EMC TEST REPORT

For

Dongguan Olight E-Commerce Technology Co., Ltd.

Headlamp

Test Model: Array 2

Prepared for	:	Dongguan Olight E-Commerce Technology Co., Ltd.
Address	:	4th Floor, Building 4, Kegu Industrial Park, No 6 Zhongnan Road, Changan Town, Dongguan City, Guangdong, P.R. China
Prepared by	:	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
Address	:	101-201, No.39 Building, Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China
Tel	:	(+86)755-29871520
Fax	:	(+86)755-29871521
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	August 02, 2021
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	August 02, 2021 ~ August 27, 2021
Date of Report	:	August 27, 2021

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

EMC TEST REPORT

EN IEC 55015:2019+A11:2020

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

EN 61547: 2009

Equipment for general lighting purposes - EMC immunity requirements

Report Reference No.....:	**LCS210802108BE**
Date Of Issue.....:	August 27, 2021
Testing Laboratory Name.....:	**Shenzhen Southern LCS Compliance Testing Laboratory Ltd.**
Address.....:	101-201, No.39 Building,Xialang Industrial Zone, Heshuikou Community, Matian Street,Guangming District, Shenzhen, China
Testing Location/ Procedure....:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....:	**Dongguan Olight E-Commerce Technology Co., Ltd.**
Address.....:	4th Floor, Building 4, Kegu Industrial Park, No 6 Zhongnan Road, Changan Town, Dongguan City, Guangdong, P.R. China
Test Specification:	
Standard.....:	EN IEC 55015:2019+A11:2020 EN IEC 61000-3-2:2019 EN 61000-3-3:2013+A1:2019 EN 61547: 2009
Test Report Form No.....:	SLCSEMC-2.2
TRF Originator.....:	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
Master TRF.....:	Dated 2016-08

Shenzhen Southern LCS Compliance Testing Laboratory Ltd. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Southern LCS Compliance Testing Laboratory Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Southern LCS Compliance Testing Laboratory Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test Item Description..... :	**Headlamp**
Trade Mark.....:	OLIGHT
Test Model.....:	Array 2
Power Supply.....:	USB-C Input: DC 5V, 1A Capacity: 1600mAh, 3.6V, (5.76Wh)
Results ..... :	**PASS**

Compiled by:	**Supervised by:**	**Approved by:**
Amy Liu	Dmgu	Cherry Chen
Amy Liu/ File administrators	Dm Gu/ Technique principal	Cherry Chen / Manager

EMC - TEST REPORT

Test Report No. : **LCS210802108BE**	August 27, 2021 Date of issue

Applicant.....:	**Dongguan Olight E-Commerce Technology Co., Ltd.**
Address.....:	4th Floor, Building 4, Kegu Industrial Park, No 6 Zhongnan Road, Changan Town, Dongguan City, Guangdong, P.R. China
Telephone.....:	/
Fax.....:	/
Manufacturer.....:	**SHENZHEN MINJUN ELECTRONIC Technology CO., LTD**
Address.....:	Libang technology Park, 3rd Xitian Industrial Zone, Guangming New District, Shenzhen China
Telephone.....	/
Fax.....:	/
Factory.....:	**SHENZHEN MINJUN ELECTRONIC Technology CO., LTD**
Address.....:	Libang technology Park, 3rd Xitian Industrial Zone, Guangming New District, Shenzhen China
Telephone.....:	/
Fax.....:	/

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

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
00	August 27, 2021	Initial Issue	Cherry Chen

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

TABLE OF CONTENTS

1. REPORT INFORMATION DESCRIPTION.....6
1.1 Summary of Standards and Results.....6
1.2 Product Information.....8
1.3 Description of Test Facility.....8
2. STATEMENT OF THE MEASUREMENT UNCERTAINTY.....9
3. MEASURING DEVICES AND TEST EQUIPMENT.....10
4. TEST DETAILS.....12
4.1 Conducted Disturbance.....12
4.2 Radiated Disturbance（9kHz to 30MHz）.....14
4.3 Radiated Disturbance（30MHz to 1000MHz）.....15
4.4 Electrostatic Discharge Immunity Test.....17
4.5 Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.....18
4.6 Electrical Fast Transient/Burst Immunity Test.....20
4.7 Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields.....21
ANNEX A（Emission and Immunity test results）.....23
ANNEX B（Test photograph）.....34
ANNEX C（External and internal photos of the EUT）.....37

1. REPORT INFORMATION DESCRIPTION

1.1 Summary of Standards and Results

1.1.1 Description of Standards and Results

EMISSION (EN IEC 55015:2019+A11:2020)			
Description of Test Item	Test Standard	Limits	Results
Conducted Disturbance at the electric power supply interface	EN IEC 55015:2019+A11:2020	/	PASS
Conducted Disturbance at wired network interfaces	EN IEC 55015:2019+A11:2020	/	N/A [1]
Radiated Disturbance (9kHz to 30MHz)	EN IEC 55015:2019+A11:2020	2m	PASS
Radiated Disturbance (30MHz to 1000MHz)	EN IEC 55015:2019+A11:2020	/	PASS
Harmonic Current Emissions [2]	EN IEC 61000-3-2:2019	Class C	N/A [1]
Voltage Fluctuations & Flicker [2]	EN 61000-3-3:2013+A1:2019	/	N/A [1]
IMMUNITY (EN 61547: 2009)			
Description of Test Item	Test Standard	Basic Standard	Results
Electrostatic Discharge Immunity Test (ESD)	EN 61547: 2009	EN 61000-4-2	PASS
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test (RS)	EN 61547: 2009	EN 61000-4-3	PASS
Power Frequency Magnetic Field Immunity Test	EN 61547: 2009	EN 61000-4-8	N/A[1]
Electrical Fast Transient/Burst Immunity Test (EFT)	EN 61547: 2009	EN 61000-4-4	PASS
Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields (CS)	EN 61547: 2009	EN 61000-4-6	PASS
Surge Immunity Test (a.c. Power Ports)	EN 61547: 2009	EN 61000-4-5	N/A [1]
Voltage Dips,Short Interruptions and Voltage Variations Immunity Test	EN 61547: 2009	EN 61000-4-11	N/A [1]
Note 1: N/A is an abbreviation for not applicable. Note 2: systems with nominal voltages less than but not equal to 220 V (line-to-neutral), the harmonic and flicker limits have not yet been considered.			

1.1.2 Performance Criteria

The performance of lighting equipment shall be assessed by monitoring:

– the luminous intensity of the luminaire or of the lamp(s).

– the functioning of the control in the case of equipment which includes a regulating control or concerns the regulating control itself.

– the functioning of the starting device, if any.

Performance criterion A: During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B: During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C: During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.

Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

1.2 Product Information

1.2.1 EUT introduce

EUT	: Headlamp
Test Model	: Array 2
Additional Models	: /
EUT Clock Frequency	: /

1.2.2 Test Modes

Mode 1	: EUT was test with power on, to get the status 'Lighting'
Mode 2	: EUT was test with power on and keep charging, to get the status 'Charging'
Mode 3	: EUT was test with keep discharging, to get the status 'Discharging'
Mode 4	: EUT was test with max power, to get the status 'Full load'
Mode 5	: EUT was test with half power, to get the status 'Half load'

1.2.3 Test Auxiliary Equipment

Configuration	Model	Rating	Manufacturer
AC adapter	STC-A520A USBA	Input:AC 100-240V, 50/60Hz Output: 5V/1A	/

1.3 Description of Test Facility

Test Facilities	: Shenzhen Southern LCS Compliance Testing Laboratory Ltd. 101-201, No.39 Building,Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China. TUV RH Registration Number. is UA 50418075 0001. UL Registration Number. is 100571-492. NVLAP Registration Code is 600112-0. CNAS Registration Number is L10160.
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test (RS)	: Shenzhen LCS Compliance Testing Laboratory Ltd. 101, 201 Building A and 301 Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, Guangdong, China. CNAS Registration Number is L4595. CMA Registration Number is 201819013358.

