APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model(s): PM10, PM15, PM20

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
EN 62040-1
Uninterruptible Power Systems

Reference No. ..... :	ES160523070S
Compiled by (+ signature) ..... :	Gary Zhang
Approved by (+ signature) ..... :	William Guo
Date of issue ..... :	June 13, 2016
Contents ..... :	71 pages

Testing laboratory

Name ..... :	EMTEK (SHENZHEN) CO., LTD.
Address ..... :	Bldg 69, Majialong, Taipingyang Industry Zone, Nanshan District, Shenzhen, Guangdong, China
Testing location ..... :	Same as above

Client

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

Test specification

Standard ..... :	EN 62040-1:2008+ A1:2013
Test procedure ..... :	Compliance with EN 62040-1:2008+ A1:2013
Non-standard test method ..... :	N.A.

Test Report Form No. ..... :	IEC62040_1A
Test Report Form(s) Originator ..... :	TÜV Rheinland Japan Ltd.
Master TRF ..... :	Dated 2014-01

Test item Description ..... :	UPS module
Trademark ..... :	INVT
Model and/or type reference ..... :	PM10, PM15, PM20
Manufacturer ..... :	INVT POWER SYSTEM (SHENZHEN) CO., LTD
Address ..... :	5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Rating(s) ..... :	See the rating labels

Particulars: test item vs. test requirements	
Equipment mobility	: Building-in equipment
Operating condition	: Continuous operation
Mains supply tolerance (%)	: -20%, +10.8%
Tested for IT power systems	: N.A.
IT testing, phase-phase voltage (V)	: N.A.
Class of equipment	: Class I
Mass of equipment (kg)	: Approx. 22kg
Protection against ingress of water	: IP20
Test case verdicts	
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)
Testing	
Date of receipt of test item	: N/A
Date(s) of performance of test	: N/A

General remarks

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 comma is used as the decimal separator.

Standard EN 62040-1:2013 is to used in conjunction with EN 60950-1:2013, which is referred to in this TRF by “RD”.

General product information:

This report is amended from previous report ES160523070S, dated Nov. 13, 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 UPS module for general use with information technology equipment.

2. Model difference description:

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

Summary of testing:

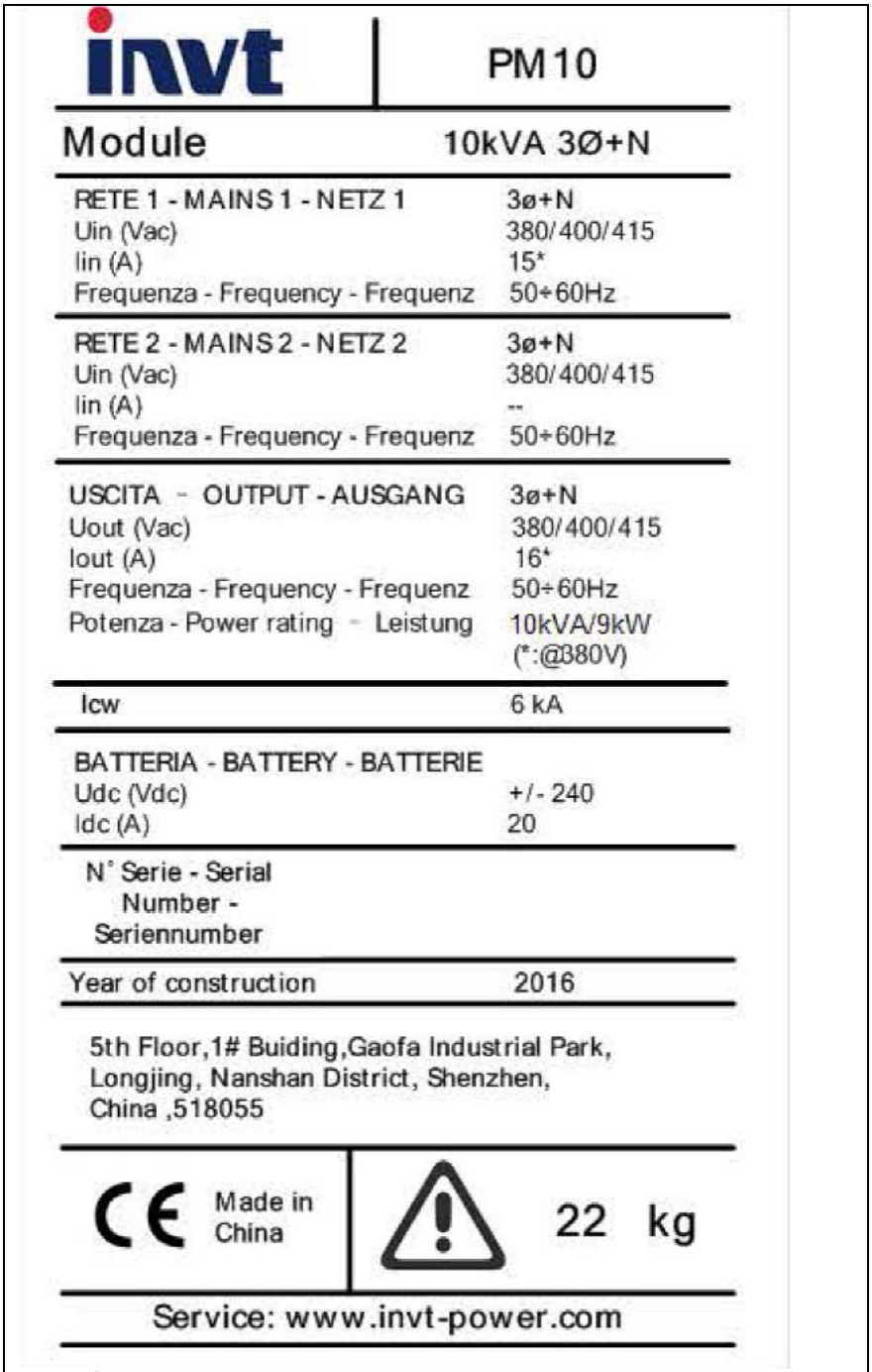
The product has been tested according to standard EN 62040-1:2008+ A1:2013

- **Tests performed on the bench**
- **Maximum ambient temperature: +40°C**
- **Tested for moderate conditions**
- **EUT is designed for altitudes not exceeding 1000 m.**

This series of UPS generally uses the same circuit diagrams, therefore, input tests were conducted on all model with different Input/output ratings. Unless otherwise specified, other tests are conducted on model PM20 considered the worst condition.

Copy of marking plate:

1. Rating label for model PM10.



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 PM15

invt	PM15
Module	**15kVA 3Ø+N**
RETE 1 - MAINS 1 - NETZ 1	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	22*
Frequenza - Frequency - Frequenz	50÷60Hz
RETE 2 - MAINS 2 - NETZ 2	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	--
Frequenza - Frequency - Frequenz	50÷60Hz
USCITA - OUTPUT - AUSGANG	**3ø+N**
Uout (Vac)	380/400/415
Iout (A)	23*
Frequenza - Frequency - Frequenz	50÷60Hz
Potenza - Power rating - Leistung	15kVA/13.5kW (*:@380V)
Icw	6 kA
BATTERIA - BATTERY - BATTERIE	
Udc (Vdc)	+/- 240
Idc (A)	30
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 | 22 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 PM20

invt	PM20
Module	**20kVA 3Ø+N**
RETE 1 - MAINS 1 - NETZ 1	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	29*
Frequenza - Frequency - Frequenz	50÷60Hz
RETE 2 - MAINS 2 - NETZ 2	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	--
Frequenza - Frequency - Frequenz	50÷60Hz
USCITA - OUTPUT - AUSGANG	**3ø+N**
Uout (Vac)	380/400/415
Iout (A)	30*
Frequenza - Frequency - Frequenz	50÷60Hz
Potenza - Power rating - Leistung	20kVA/18kW (*:@380V)
Icw	6 kA
BATTERIA - BATTERY - BATTERIE	
Udc (Vdc)	+/- 240
Idc (A)	40
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 | 22 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.

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
4	GENERAL CONDITIONS FOR TESTS		P
4.3	Components		P
1.5.1/RD	General		P
	Comply with IEC 62040-1 or relevant component standard	(see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 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	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.5/RD	Interconnecting cables	Interconnecting cables are suitable for their intended application and comply with the relevant requirements of the standard.	P
1.5.6/RD	Capacitors in primary circuits	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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
1.5.8/RD	Components in equipment for IT power systems	TN power system.	N
4.4	Power interfaces		P
1.6.1/RD	AC power distribution systems	TN power system.	P
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.4)	P
1.6.4/RD	Neutral conductor	Neutral conductor is basic insulated from earth and body of the equipment.	P
4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.6)	P
4.6 1.6.4/RD	Neutral conductor	Neutral is insulated from earth with basic insulation throughout the equipment. O/P neutral is not isolated from I/P neutral.	P
4.7	Marking and instructions		P
4.7.1	General	See below.	P
4.7.2 1.7.1/RD	Power rating	Marking plates provided on the rear of the enclosure. Further details see below.	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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Number of Input phases and neutral ..... :	3Ø with Neutral	P
	Output rated voltage/range (V)	380/400/415V～	P
	Output rated current/range (A)	Not marked.	N
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current) :		N
	Number of output phases and neutral :	3Ø	P
	Output rated active power (W)	See rating label	P
	Output rated apparent power (VA)	See rating label	P
	Output symbol for nature of supply (d.c.)	AC output	N
	Rated frequency or rated frequency range (Hz):	50/60Hz	P
	Max. ambient operating temperature range	40℃	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)		N
	Manufacturers name, trade mark or identification mark	INVT	P
	Type/model type reference	PM10, PM15, PM20	P
	Symbol for Class II equipment only	Class I equipment.	N
	Other symbols	No other symbols provided.	N
	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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
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		P
1.7.7.1/RD	Protective earthing and bonding terminals ..... :	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
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		P
4.7.8	Battery 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
4.7.9 1.7.8/RD	Controls and indicators	See below.	P
1.7.8.1/RD	Identification, location and marking :	For LCD provided, located on the front panel:	P
1.7.8.2/RD	Colours :	See above. Colors are acceptable due to only used for information (no safety involved even if disregarded).	P
1.7.8.3/RD	Symbols according to IEC 60417 :		P
1.7.8.4/RD	Markings using figures :	Not used.	N
4.7.10 1.7.9/RD	Isolation of multiple power sources :	Only one external supply of hazardous voltage of energy	N

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
4.7.11 1.7.2.4/RD	IT power systems	TN power system.	N
4.7.12	Protection in building installation	The protection does not rely upon building installation. The protection is provided by input fuse used in AC inlet.	P
	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 such devices used.	N
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s)	English user manual provided.	P
4.7.16 1.7.11/RD	Durability of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking of the label did not fade. There was neither curling nor lifting of the label edge.	P
4.7.17 1.7.12/RD	Removable parts	No required markings placed on removable parts.	P
4.7.18 1.7.13/RD	Replaceable batteries	Additional warning statement of explosion if replaced with different batteries during servicing is marked on the rear panel.	P
	Language(s)	English	P

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
4.7.19 1.7.2.5/RD	Operator access with a tool ..... :	Operator is not instructed to use a tool in order to gain access to operator access area.	N
4.7.20	Battery	No battery used	N
	Clearly legible information		N
	Battery type		N
	Nominal voltage of total battery (V)		N
	Nominal capacity of total battery (optional)		N
	Warning label		N
	Instructions		N
2.1.1.5/RD	Protection against energy hazards		
4.7.21 1.7.2.4/RD	Installation instructions	Detailed information regarding installation 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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
2.1.1.2/RD	Battery compartments		N
2.1.1.3/RD	Access to ELV wiring	No operator accessible hazardous voltage circuit wiring.	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 :	No hazardous energy level at accessible parts.	P
2.1.1.6/RD	Manual controls	Control button is of insulating material.	P
2.1.1.7/RD	Discharge of capacitors in equipment	No risk of electric shock.	P
	Time-constant (s); measured voltage (V)	(See appended table 5.1.3)	P
2.1.1.8/RD	Energy hazards – d.c. mains supply	The equipment is not connected to d.c. mains supply	N
	a) Capacitor connected to the d.c. mains supply :		N
	b) Internal battery connected to the d.c. mains supply :		N
2.1.1.9/RD	Audio amplifiers :	No such parts.	N
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		P
	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

