Standards EN62040-2: 2006

# TEST REPORT

## For

INVT POWER SYSTEM(SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model Number: RM080/20C, RM100/25C, RM120/20C, RM150/25C, RM160/20C, RM200/25C

| | | |
|---|---|---|
| Prepared for | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD |
| Address | : | 5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055 |
| Prepared by | : | EMTEK (SHENZHEN) CO., LTD. |
| Address | : | Bldg 69, Majialong Industry Zone, Nanshan District, Shenzen, Guangdong, China<br><br>Tel: (0755) 26954280<br>Fax: (0755) 26954282 |

| | | |
|---|---|---|
| Report Number | : | ES170731048E |
| Date of Test | : | August 03, 2017 to August 27, 2017 |
| Date of Report | : | August 28, 2017 |

# TABLE OF CONTENT

# TEST REPORT VERIFICATION

| | | |
|---|---|---|
| Applicant | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD |
| Manufacturer | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD |
| Trademark | : | INVT |
| EUT | : | Uninterruptible Power Systems |
| Model Number | : | RM080/20C, RM100/25C, RM120/20C, RM150/25C, RM160/20C, RM200/25C |
| Power Supply | : | Please see the page 8 |

**Measurement Procedure Used:**

EN62040-2: 2006,
(IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC 61000-4-4:2012, IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004, IEC 61000-2-2:2002)

The device described above is tested by EMTEK (SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (SHENZHEN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 62040-2 requirements.
In this report the model and configuration chosen for each test is representative for all models or configurations (defined in the user manual) by using The "Worst Case" approach of the Guide for the EMC Directive 2014/30/EU.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (SHENZHEN) CO., LTD.

Date of Test : August 03, 2017 to August 27, 2017

Prepared by : Bunny Zhang/Editor

Reviewer : Jessie Hu/Supervisor

Approved & Authorized Signer : Lisa Wang/Manager

# Modified Information

| Version | Report No. | Revision Date | Summary |
|---|---|---|---|
| Ver.1.0 | ES170731048E | / | Original Report |

# 1. SUMMARY OF TEST RESULTS

| EMISSION | | | |
|---|---|---|---|
| Description of test item | Standard | Limits | Results |
| Conducted disturbance at mains terminals | EN62040-2: 2006 | C3 | Pass |
| Radiated Disturbance | EN62040-2: 2006 | C3 | Pass |
| **Immunity** | | | |
| Description of test item | Basic Standard | Performance Criteria | Results |
| Electrostatic Discharge (ESD) | IEC 61000-4-2:2008 | B | Pass |
| Radio-frequency, Continuous radiated disturbance | IEC 61000-4-3:2006+A1:2007 +A2:2010 | A | Pass |
| EFT/B Immunity | IEC 61000-4-4:2012 | B | Pass |
| Surge Immunity | IEC 61000-4-5:2014 | B | Pass |
| Conducted RF Immunity | IEC 61000-4-6:2013 | A | Pass |
| Power frequency magnetic field | IEC 61000-4-8:2009 | A | Pass |
| Voltage dips and Voltage interruptions | IEC 61000-4-11:2004 | B | Pass |
| Low Frequency signals | IEC 61000-2-2:2002 | A | Pass |
| Power Line Unbalance (Three-Phase Ups Systems Only) | EN62040-2: 2006 | A | Pass |
| Note: / | | | |

# 2. GENERAL INFORMATION

## 2.1. Description of Device (EUT)

| | | |
|---|---|---|
| EUT | : | Uninterruptible Power Systems |
| Model Number | : | RM080/20C, RM100/25C, RM120/20C, RM150/25C, RM160/20C, RM200/25C<br>(Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only differences are the rating and model number. for trading purpose. We prepare RM200/25C for test.) |
| Test voltage | : | AC 380V/50Hz |
| Power Supply | : | RM80/20C :<br>Input: 380/400/415VAC, 50/60Hz, 156Amax<br>Output: 380/400/415VAC, 50/60Hz, 80KVA/80KW<br><br>RM100/25C :<br>Input: 380/400/415VAC, 50/60Hz, 192Amax<br>Output: 380/400/415VAC, 50/60Hz, 100KVA/100KW<br><br>RM120/20C :<br>Input: 380/400/415VAC, 50/60Hz, 234Amax<br>Output: 380/400/415VAC, 50/60Hz, 120KVA/120KW<br><br>RM150/25C :<br>Input: 380/400/415VAC, 50/60Hz, 288Amax<br>Output: 380/400/415VAC, 50/60Hz, 150KVA/150KW<br><br>RM160/20C :<br>Input: 380/400/415VAC, 50/60Hz, 312Amax<br>Output: 380/400/415VAC, 50/60Hz, 160KVA/160KW<br><br>RM200/25C :<br>Input: 380/400/415VAC, 50/60Hz, 384Amax<br>Output: 380/400/415VAC, 50/60Hz, 200KVA/200KW |
| Applicant | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD |
| Address | : | 5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055 |
| Manufacturer | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD |
| Address | : | 5# Building, Gaofa Industrial Park, Longjing, Nanshan District, Shenzhen, China, 518055 |
| Date of receiver | : | August 03, 2017 |
| Date of Test | : | August 03, 2017 to August 27, 2017 |

## 2.2. Description of Support Device

N/A

## 2.3. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006 (identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number. is 4480A.

Name of Firm : EMTEK(SHENZHEN) CO., LTD.

Site Location : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzen, Guangdong, China

## 2.4. Measurement Uncertainty

| Test Item | | Uncertainty |
|---|---|---|
| Conducted Emission Uncertainty | : | 3.16dB(9k~150kHz Conduction 2#)<br>2.90dB(150k-30MHz Conduction 2#) |
| Radiated Emission Uncertainty (10m Chamber) | : | 3.96dB (30M~1GHz Polarize: H)<br>4.04dB (30M~1GHz Polarize: V) |
| Uncertainty for C/S Test | : | 1.45(Using CDN Test) |
| Uncertainty for R/S Test | : | 2.10dB(80MHz-200MHz)<br>1.76dB(200MHz-1000MHz) |
| Uncertainty for test site temperature and humidity | : | 0.6℃<br>4% |

# 3. MEASURING DEVICE AND TEST EQUIPMENT

## 3.1. For Conducted Emission Measurement

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Test Receiver | Rohde & Schwarz | ESCS30 | 828985/018 | May 21, 2017 | 1 Year |
| ☑ | L.I.S.N. | ROHDE & SCHWARZ | ESH3-Z5 | 100191 | May 20, 2017 | 1 Year |
| ☑ | 50Ω Coaxial Switch | Anritsu | MP59B | M20531 | May 21, 2017 | 1 Year |
| ☑ | Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100006 | May 20, 2017 | 1 Year |

## 3.2. For Radiated Emission Measurement

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | EMI Test Receiver | Rohde & Schwarz | ESR3 | 1316.3003K03-101706-HN | May 21, 2017 | 1 Year |
| ☑ | EMI Test Receiver | Rohde & Schwarz | ESR3 | 1316.3003K03-101707-Z1 | May 21, 2017 | 1 Year |
| ☑ | Pre-Amplifier | Lunar EM | LNA10M1G-40 | J1011130912001 | May 20, 2017 | 1 Year |
| ☑ | Pre-Amplifier | Lunar EM | LNA10M1G-40 | J1011131126002 | May 20, 2017 | 1 Year |
| ☑ | Bilog Antenna | Schwarzbeck | VULB9163 | 659 | May 20, 2017 | 1 Year |
| ☑ | Bilog Antenna | Schwarzbeck | VULB9163 | 661 | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 1m | SS26-P1 | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 1m | SS26-P2 | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 1.5m | N/A | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 1.5m | N/A | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 12m | N/A | May 21, 2017 | 1 Year |
| ☑ | Cable | Times Microwave | LMR-240 N-N 11m | N/A | May 21, 2017 | 1 Year |

## 3.3. For Electrostatic Discharge Immunity Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | ESD Tester | TESEQ AG | NSG 438A | 130 | May 21, 2017 | 1 Year |
| ☑ | Impulse Module | TESEQ AG | IN NSG 438A A 4380-150pF/330Ohm | 403-550/1712 | May 21, 2017 | 1 Year |

## 3.4. For RF Strength Susceptibility Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Signal Generator | Agilent | N5181A | MY50145187 | May 20, 2017 | 1 Year |
| ☑ | RF Power Meter. Dual Channel | BOONTON | 4232A | 10539 | May 21, 2017 | 1 Year |
| ☑ | 50ohm Diode Power Sensor | BOONTON | 51011EMC | 34236/34238 | May 21, 2017 | 1 Year |
| ☑ | Field Strength Meter | DARE | RSS1006A | 10I00037SO 22 | May 21, 2017 | 1 Year |
| ☑ | 50ohm Diode Power Sensor | BOONTON | 51011EMC | 36164 | May 21, 2017 | 1 Year |
| ☑ | Power Amplifier | MILMEGA | 80RF1000-175 | 1059345 | May 20, 2017 | 1 Year |
| ☐ | Power Amplifier | MILMEGA | AS0102-55 | 1018770 | May 20, 2017 | 1 Year |
| ☑ | Power Amplifier | MILMEGA | AS1860-50 | 1059346 | May 20, 2017 | 1 Year |
| ☑ | Log.-Per. Antenna | SCHWARZBECK | VULP 9118E | 811 | May 21, 2017 | 1 Year |
| ☐ | Broad-Band Horn Antenna | SCHWARZBECK | STLP 9149 | 9149-227 | May 21, 2017 | 1 Year |
| ☑ | Multi-function interface system | DARE | CTR1009B | 12I00250SN O72 | N/A | N/A |
| ☑ | Automatic switch group | DARE | RSW1004A | N/A | N/A | N/A |

## 3.5. For Electrical Fast Transient/Burst Immunity Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Burst Tester | HAEFELY | PEFT4010 | 080981-16 | May 21, 2017 | 1Year |
| ☐ | Coupling Clamp | HAEFELY | IP-4A | 147147 | May 21, 2017 | 1Year |
| ☑ | Three phase CDN | Teseq | CDN 163 | 202 | May 21, 2017 | 1 Year |

## 3.6. For Surge Immunity Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Surge Controller | HAEFELY | Psurge 8000 | 174031 | May 21, 2017 | 1Year |
| ☑ | Impulse Module | HAEFELY | PIM 100 | 174124 | May 21, 2017 | 1Year |
| ☑ | Coupling Decoupling Filter | HAEFELY | PCD 130 | 172181 | May 21, 2017 | 1Year |
| ☐ | Coupling Module | HAEFELY | PCD122 | 174354 | May 21, 2017 | 1Year |
| ☐ | Surge Impulse Module | HAEFELY | PIM 120 | 174435 | May 21, 2017 | 1Year |
| ☐ | Coupling Module | HAEFELY | PCD 126A | 174387 | May 21, 2017 | 1Year |
| ☐ | Impulse Module | HAEFELY | PIM 110 | 174391 | May 21, 2017 | 1Year |
| ☐ | Impulse Module | HAEFELY | PIM 150 | 178707 | May 21, 2017 | 1Year |

## 3.7. For Injected Current Susceptibility Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Simulator | EMTEST | CWS500C | 0900-12 | May 21, 2017 | 1Year |
| ☐ | CDN | EMTEST | CDN-M2 | 5100100100 | May 21, 2017 | 1Year |
| ☑ | CDN | EMTEST | CDN-M3 | 0900-11 | May 21, 2017 | 1Year |
| ☐ | Injection Clamp | EMTEST | F-2031-23MM | 368 | May 21, 2017 | 1Year |
| ☑ | Attenuator | EMTEST | ATT6 | 0010222A | May 21, 2017 | 1Year |
| ☑ | Three phase CDN | Teseq | CDN M332S | 32655 | May 21, 2017 | 1 Year |

## 3.8. For Magnetic Field Immunity Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Magnetic Field Tester | HAEFELY | MAG100 | 250040.1 | May 20, 2017 | 1Year |

## 3.9. For Voltage Dips and Interruptions Test

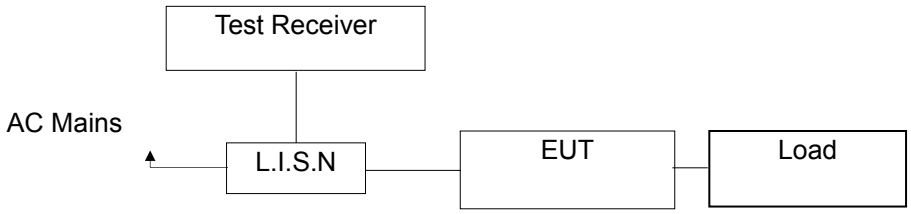
| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | 45KVA AC Power source | Teseq | NSG 1007-45/45KVA | 1305A02873 | May 20, 2017 | 1 Year |
| ☐ | Signal conditioning Unit | Teseq | CCN 1000-3 | 1305A02873 | May 20, 2017 | 1 Year |
| ☐ | Three phase impedance network | Teseq/Germany | INA2197/37A | 1305A02873 | May 20, 2017 | 1 Year |
| ☐ | Three phase impedance network | Teseq/Germany | INA 2196/75A | 1305A02874 | May 20, 2017 | 1 Year |
| ☑ | Profline 2100 AC Switching Unit | Teseq/Germany | NSG2200-3 | A22714 | May 20, 2017 | 1 Year |

## 3.10. Low Frequency Signals and Power Line Unbalance Test

| Used | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| ☑ | Programmable AC Source | CHROMA | 6530 | / | May 21, 2017 | 1Year |

# 4. CONDUCTED EMISSION MEASUREMENT

## 4.1. Block Diagram of Test Setup




(EUT: Uninterruptible Power Systems)

## 4.2. Measuring Standard

EN62040-2: 2006, Category C3

## 4.3. Power Line Conducted Emission Limits (C3)

| UPS rated output current<br>A | Frequency range<br>MHz | Limits<br>dB (μV) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| >16 – 100 | 0,15 to 0,50[b] | 100 | 90 |
| | 0,50 to 5,0[b] | 86 | 76 |
| | 5,0 to 30,0 | 90 to 70[a] | 80 to 60[a] |
| >100 | 0,15 to 0,50[b] | 130 | 120 |
| | 0,50 to 5,0[b] | 125 | 115 |
| | 5,0 to 30,0 | 115 | 105 |
| [a] The limits decrease linearly with the logarithm of the frequency.<br>[b] The lower limit shall apply at the transition frequency. | | | |

## 4.4. EUT Configuration of Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 62040-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

Uninterruptible Power Systems (EUT)
Model Number : RM200/25C
Serial Number : N/A

## 4.5. Operating Condition of EUT

4.5.1.Setup the EUT as shown on Section 4.1.

4.5.2.Turn on the power of all equipment.

4.5.3.Let the EUT work in measuring mode (Line mode, Bat mode) and measure it.

## 4.6. Test Procedure

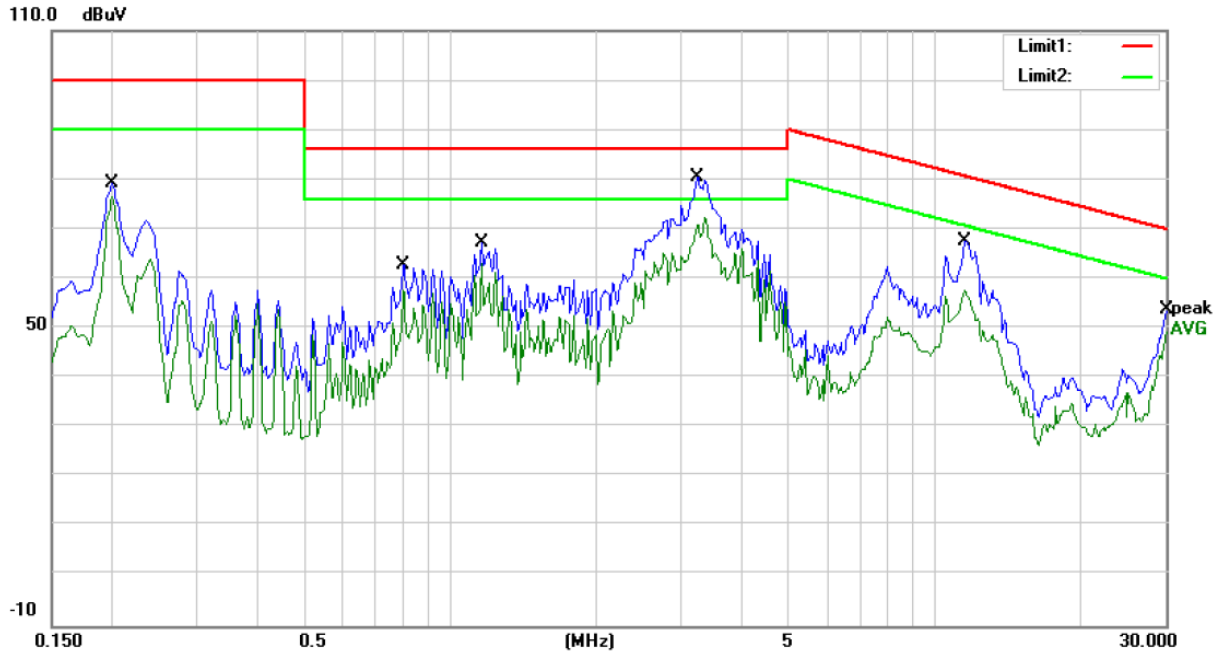
The EUT is put on the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN62040-2 regulations during conducted emission measurement.
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9kHz in 150kHz~30MHz and 200Hz in 9kHz~150kHz.

The frequency range from 150kHz to 30MHz is investigated.
All the modes were tested and the data of the worsted mode(Bat mode)are attached in the following pages.