Note : Radiated, Radio-Frequency, Electromagnetic Field Immunity Test (Rs) Subcontract To Shenzhen Lcs Compliance Testing Laboratory Ltd for Testing.

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

2. 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.

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Disturbance	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 1.40 dB ± 2.80 dB	± 4.0 dB ± 3.6 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.46 dB	N/A
Radiated Disturbance	Level accuracy (9kHz to 30MHz)	± 3.12 dB	N/A
Radiated Disturbance	Level accuracy (30MHz to 200MHz)	± 4.66 dB	± 5.2 dB
Radiated Disturbance	Level accuracy (200MHz to 1000MHz)	± 4.64 dB	± 5.0 dB
Harmonic Current	Voltage	± 0.640%	N/A
Voltage Fluctuations & Flicker	Voltage	± 0.530%	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

Conducted Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	EMI Test Receiver	R&S	ESCI	101142	2022-06-08
2	10dB Attenuator	SCHWARZBECK	VTSD9561-F	9561-F159	2022-06-08
3	Artificial Mains Network	SCHWARZBECK	NSLK8127	8127716	2022-06-08
4	EMI Test Software	EZ	EZ_EMC	N/A	/
5	Asymmetric Artificial Network	SCHWARZBECK	NTFM 8158	NTFM 8158#120	2022-06-08
6	Voltage Probe	SCHWARZBECK	KT 9420	9420401	2022-06-08
7	No. 2 shielded room	CHENGYU	843	/	2023-06-16

Radiated Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	EMI Test Receiver	R&S	ESCI	101142	2022-06-08
2	Triple-loop Antenna	EVERFINE	LLA-2	9161	2022-06-08
3	EMI Test Software	EZ	EZ_EMC	N/A	/
4	No. 2 shielded room	CHENGYU	843	/	2023-06-16

Radiated Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2024-06-15
2	EMI Test Receiver	R&S	ESCI3	101010	2022-06-08
3	Spectrum analyzer	Agilent	N9020A	MY49100699	2022-06-08
4	Log per Antenna	SCHWARZBECK	VULB9163	5094	2022-06-23
5	Horn antenna	ETS-LINDGREN	3115	00034771	2022-06-23
6	EMI Test Software	EZ	EZ_EMC	N/A	/
7	Positioning Controller	MF	BK8807-4A-2T	2016-0808-008	/

Harmonic Current&Voltage Fluctuation and Flicker

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	Harmonic Current and Flicker Test System	HTEC	AC2000A	/	2022-06-08
2	Linear variable frequency power supply	HTEC	HHF-5010	/	2022-06-08

Electrostatic Discharge Immunity Test (ESD)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	ESD Simulator	TESEQ	NSG 437	1615	2022-03-24

Electrical Fast Transient/Burst Immunity Test (EFT)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

1	Electrical fast transient(EFT)generator	HTEC	HEFT51	162201	2022-06-10
2	Coupling Clamp	HTEC	H3C	163701	2022-05-13

Surge Immunity Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	Surge Generator	3CTEST	SG5006G	EC5581070	2022-05-13
2	Coupling/decoupling Network	3CTEST	SGN-5010G	EC5591033	2022-05-13

Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	Conducted Susceptibility Generator	HTEC	CDG6000	126A140012016	2022-06-08
2	Coupling network	HTEC	CDN-M2+M3	A22/0382/2016	2022-06-08
3	Attenuator 6dB	HTEC	ATT6	HA1601	2022-06-08
4	Electromagnetic clamp	LUTHI	EM101	35535	2022-06-08

Power Frequency Magnetic Field Immunity Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	Power frequency mag-field generator System	HTEC	HPFMF100	100-2400	2022-06-08

Voltage Dips,Short Interruptions and Voltage Variations Immunity Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	Voltage dips and up generator	HTEC	HPFS161P	162202	2022-06-10

Radiated, Radio-Frequency, Electromagnetic Field Immunity Test

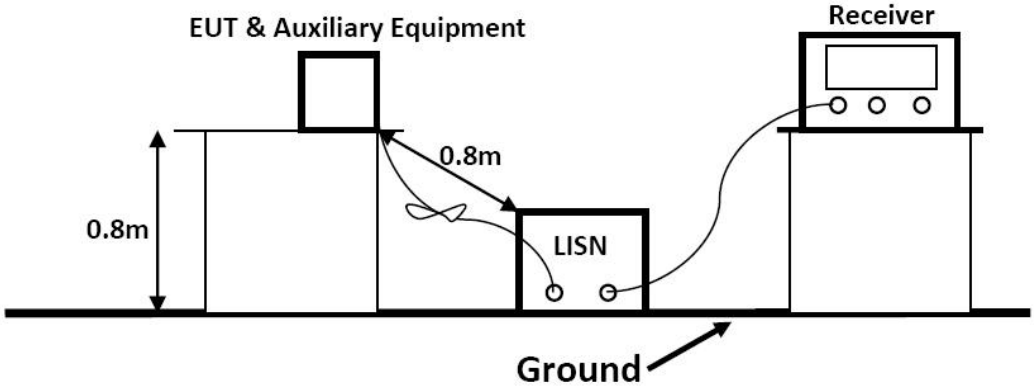
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Due Date.
1	RS Test Software	Tonscend	/	/	N/A
2	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2021-11-14
3	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2023-06-11
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2021-11-21
5	RF POWER AMPLIFIER	OPHIR	5273F	1019	2021-11-21
6	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2021-11-21
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	2021-11-21
8	RS Test Software	Tonscend	/	/	2022-03-24

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

4. TEST DETAILS

4.1 Conducted Disturbance

4.1.1 Block Diagram of Test Setup



4.1.2 Test Standard

EN IEC 55015:2019+A11:2020

4.1.3 Limits

Disturbance voltage limits at the electric power supply interface		
Frequency range	Limits (dBμV)*	
	Quasi-peak	Average
9kHz to 50kHz	110	--
50kHz to 150kHz	90 ~ 80*	--
150kHz to 0.5MHz	66 ~ 56*	56 ~ 46*
0.5MHz to 5.0MHz	56	46*
5.0MHz to 30MHz	60	50

NOTE 1：at the transition frequency, the lower limit applies.

NOTE 2：The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0,5 MHz.

Disturbance voltage limits at wired network interfaces other than power supply		
Frequency range	Limits (dBμV)*	
	Quasi-peak	Average
0.15MHz to 5.0MHz	84 to 74	74 to 64
5.0MHz to 30MHz	74	64

NOTE: The disturbance voltage limits are derived for use with an artificial asymmetrical network (AAN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the measured interface.

