

# EMC TEST REPORT

**Product :** 2.4G UV Sterilamp

**Trade Name :** 

**Model Name :** T8361UVR

**Serial Model :** N/A

**Report No. :** UNIA20042904ER-01

## Prepared for

Shenzhen Tigi Digital Lighting Technology Co., Ltd.  
7th Fl, 6th Block, Zhongyuntai Industry Park, Shiyan, Bao'an District, Shenzhen,  
China

## Prepared by

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## TEST RESULT CERTIFICATION

**Applicant's name** .....: Shenzhen Tigi Digital Lighting Technology Co., Ltd.  
**Address** .....: 7th Fl, 6th Block, Zhongyuntai Industry Park, Shiyan, Bao'an District, Shenzhen, China

**Manufacture's Name** .....: Shenzhen Tigi Digital Lighting Technology Co., Ltd.  
**Address** .....: 7th Fl, 6th Block, Zhongyuntai Industry Park, Shiyan, Bao'an District, Shenzhen, China

**Product description**  
**Product name**.....: 2.4G UV Sterilamp  
**Trade Mark**.....: 

**Model and/or type reference** ..: T8361UVR  
EN 55014-1:2017  
EN 61000-3-2:2014

**Standards**.....: EN 61000-3-3:2013  
EN 55014-2:2015

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the EMC Directive 2014/30/EU requirements. And it is applicable only to the tested sample identified in the report.

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**Date of Test** .....:  
**Date (s) of performance of tests** .....: Apr. 29, 2020~May. 09, 2020  
**Date of Issue** .....: May. 11, 2020  
**Test Result** .....: Pass

Prepared by:

*Bob Liao*

Bob Liao/Editor

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Approved & Authorized Signer:

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# 1 TEST SUMMARY

## 1.1 TEST RESULTS

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55014-1:2017	Conducted Emission	Class B	PASS	
	Disturbance Power(30-300MHz)	---	PASS	
	Radiated Emission 30MHz to 1000MHz	Class B	PASS	NOTE (1)
EN61000-3-2:2014	Harmonic Current Emission	Class A	PASS	
EN 61000-3-3:2013	Voltage Fluctuations & Flicker	---	PASS	
EMC Immunity				
Section EN 55014-2:2015	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006 +A1:2008+A2:2010	RF Electromagnetic Field	A	PASS	
EN 61000-4-4:2012	Fast Transients	B	PASS	
EN 61000-4-5:2014 /A1:2017	Surges	B	PASS	
EN 61000-4-6:2014 /AC:2015	Injected Current	A	PASS	
EN 61000-4-11:2004 /A1:2017	Volt. Dips	C / C / C	PASS	NOTE (2)

Note:

- (1) Radiated Emission 30MHz to 1000MHz only apply when test fail in Disturbance Power(200-300MHz) or the maximum clock frequency more than 30 MHz.
- (2) Voltage Dip: 100% reduction – Performance Criteria C  
Voltage Dip: 30% reduction – Performance Criteria C  
Voltage Dip: 60% reduction – Performance Criteria C
- (3) For client's request and manual description, the test will not be executed.
- (4) "N/A" denotes test is not applicable in this Test Report

## 1.2 TEST FACTORY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address :2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd,Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

A2LA Certificate Number: 4747.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 674885

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

### 1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

#### A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI01	ANSI	9KHz ~ 150KHz	3.18	
		150 KHz ~ 30MHz	2.70	


#### B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI02	ANSI	9KHz ~ 30MHz	2.50	
		30MHz ~ 200MHz	3.43	
		200MHz ~ 1000MHz	3.57	
		1GHz ~ 6 GHz	4.13	



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment:	2.4G UV Sterilamp	
Trade Mark:		
Model Name:	T8361UVR	
Serial No.:	N/A	
Model Difference:	N/A	
Product Description:	The EUT is a 2.4G UV Sterilamp.	
	Operating frequency:	N/A
	Connecting I/O port:	N/A
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.		

## 2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Running

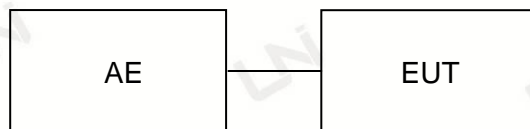
For Conducted Test	
Pretest Mode	Description
Mode 1	Running

For Radiated Test	
Pretest Mode	Description
Mode 1	Running

For EMS Test	
Pretest Mode	Description
Mode 1	Running


Note: The test modes were carried out for all operation modes(include link and idle).

## 2.3 DESCRIPTION OF TEST SETUP



### 2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	2.4G UV Sterilamp		T8361UVR	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in 『Length』 column.
3. “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2020.10.15
3	AMN	ETS	3810/2	00020199	2020.10.15
4	AAN	TESEQ	T8-Cat6	38888	2020.10.15
5	Pulse Limiter	CYBRTEK	EM5010	E115010056	2020.05.26
6	EMI Test Receiver	Rohde&Schwarz	ESCI	101210	2020.10.15
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2020.10.18
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2020.11.15
4	PREAMP	HP	8449B	3008A00160	2020.10.21
5	PREAMP	HP	8447D	2944A07999	2020.05.26
6	EMI Test Receiver	Rohde&Schwarz	ESR3	101891	2020.10.15
7	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2020.10.15
8	Active Loop Antenna	Com-Power	AL-310R	10160009	2020.05.28
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2020.05.28
10	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2020.10.23
11	Loop Antenna	Beijing daze Technology	ZN30401	13015	2020.10.15
12	EM Clamp	Schwarzbeck	MDS21	03350	2020.10.20
Harmonic / Flicker Measurement					
1	Power Analyzer	California Instrumnets	PACS-1	X71719	2020.10.15
2	AC Power Source	California Instrumnets	5001ix	HK53570	2020.10.15
Electrostatic Discharge Test					
1	ESD Generator	EVERFINE	EMS61000-2A	P185811CA837112 1	2020.10.17
RS Test					
1	Power Meter	Agilent	E4419B	QB4331226	2020.10.10
2	Power Sensor	Agilent	8481A	MY41092622	2020.10.10
3	Power Sensor	Agilent	8481A	US37296783	2020.10.10
4	Signal Generator	Agilent	N5182A	MY46240556	2020.10.10
5	Power Amplifier	MICOTOP	MPA-80-1000-250	1711489	2020.10.10
6	Power Amplifier	MICOTOP	MPA-1000-3000-7 5	1711488	2020.10.10
7	Power Amplifier	MICOTOP	MPA-3000-6000-5 0	MPA1706275	2020.10.10
8	Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.10
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2020.05.28

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Electrical Fast Transient / Burst Immunity Test					
1	EMS Test Control System	Shanghai Lioncel	SCU-614AS	SCU614S0160601	N/A
2	EFT/B Generator	Shanghai Lioncel	EFT-404S	EFT404S0160601	2020.10.15
Surge Test					
1	EMS Test Control System	Shanghai Lioncel	SCU-614AS	SCU614S0160601	N/A
2	Surge Generator	Shanghai Lioncel	LSG-506S	LSG506S0160601	2020.10.15
3	CDN	Shanghai Lioncel	CDN-532S	CDN532S0160601	2020.10.15
CS Test					
1	CS	SCHLODER	CDG-6000-25	126A1280/2014	2020.10.10
2	CDN	SCHLODER	CDN-M2+3	A2210275/2014	2020.10.10
3	EM Clamp	SCHLODER	EMCL-20	132A1283	2020.10.10
4	Attenuator	Nemtest	ATT-6DB-100	A100W224	2020.10.10
5	Audio Analyzer	R&S	UPL	100419	2020.10.10
6	Universal Radio Communication Tester	R&S	CMW500	117239	2020.10.10
7	Universal Radio Communication Tester	R&S	CMU200	111764	2020.10.10
8	Audio Analyzer	R&S	UPL	100689	2020.10.10
9	Audio Breakthrough Shielding Box	SKET	SB_ABT/C35	N/A	2020.10.10
10	Ear Simulator	SKET	AE_ABT/C35	N/A	2020.10.10
11	Mouth Simulator	SKET	AM_ABT/C35	N/A	2020.10.10
12	1KHz Standard Source	SKET	MSC_ABT/C35	N/A	2020.10.10
Power-frequency magnetic fields Test					
1	Magnetic Field Test System	Shanghai Lioncel	PMF801C-T	PMF801C-T016070 1	2020.05.26
Voltage dips and interruptions Test					
1	Voltage SAG Simulator	Shanghai Lioncel	VDS-1101	VDS11010160601	2020.10.15
2	Adjustable Power Supply	Shanghai Lioncel	RGL-210	RGL2100151001	N/A

### 3 CONDUCTED EMISSIONS MEASUREMENT

#### 3.1 CONDUCTED EMISSION LIMIT

##### 3.1.1 POWER LINE CONDUCTED EMISSION

Frequency (MHz)	At mains terminals(dB $\mu$ V)		At load terminals and additional terminals(dB $\mu$ V)	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	66~56*	56~46*	80	70
0.50~5.00	56	46	74	64
5.00~30.0	60	50	74	64

##### 3.1.2 MAINS TERMINALS OF TOOLS

Frequency (MHz)	Rated motor power not exceeding 700W dB(uV)		Rated motor power above 700W and not exceeding 1000W dB(uV)		Rated motor power above 1000W dB(uV)	
	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	66~59*	59~49*	70~63*	63~53*	76~69*	69~59*
0.50~5.00	59	49	63	53	69	59
5.00~30.0	64	54	68	58	74	64

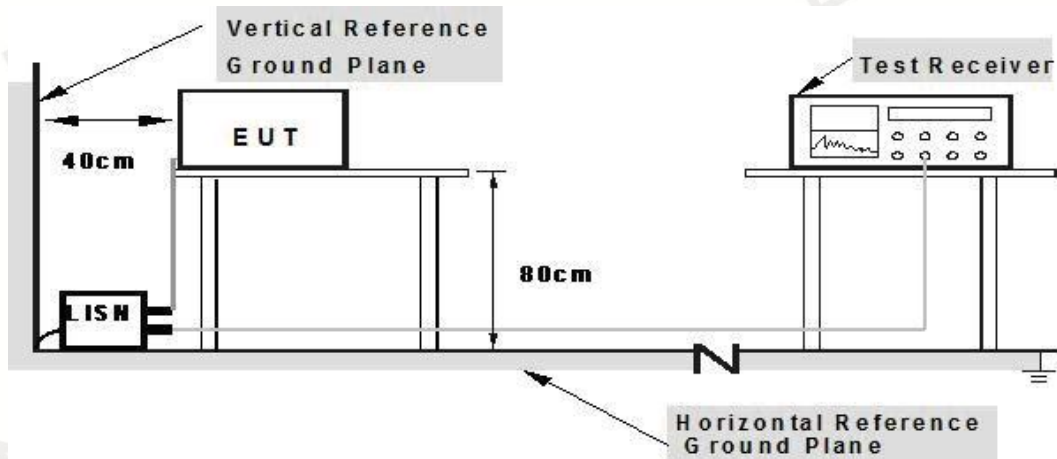
Note:

1. The tighter limit applies at the band edges.
2. The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver:

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

### 3.2 TEST SETUP



- Note: 1.Support units were connected to second LISN.**  
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

### 3.3 TEST PROCEDURE

- 1.The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- 3.I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN at least 80 cm from nearest part of EUT chassis.
- 5.For the actual test configuration, please refer to the related Item EUT Test Photos.

