# CE Marking EMC Test Report

## For the

## Beijing HollySys Intelligent Technology Co., Ltd.

## MC2000 Series Motion Controller

## Model: MC2008, MC2008L, MC2004, MC2004L

## WLL Report: 19WB0820518E Rev. 0

## August 20, 2019

Prepared for:

**Beijing HollySys Intelligent Technology Co., Ltd.**

**No.2, Disheng Middle Road, Economic-Technological Development Area, Beijing, 100176 P.R.China**

Prepared by:

**WASHINGTON TECHNOLOGY INTERNATIONAL LIMITED**

This report applies only to the sample evaluated prior to the preparation date stated above.

This report must be copied in its entirety, including all technical documents.

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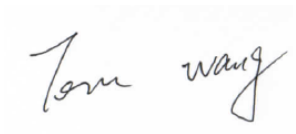

Tom Wang

Reviewed by:

Steven yang

 

# Abstract

This report has been prepared on behalf of Beijing HollySys Intelligent Technology Co., Ltd. to document the findings of the emissions and immunity testing performed on the Beijing HollySys Intelligent Technology Co., Ltd. MC2000 Series Motion Controller. The purpose of this testing is to determine compliance with emissions and immunity requirements set forth by the European Union under the requirements of the EMC Directive (2014/30/EU).

This test report supports the Beijing HollySys Intelligent Technology Co., Ltd. Declaration of Conformity for compliance with applicable specifications under the EMC Directive. The requirements of the EMC Directive specify compliance with emissions and immunity standards.

This report is based on testing methods and levels called out in:

- EN 61326-1:2013, Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements
- EN 61131-2:2007, Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests
- EN 61000-6-4:2007/A1:2011, Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
- EN 61000-6-2:2005/AC:2005, Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
- IEC 61000-4-2:2008, Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
- IEC 61000-4-3:2010, Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
- IEC 61000-4-4:2012, Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
- IEC 61000-4-5:2005, Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test
- IEC 61000-4-6:2008, Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
- IEC 61000-4-8:2009, Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques –Power frequency magnetic field
- IEC 61000-4-11:2004, Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests

 

The affixation of the "CE" marking is contingent on the product's compliance with all applicable "New Approach Directives". The conduct of this test supports the emissions and immunity requirements specified under the EMC Directive. Other directives or standards may apply (Low Voltage Directive, for example) for which a separate certification effort may be required. Other national standards may apply on a country-by-country basis for which a separate approval may be required.

Testing was performed at Beijing HollySys Intelligent Technology Co., Ltd.

Conducted Emissions, Radiated Emissions, Radio-frequency electromagnetic field Immunity and ESD were witness at Xi' an Yourtest Technology Corp., Ltd.
Address: Aode Industry Park, Num. 16, Zhangba 2th Road, Xi'an Hi-tech Zone

The Beijing HollySys Intelligent Technology Co., Ltd. MC2000 Series Motion Controller complied with the EMC requirements of EN 61326-1:2013, EN 61131-2:2007, EN 61000-6-4:2007/A1:2011 for a Class A device.

| Revision History | Reason | Date |
|---|---|---|
| Rev. 0 | Initial Release | August 20, 2019 |
| | | |

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# TEST REPORT VERIFICATION

Applicant : Beijing Hollysys Intelligent Technology Co.,Ltd.

Manufacturer : Beijing Hollysys Intelligent Technology Co.,Ltd.

EUT Description : MC2000 Series Motion Controller

Model No. : MC2008, MC2008L, MC2004, MC2004L

Trade Mark : HollySys

Power Supply : DC 24V

Test Voltage : 230V 50Hz

Measurement Standards Used:

EN 61326-1:2013

EN 61131-2:2007

EN 61000-6-4:2007/A1:2011

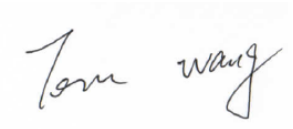
EN 61000-6-2:2005/AC:2005

(IEC 61000-4-2:2008, IEC 61000-4-3:2010, IEC 61000-4-4:2012, IEC 61000-4-5:2005, IEC 61000-4-6:2008, IEC 61000-4-8:2009, IEC 61000-4-11:2004)

The device described above are tested by Beijing HollySys Intelligent Technology Co., Ltd. And Xi'an Yourtest Technology Corp., Ltd. to determine the maximum emission levels emanating from the device and the severity levels of the device endured and its performance criterion. The measurement results were contained in this test report and Beijing HollySys Intelligent Technology Co., Ltd. And Xi' an Yourtest Technology Corp., Ltd. were assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the EN 61326-1:2013, EN 61131-2:2007, EN 61000-6-4:2007/A1:2011, EN 61000-6-2:2005/AC:2005 official requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of WLL.

| | | | |
|---|---|---|---|
| Date of Test : | August 11, 2019 to August 13, 2019 | Report of date: | August 20, 2019 |

Prepared by : 

Reviewed by : 

# 1 Introduction

Washington Technology International Limited was contracted by Beijing HollySys Intelligent Technology Co., Ltd. to perform testing on the MC2000 Series Motion Controller.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Beijing HollySys Intelligent Technology Co., Ltd., MC2000 Series Motion Controller.

## 1.1 Compliance Statement

After the modification listed in Section 2.7 were installed:

The Beijing HollySys Intelligent Technology Co., Ltd. MC2000 Series Motion Controller complied with the EMC emission requirements of EN 61326-1:2013, EN 61131-2:2007, EN 61000-6-4:2007/A1:2011 for a Class A device.

Beijing HollySys Intelligent Technology Co., Ltd. MC2000 Series Motion Controller complied with the requirements of:

- EN 61326-1:2013, *Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements*
- EN 61131-2:2007, *Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests*
- EN 61000-6-4:2007/A1:2011, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*
- EN 61000-6-2:2005/AC:2005, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*
- IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*
- IEC 61000-4-3:2010, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
- IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*
- IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
- IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*
- IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques –Power frequency magnetic field*
- IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

## 1.2 Test Scope Summary

| Test | Specific Description | Date Completed | Result | Modifications Installed (Y/N) |
|---|---|---|---|---|
| EN 61000-6-4 | Conducted Emissions from the AC mains power ports | August 13, 2019 | Complied | N |
| EN 61000-6-4 | Asymmetric mode Conducted Emissions | August 13, 2019 | Complied | N |
| EN 61000-6-4 | Radiated Emissions | August 13, 2019 | Complied | N |
| IEC 61000-3-2 | Harmonics | N/A | N/A | N/A |
| IEC 61000-3-3 | Flicker | N/A | N/A | N/A |
| IEC 61000-4-2 | Electrostatic Discharge | August 12, 2019 | Complied | N |
| IEC 61000-4-3 | Radiated RF Susceptibility | August 6, 2019 | Complied | N |
| IEC 61000-4-4 | Electrical Fast Transient/Burst AC Port | August 11, 2019 | Complied | N |
| IEC 61000-4-4 | Electrical Fast Transient/Burst Signal Port | August 11, 2019 | Complied | N |
| IEC 61000-4-5 | Voltage Surge, AC Port | August 11, 2019 | Complied | N |
| IEC 61000-4-5 | Voltage Surge, Signal Port | August 11, 2019 | Complied | N |
| IEC 61000-4-6 | Conducted RF Immunity, AC Port | August 11, 2019 | Complied | N |
| IEC 61000-4-6 | Conducted RF Immunity, Signal Port | August 11, 2019 | Complied | N |
| IEC 61000-4-8 | Power frequency magnetic field | August 11, 2019 | Complied | N |
| IEC 61000-4-11 | Voltage Dips, Interruptions and Variations | August 11, 2019 | Complied | N |
| Note: Note 1: All the test items and test level were tested according to customer's request. | | | | |

## 1.3 Contract Information

Customer: Beijing HollySys Intelligent Technology Co., Ltd.

No.2, Disheng Middle Road, Economic-Technological Development Area, Beijing, 100176 P.R.China

## 1.4 Test and Support Personnel

Beijing HollySys Intelligent Technology Co., Ltd. .

Address: Block A, Longqi Science and Technology Park, 29 Jinye Yi Road, Yanta District, Xi'an City, Shaanxi Province

Luxinke

Xi’an Yourtest Technology Corp., Ltd.

Address: Aode Industry Park, Num. 16, Zhangba 2th Road, Xi’an Hi-tech Zone

Liuchao

# 2 Equipment Under Test

## 2.1 EUT Identification

The results obtained relate only to the item(s) tested.

**Table 1: Overview of MC2000 Series Motion Controller, Equipment Under Test**

| | |
|---|---|
| **Model(s) Tested:** | MC2000 Series Motion Controller<br>MC2008 |
| **EUT Specifications:** | Primary Power (*as tested*): 24 Vdc from adapter |
| | Equipment Emissions Class: A |
| **Test Date(s):** | August 11, 2019 to August 13, 2019 |

## 2.2 EUT Description

Product Name: MC2000 Series Motion Controller

Trade Name: HollySys

Model No.: MC2008

EUT Rated Voltage: 24 Vdc from adapter

I/O Ports: (1) Power Port*3; (2) RJ45 Port*1; (3) RS232 Port*1; (4) RS485 Port*2; (5) RS422 Port*1; (6) CAN*1; (7) DI Port*24; (8) DO Port*16; (9) AI Port*4; (10) AO Port*8; (11) Servo enable Port*2; (12) Driver Port*8

## Description of the Difference of MC2000 Series Motion Controller Modules

MC2000 series motion controllers include four modules: MC2008, MC2008L, MC2004 and MC2004L. The layout of PCB, the performance index and structures of MC2008, MC2008L, MC2004 and MC2004L are the same . The only differences is the number of interfaces(see the red font in Table 1).

Table 1 MC2008, MC2008L, MC2004, MC2004L interface differences

| Model | DIO | | AIO | | Axis | Communication interface[Note] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DI | DO | AI | AO | | RS232 | RS422 | R485 | CAN | Ethernet |
| MC2008 | 24 | 16 | 4 | 8 | 8 | 1 | 1 | 3 | 1 | 1 |
| MC2008L | 24 | 16 | 0 | 0 | 8 | 1 | 1 | 3 | 1 | 1 |
| MC2004 | 24 | 16 | 2 | 4 | 4 | 1 | 1 | 3 | 1 | 1 |
| MC2004L | 24 | 16 | 0 | 0 | 4 | 1 | 1 | 3 | 1 | 1 |

Note: When using RS422 interface, the number of corresponding RS485 interface is reduced by 1. See the product manual for details.

## 2.3 Test Configuration

The Beijing HollySys Intelligent Technology Co., Ltd. MC2000 Series Motion Controller, Equipment Under Test (EUT), was operated from AC 230V, 50Hz Power Mains.

The MC2000 Series Motion Controller was configured as below:

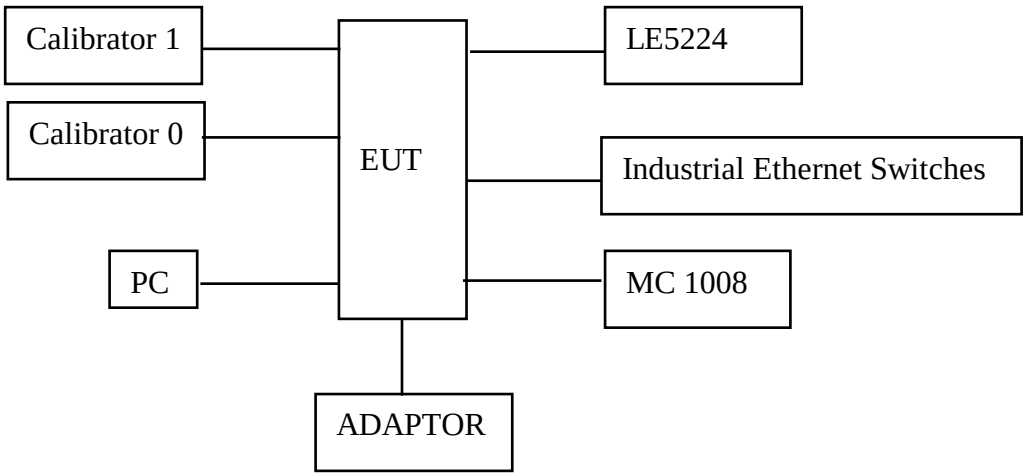



**Figure 1: Test Configuration**

## 2.4 Equipment Configuration

The EUT were set up as outlined in Figure 1. The EUT was comprised of the following equipment. (All Modules, PCBs, etc. listed were considered as part of the EUT, as tested.)

**Table 2: Equipment Configuration**

| Slot # | Name / Description | Model Number | Part Number | Serial Number | Revision |
|---|---|---|---|---|---|
| 1 | MC2000 Series Motion Controller | MC2008, MC2008L, MC2004, MC2004L | / | / | / |

## 2.5 Interface Cables

**Table 3: Interface Cables**

| Slot # | Port Identification | Cable Type | Cable Length | Supplied by |
|---|---|---|---|---|
| 1 | RJ45 Line | Shielded | 3.00m | Yourtest |
| 2 | RJ45 Line | Shielded | 3.00m | Hollysys |
| 3 | Digital DI Line | Unshielded | 2.50m | Hollysys |
| 4 | Digital DO Line | Unshielded | 2.50m | Hollysys |
| 5 | RS422/RS232 Line | Shielded twisted pair | 2.50m | Hollysys |
| 6 | RS485/CAN | Shielded twisted pair | 2.50m | Hollysys |

| | | | | |
|---|---|---|---|---|
| | Line | | | |
| **7** | AI/AO Line | Shielded | 2.50m | Hollysys |
| **8** | LEX5820 Line | Shielded | 2.20m | Hollysys |
| **9** | AXIS Line | Shielded twisted pair | 2.50m | Hollysys |

## 2.6 Support Equipment

The following support equipment was used during testing:

**Table 4: Support Equipment**

| Slot # | Description | Manufacturer | Model No. | Serial Number | Supplied by |
|---|---|---|---|---|---|
| **1** | Motion Controller | Hollysys | MC1008 | -- | Hollysys |
| **2** | Industrial Ethernet Switches | KYLAND | Opal8-8T-LV-LV | SO0K0005A170500139 | Hollysys |
| **3** | 32-channel DO Module | Hollysys | LE5224 | -- | Hollysys |
| **4** | DIN-rail power AC/DC | PULS | QS20.244 | 9867292 | Hollysys |
| **5** | DIN-rail power AC/DC | PULS | QS10.241 | 11248048 | Hollysys |
| **6** | DIN-rail power AC/DC | PULS | QS10.241 | 11648170 | Hollysys |
| **7** | Extremely stable portable calibrator | JINYEE | JY822A | 82202945 | Hollysys |
| **8** | Extremely stable portable calibrator | JINYEE | JY822A | 82202976 | Hollysys |
| **9** | PC | THINK PAD | TP00067A | -- | Hollysys |

## 2.7 EUT Modifications

No modifications were performed in order to meet the test requirements.

## 2.8 Testing Algorithm

The MC2000 Series Motion Controller was operated continuously by normal operating conditions.

Test Configuration: 24V DC power input, data and signals are transmitted between EUT and AE, which are detected by PC .

The test engineer made the decisions by Personal Computer in the test. For example during testing, if the data met the requirements of the table below, and no degradation of performance we would

judge it A; If the data does not meet the requirements of the table below, after the test, the equipment shall continue to operate as intended without user intervention, we would judge it B.

| | |
|---|---|
| Ethernet/Communication | <0.5% |
| AI | 1.0%F.S |
| AO | 0.5%F.S |
| AXIS | No lost |
| DI/DO | No lost |

## 2.9 Test Location

Name: Beijing HollySys Intelligent Technology Co., Ltd.

Address: Block A, Longqi Science and Technology Park, 29 Jinye Yi Road, Yanta District, Xi'an City, Shaanxi Province

Name: Xi'an Yourtest Technology Corp., Ltd.

Address: Aode Industry Park, Num. 16, Zhangba 2th Road, Xi'an Hi-tech Zone

China National Accreditation Service for Conformity Assessment

# LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L11956 )

## Northwestern Lab of Xi'an Yourtest Technology Co., Ltd.

*(Legal Entity: Xi'an Yourtest Technology Co., Ltd.)*

No.16, Zhangba 2nd Road, Hi-tech Zone, Xi'an, Shaanxi, China

***is accredited in accordance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence to undertake the service described in the schedule attached to this certificate.***

***The scope of accreditation is detailed in the attached schedule bearing the same registration number as above. The schedule forms an integral part of this certificate.***

**Effective Date：2019-01-30**

**Expiry Date：2025-01-29**

**Signed on behalf of China National Accreditation Service for Conformity Assessment**

China National Accreditation Service for Conformity Assessment(CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is a signatory of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Laboratory Accreditation Cooperation Mutual Recognition Arrangement (APLAC MRA).
**The validity of the certificate can be checked on CNAS website at http://www.cnas.org.cn/english/findanaccreditedbody/index.shtml**

# 3 Test Deviations and Sequence

## 3.1 Deviations to the Standard

There were no deviations to the requirements established in the specification.

# 4 Performance Criteria

EN 61131-2: 2007:

| Performance criterion | | |
|---|---|---|
| Criterion | Operation | |
| | During test | After test |
| A | The PLC-system shall continue to operate as intended. No loss of function or performance, according to PFVPs (2.5) | The PLC-system shall continue to operate as intended |
| B | Degradation of performance accepted<br>Examples: analogue values vary within manufacturer-specified limits, communication delay times vary within manufacturer-specified limits, flickering on HMI display, etc.<br>No change of operating mode<br>Examples: loss of data or uncorrected errors in communication, unintentional state changes of digital I/O which are seen by the system or test set-up, etc.<br>No irreversible loss of stored data, according to PFVPs (2.5) | The PLC-system shall continue to operate as intended. Temporary degradation of performance must be self-recoverable |
| C | Loss of functions accepted, but no destruction of hardware or software (programme or data) | The PLC-system shall continue to operate as intended automatically, after manual restart or power off/power on |

EN 61000-6-2:2005/AC:2005:

The variety and the diversity of the apparatus within the scope of this standard makes it difficult to define precise criteria for the evaluation of the immunity test results.

If, as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on one of the following criteria for each test as specified in Tables 1 to 4:

a) Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

b) Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either

of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

c) Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

EN 61326-1: 2013:

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

Performance criterion A:

The equipment shall continue to operate as intended during and after the test. 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criterion B:

The equipment shall continue to operate as intended after the test. 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. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

EXAMPLE 1 A data transfer is controlled/checked by parity check or by other means. In the case of malfunctioning, such as caused by a lightning strike, the data transfer will be repeated automatically. The reduced data transfer rate at this time is acceptable.

EXAMPLE 2 During testing, an analogue function value may deviate. After the test, the deviation vanishes.

EXAMPLE 3 In the case of a monitor used only for man-machine monitoring, it is acceptable that some degradation takes place for a short time, such as flashes during the burst application.
EXAMPLE 4 An intended change of the operating state is allowed if self-recoverable.

Performance criterion C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

EXAMPLE 1 In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator.

EXAMPLE 2 After a programme interruption caused by a disturbance, the processor functions of the equipment stops at a defined position and is not left in a "crashed state". The operator's decision prompts may be necessary.

EXAMPLE 3 The test results in an opening of an over-current protection device that is replaced or reset by the operator.

# 5 Test Result

## 5.1 Asymmetric Mode Conducted Emissions

### 5.1.1 Requirements

Test Arrangement: Table Top

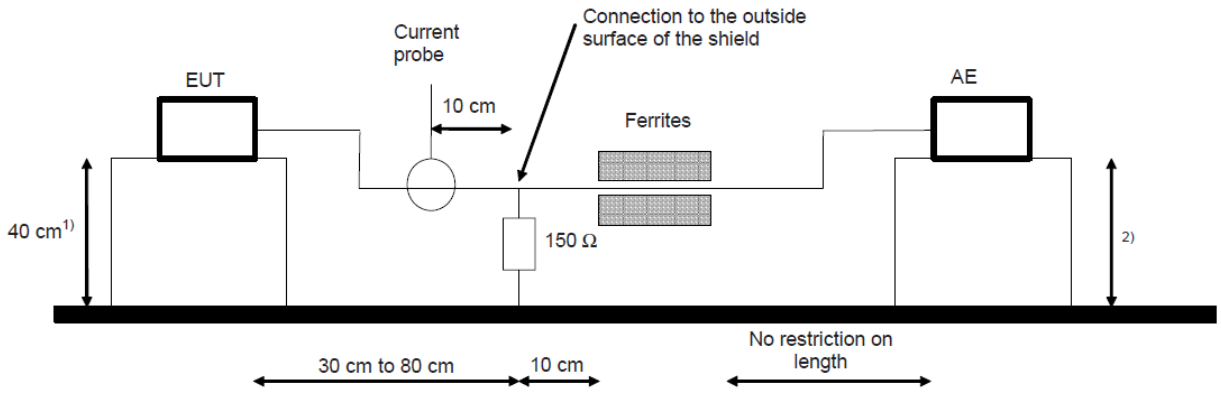
Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-4:2007/A1:2011 Class A

| Compliance Limits | | |
|---|---|---|
| **Frequency** | **Quasi-peak** | **Average** |
| 0.15-0.5MHz<br>0.5-30MHz | 53 to 43 dBμV<br>43 dBμV | 40 to 30dBμV<br>30 dBμV |

### 5.1.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | EMI Receiver | Keysight | N9038A | MY53290026 | January 10, 2019 | January 10, 2020 |
| ☑ | LISN | CYBERTEK | EM5040B | E165040228 | January 14, 2019 | January 14, 2020 |
| ☑ | Current probe | SOLAR | 9215-1N | 219057-4 | September 24, 2018 | September 24, 2020 |

### 5.1.3 Test Setup



### 5.1.4 Test Procedure Summary

The requirements of CISPR 16 call for the EUT to be placed on an 80 cm high 1 X 1.5 m non-conductive table above a ground plane. The peripherals were placed on the table in accordance with EN 61000-6-4.

Break the insulation and connect a 150 Ω resistor from the outside surface of the shield to ground.

Apply a ferrite tube or clamp between 150 Ω connection and AE.

Measure current with a current probe and compare to the current limit. The common mode impedance towards the right of the 150 Ω resistor shall be sufficiently large as not to affect the measurement.

The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

### 5.1.5 Measurement Method

All emission measurements herein were performed to EN 61000-6-4. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

### 5.1.6 Results Summary

The EUT complied with the emission requirements throughout the test.

Table 5 provides the test results for asymmetric mode conducted emissions.

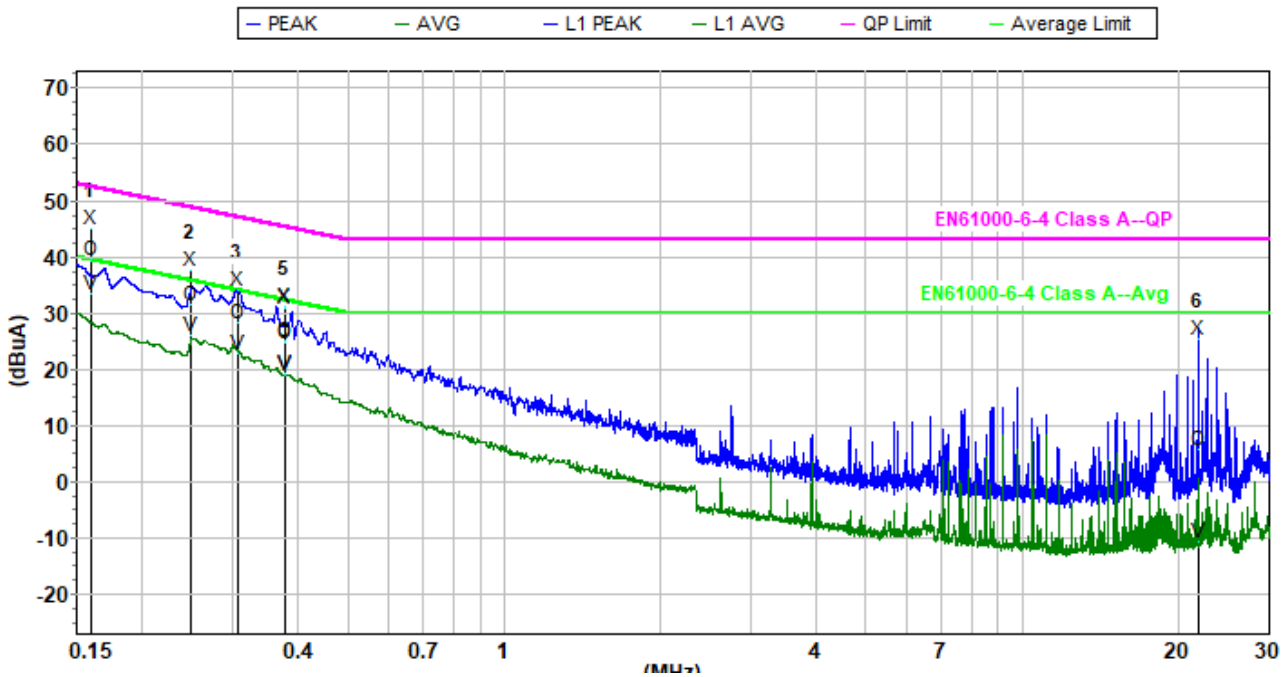
Photograph 1 show the asymmetric mode conducted emissions test configuration.

