

Test Report

Applicant: NINGBO HIGHLITE ILLUMINATION CO., LTD

Product Name: Work light

Brand Name: N/A

Model No.: HL-WL2169, HL-TC6194, HL-TC6194-1, HL-WL2162, HL-TC6192, HL-LA3037, HL-WL2101-1, HL-CL0703-2, HL-CL0714, HL-CL0715, HL-H0616, HL-WL2155, HL-H0615, HL-WL2170, HL-WL2138, HL-WL2166, HL-WL2167, HL-WF0479, HL-WF0476, HL-WL2171, HL-WF0480-3AA, HL-WF0480-6AA, HL-WL2119, HL-LA3034, HL-PF0298, HL-PF0299, HL-FL0013 HL-LA3035-1, HL-RC5065, HL-RC5056, HL-WL2149

Remark: Only difference in Appearance

Date of Receipt : Jan. 14, 2020

Date of Test: Jan. 15-16, 2020

Date of Report: Jan. 16, 2020

Prepared by: Shenzhen Most Technology Service Co., Ltd.

The EMC testing has been performed on the submitted samples and found in compliance with the council EMC directive 2014/30/EU.

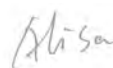

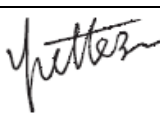
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TEST REPORT DECLARATION

Report Number	MTET20010061		
Applicant	NINGBO HIGHLITE ILLUMINATION CO., LTD		
	ROOM 2202,22F, BANK OF CHINA MANSION, FINANCIAL CENTER, NO.318 HEYUAN ROAD, YINZHOU DISTRICT, NINGBO CITY		
Manufacturer	NINGBO HIGHLITE ILLUMINATION CO., LTD		
	ROOM 2202,22F, BANK OF CHINA MANSION, FINANCIAL CENTER, NO.318 HEYUAN ROAD, YINZHOU DISTRICT, NINGBO CITY		
Product	Product Name	Work light	
	Model No.	HL-WL2169	
	Power Supply	DC 5V by USB Port DC 3.7V by Battery	
The EUT was found compliant with the requirement(s) of the standards.			
Standard	EN 55015:2013+A1:2015, EN IEC 61000-3-2:2019, EN 61000-3-3:2013, EN 61547:2009 (IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC 61000-4-4:2012, IEC 61000-4-5:2014+A1:2017, IEC 61000-4-6:2013, IEC 61000-4-8:2009, IEC 61000-4-11:2004+A1:2017)		
<p>*Note</p> <p>The above device has been tested by Shenzhen Most Technology Service Co., Ltd. To determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test record, data evaluation & Equipment Under Test (EUT) configurations represented are contained in this test report and Shenzhen Most Technology Service Co., Ltd. Is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the requirement of the above standards.</p> <p>This report applies to above tested sample only. This report shall not be reproduced except in full, without written approval of Shenzhen Most Technology Service Co., Ltd., this document may be altered or revised by Shenzhen Most Technology Service Co., Ltd., personal only, and shall be noted in the revision of the document.</p>			
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	Sunny Deng(Engineer)		
Approved by			
	Yvette Zhou(Manager)		

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Work light
Model Number	:	HL-WL2169, HL-TC6194, HL-RC5065, HL-TC6194-1, HL-WL2162, HL-TC6192, HL-LA3037, HL-LA3035-1, HL-WL2101-1, HL-CL0703-2, HL-CL0714, HL-CL0715, HL-H0616, HL-WL2155, HL-H0615, HL-WL2170, HL-WL2138, HL-WL2166, HL-WL2167, HL-WF0479, HL-WF0476, HL-WL2171, HL-WF0480-3AA, HL-WF0480-6AA HL-RC5056, HL-WL2149
Remark	:	Used HL-WL2169 does all tests

1.2. Operational Mode(s) of EUT

Order Number	:	Test Mode(s)
1	:	ON
2	:	Charging+ON

1.3. Test Voltage(s) of EUT

Order Number	:	Test Voltage(s)
1	:	DC 3.7V by Battery
2	:	DC 5V by USB Port

2. DESCRIPTION OF TEST STANDARD

The intention of this publication is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize operating conditions and interpretation of results.

The following referenced standard are indispensable for the application of this report.

Referenced Description below:

EN55015:2013+A1:2015

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.

EN IEC 61000-3-2:2019

Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).

EN 61000-3-3:2013

Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

EN 61547:2009

Equipment for general lighting purposes - EMC immunity requirements.

3. LABORATORY INFORMATION

3.1. Laboratory Name

Shenzhen Most Technology Service Co., Ltd.

3.2. Location

No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China

3.3. Test facility

3m Anechoic Chamber	: Nov. 28, 2012 File on Federal Communication Commission Registration Number:490827
Shielding Room	: Nov. 28, 2012 File on Federal Communication Commission Registration Number:490827
EMC Lab.	: Accredited by TUV Rheinland Shenzhen Audit Report: UA 50149851 Mar. 12, 2009 Accredited by Industry Canada Registration Number: 7103A-1 Oct. 22, 2012 Accredited by TIMCO Registration Number: Q1460 March 28, 2010

3.4. Measurement Uncertainty

No.	Item	Uncertainty
1.	Uncertainty for Conducted Disturbance Test	1.25dB
2.	Uncertainty for Radiated Disturbance Test	3.15dB

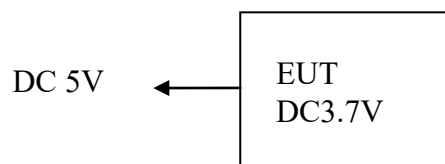
4. SUMMARY OF TEST RESULTS

EMISSION			
Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN55015:2013+A1:2015	---	PASS
Magnetic test	EN55015:2013+A1:2015	---	PASS
Radiated disturbance	EN55015:2013+A1:2015	---	PASS
Harmonic current emissions	EN IEC 61000-3-2:2019	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3:2013	---	N/A
IMMUNITY (EN 61547:2009)			
Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	PASS
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006 +A1:2007+A2:2010	A	PASS
Electrical fast transient (EFT)	IEC 61000-4-4:2012	B	PASS
Surge (Input d.c. power ports)	IEC 61000-4-5:2014+A1:2017	B	PASS
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2013	A	PASS
Power frequency magnetic field	IEC 61000-4-8:2009	A	PASS
Voltage dips, 100% reduction	IEC 61000-4-11:2004+A1:2017	B	N/A
Voltage dips, 30% reduction		C	N/A
N/A is an abbreviation for Not Applicable.			

5. BLOCK DIAGRAM OF TEST SETUP

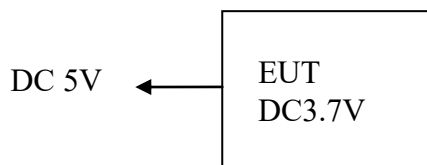
The equipments are installed test to meet EN 55015 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. EUT was tested in normal configuration (Please See following Block diagrams)

5.1. Block Diagram of connection between EUT and simulation-EMI



(EUT: Work light)

5.2. Block Diagram of connection between EUT and simulation-EMS



(EUT: Work light)

6. TEST INSTRUMENT USED

6.1. For Conducted Disturbance at Mains Terminals Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	100492	Mar. 09, 19	1 Year
2.	L.I.S.N.	Rohde & Schwarz	ENV216	100093	Mar. 09, 19	1 Year
3.	Coaxial Switch	Anritsu Corp	MP59B	6200283933	Mar. 09, 19	1 Year
4.	Terminator	Hubersuhner	50Ω	No.1	Mar. 09, 19	1 Year
5.	RF Cable	SchwarzBeck	N/A	No.1	Mar. 09, 19	1 Year

6.2. For Magnetic Test (In Shielding Room)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100307	Mar. 09, 19	1 Year
2.	Loop Antenna	Laplace	RF300	8006	Mar. 09, 19	1 Year
3.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100305	Mar. 09, 19	1 Year
4.	Coaxial Switch	Anritsu Corp	MP59B	6200283933	Mar. 09, 19	1 Year

6.3. For Radiation Test (In Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESPI	101202	Mar. 09, 19	1 Year
2.	Bilog Antenna	Sunol	JB3	A121206	Mar. 09, 19	1 Year
3.	Cable	Resenberger	N/A	NO.1	Mar. 09, 19	1 Year
4.	Cable	SchwarzBeck	N/A	NO.2	Mar. 09, 19	1 Year
5.	Cable	SchwarzBeck	N/A	NO.3	Mar. 09, 19	1 Year
6.	DC Power Filter	DuoJi	DL2×30B	N/A	N/A	N/A
7.	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	N/A	N/A
8.	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	N/A	N/A

6.4. For Harmonic / Flicker Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	AC Power Source	Kikusui	AC40MA	LM003232	Mar. 09, 19	1 Year
2.	Test Analyzer	Kikusui	KHA1000	LM003720	Mar. 09, 19	1 Year
3.	Line Impedance Network	Kikusui	LIN40MA-PCR-L	LM002352	Mar. 09, 19	1 Year

6.5. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	Zhongsheng	ESD-203AX	023K14538	Mar. 09, 19	1 Year

6.6. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	IFR	2032	203002/100	Mar. 09, 19	1 Year
2.	Amplifier	A&R	150W1000	301584	NCR	NCR
3.	Dual Directional Coupler	A&R	DC6080	301508	Mar. 09, 19	1 Year
4.	Power Sensor	Anritsu	MA2491A	32263	Mar. 09, 19	1 Year
5.	Power Meter	R&S	NRVS	100444	Mar. 09, 19	1 Year
6.	Field Monitor	A&R	FM5004	300329	Mar. 09, 19	1 Year
7.	Field Probe	A&R	FP5000	300221	Mar. 09, 19	1 Year
8.	Log-periodic Antenna	A&R	AT1080	16512	Mar. 09, 19	1 Year
9.	RF Cable	MIYAZAKI	N/A	No.1/No.2	Mar. 09, 19	1 Year

6.7. For Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMC PRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

6.8. For Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMC PRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

6.9. For Injected Currents Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	IFR	2032	203002/100	Mar. 09, 19	1 Year
2.	Amplifier	A&R	150W1000	301584	NCR	NCR
3.	CDN	FCC	FCC-801-M2-25	47	Mar. 09, 19	1 Year
4.	CDN	FCC	FCC-801-M3-25	107	Mar. 09, 19	1 Year
5.	EM Injection Clamp	FCC	F-203I-23mm	403	Mar. 09, 19	1 Year
6.	RF Cable	MIYAZAKI	N/A	No.1/No.2	Mar. 09, 19	1 Year

