中国认可
国际互认
检测
TESTING
CNAS L12276

EMC REPORT

Applicant	Siebring & Velinga
Address	Polweg 5, 7841 BV Sleen, The Netherlands
Manufacturer	Siebring & Velinga
Address	Polweg 5, 7841 BV Sleen, The Netherlands
Product Name	LED Photon Mask
Trade Name	/
Model Number	SM-1001
Additional Model	/
Test Laboratory	Shenzhen Circle Testing Certification Co., Ltd.
Address	302&101, 1/F., Building 1, Donglongxing Technology Park, Huaning Road, Xinshi Community, Dalang Subdistrict, Longhua District, Shenzhen, Guangdong, China
Cert. No.	CNAS Cert. No.: L12276, A2LA Cert. No.: 7259.01
Test Date	Nov. 12, 2025 - Nov. 18, 2025
Date of Report	Nov. 18, 2025
Report Number	CTC191J1101201ER

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

TABLE OF CONTENTS

TEST REPORT DECLARATION 4
1. TEST RESULTS SUMMARY 5
2. GENERAL INFORMATION 5
2.1. Report information 5
2.2. Measurement Uncertainty 5
3. PRODUCT DESCRIPTION 6
3.1. EUT Description 6
3.2. Block Diagram of EUT Configuration 6
3.3. Operating Condition of EUT 6
3.4. Test Conditions 6
3.5. Modifications 6
3.6. Abbreviations 7
3.7. Performance Criterion 7
4. TEST EQUIPMENT USED 7
4.1. For Conducted Emission Test 7
4.2. For Radiated Emission Measurement 7
4.3. For Electrostatic Discharge Immunity Test 8
4.4. For RF Strength Susceptibility Test 8
4.5. For Electrical Fast Transient/Burst Immunity Test 8
4.6. For Surge Test 8
4.7. For Conducted Immunity Test 8
4.8. For Voltage Dips and Interruptions Test 8
5. POWER LINE CONDUCTED EMISSION TEST 9
5.1. Block Diagram of Test Setup 9
5.2. Test Standard 9
5.3. Power Line Conducted Emission Limit 9
5.4. EUT Configuration on Test 9
6. RADIATED EMISSION TEST 10
6.1. Semi-Anechoic Chamber Setup Diagram 10
6.2. Test Standard 10
6.3. Radiated Emission Limit 10
6.4. EUT Configuration on Test 11
6.4. Operating Condition of EUT 11
6.5. Test Procedure 11
6.6. Test Results 11
7. HARMONIC CURRENT EMISSION TEST 11
7.1. Block Diagram of Test Setup 11
7.2. Test Standard and Limit 11
7.3. Test Procedure 12
7.4. Test Results 12
8. VOLTAGE FLUCTUATIONS & FLICKER TEST 12
8.1. Block Diagram of Test Setup 12
8.2. Test Standard 12
8.3. Operating Condition of EUT 12
8.4. Test Data 13
8.5. Test Results 13
9. ELECTROSTATIC DISCHARGE TEST 14
9.1. Block Diagram of ESD Test Setup 14
9.2. Test Standard 14
9.3. Severity Levels and Performance Criterion 14
9.4. EUT Configuration on Test 14
9.5. Operating Condition of EUT 14
9.6. Test Procedure 15
9.7. Test Results 15
10. RF FIELD STRENGTH SUSCEPTIBILITY TEST* 16
10.1. R/S Test Setup 16
10.2. Test Standard 16
10.3. Severity Levels and Performance Criterion 16
10.4. EUT Configuration on Test 16
10.5. Operating Condition of EUT 16
10.6. Test Procedure 17