### 5.1.7 Areas of Concern

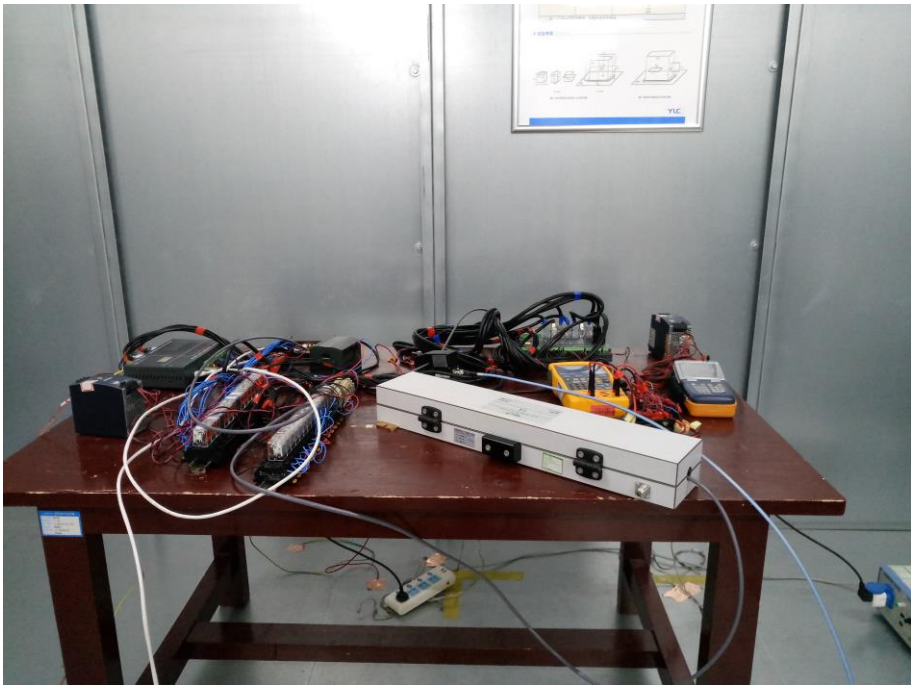
None.

Table 5: Asymmetric Mode Conducted Emissions Test Data

**Quasi Peak:**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.159560 | 23.5 | 15.9 | 39.4 | 52.5 | -13.1 | QP |
| 2 | 0.248416 | 19.3 | 12.3 | 31.6 | 48.8 | -17.2 | QP |
| 3* | 0.307795 | 17.4 | 10.9 | 28.3 | 47.0 | -18.7 | QP |
| 4 | 0.378228 | 15.9 | 9.2 | 25.1 | 45.3 | -20.2 | QP |
| 5 | 0.379760 | 15.8 | 9.1 | 24.9 | 45.3 | -20.4 | QP |
| 6 | 21.837404 | 18.6 | -12.9 | 5.7 | 43.0 | -37.3 | QP |
| 1 | 0.159560 | 17.7 | 15.9 | 33.6 | 39.5 | -5.9 | Average |
| 2 | 0.248416 | 13.6 | 12.3 | 25.9 | 35.8 | -9.9 | Average |
| 3* | 0.307795 | 11.8 | 10.9 | 22.7 | 34.0 | -11.3 | Average |
| 4 | 0.378228 | 10.1 | 9.2 | 19.3 | 32.3 | -13.0 | Average |
| 5 | 0.379760 | 10.0 | 9.1 | 19.1 | 32.3 | -13.2 | Average |
| 6 | 21.837404 | 2.2 | -12.9 | -10.7 | 30.0 | -40.7 | Average |



Photograph 1: Asymmetric Mode Conducted Emissions Test Configuration

## 5.2 Conducted Emissions from The AC Mains Power Ports

### 5.2.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-4:2007/A1:2011

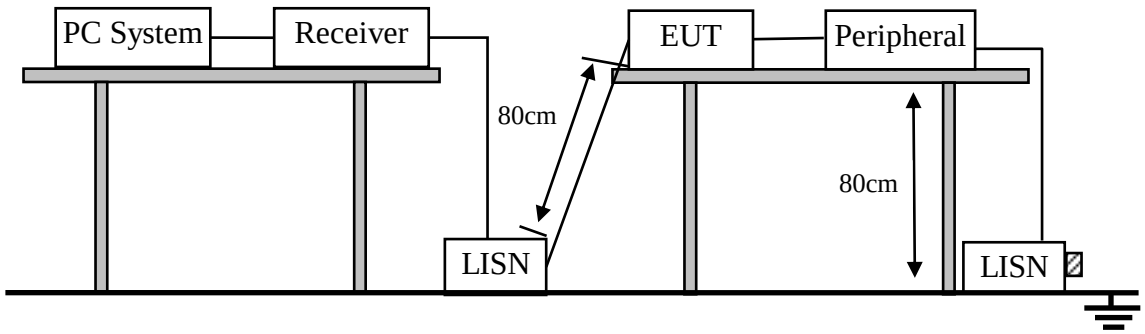
Class A

| Compliance Limits | | |
|---|---|---|
| **Frequency** | **Quasi-peak** | **Average** |
| 0.15-0.5MHz | 79dBμV | 66dBμV |
| 0.5-30 MHz | 73dBμV | 60dBμV |

### 5.2.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | EMI Receiver | Keysight | N9038A | MY53290026 | January 10, 2019 | January 10, 2020 |
| ☑ | LISN | CYBERTEK | EM5040B | E165040228 | January 14, 2019 | January 14, 2020 |
| ☐ | Attenuator | HUAXIANG | DTS200-20dB-1G | 17092508 | August 29, 2018 | August 28, 2020 |
| ☐ | Current probe | SOLAR | 9215-1N | 219057-4 | September 24, 2018 | September 24, 2020 |

### 5.2.3 Test Setup




☒ :50Ω Terminator

### 5.2.4 Test Procedure Summary

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted

interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to EN 61000-6-4:2007/A1:2011 Class A on conducted Emission test.

The bandwidth of test receiver (R & S ESCI) is set at 9kHz.
The frequency range from 150kHz to 30MHz is checked.

5.2.5 Measurement Method

All emission measurements herein were performed to EN 61000-6-4. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

5.2.6 Results Summary

Table 6 provides the test results for conducted emissions from the AC mains power ports. Photograph 2, 3 show the conducted emissions from the AC mains power ports test configuration.

5.2.7 Areas of Concern

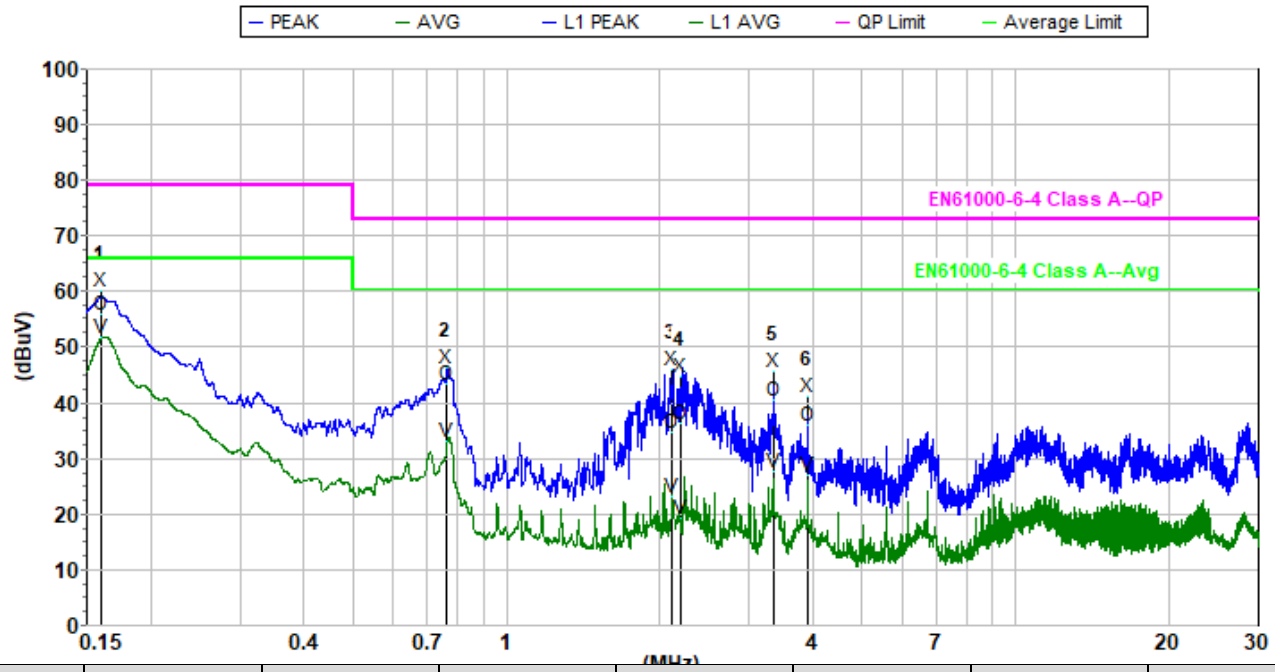
None.

## Table 6: Conducted Emissions From The AC Mains Power Ports Test Data

**Quasi Peak and Average:**

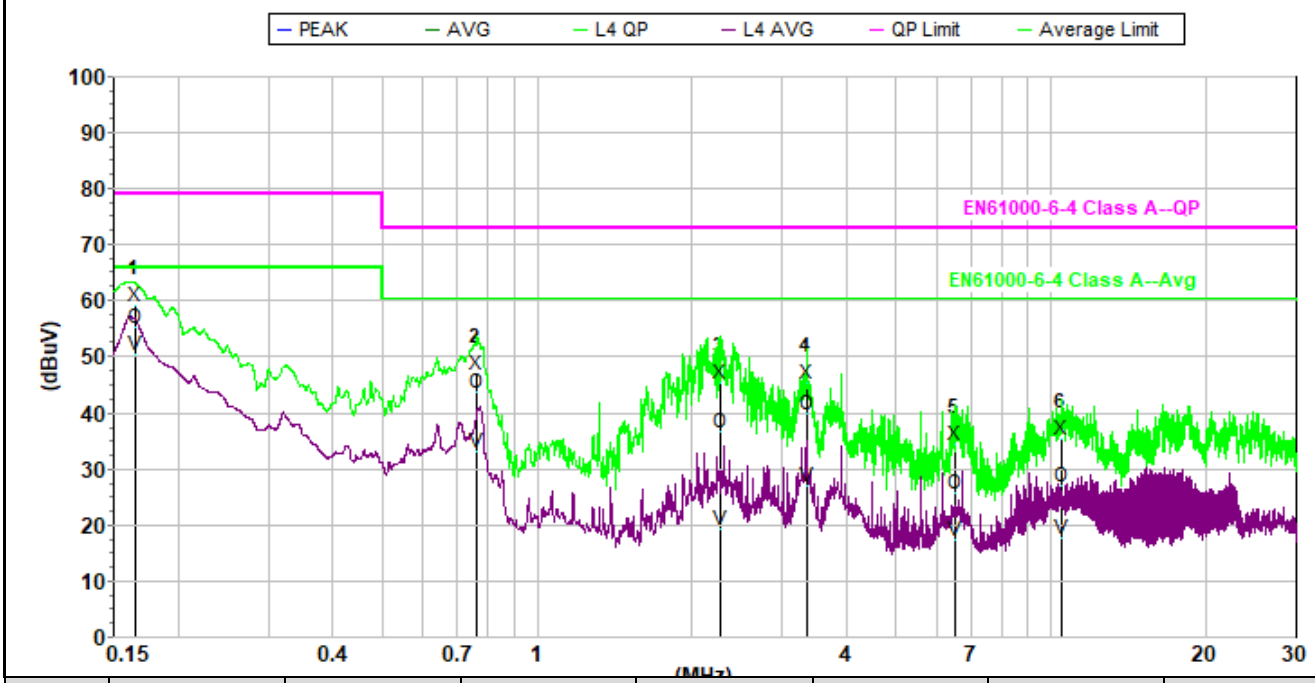
**230V~ 50Hz**

**Live Line**



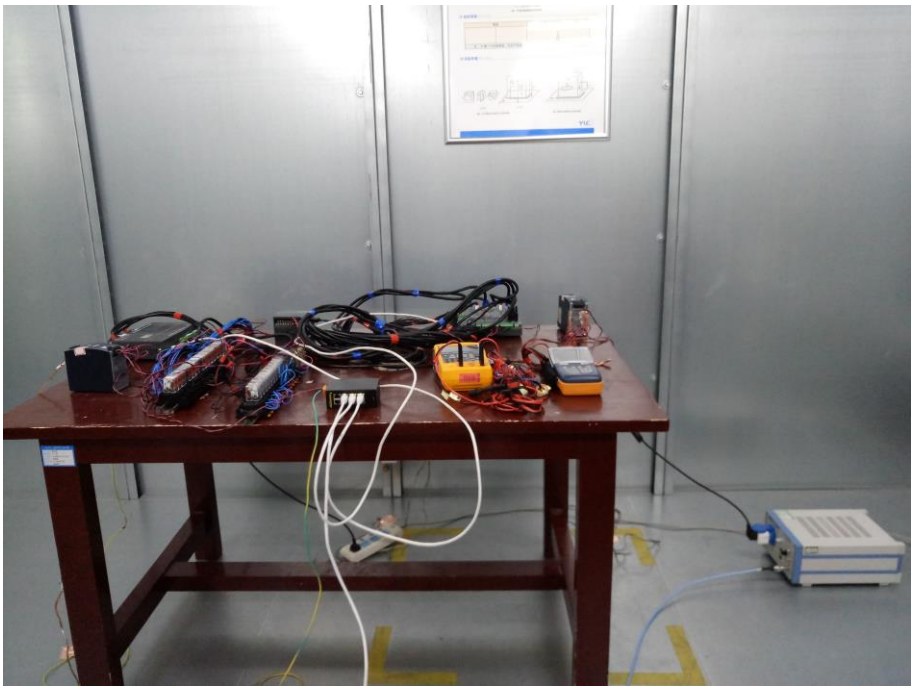

| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.160602 | 46.5 | 9.5 | 56.0 | 79.0 | -23.0 | QP |
| 2 | 0.764964 | 33.9 | 9.6 | 43.5 | 73.0 | -29.5 | QP |
| 3 | 2.116068 | 25.2 | 9.6 | 34.8 | 73.0 | -38.2 | QP |
| 4 | 2.208376 | 26.6 | 9.6 | 36.2 | 73.0 | -36.8 | QP |
| 5 | 3.354140 | 30.9 | 9.6 | 40.5 | 73.0 | -32.5 | QP |
| 6 | 3.913816 | 26.3 | 9.6 | 35.9 | 73.0 | -37.1 | QP |
| 1 | 0.160602 | 42.3 | 9.5 | 51.8 | 66.0 | -14.2 | Average |
| 2 | 0.764964 | 23.4 | 9.6 | 33.0 | 60.0 | -27.0 | Average |
| 3 | 2.116068 | 13.7 | 9.6 | 23.3 | 60.0 | -36.7 | Average |
| 4 | 2.208376 | 9.6 | 9.6 | 19.2 | 60.0 | -40.8 | Average |
| 5 | 3.354140 | 18.2 | 9.6 | 27.8 | 60.0 | -32.2 | Average |
| 6 | 3.913816 | 17.5 | 9.6 | 27.1 | 60.0 | -32.9 | Average |

**Neutral Line**

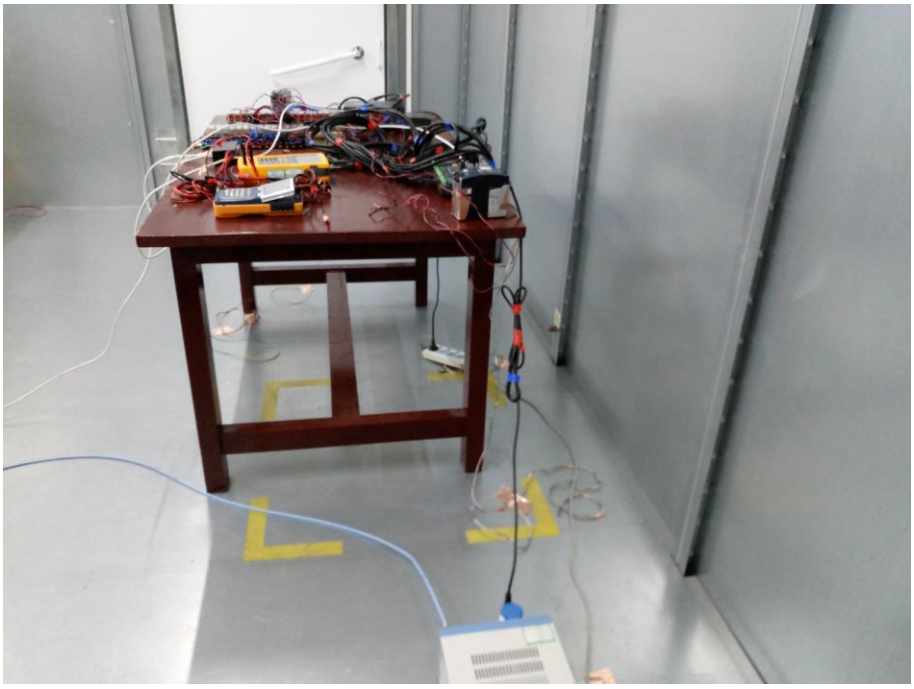



| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.165930 | 45.8 | 9.5 | 55.3 | 79.0 | -23.7 | QP |
| 2 | 0.763848 | 34.1 | 9.6 | 43.7 | 73.0 | -29.3 | QP |
| 3* | 2.265500 | 27.2 | 9.6 | 36.8 | 73.0 | -36.2 | QP |
| 4 | 3.353092 | 30.4 | 9.6 | 40.0 | 73.0 | -33.0 | QP |
| 5 | 6.518160 | 16.0 | 9.7 | 25.7 | 73.0 | -47.3 | QP |
| 6 | 10.520804 | 17.3 | 9.8 | 27.1 | 73.0 | -45.9 | QP |
| 1 | 0.165930 | 41.1 | 9.5 | 50.6 | 66.0 | -15.4 | Average |
| 2 | 0.763848 | 23.4 | 9.6 | 33.0 | 60.0 | -27.0 | Average |
| 3* | 2.265500 | 9.7 | 9.6 | 19.3 | 60.0 | -40.7 | Average |
| 4 | 3.353092 | 17.3 | 9.6 | 26.9 | 60.0 | -33.1 | Average |
| 5 | 6.518160 | 7.7 | 9.7 | 17.4 | 60.0 | -42.6 | Average |
| 6 | 10.520804 | 7.9 | 9.8 | 17.7 | 60.0 | -42.3 | Average |

Remark:
1. Margin(dB) = Result – Limit.
2. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



**Photograph 2: Conducted Emissions From The AC Mains Power Ports Test Configuration, Front**



**Photograph 3: Conducted Emissions From The AC Mains Power Ports Test Configuration, Side**

## 5.3 Radiated Emissions

### 5.3.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-4:2007/A1:2011 Class A

| Class A Compliance Limits (3m) | |
|---|---|
| **Frequency** | **Limits** |
| 30-230MHz | 50dBμV/m |
| 230-1000MHz | 57dBμV/m |
| 1000-3000 MHz | 76dBμV/m(Peak) 56dBμV/m(Average) |
| 3000-6000 MHz | 80dBμV/m(Peak) 60dBμV/m(Average) |

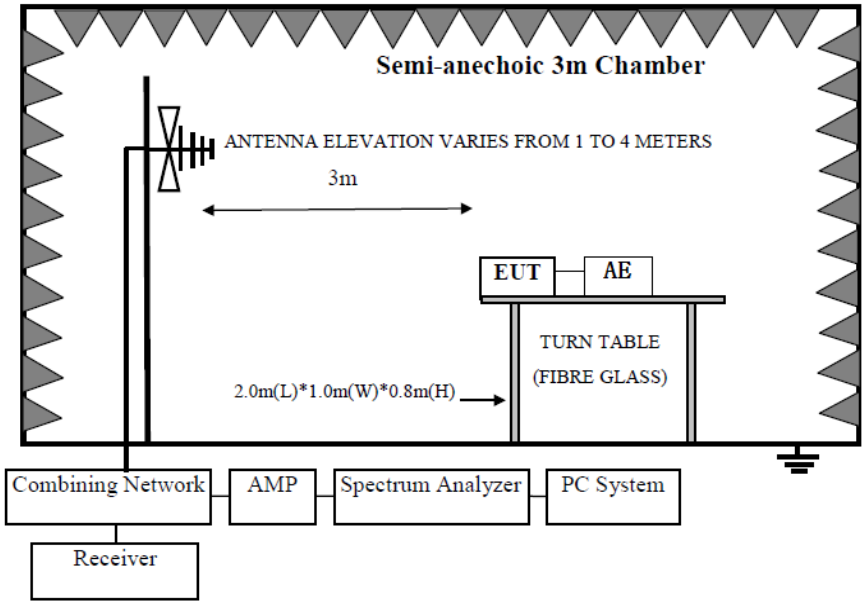
### 5.3.2 Test Equipment

For frequency range 30MHz~6000MHz (In 3m Anechoic Chamber)

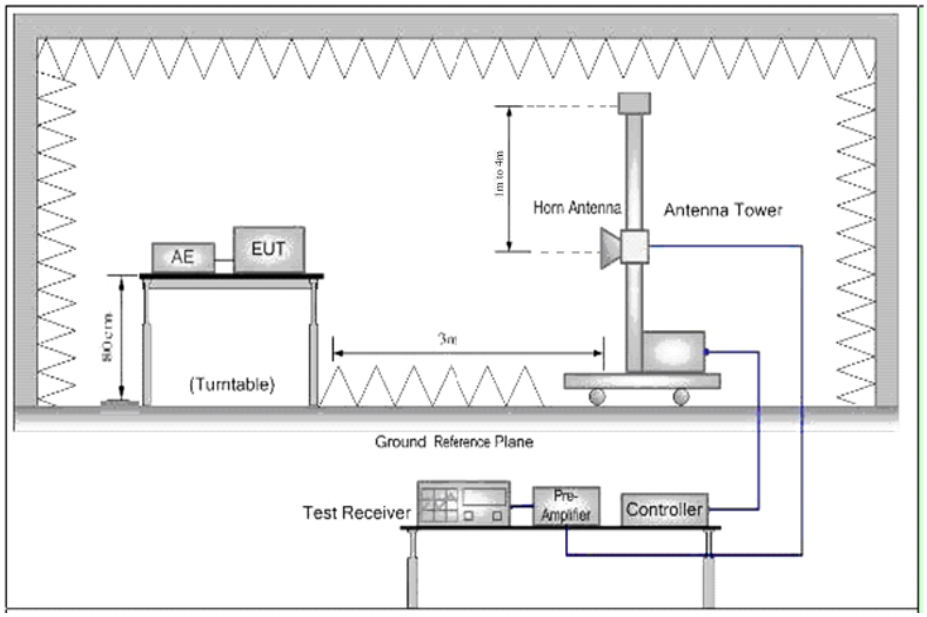
| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | EMI Receiver | Keysight | N9038A | MY53290026 | January 10, 2019 | January 10, 2020 |
| ☑ | Composite antenna | ETS | 3142E | 00217553 | August 29, 2018 | August 29, 2019 |
| ☑ | Preamplifier | YLC | YLCPreA-1G18-40 | YLCPreA-2017-09-002 | January 10, 2019 | January 10, 2020 |

### 5.3.3 Test Setup

Below 1GHz



Above 1GHz:




5.3.4 Test Procedure Summary

The system was configured at the 3 meter semi-chamber on an 80 cm high 1 X 2.0 m non-conductive table above a ground plane a turntable. During test the system under test was rotated 360 ° while the antenna was varied in height from 1 to 4 meters. The system under test was examined for emissions with both horizontal and vertical antenna polarizations.