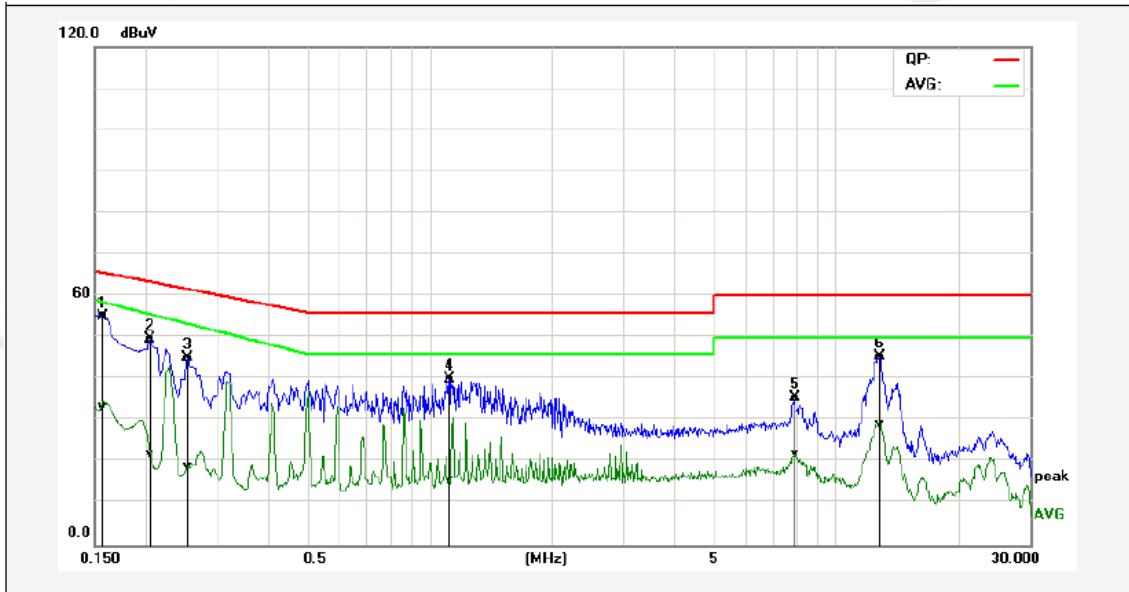
### 3.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

### 3.5 TEST RESULT

Pass

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Phase:	Line		

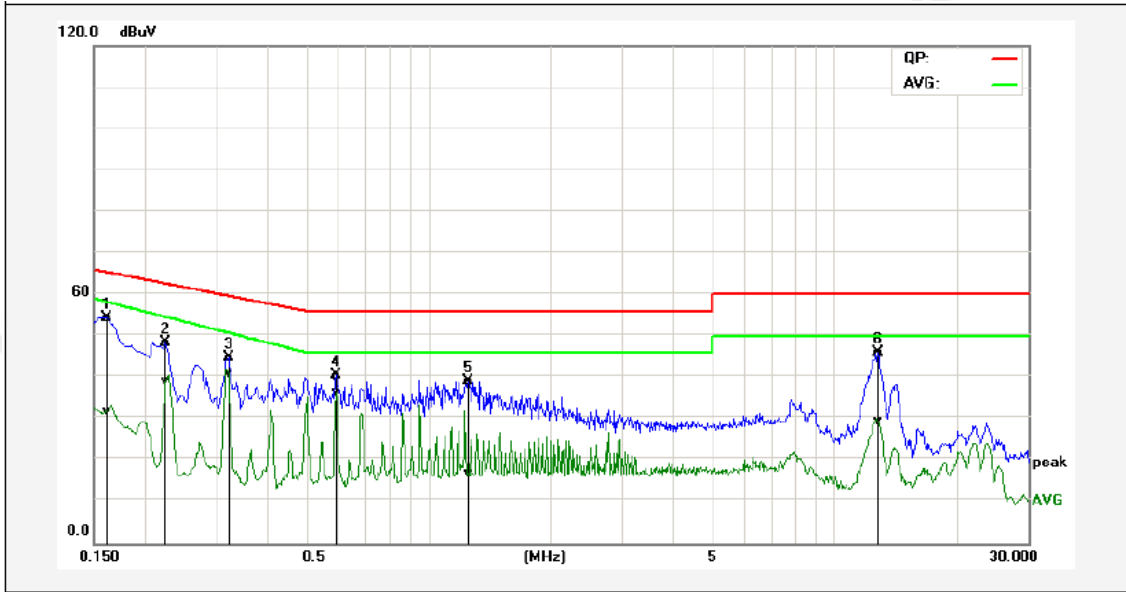


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1590	45.69	23.81	9.66	55.35	33.47	65.51	58.37	-10.16	-24.90	Pass
2P	0.2060	39.96	12.42	9.74	49.70	22.16	63.36	55.57	-13.66	-33.41	Pass
3P	0.2540	35.36	9.17	9.78	45.14	18.95	61.62	53.31	-16.48	-34.36	Pass
4P	1.1180	30.25	5.76	9.85	40.10	15.61	56.00	46.00	-15.90	-30.39	Pass
5P	7.9220	25.49	11.98	9.94	35.43	21.92	60.00	50.00	-24.57	-28.08	Pass
6P	12.8020	45.34	28.90	0.24	45.58	29.14	60.00	50.00	-14.42	-20.86	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result=Reading + Factor, Margin=Result – Limit.



Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Phase:	Neutral		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.1620	44.86	22.40	9.67	54.53	32.07	65.36	58.17	-10.83	-26.10	Pass
2P	0.2260	38.66	29.51	9.76	48.42	39.27	62.59	54.57	-14.17	-15.30	Pass
3P	0.3220	34.95	31.21	9.80	44.75	41.01	59.65	50.75	-14.90	-9.74	Pass
4*	0.5940	30.71	26.53	9.79	40.50	36.32	56.00	46.00	-15.50	-9.68	Pass
5P	1.2579	29.20	7.19	9.84	39.04	17.03	56.00	46.00	-16.96	-28.97	Pass
6P	12.7900	45.71	29.29	0.24	45.95	29.53	60.00	50.00	-14.05	-20.47	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result=Reading + Factor, Margin=Result – Limit.

## 4 DISTURBANCE POWER MEASUREMENT

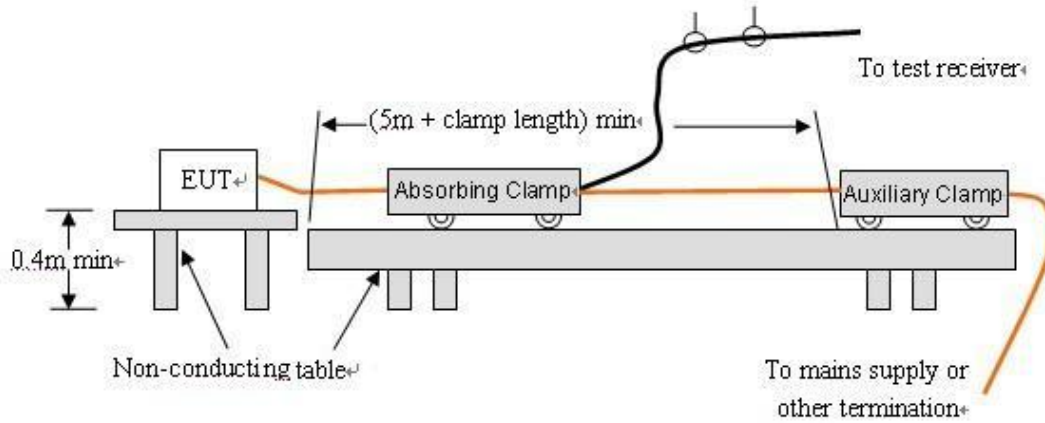
### 4.1 DISTURBANCE POWER LIMIT

Frequency (MHz)	Household and similar appliances dB(pW)		Tools					
			Rated motor power not exceeding 700W dB(pW)		Rated motor power above 700W and not exceeding 1000W dB(pW)		Rated motor power above 1000W dB(pW)	
	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
30~300	44-55	35-45	44-55	35-45	49-59	39-49	55-65	45-55

Note:

1. The limit for radiated test was performed according to as following: CISPR 14.
2. The tighter limit applies at the band edges.
3. Emission level (dBuV/m)=20log Emission level (uV/m).

### 4.2 TEST SETUP



### 4.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

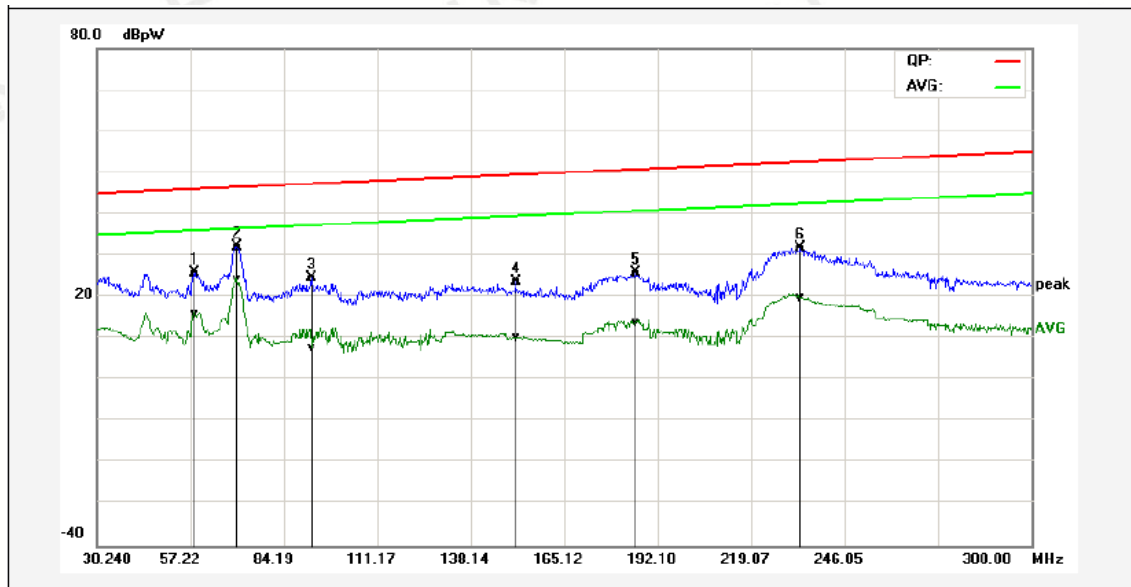
### 4.4 TEST PROCEDURE

1. The EUT is placed on a 0.8 meters height wooden table above the ground plane, and kept at least 0.8 m from other metallic object. The straight portion of main lead would put on 6 m long testing bench (if main lead is shorter than 6 m it should be extended).
2. Any lead connecting the main appliance to an auxiliary apparatus is disconnected if this does not affect the operation of the appliance, or is isolated by means of ferrite rings (or an absorbing clamp) close to the appliance.
3. The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
4. The EUT test program was started. Emissions were scanned and measured using a receiver connected to the absorbing clamp.
5. The absorbing clamp is positioned for maximum indication at each test frequency (30MHz to 300MHz), that means the clamp is moved along the main lead until the maximum emission value is found.
6. For the actual test configuration, please refer to the related EUT Test Photos.

### 4.5 TEST RESULT

Pass

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBpW)	Average result (dBpW)	QuasiPeak limit (dBpW)	Average limit (dBpW)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	58.4800	7.27	-2.62	18.65	25.92	16.03	46.05	36.05	-20.13	-20.02	Pass
2*	70.5199	13.12	5.33	18.90	32.02	24.23	46.50	36.50	-14.48	-12.27	Pass
3P	92.2400	5.69	-10.94	18.83	24.52	7.89	47.31	37.31	-22.79	-29.42	Pass
4P	150.9600	5.02	-8.49	18.76	23.78	10.27	49.48	39.48	-25.70	-29.21	Pass
5P	185.6799	8.07	-3.97	17.85	25.92	13.88	50.77	40.77	-24.85	-26.89	Pass
6P	233.3200	11.02	-0.92	20.82	31.84	19.90	52.53	42.53	-20.69	-22.63	Pass

Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit

## 5 RADIATED EMISSIONS MEASUREMENT

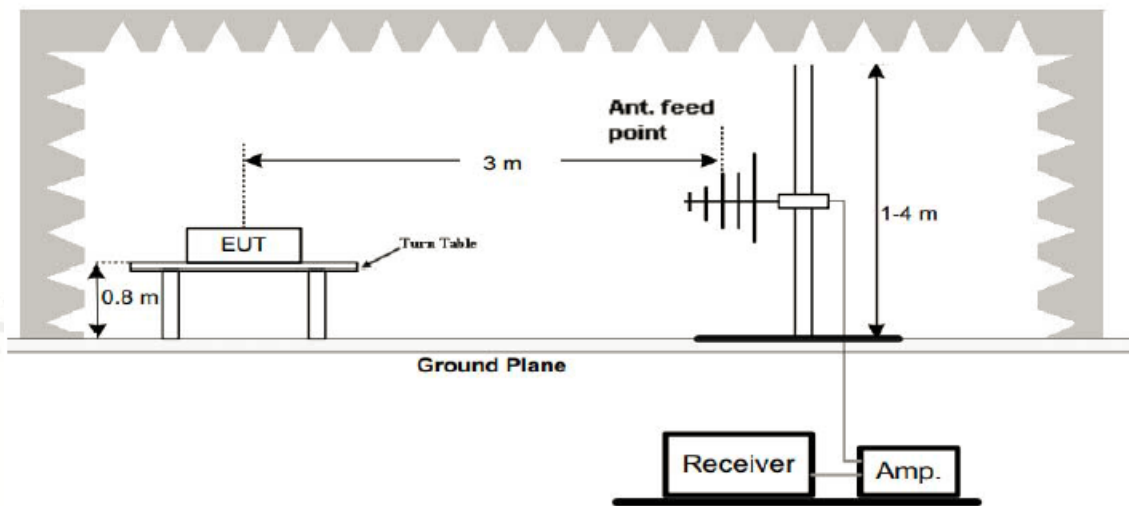
### 5.1 RADIATED EMISSION LIMIT

Frequency (MHz)	10m	3m
	dBuV/m	dBuV/m
30~230	30	40
230~1000	37	47

Note:

1. The limit for radiated test was performed according to as following: CISPR 14.
2. The tighter limit applies at the band edges.
3. Emission level (dBuV/m)=20log Emission level (uV/m).

