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CNAS L1659

LVD TEST REPORT

Report No.: SET2017-03565

Product: Off-Grid Solar Inverter

Model No. : 10kVA，20kVA

Brand Name: /

Applicant: EAST Group Co., Ltd.

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China

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Query No. :7BT2IC1B

Test Report

Product ..... : Off-Grid Solar Inverter

Model No. ..... : 10kVA，20kVA

Brand Name ..... : /

Applicant ..... : EAST Group Co., Ltd.

Applicant Address ..... : No.6 Northern Industry Road, Songshan Lake Sci. & Tech. Industrial Park, Dongguan City, Guangdong Province, China

Manufacturer ..... : EAST Group Co., Ltd.

Manufacturer Address ..... : No.6 Northern Industry Road, Songshan Lake Sci. & Tech. Industrial Park, Dongguan City, Guangdong Province, China

Rating ..... : Refer to the General product information

Test Standards ..... : EN 62040-1:2008+A1:2013

Uninterruptible power systems (UPS) –

Part 1: General and safety requirements for UPS

Test Result ..... : PASS

Tested by ..... : Zhou Jun

Apr, 20,2017

Signature, Date

Reviewed by ..... : Kang Qin Yi

Apr, 20,2017

Signature, Date

Approved by ..... : Li Si Xiong

Apr, 20,2017

Signature, Date

Copy of marking plate:

Product Name: Off-Grid Solar Inverter
Model: 10kVA
Battery Input: 360Vdc
PV Input: 350-750Vdc
Max PV current: 1*60A
AC Input: 380Vac, 3Φ+N+PE, 50Hz/60Hz, 24A
AC Output: 380Vac, 3Φ+N+PE, 50Hz/60Hz, 15A
Capacity: 10kVA/9kW
Icc: 3kA
Manufacturer: EAST Group Co., Ltd.
Address: NO.6 Northern Industry Road, Songshan Lake Sci. &Tech. industrial park, Dongguan City, Guangdong province, China
Importer: XXXXXXXX
Address: XXXXXXXXXXXX
S/N: XXXXXXXXXXXXXXX

Product Name: Off-Grid Solar Inverter
Model: 20kVA
Battery Input: 360Vdc
PV Input: 350-750Vdc
Max PV current: 1*60A
AC Input: 380Vac, 3Φ+N+PE, 50Hz/60Hz, 48A
AC Output: 380Vac, 3Φ+N+PE, 50Hz/60Hz, 30A
Capacity: 20kVA/18kW
Icc: 6kA
Manufacturer: EAST Group Co., Ltd.
Address: NO.6 Northern Industry Road, Songshan Lake Sci. &Tech. industrial park, Dongguan City, Guangdong province, China
Importer: XXXXXXXX
Address: XXXXXXXXXXXX
S/N: XXXXXXXXXXXXXXX

Note: The artwork above may be only a draft.

Test item particulars ..... :	
Equipment mobility ..... :	☐ movable ☐ transportable ☒ stationary ☐ for building-in
Connection to the mains..... :	☐ pluggable equipment ☐ type A ☐ type B ☐ detachable power supply cord ☐ non-detachable power supply cord ☐ not directly connected to the mains ☒permanent connection
Operating condition ..... :	☒ continuous ☐ rated operating / resting time:
Access location ..... :	☒ operator accessible ☐ restricted access location
Over voltage category (OVC) ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV ☐ other:
Mains supply tolerance (%)..... :	-20, +20%
Tested for IT power systems ..... :	☐ Yes ☒ No
IT testing, phase-phase voltage (V) ..... :	N/A
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Not classified
Considered current rating of protective device as part of the building installlation (A) ..... :	10kVA: 80A，20kVA: 100A
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
IP protection class ..... :	IP20
Altitude during operation (m) ..... :	Up to 2000
Altitude of test laboratory (m) ..... :	Below 2000
Laser or LED Classification ..... :	LEDs are only used as indicator
Max. Specified ambient temperature(°C) ..... :	40°C
Mass of equipment (kg)..... :	10kVA: 230kg，20kVA: 245kg
Possible test case verdicts ..... :	
- test case does not apply to the test object..... :	N(.A.)
- test object does meet the requirement..... :	P(ass)
- test object does not meet the requirement..... :	F(ail)
Testing	
Date of receipt of test item .....:	2016-09-20
Date(s) of performance of test .....:	2016-09-20 to 2017-04-20
Date of report issue .....:	2017-04-20

General remarks:

The test results presented in this report relate only to the object tested.
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"(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.

General product information:

Model 10kVA，20kVA are a serious of solar off-grid inverter without batteries built in which converts direct current generated from the PV array field and batteries to alternating current, and it is intended to be connected in parallel with the mains to charge batteries to supply common load. It is intended for professional incorporation into PV system, and it is assessed on a component test basis, Communication port: RS485, RS232;Environmental category: Indoor; Pollution degree rating: 2;Ingress protection: IP20;Protection class: Class I

All models are classified a family with the following characteristic:
--Same appearance and structure;
--The control circuits and power circuit have same scheme;
--Difference only in electrical rating ,power inverter board and power component, details see critical component list;
Full testing was performed on model 20kVA,and variations with additional examination and testing subjected to model differences:
--electrical rating test,
-- electric strength test

Test results are represent to other models.

10kVA:
PV input : 350-750Vdc, 1*60A max, DC input: 360Vdc; AC Input: 380Vac, 50Hz, 24A;
AC Output: 380V, 50/60Hz, 15A ,Output Power :9kW.

20kVA:
PV input : 350-750Vdc, 1*60A max, DC input: 360Vdc; AC Input: 380Vac, 50Hz, 48A;
AC Output: 380V, 50/60Hz, 30A ,Output Power :18kW.

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

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	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
1.5.3/RD	Thermal controls		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.	P
1.5.5/RD	Interconnecting cables	The Interconnecting power cord set provided and fulfilled with the relevant national standard.	P
1.5.6/RD	Capacitors bridging insulation	X2 and Y2 capacitor according to IEC 60384-14 with 21 days damp heat test.	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		N
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		N
1.5.8/RD	Components in equipment for IT power systems	TN power system	N

4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P
1.6.2/RD	Input current	(see appended table 4.6)	P

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.6 1.6.4/RD	Neutral conductor	Considering the neutral conductor was live conductor, the neutral conductor was insulated from the body with reinforced insulation throughout the equipment.	P
4.7	Marking and instructions		P
4.7.1	General		P
4.7.2 1.7.1/RD	Power rating	See Label	P
	Input rated voltage/range (V)..... :	Ditto	P
	Input rated current/range (A) ..... :	Ditto	P
	Input symbol for nature of supply (d.c.) ..... :	Ditto	P
	Input rated frequency/range (Hz)..... :	Ditto	P
	Number of Input phases and neutral ..... :	Ditto	P
	Output rated voltage/range (V) ..... :	Ditto	P
	Output rated current/range (A) ..... :	Ditto	P
	Output rated power factor, if less than unity, or active power and apparent power or active power and rated current ..... :	Ditto	P
	Number of output phases and neutral ..... :	Ditto	P
	Output rated active power (W or kW) ..... :	Ditto	P
	Output rated apparent power (VA or kVA) ..... :	Ditto	P
	Output symbol for nature of supply (d.c.) ..... :	No d.c output	N
	Output rated frequency/range (Hz)..... :	Ditto	P
	Ambient operating temperature range (°C) .... :	40	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	10kVA: 3kA; 20kVA: 6kA	P
	Manufacturer's name or trademark or identification mark ..... :		P
	Type/model or type reference..... :	See Label	P
	Symbol for Class II equipment only ..... :	Class I equipment	N
	Other symbols ..... :	Additional symbol or marking not give rise to misunderstanding	P
	Certification marks ..... :	CE marking	P

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructions for units with automatic bypass/maintenance bypass, additional input a.c. supply, or external batteries, having text "See installation instructions before connecting to the supply" ..... :	add the warning marking on back enclosure	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		P
4.7.3.2	Installation.....:		P
	Location in a restricted access location only ...:		N
	Permanent connector UPS .....:		P
	Pluggable type A or Pluggable type B UPS .....:		N
4.7.3.3	Operation .....:		P
4.7.3.4	Maintenance .....:		P
4.7.3.5	Distribution related backfeed .....:		P
4.7.4 1.7.4/RD	Main voltage adjustment .....:	No adjustment necessary	N
	Methods and means of adjustment; reference to installation instructions .....:		N
4.7.5 1.7.5/RD	Power 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		P
1.7.7.1/RD	Protective earthing and bonding terminals .....:	The symbol of ⏚ was marked on the terminal block for connection of protective earthing conductor.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors .....:	The marking and indication of the AC mains supply neutral conductor on junction box cover are located that indication of function is clearly	P
1.7.7.3/RD	Terminals for d.c. mains supply conductors .....:	Only one supply from mains.	P
4.7.8	Battery terminals .....:		P

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.9 1.7.8/RD	Controls and indicators		P
1.7.8.1/RD	Identification, location and marking .....:		P
1.7.8.2/RD	Colours ..... :	No safety involved controls or indicators.	N
1.7.8.3/RD	Symbols ..... :	Functional power switch marked according to IEC 60417, No. 5009 (line half inside circle).	P
1.7.8.4/RD	Markings using figures ..... :		N
4.7.10 1.7.9/RD	Isolation of multiple power sources ..... :	The markings of the functional power switch are on the switch.	P
4.7.11 1.7.2.4/RD	IT power systems	Equipment was not applied for IT power system	N
4.7.12	Protection in building installation		P
	Rated short-time withstand current (*I*cw) ..... :		N
	Rated conditional short circuit current (*I*cc) .... :	10kVA: 3kA; 20kVA: 6kA	P
	a) If higher Icp stated ≤ 10 kA		P
	a) If higher Icp stated > 10 kA		N
4.7.13 5.1/RD	High leakage current (mA) ..... :	Warning marking used.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	Not provided with thermostats and regulating devices.	N
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) ..... :	Safety instructions and markings were in English language. Other languages will be provided when submitted for national approval.	—
4.7.16 1.7.11/RD	Durability of markings	The label and markings were subjected to the permanence of marking test. The label and marking were 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 on the label and silk printing did not fade. There was no curling nor lifting of the label edge.	P

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.17 1.7.12/RD	Removable parts	No required markings placed on removable parts.	N
4.7.18 1.7.13/RD	Replaceable batteries	See user manual	P
	Language(s) ..... :		—
4.7.19 1.7.2.5/RD	Operator access with a tool ..... :	A symbol ⚠ was marked in user manual	P
4.7.20	Battery	Without external battery cabinet provided, details information see user manual.	N
	Clearly legible information ..... :		N
	Battery type (lead-acid, NiCd, etc.) and number of blocks or cells .....:		N
	Nominal voltage of total battery (V) .....:		N
	Nominal capacity of total battery (optional) .....:		N
	Warning label .....:		N
	Instructions .....:	See user manual	P
2.1.1.5/RD	Protection against energy hazards		P
4.7.21 1.7.2.4/RD	Installation instructions		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		P
2.1.1.1/RD	Access to energized parts		P
	Test by inspection .....:		P
	Test with test finger (Figure 2A) .....:		P
	Test with test pin (Figure 2B) .....:		P
	Test with test probe (Figure 2C) .....:		P
2.1.1.2/RD	Battery compartments		N
2.1.1.3/RD	Access to ELV wiring	No ELV wiring in operator accessible area.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)	(see appended table 5.7)	—

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No hazardous voltage circuit wiring operator accessible.	P
2.1.1.5/RD	Energy hazards .....:	No access with test finger to any parts with only basic insulation to ELV or hazardous voltage. The test pin can not touch hazardous voltage through any openings or seams within the appliance.	P
2.1.1.6/RD	Manual controls	No conductive controls or handles or alike provided.	N
2.1.1.7/RD	Discharge of capacitors in equipment		P
	Measured voltage (V); time-constant (s) .....:	<10s	—
2.1.1.8/RD	Energy hazards – d.c. mains supply	<10s	P
	a) Capacitor connected to the d.c. mains supply .. :		P
	b) Internal battery connected to the d.c. mains supply .....:		N
2.1.1.9/RD	Audio amplifiers in information technology equipment .....:		N
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas		P
	Hazardous energy level ..... :	Cannot be maintain at 240VA for 60s	P
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas		P
	Hazardous energy level ..... :	Cannot be maintain at 240VA for 60s	P
5.1.4	Backfeed protection	(see appended table 5.7)	P
	Shock hazard after de-energization of a.c. input for UPS		P
	Measured voltage (V); time-constant (s) .....:	<1V,15Sec	—

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Description of the construction ..... :	Backfeed protection provided by contactor plus corresponding control circuit. The input is disconnected in line and neutral from the output in backup made and separated with a gap from one input (L/N) pin to the other input (L/N) pin. The detection circuit are connected before the backfeed contactor. However these circuits were isolated by photo couplers to secondary control circuits. No hazardous voltage in backup mode at user accessible wiring connection of terminal block.	P
	Air gap is employed for backfeed protection		P
5.1.5	Emergency switching (disconnect) device		P

5.2	Requirements for auxiliary circuits		P
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV		P
2.2.1/RD	General requirements		P
2.2.2/RD	Voltages under normal conditions (V) .....:	42.4V peak or 60V d.c. not exceeded in SELV circuits under normal operation. (See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V) .....:	Single fault not cause excessive voltage in accessible SELV circuits. Limits of 71V peak and 120V d.c. not exceeded within 0.2 sec. And limits 42.4V peak and 60V d.c. not exceeded for longer than 0.2 sec. (See appended table 5.2.1)	P
2.2.4/RD	Connection of SELV circuits to other circuits ...:		P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	No TNV circuit.	N
2.3.1/RD	Limits		N

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Type of TNV circuits .....:		—
2.3.2/RD	Separation of TNV circuits 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		N
2.4.1/RD	General requirements		N
2.4.2/RD	Limit values	(See appended table 5.2.3)	—
	Frequency (Hz) .....:		—
	Measured current (mA).....:		—
	Measured voltage (V) .....:		—
	Measured circuit capacitance (nF or µF).....:		—
2.4.3/RD	Connection of limited current circuits to other circuits		N
5.2.4 3.5/RD	External signaling circuits		P
3.5.1/RD	General requirements	Interconnection to outlets only for mains powered equipment. Interconnection to SELV interfaces only for secondary circuits with voltages as defined in subclauses 2.2.2/RD and2.2.3/RD.	P
3.5.2/RD	Types of interconnection circuits .....:	See above	P
3.5.3/RD	ELV circuits as interconnection circuits		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

