

# EMC Test Report

Product : Ball Light String Waterproof Battery Box

Model Number : 10m80L, USB-10m80L.

Prepared for : Linhai Youshang Lighting Factory

Address : Pacific Industrial Park, Dongshen  
Town, Linhai City, Zhejiang Province

Prepared By : Shenzhen WJT Technology Co., Ltd.

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Report No. : WJT220803-EMC-B-01

Date of Test : August.01, 2022 to August.03, 2022

Date of Rep. : August.03,2022

Prepared by(Engineer):



Reviewer(Quality Manager):



Approved by(Technical Director):



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## TEST REPORT VERIFICATION

Applicant : Linhai Youshang Lighting Factory  
Manufacturer : Linhai Youshang Lighting Factory  
EUT : Ball Light String Waterproof Battery Box  
Model No. : 10m80L, USB-10m80L.  
Input Voltage : 4.5VDC,

Measurement Procedure Used:

EN IEC 55015:2019+A11:2020

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

EN 61000-3-3:2013+A1:2019+A2:2021

EN 61547:2009

The device described above is tested by Shenzhen WJT Technology Co., Ltd.. to determine the maximum emission levels emanating from the device and the severe levels that the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen WJT Technology Co., Ltd.. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT is technically compliant with the EN IEC 55015, EN IEC 61000-3-2, EN 61000-3-3 and EN 61547 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen WJT Technology Co., Ltd..

## 1. GENERAL INFORMATION

### 1.1 Description of Device (EUT)

EUT : Ball Light String Waterproof Battery Box  
Model Number : 10m80L, USB-10m80L.  
Test Model Number : 10m80L

*Remark:*

*All models are identical in the same PCB layout, interior structure and electrical circuits. The only differences are the model name and rated ratings.*

*Tests were conducted on model 10m80L to represent the other models.*

Brand : /  
Applicant : Linhai Youshang Lighting Factory  
Address : Pacific Industrial Park, Dongshen  
Town, Linhai City, Zhejiang Province  
Manufacturer : Linhai Youshang Lighting Factory  
Address : Pacific Industrial Park, Dongshen  
Town, Linhai City, Zhejiang Province  
Date of Sample Receipt : August.01, 2022  
Date of Test : August.01, 2022 to August.03, 2022

### 1.2 Measurement Uncertainty

Radiation Emission Uncertainty :  $U_r = 3.3$   
Conduction Emission Uncertainty :  $U_c = 2.8$   
Power clamp Emission Uncertainty :  $U_c = 2.6$

## 2. MEASURING DEVICES AND TEST EQUIPMENT

### 2.1 For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100137	2021-05-17	1 Year
2.	L.I.S.N	Rohde & Schwarz	ESH2-Z6	100253	2021-05-17	1 Year
3.	Pulse Limiter	Rohde & Schwarz	EMV216	100017	2021-05-17	1 Year
4.	50ΩCoaxial Switch	Anritsu	MP59B	6100175589	2021-05-17	1 Year

### 2.2 For Magnetic Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100137	2021-05-17	1 Year
2.	Loop Antenna	Laplace Instrument Ltd	RF300	8006	2021-05-17	1 Year
3.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	2021-05-17	1 Year
4.	RF Cable	FUJIKURA	RG-55/U	LISN Cable	2021-05-17	1 Year
5.	Coaxial Switch	Anritsu	MP59B	M73989	2021-05-17	1 Year

### 2.3 For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Rohde & Schwarz	ESCI	100137	2021-05-17	1 Year
2.	Test Receiver	Rohde & Schwarz	ESCI	100137	2021-05-17	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	143	2021-05-17	1 Year
4.	Power Amplifier	HP	8447F	OPT H64	2021-05-17	1 Year
5.	Positioning Controller	C&C LAB	CC-C-IF	N/A	2021-05-17	1 Year
6.	Color Monitor	SUNSP0	SP-140A	N/A	2021-05-17	1 Year
7.	Single Line Filter	JIANLI	XL-3	N/A	2021-05-17	1 Year
8.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	2021-05-17	1 Year
9.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	2021-05-17	1 Year
10.	DC Power Filter	JIANLI	DL-2X50B	N/A	2021-05-17	1 Year
11.	Cable	Schwarzbeck	PLF-100	N/A	2021-05-17	1 Year
12.	Cable	Rosenberger	CIL02	A0783566	2021-05-17	1 Year
13.	Cable	Rosenberger	AK9513	AC RX1	2021-05-17	1 Year