### 5.2 TEST SETUP



### 5.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

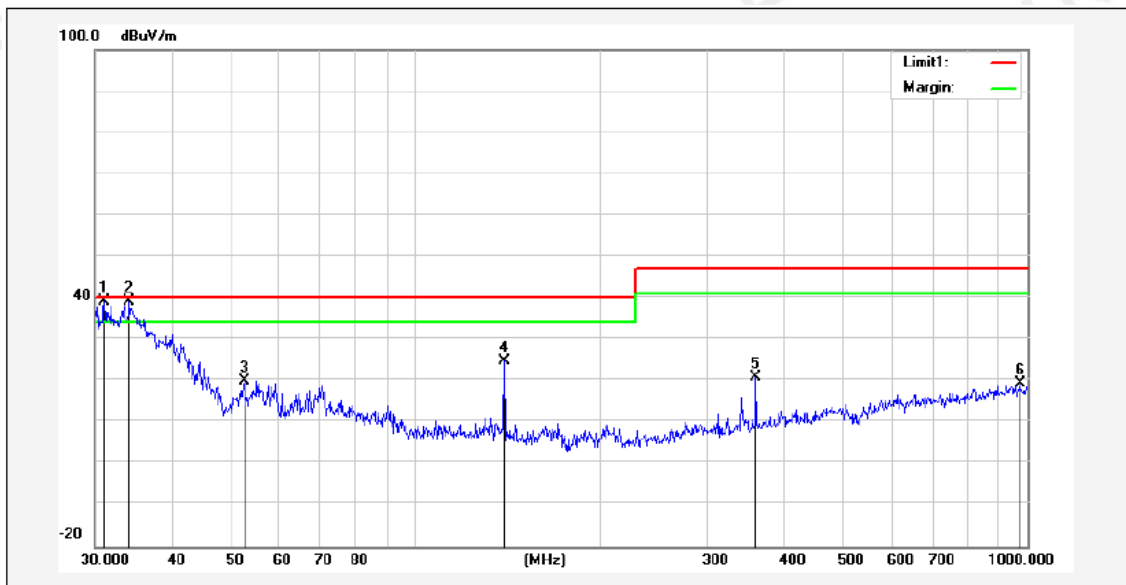
### 5.4 TEST PROCEDURE

1. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
2. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
3. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.
5. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.
6. For the actual test configuration, please refer to the related Item EUT Test Photos.

### 5.5 TEST RESULT

Pass

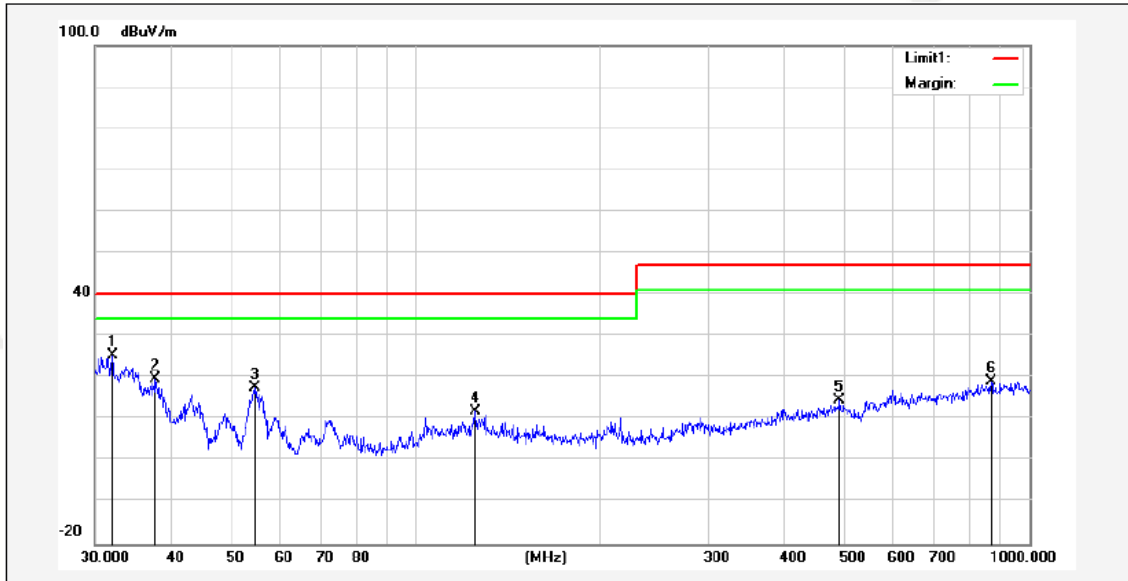
Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Polarization:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	31.0706	47.28	-7.99	39.29	40.00	-0.71			peak
2!	34.1561	49.52	-10.40	39.12	40.00	-0.88			peak
3	52.5753	41.05	-20.90	20.15	40.00	-19.85			peak
4	139.8508	41.33	-16.50	24.83	40.00	-15.17			peak
5	360.4476	34.87	-14.05	20.82	47.00	-26.18			peak
6	972.3374	25.33	-5.95	19.38	47.00	-27.62			peak

Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit  
 Factor=Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Polarization:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	32.0667	34.32	-8.77	25.55	40.00	-14.45			peak
2	37.6798	32.82	-13.05	19.77	40.00	-20.23			peak
3	54.6430	38.91	-21.14	17.77	40.00	-22.23			peak
4	125.0066	28.33	-16.50	11.83	40.00	-28.17			peak
5	490.7447	26.03	-11.43	14.60	47.00	-32.40			peak
6	866.0880	25.97	-6.83	19.14	47.00	-27.86			peak

Remark: Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit  
 Factor=Ant. Factor + Cable Loss – Pre-amplifier

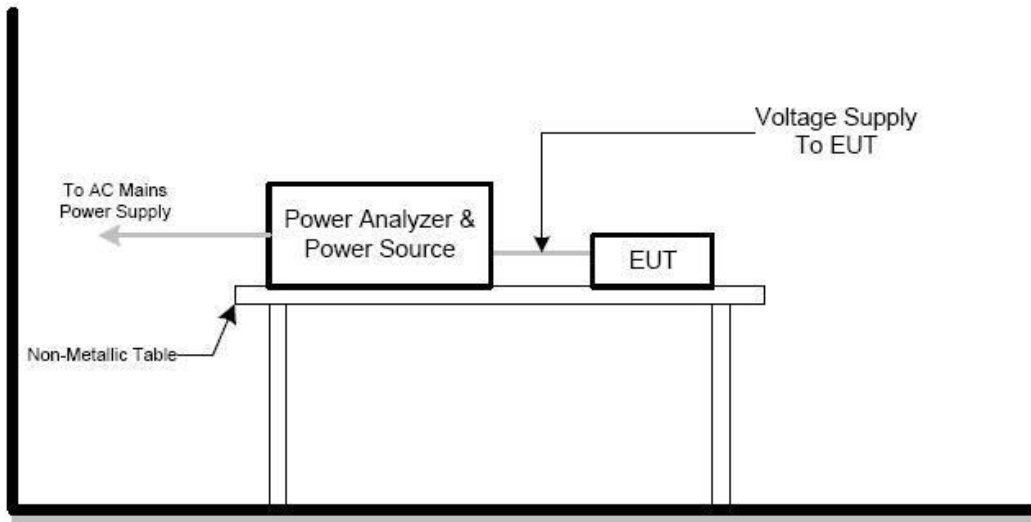
## 6HARMONICS CURRENT

### 6.1 HARMONICS CURRENT LIMIT

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15 ≤ n ≤ 39	0.15 · 15/n		15 ≤ n ≤ 39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
4	0.43	4	0.15		
8	0.30	DC	0.05		
8 ≤ n ≤ 40	0.23 · 8/n				

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A)	(mA/w)
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13 ≤ n ≤ 39	see Table I	3.85/n
only odd harmonics required					

## 6.2 TEST SETUP



## 6.3 TEST PROCEDURE

1. 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 normal operating conditions.
2. 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. 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 600W of the following types: Personal computers and personal computer monitors and television receivers.
3. The correspondent test program of test instrument to measure the current harmonic emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

## 6.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.



6.5 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

E. U. T. Result

Harmonic(s) > 200%: Order (n):	None
Harmonic(s) with average > 90%: Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min: Order (n):	None

Power Source Result

First dataset out of limit: DS (time):	None
Harmonic(s) out of limit: Order (n):	None

Average harmonic current results				
Hn	I <sub>eff</sub> [A]	I <sub>eff</sub> [%]	Limit [A]	Result
1	32.497E-3	100.000		
2	1.299E-3	3.998	972.00E-3	PASS
3	30.692E-3	94.445	2.07	PASS
4	1.816E-3	5.588	387.00E-3	PASS
5	29.329E-3	90.253	1.03	PASS
6	1.292E-3	3.977	270.00E-3	PASS
7	27.576E-3	84.858	693.00E-3	PASS
8	952.234E-6	2.930	207.00E-3	PASS
9	25.431E-3	78.258	360.00E-3	PASS
10	896.645E-6	2.759	165.60E-3	PASS
11	22.984E-3	70.728	297.00E-3	PASS
12	936.627E-6	2.882	138.00E-3	PASS
13	20.328E-3	62.555	189.00E-3	PASS
14	811.926E-6	2.498	118.29E-3	PASS
15	17.540E-3	53.975	135.00E-3	PASS
16	726.776E-6	2.236	103.50E-3	PASS
17	14.732E-3	45.335	119.11E-3	PASS
18	1.012E-3	3.114	92.00E-3	PASS
19	12.030E-3	37.019	106.58E-3	PASS
20	705.497E-6	2.171	82.80E-3	PASS
21	9.547E-3	29.379	96.43E-3	PASS
22	909.232E-6	2.798	75.28E-3	PASS
23	7.371E-3	22.682	88.05E-3	PASS
24	643.431E-6	1.980	68.99E-3	PASS
25	5.613E-3	17.273	81.00E-3	PASS
26	621.366E-6	1.912	63.69E-3	PASS
27	4.388E-3	13.504	75.00E-3	PASS
28	604.813E-6	1.861	59.14E-3	PASS
29	3.655E-3	11.249	69.83E-3	PASS
30	599.997E-6	1.846	55.20E-3	PASS
31	3.365E-3	10.356	65.32E-3	PASS
32	584.959E-6	1.800	51.75E-3	PASS
33	3.240E-3	9.969	61.36E-3	PASS
34	589.753E-6	1.815	48.71E-3	PASS
35	3.154E-3	9.706	57.86E-3	PASS
36	745.584E-6	2.294	46.00E-3	PASS
37	3.004E-3	9.245	54.73E-3	PASS
38	602.293E-6	1.853	43.58E-3	PASS
39	2.738E-3	8.426	51.92E-3	PASS
40	712.286E-6	2.192	41.40E-3	PASS

Maximum harmonic current results				
Hn	I <sub>eff</sub> [A]	I <sub>eff</sub> [%]	Limit [A]	Result
1	32.829E-3	100.000		
2	2.053E-3	6.254	2.16	PASS
3	31.136E-3	94.843	4.60	PASS
4	3.390E-3	10.327	860.00E-3	PASS
5	30.083E-3	91.635	2.28	PASS
6	1.778E-3	5.417	600.00E-3	PASS
7	28.240E-3	86.020	1.54	PASS
8	1.451E-3	4.420	460.00E-3	PASS
9	26.091E-3	79.475	800.00E-3	PASS
10	1.393E-3	4.243	368.00E-3	PASS
11	23.548E-3	71.730	660.00E-3	PASS
12	1.215E-3	3.700	306.66E-3	PASS
13	20.749E-3	63.203	420.00E-3	PASS
14	1.094E-3	3.331	262.86E-3	PASS
15	17.851E-3	54.375	300.00E-3	PASS
16	1.036E-3	3.155	230.00E-3	PASS
17	14.934E-3	45.489	264.70E-3	PASS
18	1.292E-3	3.937	204.44E-3	PASS
19	12.201E-3	37.165	236.84E-3	PASS
20	967.940E-6	2.948	184.00E-3	PASS
21	9.662E-3	29.430	214.28E-3	PASS
22	1.174E-3	3.576	167.28E-3	PASS
23	7.515E-3	22.891	195.66E-3	PASS
24	884.520E-6	2.694	153.32E-3	PASS
25	5.762E-3	17.550	180.00E-3	PASS
26	844.765E-6	2.573	141.54E-3	PASS
27	4.499E-3	13.705	166.66E-3	PASS
28	782.868E-6	2.385	131.42E-3	PASS
29	3.756E-3	11.440	155.18E-3	PASS
30	750.699E-6	2.287	122.66E-3	PASS
31	3.476E-3	10.588	145.16E-3	PASS
32	759.436E-6	2.313	115.00E-3	PASS
33	3.429E-3	10.446	136.36E-3	PASS
34	766.301E-6	2.334	108.24E-3	PASS
35	3.396E-3	10.345	128.58E-3	PASS
36	980.017E-6	2.985	102.22E-3	PASS
37	3.248E-3	9.893	121.62E-3	PASS
38	796.979E-6	2.428	96.84E-3	PASS
39	2.981E-3	9.081	115.38E-3	PASS
40	957.699E-6	2.917	92.00E-3	PASS

