APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model(s): RM060/10, RM090/15, RM120/20

Prepared For : **INVT POWER SYSTEM (SHENZHEN) CO., LTD**
5th Floor,1#Building,Gaofa Industrial Park, LongJing,
Nanshan District, Shenzhen, China, 518055

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TEST REPORT

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

Report Reference No..... :	ES160523067S
Compiled by (name + signature)..... :	Gary Zhang
Approved by (name + signature)..... :	William Guo
Date of issue ..... :	May 30, 2016
Total number of pages ..... :	72 pages
Testing Laboratory ..... :	SHENZHEN EMTEK CO., LTD.
Address ..... :	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location / address ..... :	Same as above
Applicant's name..... :	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address ..... :	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Test specification:	
Standard..... :	IEC 62040-1:2008 (First Edition) + Am 1:2013
Test procedure ..... :	Compliance with IEC 62040-1:2008 (First Edition) + Am 1:2013
Non-standard test method..... :	N/A
Test Report Form No..... :	IEC62040_1C
Test Report Form(s) Originator..... :	TÜV Rheinland Japan Ltd.
Master TRF ..... :	Dated 2014-01

Test item description ..... :	Uninterruptible Power Systems
Trade Mark..... :	INVT
Manufacturer ..... :	RM060/10, RM090/15, RM120/20
Address ..... :	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Model/Type reference ..... :	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Ratings ..... :	See the rating labels

Test item particulars ..... :	
Equipment mobility ..... :	[] movable [X] stationary [] for building-in
Connection to the mains ..... :	[] pluggable equipment [X] permanent connection [] detachable power supply cord [] non-detachable power supply cord
Operating condition ..... :	[X] continuous [] rated operating / resting time:
Access location ..... :	[X] operator accessible [] restricted access location
Over voltage category (OVC) ..... :	[] OVC I [X] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values ..... :	-20%, +10.8%
Tested for IT power systems ..... :	[X] Yes [] No
IT testing, phase-phase voltage (V) ..... :	--
Class of equipment ..... :	[X] Class I [] Class II [] Not classified
Pollution degree (PD) ..... :	[] PD 1 [X] PD 2 [] PD 3
IP protection class ..... :	IP20
Altitude during operation (m) ..... :	Up to 2000
Altitude of test laboratory (m) ..... :	below 2000
Mass of equipment (kg) ..... :	Approx. 151 Kg
Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A N equal to N / A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
Testing ..... :	
Date of receipt of test item ..... :	N/A
Date(s) of performance of tests ..... :	N/A

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.
Standard EN 62040-1:2008+A1:2013 is to be used in conjunction with EN 60950-1:2013, which is referred to in this TRF as "RD".

General product information:

This report is amended from previous report ES151023026S, dated November 05, 2015, due to below amendments:

- The Applicant, Manufacturer, factory's address changed to: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055

- Change label to: See copy of marking plate

1. The equipment is an Uninterruptible Power Systems for general use with information technology equipment.

2. The UPS is designed as primary, therefore, clearances, creepage distances and distances through insulation from input, output, battery, control circuits to the RS232 of the PC interface are dimensioned for reinforced insulation and suitable distance through inulation. The test samples are pre-productin without any serial number.

3. Model difference description:

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

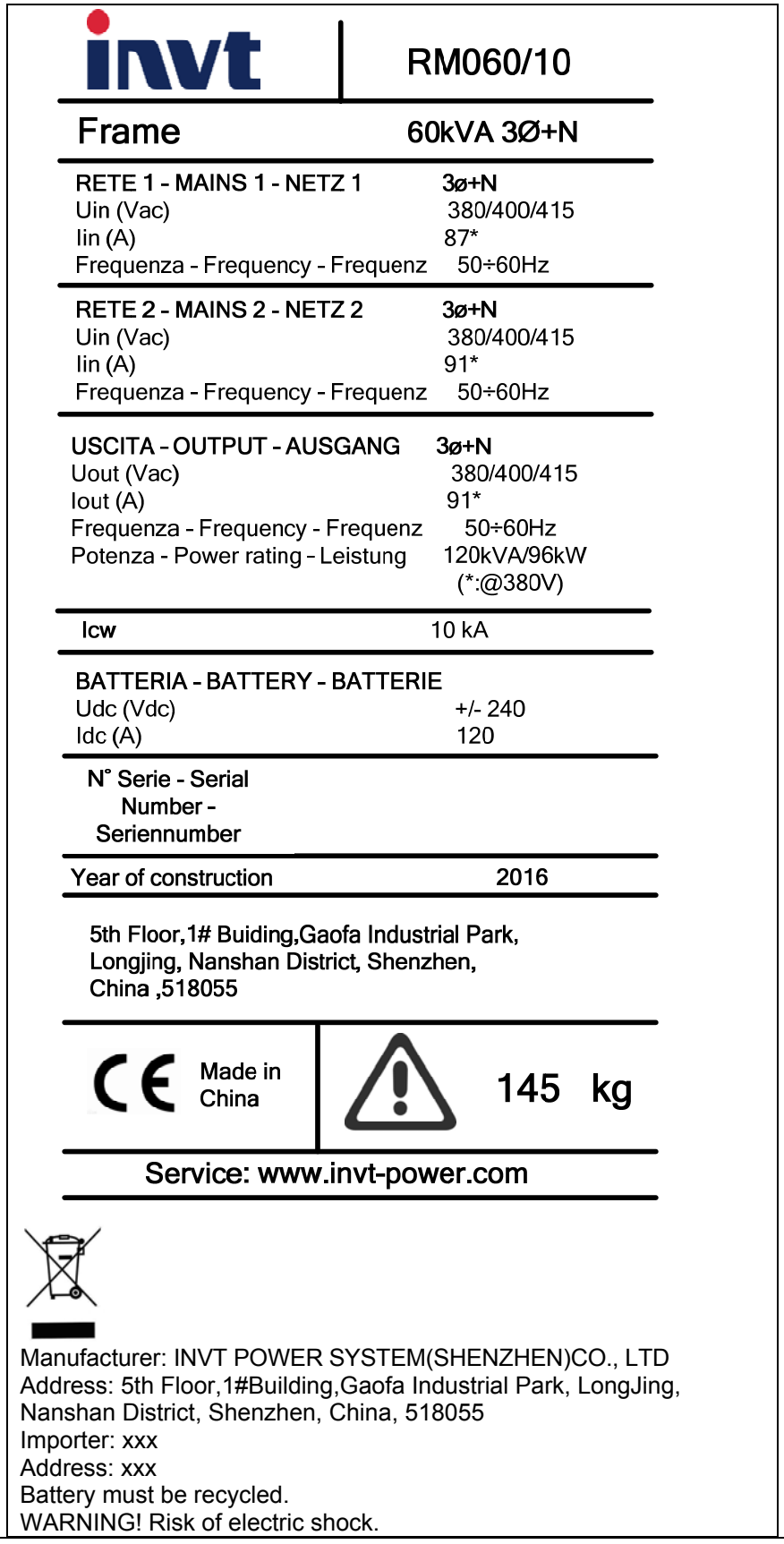
Summary of testing:

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

- Tests performed on the bench
- Maximum ambient temperature: 40°C
- Tested for moderate conditions
- EUT is designed for altitudes not exceeding 2000 m.

Copy of marking plate:

1. Rating label for model RM060/10.



Manufacturer: INVT POWER SYSTEM(SHENZHEN)CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx
Battery must be recycled.
WARNING! Risk of electric shock.

2. Rating label for model RM090/15

invt	RM090/15
Frame	90kVA 3Ø+N
RETE 1 - MAINS 1 - NETZ 1	3ø+N
Uin (Vac)	380/400/415
Iin (A)	130*
Frequenza - Frequency - Frequenz	50÷60Hz
RETE 2 - MAINS 2 - NETZ 2	3ø+N
Uin (Vac)	380/400/415
Iin (A)	137*
Frequenza - Frequency - Frequenz	50÷60Hz
USCITA - OUTPUT - AUSGANG	3ø+N
Uout (Vac)	380/400/415
Iout (A)	137*
Frequenza - Frequency - Frequenz	50÷60Hz
Potenza - Power rating - Leistung	90kVA/81kW (*:@380V)
Icw	10 kA
BATTERIA - BATTERY - BATTERIE	
Udc (Vdc)	+/- 240
Idc (A)	180
N° Serie - Serial Number - Seriennummer	
Year of construction	2016

5th Floor,1# Buiding,Gaofa Industrial Park,
Longjing, Nanshan District, Shenzhen,
China ,518055

CE Made in China

145 kg

Service: www.invt-power.com

Manufacturer: INVT POWER SYSTEM(SHENZHEN)CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx
Battery must be recycled.
WARNING! Risk of electric shock.

3. Rating label for model **RM120/20**

invt	RM120/20
Frame	**120kVA 3Ø+N**
RETE 1 - MAINS 1 - NETZ 1	3ø+N
Uin (Vac)	380/400/415
Iin (A)	173*
Frequenza - Frequency - Frequenz	50÷60Hz
RETE 2 - MAINS 2 - NETZ 2	3ø+N
Uin (Vac)	380/400/415
Iin (A)	182*
Frequenza - Frequency - Frequenz	50÷60Hz
USCITA - OUTPUT - AUSGANG	3ø+N
Uout (Vac)	380/400/415
Iout (A)	182*
Frequenza - Frequency - Frequenz	50÷60Hz
Potenza - Power rating - Leistung	120kVA/96kW (*:@380V)
Icw	10 kA
BATTERIA - BATTERY - BATTERIE	
Udc (Vdc)	+/- 240
Idc (A)	240
N° Serie - Serial Number - Seriennumber	
Year of construction	2016

5th Floor,1# Buiding,Gaofa Industrial Park,
Longjing, Nanshan District, Shenzhen,
China ,518055

CE Made in China | 145 kg

Service: www.invt-power.com

Manufacturer: INVT POWER SYSTEM(SHENZHEN)CO., LTD
Address: 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Importer: xxx
Address: xxx
Battery must be recycled.
WARNING! Risk of electric shock.

4. Warning label on outer enclosures

WARNING

CHARGED CAPACITORS
DISCHARGE TIME 5 MINUTES AFTER DISCONNECTION OF UPS AND BATTERY

CAUTION

OPERATION INSTRUCTION

HIGH LEAKAGE CURRENT, EARTH CONNECTION ESSENTIAL BEFORE CONNECTING UPS.
DO NOT REMOVE COVERS. THIS SYSTEM IS TO BE SERVICED BY QUALIFIED
SERVICE PERSONNEL ONLY.
HAZARDOUS LIVE PARTS INSIDE THIS UPS ARE ENERGIZED FROM THE BATTERY SUPPLY EVEN WHEN THE AC
INPUT POWER IS DISCONNECTED.
SEE USER MANUAL FOR INSTALLATION,
OPERATING AND MAINTENANC E INSTRUCTION

DANGER

RISK OF ELECTRIC SHOCK.
DO NOT TOUCH UNINSULATED BATTERY TERMINAL.
TEST BEFORE TOUCHING.
DISCONNECTION OF THE EXTERNAL AC & DC SWITCHES IS REQUIRED FOR COMPLETE LOAD POWER OFF OR MAINTENANCE.

OPERATION INSTRUCTION

BATTERY VOLTAGE&CONNECTION MUST COMPLY WITH UPS SPECIFICATION.
MANUAL BATTERY DISCHARGE RECOMMENDED FOR EVERY 3 MONTHS
CONTINUOUS OPERATION WITHOUT ANY BATTERY DISCHARGE.
WARRANTY VOID IF SERIAL NO.PLATE IS DAMAGED.

WARNING: BACKFEED PROTECTION

This system has a control signal available for use with an automatic device, externally located, to protect against backfeeding voltage through the mains Static Bypass circuit.If this protection is not used with the switchgear that is used to isolate the bypass circuit, a label must be added to the switchgear to advise service personnel that the circuit is connected to a UPS system.

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.3	Components		P
1.5.1/RD	General		
	Comply with IEC 62040-1 or relevant component standard	(see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 60950-1 and the relevant component standard. Components, for which no relevant IEC-standard exists, have been tested under the conditions occurring in the equipment, using applicable parts of IEC 60950-1.	P
1.5.3/RD	Thermal controls	No thermal control.	N
1.5.4/RD	Transformers	No safety isolating transformer.	N
1.5.5/RD	Interconnecting cables	The interconnecting cable to PC is carrying only SELV voltage on a low energy level.	P
1.5.6/RD	Capacitors bridging insulation	Between lines: X2 capacitor according to IEC 60384-14: 1993 with 21 days damp heat test was used.	P
1.5.7/RD	Resistors bridging insulation	Refer to below:	P
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation		P
1.5.7.2/RD	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	No resistors bridging double or reinforced insulation.	N
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	No bridging resistors	N
1.5.8/RD	Components in equipment for IT power systems	TN power system.	N
4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.6)	P
4.6 1.6.4/RD	Neutral conductor	Neutral is insulated from earth with basic insulation throughout the equipment. O/P neutral is not isolated from I/P neutral.	P
4.7	Marking and instructions		P
4.7.1	General	See below.	P
4.7.2 1.7.1/RD	Power rating	The required marking is located on the outside surface of the equipment.	P
	Input rated voltage/range (V) .....:	See rating label	P
	Input rated current/range (A).....:	See rating label	P
	Input symbol for nature of supply (d.c.) .....:	⎓	P
	Input rated frequency/range (Hz) .....:	50/60Hz	P
	Number of Input phases and neutral.....:	380/400/415V～	P
	Output rated voltage/range (V) .....:	Not marked.	P
	Output rated current/range (A) .....:	3Ø	N
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current) .....:	See rating label	N
	Number of output phases and neutral.....:	See rating label	P
	Output rated active power (W) .....:	AC output	P
	Output rated apparent power (VA) .....:	50/60Hz	P
	Output symbol for nature of supply (d.c.) .....:	40℃	N
	Output rated frequency/range (Hz) .....:	INVT	P
	Ambient operating temperature range (°C).....:	RM060/10, RM090/15, RM120/20	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	Class I equipment.	N
	Manufacturer's name or trademark or identification mark .....:	See rating label	P
	Type/model or type reference .....:	See rating label	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	Symbol for Class II equipment only .....:	The equipment is Class I.	N
	Other symbols .....:	The additional marking does not give rise to misunderstandings.	P
	Certification marks .....:	CE	P
	Instructions for units with automatic bypass / maintenance bypass, additional input a.c. supply, or external batteries, having text "See installation instructions before connecting to the supply" .....:	See caution label	P
4.7.3	Safety instructions	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
4.7.3.1	General	Considered	P
4.7.3.2	Installation .....:	Installation instructions are available to the user in User's Manual.	P
	Location in a restricted access location only ...:	Instruction manual provided. Not for restricted access location.	P
	Permanent connector UPS .....:	Instruction manual provided.	P
	Pluggable type A or Pluggable type B UPS ....:	Pluggable equipment type A	P
4.7.3.3	Operation.....:	The suitable information list in the user manual when operate the UPS. Not for restricted access location.	P
4.7.3.4	Maintenance.....:	The instruction of maintenance is only included in the service manual.	P
4.7.3.5	Distribution related backfeed.....:	Not permanently connected UPS.	N
4.7.4 1.7.4/RD	Main voltage adjustment .....:	No voltage selector	N
	Methods and means of adjustment; reference to installation instructions .....:	No voltage selector	N
4.7.5 1.7.5/RD	Power outlets.....:	Relevant information provided on the marking that is affixed near the outlets.	P
4.7.6 1.7.6/RD	Fuse identification (marking, special fusing characteristics, cross-reference)	Marking near holders for fuses.	P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.7.1/RD	Protective earthing and bonding terminals .....:	Polarity of battery terminals is indicated according to IEC 60417(+ and -) on the batteries. Indicated with red cooler (+) for positive side and black color (-) for negative side.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors		P
1.7.7.3/RD	Terminals for d.c. mains supply conductors	AC main supplied	N
4.7.8	Battery terminals :	The terminal of batteries is marked with standard symbol (IEC 60417, No. 5005 and No. 5006).	P
4.7.9 1.7.8/RD	Controls and indicators	See below	P
1.7.8.1/RD	Identification, location and marking :	The function of controls affecting safety is obvious without knowledge of language etc.	P
1.7.8.2/RD	Colours :	For LCD provided, located on the front panel	P
1.7.8.3/RD	Symbols according to IEC 60417 :	The function switch is marked " " (IEC 60417-1 No. 5010).	P
1.7.8.4/RD	Markings using figures :	No controls affecting safety are using figures.	N
4.7.10 1.7.9/RD	Isolation of multiple power sources :	Only one external supply of hazardous voltage of energy (via appliance inlet).	N
4.7.11 1.7.2.4/RD	IT power systems		N
4.7.12	Protection in building installation		N
	Rated short-time withstand current (*I*cw) .....:		N
	Rated conditional short circuit current (*I*cc) .....:		N
	a) If higher Icp stated ≤ 10 kA		N
	a) If higher Icp stated > 10 kA		N
4.7.13 5.1/RD	High leakage current (mA) .....:	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P
4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) .....:	Instructions and markings shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	
4.7.16 1.7.11/RD	Durability of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking of the label did not fade. There was neither curling nor lifting of the label edge.	P
4.7.17 1.7.12/RD	Removable parts	No such parts.	N
4.7.18 1.7.13/RD	Replaceable batteries	The battery is not placed in an operator access area. The required warning is in the safety manual.	P
	Language(s) .....:	Instructions and markings are in English.	
4.7.19 1.7.2.5/RD	Operator access with a tool.....:	No operator accessible area that needs to be accessed by the use of a tool.	N
4.7.20	Battery	Pluggable equipment type A UPS with integral batteries.	P
	Clearly legible information .....:	Warning label attached on the outside surface of External battery pack. Information clearly legible	P
	Battery type .....:	Lead-Acid	P
	Nominal voltage of total battery (V) .....:	Stated on rating user's manual.	P
	Nominal capacity of total battery (optional) .....:	Stated on rating user's manual.	P
	Warning label .....:	Warning language with information: Caution: Lead-acid battery inside the enclosure, it may cause chemical hazard. The battery may presents a risk of electric shock and energy hazards. For disposal instructions for the battery, see user's manual.	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructions .....:	The sufficient information about the battery was given in the user's manual.	P
2.1.1.5/RD	Protection against energy hazards	No energy hazard in operator access area. Checked by means of the test finger.	P
4.7.21 1.7.2.4/RD	Installation instructions	Detailed information regarding external interfaces (RS232 and modem/phone line connection) provided in the User's Manual.	P

