

# LVD TEST REPORT

**Report No.:** SET2016-11010

**Product:** Solar Inverter

**Model No. :** EA33KTLSE

**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

**Tel:** 86 755 26627338    **Fax:** 86 755 26627238



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### Test Report

**Product** ..... : Solar Inverter

**Model No.** ..... : EA33KTLSI

**Brand Name** ..... : /

**Applicant** ..... : EAST GROUP CO.,LTD.

**Applicant Address** ..... : NO.6 NORTHERN INDUSTRY ROAD, SONGSHAN LAKE  
SCI&TECH INDUSTRY PARK, DONGGUAN, P.R.CHINA


**Manufacturer** ..... : EAST GROUP CO.,LTD.


**Manufacturer Address** ..... : NO.6 NORTHERN INDUSTRY ROAD, SONGSHAN LAKE  
SCI&TECH INDUSTRY PARK, DONGGUAN, P.R.CHINA

**Rating** ..... : EA33KTLSI: DC Input : MPPT: DC320-900V,Max. DC current :3\*23A;  
AC Output: 3/PE AC 3\*400V,50/60Hz,3\*48A, Rated power 30kW,Max. power 33kW

**Test Standards**..... : EN 62109-1:2010 Safety of power converters for use in photovoltaic power  
systems-Part1:General requirements.  
  
EN 62109-2 :2011 Safety of power converters for use in photovoltaic power  
systems-Part2:Particular requirements for inverters

**Test Result** ..... : PASS

**Tested by** ..... : Zhou Jun  
 2016.06.27  
\_\_\_\_\_  
Signature, Date

**Reviewed by** ..... : Xie Yuzhang  
 2016.06.27  
\_\_\_\_\_  
Signature, Date

**Approved by** ..... : Wu Lian  
 2016.06.27  
\_\_\_\_\_  
Signature, Date



<b>Testing</b>	
Date of receipt of test item.....: 2016-04-22	
Date(s) of performance of test .....: 2016-04-22 to 2016-06-27	
Factory.....: EAST GROUP CO.,LTD.	
Address.....: NO.6 NORTHERN INDUSTRY ROAD, SONGSHAN LAKE SCI&TECH INDUSTRY PARK, DONGGUAN, P.R.CHINA	
<b>Test case verdicts</b>	
Test case does not apply to the test object.....: N/A	
Test item does meet the requirement.....: P(ass)	
Test item does not meet the requirement.....: F(ail)	
.....:	
General remarks:	Attached with:
This test report shall not be reproduced except in full without the written approval of the testing laboratory.	/
The test results presented in this report relate only to the item tested.	
"(see remark #)" refers to a remark appended to the report.	
"(see appended table)" refers to a table appended to the report.	
Throughout this report, a coma is used as the decimal separator.	
General descriptions:	
Models EA33KTL SI is a Solar Inverter which converts three MPPT channel direct current generated from the PV array to alternating current.	



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
1	GENERAL		P
4	General testing requirements		P
4.1	General		P
4.2	General conditions for testing		P
4.2.1	Sequence of tests		P
4.2.2	Reference test conditions		P
4.2.2.1	Environmental conditions		P
	<p>Unless otherwise specified in this standard, for example with regard to environmental category as defined in 6.1, the following ambient environmental conditions shall exist in the test location:</p> <p>a)temperature of 15 °C to 40 °C;</p> <p>b)a relative humidity of not more than 75 % and not less than 5 %;</p> <p>c)an air pressure of 75 kPa to 106 kPa;</p> <p>d)no frost, dew, percolating water, rain, solar radiation, etc.</p>		P
4.2.2.2	State of equipment		P
4.2.2.3	Position of equipment		P
4.2.2.4	Accessories		P
4.2.2.5	Covers and removable parts	Need to use a tool to remove covers	P
4.2.2.6	Mains supply		P
	a)Voltage:	See rating plate	P
	b) Frequency:	See rating plate	P
	c) Polarity:	Not pluggable equipment type A.	N/A
	d)Earthing:		P
	e)Over-current Protection		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
4.2.2.7	Supply ports other than the mains		P
4.2.2.7.1	Photovoltaic supply sources		P
4.2.2.7.2	Battery inputs	Without battery.	N/A
4.2.2.8	Conditions of loading for output ports		P
	- for continuous operation ratings		P
	- for intermittent operation ratings		N/A
	- for short-term operation ratings		N/A
4.2.2.9	Earthing terminals	Protective conductor terminal connected to earth.	P
4.2.2.10	Controls		P
	a) mains selection devices shall be set to the correct value unless otherwise noted in this standard.	No such selection devices.	N/A
	b) combinations of settings shall not be made if they are prohibited by the manufacturer's instructions provided with the equipment.		P
4.2.2.11	Available short circuit current	More than 1000A	P
4.3	Thermal Testing		P
4.3.1	General		P
	This subclause specifies requirements intended to prevent hazards due to:		P
	- touchable parts exceeding safe temperatures; and		P
	- components, parts, insulation and plastic materials exceeding temperatures which may degrade safety-related electrical, mechanical, or other properties during normal use over the expected life of the equipment;		P
	- structures and mounting surfaces exceeding temperatures which may degrade the materials over the expected life of the equipment		P
4.3.2	Maximum temperatures	(see appended table 4.3)	P
4.3.2.1	General		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
4.3.2.2	Touch temperatures		P
4.3.2.3	Temperature limits for mounting surfaces		P
4.4	Testing in Three fault condition	(see appended table 4.4)	P
4.4.1	General		P
4.4.2	Test conditions and duration for testing under fault conditions		P
4.4.2.1	General		P
4.4.2.2	Duration of tests		P
4.4.3	Pass/fail criteria for testing under fault conditions		P
4.4.3.1	Protection against shock hazard		P
	Compliance with requirements for protection against electric shock is checked during and after the application of Three faults as follows:	No shock hazards.	P
	a) by making measurements to check that no accessible DVC-A circuits have become shock-hazardous using the steady state limits for DVC-A in Table 6 and the short-term limits of 7.3.2.3, and that such circuits remain separated from live parts at voltages greater than DVC A with at least basic insulation. Compliance is checked by the test of 7.5.2 (without humidity preconditioning) for basic insulation		P
	b) by performing a dielectric strength test as per 7.5.2 (without humidity preconditioning) in the following cases: i) on reinforced or double Insulation, using the test level for basic insulation, and ii) on basic insulation in protective class I equipment, using the test level for basic insulation, unless it can be determined that the fault did not result in any damage to the protective earthing conductor or terminal, or to protective bonding means		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	c) by inspection to ensure a fuse connected between the protective earthing terminal and the protective earthing conductor in the test setup has not opened; the fuse shall be rated 3 A non-time-delay (for equipment rated for use on circuits protected by overcurrent protection rated 30 A or less) or 30 A to 35 A non-time-delay (for equipment rated for use on circuits protected by overcurrent protection rated more than 30 A); the enclosure is not to be contacting earth in any other location during the testing		P
	d) by inspection of the enclosure to ensure that no damage has resulted that allows access to parts that are hazardous live.		P
4.4.3.2	Protection against the spread of fire	No fire hazards	P
4.4.3.3	Protection against other hazards	No other hazards after application of the faults	P
4.4.3.4	Protection against parts expulsion hazards	No such hazards after application of the faults	P
4.4.4	Three fault condition to be applied:		P
4.4.4.1	Component fault tests		P
4.4.4.2	Equipment or parts for short-term or intermittent operation	(see appended table 4.4)	P
4.4.4.3	Motors	(see appended table 4.4)	P
4.4.4.4	Transformer short circuit tests	(see appended table 4.4)	P
4.4.4.5	Output short circuit	(see appended table 4.4)	P
4.4.4.6	Backfeed current test for equipment with more than one source of supply	Only one source of supply can be connected due to construction of PV inverter	P
4.4.4.7	Output overload		P
4.4.4.8	Cooling system failure		p
	a) air-intakes blocked or partially blocked		N/A
	b) cooling fans stopped or disconnected,one at a time		p



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	c) circulation of water or other coolant shall be stopped or partially restricted		N/A
4.4.4.9	Heating devices	Without heating devices.	N/A
	a) timers which limit the heating period shall be overridden to energize the heating circuit continuously		N/A
	b) temperature control devices or circuits shall have Three fault conditions applied such that control over the heater is lost. Over-temperature protection devices meeting the requirements of 14.3 are left operational during the test		N/A
4.4.4.10	Safety interlock systems		N/A
4.4.4.11	Reverse d.c. connections	(see appended table 4.4)	P
4.4.4.12	Voltage selector mismatch	No such device	N/A
4.4.4.13	Mis-wiring with incorrect phase sequence or polarity	(see appended table 4.4)	P
4.4.4.14	PWB short-circuit test	(see appended table 4.4)	P
4.5	Humidity preconditioning		P
4.5.1	General		P
4.5.2	Conditions	Before applying humidity, the equipment is brought to a temperature of 42 °C ± 2 °C, normally by keeping it at this temperature for at least 4 h before the humidity preconditioning. Then worst case per manufacturer's manual: 93%; 40°C, 2 days	P
4.6	Voltage Backfeed Protection	Can not touch output terminal without tools , warning label is added.	N/A
4.6.1	Backfeed tests under normal conditions		N/A
4.6.2	Backfeed tests under Three-fault conditions		N/A
4.6.3	Compliance with backfeed tests		N/A





EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	- 15 s for sources that are permanently connected		N/A
	- 1 s for sources that are cord-connected or use connectors that can be opened without the use of a tool		N/A
4.7	Electrical Ratings Tests	(see appended table 4.7.1)	P
4.7.1	Input Ratings		P
4.7.1.1	Measurement requirements for DC input ports		P
4.7.1.2	Measurement requirements for DC input ports		P
4.7.2	Output Ratings		P

5	Marking and documentation		P
5.1	Marking		P
5.1.1	General		P
5.1.2	Durability	The markings are rubbed quickly by hand, without undue pressure, for 30 s with a cloth soaked with the specified cleaning agent (or, if not specified, with isopropyl alcohol). The markings shall be clearly legible after the above treatment, and adhesive labels shall not have worked loose or become curled at the edges	P
5.1.3	Identification mark		P
	a) the name or trade mark of the manufacturer or supplier	See copy of marking plate provided in this report	P
	b) a model number, name or other means to identify the equipment	See copy of marking plate provided in this report	P
	c) a serial number, code or other marking allowing identification of manufacturing location and the manufacturing batch or date within a three month time period.	See copy of marking plate provided in this report	P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
5.1.4	Power rating	See copy of marking plate provided in this report	P
	- input voltage, type of voltage (a.c. or d.c.), frequency, and maximum continuous current for each input .....	See copy of marking plate provided in this report	P
	- output voltage, type of voltage (a.c. or d.c.), frequency, maximum continuous current, and for a.c. outputs, either the power or power factor for each output .....	See copy of marking plate provided in this report	P
	- the ingress protection (IP) rating as in 6.3 below	See copy of marking plate provided in this report	P
5.1.5	Fuse identification (marking, special fusing characteristics, cross-reference) .....		P
5.1.6	Terminals, connections and controls	DC input, grid connection	P
5.1.6.1	Protective conductor terminals	the colour coding green-yellow and symbol 7 of Annex C	P
5.1.7	Switches and circuit-breakers		P
5.1.8	Class II symbol if applicable	No such devices	N/A
5.1.9	Terminal boxes for External Connections		P
	a) the minimum temperature rating and size of the cable to be connected to the terminals		N/A
	b) a marking to warn the installer to consult the installation instructions. Symbol 9 of Annex C is an acceptable marking.	Add warning 	P

5.2	Warning markings		P
5.2.1	Visibility and legibility requirements for warning markings		P
5.2.2	Content for warning markings		P
5.2.2.1	Ungrounded heatsinks and similar parts	Without grounded heatsinks.	N/A
5.2.2.2	Hot Surfaces		P
5.2.2.3	Coolant		N/A



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
5.2.2.4	Stored energy	Symbol 21 of Annex C used for warning.	P
5.2.2.5	Motor guarding	No motor	N/A
5.2.3	Sonic hazard markings and instructions	No sonic hazard.	N/A
5.2.4	Equipment with multiple sources of supply	No multiple sources supply	N/A
5.2.5	Excessive touch current	Measured: 1.52mA <limit 3.5mA.	N/A

5.3	Documentation		P
5.3.1	General		P
	a) Explanations of markings and symbols		P
	b) Location and function of terminals and controls		P
	c) Ratings or specifications		P
	d) Warning for supplying voltage		P
5.3.1.1	Language	English version was checked. At least the safety relevant information will be given in other applicable languages to be confirmed during the respective national approval.	P
5.3.1.2	Format		P
5.3.2	Information related to installation		P
	a) assembly, location, and mounting requirements		P
	b) ratings and means of connection to each source of supply and any requirements related to wiring and external controls, colour coding of leads, disconnection means, or overcurrent protection needed, including instructions that the installation position shall not prevent access to the disconnection means		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	c) ratings and means of connection of any outputs from the PCE, and any requirements related to wiring and external controls, colour coding of leads, or overcurrent protection needed		P
	d) explanation of the pin-out of connectors for external connections, unless the connector is used for a standard purpose (e.g. RS 232)		P
	e) ventilation requirements		P
	f) requirements for special services, for example cooling liquid		N/A
	g) instructions and information relating to sound pressure level if required by 10.2.1		N/A
	h) where required by 14.8.1.3, instructions for the adequate ventilation of the room or location in which PCE containing vented or valve-regulated batteries is located, to prevent the accumulation of hazardous gases		N/A
	i) tightening torque to be applied to wiring terminals		P
	j) values of backfeed short-circuit currents available from the PCE on input and output conductors under fault conditions, if those currents exceed the max. rated current of the circuit, as per 4.4.4.6		N/A
	k) for each input to the PCE, the maximum value of short-circuit current available from the source, for which the PCE is designed		P
	l) compatibility with RCD and RCM		P
	m) instructions for protective earthing of the PCE, including the information required by 7.3.6.3.7 if a second protective earthing conductor is to be installed		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording: "This product can cause current with a d.c. component. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product."		N/A
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size, and type		P
	p) PV array configuration information, such as ratings, whether the array is to be grounded or floating, any external protection devices needed, etc.		P
5.3.3	Information related to operation		P
	– instructions for adjustment of controls including the effects of adjustment;		P
	– instructions for interconnection to accessories and other equipment, including indication of suitable accessories, detachable parts and any special materials		N/A
	– warnings regarding the risk of burns from surfaces permitted to exceed the temperature limits of 4.3.2 and required operator actions to reduce the risk		N/A
	– instructions that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.		N/A
5.3.4	Information related to maintenance		P
	– intervals and instructions for any preventive maintenance that is required to maintain safety (for example air filter replacement or periodic re-tightening of terminals);	Limited to trained and authorized professional personnel from manufacturer or its authorized representative	P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	– instructions for accessing operator access areas, if any are present, including a warning not to enter other areas of the equipment;		N/A
	– part numbers and instructions for obtaining any required operator replaceable parts;		N/A
	– instructions for safe cleaning (if recommended);		P
	– where there is more than one source of supply energizing the PCE, information shall be provided in the manual to indicate which disconnect device or devices are required to be operated in order to completely isolate the equipment.		N/A
5.3.4.1	Battery maintenance	Without battery used	N/A
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		N/A
	– When replacing batteries, replace with the same type and number of batteries or battery packs		N/A
	– General instructions regarding removal and installation of batteries.		N/A
	– CAUTION: Do not dispose of batteries in a fire. The batteries may explode.		N/A
	– CAUTION: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic		N/A
	– CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:		N/A
	a) Remove watches, rings, or other metal objects.		N/A
	b) Use tools with insulated handles.		N/A
	c) Wear rubber gloves and boots.		N/A
	d) Do not lay tools or metal parts on top of batteries.		N/A



