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:	LED Flashlight
Tested Model:	Seeker 2
Report No.:	WTX19X08056964E
Tested Date:	2019-08-17 to 2019-08-21
Issued Date:	2019-08-21
Tested By:	Will Tan / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

Shenzhen SEM Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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:	LED Flashlight
Trade Name:	Olight
Model No.:	Seeker 2
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:	/
Rated Power:	/
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	brightest mode	/	DC 3.6V (Battery provides power)

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
/	/	/	/

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)	9163-333	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	2018-09-10	2019-09-09
Power Meter	R&S	NRP2	102031	2018-09-10	2019-09-09
RF Power Amplifier	BONN Elektronik	BLWA0830-160/100/40D	128740	2018-09-10	2019-09-09
RF Power Amplifier	NJNT	NTWPAS-2560025	2560025	2018-09-10	2019-09-09
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	N/A
	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	N/A
	Surges Immunity in accordance with EN 61000-4-5	N/A
	Injected Currents Immunity in accordance with EN 61000-4-6	N/A
	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. Radiated Electromagnetic Disturbances (9kHz to 30MHz)

3.1 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.

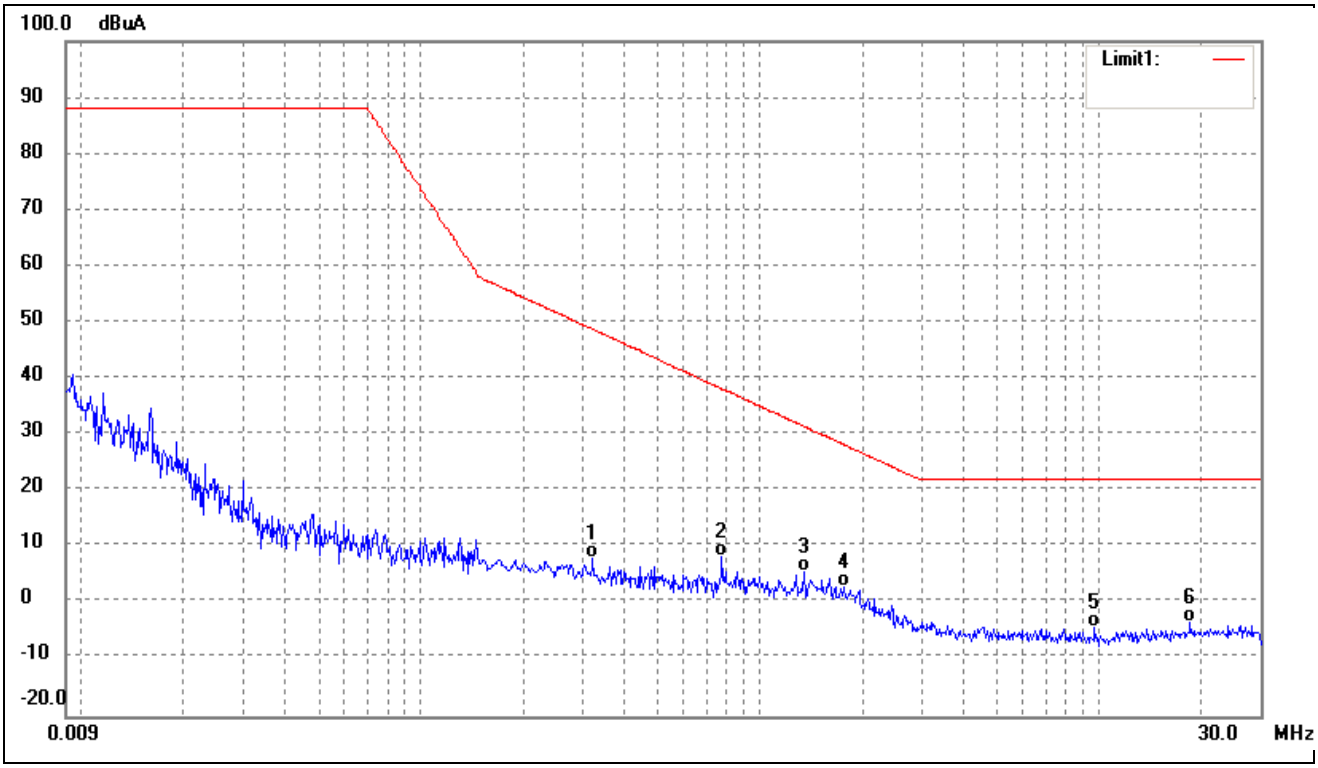
3.2 Test Procedure

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

3.3 Test Result

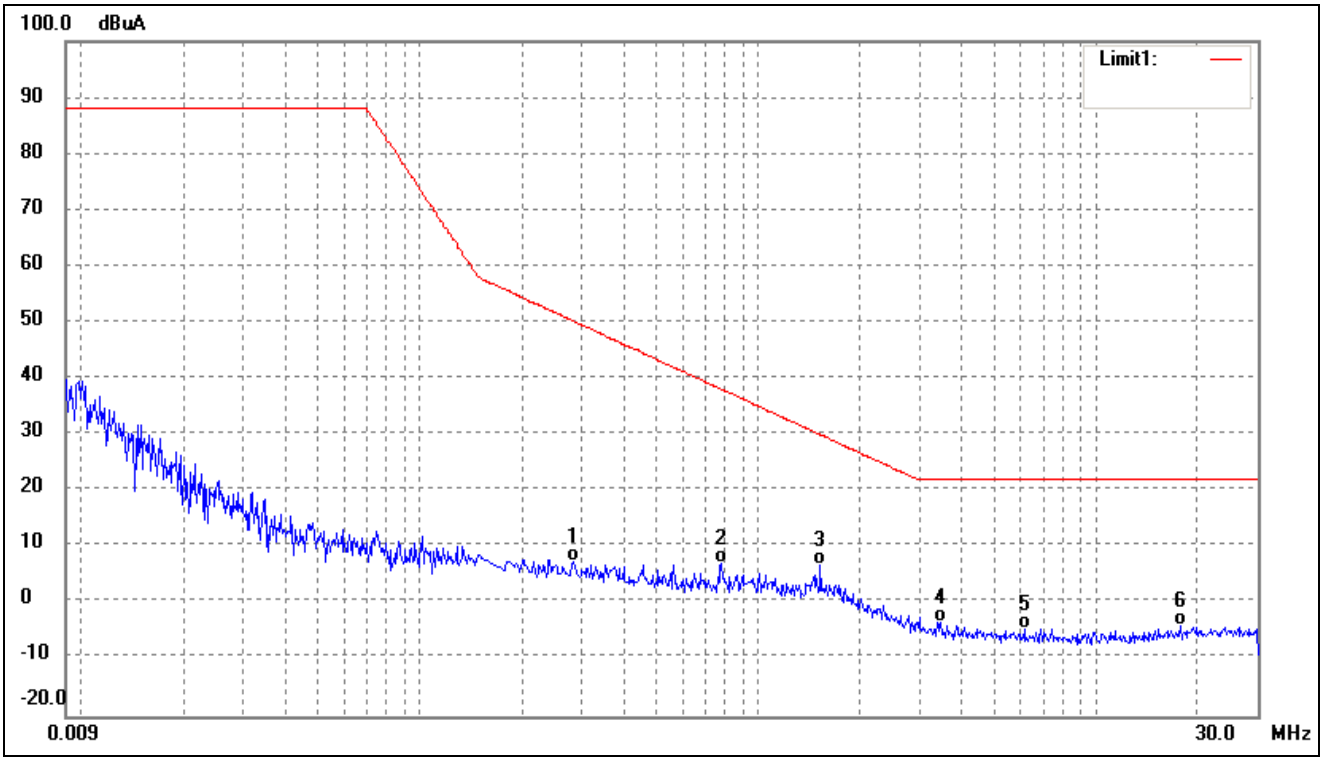
Testing according to limit table 3b and the emissions below 10dB are not report.
Test Result: Pass
Please refer to the plots:

Test mode:	TM1	Polarity:	X



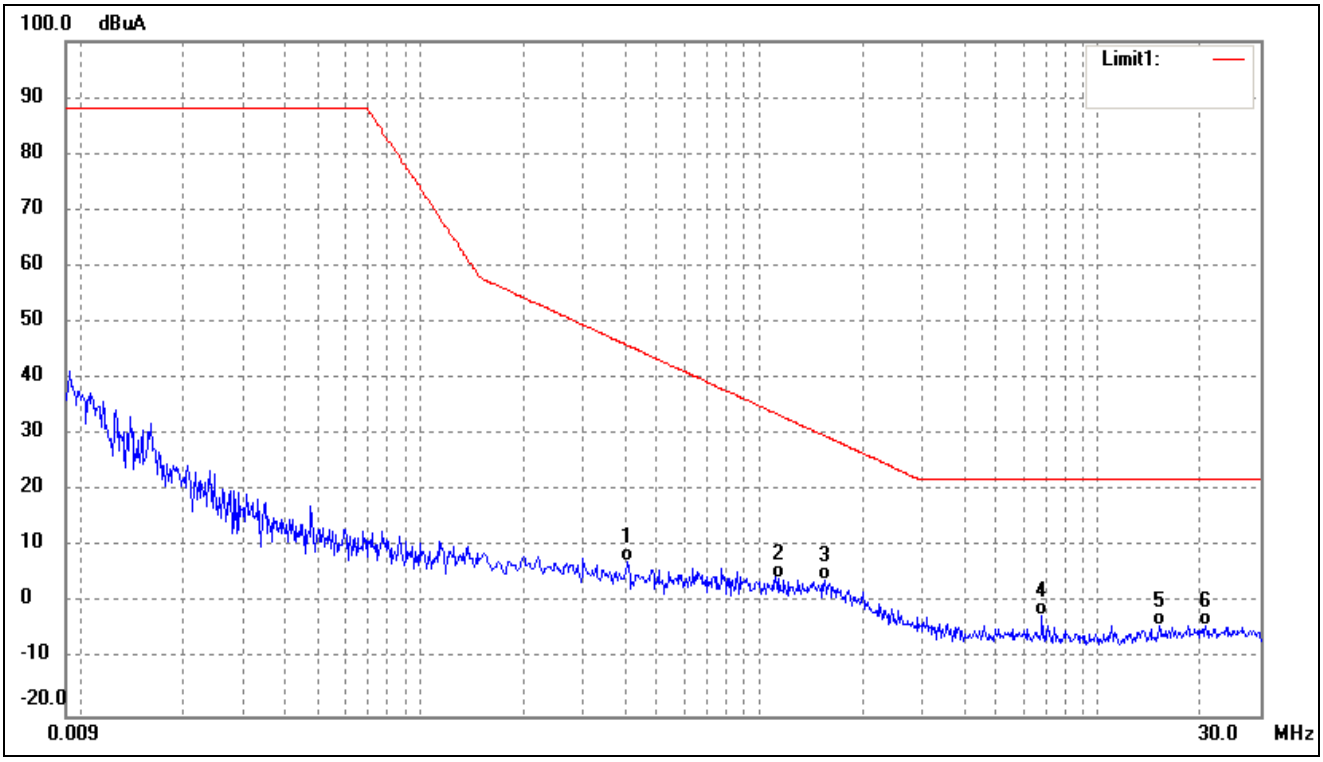
No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.3220	-12.39	20.48	8.09	48.82	-40.73	QP
2	0.7740	-11.81	20.07	8.26	38.28	-30.02	QP
3	1.3540	-14.50	20.24	5.74	31.56	-25.82	QP
4*	1.7700	-17.36	20.44	3.08	28.34	-25.26	QP
5	9.7460	-24.43	20.27	-4.16	22.00	-26.16	QP
6	18.6259	-24.60	21.12	-3.48	22.00	-25.48	QP

Test mode:	TM1	Polarity:	Y



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.2860	-12.96	20.53	7.57	50.24	-42.67	QP
2	0.7820	-12.90	20.07	7.17	38.15	-30.98	QP
3*	1.5380	-13.40	20.33	6.93	30.03	-23.10	QP
4	3.4900	-23.98	20.63	-3.35	22.00	-25.35	QP
5	6.1660	-25.19	20.73	-4.46	22.00	-26.46	QP
6	17.7580	-25.13	21.04	-4.09	22.00	-26.09	QP

Test mode:	TM1	Polarity:	Z



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuA)	(dB/m)	(dBuA)	(dBuA)	(dB)	
1	0.4100	-13.03	20.35	7.32	45.92	-38.60	QP
2	1.1460	-15.80	20.13	4.33	33.56	-29.23	QP
3	1.5580	-16.29	20.34	4.05	29.87	-25.82	QP
4*	6.8540	-22.86	20.59	-2.27	22.00	-24.27	QP
5	15.1220	-24.71	20.77	-3.94	22.00	-25.94	QP
6	20.8220	-25.14	21.26	-3.88	22.00	-25.88	QP

