EMC
Measurement and Test Report

For

Shenzhen Olight E-Commerce Technology Co., Ltd.

5th Floor, Building A2, Fuhai Information Harbor, Fuhai Subdistrict, Bao'an District, Shenzhen, China

Test Standards:	EN 55015:2013/A1:2015 EN 61547:2009
Product Description:	Flashlight
Tested Model:	Perun
Report No.:	WTX19X11080815E
Tested Date:	2019-11-21 to 2019-11-25
Issued Date:	2019-11-25
Tested By:	Will Tan / Engineer
Reviewed By:	Silin Chen / EMC Manager
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.

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1.GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Olight E-Commerce Technology Co., Ltd.
Address of applicant:	5th Floor, Building A2, Fuhai Information Harbor, Fuhai Subdistrict, Bao'an District, Shenzhen, China
Manufacturer:	Shenzhen Olight E-Commerce Technology Co., Ltd.
Address of manufacturer:	5th Floor, Building A2, Fuhai Information Harbor, Fuhai Subdistrict, Bao'an District, Shenzhen, China

General Description of EUT	
Product Name:	Flashlight
Trade Name:	Olight
Model No.:	Perun
Adding Model(s):	/
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Rated Voltage:	DC 3.6V
Rated Current:	5.5A
Rated Power:	20W
Power Adaptor Model:	/

1.2 Test Standards

The tests were performed according to following standards:

EN 55015:2013/A1:2015 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

EN 61547:2009 Electromagnetic for general lighting purposes - EMC immunity requirements

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standards EN55015, and EN61547 for general lighting purposes equipment, and all related testing and measurement techniques intentional standards.

1.4 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark	Power Supply Mode
TM1	Charging+Brightest mode	USB Port	With a adapter input AC 230V/50Hz

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Adapter	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.5 Performance Criteria for EMS

All the test data has been collected, reduced, and analyzed within this report in accordance with Immunity requires the following as specific performance criteria:

A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.

B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.

C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal.. Date	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2019-04-30	2020-04-29
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
Trilog Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2019-05-05	2021-05-04
Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-04-30	2020-04-29
EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2019-04-30	2020-04-29
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-04-30	2020-04-29
AC LISN	Schwarz beck	NSLK8126	8126-224	2019-04-30	2020-04-29
DC LISN	Schwarz beck	NNBM8126D	279	2019-04-30	2020-04-29
DC LISN	Schwarz beck	NNBM8126D	280	2019-04-30	2020-04-29
8-WIRE LISN	Schwarz beck	8158	CAT3-8158-0059	2019-04-30	2020-04-29
8-WIRE LISN	Schwarz beck	8158	CAT5-8158-0117	2019-04-30	2020-04-29
Loop Antenna	EVERFINE	LLA-2	711001	2019-04-30	2021-04-29
VDH Test Head	AFJ	VDH 30	SC022Z	2019-04-30	2020-04-29
PMF Generator	LIONCEL	PMF-801C-C	0171101	2019-04-30	2020-04-29
PMF Antenna	LIONCEL	PMF-801C-A	0180302	2019-04-30	2020-04-29
Instantaneous PMF Generator Module	LIONCEL	PMF-801C-T	0171001	2019-04-30	2020-04-29
Digital Power Analyzer	California Instrument	CTS	72831	2019-04-30	2020-04-29
Power Source	California Instrument	5001IX-CTS-400	25965	2019-04-30	2020-04-29
ESD Generator	LIONCEL	ESD-203B	0170901	2019-05-05	2020-05-04
Amplifier	Agilent	8447D	2944A10179	2019-04-30	2020-04-29
Transient 2000	EMC PARTNER	TRA2000	863	2019-05-21	2020-05-20
Couple Clamp	EMC PARTNER	CN-EFT1000	513	2019-05-21	2020-05-20
CS Immunity Tester	SCHAFFNER	NSG2070	1123	2019-04-30	2020-04-29
Attenuator	EMTEST	MA-5100/6BF2	1009	2019-04-30	2020-04-29
CDN	Luthi	L-801M2/M3	2665	2019-04-30	2020-04-29
Signal Generator	R&S	SMB100A	105942	2019-09-09	2020-09-08
Power Meter	R&S	NRP2	102031	2019-09-09	2020-09-08
RF Power Amplifier	BONN Elektronik	BLWA0830-160/100/40D	128740	2019-09-09	2020-09-08
RF Power Amplifier	NJNT	NTWPAS-2560025	2560025	2019-09-09	2020-09-08
Antenna	SCHWARZBECK	STLP9128D	043	2017-09-11	2020-09-10
Antenna	SCHWARZBECK	BBHA 9120 D	667	2017-09-11	2020-09-10
CS Generator	MARCONI	2024	112260/042	2019-05-31	2020-05-30

Attenuator	FRANKONIA	75-A-FFN-06	1001698	2019-05-31	2020-05-30
CDN	FRANKONIA	CDN M2+M3	A3027019	2019-05-31	2020-05-30
EM Injection Clamp	FCC	F-203I-23mm	91536	2019-05-31	2020-05-30
RF POWER AMPLIFIER	FRANKONIA	FLL-75	102A1109	2019-05-31	2020-05-30

2. SUMMARY OF TEST RESULTS

Standards	Description of Test Item	Result
EN55015	Disturbance Voltages	Compliant
	Radiated Electromagnetic Disturbances (Frequency range 9kHz to 30MHz)	Compliant
	Radiated Electromagnetic Disturbances (Frequency range 30MHz to 300MHz)	Compliant
EN61000-3-2	Harmonic Current Emission	N/A
EN61000-3-3	Voltage Fluctuation And Flicker	N/A
EN61547	Electrostatic Discharge Immunity in accordance with EN 61000-4-2	Compliant
	Radio-Frequency Electromagnetic Field Immunity in accordance with EN 61000-4-3	Compliant
	Electrical Fast Transient/Burst Immunity in accordance EN 61000-4-4	Compliant
	Surges Immunity in accordance with EN 61000-4-5	Compliant
	Injected Currents Immunity in accordance with EN 61000-4-6	Compliant
	Power-frequency Magnetic Field Immunity in accordance with EN 61000-4-8	Compliant
	Voltage Dips/Interruptions Immunity in accordance with EN 61000-4-11	N/A