EN 62040-1			
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		—
5.3	Protective earthing and bonding		P
5.3.1	General		P
2.6/RD	Provisions for earthing and bonding		P
2.6.1/RD	Protective earthing		P
2.6.2/RD	Functional earthing	No functional earthing necessary.	P
2.6.3/RD	Protective earthing conductors and protective bonding conductors		P
2.6.3.1/RD	General		P
2.6.3.2/RD	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .....:		—
2.6.3.3/RD	Size of protective bonding conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG .....:		—
	Protective current rating (A), cross-sectional area (mm^2), AWG.....:		—
2.6.3.4/RD	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min).....:	60A , 4 min <0.1Ω	P
2.6.3.5/RD	Colour of insulation .....:	Green/Yellow	P
2.6.4/RD	Terminals		P
2.6.4.1/RD	General		P
2.6.4.2/RD	Protective earthing and bonding terminals	Protective Bonding by screw terminal with washer.	P
	Rated current (A), type, nominal thread diameter (mm).....:		—
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Separated PE and protective bonding conductor used.	N
2.6.5/RD	Integrity of protective earthing		N
2.6.5.1/RD	Interconnection of equipment		N

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors		N
2.6.5.3/RD	Disconnection of protective earth		N
2.6.5.4/RD	Parts that can be removed by an operator		N
2.6.5.5/RD	Parts removed during servicing		N
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		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
5.3.2 2.6.1/RD	Protective earthing		P
2.10/RD	Clearances, creepage distances and distances through insulation		P
4.2/RD	Mechanical strength		P
5.2/RD	Electric strength		P
5.3.3	Protective bonding		P
5.4	AC and d.c. power isolation		P
5.4.1	General		P
3.4/RD	Disconnection from the mains supply	Disconnect device provided	P
3.4.1/RD	General requirement		P
3.4.2/RD	Disconnect devices	Breaker used as disconnect device	P
3.4.3/RD	Permanently connected equipment		P
3.4.4/RD	Parts which remain energized		P
3.4.5/RD	Switches in flexible cords		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		P
3.4.8/RD	Switches as disconnect devices		P
3.4.9/RD	Plugs as disconnect devices		N
3.4.10/RD	Interconnected equipment		P
3.4.11/RD	Multiple power sources		P
5.4.2	Disconnect devices		P
5.5	Overcurrent and earth fault protection		P

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.1	General		P
2.7.3/RD	Short-circuit backup protection		P
2.7.4/RD	Number and location of protective devices .....:	Overcurrent protection by breakers in the rear of enclosure.	P
2.7.5/RD	Protection by several devices		N
2.7.6/RD	Warning to service personnel .....:	Hazardous voltage may be still present in the equipment after the circuit breaker opened. So that the below wording is required as suitable: Caution – Double Pole/Neutral Fusing.	P
5.5.2	Basic requirements	Equipment relies on circuit breaker	P
5.5.3	Battery circuit protection		P
5.5.3.1	Overcurrent and earth fault protection		P
5.5.3.2	Location of protective device	Overcurrent protection by breakers in the rear of enclosure.	P
5.5.3.3	Rating of protective device		P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current		N
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) .....:		—
	Prospective test current/(r.m.s) (A) .....:		—
	Typical power factor .....:		—
	Initial asymmetric peak current ration (*I*pk / *I*cw) .:		—
	Minimum durating of prospective test current (cycles 50/60 Hz) .....:		—
5.5.4.3.2	Exemption from testing	UPS with declared Icc not exceeding 10kA	P

5.6	Protection of personnel – Safety interlocks	N

EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	Operator protection		N
2.8/RD	General principles		N
2.8.1/RD	Protection requirements		N
2.8.2/RD	Inadvertent reactivation		N
2.8.3/RD	Fail-safe operation		N
2.8.4/RD	Protection against extreme hazard		N
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches, relays and their related circuits		N
2.8.7.1/RD	Separation distances for contact gaps and their related circuits .....:		N
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection		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		N
5.6.2.5	Component access		N
2.8.3/RD	Fail-safe operation		N
5.6.2.6	Moving parts		N
5.6.2.7	Capacitor banks		N
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		P
2.10.1.1/RD	Frequency .....:		N
2.10.1.2/RD	Pollution degrees .....:	Pollution degrees 2	P
2.10.1.3/RD	Reduced values for functional insulation		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1.4/RD	Intervening unconnected conductive parts		P
2.10.1.5/RD	Insulation with varying dimensions		N
2.10.1.6/RD	Special separation requirements		N
2.10.1.7/RD	Insulation in circuits generating starting pulses		N
2.10.2/RD	Determination of working voltage		P
2.10.2.1/RD	General		P
2.10.2.2/RD	RMS working voltage		P
2.10.2.3/RD	Peak working voltage		P
2.10.3/RD	Clearances		P
2.10.3.1/RD	General		P
2.10.3.2/RD	Mains transient voltages		P
	a) AC mains supply .....:		—
	b) Earthed d.c. mains supplies .....:		—
	c) Unearthed d.c. mains supplies .....:		—
	d) Battery operation .....:		—
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		N
2.10.3.6/RD	Transients from a.c. mains supply .....:		—
2.10.3.7/RD	Transients from d.c. mains supply .....:		—
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems .....:		N
2.10.3.9/RD	Measurement of transient voltage levels		P
	a) Transients from a mains supply		—
	For an a.c. mains supply .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	For a d.c. mains supply .....:		—
	b) Transients from a telecommunication network :		—
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General		N
2.10.4.2/RD	Material group and comparative tracking index	III b	P
	CTI tests .....:		—
2.10.4.3/RD	Minimum creepage distances		P
2.10.5 /RD	Solid insulation		P
2.10.5.1/RD	General		P
2.10.5.2/RD	Distances through insulation	(see appended table 5.7)	N
2.10.5.3/RD	Insulating compound as solid insulation		N
2.10.5.4/RD	Semiconductor devices		N
2.10.5.5/RD	Cemented joints		N
2.10.5.6/RD	Thin sheet material – General		N
2.10.5.7/RD	Separable thin sheet material		N
	Number of layers (pcs) .....:		—
2.10.5.8/RD	Non-separable thin sheet material		N
2.10.5.9/RD	Thin sheet material – standard test procedure	The thin sheet materials of polyester tape used in inverter transformer.	P
	Electric strength test	(see appended table 8.2)	—
2.10.5.10 /RD	Thin sheet material – alternative test procedure		N
	Electric strength test	(see appended table 8.2)	—
2.10.5.11 /RD	Insulation in wound components		N
2.10.5.12 /RD	Wire in wound components		N
	Working voltage .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	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° .....:		N
2.10.5.13 /RD	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		N
	Working voltage .....:		—
	- Basic insulation not under stress .....:		N
	- Supplementary, reinforced insulation .....:		N
2.10.6/RD	Construction of printed boards		N
2.10.6.1/RD	Uncoated printed boards		N
2.10.6.2/RD	Coated printed boards		N
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board		N
2.10.6.4/RD	Insulation between conductors on different layers of a printed board		N
	Distance through insulation		N
	Number of insulation layers (pcs) .....:		N
2.10.7/RD	Component external terminations		P
2.10.8/RD	Tests on coated printed boards and coated components		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	(see appended table 8.2)	—
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		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.11/RD	Tests for semiconductor devices and cemented joints		N
2.10.12/RD	Enclosed and sealed parts		N
6	Wiring, connections and supply		P
6.1	General		P
6.1.1	Introduction		P
3.1/RD	General		P
3.1.1/RD	Current rating and overcurrent protection	All internal wires are UL recognized wiring that is PVC insulated, rated VW-1, min. 105°C, 450V. Internal wiring gauge is suitable for current intended to be carried.	P
3.1.2/RD	Protection against mechanical damage	Wires do not touch sharp edges and heatsinks which could damage the insulation and cause hazard.	P
3.1.3/RD	Securing of internal wiring	Internal wires with only basic isolation are routed so that they are not close to any live bare components. The wires are secured by solder pins and quick-connect terminals or solder and glue so that a loosening of the terminal connection is unlikely.	P
3.1.4/RD	Insulation of conductors	Internal wires with only basic isolation are routed so that they are not close to any live bare components. The wires are secured by solder pins and quick-connect terminals or solder and glue so that a loosening of the terminal connection is unlikely.	P
3.1.5/RD	Beads and ceramic insulators	Not used.	N
3.1.6/RD	Screws for electrical contact pressure	Electrical connections screwed two or more complete threads into metal. No screws of insulating material for electrical connections, or where supplementary or reinforced insulation could be impaired by a metal replacement.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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	All current carrying and safety earthing connections are metal to metal.	P
3.1.9/RD	Termination of conductors	All conductors are reliable secured.	P
	10 N pull test		P
3.1.10/RD	Sleeving on wiring	All sleeving on wiring which used as supplementary insulation were retained in position reliably.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections		P
3.2.3/RD	Permanently connected equipment	The terminals used	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		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 .....:	Terminals for permanent connection to supply	P

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Clause	Requirement + Test	Result - Remark	Verdict
	More than one supply connection .....:		N
6.3	Wiring terminals for external power conductors		P
3.3/RD	Wiring terminals for connection of external conductors		P
3.3.1/RD	Wiring terminals		P
3.3.2/RD	Connection of non-detachable power supply cords		P
3.3.3/RD	Screw terminals		P
3.3.4/RD	Conductor sizes to be connected		P
	Rated current (A), cord/cable type, cross-sectional area (mm^2) .....:	Rated current (30A);cross-sectional area :4 to 6 mm^2	—
3.3.5/RD	Wiring terminal sizes		P
	Rated current (A), type, nominal thread diameter (mm) .....:	nominal thread diameter: 4.0mm	—
3.3.6/RD	Wiring terminal design		P
3.3.7/RD	Grouping of wiring terminals		P
3.3.8/RD	Stranded wire		N
7	Physical requirements		P
7.1	Enclosure	Enclosure completely encloses hazardous parts.	P
7.2 4.1/RD	Stability		P
	Angle of 10°	The UPS does not overbalance when: (for all types) - titled to an angle of 10˚ when a force of 20% of the UPS weight is used from any direction.	P
	Test force (N) .....:		P
7.3 4.2/RD	Mechanical strength		P
4.2.1/RD	General		P
4.2.2/RD	Steady force test, 10 N		—
4.2.3/RD	Steady force test, 30 N	30 N force applied to housing of battery compartment.	P

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Clause	Requirement + Test	Result - Remark	Verdict
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		P
	Fall test	500 g steel sphere ball fall from 1.3 m height onto top of enclosure. No safety relevantdamages.	P
	Swing test	500 g steel sphere ball as pendulum onto side of enclosure. No safety relevant damages.	P
4.2.6/RD	Drop test; height (mm) .....:		N
4.2.7/RD	Stress relief test	After 7h at 70°C and cooling down to room temperature, no shrinkage, distortion or loosing of front panel was noticeable.	P
4.2.8/RD	Cathode ray tubes	No CRT in the unit.	N
	Picture tube separately certified .....:		—
4.2.9/RD	High pressure lamps	No high pressure lamp.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N) .:	Not wall or ceiling mounted.	N
7.4	Construction details		P
7.4.1	Introduction		P
4.3.1/RD	Edges and corners	No sharp edge or corner.	N
4.3.2/RD	Handles and manual controls; force (N).....:	No handle or manual control.	N
4.3.3/RD	Adjustable controls	No control.	N
4.3.4/RD	Securing of parts	No connection likely to be exposed to mechanical stress are provided in unit.	P
4.3.5/RD	Connection by plugs and sockets	No plug or socket.	N
4.3.7/RD	Heating elements in earthed equipment	No heating element.	N
4.3.11/RD	Containers for liquids or gases	No container for liquid or gas.	N
4.4/RD	Protection against hazardous moving parts		N
4.4.1/RD	General		N
4.4.2/RD	Protection in operator access areas .....:		P
4.4.3/RD	Protection in restricted access locations .....:		P
4.4.4/RD	Protection in service access areas		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.5/RD	Protection against moving fan blades		P
4.4.5.1/RD	General		P
	Not considered to cause pain or injury. a) .....:		N
	Is considered to cause pain, not injury. b) .....:		N
	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		P
4.5.1/RD	General		P
4.5.2/RD	Temperature tests		N
	Normal load condition per Annex L .....:		N
4.5.3/RD	Temperature limits for materials		P
4.5.4/RD	Touch temperature limits		P
4.5.5/RD	Resistance to abnormal heat .....:	(see appended table 7.4)	N
7.4.2	Openings		N
7.4.3	Gas Concentration		N
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		P
	Method 1, selection and application of components wiring and materials	Materials with the required flammability classes are used. (see appended table 7.5)	P
	Method 2, application of all of simulated fault condition tests		N
4.7.2/RD	Conditions for a fire enclosure	Electrical parts are not likely to ignite nearby materials. Parts not protected against overheating under fault conditions.	P
4.7.2.1/RD	Parts requiring a fire enclosure		P
4.7.2.2/RD	Parts not requiring a fire enclosure		N
4.7.3/RD	Materials	See below.	P
4.7.3.1/RD	General	PCB rated V-1 or better.	P
4.7.3.2/RD	Materials for fire enclosures	Metal enclosure is used	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		N
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	Internal components except small parts are V-1 or better	P
4.7.3.5/RD	Materials for air filter assemblies	No air filter.	N
4.7.3.6/RD	Materials used in high-voltage components	No high voltage component.	N
7.6	Battery location		N
7.6.1	Battery location and installation		N
7.6.2	Accessibility and maintainability		N
7.6.3	Distance		N
7.6.4	Case insulation		N
7.6.5	Wiring		N
7.6.6	Electrolyte spillage		N
7.6.7	Ventilation		N
7.6.8	Charging voltage		N
7.7	Temperature rise		P
4.5/RD	Thermal requirements		P
4.5.1/RD	General		P
4.5.2/RD	Temperature tests	(see appended table 7.7)	P
	Normal load condition per Annex L .....:		P
4.5.3/RD	Temperature limits for materials		P
4.5.4/RD	Touch temperature limits		P
4.5.5/RD	Resistance to abnormal heat .....:		P
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General	Permanently connected wire and required cross-section of protective earthing conductor is used.	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA	Warning marking used	P
8.2 5.2/RD	Electric strength		P
5.2.1/RD	General	(see appended table 8.2)	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.2/RD	Test procedure	(see appended table 8.2)	P
8.3	Abnormal operating and fault conditions		P
8.3.1	General		P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.3.2/RD	Motors	(see appended Annex B)	P
5.3.3/RD	Transformers	(see appended Annex C)	P
5.3.4/RD	Functional insulation .....:		P
5.3.5/RD	Electromechanical components		N
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions		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		P
8.3.3	Conditions for tests		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	(see appended table 9)	N
6.2.2.2/RD	Steady-state test	(see appended table 9)	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) .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
3.5/RD	Interconnection of equipment		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits .....:		N
3.5.3/RD	ELV circuits as interconnection circuits		N
3.5.4/RD	Data ports for additional equipment		N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits .....:		—
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions .....:		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed.....:		—
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed.....:		—
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	N
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	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