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

10.7. Test Results *17*
11. ELECTRICAL FAST TRANSIENT/BURST TEST 17
11.1. EFT Test Setup *17*
11.2. Test Standard *18*
11.3. Severity Levels and Performance Criterion *18*
11.4. EUT Configuration on Test *18*
11.5. Operating Condition of EUT *18*
11.6. Test Procedure *18*
11.7. Test Results *19*
12. SURGE TEST 19
12.1. Surge Test Setup *19*
12.2. Test Standard *19*
12.3. Severity Levels and Performance Criterion *19*
12.4. EUT Configuration on Test *20*
12.5. Operating Condition of EUT *20*
12.6. Test Procedure *20*
12.7. Test Results *20*
13. CONDUCTED IMMUNITY TEST* 20
13.1. Block Diagram of Test AC Mains Setup *20*
13.2. Test Standard *20*
13.3. Severity Levels and Performance Criterion *21*
13.4. EUT Configuration on Test *21*
13.5. Operating Condition of EUT *21*
13.6. Test Procedure *21*
13.7. Test Results *21*
14. VOLTAGE DIPS AND INTERRUPTIONS TEST 22
14.1. Voltage Dips and Interruptions Test Setup *22*
14.2. Test Standard *22*
14.3. Severity Levels and Performance Criterion *22*
14.4. EUT Configuration on Test *22*
14.4. Operating Condition of EUT *22*
14.6. Test Procedure *22*
14.7. Test Result *23*
APPENDIX I: RADIATED EMISSION TEST DATA 24
APPENDIX II: TEST SETUP PHOTO AND EUT PHOTO 26
DECLARATION 28

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

TEST REPORT DECLARATION

Applicant	Siebring & Velinga
Address	Polweg 5, 7841 BV Sleen, The Netherlands
EUT Description	LED Photon Mask
Model Number	SM-1001

Test Standards:

EN IEC 55014-1:2021
EN IEC 55014-2:2021*

The EUT described above is tested by Shenzhen Circle Testing Certification Co., Ltd. EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen Circle Testing Certification Co., Ltd. EMC Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/30/EU directive and its amendment requirements.
The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Tested by : Arthur

Test Engineer

Approved & Authorized Signer :

Manager

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Power Line Conducted Emission Test	N/A
Radiated Emission Test	PASS
Harmonic Current &Voltage Fluctuations & Flicker	N/A
Electrostatic Discharge Test	PASS
RF Field Strength Susceptibility Test*	PASS
Electrical Fast Transient/Burst Test	N/A
Surge Test	N/A
Conducted Immunity Test*	N/A
Voltage Dips And Interruptions Test	N/A

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that CTC approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that CTC in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, CTC therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through CTC, unless the applicant has authorized CTC in writing to do so.

2.2. Measurement Uncertainty

(95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test	3.42dB
Uncertainty for Radiation emission test (30MHz to 1GHz)	4.5dB

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

3. PRODUCT DESCRIPTION

3.1. EUT Description

EUT Description	LED Photon Mask
Applicant	Siebring & Velinga
Address	Polweg 5, 7841 BV Sleen, The Netherlands
Manufacturer	Siebring & Velinga
Address	Polweg 5, 7841 BV Sleen, The Netherlands
Product Model	SM-1001
Rating(s)	Input: DC5V, 1A

3.2. Block Diagram of EUT Configuration

3.3. Operating Condition of EUT

Test mode : Normal operation

3.4. Test Conditions

Temperature: 22-25℃
Relative Humidity: 55-60%

3.5. Modifications

No modification was made.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

3.6. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
RMS	Root Mean Square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

3.7. Performance Criterion

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

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 manufacturer, when the equipment is used as intended.

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 manufacturer's instructions.

4. TEST EQUIPMENT USED

4.1. For Conducted Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESR	E087	2026-02-16	1 Year
2.	Coaxial Cable	CTC	10B	E159	2026-02-16	1 Year
3.	L.I.S.N.	Rohde & Schwarz	ENV 216	E089	2026-05-30	1 Year

4.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESPI	E087	2026-02-16	1 Year
2.	Test Receiver	Rohde & Schwarz	ESR	E155	2026-02-16	1 Year
3.	Broadband Trilog Antenna	Schwarzbeck	VULB9162	E088	2026-06-03	1 Year
4.	Cable	CTC	3C	E164	2026-02-16	1 Year
5.	Cable	CTC	3B	E139	2026-02-16	1 Year

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

6.	Cable	CTC	3D	E140	2026-02-16	1 Year
7.	Cable	CTC	10A	E141	2026-02-16	1 Year
8.	Horn Antenna	Schwarzbeck	BBHA9120D	E158	2026-02-16	1 Year
9.	Broadband Preamplifier	Schwarzbeck	BBV9718	E161	2026-02-16	1 Year
10.	Cable	CTC	3C	E162	2026-02-16	1 Year