N/A: not applicable

3. Disturbance Voltages

3.1 Measurement Uncertainty

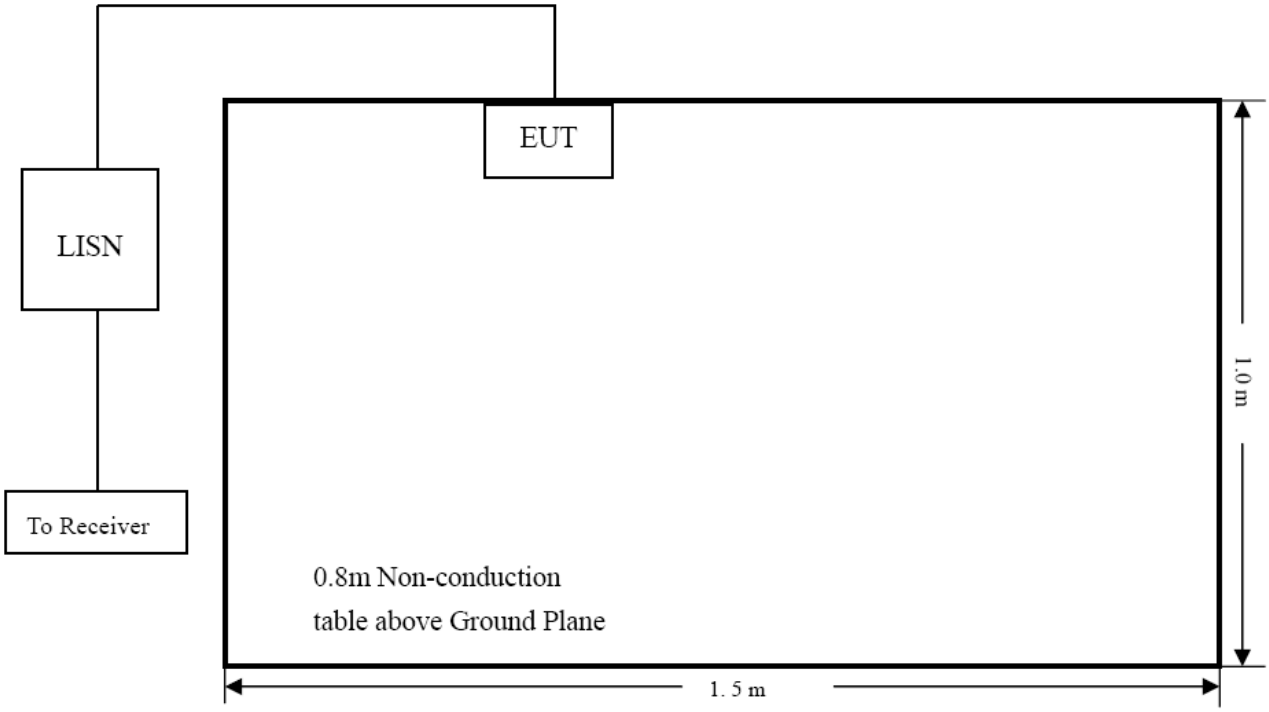
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB

3.2 Test Procedure

Test is conducting under the description of EN55015, According to Clause 5.3.2.2, 6 & 8.3.1.

3.3 Basic Test Setup Block Diagram



3.4 Environmental Conditions

Temperature:	22 ° C
Relative Humidity:	55 %
ATM Pressure:	1015 mbar

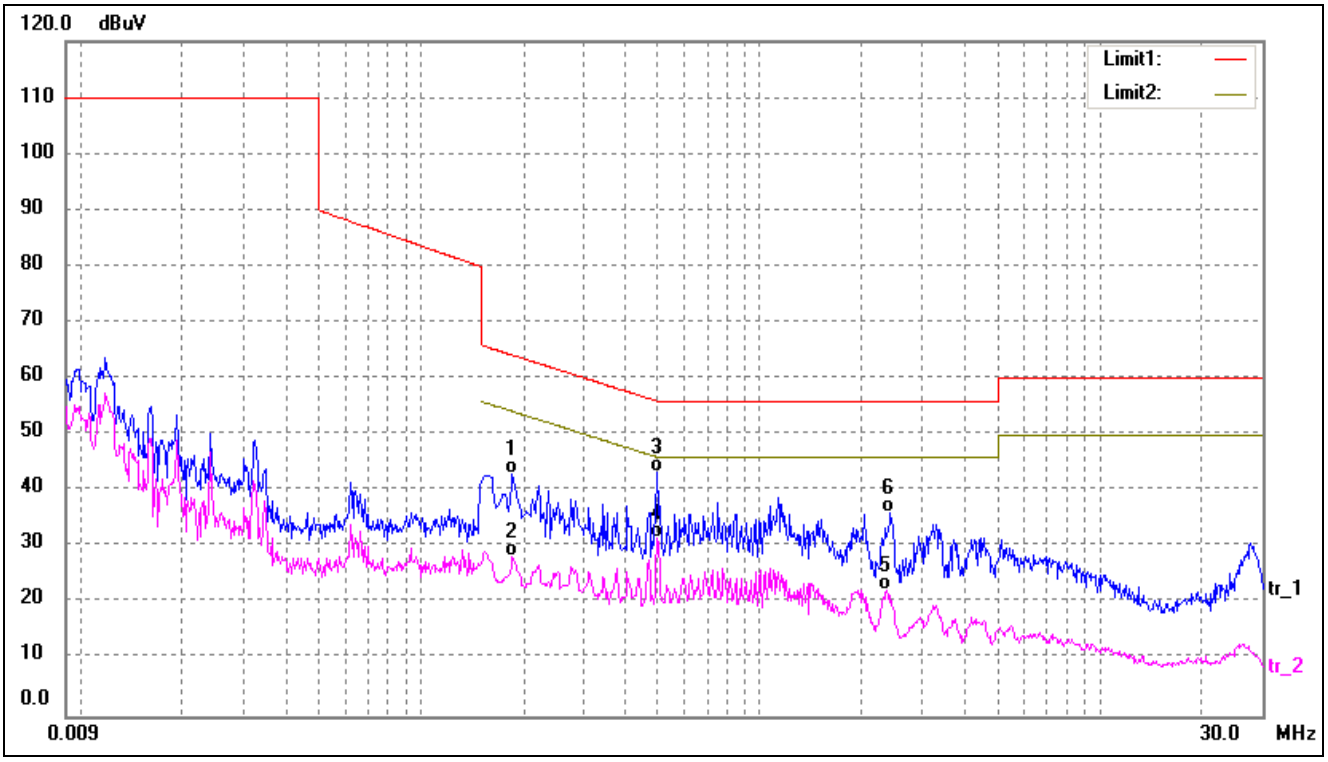
3.5 Summary of Test Results/Plots

According to the data in section 3.6, the EUT complied with the EN55015 conducted margin for a lighting device, with the *worst* margin reading of:

-10.25 dB at **0.5020 MHz** in the **Neutral** mode, **AVG** detector, **0.009-30 MHz**

