SPORTON LAB.

Project No : EC5N2020

VERIFICATION OF COMPLIANCE

Equipment	:	**Electromagnet Locks Indoor Series**
Model No.	:	**EM-300, FDH-L45\M, FDH-L90\M, FDH-L96\M, FDH-LMS42,FDH-M39M, FDH-M45\M, FDH-M90\M, FDH-M96\M, FDH-RLS45,GEM-1200, GEM-600, GEM-800, GEM-D1200, GEM-D600, GEM-D800**
Applicant	:	**GIANNI INDUSTRIES, INC.** No. 13, Zhong Sing Road, Tu-Cheng Industrial Zone, Tu-Cheng, Taipei, Taiwan 23678

SPORTON LAB.

I HEREBY DECLARE THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 2014/30/EU. 2004/108/EC.** The equipment was ***passed*** the test performed according to **European Standard EN 61000-6-3:2007/A1:2011, EN 61000-3-2:2014, EN 61000-3-3:2013 and EN 61000-6-1:2007 (IEC 61000-4-2 Edition 2.0 2008-12, IEC 61000-4-3 Edition 3.2 2010-04, IEC 61000-4-4 Edition 3.0 2012-04, IEC 61000-4-5 Edition 3.0 2014-05, IEC 61000-4-5 Edition 2.0 2005-11, IEC 61000-4-6 Edition 3.0 2008-10, IEC 61000-4-11 Edition 2.0 2004-03).**

The sample received on Dec. 03, 2015 and completely tested on ***Dec. 11,2015*** at **SPORTON LAB International Inc.** LAB.

Kero Kuo
Assistant Manager

CE EMC TEST REPORT

according to

**European Standard EN 61000-6-3:2007/A1:2011,
EN 61000-3-2:2014, EN 61000-3-3:2013 and
EN 61000-6-1:2007 (IEC 61000-4-2 Edition 2.0 2008-12,
IEC 61000-4-3 Edition 3.2 2010-04, IEC 61000-4-4 Edition 3.0 2012-04,
IEC 61000-4-5 Edition 2.0 2005-11, IEC 61000-4-6 Edition 3.0 2008-10,
IEC 61000-4-8 Edition 2.0 2009-09, IEC 61000-4-11 Edition 2.0 2004-03)**

Equipment : Electromagnet Locks Indoor Series

Model No. : EM-300, FDH-L45\M, FDH-L90\M, FDH-L96\M, FDH-LMS42,FDH-M39M, FDH-M45\M, FDH-M90\M, FDH-M96\M, FDH-RLS45, GEM-1200, GEM-600, GEM-800, GEM-D1200, GEM-D600, GEM-D800

Applicant : **GIANNI INDUSTRIES, INC.**
No. 13, Zhong Sing Road, Tu-Cheng Industrial Zone,
Tu-Cheng, Taipei, Taiwan 23678

Statement

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- This test report is only applicable to European Community.

SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan, R.O.C.

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
EC5N2020	Rev. 01	Initial issue of report	Dec. 21, 2015

Verification No. : EC5N2020

VERIFICATION OF COMPLIANCE

according to

**European Standard EN 61000-6-3:2007/A1:2011,
EN 61000-3-2:2014, EN 61000-3-3:2013 and
EN 61000-6-1:2007 (IEC 61000-4-2 Edition 2.0 2008-12,
IEC 61000-4-3 Edition 3.2 2010-04, IEC 61000-4-4 Edition 3.0 2012-04,
IEC 61000-4-5 Edition 2.0 2005-11, IEC 61000-4-6 Edition 3.0 2008-10,
IEC 61000-4-8 Edition 2.0 2009-09, IEC 61000-4-11 Edition 2.0 2004-03)**

Equipment	:	Electromagnet Locks Indoor Series
Model No.	:	EM-300, FDH-L45\M, FDH-L90\M, FDH-L96\M, FDH-LMS42,FDH-M39M, FDH-M45\M, FDH-M90\M, FDH-M96\M, FDH-RLS45, GEM-1200, GEM-600, GEM-800, GEM-D1200, GEM-D600, GEM-D800
Applicant	:	**GIANNI INDUSTRIES, INC.** No. 13, Zhong Sing Road, Tu-Cheng Industrial Zone, Tu-Cheng, Taipei, Taiwan 23678

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 2014/30/EU. 2004/108/EC.** The equipment was ***passed*** the test performed according to **European Standard EN 61000-6-3:2007/A1:2011, EN 61000-3-2:2014, EN 61000-3-3:2013 and EN 61000-6-1:2007 (IEC 61000-4-2 Edition 2.0 2008-12, IEC 61000-4-3 Edition 3.2 2010-04, IEC 61000-4-4 Edition 3.0 2012-04, IEC 61000-4-5 Edition 2.0 2014-05, IEC 61000-4-5 Edition 2.0 2005-11, IEC 61000-4-6 Edition 3.0 2008-10, IEC 61000-4-11 Edition 2.0 2004-03).**
The sample received on Dec. 03, 2015 and completely tested on ***Dec. 11, 2015*** at **SPORTON LAB International Inc.** LAB.

Kero Kuo / Assistant Manager

SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

GIANNI INDUSTRIES, INC.

No. 13, Zhong Sing Road, Tu-Cheng Industrial Zone, Tu-Cheng, Taipei, Taiwan 23678

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	:	Electromagnet Locks Indoor Series
Model No.	:	EM-300, FDH-L45\M, FDH-L90\M, FDH-L96\M, FDH-LMS42, FDH-M39M, FDH-M45\M, FDH-M90\M, FDH-M96\M, FDH-RLS45, GEM-1200, GEM-600, GEM-800, GEM-D1200, GEM-D600, GEM-D800
Trade Name	:	GEM

1.4. Feature of Equipment under Test

Please refer to user manual.

2. Test Configuration of Equipment under Test

2.1. Test Manner

a. The EUT has been associated with personal computer and peripherals pursuant to European Standard EN 61000-6-3 and EN 61000-6-1.

b. The equipment under test were performed the following test modes:

Test Items	Description of test modes
Radiated Emissions	Mode 1. GEM-600: 12V, LOCK Mode 2. GEM-600: 24V, LOCK Mode 3. GEM-600: 12V, UNLOCK Cause “mode 1” generated the worst test result; it was reported as final data.
EMS	Mode 1. GEM-600: 12V, LOCK

c. The highest frequency of the internal sources of the EUT is less than 108MHz, so the measurement shall only be made up to 1GHz

d. Frequency range investigated: Conduction 150 kHz to 30 MHz, Radiation 30 MHz to 1,000 MHz.

e. Frequency range investigated immunity test: CS 150 kHz to 80 MHz, RS 80 MHz to 2,700 MHz.

2.2. Description of Test System

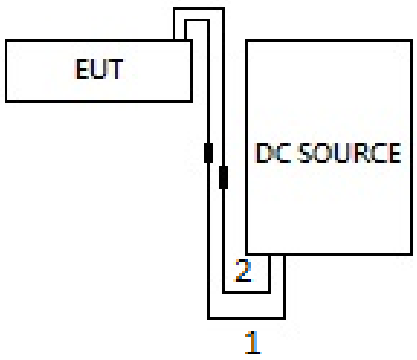
< For conducted emission & radiated emission below 1GHz >

No.	Peripheral	Manufacturer	Model Number	Cable / Spec. Description
For Local				
1	DC Source	GW	GPC-6030D	DC Power Cable, Non-Shielded, 1.0m (x2)

< EMS >

No.	Peripheral	Manufacturer	Model Number	Cable / Spec. Description
For Local				
1	DC Source	CHROMA	62024P-100-50	DC Power Cable, Non-Shielded, 1.8m

2.3. Connection Diagram of Test System for Radiated Emission



1-2. The DC power cable is connected from the EUT to the support unit 1.

3. Test Software

No test software was used during testing.

4. General Information of Test

4.1. Test Facility

<EMI>

Test Site：SPORTON INTERNATIONAL INC.

Test Site Location : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
TEL : 886-2-2631-5551
FAX : 886-2-2631-9740

Test Site No. : OS01-NH

<EMS>

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-327-0973

4.2. Test Voltage

AC 230V / 50Hz

4.3. Measurement Procedure

EMI Test	:	European Standard EN 61000-6-3
Harmonics Test	:	European Standard EN 61000-3-2
Voltage Fluctuations Test	:	European Standard EN 61000-3-3
EMS Test	:	European Standard EN 61000-6-1

(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5, CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

4.4. Test in Compliance with

EMI Test	:	European Standard EN 61000-6-3
Harmonics Test	:	European Standard EN 61000-3-2
Voltage Fluctuations Test	:	European Standard EN 61000-3-3
EMS Test	:	European Standard EN 61000-6-1

(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5, CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

4.5. Frequency Range Investigated

a. Conducted emission test: from 150 kHz to 30 MHz
b. Radiated emission test: from 30 MHz to 1,000 MHz
c. Radio frequency electromagnetic field immunity test: 80-2700 MHz

4.6. Test Distance

a. The test distance of radiated emission test from antenna to EUT is 10 M.
b. The test distance of radio frequency electromagnetic field immunity test from antenna to EUT is 3 M.

5. Conducted Emissions Measurement

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 61000-6-3. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meter above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

5.1. Test Procedures

a. The EUT was warmed up for 15 minutes before testing started.
b. The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.
c. Connect EUT to the power mains through a line impedance stabilization network (LISN).
d. Connect Telecommunication port to ISN (Impedance Stabilization Network).
e. All the support units are connect to the other LISN.
f. The LISN provides 50 ohm, coupling impedance for the measuring instrument.
g. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
h. Both sides of AC line were checked for maximum conducted interference.
i. The frequency range from 150 kHz to 30 MHz was searched.
j. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.2. Typical Test Setup Layout of DC Powerline Conducted Emissions

a. AMN is 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b. EUT is connected to one artificial mains network (AMN).
c. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d. Rear of EUT to be flushed with rear of table top.
e. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f. If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h. Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.

5.3. Typical Test Setup Layout of Disturbance at Telecommunication Ports

a. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b. EUT is connected to one artificial mains network (AMN).
c. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d. Rear of EUT to be flushed with rear of table top.
e. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f. If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h. Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.

5.4. Test Result of DC Powerline Conducted Emission

The power supply of this EUT is DC voltage.

Conduction Powerline tests is not applicable for this EUT.

5.5. Test Result of Disturbance at Telecommunication Ports

The EUT does not have the communication port.

6. Radiated Emission Measurement

Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in European Standard EN 61000-6-3. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

6.1. Test Procedures

For Below 1GHz

a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

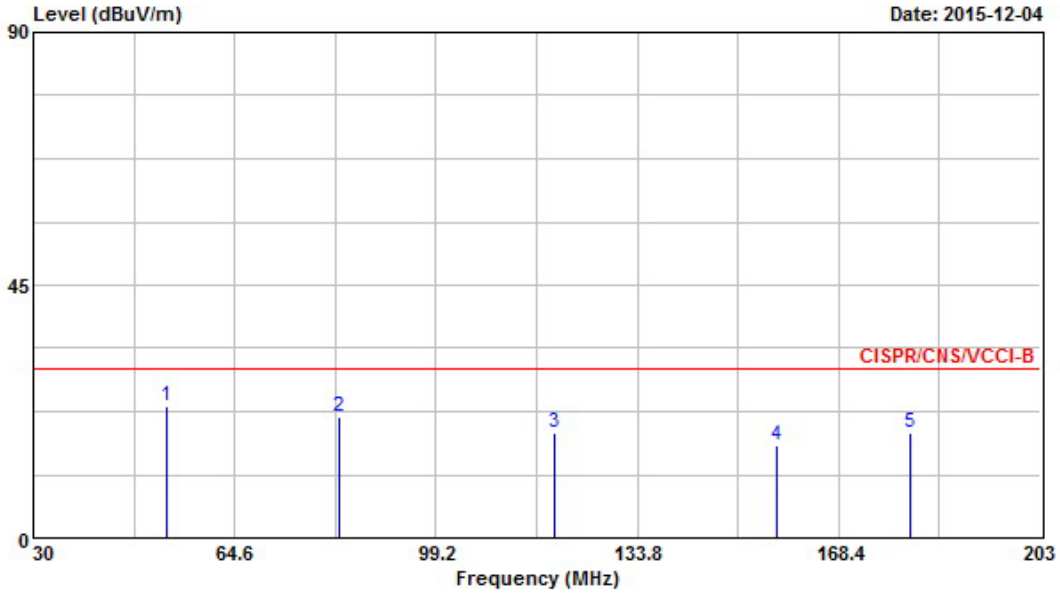
For above 1GHz

a. Same test set up as below 1GHz radiated testing.
b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.
d. The table was rotated 360 degrees to determine the position of the highest radiation.
e. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
f. Set the DRG Horn Antenna at 1M height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.
g. When EUT locating on the turn-table, and its height is over 172cm (Antenna's 3dB beam width of 6GHz is 27°), the DRG Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.
h. If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i The EUT and local AE shall be arranged in the most compact practical arrangement within the test volume, while respecting typical spacing and the requirements defined in Annex D. The central point of the arrangement shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.

