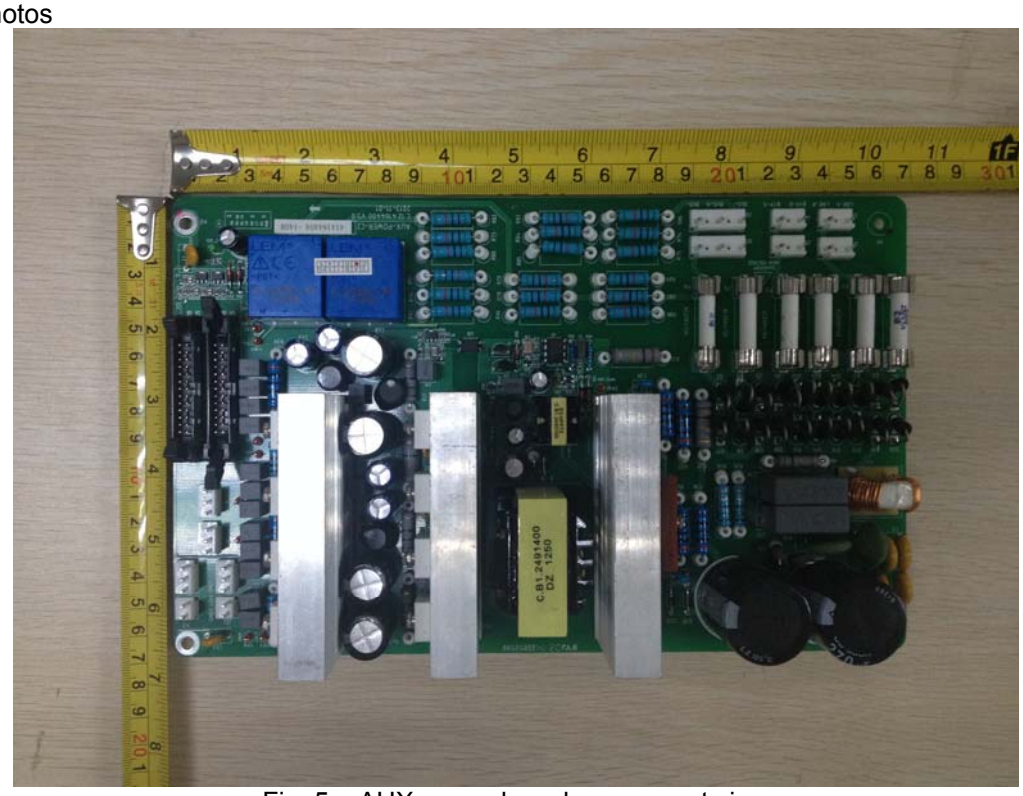

Fig. 5 – AUX power board component view

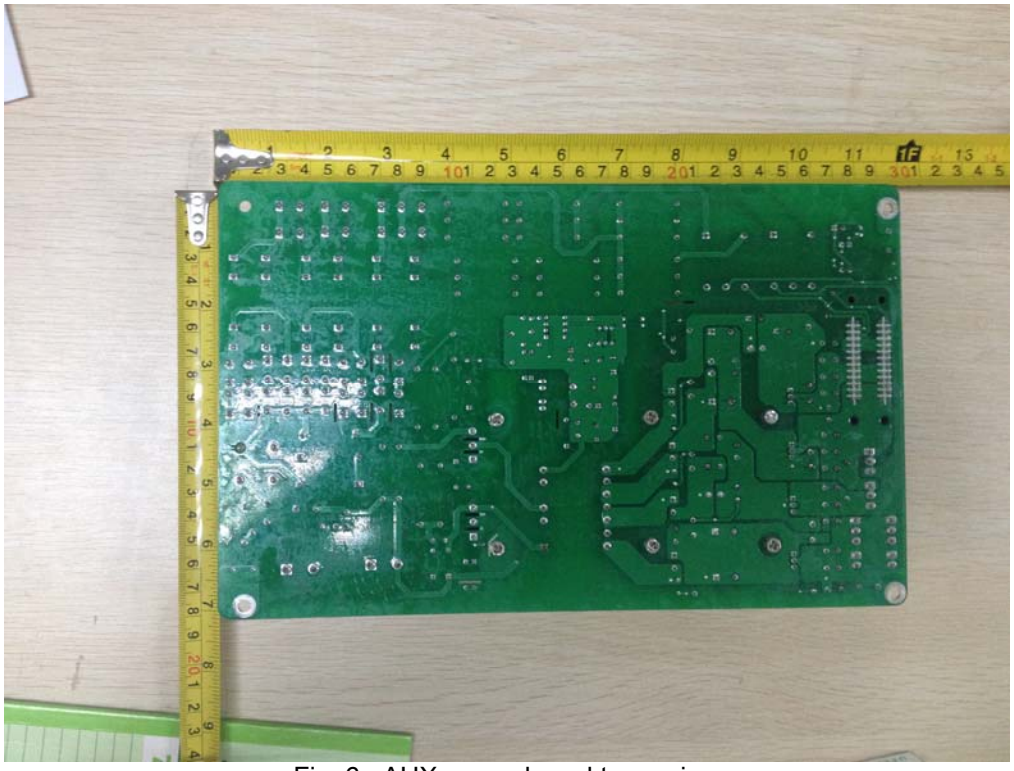

Fig. 6 –AUX power board trace view

Product photos

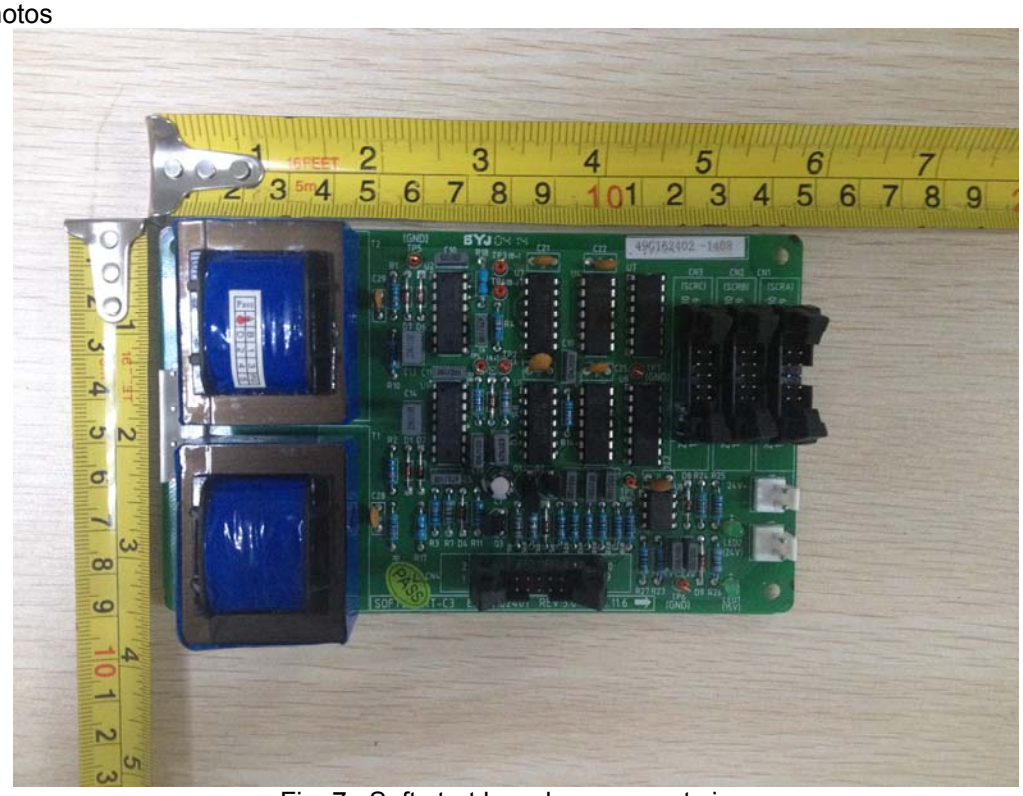

Fig. 7 –Soft start board component view

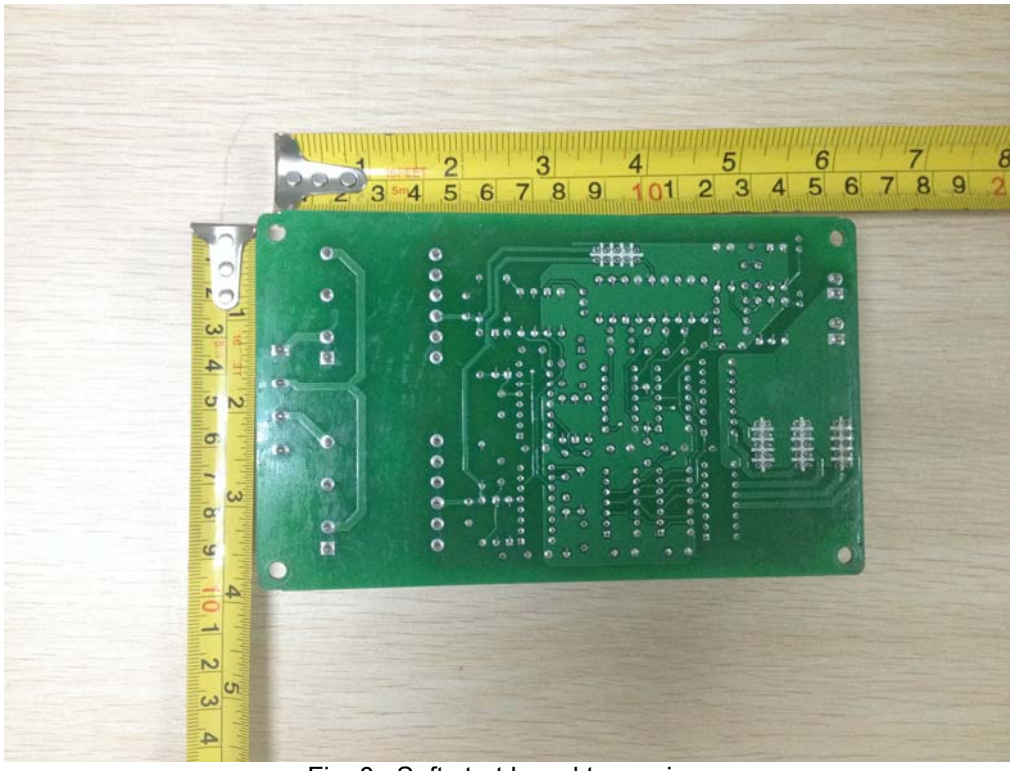

Fig. 8 –Soft start board trace view

Product photos

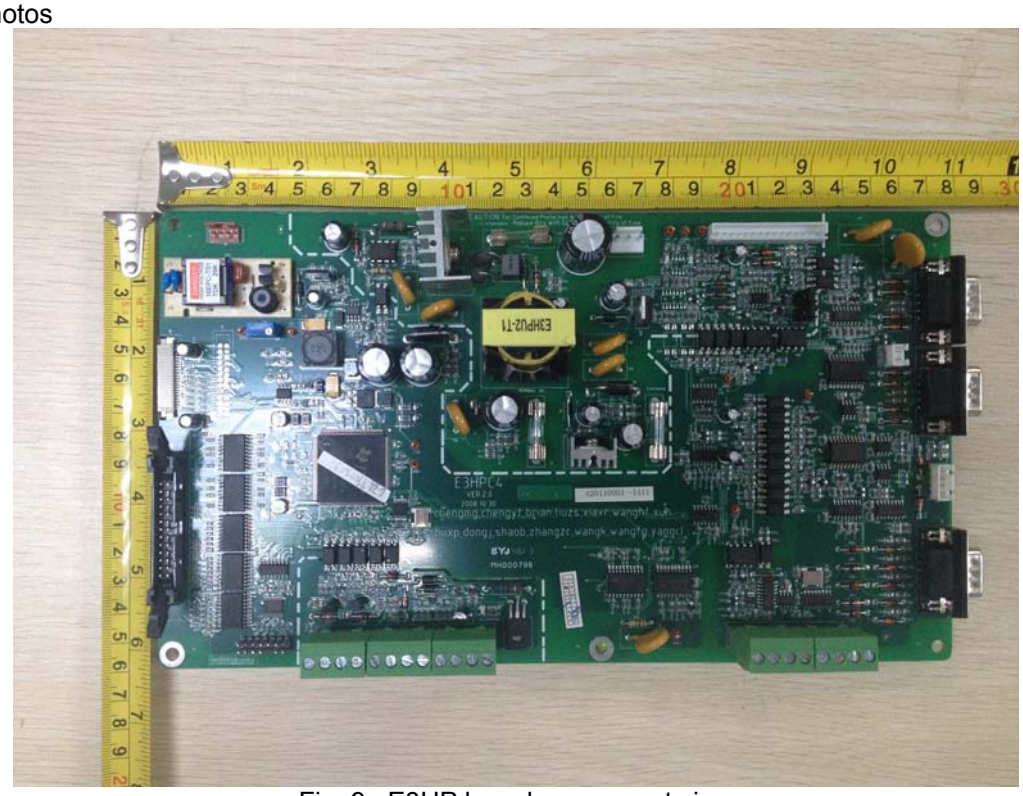

Fig. 9 –E3HP board component view