6.10. For Magnetic Field Immunity Test

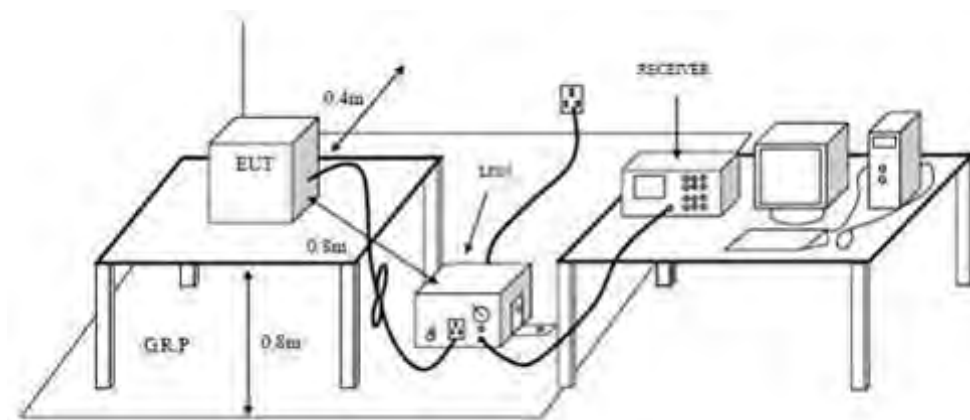
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMC PRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

6.11. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMC PRO System	EM Test	UCS-500-M4	V0648102026	Mar. 09, 19	1 Year

7. CONDUCTED DISTURBANCE AT MAINS TERMINALS TEST

7.1. Configuration of Test System



7.2. Test Standard

EN55015:2013+A1:2015

7.3. Power Line Conducted Disturbance at Mains Terminals Limit

Frequency (MHz)	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
0.009 ~ 0.05	110	-
0.05 ~ 0.15	90 to 80*	-
0.15 ~ 0.50	66 to 56*	56 to 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. At the transition frequency, the lower limit applies.

2. *The limit decreases linearly with the logarithm of the frequency in the Frequency in the ranges 50KHz to 150KHz and 150KHz to 0.5MHz.

7.4. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55015 on conducted Disturbance test.

The bandwidth setting on the test receiver is 200Hz(frequency range from 9KHz to 150KHz) and 9KHz (frequency range from 150KHz to 30MHz)

The frequency range from 9kHz to 30MHz is checked. The test result are reported on Section 7.5.

7.5. Conducted Disturbance at Mains Terminals Test Results

7.5.1. Test Results: **PASS**

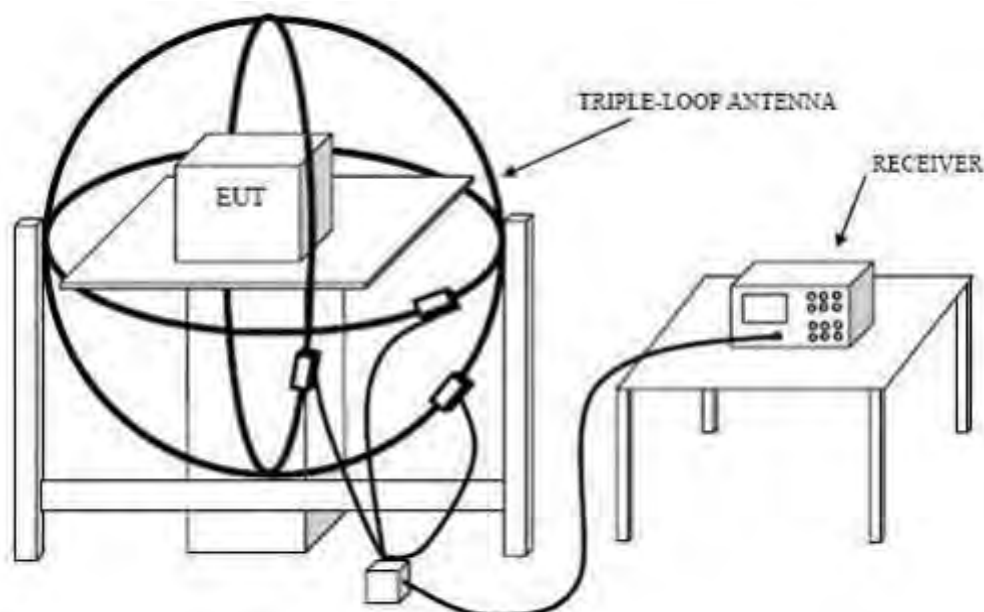
7.5.2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

7.5.3. Emission Level= Correct Factor + Reading Level.

7.5.4. The test data and the scanning waveform are attached within Appendix I.

8. MAGNETIC TEST

8.1. Configuration of Test System



8.2. Test Standard

EN55015:2013+A1:2015

8.3. Magnetic Field Emission Limit

Frequency (MHz)	Limits for loop diameter (dBuA)
	2m
0.009~0.07	88
0.07~0.15	88~58*
0.15~3.00	58~22*
3.00~30.0	22

Note: 1. At the transition frequency the lower limit applies.

2. *decreasing linearly with logarithm of the frequency.

8.4. Test Procedure

The EUT is placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver. Three field components are checked by means of a coax switch.

The frequency range from 9 KHz to 30MHz is investigated. The receiver is measured with the quasi-peak detector. For frequency band 9 KHz to 150 KHz, the bandwidth of the field strength meter (R&S test receiver ESCI) is set at 200Hz. For frequency band 150 KHz to 30MHz, the bandwidth is set at 9 KHz.

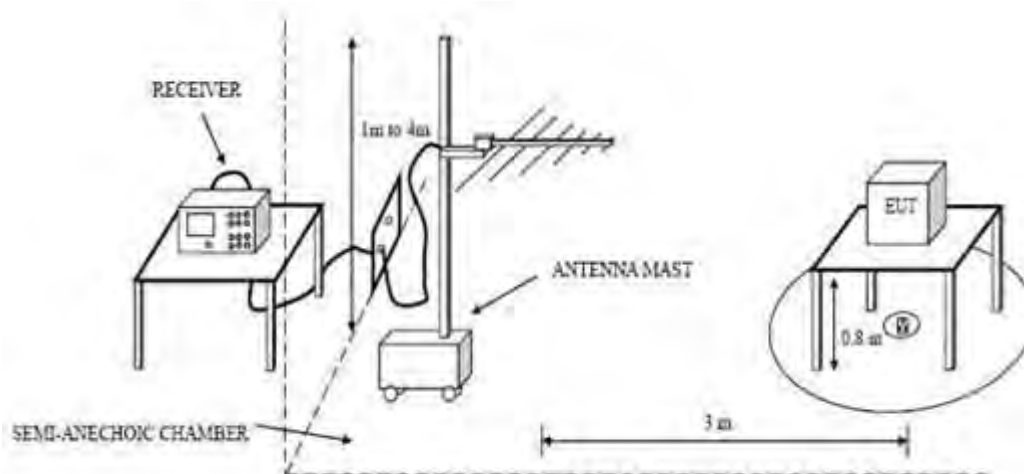
The test result are reported on Section 8.5.

8.5. Radiated Disturbance Test Results

8.5.1. Test Results: **PASS**

9. RADIATED DISTURBANCE TEST

9.1. Configuration of Test System



9.2. Test Standard

EN55015:2013+A1:2015

9.3. Radiated Disturbance Limit

All emanations from devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB μ V/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: 1. The lower limit shall apply at the transition frequencies.

2. Distance refers to the distance in meters between the test antenna and the closed point of any part of the EUT.

9.4. Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55015 on Radiated Disturbance test.

The bandwidth setting on the test receiver is 120 kHz.

The frequency range from 30MHz to 300MHz is checked. The test result are reported on Section 9.5.

9.5. Radiated Disturbance Test Results

9.5.1. Test Results: **PASS**

9.5.2. Emission Level = Correct Factor + Reading Level.

9.5.3. All readings are Quasi-Peak values.

9.5.4. The test data and the scanning waveform are attached within Appendix II.

10. IMMUNITY PERFORMANCE CRITERIA

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level by its manufacturer or the requestor of the test, or the agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

Based on the used product standard

Based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

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.

Criterion 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.

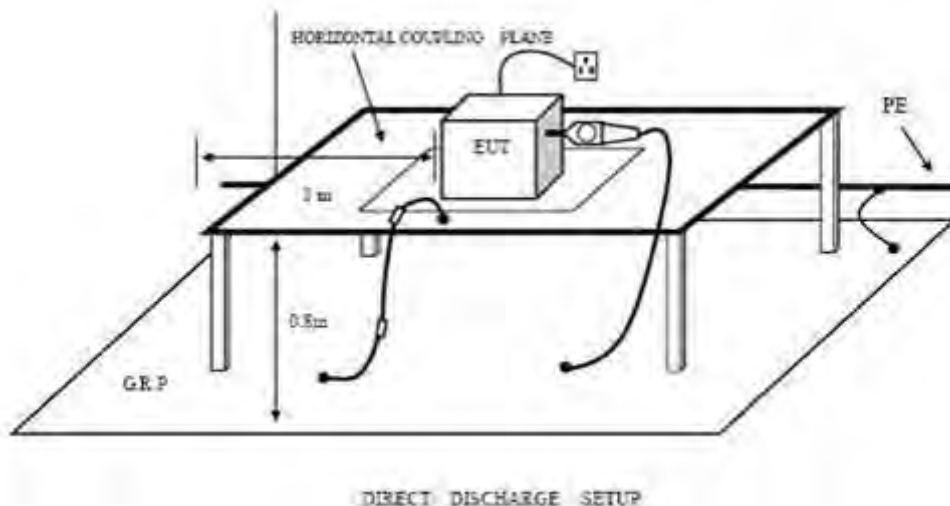
Criterion C:

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 normal if necessary by temporary interruption of the mains supply and/or operating the regulating control.