### 2.4 For Harmonic / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power Frequency Test System	EMTEST	DPA500	U0526100506	2021-05-17	1 Year
2.	PC	LENOVO	T2900D	SS12485803	2021-05-17	N/A

### 2.5 For Electrostatic Discharge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	Schaffner	NSG432	1285	2021-05-17	1 Year

### 2.6 For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	2021-05-17	1 Year

2	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	2021-05-17	1 Year
3	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	2021-05-17	1 Year
4	Power Amplifier	PRANA	AP32MT215	N/A	2021-05-17	1 Year
5	Power Amplifier	MILMEGA	AS0102-55	N/A	2021-05-17	1 Year
6	Signal Generator	AEROFLEX	2023B	N/A	2021-05-17	1 Year
7	Field Strength Meter	HOLADAY	HI-6005	N/A	2021-05-17	1 Year
8	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	2021-05-17	1 Year
9	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	2021-05-17	1 Year

## 2.7 For Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	EM TEST	UCS500M6B	V0526100502	2021-05-17	1 Year
2.	Coupling Clamp	EM TEST	HFK	0605-10	2021-05-17	1 Year

## 2.8 For Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	HAEFELY	PSURGE4.1	080107-04	2021-05-17	1 Year

## 2.9 For Injected Currents Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EM TEST	CWS500C	0900-12	2021-05-17	1 Year
2.	CDN	EM TEST	CDN-M2	5100100100	2021-05-17	1 Year
3	CDN	EM TEST	CDN-M3	0900-11	2021-05-17	1 Year
4	Injection CSWITCHING POWER SUPPLY	EM TEST	F-2031-23MM	368	2021-05-17	1 Year
5	Attenuator	EM TEST	ATT6	0010222A	2021-05-17	1 Year

## 2.10 For Magnetic Field Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	HAEFELY	MAG100	250040.1	2021-05-17	1 Year
2.	AC Transformer	CHOKUN	TDGC2J-5	N/A	N/A	N/A

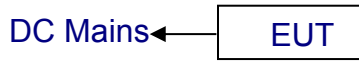
## 2.11 For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HAEFELY	Pline1610	083732-18	2021-05-17	1 Year