5.3.5 Measurement Method

All emission measurements herein were performed according to EN 61000-6-4:2007/A1:2011. Calibration

checks are made periodically to verify proper performance of the measuring instrumentation.

5.3.6 Radiated Data Reduction and Reporting

To convert the EMI Receiver radiated data into a form that can be compared with the limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included the antenna factor (AF) and the cable factor (CF). The AF (in dB/m) and the CF (in dB) is algebraically added to the EMI Receiver Voltage in dBµV to obtain the Radiated Electric Field in dBµV/m.

The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the data is given as follows:

| | | |
|---|---|---|
| Example: | EMI Receiver Voltage: | VdBµV |
| | Antenna Correction Factor: | AFdB/m |
| | Cable Correction Factor: | CFdB |
| | Amplifier Gain: | AGdB |

| | |
|---|---|
| Standard Limits: | LdBµV/m |
| Electric Field: | EdBµV/m = V dBµV + AFdB/m + CFdB- AGdB |
| Margin: | dB = EdBµV/m - LdBµV/m |

5.3.7 Results Summary

The EUT complied with the emission requirements throughout the test.

Table 7 provide the test results for radiated emissions.

Photograph 4, 5 show the radiated emission test configuration.

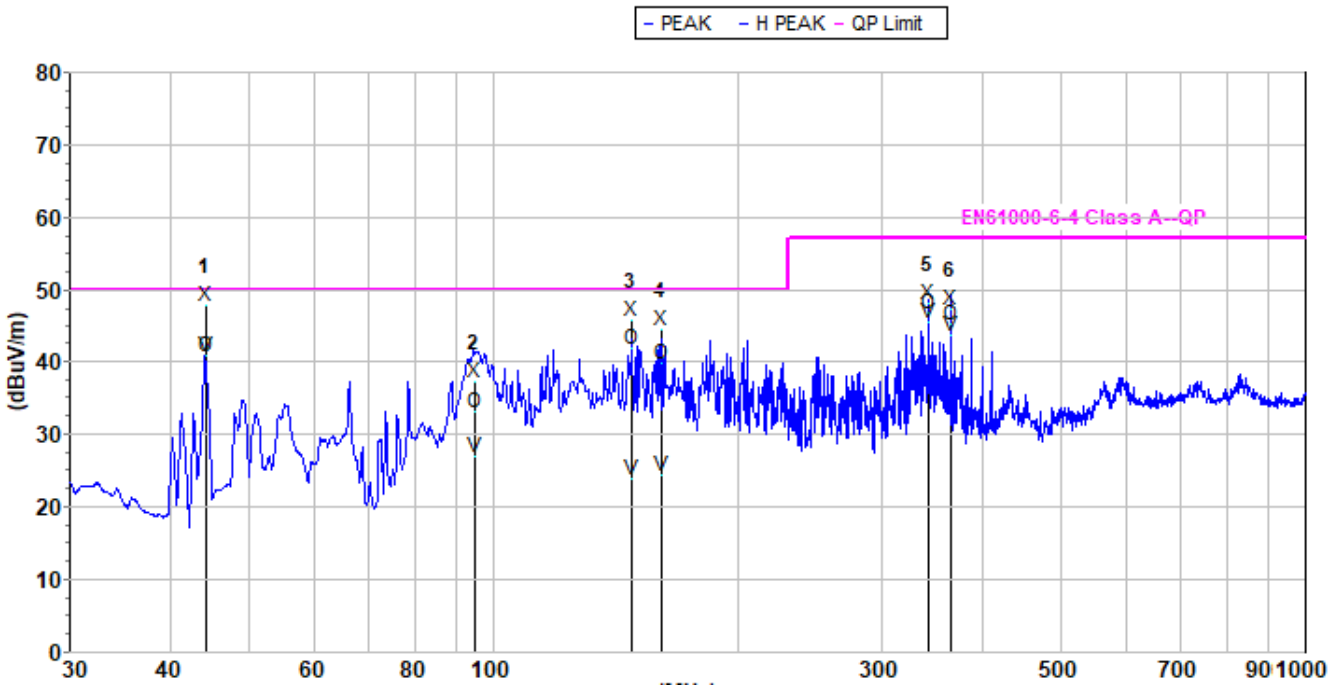
5.3.8 Areas of Concern

None.

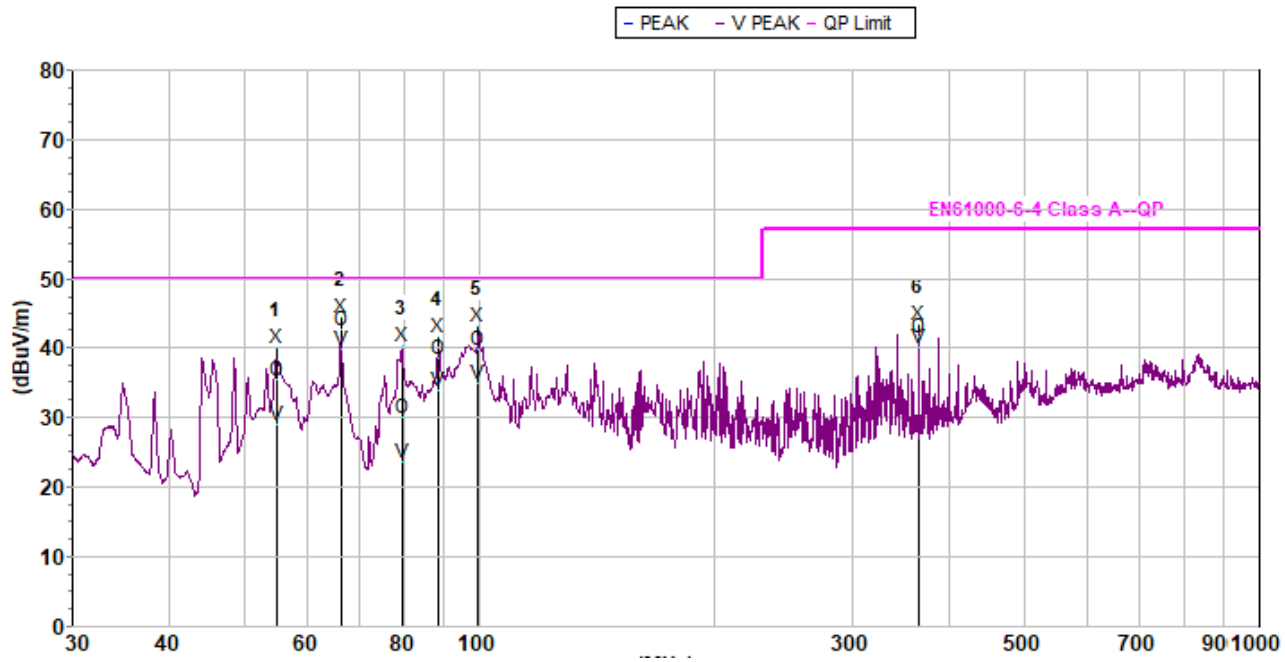
## Table 7: Radiated Emission Test Data – Below 1GHz

**Below 1GHz(Quasi Peak):**
**230V~ 50Hz**
**Horizontal**



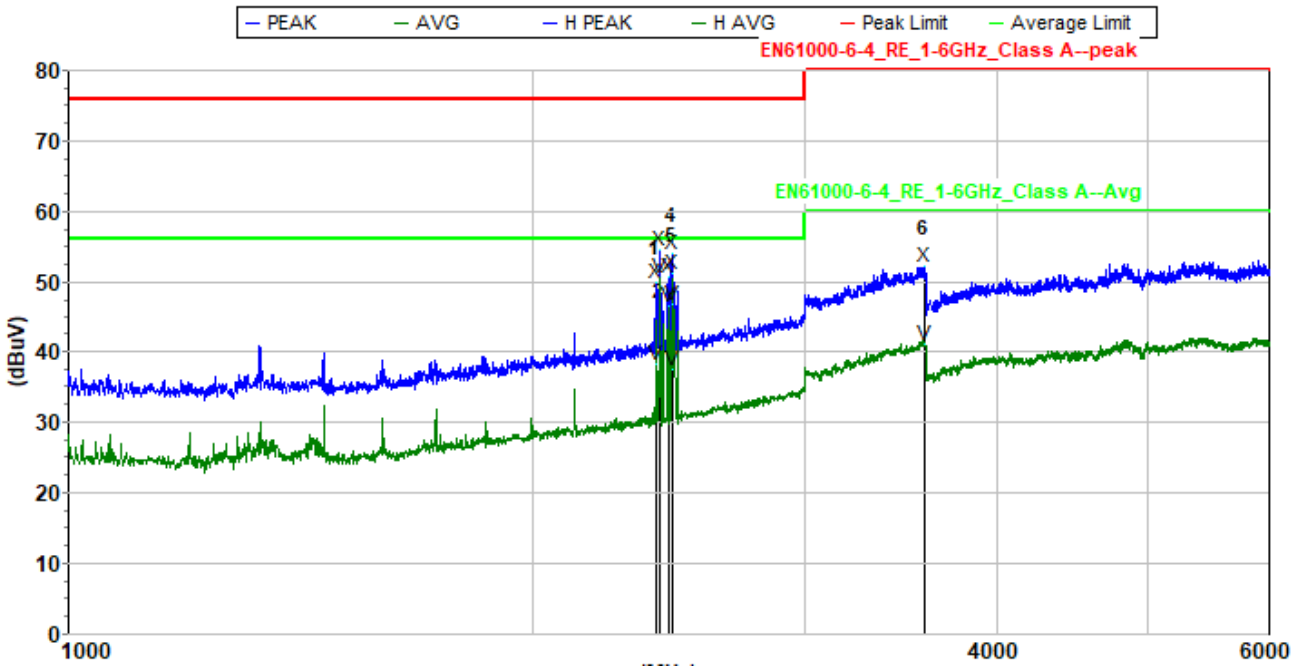

| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 44.239998 | 32.0 | 9.0 | 41.0 | 50.0 | -9.0 | QP |
| 2 | 94.461274 | 25.1 | 8.2 | 33.3 | 50.0 | -16.7 | QP |
| 3 | 147.765265 | 31.9 | 10.0 | 41.9 | 50.0 | -8.1 | QP |
| 4 | 160.697500 | 29.6 | 10.3 | 39.9 | 50.0 | -10.1 | QP |
| 5 | 343.575108 | 30.0 | 16.7 | 46.7 | 57.0 | -10.3 | QP |
| 6 | 365.740428 | 27.5 | 17.8 | 45.3 | 57.0 | -11.7 | QP |

**Vertical**



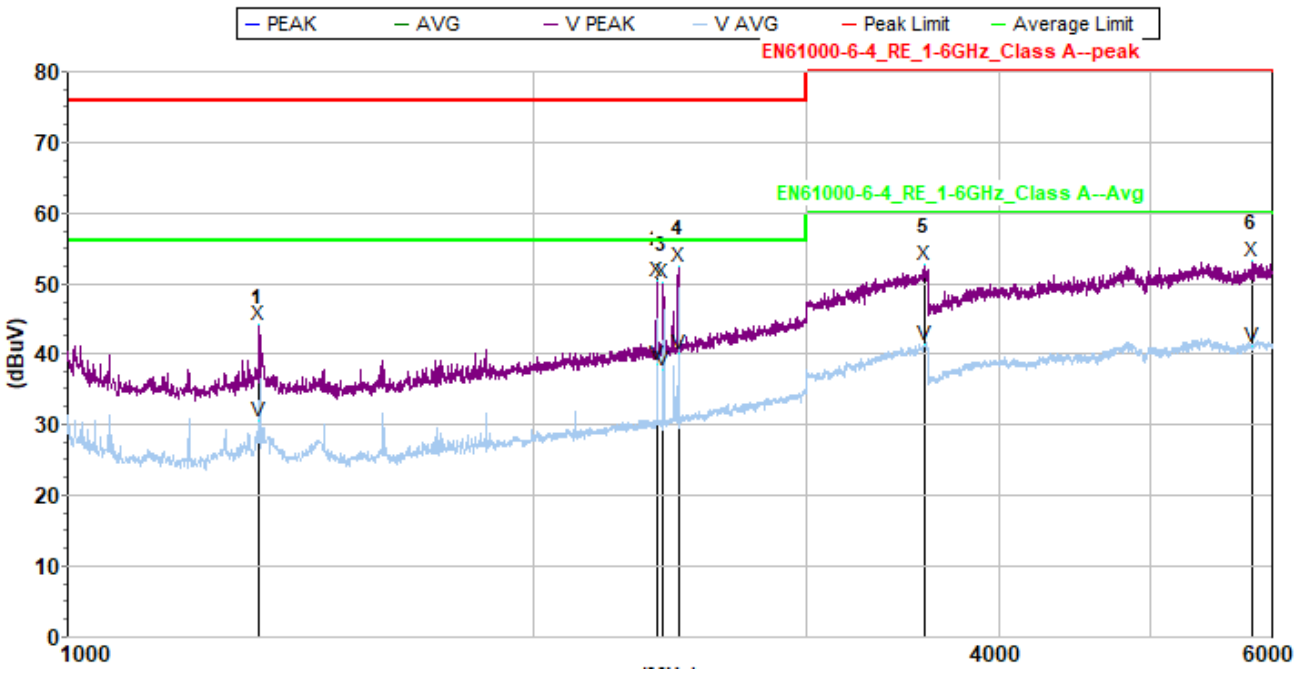

| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 54.766952 | 28.4 | 7.0 | 35.4 | 50.0 | -14.6 | QP |
| 2 | 66.357847 | 35.5 | 7.1 | 42.6 | 50.0 | -7.4 | QP |
| 3 | 79.394847 | 23.1 | 7.1 | 30.2 | 50.0 | -19.8 | QP |
| 4 | 88.478459 | 30.8 | 7.8 | 38.6 | 50.0 | -11.4 | QP |
| 5 | 99.492530 | 31.3 | 8.6 | 39.9 | 50.0 | -10.1 | QP |
| 6 | 365.739228 | 23.8 | 17.8 | 41.6 | 57.0 | -15.4 | QP |

**Above 1GHz(Peak & Average)**
**Mode1(230V~ 50Hz)**
**Horizontal**



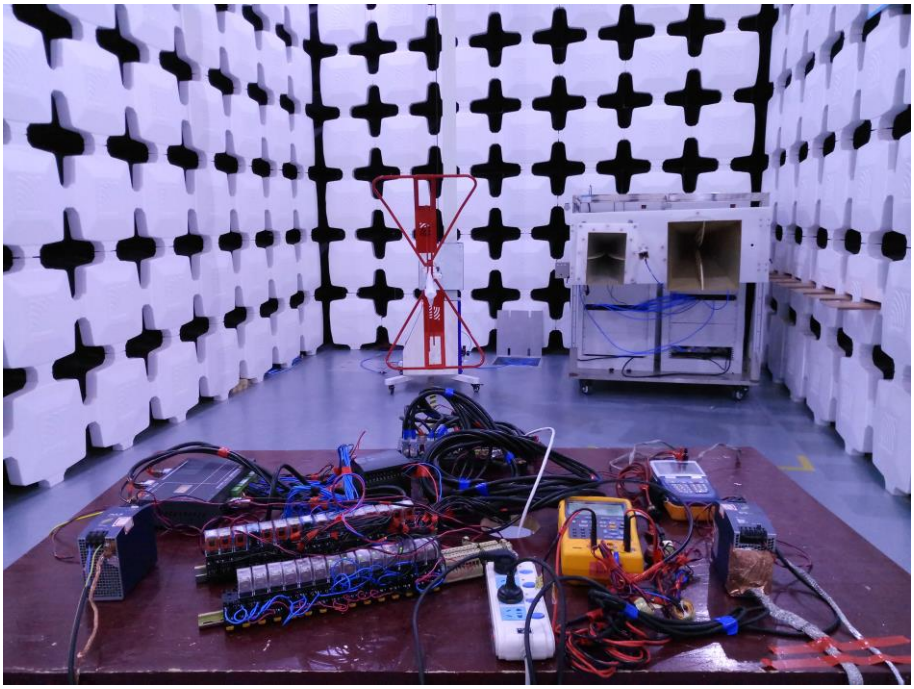

| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 2401.986000 | 16.2 | 33.1 | 49.3 | 76.0 | -26.7 | Peak |
| 2 | 2416.256000 | 10.0 | 33.1 | 43.1 | 76.0 | -32.9 | Peak |
| 3 | 2448.000000 | 17.6 | 33.2 | 50.8 | 76.0 | -25.2 | Peak |
| 4 | 2460.000000 | 20.6 | 33.4 | 54.0 | 76.0 | -22.0 | Peak |
| 5 | 2464.000000 | 17.7 | 33.4 | 51.1 | 76.0 | -24.9 | Peak |
| 6 | 3585.000000 | 13.7 | 38.5 | 52.2 | 80.0 | -27.8 | Peak |
| 1 | 2401.986000 | -4.7 | 33.1 | 28.4 | 56.0 | -27.6 | Avg |
| 2 | 2416.256000 | -5.0 | 33.1 | 28.1 | 56.0 | -27.9 | Avg |
| 3 | 2448.000000 | 13.4 | 33.2 | 46.6 | 56.0 | -9.4 | Avg |
| 4 | 2460.000000 | 13.4 | 33.4 | 46.8 | 56.0 | -9.2 | Avg |
| 5 | 2464.000000 | 4.2 | 33.4 | 37.6 | 56.0 | -18.4 | Avg |
| 6 | 3585.000000 | 2.7 | 38.5 | 41.2 | 60.0 | -18.8 | Avg |

**Vertical**

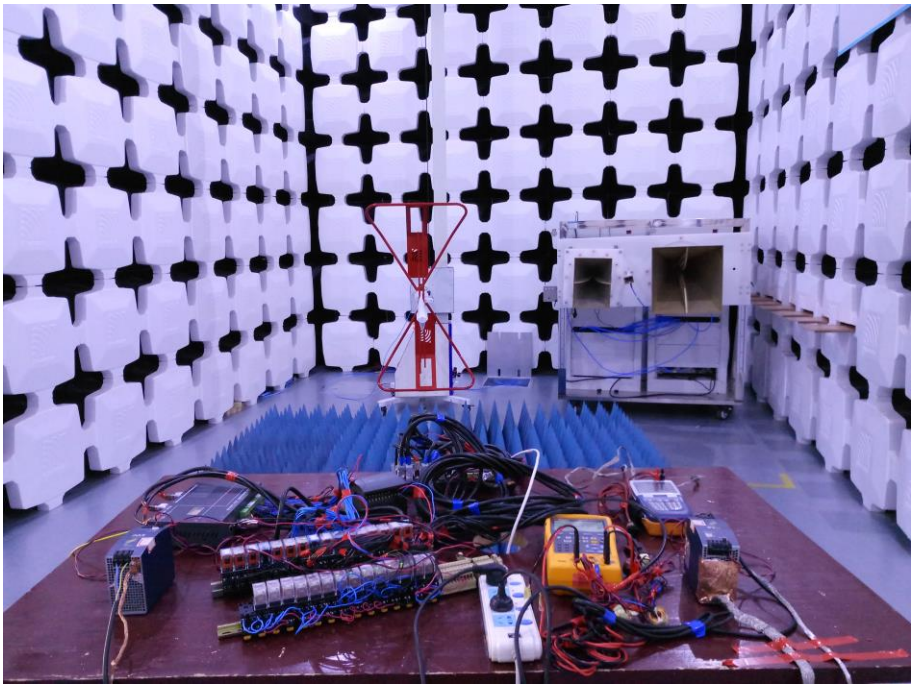



| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 1329.956000 | 15.3 | 27.4 | 42.7 | 76.0 | -33.3 | Peak |
| 2 | 2401.910000 | 17.9 | 33.1 | 51.0 | 76.0 | -25.0 | Peak |
| 3 | 2426.000000 | 17.1 | 33.1 | 50.2 | 76.0 | -25.8 | Peak |
| 4 | 2480.000000 | 19.0 | 33.4 | 52.4 | 76.0 | -23.6 | Peak |
| 5 | 3582.000000 | 14.3 | 38.5 | 52.8 | 80.0 | -27.2 | Peak |
| 6 | 5820.000000 | 6.1 | 47.2 | 53.3 | 80.0 | -26.7 | Peak |
| 1 | 1329.956000 | 2.1 | 27.4 | 29.5 | 56.0 | -26.5 | Avg |
| 2 | 2401.910000 | -4.6 | 33.1 | 28.5 | 56.0 | -27.5 | Avg |
| 3 | 2426.000000 | 4.7 | 33.1 | 37.8 | 56.0 | -18.2 | Avg |
| 4 | 2480.000000 | 6.6 | 33.4 | 40.0 | 56.0 | -16.0 | Avg |
| 5 | 3582.000000 | 2.9 | 38.5 | 41.4 | 60.0 | -18.6 | Avg |
| 6 | 5820.000000 | -6.0 | 47.2 | 41.2 | 60.0 | -18.8 | Avg |

Remark:
1. Margin(dB) = Result – Limit.
2. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



**Photograph 4: Radiated Emission Test Configuration, Below 1GHz**



**Photograph 5: Radiated Emission Test Configuration, Above 1GHz**

## 5.4 Harmonic Current Test

### 5.4.1 Requirements

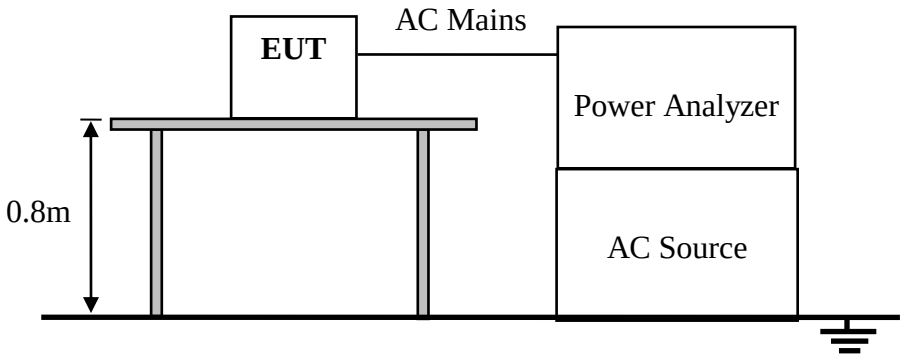
Test Arrangement: Table Top

Reference Standard: EN 61000-3-2

### 5.4.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | 5KVA AC POWER SOURCE | California instruments | 5001iX+CTS-411 | 56178 | May 27, 2019 | May 27, 2020 |
| ☑ | Flicker & Harmonic Tester | California instruments | PACS-1 | 72333 | May 24, 2019 | May 24, 2020 |

### 5.4.3 Test Setup




### 5.4.4 Test Procedure Summary

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5.4.5 Limits of Harmonic Current

| Limits for Class A equipment | |
|---|---|
| **Harmonic ordern** | **Maximum permissible Harmonic current A** |
| Odd harmonics | |
| 3 | 2,30 |
| 5 | 1,14 |
| 7 | 0,77 |
| 9 | 0,40 |
| 11 | 0,33 |
| 13 | 0,21 |
| 15≤n≤39 | $0{,}15\ \frac{15}{n}$ |
| Even harmonics | |
| 2 | 1,08 |
| 4 | 0,43 |
| 6 | 0,30 |
| 8≤n≤40 | $0{,}23\ \frac{8}{n}$ |

Remark: if the EUT Power level is below 75 Watts and therefore has no defined limits.

5.4.6 Test Results

Since the EUT is DC power supply, the test item is not applicable.

5.4.7 Areas of Concern

None.