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

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
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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
3.5.3/RD	ELV circuits as interconnection circuits	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment	Data ports (RJ45 and RS232) is signal port only, no test required.	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
	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	Appliance coupler and outlets 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		N
2.6.3/RD	Protective earthing and protective bonding conductors	Through appliance coupler and outlets used	P
2.6.3.1/RD	General	**Compliance checked.**	P
2.6.3.2/RD	Size of protective earthing conductors	Appliance inlet used	P
	Rated current (A), cross-sectional area (mm^2), AWG :	(see appended tabel 4.5)	
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

IEC 62040-1			
Clause	Requirement – Test	Result - Remark	Verdict
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) :		
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	Appliance inlet used	P
2.6.5.4/RD	Parts that can be removed by an operator	Appliance inlet, earthing connected before and disconnected after hazardous voltage. No other operator removable parts.	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

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Clause	Requirement – Test	Result - Remark	Verdict
3.4/RD	Disconnection from the mains supply		P
3.4.1/RD	General requirement		P
3.4.2/RD	Disconnect devices	Appliance coupler used disconnect device.	P
3.4.3/RD	Permanently connected equipment		N
3.4.4/RD	Parts which remain energized	Adequate protection provided to service personnel during backup and maintenance mode.	P
3.4.5/RD	Switches in flexible cords	No such construction.	N
3.4.6/RD	Number of poles - single-phase and d.c. equipment	The plug / appliance inlet and coupler disconnected both poles simultaneously.	P
3.4.7/RD	Number of poles - three-phase equipment	Single-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

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Clause	Requirement – Test	Result - Remark	Verdict
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
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: 6KA	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

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Clause	Requirement – Test	Result - Remark	Verdict
2.8.4/RD	Fail-safe operation		N
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches and relays		N
2.8.7.1/RD	Contact gaps (mm) :		N
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(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

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Clause	Requirement – Test	Result - Remark	Verdict

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
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

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Clause	Requirement – Test	Result - Remark	Verdict
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	
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	See below.	P
2.10.5.7/RD	Separable thin sheet material	Used in transformer and over heatsink	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

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Clause	Requirement – Test	Result - Remark	Verdict

2.10.5.14 /RD	Additional insulation in wound components	No additional insulation used.	N
	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

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

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Clause	Requirement – Test	Result - Remark	Verdict
2.10.2/RD	Determination of working voltage		P
2.10.2.1/RD	General	The rms and the peak voltage were measured with unit connected to a 240V TN power system. Pollution Degree 2 and Overvoltage Category II considered.	P
2.10.2.2/RD	RMS working voltage	(See appended table 5.7)	P
2.10.2.3/RD	Peak working voltage	(See appended table 5.7)	P
2.10.3/RD	Clearances	See below. Annex G/RD was not considered.	P
2.10.3.1/RD	General	Annex F/RD and minimum clearances considered.	P
2.10.3.2/RD	Mains transient voltages	See below.	P
	a) AC mains supply .....:	Equipment is Overvoltage Category II.	P
	b) Earthed d.c. mains supplies .....:	Not intended for d.c. mains supplies	N
	c) Unearthed d.c. mains supplies :	Not intended for d.c. mains supplies	N
	d) Battery operation :	Dedicated battery used.	P
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.3.5/RD	Clearances in circuits having starting pulses	No such circuit generating starting pulses.	N
2.10.3.6/RD	Transients from a.c. mains supply :	Considered.	P
2.10.3.7/RD	Transients from d.c. mains supply :	Not connected to d.c. mains supply.	N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :	No TNV circuits	N
2.10.3.9/RD	Measurement of transient voltage levels	Measurement not relevant	N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	

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Clause	Requirement – Test	Result - Remark	Verdict
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	See below.	P
2.10.5.7/RD	Separable thin sheet material	Used in transformer and over heatsink	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
	Working voltage :		
	- Basic insulation not under stress :		N
	- Supplementary, reinforced insulation :		N

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

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Clause	Requirement – Test	Result - Remark	Verdict
3.1.2/RD	Protection against mechanical damage	Wires do not touch sharp edges which could damage the insulation and cause hazard.	P
3.1.3/RD	Securing of internal wiring	Internal wires are secured by solder pins and quick connect terminals so that a loosening of the terminal connection is unlikely.	P
3.1.4/RD	Insulation of conductors	The insulation of the individual conductors is suitable for the application and the working voltage. For the insulation material see 3.1.1/RD.	P
3.1.5/RD	Beads and ceramic insulators	Not used.	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

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Clause	Requirement – Test	Result - Remark	Verdict
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Single supply connection.	N
3.2.3/RD	Permanently connected equipment	Built-in component. Approved connector for connecting to end system. Connection to an a.c. mains supply must be checked in end system.	N
	Number of conductors, diameter (mm) of cable and conduits		--
3.2.4/RD	Appliance inlets	No appliance inlet used.	N
3.2.5/RD	Power supply cords	See below.	N
3.2.5.1/RD	AC power supply cords	Not used.	N
	Type		--
	Rated current (A), cross-sectional area (mm2),AWG		--
3.2.5.2/RD	DC power supply cords	Not used.	N
3.2.6/RD	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) .....:		N
	Longitudinal displacement (mm) .....:		--
3.2.7/RD	Protection against mechanical damage		--
3.2.8/RD	Cord guards		
	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 *(No wiring terminals for external power conductors)*		N
3.3/RD	Wiring terminals for connection of external conductors		N
3.3.1/RD	Wiring terminals		N
3.3.2/RD	Connection of non-detachable power supply cords		N
3.3.3/RD	Screw terminals		N
3.3.4/RD	Conductor sizes to be connected		N

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Clause	Requirement – Test	Result - Remark	Verdict
	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	Unit for building-in	N
	Angle of 10^0		N
	Test: force (N)		N
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
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

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Clause	Requirement – Test	Result - Remark	Verdict

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.	P
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
	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

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Clause	Requirement – Test	Result - Remark	Verdict
	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
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

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Clause	Requirement – Test	Result - Remark	Verdict
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	Maintenance free battery. The battery is connected by quick connect terminals (no necessary tightening).	P
7.6.3	Distance	The temperature of the electrolyte and the gas emission are within the limits of this standard.	P
7.6.4	Case insulation	No battery used inside.	N
7.6.5	Wiring	The protection of connection wiring complies with sub-clause 6, 3.1/RD.	P
7.6.6	Electrolyte spillage	Sealed maintenance free batteries provided unlikely emission of electrolyte.	P
7.6.7	Ventilation	See appended table	P
7.6.8	Charging voltage	Protective circuit to prevent excessive charging voltages occurring under any single fault condition. See sub-clause 8.3	P
7.7	Temperature rise		P
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L .....:		—
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat .....:	(See appended table 7.4)	P
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General		P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P

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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
6.2.2/RD	Electric strength test procedure		N

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Clause	Requirement – Test	Result - Remark	Verdict
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	Data ports (RJ45 and USB) is signal port only, no test required.	N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits .....:		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions .....:		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed .....:		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed .....:		
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.4/RD	Creepage distances		P
2.10.4.1/RD	General		P
2.10.4.2/RD	Material group and comparative tracking index		P
	CTI tests .....:		
2.10.4.3/RD	Minimum creepage distances		P

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Clause	Requirement – Test	Result - Remark	Verdict

M/RD	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)		N
M.1/RD	Introduction		N
M.2 /RD	Method A		N
M.3/RD	Method B		N
M.3.1/RD	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		N
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2/RD)		N
A.1.1/RD	Samples.....:		
	Wall thickness (mm).....:		
A.1.2/RD	Conditioning of samples; temperature (°C) .....:		N
A.1.3/RD	Mounting of samples .....:		N
A.1.4/RD	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D .....:		
A.1.5/RD	Test procedure		N
A.1.6/RD	Compliance criteria		N
	Sample 1 burning time (s).....:		
	Sample 2 burning time (s).....:		
	Sample 3 burning time (s).....:		
A.2/RD	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2/RD and 4.7.3.4/RD)		N
A.2.1/RD	Samples, material.....:		
	Wall thickness (mm).....:		
A.2.2/RD	Conditioning of samples; temperature (°C) .....:		N
A.2.3/RD	Mounting of samples .....:		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .....:		

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Clause	Requirement – Test	Result - Remark	Verdict
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)		N
B.1/RD	General requirements	No motors	N
	Position .....:		N
	Manufacturer .....:		N
	Type .....:		N
	Rated values .....:		N
B.2/RD	Test conditions		N
B.3/RD	Maximum temperatures		N
B.4/RD	Running overload test		N
B.5/RD	Locked-rotor overload test		N
	Test duration (days) .....:		N
	Electric strength test: test voltage (V) .....:		N
B.6/RD	Running overload test for d.c. motors in secondary circuits		N
B.6.1/RD	General		N
B.6.2/RD	Test procedure		N
B.6.3/RD	(Alternative) test procedure		N
B.6.4/RD	Electric strength test; test voltage (V) .....:		N
B.7/RD	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1/RD	General		N
B.7.2/RD	Test procedure		N
B.7.3/RD	(Alternative) test procedure		N

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Clause	Requirement – Test	Result - Remark	Verdict
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
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

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Clause	Requirement – Test	Result - Remark	Verdict
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.	
K/RD	Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD)		N
K.1/RD	Making and breaking capacity		N
K.2 /RD	Thermostat reliability; operating voltage (V) ....:		N
K.3/RD	Thermostat endurance test; operating voltage (V) .....:		N
K.4/RD	Temperature limiter endurance; operating voltage (V) .....:		N
K.5/RD	Thermal cut-out reliability		N
K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P

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Clause	Requirement – Test	Result - Remark	Verdict
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
V.1/RD	Introduction		P
V.2/RD	TN power distribution systems	See sub-clause 1.6.1/RD.	P
V.3/RD	TT power distribution systems		P
V.4/RD	IT power distribution systems		P

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Clause	Requirement – Test	Result - Remark	Verdict

4.3	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	--	--	--
Mylar sheet	E I DUPONT DE NEMOURS & CO INC	NOMEX 410	Min, 220℃	UL 94	UL:E34739
AC fan (four provided)	YEN SUN	FD248025EB-N(2R9)	DC24V, 0.14A, 3.36W	--	TÜV : R50027591
AC connector	FLYAFORD IND CO LTD	JMD29	---	UL 1977	UL:E227185
Input and output wire	Various	Various	Min. 10mm^2, 600V, 105℃	--	UL
ON PCB_3320_DR4 board					
SCR (S1, S2)	SEMIKRON	SK45STA16	1600V, 47A	--	UL : E63532
IGBT1, IGBT2, IGBT1	Vincotech	FZ06NBA030SA	600V, 30A	--	UL: E192116.
IGBT 4	Vincotech	FZ06NBA050SA	600V, 50A	--	UL: E192116.
Current Transformer (T2, T3, T4, T5)	SIDNA	UMS33CT4	CLASS F	--	Test with appliance
Transformer (T6)	SIDNA	UMS33D2T1	CLASS F	--	Test with appliance
Hall (H1,H2,H4,H5, H6)	LEM	HX50-P	50A	--	Test with appliance
Fuse (F5, F6, F7, F8, F9, F10, F11)	littelfuse	KLKD	32A, 500V	--	UL: E10480
DC capacitor 1 (C86,C87,C88, C89,C90,C91, C92,C93)	Jianghai	CD293-560UF	450V, 560uF, 85℃	--	UL: E227010
DC capacitor 2 (C96,C97)	Jianghai	CD293-220uF	450V, 220uF, 85℃		UL: E227010
PCB	Various	Various	V-0, 130℃	--	UL

