

## EMC TEST REPORT

For

Ningbo Amlife Photoelectricity Co., Ltd

S3 USB Solar Integrated Lamp

Model No.: AL-S3 USB

Prepared for : Ningbo Amlife Photoelectricity Co., Ltd  
Address : No. 24 Fangshan Road Qiaotouhu Industrial Zone,  
Ninghai County, Zhejiang, China

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Date of receipt of test sample : April. 06, 2021  
Number of tested samples : 1  
Serial number : Prototype  
Date of Test : April. 06, 2021~ April. 09, 2021  
Date of Report : April. 09, 2021

**EMC TEST REPORT**  
**EN IEC 55015:2019**

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. .... :** LCS210406004EE

**Date Of Issue..... :** April. 09, 2021

**Testing Laboratory Name.... :** Ningbo LCS Standard Technology Service Co., Ltd.

**Address..... :** Room 101-106, 202-206, Building 037, No. 166, Jinghua Road, Meixu Street, Ningbo High-tech Zone, Yinzhou District, Ningbo City, Zhejiang Province, China

**Testing Location/ Procedure.. :** Full application of Harmonised standards   
Partial application of Harmonised standards   
Other standard testing method

**Applicant's Name..... :** Ningbo Amlife Photoelectricity Co., Ltd

**Address..... :** No. 24 Fangshan Road Qiaotouhu Industrial Zone, Ninghai County, Zhejiang, China

**Test Specification:**

**Standard..... :** EN IEC 55015:2019  
EN 61547: 2009  
EN IEC 61000-3-2:2019  
EN 61000-3-3: 2013 +A1:2019

**Test Report Form No..... :** LCSEMC-1.0

**TRF Originator..... :** Ningbo LCS Standard Technology Service Co., Ltd.

**Master TRF..... :** Dated 2019-03

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**Test Item Description..... :** S3 USB Solar Integrated Lamp

**Trade Mark..... :** N/A

**Model/ Type Reference..... :** AL-S3 USB

**Test Voltage..... :** Adapter Input: AC 230V, 50/60Hz;  
EUT Input : DC 5V

**Result ..... :** PASS

**Compiled by:**

*Feng Liang*

Feng Liang/File administrators

**Supervised by:**

*Joker Wang*

Joker Wang/Technique principal

**Approved by:**



Lh Li/ Manager



### Revision History

Revision	Issue Date	Revisions	Revised By
000	April. 09, 2021	Initial Issue	Lh Li

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## 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.

<b>EMISSION (EN IEC 55015:2019)</b>			
<b>Description of Test Item</b>	<b>Standard</b>	<b>Limits</b>	<b>Results</b>
Conducted disturbance at mains terminals	EN IEC 55015:2019	-----	PASS
Magnetic field emission	EN IEC 55015:2019	-----	PASS
Radiated disturbance	EN IEC 55015:2019	-----	PASS
Harmonic current emissions	EN IEC 61000-3-2:2019	Class C	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013+A1:2019	-----	N/A
<b>IMMUNITY (EN 61547: 2009)</b>			
<b>Description of Test Item</b>	<b>Basic Standard</b>	<b>Performance Criteria</b>	<b>Results</b>
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-6: 2014	A	N/A
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	C	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	N/A
Voltage dips, 30% reduction	EN 61000-4-11: 2004+A1: 2017	C	PASS
Voltage interruptions		B	PASS
N/A is an abbreviation for Not Applicable.			

## 1.2. Description of Performance Criteria

### General Performance Criteria

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

- essential operational modes and states;
- tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
- quality of software execution;
- quality of data display and transmission;
- quality of speech transmission.

#### 1.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deliver 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	: S3 USB Solar Integrated Lamp
Trade Mark	: N/A
Test Model	: AL-S3 USB
Additional Models	: N/A
Power Supply	: Adapter Input: AC 230V, 50/60Hz; EUT Input : DC 5V

### 2.2. Test Modes

Lighting	: EUT was test with power on, to get the status 'Lighting' ■
Charging	: EUT was test with power on and keep charging, to get the status 'Charging' ■
Discharging	: EUT was test with keep discharging, to get the status 'Discharging' ■
Full Load	: EUT was test with max power, to get the status 'Full load' □
Half Load	: EUT was test with half power, to get the status 'Half load' □

### 2.3. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

### 2.4. Measurement Uncertainty

Test Item	Parameters	Expanded uncertainty (U <sub>lab</sub> )	Expanded uncertainty (U <sub>cispr</sub> )
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 4.5 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	± 3.3 dB
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	N/A
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.3 dB
Mains Harmonic	Voltage	± 0.510%	± 5.2 dB
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 DEVICES AND TEST EQUIPMENT

#### 3.1. Conducted Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Software	AUDIX	E3	/	N/A
2	EMI Test Receiver	R&S	ESR 3	102519	2020-06-01
3	Artificial Mains	R&S	ENV216	102318	2020-06-01

#### 3.2. Radiated Electromagnetic Disturbance

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Large Loop Antenna	DAZE	ZN304401	17029	2020-06-01
2	EMI Test Receiver	R&S	ESR 3	102519	2020-06-01
3	EMI Test Software	AUDIX	E3	/	N/A

#### 3.3. Radiated Disturbance (Electric Field)

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Software	AUDIX	E3	/	N/A
2	3m Semi Anechoic Chamber	MAORUI	9m*6m*6	160218849	2020-06-01
3	By-log Antenna	SCHWARZBECK	VULB9168	9168-988	2020-06-01
4	Horn Antenna	SCHWARZBECK	BBHA9120 D	9120D-2049	2020-06-01
5	EMI Test Receiver	R&S	ESRP	101372	2020-06-01
6	AMPLIFIER	SCHWARZBECK	BBV9745	136	2020-06-01
7	RF Cable	Hubber Suhner	CBL-RE	/	2020-06-01
8	AMPLIFIER	SCHWARZBECK	BBV9718C	21	2020-06-01

#### 3.4. Harmonic Current

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Harmonic current and voltage scintillation measurement system	Li	AC2000A	311355	2020-06-01

#### 3.5. Electrostatic Discharge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SCHLODER	SESD216	102318	2020-05-28

#### 3.6. Electrical Fast Transient/Burst

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Immunity Simulative Generator	HTEC	HCOMPACT7 /HV1P16T	190308/190402	2020-06-01

## 3.7.Surge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Immunity Simulative Generator	HTEC	HCOMPACT7 /HV1P16T	190308/190402	2020-06-01

## 3.8.Conducted Susceptibility

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2020-06-01
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2020-06-01
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2020-06-01

## 3.9.Voltage Dips

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Immunity Simulative Generator	HTEC	HCOMPACT7 /HV1P16T	190308/190402	2020-06-01

## 3.10.Voltage Short Interruptions

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Immunity Simulative Generator	HTEC	HCOMPACT7 /HV1P16T	190308/190402	2020-06-01

## 3.11. RF Field Strength Susceptibility

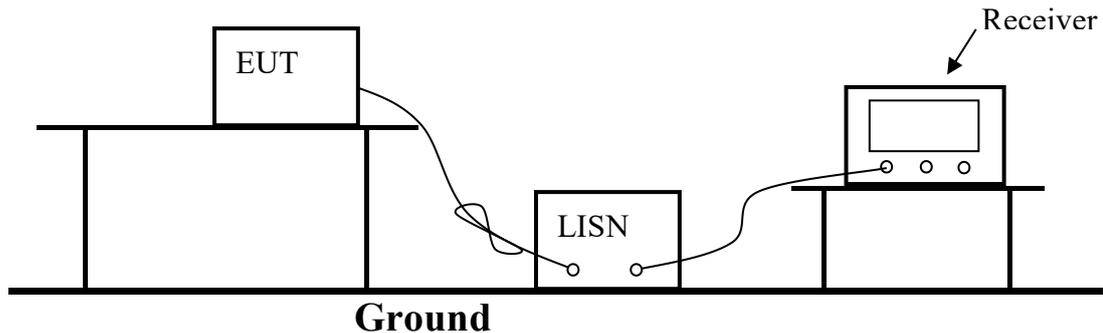
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	RS Test Software	Tonscend	/	/	N/A
2	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2020-11-14
3	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2020-06-11
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2020-11-21
5	RF POWER AMPLIFIER	OPHIR	5273F	1019	2020-11-21
6	Stacked Broadband Log Periodic Antenna	SCHWARZBEC K	STLP 9128	9128ES-145	2020-11-21
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBEC K	STLP 9149	9149-484	2020-11-21
8	RS Test Software	Tonscend	/	/	2021-03-24

Note: NCR means no calibration requirement

## 4. TEST RESULTS

### 4.1 POWER LINE CONDUCTED MEASUREMENT

#### 4.1.1 Block Diagram of Test Setup



#### 4.1.2. Conducted Power Line Emission Measurement Standard and Limits

##### 4.1.2.1. Standard:

EN IEC 55015:2019

##### 4.1.2.2. Limits

Frequency	At mains terminals (dB $\mu$ V)	
	Quasi-peak Level	Average Level
9kHz ~ 50kHz	110	--
50kHz ~ 150kHz	90 ~ 80*	--
150kHz ~ 0.5MHz	66 ~ 56*	56 ~ 46*
0.5MHz ~ 5.0MHz	56	46
5.0MHz ~ 30MHz	60	50

1. At the transition frequency the lower limit applies.
2. \* decreasing linearly with logarithm of the frequency.

#### 4.1.3. EUT Configuration on Test

The configuration of the EUT is same as Section 3

#### 4.1.4. Operating Condition of EUT

- 4.1.4.1. Setup the EUT as shown in Section 4.1.1.
- 4.1.4.2. Turn on the power of all equipments.
- 4.1.4.3. Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.1.5. Test Procedure

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 (L.I.S.N.). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission according to the EN 55015 regulations during conducted emission measurement. And the voltage probe had been used for the load terminals measurement according to the EN 55015 standard.