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

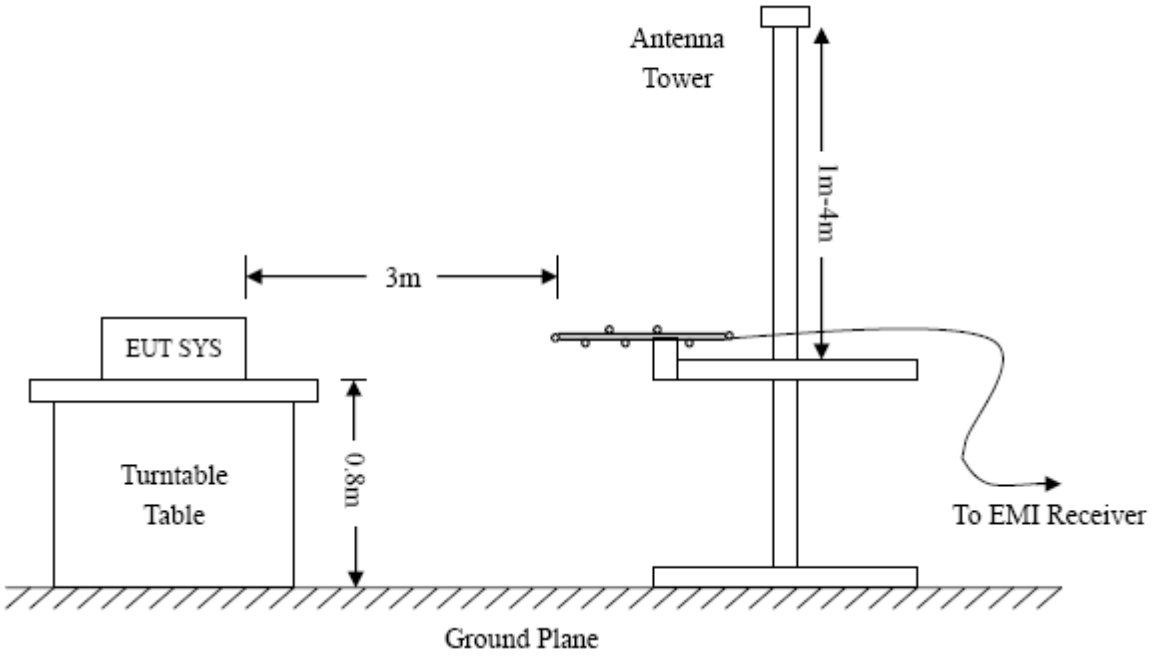
4.1 Measurement Uncertainty

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

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

4.2 Test Procedure

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



4.3 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