5	FUNDAMENTAL DESIGN REQUIREMENTS		P
5.1	Protection against electric shock and energy hazards		P
5.1.1 2.1.1/RD	Protection for UPS intended to be used in operator access areas	Refer below:	P
2.1.1.1/RD	Access to energized parts	There is adequate protection against operator contact with bare parts at ELV or hazardous voltage or parts separated from these with basic or functional insulation only (except protective earth). No hazardous voltages exceeding 1000V a.c. or 1500V d.c. Checked by test finger, test probe and test pin.	P
	Test by inspection :	Complies	P
	Test with test finger (Figure 2A) :	Complies	P
	Test with test pin (Figure 2B) :	Complies	P
	Test with test probe (Figure 2C) :	No TNV circuits	N
2.1.1.2/RD	Battery compartments	Inside the battery compartment only primary circuits.	N
2.1.1.3/RD	Access to ELV wiring	No internal wiring at ELV accessible to the operator.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No operator accessible hazardous voltage circuit wiring.	N
2.1.1.5/RD	Energy hazards :	The user accessible RS-232 and RJ45 ports are isolated from the hazardous energy level of the battery inside the UPS.	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
2.1.1.6/RD	Manual controls	Operator only has access to bare parts of SELV circuits.	P
2.1.1.7/RD	Discharge of capacitors in equipment	The capacitance of the input circuits>0.1uF, refer to list of critical components.	P
	Measured voltage (V); time-constant (s) :	(See appended table 5.1.1)	--
2.1.1.8/RD	Energy hazards – d.c. mains supply	The equipment is not connected to d.c. mains supply	N
	a) Capacitor connected to the d.c. mains supply :		N
	b) Internal battery connected to the d.c. mains supply :		N
2.1.1.9/RD	Audio amplifiers :	No such parts.	N
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas	Checked by inspection, unintentional contact is unlikely during service operations.	N
	Hazardous energy level		N
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas	Not for restricted access area	N
	Hazardous energy level		N
5.1.4	Backfeed protection	See below	--
	Shock hazard after de-energization of a.c. input for UPS	No shock hazard	P
	Measured voltage (V); time-constant (s) :	(see appended table 5.8)	--
	Description of the construction:	Backfeed protection was provided externally to the UPS in the a.c. input line.	P
	Air gap is employed for backfeed protection		P
5.1.5	Emergency switching device	Not mandatory for pluggable UPS.	N

5.2	Requirements for auxiliary circuits		P
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV	See below:	P
2.2.1/RD	General requirements	SELV limits are not exceeded under normal condition.	P
2.2.2/RD	Voltages under normal conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P
2.2.3/RD	Voltages under fault conditions (V) ..... :	Within SELV limits. (See appended table 5.2.1)	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
2.2.4/RD	Connection of SELV circuits to other circuits .. :	SELV circuits are only connected to other SELV and protective earth.	P
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	Refer below:	N
2.3.1/RD	Limits	No TNV circuits, cl. 2.3/RD	N
	Type of TNV circuits :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed :		
2.3.5/RD	Test for operating voltages generated externally		N
5.2.3 2.4/RD	Limited current circuits	No limited current circuits, cl. 2.4/RD.	N
2.4.1/RD	General requirements		N
2.4.2/RD	Limit values		
	Frequency (Hz) :		
	Measured current (mA) :		
	Measured voltage (V) :		
	Measured circuit capacitance (nF or µF) :		
2.4.3/RD	Connection of limited current circuits to other circuits		N
5.2.4 3.5/RD	External signalling circuits	Refer to below:	P
3.5.1/RD	General requirements	Considered.	P
3.5.2/RD	Types of interconnection circuits :	SELV circuits.	P
3.5.3/RD	ELV circuits as interconnection circuits	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment		N
5.2.5 2.5/RD	Limited power source	No limited power source.	N
	a) Inherently limited output		N
	b) Impedance limited output		N

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

	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA) ..... :		
	Current rating of overcurrent protective device (A)		
	Use of integrated circuit (IC) current limiters		N

5.3	Protective earthing and bonding		P
5.3.1	General	See below.	P
2.6/RD	Provisions for earthing and bonding	Screw terminal used.	P
2.6.1/RD	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal (via green/yellow insulated wires).	P
2.6.2/RD	Functional earthing	No functional earthing employed.	N
2.6.3/RD	Protective earthing and protective bonding conductors	Through approved enclosure.	P
2.6.3.1/RD	General	Compliance checked.	P
2.6.3.2/RD	Size of protective earthing conductors	See below.	P
	Rated current (A), cross-sectional area (mm^2), AWG :	According to table 3B.	
2.6.3.3/RD	Size of protective bonding conductors	Refer to 2.6.3.4/RD.	P
	Rated current (A), cross-sectional area (mm^2), AWG :	Refer to 2.6.3.4/RD.	
	Protective current rating (A), cross-sectional area (mm2), AWG :	Refer to 2.6.3.4/RD.	
2.6.3.4/RD	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) :	(See appended table 5.3.1)	P
2.6.3.5/RD	Colour of insulation :	All insulated protective earth conductors are used colored green and yellow.	P
2.6.4/RD	Terminals	See below.	P
2.6.4.1/RD	General	See below.	P
2.6.4.2/RD	Protective earthing and bonding terminals	Adequate protective earth connection, see also Sub-clause 2.6.3.4/RD and 3.3/RD	P
	Rated current (A), type, nominal thread diameter (mm) :		

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Separate PE and protective bonding conductor used.	N
2.6.5/RD	Integrity of protective earthing	See below.	P
2.6.5.1/RD	Interconnection of equipment	The unit has its own earthing connection. PE terminals of outlets reliably connected to PE terminal of unit	P
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3/RD	Disconnection of protective earth		P
2.6.5.4/RD	Parts that can be removed by an operator		P
2.6.5.5/RD	Parts removed during servicing	It is not necessary to disconnect earthing except for the removal of the earthed part itself.	P
2.6.5.6/RD	Corrosion resistance	All safety earthing connections in compliance with Annex J.	P
2.6.5.7/RD	Screws for protective bonding	No such screw	N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system	Protective earthing is not rely on cable distribution system.	N
5.3.2 2.6.1/RD	Protective earthing	Accessible conductive parts are reliably connected to protective earth terminal	P
2.10/RD	Clearances, creepage distances and distances through insulation	See clause 5.7	P
4.2/RD	Mechanical strength	See clause 7.3	P
5.2/RD	Electric strength	See clause 8.2	P
5.3.3	Protective bonding	Refer also to 2.6.3.4/RD	P

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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
3.4.5/RD	Switches in flexible cords	No such construction.	N
3.4.6/RD	Number of poles - single-phase and d.c. equipment		N
3.4.7/RD	Number of poles - three-phase equipment	Three-phase only.	N
3.4.8/RD	Switches as disconnect devices		N
3.4.9/RD	Plugs as disconnect devices		N
3.4.10/RD	Interconnected equipment	SELV circuits connect only to SELV circuits and Hazardous Voltage circuits to Hazardous circuits.	P
3.4.11/RD	Multiple power sources		N
5.4.2	Disconnect devices	Refer to cl. 3.4.2/RD.	N
5.5	Overcurrent and earth fault protection		P
5.5.1	General	See below.	P
2.7.3/RD	Short-circuit backup protection	Pluggable equipment with type A. Building installation is considered as providing short circuit backup protection.	P
2.7.4/RD	Number and location of protective devices …….:	Over current protection by one input breaker.	P
2.7.5/RD	Protection by several devices	Only one protective device provided.	P
2.7.6/RD	Warning to service personnel :	No double-pole fusing inside this pluggable equipment type A UPS.	N
5.5.2	Basic requirements	Equipment relies on fuse protection of the building installation in regard to L to N short-circuits. Over current protection is provided by the built-in circuit breaker.	P
5.5.3	Battery circuit protection	Ungrounded batteries inside the UPS. Protection against overcurrent by three fuses in parallel in the plus pole of the battery supply circuit of the UPS or battery cabinet.	P
5.5.3.1	Overcurrent and earth fault protection	See below.	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.3.2	Location of protective device	The fuses are directly located behind the supply wire of the battery. The charger circuit is located in the battery circuit before the fuses. For the charger circuit there are no hazardous conditions under any simulated fault conditions. See appended table.	P
5.5.3.3	Rating of protective device	The rating of the fuses inside the UPS provides adequate safety protection during abnormal and/or fault conditions.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current		P
5.5.4.1	General		P
5.5.4.2	Modes of operation		P
5.5.4.3	Test procedure		P
5.5.4.3.1	General application		P
	Rated UPS output current/(r.m.s) (A) ..... :	See product specification	P
	Prospective test current/(r.m.s) (A) ..... :	See product specification	P
	Typical power factor ..... :	See product specification	P
	Initial asymmetric peak current ration (*I*pk / *I*cw) . :	Icw: 10KA	P
	Minimum durating of prospective test current (cycles 50/60 Hz) ..... :	50Hz	P
5.5.4.3.2	Exemption from testing		P

5.6	Protection of personnel – Safety interlocks *(No safety interlock provided for operator protection since there are no liable hazards capable of harming the operator during operation).*		P
5.6.1	Operator protection	See below	N
2.8/RD	Safety interlocks	No safety interlocks.	N
2.8.1/RD	General principles		N
2.8.2/RD	Protection requirements		N
2.8.3/RD	Inadvertent reactivation		N
2.8.4/RD	Fail-safe operation		N
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches and relays		N
2.8.7.1/RD	Contact gaps (mm) :		N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection	See below.	P
5.6.2.1	Introduction	Considered	P
5.6.2.2	Covers	It is unlikely that during the removal of any covers service personnel may touch hazardous voltage or energy.	P
5.6.2.3	Location and guarding of parts	Only the exchange of the battery is considered as possible servicing. A risk of injury is unlikely for the service personnel.	P
5.6.2.4	Parts on doors	The UPS is designed with only screwed enclosure parts.	P
5.6.2.5	Component access	No component access during operation mode necessary.	N
2.8.3/RD	Inadvertent reactivation	No servicing in operation mode necessary.	N
5.6.2.6	Moving parts	No hazardous moving parts.	N
5.6.2.7	Capacitor banks	The capacitors provided can produce energy level way below 20 joules.	P
5.6.2.8	Internal batteries	The terminals of the battery connections are isolated and covered so that it is unlikely to bridge the terminals of the battery during servicing or its replacement.	P

5.7 2.10/RD	Clearances, creepage distances and distances through insulation		P
2.10.1/RD	General	See 2.10.3/RD, 2.10.4/RD and 2.10.5/RD.	P
2.10.1.1/RD	Frequency ..... :	Considered.	P
2.10.1.2/RD	Pollution degrees ..... :	II	P
2.10.1.3/RD	Reduced values for functional insulation	See 5.3.4.	N
2.10.1.4/RD	Intervening unconnected conductive parts	No such part.	N
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	N
2.10.1.6/RD	Special separation requirements	No TNV	N
2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit.	N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.2/RD	Determination of working voltage		P
2.10.2.1/RD	General	The rms and the peak voltage were measured with unit connected to a 240V TN power system. Pollution Degree 2 and Overvoltage Category II considered.	P
2.10.2.2/RD	RMS working voltage	(See appended table 5.7)	P
2.10.2.3/RD	Peak working voltage	(See appended table 5.7)	P
2.10.3/RD	Clearances	See below. Annex G/RD was not considered.	P
2.10.3.1/RD	General	Annex F/RD and minimum clearances considered.	P
2.10.3.2/RD	Mains transient voltages	See below.	P
	a) AC mains supply ..... :	Equipment is Overvoltage Category II.	P
	b) Earthed d.c. mains supplies ..... :	Not intended for d.c. mains supplies	N
	c) Unearthed d.c. mains supplies :	Not intended for d.c. mains supplies	N
	d) Battery operation :	Dedicated battery used.	P
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.3.5/RD	Clearances in circuits having starting pulses	No such circuit generating starting pulses.	N
2.10.3.6/RD	Transients from a.c. mains supply :	Considered.	P
2.10.3.7/RD	Transients from d.c. mains supply :	Not connected to d.c. mains supply.	N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :	No TNV circuits	N
2.10.3.9/RD	Measurement of transient voltage levels	Measurement not relevant	N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	CTI tests	CTI rating for all material of min. 100.	
2.10.4.3/RD	Minimum creepage distances	(see appended table 5.7)	P
2.10.5 /RD	Solid insulation	Solid or laminated insulating materials having adequate thickness are provided.	P
2.10.5.1/RD	General	See below.	P
2.10.5.2/RD	Distances through insulation	(see appended table 5.8)	P
2.10.5.3/RD	Insulating compound as solid insulation	Approved opto-couplers, see appended table 4.5	P
2.10.5.4/RD	Semiconductor devices	Approved optocoupler complies to IEC 60747-5-2 with dti≥0.4mm used.	P
2.10.5.5/RD	Cemented joints	No cemented joint.	N
2.10.5.6/RD	Thin sheet material – General	At least layers	P
2.10.5.7/RD	Separable thin sheet material	AC 3000V for each layer of insulation (See appended table 5.8)	P
	Number of layers (pcs).		--
2.10.5.8/RD	Non-separable thin sheet material	Not used.	N
2.10.5.9/RD	Thin sheet material – standard test procedure		N
2.10.5.10 /RD	Thin sheet material – (Alternative) test procedure		N
	Electric strength test		--
2.10.5.11 /RD	Insulation in wound components	See cl. 2.10.5.12/RD	N
2.10.5.12 /RD	Wire in wound components		N
	Working voltage :		
	a) Basic insulation not under stress :		N
	b) Basic, supplementary, reinforced insulation :		N
	c) Compliance with Annex U :		N
	Two wires in contact inside wound component; angle between 45º and 90º :	Insulation sheets and tapes used to relieve mechanical stress at crossover points.	N
2.10.5.13 /RD	Wire with solvent-based enamel in wound components	No wire with solvent-based enamel in wound components.	N
	Electric strength test	(see appended table 8.2)	
	Routine test		N
2.10.5.14 /RD	Additional insulation in wound components	No additional insulation used.	N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	Working voltage :		
	- Basic insulation not under stress :		N
	- Supplementary, reinforced insulation :		N
2.10.6/RD	Construction of printed boards	See below.	P
2.10.6.1/RD	Uncoated printed boards	(see appended table 5.7)	P
2.10.6.2/RD	Coated printed boards	No such part.	N
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board	No such part.	N
2.10.6.4/RD	Insulation between conductors on different layers of a printed board	PCB layout does not serve as insulation barrier.	N
	Distance through insulation		N
	Number of insulation layers (pcs) :		N
2.10.7/RD	Component external terminations	No such part.	N
2.10.8/RD	Tests on coated printed boards and coated components	No such part.	N
2.10.8.1/RD	Sample preparation and preliminary inspection		N
2.10.8.2/RD	Thermal conditioning		N
2.10.8.3/RD	Electric strength test		
2.10.8.4/RD	Abrasion resistance test		N
2.10.9/RD	Thermal cycling		N
2.10.10/RD	Test for Pollution Degree 1 environment and insulating compound	Pollution Degree 2	N
2.10.11/RD	Tests for semiconductor devices and cemented joints	Approved optocoupler used. No other parts to be tested.	P
2.10.12/RD	Enclosed and sealed parts	No hermetically sealed component.	N