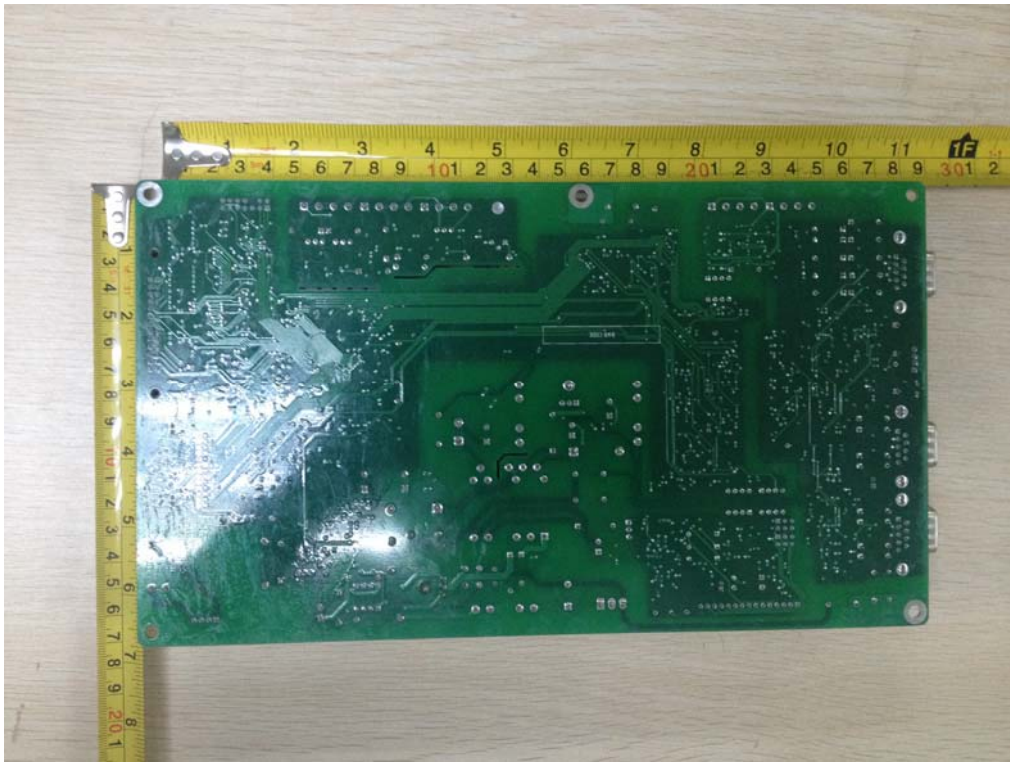

Fig. 10 –E3HP board trace view

Product photos

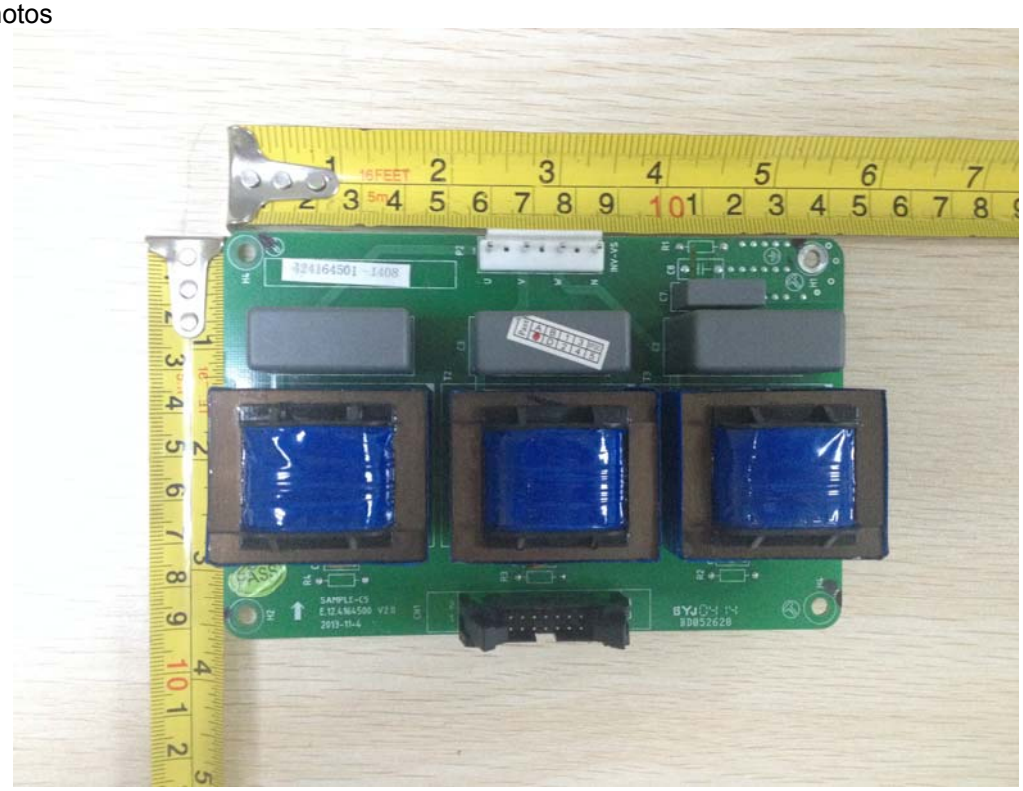

Fig. 11 –Sample board component view

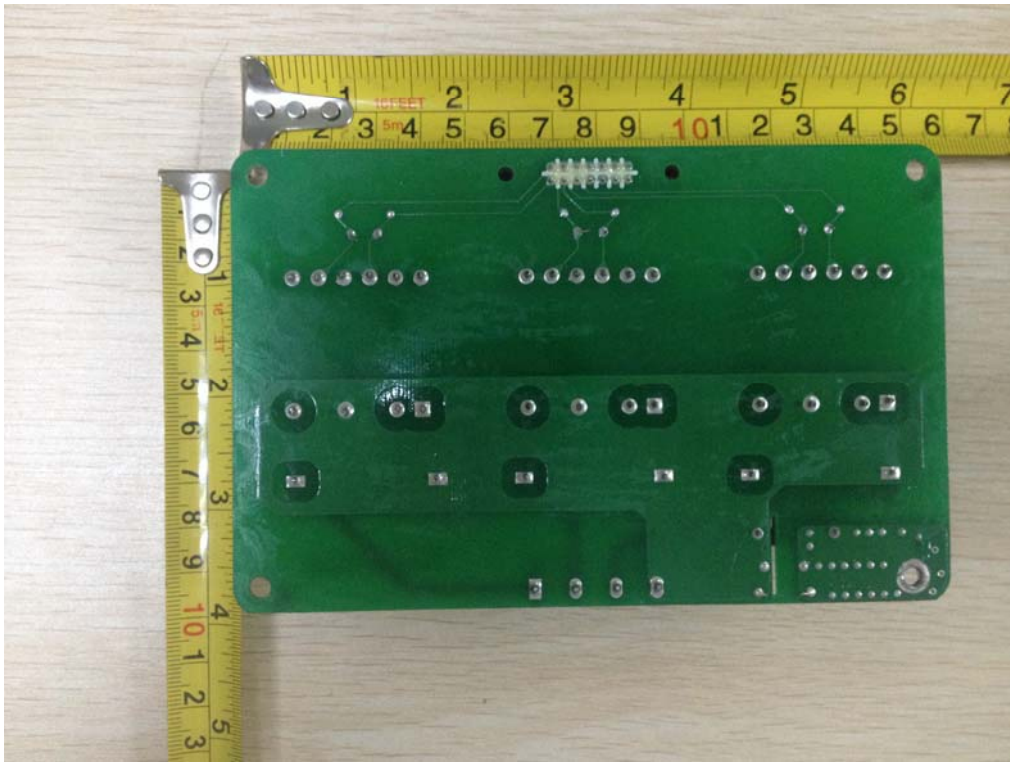

Fig. 12 –Sample board trace view

Product photos

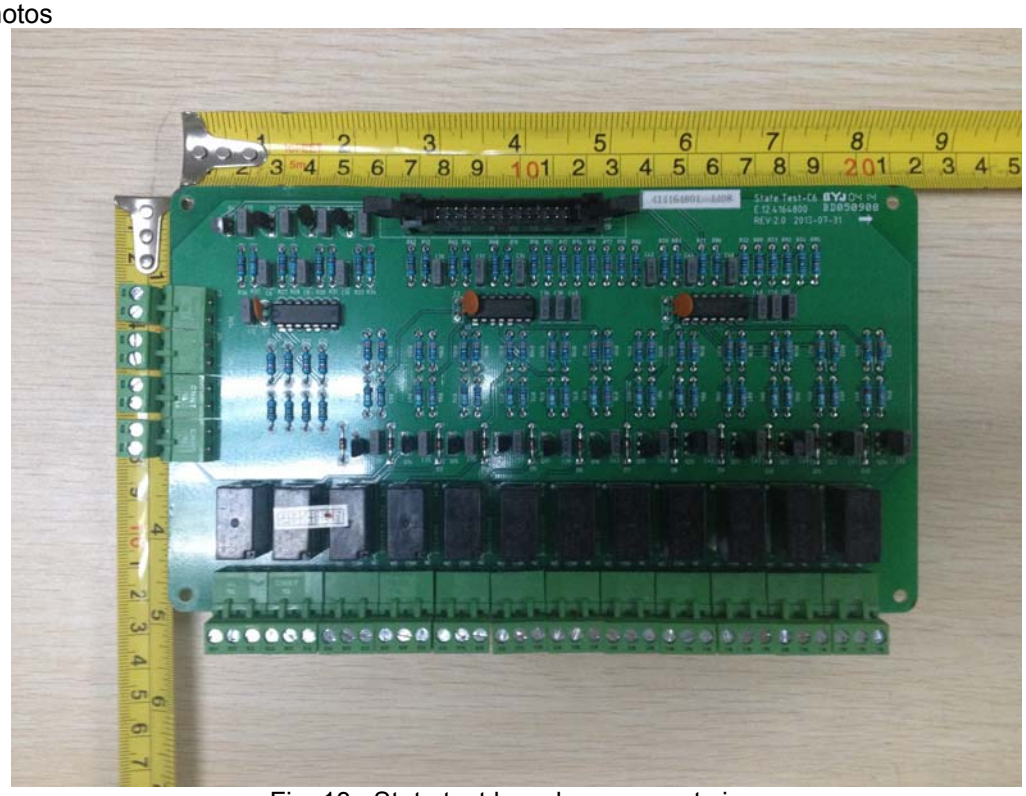

Fig. 13 –State test board component view

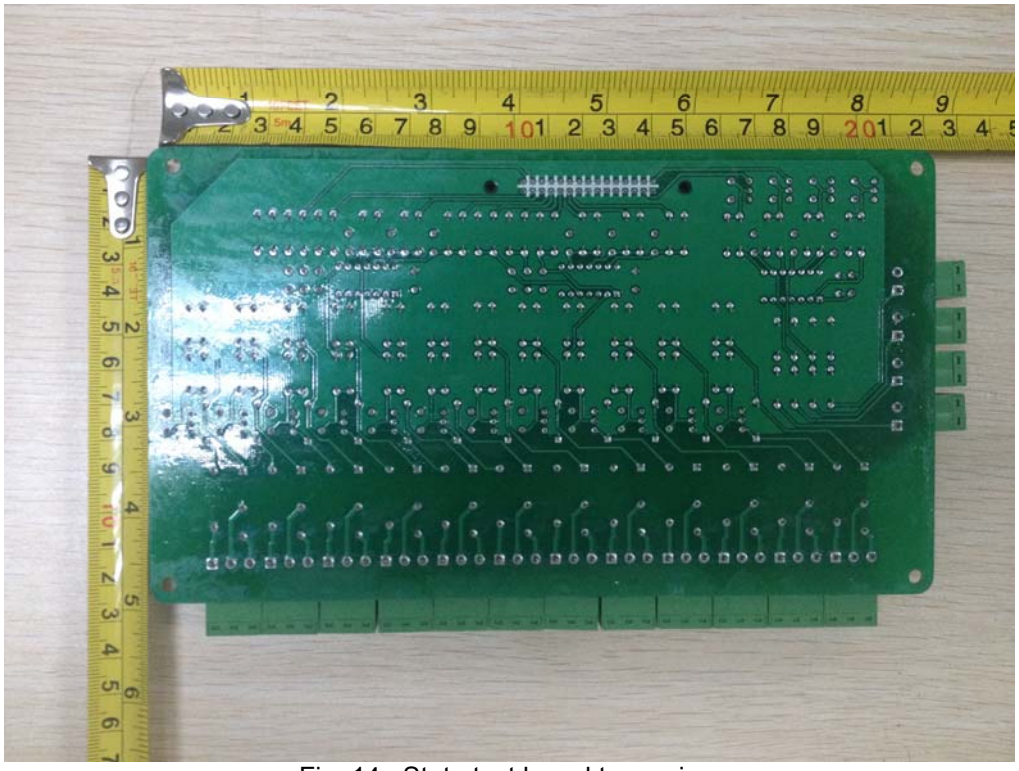

Fig. 14 –State test board trace view

Product photos