4.3. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	PSD 1600	E085	2026-06-26	1 Year

4.4. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	HP	8648A	3633A02081	2026-05-03	1 Year
2.	Amplifier	A&R	500A100	17034	NCR	NCR
3.	Amplifier	A&R	100W/1000M1	17028	NCR	NCR
4.	Isotropic Field Monitor	A&R	FM2000	16829	NCR	NCR
5.	Isotropic Field Probe	A&R	FLW220100	16755	2026-05-03	1 Year
6.	Biconic Antenna	EMCO	3108	9507-2534	NCR	NCR
7.	Log-periodic Antenna	A&R	AT1080	16812	NCR	NCR
8.	PC	N/A	486DX2	N/A	N/A	N/A

4.5. For Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMS Integrated Test System-EFT & SURGE	HTECINSTRUMENTS	HCOMPACT 5	E084	2026-06-25	1 Year

4.6. For Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMS Integrated Test System-EFT & SURGE	HTECINSTRUMENTS	HCOMPACT 5	E084	2026-06-25	1 Year

4.7. For Conducted Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EMTEST	CWS 500C	0900-12	2026-05-03	1 Year
2.	CDN	EMTEST	CDN-M2	510010010010	2026-05-03	1 Year
3.	VDN	EMTEST	CDN-M3	0900-11	2026-05-03	1 Year
4.	Injection Clamp	EMTEST	F-2031-23MM	368	2026-05-03	1 Year
5.	Attenuator	EMTEST	ATT6	0010222a	2026-05-03	1 Year

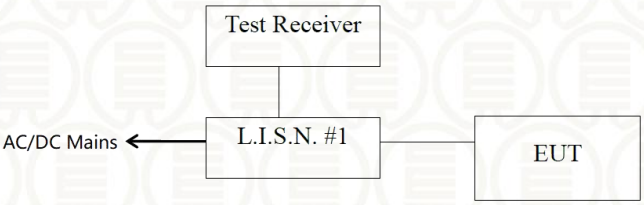
4.8. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMS Integrated Test System-EFT & SURGE	HTECINSTRUMENTS	HCOMPACT 5	E084	2026-06-25	1 Year

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

5. POWER LINE CONDUCTED EMISSION TEST

5.1. Block Diagram of Test Setup



5.2. Test Standard

EN IEC 55014-1:2021

5.3. Power Line Conducted Emission Limit

Frequency		Limits dB(uV)
MHz	Quasi-peak Level	Average Level
0.15-0.50	66-56*	59-46*
0.50-5.00	56	46
5.00-30.00	60	50

Notes: 1.*Decreasing linearly with logarithm of frequency.
2.The lower limit shall apply at the transition frequencies.

5.4. EUT Configuration on Test

The following equipment are installed on conducted emission test to meet EN IEC 55014-1 requirement and operating in a manner, which tends to maximize its emission characteristics in a normal application.

5.5. Operating Condition of EUT

5.5.1.Setup the EUT and simulators as shown in Section 5.1.
5.5.2.Turn on the power of all equipment.
5.5.3.Let the EUT work in test modes (Normal operation) and test it.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

5.6. Test Procedure

The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided 50ohm-coupling impedance for the tested equipment. Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN IEC 55014-1 regulations during conducted emission test.

The bandwidth of the test receiver is set at 9kHz.

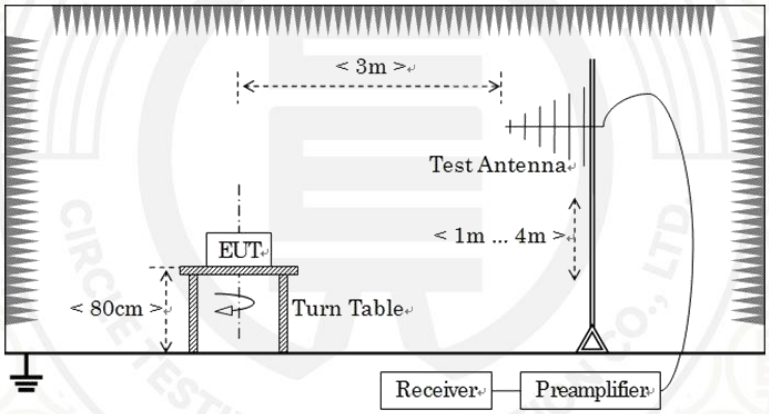
The frequency range from 150 kHz to 30 MHz is investigated.