Disturbance voltage limits of local wired ports: electrical power supply interface of non-restricted ELV lamps		
Frequency range	Limits (dBμV)*	
	Quasi-peak	Average
9kHz to 50kHz	136	--
50kHz to 150kHz	116 ~ 106*	--
150kHz to 0.5MHz	92 ~ 82*	82 ~ 72*
0.5MHz to 5.0MHz	82	72*
5.0MHz to 30MHz	86	76

NOTE: The limits in this table apply if no 26 dB attenuator is applied.

Disturbance voltage limits at local wired ports: local wired ports other than electrical power supply interface of ELV lamp		
Frequency range	Limits (dBμV)*	
	Quasi-peak	Average
0.15MHz to 5.0MHz	80	70
5.0MHz to 30MHz	74	64

4.1.4 Test Procedure Description

The EUT is put on the table which is 0.8 meter high above the ground, and connected to the AC mains through a Line Impedance Stabilization Network (LISN). EUT is powered by V-type artificial power network,and the distance from LISN/ISN is 0.8m.The part of the EUT power cord exceeding 0.8m folds in parallel to form a 0.3-0.4 m eights harness.

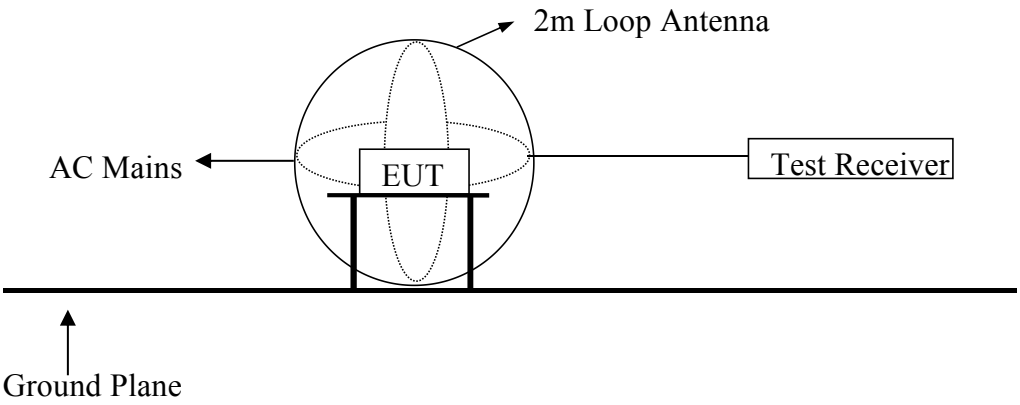
The bandwidth of the test receiver is set at 200Hz in 9k~150kHz range and 9kHz in 150k~30MHz range.

4.1.5 Test Results

Refer to Annex A.1

4.2 Radiated Disturbance（9kHz to 30MHz）

4.2.1 Block Diagram of Test Setup



4.2.2 Test Standard

EN IEC 55015:2019+A11:2020

4.2.3 Limits

LLAS radiated disturbance limits in the frequency range 9 kHz to 30 MHz	
Frequency range	Limits for loop diameter (dBμA)
	2m
9kHz to 70kHz	88
70kHz to 150kHz	88 to 58*
150kHz to 3.0MHz	58 to 22*
3.0MHz to 30MHz	22

NOTE1: At the transition frequency the lower limit applies.

NOTE2: Decreasing linearly with logarithm of the frequency.

4.2.4 Test Procedure Description

The EUT is placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver. Three field components are checked by means of a coaxial switch.

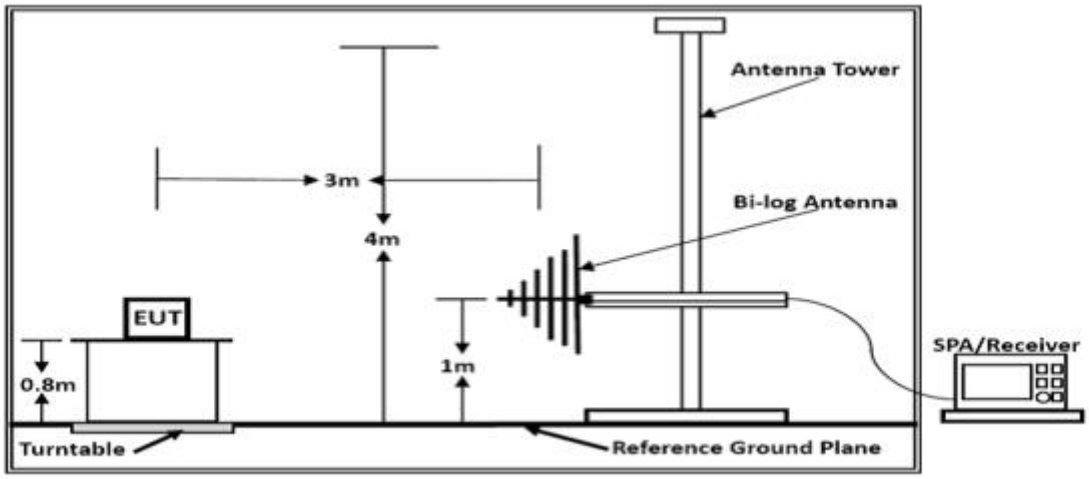
The frequency range from 9kHz to 30MHz is investigated. The receiver is measured with the quasi-peak detector. For frequency band 9kHz to 150kHz, the bandwidth of the field strength meter is set at 200Hz. For frequency band 150kHz to 30MHz, the bandwidth is set at 9kHz.

4.2.5 Test Results

Refer to Annex A.2

4.3 Radiated Disturbance（30MHz to 1000MHz）

4.3.1 Block Diagram of Test Setup



4.3.2 Test Standard

EN IEC 55015:2019+A11:2020

4.3.3 Limits

SAC Radiated disturbance limits and associated measurement methods in the frequency range 30 MHz to 1 GHz (at 3 m distance)	
Frequency range（MHz）	Quasi-Peak Limits(dBμV/m)
30 ~ 230	40
230 ~ 1000	47

NOTE1: at the transition frequency, the lower limit applies.
NOTE2: Distance refers to the distance in meters between the measuring instrument antenna geometric center and the closed point of any part of the EUT.
NOTE3: Testing method which the Semi Anechoic Chamber

4.3.4 Test Procedure Description

The Radiated Disturbance test was conducted in a 3M Semi Anechoic Chamber and conforming to CISPR 16.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.

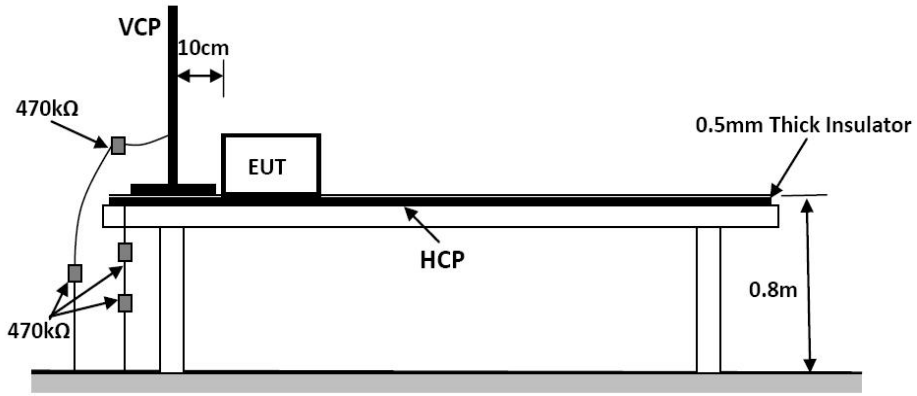
The bandwidth of the Receiver is set at 120kHz； The frequency range from 30MHz to 1000MHz is investigated.