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Clause	Requirement + Test	Result - Remark	Verdict
M.3.1/RD	Ringing signal		N
M.3.1.1/RD	Frequency (Hz) .....:		—
M.3.1.2/RD	Voltage (V) .....:		—
M.3.1.3/RD	Cadence; time (s), voltage (V) .....:		—
M.3.1.4/RD	Single fault current (mA) .....:		—
M.3.2/RD	Tripping device and monitoring voltage .....:		N
M.3.2.1/RD	Conditions for use of a tripping device or a monitoring voltage		—
M.3.2.2/RD	Tripping device		N
M.3.2.3/RD	Monitoring voltage (V) .....:		N
A/RD	Annex A, Tests for resistance to heat and fire		P
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass 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) Metal material as fire enclosure		P
A.2.1/RD	Samples, material .....:		—
	Wall thickness (mm) .....:		—
A.2.2/RD	Conditioning of samples; temperature (°C) .....:		N
A.2.3/RD	Mounting of samples .....:		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .....:		—
A.2.5/RD	Test procedure		N

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Clause	Requirement + Test	Result - Remark	Verdict
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	Approved DC fan used.	P
	Position .....:	AC fans	—
	Manufacturer .....:	AEAOA	—
	Type .....:	SA1238A2HBT	—
	Rated values .....:	220V-240V 0.09A	—
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) .....:		—
	Electric strength test: test voltage (V) .....:		—
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		P
B.7.1/RD	General		P
B.7.2/RD	Test procedure		N

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Clause	Requirement + Test	Result - Remark	Verdict
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) .....:		—
C/RD	Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)		P
	Position .....:		—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
	Method of protection .....:		—
C.1/RD	Overload test		P
C.2/RD	Insulation		P
	Protection from displacement of windings .....:		P
D/RD	Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)		P
D.1/RD	Measuring instrument	Fig. D.1 used.	P
D.2/RD	Alternative measuring instrument		N
E/RD	Annex E, Temperature rise of a winding (see Annex E/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

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Clause	Requirement + Test	Result - Remark	Verdict
G.3/RD	Determination of telecommunication network transient voltage (V) .....:		N
G.4/RD	Determination of required withstand voltage (V)		N
G.4.1/RD	Mains transients and internal repetitive peaks :		N
G.4.2/RD	Transients from telecommunication networks .:		N
G.4.3/RD	Combination of transients		N
G.4.4/RD	Transients from cable distribution systems		N
G.5/RD	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		N
	For an a.c. mains supply		N
	For a d.c. mains supply		N
	b) Transients from a telecommunication network		N
G.6/RD	Determination of minimum clearances .....:		N
H	Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)		N
I	Annex I, Backfeed protection test		P
I.1	General		P
I.2	Test for pluggable UPS		N
I.3	Test for permanently connected UPS		P
I.4	Load-induced change of reference potential		P
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)		N
	Metal(s) used .....:		—
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

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K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P
L.2	Reference resistive load	Measured output voltage from online and battery back-up mode is complied with the tolerance specified by manufacturer.	P
L.3	Reference inductive-resistive load		—
L.4	Reference capacitive-resistive loads	Measured output voltage from online and battery back-up mode is complied with the tolerance specified by manufacturer.	P
L.5	Reference non-linear load		N
L.5.1	General		N
L.5.2	Test method		N
L.5.3	Connection of the non-linear reference load		—
M	Annex M, Ventilation of battery compartments		N
M.1	General		N
M.2	Normal conditions		N
M.3	Blocked conditions		N
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		N
V.2/RD	TN power distribution systems		P
V.3/RD	TT power distribution systems		N
V.4/RD	IT power distribution systems		N

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4.6, 1.6.2/RD	TABLE: Electrical Data (in normal conditions)						P
fuse #	**I rated (A)**	**U (V)**	**P (kW)**	**I (A)**	**I fuse (A)**	**condition/status**	
10kVA							
--	--	232.28/232.38/232.39	10.043	19.72/19.05/19.16	--	Supply by mains, charging of empty batteries and rated output load	
--		280.17/280.22/280.24	10.076	19.87/19.88/19.85	--	Ditto	
--	--	179.00/179.09/179.13	9.899	20.68/20.67/20.57	--	Ditto	
--	--	371.52	9.797	26.37	--	Supply by battery and rated output load.	
--	--	699.59	16.160	26.842	--	Supply by PV module, charging of empty batteries and rated output load	
--	--	400.12	16.025	39.851	--	Supply by PV module, charging of empty batteries and rated output load	
20kVA							
--	--	220.21/220.12/219.60	19.547	37.562/37.470/36.902	--	Supply by mains, charging of empty batteries and rated output load	
--		263.5/263.42/262.91	19.012	38.122/38.653/38.486	--	Ditto	
--	--	177.82/177.81/177.41	19.043	43.012/43.101/43.013	--	Ditto	
--	--	368.54	20.102	54.396	--	Supply by battery and rated output load.	
--	--	700	22.890	32.7	--	Supply by PV module, charging of empty batteries and rated output load	
--	--	398	18.825	47.3	--	Supply by PV module, charging of empty batteries and rated output load	
Supplementary information: means A/B/C three phase							

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Clause	Requirement + Test	Result - Remark	Verdict

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

Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V peak	V d.c.	

Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)

Supplementary information: No voltage on secondary side exceeding SELV limits during normal/abnormal operation. No test necessary.

5.2.5 2.5/RD	TABLE: Limited Power Sources	N

Circuit output tested:

Note: Measured Uoc (V) with all load circuits disconnected:

Components	Sample No.	Uoc (V)	Isc (A)		VA	
			Meas.	Limit	Meas.	Limit

Supplementary information:
Sc=Short circuit, Oc=Open circuit

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Clause	Requirement + Test	Result - Remark	Verdict

5.7 2.10.3/RD	TABLE: Clearance And Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
AC circuit to Secondary Circuit near to Opto-coupler U0 Pre –Sec side on PCB of SMPS Power board (RI)	700	420	5.6	6.0	5.6	6.0
DC circuit to GND of Top enclosure (BI)	700	700	10.0	>10.0	10.0	>10.0
AC circuit to Secondary Circuit near to X'FMR Pre – Sec side on PCB of SMPS Power board (RI)	700	420	5.6	12.0	5.6	12.0
AC circuit to Secondary Circuit near to CT Pre –Sec side on PCB of SMPS Power board (RI)	700	420	5.6	9.0	5.6	9.0
AC circuit to Secondary Circuit near to RST terminal Pre –Sec side on PCB of Rectify Power board (RI)	700	420	5.6	10.0	5.6	10.0
AC circuit to Secondary Circuit near to X'FMR T1 Pre –Sec side on PCB of Rectify Power board (RI)	700	420	5.6	8.0	5.6	8.0
AC circuit to Secondary Circuit on PCB of INV Power board (RI)	700	420	5.6	8.0	5.6	8.0
AC circuit to Secondary Circuit near to X'FMR T1 Pre –Sec side on PCB of STS Power board (RI)	700	420	5.6	10.0	5.6	10.0
AC circuit to Secondary Circuit near to X'FMR T1 Pre –Sec side on PCB of IGBT Power board (RI)	700	420	5.6	10.0	5.6	10.0
AC circuit to GND on PCB of Filter board (BI)	700	420	2.8	7.3	2.8	7.3
AC circuit to Secondary Circuit near to X'FMR T1 Pre –Sec side on PCB of IGBT DRIVING board (RI)	700	420	5.6	9.0	5.6	9.0

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Clause	Requirement + Test	Result - Remark	Verdict

AC circuit to Secondary Circuit near to Opto-coupler U4,U5 Pre –Sec side on PCB of IGBT DRIVING board (RI)	**700**	**420**	**5.6**	**9.0**	**5.6**	**9.0**
AC circuit to to GND on PCB of IGBT DRIVING board (BI)	**700**	**420**	**2.8**	**5.0**	**2.8**	**5.0**
DC circuit to Secondary Circuit near to Opto-coupler U1-3 Pre –Sec side on PCB of IGBT DRIVING board (RI)	**700**	**700**	**5.6**	**6.8**	**5.6**	**6.8**
DC circuit to Secondary Circuit near to Y CAP Y1 Pre –Sec side on PCB of IGBT DRIVING board (RI)	**700**	**700**	**5.6**	**8.5**	**5.6**	**8.5**
DC circuit to Secondary Circuit near to RS485 Opto-coupler U15,U16 Pre –Sec side on PCB of IGBT DRIVING board (RI)	**700**	**700**	**5.6**	**7.5**	**5.6**	**7.5**
DC circuit to Secondary Circuit near to X'FMR T1 Pre –Sec side on PCB of IGBT DRIVING board (RI)	**700**	**700**	**5.6**	**20.0**	**5.6**	**20.0**
Supplementary information:						

5.7 2.10.5.2/ RD	**TABLE: Distance Through Insulation Measurements**			**P**
Distance through insulation di at/of:	**U r.m.s. (V)**	**Test voltage (V)**	**Required di (mm)**	**di (mm)**
Opto-coupler for RS485	**450**	**300**	**0.4**	**approved comp.**
Supplementary information:				

7.7 4.5/RD	**TABLE: Heating Test**								**P**
Supply voltage (V) .....:	**304V (AC mode)**		**456V (AC mode)**		**700Vdc (PV mode)**		**350Vdc (PV mode)**		—
Ambient Tmin (°C) .....:	**26.7**	**Shift to**	**26.7**	**Shift to**	**23.1**	**Shift**	**28.4**	**Shift to**	—

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Clause	Requirement + Test	Result - Remark	Verdict

Ambient Tmax (°C) .....:	32.7	40.0	32.7	40.0	33.0	to 40.0	33.9	40.0	—
Maximum measured temperature T of part/at:	T (°C)								Allowed Tmax (°C)
DSP of main control board	61.4	68.7	59.1	70.7	61.3	68.3	61.8	67.9	130
Transformer T1 winding of main control board	52.1	59.4	50.0	61.6	52.2	59.2	52.7	58.8	100
Transformer T2 winding of power board	92.1	99.4	91.4	103	91.2	98.2	91.7	97.8	100
Transformer T2 core of power board	81.8	89.1	80.2	91.8	80.0	87.0	81.0	87.0	100
Transformer T1 winding of power board	61.3	68.6	58.7	70.3	61.7	68.7	62.8	68.9	100
Transformer T1 core of power board	56.6	63.9	53.9	65.5	56.9	63.9	58.4	64.5	100
Fuse F1 of power board	51.2	58.5	49.8	61.4	43.5	50.5	43.9	50.0	90
Rectifier D2 on power board	72.1	79.4	48.2	59.8	58.6	65.6	58.7	64.8	130
Cap C19 on power board	63.2	70.5	60.5	72.1	51.7	58.7	51.9	58.0	85
Transistor Q4 on power board	90.5	97.8	85.8	97.4	80.7	87.7	81.1	87.1	130
Heatsink of Diode D38 on power board	91.9	99.2	90.1	101.7	90.4	97.4	90.7	96.7	130
Heatsink of Diode D41 on power board	76.7	84	74.6	86.2	76.0	83.0	76.8	82.9	130
Winding of A phase inductor	65.8	73.1	60.5	72.1	32.5	39.5	33.3	39.4	165
Winding of B phase inductor	78.4	85.7	73.9	85.5	33.0	40.0	33.7	39.8	165
Core of inductor	77.5	84.8	70.7	82.3	33.9	40.9	34.5	40.6	165
Winding of A phase isolated transformer	119.3	126.6	117.1	128.7	105.9	112.9	106.5	112.5	165
Winding of B phase isolated transformer	127.6	134.9	125.5	137.1	101.0	108.0	101.5	107.5	165
Core of isolated transformer	108.4	115.7	108.2	119.8	98.4	105.4	98.5	104.6	165
Filter capacitor	33.7	41.0	31.5	43.1	34.6	41.6	35.1	41.2	85
X capacitor on filter board	41.7	49.0	38.5	50.1	40.5	47.5	41.2	47.3	85
Enclosure of relay	42.9	50.2	40.5	52.1	42.2	49.2	42.7	48.8	85
Bus cap C73 on Inverter board	40.9	48.2	38.8	50.4	43.2	50.2	43.9	50.0	85
A phase current detector on inverter board	44.2	51.5	41.3	52.9	45.7	52.7	47.0	53.1	85
A phase inverter IGBT top	52.0	59.3	49.1	60.7	53.4	60.4	53.8	59.9	130
A phase inverter IGBT bottom	49.4	56.7	46.5	58.1	50.6	57.6	51.1	57.2	130