4.4 Environmental Conditions

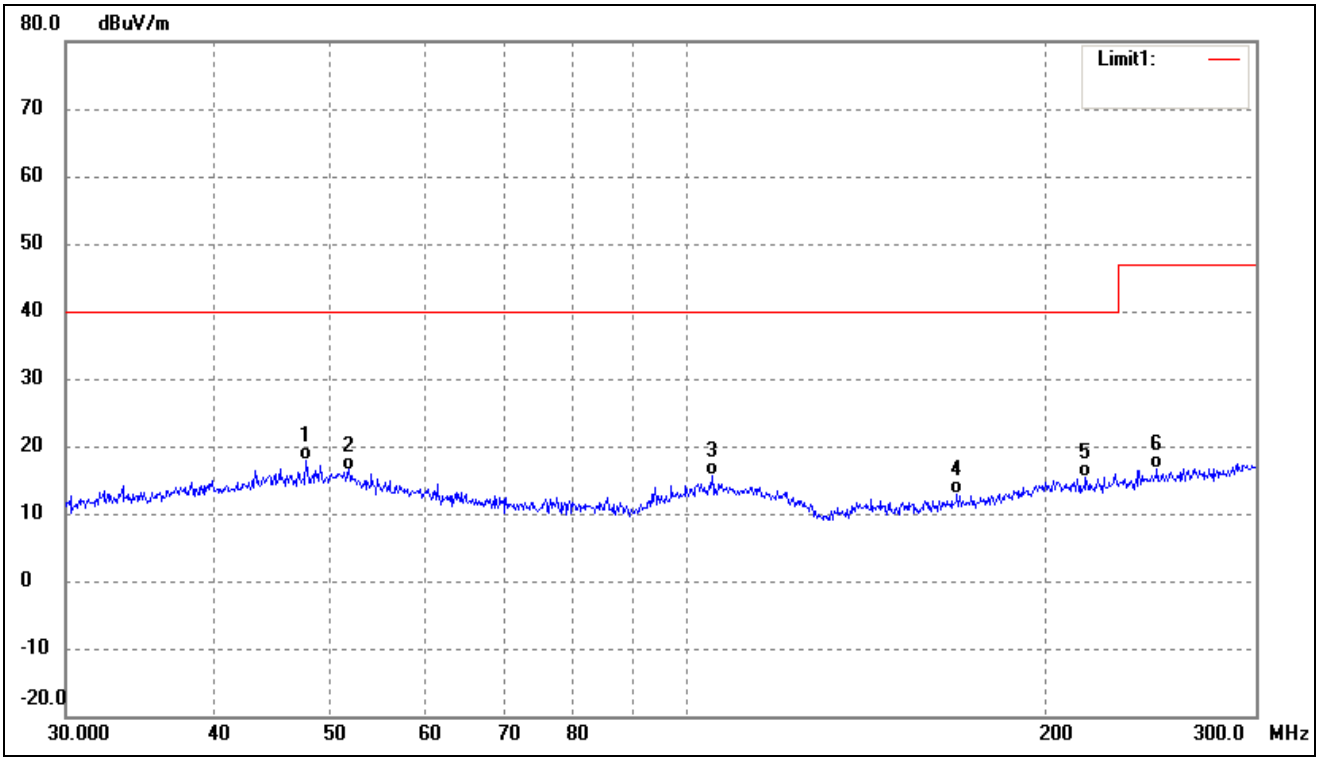
Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

4.5 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:

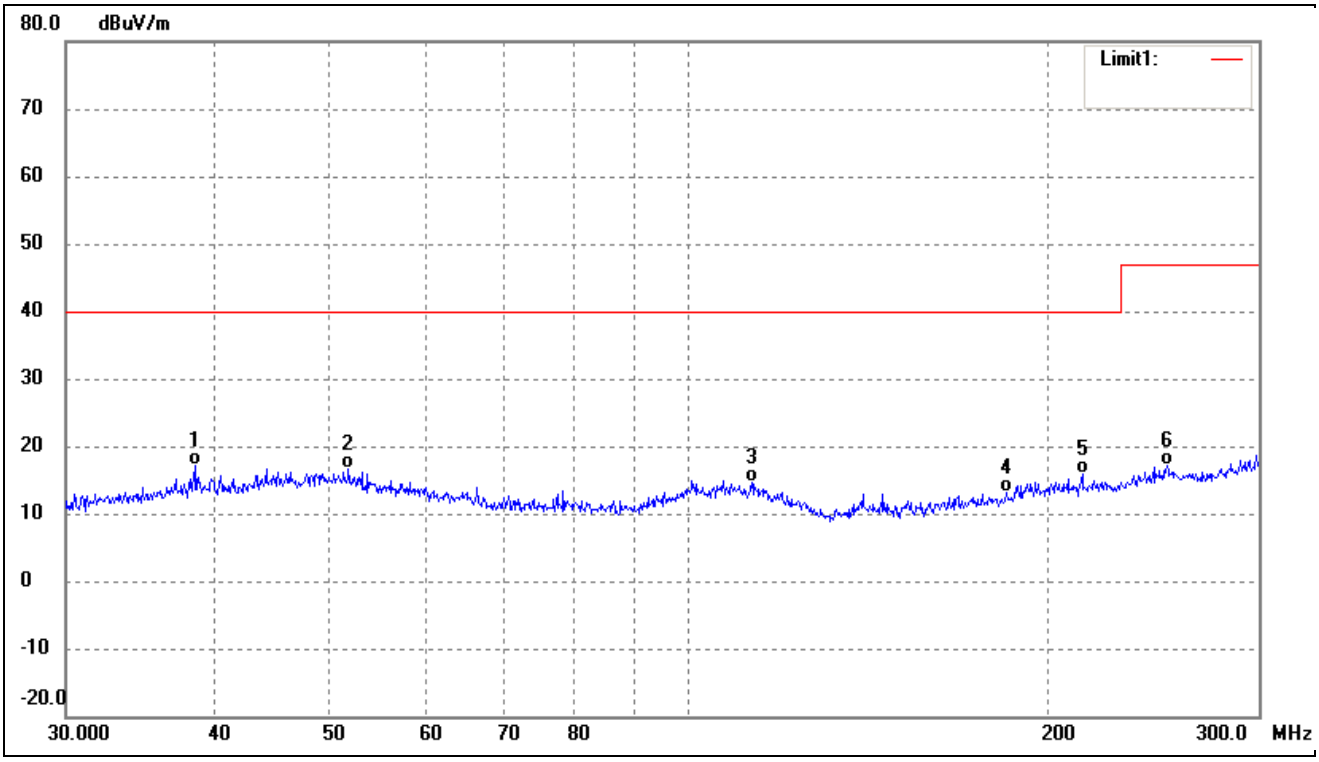
-22.05 dB at **47.7662 MHz** in the **Horizontal** polarization, **30 MHz to 300 MHz, 3 Meters**

