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# APPLICATION FOR LOW VOLTAGE DIRECTIVE

## On Behalf of

## INVT POWER SYSTEM (SHENZHEN) CO., LTD

## Uninterruptible Power Systems

## Model(s):HT33040XL, HT33040XS, HT33030XL, HT33030XS, HT33020XL, HT33020XS

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

**Prepared By :** **EMTEK (Shenzhen) CO., LTD.**
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# TEST REPORT

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

| | |
|---|---|
| **Report Reference No**..... : | ES160523065S |
| Compiled by (name + signature)..... : | Gary Zhang |
| Approved by (name + signature)..... : | William Guo |
| Date of issue ..... : | May 30, 2016 |
| Total number of pages ..... : | 74 pages |
| Testing Laboratory ..... : | EMTEK (Shenzhen) 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_1A |
| Test Report Form(s) Originator..... : | TÜV Rheinland Japan Ltd. |
| Master TRF ..... : | Dated 2014-01 |

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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

| | |
|---|---|
| **Test item description** ..... : | Uninterruptible Power Systems |
| Trade Mark ..... : | INVT |
| Manufacturer ..... : | INVT Power System ( Shenzhen ) Co., LTD |
| Address ..... : | 5th Floor,1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055 |
| Model/Type reference ..... : | HT33040XL, HT33040XS, HT33030XL, HT33030XS, HT33020XL, HT33020XS |
| Ratings ..... : | See the rating labels |

| | |
|---|---|
| **Test item particulars** ..... : | |
| Equipment mobility ..... : | [X] movable [] stationary [] for building-in |
| Connection to the mains ..... : | [] pluggable equipment [X] permanent connection<br>[] detachable power supply cord<br>[] non-detachable power supply cord |
| Operating condition ..... : | [X] continuous<br>[] rated operating / resting time: |
| Access location ..... : | [X] operator accessible<br>[] restricted access location |
| Over voltage category (OVC) ..... : | [] OVC I [X] OVC II [] OVC III [] OVC IV<br>[] other: |
| Mains supply tolerance (%) or absolute mains supply values ..... : | 380Vac(-10%), 415Vac(+10%) of input voltage considered |
| Tested for IT power systems ..... : | [X] Yes [] No |
| IT testing, phase-phase voltage (V) ..... : | N/A |
| Class of equipment ..... : | [X] Class I [] Class II<br>[] Not classified |
| Considered current rating (A) ..... : | 73A |
| Pollution degree (PD) ..... : | [] PD 1 [X] PD 2 [] PD 3 |
| IP protection class ..... : | IP20 |
| Altitude during operation (m) ..... : | Up to 2000 |
| Altitude of test laboratory (m) ..... : | below 2000 |
| Mass of equipment (kg) ..... : | >18Kg |
| **Possible test case verdicts:** | |
| - test case does not apply to the test object ..... : | N/A<br>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 60950-1:2006, which is referred to in this TRF as "RD".

**General product information:**

This report is amended from previous report ES150423307S, dated June 24, 2015, due to below amendments:

**- 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 insulation. The test samples are pre-production without any serial number.

3. Model difference description:

All models are designed with same control logic, constructions, PCB Layout except for the quantity of UPS module, model name and ratings. All tests were performed on model HT33040XL which means the typical model.

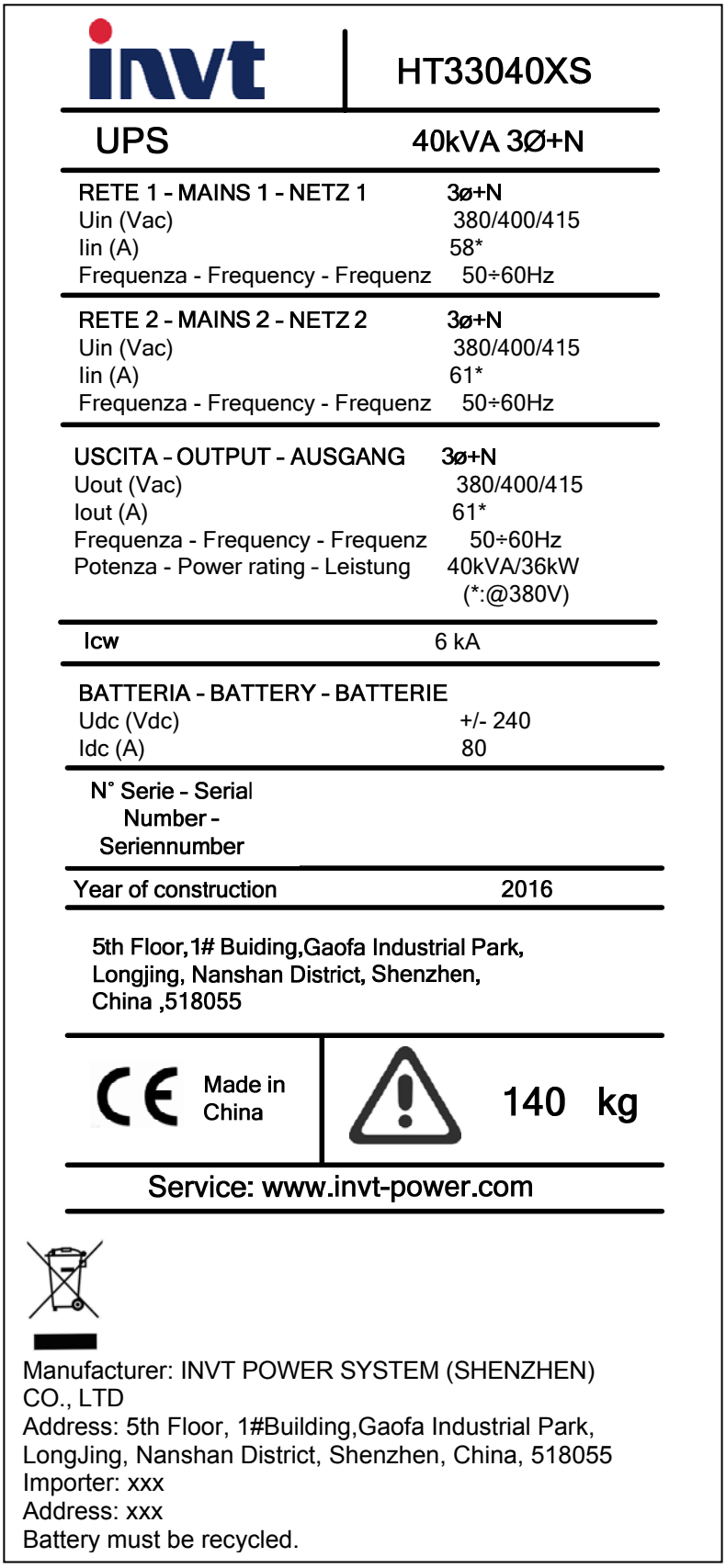
**Summary of testing:**

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

- 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 HT33040XS:




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.

2. Rating label for model HT33040XL:

| | |
|---|---|
| invt | HT33040XL |
| UPS | 40kVA 3Ø+N |
| RETE 1 - MAINS 1 - NETZ 1 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 58* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| RETE 2 - MAINS 2 - NETZ 2 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 61* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| USCITA - OUTPUT - AUSGANG | 3ø+N |
| Uout (Vac) | 380/400/415 |
| Iout (A) | 61* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| Potenza - Power rating - Leistung | 40kVA/36kW (*:@380V) |
| Icw | 6 kA |
| BATTERIA - BATTERY - BATTERIE | |
| Udc (Vdc) | +/- 240 |
| Idc (A) | 80 |
| N° Serie - Serial Number - Seriennumber | |
| Year of construction | 2016 |

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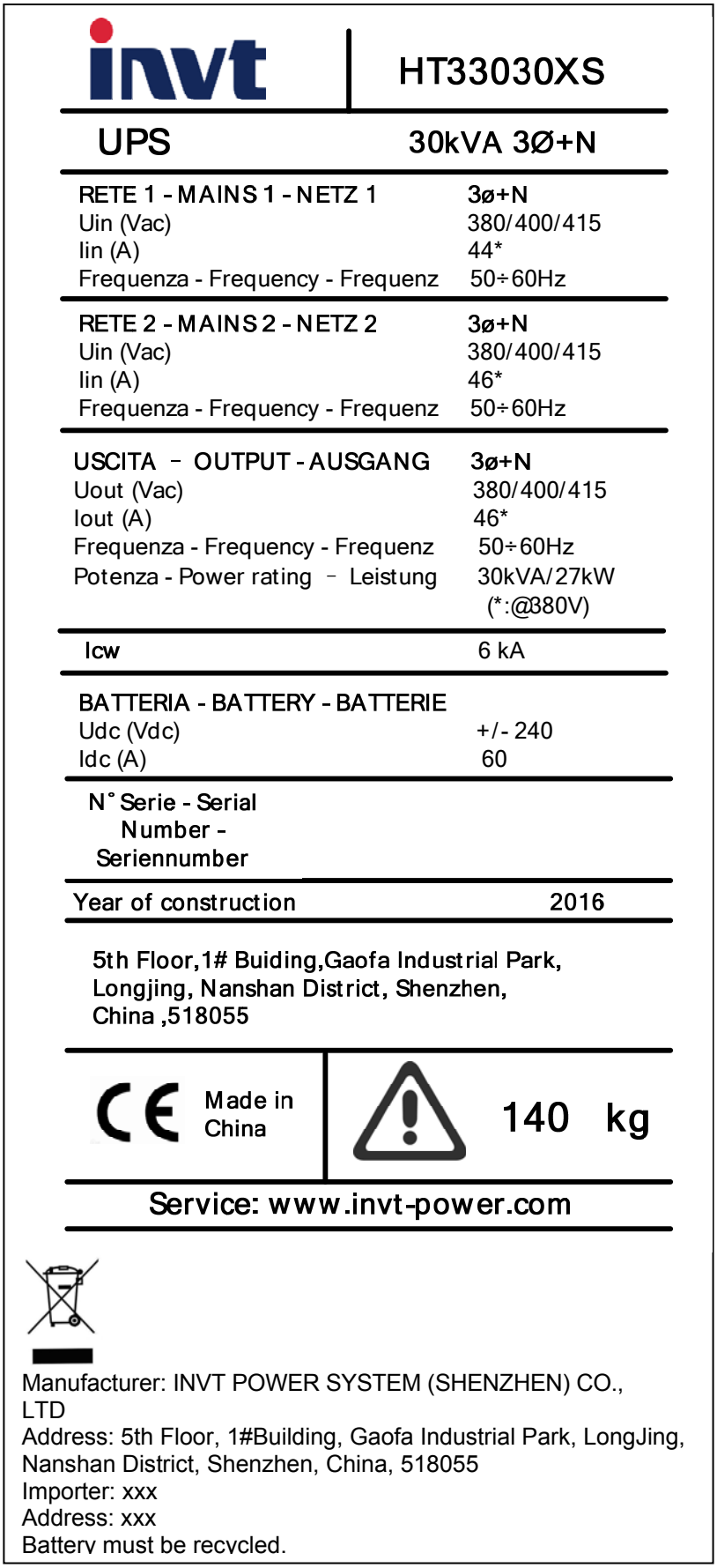
China ,518055

CE Made in China | 61 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.

3. Rating label for model HT33030XS:



| | |
|---|---|
| invt | HT33030XS |
| UPS | 30kVA 3Ø+N |
| RETE 1 - MAINS 1 - NETZ 1 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 44* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| RETE 2 - MAINS 2 - NETZ 2 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 46* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| USCITA - OUTPUT - AUSGANG | 3ø+N |
| Uout (Vac) | 380/400/415 |
| Iout (A) | 46* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| Potenza - Power rating - Leistung | 30kVA/27kW (*:@380V) |
| Icw | 6 kA |
| BATTERIA - BATTERY - BATTERIE | |
| Udc (Vdc) | +/- 240 |
| Idc (A) | 60 |
| N° Serie - Serial Number - Seriennumber | |
| Year of construction | 2016 |

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CE Made in China | 140 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.

4. Rating label for model HT33030XL:

| | |
|---|---|
| invt | HT33030XL |
| UPS | 30kVA 3Ø+N |
| RETE 1 - MAINS 1 - NETZ 1 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 44* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| RETE 2 - MAINS 2 - NETZ 2 | 3ø+N |
| Uin (Vac) | 380/400/415 |
| Iin (A) | 46* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| USCITA – OUTPUT - AUSGANG | 3ø+N |
| Uout (Vac) | 380/400/415 |
| Iout (A) | 46* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| Potenza - Power rating – Leistung | 30kVA/27kW (*:@380V) |
| Icw | 6 kA |
| BATTERIA - BATTERY - BATTERIE | |
| Udc (Vdc) | +/- 240 |
| Idc (A) | 60 |
| N°Serie - Serial Number - Seriennumber | |
| Year of construction | 2016 |

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China ,518055

CE Made in China | 61 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.

5. Rating label for model HT33020XS:

| | |
|---|---|
| invt | HT33020XS |
| UPS | 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) | 31* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| USCITA - OUTPUT - AUSGANG | 3ø+N |
| Uout (Vac) | 380/400/415 |
| Iout (A) | 31* |
| 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 |

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China ,518055

| | |
|---|---|
| CE Made in China | 140 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.

6. Rating label for model HT33020XL:

| | |
|---|---|
| invt | HT33020XL |
| UPS | 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) | 31* |
| Frequenza - Frequency - Frequenz | 50÷60Hz |
| USCITA – OUTPUT - AUSGANG | 3ø+N |
| Uout (Vac) | 380/400/415 |
| Iout (A) | 31* |
| 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 | 61 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.

7. 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 | | |
| | 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 | X2 capacitors according to IEC 60384-14:1993. | P |
| 1.5.7/RD | Resistors bridging insulation | Refer to below: | N |
| 1.5.7.1/RD | Resistors bridging functional, basic or supplementary insulation | No bridging resistors | N |
| 1.5.7.2/RD | Resistors bridging double or reinforced insulation between a.c. mains and other circuits | No resistors bridging double or reinforced insulation. | N |
| 1.5.7.3/RD | Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable | No antenna or coaxial cable. | N |
| 1.5.8/RD | Components in equipment for IT power systems | No Y-cap used. | N |
| 4.6 | Power interface | | P |
| 1.6.1/RD | AC power distribution systems | TN power system | P |
| 1.6.2/RD | Input current | (see appended table 4.6) | P |

| IEC 62040-1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.6<br>1.6.4/RD | Neutral conductor | Neutral conductor is basic insulated from earth and body of the equipment. | P |
| 4.7 | Marking and instructions | | P |
| 4.7.1 | General | See below. | P |
| 4.7.2<br>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 labels | P |
| | Input rated current/range (A).....: | See rating labels | P |
| | Input symbol for nature of supply (d.c.) .....: | ±240V⎓ | P |
| | Input rated frequency/range (Hz) .....: | 50/60 | P |
| | Number of Input phases and neutral.....: | 3Φ | P |
| | Output rated voltage/range (V) .....: | See rating labels | 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) .....: | Not marked. | N |
| | Number of output phases and neutral.....: | 3Φ | P |
| | Output rated active power (W) .....: | See rating labels | P |
| | Output rated apparent power (VA) .....: | See rating labels | P |
| | Output symbol for nature of supply (d.c.) .....: | No d.c. output. | N |
| | Output rated frequency/range (Hz) .....: | 50/60 | P |
| | Ambient operating temperature range (°C).....: | 40℃ | P |
| | Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc) | | N |
| | Manufacturer's name or trademark or identification mark .....: | See rating label | P |
| | Type/model or type reference .....: | See rating label | P |
| | Symbol for Class II equipment only .....: | The equipment is Class I. | N |
| | 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 |

| IEC 62040-1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 ....: | Not Pluggable type A or Pluggable type B UPS | N |
| 4.7.3.3 | Operation.....: | The suitable information list in the user manual when operate the UPS. Not for restricted access location. | P |
| 4.7.3.4 | Maintenance.....: | The instruction of maintenance is only included in the service manual. | P |
| 4.7.3.5 | Distribution related backfeed.....: | Backfeed protection provided externally to the UPS. | P |
| 4.7.4<br>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<br>1.7.5/RD | Power outlets.....: | Relevant information provided on the marking that is affixed near the outlets. | P |
| 4.7.6<br>1.7.6/RD | Fuse identification (marking, special fusing characteristics, cross-reference) .....: | Marking near holders for fuses. | P |
| 4.7.7<br>1.7.7/RD | Wiring terminals | Refer below: | P |
| 1.7.7.1/RD | Protective earthing and bonding terminals .....: | The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal. | P |
| 1.7.7.2/RD | Terminals for a.c. mains supply conductors | The AC terminal is marked with L, N, G symbol near the terminal. | 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 |

| IEC 62040-1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7.9<br>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<br>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<br>1.7.2.4/RD | IT power systems | TN power system. | N |
| 4.7.12 | Protection in building installation | Permanently connected equipment relies on the building installation for short-circuit protection or overcurrent protection. | 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<br>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<br>1.7.10/RD | Thermostats and other regulating devices | No thermostats or other regulating devices. | N |
| 4.7.15<br>1.7.2.1/RD<br>and<br>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. | |

