EMC TEST REPORT

For

Chang Zhou Dings Electrical&Mechanical Co.,Ltd

Hollow shaft Actuator

Model No.: 14H2045

Additional Model No.: 8H, 11H, 14H, 17H, 23H, 24H

Prepared for	:	Chang Zhou Dings Electrical&Mechanical Co.,Ltd
Address	:	3rd floor, Block C, Tian´an Industrial Park, New District, Changzhou, Jiangsu, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
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Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 02, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	August 02, 2017~ August 18, 2017
Date of Report	:	August 22, 2017

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EMC TEST REPORT

EN 55014-1: 2006+A1: 2009+A2: 2011

Requirements for household appliances, electric tools and similar apparatus -- Part 1: Emission

EN 55014-2: 2015

Requirements for household appliances, electric tools and similar apparatus -- Part 2: Immunity - Product family standard

Report Reference No. .....:	**LCS170802047AE**
Date Of Issue.....:	August 22, 2017
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**Chang Zhou Dings Electrical&Mechanical Co.,Ltd**
Address.....:	3rd floor, Block C, Tian ´ an Industrial Park, New District, Changzhou, Jiangsu, China
Test Specification:	
Standard .....:	EN 55014-1: 2006+A1: 2009+A2: 2011 EN 55014-2: 2015
Test Report Form No. .....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2011-03

Test Item Description.....:	**Hollow shaft Actuator**
Trade Mark.....:	DINGS'
Model/ Type Reference.....:	14H2045
Ratings .....:	DC 1-24V, 0.5-8A
Result .....:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Raing Ye/ File administrators	Davey Xu/ Technique principal	Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. : LCS170802047AE	August 22, 2017 Date of issue

Type / Model.....	: 14H2045
EUT.....	: Hollow shaft Actuator
Applicant.....	**: Chang Zhou Dings Electrical&Mechanical Co.,Ltd**
Address.....	: 3rd floor, Block C, Tian ´ an Industrial Park, New District, Changzhou, Jiangsu, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Chang Zhou Dings Electrical&Mechanical Co.,Ltd**
Address.....	: 3rd floor, Block C, Tian ´ an Industrial Park, New District, Changzhou, Jiangsu, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Chang Zhou Dings Electrical&Mechanical Co.,Ltd**
Address.....	: 3rd floor, Block C, Tian ´ an Industrial Park, New District, Changzhou, Jiangsu, China
Telephone.....	: /
Fax.....	: /

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	August 22, 2017	Initial Issue	Gavin Liang

TABLE OF CONTENT

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION (EN 55014-1: 2006+A1: 2009+A2: 2011)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 55014-1: 2006+A1: 2009+A2: 2011	--------	N/A
Clicks	EN 55014-1: 2006+A1: 2009+A2: 2011	--------	N/A
Disturbance Power	EN 55014-1: 2006+A1: 2009+A2: 2011	--------	N/A
Radiated disturbance	EN 55022: 2010	--------	PASS
Harmonic current emissions	EN 61000-3-2: 2014	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013	--------	N/A

IMMUNITY (EN 55014-2: 2015)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A1: 2010	A	N/A
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	N/A
Surge (Input a.c. power ports)	EN 61000-4-5: 2014	B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014	A	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	A	N/A
Voltage dips, 60% reduction	EN 61000-4-11: 2004	C	N/A
Voltage dips, 30% reduction		C	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

1.2.Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

— essential operational modes and states;

— tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);

— quality of software execution;

— quality of data display and transmission;

— quality of speech transmission.

1.2.1.Performance criterion A

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

1.2.2.Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, 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 allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3.Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture’s instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

EUT : Hollow shaft Actuator

Trade Mark : DINGS'

Model Number : 14H2045

Power Supply : DC 1-24V, 0.5-8A

EUT Clock Frequency : ≤15MHz

2.2.Test Facility

Site Description

EMC Lab. : CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

2.3.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4.Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucispr)
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.2 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1.Radiated Disturbance (Electric Field)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17
2	EMI Test Receiver	ROHDE & SCHWARZ	ESR 7	101181	2017-06-17
3	Log per Antenna	SCHWARZBECK	VULB9163	9163-470	2017-04-17
4	EMI Test Software	AUDIX	E3	N/A	2017-06-17
5	Positioning Controller	MF	MF-7082	/	2017-06-17

