EMC TEST REPORT
For

Changsha Lubang Photonics Technology Co.,Ltd.

Liquid Crystal Controller

Model No.: LCVRC-2K25

Prepared for	:	Changsha Lubang Photonics Technology Co.,Ltd.
Address	:	Room 602, Floor 6, Unit N, Zone A-6, Huanchuang Park, 2450 Yuelu West Avenue, High-tech Development Zone, Changsha
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	May 18, 2022
Number of tested samples	:	2
Sample No.	:	A050922327-1, A050922327-2
Date of Test	:	May 18, 2022 ~ May 24, 2022
Date of Report	:	May 25, 2022

CE

TEST REPORT

EN 55011:2016+A2:2021

Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

EN IEC 61000-6-1:2019

Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments

Report Reference No. .....:	**LCSA050922327E**
Date Of Issue .....:	May 25, 2022
Testing Laboratory Name ....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address .....:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, 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 .....:	**Changsha Lubang Photonics Technology Co.,Ltd.**
Address .....:	Room 602, Floor 6, Unit N, Zone A-6, Huanchuang Park, 2450 Yuelu West Avenue, High-tech Development Zone, Changsha
Test Specification:	
Standard .....:	EN 55011:2016+A2:2021, EN IEC 61000-6-1:2019 EN IEC 61000-3-2:2019+A1: 2021 EN 61000-3-3: 2013+A1:2019
Test Report Form No. .....:	LCSEMC-1.0
TRF Originator .....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2011-03

Test Item Description. .....:	**Liquid Crystal Controller**
Trade Mark .....:	LBTEK www.lbtek.com
Model/ Type Reference .....:	LCVRC-2K25
Ratings .....:	Please Refer To Page 8
Result .....:	**Positive**

Compiled by:	Supervised by:	Approved by:
Emma Wang/ File administrators	Baron Wen/Technique principal	Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. :	LCSA050922327E	May 25, 2022 Date of issue

Type / Model.....	:	LCVRC-2K25
EUT.....	:	Liquid Crystal Controller
Applicant.....	:	**Changsha Lubang Photonics Technology Co.,Ltd.**
Address.....	:	Room 602, Floor 6, Unit N, Zone A-6, Huanchuang Park, 2450 Yuelu West Avenue, High-tech Development Zone, Changsha
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	:	**Changsha Lubang Photonics Technology Co.,Ltd.**
Address.....	:	Room 602, Floor 6, Unit N, Zone A-6, Huanchuang Park, 2450 Yuelu West Avenue, High-tech Development Zone, Changsha
Telephone.....	:	/
Fax.....	:	/
Factory.....	:	**Changsha Lubang Photonics Technology Co.,Ltd.**
Address.....	:	Room 602, Floor 6, Unit N, Zone A-6, Huanchuang Park, 2450 Yuelu West Avenue, High-tech Development Zone, Changsha
Telephone.....	:	/
Fax.....	:	/

Test Result according to the standards on page 7:	**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 Content	Revised By
000	May 25, 2022	Initial Issue	/

TABLE OF CONTENT

Test Report Description Page

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 IEC 61000-6-1:2019)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 55011:2016+A2:2021	Class B	PASS
Conducted disturbance at telecommunication port	EN 55011:2016+A2:2021	Class B	N/A
Radiated disturbance	EN 55011:2016+A2:2021	Class B	PASS
Harmonic current emissions	EN IEC 61000-3-2:2019+A1: 2021	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013+A1:2019	--------	PASS

IMMUNITY (EN IEC 61000-6-1:2019)			
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 IEC 61000-4-3:2020	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	PASS
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6:2014+AC:2015	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips,＞95% reduction	EN IEC 61000-4-11:2020+AC: 2020	B	PASS
Voltage dips,＞60% reduction		B	PASS
Voltage dips, 30% reduction		B	PASS
Voltage interruptions＞95%		C	PASS
N/A is an abbreviation for Not Applicable.			

Test mode:		
Mode	Working	Record

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 deliver 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 : Liquid Crystal Controller

Trade Mark : LBTEK www.lbtek.com

Model Number : LCVRC-2K25

Power Supply : Input: 230V~, 50/60Hz, 50W

2.2.Description of Test Facility

Site Description
EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

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	Parameters	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucispr)
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 4.0 dB ± 3.6 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 2.90dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	N/A
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
Mains Harmonic	Voltage	± 0.510%	N/A
Voltage Fluctuations &Flicker	Voltage	± 0.510%	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 DEVICE AND TEST EQUIPMENT

LINE CONDUCTED EMISSION

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	EMI Test Receiver	R&S	ESR3	102312	2022-02-18	2023-02-17
3	Artificial Mains	R&S	ENV216	101119	2021-06-21	2022-06-20
4	Pulse Limiter	R&S	ESH3-Z2	102750-NB	2021-08-19	2022-08-18

RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	E3	E3-EMC	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
4	EMI Test Receiver	R&S	ESR3	102311	2021-08-19	2022-08-18
5	Broadband Preamplifier	/	BP-01M18G	P190501	2021-06-21	2022-06-20

VOLTAGE FLUCTUATION AND FLICKER/HARMONIC CURRENT EMISSIONS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD141 1116	2022-02-08	2023-02-07
2	HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFS-4000	P624486CD141 1124	2022-02-08	2023-02-07

ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2021-07-28	2022-07-27

RF ELECTROMAGNETIC FIELD)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2021-06-11	2022-06-10
2	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR	NCR
3	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR	NCR
4	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	NCR	NCR
5	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	NCR	NCR
6	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2021-06-29	2022-06-28

Note: NCR means no calibration requirement

ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2021-06-21	2022-06-20

SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2021-06-21	2022-06-20

RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2021-08-19	2022-08-18
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2021-06-21	2022-06-20
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2021-06-21	2022-06-20

MAGNETIC FIELD SUSCEPTIBILITY TEST

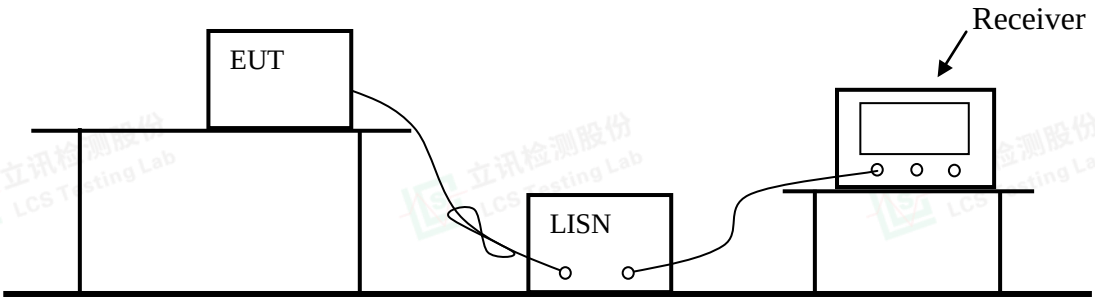
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2021-06-21	2022-06-20

VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2021-06-21	2022-06-20

4. POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1.Block Diagram of Test Setup



Ground

4.2.Test Standard

EN 55011:2016+A2:2021

Power Line Conducted Emission Limits (Class B)

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0
NOTE1-The lower limit shall apply at the transition frequencies. NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

4.3.EUT Configuration on Test

The following equipments are installed on Conducted Emission Measurement to see EN 55011 requirements and operating in a manner which tends to maximize its emission characteristics in normal application.

4.4.Operating Condition of EUT

4.4.1.Setup the EUT as shown on Section 4.1.

4.4.2.Turn on the power of all equipments.

4.4.3.Let the EUT work in measuring Mode (Working) and measure it.

4.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50-ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55011 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz in 150kHz~30MHz and 200Hz in 9kHz~150kHz.