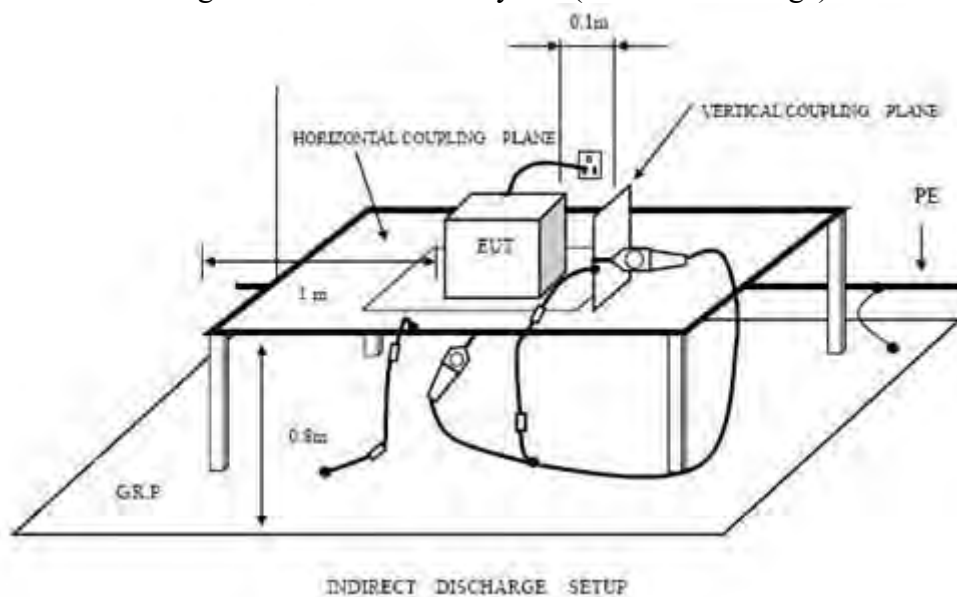
11.ELECTROSTATIC DISCHARGE IMMUNITY TEST

11.1.Configuration of Test System

11.1.1. Configuration of ESD Test System(Direct Discharge)



11.1.2.Configuration of ESD Test System(Indirect Discharge)



11.2.Test Standard

EN 61547:2009 (IEC 61000-4-2:2008)
(Severity Level 3 for Air Discharge at 8KV,
Severity Level 2 for Contact Discharge at 4KV)

11.3. Severity Levels and Performance Criterion

11.3.1. 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

11.3.2. Performance criterion : **B**

11.4. Test Procedure

11.4.1. Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure was repeated until all the air discharge completed

11.4.2. Contact Discharge:

All the procedure was same as Section 13.4.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch was operated.

11.4.3. 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.

11.4.4. 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 X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

11.5. Test Results

11.5.1. Test Results: **PASS**

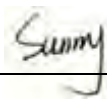
11.5.2. Test data on the following pages.

Electrostatic Discharge Test Results

Shenzhen Most Technology Service Co., Ltd.

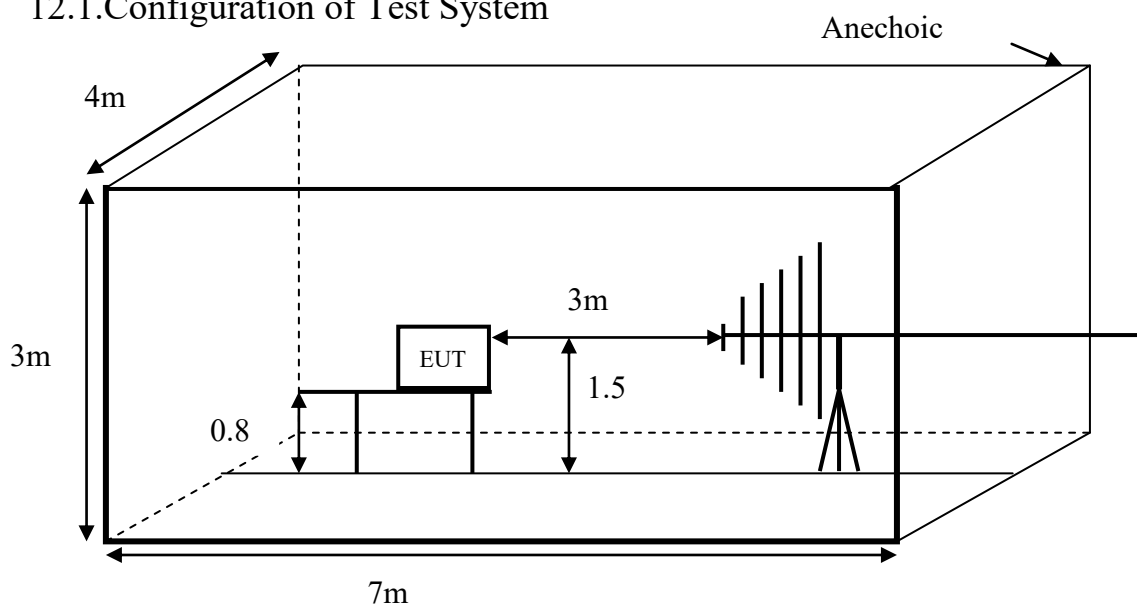
<i>Test Voltage</i> :	<i>1&2</i>	<i>Test Date:</i>	<i>Jan. 15, 2020</i>
<i>Test Mode</i> :	<i>1&2</i>	<i>Criterion</i> :	<i>B</i>
<i>Temperature:</i>	<i>26 °C</i>	<i>Humidity:</i>	<i>54%</i>
<i>Air Discharge: ±2,4 and 8KV</i> # <i>For Air Discharge each Point Positive 10 times and negative 10 times discharge.</i>			
<i>Contact Discharge: ±4KV</i> # <i>For Contact Discharge each point positive 10 times and negative 10 times discharge.</i>			
<i>Test Results Description</i>			
<i>Location</i>	<i>Kind C- ir Disch arge C-Contact Discharge</i>	<i>Result</i>	
<i>Gaps</i>	<i>A</i>	<i>PASS</i>	
<i>Switch</i>	<i>A</i>	<i>PASS</i>	
<i>Port</i>	<i>A</i>	<i>PASS</i>	
<i>Screw</i>	<i>C</i>	<i>PASS</i>	
<i>HCP</i>	<i>C</i>	<i>PASS</i>	
<i>VCP of Front</i>	<i>C</i>	<i>PASS</i>	
<i>VCP of Rear</i>	<i>C</i>	<i>PASS</i>	
<i>VCP of Left</i>	<i>C</i>	<i>PASS</i>	
<i>VCP of Right</i>	<i>C</i>	<i>PASS</i>	
<i>Remark :</i>			

Discharge was considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

Reviewer : 

12. RF FIELD STRENGTH SUSCEPTIBILITY TEST

12.1. Configuration of Test System



12.2. Test Standard

EN 61547:2009 (IEC 61000-4-3:2006+A1:2007+A2:2010)
(Severity Level: 2 at 3V / m)

12.3. Severity Levels and Performance Criterion

12.3.1. Severity level

Level	Test Field Strength V/m
1.	1
2.	3
3.	10
X	Special

12.3.2. Performance criterion : A

12.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor the EUT.

All the scanning conditions are as follows :

Condition of Test	Remarks
1. Test Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	80% amplitude modulated with a 1kHz sine wave
3. Scanning Frequency	80 - 1000 MHz
4. Sweeping time of radiated	0.0015 decade/s
5. Dwell Time	1.5 Sec.

12.5. Test Results

12.5.1. Test Results: **PASS**

12.5.2. Test data on the following pages.

RF Field Strength Susceptibility Test Results

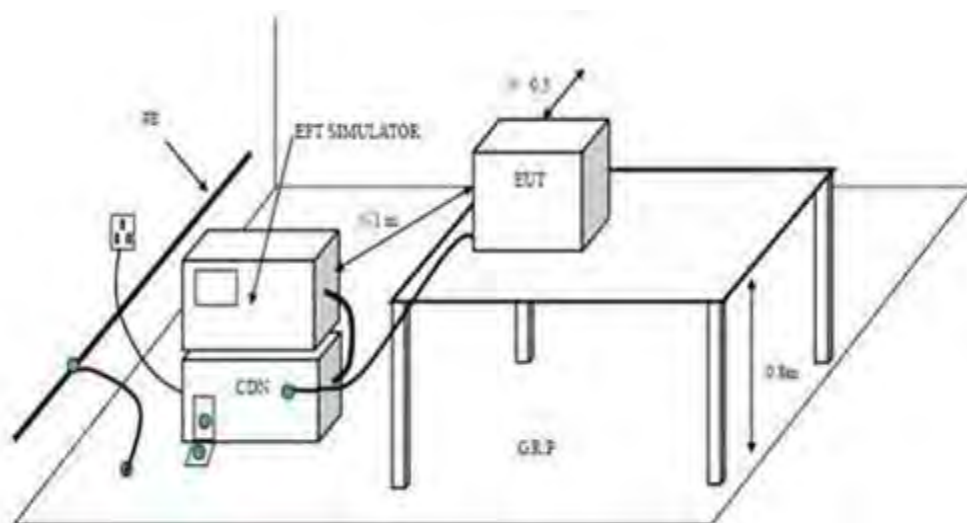
Shenzhen Most Technology Service Co., Ltd.

Test Voltage :	1&2	Test Date:	Jan. 15, 2020
Test Mode:	1&2	Frequency Range:	80-1000MHz
Field Strength:	3 V/m	Criterion :	A
Temperature:	25 °C	Humidity:	55%
Modulation: <input checked="" type="checkbox"/> AM <input type="checkbox"/> Pulse <input type="checkbox"/> none 1 kHz 80%			
Test Results Description			
Frequency Rang 1: 80MHz - 1000 MHz			
Steps	1%	1%	
	Horizontal	Vertical	
Front	PASS	PASS	
Right	PASS	PASS	
Rear	PASS	PASS	
Left	PASS	PASS	
Note: No function loss			

Reviewer : 

13.ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

13.1.Configuration of Test System



13.2.Test Standard

EN 61547:2009 (IEC 61000-4-4:2012)
(Severity Level 1 at 0.5KV)

13.3.Severity Levels and Performance Criterion

13.3.1.Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

13.3.2.Performance criterion : **B**

13.4. Test Procedure

The EUT and its simulators were placed on a the ground reference plane and were insulated from it by an wood support $0.1\text{m} \pm 0.01\text{m}$ thick. The ground reference plane was $1\text{m} \times 1\text{m}$ metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

13.4.1. For input and AC power ports:

The EUT was connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage was applied during compliance test and the duration of the test can't less than 2mins.