### 3. RADIATED EMISSION MEASUREMENT

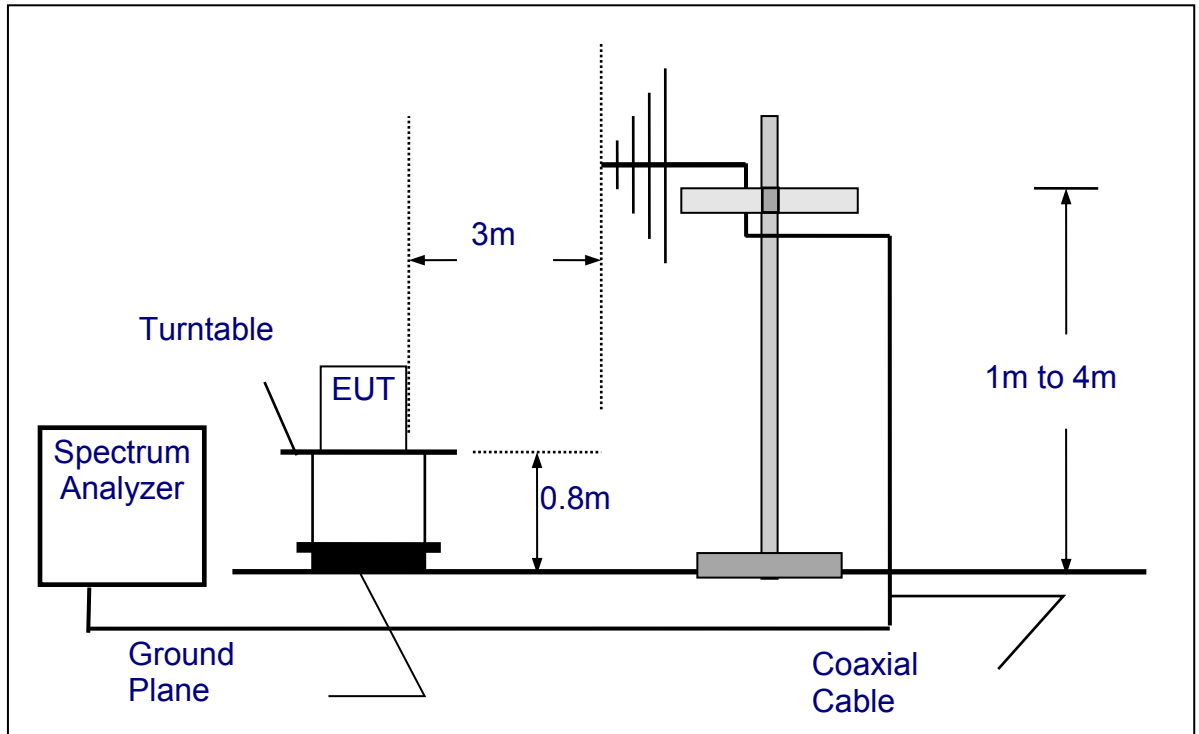
#### 3.1 Block Diagram of Test Setup

3.1.1 Block diagram of connection between the EUT and simulators



(EUT:Ball Light String Waterproof Battery Box)

3.1.2 Block diagram of test setup (In chamber)



(EUT:Ball Light String Waterproof Battery Box)

#### 3.2 Measuring Standard

EN IEC 55015:2019+A11:2020

#### 3.3 Radiated Emission Limits

All emanations from devices or system 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 ~ 300	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.

### 3.4 EUT Configuration on Measurement

The EN 55015 Regulations test method must be used to find the maximum emission during radiated emission measurement. The configuration of the EUT is the same as used in conducted emission measurement.

### 3.5 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog 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 (ESCI) is set at 120kHz.

All scanning waveform is attached in Appendix I.

### 3.6 Measuring Results

**PASS.**

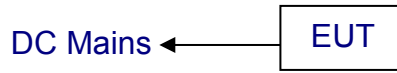
The frequency range from 30MHz to 300MHz is investigated.



## 4. ELECTROSTATIC DISCHARGE TEST

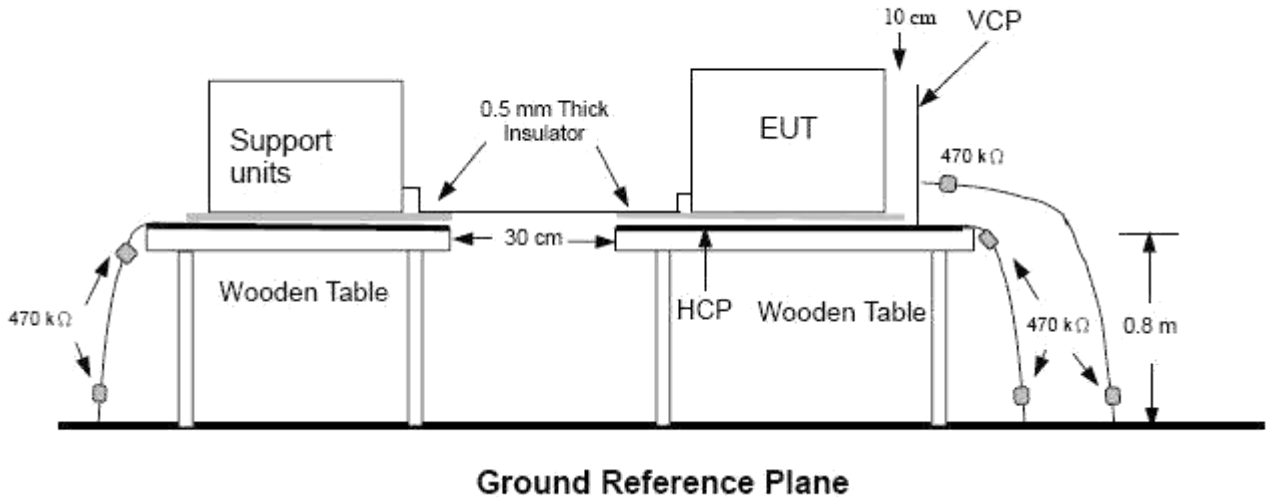
### 4.1 Block Diagram of Test Setup

#### 4.1.1 Block Diagram of connection between the EUT and simulators



(EUT:Ball Light String Waterproof Battery Box)

#### 4.1.2 Block Diagram of ESD Test Setup



(EUT:Ball Light String Waterproof Battery Box)

### 4.2 Test Standard

EN 61547:2009

(EN 61000-4-2 (Severity Level: 2 / Contact Discharge: ±4KV  
Severity Level: 3 / Air Discharge: ±8KV))

### 4.3 Severity Levels and Performance Criterion

#### 4.3.1 Severity Level

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

#### 4.3.2 Performance Criterion: B

### 4.4 EUT Configuration

The configuration of EUT is listed in Section 4.1.1

## 4.5 Operating Condition of EUT

- 4.5.1 Setup the EUT as shown in Section 4.1.
- 4.5.2 Turn on the power of all equipments.
- 4.5.3 Let the EUT work in test mode (ON) and measure it.

