



Shenzhen HTT Technology Co., Ltd.

Report No.: HTT190304316ER

# CE EMC TEST REPORT

**Product: LED outdoor light flashlight**

**Model: 911COB**

**Report No.: HTT190304316ER**

**Issued Date: Mar.21,2019**

Issued for:

**Hangzhou Zorro Outdoor Products Co., Ltd.  
209#, Building 1, No. 1672, South Ring Road, Binjiang District,  
Hangzhou, Zhejiang, China**

Issued By:

**Shenzhen HTT Technology Co., Ltd.  
7F,A Building,Smart valley Science and technology innovation  
Park,Xixiang,Baoan District,Shenzhen,Guangdong,China**

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# 1 TEST CERTIFICATION

**Product:** LED outdoor light flashlight

**Model:** 911COB

**Trade Mark :** E-SMARTER

**Applicant:** Hangzhou Zorro Outdoor Products Co., Ltd.  
209#, Building 1, No. 1672, South Ring Road, Binjiang District, Hangzhou, Zhejiang, China

**Manufacturer:** Hangzhou Zorro Outdoor Products Co., Ltd.  
209#, Building 1, No. 1672, South Ring Road, Binjiang District, Hangzhou, Zhejiang, China

**Tested:** Mar.18,2019~Mar.21,2019

**Applicable Standards:** EN 55015: 2013+A1:2015  
EN 61547:2009  
EN 61000-3-2: 2014  
EN 61000-3-3: 2013

### Deviation from Applicable Standard

None

The above equipment has been tested by Shenzhen HTT Technology Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:** Jack Chen

**Date:** Mar.21,2019

**Check By:** Ervin Xu

**Date:** Mar.21,2019

**Approved By:** Kevin Yang  
(Kevin Yang)

**Date:** Mar.21,2019





## 2 TEST RESULT SUMMARY

EMISSION			
Standard	Item	Result	Remarks
EN 55015: 2013+A1:2015	Conducted (Main Port)	N/A	Meet limit
	Radiated Electromagnetic Disturbance	Pass	Meet limit
	Radiated	Pass	Meet limit
EN 61000-3-2: 2014	Harmonic current emissions	N/A	Meet limit
EN 61000-3-3: 2013	Voltage fluctuations & flicker	N/A	Meet limit

IMMUNITY [EN 61547: 2009]			
Standard	Item	Result	Remarks
EN 61000-4-2:2009	ESD	Pass	Meets the requirements of Performance Criterion B
EN 61000-4-3:2006+A1:2008 +A2:2010	RS	Pass	Meets the requirements of Performance Criterion A
EN 61000-4-4:2012	EFT	N/A	Meets the requirements of Performance Criterion B
EN 61000-4-5:2014	Surge	N/A	Meets the requirements of Performance Criterion B
EN 61000-4-6:2014+AC:2015	CS	N/A	Meets the requirements of Performance Criterion A
EN 61000-4-8: 2010	PFMF	N/A	Meets the requirements
EN 61000-4-11:2004+A1:2017	Voltage dips & voltage variations	N/A	Meets the requirements of <b>Voltage dips and variations</b> 1) 30% reduction performance Criterion C 2)100% reduction performance Criterion B

- Note:**
1. The test result judgment is decided by the limit of test standard
  2. The information of measurement uncertainty is available upon the customer's request.



Shenzhen HTT Technology Co., Ltd.

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### 3 EUT DESCRIPTION

<b>Product</b>	LED outdoor light flashlight
<b>Model</b>	911COB
<b>Applicant</b>	Hangzhou Zorro Outdoor Products Co., Ltd.
<b>Housing material</b>	Metal
<b>EUT Type</b>	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.
<b>Serial Number</b>	N/A
<b>EUT Power Rating</b>	DC 4.2V, 500mAh, 5W
<b>AC Line</b>	N/A

#### I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
N/A	N/A	N/A

#### Model list and Models difference

No.	Model Number	Tested With
1	911COB	<input checked="" type="checkbox"/>
Other models	WT-01, SK68, R5-T6, A077, X10, 2816TD, K22, T16, U518, CDBX2, W052, W051, S580, W832, W838, W839, K16, C8, 838SD	<input type="checkbox"/>

NOTE: 911COB is tested model, other models are derivative models, The models are identical in circuit , only different on the model names, size, So the test data of 911COB can represent the remaining models.



## 4 TEST METHODOLOGY

### 4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the thereafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode		
Emission	Conducted Emission	Mode: Lighting
	Radiated Electromagnetic Disturbance	Mode: Lighting
	Radiated Emission	Mode: Lighting
Immunity		Mode: Lighting

After the preliminary scan, the following test mode was found to produce the highest emission level.

The Worst Mode		
Emission	Conducted Emission	Mode: Lighting
	Radiated Electromagnetic Disturbance	Mode: Lighting
	Radiated Emission	Mode: Lighting
Immunity		Mode: Lighting

### 4.2. EUT SYSTEM OPERATION

1. Set up EUT with the support equipments.
2. Make sure the EUT work normally during the test.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST





## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at HTT Lab.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 15. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	<b>FCC</b>
	<b>TIMCO</b>
<b>Japan</b>	<b>VCCI</b>
<b>Canada</b>	<b>INDUSTRY CANADA</b>
<b>Germany</b>	<b>TUV</b>
	<b>EMCC</b>

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty	
Conducted emissions	9kHz~30MHz	+/- 3.59dB	
Radiated electromagnetic	9kHz~30MHz	+/- 4.77dB	
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.





## 7 EMISSION TEST

### 7.1. CONDUCTED EMISSION MEASUREMENT

#### 7.1.1. LIMITS

FREQUENCY (MHz)	LIMITS(dBuV)	
	Quasi-peak	Average
0.009-0.05	110	N/A
0.05-0.15	90 - 80	N/A
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from EUT or system, shall not exceed the level of field strengths specified above.

#### 7.1.2. TEST INSTRUMENTS

Conducted Emission Shielding Room Test Site (843)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/09/2019
LISN	AFJ	LS16	16010222119	06/09/2019
LISN(EUT)	Mestec	AN3016	04/10040	06/09/2019

**NOTE:**

- (1) The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).
- (2). N.C.R = No Calibration Request.



### **7.1.3. TEST PROCEDURES**

#### **Procedure of Preliminary Test**

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 9 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in Item 3.1 were scanned during the preliminary test.

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.

The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

#### **Procedure of Final Test**

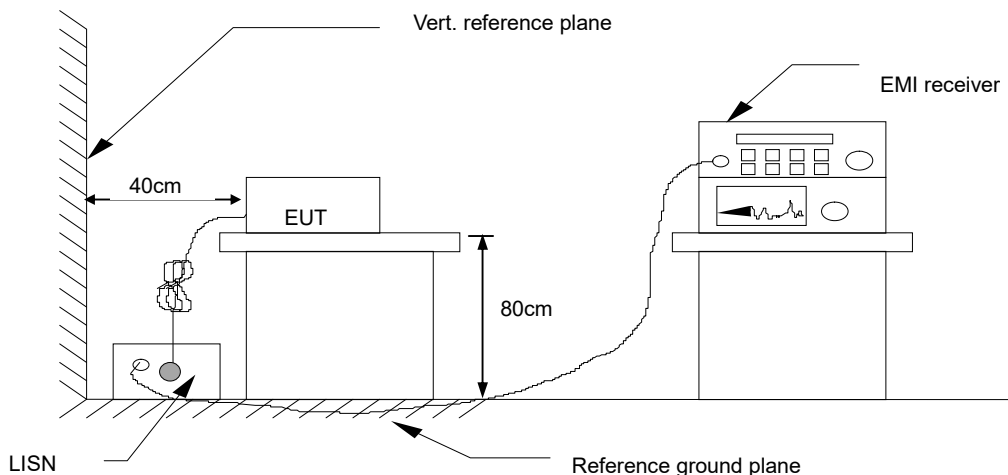
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.



**7.1.4. TEST SETUP**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.1.5. TEST RESULTS**

<b>6dB Bandwidth</b>	10 KHz	<b>Environmental Conditions</b>	26°C, 60% RH
<b>Test Mode</b>	Lighting	<b>Test Result</b>	N/A
<b>Detector Function</b>	Peak / Quasi-peak/AV	<b>Test By</b>	Jack Chen

**NOTE:**

- L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).
- “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- Freq. = Emission frequency in MHz
- Reading level(dBuV) = Receiver reading
- Corr. Factor (dB) = attenuator + Cable loss
- Level (dBuV) = Reading level(dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Level (dBuV) – Limits (dBuV)
- Q.P.=Quasi-Peak



## 7.2. RADIATED ELECTROMAGNETIC DISTURBANCE

### 7.2.1. LIMITS

Frequency	Limits for loop diameter dB( $\mu$ A)*		
	2m	3m	4m
9KHz-70KHz	88	81	75
70KHz-150KHz	88-58**	81-51**	75-45**
150KHz-3.0MHz	58-22**	51-22**	45-16**
3.0MHz-30MHz	22	15-16***	9-12***

\* At the transition frequency, the lower limit applies.

\*\* Decreasing linearly with the logarithm of the frequency.

\*\*\* Increasing linearly with the logarithm of the frequency.

Note: In Japan, the limits for frequencies 9KHz to 150KHz do not apply.