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
	e) Disconnect charging source prior to connecting or disconnecting battery terminals.		N/A
	e) Disconnect charging source prior to connecting or disconnecting battery terminals.		N/A
	f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).		N/A

6	Environmental requirements and conditions		P
6.1	Environmental categories and minimum environmental conditions		P
6.1.1	OUTDOOR		P
6.1.2	INDOOR, unconditioned		N/A
6.1.3	INDOOR, conditioned		N/A
6.2	Pollution degree	PDIII –Outside PD II – Inside (due to IP65 )	P
6.3	Ingress Protection	IP65	P
6.4	UV exposure		N/A
6.5	Temperature and humidity	Ambient temperature Operation: -25 °C to +60 °C Operation: ≤95 %, no condensation.	P

7	Protection against electric shock and energy hazards		P
7.1	General		P
7.2	Fault conditions		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
7.3	Protection against electric shock		P
7.3.1	General		P
7.3.2	Decisive voltage classification		P
7.3.2.1	Use of <i>decisive voltage class (DVC)</i>		P
7.3.2.2	Limits of <i>DVC</i>	Accessible circuit: DVC A Power circuit: DVC C,sampling circuit:DVC B	P
7.3.2.3	Short-term limits of accessible voltages under fault conditions		P
7.3.2.4	Requirements for protection		P
7.3.2.5	Connection to PELV and SELV circuits		P
7.3.2.6	Working voltage and DVC		P
7.3.2.6.1	General		P
7.3.2.6.2	AC working voltage		P
7.3.2.6.3	DC working voltage		P
7.3.2.6.4	Pulsating working voltage		N/A
7.3.3	Protective separation		P
	• double or reinforced insulation,		P
	• protective screening, i.e. by a conductive screen connected to earth by protective bonding in the PCE, or connected to the protective earth conductor itself, whereby the screen is separated from live parts by at least basic insulation		P
	• protective impedance comprising limitation of current per 7.3.5.3.1 and of discharged energy per 7.3.5.3.2		N/A
	• limitation of voltage according to 7.3.5.4		N/A
7.3.4	Protection against direct contact		P
7.3.4.1	General		P
7.3.4.2	Protection by means of enclosures and barriers		P





EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
7.3.4.2.1	General	User could not open the door without a tool.	P
7.3.4.2.2	Access probe criteria		P
	a) decisive voltage classification A, (DVC A) - the probe may touch the live parts;		P
	b) decisive voltage classification B, (DVC B) - the probe shall have adequate clearance to live parts, based on the clearance for functional insulation;		N/A
	c) decisive voltage classification C, (DVC C) - the probe shall have adequate clearance to live parts, based on the clearance for basic insulation.		P
7.3.4.2.3	Access probe tests		P
	Test by inspection .....	Compliance	P
	Test with test finger&pin (Figure D.1& D.2) .....	No hazards.	P
	Test with jointed test finger (Figure D.1) .....	No hazards.	P
	Test with IP3X test probe .....	No TNV circuit	N/A
7.3.4.2.4	Service access areas	The manufacturer's manual with the following substance: Always disconnect the unit from the MAINS and PV supply by the external customer installed disconnecting devices before installation, servicing and maintenance works	P
7.3.4.3	Protection by means of insulation of live parts		P
7.3.5	Protection in case of direct contact		P
7.3.5.1	General		P
7.3.5.2	Protection using decisive voltage class A		P
7.3.5.3	Protection by means of protective impedance		N/A
7.3.5.3.1	Limitation of current through protective impedance		N/A
7.3.5.3.2	Limitation of discharging energy through protective impedance		N/A



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
7.3.5.4	Protection by means of limited voltages		N/A
7.3.6	Protection against indirect contact		P
7.3.6.1	General		P
7.3.6.2	Insulation between live parts and accessible conductive parts		P
7.3.6.3	Protective class I - Protective bonding		P
7.3.6.3.1	General		P
	a) accessible conductive parts that are protected by one of the measures in 7.3.5.2 to 7.3.5.4		P
	b) accessible conductive parts that are separated from live parts of DVC-B or -C using double or reinforced insulation.		P
7.3.6.3.2	Rating of protective bonding		P
	a) through direct metallic contact;		N/A
	b) through other conductive parts which are not removed when the PCE or sub-units are used as intended		N/A
	c) through dedicated protective bonding conductors;		P
	d) through other metallic components of the PCE.		N/A
7.3.6.3.3	Rating of protective bonding		P
7.3.6.3.3.1	Test current, duration, and acceptance criteria	Testcurrent:60A, duration:4min; limit:2.5V	P
7.3.6.3.4	Protective bonding impedance (routine test)	0.19V	P
7.3.6.3.5	External protective earthing conductor		P
7.3.6.3.6	Means of connection for the external protective earthing conductor		P
7.3.6.3.6.1	General	Symbol 7 of annex C and the colour coding green-yellow	P
7.3.6.3.7	Touch current in case of failure of the protective earthing conductor	<1.08mA	P
7.3.6.4	Protective class II - Double or reinforced insulation		N/A



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
7.3.7	Insulation Including Clearance and Creepage Distances		P
7.3.7.1	General		P
7.3.7.1.1	Pollution degrees	III	P
7.3.7.1.2	Overvoltage category and Impulse withstand voltage rating category:	OVCIII for AC, and OVC II for DC	P
7.3.7.1.3	Supply earthing systems	IT system	P
7.3.7.1.4	Insulation voltages	AC: 4000V DC:4470V	P
7.3.7.2	Insulation between a circuit and its surroundings		P
7.3.7.2.1	General		P
7.3.7.2.2	Circuits connected directly to the MAINS		P
7.3.7.2.3	Circuits other than MAINS circuits		P
7.3.7.2.4	Insulation between circuits		P
7.3.7.3	Functional insulation		P
7.3.7.4	Clearance distances	(see append table 7.3.7)	P
7.3.7.4.1	Determination		P
7.3.7.4.2	Electric field homogeneity		N/A
7.3.7.4.3	Clearance to conductive enclosures		P
7.3.7.5	Creepage distances	(see append table 7.3.7)	P
7.3.7.5.1	General		P
7.3.7.5.2	Voltage		P
7.3.7.5.3	Materials	Insulating material group IIIb: 175 CTI $\geq$ 100, compliance checked for material certificate and specifications.	P
7.3.7.6	Coating		N/A
7.3.7.7	PWB spacings for functional insulation	UL approved PCB used	P
7.3.7.8	Solid insulation		P
7.3.7.8.1	General		P



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
7.3.7.8.2	Requirements for electrical withstand capability of solid insulation		P
7.3.7.8.2.1	Basic, supplemental, reinforced, and double insulation		P
7.3.7.8.2.2	Functional insulation		P
7.3.7.8.3	Thin sheet or tape material		P
7.3.7.8.3.1	General		P
7.3.7.8.3.2	Material thickness not less than 0,2 mm	Sleeving use for insulation not less than 0.3mm	P
7.3.7.8.3.3	Material thickness less than 0,2 mm		N/A
7.3.7.8.3.4	Compliance		P
7.3.7.8.4	Printed wiring boards (PWBs)		P
7.3.7.8.4.1	General		P
7.3.7.8.4.2	Use of coating materials		N/A
7.3.7.8.5	Wound components		P
7.3.7.8.6	Potting materials		N/A
7.3.7.9	Insulation requirements above 30 kHz		N/A
7.3.8	Residual Current Detection (RCD) or Monitoring (RCM) device compatibility		P
7.3.9	Protection against shock hazard due to stored energy	Add warning label	P
7.3.9.1	Operator access area		P
7.3.9.2	Service access areas	The warning symbol of Annex D was placed on the outer enclosure.	P
7.4	Protection against energy hazards		P
7.4.1	Determination of hazardous energy level		P
7.4.2	Operator access areas		P
7.4.3	Service access areas		P
7.5	Electrical tests related to shock hazard		P



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Clause	Requirement – Test	Result - Remark	Verdict
7.5.1	Impulse voltage test (type test)	See append table 7.5.1	P
7.5.2	Voltage test (dielectric strength test) (type test and routine test)		P
7.5.2.1	Purpose of test		P
7.5.2.2	Value and type of test voltage		P
7.5.2.3	Humidity pre-conditioning	40°C, 93%RH 48 h	P
7.5.2.4	Performing the voltage test		P
7.5.2.5	Duration of the a.c. or d.c. voltage test		P
7.5.2.6	Verification of the a.c. or d.c. voltage test		P
7.5.3	Partial discharge test (type test or sample test)		P
7.5.4	Touch current measurement (type test)		P
	Measured touch current (mA)	1.08mA	P
	Max. allowed touch current (mA)	3.5 mA, comply with related requirement	—
7.5.5	Equipment with multiple sources of supply		N/A

8	Protection against mechanical HAZARDS		P
8.1	General		P
8.2	Moving parts		N/A
8.2.1	Protection of service persons		N/A
8.3	Stability		N/A
8.4	Provisions for lifting and carrying		P
8.5	Wall mounting		N/A
8.6	Expelled parts		N/A

9	Protection against fire hazards		P
9.1	Resistance to fire		P
9.1.1	Reducing the risk of ignition and spread of flame	Use of materials with the required flammability classes.	P



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Clause	Requirement – Test	Result - Remark	Verdict
	Method 1, selection and application of components wiring and materials	(see appended table 4.7)	P
	Method 2, application of all of simulated fault condition tests		N/A
9.1.2	Conditions for a fire enclosure	See below	P
9.1.2.1	Parts requiring a fire enclosure		P
	– components in mains circuits;		P
	– components in secondary circuits supplied by power sources which exceed the limits for a limited power source as specified in 9.2;		P
	– components in secondary circuits supplied by a limited power source as specified in 9.2, but not mounted on material of flammability class V-1;		N/A
	– components within a power supply unit or assembly having a limited power output complying with the criteria for a limited power source as specified in 9.2, including overcurrent protective devices, limiting impedances, regulating networks and wiring, up to the point where the limited power source output criteria are met;		N/A
	– components having unenclosed arcing parts, such as open switch and relay contacts and commutators, in a circuit at hazardous voltage or at a hazardous energy level;		P
	– insulated wiring, except as permitted in 9.1.2.2.		P
9.1.2.2	Parts not requiring a fire enclosure		P
	– wiring and cables insulated with PVC, TFE, PTFE, FEP, neoprene or polyimide;		P
	– plugs and connectors forming part of a power supply cord or interconnecting cable;		N/A
	– components, including connectors, meeting the requirements of 9.1.3.2, which fill an opening in a fire enclosure;		P



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Clause	Requirement – Test	Result - Remark	Verdict
	– connectors in secondary circuits supplied by power sources which are limited to a maximum of 15 VA under normal operating conditions and after a Three fault in the equipment;		N/A
	– connectors in secondary circuits supplied by a limited power source as specified in 9.2,		N/A
	– other components in secondary circuits:		N/A
9.1.3	Materials requirements for protection against fire hazard		P
9.1.3.1	General	PCB is with flammability category V-0	P
9.1.3.2	Materials for fire enclosures	Metal enclosure used.	P
9.1.3.3	Materials for components and other parts inside fire enclosures	Plastic parts outside metal enclosure rated at HF-1	P
9.1.3.4	Materials for air filter assemblies	Internal components except small parts are V-2 or better.	P
9.1.4	Openings in fire enclosures		N/A
9.1.4.1	General		N/A
9.1.4.2	Side openings treated as bottom openings		N/A
9.1.4.3	Openings in the bottom of a fire enclosure		N/A
	Construction of the bottom, dimensions (mm) .....		N/A
9.1.4.4	Equipment for use in a closed electrical operating area		N/A
9.1.4.5	Doors or covers in fire enclosures		N/A
9.1.4.6	Additional requirements for openings in transportable equipment	Not transportable equipment.	N/A
	dimensions (mm) .....		N/A
9.2	Limited power sources		N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Overcurrent protective device limited output		N/A



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Clause	Requirement – Test	Result - Remark	Verdict
	d) Regulating network limits the output		N/A
	Max. output voltage (V), max. output current (A), max. apparent power (VA).....		—
	Current rating of overcurrent protective device (A) :		—
9.3	Short-circuit and overcurrent protection		P
9.3.1	General		P
9.3.2	Number and location of overcurrent protective devices		P
9.3.3	Short-circuit co-ordination (backup protection)		P

10	Protection Against Sonic Pressure Hazards		P
10.1	General	57.4dB	P
10.2	Sonic Pressure and Sound level		P
10.2.1	Hazardous noise levels	No such hazards.	P