## 4.7. Measuring Results

**PASS.**

Please refer to the following pages.




Site :10m Chamber #1 Phase: *L1* Temperature: 26

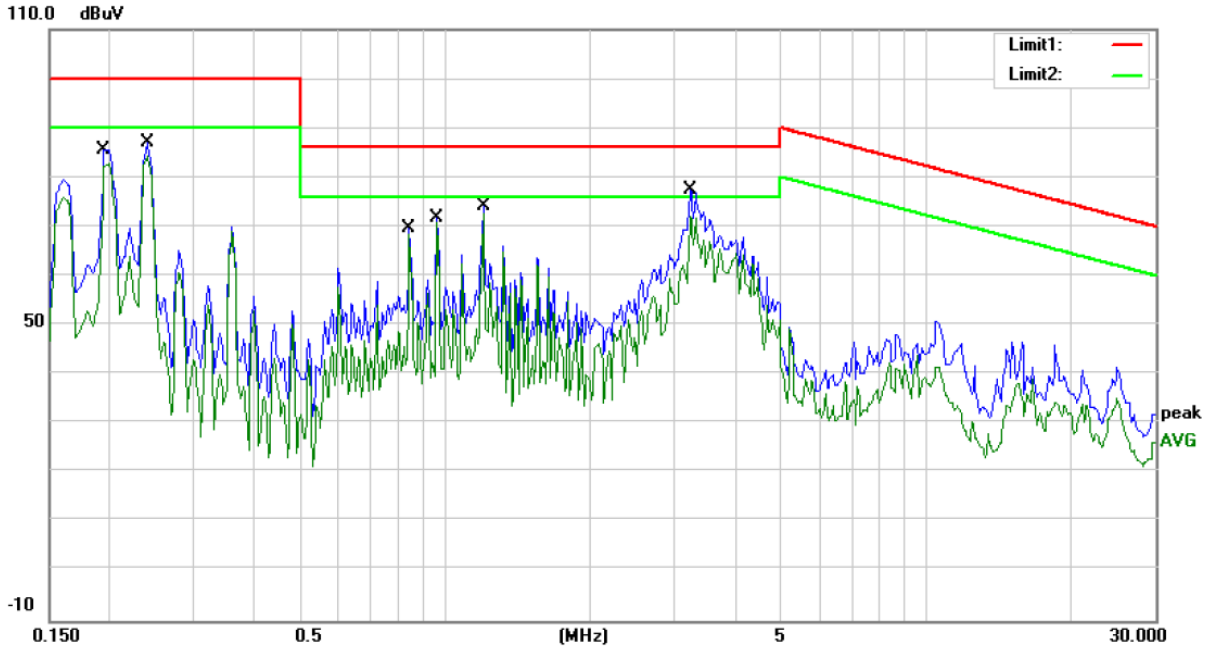
Limit: (CE)EN62040-2 C3_QP Power: AC 380V/50Hz Humidity: 60 %

Mode: BAT MODE

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.2000 | 79.23 | 0.00 | 79.23 | 100.00 | -20.77 | QP | |
| 2 | | 0.2000 | 76.55 | 0.00 | 76.55 | 90.00 | -13.45 | AVG | |
| 3 | | 0.8000 | 62.78 | 0.00 | 62.78 | 86.00 | -23.22 | QP | |
| 4 | | 0.8000 | 57.69 | 0.00 | 57.69 | 76.00 | -18.31 | AVG | |
| 5 | | 1.1600 | 67.37 | 0.00 | 67.37 | 86.00 | -18.63 | QP | |
| 6 | | 1.1600 | 63.17 | 0.00 | 63.17 | 76.00 | -12.83 | AVG | |
| 7 | | 3.2400 | 80.48 | 0.00 | 80.48 | 86.00 | -5.52 | QP | |
| 8 | * | 3.2400 | 72.44 | 0.00 | 72.44 | 76.00 | -3.56 | AVG | |
| 9 | | 11.5000 | 67.56 | 0.00 | 67.56 | 80.70 | -13.14 | QP | |
| 10 | | 11.5000 | 57.58 | 0.00 | 57.58 | 70.70 | -13.12 | AVG | |
| 11 | | 30.0000 | 53.62 | 0.00 | 53.62 | 70.00 | -16.38 | QP | |
| 12 | | 30.0000 | 49.59 | 0.00 | 49.59 | 60.00 | -10.41 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL




Site :10m Chamber #1 Phase: *L2* Temperature: 26

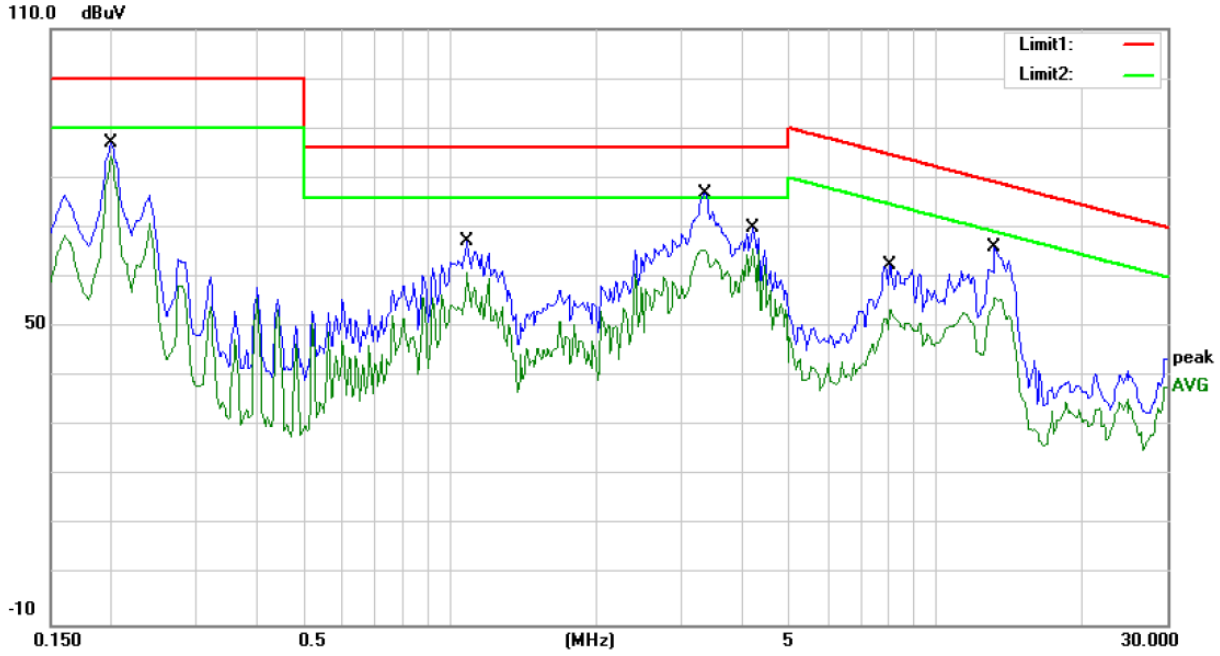
Limit: (CE)EN62040-2 C3_QP Power: AC 380V/50Hz Humidity: 60 %

Mode: BAT MODE

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1950 | 85.53 | 0.00 | 85.53 | 100.00 | -14.47 | QP | |
| 2 | | 0.1950 | 82.80 | 0.00 | 82.80 | 90.00 | -7.20 | AVG | |
| 3 | | 0.2400 | 86.97 | 0.00 | 86.97 | 100.00 | -13.03 | QP | |
| 4 | | 0.2400 | 84.34 | 0.00 | 84.34 | 90.00 | -5.66 | AVG | |
| 5 | | 0.8400 | 69.65 | 0.00 | 69.65 | 86.00 | -16.35 | QP | |
| 6 | | 0.8400 | 68.32 | 0.00 | 68.32 | 76.00 | -7.68 | AVG | |
| 7 | | 0.9600 | 71.80 | 0.00 | 71.80 | 86.00 | -14.20 | QP | |
| 8 | | 0.9600 | 70.88 | 0.00 | 70.88 | 76.00 | -5.12 | AVG | |
| 9 | | 1.2000 | 74.06 | 0.00 | 74.06 | 86.00 | -11.94 | QP | |
| 10 | * | 1.2000 | 72.50 | 0.00 | 72.50 | 76.00 | -3.50 | AVG | |
| 11 | | 3.2400 | 77.42 | 0.00 | 77.42 | 86.00 | -8.58 | QP | |
| 12 | | 3.2400 | 71.95 | 0.00 | 71.95 | 76.00 | -4.05 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL




Site :10m Chamber #1 Phase: *L3* Temperature: 26

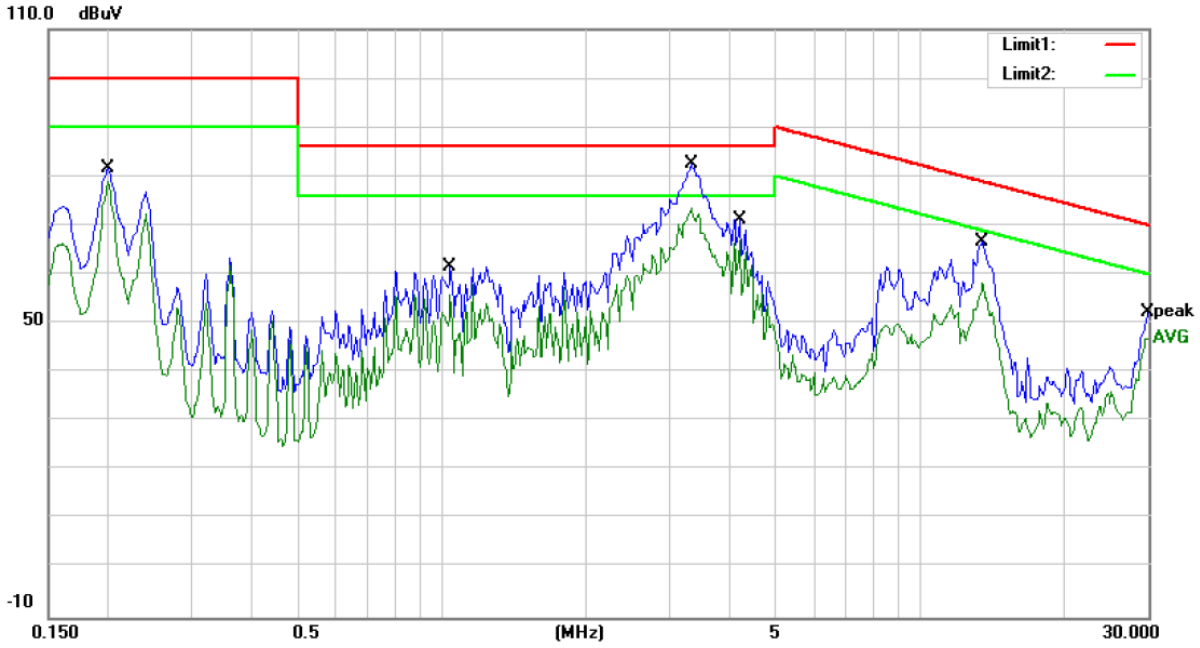
Limit: (CE)EN62040-2 C3_QP Power: AC 380V/50Hz Humidity: 60 %

Mode: BAT MODE

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.2000 | 87.18 | 0.00 | 87.18 | 100.00 | -12.82 | QP | |
| 2 | * | 0.2000 | 84.43 | 0.00 | 84.43 | 90.00 | -5.57 | AVG | |
| 3 | | 1.0800 | 67.37 | 0.00 | 67.37 | 86.00 | -18.63 | QP | |
| 4 | | 1.0800 | 60.91 | 0.00 | 60.91 | 76.00 | -15.09 | AVG | |
| 5 | | 3.3600 | 76.95 | 0.00 | 76.95 | 86.00 | -9.05 | QP | |
| 6 | | 3.3600 | 65.47 | 0.00 | 65.47 | 76.00 | -10.53 | AVG | |
| 7 | | 4.2000 | 70.10 | 0.00 | 70.10 | 86.00 | -15.90 | QP | |
| 8 | | 4.2000 | 65.74 | 0.00 | 65.74 | 76.00 | -10.26 | AVG | |
| 9 | | 8.0500 | 62.40 | 0.00 | 62.40 | 84.68 | -22.28 | QP | |
| 10 | | 8.0500 | 53.52 | 0.00 | 53.52 | 74.68 | -21.16 | AVG | |
| 11 | | 13.2250 | 65.93 | 0.00 | 65.93 | 79.14 | -13.21 | QP | |
| 12 | | 13.2250 | 55.94 | 0.00 | 55.94 | 69.14 | -13.20 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL




Site :10m Chamber #1 Phase: N Temperature: 26

Limit: (CE)EN62040-2 C3_QP Power: AC 380V/50Hz Humidity: 60 %

Mode: BAT MODE

Note:

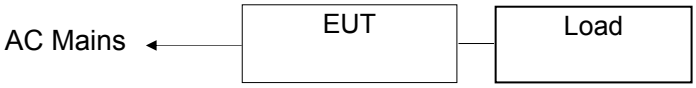
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.2000 | 81.67 | 0.00 | 81.67 | 100.00 | -18.33 | QP | |
| 2 | | 0.2000 | 78.95 | 0.00 | 78.95 | 90.00 | -11.05 | AVG | |
| 3 | | 1.0400 | 61.63 | 0.00 | 61.63 | 86.00 | -24.37 | QP | |
| 4 | | 1.0400 | 55.83 | 0.00 | 55.83 | 76.00 | -20.17 | AVG | |
| 5 | | 3.3200 | 82.42 | 0.00 | 82.42 | 86.00 | -3.58 | QP | |
| 6 | * | 3.3200 | 73.64 | 0.00 | 73.64 | 76.00 | -2.36 | AVG | |
| 7 | | 4.2000 | 71.24 | 0.00 | 71.24 | 86.00 | -14.76 | QP | |
| 8 | | 4.2000 | 66.84 | 0.00 | 66.84 | 76.00 | -9.16 | AVG | |
| 9 | | 13.5500 | 66.59 | 0.00 | 66.59 | 78.87 | -12.28 | QP | |
| 10 | | 13.5500 | 58.11 | 0.00 | 58.11 | 68.87 | -10.76 | AVG | |
| 11 | | 29.9500 | 52.11 | 0.00 | 52.11 | 70.02 | -17.91 | QP | |
| 12 | | 29.9500 | 46.91 | 0.00 | 46.91 | 60.02 | -13.11 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL

# 5. RADIATED EMISSION MEASUREMENT

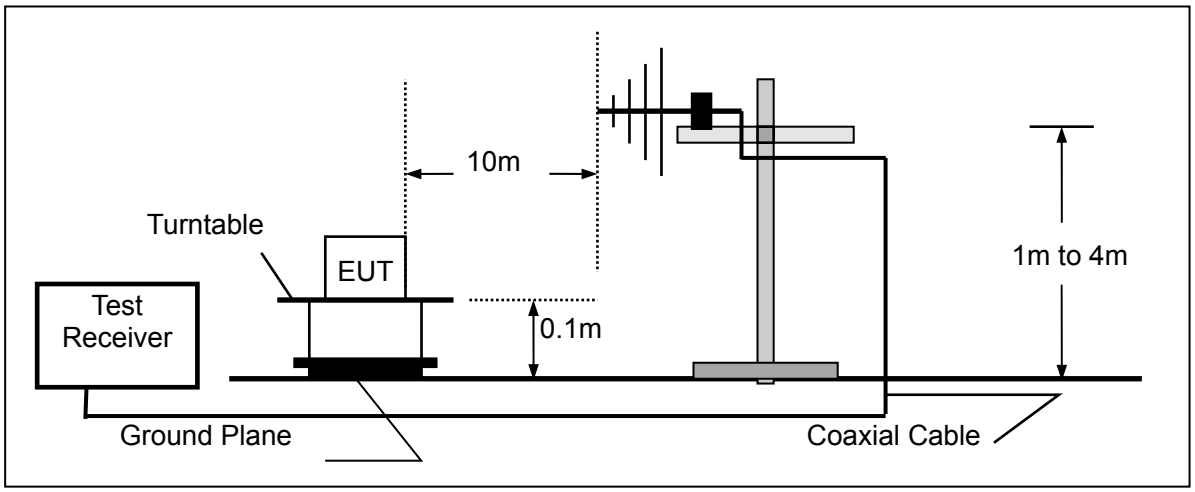
## 5.1. Block Diagram of Test

### 5.1.1. Block diagram of connection between the EUT and simulators




(EUT: Uninterruptible Power Systems)

### 5.1.2. Block diagram of test setup (In chamber)




(EUT: Uninterruptible Power Systems)

## 5.2. Measuring Standard

EN62040-2: 2006 Category C3

## 5.3. Radiated Emission Limits(C3)

All emanations from a C3 device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

| FREQUENCY (MHz) | DISTANCE (Meters) | FIELD STRENGTHS LIMIT (dBμV/m) |
|---|---|---|
| 30 ~ 230 | 10 | 50 |
| 230 ~ 1000 | 10 | 60 |

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

## 5.4. EUT Configuration on Test

The EN 62040-2 regulations test method must be used to find the maximum emission during radiated emission measurement.