## 5.5 Voltage Fluctuations & Flicker

5.5.1 Requirements

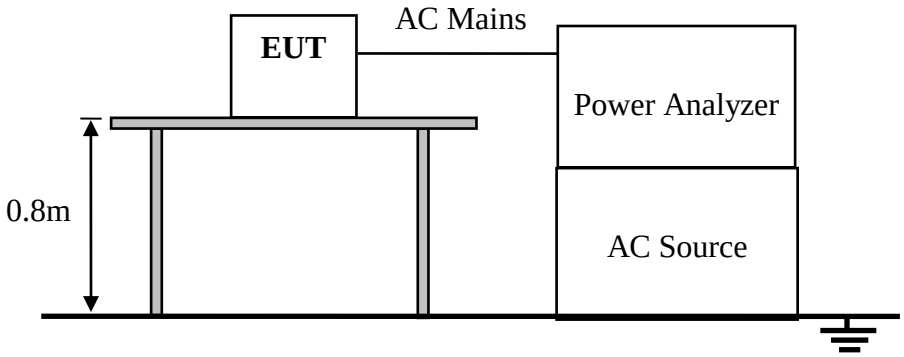
Test Arrangement: Table Top

Reference Standard: EN 61000-3-3:2013

5.5.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | 5KVA AC POWER SOURCE | California instruments | 5001iX+CTS-411 | 56178 | May 27, 2019 | May 27, 2020 |
| ☑ | Flicker & Harmonic Tester | California instruments | PACS-1 | 72333 | May 24, 2019 | May 24, 2020 |

5.5.3 Test Setup




5.5.4 Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5.5.5 Limits of Voltage Fluctuation and Flick

| Test Item | Limit | Note |
|---|---|---|
| $P_{st}$ | 1.0 | $P_{st}$ means Short-term flicker indicator |
| $P_{lt}$ | 0.65 | $P_{lt}$ means long-term flicker indicator |
| $T_{max}$ | 500ms | $T_{max}$ means maximum time that d(t) exceeds 3.3% |
| $d_{max}$(%) | 4% | $d_{max}$ means maximum relative voltage change. |
| AC(%) | 3.3% | AC means relative steady-state voltage change. |

### 5.5.6 Test Results

Since the EUT is DC power supply, the test item is not applicable.

### 5.5.7 Areas of Concern

None.

## 5.6 Electrostatic Discharge

### 5.6.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

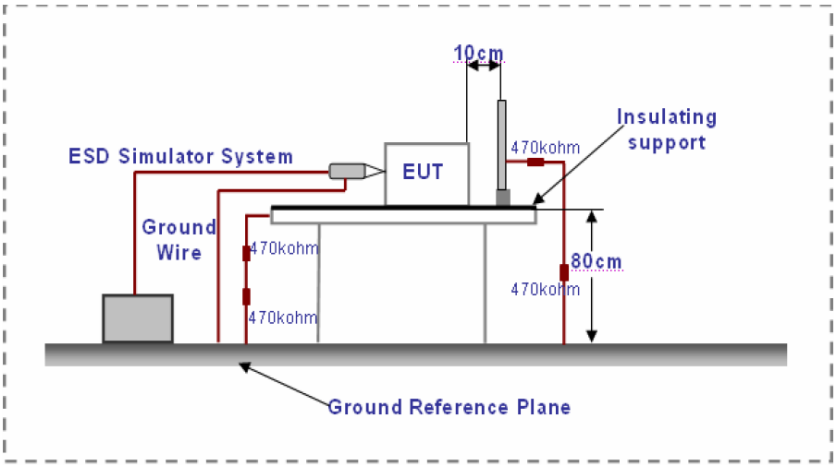
Reference Standard: IEC 61000-4-2: 2008

Compliance Limits: Air = ±8kV; Contact = ±6kV; Performance Criterion B

### 5.6.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | ESD Generator | 3ctest | EDS 30T | ES0131722 | January 5, 2018 | January 4, 2020 |

### 5.6.3 Test Setup




### 5.6.4 Test Procedure Summary

The requirements of EN 61000-6-2 (IEC 61000-4-2:2008) call out an Electrostatic Discharge (ESD) test level and procedure. The intent of this test is to determine the effect of electrostatic discharge events on equipment operation. ESD is the result of potential build-up and the subsequent rapid discharge and equalization of that potential. The result of the discharge is a transient waveform that produces peak voltages up to tens of kilovolts, peak currents of a few amperes, and rise times on the order of a few nanoseconds (ns). This discharge may produce malfunction and damage to sensitive electronic equipment.

Table-top EUTs are placed on a Horizontal Coupling Plane (HCP) and isolated from it by 0.5mm. The HCP was connected to a Ground Reference Plane (GRP) via a bonding strap with 470k-ohm resistors located at each end. When the Vertical Coupling Plane (VCP) was used, it was also connected to the GRP with a second bonding strap with 470k-ohm resistors located at each end. The VCP is located 10 cm from the EUT for test. The earth cable of the ESD generator was attached to the GRP.

Contact discharge points were metallic points on the EUT that are subject to contact by operators or maintenance personnel. Air discharge points were non-conductive surfaces, indicators, and other points subject to contact.

The voltage was stepped at 6 kV for contact discharge and 8 kV for air discharges. The ESD simulator was then set at the test voltage and applied 10 times (positive and negative) at intervals of one second at each discharge test point. Two ESD modes were applied: direct application of the discharge to the EUT, and indirect application of the discharge to the horizontal and vertical coupling planes. Direct application simulates a static discharge to the EUT itself and indirect application simulates a static discharge to objects placed or installed near the EUT.

**Environmental Conditions during Electrostatic Discharge Testing**

| | |
|---|---|
| **Ambient Temperature:** | 26 ℃ |
| **Relative Humidity:** | 48 % |

5.6.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 8 shows the ESD test results.

Photograph 6 show the test configuration.

5.6.6 Areas of Concern

None.

## Table 8: ESD Test Results

| | | | | | |
|---|---|---|---|---|---|
| Applicant | : | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date | : | August 12, 2019 |
| EUT | : | MC2000 Series Motion Controller | Temperature | : | 26 ℃ |
| M/N | : | MC2008 | Humidity | : | 48 % |
| Test Voltage | : | AC 230V/50Hz | Test Mode | : | Running |
| Test Engineer | : | Chao Liu | Pressure | : | 100.1KPa |
| Required Performance | : | **B** | Actual Performance | : | **A** |

| Discharge Type | Applied Voltage | Pulse No. | Result |
|---|---|---|---|
| Contact Discharge | ±6 kV | 10 for every level | A |
| Air Discharge | ±8 kV | 10 for every level | A |
| Indirect HCP Discharge | ±6 kV | 10 for every level | A |
| Indirect VCP Discharge | ±6 kV | 10 for every level | A |

**Photograph 6: ESD Test Configuration**

## 5.7 Radiated RF Susceptibility

5.7.1 Requirements

Test Arrangement : Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

Reference Standard: IEC 61000-4-3:2010

Compliance Limits:

80MHz-1GHz, 10V/m (80%AM, 1kHz),

1.4 GHz -2 GHz, 10V/m (80%AM, 1kHz),

2 GHz -6 GHz, 10V/m (80%AM, 1kHz)

Performance Criterion A

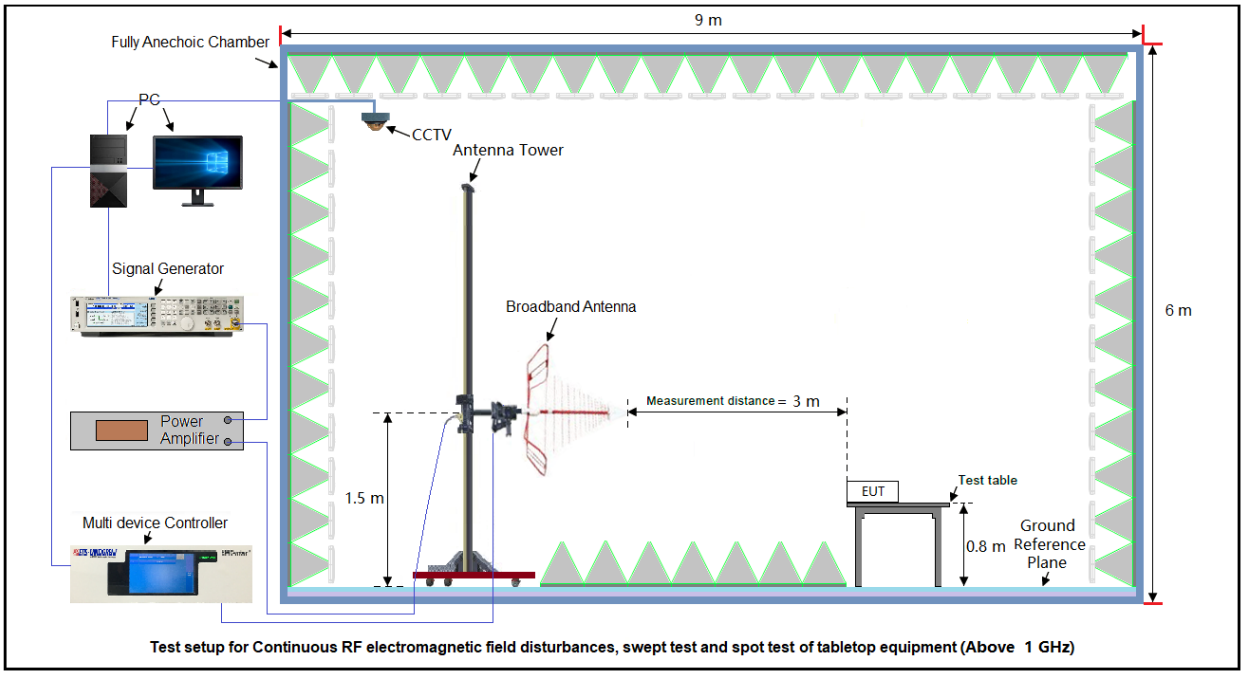
5.7.2 Test Equipment

For RF Strength Susceptibility Test (80-6000MHz)

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | RF Signal Source | R&S | SMC100A | 1411.4002K02 -106355-Yi | April 22, 2019 | April 22, 2020 |
| ☑ | Signal Generator | R&S | SMB100A | 1406.6000K03 -180401-Gg | April 22, 2019 | April 22, 2020 |
| ☑ | Power Meter | R&S | NRP2 | 1144.1374K02 -103709-XR | November 5, 2018 | November 5, 2019 |
| ☑ | Power Meter | R&S | NRP2 | 1144.1374K02 -103880-Dh | November 5, 2018 | November 5, 2019 |
| ☑ | Power Amplifier | NT | NTWPAS-0081020007 00E | 17063169 | N/A | N/A |
| ☑ | Power Amplifier | NT | NTWPA-00825250 | 17063175 | N/A | N/A |
| ☑ | Power Amplifier | NT | NTWPA-2060200 | 18013007 | N/A | N/A |
| ☑ | Log-periodic Antenna | YLC | YLCANT-T-80M1000-2000 | YLCANT-T-2017-09-002 | N/A | N/A |
| ☑ | Double-ridged horn antenna | YLC | YLCANT-T-1G2.5-300 | YLCANT-T-2017-09-003 | N/A | N/A |
| ☑ | Double-ridged horn antenna | YLC | YLCANT-T-2.5G6-300 | YLCANT-T-2017-09-004 | N/A | N/A |
| ☑ | Field Intensity Probe 2 | ETS | HI-6053 | 00214496 | August 28, 2018 | August 28, 2019 |

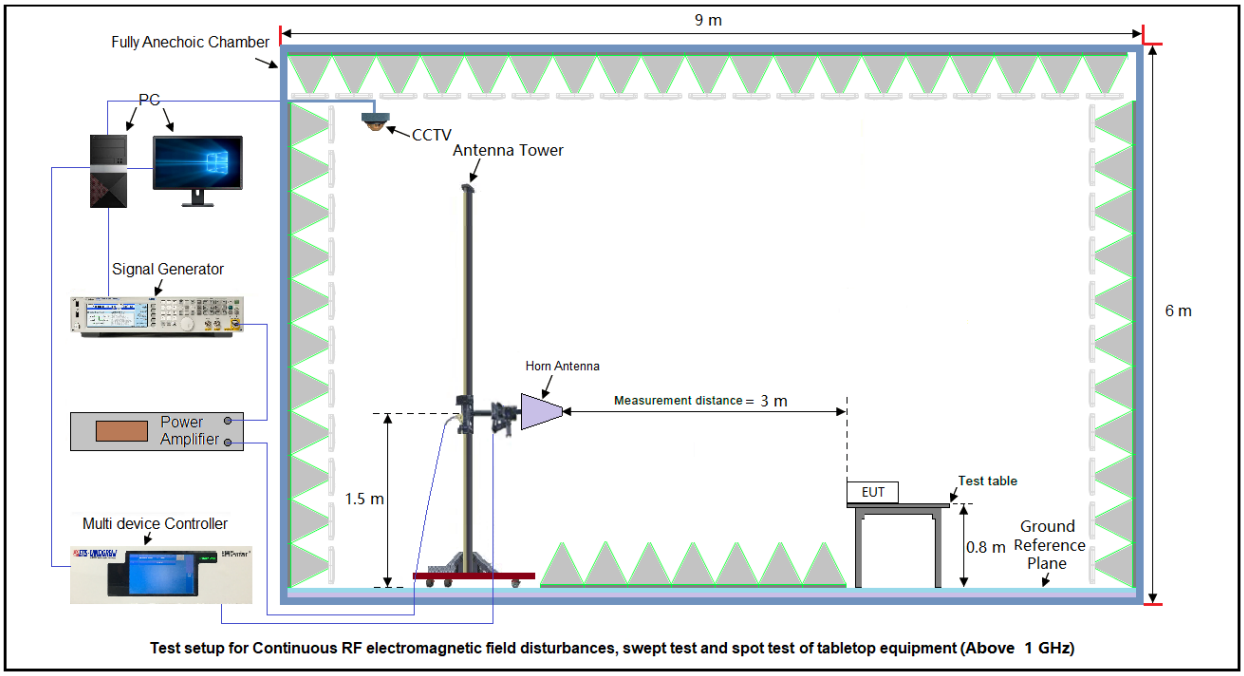
### 5.7.3 Test Setup

Below 1GHz




Test setup for Continuous RF electromagnetic field disturbances, swept test and spot test of tabletop equipment (Above 1 GHz)

Above 1GHz




Test setup for Continuous RF electromagnetic field disturbances, swept test and spot test of tabletop equipment (Above 1 GHz)

### 5.7.4 Test Procedure Summary

The requirements of IEC 61000-4-3:2010 call out a Radiated Immunity test level and procedure. The system was placed in an anechoic chamber calibrated for IEC 61000-4-3 testing. The system was oriented to face the radiating antenna and cables were configured to expose at least one meter of each cable bundle.

The antenna was positioned 3 meters from the equipment under test and the signal generator/amplifier operated under computer control to generate the radiated field and sweep the interfering signal through the test frequency range. The test level is maintained by computer control along with application of the 80% AM.

During test the system was monitored for performance degradation.

**Environmental Conditions during Radiated RF Susceptibility Testing**

| | |
|---|---|
| **Ambient Temperature:** | 23 ℃ |
| **Relative Humidity:** | 48% |

### 5.7.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 9 shows the Radiated RF Susceptibility test results.

Photograph 7, 8 show the test configuration.

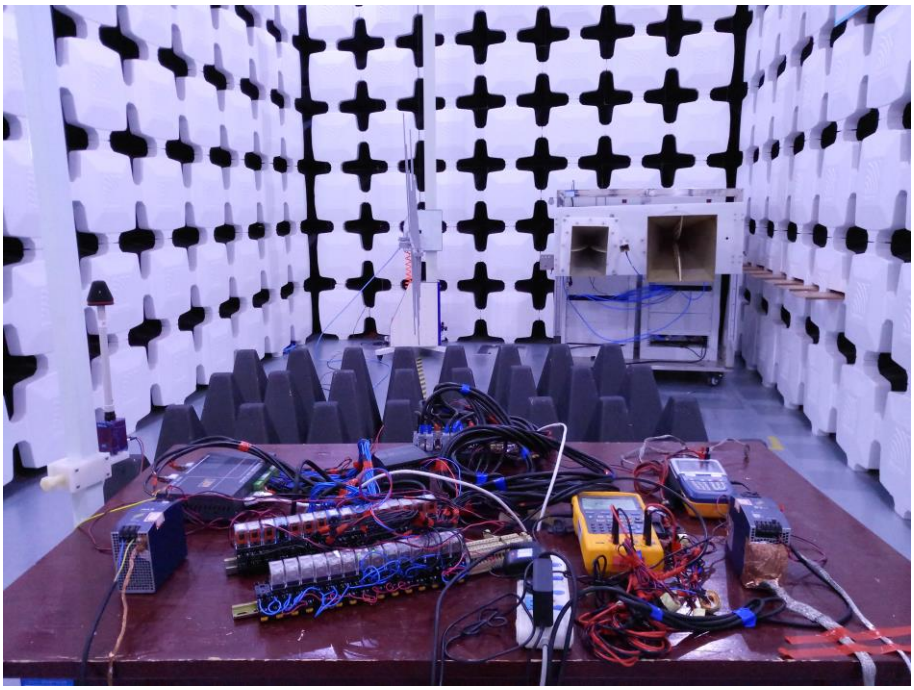
### 5.7.6 Areas of Concern

None.

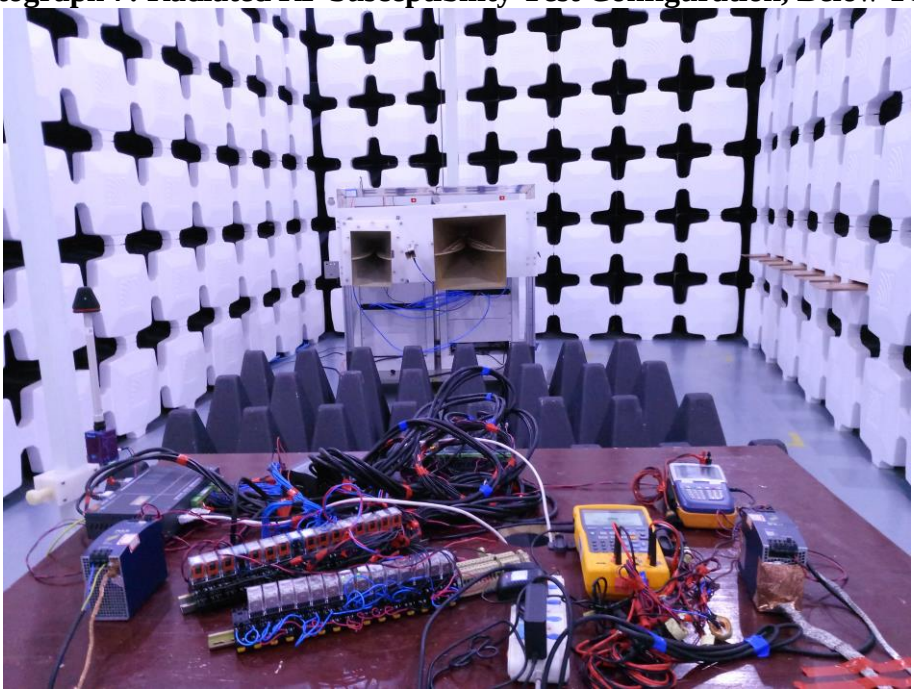
## Table 9: Radiated RF Susceptibility Test Results

| | | | |
|---|---|---|---|
| Applicant: | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date: | August 13, 2019 |
| EUT: | MC2000 Series Motion Controller | Temperature: | 23℃ |
| M/N: | MC2008 | Humidity: | 48% |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Running |
| Test Engineer: | Chao Liu | Pressure: | 100.06KPa |
| Required Performance: | **A** | Actual Performance: | **A** |

| Frequency Range | Severity Level | Antenna Polarity | EUT Orientation | Performance | | Result |
|---|---|---|---|---|---|---|
| | | | | Required | Observation | (Pass/ Fail) |
| 80MHz-1GHz | 10V/m | V / H | Front | A | A | **Pass** |
| | 10V/m | V / H | Right | A | A | **Pass** |
| | 10V/m | V / H | Back | A | A | **Pass** |
| | 10V/m | V / H | Left | A | A | **Pass** |
| 1.4 -2 GHz | 10V/m | V / H | Front | A | A | **Pass** |
| | 10V/m | V / H | Right | A | A | **Pass** |
| | 10V/m | V / H | Back | A | A | **Pass** |
| | 10V/m | V / H | Left | A | A | **Pass** |
| 2 -6 GHz | 10V/m | V / H | Front | A | A | Pass |
| | 10V/m | V / H | Right | A | A | Pass |
| | 10V/m | V / H | Back | A | A | Pass |
| | 10V/m | V / H | Left | A | A | Pass |



**Photograph 7: Radiated RF Susceptibility Test Configuration, Below 1GHz**



**Photograph 8: Radiated RF Susceptibility Test Configuration, Above 1GHz**

## 5.8 Electrical Fast Transient/Burst

5.8.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

Reference Standard: IEC 61000-4-4:2012

Compliance Limits:

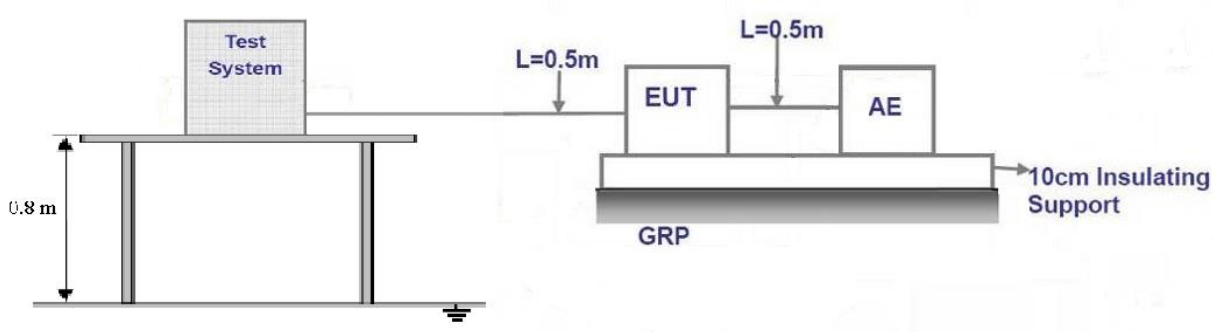
AC Power, ±2kV; Performance Criterion B

Signal Cable: ±1kV; Performance Criterion B

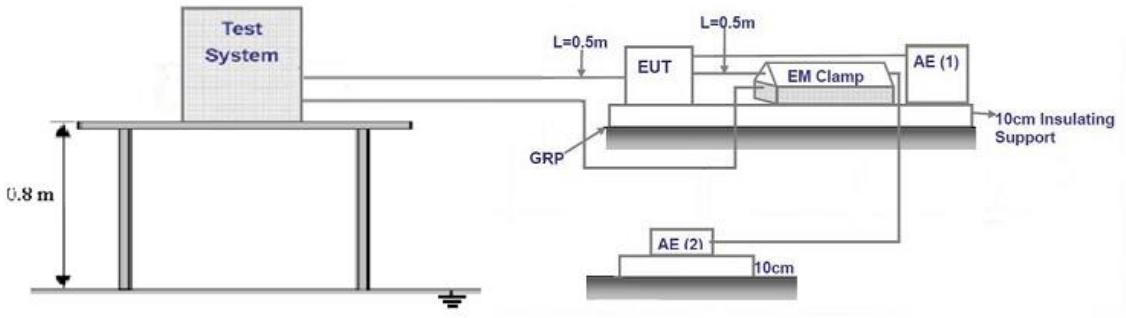
5.8.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | EFT Generator | 3ctest | EFT 500T | ES0201730 | June 6, 2019 | June 6, 2020 |
| ☑ | Capacitive Clamp | 3ctest | CCC100 | ES2901753 | July 17, 2019 | July 17, 2020 |

5.8.3 Test Setup




Mains Port




Signal Port

### 5.8.4 Test Procedure Summary

The requirements of IEC 61000-4-4:2012 call for testing the immunity of the device to "Electrical Fast Transients" or "EFTs". The EFT requirement simulates the effect on the EUT of noise generated by other users connected to the same power mains, such as that caused by contact arcing, switch closure and relay operation. EFT simulators produce a series of bursts that contain a collection of high frequency transients at predetermined intervals.