## 4.6 Test Procedure

### 4.6.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. Then the generator is 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 discharges are completed.

### 4.6.2 Contact Discharge:

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

### 4.6.3 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.

### 4.6.4 Indirect discharge for vertical coupling plane:

At least 20 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m×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.

## 4.7 Test Results

**PASS.**

Please refer to the following page.

## Electrostatic Discharge Test Results

Applicant : Linhai Youshang Lighting Factory	Test Date : August.01, 2022
EUT : Ball Light String Waterproof Battery Box	Temperature : 23°C
M/N : 10m80L	Humidity : 50%
Power Supply : 4.5V	Test Engineer : Bill
Test Mode : ON	Criterion : B

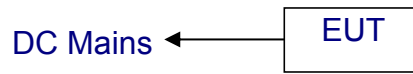
	Test Levels (kV)							
	-2	+2	-4	+4	-6	+6	-8	+8
<b>Air Discharge</b>								
Aperture	A	A	A	A	A	A	A	A
Surface	A	A	A	A	A	A	A	A
<b>Contact Discharge</b>								
/	/	/	/	/				
<b>Test Levels (kV)</b>								
<b>Indirect Contact Discharge(HCP)</b>					<b>Indirect Contact Discharge(VCP)</b>			
	-2	+2	-4	+4	-2	+2	-4	+4
Front	A	A	A	A	A	A	A	A
Bottom	A	A	A	A	A	A	A	A
Side	A	A	A	A	A	A	A	A

Discharges should be conducted on Contact, Air, Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

## 5. MAGNETIC FIELD IMMUNITY TEST

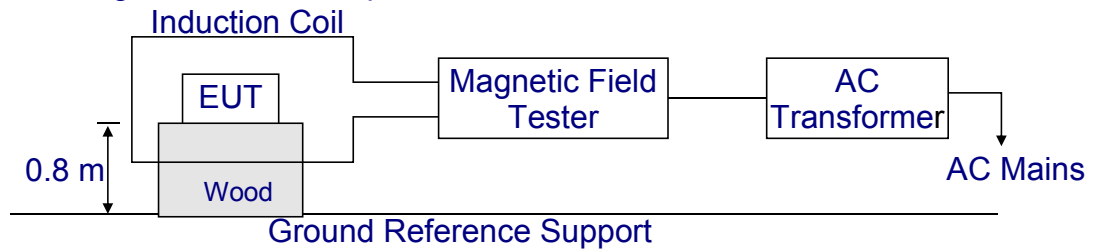
### 5.1 Block Diagram of Test Setup

#### 5.1.1 Block Diagram of the EUT



(EUT:Ball Light String Waterproof Battery Box)

#### 5.1.2 Block Diagram of Test Setup



(EUT:Ball Light String Waterproof Battery Box)

### 5.2 Test Standard

EN 61547:2009

(EN 61000-4-8, Severity Level 2: 3A/m)

### 5.3 Severity Levels and Performance Criterion

#### 5.3.1 Severity level

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

#### 5.3.2 Performance criterion: A

### 5.4 EUT Configuration

The configuration of EUT is listed in Section 3.1.

### 5.5 Operating Condition of EUT

5.5.1 Setup the EUT as shown in Section 5.1.

5.5.2 Turn on the power of all equipments.

5.5.3 Let the EUT work in test mode (ON) and measure it.

## 5.6 Test Procedure

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

## 5.7 Test Results

**PASS.**

Please refer to the following page

## Magnetic Field Immunity Test Results

Applicant : Linhai Youshang Lighting Factory  EUT : Ball Light String Waterproof : Battery Box  M/N : 10m80L  Power Supply : 4.5V	Test Date : August.01, 2022  Temperature : 23°C  Humidity : 50%  Test Engineer : Tina			
Test Mode : ON				
Test Level	Testing Duration	Coil Orientation	Criterion	Result
3A/m	5 mins	X	A	PASS
3A/m	5 mins	Y	A	PASS
3A/m	5 mins	Z	A	PASS
Test Mode :				
Test Level	Testing Duration	Coil Orientation	Criterion	Result
Remark:			Test Equipment: Magnetic Field Tester MAG100 AC Transformer TDGC2J-5	