13.4.2. For signal lines and control lines ports:

It's unnecessary to test.

13.4.3. For DC input and DC output power ports:

It's unnecessary to test.

13.5. Test Results

13.5.1. Test Results: **PASS**

13.5.2. Test data on the following pages.

Electrical Fast Transient/Burst Test Results

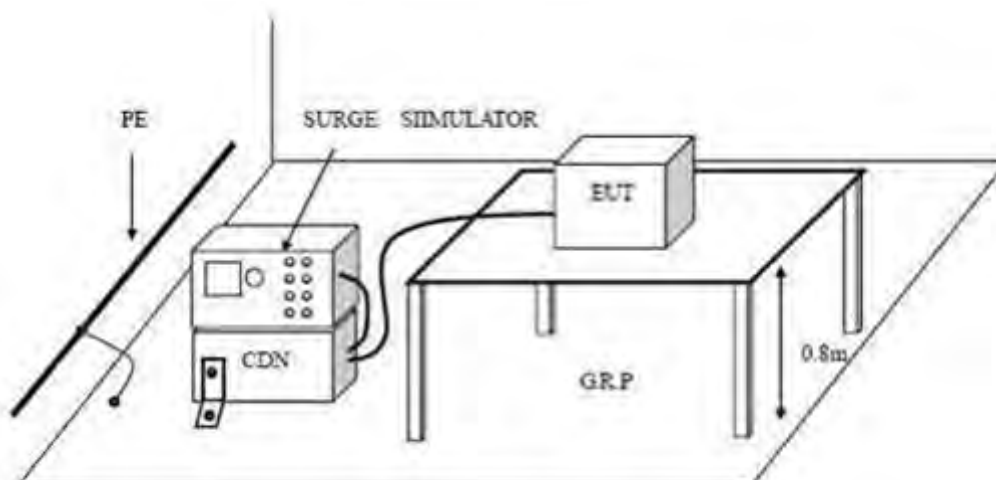
Shenzhen Most Technology Service Co., Ltd.

<i>Test Voltage</i> :		2			<i>Test Date</i> :		<i>Jan. 15, 2020</i>		
<i>Test Mode</i> :		2			<i>Criterion</i> :		<i>B</i>		
<i>Temperature:</i>		24 °C			<i>Humidity:</i>		55%		
<i>Test Results Description</i>									
<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Results</i>	<i>Inject Line</i>	<i>Voltage KV</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Results</i>
<i>L</i>	<i>±0.5</i>	<i>120</i>	<i>Direct</i>	<i>PASS</i>					
<i>N</i>	<i>±0.5</i>	<i>120</i>	<i>Direct</i>	<i>PASS</i>					
<i>L+ N</i>	<i>±0.5</i>	<i>120</i>	<i>Direct</i>	<i>PASS</i>					
<i>Remark:</i>									

Reviewer : Sunny

14.SURGE TEST

14.1.Configuration of Test System



14.2.Test Standard

EN 61547:2009 (IEC 61000-4-5:2014+A1:2017)
 (Severity Level : Line to Line was Level 1 at 0.5KV
 Line to PE was Level 2 at 1KV)

14.3.Severity Levels and Performance Criterion

14.3.1.Severity level

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

14.3.2.Performance criterion : C

14.4. Test Procedure

- 14.4.1. Set up the EUT and test generator as shown on Section 16.1.
- 14.4.2. For line to line coupling mode, provide a 0.5KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral line to ground are same except test level is 1KV.
- 14.4.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.
- 14.4.4. Different phase angles are done individually.
- 14.4.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

14.5. Test Results

- 14.5.1. Test Results: **PASS**
- 14.5.2. Test data on the following pages.

Surge Immunity Test Results

Shenzhen Most Technology Service Co., Ltd.

Test Voltage :	2	Test Date :	Jan. 15, 2020
Test Mode :	2	Criterion :	C
Temperature:	25 °C	Humidity:	55%

Test Results Description

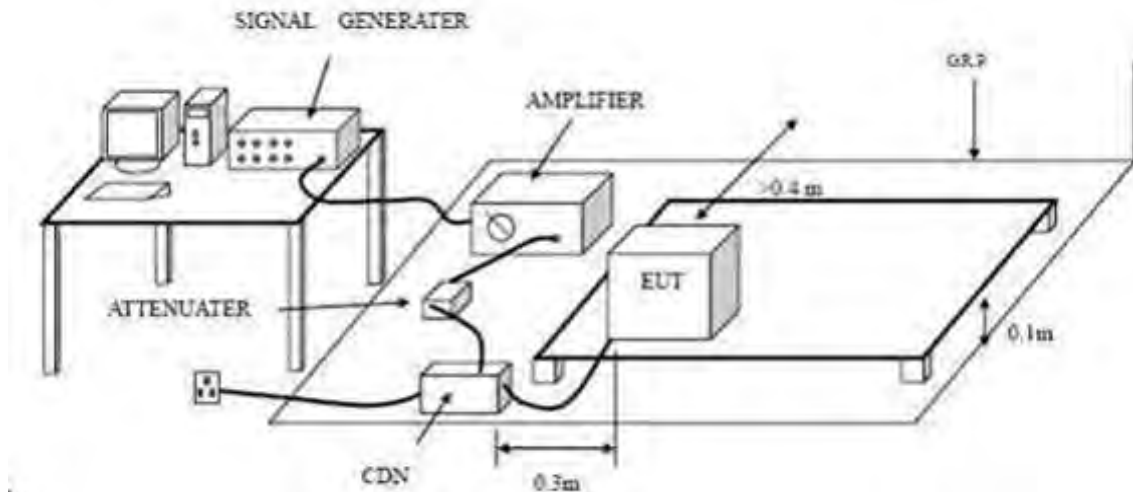
Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (KV)	Result
L-N	+	90	5	0.5	PASS
	-	270	5	0.5	PASS

Remark:

Reviewer : 

15. INJECTED CURRENTS SUSCEPTIBILITY TEST

15.1. Configuration of Test System



15.2. Test Standard

EN 61547:2009 (IEC 61000-4-6:2013)

(Severity Level 2 at 3V (r.m.s.) and frequency is from 0.15MHz to 80MHz)

15.3. Severity Levels and Performance Criterion

15.3.1. Severity level

Level	Voltage Level (e.m.f.) V
1.	1
2.	3
3.	10
X	Special

15.3.2. Performance criterion: A

15.4. Test Procedure

- 15.4.1. Set up the EUT, CDN and test generators as shown on Section 17.1.
- 15.4.2. Let the EUT work in test mode and test it.
- 15.4.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 15.4.4. The disturbance signal description below is injected to EUT through CDN.
- 15.4.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 15.4.6. The frequency range is swept from 0.15MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 15.4.7. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 15.4.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

15.5. Test Results

- 15.5.1. Test Results: **PASS**
- 15.5.2. Test data on the following pages.

Injected Currents Susceptibility Test Results

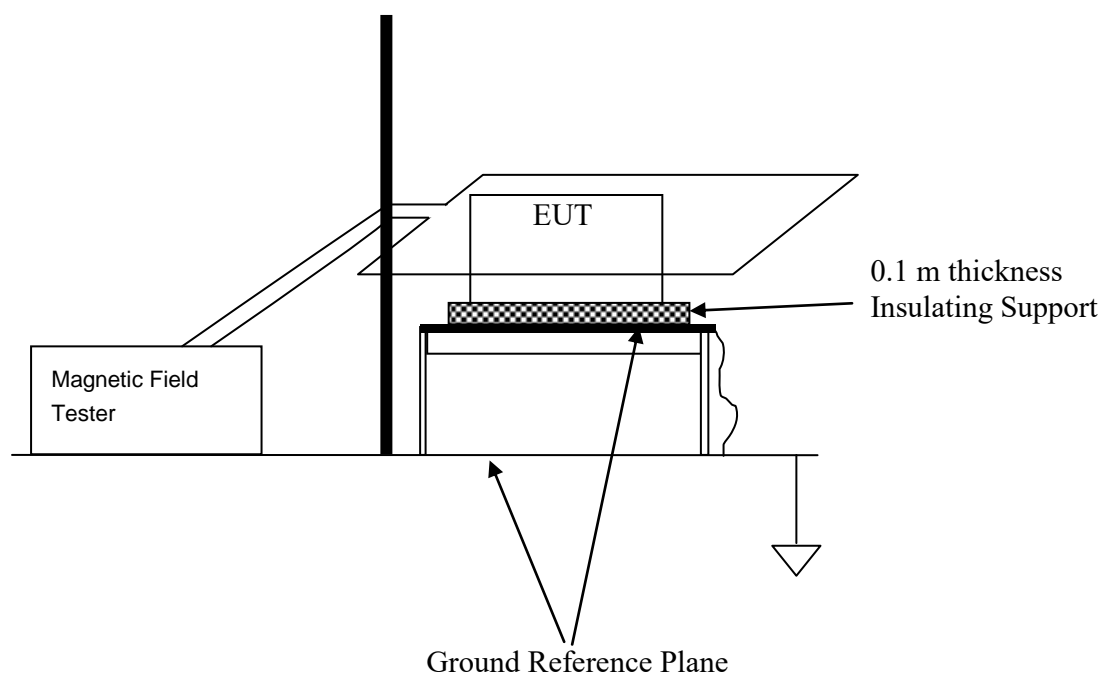
Shenzhen Most Technology Service Co., Ltd.

Power Supply :	2	Test Date: :	Jan. 15, 2020	
Test Mode :	2	Criterion: :	A	
Temperature:	26 °C	Humidity:	54%	
Test Results Description				
Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Criterion	Result
0.15 ~ 80	DC Mains	3V(rms), Unmodulated	A	PASS
Remark : No function loss				

Reviewer : 

16. MAGNETIC FIELD IMMUNITY TEST

16.1. Configuration of Test System



16.2. Test Standard

EN 61547:2009 (IEC 61000-4-8:2009)
(Severity Level 2 at 3A/m)

16.3. Severity Levels and Performance Criterion

16.3.1. Severity level

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

16.3.2. Performance criterion : A

16.4. Test Procedure

The EUT was subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 18.1. The induction coil was then rotated by 90° in order to expose the EUT to the test field with different orientations.

16.5. Test Results

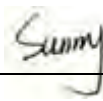
16.5.1. Test Results: **PASS**

16.5.2. Test data on the following pages.

Magnetic Field Immunity Test Results

Shenzhen Most Technology Service Co., Ltd.