These transients are conducted into the AC mains of the equipment, coupled onto the I/O cables of the equipment, and the effect of the EFT on equipment operation is monitored.

For the AC power main coupling test, the power is plugged into the power coupling network (part of the EFT generator) with a 1 meter long detachable power cord.

The I/O cable bundle was routed through a coupling clamp meeting the IEC 61000-4-4 requirements. The I/O cable coupling test was performed on all I/O cables >3 meters in length.

Both positive and negative transient bursts were applied at the required transient repetition rate and burst repetition rate for a period not less than one minute for each line or bundle under test.

During test the system was monitored for performance degradation.

**Environmental Conditions during Electrical Fast Transient/Burst Testing**

| | |
|---|---|
| **Ambient Temperature:** | 24 ℃ |
| **Relative Humidity:** | 68 % |

### 5.8.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 10 shows the Electrical Fast Transient/Burst test results.

Photograph 9, 10, 11 show the test configuration.

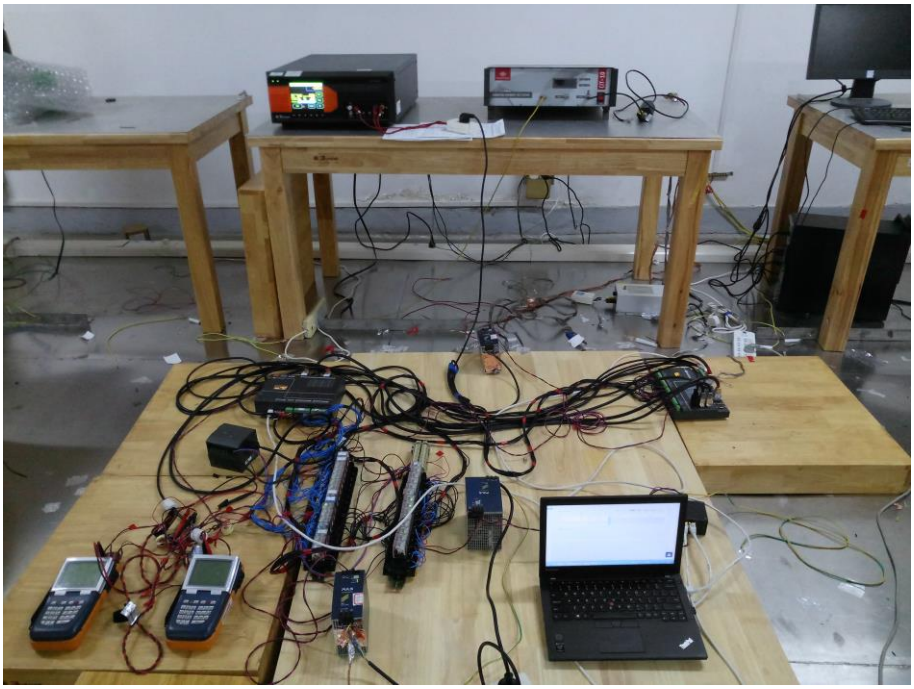
### 5.8.6 Areas of Concern

None.

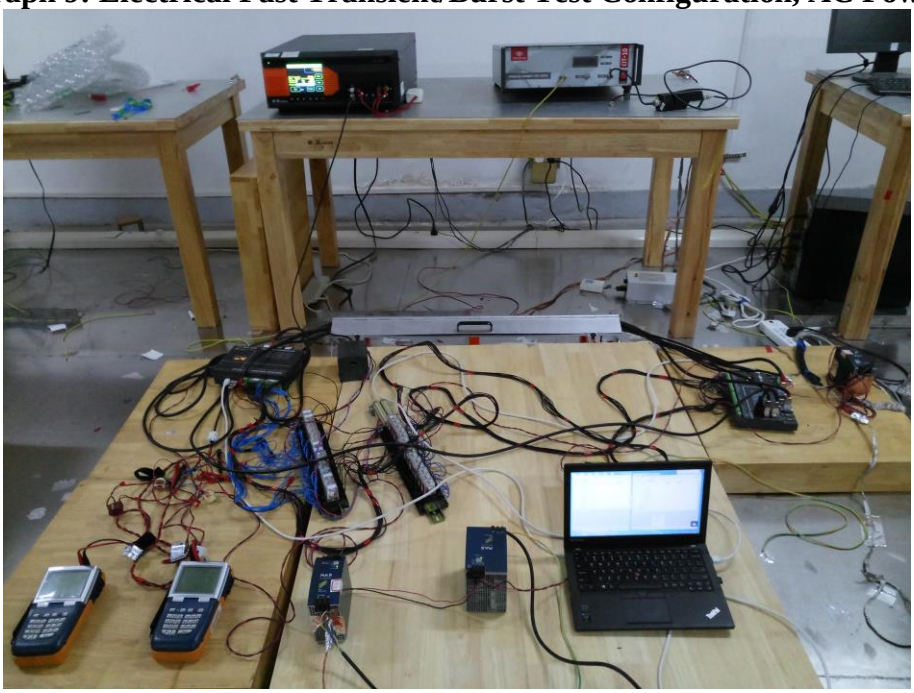
## Table 10: Electrical Fast Transient/Burst Test Results

| | | | |
|---|---|---|---|
| Applicant: | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date: | August 11, 2019 |
| EUT: | MC2000 Series Motion Controller | Temperature: | 24 ℃ |
| M/N: | MC2008 | Humidity: | 68 % |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Running |
| Test Engineer: | ShaoFei Tan | Pressure: | 100.09KPa |
| Required Performance: | **B** | Actual Performance: | **A** |

| Line | Amplitude (kV) | Burst Repetition Rate | Test Duration | Performance | | Result |
|---|---|---|---|---|---|---|
| | | | | Required | Observation | (Pass/ Fail) |
| L | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| N | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| PE | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| L-N | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| L-PE | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| N-PE | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| L-N-PE | ±2 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| RJ45 Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| Digital DI Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| Digital DO Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| RS485 Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| RS422 Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| AI Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| AO Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |
| AXIS Line | ±1 kV | 5kHz/100 kHz | 60s | B | A | **Pass** |

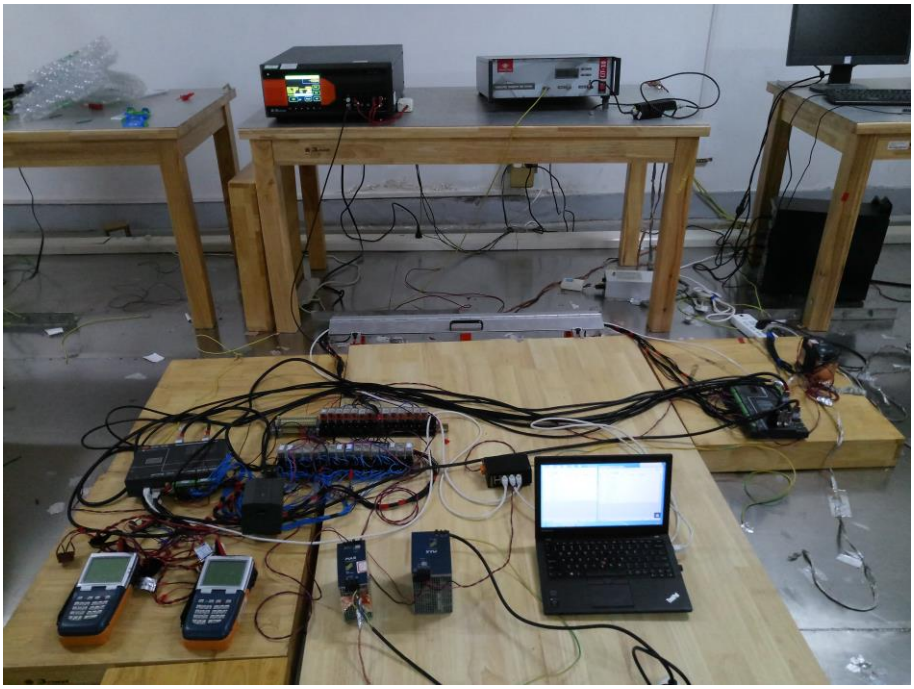


**Photograph 9: Electrical Fast Transient/Burst Test Configuration, AC Power Port**



**Photograph 10: Electrical Fast Transient/Burst Test Configuration, Signal Port**



**Photograph 11: Electrical Fast Transient/Burst Test Configuration, Signal Port**

## 5.9 Voltage Surge

5.9.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

Reference Standard: IEC 61000-4-5:2014

Compliance Limits:

AC Power, ±2kV (Line to Ground), Performance Criterion B

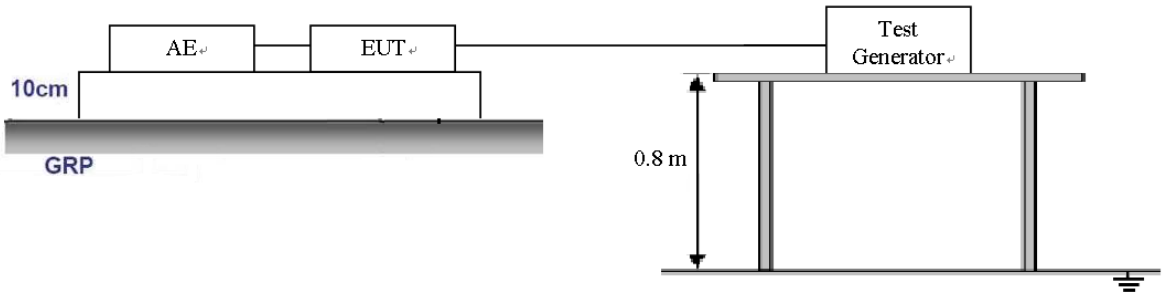
AC Power, ±1kV (Line to Neutral), Performance Criterion B

Signal port, ±1kV, Performance Criterion B

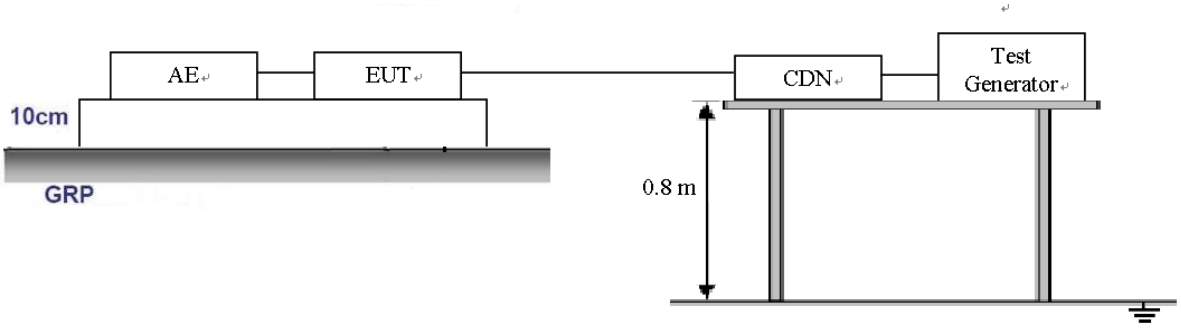
5.9.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | Surge Generator | 3ctest | CWS600 | ES0301511 | December 11, 2018 | December 11, 2019 |
| ☑ | Unshielded coupled decoupling network | 3ctest | CPN40SAF8 | ES1011505 | N/A | N/A |

5.9.3 Test Setup




Mains Port




Signal Ports

### 5.9.4 Test Procedure Summary

The requirements of IEC 61000-4-5:2014 call for testing the immunity of the device to surges caused by overvoltages from switching and lightning transients. The surge requirement simulates the effect on the EUT of surges that can couple into the device from the power line or "long" external cabling. Surge simulators produce a surge waveform with predetermined waveshapes, at various amplitudes. These surges are coupled onto the power input and signal lines.

The selected I/O cable lines were connected to the coupling network. The I/O cable bundle was routed through a decoupling network to isolate the support equipment. Both positive and negative surge voltages were applied at least 5 times with each polarity.

During test the system was monitored for performance degradation.

**Environmental Conditions during Voltage Surge Testing**

| | |
|---|---|
| **Ambient Temperature:** | 24 ℃ |
| **Relative Humidity:** | 68% |

### 5.9.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 11 shows the Voltage Surge test results.

Photograph 12, 13, 14 show the Voltage Surge test configuration.

### 5.9.6 Areas of Concern

None.

## Table 11: Voltage Surge Test Results

| | | | | | |
|---|---|---|---|---|---|
| Applicant | : | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date | : | August 11, 2019 |
| EUT | : | MC2000 Series Motion Controller | Temperature | : | 24℃ |
| M/N | : | MC2008 | Humidity | : | 68% |
| Test Voltage | : | AC 230V/50Hz | Test Mode | : | Running |
| Test Engineer | : | ShaoFei Tan | Pressure | : | 100.09kPa |
| Required Performance | : | **B** | Actual Performance | : | **A** |

No.of pluse: ±5 Repetition rate: 30s

Line : 1. ☑ AC Mains : ☑ 1.2/50us ☐ 10/700us 2. ☐ DC Supply : ☐ 1.2/50us ☐ 10/700us
3. ☑ Signal : ☑ 1.2/50us ☐ 10/700us

| Location | Volt | 0.5kV | | | 1kV | | | 2kV | | | Result (Pass/Fail) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Phase | Performance | | | Performance | | | Performance | | | |
| | | Required | + | - | Required | + | - | Required | + | - | |
| L-N | 0° | B | A | A | B | A | A | --- | --- | --- | Pass |
| | 90° | B | A | A | B | A | A | --- | --- | --- | Pass |
| | 180° | B | A | A | B | A | A | --- | --- | --- | Pass |
| | 270° | B | A | A | B | A | A | --- | --- | --- | Pass |
| L-PE | 0° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 90° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 180° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 270° | --- | --- | --- | B | A | A | B | A | A | Pass |
| N-PE | 0° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 90° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 180° | --- | --- | --- | B | A | A | B | A | A | Pass |
| | 270° | --- | --- | --- | B | A | A | B | A | A | Pass |
| Digital DI Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| Digital DO Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| RS485 Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| RS422 Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| RJ45 Line | --- | B | A | A | B | B | B | --- | --- | --- | Pass |
| AI Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| AO Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AXIS Line | --- | B | A | A | B | A | A | --- | --- | --- | Pass |
| Note：Mark “B”: During the test, the data lost. After the test, the EUT can be restored without the operator. | | | | | | | | | | | |

**Photograph 12: Voltage Surge Immunity Test Configuration AC Mains Port**

Photograph 13: Voltage Surge Immunity Test Configuration Signal Port

Photograph 14: Voltage Surge Immunity Test Configuration Signal Port

## 5.10 Conducted RF Susceptibility

5.10.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

Reference Standard: IEC 61000-4-6:2013

Compliance Limits:

AC Power:

0.15MHz-80MHz, 10Vrms (80%AM, 1kHz); Performance Criterion A

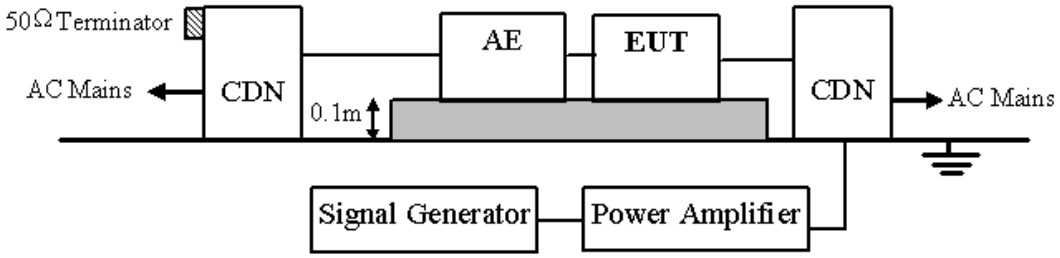
Signal port:

0.15MHz-80MHz, 10Vrms (80%AM, 1kHz); Performance Criterion A

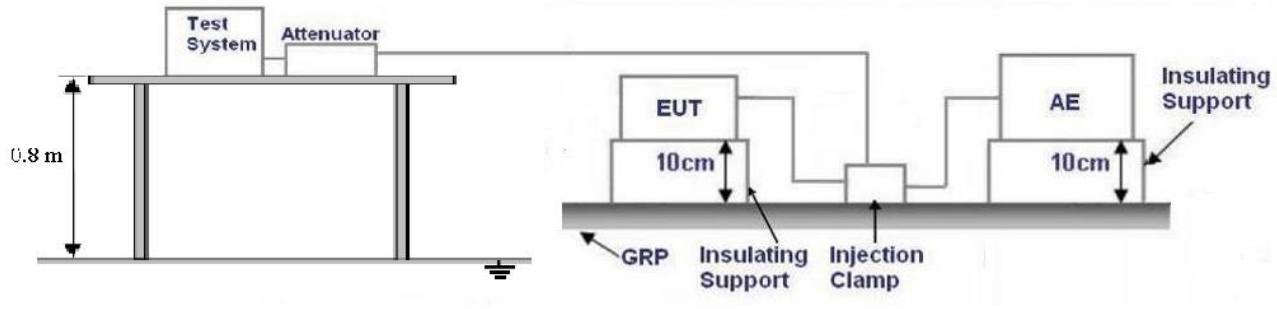
5.10.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | Conducted Immunity Tester | FRANKONIA | CIT-10-75 | 126B1360/2015 | December 11, 2018 | December 11, 2019 |
| ☑ | Coupling/Decoupling network | Frankonia | CDN-M2/M3 | A221034812015 | July 17, 2019 | July 17, 2020 |
| ☑ | 6dB Attenuator | Frankonia | 75-A-FFN-06 | 1324972 | July 17, 2019 | July 17, 2020 |
| ☑ | EM-Clamp | Frankonia | EMCL-20 | 132A123512015 | July 17, 2019 | July 17, 2020 |

5.10.3 Test Setup




Mains Port




Signal Ports

5.10.4 Test Procedure Summary

The requirements of IEC 61000-4-6:2013 call for testing for immunity of devices to RF conducted currents. The purpose of this test is to simulate the induced currents that are driven by radiated coupling of electromagnetic fields to cabling in a system.

The EUT was insulated by 0.1 m from the ground reference plane. The coupling decoupling network was bonded to the ground plane and the I/O cables were isolated from the ground plane by 30 mm. The radio frequency signal was fed into a coupling network that applied the signal to the cable under test. The coupling network was located 10 to 30 cm from the EUT port under test.

Prior to commencement of the tests, the coupling networks were calibrated by measuring the power necessary to produce 10Vrms (unmodulated) across a 50 ohm load at the EUT port of the coupling networks. This power was recorded and used to drive the coupling network when the coupling network was connected to the EUT.

The stimulus signal was modulated with an 80%, 1 kHz sinewave, which is supplied internally from the signal generator. The frequency of the injected signal was adjusted for 150 kHz and increased at a maximum of 1% increments up to a frequency of 80 MHz.

During test the system was monitored for performance degradation.

**Environmental Conditions during Conducted RF Susceptibility Testing**

| | |
|---|---|
| **Ambient Temperature:** | 24 ℃ |
| **Relative Humidity:** | 72% |

5.10.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 12 shows the Conducted RF Susceptibility test results.

Photograph 15, 16, 17, 18, 19, 20, 21 show the test configuration.

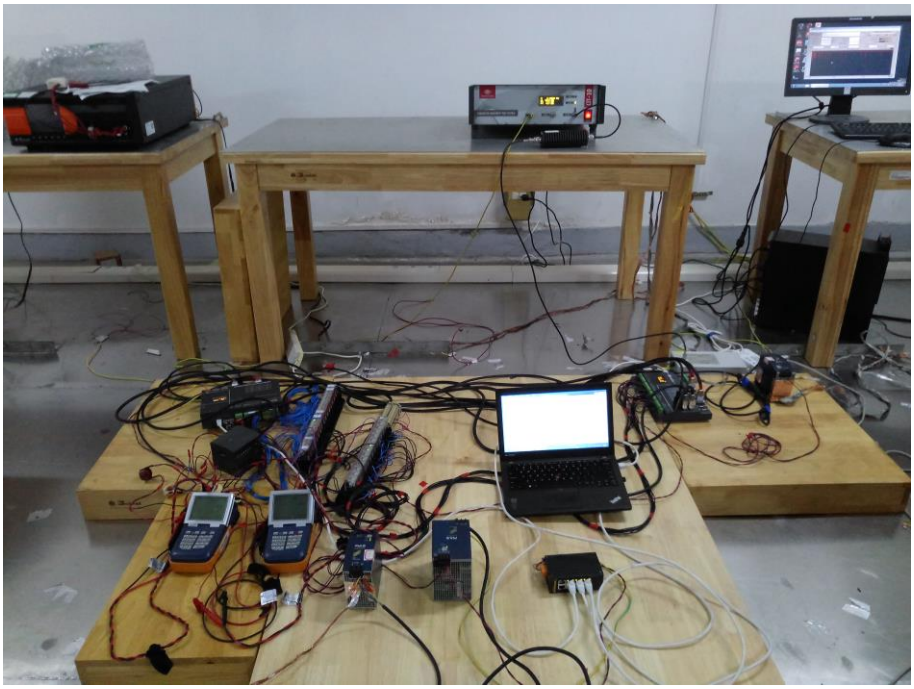
5.10.6 Areas of Concern

None.