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Clause	Requirement – Test	Result - Remark	Verdict

On SNT_ASY_3320_FG board					
PCB	Various	Various	V-0, 130℃	UL 94	UL
IGBT (U6, U7, U8)	Vincotech	FZ06NIA050SA	600V,50A	--	UL: E192116.
Hall (U9,U10,U11)	LEM	HX50-P	50A	--	Test with appliance
DC capacitor （C1,C2,C4,C5,C6,C7,C8,C93）	Jianghai	CD293-560UF	450v/85℃	--	UL:E227010
Relay （ RLY1,RLY2,RLY3）	hongfa	HF92F-024D-2A11S	24VDC/ 250VAC/2A/30A		UL:E134517 VDE：40016109
Y2 capacitor （C53,C54,C55,C56,C57,C58,C59）	Various	CD16-E2GA472MYGS	250VAC/ 4700pf	IEC 60384-14	VDE: 124321
Fuse (F1, F2, F3)	littelfuse	KLKD	32A, 500V	--	UL: E10480
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_ZK board					
Y2 capacitor (C142,C143)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE: 124321
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_CK board					
Y2 capacitor (C142,C143,C586)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE:124321
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_DG board					
Inductor (L1,L2,L4,L5,L6,L7,L8,L9)	taicheng	UMS33L1	CLASS H	--	Test with appliance
Inductor (L10,L11,L12)	taicheng	UMS33L2	CLASS H	--	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_DY board					

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Clause	Requirement – Test	Result - Remark	Verdict

DC capacitor (C7,C8)	Jianghai	CD293-220uF	450V, 85℃	--	UL:E227010
Y2 capacitor (C3,C4,C5,C6, C59,C60)	Various	Various	250VAC, 4700pF	IEC 60384-14	VDE:124321
Y2 capacitor (C11,C12,C61)	Various	Various	250VAC, 2200pF	IEC 60384-14	VDE:12006
Optocouplers (U2)	NEC	PS2501L-1-L	Di>0.4mm	--	UL:E72422, VDE:40008862
Transformer (T1)	SIDNA	UMS33P1T2	CLASS B	--	Test with appliance
Transformer (T2)	SIDNA	UMS33P1T1	CLASS B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_FS board					
Optocouplers (U1)	NEC	PS2561	Di>0.4mm	--	UL:E72422, VDE:40008862
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_ZQ board					
Transformer (T1)	SIDNA	UMS33D1T1	CLASS B	---	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
On SNT_ASY_3320_FQ board					
Transformer (T1,T3,T4)	SIDNA	UMS33D2T1	CLASS B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	--	UL
[1]) an asterisk indicates a mark which assures the agreed level of surveillance.					

4.4 1.6.2/RD	TABLE: electrical data (in normal conditions)					P
Fuse#	Irated(A)	U(V)	P(W)	P(VA)	I(A)	Condition/status
Tested on model PM10						
Input breaker	--	304V/50Hz	7836	7899	15	Charging of empty batteries and rated output load 10kVA/8kW.

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Clause	Requirement – Test	Result - Remark	Verdict

Input breaker	15	380V/50Hz	9653	9745	14.7	Ditto
Input breaker	15	400V/50Hz	9562	9632	13.9	Ditto
Input breaker	15	415V/50Hz	9473	9560	13.4	Ditto
Input breaker	--	460V/50Hz	9075	9162	11.5	Ditto
Input breaker	--	304V/60Hz	7836	7899	15	Ditto
Input breaker	15	380V/60Hz	9710	9806	14.9	Ditto
Input breaker	15	400V/60Hz	9610	9700	14	Ditto
Input breaker	15	415V/60Hz	9606	9689	13.5	Ditto
Input breaker	--	460V/60Hz	9160	9250	11.6	Ditto
Tested on model PM15						
Input breaker	--	304V/50Hz	12000	12110	23	Charging of empty batteries and rated output load 15kVA/13.5kW.
Input breaker	23	380V/50Hz	14529	14603	22.1	Ditto
Input breaker	23	400V/50Hz	14450	14575	21	Ditto
Input breaker	23	415V/50Hz	14358	14450	20.1	Ditto
Input breaker	--	460V/50Hz	14323	14433	16.8	Ditto
Input breaker	--	304V/60Hz	12143	12210	23	Ditto
Input breaker	23	380V/60Hz	14665	14713	22.3	Ditto
Input breaker	23	400V/60Hz	14604	14650	21	Ditto

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Clause	Requirement – Test	Result - Remark	Verdict

Input breaker	23	415V/60Hz	14368	14500	20.3	Ditto
Input breaker	--	460V/60Hz	14335	14480	17	Ditto
Tested on model PM20						
Input breaker	--	304V/50Hz	15637	15795	30	Charging of empty batteries and rated output load 20KVA/16KW.
Input breaker	30	380V/50Hz	19209	19404	29.4	Ditto
Input breaker	30	400V/50Hz	19182	19375	27.8	Ditto
Input breaker	30	415V/50Hz	18999	19191	26.7	Ditto
Input breaker	--	460V/50Hz	19080	19178	22.4	Ditto
Input breaker	--	304V/60Hz	15674	15675	30	Ditto
Input breaker	30	380V/60Hz	19269	19484	29.5	Ditto
Input breaker	30	400V/60Hz	19201	19400	27.8	Ditto
Input breaker	30	415V/60Hz	19005	19201	26.8	Ditto
Input breaker	--	460V/60Hz	19091	19184	22.5	Ditto
Note(s):						

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 (reinforced insulation)	<420	3000Va.c.	0.4	>0.4 [1)]
Note(s): 1). Approved component. For details refer to table 4.3.				

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Clause	Requirement – Test	Result - Remark	Verdict

5.1.1 and 2.1.1.7/RD	TABLE: discharge of capacitors in the primary circuit			P
Condition	τcalculated (s)	τmeasured (s)	t u→ 0V(s)	Comments
Tested on model PM20				
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				

5.1.4	TABLE: backfeed protection test			N
Condition	Voltage measured (V)/ current (mA)			Comments
	L-N	L-G	N-G	
Note(s):				

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

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

5.2 2.2.3/RD	TABLE: insulation / SELV voltage measurement		N
Location		Voltage measured (V)	Comments
--		--	--
Note(s): No any voltage in RS232 circuit side exceeding SELV limits during normal / abnormal operation. No test necessary.			

5.2.3 and 2.4.2/RD	TABLE: limited current circuit measurement					N
condition	Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments
--	--	--	--	--	--	--
--	--	--	--	--	--	--
Note(s):						

5.4, 2.6.3.3/ RD	TABLE: provisions for protective earthing		P
Location		Resistance measured(mΩ) / voltage drop(V)	Comments
Tested on model PM20			
I/P earth →O/P earth		1V	Test current of ___60__A for _2__min.
I/P earth →metal enclosure		1V	Ditto
I/P earth →earth on PCB		1V	Ditto
Note: The Voltage drop shall not exceed 2.5V.			

5.8, 2.10.2/ RD	TABLE: working voltage measurement			N
Location		RMS voltage (V)	Peak voltage (V)	comments
---		--	--	--
---		--	--	--
Note:				

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

5.8 and 9	TABLE: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr(mm)	dcr (mm)
Whole unit						
PCB_3320_DY PCB						
Under C11, C61 traces	<420	<250	2.0	5.3	2.5	5.3
Under C3, C4 traces	<420	<250	2.0	6.5	2.5	6.5
Under C12 traces	<420	<250	2.0	5.4	2.5	5.4
PE-R85 Pin	<420	<250	2.0	5.6	2.5	5.6
PE -R83Pin	<420	<250	2.0	5.6	2.5	5.6
Parts Pin-bottom metal enclosure (PE)	<420	<250	2.0	>2.0 #	2.5	>2.5 #
PCB_3320_CT1 PCB						
Under C142 traces	<420	<250	2.0	7.8	2.5	7.8
Under C143 traces	<420	<250	2.0	6.7	2.5	6.7
PCB_3320_CT2 PCB						
Under C142 traces	<420	<250	2.0	8.2	2.5	8.2
Under C149 traces	<420	<250	2.0	8.0	2.5	8.0
Under C586 traces	<420	<250	2.0	7.8	2.5	7.8
PCB_3320_DR3 PCB						
Under C83 traces	<420	<250	2.0	5.8	2.5	5.8
Under C53 traces	<420	<250	2.0	7.5	2.5	7.5
Under C57 traces	<420	<250	2.0	7.7	2.5	7.7
PE –J2 Pin	<420	<250	2.0	4.7	2.5	4.7
IGBT metal-heatsink (PE)	<420	<250	2.0	6.0	2.5	6.0
C7 Pin-heatsink (PE)	<420	<250	2.0	9.3	2.5	>9.3
Parts(C1, C3, C4, C5, C6, C7, C8, C93, C94)-top metal enclosure (PE)	<420	<250	2.0	3.7	2.5	3.7
PCB_3320_CP3 PCB						
PE (H6)-J1 traces	<420	<250	2.0	4.8	2.5	4.8
PE (H21)-L9 traces	<420	<250	2.0	8.2	2.5	8.2
PE (H14)-L7 traces	<420	<250	2.0	5.4	2.5	5.4
PE (H7)-L14 traces	<420	<250	2.0	5.4	2.5	5.4
PE (H1)-L1 traces	<420	<250	2.0	4.7	2.5	4.7

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Clause	Requirement – Test	Result - Remark	Verdict

Parts Pin-bottom metal enclosure (PE)	<420	<250	2.0	>2.0 #	2.5	>2.5 #
PCB_3320_DR4 PCB						
PE (H1)-D53 Pin	<420	<250	2.0	5.4	2.5	5.4
PE (H2)-C64 Pin	<420	<250	2.0	5.6	2.5	5.6
PE (H5)-J13 traces	<420	<250	2.0	6.3	2.5	6.3
PE (H4)-J22 traces	<420	<250	2.0	4.8	2.5	4.8
PE (H3)-R194/J34 Pin	<420	<250	2.0	7.2	2.5	7.2
IGBT metal-heatsink (PE)	<420	<250	2.0	6.0	2.5	6.0
Parts(C100, C101, C102)-heatsink (PE)	<420	<250	2.0	7.5	2.5	>7.5
Parts(C86, C87, C88, C89, C90, C91, C92, C93, C94)-top metal enclosure (PE)	<420	<250	2.0	3.7	2.5	3.7
Parts(C96, C97)-top metal enclosure (PE)	<420	<250	2.0	2.7	2.5	2.7
PCB_3320_CP1 PCB						
PE (H1)-D2 Pin	<420	<250	2.0	4.2	2.5	4.2

Note(s):

1.) A minimum clearance of 1.75mm for each contact pair had been provided (required according to sub-clause 5.1.4: 1.4mm minimum).

2.) Shrink tubings are used to cover internal wires.

3.) # means mylar provided between board PCB_3320_DY / PCB_3320_DR3 and metal enclosure.

5.8, 6, 8.2 and 9	TABLE: electric strength tests, impulse tests and voltage surge tests	P

test voltage applied between:	test voltage (V)	breakdown Yes / No
All models		
Primary to Secondary (mains input & output conductor to sub-D connector)	3000Va.c.	No
Primary to earth (mains input & output conductor to earth)	1500Va.c.	No

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

7.4.1 4.6.1/RD and 4.6.2/RD	TABLE: openings	N

Location	Size (mm)	Comments
Top		
Bottom		
side		
Front		
Back		
Note(s):		

7.5	TABLE: resistance to fire			N
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class

7.5 and 8.3	TABLE: fault condition tests				25℃,if not otherwise stated	P
	Ambient temperature (°C) ……:				See below	--
	Model/type of power supply ……:				See nameplate for details	--
	Manufacturer of power supply ……:				See nameplate for details	--
	Rated markings of power supply ……:				Refer to page 1	--
component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	Result
PM20 model						
On PCB_3320_DR4 PCB						
input SCR S1 (Pin2-Pin29)	s-c	415	10ms	F5, F6, F7	2	Input fuse F5 opened. The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.
IGBT1 (“+DC”-“+GND”)	s-c	415	10ms	F5, F6, F7	2	Input fuse F5 opened. IGBT1 damaged. The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.