6	Wiring, connections and supply		P
6.1	General	Considered.	P
6.1.1	Introduction	Considered.	P
3.1/RD	General	See below.	P
3.1.1/RD	Current rating and overcurrent protection	All internal wires are UL recognized wiring which is PVC insulated. Rated VW-1, 600V, minimum 105°C. Internal wiring gauge is suitable for current intended to be carried. Internal wiring for primary power distribution protected against overcurrent by built-in input fuse.	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
3.1.2/RD	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3/RD	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4/RD	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5/RD	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N
3.1.6/RD	Screws for electrical contact pressure	Electrical and earthing connections screwed two or more complete threads into metal. No screws of insulating material for electrical and earthing connections, or where supplementary or reinforced insulation could be impaired by a metal replacement.	P
3.1.7/RD	Insulating materials in electrical connections	All current carrying and safety earthing connections are metal to metal.	P
3.1.8/RD	Self-tapping and spaced thread screws	Self-tapping screws provided in inverter circuit and earthing bonding.	P
3.1.9/RD	Termination of conductors	All conductors are reliable secured by the use of solder pins or glue or other mechanical fixing means. No risk of stranded conductors coming loose.	P
	10 N pull test	Break away or pivot on its terminal is unlikely.	P
3.1.10/RD	Sleeving on wiring	Sleeving used to provide supplementary/ reinforce insulation.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Only one supply connections.	N
3.2.3/RD	Permanently connected equipment	Pluggable equipment type A	N
	Number of conductors, diameter of cable and conduits (mm) ..... :		--
3.2.4/RD	Appliance inlets	The appliance inlet complies with IEC/EN 60320. The power cord can be inserted without difficulties and does not support the unit.	P
3.2.5/RD	Power supply cords	See below.	N
3.2.5.1/RD	AC power supply cords		N
	Type ..... :		--
	Rated current (A), cross-sectional area (mm²), AWG ..... :		--
3.2.5.2/RD	DC power supply cords	Not connected to DC power supply cords.	N
3.2.6/RD	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) ..... :		--
	Longitudinal displacement (mm) ..... :		--
3.2.7/RD	Protection against mechanical damage	No parts under this unit likely to damage the power supply cord. Enclosure without sharp edges.	P
3.2.8/RD	Cord guards	Appliance inlet and outlets used.	N
	Diameter or minor dimension D (mm); test mass (g) ..... :		--
	Radius of curvature of cord (mm)..... :		--
6.2.2	Means of connection :		P
	More than one supply connection :	Single voltage range supply connection.	N

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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
3.3.4/RD	Conductor sizes to be connected		N
	Rated current (A), cord/cable type, cross-sectional area (mm2) ..... :		
3.3.5/RD	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) ..... :		
3.3.6/RD	Wiring terminal design		N
3.3.7/RD	Grouping of wiring terminals		N
3.3.8/RD	Stranded wire		N
7	Physical requirements		P
7.1	Enclosure	Adequate protection against risk of fire, electric shock, injury to persons and hazardous energy level.	P
7.2 4.1/RD	Stability		P
	Angle of 10	All models of the UPS do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) :	800N applied to UPS.	P
7.3 4.2/RD	Mechanical strength		P
4.2.1/RD	General	Tests performed and passed. Results see below. After the tests, unit complied with the requirements of sub-clauses 2.1.1/RD, 2.6.1/RD, 2.10/RD and 4.4.1/RD.	P
4.2.2/RD	Steady force test, 10 N	10 N applied to components.	P
4.2.3/RD	Steady force test, 30 N		N
4.2.4/RD	Steady force test, 250 N	250 N applied to outer enclosure. No energy or other hazards.	P
4.2.5/RD	Impact test	No hazard as a result from steel ball impact test.	P
	Fall test	No hazard as a result from steel ball impact test.	P
	Swing test	No hazard as result from steel sphere ball swung test.	P
4.2.6/RD	Drop test; height (mm):	Drop test not applicable	N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
4.2.7/RD	Stress relief test	Test is carried out at 70°C / 7h. No risk of shrinkage or distortion on enclosures due to release of internal stresses.	P
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment.	N
	Picture tube separately certified :		N
4.2.9/RD	High pressure lamps	No high pressure lamps in the equipment.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N) :	No wall or ceiling mounted equipment	N
7.4	Construction details		P
7.4.1	Introduction	Considered.	P
4.3.1/RD	Edges and corners	All edges and corners are rounded and/or smoothed.	P
4.3.2/RD	Handles and manual controls; force (N) ..... :	No loosening of any knobs.	N
4.3.3/RD	Adjustable controls	No hazardous adjustable controls.	N
4.3.4/RD	Securing of parts	No loosening of parts impairing creepage distances or clearances is likely to occur.	P
4.3.5/RD	Connection by plugs and sockets	No mismatch of connectors, plugs or sockets possible.	P
4.3.7/RD	Heating elements in earthed equipment	No heating elements provided.	N
4.3.11/RD	Containers for liquids or gases	The equipment does not contain flammable liquids or gases.	N
4.4/RD	Protection against hazardous moving parts		P
4.4.1/RD	General	DC fan located at primary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2/RD	Protection in operator access areas :	See 4.4.1	P
4.4.3/RD	Protection in restricted access locations :	Not for restricted access locations.	N
4.4.4/RD	Protection in service access areas	See 4.4.1	P
4.4.5/RD	Protection against moving fan blades		N
4.4.5.1/RD	General		N
	Not considered to cause pain or injury. a) ..... :		N
	Is considered to cause pain, not injury. b) ..... :		N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	Considered to cause injury. c) ..... :		N
4.4.5.2	Protection for users		N
	Use of symbol or warning ..... :		N
4.4.5.3	Protection for service persons		N
	Use of symbol or warning ..... :		N
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L :		
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat :		P
7.4.2	Openings	(See appended table 7.4.2)	P
7.4.3	Gas Concentration	The ventilation by openings exceeds the required airflow. Refer to Annex M.	P
7.4.4	Equipment movement		N
7.5 4.7/RD	Resistance to fire		P
4.7.1/RD	Reducing the risk of ignition and spread of flame	Use of materials with the required flammability classes	P
	Method 1, selection and application of components wiring and materials	Method 1 is used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits.	P
	Method 2, application of all of simulated fault condition tests		N
4.7.2/RD	Conditions for a fire enclosure	See below.	P
4.7.2.1/RD	Parts requiring a fire enclosure	Will having the following parts: Components in primary The fire enclosure is required.	P
4.7.2.2/RD	Parts not requiring a fire enclosure	The fire enclosure is required to cover all parts.	N
4.7.3/RD	Materials	See below.	P
4.7.3.1/RD	General	PCB rated V-0. See appended table.	P
4.7.3.2/RD	Materials for fire enclosures	(See appended table 4.3)	P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3.3/RD	Materials for components and other parts outside fire enclosures	See sub-clause 4.7.2/RD	N
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	Internal components except small parts are V-2, HF-2 or better.	P
4.7.3.5/RD	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6/RD	Materials used in high-voltage components	No parts exceeding 4kV.	N
7.6	Battery location		P
7.6.1	Battery location and installation	Batteries are located inside the UPS enclosure.	P
7.6.2	Accessibility and maintainability		N
7.6.3	Distance		N
7.6.4	Case insulation	No Ni-Cd battery used inside.	N
7.6.5	Wiring	The protection of connecting wiring complies with subclause 6, details see there.	P
7.6.6	Electrolyte spillage		N
7.6.7	Ventilation		N
7.6.8	Charging voltage	Protective circuit to prevent excessive charging voltages occurring under any single fault condition. See sub-clause 8.3	P
7.7	Temperature rise		P
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L ..... :		—
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat ..... :	(See appended table 7.4)	P
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General		P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
8.2 5.2/RD	Electric strength		P
5.2.1/RD	General	(see appended table 8.2)	P
5.2.2/RD	Test procedure	(see appended table 8.2)	P
8.3	Abnormal operating and fault conditions		P
8.3.1	General	Considered.	P
5.3.1/RD	Protection against overload and abnormal operation	(See appended table 8.3)	P
5.3.2/RD	Motors	No motors	N
5.3.3/RD	Transformers	No isolating transformer.	N
5.3.4/RD	Functional insulation :	Complies with a) and c).	P
5.3.5/RD	Electromechanical components	No electromechanical components in secondary circuits.	N
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	No fire or molten metal occurred and no deformation of enclosure during the tests. No reduction of clearance and creepage distances. Electric strength test is made on basic, supplementary and reinforced insulation.	P
5.3.9.1/RD	During the tests		P
5.3.9.2/RD	After the tests		P
8.3.2	Simulation of faults	(See appended table 8.3)	P
8.3.3	Conditions for tests	(See appended table 8.3)	P
9 6/RD	Connection to telecommunication networks		N
6.1/RD	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1/RD	Protection from hazardous voltages		N
6.1.2/RD	Separation of the telecommunication network from earth		N
6.1.2.1/RD	Requirements		N
	Supply voltage (V) ..... :		
	Current in the test circuit (mA) ..... :		
6.1.2.2/RD	Exclusions ..... :		N
6.2/RD	Protection of equipment users from overvoltages on telecommunication networks		N
6.2.1/RD	Separation requirements		N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.2/RD	Electric strength test procedure		N
6.2.2.1/RD	Impulse test		N
6.2.2.2/RD	Steady-state test		N
6.2.2.3/RD	Compliance criteria		N
6.3/RD	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A) ..... :		
3.5/RD	Interconnection of equipment		N
3.5.1/RD	General requirements	This power supply is not considered for connection to TNV.	P
3.5.2/RD	Types of interconnection circuits ..... :	Interconnection circuits of SELV through the connector. No ELV interconnection circuits.	P
3.5.3/RD	ELV circuits as interconnection circuits		N
3.5.4/RD	Data ports for additional equipment		N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits..... :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions ..... :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed ..... :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed ..... :		
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.4/RD	Creepage distances		P
2.10.4.1/RD	General		P
2.10.4.2/RD	Material group and comparative tracking index		P
	CTI tests..... :		
2.10.4.3/RD	Minimum creepage distances		P

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
M/RD	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)		N
M.1/RD	Introduction		N
M.2 /RD	Method A		N
M.3/RD	Method B		N
M.3.1/RD	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)		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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	Flame A, B or C ..... :		
A.2.5/RD	Test procedure		N
A.2.6/RD	Compliance criteria		N
	Sample 1 burning time (s) ..... :		
	Sample 2 burning time (s) ..... :		
	Sample 3 burning time (s) ..... :		
A.2.7/RD	(Alternative) test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s) ..... :		
	Sample 2 burning time (s) ..... :		
	Sample 3 burning time (s) ..... :		
A.3/RD	Hot flaming oil test (see 4.6.2/RD)		N
A.3.1/RD	Mounting of samples		N
A.3.2/RD	Test procedure		N
A.3.3/RD	Compliance criterion		N
B/RD	Annex B, Motor tests under abnormal conditions (see 4.7.2.2/RD and 5.3.2/RD)		P
B.1/RD	General requirements	All fans are separately certified, see list of critical components. Only fan block test performed, for temperature, see fault condition tests	P
	Position ..... :		N
	Manufacturer ..... :		N
	Type ..... :		N
	Rated values ..... :		N
B.2/RD	Test conditions		N
B.3/RD	Maximum temperatures		N
B.4/RD	Running overload test		N
B.5/RD	Locked-rotor overload test		N
	Test duration (days) ..... :		N
	Electric strength test: test voltage (V) ..... :		N
B.6/RD	Running overload test for d.c. motors in secondary circuits		N
B.6.1/RD	General		N
B.6.2/RD	Test procedure		N
B.6.3/RD	(Alternative) test procedure		N
B.6.4/RD	Electric strength test; test voltage (V) ..... :		N

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
B.7/RD	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1/RD	General		N
B.7.2/RD	Test procedure		N
B.7.3/RD	(Alternative) test procedure		N
B.7.4/RD	Electric strength test; test voltage (V) ..... :		N
B.8/RD	Test for motors with capacitors		N
B.9/RD	Test for three-phase motors		N
B.10/RD	Test for series motors		N
	Operating voltage (V) ..... :		N
C/RD	Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)		N
	Position ..... :	No isolating transformer.	N
	Manufacturer ..... :		N
	Type ..... :		N
	Rated values ..... :		N
	Method of protection ..... :		N
C.1/RD	Overload test		N
C.2/RD	Insulation		N
	Protection from displacement of windings ..... :		N
D/RD	Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)		P
D.1/RD	Measuring instrument		P
D.2/RD	(Alternative) measuring instrument		N
E/RD	Annex E, Temperature rise of a winding (see 1.4.13/RD)		N
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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
G.2.2/RD	Earthed d.c. mains supplies ..... :		N
G.2.3/RD	Unearthed d.c. mains supplies ..... :		N
G.2.4/RD	Battery operation ..... :		N
G.3/RD	Determination of telecommunication network transient voltage (V) ..... :		N
G.4/RD	Determination of required withstand voltage (V)		N
G.4.1/RD	Mains transients and internal repetitive peaks :		N
G.4.2/RD	Transients from telecommunication networks . :		N
G.4.3/RD	Combination of transients		N
G.4.4/RD	Transients from cable distribution systems		N
G.5/RD	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		N
	For an a.c. mains supply		N
	For a d.c. mains supply		N
	b) Transients from a telecommunication network		N
G.6/RD	Determination of minimum clearances ..... :		N

H	Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)	N

I	Annex I, Backfeed protection test		P
I.1	General		P
I.2	Test for pluggable UPS	Backfeed relay provided.	P
I.3	Test for permanently connected UPS		N
I.4	Load-induced change of reference potential		N
I.5	Solid-state backfeed protection (see clause 7.1-7.5 of IEC 62040-2 and clause 7.1-7.2 of IEC 62040-3)		N

J/RD	Annex J, Table of electrochemical potentials (see 2.6.5.6/RD)		P
	Metal(s) used ..... :	Copper plated with tin and soldering lead.	