## 5.5. Operating Condition of EUT

5.5.1. Turn on the power.

5.5.2. After that, let the EUT work in test mode (Line mode, Bat mode) and measure it.

## 5.6. Test Procedure

The EUT is placed on a turn table which is 0.1 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 10 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

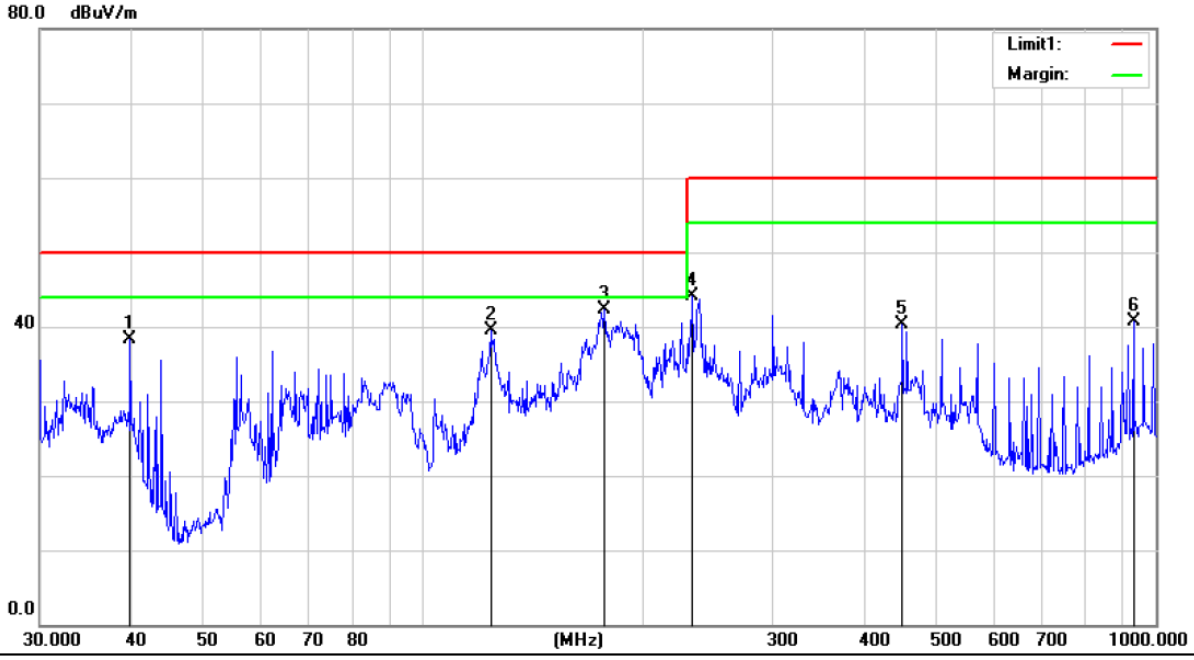
The bandwidth of the Receiver is set at 120kHz.

All the modes were tested and the data of the worsted mode(Line mode)are attached in the following pages.

## 5.7. Measuring Results

**PASS.**

The frequency range from 30MHz to 1000MHz is investigated.




Site :10m Chamber #1 Polarization: *Horizontal* Temperature: 26

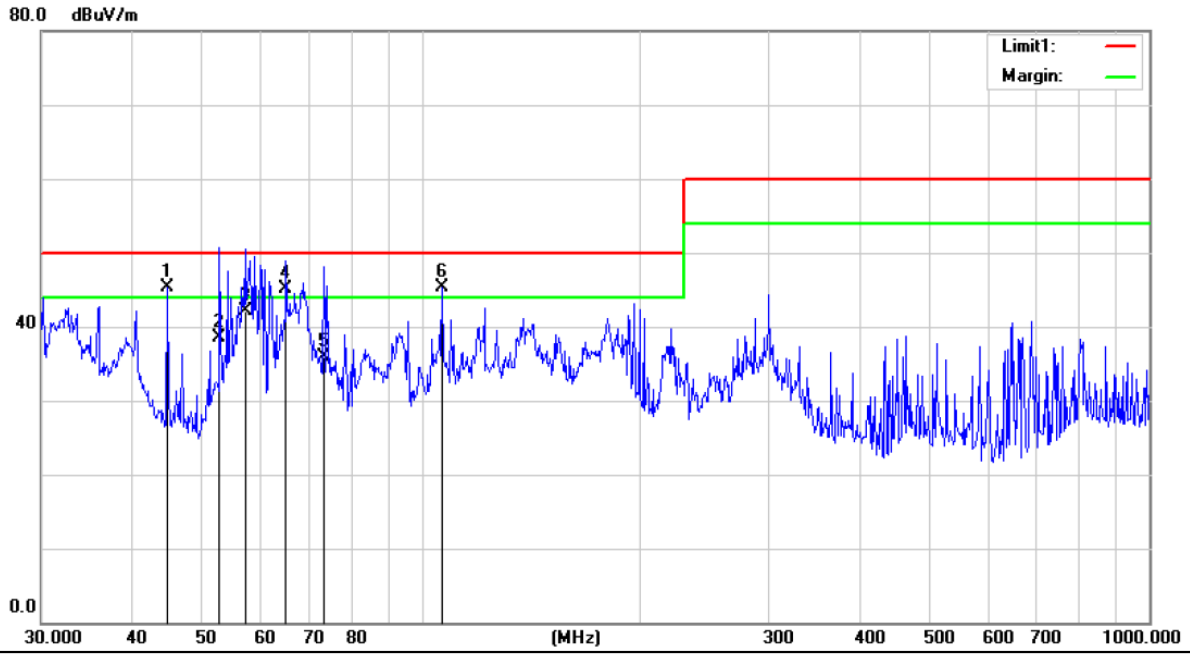
Limit: (RE 10M)EN62040-2 C3 Power: AC 380V/50Hz Humidity: 60 %

Mode:line mode

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 39.8542 | 67.99 | -29.69 | 38.30 | 50.00 | -11.70 | QP | | | |
| 2 | | 123.6985 | 72.49 | -33.08 | 39.41 | 50.00 | -10.59 | QP | | | |
| 3 | * | 176.8878 | 74.82 | -32.50 | 42.32 | 50.00 | -7.68 | QP | | | |
| 4 | | 233.3487 | 73.10 | -29.01 | 44.09 | 60.00 | -15.91 | QP | | | |
| 5 | | 451.1350 | 62.48 | -22.24 | 40.24 | 60.00 | -19.76 | QP | | | |
| 6 | | 932.2715 | 53.58 | -12.93 | 40.65 | 60.00 | -19.35 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: CSL




Site :10m Chamber #1 Polarization: *Vertical* Temperature: 26

Limit: (RE 10M)EN62040-2 C3 Power: AC 380V/50Hz Humidity: 60 %

Mode:line mode

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | * | 44.7433 | 75.75 | -30.36 | 45.39 | 50.00 | -4.61 | QP | | | |
| 2 | | 52.7600 | 67.11 | -28.51 | 38.60 | 50.00 | -11.40 | QP | | | |
| 3 | | 57.1914 | 71.06 | -28.86 | 42.20 | 50.00 | -7.80 | QP | | | |
| 4 | ! | 65.1145 | 75.61 | -30.41 | 45.20 | 50.00 | -4.80 | QP | | | |
| 5 | | 73.3593 | 68.37 | -32.37 | 36.00 | 50.00 | -14.00 | QP | | | |
| 6 | ! | 106.7587 | 75.33 | -30.03 | 45.30 | 50.00 | -4.70 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: CSL

# 6. IMMUNITY PERFORMANCE CRITERIA DESCRIPTION

Performance Level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:
1. Based on the used product standard
2. Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor and purchaser.
The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Criterion B:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention.

After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Criterion C:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention.
Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer’s instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Criterion D

Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data.

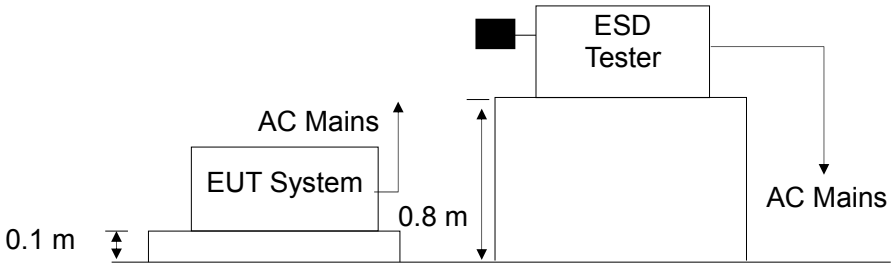
# 7. ELECTROSTATIC DISCHARGE IMMUNITY TEST

## 7.1. Block Diagram of Test Setup

### 7.1.1. Block diagram of connection between the EUT and simulators


(EUT: Uninterruptible Power Systems)

### 7.1.2. Block diagram of ESD test setup




(EUT: Uninterruptible Power Systems)

## 7.2. Test Standard

IEC 61000-4-2:2008 (Air Discharge: ±8kV, Contact Discharge: ±4kV)

## 7.3. Severity Levels and Performance Criterion

### 7.3.1. Severity level

| Level | Test Voltage Contact Discharge (kV) | Test Voltage Air Discharge (kV) |
|---|---|---|
| 1. | ±2 | ±2 |
| 2. | ±4 | ±4 |
| 3. | ±6 | ±8 |
| 4. | ±8 | ±15 |
| X | Special | Special |

7.3.2.Performance criterion : B

| | Criterion B |
|---|---|
| Output characteristics | Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3) |
| External and internal indications and metering | Change only during test |
| Control signals to external devices | Change only temporarily in consistency with the actual Uninterruptible Power Systems mode of operation |
| Mode of operation | Change only temporarily |

## 7.4. EUT Configuration

The configuration of EUT are listed in Section 4.3.

## 7.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. except the test set up replaced by Section 7.1.

## 7.6. Test Procedure

7.6.1.Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT.
After each discharge, the discharge electrode shall be removed from the EUT.
The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

7.6.2.Contact Discharge:

All procedure shall be the same as Section 7.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.6.3.Indirect discharge for horizontal coupling plane

At least 10 single discharges(in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit(if applicable) of the
EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

7.6.4.Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

## 7.7. Test Results

PASS

Please refer to the following page.

# Electrostatic Discharge Test Result

EMTEK(SHENZHEN) CO., LTD.

| | | | | | |
|---|---|---|---|---|---|
| Applicant | : INVT POWER SYSTEM(SHENZHEN) CO., LTD | | Test Date | : | August 25, 2017 |
| EUT | : Uninterruptible Power Systems | | Temperature | : | 22℃ |
| M/N | : RM200/25C | | Humidity | : | 50% |
| Power Supply | : AC 380V/50Hz | | Actual Criterion | : | B |
| Test Mode | : Line mode, Bat mode | | Air discharge | : | ±8kV |
| Test Engineer | : ZZY | | Contact discharge | : | ±4kV |

| **Location** | **Kind** A-Air Discharge C-Contact Discharge | **Result** |
|---|---|---|
| Slot | A | A |
| Metal | C | A |
| HCP | C | A |
| VCP of front | C | A |
| VCP of rear | C | A |
| VCP of left | C | A |
| VCP of right | C | A |
| | | |
| | | |

Test Equipment: ESD Simulator (TESEQAG, NSG 437)

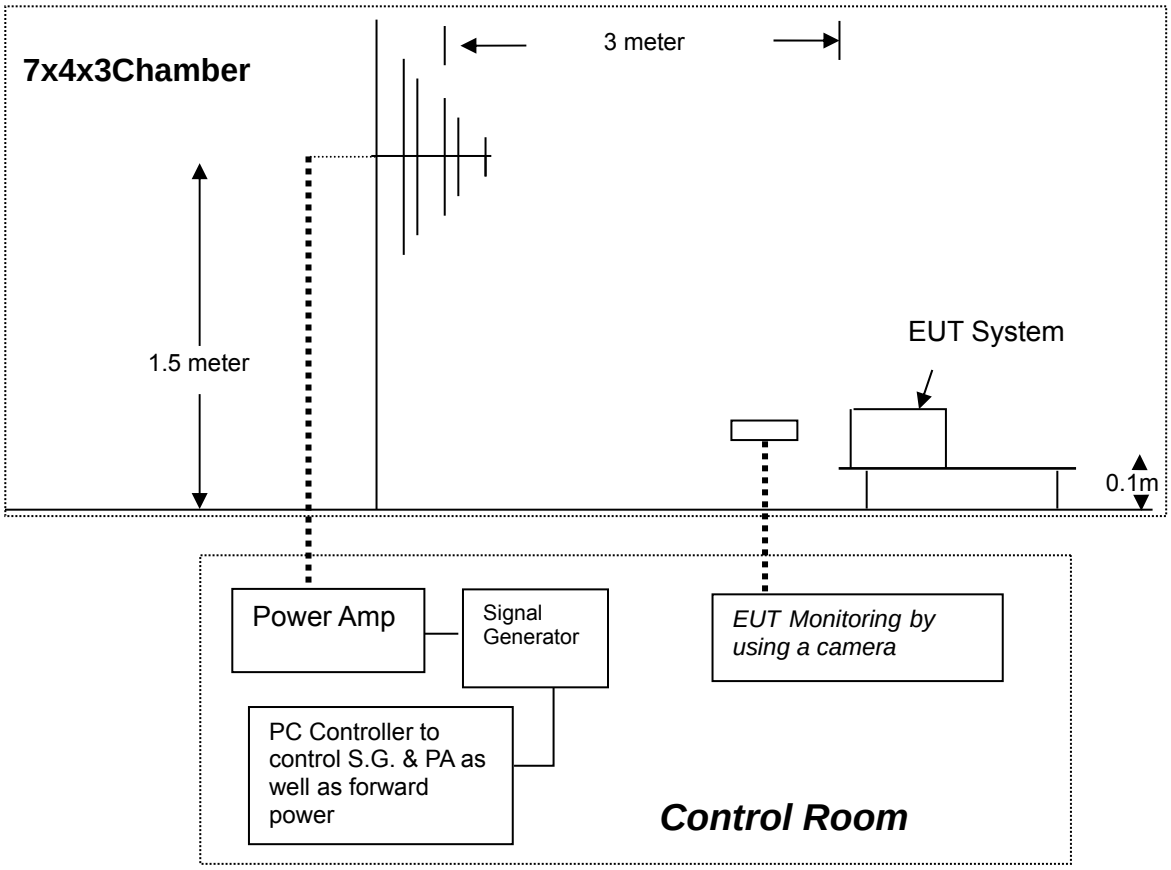
# 8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

## 8.1. Block Diagram of Test

### 8.1.1. Block diagram of connection between the EUT and Load


(EUT: Uninterruptible Power Systems)

### 8.1.2. Block diagram of RS test setup




(EUT: Uninterruptible Power Systems)

## 8.2. Test Standard

IEC 61000-4-3:2006+A1:2007+A2:2010 (level 3: 10V / m)

## 8.3. Severity Levels and Performance Criterion

### 8.3.1. Severity Levels

| Level | Field Strength V/m |
|---|---|
| 1. | 1 |
| 2. | 3 |
| 3. | 10 |
| X | Special |

### 8.3.2. Performance Criterion : A

| | **Criterion A** |
|---|---|
| External and internal indications and metering (LCD) | No change |
| Output characteristics (Load) | No change |
| Control signals to external devices (Signal line) | No change |
| Mode of operation | No change |

## 8.4. EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

## 8.5. Operating Condition of EUT

Same as radiated emission measurement which is listed in Section 4.4, except the test setup replaced as Section 8.1.

## 8.6. Test Procedure

The EUT is placed on a table which is 0.1m high above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor its screen.
All the scanning conditions are as following:

| Condition of Test | Remark |
|---|---|
| 1. Fielded Strength | 10V/m(level 3) |
| 2. Radiated Signal | Modulated |
| 3. Scanning Frequency | 80-1000MHz |
| 4. Sweep time of radiated | 0.0015 Decade/s |
| 5. Dwell Time | 1 Sec. |

## 8.7. Test Results

**PASS.**

Please refer to the following page.

# RF Field Strength Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

| | | | |
|---|---|---|---|
| Applicant | : INVT POWER SYSTEM(SHENZHEN) CO., LTD | Test Date | : August 25, 2017 |
| EUT | : Uninterruptible Power Systems | Temperature | : 22℃ |
| M/N | : RM200/25C | Humidity | : 50% |
| Field Strength | : 10V/m | Actual Criterion | : A |
| Power Supply | : AC 380V/50Hz | Test Mode | : Line mode, Bat mode |
| Test Engineer | : ZZY | Frequency Range | : 80 to 1000 MHz |

Modulation: ☐None ☐ Pulse ☑AM 1KHz 80%

| | Frequency Rang 1: 80~ 1000MHz | | Frequency Rang 2: N/A | |
|---|---|---|---|---|
| Steps | # / % | | # / % | |
| | Horizontal | Vertical | Horizontal | Vertical |
| Front | A | A | | |
| Right | A | A | | |
| Rear | A | A | | |
| Left | A | A | | |

Test Equipment :
1. Signal Generator : N5181A (Agilent)
2. Power Amplifier : 80RF1000-175 (MILMEGA) & AS1860-50 (MILMEGA)
3. Log.-Per.Antenna: VULP9118E (SCHWARZBECK)
4 RF Power Meter. Dual Channel: 4232A (BOONTON)
5 Field Strength Meter: RSS1006A (DARE)

Note: /

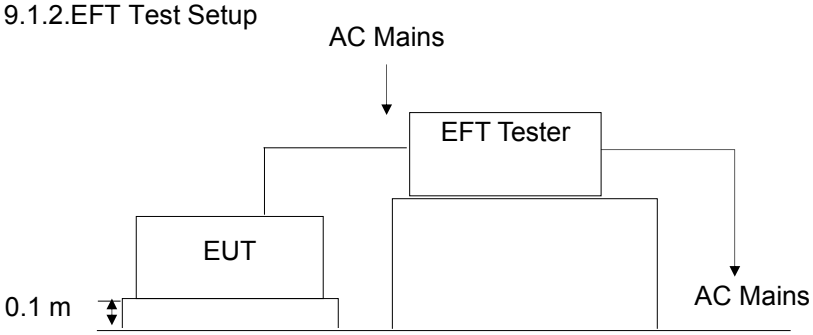
# 9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

## 9.1. Block Diagram of Test Setup

### 9.1.1.Block Diagram of the EUT


(EUT: Uninterruptible Power Systems)

### 9.1.2.EFT Test Setup




(EUT: Uninterruptible Power Systems)

## 9.2. Test Standard

IEC 61000-4-4:2012 (Level 3: 2KV/5kHz for AC Mains)

## 9.3. Severity Levels and Performance Criterion

### 9.3.1.Severity level

| Open Circuit Output Test Voltage ±10% | | |
|---|---|---|
| Level | On Power Supply Lines | On I/O (Input/Output) Signal data and control lines |
| 1. | 0.5 kV | 0.25 kV |
| 2. | 1 kV | 0.5 kV |
| 3. | 2 kV | 1 kV |
| 4. | 4 kV | 2 kV |
| X | Special | Special |

### 9.3.2.Performance criterion : B

| | Criterion B |
|---|---|
| Output characteristics | Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3) |
| External and internal indications and metering | Change only during test |
| Control signals to external devices | Change only temporarily in consistency with the actual Uninterruptible Power Systems mode of operation |
| Mode of operation | Change only temporarily |

## 9.4. EUT Configuration

The configuration of EUT is listed in Section 4.4.