| IEC 62040-1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 4.7.16<br>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<br>1.7.12/RD | Removable parts | No such parts. | N |
| 4.7.18<br>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<br>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 | No energy hazard in operator access area. Checked by means of the test finger. | P |
| 4.7.21<br>1.7.2.4/RD | Installation instructions | Detailed information regarding external interfaces and connection of supply and loads 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<br>2.1.1/RD | Protection for UPS intended to be used in operator access areas | Refer below: | P |

| IEC 62040-1 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 2.1.1.1/RD | Access to energized parts | There is adequate protection against operator contact with bare parts at ELV or hazardous voltage or parts separated from these with basic or functional insulation only (except protective earth). No hazardous voltages exceeding 1000V a.c. or 1500V d.c. Checked by test finger, test probe and test pin. | P |
| | Test by inspection : | Complies | P |
| | Test with test finger (Figure 2A) : | Complies | P |
| | Test with test pin (Figure 2B) : | Complies | P |
| | Test with test probe (Figure 2C) : | No TNV circuits | N |
| 2.1.1.2/RD | Battery compartments | 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 | All accessible parts are separated from internal wiring at hazardous voltage by double or reinforced insulation. | N |
| 2.1.1.5/RD | Energy hazards : | No energy hazard in operator access area. Checked by means of the test finger. | P |
| 2.1.1.6/RD | Manual controls | No shafts of knobs etc. at ELV or hazardous voltage. | 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 | | P |
| | a) Capacitor connected to the d.c. mains supply : | | P |
| | b) Internal battery connected to the d.c. mains supply : | | N |
| 2.1.1.9/RD | Audio amplifiers : | No such parts. | N |
| 5.1.2<br>2.1.1.5 c)<br>/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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.1.3<br>2.1.1.5 c)<br>/RD | Protection for UPS intended to be used in restricted access areas | | N |
| | Hazardous energy level | | N |
| 5.1.4 | Backfeed protection | | — |
| | Shock hazard after de-energization of a.c. input for UPS | No shock hazard | P |
| | Measured voltage (V); time-constant (s) : | | — |
| | 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 | Not mandatory for pluggable UPS. | N |
| 5.1.5 | Emergency switching device | Not mandatory for pluggable UPS. | N |
| 5.2 | Requirements for auxiliary circuits | | P |
| 5.2.1<br>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<br>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 |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | Insulation employed : | | |
| 2.3.5/RD | Test for operating voltages generated externally | | N |
| 5.2.3<br>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<br>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 | Data ports (RS232 and USB) is signal port only, no test required. | P |
| 5.2.5<br>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 | See below. | P |
| 2.6.1/RD | Protective earthing | Accessible conductive parts are reliably connected to protective earth. | P |
| 2.6.2/RD | Functional earthing | No functional earthing. | N |
| 2.6.3/RD | Protective earthing and protective bonding conductors | See below. | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 2.6.3.1/RD | General | See below. | P |
| 2.6.3.2/RD | Size of protective earthing conductors | Refer below: | 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 |
| 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 | Interconnected equipment is properly earthed. | 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. | N |
| 2.6.5.3/RD | Disconnection of protective earth | It is not possible to disconnect protective earth without disconnecting mains | P |
| 2.6.5.4/RD | Parts that can be removed by an operator | No operator removable parts with protective earth connection except supply cord. | P |
| 2.6.5.5/RD | Parts removed during servicing | Protective earthed parts cannot be removed in a way which impair safety. | P |
| 2.6.5.6/RD | Corrosion resistance | No risk of corrosion | P |
| 2.6.5.7/RD | Screws for protective bonding | Adequate connection of protective bonding | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 2.6.5.8/RD | Reliance on telecommunication network or cable distribution system | Protective earthing does not rely on a telecommunication network. | N |
| 5.3.2<br>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 | See below. | P |
| 3.4/RD | Disconnection from the mains supply | See below. | P |
| 3.4.1/RD | General requirement | Considered | P |
| 3.4.2/RD | Disconnect devices | Circuit breaker used | P |
| 3.4.3/RD | Permanently connected equipment | | P |
| 3.4.4/RD | Parts which remain energized | No parts remain energized after the disconnect device is pull out. | N |
| 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 | three-phase equipment | N |
| 3.4.7/RD | Number of poles - three-phase equipment | | P |
| 3.4.8/RD | Switches as disconnect devices | Permanently connected equipment. | N |
| 3.4.9/RD | Plugs as disconnect devices | | N |
| 3.4.10/RD | Interconnected equipment | Warning label provided on both the UPS, that both units must be disconnected before service. See copy of marking. | P |
| 3.4.11/RD | Multiple power sources | Only one external supply of hazardous voltage or energy | N |
| 5.4.2 | Disconnect devices | Permanently connected equipment. | N |
| 5.5 | Overcurrent and earth fault protection | | P |
| 5.5.1 | General | See below. | P |
| 2.7.3/RD | Short-circuit backup protection | Adequate protective device. | P |
| 2.7.4/RD | Number and location of protective devices …….: | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 2.7.5/RD | Protection by several devices | Only one protective device provided. | N |
| 2.7.6/RD | Warning to service personnel : | Hazard may be still present in the equipment after the input circuit breaker opens. However, as it is considered that the plug to the mains will be disconnected during service work. No markings were needed. | N |
| 5.5.2 | Basic requirements | Equipment relies on circuit breaker of the wall outlet installation protection of the building installation in regard to L, N short circuit and for L to PE earth fault. Over current protection is provided by the built-in device breaker. | P |
| 5.5.3 | Battery circuit protection | See below. | 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 from the battery. The charger located in the battery circuit before the fuses. For the charger circuit there are no hazardous condition under any simulated fault conditions. (see also “Fault condition tests”) | P |
| 5.5.3.3 | Rating of protective device | See below. | 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 |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.6 | Protection of personnel – Safety interlocks<br>*(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 |
| 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 |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 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<br>2.10/RD | Clearances, creepage distances and distances through insulation | | P |
| 2.10.1/RD | General | See below. | P |
| 2.10.1.1/RD | Frequency ..... : | Considered. | P |
| 2.10.1.2/RD | Pollution degrees ..... : | II | P |
| 2.10.1.3/RD | Reduced values for functional insulation | The functional insulations comply with 5.3.4/RD a) and c) | P |
| 2.10.1.4/RD | Intervening unconnected conductive parts | Considered. | P |
| 2.10.1.5/RD | Insulation with varying dimensions | No such transformer used. | P |
| 2.10.1.6/RD | Special separation requirements | Special separation is not used. | N |
| 2.10.1.7/RD | Insulation in circuits generating starting pulses | No such circuit generating starting pulses. | N |
| 2.10.2/RD | Determination of working voltage | (See appended table 5.7) | P |
| 2.10.2.1/RD | General | See below. | P |
| 2.10.2.2/RD | RMS working voltage | (See appended table 5.7) | P |
| 2.10.2.3/RD | Peak working voltage | (See appended table 5.7) | P |
| 2.10.3/RD | Clearances | See below. | P |
| 2.10.3.1/RD | General | See below. | 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 |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 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. | |
| 2.10.4.3/RD | Minimum creepage distances | (see appended table 5.7) | P |
| 2.10.5 /RD | Solid insulation | Considered. | 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 | No semiconductor devices. | N |
| 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 | (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 | | — |
| | Electric strength test | | N |
| 2.10.5.11 /RD | Insulation in wound components | | — |
| 2.10.5.12 /RD | Wire in wound components | See cl. 2.10.5.12/RD | N |
| | Working voltage : | No wound components. | N |
| | a) Basic insulation not under stress : | | — |
| | b) Basic, supplementary, reinforced insulation : | | N |
| | c) Compliance with Annex U : | | N |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | Two wires in contact inside wound component; angle between 45º and 90º : | | N |
| 2.10.5.13 /RD | Wire with solvent-based enamel in wound components | | N |
| | Electric strength test | No wire with solvent-based enamel in wound components. | N |
| | Routine test | (see appended table 8.2) | — |
| 2.10.5.14 /RD | Additional insulation in wound components | | N |
| | Working voltage : | No additional insulation used. | N |
| | - Basic insulation not under stress : | | — |
| | - Supplementary, reinforced insulation : | | N |
| 2.10.6/RD | Construction of printed boards | | N |
| 2.10.6.1/RD | Uncoated printed boards | See below. | N |
| 2.10.6.2/RD | Coated printed boards | (see appended table 5.7) | P |
| 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 | No such part. | N |
| | Distance through insulation | PCB layout does not serve as insulation barrier. | N |
| | Number of insulation layers (pcs) : | | N |
| 2.10.7/RD | Component external terminations | | 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 | No such part. | N |
| 2.10.8.2/RD | Thermal conditioning | | N |
| 2.10.8.3/RD | Electric strength test | | N |
| 2.10.8.4/RD | Abrasion resistance test | | — |
| 2.10.9/RD | Thermal cycling | | N |
| 2.10.10/RD | Test for Pollution Degree 1 environment and insulating compound | | N |
| 2.10.11/RD | Tests for semiconductor devices and cemented joints | Approved opto-couplers, see appended table 4.5 | P |
| 2.10.12/RD | Enclosed and sealed parts | No such device used. | N |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 | Adequate cross sectional areas on internal wiring and interconnecting cables. | P |
| 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 | No such screw. | N |
| 3.1.7/RD | Insulating materials in electrical connections | No contact pressure through insulating material. | N |
| 3.1.8/RD | Self-tapping and spaced thread screws | Thread-cutting or space thread screws are not used for electrical connections. | N |
| 3.1.9/RD | Termination of conductors | Terminations can't become displaced so that clearances and creepage distances can be reduced. | P |
| | 10 N pull test | Considered | P |
| 3.1.10/RD | Sleeving on wiring | Sleeves can only be removed by breaking or cutting. | P |
| 6.1.2 | Dimensions and rating of busbars and insulated conductors | | P |
| 6.2 | Connection to power | | P |
| 6.2.1 | General provisions for connection to power | | P |
| 3.2.2/RD | Multiple supply connections | Only one supply connections. | P |
| 3.2.3/RD | Permanently connected equipment | Screw terminal used. | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | Number of conductors, diameter of cable and conduits (mm) ..... : | | — |
| 3.2.4/RD | Appliance inlets | No appliance inlet. | N |
| 3.2.5/RD | Power supply cords | No provided. | 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 used. | N |
| 3.2.6/RD | Cord anchorages and strain relief | | N |
| | Mass of equipment (kg), pull (N) ..... : | | — |
| | Longitudinal displacement (mm) ..... : | | — |
| 3.2.7/RD | Protection against mechanical damage | | N |
| 3.2.8/RD | Cord guards | | N |
| | Diameter or minor dimension D (mm); test mass (g) ..... : | | — |
| | Radius of curvature of cord (mm)..... : | | — |
| 6.2.2 | Means of connection : | Screw terminal used. | P |
| | More than one supply connection : | Only one connection. | P |

| | | | |
|---|---|---|---|
| 6.3 | Wiring terminals for external power conductors<br>*(No wiring terminals for external power conductors)* | | P |
| 3.3/RD | Wiring terminals for connection of external conductors | | P |
| 3.3.1/RD | Wiring terminals | Each phase and output with separate terminal of same type screw. Screw terminal for cable lug only used for earthing | P |
| 3.3.2/RD | Connection of non-detachable power supply cords | | N |
| 3.3.3/RD | Screw terminals | Screw terminals used | P |
| 3.3.4/RD | Conductor sizes to be connected | Conductor size will be connected according to installation manual. | P |
| | Rated current (A), cord/cable type, cross-sectional area (mm2) ..... : | Conductor size will be connected according to installation manual. | — |
| 3.3.5/RD | Wiring terminal sizes | | P |

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| Clause | Requirement + Test | Result - Remark | Verdict |
| | Rated current (A), type, nominal thread diameter (mm) ..... : | | — |
| 3.3.6/RD | Wiring terminal design | | P |
| 3.3.7/RD | Grouping of wiring terminals | | P |
| 3.3.8/RD | Stranded wire | | N |
| 7 | Physical requirements | | P |
| 7.1 | Enclosure | Adequate protection against risk of fire, electric shock, injury to persons and hazardous energy level. | P |
| 7.2<br>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) : | 250N | P |
| 7.3<br>4.2/RD | Mechanical strength | | P |
| 4.2.1/RD | General | Complies with the requirement also after tests described below are applied. | P |
| 4.2.2/RD | Steady force test, 10 N | No hazard, ref. comment in appended table 5.7, 2.10.4/RD. | — |
| 4.2.3/RD | Steady force test, 30 N | No internal enclosure | N |
| 4.2.4/RD | Steady force test, 250 N | No hazard. The test is performed on all sides of enclosure. | P |
| 4.2.5/RD | Impact test | See below. | P |
| | Fall test | No hazard as result from the steel sphere fall test. | P |
| | Swing test | No hazard as result from the steel sphere swing test. | P |
| 4.2.6/RD | Drop test; height (mm): | Drop test not applicable | N |
| 4.2.7/RD | Stress relief test | Metal enclosure. | — |
| 4.2.8/RD | Cathode ray tubes | CRT(s) not used in the equipment. | N |
| | Picture tube separately certified : | | — |
| 4.2.9/RD | High pressure lamps | No high pressure lamps in the equipment. | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 handles | N |
| 4.3.3/RD | Adjustable controls | No 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 outlet provided. | N |
| 4.3.7/RD | Heating elements in earthed equipment | No heating elements provided. | N |
| 4.3.11/RD | Containers for liquids or gases | The equipment does not contain flammable liquids or gases. | N |
| 4.4/RD | Protection against hazardous moving parts | No moving parts. | P |
| 4.4.1/RD | General | DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible. | P |
| 4.4.2/RD | Protection in operator access areas : | See 4.4.1 | P |
| 4.4.3/RD | Protection in restricted access locations : | Not for restricted access locations. | P |
| 4.4.4/RD | Protection in service access areas | See 4.4.1 | P |
| 4.4.5/RD | Protection against moving fan blades | Considered | P |
| 4.4.5.1/RD | General | See below. | P |
| | Not considered to cause pain or injury. a) ..... : | | N |
| | Is considered to cause pain, not injury. b) ..... : | | N |
| | Considered to cause injury. c) ..... : | | N |
| 4.4.5.2 | Protection for users | | N |
| | Use of symbol or warning ..... : | | N |
| 4.4.5.3 | Protection for service persons | | N |
| | Use of symbol or warning ..... : | | N |
| 4.5/RD | Thermal requirements | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 | | N |
| 7.4.4 | Equipment movement | No castors provided. | N |
| 7.5<br>4.7/RD | Resistance to fire | | P |
| 4.7.1/RD | Reducing the risk of ignition and spread of flame | See below. | P |
| | Method 1, selection and application of components wiring and materials | Method 1 is used. (See appended table 7.5) | P |
| | Method 2, application of all of simulated fault condition tests | | N |
| 4.7.2/RD | Conditions for a fire enclosure | See below. | P |
| 4.7.2.1/RD | Parts requiring a fire enclosure | The fire enclosure is required to cover all parts. | 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 | Considered. | P |
| 4.7.3.2/RD | Materials for fire enclosures | Metal enclosure. (See appended table 4.3) | N |
| 4.7.3.3/RD | Materials for components and other parts outside fire enclosures | No parts outside the fire enclosure. | N |
| 4.7.3.4/RD | Materials for components and other parts inside fire enclosures | Other materials inside fire enclosure are minimum V-2 material. Battery enclosure is of HB. | P |
| 4.7.3.5/RD | Materials for air filter assemblies | No air filters in the equipment. | N |
| 4.7.3.6/RD | Materials used in high-voltage components | No parts exceeding 4kV. | N |
| 7.6 | Battery location | | N |
| 7.6.1 | Battery location and installation | No internal batteries provided | N |
| 7.6.2 | Accessibility and maintainability | | N |
| 7.6.3 | Distance | | N |
| 7.6.4 | Case insulation | | N |
| 7.6.5 | Wiring | | N |
| 7.6.6 | Electrolyte spillage | | N |
| 7.6.7 | Ventilation | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.6.8 | Charging voltage | | N |
| 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 |
| 8.2<br>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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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<br>6/RD | Connection to telecommunication networks | | N |
| 6.1/RD | Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment | | N |
| 6.1.1/RD | Protection from hazardous voltages | | N |
| 6.1.2/RD | Separation of the telecommunication network from earth | | N |
| 6.1.2.1/RD | Requirements | | N |
| | Supply voltage (V) ..... : | | |
| | Current in the test circuit (mA) ..... : | | |
| 6.1.2.2/RD | Exclusions ..... : | | N |
| 6.2/RD | Protection of equipment users from overvoltages on telecommunication networks | | N |
| 6.2.1/RD | Separation requirements | | N |
| 6.2.2/RD | Electric strength test procedure | | N |
| 6.2.2.1/RD | Impulse test | | N |
| 6.2.2.2/RD | Steady-state test | | N |
| 6.2.2.3/RD | Compliance criteria | | N |
| 6.3/RD | Protection of the telecommunication wiring system from overheating | | N |
| | Max. output current (A) ..... : | | |
| 3.5/RD | Interconnection of equipment | | N |
| 3.5.1/RD | General requirements | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 2.3.2.1/RD | General requirements | | N |
| 2.3.2.2/RD | Protection by basic insulation | | N |
| 2.3.2.3/RD | Protection by earthing | | N |
| 2.3.2.4/RD | Protection by other constructions ..... : | | N |
| 2.3.3/RD | Separation from hazardous voltages | | N |
| | Insulation employed ..... : | | |
| 2.3.4/RD | Connection of TNV circuits to other circuits | | N |
| | Insulation employed ..... : | | |
| 2.3.5/RD | Test for operating voltages generated externally | | N |
| 2.6.5.8/RD | Reliance on telecommunication network or cable distribution system | | N |
| 2.10.3.3/RD | Clearances in primary circuits | (see appended table 5.7) | N |
| 2.10.3.4/RD | Clearances in secondary circuits | (see appended table 5.7) | N |
| 2.10.4/RD | Creepage distances | | N |
| 2.10.4.1/RD | General | | N |
| 2.10.4.2/RD | Material group and comparative tracking index | | N |
| | CTI tests ..... : | | |
| 2.10.4.3/RD | Minimum creepage distances | | N |
| M/RD | ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD) | | N |
| M.1/RD | Introduction | | N |
| M.2 /RD | Method A | | N |
| M.3/RD | Method B | | N |
| M.3.1/RD | Ringing signal | | N |
| M.3.1.1/RD | Frequency (Hz) ..... : | | |
| M.3.1.2/RD | Voltage (V) ..... : | | |
| M.3.1.3/RD | Cadence; time (s), voltage (V) ..... : | | |
| M.3.1.4/RD | Single fault current (mA) ..... : | | |
| M.3.2/RD | Tripping device and monitoring voltage ..... : | | N |
| M.3.2.1/RD | Conditions for use of a tripping device or a monitoring voltage | | |
| M.3.2.2/RD | Tripping device | | N |
| 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 ..... : | | |