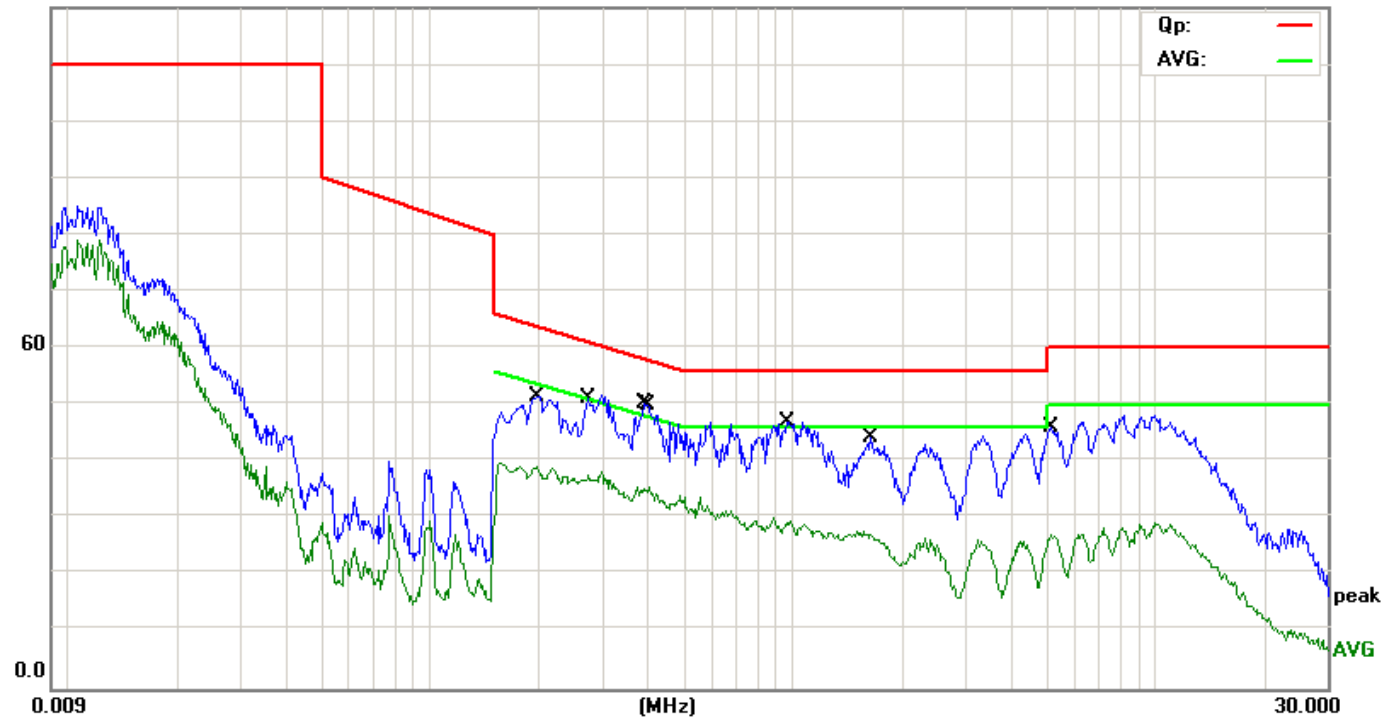
<i>Test Voltage</i> :	<i>1&2</i>		<i>Test Date:</i>	<i>Jan. 15, 2020</i>
<i>Test Mode</i> :	<i>1&2</i>		<i>Criterion :</i>	<i>A</i>
<i>Temperature:</i>	<i>25 ℃</i>		<i>Humidity:</i>	<i>55%</i>
<i>Test Results Description</i>				
<i>Test Level</i>	<i>Testing Duration</i>	<i>Coil Orientation</i>	<i>Criterion</i>	<i>Result</i>
<i>3A/m(50Hz/60Hz)</i>	<i>5 mins</i>	<i>X</i>	<i>A</i>	<i>PASS</i>
<i>3A/m(50Hz/60Hz)</i>	<i>5 mins</i>	<i>Y</i>	<i>A</i>	<i>PASS</i>
<i>3A/m(50Hz/60Hz)</i>	<i>5 mins</i>	<i>Z</i>	<i>A</i>	<i>PASS</i>
<i>Remark: No function loss</i>				

Reviewer : 

APPENDIX I

EUT:	Work light	M/N:	HL-WL2169
Mode:	Charging+ON	Phase:	L
Test by:	jaya	Power:	DC 5V by USB Port
Temperature: / Humidity	22.0°C/ 56.0%	Test date:	2020-01-15

120.0 dBuV

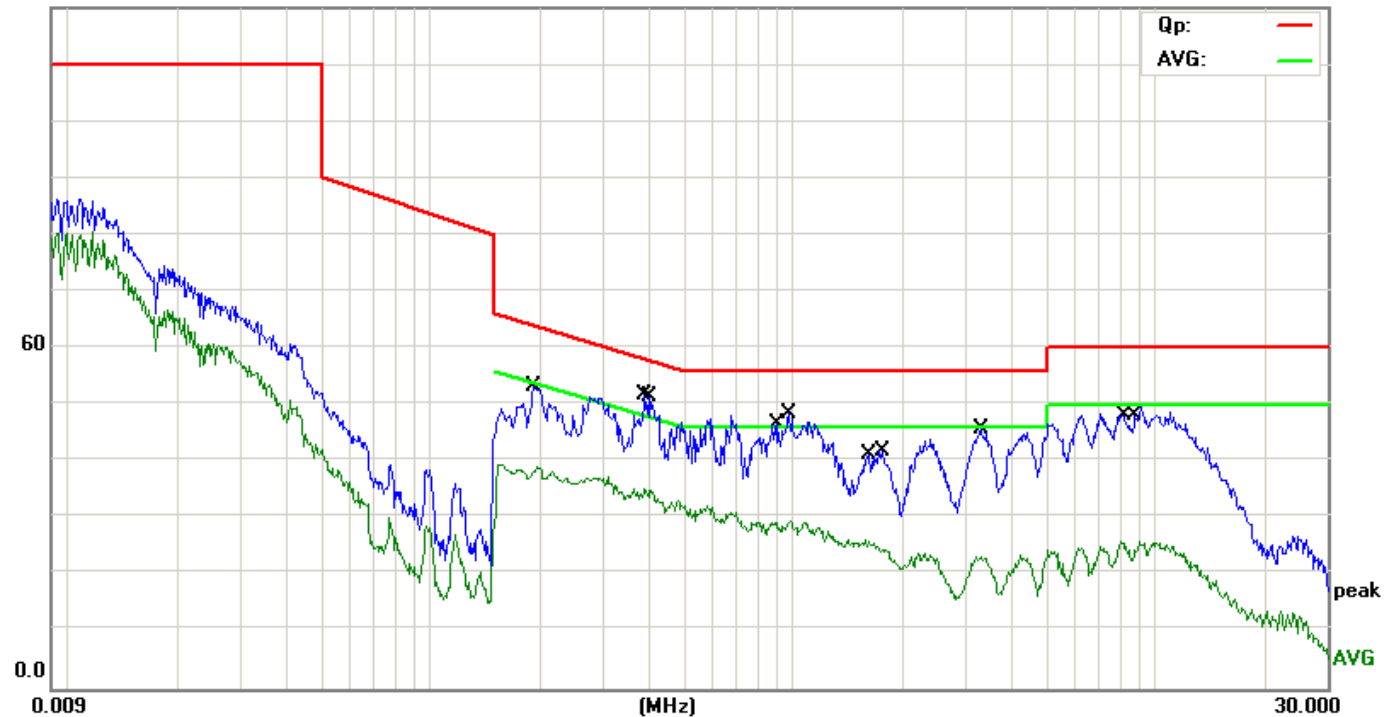


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1947	41.65	9.60	51.25	63.83	-12.58	QP	
2		0.1980	29.58	9.60	39.18	53.69	-14.51	AVG	
3		0.2740	41.47	9.60	51.07	61.00	-9.93	QP	
4		0.2740	27.98	9.60	37.58	51.00	-13.42	AVG	
5	*	0.3900	40.72	9.59	50.31	58.06	-7.75	QP	
6		0.4020	25.87	9.59	35.46	47.81	-12.35	AVG	
7		0.9660	37.39	9.60	46.99	56.00	-9.01	QP	
8		0.9940	19.86	9.60	29.46	46.00	-16.54	AVG	
9		1.6460	34.53	9.60	44.13	56.00	-11.87	QP	
10		1.6460	17.46	9.60	27.06	46.00	-18.94	AVG	
11		5.1780	36.31	9.63	45.94	60.00	-14.06	QP	
12		5.1780	17.56	9.63	27.19	50.00	-22.81	AVG	

*:Maximum data x:Over limit !:over margin

EUT:	Work light	M/N:	HL-WL2169
Mode:	Charging+ON	Phase:	N
Test by:	jaya	Power:	DC 5V by USB Port
Temperature: / Humidity	22.0°C/ 56.0%	Test date:	2020-01-15