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

The frequency range from 9kHz to 30MHz is checked.

All the test results are listed in Section 4.1.6.

The frequency range from 9kHz to 30MHz is investigated.

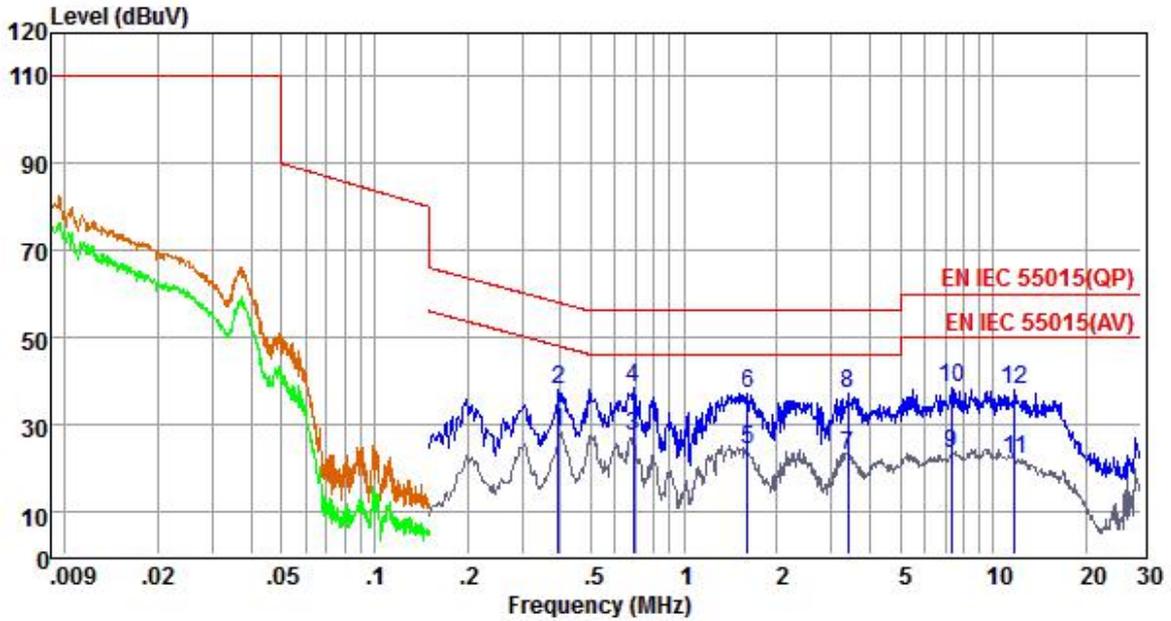
#### 4.1.6. Test Results

**PASS.**

The test result please refer to the next page.

Environmental Conditions:	22.6°C, 54% RH
Test Voltage:	AC 230V, 50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Line

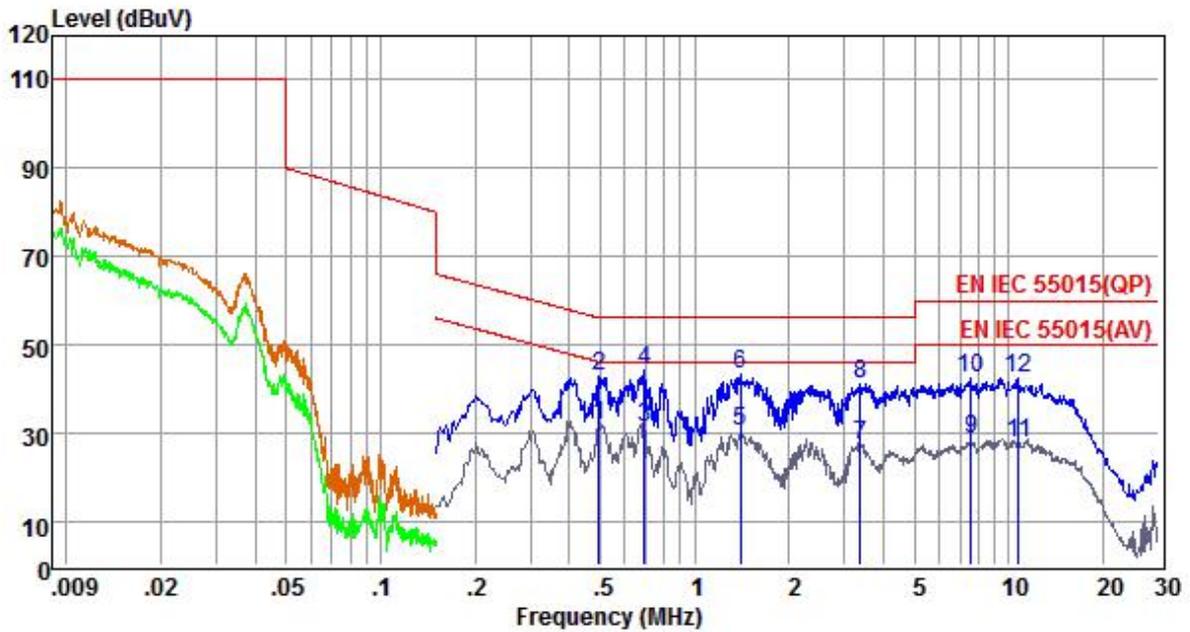
Detailed results are shown below



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.39	18.40	9.58	0.11	28.09	47.99	-19.90	Average
2	0.39	28.40	9.58	0.11	38.09	57.99	-19.90	QP
3	0.69	17.69	9.59	0.11	27.39	46.00	-18.61	Average
4	0.69	28.69	9.59	0.11	38.39	56.00	-17.61	QP
5	1.60	14.17	9.60	0.13	23.90	46.00	-22.10	Average
6	1.60	27.17	9.60	0.13	36.90	56.00	-19.10	QP
7	3.38	13.10	9.62	0.13	22.85	46.00	-23.15	Average
8	3.38	27.10	9.62	0.13	36.85	56.00	-19.15	QP
9	7.29	13.51	9.69	0.12	23.32	50.00	-26.68	Average
10	7.29	28.51	9.69	0.12	38.32	60.00	-21.68	QP
11	11.74	11.82	9.91	0.14	21.87	50.00	-28.13	Average
12	11.74	27.82	9.91	0.14	37.87	60.00	-22.13	QP

Environmental Conditions:	22.6°C, 54% RH
Test Voltage:	AC 230V, 50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Neutral