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	47.7662	29.09	-11.14	17.95	40.00	-22.05	350	100	QP
2	51.8945	27.93	-11.43	16.50	40.00	-23.50	91	100	QP
3	104.7421	28.63	-13.10	15.53	40.00	-24.47	138	100	QP
4	168.3144	27.80	-14.97	12.83	40.00	-27.17	108	100	QP
5	215.8347	27.76	-12.45	15.31	40.00	-24.69	264	100	QP
6	247.8114	27.69	-11.12	16.57	47.00	-30.43	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	38.5586	29.75	-12.74	17.01	40.00	-22.99	319	100	QP
2	51.7751	27.92	-11.40	16.52	40.00	-23.48	207	100	QP
3	112.7512	27.93	-13.33	14.60	40.00	-25.40	97	100	QP
4	184.5531	27.14	-14.06	13.08	40.00	-26.92	344	100	QP
5	213.3641	28.36	-12.49	15.87	40.00	-24.13	79	100	QP
6	251.2588	28.20	-10.98	17.22	47.00	-29.78	142	100	QP

5. Electrostatic Discharge Immunity (ESD)

5.1 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

5.2 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

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

6.1 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

6.2 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

7. Power Frequency Magnetic Fields

7.1 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

7.2 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

LED Flashlight
Model: Seeker 2
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