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heatsink of IGBT	49.1	56.4	46.3	57.9	50.4	57.4	50.9	57.0	130
DC fuse body	59.7	67.0	55.1	66.7	60.3	67.3	61.7	67.7	90
Cap C57 on rectifier board	61.4	61.4	49.5	61.1	43.9	50.9	45.3	51.4	85
Driving transformer T6 winding on rectifier board	63.4	63.4	55.2	66.8	49.8	56.8	50.7	56.8	100
A phase current detector on rectifier board	70.4	70.4	61.8	73.4	50.7	57.7	51.7	57.7	85
DC current detector	55.2	55.2	43.8	55.4	49.1	56.1	49.8	55.9	85
Rectifier SCR	67.8	67.8	57.8	69.4	51.8	58.8	52.3	58.4	130
Inverter SCR	52.3	59.6	49.6	61.2	52.8	59.8	53.5	59.6	130
By pass SCR	50.3	57.6	47.6	59.2	50.9	57.9	51.4	57.5	130
AC input breaker	52.1	59.4	48.2	59.8	35.1	42.1	35.8	41.9	85
output breaker	41.6	48.9	38.8	50.4	39.1	46.1	40.1	46.2	85
PV breaker	36.9	44.2	34.3	45.9	41.1	48.1	42.2	48.2	85
top enclosure	38.8	46.1	35.5	47.1	40.3	47.3	40.6	46.7	70
left enclosure	38.1	45.4	35.6	47.2	39.3	46.3	39.8	45.9	70
right enclosure	36.4	43.7	33.5	45.1	35.8	42.8	36.3	42.4	70
Winding of transformer T1 on PV module	31.5	38.8	28.8	40.4	29.5	36.5	39.1	45.2	100
Cap C49 of PV module	31.6	38.9	29.8	41.4	47.5	54.5	53.6	59.7	85
Inductor L1 of PV module	31.7	39.0	30.2	41.8	62.9	69.9	98.0	104.1	165
IGBT 1 of PV module (Q12)	31.7	39.0	29.7	41.3	89.0	96.0	100.1	106.1	130
IGBT 2 of PV module (Q9)	31.7	39.0	29.6	41.2	64.6	71.6	101.5	107.6	130
heatsink of IGBT 1 of PV module(Q12)	31.7	39.0	29.6	41.2	58.5	65.5	75.1	81.2	130
heatsink of IGBT 2 of PV module(Q9)	31.8	39.1	29.8	41.4	58.7	65.7	75.6	81.6	130
Cap C47	32.0	39.3	30.5	42.1	39.4	46.4	50.9	57.0	85
Enclosure of Relay RLY1	33.0	40.3	31.1	42.7	54.1	61.1	88.2	94.3	130
Enclosure of Relay RLY2	32.0	39.3	29.8	41.4	44.5	51.5	68.6	74.7	130
panel	34.4	41.7	32.3	43.9	35.6	42.6	36.0	42.0	80
Cabinet of PV module	32.6	39.9	29.8	41.4	36.0	43.0	36.6	42.7	70
ambient	32.7	40.0	28.4	40	33.0	40.0	33.9	40.0	--

Supplementary information: regarding the condition of batteries input , please refer to other test condition as the batteries input is directly enter to bus capacitor just thought contactor
1. Tma is 40°C;
2. Test on model 20kVA

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

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Supplementary information:

7.4 4.5.5/RD	TABLE: Ball Pressure Test of Thermoplastics		N
Allowed impression diameter (mm) ..... :			—
Part	Test temperature (°C)	Impression diameter (mm)	
Supplementary information:			

5.7 2.10.5	TABLE: Dielectric Strength		P
Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)	
DC input to Ground	2120V d.c.	No	
DC input to ungrouded assesposible part	4240V d.c.	No	
AC output to ground	2120V d.c.	No	
AC output to ungrouded assesposible part	4240V d.c.	No	
Supplementary information: the test is conducted under 10K and 20K separately.			

7.5 4.7/RD	TABLE: Resistance to fire					N
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence	
Supplementary information:						

8.3 5.3/RD	TABLE: Fault condition tests		P
	Ambient temperature (°C) .....:	24.8	—

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	Power source for EUT: Manufacturer, model/type, output rating .....:				**--**		**—**
Com-ponent No.	**Fault**	**Supply voltage (V)**	**Test time**	**Fuse #**	**Fuse current (A)**	**Observation**	
Output	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**1S**	**----**	**----**	**EUT shut down immediately. No display due to system shun down. warning signal light is on and message" over-current problem" displayed on the panel. No component damaged, once the short-circuit resume, EUT is worked normally. No hazards.**	
Output	**overload**	**I/P: 360Vdc O/P: 380Vac**	**1S**	**----**	**----**	**EUT shut down immediately. 200% overload; warning signal light is flashed and message" output overload problem" displayed on the panel. No component damaged, once the problem resume, EUT is worked normally. No hazards.**	
Ventilation hole	**Blocked**	**I/P: 360Vdc O/P: 380Vac**	**30 min**	**----**	**----**	**EUT limit output when temperature of thermal detector rised to 85℃. warning signal light is on and message" high temperature problem" displayed on the panel. No component damaged, once the problem resume, EUT is worked normally, No hazards.**	
Fan	**Blocked**	**I/P: 360Vdc O/P: 380Vac**	**30 min**	**----**	**----**	**Warning signal light is flashed and message" Fan problem" displayed on the panel. No component damaged,No hazards.**	
batteries	**Reverse**	**I/P: 360Vdc O/P: 380Vac**	**1S**	**----**	**----**	**EUT shut down immediately. Contactor is opened, aux power supply is not worked, Soft start component is overheat, No hazards**	

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Input	**Reverse**	**I/P: 360Vdc O/P: 380Vac**	**5 min**	**----**	**----**	**Unit can n't start. warning signal light is fiashed and message" phase error" displayed on the panel. once the problem resume, EUT is worked normally, No hazards**
Manual by pass AC switch	**Mis-match**	**I/P: 360Vdc O/P: 380Vac**	**5 min**	**----**	**----**	**EUT under PV mode, Manual by pass AC switch can not power on due to mechanical lock, only operated by professional person.**
Manual by pass maintance switch	**Mis-match**	**I/P: 360Vdc O/P: 380Vac**	**5 min**	**----**	**----**	**EUT under PV mode, Manual by pass maintance switch can not power on due to mechanical lock, only operated by professional person**
Display board						
power supply+5 /485 C223	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**Diode D30 is smoking , the second winding of transformer T1 is short-circuit, no 5V power supply for RS485 No hazards.**
power supply+5 /monitor C267	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**Diode 36 damaged,The Primary winding of transformer T1 is short-circuit, no 5V power supply for minitor,No hazards.**
power supply+12 /com C261	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**Diode D34 damaged, indicating light for LED1、LED2、LED3、D15、D16、D17 are power off ,monitor circuit does not work, no hazards.**
Q10 D and C	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**F1**	**2A**	**F1 fuse opened. All light are power off.monitor circuit does not work, no hazards.**
Power board						
C19	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, C20 damaged, aux power supply does not work. No hazards .**
Q1 C and E	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, D25 light is off, aux power supply does not work. No hazards .**

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Q3 C and E	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, D25 light is off, aux power supply does not work. No hazards .**
C43 -15V	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, Diode D36 damaged, aux power supply -15V does not output. No hazards .**
D36	**Shorted-circuit**	**I/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, aux power supply -15V does not output. No hazards.**
EA89Ⅱ IGBT driving board						
C4	**Shorted-circuit**	**/P: 360Vdc O/P: 380Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "IGBI over current" on the panel, warning light is on, No hazards .**
Sampling board						
INV Voltage sample Resistor R159	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**Wrong voltage display on the panel, still work normally.**
INV Voltage sample Resistor R159	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, SCR circuit shu down,No hazards .**
Current sample signal C4	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**Wrong current display on the panel, still work normally.**
Current sample signal C4	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**Wrong current display on the panel, still work normally.**
BYP Voltage sample Resistor R164	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT cannot start, with "wrong voltage problem" on the panel, No hazards .**

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BYP Voltage sample Resistor R164	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT cannot start, with "wrong voltage problem" on the panel, No hazards .**
OUT Voltage sample Resistor R167	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT does work normally.**
OUT Voltage sample Resistor R167	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "Mosffet problem" on the panel, No hazards .**
PV voltage resistor	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**Wrong PV voltage display on the panel, still work normally.**
PV voltage resistor	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "PV wrong voltage problem" on the panel, No hazards**
PV current	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**Wrong PV current display on the panel, still work normally.**
PV current	**Open-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT MPPT modem shut down immediately, with "PV wrong current problem" on the panel, No hazards**
Main circuit						
Contactor signal	**misfunction**		**2min**	**----**	**----**	**EUT MPPT modem shut down immediately, relay is opened with warning light flashing,No hazards**
IGBT D and S	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "IGBI over current" on the panel, warning light is on, No hazards .**
SCR3 C and E	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "rectify circuit problem " on the panel, warning light is on, No hazards .**

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Clause	Requirement + Test	Result - Remark	Verdict

PWM1 Q1 C and E	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "rectify circuit problem " on the panel, warning light is on, No hazards**
PWM1 Q1 C and G	**Shorted-circuit**	**I/P: 350Vdc O/P: 230Vac**	**2min**	**----**	**----**	**EUT shut down immediately, with "rectify circuit problem " on the panel, warning light is on, No hazards y**
Supplementary information: Test on model 20kVA.						

4.5	**TABLE: Critical components information**				P
Object / part No	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of Conformity**
Optical-couplers	**LITE-ON TECHNOLOGY CORP**	**LTV-816S-TA1**	**CTR200~400-tp6/6uS-5000Vac-GW4**	**UL1577**	**E113898**
Optical-couplers	**LITE-ON TECHNOLOGY CORP**	**LTV-356T**	**50mA,6V,50%～600%,80V,170mW,-55℃～110**	**UL1577**	**E113898**
Optical-couplers	**AVAGO TECHNOLOGIES PTE LTD**	**HCPL-316J-500E**	**Double protection optical isolators having an isolation voltage of 3750 Vac**	**UL1577**	**E55361**
Metalized Film Capacitor	**Xiamen Faratronic Co. Ltd.**	**C43Q1224MB0C400**	**Y2,300VAC,0.22uF±20%**	**UL60384-14**	**E186600**
CAP safety	**Xiamen Faratronic Co. Ltd.**	**C42P2225KBSC400**	**X1,275VAC,2.2uF,±10%**	**UL60384-14**	**E186600**
CAP safety	**Xiamen Faratronic Co. Ltd.**	**C43Q1223M61C000**	**MKP,Y2X1,300V,22n,20%**	**UL60384-14**	**E186600**
CAP safety	**Shenzhen Surong Capacitors Co. Ltd.**	**MP2474K3E4G0-A**	**X2 280V 474 K(±10%)**	**UL60384-14**	**E314875**
Isolated Transformer （for AUX.POWER ）	**SHENZHEN FERROCOIL ELECTRONICS TECHNOLOGY CO.,LTD**	**E3HPPT2**	**22:22:22,300uH**	**Applicable parts of EN62040**	**Tested with appliance**

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

--Bobbin	CHANG CHUN PLASTICS CO.,LTD OR EQU	PHENOLIC T375J	94v-0	UL94	E59481
--Ferrite Core Eel-16	HENGDIAN GROUP DMEGC MAGNETICS CO.,LTD	DMR40	--	--	--
	LINGTONG	LP4	--	--	--
--Wire	PACIFIC ELECTRIC WIRE & CABLE CO.,LTD	POLYURETHANE ENAMELED TYPE NO.: UEW/U	THERMAL RATING: 130℃	UL1446	E201757
--Mylar Tape	SHENGDAFENG ELECTRONICS CO.,LTD	ADHESIVE POLYESTER TYPE NO.: PZ	TAPE 0.025mm THERMAL RATING: 130℃	UL510	E317896
--Varnish	HANG CHEUNG PETROCHEMICAL LTD	TYPE: 8562/C	THERMAL RATING: 155℃	UL1446	E200154
--Tube	FLUO TECH INDUCTRIES CO LTD	TEFLON TUBE THERMAL RATING 200℃	MAX. OPER TEMP: 200℃	UL224	E175982
--Margin Tape	JINGJIANG PRESSURE SENSITIVE GLUE FTY	NONWOVEN CLOTH TYPE NO.:WF	THERMAL RATING 130℃	UL510	E165111
Isolated Transformer （for IGBT-DR）	JEPULS TECHNOLOGY (SHENZHEN) CO.,LTD	BCK1301-064	EA66Ⅱ-IGBT_DRV TX	Applicable parts of EN62040	Tested with appliance
--Bobbin	CHANG CHUAN PLASTICS CO.,LTD.	Phenolic T375J	94v-0	UL94	E59481(S)
--Ferrite Core	LIANFENG	EPC13 NH2B	--	--	--
	DONGYAN	EPC13 HE4	--	--	--
	DONGYAN	EPC13 KP4	--	--	--
--Wire	SHEN ZHEN CITY CHENG WEI INDUSTRY CO.,LTD	POLYURETHANE ENAMELED	THERMAL RATING: 130℃	UL1446	E227475

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

	SHEN ZHEN FENG CHING METAL CORP	TYPE NO.: 2UEW		UL1446	E172395
--Mylar Tape	JINGJIANG PRESSURE SENSITIVE GLUE FTY	Polyester Tape Type:CT-280	RATING THERMAL:130 ℃	UL510	E165111
--Varnish	HANG CHEUNG CO.	Type NO.:8562E		UL1446	E180908
--Tube	SHENZHEN CHANGYUAN ELECTRONIC MATERIAL CO.,LTD	Teflon TFL 200℃		UL224	E180908
--Margin Tape	JINGJIANG PRESSURE SENSITIVE GLUE FTY	Nonwoven Cloth Type: WF	RATING THERMAL:130 ℃	UL510	E165111
Isolated Transformer （for AUX.POWER ）	SHENZHEN FERROCOIL ELECTRONICS TECHNOLOGY CO.,LTD	ER42 Transformer	EA200T1-23:23:6:3:5:5:8-700uH	Applicable parts of EN62040	Tested with appliance
--Bobbin	CHANG CHUN PLASTICS CO.,LTD	PHENLIC T375J	94v-0	UL 94	E59481(S)
--Ferrite Core ER42	HENGDIAN GROUP DMEGC MAGNETICS CO.,LTD	DMR40	ER42	--	--
	TONGDA	TD4		--	--
--Wire	PACIFIC ELECTRIC WIRE & CABLE CO.,LTD	POLYURETHANE ENAMELED WIRE TYPE: UEW-U	THERMAL RATING 130℃	UL1446	E201757(S)
--Mylar Tape	JEPULS PRESSURE SENDITIVE GLUE FTY	TYPE NO.:PZ	THERMAL RATING 130℃ ADHESIVE POLYESTER TAPE 0.025mm	UL510	E165111(N)