3.2.Electrostatic Discharge

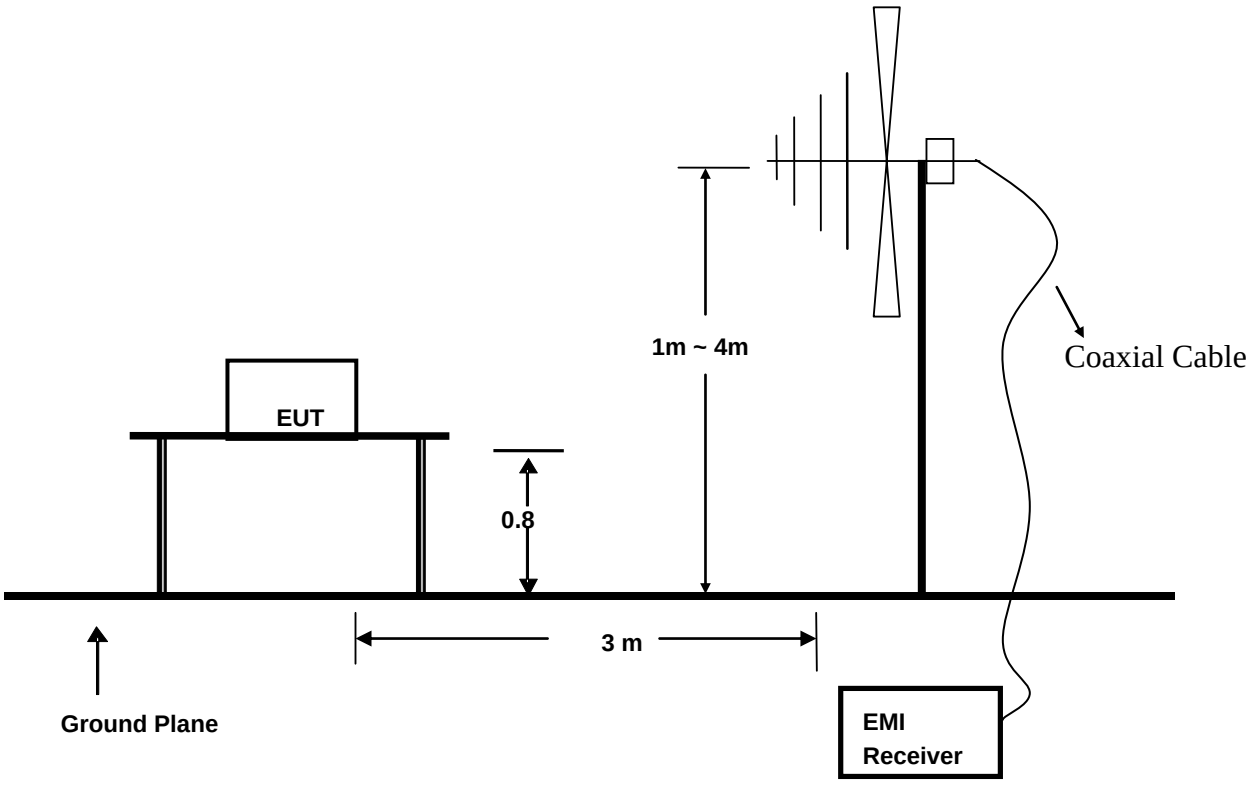
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SCHLODER	SESD 230	604035	2017-06-17

3.3.RF Field Strength Susceptibility

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	RF POWER AMPLIFIER	OPHIR	5225R	1052	2017-03-22
2	RF POWER AMPLIFIER	OPHIR	5273F	1019	2017-03-24
3	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2017-04-28
4	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2017-04-28
5	Signal Generator	Agilent	E4438C	MY42081396	2016-11-18
6	Electric field probe	Narda S.TS./PMM	EP601	611WX70332	2017-02-05
7	Power Meter	Agilent	E4419B	MY45104493	2017-06-17
8	Power Sensor	Agilent	E9301H	MY41495234	2017-06-17
9	Power Sensor	Agilent	E4412A	MY41500229	2017-06-17

4. RADIATED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



4.2.Test Standard

EN 55014-1: 2006+A1: 2009+A2: 2011 (EN 55022: 2010）

4.3.Radiated Emission Limits

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30-230	3	40
230-1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.4.EUT Configuration on Test

The EN 55022 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5.Operating Condition of EUT

4.5.1.Turn on the power.
4.5.2.After that, let the EUT work in test mode (ON) and measure it.