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

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Type ..... : | | N |
| | Rated values ..... : | | N |
| B.2/RD | Test conditions | | N |
| B.3/RD | Maximum temperatures | | N |
| B.4/RD | Running overload test | | N |
| B.5/RD | Locked-rotor overload test | | N |
| | Test duration (days) ..... : | | N |
| | Electric strength test: test voltage (V) ..... : | | N |
| B.6/RD | Running overload test for d.c. motors in secondary circuits | | N |
| B.6.1/RD | General | | N |
| B.6.2/RD | Test procedure | | N |
| B.6.3/RD | (Alternative) test procedure | | N |
| B.6.4/RD | Electric strength test; test voltage (V) ..... : | | N |
| B.7/RD | Locked-rotor overload test for d.c. motors in secondary circuits | | N |
| B.7.1/RD | General | | N |
| B.7.2/RD | Test procedure | | N |
| B.7.3/RD | (Alternative) test procedure | | N |
| B.7.4/RD | Electric strength test; test voltage (V) ..... : | | N |
| B.8/RD | Test for motors with capacitors | | N |
| B.9/RD | Test for three-phase motors | | N |
| B.10/RD | Test for series motors | | N |
| | Operating voltage (V) ..... : | | N |
| C/RD | Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD) | | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| D.2/RD | (Alternative) measuring instrument | | N |
| E/RD | Annex E, Temperature rise of a winding (see 1.4.13/RD) | | N |
| F/RD | Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD) | | P |
| G/RD | Annex G, (Alternative) method for determining minimum clearances | | N |
| G.1/RD | Clearances | | N |
| G.1.1/RD | General | | N |
| G.1.2/RD | Summary of the procedure for determining minimum clearances | | N |
| G.2/RD | Determination of mains transient voltage (V) | | N |
| G.2.1/RD | AC mains supply ..... : | | N |
| G.2.2/RD | Earthed d.c. mains supplies ..... : | | N |
| G.2.3/RD | Unearthed d.c. mains supplies ..... : | | N |
| G.2.4/RD | Battery operation ..... : | | N |
| G.3/RD | Determination of telecommunication network transient voltage (V) ..... : | | N |
| G.4/RD | Determination of required withstand voltage (V) | | N |
| G.4.1/RD | Mains transients and internal repetitive peaks : | | N |
| G.4.2/RD | Transients from telecommunication networks . : | | N |
| G.4.3/RD | Combination of transients | | N |
| G.4.4/RD | Transients from cable distribution systems | | N |
| G.5/RD | Measurement of transient voltages (V) | | N |
| | a) Transients from a mains supply | | N |
| | For an a.c. mains supply | | N |
| | For a d.c. mains supply | | N |
| | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| I.4 | Load-induced change of reference potential | | N |
| I.5 | Solid-state backfeed protection<br>(see clause 7.1-7.5 of IEC 62040-2 and clause 7.1-7.2 of IEC 62040-3) | | N |
| J/RD | Annex J, Table of electrochemical potentials (see 2.6.5.6/RD) | | P |
| | Metal(s) used ..... : | Copper plated with tin and soldering lead. | |
| K/RD | Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD) | | N |
| K.1/RD | Making and breaking capacity | | N |
| K.2 /RD | Thermostat reliability; operating voltage (V) ... : | | N |
| K.3/RD | Thermostat endurance test; operating voltage (V) ..... : | | N |
| K.4/RD | Temperature limiter endurance; operating voltage (V) ..... : | | N |
| K.5/RD | Thermal cut-out reliability | | N |
| K.6/RD | Stability of operation | | N |
| L | Annex L, Reference loads | | P |
| L.1 | General | | P |
| L.2 | Reference resistive load | | 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 | | N |
| M.1 | General | | N |
| M.2 | Normal conditions | | N |
| M.3 | Blocked conditions | | N |
| M.4 | Overcharge conditions | | N |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 |

| 4.5 | TABLE: list of critical components | | | | P |
|---|---|---|---|---|---|
| object/part No. | manufacturer/ trademark | type/model | technical data | standard | mark(s) of conformity[1]) |
| Whole unit | | | | | |
| Enclosure | Various | Steel/Aluminium | -- | -- | -- |
| Breaker 1 | DELIXI | CDB91253C80 | 80A 3P | IEC60947-2 | UL<br>VDE |
| Breaker 2 | DELIXI | CDB91253C125 | 125A 3P | IEC60947-2 | UL<br>VDE |
| Breaker 3 | DELIXI | CDB91254C100 | 100A 4P | IEC60947-2 | UL<br>VDE |
| DC fan | NMB-MAT | 09225VA24QAL01 | DC24V, 0.38A, 9.12W | -- | UL:E89936 |
| Material of Front panel | Chi-Mei | PA-757 | -- | -- | UL:E56070 |
| Insulation sheet | FORMEX | Formex GK-10 | -- | -- | UL:E256266/E121855 |
| wire | Various | Various | --- | --- | UL:E314168 |
| ON SNT_ASY_3815_JP_03 | | | | | |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY02_PS1203_CT1 | | | | | |
| Y2 capacitor (C265,C266,C267) | Various | CD16-E2GA472MYGS | 250VAC/ 4700pF | IEC 60384-14 | VDE:124321 |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1203_PW3 board | | | | | |
| DC capacitor (C7,C8) | Jianghai | CD293-220UF | 450V, 220uF, 85℃ | -- | UL |
| Optocouplers (U2) | NEC | PS2561L-1-V-F3-A-L | -- | -- | UL:E72422, |
| Current Transformer (T2) | SIDNA | USS11CT2 | Class B | -- | Test with appliance |
| Transformer (T1) | SIDNA | UMS33P1T2 | Class B | -- | Test with appliance |
| Transformer (T3) | Boulder | UMXPS3T1 | Class B | -- | Test with appliance |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| Y2 capacitor (C3,C4,C5,C6, C59,C60) | Various | CD16-E2GA472MYGS | 250VAC/ 4700pF | IEC 60384-14 | VDE:124321 |
| Y2 capacitor (C11,C12,C61) | Various | CS11-E2GA222MYNS | 250VAC/ 2200pF | IEC 60384-14 | VDE:124321 |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY02_PS1203_PW5 | | | | | |
| Optocouplers (U1) | NEC | PS2561L-1-V-F3-A-L | -- | -- | UL:E72422, |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1203_TF8 | | | | | |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1312_TF1 | | | | | |
| Transformer (T1) | Boulder | UMX33MN1T1 | Class B | -- | Test with appliance |
| Optocouplers (U8,U9,U10,U11,U12) | NEC | PS2561L-1-V-F3-A-L | -- | -- | UL:E72422, |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_CP1 | | | | | |
| FUSE (F1,F2) | BUSSMANN | BK-GBH-V030A6FR | 30A/500VAC | -- | UL:E56412 |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_CP3 | | | | | |
| Inductor (L1,L2) | FOT | HTX3340L2 | CLASS F | -- | Test with appliance |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_CV2 | | | | | |
| Optocouplers (U1,U2,U3,U4, U5,U6) | NEC | PS2561L-1-V-F3-A-L | -- | -- | UL:E72422, |
| FUSE (F1,F2,F3,F4,F5,F6,F7,F8,F9,F11,F12,F14,F15,F17,F18,F19,F20,F21) | BUSSMANN | BK/ABC-V-30 | 30A/250VAC | -- | UL:E19180 |
| PCB | Various | Various | V-0, 130℃ | -- | UL |

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

| | | | | | |
|---|---|---|---|---|---|
| ON ASY01_PS1408_DR1 | | | | | |
| IGBT (Q45,Q46) | Infineon | IKW50N65H5 | 50A/650V | -- | -- |
| Thyristor (Q43,Q44) | IR | 40TPS12 | 40A 1200V | -- | -- |
| Thyristor (Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12) | VISHAY | VS-70TPS12Pbf | 70A 1200V | -- | -- |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_DR2 | | | | | |
| Y2 capacitor (C58,C59) | Various | CS11-E2GA222MYNS | 250VAC/ 2200pF | IEC 60384-14 | VDE:124321 |
| DC capacitor (C13,C14) | Jianghai | CD293-820UF | 450V, 820uF, 85℃ | -- | UL |
| Diode (D17,D18,D30,D31) | Fairchild | FFH75H60S | 75A/600V | -- | -- |
| IGBT (Q2,Q3,Q4,Q6) | Infineon | IKW50N65H5 | 50A/650V | -- | -- |
| Inductor (L1,L2) | FOT | HTX3340L3 | CLASS F | -- | Test with appliance |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_DR4 | | | | | |
| DC capacitor (C47,C48,C49,C50) | Jianghai | CD293-820UF | 450V, 820uF, 85℃ | -- | UL |
| Y2 capacitor (C63,C64,C65,C66,C67,C68) | Various | CD16-E2GA472MYGS | 250VAC/ 4700pF | IEC 60384-14 | VDE:124321 |
| IGBT (Q5,Q6,Q7,Q8,Q9,Q10) | Infineon | IKW40N120H3 | 40A/1200V | -- | -- |
| IGBT (Q1,Q2,Q3,Q4) | Infineon | IKW75N60H3 | 75A/600V | -- | -- |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_EM1 | | | | | |

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

| | | | | | |
|---|---|---|---|---|---|
| Relay(RY1,RY2,RY3,RY4,RY5,RY6,RY7,RY8,RY9) | Hongfa | JQX-105F-1 | 24V 30A | --\ | UL:E134517 |
| Y2 capacitor (C85,C86,C87,C88,C89,C90) | Various | CS11-E2GA222MYNS | 250VAC/ 2200pF | IEC 60384-14 | VDE:124321 |
| Thyristor (Q23,Q24,Q25,Q26,Q27,Q28) | VISHAY | VS-70TPS12Pbf | 70A 1200V | -- | -- |
| Current Transformer (T7,T8.T9) | Boulder | HTX3340CT1 | Class B | -- | Test with appliance |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_TF2 | | | | | |
| Y2 capacitor (C3) | Various | CS11-E2GA222MYNS | 250VAC/ 2200pF | IEC 60384-14 | VDE:124321 |
| PCB | Various | Various | V-0, 130℃ | -- | UL |
| ON ASY01_PS1408_TF3 | | | | | |
| 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 |

| 4.6 | TABLE: electrical data (in normal conditions) | | | | | P |
|---|---|---|---|---|---|---|
| Fuse# | Irated(A) | U(V) | P(W) | I(A) | P(VA) | Condition/status |
| Tested on model HT33040XL | | | | | | |
| Input breaker | -- | 342V/50Hz | 37920 | 57 | 38000 | Charging of empty batteries and rated output load . |
| Input breaker | -- | 342V/60Hz | 37725 | 57 | 37949 | Ditto |
| Input breaker | 73 | 380V/50Hz | 37760 | 52 | 37923 | Ditto |
| Input breaker | 73 | 380V/60Hz | 37795 | 52 | 37945 | Ditto |
| Input breaker | 73 | 415V/50Hz | 37872 | 48 | 37951 | Ditto |
| Input breaker | 73 | 415V/60Hz | 37805 | 48 | 37953 | Ditto |
| Input breaker | -- | 456.5V/50Hz | 37920 | 57 | 38000 | Ditto |
| Input breaker | -- | 456.5V/60Hz | 37725 | 57 | 37949 | Ditto |
| Note(s):Please measure the input currents with normal load. | | | | | | |

| 5.1.3 | TABLE: discharge of capacitors in the primary circuit | | | | P |
|---|---|---|---|---|---|
| Condition | τcalculated (s) | τmeasured (s) | t u→ 0V(s) | Comments | |
| Tested on model l HT33040XL | | | | | |
| Power switch on (L1-N) | -- | 4 | 10 | Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied | |
| Power switch on (L2-N) | -- | 4 | 10 | Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied | |
| Power switch on (L3-N) | -- | 4 | 10 | Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied | |
| Power switch on (N-PE) | -- | 1 | 10 | Vi=_376___Vp, 37% of Vi=_139___Vp, No load applied | |
| Note(s):<br>1. Relevant discharge resistance: discharged through circuit | | | | | |

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

| 5.1.4 | TABLE: Backfeed protection test | | | | P |
|---|---|---|---|---|---|
| Condition | Voltage measured (V)/current (mA) | | | | Comments |
| | L1-N | L1-G | N-G | | |
| NO LOAD | 0.236V | 11.0V | 10.8V | Battery mode, Normal | |
| FULL LOAD | 0.332V | 11.0V | 10.8V | Ditto | |
| NO LOAD | 0.182V | 0.130V | 0.172V | Battery mode, Abnormal condition (__ On DR4 Board PIN 2、3 of Q6__ short circuit) | |
| FULL LOAD | 0.196V | 0.130V | 0.172V | Battery mode, Abnormal condition (__ On DR4 Board PIN 2、3 of Q6__ short circuit) | |
| Note(s): | | | | | |

| 5.2.1 and 2.2.2/RD | 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):<br>1). Approved component. For details refer to table 4.3. Tested on model HT33040XL | | | | | |

| 5.2.1 and 2.2.3/RD | TABLE: insulation / SELV voltage measurement | | P |
|---|---|---|---|
| Location | | Voltage measured (V) | Comments |
| T1 (on TF1 board) Pin10– Pin9 | | 17.3 | -- |
| T1 (on TF1 board) Pin6 – Pin7 | | 13.4 | -- |
| Note(s): No any voltage in RS232 circuit side exceeding SELV limits during normal / abnormal operation. No test necessary. | | | |

| 5.2.1 and 2.2.3/RD | TABLE: SELV measurement (under fault conditions) | | P |
|---|---|---|---|
| Location | | Voltage (max.) (V) | Comments |
| T1 Pin 6-7 s-c | | 0 | -- |
| T1 Pin 6-9 s-c | | 0 | -- |
| T1 Pin 6-10 s-c | | 0 | -- |
| T1 Pin 7-9 s-c | | 0 | -- |
| T1 Pin 7-10 s-c | | 0 | -- |

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

| | | |
|---|---|---|
| T1 Pin 9-10 s-c | 0 | -- |
| Supplementary information: | | |

| 5.2.3and 2.4.2/RD | TABLE: limited current circuit measurement | | | | | N |
|---|---|---|---|---|---|---|
| condition | Location | Voltage (V) | Current (mA) | Freq. (kHz) | Limit (mA) | Comments |
| | | | | | | |
| | | | | | | |
| Note(s): test during battery mode. Output measured with a 2 kΩ resistor as load. | | | | | | |

| 5.2.5 and 2.5/RD | TABLE: Limited power source measurement | | |
|---|---|---|---|
| | Limits | Measured | Verdict |
| | | | |
| | | | |

| 5.3.1 and 2.6.3.4/RD | TABLE: provisions for protective earthing | P |
|---|---|---|
| Location | Resistance measured(mΩ) / voltage drop(V) | Comments |
| Tested on model HT33040XL | | |
| I/P earth →O/P earth | 1V | Test current of ___150__A for _4__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. | | |

| 5.5 and 8.3 | TABLE: Abnormal operating and fault conditions | | | | | | | P |
|---|---|---|---|---|---|---|---|---|
| | ambient temperature (°C) | | | | | See below | | |
| | model/type of power supply | | | | | Integral part of equipment. | | |
| | manufacturer of power supply | | | | | See below | | |
| | rated markings of power supply | | | | | See page 4 | | |
| No. | component No. | fault | test voltage (V) | test time | fuse no. | fuse current (A) | Result | |