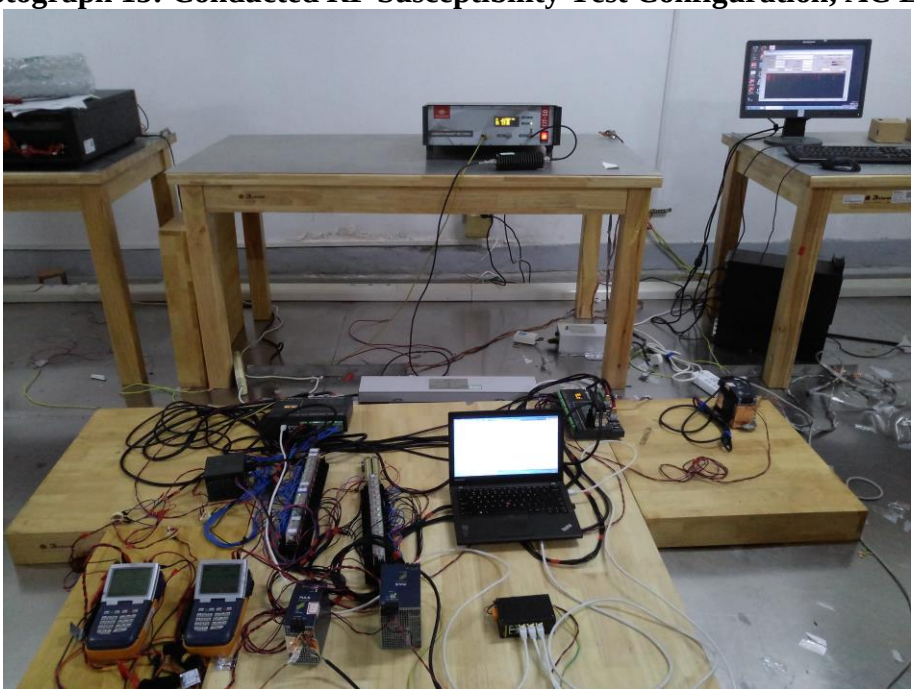
## Table 12: Conducted RF Susceptibility Test Results

| | | | |
|---|---|---|---|
| Applicant: | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date: | August 11, 2019 |
| EUT: | MC2000 Series Motion Controller | Temperature: | 24℃ |
| M/N: | MC2008 | Humidity: | 72% |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Running |
| Test Engineer: | ShaoFei Tan | Pressure: | 100.09kPa |
| Required Performance: | **A** | Actual Performance: | **A** |

| Test Point | Frequency [MHz] | Test level [V] | Amplitude Modulated | Performance | | Result |
|---|---|---|---|---|---|---|
| | | | | Required | Observation | (Pass/ Fail) |
| AC power | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| RJ45 Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| Digital DI Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| Digital DO Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| RS485 Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| AI Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| AO Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| RS422 Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| AXIS Line | 0.15MHz~80MHz | 10 | 80%AM (1kHz) | A | A | **Pass** |
| **Note:** | | | | | | |



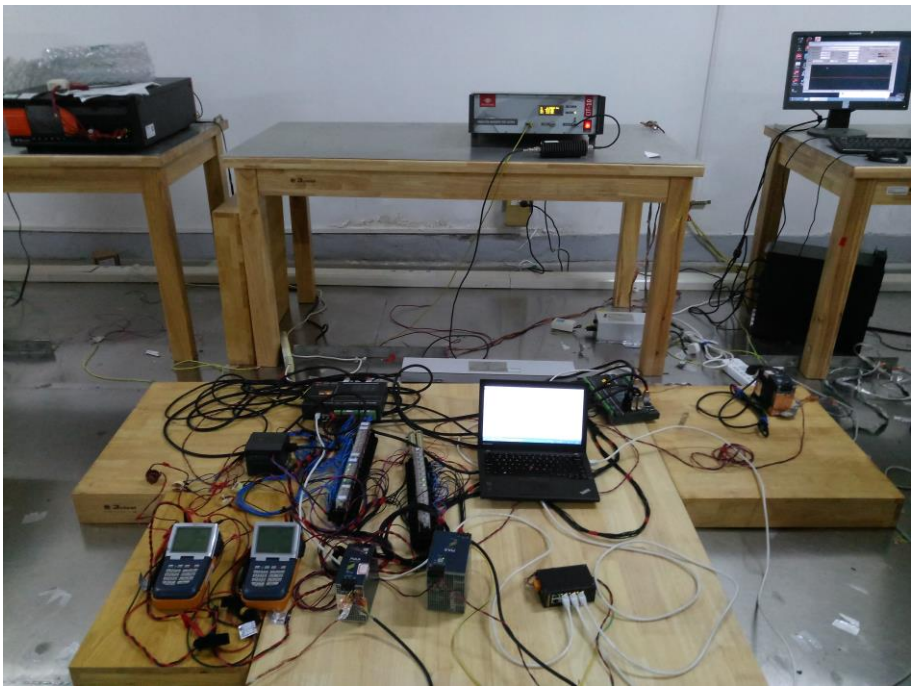
**Photograph 15: Conducted RF Susceptibility Test Configuration, AC Line**



**Photograph 16: Conducted RF Susceptibility Test Configuration, Signal Line**

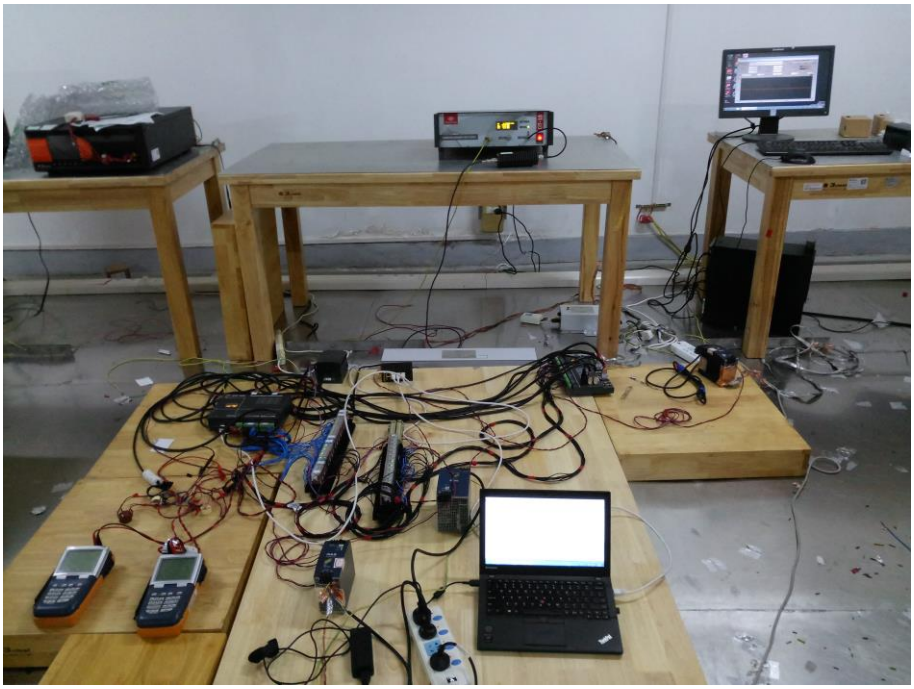
 

**Photograph 17: Conducted RF Susceptibility Test Configuration, Signal Line**

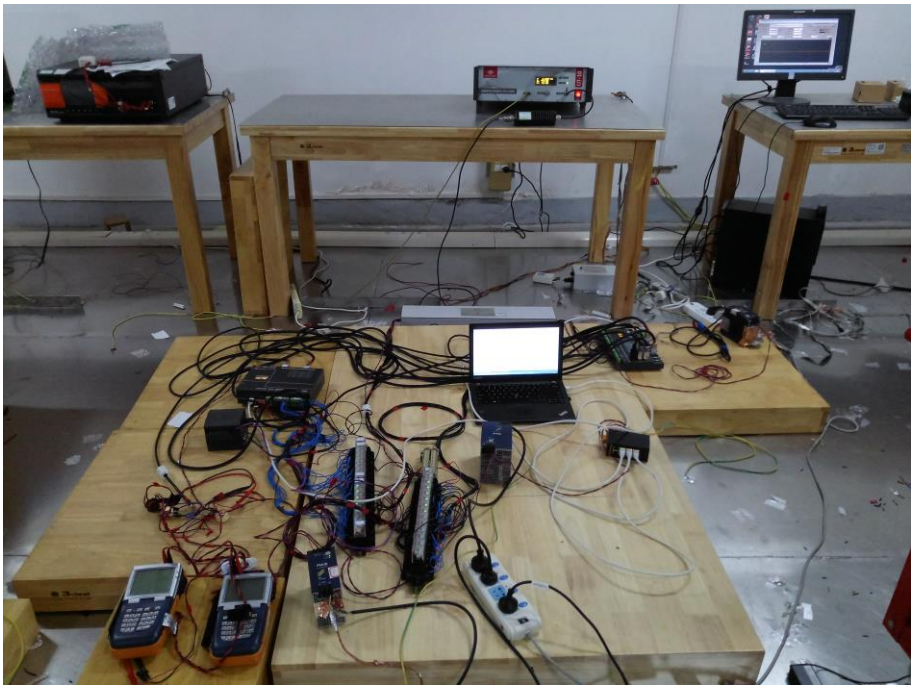


**Photograph 18: Conducted RF Susceptibility Test Configuration, Signal Line**

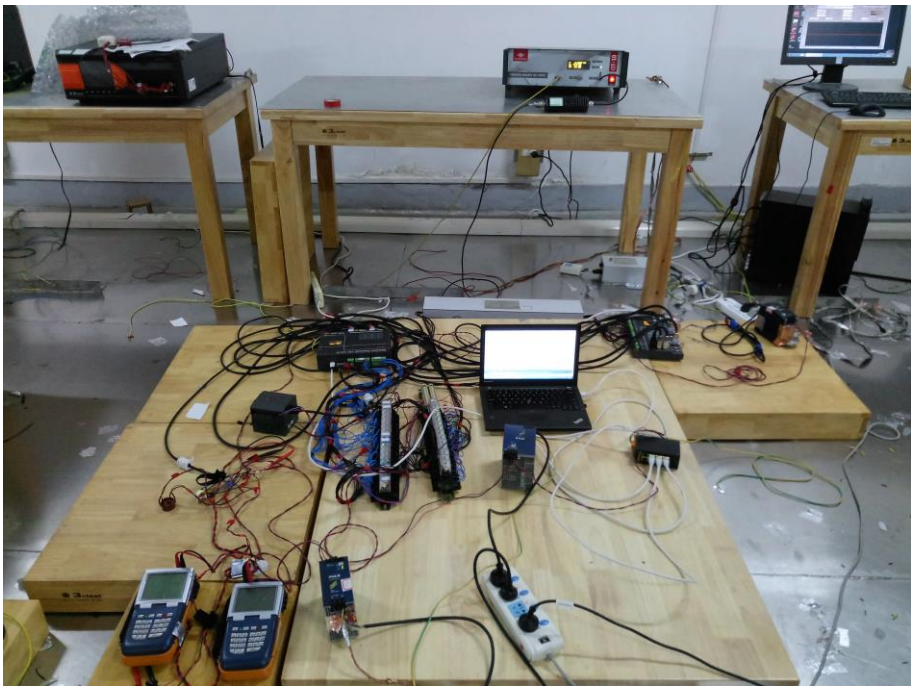
 



**Photograph 19: Conducted RF Susceptibility Test Configuration, Signal Line**



**Photograph 20: Conducted RF Susceptibility Test Configuration, Signal Line**



**Photograph 21: Conducted RF Susceptibility Test Configuration, Signal Line**

## 5.11 Power-frequency magnetic fields

5.11.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2：2007、EN 61000-6-2：2005

Reference Standard: IEC 61000-4-8, clause 5

Compliance Requirement: Severity Level 4

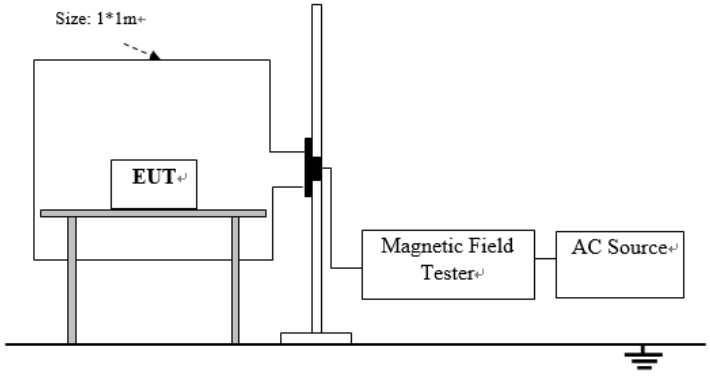
30A/m, Performance Criterion A

Test Engineer: ShaoFei Tan Date: August 2, 2019

5.11.2 Test Equipment

| Equipment | Manufacturer | Model | Serial No. | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
|---|---|---|---|---|---|
| Power-frequency magnetic field Generator | 3ctest | MFS400/MFT400 | ES0651602/ES1111602 | June 6, 2019 | June 6, 2020 |

5.11.3 Test Setup




5.11.4 Test Procedure Summary

The requirements of EN 61000-6-2:2005/AC:2005 (61000-4-8 IEC: 2009) call for testing for immunity of devices to Immunity to power-frequency magnetic fields. The purpose of this test is to simulate the product quality and the effects on the EUT performance.

The test magnetic field is obtained by a current flowing in an inductive coil; the application of

the test field to the EUT is by the immersion method.

During test the system was monitored for performance degradation.

**Environmental Conditions during Immunity to power-frequency magnetic fields**

| | |
|---|---|
| **Ambient Temperature:** | 24 ℃ |
| **Relative Humidity:** | 68 % |

5.11.5 Results Summary

The EUT complied with the required performance throughout the test.

Table 13 shows the power-frequency magnetic fields immunity test results.

Photograph 22 shows the test configuration.

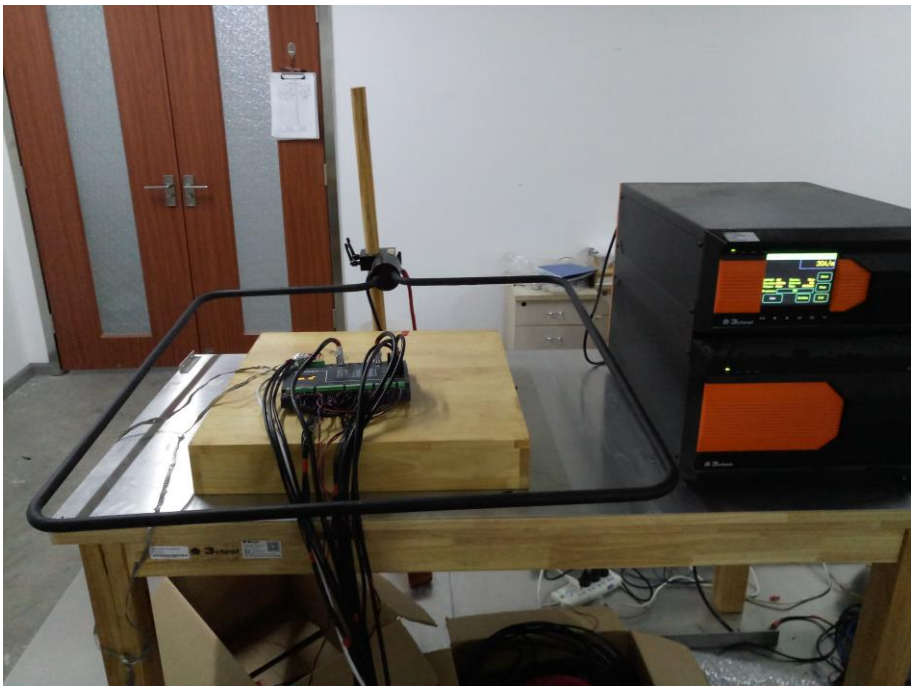
5.11.6 Areas of Concern

None.

**Table 13: Magnetic field immunity Test Results**

| | | | | | |
|---|---|---|---|---|---|
| Applicant | : Beijing HollySys Intelligent Technology Co., Ltd. | | Test Date | : August 11, 2019 | |
| EUT | : MC2000 Series Motion Controller | | Temperature | : 24 ℃ | |
| M/N | : MC2008 | | Humidity | : 68 % | |
| Test Voltage | : AC 230V/50Hz | | Test Mode | : Running | |
| Test Engineer | : ShaoFei Tan | | Pressure | : 99.8kPa | |
| Required Performance | : **A** | | Actual Performance | : **A** | |
| Test Level | Testing Duration | Coil Orientation | Required | Observation | Result (Pass/Fail) |
| 30A/m | 5 min / coil | X | A | A | PASS |
| 30A/m | 5 min / coil | Y | A | A | PASS |
| 30A/m | 5 min / coil | Z | A | A | PASS |
| Remark: | | | | | |



**Photograph 22: Magnetic field immunity Test**

## 5.12 Voltage Dips and Interruptions Test

5.12.1 Requirements

Test Arrangement: Table Top

Compliance Standard: EN 61326-1：2013、EN 61131-2: 2007、EN 61000-6-2:2005/AC:2005

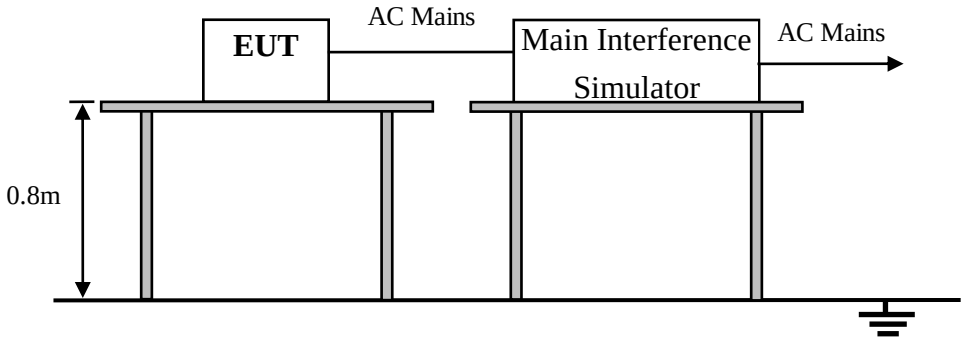
Reference Standard: IEC 61000-4-11:2004

Compliance Requirement: Performance Criterion: A, B, C

5.12.2 Test Equipment

| Used | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|
| ☑ | Power failure simulator (Voltage dips, short interruption and variation generator) | 3ctest | PFS 2216SV | ES2671601 | June 6, 2019 | June 6, 2020 |

5.12.3 Test Setup




5.12.4 Severity Levels and Performance Criterion

| Test Level %$U_T$ | Voltage dip and short interruptions %$U_T$ | Duration (in period) | Performance Criterion |
|---|---|---|---|
| 0 | 100 | 0.5 | A |
| 0 | 100 | 1 | B |
| 40 | 60 | 10 | C |
| 70 | 30 | 25 | C |
| 0 | 100 | 250 | C |

### 5.12.1 Test Procedure Summary

The requirements of IEC 61000-4-11:2004 call for testing for immunity of devices to voltage dips and interruptions. The purpose of this test is to simulate power quality transient conditions and the effects on the EUT performance.

The EUT power source is connected to a programmable supply and operated in the test modes. The programmed power dip and interrupt conditions are applied to the power input and the EUT performance is observed.

During test the system was monitored for performance degradation.

**Environmental Conditions during Voltage Dips/Interrupts Testing**

| | |
|---|---|
| **Ambient Temperature:** | 24 ℃ |
| **Relative Humidity:** | 68 % |

### 5.12.2 Test Results

The EUT complied with the required performance throughout the test.

Table 14 shows the Voltage Dips/Interrupts test results.

Photograph 23 shows the Voltage Dips/Interrupts test configuration.

### 5.12.3 Areas of Concern

None.

## Table 14: Voltage Dips/Interrupts Test Results

| | | | |
|---|---|---|---|
| Applicant: | Beijing HollySys Intelligent Technology Co., Ltd. | Test Date: | August 11, 2019 |
| EUT: | MC2000 Series Motion Controller | Temperature: | 24℃ |
| M/N: | MC2008 | Humidity: | 68% |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Running |
| Test Engineer: | ShaoFei Tan | Pressure: | 100.11KPa |
| Required Performance: | **A&B&C** | Actual Performance: | **A&C** |

**Voltage Dips**

| Test Voltage Applied | Dips % | Duration (s) | # Of Dips | Performance | | Result |
|---|---|---|---|---|---|---|
| | | | | Required | Observation | (Pass/ Fail) |
| AC Power Line | 100 | 0.01 | 3 | A | A | **Pass** |
| AC Power Line | 100 | 0.02 | 3 | B | A | **Pass** |
| AC Power Line | 60 | 0.2 | 3 | C | A | **Pass** |
| AC Power Line | 30 | 0.5 | 3 | C | A | **Pass** |

**Voltage Short Interruption**

| Test Voltage Applied | Interrupts % | Duration (s) | # Of Interruptions | Performance | | Result |
|---|---|---|---|---|---|---|
| | | | | Required | Observation | (Pass/ Fail) |
| AC Power Line | 100 | 5 | 3 | C | C | **Pass** |

Note：Mark “C”: During the test, the packets lost and the EUT stop. After the test, the EUT can be restored by the operator.