## 9.5. Operating Condition of EUT

9.5.1. Setup the EUT as shown in Section 9.1.

9.5.2. Turn on the power of all equipment.

9.5.3. Let the EUT work in test mode (Line mode) and measure it.

## 9.6. Test Procedure

The EUT is put on the table which is 0.1m high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

9.6.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

9.6.2. For signal line and control lines ports:

It's unnecessary to test.

9.6.3. For DC output line ports**:**

It's unnecessary to test.

## 9.7. Test Result

**PASS.**
Please refer to the following page.

# Electrical Fast Transient/Burst Test Results

EMTEK (SHENZHEN) CO., LTD.

| Standard | IEC 61000-4-4 | Result: ☒ PASS / ☐ FAIL |
|---|---|---|

Applicant : INVT POWER SYSTEM(SHENZHEN) CO., LTD

EUT : Uninterruptible Power Systems

M/N : RM200/25C

Input Voltage : AC 380V/50Hz

Actual Criterion : B

Ambient Condition : 23 ℃ 55% RH

Operation Mode: Line mode

| Line : ☒ AC input and output power ports | Line : ☐ Signal ☐ I/O Cable |
|---|---|
| Coupling : ☒ Direct | Coupling : ☐ Capacitive |
| Test Time : 120s | |

| Line | Test Voltage | Result(+) | Result(-) |
|---|---|---|---|
| AC input power ports: L1, L2, L3, N, PE | 2kV | A | A |
| L1-L2, L1-L3, L2-L3, L1-N, L2-N, L3-N | 2kV | A | A |
| L1-PE, L2-PE, L3-PE, N-PE | 2kV | A | A |
| L1-L2-PE, L1-L3-PE, L2-L3-PE, L1-L2-L3, L1-L2-N, L1-L3-N, L2-L3-N, L1-N-PE, L2-N-PE, L3-N-PE | 2kV | A | A |
| L1-L2-L3-PE, L1-L2-L3-N, L1-L2-N-PE,L1-L3-N-PE, L2-L3-N-PE | 2kV | A | A |
| AC output power ports: L1, L2, L3, N, PE | 2kV | A | A |
| L1-L2, L1-L3, L2-L3, L1-N, L2-N, L3-N | 2kV | A | A |
| L1-PE, L2-PE, L3-PE, N-PE | 2kV | A | A |
| L1-L2-PE, L1-L3-PE, L2-L3-PE, L1-L2-L3, L1-L2-N, L1-L3-N, L2-L3-N, L1-N-PE, L2-N-PE, L3-N-PE | 2kV | A | A |
| L1-L2-L3-PE, L1-L2-L3-N, L1-L2-N-PE, L1-L3-N-PE, L2-L3-N-PE | 2kV | A | A |
| DC line | | | |
| Signal line | | | |

Note:

| Test Equipment | Burst Tester Model : PEFT 4010 |
|---|---|

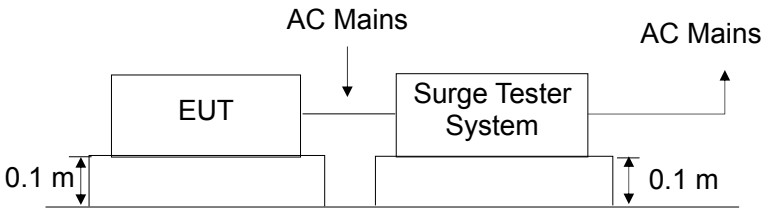
# 10. SURGE IMMUNITY TEST

## 10.1.Block Diagram of Test Setup

### 10.1.1.Block Diagram of the EUT


(EUT: Uninterruptible Power Systems)

### 10.1.2. Surge Test Setup




(EUT: Uninterruptible Power Systems)

## 10.2.Test Standard

IEC 61000-4-5:2014 (Line to Line: Level 2, 1.0kV, Line to earth: Level 3, 2.0kV)

## 10.3.Severity Levels and Performance Criterion

### 10.3.1.Severity level

| Severity Level | Open-Circuit Test Voltage<br>kV |
|---|---|
| 1 | 0.5 |
| 2 | 1.0 |
| 3 | 2.0 |
| 4 | 4.0 |
| * | Special |

### 10.3.2.Performance criterion: B

| | Criterion B |
|---|---|
| Output characteristics | Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3) |
| External and internal indications and metering | Change only during test |
| Control signals to external devices | Change only temporarily in consistency with the actual Uninterruptible Power Systems mode of operation |
| Mode of operation | Change only temporarily |

## 10.4.EUT Configuration

The configuration of EUT is listed in Section 4.3.

## 10.5.Operating Condition of EUT

10.5.1.Setup the EUT as shown in Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in test mode (Line mode) and measure it.

## 10.6.Test Procedure

1) Set up the EUT and test generator as shown on Section 10.1.2.
   For line to line coupling mode, provide 1kV 1.2/50us voltage surge.
   For line to earth coupling mode, provide 2kV 1.2/50us voltage surge.
   (At open-circuit condition) and 8/20us current surge to EUT selected points.
2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
3) Different phase angles are done individually.
4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 10.7.Test Result

**PASS.**

Please refer to the following page.

# Surge Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

Applicant : INVT POWER SYSTEM(SHENZHEN) CO., LTD
EUT : Uninterruptible Power Systems
M/N : RM200/25C
Power Supply : AC 230V / 50Hz
Test Mode : Line mode

Test Engineer: ZZY
Test Date : August 25, 2017
Temperature : 23℃
Humidity : 51%
Criterion : B

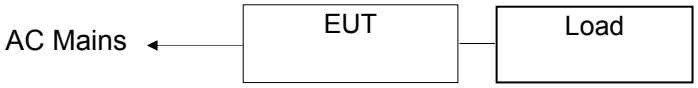
| Location | Polarity | Phase Angle | Number of Pulse | Pulse Voltage (kV) | Result |
|---|---|---|---|---|---|
| AC Input: L1-L2, L1-L3, L2-L3 | + | 0˚, 90˚, 180˚, 270˚ | 5 | 1.0 | A |
| | - | 0˚, 90˚, 180˚, 270˚ | 5 | 1.0 | A |
| L1-N, L2-N, L3-N | + | 0˚, 90˚, 180˚, 270˚ | 5 | 1.0 | A |
| | - | 0˚, 90˚, 180˚, 270˚ | 5 | 1.0 | A |
| L1-PE, L2-PE, L3-PE | + | 0˚, 90˚, 180˚, 270˚ | 5 | 2.0 | A |
| | - | 0˚, 90˚, 180˚, 270˚ | 5 | 2.0 | A |
| N-PE | + | 0˚, 90˚, 180˚, 270˚ | 5 | 2.0 | A |
| | - | 0˚, 90˚, 180˚, 270˚ | 5 | 2.0 | A |
| AC Output: L1-L2, L1-L3, L2-L3 | + | Random | 5 | 1.0 | A |
| | - | Random | 5 | 1.0 | A |
| L1-N, L2-N, L3-N | + | Random | 5 | 1.0 | A |
| | - | Random | 5 | 1.0 | A |
| L1-PE, L2-PE, L3-PE | + | Random | 5 | 2.0 | A |
| | - | Random | 5 | 2.0 | A |
| N-PE | + | Random | 5 | 2.0 | A |
| | - | Random | 5 | 2.0 | A |

Note:

# 11. INJECTED CURRENTS SUSCEPTIBILITY TEST

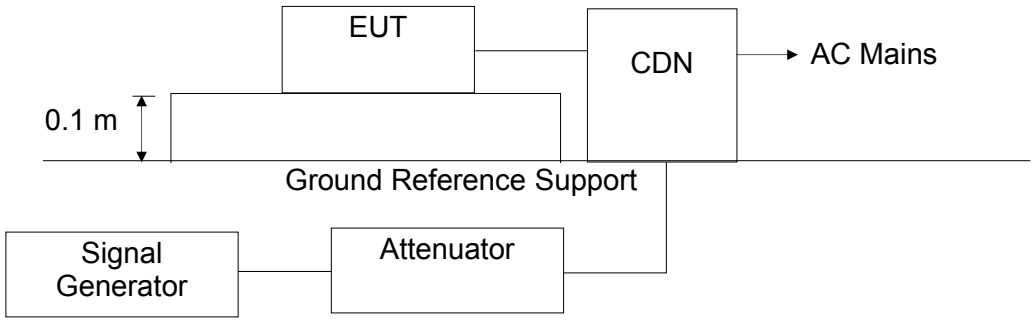
## 11.1.Block Diagram of Test Setup

### 11.1.1.Block Diagram of the EUT




(EUT: Uninterruptible Power Systems)

### 11.1.2.Block Diagram of Test Setup




## 11.2.Test Standard

IEC 61000-4-6:2013 (Level 3: 10V (rms) (0.15MHz ~ 80MHz))

## 11.3.Severity Levels and Performance Criterion

### 11.3.1.Severity level

| Level | Field Strength V |
|---|---|
| 1 | 1 |
| 2 | 3 |
| 3 | 10 |
| X | Special |

### 11.3.2.Performance criterion: A

| | Criterion A |
|---|---|
| External and internal indications and metering (LCD) | No change |
| Output characteristics (Load) | No change |
| Control signals to external devices (Signal line) | No change |
| Mode of operation | No change |

## 11.4.EUT Configuration

The configuration of EUT is listed in Section 4.3.

## 11.5.Operating Condition of EUT

11.5.1.Setup the EUT as shown in Section 11.1.

11.5.2.Turn on the power of all equipment.

11.5.3.Let the EUT work in test mode (Line mode) and measure it.

## 11.6.Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section 11.1.2.
2) Let the EUT work in test mode and measure it.
3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6) The frequency range is swept from 150KHz to80MHz using 10V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7) The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

## 11.7.Test Results

**PASS.**

Please refer to the following page.

# Injected Currents Susceptibility Test Results

EMTEK (SHENZHEN) CO., LTD.

| | | | |
|---|---|---|---|
| Applicant | : INVT POWER SYSTEM(SHENZHEN) CO., LTD | Test Date | : August 25, 2017 |
| EUT | : Uninterruptible Power Systems | Temperature | : 23℃ |
| M/N | : RM200/25C | Humidity | : 50% |
| Power Supply | : AC 380V/50Hz | Actual Criterion | : A |
| Test Engineer | : ZZY | | |

Test Mode **:** Line mode

| Frequency Range (MHz) | Injected Position | Strength (Unmodulated) | Criterion | Result |
|---|---|---|---|---|
| 0.15 ~ 80 | AC Input | 10V | A | A |
| 0.15 ~ 80 | AC Output | 10V | A | A |

Remark **:** 1. Modulation Signal**:**1KHz 80% AM
Measurement Equipment :
Simulator: CWS 500C (SWITZERLAND EMTEST)
CDN : ☐ CDN-M2 (SWITZERLAND EMTEST)
☒ CDN-M4 (SWITZERLAND EMTEST)
☐ EM-Clamp (SWITZERLAND EMTEST)

Note**: /**

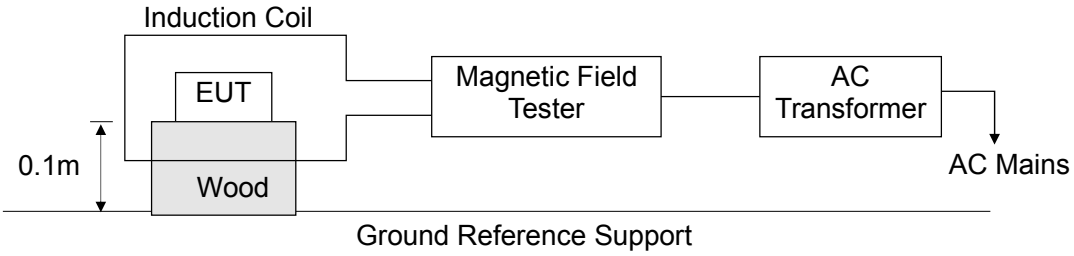
# 12. MAGNETIC FIELD SUSCEPTIBILITY TEST

## 12.1.Block Diagram of Test

### 12.1.1.Block diagram of test setup


(EUT: Uninterruptible Power Systems)

### 12.1.2.Magnetic field test setup




(EUT: Uninterruptible Power Systems)

## 12.2.Test Standard

IEC 61000-4-8:2009, (Severity Level 4: 30A / m)

## 12.3.Severity Levels and Performance Criterion

### 12.3.1.Severity Levels

| Level | Field Strength A/m |
|---|---|
| 1 | 1 |
| 2 | 3 |
| 3 | 10 |
| 4 | 30 |
| 5 | 100 |
| X | Special |

12.3.2.Performance Criterion: A

| | Criterion A |
|---|---|
| Output characteristics | Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3) |
| External and internal indications and metering | Change only during test |
| Control signals to external devices | Change only temporarily in consistency with the actual Uninterruptible Power Systems mode of operation |
| Mode of operation | Change only temporarily |

## 12.4.EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.

## 12.5.Test Procedure

The EUT is placed in the middle of a induction coil, under which is a 0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

## 12.6.Test Results

**PASS.**

Please refer to the following page.

# Magnetic Field Immunity Test Result

EMTEK (SHENZHEN) CO., LTD.

| Standard | IEC 61000-4-8 | Result: ☒ Pass / ☐ Fail |
|---|---|---|

Applicant : INVT POWER SYSTEM(SHENZHEN) CO., LTD

EUT : Uninterruptible Power Systems M/N : RM200/25C

Input Voltage : AC 380V/50Hz

Date of Test : August 25, 2017 Test Engineer : ZZY

Ambient Condition : Temp : 22℃ Humid : 50%

Actual Criterion : A

Operation Mode : Line mode

| Test Level (A/M) | Testing Duration | Coil Orientation | Criterion | Result |
|---|---|---|---|---|
| 30 | 5 mins | X | A | A |
| 30 | 5 mins | Y | A | A |
| 30 | 5 mins | Z | A | A |

Operation Mode : N/A

| Test Level (A/M) | Testing Duration | Coil Orientation | Criterion | Result |
|---|---|---|---|---|
| | | | | |
| | | | | |

| Test Equipment | Magnetic Field Test : HEAFELY MAG 100.1 |
|---|---|

Note: /

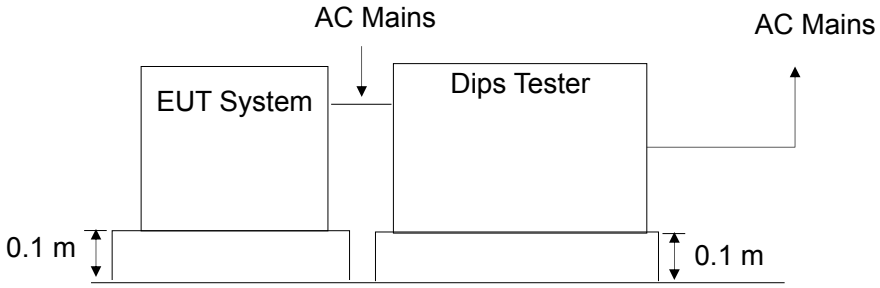
# 13. VOLTAGE DIPS AND INTERRUPTIONS TEST

## 13.1.Block Diagram of Test Setup

### 13.1.1.Block Diagram of the EUT


(EUT: Uninterruptible Power Systems)

### 13.1.2. Dips Test Setup




(EUT: Uninterruptible Power Systems)

## 13.2.Test Standard

IEC 61000-4-11:2004

## 13.3.Severity Levels and Performance Criterion

### 13.3.1.Severity level

| Test Level %UT | Voltage dip and short interruptions %UT | Duration (in period) |
|---|---|---|
| 0 | 100 | 0.5<br>1<br>5<br>10<br>25<br>50<br>* |
| 40 | 60 | |
| 70 | 30 | |

13.3.2.Performance criterion: B

| | Criterion B |
|---|---|
| Output characteristics | Voltage permitted to vary within the inverse time characteristics applicable (<100 m sec limits in Figures 1, 2 or 3 of IEC 62040-3) |
| External and internal indications and metering | Change only during test |
| Control signals to external devices | Change only temporarily in consistency with the actual Uninterruptible Power Systems mode of operation |
| Mode of operation | Change only temporarily |

## 13.4.EUT Configuration

The configuration of EUT is listed in Section 4.3.

## 13.5.Operating Condition of EUT

13.5.1.Setup the EUT as shown in Section 13.1.