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

--Varnish	HANG CHEUNG PETROCHEMICAL LTD	TYPE: 8562/C		UL1446	E200154
--Tube	FLUO TECH INDUSTRIES CO.,LTD	TEFLON TUBE		UL224	E175982(S)
--Margin Tape	JEPULS PRESSURE SENDITIVE GLUE FTY	NONWOVEN CLOTH NO.:WF		UL510	E165111(N)
--EPOXY	SHAW HUOW	9001A/B		UL94	E105888(S)
Isolated output Transformer （for 20kVA）	Guang Hua Industrial Co., Ltd.	EA89II-20K-3/3-1, 187-220,20kVA,AL C.B1.0620300	Input 187VAC CLASS H output 220VAC	Applicable parts of EN62040	Tested with appliance
--wire	DONGGUAN XINLONG VARNISHED WIRE CO LTD	Primary coil-Aluminum enamelled wire-Φ2.6mm； Secondary coil-Aluminum enamelled wire -Φ2.4mm	Material Designation:xUEWF(AL)；ANSI/Conductor Type：Al；Temp Class：180	UL1446	E171082
	YICHUN DEYUANXINMAO ALUMINIUM INDUSTRY CO LTD		Material Designation:xUEWH(AL), QAL-x/180; ANSI/Conductor Type：Al；	UL1446	E347038
--insulating paper	GUANGZHOU BETTER NEW MATERIALS CO., LTD	System Component：NMN, NHN, YMY, BETTER 116	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E316816
	ZHUZHOU TIMES ELECTRIC INSULATION CO., LTD	Laminate Designation:TJ6630 DMD	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E355960
--Core	Shanghai	B50A470	300-340-115	--	--

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

	Baosteel Group	Thickness 0.5mm			
--Varnish	ZHUZHOU TIMES ELECTRIC INSULATION CO LTD	TJ11	Twisted Pair：1 80	UL1446	UL:E235491
--Temperature switch	THERMIK GERAETEBAU GMBH	C06.155.05-XXXX	160±5℃ 250V/2.5A	IEC60730	VDE:4002228
	GUANGZHOU DE WAN ELECTRICAL EQUIPMENT CO LTD	T11-U	160±5℃ 250V/2.5A	IEC60730	VDE:4000120
--Tube	DONGGUAN YONGCHAO INSULATION MATERIAL CO LTD	YC-15-25-40-70	200℃ 4KV	UL224	UL:E325767
Isolated Output Transformer（for 10kVA）	Guang Hua Industrial Co., Ltd.	EA89II-20K,187：220, 20kVA,AL C.B1.EA89800	Input 187VAC CLASS H output 220VAC	Applicable parts of EN62040	Tested with appliance
--wire	DONGGUAN XINLONG VARNISHED WIRE CO LTD	Primary coil-Aluminum enamelled wire -Φ1.9mm；Secondary coil-Aluminum enamelled wire -Φ1.8mm	Material Designation:xUEWF(AL)；ANSI/Conductor Type：Al；Temp Class：180	UL1446	UL：E171082
	YICHUN DEYUANXINMAO ALUMINIUM INDUSTRY CO LTD		Material Designation:xUEWH(AL), QAL-x/180; ANSI/Conductor Type：Al；	UL1446	UL：E347038
--insulating paper	GUANGZHOU BETTER NEW MATERIALS CO., LTD	System Component：NMN, NHN, YMY, BETTER 116	System Temp Class:180(H)；thickness：0.13 mm;0.25mm	UL510	UL:E316816
	ZHUZHOU TIMES ELECTRIC	Laminate Designation:T	System Temp Class:180(H)；	UL510	UL:E355960

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

	INSULATION CO., LTD	J6630 DMD	thickness：0.13 mm;0.25mm		
--Core	Shanghai Baosteel Group	B50A470 Thickness 0.5mm	300-335-80	--	--
--Varnish	ZHUZHOU TIMES ELECTRIC INSULATION CO LTD	TJ11	Twisted Pair：1 80	UL1446	UL:E235491
Reactor(for 20kVA)	Guang Hua Industrial Co., Ltd.	EA89-20K,3mH, +/-10%,40A; C.L0.EA89200	CLASS H	Applicable parts of EN62040	Tested with appliance
--wire	SHANGHAI YOUTUO MAGNET WIRE CO LTD	coil-Aluminum enamelled wire -3*7mm；	Material Designation: xEI / AIW @，Q（ZY / XY）@ -x；ANSI/Conductor Type：Al； Temp Class：180(#)	UL1446	UL:E338133
--insulating paper	GUANGZHOU BETTER NEW MATERIALS CO., LTD	System Component：NMN, NHN, YMY, BETTER 116	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E316816
	ZHUZHOU TIMES ELECTRIC INSULATION CO., LTD	Laminate Designation:TJ6630 DMD	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E355960
--Core	Shanghai Baosteel Group	B50A470 Thickness 0.5mm	230-198-65	--	--
--Varnish	ZHUZHOU TIMES ELECTRIC INSULATION CO LTD	TJ11	Twisted Pair：1 80	UL1446	UL:E235491
--Temperature switch	THERMIK GERAETEBAU	C06.155.05-XXXX	160±5℃	EN60730	VDE:4002228

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

	GMBH		250V/2.5A		
	GUANGZHOU DE WAN ELECTRICAL EQUIPMENT CO LTD	T11-U	160±5℃ 250V/2.5A		VDE:4000120
--Tube	DONGGUAN YONGCHAO INSULATION MATERIAL CO LTD	YC-15-25-40-70	200℃ 4KV	UL224	UL:E325767
Reactor(for 20kVA)	Guang Hua Industrial Co., Ltd.	EA89-10K,6mH, +/-10%,20A; C.L0.EA89010	CLASS H	Applicable parts of EN62040	Tested with appliance
--wire	SHANGHAI YOUTUO MAGNET WIRE CO LTD	coil-Aluminum enamelled wire -2*5mm；	Material Designation: xEI / AIW @，Q（ZY / XY）@ -x；ANSI/Conductor Type：Al； Temp Class：180(#)	UL1446	UL:E338133
--insulating paper	GUANGZHOU BETTER NEW MATERIALS CO., LTD	System Component：NMN, NHN, YMY, BETTER 116	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E316816
	ZHUZHOU TIMES ELECTRIC INSULATION CO., LTD	Laminate Designation:TJ6630 DMD	System Temp Class:180(H)； thickness：0.13 mm;0.25mm	UL510	UL:E355960
--Core	Shanghai Baosteel Group	B50A470 Thickness 0.5mm	230-170-45	--	--
--Varnish	ZHUZHOU TIMES ELECTRIC INSULATION CO LTD	TJ11	Twisted Pair：180	UL1446	UL:E235491
--Temperature switch	THERMIK GERAETEBAU GMBH	C06.155.05-XXXX	160±5℃ 250V/2.5A	IEC60730	VDE:4002228

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

	GUANGZHOU DE WAN ELECTRICAL EQUIPMENT CO LTD	T11-U	160±5℃ 250V/2.5A	IEC60730	VDE:4000120
--Tube	DONGGUAN YONGCHAO INSULATION MATERIAL CO LTD	YC-15-25-40-70	200℃ 4KV	UL510	UL:E325767
--Temperature switch	THERMIK GERAETEBAU GMBH	C06.155.05-XXXX	160±5℃ 250V/2.5A	IEC60730	VDE:4002228
	GUANGZHOU DE WAN ELECTRICAL EQUIPMENT CO LTD	T11-U	160±5℃ 250V/2.5A	IEC60730	VDE:4000120
--Tube	DONGGUAN YONGCHAO INSULATION MATERIAL CO LTD	YC-15-25-40-70	200℃ 4KV	UL224	UL:E325767
Contactor (for 10kVA)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDC1(Z)-1210	12A/3P,Ith=25A, DC24V	IEC 60947-4 IEC60947-5	TUV: B150783574102
Contactor (for 20kVA)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDC1(Z)-1810	18A/3P,Ith=32A, DC24V	IEC 60947-4 IEC60947-5	TUV: AN50205110
Breaker(Cold start)	PEOPLE ELECTRICAL APPLIANCES GROUP CO., LTD	DZ47-63	1P ,type C,16A Ics=Icn:6000A	IEC 60898-1	CQC: 2002010307012494
Breaker(Cold start)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDM1A-63	1P ,type C,16A Ics=Icn:6000A	IEC 60898-1	TUV: R50150384
Breaker (for 10kVA:Bypass,Output)	ZHEJIANG CHNT ELECTRICS CO., LTD	DZ47-60	3P , type C ,32A Ics=Icn:6000A	IEC 60898-1	CQC: 2002010307005876
Breaker (for	SHANGHAI LIANGXIN ELECTRICAL CO.,	NDM1A-63	3P , type C ,32A Ics=Icn:6000A	IEC 60898-1	TUV: R50150384

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

10kVA:Bypass,Output)	LTD				
Breaker (for 20kVA :Bypass,Output)	ZHEJIANG CHNT ELECTRICS CO., LTD	DZ47-60	3P , type C ,50A Ics=Icn:4000A	IEC 60898-1	CQC: 2002010307005876
Breaker (for 20kVA :Bypass,Output)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDM1A-63	3P , type C ,50A Ics=Icn:4500A	IEC 60898-1	TUV: R50150384
Breaker (for 10kVA: Input)	ZHEJIANG CHNT ELECTRICS CO., LTD	DZ158-125	3P , type C ,80A Ics=Icn:6000A	IEC60947-2	CQC: 2002010307005877
Breaker (for 10kVA: Input)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDM1A-125	3P , type C ,80A Ics=Icn:7500A	IEC60947-2	TUV: R50349722
Breaker (for 20kVA: Input)	ZHEJIANG CHNT ELECTRICS CO., LTD	DZ158-125	3P , type C ,100A Ics=Icn:6000A	IEC60947-2	CQC: 2002010307005877
Breaker (for 20kVA: Input)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDM1A-125	3P , type C ,100A Ics=Icn:7500A	IEC60947-2	TUV: R50349722
Breaker（PV input）	SHANGHAI LIANGXIN ELECTRICAL CO., LTD	NDB2Z-63	2P type C ,63A Ics=Icn:6000A	NDT500324	TUV: AN50226324
Fuse (for 10kVA)	Mingrong Electrical Proterction Co.,ltd	Φ16.5*49.5 mm	RGS4,690V,35A,	IEC 60269-4	CQC CB Certif. No.:CN30196
Fuse (for 20kVA)	Mingrong Electrical Proterction Co.,ltd	Φ16.5*63mm	RGS4,63A,690V,	IEC 60269-4	CQC CB Certif. No.:CN30196
Relay of PV module	SHORI Electric Co., Ltd	S16-12-1AP	12VDC,1A,14VDC,80A	Applicable parts of EN62040	Tested with appliance

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

AC FAN	**AEAOA**	**AC AXIAL FAN**	**SA1238A2HBT 220V-240V 0.09A**	**EN60335 -2-80 EN60335 -1**	**TUV: R50250076**
DC fan	**PELKO Motors**	**R1238Y24BP CB1-7**	**DC24V,0.85A**	**EN60335 -2-80 EN60335 -1**	**TUV B050955369**
IGBT	**STARPOWER**	**GD50HFK60C 1S**	**Vce=600V Ic=50A Vcesat=1.95V Tvjmax 175℃**	**--**	**--**
SCR	**SEMIKRON**	**SKKT 57/16 E G6**	**1600V/57A**	**UL1557**	**UL E63532**
hall effect sensor	**Nanjing Chieful Science & Technology CO.,LTD**	**CS100B**	**100A 4V**	**Q/3201C HGL02-2007**	**--**
Capacitor	**HUNAN AIHUA GROUP CO.,LTD**	**ELH2WM471R 50TC**	**450VDC/470UF**	**--**	**--**
PCB	**BAOYUEJIA ELECTRONICS CO LTD**	**Various**	**130℃ V-0**	**UL94**	**UL: E230225**
PCB	**HUIZHOU TRUSTWIN ELECTRONICS DEVELOPMENT CO LTD**	**Various**	**130℃ V-0**	**UL94**	**UL: E340729**
PCB	**KEMBLE ELECTRONICS LTD**	**Various**	**130℃ V-0**	**UL94**	**UL : E64353**
hall effect sensor of PV module	**Nanjing Chieful Science & Technology CO.,LTD**	**sensor CSM050SY**	**50A ,4V**	**Q/320115QHKJ01-2013**	**--**
Hyperfast Diode of PV module	**FAIRCHILD**	**RHRG30120**	**1200V,30A,TO-247**	**--**	**--**
Diodes Module of PV module	**IXYS**	**DSEP60-06A**	**600V/60A,1.39V/ 35nS,TO-247AD**	**--**	**--**

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

IGBT of PV module	FAIRCHILD	SGL50N60RUFDTU	600V/80A,TO-264	--	--
Transformer of PV module	BO LUO DA XIN ELECTRONICS CO.,LTD	EI33	64:12:5:12:8:7,100W，1.0mH	Applicable parts of EN62040	Tested with appliance
--BOBBIN	CHANG CHUN PLASTICS CO.,LTD	PHENOLIC T375HF EI-33 (PIN6+6)	150℃	UL94	UL: E59481
--CORE	RUYUAN DONGYANGGUANG MAGNETIC MATERIAL CO.,LTD	FERRITE HE4 (GAP)	--	--	--
--COPPER WIRE	HUIZHOU GOLDEN OCEAN MAGNET WIRE FACTORY	UEW-X# MW75	130℃	UL1446	UL: E225143
	HOI LUEN ELECTRICALMFR CO.,LTD	XUEW MW75	130℃	UL1446	UL: E164409
--TAPE	JINGJIANG YA HUA PRESSURE SENSITIVE GLUE	MYLAR TAPE	130℃	UL510	UL: E165111
--MARGIN TAPE	JINGJIANG YA HUA PRESSURE SENSITIVE GLUE CO.,LTD	NONWOVEN CLOTH TAPE(WF-2902)	130℃	UL510	UL: E165111
--BUSHING	SHEN ZHENWOER HEAT SHRINKABLE MATERIAL CO.,LTD	TEFLON/WF	200℃	UL226	UL: E203950
--VARNISH	WU JIANG TAIHU INSULATING MATERIAL CO LTD	T-4260(a)	130℃	UL1446	UL: E228349
Inductor of PV module	YUYUAN ELECTRICAL CO.,LTD	DSP-INV.LT250-34	265uH±10% 50TS φ2.0mm*2P	--	--
--CORE	DMEGC or MICROMETALS	IRON CORE	T250-34	--	--
--WIRE	P.E.W.C.CO.LTD	PEW H	180℃	UL1446	UL: E201757