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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

EN 62040-1: 2008+A1: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
K.4/RD	Temperature limiter endurance; operating voltage (V) ..... :		N
K.5/RD	Thermal cut-out reliability		N
K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P
L.2	Reference resistive load		N
L.3	Reference inductive-resistive load		
L.4	Reference capacitive-resistive loads	Worst case power factors as specified by the manufacturer maintained during the relevanttests.	P
L.5	Reference non-linear load		N
L.5.1	Test method		N
L.5.2	Connection of the non-linear reference load		
L.5.3	Connection of the non-linear reference load		N
M	Annex M, Ventilation of battery compartments		P
M.1	General	Sufficient openings and a suitable arrangement of components (relays) are provided in such a way that a local concentration of hydrogen and oxygen is not possible. No requirement regarding the separation of operational arcing parts from battery vents/valves.	P
M.2	Normal conditions	See M.1 above.	P
M.3	Blocked conditions	See appended table 8.3.	P
M.4	Overcharge conditions		N
N	Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)		N
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

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

V.1/RD	Introduction		P
V.2/RD	TN power distribution systems	See sub-clause 1.6.1/RD.	P
V.3/RD	TT power distribution systems		P
V.4/RD	IT power distribution systems		P

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

4.5	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity[1])
Whole unit					
Metal enclosure	Various	Steel/Aluminium	--	--	--
Material of Front panel	CHI MEI CORPORATION	PA-765A(+)	5VA, 80℃, Min, thickness 2.1mm	UL 94	UL: E56070
Breaker 1	LS	ABE203B 225A	660V, 225A	IEC 60947-2	KEMA NL-8832/1-A2
Current Transformer (CT)	HAIGUANG	UMS33CT3	CLASS F	--	Test with appliance
AC fan (two provided)	YEN SUN	FD248025EB-N(2R9)	DC24V, 0.14A, 3.36W	--	TÜV : R50027591
SCR (three provided)	SEMIKRON INTERNATIONAL GMBH	SKKT162/16E	1600V,162A	--	UL: E63532
UPS module (for model RM120/20 RM90/15 and RM60/10	INVT	--	PM20/PM15/PM10	--	--
Input/output wire	Various	Various	Min. 35mm^{2,} , 600V, 105℃	--	UL
Internal wire (connect to external battery)	Various	Various	Min. 50mm^{2,} , 600V, 105℃	--	UL
On SNT_PCB_3320_ZJ board,					
PCB	Various	Various	V-0, 130℃	UL 94	UL
On SNT_PCB_3320_FJ board,					
PCB	Various	Various	V-0, 130℃	UL 94	UL
On SNT_PCB_3320_DY board,					
DC capacitor (C7, C8)	NANTONG JIANGHAI CAPACITOR FACTORY	CD293-220uF	450V, 220uF, 85℃	--	UL: E227010
Y2 capacitor 1 (C3, C4, C5, C6, C59, C60)	TDK-EPC Corporation, Capacitors Group	CD	250VAC, 4700pF	IEC 60384-14	VDE:124321
(Aternative)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE

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

Y2 capacitor 2 (C11, C12, C61)	Various	Various	250VAC/ 2200pF	IEC 60384-14	VDE
Optocouplers (U2)	NEC	PS2561	Dti>0.4mm	--	UL:E72422 VDE: 40008862
Transformer 1 (T1)	SIDNA	UMS33P1T2	CLASS B	--	Test with appliance
Transformer 2 (T2)	SIDNA	UMS33P1T1	CLASS B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
On PCB_3320_MN1 board					
Optocouplers (U82, U88, U89, U90, U112, U118, U119)	NEC	PS2561	Dti>0.4mm	--	UL:E72422 VDE:40008862
Y2 capacitor 1 (C646,C677)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE:124321
PCB	Various	Various	V-0, 130℃	--	UL
On PCB_3320_KY1 board,					
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_PCB_3320_QD board,					
PCB	Various	Various	V-0, 130℃	--	UL
On PCB_PS1312_DR7 board,					
Y2 capacitor (C4, C5)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE:124321
Transformer (T1,T2,T3)	SIDNA	UMS33P1T2	CLASS B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_PCB_3320_CR board					
X2 capacitor (C8, C9, C10)	Various	Various	275VAC, 0.22UF	IEC 60384-14	VDE: 94714
Y2 capacitor (C4, C5, C6, C7)	Various	Various	250VAC, 2200pF	IEC 60384-14	VDE:12006
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_PCB_3320_FR board					

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

Y2 capacitor (C5, C6, C7, C8, C9, C10, C11, C12, C13, C14)	Various	Various	250VAC, 2200pF	IEC 60384-14	VDE:12006
X2 capacitor (C1, C2, C3, C4)	Various	Various	275VAC, 0.22uF	IEC 60384-14	VDE: 94714
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_PCB_3320_GJ board					
Optocouplers (U5,U6, U7, U8, U9, U10, U11, U12, U13, U14)	NEC	PS2561	Dti>0.4mm	--	UL:E72422 VDE:40008862
Relay (RLY1, RLY2, RLY3)	SONG CHUAN	892-1CC-C	24VDC, 240VAC, 5A	--	UL:E88991 VDE:40006318
PCB	Various	Various	V-0, 130℃	--	UL
[1]) an asterisk indicates a mark which assures the agreed level of surveillance.					

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

4.4 1.6.2/RD	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	P (VA)	Condition/status
Tested on model RM060/10						
Input breaker	--	304V/50Hz	47197	47400	90	Charging of empty batteries and rated output load 60kVA/48kW.
Input breaker	90	380V/50Hz	57630	57920	88	Ditto
Input breaker	90	400V/50Hz	57456	57850	83.5	Ditto
Input breaker	90	415V/50Hz	57040	57575	80	Ditto
Input breaker	--	460V/50Hz	57080	57363	72	Ditto
Input breaker	--	304V/60Hz	47197	47400	90	Ditto
Input breaker	90	380V/60Hz	58684	58972	89.4	Ditto
Input breaker	90	400V/60Hz	58630	58899	85	Ditto
Input breaker	90	415V/60Hz	58615	58840	81.8	Ditto
Input breaker	--	460V/50Hz	57880	58160	73	Ditto
Tested on model RM090/15						
Input breaker	--	304V/50Hz	70796	71100	135	Charging of empty batteries and rated output load 90kVA/72kW.
Input breaker	136	380V/50Hz	86448	86880	132	Ditto
Input breaker	136	400V/50Hz	86200	86775	126	Ditto
Input breaker	136	415V/50Hz	85560	86362	120	Ditto
Input breaker	--	460V/50Hz	85614	86045	108	Ditto

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

4.4 1.6.2/RD	TABLE: Electrical data (in normal conditions)					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	P (VA)	Condition/status
Input breaker	--	304V/60Hz	70790	71100	135	Ditto
Input breaker	136	380V/60Hz	88026	88458	134	Ditto
Input breaker	136	400V/60Hz	87945	88348	128	Ditto
Input breaker	136	415V/60Hz	87922	88260	123	Ditto
Input breaker	--	57880/58160	86820	87240	110	Ditto
Tested on model RM120/20						
Input breaker	--	304V/50Hz	94394	94800	180	Charging of empty batteries and rated output load 120kVA/96kW.
Input breaker	180	380V/50Hz	115260	115840	176	Ditto
Input breaker	180	400V/50Hz	114912	115700	167	Ditto
Input breaker	180	415V/50Hz	114080	115150	160	Ditto
Input breaker	--	460V/50Hz	114160	114726	144	Ditto
Input breaker	--	304V/60Hz	94394	94800	180	Ditto
Input breaker	180	380V/60Hz	117368	117944	179	Ditto
Input breaker	180	400V/60Hz	117260	117798	170	Ditto
Input breaker	180	415V/60Hz	117230	117680	164	Ditto
Input breaker	--	460V/50Hz	115760	116320	146	Ditto
Supplementary information:						

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

5.1.1 and 2.1.1.7/RD	TABLE: discharge of capacitors in the primary circuit			P
Condition	τcalculated (s)	τmeasured (s)	t u→ 0V(s)	Comments
Tested on model RM120/20				
Power switch on (L1-N)	--	8	12	Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied
Power switch on (L2-N)	--	8	12	Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied
Power switch on (L3-N)	--	8	12	Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied
Power switch on (N-PE)	--	<1V	12	Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied
Note(s): 1. Relevant discharge resistance: discharged through circuit				

5.1.2	TABLE: distance through insulation measurements			P
distance through insulation di at/of:	Up (V)	test voltage (V)	required di(mm)	di (mm)
Optocoupler	<420	3000Va.c.	0.4	>0.4 [1)]
Note(s): 1). Approved component. For details refer to table 4.3.				

5.1.4	TABLE: Backfeed protection test			P
Condition	Voltage measured (V)/current (mA)			Comments
	L-N	L-G	N-G	
Tested on model RM120/20				
No load	6V	5.6V	0.3V	Battery mode. Normal
Full load	4.2V	6.8V	0.5V	Battery mode. Normal
Note(s):				

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

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

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

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

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

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

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

Location	Resistance measured (mΩ) / voltage drop(V)	Comments
Tested on model RM120/20		
I/P earth →O/P earth	1V	Test current of ___320__A for _8__min.
I/P earth →metal enclosure	1V	Ditto
I/P earth →earth on PCB	1V	Ditto
Supplementary information:		

7.5 and 8.3	TABLE: fault condition tests		P
	ambient temperature (°C)	25℃,if not otherwise stated	--
	model/type of power supply	See below	--
	manufacturer of power supply	See nameplate for details	--
	rated markings of power supply	See nameplate for details	--

No.	component No.	fault	test voltage (V)	test time (s)	fuse no.	fuse current (A)	Result
Tested on model RM120/20							
On SNT_PCB_3320_JK PCB							
1	U82 pri	s-c	415	10min	Input breaker	164	Systems operated normally. Display screen show “Communication module fault”. No any hazards.
2	U82 sec	s-c	415	10min	Input breaker	164	Systems operated normally. Display screen show “Communication module fault”. No any hazards.
3	U88 pri	s-c	415	10min	Input breaker	164	Systems operated normally. Display screen show “Communication module fault”. No any hazards.
4	U88 SEC	s-c	415	10min	Input breaker	164	Systems operated normally. Display screen show “Communication module fault”. No any hazards.
5	U89 PRI	s-c	415	10min	Input breaker	163	Systems operated normally. RS485 port of Communication module abnormal. No any hazards.
6	U89 SEC	s-c	415	10min	Input breaker	163	Systems operated normally. RS485 port of Communication module abnormal. No any hazards.

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

7	U90 PRI	s-c	415	10min	Input breaker	163	Systems operated normally. RS485 port of Communication module abnormal. No any hazards.
8	U90 SEC	s-c	415	10min	Input breaker	163	Systems operated normally. RS485 port of Communication module abnormal. No any hazards.
9	U118 pri	s-c	415	10min	Input breaker	163	Systems operated normally. LBS communication abnormal. No any hazards.
10	U118 sec	s-c	415	10min	Input breaker	163	Systems operated normally. LBS communication abnormal. No any hazards.
11	U119 pri	s-c	415	10min	Input breaker	163	Systems operated normally. LBS communication abnormal. No any hazards.
12	U119 sec	s-c	415	10min	Input breaker	163	Systems operated normally. LBS communication abnormal. No any hazards.
On SNT_PCB_3320_DY PCB							
13	T2 (pin8-9)	s-c	415	60min	F5, F6, F7	0	Unit shutdown and no output. No hazard.
14	T2 (pin11-12)	s-c	415	60min	F5, F6, F7	3	Unit shutdown and no output. Display screen show “Fan fault”. No any hazards.
15	T2 (pin13-14)	s-c	415	60min	F5, F6, F7	0	Unit shutdown and no output. No hazards.
16	Q1 G-S	s-c	415	10ms	F5, F6, F7	3A	Q1 was damaged. Unit no output. No hazards.
17	Q1 D-S	s-c	415	10ms	F5, F6, F7	3A	Unit shutdown and no output. No hazard.
18	Q1 D-G	s-c	415	10ms	F5, F6, F7	3A	Unit shutdown and no output. No hazards.
On whole unit							

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

19	Output （L1-N）	o-l	415	75min	Input breaker	--	UPS shutdown the output at load of 110% load. Measured max temperatures: On SNT_PCB_3320_GL PCB: SCR S1: 55℃ IGBT1: 71℃ On SNT_PCB_3320_FG PCB: U6: 74℃ On SNT_PCB_3320_DG PCB: L1: 93℃ L7: 120℃ L10: 56℃ On SNT_PCB_3320_DY PCB: T2 winding: 37.6℃ Ambient: 25.0℃
20	Output （L1-N）	o-l	Battery mode	75min	DC fuse	--	UPS shutdown the output at load of 110% load. Measured max temperatures: On SNT_PCB_3320_GL PCB: SCR S1: 57℃ IGBT1: 73℃ On SNT_PCB_3320_FG PCB: U6: 74℃ On SNT_PCB_3320_DG PCB: L1: 93℃ L7: 120℃ L10: 50℃ On SNT_PCB_3320_DY PCB: T2 winding: 40.0℃ Ambient: 25.0℃
21	Output （L1-N）	s-c	415	1s	Output breaker	--	The output shutdown immediately. And the UPS display warning : Output short
22	Output （L1-N）	s-c	Battery mode	1s	DC fuse	--	The output shutdown immediately. And the UPS display warning : Output short

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

23	Ventilation openings (front and bottom)	Blocked	415	80min	Input breaker	--	After blocked the openings, the temperature increased . when the rectifier heat sink temperature reached about 90 ℃, the UPS output switch to bypass. And the UPS display warning : Rec overtemp. Measured max temperatures: On SNT_PCB_3320_GL PCB: SCR S1: 68℃ IGBT1: 90℃ On SNT_PCB_3320_FG PCB: U6: 88℃ On SNT_PCB_3320_DG PCB: L1: 120℃ L7: 156℃ L10: 67℃ On SNT_PCB_3320_DY PCB: T2 winding: 68℃ Ambient: 28.0℃
24	Ventilation openings (front)	Blocked	Battery mode	80min	DC fuse	--	After blocked the openings, the temperature increased . when the rectifier heat sink temperature reached about 90 ℃, the UPS output 0V&0A. And the UPS display warning : Rec overtemp. Measured max temperatures: On SNT_PCB_3320_GL PCB: SCR S1: 69℃ IGBT1: 90℃ On SNT_PCB_3320_FG PCB: U6: 87℃ On SNT_PCB_3320_DG PCB: L1: 120℃ L7: 160℃ L10: 65℃ On SNT_PCB_3320_DY PCB: T2 winding: 63℃ Ambient: 26.4℃

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

Note(s):

All faults are started during normal operation unless otherwise stated; and after each fault condition, a electric strength test is followed, the unit not breakdown.

s-c: short circuit; o-c: open circuit; o-l: overload

5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Whole unit						
SNT_PCB_3320-QD PCB						
PE (H5)-J3 Pin	<420	<250	2.0	4.5	2.5	4.5
PE (H4)-R50 Pin	<420	<250	2.0	11.5	2.5	11.5
PE (H1)-R32 Pin	<420	<250	2.0	7.3	2.5	7.3
PE (H3)-D37 Pin	<420	<250	2.0	11.5	2.5	11.5
Q4 Pin-bottom metal enclosure (PE)	<420	<250	2.0	4.5	2.5	>4.5
SNT_PCB_3320-GJ PCB						
PE (H1)-J2 Pin	<420	<250	2.0	4.1	2.5	4.1
PE (H2)-J10 Pin	<420	<250	2.0	2.8	2.5	2.8
PE (H3)-RLY1 Pin	<420	<250	2.0	5.3	2.5	5.3
PE (H4)-U18 Pin	<420	<250	2.0	3.8	2.5	3.8
RLY3 Pin-bottom metal enclosure (PE)	<420	<250	2.0	7.3	2.5	>7.3
Primary trace-secondary trace under optocouplers (U5, U7, U8, U9, U10, U12, U13)	<420	<250	4.0	5.8	5.0	5.8
Primary trace-secondary trace under optocoupler (U6)	<420	<250	4.0	4.8	5.0	>10
Primary trace-secondary trace under optocoupler (U14)	<420	<250	4.0	4.8	5.0	5.0
SNT_PCB_3320-JK PCB						
PE (H5)-RS-232 Pin	<420	<250	2.0	3.8	2.5	3.8
Under C646 traces	<420	<250	2.0	6.2	2.5	6.2
Under C646 traces	<420	<250	2.0	7.3	2.5	7.3

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

5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
U108 Pin-bottom metal enclosure (PE)	<420	<250	2.0	6.2	2.5	>6.2
Primary-secondary (C579 Pin-C492 Pin)	<420	<250	4.0	6.0	5.0	6.0
Primary-secondary (C534 Pin-R713 Pin)	<420	<250	4.0	6.4	5.0	6.4
SNT_PCB_3320-FR PCB						
Under C5, C10 traces	<420	<250	2.0	5.1	2.5	5.1
Under C11, C12 traces	<420	<250	2.0	5.2	2.5	5.2
PE (H1)-J1 Pin	<420	<250	2.0	6.2	2.5	6.2
PE (H4)-J3 Pin	<420	<250	2.0	6.2	2.5	6.2
C16 Pin-bottom metal enclosure (PE)	<420	<250	2.0	4.9	2.5	>4.9
SNT_PCB_3320-CR PCB						
PE (H3)-C8 Pin	<420	<250	2.0	10.2	2.5	10.2
PE (H2)-R2 Pin	<420	<250	2.0	11.6	2.5	11.6
C9 Pin-bottom metal enclosure (PE)	<420	<250	2.0	4.6	2.5	>4.6
SNT_PCB_3320-DY PCB						
Under C11, C61 traces	<420	<250	2.0	5.0	2.5	5.0
Under C3, C4 traces	<420	<250	2.0	7.6	2.5	7.6
Under C12 traces	<420	<250	2.0	4.6	2.5	4.6
PE (H4)-R85 Pin	<420	<250	2.0	5.6	2.5	5.6
PE (H3)-R86 Pin	<420	<250	2.0	5.6	2.5	5.6
C7 Pin-bottom metal enclosure (PE)	<420	<250	2.0	4.0	2.5	>4.0
SNT_PCB_3320-CQ PCB						
Under C4 traces	<420	<250	2.0	7.6	2.5	7.6
Under C5 traces	<420	<250	2.0	7.6	2.5	7.6
PE (H4)-J3 Pin	<420	<250	2.0	5.6	2.5	5.6
PE (H3)-J8 Pin	<420	<250	2.0	8.8	2.5	8.8

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

5.7 and 2.10.4/RD	TABLE: Clearance and creepage distance measurements					P
Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
J7 Pin-bottom metal enclosure (PE)	<420	<250	2.0	5.5	2.5	>5.5
SNT_PCB_3320-JP PCB						
C8 Pin- metal enclosure (PE)	<420	<250	2.0	3.1	2.5	3.1
Supplementary information: 1. A minimum clearance of 2.0mm for each contact pair had been provided (required according to sub-clause 5.1.4: 1.4mm minimum). 2. All internal wires soldered on PCB are additional crimped with connectors for soldering. Shrink tubings are used to cover the tab connectors.						