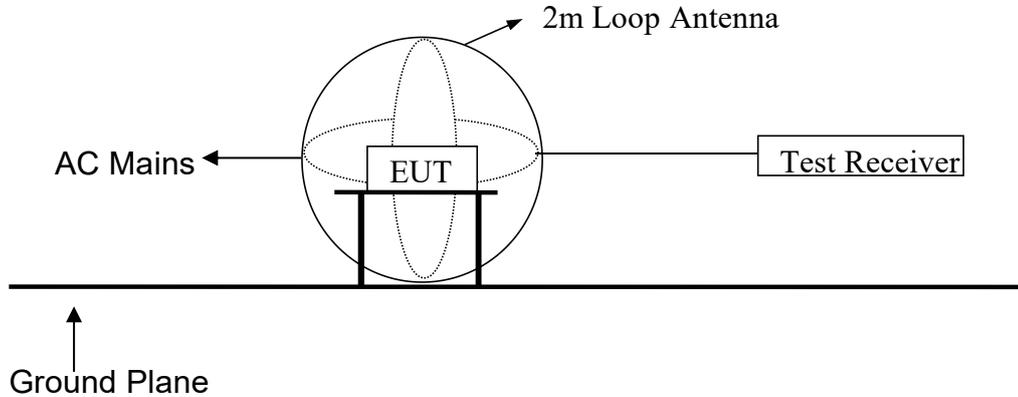
Detailed results are shown below



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.50	22.11	9.57	0.10	31.78	46.05	-14.27	Average
2	0.50	33.11	9.57	0.10	42.78	56.05	-13.27	QP
3	0.69	21.60	9.58	0.11	31.29	46.00	-14.71	Average
4	0.69	34.60	9.58	0.11	44.29	56.00	-11.71	QP
5	1.40	20.53	9.59	0.12	30.24	46.00	-15.76	Average
6	1.40	33.53	9.59	0.12	43.24	56.00	-12.76	QP
7	3.36	17.43	9.61	0.13	27.17	46.00	-18.83	Average
8	3.36	31.43	9.61	0.13	41.17	56.00	-14.83	QP
9	7.61	18.77	9.68	0.12	28.57	50.00	-21.43	Average
10	7.61	32.77	9.68	0.12	42.57	60.00	-17.43	QP
11	10.73	17.61	9.81	0.13	27.55	50.00	-22.45	Average
12	10.73	32.61	9.81	0.13	42.55	60.00	-17.45	QP

## 4.2 MAGNETIC FIELD EMISSION MEASUREMENT

### 4.2.1. Block Diagram of Test Setup



### 4.2.2. Magnetic Field Emission Measurement Standard and Limits

#### 4.2.2.1. Test Standard

EN IEC 55015:2019

#### 4.2.2.2. Test Limits

Frequency	Limits for loop diameter (dB $\mu$ A)
	2m
9kHz ~ 70kHz	88
70kHz ~ 150kHz	88 ~ 58*
150kHz ~ 3.0MHz	58 ~ 22*
3.0MHz ~ 30MHz	22

1. At the transition frequency the lower limit applies.
2. \* decreasing linearly with logarithm of the frequency.

### 4.2.3. EUT Configuration on Test

The configuration of the EUT is same as Section 3

### 4.2.4. Operating Condition of EUT

Same as conducted measurement which is listed in Section 4.1.4, except the test set up replaced by Section 4.2.1.

#### 4.2.5. Test Procedure

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.

All the test results are listed in Section 4.2.6.

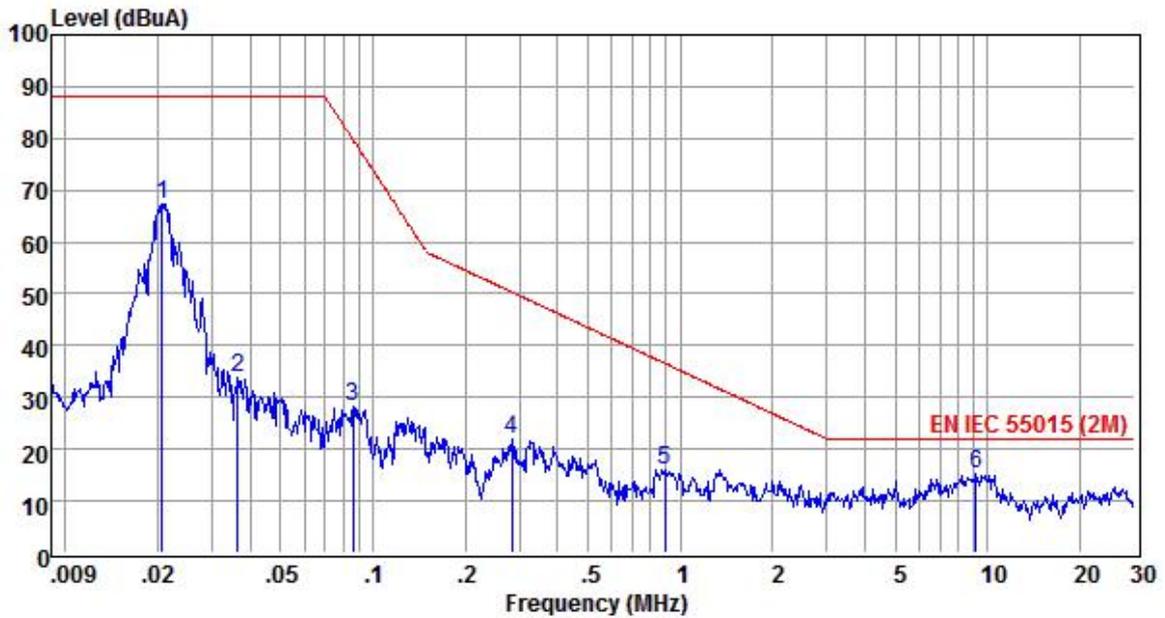
#### 4.2.6. Test Results

**PASS.**

The frequency range from 9kHz to 30MHz is investigated.

Environmental Conditions:	22.6°C, 54% RH
Test Voltage:	AC 230V, 50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	X

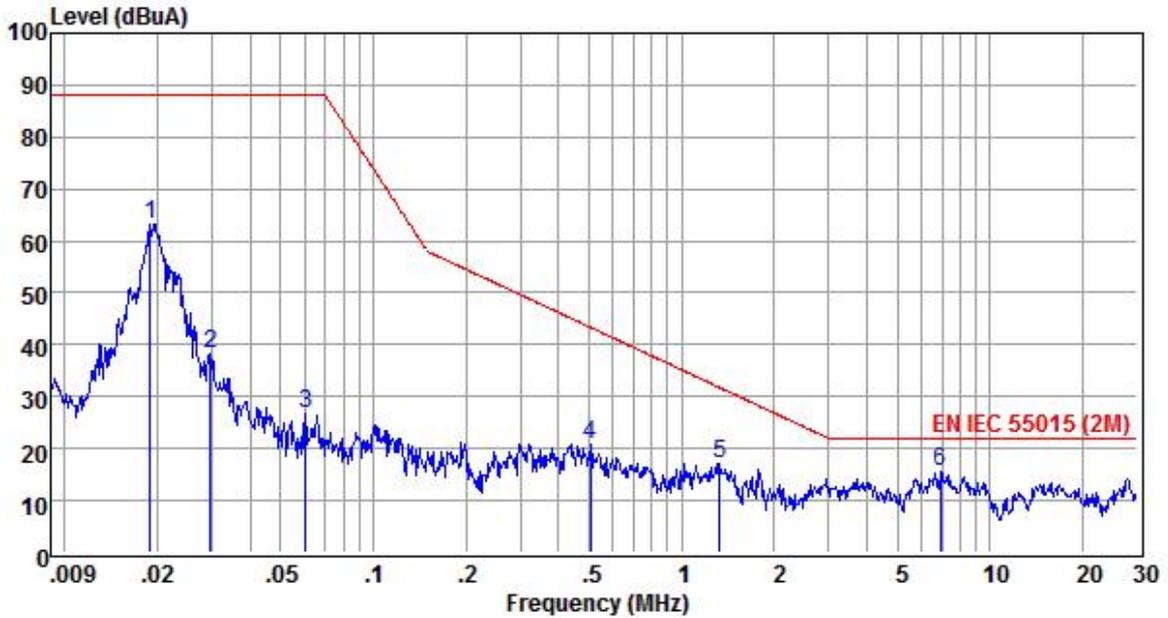
Detailed results are shown below



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.02	67.39	0.00	0.00	67.39	88.00	-20.61	QP
2	0.04	33.71	0.00	0.00	33.71	88.00	-54.29	QP
3	0.09	28.32	0.00	0.00	28.32	79.66	-51.34	QP
4	0.28	21.87	0.00	0.00	21.87	50.38	-28.51	QP
5	0.89	16.09	0.00	0.00	16.09	36.54	-20.45	QP
6	9.18	15.24	0.00	0.00	15.24	22.00	-6.76	QP

Environmental Conditions:	22.6°C, 54% RH
Test Voltage:	AC 230V, 50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Y