120.0 dBuV

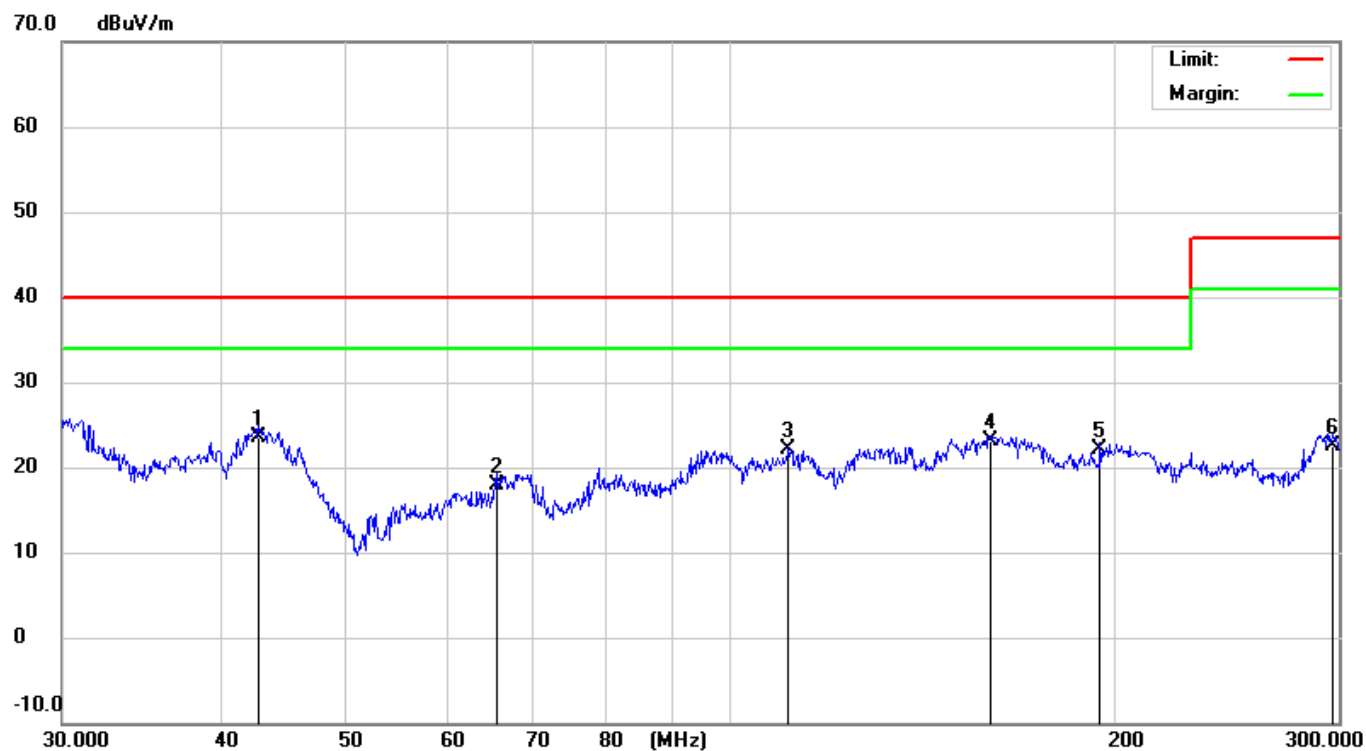


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1940	43.61	9.60	53.21	63.86	-10.65	QP	
2		0.1947	28.74	9.60	38.34	53.83	-15.49	AVG	
3		0.3940	25.61	9.59	35.20	47.98	-12.78	AVG	
4	*	0.4020	41.95	9.59	51.54	57.81	-6.27	QP	
5		0.9100	37.17	9.60	46.77	56.00	-9.23	QP	
6		0.9940	19.92	9.60	29.52	46.00	-16.48	AVG	
7		1.6420	16.44	9.60	26.04	46.00	-19.96	AVG	
8		1.7300	32.29	9.60	41.89	56.00	-14.11	QP	
9		3.3140	36.05	9.61	45.66	56.00	-10.34	QP	
10		3.3140	13.78	9.61	23.39	46.00	-22.61	AVG	
11		8.2020	16.02	9.67	25.69	50.00	-24.31	AVG	
12		8.8220	38.58	9.67	48.25	60.00	-11.75	QP	

*:Maximum data x:Over limit !:over margin

APPENDIX II

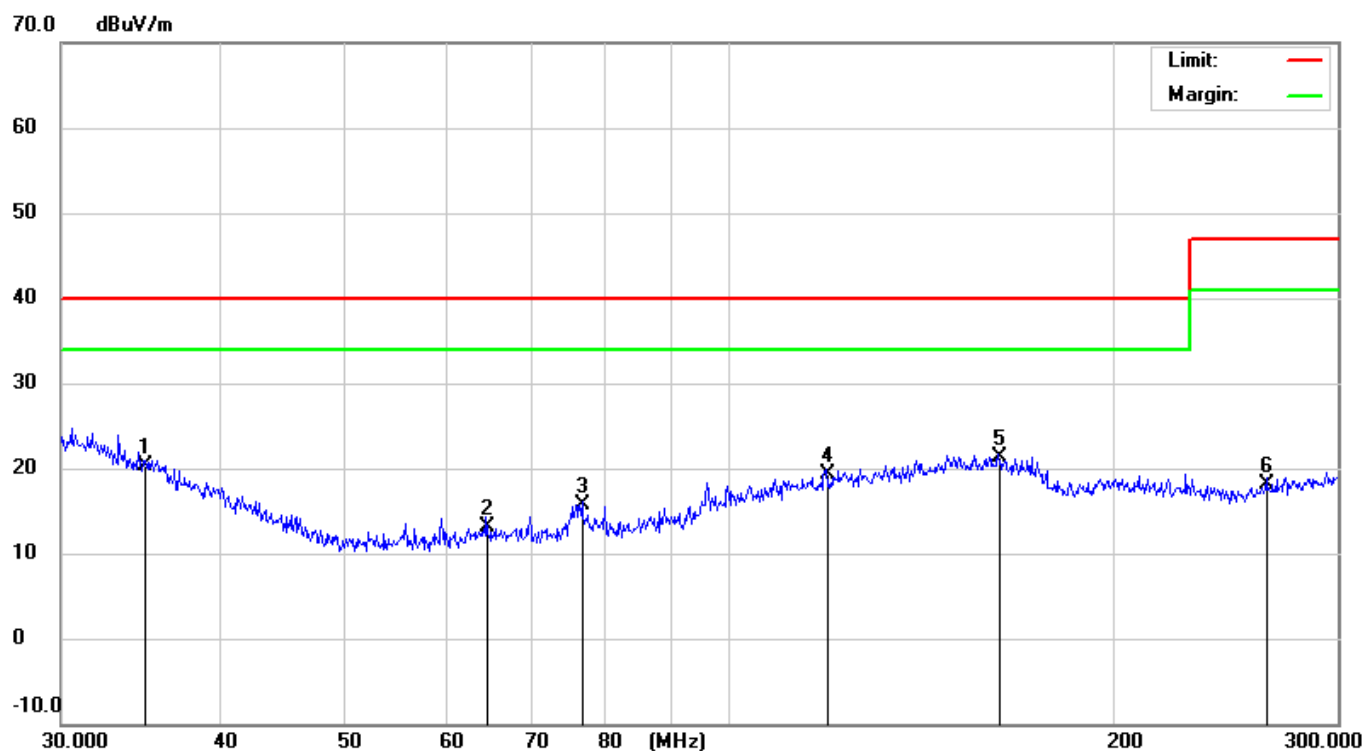
EUT:	Work light	M/N:	HL-WL2169
Mode:	ON	Polarization:	Vertical
Test by:	LEO	Power:	DC 3.7V by battery
Temperature: / Humidity	22.0°C/ 51.0%	Test date:	2020-01-15



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	42.7682	11.60	11.97	23.57	40.00	-16.43	QP			
2		65.6328	8.90	8.99	17.89	40.00	-22.11	QP			
3		111.2042	7.20	14.83	22.03	40.00	-17.97	QP			
4		160.0004	5.90	17.30	23.20	40.00	-16.80	QP			
5		195.0389	7.00	15.05	22.05	40.00	-17.95	QP			
6		296.5658	7.10	15.38	22.48	47.00	-24.52	QP			

*:Maximum data x:Over limit !:over margin

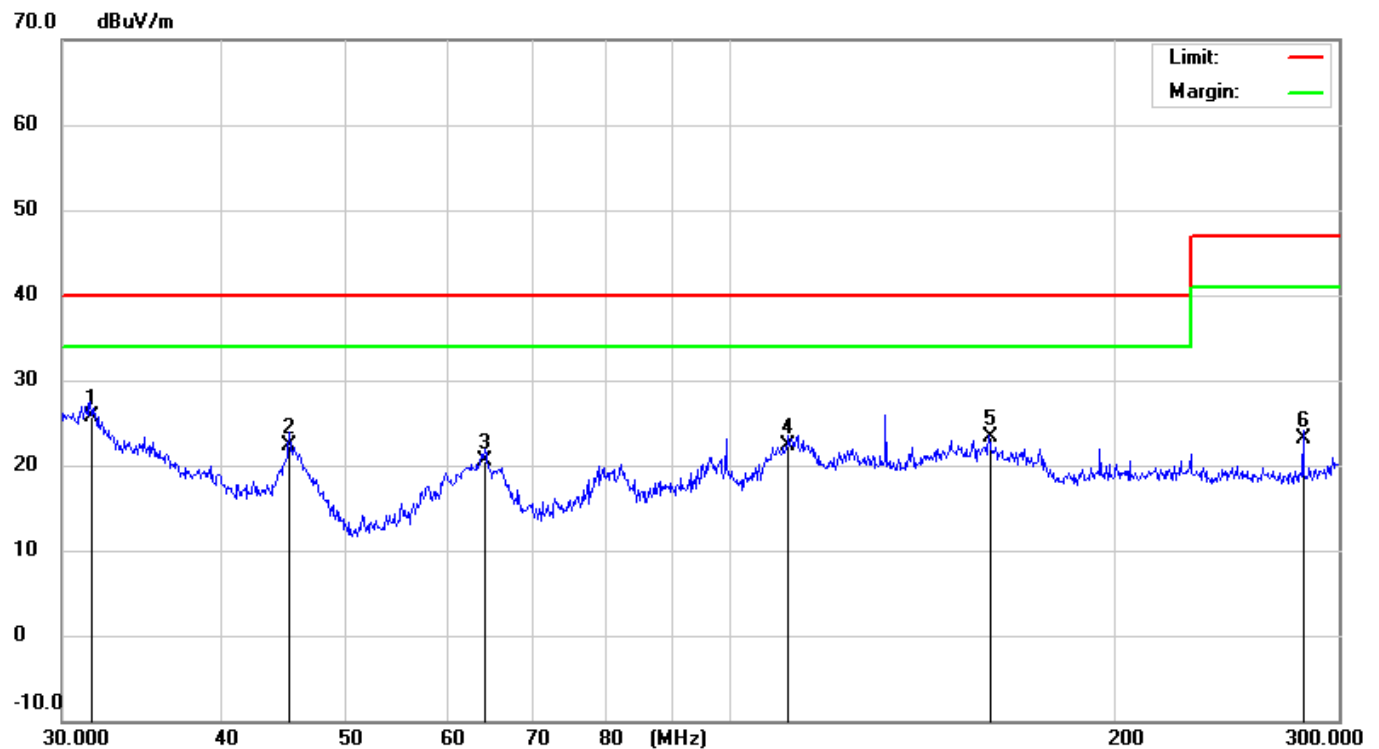
EUT:	Work light	M/N:	HL-WL2169
Mode:	ON	Polarization:	Horizontal
Test by:	LEO	Power:	DC 3.7V by battery
Temperature: / Humidity	22.0°C/ 51.0%	Test date:	2020-01-15