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

| | | | |
|---|---|---|---|
| 5.5 and 8.3 | TABLE: Abnormal operating and fault conditions | | P |
| | ambient temperature (°C) | See below | |
| | model/type of power supply | Integral part of equipment. | |
| | manufacturer of power supply | See below | |
| | rated markings of power supply | See page 4 | |

| No. | component No. | fault | test voltage (V) | test time | fuse no. | fuse current (A) | Result |
|---|---|---|---|---|---|---|---|
| **DR1 board** | | | | | | | |
| 1 | Q45 (c-e) | s-c | 415 | 1s | F1 on CP1 board | 30 | UPS output normally, fuse F1 opened, charger shut down.<br>Q45 damaged.<br>Output voltage: 397.3V. |
| 2 | Q45(g-e) | s-c | 415 | 1s | F1 on CP1 board | 30 | UPS output normally, charger shut down.<br>recoverable after fault removed, no damaged.<br>Output voltage: 397.3V. |
| 3 | Q45(c-g) | s-c | 415 | 1s | F1 on CP1 board | 30 | UPS output normally, fuse F1 opened, charger shut down.<br>Q45 damaged.<br>Output voltage: 397.3V. |
| **DR2 board** | | | | | | | |
| 6 | A+ IGBT(c-e) | s-c | 415 | 1s | F1 on DR1 board | -- | UPS output normally, fuse F1 opened, charger shut down.<br>A+ IGBT damaged.<br>Output voltage: 397.3V. |
| 7 | A+ IGBT (c-g) | s-c | 415 | 1s | F1 on DR1 board | -- | UPS output normally, fuse F1 opened, charger shut down.<br>A+ IGBT damaged.<br>Output voltage: 397.3V. |
| 8 | A+ IGBT (g-e) | s-c | 415 | 10min | F1 on DR1 board | -- | UPS output normally, charger shut down.<br>recoverable after fault removed, no damaged.<br>Output voltage: 397.3V. |

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

| | | | |
|---|---|---|---|
| 5.5 and 8.3 | TABLE: Abnormal operating and fault conditions | | P |
| | ambient temperature (°C) | See below | |
| | model/type of power supply | Integral part of equipment. | |
| | manufacturer of power supply | See below | |
| | rated markings of power supply | See page 4 | |

| No. | component No. | fault | test voltage (V) | test time | fuse no. | fuse current (A) | Result |
|---|---|---|---|---|---|---|---|
| 9 | BUS E-capacitor | s-c | 415 | 1s | F1,F2,F3 | -- | UPS output normally, charger shut down.<br>fuse F1/F2/F3 opened,<br>IGBT of A/B/C phase hazards,<br>No damaged.<br>Output voltage: 397.3V. |
| **CP1 board** | | | | | | | |
| 10 | Bus Voltage detecting resistor R5 | s-c | 415 | 10min | -- | -- | UPS work normally, no hazards.<br>Charge voltage: 276V,<br>Output voltage: 397.3V. |
| 11 | Bus Voltage detecting resistor R5 | o-c | 415 | 10min | -- | -- | UPS output normally, charger shut down.<br>Output voltage: 397.3V. |
| TF1 board | | | | | | | |
| 12 | Transformer T1 pin 9-10 | s-c | 415 | 10min | F1 | -- | UPS output and the charger operate normally,<br>no damaged.<br>Charge voltage: 276V,<br>Output voltage: 397.3V. |
| 13 | Opto coupler U12 (pin1-2) | s-c | 415 | 10min | --- | -- | UPS work normally, no damaged.<br>Charge voltage: 276V,<br>Output voltage: 397.3V. |
| 14 | Opto coupler U12 (pin3-4) | s-c | 415 | 10min | -- | -- | UPS work normally, no damaged.<br>Charge voltage: 276V,<br>Output voltage: 397.3V. |
| 15 | Opto coupler U12 pin1 | O-c | 415 | 10min | -- | -- | UPS work normally, no damaged.<br>Charge voltage: 276V,<br>Output voltage: 397.3V. |

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

| | | | |
|---|---|---|---|
| 5.5 and 8.3 | TABLE: Abnormal operating and fault conditions | | P |
| | ambient temperature (°C) | See below | |
| | model/type of power supply | Integral part of equipment. | |
| | manufacturer of power supply | See below | |
| | rated markings of power supply | See page 4 | |

| No. | component No. | fault | test voltage (V) | test time | fuse no. | fuse current (A) | Result |
|---|---|---|---|---|---|---|---|
| 16 | Opto coupler U12 pin3 | O-c | 415 | 10min | -- | -- | UPS work normally, no damaged.<br>Charge voltage: 276V, Output voltage: 397.3V. |
| 17 | D14 | s-c | 415 | 10min | -- | -- | UPS work normally, no damaged.<br>Charge voltage:276V,<br>Output voltage: 397.3V. |
| Whole unit | | | | | | | |
| 18 | Output | s-c | 415 | 1s | -- | - | UPS output shut down immediately, the charger operate normally, no damaged.<br>Charge voltage: 276V, Output voltage: 0V. |
| 19 | Output | s-c | battery | 1s | -- | - | UPS output shut down immediately, no damaged.<br>Charge voltage: 0V, Output voltage: 0V. |
| 20 | Output | o-l | 415 | 15min | -- | - | UPS output shut down at condition of 5min at 100% load + 5min at 117% load + 2s at 133% load. |
| 21 | Output | o-l | Battery mode | 15min | -- | -- | UPS output shut down at condition of 5min at 100% load + 5min at 117% load + 2s at 133% load. |
| 22 | Ventilation openings | Block -ed | 415 | 30min. | -- | -- | UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously. |

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

| | | | |
|---|---|---|---|
| 5.5 and 8.3 | TABLE: Abnormal operating and fault conditions | | P |
| | ambient temperature (°C) | See below | |
| | model/type of power supply | Integral part of equipment. | |
| | manufacturer of power supply | See below | |
| | rated markings of power supply | See page 4 | |

| No. | component No. | fault | test voltage (V) | test time | fuse no. | fuse current (A) | Result |
|---|---|---|---|---|---|---|---|
| 23 | Ventilation openings | Block -ed | Battery mode | 30min | -- | -- | UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously. |
| 24 | Fan | Lock ed | 415 | 30mins | -- | -- | UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously. |
| 25 | Fan | Lock ed | Battery mode | 30mins | -- | -- | UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously. |

Note(s):
s-c means short circuit. o-l means overload. o-p means open circuit.

| 5.7 2.10.2/ RD | TABLE: working voltage measurement | | P |
|---|---|---|---|

| Location | RMS voltage (V) | Peak voltage (V) | comments |
|---|---|---|---|
| Tested on model HT33040XL | | | |
| T1 pin1-pin6 | 20 | 6 | Normal operation at rated load |
| T1 pin1-pin7 | 19 | 7 | Ditto |
| T1 pin1-pin9 | 18 | 8 | Ditto |
| T1 pin1-pin10 | 20 | 6 | Ditto |
| T1 pin2-pin6 | 20 | 7 | Ditto |
| T1 pin2-pin7 | 20 | 8 | Ditto |
| T1 pin2-pin9 | 19 | 6 | Ditto |

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

| | | | |
|---|---|---|---|
| T1 pin2-pin10 | 18 | 7 | Ditto |
| T1 pin3-pin6 | 20 | 8 | Ditto |
| T1 pin3-pin7 | 20 | 6 | Ditto |
| T1 pin3-pin9 | 20 | 7 | Ditto |
| T1 pin3-pin10 | 20 | 8 | Ditto |
| T1 pin4-pin6 | 19 | 6 | Ditto |
| T1 pin4-pin7 | 18 | 7 | Ditto |
| T1 pin4-pin9 | 20 | 8 | Ditto |
| T1 pin4-pin10 | 20 | 8 | Ditto |
| U8 pin1-pin3 | 19 | 6 | Ditto |
| U8 pin1-pin4 | 18 | 7 | Ditto |
| U8 pin2-pin3 | 20 | 8 | Ditto |
| U8 pin2-pin4 | 20 | 8 | Ditto |
| U9 pin1-pin3 | 19 | 6 | Ditto |
| U9 pin1-pin4 | 18 | 7 | Ditto |
| U9 pin2-pin3 | 20 | 8 | Ditto |
| U9 pin2-pin4 | 20 | 8 | Ditto |
| U10 pin1-pin3 | 19 | 6 | Ditto |
| U10 pin1-pin4 | 18 | 7 | Ditto |
| U10 pin2-pin3 | 20 | 8 | Ditto |
| U10 pin2-pin4 | 20 | 8 | Ditto |
| U11 pin1-pin3 | 19 | 6 | Ditto |
| U11 pin1-pin4 | 18 | 7 | Ditto |
| U11 pin2-pin3 | 20 | 8 | Ditto |
| U11 pin2-pin4 | 20 | 8 | Ditto |
| U12 pin1-pin3 | 19 | 6 | Ditto |
| U12 pin1-pin4 | 18 | 7 | Ditto |
| U12 pin2-pin3 | 20 | 8 | Ditto |
| U12 pin2-pin4 | 20 | 8 | Ditto |
| Note: Vin=415V, 50Hz Test model for HT33040XL. | | | |

| 5.7 and 2.10.4/RD | TABLE: clearance and creepage distance measurements | | | | | P |
|---|---|---|---|---|---|---|
| clearance cl and creepage distance dcr at/of: | Up (V) | U r.m.s. (V) | required cl (mm) | cl (mm) | required dcr (mm) | dcr (mm) |

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

| Whole unit | | | | | | |
|---|---|---|---|---|---|---|
| Metal enclosure to bare pin of battery terminal | <420 | <250V | 2.0 | 12.2 | 2.5 | >12.2 |
| Primary pin to earthed metal plate on Input EMI PCB | <420 | <250V | 2.0 | 5.1 | 2.5 | >5.1 |
| Primary pin to earthed metal enclosure on Output EMI PCB | <420 | <250V | 2.0 | 8.9 | 2.5 | >8.9 |
| On ASY01_PS1312_TF1 BOARD | | | | | | |
| Primary trace to secondary trace under (U8, U9, U10, U11, U12) | <420 | <250 | 4.0 | 6.2 | 5.0 | 6.2 |
| Primary trace to secondary trace under T1 | <420 | <250 | 4.0 | 5.1 | 5.0 | 5.1 |
| Primary winding to secondary winding of T1 | <420 | <250 | 4.0 | 5.0 | 5.0 | 5.0 |
| Primary winding to core of T1 | <420 | <250 | 2.0 | 2.5 | 2.5 | 2.5 |
| Secondary winding to core of T1 | <420 | <250 | 2.0 | 2.5 | 2.5 | 2.5 |
| Note(s): | | | | | | |

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

| test voltage applied between: | test voltage (V) | Breakdown Yes / No |
|---|---|---|
| Primary to Secondary (mains inlet&outlet conductor to USB port and RS232 port) | 3000Vac | No |
| Primary to earth (mains inlet&outlet conductor to earth) | 1500Vac | No |
| Primary winding to secondary winding of transformer T1 on ASY01_PS1312_TF1 Board | 3000Vac | No |
| Primary winding to core of transformer T1 on ASY01_PS1312_TF1 Board | 1500Vac | No |
| Secondary winding to core of transformer T1 on ASY01_PS1312_TF1 Board | 1500Vac | No |
| 1 layer insulation tape used in transformer T1 on ASY01_PS1312_TF1 Board | 3000Vac | No |
| Primary to Secondary (mains input & output conductor to sub-D connector) | 3000Vac | No |
| Primary to earth (mains input & output conductor to earth) | 1500Vac | No |
| Supplementary information: TESTED ON MODEL HT33040XL | | |

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

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

| Part | Test temperature (°C) | Impression diameter (mm) |
|---|---|---|
| Bobbin of T1 | 125 | 0.8 |
| Battery Connector | 125 | 1.0 |

Note(s):

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

| | | |
|---|---|---|
| 7.4.2 4.6.1/RD and 4.6.2/RD | TABLE: openings | 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. |

Note(s): Tested on model HT33040XL

| | | |
|---|---|---|
| 7.5 | TABLE: resistance to fire | P |

| Part | Manufacturer of material | Type of material | Thickness (mm) | Flammability class |
|---|---|---|---|---|
| Material of Front panel | CHI MEI CORPORATION | PA-765A(+) | Min, thickness 2.1mm | 5VA |

| | | | |
|---|---|---|---|
| 7.7 | TABLE A: maximum temperature rises | | P |
| | test voltage (V) : | See below. | -- |
| | T1 (°C) : | -- | -- |
| | T2 (°C) : | -- | -- |

| Temperature rise T of part/at: | T(°C) : | required T |
|---|---|---|

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

| | 456.5V/50 Hz | 342V/50Hz | (Battery mode) | |
|---|---|---|---|---|
| Enclosure (plastic panel) | 53.1 | 43.4 | 40.6 | 95 |
| Enclosure (metal) | 54.2 | 46.1 | 47.5 | 70 |
| AC terminal | 55.5 | 56.9 | 56.4 | 70 |
| DC terminal | 55.2 | 54.2 | 53.6 | 70 |
| DC Fan | 57.4 | 57.3 | 57.6 | -- |
| Battery wire '+'' | 52.3 | 41.2 | 55.8 | 105 |
| Primary wire | 52.1 | 52.8 | 55.7 | 105 |
| X Capacitor on DR1 board | 55.5 | 56.7 | 56.5 | 100 |
| PCB near R on DR1 board | 50.8 | 55.5 | 57.9 | 130 |
| Transformer (T1) coil on ASY01_PS1312_TF1 Board | 55.2 | 57.3 | 59.4 | 110 |
| Transformer (T1) core on ASY01_PS1312_TF1 Board | 55.4 | 54.7 | 54.3 | 110 |
| Optocoupler on ASY01_PS1312_TF1board | 51.9 | 52.9 | 52.1 | 100 |
| PCB near transformer T1 on ASY01_PS1312_TF1 Board | 53.9 | 55.7 | 57.6 | 130 |
| Transformer (T1) coil on DR1 board | 48.3 | 48.8 | 48.8 | 110 |
| Transformer (T1)core on DR1 board | 52.1 | 52.2 | 53.4 | 110 |
| Transformer on DR2 board | 59.6 | 60.5 | 52.3 | 110 |
| Transformer on DR2 board | 55.4 | 54.3 | 53.8 | 110 |
| Inductor on CP3 board | 55.2 | 55.1 | 51.3 | 110 |
| Output relay EM1 board | 52.1 | 52.2 | 53.5 | 85 |
| E capacitor on DR2 board | 50.6 | 48.1 | 40.9 | 105 |
| PCB near Q1 on DR2 board | 60.3 | 57.6 | 60.9 | 130 |
| Ambient | 40 | 40 | 40 | -- |

Supplementary information:

| Temperature T of winding: | t1 (°C) | R1 (Ω) | t2 (°C) | R2 ((Ω) | T (°C) | Allowed Tmax (°C) | Insulation class |
|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -- |

Supplementary information:

The maximum ambient temperature permitted by the manufacturer's specification is 40°C.Tested on model HT33040XL

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

| 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 HT33040XL | | | | | |
| Unit on | 0.2 | 0.18 | 60 | 3.5 | Switch “e” open, L to PE, no load |
| Unit on | 0.003 | 0.003 | 60 | 3.5 | Switch “e” open, N to PE, no load |
| Unit on | 0.001 | 0.002 | 60 | 0.25 | Switch “e” close, L to RS232 port |
| Unit on | 0.002 | 0.001 | 60 | 0.25 | Switch “e” close, N to RS232 port. |
| Note(s) : Test voltage: 456V/60Hz | | | | | |

| C.2 | Safety isolation transformer | | P |
|---|---|---|---|
| | Construction details: | | |
| Transformer part name: T1 on ASY01_PS1312_TF1 Board | | | |
| Manufacturer: See appended table 1.5.1 | | | |
| Type: See appended table 1.5.1 | | | |
| | | | |
| Recurring peak voltage | | 20Vpeak | |
| Required clearance for reinforced insulation (from table 2H and 2J) | | 4.0 | |
| | | | |
| Effective voltage rms | | 8Vrms | |
| Required creepage distance for reinforced insulation (from table 2L) | | 5.0 | |
| | | | |
| Measured min. creepage distance | | | |
| Location | | inside (mm) | outside (mm) |
| Primary winding/pin to secondary winding/pin | | 5.8 | 6.2 |
| Primary winding/pin to core | | 2.8 | 2.8 |
| Secondary winding/pin to core | | 2.8 | 2.8 |
| Measured min. clearances | | | |
| Location | | inside (mm) | outside (mm) |
| Primary winding/pin to secondary winding/pin | | 5.8 | 6.2 |
| Primary winding/pin to core | | 2.5 | 2.5 |
| Secondary winding/pin to core | | 2.5 | 2.5 |