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

IGBT1 (“+DC”-“S1”)	s-c	415	10ms	F5, F6, F7	2	Input fuse F5 opened. IGBT1 damaged. The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.
IGBT1 (“+DC”-“G1”)	s-c	415	10ms	F5, F6, F7	3	Input fuse F5 opened. IGBT1 damaged. The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.
IGBT1 (“+G1”-“S1”)	s-c	415	10ms	F5, F6, F7	1	The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.
C90	s-c	415	10ms	F5, F6, F7	1	Input fuses F5, F6 and F7 opened. S1 and S2 damaged. The rectifier shutdown. Display screen show “Rectifier fault”. No any hazards.
T6 (Pin10-9)	s-c	415	10ms	F5, F6, F7	2	Q3 damaged. Display screen show “charger fault, Rectifier fault”. No any hazards.
T6 (Pin6-7)	s-c	415	10ms	F5, F6, F7	2	Q3 damaged. Display screen show “charger fault, Rectifier fault”. No any hazards.
On PCB_3320_DY PCB						
T2 (pin8-9)	s-c	415	60min	F5, F6, F7	0	Unit shutdown. No any hazards.
T2 (pin11-12)	s-c	415	60min	F5, F6, F7	0	Unit shutdown. Display screen show “Fan fault”. No any hazards.
T2 (pin13-14)	s-c	415	60min	F5, F6, F7	0	Unit shutdown. No any hazards.
Q1 G-S	s-c	415	10ms	F5, F6, F7	3	Unit shutdown. Q1 damaged. No any hazards.
Q1 D-S	s-c	415	10ms	F5, F6, F7	3	Unit shutdown. No any hazards.
Q1 D-G	s-c	415	10ms	F5, F6, F7	3	Unit shutdown. No any hazards.

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Clause	Requirement – Test	Result - Remark	Verdict

On PCB_3320_DR3 PCB						
U6 (“+DC”-“+GND”)	s-c	415	10ms	F5, F6, F7	4	U6 damaged. Display screen show “Inverter fault”. No any hazards.
U6 (“+DC”-“S1”)	s-c	415	10ms	F5, F6, F7	4	U6 damaged. Display screen show “Inverter fault”. No any hazards.
U6 (“+DC”-“G1”)	s-c	415	10ms	F5, F6, F7	3	U6 damaged. The fuse F1 opened. Display screen show “Inverter fault”. No any hazards.
U6 (“+G1”-“S1”)	s-c	415	10ms	F5, F6, F7	4	Display screen show “Inverter fault”. No any hazards.
U6 (“+DC”-“+GND”)	s-c	Battery mode	10min	DC fuse	3	U6 damaged. Display screen show “Inverter fault”. No any hazards.
U6 (“+DC”-“S1”)	s-c	Battery mode	10min	DC fuse	3	U6 damaged. Display screen show “Inverter fault”. No any hazards.
U6 (“+DC”-“G1”)	s-c	Battery mode	10min	DC fuse	3	U6 damaged. The fuse F1 opened. Display screen show “Inverter fault”. No any hazards.
U6 (“+G1”-“S1”)	s-c	Battery mode	10min	DC fuse	3	Display screen show “Inverter fault”. No any hazards.
C7	s-c	415	10ms	F5, F6, F7	3	Input fuses F5, F6 and F7 opened. S1 and S2 damaged. Display screen show “Rectifier fault”. No any hazards.
Whole unit						

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

Output (L1-N)	o-l	415	75min	F5, F6, F7	22→ 30→3	UPS shutdown the output at load of 110% load. Measured max temperatures: On PCB_3320_DR4 PCB: SCR S1: 55℃ IGBT1: 71℃ On PCB_3320_DR3 PCB: U6: 74.4℃ On PCB_3320_CP3 PCB: L1: 93℃ L7: 120℃ L10: 56℃ On PCB_3320_DY PCB: T2 winding: 37.6℃ Ambient: 21.0℃
Output (L1-N)	o-l	Battery mode	75min	DC fuse	--	UPS shutdown the output at load of 110% load. Measured max temperatures: On PCB_3320_DR4 PCB: SCR S1: 57℃ IGBT1: 73℃ On PCB_3320_DR3 PCB: U6: 78℃ On PCB_3320_CP3 PCB: L1: 98℃ L7: 124℃ L10: 48℃ On PCB_3320_DY PCB: T2 winding: 40℃ Ambient: 21.4℃
Output (L1-N)	s-c	415	1s	Output breaker	35→3	The output shutdown immediately. And the UPS display warning “Output short”.
Output (L1-N)	s-c	Battery mode	1s	DC fuse	--	The output shutdown immediately. And the UPS display warning “Output short”.

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Clause	Requirement – Test	Result - Remark	Verdict

Ventilation openings (front and bottom)	Blocked	415	80min	Input breaker	27	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 PCB_3320_DR4 PCB: SCR S1: 68℃ IGBT1: 90℃ On PCB_3320_DR3 PCB: U6: 88℃ On PCB_3320_CP3 PCB: L1: 120℃ L7: 156℃ L10: 67℃ On PCB_3320_DY PCB: T2 winding: 68℃ Ambient: 28.0℃

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

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 PCB_3320_DR4 PCB: SCR S1: 69℃ IGBT1: 90℃ On PCB_3320_DR3 PCB: U6: 87℃ On PCB_3320_CP3 PCB: L1: 120℃ L7: 160℃ L10: 65℃ On PCB_3320_DY PCB: T2 winding: 63℃ Ambient: 26.4℃
Fan(one for IGBT)	Locked	415	120min	Input breaker	26	UPS works normal. Measured max temperatures: On PCB_3320_DR4 PCB: SCR S1:69℃ IGBT1: 78℃ On PCB_3320_DR3 PCB: U6: 81℃ On PCB_3320_CP3 PCB: L1: 115℃ L7: 132℃ L10: 67℃ On PCB_3320_DY PCB: T2 winding: 54℃ Ambient: 25.3℃

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Clause	Requirement – Test	Result - Remark	Verdict

Fan(one for IGBT)	Locked	Battery mode		DC fuse	--	UPS works normal. Measured max temperatures: On PCB_3320_DR4 PCB: SCR S1: 72℃ IGBT1: 78℃ On PCB_3320_DR3 PCB: U6: 81℃ On PCB_3320_CP3 PCB: L1: 115℃ L7: 132℃ L10:58℃ On PCB_3320_DY PCB: T2 winding: 54℃ Ambient: 25.3℃
Note(s): s-c means short circuit. o-l means overload. o-p means open circuit.						

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 PM20				
Whole unit				
Input wire (phase A/ battery)	38	34	42	105-40
Battery wire ‘+”	25	25	34	105-40
Fan	28	28	28	70-40
Top enclosure	27	27	27	70-40
On PCB_3320_DR4 PCB				
SCR S1	67	57	57	130-40
IGBT1	74	64	67	130-40
C89	42	42	42	105-40
T6 winding	64	64	64	110-40

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

L4 coil	58	87	54	130-40
T2 primary winding	44	53	44	110-40
T2 secondary winding	47	53	44	110-40
C97	43	56	43	105-40
PCB near IGBT1	66	56	56	`130-40
On PCB_3320_CP3 PCB				
coil of REC A inductor (L1)	105	90	115	180-40
coil of REC B inductor (L4)	98	82	61	180-40
coil of INV A inductor (L7)	126	126	139	180-40
Winding of inductor (L10)	74	65	55	155-40
On 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
On SNT_PCB_3320_CQ PCB				
Y2 capacitor (C56)	26.2	28	27	85-40
IGBT (U6)	82	74	74	130-40
C5	41	41	41	105-40
U9 coil	67	67	67	130-40
PCB near U6	72	72	72	130-40
Ambient	26.0℃	25.4℃	25.8℃	--
Backup time	--	--	30min	--

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

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

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

With a specified ambient temperature of 40°C, the maximum temperature rise is calculated as follows:
Winding components:

- T2 (On PCB_3320_DR4 PCB and PCB_3320_DY PCB) of class B →.
  dT max = 95K - 10K - (40-25)K = 70K
- transformers 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

7.7	TABLE B: ball pressure test of thermoplastic parts		N
	allowed impression diameter (mm)	<2mm	

part	test temperature (°C)	impression diameter (mm)
---	--	--
---	--	--

Note(s):

1. Other relevant thermoplastic parts are Phenolic type that is accepted without further tests for test temperatures not exceeding 125°C

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 PM20					
Unit on	0.9	0.9	60	3.5	Switch “e” open, L to PE, no load
Unit on	0.9	0.9	60	3.5	Switch “e” open, N to PE, no load
Note(s) : Test voltage: 460V/60Hz					

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

M	Ventilation of battery compartments	P

	The required dimension for the ventilation openings will be calculated with the following formula:	
	A > K1 * Q	
	with Q = (0.054 m³/Ah) * n * I * C	
	where: K1 : constant factor of 28 h * cm²/m³ Q : airflow in m³/h n : number of battery cells I : constant factor (0,2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	With the specific data for the UPS the following dimension for the ventilation openings is required:	
	External battery pack n :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 –Unit view (I)

Fig. 2 –Unit view (II)