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

--VARNISH	**P D GEORGE/VIKING OR EQUIVALENCE**	**F8033-2 V1630 FS**	**F8033-2 V1630 FS**	**UL1446**	**UL: E73071**
--BASE	**PANYU TIANYU OR EQUIVALENCE**	**PBT 301-G20**	**UL94V-0**	**UL94**	**UL: E152735**
--EPOXY	**DONGGUAN EATTO ELECTRONIC MATERIAL CO LTD**	**3300A/B-1**	**UL94V-0**	**UL94**	**UL: E218090**
Capacitor of PV module	**HUNAN AIHUA GROUP CO.,LTD**	**LH**	**500V 820uF M(+/-20%)Φ35*80 P(K)=10mm -25℃～+105℃**	**CRS-2014-LH / 01**	**--**
Heatsink	**Shenzhen HuashengYuan Electrical Co.,Ltd**		**Metal Size: 270mmx80mmx 62 0mm**	**--**	**--**
Heatsink of PV module	**EAST GROUP CO,.LTD**		**Metal Size: 112mmx57mmx 78mm**	**--**	**--**
PV Enclosure	**EAST GROUP CO,.LTD**		**Metal Size: 450mmx840mm x1 100mm**	**--**	**--**
Supplementary information:					

Photo document

Photo 1 Front view

Photo 2 Side view

Photo document

Photo 3 Side view

Photo 4 Back view

Photo document

Photo 5 Inside instruction(right side)

Photo 6 Inside instruction(left side)