Maximum harmonic voltage results				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.38	100.599		
2	73.71E-3	0.032	0.2	PASS
3	118.14E-3	0.051	0.9	PASS
4	17.60E-3	0.008	0.2	PASS
5	39.89E-3	0.017	0.4	PASS
6	15.11E-3	0.007	0.2	PASS
7	46.20E-3	0.020	0.3	PASS
8	14.51E-3	0.006	0.2	PASS
9	41.06E-3	0.018	0.2	PASS
10	11.32E-3	0.005	0.2	PASS
11	44.90E-3	0.020	0.1	PASS
12	10.67E-3	0.005	0.1	PASS
13	40.80E-3	0.018	0.1	PASS
14	9.95E-3	0.004	0.1	PASS
15	37.21E-3	0.016	0.1	PASS
16	10.53E-3	0.005	0.1	PASS
17	34.50E-3	0.015	0.1	PASS
18	10.00E-3	0.004	0.1	PASS
19	21.94E-3	0.010	0.1	PASS
20	11.21E-3	0.005	0.1	PASS
21	45.11E-3	0.020	0.1	PASS
22	9.99E-3	0.004	0.1	PASS
23	20.80E-3	0.009	0.1	PASS
24	14.25E-3	0.006	0.1	PASS
25	18.43E-3	0.008	0.1	PASS
26	10.98E-3	0.005	0.1	PASS
27	21.66E-3	0.009	0.1	PASS
28	11.93E-3	0.005	0.1	PASS
29	40.50E-3	0.018	0.1	PASS
30	10.68E-3	0.005	0.1	PASS
31	19.94E-3	0.009	0.1	PASS
32	10.30E-3	0.004	0.1	PASS
33	17.33E-3	0.008	0.1	PASS
34	10.45E-3	0.005	0.1	PASS
35	18.79E-3	0.008	0.1	PASS
36	10.45E-3	0.005	0.1	PASS
37	28.09E-3	0.012	0.1	PASS
38	9.74E-3	0.004	0.1	PASS
39	24.44E-3	0.011	0.1	PASS
40	12.46E-3	0.005	0.1	PASS

Harmonic current results - DS: 22				
Hn	I <sub>eff</sub> [A]	I <sub>eff</sub> [%]	Limit [A]	Result
1	32.561E-3	100.000		
2	1.407E-3	4.323	1.08	PASS
3	30.902E-3	94.905	2.30	PASS
4	2.826E-3	8.680	430.00E-3	PASS
5	30.071E-3	92.353	1.14	PASS
6	1.277E-3	3.922	300.00E-3	PASS
7	28.178E-3	86.539	770.00E-3	PASS
8	1.004E-3	3.082	230.00E-3	PASS
9	26.049E-3	80.001	400.00E-3	PASS
10	900.316E-6	2.765	184.00E-3	PASS
11	23.490E-3	72.140	330.00E-3	PASS
12	915.808E-6	2.813	153.33E-3	PASS
13	20.748E-3	63.720	210.00E-3	PASS
14	793.970E-6	2.438	131.43E-3	PASS
15	17.851E-3	54.822	150.00E-3	PASS
16	745.497E-6	2.290	115.00E-3	PASS
17	14.902E-3	45.765	132.35E-3	PASS
18	1.193E-3	3.663	102.22E-3	PASS
19	12.094E-3	37.143	118.42E-3	PASS
20	693.706E-6	2.130	92.00E-3	PASS
21	9.510E-3	29.206	107.14E-3	PASS
22	1.132E-3	3.477	83.64E-3	PASS
23	7.315E-3	22.465	97.83E-3	PASS
24	668.640E-6	2.053	76.66E-3	PASS
25	5.512E-3	16.928	90.00E-3	PASS
26	662.294E-6	2.034	70.77E-3	PASS
27	4.305E-3	13.222	83.33E-3	PASS
28	649.062E-6	1.993	65.71E-3	PASS
29	3.618E-3	11.112	77.59E-3	PASS
30	632.252E-6	1.942	61.33E-3	PASS
31	3.444E-3	10.577	72.58E-3	PASS
32	608.284E-6	1.868	57.50E-3	PASS
33	3.323E-3	10.206	68.18E-3	PASS
34	573.288E-6	1.761	54.12E-3	PASS
35	3.273E-3	10.052	64.29E-3	PASS
36	928.190E-6	2.851	51.11E-3	PASS
37	3.171E-3	9.738	60.81E-3	PASS
38	606.135E-6	1.862	48.42E-3	PASS
39	2.797E-3	8.589	57.69E-3	PASS
40	916.792E-6	2.816	46.00E-3	PASS

Caution: Results related to the 100% limit values

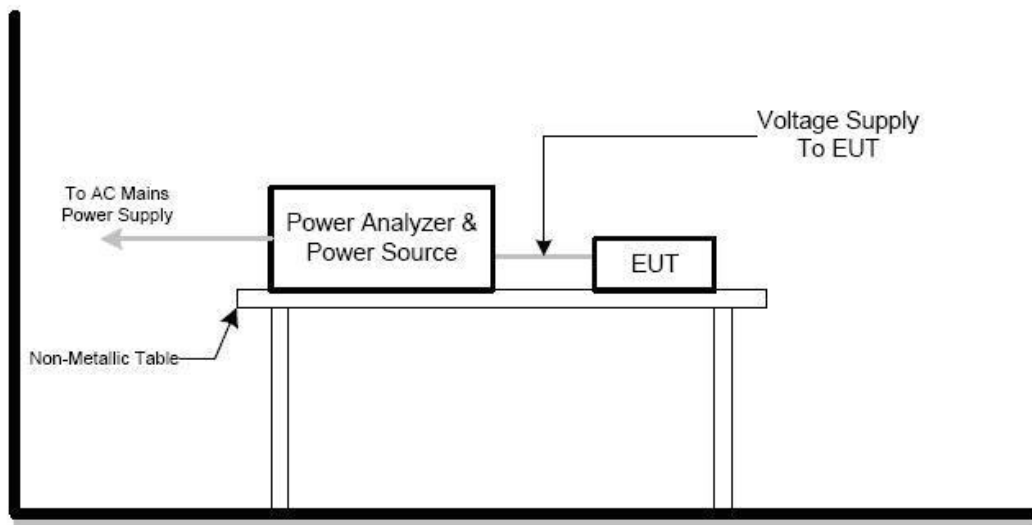
Harmonic voltage results - DS: 22				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.37	100.594		
2	56.61E-3	0.025	0.2	PASS
3	98.20E-3	0.043	0.9	PASS
4	6.66E-3	0.003	0.2	PASS
5	35.37E-3	0.015	0.4	PASS
6	6.01E-3	0.003	0.2	PASS
7	38.57E-3	0.017	0.3	PASS
8	599.76E-6	0.000	0.2	PASS
9	32.03E-3	0.014	0.2	PASS
10	9.29E-3	0.004	0.2	PASS
11	30.48E-3	0.013	0.1	PASS
12	4.31E-3	0.002	0.1	PASS
13	34.38E-3	0.015	0.1	PASS
14	3.40E-3	0.001	0.1	PASS
15	30.32E-3	0.013	0.1	PASS
16	2.68E-3	0.001	0.1	PASS
17	30.97E-3	0.013	0.1	PASS
18	5.19E-3	0.002	0.1	PASS
19	11.73E-3	0.005	0.1	PASS
20	8.01E-3	0.003	0.1	PASS
21	41.84E-3	0.018	0.1	PASS
22	3.10E-3	0.001	0.1	PASS
23	11.97E-3	0.005	0.1	PASS
24	2.73E-3	0.001	0.1	PASS
25	13.32E-3	0.006	0.1	PASS
26	4.32E-3	0.002	0.1	PASS
27	10.01E-3	0.004	0.1	PASS
28	4.48E-3	0.002	0.1	PASS
29	33.31E-3	0.014	0.1	PASS
30	2.35E-3	0.001	0.1	PASS
31	13.06E-3	0.006	0.1	PASS
32	5.47E-3	0.002	0.1	PASS
33	16.34E-3	0.007	0.1	PASS
34	2.67E-3	0.001	0.1	PASS
35	16.24E-3	0.007	0.1	PASS
36	1.18E-3	0.001	0.1	PASS
37	22.01E-3	0.010	0.1	PASS
38	4.85E-3	0.002	0.1	PASS
39	14.27E-3	0.006	0.1	PASS
40	4.35E-3	0.002	0.1	PASS

## 7 VOLTAGE FLUCTUATION AND FLICKERS

### 7.1 VOLTAGE FLUCTUATION AND FLICKERS LIMIT

Tests	Measurement Value	Limit	Descriptions
	IEC555-3	IEC/EN 61000-3-3	
Pst	$\leq 1.0, T_p= 10 \text{ min.}$	$\leq 1.0, T_p= 10 \text{ min.}$	Short Term Flicker Indicator
Plt	N/A	$\leq 0.65, T_p=2 \text{ hr.}$	Long Term Flicker Indicator
Tdt(s)	$\leq 3\%$	$\leq 3.3\%$	Relative Steady-State V-Chang
dmax(%)	$\leq 4\%$	$\leq 4\%$	Maximum Relative V-Chang
dc(%)	N/A	$\leq 3.3\%$ for $> 500 \text{ ms}$	Relative V-change Characteristic

### 7.2 TEST SETUP



### 7.3 TEST PROCEDURE

1. Fluctuation and Flickers Test:

Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

2. All types of voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

### 7.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

7.5TESTRESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Test Parameter	Measurement Value	Limit	Result
Pst	0.028	1.00	Pass
Plt	0.028	0.65	Pass
dc [%]	0.004	3.30	Pass
dmax [%]	0.170	7.00	Pass
dt [s]	0.000	0.50	Pass



## 8EMC IMMUNITY TEST

### 8.1 STANDARD COMPLIANCE/SERVIRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform Criteria
ESD IEC/EN 61000-4-2	8kV air discharge 4kV contact discharge	Direct Mode	B
	4kV HCP discharge 4kV VCP discharge	Indirect Mode	B
RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1000Hz, 80%,AM modulated	Enclosure	A
EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B
	5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B
Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	DC Power Port	A
Power Frequency Magnetic Field IEC/EN 61000-4-8	50 Hz	Enclosure	A
Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 0%	AC Power Port	C
	Voltage dip 30%		C
	Interruption 60%		C

## 8.2 GENERAL PERFORMANCE CRITERIA

According to EN 55014-2 standard, the general performance criteria as following:

<p>Criterion A</p>	<p>The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criterion B</p>	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<p>Criterion C</p>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

## 8.3 EUT OPERATING CONDITIONS

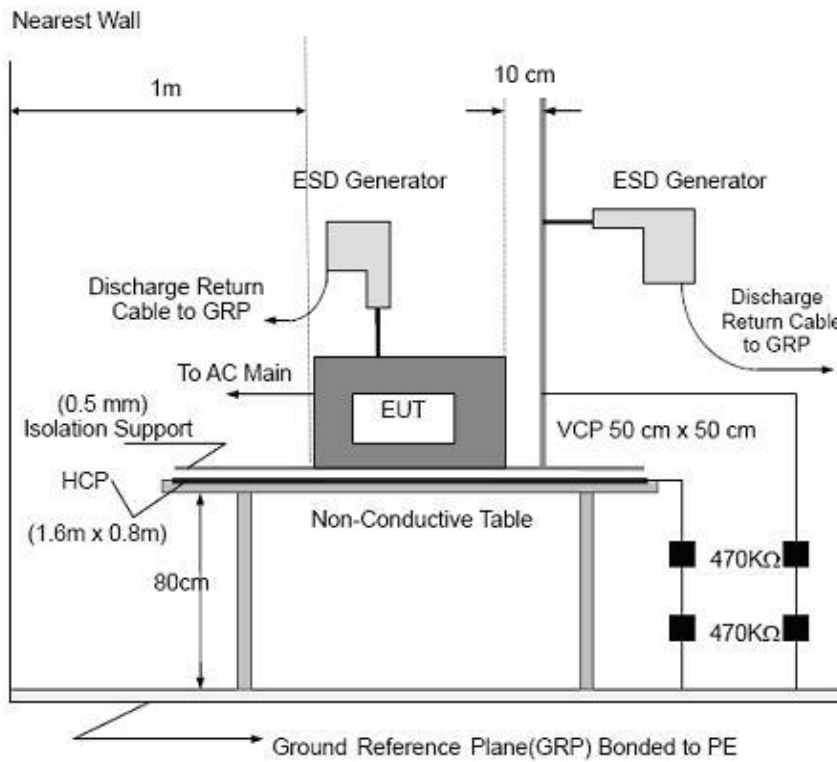
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

## 9 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

### 9.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance:	B
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV (Direct) Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

### 9.2 TEST SETUP



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. 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 IEC /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 0.8-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/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1 meter thickness. The GRP was consisted of a sheet of aluminum that is at least 0.25mm thick, and extended at least 0.5 meters from the EUT on all sides.