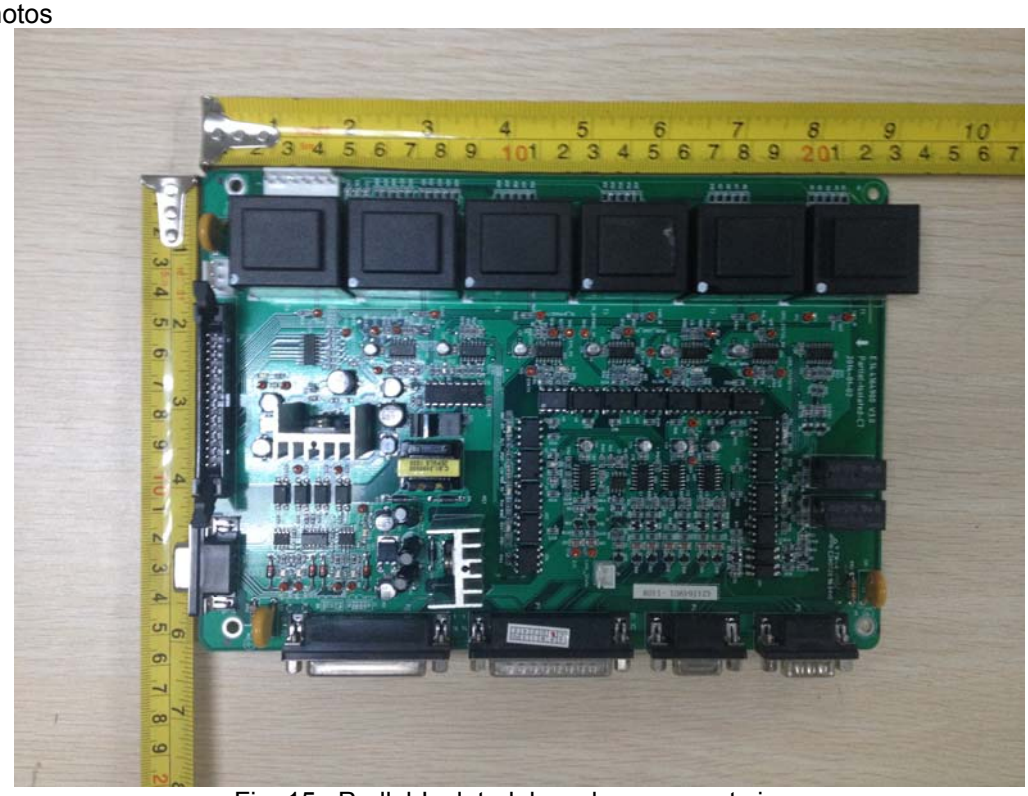

Fig. 15 –Parllel-Isolated board component view

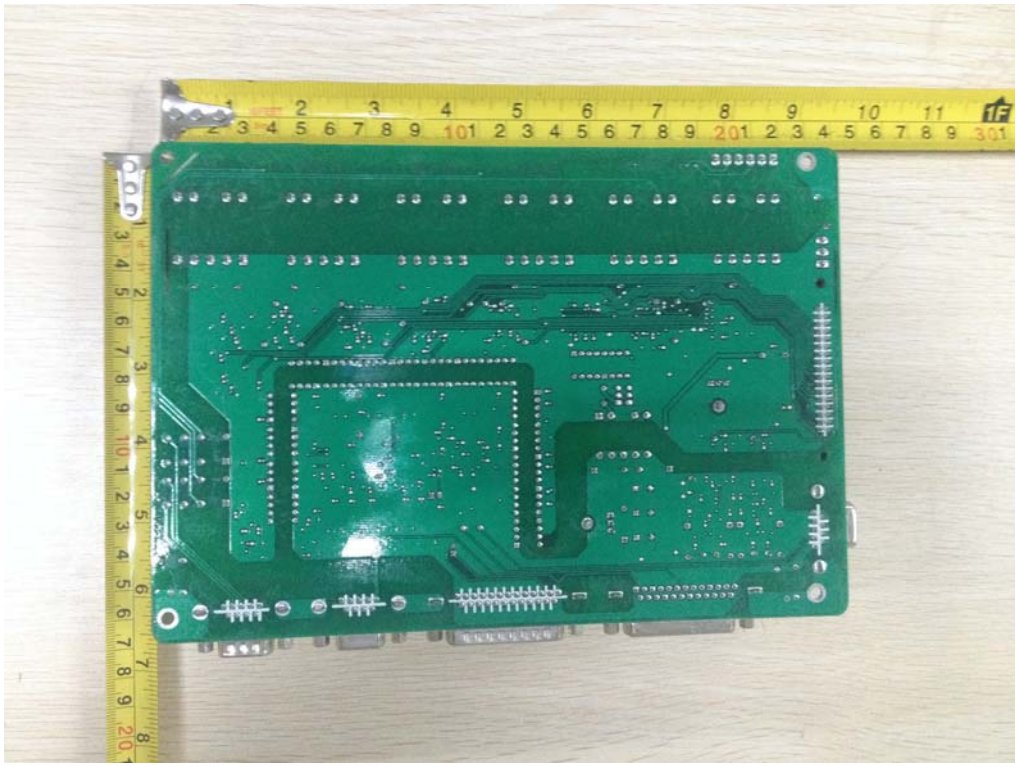

Fig. 16 –Parllel-Isolated board trace view

Product photos

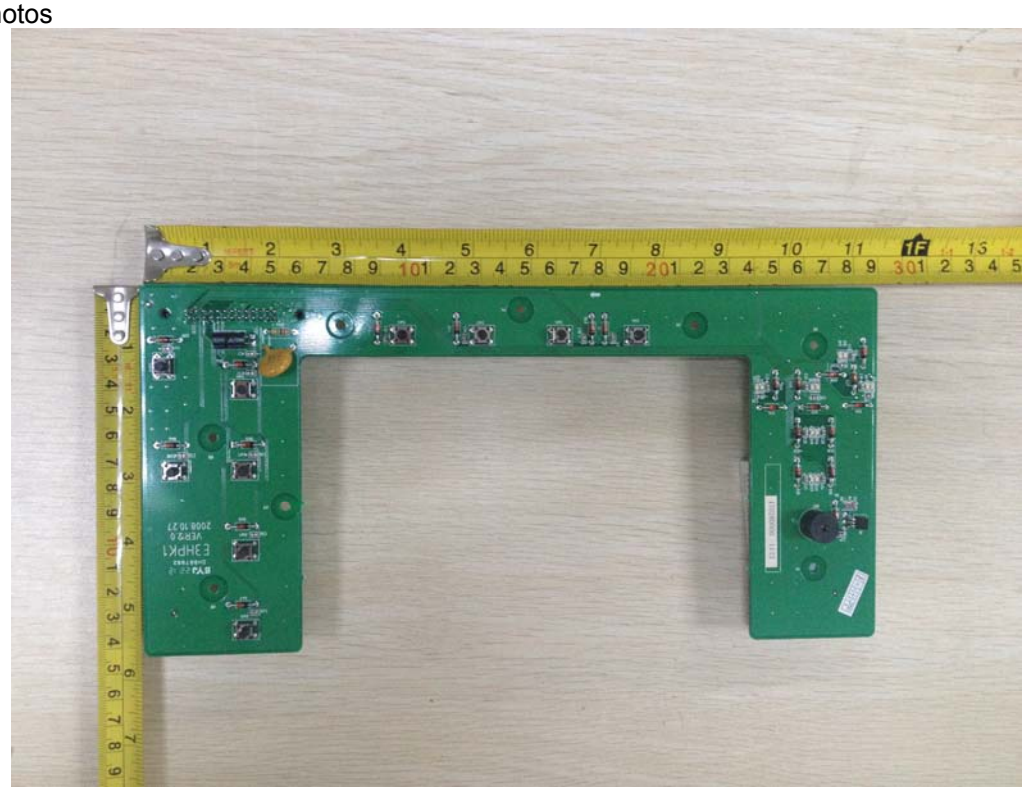

Fig. 17 –E3HPK1 board component view

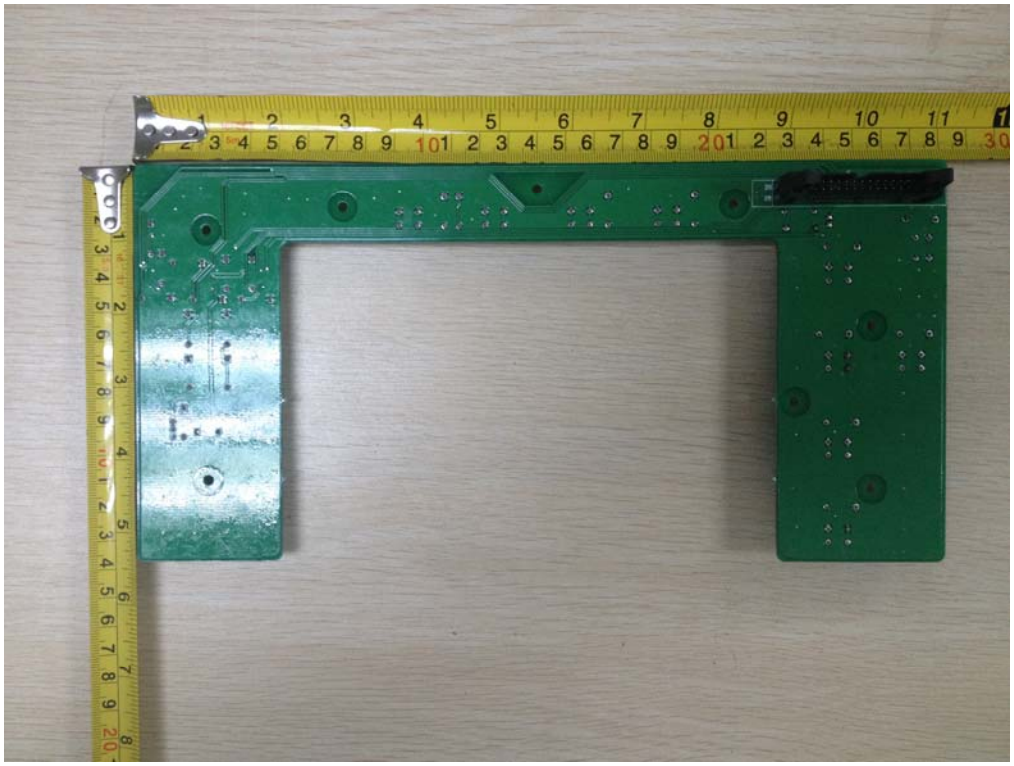

Fig. 18 –E3HPK1 board trace view

Product photos

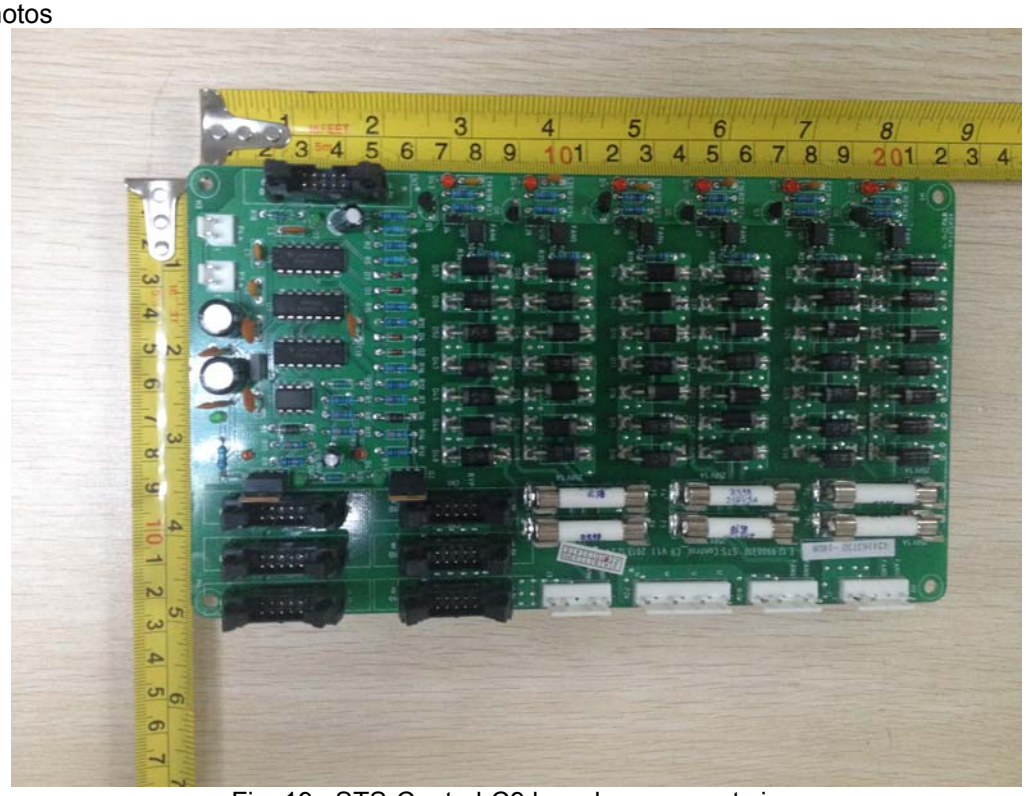

Fig. 19 –STS-Control-C9 board component view