### 7.2.2. TEST INSTRUMENTS

Radiated Electromagnetic Emission Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/09/2019
Triple-Loop Antenna	EVERFINE	LLA-2	N/A	06/09/2019

**NOTE:** (1). The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

(2). N.C.R = No Calibration Request.



### **7.2.3. TEST PROCEDURE**

In the frequency range 9KHz to 30MHz the interference capability of the magnetic field component of the radiation of Equipment Under Test (EUT) can be determined by using a special Loop Antenna System (LAS). In the LAS, this capability is measured in terms of the currents induced by the magnetic field in the loop antennas of the LAS. The LAS allows indoor measurement.

The LAS consists of three circular, mutually perpendicular Large-Loop Antennas (LLAs), having a diameter of 2 m, supported by a non-metallic base. A 50Ω coaxial cable between the current probe of an LLA and the coaxial switch, and between this switch and the measuring equipment, shall have a surface transfer impedance smaller than 10mΩ/m at 100KHz and 1mΩ/m at 10MHz.

The distance between the outer diameter of the loop antenna system and nearby objects, such as floor and walls, shall be at least 0.5m as per CISPR 15/ EN55015.

The EUT is positioned in the center of the LAS (To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT are limited so that the distance between the EUT and an LLA is at least 0.2m). Cables should be routed together and leave the loop volume in the same octant of the cell, no closer than 0.4m to the LAS loops.

The induced current in the loop antenna is measured by means of a current probe(1V/A) and the CISPR measuring receiver(or equivalent). By means of a coaxial switch, the three field direction(X, Y, Z) can be measured in sequence, and recorded at least the six highest emission. Each value shall fulfill the requirement given.

The test data of the worst-case condition(s) was recorded.

### **7.2.4. TEST SETUP**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



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### 7.2.5 TEST RESULTS

<b>Test Mode</b>	Lighting	<b>Environmental Conditions</b>	26°C,60% RH
<b>6dB Bandwidth</b>	10 KHz	<b>Antenna Pole</b>	X,Y,Z
<b>Antenna Diameter</b>	2m	<b>Detector Function</b>	Peak
<b>Test Result</b>	Pass	<b>Test By</b>	Jack Chen

Freq. = Emission frequency in MHz

Reading level (dBuA) = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement (dBuA) = Reading level (dBuA) + Corr. Factor (dB)

Limit (dBuA) = Limit stated in standard

Margin (dB) = Measurement (dBuA) – Limits (dBuA)



### 7.3. RADIATED EMISSION MEASUREMENT

#### 7.3.1. LIMITS

FREQUENCY (MHz)	dBuV/m (At 3m)
30 ~ 230	40
230 ~ 300	47

**NOTE:** (1) The lower limit shall apply at the transition frequencies.  
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

#### 7.3.2. TEST INSTRUMENTS

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/09/2019
Spectrum Analyzer	R&S	FSU	100114	06/09/2019
Pre Amplifier	H.P.	HP8447E	2945A02715	06/09/2019
Bilog Antenna	SUNOL Sciences	JB3	A021907	06/09/2019
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/09/2019
System-Controller	CCS	N/A	N/A	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R = No Calibration Request.



### **7.3.3. TEST PROCEDURE**

#### **Procedure of Preliminary Test**

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

Support equipment, if needed, was placed as per EN 55015.

All I/O cables were positioned to simulate typical usage as per EN 55015.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in EN 55015. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Analyzer / Receiver quickly scanned from 30MHz to 300MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in Item 3.1 were scanned during the preliminary test:

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

#### **Procedure of Final Test**

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Analyzer / Receiver scanned from 30MHz to 300MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

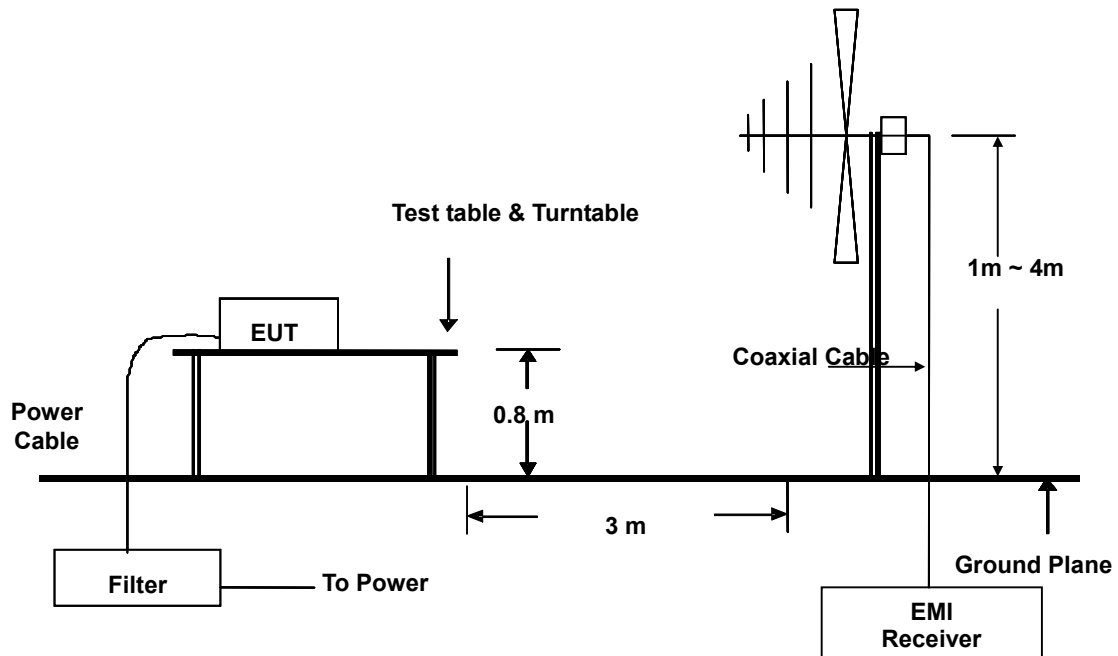
Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.





**7.3.4. TEST SETUP**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

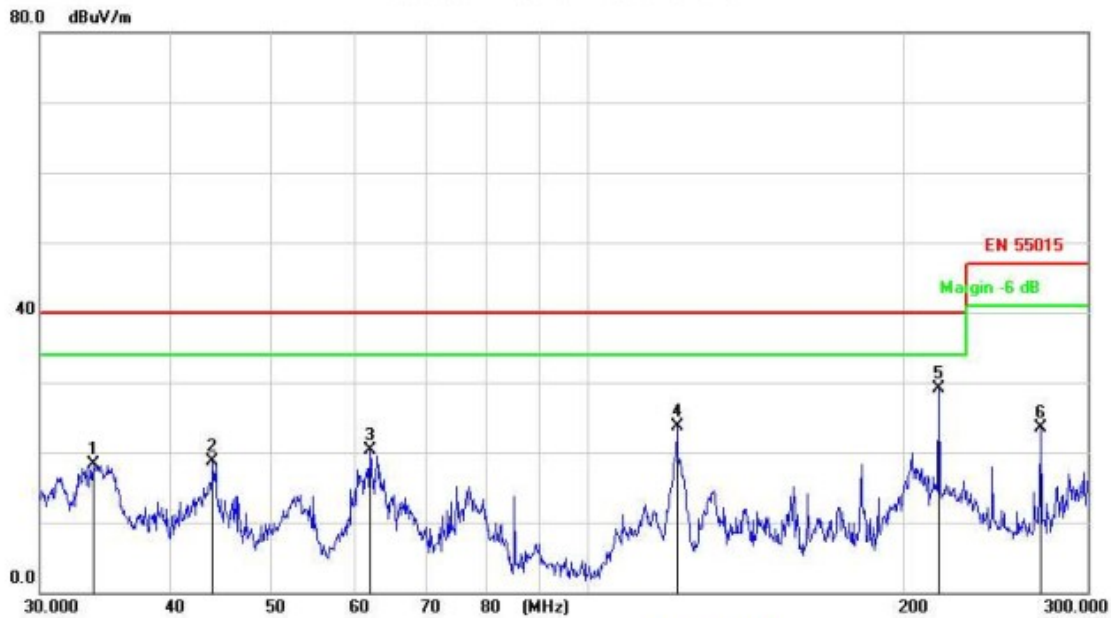
<b>Test Mode</b>	Lighting	<b>Environmental Conditions</b>	26°C,55% RH
<b>6dB Bandwidth</b>	120 KHz	<b>Antenna Distance</b>	3m
<b>Antenna Pole</b>	Vertical / Horizontal	<b>Detector Function</b>	Peak / Quasi-peak
<b>Tested by</b>	Jack Chen		

**7.3.5 TEST RESULTS**

Freq. = Emission frequency in MHz  
 Reading level (dBuV) = Receiver reading  
 Corr. Factor (dB) = Antenna factor + Cable loss  
 Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)  
 Limit (dBuV) = Limit stated in standard  
 Margin (dB) = Measurement (dBuV) – Limits (dBuV)



**Radiated Emission Measurement**



Site LAB

Polarization: *Horizontal*

Temperature:

Limit: EN 55015

Power:

Humidity: %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree degree	Detector	Comment
1		33.7381	34.69	-16.45	18.24	40.00	-21.76			peak	
2		43.8653	34.39	-15.76	18.63	40.00	-21.37			peak	
3		61.9614	38.89	-18.55	20.34	40.00	-19.66			peak	
4		121.6526	44.14	-20.41	23.73	40.00	-16.27			peak	
5	*	216.3322	47.97	-18.89	29.08	40.00	-10.92			peak	
6		270.4713	42.11	-18.65	23.46	47.00	-23.54			peak	



**Radiated Emission Measurement**



Site LAB Polarization: *Vertical* Temperature:  
 Limit: EN 55015 Power: Humidity: %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		31.2695	41.24	-17.78	23.46	40.00	-16.54	peak		
2		43.4632	32.27	-15.69	16.58	40.00	-23.42	peak		
3	*	59.9959	49.12	-18.25	30.87	40.00	-9.13	peak		
4		85.1376	45.47	-22.67	22.80	40.00	-17.20	peak		
5		121.6526	43.64	-20.41	23.23	40.00	-16.77	peak		
6		182.4405	37.34	-20.27	17.07	40.00	-22.93	peak		

**7.4. HARMONICS CURRENT MEASUREMENT****7.4.1. LIMITS OF HARMONICS CURRENT MEASUREMENT**

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

**NOTE:** 1. Class A and Class D are classified according to item 4.4.3.

2. According to section 7 of EN 61000-3-2, the above limits apply for all equipments with a rated power more than 75W, except for lighting equipment.