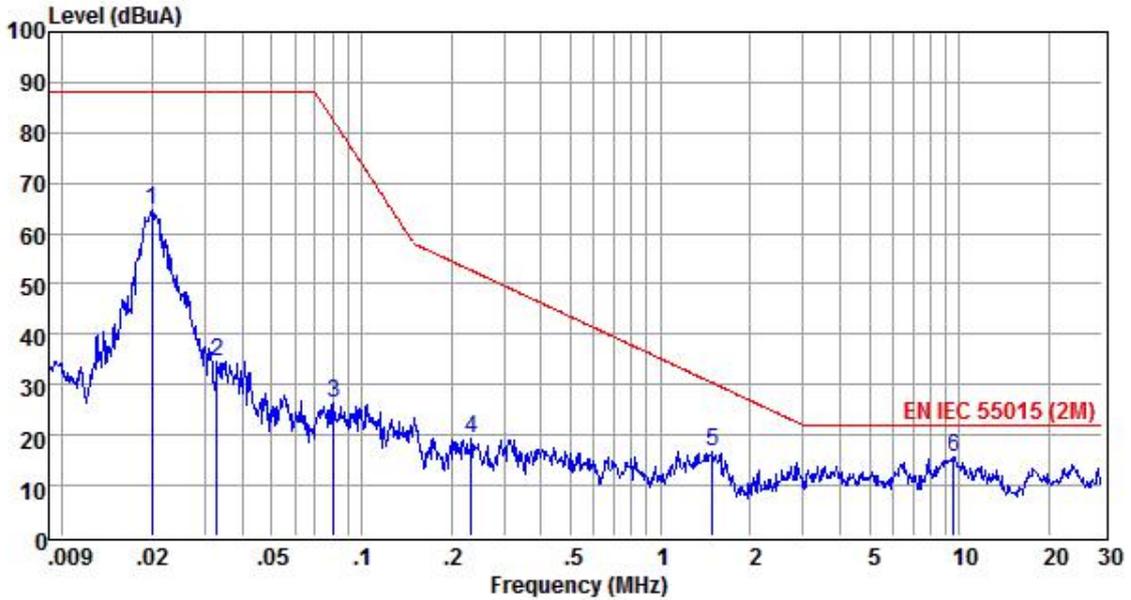
Detailed results are shown below



	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	0.02	63.29	0.00	0.00	63.29	88.00	-24.71	QP
2	0.03	38.28	0.00	0.00	38.28	88.00	-49.72	QP
3	0.06	26.84	0.00	0.00	26.84	88.00	-61.16	QP
4	0.51	20.88	0.00	0.00	20.88	43.36	-22.48	QP
5	1.33	17.10	0.00	0.00	17.10	31.76	-14.66	QP
6	6.91	15.43	0.00	0.00	15.43	22.00	-6.57	QP

Environmental Conditions:	22.6°C, 54% RH
Test Voltage:	AC 230V, 50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Z

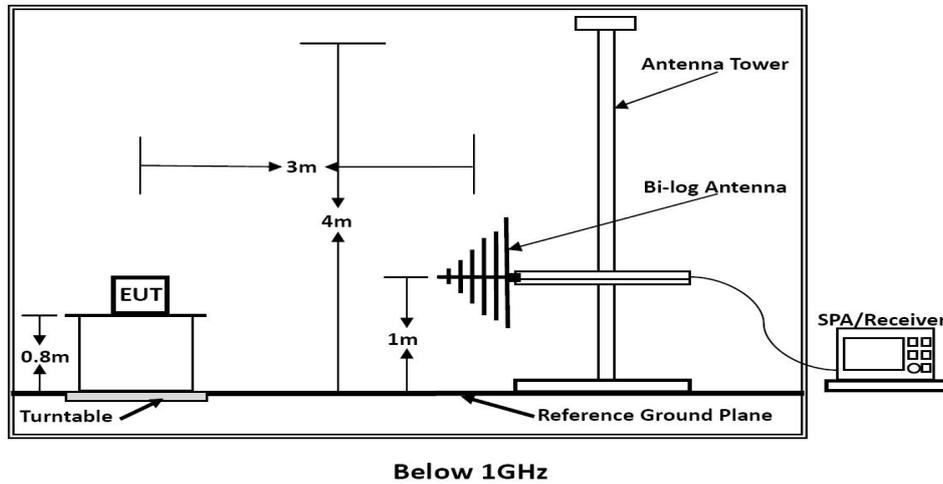
Detailed results are shown below



Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
MHz	dBpW	dB	dB	dBpW	dBpW	dB	
1	64.58	0.00	0.00	64.58	88.00	-23.42	QP
2	34.54	0.00	0.00	34.54	88.00	-53.46	QP
3	26.32	0.00	0.00	26.32	82.21	-55.89	QP
4	19.22	0.00	0.00	19.22	52.72	-33.50	QP
5	16.64	0.00	0.00	16.64	30.40	-13.76	QP
6	15.57	0.00	0.00	15.57	22.00	-6.43	QP

### 4.3 RADIATED EMISSION MEASUREMENT

#### 4.3.1. Block Diagram of Test Setup



#### 4.3.2. Test Standard

EN IEC 55015:2019

#### 4.3.3. Radiated Emission 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:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

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

#### 4.3.4. EUT Configuration on Test

The EN 55015 regulations test method must be used to find the maximum emission during radiated emission measurement.

### 4.3.5. Operating Condition of EUT

4.3.5.1 Turn on the power.

4.3.5.2 After that, let the EUT work in test mode (Lighting+Charging) and measure it.

### 4.3.6. Test Procedure

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

The bandwidth of the Receiver is set at RBW/VBW=120kHz/300kHz.

The frequency range from 30MHz to 300MHz is investigated.

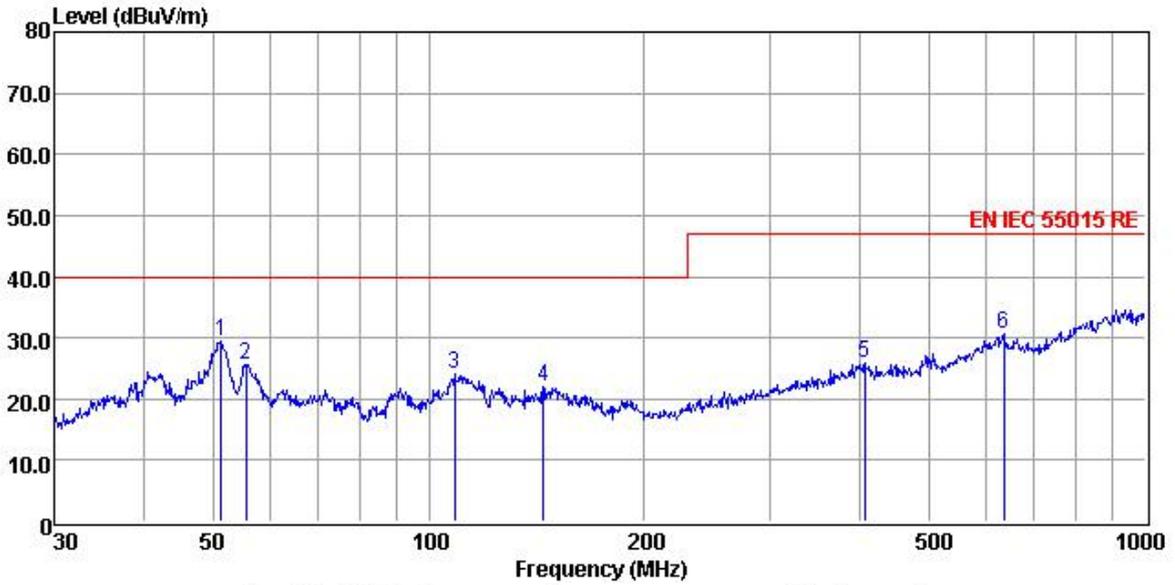
### 4.3.7. Test Results

**PASS.**

The test result please refer to the next page.

Environmental Conditions:	21.8°C, 54% RH
Test Voltage:	AC 230V,50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Vertical

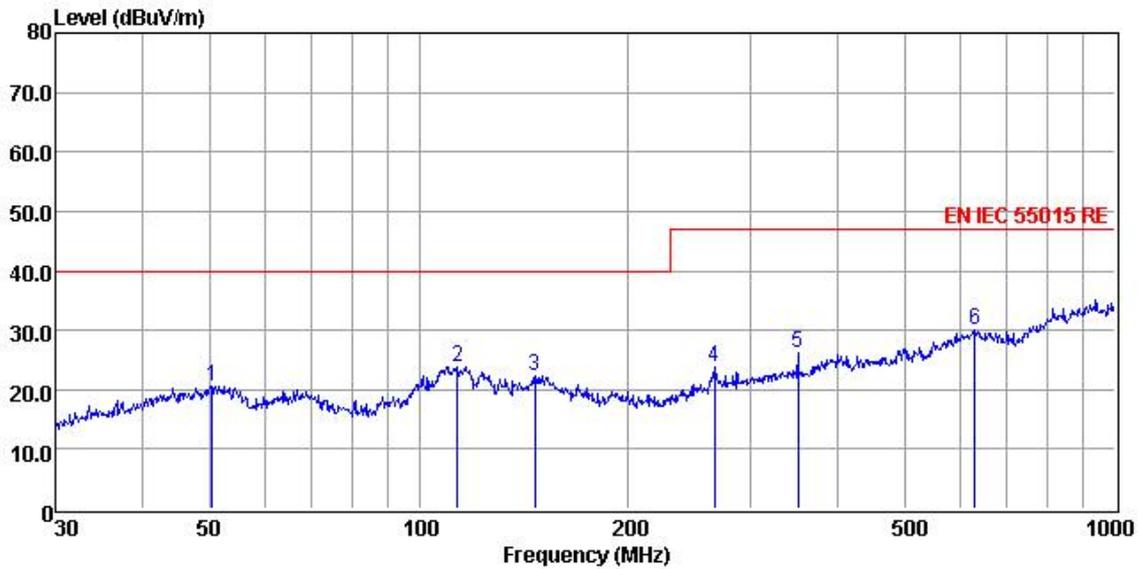
Detailed results are shown below



	Read Freq	Cable Loss	Antenna Factor	Preamp Factor	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	51.30	2.43	13.43	30.32	29.52	40.00	-10.48 QP
2	55.61	2.50	12.37	30.34	25.54	40.00	-14.46 QP
3	108.65	3.15	10.15	30.53	24.08	40.00	-15.92 QP
4	144.33	3.49	13.51	30.59	22.09	40.00	-17.91 QP
5	406.09	5.32	15.93	31.19	26.00	47.00	-21.00 QP
6	633.91	5.98	20.33	31.69	30.78	47.00	-16.22 QP