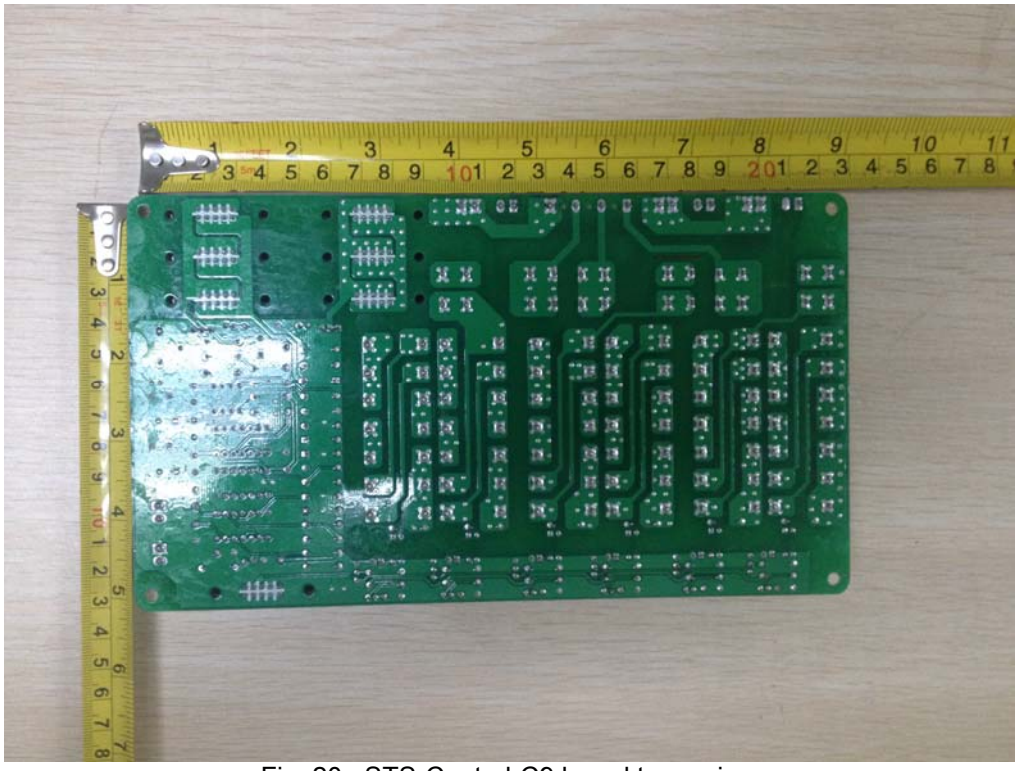

Fig. 20 –STS-Control-C9 board trace view

Product photos

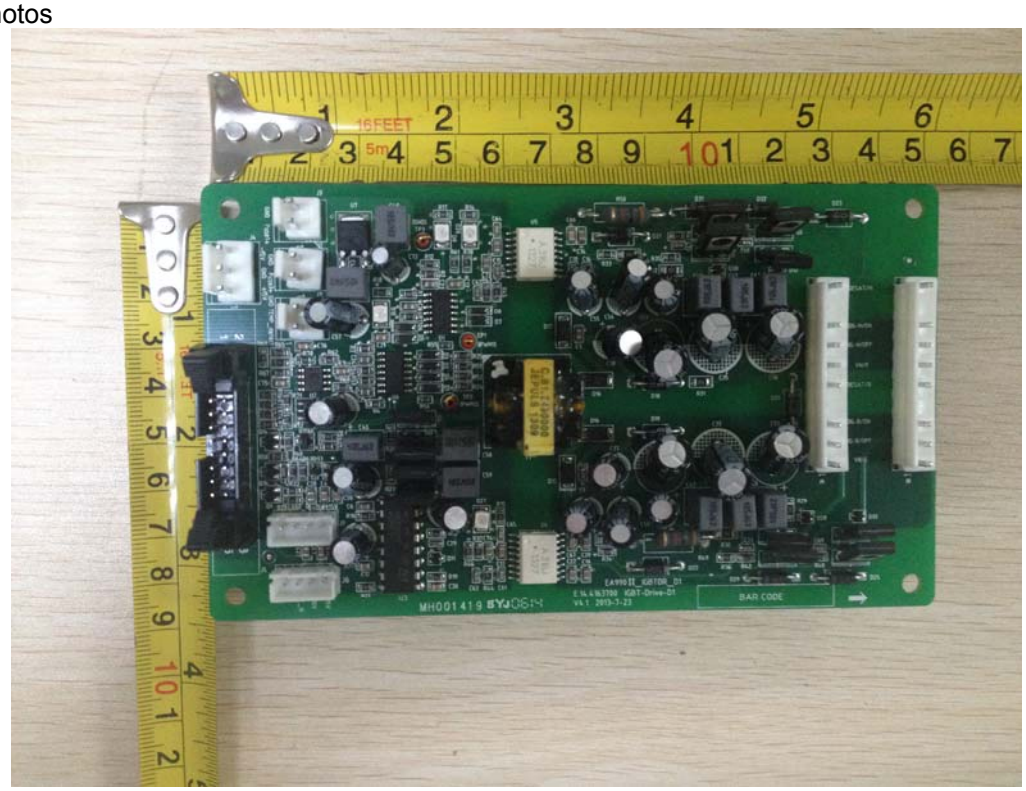

Fig. 21 –IGBT-Drive-D1 component view

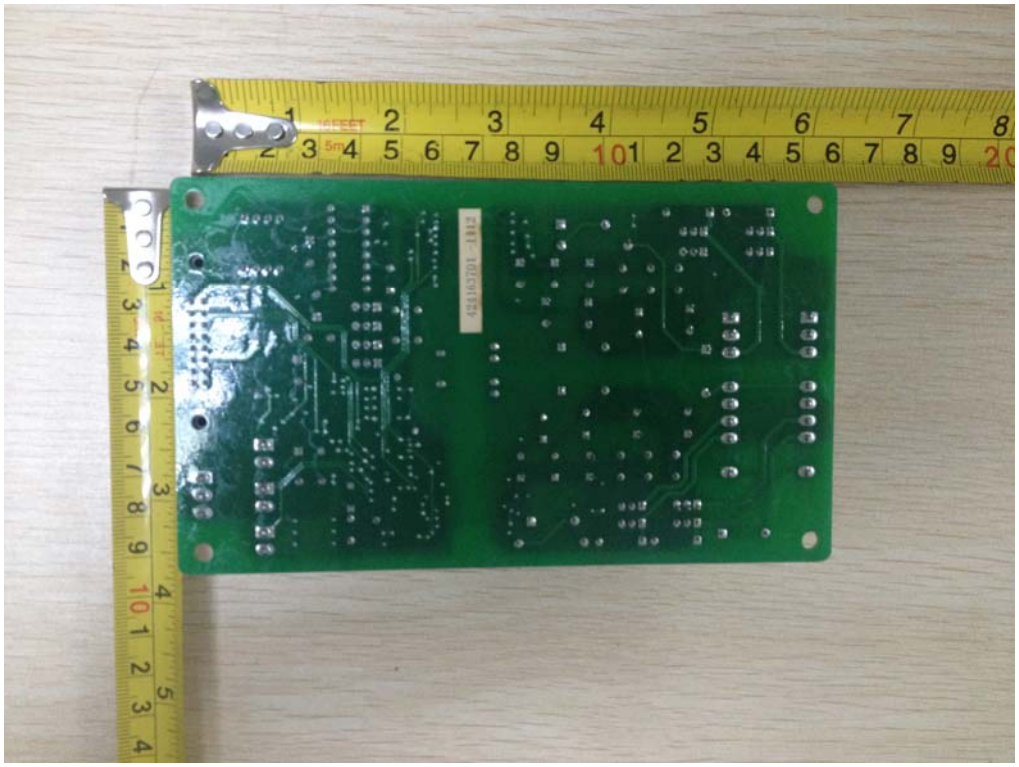

Fig. 22 –IGBT-Drive-D1 trace view

Product photos

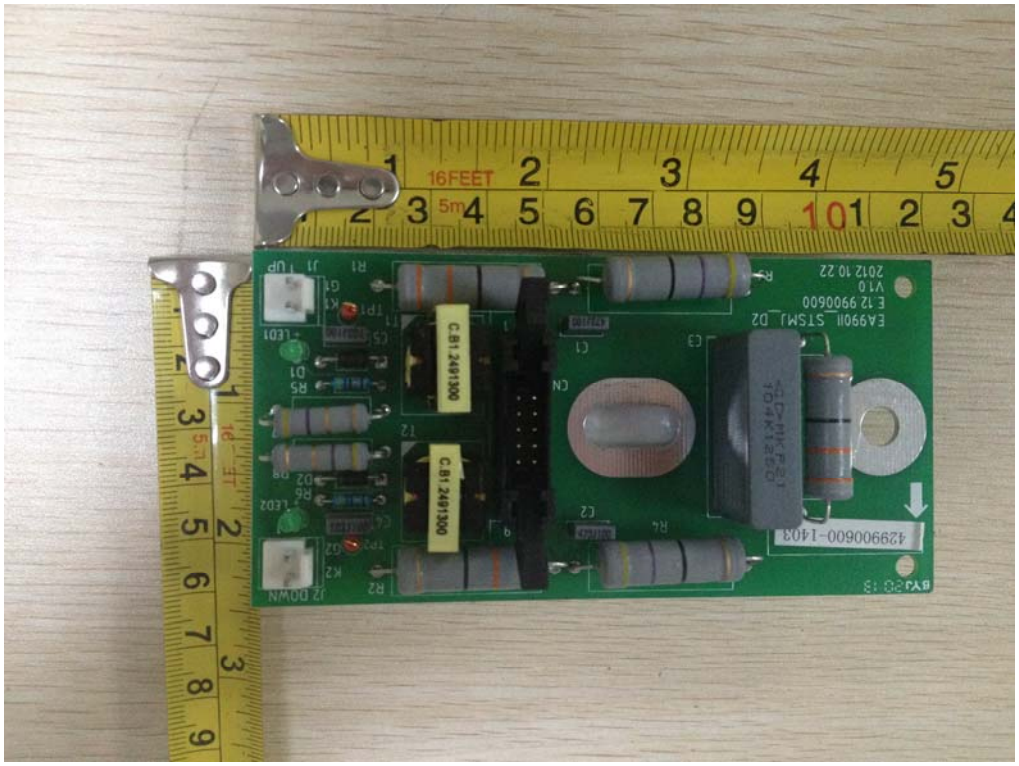

Fig. 23 –STSMJ-D2（1）board component view

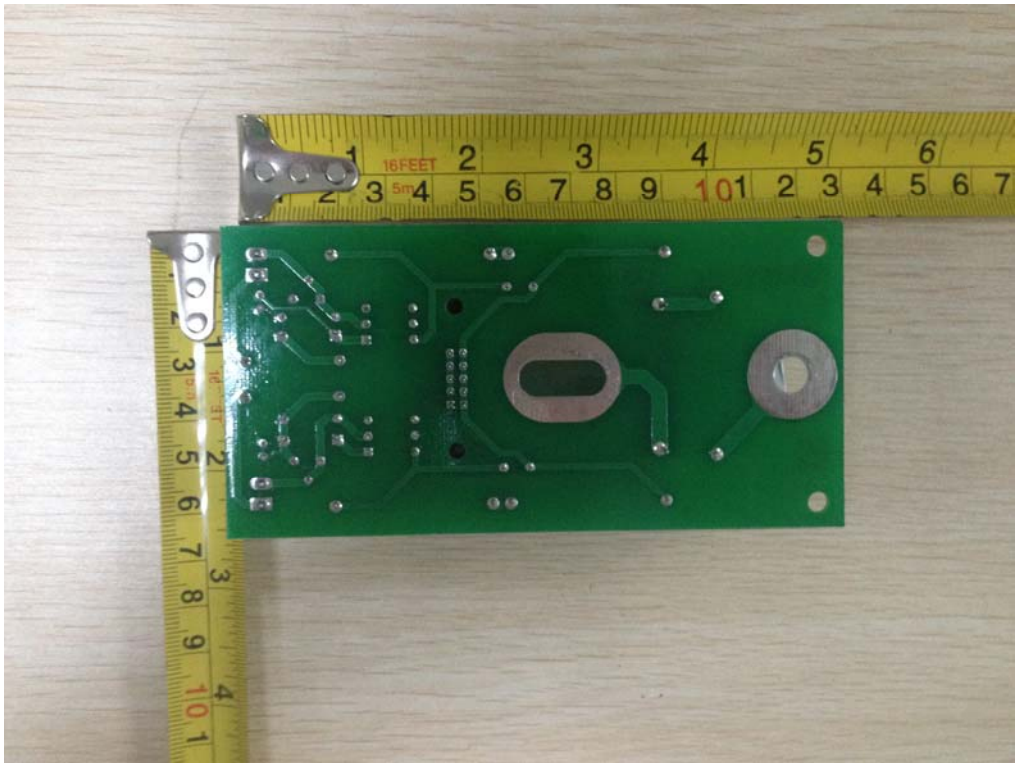

Fig. 24 –STSMJ-D2（1）board trace view

Product photos