**7.4.2. TEST INSTRUMENTS**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Harmonic & Flicker Tester	California instruments	PACS-3	SB2588/01	06/09/2019
AC Power Source	California instruments	5001iX-CTS-40	SB2588	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### **7.4.3. TEST PROCEDURE**

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under LIGHTING operating conditions for each successive harmonic component in turn.

The classification of EUT is according to section 5 of EN 61000-3-2.

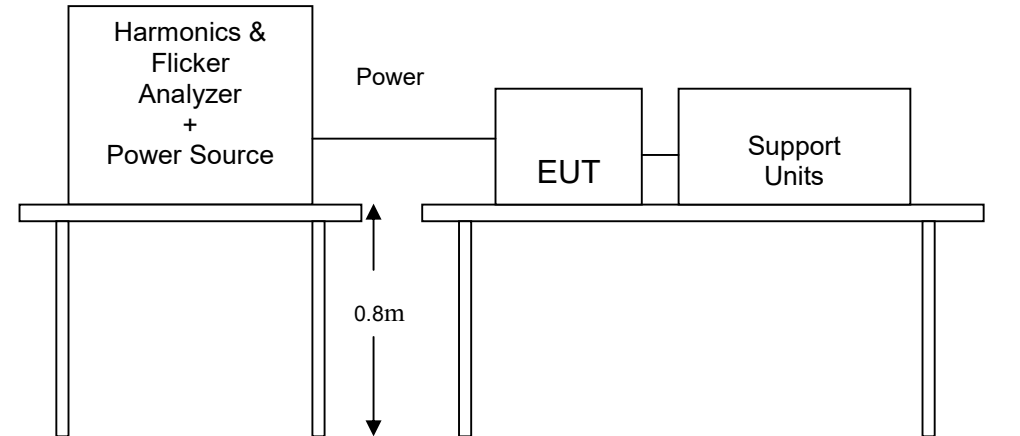
The EUT is classified as follows:

- Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
- Class B: Portable tools; Arc welding equipment which is not professional equipment.
- Class C: Lighting equipment.
- Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.



### 7.4.4. TEST SETUP



For the actual test configuration, please refer to the related item .

### 7.4.5. TEST RESULTS

<b>Test Results</b>	N/A	<b>ENVIRONMENTAL CONDITIONS</b>	25.5deg.C, 55% RH, 992 hPa
<b>Limits</b>	Class <input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D	<b>Test Mode</b>	Lighting
<b>Tested by</b>	Jack Chen		

**NOTE:** 1. Limits classified according to item 7.3.1.

2. There is no need for Harmonics test to be performed on this product(rated power is less than 25W) in accordance with EN 61000-3-2:2014.

For further details, please refer to Clause 7 of EN 61000-3-2:2014 which states:

“For the following categories of equipment, limits are not specified in this edition of the standard: equipment with a rated power of 25W or less, other than lighting equipment.”



## 7.5. VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

### 7.5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST ITEM	LIMIT	REMARK
$P_{st}$	1.0	$P_{st}$ means short-term flicker indicator.
$P_{lt}$	0.65	$P_{lt}$ means long-term flicker indicator.
$T_{dt}$ (ms)	500	$T_{dt}$ means maximum time that dt exceeds 3 %.
$d_{max}$ (%)	4%	$d_{max}$ means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

### 7.5.2. TEST INSTRUMENTS

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Harmonic & Flicker Tester	California instruments	PACS-3	SB2588/01	06/09/2019
AC Power Source	California instruments	5001iX-CTS-40	SB2588	06/09/2019

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

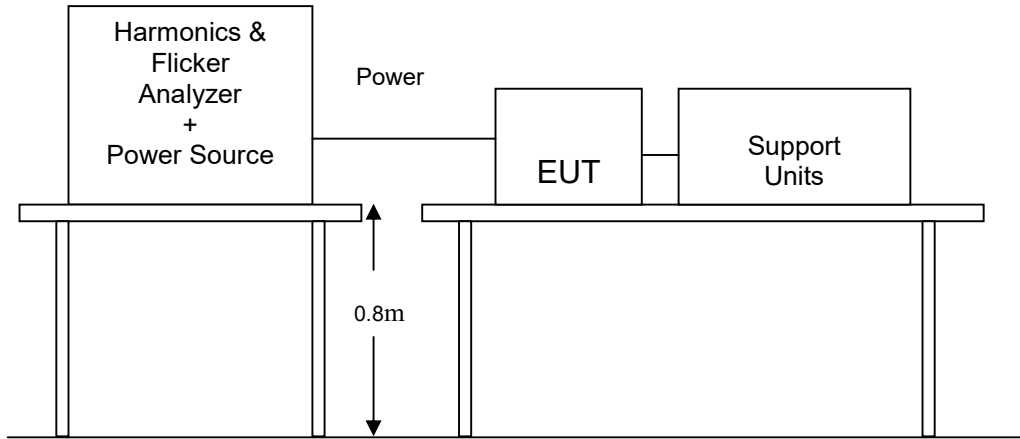
### 7.5.3. TEST PROCEDURE

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under LIGHTING operating conditions.

During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.



### 7.5.4. TEST SETUP



For the actual test configuration, please refer to the related item.

### 7.5.5. TEST RESULTS

<b>OBSERVATION PERIOD (Tp)</b>	10mins	<b>Test Mode</b>	Lighting
<b>ENVIRONMENTAL CONDITIONS</b>	25.5deg.C, 55% RH, 996 hPa	<b>Test Result</b>	N/A
<b>Tested by:</b>	Jack Chen		





## 8 IMMUNITY TEST

### 8.1. GENERAL DESCRIPTION

Product Standard	EN 61547: 2009	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: 1kV, Signal line: 0.5kV, Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power Port ~ Line to line: 0.5kV, Line to ground: 1kV ( to self-ballasted lamps and semi-luminaires;luminaires and independent auxiliaries which are less than 25W) Power Port ~ Line to line: 1kV, Line to ground: 2kV (to luminaires and independent auxiliaries which are more than 25W) Signal Port : 0.5kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test –CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	EN 61000-4-8	Power frequency magnetic field immunity test 50 Hz, 3A/m Performance Criterion A
	EN 61000-4-11	Voltage Dips and Interruptions: ii) 30% reduction for 10 period, Performance Criterion C 100% reduction for 0.5 period Performance Criterion B



## 8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

<b>Criteria A:</b>	During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
<b>Criteria B:</b>	During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.
<b>Criteria C:</b>	During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to LIGHTING if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.



### 8.3. ELECTROSTATIC DISCHARGE (ESD)

#### 8.3.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-2
<b>Discharge Impedance:</b>	330ohm
<b>Charging Capacity:</b>	150pF
<b>Discharge Voltage:</b>	Air Discharge: 8 kV (Direct) Contact Discharge: 4 kV (Direct/Indirect)
<b>Polarity:</b>	Positive & Negative
<b>Number of Discharge:</b>	Minimum 10 times at each test point
<b>Discharge Mode:</b>	1 time/s
<b>Performance Criterion:</b>	B

#### 8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESD 2000	EMC PARTNER	ESD2000	182	06/09/2019

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 8.3.3. TEST PROCEDURE

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:

Twenty dischargers (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. In case of a non-conductive enclosure, dischargers shall be applied on the horizontal or vertical coupling planes. Test shall be performed at a maximum repetition rate of one discharge per second.

b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).

b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.

c) The time interval between two successive single discharges was at least 1 second.

d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

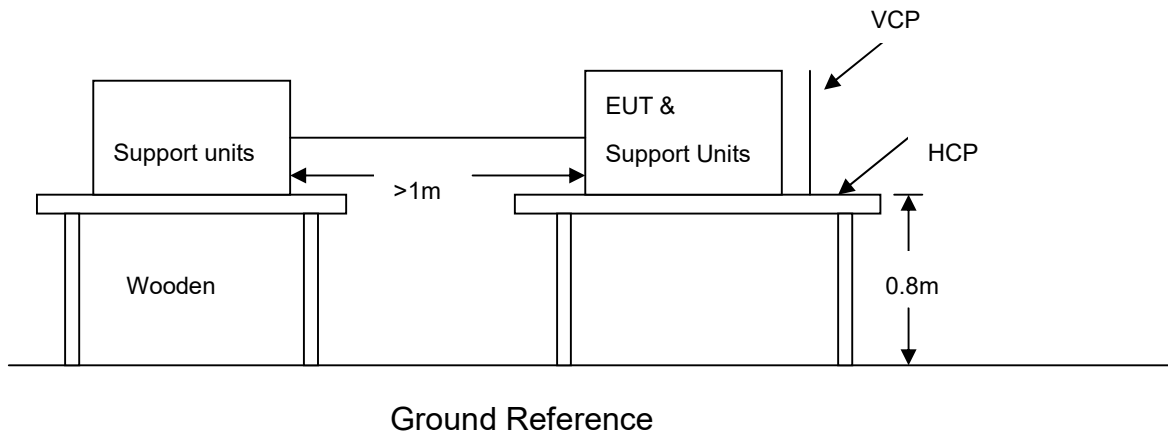
e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.

g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane (VCP)** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.