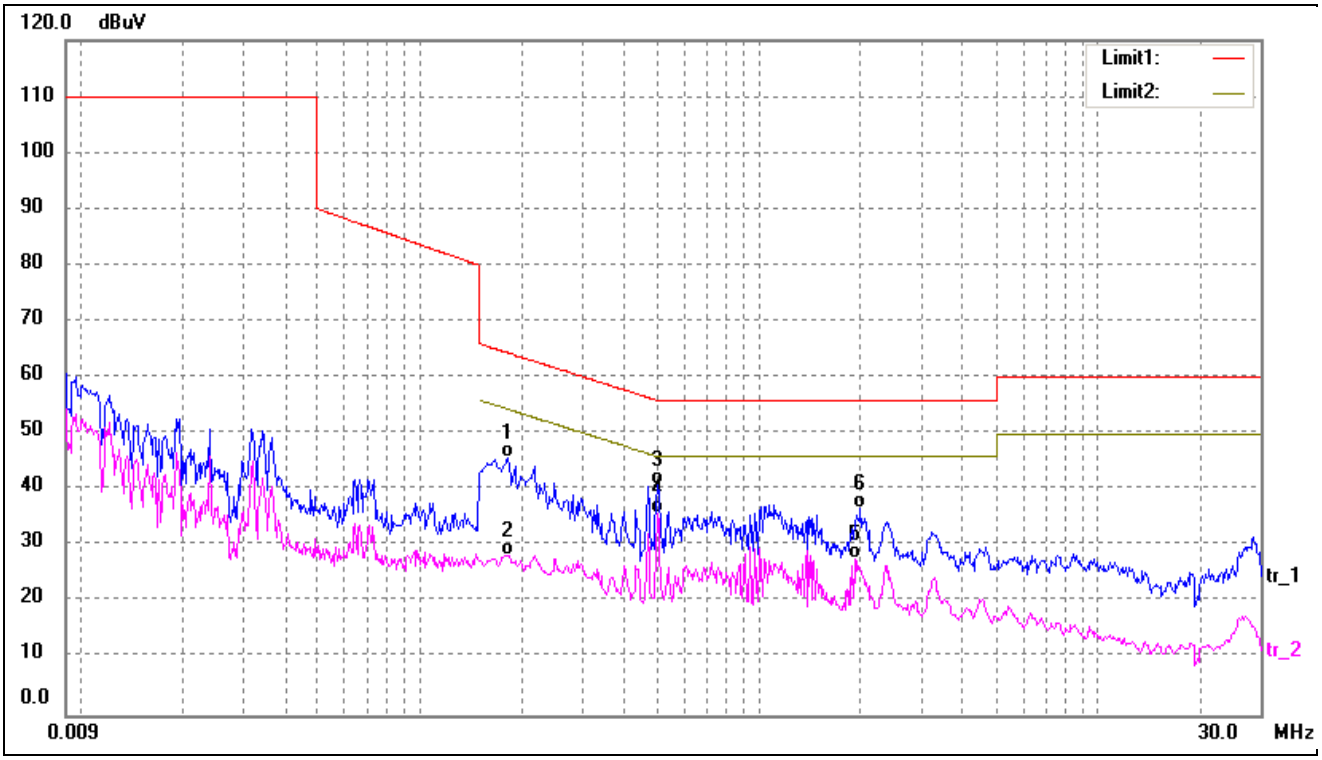
3.6 Conducted Emissions Test Data

Test mode:	TM1	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1860	33.15	9.96	43.11	64.21	-21.10	QP
2	0.1860	18.52	9.96	28.48	54.21	-25.73	AVG
3*	0.4980	33.33	10.02	43.35	56.03	-12.68	QP
4	0.4980	21.51	10.02	31.53	46.03	-14.50	AVG
5	2.3500	11.85	10.37	22.22	46.00	-23.78	AVG
6	2.4140	25.68	10.37	36.05	56.00	-19.95	QP

Test mode:	TM1	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1819	35.73	9.96	45.69	64.39	-18.70	QP
2	0.1819	18.46	9.96	28.42	54.39	-25.97	AVG
3	0.5020	31.05	10.02	41.07	56.00	-14.93	QP
4*	0.5020	25.73	10.02	35.75	46.00	-10.25	AVG
5	1.9100	17.35	10.37	27.72	46.00	-18.28	AVG
6	1.9820	26.24	10.37	36.61	56.00	-19.39	QP

4. Radiated Electromagnetic Disturbances (9kHz to 30MHz)

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 3.6 dB.