Photo document

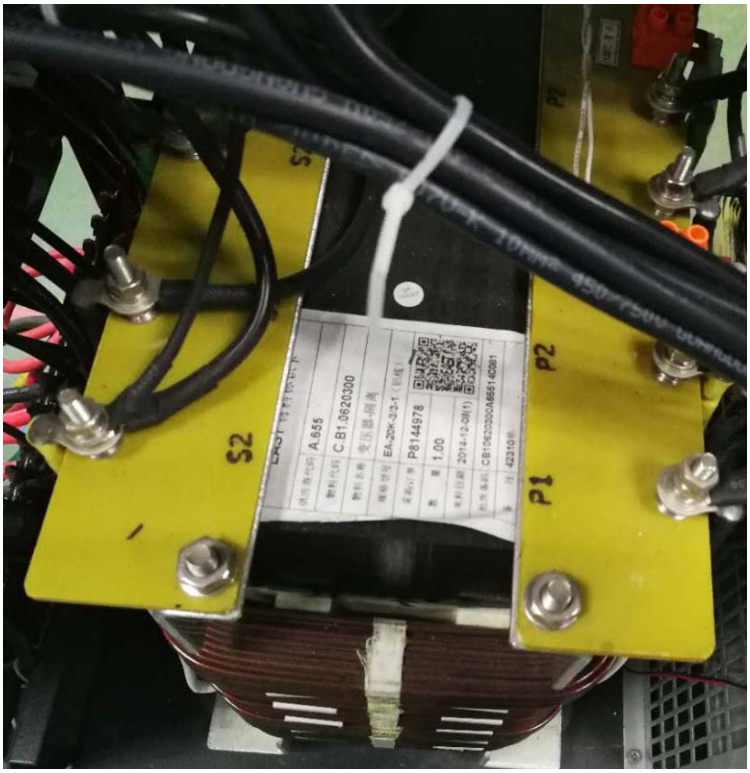

Photo 7 Main isolated transformer

Photo 8 reactor

Photo document

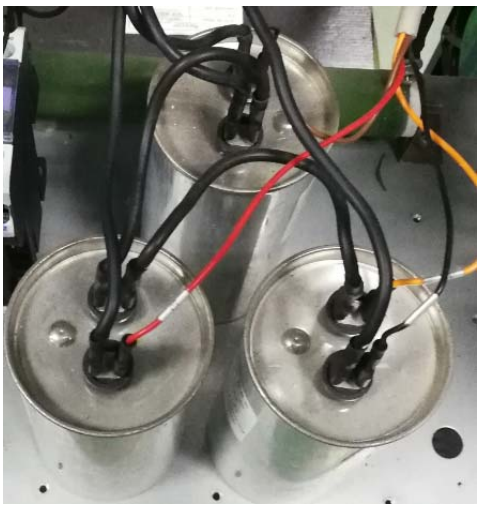

Photo 9 Bus capacitor

Photo 10 I/O board front view

Photo document

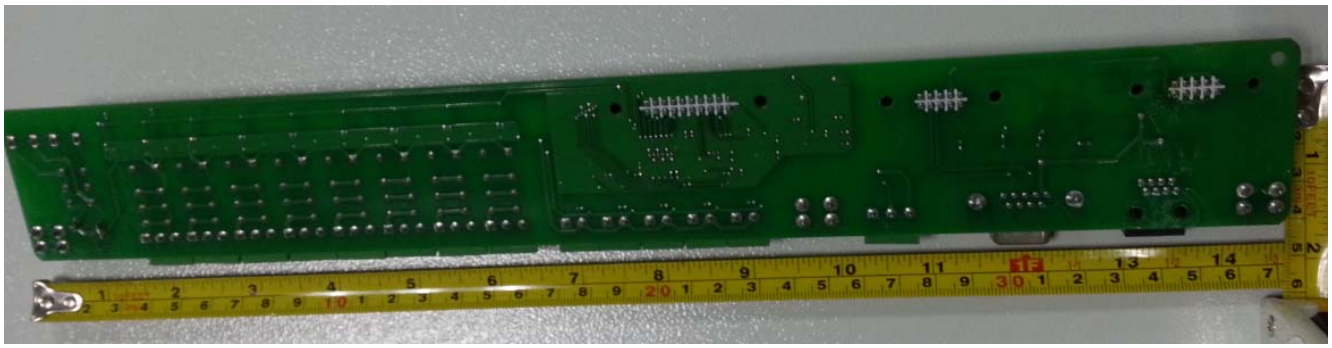

Photo 11 I/O board back view

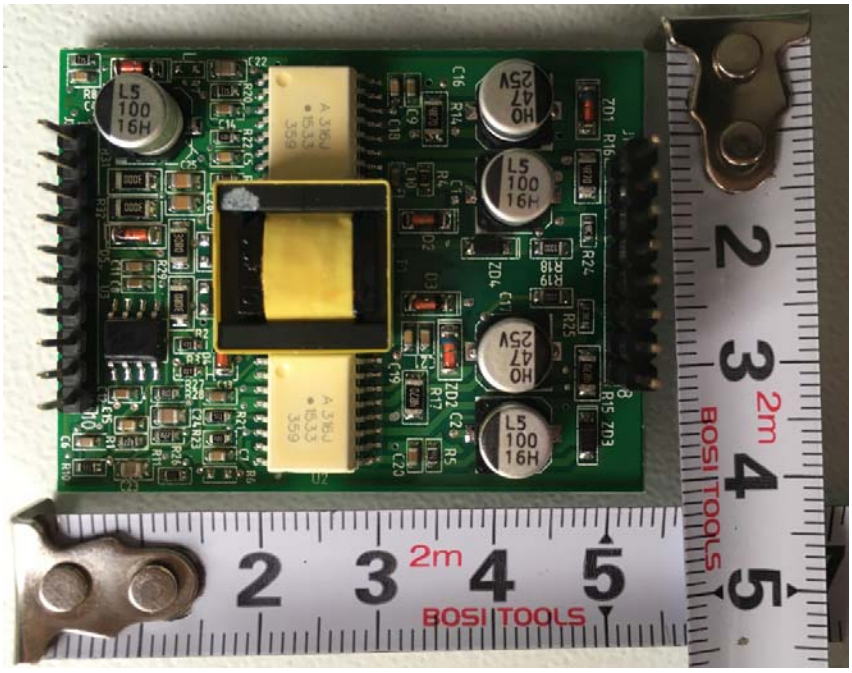

Photo 12 IGBT driving board front view

Photo document

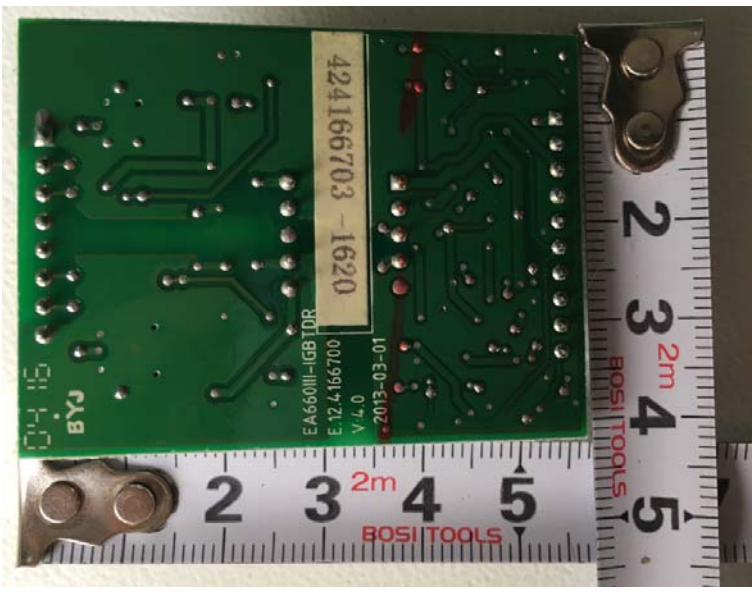

Photo 13 IGBT driving board back view

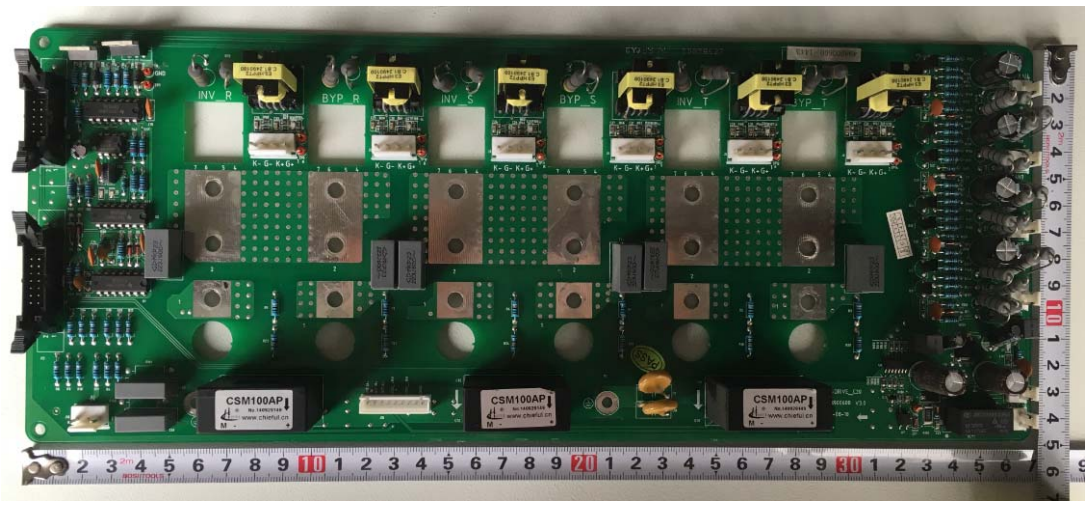

Photo 14 STS driving board front view

Photo document

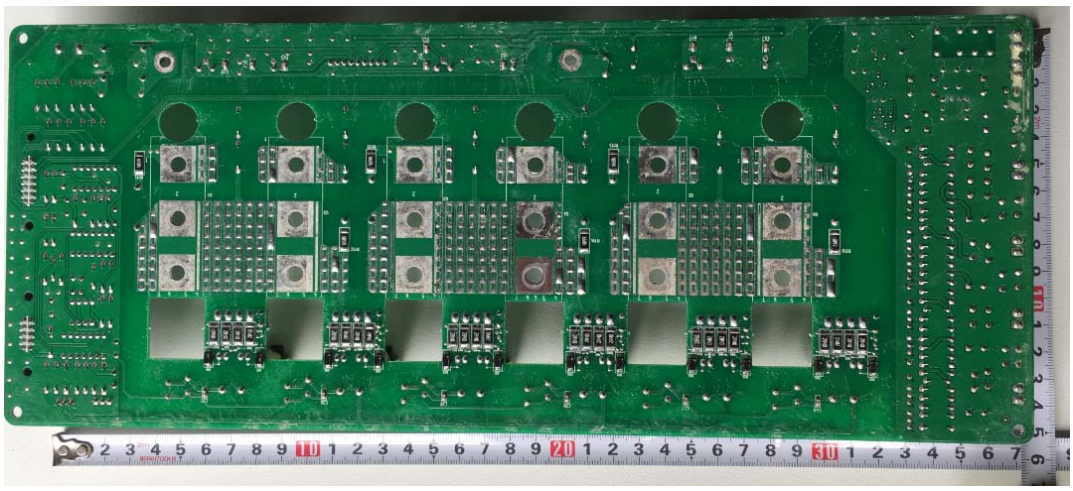

Photo 15 STS driving board back view

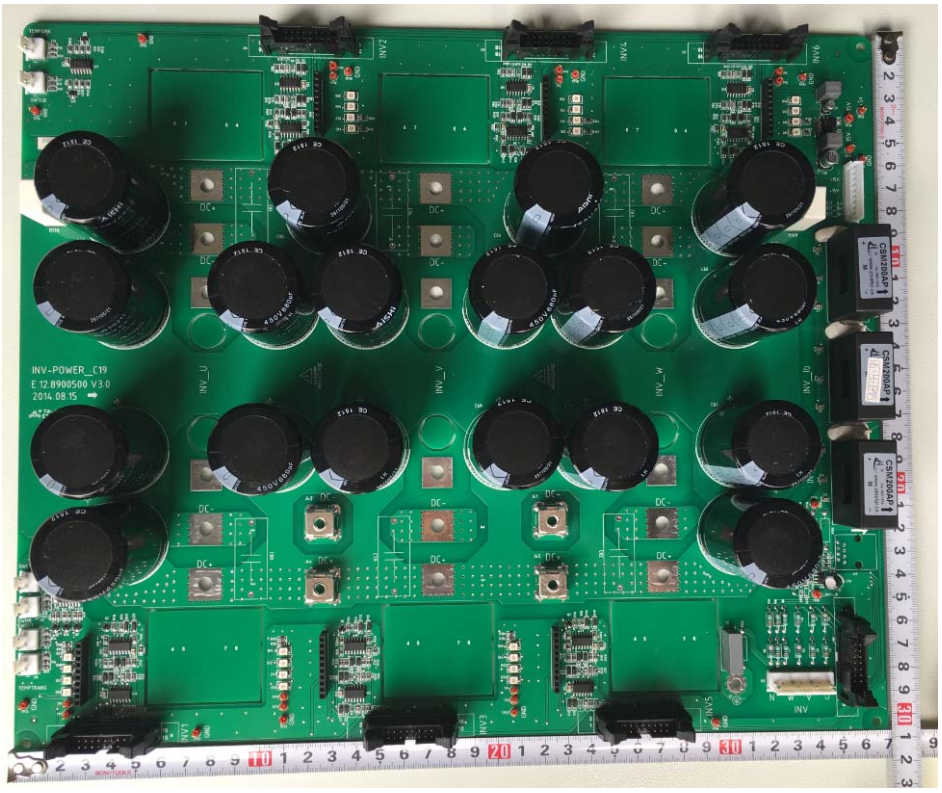

Photo 16 INV power board front view

Photo document

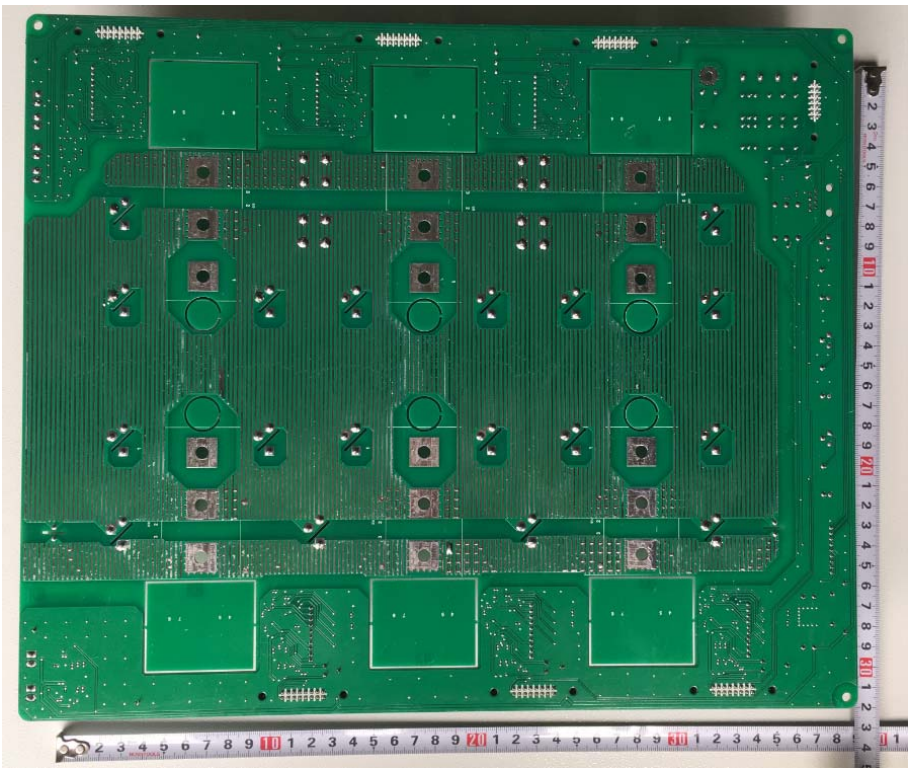

Photo 17 INV power board back view

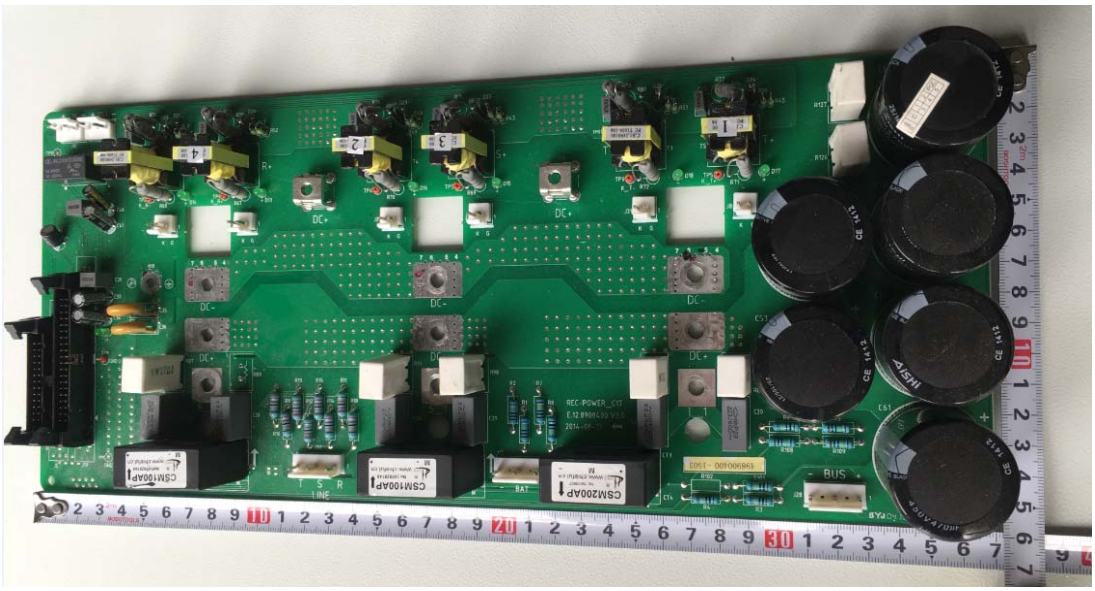

Photo 18 Rectify driving board front view