4.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120kHz.

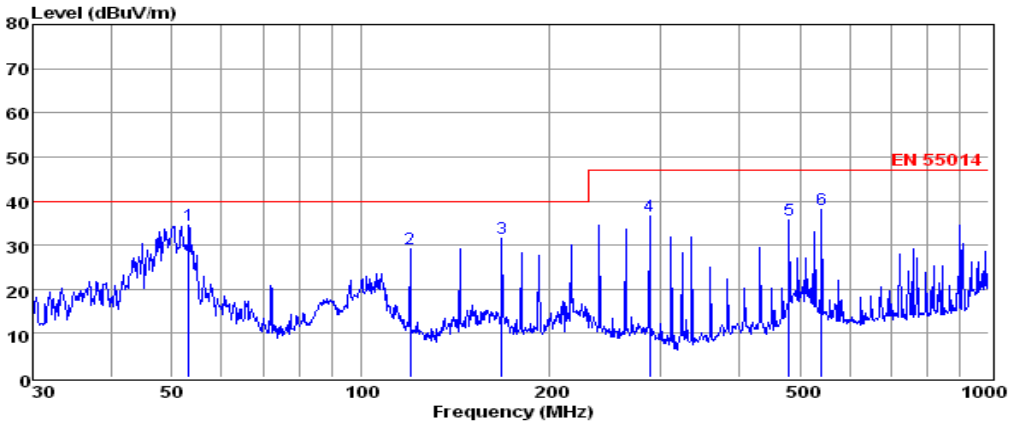
The frequency range from 30MHz to 1000MHz is investigated.

4.7.Test Results

PASS.

The scanning waveform please refer to the next page.

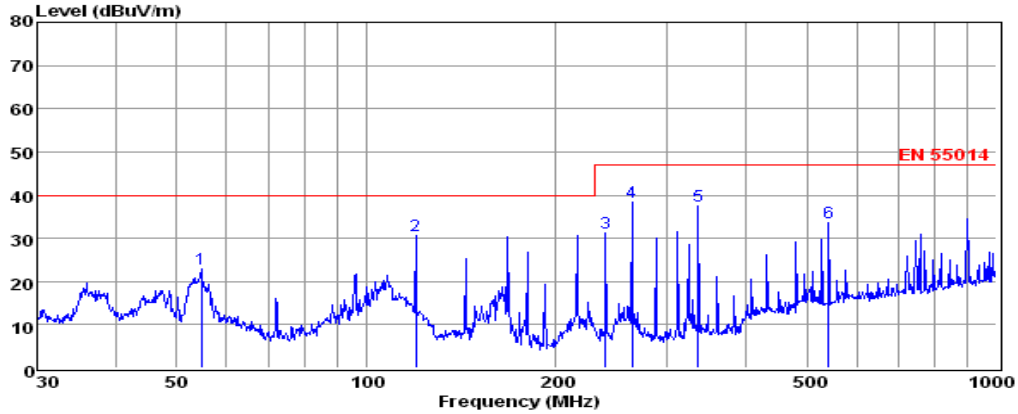
Model No.	14H2045	Test Mode	ON
Environmental Conditions	27.4℃, 54.8% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Daiwei Dai		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	53.13	20.88	0.46	13.11	34.45	40.00	-5.55	QP
2	119.86	17.97	0.64	10.51	29.12	40.00	-10.88	QP
3	167.82	21.87	0.77	8.90	31.54	40.00	-8.46	QP
4	287.99	22.62	1.05	12.83	36.50	47.00	-10.50	QP
5	480.53	18.43	1.31	16.08	35.82	47.00	-11.18	QP
6	541.37	19.30	1.34	17.35	37.99	47.00	-9.01	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Model No.	14H2045	Test Mode	ON
Environmental Conditions	27.4℃, 54.8% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Daiwei Dai		