### 8.3.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### NOTE:

##### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

##### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.



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**8.3.5. TEST RESULTS**

<b>Temperature:</b>	25 °C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test result</b>	Pass
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

Air Discharge						
Test Points		Test Levels	Results			
		± 8 kV	Pass	Fail	Performance Criterion	Observation
Slot	4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

Contact Discharge						
Test Points		Test Levels	Results			
		± 4 kV	Pass	Fail	Performance Criterion	Observation
HCP	4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
VCP	4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Port	4Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

**NOTE:** 1. There was no change compared with initial operation during the test.  
 2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.

**8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)****8.4.1. TEST SPECIFICATION**

<b>Basic Standard:</b>	EN 61000-4-3
<b>Frequency Range:</b>	80 MHz ~1000 MHz,
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Test Distance:</b>	3 m
<b>Antenna Height:</b>	1.5m
<b>Performance Criterion:</b>	A

**8.4.2. TEST INSTRUMENT**

743 RS Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Signal Generator	Maconi	2022D	119246/003	06/09/2019
Power Amplifier	M2S	A00181-1000	9801-112	06/09/2019
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	06/09/2019
Power Antenna	SCHAFFNER	CBL6140A	1204	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R.= No Calibration required

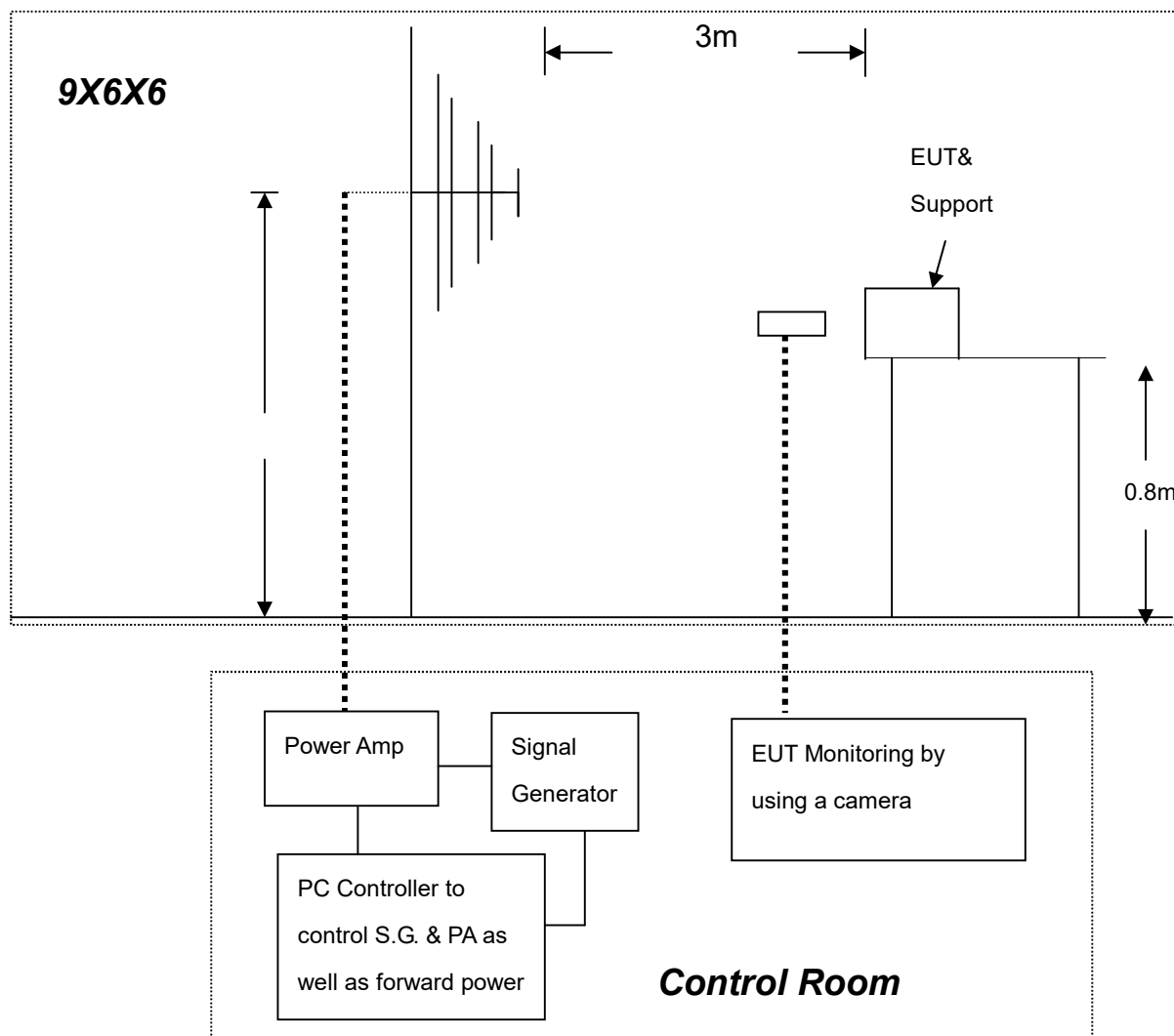
**8.4.3. TEST PROCEDURE**

The test procedure was in accordance with EN 61000-4-3

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1 kHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally; the step size was 1% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.



### 8.4.4. TEST SETUP



For the actual test configuration, please refer to the related item.

#### NOTE:

##### TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

##### FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.





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### 8.4.5. TEST RESULTS

<b>Temperature:</b>	25 °C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test result</b>	Pass
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

Frequency (MHz)	Polarity	Position	Field Strength (V/m)	Observation	Result
80 ~ 1000	V&H	Front	3	Note	Pass
80 ~ 1000	V&H	Rear	3	Note	Pass
80 ~ 1000	V&H	Left	3	Note	Pass
80 ~ 1000	V&H	Right	3	Note	Pass

**NOTE:** 1. There was no change compared with the initial operation during the test.



## 8.5. ELECTRICAL FAST TRANSIENT (EFT)

### 8.5.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-4
<b>Test Voltage:</b>	Power Line: 1 kV Signal/Control Line: 0.5 kV
<b>Polarity:</b>	Positive & Negative
<b>Impulse Frequency:</b>	5 kHz
<b>Impulse Wave-shape:</b>	5/50 ns
<b>Burst Duration:</b>	15 ms
<b>Burst Period:</b>	300ms
<b>Test Duration:</b>	Not less than 1 min.
<b>Performance Criterion:</b>	B

### 8.5.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

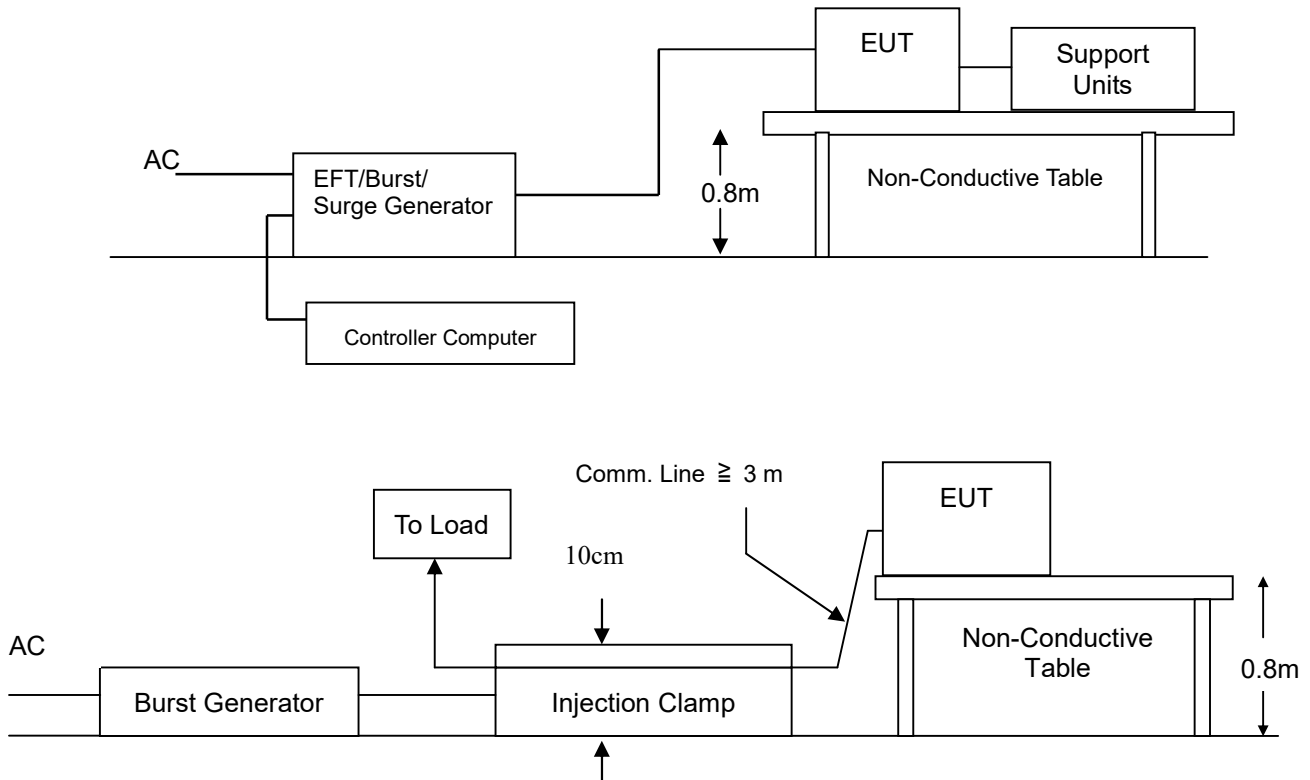
2. N.C.R.= No Calibration required

### 8.5.3. TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.



### 8.5.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### NOTE:

##### TABLETOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

##### FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.



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### 8.5.5. TEST RESULTS

<b>Temperature:</b>	25°C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test result</b>	N/A
<b>Test mode:</b>	Lighting	<b>Test By</b>	Jack Chen