Photo document

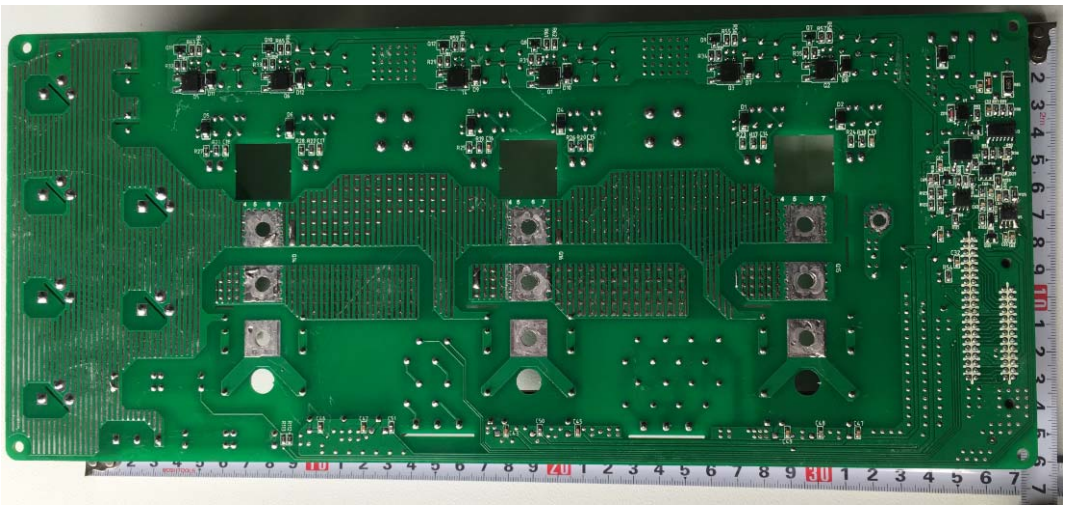

Photo 19 Rectify driving board back view

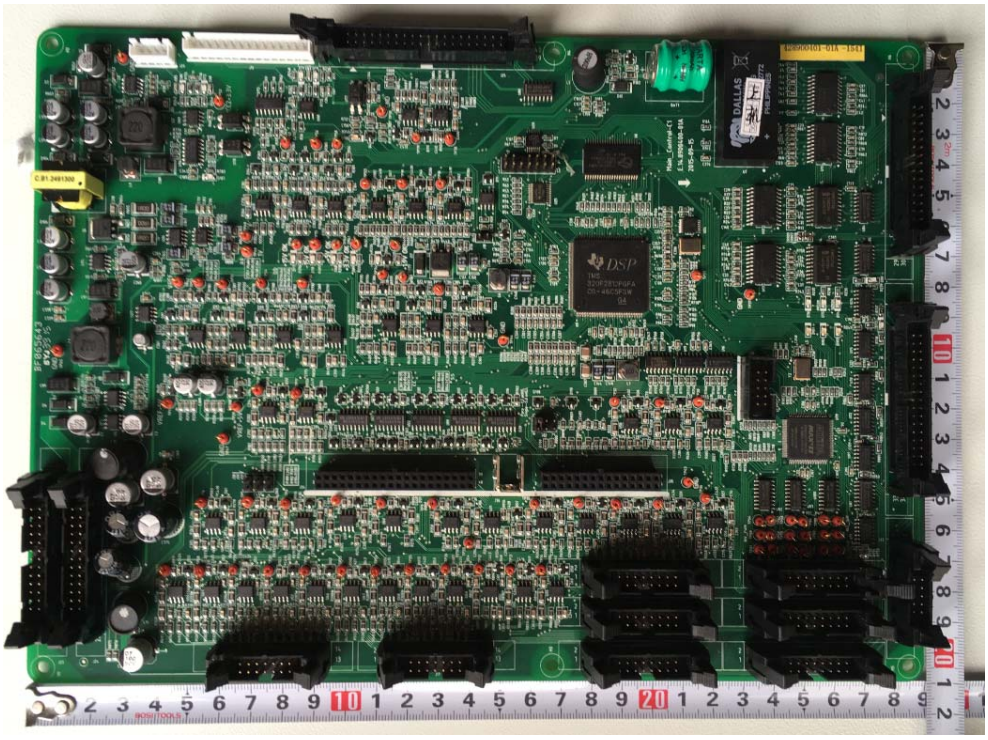

Photo 20 Main control front view

Photo document

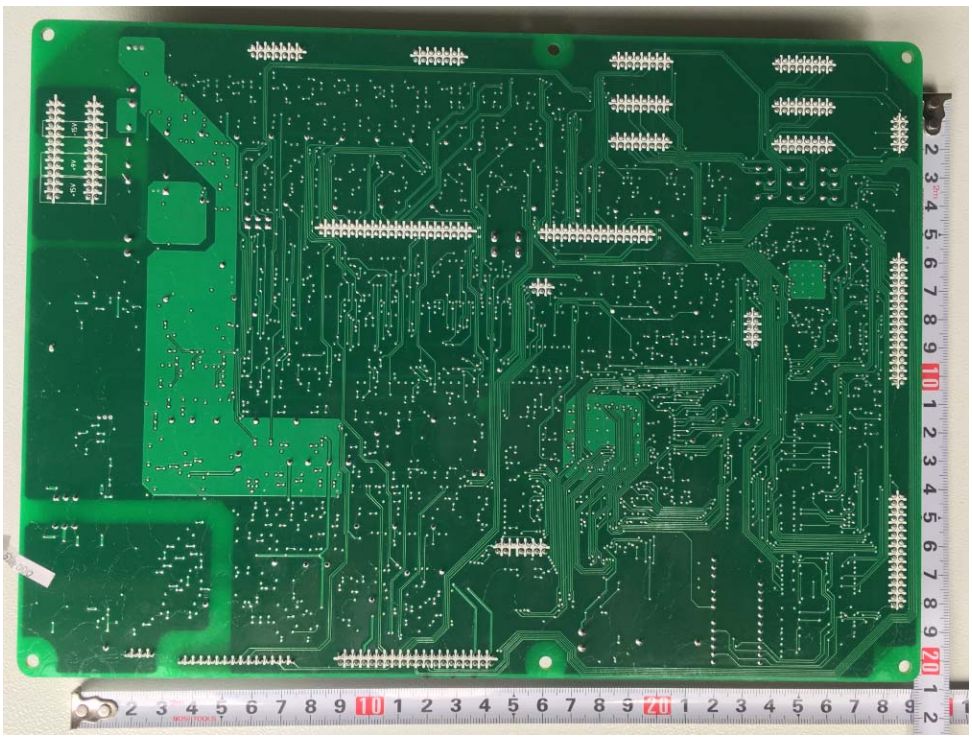

Photo 21 Main control back view

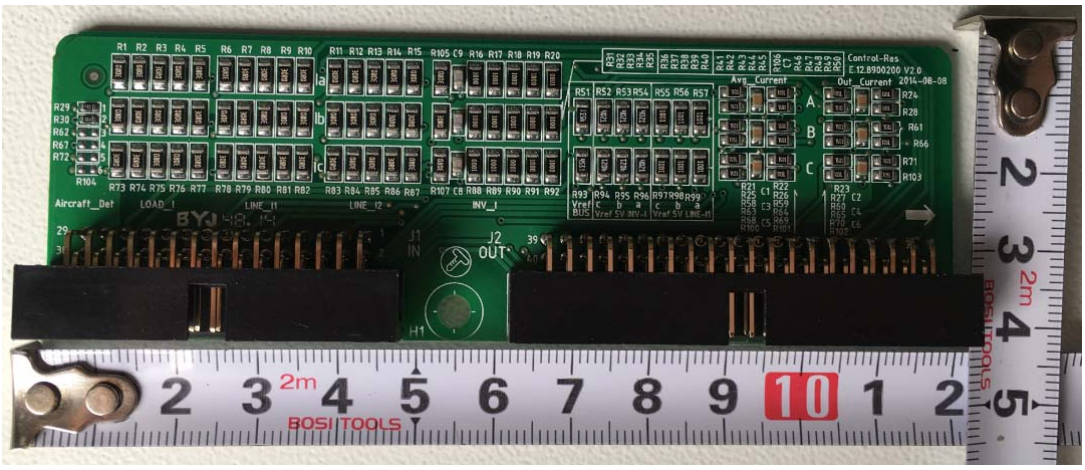

Photo 22 Current sampling board front view

Photo document

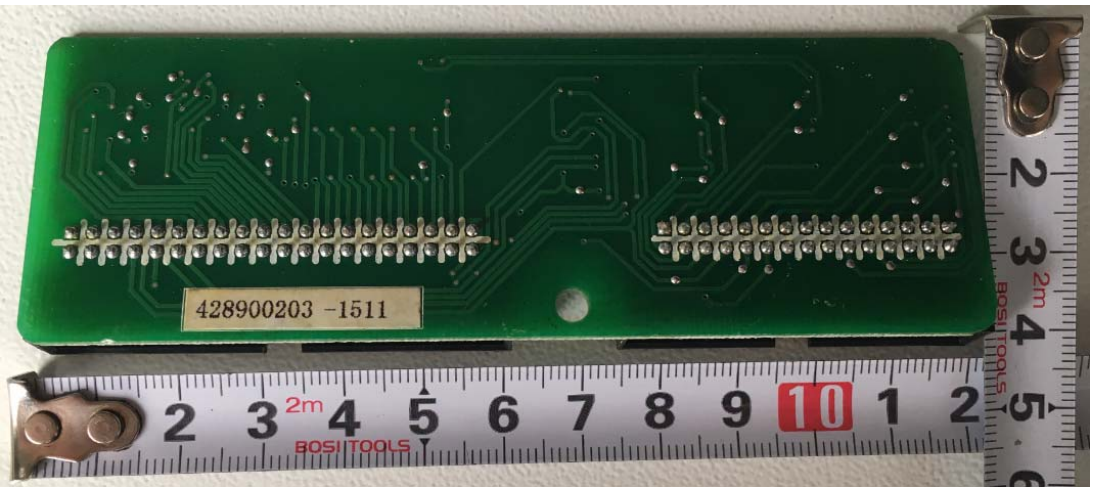

Photo 23 Current sampling board back view

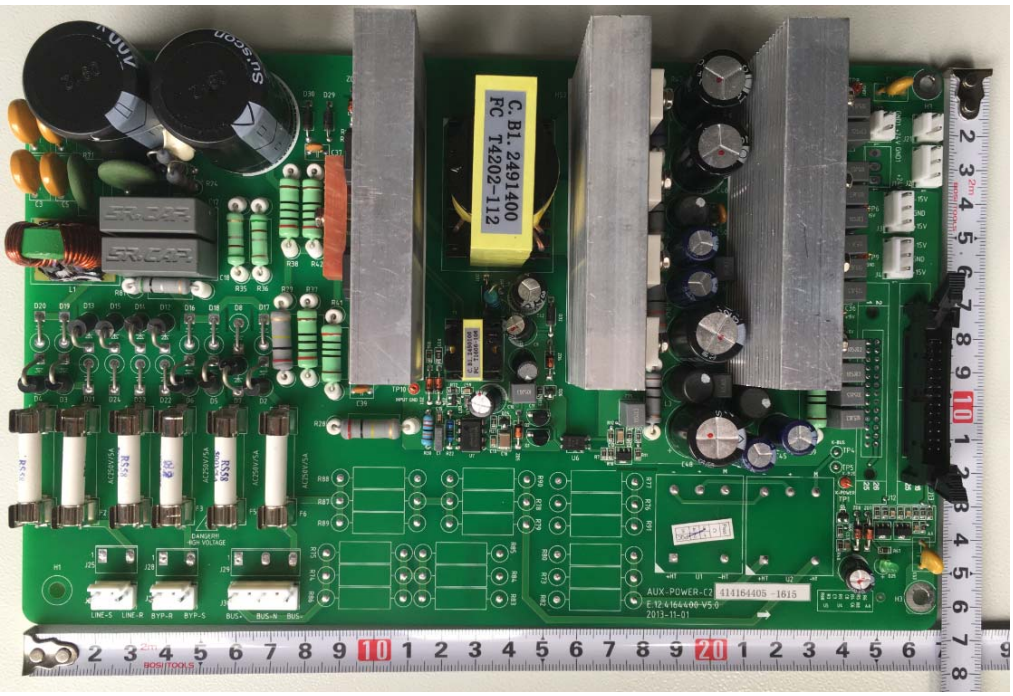

Photo 24 SMPS power front view

Photo document

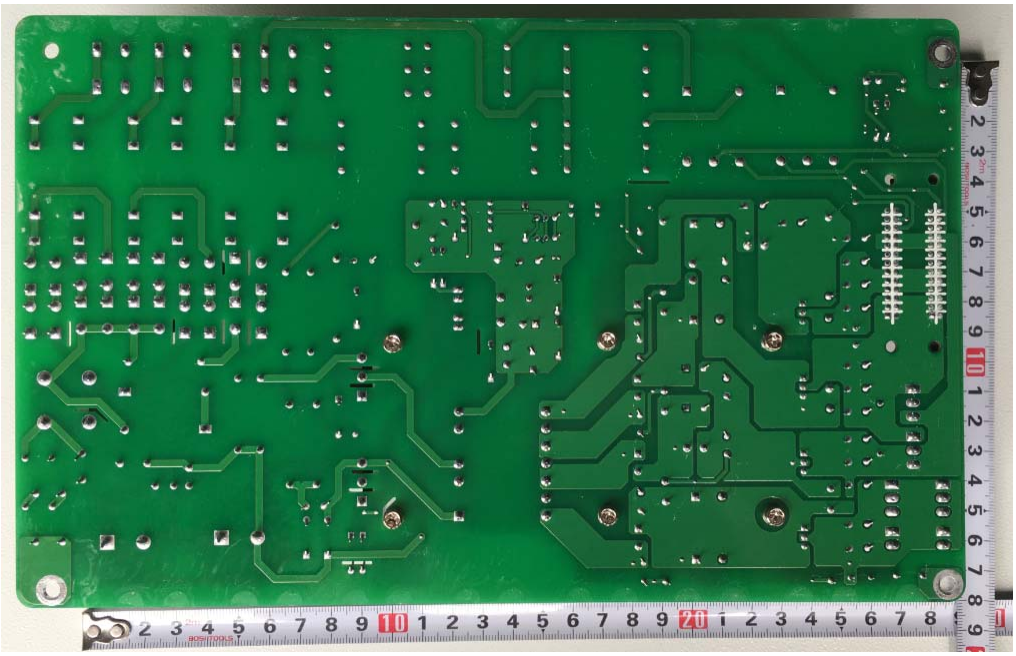

Photo 25 SMPS power back view

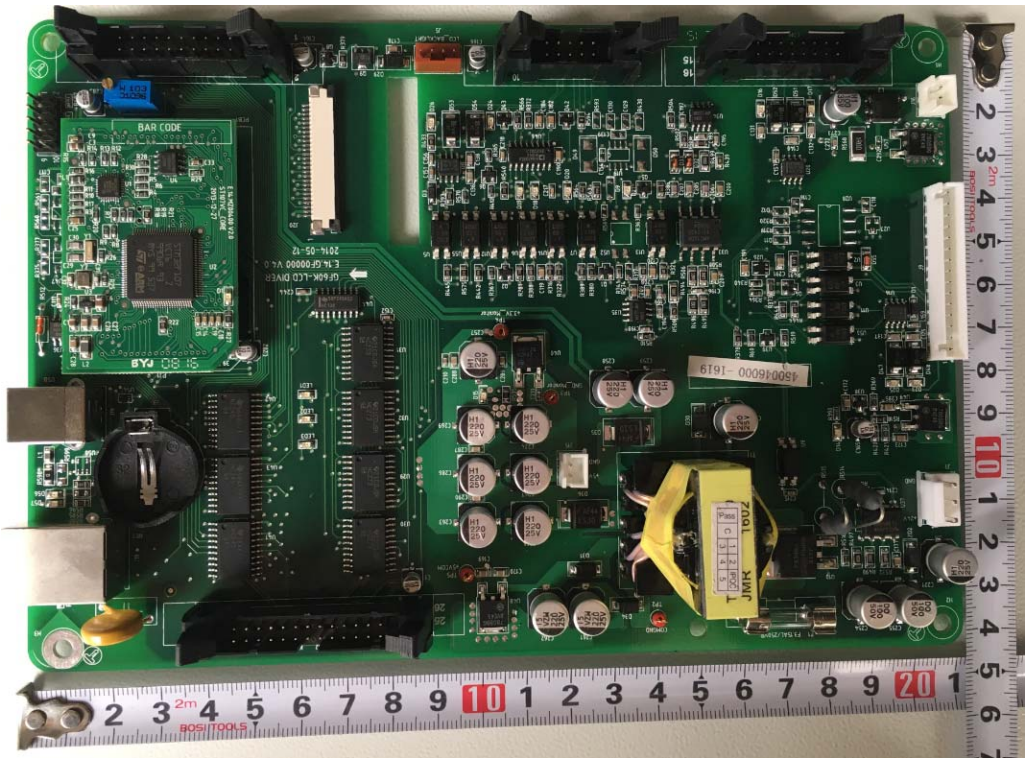

Photo 26 Monitor board front view

Photo document

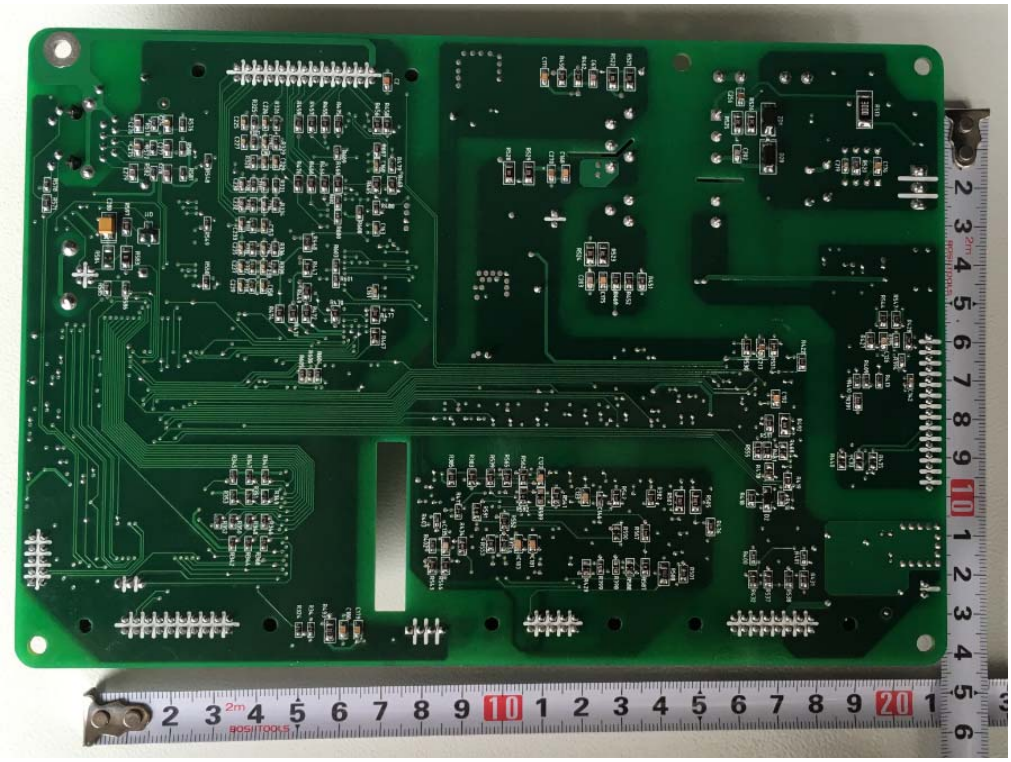

Photo 27 Monitor board back view

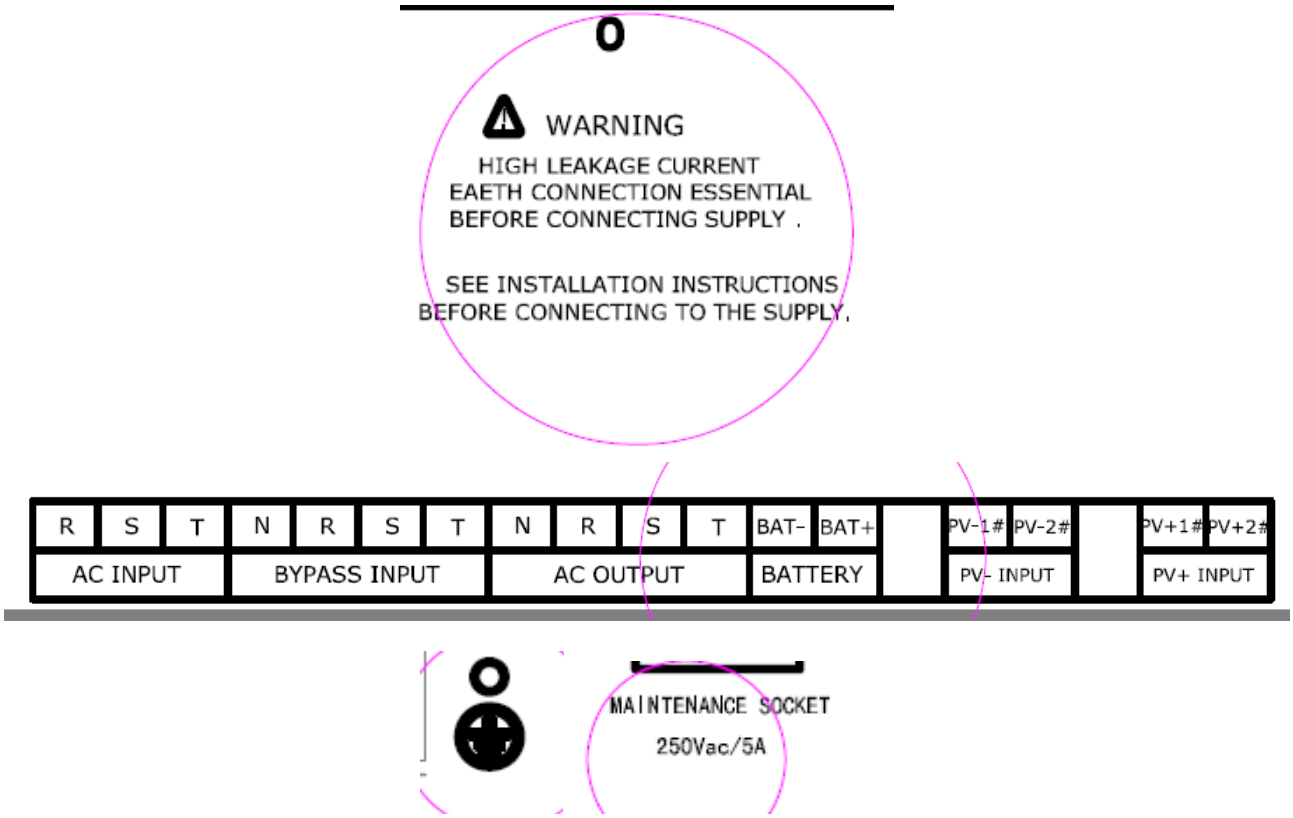

Photo 27 Warning marking on back cabinet

End of report