6.2. Test Result of Radiated Emission for Below 1GHz

Test mode	Mode 1	Test Site No.	OS01-NH
Test frequency	30 MHz ~ 1000 MHz	Test Engineer	Louis
Temperature	22 ℃	Relative Humidity	53 %
Note: 1. Emission level (dBμV/m) = 20 log Emission level (μV/m)			
2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level			
■ The test was passed at the minimum margin that marked by the frame in the following data			

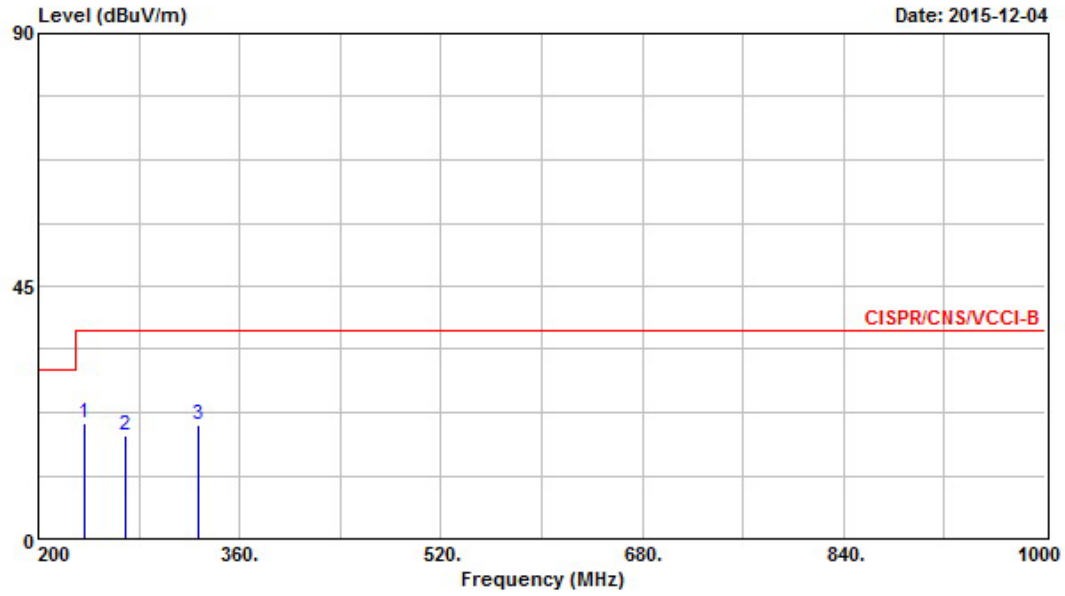
Vertical



Site : OS01-NH
Condition : CISPR/CNS/VCCI-B 10m OS01-ANT-03-06-2015 VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	53.010	23.50	-6.50	30.00	42.78	6.89	1.16	27.33	Peak	100	185
2	82.590	21.51	-8.49	30.00	39.84	7.57	1.40	27.30	Peak	---	---
3	119.610	18.70	-11.30	30.00	32.61	11.61	1.68	27.20	Peak	---	---
4	157.850	16.36	-13.64	30.00	30.90	10.54	1.94	27.02	Peak	---	---
5	180.680	18.66	-11.34	30.00	34.44	9.02	2.12	26.92	Peak	---	---

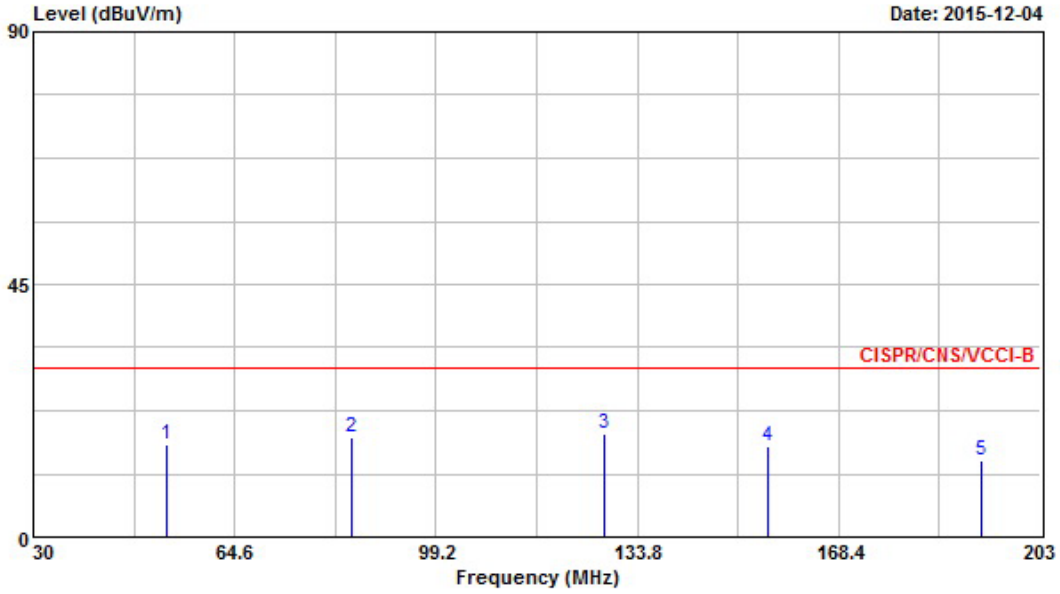
Vertical



Site : OS01-NH
Condition : CISPR/CNS/VCCI-B 10m OS01-ANT-03-06-2015 VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	236.800	20.46	-16.54	37.00	33.97	10.86	2.38	26.75	Peak	---	---
2	269.600	18.53	-18.47	37.00	29.72	12.81	2.68	26.68	Peak	---	---
3	327.200	20.28	-16.72	37.00	30.43	13.65	3.04	26.84	Peak	---	---

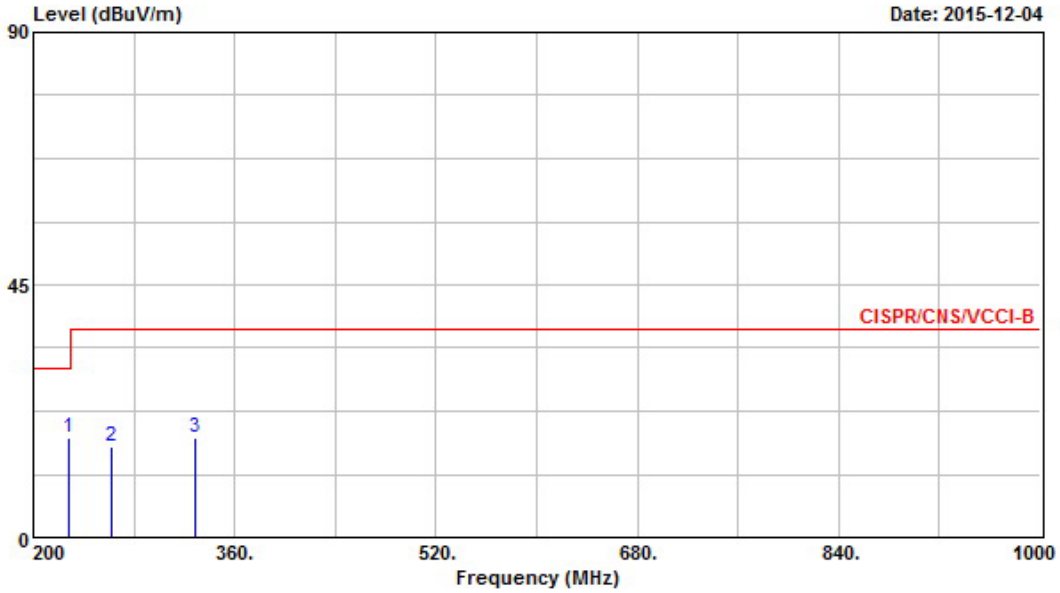
Horizontal



Site : OS01-NH
Condition : CISPR/CNS/VCCI-B 10m OS01-ANT-03-06-2015 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	53.010	16.61	-13.39	30.00	35.89	6.89	1.16	27.33	Peak	---	---
2	84.670	17.78	-12.22	30.00	35.89	7.78	1.41	27.30	Peak	---	---
3	128.090	18.29	-11.71	30.00	32.00	11.71	1.74	27.16	Peak	---	---
4	156.290	16.06	-13.94	30.00	30.45	10.71	1.93	27.03	Peak	---	---
5	192.970	13.75	-16.25	30.00	29.50	8.90	2.21	26.86	Peak	---	---

Horizontal



Site : OS01-NH
Condition : CISPR/CNS/VCCI-B 10m OS01-ANT-03-06-2015 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	228.000	17.69	-12.31	30.00	32.14	9.99	2.33	26.77	Peak	---	---
2	262.400	16.32	-20.68	37.00	27.01	13.43	2.58	26.70	Peak	---	---
3	328.800	17.88	-19.12	37.00	28.02	13.69	3.03	26.86	Peak	---	---

6.3. Test Result of Radiated Emission for Above 1GHz

The highest frequency of the internal sources of the EUT is less than 108MHz, so the measurement shall only be made up to 1GHz.

7. Harmonic Current Emissions Measurement

7.1. Standard

- Standard : EN 61000-3-2

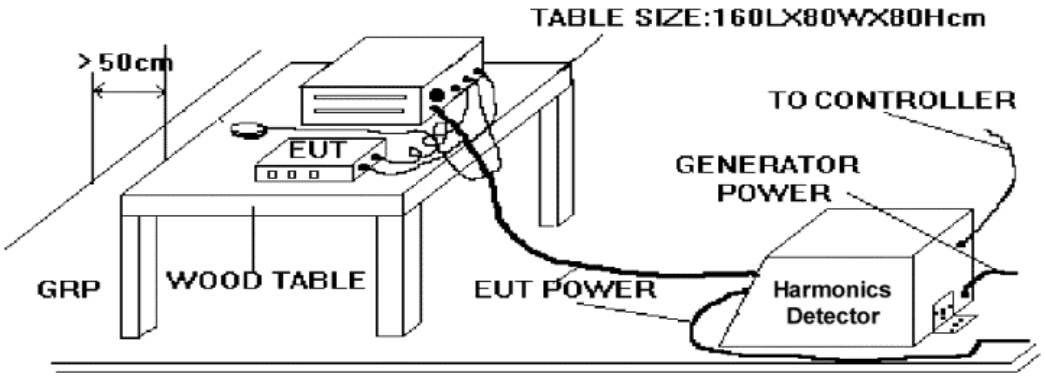
7.2. Test Procedure

The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in Clause 7 of EN 61000-3-2.