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		34.8435	2.60	17.61	20.21	40.00	-19.79	QP		
2		64.5835	4.10	8.92	13.02	40.00	-26.98	QP		
3		76.7576	5.90	9.84	15.74	40.00	-24.26	QP		
4		119.1575	3.50	15.71	19.21	40.00	-20.79	QP		
5	*	162.6003	4.00	17.21	21.21	40.00	-18.79	QP		
6		263.7068	3.80	14.27	18.07	47.00	-28.93	QP		

*:Maximum data x:Over limit !:over margin

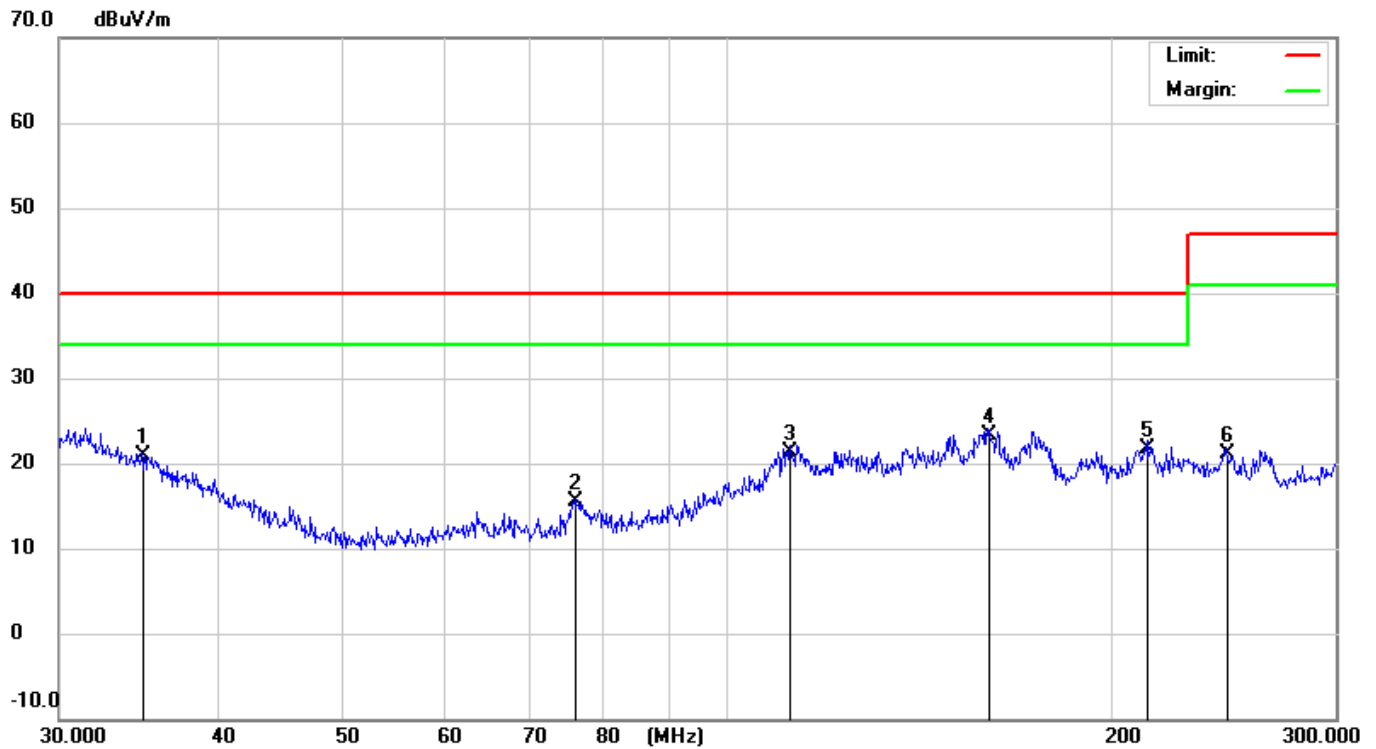
EUT:	Work light	M/N:	HL-WL2169
Mode:	Charging+ON	Polarization:	Vertical
Test by:	LEO	Power:	DC 5V by USB Port
Temperature: / Humidity	22.0°C/ 51.0%	Test date:	2020-01-15



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	31.5589	5.80	19.84	25.64	40.00	-14.36	QP		
2		45.1982	12.00	10.40	22.40	40.00	-17.60	QP		
3		64.2867	11.60	8.90	20.50	40.00	-19.50	QP		
4		111.2042	7.40	14.83	22.23	40.00	-17.77	QP		
5		159.6325	5.90	17.31	23.21	40.00	-16.79	QP		
6		281.2686	8.30	14.86	23.16	47.00	-23.84	QP		

*:Maximum data x:Over limit !:over margin

EUT:	Work light	M/N:	HL-WL2169
Mode:	Charging+ON	Polarization:	Horizontal
Test by:	LEO	Power:	DC 5V by USB Port
Temperature: / Humidity	22.0°C/ 51.0%	Test date:	2020-01-15



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		34.8435	3.20	17.61	20.81	40.00	-19.19	QP		
2		76.0539	5.70	9.78	15.48	40.00	-24.52	QP		
3		111.9750	6.30	14.92	21.22	40.00	-18.78	QP		
4	*	160.0005	6.00	17.30	23.30	40.00	-16.70	QP		
5		213.3641	6.80	14.83	21.63	40.00	-18.37	QP		
6		246.1055	7.10	13.91	21.01	47.00	-25.99	QP		

*:Maximum data x:Over limit !:over margin

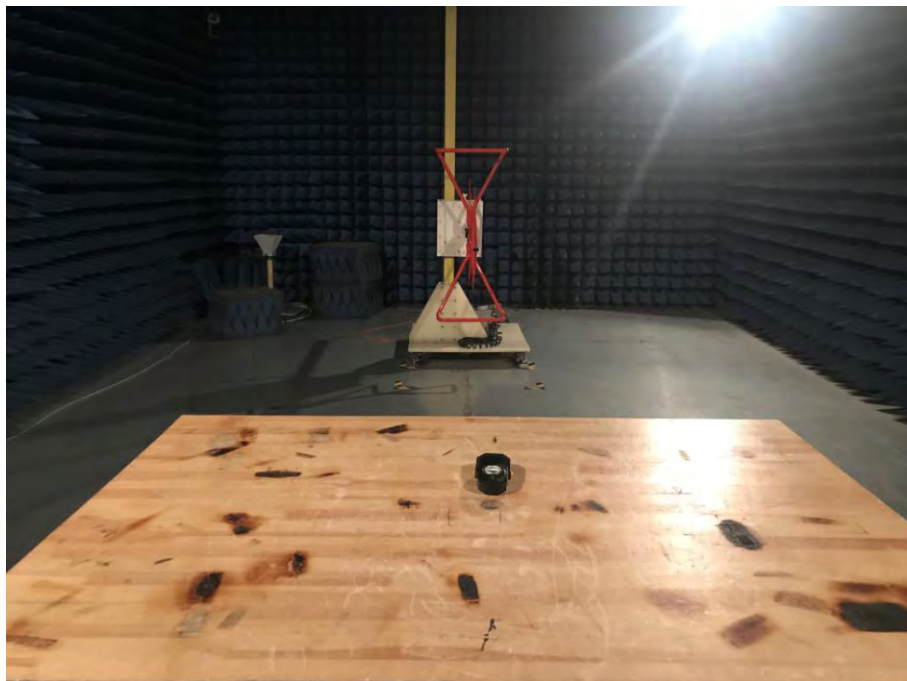
APPENDIX III

(Test Photos)

Configuration Test Setup Photograph



RADIATED Test Setup Photograph



Electrostatic Test Setup Photograph



APPENDIX IV

(Photos of the EUT)