5.7. Test Result

N/A.

6. RADIATED EMISSION TEST

6.1. Semi-Anechoic Chamber Setup Diagram



6.2. Test Standard

EN IEC 55014-1:2021

6.3. Radiated Emission Limit

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

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

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

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

6.4. EUT Configuration on Test

The EN IEC 55014-1 regulations test method must be used to find the maximum emission during radiated emission test.

6.4. Operating Condition of EUT

6.5.1.Setup the EUT as shown on Section 6.1.

6.5.2.Turn on the power of all equipment.

6.5.3.Let the EUT work in test mode (Normal operation) and measure it.

6.5. Test Procedure

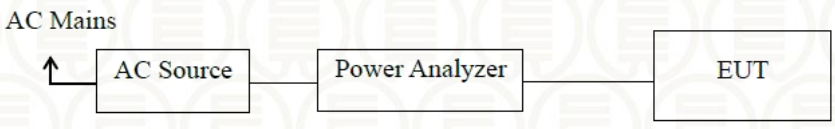
The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.
The bandwidth setting on the test receiver is 120 kHz.
The EUT is tested in Semi-Anechoic Chamber. and all the scanning waveform is put in **Appendix I.**

6.6. Test Results

PASS.

7. HARMONIC CURRENT EMISSION TEST

7.1. Block Diagram of Test Setup



7.2. Test Standard and Limit

7.2.1.Test Standard

EN IEC 61000-3-2:2019/A1:2021

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

7.2.2.Limits

Table 12 Harmonic Current Test Limit (Class A)

Harmonic order(n)	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	0.15×15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23×8/n

7.3. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the Power of the EUT and use the test system to test the harmonic current level.

7.4. Test Results

N/A.

8. VOLTAGE FLUCTUATIONS & FLICKER TEST

8.1. Block Diagram of Test Setup

Same as Section 7.1.

8.2. Test Standard

EN 61000-3-3:2013/A2:2021

8.3. Operating Condition of EUT

Same as Section7.3. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test.

Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

8.4. Test Data

Test Mode: Normal operation		
Items	Reading	Limit
dmax	0.02	4.0%
dc	0.03	3.3%
dt	0.05	Not exceed 3.3% for 500ms
Pst	0.001	1.0

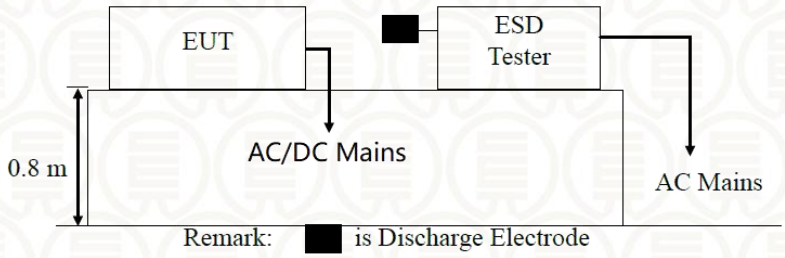
8.5. Test Results

N/A.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

9. ELECTROSTATIC DISCHARGE TEST

9.1. Block Diagram of ESD Test Setup



9.2. Test Standard

EN IEC 55014-2:2021*
Severity Level 3 for Air Discharge at 8kV
Severity Level 2 for Contact Discharge at 4kV

9.3. Severity Levels and Performance Criterion

9.3.1.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

9.3.2.Performance criterion: B

9.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

9.5. Operating Condition of EUT

9.5.1.Setup the EUT as shown in Section 9.1.

9.5.2.Turn on the power of all equipment.

9.5.3.Let the EUT work in test mode (Normal operation) and test it.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

9.6. Test Procedure

9.6.1.Air Discharge:

This test is done on a non-conductive surfaces. 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.