11	Protection Against Liquid Hazards		N/A
11.1	Liquid Containment, Pressure and Leakage		N/A
	a) Normal operation, including condensation;		N/A
	b) Servicing of the equipment;		N/A
	c) Inadvertent loosening or detachment of hoses or other cooling system parts over time.		N/A
11.2	Fluid pressure and leakage		N/A
11.2.1	Maximum pressure		N/A
	a) the rated maximum supply pressure specified for an external source;		N/A
	b) the pressure setting of an overpressure safety device provided as part of the assembly		N/A
	c) the maximum pressure that can be developed by an air compressor that is part of the assembly, unless the pressure is limited by an overpressure safety device.		N/A
11.2.2	Leakage from parts		N/A





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Clause	Requirement – Test	Result - Remark	Verdict
11.2.3	Overpressure safety device		N/A
	a) be connected as close as possible to the liquid-containing parts of the system that it is intended to protect;		N/A
	b) be installed so as to provide easy access for inspection, maintenance and repair;		N/A
	c) only be adjustable via the use of a tool;		N/A
	d) have its discharge opening so located and directed that the released material is not directed towards any person;		N/A
	e) have its discharge opening so located and directed that operation of the device will not deposit liquid on parts that may cause a hazard;		N/A
	f) have adequate discharge capacity to ensure that, in the event of a failure of the supply pressure control, the pressure does not exceed the rated maximum working pressure of the system;		N/A
	g) have no shut-off valve between it and the parts that it is intended to protect.		N/A
11.3	Oil and grease		N/A

12	Chemical Hazards		N/A
12.1	General		N/A

13	Physical Requirements		P
13.1	Handles and manual controls		P
13.1.1	Adjustable controls	No such controls.	N/A
13.2	Securing of parts		P
13.3	Provisions for external connections		P
13.3.1	General		P
13.3.2	Connection to an a.c. MAINS supply		P
13.3.2.1	General		P
13.3.2.2	Permanently connected equipment		P
13.3.2.3	Appliance inlets		N/A



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Clause	Requirement – Test	Result - Remark	Verdict
13.3.2.4	Power supply cords	No provide	N/A
	Type .....		N/A
	Rated current (A), cross-sectional area (mm <sup>2</sup> ), AWG .....		N/A
13.3.2.5	Cord anchorages and strain relief	Use wire connector to fix	N/A
	Mass of equipment (kg), pull (N) .....		—
	Longitudinal displacement (mm) .....		—
13.3.2.6	Protection against mechanical damage		P
13.3.3	Wiring terminals for connection of external conductors		P
13.3.3.1	Wiring terminals		P
13.3.3.2	Screw terminals		P
13.3.3.3	Wiring terminal sizes		P
	Rated current (A), type, nominal thread diameter (mm) .....		—
13.3.3.4	Wiring terminal design		P
13.3.3.5	Grouping of wiring terminals		P
13.3.3.6	Stranded wire		P
13.3.4	Supply wiring space		P
13.3.5	Wire bending space for wires 10 mm <sup>2</sup> and greater		N/A
13.3.6	Disconnection from supply sources		P
13.3.7	Connectors, plugs and sockets		P
13.3.8	Direct plug-in equipment		N/A
	Torque .....		N/A
	Compliance with the relevant mains plug standard . :		N/A
13.4	Internal wiring and connections		P
13.4.1	General		P
13.4.2	Routing		P
13.4.3	Colour coding	Yellow/green only used for protective bonding.	P



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Clause	Requirement – Test	Result - Remark	Verdict
13.4.4	Splices and connections		P
13.4.5	Interconnections between parts of the PCE		P
13.5	Openings in enclosures		N/A
13.5.1	Top and side opening		N/A
	Dimensions (mm) ..... :	Ingress degree IP65	—
13.6	Polymeric Materials	No such materials.	N/A
13.6.1	General		N/A
13.6.1.1	Thermal index or capability		N/A
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards		P
13.6.2.1	Stress relief test	Bobbin material 70°C 7H	P
13.6.3	Polymers serving as solid insulation		P
13.6.3.1	Resistance to arcing		P
13.6.4	UV resistance		N/A
13.7	Mechanical resistance to deflection, impact, or drop		P
13.7.1	General		P
13.7.2	Thickness requirements for metal enclosures		P
13.7.3	7 J impact test for polymeric enclosures		N/A
13.7.4	Drop test		N/A
13.8	Thickness requirements for metal enclosures		P
13.8.1	General		P
13.8.2	Cast metal		N/A
13.8.3	Sheet metal	Min 2.0mm	P
14	Components		P
14.1	General		P
14.2	Motor Overtemperature Protection		P
14.3	Overtemperature protection devices		P
14.4	Fuse holders	No such fuse holder	N/A



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Clause	Requirement – Test	Result - Remark	Verdict
14.5	MAINS voltage selecting devices	No such devices.	N/A
14.6	Printed circuit boards	PCB rated v-0	P
14.7	Circuits or components used as transient overvoltage limiting devices		P
14.8	Batteries		P
14.8.1	Battery enclosure ventilation		N/A
14.8.1.1	Ventilation requirements		N/A
14.8.1.2	Ventilation testing		N/A
14.8.1.3	Ventilation instructions		N/A
14.8.2	Battery mounting		N/A
14.8.3	Electrolyte spillage		N/A
14.8.4	Battery connections		N/A
14.8.5	Battery maintenance instructions		N/A
14.8.6	Battery accessibility and maintainability		N/A
15	Software and firmware performing safety functions		N/A
A	ANNEX A, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES		P
B	ANNEX B, PROGRAMMABLE SOFTWARE		N/A
B.1	Software or firmware that performs safety critical functions		N/A
B.1.1	Firmware or Software that performs a critical safety function/s		N/A
B.2.	Evaluation of controls employing software		N/A
B.2.1	Risk analysis		N/A
B.2.1.1	Risk analysis determine a set of risks and that the software addresses the identified risks		N/A
B.2.1.2	Risk analysis identify the critical, non-critical, and supervisory parts of the software		N/A



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Clause	Requirement – Test	Result - Remark	Verdict
B.2.1.3	Risk analysis identify transitions or states that can result in a risk		N/A
B.2.1.4	Risks to be considered		N/A
	a) Temperature control, monitoring and response (i.e. coolant, internal ambient, device)		N/A
	b) Safety interlocks		N/A
	c) Synchronization between multiple AC sources		N/A
	d) Emergency stop of operation (including staged shutdown / sequencing)		N/A
	e) Connection / disconnection – from an input source and output source		N/A
	f) RCD functions		N/A
	g) Over current protection or control		N/A
C	ANNEX C, SYMBOLS TO BE USED IN EQUIPMENT MARKINGS		P
D	ANNEX D, TEST PROBES FOR DETERMINING ACCESS		P
E	ANNEX E, RCDs		N/A
E.1	Selection of RCD type in AC circuits		N/A
F	ANNEX F, RCDs		N/A
F.1	Correction factor for clearances at altitudes above 2 000 m		N/A
F.2	Test voltages for verifying clearances at different altitude		N/A
G	ANNEX G, CLEARANCE AND CREEPAGE DISTANCE DETERMINATION FOR FREQUENCIES GREATER THAN 30 KHZ		N/A
G.1	Clearances		N/A
G.2	Creepage		N/A



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Clause	Requirement – Test	Result - Remark	Verdict
H	ANNEX H, MEASURING INSTRUMENT FOR TOUCH CURRENT MEASUREMENTS		P
H.1	Measuring instrument		P
H.2	Alternative measuring instrument		N/A
I	ANNEX I, EXAMPLES OF PROTECTION, INSULATION, AND OVERVOLTAGE CATEGORY REQUIREMENTS FOR PCE		P
I.1	Numerical		P
I.2	Illustrative		P
J	ANNEX J, ULTRABIOLET LIGHT CONDITIONING TEST		N/A
J.1	General		N/A
J.2	Mounting		N/A
J.3	Carbon-arc light-exposure apparatus		N/A
J.4	Xenon-arc light-exposure apparatus		N/A



EN 62109-1 : 2010			
Clause	Requirement – Test	Result - Remark	Verdict
4.3	TABLE: Thermal requirements		P
Condition 1:			
	Supply voltage (V) .....	DC800V	—
	Ambient T <sub>min</sub> (°C) .....	60.1	—
	Ambient T <sub>max</sub> (°C) .....	60.6	—
Maximum measured temperature T of part/at::		T (°C)	Allowed
		DC800V	T <sub>max</sub> (°C)
EMI board -filter cap C27		84.8	105
Driving board –opt coupler U1		86.0	105
EMI board-AC current detector CT1		85.2	90
Boost inductor L2		107.1	130
INV board -Bus cap C20		86.7	105
INV board -absorb cap C6		86.5	105
EMI board –AC inductor L14		107.8	130
Boost filter cap C2		83.6	105
INV board Bus Cap C10		82.7	105
Filter board – Y Cap C10		93.2	105
EMI board –filter cap C69		83.6	105
Driving board –transformer winding T1		82.4	110
EMI board –relay RLY1		83.0	90
Filter board –common inductor L1		132.0	180
Filter board-arrestor MOV3		86.3	90
EMI board – leakage current detector CT7		85.4	130
Filter board- X Cap C3		88.7	90
R phase INV inductor		121.0	130
Boost 1 inductor		93.4	130
S phase INV inductor		117.6	130
Boost 2 inductor		90.3	130
Boost 3 inductor		89.9	130
T phase INV inductor		117.0	130
EMI board -DC power transformer winding T5		88.0	110
EMI board-DC power common inductor L11		82.0	130
EMI board Y cap C145		80.4	105
EMI board X cap C105		81.3	90
EMI board –input common inductor T6		83.0	130
EMI board -DC power Y cap C25		82.4	105



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Clause	Requirement – Test	Result - Remark	Verdict
	EMI board –input filter cap C118	80.0	105
	EMI board –DC current detector CT4	87.2	90
	EMI board –input X cap C197	80.8	90
	EMI board- DC power MOS Q67	87.6	130
	EMI board DC power opt coupler U15	82.6	100
	DC switch inside	79.3	90
	Enclosure heatsink	78.7	90*
	DC switch outside	61.9	75
	Enclosure top near to heatsink	73.6	100*
	panel	72.9	75
	Inside DC power cable	76.8	105
	DC SPD	77.1	90
	EMI board AC power common inductor L15	83.3	130
	EMI board AC power X cap C167	82.3	90
	EMI board AC power opt coupler U20	83.5	100
	EMI board AC power transformer T5	82.4	110
	EMI board AC power transformer T4	81.3	110
	EMI board AC power opt coupler U23	81.2	100
	EMI board AC power transformer T8	80.0	110
	Control board DSP	89.5	105
	Enclosure side near to heatsink	74.9	100*
Remark: the power consumption is derating to 27.5kW and stable; 2)*denote the temperature limit can reach to 100 degree C with hot surface marking.			

4.3	TABLE: Thermal requirements		P
Condition 2:			
	Supply voltage (V) .....	DC480V	—
	Ambient T <sub>min</sub> (°C) .....	60.4	—
	Ambient T <sub>max</sub> (°C) .....	60.6	—
Maximum measured temperature T of part/at::		T (°C)	Allowed
		DC480V	T <sub>max</sub> (°C)
	EMI board -filter cap C27	83.1	105
	Driving board –opt coupler U1	85.4	105
	EMI board-AC current detector CT1	83.9	90
	Boost inductor L2	123.6	130
	INV board -Bus cap C20	83.8	105
	INV board -absorb cap C6	84.7	105





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Clause	Requirement – Test	Result - Remark	Verdict
	EMI board –AC inductor L14	99.6	130
	Boost filter cap C2	86.0	105
	INV board Bus Cap C10	81.5	105
	Filter board – Y Cap C10	88.6	105
	EMI board –filter cap C69	81.8	105
	Driving board –transformer winding T1	82.1	110
	EMI board –relay RLY1	81.2	90
	Filter board –common inductor L1	119.1	180
	Filter board-arrestor MOV3	83.3	90
	EMI board – leakage current detector CT7	83.1	130
	Filter board- X Cap C3	84.7	90
	R phase INV inductor	102.8	130
	Boost 1 inductor	107.1	130
	S phase INV inductor	107.7	130
	Boost 2 inductor	111.1	130
	Boost 3 inductor	110.9	130
	T phase INV inductor	101.5	130
	EMI board -DC power transformer winding T5	87.1	110
	EMI board-DC power common inductor L11	80.5	130
	EMI board Y cap C145	81.7	105
	EMI board X cap C105	80.0	90
	EMI board –input common inductor T6	85.6	130
	EMI board -DC power Y cap C25	82.2	105
	EMI board –input filter cap C118	80.1	105
	EMI board –DC current detector CT4	88.3	90
	EMI board –input X cap C197	81.5	90
	EMI board- DC power MOS Q67	84.4	130
	EMI board DC power opt coupler U15	81.3	100
	DC switch inside	81.0	90
	Enclosure heatsink	82.1	90*
	DC switch outside	61.9	75
	Enclosure top near to heatsink panel	76.4	100*
	panel	71.5	75
	Inside DC power cable	78.0	105
	DC SPD	76.7	90
	EMI board AC power common inductor L15	81.5	130
	EMI board AC power X cap C167	80.6	90
	EMI board AC power opt coupler U20	82.2	100
	EMI board AC power transformer T5	80.8	110



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Clause	Requirement – Test	Result - Remark	Verdict
	EMI board AC power transformer T4	80.1	110
	EMI board AC power opt coupler U23	80.4	100
	EMI board AC power transformer T8	79.6	110
	Control board DSP	89.7	105
	Enclosure side near to heatsink	75.5	100*
Remark: 1) the power consumption is derating to 22.5kW and stable; 2)*denote the temperature limit can reach to 100 degree C with hot surface marking .			