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
N	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
L-N	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
PE	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
L-PE	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
N-PE	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
L-N-PE	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
RJ45 UTP cable	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

- NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.



### 8.6. SURGE IMMUNITY TEST

#### 8.6.1 TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-5
<b>Wave-Shape:</b>	Combination Wave 1.2/50 us Open Circuit Voltage 8/20 us Short Circuit Current
<b>Test Voltage:</b>	Power line ~ line to line: 1 kV; line to ground: 2kV Telecommunication line: 1 kV;
<b>Surge Input/Output:</b>	Power Line: L-N / L-PE / N-PE Telecommunication line: T-Ground / R-Ground
<b>Generator Source Impedance:</b>	2 ohm between networks 12 ohm between network and ground
<b>Polarity:</b>	Positive/Negative
<b>Phase Angle:</b>	0 /90 /180 /270
<b>Pulse Repetition Rate:</b>	1 time / min. (maximum)
<b>Number of Tests:</b>	5 positive and 5 negative at selected points
<b>Performance Criterion:</b>	B

#### 8.6.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R.= No Calibration required



### 8.6.3. TEST PROCEDURE

a) For EUT power supply:

The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

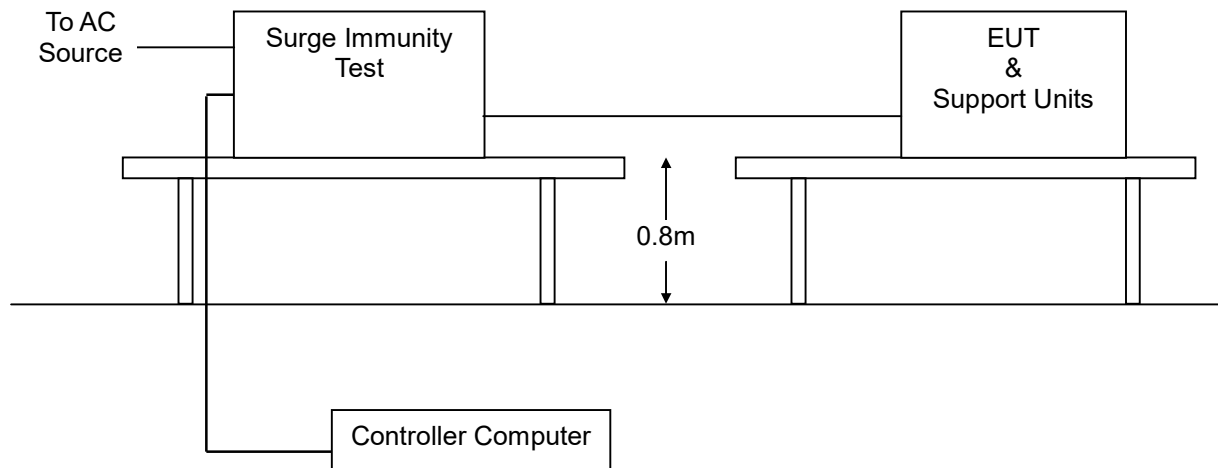
b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

### 8.6.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



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### 8.6.5. TEST RESULTS

<b>Temperature:</b>	25°C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	N/A
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L - N	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
L- PE	+/-	2	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
N - PE	+/-	2	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	N/A
R - Ground	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
T - Ground	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

- NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.



### 8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

#### 8.7.1. TEST SPECIFICATION

**Basic Standard:** EN 61000-4-6  
**Frequency Range:** 0.15 MHz ~ 80 MHz  
**Field Strength:** 3 V  
**Modulation:** 1kHz Sine Wave, 80%, AM Modulation  
**Frequency Step:** 1 % of preceding frequency value  
**Coupled cable:** Power Mains, Shielded  
**Coupling device:** CDN-M3/2 (3 wires)  
**Performance Criterion:** A

#### 8.7.2. TEST INSTRUMENT

CS Test				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Signal Generator	Maconi	2022D	119246/003	06/09/2019
Power Amplifier	M2S	A00181-1000	9801-112	06/09/2019
CDN	MEB	M3-8016	003683	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R.= No Calibration required





### 8.7.3. TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.

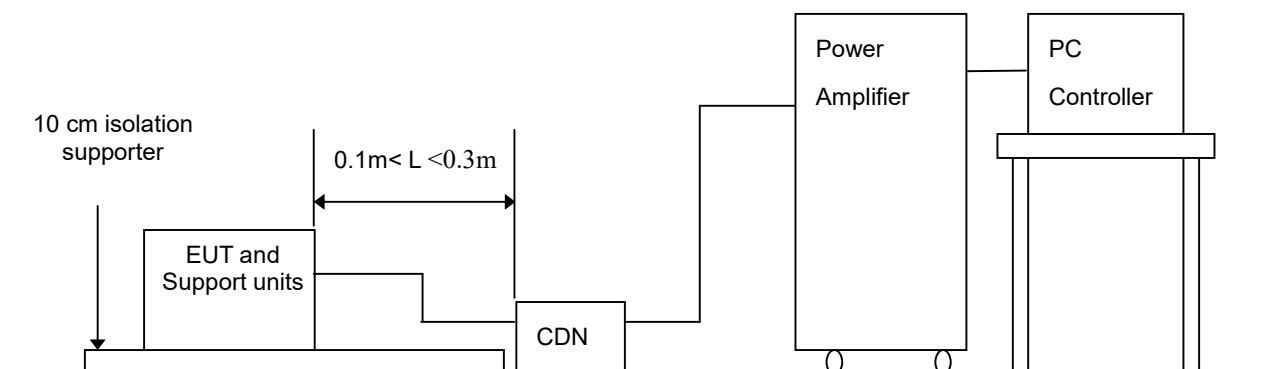
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was  $1.5 \times 10^{-3}$  decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

### 8.7.4. TEST SETUP



- Note:**
1. The EUT is setup 0.1m above Ground Reference Plane
  2. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.

For the actual test configuration, please refer to the related item.

#### **NOTE:**

#### TABLE-TOP AND FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.



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### 8.7.5. TEST RESULTS

<b>Temperature:</b>	25°C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	N/A
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

Frequency Band (MHz)	Field Strength (Vrms)	Injected Position	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Mains	CDN-M3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
0.15 ~ 80	3	N/A			Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

**NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.



## 8.8. POWER FREQUENCY MAGNETIC FIELD

### 8.8.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-8
<b>Frequency Range:</b>	50Hz,
<b>Field Strength:</b>	3A/m
<b>Observation Time:</b>	5 minutes
<b>Inductance Coil:</b>	Rectangular type, 1mx1m
<b>Performance Criterion:</b>	A

### 8.8.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power-frequency Magnetic field	SCHAFFNER	CCN 1000-1	72046	06/09/2019
Induction Coil Interface	SCHAFFNER	INA2141	6003	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

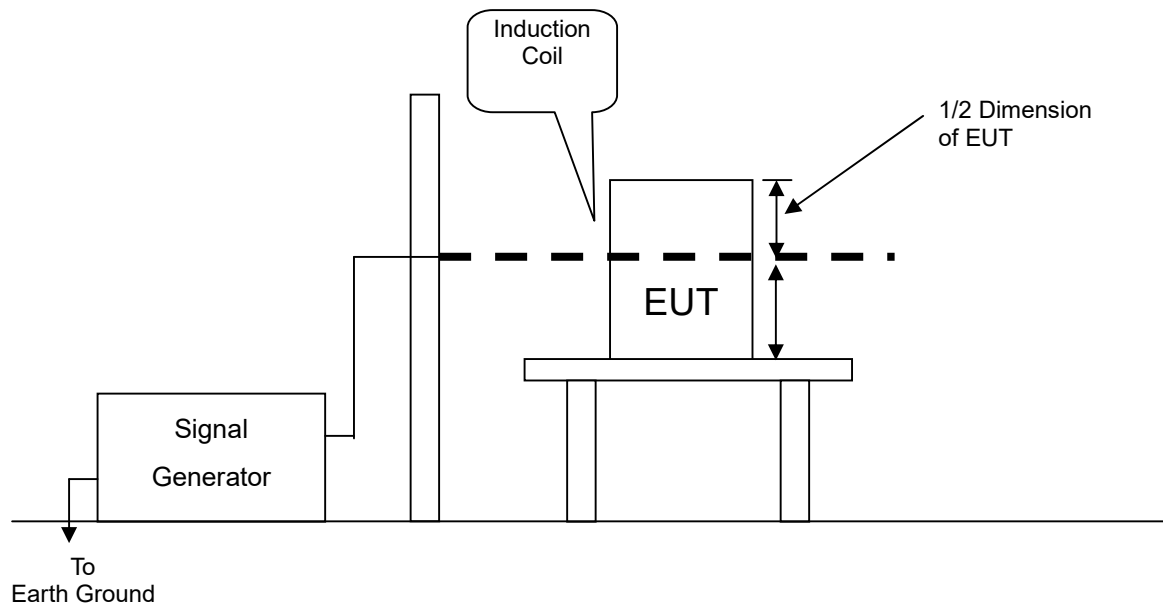
2. N.C.R.= No Calibration required

### 8.8.3. TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.



### 8.8.4. TEST SETUP



For the actual test configuration, please refer to the related item.