Environmental Conditions:	21.8°C, 54% RH
Test Voltage:	AC 230V,50Hz
Test Model:	AL-S3 USB
Test Mode:	Lighting+Charging
Test Engineer:	FENG LIANG
Pol:	Horizontal

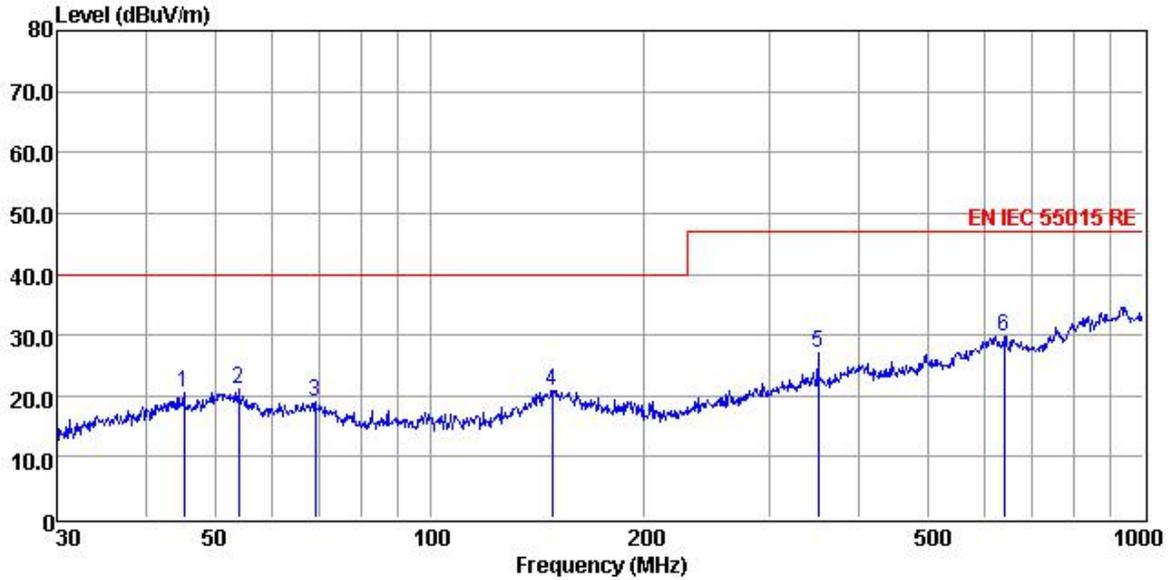
Detailed results are shown below



	Read	Cable	Antenna	Preamp	Limit	Over			
Freq	Level	Loss	Factor	Factor	Line	Limit	Remark		
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB		
1	50.41	35.05	2.42	13.48	30.32	20.63	40.00	-19.37	QP
2	113.71	41.23	3.19	10.01	30.53	23.90	40.00	-16.10	QP
3	146.89	35.58	3.51	13.86	30.59	22.36	40.00	-17.64	QP
4	265.68	38.64	4.52	11.34	30.80	23.70	47.00	-23.30	QP
5	350.48	38.00	5.20	14.00	31.02	26.18	47.00	-20.82	QP
6	629.48	35.46	5.97	20.35	31.68	30.10	47.00	-16.90	QP

Environmental Conditions:	21.8°C, 54% RH
Test Voltage:	DC 3.7V
Test Model:	AL-S3 USB
Test Mode:	Lighting+Discharging
Test Engineer:	FENG LIANG
Pol:	Vertical

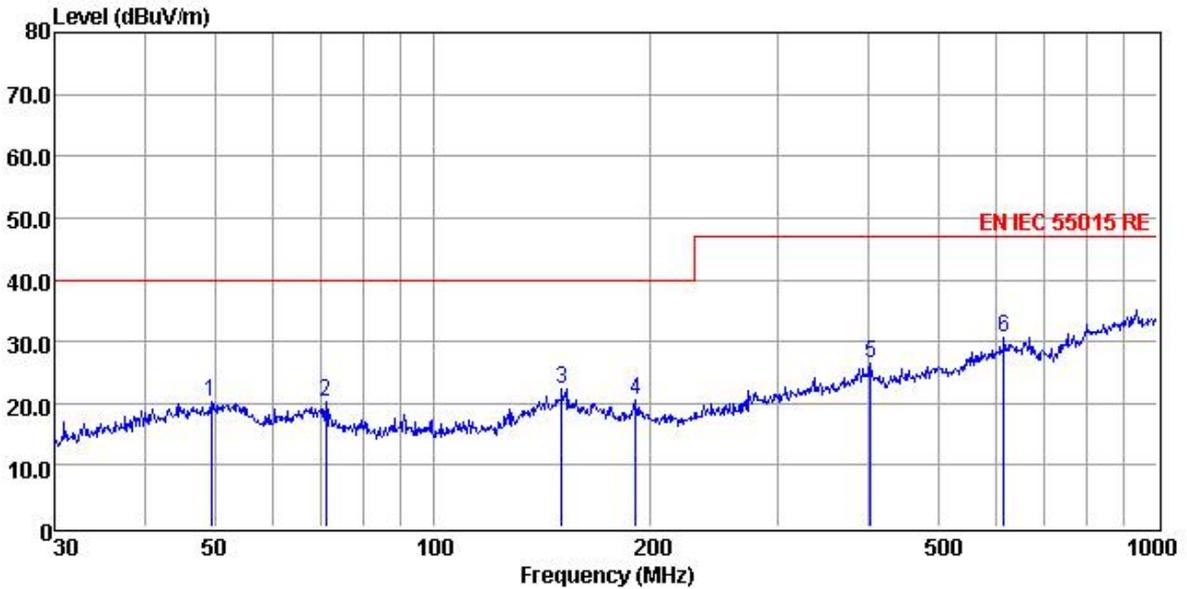
Detailed results are shown below



	Read Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Limit Level	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dB	
1	45.22	35.46	2.34	12.93	30.32	20.41	40.00	-19.59 QP
2	53.88	35.55	2.48	13.31	30.33	21.01	40.00	-18.99 QP
3	69.11	34.66	2.70	12.08	30.39	19.05	40.00	-20.95 QP
4	148.44	33.83	3.53	14.08	30.59	20.85	40.00	-19.15 QP
5	350.48	38.86	5.20	14.00	31.02	27.04	47.00	-19.96 QP
6	638.37	35.20	5.99	20.31	31.70	29.80	47.00	-17.20 QP

Environmental Conditions:	21.8°C, 54% RH
Test Voltage:	DC 3.7V
Test Model:	AL-S3 USB
Test Mode:	Lighting+Discharging
Test Engineer:	FENG LIANG
Pol:	Horizontal

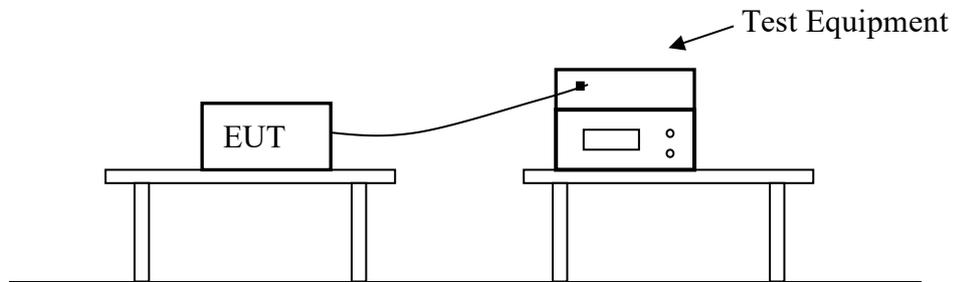
Detailed results are shown below



	Read Freq	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	49.36	34.89	2.40	13.34	30.32	20.31	40.00	-19.69	QP
2	71.08	36.37	2.73	11.65	30.40	20.35	40.00	-19.65	QP
3	150.54	35.13	3.55	14.21	30.60	22.29	40.00	-17.71	QP
4	190.41	35.79	3.94	11.53	30.67	20.59	40.00	-19.41	QP
5	401.84	36.06	5.31	16.19	31.18	26.38	47.00	-20.62	QP
6	614.21	36.03	5.92	20.26	31.66	30.55	47.00	-16.45	QP

#### 4.4. HARMONIC CURRENT MEASUREMENT

##### 4.4.1. Block Diagram of Test Setup



##### 4.4.2. Test Standard

EN IEC 61000-3-2:2019

##### 4.4.3. Operating Condition of EUT

Same as Section 4.1.4, except the test setup replaced by Section 4.4.1.