4.3	TABLE: Thermal requirements		P
Condition 3:			
	Supply voltage (V) .....	DC800V	—
	Ambient T <sub>min</sub> (°C) .....	50.1	—
	Ambient T <sub>max</sub> (°C) .....	51.4	—
Maximum measured temperature T of part/at::		T (°C)	Allowed
		DC800V	T <sub>max</sub> (°C)
	EMI board -filter cap C27	80.7	105
	Driving board –opt coupler U1	82.5	105
	EMI board-AC current detector CT1	81.6	90
	Boost inductor L2	129.1	130
	INV board -Bus cap C20	83.1	105
	INV board -absorb cap C6	82.7	105
	EMI board –AC inductor L14	106.2	130
	Boost filter cap C2	84.5	105
	INV board Bus Cap C10	79.1	105
	Filter board – Y Cap C10	89.7	105
	EMI board –filter cap C69	79.2	105
	Driving board –transformer winding T1	79.0	110
	EMI board –relay RLY1	78.7	90
	Filter board –common inductor L1	128.3	180
	Filter board-arrestor MOV3	82.2	90
	EMI board – leakage current detector CT7	81.5	130
	Filter board- X Cap C3	84.7	90
	R phase INV inductor	117.8	130
	Boost 1 inductor	112.9	130
	S phase INV inductor	117.3	130
	Boost 2 inductor	118.4	130
	Boost 3 inductor	117.8	130



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Clause	Requirement – Test	Result - Remark	Verdict
	T phase INV inductor	115.5	130
	EMI board -DC power transformer winding T5	83.9	110
	EMI board-DC power common inductor L11	77.4	130
	EMI board Y cap C145	79.4	105
	EMI board X cap C105	76.8	90
	EMI board –input common inductor T6	84.8	130
	EMI board -DC power Y cap C25	79.8	105
	EMI board –input filter cap C118	77.3	105
	EMI board –DC current detector CT4	87.1	90
	EMI board –input X cap C197	79.4	90
	EMI board- DC power MOS Q67	83.0	130
	EMI board DC power opt coupler U15	78.1	100
	DC switch inside	78.9	90
	Enclosure heatsink	78.3	90*
	DC switch outside	56.2	75
	Enclosure top near to heatsink	71.8	100*
	panel	67.6	75
	Inside DC power cable	74.5	105
	DC SPD	72.9	90
	EMI board AC power common inductor L15	79.4	130
	EMI board AC power X cap C167	77.9	90
	EMI board AC power opt coupler U20	79.1	100
	EMI board AC power transformer T5	78.8	110
	EMI board AC power transformer T4	77.1	110
	EMI board AC power opt coupler U23	77.0	100
	EMI board AC power transformer T8	76.3	110
	Control board DSP	86.5	105
	Enclosure side near to heatsink	70.4	100*
Remark: 1)*denote the temperature limit can reach to 100 degree C with hot surface marking.			



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Clause	Requirement – Test	Result - Remark	Verdict
4.3	TABLE: Thermal requirements		P
Condition 4:			
	Supply voltage (V) .....	DC480V	—
	Ambient T <sub>min</sub> (°C) .....	50.3	—
	Ambient T <sub>max</sub> (°C) .....	50.8	—
Maximum measured temperature T of part/at::		T (°C)	Allowed
		DC480V	T <sub>max</sub> (°C)
EMI board -filter cap C27		80.7	105
Driving board –opt coupler U1		82.5	105
EMI board-AC current detector CT1		80.9	90
Boost inductor L2		128.1	130
INV board -Bus cap C20		82.3	105
INV board -absorb cap C6		82.5	105
EMI board –AC inductor L14		103.1	130
Boost filter cap C2		84.4	105
INV board Bus Cap C10		79.1	105
Filter board – Y Cap C10		87.7	105
EMI board –filter cap C69		79.1	105
Driving board –transformer winding T1		79.1	110
EMI board –relay RLY1		78.3	90
Filter board –common inductor L1		123.4	180
Filter board-arrestor MOV3		81.2	90
EMI board – leakage current detector CT7		80.8	130
Filter board- X Cap C3		83.4	90
R phase INV inductor		108.7	130
Boost 1 inductor		112.9	130
S phase INV inductor		115.0	130
Boost 2 inductor		118.3	130
Boost 3 inductor		117.7	130
T phase INV inductor		107.1	130
EMI board -DC power transformer winding T5		83.9	110
EMI board-DC power common inductor L11		77.4	130
EMI board Y cap C145		79.4	105
EMI board X cap C105		76.8	90
EMI board –input common inductor T6		84.8	130
EMI board -DC power Y cap C25		79.8	105



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Clause	Requirement – Test	Result - Remark	Verdict
	EMI board –input filter cap C118	77.3	105
	EMI board –DC current detector CT4	86.2	90
	EMI board –input X cap C197	79.4	90
	EMI board- DC power MOS Q67	81.3	130
	EMI board DC power opt coupler U15	78.0	100
	DC switch inside	78.9	90
	Enclosure heatsink	78.0	90*
	DC switch outside	52.5	75
	Enclosure top near to heatsink	71.5	100*
	panel	65.7	75
	Inside DC power cable	74.5	105
	DC SPD	72.9	90
	EMI board AC power common inductor L15	78.9	130
	EMI board AC power X cap C167	77.7	90
	EMI board AC power opt coupler U20	79.0	100
	EMI board AC power transformer T5	78.0	110
	EMI board AC power transformer T4	76.9	110
	EMI board AC power opt coupler U23	77.0	100
	EMI board AC power transformer T8	76.3	110
	Control board DSP	86.5	105
	Enclosure side near to heatsink	70.4	100*
Remark: 1)*denote the temperature limit can reach to 100 degree C with hot surface marking.			

4.4	TABLE: Fault condition tests					P
	Ambient temperature (°C) :				24.5°C	—
	Power source for EUT: Manufacturer, model/type, output rating :				--	—
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Output	Short circuit	DC800	10 min	/	/	Unit shut down immediately ,No output, no hazard, no damaged.
Output	Overload	DC800	10min	/	/	Unit operated with rating under MPPT mode, No damage, no hazard.
Heatsink	Block	DC800	60min	/	/	Unit derating, No damaged, no hazard.



EN 62109-1 : 2010							
Clause	Requirement – Test					Result - Remark	Verdict
PV + and -	Reverse phase	DC800	10min	/	/	PCE can't start. No output ,no damage,no hazard.	
Output	Missing phase	DC800	10min	/	/	Unit operated normally.	
Safety interlock system	Disable	DC800	10min	/	/	Need tools to open the EUT	
R284	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
MOSFET Q69 Gate to Source	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C106	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset	
C128	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset	
C142	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset	
J19 Pin23 to Pin24	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
R1	Short circuit	DC800	10min	/	/	LCD display fault condition, No output,no damaged,no hazard.	
D62	Short circuit	DC800	10min	/	/	Diode D63、 D68 damaged. Unit work as normal. No emission of molten metal, or burning insulation, or flaming or glowing particles. Can withstand electric strength test. No hazard.	



EN 62109-1 : 2010							
Clause	Requirement – Test					Result - Remark	Verdict
MOSFET Q78 Gate to Source	Short circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
C173	Short circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
R354	Short circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
R354	Open circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
C8	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C186	Short circuit	DC800	10min	/	/	Unit shut down, disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
R250	Short circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
C38	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C35	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C41	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C46	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C65	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	



EN 62109-1 : 2010							
Clause	Requirement – Test					Result - Remark	Verdict
C19 (INV board)	Short circuit	DC800	10min	/	/	A、 B、 C phase IGBT modules are all damaged. Unit shut down, disconnected AC mains. No emission of molten metal, or burning insulation, or flaming or glowing particles. Can withstand electric strength test. No hazard.	
R81 (INV board)	Short circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
R82 (INV board)	Open circuit	DC800	10min	/	/	Unit work as normal, no hazards.	
C261 (CTRL board)	Short circuit	DC800	10min	/	/	Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C329 (CTRL board)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C296 (CTRL board)	Short circuit	DC800	10min	/	/	LCD display warning condition. Unit work as normal, no hazards.	
C313 (CTRL board)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
C322 (CTRL board)	Short circuit	DC800	10min	/	/	Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
U28 Pin2 to U24 Pin4 (CTRL board)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit disconnected AC mains, no hazard. When fault remove Unit is recoverable after reset.	
Relay (RY1)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit does not connect to AC mains, no hazard. When fault remove Unit is recoverable after reset.	
Relay (RY2)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit does not connect to AC mains, no hazard. When fault remove Unit is recoverable after reset.	





EN 62109-1 : 2010								
Clause	Requirement – Test					Result - Remark	Verdict	
Relay (RY3)	Short circuit	DC800	10min	/	/	LCD display fault condition. Unit does not connect to AC mains, no hazard. When fault remove Unit is recoverable after reset.		
Supplementary information:								

4.7	TABLE: Electrical rating tests (in normal conditions)							P
Input voltage(V)	DC current(A)	Rating DC current(A)	DC input power	Output voltage(V)	Output current(A)	Rating output current (A)	Output power (KW)	Efficiency
481.84	3*23	63.71	30.68	A:233.25 B:234.16 C:234.24	A:42.60 B:42.73 C:42.55	48	29.91	97.19%
802.10	3*23	38.07	30.53	A:233.92 B:234.67 C:234.78	A:42.56 B:42.71 C:42.52	48	29.81	97.64%
652.27	3*23	46.69	30.44	A:233.79 B:234.71 C:234.74	A:42.56 B:42.71 C:42.52	48	29.82	97.96%

7.3.7	TABLE: Clearance and creepage distance measurements						P
Clearance (cl) and creepage distance (cr) at/of/between:	U r.m.s. (V)	System Voltage (V)	Required cl (mm)	cl (mm)	Required dcr (mm)	dcr (mm)	
DC circuit to Ground (BI)	1000Vdc	1000Vdc	4.1	>10.0	10.0	>15.0	
AC circuit to Ground (BI)	230Vac	1000Vdc	4.1	>8.0	10.0	>15.0	
The conductor on PCB to ground (BI)	1000Vdc	1000Vdc	4.1	>10.0	10.0	>15.0	
PCB:							



EN 62109-1 : 2010						
Clause	Requirement – Test			Result - Remark		Verdict
Main EMI board 30KTL-EMI PCB: AC circuit to RS485 communication circuit (RI) --- isolated transformer T5	230Vac	1000Vdc	7.0	>20	7.0	>20
Main EMI board 30KTL-EMI PCB: AC circuit to RS485 communication circuit (RI)-- Y cap C179-C181	230Vac	1000Vdc	7.0	>10.0	7.0	>10.0
Main EMI board 30KTL-EMI PCB: AC circuit to ground (BI)	230Vac	1000Vdc	4.1	8.5	4.8	8.5
Output EMI board 30KTL-FILTER PCB : AC circuit to ground (BI) --Y CAP C4/C10	230Vac	1000Vdc	4.1	6.5	4.8	6.5
Output EMI board 30KTL-FILTER PCB : AC circuit to ground (BI) --Y CAP C5-7	230Vac	1000Vdc	4.1	6.5	4.8	6.5
Output EMI board 30KTL-FILTER PCB : AC circuit to ground (BI) --MOV4	230Vac	1000Vdc	4.1	7.0	4.8	7.0
Main EMI board 30KTL-EMI PCB: ELV circuit to SELV circuit (BI) -- Transformer T8 pri-sec	1000Vdc	1000Vdc	4.1	12.5	5.0	12.5
Main EMI board 30KTL-EMI PCB: ELV circuit to SELV circuit (BI) -- U23, U24	1000Vdc	1000Vdc	4.1	8.5	5.0	8.5
Main EMI board 30KTL-EMI PCB: DC cuit to ground (BI) -- Y C143-149	1000Vdc	1000Vdc	4.1	7.5	5.0	7.5
Main EMI board 30KTL-EMI PCB : DC circuit to ELV circuit (BI)	1000Vdc	1000Vdc	4.1	4.5	5.0	5.5



EN 62109-1 : 2010							
Clause	Requirement – Test			Result - Remark			Verdict
INV board PCB : DC circuit to Ground(BI)	30KTL-INV circuit to	1000Vdc	1000Vdc	4.1	4.5	5.0	5.5
Boost board PCB: DC circuit to Ground (BI)	30KTL-BOOST circuit to	1000Vdc	1000Vdc	4.1	5.5	5.0	5.5
Supplementary information:BI=Basic Insulation;RI=Reinforce Insulation							

7.5.1	TABLE:				P
7.5.2	Impulse voltage test				
7.5.3	AC or DC voltage test Partial Discharge Test				
test voltage applied between:		test voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result
DC input circuit to Earth		d.c. 2120	6000	--	No breakdown
DC input circuit to RS485 accessible part		d.c.4240	8000	--	No breakdown
AC output circuit to Earth		d.c. 2120	4000	--	No breakdown
AC output circuit to RS485 accessible part		d.c.4240	6000	--	No breakdown
DC input circuit to panel		d.c.2120	8000	--	No breakdown
AC output circuit to panel		d.c.4200	6000	--	No breakdown



EN 62109-1 : 2010					
Clause	Requirement – Test		Result - Remark		Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Metal enclosure	--	--	Whole size: 820mm×580mm× 255mm Thickness:2.0mm	---	--
PV input terminal	Amphenol Industrial Operation	Helios H4	4mm <sup>2</sup> for cable, 1000Vdc, 32A(at90°C), (-40~+90)°C, IP68,V-0	2 PfG 2330/04.2013	TUV R 50278625
	NBC(DongGuan) Electronic Technological Company Limited	PV-100508-000	1000V 45A 4MM <sup>2</sup> ,IP68	TUV	50208382-000 1
Heat-sink	--	--	Whole size: 605mm×580mm× 100mm Thickness:12mm	--	--
PCB	BAOYUEJIA ELECTRONICS CO., LTD.	--	V-0, Max.130°C	UL 796	UL E230225
	HUIZHOU TRUSTWIN ELECTRONICS DEVELOPMENT CO., LTD.	--	V-0,Max.130°C	UL 796	UL E340729
Input switch	SANTON ELECTRONICS CO., LTD.	XA100.16P6E-D	XA100, 16P6E-D,16A, 1000V, 6Pin(-40~+80)°C, IP65	EN 60947-3	DEKRA 2152871.01
AC output terminal	NBC(DongGuan) Electronic Technological Company Limited	PT50-5BA	50A, 500VAC, IP67	EN 61984	CE B-S14116441