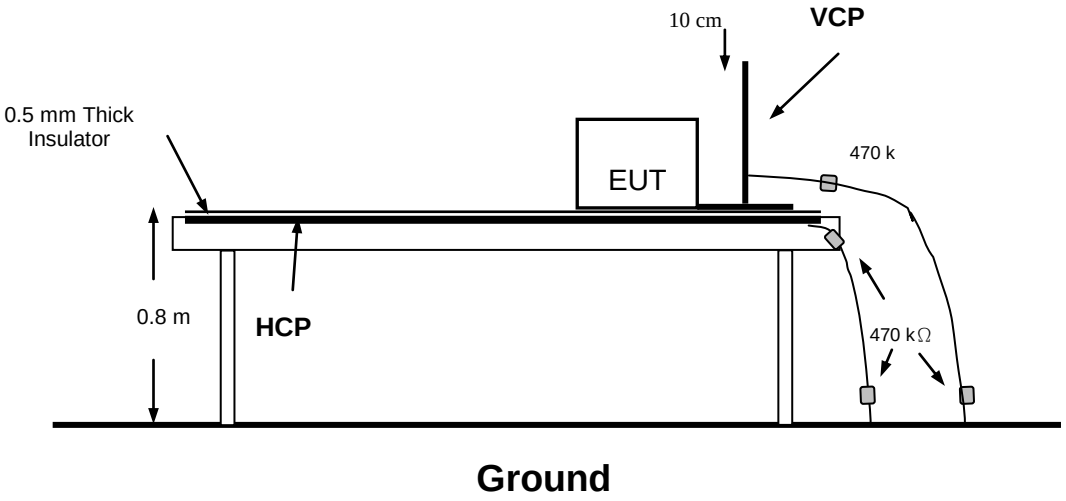


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	54.64	9.26	0.46	13.04	22.76	40.00	-17.24	QP
2	119.86	19.47	0.64	10.51	30.62	40.00	-9.38	QP
3	239.99	18.27	1.01	12.09	31.37	47.00	-15.63	QP
4	263.82	25.04	1.03	12.17	38.24	47.00	-8.76	QP
5	336.04	22.34	1.09	13.96	37.39	47.00	-9.61	QP
6	541.37	14.82	1.34	17.35	33.51	47.00	-13.49	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1.Block Diagram of Test Setup



5.2.Test Standard

EN 55014-2: 2015
(EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge: ± 8KV, Level: 2 / Contact Discharge: ±4KV)

5.3.Severity Levels and Performance Criterion

5.3.1.Severity level

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

5.3.2.Performance criterion: **B**

5.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.7.

5.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.5 except the test set up replaced by Section 5.1.

5.6.Test Procedure

5.6.1.Air Discharge

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

5.6.2.Contact Discharge

All the procedure shall be same as Section 5.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.6.3.Indirect Discharge For Horizontal Coupling Plane

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

5.6.4.Indirect Discharge For Vertical Coupling Plane

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

5.7.Test Results

PASS.

Please refer to the next page.

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Chang Zhou Dings Electrical&Mechanical Co.,Ltd		
EUT	Hollow shaft Actuator	**Temperature**	25.6℃
M/N	14H2045	**Humidity**	54%
Criterion	B	**Pressure**	1021mbar
Test Mode	Normal	**Test Engineer**	Daiwei Dai

Air Discharge

Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	Pass	Fail	Performance Criterion
Front	☒	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☒	☐	☐A ☒B

Contact Discharge

Test Points	Test Levels		Results		
	± 2 KV	±4 KV	Pass	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☐	☐A ☒B