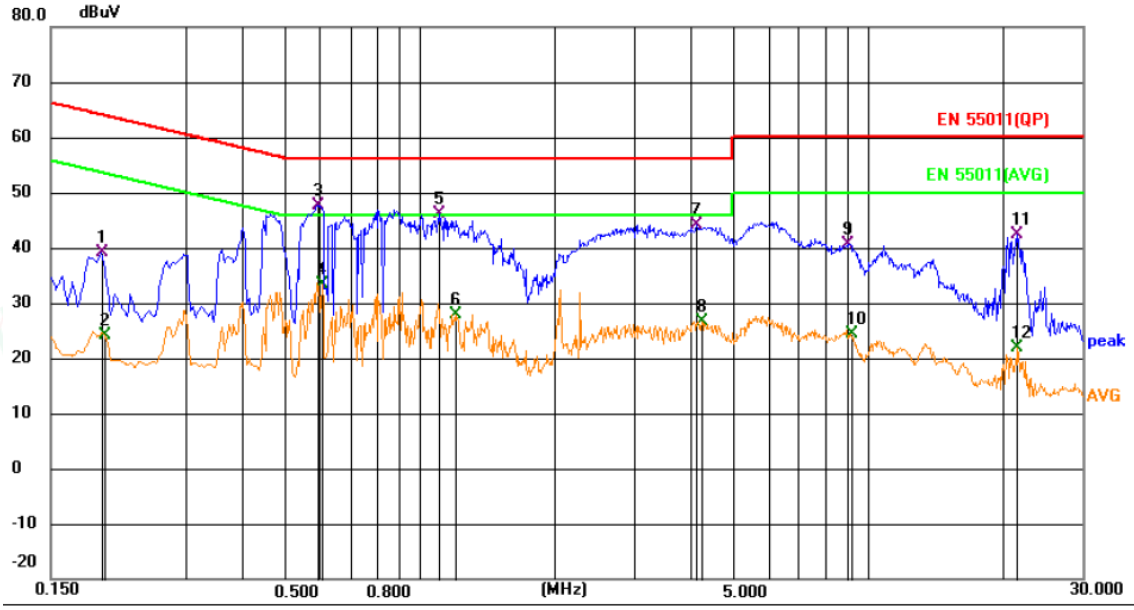
The frequency range from 150kHz to 30MHz is investigated

4.6.Test Results

PASS.

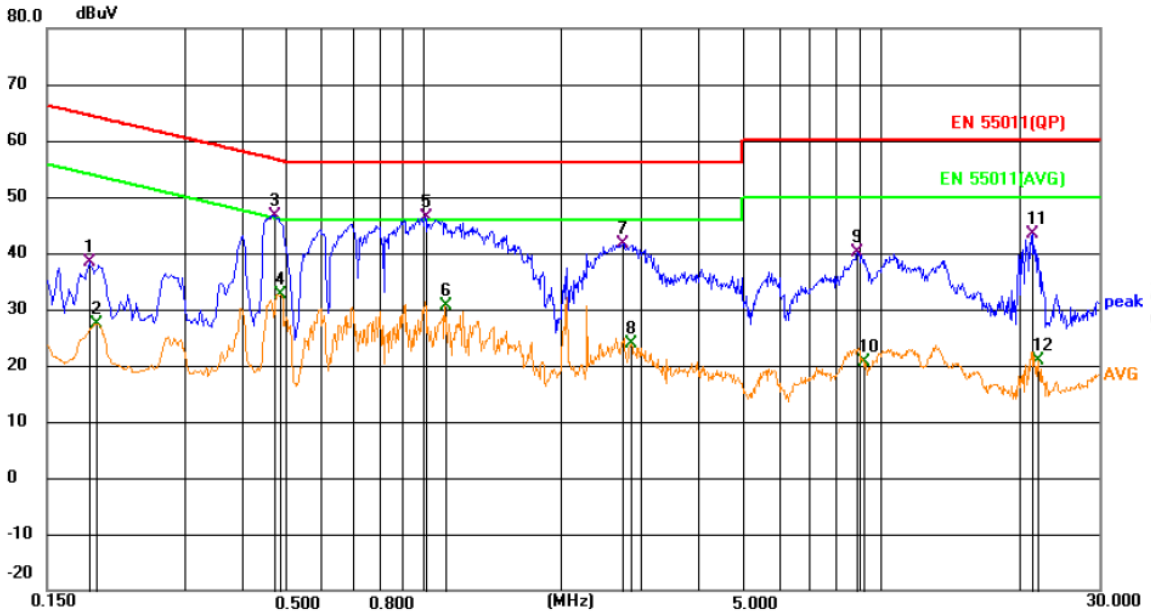
The test result please refer to the next page.

Model No.	LCVRC-2K25	Test Mode	Working
Environmental Conditions	22.5℃, 53.7% RH	Test Engineer	Paul Xie
Pol	Line		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1951	19.61	19.63	39.24	63.82	-24.58	QP	
2		0.1975	4.46	19.63	24.09	53.72	-29.63	AVG	
3	*	0.5910	28.03	19.66	47.69	56.00	-8.31	QP	
4		0.6045	13.80	19.66	33.46	46.00	-12.54	AVG	
5		1.1085	26.48	19.65	46.13	56.00	-9.87	QP	
6		1.2030	8.27	19.66	27.93	46.00	-18.07	AVG	
7		4.1551	24.34	19.70	44.04	56.00	-11.96	QP	
8		4.2495	6.92	19.70	26.62	46.00	-19.38	AVG	
9		8.9746	20.85	19.82	40.67	60.00	-19.33	QP	
10		9.1321	4.60	19.82	24.42	50.00	-25.58	AVG	
11		21.5161	22.25	20.12	42.37	60.00	-17.63	QP	
12		21.5161	1.72	20.12	21.84	50.00	-28.16	AVG	

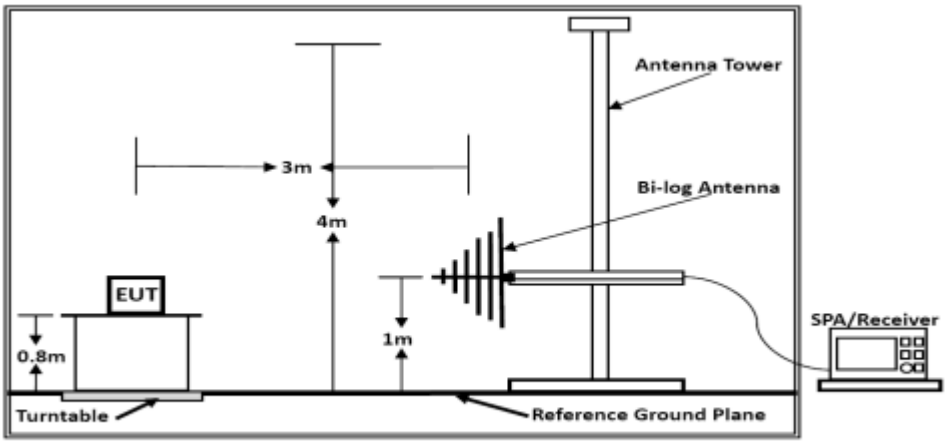
Model No.	LCVRC-2K25	Test Mode	Working
Environmental Conditions	22.5℃, 53.7% RH	Test Engineer	Paul Xie
Pol	Neutral		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1861	18.82	19.63	38.45	64.21	-25.76	QP	
2		0.1924	7.80	19.63	27.43	53.93	-26.50	AVG	
3		0.4741	27.10	19.64	46.74	56.44	-9.70	QP	
4		0.4876	13.05	19.64	32.69	46.21	-13.52	AVG	
5	*	1.0096	26.71	19.65	46.36	56.00	-9.64	QP	
6		1.1131	10.90	19.65	30.55	46.00	-15.45	AVG	
7		2.7330	22.01	19.72	41.73	56.00	-14.27	QP	
8		2.8501	4.23	19.72	23.95	46.00	-22.05	AVG	
9		8.8801	20.31	19.85	40.16	60.00	-19.84	QP	
10		9.1726	0.88	19.85	20.73	50.00	-29.27	AVG	
11		21.5746	23.26	20.12	43.38	60.00	-16.62	QP	
12		22.0831	0.70	20.09	20.79	50.00	-29.21	AVG	

5. RADIATED EMISSION MEASUREMENT

5.1.Block Diagram of Test Setup



Below 1GHz

5.2.Measuring Standard

EN 55011:2016+A2:2021

5.3.Radiated Emission Limits

EN 55011 Limits:

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

Limits for radiated disturbance Blow 1GHz

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.		

5.4.EUT Configuration on Test

The EN 55011 regulations test method must be used to find the maximum emission during radiated emission measurement.