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

6, 8.2 and 9	TABLE: Electric strength tests, impulse tests and voltage surge tests		P
Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No
All models			
Primary to Secondary (mains input & output conductor to sub-D connector)	3000Va.c.	No	No
Primary to earth (mains input & output conductor to earth)	1500Va.c.	No	No
Supplementary information: Test after humidity treatment, heating test, and each fault condition test of 8.3.			

7.4, 4.5.5/RD	TABLE: Ball pressure test of thermoplastic parts	N

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

	Allowed impression diameter (mm) .....:	≤ 2 mm	
Part		Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

7.4.2,	Table: Enclosure opening measurements		P
Location		Size (mm)	Comments
Top		None	No openings.
Bottom		None	No openings.
Side		None	No openings.
Front		6.5mm round openings	Ventilation openings provided. No hazardous parts within 5° angles.
Back		9.6*24.8mm	Ventilation openings provided. No hazardous parts within 5° angles.
Supplementary information:			

7.5	Table: Resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
Material of Front panel	CHI MEI CORPORATION	PA-765A(+)	Min, thickness 2.1mm	5VA	
Supplementary information: See table 4.5					

7.7	TABLE A: maximum temperature rises				P
	test voltage (V) :	See below.			--
	T1 (°C) :	--			--
	t2 (°C) :	--			--
Temperature rise dT of part/at:		dT (K)			required dT
		304V/50Hz	460V/50Hz	0V (Battery mode)	
Tested on model RM120/20					
Whole unit					
Input wire (phase A/ battery)		38	34	42	105-40
Battery wire '+"		25	25	34	105-40
Fan		28	--	--	70-40

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

Top enclosure	27	--	--	70-40
Front panel	28	--	--	95-40
Input breaker	45	40	38	70-40
Output breaker	40	40	40	70-40
SCR (Phase R)	67	56	45	130-40
On SNT_PCB_3320_DY PCB				
T2 winding	45	--	--	110-40
U2	37	--	--	100-40
X2 capacitor (C1)	42	--	--	100-40
L1 coil	57	--	--	130-40
PCB near Q1	67	--	--	130-40
X2 capacitor (C59)	42	--	--	100-40
On SNT_PCB_3320_JK PCB				
U82	43	--	--	100-40
U88	43	--	--	100-40
U89	43	--	--	100-40
U90	43	--	--	100-40
U118	43	--	--	100-40
U119	43	--	--	100-40
On SNT_PCB_3320_GJ PCB				
U6	38	--	--	100-40
U14	38	--	--	100-40
U8	38	--	--	100-40
U5	38	--	--	100-40
U10	38	--	--	100-40
U7	38	--	--	100-40
U9	38	--	--	100-40
U11	38	--	--	100-40
U12	38	--	--	100-40
U13	38	--	--	100-40
On SNT_PCB_3320_CQ PCB				
T1 winding	67	--	--	110-40
Ambient	26℃	25.4	25.8℃	--
Backup time	120	120	25	--

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

Temperature T of winding:	R1 (Ω)	R2 (Ω)	T1 (℃)	Allowed Tmax (℃)	Insulation class
--	--	--	--	--	--
--	--	--	--	--	--

Note(s):
The temperatures were measured under worst case normal mode defined in 1.2.2.1/RD and as described in sub-clause 1.6.2/RD and at voltages as described above.

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

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

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

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

8.1, 5.1.1/ RD	TABLE: Touch current measurement				P
Condition	L→terminal A	N→terminal A	Freq. (Hz)	Limit (mA)	Comments
Tested on model RM120/20					
Unit on	5.2	5.2	60	--	Switch “e” open, L to PE, no load
Unit on	5.2	5.2	60	--	Switch “e” open, N to PE, no load
Unit on	0.03	0.03	60	0.25	Switch “e” close, L to RS232 port
Unit on	0.03	0.03	60	0.25	Switch “e” close, N to RS232 port.
Note(s) : Test voltage: 460V/60Hz					

M	Ventilation of battery compartments	P
	The required dimension for the ventilation openings will be calculated with the following formula:	
	A > K1 * Q	

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

	with Q = (0.054 m³/Ah) * n * I * C	
	where: K1 : constant factor of 28 h * cm²/m³ Q : airflow in m³/h n : number of battery cells I : constant factor (0,2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	With the specific data for the UPS the following dimension for the ventilation openings is required:	
	External battery pack n :2 (3 cells per battery) C :7 Ah A > 28 h * cm²/m³ * (0.054 m³/Ah) * n * 0.2 A/100 Ah * C A > 0.127cm²	
	Verdict	
	The size of ventilation openings in battery cabinet exceeds the required airflow by far.	

Appendix 1

European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

EN 62040-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions		P
ZA	**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS** The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Note: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD Applies.		—

Publication	Year	Title	EN/HD	Year
IEC 60364-4-42	-[1]	Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects	-	-
IEC 60417	Data-base	Graphical symbols for use on equipment	-	-
IEC 60529	-[1]	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991[2] 1993
IEC 60664	Series	Insulation coordination for equipment within low-voltage systems	EN 60664	Series
IEC/TR 60755	-[1]	General requirements for residual current operated protective devices	-	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
IEC 61000-2-2	-[1]	Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems	EN 61000-2-2	2002[2]
IEC 61008-1 (mod)	-[1]	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules	EN 61008-1 + A11	2004[2] 2007
IEC 61009-1 (mod)	-[1]	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules	EN 61009-1 + corr. July + A11	2004[2] 2006 2008
IEC 62040-2	2005	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN 62040-2 + corr. November	2006 2006
IEC 62040-3 (mod)	1999	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements	EN 62040-3	2001

[1] Undated reference.
[2] Valid edition at date of issue.

Appendix 1

European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative)

SPECIAL NATIONAL CONDITIONS (EN)

The FI, NO and SE - SNCs originate from IEC 60950-1 2nd Edition, which is the reference document (RD) for IEC 62040-1. The national requirements are included in IEC 62040-1 through the following statement in the scope of the standard:
"National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD."

The national requirements have not been specifically listed in the EN 62040-1:2008.
If demanded, CLC/TC 22X will be requested to take proper measures to complete EN 62040-1 with Annexes ZB containing the SNCs as presented below.

EN 62040-1:2008 supersedes EN 62040-1-1:2003. As a reference, see also SNCs for Finland, Norway and Sweden as included in the earlier EN 62040-1-1:2003

Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	In **Finland**, **Norway** and **Sweden**, when safety relies upon connection to the safety earth (see 5.3), a pluggable equipment type A UPS shall have a marking on the equipment, stating that the UPS must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: "Apparatet må tilkoples jordet stikkontakt" In **Sweden**: "Apparaten skall anslutas till jordat uttag"		P
4.7.11	In **Norway**, because of a widely used IT power system, equipment shall be designed or modified for connection to such a system and shall be marked by a label with the following wording in Norwegian: "Apparatet er egnet for tilkopling til et IT forsyningsnett"		P
9	In **Finland, Norway and Sweden** requirements of 6.1.2.1 and 6.1.2.2 in Annex ZB of EN 60950-1:2001 apply.		P