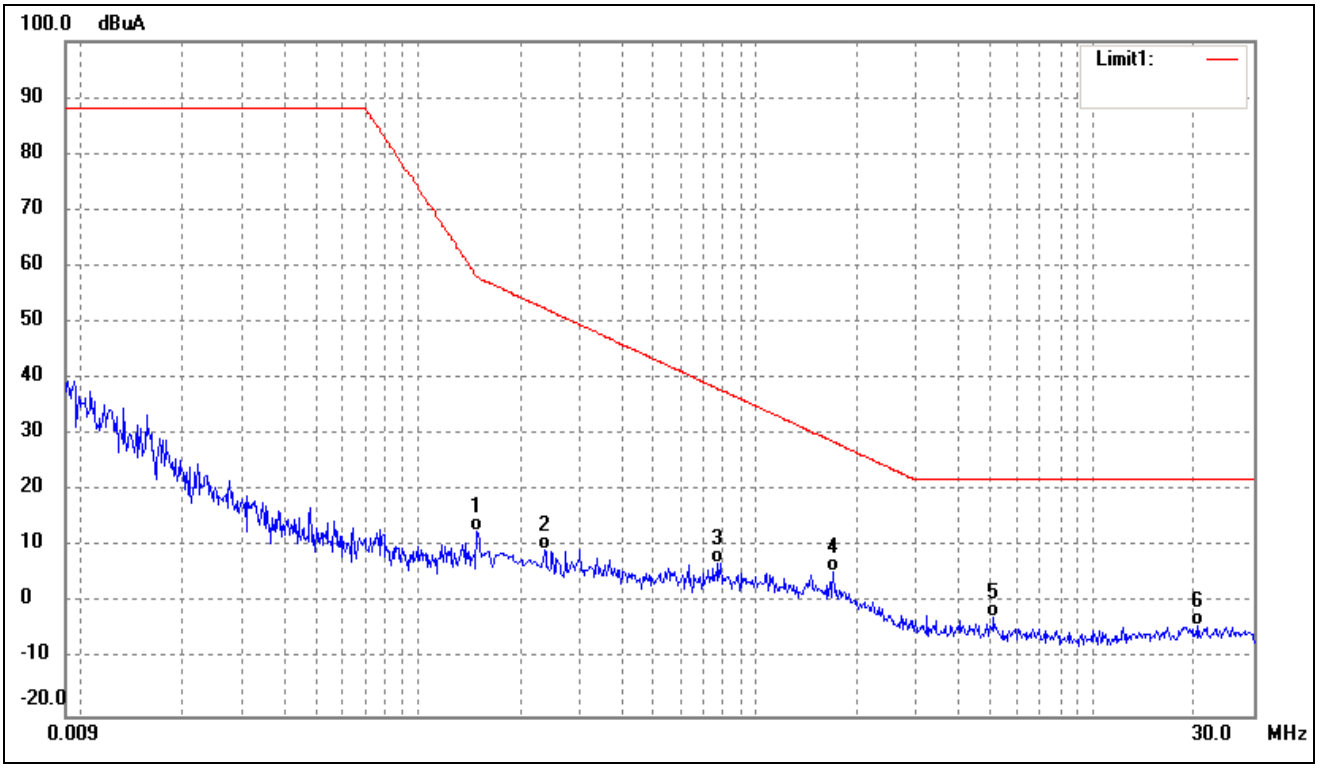
4.2 Test Procedure

Test is conducted under the description of EN 55015, According to Clause 4.4

4.3 Test Result

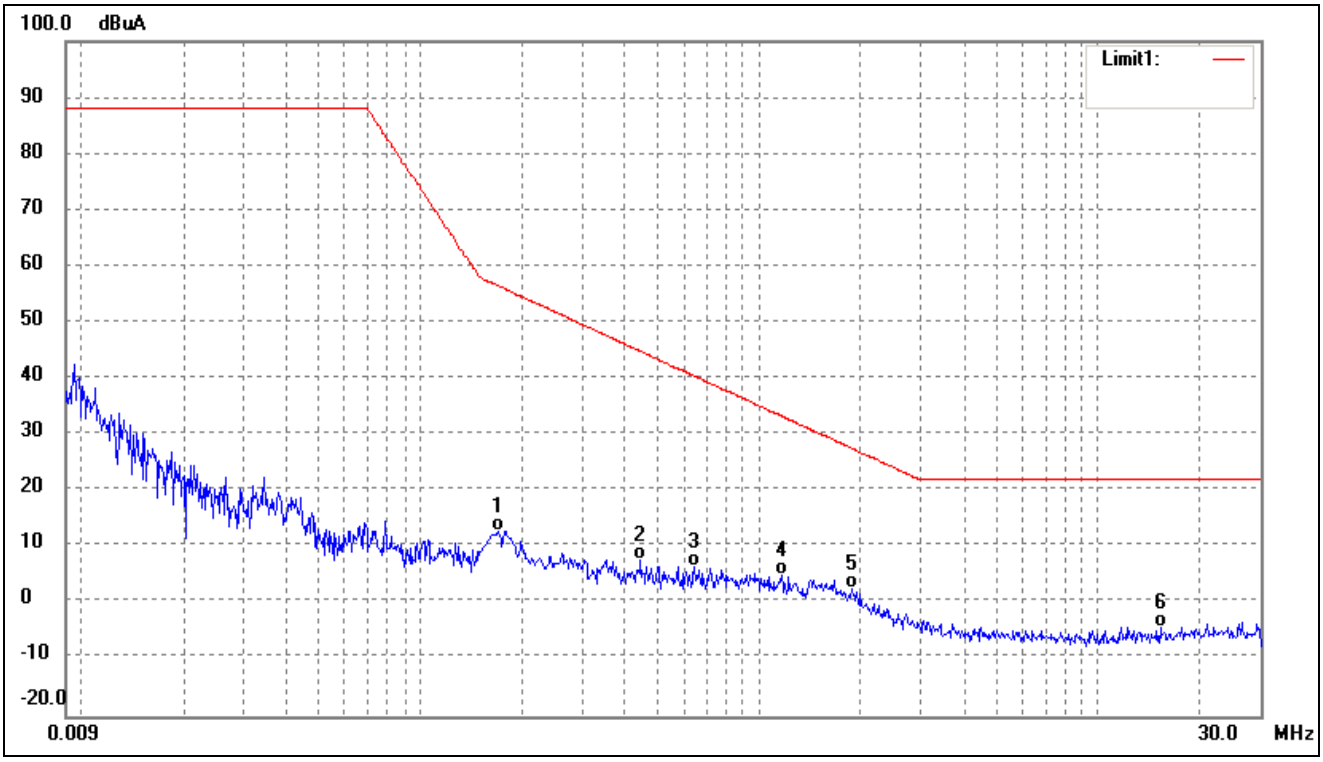
Testing according to limit table 3b and the emissions below 10dB are not report.
Test Result: Pass
Please refer to the plots:

Test mode:	TM1	Polarity:	X



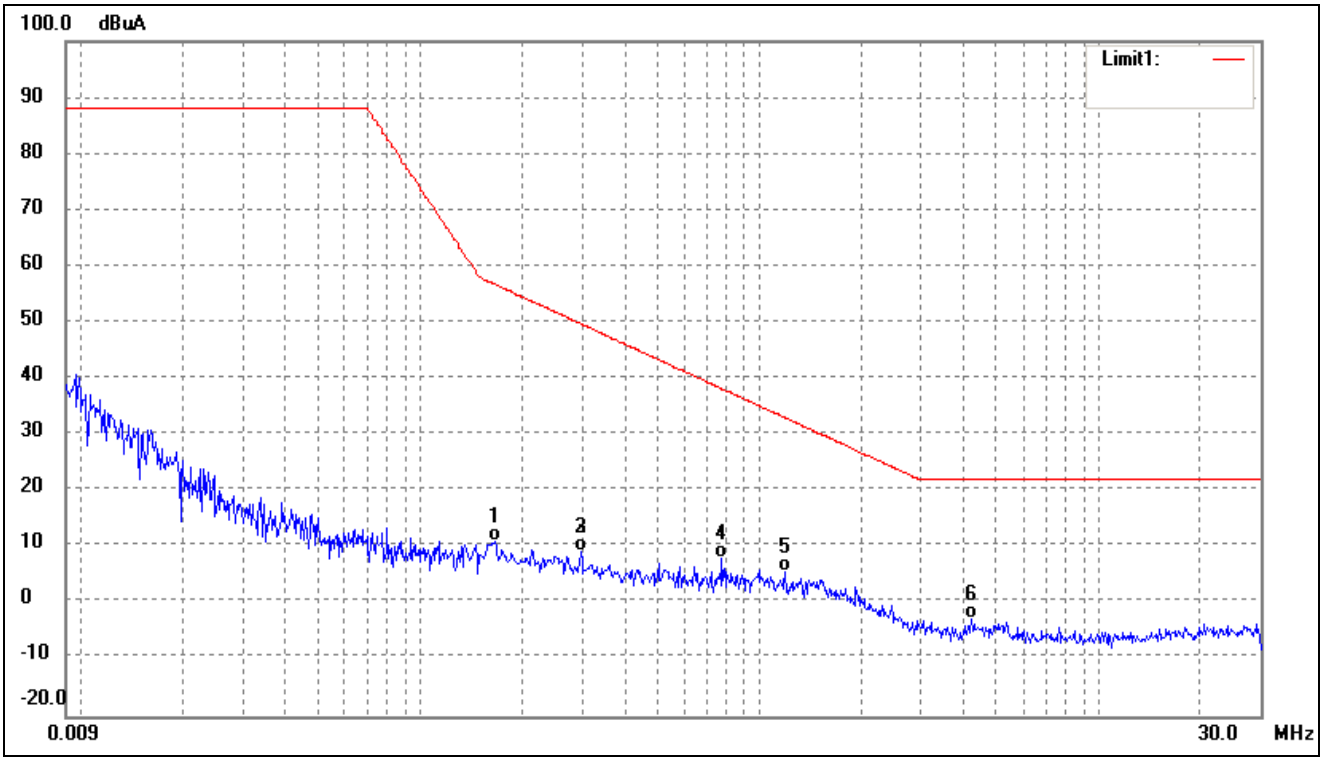
No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.1500	-8.33	21.11	12.78	58.00	-45.22	QP
2	0.2380	-11.01	20.60	9.59	52.45	-42.86	QP
3	0.7740	-12.80	20.07	7.27	38.28	-31.01	QP
4*	1.7060	-14.88	20.41	5.53	28.78	-23.25	QP
5	5.0980	-23.20	20.71	-2.49	22.00	-24.49	QP
6	20.5500	-25.35	21.26	-4.09	22.00	-26.09	QP