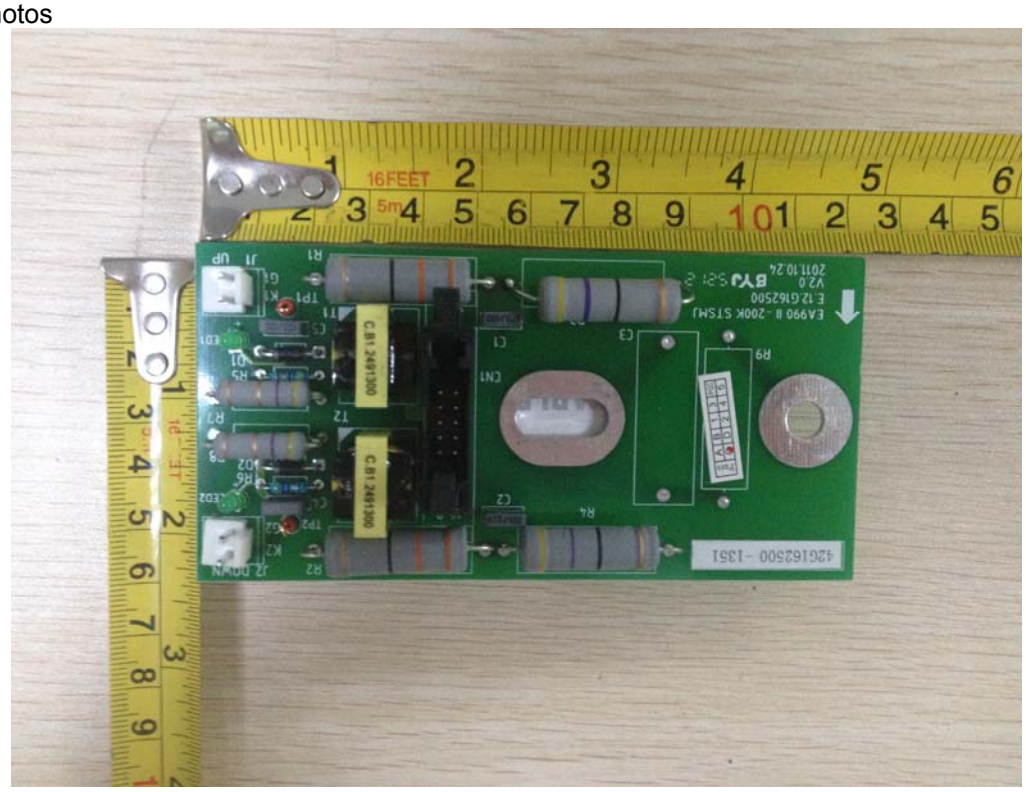

Fig. 25 –STSMJ-D2（2）board component view

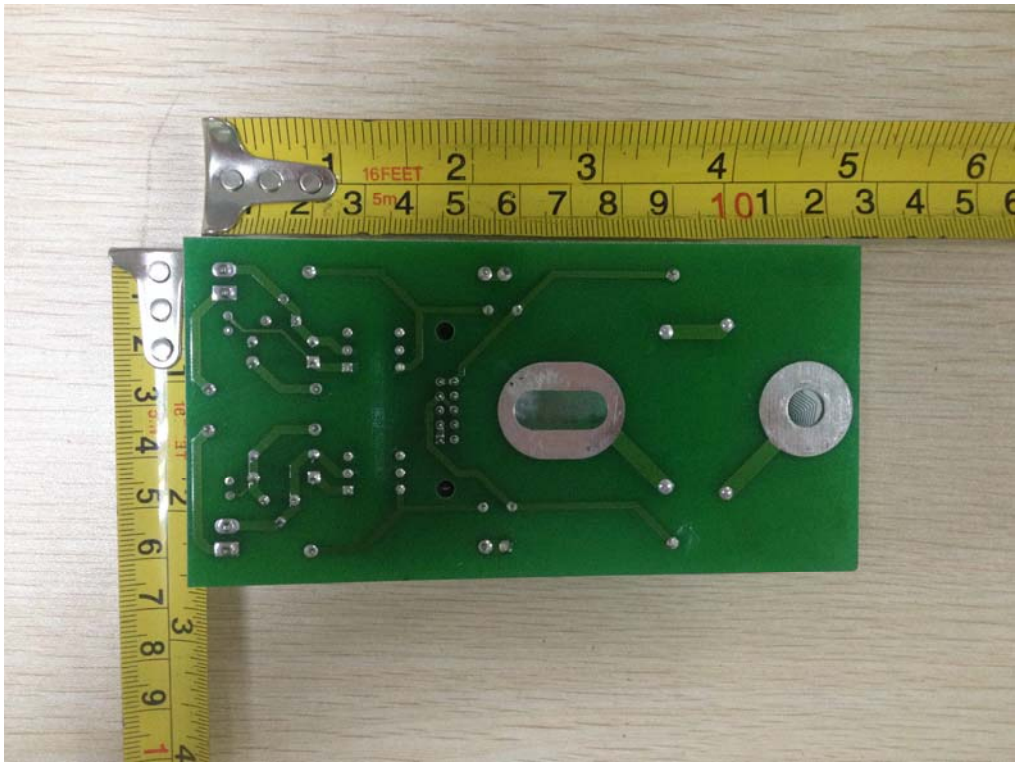

Fig. 26 –STSMJ-D2（2）board trace view

Product photos

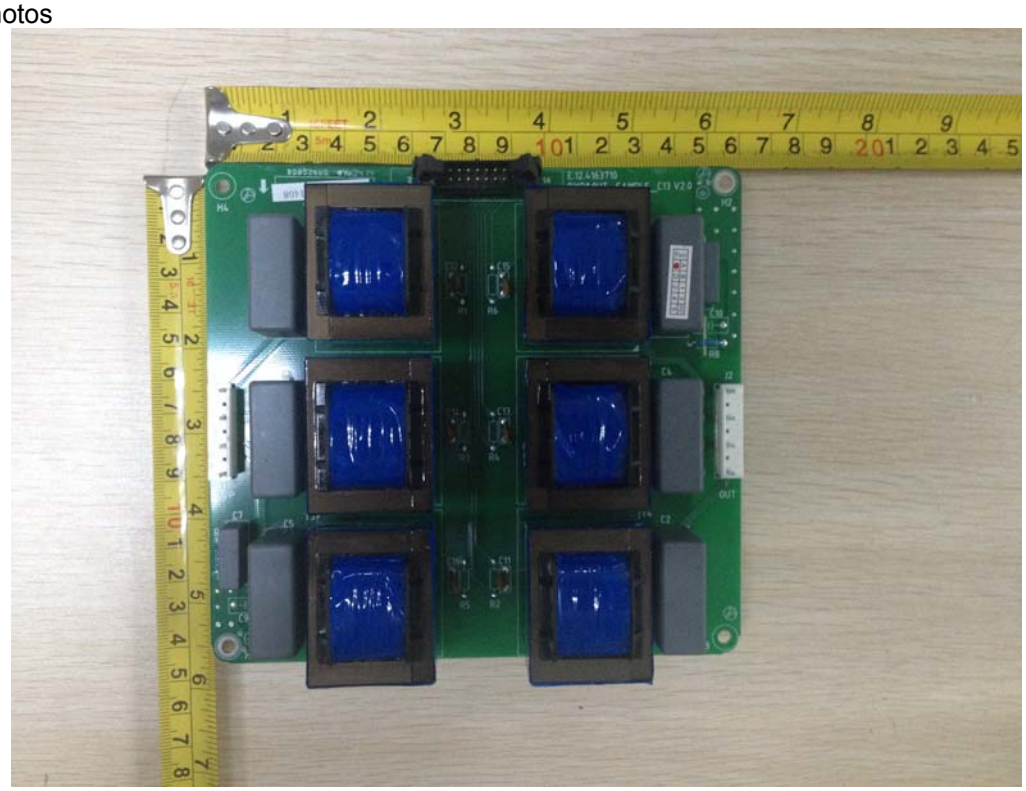

Fig. 27 –BYP&OUT-SAMPLE-C13 board component view

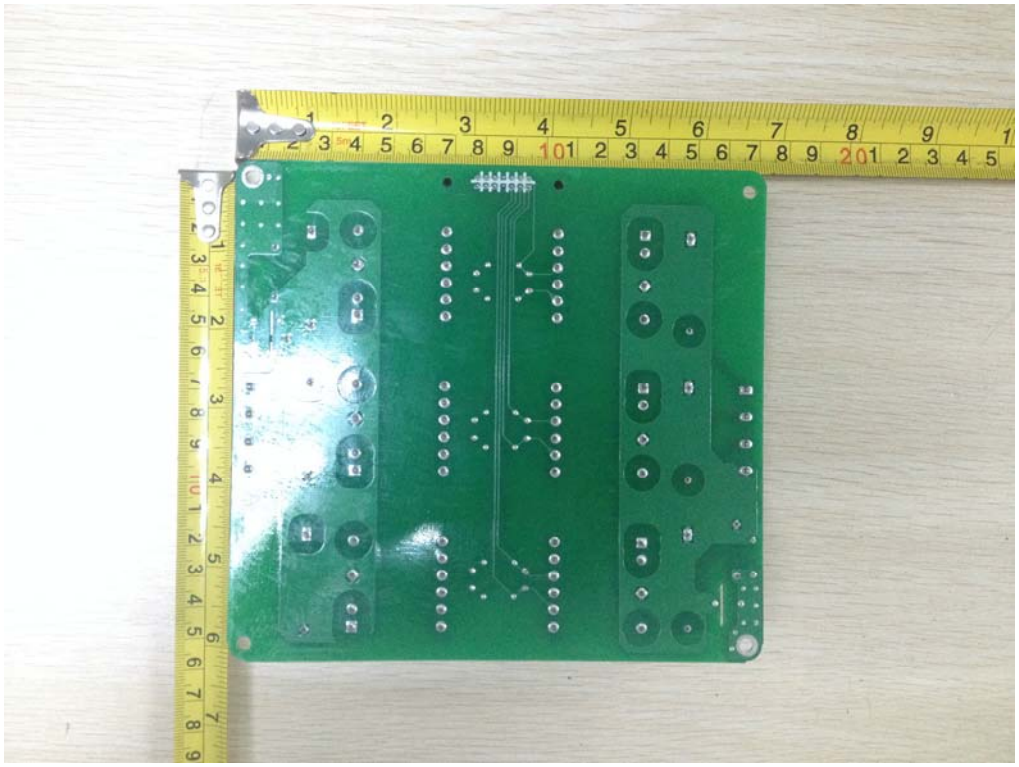

Fig. 28 –BYP&OUT-SAMPLE-C13 board trace view

Product photos

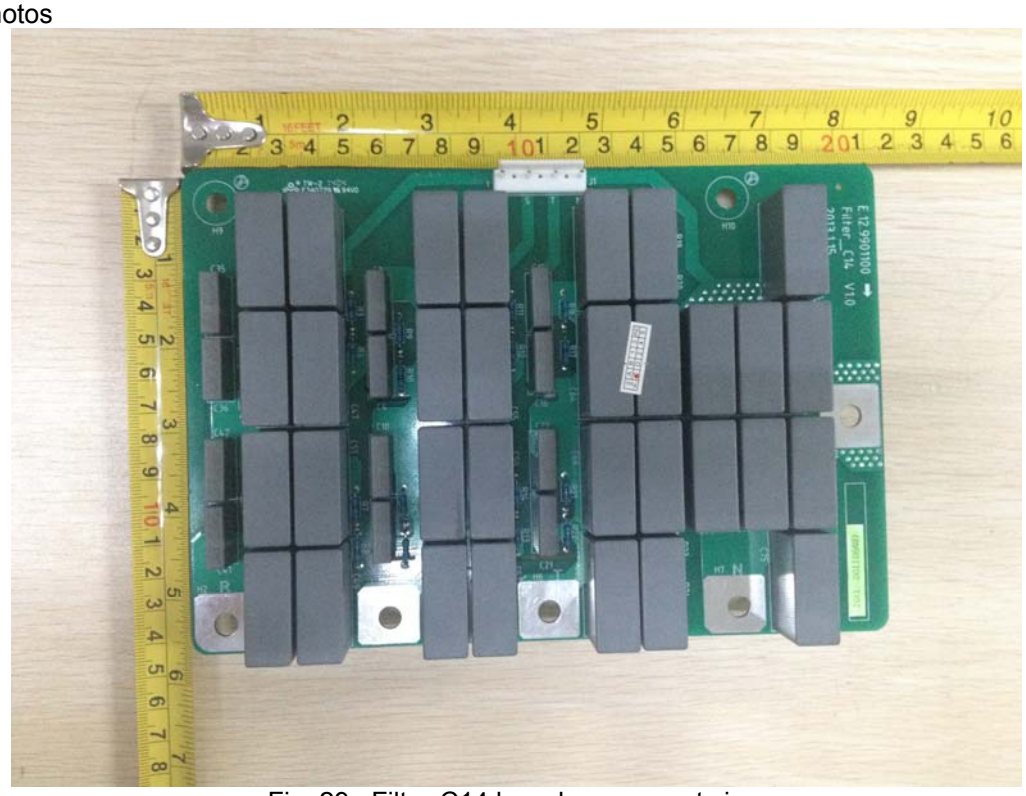

Fig. 29 –Filter-C14 board component view