4.3.5 Test Results

Refer to Annex A.3

4.4 Electrostatic Discharge Immunity Test

4.4.1 Block Diagram of Test Setup



4.4.2 Test Standard

EN 61547:2009

4.4.3 Limits

Electrostatic discharges — Test levels				
Discharge Type	Discharge Level（KV）		Number of discharges（Each point）	Performance Criteria
	+	-		
Air Discharge-Direct	2, 4, 8	2, 4, 8	20	B
Contact Discharge-Direct	2, 4	2, 4	20	
Contact Discharge- Indirect	2, 4	2, 4	20	

4.4.4 Test Procedure

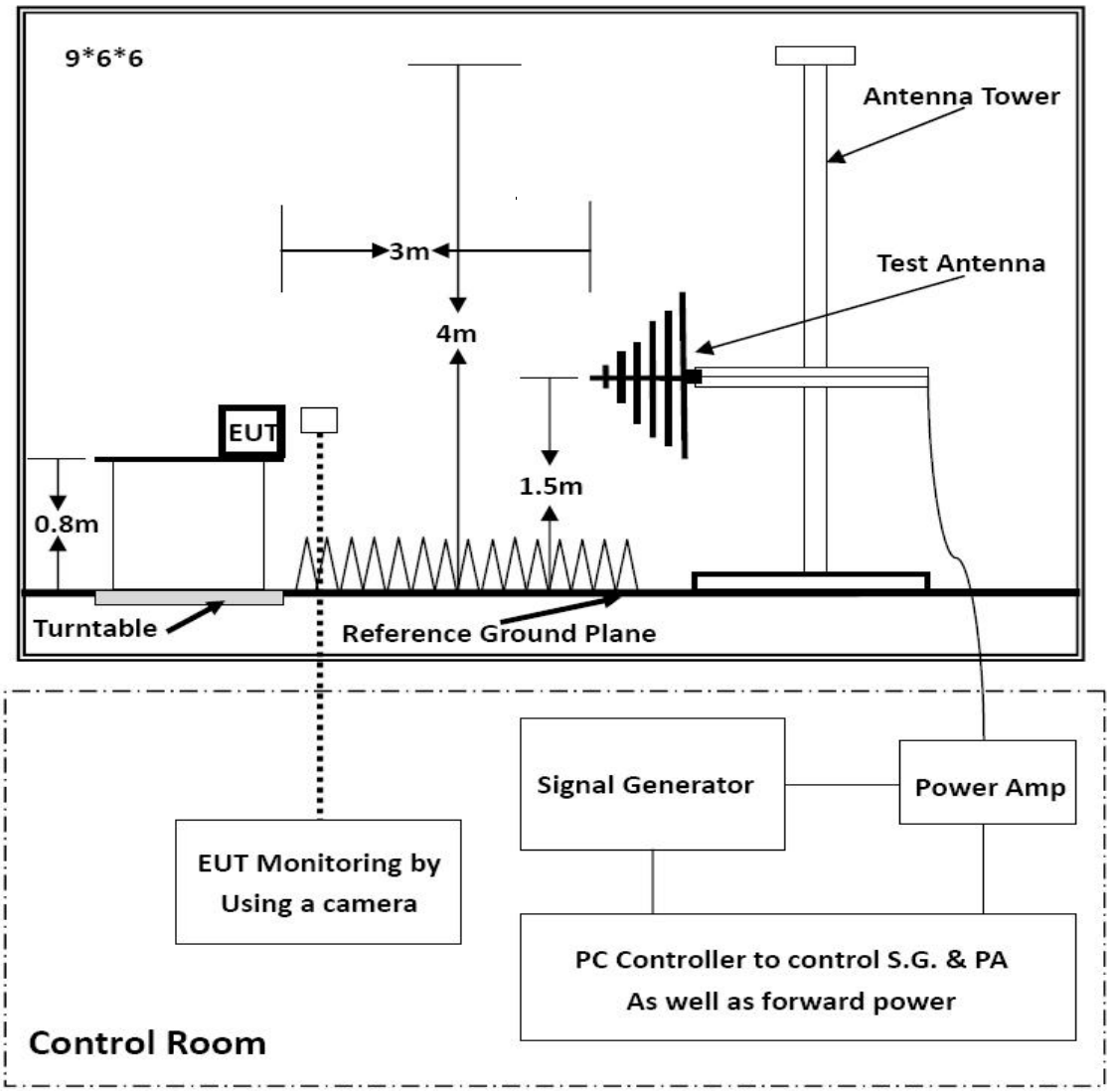
a) Air Discharge
This test is done on a non-conductive surfaces. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.
b) Contact Discharge
This test is done on a conductive surfaces. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
c) Indirect Discharge For Horizontal Coupling Plane and Vertical Coupling Plane
At least 20(+/- 10 times at each pole) single discharges shall be applied to the 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. with a time interval of at least 1 second between each discharge.

4.4.5 Test Results

Refer to Annex A.4

4.5 Radiated, Radio-Frequency, Electromagnetic Field Immunity Test

4.5.1 Block Diagram of Test Setup



4.5.2 Test Standard

EN 61547:2009

4.5.3 Limits

Radio-frequency electromagnetic fields – Test levels		
Characteristics	Test levels	Performance Criteria
Frequency range	80 MHz to 1 000 MHz	A
Test level	3 V/m (unmodulated)	
Modulation	1 kHz, 80 % AM, sine wave	

4.5.4 Test Procedure

The test was carried out in a half-wave anechoic chamber with absorbent material attached to a reflective ground plate.

Before the test, the test field strength needs to be calibrated. During the calibration, the corresponding relationship between the target field strength and the forward power applied to the transmitting antenna is established.During the test, except for EUT, the indoor layout is consistent with the calibration.

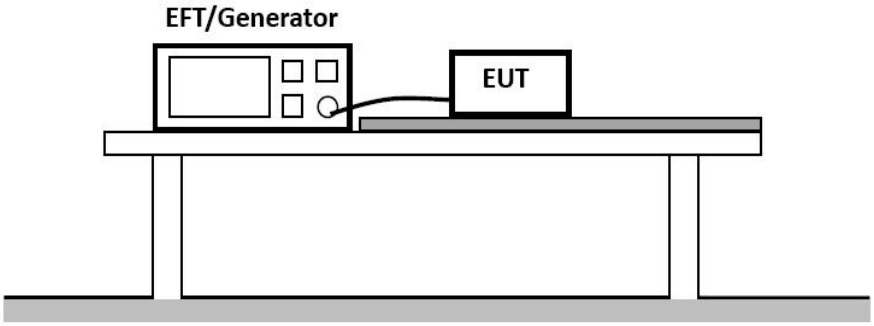
The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this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

4.5.5 Test Results

Refer to Annex A.4

4.6 Electrical Fast Transient/Burst Immunity Test

4.6.1 Block Diagram of Test Setup



4.6.2 Test Standard

EN 61547:2009

4.6.3 Limits

Fast transients - Test levels at input and output a.c. power ports						
Test Levels	Repetition Frequency	Burst Duration	Burst Period	Test Duration	Coupling Method	Performance Criteria
±1 kV	5 kHz	15ms	300ms	2 min per polarity	Direct	B

Fast transients - Test levels at input and output d.c. power ports						
Test Levels	Repetition Frequency	Burst Duration	Burst Period	Test Duration	Coupling Method	Performance Criteria
±0.5kV	5 kHz	15ms	300ms	2 min per polarity	Direct	B
Note: Not applicable to equipment not connected to the mains while in use.						