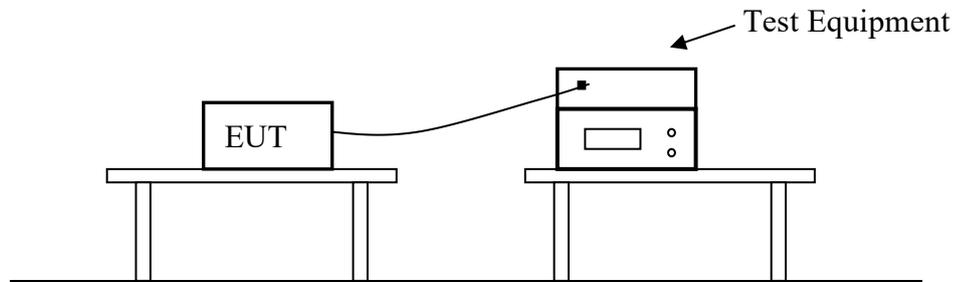
##### 4.4.4. Test Results

###### **PASS**

Because of the power of the EUT  $\leq 5W$ , according to the standard of EN IEC 61000-3-2:2019, there is no need harmonic current test.

## 4.5. VOLTAGE FLUCTUATIONS & FLICKER MEASUREMENT

### 4.5.1. Block Diagram of Test Setup



### 4.5.2. Test Standard

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

### 4.5.3. Operating Condition of EUT

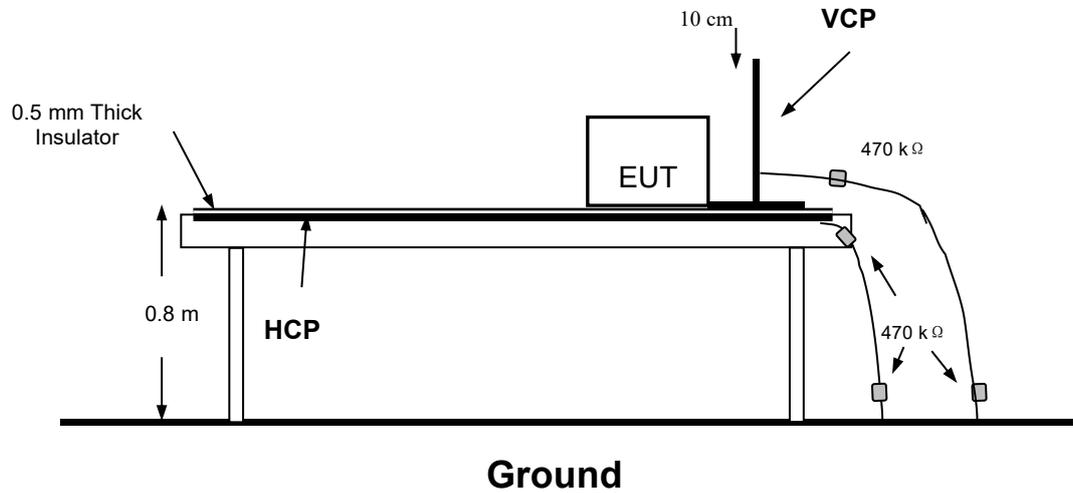
Same as Section 4.1.4, except the test setup replaced by Section 4.5.1.

### 4.5.4. Test Results

According to EN 61000-3-3: 2013 +A1:2019 Clause A.2, Incandescent lamp luminaries with ratings less than or equal to 1000W and discharge and LED lamp luminaries with ratings less than or equal to 600W, are deemed to comply with the standard and are not required to be tested.

## 4.6. Electrostatic Discharge TEST

### 4.6.1. Block Diagram of Test Setup



### 4.6.2. Test Standard

EN 61547: 2009 (EN 61000-4-2: 2009, Severity Level: Air Discharge: Level 3,  $\pm 8$ KV  
Contact Discharge: Level 2,  $\pm 4$ KV)

### 4.6.3. Severity Levels and Performance Criterion

#### 4.6.3.1. Severity level

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

#### 4.6.3.2. Performance criterion: **B**

### 4.6.4. EUT Configuration on Test

The configuration of EUT is listed in Section 3

#### 4.6.5. Operating Condition of EUT

4.6.5.1. Setup the EUT as shown in Section 4.6.1.

4.6.5.2. Turn on the power of all equipments.

4.6.5.3. Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.6.6. Test Procedure

##### 4.6.6.1. 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.

Because the case of the EUT is metal surface, so it does not need to be tested.

##### 4.6.6.2. Contact Discharge

All the procedure shall be same as Section 4.6.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

##### 4.6.6.3. 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.

##### 4.6.6.4. 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 0.1m 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.

#### 4.6.7. Test Results

**PASS.**

Please refer to the following page.

# Electrostatic Discharge Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
<b>Applicant</b>	Ningbo Amlife Photoelectricity Co., Ltd		
<b>EUT</b>	S3 USB Solar Integrated Lamp	<b>Temperature</b>	21.4°C
<b>M/N</b>	AL-S3 USB	<b>Humidity</b>	55.5%
<b>Criterion</b>	B	<b>Pressure</b>	1021mbar
<b>Test Mode</b>	Lighting+Charging	<b>Test Engineer</b>	FENG LIANG

Air Discharge						
Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	Pass	Fail	Performance Criterion
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B

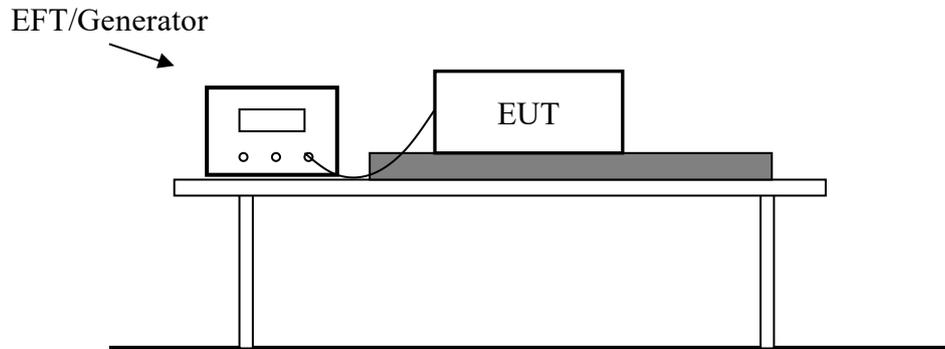
Contact Discharge						
Test Points	Test Levels		Results			
	± 2 KV	±4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	

Discharge To Horizontal Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	

Discharge To Vertical Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 KV	± 4 KV	Pass	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	

## 4.7. Electrical Fast Transient/Burst Test

### 4.7.1. Block Diagram of Test Setup



### 4.7.2. Test Standard

EN 61547: 2009 (EN 61000-4-4: 2012, Severity Level: Level 2: 1KV)

### 4.7.3. Severity Levels and Performance Criterion

#### 4.7.3.1. Severity level

Level	Open Circuit Output Test Voltage $\pm 10\%$	
	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

#### 4.7.3.2. Performance criterion: **B**

### 4.7.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3

### 4.7.5. Operating Condition of EUT

4.7.5.1. Setup the EUT as shown in Section 4.7.1.

4.7.5.2. Turn on the power of all equipments.

4.7.5.3. Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.7.6. 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.

##### 4.7.6.1. 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.

##### 4.7.6.2. For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

##### 4.7.6.3. For DC output line ports:

It's unnecessary to test.

#### 4.7.7. Test Results

**PASS.**

Please refer to the following page.