13.5.2.Turn on the power of all equipment.

13.5.3.Let the EUT work in test mode (Line mode) and measure it.

## 13.6.Test Procedure

1) Set up the EUT and test generator as shown on Section 13.1.2.
2) The interruption is introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

## 13.7.Test Result

**PASS.**

Please refer to the following page.

# Voltage Dips And Interruptions Test Results

EMTEK (SHENZHEN) CO., LTD.

| | | | |
|---|---|---|---|
| Applicant | : INVT POWER SYSTEM(SHENZHEN) CO., LTD | Test Date | : August 25, 2017 |
| EUT | : Uninterruptible Power Systems | Temperature | : 22℃ |
| M/N | : RM200/25C | Humidity | : 50% |
| Power Supply | : AC 380V/50Hz | Test Engineer | : ZZY |

Test Mode: Line mode

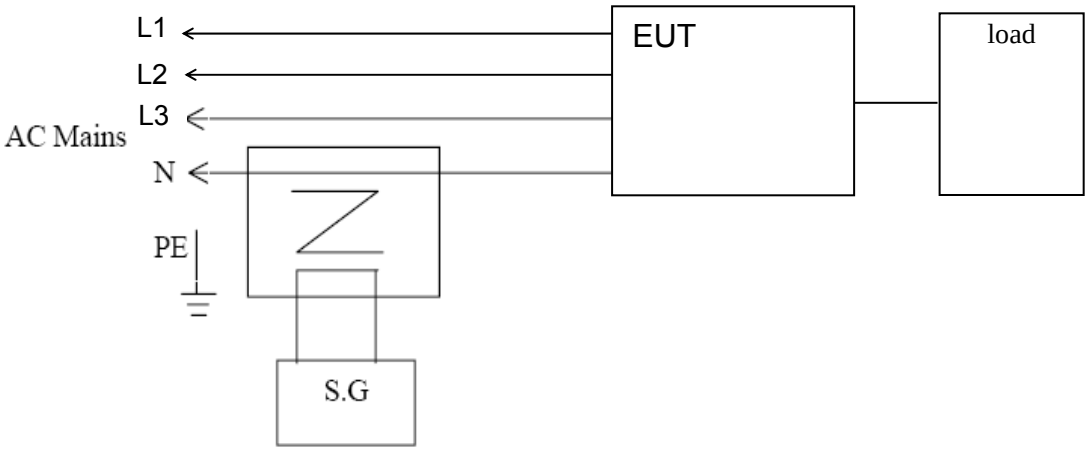
| Test Level % $U_T$ | Voltage Dips & Short Interruptions % $U_T$ | Duration (in periods) | Criterion ☐ A ☒ B ☐ C ☐ D | Result |
|---|---|---|---|---|
| 0 | 100 | 0.5P | B | A |
| 0 | 100 | 1P | B | A |
| 70 | 30 | 25P | B | A |
| 0 | 100 | 250P | B | B |
| | | | | |
| | | | | |

Note: Test in 0%, 250P, light appears flicker, but can self-recovery.

# 14. LOW FREQUENCY SIGNALS TEST

## 14.1. Block Diagram of Test Setup

15.1.1 Block Diagram of the EUT




(EUT: Uninterruptible Power Systems)
Note: Above test setup is worst case by pretest.

## 14.2. Test Standard

IEC 61000-2-2:2002, Performance: A

| | Criterion A |
|---|---|
| External and internal indications and metering (LCD) | No change |
| Output characteristics (Load) | No change |
| Control signals to external devices (Signal line) | No change |
| Mode of operation | No change |

## 14.3. Operating Condition of EUT

Same as Section 4.4, Except the test setup replaced by Section 14.1.

## 14.4. Test Results

PASS.

Please refer to following page.

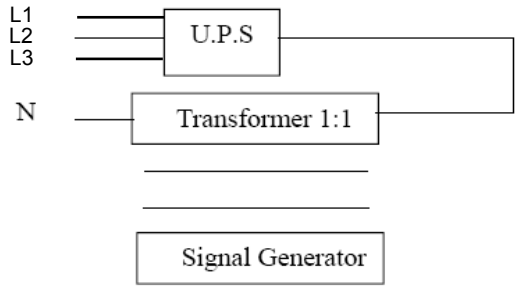
# Low Frequency Signals Test Result

EMTEK (SHENZHEN) CO., LTD.

| | | | | | |
|---|---|---|---|---|---|
| Applicant | : | INVT POWER SYSTEM(SHENZHEN) CO., LTD | Test Date | : | August 25, 2017 |
| EUT | : | Uninterruptible Power Systems | Temperature | : | 22℃ |
| M/N | : | RM200/25C | Humidity | : | 58% |
| Power Supply | : | AC 380V/50Hz | Test Mode | : | Line mode |
| Test Engineer | : | ZZY | Actual Criterion | : | A |

| Frequency Range (Hz) | Position | Strength | Result | Note |
|---|---|---|---|---|
| 140 | See Fig.1 | 10V(rms) Sinusoidal | A | / |
| 160 | | | A | / |
| 200 | | | A | / |
| 240 | | | A | / |
| 280 | | | A | / |
| 320 | | | A | / |
| 360 | | | A | / |

Note



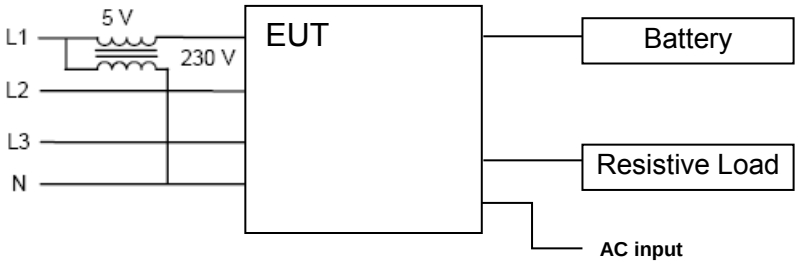

Test Equipment:
1. Isolation transformer
   Primary: Secondary=1:1
2. Signal Generator
   AC Source: 6530(Chroma)

# 15. POWER LINE UNBALANCE (THREE-PHASE UPS SYSTEMS ONLY)

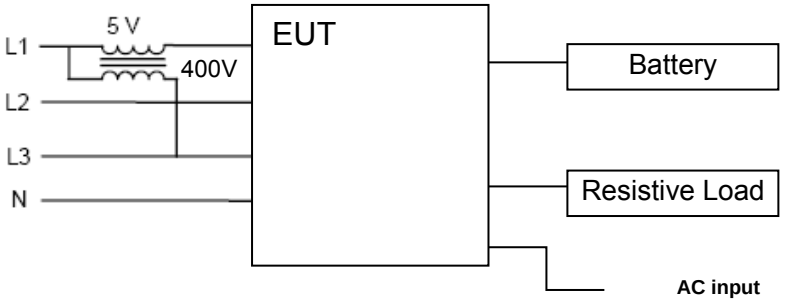
## 15.1. Block Diagram of Test Setup

### 15.1.1. Block Diagram of the EUT

For Amplitude unbalance:




For Phase unbalance:




(EUT: Uninterruptible Power Systems)

## 15.2. Test Standard

EN62040-2: 2006
Performance: A

## 15.3. Operating Condition of EUT

Same as Section 4.4, Except the test setup replaced by Section 14.1.

## 15.4. Test Results

**PASS.**

Please refer to following page.

# Power Line Unbalance Test Result

EMTEK (SHENZHEN) CO., LTD.

| | |
|---|---|
| Applicant : INVT POWER SYSTEM(SHENZHEN) CO., LTD | Test Date:August 25, 2017 |
| EUT : Uninterruptible Power Systems | Temperature : 22℃ |
| M/N : RM200/25C | Humidity : 50% |
| Power Supply : AC 380V/50Hz | Test Mode : Line Mode |
| Test Engineer : ZZY | Actual Criterion : A |

| Frequency Range (Hz) | Position | Strength | Result | Note |
|---|---|---|---|---|
| 50 | See 14.1.1 | 5V(rms) Sinusoidal | A | N/A |

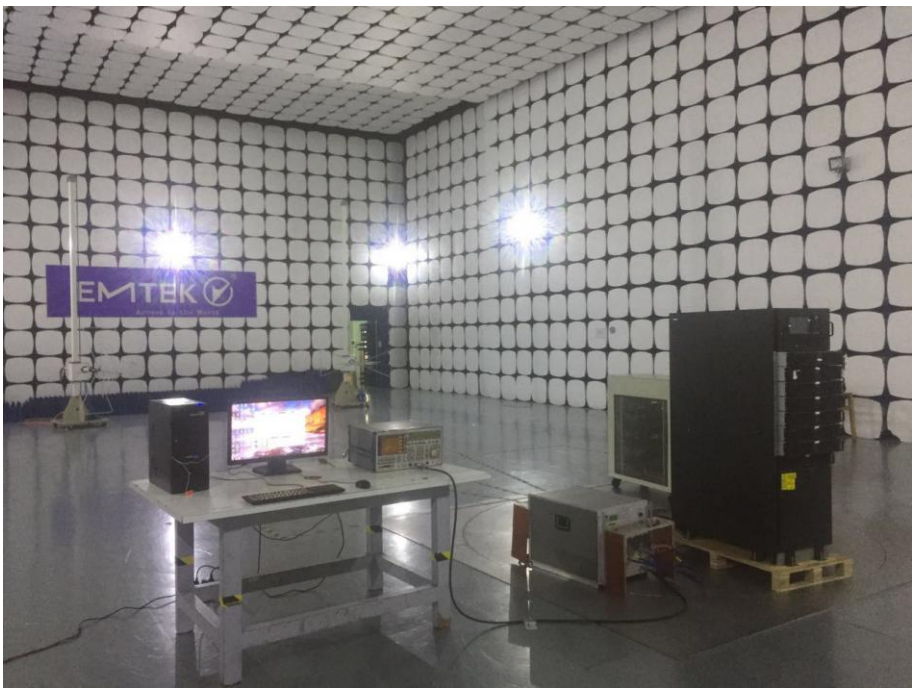
Note: This result for normal.

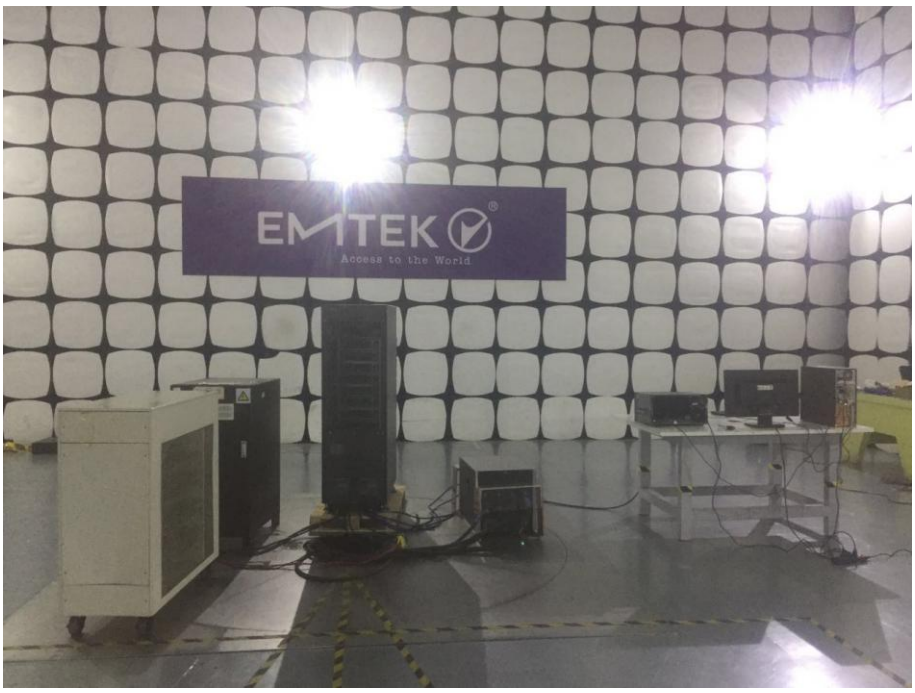
See 14.1.1

Test Equipment:
3. Isolation transformer
   Primary: Secondary=1:1
4. Signal Generator
   AC Source: 65930 (Chroma)