4.6.4 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.

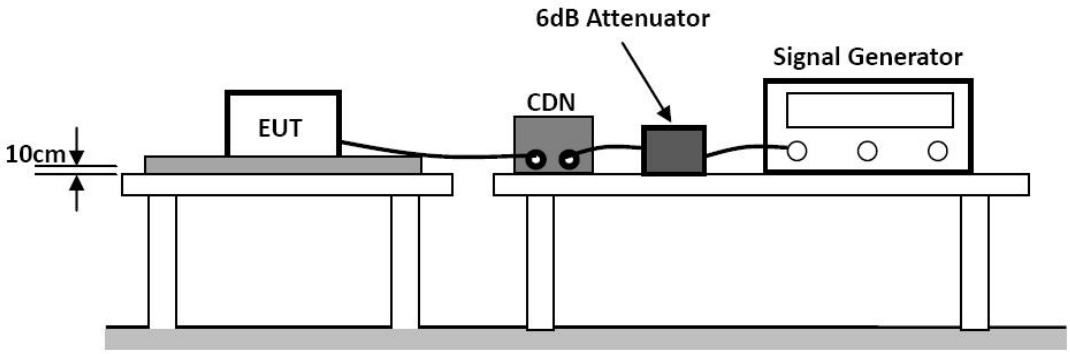
The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC or DC power lines. Both polarities of the test voltage should be applied during compliance test, Fast transients are carried out with a minimum duration of 2 min with a positive polarity and a minimum of 2 min with a negative polarity

4.6.5 Test Results

Refer to Annex A.4

4.7 Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields

4.7.1 Block Diagram of Test Setup



4.7.2 Test Standard

EN 61547:2009

4.7.3 Limits

Radio-frequency common mode – Test levels at input and output a.c. power ports					
Frequency range（MHz）	Test Level（V/m）	Modulation Signal	Coupling Method	Steps	Performance Criteria
0.15 to 80	3	1kHz, 80%, AM, Sine wave	CDN	1%	A
Note: Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3 m.					

Radio-frequency common mode – Test levels at input and output d.c. power ports					
Frequency range（MHz）	Test Level（V/m）	Modulation Signal	Coupling Method	Steps	Performance Criteria
0.15 to 80	3	1kHz, 80%, AM, Sine wave	CDN	1%	A
Note: Only applicable to equipment that is connected to the mains while in use.					

4.7.4 Test Procedure

a) The EUT are placed on an insulated wooden table 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).

b) The test signal is sent to the coupling device through the 6dB attenuator, and then injected into the EUT test port by the common mode of the coupling device.The power port is injected use CDN.The signal line and control line are injected use Electromagnetic Injection Clamp

c) 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.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.

4.7.5 Test Results

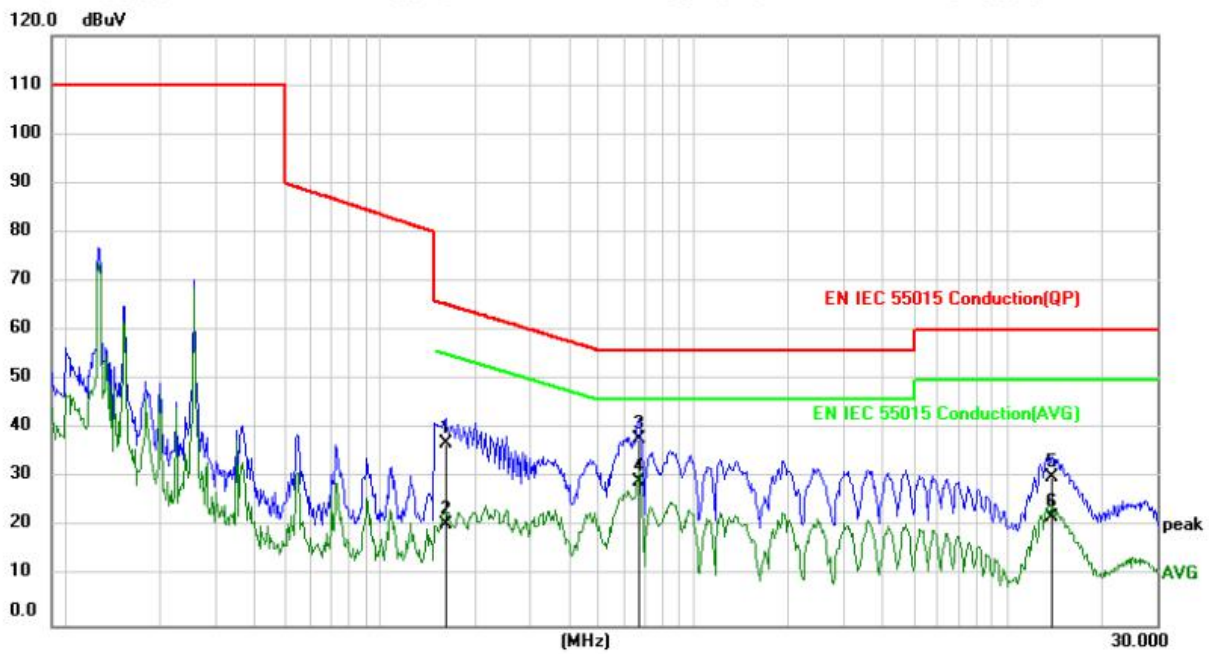
Refer to Annex A.4

ANNEX A

(Emission and Immunity test results)

A.1 Conducted Disturbance Test Results

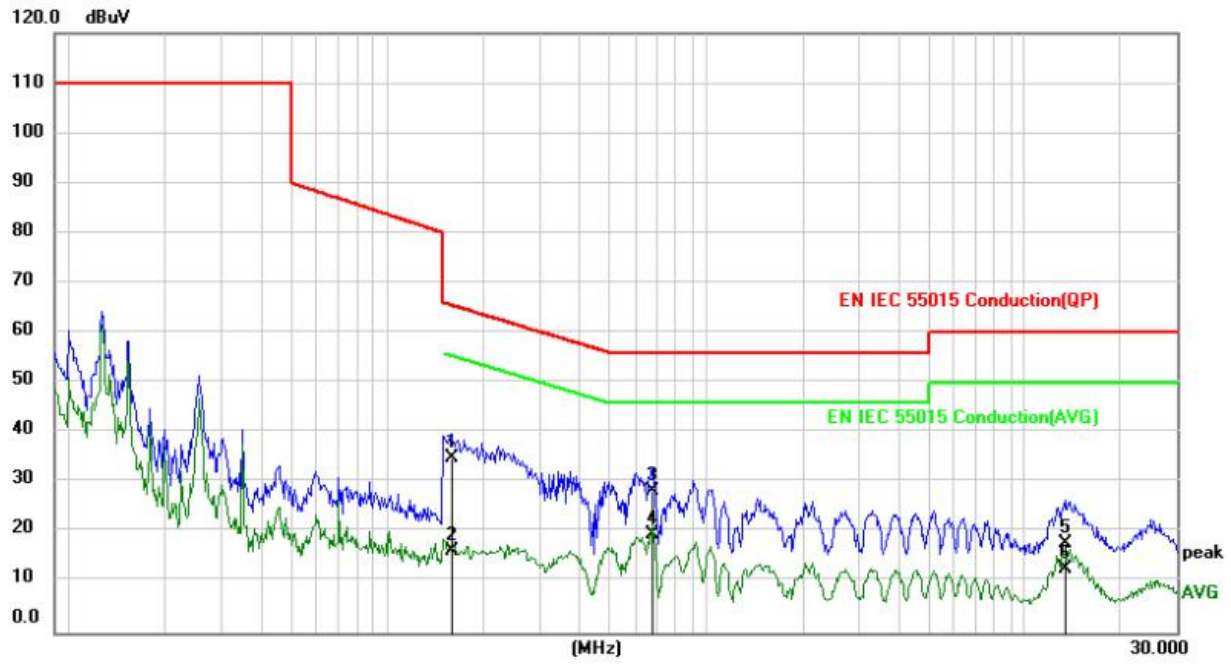
Environmental Conditions:	23.9℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Line
Detailed results are shown below	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1607	26.69	10.23	36.92	65.43	-28.51	QP	
2		0.1607	10.37	10.23	20.60	55.43	-34.83	AVG	
3		0.6753	27.69	10.20	37.89	56.00	-18.11	QP	
4	*	0.6753	19.09	10.20	29.29	46.00	-16.71	AVG	
5		13.7782	19.84	10.20	30.04	60.00	-29.96	QP	
6		13.7782	11.76	10.20	21.96	50.00	-28.04	AVG	