**Photograph 23: Voltage Dips/Interrupts Test Configuration**

# 6 Attachment (EUT Photograph)

***EUT Model: MC2004***

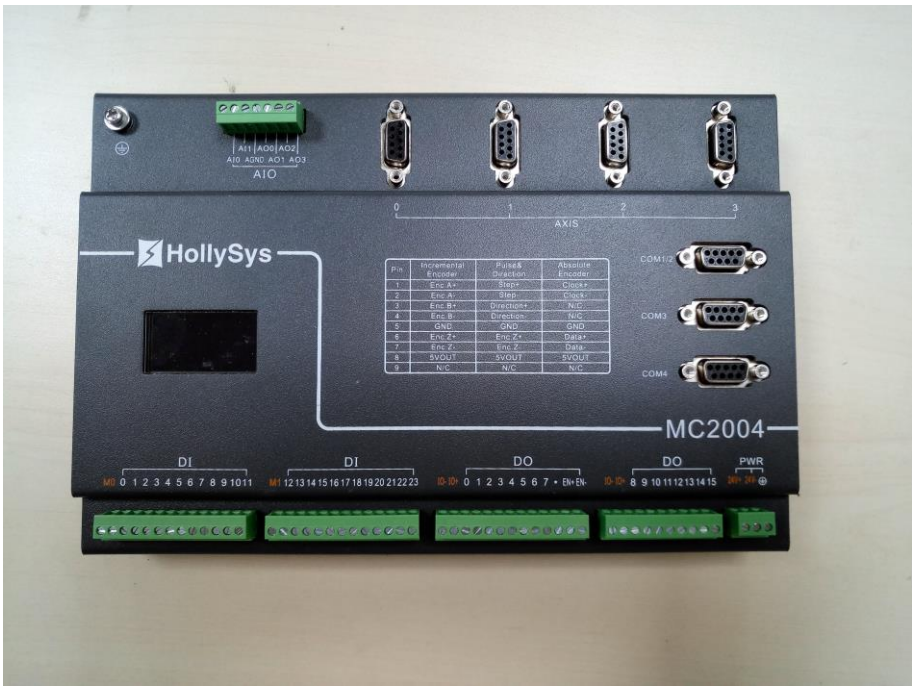



**Fig. 1**

**Fig. 2**

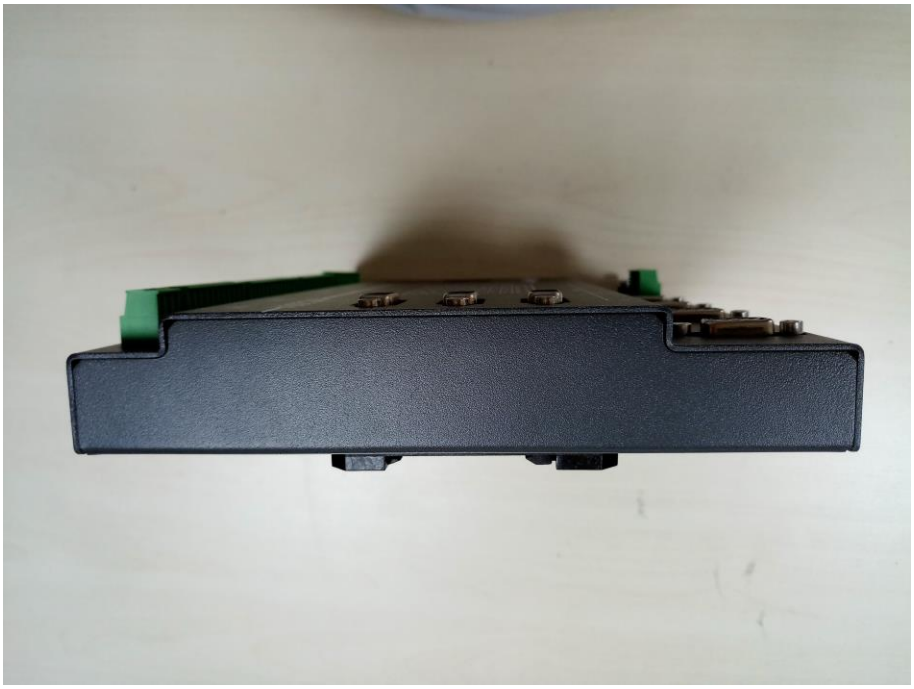


**Fig. 3**

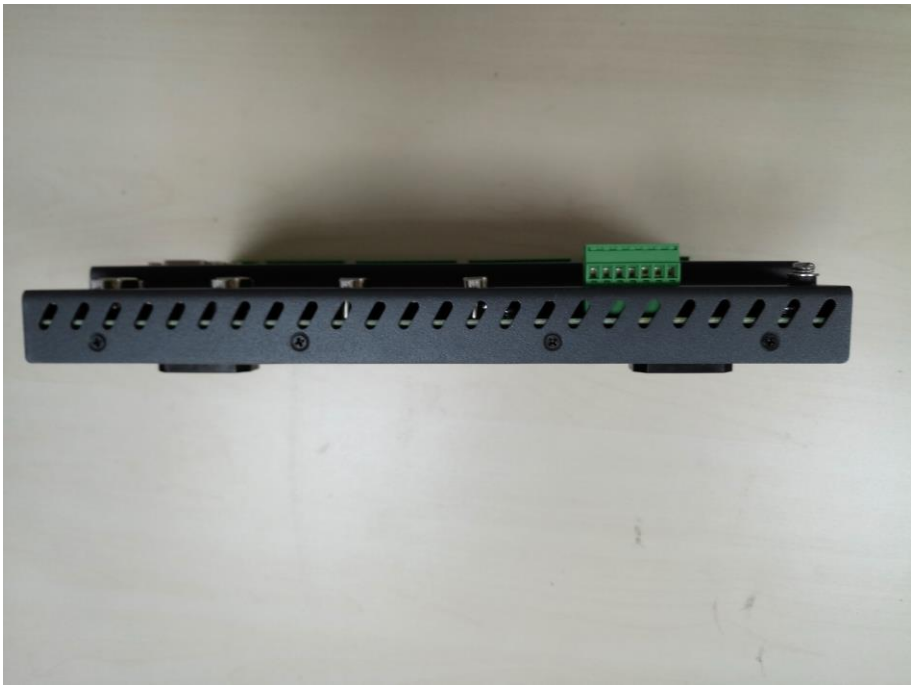


**Fig. 4**


**Fig. 5**

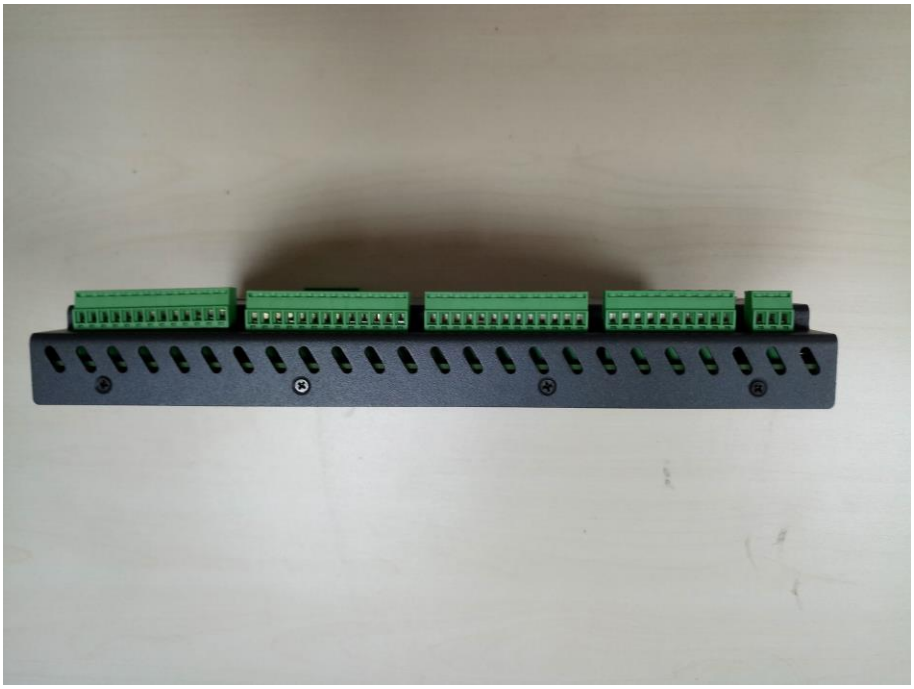


**Fig. 6**

Fig. 7

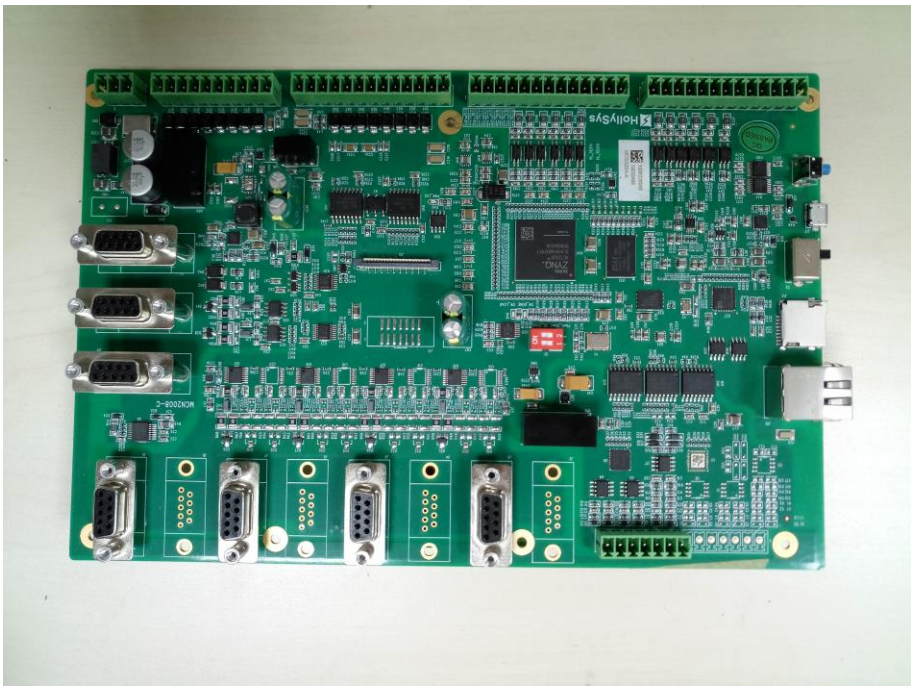


Fig. 8

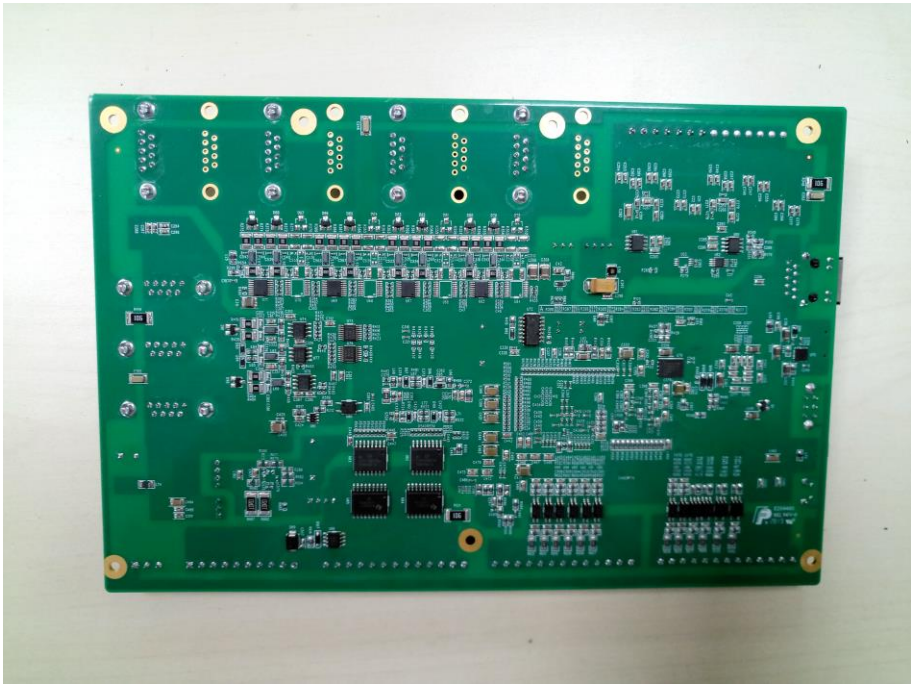


**Fig. 9**


**Fig. 10**

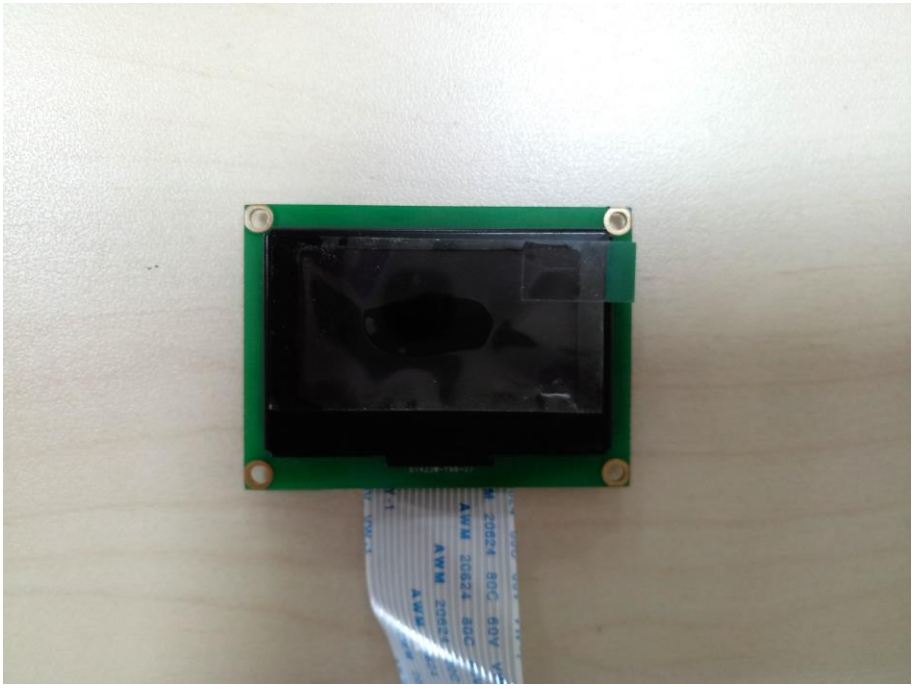


**Fig. 11**

***MC2004L***


**Fig. 12**

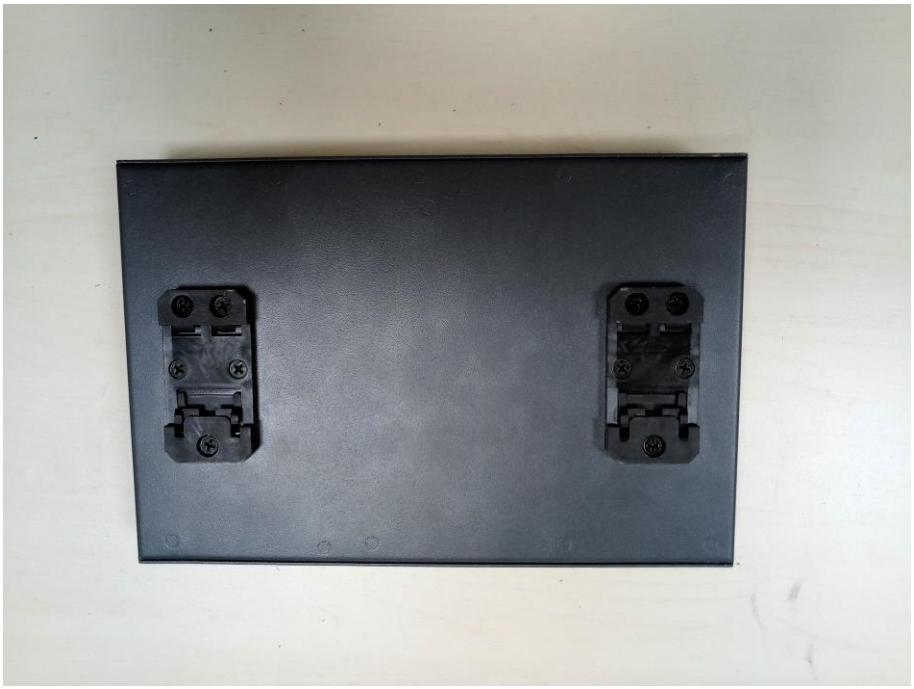


Fig. 13

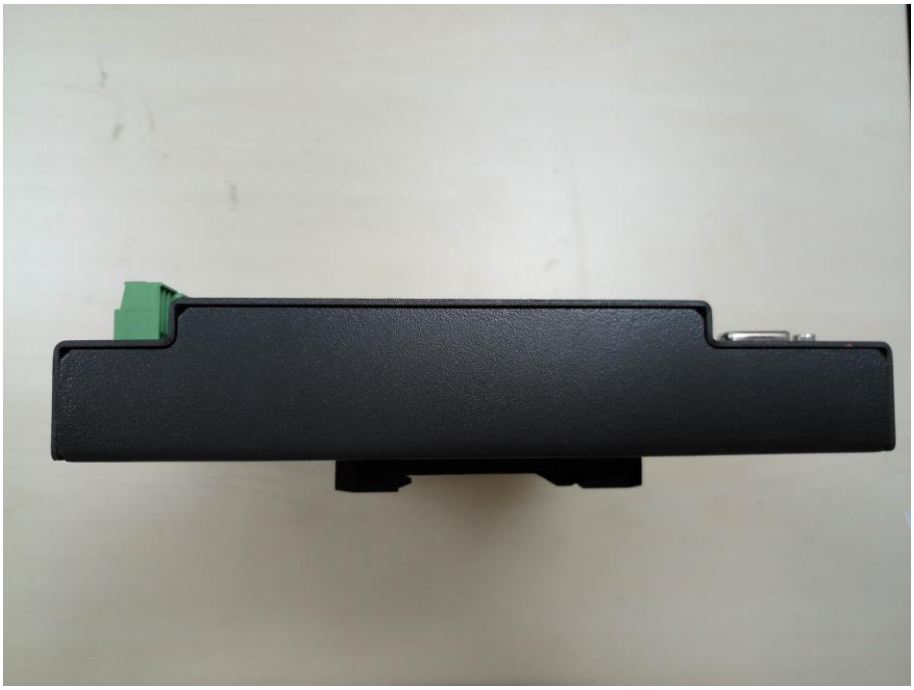


Fig. 14

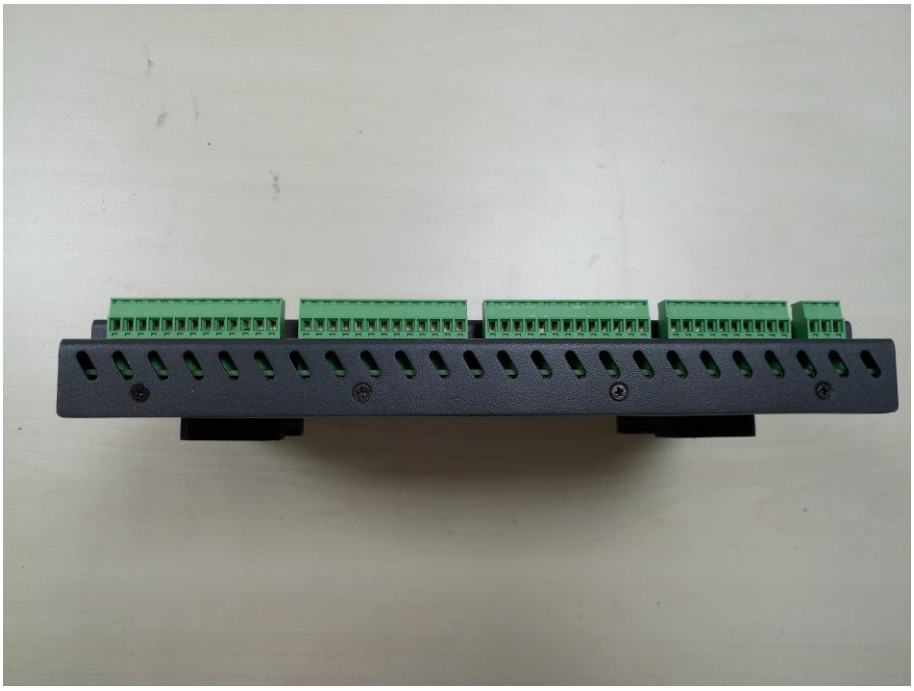


Fig. 15


Fig. 16

Fig. 17

Fig. 18

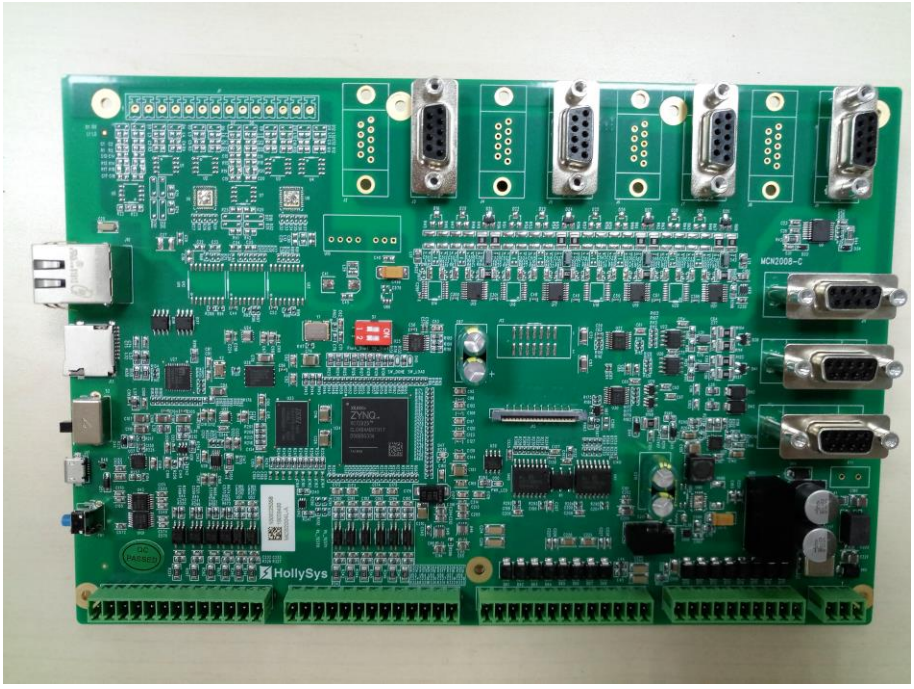



Fig. 19

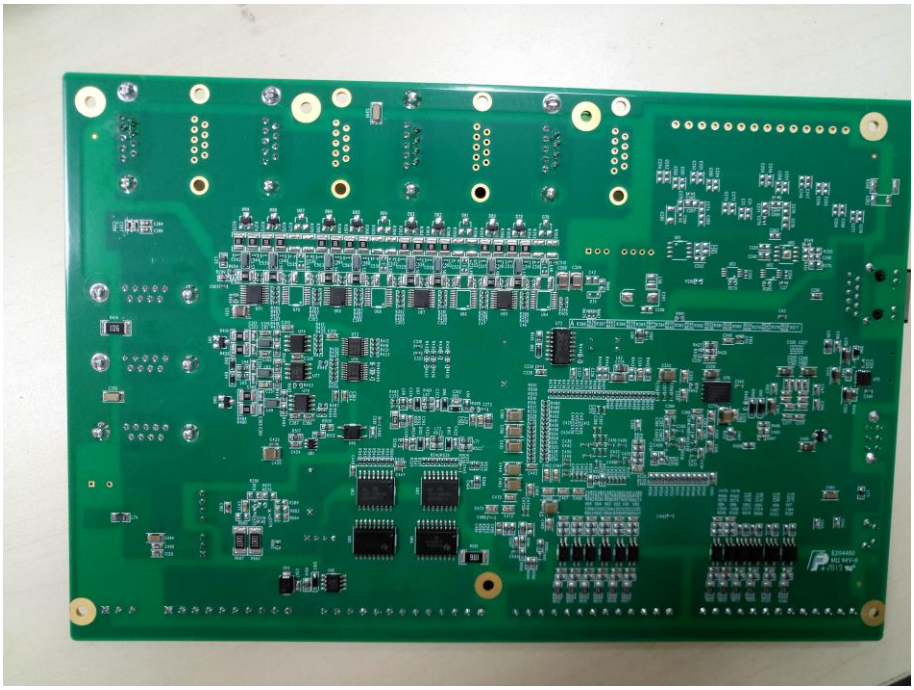


Fig. 20


**Fig. 21**

**Fig. 22**

## *MC2008*

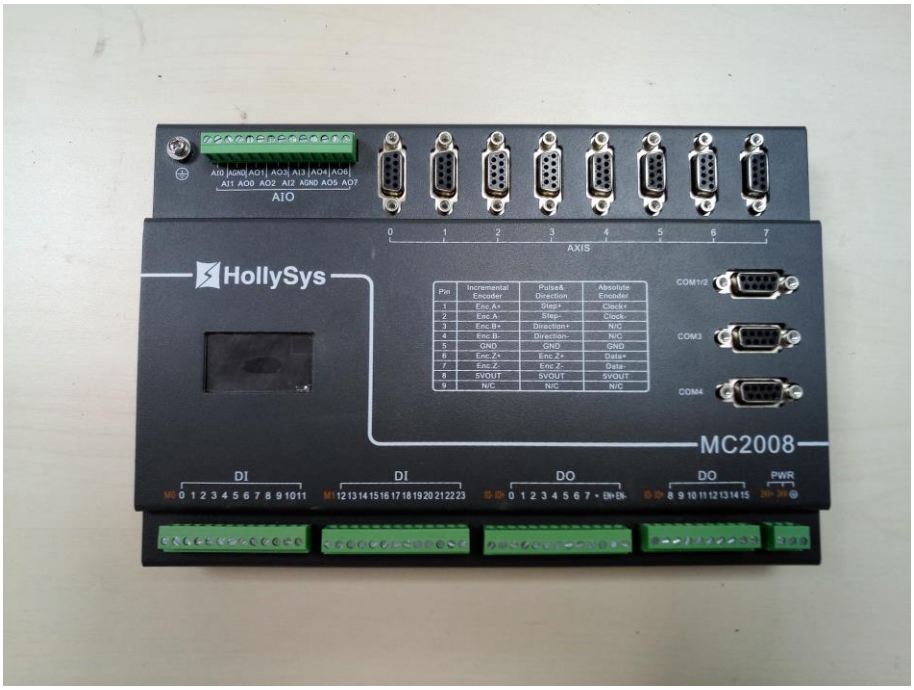



**Fig. 23**

**Fig. 24**

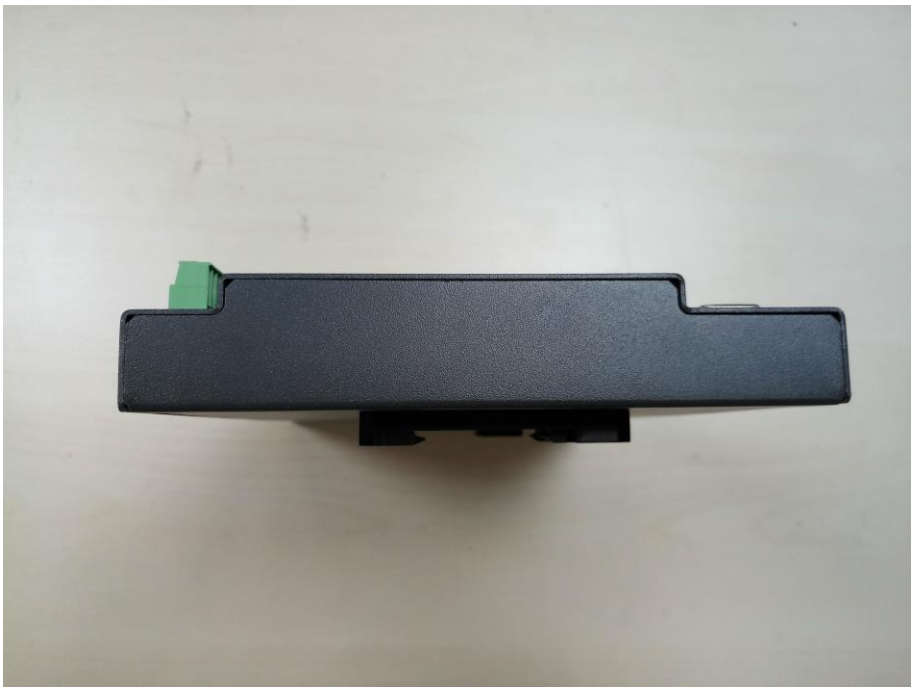


Fig. 25

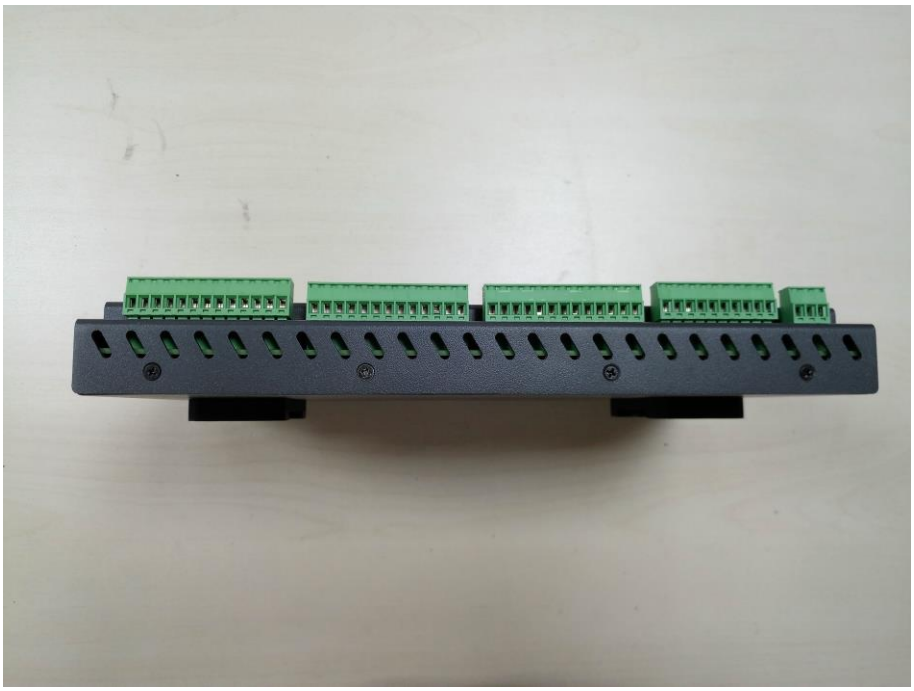


Fig. 26


**Fig. 27**

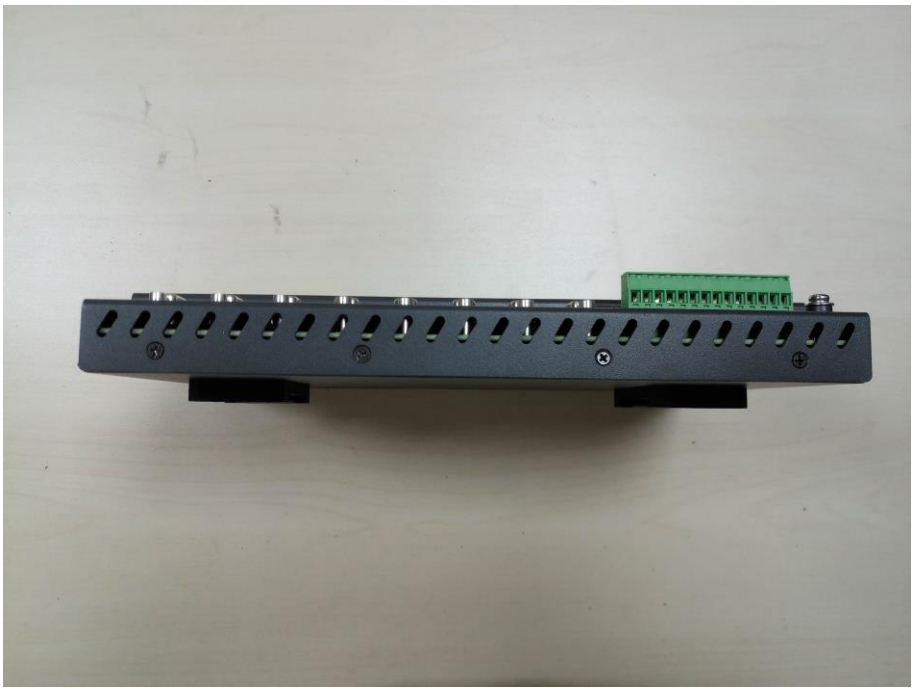


**Fig. 28**

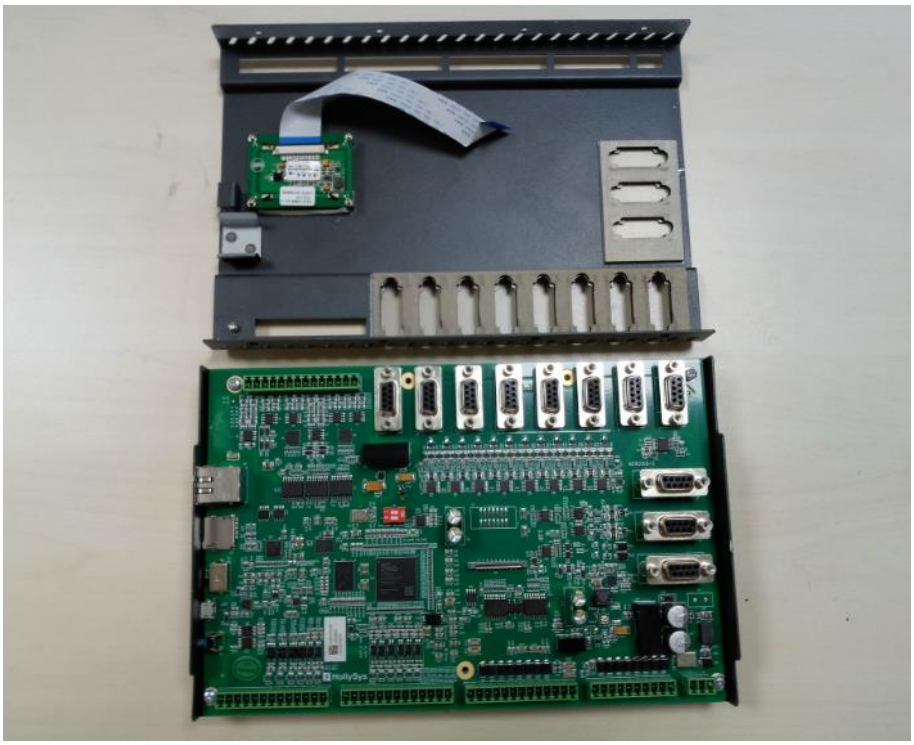


Fig. 29

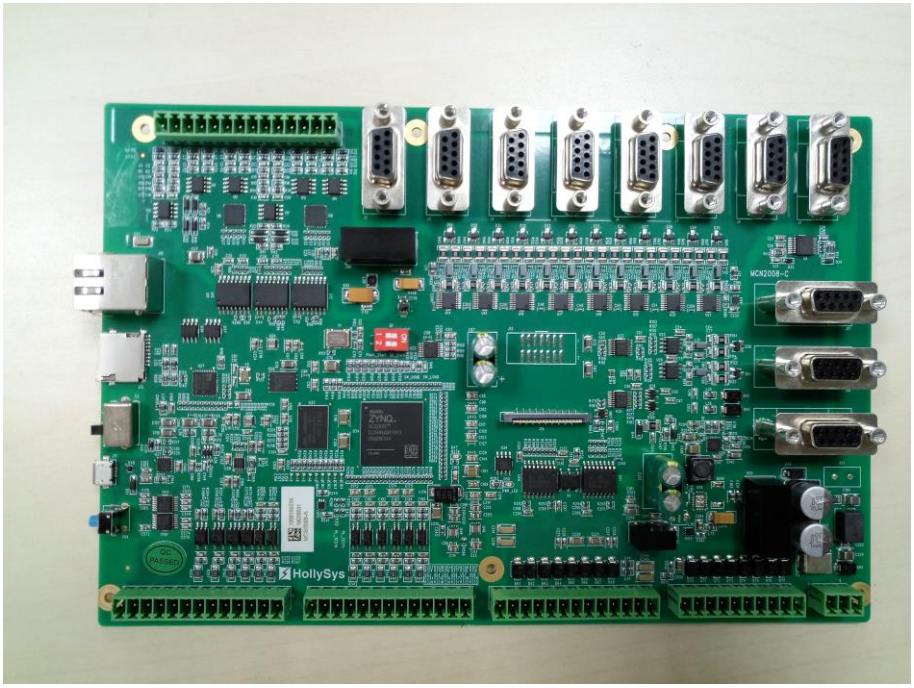


Fig. 30

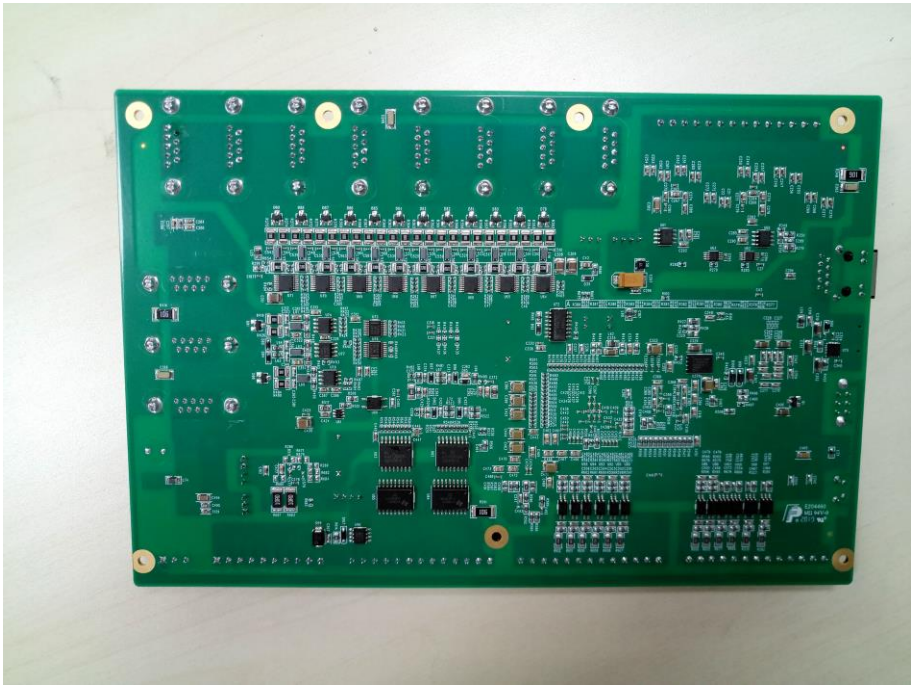


Fig. 31


Fig. 32

Fig. 33
*MC2008L*

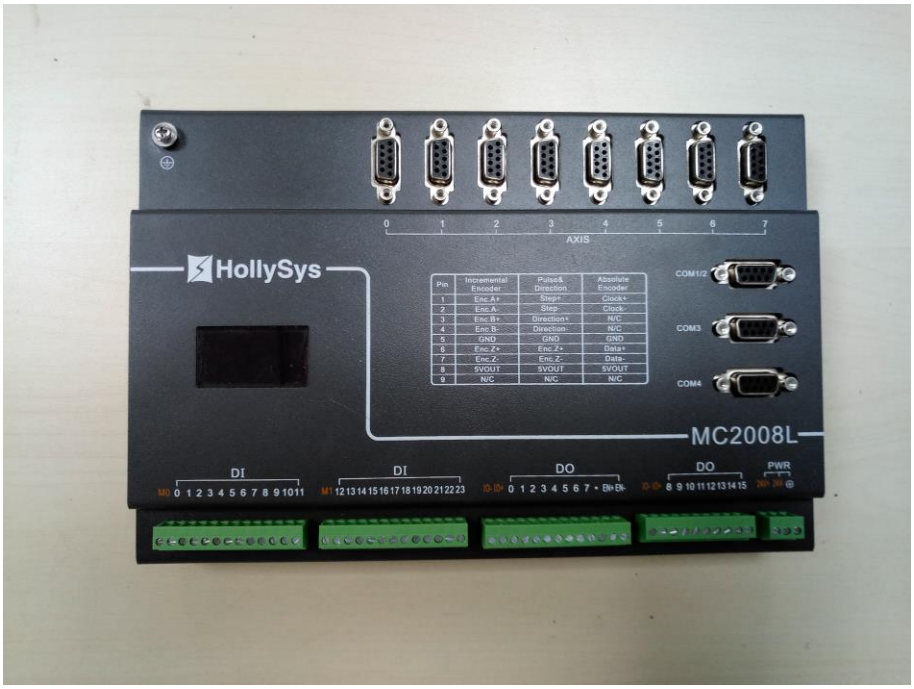



Fig. 34

Fig. 35

Fig. 36

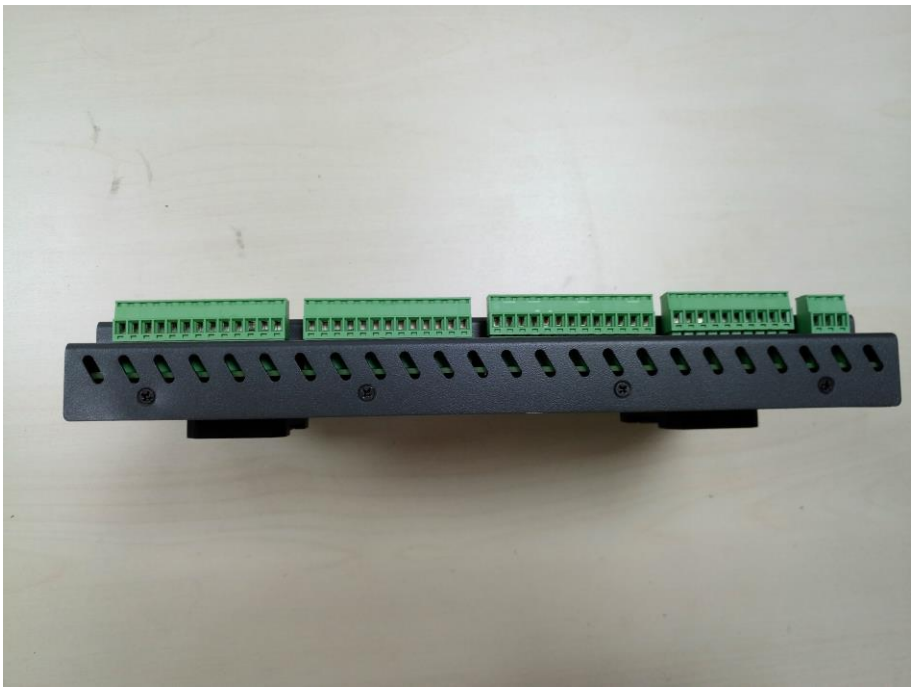


Fig. 37


Fig. 38

Fig. 39

Fig. 40

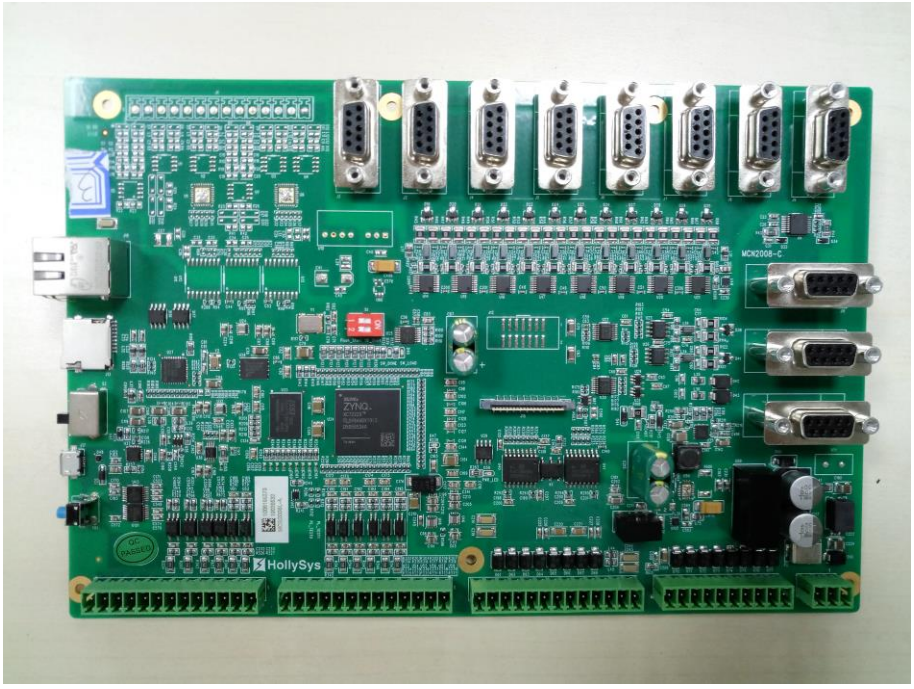



Fig. 41

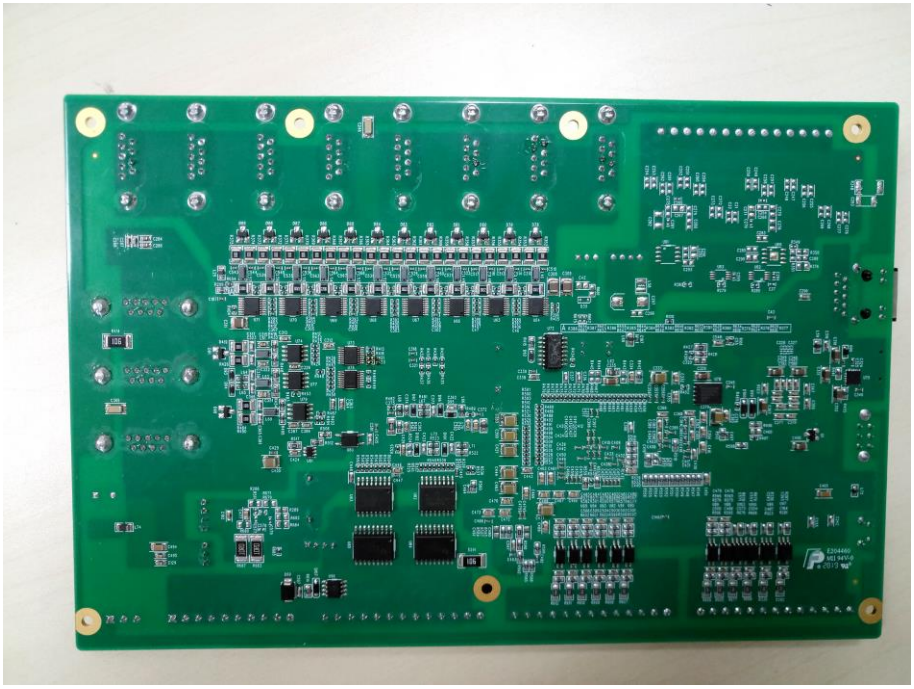


Fig. 42


**Fig. 43**

**Fig. 44**

# 7 Appendix

## A. Declaration of Conformity

According to the European EMC Directive (2014/30/EU), the conformity of a device to the Directive shall be certified by an EU declaration of conformity issued by the manufacturer or his authorized representative established within the European Union. If neither the manufacturer nor his authorized representative is established in the European Union, the EU declaration of conformity shall be the responsibility of the person who places the device on the European Union market.

The EU declaration of conformity shall be held at the disposal of the competent authority for ten years following the last placement of the device on the market (i.e., 10 years after that last device has been sold) and must contain the following information:

- Description of the device to which the declaration refers,
- Reference to the specifications under which conformity is declared, and, where appropriate, the national measures implemented to ensure the conformity of the provisions of the Directive,
- Identification of the signatory empowered to bind the manufacturer or his authorized representative.

An example of an EU declaration of conformity is shown on the next page.

Please note that WLL operates as a contract-testing laboratory and provides test results to support the EU declaration of conformity. However, under the EU's current regulations, it is up to the manufacturer/importer to declare conformity to the proper standards. Although WLL can provide technical guidance, the final determinations as to which standards apply to the product and whether the product conforms to the standards is the responsibility of the manufacturer/importer.

**S a m p l e**

# DECLARATION OF CONFORMITY

Application of Council Directive(s):

2014/30/EU

Standard(s) to which Conformity is Declared:

EN 61326-1: 2013, EN 61131-2: 2007, EN 61000-6-2:2005/AC:2005, EN 61000-6-4: 2011

| | |
|---|---|
| Manufacturer's Name: | Beijing HollySys Intelligent Technology Co., Ltd. |
| Manufacturer's Address: | No.2, Disheng Middle Road, Economic-Technological Development Area, Beijing, 100176 P.R.China |
| Importer's Name: | |
| Importer's Address: | |
| Type of Equipment: | MC2000 Series Motion Controller |
| Model Number: | MC2008, MC2008L, MC2004, MC2004L |
| Year of Manufacture: | |

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Place: _____ _____

(Signature)

Date: _____ _____

(Full Name)

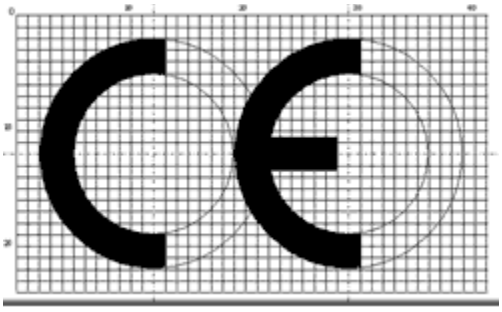
 