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
AC/DC internal wire	DONGGUAN XINRU HARDWARE & ELECTRICAL CO., LTD.	--	10mm2 Max.105°C	IEC 60227-3	CQC 201301010566 6873
	Guangdong Hichain Electricity Group Co., Ltd.	--	10mm2, Max.105°C, VW-1	UL 758	UL E304337
DC fuse	Zhejiang GALAXY, FUSE Co., Ltd.	YRPV-30	1000VDC,15A, 10.5x38mm	EN 60947-1, EN 60269-6	TUV AN 50204847
DC fuse holder	Zhejiang GALAXY, FUSE Co., Ltd.	YRPV-30	1000VDC, 20A,	EN 60947-1 EN 60947-3	TUV R 50276247
Cooling fan	Shenzhen Huaxia Hengtai Electronic Co.,Ltd	DA12025B12 HR	12VDC, 0.50A 3000rpm 120×120×25mm	UL 507, EN 60950-1	UL E254715, TUV R 50229698
	YATE LOON ELECTRONICS CO., LTD.	D12BH-12-30 00RPM-2011- 07-06-A	12VDC, 0.50A, 3000rpm, 120×120×25mm	UL 507, EN 60950-1	UL E189702, TUV R 09954588
Surge protective devices	shanghai citel electronics Co., Ltd.	DS50PV-1000 /30	In=20KA Imax=40KA Up<4.0KA 1300VDC, Max.85oC	IEC 61643-1	TUV Z1 11 06 77124 001
Surge protective devices	Anhui Jinli Electrical Technology Co., Ltd.	JLSP-GA270/ 40	In=20KA Imax=40KA Up<4.0KA 1700VDC	IEC 61643-11	TUV R 50276154
AC filter inductor	Bo luo Da Xin Electronic Co., Ltd.	NPS306060x2 +NPF306060x 1	640uF±10%, 45A, 155°C	--	--



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Insulation tape for IGBT	KUNSHAN ZHONGDI MATERIALS TECHNOLOGY CO., LTD.	TSP-10	94V-0, 150°C	UL 746C	UL E343369
Screen barrier sheet	AGC POLYCARBONATE CO., LTD.	8010	V-2, Max. 80°C	UL 746C, UL94	UL E141248
Mains board					
Capacitor (C105, C115, C168, C198, C197)	XIAMEN FARATRONIC CO.,LTD.	C3D	1100Vdc, 2.0uF+/-10%, 85°C	IEC/EN 61071, IEC/EN 61881-1	TUV R 50266108
Capacitor (C81-C83, C118-C120)	XIAMEN FARATRONIC CO., LTD.	C6A	20uF,350VAC, 105°C	IEC/EN 61071, IEC/EN 61881-1	TUV R 50266136
Input inductor (T3, T6, T7)	Shenzhen JiaMeiRui Electronics Co., Ltd.	R7K	730μH±20%, 8TS, φ1.8mmx2P, 130°C	--	--
Input capacitor (C152-C154, C159-C162)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 400V, 4700pF, +/-20%, P=10mm, Max.85°C	IEC/EN 60384-14	VDE 40008010
Input capacitor (C152-C154, C159-C162)	SHANTOU HIGH-NEW ZONE SONGTIAN ENTERPRISE CO., LTD.	CD-Series	Y1, 400V, 4700pF, (472), +/-20%, P=10mm, Max.85°C	IEC/EN 60384-14	VDE 40025754
Y capacitor (C143-C145, C147-C149)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 250V, 470pF, 10%, P(K)=10mm, Max.85°C	IEC/EN 60384-14	VDE 40008010



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Y capacitor (C143-C145, C147-C149)	SHANTOU HIGH-NEW ZONE SONGTIAN ENTERPRISE CO., LTD.	CD-Series	Y1, 250V, 470pF,10%, P(K)=10mm, Max.85°C	IEC/EN60384-14	VDE 40025754
Y capacitor (C11, C12, C25, C26, C125, C126, C121, C122)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 250V, 470p, 10%, P(K)=10mm, Max.85°C	IEC/EN 60384-14	VDE 40008010
Current transducer (CT4-CT6)	Nanjing Chieful Science&Technology Co., Ltd	CSM015NPT	15A, +5VDC, 1:1200	--	--
Current transducer (CT4-CT6)	NINGBO CSRTIMESTRANSDUCER TECHNIQUECO., LTD.	NACL.15T-P6 /SPIV	15A, +5VDC, 1:1200	--	--
Capacitor (C162, C163, C169, C170, C175, C176)	XIAMEN FARATRONIC CO., LTD.	MKP63	Y2X1, 300V, 22nF, 110°C	--	--
Inductor(L11)	SHENZHEN YUYUAN Electronic Co., Ltd.	T16x12x8C,T001	580uH±35%, 10TS, φ1.2mm, 130°C	--	--
Resistor (R362-R369)	DONGGUAN MEIFU Electronic Co., Ltd.	RY21	Metal Oxide Film Resistor(RY21), 5W, 300ohm, ±5%	--	---
Opto-coupler (U23, U24)	Avago Technologies	HCNW2601	8000Vac, 85°C, Cr.: 10mm, Cl.: 9.6mm	DIN EN 60747-5-5, EN 60747-5-5	VDE 40009376



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Opto-coupler (U23, U24)	Fairchild Semiconductor.	6N137M,	6000Vac, 125°C, Cr.≥8mm, Cl.:≥8mm	DIN EN 60747-5-2	VDE 40018398
Opto-coupler (U20)	LINEON Technologies	LTV-816S-TA 1(C)	5300Vrms	UL 1577	UL E113898
Transformer (T8)	Shenzhen JiaMeiRui Electronics Co., Ltd.	EF20	Max.130°C	--	--
Bobbin	CHANG CHUN PLASTICS CO., LTD.	--	Max.150°C	UL 746C	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	Max.155°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	CT-280B	Max.130°C	UL 510	UL E165111
Transformer (T8)	DAXING Electronic Co., Ltd.	EF20	9:9,100mH, 130°C	--	--
Bobbin	CHANG CHUN PLASTICS CO., LTD.	--	Max.150°C	UL 746C	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	Max.155°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	CT-280B	Max.130°C	UL 510	UL E165111
-Varnish	ZHUHAI CHANGXIAN NEW MATERIALS TECHNOLOGY CO., LTD.	E962	Max.130°C	UL 1446	UL E335405
Transformer (T4)	DAXING Electronic Co.,Ltd	EF16	Max.130°C	--	--





EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Bobbin	CHANG CHUN PLASTICS CO., LTD.	--	Max.150°C	UL 746C	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	Max.155°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	CT-280B	Max.130°C	UL 510	UL E165111
Transformer (T5)	Shenzhen JiaMeiRui Electronics Co., Ltd.	EEL22	Max.130°C	--	--
Bobbin	CHANG CHUN PLASTICS CO., LTD.	--	Max.150°C	UL 746C	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	Max.155°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	CT-280B	Max.130°C	UL 510	UL E165111
-Varnish	ZHUHAI CHANGXIAN NEW MATERIALS TECHNOLOGY CO., LTD.	E962	Max.130°C	UL 1446	UL E335405
Transformer (T1)	Shenzhen JiaMeiRui Electronics Co., Ltd.	ETD29	Max.130°C	--	--
Bobbin	CHANG CHUN PLASTICS CO., LTD.	--	Max.150°C	UL 746C	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	Max.155°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	CT-280B	Max.130°C	UL 510	UL E165111



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Relay (RY1-RY6)	Tyco Electronics Corporation	T92S7D12-12	DC12V, 250VAC, 30A, 85°C	EN 61810-1	VDE 40019600
Current transducer (CT1-CT3)	LEM Electronics (China) Co., Ltd.	CKSR 50-NP	±50A, Supply Voltage: 7V, Max.105°C	--	---
Capacitor (C27-C29)	XIAMEN FARATRONIC CO., LTD.	CBB61	3.5uF, 350VAC	IEC/EN 61071, IEC/EN 61881-1	VDE 40023504
Filter capacitor (C69, C70, C71)	XIAMEN FARATRONIC CO., LTD.	C6A	20uF,350VAC, 42x45x30mm, 37.5mm	IEC/EN 61071, IEC/EN 61881-1	TUV R 50266136
Filter capacitor (C69, C70, C71)	EACO CAPACITOR INC.	STR-250-20-5 7.5	20uF, 350VAC	UL 810	UL E346002
Filter inductor (L14)	EACO CAPACITOR INC.	92F5620-L	40uH±10%, 45A, 108x75x50,105°C	--	---
AC current Transducer (CT7)	Magtron Industry ELECTRONC CO., LTD.	RCMU101S-3 P6	300mA, Supply voltage: ±12-15V, 85°C	--	--
AC filter board					
MOV (MOV1-MOV4)	Xiamen SET Electronics Co., Ltd.	TFMOV34S62 1-IT	385V, In 20KA I <sub>max</sub> . 40KA	EN 61643-11	TUV 50226017
X capacitor(C1-C3)	XIAMEN FARATRONIC CO., LTD.	MKP62	X1, 275VAC, 2.2uF	IEC/EN60384-14	VDE 40000358



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Gas discharge tube(Gas1)	Brightking ELECTRONIC CO., LTD.	BK2RM600L-8	BK2RM600L-8, 600V, 8.0x6.0mm	--	--
Y capacitor (C5-C7)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 400Vac, 33nF	IEC/EN 60384-14	VDE 40008010
Y capacitor (C8-C10)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 400V, 4700pF, (472), +/-20%, P=10mm	IEC/EN 60384-14	VDE 40008010
	SHANTOU HIGH-NEW ZONE SONGTIAN ENTERPRISE CO., LTD.	CD-Series	Y1, 400V, 4700pF, (472), +/-20%, P=10mm	IEC/EN 60384-14	VDE 40025754
Y capacitor (C4)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 250V, 470p,10%,P(K)=10MM	IEC/EN 60384-14	VDE 40008010
	SHANTOU HIGH-NEW ZONE SONGTIAN ENTERPRISE CO.,LTD.	CD-Series	Y1,250V,470p,10%,P(K)=10MM	IEC/EN 60384-14	VDE 40025754
Inductor (L1)	SHENZHEN YUYUAN ELECTRONIC CO., LTD.	R10K	R10K, 720uH, 45A,180°C	--	--
Sampling board					
Y capacitor (C1-C12)	NAN JING YU YUE ELECTRONICS CO., LTD.	CT7	Y1, 400V, 4700pF, (472), +/-20%, P=10mm	IEC/EN 60384-14	VDE 40008010
	SHANTOU HIGH-NEW ZONE SONGTIAN ENTERPRISE CO., LTD.	CD-Series	Y1, 400V, 4700pF, (472), +/-20%, P=10mm	IEC/EN 60384-14	VDE 40025754
Current transducer (CT1-CT3)	Nanjing Chieful Science&Technology Co., Ltd.	CSM015NPT	15A, +5VDC, 1:1200, Max.85°C	--	--



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Boost board					
Capacitor (C4-C6)	XIAMEN FARATRONIC CO., LTD.	C3D	1100Vdc, 12uF+/-10%, 85°C	IEC/EN 61071, IEC/EN 61881-1	TUV R 0266108
	EACO CAPACITOR INC,	SHP-1100-12-4FS	Film Capacitor, 1100Vdc,12uF+/-10%, 85°C	UL 810	UL E346002
	Nantong Jianghai Capacitor Co., Ltd.	CD13X, CD29X	Film Capacitor, 1100Vdc,12uF+/-10%, 85°C	UL 810	UL E355297
Transistor (Q1-Q3)	Fairchild Semiconductor.	FGH40T120S MD	40A/1200V, 175°C	--	--
Transistor (Q1-Q3)	International Rectifier Corporation	IRG7PH46UD PBF	40A/1200V, 175°C	--	--
Transistor (Q1-Q3)	INFINEON TECHNOLOGIES AG	IKW40N120H 3,	40A/1200V, 175°C	--	--
Transistor (Q1-Q3)	STMicroelectronics	STGW40H120 DF2	40A/1200V, 175°C	ST –E115797	
Inductor (L2)	Shenzhen JiaMeiRui Electronics Co., Ltd.	EE30	16uH, 30x32x32mm, 130°C	--	--
Bobbin	CHANG CHUN PLASTICS CO., LTD.	T375J	V-0, 150°C	UL 746	UL E59481
Winding	TAI-I ELECTRIC WIRE & CABLE CO., LTD.	UEW	130°C	UL 1446	UL E85640
Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO., LTD.	--	V-0, 85°C	UL 510	UL:E165111



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
Relay (RY1)	Songchuang Electronics Co., Ltd.	832A-1A-F-C-BH	12VDC,250V,30A, 130°C	EN 61810-1	VDE 006615
Boost inductor	Huizhou BOLUODAXIN Electronic Co., Ltd.	PPF306060x1+NPS306060x2	1.18mH±10%, 68TS, φ2.2mmx3P	--	--
Inverter board					
Bus capacitor (C19, C20, C24, C25, C26, C27, C28, C29)	Hunan Aihua Group Co., Ltd.	ELT2HM471 Y45TT	500V, 470uF, Max.105°C	--	--
Bus capacitor (C19, C20, C24, C25, C26, C27, C28, C29)	Lelon Electronics Corp.	F.C4.5M4700 0	500V, 470uF, Max.105°C	--	--
Bus capacitor (C19, C20, C24, C25, C26, C27, C28, C29)	Nantong Jianghai Capacitor Co., Ltd.	CD29X	500V, 470uF, Max.105°C	--	--
Capacitor (C8, C10)	XIAMEN FARATRONIC CO., LTD.	C3D	110uF/600V, Max.105°C	UL 810	UL E256238
	EACO CAPACITOR INC.	SHB-600-110	110uF/600V, Max.105°C	UL 810	UL E346002
	Nantong Jianghai Capacitor Co., Ltd.	CBB131	110uF/600V, Max.105°C	UL 810	UL E227010



EN 62109-1 : 2010					
Clause	Requirement – Test			Result - Remark	Verdict
14	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
IGBT (Q3-Q5)	Vincotech GmbH	FZ12NMA080 SH01-M260F	1200V, 80A, Max.150°C	--	--
Capacitor (C2-C6)	XIAMEN FARATRONIC CO., LTD.	CBB20	630V, 1μF(105) ±10%, Φ24x27mm	--	--



EN 62109-1 : 2010										
Clause	Requirement – Test			Result - Remark				Verdict		
14.8	TABLE: Batteries								N/A	
The tests of 4.3.8 are applicable only when appropriate battery data is not available								N/A		
Is it possible to install the battery in a reverse polarity position?								N/A		
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition	--	--	--	--	--	--	--	--	--	
Max. current during fault condition	--	--	--	--	--	--	--	--	--	
Test results:										
- Chemical leaks								Verdict		
- Explosion of the battery								N/A		
- Emission of flame or expulsion of molten metal								N/A		
- Electric strength tests of equipment after completion of tests								N/A		