Pictures

Fig. 3 –Unit view

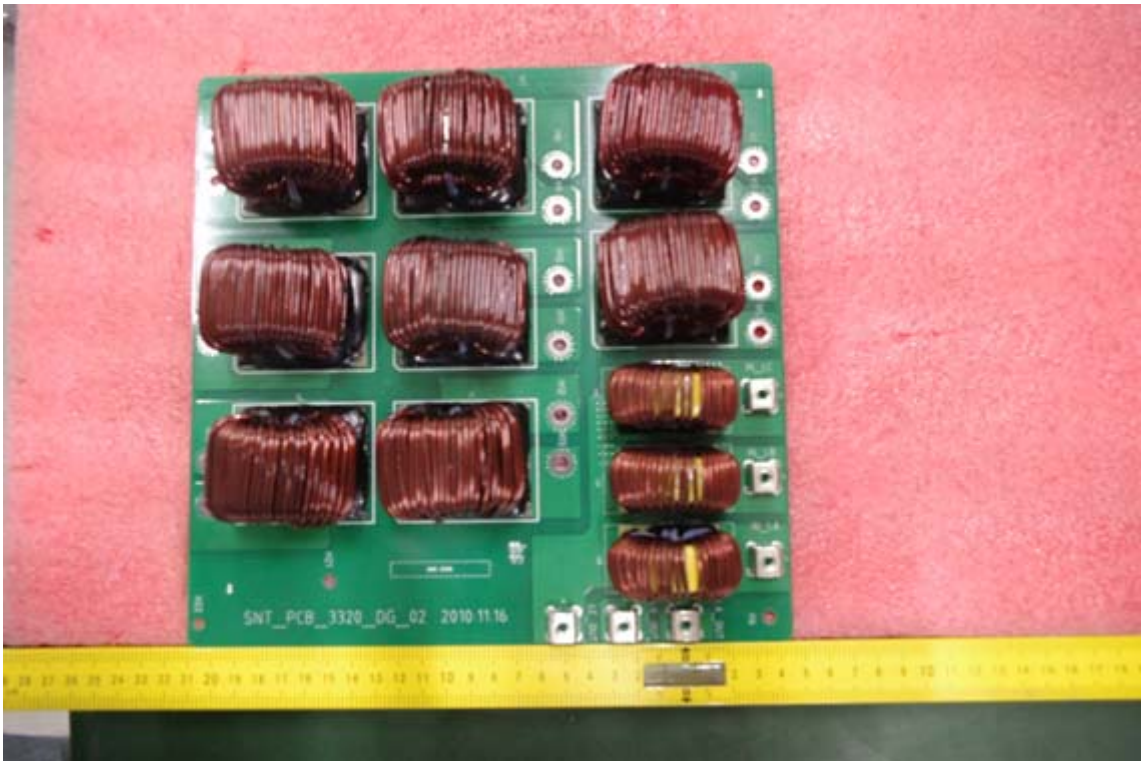

Fig.4 – Board PCB_3320_CP3, components side view

Pictures

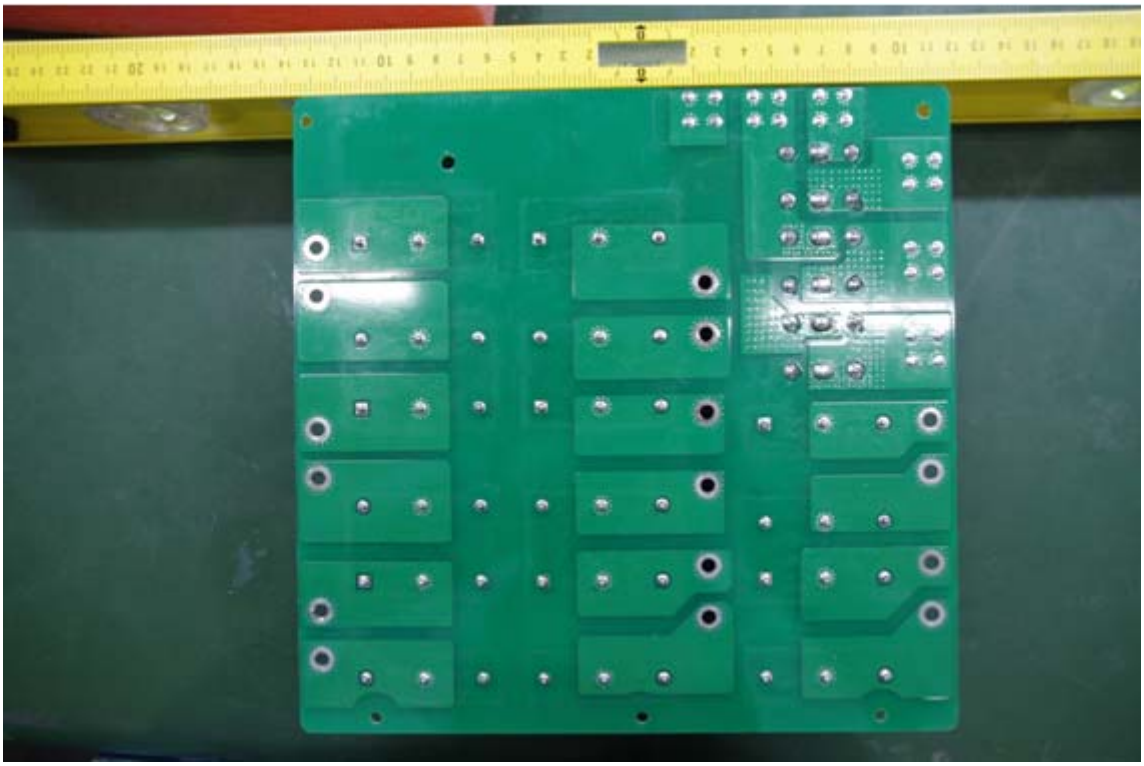

Fig.5 – Board PCB_3320_CP3, traces side view

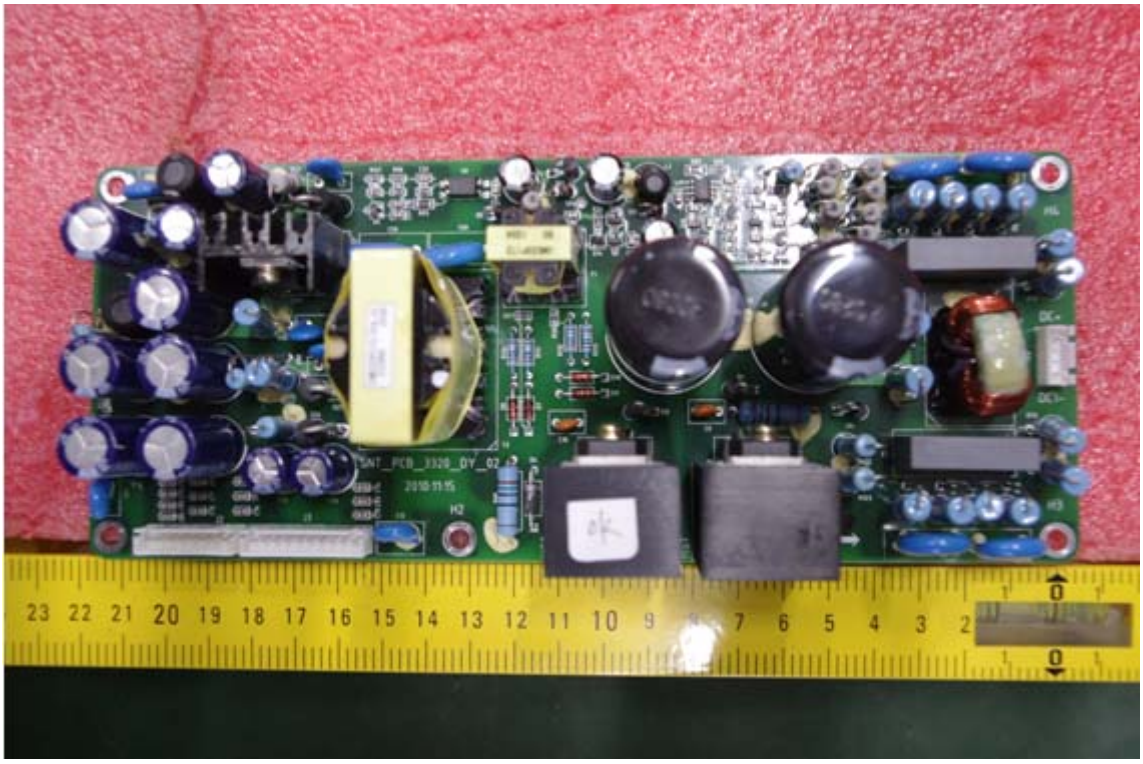

Fig. 6 – Board PCB_3320_DY, components side view

Pictures

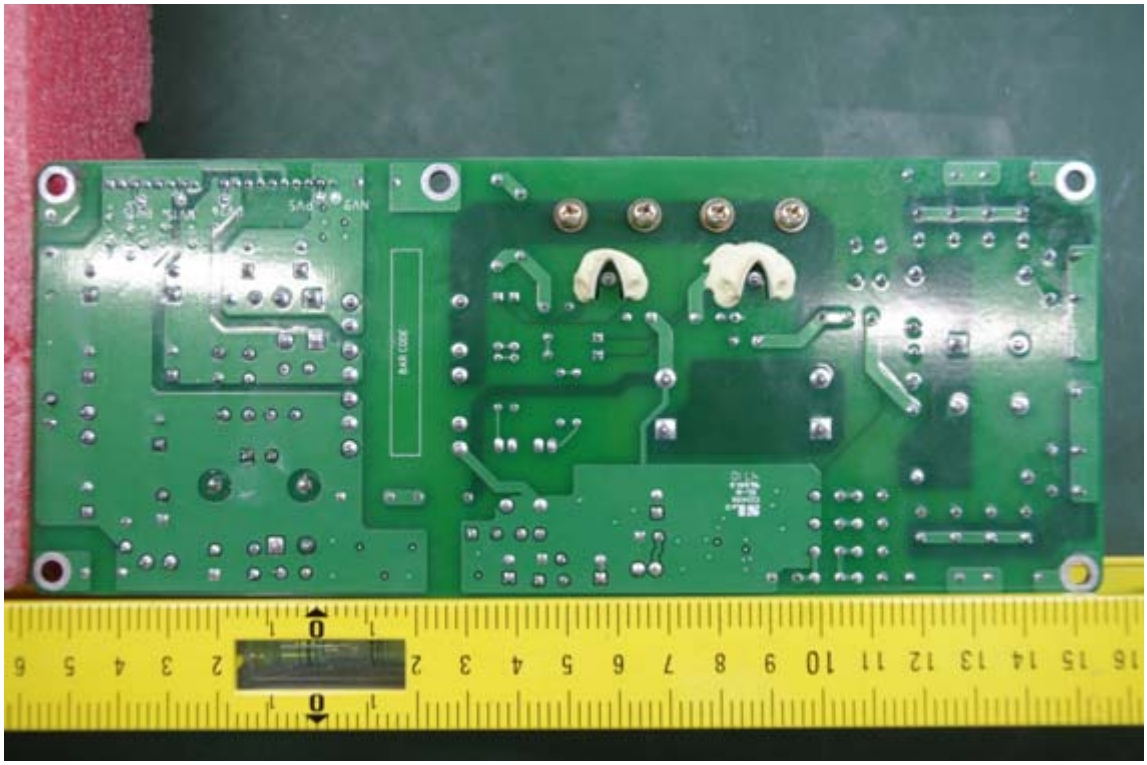

Fig. 7 – Board PCB_3320_DY, traces side view