Pictures

Fig. 1 – Front view for 1.6m high case model

Pictures

Fig. 2 –Rear view for 1.6m high case model

Pictures

Fig. 3 –Top and side view for 1.6m high case model

Pictures

Fig. 4 –Inside view (I) for 1.6m high case model

Pictures

Fig. 5 – Inside view (II) for 1.6m high case model

Pictures

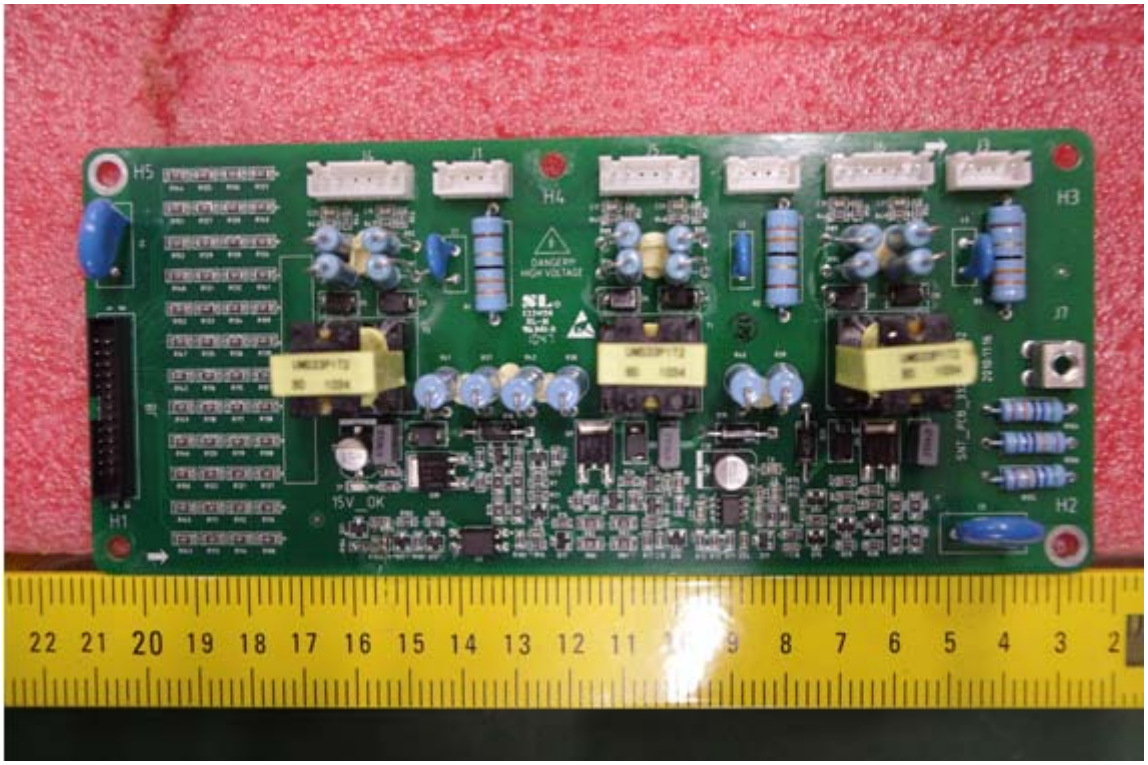

Fig.6 – Board SNT_3320_PCB_CQ, components side view

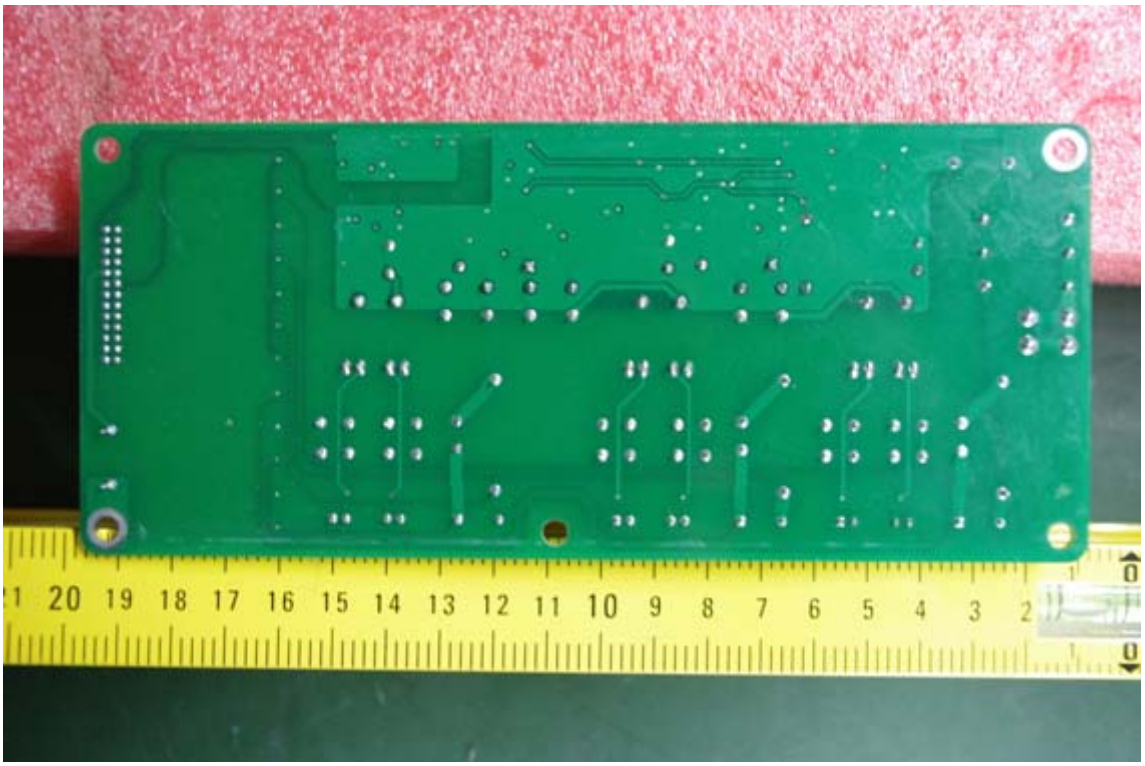

Fig.7 – Board SNT_3320_PCB_CQ, traces side view

Pictures

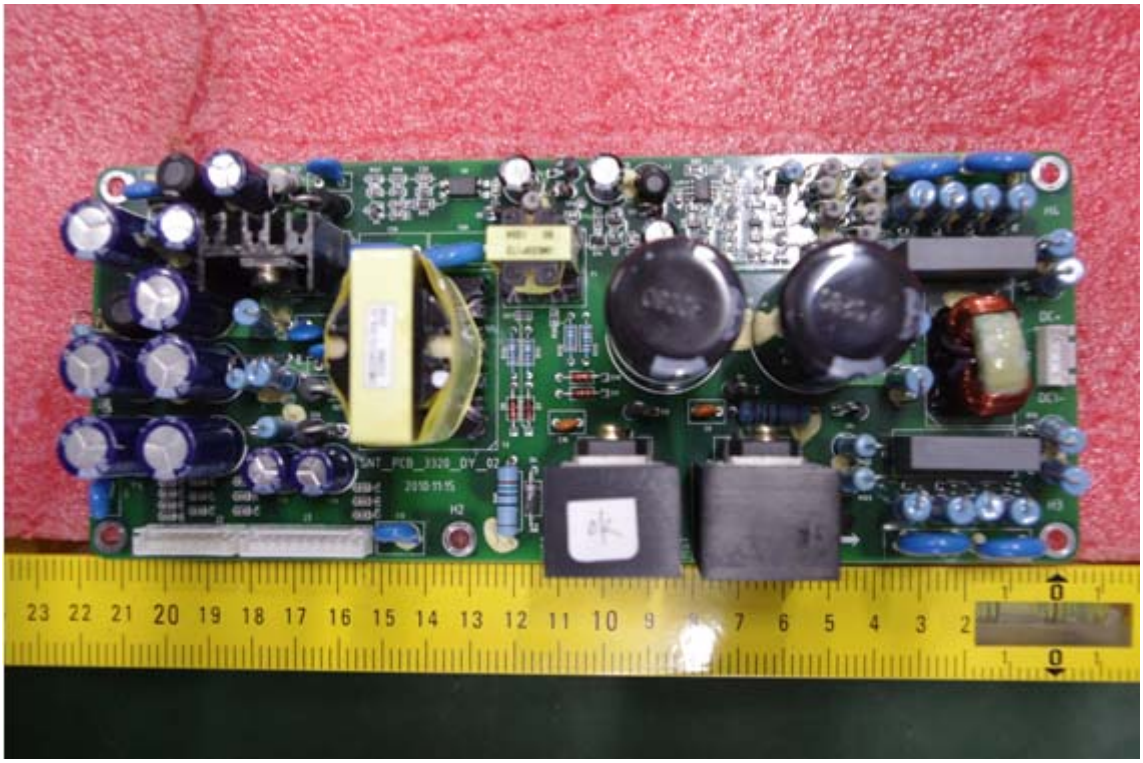

Fig.8 – Board SNT_3320_PCB_DY, components side view

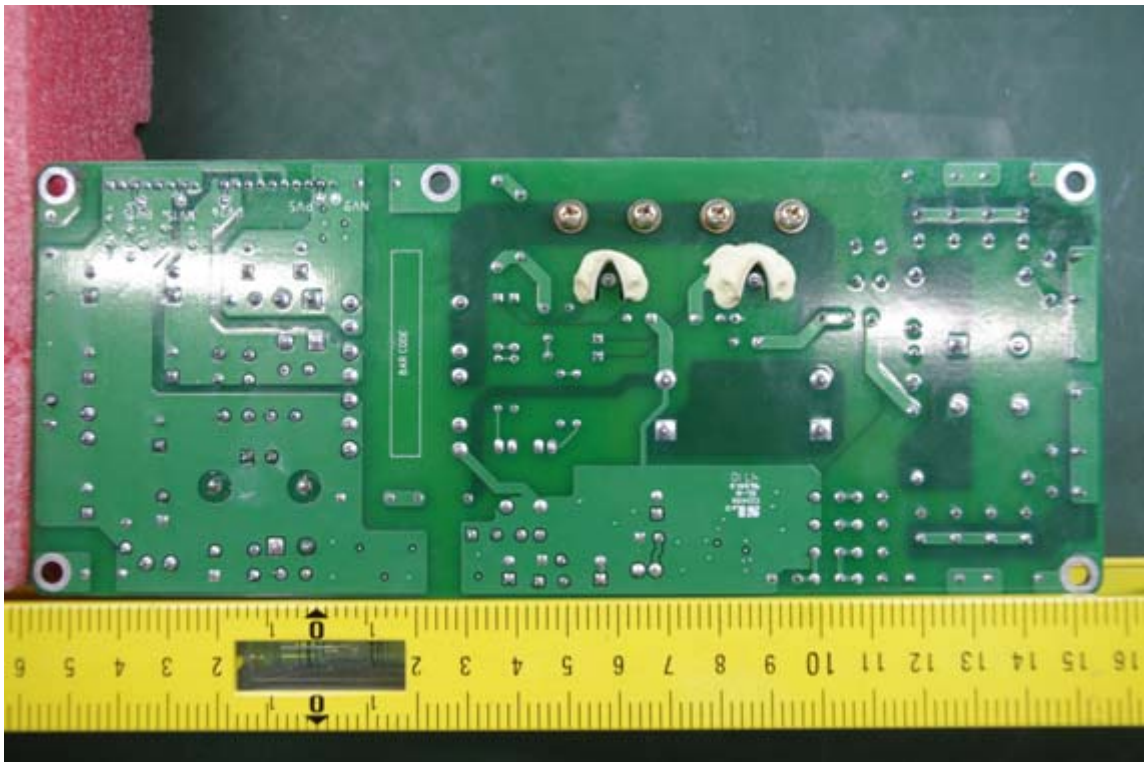

Fig. 9 – Board SNT_3320_PCB_DY, traces side view

Pictures

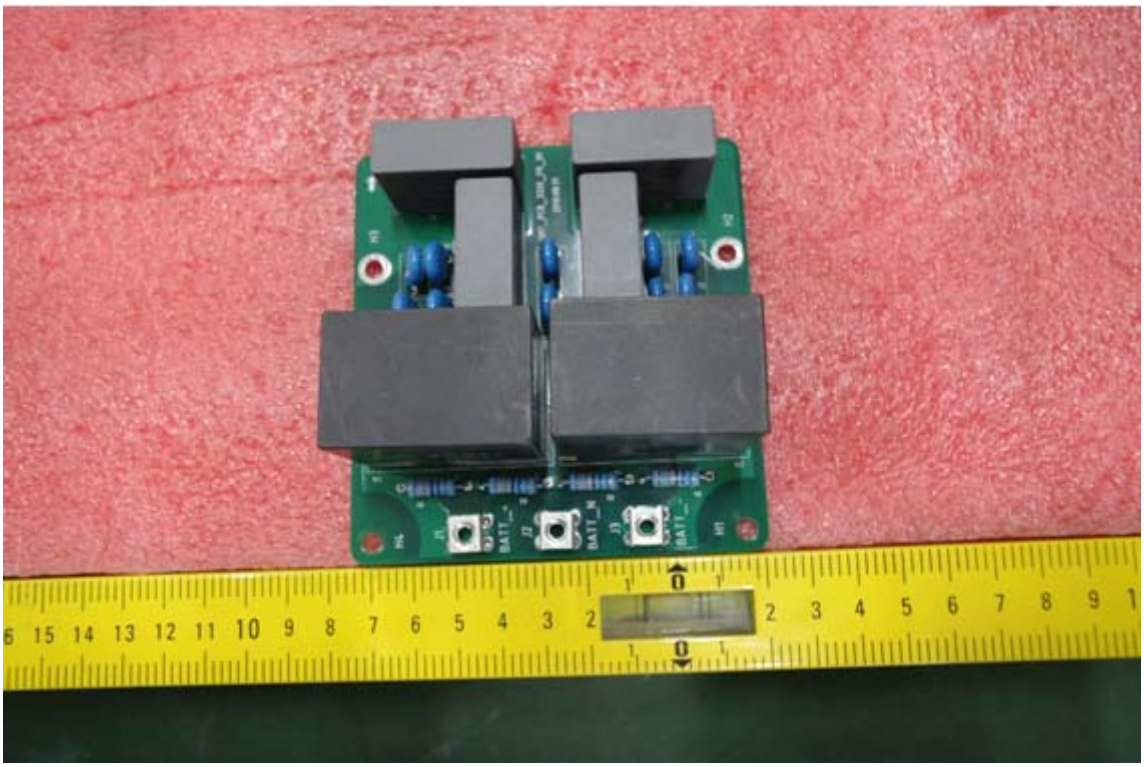