## 9.3 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manners:

1. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

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

The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

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

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.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

2. Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

9.4 TEST RESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

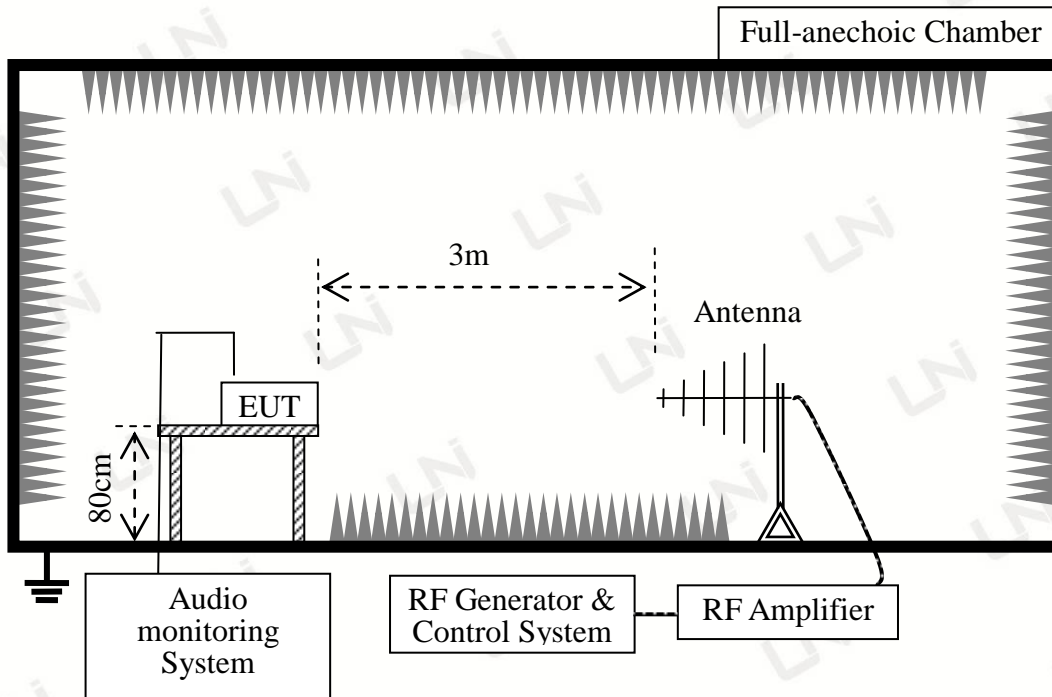
Mode	Air Discharge								Contact Discharge								Perform Criteria	Result
	4		8		10		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
HCP									A	A	A	A					B	PASS
VCP									A	A	A	A						PASS
Slots	A	A	A	A														PASS
Surface	A	A	A	A														PASS

## 10 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

### 10.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range:	80~1000MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

### 10.2 TEST SETUP



Note:

**TABLE-TOP EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC/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/EN 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.

**10.3 TEST PROCEDURE**

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition need as following manners:

- 1.The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz 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 fundamental.
- 2.The dwell time at each frequency shall be not less than the time necessary for theEUT to be able to respond.
- 3.The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

**10.4 TEST RESULT**

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

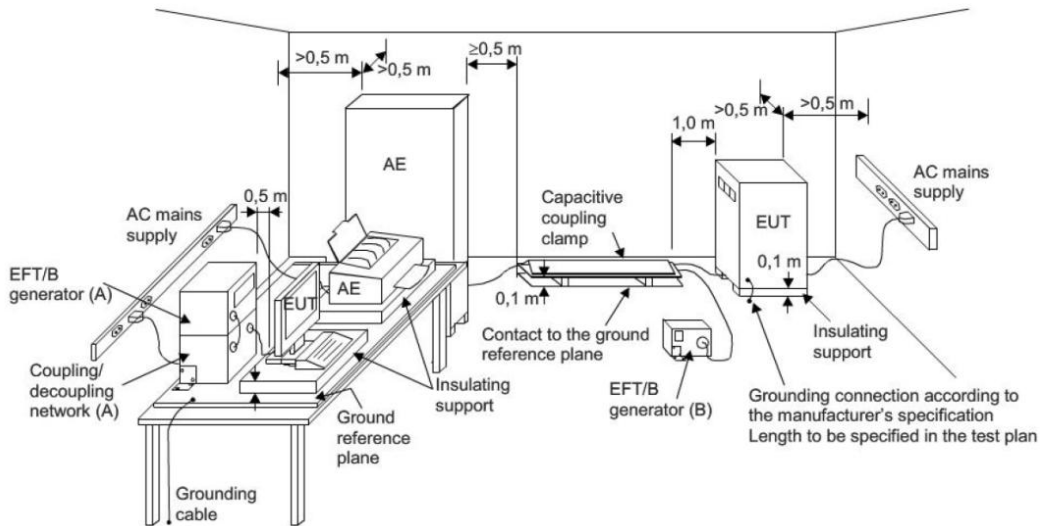
Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform Criteria	Result
80~1000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	PASS
			Rear		
			Left		
			Right		

## 11 ELECTRICAL FAST TRANSIENT IMMUNITY TEST (EFT)

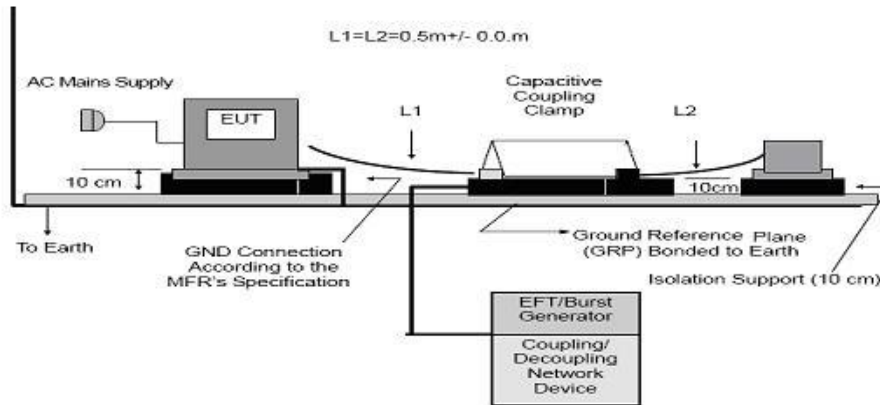
### 11.1 TEST SPECIFICATION

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

### 11.2 TEST SETUP







Note:

### TABLE-TOP EQUIPMENT

Table-top equipment and equipment normally mounted on ceilings or walls as well as built-in equipment shall be tested with the EUT located  $(0.1 \pm 0.01)$  m above the ground reference plane.

Testing of large table-top equipment or multiple systems can be performed on the floor; maintaining the same distances as for the test setup of table-top equipment.

The test generator and the coupling/decoupling network shall be bonded to the ground reference plane.

The ground reference plane shall be a metallic sheet (copper or aluminium) of 0.25 mm minimum thickness; other metallic materials may be used, but they shall have at least 0.65 mm minimum thickness.

The minimum size of the ground reference plane is 0.8 m x 1 m. The actual size depends on the dimensions of the EUT.

The ground reference plane shall project beyond the EUT by at least 0.1 m on all sides.

The ground reference plane shall be connected to protective earth (PE) for safety reasons.

The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications.

The minimum distance between the EUT and all other conductive structures (including the generator, AE and the walls of a shielded room), except the ground reference plane, shall be more than 0.5 m.

All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane.

Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.

The EUT shall be connected to the earthing system in accordance with the manufacturer's installation specifications; no additional earthing connections are allowed.

The connection impedance of the coupling/decoupling network earth cables to the ground reference plane and all bondings shall provide a low inductance.

Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages. The test voltages shall be coupled to all of the EUT ports in turn including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.

## FLOOR-STANDING EQUIPMENT

When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces (including the generator), except the ground reference plane beneath the coupling clamp and beneath the EUT, shall be at least 0.5m.

The distance between any coupling devices and the EUT shall be (0.5 - 0/+0.1) m for tabletop equipment testing, and (1.0±0.1) m for floor standing equipment, unless otherwise specified in product standards. When it is not physically possible to apply the distances mentioned above, other distances can be used and shall be recorded in the test report.

The cable between the EUT and the coupling device, if detachable, shall be as short as possible to comply with the requirements of this clause. If the manufacturer provides a cable exceeding the distance between the coupling device and the point of entry of the EUT, the excess length of this cable shall be bundled and situated at a distance of 0.1 m above the ground reference plane. When a capacitive clamp is used as a coupling device, the excess cable length shall be bundled at the AE side.

Parts of the EUT with interconnecting cables of a length less than 3 m, which are not tested, shall be placed on the insulating support. The parts of the EUT shall have a distance of 0.5 m between them. Excess cable length shall be bundled.

### 11.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter±0.1 meter above a metal ground plane measured 1m\*1m min.

The ground reference plane shall be a metallic sheet (copper or aluminium) of 0.25 mm minimum thickness; other metallic materials may be used, but they shall have at least 0.65 mm minimum thickness.

The other condition need as following manners:

1. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
2. Both positive and negative polarity discharges were applied.
3. The duration time of each test sequential was 2 minute.

11.4 TEST RESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

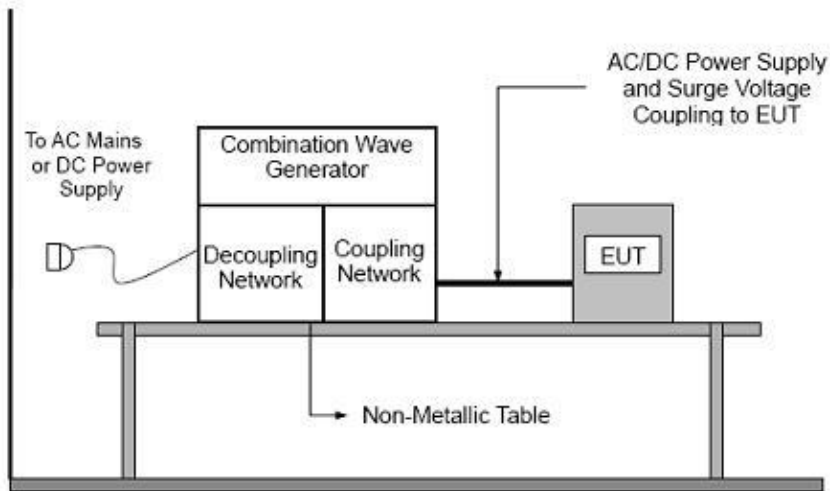
Coupling Line		Test level (kV)								Perform Criteria	Result
		0.5		1		2		4			
		+	-	+	-	+	-	+	-		
AC line	L	A	A	A	A					B	PASS
	N	A	A	A	A						PASS
	PE										
	L+N	A	A	A	A						PASS
	L+PE										
	N+PE										
	L+N+PE										
DC Line											
Signal Line											

## 12SURGE IMMUNITY TEST (SURGE)

### 12.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance:	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Line: 0.5 kV, 1 kV, 2 kV
Surge Input/Output:	L-N, L-PE, N-PE
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

### 12.2 TEST SETUP



### 12.3 TEST PROCEDURE

1. For EUT power supply:

The surge is to be 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 shall be 2meters in length (or shorter).

2. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

3. The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

### 12.4 TEST RESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

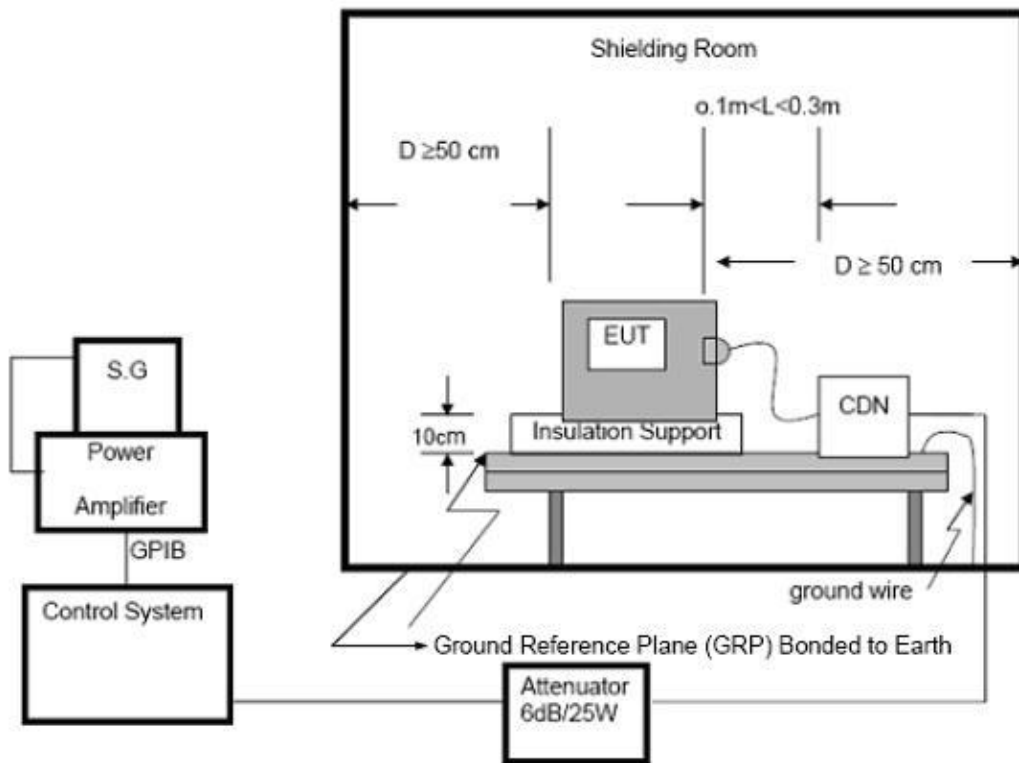
Coupling Line			Test level								Perform Criteria	Result	
			0.5 kV		1 kV		2 kV		4 kV				
			+	-	+	-	+	-	+	-			
AC line	L-N	0°	A	A	A	A					B	PASS	
		90°	A	A	A	A							
		180°	A	A	A	A							
		270°	A	A	A	A							
	L-PE	0°											
		90°											
		180°											
		270°											
	N-PE	0°											
		90°											
		180°											
		270°											
DC Line													
Signal Line													

### 13 CONDUCTED RADIO FREQUENCY DISTURBANCES IMMUNITY TEST (CS)

#### 13.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance:	A
Frequency Range:	0.15~80MHz
Field Strength:	3V(rms)
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

#### 13.2 TEST SETUP



Note:

#### 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.

### 13.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter&0.1 meter above a metal ground plane measured 1m\*1m min.

The other condition need as following manners:

- 1.The EUT shall be tested within its intended operating and climatic conditions.
- 2.An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- 3.One of the CDNs not used for injection was terminated with 50Ω, providing only one return path. All other CDNs were coupled as decoupling networks.
4. The frequency range is swept 0.15-80MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1% of the preceding frequency value.
5. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
6. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

### 13.4 TEST RESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

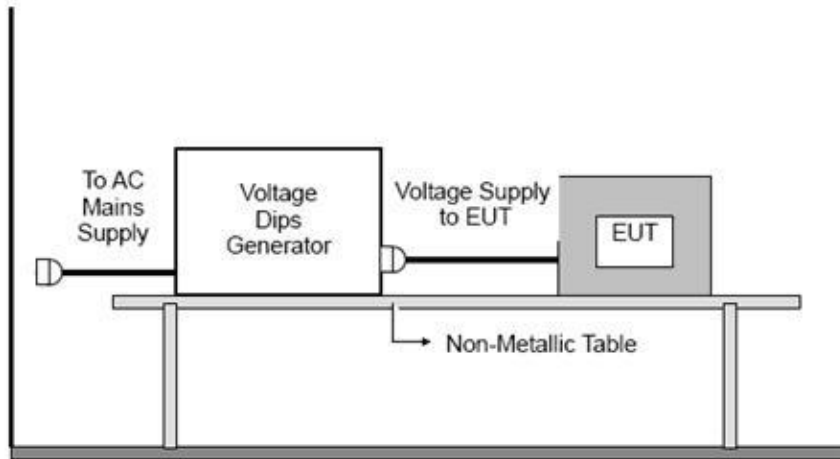
Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Perform Criteria	Result
Input/Output AC. Power Port	0.15~80	3V(rms) AM Modulated 1000Hz, 80%	A	PASS
Input/Output DC. Power Port	0.15~80		N/A	N/A
Signal Line	0.15~80		N/A	N/A

## 14VOLTAGE INTERRUPTION/DIPS IMMUNITY TEST (DIPS)

### 14.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance:	C (For 0% Voltage Dips) C (For 30% Voltage Dips) C (For 60% Voltage Dips)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

### 14.2 TEST SETUP





### 14.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### 14.4 TEST RESULT

Temperature:	22°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Voltage Reduction	Duration (cycle)	Perform Criteria	Result
Voltage dip 100%	0.5	C	PASS
Voltage dip 30%	10	C	PASS
Voltage interruptions	50	C	PASS

15 PHOTO OF EUT



PHOTO 01



PHOTO 02

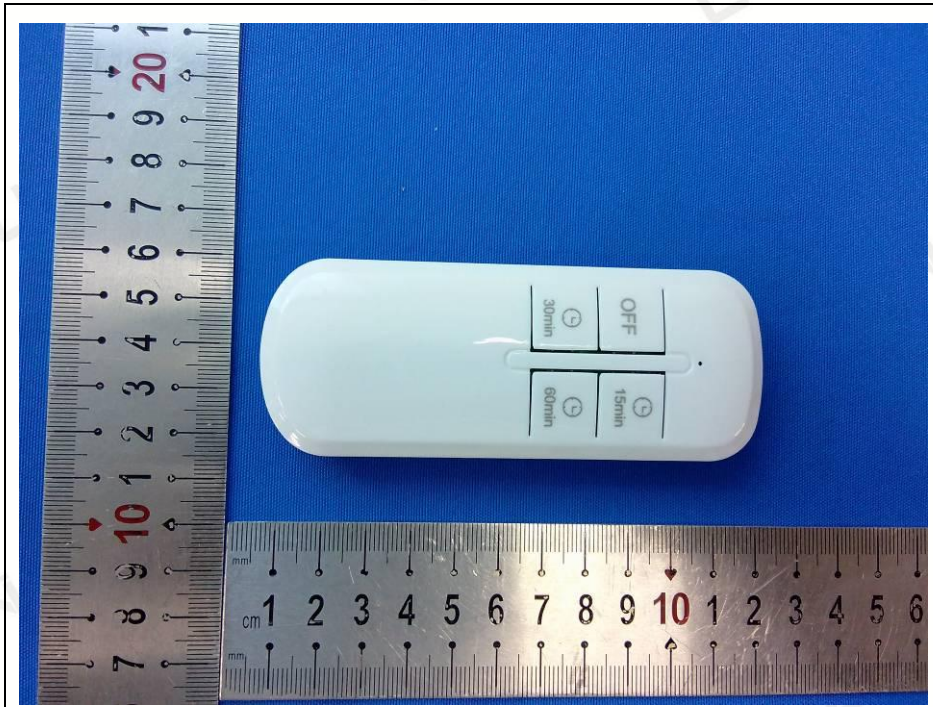


PHOTO 03

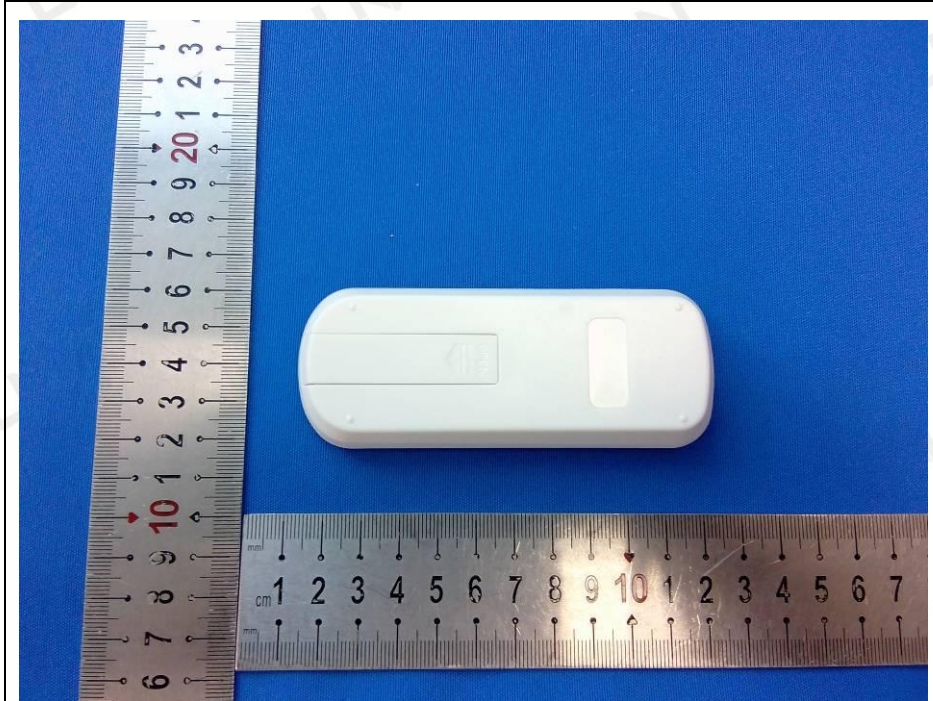


PHOTO 04

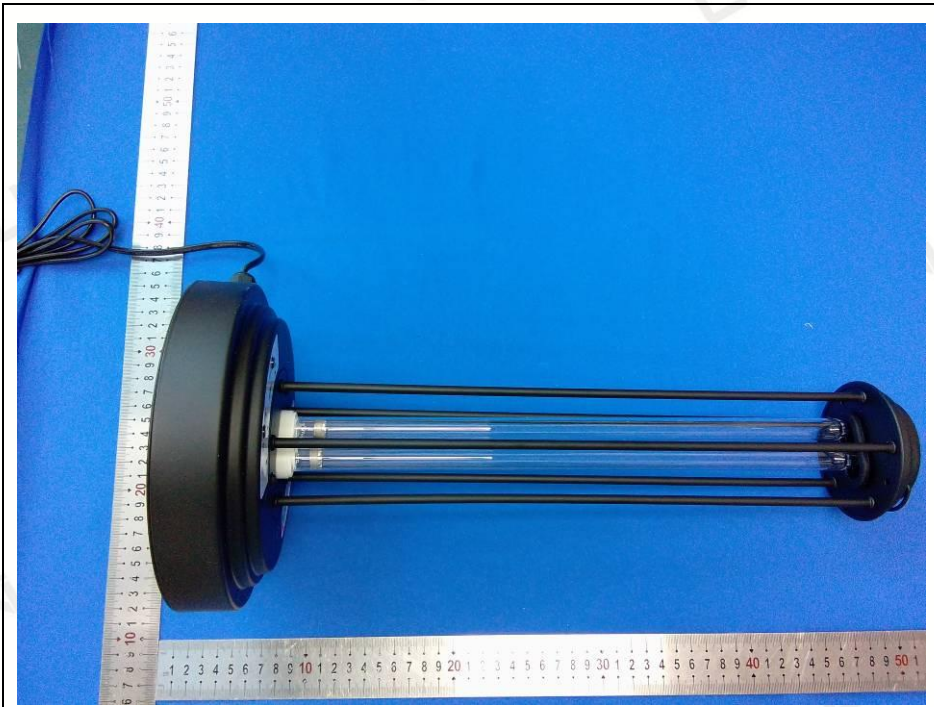


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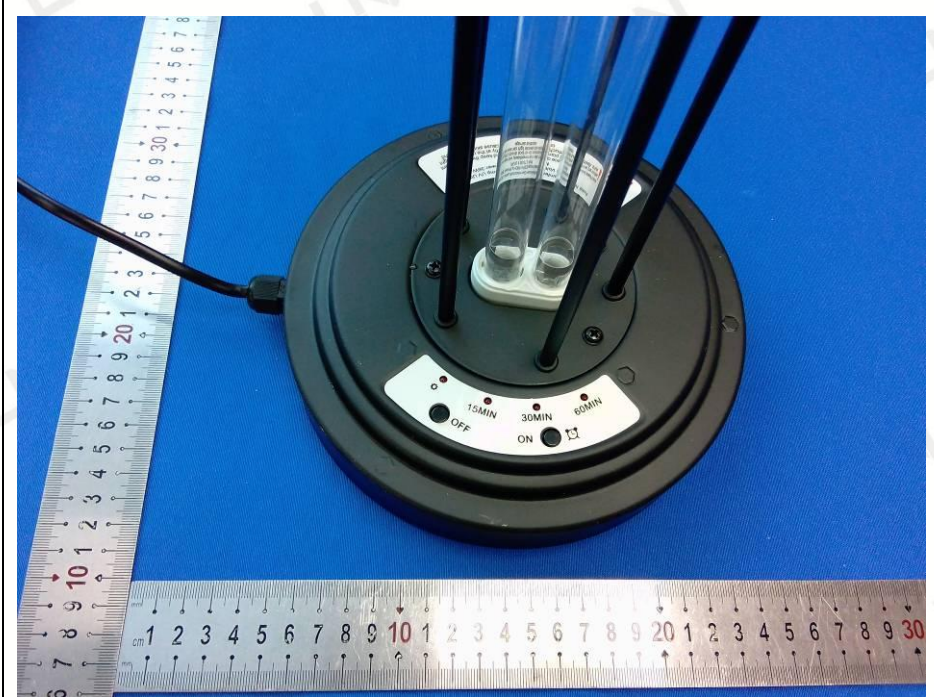