This report shall not be reproduced except in full, without the written approval of Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

Environmental Conditions:	23.9℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Neutral
Detailed results are shown below	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1597	24.81	10.24	35.05	65.48	-30.43	QP	
2		0.1597	6.26	10.24	16.50	55.48	-38.98	AVG	
3		0.6707	18.16	10.20	28.36	56.00	-27.64	QP	
4	*	0.6707	9.33	10.20	19.53	46.00	-26.47	AVG	
5		13.3567	7.80	10.20	18.00	60.00	-42.00	QP	
6		13.3567	2.56	10.20	12.76	50.00	-37.24	AVG	

Note Measure-ment = Reading Level + Correct Factor

A.2 Radiated Disturbance Test Results（9kHz to 30MHz）

Environmental Conditions:	23.9℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	X
Detailed results are shown below	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1	*	3.3029	10.20	-8.11	2.09	22.00	-19.91	QP	
2		11.0609	16.13	-20.72	-4.59	22.00	-26.59	QP	
3		17.0028	24.04	-27.35	-3.31	22.00	-25.31	QP	

Environmental Conditions:	23.9℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Y
Detailed results are shown below	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1	*	3.8847	10.37	-9.85	0.52	22.00	-21.48	QP	
2		7.0231	12.77	-16.54	-3.77	22.00	-25.77	QP	
3		14.3397	22.91	-23.31	-0.40	22.00	-22.40	QP	

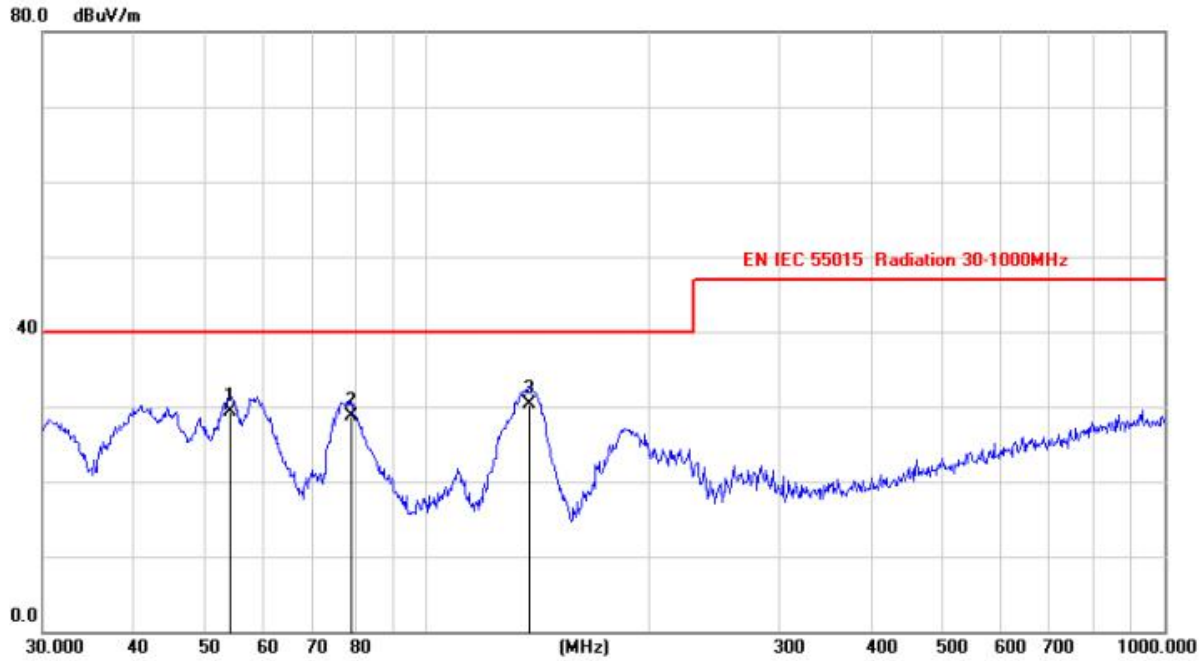
Environmental Conditions:	23.9℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Z
Detailed results are shown below	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1	*	4.8752	8.70	-12.26	-3.56	22.00	-25.56	QP	
2		11.7073	15.24	-20.91	-5.67	22.00	-27.67	QP	
3		18.7408	23.44	-27.66	-4.22	22.00	-26.22	QP	

Note Measure-ment = Reading Level + Correct Factor

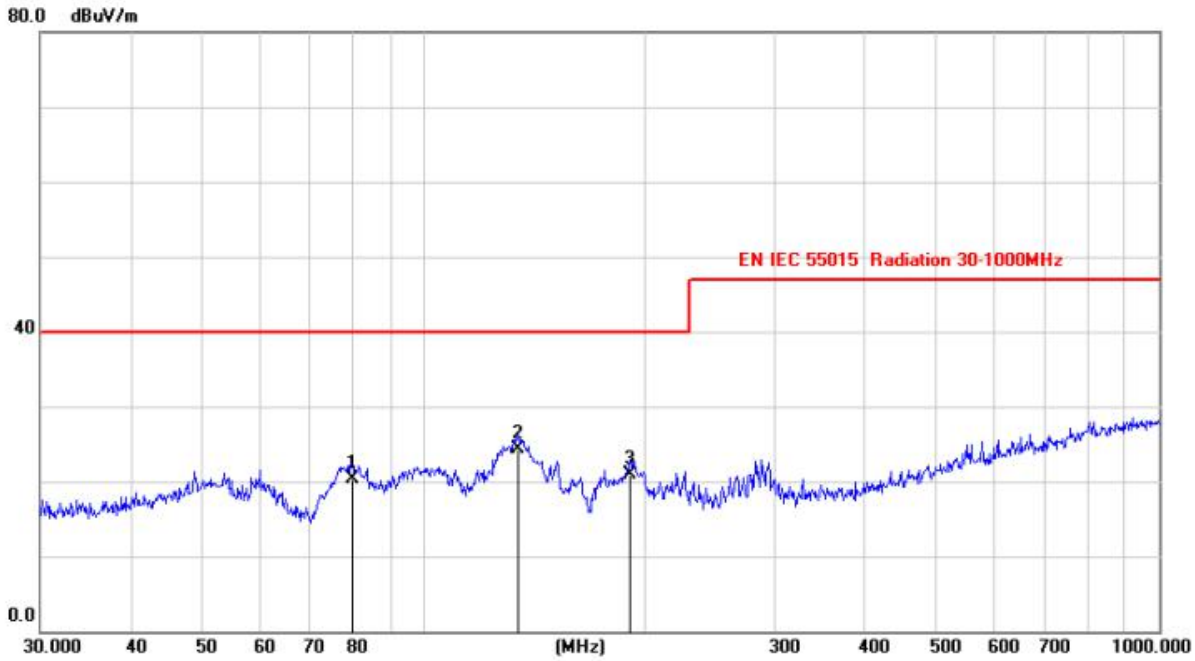
A.3 Radiated Disturbance Test Results（30MHz to 1000MHz）