# 16. TEST PHOTOGRAPHS

## 16.1.Photos of Conducted Emission Measurement

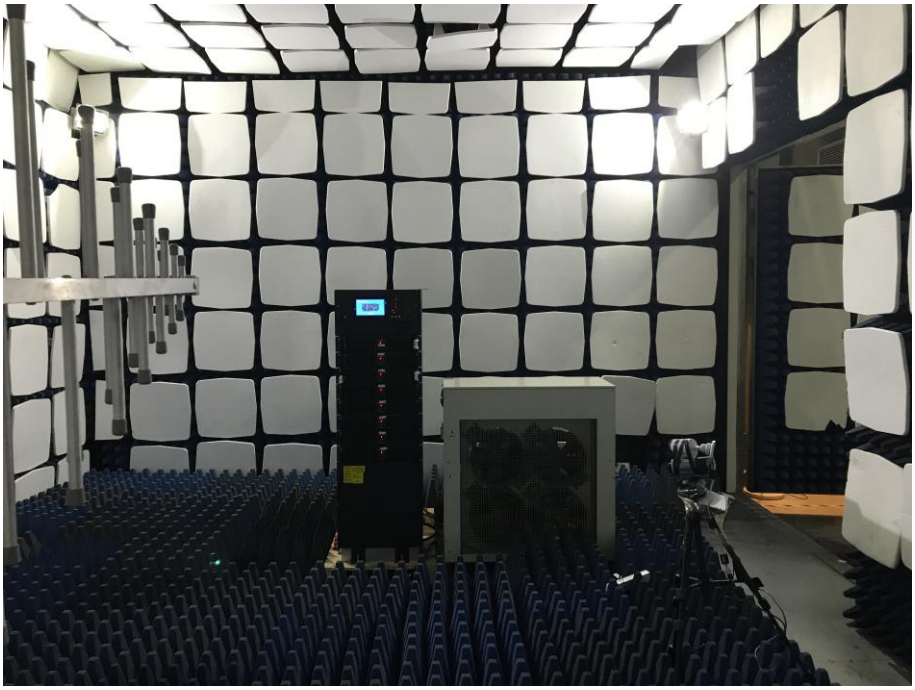


## 16.2.Photos of Radiation Emission Measurement


## 16.3.Photo of Electrostatic Discharge Test

## 16.4.Photo of RF Field Strength susceptibility Test



## 16.5.Photos of Electrical Fast Transient/Burst Test


## 16.6.Photo of Surge Test

## 16.7.Photo of Injected Currents Susceptibility Test


## 16.8.Photo of Magnetic Field Immunity Test

## 16.9.Photo of Voltage dips and interruption Test

## 16.10.Photo of Low Frequency Signals and Power Line Unbalance Test

# APPENDIX
# (Photos of EUT)

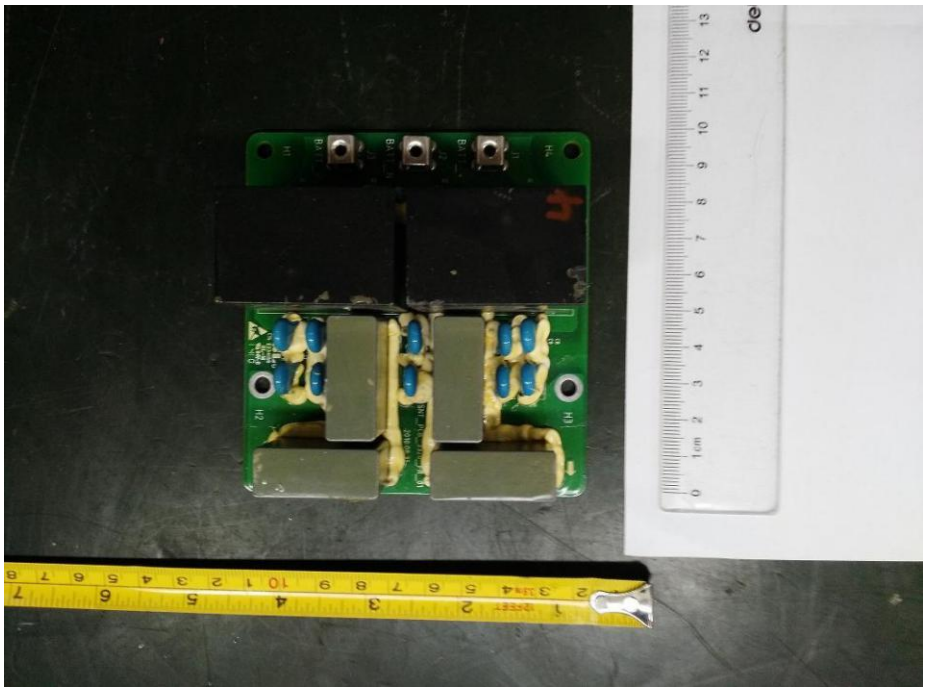

FRONT

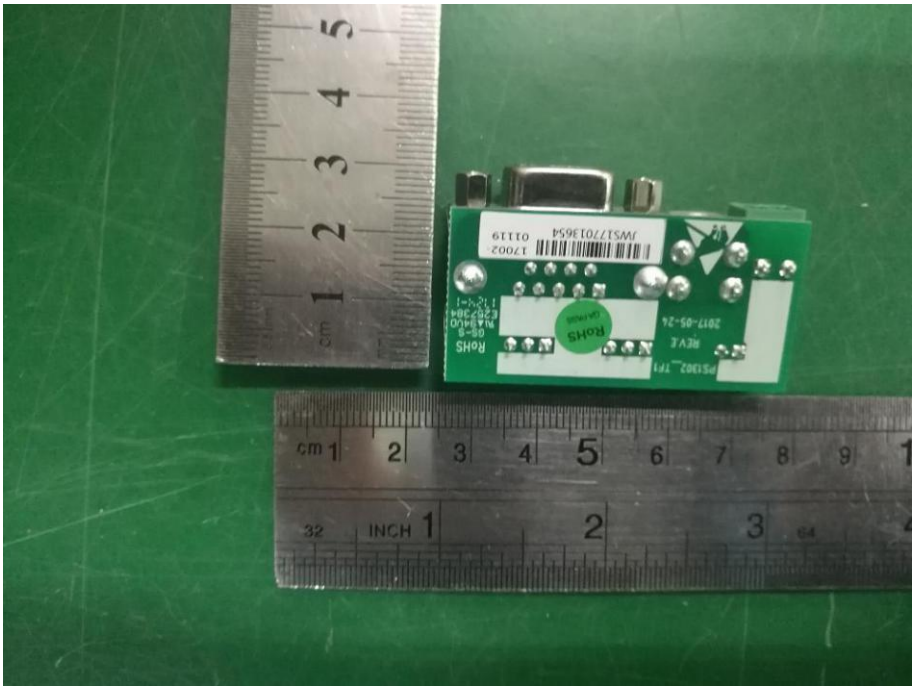

FRONT

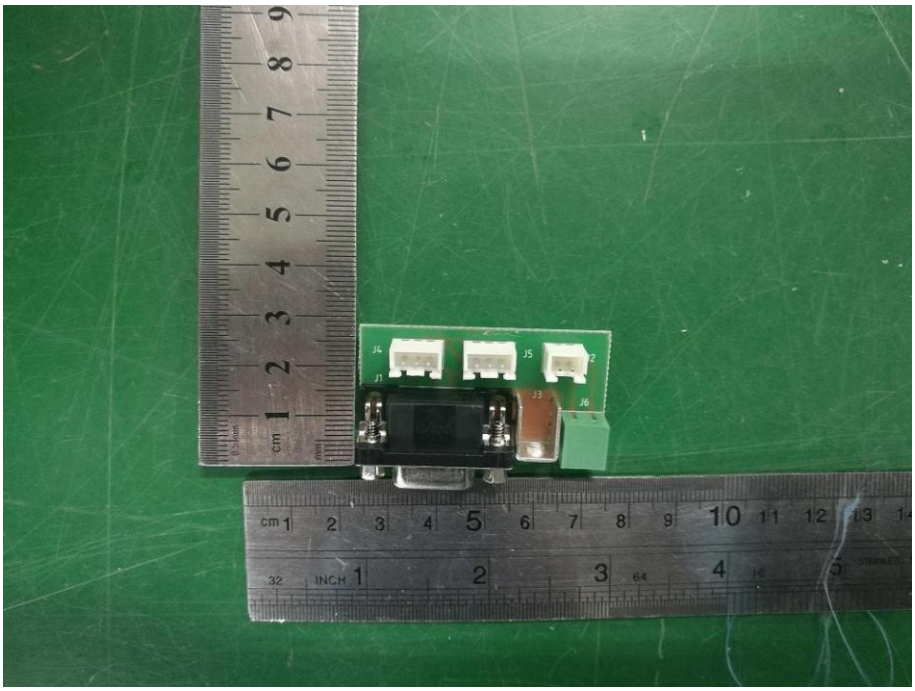

BACK

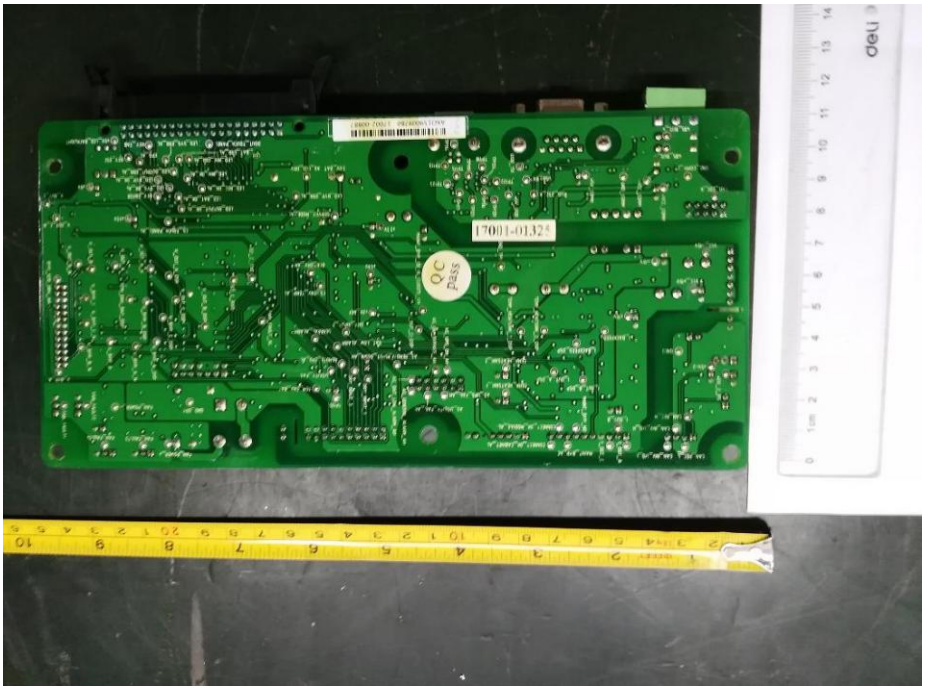

AC Input
Q2
UPS
Load

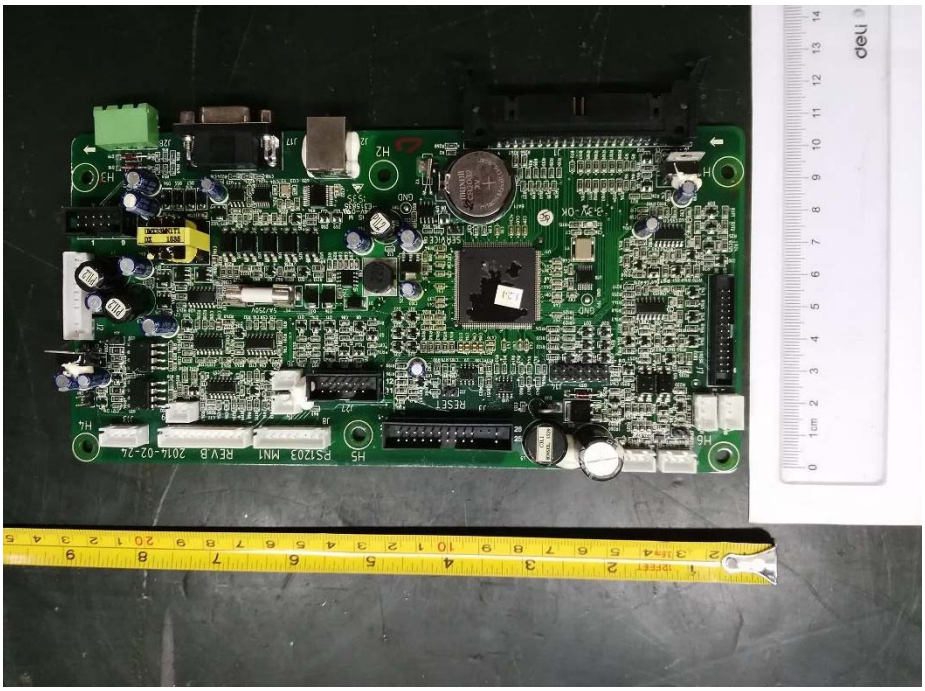

17001-00432

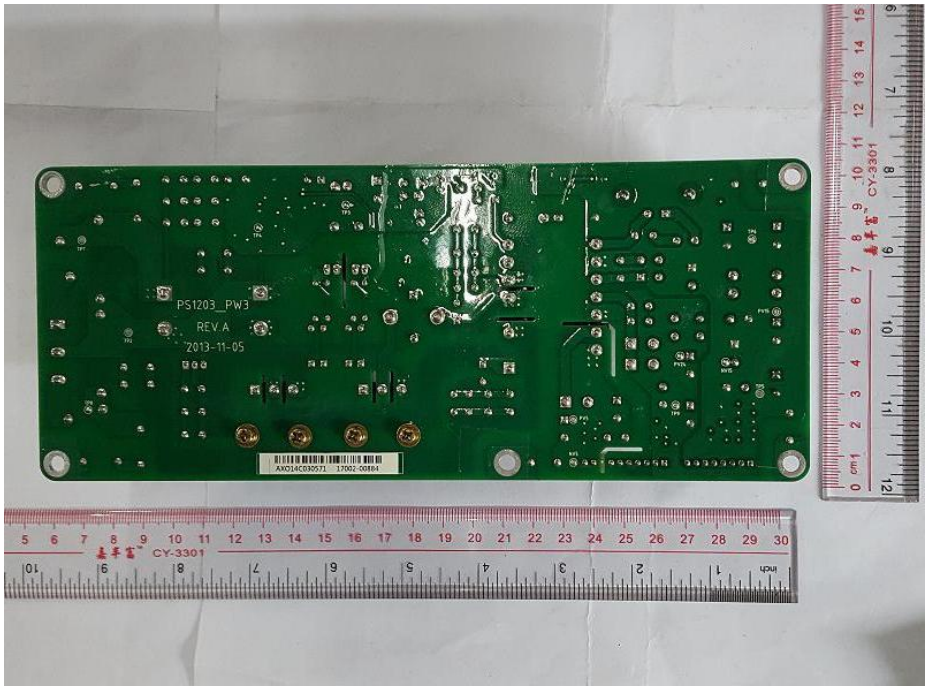