9.6.2.Contact Discharge:

All the procedure shall be same as Section 9.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.6.3.Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

9.6.4.Indirect discharge for vertical coupling plane

At least 20 single discharge 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 0.8m 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.

9.7. Test Results

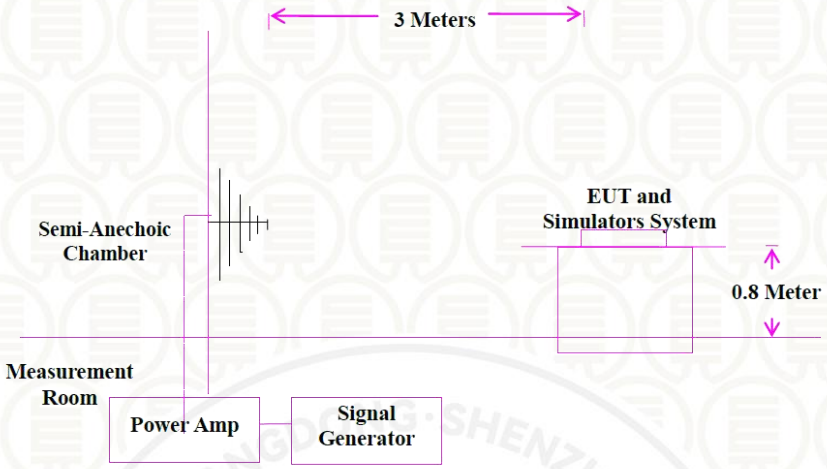
Temperature:	25℃	Humidity:	55%
Air Discharge: ±8kV For each point positive 10 times and negative 10 times discharge. Contact Discharge: ±4kV			
Location	**Kind** A-Air Discharge C-Contact Discharge		**Result**
HCP	C		PASS
VCP	C		PASS
Press key	A		PASS
Product surface	A		PASS
Gap	A		PASS
Pilot lamp	A		PASS

Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

10.RF FIELD STRENGTH SUSCEPTIBILITY TEST*

10.1. R/S Test Setup



10.2. Test Standard

EN IEC 55014-2:2021*
Severity Level 2 at 3V/m

10.3. Severity Levels and Performance Criterion

10.3.1.Severity level

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

10.3.2.Performance criterion : A

10.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2

10.5. Operating Condition of EUT

Setup the EUT as shown in Section 10.1. The operating condition of EUT are listed in section 3.3.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

10.6. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually.

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

	Condition of Test	Remarks
1.	Fielded Strength	3 V/m (Severity Level 2)
2.	Radiated Signal	Modulated
3.	Scanning Frequency	80MHz-2.0GHz
4.	Sweeping time of radiated	0.0015 decade/s
5.	Dwell Time	1 Sec.

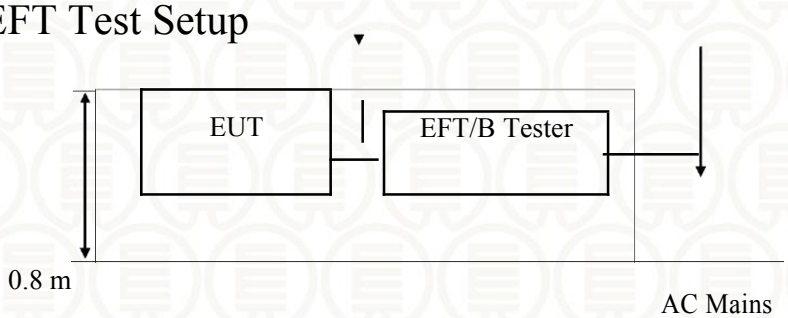
10.7. Test Results

Temperature:	25℃		Humidity:	55%
Modulation: ■AM	□ Pulse	□ none	1kHz 80%	
Criterion : A				
Frequency Range : 80 MHz to 2.0 GHz				
Steps: 1%				

	Horizontal	Vertical
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

11. ELECTRICAL FAST TRANSIENT/BURST TEST

11.1. EFT Test Setup



AC/DC Mains

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

11.2. Test Standard

EN IEC 55014-2:2021*
Severity Level 2 at 1kV
+/- 1KV for AC mains port;
+/- 0.5KV for analogue digital data ports and DC network power port.