5.5.Operating Condition of EUT

5.5.1 Turn on the power.

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

5.6.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 a 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 is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

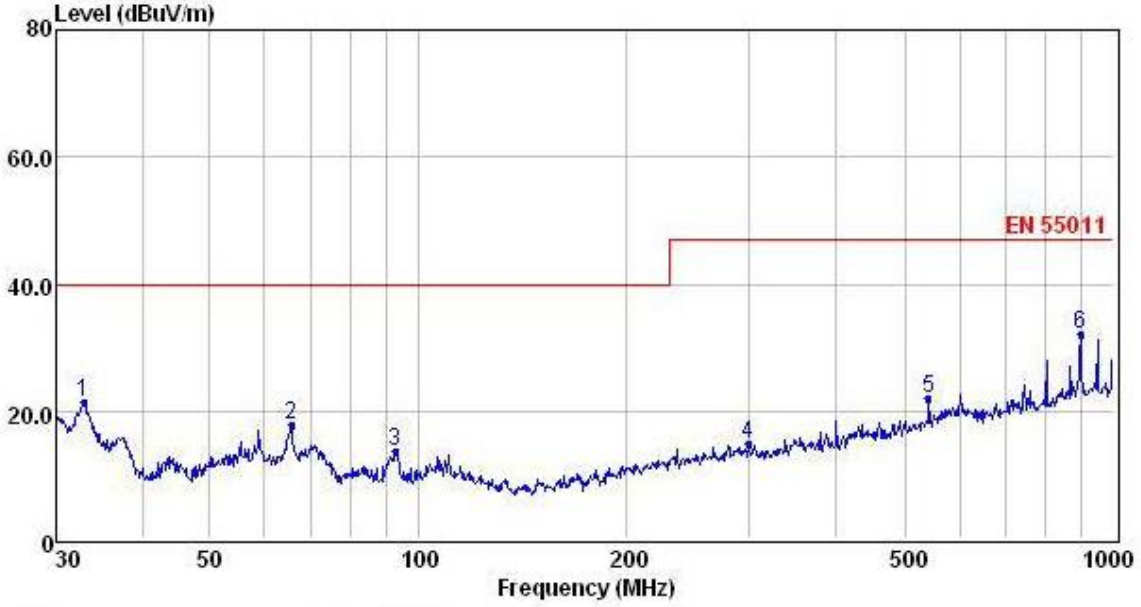
The bandwidth of the Receiver is set at 120kHz.
The frequency range from 30MHz to 1000MHz is investigated.

5.7.Test Results

PASS.

The test result please refer to the next page.

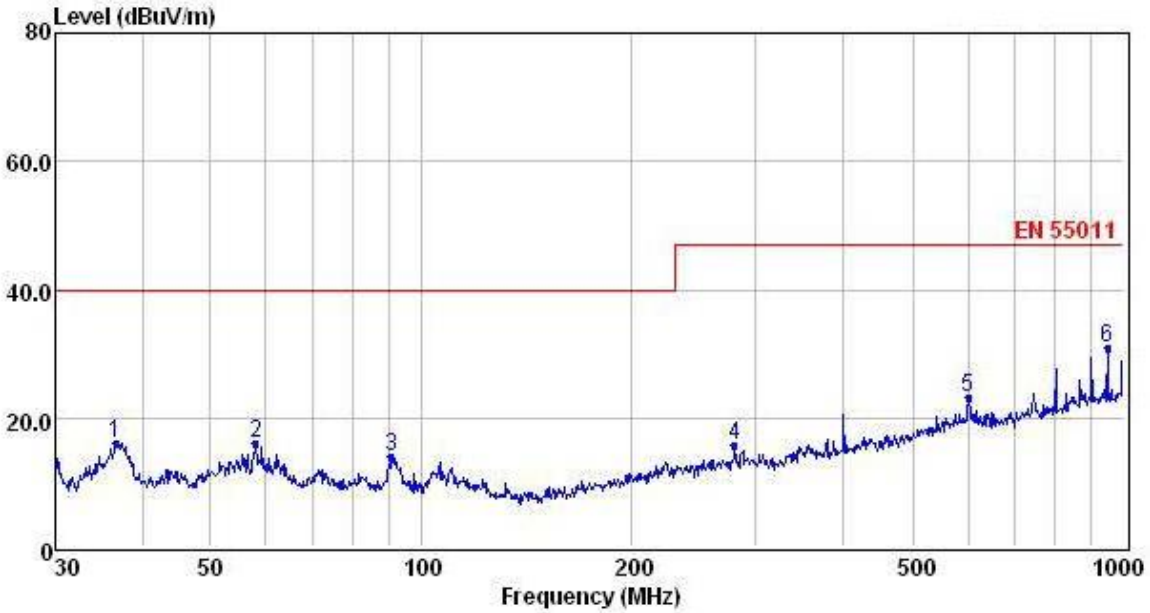
Model No.	LCVRC-2K25	Test Mode	Working
Environmental Conditions	22.3℃, 53.6% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Paul Xie		



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	32.86	10.24	0.44	10.78	21.46	40.00	-18.54	QP
2	65.57	6.02	0.68	11.17	17.87	40.00	-22.13	QP
3	92.79	2.98	0.78	9.85	13.61	40.00	-26.39	QP
4	299.32	-0.28	1.32	13.69	14.73	47.00	-32.27	QP
5	541.37	2.83	1.50	17.55	21.88	47.00	-25.12	QP
6	897.00	8.68	2.10	21.29	32.07	47.00	-14.93	QP

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

Model No.	LCVRC-2K25	Test Mode	Working
Environmental Conditions	22.3℃, 53.6% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Paul Xie		

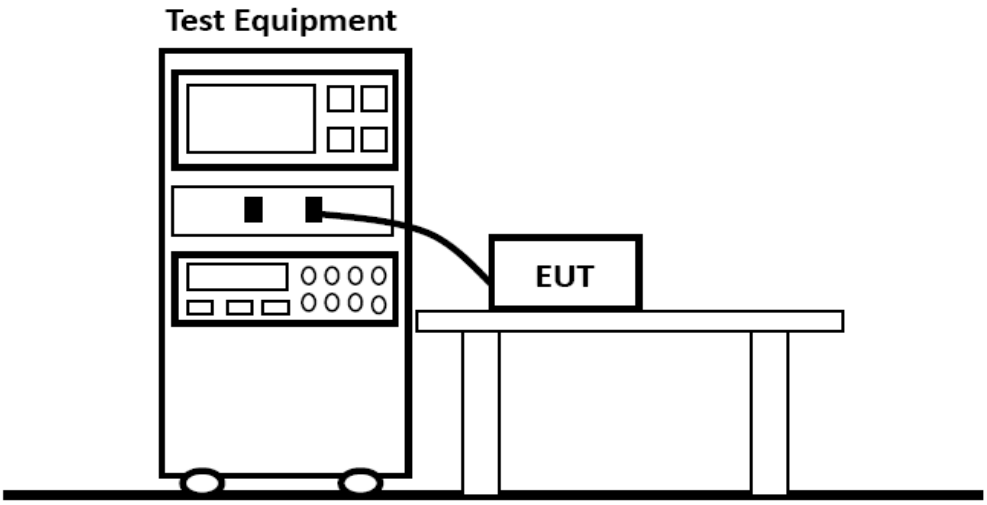


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	36.64	4.38	0.48	11.11	15.97	40.00	-24.03	QP
2	58.00	2.80	0.64	12.52	15.96	40.00	-24.04	QP
3	90.54	3.70	0.77	9.57	14.04	40.00	-25.96	QP
4	280.02	1.10	1.30	13.30	15.70	47.00	-31.30	QP
5	601.43	2.28	1.50	19.28	23.06	47.00	-23.94	QP
6	948.76	7.37	2.15	21.51	31.03	47.00	-15.97	QP

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

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1.Block Diagram of Test Setup



6.2.Test Standard

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

6.3.Operation Condition of EUT

Same as Section 3.4, except the test setup replaced as Section 6.1.