PHOTO 06



PHOTO 07

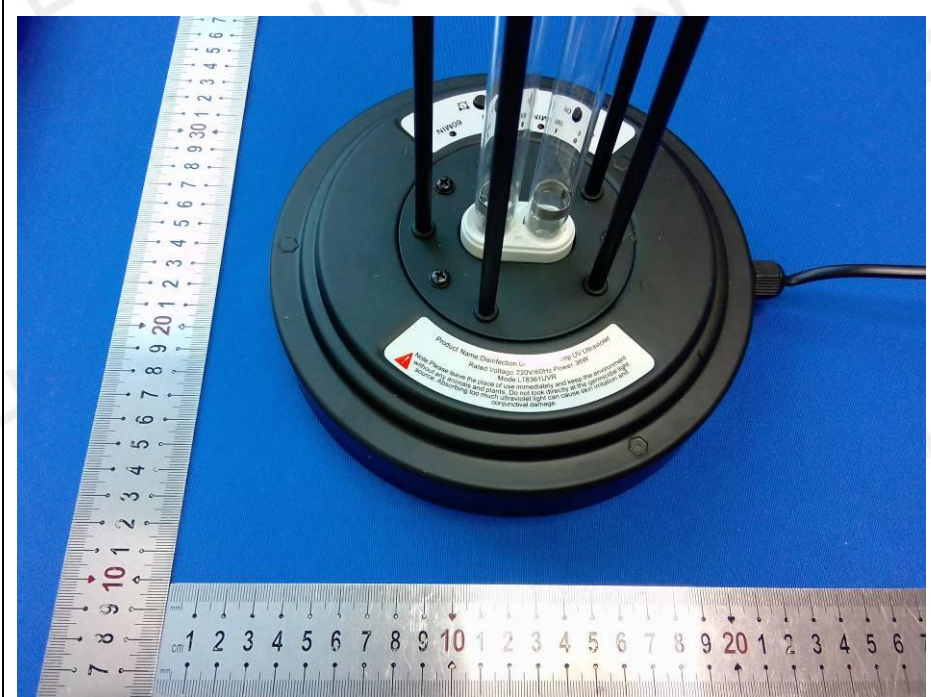


PHOTO 08



PHOTO 09

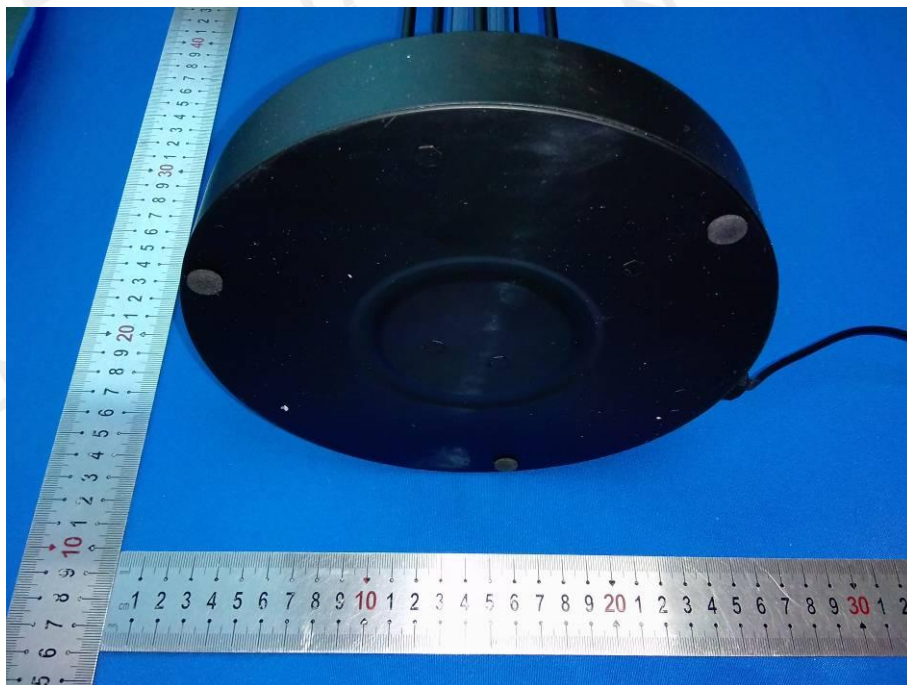


PHOTO 10

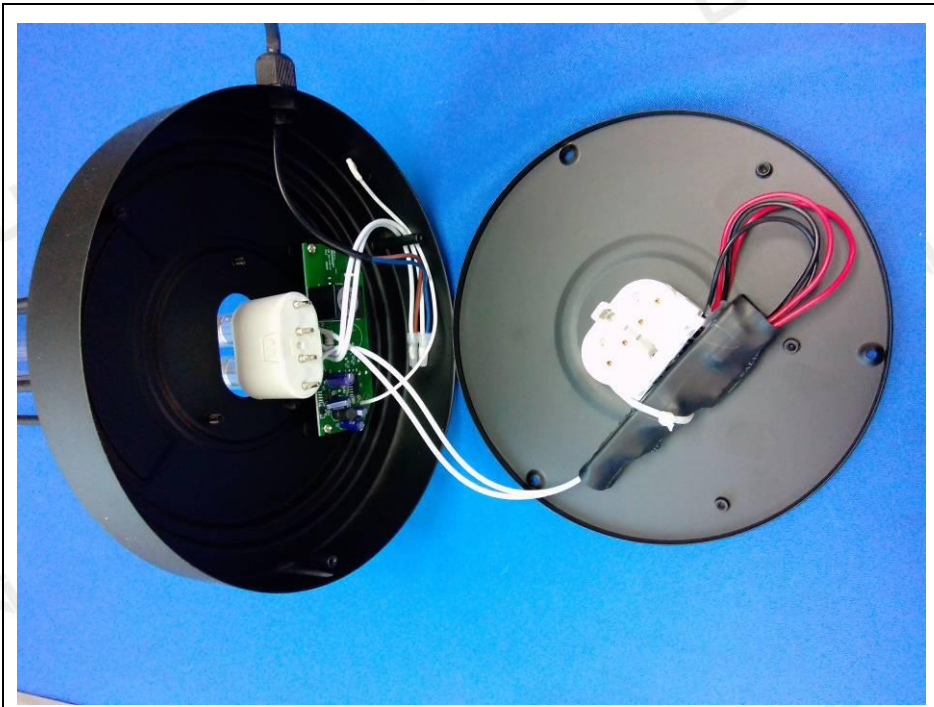


PHOTO 11

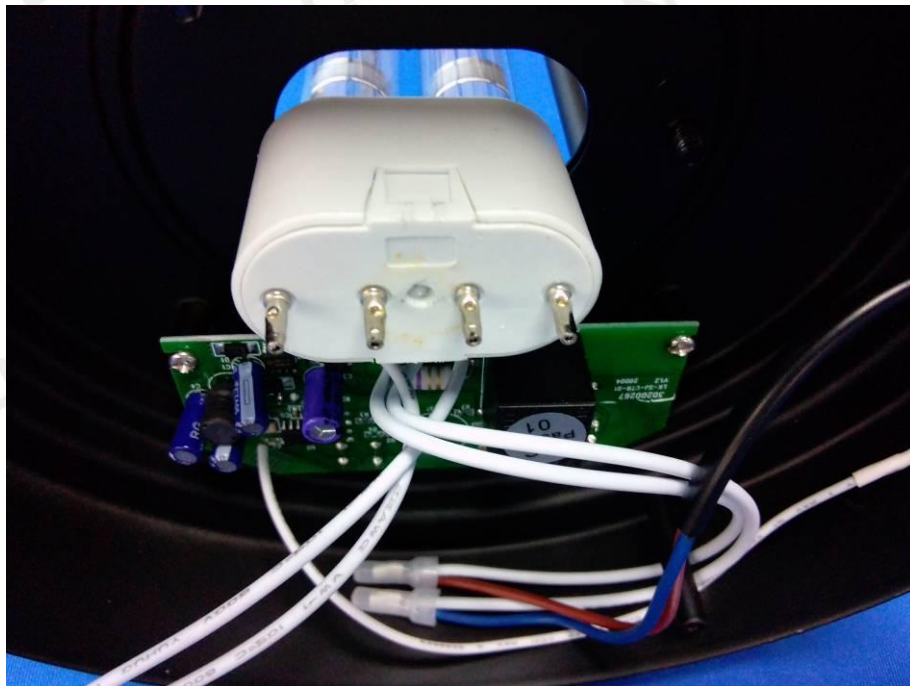


PHOTO 12



PHOTO 13

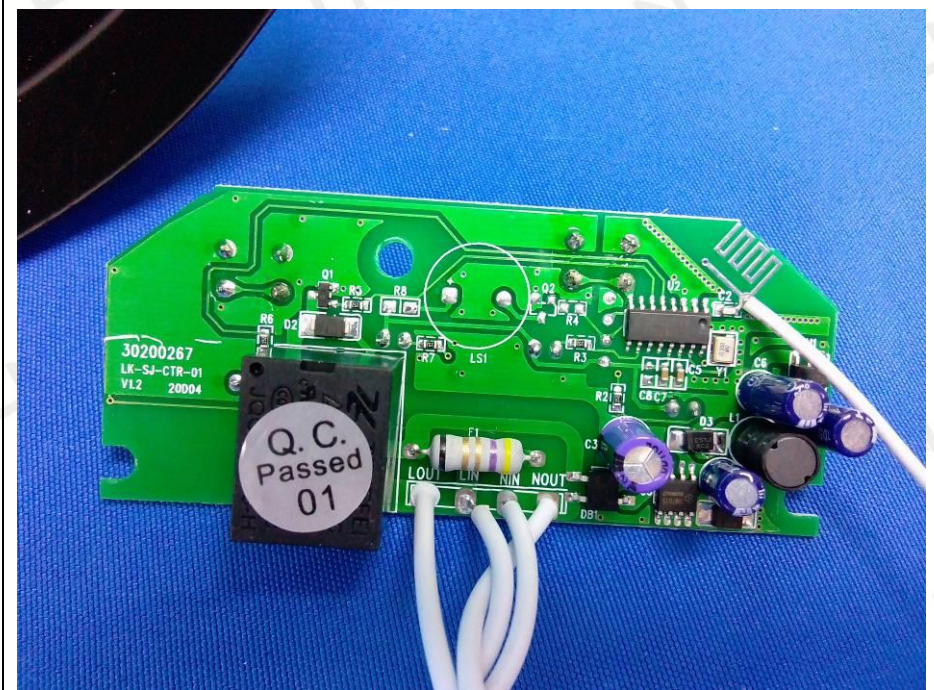


PHOTO 14



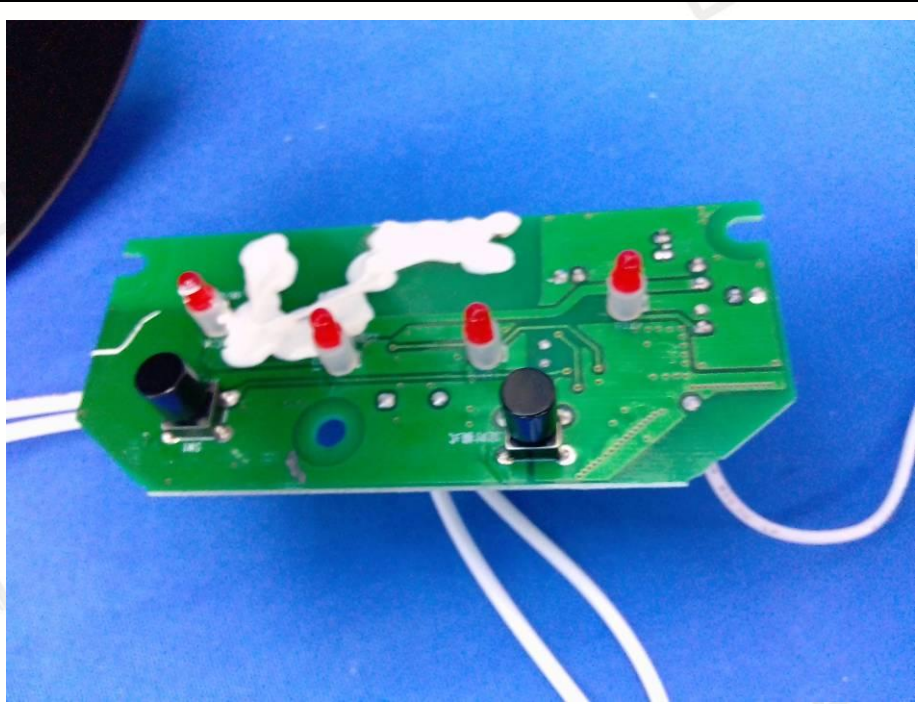