## 6. APPENDIX

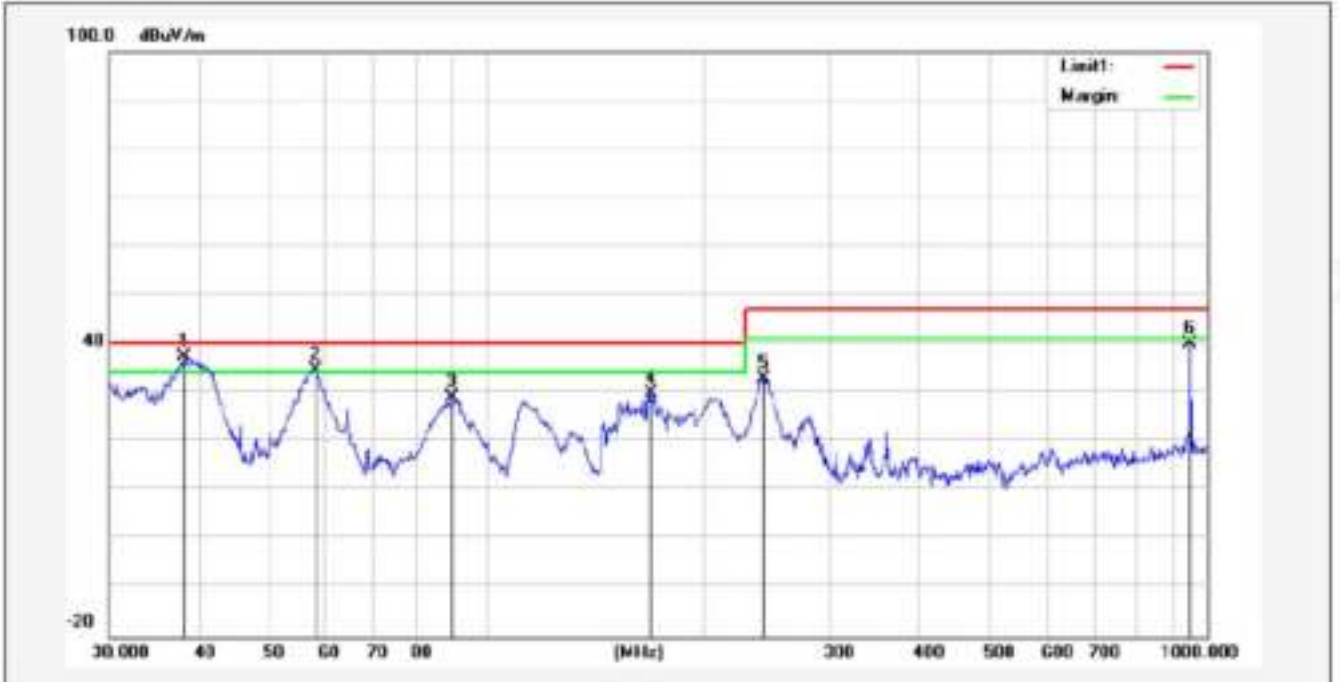
### 6.1 APPENDIX I

EUT	: Ball Light String Waterproof Battery Box	Applicant	: Linhai Youshang Lighting Factory
M/N	: 10m80L	Mode	: ON
Test Item	: Radiation Emission	Ant. Polarization	: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	30.3173	40.80	-7.40	33.40	40.00	-6.60			peak
2	33.4449	39.78	-9.85	29.93	40.00	-10.07			peak
3	164.3302	46.42	-17.21	29.21	40.00	-10.79			peak
4	206.3976	48.80	-17.44	31.36	40.00	-8.64			peak
5	244.2321	49.57	-17.63	31.94	47.00	-15.06			peak
6	948.7610	46.14	-6.15	39.99	47.00	-7.01			peak

EUT : Ball Light String Waterproof Applicant : Linhai Youshang Lighting  
 Battery Box Factory  
 M/N : 10m80L Mode : ON  
 Test Item : Radiation Emission Ant. Polarization : Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	38.2120	50.78	-13.45	37.33	40.00	-2.67			peak
2†	57.9993	56.28	-21.53	34.75	40.00	-5.25			peak
3	89.9047	50.21	-21.25	28.96	40.00	-11.04			peak
4	169.5990	47.24	-17.26	29.98	40.00	-10.02			peak
5	243.3772	50.51	-17.66	32.85	47.00	-14.15			peak
6	948.7610	46.36	-6.15	40.21	47.00	-6.79			peak



### 6.2 APPENDIX II Photos of EUT

#### Photo documentation

Type of equipment, model: Ball Light String Waterproof Battery Box, 10m80L





\*\*\*\*\*End of Report\*\*\*\*\*