Environmental Conditions:	23.6℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Vertical
Detailed results are shown below	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		53.9290	16.29	13.09	29.38	40.00	-10.62	QP			
2		78.8960	18.98	9.66	28.64	40.00	-11.36	QP			
3	*	137.7821	16.84	13.42	30.26	40.00	-9.74	QP			

Environmental Conditions:	23.6℃, 53% RH
Test Voltage:	AC 230V,50Hz
Test Model:	Array 2
Test Mode:	Mode 1
Test Engineer:	Sam Chen
Pol:	Horizontal
Detailed results are shown below	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		79.8353	11.12	9.26	20.38	40.00	-19.62	QP			
2	*	134.3235	14.14	10.11	24.25	40.00	-15.75	QP			
3		190.7390	9.66	11.29	20.95	40.00	-19.05	QP			

Note Measure-ment = Reading Level + Correct Factor

A.4 Immunity Test Results

Electrostatic Discharge Immunity Test Results			
Standard	☑ EN 61547: 2009 ☑ EN 61000-4-2 : 2009		
Applicant	Dongguan Olight E-Commerce Technology Co., Ltd.		
EUT	Headlamp	Temperature	23.9℃
M/N	Array 2	Humidity	51%
Test Mode	Mode 1	Pressure	1008mbar
Input Voltage	AC 230V,50Hz	Test Results	Pass
Test Engineer	Sam Chen		

Discharge mode	Test points	Results						Performance Criteria
		2kv		4kv		8kv		
		+	-	+	-	+	-	
Direct-Contact Discharge	Front	P	P	P	P	/	/	B
	Back	P	P	P	P	/	/	B
	Left	P	P	P	P	/	/	B
	Right	P	P	P	P	/	/	B
	Top	P	P	P	P	/	/	B
	Bottom	P	P	P	P	/	/	B
Direct-Air Discharge	Front	P	P	P	P	P	P	B
	Back	P	P	P	P	P	P	B
	Left	P	P	P	P	P	P	B
	Right	P	P	P	P	P	P	B
	Top	P	P	P	P	P	P	B
	Bottom	P	P	P	P	P	P	B
Indirect-Contact Discharge(VCP)	/	P	P	P	P	/	/	B
Indirect-Contact Discharge(HCP)	/	P	P	P	P	/	/	B

Note: “P” = Pass.

Radiated, Radio-Frequency, Electromagnetic Field Immunity Test Results

Standard	☑ EN 61547: 2009 ☑ EN 61000-4-3: 2006+A2: 2010		
Applicant	Dongguan Olight E-Commerce Technology Co., Ltd.		
EUT	Headlamp	Temperature	23.5℃
M/N	Array 2	Humidity	53％
Test Mode	Mode 1	Pressure	1008mbar
Input Voltage	AC 230V,50Hz	Test Engineer	Baron.wen
Modulation	80% AM 1KHz	Test Results	Pass
Steps	1%		

Angle of EUT	Antenna polarization	Frequency Range（MHz）	Test Level（V/m）	Performance Criteria
0°	Vertical, Horizontal	80 to 1000	3	A
90°	Vertical, Horizontal	80 to 1000	3	A
180°	Vertical, Horizontal	80 to 1000	3	A
270°	Vertical, Horizontal	80 to 1000	3	A

Note:

Electrical Fast Transient/Burst Immunity Test Results

Standard	☑ EN 61547: 2009 ☑ EN 61000-4-4: 2012		
Applicant	Dongguan Olight E-Commerce Technology Co., Ltd.		
EUT	Headlamp	Temperature	24.1℃
M/N	Array 2	Humidity	54%
Test Mode	Mode 1	Pressure	1008mbar
Input Voltage	AC 230V,50Hz	Test Results	Pass
Test Engineer	Sam Chen		

Test Port Type	Test Level	Repetition Frequency	Test Duration		Performance Criteria
			+	-	
AC Power ports	±1.0kV	5kHz	2min	2min	B
DC Input /Output Power ports					

Note:

Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields Test Results

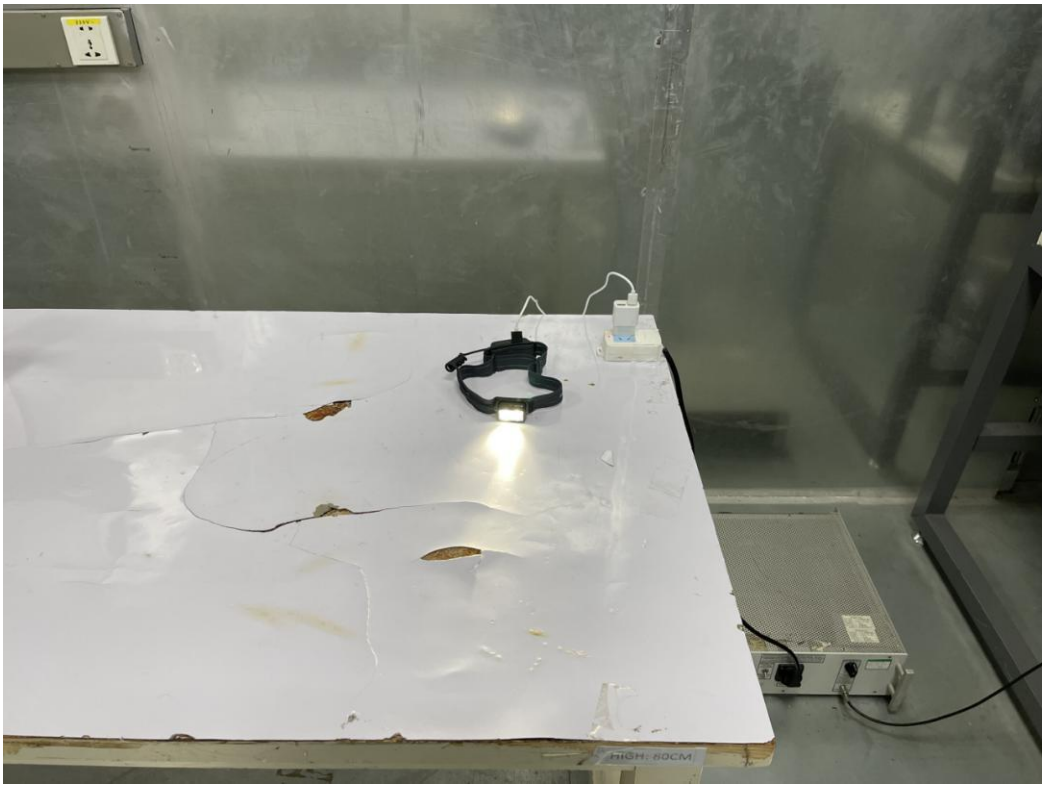
Standard	☑ EN 61547: 2009 ☑ EN 61000-4-6: 2014+A1:2015		
Applicant	Dongguan Olight E-Commerce Technology Co., Ltd.		
EUT	Headlamp	Temperature	24.1℃
M/N	Array 2	Humidity	54%
Test Mode	Mode 1	Pressure	1008mbar
Input Voltage	AC 230V,50Hz	Test Results	Pass
Test Engineer	Sam Chen		