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

| Construction: | |
|---|---|
| Concentrically wound transformer design, core size EE-16. N1, N2 are primary winding which is wound around the internal side of the bobbin. 3 layers of mylar tapes are used to separate primary and secondary windings. N3, N4, N5 are secondary windings on outer side of bobbin. Margin tape with width of 2.8mm is used on both side of bobbin and each winding layer. Tubing is used on every winding exits to the bare pins on bobbin. | |
| Pin numbers | |
| Prim. | 1-2, 3-4 |
| Sec. | 6-7, 9-10 |
| Bobbin | |
| Material | |
| Thickness | 0.7mm |
| | |
| Electric strength test | |
| With 4242Vdc. after humidity treatment | |
| Result | Pass |

| M | Ventilation of battery compartments | N |
|---|---|---|
| | The required dimension for the ventilation will be calculated with the following formula: | |
| | A > K1 * Q<br>with Q = (0.054 m³/Ah) * n * I * C<br>where:<br>K1 : constant factor of 28 h * cm²/m³<br>Q : airflow in m³/h<br>n : number of battery cells<br>I : constant factor (0.2A/100Ah for valve regulated lead acid batteries)<br>C : nominal capacity of the battery | |
| | Model:<br>n :<br>C :<br>A > 28 * cm²/m³ * (0.054m³/Ah) * n * (0.2 A/100Ah) * C = cm² | |
| | Verdict | |
| | The size of the ventilation openings exceeds the required airflow by far (as well as the UPS). | |

*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:<br>Annex ZA (normative) Normative references to international publications with their corresponding European publications<br>Annex ZB (normative) Special national conditions | | P |
| **ZA** | **NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS**<br><br>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.<br>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<br>+ corr. May | 1991[2)]<br>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<br>+ A11 | 2004[2)]<br>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<br>+ corr. July<br>+ A11 | 2004[2)]<br>2006<br>2008 |
| IEC 62040-2 | 2005 | Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements | EN 62040-2<br>+ corr. November | 2006<br>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.<br><br>The marking text in the applicable countries shall be as follows:<br><br>In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"<br><br>In **Norway**: "Apparatet må tilkoples jordet stikkontakt"<br><br>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:<br>"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 |

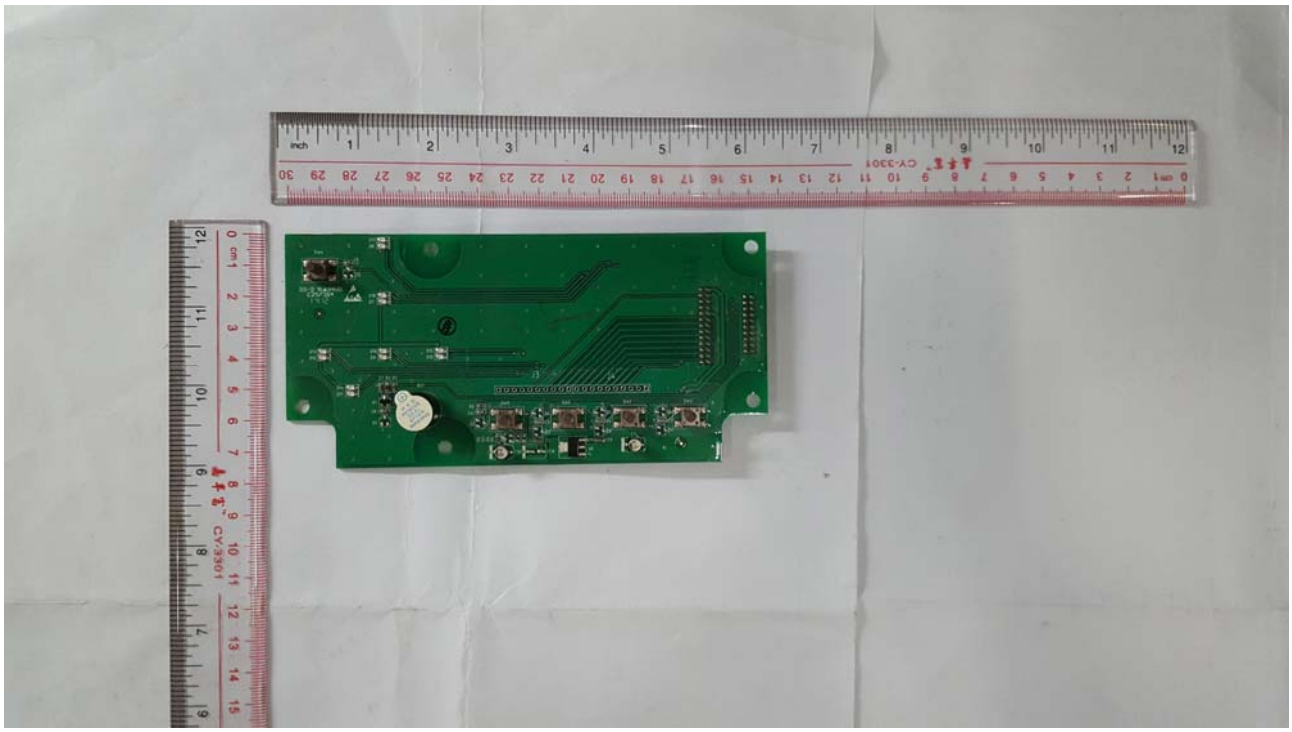
*Pictures*

Fig. 1 – Front view

Fig. 2 –Rear view

*Pictures*

Fig. 3 –Inside view



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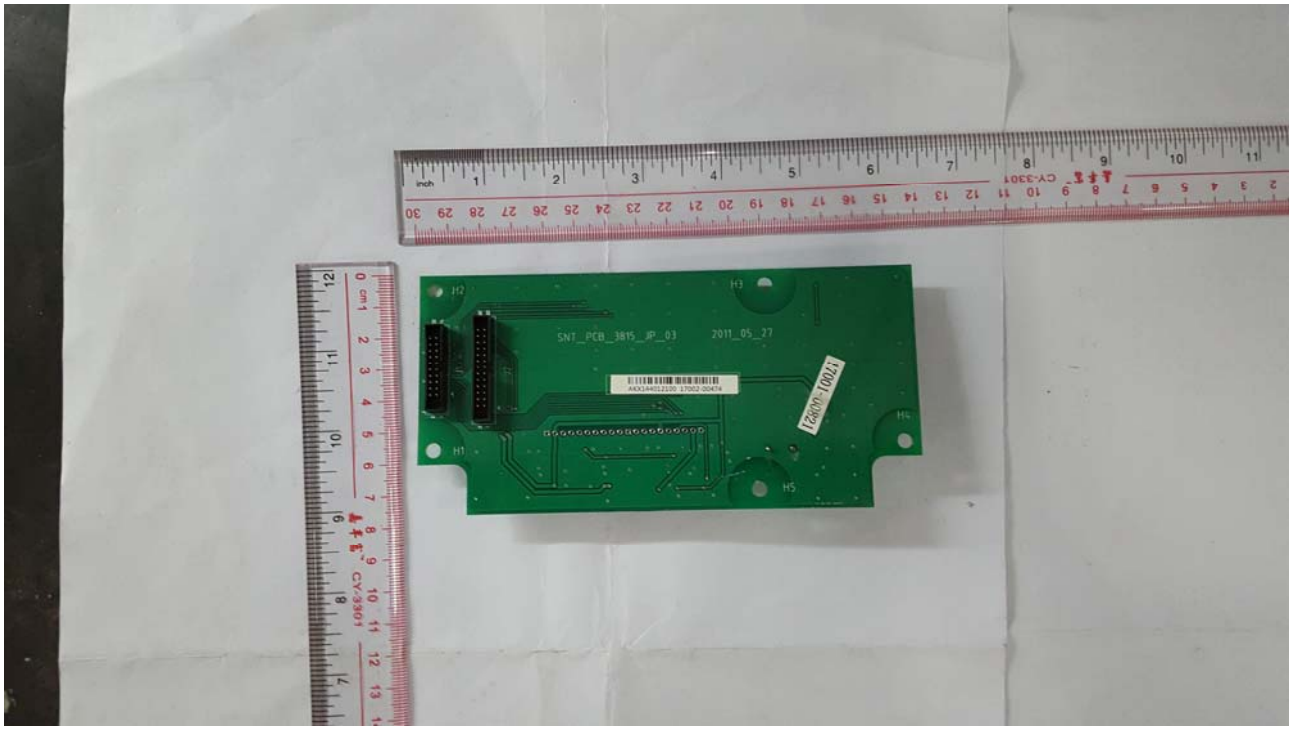


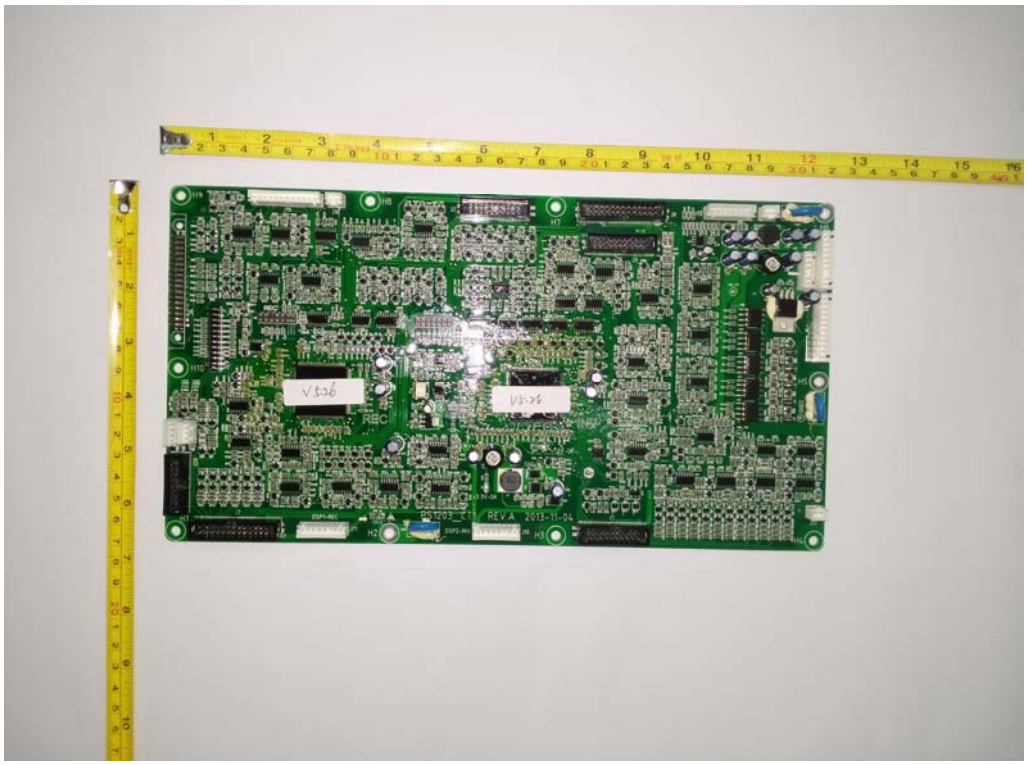

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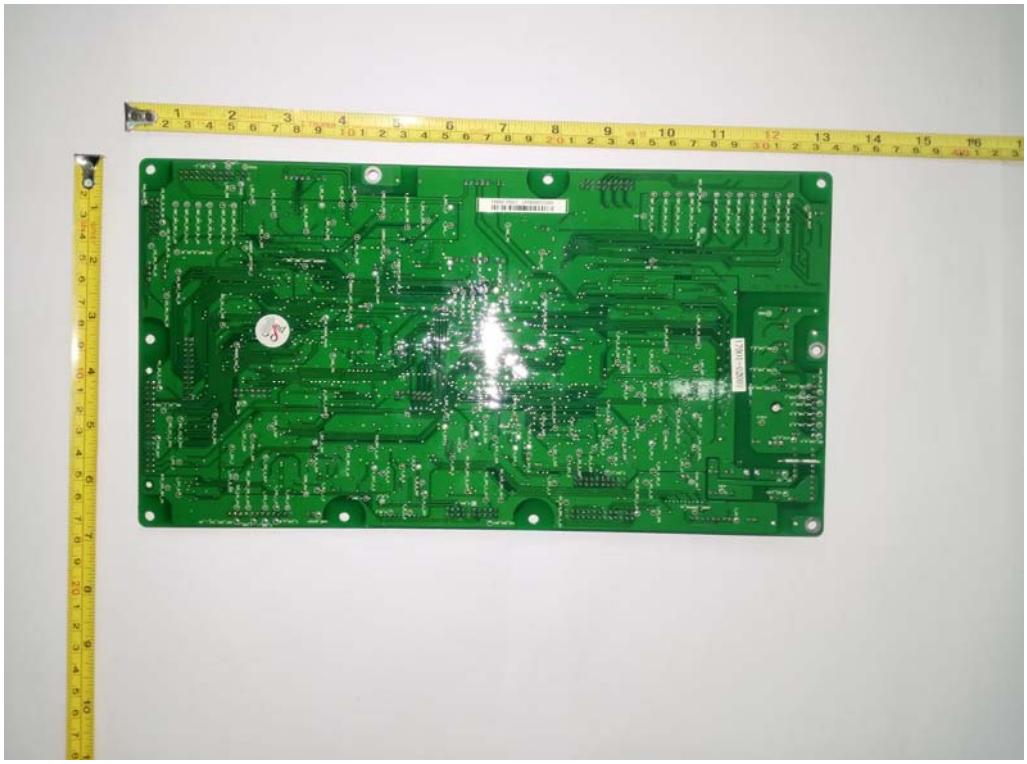