Discharge To Horizontal Coupling Plane

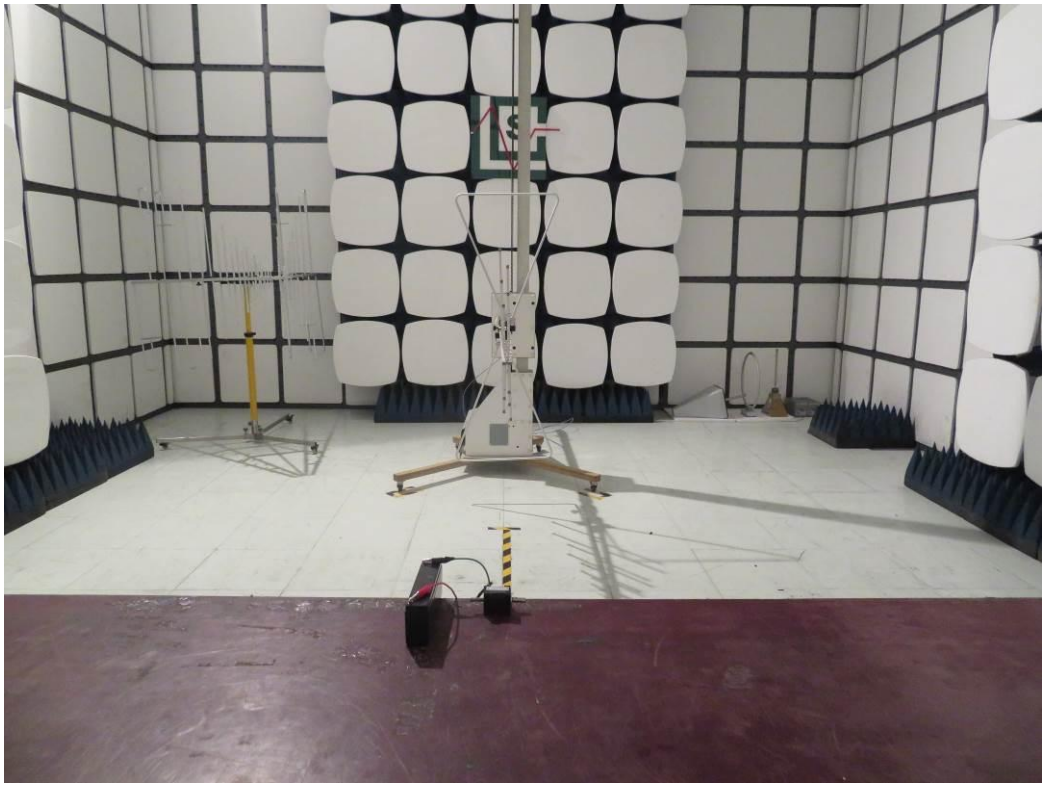
Side of EUT	Test Levels		Results		
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

Discharge To Vertical Coupling Plane

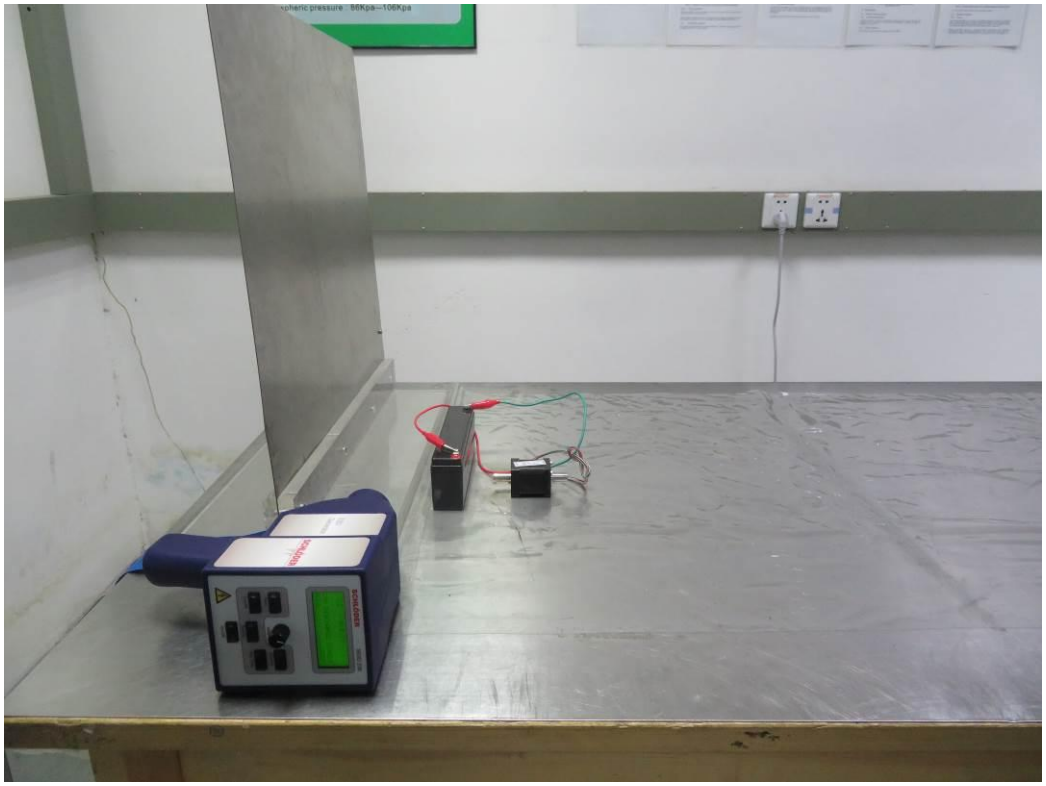
Side of EUT	Test Levels		Results		
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