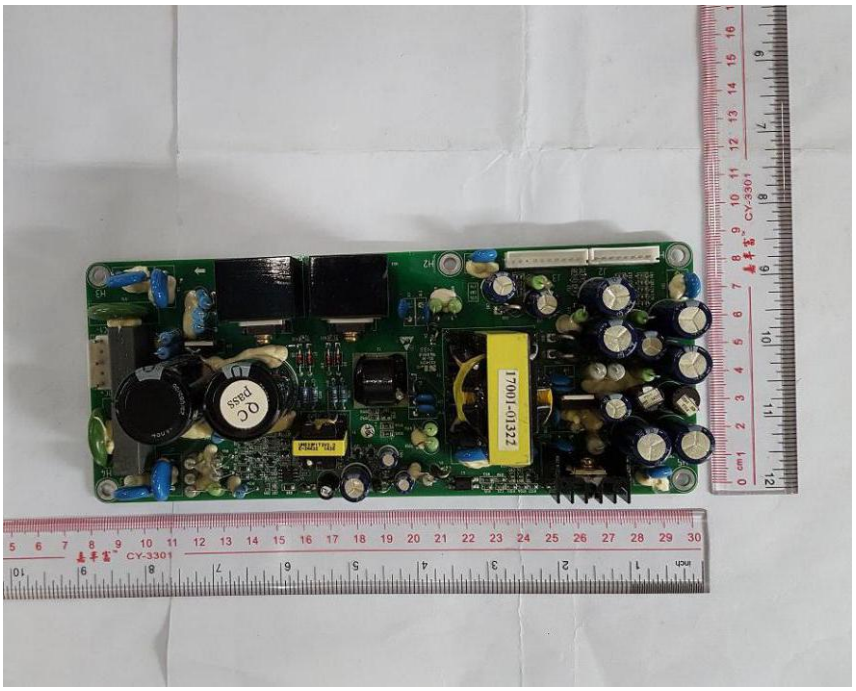









PS1203_PW3
REV.A
2013-11-05
CY-3301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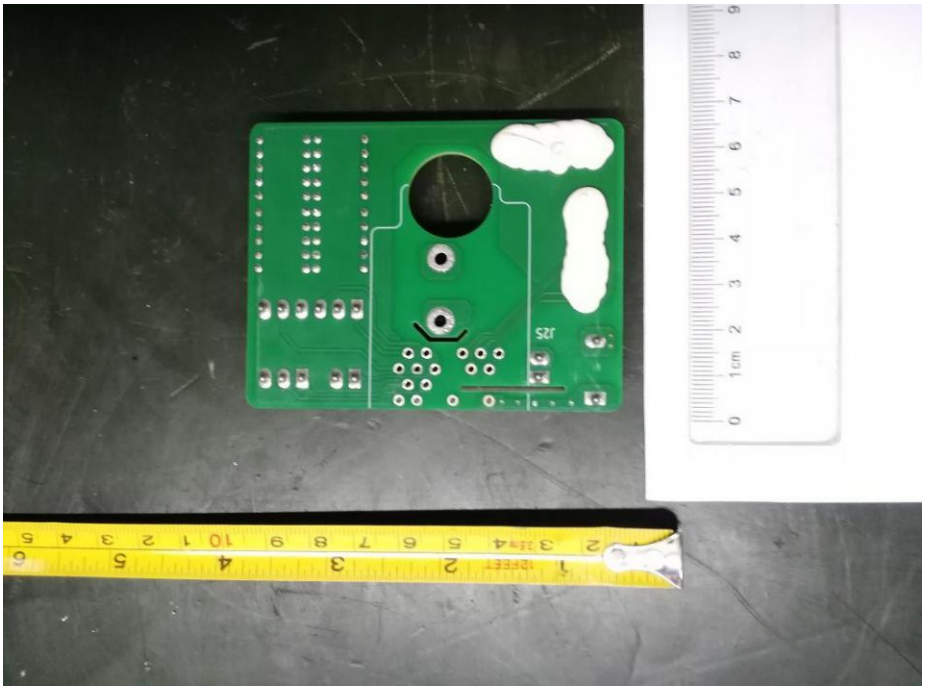
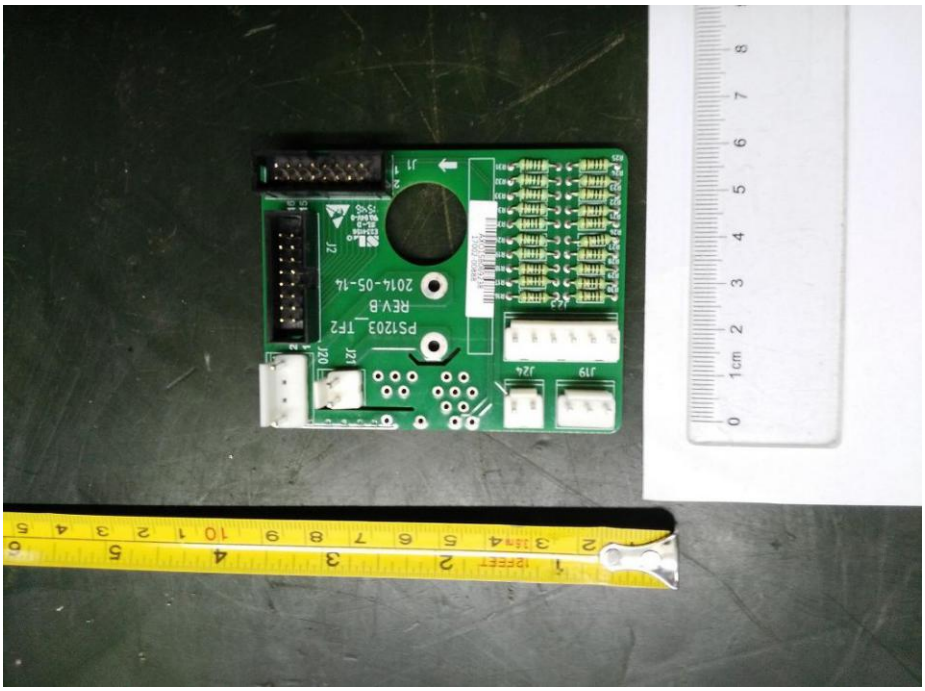
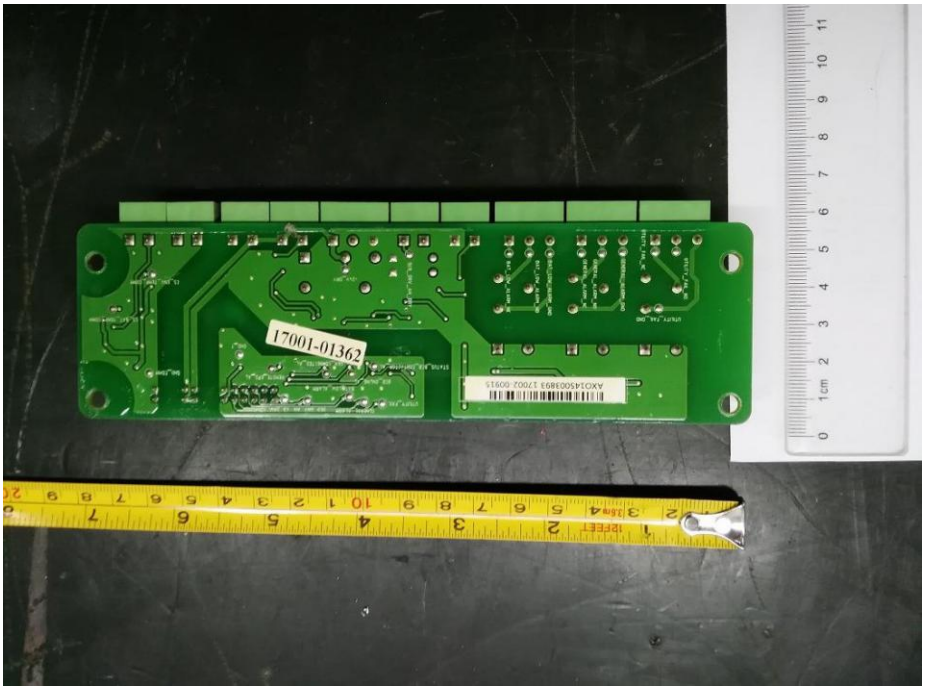
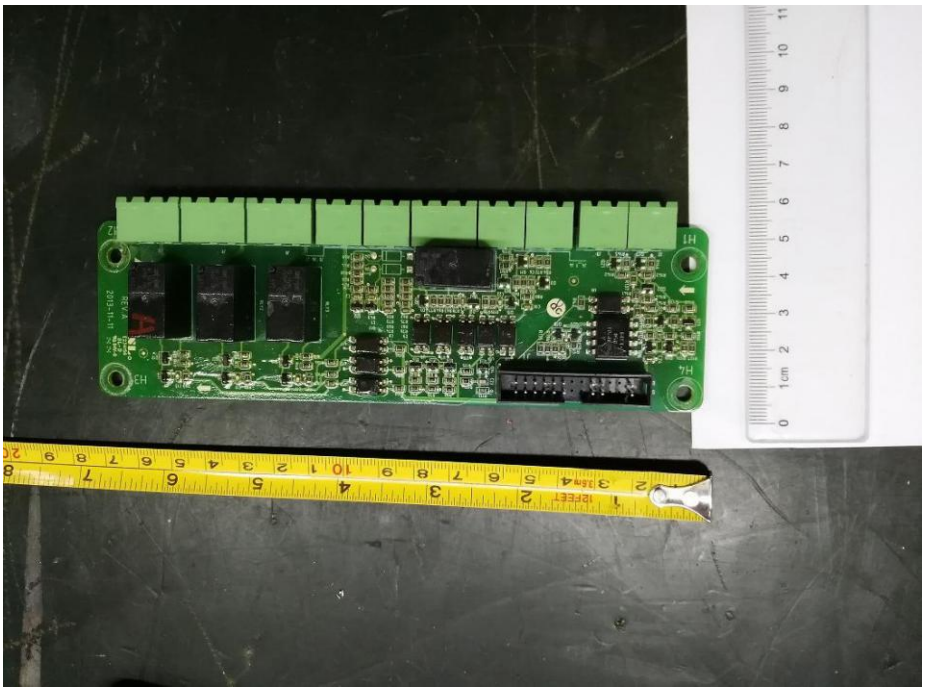
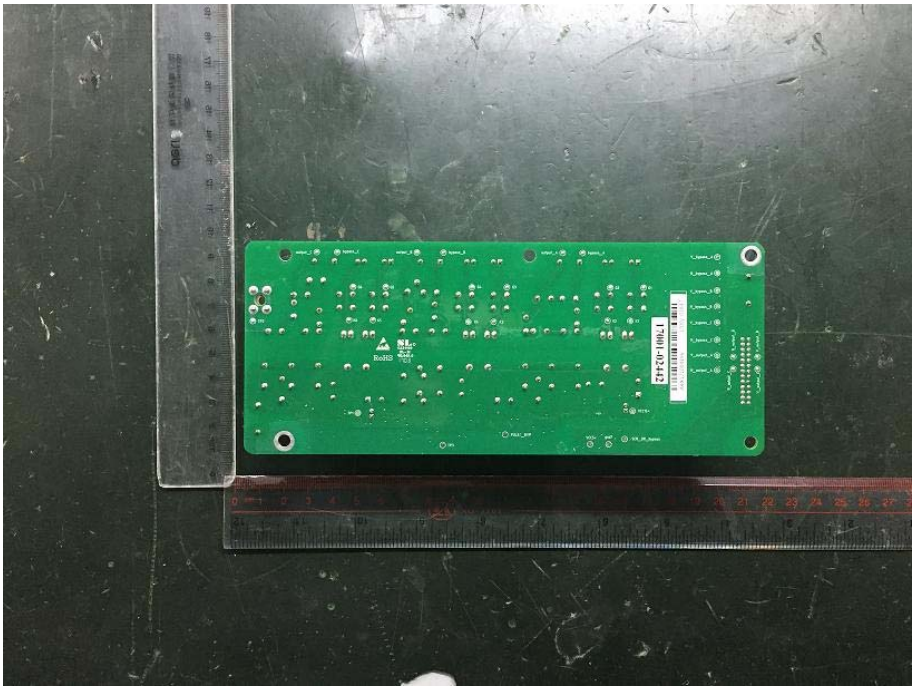
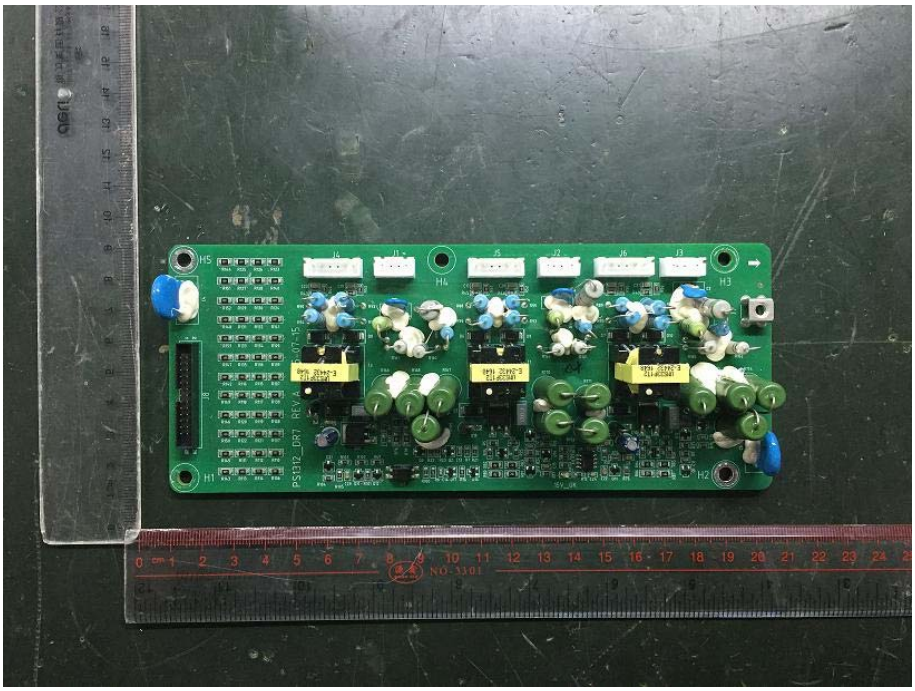


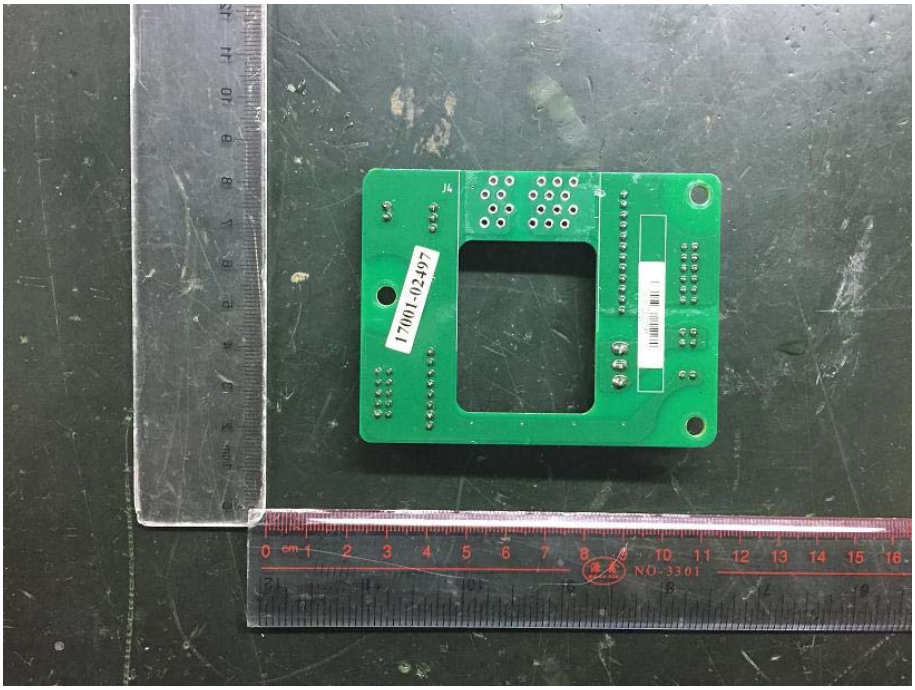

PS1203 TF2
REV.B
2014-05-14

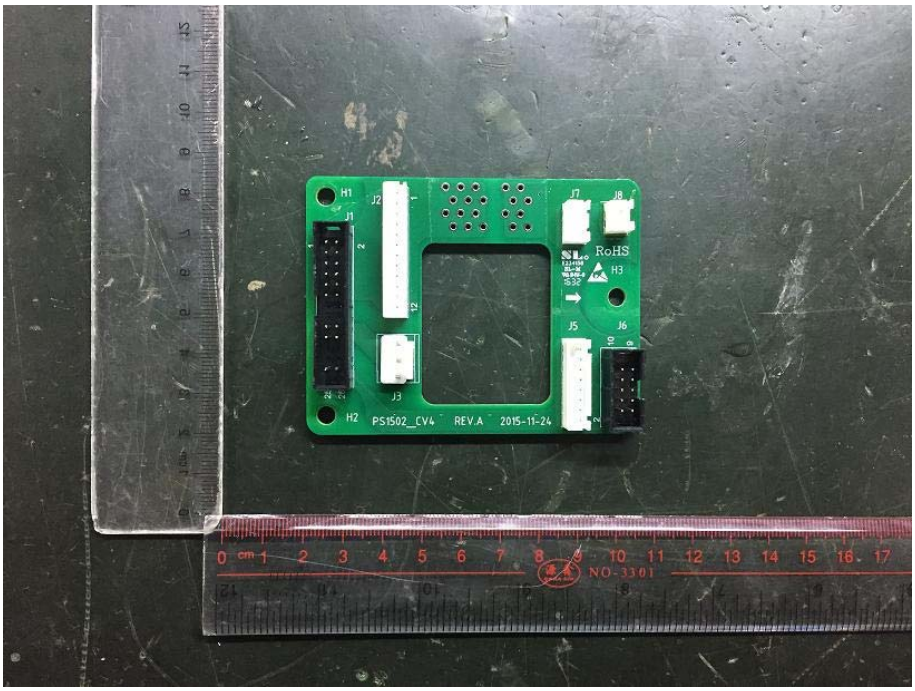

17001-01362

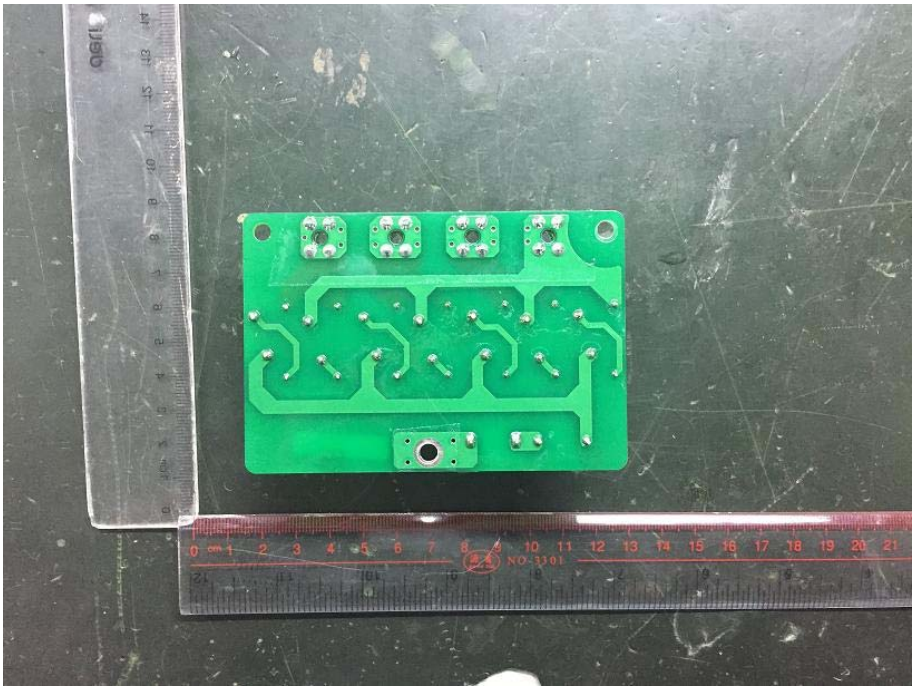







17001-02497


H1
J2
J1
J7
J8
RoHS
H3
J5
J6
J3
H2
PS1502_CV4
REV.A
2015-11-24
NO-3301


NO-3301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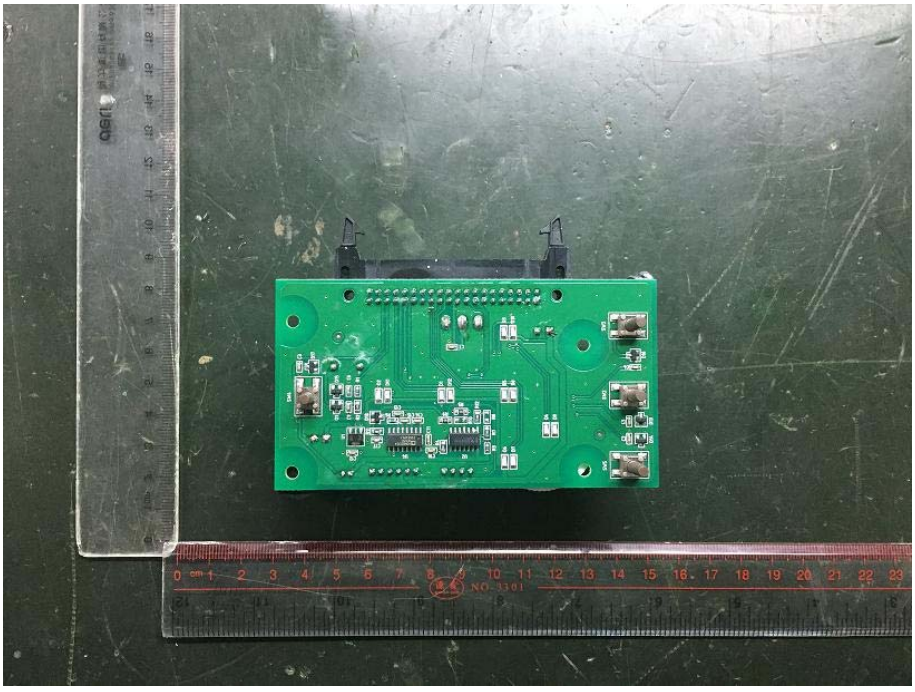
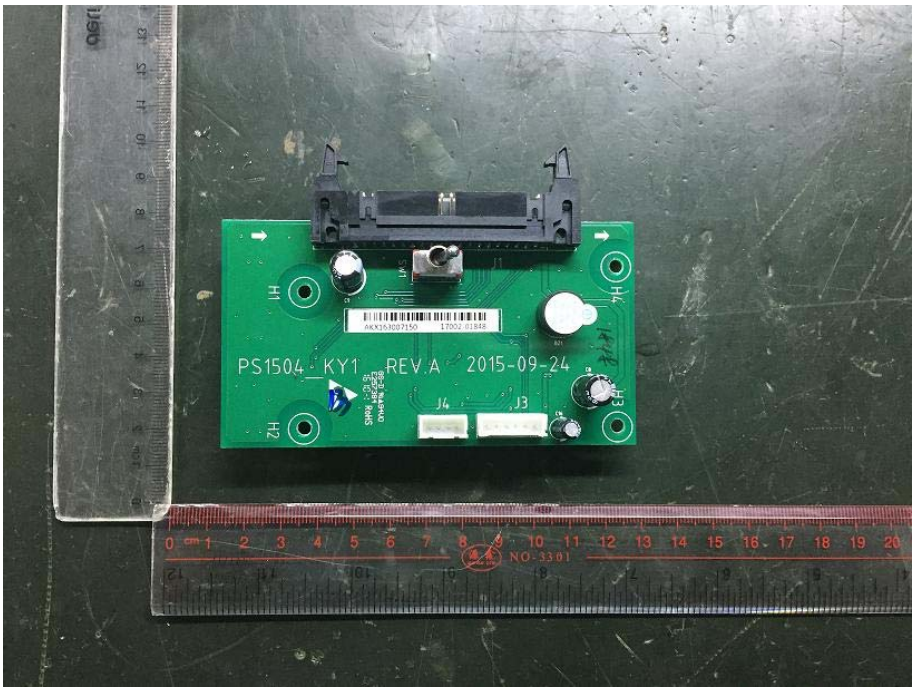
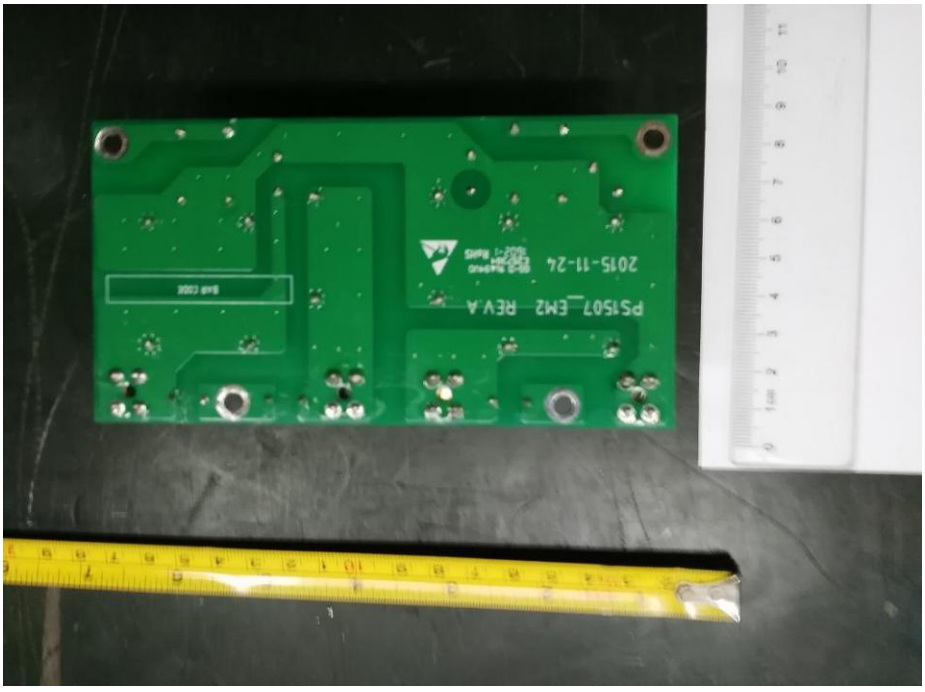
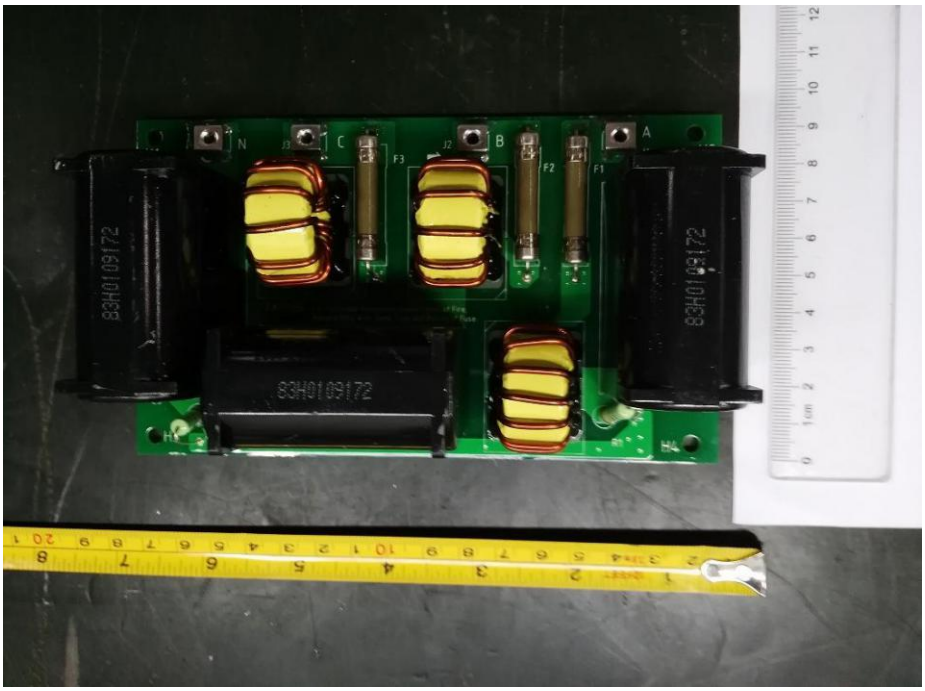
17001-03402