Test mode:	TM1	Polarity:	Y



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.1700	-7.98	20.93	12.95	56.50	-43.55	QP
2	0.4460	-12.46	20.31	7.85	44.91	-37.06	QP
3	0.6460	-13.70	20.14	6.44	40.45	-34.01	QP
4	1.1620	-15.13	20.14	5.01	33.40	-28.39	QP
5*	1.8820	-17.76	20.50	2.74	27.60	-24.86	QP
6	15.2100	-24.97	20.78	-4.19	22.00	-26.19	QP

Test mode:	TM1	Polarity:	Z



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.1660	-9.84	20.97	11.13	56.78	-45.65	QP
2	0.2980	-11.40	20.51	9.11	49.75	-40.64	QP
3	0.2980	-11.40	20.51	9.11	49.75	-40.64	QP
4	0.7780	-11.91	20.07	8.16	38.22	-30.06	QP
5	1.1940	-14.49	20.16	5.67	33.07	-27.40	QP
6*	4.2300	-23.54	20.67	-2.87	22.00	-24.87	QP

5. Radiated Electromagnetic Disturbances (30MHz to 300MHz)

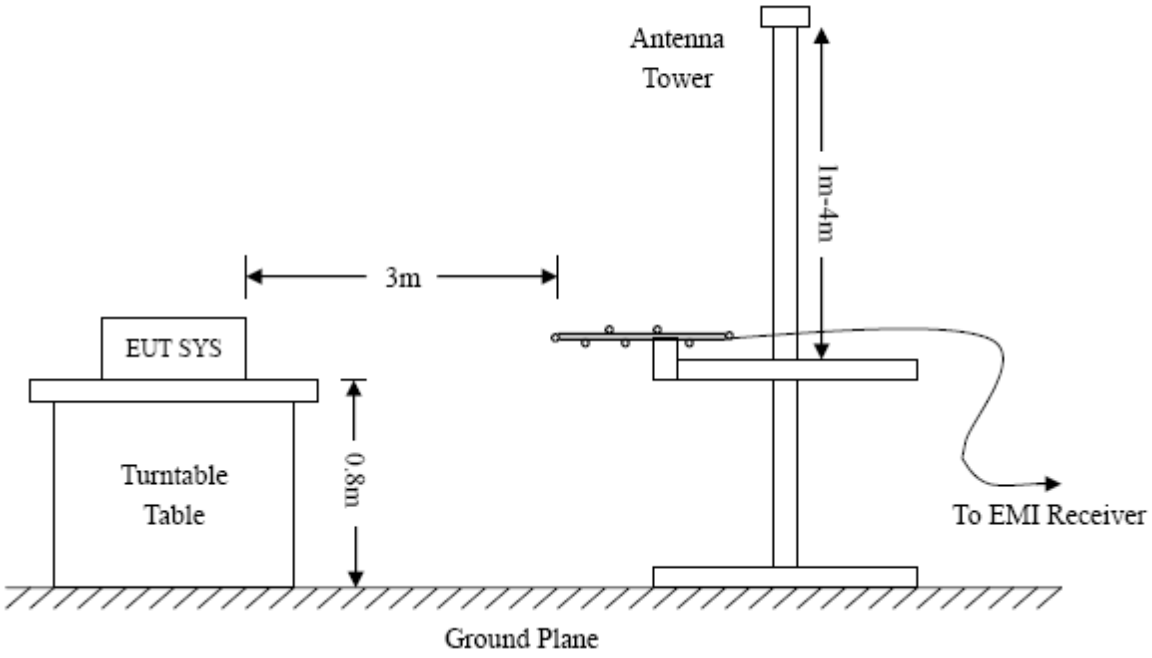
5.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Radiated Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

5.2 Test Procedure

Test is conducting under the description of EN55015 According to Clause 4.4.2.



5.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Correct

Correct=Ant.Factor + Cable Loss - Ampl.Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for a lighting device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN55015 Limit

5.4 Environmental Conditions

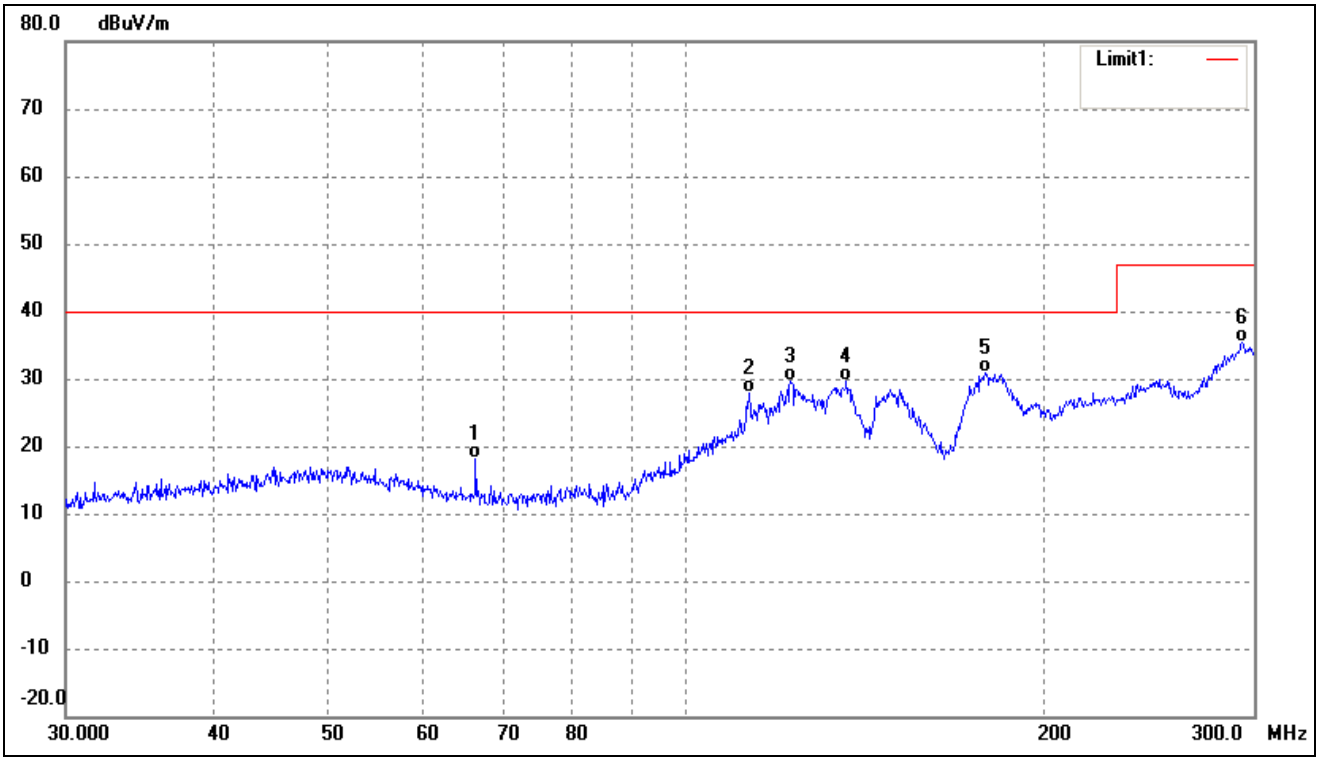
Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