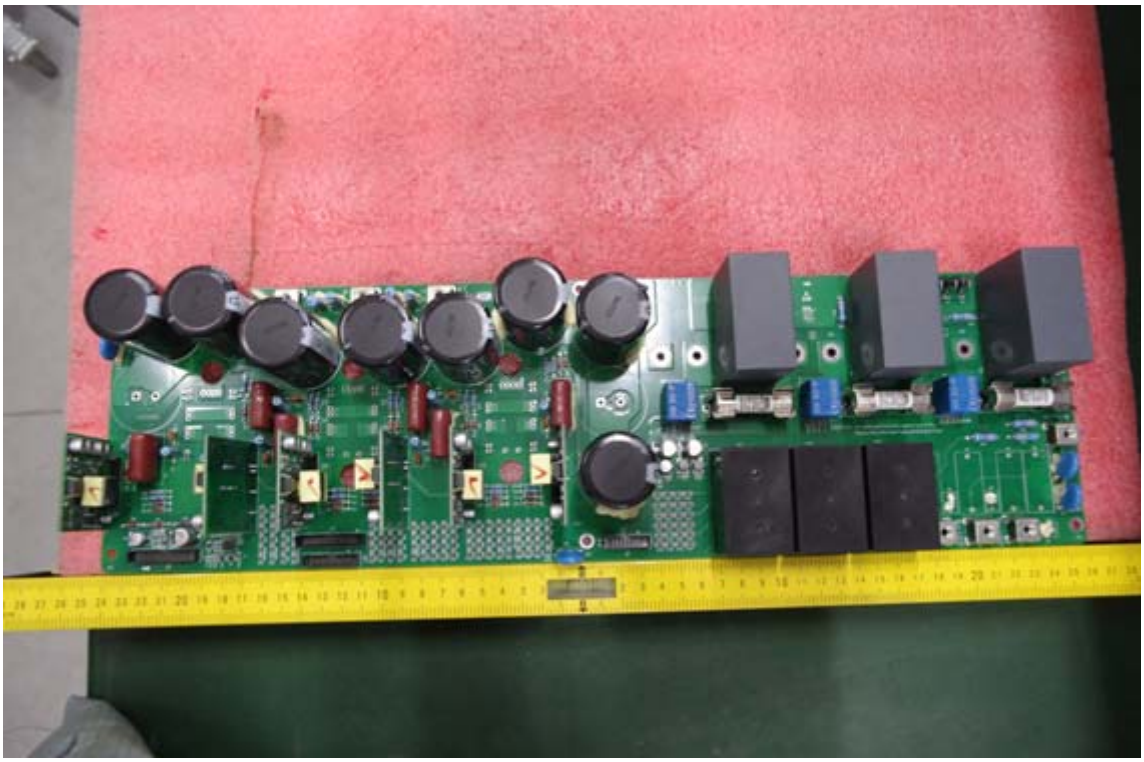

Fig. 8 –Board PCB_3320_DR3, components side view

Pictures

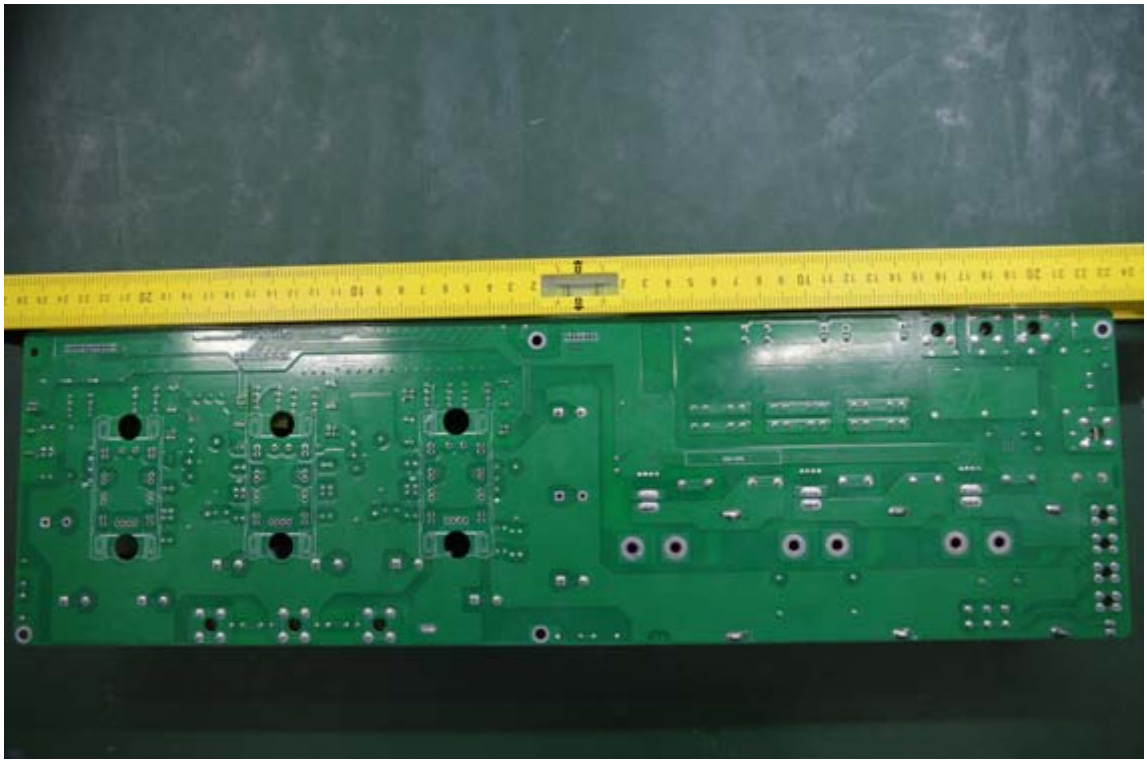

Fig.9 –Board PCB_3320_DR3, traces side view

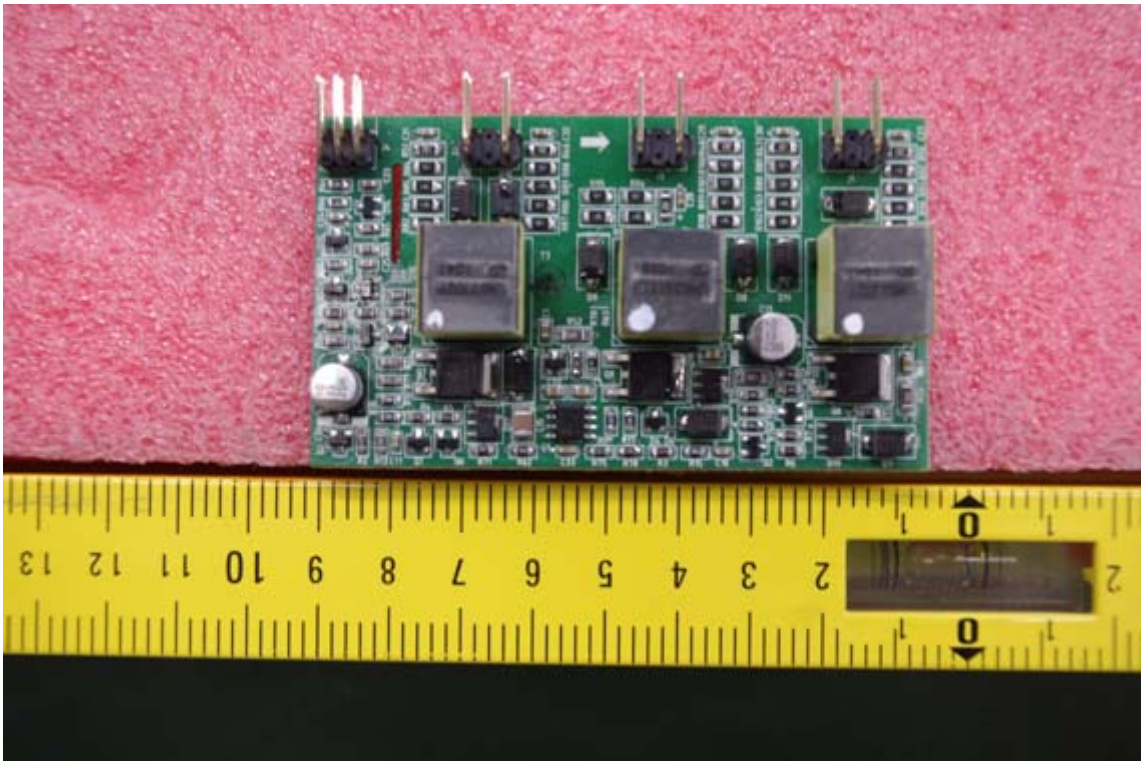

Fig.10 –Board SNT_PCB_3320_FQ, components side view

Pictures

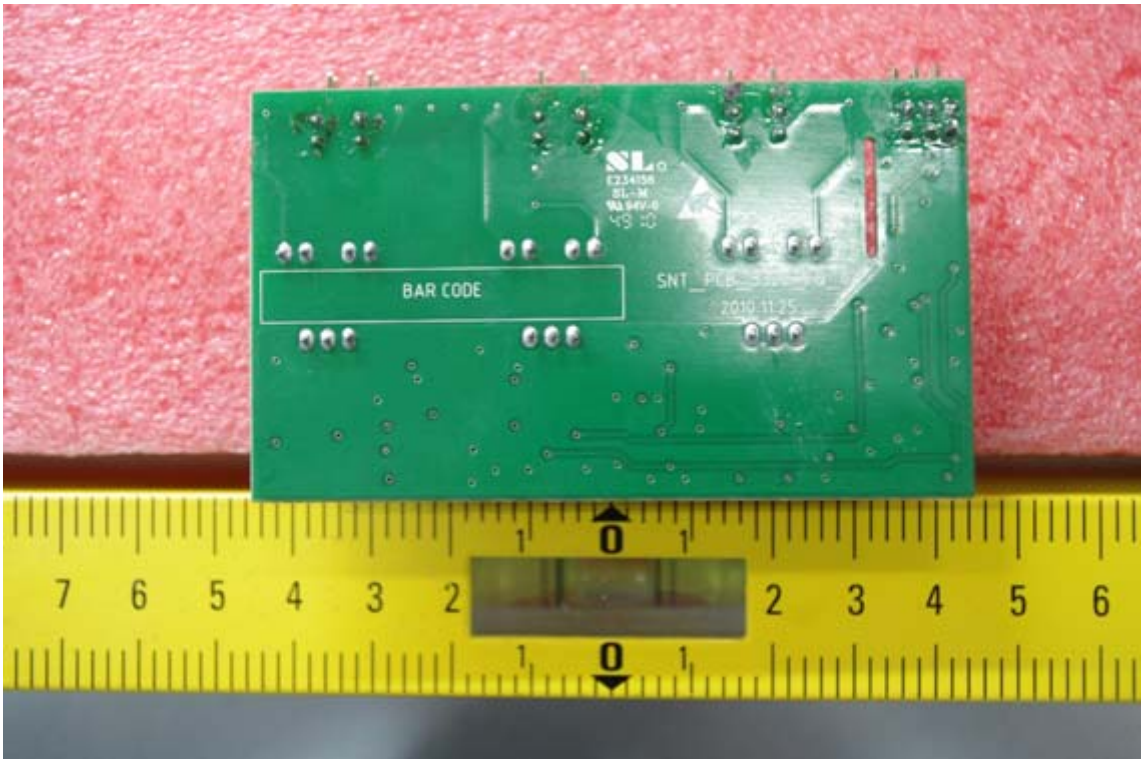

Fig.11 –Board SNT_PCB_3320_FQ, traces side view

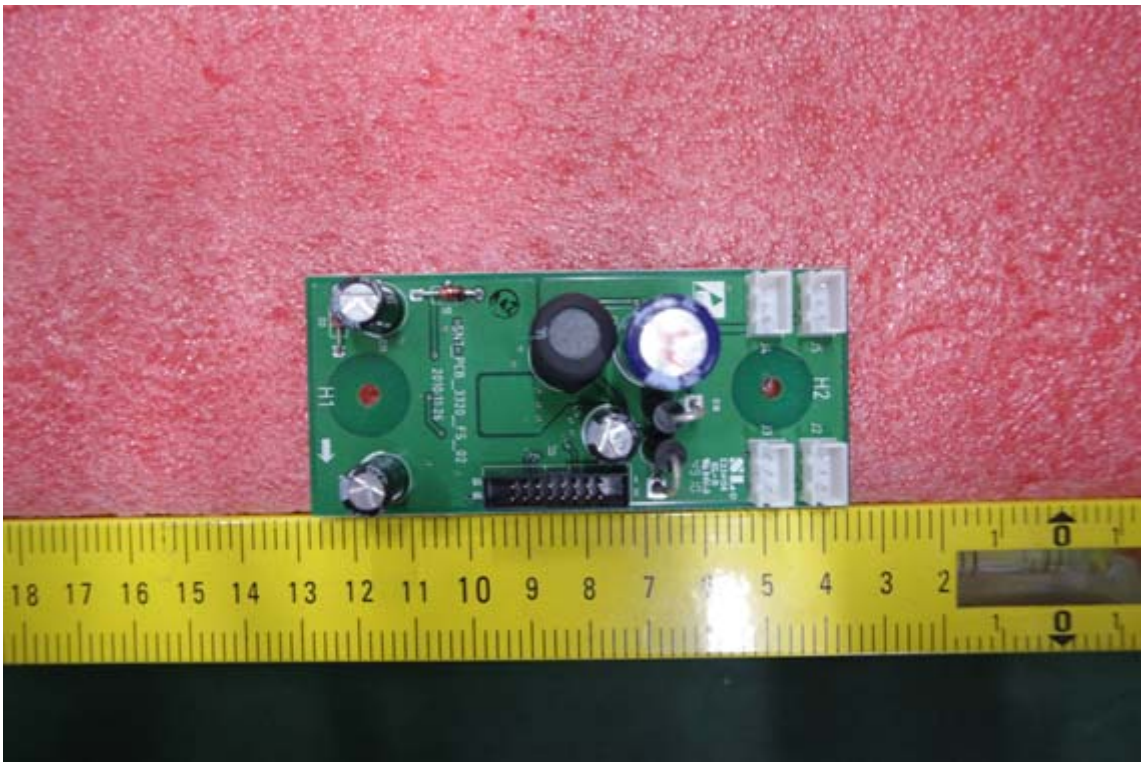