7.3. Test Equipment Settings

Harmonic Parameters	Setting
Line Voltage	230 V
Line Frequency	50 Hz
Device Class	-
Current Measurement Range	High
Measurement Delay	10.0 seconds
Test Duration	10.0 minutes
Class determination Pre-test Duration	10.0 seconds

7.4. Typical Test Setup Layout of Harmonic Current Emissions



7.5. Test Result of Harmonic Current Emissions

The power supply of this EUT is DC voltage.
Harmonics tests are not applicable for this EUT.

8. Voltage Fluctuations and Flicker Measurement

8.1. Standard

- Product Standard : EN 61000-3-3

8.2. Test Procedure

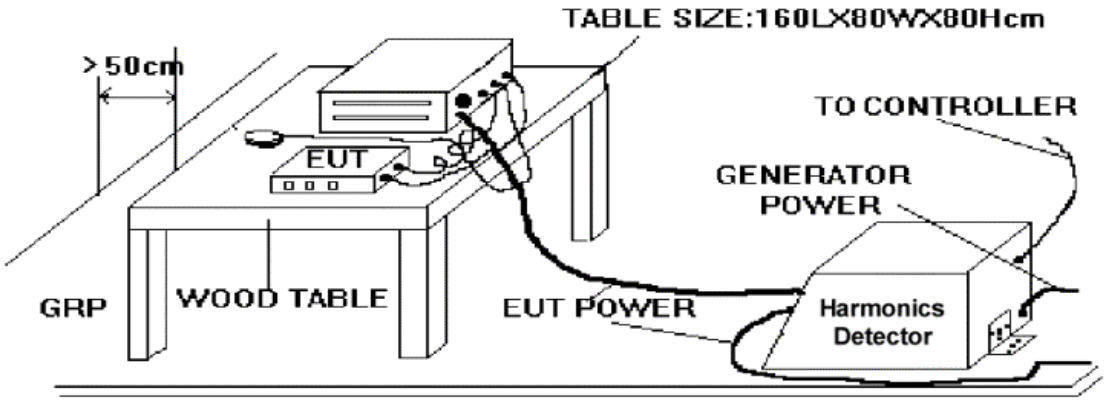
The equipment shall be tested under the conditions of **Clause 5.**

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of ±8% is achieved during the whole assessment procedure.

8.3. Test Equipment Settings

Flicker Parameters	Setting
Line Voltage	230 V
Line Frequency	50 Hz
Measurement Delay	10.0 seconds
Pst Integration Time	10.0 minutes
Pst Integration Periods	1
Test Duration	10.0 minutes

8.4. Typical Test Setup Layout of Voltage Fluctuations and Flicker



8.5. Test Result of Voltage Fluctuation and Flicker

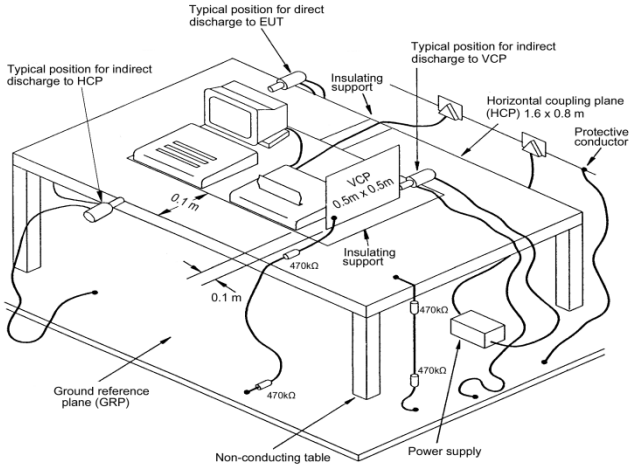
The power supply of this EUT is DC voltage.

Voltage Fluctuations tests is not applicable for this EUT.

9. Electrostatic Discharge Immunity Measurement (ESD)

Test mode	Mode 1
Final Test Result	***PASS***
Pass Performance Criteria	**A** ±2 / ±4 / ±8 kV for air discharge
	A ±2 / ±4 kV for contact discharge
Required Performance Criteria	**B** ±2 / ±4 / ±8 kV for air discharge
	B ±2 / ±4 kV for contact discharge
Basic Standard	IEC 61000-4-2
Product Standard	EN 61000-6-1:2007
Level	3 for air discharge
	2 for contact discharge
Test Voltage	±2 / ±4 / ±8 kV for air discharge
	±2 / ±4 kV for contact discharge
Discharge Impedance	330 ohm / 150 pF
Temperature	22 ℃
Relative Humidity	48 %
Atmospheric Pressure	101 kPa
Test Date	Dec. 11, 2015
Test Engineer	ZHEN
Observation	The test points, please refer to section 9.5.

9.1. Test Setup



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner:

a. CONTACT DISCHARGE to the conductive surfaces and to coupling plane;
b. AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

9.2. Test Setup for Tests Performed in Laboratory

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB., we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1 m minimum was provided between the EUT and the wall of the Lab., and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2 m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resister located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8 m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.

9.3. ESD Test Procedure

a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
   - ambient temperature: 15 °C to 35 °C;
   - relative humidity : 30 % to 60 %;
   - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).

b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.

c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.

d. The test shall be performed with both air discharge and contact discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on contact discharge.

e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted:
   - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
   - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
   - The contact discharge test shall not be applied to such surfaces.

h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

9.4. Test Severity Levels

9.4.1. Contact Discharge

Level	Test Voltage (kV) of Contact discharge
1	±2
2	±4
3	±6
4	±8
X	Specified
Remark : “X” is an open level.	

9.4.2. Air Discharge

Level	Test Voltage (kV) of Air Discharge
1	±2
2	±4
3	±8
4	±15
X	Specified
Remark : “X” is an open level.	

9.5. Test Points

9.5.1. Test Result of Air Discharge

Test Point	No. of Discharges	Air Discharge/Round Tip						Test Record
		+2kV	-2kV	+4kV	-4kV	+8kV	-8kV	
DC IN	10	A	A	A	A	A	A	Normal

9.5.2. Test Result of Contact Discharge

Direct discharge

Test Point	No. of Discharges	Contact Discharge/Pointed Tip				Test Record
		+2kV	-2kV	+4kV	-4kV	
Case	10	A	A	A	A	Normal
Screw	10	A	A	A	A	Normal

Indirect discharge to HCP and VCP

Test Point	No. of Discharges	Contact Discharge/Pointed Tip				Test Record
		+2kV	-2kV	+4kV	-4kV	
HCP (At Front)	10	A	A	A	A	Normal
HCP (At Left)	10	A	A	A	A	Normal
HCP (At Right)	10	A	A	A	A	Normal
HCP (At Rear)	10	A	A	A	A	Normal
VCP (At Front)	10	A	A	A	A	Normal
VCP (At Left)	10	A	A	A	A	Normal
VCP (At Right)	10	A	A	A	A	Normal
VCP (At Rear)	10	A	A	A	A	Normal

10. Radio Frequency Electromagnetic Field Immunity Measurement (RS)

Test mode	Mode 1
Final Test Result	***PASS***
Pass Performance Criteria	A
Required Performance Criteria	A
Basic Standard	IEC 61000-4-3
Product Standard	EN 61000-6-1:2007
Level	1 / 2
Frequency Range	80-1000 MHz, 1400-2700 MHz
Field Strength	3 V/m (unmodulated, r.m.s) 80% AM (1 kHz) – for 80-1000 MHz 3 V/m (unmodulated, r.m.s) 80% AM (1 kHz) – for 1400-2000 MHz 1 V/m (unmodulated, r.m.s) 80% AM (1 kHz) – for 2000-2700 MHz
Temperature	22 ℃
Relative Humidity	48 %
Atmospheric Pressure	101 kPa
Test Date	Dec. 11, 2015
Test Engineer	ZHEN

10.1. Test Record

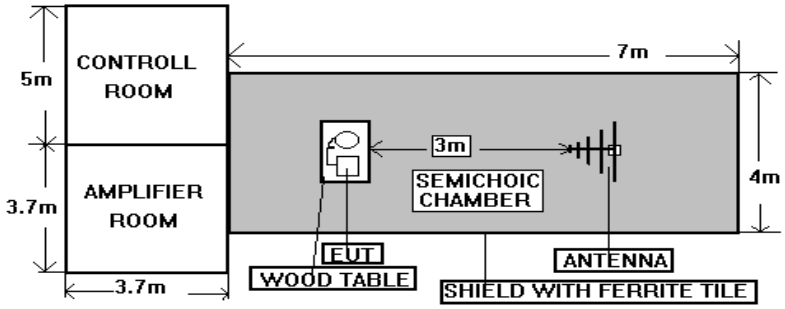
Frequency Band: 80-1000 MHz, 1400-2000 MHz

Sides of the EUT have been exposed to the field	Antenna positioned	Test field strength Level	Test field strength (V/m)	Test Record
Front	Vertical	2	3	Normal (No influencing)
	Horizontally	2	3	Normal (No influencing)
Left	Vertical	2	3	Normal (No influencing)
	Horizontally	2	3	Normal (No influencing)
Back	Vertical	2	3	Normal (No influencing)
	Horizontally	2	3	Normal (No influencing)
Right	Vertical	2	3	Normal (No influencing)
	Horizontally	2	3	Normal (No influencing)

2000-2700 MHz

Sides of the EUT have been exposed to the field	Antenna positioned	Test field strength Level	Test field strength (V/m)	Test Record
Front	Vertical	1	1	Normal (No influencing)
	Horizontally	1	1	Normal (No influencing)
Left	Vertical	1	1	Normal (No influencing)
	Horizontally	1	1	Normal (No influencing)
Back	Vertical	1	1	Normal (No influencing)
	Horizontally	1	1	Normal (No influencing)
Right	Vertical	1	1	Normal (No influencing)
	Horizontally	1	1	Normal (No influencing)

10.2. Test Setup



NOTE : The SPORTON 7m x 4m x 4m semi-anechoic chamber is compliance with the sixteen point's uniform field requirement as stated in IEC 61000-4-3 Section 6.2.

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

10.3. Test Procedure

a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.

b. The bilog antenna which is enabling the complete frequency range of 80-1000MHz, 1400-2700MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.

c. The test is normally performed with the generating antenna facing each of four sides of the EUT. The polarization of the field generated by the broadband (bilog) antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.

d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.

e. At each of the above conditions, the frequency range is swept 80-1000MHz, 1400-2700MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of 1.5*10-3 decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

10.4. Test Severity Levels

Frequency Band : 80-1000MHz, 1400-2700MHz

Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified
Remark : “X” is an open class.	