According to the data in section 5.5, the EUT complied with the EN55015 standards, and had the worst margin is:

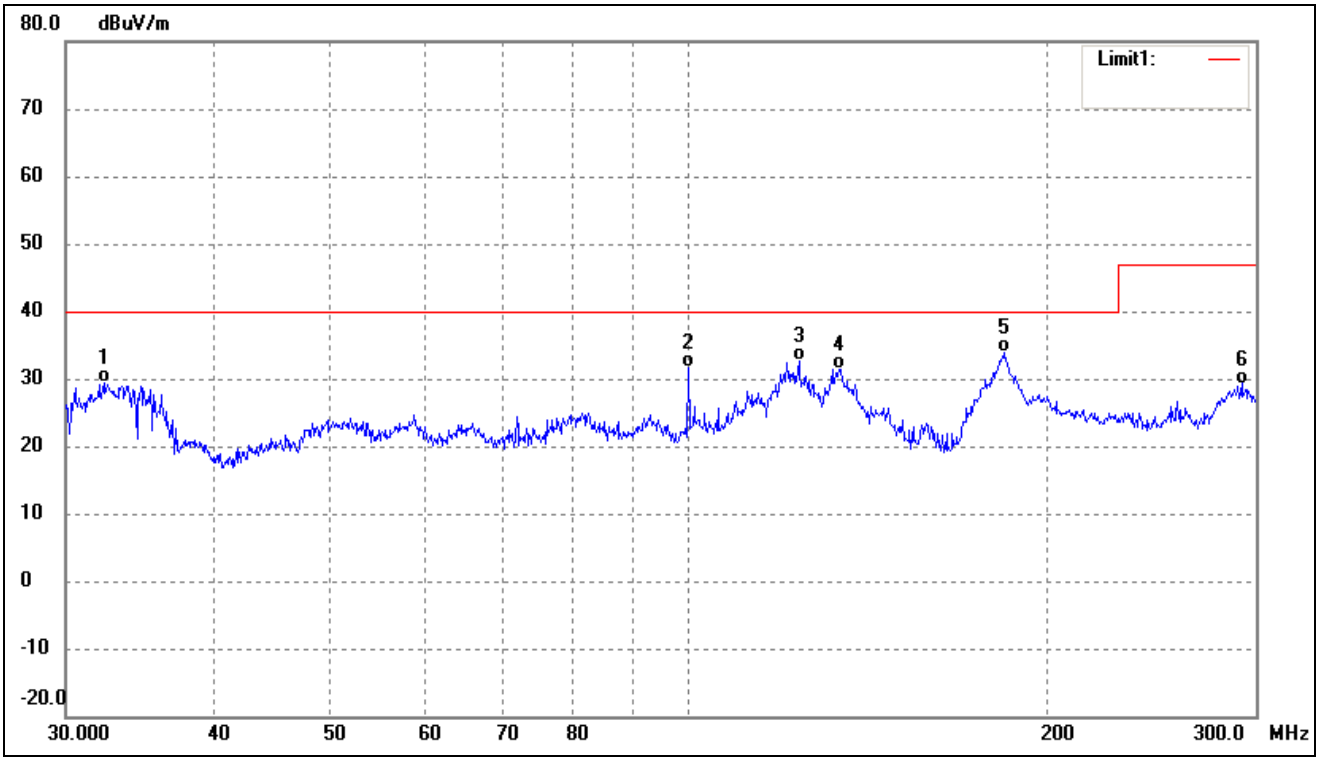
-6.04 dB at **184.1286 MHz** in the **Vertical** polarization, **30 MHz to 300 MHz, 3 Meters**

Test mode:	TM1	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	66.3928	32.51	-14.38	18.13	40.00	-21.87	350	100	QP
2	112.7512	41.18	-13.33	27.85	40.00	-12.15	91	100	QP
3	122.2141	44.26	-14.74	29.52	40.00	-10.48	138	100	QP
4	136.1825	45.62	-16.02	29.60	40.00	-10.40	108	100	QP
5	178.2876	45.64	-14.65	30.99	40.00	-9.01	264	100	QP
6	293.1712	44.99	-9.59	35.40	47.00	-11.60	272	100	QP

Test mode:	TM1	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	32.2940	43.28	-14.01	29.27	40.00	-10.73	319	100	QP
2	100.0279	44.79	-13.18	31.61	40.00	-8.39	207	100	QP
3	123.9143	47.92	-15.21	32.71	40.00	-7.29	97	100	QP
4	134.0050	47.59	-16.31	31.28	40.00	-8.72	344	100	QP
5	184.1286	48.07	-14.11	33.96	40.00	-6.04	79	100	QP
6	291.8241	38.91	-9.66	29.25	47.00	-17.75	142	100	QP

6. Electrostatic Discharge Immunity (ESD)

6.1 Test Procedure

Test is conducting under the description of EN 61000-4-2.

Test Performance

Performance Criterion: B

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

6.2 Electrostatic Discharge Immunity Test Data

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
/	/	/	/	/	/	/	/	/	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
metal case	A	A	A	A	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP & VCP)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
HCP (6 Sides)	A	A	A	A	/	/	/	/	/	/
VCP (4 Sides)	A	A	A	A	/	/	/	/	/	/

Test Result: Pass

7. Radio-Frequency Electromagnetic Fields (R/S)

7.1 Test Procedure

Test is conducting under the description of EN 61000-4-3.

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

7.2 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A

Test Result: Pass

8. Electrical Fast Transients (EFT)

8.1 Test Procedure

Test is conducting under the description of EN 61000-4-4.

Test Performance

Performance Criterion: B

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

8.2 Electrical Fast Transients Test Data

EN 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
Power Supply Power Port of EUT	L1	/	/	A	A	/	/	/	/
	L2	/	/	A	A	/	/	/	/
	PE	/	/	/	/	/	/	/	/
	L1+L2	/	/	A	A	/	/	/	/
	L1 + PE	/	/	/	/	/	/	/	/
	L2 + PE	/	/	/	/	/	/	/	/
	L1+L2+PE	/	/	/	/	/	/	/	/
Signal ports	/	/	/	/	/	/	/	/	/

Test Result: Pass

9. Surges

9.1 Test Procedure

Test is conducting under the description of EN 61000-4-5.

Test Performance

Performance Criterion: B

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

9.2 Surge Test Data

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	L-N	A	/
2	1kV	±	L-N	/	/
3	2kV	±	L-PE, N-PE	/	/
4	4kV	±	L-N, L-PE, N-PE	/	/

Test Result: Pass

10. Injected Currents (C/S)

10.1 Test Procedure

Test is conducting under the description of EN 61000-4-6.