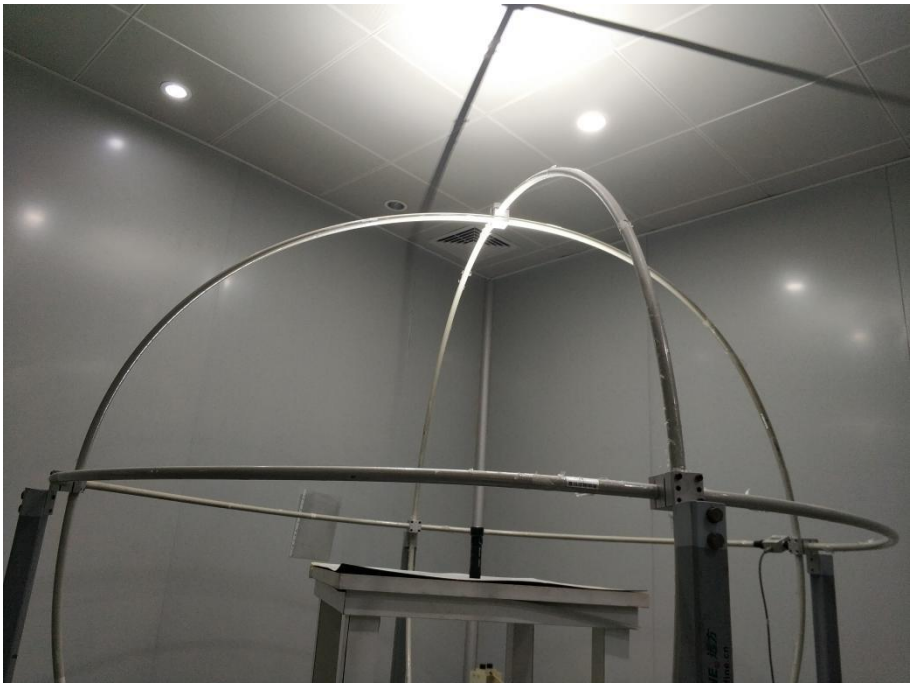


EUT Housing and Board View 1

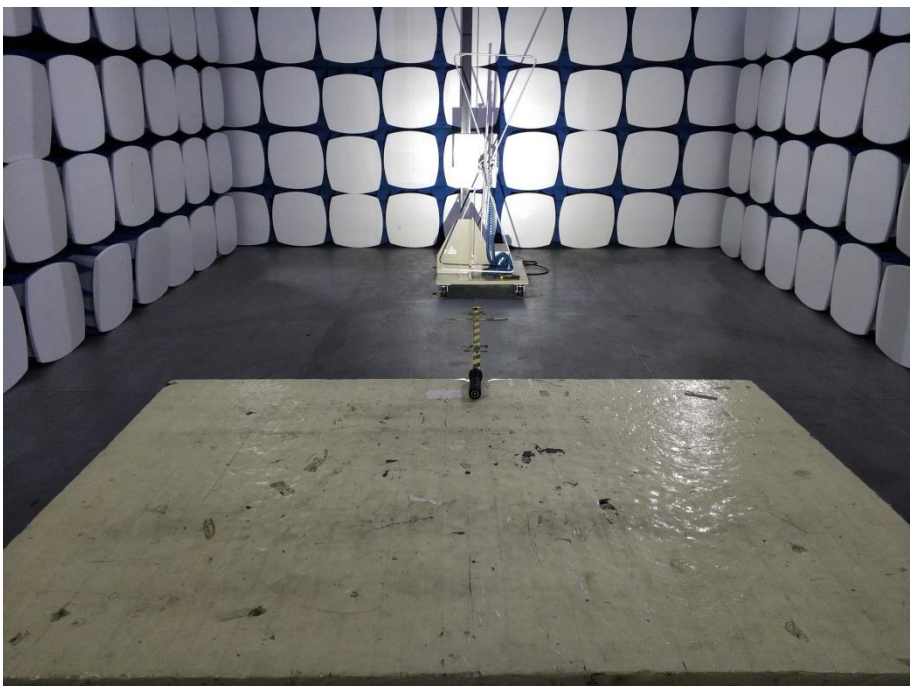


EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

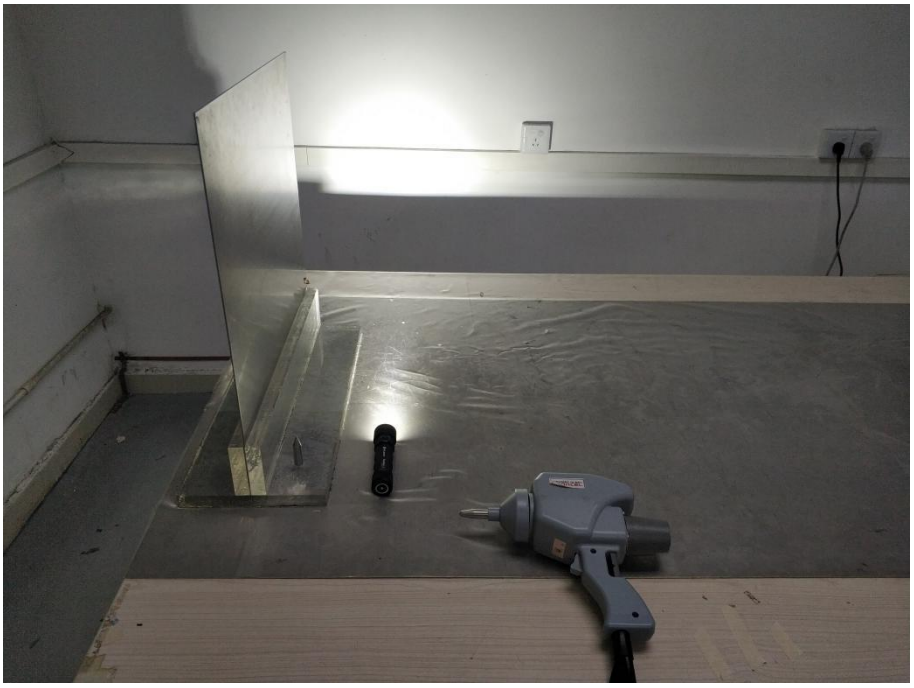
Radiation Emission Test View (9kHz to 30MHz)