Fig. 10 –Board SNT_3320_PCB_FR, components side view

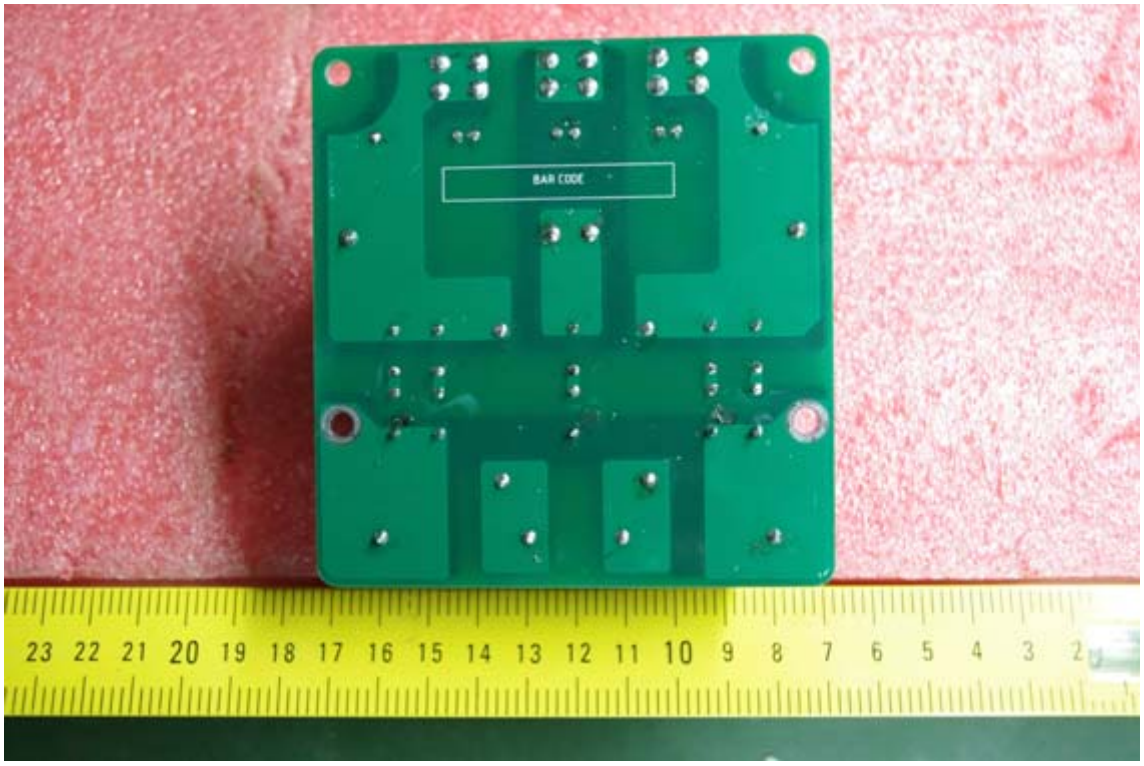

Fig.11 –Board SNT_3320_PCB_FR, traces side view

Pictures

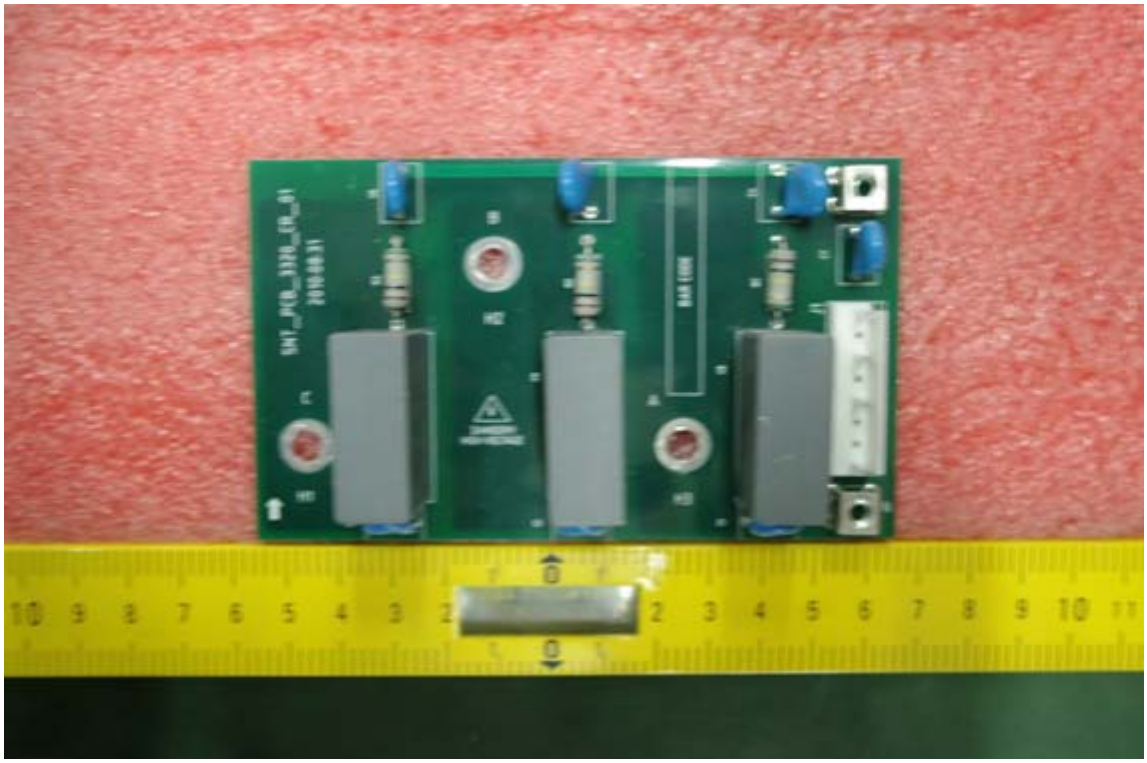

Fig.12 –Board SNT_PCB_3320_CR, components side view

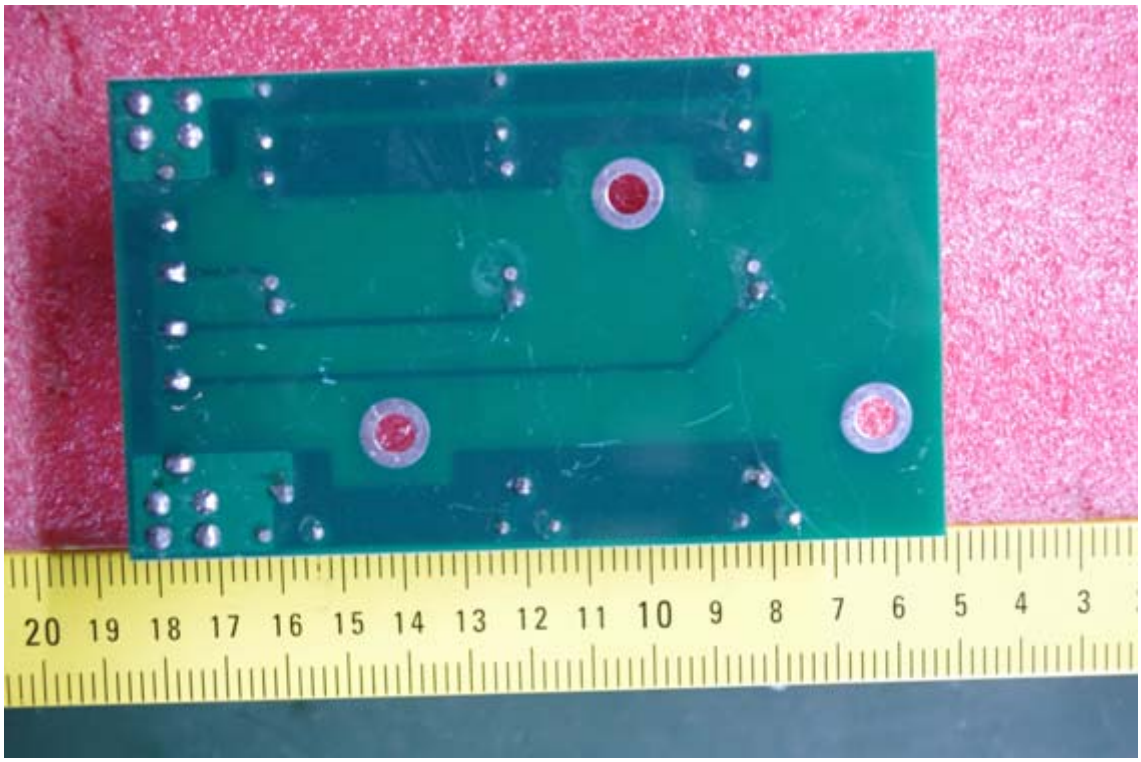

Fig.13 –Board SNT_PCB_3320_CR, traces side view

Pictures

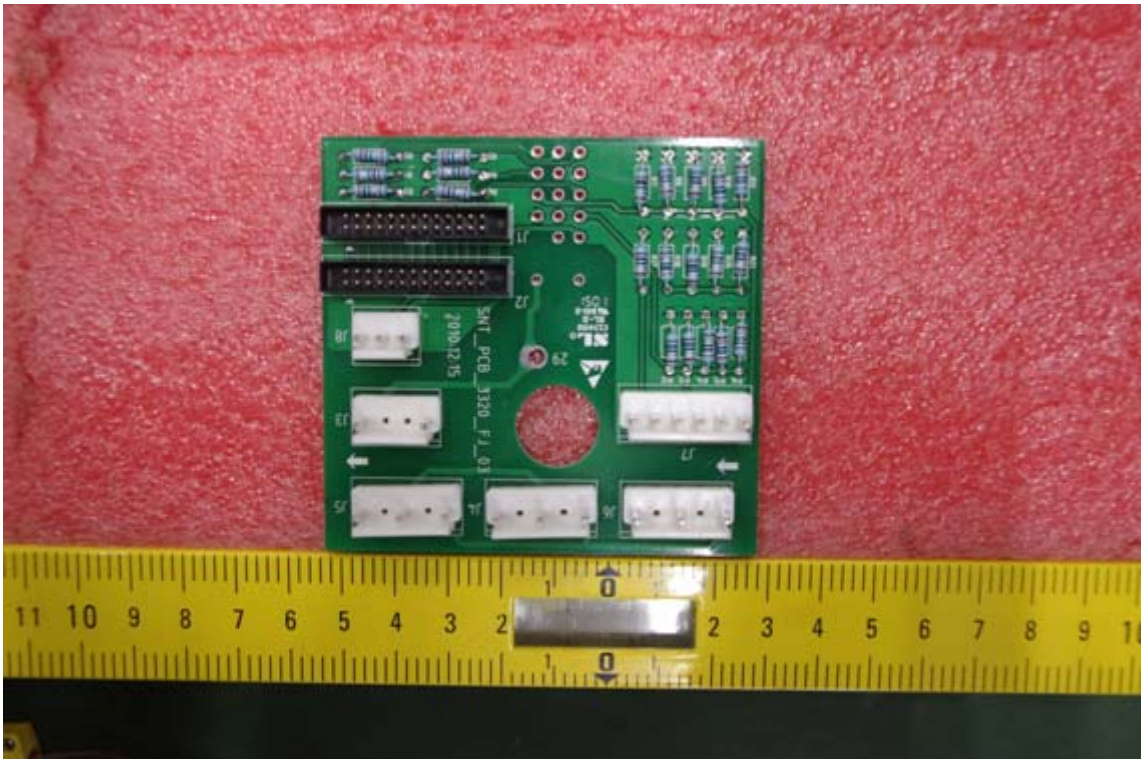

Fig.14 - Board SNT_PCB_3320_FJ, component side view

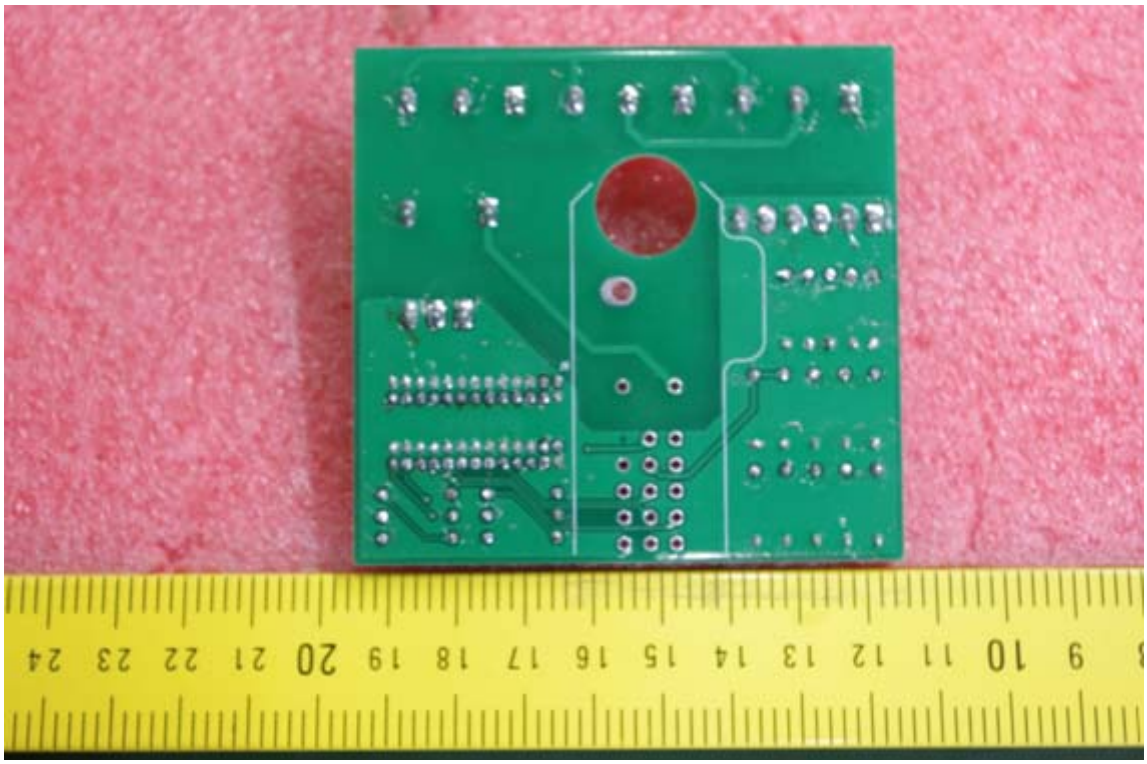

Fig.15 – Board SNT_PCB_3320_FJ, trace side view

Pictures

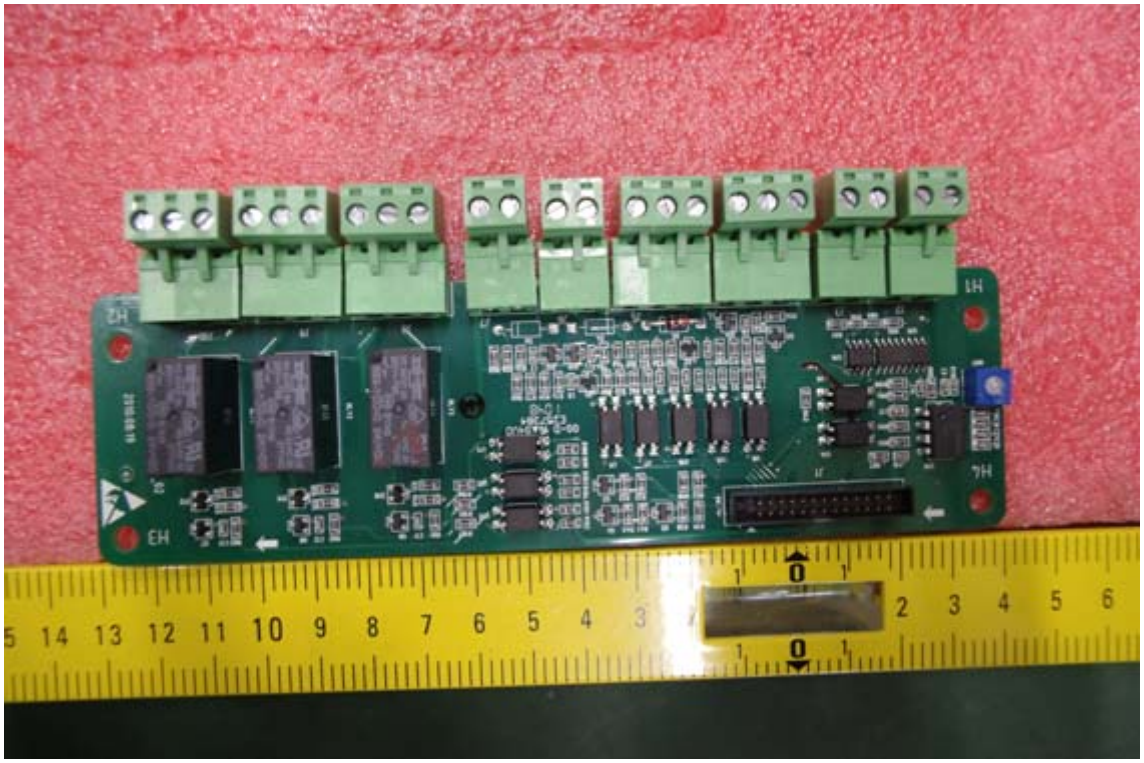

Fig.16–Board SNT_PCB_3320_GJ, component side view

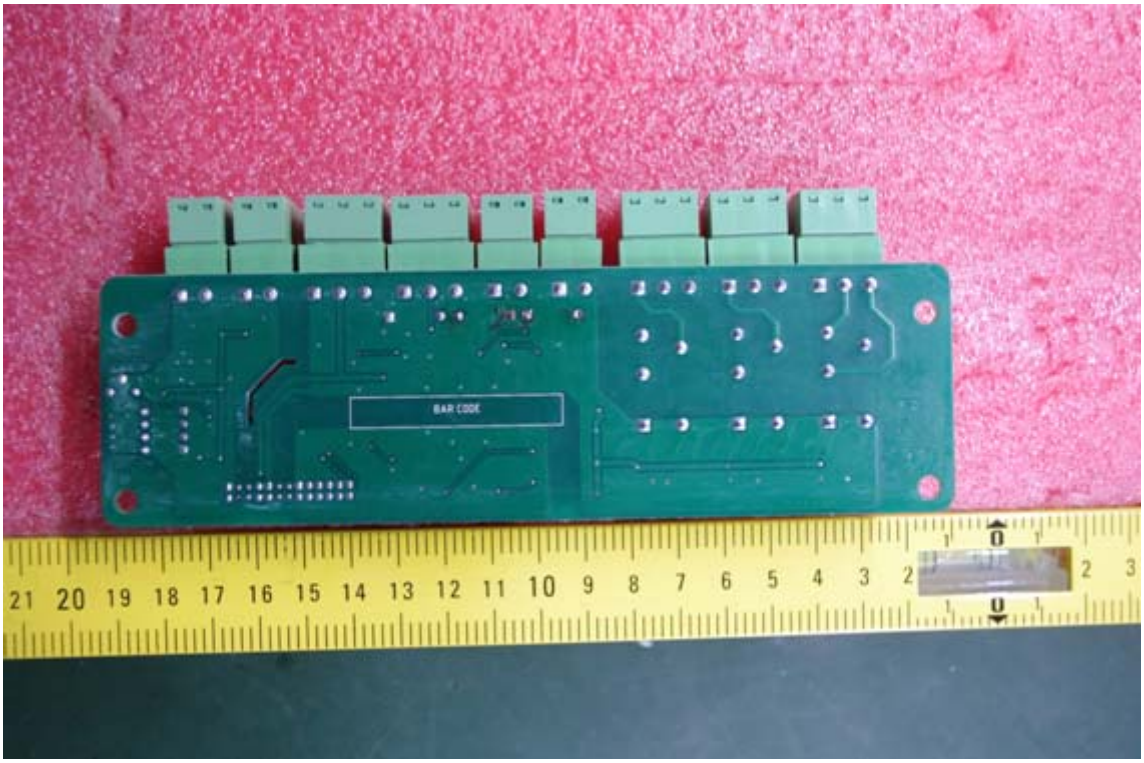

Fig.17 –Board SNT_PCB_3320_GJ, traces side view

Pictures

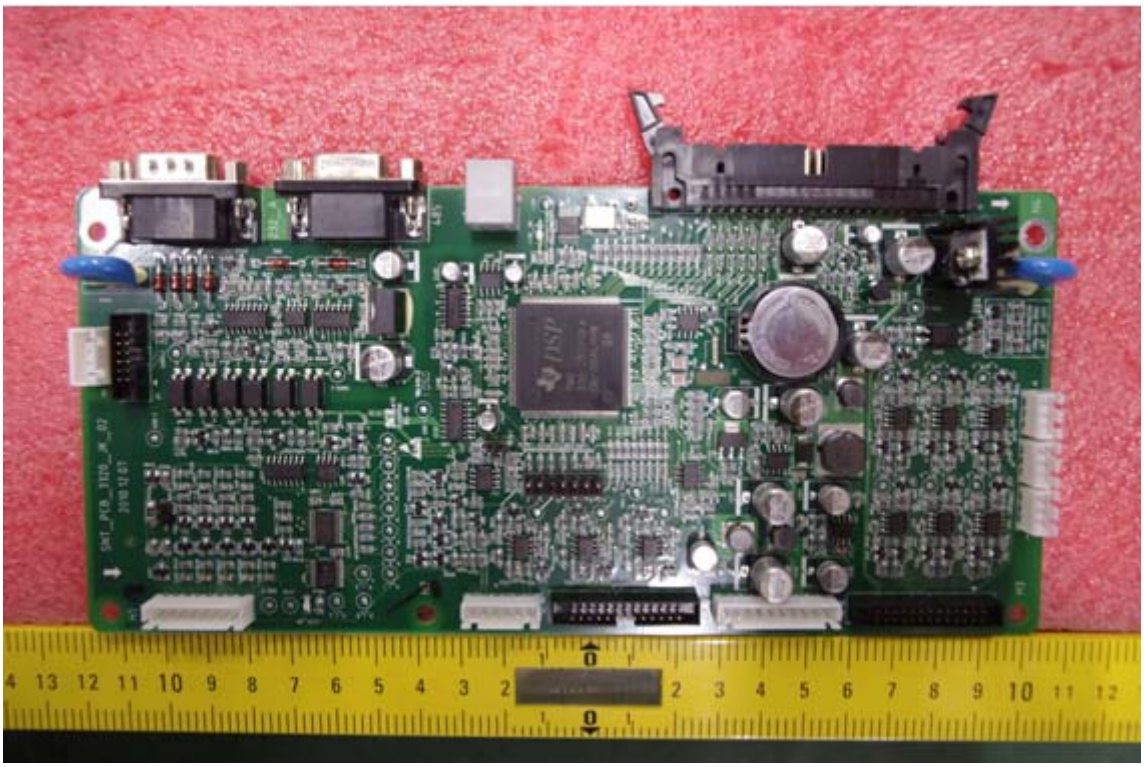