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

10.2 Continuous Conducted Disturbances Test Data

Sweep frequency range: 150kHz~80MHz
Frequency step: 1% of fundamental
Dwell time: 1 second

Level	Voltage Level (e.m.f.) U_0	Modulation:	Pass	Fail
1	1	AM 80%, 1kHz sinewave	/	/
2	3	AM 80%, 1kHz sinewave	A	/
3	10	AM 80%, 1kHz sinewave	/	/
X	Special	/	/	/

Test Result: Pass

11. Power Frequency Magnetic Fields

11.1 Test Procedure

Test is conducting under the description of EN 61000-4-8.

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

11.2 Power-Frequency Magnetic Field Test Data

Level	Magnetic Field Strength (r.m.s) A/m	Frequency Hz	Induction Coil Postion	Pass	Fail
1	1	50	X, Y, Z	/	/
2	3	50	X, Y, Z	A	/
3	10	50	X, Y, Z	/	/
X	Special	/	/	/	/

Test Result: Pass

EXHIBIT 1 - PRODUCT LABELING

Proposed CE Label Format

Flashlight
Model: Perun
Brand: Olight
Importer Name: XXX
Importer Address: XXX
Shenzhen Olight E-Commerce Technology Co., Ltd.
5th Floor, Building A2, Fuhai Information Harbor, Fuhai Subdistrict, Bao'an District, Shenzhen, China

Specifications: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking is allowed less than 5 mm but must clear. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected. The Importer name, address and Manufacturer name and address should indicate on marking label or packaging or in a document accompanying

Proposed Label Location on EUT

CE Label Location



EXHIBIT 2 - EUT PHOTOGRAPHS

EUT View 1



EUT View 2



EUT View 3



EUT View 4



EUT View 5



EUT View 6

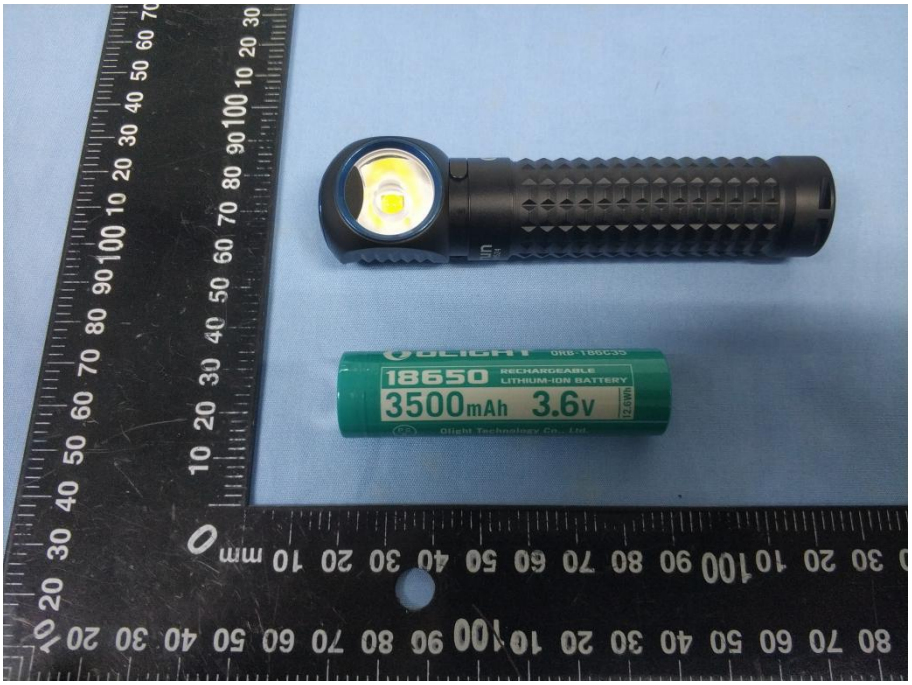
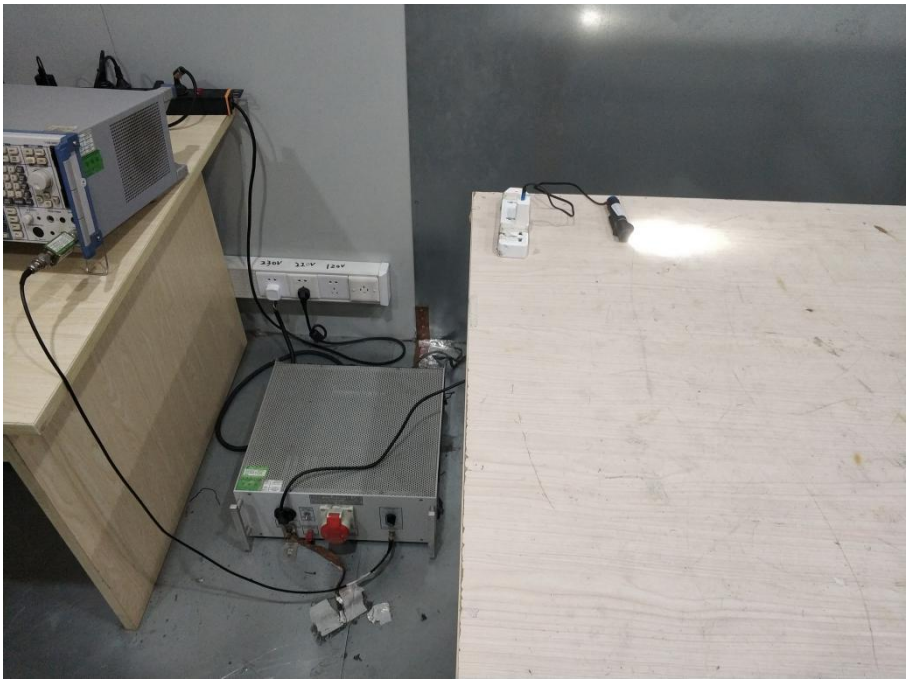


EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

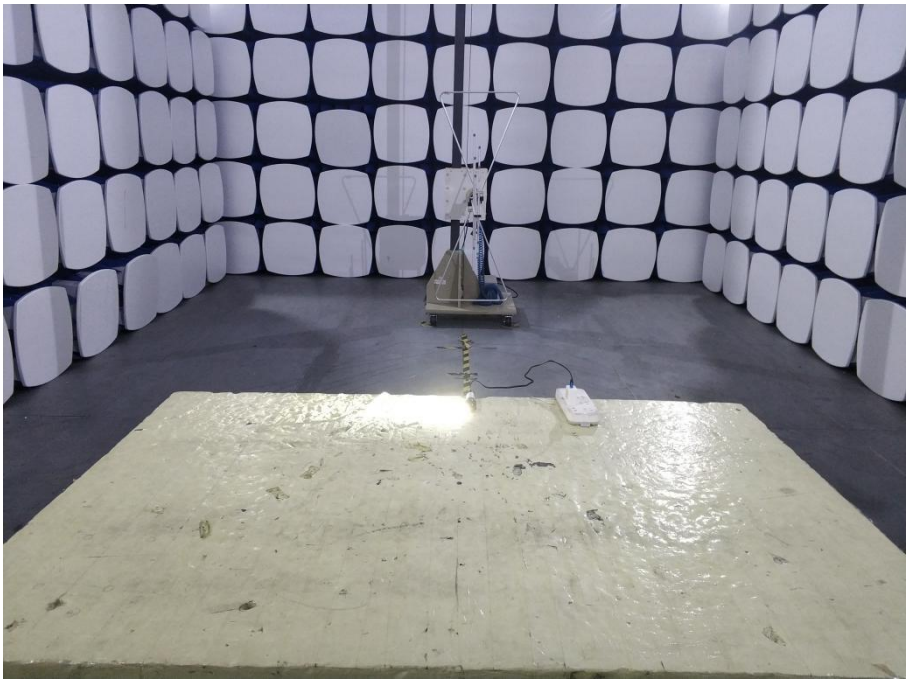
Conduction Emission Test View



Radiation Emission Test View (9kHz to 30MHz)