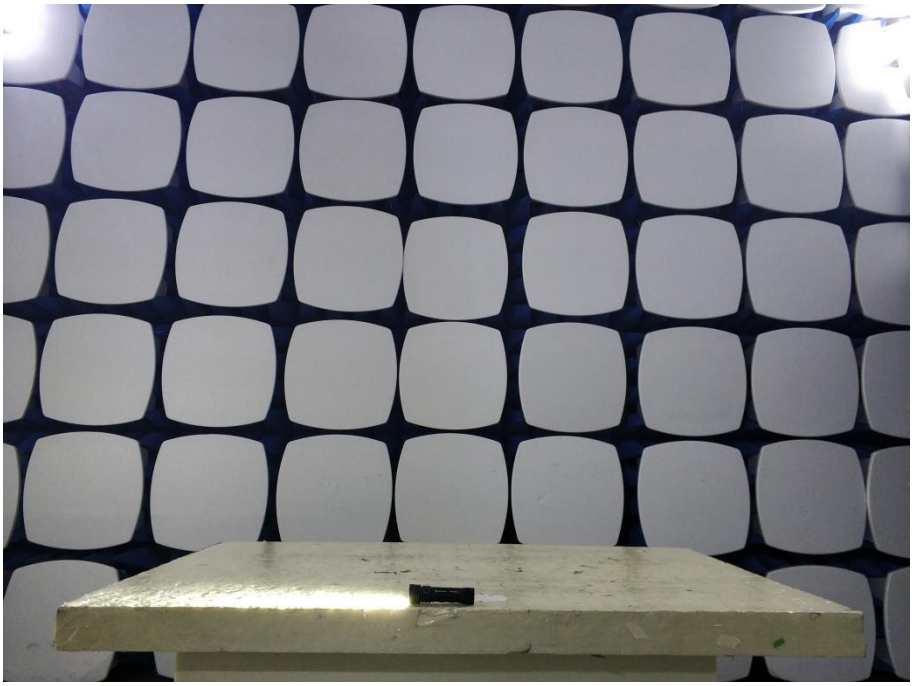
Radiation Emission Test View (30MHz to 300MHz)



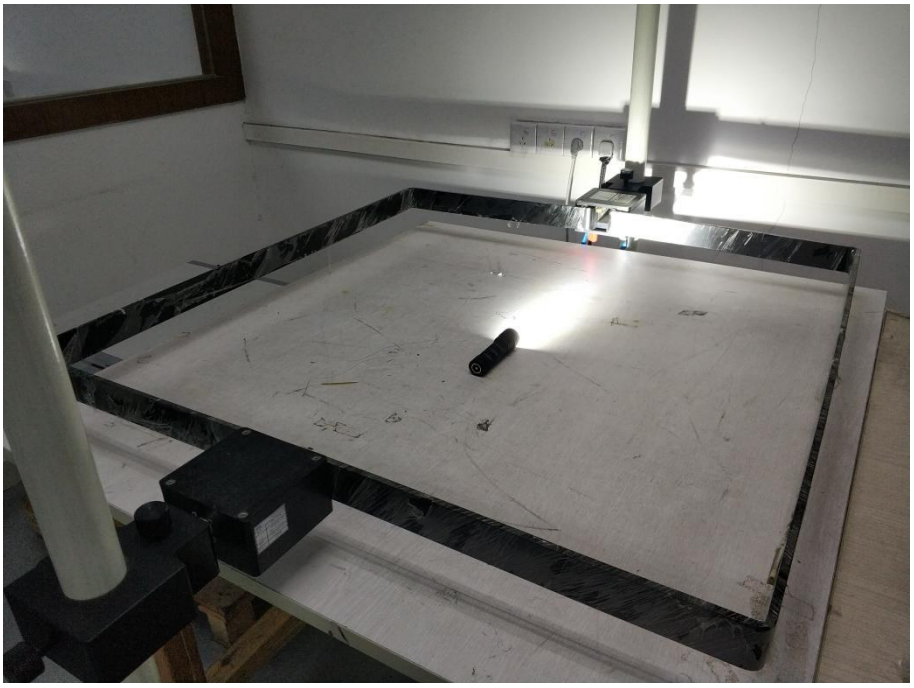
EN 61000-4-2 Test View



EN 61000-4-3 Test View



EN 61000-4-8 Test View



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