11.3. Severity Levels and Performance Criterion

11.3.1.Severity level

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

11.3.2.Performance criterion : B

11.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

11.5. Operating Condition of EUT

Setup the EUT as shown in Section 11.1. The operating condition of EUT are listed in section 3.3.

11.6. Test Procedure

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

11.6.1.For input and output AC power ports:

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

11.6.2.For signal lines and control lines ports: It's unnecessary to test.

11.6.3.For DC output line ports: It's unnecessary to test.

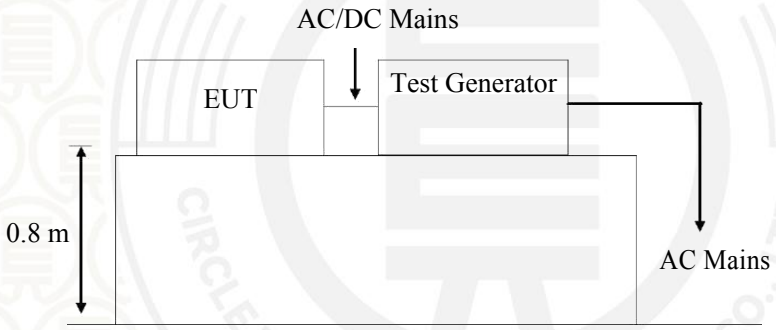
This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

11.7. Test Results

Temperature:	25℃			Humidity:	55%				
Power Supply:	AC 230V/50Hz			Test Mode:	-				
Inject Place : AC Mains									
Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results	Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results
L	±1	120	Direct	N/A					
N	±1	120	Direct	N/A					
L+N	±1	120	Direct	N/A					
PE	±1	120	Direct	N/A					
L+N+PE	±1	120	Direct	N/A					
L+PE	±1	120	Direct	N/A					
N+PE	±1	120	Direct	N/A					

12. SURGE TEST

12.1. Surge Test Setup



12.2. Test Standard

EN IEC 55014-2:2021*
Severity Level 2 for Line to Neutral at 1.0kV
4KV for the primary protactors fitted;
0.5KV for coaxial or shielded signal port

12.3. Severity Levels and Performance Criterion

12.3.1.Severity level

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

Performance criterion **: B**

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

12.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

12.5. Operating Condition of EUT

12.5.1.Setup the EUT as shown in Section 12.1.

12.5.2.Turn on the power of all equipment.

12.5.3.Let the EUT work in test mode (Normal operation) and test it.

12.6. Test Procedure

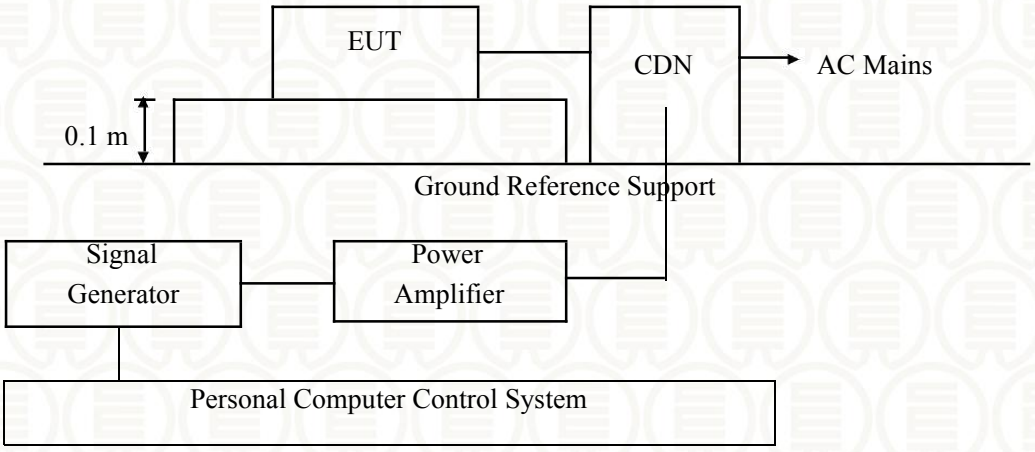
1. Setup the EUT and test generator as shown on Section 12.1.
2. For line to line coupling mode, provide a 1.0kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4. Different phase angles are done individually.
5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.7. Test Results