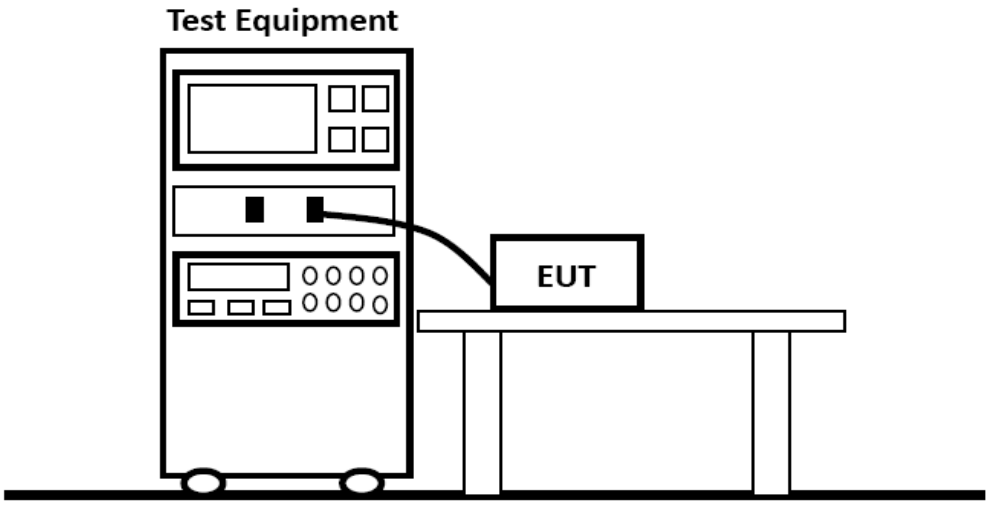
6.4.Test Results

N/A

Because the power of EUT is less than 75W, according to standard EN 61000-3-2, harmonic current unnecessary to test.

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1.Block Diagram of Test Setup



7.2.Measuring Standard

EN 61000-3-3: 2013+A1:2019

7.3.Operation Condition of EUT

Same as Section 3.4, except the test setup replaced as Section 7.1.

7.4.Test Results

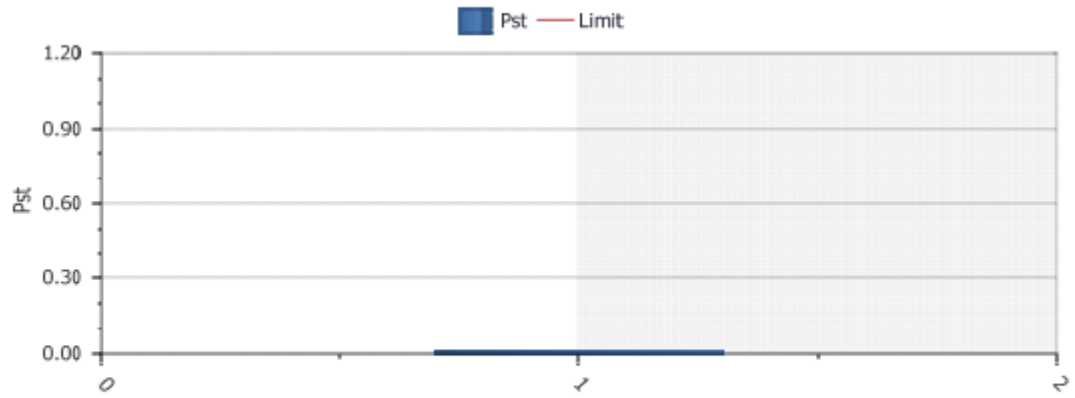
PASS.

The test result please refer to the next page.

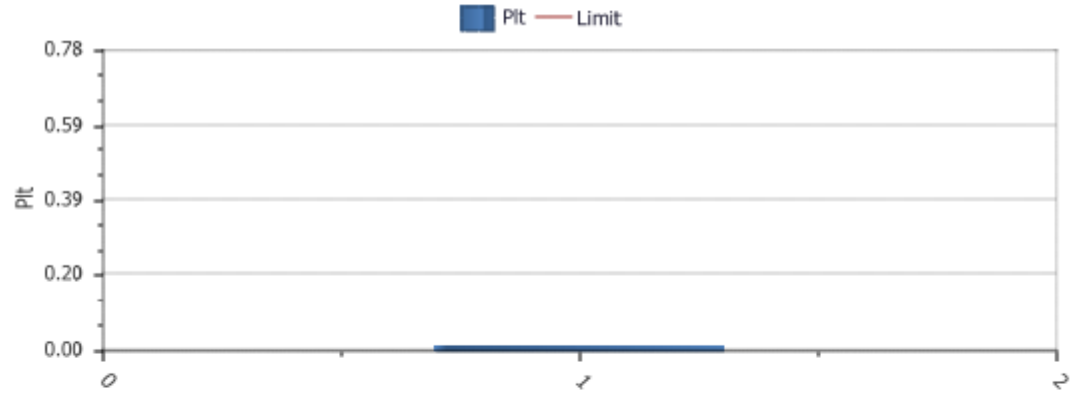
Model No.	LCVRC-2K25	Test Engineer	Hy Luo

Customer : xxx Result : PASS

Pst and Limit



Plt and Limit

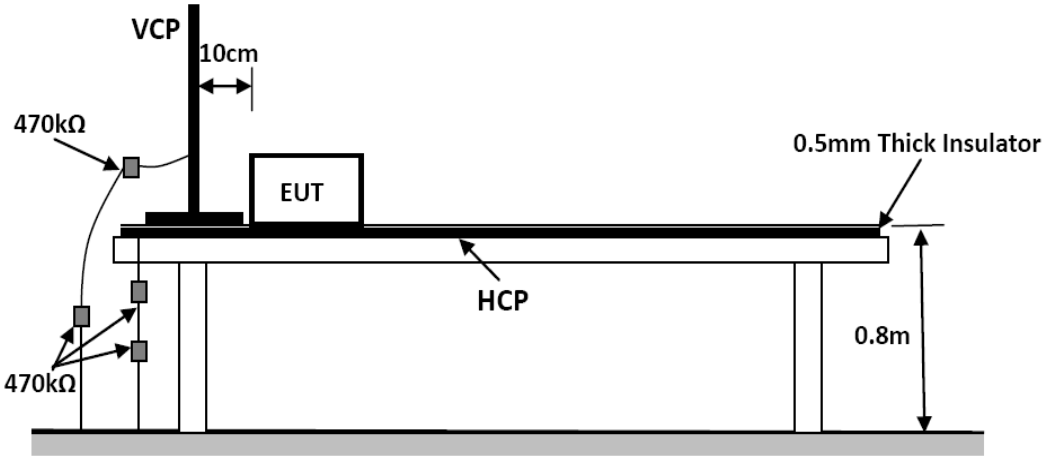


Relevant Parameter and Judgement During Test Period

Vrms at the end of test(V)	229.86			
Error Max(%)		Test Limit(%)		
T-max(ms)	0.00	Test Limit(ms)	500	Pass
dc(%)	0.00	Test Limit(%)	3.30	Pass
dmax(%)	0.00	Test Limit(%)	4.00	Pass
Pst	0.01	Test Limit	1.00	Pass
Plt	0.00	Test Limit	0.65	Pass

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1. Block Diagram of Test Setup



8.2. Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

8.3. Severity Levels and Performance Criterion

8.3.1. 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

8.3.2. Performance Criterion
Performance Criterion: B

8.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4.

8.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.4. Except the test set up replaced by Section 8.1.

8.6. Test Procedure

8.6.1. 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

8.6.2. Contact Discharge

All the procedure shall be same as Section 8.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.6.3. 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.

8.6.4. Indirect Discharge For Vertical Coupling Plane

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

8.7. Test Results

PASS.

The test result please refer to the next page.