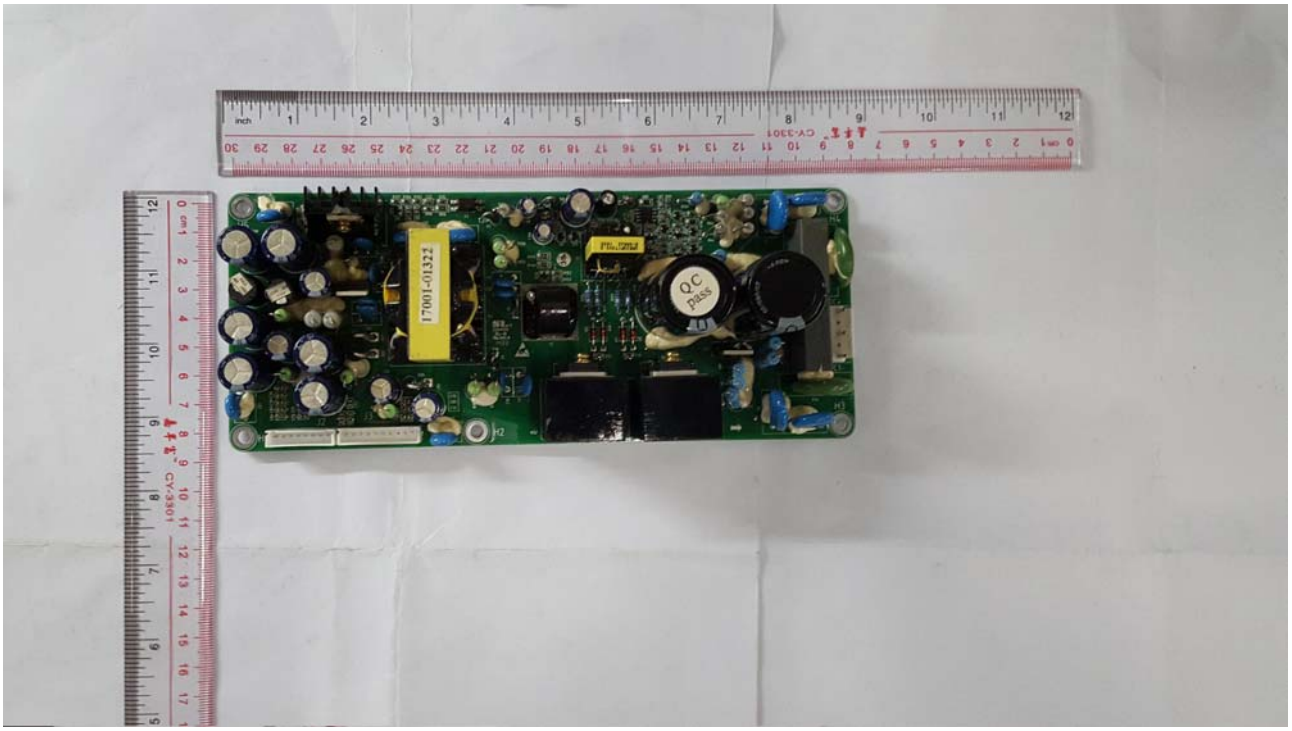

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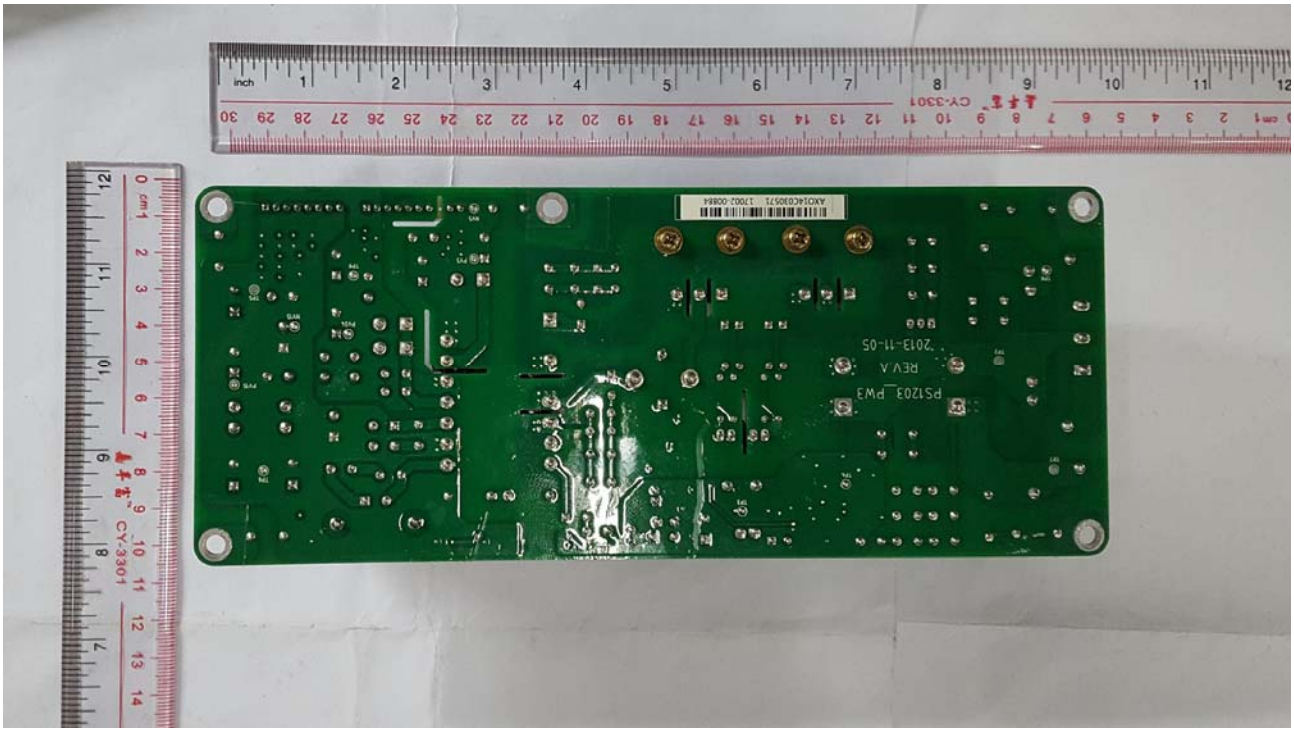

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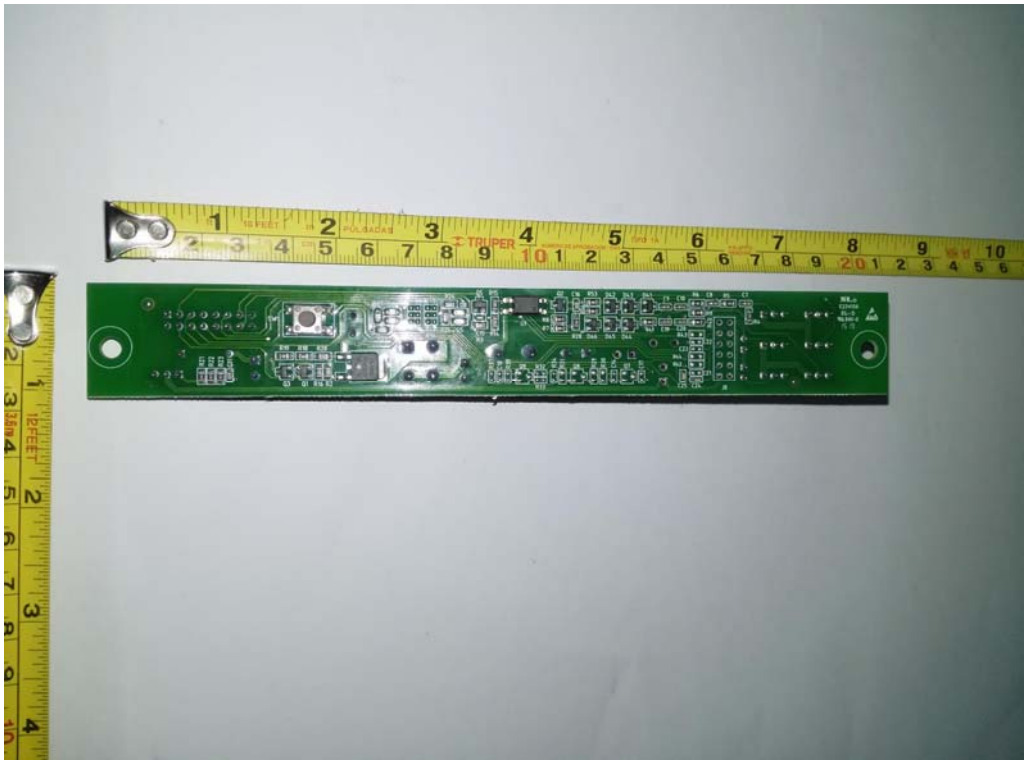

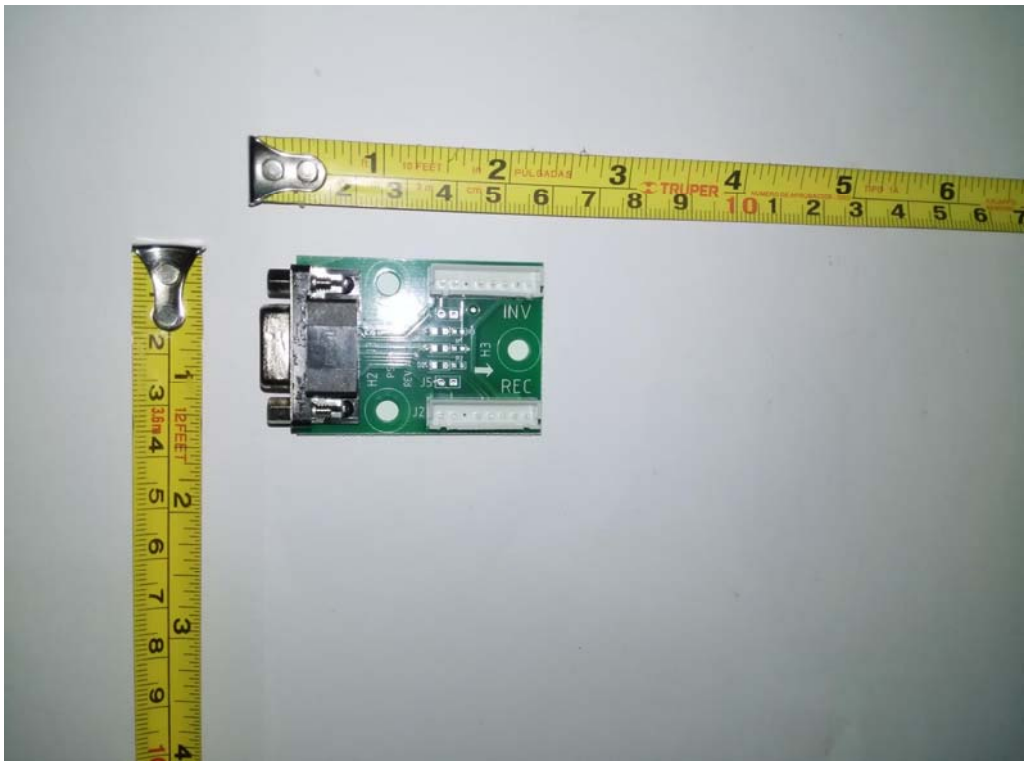

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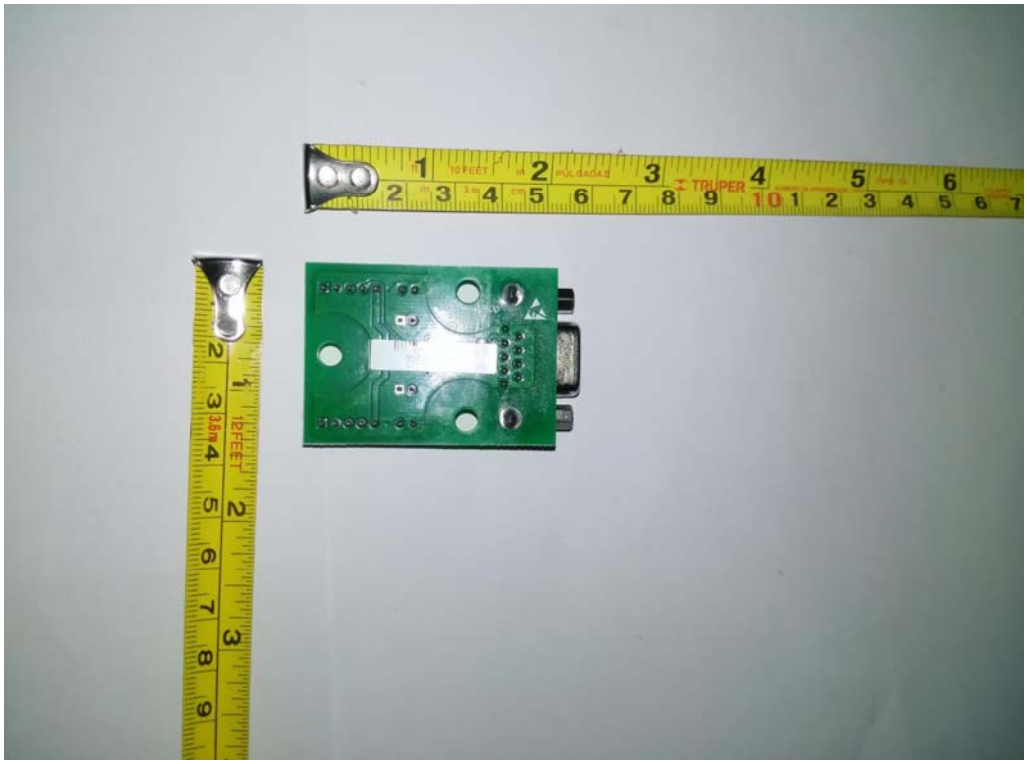

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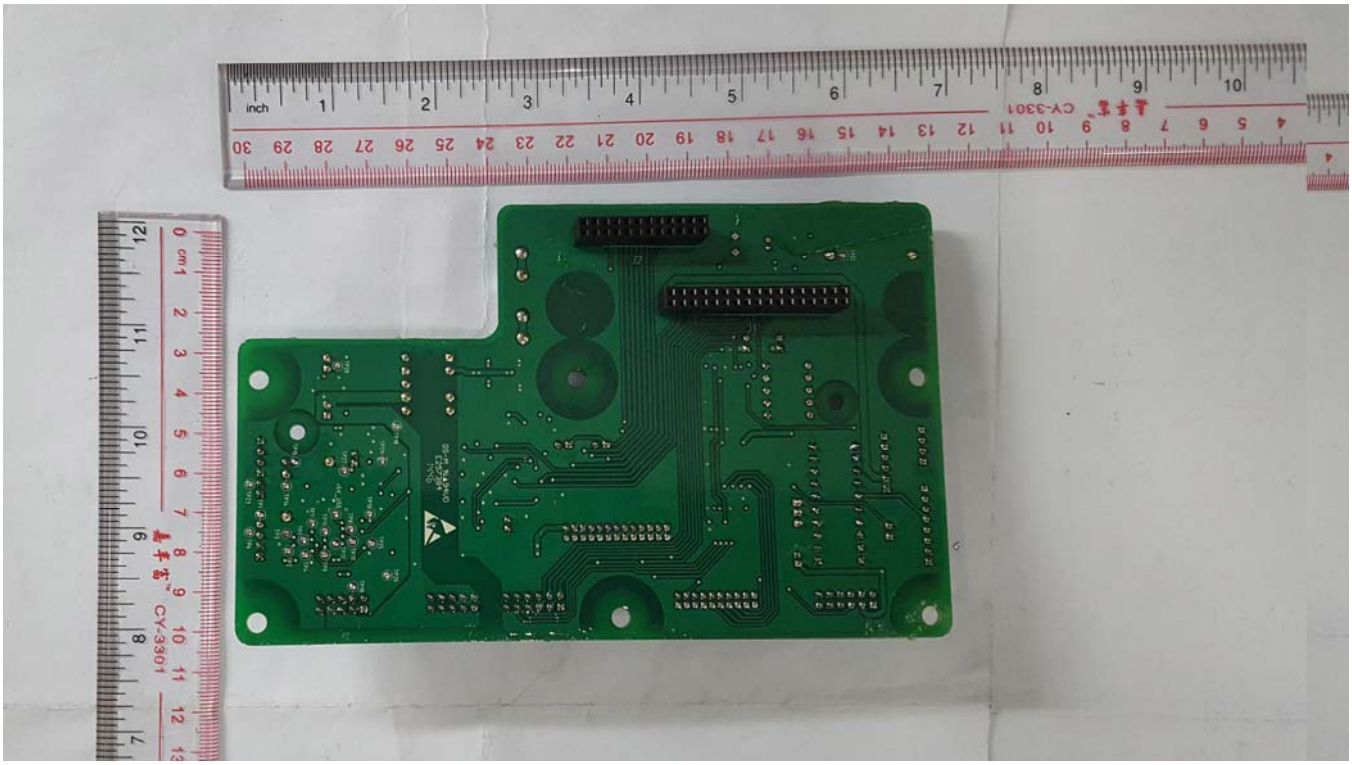