Test Port Type	Frequency range (MHz)	Test Level (V/m)	Coupling method	Performance Criteria
AC Power ports	0.15 to 80	3	CDN	A
DC Input /Output Power ports				

Remark:
1.Modulation Signal:1kHz, 80%, AM, Sine wave.
2.Measurement Equipment:
Simulator : CIT-10 (FRANKONIA)
CDN : ☑CDN-M2 (FRANKONIA)
☐CDN-M3 (FRANKONIA)

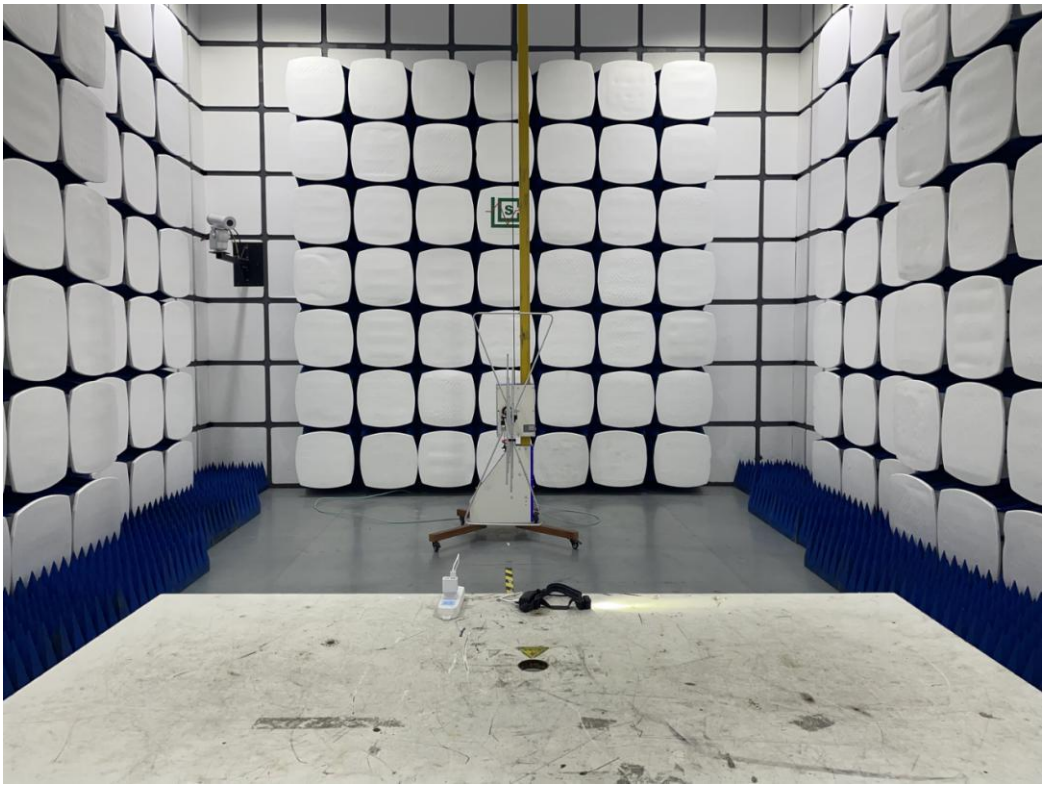
ANNEX B
(Test photograph)

B.1 Photo of Conducted Disturbance



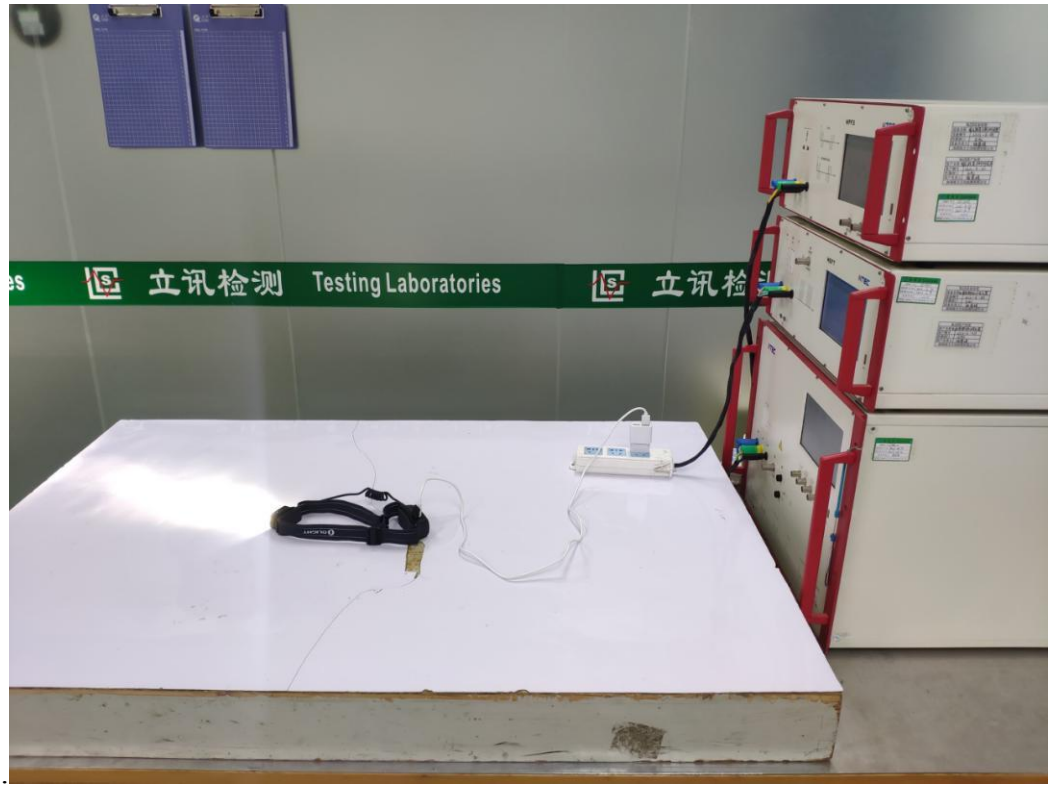
B.2 Photo of Radiated Disturbance(9kHz to 30MHz)

B.3 Photo of Radiated Disturbance(30MHz to 1000MHz)



B.4 Photo of Electrostatic Discharge Immunity Test

B.5 Photo of Electrical Fast Transient/Burst Immunity Test



B.6 Photo of Immunity To Conducted Disturbances, Induced by Radio-Frequency Fields

ANNEX C

(External and internal photos of the EUT)

Figure. 1（Array 2 ）

Figure. 2

Figure. 3

Figure. 4

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