#### NOTE:

##### TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

##### FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.



Shenzhen HTT Technology Co., Ltd.

Report No.: HTT190304316ER

### 8.8.5. TEST RESULTS

<b>Temperature:</b>	25°C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	N/A
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

DIRECTION	Field Strength (A/m)	Performance Criterion	OBSERVATION	RESULTS
X	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
Y	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
Z	3	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

**NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.



## 8.9. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

### 8.9.1. TEST SPECIFICATION

**Basic Standard:** EN 61000-4-11

**Test Duration Time:** Minimum three test events in sequence

**Interval Between Event:** Minimum 10 seconds

**Phase Angle:** 0 / 45 / 90 / 135 / 180 / 225 / 270 / 315 / 360

**Test Cycle:** 3 times

**Performance Criterion:** B & C

### 8.9.2. TEST INSTRUMENT

Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/09/2019

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R.= No Calibration required

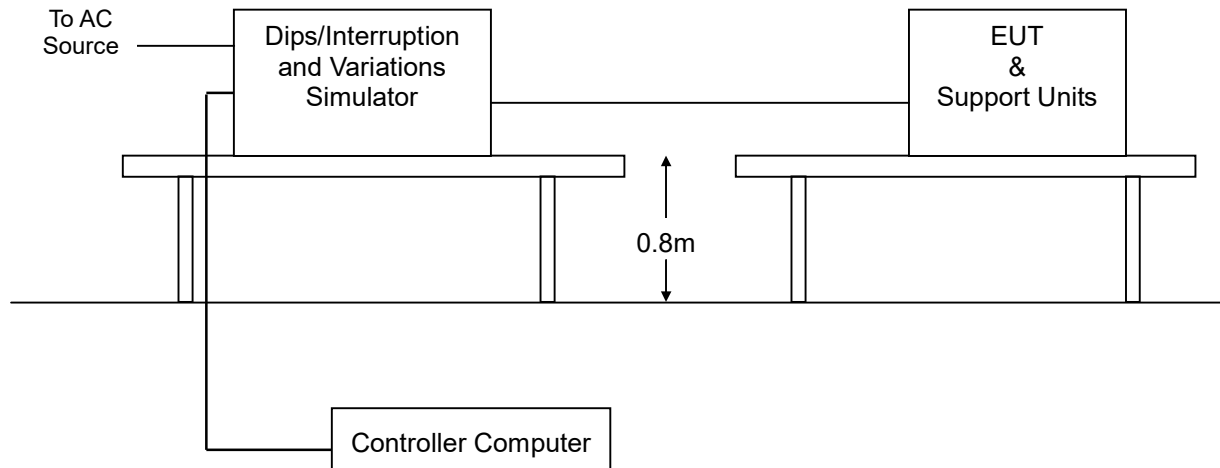
### 8.9.3. TEST PROCEDURE

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.



**8.9.4. TEST SETUP**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



**8.9.5. TEST RESULTS**

<b>Temperature:</b>	25°C	<b>Humidity</b>	50% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	N/A
<b>Test mode</b>	Lighting	<b>Test By</b>	Jack Chen

Test Power: 230Vac, 50Hz				
Voltage (% Reduction)	Duration (Period)	Performance Criterion	Observation	Test Result
0	0.5	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3	N/A
70	10	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	N/A

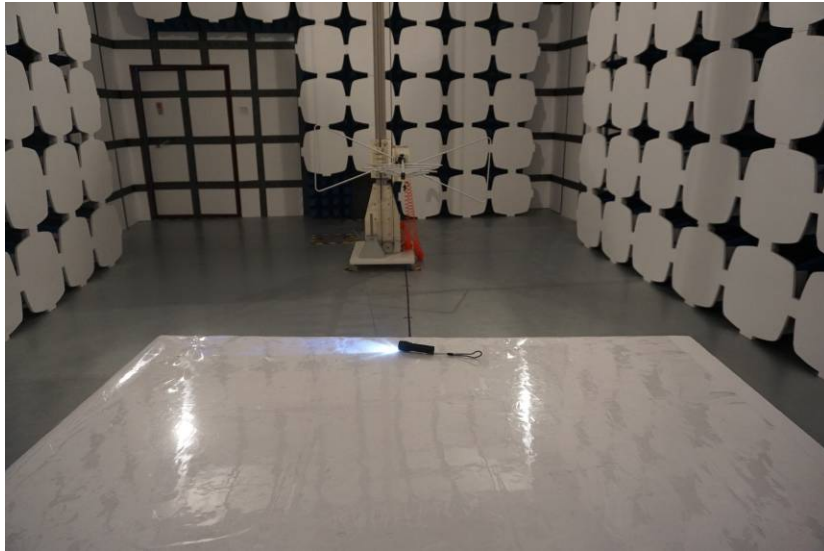
**NOTE:** 1. There was no change compared with initial operation during and after the test.  
 No unintentional response was found during the test.  
 2. The function stopped during the test, but can be recoverable by itself operation after the test.  
 3. The function stopped during the test, but can be recoverable manually after the test.



Shenzhen HTT Technology Co., Ltd.

Report No.: HTT190304316ER

## 9 PHOTOGRAPHS OF EUT









**HUACETONG**

## FCC Supplier's Declaration of Conformity

Certificate No.: WUX202005201569FC

Importer: /

Address: /

Contact Person: / Tel: / Web: /

Applicant: Hangzhou Zorro outdoor products Co., Ltd

Address: Room 209, building 1, cultural and Creative Industrial Park, 1672 South Ring Road, Binjiang District, Hangzhou City, Zhejiang Province

Manufacturer: Hangzhou Zorro outdoor products Co., Ltd

Address: Room 209, building 1, cultural and Creative Industrial Park, 1672 South Ring Road, Binjiang District, Hangzhou City, Zhejiang Province

Product Name: 851 mosquito lamp

Model No.: 851 mosquito lamp

Trade Mark: /

Test Standard: FCC PART 15 SubpartB Class B

Test Report No.: WUX202005201569F

**Remarks:**

This device is complies with the part 15 of FCC rules. It's confirmed and found to comply with the requirements setup by ANSI C63.4 & FCC part 15 regulation for the evaluation of electromagnetic compatibility.

Tony Bi  
Technical Director



**Shenzhen Huacetong Testing and Certification Co., Ltd.**

Building B, Xinbaosheng, No.233, Xixiang Street, Bao' an District, Shenzhen, China.

Web: [www.szctlab.com](http://www.szctlab.com) Tel: 86-755-23592524 E-mail: [ctt\\_lab@foxmail.com](mailto:ctt_lab@foxmail.com)



**HUACETONG**

**Shenzhen Huacetong Testing and Certification Co., Ltd.**

Web: [www.szcttlab.com](http://www.szcttlab.com) Tel: 86-755-23592524

### FCC Part 15 Subpart B Test Report

### FCC PART 15 Subpart B Class B

**Report Reference No.** ..... : WUX202005201569F

Compiled by

( position+printed name+signature) . : File administrators Judy Chan

Name of the organization performing the tests

Test Engineer Andy Liu

( position+printed name+signature) . :

Approved by

( position+printed name+signature) . : Manager Tony Bi

Date of issue ..... : May 25, 2020



**Representative Laboratory Name.** : Shenzhen Huacetong Testing and Certification Co., Ltd.

Address ..... : Building B, Xinbaosheng, No.233, Xixiang Street, Bao'an District, Shenzhen, China

**Applicant's name** ..... : Hangzhou Zorro outdoor products Co., Ltd

Address ..... : Room 209, building 1, cultural and Creative Industrial Park, 1672 South Ring Road, Binjiang District, Hangzhou City, Zhejiang Province

Importer : /

Address : /

**Test specification:**

Standard..... : FCC PART 15 Subpart B Class B

TRF Originator ..... : Shenzhen Huacetong Testing and Certification Co., Ltd.