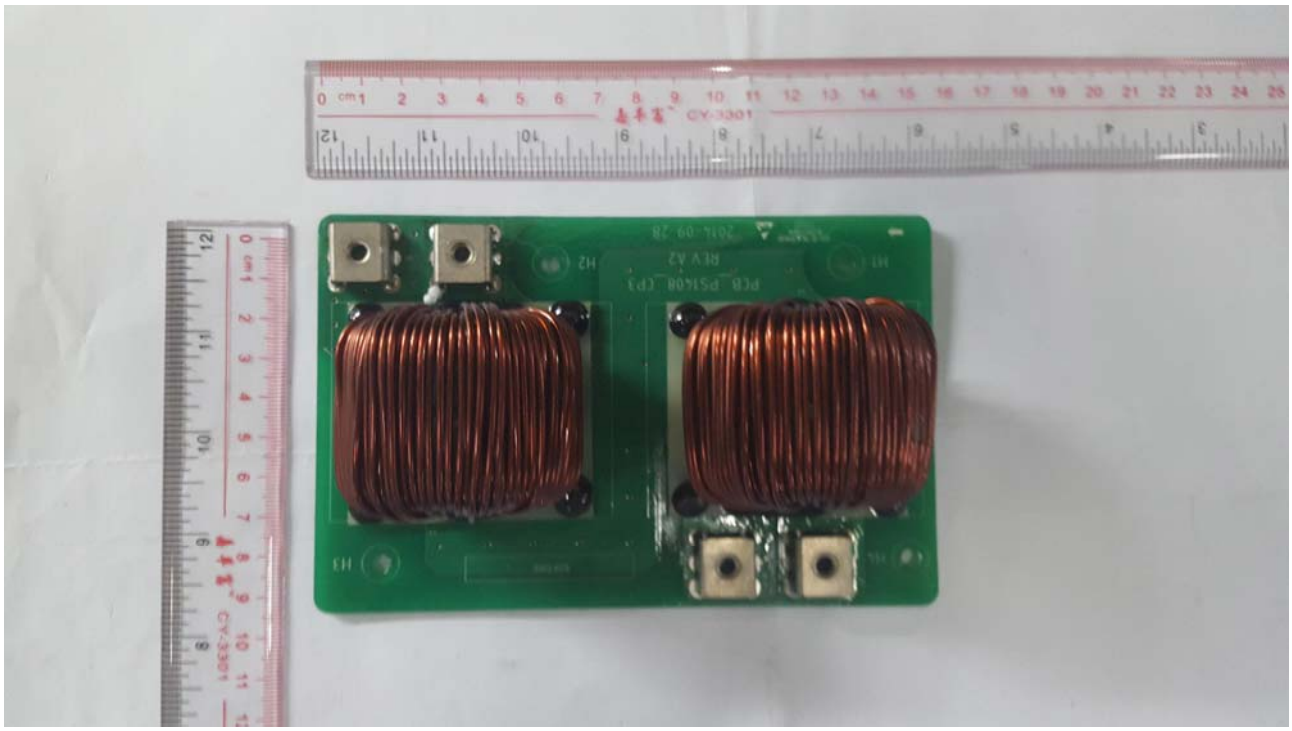

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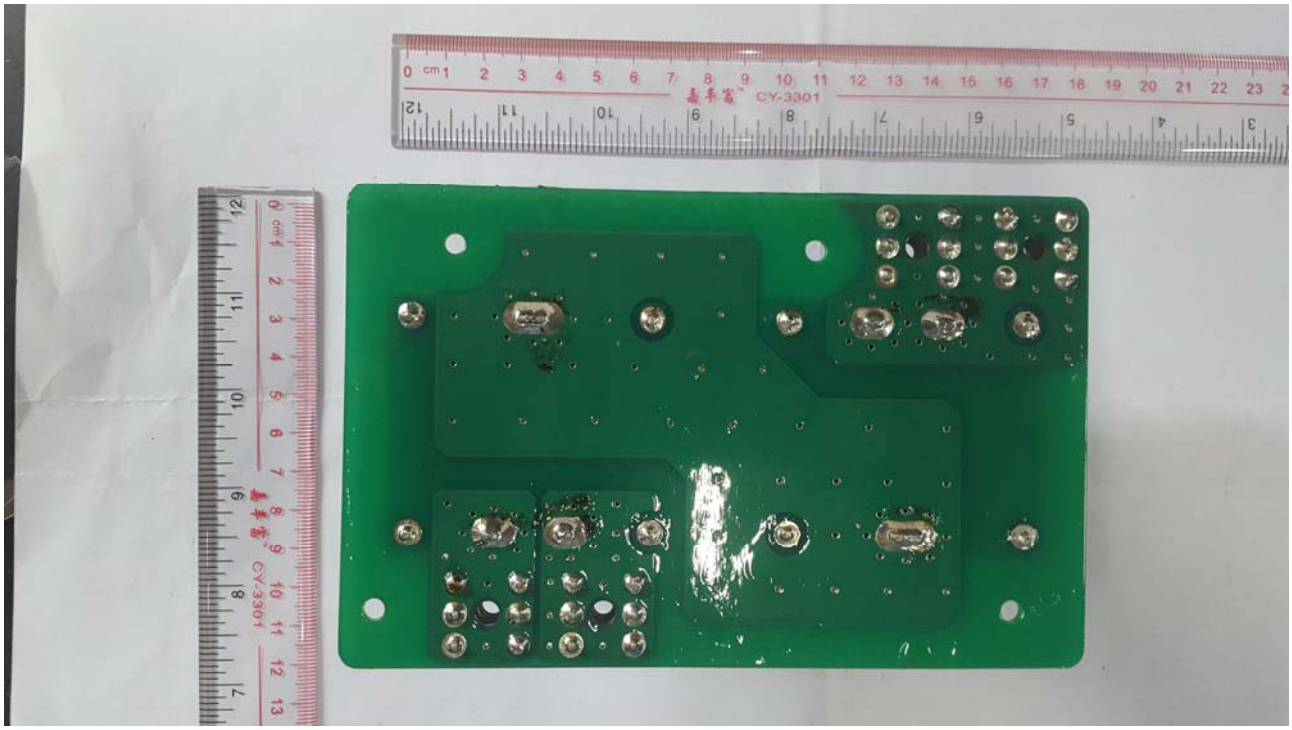

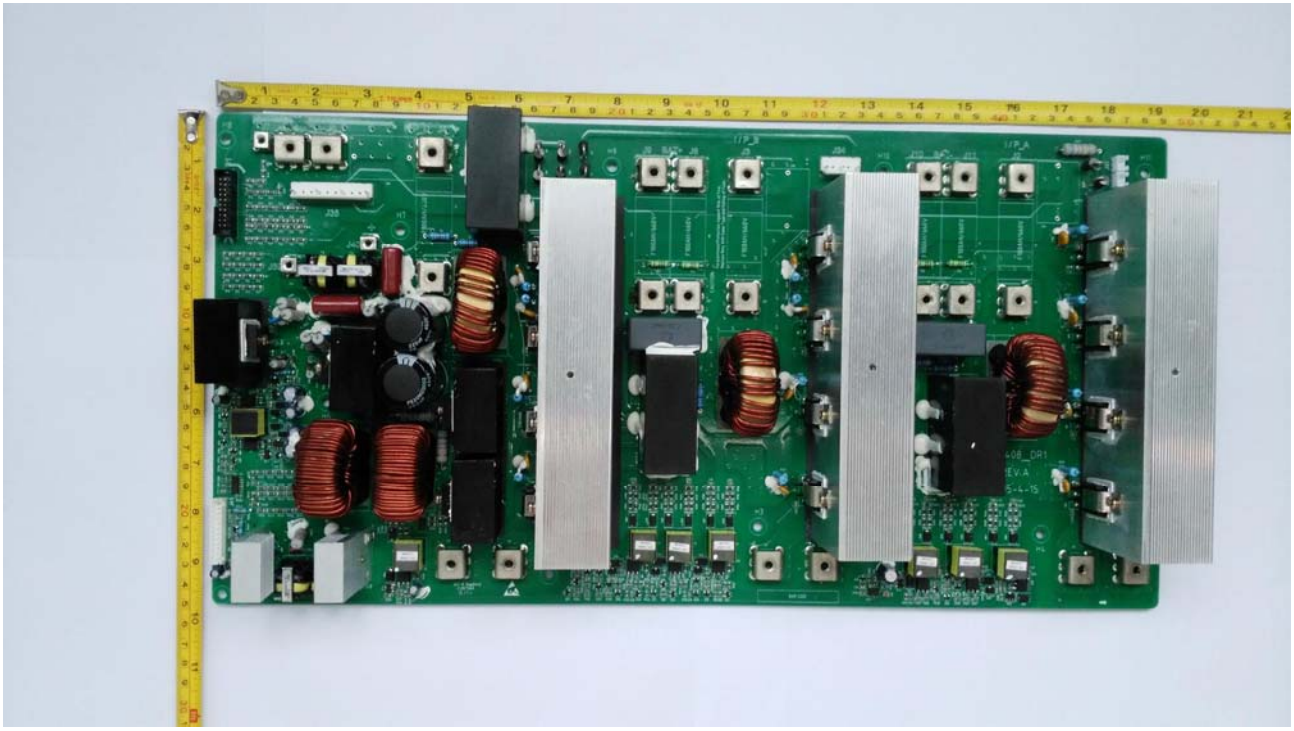

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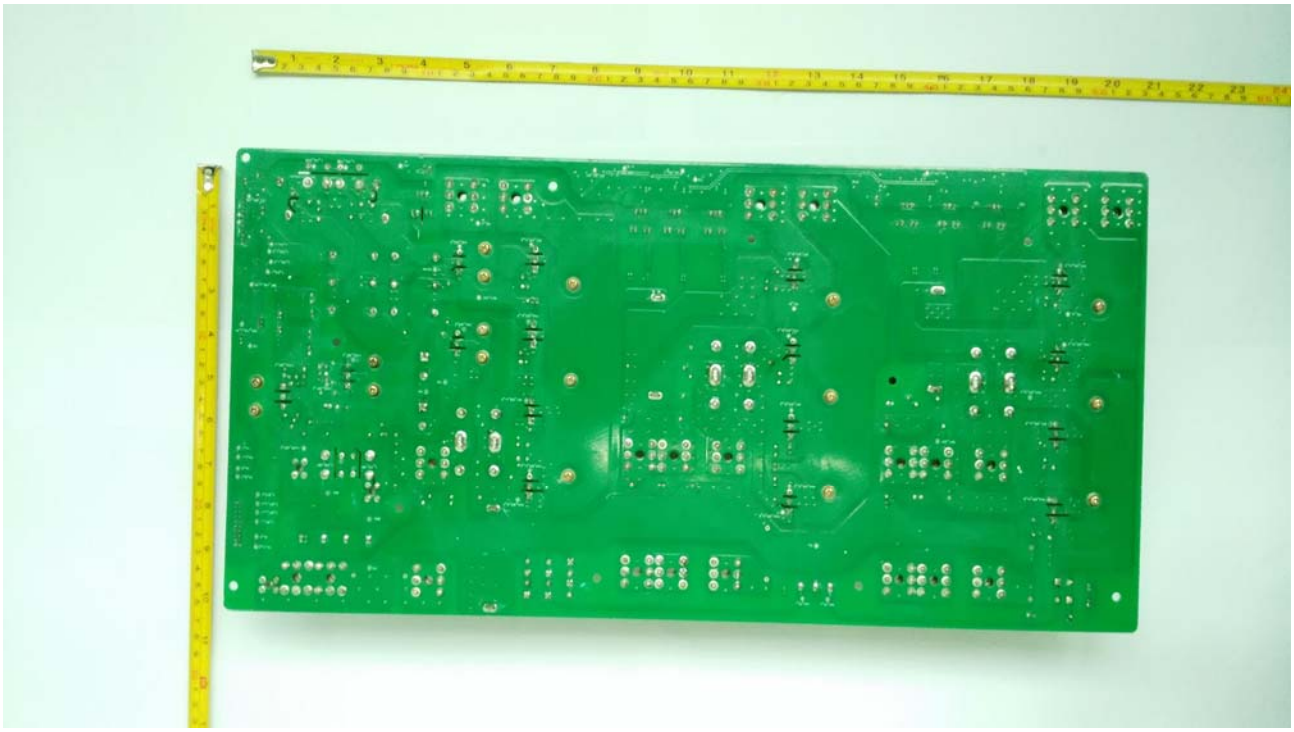

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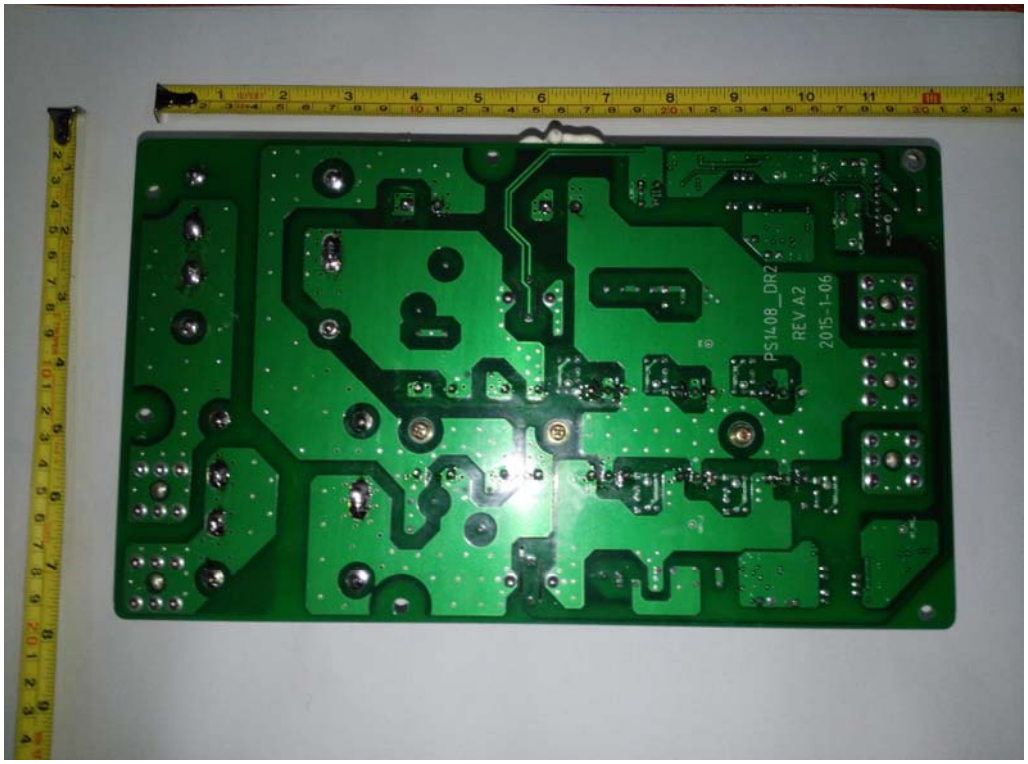


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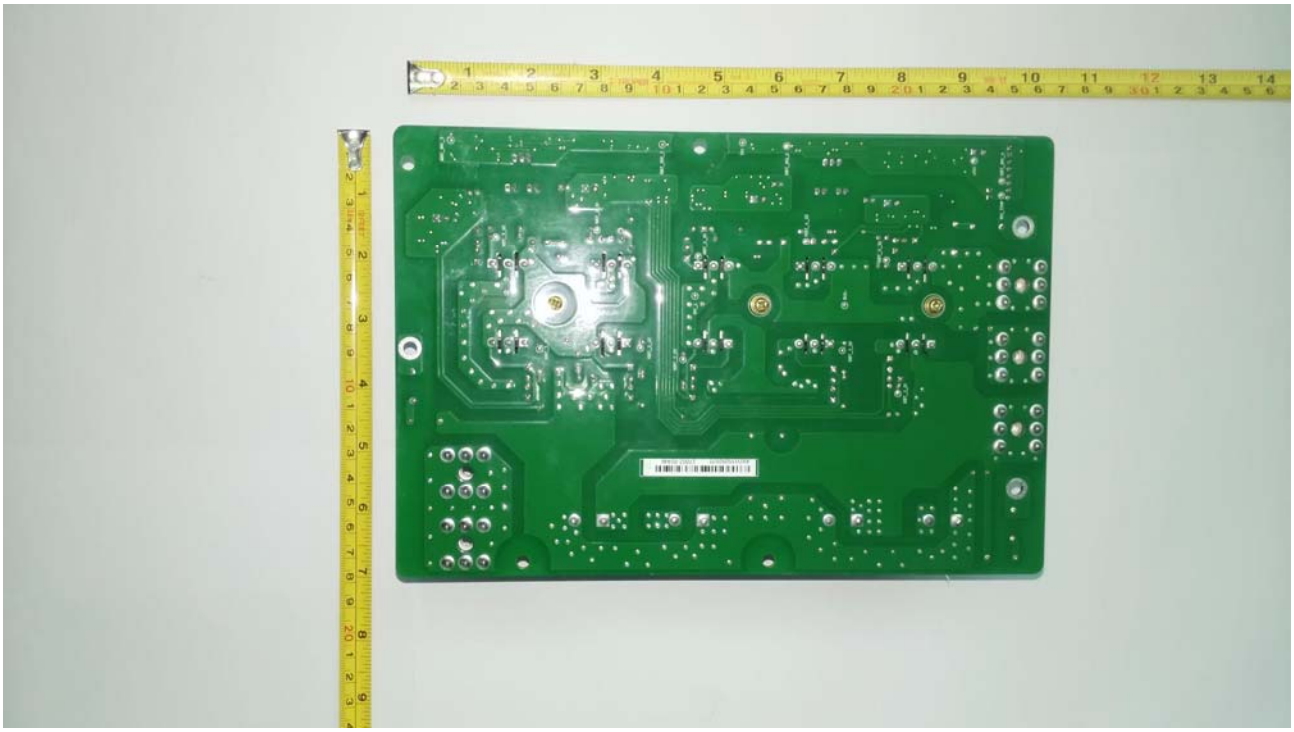