Fig.12 - Board PCB_3320_CP1, component side view

Pictures

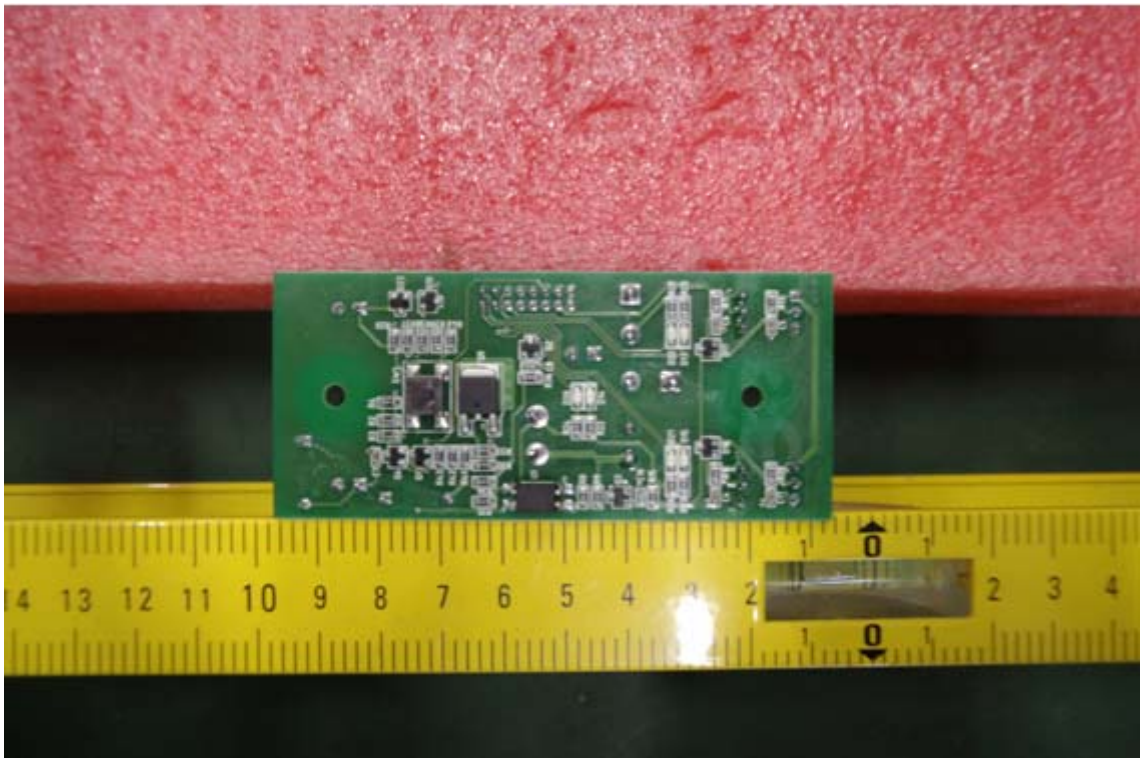

Fig.13 – Board PCB_3320_CP1, trace side view

Fig.14–Board PCB_3320_DR4, component side view

Pictures

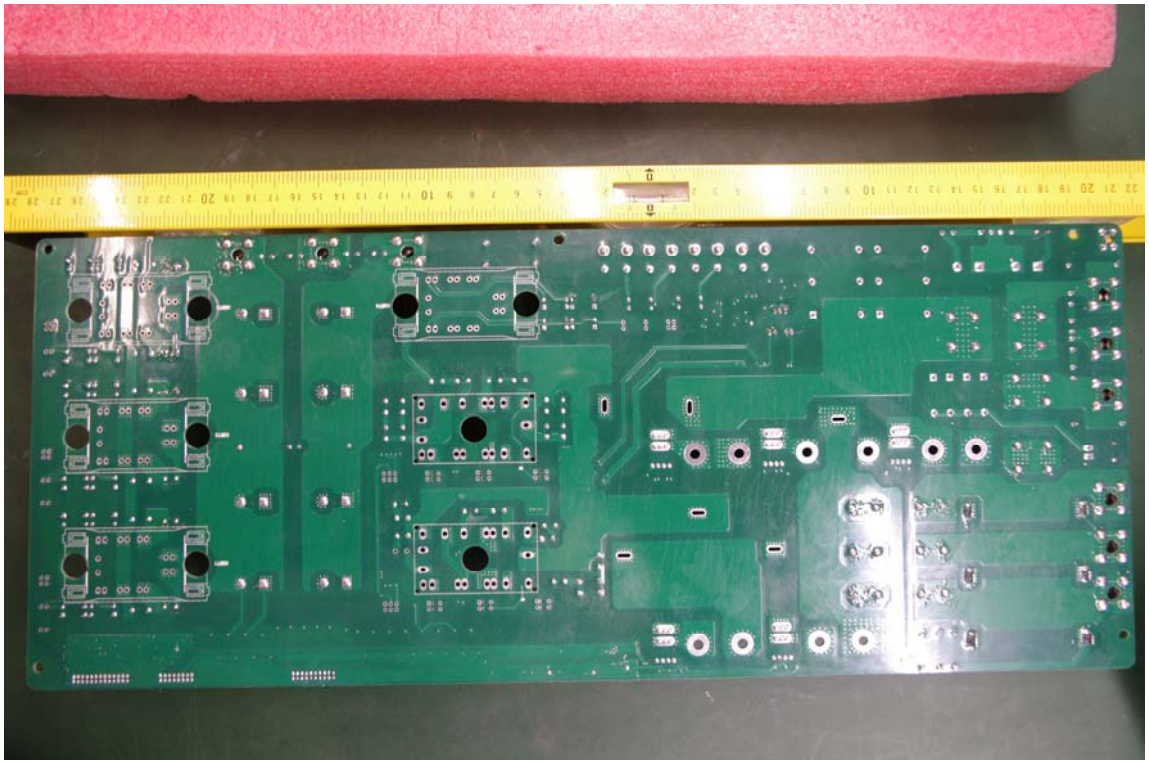

Fig.15 –Board PCB_3320_DR4, traces side view

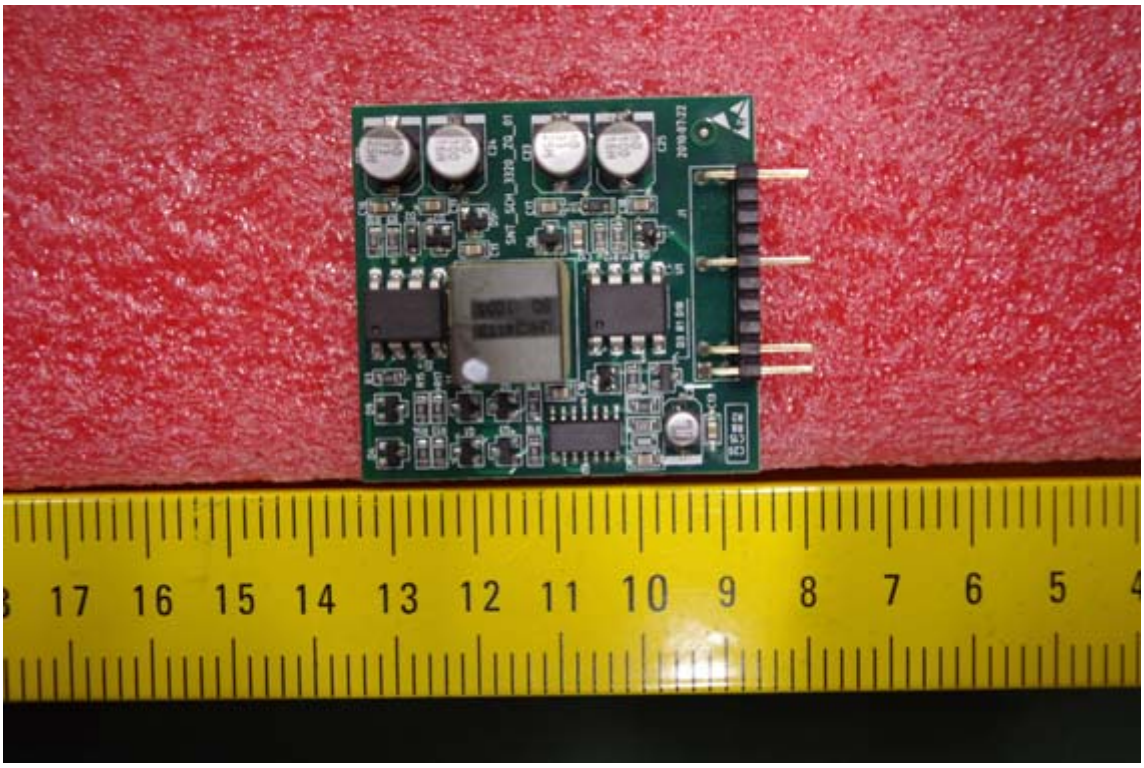

Fig.16 –Board SNT_PCB_3320_ZQ, component side view

Pictures

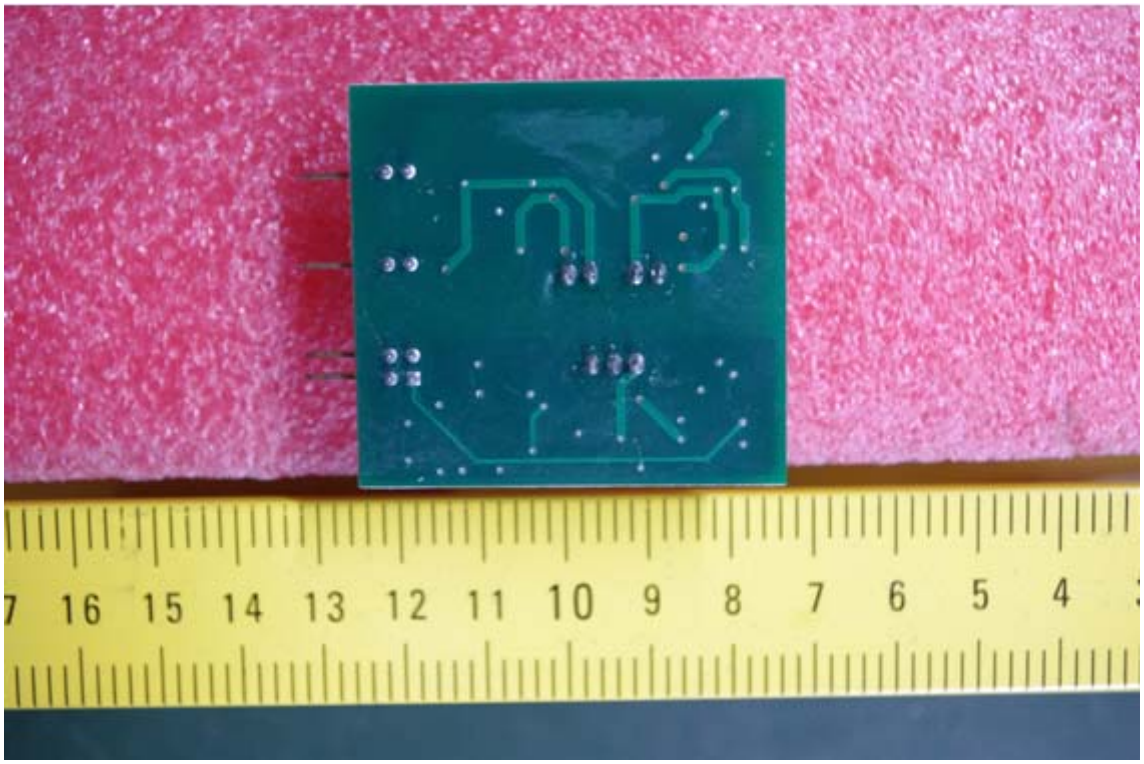