Figure 1
General Appearance of the EUT

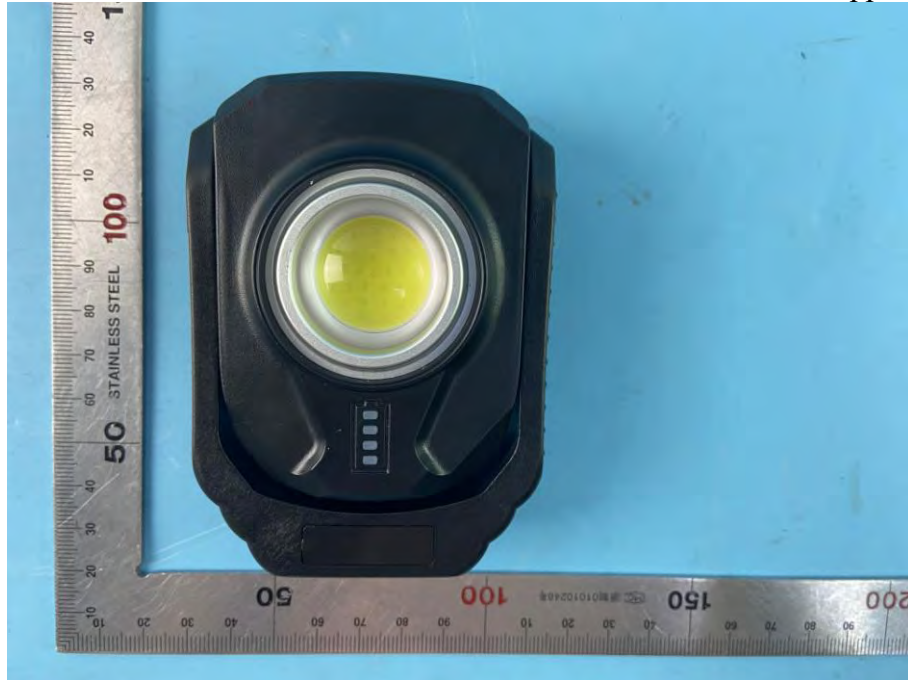


Figure 2
General Appearance of the EUT



Figure 3
Internal of the EUT

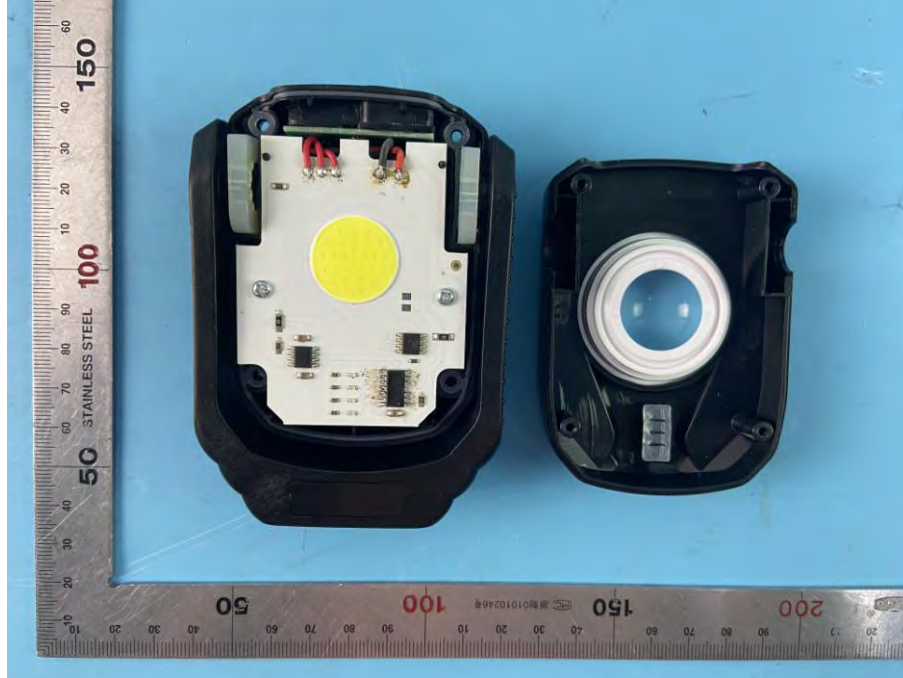


Figure 4
Components Side of the PCB

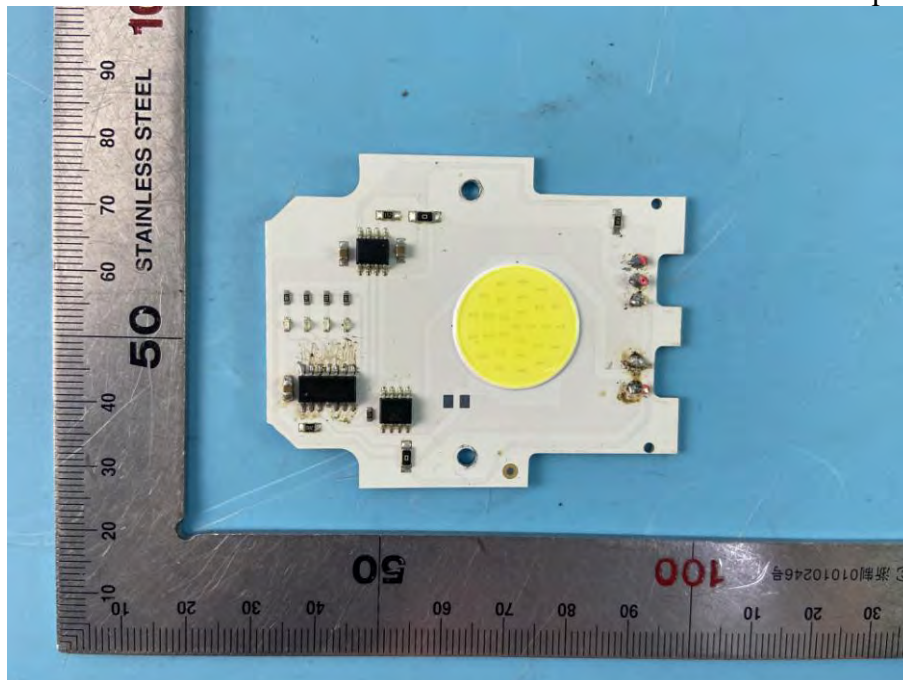


Figure 5
Components Side of the PCB

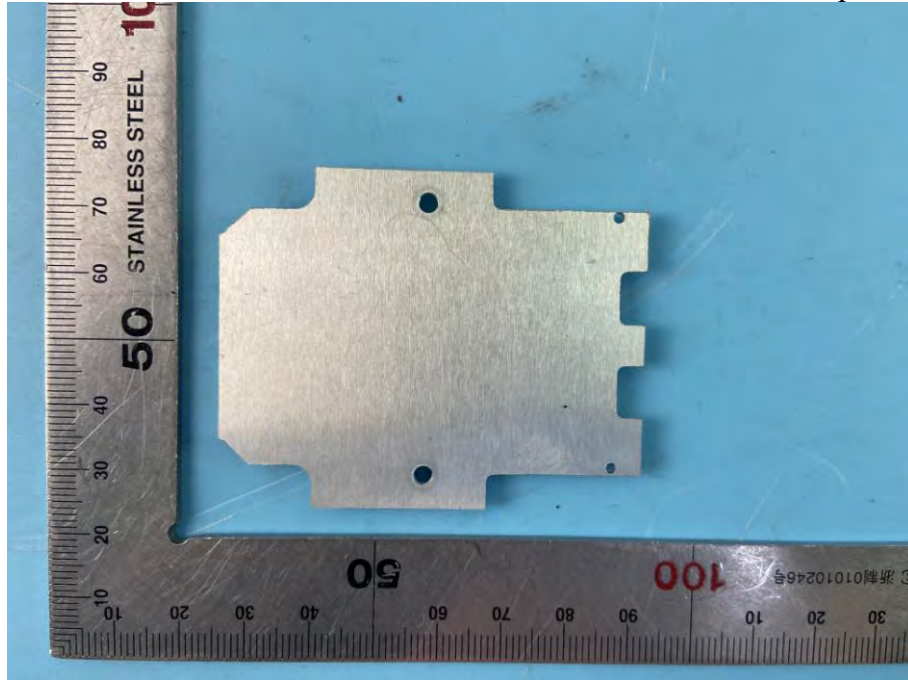


Figure 6
Components Side of the PCB

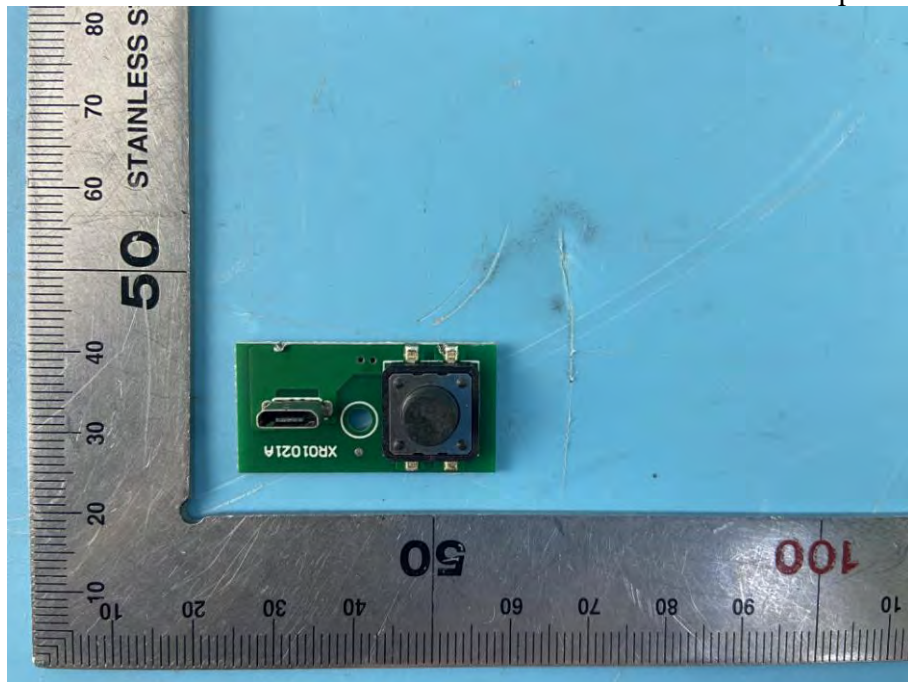


Figure 7
Components Side of the PCB

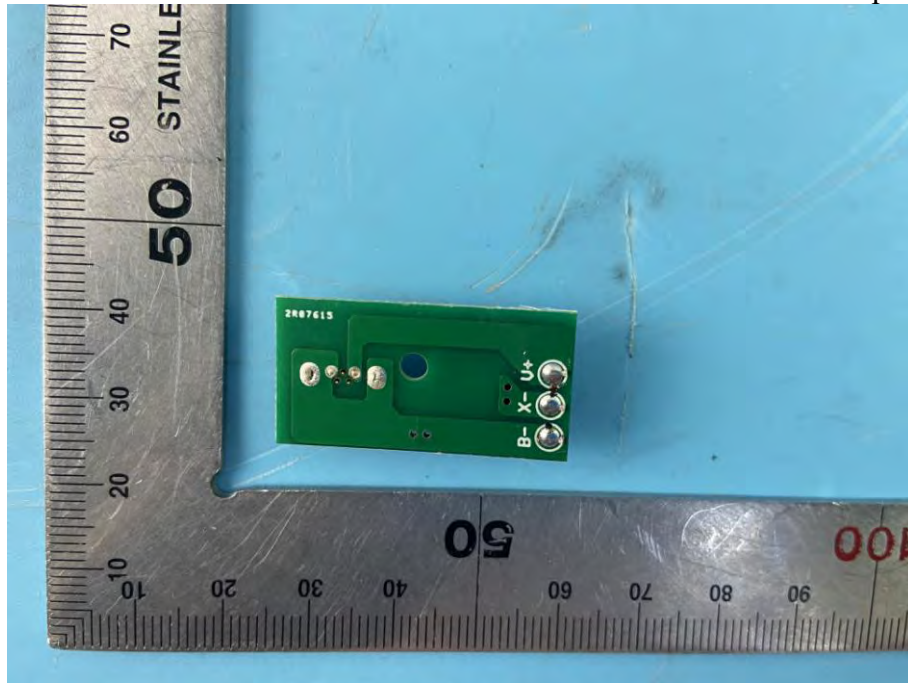


Figure 8
Battery of the EUT

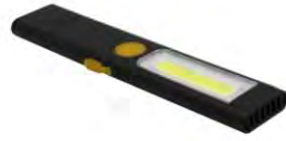




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