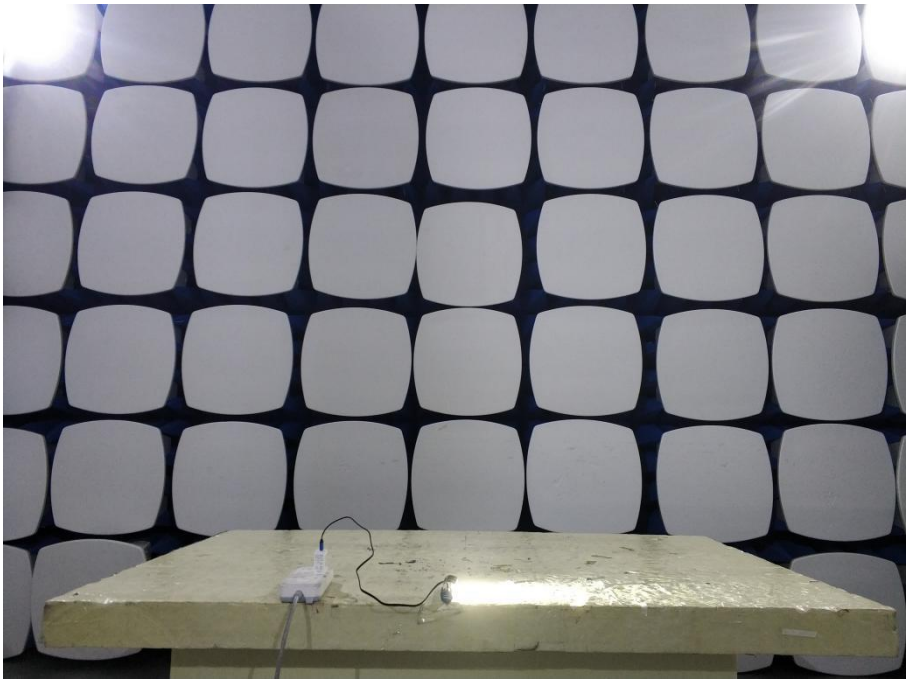
Radiation Emission Test View (30MHz to 300MHz)



EN 61000-4-2 Test View



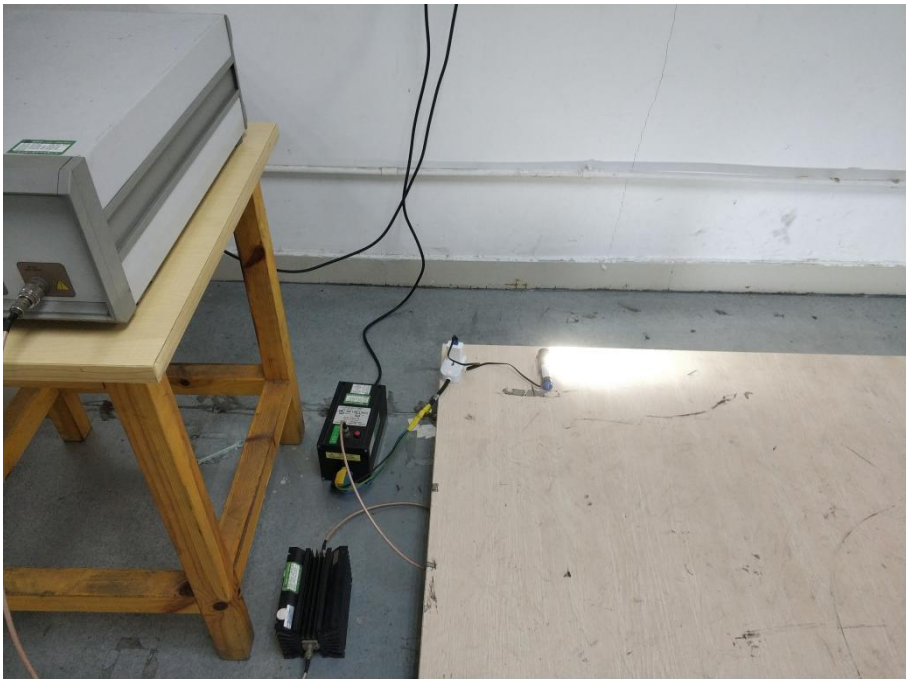
EN 61000-4-3 Test View



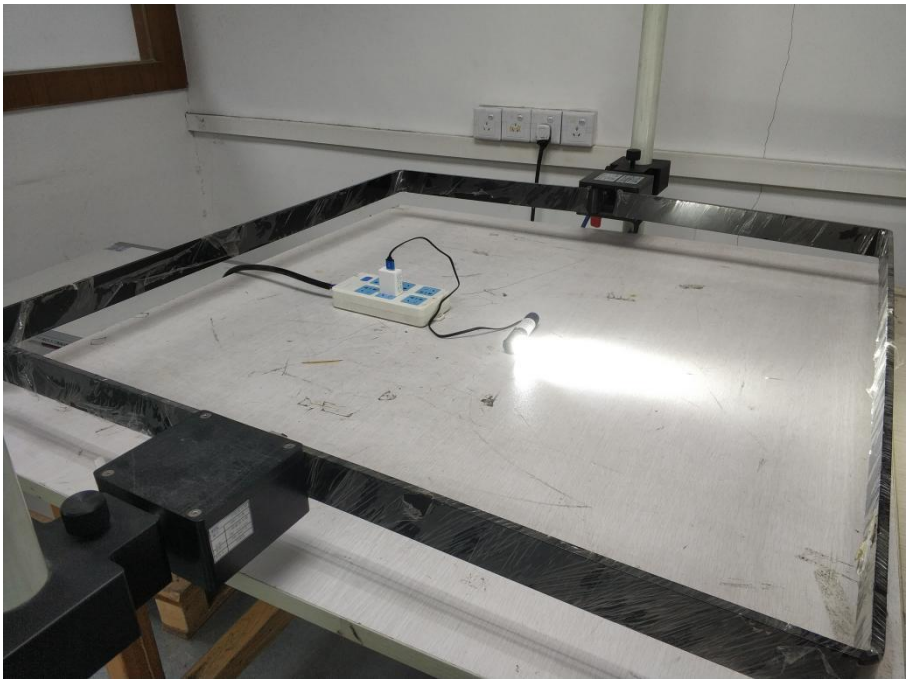
EN 61000-4-4/5 Test View



EN 61000-4-6 Test View



EN 61000-4-8 Test View



******* END OF REPORT *******