# B. Marketing and Labeling Instructions

Labeling Requirements

According to the European EMC Directive (2014/30/EU), the EU conformity marking for a device shall be affixed by the manufacturer, or his authorized representative established within the European Union. The EU conformity marking can be affixed to the device, packaging, instructions for use, or guarantee certificate.

The EU conformity marking shall consist of the letters "CE" (as shown below).



NOTE: The grid is to show proportions only.

Marketing Requirements

This report and the manufacturer's subsequent EU declaration of conformity are only valid for the technical standards (i.e. European Norms) noted in this report. If these technical standards are updated or additional technical standards are adopted, that are applicable to this device, then the device should be tested to these updated or new standards to ensure continued compliance with the EMC Directive (2014/30/EU). If changes to the original equipment are made, then these changes should be reviewed to ensure that they do not effect compliance with the technical standards. If the changes are determined to change the EMC characteristics of the device then the device should be retested to the applicable technical standards.

# C. Abbreviations

| | |
|---|---|
| **A** | Ampere |
| **AC** | alternating current |
| **AM** | Amplitude Modulation |
| **Amps** | Amperes |
| **b/s** | bits per second |
| **BW** | Bandwidth |
| **CAB** | Conformity Assessment Body |
| **CE** | Conducted Emission |
| **cm** | centimeter |
| **CW** | Continuous Wave |
| **dB** | decibel |
| **AC** | direct current |
| **EFT** | Electrically Fast Transient |
| **EMI** | Electromagnetic Interference |
| **ESD** | ElectroStatic Discharge |
| **EUT** | Equipment Under Test |
| **FM** | Frequency Modulation |
| **G** | giga - prefix for $10^9$ multiplier |
| **Hz** | Hertz |
| **IF** | Intermediate Frequency |
| **k** | kilo - prefix for $10^3$ multiplier |
| **LISN** | Line Impedance Stabilization Network |
| **M** | Mega - prefix for $10^6$ multiplier |
| **m** | meter |
| **NB** | Narrowband |
| **PC** | Personal Computer |
| **PCB** | Printed Circuit Board |
| **PCI** | Peripheral Component Interconnect |
| **RE** | Radiated Emissions |
| **RF** | Radio Frequency |
| **rms** | root-mean-square |
| **S** | second |
| **S/A** | EMI Receiver |
| **SN** | Serial Number |
| **V** | volt |
| **µ** | micro - prefix for $10^{-6}$ multiplier |

# D. Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation1 and Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

**Equation 1: Standard Uncertainty**

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + .....}$$

where $u_c$ = standard uncertainty

a, b, c,.. = individual uncertainty elements

$div_{a,\ b,\ c}$ = the individual uncertainty element divisor based on the probability distribution

divisor = 1.732 for rectangular distribution

divisor = 2 for normal distribution

divisor = 1.414 for trapezoid distribution

**Equation 2: Expanded Uncertainty**

$$U = ku_c$$

where U = expanded uncertainty

k = coverage factor

$k \leq 2$ for 95% coverage (ANSI/NCSL Z540-2 Annex G)

$u_c$ = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 15

## Table 15: Expanded Uncertainty List

| Scope | Standard(s) | Expanded Uncertainty |
|---|---|---|
| Conducted Emissions, Power Port | CISPR11, CISPR32, CISPR14, CISPR16, FCC Part 15 | ±3.60dB |
| Conducted Emissions, Signal Port | CISPR11, CISPR32, CISPR14, CISPR16, FCC Part 15 | ±2.00dB |
| Radiated Emissions 30MHz-1000MHz | CISPR11, CISPR32, CISPR14, CISPR16, FCC Part 15 | ±4.60dB |
| Radiated Emissions 1GHz-6GHz | CISPR11, CISPR32, CISPR14, CISPR16, FCC Part 15 | ±4.60dB |
| Electrostatic Discharge | IEC 61000-4-2 | ±5.00% |
| Radiated Immunity | IEC 61000-4-3 | ±2.80dB |
| Electrically Fast Transients | IEC 61000-4-4 | ±5.50% |
| Surge | IEC 61000-4-5 | ±5.50% |
| Conducted Immunity | IEC 61000-4-6 | ±1.20dB |
| Magnetic field immunity | IEC 61000-4-8 | 12.00% |
| Dips & Interrupts | IEC 61000-4-11 | ±3.80% |

----------The End----------