Fig.17 –Board SNT_PCB_3320_ZQ, traces side view

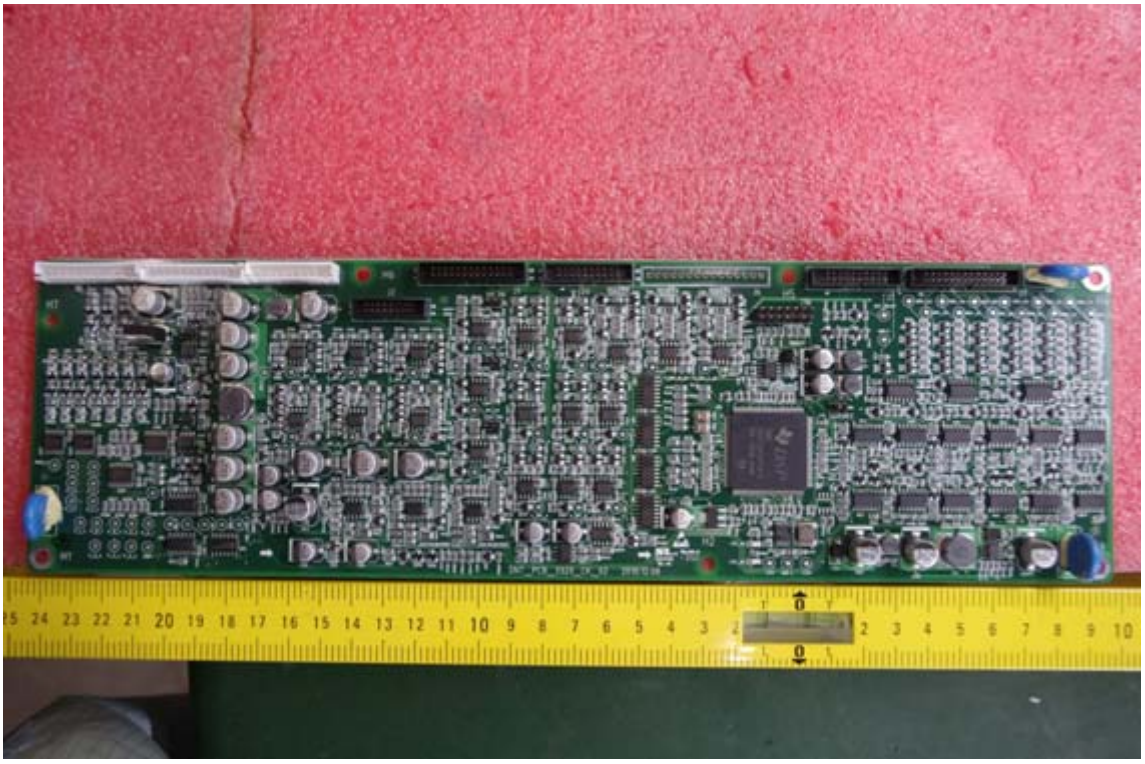

Fig.18 – Board PCB_3320_CT2, component side view

Pictures

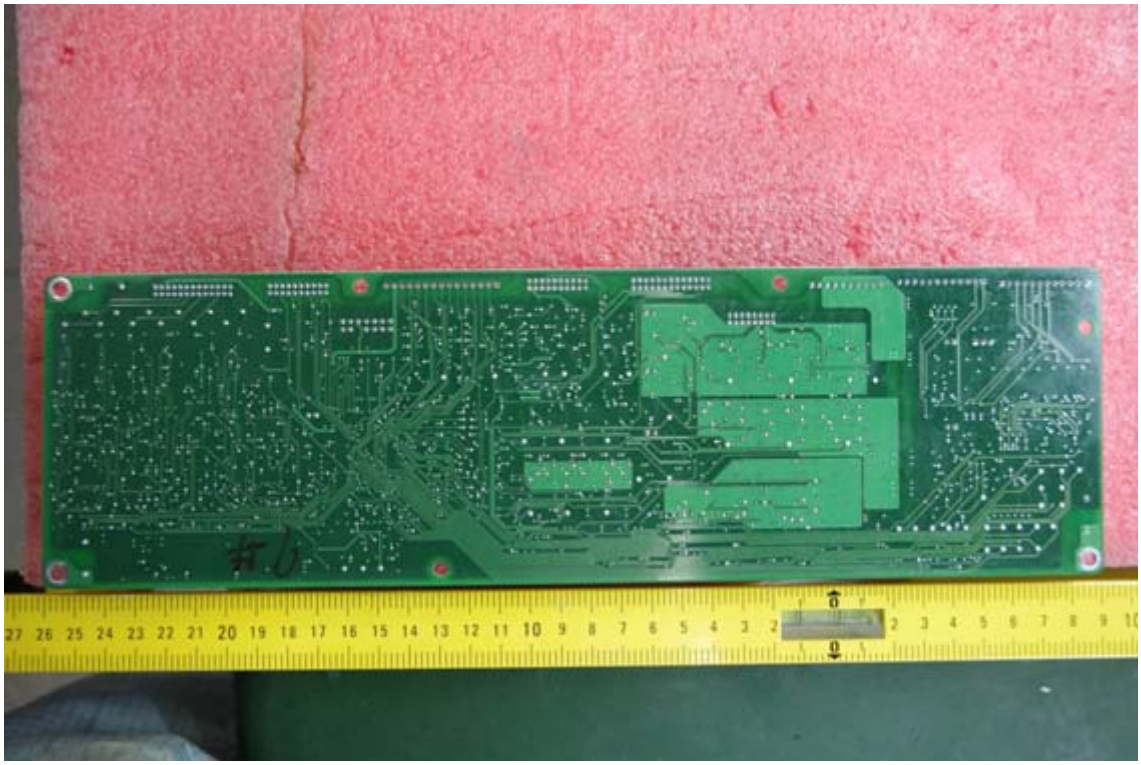

Fig.19 –Board PCB_3320_CT2, traces side view

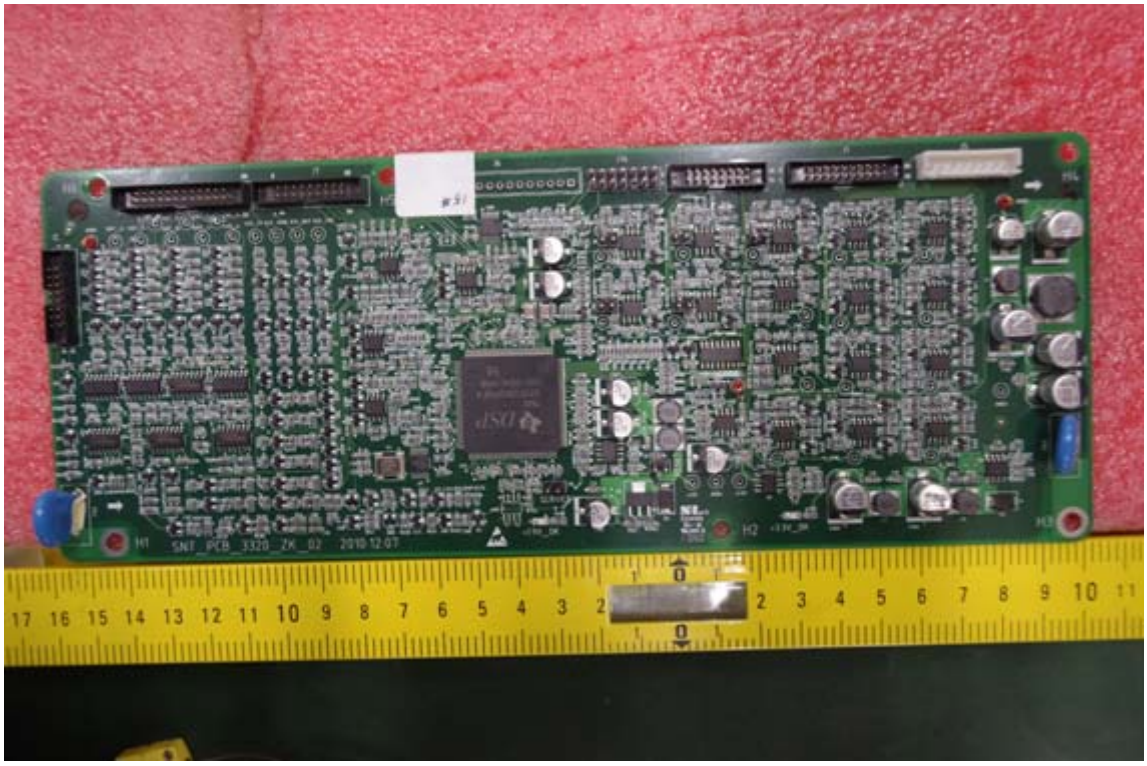

Fig.20 – Board PCB_3320_CT1, component side view

Pictures

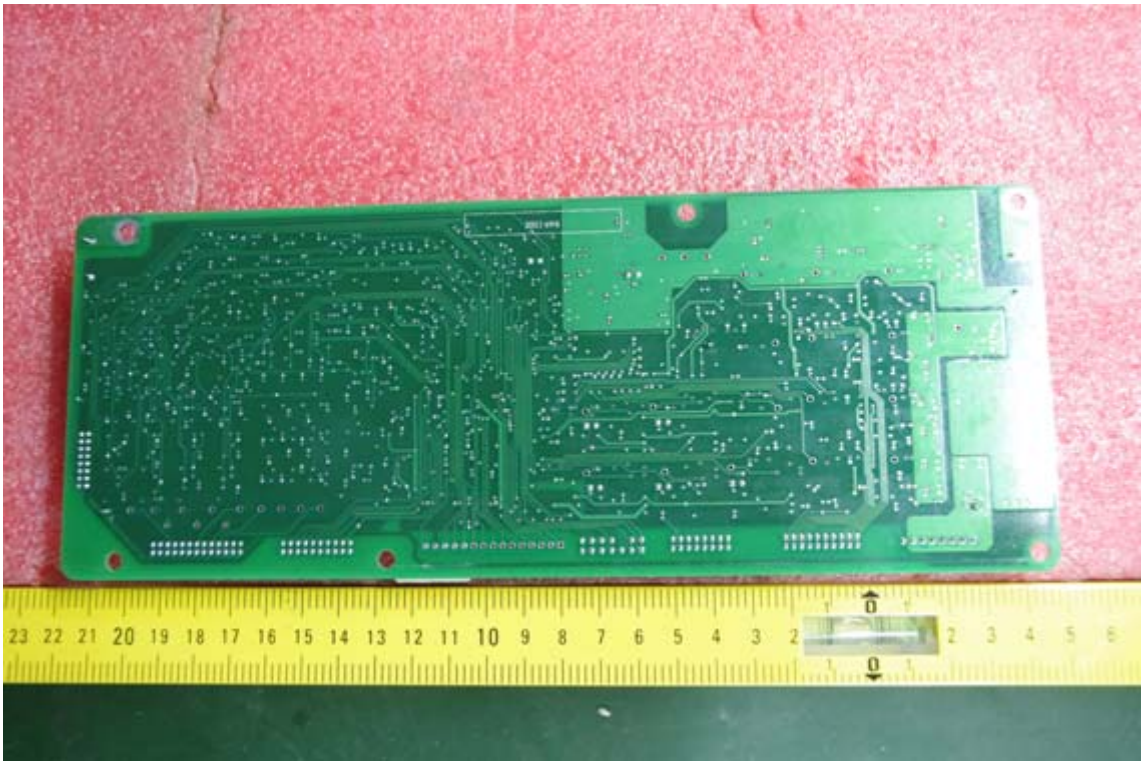

Fig.21 –Board PCB_3320_CT1, traces side view