Master TRF ..... : Dated 2014-08

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**Test item description** ..... : 851 mosquito lamp

Trade Mark..... : /

Model/Type reference ..... : 851 mosquito lamp

Listed Models ..... : /

Power Supply..... : DC 5V, 1A

Result ..... : **Positive**

# FCC Test Report

<b>Test Report No. :</b>	<b>WUX202005201569F</b>	May 25, 2020
		Date of issue

Equipment under Test : 851 mosquito lamp

Model /Type : 851 mosquito lamp

Listed Models : /

**Applicant** : Hangzhou Zorro outdoor products Co., Ltd

Address : Room 209, building 1, cultural and Creative Industrial Park,  
1672 South Ring Road, Binjiang District, Hangzhou City,  
Zhejiang Province

**Manufacturer** : Hangzhou Zorro outdoor products Co., Ltd

Address : Room 209, building 1, cultural and Creative Industrial Park,  
1672 South Ring Road, Binjiang District, Hangzhou City,  
Zhejiang Province

Importer : /

Address : /

<b>Test Result</b> according to the standards on page 4:	<b>Positive</b>
--	-----------------

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## **1. TEST STANDARDS**

The tests were performed according to following standards:

[FCC Rules Part 15 Subpart B - Unintentional Radiators](#)

[ANSI C63.4-2003](#)

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample : May 20, 2020

Testing commenced on : May 21, 2020

Testing concluded on : May 25, 2020

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage :  100V / 60 Hz  240V / 60Hz  
 12 V DC  24 V DC  
Other (specified in blank below)

DC 5V

---

### 2.3. Short description of the Equipment under Test (EUT)

851 mosquito lamp Insert: Usage of Machine, Place it will be used, Functions For more details, refer to the user's manual of the EUT.

Serial number: 851 mosquito lamp

### 2.4. EUT operation mode

The EUT has been tested under typical operating condition.

### 2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

## 2.6. Related Submittal(s) / Grant (s)

This test report is intended for 851 mosquito lamp filing to comply with the FCC Part 15, Subpart B Rules.

## 2.7. Modifications

No modifications were implemented to meet testing criteria.

## 2.8. Test Result Summary

Test Item	Test Requirement	Standard Paragraph	Result
Radiated Emission	FCC PART 15 Subpart B Class B: 2014	Section 15.109	PASS
Conducted Emission	FCC PART 15 Subpart B Class B: 2014	Section 15.107	N/A



### 3. TEST ENVIRONMENT

#### 3.1. Address of the test laboratory

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd  
Electronic detection of building, Shahe West Road, Xili Town, Nanshan, Shenzhen, China.

There is one 3m semi-anechoic chamber and two line conducted labs for final test.  
The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

#### 3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

##### IC Registration No.: 7631A

The 3m alternate test site of CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on March, 2011.

##### FCC-Registration No.: 338263

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

#### 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

#### 3.4. 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 CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd 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.

Hereafter the best measurement capability for CCIC laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~12.75GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.22dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.5. Equipments Used during the Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	2020/05
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESPI	1164.6407.07	2020/05
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2020/05
4	Controller	EM Electronics	Controller EM 1000	N/A	2020/05
5	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2020/05

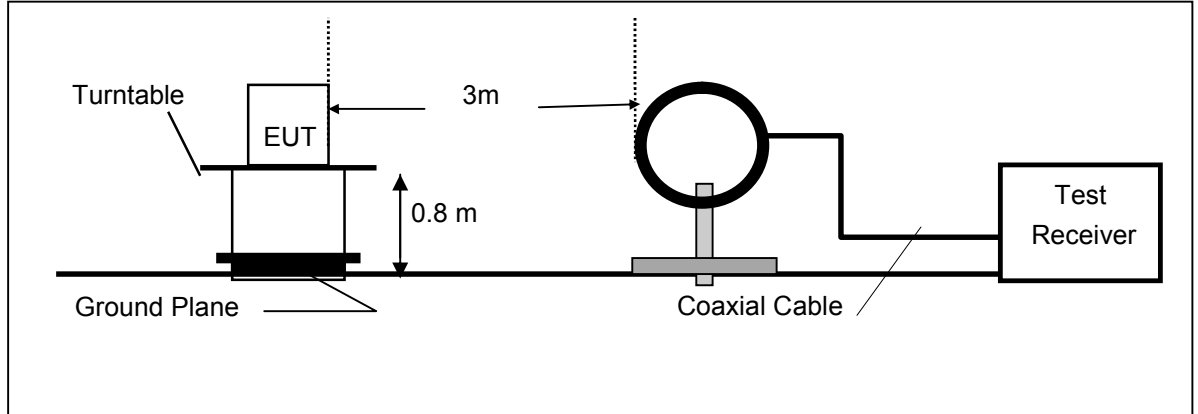
Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2020/05
2	LISN	ROHDE & SCHWARZ	ENV216	101034	2020/05
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2020/05

## 4. TEST CONDITIONS AND RESULTS

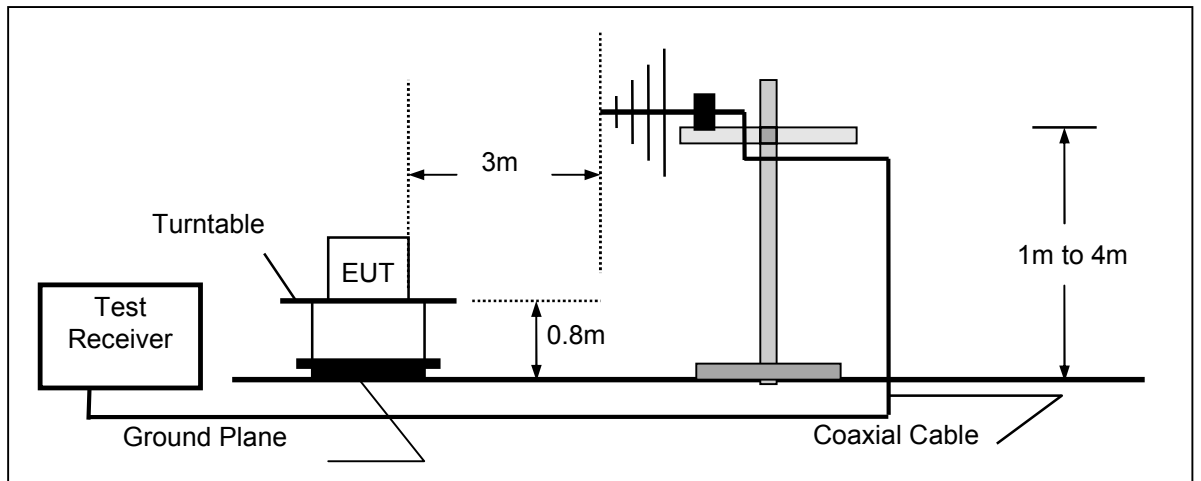
### 4.1. Radiated Emission Test

#### TEST CONFIGURATION

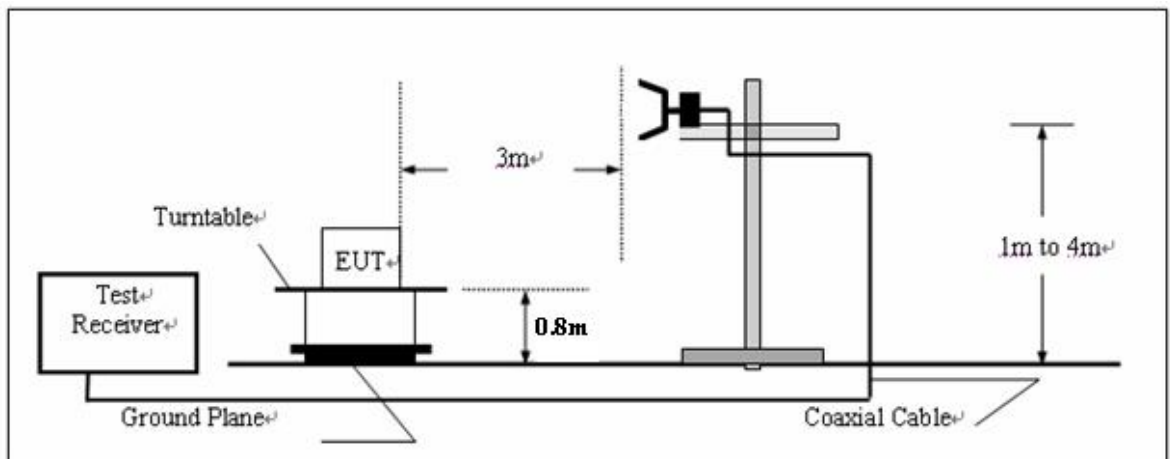
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



### **Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

### **RADIATION LIMIT**

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

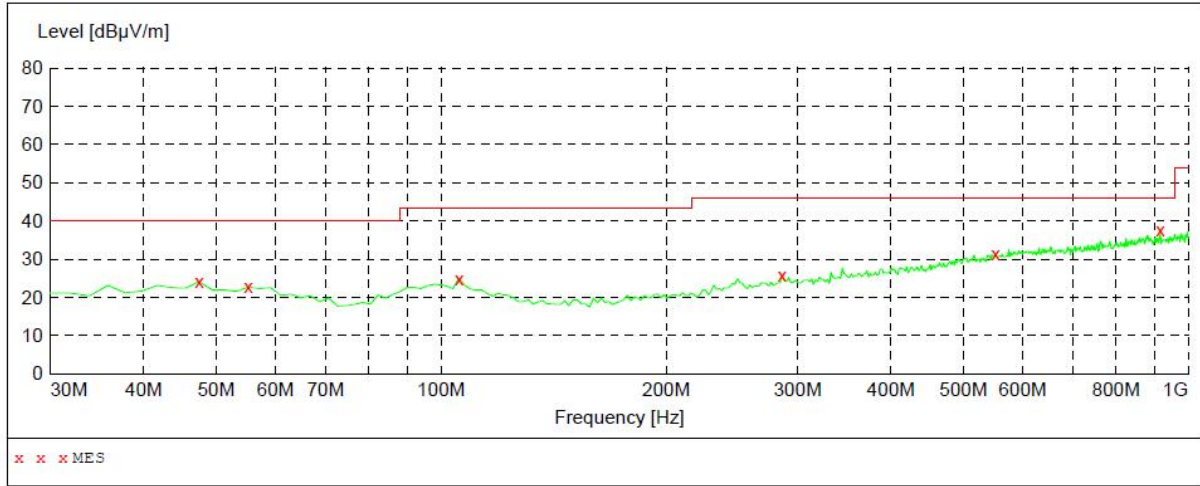
### **Test Procedure**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