11. Electrical Fast Transient/Burst Immunity Measurement (EFT/BURST)

Test mode	Mode 1
Final Test Result	***PASS***
Pass Performance Criteria	A
Required Performance Criteria	B
Basic Standard	IEC 61000-4-4
Product Standard	EN 61000-6-1:2007
Level	on input power ports – 1
Test Voltage	on input power ports -- ± 0.5kV
Impulse wave shape	5/50 ns (Tr/Th)
Impulse frequency	5 kHz
Test Repetition Rate	1 time / minute
Temperature	21 ℃
Relative Humidity	47 %
Atmospheric Pressure	101 kPa
Test Date	Dec. 11, 2015
Test Engineer	ZHEN

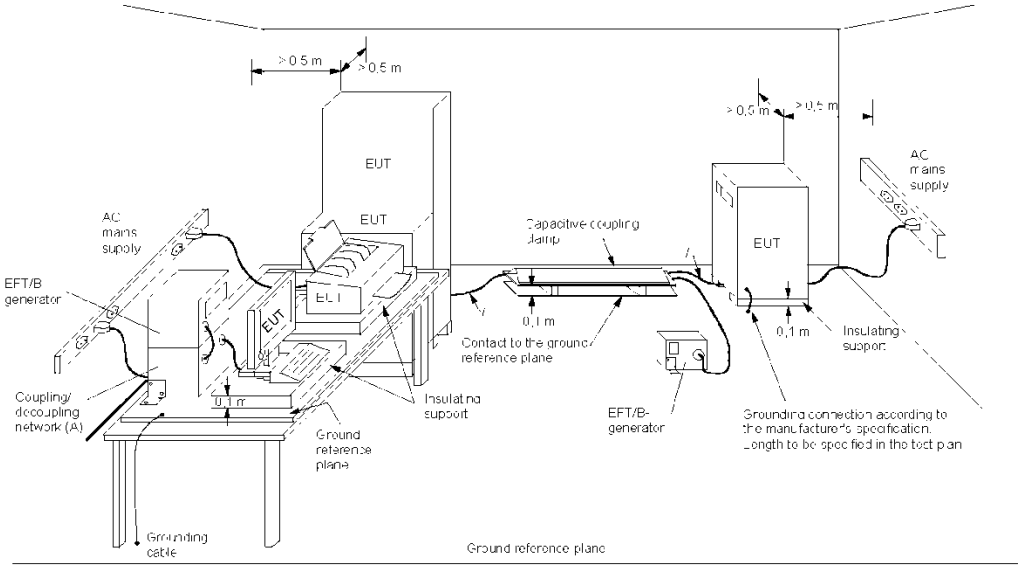
11.1. Test Record

■ **on Input power ports:**

Test Location	Polarity	Test Level	Voltage (Peak)	Test Record
L+N+PE	+	1	0.5 kV	Normal (No influencing)
	−	1	0.5 kV	Normal (No influencing)

Remark : PE = Earth reference

11.2. Test setup



Key

l length between clamp and the EUT to be tested (should be 0,5 m ± 0,05 m)

(A) location for supply line coupling

(B) location for signal lines coupling

The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1 m thick. If the EUT is table-top equipment, it was located approximately 0.8 m above the GRP. The GRP. Was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1 m on all sides and connected to the protective earth. In the SPORTON EMC LAB., We provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. Beneath the EUT, was more than 0.5 m. using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. Beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1 m or less.

11.3. Test on Power Line

a. The EFT/B-generator was located on the GRP. The length from the EFT/B-generator to the EUT as not exceeds 1 m.

b. The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

11.4. Test on Communication Lines

a. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP.

b. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

11.5. Test Procedure

a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
   - ambient temperature: 15 °C to 35 °C;
   - relative humidity : 45 % to 75 %;
   - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).

b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.

c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.

d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
   - Normal performance within the specification limits.
   - Temporary degradation or loss of function or performance which is self-recoverable.
   - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
   - Degradation or loss of function which is not recoverable due to damage of equipment (components).

11.6. Test Severity Levels

The following test severity levels are recommended for the fast transient/burst test :

Open circuit output test voltage ± 10%		
Level	**On Input power ports**	**On signal port and telecommunication ports**
1	0.5 kV	0.25 kV
2	1.0 kV	0.50 kV
3	2.0 kV	1.00 kV
4	4.0 kV	2.00 kV
X	Specified	Specified
Remark : " X " is an open level. The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.		

12. Surge Immunity Measurement

The power supply is From DC Source.

Surge Immunity tests is not applicable for this EUT.

13. Conducted Disturbances Induced by Radio-Frequency Field Immunity Measurement (CS)

Test mode	Mode 1
Final Test Result	***PASS***
Pass Performance Criteria	A
Required Performance Criteria	A
Basic Standard	IEC 61000-4-6
Product Standard	EN 61000-6-1:2007
Level	2
Test Voltage	3 V (unmodulated, r.m.s), 80% AM (1 kHz)
Frequency Range	0.15 MHz to 80 MHz
Test Port	on Input Power Port
Dwell time	2.9 seconds
Frequency step size	1 %
Coupling mode	CDN M016 M3 for DC power Port
Temperature	22 ℃
Relative Humidity	47 %
Atmospheric Pressure	101 kPa
Test Date	Dec. 11, 2015
Test Engineer	ZHEN

13.1. Test Record

Test Port	Test field strength level	Test field strength (V rms)	Test Record
Input power port	2	3	Normal (No influencing)

13.2. Test Severity Levels

Level	Voltage Level (EMF)
1	1 V rms
2	3 V rms
3	10 V rms
x	Specified
Remark : " X " is an open level. This level can be specified in the product specification.	

13.3. Test Procedure

a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.

b. This test method test can be performed without using a sell shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.

c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF-input ports of the coupling devices are terminated by a 50 ohm load resistor.

d. The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.

e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.

f. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.

g. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

h. The use of special exercising programs is recommended.

i. Testing shall be performed according to a Test Plan, which shall be included in the test report.

j. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

13.4. Operating Condition

Full system

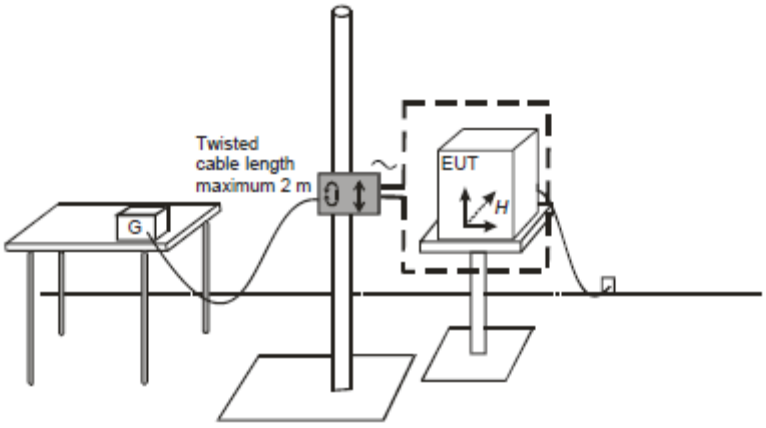
14. Power Frequency Magnetic Field immunity Measurement (PFMF)

Test mode	Mode 1
Final Test Result	***PASS***
Pass Performance Criteria	A
Required Performance Criteria	A
Basic Standard	IEC 61000-4-8
Product Standard	EN 61000-6-1:2007
Temperature	20 ℃
Relative Humidity	50 %
Atmospheric Pressure	101 kPa
Test Date	Dec. 11, 2015
Test Engineer	ZHEN
Observation	Please refer to section 14.1

14.1. Test Record

Power Frequency Magnetic Field	Testing duration	Coil Orientation	Test Record
50/60Hz, 3A/m	1.0 Min	X-axis	Normal (No influencing)
50/60Hz, 3A/m	1.0 Min	Y-axis	Normal (No influencing)
50/60Hz, 3A/m	1.0 Min	Z-axis	Normal (No influencing)

14.2. Test Setup



EUT : Equipment under test G : Test Generator

15. Voltage Dips and Voltage Interruptions Immunity Measurement (DIP)

The power supply is From DC Source.

DIP Immunity tests is not applicable for this EUT.

16. List of Measuring Equipment Used

< Radiated Emission below 1GHz >

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Open Area Test Site	SPORTON	OATS-10	OS01-NH	30 MHz - 1 GHz 10m	Jul. 25, 2015	Radiation (OS01-NH)
Amplifier	HP	8447D	2944A06292	0.1 MHz - 1.3 GHz	Apr. 29, 2015	Radiation (OS01-NH)
Spectrum Analyzer	R&S	R&S	FSP	838858/038	Mar. 23, 2015	Radiation (OS01-NH)
Test Receiver	R&S	ESCS 30	100167	9 kHz - 2.75 GHz	Nov. 12, 2015	Radiation (OS01-NH)
Bilog Antenna	SCHAFFNER	CBL6111C	2738	30 MHz ~ 1 GHz	Mar. 06, 2015	Radiation (OS01-NH)
Turn Table	EMCO	1060-1.211	9507-1805	0 ~ 360 degree	NCR	Radiation (OS01-NH)
Antenna Mast	EMCO	1051-1.2	9503-1876	1 m ~ 4 m	NCR	Radiation (OS01-NH)
RF Cable-R10m	BELDEN	RG8/U	CB001	30 MHz ~ 1 GHz	Nov. 05, 2015	Radiation (OS01-NH)

Note: Calibration Interval of instruments listed above is one year. NCR: No Calibration Request.

<EMS>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
ESD Simulator	KEYTEK	MZ-15/EC	0302234	Air: 0 ~15kV Contact: 0 ~ 8kV	Oct. 26, 2015	ESD
RS immunity Test system	ROHDE& SCHWARZ	RSF	RS-01	80M~3GHz	Apr. 21, 2015	RS
Amplifier	AMPLIFIER& RESEARCH	250W 1000AM	0332909	80MHz ~ 1GHz	Mar. 19, 2015	RS
Amplifier	AMPLIFIER& RESEARCH	30S1G3	312505	800M~3GHz	Oct. 14, 2015	RS
DUAL DIRECTIONAL COUPLER	AMPLIFIER& RESEARCH	DC6180A	312453	0.08 ~ 1GHz	Oct. 14, 2015	RS
DUAL DIRECTIONAL COUPLER	AMPLIFIER& RESEARCH	DC7144A	312782	0.8 ~ 4.2GHz	Oct. 14, 2015	RS
INTEGRATED MEASUREMENT SYSTEM	ROHDE& SCHWARZ	IMS	100007	9kHz ~ 3GHz	May 08, 2015	RS
NRP-Z91 POWER SENSOR 6GHZ	ROHDE& SCHWARZ	NRP-Z91 1168.8004.02	100095	9kHz ~ 3GHz	May 08, 2015	RS
Antenna	FRANKONIA	BTA-L	02002L	26MHz ~ 1GHz	May 05, 2015	RS
Antenna	AR	AT4002A	312601	800MHz ~ 5GHz	May 05, 2015	RS
Probe	ETS-LINDGREN	HI-6005	00069910	0.1MHz ~ 5GHz	Sep. 30, 2015	RS
EFT Generator	TESEQ	FTM3425	0180	0 ~ 4kV	Jan. 14, 2015	EFT
Conducted Immunity Test System	TESEQ	NSG4070	34293	9kHz ~ 1GHz	Aug. 23, 2015	CS
Attenuator	BIRD	100-SA-MFB-06	0232	150kHz ~ 230MHz	Aug. 25, 2015	CS
Coupling and Decoupling Network	SCHAFFNER	CDN M016	16676	150kHz ~ 230MHz	Jul. 03, 2015	CS
Magnetic field Immunity Loop	FCC (KEYTEK)	F-1000-4-8-G-125A	03007	30A//CONTINUOUS 100A/2Hrs 230A/30SEC	Oct. 27, 2015	PFMF
Magnetic Generator	FCC (KEYTEK)	F-1000-4-8/9/10-L-1M	03003	30A//CONTINUOUS 100A/2Hrs 230A/30SEC	Oct. 27, 2015	PFMF

Note: Calibration Interval of instruments listed above is one year.