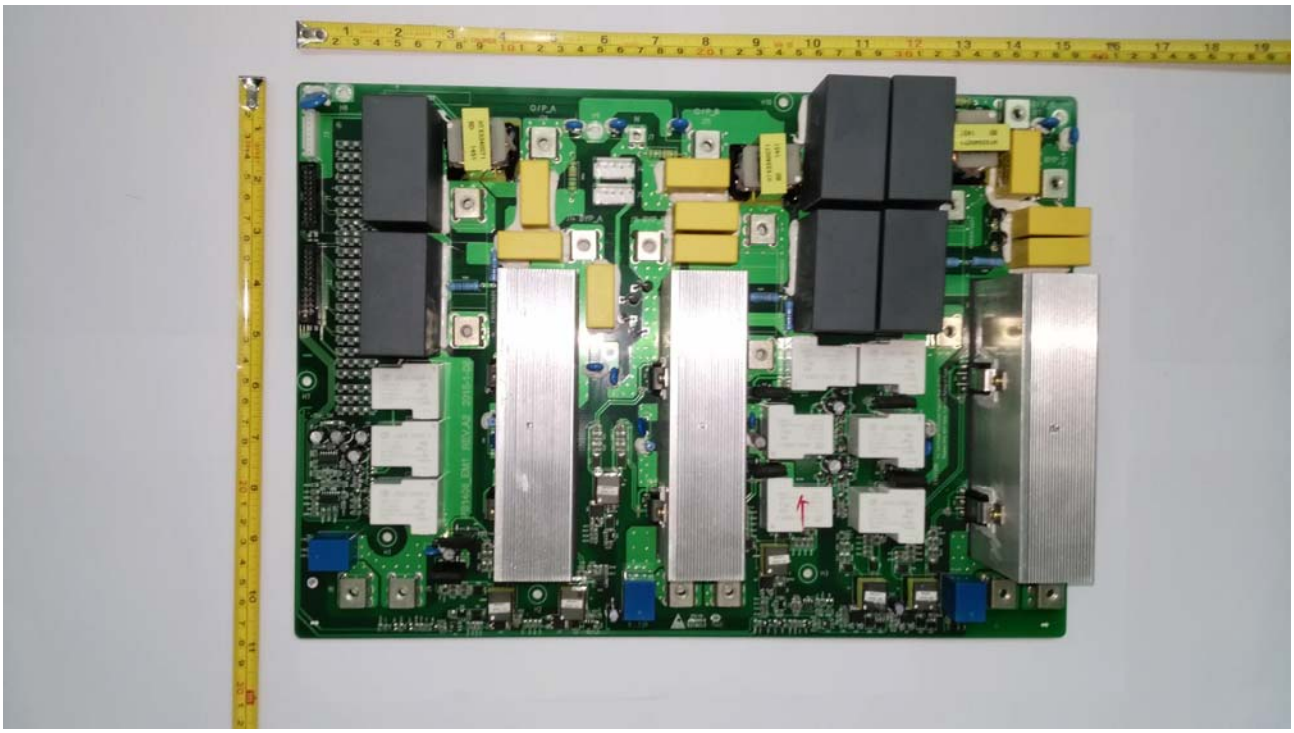

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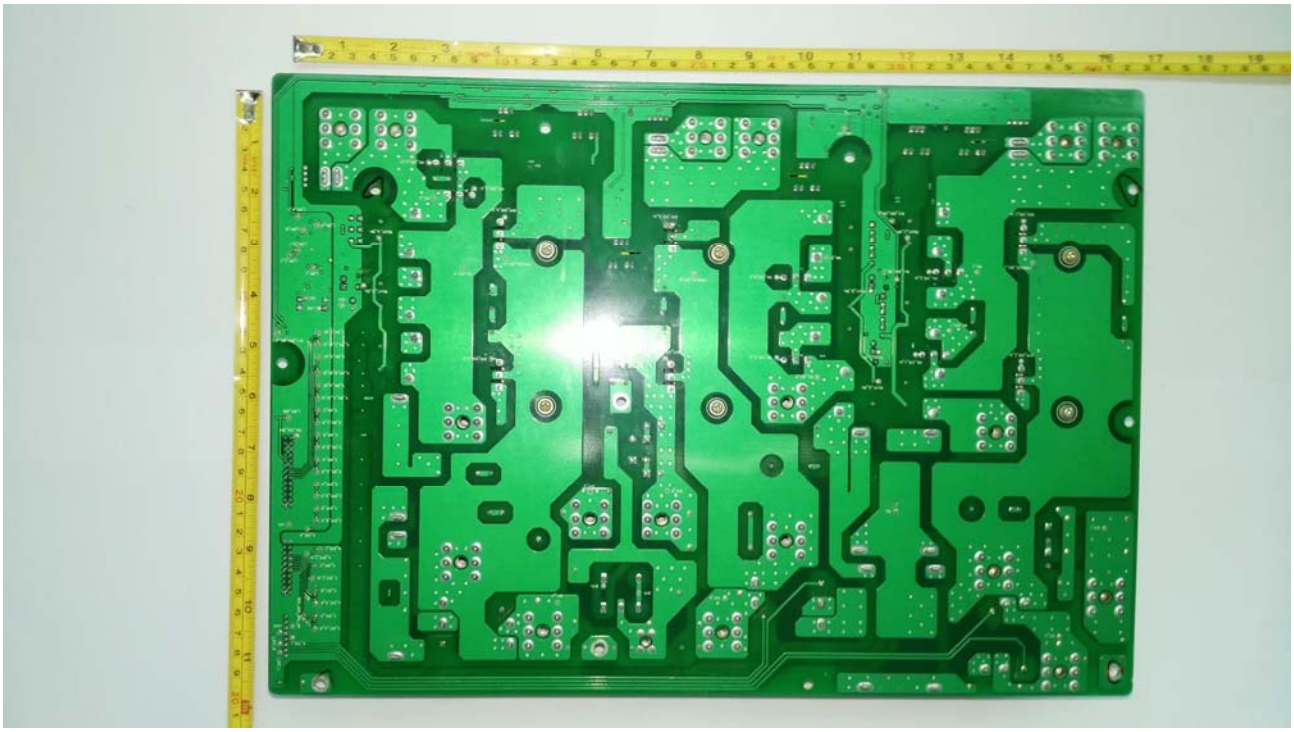

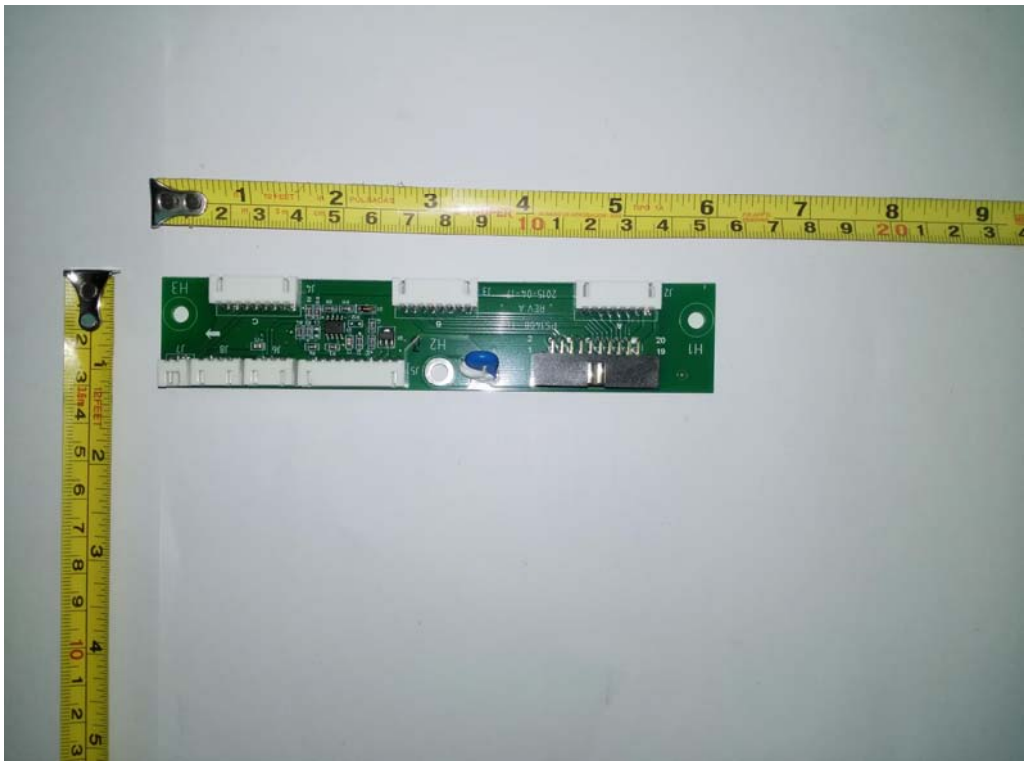

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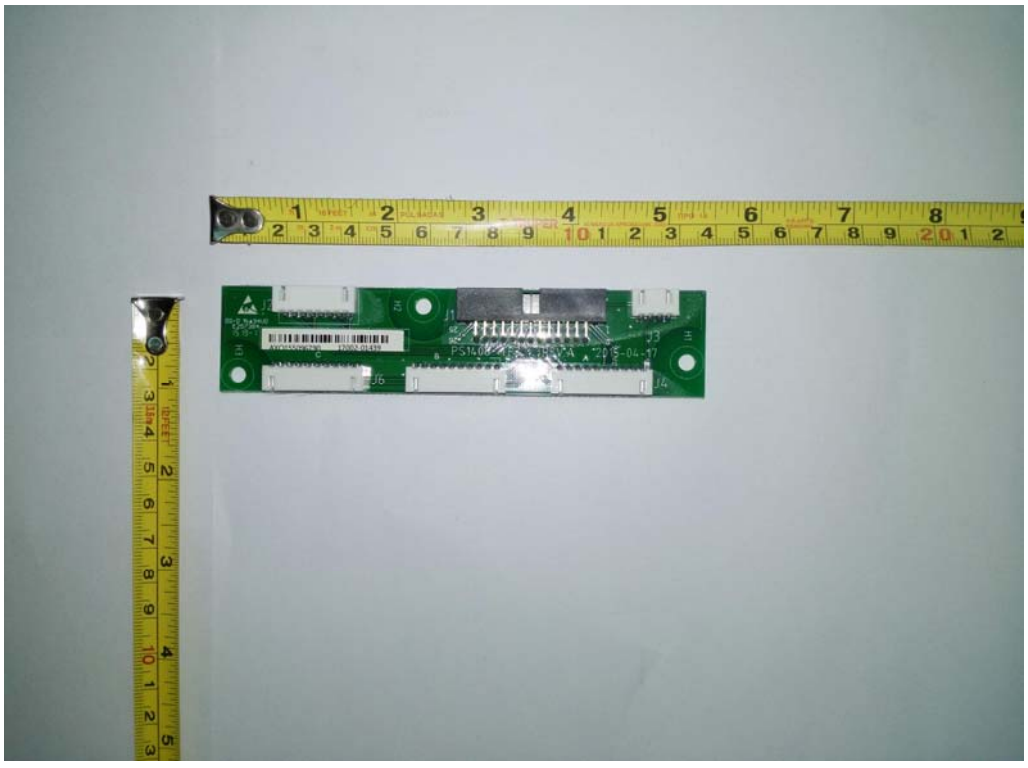

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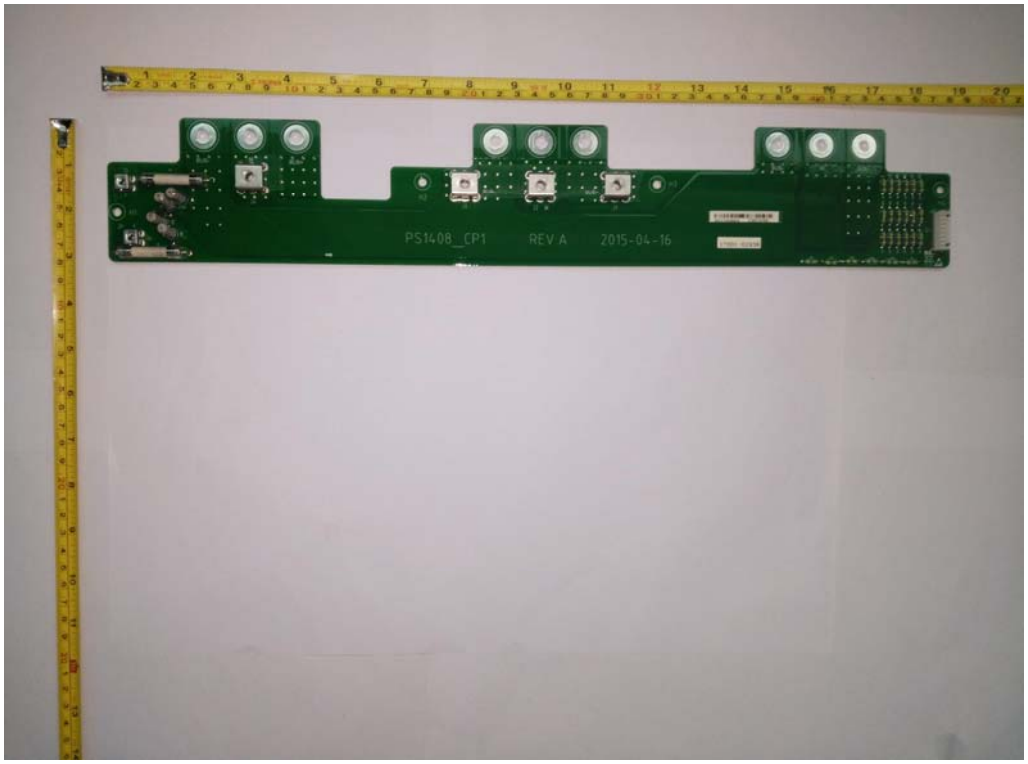

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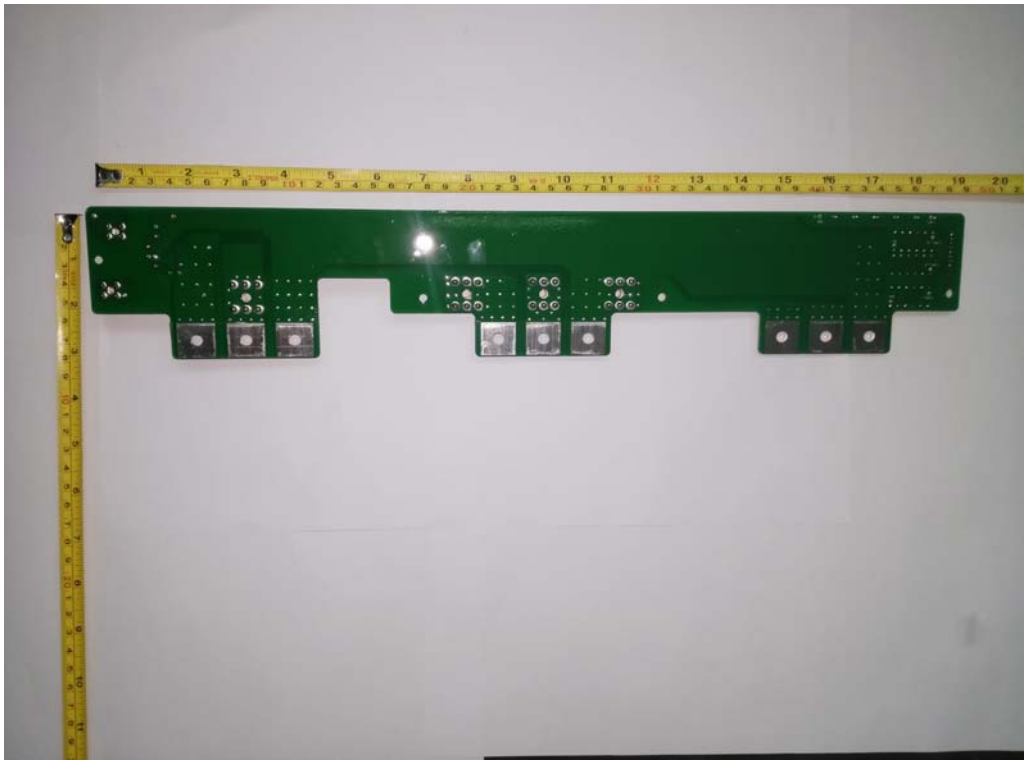

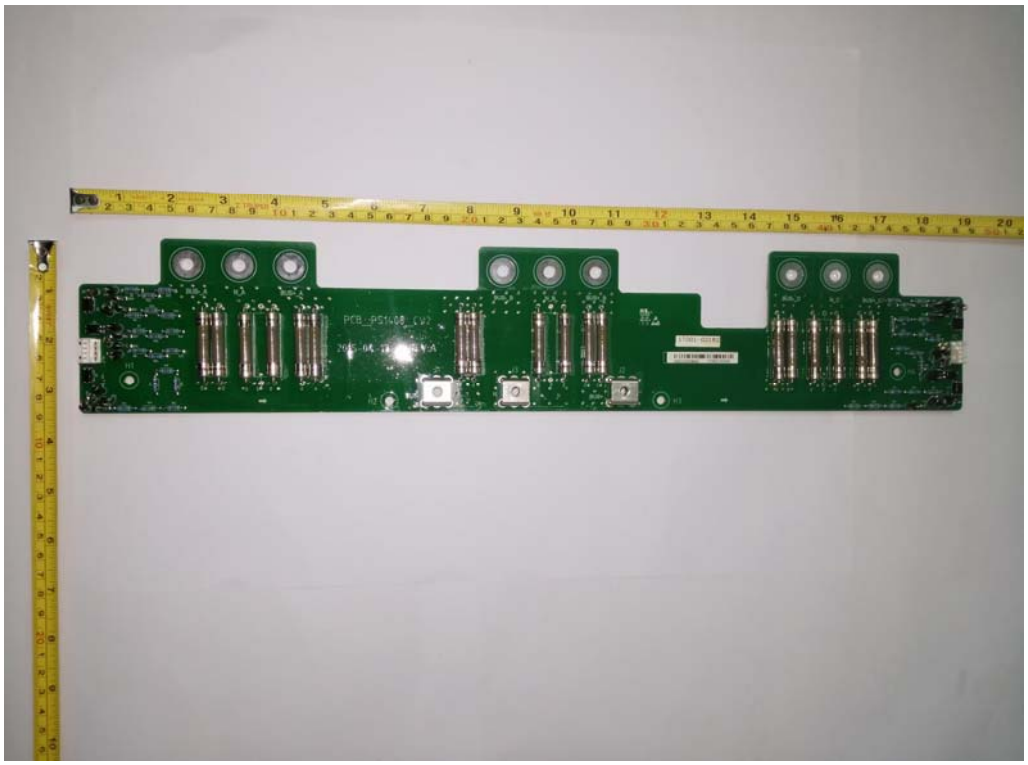

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