### **Radiation Test Results**

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW

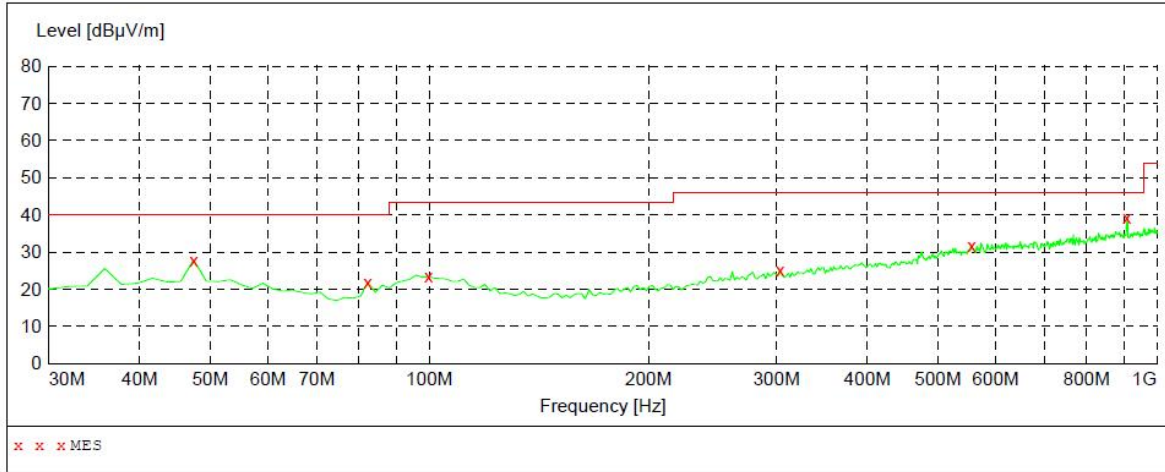


**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	24.10	15.8	40.0	15.9	---	100.0	0.00	HORIZONTAL
55.220000	22.70	15.6	40.0	17.3	---	100.0	0.00	HORIZONTAL
105.660000	25.00	16.9	43.5	18.5	---	300.0	0.00	HORIZONTAL
286.080000	25.70	18.3	46.0	20.3	---	300.0	0.00	HORIZONTAL
551.860000	31.30	25.0	46.0	14.7	---	300.0	0.00	HORIZONTAL
916.580000	37.60	29.3	46.0	8.4	---	300.0	0.00	HORIZONTAL

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW

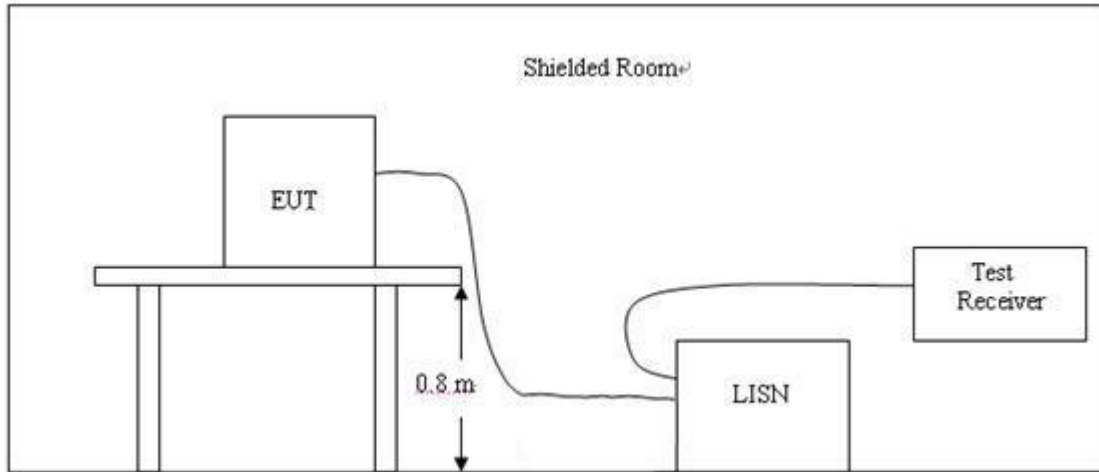


**MEASUREMENT RESULT:**

Frequenc MHz	Leve dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	27.90	15.8	40.0	12.1	---	100.0	0.00	VERTICAL
82.380000	21.90	13.4	40.0	18.1	---	100.0	0.00	VERTICAL
99.840000	23.40	17.5	43.5	20.1	---	100.0	0.00	VERTICAL
303.540000	25.10	18.8	46.0	20.9	---	100.0	0.00	VERTICAL
555.740000	31.80	25.1	46.0	14.2	---	100.0	0.00	VERTICAL
908.820000	39.40	29.3	46.0	6.6	---	100.0	0.00	VERTICAL

## 4.2. Conducted Emissions Test

### TEST CONFIGURATION



### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
- 2 Support equipment, if needed, was placed as per ANSI C63.4.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4 The EUT received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

### Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dBµV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

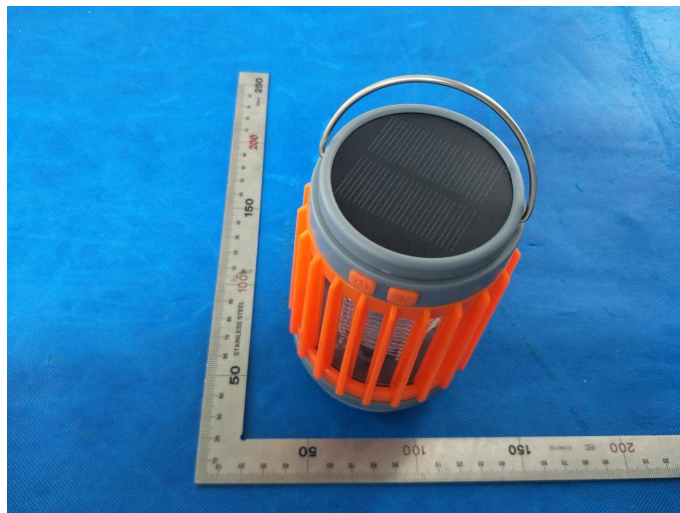
\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

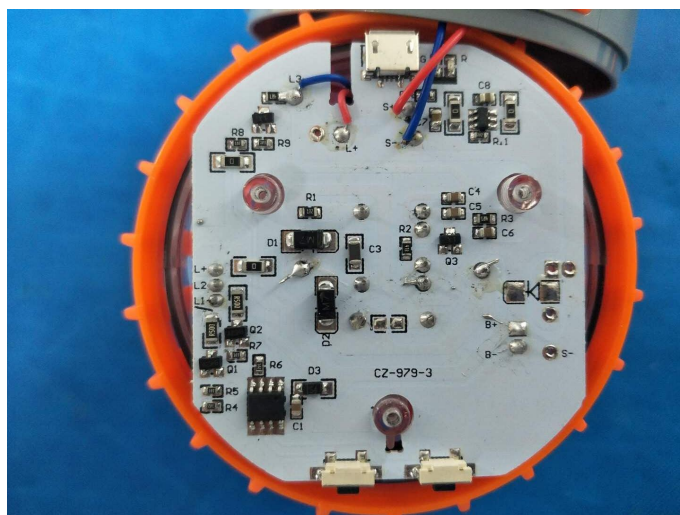
### TEST RESULTS

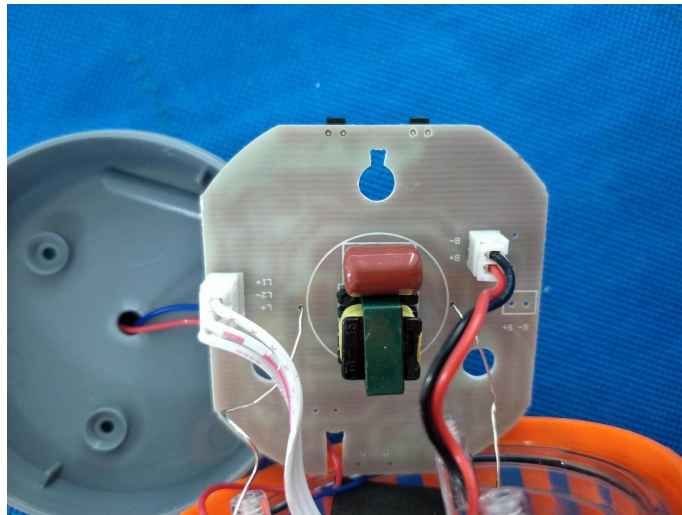
The test is not applicable.

## 5. Photos of the EUT









.....End of Report.....