17. Uncertainty of Test Site

Emission Test Measurement Uncertainty

Test Items	Test Site No.	Uncertainty	Remark
Radiated Emissions below 1GHz	OS01-NH	± 2.8dB	Confidence levels of 95%

Immunity Test Measurement Uncertainty

◆ **ESD Immunity (IEC 61000-4-2)**

Negative Discharge Current

From Standard				From calibration certificate					
2kV	First Peak Current	Current at 30ns	Current at 60ns	Measured First Peak Current	1st Peak Worst case. **+5%**	Measured Current at 30ns	30ns Worst case. **+5%**	Measured Current at 60ns	60ns Worst case. **-5%**
Nominal	7.5	4	2	7.48	7.85	4.2	4.41	2.01	2.11
Min	6.75	2.8	1.4		6.75		2.8		1.4
Max	8.25	5.2	2.6		8.25		5.2		2.6
Tolerance in %	10%	30%	30%						

4kV	First Peak Current	Current at 30ns	Current at 60ns	First Peak Current	1st Peak Worst case. **+5%**	Measured Current at 30ns	30ns Worst case. **+5%**	Measured Current at 60ns	60ns Worst case. **+5%**
Nominal	15	8	4	15.12	15.88	8.03	8.43	3.68	3.86
Min	13.5	5.6	2.8		13.5		5.6		2.8
Max	16.5	10.4	5.2		16.5		10.4		5.2
Tolerance in %	10%	30%	30%						

6kV	First Peak Current	Current at 30ns	Current at 60ns	First Peak Current	1st Peak Worst case. **-5%**	Measured Current at 30ns	30ns Worst case. **+5%**	Measured Current at 60ns	60ns Worst case. **+5%**
Nominal	22.5	12	6	22.78	23.92	12.37	12.99	5.45	5.72
Min	20.25	8.4	4.2		20.25		8.4		4.2
Max	24.75	15.6	7.8		24.75		15.6		7.8
Tolerance in %	10%	30%	30%						

Negative Discharge Current

From Standard				From calibration Certificate					
8kV	First Peak Current	Current at 30ns	Current at 60ns	First Peak Current	1st Peak Worst case. **+5%**	Measured Current at 30ns	30ns Worst case. **+5%**	Measured Current at 60ns	60ns Worst case. **+5%**
Nominal	30	16	8	30.26	31.77	16.13	16.94	7.39	7.76
Min	27	11.2	5.6		27		11.2		5.6
Max	33	20.8	10.4		33		20.8		10.4
Tolerance in %	10%	30%	30%						

Negative Discharge Voltage

Standard Parameters				Measured Values
Indicated Voltage.	Tolerance.	Max.	Min.	
kV	%	kV	kV	kV
2	10	2.20	1.80	2.05
4	10	4.40	3.60	4.027
6	10	6.60	5.40	5.955
8	10	8.80	7.20	7.916
15	10	16.50	13.50	14.839

Negative Rise Time

Standard Parameters	
T max.	1ns
T min	0.7ns

Measured Values			
Indicated Voltage.	Measured Rise Time.	Worst Case max. +6%	Worst Case min. -6%
2kV	0.851	0.902	0.799
4kV	0.780	0.827	0.733
6kV	0.750	0.795	0.705
8kV	0.772	0.818	0.726

It has been demonstrated that the ESD generator meets the specified requirements in the standard with at least a 95% confidence

◆ RF Radiated Immunity (IEC 61000-4-3)

Symbol	Source of Uncertainty	Value	Probability distribution	Divisor	$u_i(y)$
F_{SM}	Felds Strength monitor	1.5	Normal 2	2.000	0.75
FS_{AW}	Field Strength acceptability window	0.50	Rectangular	1.732	0.29
PAH	Power Amplifier Harmonics	0.50	Rectangular	1.732	0.29
R_S	Measurement System Repeatability	0.50	normal 1	1.000	0.50
R_{EUT}	Repeatability of EUT	0.00	normal 1	1.000	0.00
$u_c(F_S)$	Combined Standard Uncertainty	-	normal	-	0.83
$U(F_S)$	**Expanded Uncertainty**	-	**normal k= 2**		**1.66**

Specified Level (V/m)	Test level (V/m)
For 1 Volts	1.25
For 3 Volts	3.33
For 10 Volts	11.22

◆ EFT/BURST Immunity (IEC 61000-4-4)

Voltage Output

Standard Parameters				Measured Values
Indicated Voltage.	Tolerance.	Max.	Min.	
kV	%	kV	kV	kV
0.5	10	0.55	0.45	0.489
1	10	1.1	0.9	1.006
2	10	2.2	1.8	2.016
4	10	4.4	3.6	3.830
- 0.5	10	- 0.55	- 0.45	- 0.489
- 1	10	- 1.1	- 0.9	- 0.972
- 2	10	- 2.2	- 1.8	- 1.961
- 4	10	- 4.4	- 3.6	- 3.770

Spike frequency

Standard Parameters					Measured Values
Indicated Voltage.		Tolerance.	Max.	Min.	
kV	kHz	%	kHz	kHz	kHz
0.5	5	10	5.5	4.5	5.00
1	5	10	5.5	4.5	4.98
2	5	10	5.5	4.5	4.98
4	2.5	10	2.75	2.25	2.49
4	5	10	5.5	4.5	5.01

Burst width

Standard Parameters					Measured Values
Indicated Voltage.		Tolerance.	Max.	Min.	
kV	ms	%	ms	ms	ms
0.5	15	20	18	12	14.97
1	15	20	18	12	14.94
2	15	20	18	12	14.91
4	15	20	18	12	14.95

Burst period

Standard Parameters					Measured Values
Indicated Voltage.		Tolerance.	Max.	Min.	
kV	ms	%	ms	ms	ms
0.5	300	20	360	240	299.7
1	300	20	360	240	300.5
2	300	20	360	240	299.2
4	300	20	360	240	300.2

It has been demonstrated that the EFT/BURST generator meets the specified requirements in the standard with at least a 95% confidence

◆ RF Conducted Immunity (IEC 61000-4-6)

Symbol	Source of Uncertainty	Value	Probability distribution	Divisor	$u_i(y)$
S_A	Spectrum Analyzer	1.50	Rectangular	1.732	0.87
C_C	Current coil Calibration	1.00	normal 2	2.000	0.50
M	Mismatch	-0.5	U-shaped	1.414	-0.35
M	Mismatch	-0.3	U-shaped	1.414	-0.35
R_S	Measurement System Repeatability	0.50	normal 1	1.000	0.50
R_{EUT}	Repeatability of EUT	0.00	normal 1	1.000	0.00
$u_c(F_S)$	Combined Standard Uncertainty	-	normal	-	1.57
$U(F_S)$	**Expanded Uncertainty**	-	**normal k= 2**		**3.14**

Specified Level (V)	Test level (V)
For 1 Volts	1.30
For 3 Volts	3.88
For 10 Volts	12.15

◆ Magnetic Field Immunity (IEC 61000-4-8)

Current output

Standard Parameters					Measured Values
Magnetic Field Strength	Output Current	Tolerance.	Max.	Min.	
A/m	A	%	A	A	A
1	6	5	6.3	3.8	6.1
3	50	5	52.5	47.5	49.0
10	180	5	189	171	188.0

It has been demonstrated that the Magnetic generator meets the specified requirements in the standard with at least a 95% confidence