PHOTO 15

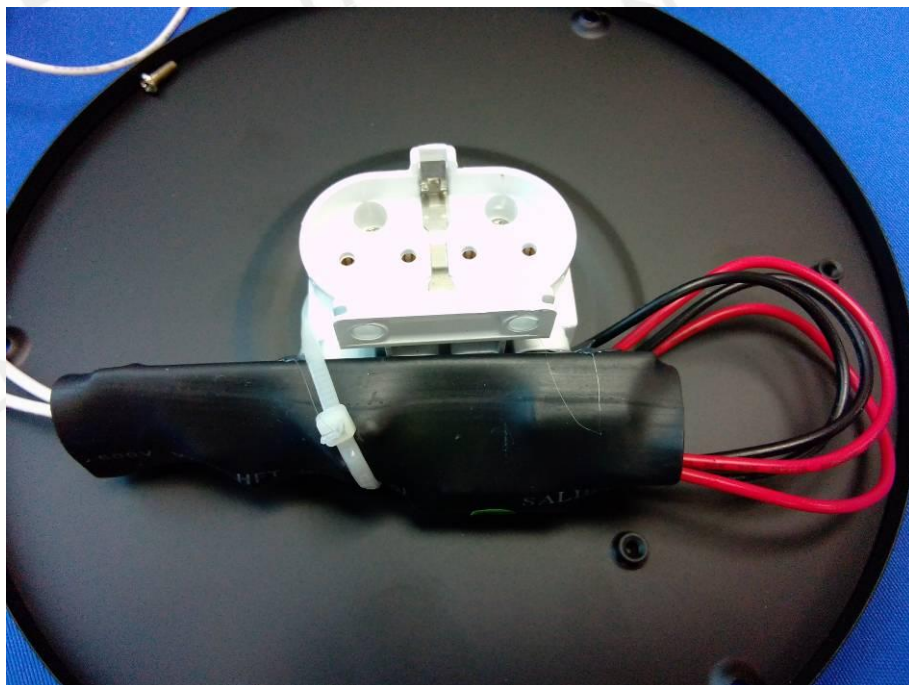


PHOTO 16



PHOTO 17

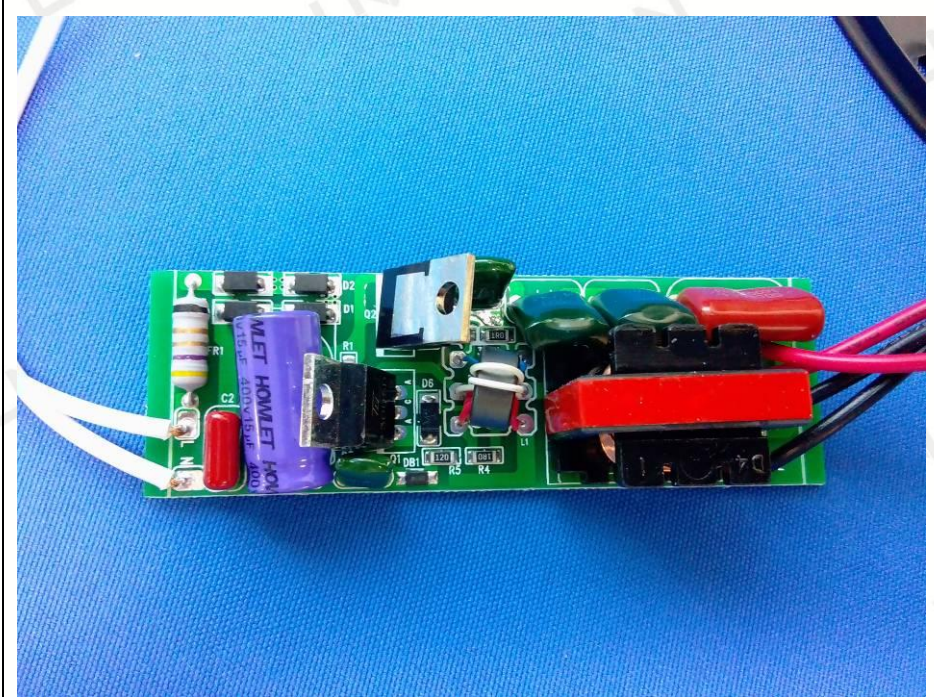
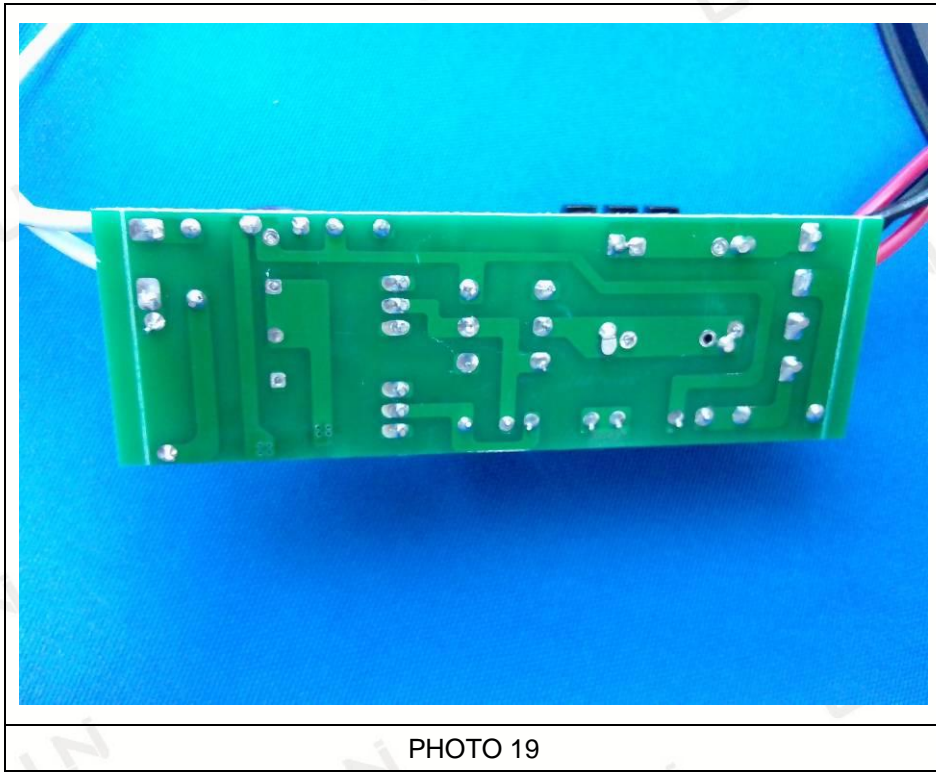


PHOTO 18



16 PHOTO OF TEST

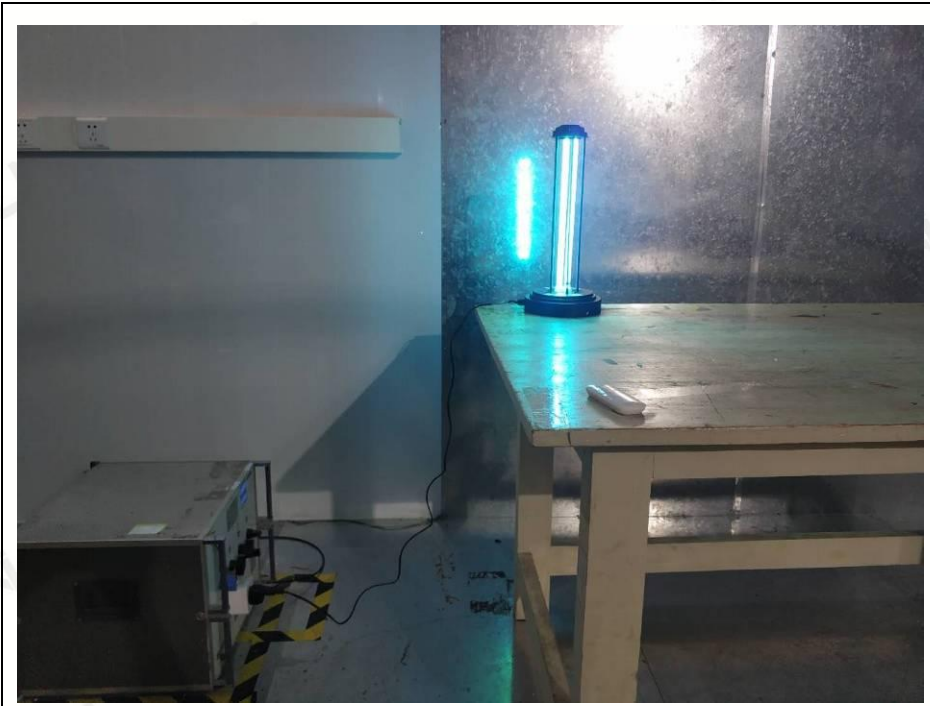
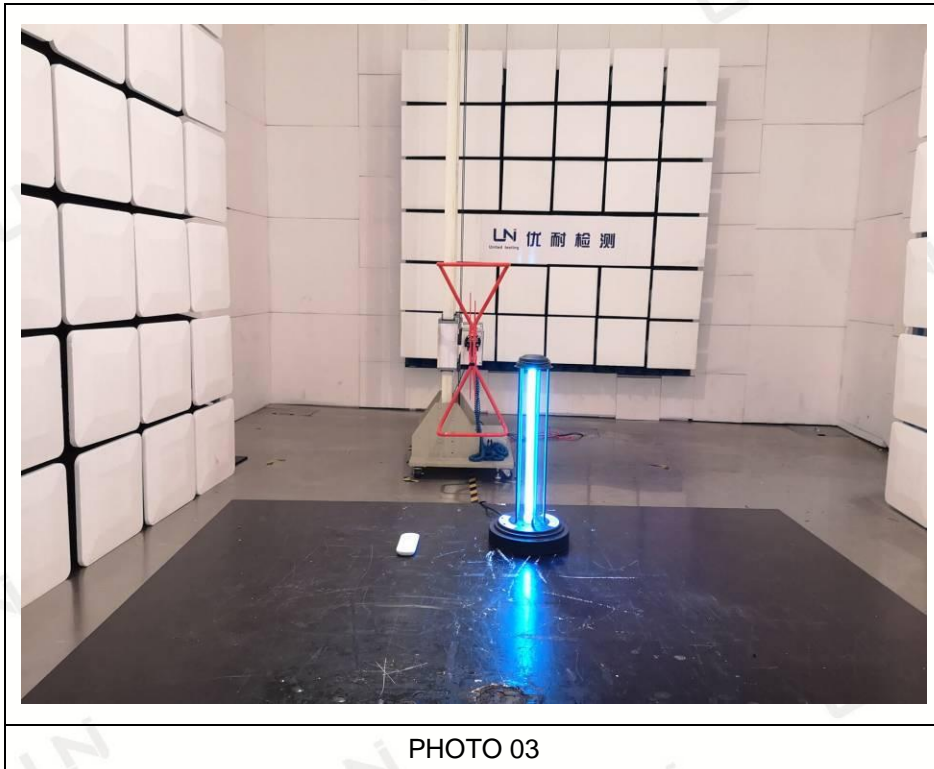


PHOTO 01



PHOTO 02



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