EN 62109-2 : 2011			
Clause	Requirement – Test	Result - Remark	Verdict
4	General testing requirements		P
4.4	Testing in Three fault condition	See the IEC/EN 62109-1 report	P
4.4.4	Three fault conditions to be applied		P
4.4.4.15	Fault-tolerance of protection for grid-interactive inverters		P
4.4.4.15.2.1	General (EN 62109-2)		P
4.4.4.15.2.2	Design of insulation or separation (EN 62109-2)	2 separate relay control circuits (Control A and B) each controlling one line relay and one neutral relay.	P
4.4.4.15.2.3	Automatic checking of the disconnect means (EN 62109-2)	Another relay is still in the open position after one relay pole is short-circuit.	P
4.4.4.16	Stand-alone inverters – Load transfer test	Not a stand-alone inverters	N/A
4.4.4.17	Cooling system failure – Blanketing test	Blanketed the inverter by surgical cotton. After 7h, no fire, no hazards.	P
4.7	Electrical ratings tests	Not a stand-alone inverters	N/A
4.7.3	Measurement requirements for AC output ports for stand-alone inverters		N/A
4.7.4	Stand-alone Inverter AC output voltage and frequency		N/A
4.7.5	Stand-alone inverter output voltage waveform		N/A
4.8	Additional tests for grid-interactive inverters		P
4.8.1	General requirements regarding inverter isolation and array grounding	Isolated inverter	P
4.8.2	Array insulation resistance detection for inverters for ungrounded and functionally grounded arrays	30K ohms resistance used, EUT indicate a fault, and disconnect from the PV and grid .	P
4.8.3	Array residual current detection	See append table 4.8.3	P
4.8.3.1	General		P





EN 62109-2 : 2011			
Clause	Requirement – Test	Result - Remark	Verdict
4.8.3.2	30mA touch current type test for isolated inverters	See append table 4.8.3.2 External isolated transformer used for test.	P
4.8.3.3	Fire hazard residual current type test for isolated inverters	See append table 4.8.3. External isolated transformer used for test.	P
4.8.3.4	Protection by application of RCD's	No RCD used	N/A
4.8.3.5	Protection by residual current monitoring	See append table 4.8.3.5	N/A
5	Marking and documentation		P
6	Environmental requirements and conditions		P
7	Protection against electric shock and energy hazards		P
7.3	Protection against electric shock		P
7.3.10	Additional requirements for stand-alone inverters		N/A
7.3.11	Functionally grounded arrays		N/A
8	Protection against mechanical hazards		P
9	Protection against fire hazards		P
9.3	Short-circuit and overcurrent protection		P
9.3.4	Inverter backfeed current onto the array		P
10	Protection against sonic pressure hazards		P
11	Protection against liquid hazards		P
12	Protection against chemical hazards		N/A
13	Physical requirements		P
13.9	Fault indication	Fault indicated in LCD panel,detailed instruction in manual	P
14	Components		P



EN 62109-2 : 2011				
Clause	Requirement – Test		Result - Remark	Verdict
Table 4.8.3.2, 4.8.3.3	Touch current and fire hazard residual current measurement			
Condition	PV power supply “+” → terminal A [mA]	PV power supply “-” → terminal A [mA]	Limit [mA]	Comments
30mA Touch current	--	--	30mA	--
Condition	PV power supply “+” → terminal A [mA]	PV power supply “-” → terminal A [mA]	Limit [mA]	Comments
fire hazard residual current	--	--	300mA	Inverter ≤ 30KVA
fire hazard residual current	--	--	10mA per KVA	Inverter > 30KVA
Note:				

Table 4.8.3.5: Array residual current detection								Verdict
fault current that occurs suddenly								P
PV polarity	Trip current(mA)	Cut-off time(ms)					limits(s)	--
PV+	30	232.5	237.5	241.5	220.0	228.0	0.3	P
	60	118.0	139.5	132.0	126.0	137.0	0.15	P
	150	35.0	39.0	39.5	24.5	27.5	0.04	P
PV-	30	235.0	237.5	235.5	226.5	228.0	0.3	P
	60	137.0	139.0	139.5	116.5	120.0	0.15	P
	150	39.0	39.5	38.0	38.5	39.0	0.04	P
constantly rising fault current								
PV polarity	Current (mA)					limits(mA)	P	
PV+	288.55	289.7	289.1	286	287.1	300	P	
PV-	294.7	296.1	296.3	296.2	295.1	300	P	



Photo document



Photo 1 Front view



Photo 2 Side view

Photo document



Photo 3 Top View



Photo 4 Wire connective terminal





Photo document



Photo 5 Wire connective terminal— AC connective terminal (alt.)



Photo 6 Bottom view



Photo document

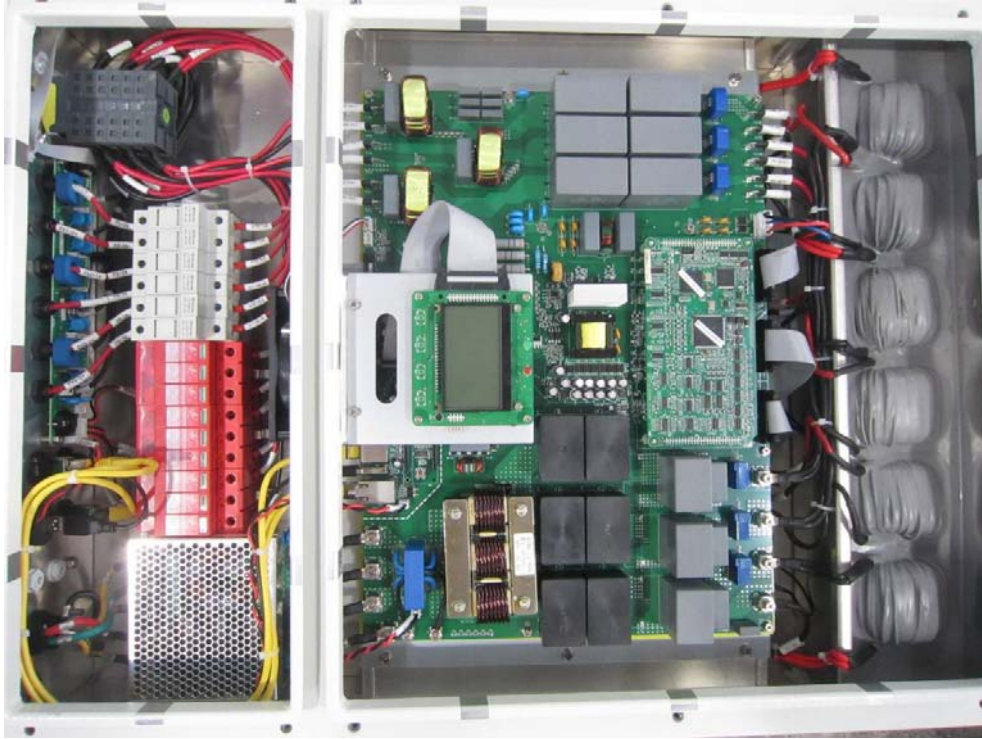


Photo 7 Inside structure view



Photo 8 Inside structure view—AC connective terminal (alt.)





Photo document

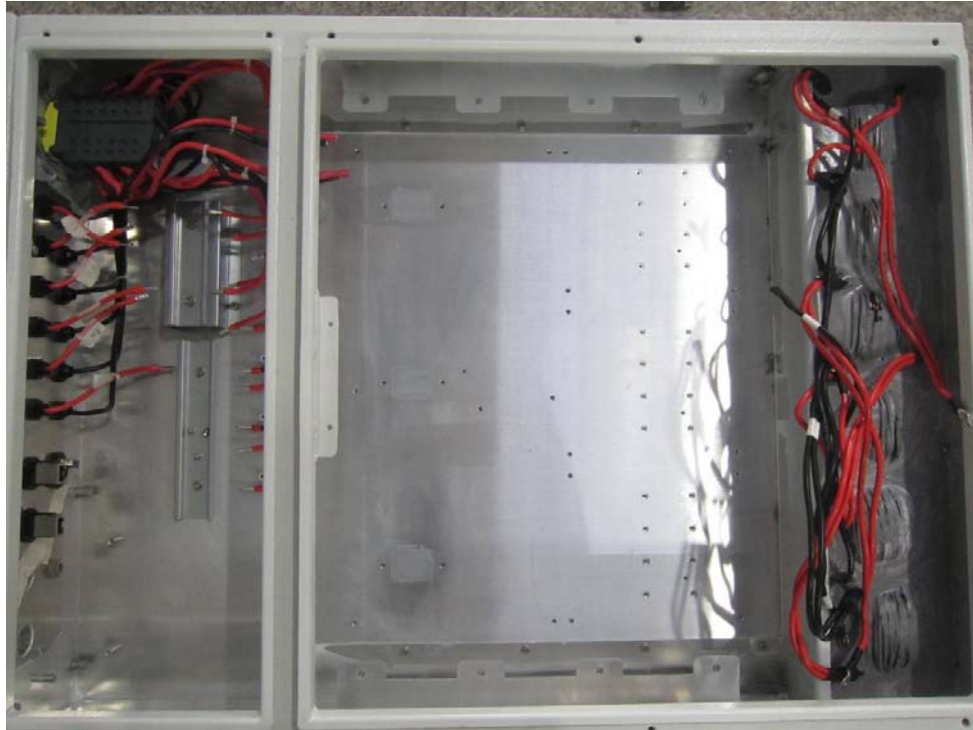


Photo 9 Inside structure view

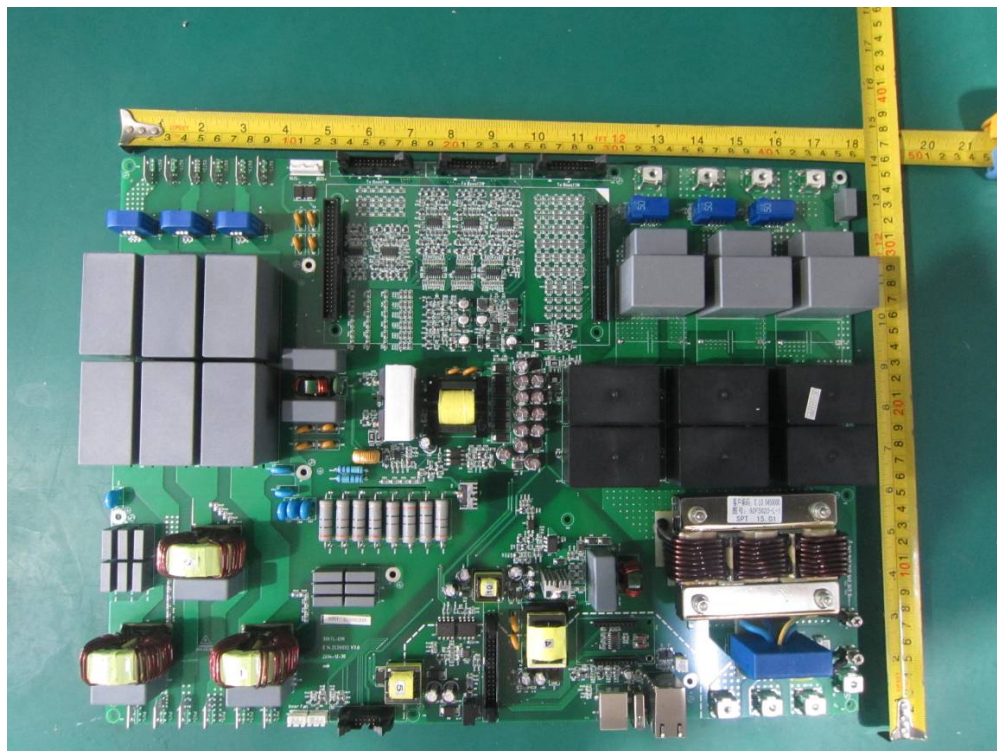


Photo 10 Main EMI board front view



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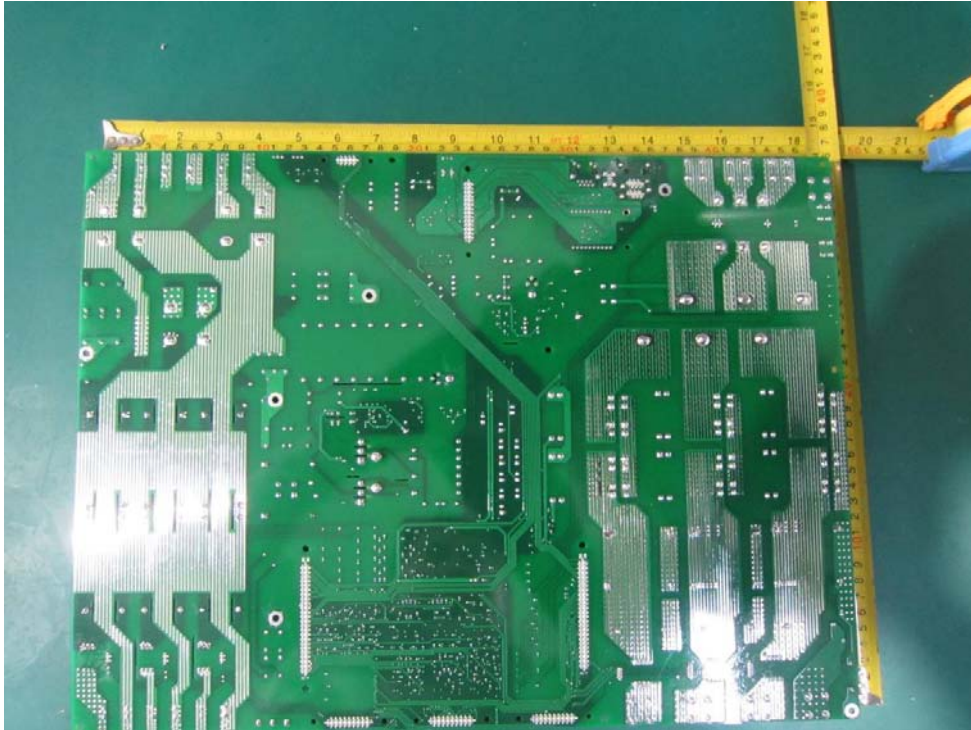