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	23.2℃
M/N	LCVRC-2K25	**Humidity**	52.5%
Criterion	B	**Pressure**	1021mbar
Test Mode	Working	**Test Engineer**	Hy Luo
Test Voltage	AC 230V/50Hz	**Test voltage**	AC 230V/50Hz

Air Discharge

Test Points	Test Levels			Results		
	± 2kV	± 4kV	± 8kV	Passed	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	Passed	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

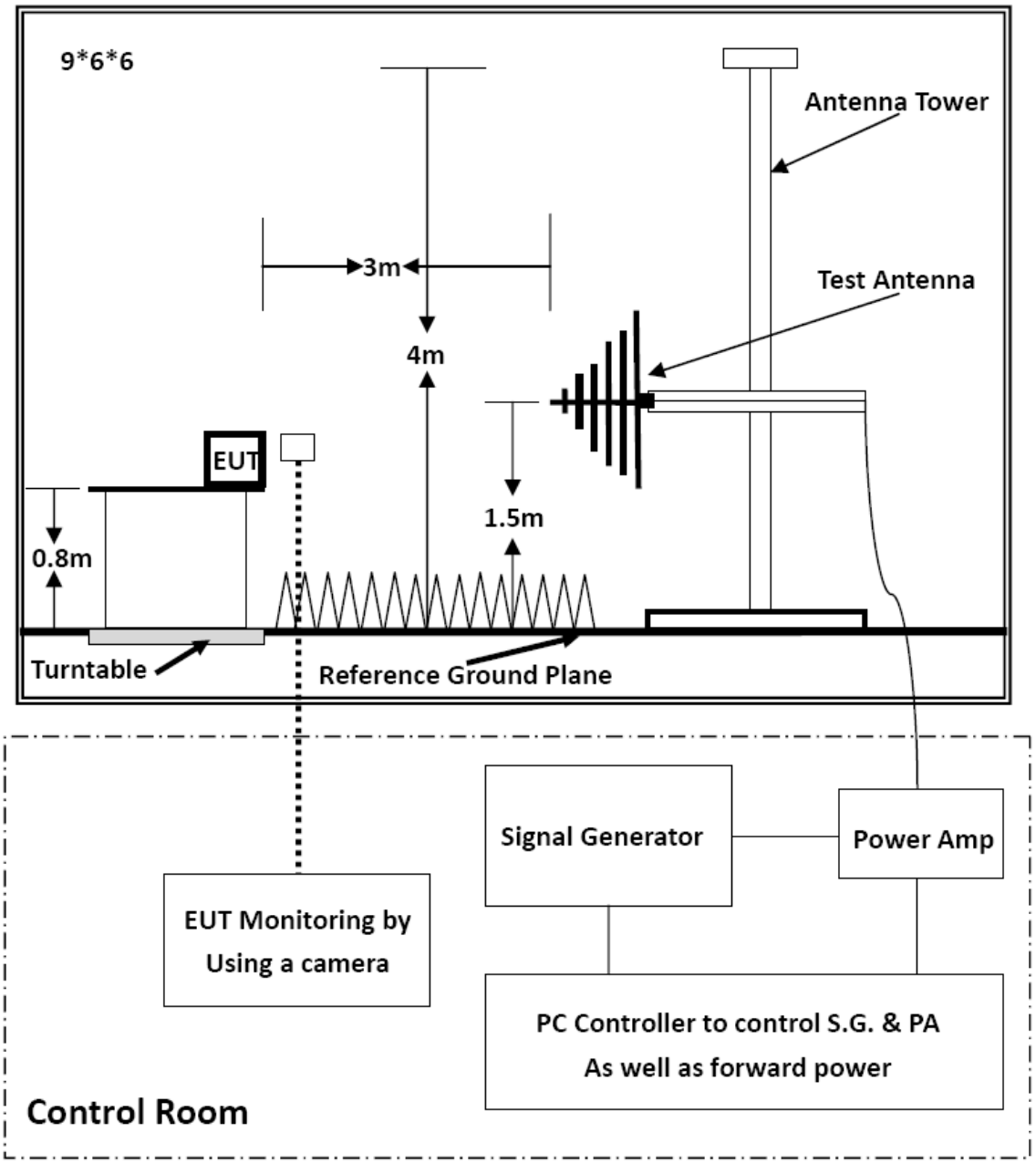
Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

Discharge To Vertical Coupling Plane

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

9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1. Block Diagram of Test Setup



9.2. Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-3: 2006+A2: 2010 Severity Level 2: 3V/ m; Level 2: 3V/m; Level 1: 1V/m)

9.3. Severity Levels and Performance Criterion

9.3.1. Severity level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	1

9.3.2. Performance Criterion
Performance Criterion: A

9.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

9.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.5, except the test setup replaced as Section 9.1.

5.6.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD Recording is used to monitor its screen.
All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Unmodulated
3. Scanning Frequency	80-1GHz
4. Sweep Time of Radiated	0.0015 Decade/s
5. Dwell Time	3 Sec.
6. Fielded Strength	3V/m (Severity Level 2)
7. Radiated Signal	Unmodulated
8. Scanning Frequency	1.4-2.0GHz
9. Sweep time of radiated	0.0015 Decade/s
Dwell Time	3 Sec.
10. Fielded Strength	1V/m (Severity Level 1)
11. Radiated Signal	Unmodulated
12. Scanning Frequency	2.0-2.7GHz
13. Sweep time of radiated	0.0015 Decade/s
14. Dwell Time	3 Sec.

5.6.7. Test Results

PASS.

The test result please refer to the next page.

RF Field Strength Susceptibility Test Results

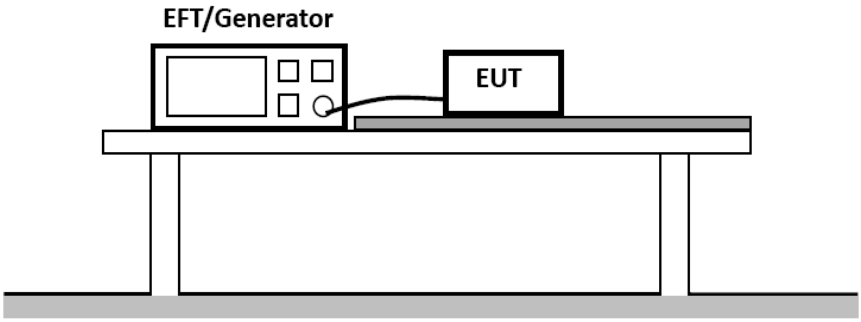
Standard	☐ IEC 61000-4-3 ☑ EN 61000-4-3		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	22.7℃
M/N	LCVRC-2K25	**Humidity**	53.6％
Test Mode	Working	**Criterion**	A
Field Strength	3 V/m	**Frequency Range**	80 MHz to1.0 GHz
	3 V/m		1.4 GHz to2.0 GHz
	1 V/m		2.0 GHz to2.7 GHz
Test Engineer	Hy Luo	**Test Voltage**	AC 230V/50Hz
Modulation	☐None ☐ Pulse ☑AM 1KHz 80%		
Steps	1%		

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

Note:

10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1. Block Diagram of Test Setup



10.2. Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-4: 2012, Severity Level, Level 2: 1KV)

10.3. Severity Levels and Performance Criterion

10.3.1. 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

10.3.2. Performance Criterion
Performance Criterion: B

10.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

10.5. Operating Condition of EUT

10.5.1. Setup the EUT as shown in Section 10.1.
10.5.2. Turn on the power of all equipments.
10.5.3. Let the EUT work in test Working and measure it.

10.6. Test Procedure

The EUT is put on the table, which is 0.8 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 EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.6.1. 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 1 mins.

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

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

10.7. Test Results

PASS.

The test result please refer to the next page.

Electrical Fast Transient/Burst Test Results

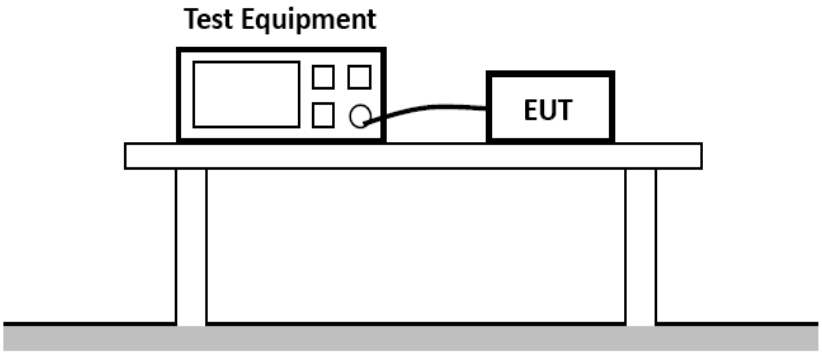
Standard	☐ IEC 61000-4-4 ☑ EN 61000-4-4		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	24.6℃
M/N	LCVRC-2K25	**Humidity**	52.5%
Test Mode	Working	**Criterion**	B
Test Engineer	Hy Luo	**Test Voltage**	AC 230V/50Hz

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
PE			
L-N	1KV	PASS	PASS
L-PE			
N-PE			
L-N-PE			
Signal Line			
I/O Cable			

Note:

11. SURGE IMMUNITY TEST

11.1. Block Diagram of Test Setup



11.2. Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-5: 2014+A1: 2017, Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth: Level 3, 2.0KV)

11.3. Severity Levels and Performance Criterion

11.3.1. Severity level

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

11.3.2. Performance Criterion
Performance Criterion: B

11.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

11.5. Operating Condition of EUT

11.5.1.Setup the EUT as shown in Section 11.1.
11.5.1.Turn on the power of all equipments.
11.5.1.Let the EUT work in test mode and measure it.