Temperature:	25℃		Humidity:	55%	
Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (kV)	Result
L-N	+/-	90/270	5	1.0	N/A
L-PE	+/-	90/270	5	2.0	N/A
N-PE	+/-	90/270	5	2.0	N/A

13. CONDUCTED IMMUNITY TEST*

13.1. Block Diagram of Test AC Mains Setup



13.2. Test Standard

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

EN IEC 55014-2:2021*
Severity Level 2 at 3 V (rms), 0.15MHz ~ 80MHz

13.3. Severity Levels and Performance Criterion

13.3.1.Severity level

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

13.3.2.Performance criterion: A

13.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2

13.5. Operating Condition of EUT

Setup the EUT as shown in Section 13.1. The operating condition of EUT are listed in section 3.3

13.6. Test Procedure

1. Set up the EUT, CDN and test generators as shown on Section 13.1.
2. Let the EUT work in test mode and test it.
3. The EUT are placed on an insulating support 0.8m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4. The disturbance signal described below is injected to EUT through CDN.
5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6. The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
7. The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

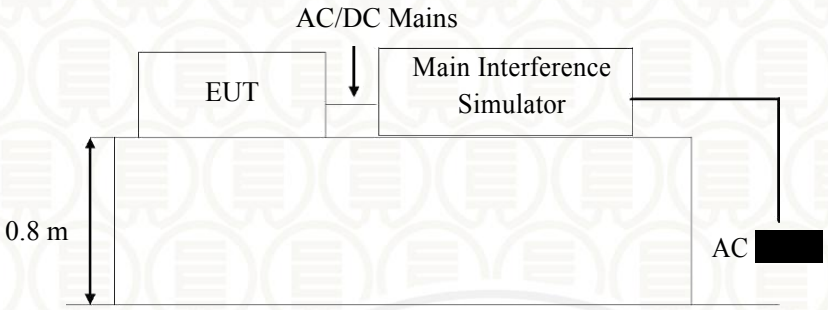
13.7. Test Results

Temperature	25℃	Humidity	55%	
Frequency Range (MHz)	Injected Position	Strength	Criterion	Result
0.15 ~ 20	AC Line	3V(rms), Unmodulated	A	N/A
20 ~ 80	AC Line	3V(rms), Unmodulated	A	N/A

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1. Voltage Dips and Interruptions Test Setup



Remark: Combination wave generator and decoupling network are included in test generator.

14.2. Test Standard

EN IEC 55014-2:2021*

14.3. Severity Levels and Performance Criterion

14.3.1.Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	250p
40	60	5p
70	30	0.5p

14.3.2.Performance criterion : C & B

14.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

14.4. Operating Condition of EUT

14.5.1.Setup the EUT as shown in Section 14.1.

14.5.2.Turn on the power of all equipment.

14.5.3.Let the EUT work in test mode (Normal operation) and test it.

14.6. Test Procedure

1. Set up the EUT and test generator as shown on Section 14.1.
2. The interruptions is introduced at selected phase angles with specified duration.
3. Record any degradation of performance.

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

14.7. Test Result

Temperature	25℃		Humidity	55%	
Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in period)	Phase Angle	Criterion	Result
0	100	250P	0° ~360°	C	N/A
40	60	5P	0° ~360°	C	N/A
70	30	0.5P	0° ~360°	B	N/A

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

APPENDIX I: Radiated Emission Test data

Polarization : Horizontal
Operation Mode : Normal operation

Test Graph

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	38.8878	26.51	-7.71	18.80	40.00	-21.20	QP	100	82	
2	54.0711	34.19	-14.51	19.68	40.00	-20.32	QP	100	360	
3	72.0843	34.57	-14.63	19.94	40.00	-20.06	QP	100	24	
4	229.2931	35.26	-10.79	24.47	40.00	-15.53	QP	100	360	
5	387.9920	42.81	-6.36	36.45	47.00	-10.55	QP	100	0	
6	810.2654	30.57	-0.79	29.78	47.00	-17.22	QP	100	77	