Photo 11 Main EMI board back view

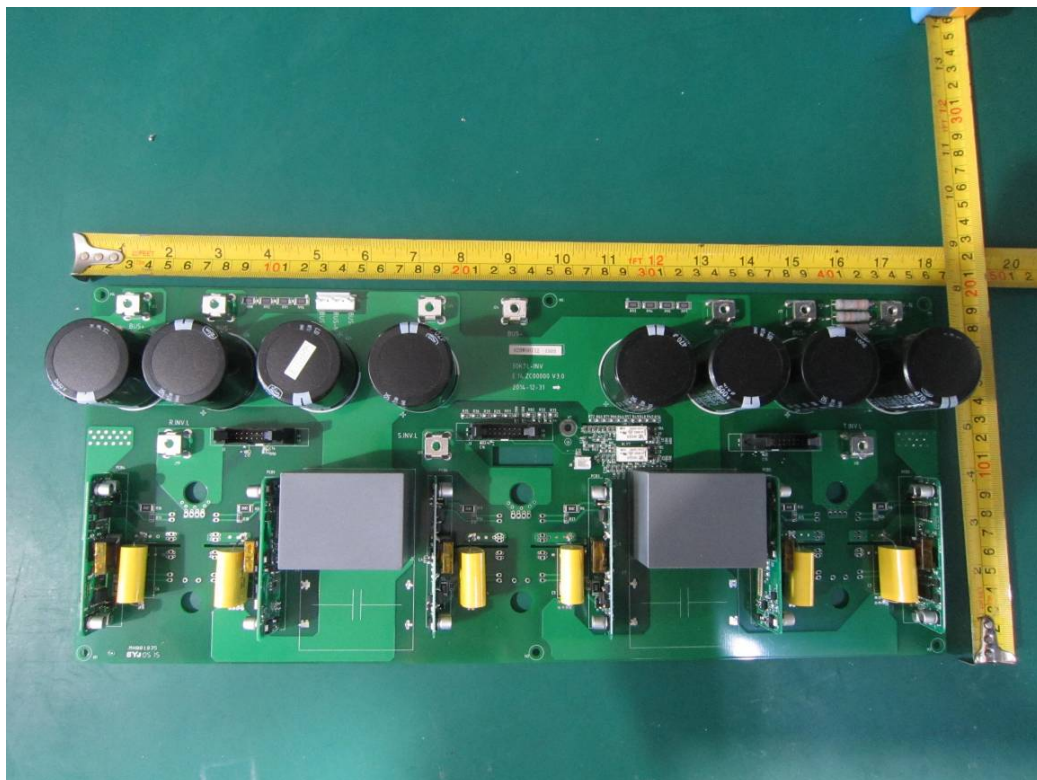


Photo 12 Power board front view



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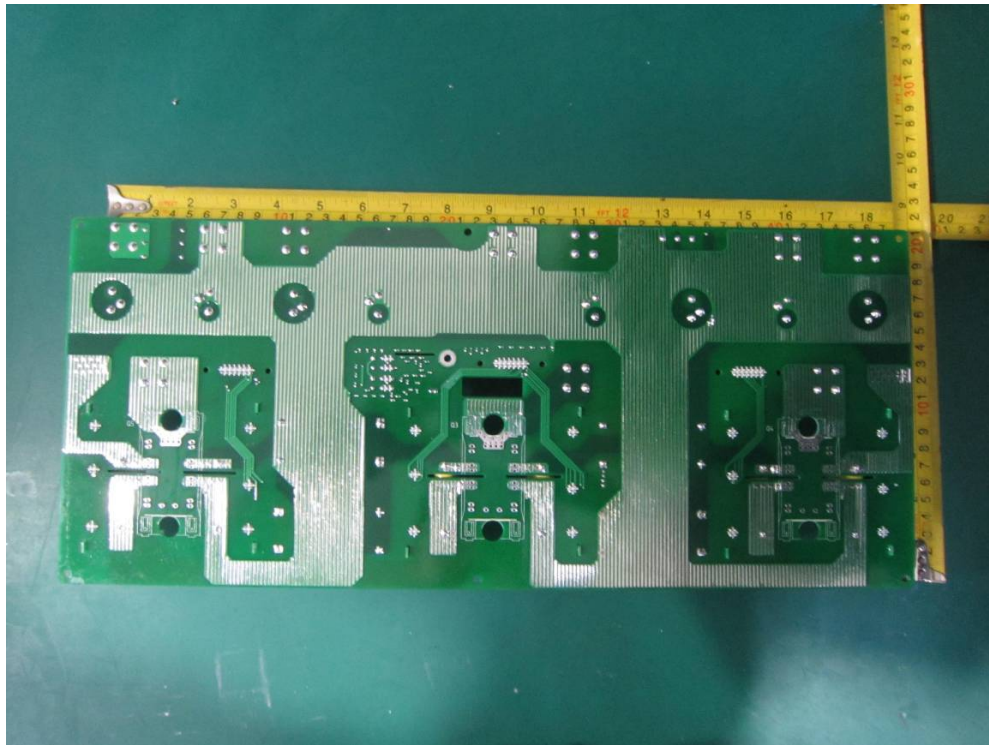


Photo 13 Power board back view

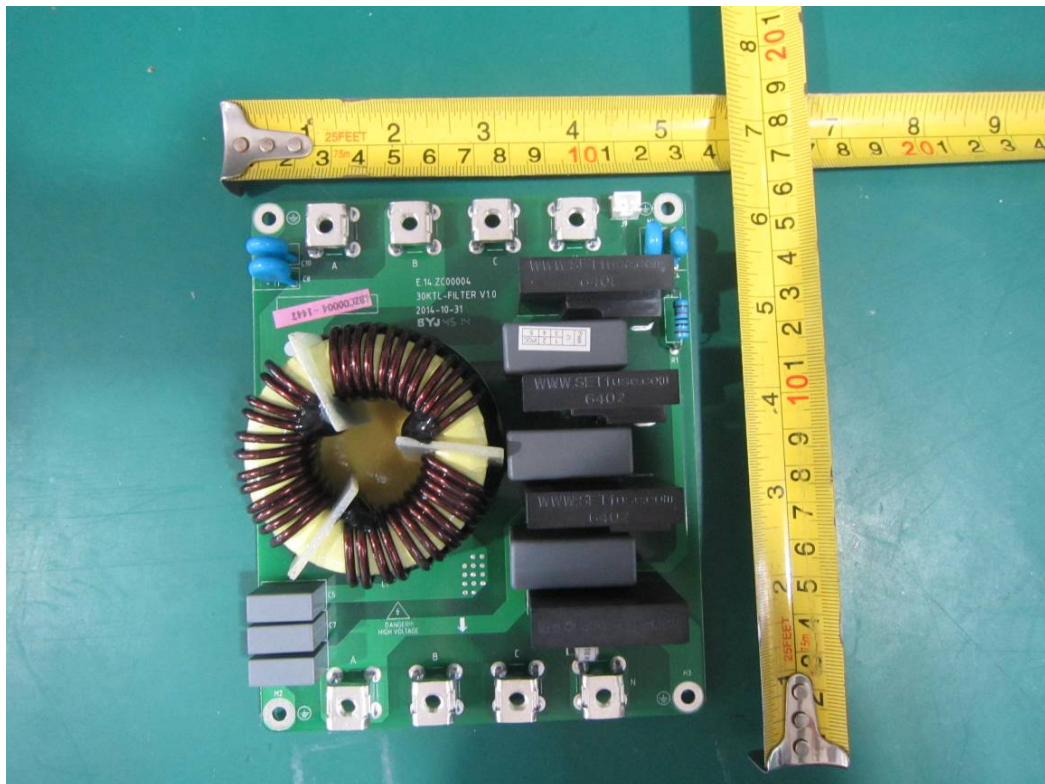


Photo 14 AC EMI board front view



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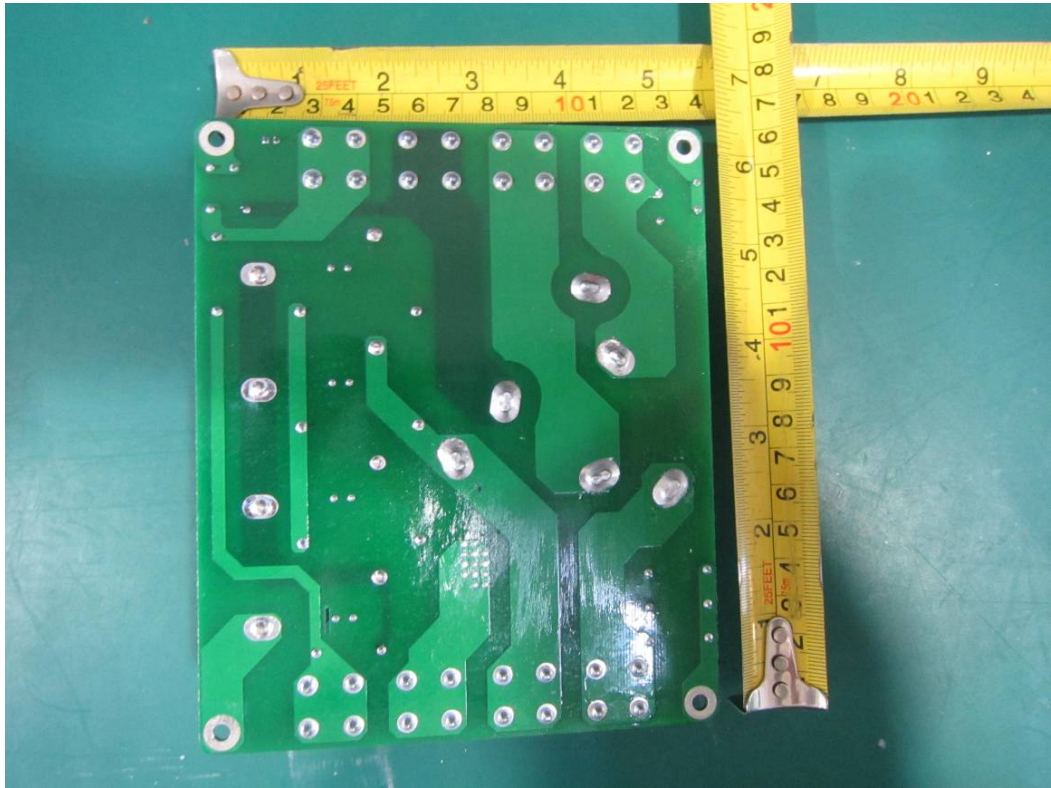