6. PHOTOGRAPH

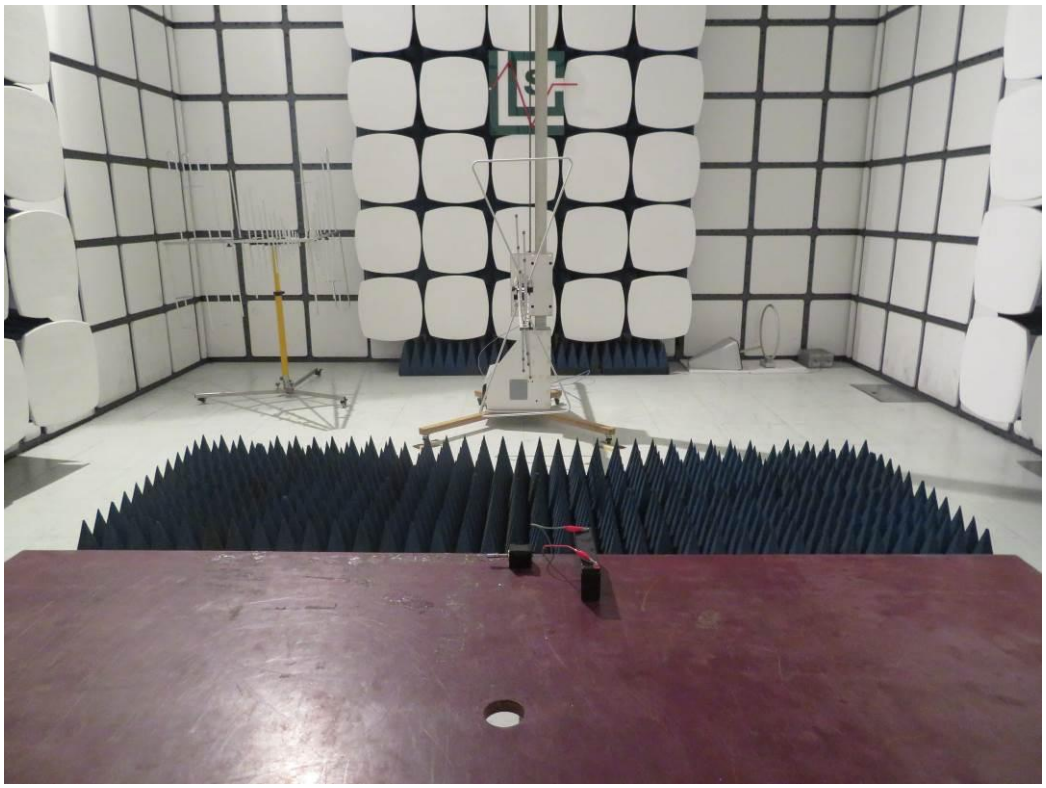
6.1. Photo of Radiated Measurement



6.2. Photo of Electrostatic Discharge Test



6.3.Photo of Radio-frequency, Continuous radiated disturbance