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

Polarization : Vertical
Operation Mode : Normal operation

Test Graph

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	39.9942	32.29	-8.37	23.92	40.00	-16.08	QP	100	347	
2	46.6664	38.70	-11.95	26.75	40.00	-13.25	QP	100	135	
3	60.4919	41.83	-15.87	25.96	40.00	-14.04	QP	100	92	
4	89.5899	32.64	-11.60	21.04	40.00	-18.96	QP	100	283	
5	413.2706	34.01	-5.79	28.22	47.00	-18.78	QP	100	305	
6	952.0937	28.19	0.60	28.79	47.00	-18.21	QP	100	347	

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

APPENDIX II: Test Setup Photo and EUT Photo

Figure 1: EUT Front-Side

Figure 2: EUT Back-Side

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

Figure 3: Radiated Emission Test Setup

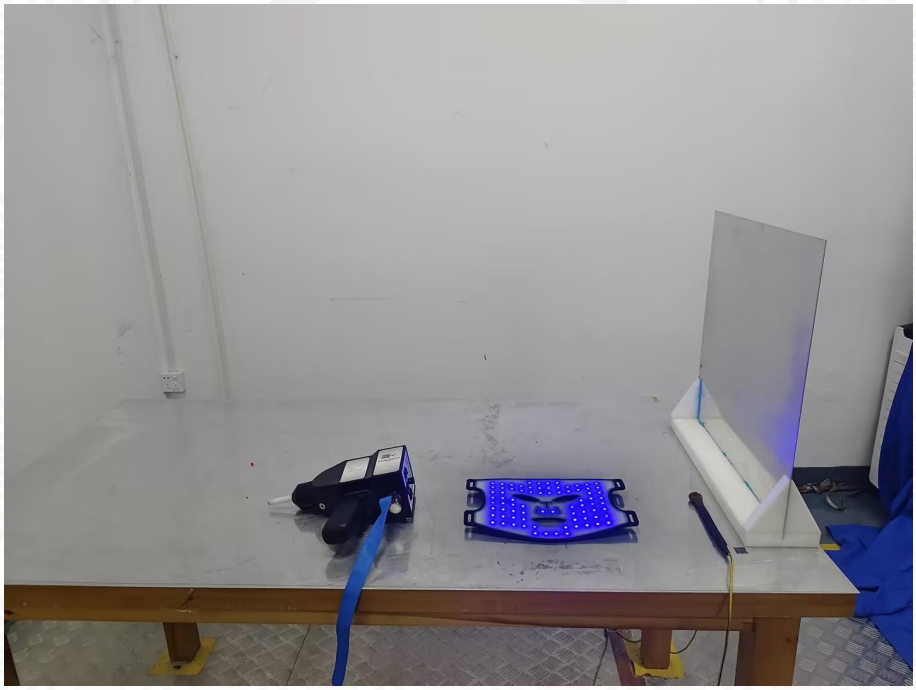


Figure 4: Electrostatic Discharge Test Setup

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.

DECLARATION

1. The report is invalid without "Signature and seal".

2. The report is invalid without the signature of the Tester,Reviewer

3. This report is invalid if it is changed.

4. This report shall not be partially copied without the written approval of the Testing unit.

5. The entrusted test results are only responsible for the Incoming Samples.

6. The reports marked with "*" are not within the scope of CNAS qualification, or are completed in subcontracted laboratories. The testing methods, data and results are for reference by both parties.

7. If there is any objection to the Test report, it shall be submitted to the Testing unit within 15 days from the date of receiving the report. If it is overdue, it will not be accepted.

TESTING LABORATORY INFORMATION

Address: 302 & 101, 1F., Building 1, Donglongxing Technology Park, Huaning Road,

Xinshi Community, Dalang Subdistrict, Longhua District, Shenzhen, Guangdong, China

Website: http://www.c-cert.com

Tel.: 400-188-1878

E-mail: service@c-cert.com

***** REPORT END *****

This report shall not be altered,increased or deleted.The results shown in this test report refer only to the sample(s) tested. Without written approval of CIRCLE Lab, this test report shall not be copied except in full and published as advertisement. CIRCLE Lab.