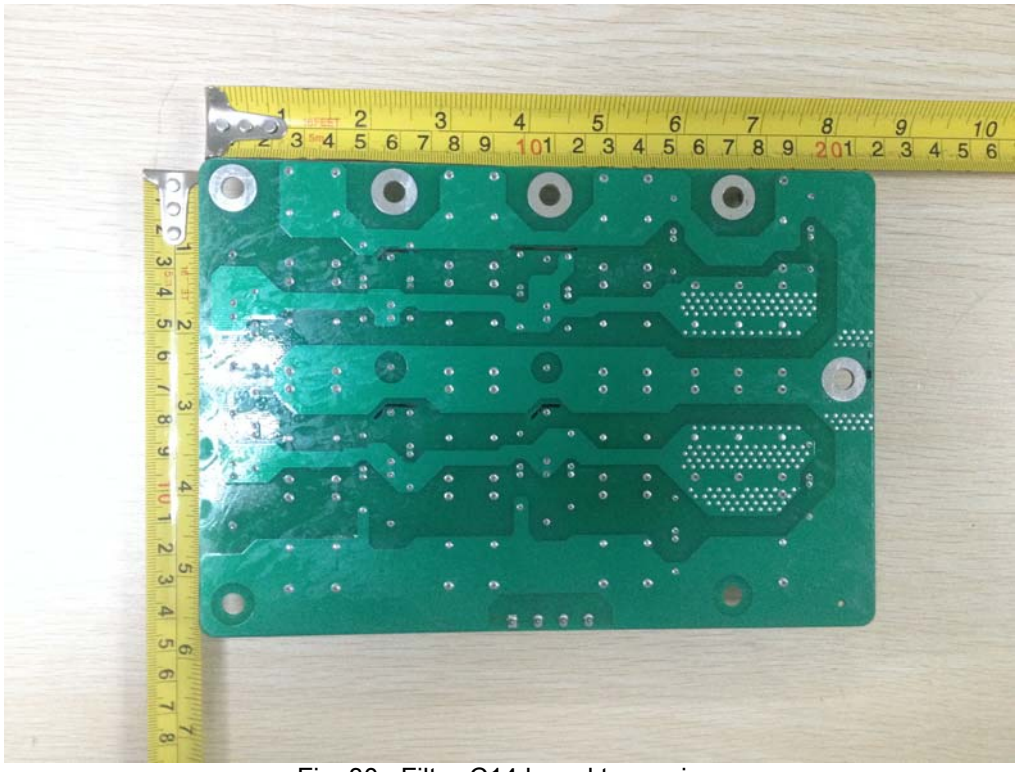

Fig. 30 –Filter-C14 board trace view

Product photos

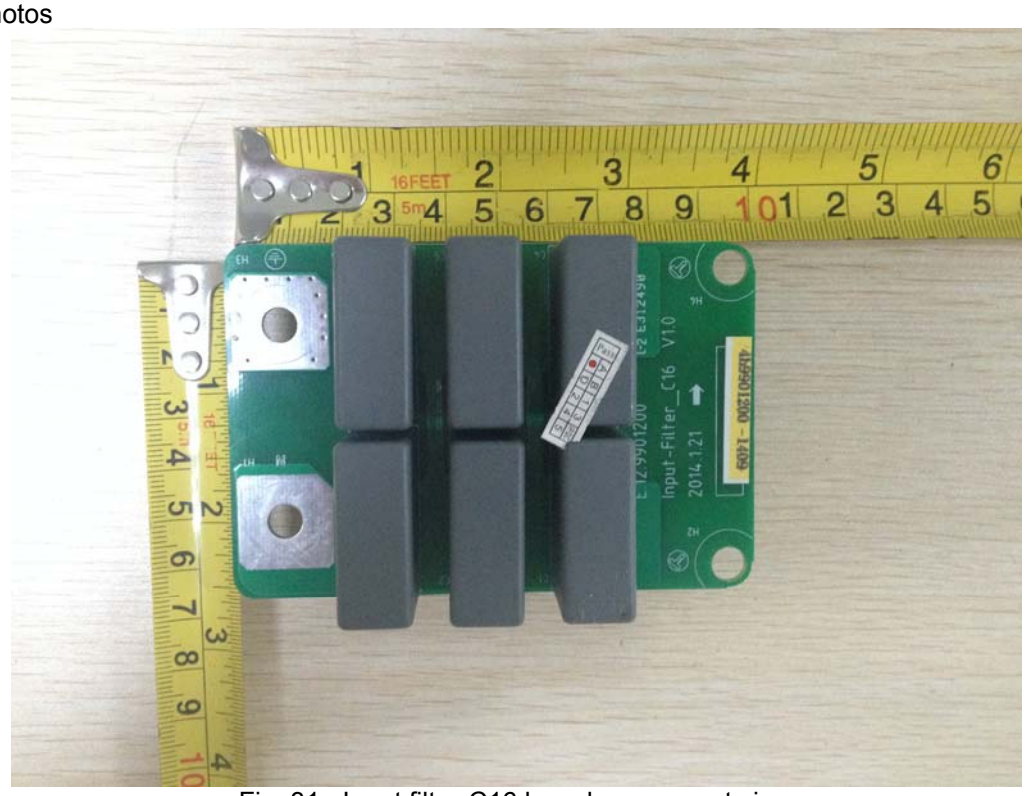

Fig. 31 –Input filter-C16 board component view

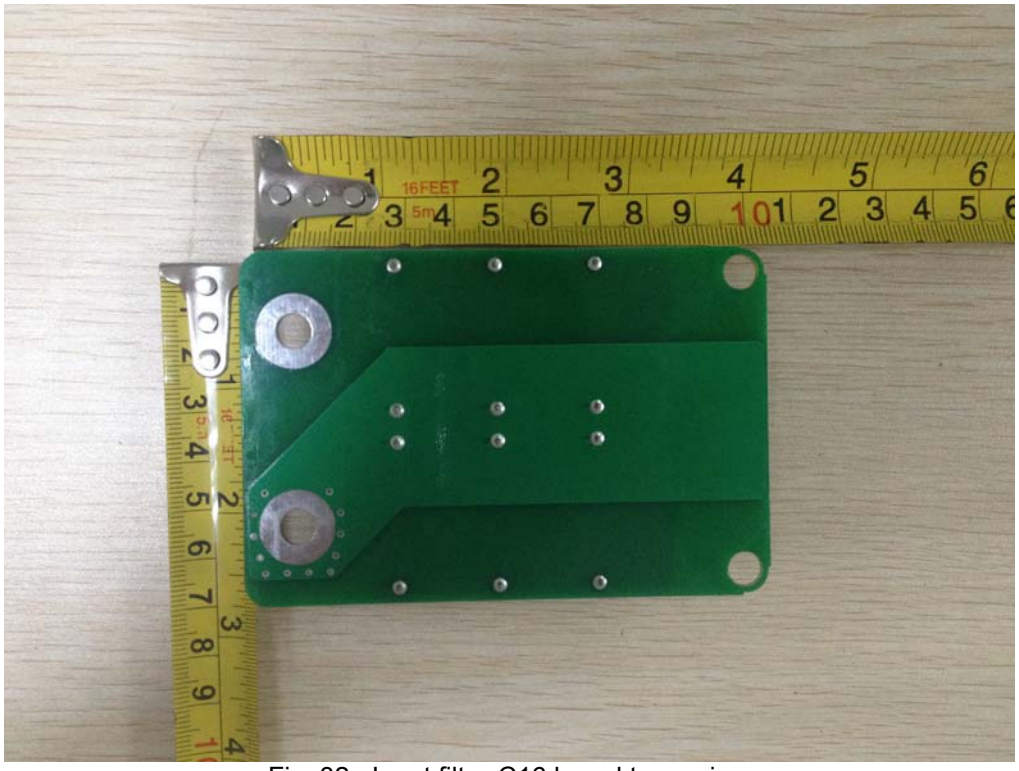

Fig. 32 –Input filter-C16 board trace view

Product photos

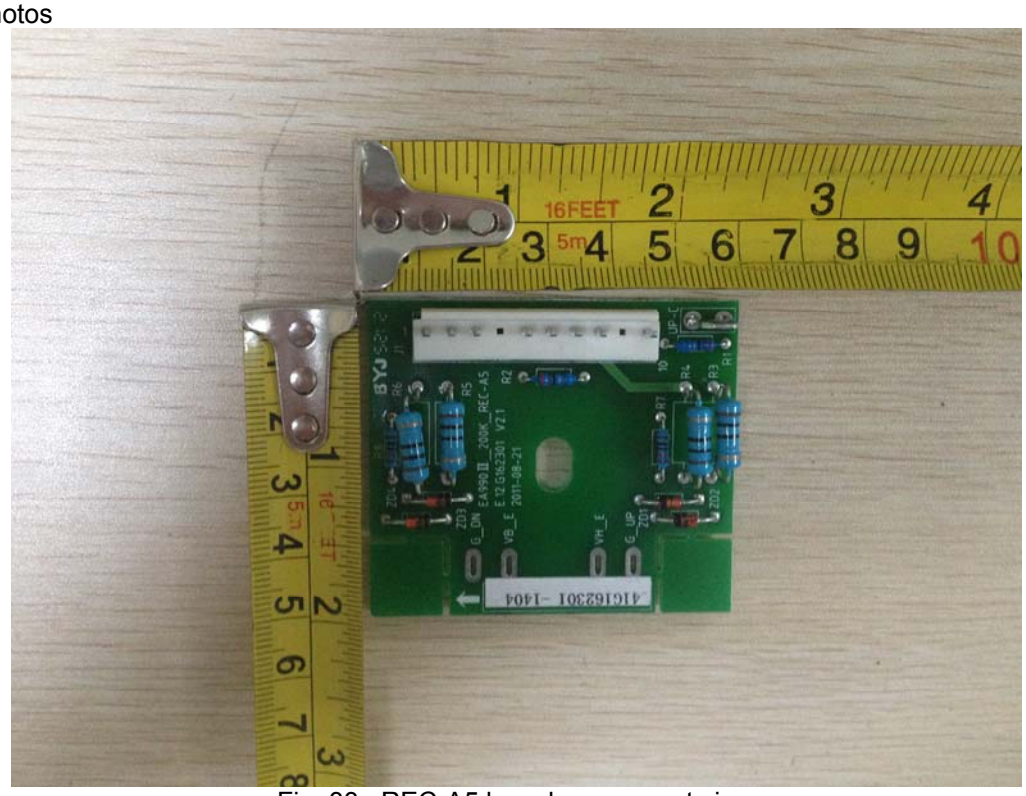

Fig. 33 –REC-A5 board component view

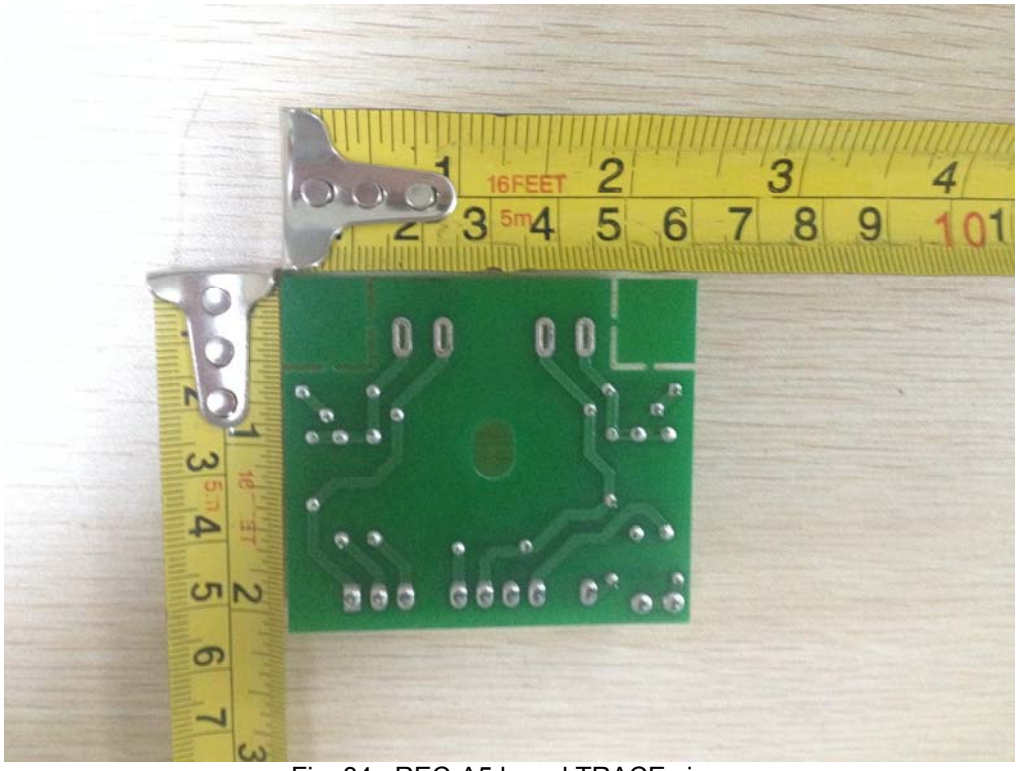

Fig. 34 –REC-A5 board TRACE view