Appendix A. Test Photos

1. Photographs of Radiated Emissions Test Configuration

For radiated emissions below 1GHz

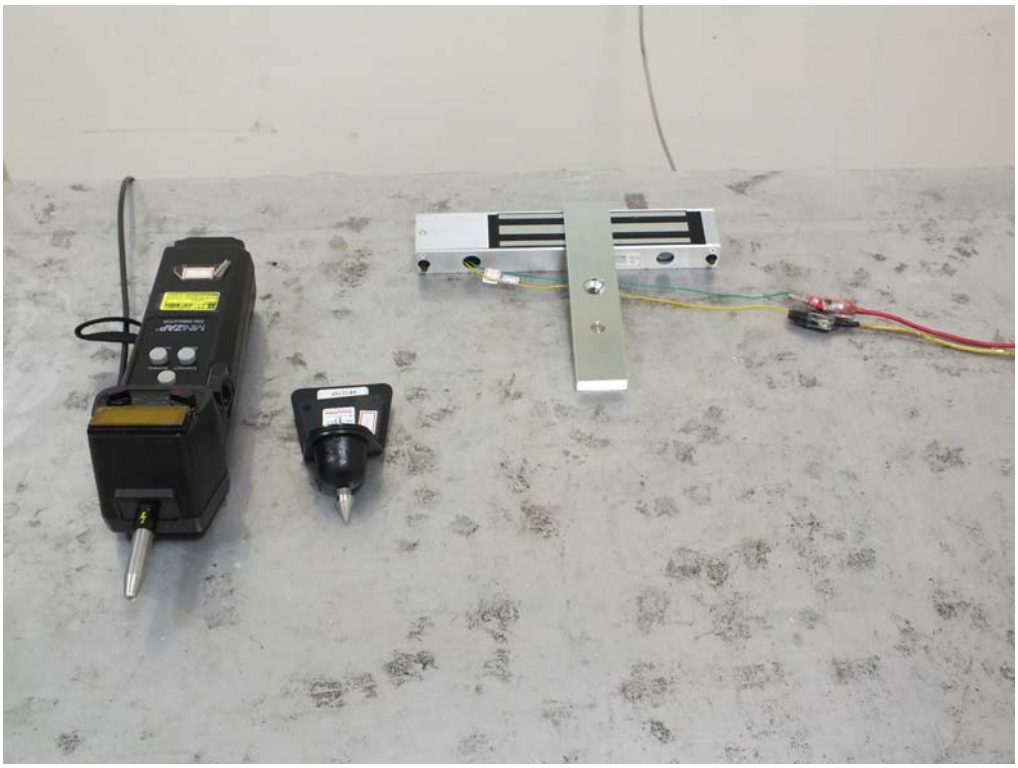
Front view

Rear view

2. Photographs of ESD Immunity Test Configuration

Front view

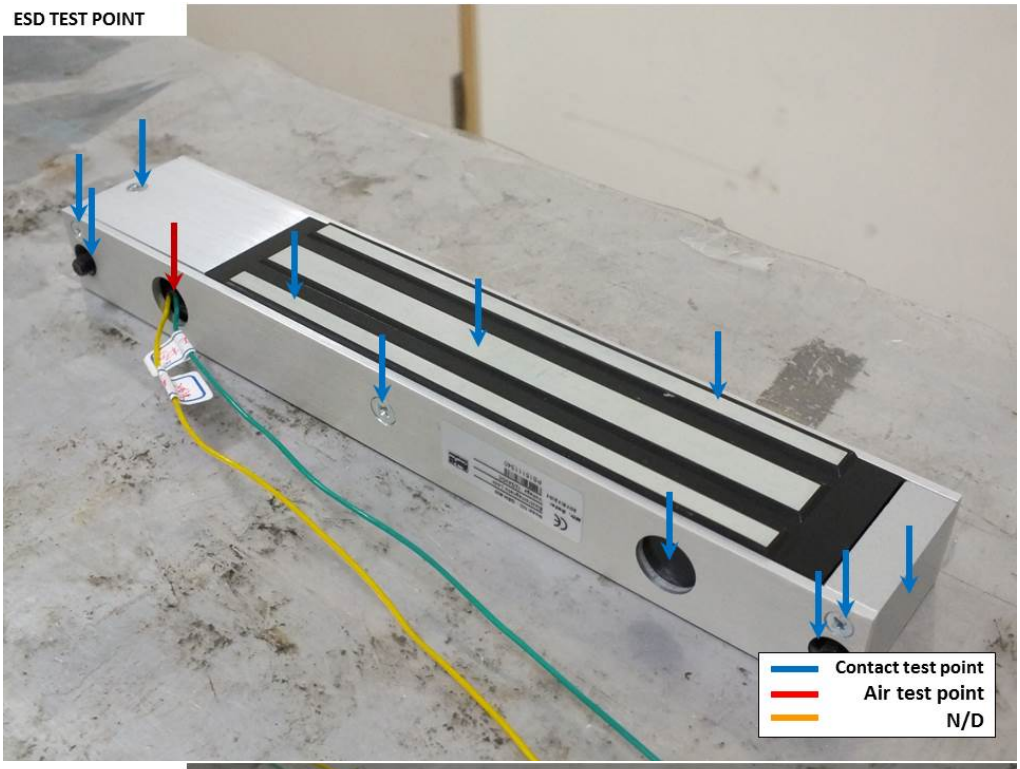
Rear view



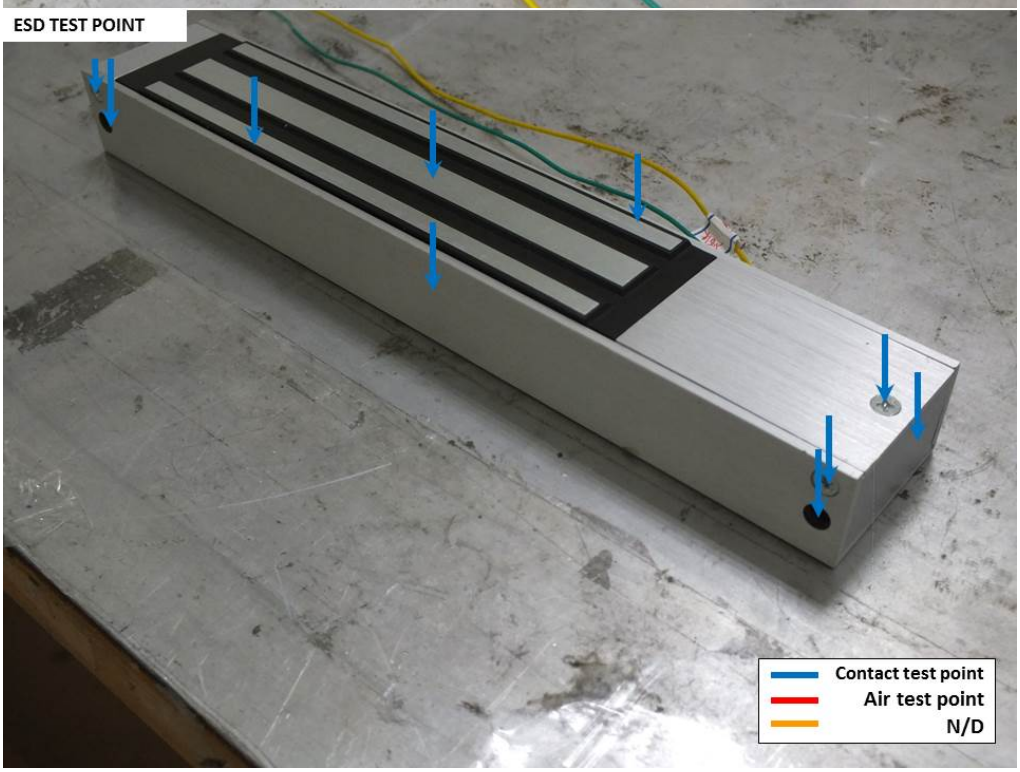
Test Points

Contact test point
Air test point

ESD TEST POINT

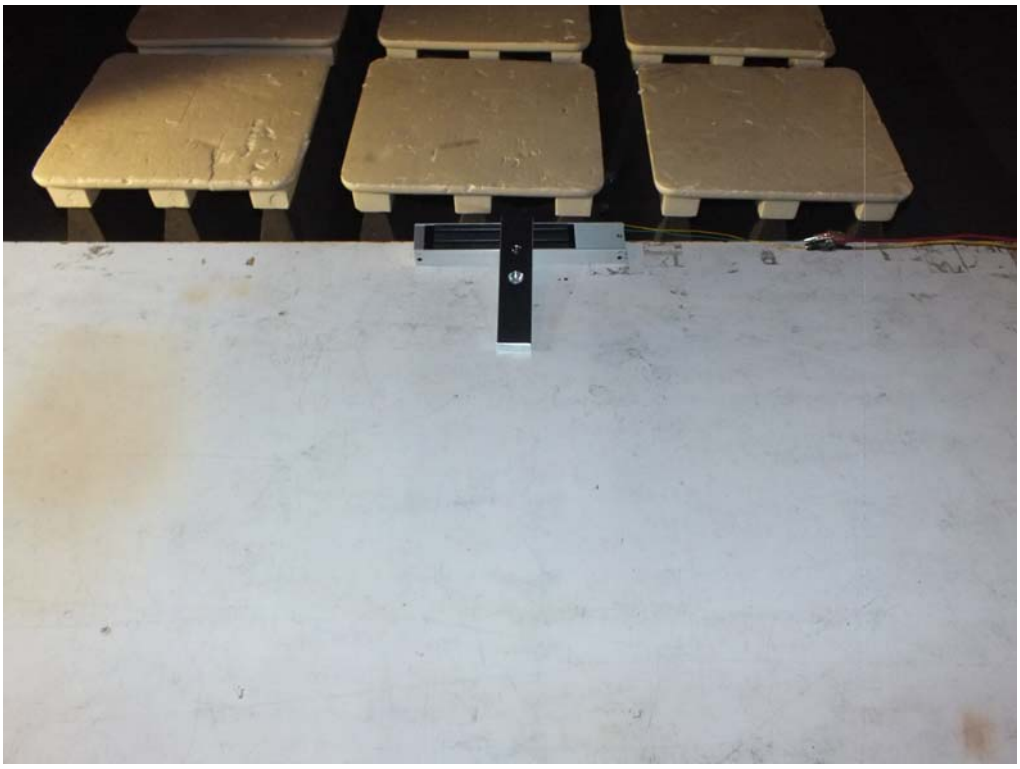


ESD TEST POINT

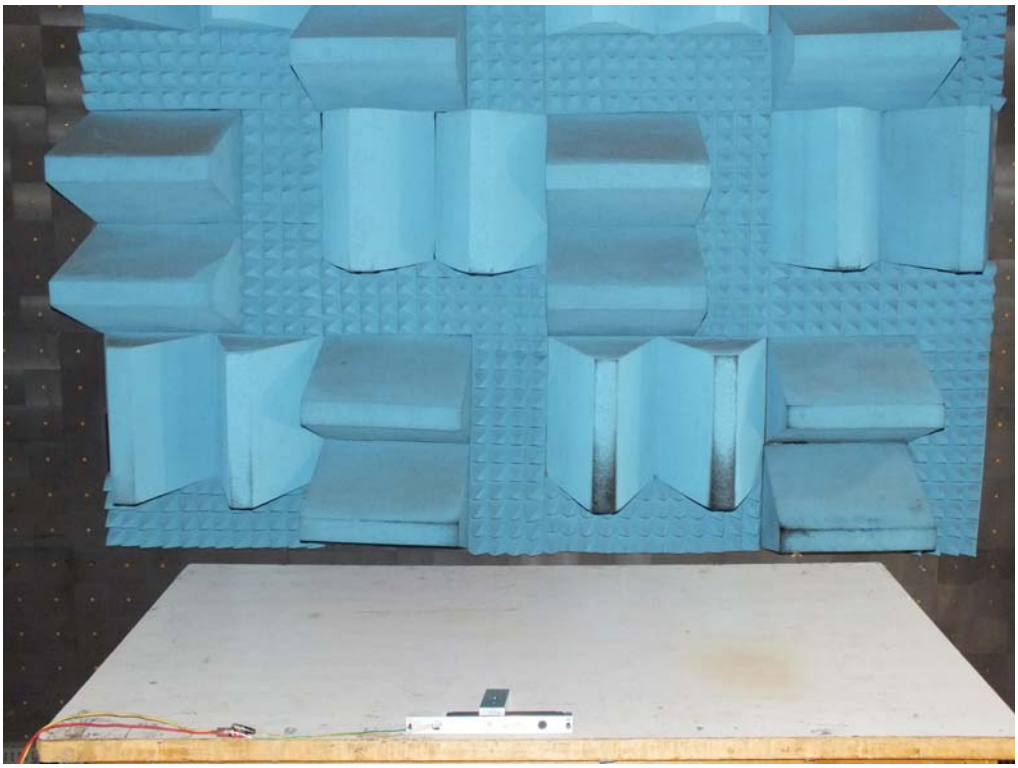