Fig.18 –Board SNT_PCB_3320_JK, component side view

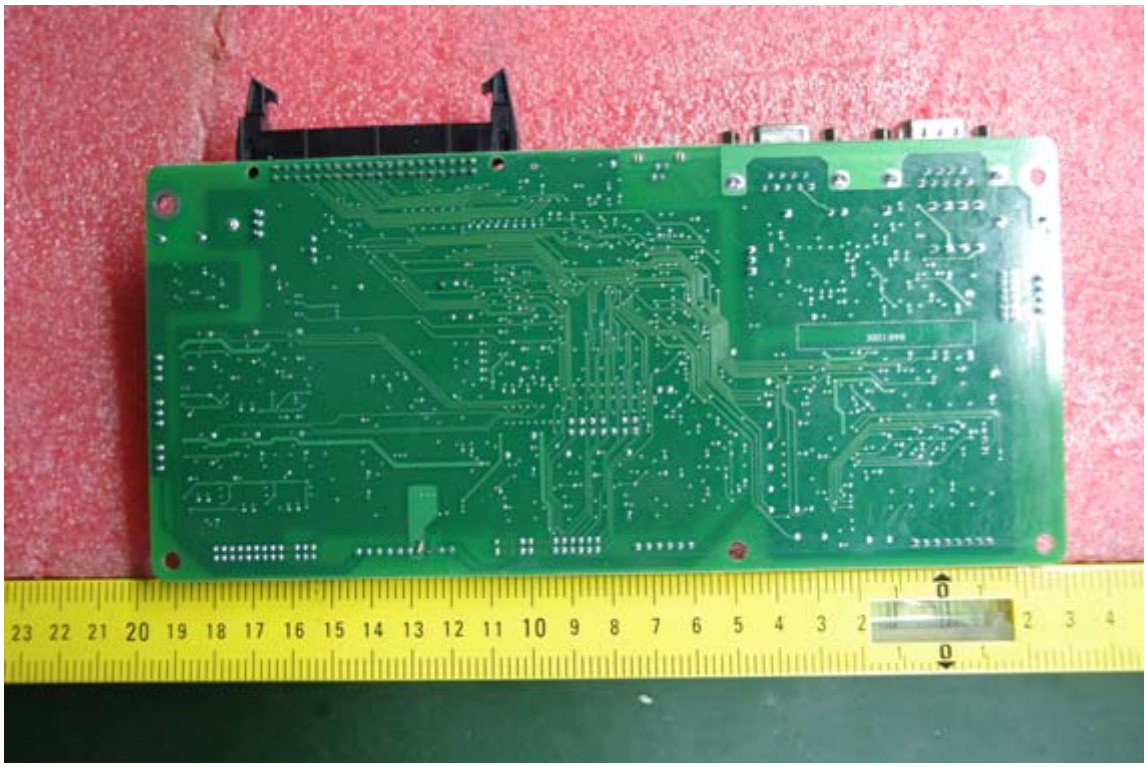

Fig.19 –Board SNT_PCB_3320_GJ, traces side view

Pictures

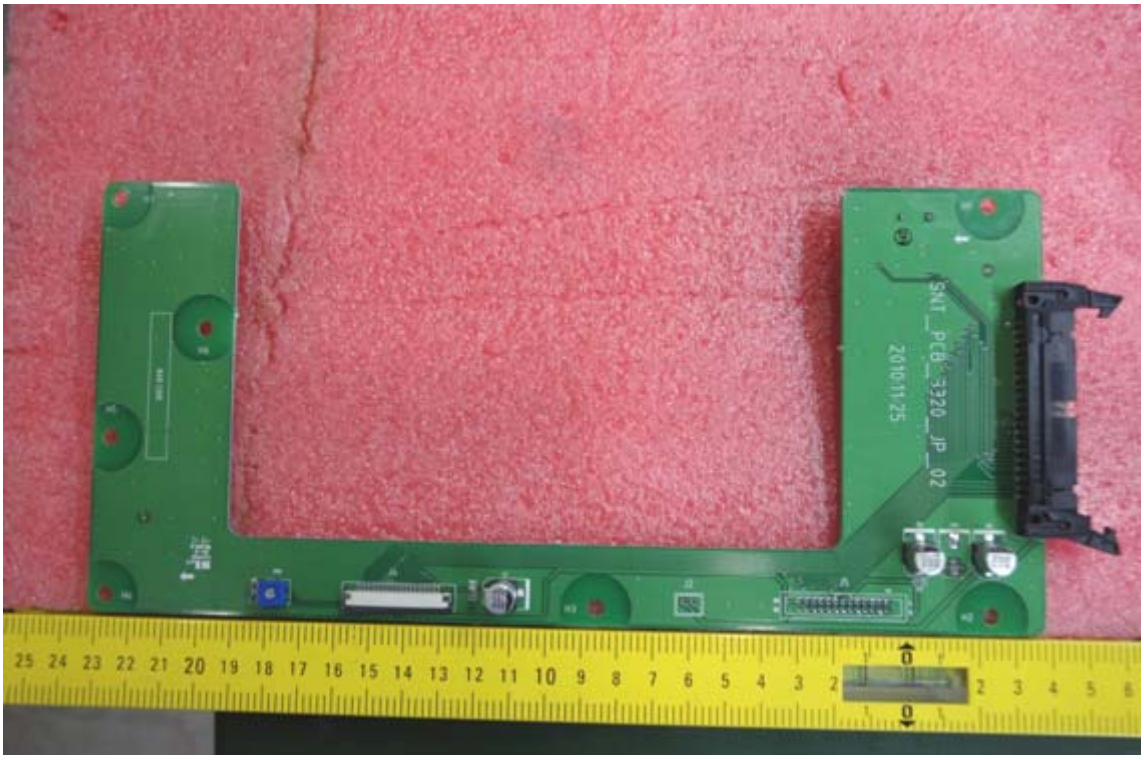

Fig.20 – Board SNT_PCB_3320_JP, component side view

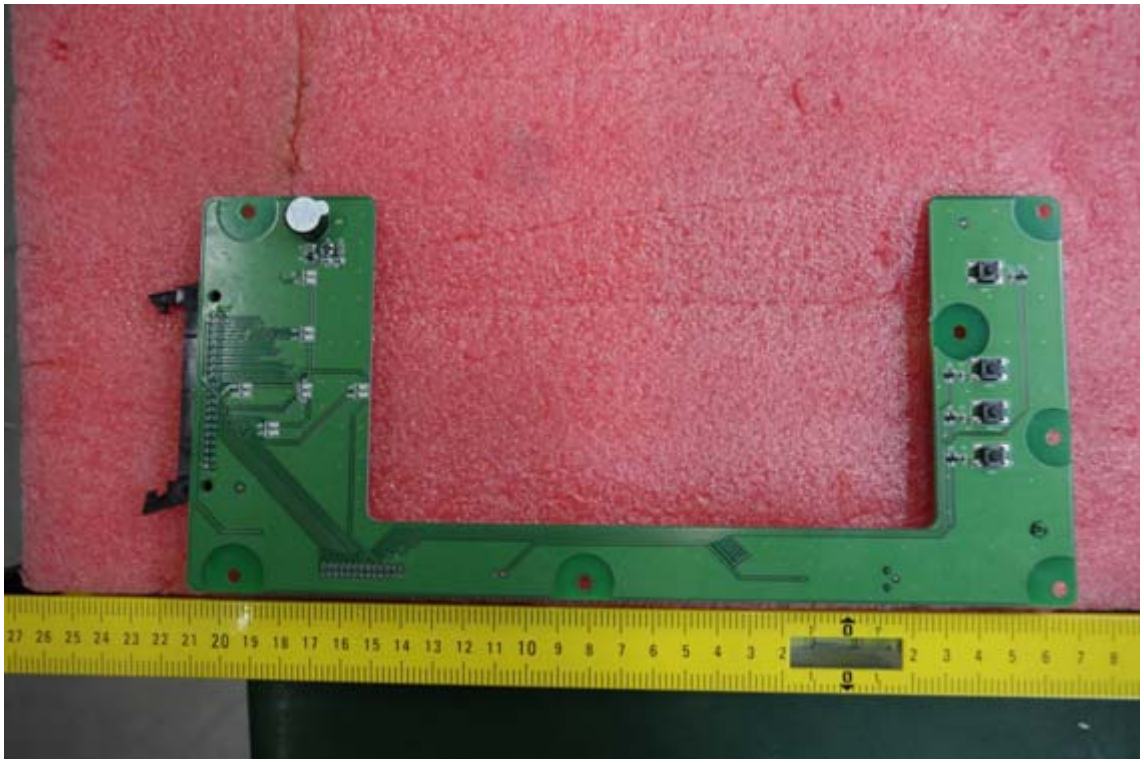

Fig.21 –Board SNT_PCB_3320_JP, traces side view

Pictures

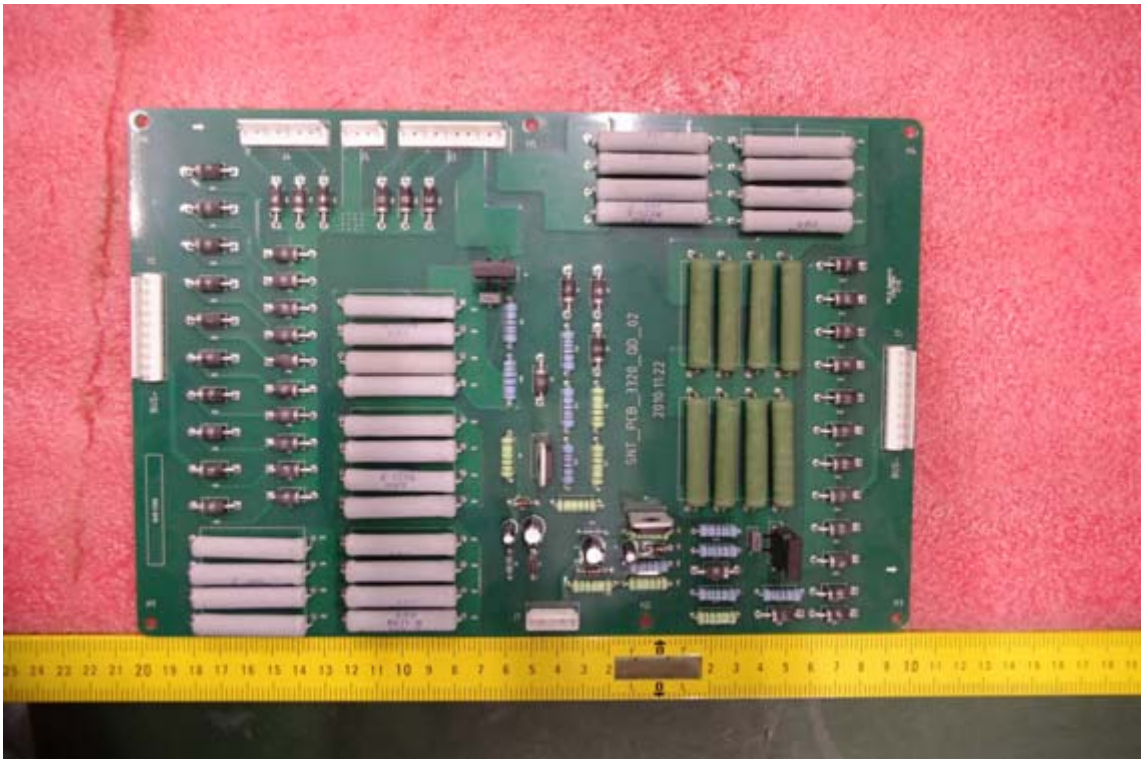

Fig.22 – Board SNT_PCB_3320_QD, component side view

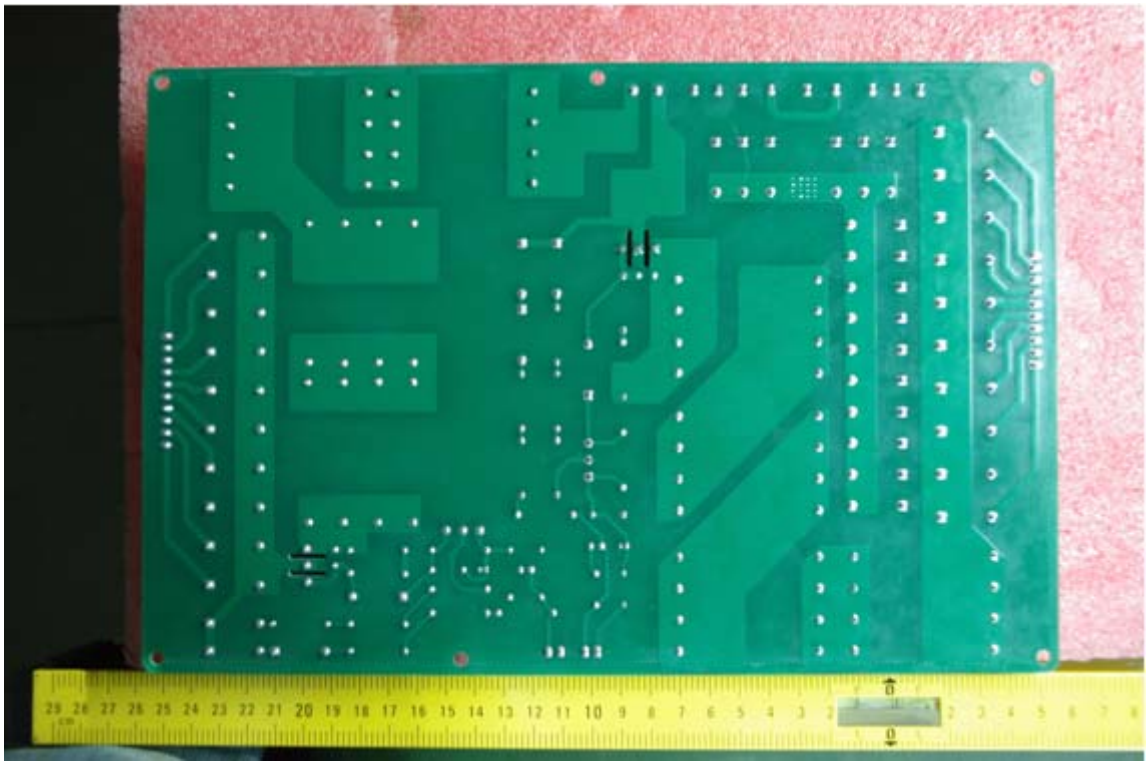

Fig.23 –Board SNT_PCB_3320_QD, traces side view

Pictures

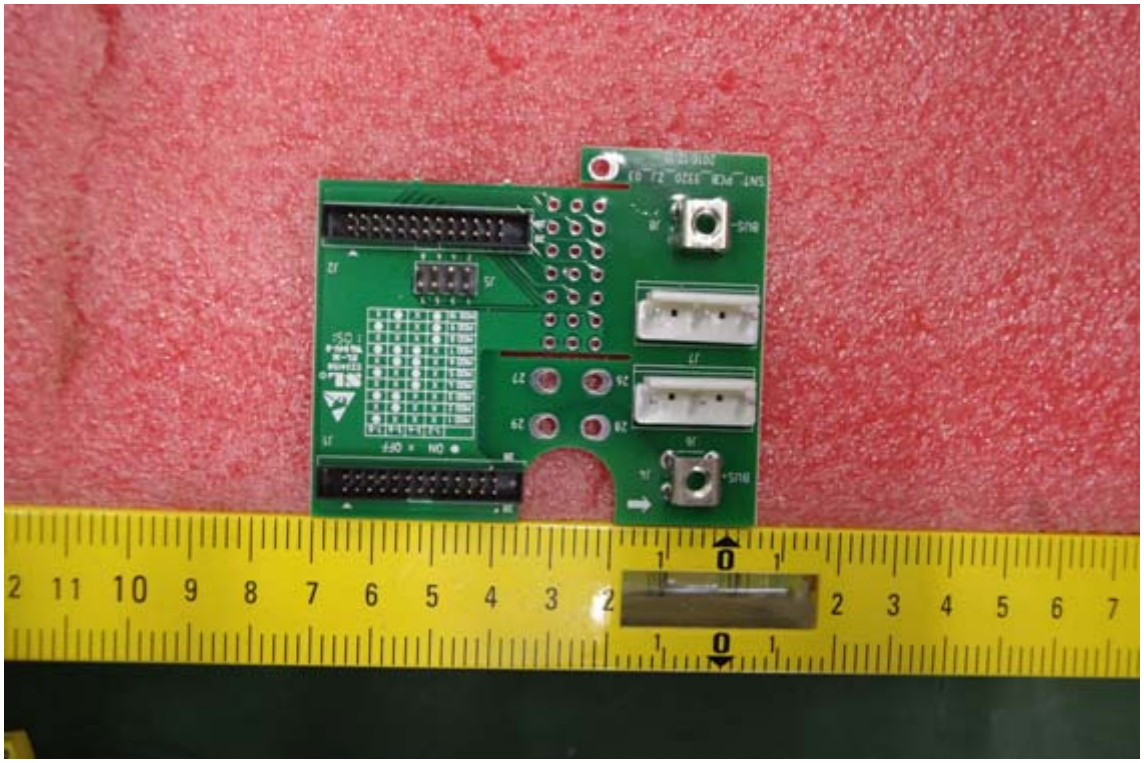

Fig.24 – Board SNT_PCB_3320_ZJ, component side view

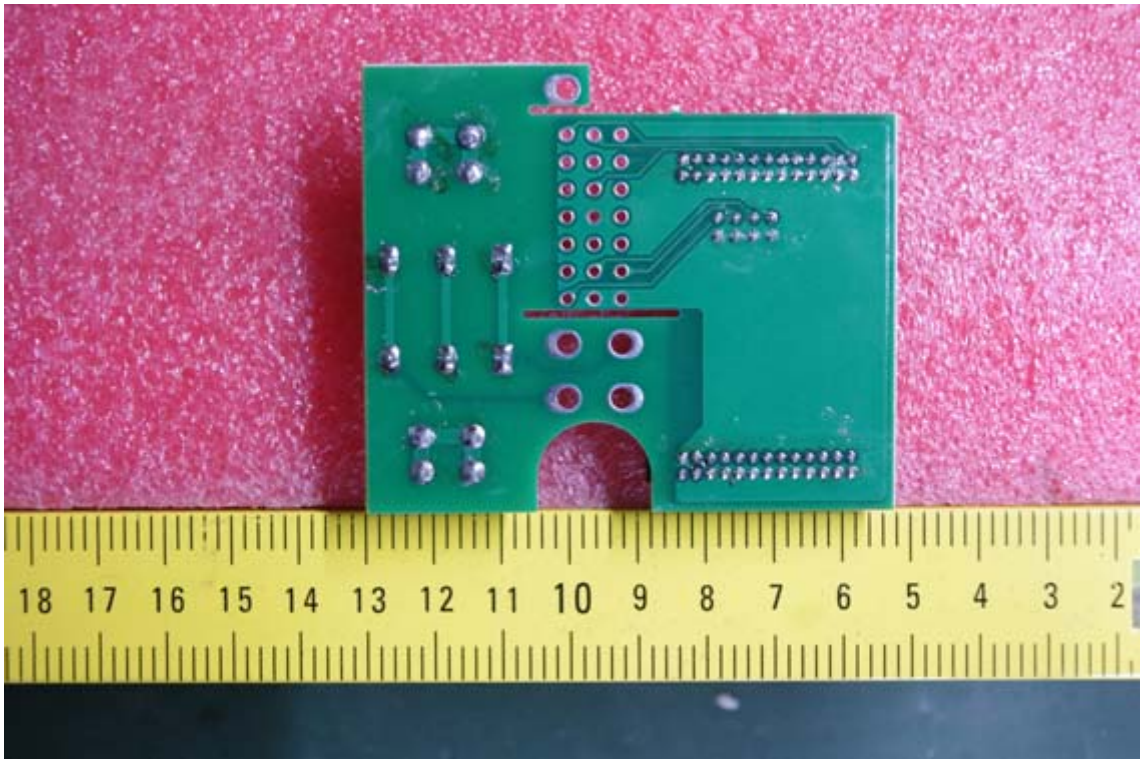

Fig.25 – Board SNT_PCB_3320_ZJ, traces side view