Product photos

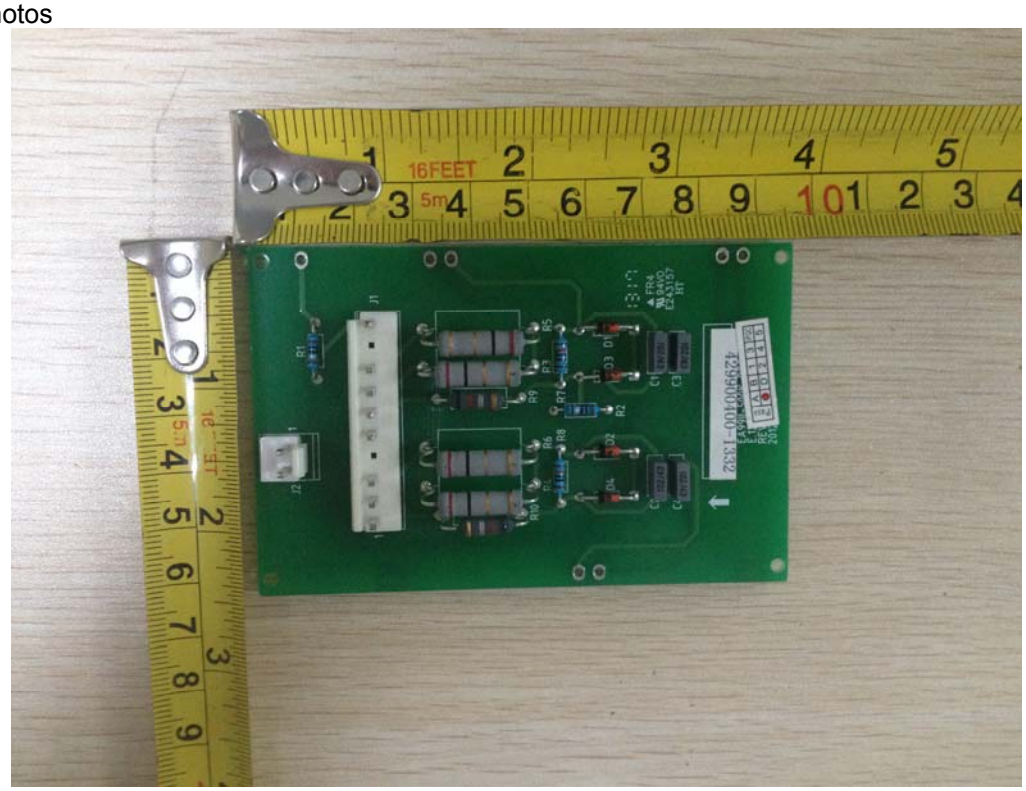

Fig. 35 –REC-A1 board component view

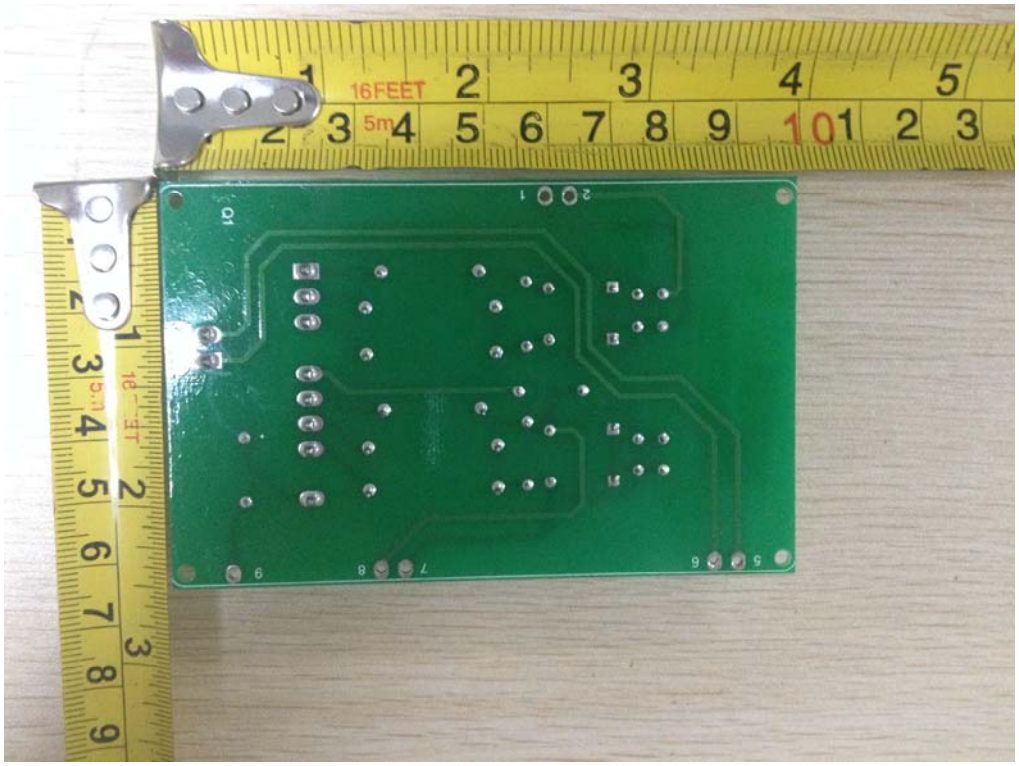

Fig. 36 –REC-A1 board TRACE view

Product photos

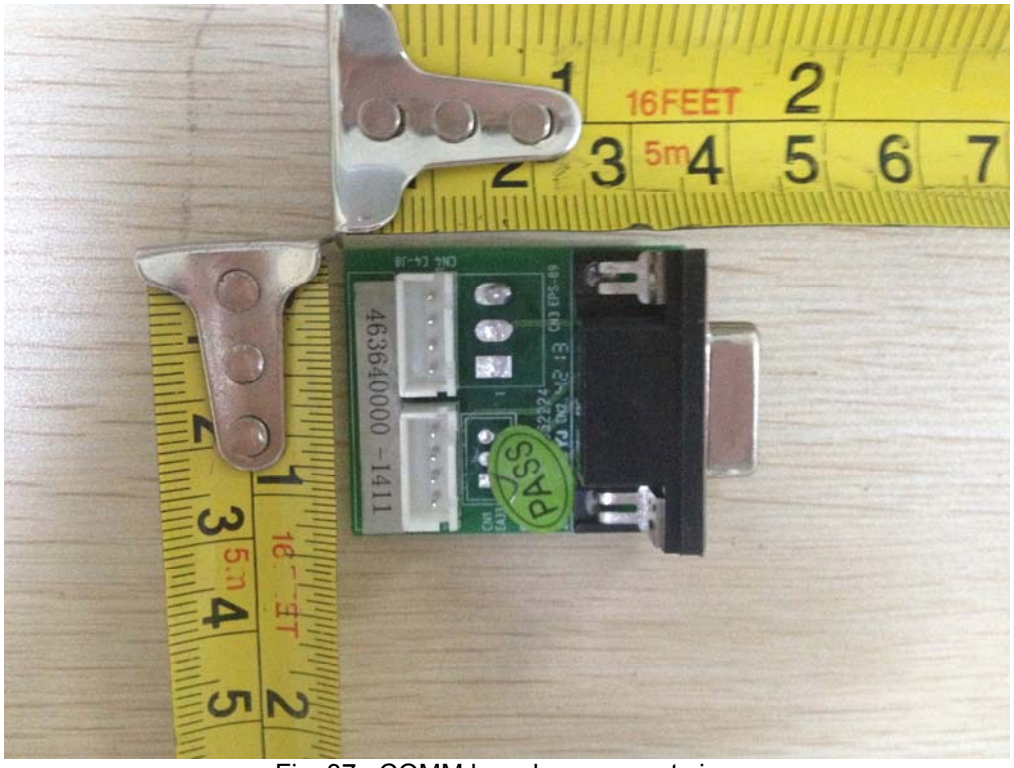

Fig. 37 –COMM board component view

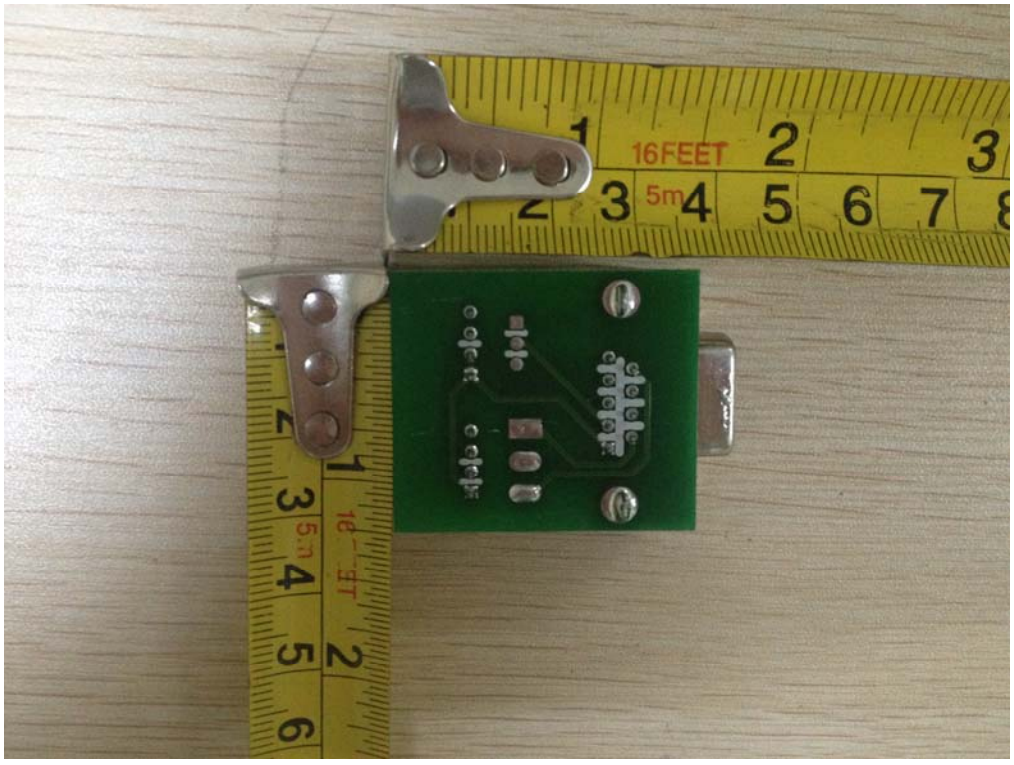

Fig. 38 –COMM board trace view

Product photos

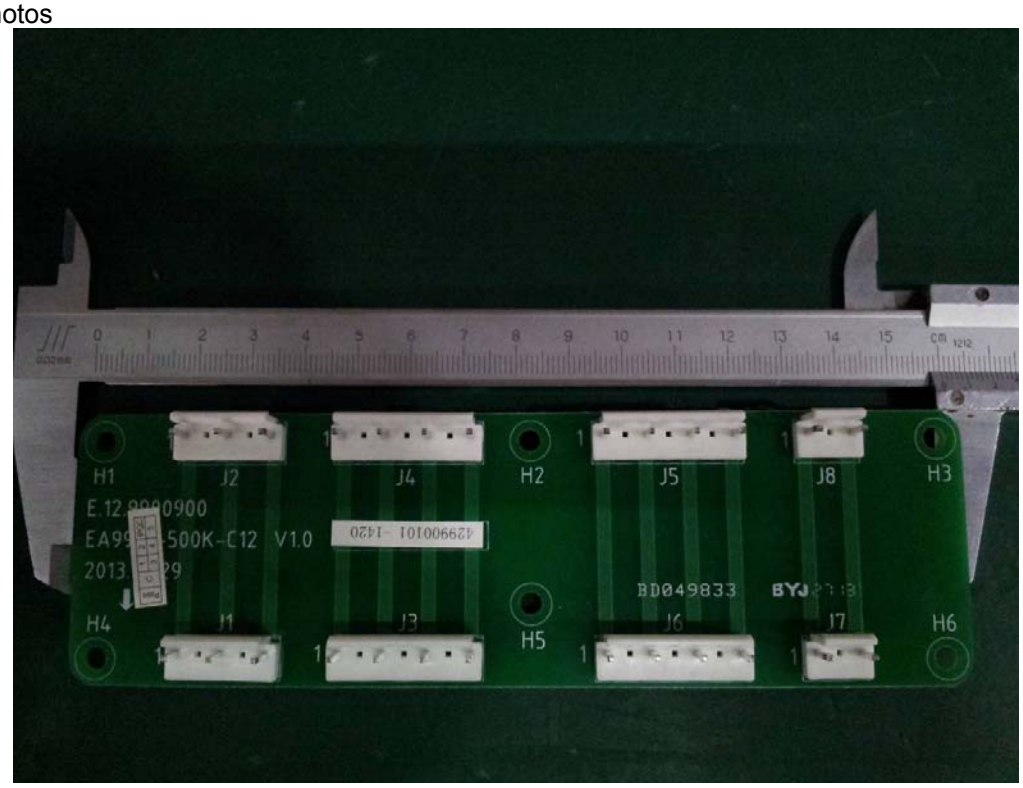

Fig. 39 –Signal switching board C11 component view