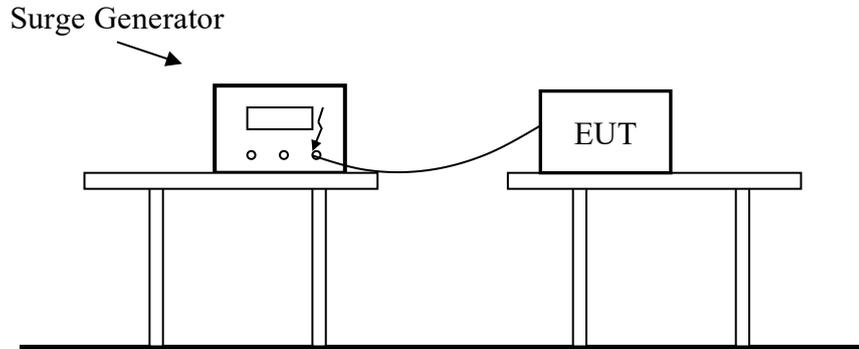
## Electrical Fast Transient/Burst Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-4 <input checked="" type="checkbox"/> EN 61000-4-4		
<b>Applicant</b>	Ningbo Amlife Photoelectricity Co., Ltd		
<b>EUT</b>	S3 USB Solar Integrated Lamp	<b>Temperature</b>	21.7°C
<b>M/N</b>	AL-S3 USB	<b>Humidity</b>	54.2%
<b>Test Mode</b>	Lighting+Charging	<b>Criterion</b>	B
<b>Test Engineer</b>	FENG LIANG	<b>Test Voltage</b>	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:			

## 4.8 SURGE Immunity Test

### 4.8.1. Block Diagram of Test Setup



### 4.8.2. Test Standard

EN 61547: 2009 (EN61000-4-5: 2014, Severity Level: Line to Line: Level 2, 1KV;)

### 4.8.3. Severity Levels and Performance Criterion

#### 4.8.3.1. Severity level

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

#### 4.8.3.2. Performance criterion: **C**

### 4.8.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3

#### 4.8.5. Operating Condition of EUT

- 4.8.5.1. Setup the EUT as shown in Section 4.8.1.
- 4.8.5.2. Turn on the power of all equipments.
- 4.8.5.3. Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.8.6. Test Procedure

- 4.8.6.1. Set up the EUT and test generator as shown on Section 4.8.1.
- 4.8.6.2. 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.
- 4.8.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4.8.6.4. Different phase angles are done individually.
- 4.8.6.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

#### 4.8.7. Test Results

**PASS.**

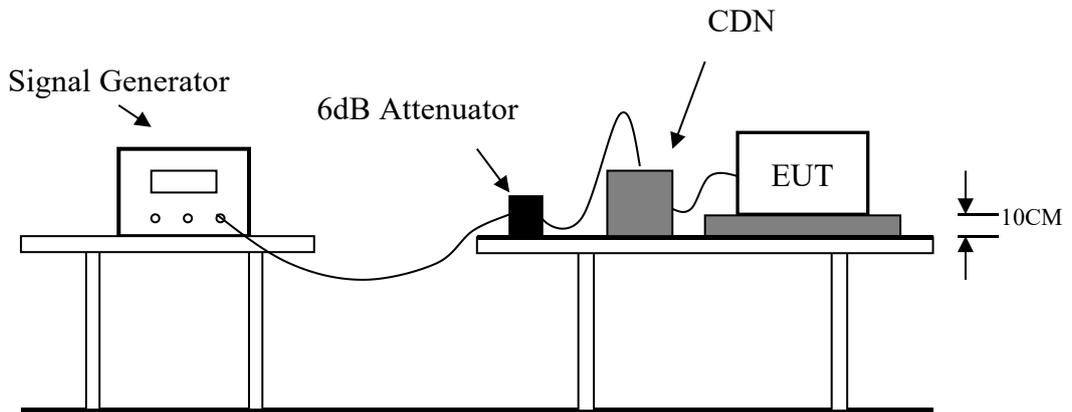
Please refer to the following page.

Surge Immunity Test Result			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-5 <input checked="" type="checkbox"/> EN 61000-4-5		
<b>Applicant</b>	Ningbo Amlife Photoelectricity Co., Ltd		
<b>EUT</b>	S3 USB Solar Integrated Lamp	<b>Temperature</b>	21.7°C
<b>M/N</b>	AL-S3 USB	<b>Humidity</b>	54.2%
<b>Test Mode</b>	Lighting+Charging	<b>Criterion</b>	C
<b>Test Engineer</b>	FENG LIANG	<b>Test Voltage</b>	AC 230V, 50Hz

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	90°	5	0.5	PASS
	-	270°	5	0.5	PASS
L-PE					
N-PE					
Signal Line					
Note					

## 4.9. Injected currents susceptibility test

### 4.9.1. Block Diagram of Test Setup



### 4.9.2. Test Standard

EN 61547: 2009 (EN 61000-4-6: 2014, Severity Level: 3V (rms), 0.15MHz ~ 80MHz)

### 4.9.3. Severity Levels and Performance Criterion

#### 4.9.3.1. Severity level

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

#### 4.9.3.2. Performance criterion: **A**

### 4.9.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3

#### 4.9.5. Operating Condition of EUT

- 4.9.5.1. Setup the EUT as shown in Section 4.9.1.
- 4.9.5.2. Turn on the power of all equipments.
- 4.9.5.3. Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.9.6. Test Procedure

- 4.9.6.1. Set up the EUT, CDN and test generators as shown on Section 4.9.1.
- 4.9.6.2. Let the EUT work in test mode and measure it.
- 4.9.6.3. 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).
- 4.9.6.4. The disturbance signal described below is injected to EUT through CDN.
- 4.9.6.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 4.9.6.6. 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.
- 4.9.6.7. The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/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.
- 4.9.6.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

#### 4.9.7. Test Results

**PASS.**

Please refer to the following page.

## Injected Currents Susceptibility Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-6 <input checked="" type="checkbox"/> EN 61000-4-6		
<b>Applicant</b>	Ningbo Amlife Photoelectricity Co., Ltd		
<b>EUT</b>	S3 USB Solar Integrated Lamp	<b>Temperature</b>	21.6°C
<b>M/N</b>	AL-S3 USB	<b>Humidity</b>	54.5%
<b>Test Mode</b>	Lighting+Charging	<b>Criterion</b>	A
<b>Test Engineer</b>	FENG LIANG	<b>Test Voltage</b>	AC 230V, 50Hz

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

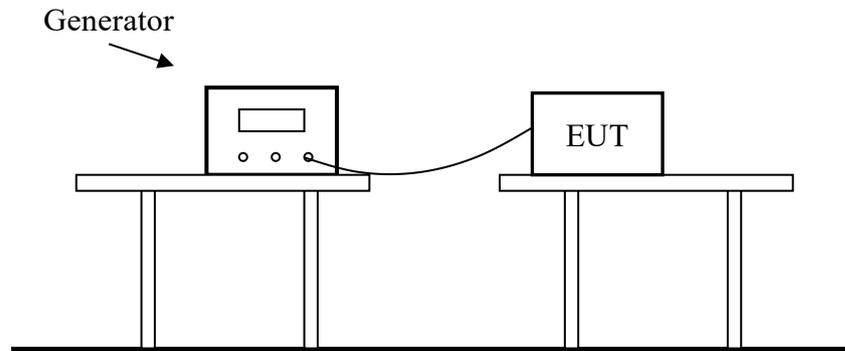
**Remark:**

1. Modulation Signal: 1kHz 80% AM
2. Measurement Equipment:
  - Simulator: CIT-10 (FRANKONIA)
  - CDN :  CDN-M2 (FRANKONIA)
  - CDN-M3 (FRANKONIA)

**Note:**

## 4.10. Voltage dips and interruptions test

### 4.10.1. Block Diagram of Test Setup



### 4.10.2. Test Standard

EN 61547: 2009 (EN 61000-4-11: 2004+A1: 2017)

### 4.10.3. Severity Levels and Performance Criterion

#### 4.10.3.1. Severity level

Test Level (%U <sub>T</sub> )	Voltage dip and short interruptions (%U <sub>T</sub> )	Duration (in period)
0	100	0.5
70	30	10

#### 4.10.3.2. Performance criterion: **B&C**

### 4.10.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3

#### 4.10.5.Operating Condition of EUT

4.10.5.1.Setup the EUT as shown in Section 4.10.1.

4.10.5.2.Turn on the power of all equipments.

4.10.5.3.Let the EUT work in test mode (Lighting+Charging) and measure it.

#### 4.10.6.Test Procedure

4.10.6.1.Set up the EUT and test generator as shown on Section 4.10.1.

4.10.6.2.The interruptions is introduced at selected phase angles with specified duration.

4.10.6.3.Record any degradation of performance.

#### 4.10.7.Test Results

**PASS.**

Please refer to the following page.