7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

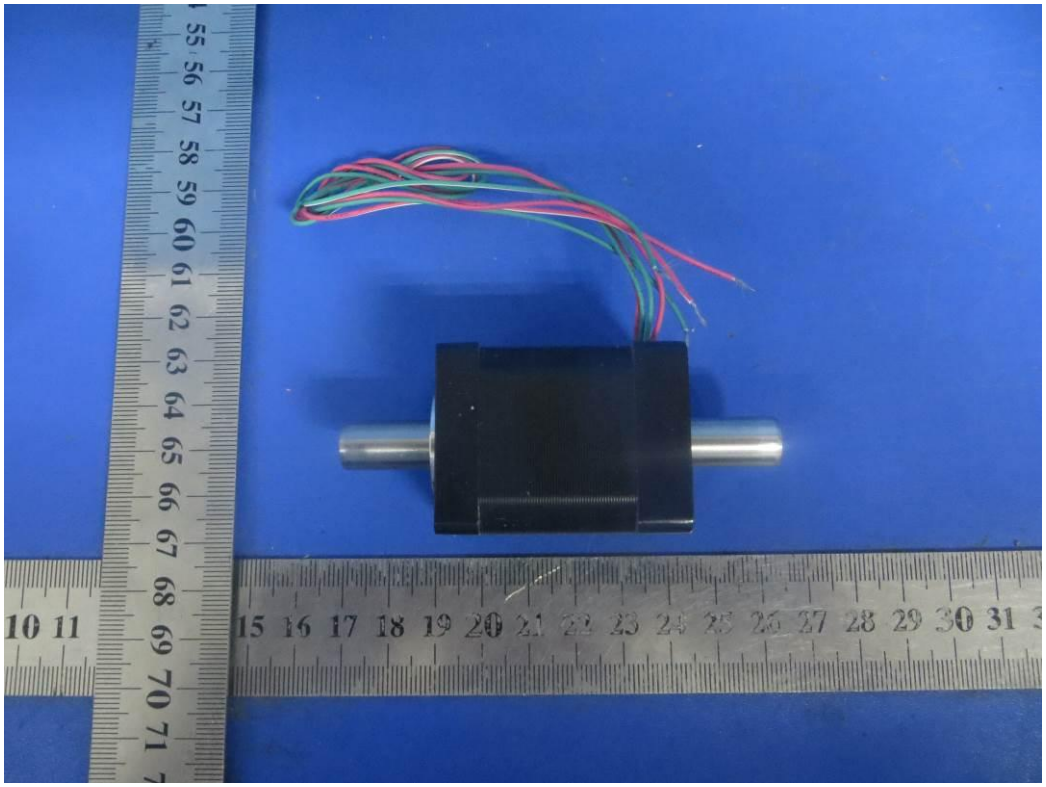


Fig. 1

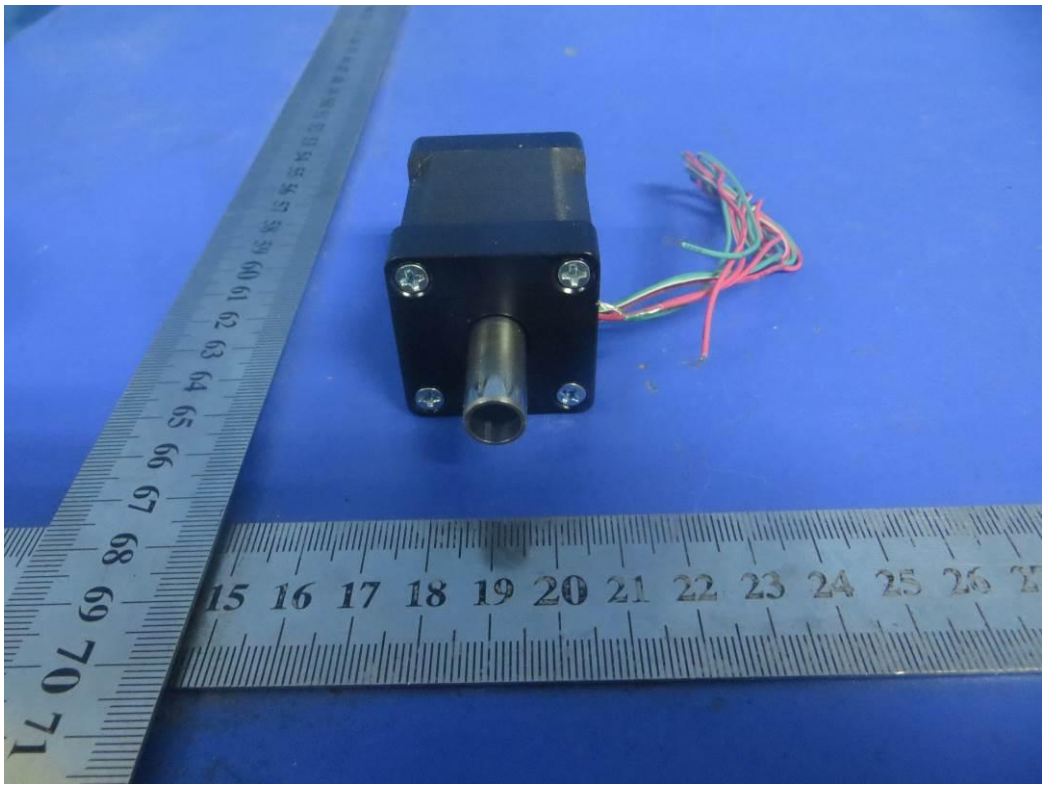


Fig. 2

Fig. 3

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