Photo 15 AC EMI back view

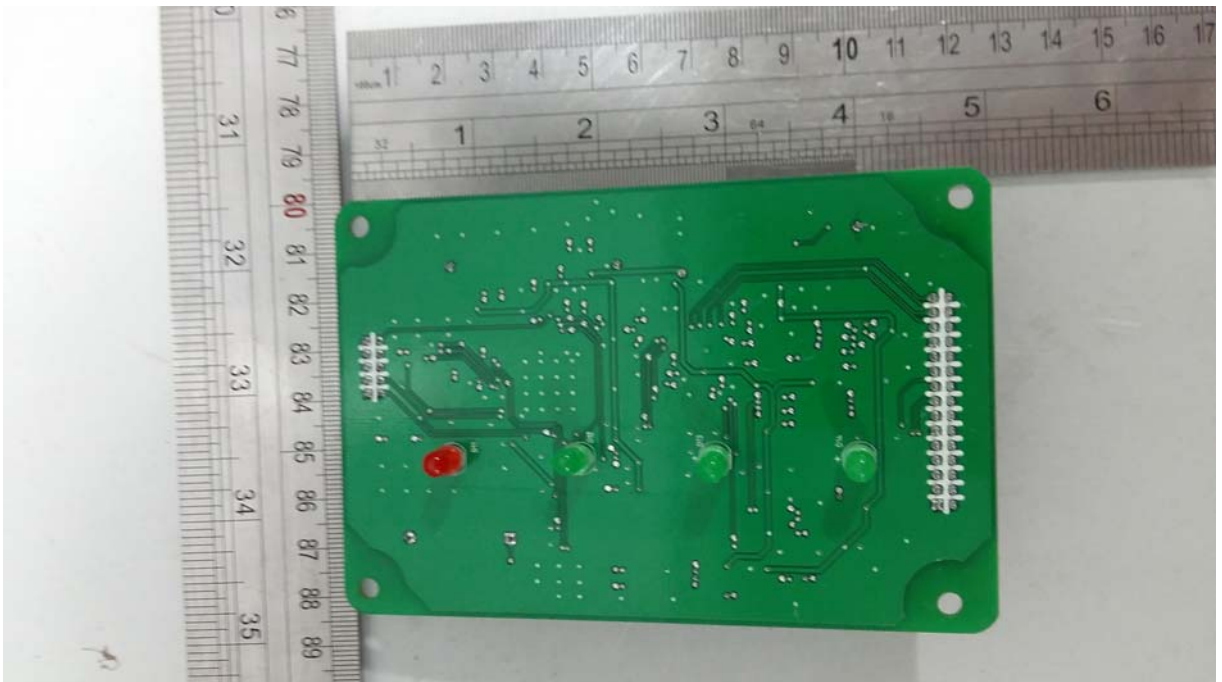


Photo 16 Display front view



Photo document



Photo 17 Display back view

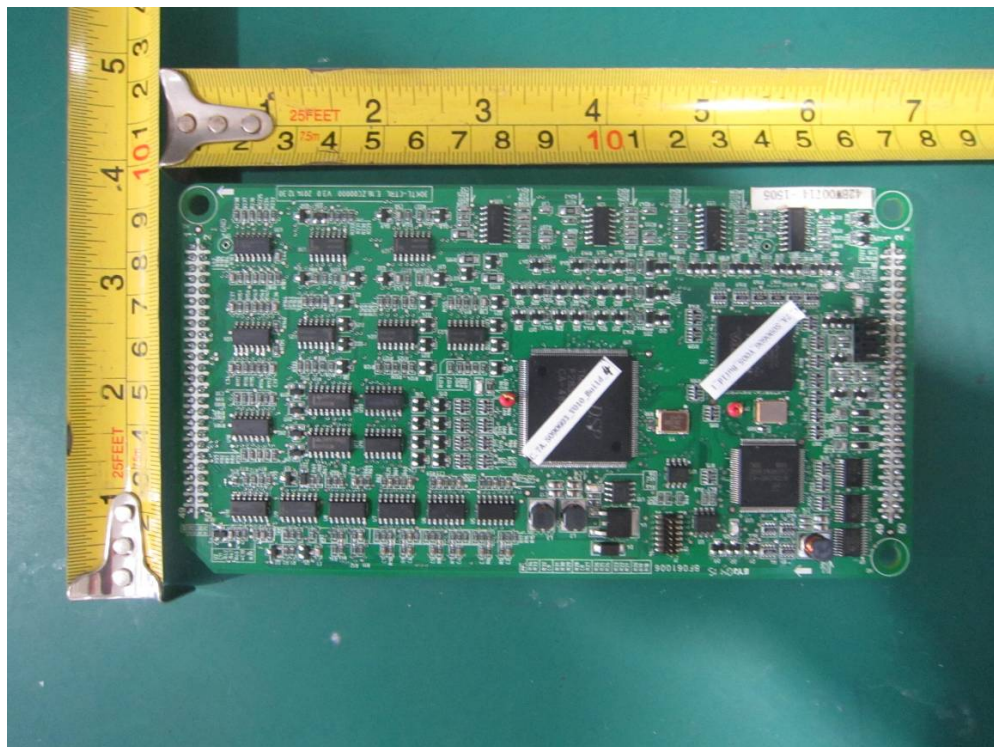


Photo 18 Control board front view



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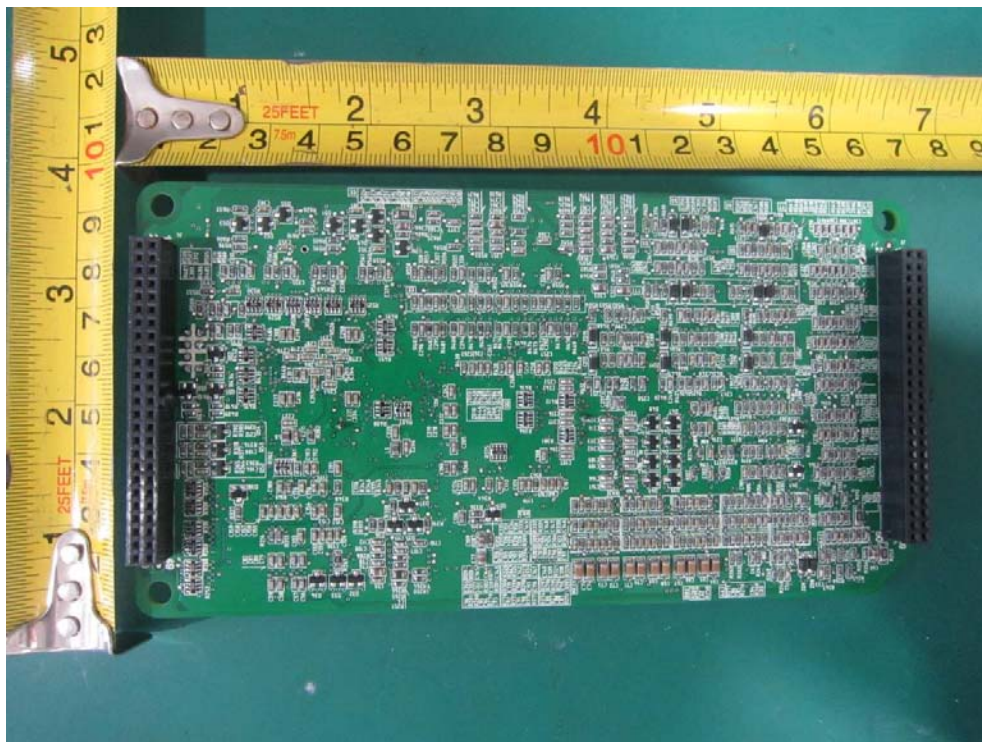


Photo 19 Control board back view

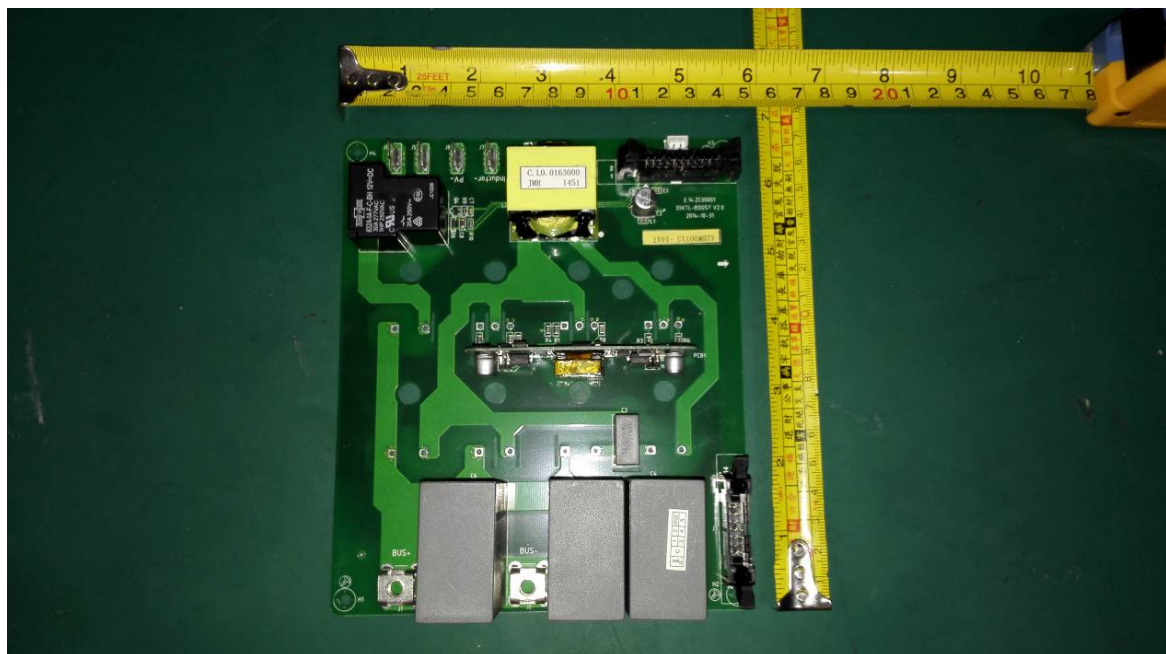


Photo 20 Boost board front view





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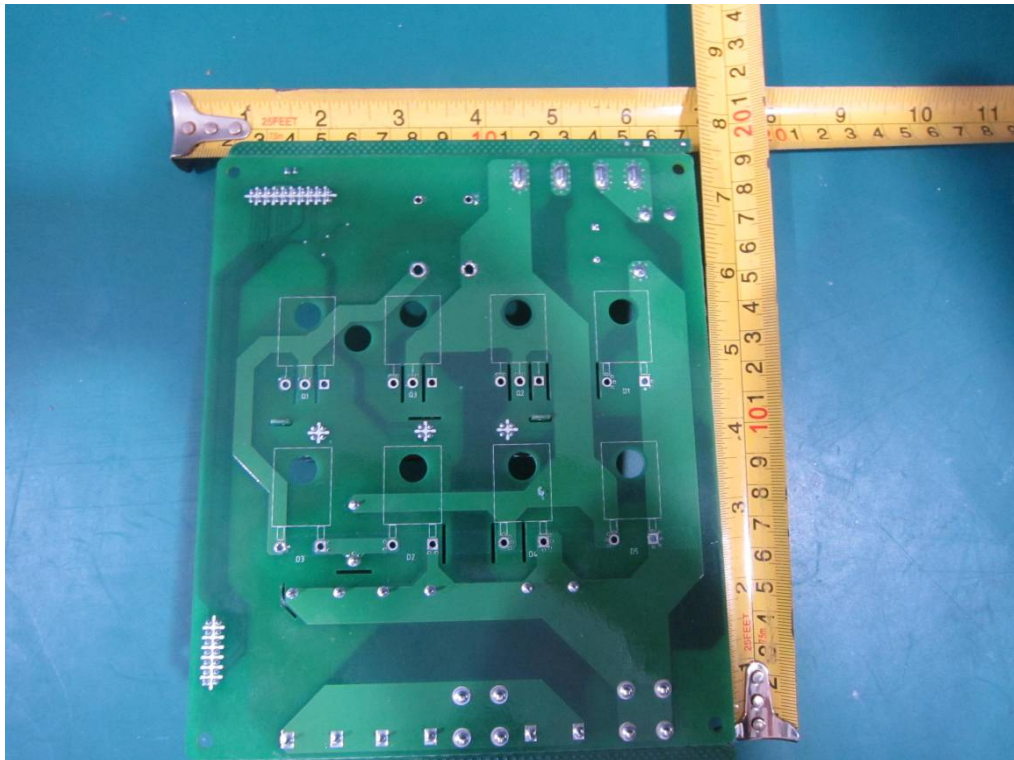


Photo 21 Boost board back view

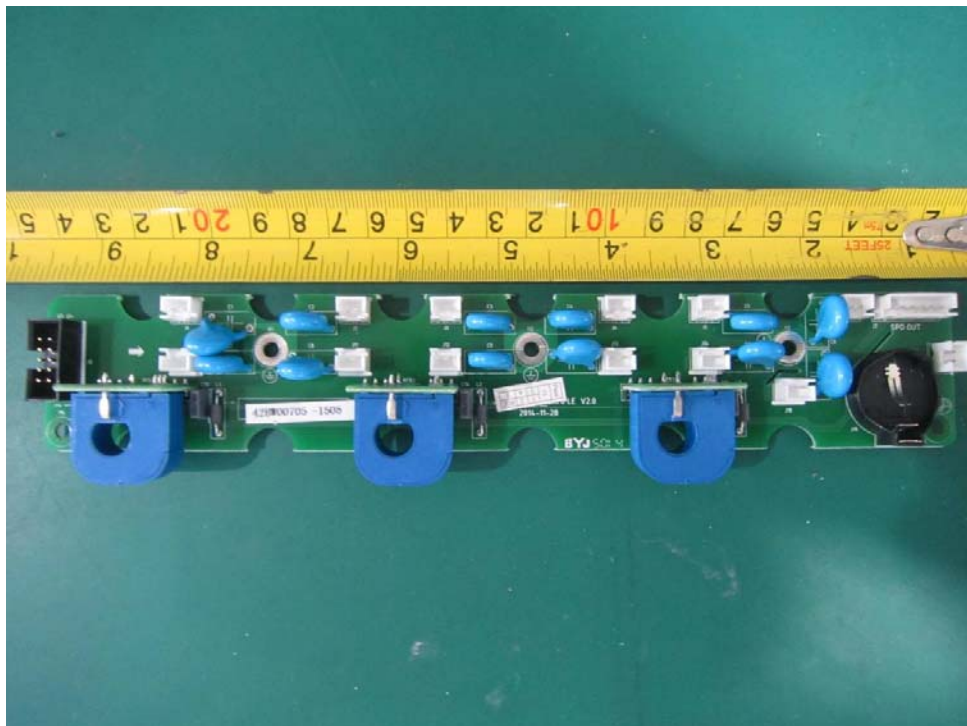


Photo 22 Sampling board front view



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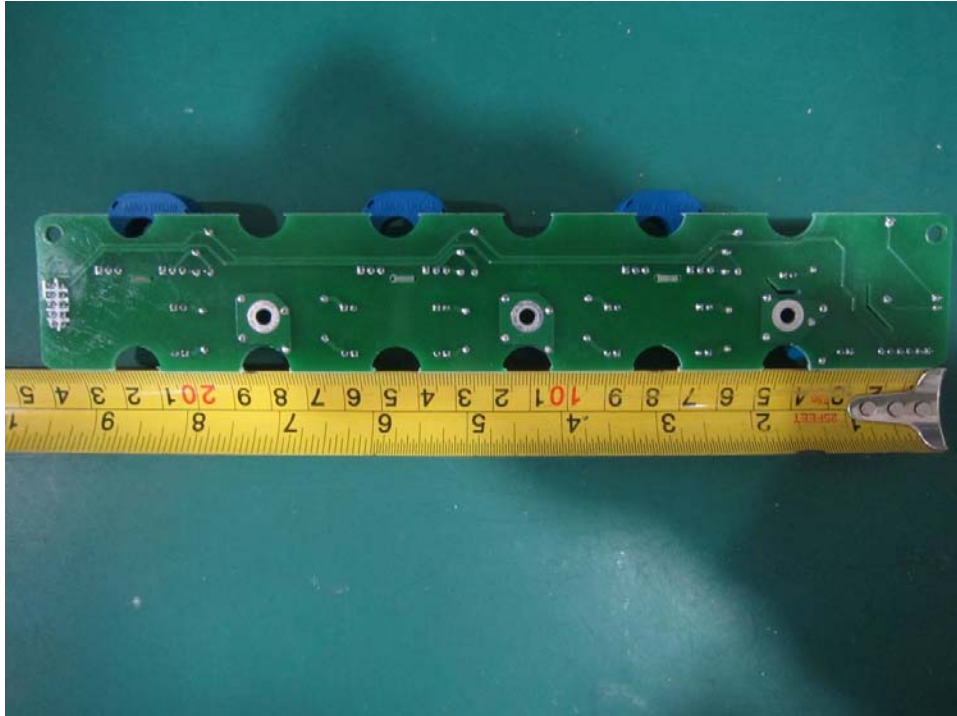


Photo 23 Sampling board back view



Photo 24 Ground terminal



Photo document



Photo 25 Ground terminal



Photo 26 Caution label




Photo document

**EAST**® 易事特

SOLAR INVERTER

Model	EA33KTL5I
Max. Input DC Voltage	1000Vdc
MPP Voltage Range	320~900Vdc
DC Rated Current	3x21Adc
Max. Short-circuit DC Current	3x23Adc
Number of MPP-trackers	3
String Connections	2x6
Nominal AC Voltage	400Vac
AC Connections	3W+N+PE
Max. Output Current	48Aac
AC Output Frequency	50/60Hz
Output Rated Power	30kW
Max. Output Power	33kVA
Max. Efficiency	98.7%
Ingress Protection	IP65
Operating Temperature Range	-25~60°C
Serial NO.	

Protective class I



EAST GROUP CO.,LTD.

Photo 27 Rating plate