## Voltage Dips And Interruptions Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-11 <input checked="" type="checkbox"/> EN 61000-4-11		
<b>Applicant</b>	Ningbo Amlife Photoelectricity Co., Ltd		
<b>EUT</b>	S3 USB Solar Integrated Lamp	<b>Temperature</b>	21.7°C
<b>M/N</b>	AL-S3 USB	<b>Humidity</b>	54.2%
<b>Test Mode</b>	Lighting+Charging	<b>Criterion</b>	B&C
<b>Test Engineer</b>	FENG LIANG	<b>Test Voltage</b>	AC 230V, 50Hz

Test Level % U <sub>T</sub>	Voltage Dips & Short Interruptions % U <sub>T</sub>	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	10P	C	PASS

Note:

## 5. PHOTOGRAPH

### 5.1. Photo of Power Line Conducted Measurement



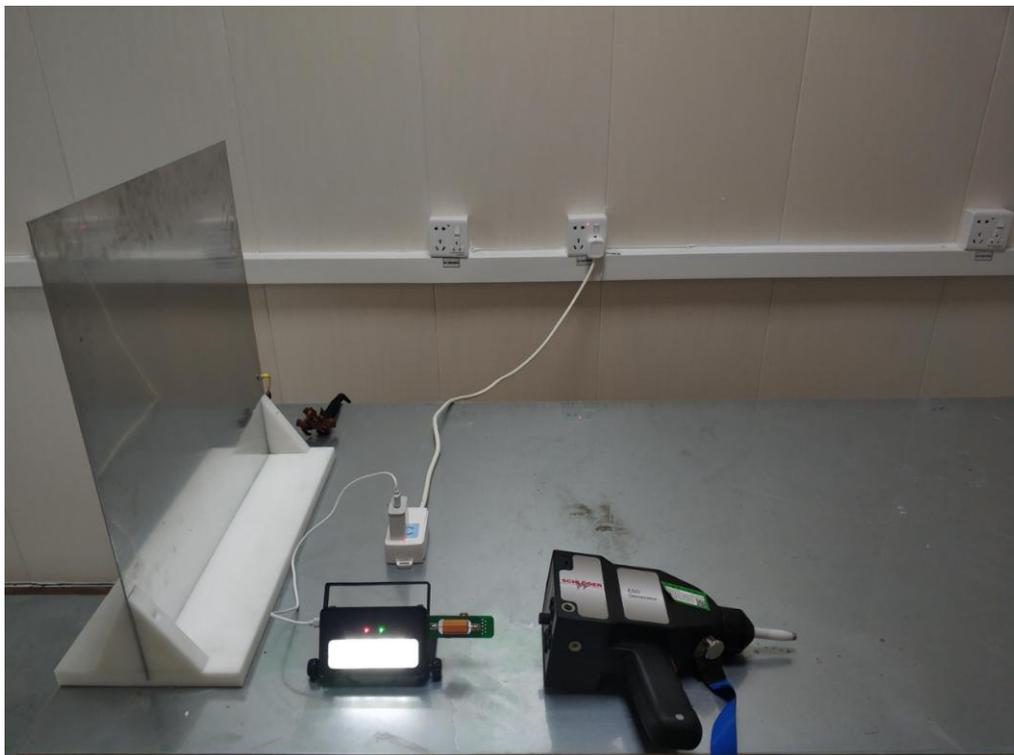
### 5.2. Photo of Radiated Electromagnetic Disturbance Measurement



### 5.3. Photo of Radiated Measurement



### 5.4. Photo of Electrostatic Discharge Test



### 5.5. Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test



## 6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Figure. 1



Figure. 2



Figure. 3



Figure. 4



Figure. 5



Figure. 6

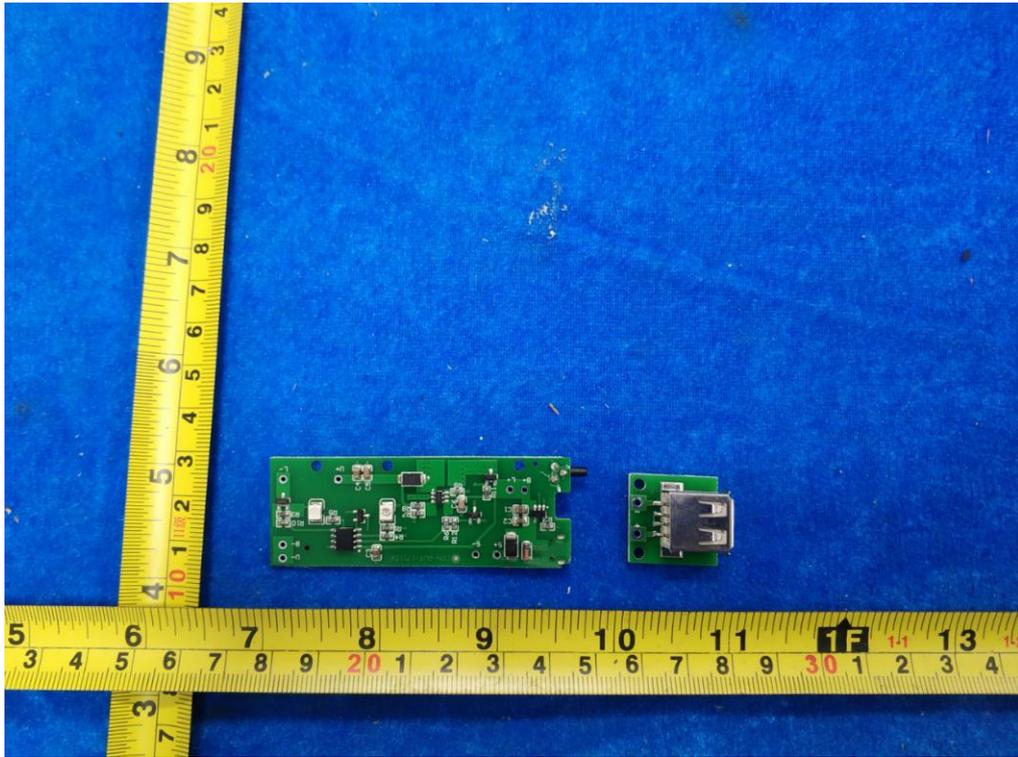


Figure. 7

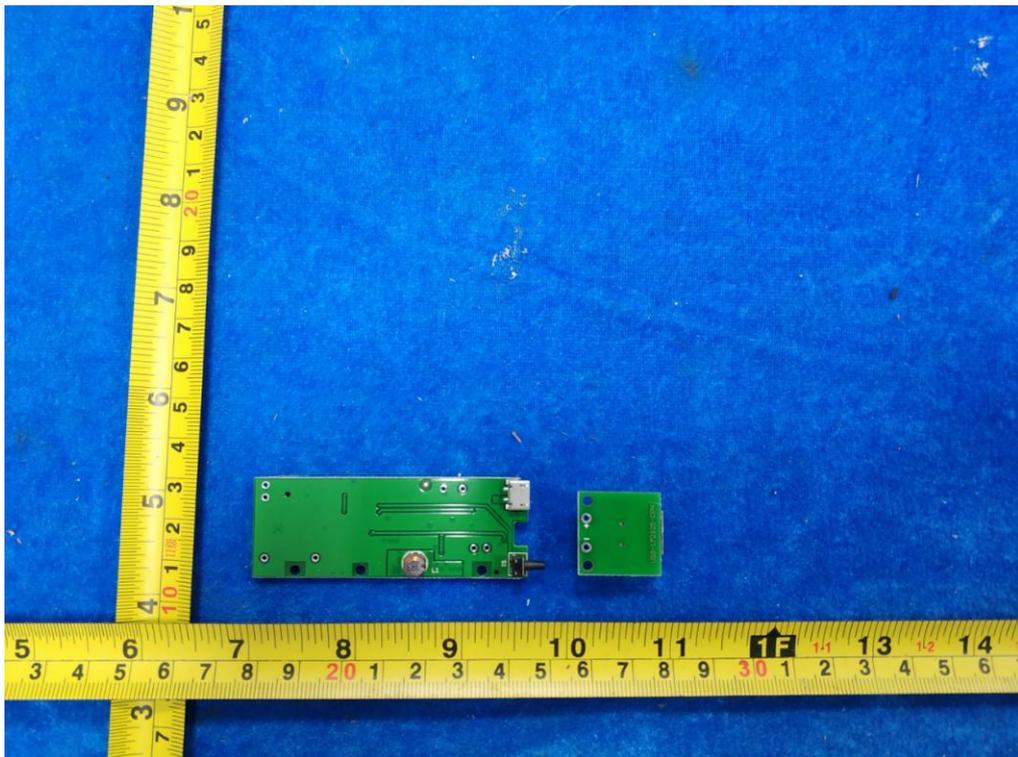


Figure. 8

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