3. Photographs of RS Immunity Test Configuration

Front view

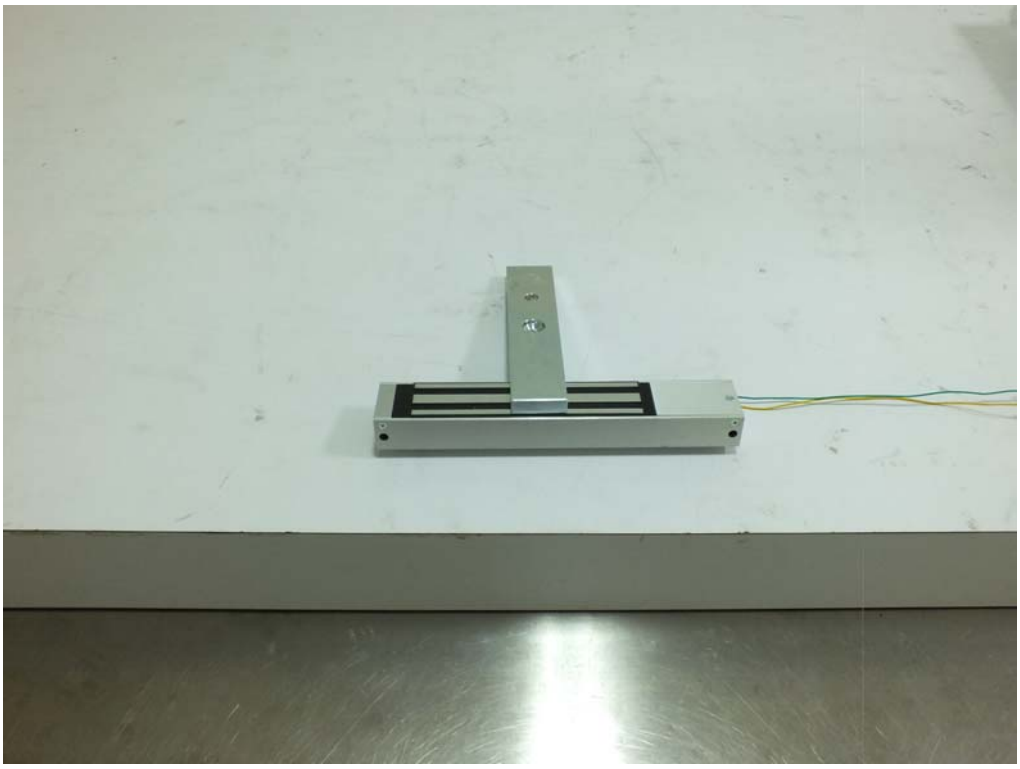


Rear view

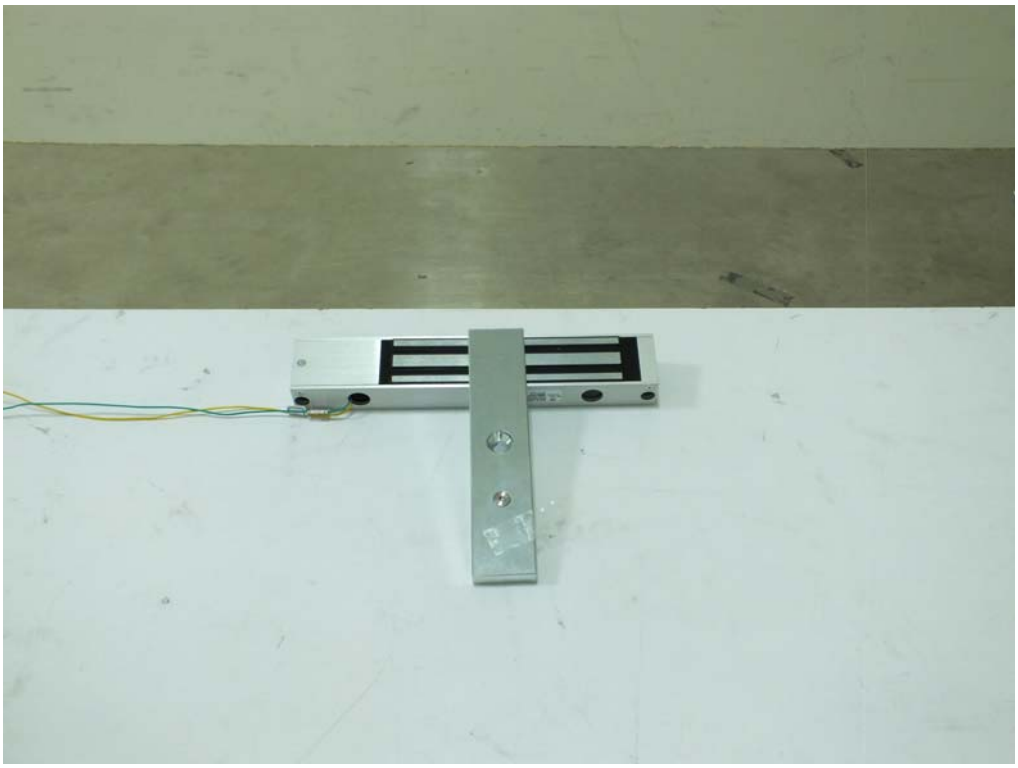


4. Photographs of EFT Test Configuration

Front view

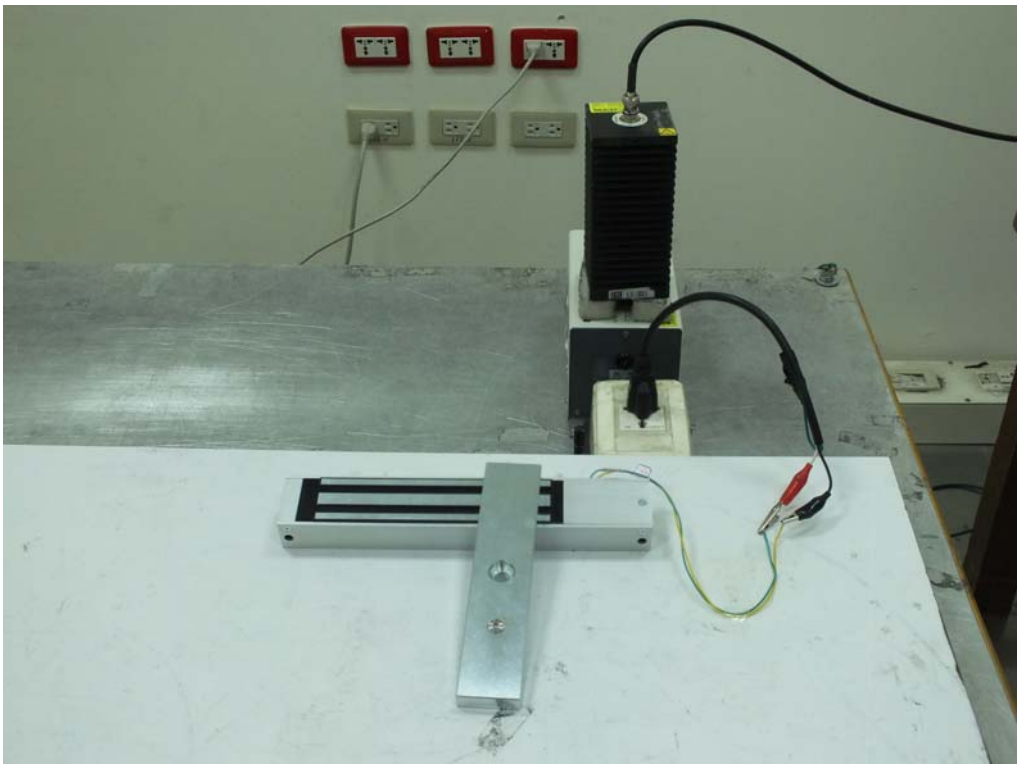


Rear view

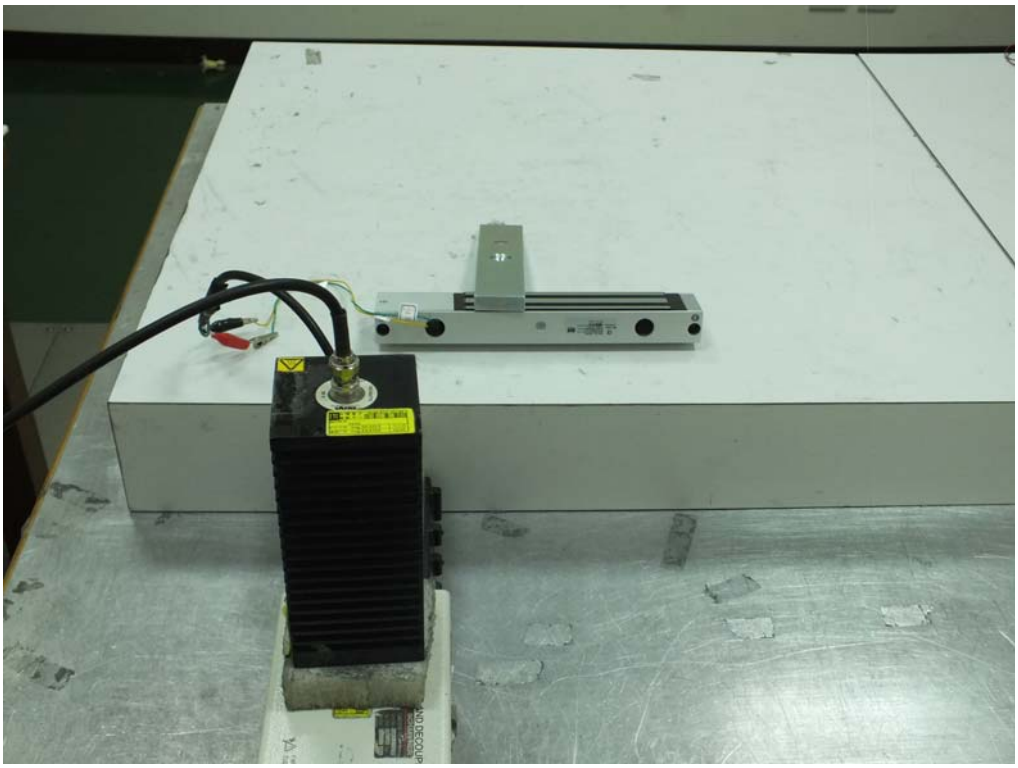


5. Photographs of CS Immunity Test Configuration

Front view

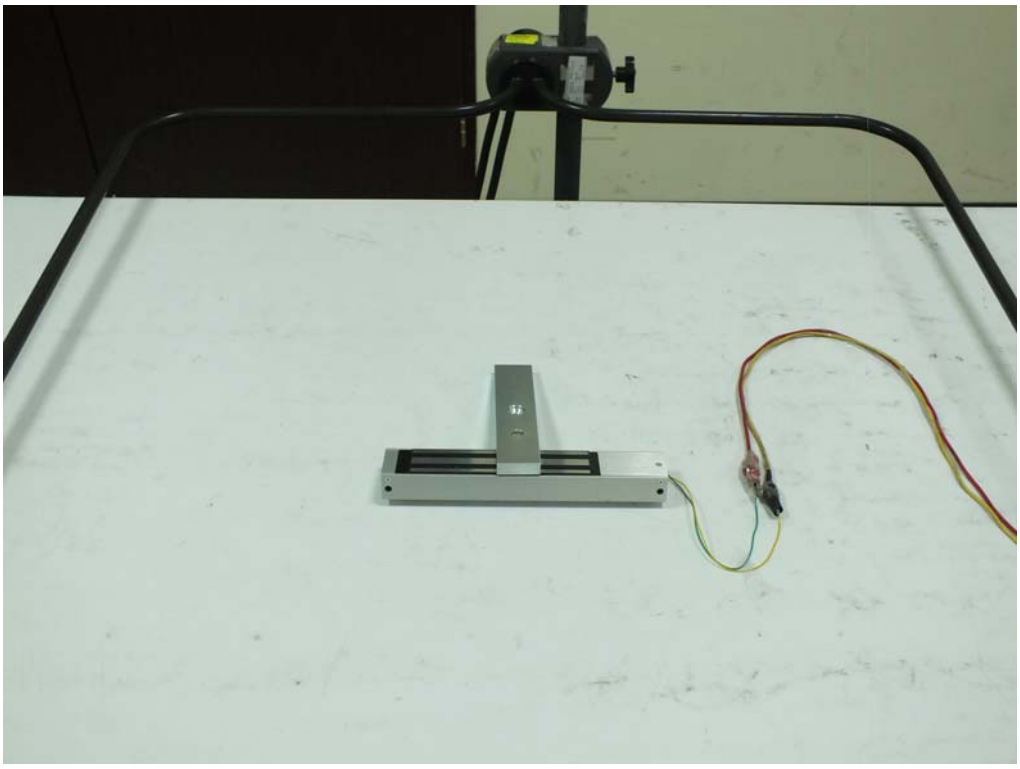


Rear view



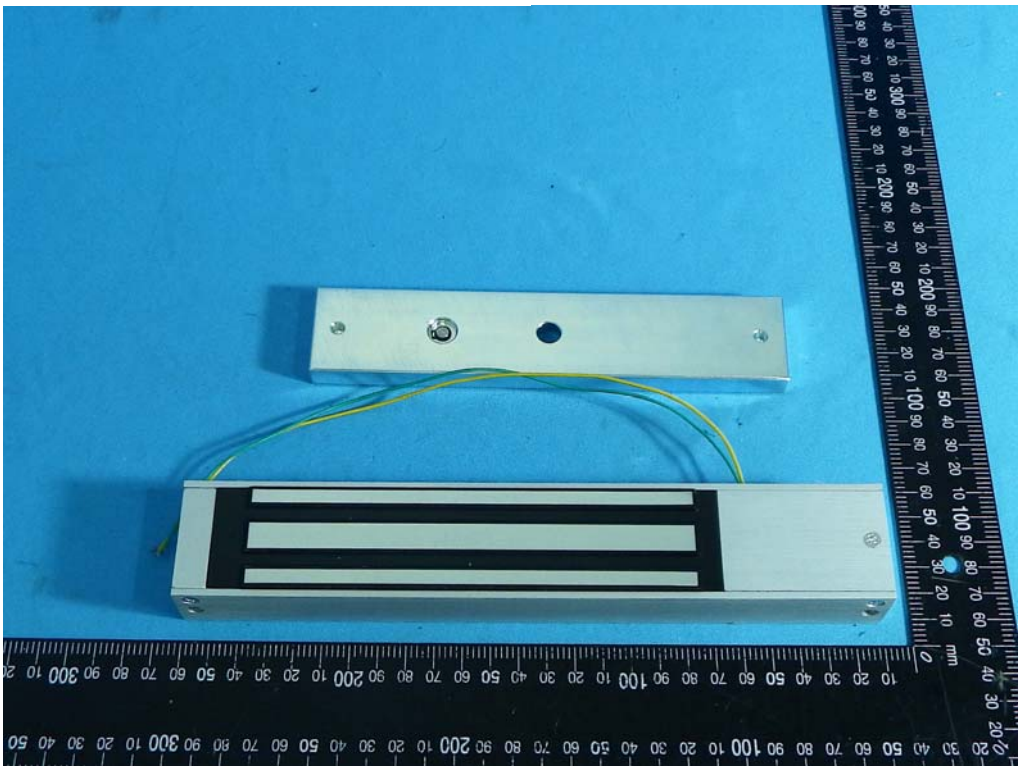
6. Power Frequency Magnetic Field immunity Measurement (PFMF)