11.6. Test Procedure

11.6.1. Set up the EUT and test generator as shown on Section 11.1.

11.6.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

11.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

11.6.4. Different phase angles are done individually.

11.6.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.7. Test Results

PASS.

The test result please refer to the next page.

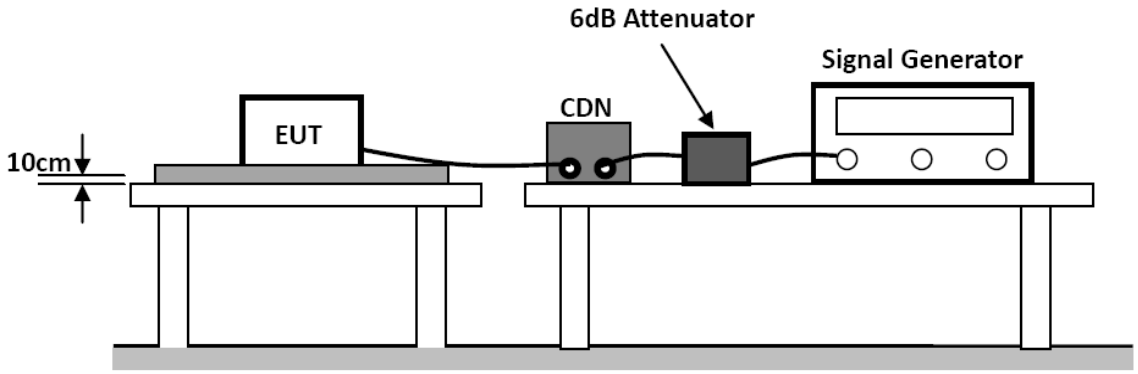
Surge Immunity Test Result

Standard	☐ IEC 61000-4-5 ☑ EN 61000-4-5		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	24.1℃
M/N	LCVRC-2K25	**Humidity**	54.1%
Test Mode	Working	**Criterion**	B
Test Engineer	Xin Li	**Test Voltage**	AC 230V/50Hz

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	90°	5	1.0	PASS
	-	270°	5	1.0	PASS
L-PE					
N-PE					
Signal Line					
Note					

12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1. Block Diagram of Test Setup



12.2. Test Standard

EN IEC 61000-6-1: 2019(EN 61000-4-6: 2014+A1:2015, Severity Level: Level 2, (0.15MHz ~ 80MHz))

12.3. Severity Levels and Performance Criterion

12.3.1. Severity level

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

12.3.2. Performance Criterion
Performance Criterion: A

12.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

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 equipments.
12.5.3.Let the EUT work in test Working and measure it.

12.6. Test Procedure

12.6.1. Set up the EUT, CDN and test generators as shown on Section 12.1.
12.6.2. Let the EUT work in test mode and measure it.
12.6.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
12.6.4. The disturbance signal described below is injected to EUT through CDN.
12.6.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
12.6.6. The frequency range is swept from 150kHz to 10MHz using 3V signal level,10MHz to 30MHz using 3V to 1V signal level,30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
12.6.7. 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.
12.6.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.7. Test Results

PASS.

The test result please refer to the next page.

Injected Currents Susceptibility Test Results

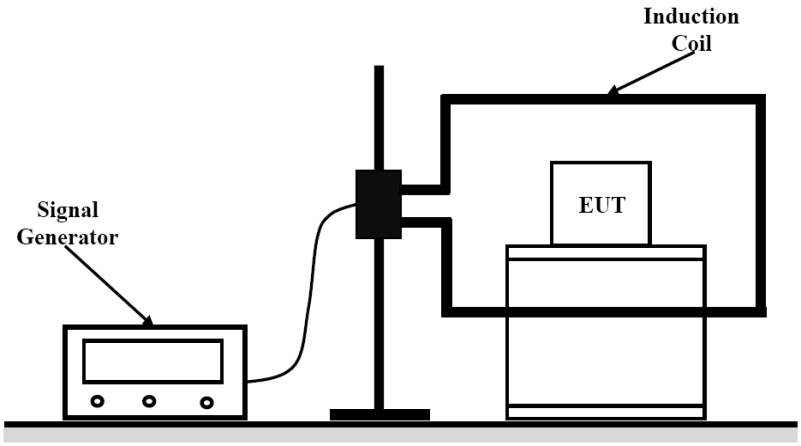
Standard	☐ IEC 61000-4-6 ☑ EN 61000-4-6		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	25.1℃
M/N	LCVRC-2K25	**Humidity**	53.6%
Test Mode	Working	**Criterion**	A
Test Engineer	Hy Luo	**Test Voltage**	AC 230V/50Hz

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 10	AC Mains	3V	A	PASS
10 ~ 30		3V ~ 1V		
30 ~ 80		1V		

Note:

13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1. Block Diagram of Test Setup



13.2. Test Standard

EN IEC 61000-6-1: 2019 (EN 61000-4-8: 2010, Severity Level: Level 1, 3A/m)

13.3. Severity Levels and Performance Criterion

13.3.1. Severity level

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

13.3.2. Performance Criterion
Performance Criterion: A

13.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

13.5. Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

13.6. Test Results

PASS.
The test result please refer to the next page.

Magnetic Field Immunity Test Result

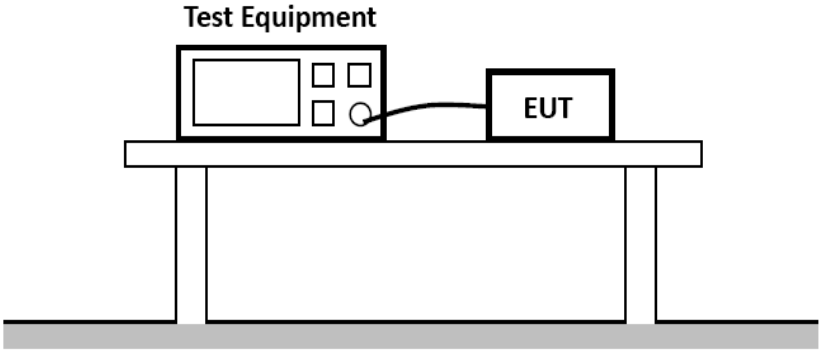
Standard	☐ IEC 61000-4-8 ☑ EN 61000-4-8		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	24.7℃
M/N	LCVRC-2K25	**Humidity**	54.1%
Test Mode	Working	**Criterion**	A
Test Engineer	Hy Luo	**Test Voltage**	AC 230V/50Hz

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
3	5 mins	X	A	PASS
3	5 mins	Y	A	PASS
3	5 mins	Z	A	PASS

Note:

14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1. Block Diagram of Test Setup



14.2. Test Standard

EN IEC 61000-6-1: 2019 (EN IEC 61000-4-11:2020+AC: 2020)

14.3. Severity Levels and Performance Criterion

14.3.1. Severity level

Test Level		
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	0.5
30	70	25
Voltage Reduction $\%U_T$	Voltage Dips $\%U_T$	Duration (in Period)
100	0	250

14.3.2. Performance Criterion
Performance Criterion: B&C

14.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4

14.5. 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 equipments.
14.5.3. Let the EUT work in test mode and measure it.

14.6. Test Procedure

14.6.1. Set up the EUT and test generator as shown on Section 14.1.
14.6.2. The interruptions are introduced at selected phase angles with specified duration.
14.6.3. Record any degradation of performance.

14.7. Test Results

PASS.

The test result please refer to the next page.