PS1504_KY1 REV.A 2015-09-24
H1
H2
H3
H4
J1
J3
J4


PS1507_EM2 REV.A
2015-11-24


83H0109172
83H0109172
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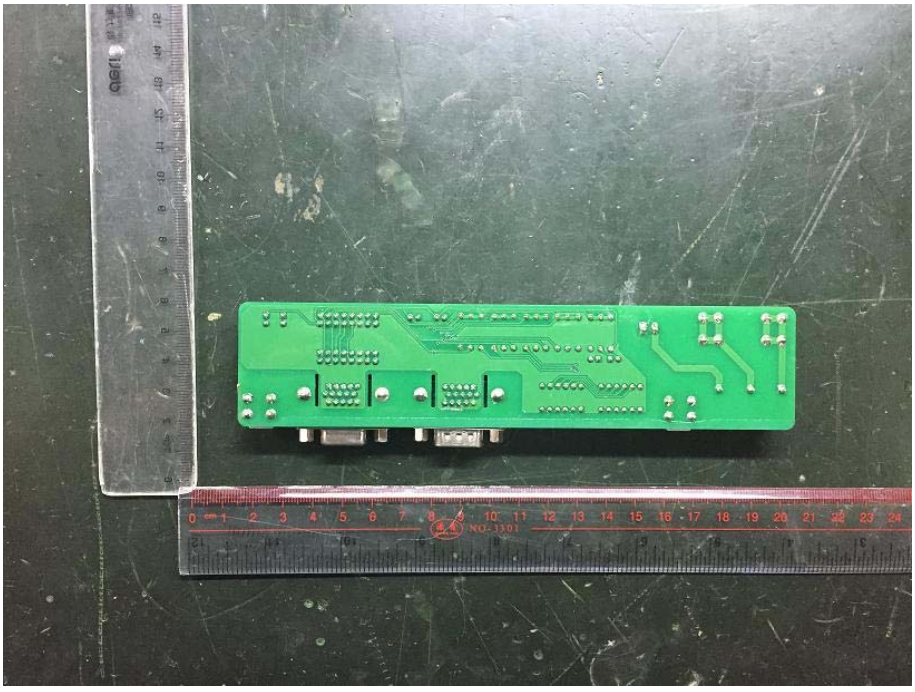

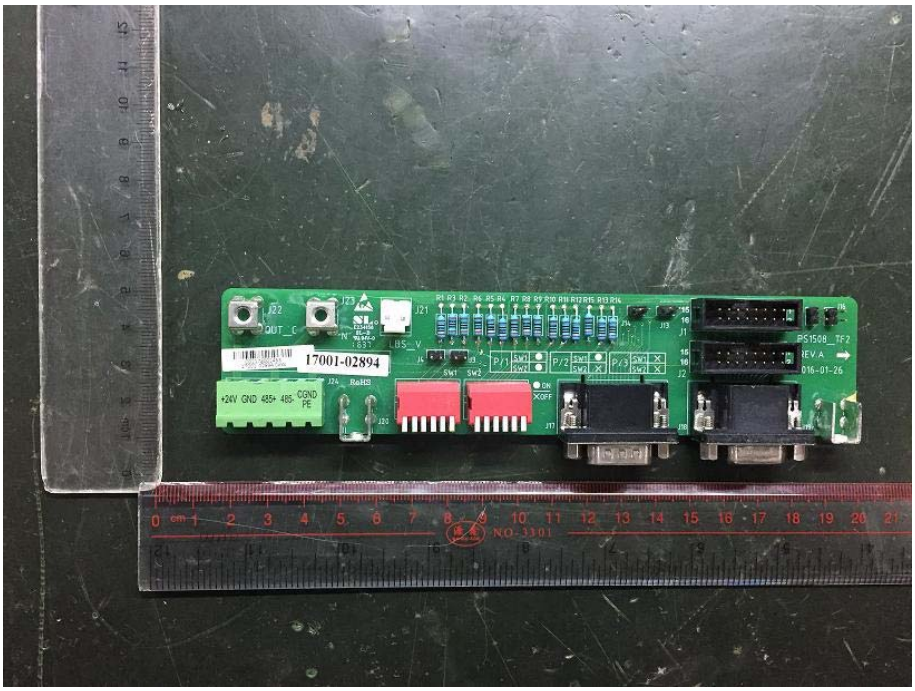
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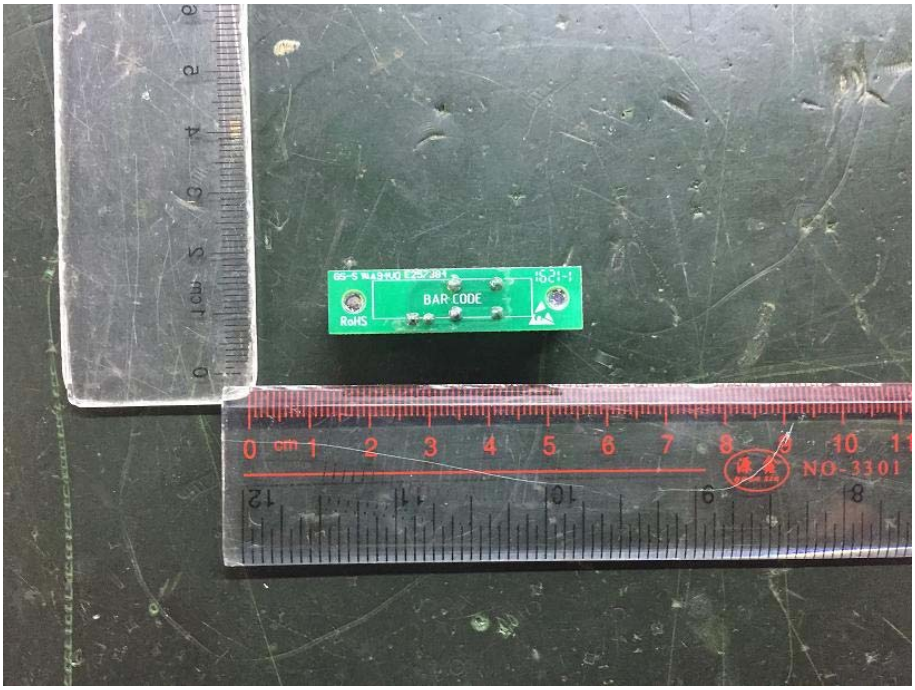
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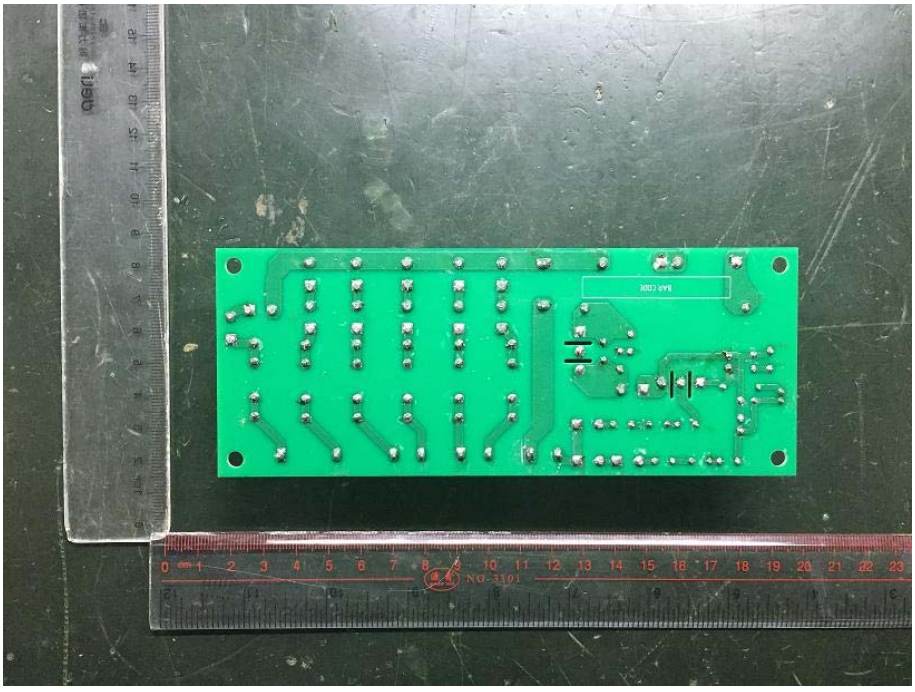

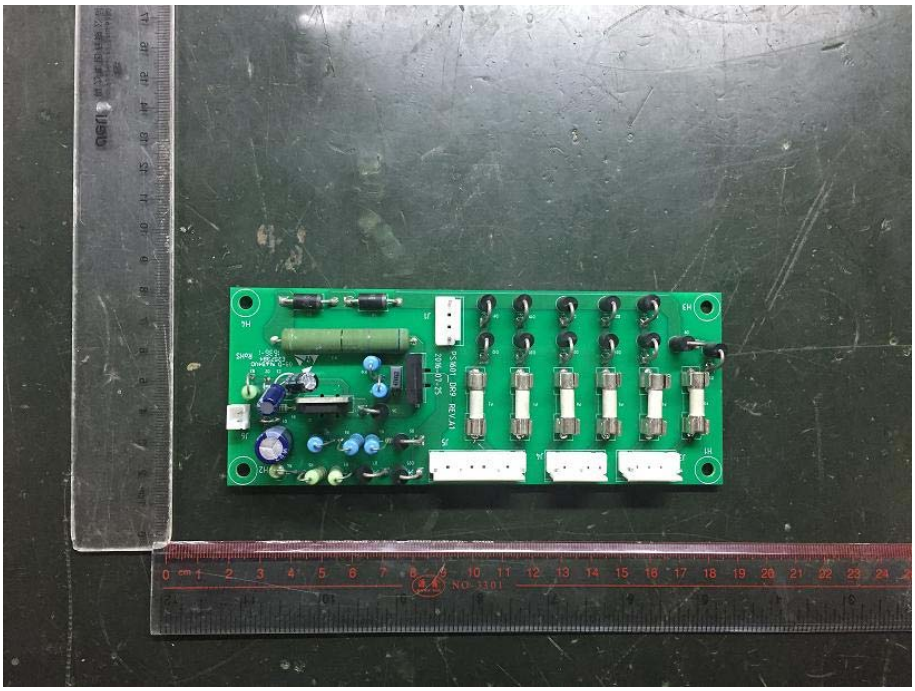

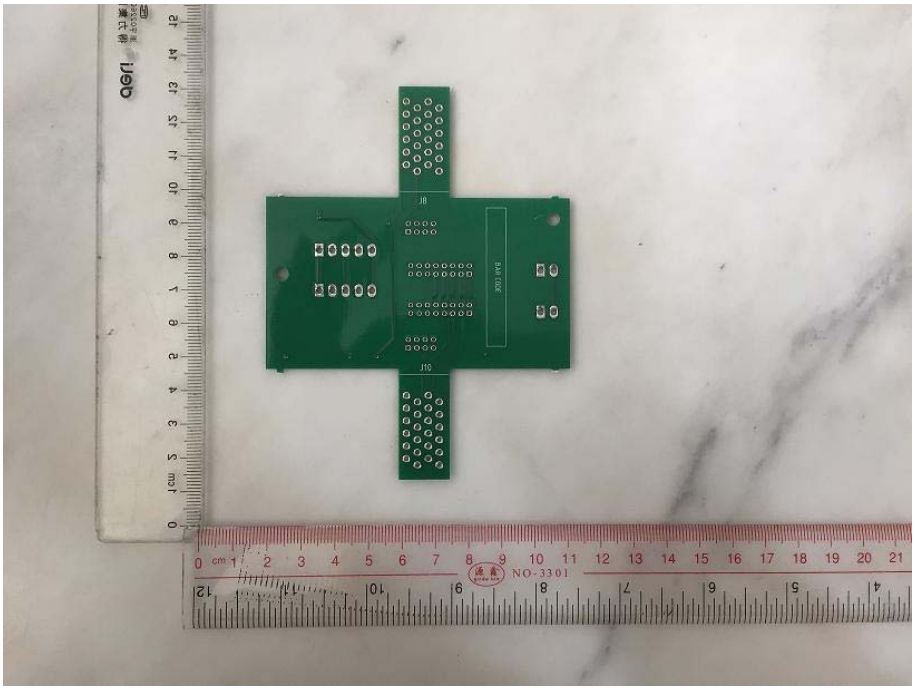

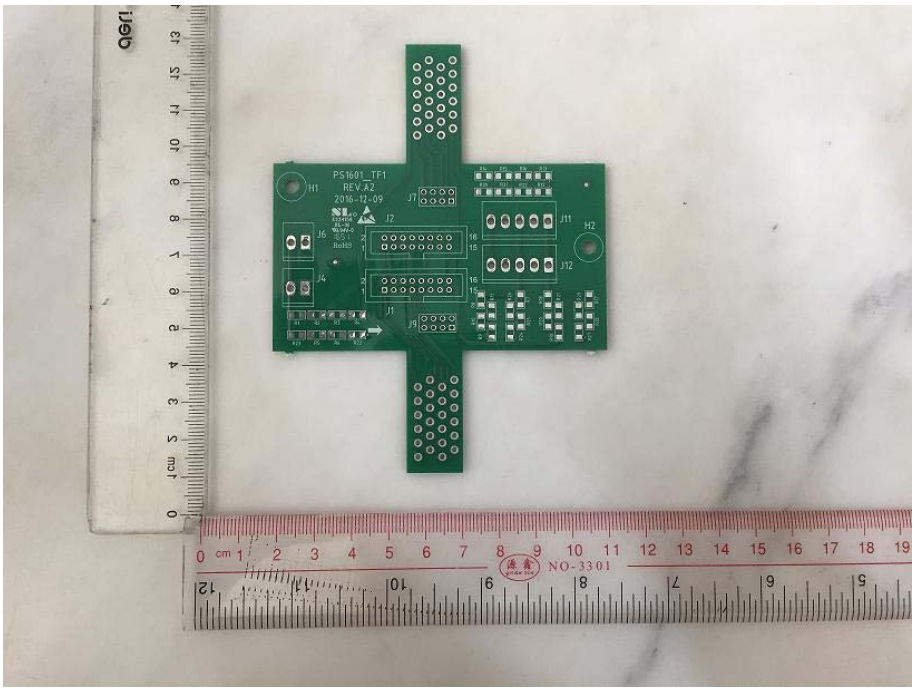


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