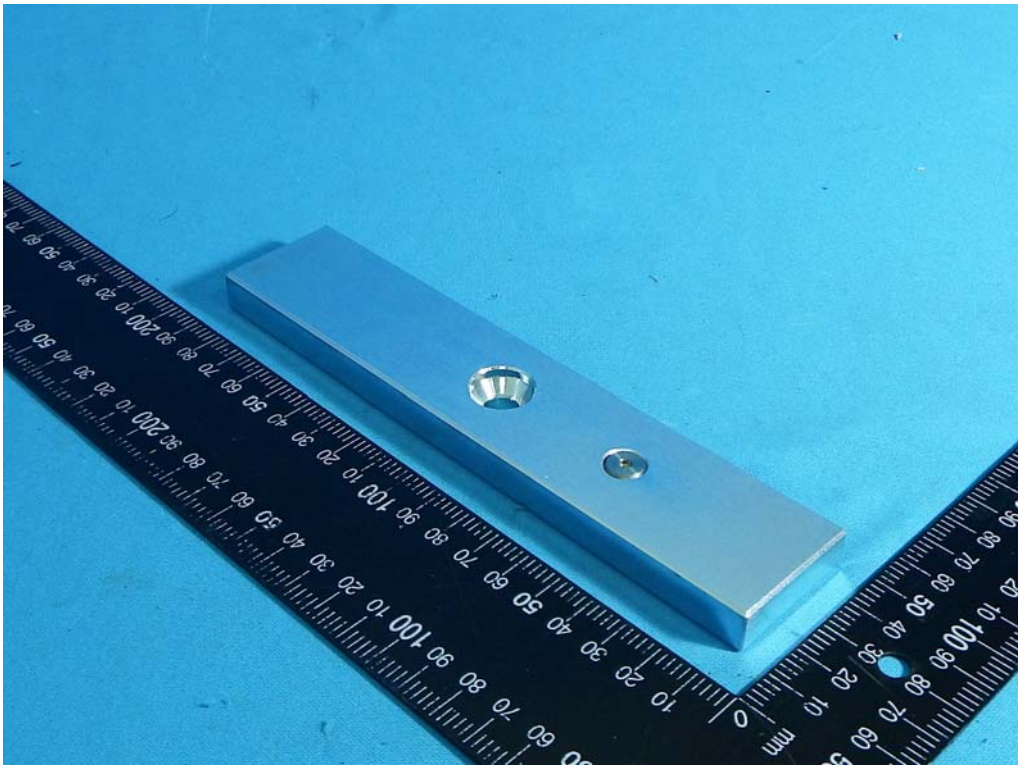
Front view

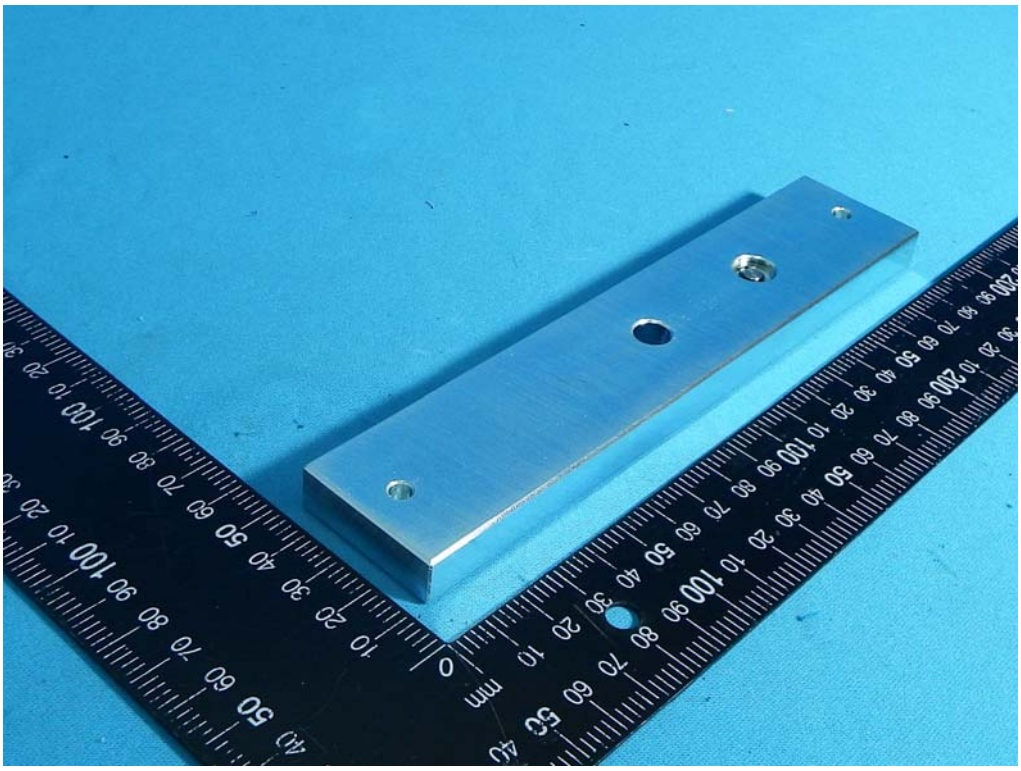


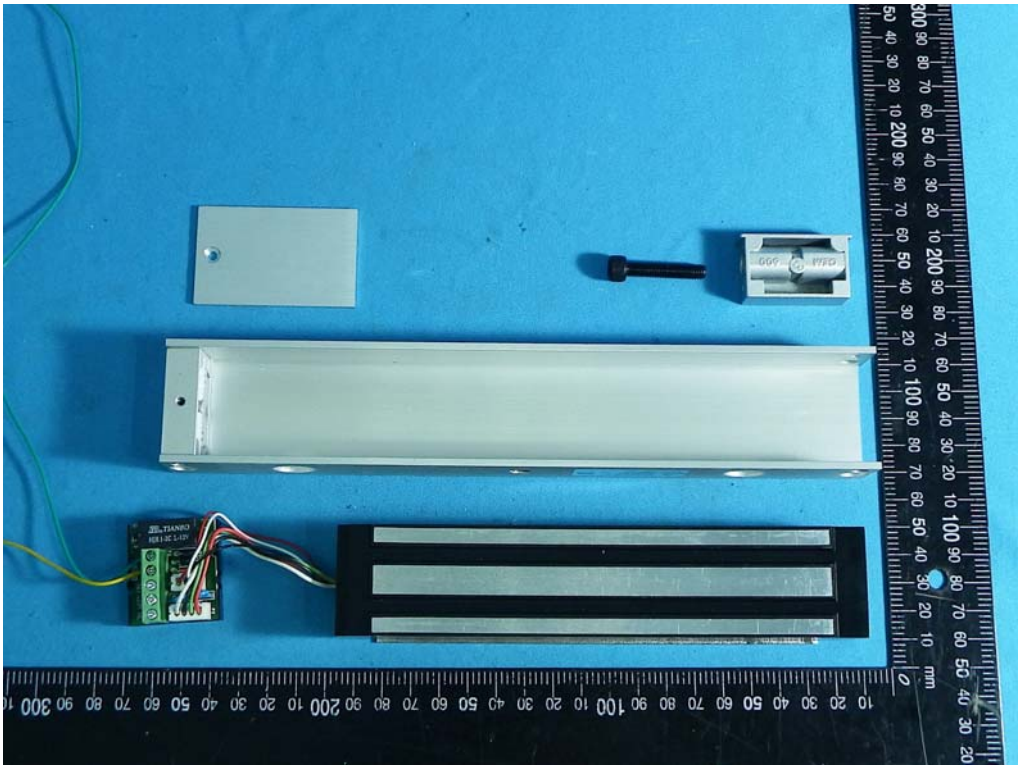
Rear view

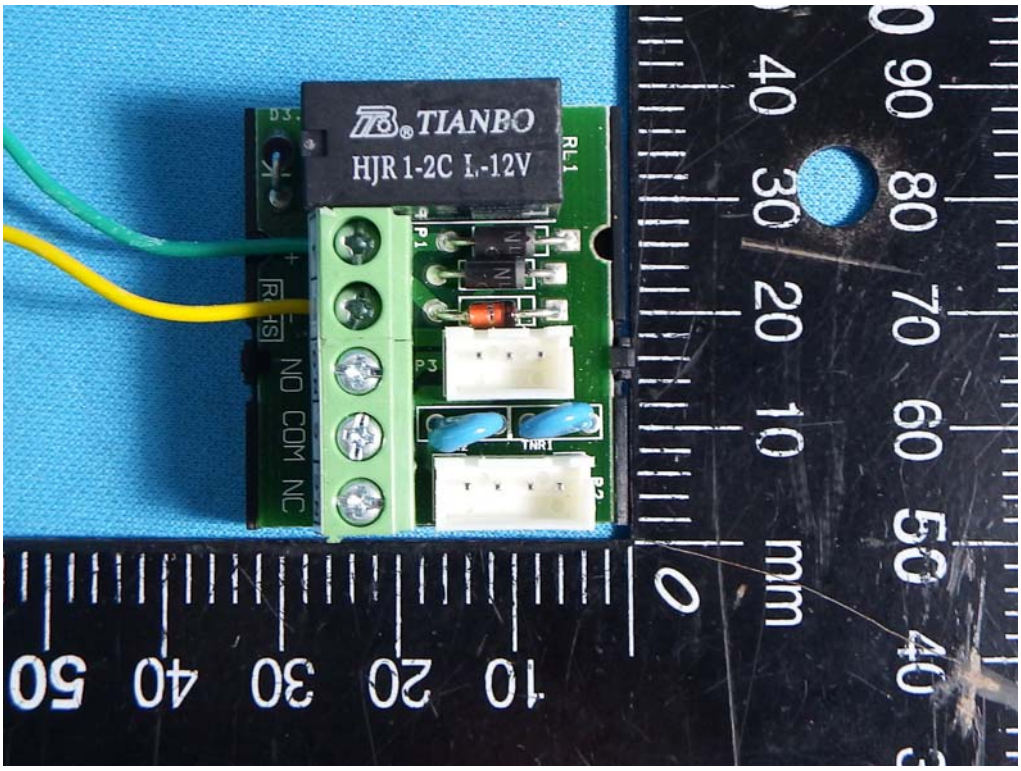
APPENDIX B. Photographs of EUT

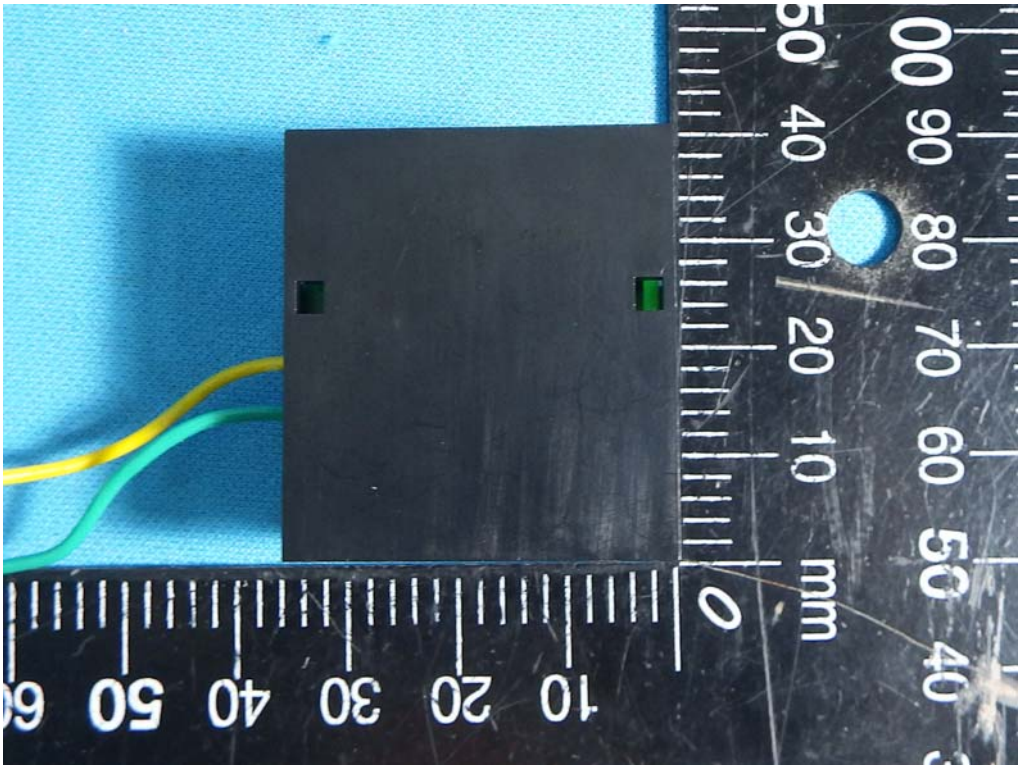









TIANBO
HJR 1-2C L-12V
RL1
NO COM NC
mm


mm