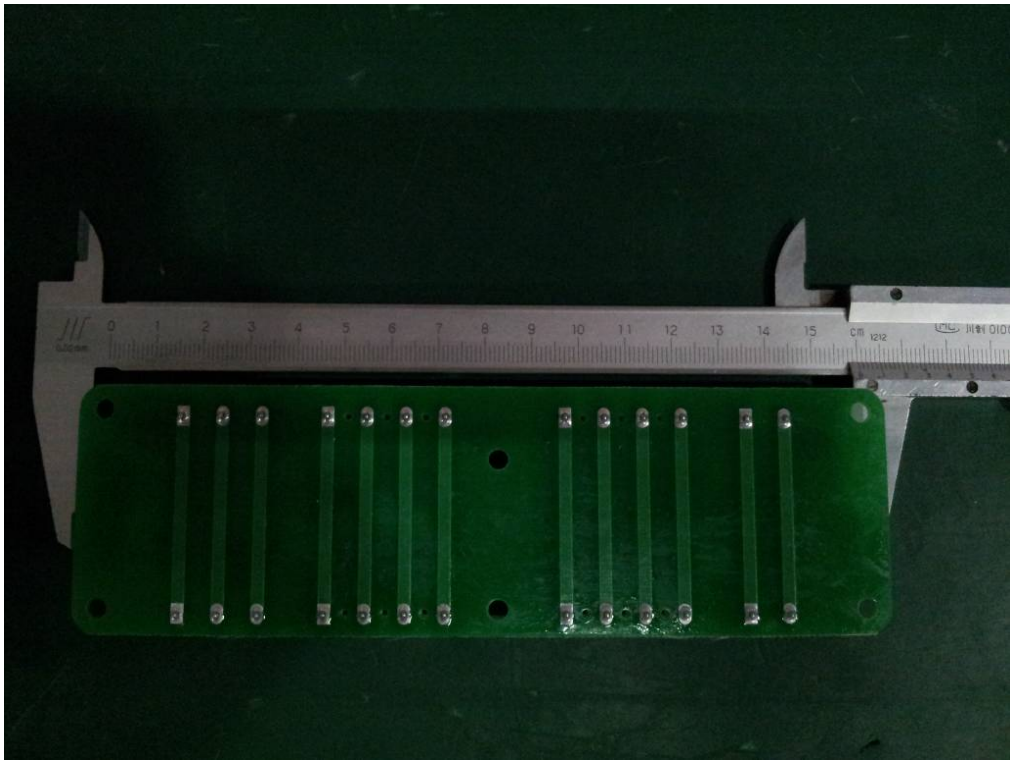

Fig. 40 –Signal switching board C11 trace view

Product photos

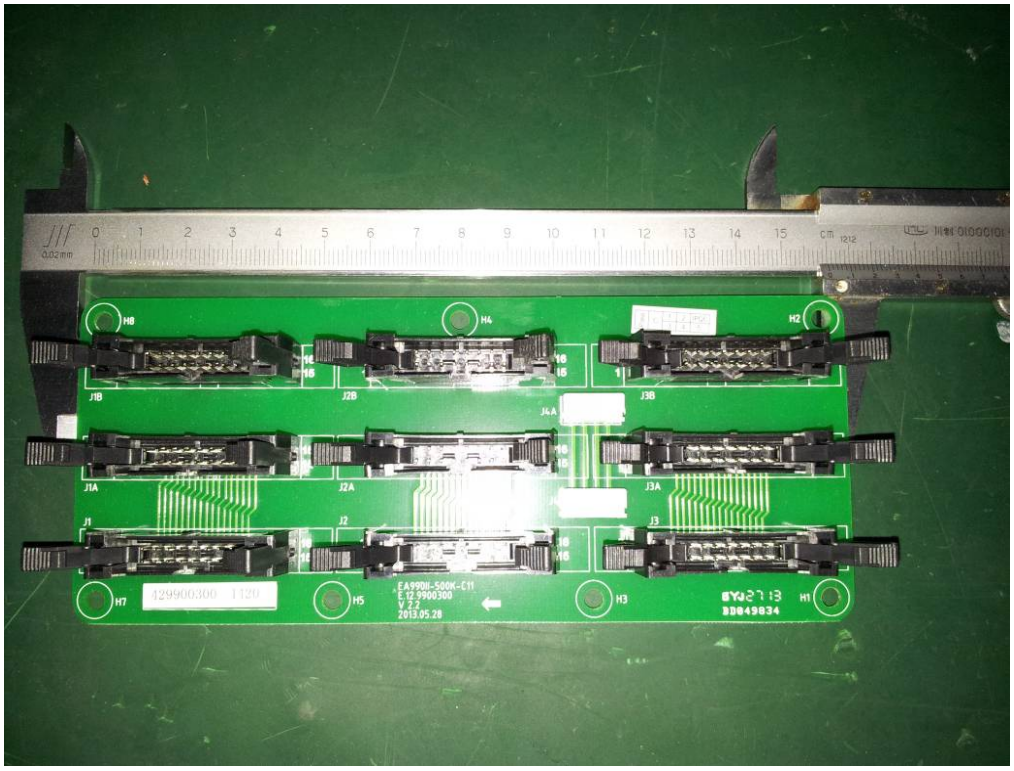

Fig. 41 –Inverter IGBTDriver board A2 component view

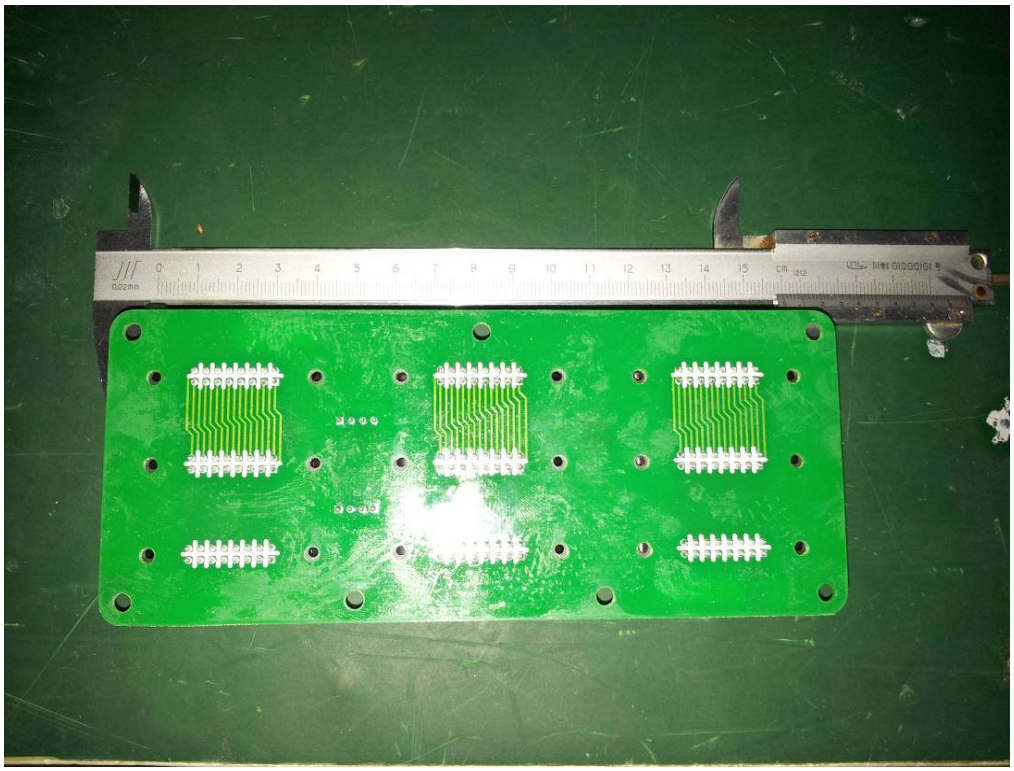

Fig. 42–Inverter IGBTDriver board A2 trace view

Product photos

Fig. 43 –INV-IGBTDR-A2 board component view

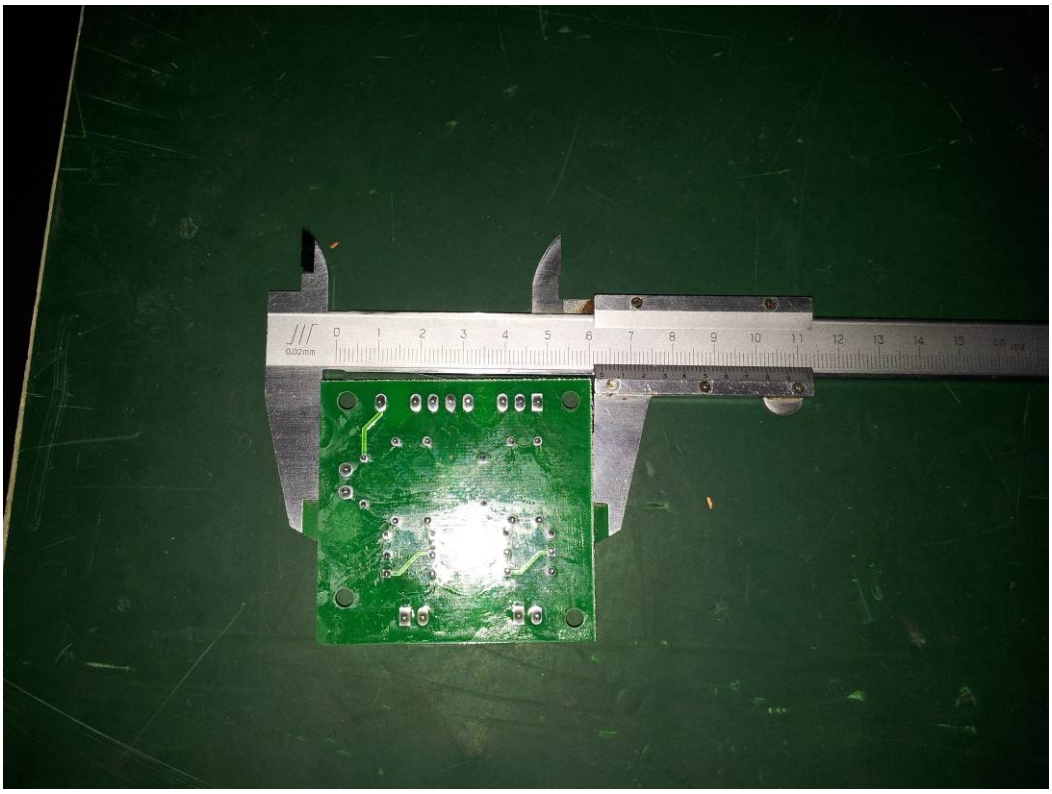

Fig. 44–INV-IGBTDR-A2 board trace view