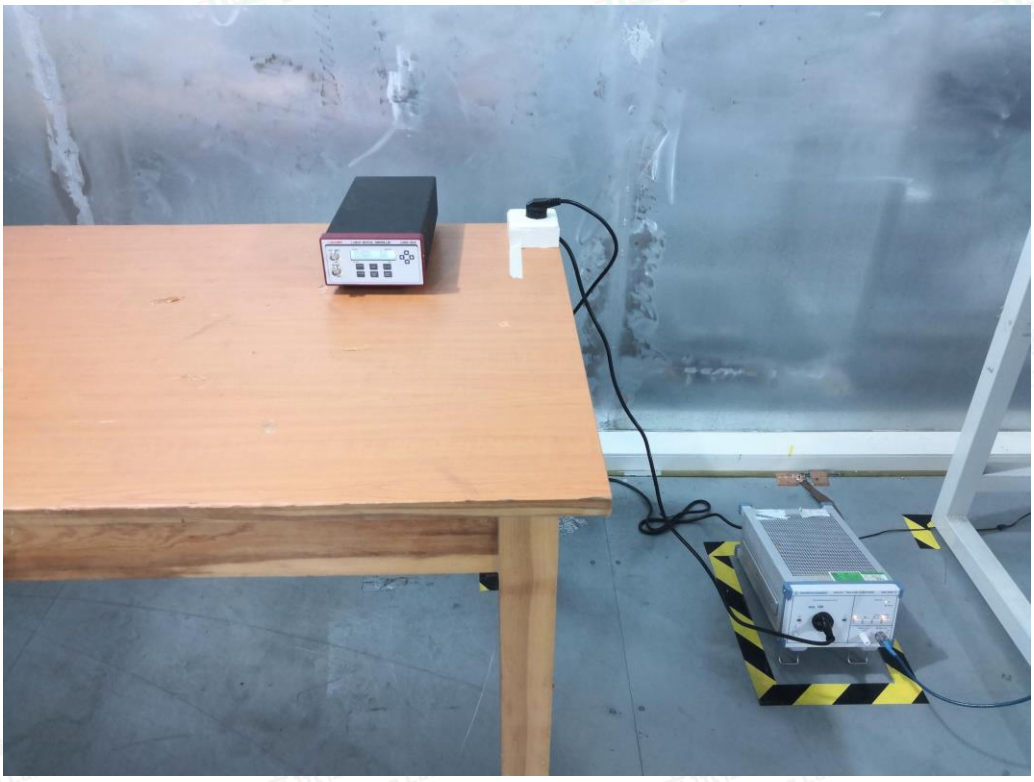
Voltage Dips And Interruptions Test Results

Standard	☐ IEC 61000-4-11 ☑ EN 61000-4-11		
Applicant	Changsha Lubang Photonics Technology Co.,Ltd.		
EUT	Liquid Crystal Controller	**Temperature**	24.1℃
M/N	LCVRC-2K25	**Humidity**	54.5％
Test Mode	Working	**Criterion**	B&C
Test Engineer	Hy Luo	**Test Voltage**	AC 230V/50Hz

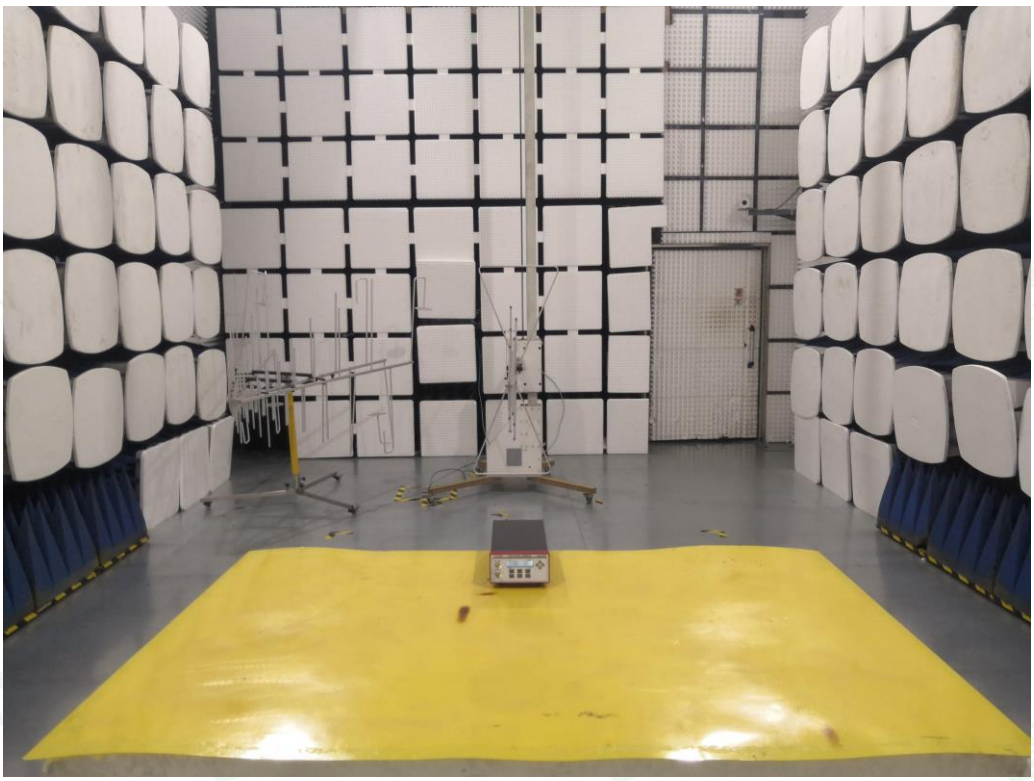
Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

Note:

15. PHOTOGRAPH

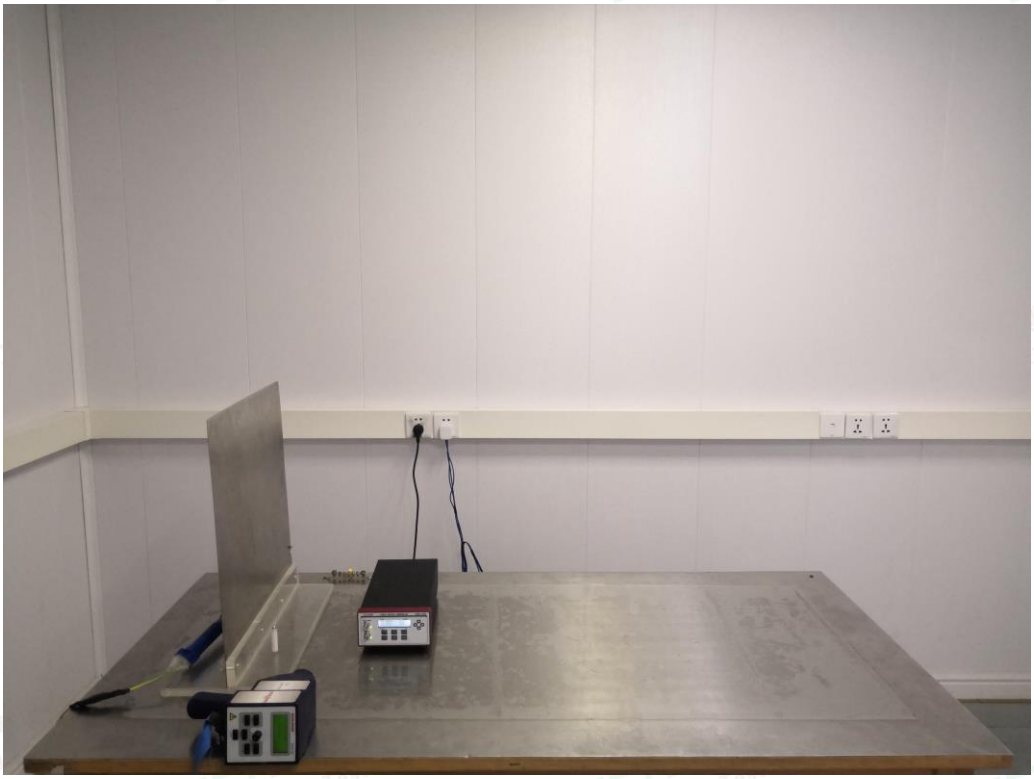


Test Setup Photo of Power Line Conducted Measurement

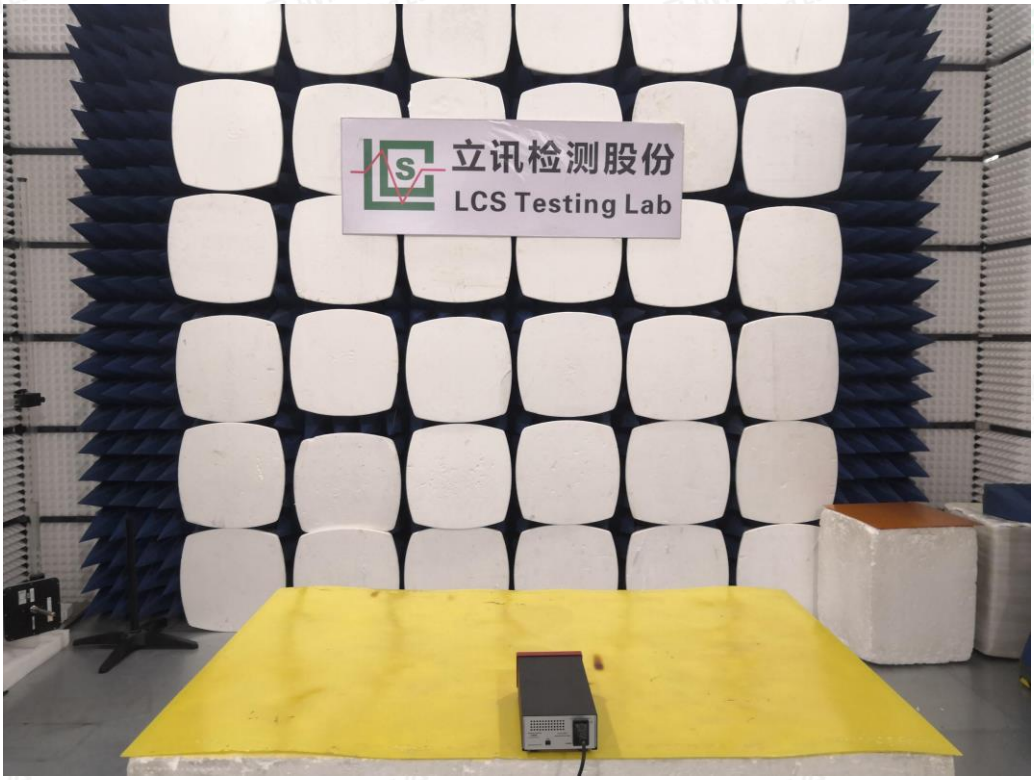


Test Setup Photo of Radiated Measurement (30MHz~1GHz)

Test Setup Photo of Harmonic & Flicker Measurement



Test Setup Photo of Electrostatic Discharge Test

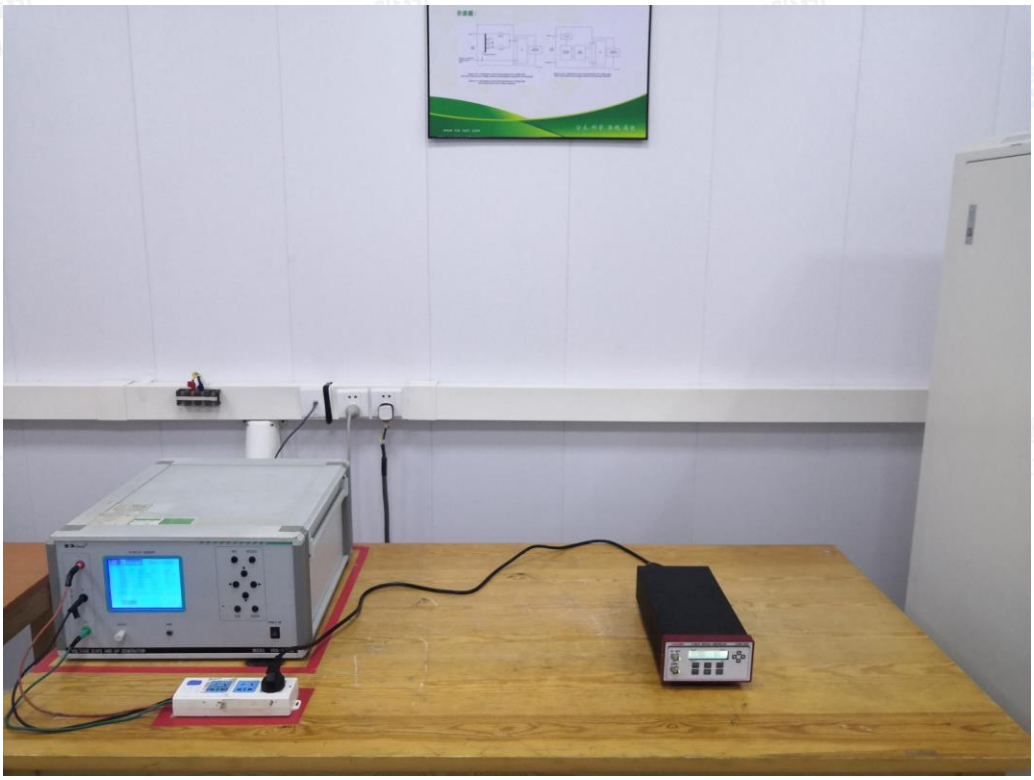


Test Setup Photo of RF Field Strength Susceptibility

Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test

Test Setup Photo of Injected Currents Susceptibility Test

Test Setup Photo of Magnetic Field Immunity Test



Test Setup Photo of Voltage Dips and Interruptions Test

16. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Fig. 1

Fig. 2

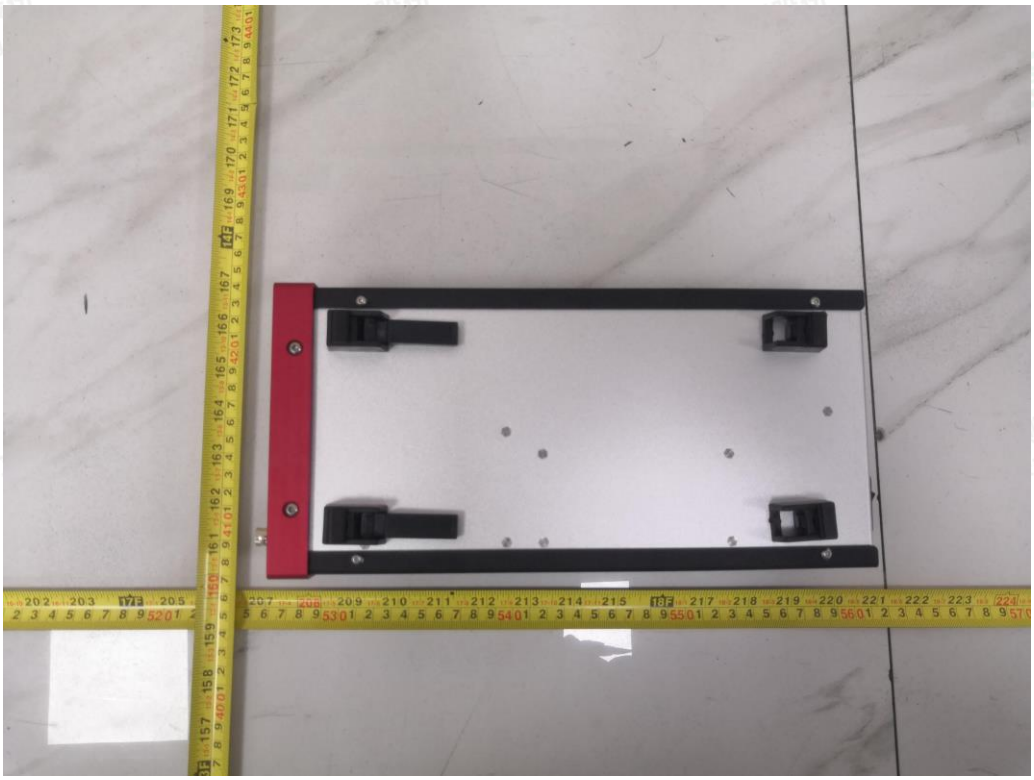


Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

---------- THE END OF TEST REPORT ----------